

July 12

15c 1924

# 1-TUBE SET

# WORKS SPEAKER!

# RADIO WORLD

Title Reg. U. S. Pat. Off.

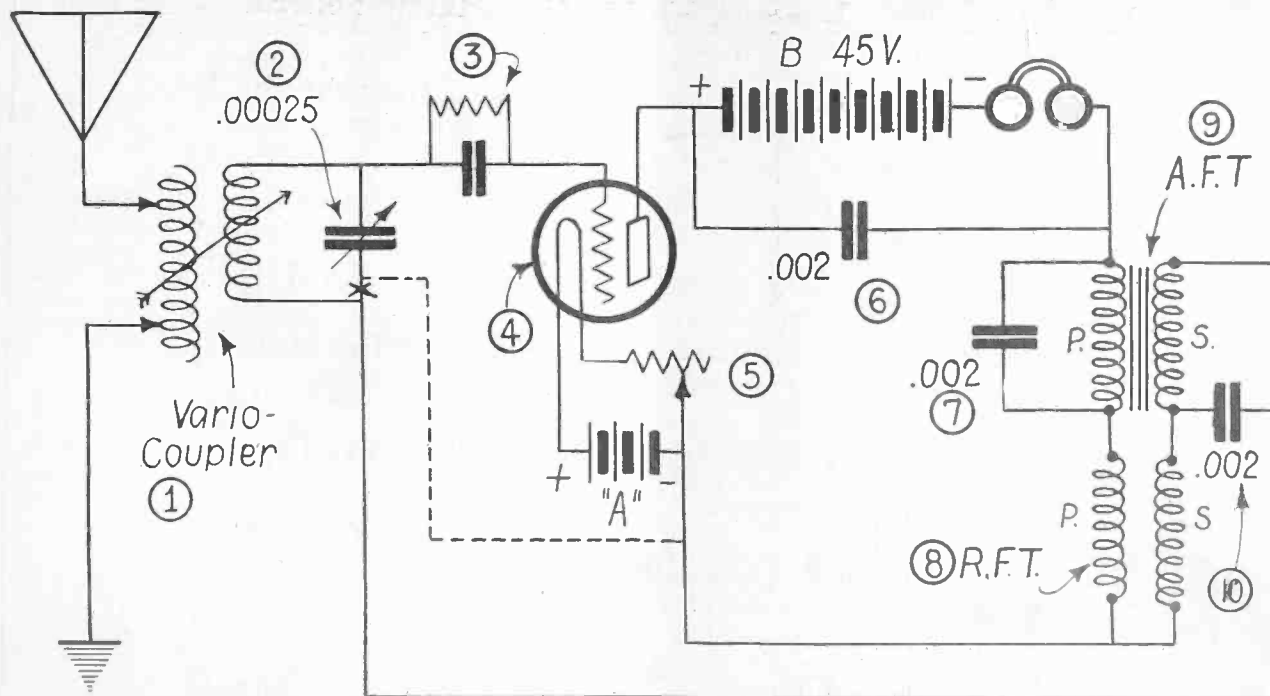
*RF, Detector and AF, all on one tube, accomplished by A. P. Peck, associate member, Institute of Radio Engineers—Locals heard on loud Speaker, DX stations on ear-phones—No crystal detector and no potentiometer employed—Stability of circuit proves satisfactory—Only two controls used,*

135-120

VOL. 5. No. 16.

ILLUSTRATED EVERY WEEK

## WONDER REFLEX—HERE IT IS!



THE ONE-TUBE REFLEX, using the same tube for one stage of radio-frequency amplification, detector and one stage of audio-frequency amplification, as designed by A. P. Peck. The parts used are 1, standard variocoupler; 2, a .00025 variable condenser (23 plates, normally); 3, grid leak and .00025 grid condenser; 4, UV201A tube or equal; 5, rheostat; 6, a .002 fixed condenser; 7, a .002 fixed condenser; 8, standard commercial RF transformer; 9, 4½ to 1 audio-frequency transformer; 10, a .002 fixed condenser. B battery has 45 volts. (See article on page 3.)

## PORTABLE 4-TUBE 'SUPER-HET'

By B. J. BONGART



# RADIO WORLD

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## 1-Tube Set Works a Loud Speaker!

*Peck's Reflex, a new improvement, brings in DX on earphones, but some locals on the horn.  
No crystal and no potentiometer are used.*

By A. P. Peck

Associate, Institute of Radio Engineers

EVER since reflex circuits were brought to the attention of the radio public they have been a subject of absorbing interest to me. Numerous ones have been tried with more or less success. One or two of the best of them have been described by the writer in the pages of this magazine. Most of the reflex circuits are tricky to a degree. The best one of those heretofore described was the one tuber, with tuned radio frequency amplification. The writer tried this circuit and used it for some time, endeavoring to improve its action, but without extraordinary results.

The great problem in successful reflex amplification seems to be to avoid the overloading of the tubes. It is almost impossible to devise a reflex set without being tempted to force the tubes. Sometimes the addition of a potentiometer across the A battery, with the arm connected to the grid return will help some, but even with this assistance the results are often far from perfect.

After trying most of the reflex sets I was just about ready to turn to something simpler when the managing editor of RADIO WORLD made a suggestion somewhat as follows:

"Why not build a reflex set using one tube, but without the usual crystal detector? Make the tube act as the detector, radio-frequency amplifier and audio-frequency amplifier."

No sooner said than back I rushed to my workshop and library. In the library I first started to work on the problem. Out came note books and reference volumes. The note books showed no trace of former experiments along the desired line. All of the one-tube reflex sets that I had jotted down therein made use of a crystal detector.

Then began the hunt through the text books. Most of them touched on the subject of reflex sets only very lightly. At last one came to light that held a glimmer of hope. That book was one devoted to the subject of vacuum tubes and their many uses. It is a well-worn volume that has helped me to solve many troublesome problems. Once more it stepped up and offered me assistance in the form of a fundamental circuit supposed to accomplish the feat. But it called for just eight tuning controls. Four were variable condensers!! But the seed of suggestion was planted, and so to the workbench I started.

First I collected together all of the instruments called for in the diagram in the book and hooked them up as was shown.

After hooking it up with the multitudinous variable condensers and other apparatus, I lit the tube and started to tune. It kept me busy trying to find out

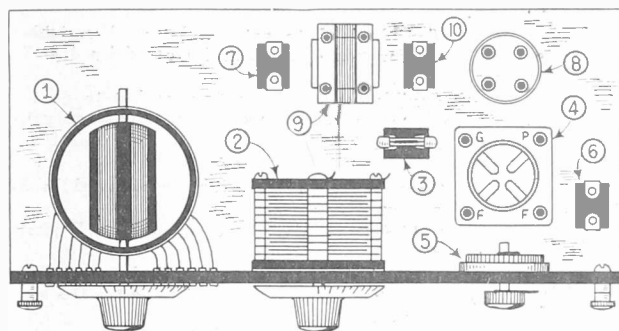


FIG. 2—Assembly plan of Peck's Reflex, the numerical designations coinciding with those on the circuit diagram published on the front cover of this issue, and with the list of parts enumerated on Page 4. Mr. Peck strongly advises that the utmost care be bestowed on the placement of parts, so that there will be no inductive relationship or inter-capacity effects to spoil an excellent circuit. In the set he built, Mr. Peck disposed the parts as shown above and heard the convention, through WEA F, on the loud speaker at his home in a New Jersey suburb of New York City. He used one—yes, only one—tube. The parts are: (1) variocoupler; (2) variable condenser, .00025, normally 23 plates; (3) grid condenser and leak; (4) tube and socket; (5) rheostat; (6) .002 fixed condenser; (7) .002 fixed condenser; (8) radio-frequency transformer; (9) audio-frequency transformer; (10) .002 fixed condenser. The aerial and ground connections are not shown here, nor are the A and B batteries, or phones, for the sake of simplicity. The panel may be 7 inches by 14 inches, with cabinet to match, thus affording plenty of room for the parts, although leads must be kept as short as possible. The short-lead advice is most pertinent in this circuit. Note that the coupler must be tapped to obtain best results in tuning.

what was going on. But the set worked, with a 9-to-1 ratio audio-frequency transformer. Changing to a 4½-to-1, results improved considerably. A strange fact came up here. I tried one low-ratio transformer in perfect condition, but not a peep could I get. Substituting another of like ratio, but of different make, brought in the signals again. So I started to eliminate and substitute apparatus in different parts of the circuit with the object of simplifying the controls and making the set more stable in operation:

Of course the first point of attack was the variable condensers. So many of these in a set are bad from two points of view. They complicate the control and add to the expense of the finished set.

The original circuit called for variable condensers across both windings of the audio-frequency transformer as well as one in shunt with the B battery and the phones. By the process of substitution these three condensers were replaced by fixed condensers which gave good results. The use of the variable condensers in the original circuit helped considerably in the result I was about to achieve, as by their use it was possible to determine very closely the capacity necessary for use when the fixed condensers were substituted.

When the change of condensers had been completed the next point of attack was the tube. Several different ones were tried and it was found that either dry cell or 6-volt tubes gave good results. The main re-

(Concluded on next page)

# RF, Detector and AF in Same Tube!

## Wiring Directions for Peck's Reflex

1. Connect aerial lead or binding post to one switch arm of stator of coupler.
2. Connect other switch arm to ground lead or post.
3. Connect one side of coupler rotor to grid leak and condenser.
4. Connect grid leak and condenser to G post on socket.
5. Connect stationary plates of condenser to same side of coupler rotor as used in 3.
6. Connect other side of rotor to G or S1 post on AFT.
7. Attach flexible lead to rotary plates of variable condenser, for test connection indicated by dotted lines.
8. Attach flexible lead to P post on socket to go to positive B battery. Do not connect battery yet.
9. Connect one side of phones to P or P1 post of AFT.
10. Connect same post of transformer as used in 9 to .002 condenser.
11. Connect other side of fixed condenser to P post on socket.
12. Connect flexible lead to other side of phones. This is to go to the negative B battery post. Do not connect it yet.
13. Connect the two .002 fixed condensers across the AFT windings as shown in the diagram. (Fig. 1.)
14. Connect B+ or P2 post on AFT to P post on RFT.
15. Connect A- or S2 post on AFT to G post on RFT.
16. Connect the two remaining posts on the RFT together.
17. Run connection 16 to the arm post on the rheostat.
18. Connect filament circuit as follows: (a) Positive A battery to A+ post on socket. (b) Negative A battery to arm post of rheostat. (c) Other post of rheostat to A- post on socket.
19. Test filament circuit by inserting tube in socket and turning on rheostat. Tube should light. If not, check circuit.
20. Remove tube from socket and connect B battery. Be sure that the polarities are correct. Turn on rheostat and connect battery voltmeter across filament terminals on socket. If reading is the same as A battery, circuit is O. K. If reading is higher than A battery, something is wrong with B battery circuit. Check and correct. Then insert tube, light it and proceed to tune.

(Concluded from preceding page)

quirement was that the tube be not too hard or not too soft. One that would act as either detector or amplifier on about 45 volts was found to give the very best results, as the tube had to work as both. UV201A or equivalent is recommended.

In the original circuit regeneration by the tuned plate method was illustrated. This feature gave a large amount of trouble until it was eliminated entirely. Then the set became more stable and the noises were reduced considerably.

The final circuit developed after the work described above is shown in Fig. 1. (See diagram on front cover.)

If you try out this circuit and do not obtain the results at once, do not be discouraged. Properly constructed and operated, this set will give results equal

to if not better than those obtained from any other reflex set using only one tube. If you do not get results at first, try reversing the connections to the primary and the secondary of the audio-frequency transformer. Then try the radio-frequency transformer. Try these changes one at a time, noting the results before making another change. Then try connecting the variable condenser as indicated by the dotted lines, eliminating the connection marked X at the same time. If the results still do not improve, the next best thing to do it to try other transformers. This procedure will cause the set to work. Do not mount the set on a panel until you get it to work.

With my final set, most of the locals came in with enough volume to be heard on a speaker over a small room. Several DX stations were also heard, using head phones. These included KDKA, Pittsburgh; WJAX, Cleveland; WGY, Schenectady; WOO, Philadelphia, and WSB, Atlanta. I live in a suburb of New York City. Some of the DX stations had never before been heard in my shop on a single-tube set.

A good deal of the success of this circuit depends on the correct placement of the apparatus. The transformers must not be placed too close to the tuning apparatus. The plate and grid circuits must be kept as far away from each other as is consistent with good workmanship. The tube is placed between the instruments composing the grid and plate circuits (Fig. 2). Thus short leads may be used and at the same time there will be no tendency towards interaction.

Since this set does not depend on regeneration by the direct tickler feed-back method, there must be no chance coupling between the oscillating circuits.

In Fig. 2 the batteries, phones, aerial and ground are not shown. This drawing is given only as a guide towards the layout of the apparatus. The connections necessary are given in the diagram on the front cover.

I am thoroughly satisfied with the results obtained from this receiver, having tried it out for two and a half weeks, including the period of the Democratic National Convention, when the proceedings came through the loud speaker from WEAf. This, it seems to me, sufficiently answers natural enough inquiries that are to be expected concerning the functioning of the tube under the heavy load exacted of it. The answer is that the load is heavy, but not too heavy. The set does work, and work well, but I advise anybody who is going to construct it to take excellent care in the purchase of quality parts and in the disposition of those parts in the assembly. I am prepared to defend this circuit against the world, for I know that a 1-tube reflex, with RF, detector and AF obtained from the same tube, is bound to raise a storm of interest.

### PARTS NEEDED

- One variocoupler of any good standard make (1)
- One .00025 variable condenser, normally 23 plates (2)
- One .00025 fixed grid condenser with grid leak (3)
- One vacuum tube, UV201A or equal, or a dry-cell tube that works well for RF and detector, and one socket (4)
- One rheostat to match the tube (5)
- One .002 fixed condenser (6)
- One .002 fixed condenser (7)
- One radio-frequency transformer of any good commercial make, or one made at home, on a 3" diameter tube, 20 turns of No. 24 DSC wire on the primary and 60 turns on the secondary (8)
- One audio-frequency transformer of good make, those well advertised being among the best (9)
- One .002 fixed condenser (10)

A battery to supply proper filament current for the tube, 45-volt B battery; phones or loud speaker or both, bus bar, lugs, and sundries; 7" x 14" panel; 7" x 14" cabinet; 6" x 12" base-board.

# Reforming a Single-Circuit Squealer

By Byrt C. Caldwell

**I**F you have a set that radiates and desire to change it into a non-radiating sensitive receiver it can be done without much trouble. Fig. 1 shows a radiating receiver. Of the hundreds which the writer has examined, this general type leads the way, as far as numbers are concerned.

It will be noticed that in this receiver there is a variocoupler and a variable condenser. The rotor of the coupler is used as a tickler. Any receiver which uses a variocoupler and a variable condenser may be changed over into the receiver which will be described.

Look at Fig. 2, where we still have the coupler and the condenser in use as the tuning unit, but they are connected up in an entirely different fashion. In addition, in the new circuit, we have a radio-frequency transformer (any good reflex or first stage cascade transformer will suffice), a crystal detector, and an audio-frequency transformer. We also have two mica fixed condensers, one of .00025 mfd., and the other of .002 mfd. capacity.

In changing, take all of the wiring from the old receiver and with a cloth or brush clean the receiver thoroughly, especially between the condenser plates. Take the socket off, tighten up the connections, and look over the receiver carefully for any connection which is made by two pieces of spring brass rubbing together. If the contact is no longer good, tighten the part so that it is. If you can afford it, it would indeed be advisable to discard the variable condenser entirely, and install one of the new low-loss condensers.

Now place the two new transformers, and the crystal in convenient positions, and with great care rewire the receiver. This new receiver is a reflex, and it is essential that a good wiring job be done.

The action of the receiver is explained by the following: The receiver is tuned to the frequency of the incoming wave and the signal is impressed on the grid. It will be noticed that the secondary of the audio-frequency transformer is connected in the lead to the negative of the filament battery. A negative potential must be kept on the grid of the tube, but as the incoming signal is of a radio-frequency, the secondary of the transformer acts as a choke. A small fixed condenser must therefore be shunted across the secondary to allow the radio-frequency current to pass. The signals impressed on the grid act the same as does the finger on the trigger of a gun. They release a current from the B battery, which is of the same frequency, but which is greatly augmented in power. This current is still at a radio-frequency and so cannot pass through the phone windings. For this reason a condenser is shunted across the phones. This current passes through the primary of the radio-frequency transformer, is stepped up in voltage and is passed through the crystal. It is changed here to an audible frequency and is passed to the primary of the audio-frequency transformer. It is again stepped up, and is for the second time impressed on the grid of the tube, this time at an audible frequency. It will now be noticed that the negative potential is this time impressed on the grid through the secondary of the transformer. As it is of a low frequency the resistance of the transformer does not interfere. For the second time also current is released from the B battery. As it is now of an audible frequency, the primary of the radio-frequency transformer offers practically no resistance, and instead of passing through the condenser, it passes through the phones and causes a sound. Study carefully this explanation in all of its

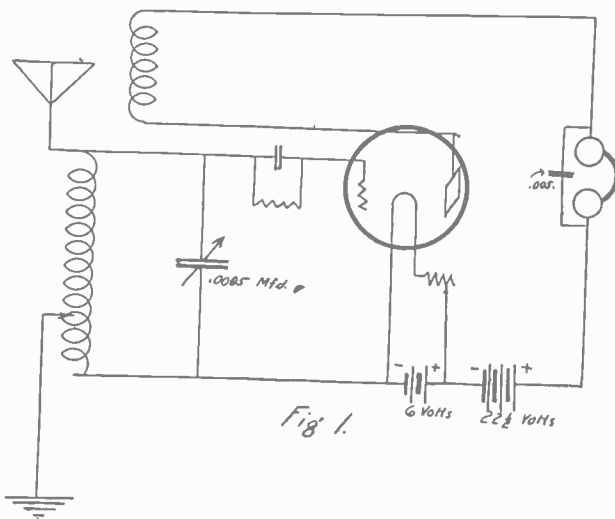


FIG. 1—The single circuit regenerative set, of which a greater number are in use in the United States than all other kinds combined. Improperly tuned (as is most often the case), it causes annoyance to neighbors who have sets. The radiation is intense. This circuit can easily be converted into an efficient, non-radiating reflex. (See Fig. 2.)

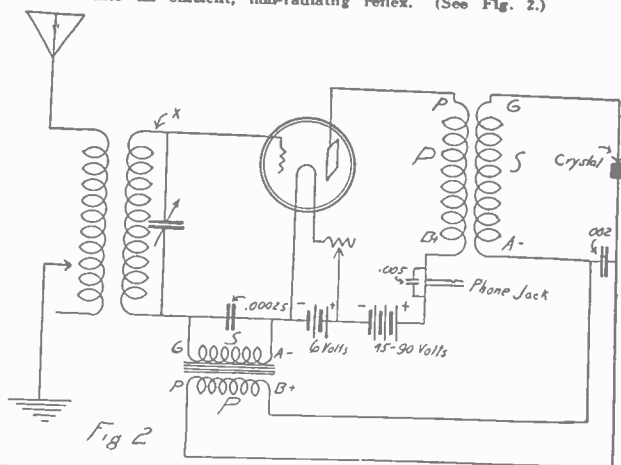


FIG. 2—Here is the one-tube and crystal reflex Burt C. Caldwell says is more than the equal of the 1-tube set shown in Fig. 1, and which does not radiate. There are one stage of RF, detector and one stage of AF, the RF and AF being obtained from the one tube by reflexing.

particulars and you will be able to analyze your receiver and thereby change it over into a non-radiating reflex machine.

As it will now be the receiver is equivalent to your old one plus the value of at least one more tube. The locals will come in with loudspeaker intensity, sensitivity will have been greatly increased, and tone will have been improved, not to mention the fact that there will be no howling and squealing.

When you get used to this receiver, and are itching for more distance and greater selectivity, take all of the wire from the variocoupler, rewind the rotor with twenty turns, spacing it so that it takes the same amount of space, and fasten it down with collodion (not shellac!) Rewind in the same way, the stator, but with thirty turns, and leave out the taps. Connect the antenna binding post to one end, and the ground binding post to the other. When you connect the rotor up again, connect a 50-turn honeycomb coil in at the point marked X. Connect a honeycomb coil (50 to 100 turn), of a value to be determined by experiment, and a .0005 low-loss variable condenser in series with the antenna. You will find that the sensitivity, selectivity and volume of the receiver has been greatly improved.

# A 1-Tube Set That You Can Log

*Fixed Honeycomb coils used with Novel Mounting—Circuit has two controls and is extremely simple to construct. It can be made for \$25, complete including everything.*

*By Herman Bernard*

DU<sup>E</sup> to their low distributed capacity, honeycomb coils are highly efficient. Using them in variable inductive relation, however, requires special mountings, and if the mountings are, as usual, on the front of the panel, the appearance of the set is not improved, to say the least, and body capacity becomes a source of trouble. Therefore, why not let the coupling be fixed and vary the capacities with condensers? This dispenses with the vario-coupler and in so doing also permits the regeneration dial settings to be logged, which can not be done with a vario-coupler.

The mounting of the honeycomb coils is accomplished as follows: Cut a strip of hard rubber, radion or bakelite,  $1'' \times \frac{1}{8}'' \times 5\frac{1}{4}''$ . Mount the two variable condensers on a  $7'' \times 10''$  panel, so that the strip can be screwed on to the back plates of the condensers at the points marked A and B, Fig. 1. Tie the honeycomb coils (L1, 75 turns, and L2, 35 turns) to the strip by passing a piece of cord inside the coils and around the strip. Leave  $\frac{1}{4}''$  space between the coils. Connect the beginning and end of the aerial circuit coil (L1) to the variable condenser (C1, 23 plates) with bus bar. The beginning of a honeycomb coil always emerges from under the winding that is nearest the form or tube. The end is on the outside. The plate coil (L2) is mounted the same way. In the case of L1, connect the end of the coil to the stator of the variable condenser C1, unless a low-loss condenser is used, when the connection should be made to the stator instead of to the rotor.

That is all there is to the coil mounting.

As for the wiring of the circuit itself, the ground is connected to the beginning of L1 and the aerial to the end, though the reverse may be done with no different effect, save that it reverses also the preceding directions for the grid lead. The variable condenser C1 shunts L1. The beginning of coil L2 is connected to the plate, the end to the phones, the coil being shunted by an 11 or 13 plate variable condenser. If the circuit does not oscillate, just swap the leads on L2. A .001 fixed condenser shunts the phones.

The circuit fits on a  $7'' \times 10''$  panel (the panel is only twice the size of Fig. 1). But if the usual two stages of audio-frequency amplification are to be added for loud speaker operation, get a  $7 \times 18$  panel, with cabinet to match.

This circuit works well on storage battery or dry cell tubes. Scarcely any difference was noted between

the results from dry cell UV199, C299, WD11, WD12, Schickerling and Myers tubes and storage battery UV201A. Whatever detector tube you have will be adequate.

The rheostat should be of the correct value for the

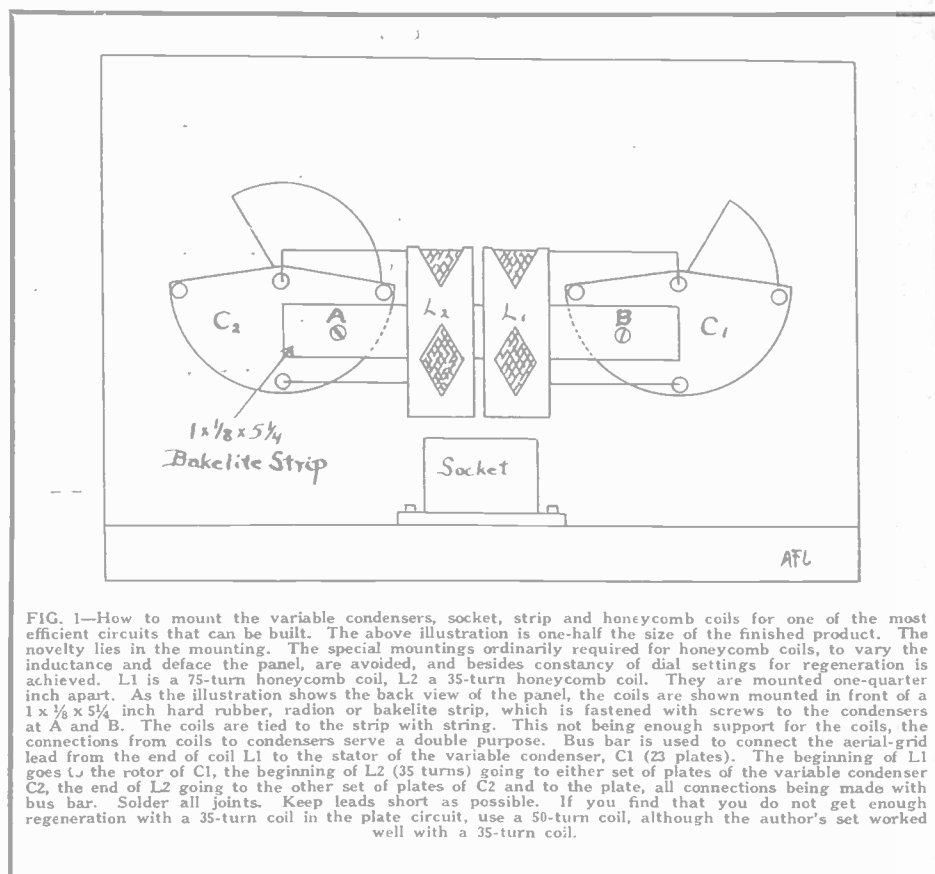


FIG. 1—How to mount the variable condensers, socket, strip and honeycomb coils for one of the most efficient circuits that can be built. The above illustration is one-half the size of the finished product. The novelty lies in the mounting. The special mountings ordinarily required for honeycomb coils, to vary the inductance and deface the panel, are avoided, and besides constancy of dial settings for regeneration is achieved. L1 is a 75-turn honeycomb coil, L2 a 35-turn honeycomb coil. They are mounted one-quarter inch apart. As the illustration shows the back view of the panel, the coils are shown mounted in front of a  $1 \times \frac{1}{8} \times 5\frac{1}{4}$  inch hard rubber, radion or bakelite strip, which is fastened with screws to the condensers at A and B. The coils are tied to the strip with string. This not being enough support for the coils, the connections from coils to condensers serve a double purpose. Bus bar is used to connect the aerial-grid lead from the end of coil L1 to the stator of the variable condenser, C1 (23 plates). The beginning of L1 goes to the rotor of C1, the beginning of L2 (35 turns) going to either set of plates of the variable condenser C2, the end of L2 going to the other set of plates of C2 and to the plate, all connections being made with bus bar. Solder all joints. Keep leads short as possible. If you find that you do not get enough regeneration with a 35-turn coil in the plate circuit, use a 50-turn coil, although the author's set worked well with a 35-turn coil.

tube used: 6 ohms for UV200; 30 ohms for UV201A, C301A, UV199, C299; 20 ohms for WD11, WD12.

As for results, delightful tone quality was obtained, with plenty of volume. At night, radiocast signals could be distinctly heard with the phones held 5 feet from the ear. One important factor in accomplishing both these highly desirable results is the low distributed capacity of honeycomb coils, occasioned by the wire being wound criss-cross over itself so many times. Also, there are no taps to cause dead end and other losses.

DX? Yes! Getting Schenectady, Boston, Philadelphia and Pittsburgh from Brooklyn, N. Y., in July, on a 60-foot inverted L type aerial, using 30-foot lead-in and cold-water-pipe ground 35 feet from the set, on ear phones, gives promise of Chicago on the loud speaker, using three tubes, next winter.

No jack is shown in the circuit diagram of this regenerative set (Fig. 2), as phone tip jacks are suggested. Two of these can be bought for a few cents. Usually, they require drilling two  $\frac{1}{4}''$  holes side by side or one above the other, into which the tips fit snugly. The plate and B+ are fastened to the jack

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# A Superlatively Efficient Circuit

## Wiring Directions for Set you can log

**1.** Connect aerial-grid lead as follows: (a) aerial to stator of variable condenser C1 (23 plates), but if condenser is marked "low loss," make this connection instead to the rotor or movable plates; (b) connect the same wire as hertofore to the end of the coil L1 (75-turn honeycomb); (c) continue this same lead to one end of the grid condenser (.00025), the other end of this condenser going to the binding post marked G on the tube socket.

**2.** Connect the ground as follows: (a) to the beginning of the coil L1; (b) to the remaining plates of C1; (c), to the A+. This connection to the A+ is the grid return.

**3.** Connect the plate (marked P on the socket) as follows: (a), to the beginning of the coil L2 (35-turn honeycomb); (b), to one set of the plates of C2, 13-plate variable condenser.

**4.** Connect the end of L2 as follows: (a) to the remaining set of plates of C2; (b) to one of the phone terminals (phone tip jacks are suggested).

**5.** Connect the plus post of the B battery to the remaining phone terminal.

**6.** Shunt a .001 fixed condenser across the phones (P and B+).

**7.** Connect the A+ of the battery directly to the F+ post of the socket.

**8.** Connect the A- as follows: (a) to one terminal of the rheostat, the other terminal going to the F- post of the socket; (b) to the B-; (c) to the ground (the last-named connection being the same one directed under subdivision 2).

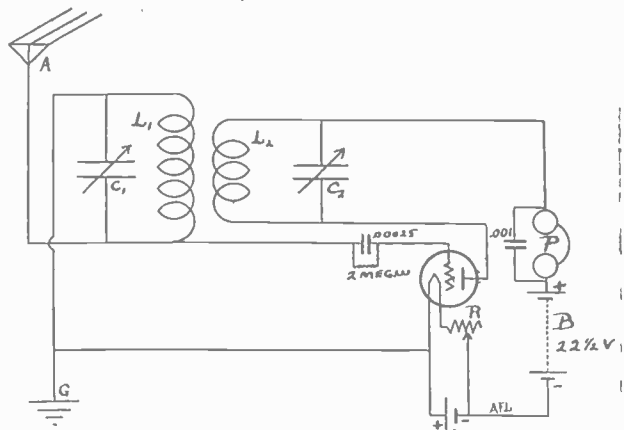
[For what kind of tube and rheostat to use, see accompanying text.]

(Concluded from preceding page)

ends on the inside of the cabinet, and the phones tips inserted through the front of the panel. No short circuit can be caused by such jacks. Also, they add as much to the appearance of the panel as the conventional form of jack. However, either type may be used with no difference in tone result.

In tuning, it will be found that the wavelength dial setting is always the same for any given station. This is always true of this type of circuit. But the plate circuit, being varied as to capacity, instead of as to inductance, also lends itself to such constancy. This advantage of being able to log both dials is a material one indeed for members of the family who are at home while the expert of the family is away. Mother, wife or sister will be greatly obliged to find tuning is so simple, and that the combination to open the radio safe always works. Then, too, don't forget the superlative quality of the reception. You have to use crystal rectification to beat it.

As for assembly, be sure to mount the tube after you have mounted the coils and condensers. Also, drill for the rheostat after the tube has been suitably placed. These precautions avoid cramping or facing the problem of putting two parts in one place. No



WIRING DIAGRAM for circuit (Fig. 2) using honeycomb coils in fashion devised by the author of the accompanying article. The constants are: L1, 75-turn honeycomb coil; L2, 35-turn honeycomb coil; C1, 23-plate condenser; C2, 13-plate condenser; .001 fixed phone condenser; .00025 fixed grid condenser, with mounting for 2-megohm grid leak. R, rheostat, A, A battery; B, B battery, concerning which see text. Any detector tube (except Sodian type) can be used. Quality, volume and distance are obtained from this highly efficient circuit.

kink should develop, excepting perhaps in mounting the coils. As the two variable condensers may not be of equal depth (one having 23 plates, the other 13), the strip and coils would not then run parallel to the panel. No need that they should, but those desiring to follow the rule of parallel and right angles may keep the 13-plate condenser equi-distant from the panel by using 1/4" or 1/8" brass, copper or other washers between the condenser and the panel, where the machine screws enter from front of panel. Cardboard washers can be made at home. Square ones will do all right. Use your drill to bore the holes. If you have some odd panel strips, these would be better if sawed and drilled for this purpose. You may then need longer machine screws than those that come with the condenser, though usually not.

### PARTS NEEDED

- One honeycomb coil, 75 turns (L1).
  - One honeycomb coil, 35 turns (L2).
  - One variable condenser, 23 plates (C1).
  - One variable condenser, 13 plates, though 11 plates can be used, too (C2).
  - One .001 fixed condenser to shunt phones.
  - One .00025 fixed condenser and grid leak mounted thereon. Usually 2 megohms will work well, except for soft tubes, like UV200.
  - One detector tube.
  - One socket to fit tube.
  - One rheostat to fit the tube.
  - One 22 1/2-volt B battery.
  - One A battery, voltage depending on type of tube used (See accompanying text).
  - One ground clamp.
  - One coil of No. 14 stranded bare aerial wire, 100 feet.
  - One coil of 50 feet insulated lead-in wire, No. 14.
  - One set of head phones.
  - Two phone tip jacks.
  - Bus bar, lugs, solder.
- Total should cost \$25 or less, complete, including everything.

## Heartbeats Broadcast

LONDON.

A BUSINESS man of Bournemouth was visiting Cardiff when he suffered a severe heart attack. He persuaded officials of a broadcasting station to broadcast his heart beats.

The man's doctor was asked by telephone to "listen in" on a receiving set at Bournemouth, while a microphone was placed on the patient's heart. The doctor did so, then called Cardiff on the long distance phone and prescribed for the sufferer.



# The 4-tube Super-Heterodyne Converted Into a Portable Set

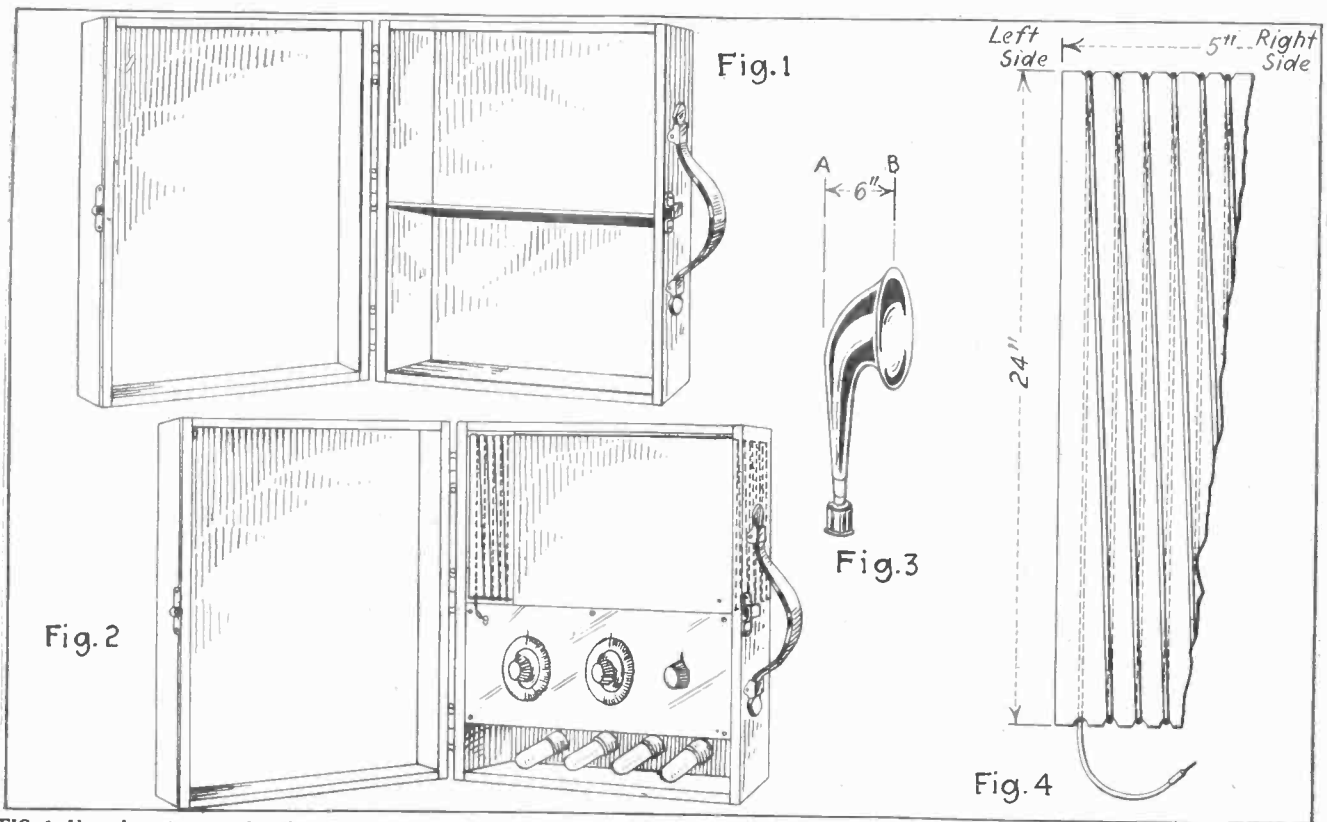


FIG. 1—How the suitcase looks when prepared for the Simplified 4-Tube Super-Heterodyne. The preparation shown is the insertion of the hard rubber or bakelite shelf to permit the construction of the receiver in tiers, instead of in a row. Fig. 2 shows how the finished product will look, if controlled by one rheostat only. Note suggestion of how the loop should be placed, indicated by the dotted lines. Also observe the exposed tubes. Fig. 3 shows the straight bell of the speaker, recommended by the author as most convenient. Fig. 4 shows how the cardboard should be notched and the wire wound thereon for the construction of the loop. Only a section of this cardboard is shown. The dimensions are given in the diagram and also in the article.

By B. J. Bongart

“HOW can I make a portable set of your 4-Tube Simplified Super-Heterodyne?” Since this circuit was first presented in RADIO WORLD, issue of June 28, a deluge of letters asking that question has been received.

This circuit is exceptionally well suited for portability. It gives splendid DX results, volume and tone quality on a loop, and uses comparatively little current, due to only half as many tubes being used as in the regular Super-Heterodyne. The new Schickerling tubes can be used throughout, since they draw only 1-10 ampere and may be operated on 4½-volt dry cells conveniently stored in the suitcase cabinet. I recommend their use. However, for those preferring other tubes they may have on hand, I have made provision for a UV201A or equal in the oscillator socket, dry-cell operated. The three other tubes would be UV199, C299, Myers' dry-cell tube or equal. If the three tubes of this class are on hand, and an extra tube is to be bought, you may use the Schickerling tube, the UV201A or the C301A, following the circuit diagram (Fig. 5), particularly as to the insertion of the 1½-volt dry cell battery.

The construction of the portable is similar to that described in the June 28 issue, except that the width of the suitcase will not permit the whole set to be assembled in a row, so we resort to the “etage” form,

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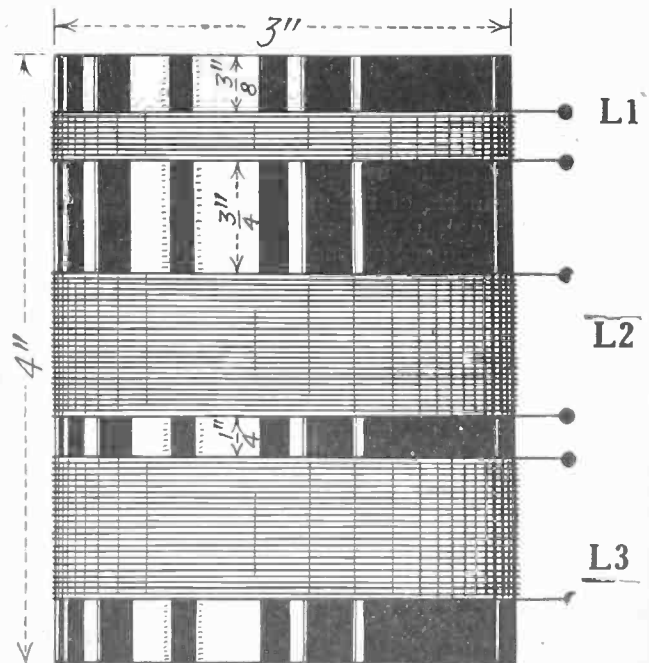


FIG. 6—Oscillator coil—L1, pick-up coil, has ten turns of No. 24 double silk covered wire, one end connected to the plate of the first tube, the other end to the condenser, C4, and to H, in Fig. 5. L2 and L3 have 35 turns each of the same wire, all wound in the same direction on a 3-inch diameter tube, which is 4 inches deep. The top terminal of L2 and the bottom terminal of L3 are connected to condenser C3 (variable), shown on the wiring diagram. The bottom terminal of L2 goes to condenser C3 (fixed), and to the grid of the second tube. The top terminal of L3 goes to condenser C3 (fixed), to the plate of the second tube and to C4.



# How to Wire Bongart's 'Super-Het'

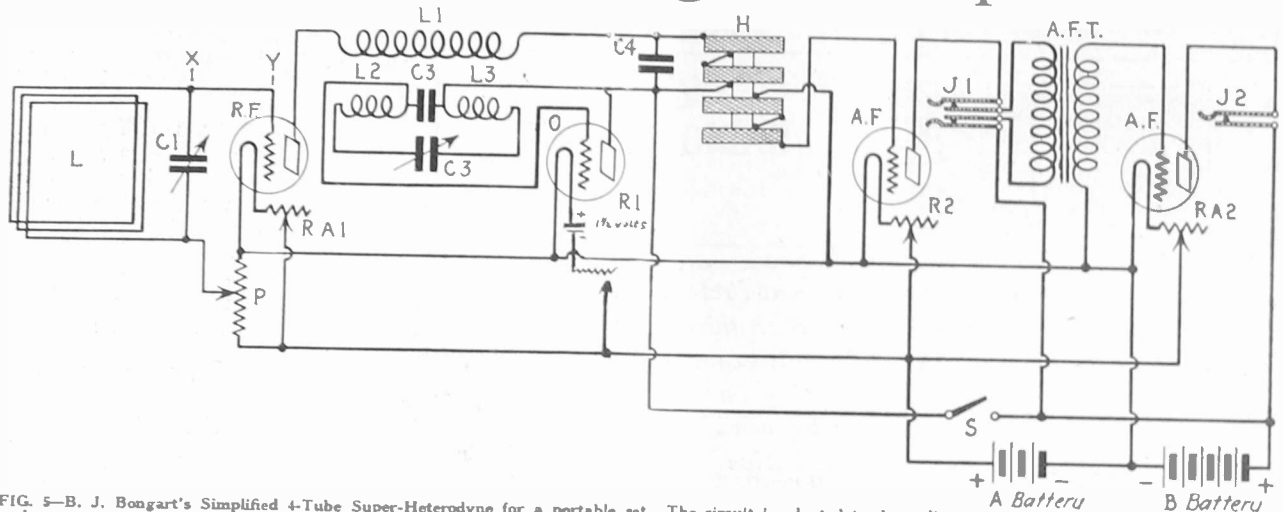


FIG. 5—B. J. Bongart's Simplified 4-Tube Super-Heterodyne for a portable set. The circuit is adapted to dry-cell operation; if the first, third and fourth sockets, counting from the left, as shown in the diagram, are tubes consuming 4½ volts on the filament, the 1½ are added to supply 6 volts to the second tube only. The 1½-volt battery connections are to the plus post on socket 4 and the resistance wire post on the rheostat. This extra battery is provided so that a UV201A, C301A, Myers dry-cell or similar tube may be used in this socket only. The three other tubes should all be alike, and may be UV199, C299 or similar, but these are not suitable for the oscillator (O). The UV201A or equal could be used throughout, but the current consumption is high and the tubes would require a storage battery, which seriously detracts from portability. However, the new Schicklering tube, which may be operated on 4½-volt dry-cells (for example the usual C battery), could be used in all four sockets with good results. In the diagram the designations are: L, loop, the special construction of which is described in the accompanying article; RF, radio frequency tube; RA1, rheostat; P, potentiometer; L1, L2 and L3, turns same wire; space ¼" wind 35 more turns same wire; C1, 17-plate variable condenser; C2, 4" long, as follows: ¾" from the top, wind ten turns No. 24 DSC wire; leave space of ¼", wind 35 turns same wire; space ¼" wind 35 more turns same wire; C3, .001 fixed condenser; H, 4 honeycomb coils, 1,500 turns each, two coils being connected in series, to give the primary 3,000 and the secondary 3,000 turns; A.F.T., second audio frequency transformer; AF, first audio frequency tube; RA2, rheostat; J1, double circuit jack; J2, single-circuit jack; disregard the switch S and make a continuous lead, instead of following the diagram and interrupting the plate lead. The beginning of L3 goes to plate of tube No. 2, to C3, to C4, and to H. L4 goes direct to C1.

(Concluded from preceding page)

building the set in two tiers. The lower story is a wood or bakelite panel, 3½ x 12 for the 4 tube sockets, to be mounted onto the bottom wall of the suitcase. The upper story is a shelf 6 x 12 on which are to be mounted the various coils and transformers, also the loud-speaker unit of the horn, and a covering panel 12 x 12. On the upper shelf are also mounted the condensers, rheostats, battery switch and the jacks for the loop connection. Above this second tier we have the bell of the loud-speaker on the one side, and we build a battery compartment for the A and B batteries on the other, thus filling the entire suitcase.

The loop is wound as per Fig. 4. Twenty turns of No. 20 DSC wire are wound on two cardboard strips, 5 x 24 inches each. Notches are cut into the cardboard strips to prevent the wire from shifting, these notches to be ¼ inch apart and the wire to be wound in full turns around both sides of the strips. Leave about 12 inches of wire overhanging on the lower side of both strips to be connected to the receiver proper. On the upper end of the two strips a length of about 12 inches of wire is necessary to reach across the suitcase so that the left and right-hand side of the loop may be connected to make the loop continuous. The two strips of cardboard with the loop wound on them are then fastened to the sides of the suitcase with gummed paper such as may be obtained in any stationery store.

The horn should be small, with a bell diameter not exceeding eight inches. From 6 to 7 inches is better, to leave enough room for the battery compartment. Select a "straight" horn since space is limited.

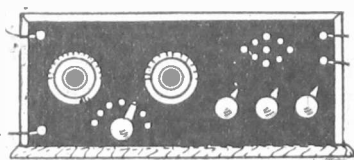
The suitcases obtainable or in the possession of the reader average 24 to 26 inches in length, 12 to 14 inches in width and are from 6 to 7 inches in height. The dimensions given as to width of panels, heights, etc., may be altered to fit your suitcase.

Any suitcase, either new, slightly or more than slightly worn, can be used. Even if you have only two vacation suitcases, it will be worth your while to appropriate one of them for your vacation radio set. The

actual wiring of the set itself is conventional, and the usual precautions should be taken in order to avoid capacity leads or overlong connections. The leads from the loop L go to the low-loss condenser C1. One lead continues on to the grid of the first tube. The other goes to the switch arm of the potentiometer P. The A battery is connected as follows: The A minus goes to the negative post on all the tube sockets and to one leg of the potentiometer. Switch S, which is shown by mistake in the B battery circuit, should be placed underneath in the A battery circuit, or it may be omitted altogether. The A plus lead goes to the sliding arms of the four rheostats, and also to the other leg of the potentiometer. This does not short circuit the battery, as the resistance of the potentiometer is too high. The remaining post on the first, third and fourth rheostats are connected to the filament plus lead on the respective sockets. The lead from the second rheostat goes to the negative post on the added A battery, as shown in the circuit diagram. This battery is a 1½ volt No. 6 dry cell, and can be placed in any convenient space in the suitcase, with flexible leads going to the set. The A plus from the added battery goes to the filament plus on the second socket.

The oscillator coil is connected as follows: Referring to the diagram (Fig. 5), one end of the top coil, L1, goes to the plate terminal on the first socket (at extreme left in circuit diagram) and the other end to the beginning of the primary of H, the series-connected 6,000 turns of honeycomb coil. This lead also goes to one side of fixed condenser C4. The top terminal of L2 and the bottom terminal of L3 are connected to the variable condenser C3. The bottom terminal of L2 and the top terminal of L3 are connected to the fixed condenser C3. The bottom lead from L2 also goes to the grid of the second tube. The lead from the top of L3 also goes to the plate of tube No. 2 and to C4 and the end of the primary lead on H. From the secondary of H, one lead goes to the negative A lead and the other goes to the grid of the third tube. The audio-frequency jack and transformer are connected in the usual way.

# The Why and the Wherefore of LC



## The RADIO PRIMER

Information and Instruction  
for the Beginner

**Inductance and capacity, the two great factors without which there would be no such thing as wavelength, must be properly understood for intelligent work in constructing sets—How fixed condensers may be used to increase or decrease effective wavelength of the antenna.**

By **N. N. Bernstein**

Technical Editor

**T**HERE are two great factors in radio without which there would be no such thing as wavelength or frequency. These two are known technically as LC, meaning inductance and capacity. For the layman the expression holds a vague and somewhat indefinite meaning. Some little knowledge of these great factors, or rather, how those conditions are brought about, is necessary to understand the functioning of a radio receiving set.

An inductance, in radio, is a coil of wire. No matter if there is only one turn or 1,000 turns of wire, or in what shape they are wound, it is still an inductance. **Every bit of wire used in a receiver is an inductance with the exception of the connection wires.** The windings of the transformers, radio and audio-frequency, are inductances. They transform energy by inductance. In diagrams the symbols for inductances are as shown in Fig. 1.

**Coils in series add up the inductances if the coils are wound in the same direction.** The total inductance in a circuit is the sum of all the inductances in series added together. Mutual inductance is obtained when coils in series are coupled magnetically. A variometer illustrates this principle. When a variometer is adjusted so that the turns of wire are in the same direction, the mutual inductance is increased. When at right angles (90 degrees), the mutual inductance is zero, and when the turns are in opposite directions the mutual inductance is minus.

Distributed capacity in inductances is due to the difference in potential between the turns. Losses are due to the dielectric between the windings and to the substance on which the winding is done.

The larger the diameter of the coil, the greater its distributed capacity. Honeycomb coils, which are wound eccentrically with a small diameter, have a very low distributed capacity, which accounts for their high efficiency. As distributed capacity increases the effective resistance of a circuit (something to guard against), honeycomb coils are probably the best to use wherever available.

**As far as possible use nothing to keep the windings of a coil in place, except perhaps at the ends a drop of insulating varnish or collodion.** Shellac, glue or similar substances should never be used, because they absorb moisture, thereby introducing an additional source of losses. Distributed capacity and insulation losses weaken signals and make the tuning broad. Of course,

capacity does exist everywhere in a radio receiver—between the windings of the coils, in the tubes, between the metal parts of the jacks and the connecting wires, etc. It is very important to keep this capacity between circuits at minimum, as it causes considerable loss in signal strength and makes tuning broad. This is especially noticeable

in circuits carrying very high frequencies (or low wave lengths), when the wiring and construction are done in a slipshod manner.

Capacity is used in receiving sets in the form of fixed and variable condensers. The most efficient fixed condenser uses mica for the dielectric, which is proven the best by laboratory observation. Paraffin paper is used in some cheaper makes, and is not so efficient.

The commonest use of a fixed condenser is in the grid circuit of vacuum detector tubes. **Used here, the condenser blocks the incoming potential going to the grid, allowing only a positive charge of high frequency to pass through it to the grid in the tube.** As condensers pass high frequency currents, and obstruct low frequency discharges, capacities are used to bridge circuits carrying both low and high frequency. This is done in reflex sets across the audio-frequency transformers to keep the high pitched whistle or squeal out of the ear phones. In these cases the by-pass condenser is so-called because it allows the high frequencies to pass through without being heard.

Variable condensers are used to tune the various circuits where necessary, especially to tune fixed inductances. An example of this is the Neutrodyne set, where the secondaries of the neutroformers are tuned with variable condensers. This is known as capacitive tuning, as contrasted with inductive tuning.

Dielectric losses in variable condensers occur in the insulating material separating the rotor and stator plates. There is no loss between the plates themselves so long as they are kept clean, allowing no dust or dirt to settle between them. Bakelite, radion or porcelain are the best materials for the end plates of condensers, these having the greatest resistance. Mud or composition end condensers are very inefficient, and should never be used, as the losses run as high as 50 per cent. in some cases.

**Condensers in series decrease the effective capacity, while condensers in parallel increase the effective capacity.** Two condensers of the same capacity connected in series equal one-half the capacity of one of the condensers. To find the capacity of two fixed condensers of the same capacity in series, divide the sum of both capacities by four. To find the capacity of condensers in parallel, add them together. **As capacity introduces a high frequency resistance, it is always advisable to keep the inductance up to maximum and capacity down to minimum in designing circuits.**

It is sometimes desirable to add or detract from the effective wave length of an aerial by means of a condenser. To increase wavelength, shunt the condenser across the primary tuning inductance, and to decrease, place the condenser in series with the antenna or the ground lead.

Wires carrying high frequency radio currents offer more resistance to them than to direct or low frequency currents. **Radio signals travel on the outside of straight wires, and on the inside of the wire when it is curved or bent.** The difference in area between

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# Favor Inductance Against Capacity

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the outside of the wire when straight, and the inside when bent or curved, accounts for the added resistance in the latter case. This again proves that angles as far as possible in all radio circuits should be eliminated, and the wiring be run in as straight lines as possible. When you must turn a corner, bend the wire as round as possible.

Advantage is taken of this phenomenon in radio by the use of stranded wire for antennae, which gives a greater surface than single wire, thereby decreasing resistance. Litzendraht wire, made up of many fine wires, each insulated from the other and stranded into a small cable, is used in winding the coils of the more expensive sets. High frequency resistance also makes the signals weaker and the tuning broader.

In constructing a receiving set, therefore, we must remember to wind the coils on a good insulating material, such as bakelite or radion, keep the windings free from kinks and bends, and to use little or no adhesive substance to keep them in place. A good method to keep the windings from slipping is to make two small holes in the tubing at the start, threading the end of

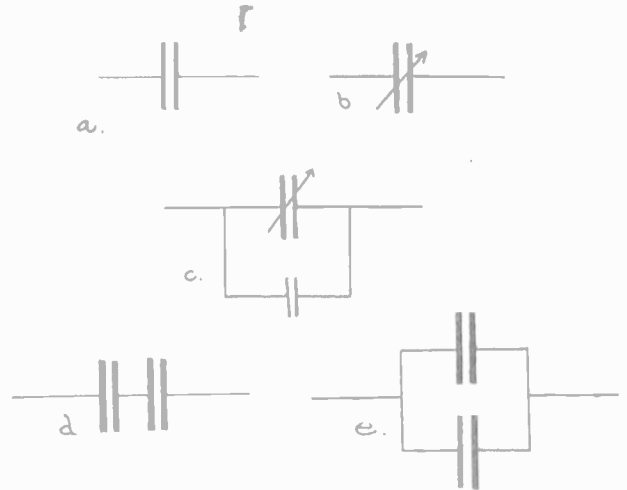


FIG. 2—Fixed condenser (a); variable condenser (b); variable condenser and fixed condenser in parallel (c). The small capacity fixed condenser, shunted across the terminals of the variable condenser, boosts the variable's capacity. Two fixed condensers in series (d) reduce the capacity. Fixed condensers in parallel (e). The total capacity of condensers in parallel is equal to the sum of all capacities added.

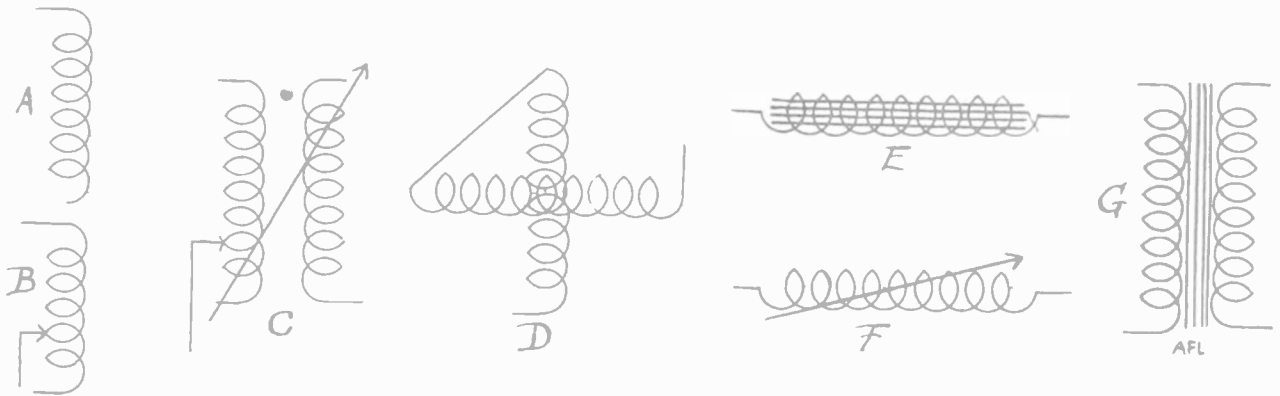


FIG. 1—A, fixed inductance; B, variable inductance; C, one variable inductance in inductance relation to one fixed inductance as in a variocoupler; D, two fixed inductances connected together and made variable by changing the inductive relation between them, as in a variometer; E, iron core inductance, or reactance coil; F, another symbol for a variable inductance; G, two inductances wound on an iron core, as in an audio frequency transformer.

the wire through them, and repeat the operation at the termination of the winding. Where it is necessary to avoid mutual inductance between transformers, as in Neutrodyne sets, the coils should be kept a wide distance apart, usually about 4½" to 6", and inclined

from the perpendicular from about 57 to 60 degrees. In regenerative circuits where mutual inductance is desired provision should be made to bring the proper coils in as close an inductive relation as possible to achieve true resonance.

## RADIOGRAMS *The March of Events*

**EXPERIMENTS** have been made recently on the Great Western Railway, England, to test the possibilities of wireless transmission on high speed trains. A 6-tube receiving set was placed in a brake van on the 4:10 London to Birmingham express, and speech and music from the London station were successfully picked up all the way to Birmingham. When the train was traveling at a speed of eighty miles an hour and was forty miles out loud speaker reception was extremely good.

\* \* \*

**BENJAMIN FISHER**, of Fisher & Deimal, 331 Madison avenue, attorneys for Dr. Lee DeForest and DeForest Phonofilm Corporation, have entered a general denial to the claim made by Julius L. Burns that he is entitled to \$882,250 from DeForest Phonofilm Corporation.

**THE BAN** on amateur radio telegraph transmission in Sweden has just been lifted by the government and thirty licenses for transmitting stations have been issued. All receiving sets are licensed by the government, 30,000 of these licenses having been issued since the new regulations were passed. There is still a great deal of confusion "in the air" and the Swedish Radio Club is co-operating with the transmitting amateurs to provide for a fair division of wavelengths.

\* \* \*

**"DIRECT RAY"** radio transmission tests being conducted by the Marconi station at Poldhu, England, have aroused a great deal of interest among amateurs of the American Radio Relay League in the eastern part of the country who have heard these signals on 94 meters. The call 2YT identifies the messages as com-

ing from the test station. This method of transmission which provides for the sending of radio signals in a given direction is accomplished by a system of reflector similar to that used for directing a light beam. The radio waves are sent out from the station toward a definite point of the compass with the help of a network of wires near the antenna, placed in such fashion that they act as a reflector.

\* \* \*

**LEO DELOY**, prominent amateur of Nice, France, was heard in Brazil during the Pan-American radio tests of the American Radio Relay League. This probably gives Deloy the honor of being the first European amateur to be heard by an amateur operator in South America. Deloy's station will be "off the air" for the rest of the summer.

# A Handsome Terminal Strip

*Ugly appearance of wires from A and B batteries, ground and aerial, in front of set, supplanted with an easily accessible block in the rear, phone jacks and tips being used instead of binding posts*

By A. P. Peck

Associate, Institute of Radio Engineers

THE row of binding posts on the edges of the panel that necessitates the bringing of many leads around the cabinet still mar the appearance of many home-made sets. The result is that the looks of an otherwise beautiful set are spoiled by the ragged wires that can never be made to look right.

There is no reason for this condition. There is no law that the binding posts must be in front, or even in an awkward position in the rear of the set.

You will undoubtedly ask, "Where shall the terminals be placed and what form should they take?"

The answer is easy. Put them on the rear of the cabinet, where they will be out of sight and readily accessible. The accessibility problem took quite a bit of figuring to solve. Binding posts are undesirable if they pry loose easily. It is sometimes hard to clamp a wire in them tightly, especially when working on the rear of a set. Then there is always the possibility of a screwdriver or other metallic object falling behind the cabinet and short-circuiting some of the batteries. Sometimes a short of this kind can throw the B battery juice through the tube filaments and ruin the tubes.

The solution finally hit upon was the use of phone tip jacks. These are small objects resembling bushings with a hole through the center and a spring arrangement for gripping the end of a phone tip. They may be purchased at the same price as or more cheaply than binding posts. When purchasing them, be sure to get the type in which most of the phone tip may be pushed into the jack so that as little as possible will project. This is to avoid the possibility of short-circuit.

The problem of insulation must next be considered. We all know that it would not be good electrical practice to mount the jacks directly on the cabinet. The wood would allow too many losses. Use a bakelite, radion or hard rubber strip (Fig. 4).

To allow the removal of the set from the cabinet for repairs or inspection provision must be made for the removal of the connections from the jacks. The set must be so constructed as to allow this to be done readily and easily.

Fig. 1 shows the rear view of one of the first sets that the writer equipped with this system. The terminal strip in this case was purchased at a radio store and was already drilled and engraved. The style was not just what was desired, so subsequent strips took the form put forth in the drawings, Figs. 1, 2 and 3. The specifications and drawings show a layout suitable for any standard set, but they can be expanded or changed to fit the set on hand.

The first requisite are two strips of bakelite or hard rubber, each 7" long. One is to be  $2\frac{3}{4}$ " wide and the other may be somewhat narrower. The larger one is the outside terminal strip, while the smaller one is to be

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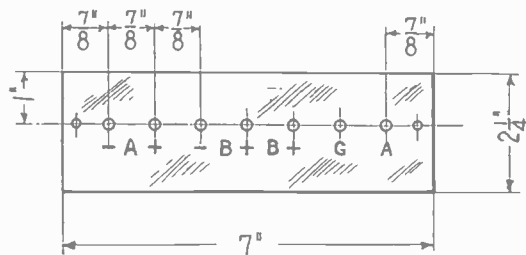


Fig. 1

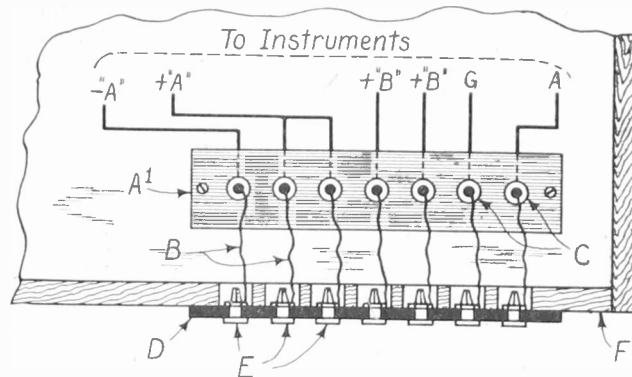


Fig. 2

FIG. 1—Cutting and drilling dimensions are given for the outside strip, which may be  $\frac{3}{16}$ " or  $\frac{1}{4}$ " thick. Fig. 2 shows the top view of both strips in their proper position. A is the inside strip; B, the flexible leads to the outside strip D; E, the phone tip jacks on the strip; F, rear of panel. To save labor both strips can be drilled together by clamping them in a vise, and drilling through both with one operation. The inside strip may be the same size as the outer. The phone tip jacks C on the inside strip are marked in the same order as those on the outside strip.

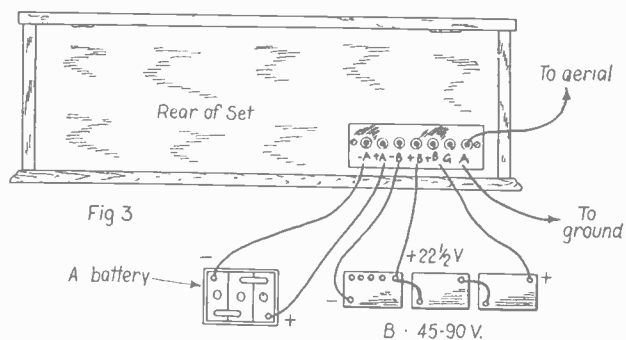


FIG. 3—The exterior connections from the connector strip to the batteries are made of flexible wire, such as lamp cord. Phone tips are soldered on the free ends of the wire so that they can be plugged into the jacks. These tips may be purchased at any radio supply store for a few cents. It will be found that this method of making set connections is very convenient, especially when the experimenter has occasion to test a number of outfits.

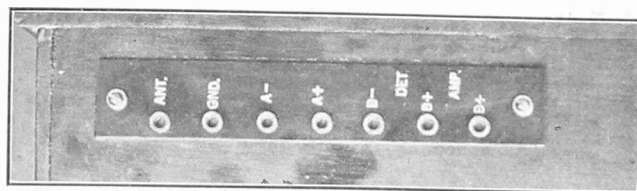


FIG. 4—The conventional terminal strip, to which binding posts are attached for connecting the leads as designated. In most cases the binding posts work loose after the cap is turned a few times. A. P. Peck's method avoids this nuisance and adds accessibility to its other virtues.

# Terminals Made More Accessible

(Concluded from preceding page)

used in the inside. The exact method for doing the drilling for the other or outside strip is shown in Fig. 1. The same procedure is followed for the inside strip, except that the holes for the phone tip jacks should be drilled along a center line. The spacing of the holes in each case is the same.

The outside strip is drilled as shown in Fig. 1. There is no possibility of the leads becoming mixed. There is no need of engraving on the inside strip as the jacks opposite each other are to be connected together. This engraving can be done by the builder if patience is used, but a better job can be done by having an expert do the work. If the builder tries engraving, a sharply pointed steel tool should be used. The lettering should be done evenly and smoothly. The grooves can then be filled with the material known as "engraver's white." This may be purchased at almost any paint store. Either the lettering shown in Fig. 4 or in Fig. 1 should be followed.

The next step in the assembly is to mount the two strips (Fig. 2). The inside strip is mounted on the baseboard and held up therefrom by two short pieces of brass tubing. This is done so that the jacks will not touch the base and to provide room for the connections to the set.

In mounting the outside strip, it will be necessary to drill seven half-inch holes so that the jacks will not touch the cabinet and so that the nuts on the jacks can be screwed up tight.

Fourteen jacks are then obtained and placed in position as shown in Fig. 2. Short flexible leads are securely fastened (preferably soldered) to the jacks on the outside strip and cord tips soldered to the other ends of the leads. The jacks on the inside strip are then connected to the set as shown.

In Fig. 2 the letters indicate the following:

A, inside strip; B, flexible leads to outside strip; C, jacks on inside strip; D, outside strip; E, jacks on outside strip; F, cabinet.

After the set is assembled and the interior connections made as described, provision must be made for the exterior connections. Leads of flexible wire are provided from each battery (Fig. 3). These may be made from ordinary lamp cord, which, by the way, is excellent for all flexible leads on a radio set. Cord tips are soldered on the free ends so that they can be plugged into the jacks. The extra cord tips required may be purchased at any radio store.

When this system is used the builder will be more than pleased with the appearance of his set.

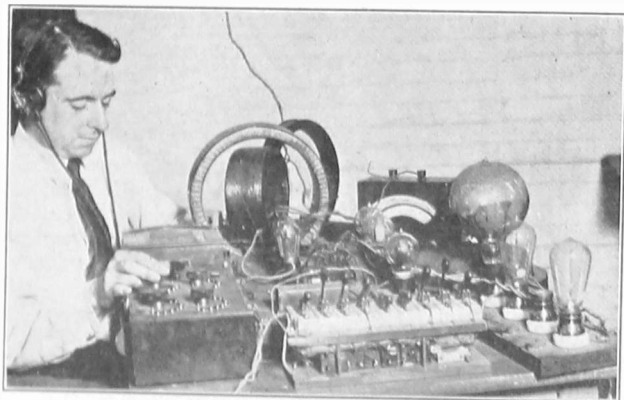
## How to Operate Super-Regenerative Receiving Set

*Vary the Grid Battery if a High  
Whistle is not Heard at First*

**I**N RADIO WORLD for May 10, there appeared an article on a One-Tube Super-Regenerative set by Byrt C. Caldwell. Although many of our readers are familiar with this type of set, there are some newcomers to whom a few words on the general operation of this outfit would be welcome.

To operate the Super-Regenerative set, light the tubes and then connect the other batteries, after the two large coils are placed at right angles to each other. If the high whistle is not heard, vary the grid battery. If no whistle is heard then, bring the large coils nearer together, and again vary the grid battery. Keep this up until the whistle is heard. Then bring the small coils together, until there is a loud click in the phones when the antenna binding post is touched with the hand. The set is now functioning properly. Separate the large coils, and the small coils, and then with the condenser, tune in the station. When it is tuned in as loud as possible, tighten the coupling between the two small coils, until the greatest amplification takes place. Then gradually bring the two large coils together until the signals suddenly rush in with great volume. After this point is reached, vary the distances between both sets of coils, until the greatest amount of volume is obtained.

This set is really a wonderful one, and for the outlay of money, it undoubtedly gives the best results of any receiver, not even excepting the reflex. It is easy to construct, and easy to operate after a few nights' practice, and for the reason that a loop can be used, it is the best for other fans in the neighborhood who would rather listen to a concert than to a chorus of squeals from your single circuit set. Try it out. If you use a reasonable amount of care, you can't help succeeding.



(Kadel & Herbert)  
AT LEFT, J. G. Aceves, electrical engineer, Columbia University, New York City, sitting before his invention that uses the electric light line instead of A and B batteries to supply the current for his set. He has succeeded in eliminating the hum that sometimes is found in such devices.



(Wide World)

LADY ASTOR, American-born factor in English politics, who was Nancy Langhorne, of Virginia, is an enthusiastic radio fan. Recently she spoke from a Plymouth, Eng., radiocasting station, telling of her recent tour through Palestine.

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## A Lesson in Appreciation

THE radiocasting of the Democratic Presidential Convention in addition to the thrill of bringing such an important event to our very living rooms, served to remind radio fans that station announcers do not get all the appreciation they deserve. The contrast between the croaking announcing from the convention itself in a statesman's voice broken down with overtaxation, and the soothing, mellifluous, interesting tones of the professional interlocutor was pronounced. Much more in the way of enjoyment of a program depends on the announcer than one would suppose offhand. So well is radio advancing that we take its splendors for granted, and are prone to dwell on minor shortcomings, such as invest all enterprises in which imperfect man engages.

One good way to show appreciation of your favorite announcer is to vote for him in RADIO WORLD'S popularity contest.

## FORMS A LOCAL RADIO CLUB

A CLUB is being formed in Yorkville for the improvement of radio and the advancement of the knowledge of those interested in the art. Communications should be addressed to H. E. Stroh, Yorkville Radio Co., 148 East 86th St., N. Y. C.

\* \* \*

# How to Make Your Receiver Respond to Higher Wave Lengths

[When The Crosley Radio Corporation's WLW Broadcasting Station began using their new 423 meter wave length, it was discovered that several owners of receiving sets did not know how to adjust their receivers to tune in on the high wave length. E. J. Bussard of the engineering department prepared the following information for those who desire to make the necessary changes in their radio sets.]

IT appears that there are quite a number of receiving sets on the market sets manufactured one to three years ago, which will receive wave lengths no higher than 400 meters. It can be readily seen that a receiver of this nature is of no value for receiving wave lengths between 400 and 600 meters.

In the majority of cases, these receivers are of the single circuit type. It is relatively easy to correct this type of receiver to receive higher wave lengths. The most common method is to insert a small loading coil in the antenna circuit. In quite a few cases however it is only necessary to increase the length of the receiving antenna. Another common method is to remove the condenser from the series connection with antenna circuit and place it in parallel with the antenna inductance coil of the receiver.

By a loading coil is meant an inductance coil (usually only a few turns of wire are necessary) placed in the antenna lead one side of the coil being connected to the antenna lead-in and the other to the antenna binding post. This method is especially adapted to receivers having only an inductance coil for tuning. To construct a loading coil take a tube three to three and a half inches in diameter and wind it with 20 to 40 turns of No. 24 or No. 26 B & S gage DCC wire. This tube should be of insulating material such as formica, hard rubber, etc. although cardboard tubes are often used with success. The size of this coil will be determined by the size of the

inductance already in the receiver. For instance, if the receiver will receive stations radiocasting on 400 meters at its maximum, only 8 to 12 turns of wire will be required to raise the wave length to 430 meters. However, should 360 meters be the maximum, then 20 to 25 turns would be required. Should there be only an inductance coil in the receiver for tuning, then a small condenser of approximately 00025 mfd capacity, one terminal connected to the antenna binding post and the other terminal to the ground binding post, will be very satisfactory. This condenser may be variable, but usually a fixed condenser will be sufficient.

Should the circuit be tuned by a condenser used in series with tuning coil or tuned inductance, the wave length range may be sufficiently increased by shunting this condenser or connecting it in parallel with the tuned inductance or untuned inductance as the case may be. This can usually be done by connecting the antenna binding post to the ground binding post with a piece of copper wire and then connecting the antenna lead-in to the wire connecting the antenna condenser to the inductance coil, should the condenser be in the antenna side of the circuit. Should the condenser be in the ground side of the antenna circuit the antenna lead-in will be connected to the binding post as before but the ground connections will be made to the wire connecting the condenser to the inductance coil.

A few complaints have been received from persons using three-circuit tuners. Undoubtedly the difficulty here lies in the type of variometers used and it will in a majority of cases be necessary to substitute variometers having the proper characteristics for tuning between 200 and 600 meters. In a few cases it may be possible to wind a few turns of wire on the variometer and correct this defect to some extent, but the novice will find no little difficulty in doing this.

## Western Union Men to Have Program

ON July 28 1924, 9:00 P. M. Pacific standard time, the Western Union Telegraph Employees' Radio Club of San Francisco will radiocast a special program through station KPO (423 meters). Land Line telegraph employes have taken to the radio like the proverbial "duck takes to water" and this concert in addition to offering an hour of exceptional entertainment is being conducted along experimental and development lines.

Nation wide publicity has been circulated by the committee and all radio enthusiasts have been invited to report to C. F. Newsum, Pacific Division Commercial Manager, care General Manager Western Union Telegraph Co., or direct to station KPO, Hale Bros, Inc., San Francisco, either by wire or by mail, during or following the program. An excellent long-distance record is expected as a result of this experiment.

## UNRULY WAVES

IN 1930. "Central! You've given me the wrong wave length!" — Little Rock Gazette.

## KFI to Use 1,000 Watts

KFI Los Angeles will be a 1,000-watt station instead of 500 watts. The law permits 1,000 watts in the antennae therefore KFI will be operated at 1,000 watts, but with a reserve of five times that amount, available for special occasions and in case the law is modified.

## An Exclusive Autographed

## PORTRAIT OF ROXY

will be published in RADIO WORLD, issue of July 19. The portrait also contains his own written greeting—"Hello Everybody"—words familiar to all who hear Roxy's cheerful voice announcing the Capitol Theatre program from WEA, New York City, Sunday nights.

This portrait is suitable for framing and was furnished specially to Radio World.



# RADIOCAST PROGRAMS

Thursday, July 10

**WFAA, Dallas, Tex., 476m (630k), C. S. T.—** 12:30 P. M., Dr. A. D. Laugenour telling of "Why Days and Nights Vary in Length," and the economic effect. 8:30 P. M., program of voice, piano, reading, violin and guitar, arranged by entertainers directed by W. W. Murphy of The Dallas Journal. 11 P. M., Mustang Serenaders' orchestra.

**WMC, Memphis, Tenn., 500m (600k), C. S. T.—** 8:30 P. M., program by R. L. Sharpe and the Memphis Picturum orchestra.

**WHAS, Louisville, Ky., 400m (750k), C. S. T.—** 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time. 7:30 P. M., concert by Earl Elliott's Falls Cities Serenaders, Earl Elliott, director; four-minute digest of International Sunday-school lesson; four-minute child welfare talk; late important news bulletins; baseball scores; Central Standard time.

**WGY, Schenectady, N. Y., 380m (790k), E. S. T.—** 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:15 P. M., report on New York State highways, by Captain A. W. Brandt, State Highway Commissioner. 5:30 P. M., organ recital by Stephen E. Boisclair. 7:30 P. M., concert by New York Philharmonic orchestra from Lewisohn Stadium, College of the City of N. Y., Willem Von Hoogstraten, conductor. This will be the first of a series of concerts by New York Philharmonic orchestra broadcast by WGY in co-operation with WJZ of New York during the months of July and August.

**WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—** 11:45 A. M., daily almanac. 12 noon, organ recital from Stanley Theatre; features from the studio; Arcadia Cafe concert orchestra. 2 P. M., Arcadia Cafe concert orchestra; artist recital from studio. 4:30 P. M., artist recital from studio. 5:30 P. M., question period, series of educational talks delivered under auspices of Peirce School of Business Administration. 5:45 P. M., baseball scores.

**WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—** 6:15 P. M., Albert E. Sonn, technical editor, Radio Department, weekly talk on "Radio for the Layman." 6:30 P. M., "Music While You Dine." Tom Cooper's Country Club orchestra. 7:20 P. M., resume of the day's sports.

**WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—** 6:30 P. M., closing stock market reports; agriograms; Boston police reports. 6:45 P. M., code practice. 7 P. M., meeting, Amrad Big Brother Club. 7:30 P. M., evening program; talk by Geoffry L. Whalen, "The Radio Movie Man." 7:45 P. M., Bernis and His Bunch. 8:15 P. M., musicale; weather report and time.

**WRC, Washington, 469m (640k), E. S. T.—** 5:15 P. M., instruction in International code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., talk on motoring, auspices American Automobile Association. 8 P. M., musical program announced. 9 P. M., dance program by Pete Macias' L'Aiglon orchestra. 9:55 P. M., time signals and weather forecast.

**WHN, New York, 360m (830k), E. S. D. S. T.—** 6 to 7 P. M., Around the Alamac's festive board; Olcott Vail's trio; jests by toastmaster; talks and songs by renowned folk; dance music by Paul Specht and his Alamac orchestra. 7 P. M., sport period by Thornton Fisher. 9:30 P. M., Charles Strickland's Palisades Park orchestra. 10 P. M., baseball statistics by Al Munroe Elias. 10:05 P. M., Sara V. Turita, soprano. 10:15 P. M., Harry Hock and his entertainers. 10:30 P. M., Roseland dance orchestra. 11 P. M., Henry Covert and Sol Hirsch, song writers. 11:15 P. M., Sylvia Brown, popular songs. 11:25 P. M., Ross Fowler, baritone. 11:30 P. M., original James Boys from the El Fey Club.

**WJZ, New York, 455m (660k), E. S. D. S. T.—** 5 P. M., Dorothy Emmelyn Bradshaw, soprano. 9:30 P. M., state and federal agricultural reports; Farm and Home reports; closing quotations, N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Pershing Square Cafe Savarin string ensemble. 7:20 P. M., financial developments of the day. 8 P. M., French lesson. 8:30 P. M., Stadium concert by New York Philharmonic orchestra, direction of Willem Von Hoogstraten. 9:45 P. M., American Museum of Natural History, "The High Andes of Ecuador," by Harold E. Anthony. 10 P. M., John Marshall, baritone. 10:30 P. M., Hotel Majestic orchestra.

**WJY, New York, 405m (740k), E. S. D. S. T.—** 7:30 P. M., Gotham Hotel concert orchestra under direction of Alfred Muncer. 9:30 P. M., Paul Specht and his orchestra.

**WEAF, New York, 492m (610k), E. S. D. S. T.—** 11 P. M., talk on fish as a food by Middle Atlantic Fisheries Ass'n.; market and weather reports. 4 P. M., Hazel Fleener Love, mezzo soprano; Jimmie Clark, jazz pianist; children's program. 6 P. M., dinner music from Rose Room, Hotel Waldorf-Astoria; mid-week services, auspices of Greater New York Federation of Churches; Mabelanna Corby, composer, pianist, with group of artists; talk by Bank of America; Rafael Saumell, pianist; Warren Scofield, baritone; W. E. A. F. Country Club program; Vincent Lopez and his orchestra.



**SHIRLEY JANOFF, who radiocasts from WOAW, the Woodmen of the World station at Omaha, Neb., believes in putting her stuff over in the proper costume. Although the radio audience cannot see her, they can get her comedy every time.**

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.—** 6:05 P. M., dinner music by the Vernon dance orchestra. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8 P. M., "Timely Talks to Motorists," talk by Gene Hogle. 8:15 P. M., concert by Comfort's Philharmonic orchestra. 8:45 P. M., "What the Wild Waves are Saying," picked up by a microphone placed amidst the breaking waves under the Steel Pier, Atlantic City, New Jersey. 8:50 P. M., Murphy's Minstrels broadcast Steel Pier, Atlantic City. 9:30 P. M., concert by Vessella's concert band; soloist, Miss Inga Wank, contralto. 11:05 P. M., dance music by LeRoyale orchestra.

**KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—** 6 P. M., baseball scores; dinner concert. 6:30 P. M., Little Miss Merry Heart sings songs for radio children. 6:45 P. M., news bulletins. 7 P. M., baseball scores; "Roses and Rose Culture," prepared by Fruit Growers Nurseries. 7:15 P. M., farm program; market reports by National Stockman and Farmer. 8 P. M., concert by Westinghouse band, assisted by the Misses Edith and Kathryn McKee, soprano soloists. 9:55 P. M., time signals; weather forecast; baseball scores. 10 P. M., concert.

**KYW, Chicago, 536m (560k), C. S. D. S. T.—** 6:35 P. M., talk on Sports by Leo Fisher. 6:45 P. M., talk on finance and markets. 7:20 P. M., musical program by Vesta Murray Watkins, soprano and reader; W. B. Freeman, dramatic reader; Merrie Boyd Mitchell, soprano; James W. Mitchell, baritone; K. M. Chworowsky, accompanist; additional artists announced by radio-phonie. 8:15 P. M., "Safety First" talk by Mr. C. Z. Elkin. 9 P. M., "At Home" program radiocast from KYW's studio.

**WBZ, Springfield, Mass., 337m (890k), E. S. D. S. T.—** 6 P. M., Leo Reisman Hotel Lenox ensemble. 6:30 P. M., songs by Bill Coty and Jack Armstrong, Boston studio. 6:40 P. M., Leo Reisman and his Hotel Brunswick orchestra. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., market reports; letter from the New England Homestead; "At the Theatres," with A. L. S. Wood, dramatic editor. 7:30 P. M., bedtime story for kiddies. 9 P. M., Albert Faucou, violinist; Lena B. Knox, accompanist, Boston studio. 10:55 P. M., time signals; weather reports.

## Friday, July 11

**WFAA, Dallas, Tex., 476m (630k), C. S. T.—** 12:30 P. M., address, Dr. Robert Stewart Hyer, president emeritus of Southern Methodist University, on the Sunday school lesson. 8:30 P. M., musical recital, George A. Nicoud, simulating old-time music-box program; W. W. Macbeth and his Harmonica Harmonists.

**WMC, Memphis, Tenn., 500m (600k), C. S. T.—** 8:30 P. M., program by Britling's Cafeteria orchestra. 11 P. M., Midnight Frolic by Bob Miller and his steamer Idlewild orchestra.

**WHAS, Louisville, Ky., 400m (750k), C. S. T.—** 4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball scores. 5 P. M., Central Standard time. 7:30 P. M., concert by the K. & L. Terminal Railroad orchestra; an interesting historical episode; late important news bulletins; baseball scores; Central Standard time.

**WGY, Schenectady, N. Y., 380m (790k), E. S. T.—** 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., stories for children. 5:45 P. M., children's story, in French, by Frederic Duclert. 6 P. M., International Sunday school lesson. 7:35 P. M., health talk, N. Y. State Department of Health. 7:40 P. M., baseball results. 7:45 P. M., "How to Prevent the Spread of the Gypsy Moth," H. McIntyre. 8 P. M., radio drama, "Polyanna," by WGY Student Players; WGY orchestra.

**WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—** 6:15 P. M., Agnes Leonard in songs for children. 6:30 P. M., "Man in the Moon" stories for children by Josephine Lawrence and William F. B. McNeary. 7 P. M., joint program by Rev. Edmont Hains, Evangelist and pastor; John A. Scott, accompanied by the Aue String Trio of Montclair. 7:20 P. M., resume of the day's sports.

**WGL, Medford, Mass., 360m (830k), E. S. D. S. T.—** 12-12:40 P. M., New England weather forecast. 12:45 P. M., closing report on farmers produce market. 6:30 P. M., closing stock market reports; code practice; Boston police reports. 7 P. M., meeting Amrad Big Brother Club. 7:30 P. M., evening program, selected verses by Mr. Charles L. H. Wagner, radio poet. 7:45 P. M., concert arranged by Madam Apollito.

**WOC, Davenport, Ia., 484m (620k), C. S. T.—** 9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecasts. 7 P. M., musical program; Bernice Vaz, contralto; Richard Everett, pianist; Billie Buren, alto soprano; Phil Lioen, tenor; Dewitt Dupue, violinist. 9 P. M., weekly tourists' road bulletin.

**WRC, Washington, 469m (640k), E. S. T.—** 3 P. M., fashion developments of the moment, prepared by "Women's Wear." 3:10 P. M., song recital by Arthur McCormick, baritone. 3:20 P. M., "Beauty and Personality" by Elsie Pierce. 3:25 P. M., current topics by editor of "The Review of Reviews." 3:35 P. M., piano recital by Ethel Grant. 3:50 P. M., Magazine of Wall Street. 4 P. M., song recital announced. 5:15 P. M., time signals and weather forecasts. 6 P. M., stories and songs for children by Peggy Albion and Mary Frances Glenn.

**WHN, New York, 360m (830k), E. S. D. S. T.—** 6 P. M., Around the Alamac's Festive Board; overture by Olcott Vail's trio; jests by toastmaster; talk and songs by renowned folk; dance music by Paul Specht and his Alamac orchestra. 7 P. M., sport period by Thornton Fisher. 9:30 P. M., Chas. Strickland's Palisades Park orchestra. 10 P. M., baseball statistics by Al Munroe Elias. 10:10 P. M., musical program. 10:30 P. M., Roseland dance orchestra. 11 P. M., musical program. 11:30 P. M., Original James Boys from the El Fey Club.

**WJZ, New York, 455m (660k), E. S. D. S. T.—** 4:30 P. M., Hotel Astor organ recital, direct. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; closing quotations N. Y. Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Bill Wilson's Allerton Country Club orchestra. 7:20 P. M., financial developments of the day. 7:30 P. M., Bill Wilson's Allerton Country Club orchestra. 8:15 P. M., time pop question game. 8:30 P. M., Raymond G. Parker, tenor. 8:55 P. M., talk by Prof. Robert MacElroy. 9:15 P. M., U. S. Army Night. 10:30 P. M., Harold Stern's Hotel Belleclair Towne orchestra.

**WJY, New York, 405m (740k), E. S. D. S. T.—** 8 P. M., looseleaf current topics by Dr. William H. Allen. 8:15 P. M., Goldman band concert, Edwin Franko Goldman, conductor, direct from Mall, Central Park; Mendelssohn program; Waino Kauppi, cornet soloist.

**WLW, Cincinnati, 423m (710k), C. S. D. S. T.—** 11 A. M., weather forecast and business reports. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., special program T. C. O'Donnell, editor of Writers' Digest; lecture on "Practical Lessons in Writing."

**WEAF, New York, 492m (610k), E. S. D. S. T.—** 11 A. M., musical program announced; talk by Julia Fulton, auspices committee for the Prevention of Blindness; market and weather reports. 4 P. M., Ella May Landi, soprano; moonlight instrumental trio; Charles Mansfield, tenor; children's program. 6 to 10 P. M., dinner music from Rose Room, Hotel Waldorf-Astoria; Dorothy A. Jung, soprano; the Happiness Boys, Billy Jones and Ernest Hare; B. Fischer and Company's "Astor Coffee" orchestra.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.—** 3:05 P. M., visiting artists and chats with celebrities, broadcast from Steel Pier, Atlantic City. 3:30 P. M., concert by Comfort's Philharmonic orchestra; soloists, Madeleine Reed, lyric soprano; Charles Cinti, piccolo soloist. 6 P. M., weather forecast. 6:05 P. M., dinner music by the Jordan Lewis dance orchestra. 6:45 P. M., Agriculture-livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children.

(Continued on page 18)



# Radio Hath Charms to Inspire Dancers



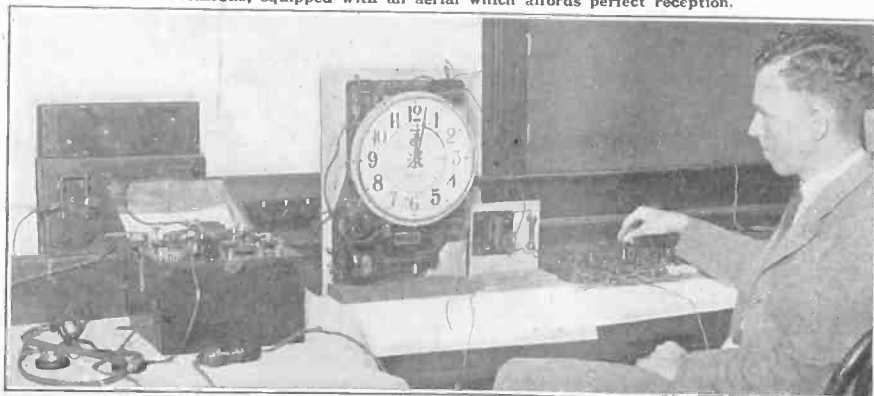
(Keystone View)

TEACHING dancing by radio is one of the latest fads on the Pacific Coast. The music picked up from local and distant radiocast stations is utilized by May Garcia, San Francisco dancing instructress.



(Fotograms)

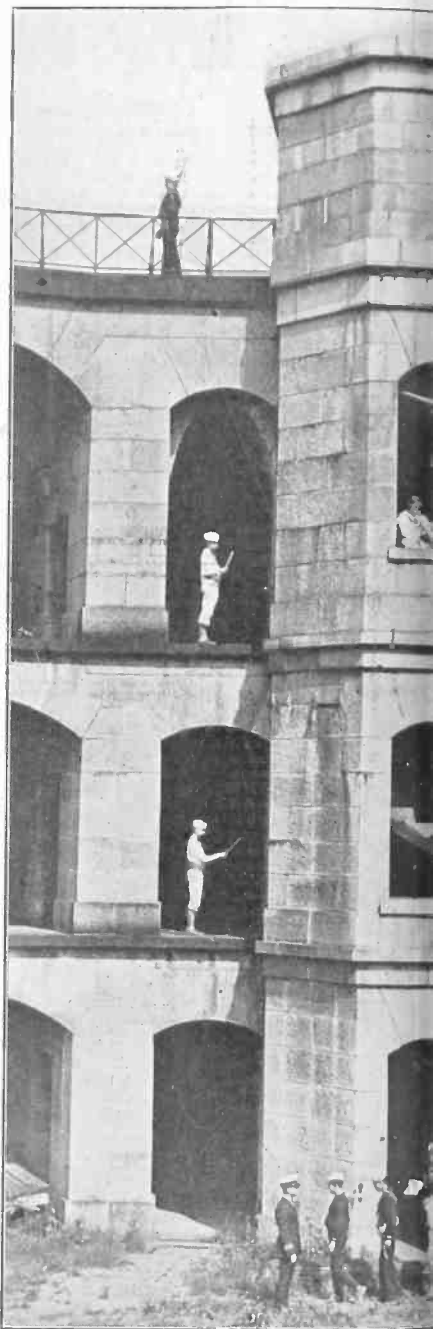
WEST POINT CADETS, who received a course in the fundamentals of aviation at Mitchel Field, Mineola, L. I., at the same time studied radio apparatus. They are shown looking over A. H. Grebe's automobile, equipped with an aerial which affords perfect reception.



(Kadel & Herbert)

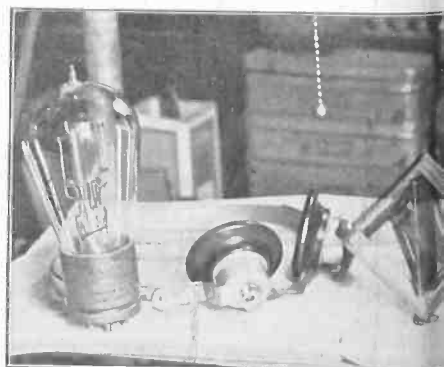
H. J. WALLS, assistant radio engineer at the Bureau of Standards, Washington, D. C., and his system using retardation relays in a clock-setting arrangement, regulated by the time signals sent out from the large station at Arlington, near Washington. By use of the retardation relays, the ether wave can ring your alarm in the morning and put your lights out at night.

# Junior Naval Reser



(Kadel & Herbert)

RADIO plays an important part in the training of the members practice in code messages. The photo shows the Junior Reserve building on Governors Island, New York City, where the Junior Reserve has



(Kadel & Herbert)

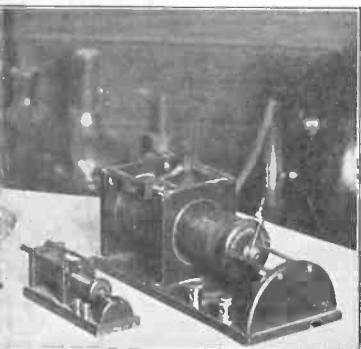
HERE are some "smallest" radio instruments. This family, who are all thorough radio fans. An idea of the size of the standard vacuum tube

# Practices Code

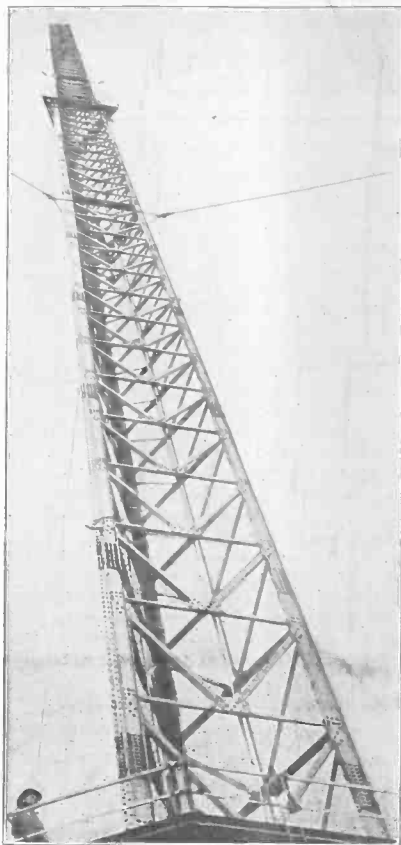
# Aerials that Almost Pierce the Sky



Junior Naval Reserve Force, and also gives  
 ph was taken at Fort Wadsworth, Staten  
 It a complete radio receiver and transmitter.



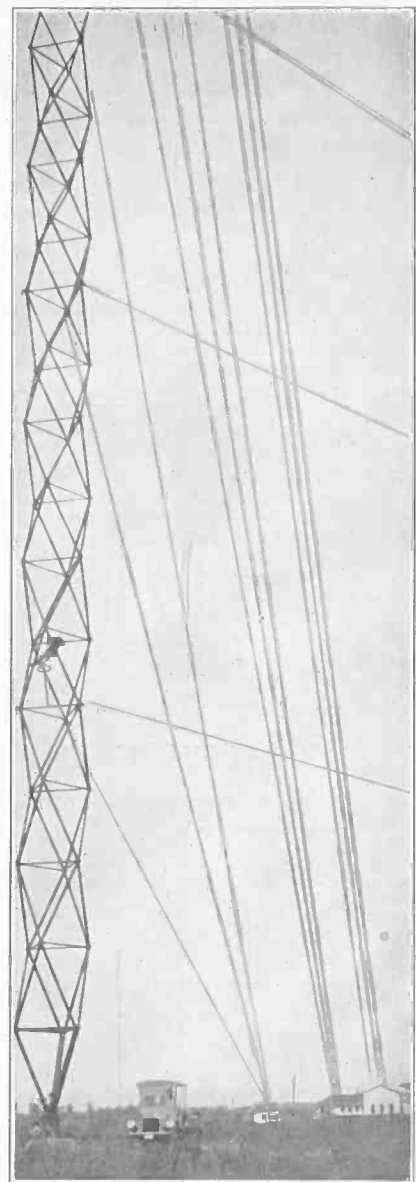
was made by M. W. Obermiller and his  
 e may be had by comparing the parts with  
 e extreme left.



(International Newsreel)  
**ONE** of the nine 480-foot steel towers at the powerful Naval wireless station, Sayville, N. Y. The peculiar construction of these towers enables them to withstand high winds. The sailors at the station make regular inspections of the towers. One is shown in the boatswain's chair giving this mast the once over. This station is heard in all parts of the world.



(Fotograms)  
**ANOTHER** view of one of the supporting towers of the huge aerial system at the power Naval wireless station at Sayville, N. Y. The photographed climbed up the middle of one of the towers to take this photograph. At the top, which is 480 feet above ground, the towers sway in the wind.



(Fotograms)  
**THE WORLD'S TALLEST** wireless mast is being erected by the British General Post Office at Rugby, England. This new wireless station will enable London to telephone to New York. Each tower weighs 140 tons and is 820 feet high. Elevators will be installed to run up the center of the towers, which are to be sixteen in all.



(Foto Topics)  
**PROFESSOR M. I. PUPIN**, well-known radio engineer, shown receiving the medal of honor of the Institute of Radio Engineers, of regenerative fame, and Major E. H. Armstrong, of regenerative fame, and Professor J. H. Morecroft. The medal was presented to Professor Pupin in recognition of his work in the field of radio art. Left to right the men are Major Armstrong, Professor Pupin and Professor Morecroft. All three have contributed materially to the success of radio.

# RADIO WORLD

## ISSUE OF JULY 12, 1924

Vol. 5. No. 16. Whole No. 120.

Illustrated

Every Week

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**NEXT WEEK, issue of July 19, out July 16, RADIO WORLD will publish its Mid-Summer Number. Fascinating pictures of outdoor radio activities will be displayed. B. J. Bongart will contribute an authoritative article on loops—how to make them, which type is best, why loops improve Mid-Summer reception, etc. "The Superdyne Lauded to the Skies" will include tips on Superdyne construction and letters from RADIO WORLD readers, telling of splendid results obtained in constructing the Superdyne according to directions published in RADIO WORLD, May 17, 24 and 31. "Getting a Strangle Hold on Static," by N. N. Bernstein, Technical Editor, and "Solving Your Panel Troubles," by Herman Bernard are among the other interesting articles to appear in the Mid-Summer Number. Don't miss it, for if you don't get it you surely WILL miss it!**

## Programs

### Friday, July 11 (continued from page 15)

**WLAG, Minneapolis, Minn., 423m (710k), C. S. T.—**6 P. M., baseball scores and sport hour. 7:30 P. M., farm lectures, speakers from Conference of Farmers of Northwest. 8 P. M., business messages. 8:15 P. M., band concert, from Phalen Park, St. Paul, by A. L. Snyder's Band. 11 P. M., program, Geo. Osborn's Nicollet Hotel orchestra; L. V. Peterson, tenor; Elsa Henke, accompanist.

**KHJ, Los Angeles, 395m (760k), P. T.—**2:30 P. M., matinee musicale. 6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program; Jack Downs, singer; bedtime story by Uncle John. 8 P. M., program presented by Community Broadcasters of Pasadena; Hatch Graham, singer and banjoist. 10 P. M., Art Hickman's dance orchestra.

**KSD, St. Louis, 546m (550k), C. S. T.—**8 P. M., Silverman's orchestra concert broadcast from Lyric Skydome.

**KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—**6 P. M., baseball scores; dinner concert. 6:30 P. M., Uncle Wiggley will visit the radio children. 6:45 P. M., feature. 7 P. M., baseball scores. 7:40 P. M., Farmer. 8 P. M., National Stockman and Farmer. 8 P. M., concert by Ruth Bailey, soprano; D. P. Decker, mezzo soprano; Chas. H. Smith, baritone; James L. Scott, tenor; H. Russell Triott, mandolinist. 9:55 P. M., time signals; weather forecast; baseball scores.

**KYW, Chicago, 536m (560k), C. S. D. S. T.—**5:45 P. M., children's bedtime story. 6 P. M., dinner concert broadcast from Congress Hotel. 7:20 P. M., talks, auspices American Farm Bureau Federation; "Youth Now, Leaders Later," by Margaret R. Filkins; "A Ten Minute Crop Talk," by L. C. Brown. 8 to 11:30 P. M., Mid night revue.

**WBZ, Springfield, Mass., 337m (890k), E. S. D. S. T.—**6 P. M., dinner concert by the WBZ trio, Springfield studio. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., market reports; "The Great Bear Year," dramatized story; current book review, by R. A. MacDonald. 7:30 P. M., bedtime story for kiddies; "Something About Bears," by Thornton W. Burgess. 10 P. M., concert by Mrs. Edna Shotlender, soprano; Philip Shotlender, tenor; George Fitzgerald, baritone; S. P. Keene, accompanist and pianist, Boston studio. 10:55 P. M., time signals; weather reports. 11 P. M., concert by WBZ trio; and A. Ceboneschi, trombone; Byron P. Hayden, baritone; Myrtle C. Chapman, accompanist.

**Saturday, July 12**

**WFAA, Dallas, Tex., 476m (630k), C. S. T.—**12:30 P. M., address, John H. Cullom, Clerk of the District Courts, on "Courts and Cases." 3:30 P. M., old-time music, Capt. Charles H. McKinney and old fiddlers. 8:30 P. M., musical recital, Dr. Richard Mandell and assisting entertainers. 11 P. M., dance music program of the Adolphus Hotel orchestra.

**WMC, Memphis, Tenn., 500m (600k), C. S. T.—**8:30 P. M., program arranged by W. McMaster

White for the "special entertainment of the "Old Sea Dogs" who are obliged to live inland.

**WHAS, Louisville, Ky., 400m (750k), C. S. T.—**4:50 P. M., local livestock, produce and grain market reports. 4:55 P. M., baseball reports. 5 P. M., Central Standard time. 7:30 P. M., concert by the Sylvian Trio; readings, Mrs. Cordia Greer Petrie; soprano solos, Mrs. J. F. McConnell; an interesting historical episode; late important news bulletins; baseball scores; Central Standard time.

**WGY, Schenectady, N. Y., 380m (790k), E. S. T.—**11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:55 A. M., U. S. Naval Observatory time signals. 8:30 P. M., dance music by Joseph A. Chickene and his Clover Club orchestra.

**WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—**6:15 P. M., "Music While You Dine," Ernie Krickett's Cinderella orchestra. 7:20 P. M., resume of the day's sports. 8 P. M., Gene Ingraham's orchestra. 8:30 P. M., recital by Gustav Brasch, bass, of New York. 9:30 P. M., concert by the Silk City Plectral ensemble. 10:10 P. M., tenor solos by Frederick Moss assisted by Mrs. Corwyn Alexander at the piano.

**WGI, Medford, Mass., 360m (830k), E. S. D. S. T.—**6:30 P. M., code practice; New England weather forecast; New England crop notes. 7 P. M., meeting Amrad Big Brother Club. 7:30 P. M., talk on current events by David M. Cheney; musicale; weather report and time.

**WOC, Davenport, Ia., 484m (620k), C. S. T.—**9 A. M., opening market quotations. 10 A. M., garden and household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., government bulletins. 11:15 A. M., closing market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 5:45 P. M., chimes concert. 6:30 P. M., Sandman's visit. 6:50 P. M., sport news and weather forecast. 9 P. M., orchestra program the Palmer School radio orchestra.

**WRC, Washington, 469m (640k), E. S. T.—**5:15 P. M., instruction in International code. 6 P. M., children's hour by Peggy Albion. 7:45 P. M., Bible talk. 8 P. M., song recital and banjo solos by Leonard Chapman. 8:30 P. M., song recital by J. R. Hinton, contralto. 9:15 P. M., concert by the Army Band. 9:55 P. M., time signals and weather forecasts.

**WHN, New York, 360m (830k), E. S. D. S. T.—**6 P. M., Around the Alamac's Festive Board; overture by Olcott Vail's trio; jests by toastmaster; talk and songs by renowned folk; dance music by Paul Specht and his Alamac orchestra. 7:30 P. M., musical program. 8 P. M., Tom Bracken in popular songs. 8:15 P. M., Jimmy Flynn, tenor. 8:30 P. M., musical program. 9 P. M., baseball statistics by Al Munroe Elias. 9:05 P. M., Josiah B. Free, baritone; Muriel Snyder, accompanist. 9:15 P. M., Ellen Montague Cross concert company. 9:30 P. M., joint recital by William Neibling, baritone; Alfred Arnold, tenor. 10 P. M., special man's program. 11 P. M., Fitzpatrick Brothers, in old time medleys. 11:15 P. M., George Roberts and Jimmy Doyle, popular songs. 11:30 P. M., Jimmy Clarke and his entertainers.

**WJZ, New York, 455m (660k), E. S. D. S. T.—**5 P. M., Marion Lowell Larimer, soprano. 5:30 P. M., state and federal agricultural reports; Farm and Home reports; closing quotations N. Y. Stock Exchange; foreign exchange quota

tions; Evening Post news. 7 P. M., Waldorf Astoria orchestra. 8:20 P. M., "The Slums of London" by George Laval Chesterton. 8:35 P. M., Frank Anderson, baritone. 8:50 P. M., program, auspices New York Times, Mr. Dunlap, radio editor. 10:15 P. M., "Exchange of Populations between Turkey and Greece" by A. C. Jasquith of Near East Relief. 10:30 P. M., Elsie Ahrens, soprano; Marion B. Witcover, contralto. 11 P. M., Club Lido Venice orchestra presented by Paul Specht.

**WLW, Cincinnati, 423m (710k), C. S. D. S. T.—**11 A. M., weather forecast and business reports. 1:30 P. M., market reports.

**WEAF, New York, 492m (610k), E. S. D. S. T.—**4 to 6 P. M., Bruno Brothers orchestra; Freda Williams, lyric soprano. 6 to 12 P. M., dinner music from Rose Room, Hotel Waldorf-Astoria; Guy Hunter, blind entertainer; Emma Burkhardt, contralto; talk on the history of hand ball by Mr. Sumner of the West Side Y. M. C. A.; Adran Vanderbilt, pianist; Israel Sikiorka, violinist, accompanied by Nathan Ciganeriy; Manhattan Ladies Quartette; Vincent Lopez and his orchestra.

**WIP, Philadelphia, 509m (590k), E. S. D. S. T.—**3:30 P. M., concert by Comfort's philharmonic orchestra; soloists, Madeleine Reed, lyric soprano. 6 P. M., weather forecast. 6:05 P. M., dinner dance music. 6:45 P. M., Agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children. 8 P. M., concert by Comfort's philharmonic orchestra; soloist, Madeleine Reed, lyric soprano. 8:45 P. M., "What the Wild Waves are Saying," picked up by microphone placed amidst the breaking waves under the Steel Pier, Atlantic City. 8:50 P. M., concert by Vessella's concert band. 10 P. M., dance music by Bob Leman's dance orchestra. 11:05 P. M., organ recital by Karl Bonawitz broadcast from Germantown Theatre.

**WLAG, Minneapolis, Minn., 417m (720k), C. S. T.—**8:30 A. M., announcements. 11:35 P. M., Post Card Club. 7:30 P. M., business messages. 8:15 P. M., Municipal band concert direct from Lake Harriet, Minneapolis. 11 P. M., dance program, Geo. Osborn's Nicollet Hotel Orchestra; Mrs. Geo. Palmer, soprano; Mrs. Russell Sabor, accompanist.

**KHJ, Los Angeles, 395m (760k), P. T.—**2:30 P. M., matinee musicale. 6 P. M., Art Hickman's concert orchestra. 6:45 P. M., children's program; Hector Dyer, pianist; Helene Pirie, screen juvenile; bedtime story by Uncle John. 8 P. M., program courtesy San Diego Elks. 10 P. M., Art Hickman's dance orchestra from the Biltmore Hotel.

**KSD, St. Louis, 546m (550k), C. S. T.—**8 P. M., Missouri Theatre orchestra and specialties broadcast from Missouri Theatre.

**KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—**5:30 P. M., dinner concert by the KDKA little symphony orchestra. 6 P. M., baseball scores; dinner concert. 6:30 P. M., bedtime story; 6:45 P. M., "Last Minute Helps to Teachers," Carman Cover Johnson. 7 P. M., baseball scores; "Sport Review," James J. Long, sport writer. 8 P. M., concert by the KDKA little symphony orchestra. 9:55 P. M., time signals; weather forecast; baseball scores.

**KYW, Chicago, 536m (560k), C. S. D. S. T.—**5:02 P. M., news, financial and final markets. 6 P. M., dinner concert broadcast from Congress Hotel. 7 P. M., musical program; Florence Morris, soprano; Geraldine Lacey, accompanist; Saint Ann's orchestra. 8 P. M., talk by Vivette Gorman, Home Economics Dept. 8:05 P. M., short stories, articles and humorous sketches. 9:15 P. M. to 12:30 A. M., date show.

**WBZ, Springfield, Mass., 337m (890k), E. S. D. S. T.—**6 P. M., Schrafft's symphony ensemble. 6:30 P. M., Leo Reisman Hotel Lenox ensemble. 7 P. M., results of games, Eastern, American and National leagues. 7:05 P. M., market reports. 7:10 P. M., Leo Reisman and his Hotel Brunswick orchestra. 7:30 P. M., bedtime story for kiddies. 7:40 P. M., concert by Hotel Kimball trio. 9 P. M., concert by Paul Laurent, pianist; Walter J. Connor, baritone, Boston studio. 10:55 P. M., time signals; weather reports.

**Sunday, July 3**

**WOO, Philadelphia, 509m (590k), E. S. D. S. T.—**2:25 P. M., musical exercises and opening of regular Sunday afternoon session, Bethany Sunday school; Bethany Sunday school orchestra. 3:15 P. M., sacred recital of the Wamaker grand organ. 7:30 P. M., evening services from Bethany Presbyterian church; organ recital by Miss Caroline Quigg.

**WWJ, Detroit, 517m (580k), E. S. T.—**7:30 P. M., services at St. Paul's Episcopal Cathedral. 4 P. M., concert by Schmemman's concert band. 5 P. M., Detroit News orchestra.

**WFAA, Dallas, Tex., 476m (630k), C. S. T.—**6 P. M., Radio Bible class, William M. Anderson, pastor; Bible study and Gospel song. 7:45 P. M., City Temple Presbyterian church, Dr. L. D. Young, pastor; City Temple orchestra; J. Wesley Hubbell, director of choir and of children's chorus; Miss Katherine Hammons, organist. 9:30 P. M., Footwarmers orchestra.

**WGI, Medford, Mass., 405m (830k), E. S. D. S. T.—**5 P. M., twilight program: "Adventure Hour" conducted by Youth's Companion; musicale; talk auspices Greater Boston Federation of Churches.

**KGO, Oakland, Cal., 312m (960k), P. T.—**3:30 P. M., concert by KGO Little Symphony orchestra and soloists, Carl Rhodelamel conducting.

**KPO, San Francisco, 423m (710k), P. T.—**11 A. M., undenominational and non-sectarian church services, speaker, Dr. Roy Guild, field secretary of the Federal Council of the Churches of Christ of America; soloist, Clara T. Ward, contralto; organ selections by Theodore J. Irwin. 8:30 P. M., concert by Rudy Seiger's Fairmont Hotel orchestra.

**WOS, Jefferson City, Mo., 441m (680k), C. S. T.—**8 P. M., union open air religious services

broadcast from Capitol lawn; music by the Missouri State Prison band.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—9 A. M., radio chapel service, conducted by Rev. R. R. Brown; Marie Danielson, soloist; Mrs. Albert McIntosh, pianist. 9 A. M., Presbyterian chapel service, courtesy Second P. M., musical church, Lincoln, Neb. Dr. S. S. Hilscher, pastor. WIP, Philadelphia, 509m (590k), E. S. D. S. T.—11 A. M., morning service from Holy Trinity Church, Rittenhouse Square, Rev. Floyd W. Tompkins, D.D., rector.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—baseball scores at 3:30, 4:43:30 and 5 o'clock. 4 P. M., program broadcast from Newman Theatre.

KYW, Chicago, 536m (600k), C. S. D. S. T.—10 A. M., Sunday morning service broadcast from St. Chrysostom's Episcopal church, Rev. Norman Hutton, rector. 9:30 P. M., studio chapel service radiocast from studio in the Commonwealth-Edison building, Chicago.

Monday, July 14

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sport results. 6 P. M., Chicago theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra.

WHAZ, Troy, N. Y., 380m (790k), E. S. T.—9 P. M., Edward L. Wilson and his orchestra of Amsterdam, N. Y., in solo and ensemble numbers, with features.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., N. Y. Stock Exchange and U. S. Weather Bureau reports. 5 P. M., an hour of music. 4 P. M., Hotel St. Francis dance orchestra. 6:45 P. M., stock exchange and weather reports, and news items. 8 P. M., educational program, with musical numbers; courses in agriculture, Spanish, music, economics and literature.

KPO, San Francisco, 423m (710k), P. T.—4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO; piano solos by Frederica Levina. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. Theodore J. Irwin. 8 P. M., organ recital by management Miss W. Woodbridge. 10 P. M., Bradfield's versatile band.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—3 P. M., address: "Crushing Clouds With Lime," "Insurance for Your Next Clover Crop," and "The March Westward," by Colonel Arthur T. Nelson, State Marketing Commissioner. 8:20 P. M., varied musical program by Moberly, Missouri, talent.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—6 P. M. speakers' hall hour. 6:35 P. M., dinner program by Randall's Royal orchestra. 9 P. M., recital program from vocal class of Lee G. Kratz; Myrtle Benson accompanist.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—3:30 P. M., sports results and police reports; dinner music. 4 Candelori and his Hotel Adelphia orchestra. 8:30 P. M., musical program.—Instrumental quartette Stephen J. Benna, director, Frances W. Hoover, soprano; Opal L. Proctor, contralto; Harriette G. Ridley, accompanist. 9:10 P. M., Fox theatre grand orchestra. 10 P. M., grand organ recital Mary E. Vogt. 10:30 P. M., dance program by Vincent Rizzo and his Hotel Sylvania orchestra.

WWJ, Detroit, 517m (580k), E. S. T.—12 Noon, Detroit News orchestra. 3 P. M., concert by Schmemman's concert band. 3:50 P. M., official dinner forecast. 4:45 P. M., market reports and baseball scores. 5 P. M., baseball scores. 8:30 P. M., concert by Schmemman's concert band. 9:30 P. M., Detroit News orchestra.

CKAC, Montreal, 425m (710k), E. S. D. S. T.—1:45 P. M., Mount Royal Hotel luncheon concert. 4 P. M., weather, stock, news. 4:15 P. M., music. WDAF, Kansas City, Mo., 411m (730k), C. S. T.—baseball scores at 3:30, 4:43:30, 5 and 6 P. M. 5:30 P. M., the Star's radio trio. 5 P. M., weekly Boy Scout program. 5:50 P. M., marketgram; weather forecast; time signal; road report. 6 P. M., address, Clay Harvey; address speaker from University of Kansas "request story night" by Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players. 8 P. M., program by the Star's radio orchestra and the WDAF minstrels. 11:45 P. M., (Nighthawk Frolic), the Riley-Elhart Winwood Beach orchestra.

Tuesday, July 15

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—12 Noon, luncheon music by the Tea Room orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports. 10:55 P. M., time signals and weather forecast.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 Noon, Detroit News orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 8:30 P. M., concert by Schmemman's concert band. 9:30 P. M., Detroit News orchestra.

CKAC, Montreal, 425m (710k), E. S. D. S. T.—4 P. M., weather, stock, news. 7 P. M., kiddies' stories in French and English. 7:30 P. M., special classical concert, Mount Royal Hotel restaurant, by Rex Bittle's orchestra. 8:30 P. M., variety program from La Presse studio. 10:30 P. M., dance program by Joseph G. Smith and his Mount Royal Hotel dance orchestra.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sport results. 6 P. M., Chicago theatre organ recital. 6:30 P. M., Hotel LaSalle orchestra. 8 P. M., Harry Hansen, literary editor the Daily News. 8:30 P. M., Babson report. 8:40 P. M., French lesson. 9 P. M., talk by United States civil service commission. 9:15 P. M., Hawaiian trio and Harry Geske, pianist.

KGO, Oakland, Cal., 312m (960k), P. T.—6:45 P. M., stock exchange and weather reports; news items. 8 P. M., Musaeus Trio; Eva Gruninger Atkinson, contralto; Walter H. Bundy, baritone; Jozienna Van der Ende, cellist; Jack Sheehan, tenor; court scene from "Merchant of Venice" direction of Wilda Wilson Church; Walter Klie-

Radio Aids in Solving Mirage

WHEN approaching Sydney, Nova Scotia, recently, Captain Bauge of the hospital ship St. Joan of Arc, was confronted by a mirage which distorted the shore lines so they could not be recognized. Calling his radio compass into service, he took radio bearings from North Sydney, Magdalen Island and Cors, with the result that he succeeded in locating his position.

Endeavoring to find the proper point at which to land in a fog, Captain Bauge and a native fisherman who was on board, were greatly confused by a mirage which changed the appearance of the coast. They knew they were not in front

of Scarati, for a steep cliff could be seen behind the lighthouse, obviously not the gentle sloping hill of the Nova Scotia shore, five miles distant from the lighthouse.

2 Hotels in New York City May Have Stations

THE Hotel Majestic is getting ready to open a radiocasting station in New York City. An elaborate installation is being made. The Hotel McAlpin, it is said, expects to do likewise. The municipal station, WCNY, 525 meters, will be on the air any day.

gcl. baritone; William Emery, tenor; Natalie Levina, violinist; address, "The Imprisoned Splendor of Service," Rev. Harvey V. Miller; duets for contralto and baritone, Corinne Keefer and Walter H. Bundy; Wilhelmina Wolthus, pianist; Corinne Keefer, contralto. 10 P. M., to 1 A. M., Hotel St. Francis dance orchestra.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by "Big Brother," of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., Guatemala Imperial Marimba band. 10 P. M., Bradfield's versatile band.

WOAW, Omaha, Neb., 526m (570k), C. S. T.—6 P. M., dinner program by May's mandolin orchestra. 9 P. M., program courtesy Osceola Community Club, Osceola, Neb.

WDAF, Kansas City, 411m (730k), C. S. T.—5 P. M., weekly child talent program, Gertrude Concannon, piano, and Herman Springer, voice. 5:50 P. M., marketgram, weather forecast, time signal and road report. 6 P. M., address, Clerin Zumwalt, M. A.; The Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players, Hotel Muehlebach.

Wednesday, July 16

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—12 Noon, luncheon music by the Tea Room orchestra. 12:55 P. M., time signals. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports; dinner music by Vincent Rizzo and his Hotel Sylvania orchestra. 8:30 P. M., musical program radiocast from Houston Hall—Charles Massinger, tenor; Henry W. Schmidt, violinist; William S. Thunder, pianist. 9:30 P. M., grand organ recital, Mary E. Vogt.

WWJ, Detroit, 517m (580k), E. S. T.—10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 Noon, Detroit News orchestra. 3 P. M., concert by Schmemman's concert band. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 8:30 P. M., concert by Schmemman's concert band. 9:30 P. M., Detroit News orchestra.

CKAC, Montreal, 425m (710k), E. S. D. S. T.—1:45 P. M., Mount Royal Hotel concert. 4 P. M., weather, stock, news. 4:15 P. M., music.

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sports results. 6 P. M., Chicago Theatre organ recital. 6:30 P. M., stories for children by Miss Katherine Waller. 8 P. M., weekly North western University lecture. 8:40 P. M., travel talk by Clara E. Laughlin. 9 P. M., talk from one of the Chicago charities. 9:15 P. M., program by La Ponsa College of Music.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., Stock Exchange and U. S. Weather Bureau reports. 3 P. M., musical program; speaker furnished courtesy, Cora L. Williams Institute Berkeley. 6:45 P. M., stock exchange and weather reports, and news items.

KPO, San Francisco, 423m (710k), P. T.—2:30

P. M., Jack Fait's Entella Cafe orchestra. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., talk on "Irisles," by Curtis Redfern; Bradfield's versatile band.

WOS, Jefferson City, Mo., 441m (680k), C. S. T.—8 P. M., address, "Inoculation for Logumes," by W. A. Albrecht, College of Agriculture, Columbia. 8:20 P. M., barn dance tunes played by the Old Lyme String Trio.

PWX, Havana, 400m (750k), E. S. T.—concert at Milecon band stand by band of the Cuban Navy, Lieutenant Juan Iglesias, band leader.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—5:50 P. M., marketgram, weather forecast, time signal and road report. 6 P. M., address, weekly health talk given auspices Health Conservation Association; The Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players, Hotel Muehlebach. 8 P. M., program presented by pupils of Anton Seufert teacher of string instruments. 11:45 P. M., (Nighthawk Frolic.) The Plantation Players Hotel Muehlebach.

Thursday, July 17

WMAQ, Chicago, 448m (670k), C. S. D. S. T.—4 P. M., sports results. 6 P. M., Chicago theatre organ recital. 6:30 Hotel LaSalle orchestra. 8 P. M., weekly talk by Rockwell R. Stephens. 8:15 P. M., weekly talk for Boy Scout. 8:30 P. M., recreational talk. 8:45 P. M., weekly investment talk by John English. 9 P. M., garden talk by James H. Burdett. 9:15 P. M., Miss Rose Hummel contralto.

KGO, Oakland, Cal., 312m (960k), P. T.—1:30 P. M., Stock Exchange and U. S. Weather Bureau reports. 6 P. M., stock exchange and weather reports and news items. 8 P. M., Arion Trio. Jose Corral basso, euphonium solos, Ernest Paul Alwyn; Flora Wilson Zimmerman soprano; Ilma Lewton Hill contralto; Mertianna Towler pianist; reading, Casey at the Bat. J. H. Connell; W. M. Dury and Vigil M. Holden guitar duet; Beulah M. Walker, contralto; Louise Haagan, soprano; concert in solo. Antone Tommie; Glen Chamberlain, tenor; saxophone solo, Ernest Paul Alwyn.

KPO, San Francisco, 423m (710k), P. T.—2:30 P. M., organ recital by Theodore J. Irwin. 4:30 P. M., Rudy Seiger's Fairmont Hotel orchestra. 5:30 P. M., children's hour stories by "Big Brother" of KPO. 7 P. M., Rudy Seiger's Fairmont Hotel orchestra. 8 P. M., organ recital by Theodore J. Irwin. 9 P. M., Mme. Natalie Albini, soprano, accompanied by Mme. Anna Ketaeva; program management of Leda Gregory Jackson, soprano. 10 P. M., Bradfield's versatile band.

WDAF, Kansas City, Mo., 411m (730k), C. S. T.—5:50 P. M., marketgram, weather forecast, time signal and road report. 6 P. M., reading, Miss Cecile Burton; The Tell-Me-a-Story Lady; music, Carl Nordberg's Plantation Players, Hotel Muehlebach.

Who Is America's Most Popular Radio Entertainer?

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# Transformers Doubled up for AF

By Charles H. M. White,

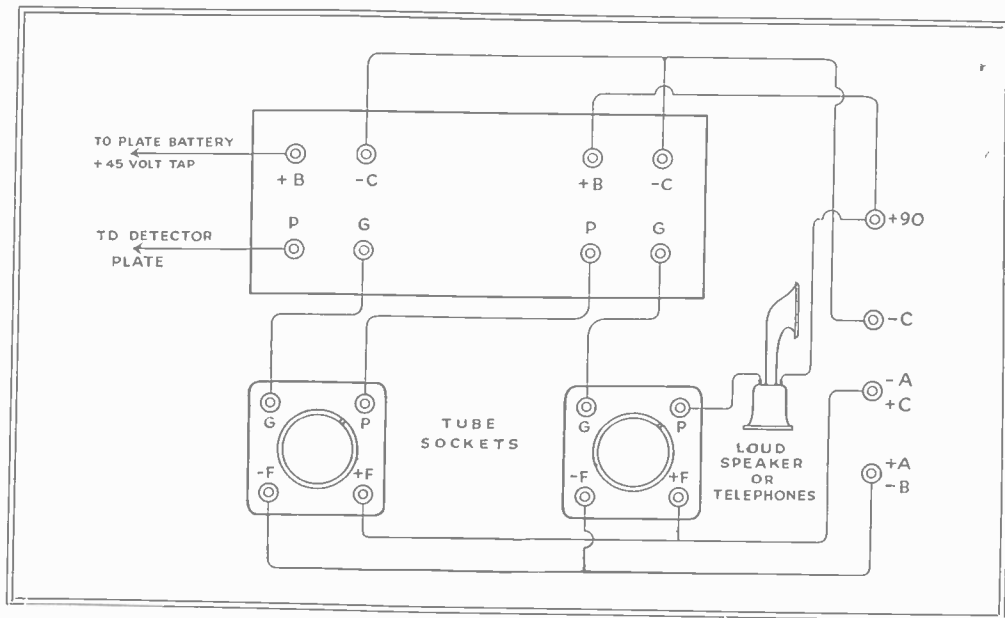
Consulting Engineer

VERY few radio fans indeed realize the extremely good results to be obtained by well balanced audio-frequency amplification. In fact, many literally throw together their audio amplifier part of the circuit and spend much time and pains in perfecting the radio-frequency and the aerial tuning circuits. No matter how sensitive and selective the tuner may be, little satisfaction will be had if the AF is poorly constructed. Recently, however, there has been a marked tendency towards the improvement of audio-frequency amplification. This tendency is mainly marked by the demand for higher grade audio-frequency amplifying transformers in place of poorly constructed and designed units selling for a much lower price. From an engineering viewpoint

audio-frequency presents as serious problems to be mastered as radio-frequency, only the problems as of a slightly different nature. In radio-frequency amplification we want selectivity, but with audio-frequency we do not want selectivity, since we wish to amplify over the entire audio-frequency band because voice currents are composed of frequencies from 200 to 2000 approximately, while music ranges from 15 cycles for the deep base note of an organ to 10,000 cycles to the extreme sigh C of a violin. The problem of keeping the audio-frequency transformer from being selective and still make it sensitive over the entire audible range, that is 15 cycles to 10,000 cycles, is indeed difficult.

Just as there is a marked tendency for a radio-frequency tuned circuit to oscillate, there is a similar tendency for the audio-frequency circuit to do the same. Often this oscillation takes place at an audible frequency, that is a frequency below 10,000 and takes the general form of a howl. Then again, the oscillation takes place at a radio-frequency just past the band of audibility, but, the results are very pronounced in chopping off the peak notes at 10,000 cycles or thereabouts. In other words, an audio-frequency circuit has regenerative principles of feedback which tends to make it selective and more sensitive to one frequency than another. Many radio engineers have tried to cure this tendency by using transformers of different ratios in the first and second stages, but, personally, I am not in strict accord with such practice, since the solution, in my mind, lies in the transformer itself and not the varying of the ratio for the different stages.

Many radio engineers were quick to realize the benefits of high ratio transformers and therefore set about the task to eliminate howls and distortion they often caused. One result is the Peerless Twin-Aud. A Twin-Aud consists of two separate audio-frequency



HOW to hook-up the Twin-Aud (Fig. 1). This is a new type of audio-frequency arrangement, consisting of two AF transformers mounted so as to avoid bad effects from magnetic feedback. The diagram includes C battery connections, the -C going where -A would go if the C battery were not used. The +C is connected to the -A. The + and - posts on the sockets are interchangeable, so that the connection of the -A battery lead to the -F socket post, as shown in diagram, is correct. The two transformers require two tubes, as usual. The socket shown at left is fed by the first AF transformer, constituting together the first stage. The second stage is at right, the P and +B going to the speaker terminals.

transformers mounted on the same sheet-steel transformer core. There is a definite electrical reaction between the fields of the two because of this style of mounting, which can be used to counteract tendency toward oscillation, much the same as negative feedback prevents oscillation in a Superdyne. Quality amplification is thus obtainable over the entire audio-frequency range without tendency toward howling or distortion, making it possible to accomplish with non-power tubes the same power and quality of amplification. The Twin-Aud arrangement also has the advantage of cancelling out quite a bit of tube noise in the same manner as push-pull amplification, and, yet, for volume of tube as well as quality of received note, it is in my opinion superior.

Since the Twin-Aud is nothing more mechanically than two audio-frequency transformers mounted electrically so that their magnetic fields exert a corrective and amplifying effect unobtainable with two separately mounted transformers, the connections are similar to those made with two ordinary transformers. The arrangement, however, makes it possible to assemble the two stages more compactly. As a matter of general practice it is good to use a C battery not only to clarify reception but also reduce the B battery current, which makes your B batteries last longer. The amount of C battery will depend solely on the amount of B battery voltage and the type of vacuum tubes used.

## Extra Condenser Gives Vernier Results

VERNIER results may be obtained by connecting a 3-plate variable condenser in parallel with the condenser or coil that causes you to pass by DX stations without hearing them.

**THOUGHT FOR THE WEEK**—Every so often I just sit and stare at my radio set and marvel at the wonders that it works.



# The Radio University

**A** Question and Answer Department conducted by RADIO WORLD for its Readers by its Staff of Experts. Address Letters to Radio University Department, RADIO WORLD, 1493 Broadway, New York City.

I HAVE a 3-tube regenerative set, using UV199 tubes on dry cells. I have had three of these tubes go almost dead after about 200 hours of use. I find that they can still be used as amplifiers by turning the current on full. They light just the same as when new, but will not work in the detector socket. I am using three No. 6 dry cells to light the filament and about 45 volts on the plate. These batteries last only from 40 to 60 hours, which seems to me to be too little. Where can I look for my trouble? Is it practical to have dead tubes repaired?—George Schmoll, Hartley, Iowa.

Apparently you are using too much current on the filament. You should use a 30-ohm rheostat and burn the tubes just bright enough to bring the signal in with the desired strength. When burned too bright, the tube loses its electron source, and also exhausts the battery too quickly. There are firms that repair tubes. The repaired tubes work quite as well as the new ones in most cases.

In a back number of RADIO WORLD there was published a circuit of a non-radiating regenerative circuit. This appeals to me very much and I would like to have some information on how to build it.—James Ashley, 1948 48th St., Brooklyn, N. Y.

The accompanying diagram, Fig. 23, is the circuit you request. The anti-radiation feature is

so used in the different stages? Also, how many dry cells would have to be used to operate the three tubes? What should be the values of the three rheostats?—Frank A. Kunert, Clarendon Hotel, Zanesville, Ohio.

Although dry cell tubes can be used in the reflex set with UV199s, greater volume is obtained with type 201 A tubes. Dry cells do not give much satisfaction with the 201A because they draw too much current. For three UV199s, nine dry cells, wired in series-parallel, should be used. The rheostats should be 30 ohms apiece.

Please give me the size in diameter of the coil described by Walt S. Thompson, Jr., in his article on the new Metaform system of reception, published in RADIO WORLD for June 21.—H. R. Block, 1411 North 17th St., Philadelphia, Pa.

This same question is also asked by Stuart McKeighan, 12215 Clifton Blvd., Lakewood, Ohio, and C. A. Hansen, 4512 North Artesian Ave., Chicago.

The formers for the windings L1, L2, L3 and L4 are three inches in diameter and four and one-half inches long. The primaries L1 and L3 may be wound directly over the secondaries L2 and L4 respectively.

I have trouble with my 5-tube Neutrodyne, which I constructed from good parts and which covers the radiocast wavelengths effectively. The wiring is No. 12 bus bar covered with cambric tubing.

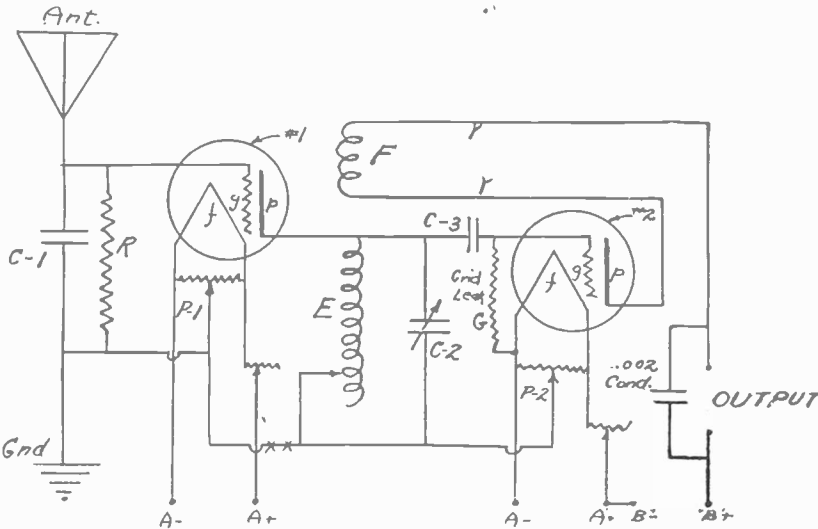


FIG. 23—Circuit diagram of the non-radiating regenerative circuit asked for by James Ashley. The first tube is the muffler and uses a separate A battery supply. There is no B battery connection to the plate of the first tube, but the plate return is connected to the slider arm of potentiometer P-1. This potentiometer affords a means of balancing the grid bias voltage on the grid of the first tube. Sometimes better results are obtained when the wire marked XX is opened, and another 4½-volt battery inserted with the positive terminal connected to the plate side of the circuit.

incorporated in the first tube. This tube is the standard UV199 or C299 and uses a small 4½-volt battery for the filament. No B battery is used on the first tube, but the plate return is connected to the slider on the potentiometer P-1. This potentiometer affords a means of balancing the grid bias voltage on the grid of the first tube. Sometimes better results are obtained when the wire marked XX is opened and another 4½-volt C battery inserted in the plate circuit. The positive terminal of this battery is connected to the plate side of the circuit. To prevent a strong hum the condenser C-1 and leak R are inserted between the antenna and ground. This leak path also shunts out much extraneous noise. The parts designated in the diagram are C-1, .0001 mfd. fixed mica condenser; R, ¼ meg. leak; C-2, 11 or 23-plate variable; C-3, .00025 mfd. fixed condenser; potentiometers P-1 and P-2, 400 ohms apiece; unit C-E-F, 180 degree variocoupler, using the rotor as coil F; UV199 tube provided with suitable grid leak and a 20 or 30-ohm rheostat. Use separate A batteries for each tube. Connect the movable plates to the ground head. It may be necessary to reverse the leads marked YY for best results. A short outdoor antenna will suffice to operate this set with good results. The first tube needs very little filament current. In operation, this circuit gives excellent tone qualities, smooth reception, and although you may allow it to oscillate always, it will never annoy your neighbors.

I have read P. E. Edelman's article on radio tubes in the June 7 issue and note that he says that for operation on dry cells a UV199 tube can be used for the first stage, and UV201A for the second stage of a reflex set. I would like to know if dry cell tubes can be successfully used in the Erla 3-tube reflex set, and what tubes could be

My trouble is that the set works with great power and range on short wavelengths, but has a tendency to go into oscillation there, so that I must reduce the filament current, thereby reducing the volume. On long waves it will not oscillate, but I must increase the filament current a great deal to get results. Also, on the longer waves, volume and distance decreases. I have tried all types of antennae with no good results. What can my trouble be?—Ralph M. Mead, Udall, Kan.

The trouble with your set is that it is not neutralized properly. This is the reason for the circuit going into oscillation on the lower waves. The following is a good method for properly neutralizing the circuit: Tune in on any station, preferably about 300 meters (a bit more or less does not matter). After setting the dials at the loudest point, remove the first tube, starting at the extreme left; place a small piece of paper on one of the socket filament prongs, and replace the tube. The filament should not light now. Next vary the small Neutrodon condenser after the first tube in the cabinet until the signals grow weakest. Do not change the position of the dials during the whole operation. When the weakest signal is heard, fasten the Neutrodon in that position and remove the piece of paper from under the filament prong of the first tube. The first stage is now neutralized. Repeat the same operation with the second tube and second Neutrodon, also without changing the position of the dials. After completing the neutralization, the set is properly adjusted, and your trouble will have disappeared.

Where can I purchase the old type of book condensers?—H. E. Huttig, 1771 N. E. 3rd Ave., Miami, Fla.

Write to the Crosley Manufacturing Co., Cincinnati, O.

# MAGNAVOX Radio Products



A1-R—\$59.00

THIS combination of electro-dynamic Reproducer and one-stage Power Amplifier gives the user the utmost in adaptability, convenience and efficiency.

### Magnavox Reproducer.

- R2 with 18-inch curvex horn \$50.00
- R3 with 14-inch curvex horn \$35.00
- M1 with 14-in. curvex horn. Requires no battery for the field \$30.00

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- AC-3-C—3-stage Power Amplifier \$60.00

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

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# Selznick to Try to Buck R. C. A. on Tubes

## The Radio Trade

*General American Radio to Consolidate Firms. Sets to Be Sold, too, and Parts Manufactured*

WORD was received from Wilmington, Del., of the incorporation of the General American Radio Corporation for \$60,000,000, and caused a sensation in radio trade circles. This is the concern of which Lewis J. Selznick, whose name is most familiarly associated with moving picture production, is president. However the flourishing \$60,000,000 was an unshackled guess such as any one is entitled to make without fear of indictment. The fact is that the incorporation is for 100,000 shares of 7% preferred stock, at \$100 making \$10,000,000, and 500,000 shares of common stock of no par value. Incorrigible optimists at Wilmington gave the no-par value shares a book value of \$100 too with arbitrary confidence, thus adding \$50,000,000 to the \$10,000,000.

The headquarters of the corporation are at 345 Madison Avenue, New York City, where the executives and their staffs are installed in handsome quarters, with a private elevator entrance. At the office a formal statement was emitted giving the list of officers, which RADIO WORLD published a few weeks ago and ending up with a statement by Mr Selznick saying the corporation would consolidate "a number of the most important radio and accessories manufacturers," and that "its business will include the manufacture and sale of various kinds of receiving apparatus, and all parts thereof." Mr Selznick continued:

It will also manufacture non infringing radio vacuum tubes and tungsten filament wire under patents recently issued and now acquired by the corporation."

As for intimate details of the project, no inkling could be obtained at the office. But a friend of a man who knows a doctor who is a friend of a law clerk in the office of a patent attorney interested in the corporation gave some inside information. When this was checked up it was found to conflict not too severely with the verities. This "dope" included the following:

That the tube patent the corporation has acquired is the Yunck patent (which is positively a fact) and that the corporation will buck the R. C. A. in the tube market, selling a 3-element tube at a lower price than the R. C. A. and allied companies.

That the corporation will not manufacture Neutrodyne or other sets that entail license fees for the right to manufacture under such set patents, but will get out principally two-tube and three-tube sets not in this class.

That the common stock will be offered for public subscription.

As for the officers, the chairman of the board of directors is Warren S. Stone.

president of the Brotherhood of Locomotive Engineers. Besides him and President Selznick, the officers are Samuel R. Stone, of Cleveland, and Henry M. Shaw, of East Orange, N. J., vice-presidents; Arthur S. Friend, of New York City, treasurer; A. M. Grill, of New York City secretary. The directors, in addition to the above, are: R. D. Hickok, of Cleveland; A. H. Claus, of Cleveland; Frank Fox, of Cleveland, and Frank H. Shaw, of Montclair, N. J. Nine firms are in the combine.

### Boston Exposition Set for December 1 to 6

EVIDENCE of the rapid stabilization of the radio industry is contained in the announcement that approximately 90 per cent. of last year's exhibitors already have reserved space in the fourth annual Boston Radio Exposition to be held in Mechanics Building the week of December 1 to 6 inclusive. Quadrupled floor space for this year's show also indicates the growth of radio in New England and the popularity of this exposition. The Boston Radio Exposition was the first commercial radio show to be held in the world and has continued under the original management, Sheldon L. Banks, 209 Massachusetts Avenue, Boston, its manager.

### Order Now for Fall Trade

ORDERS for fall merchandise should be placed now. Radio manufacturers who deplore the changes in public taste and hesitate to order raw materials in advance lest they be left on hand should study the clothing trades where a fall line is made up four to six months ahead of the season. Radio sets that work efficiently have nothing to fear in the future. Radio parts that have a purpose and that perform will sell next season as well as they sell at the present time.

Radio accessories that operate with a fair degree of efficiency will sell rapidly in the 1924 season and if merchandise of quality will not become obsolete. Ordering raw materials and parts ahead will not only protect the manufacturer from lost orders because of inability to supply demand but will often work for lower prices because the raw products man can work his force all the year around.

Order now! Insure sales and reduce costs!—THE RADIO DEALER.

### Radio Stocks Brisk

NEW radio stocks are beginning to appear, while the older shares, with the exception of Radio Corporation of America, have been showing pronounced strength. In some of the radio stocks that have been leading recently strength is due largely to technical market conditions.

## New Corporations

Witherbee Battery Corp., Wilmington, Del., manufacturing, \$1,000,000. Corporation Service Co. Intervale Radio Corp., Bronx, New York City, \$5,000. H. Langfelder, S. Dombro S. Stimmer Attorney S. Fertig, 320 Broadway, New York City. Eureka Battery Co., New York City \$10,000. J. Guarino, Dr. R. Shapiro, J. Piscione Attorneys, B. Eskwitt, 51 Chambers St. Dual Loud Speaker Co., New York City, \$25,000. B. Weinberg, S. L. Weyl. Attorney, I. I. Kremer, 233 Broadway.

Radiotive Corp., Brooklyn, N. Y., make radios. \$1,000,000. W. P. Graham, L. and L. Schmidt, Jr. Attorney, S. Graham, 217 Broadway, New York City.

Philadelphia Technical Institute, Wilmington, Del., \$500,000. Corporation Service Co.

Gould Radio Stores, New York City, \$20,000. M. I. Gould, E. V. Alkhus, W. S. Walters. Attorney, E. Morganlander, 1140 Broadway.

Marathon Radio Corp., Wilmington, Del., \$500,000. Corporation Service Co.

Walker Evans Radio Corp., Brooklyn, N. Y., \$20,000. J. C. Hind, R. J. Gorman, S. C. Wood. Attorney, S. Ryan, Albany, N. Y.

Manhattan Art Radio Cabinets New York City, \$20,000. F. Giannini, C. and V. George. Attorneys, Goldsmith and Faenkel, 52 William St., New York City.

Radio Electric Clock Corp., Wilmington, Del., manufacturing, \$1,000,000. Corporation Trust Co. of America.

## Coming Events

JULY 7 TO 12—Radio show Bangor, Me., auspices R. C. A.

JULY 21 TO 26—Radio show Burlington, Vt., auspices of R. C. A.

AUG. 16 21—Radio Exposition San Francisco, conducted by Pacific Radio Trade Association

SEPT. 22-28—First Annual International Radio Show Madison Square Garden New York City.

OCT. 2 11—Exposition Grand Central Palace, New York City under auspices of American Radio Exposition Co.

NOV. 3-8—Third Annual National Radio Show, Grand Central Palace S. L. Rothafel (Roxy) and his gang will broadcast from the convention

NOVEMBER 24 TO 30 INCLUSIVE—International Radio Week

DECEMBER 1 TO 6 INCLUSIVE—Boston Radio Exposition Mechanics Building Boston

## Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

RADIO VACUUM TUBE SHOP, in active production complete modern equipment, perfect condition convenient location, low rent; large, light, airy quarters; very low price. A. B., Radio World

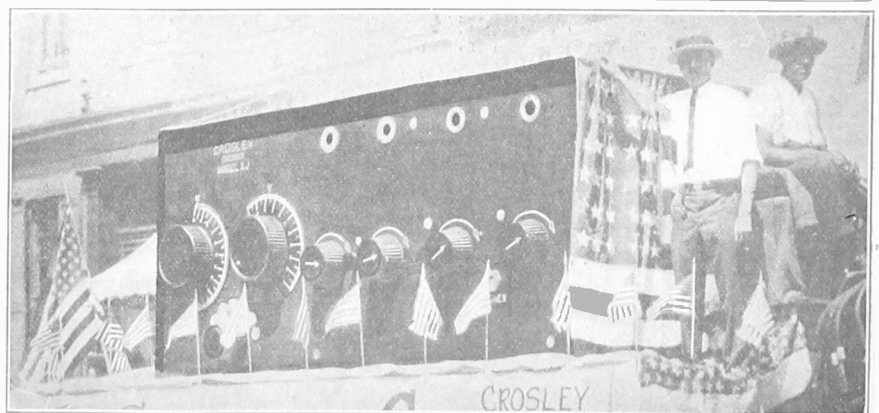
PATENT FOR SALE—Recording device for tuning radio sets; necessary today; big opportunity bookbinders, printers or anybody in radio line. C. D. Radio World.

HAVE 4 highly improved radio parts; require \$8,000 to finance; can get large orders; patent pending. I. F. Radio World

## S-U-P-E-R-D-Y-N-E SPECIALISTS

Our Own Coils—guaranteed..... \$6.50  
Kit (Flewelltag Condensers, Coils and Diagram)..... 19.50  
Complete Parts, Assembled with Diagram... 65.00  
Superdyne Advice Free. Mail Orders Solicited.

WALLACE RADIO COMPANY, Inc.  
135 LIBERTY STREET NEW YORK CITY

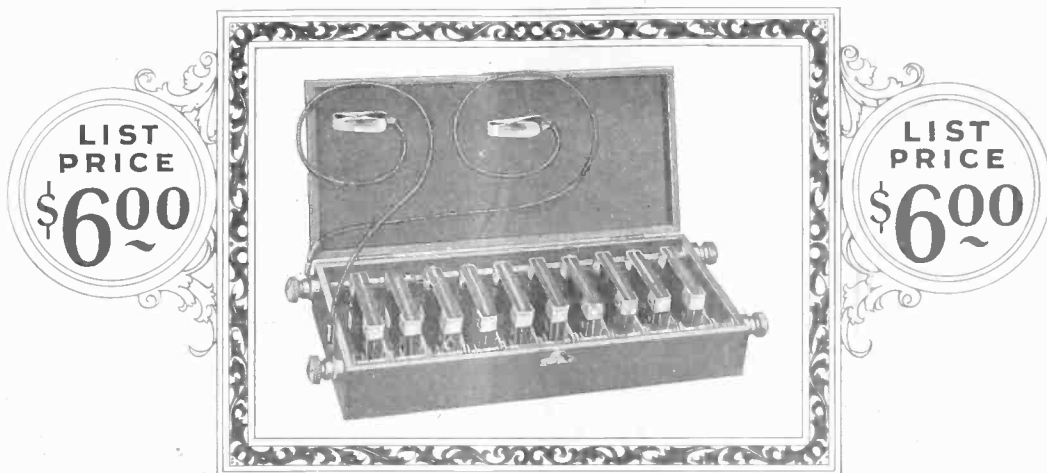


(Keystone)

IN NASHVILLE, TENN., the Crosley agent had a workable set on parade during radio week.



# The **PEERLESS** KONDENSER-KIT



Know the capacities for all circuits—don't guess them. The Peerless Kondenser Kit eliminates the purchase and use of wrong condensers by enabling the experimenter to determine in advance the exact capacities required for best results.

By means of the flexible leads and clips provided it is a simple matter to determine quickly and accurately by trial what capacity gives the best results at any point in a circuit.

The condensers in the Kit can be permanently connected in any circuit, and may be used wherever fixed condensers are necessary. Peerless condensers may be purchased individually to replace any taken from the Kit.

Peerless  
Condensers  
adaptable to  
all mountings.  
They are  
provided  
with tabs for  
soldering.

**THOROUGHLY  
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## The Kondenser Kit

includes

10 thoroughly tested constant capacity low loss mica condensers.

2-.001 mfd.	1-.001 mfd.
2-.002 mfd.	1-.002 mfd.
2-.005 mfd.	1-.003 mfd.

1-.005 mfd.

Total capacity .0126 mfd.  
Adjustable in .0001 mfd. steps.

Peerless  
Condensers  
can be used with—  
Grid Leaks  
As series Antenna  
Condensers  
Telephone Condensers  
By-Pass Condensers,  
Etc.

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GUARANTEED**

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EVERY SET TESTED BY LICENSED RADIO OPERATORS

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Scientific

# What's Doing at the Radiocast Stations

A NEW Western Electric five-kilowatt transmitter has been ordered for WSAJ, Cincinnati. The apparatus will be so adjusted that it will be possible to use two and one-half and one kilowatt instead of

the full power. The new set will be "on the air" in the early fall. Arrangement made with the new Cincinnati station, WMH, will change radiocasting time for WSAJ. The new schedule follows: Monday, 10-12 P. M.; Tuesday, 7-10 P. M.; Thursday, 10-12 P. M.; Saturday, 8-10 P. M. and midnight; Sunday, 3 P. M., Central Daylight Saving Time.

7:30, from 8:30 to 9:30 and from 10:30 to 11:30. The time listed above is for weekday operations. On Sunday WEBH will be on the air from 4 until 5 o'clock and from 6 until 8 o'clock.

COSMOPOLITAN PHUSIFORMER

*"The Missing Link in Radio"*

15-17 WEST 18th ST. NEW YORK

\* \* \*

STATION WWJ reports that more than 30,000 listeners are participating in the setting-up exercises which are broadcast every morning at 9 o'clock, Eastern Daylight Saving Time.

BRISTOL AUDIOPHONE

MORE THAN A LOUD SPEAKER

Bristol Audiophone, Sr., 15-in. Horn..\$38.00  
 Bristol Audiophone, Jr., 11-in. Horn..\$22.50  
 Bristol Single Stage Power Amplifier.\$25.00

Write for Bulletin 3006-W  
**The Bristol Company**  
 Waterbury, Conn.

\$25 FOR \$10

THE FAMOUS BEL-CANTO

ACOUSTICAL LOUD SPEAKER

Direct from Factory to You.  
 Delivered free C. O. D. to your door.  
**Bel-Canto Mfg. Co.**  
 General Office and Factory: Dept. R.W.,  
 417-419-421 E. 34th St., N. Y. City  
 Telephone Vanderbilt 8969

\* \* \*

STATION WCBX, Newark, discontinued radiocasting during the remainder of June, July and August, during which time extensive alterations will be made to the studio and apparatus. Broadcasting will be resumed on September 1.

ACME

for amplification

Latest Developments in the SUPERDYNE CIRCUIT

In Text and Diagrams

RADIO WORLD dated May 17, 24 and 31 contains a series of three articles covering all the angles of the famous Superdyne Circuit. The original Superdyne Circuit articles appeared in Radio World last December, and the three issues in which they appeared are now completely out of print. That is the reason why we have published the Superdyne series in the May 17, 24 and 31 issues. 15c. per copy, three for 45c., or start your subscription with any number.

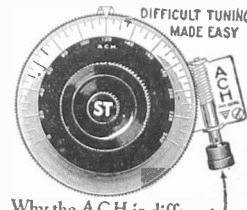
SPECIAL SUBSCRIPTION: Send \$8.00 for one year's subscription and we will send you our issues of May 17, 24 and 31 as a premium.

RADIO WORLD, 1493 Broadway, N. Y. City

\* \* \*

THE CITY OF MILWAUKEE is now operating Station WCAV. The cost of operation is being defrayed by ten firms in the city, each of whom contributes \$2,500 annually. Included in the plans for better programs is the establishment of an artist financing fund.

ACH SHARP TUNER



DIFFICULT TUNING MADE EASY

Why the ACH is different

3 in. DIAL \$2.50 (150-10-1)  
 4 in. DIAL \$5.00 (210-10-1)  
 5/16 REG. 1/4-3/16 BUSHINGS 35 EACH

Send for Circular D

A. C. Hayden Radio & Research Co.

Brockton, Mass., U. S. A.

\* \* \*

WEBH and WGN, Chicago, were operating at the same hours, WEBH on a 370-meter wavelength and WGN on a wavelength of 360 meters. Under a time adjustment WEBH will be on the air each night except Monday, which is silent night by agreement of Chicago stations, from 7:30 to 8:30, from 9:30 to 10:30 and from 11:30 to 12:30. WGN will be on during the day with market reports, and will operate on a program basis from 6:30 to

# Reception Conditions Figure As Factor In Real Estate

THAT the value of a home site is affected by its efficiency as a radio receiving point is shown by the following advertisement which appeared recently in a

New York City newspaper: "Farm for sale; nine-room house; fruit; 2 hours by rail from New York; excellent radio reception, KGO being heard consistently on one-tube set. Price —, Box —." More space was devoted to radio than to description of the property.


New Yorkers building homes in the suburbs frequently inquire how their favorite stations come in before purchasing home sites, according to real estate men.

One prominent attorney, however, was not satisfied with the realtor's assurance. His present home is located in a Westchester suburb, but he suffers from interference from a mysterious source of induction. Before building his new home he secured a loop receiver, mounted it in his car and spent an evening listening in, so as to be certain that the new location would be a first-class receiving point.

Perhaps some day travelers will be mystified by groups of abandoned homes, until it is explained that residents found it necessary to move elsewhere because radio reception at these points is unsatisfactory.

## PEIRCE SCHOOL

of Business Administration.




Two-Year Business Administration Course (college-grade) contains as many credit hours of instruction as usual college course of four years. One who takes this course is therefore ready for business two years sooner than one who takes a four-year course.

Accounting Course prepares for C. P. A. examinations. Executive Secretary Course. Stenographic Secretary Course.

Pleasant living accommodations; both sexes. 60th Year Book. Six weeks' Summer School—June 20 to August 8.

PEIRCE SCHOOL OF BUSINESS ADMINISTRATION  
Fine Street, West of Broad Philadelphia



## ULTRADYNE

the improved Super-Heterodyne. Send 50c for book giving complete details of drilling, assembling, wiring and tuning 6 and 8 tube ULTRADYNE Receivers.

50c

Phenix Radio Corp., 5-9 Beekman St., N. Y. C.

## RADIO MAP FREE

Big Broadcasting Station List. Also Radio Bargain List. Just Out.

# The RADIO SHACK

America's Largest Radio Dealers  
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10c Brings You Our New 48-Page Radio Catalog Includes Thousands of Unequalled Radio Bargains



Send a dime for your copy, today!

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Dept. W6, 500 South State Street  
CHICAGO

## NEW PATENTS

No. 1,496,768, Patented June 10, 1924. Walter A. Boyd and William T. Booth, Brooklyn, N. Y., and East Orange, N. J., assignors to Western Electric Co., New York. Vibration reducing mounting device.

This invention relates to means for mounting electric discharge devices such as vacuum tubes or equivalent elements, particularly for mounting vacuum tubes upon vehicles or in other places where they are subject to shocks, jars or vibrations.

It has been found that the electrodes of vacuum tubes as they are usually constructed almost always tend to act as vibratory systems with small damping factors. In a single vacuum tube there are in some instances two control electrodes or grid elements, two cathode elements and an anode consisting of two or more filament sections. Since any relative movement of the electrodes or parts thereof varies the output or space current which passes in a circuit including the cathode and anode of such a tube, it is seen that shocks or vibrations impressed upon the tube so as to cause the several electrodes to vibrate in their several respective periods will cause troublesome noises in a telephone bridged across the output circuit of the tube. Especially is this true when several amplifier tubes are connected in tandem, when each tube in addition to amplifying the current variations of the preceding tube will add a series of variations due to the vibrations of its own elements. The trouble due to vibrations of the electrodes is not limited to tubes in tandem, but is usually present where vacuum tubes are mounted on any solid structure subject to vibrations, such as an aeroplane or boat. The invention is equally applicable to tubes used as amplifiers, detectors, generators, modulators, or for other purposes.

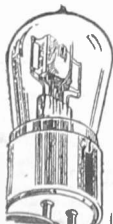
The object of this invention is to produce a practical structure to overcome the difficulties mentioned.

"Can't Lose 'Em"



Bakelite, Engraved, Nickel-plated with Inco Panels Cut, Drilled, Engraved  
Dealers Write for Terms  
CORTLANDT PANEL ENGRAVING CO.  
31 Cortlandt Street New York City

## Burnt-Out Tubes Replaced for \$2.50



A Wonderful Tube for Your Superdync.

The Only Tube with a written Replacement Guarantee Against Breakage or Blowout.

Burnt-out, Defective or Broken Tubes of any brand or make whatsoever will be replaced by a brand new (not refilled) Royaltron Tube, at a cost of only \$2.50.

It is with the Object of Advertising the MERITS of ROYALTRON Tubes, that we make the above unusual offer.

ROYALTRON TUBES TYPES 199 (.88 Amp.) WD12 (¼ Amp.) 200 (¼ Amp.) 201A (¼ Amp.)

Every ROYALTRON Tube is accompanied by a money-back guarantee.

Approved by the Radio News and World Laboratories

ROYAL MANUFACTURING CO. Department W. O. 206 BROADWAY NEW YORK  
Dealers, Distributors and agents, write or wire immediately for unusual proposition.

# The "Goode" Two-o-One



Le Ton d'argent

Guaranteed



BY MAIL ONLY

\$2.39

Postpaid

## QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits

ONE—"Goode" Detector-Amplifier ..... \$2.39  
THREE—"Goode" Detector-Amplifiers ..... \$6.42  
(All postage prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, standard base silvered tube.

Send express or postal money order or New York draft to—

The Goode Tube Corporation

Incorporated  
EVANSVILLE INDIANA

M. B. SLEEPER RADIO DESIGN & CONSTRUCTION FOR EXPERIMENTERS, REFLEX & RADIO FREQUENCY, \$1.00. The Columbia Print, 1493 Broadway, N. Y. C.

# Convention Was First Radio Marathon

By Harry, the Office Boy

THE Democratic Convention proved to be the first radio Marathon in history, aside from being the first radiocasting of a Democratic Presidential Convention. The radio fans had the better of it by far, as delegates in considerable numbers had to hie themselves home before a candidate was selected, due to troubles at home and in the purse. But the radioists had a fine feast of enjoyment, listening to the exciting totals, the brazen band and the purling voice of the regular station announcers interrupting the conventional raucous voices from Madison Square Garden. And purse difficulties never diminished the fan's fun at all. The convention required only a little extra drain on the A and B batteries to keep the tubes oscillating, and the B batteries stood up inexpensively well if the familiar C battery was inserted with the C+ going to the A— and the C— to the F of the AF transformers. This gave the proper grid

bias, and a little bias was quite apropos when listening in on the convention.

The great event eclipsed in interest anything that had taken place for the edification and diversion of the radio audience since Noah radiocast a call for fish, fowl and flesh to attend the convention in the Ark. While it was untrue that many candidates for the candidacies debated at the Garden were disqualified by passing the age limit, due to the protraction of the balloting, it was true that persons who got their first set, just to hear the convention, were experienced radioists and subscribers to RADIO WORLD before the final adjournment was welcomed!

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Or use the lighting current, and warn the power company to be prepared for a long siege.

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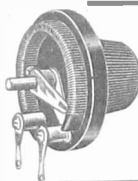
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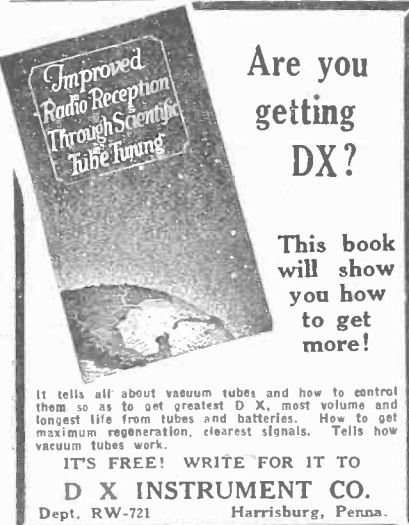


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By Harry, the Office Boy

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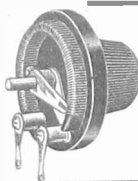
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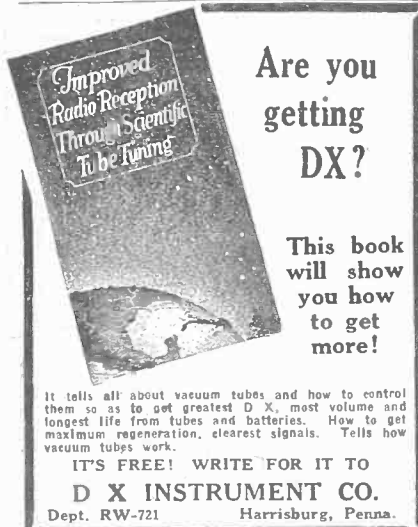
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# How England Solves Radiation Problem

**LONDON.**  
**THE British Broadcasting Company, Ltd.,** which has a monopoly of broadcasting in England, under its charter, while occupying a semi-official position, is yet a commercial undertaking. The listeners-in are

its customers, but the Broadcasting Company has no authority to enforce the regulations other than through the Post Office, from which branch of the Government it obtains its authority to operate.

The Postmaster General, by whom licenses to operate receiving sets are granted, issues certain regulations which are printed on the reverse side of the licenses. Under these circumstances, the attitude of the British Broadcasting Company has been purely educational. They commenced by having a brochure printed in very large numbers, explaining re-radiation and oscillation. The text of this brochure follows:

interfere just as badly as any other if the reaction coil is too tightly coupled. It can also oscillate without a reaction coil. Keep down the coupling between stray leads to avoid this, and avoid stray wiring everywhere.

It is not in the scope of this article to go more fully than this into the subject, but if from the above you find you are oscillating, please, for the  
*(Concluded on next page)*

**IS YOUR NEUT RIGHT?**  
 To revitalize unneutralizable Neutrodyne, we devised this Kludag Coast-to-Coast Circuit. Uses same panel, etc., as Neut, except three less parts. Merely rewire. Success certain. Necessary stabilizer, 23 feet gold sheathed wire, circuit and complete, simple instructions—\$5.00 prepaid. Many have already rebuilt their Neuts—and written wonderful testimonials. Thousands will do it. Be FIRST—have the finest five tube set in your neighborhood, revitalize others' Neuts. Description, etc.—10c. Radio Lists—3c. Stamps accepted.  
**KLADAG LABORATORIES, Kent, Ohio**

**PRE-AMPLIFIER**  
 A Radio Frequency Amplifier of TREMENDOUS POWER Gets distance, volume, less static. Attachable to any receiving set. Price complete with tube, \$25.00. Send for Circular  
**S. A. TWITCHELL**  
 1930 Western Avenue Minneapolis, Minn.

**THOUSANDS** find it profitable to buy from us direct by mail. Build your set, using standard parts at the lowest New York prices.  
**SEND FOR PRICE LIST**  
**DIXIE RADIO COMPANY**  
 133 7th Ave. New York City

**SOMETHING NEW**  
 Green Radio Applause Cards Bound in Book Form with stubs on which records of Radio Artist are kept after card is detached and sent, a Log Book and Card combined, all for 1c. 25 CARDS 25c. Sent by mail postpaid. No stamps. Address  
**PLATTSBURGH RADIO SUPPLY CO.**  
 PLATTSBURGH, N. Y.  
 DEALERS: Write for sample and terms.

**COAST TO COAST**  
 Every Turn **STAR** No Soldering  
 A Tap **COIL**  
**SEND FOR LITERATURE**  
**STAR RADIO PRODUCTS CO.**  
 711 S. DEARBORN ST. CHICAGO, ILL.

## What Reaction Means By P. P. Eckersley

Chief Engineer of the B. B. C.  
 I should like to try and explain exactly, and in simple words, what reaction means.  
 1. The terms reaction, oscillation, heterodyning, howling, mean the same thing.  
 2. Any valve (tube) receiver may be made to oscillate, and so cause interference by reaction, oscillation, heterodyning, howling, etc. A crystal set can never offend. When a valve receiver is handled in this way, it may cause a howling noise in every receiver in an area of 75 square miles around the offender.  
 3. If a howling noise is heard in your own receiver, it may be you, or it may be someone else. To test if it is you, perform the following operation:  
 Alter the tuning of your aerial and listen to the howl. If the howl changes its note sympathetically with your tuning, it is you. If the intensity only of the note changes, it is not you.  
 4. Reaction occurs on a set by the following means:

**A Single Valve Set**  
 A coil is connected in the lead from the high-tension battery to the anode (grid) of the valve via the phones. This coil is coupled variably to the aerial circuit. The tighter the coil is coupled, the louder the signals up to a point (and provided the set is working properly).  
 After a certain degree of coupling is obtained, the set will oscillate and cause howling, and the signals will be distorted. It is useless to use too much reaction, both from your point of view and that of your neighbors.

**A Two Valve Set**  
 Use only reaction on the second valve, if you must use it. The reaction coil is coupled to the tuned anode circuit inductance. This circuit can

**Perpetual Radio Fuse \$2.50**  
 \$100.00 reward if you can blow your tubes with this protector in your circuit according to our instructions. **SUPER ULTRADYNE** Transformers, complete set including blue print.....\$16.00  
**ULTRA SYNCHRODYNE** Coils, set of three...\$7.00  
 Including blue print. With condensers.....\$17.00  
**DEALERS and JOBBERS**, we have an attractive territory proposition.  
**THE STANLEY RADIO COMPANY, Manufacturers**  
 2947 Lorain Avenue Cleveland, Ohio

**RADIO CRYSTALS**  
 MOUNTED, UNMOUNTED, BULK  
 Packed under your own label if desired.  
 Dealers and Jobbers—Write us for lowest prices on Quality Crystals.  
**MELODIAN CO. OF AMERICA**  
 INDEPENDENCE, MISSOURI

**RADIO RECORD**  
 Keep a permanently bound record of all stations you have received and how you received them. Radio Record 5 1/2" x 14"—600 lines. All broadcasting stations listed, and indexed with space for new stations—\$1.00 Postpaid.  
**THE BEADLE PRINTING CO.**  
 MITCHELL SOUTH DAKOTA  
 Applause Cards 60 for \$1.00 Postpaid.

**\$15 Set Gets 2,000 Miles**  
 The Essex Radio Special, the receiving set with a condenser, sets you more distant stations clearer and sweeter than sets costing ten times its price. \$15 Set complete with cabinet, without tube or batteries. \$20 Set complete with cabinet, tube and batteries.  
**ESSEX RADIO SERVICE**  
 617 West 125th St. New York  
 Detailed information on request.

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 How to obtain a patent and other valuable information is supplied in our FREE Booklet. Write for a copy today  
**MANUFACTURERS PATENT CO., Inc.**  
 70 WALL STREET, NEW YORK

**Free Mailing Lists**  
 Will help you increase sales. Send for FREE catalog giving counts and prices on thousands of classified names of your best prospective customers—National, State and local—Individuals, Professions, Business Concerns.  
 99% Guaranteed by refund of 5¢ each  
**ROSS-Gould Co.** 313 N. 10th St. St. Louis

## For Your Summer Vacation and For New Subscribers Only Subscribe NOW and Receive Another Radio Publication Without Extra Cost

- Radio World has made arrangements
- to offer a year's subscription for
  - any one of the following publications
  - with one year's subscription for
  - RADIO WORLD;
  - RADIO NEWS or
  - POPULAR RADIO or
  - RADIO BROADCAST or
  - WIRELESS AGE or
  - RADIO DEALER or
  - RADIO (San Francisco).
- This is the way to get two publications
- for the price of one;
  - Send \$6.00 today for RADIO WORLD
  - for one year (regular price)
  - for 52 numbers)
  - and select any one of the other
  - six publications for twelve months—
  - Add \$1.00 a year extra for
  - Canadian or Foreign postage.
  - Present RADIO WORLD subscribers
  - can take advantage of this offer by
  - extending subscriptions one year NOW.
  - Or order thru your newsdealer.

**RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK**  
 RADIO WORLD, 1493 Broadway, New York City.  
 Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers, beginning ..... and also without additional cost, Radio News, or Popular Radio, or Radio Broadcast, or Wireless Age, or Radio Dealer, or Radio for twelve months, beginning ..... Put a circle around the other publication you want.

Indicate if renewal  
 This Offer Good  
 Until  
 July 25, 1924

Name .....  
 Street Address .....  
 City and State .....

# How to Test Oscillation

(Concluded from preceding page)

sake of the enjoyment of hundreds of others around you, take steps to stop it.



## WE REPAIR RADIO TUBES

WD-11	.. \$2.50	DV-2	.. \$2.50
WD-12	.. 2.50	DV-6A	.. 2.50
UV-200	.. 2.50	UV-199	.. 2.50
UV-201	.. 2.50	O-299	.. 2.50
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6 v. Plain Detector	..... 2.50		
6 v. Plain Amplifier	..... 2.50		

Mail orders solicited and promptly attended to.  
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Clinton-Hill Station Newark, N. J.

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### THAT GOT SCOTLAND

Build Your Own "Rolls-Royce"

#### SPECIAL KIT OFFER

Kit comprising 3 Reams Intermediate Transformers, 1 Ream 10,000 meter Coupler, 1 Ream Oscillator Coupler. **\$39.50**

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If your dealer cannot supply you, send his name and your remittance direct to

#### SUPER-SALES-SERVICE

Mail Order Department: 214 WEST 34th STREET  
Factory: 112 CHAMBERS STREET  
NEW YORK CITY

FREE! Descriptive Catalogue on request.

## THEY'RE SHOT!

That's the common expression when using dry "B" batteries. Purchase the economy way. Put together a "Hawley" rechargeable "B" storage battery at dry cell prices. These are put up in various size units by the oldest and largest pioneer dealer in this line and consist of everything for the actual construction of battery with the highest quality material such as special flat bottom glass cells, rubber stoppers, etc., together with large size Edison elements. Sold on an unconditional guarantee of greater volume, clearness and satisfaction or your money refunded with no ifs nor ands. An 8-page illustrated folder of instructions showing simple putting together, making of charger and charging free with all orders. Complete units as follows: 22 volt, \$2.95; 45-volt, \$5.75; 90-volt, \$8.95; 100-volt, \$9.95; 135-volt, \$12.75; 200-volt, \$17.95. Complete sample cell \$5 prepaid. Wanted dealers to write. "A" batteries at special prices. Order direct or write for my literature and 30-day trial offer and guarantee. Orders shipped same day received. B. W. SMITH, DANBURY, CONN.

## "ROLLS ROYCE"

### RADIO TUBES



Like their name, significant of quality. Durable and powerful. Bring in distance with a maximum of volume and clearness.

- Type 200—5 volts, 1 ampere Detector Tube
- Type 201A—5 volts, .25 ampere Amplifier and Detector
- Type 195—3-4 volts, .06 ampere Amplifier and Detector
- Type 199—3-4 volts, .06 ampere With Standard Base—Amplifier and Detector
- Type 12—1 1/4 volts, .25 ampere Platinum Filament—Amplifier and Detector

of Radio Tubes' **\$2.50**

ALL TYPES

Type 202 Five (5) Watt Transmitter.....\$3.00  
**EVERY TUBE GUARANTEED**  
to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super Heterodyne Sets.  
Shipped Parcel Post C. O. D.  
When ordering mention type.

**Rolls Royce Tube Co.**

21 Norwood St. Dept. W Newark, N. J.

If in trouble, consult your local Radio Society.

### Don'ts for Listeners

- Don't do it.
- Don't think that a two-valve set with reaction on the second valve will not interfere. Without special precautions, it will.
- Don't tune in a station by receiving its howl first, tuning to the silent point, and then relaxing the reaction coil.
- Don't have a set that can only be adjusted in this way, unless it is guaranteed by the makers not to offend.
- Don't have a home-made set that has not got an adequate factor of safety, and therefore requires intense reaction.
- Don't, PLEASE, do it.

### Supplementary Information on Oscillation

Briefly, the following is the way to test if you are oscillating:  
You hear a howl in your phones or loud speaker.

If the note of the howl varies sympathetically with the movement of the handles on your set you are oscillating; the note (or pitch) of the howl will be chiefly influenced by your tuning adjustment (probably a condenser or variometer).

If the note of the tuneful howl varies with your tuning adjustments it is you. Twist your adjustments so that the howl vanishes. If broadcasting is not on you can't howl, but you can tell if you are oscillating by tapping the aerial with your finger. If you are oscillating you will hear clicks in the phones, rubbing the finger on the rough part of the terminal will give a rasping sound. This is a good test to try adjustments when broadcasting is not on—and will help you to find out what makes your set oscillate.

Numerous letters complaining of oscillation have been received by the Broadcasting Company. As regards London they are all carefully plotted, and a copy is sent in each case to the Radio Society of Great Britain for the local society. If either of these bodies has any experienced individual on the spot, he is asked to go to the house of the complainant and advise him. Often, of course, it is a question of altering an aerial; at other times the situation is such that there is little that can be done.

As regards the number of complaints, the proportion is reported to be extraordinarily small. A form was put into the organ of the Broadcasting Company—the Radio Times—asking for information as to oscillation. Although this paper has an issue comparable with the number of license holders, only some 600 or 700 complaints were returned. Some districts are now very much worse than others, and notably where there is a large residential population with detached or semi-detached houses, with small gardens, where it is only possible to fix the aerials parallel. But owing to the amicable way in which the matter has been treated, it is thought that the trouble is gradually being cured, and while of course there will always be a certain amount of obstruction to the broadcasting, where possible, obstruction is being removed.

[The above information was obtained by RADIO WORLD through the courtesy of Robert B. Macatee, American Consul in London.]

## Jester's Dictionary

- DISTANCE**—Something that will make prevaricators of us all.
- GROUND WIRE**—A wire used to anchor one's set firmly to terra firma. Compare ground hog.
- GRID LEAK**—The common cause for sloppy reception and appearance of some radio sets.

The Ultimate Radio Receiver

## THE FLEX-O-DYNE CO.

1674 Broadway (At 52nd St.)  
New York, N. Y.

Circle 4569

## MAHOGANITE and BLACK RADION PANELS

DIALS, KNOBS, TUBING, SOCKETS MAHOGANITE BINDING POSTS

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ALL STOCK SIZES

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Send for Complete Price List

New York Hard Rubber Turning Co.  
212 Centre Street New York City

## "GET HASTINGS, NEB."

We Will Mail Free the Hook-up of

### "Killoch Kilo Koupler"

Most Wonderful Coil

A CIRCUIT WELL WORTH WHILE!  
Send a two-tube set, one stage of R. F., using neutrodyne principle, and detector. Full details in Radio World, issue April 12. Send 15 cents.

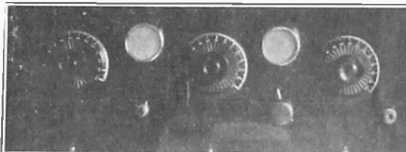
#### David Killoch Company

Dodge Building, 45 West Broadway  
Corner Park Place, New York City

## HOW TO MAKE THE

? ? ? ? ? ? ?

What shall we call it?



After a great deal of experimenting and testing, we have evolved what is undoubtedly the most sensitive, most selective, and most satisfactory two tube receiver which has ever been designed. In fact, it is more sensitive than any three tube receiver, more so than all but a few, a very few, four and five tube receivers.

The receiver uses but two tubes, and yet it is extremely sensitive, equal in this respect to the five tube tuned radio frequency receivers such as the neutrodyne. By that we mean that under ordinary good conditions, the receiver will bring in stations from all over the country on the loud speaker! And with but two tubes!

**SELECTIVITY.** No more selective receiver has ever been made. Local stations may be tuned out, and stations a thousand miles or more can be tuned in without the least interference, even if their wavelengths are but a few meters apart.

**STONE.** A crystal detector is used, and as a consequence, the tone is perfect. There is no howling, and no radiation.

**PRICE.** At the cost of an ordinary two tube receiver, you can make this super-sensitive, super-selective super receiver. In the directions, instructions are given, so that with a little work, and at no cost, you can use low priced apparatus, and so change this, that it is equal in efficiency to the highest priced equipment. This alone is worth the price of the direction many times over.

If you are going to build a receiver, if you build receivers for others, or if you are going to build any kind of a receiver, you should order today.

We sell the complete outfit of parts for this receiver, assembled, ready for wiring, or we sell the receiver, ready for operation, with a guarantee of perfect results.

When you order your directions, suggest a name for this wonderful receiver. As soon as a satisfactory name is received, we shall present to the person who suggested it, one of these receivers, made from the best parts which money will buy. Will you be the winner? Order now!

**PRICE**—Complete instructions, hook-up, diagrams, etc., etc.

**\$1.50**

Dealers! Write us for prices on this lightning seller.

## The Biltmore Radio Co.

Dept. W-4

Boston 30, Mass.

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Bound in Book Form

with stubs on which records of Radio Artist are kept after card is detached and sent, a Log Book and Card combined, all for 1c. 25 CARDS 25c. Sent by mail postpaid. No stamps. Address

**PLATTSBURGH RADIO SUPPLY CO.**

PLATTSBURGH, N. Y.

DEALERS: Write for sample and terms.

## COAST TO COAST

Every Turn **STAR** No  
 A Tap **COIL** Soldering

SEND FOR LITERATURE  
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## What Reaction Means By P. P. Eckersley

Chief Engineer of the B. B. C.

I should like to try and explain exactly, and in simple words, what reaction means.

1. The terms reaction, oscillation, heterodyning, howling, mean the same thing.

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Alter the tuning of your aerial and listen to the howl. If the howl changes its note sympathetically with your tuning, it is you. If the intensity only of the note changes, it is not you.

4. Reaction occurs on a set by the following means:

### A Single Valve Set

A coil is connected in the lead from the high-tension battery to the anode (grid) of the valve via the phones. This coil is coupled variably to the aerial circuit. The tighter the coil is coupled, the louder the signals up to a point (and provided the set is working properly).

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\$100.00 reward if you can blow your tubes with this protector in your circuit according to our instructions. **SUPER ULTRADYNE** Transformers, complete set including blue print.....\$16.00  
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- RADIO NEWS** or
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This is the way to get two publications

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- six publications for twelve months—
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**RADIO WORLD**, 1493 Broadway, New York City.

Enclosed find \$6.00, for which send me **RADIO WORLD** for twelve months (52 numbers, beginning ..... Put a circle around the other publication you want.

Indicate if renewal

This Offer Good

Until

July 25, 1924

Name .....

Street Address .....

City and State .....

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O-301	.. 2.50	C-301A	.. 2.50
DV-6	.. 2.50	Marconi	.. 2.50
DV-1	.. 2.50	Moorhead	.. 2.50
6 v. Plain Detector	..... 2.50		
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- Type 200—5 volts, 1 ampere Detector Tube
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- Type 12—1 1/4 volts, .25 ampere Platinum Filament—Amplifier and Detector

of Radio Tubes' **\$2.50**

ALL TYPES

Type 202 Five (5) Watt Transmitter..... \$3.00  
**EVERY TUBE GUARANTEED**  
 to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super Heterodyne Sets.  
 Shipped Parcel Post, O. O. D.  
 When ordering mention type.

**Rolls-Royce Tube Co.**

21 Norwood St. Dept. W Newark, N. J.

If in trouble, consult your local Radio Society.

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 You hear a howl in your phones or loud speaker.

If the note of the howl varies sympathetically with the movement of the handles on your set you are oscillating; the note (or pitch) of the howl will be chiefly influenced by your tuning adjustment (probably a condenser or variometer).

If the note of the tuneful howl varies with your tuning adjustments it is you. Twist your adjustments so that the howl vanishes. If broadcasting is not on you can't howl, but you can tell if you are oscillating by tapping the aerial with your finger. If you are oscillating you will hear clicks in the phones, rubbing the finger on the rough part of the terminal will give a rasping sound. This is a good test to try adjustments when broadcasting is not on—and will help you to find out what makes your set oscillate.

Numerous letters complaining of oscillation have been received by the Broadcasting Company. As regards London they are all carefully plotted, and a copy is sent in each case to the Radio Society of Great Britain for the local society. If either of these bodies has any experienced individual on the spot, he is asked to go to the house of the complainant and advise him. Often, of course, it is a question of altering an aerial; at other times the situation is such that there is little that can be done.

As regards the number of complaints, the proportion is reported to be extraordinarily small. A form was put into the organ of the Broadcasting Company—the Radio Times—asking for information as to oscillation. Although this paper has an issue comparable with the number of license holders, only some 600 or 700 complaints were returned. Some districts are now very much worse than others, and notably where there is a large residential population with detached or semi-detached houses, with small gardens, where it is only possible to fix the aerials parallel. But owing to the amicable way in which the matter has been treated, it is thought that the trouble is gradually being cured, and while of course there will always be a certain amount of obstruction to the broadcasting, where possible, obstruction is being removed.

[The above information was obtained by RADIO WORLD through the courtesy of Robert B. Macatee, American Consul in London.]

## Jester's Dictionary

- DISTANCE**—Something that will make prevaricators of us all.
- GROUND WIRE**—A wire used to anchor one's set firmly to terra firma. Compare ground hog.
- GRID LEAK**—The common cause for sloppy reception and appearance of some radio sets.

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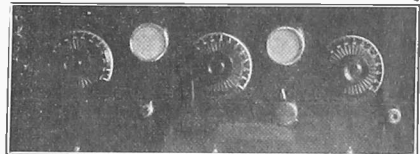
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**STONE.** A crystal detector is used, and as a consequence, the tone is perfect. There is no howling, and no radiation.

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We sell the complete outfit of parts for this receiver, assembled, ready for wiring, or we sell the receiver, ready for operation, with a guarantee of perfect results.

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**PRICE**—Complete instructions, hook-up, diagrams, etc., etc.

**\$1.50**

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## The Biltmore Radio Co.

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# U. S. Adopts Standard Receiving Tube WD11 Using a UV199 Socket

THE Interdepartment Radio Advisory Committee adopted a report submitted by its subcommittee on technical problems, recommending specifications for a receiving tube for use by the government departments and establishments. The tube adopted is electrically very similar to the present WD11 tube and the base is of a size which will fit UV199 sockets made by a number of manufacturers.

The new government tube makes a radical change in the method of obtain-

ing contact between the tube base and socket. A knife-blade type of contact is employed. A horizontal projection is formed at the end of each of the four base terminals, the socket for use with this tube having four pairs of spring clips with which these knife-blade projection engage. The diameter of the base is one inch and the overall height of the tube is not more than  $3\frac{1}{2}$  inches.

The filament requires .25 ampere with a nominal voltage of 1 volt. It will generally be used with 60 volts on the plate and a negative grid voltage of 3 volts.

The specifications adopted provide that the manufacturer shall submit a sample lot of 50 tubes for test, the tests to determine whether the tubes submitted meet these specifications will be conducted jointly by the Bureau of Standards, Signal Corps, and the Bureau of Engineering (Navy Department). If the sample lot complies with the specifications, bids on these tubes will be acceptable for purchase by the Government departments.

The specifications cover the electrical characteristics which are essential, and the mechanical dimensions which must be followed in order to insure that the tubes will be interchangeable. It is left to the manufacturers to work out the detailed means by which this performance and construction may be accomplished.

It is understood that several manufacturers are prepared to produce tubes which meet these specifications and that two or three departments have delayed the placing of orders until these specifications were completed.

Copies of the specifications may be obtained from the Secretary, Interdepartment Radio Advisory Committee, Room 603B, Department of Commerce, Washington, D. C.

## Radio Helps Theatre

RADIO broadcasting as an asset to the theatre box office made its debut at Loew's State Theatre, Newark. Every performance during the week, the regular program being augmented by well known radio stars, was broadcast in full view of the audience by station WHN. This was accomplished by means of a relay wire from the theatre stage to the radio station located in Loew's State Theatre Building, at Broadway and Forty-fifth Street, New York City. N. T. G., official announcer of the station, acted in the same capacity on the stage of the theatre in Newark.

Strange But True!  
WHENEVER  
Uncle Ephriam,  
Whom I am not crazy about,  
Comes and visits us,  
That little old "neut" of mine  
Gives the sweetest music ever heard  
**BUT**  
When Aunt Alice Elizabeth,  
Whom I adore,  
(But from whom I expect nothing per  
will),  
Drops in for a cozy visit,  
That old "neut" cuts up,  
Takes on the attributes  
Of the 'lowest-down' crystal set,  
And is as dumb as a fried oyster.  
How come?

Johnnie B. A.

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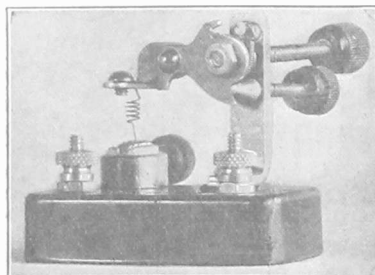
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Neutrodyne Article  
By R. L. Dougherty, March 15, 22, 29  
Construction of a Battery Charger  
By Walt S. Thompson, March 29, April 6  
Spider Web Neutrodyne  
By Byrt C. Caldwell, April 12  
Amplidyne  
By Thomas W. Benson, April 19  
Camper's Portable Set  
By J. E. Anderson, April 26  
Power-Amplification  
By Chas. H. M. White, April 26  
Neutrad Radio Frequency Unit  
By Walt S. Thompson, May 3  
Explanation of Super-Heterodyne  
By Walt S. Thompson, May 3  
Short Wave Adapters  
By J. E. Anderson, May 10  
Simplified Super-Heterodyne  
By Chas. H. M. White, May 17  
Superdyne  
By N. N. Bernstein, May 17, 24, 31  
Improved Super-Heterodyne  
By J. E. Anderson, May 31, June 7, 14 and 21  
New Double Superdyne  
By J. E. Anderson, June 14  
New Metaform Receiver  
By Walt S. Thompson, June 21 and 28  
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ings will be published in RADIO WORLD soon after the twelfth Rebus has been printed. At that time a list will be compiled of all those who correctly answered all the Rebus



REBUS NO. 9

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