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# RADIO

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# WORLD

The Best Aerial  
 By P. E. Edelman  
 A Selective Tube-Crystal Reflex  
 By Lieut. P. O'Rourke  
 A Phone Transmitter Costing \$50  
 By Abner J. Gelula  
 A 3-Circuit Tuner You Can Log  
 By Herman Bernard  
**THE RADIO PRIMER**

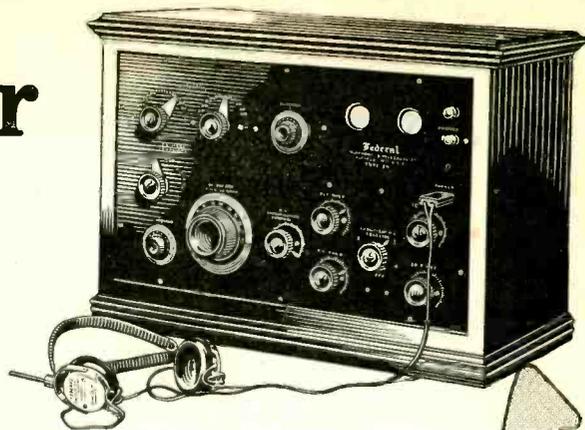
VOL. 6. NO. 7. ILLUSTRATED EVERY WEEK



Saul Hombrevero

IN TUNE WITH THE UNIVERSE

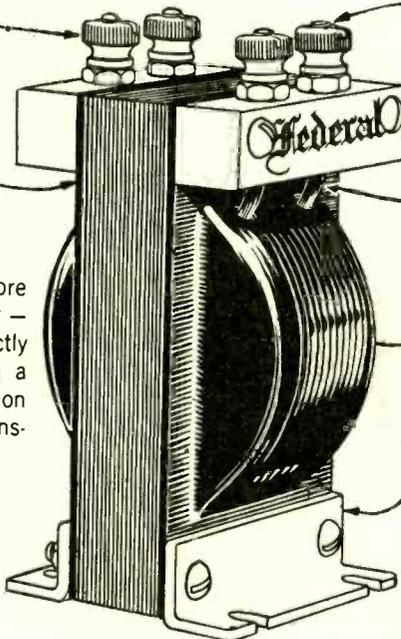
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# RADIO WORLD

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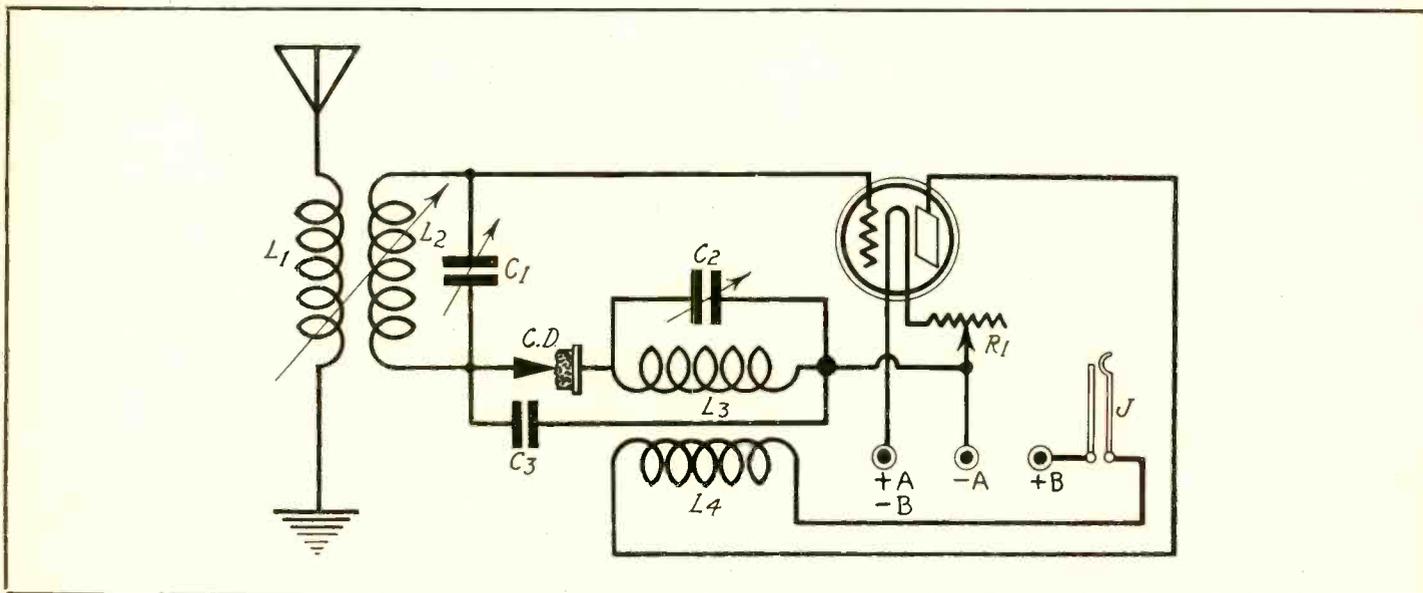
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## A Novel Selective Reflex



CIRCUIT NETWORK of Lieut. Peter V. O'Rourke's novel reflex. The coil in the aerial-grid circuit is a standard untapped variocoupler. Three controls are used and the circuit was found to be quite selective. Signal quality was excellent. An adjustable crystal was used.

By Lieut. Peter V. O'Rourke

THOSE who desire to try a reflex circuit somewhat out of the ordinary, yet one that works well and is selective, will enjoy experimenting with this one. The tube is used for a stage of radio-frequency amplification, the crystal functions as the rectifier, and the audio currents are returned to the tube for such audio amplification as is obtainable without the use of an audio transformer. The final audio output is from the tube.

This is a 3-control set, because L1 L2 is a variocoupler and the secondaries of both the coupler and the radio-frequency transformer L3 L4 are tuned by two variable condensers. The one across the coupler secondary (L2) has 23 plates, the one across the RFT secondary (L4) 17 plates. The capacities of these two condensers are respectively .0005 and .00035 mfd.

A good lively signal is obtainable from this circuit. Some regeneration is present, which accounts for this, the regeneration being obtained by the flow of radio current from L3 to L4, whence the current is returned to the grid circuit, C3 serving as a by-pass condenser to enable this purpose to be accomplished.

This set will not get terrific distance but it will produce superb quality of signal that music-lovers will enjoy.

If a 3" tubing is used for the RFT 68 turns should be wound for the secondary L4. The primary is wound on a separate tubing of diameter a trifle smaller than 3", say, 2¾", so that the primary tubing and coil may be inserted in the larger tubing. No. 22 double cotton covered wire is used for both windings. The smaller tubing may be fastened inside the other by bringing its terminals also through two holes in the secondary tubing. When inserting the primary tubing

the coils are so arranged that the windings will be in the same direction. Use the ends of the windings as your guide and if they point in the same direction you are on the right track. Even if you make a mistake here you may rectify it by reversing connections, as explained later. The primary winding is inserted toward the end of the secondary coil, not near its beginning. In other words, the primary goes nearest that secondary lead which will connect with the A—, and not nearest the lead that goes to the crystal.

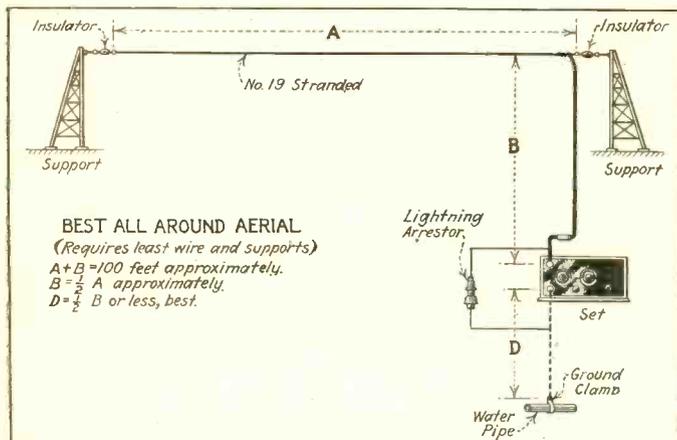
### Wiring Directions

Joining the beginning of the variocoupler stator (L1) to the aerial and the end to the ground. Connect the beginning of the coupler rotor (the lower point when the coupler is mounted on a panel) to the grid of the tube and to the stator plates of C1. The end of this rotor goes to the rotary plates of C1, to one side of the fixed condenser, C3, which is .001 mfd., and to one side of the crystal detector. It is preferable to use a catwhisker crystal and I employed an Ambrose Vernier Crystal with fine results. The other side of the crystal goes to the stator plates of C2 (17 plates) and to the beginning of the RFT secondary, L4. The end of this secondary goes to the remaining side of C2, to the still unconnected side of the fixed condenser, and also to the A—. Be sure this lead goes to the battery side, not socket side, of the rheostat. This lead goes through the rheostat to the F—socket post. F+ goes directly from battery to socket and B— goes to A+. One phone tip goes to B+ 45 volts and the other tip to the end of L3, the RFT primary, whose beginning goes to the plate post of the socket. The best tube to use is the 201A or 301A, although the 199 or 299 will work well.

For possible better results reverse L4 connections.

# L Type Aerial the Best

*With proper lead-in it is not too directional and suits well the needs of broadcast listeners—Values of other aerial types, also ground connections and counterpoise compared.*



HERE IS THE L TYPE OF AERIAL, frequently referred to as the inverted L, which is the best all-around aerial for radiocast reception. It requires the least wire and supports. About 100 feet of wire serves excellently, this length including the lead-in. The ground lead should be 25 feet or, preferably, less.

By P. E. Edelman

WHILE aeriels are loosely spoken of as non-directional, most of the antennae used for radiocast reception have a large horizontal component and are necessarily directional. The longer the horizontal part and the shorter the vertical wire of the aerial, the more marked is this directional effect, so that stations nearly in line with the horizontal stretch of the aerial will be heard far better than those located in directions at right angles thereto. This effect is most marked in a so-termed Beveridge aerial wire, which is sometimes used in a length of 1,000 feet, with grounded end, and vertical height of possibly eight feet. But this form is little used for broadcast reception unless an experimenter wants to hear one station exclusively, and has ample space for the long stretch.

## Non-directional Types

The vertical wire receives from all directions about uniformly. So do modifications such as the umbrella aerial. The triangle and T types come next in ability to receive fairly uniformly from all directions. The L aerial is not too directional for broadcast reception, provided that the vertical portion is, say, one-third or more of the total length of the stretch from the instruments to the free end of the aerial. This type is the best for all-around broadcast reception. In cases where this is not so, the difference is often made up by a long ground connection, as when a waterpipe in an upper story of a building is used for a ground. The waterpipe then is a considerable vertical conductor. That is another reason why short aeriels often work very well, because the ground connection leading down a long length of pipe is doing most of the work. A general pointer is to keep close to a total length of one hundred feet of wire for the aerial and not over one hundred and forty feet, with at least one-third or one-half kept vertically where feasible, in order to get a broadcast interceptor good for all directions.

## Lead-in Important

The lead-in or wire connecting the aerial to the instruments is important. Run it as direct and straight as feasible and keep it insulated all the way up to the

binding post on the set. If it comes too near a metal roof or cornice some of the energy will surely jump via the condenser capacity thus formed, even if there is no high resistance leakage path and not get to the set.

## Underwriters' Requirements

Observance of underwriters' requirements for approved lightning arrester installation is necessary to maintain fire insurance valid on most buildings, even when the technical necessity therefor appears superfluous. Any of the approved types may be used and installed per directions accompanying the device. Of the various kinds, the vacuum type appears to be least desirable, as it often goes bad during use. Also for radio reasons, keep away from arresters which are made so as to have large condenser acting surfaces which can bypass the higher frequency bands direct to the ground.

## Ground or Counterpoise

A good ground is recommended for long-distance reception. By this is meant a cleanly soldered connection to a water pipe or to seven or eight pipes each eight feet long and one inch in diameter (galvanized iron) driven into moist soil, all connected together. A gas pipe connection is a poor ground. Some steam pipes are serviceable and others poor. It does no harm to connect to both the water and steam pipes. A counterpoise is not much used for reception but will sometimes increase selectivity by permitting sharper tuning. It can comprise simply a second aerial, preferably located beneath the first one and not over ten feet above the ground or earth. Wire netting tacked to the ceiling of a basement will do as a counterpoise.

## How Many Wires in Aerial?

For vacuum tube sets it is repeated that there is little advantage, if any, in using more than a single wire. For a crystal set, better results may be had when two or three wires are used in parallel, at least one foot apart. This makes an aerial of low resistance. Probably the best aerial for a crystal set is one comprised by three wires 90 feet long and 40 feet high of No. 14 stranded copper wire, no wire nearer to the other than one foot and all three leading directly to the set. For a vacuum tube set the extra two wires can be omitted.

## "Haywire" Freak Aeriels

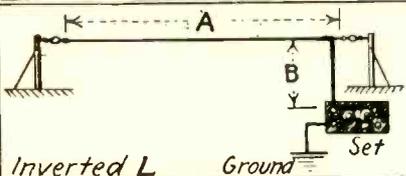
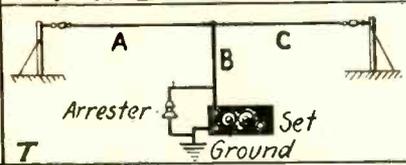
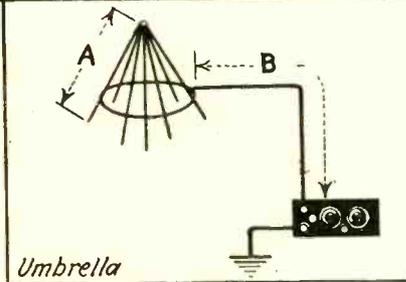
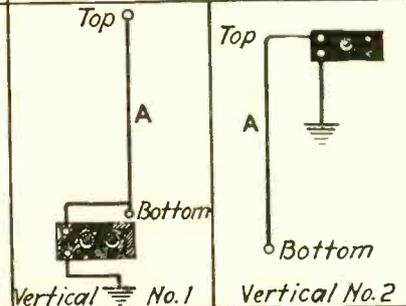
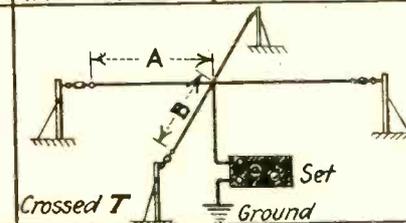
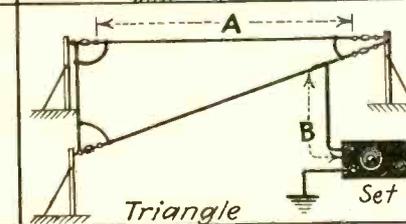
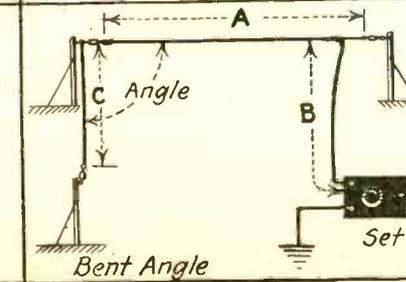
For satisfaction keep away from flimsy or "haywire" aerial constructions. Makeshifts strung all over the lot or connected from both ends may work after a fashion, as would any kind of a conductor, but there is no advantage in freak shapes, nor do they usually work as well as simple forms. Why clutter up the wave catcher with unnecessary twists, leaks, lumps, bypass condensers, etc., when the simple direct forms work out best? Where space does not permit the standard form, then there is reason for a small-space substitute. It will work well only when the principles are followed so that it is well supported and insulated from surrounding objects.

## Robbing the Neighbors' Aerial

Many apartment houses have two or four or more aeriels close together or supported parallel to one another from the same poles. Such close aeriels surely rob each other, even when they do not cause direct whistles on connected sets. The best way is to have the aeriels located nearly at right angles when possible. The little crystal set user gets the benefit of closely located aeriels sometimes and hears distance con-

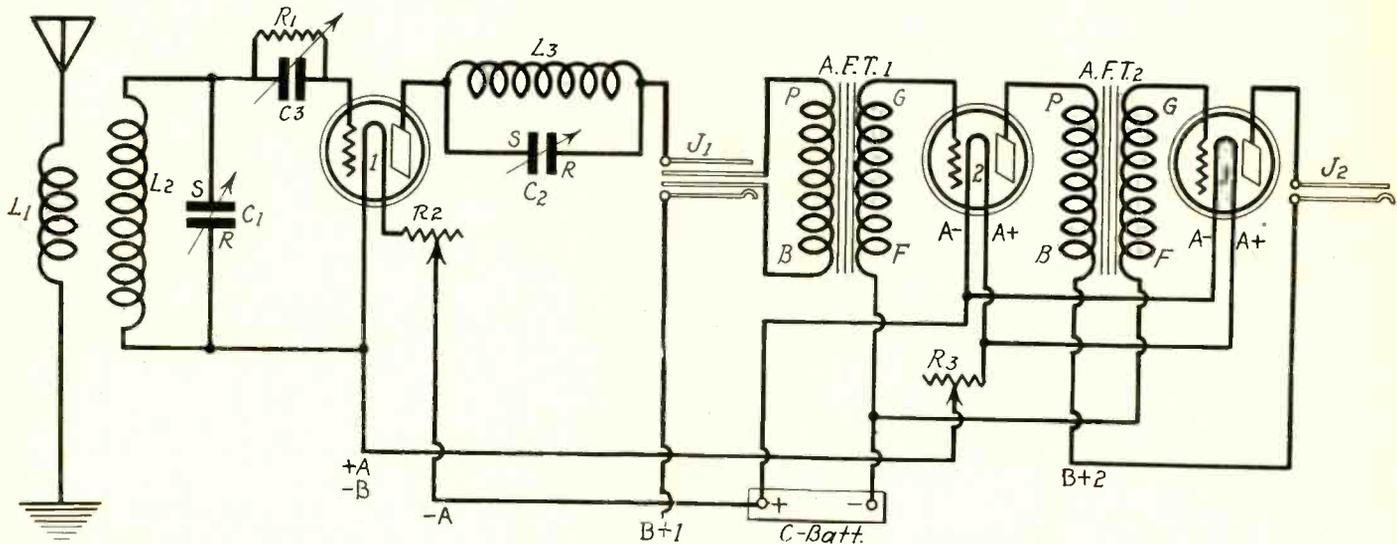
(Concluded on page 22)

# Antenna Values Compared for Strongest Signals

BROADCASTING AERIALS				
(Percentage Desirability Ratings)				
Type	Form	Effective Length	Directions	Wire
"L" Rating 90%	 Inverted L	$A+B=100$ to 140 feet $B=\frac{1}{2}$ to $\frac{3}{4}$ of A	Receives best in line A, but fairly well, all directions.  Standard Broadcatcher	No. 14 stranded, copper preferred, one wire sufficient  (Selectivity good)
"T" Rating 90%	 T	$A+B=100$ to 140 ft. A nearly = to C $B=\frac{1}{2}$ A, preferred	Receives all directions, but favors stations in line A-C	Same, Tunes sharply
Umbrella Rating 90%	 Umbrella	One wire A+lead in B=100 ft. 4 to 10 wires, A in parallel. $B=\frac{1}{2}$ A approximately	All directions uniformly.	Same Good Crystal set aerial  Capacity too large for some tube sets.
Vertical Rating No. 1-90% No. 2-90%	 Vertical No. 1      Vertical No. 2	A = 100 feet approximately. Set at top or bottom. No. 1 best for crystal set. No. 2 best for tube set	Uniform directions unless building shields with steel frame	Same Tunes sharply
Crossed T Rating 85%	 Crossed T	$A+B=100$ to 140 ft. $B=\frac{1}{2}$ A approximately.	Good all directions.	Same (Requires 4 Supports) Needs good tuner to cut out local stations.
Triangle Rating 80%	 Triangle	$A+B=140$ ft. $A=2B$ . 3 supports. Wire in parallel connections	Good Broadcatcher	Same Series with connections not advised.
Best Angle Rating 70%	 Bent Angle	$A+C+B=140$ ft. $B=A=C$ best. A and C horizontal B-vertical lead-in.	Suitable on small roof space. Fair broad-catcher.	Same Keep angle 90° or more if possible

# A 3-Circuit Tuner that You Can Log

## 3 Tubes Used in Set That Gets DX on Speaker



HOME-CONSTRUCTED coils, L1L2 and L3, are used in this 3-circuit tuner you can log (Fig. 2). L1 is the aperiodic primary, in inductive relationship to L2, the secondary. Both windings are on one spider-web form. When the windings are completed the form is removed and the coil is low-loss. L3, the designate stator and rotor connections. It is important that the grid of the detector tube go to the stator plates. The arrow across the grid leak (R1) and grid condenser denotes that both of these are variable. It is decidedly advantageous to have at least a variable leak, although a fixed grid condenser, .00025 mfd., may be used. The coil-and-condenser combination in the plate circuit causes regeneration through the capacities in the tube itself, hence L3 is not in inductive relationship to L1L2. Note that two rheostats are used, one, through A-, for the detector tube (1), and the other, through the A+, for both AF tubes (2 and 3). A C battery is used in both amplifier stages to prevent distortion and excessive B battery drain. PB represents the primary and GF the secondary of the AFT. A jack, J1, is used for the detector circuit, if earphones are to be used, and another (J2) in the last AF stage, for speaker operation. This circuit has great DX possibilities and affords fine control of regeneration. For best DX results C1 must have vernier, but no vernier is needed on C2.

By Herman Bernard

THE fact that the Neutrodyne and the Super-Heterodyne can be logged, that is, the same stations be brought in at the same dial readings, and at no other positions of the dials, has enhanced the popularity of the logging advantage. As the 3-circuit tuner is one of the most selective and best DX sets that can be inexpensively made, adding the advantage of "logability" makes this circuit doubly inviting. This added attraction is obtainable by using a coil (L3) in the plate circuit, tuned by a variable condenser, the coil being kept out of inductive relationship to the primary and secondary (L1L2). The elements of the tube possess capacity and this is used for the transfer of energy from grid to plate, the feedback afforded by a rotating tickler coil in the usual 3-circuit tuner. But the tickler method is harder to control than the one used in the present circuit, because the feedback for the entire broadcast range is obtained from a relatively small arc of the tickler dial, that is, the highest waves that require the tighter coupling, and the lowest waves that require the looser coupling, occasion a small variation, sometimes as low as 10 degrees on the dial. This is indeed critical and makes it harder to tune in DX, where feedback must be just right or you do not hear the station, or else hear it only faintly and distortedly. In the present set the range is comparatively large and may comprehend half of the dial. Just how extensive this range will be depends on the relationship of tube self-capacity, the plate coil and the condenser shunting that coil. I used a .0005 mfd. variable condenser (normally 23 plates) to tune the secondary and a .00025 condenser (normally 13 plates) to tune the plate circuit. In the secondary a vernier condenser is vital, for otherwise DX will be difficult or impossible to obtain. In the plate circuit no vernier is necessary, since the variation

is not critical, though it is indeed sharp enough. A critical adjustment is one that is delicate. Sharp tuning denotes clear and decisive reception of signal, without elusiveness. Hence critical tuning may even bring in interference and what one desires is sharp tuning, which is an adjunct of selectivity.

The directions for winding the coils are based on my own experiences with the set I built. As all experimenters know, the fact that one person used a certain 17-plate condenser does not mean that somebody else's 17-plate condenser of different make has the same maximum and minimum capacity. The difference usually is not much, but still differences must be allowed for, hence the constructor may find that a few turns more or less will bring the same results as I obtained. Therefore in winding the coils it would be advisable in the case of the secondary L2 and the plate coil L3 to include five or six more turns than I specify, in case your condensers do not come up to the actual maximum capacity of the ones I used. Then you can remove turns as found necessary and by the same arrangement so combine coils and condensers that the secondary and the plate coils will call for approximately the same dial readings as I got.

There are only two controls, as in the Super-Heterodyne. And, by the way, the selectivity of this set compares favorably with that of the Super-Heterodyne and precludes any possibility of station interference if you are more than a mile from any two stations broadcasting at the same time at 500 watts or less.

The performance of this set is close to that of the Neutrodyne, because the Neutrodyne uses no regeneration, and regeneration is equal to at least a stage of radio-frequency. Hence with three tubes you get 4-tube results.

The factors of selectivity and sensitivity, due to lowered resistance occasioned by regeneration, enable DX reception of fine quality. In October I consistently got 800

miles on the loudspeaker, using a 150-foot outdoor aerial, which length included the lead-in. The aerial was on the roof, mounted on the top of two masts, 12 feet high, and consisted of braided enamelled wire, which I recommend. One of the masts, as you may imagine, was on a neighbor's roof. Under excellent conditions it was possible to tune in nearly all the Chicago stations on a set in Brooklyn, N. Y., on the loudspeaker. Once in a while I got Hastings, Neb. There was no trouble whatever in tuning out WNYC, 1,000 watts, 526 meters, when I wanted to hear WEA, 500 watts, 492 meters. They are five miles from my home and my aerial points toward them. I tried the set in the home of a friend who lives less than two miles from these two powerful stations, and one was tuned out and the other brought in at will and with ease. Some friends of mine in Brooklyn who live a mile and a half or so from the new Grebe station, WAHG ("Wait and Hear Grebe") complained that their regenerative sets sometimes brought in this station all over the dial and kept all other stations off. When I tried my set out under exactly the same conditions, except that I selected the friend whose home was nearest to the station and aerial in direct line with that of the station, no such trouble developed, although the tests were continued for five successive nights and the set operated by the 7-year-old son of my obliging yet complaining friend. So father built himself a set like mine and now he's happy.

As for the coils to use, I cite No. 24 enamelled wire because that is what I used. After this wire is wound on a spider-web form the form may be removed and the coil will be self-supporting. The silk or cotton more popular for wire insulation makes for the shiftiness and bulging effect that can be overcome only by the use of some form of binding. Sometimes it is recommended that collodion be used on coils of such wire. This may be bought in ample quantity

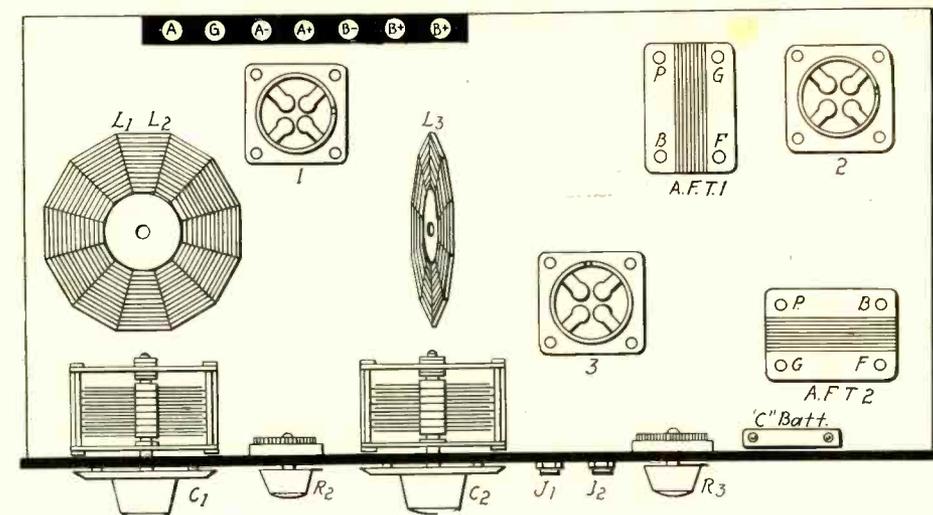
# Low-Loss Coils Used in DX Set

for months of usage at 25 cents in a drug store. A little collodion applied to a coil with a brush does no appreciable harm. The cry has been that it destroys the low-loss characteristics of a coil, but this is true only when the collodion is used to excess. Linen thread may be used instead inserted around the coil at as many points as there are spokes on the spider-web, and then the form is cut away. I mention these things because experimenters with wire on hand other than what an author calls for sometimes use that wire in their eagerness to build the set. But do not use any wire other than No. 20, 22 or 24. Granting that enamelled wire is to be used, see that you get the best quality obtainable. Even the best is inexpensive. If the enamel is not properly baked on the wire the resistance will be higher than advisable. There has been much said against the use of enamelled wire for this reason, so be careful to patronize some reliable dealer who sells quality supplies. Some very important firms, guided by excellent and expensive engineering talent, are beginning to put out sets using enamelled wire coils and you need not fear using this kind.

Use a spider-web form having 13 spokes, if possible. The diameter clear across should be about 5". Measure off 11 feet of this wire. Cut it and lay this length aside. Now start winding the secondary first. Wind the wire in and out of the spokes, alternately. After fifteen turns have been completed pick up the 11-foot length, leaving 6" for later connections, and start winding the new wire along with the continuation of the secondary winding. The wire is wound side by side, both wires being wound in the same operation. Now as you near the end of the 11-foot length which will be the aperiodic primary, L1, wind until there is left 6" excess for later connections, and at this point stop winding the primary and continue on with the secondary above until 47 turns of wire have been wound. The wire in both cases is No. 24 enamelled. The 47 turns include the ten turns or so that were wound along with the primary. Watch out when counting the turns on the secondary, because the nature of a spider-web winding makes the coil deceptive as to discovery of the number of turns. Usually the number is twice the amount you count when you move your finger over a radius, because the under winding (represented by the upper winding on the next spoke) is hidden at this particular point. By keeping track of the number of turns on the secondary as you wind them you will avoid difficulty. It is advisable to put a pencil mark on the end of one of the arms, to use this as a guide, so that if you shift the form around in your hand you will know nevertheless that you have completed another turn when you come to this mark. As suggested before, you might include a few more turns, say four or five, on the secondary, to make allowances for difference in capacities between your condensers and mine. If your condenser is of higher maximum capacity this will be love's labor lost, but it is always easy to remove windings, awkward to add any.

A word of caution: Leave the coil on the form. There is no use taking for granted that your coil is right without it having been put to the easy test. Hence lay your coil aside, and later, when you have made some progress in your assembly, you may actually test the coil in the set. This applies also to the plate coil, which will be wound on another spider-web form, and will consist of 35 turns, a single coil.

The matching of the coils and con-



**CONSTRUCTIONAL LAYOUT** of the 3-tube DX set you can log. Note that the two coils are mounted at right angles and the first AFT is kept a safe distance from the plate coil, to prevent magnetic inter-currents and any suggestions of resonance in the AFT, which would be fatal. (Fig. 1.)

densers will be taken up later, with due attention to covering the new broadcasting wave length band, 200 to 545 meters. The present band is 222 to 546.

### The Panel

If 4" dials are to be used, drill for the shaft of C1 3" from the left, on a center line drawn across the panel parallel with the horizontal. The center shaft for C2 is drilled 5" to the right of the other center shaft. The detector rheostat, R2 is mounted at bottom, midway between the two condenser dials. Temporarily affix the dials, to make sure that the panel part of the rheostat will not conflict with the condenser dials. Also be sure that 1/2" clear space is left at bottom of the panel, so that a base-board may be mounted there. The detector tube, No. 1, is mounted directly behind the detector rheostat. The condensers and their dials may be permanently mounted on the panel and the panel placed against book endpieces or any other device used for temporary support, so that the coils may be tested.

### Testing the Coils

Coils L1 L2 and L3 may be laid flat for the present and connected to the condensers and aerial. The beginning of L1 goes to aerial, the end to ground. The beginning of L2 goes to one side of the grid condenser and to the stator plates of C1, whose rotor plates go to A+ and to the end of L2. The filament wires may be connected directly to the socket. For test purposes the rheostat will not be necessary.

One phone tip is connected to the plate post of the socket and the other tip to B+ 22 1/2 volts. A+ and B- are joined. Tune in a local station. The receiver as now arranged is good for 25 miles or more, maybe 100 miles on a receiver in the rural districts. The maximum wavelength, 545, should come in no higher than 95 and not lower than 93. At 75 on the wavelength condenser a station at 492 meters should come in. You will be able to judge as to the correctness of your combination by the station you are tuning in. The setting may conform approximately to what is outlined here, but it should not be widely divergent. If your readings are too low, say 85 for 545 meters or 65 for 492, then turns must be removed from the secondary, to eliminate unused capacity. As our method was to have the error, if any, on the side of too much inductance, the adjustment is rendered easy. Remove turns from the secondary,

one at a time, until the correct relationship between capacity and inductance is established.

Granting that this coil is properly matched with its condenser, now turn your attention to the plate coil. The beginning of this coil goes to the plate socket of the tube, from which socket the phone tip has been removed. This lead, from L3 goes also to one side of the condenser C2. The other side of the condenser and the other side of the coil go to the phone tip that was removed from the plate of the socket. Now you can determine how your plate combination functions. Regeneration should be best for the higher wave stations somewhere at or above 60. By removing turns as needed this point may be established for some stations near the same setting as for the wavelength dial, although it must not be expected that they will ever be in step throughout. This adjustment is very simple.

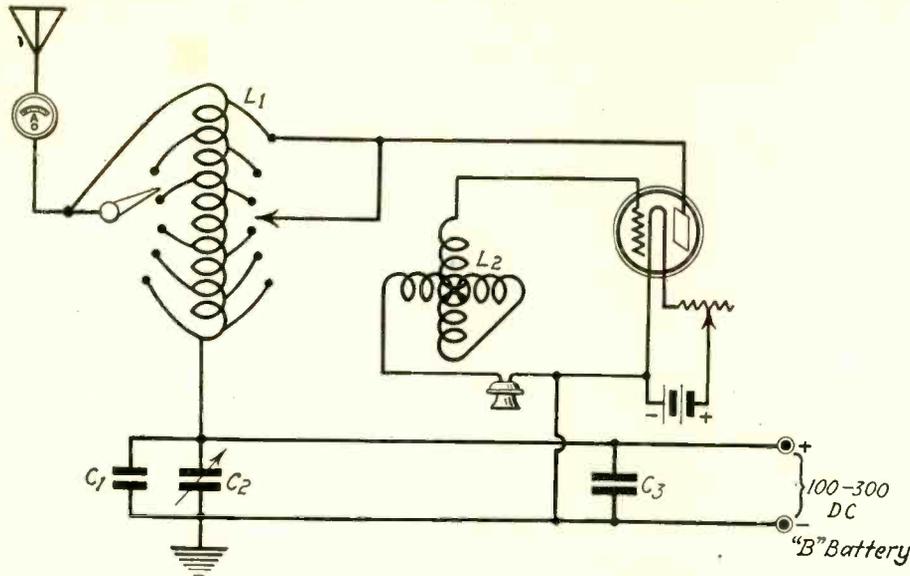
### Finishing and Mounting the Coils

Now that the coils are of proper inductive value they may be removed from the form, thus getting rid of that much insulation and contributing to the good cause of low-loss. The spokes or arms of the form are cut where they join the circular center. When the last arm is cut away the center will fall out. The spokes are removed by pulling them through the wire that is wound around them. As a safeguard linen thread may be passed around the windings where the spokes were and a knot made to secure this tie-string. The thread goes through the opening formerly occupied by an arm. One piece of thread may be used on each side of each aperture, 26 pieces of tie-string, all told.

The coil L1 L2 is mounted so that it is parallel with the front of the panel. In Fig. 1 it is shown as if it were lying flat on the baseboard, but this is simply to accentuate the right-angle idea. The plate coil is at right angles to the turning coil, hence at right angles to the panel. Two dowels or wooden sticks about 1/8" diameter and 4" long may be inserted through the two adjacent apertures of one coil where the arms of the spider-web form had been. These dowels will emerge at an angle of about 25 degrees. Holes are bored at a corresponding angle in the baseboard and the ends of the sticks protruding from the coil are pressed into these drill holes and glued there. Other ways of mounting will

(Continued on page 26)

# A 15-Mile Transmitter



THE CIRCUIT for a 5-watt phone transmitter. L1 is a 25-turn coil, wound on a bakelite tube 5" in diameter. A tap is taken off at every alternate turn. L2 is an ordinary variometer. C2 may be a .001 mfd. fixed condenser; C2 a 43-plate variable condenser. Two storage batteries should be used as the 5-watt tube requires higher voltage. C3 is a 2 mfd. fixed condenser.

By Abner J. Gelula

TRANSMITTING is an art. Anyone can build a receiving set and listen to the transmissions of other stations, but it requires a real, efficient radio man to build a transmitter. A government license is required of all transmitting stations. You must be able to receive and transmit code at the rate of 12 words per minute and know the whys and wherefores of the receiving and transmitting set.

If you live within travelling distance of the customs house of your district it is necessary to go personally for the test; but if it is impossible to go personally, a notary public may take your affidavit that you are able to pass the test. Standard forms may

be procured from your district inspector.

A conservative rating of this transmitter would be 15 miles. However, that does not mean that greater distance cannot be covered. If this set, if well made and tuned and connected to a good aerial-counterpoise system, covers distances over 50 miles, the cost, all told, should not exceed \$50.

A 5-watt tube is necessary. It may be purchased at any reliable radio supply house. A hot-wire ammeter is also necessary, as this is your only indication that the set is operating.

This is the simplest transmitter to construct. It is hooked up just like a receiver, but there is a certain amount of difficulty in tuning. Set the switches, one at the beginning of the winding, the other at the

end, and slowly turn the condenser, watching the ammeter. As soon as you see the least rise, keep adjusting the switches until the ammeter reads at the maximum—that does not necessarily mean to the end of the reading, but as high as possible. The variometer is very important in controlling the grid circuit.

Watch the wavelength! There is a heavy fine if you exceed 200 meters. It is best to use a wavemeter if possible, but if you set your receiver to below 200 meters you will be able to hear yourself speak, when you have reached the wavelength of the receiving set. If there is another amateur in your city he will be able to help you in tuning to wavelength by listening in on his set.

As to construction, L1 is a 25-turn coil of No. 14 bare wire, turns well spaced (about  $\frac{1}{4}$ -inch between each turn) tapped at every second turn. L2 is a variometer. C1 is a .001 mfd fixed condenser. C2 a 43-plate variable condenser. Two storage batteries are suggested as the 5-watt tube requires 8 volts. C3 is a 2 mfd. fixed condenser. From 100 to 300 volts may be used, although higher voltages may be used. Naturally the higher the voltage the greater the distance you will be able to cover. However, do not use more than 500 volts. If you have a direct current generator, so much the better, but then place a choke coil in series with the positive lead. A 0-3 hot-wire ammeter should be used.

The aerial system is very important when used in connection with a transmitter. A minimum of 4 wires, not longer than 75 feet, 50 to 60 feet preferably, should be used. The aerial must be well insulated at the ends, the length of the entire lead-in should be insulated and the lead-in direct to set should be insulated.

The ground should be noted especially. A series of cold water pipes may be used or, better yet, a counterpoise. A counterpoise may be made by using ordinary chicken wire laid on the ground under the aerial. A lead is taken from it just as from a receiving ground.

## The Superdyne Principle

Reverse Feedback May Be Obtained Either by Winding Coil in Reverse Fashion or Simply by Reversing Leads

By C. D. Tuska

If one coils up some wire and sends a current through it, at the ends of the coils we will have magnetic poles, one

north pole and one south. If we sent the current through the same coil in the reverse direction the poles that I have described will reverse. If we want to reverse the poles we can send the current through the wire in the opposite direction or, if we are so inclined, we may rewind the coil in the opposite direction.

In building the current should flow through the coil which controls the reverse feedback in a manner which would oppose the feedback due to the capacity

of the tube. You may change the poles by changing the direction of the current or rewinding the coil. As a matter of fact it doesn't make any difference. All that you have to do in the case of the Superdyne is to wind the grid coil and wind the plate coil in strict accordance with the dimensions. Then connect the set up and if the reverse feedback coil does not stop oscillation change the two leads going into it so that the current flows through the coil in the opposite direction. This will cause the reverse feedback action which has been so much discussed.

The interesting part about it is that you can reverse either the leads to the secondary coil or the tickler coil. The set will be most inclined toward oscillation when the tickler is at right angles to the grid coil. There should be no tendency toward oscillation when the tickler or reverse feedback coil is in a parallel position to the grid coil.

It is difficult indeed to believe that this would be misunderstood. However, I have found that not one out of ten persons really know what "reverse feedback" means and that nineteen out of twenty think you had to rewind the coil instead of reversing the leads to it.

## Navy Reducing Code Interference

By Carl H. Butman

WASHINGTON

Officers of the Navy afloat and shore are doing all they can to eliminate interference in the interest of efficiency and in aiding the broadcast listeners. During the past year over five per cent of the old ship spark sets have been replaced with tubes, practically all new ships are equipped with tube transmitters, and Naval operators have been ordered to tune loose-coupled receiving sets correctly. Another effort on the part of the Naval radio personnel has been to eliminate mush and harmonics from high

powered shore stations.

Commandants of all naval districts have been ordered to conduct reception tests in their districts to determine whether naval arcs and sparks are causing interference attributed to the Navy.

Why the Navy is so generally charged with causing practically all the interference, is not understood by Naval officers, who point out that the Navy actually operates only about one-half of one per cent of the shore radio stations in this country, actually only 88 in Continental United States out of a total of 17,142 government-owned land stations.

HOOK-UPS FOR EVERYBODY—Henley's 22 Radio Circuit Designs, \$1.00, postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

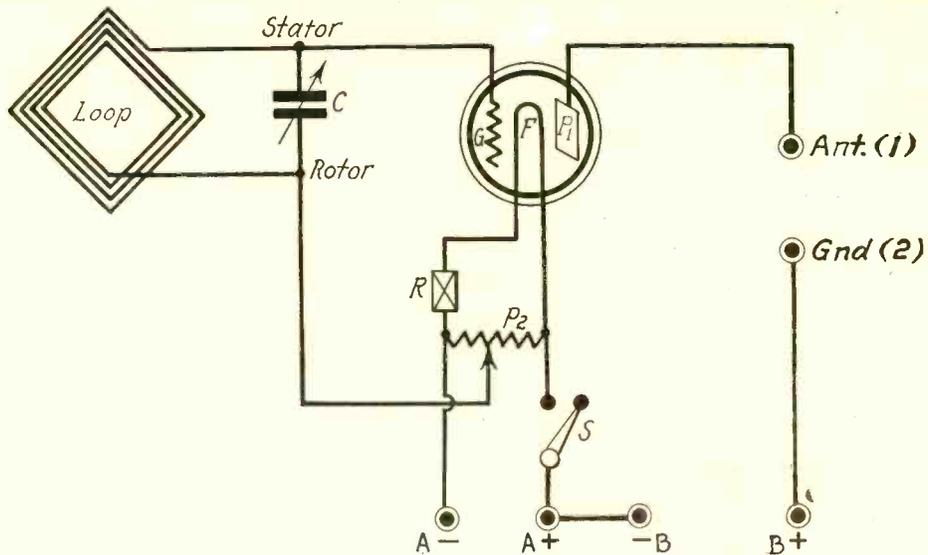
FALL BUYERS' NUMBER OF RADIO WORLD dated Sept. 27 sent on receipt of 15c.

# The Neutrodyne on a Loop

By Charles H. M. White  
Consulting Engineer.

THE Neutrodyne, or rather the tuned radio-frequency method of amplification, has been proven efficient in its ability to reach out, and is as selective in tuning as music and voice production would permit without distortion. The only argument that has been advanced against this type of receiver has been its inability to operate successfully on a loop for distant reception. The added directional selectivity of the loop is another feature the Neutrodyne has not been able to use. Still, the addition of a loop to a Neutrodyne is very simple, if certain precautions are observed. Owing to the different methods of winding the first Neutroformer coil it is not possible on some receivers to use both common A and B batteries for the added tube, but, this can be easily overcome by using the 199 tube instead of the UV201A in this added RF stage, necessary to compensate for the decreased collecting power of a loop as compared to an outside aerial.

An efficient loop should be used and the entire extra stage of RF should be contained in a separate cabinet, with the loop mounted on top of the cabinet. The lead wires from the loop to the condenser C should be kept as far apart as possible. Do not under any circumstances use twisted lamp cord wires for this purpose. The condenser C must be a low-loss 23-plate condenser with vernier. Be sure in connecting this condenser that the stator or fixed plates are attached to the grid side of the circuit. The wiring is still further simplified by the use of Amperite, type 199, the self-adjusting rheostat. To prevent oscillation of this first tube the 400-ohm potentiometer P is used. The switch S is a toggle or push-pull filament switch, used to shut off the filament current. For A battery, three No. 6 dry cells will suffice, and for B battery three medium-size 22½-volt blocks will do. The output terminals of this unit are marked ANT. (1) and GND. (2) which are connected respectively to the Ant. and Gnd.



IT IS NECESSARY to add a stage of radio-frequency amplification to the 5-tube Neutrodyne, to use a loop aerial. It is advisable to place this RF unit behind a separate panel. The loop is connected to the two binding posts, with a 23-plate condenser (C) across it. One side of the loop goes to the grid (G) of the RF tube, and the other side of the loop to the variable arm of the potentiometer. A balanced rheostat (R) may be used in the filament (F). The two poles of the potentiometer (P2) are connected across the filament. A filament switch is used (S). The plate (P1) of the tube is connected to the aerial binding post of the set, while the ground pole of the set goes to the +B high voltage. This takes for granted an aperiodic primary in the first Neutroformer in your present set.

terminals of the receiver. Interchange these two connections and note the results. Under all normal conditions they are better as shown on the diagram. By all means allow the ground wire to remain on the ground terminal of the receiver. This will mean increased distance, ease of tuning and clarity. To use the regular outside aerial all that is necessary is to open switch S, place the antennae lead-in wire on the ant. post of the receiver and proceed to tune as usual.

The use of the loop adds directional selectivity to the Neutrodyne as well as insuring quieter reception of distant stations. The tuning is slightly changed. There are four tuning dials instead of three. The new No. 1 dial is created by the condenser C. Dials 3 and 4 will read the same as with an out-

side aerial, but dial 2, formerly dial 1, will read almost the same as dial 4, leaving dial 1 as the only unknown setting. Therefore from your old log you can approximately eliminate three of the four uncertainties and with dial 1 you can adjust for the desired station. After a little experimenting you will discover it is just as easy to log four dials as three, bearing in mind that the loop must be pointed in the direction of the station wanted. Sensitivity of a tuned RF receiver may be increased by adding regeneration to the detector. With this, plus a loop, the set is in a very exclusive and selective class. It is possible to make an improved Neutrodyne equal a Super-Heterodyne, maybe exceed it, and a test will prove this fact.

## My Favorite Low-Loss Coil

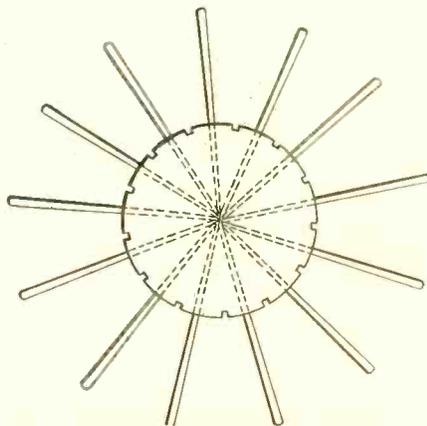
By Hallett B. Graeff

MY favorite coil is wound on a form made of a piece of round wood about 2" long and about 2" in diameter. The wood is turned in a lathe and smoothed off with sandpaper, then boiled in paraffine wax. This makes the coils easier to take off when completed. After form is waxed, 13 holes are drilled for spokes or formers. These spokes are made from 20D finishing nails, about 1/8" in diameter. The heads are sawed off and slightly rounded on ends and smoothed off so the spokes will not catch and injure insulation while winding. These nails should be about 2½" long. Another good idea is to use wooden meat skewers instead of nails.

After drilling holes in former, notches are sawed half way between each spoke. Saw down about 1/8". These notches are for the strings after coil is wound.

This form is used for winding the Solo-coil as used in Herman Bernard's 1-dial DX set article in RADIO WORLD, Aug. 23, and will give a coil of the same dimensions as the form on page 6 of this article. Following Mr. Bernard's instructions as to length of wire, there will be about 47 turns when coil is wound.

I measure off 50 feet of No. 22 DCC



FORM used by Hallett B. Graeff for winding a low-loss spider-web coil.

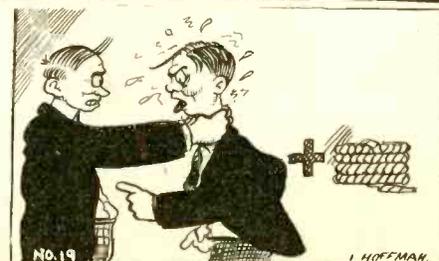
wire. Then I mark off 11½ feet of wire. When this is dry I cut and wind on a small spool to wind in with secondary as per directions. This makes a distinctive color and is easily traced for terminals.

When wire or coil is wound on former, I take carpet thread and run needle through slot between spokes and tie ends on top of coil, and after all of these are tied, the coil may be slipped off former,

after nails are taken out. The coil is then ready to mount, and may be treated or not.

These formers may be used indefinitely. They are harder to make than the paste-board forms but once made will repay the time and trouble, as all low-loss coils should be wound this way, on spider-web forms.

### The Weekly Rebus



WHAT does this rebus represent? Send answer to Rebus Editor, RADIO WORLD, 1493 Broadway, New York City. The names of those sending the solution will be published.

# Reflexing in the Inverse Way

**First RF Tube Used for Last AF Stage, While Last RF Tube Handles First AF Stage, to Equalize Loads**

By Edgar G. Sisson

THE terms inverse duplex and reflex mean the return of the energy through tubes already used in the amplification of this same energy. In other words, making one tube do the work of two.

The simplest method of receiving radio energy is by the use of a crystal or tube detector without the use of extra amplification. As it takes a certain minimum amount of current to make either a crystal or tube detector start functioning—and in the use of a crystal this minimum current is quite large—the receiving radius of such a set is not very great, unless some method is used to increase the amount of energy before it reaches the detector. There are two methods of doing this. One is by regeneration, which can be used only with a vacuum tube detector, and the other is by amplifying the radio wave at the frequency at which it is received, that is, by radio-frequency amplification, and then putting this current into the detector to be changed to audible frequencies. After the energy has been made audible it can then be amplified again until the desired volume is obtained. Thus it is seen that the sensitivity of a set is dependent upon radio-frequency amplification before the energy reaches the detector, or upon regeneration, and that the volume is largely dependent on the audio-frequency amplification. The sensitivity of a set is also dependent on the efficiency of the detector, that is, a radio-frequency set employing a crystal detector would not be as sensitive as if the same set used a vacuum tube detector, because the tube detector changes a much greater percentage of current to audible frequencies than does a crystal detector.

## Aids DX Reception

At present nearly everyone who wants a radio receiving set, wants to be able to hear distant stations, and wants to hear them with good volume, so that to fill these requirements it is necessary to have a sensitive set. It is also necessary to have a set that will amplify the signals so they can be heard on a loudspeaker. Such a set would require a number of tubes were it not possible to pass both audio and radio-frequency currents through the same tubes, as is done in the Inverse Duplex Circuit. It might seem at first to be impossible to make a tube amplify currents of different frequencies at the same time, but it is perfectly analogous to the case of the diaphragm of a telephone receiver or loudspeaker, which responds to the tones of all the different instruments in an orchestra, so that each of these can be heard distinctly.

The reflex principle was invented by a Frenchman, Marius LaTour, who amplified a current through a series of tubes at a radio-frequency, and then came back to the beginning and amplified the currents through the same tubes at an audio-frequency. This system has certain disadvantages, as the strongest audio and the strongest radio-frequency currents are in the same tube.

To David Grimes goes the credit of improving LaTour's system by reflexing inversely. After amplifying a current at a radio frequency, he put the audio currents through the amplifier tube backwards, so to speak, going from the last to the first tube. This balances the load on all the tubes, makes the circuit stable and makes possible the increase in efficiency of both the radio and audio-frequency circuits.

Even though a tube is used to amplify two different currents at the same time, it draws no more current from the B battery than if it were used to amplify only one current, as the plate current drawn by a tube is dependent on the resistance between the plate and filament.

## The Plate Resistance

When the filament of a tube is lit, electrons (negative particles of electricity) emanate, and if the plate battery is connected with the positive side to the plate, these electrons will be attracted to the plate, thus forming a path for the battery current. This electron path between the filament and plate has a definite resistance and in the case of the present-day amplifier tubes this resistance is between 20,000 and 60,000 ohms, depending on the plate battery voltage. Even though the current being amplified makes a variation in the plate current, this variation goes both positive and negative in relation to the steady plate current, so the average current is of no greater intensity whether a current is being amplified or not. This also holds true even though several currents are being amplified in the same tube at the same time. So it is readily seen that if a tube can be used to amplify two currents at the same time saving can be made in both the plate and filament batteries, because fewer tubes are needed to do the work.

It might be well to point out some of the problems which arise in construction. As has been said, the balancing of the Inverse Duplex Circuit abolishes the necessity of the more radical methods used to prevent oscillation. However, there are certain things to watch for in the physical layout of the set so as to prevent interaction between its component parts.

It is of prime importance in any radio receiver to prevent oscillation in the tubes, as a tube will not amplify when oscillating. Oscillation is the result of three different causes—capacity coupling, magnetic coupling and inductive resonance. All three of these causes can be prevented by care taken in the construction of the set.

## Remedies To Be Applied

Following are a few suggestions:

By capacity coupling is meant interaction between grid and plate circuits, due to the capacity between either wires or transformers, and in some cases between the separate parts of the set itself. In wiring it is necessary to keep the grid and plate wires as far apart as possible, making the grid wires as short as possible. To minimize capacity coupling between transformers they should be kept a reasonable distance apart and at right angles to one another. This also reduces the magnetic coupling.

For all practical purposes it is not necessary to be careful of the position of the radio-frequency transformers in relation

to the audio transformers, but it is of prime importance to keep the radio transformers at right angles to one another, as any magnetic interaction in the radio-frequency circuit will cut down the efficiency of the set a great deal. When a tuned radio-frequency transformer is employed in the radio-frequency circuit it is necessary to have the inductance of this transformer different from the inductance of the grid circuit, for, when the grid and plate circuits are of the same inductions, inductive resonance is set up between the grid and plate, thereby causing the tube to oscillate. The inductance of the plate circuit can be changed by varying the number of turns of wire on the primary of the tuned transformer.

## Regulation of the Input

Further to stabilize and balance the set, it has been found desirable to regulate the amount of incoming energy. This is accomplished by a unique arrangement, invented by Grimes, and peculiar to all the Inverse Duplex Sets, with which, by means of tapping the antenna coil or loop, the voltage impressed on the grid of the first tube can be varied according to the number of turns connected between the grid and filament. This affects the tuning of the set very slightly and gives an even control of the incoming energy, controlling the overloading of a set, when it is close to a broadcasting station. Also, when using tuned radio-frequency amplification the use of a grid tap on the secondary of the tuned transformer prevents oscillation, and in that way no potentiometer or stabilizer—which, by the way is inefficient, because it puts a positive voltage on the grid—is needed, and the efficiency of the radio circuit is thereby increased.

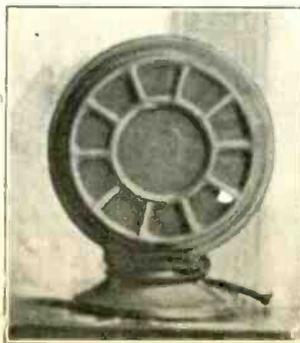
It has been explained that by balance and prevention of oscillation that the efficiency of both circuits can be brought to a maximum. It is possible, when an efficient input circuit and two stages of radio-frequency amplification are employed, to obtain excellent results with a loop. It is becoming more essential for a set to permit loop operation, because of the decided advantages derived under certain conditions. The greatest of these is the elimination of a great deal of static interference. As a loop receives in one direction only, it naturally picks up only the static coming in the direction, cutting out the static that is coming in at right angles to its plane. A loop has the further advantage of assisting in separating signals which are coming in at right angles to one another. It is also desirable in the case of residents of apartment houses, who because of objections or physical impossibility cannot put up an aerial.

## Facts on Loop Reception

Location has a great deal to do with the intensity of the signal received. This being true of an antenna, it is much more so when using a loop, as a loop picks up in the neighborhood of one per cent. of the energy received on the average antenna. There are some locations where it would be foolhardy to attempt to operate on a loop, as there are large areas where reception is sub-normal. The above not only applies to districts, but also in the case of loop reception to the location of the loop in the room.

If a person has a sensitive set that is capable of picking up distant stations he wants that set to be able to tune out the local stations so that he can hear the distant stations while the locals are on. To do this it is necessary to use at least one stage of tuned radio-frequency amplification, and if very sharp tuning is desired two stages of tuned radio-frequency amplification. This is particularly true if a set is very close to a broadcasting station.

GREAT ingenuity was displayed by A. Schomburg, 65 West 45th street, New York City, in constructing a microphone of an old electric stove and an inkwell base. A phone transmitter is supported inside by coil springs. Mr. Schomburg is an artist.



# Building Your First Tube Set

## THE RADIO PRIMER

### Course in Construction for Beginners

#### PART II

**N**EVER take a larger bite than you can chew. Don't build a Super-Heterodyne before you can make a crystal set operate. Far more pleasure is derived from a 1-tube set that works than from an 8-tube set that doesn't work!

In Fig. 1, a tube is used in connection with a radio-frequency transformer. A variable condenser of 23 plates is placed across the secondary coil. This position of the condenser is called a shunt. The coil that the aerial and ground connects to is the primary, while the coil that goes to the tube is the secondary.

The primary's duty is to bring in the radio impulses, a pick-up duty. The secondary's duty is to supply inductance and be tuned by the condenser.

Thus we see that when one coil is used for primary and secondary, we cannot vary the receptive ability of the secondary circuit and consequently everything the aerial receives that is at the wavelength set by the primary will be received in the head set. Hence the two coils in this case are better.

The primary is untuned or aperiodic. The aerial may be 100 feet long, well-insulated and of a single wire. The multi-wire aerial will not necessarily increase the efficiency of the receiving set.

The lead-in comes into the primary (Fig. 1), the other side of the primary going to the ground. A lead is taken from the aerial binding post and goes to the plate and to one end of the phones. The other end of the phones is connected to the positive B battery. One end of the secondary is connected to a grid condenser, thence to the grid or G post vacuum tube. The other side of the secondary coil goes to the positive A battery. The negative A connects with the negative B. A 23-plate variable condenser is in shunt with the secondary. The ground also goes to a .001 fixed condenser, C3, whose other side goes to the end of L2.

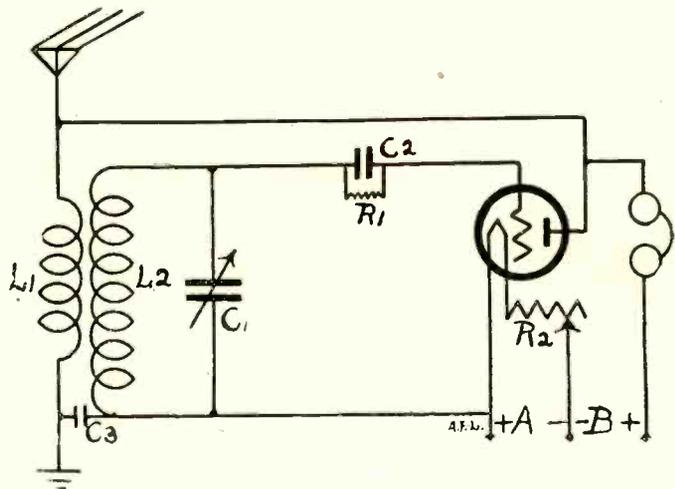
This receiver is regenerative and gets DX.

## Reserve Officers Form National Association

WASHINGTON

**T**HE formation of a national body of signal officers and those interested in radio, telegraph and telephone communications has been undertaken in several cities, according to Maj. Louis M. Evans, Signal Officers' Reserve Corps. The organization is known as The American Signal Association. It is planned to have branches in every crops area and city if possible. Maj. Gen. Chas. McK. Saltzman, Chief Signal Officer of the Army is back of the project, which it is understood will have headquarters in Washington with posts in important centers. The object of this association is to bring reserve officers and others interested in radio communication and signal work into closer touch with the activities of the regular army. Local posts have been formed in Chicago, Washington, Detroit, and Boston, while others are in process of organization.

FIG. 1, a simple tube circuit that works well. L1L2 is a radio-frequency transformer, consisting of 55 turns of No. 22 double cotton covered wire on a 3 1/2" diameter tubing, 4" high, and 18 turns of the same wire, separately wound on the same tubing. The primary (L1) is at top of the tubing. Each wire terminal is brought through two holes bored in the tubing. C1 is a 23-plate variable condenser. C2 is a grid condenser, .00025 mfd. R1 is a grid leak, preferably variable, 1/2 to 8 or 10 megohms. R2 is a rheostat to match the tube. The zig-zag line in the tube is the grid, the right angle is the plate.



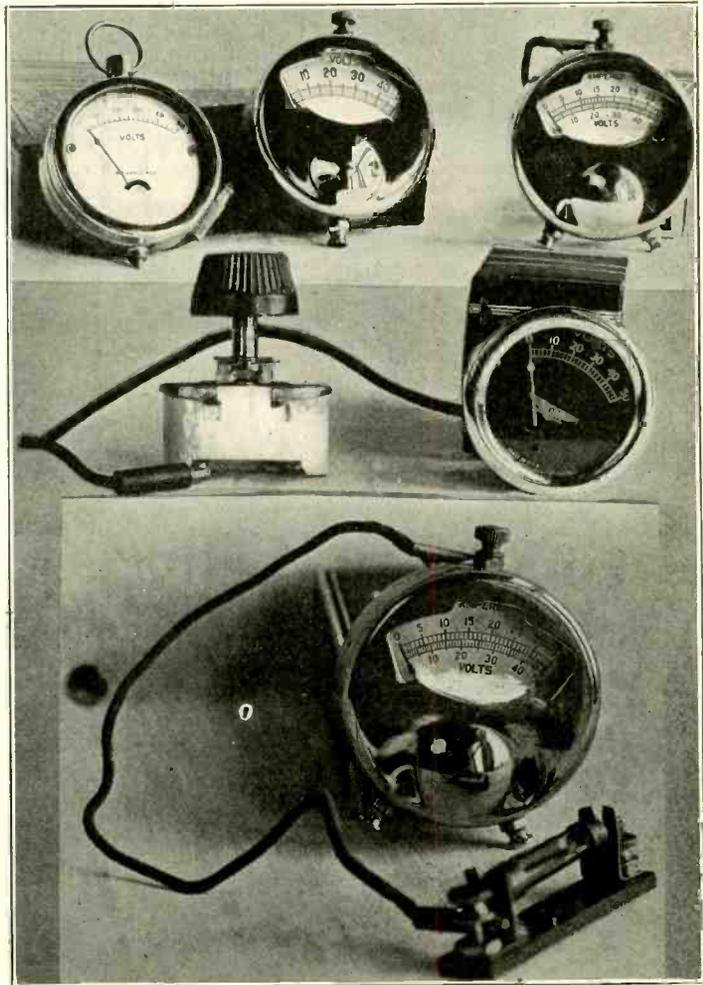
## Increasing Range of Meters

**M**ANY times the experimenter, possessing only a small portable voltmeter, may require a higher reading than it can give, and he is at a loss as to how to go about it. It is actually a very simple operation and requires none of the mathematical calculation that many suppose.

A voltmeter operates by current control. If we increase the resistance of the meter, naturally the reading is deflated. Working on this principle, and according to Ohm's law, we know that if we apply an external resistance that is equal exactly to the internal resistance of the meter, the reading will be exactly one half.

Practically it works like this: Set a fairly high resistance, variable preferred, with a minimum of not more than .01 megohm (10,000 ohms). Place the resistance in series with the one lead of the voltmeter.

However, before this is done, set a battery that gives a previous reading—say 6 volts. Now, with the resistance in circuit, again apply the current. The reading may now indicate perhaps 1 volt, more or less. Let us say one-volt as a specific example. The reading is then one-sixth of the actual voltage. All resistance being proportional, a meter reading only up to 10 volts will now give actual



THE TOP ROW shows voltmeters of various readings, while the middle picture indicates how a variable resistance is connected in series with a voltmeter. If a variable resistance it should have a minimum of 100,000 ohms or less. The bottom picture shows how a fixed resistance is placed in the circuit. In all cases, one side of the resistance is connected to the battery, while the other side goes to the voltmeter. The other side of the meter is connected to the battery. Be sure the polarity is correct.

readings up to 60 volts—all apparent readings being multiplied by 6.

It is safe to apply 100 ohms for each direct-reading volt. If, for instance, a voltmeter reads up to 10 volts, a resistance of 100 times 10 or 1,000 ohms would necessarily have to be put in circuit to give a reading of approximately half.

# De Forest Wins '190th Round' in Regenerative Fight

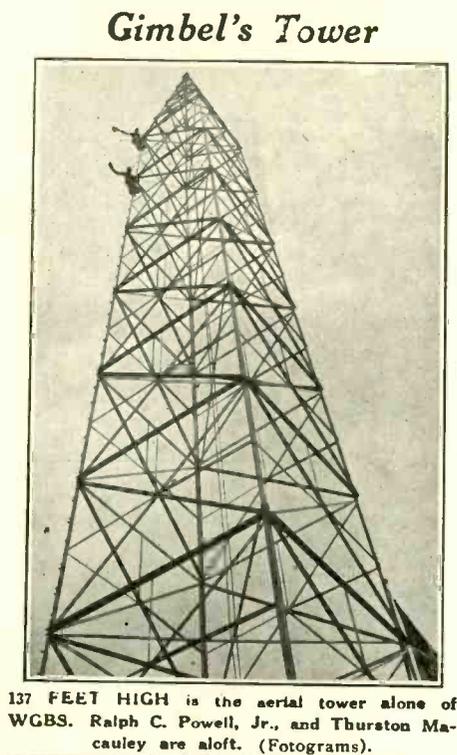
THE De Forest Radio Co. won a legal victory to establish the priority of its patents in the controversy over the feed-back regenerative circuit, when Federal District Judge Winslow in New York City denied injunctions sought by the Westinghouse Electric and Manufacturing company. The injunction would have restrained the De Forest Co., from prosecuting filed suits to cancel patents on the alleged infringing Edwin H. Armstrong circuit controlled and manufactured by the Westinghouse Co., plaintiff.

Aptly termed "the heart and soul of radio," and without which broadcasting would be impossible, the regenerative transmitter, with its novel circuit, was held to be the original invention of this essential device in a recent reversal of the Commissioner of Patents by the District of Columbia Court of Appeals. This reversal involved the Armstrong circuit, previously granted priority.

As a result, actions were later filed by the De Forest company against the Westinghouse interests for cancellation of their Armstrong patents and will be shortly tried in the Federal court, Eastern Pennsylvania district.

"It was in attempt to prevent prosecution of this suit that Westinghouse attorneys sought the injunctions, that Judge Winslow has denied," Attorney S. E. Darby, Jr., stated for the De Forest company. "Not only the Westinghouse Electric and Manufacturing Company, but the General Electric, American Telephone and Telegraph and seventeen other prominent manufacturers of radio equipment are marketing the Armstrong type of circuit."

Other suits against the Westinghouse Electric and Manufacturing, Westinghouse Lamp and Radio Corporation of America,



for infringement, simultaneously filed in the Federal courts of Delaware and Pennsylvania, charging conspiracy and asking for accounting are set for early answer. These suits are expected to bring the controversy to a close.

## De Forest Defeats Attempted Sales Restriction by R. C. A.

JERSEY CITY, N. J. — THAT the Radio Corporation of America sought to restrict competition and limit the field for the retail sale of radio receiving apparatus and vacuum tubes, was the opinion of Vice-Chancellor Lewis, in a decision, dismissing the suit of the R.C.A. company against the De Forest Radio Company. Relying upon a provision in a 1917 agreement between the De Forest and Western Electric Companies, the Radio Corporation's action would have compelled the De Forest interests to sell the principal portion of the radio equipment it manufactures directly to the ultimate consumer, rather than through usual trade channels of distributors and dealers and, which would if successful result, "in a benefit to the Radio Corporation by the elimination of competition," the Vice-Chancellor said. The court said:

"The effect of the relief prayed for would be to compel the De Forest Company to submit to a sales method, seriously crippling it in disposing of apparatus for the use for which it is entitled to dispose of apparatus under its reserved rights under the agreement of March 16, 1917.

### "Have Equal Rights"

"The Radio Corporation is engaged in disposing of apparatus for use in the amateur field, and, if it can compel the De Forest Company to submit to this method

of sale, it, not being required to secure similar agreements from its customers, will be benefited by a decrease in competition. Both the Radio Corporation and the De Forest Company have equal rights in disposing of the apparatus for amateur use. It is not claimed that any of the apparatus sold by the De Forest Company is being used for the transmission of messages for pay, or for any purpose other than amateur or experimental, and it would be no concern of the Radio Corporation if, as a matter of fact, the apparatus sold by the De Forest Company, were used for the transmission of messages for pay or for other than amateur or experimental use for the Radio Corporation is not in that field.

"The clear purpose of the provision and the agreement of March 16, 1917, requiring the De Forest Company to obtain from purchasers of its apparatus an agreement that the apparatus should not be used in the transmission or reception of messages for pay, or by others than the original purchasers, or for purposes other than radio communication was to protect the exclusive right of the American Telephone and Telegraph Company in the field of transmission and reception of messages either by wire or radio for pay. The complainant, the Radio Corporation, is not using apparatus or selling apparatus for use in this field and it is not entitled to enforce the covenant for the purpose of protecting the 'pay' field."

## WGBS, New Station, Is Big Hit

NEW YORK'S newest broadcasting station was inaugurated. It was WGBS, 316 meters, operated by Gimbel Brothers. An unusually entertaining program was presented for the benefit of millions listening in at the radios as well as several hundred guests present. Isaac Gimbel opened the exercises with an address. The personnel of Gimbel Brothers served as reception committee.

During the previous week WGBS sent out test programs nightly after other programs were off the air. Letters, telegrams and long distance calls from many parts of the country have been received daily, as far west as Ohio and from many Pennsylvania towns, saying that the programs were being heard with perfect clarity and had a fine degree of modulation.

The first program was also relayed by special ground wires to station WIP, operated by Gimbel Brothers in Philadelphia, and sent out by that station.

Many of the numbers of the program were given on a specially constructed stage, equipped like the stage of a theatre.

The first program included Herbert Bayard Swope; Arthur Brisbane; Louis Wiley; Edwin S. Friendly; Heywood Brown; Roy K. Moulton; Franklin P. Adams and Karl Kitchen, journalists.

From the theatre world: Eddie Cantor, master of Ceremonies; Morris Gest, Arthur Hammerstein, Robert Milton, Arthur Hornblow, Arthur Hornblow, Jr., Paul Meyer, William Morris, William Morris, Jr., Chas. F. Pope, Augustus Thomas, Oliver Saylor, Vincent Lopez and his Pennsylvania Orchestra; George Olsen and his "Kid Boots" Orchestra; Nat Martin with his orchestra, from "I'll Say She Is"; Cliff Edwards, the Dolly Sisters, Earl Carroll, with stars from his "Vanities" and others.

## Set Sales Reach \$150,000,000 in a Year

WASHINGTON

A YEAR ago it was predicted that demand for radio receiving sets would slacken, since it was believed that the market was becoming saturated, but a review of developments in the past twelve months has convinced the Department of Commerce that the reverse is true. A notable increase in the sale of radio receivers was shown, in the past year, retail set sales approximating \$150,000,000. During the 1924 holiday season receiving sets were purchased on a far greater scale than at any time since such apparatus became available to the public. A feature of the development indicates that the purchaser of a cheap or simple radio set will sooner or later buy a more expensive one.

# U. S. Promulgates Rules for Higher-Power Stations

WASHINGTON.

**T**HE Department of Commerce has announced that it will immediately begin the issue of experimental licenses for the increase of power for broadcasting stations. In a statement outlining the conditions under which such licenses will be issued, the Department said:

The National Radio conference which adjourned last week at the Department of Commerce recommended that a general increase in power over 1,000 watts was desirable in all stations in order to overcome static and give better service to the listeners. This is a question entirely apart from so-called super-power stations, of 25 or 50,000 watts, which are not here dealt with.

In order to include increases up to a maximum of 5,000 watts, the Department feels that it should be proceeded upon an experimental basis under strict limitations which will insure that this development may be without interference with the service of other stations or with the reception now enjoyed by listeners. The Department is receiving many inquiries as to the granting of licenses authorizing this use of increased power.

Licenses for the use in broadcasting of power up to 5,000 watts on a purely experimental basis will be issued under the following conditions:

1 Experiments may be carried on only after due notice to the supervisor of radio of the district and must be at all times under the control of the supervisor and the Department.

2 Stations operating under experimental licenses may at the outset use a power input to the antenna not exceeding 1,500 watts. Whenever the radio supervisor of the district and the Department are satisfied that the public interest is served by the use of such increased power and that no undue interference with other stations or with receiving sets results, its use may be continued. All applicants for such licenses must agree in advance they will reduce the power used during the course of the experimentation whenever the Department or the supervisor of radio deems such a course to be in the public interest and so directs.

3 If as a result of the experimentation above specified, the use of the additional power is found to be in the public interest and the station desires to make a further increase, such increase will be allowed in successive steps of 500 watts, and experiments may be carried on at each of such increased stages, under the same conditions and restrictions as are above specified for the first increase.

4 The Department anticipates difficulty in laying down any general rule which will be of universal application to all such stations. It will therefore consider each station as a separate entity and deal with it according to the local conditions involved.

5 It is anticipated that the location of the station will be a factor of great importance and that the amount of power that may be safely used will be in direct proportion to the distance of the station from congested receiving centers.

6 All such experimentation will be absolutely at the risk of the station conducting it, both as to location and power used, and notice is given in advance that these licenses will carry with them no permanent rights or privileges of any character, are entirely temporary and experimental in their nature, and are subject to withdrawal or revocation by the Department at any time in its absolute discretion.

The prime consideration of the Department is directed to the listening public.

## More Broadcast Ads, U. S. Reports

WASHINGTON

**T**HE resume of the radio situation in the Department of Commerce Year Book reveals that probably the most important development last year was the introduction of the commercial element into radio broadcasting. Previously all broadcasters sent out programs at their own expense, but recently some stations established a fixed rate per hour for the use of their transmitters,

so that business organizations wishing to popularize their names or wares might furnish educational or entertaining programs, paying for the time.

"It now appears possible," the Departmental Year Book States, "that the cost of broadcasting may be borne more and more by those wishing to reach the great audience available through this system of communication."

## WGN Fights Ban by Associated Press

CHICAGO

**I**N an editorial entitled "A. P. Tries to Shut Off Radio Service," the Chicago *Tribune* challenged the right of the Associated Press to prohibit member papers from broadcasting news or election bulletins to which the news agency is "exclusively" entitled.

The notice served on the *Tribune* by the Associated Press raises an issue of interest to radio users as well as newspaper managers and readers, the editorial states.

"The notice in effect forbids the broadcasting of election news by newspapers using the Associated Press service," the editorial

declares in part. "News gathered by the *Tribune*," by reason of its membership in the Associated Press, is available to the A. P. and becomes at will news matter of the association.

"Thus the notice referred to, if not resisted, would prevent the *Tribune* from sending out through its radio service broadcasting station, WGN, any local news gathered by its own reporters.

"There may be legal obstacles in the way of our giving to the public the full value of our news broadcasting service," the editorial adds, "but if so, we intend to test them in the courts and, if possible, overcome them, as we are confident we can."

## Crosley Lauds Higher Power

By Powel Crosley, Jr.

Member of Hoover Conference Committee

**U**SERS of inexpensive radio sets and radio fans residing in the rural districts will benefit through the approval of the report of the committee at the Third National Radio Conference to solve the problem of higher power. The masterly ability of Herbert Hoover in directing and handling the many problems which confronted the Conference has been demonstrated. It must be remembered there are no laws governing broadcasting. Its rules and regulations have been laid down for three years by annual conferences at which broadcasters, manufacturers, listeners, amateurs and other interested parties make their own rules and regulations under the supervision of the Department of Commerce and Secretary Hoover. As Mr. Hoover said: "It is a wonderful example of self-government."

Due largely to a misunderstanding, the question of increased power in broad-

casting at first caused a considerable amount of opposition, because of the fear of interference and obsolescence of the lower powered stations. Upon the question of higher power hinged most of the argument and discussion. It was not until the fourth day of the conference that a solution agreeable to all finally was decided upon. It finally was decided to leave the matter entirely to the discretion of the Secretary of Commerce. Licenses will be granted to those fitted to handle high power broadcasting on the proper basis, subject to the approval of Secretary Hoover.

On super-power stations up to fifty kilowatts (50,000 watts), the matter is to be entirely in the hands of Secretary Hoover as to the amount of power in relation to any given location that can be used with the minimum of interference. In other words, the advantage in the use of higher power will enable a station to ride over static and other interferences. The question of how much power can be used is a matter of experiment. It would have been a mistake to have limited the amount of power that could be used and it would have been a serious set-back to the development of broadcasting had the principle of power limitation been applied.

3-CIRCUIT TUNER, all circuits tuned; uses coupler and two variometers. Great for DX and volume. Described by Herbert E. Hayden, Radio World, issue of Oct. 11. 15 cents. Radio World, 1493 Broadway, N. Y.



Powel Crosley, Jr.

# 3 Stages of Resistance AF

## 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.

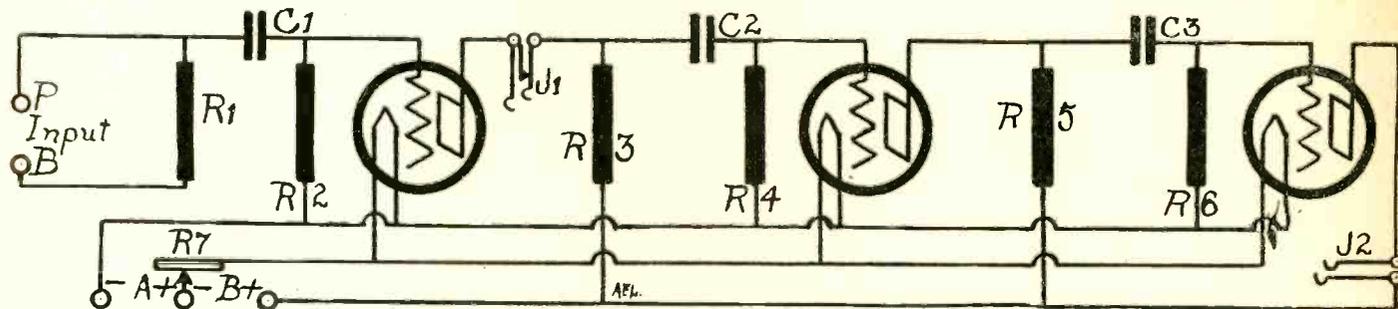


FIG. 45, showing how to connect three stages of resistance-coupled audio-frequency amplification, requested by Bert DeLange.

HOW may I connect up a 3-stage resistance-coupled amplifier? 2. Is this type of amplifier advantageous? 3. Will it give me as much volume as a 2-tube transformer-coupled amplifier?—Bert DeLange, Philadelphia, Pa.

A circuit of a 3-stage resistance-coupled amplifier is shown in Fig 45, this page. R1 is .1 megohm or 100,000 ohms; R2 is 3 megohms, or 3,000,000 ohms; R3 is .1 megohm; R4 5 megohms; R5 .1 megohm; R6 .25 megohm. All fixed condensers are .00025 each. 2. It will give a very clear, true tone. 3. Just about. But volume will be sufficient to operate a loudspeaker on the average receiving range of the detector.

I CAN'T TUNE in anything below 455 meters. I use low-loss condensers and constructed the coil as directed in the article by Wainwright Astor in the issue of Aug. 30 RADIO WORLD. I can't hold the set in oscillation. I use an indoor aerial of 60 feet.—Stephen J. Fuller, 864 E. 34th St., Brooklyn, N. Y.

Take off turns from the primary, one at a time, until 455-meter stations come in around 50. This may require removal of 10 to 15 turns. Use an outdoor aerial.

I HAVE BEEN troubled with a bad case of power-line interference. I have tried nearly everything, I believe, but to no avail. There is a railway crossing bell-ringing device about a block away. Is it possible that this is the trouble?—J. Liken, 302 E. Randolph St., Eued, Okla.

No doubt the crossing device is causing the trouble and if the roar is perceptible all day and night it isn't the ringing that would bother you, but the operating transformer of this device probably is leaky. The railroad would appreciate your telling them of this trouble, as it is a loss of current and an expense to them as well as being an annoyance to you.

REFERRING TO Byrt C. Caldwell's article in the Oct. 11 issue of RADIO WORLD: 1. What ratio should the first and second audio-frequency transformers be? 2. What kind of wire would you suggest for wiring up the set? 3. What is a condenser kit?—T. J. Sillstrop, Ft. Morgan, Colo.

1. First stage, 6-to-1; second stage, 3½-to-1. 2. No. 14 bus-bar, or ordinary No. 18 bell wire (insulated). 3. A condenser kit is a set of fixed condensers of various capacities for testing.

CAN the Super-Heterodynes be built without a license for commercial sale?—C. S. Culp, Salineville, O.

No. The Radio Corporation of America is the sole manufacturer of the commercial Super-Heterodyne.

WHERE can I get the best parts for the Superdyne? 2. Is the double Superdyne a better circuit? 3. Is there any new improvement on the Superdyne?—C. R. Slocumb, 1112 Beacon St., Chicago, Ill.

See advertisements in Radio World. 2. No. 3. Yes.

I BOUGHT a second-hand 5-tube set which is very noisy. When Portland is on the air I can get nothing else but that station. I should appreciate it if you could help me.—Geo. Laurent, Box 477, Milwaukee, Ore.

We cannot help you if you do not tell us what circuit you are using. If it is a Neutrodyne probably it is improperly neutralized.

I HAVE BUILT Super-Heterodynes but this

little crystal set that I made certainly beats all for making trouble. I built a 2-circuit crystal set but can hardly hear a 500-watt station 3 miles away.—Jas. E. Lee, 1463 W. 77th St., Cleveland, O.

You have a bad crystal. Get a good one. Place a 43-plate variable condenser in the aerial, if any trouble exists there.

I HAVE an Acmedyne, tuned with a variometer. It tunes rather broadly. Is there anything I can do to sharpen the tuning?—P. R. Byrd, Winter Garden, Fla.

Use a fixed coil of approximately 35 turns, shunted by a 23-plate variable condenser, in place of the variometer. This will increase the sharpness of the tuning without increasing the number of controls. You may place the variometer in the grid lead, using the above suggested coil also, but the condenser in the aerial.

WHERE can I get a circuit for the 4-tube Super-Heterodyne?—Chas. Kubin, 5350 S. Lincoln, Chicago, Ill.

The August 9 issue of RADIO WORLD gives this Super-Heterodyne in simplified form, using only three tubes. But this circuit is not one for anybody but a radio engineer to tinker with. It is still rather an experimental circuit.

WILL YOU kindly tell me what is the most selective circuit known? I have tried nearly every circuit ever published, but as yet I haven't found a circuit suitable for around New York.—R. R. Doak, 1 Parade Place, Brooklyn, N. Y.

For the utmost in selectivity on one tube it is necessary to use the aperiodic primary, the stator of the coupler as a secondary and, if a 3-circuit tuner is desired, the rotor as the tickler. If you want a more ambitious and more selective set, the Super-Heterodyne or the Ultradyne will satisfy you.

IN REFERENCE to the Ultradyne article appearing in the Aug. 30 issue of RADIO WORLD, where can I get ½" radion panels? Would hard rubber be just as good?—Roland Cresswell, Daisytown P. O., Pa.

Hard rubber will serve the purpose.

I HAVE a 5-tube Neutrodyne that is getting very noisy. At certain points on the dial it sounds like a thunderstorm. There are no loose connections. 2—Is heat dangerous around a charging battery? The furnace is about 16 feet away while the battery is charging.—Claude D. Lee, 39 E. Dover St., Easton, Md.

Look over the variable condensers; be sure they are not shorted and that the plates are clean. Clean them with pipe cleaners saturated with alcohol, then dry with dry cleaners. Be careful that you don't bend the plates. If the trouble is not then removed, inspect the grid and phone condensers for shorts. One of the tubes may have developed a loose connection in the base that causes the trouble you describe. 2. The gases liberated by a charging battery should not be anywhere near fire, but 16 feet is a safe distance.

HOW MANY turns will I have to wind for a low-loss spider-web coil for a Neutrodyne? I am using 11-plate condensers.—E. A. Gloistein, 168 Tiffany Ave., San Francisco, Calif.

See the Nov. 1 issue of RADIO WORLD, article by J. E. Anderson. A table of condenser-coil combinations was published.

PLEASE answer the following questions: 1—

Is a 70 ft. long, 30 ft. high aerial suitable for a Superdyne? 2—Are Federal .0005 condensers all right for this set? 3—Would these condensers be all right for the low-loss Superdyne? 4—Using an audio transformer for the first stage of audio amplification, and resistance coupled for the following two stages of audio, what results may I expect? 5—with 199 tubes, what voltage may I place on the amplifier? 6—Could a fixed crystal be substituted for the tube as detector? 7—Could a stage of tuned radio-frequency amplification be placed before the present coupler? 8—I have wound my low-loss coils already, with no insulation whatever. Would a 17-plate condenser in the plate coil be all right for increasing the sharp-

ness in tuning?—L. A. Brawn, 14 West St., Newport, N. H.

1—Yes. 2—Yes. 3—Yes. 4—Decrease in volume, but increase in tone-quality. 5—45 to 90 volts. 6—Not with the Superdyne circuit. 7—Yes, but would not advise it, as one stage is not worth the extra cost. 8—The condenser would work well if you were having trouble in controlling the regeneration. For a control of the feedback, try a potentiometer.

I DON'T understand the third RFT in the low-loss Neutrodyne as described in the Oct. 11 issue of RADIO WORLD. Is it an iron core transformer?—John Guthrie, 317 Hodge St., Newport, Ky.

There is no third stage of radio frequency in the circuit you refer to. There are two tuned RF stages, detector and two transformer-coupled audio. The stage you mistake for radio-frequency is the detector circuit, tuned by a variable condenser across an RFT secondary.

KINDLY explain the radio-frequency unit in the hookup on page 8 of the May 10 RADIO WORLD.—Earl Mortenson, Everett, Mass.

Referring to the circuit: EF, is your present tuning unit. GH is wound on a 3" tube, 55 turns of No. 22 SCC for H, and only 8 turns for G. The plate lead P goes to your present aerial post and plus B goes to the present ground post.

HOW does the Superdyne circuit compare with the Neutrodyne in selectivity, volume and distance?—L. C. Betsold, 335 18th Ave., San Francisco, Calif.

The Neutrodyne is simpler to tune and is a more consistent DX getter.

I CAN'T get the Superdyne to work. When I turn the filament rheostats and control switch, tubes 1 and 2 light up but not a glimmer from tubes 3, 4 and 5. I have tried everything, but I can't get the tubes to light.—Edward Thomp-son, 19 E. 113th Street, N. Y. C.

You have failed to get the required A voltage across the filament terminals of the tubes or they would light, unless the tubes 3, 4 and 5 are burnt out or not connected. Test the tubes in the sockets that light tubes 1 and 2. Others who have built this circuit report wonderful results.

I HAVE been experimenting with low-loss Neutrodyne coils. How many turns should I wind on a 15-spoke form, with a 2½" center? What turn is the tap taken from?—Curtis Siebert, 1320 W. Somerset St., Philadelphia, Pa.

First wind the secondary, 55 turns, with a 15-plate variable condenser across this coil. Tap taken off at the 25th turn. Primary wound above the secondary, on the same form, 8 turns. No. 20 or 22 DSC wire is preferred.

IN THE ISSUE of Oct. 4 RADIO WORLD a 1-tube DX set is described by Herbert C. Hayden. It gives in the specifications a 3¼" by 7½" coil and two 2½" by 1¾" rotors. I am unable to get coils according to these specifications. What size may I use that will give me the same results?—A. H. Arnold, 446 E. 7th St., Erie, Pa.

Use the same size coils as directed for best results. If you want to try a variation you may use a 3x7 coil, adding about 5 more turns than Mr. Hayden suggests. Two formed rotors 3" diameter will serve the purpose. Take off five turns if this size coil is used.

IN MY Ultradyne set I have a .0005 and a .001 mfd. condenser. When tuning I cover the

# RF, Crystal and Two of Audio

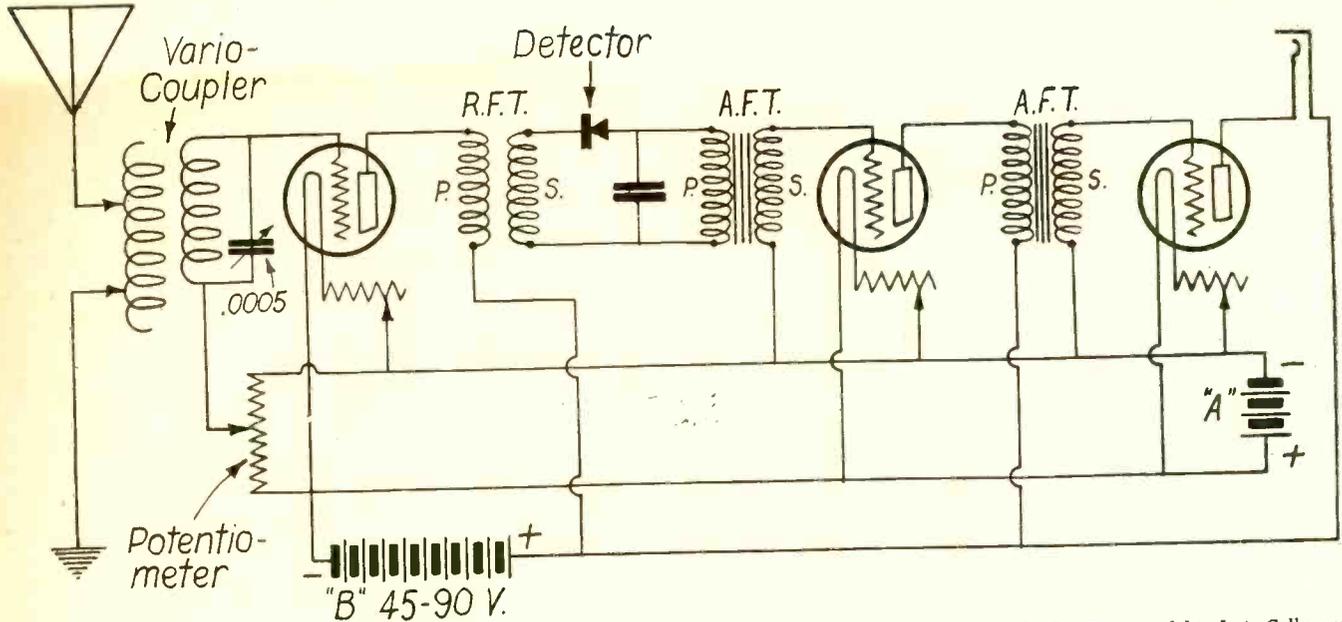


FIG. 46. A variocoupler and a variable condenser used in a crystal RF set, three tubes, including two stages of AF. Requested by Jack Calloway.

entire broadcast band when the tuning dial reaches number 62, whereas the condensers reach only 48 degrees. What can I do to make the condensers cover the entire band by reading from 1 to 100?—Frank Smith, P. O. Box 574, Bowling Green, Ky.

The condensers are too large or your aerial and ground system too short. You may change the .0005 condenser to a .00035 (17 plates) and the .001 to a .0005.

**WILL YOU** kindly give me a good circuit (not reflex) for three tubes, using crystal detector. I have a tapped variocoupler which I should like to use in this set, if possible. I should rather have volume and clear tone than extreme distance.—Jack Calloway, Asheville, N. C.

The circuit you request is shown in Fig. 46. If the coupler is used as shown in the diagram it is advisable to use a .0005 variable condenser. A potentiometer is advisable. The RFT is fixed or "untuned."

**HOW** can I make my Neutrodyne more selective?—G. D. Bartlett, 578 So. 28th St., Omaha, Neb.

If it has a tuned primary use an aperiodic primary. Otherwise use the Selectocoil. See Aug. 2 issue RADIO WORLD.

**REFERRING** to the 4-tube Superdyne in the issue of Oct. 4 RADIO WORLD: 1—How many turns for L, LL, LF1, L2? 2—How many plates has a .0005 mfd. variable condenser?—H. S. Wells, Jr., 34 Union Ave., Framingham.

1—L, 6 turns; LL, 35 turns; LF1, 25 turns; L2, 35 turns, tapped at 20th turn. 2—Usually 23 plates.

**IN WHAT** issue of RADIO WORLD may I find instruction and diagrams for a 5-tube Neutrodyne receiver?—Louis N. Printz, Box 104, Waynesville, Ohio.

The Magnadyne, a low-loss Neutrodyne, appeared Aug. 16 and 23.

**WHERE** can I get a book telling which circuits are best?—D. Haselton, 638 Bagley Ave., Detroit, Mich.

We know of no such book. Personal preference has much to do with the decision as to which circuit is better than another. Keep in constant touch with radio magazines.

**I HAVE BUILT** the Super-Heterodyne set described in the issue of June 28, but I can't get a sound. Can you help me?—Lawrence Moran, 127 Lake Ave., Greenwich, Conn.

See the circuit of the 3-tube Super described in the issue of August 9. Connect the oscillator as indicated in the August 9 issue.

**I AM** located about 30 miles from the nearest broadcasting station. I have a crystal set, but cannot get either DX or selectivity with it. Is there anything I can add to the set to increase its range?—C. W. Day, Newark, Cal.

Your set must be receiving very good distance now for a crystal set. Add one stage of radio-frequency amplification ahead of the crystal. It will increase volume, DX and selectivity.

**COMPLETE INDEX OF RADIO WORLD**, January 5 issue to September 20, inclusive, published in the October 18 issue. Send 15 cents to RADIO WORLD, 1493 Broadway, New York City.

## RADIO WORLD'S Broadcast University

Questions and Answers on the Air Every Wednesday Evening at WLS, the Sears-Roebuck Station, Chicago—Department Conducted by Mat H. Friedman, RADIO WORLD'S Chicago Representative.

**WHILE LISTENING** in to a station it will suddenly fade out and then return again in about 30 seconds in full volume without my touching the set at all. I have tested the various instruments and batteries and find them all right. Can you help me in eliminating this trouble?—Proctor McCormack, Pontiac, Ill.

We are sorry that we cannot help you, but there is no remedy known for this trouble. It is a common trouble that is due to atmospheric conditions. There is nothing the matter with your set. "Fading" has been known nearly as long as radio has been known, and cannot yet be eliminated any more than static.

**CAN YOU** tell me where I can find a circuit for a really good 1-tube receiver?—Archie Powell, Barney, Ia.

We refer you to Herbert E. Hayden's article on "A Dandy 1-Tube Set" in the Oct. 4 issue of RADIO WORLD.

**THE USE AND CARE OF A STORAGE BATTERY.** How to test the battery, how often to recharge it, what size to buy. Send 15 cents for Sept. 6 issue or start your subscription with that number. Radio World, 1493 Broadway, N. Y.

**RADIO TELEG. & TELEPHONE RECEIVERS FOR BEGINNERS.** Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

## New Broadcasters

Call	Station	Meters	Watts
WGBS	Gimbel Bros., New York City	316	500
WBBF	Georgia School of Tech., Atlanta, Ga.	270	500
WFBK	Dartmouth College, Hanover, N. H.	256	100
WFBL	Onondaga Hotel Co., Syracuse, N. Y.	286	100
WFBM	Merchants Heat & Light Co., Indianapolis, Ind.	268	250
WFBN	Radio Sales & Service Co., Bridgewater, Mass.	226	200
WEBZ	Savannah Radio Corp., Savannah, Ga.	280	5
KFOL	Leslie M. Schafbuch, Marengo, Ia.	234	5
KNX	Evening Express, Los Angeles, Calif.	337	500
WBBS	First Baptist Church, New Orleans, La.	252	50
WEBX	J. E. Cain, Jr., Nashville, Tenn.	263	50
WEBY	Hobart Radio Co., Roslindale, Mass.	226	10
WHA	University of Wisconsin, Madison, Wisc.	275	500
WJJD	Loyal Order of Moose, Mooseheart, Ill.	278	500
WWAE	The Alamo Ball Room, Joliet, Ill.	242	500

### ANY "DYNE" YOU WANT

The Dynoflex, one stage of tuned RF, crystal detector and one stage of reflexed AF, Aug. 9 issue.

The Magnadyne, a Low-Loss Neutrodyne. Issues of Aug. 16 and 23.

A Low-Loss Superdyne, 5 tubes, including 3 stages of resistance-coupled AF. Issues of Aug. 23 and 30. Fifteen cents a copy.

**CRAM'S LATEST POCKET MAP** in 3 colors, with 16-page log, 40c. The Columbia Print, 1493 Broadway, N. Y. C.

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

## Join RADIO WORLD'S University Club

And Get Full Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year.

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

Telegraph queries will be answered collect the same day as received. Be sure to direct in your query that the answer be sent collect.

# Happiness Boys, WEA F, Friday

## BROADCAST PROGRAMS

The time given in programs is Eastern, Central, Mountain or Pacific, depending on the station's location.

### Thursday, November 6

**WQJ, Chicago, 448 (C. S. T.)—11 A. M.,** Home Economics program, direction of Helen Harrington Downing; Eleanor Chalmers, New York Style Talk; Erna Bertrams, "Buying Pork." 3 P. M., Cora Beeman, "Starchy Foods (macaroni, rice, potatoes)," Chas. T. Wolf, apparel for the stout woman. 7, Williams Rainbo Garden orch.; Manuel Rodriguez, tenor; Lydia Lochner, contralto; Marion Henry, pianist; Florence Flintfield, dramatic sketches. 10, Williams Rainbo skylarks; Axel Christensen, pianologues; Grace Wilson, contralto; Hill, Hirsch and Gorny, singers; Edna Solomon, contralto.

**CNRM, Montreal, 430 (E. S. T.)—8:30 P. M.,** Recitation, Mildred Page; solo, E. Gorm; address, Capt. J. M. State; solo, A. Nouradin; solo, J. M. Magnon; solo, A. Gauthier.

**WHAS, Louisville, 400 (C. S. T.)—4 to 5 P. M.,** Alamo Theatre orch., Harry S. Currie, conductor; police bulletins; weather; "Just Among Home Folks," readings; news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert by Mrs. R. H. Van Pelt; four-minute digest of Sunday school lesson; four-minute welfare talk; news bulletins; time.

**KFI, Los Angeles, 469 (P. S. T.)—5 P. M., news.** 5:30, news. 6:45, Bon Ton orch. and Y. M. C. A. lecture. 7:30, vocal program. 8, Hotel Ambassador concert orch. 9, studio program. 10, instrumental quartet concert.

**WEBH, Chicago, 370 (C. S. T.)—7-8 P. M.,** concert, Edgewater Beach Oriole orch.; James De Young, tenor; musical bits from Riviera Theatre; Viola Wruck, alto. 9, dance selections, Edgewater Beach Oriole orch.; Sophie Loeel, pianist; Nick Lucas, songs; musical bits from Balaban & Katz, Riviera Theatre. 11, dance, Edgewater Beach Oriole orch.; Harry Davis, baritone; Edgewater Beach Hotel Trio, banjo, accordion and piano; Nick Lucas, special songs; Edgewater Beach Hotel late revue.

**WEEL, Boston, 303 (E. S. T.)—1 P. M.,** Assembly luncheon, Boston Chamber of Commerce. 6:30, Dok-Eisenbourg and his Sinfonians. 7, Boston Big Brother Club. 7:30, musicale. 8, Hampton Institute Quartet. 9, program from N. Y. Studio.

**WHN, New York City, 360 (E. S. T.)—12:30-1 P. M.,** Strickland's Palais D'Or orch. 2:15, Mrs. Bob Schaefer, the Radio Girl. 2:30, original Louisville Jazz Band, Christie Maisto, leader. 3, Bob Miller and Ira Schuster, popular songs. 3:45, George Cameron Emslie, pianist, with Jeanne LaMar, dramatic soprano. 4:15, Joseph C. Wolfe, baritone. 4:30, Alfred Dulin, concert pianist. 4:45, Loretta C. Lynch in "Tea Time Talk." 5, original Dixie Five. 6:30-7, Huston Ray's Almanac Strong Quartet. 7-7:20, Huston Ray's Almanac Orch. 7:20-7:30, WHN welfare period. 9:30, news. 9:37, Marconi Brothers, accordion selections. 9:45, songs. 10, Spear's Dance Orch. 10:30, Sam Lanning's Roseland Dance Orch. 11, Lillian Havel, soprano. 11:10, Victor Wilbur, baritone. 11:15, Bob Emmerich, popular jazz pianist. 11:30, Lou Gold's Orch., with Loretta McDermott and Adler, Well and Herman. 12-12:30 A. M., Ted Lewis and his symphonic clowns.

**KYW, Chicago, 536 (C. S. T.)—6:30 A. M.,** physical exercises. Also at 7 and 8. 9:30, news and comment of the financial and commercial markets. 10:30, farm and home service. 11:35, table talk by Mrs. Anna J. Peterson. 2:35-4 P. M., "Afternoon Frolic," broadcast from KYW. 6:02-6:18, news, financial and final markets. 6:35-7, children's bedtime story, told by Walter Wilson. 7, DeBabary's Orch. 7:10, Coon-Sanders Nighthawks. 7:20, DeBabary's Orch. 8-8:20, 20 minutes of good reading by Rev. C. J. Pernin. 8:20, Bernice Barber, whistler; James Russell Hogg, accompanist; George D. Horne, baritone; Sallie Menkes, accompanist; Louise Rood Lutes, pianist. 9:15, "Safety First" talk by Mr. Z. C. Elkin. 10, "At Home" program from KYW's studio.

**KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M.,** stockman reports, general market review and agricultural items. 11:55, time. 12 noon, weather, stockman reports, livestock and wholesale produce markets. 12:15 P. M., Scalo's Orch. 3:30, quotations on hay, grain and feed from the Stockman Studio. 6:30, KDKA Little Symphony Orch., Victor Saudek, conductor. 7:15, The Poetry Lady, for the children. 7:30, talk by a representative of the Automobile Club of Pittsburgh. 7:40, stockman reports. 8, program by the National Stockman and Farmer. 8:30, concert, Harvey B. Gaul; song recital by Christine Miller Clemson, mezzo soprano; concert by Christian Miller Clemson and KDKA Little Symphony Orch. 9:55, time, weather. 11, concert from the Pittsburgh Post Studio.

**WOC, Davenport, Ia., 486 (C. S. T.)—10 A. M.,** opening market quotations. 10:05, household hints. 10:55, time signals. 11, weather and river forecast. 11:05, market quotations. 11:10, agricul-

tural bulletins. 12 noon, chimes concert. 12:15 P. M., weather. 2, stocks and markets; report of wool market. 6:45, sport news and weather. 7, Sandman's Visit (stories by Miss Val McLaughlin). 9, orchestra program; Ralph W. Fuller, baritone soloist.

**WEAF, New York City, 492 (E. S. T.)—11-12 A. M.,** talk on "Etiquette," by Lillian Eichler; market and weather reports. 4 P. M., musical program. 4:15-5, lecture direct from Columbia University. 6-12, dinner music from the Hotel Waldorf-Astoria; mid-week services; talk by Proctor & Gamble; Anne B. Tyndall, soprano; financial talk by Dudley F. Fowler; "Touring" with George Elliott Cooley; Leon Gilbert Simon, baritone; Anna Fried and Leonore Ehrlich, concert violinists; dance program by "The Tennesseans"; Vincent Lopez and his orchestra from Hotel Pennsylvania.

**WOAW, Omaha, Neb., 526 (C. S. T.)—6 P. M.,** story hour, by Grace Sorenson. 6:30, Ackerman's Orch. 9, Page County Farmers' Band, Major George W. Landers, conductor.

**WGBS, New York, 316 (E. S. T.)—10 A. M.,** talks. 10:10, Dorothy Sutton, soprano. 10:20, Mrs. Burbridge, "Beauty," 10:30, soprano. 10:40, Haryot Dey, "Saving," 10:50, soprano. 1:30 P. M., Erna Steinway, contralto. 1:45, Helen Rouss, harpist. 2, contralto. 2:15-2:30, harpist. 3, Interview with Mrs. William Voigt on "Northern Africa." 3:10, Mrs. Owen Voigt, soprano. 3:20, Dr. Ralston, on "Your Feet." 3:30, soprano. 3:40 Foreign News. 3:50-4, Mrs. Owen Voigt, soprano. 6-6:30, Uncle Geebee. 6:30-6:45, Loretta Brady, story telling. 6:45, Larry Vinant, of California. 7:05, Wm. A. Shropshire, violinist; Hans Stosser, pianist. 8:30, Oliver M. Saylor, review of plays and books. 9, William Sweeney, baritone. 9:15, Mabel Farrar, violinist. 9:30, Wagner operatic program by English Grand Opera Co. 10:15, William Sweeney, baritone. 10:25, Mabel Farrar, violinist. 10:40-11, "The Better Way." Sketch by Edna Dill and Co. 11, special program from the Piccadilly Theatre.

**WDAR, Philadelphia, 395, (E. S. T.)—11:45 A. M.,** almanac. 12:02 P. M., organ; features from Studio; Arcadia Concert Orch, Prof. Feri Sarkozi, director. 2, "Child Welfare" by Anna B. Pratt. 4:30, artist recital. 5, question period in education. 5:45, sporting results and special announcements. 7:30, Dream Daddy.

**WCAE, Pittsburgh, 462, (E. S. T.)—12:30 P. M.,** news; weather. 3:30, news. 4:30, stock market; The Sunshine Girl. 6:30, concert. 7:30, Uncle Kaybee. 7:45, special feature. 8, special feature. 8:15, special feature. 8:30, Clark's Pennsylvanians.

**KHJ, Los Angeles, 395, (P. S. T.)—12:30 P. M.,** Coy Barkley and Palace Orch. 2:30, Carolyn Pearson, Music Appreciation Talk. 6, Hickman's Concert Orch. 6:30, children's program. 8, to be announced. 10, Hickman's dance orch.

**WJZ, New York City, 455 (E. S. T.)—10 A. M.,** Housewives Menu, Mrs. Julian Heath. 10:20, Review of Reviews. 10:30, Household Equipment, Ethel R. Peysor. 10:30, Bride's Linen by Editor of Needle Art. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Nathan Abas' Orch. 4, Emma Senger, soprano; Keith McLeod, accompanist. 4:30, Bernhard Levitow's Tea Orch. 5:30, agricultural reports; farm and home reports; quotations of the New York Stock Exchange; foreign exchange; News. 7 P. M., Bernhard Levitow's Orch. 8, Wall Street review. 8:10, NYU Air College; "Economics," Prof. Reid L. McClung. 8:30, organ. 10:30, Waldorf-Astoria Dance Orch.

### Friday, November 7

**WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M.,** market quotations. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 12 noon, chimes concert. 12:15 P. M., weather. 2, stocks and markets. 6:45, sport news and weather. 7, sandman's visit; stories by Miss Val McLaughlin. 7:20, educational lecture. 8, Emma Butler, contralto; Erwin Swindell, pianist.

**WEAF, New York City, 492 (E. S. T.)—11 A. M.,** talks; musical program; market and weather. 4 P. M., music by "Three Peasants"; children's stories. 6, music from Hotel Waldorf-Astoria; children's story by Blanche Elizabeth Wade; Edith Law, soprano; Billy Jones and Ernest Hare, the Happiness Boys; "Style," by Nat Lewis; United States Navy Band, Chas. Benter, director.

**KDKA, Pittsburgh, Pa., 326 (E. S. T.)—7:30 A. M.,** calisthenics by O. Shannon. 9:45, stockman reports; general market review and agricultural items. 11:55, time. 12 noon, weather forecast; stockman reports. 12:15 P. M., Sunday School lesson by James C. Mace. 3:30, quotations on hay, grain and feed, from stockman studio. 6:30, organ by Samuel Elliotson. 7:15, radio rhytmster for children. 7:30, news. 7:40, stockman reports; produce markets. 8, Sunday School lesson. 8:15, "football coaching" by Guy M. Williamson. 8:30, concert by talent from regions of Pennsylvania R. R. System. 9:55, time.

**KYW, Chicago, 536 (C. S. T.)—6:30 A. M.,** Calisthenics; also 7-8. 9:30, news, comment of financial and commercial markets. 11:35, table talk by Mrs. Anna J. Peterson. 6:30 P. M., news, financial and final markets; Dun's Review and Bradstreet's Weekly Review. 6:35, children's story by Walter Wilson. 7, DeBabary's orch. 7:10, Coon-Sanders' Nighthawks. 7:20, DeBabary's orch. 7:30, program from KYW's studio. 8:20, speeches of American Farm Bureau Federation; speakers will be announced by radio. 9-10, midnight revue.

**WHN, New York City, 360 (E. S. T.)—2:15 P. M.,** Wal Wilson's Orch. 2:45, Metropolis Trio; King,

Butler and Ellis. 3, Lou Fordon and Leo Jacobs, songs. 3:45, Uncle Robert's Chat to Children. 4, Mabel Livingston, the children's poet. 4:15, Gertrude H. Bronnenkant, lyric soprano. 4:30, Mario Silva, operatic tenor. 4:45, Wm. J. Stuart Story. 4:55, Rady O'Flynn, baritone. 5:05, Alja and His Orch. 6:30, Huston Ray's String Quartet. 7, Huston Ray's Alamac Orch. 7:20, WHN Welfare Period. 9:30, news. 9:37, Gregory's Crystal Palace Orch. 10, Bob Miller sings. 10:05, Max Hitrig sings. 10:10, Ira Schuster sings. 10:15, Edna Isaacson, soprano. 10:30, Henderson and Roseland Dance Orch. 11, Judith Roth and AL Wilson, songs. 11:15, Henny Cogert and Chas. Hirst, pianists. 11:30, Wooling's Club Alabama Orch. 12, Ted Lewis and His Symphonic Clowns.

**WEEL, Boston, 303 (E. S. T.)—6 P. M.,** Dok-Eisenbourg and Sinfonians. 7, Boston Big Brother Club. 7:30, musicale. 8, Madame Damiano, vocal and instrumental. 9, program from New York Studio.

**WEBH, Chicago, 370 (C. S. T.)—7 P. M.,** concert selections, Edgewater Beach Oriole Orch.; W. H. Bundy, tenor; musical bits. 9, dance, Edgewater Beach Oriole Orch.; Frederick Agard, tenor; musical bits; Rita McFawn, soprano. 11, dance selections, Edgewater Beach Oriole Orch.; Winter Garden Four, songs; Sandy Meek, tenor.

**KSD, St. Louis, Mo., 546 (C. S. T.)—8 P. M.,** program to be announced.

**KGO, Portland, Ore., 492 (P. S. T.)—11:30 A. M.,** weather. 12:30 P. M., Multnomah Hotel Strollers. 5, Children's Hallowe'en program. 7:15, markets, weather, news, police reports. 8, lecture, University of Oregon. 10:30, Hoot Owls.

**KFI, Los Angeles, 469 (P. S. T.)—5 P. M.,** news. 5:30, news. 6:45, organ. 8, Evening Herald program. 9, program from studio. 10, Packard Orch. and Louise Sullivan, Jeannette Dace, Leonard Van Berg. 11, Ambassador Hotel Orch.

**WRC, Washington, D. C., 469 (E. S. T.)—3 P. M.,** Fashion Developments by "Women's Wear." 3:10, Arthur McCormick, baritone. 3:20, "Beauty and Personality," by Elsie Pierce. 3:25, Topics, by "The Review of Reviews." 3:35, piano recital. 3:50, The Magazine of Wall Street. 4, song recital. 6, stories for children by Peggy Albion.

**WWJ, Detroit, 517 (C. S. T.)—8 A. M.,** Calisthenics. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin, talks on subjects of general interest. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch.; Claudine Secor, soprano.

**WHAS, Louisville, 400 (E. S. T.)—4 P. M.,** Alamo Theatre Orch.; Harry S. Currie, conductor; police bulletins; weather; "Just Among Home Folks"; news. 4:55, market reports. 5 time. 7:30, concert by the Fine Arts Trio: Miss Geraldine McNeely, director; Edward Lurton, violin; William Fries, flute. Baritone solos: George Thixton. Four-minute Civil Service talk, O. A. Beckman. News. Time.

**WQJ, Chicago, 448 (C. S. T.)—11 A. M.,** Fred Mann. 3 P. M., Marion Jane Parker, "Questions and Answers"; Mrs. Harry T. Sanger, Travelogue. 7, Williams and Rainbo Garden Orch. Fred Jacobson, monologues; Arthur Ward, tenor; Dorothe Schubert, soprano. 10, Williams and Rainbo Skylarks; Albert M. Tilton, Jr., tenor. Marie Watson Tilton, accompanist; Paul Lougher, tenor; Langdon Bros., steel guitar duets; Nubs Allen, contralto.

**WOO, Philadelphia, 509 (E. S. T.)—11 A. M.,** organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10, sports results and police reports. 5:15P. M., organ and trumpets. 7:30, sports results and police reports; A. Candelori and orch. 8:30, special program. 9:10, A. W. Hutchinson, baritone; Carolyn Jermon McCarthy, contralto; Lucius Cole, violinist; Harriette G. Ridley, accompanist. 9:55, time. 10:02, weather. 10:03, organ, Mary E. Vogt. 10:30, Vincent Rizzo and orch.

**WCAE, Pittsburgh, 462, (E. S. T.)—12:30 P. M.,** news; weather. 3:30, news. 4:30, Sunshine Girl; stock market. 6:30, concert William Penn hotel. 7:30, Uncle Kaybee. 8, special feature. 8:15, special feature. 8:30, operatic program.

**KHJ, Los Angeles, 395, (P. S. T.)—12:30 P. M.,** news. 2:30, musicale. 6, Hickman's Orch; Edward Fitzpatrick, director. 6:30, children's program. 8, G. Washington Coffee Co., program. 10, Art Hickman's dance orch; Burnett, director.

**WGBS, New York City, 316, (E. S. T.)—10 A. M.,** talks. 10:10, A. V. Lufrio, tenor. 10:20, Gertrude Tucker talk on "Romance of America." 10:30, tenor. 10:40, Alice Blair, beauty talk. 10:50, tenor. 1:30 P. M., Henry Kirvey Davies, baritone. 1:45, Agnes Bezington, pianist. 2, baritone. 2:15, pianist. 3, interview by Terese Nagel with Ruth Hale, "A Married Woman and Her Name." 3:10, Maria Samson, dramatic soprano. 3:20, Ethel Peysor in "Straight Thinking." 3:30, Maria Samson, dramatic soprano. 3:40, Mary Hamilton of the N. Y. Police, "Talk to Girls." 3:50, Maria Samson, dramatic soprano. 6:00, Uncle Geebee. 6:30, Nat Martin and his "I'll Say She Is" Orch.

**WDAR, Philadelphia, 395, (E. S. T.)—11:45 A. M.,** almanac. 12:02 P. M., organ; features from the Studio. Arcadia Concert Orch., Feri Sarkozi, director. 2, Arcadia Concert Orch; playlet by School of Elocution. 4:30, Max Essner's Dance Orch. 5:45, sporting results and special announcements. 7:30, Dream Daddy. 8, a book review, Arnold Abbott. 8:10, football talk. 8:30, talk by Dr. Wilmer Krusen; "WDAR Walter Greenough Players," Herman Kentner, violinist

# Harvard vs. Princeton

and director; Alfred Lennartz, 'Celloist; Richard Castello, pianist. 10, Morning Glory Club; Arcadia Orch.

## Saturday, November 8

WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M., market. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market quotations. 11:10, agricultural bulletins. 12 M., Chimes Concert. 12:15 P. M., weather. 12:17, closing markets. 6:45, sport news and weather. 7, Sandman's Visit (Stories by Val McLaughlin). 7:30, Sunday School Lesson for tomorrow by Rev. M. A. Getzendaner. 9, orchestra program.

WEAF, New York City, 492 (E. S. T.)—2 P. M., play-by-play description of the Harvard-Princeton football game direct from Cambridge, Mass., Graham McNamee announcing. 4, Clifford Lodge orch. 6, music from the Hotel Waldorf-Astoria; boys' stories by Fred J. Turner; Marie and Adolph Opfinger, soprano and pianist; radio show from Grand Central Palace; John Ryan and Arthur Hall, popular singers; Rudolph Joskowitz, violinist; Vincent Lopez and orch. from Grill of Hotel Pennsylvania.

KDKA, E. Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., stockman reports, market review and agricultural items. 11:55, time. 12, weather, stockman reports livestock and wholesale produce markets. 1:30 P. M., Daugherty's orch. 2:30, Pitt-Geneva football game from Forbes Field, Pittsburgh. 6, football scores. 6:30, Westinghouse band, T. J. Vastine, conductor. 7, football scores. 7:15, Richard, the Riddler. 7:30, sport review by James J. Long. 8, football scores. 8:30, Westinghouse band and Davis male quartet. 9:55, time, weather.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., calisthenics. 9:30, news, comment of the financial and commercial markets. 10:30, farm and home service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02 P. M., news, financial and final markets. 6:35, children's bedtime story. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabary's orch. 8, Edward Zaccala, tenor; Sallie Menkos, accompanist; James Rotas, violinist. 9:05, talk by H. Archibald Harris, income tax expert. 9:35, late show.

WHN, New York City, 360 (E. S. T.)—2:15 P. M., Cooper and Bourne, songs. 2:30, Victor Wilbur, baritone. 2:45, Nassau Ramblers, Rose Keegan, director. 3:45, Ellen Cross Concert Company. 4:10, Burton Levy, pianist. 4:20, Kiwanis Club boys' period. 4:30, recital by Genevieve Williams, coloratura soprano, with Alice Rinck, violinist, and Lillian Spitzer, pianist. 5, Bert Reith's Southern Harmonists. 6:30, Huston Ray's string quartet. 7, Huston Ray's Alamac orch. 7:30, Hotel Carlton Terrace orch. 8, "Goodnight Children," by Elizabeth Morrison-Jones. 8:05, Jimmy Flynn, dramatic tenor. 8:15, Barbara Weil, soprano. 8:30, "The Gothamites," Chas. Schreiber, director. 9, Alfred Dulin, concert pianist. 9:10, Metropolis Trio, King, Butler and Ellis. 9:20, Carrie S. Hirsch, mezzo soprano. 9:30, Elrige's ladies trio, violin, cello and piano. 10:15, Harry Harris, tenor. 10:30, Clarence Williams and his radio trio, assisted by the Blue Five orch. 11, Jimmy Clarke and his entertainers. 11:30, Fletcher Henderson and his Roseland dance orch.

WEBB, Chicago, 370 (C. S. T.)—7 P. M., concert selections, Edgewater Beach Oriole orch.; radio Sunday school lesson, Dr. Herbert W. Virgin; musical bits. 9, William H. Hunt, tales; dance selections, Edgewater Beach Oriole orch.; Marie Kelly, readings; Langdon Brothers, Hawaiian guitars. 11, dance selections, Edgewater Beach Oriole orch.; Marie Kelly, readings; Hawaiian guitars.

KSD, St. Louis, Mo., 546 (C. S. T.)—8 P. M., St. Louis Symphony orch. 11:30, Varsity Club orch.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 10 P. M., Olsen's Metropolitan orch.; weather, news.

KFI, Los Angeles, 469 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, dance orch. 8, Virginia Flohri, coloratura soprano. 9, program from Examiner studio. 10, Radio Club. 11, Ambassador Hotel orch.

WRC, Washington, D. C., 469 (E. S. T.)—6 P. M., children's hour by Peggy Albion. 7:45, Bible talk. 8, Mary Callahan, soprano. 8:15, piano recital by Robert Ruckmann. 8:30, Ruth Kobbe, mezzo-soprano. 8:45, to be announced. 9:15, Lee House Trio, Samuel Udwin, directing. 9:55, time and weather. 10:30, Hotel Astor orch.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's Dinner." 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12, music. 2:30 P. M., University of Michigan-Northwestern University football game broadcast from Ferry Field, Ann Arbor.

WHAS, Louisville, 400 (E. S. T.)—4 P. M., Alamo Theatre orch., Harry S. Currie, conductor; police bulletins, weather. 4:30, "Just Among Home Folks"; readings. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, Sylvian Trio, Miss Fannie Elizabeth Stoll, director and violin; Miss Myrl Chrisman, flute; Miss Evelyn Kaiser, piano; news. 9, time.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., Helen Harrington Downing; H. F. West, "Pressure Cookers"; Mrs. Albion Headburg, of the First District Illinois Federation of Women's Clubs, "Art" 3, "Koffe Klatsch"; musical features. 7, Williams and Rainbo Garden orch.; Kathryn Orr, accompanist; Grace Hegseth, soprano; Myron Muench, dramatic interpreter. 10, Williams and

Rainbo Skylarks; Jerry Sullivan, writer of "Dad," "Whistle," "When, Where and Why"; Sandy Meek, Scotch tenor; The Melodians, Laurie, Eddie and Bennie; Geo. A. Little and Larry Shay, harmony singers; Lew Butler, singing, "She Loves Me."

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., news, music. 2:30, Charlie Wellman, tenor; Helene Smith, pianist. 6, Art Hickman's Concert Orch.; Edward Fitzpatrick, director. 6:30, children's program. 8, program by Dr. A. Zimmerman. 10, Art Hickman's dance orchestra.

WGBS, New York, 316 (E. S. T.)—10 A. M., talks. 10:10, Josephine Pauline, soprano. 10:20, Susan Salt in "Rugs." 10:30, soprano. 10:40, Elsie Irvine in "Current Events." 10:50, soprano. 1:30 P. M., Christine Thompson, pianist. 1:45, Melo Dance Orch. 2:15, Christine Thompson, pianist. 3, N. Y. City Federation of Women's Clubs. 3:10, music and talks. 6, Uncle Geebee. 6:30, Ray Hunter, baritone. 6:50, May Arno recital. 9:30, Wagner operatic program. 10:15, Lawrence K. Downey, baritone. 10:30, Anne B. Tyndall, soprano. 10:45, baritone. 11, soprano. 11:15-12, Bud Fisher's Happy Players.

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., almanac. 12:02 P. M., organ; features from the Studio; Arcadia Concert Orch. 2-3, Arcadia Concert Orch.; recital from Studio. 4:30, program by the Cotton Pickers. 5:45, sporting results and special announcements. 7:30, Dream Daddy.

WJZ, New York City, 455 (E. S. T.)—1:15 P. M., Orlando's Orch. 1:45, play-by-play description of the Yale-Maryland football game direct from New Haven by Ennis Brown, noted football authority and J. Andrew White. 7, Waldorf-Astoria Dance Orch. 8, Hunter Sawyer, tenor; Henry Ackley, accompanist. 8:30, Estrella Mandolin Quartet. 10:30, Intel Astor Orch.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., organ. 11:30, weather. 11:55, time. 12, Tea Room orch. 5:10 P. M., sports results and police reports. 5:15, grand organ trumpets, J. W. C. I. band, Arthur A. Rosander, director. 9:55, time. 10:02, weather.

## Sunday, November 9

WEEL, Boston, 303 (E. S. T.)—3:45 P. M., Sunday men's conference, Y. M. C. A., Brooklyn. 7:20, music from Strand Theatre, New York.

WHAS, Louisville, 400 (E. S. T.)—9:57 A. M., organ. 10, church service, Rev. Russell J. Pirkey; H. U. Goodwin, organist; Mrs. O. W. Edinger, soprano; Angelina McCrocklin, contralto; Charles H. Barnes, Jr., tenor; William Cornwall, baritone. 4-5, Vesper song service.

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30-9 P. M., Bankers' Life radio artists; Bankers' Life radio orch.; W. L. Marsh, director; Helen Birmingham, pianist; Myrtle Williams, soprano; Hibbard Cleveland, basso.

WOO, Philadelphia, 509 (E. S. T.)—10:30 A. M., church services, Rev. A. Gordon MacLennan, pastor. 2:30 P. M., Sunday school. 6, old-time hymns and melodies and sacred chimes recital on organ, Clarence K. Bawden at the console.

WBZ, Springfield, Mass., 337 (E. S. T.)—10:45 A. M., church services, Rev. Charles A. Wing, pastor. 8:30 P. M., organ, E. Rupert Sircom, organist; Frances Burr Mitchell, soprano; Aimee Suppr, mezzo-soprano. 9:30, Maria Gertrude Healey, soprano, accompanied by Mrs. E. C. Healey.

KGW, Portland, Ore., 492 (P. S. T.)—6 P. M., church services. 7, Colburn Concert orch.

KPO, San Francisco, 423 (P. S. T.)—11 A. M., undenominational church services. Rev. H. L. Rowley. 8:30 P. M., Rudy Seiger's Orch.

WCBD, Zion, Ill., 345 (C. S. T.)—Trio: harp, viola and flute; cello solo, Herman Becker; tenor and soprano duet, Ralph Bull and Dorothy Bull; contralto solo, Mrs. G. R. Sparrow; soprano solo, Dorothy Bull; baritone solo, R. F. Reid.

## Monday, November 10

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30 P. M., "Care of Teeth," by Emma Weisgerber. 8, Sciota MacAdow Herndon, soprano; talent under Dean Holmes Cowper of Drake University; Grace Robinson, soprano. 11:15, L. Carlos Meier, master organist.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., The Star's trio. 5, Boy Scout program. 5:50, marketgram, weather, time signal and road report. 6, School of the Air; message from Rnger W. Babson; The Story Lady; The Hanlein-Knutson ensemble. 8, popular program. 11:45, Nighthawk Frolic.

WHAZ, Troy, N. Y., 380 (E. S. T.)—9 P. M., father and son night. 12, midnight trans-continental; Students' Symphony orch.

WHAS, Louisville, 400 (E. S. T.)—4 P. M., Alamo Theatre orch., Harry S. Currie, cond.; police bulletins; weather; "Just Among Home Folks"; readings; news. 4:55, livestock, produce and grain market. 5, time.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., Marcia Meadows, "Woolens and Their Manufacture"; Mrs. Geo. M. Shirk, "Scientific Preservation of Food." 3 P. M., "Oyster Dishes, So Popular in New Orleans"; Madame Huntingford, hair specialist. "The Care of Your Hair."

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time weather, market report. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, talk by Our World. 7:30, second lesson in modern American literature by Robert Emmons Rogers. 8, Hazel

(Continued on page 21)



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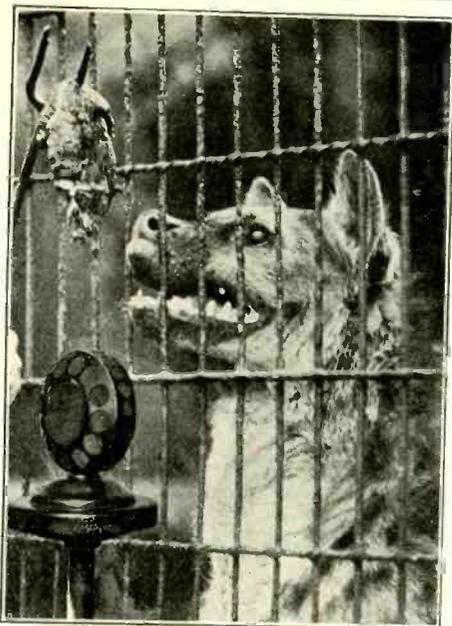
Magnavox Radio Products are sold by good dealers everywhere. Catalog on request.

THE  
**MAGNAVOX**  
COMPANY

New York: 350 West 31st Street  
San Francisco: 274 Brannan St.

Canadian Distributors: Perkins Electric Limited,  
Toronto, Montreal, Winnipeg

# "Artist"

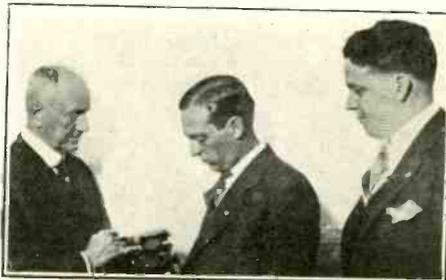


THE GROWL of the laughing hyena, from his domesticated haunt in the London Zoo, was broadcast just to make folks realize how much more comfortable is life in a civilized community than in a beastly jungle. Hundreds of thousands heard the hungered and serious laugh of the unwitting broadcaster. (Gilliams)

# Kite Aerial Under Test



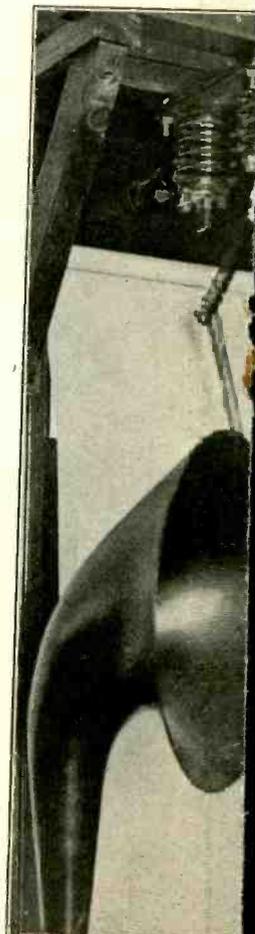
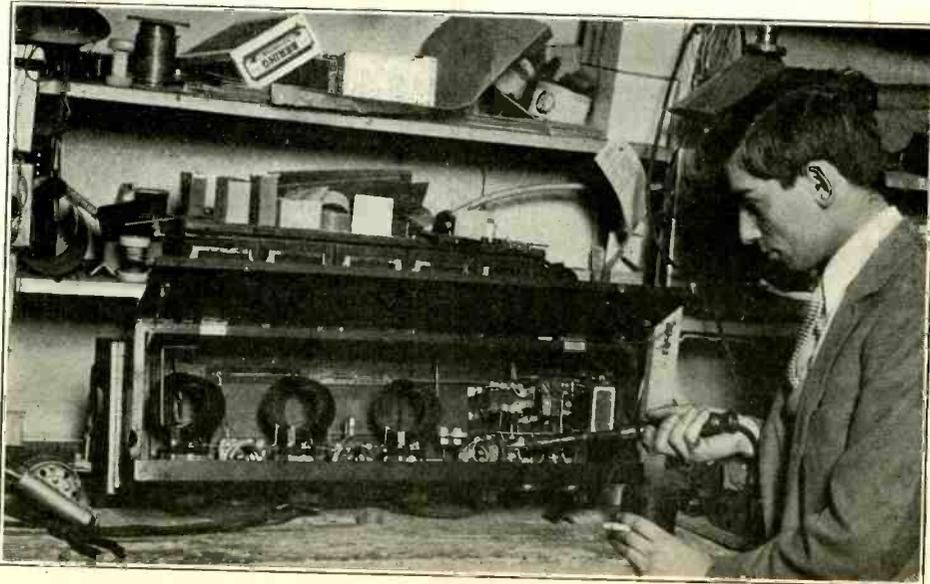
A HUGE KITE was used in recent tests at a radio field day in England for raising a long aerial to a position amid the clouds. A mobile station used the aerial for broadcasting. Note the insulator, at right, on the ground, showing where the aerial wire is joined as part of the kite string, and in this fashion raised. (International Newsreel)



GENERAL JAMES A. HARBOARD, the distinguished president of the Radio Corporation of America, (left), presented gold medals to Elmer Walter (center) and Charles Sullivan, radio operators, for meritorious service at the key when their vessel, the S.S. Boston, collided with the tanker Swift Arrow, off Point Judith, R. I. (Kadel & Herbert)

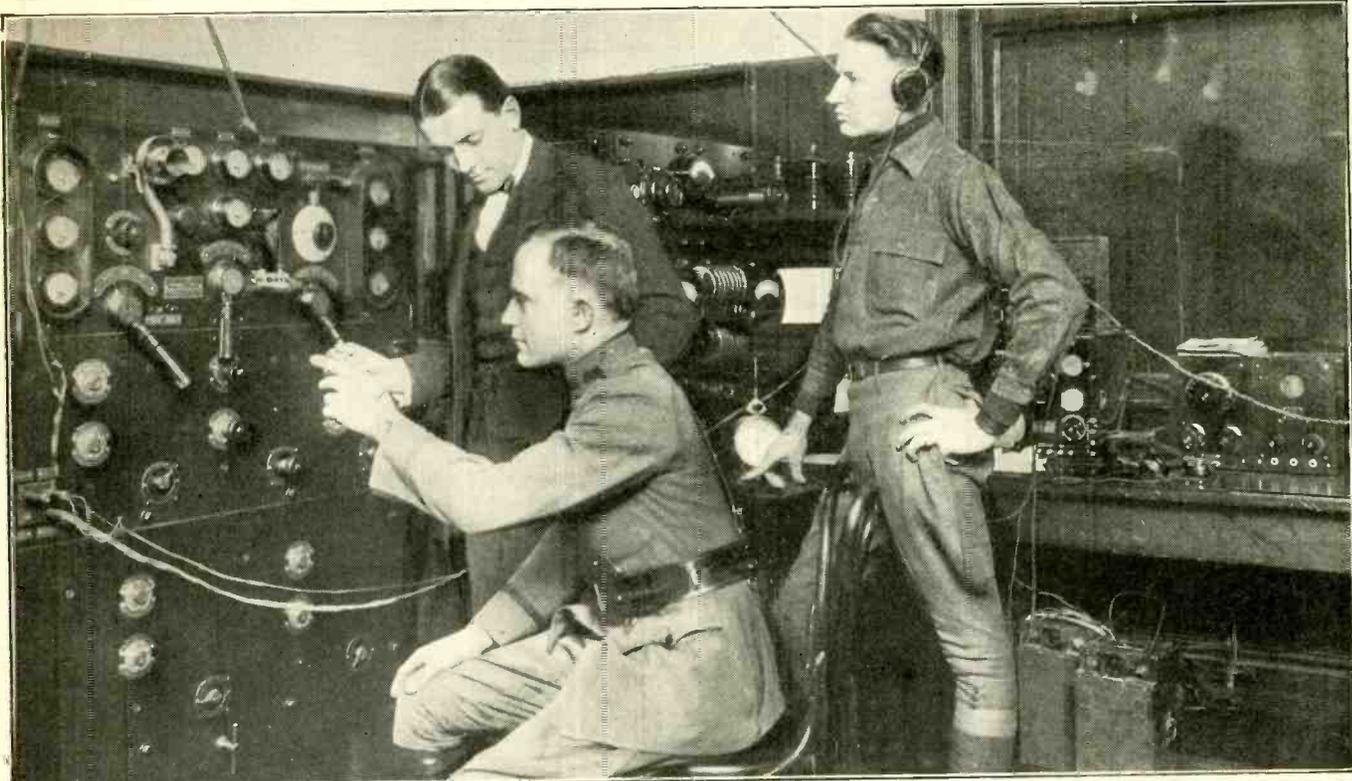
WHO are the noted radio men in the above photo? The one whose correct answer is first to reach RADIO WORLD'S office will be awarded the original of the drawing reproduced on the front cover of this issue.

A YOUNG MAN of many activities is Roger Wolfe Kahn, son of the noted banker and operatic patron, Otto H. Kahn, of Kahn, Loeb & Co. Radio is Roger's chief hobby, jazz being a sort of avocation with him. He is leader of the Roger Wolfe Orchestra. Roger has four Super-Heterodynes and three Neutrodyne, one of which he is shown soldering. And as for 1-tube sets, the place abounds with them. Note the spools of flexible connecting wire on the shelf and the No. 20 DCC magnet wire. "This is the life," says Roger, who lives at 1100 Fifth Avenue, New York City. (Kadel & Herbert).

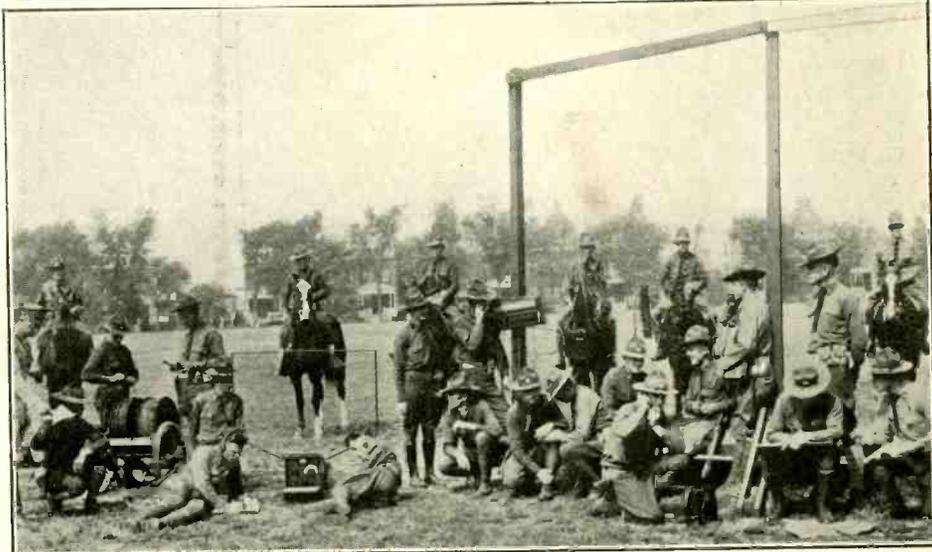


WIRED WIRELESS, although still the subject reported. The idea is to and re-transmit them by  
is send

# Army Conducts Radio Experiment



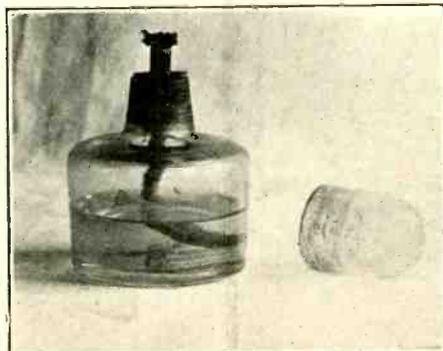
WHILE the field work is being conducted by the communication platoons of the U. S. A., headquarters keeps on the alert to receive the messages dispatched.



A CAGE WALL AERIAL is used by the communication platoon, 26th Infantry, U. S. A., for radio field work. Capt. H. B. Cromwell is in command, aided by Lieut. W. W. Jenna. At right, at bottom, is a photo of Army radio work in the tropics. (Kadel & Herbert).



ough previously tested with only moderate success of much experimenting and better results are receive radio programs on a set, over the air, telephone wire, the persons to whom this service offered not requiring any set.



AN ALCOHOL LAMP may be used to heat a soldering iron, if there is no electricity available. The heat generated is great. The cost and upkeep are inexpensive. (Radio World).



ARMY RADIC TESTS in the tropics.

# Seized German Radio Patents Available to Americans

## Literature Wanted

THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers, are published in RADIO WORLD, on request of the reader. The blank below may be used, or a post card or letter will do instead.

Service Editor,  
Radio World,  
1493 Broadway, New York City.  
I desire to receive radio literature.

Name .....

City or town .....

State .....

Dealer ? .....

C. E. Dezotell, 313 DeMers Ave., Grand Forks, N. D.

Archibald Brown, 408 Artell St., Clouis, N. Mex.  
Leonard Scheele, 1238 Oak St., Ft. Wayne, Ind.  
Mr. W. Walunas, 10263 Russell St., Detroit, Mich.

George Fourmer, 24 Morris Ave., Pawtucket, R. I.

C. D. Harris, 866 17th St., Altoona, Pa.

G. T. Grunn, 2102 Hillman St., Youngstown, O.

B. P. Craig, 304 Arlington St., Youngstown, O.

A. J. Jenchura, 120 Camp St., Braddock, Pa.

Frank A. Piche, 26 Belknap St., Lacomia, N. H.

William C. Shortiss, 23 Highland St., Framingham, Mass. (Dealer.)

A. D. Findley, 145 Belmont Ave., Everett, Mass.

W. R. Anderson, 102 Linden Ave., Council Bluffs, Ia.

John Conrad, 4512 Gladwin Ave., Detroit, Mich.

Elwood Hosier, Portland, N. Y.

W. H. LeVeque, 854 Harris Ave., Woonsocket, R. I.

Wm. C. Schultz, 6406 S. Hoyne Ave., Chicago, Ill.

Harold Boughman, Daylestown, O.

W. N. Fairmont, McAlpin Hotel, Fairmont, Va.

H. C. Fetley, 129 33rd St., Brooklyn, N. Y. (Dealer.)

B. Doody, Graham Court, Graham & 5th Aves., Astoria, L. I.

J. W. Hectjan, 460 Belmont Ave., Chicago, Ill.

John G. Taylor, 56 Nassau St., New York City.

Erman O. Miller, Dixon, Ill.

James H. Michael, 318½ W. Pike St., Canonsburgh, Pa.

R. C. Rivers, Glens Falls, N. Y.

Lawrence Brown, 4625 Friendship Ave., Pittsburgh, Pa.

Milo Gilbertson, Mt. Horeb, Wis., RFD.

John H. DeHart, Mohnton, Pa.

Geo. E. Perry, Main Street, Newtown, O.

J. I. Varner, 215 N. E. 1st Ave., Miami, Fla.

H. T. Linn, 110 Market St., Jersey Shore, Pa.

Wm. A. Mindgenk, 545 Terrace Ave., Clifton-Cinto, O.

W. McDonough, 365 Washington Ave., Braintree, Mass.

V. R. Baukat, Readsboro, Vt.

Wm. L. Bostock, Palisade, Neb.

C. J. Simons, Dept. of Chemistry, University of Colo., Boulder, Colo.

Paul Powers, Girard, O.

C. N. Fancher, 1606 Dudley St., Cincinnati, O.

Paul E. Johnson, Fenino, Wash.

C. H. Ericson, Tampico, Mexico; East Coast Oil Co.

R. Ralph Barker, Mooresville, N. C.

A. Heggelke, Johnson City, N. Y.

Joe Fair, 2272 E. 73rd St., Cleveland, O.

Edw. F. Carroll, 51 Pacific St., New London, Conn.

E. H. Franklin, 844 Freedmore St., Pittsburgh, Pa.

R. C. Wright, P. O. Box 452, Wheatland, Wyo.

Howard F. Purcell, 221 E. McCreight Ave., Springfield, O.

W. H. Puleston, Wellington, Colo.

William F. Busch, 118 S. 4th St., Mankato, Minn.

N. J. Brown, P. O. Box 194, Wellsville, N. Y.

T. L. Beckwithley, S. W. 10th Ave., Miami, Fla.

Henry Hartman, 218 E. Jersey St., Elizabeth, N. J.

D. C. Nelson, Box 661, Miami, Fla.

Geo. B. Corrie, Charleston, W. Va.

Geo. Garron, 201 Saratoga St., E. Boston, Mass.

W. K. Bush, Missouri Pacific R. R. Co., Clarks, La.

Christ J. Chamales, 4755 Magnolia Ave., Chicago, Ill.

W. A. Dunkin, 3517 Shenandoah Ave., St. Louis, Mo.

Wm. O. Brown, Iey S. Fourth St., Easton, Pa.

Walter A. Krantz, 82 N. Fourth St., Easton, Pa.

(Continued in next column)

## The Radio Trade

WASHINGTON.

ATTORNEY-GENERAL STONE ruled that the Navy Department could lease to American manufacturers certain German patents for the manufacture of radio parts held by the department since the war.

Responding to a request from Secretary Wilbur for an opinion on the question, Mr. Stone held that there appeared to be no inhibition against the issue of licenses to manufacture under the patents, such licenses not to be exclusive, but that

the patents could not be sold.

While the text of the Attorney-General's opinion was not made public, it was believed the ruling would constitute a precedent that would open the way for use by American industry of several hundred patents held under seizure by various Government agencies since the war. Use of the patents by license or otherwise heretofore has been denied. Owing to the varying nature of the patents, however, it has not yet been determined just how far-reaching the ruling will be.

## Detroit Radio Show Nov. 12 to 16

THE third annual radio show of Detroit will be held at the Arena Gardens, November 12 to 16, inclusive, by the Radio Trade Association of Michigan under the auspices of The Detroit News. Many of the features that made the New York show a success in attendance and interest will be at the Detroit exhibition.

The transmitting and receiving equipment of WNP of Captain Donald MacMillan's ship Bowdoin will be one of the features of this year's exhibit. An effort is now being made to have Captain MacMillan or his radio operator, Donald M. Mix, on hand to give talks on the benefits they derived from the equipment while frozen in at Etah, Greenland, last winter.

There will be plenty for the radio fan to see at the show. The leading manufacturers of the country have reserved their booths, and from the present indications the big show hall will be filled with interesting developments of the radio art. The doors will be open from 11 A. M. to 12 midnight throughout the five days.

## MAJ. WHITE HEADS RADIO GROUP FOR RED CROSS DRIVE

MAJ. J. ANDREW WHITE, of the Haynes-Griffin Radio Service, Inc., heads as volunteer Roll Call Chairman a special radio industry group to enlist the maximum response throughout the radio industry of New York City to the annual Roll Call of the Red Cross, opening November 11, Armistice Day, for funds to maintain the organization's relief work and public health program.

The radio industry group is one of the first 75 groups formed in accordance with the campaign plan of committee organization of the city into various industrial, banking, mercantile and professional groups. Headquarters are at 598 Madison Avenue.

John N. Owen, Box 1111, Savannah, Ga.

Harry C. Blake, 137 13th St., Oakland, Cal.

Wm. Wisniewski, 466 E. 147th St., N. Y. C.

A. Kernish, 3106 Euclid Ave., Philadelphia, Pa.

Chas. Diamond, 1 Neilson St., New Brunswick, N. J.

C. R. Meddins, 315 W. Walnut St., Springfield, Mo.

Milton Shulowitz, 345 New Jersey Ave., Brooklyn, N. Y.

F. C. Burling, 802 N. Tioga Ave., Ithaca, N. Y.

M. E. Marsh, 205½ W. Court St., Ithaca, N. Y.

John D. Boyd, 697½ Hillside Ave., Fayetteville, N. C.

Clarence Carter, Route 4, Elizabeth City, N. C.

A. P. Stroganoff, 1922 E. 71st St., Cleveland, O.

P. A. Roberts, 11 Florence St., Woodford, Me.

W. L. Cahow, Plant City, Fla.

Richard Lynch, Inwood Park, L. I., N. Y.

A. D. Findley, 145 Belmont St., Everett, Mass.

Harry Rowan, 217 Pusey St., Chester, Pa.

Carlos Sapp, 71 E. Norwich Ave., Columbus, O.

W. A. Bray, 728 Grand Ave., Oakland, Cal.

C. T. McNabb, Murfreesboro, Tenn.

Fred C. Haynes, 5011 California St., Omaha, Neb.

Mr. L. Smith, 1012 N. 11th St., St. Louis, Mo.

Clarence R. Eldredge, 41 Lawrence St., Wakefield, Mass.

E. C. Thomas, 465 W. Dewey St., Youngstown, O.

Michael Green, 524 W. 46th St., N. Y. C.

William F. Swings, Supus, Mo.

W. C. Bower, 942 Highland St., Columbus, O.

Victor Price, Fessenden, N. D.

E. L. Jarboe, 6512 Quimby Ave., Cleveland, O.

E. F. Dewey, Los Angeles, Cal.

Norman Johnson, Fenino, Wash.

## Coming Events

NOV. 3-8—Third Annual National Radio Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co., 522 Fifth Ave., N. Y. C. Annual National Radio Convention in conjunction with show.

NOV. 11-14—Wisconsin Radio Exposition, Milwaukee.

NOV. 17-22—Buffalo Radio Show.

NOV. 18-23—Chicago Radio Fair. They advertise "all space sold."

NOV. 24 TO 30, INCLUSIVE—International Radio Week.

DEC. 1-7—Newark Radio Fair.

DEC. 1 TO 8, INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

## You "R. F. Monkeyers"

Same panel, same layout, fewer parts than a "Neut"—but, oh! how she steps out. Relativity with deep, resonant volume. If you've been thro the embarrassing vicissitudes of "Neut" making, there's "Welcome" on your door mat for this very circuit. No one else has it. Necessary stabilizer, 22 feet gold sheathed wire, lithographed white print of circuit and complete, simple instructions—prepaid anywhere, cash or stamps—\$5.00. Nothing else to buy. Satisfaction guaranteed. Data about this circuit sent for 10c. New radio catalog, thousands unusual items for stamp.

Kladag Radio Laboratories  
KENT, OHIO

## 1-TUBE SUPERDYNE

Tone-Quality Marvelous

"A Set Like a Dream Come True"  
Full constructional text and diagrams in next week's Radio World, issue of November 15, on sale Wednesday, November 12.

## Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum, 3 lines.

I HAVE TWELVE PATENTS on loudspeaking telephone apparatus now marketed; I want party with capital to join in developing radio line and enlarging present operations; consider sale of patents, tools, stock, etc., with or without services, if satisfactory tender is made; principals only; references exchanged. 1-O, Radio World.

CORPORATION MANUFACTURING radio sets with exclusive patented features desires \$50,000 for production purposes; investors only; will welcome strictest investigation. 2-O, Radio World.

## RADIO OPPORTUNITY

Man or group of men interested in securing license to manufacture patented 4-tube radio receiving set; compares favorably with any 5-tube set; who are ready and able financially to get into big production at once? Appointment for demonstration. 3-O, Radio World.

# Yale-Maryland Game Saturday

## Programs

### Monday, November 10

(Continued from page 17)

Levasseur, soprano. 8:30, talk on "Starlore," by George Leo Patterson. 9, violin recital by Miriam Carleton. 9:30, Louis V. Bedard, violinist; Westinghouse Philharmonic trio. 9:55, time, weather. 10:01, musical program. 11:30, McEnelly's singing orch.

WLW, Cincinnati, 423, (C. S. T.)—10:45 A. M., forecast; business reports. 1:30 P. M., business reports. 3, market reports. 4, lesson in "Ilo"; Babson reports. 8, Alvin Roehr's Music Makers; Crosley Theatrical Review. 8:40, songs; Orchie Snyder Beall, soprano. Mrs. Geo. W. Collins, accompanist. 8:50, Cooper Orch. and Male Quartet. 11:30, Crosley Arabian Nights; Lange-McKay Orch.

KPO, San Francisco, 423, (P. S. T.)—12 A. M., time. 1 P. M., Rudy Seiger's Orch. 4:30, Rudy Seiger's Orch. 5:30, children's story hour. 7, Rudy Seiger's Orch. 8, organ. 9, Elsie Ingham, contralto; Marion Kislingsbury, pianist; Bohemian Trio. 10, E. Max Bradford's Band.

WCBD, Zion, Ill., 345, (C. S. T.)—Vocal trio, the Sweeney, Naffziger, and Mrs. Crowe; contralto and baritone duet, Mrs. LaRose and Mr. Thomas; soprano solo, Emma Reynolds; contralto solo, Mrs. P. M. LaRose; baritone solo, J. D. Thomas; cornet and trombone duet, Messrs. Gerald and Daniel Mason; cornet solo, Gerald Mason.

PWX, Havana, Cuba, 400, (E. S. T.)—8:30 P. M., concert by pupils of Prof. Juan Gonzalez.

KGW, Portland, Ore., 492, (P. S. T.)—11:30 A. M., weather. 5 P. M., children's program. 7:15, markets, weather, news and police reports. 8, concert by The Oregonian Concert orch.

KGO, Oakland, Cal., 312, (P. S. T.)—1:30 P. M., N. Y. and S. F. stock reports and weather. 3, Studio musical program; Parent-Teacher Association speaker. 4, Henry Halstead's Orch. 5:30, Aunt Betty stories and KGO Kiddies' Klub. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores, and news. 8, educational program. 10, dance music.

### Tuesday, November 11

WLW, Cincinnati, 423, (C. S. T.)—10:45 A. M., weather and business reports. 1:30 P. M., business reports. 3, market reports. 4, lesson in "Ilo." 10:30, Ohio Rubber Quartet and Instrumental Trio; Howard Hafford, 1st tenor; Erwin Meyer, 2nd tenor; Edwin Weidinger, baritone; John Dodd, bass; Howard Evans, accompanist. 11:30, Crosley Arabian Nights; Lange-McKay Orch.

KPO, San Francisco, 423, (P. S. T.)—12 A. M., time. 1 P. M., Seiger's Orch. 4:30, Seiger's Orch. 5:30, children's hour stories. 7, Rudy Seiger's Orch. 8, U. S. Army Band. 10, E. Max Bradford's Band.

KGW, Portland, Ore., 492, (P. S. T.)—11:30 A. M., U. S. Weather. 12:30 P. M., concert. 5, children's program. 7:15, markets, weather, news and police reports. 8, agricultural lecture. 8:30, concert by Portland Civic Music Club.

KGO, Oakland, Cal., 312, (P. S. T.)—1:30 P. M., N. Y. and S. F. stock report; weather. 4, orch. of the Hotel St. Francis. 6:45, final reading, stock reports, weather, S. F. produce news, baseball scores, and news. 8, Bodley, pianist; Mima B. Montgomery, soprano; Glen Halik, violinist; Miriam Burton, pianist; Charles M. Dennis, baritone; address, "The New Renaissance," by Tully Cleon Knoles, President of the College of the Pacific; Bozena Kalas, pianist; Nella Rogers, contralto; travel talk by Ford E. Samuel; Allan Bacon, pianist. 10, Henry Halstead's Orch. and soloists.

WDAF, Kansas City, Mo., 411 (C. S. T.)—3:30 P. M., The Star's trio. 5, child talent program. 5:50, marketgram, weather, time signal and road report. 6, School of the Air; The Tell-Me-a-Story Lady; radio piano lessons, Maudellen Littlefield; Hanlein-Knutson ensemble. 11:45, Nighthawk Frolic.

WHAS, Louisville, 400 (C. S. T.)—4 P. M., Alamo Theatre orch.; Harry S. Curries, conductor; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, livestock. (Continued on page 24)

### ACME 4-Tube REFLEX

We will build this set for you, using a genuine ACME KIT-SET assembled and wired in a beautiful mahogany cabinet, ready to operate, with loop. 5 Days' Trial—Return if Not Satisfactory. **\$65.00**  
GABE RADIO CO.  
1261 BROADWAY NEW YORK CITY  
Mail Orders Given Prompt Attention

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

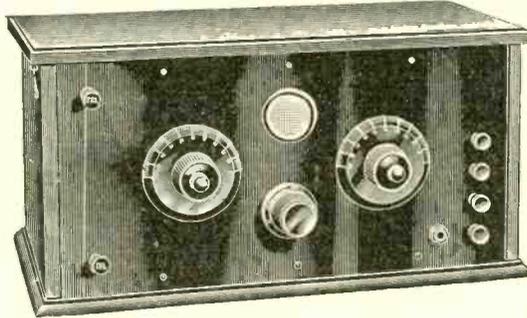
#### SPECIALISTS

Our Own Coils—guaranteed..... \$8.50  
Kit (Flowelling Condensers, Cells and Diagram) 10.00  
Complete Parts, Assembled with Diagram..... \$5.00  
Supplies Advise Free. Mail Orders Solicited.  
**WALLACE RADIO COMPANY, Inc.**  
135 LIBERTY STREET NEW YORK CITY

## Quality Reflex Set \$27.72

Here is the set illustrated and described on pages 4-5-6 in issue of Radio World, Oct. 25

### ON APPROVAL NOT ONE CENT IN ADVANCE!



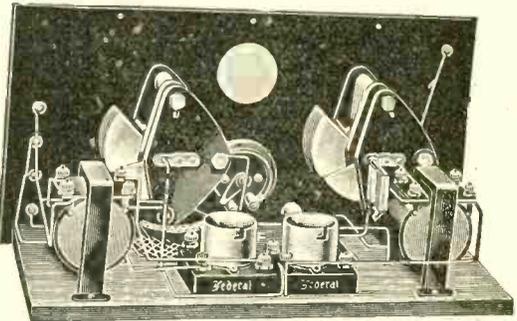
### JUST INVEST IN A 2c STAMP

Say you are willing to look at the set in your express office. If you like it, give the agent the price, and take it away. If after testing and using it a reasonable time, you are not absolutely sure you got your money's worth, we will take it back and refund every cent you paid.

We Pay Transportation Anywhere in U. S.

## You have been wanting a real good set. Here it is!

This Quality Reflex "Sherma-Flex" set produces most unusual results. It is highly selective. It brings in local and distant stations with a fine clearness and so strong that many users say the volume equals that of a five-tube set! It has been subjected to numerous severe tests under different trying conditions and in many locations, and in every case it has proved extremely satisfactory alike to novice and expert.



We know it will please you, or we could not afford to make such a wide-open offer.

THE SET COMPLETE, with all parts of the Receiver assembled, in a nice piano-polished, dark mahogany finish cabinet, and with all accessories, ready to use —nothing more to buy—for only **\$53.78**

IF YOU WANT TO SAVE THE COST OF ASSEMBLED, including the cabinet, for only.... **\$27.72**  
You—anyone—can put the parts together in a few hours. Easily followed charts and instructions go with every set.

As the price of all the accessories is only **\$16.06**

THE WHOLE OUTFIT, WITH RECEIVER unassembled, then will cost you only **\$43.78**

Don't Let This Opportunity Get Away—Order from This Ad.—To-day!

## LIBERTY MAIL ORDER HOUSE

Dept. S-681, 112 TRINITY PLACE, NEW YORK

From N. Y. this set brings in Hastings, Neb., using Ducon plug. Also Miami, Fla., on loud speaker, using aerial. Chicago comes in with great volume on loud speaker, using bare wire aerial, without insulation, in pouring rain! Greater distance on phones!

#### PARTS

- 1 Cabinet, 7x14.
- 1 Baseboard.
- 1 Panel, 7x14.
- 2 Sherma-Tran Transformers.
- 2 26-plate Sherman Kant-Short Vernier Condensers.
- 2 Honeycomb Coils.
- 1 Rheostat.
- 2 Sockets.
- 2 Micadons.
- 1 Fixed Crystal Detector.
- 1 Single Circuit Jack.
- 6 Binding Posts.
- 12 ft. Bus Bar.
- 1 lb. No. 20 DCC Wire.
- 1 Bezel.

#### ACCESSORIES

- 2 UV-201A Tubes
- 1 Pair Guaranteed Phones.
- 1 Phone Plug.
- 2 B Batteries, 45 volts each.
- 1 A Battery, 4 Dry Cells.
- 1 Coil of Aerial Wire.
- 1 Coll Lead-In Wire.
- 1 Ground Clamp.
- 1 Insulator Tube.
- 2 Insulators.

**\$7.75**

**SPECIAL**

On August 18, 1924, the United States Patent Office issued patents for the protection and manufacture of the world's greatest storage "B" battery. The new battery gives an extra long service and lasts much over five years—gives good, clear and loud reception and gets distance very well.

**A New Kind of Plate**  
The battery is absolutely noiseless and gives over 3,000 milli ampere hours of service per charge. The new plate is graphic, treated, size 2 1/4 x 1 1/2 inches, and can be recharged in a few hours from any charger, lamp socket or farm outfit. Five batteries cost only five cents per charge.

**Container is Genuine Hard Rubber**  
The new battery is built in a one piece, unbreakable, neat, hard rubber container as illustrated, with vent caps large enough for hydrometer reading. Each battery is called a unit of 2 1/2 volts. Add units for higher voltage.

**Most for Your Money**  
This is the largest size battery for your money. Built under patents, thus you get the very best. The battery can be bought assembled or knockdown. Units come with full directions printed very clear. Units can be assembled by any one in a few minutes' time. Don't waste more money on dry batteries—send today for the new patented battery. A set of them will last indefinitely.

Price Assembled ..... \$4.50  
Knock down ..... 3.75  
A. C. Rectifier ..... .75

**SIDNELL RADIO MFG. CO.**  
Licensed Manufacturer  
29 WEST MT. EDEN AVE. NEW YORK CITY  
BIG CATALOG ON REQUEST

MR. D. X. HOUND

A Character Created  
by RADIO WORLD Artist

By HAL SINCLAIR



**RADIO WORLD**  
The Big U.S. Paper

TELEPHONE: LACKAWANNA 6976, 2063  
PUBLISHED EVERY WEDNESDAY  
(Dated Saturday of same week)  
FROM PUBLICATION OFFICE  
HENNESSY RADIO PUBLICATIONS CORPORATION  
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M. B. HENNESSY, Vice-President  
FRED S. CLARK, Secretary and Manager  
1493 BROADWAY, NEW YORK, N. Y.  
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Brema's Bldgs., Chancery Lane, London, Eng. Paris,  
France, Brentano's, 38 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy  
MANAGING EDITOR, Herman Bernard  
TECHNICAL EDITOR, Abner J. Getula

SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months. Add \$1.00 a year extra for foreign postage. Canada, 50 cents.  
Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

ADVERTISING RATES

RATES—Page, 7 1/4 x 11", \$200.00; half page, 3 1/2 D. C. or 5 1/2 x 3" col., \$100.00; quarter page, 4 1/2 D. C., \$50.00; one col., 2 1/4 x 11", \$68.66; \$7.00 per inch. Per agate line, 50c. Times Discounts: 52 Consecutive Issues, 20%; 26 Times Consecutively, or E. O. V. One Year, 15%; 4 Consecutive Issues, 10%.

CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order.  
Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

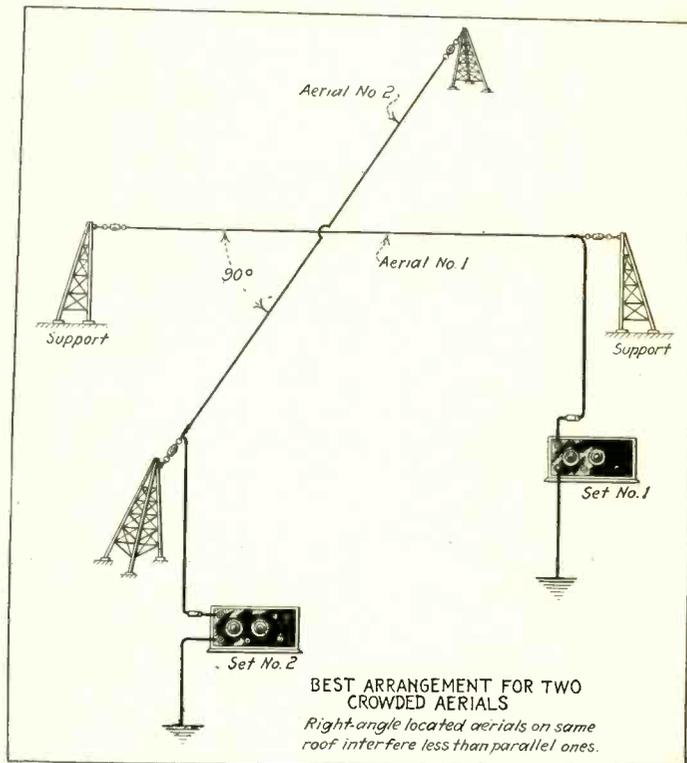
NOVEMBER 8, 1924

The Best Aerial to Use

(Concluded from page 4)

sistently as picked up by the neighbor with a regenerative set.

Another way to get broadcasts with small-space aerial, limited to reception of relay broadcasts using waves in vicinity of 100 meters, is to be satisfied with such few programs and build a short wave set to fit. The manufactured sets sold to amateur telegraph radio operators are also suited for such reception and will operate from 75 meters up to 220 meters. Any indoor aerial from twenty feet upwards will serve well, for aerial, and a similar wire for counterpoise, omitting ground connection.



BEST ARRANGEMENT FOR TWO CROWDED AERIALS

Right-angle located aerials on same roof interfere less than parallel ones.

WHEN two sets use aerials that must be near each other, due to unavoidable limitations, it is best to run the aerials at right angles and keep them as far away from each other.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

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# New German Microphone Proves Efficient

BERLIN.

THE Germans have gone to the bottom of voice-modulation in a careful study of microphones, which has resulted in their doing away with the old form of carbon diaphragm transmitter and using in its place a form of microphone which is not, perhaps, in principle so far removed from the De Forest flame microphone, nor the Westinghouse spark transmitter. This new German apparatus, which has proven itself of great practical use in the last six months, is called the Cathodophone.

The trouble with the old "mikes," according to the German findings, is that they require too strong sound vibrations before their inertia is disturbed, and, therefore, they cannot carry the proper "overtones," &c.

### Electron Effect Improved

The latest invention is based upon the findings of Wehnelt, that the surface of glowing wires coated with an oxide (such as barium, calcium or strontium), will give off free negative electrons in rarefied gas. This property has been discovered to hold in the normal air pressures also. The high speed of the electron is missing, however, as the free electrons collide with air molecules or atoms, thus forming ions. The glowing oxide body being made the cathode (hence the name of the transmitter), the ions will drift slowly to the anode and thus become carriers for the electric current.

### Glow Helps Results

This "ion current" or "emission current" is subject to various pressure modifications in much the same way (but to higher degree) as the atmosphere. When a sort of "box" of refractory material coated with an oxide is made to glow by a resistance heating, a bluish glow is set up between it and a perforated diaphragm slightly separated from it by an air gap. This diaphragm is also the small end of a funnel which catches sound waves—the funnel being slotted to avoid vibratory distortion. Thus sound oscillations will be transmitted to this glowing portion of the air gap, causing variations in the "emission current." These are registered in the circuit of which this air gap is a part, via a resistance, and thus carried through valve amplifiers.

According to claims made for this microphone by its users, it is particularly good for the transmission of a concert of several musical instruments. It is used in the Voxhaus Station (Berlin), as well as in Leipzig and other broadcasting stations.

### BEST B BATTERY VOLTAGE

THE "B" battery voltage depends upon the type of amplifier tubes used. Some tubes work more satisfactory as amplifiers with forty-five volts than with sixty-seven volts. The fact that a set works best with a lower plate voltage does not indicate anything is wrong with the set.

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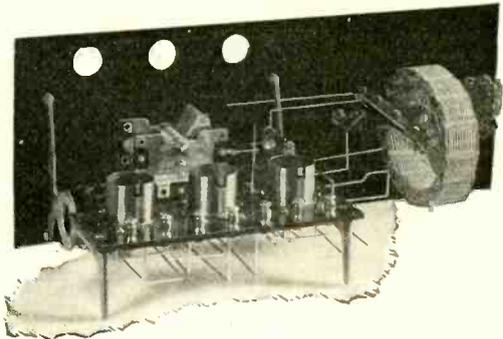
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  - 1 Genuine Brunswick Low Loss Condenser.
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  - 1 Freshman Mica Grid Condenser.
  - 1 Standard Glass-Enclosed Grid Leak.
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Everything needed to operate after building is listed here—

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- 1 Antenna Equipment..... 1.50
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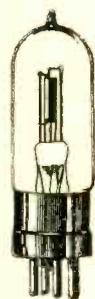
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# ACME

for amplification

# Best Tubes for DX Log Set

(Continued from page 7)

present themselves and the experimenter may choose any he prefers, remembering to keep the coils at least 1½" away from the condensers, to avoid exchange of currents.

### By-Pass Condenser

The circuit diagram shows no by-pass condenser across the detector output. Many experimenters recommend the use of such a condenser to by-pass the radio-

frequency currents, keeping truant impulses out of the amplifier circuit. Personally, I never found such a condenser to be of any noticeable help, except just once, in a simple crystal set. If the constructor desires to include one (.001mfd.) he should connect it, instead of across the detector output, from the plate post of the detector tube to the A+. Thus the currents would be kept out of the batteries, whereas they would be running through the batteries if the condenser were across P and B.

### Type of Instruments

As the coils are designed along low-loss lines and the excellent DX reception depends much on the low-loss design, the variable condensers should be low-loss too. It makes a remarkable difference in quality and sensitivity. Remember, too, that there are such things as low-loss sockets and that the radio-frequency impulses crowd upon the detector tube at that point where the grid condenser connects to this socket, hence any considerable insulation on the socket offers paths of easy escape for precious feeble impulses.

### Tubes

For this circuit the 200 or 300 type tube functions best in the detector circuit and the 201A or 301A type best in the amplifier. However, the 200 and 300 tubes, draw 1 ampere, or four times as much as the other type mentioned. The difference in receptive qualities is not great enough to justify this quadrupled drain, hence 201A tubes or equal may be used throughout.

For those desiring dry battery operation the 199 or 299 type of tube is recommended throughout. This tube functions better with 45 volts on the plate of the detector than the 22½ at which other tubes function best. The 199 or equal should not have more than 90 volts on the amplifier plates, but the 201A or equal will stand up to 112. The 199 type is almost as good as the 201A as a detector, if a good 199 or 299 tube is obtained, but the quality of these tubes varies considerably. The volume in the amplifier circuit is about 75 per cent. of that obtained from 201A or equal. However, it is quite sufficient, and, expense considered, gives ample return for the money. Nobody need hesitate to use 199 or 299 tubes throughout.

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# A

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The 11 and 12 type of tubes will work well in this circuit, also. If these tubes are on hand, use them. But if you are going to buy tubes of the dry-cell type, buy 199 or 299.

### Rheostats

The rheostats should be purchased to match the tubes used. In the detector, 6 ohms for 11 or 12 type; 20 ohms for 201A or 301A, and 30 ohms for 199 or

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# Table of C Battery Voltages

(Continued from preceding page)

299. As the amplifier rheostat operates two tubes it should have half the resist-

ance necessary for one tube of the type to be used.

### Batteries

The 201A tubes require a 6-volt storage battery, as do the 200. For the 199 or 299 use three 4½-volt dry cells in parallel, that is minuses connected together and pluses connected together. The B batteries are connected in series, i. e., the +45 of one B battery to the — of the other B battery. That leaves two free ends, one +, the other —. The — goes to A+. The remaining open + is now 90 volts and goes to the two amplifier plates (see wiring direction). The detector B+ is tapped from the battery whose — goes to A+. The tap is at 22½ or 45, depending on the tube.

### C Battery Voltage

The best voltage for the C battery will be determined by experiment. The following, based on personal experience, may be used as a guide:

Plate Voltage	C Battery Voltage for Tubes 201A	199	12
60	1 to 1 1/3	1 to 3	1 1/2
80	3 to 4 1/2	4 1/2 to 6	3
100	4 1/2 to 6	6 to 7 1/2	3
120	6 to 9	(not used) (not used)	

### Terminal Strip

The connections to the outside are made through a terminal strip, shown in black in Fig. 1. This strip may be disposed at any convenient place at the back of the baseboard. After the leads are connected to panel and baseboard instruments they are soldered to lugs on the bottom of the corresponding binding posts on the strip. Then the flexible wire leads to the outside are secured to the

binding posts, either by looping and screwing down, or by soldering to lugs and tightening the posts against the lugs. The terminal strip is now fastened to the  
(Continued on next page)

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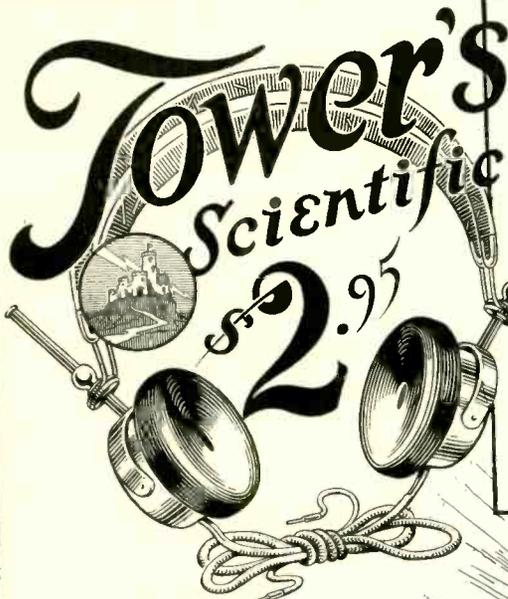
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# Wiring Directions for Log Set

(Continued from preceding page)  
baseboard. Holes are bored in the back of the cabinet to permit the leads to be

brought to the outside. In the case of the aerial and ground the lead-in wire for both may be introduced directly to the posts on the strip through the holes in the cabinet. Rubber bushings may be inserted in the holes for better insulation, but are not vital.

### Assembly

We shall suppose that these coils and condensers are properly matched and will return to the panel and assembly. The detector rheostat may now be mounted on the panel, if that has not been done already. All wired connections made in the preliminary test have been removed. The two AFT are laid on the baseboard in their approximate positions (Fig. 1) Note that the two AFT are mounted on the baseboard at right angles, the first AF tube (No. 2 in Fig. 1) being as far to right as possible, which enables AFT1 to be kept several inches from the plate coil. This distance prevents interplay of currents, for it is more disastrous to have any feedback where the AFT is concerned than it is in an RF circuit. The reason is that no suggestion of tuning must be present in the audio transformers, for that spells volume loss and distortion. All frequencies must be impartially handled, whereas resonance decidedly favors a given frequency. A C battery is to be inserted and the most convenient place may be selected by the experimenter. Fig. 1 shows where I placed this battery. The object of the temporary placement of the parts on the baseboard is to determine the positions of the jacks and the second rheostat on the panel. There may be slight variations from my own set, because of different makes of instruments to be used by constructors. J1 should be about 1" to the right of the C2 dial. Mount the jacks and the rheostat. Mount J1 and R3. Now mount the parts to the baseboard, which is next mounted on the panel with wood-screws through four equi-distant holes

drilled in the panel.

### Wiring Directions

1. Connect the A—to one side of the rheostat R2 of the detector tube, No. 1. The other terminal of the rheostat (Concluded on next page)

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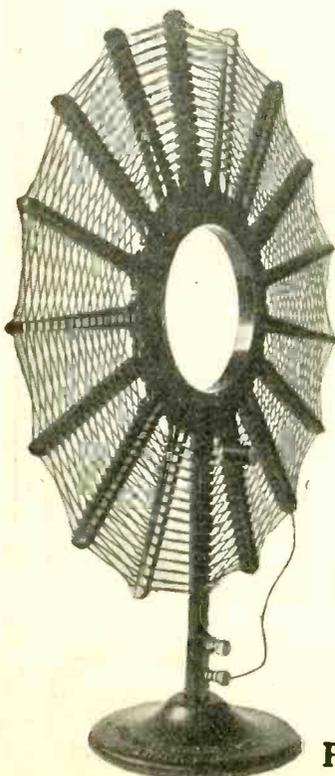
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Patent Pending

# Parts for DX Set

(Concluded from preceding page)

goes to the F—post on the socket of that tube. Connect the A+ to one side of the amplifier rheostat R3. The other side of R3 goes jointly to the F+ post of the two amplifier tube sockets, Nos. 1 and 2. The A—, (direct from battery, not from the socket side of R2), goes to C+. The F or S2 posts of the two AFT go to C—. A+ and B—are joined. This completes the A battery wiring.

2. The beginning of L2 is connected

(a) to the stator side of the condenser C1 and (b) to one side of the grid condenser. The grid condenser is mounted, if possible, directly to the socket at the grid or G binding post of tube No. 1. This is the connection for the other side of the grid condenser. The grid leak R1 is mounted across the grid condenser, which has clips therefor. The end of L1 goes to (a) to the rotor plates of C1 and (b) to A+, if any tube other than the 200 or 300 type is used. With 200 or 300 this lead is to A—.

3. The plate of the detector tube goes

(a) to the beginning or inside of L3 and (b) to the stator plates of C2. The end of L3 goes (a) to the other plates of C2 and (b) to the frame or right angle of the double-circuit jack J1. Do NOT connect the plate to one end of the coil, the other end of the coil to one side of the condenser and the other side of the condenser to the jack. You can never hear signals that way. The remaining outside spring of J1 goes to B1, usually 22½ volts or less, except with the 199 and 299 type tubes, when 45 volts or less function produce better signals. This completes the wiring of the detector circuit.

4. The inside spring of the jack J1 that makes contact with the plate lead goes to P of the first AFT, while the remaining spring goes to the B post on AFT 1. G of this AFT is connected to the grid of the second tube, No. 2, which is the first amplifier tube. The remaining post, F, on this AFT already has been connected to C—. Also the A battery connections already have been wired for the amplifier. The plate of tube No. 2 connects to P of AFT2, the B post going to B2, usually 90 volts. The G of AFT2 goes to the grid of tube No. 3. The plate of this tube goes to one side of the jack J1, the other side of this jack going to B2. The F post of AFT2 already has been wired as have the filament connections to the tube.

Disconnect the wires to the two B+ posts. Turn on the rheostats. If the tubes light (199, 299, 11 and 12 light very faintly) restore the B+ battery connec-

tions. If they don't light, check up for wrong wiring.

### LIST OF PARTS

- Two spider-web forms.
- ¼ 11 b. No. 24 enamel-covered wire.
- One .0005 mfd. low-loss variable condenser, with vernier; normally 23 plates (C1).
- One variable low-loss condenser, .00025 mfd. normally 13 plates (C2).
- Two 4-in dials.
- One grid condenser, preferably variable, otherwise .00025 mfd. (C3).
- One variable grid leak, ½ to 8 or 10 megohms. (R1).
- Three tubes.
- Three low-loss sockets to match tubes.
- A battery to match tubes.
- Two 45-volt B batteries.
- Two rheostats, one R2, for detector, of rated resistance for type of tube to be

used, the other, R3, for amplifier, about half that rated resistance.

- One double-circuit jack (J1).
- One single-circuit jack (J2).
- Two audio-frequency transformers, about 5-to-1 ratio; or, if different ratios are used, the higher ratio is in the first stage. (AFT 1 and AFT2).
- Two 4½-volt dry-cell batteries for C battery. If 199 type tube is used these will be the same as the A battery.
- One pair of earphones.
- One loud speaker.
- One 7x21 hard rubber panel.
- One cabinet to fit.
- One 7x19" baseboard.
- 100 feet of enamelled braided aerial wire, 50 feet of No. 14 insulated lead-in wire; No. 18 hard drawn connecting wire; flexible insulated wire for outside battery connections; solder, lugs, hardware.

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By Washington Radio News Service

WASHINGTON

**JACKSON H. PRESSLEY**, Chief Engineer of the Signal Corps Radio Laboratories, has invented a radically new circuit for the superheterodyne which is, according to prominent radio engineers "the most remarkable superheterodyne that has ever been developed." The essential features of the new circuit are its remarkable economy and simplicity of operation and the radical, though simple, features embodied in the tuning circuit. The new circuit utilizes the principle of capacity bridge in such a manner as to provide a positive non-radiating detector which employs an oscillating detector. The same tube which acts as the detector provides the beat frequency oscillations, thus eliminating the use of one tube and without the complications of the second harmonic principle. This arrangement permits the use of a very small loop antenna, requires but two tuning dials and is so compact that the entire circuit may be set up in a standard cabinet of seven by six by eighteen inches. Without tubes and batteries, it is understood the set may be built for less than \$75.00.

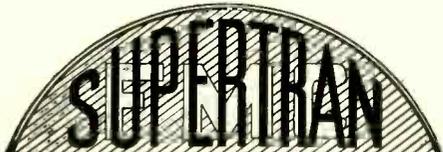
Asked if he proposed to dedicate his invention to the public in the same manner that General Squier dedicated his famous wired-wireless patents of several years ago, Mr. Pressley said: "I would like to have every one of the twenty million radio enthusiasts in this country who may be interested in this new super-heterodyne tuning circuit build and operate it. It will be possible for anyone having a slight mechanical knowledge to construct an experimental set. I have applied for patents which will assure to the Government the full rights for their use, and have reserved for myself only the privileges of collecting royalties from the specific commercial use of my rights."

Mr. Pressley is one of the youngest and highest-salaried radio engineers in the Government service. He is twenty-six.

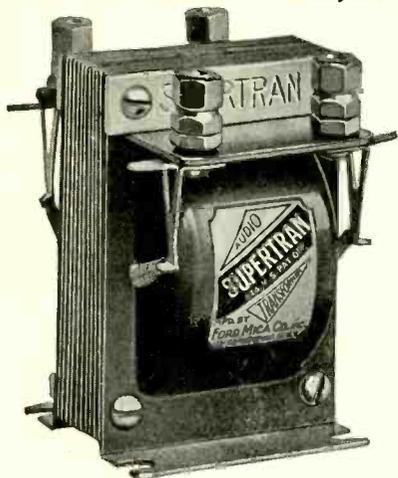
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Every one with a radio set can play radio golf. The game is at its best at night. The goal is to tune in as many stations as possible. Radio golf has its hazards and "breaks of the game," caused by interference of all sorts criss-crossed through the air by spark apparatus of ships, commercial land stations, broadcasting stations, amateur transmitters, radiation from neighbors' receivers, fading static and even lightning. Such are the hazards of radio golf.

After a broadcast listener gets a mental picture of the radio golf course it is a wonder to him that his receiving set can distinguish anything at all from the great mass and variety of human thoughts traveling through space. The difficulties of obtaining a good score in radio golf can be more clearly understood when the radio golfer thinks of the ether as a pond of water after thousands of stones have been hurled into it. The winner of a radio golf game is the one who can distinguish and understand the largest number of the thousands of waves and ripples, says "The N. Y. Times." Skill in tuning is a leading factor in being a good radio golfer. Some one-tube sets receive more distant stations than multi-tube sets because the operator of the simple set knows how to handle the dials. For example, the tubes must be burned at the point of maximum efficiency. Many get poor radio golf scores because they burn the tubes as bright as possible.

In the still watches of the night the radio golfer sits before his set, turning the dials to bring in different wave lengths. The golfer of the ether seldom listens to a complete talk or song. He picks up a new station, and, as a cat waits for a mouse, he sits just as quietly waiting for the announcer to give the call letters. Then he hunts around the dials for another city.

There are several aggravating incidents in radio golf which are just as bad as miss-

ing the hole or losing the ball. To sit for ten or fifteen minutes listening to a speaker, orchestra or song and then have the an-

nouncer fail to tell what station is broadcasting or give a clue to identify the broadcaster stirs the ire of a radio golfer.

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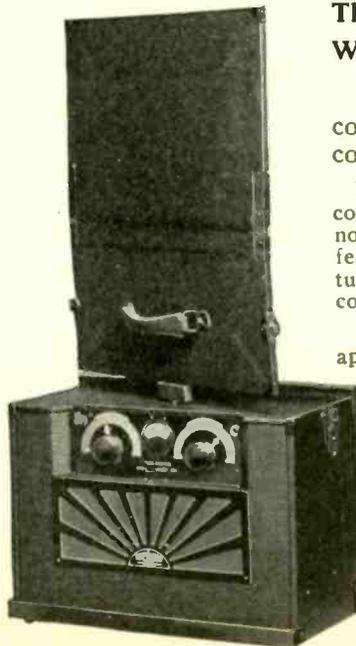
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Daniel Castellanos, Manhattan, phonographs and radio; 100 shares preferred stock, \$100 each; 150 common, no par; B. Castellanos, R. D. Basserman, G. Mateo. (Attorney, A. E. Garmaize, 1819 Broadway).

Raven Radio, Albany, 300 to 7,000 shares, of which 2,000 are preferred. \$50 each; 5,000 common, no par.

Jayeff Electric Co., Brooklyn, N. Y., H. I. Barnett, B. Mintz, F. Leder. (Attorneys, Barnett and Mintz, 44 Court St., Brooklyn, N. Y.)

Por-Cell Manufacturing Co., Brooklyn, make electric machinery. \$100,000; I. & B. Beck, E. Kameny. (Attorneys, Weisman and Saperstein).

World Loud-Speaker Manufacturing Corp., Manhattan, radio instruments, \$20,000. L. Sherman, B. Greenspan. (Attorneys, Greenspan and Morris).

National Radio Panel Co., Manhattan, radio panels, \$10,000; J., S., and P. Sprung. (Attorney, S. Sprung, 291 Broadway).

Melodyne Co., Manhattan, radio sets, \$10,000; E. Hajos, H. Kirschbaum, F. Nelson. (Attorneys, Kurtz and Ruby).

Thermodyne Radio Corp., manufacturing machinery and radio apparatus, \$30,000,000; Lee Potter, W. M. Levy, Jr., J. W. Guibord. (Corp. Trust Co. of America).

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By Herbert E. Hayden

In Radio World, issue of October 4. Send 15 cents or start your subscription with that number.

RADIO WORLD, 1493 Broadway  
New York City

# Resonance in Audio Stages

**By Percy W. Mack**  
Vice-President, Acme Apparatus Co.

IN the audi-frequency transformer the voice currents are transferred from one circuit to another through a magnetic

field. These two circuits are not conductively connected. Before the days of broadcasting amplifying transformers were purposely made to have an audio resonance around 1,000 cycles, so that the prevailing spark frequencies used in radio telegraphy would have free passage through them. But telephony deals with many frequencies simultaneously, so that it becomes necessary to eliminate resonance from the transformer. Resonance in the transformer allows one or a few frequencies to come through much more easily than others, causing great distortion. If two or three stages of audio-frequency are used any distortion occurring in the first stage is amplified by the succeeding ones, in addition to whatever distortion these succeeding ones introduce.

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2c stamp to Dept. RW-116 brings you this book.  
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Registered  
**Makes Distant Stations Sound Like Local Ones**  
THE TWITCHELL PRE-AMPLIFIER is a Powerful Radio Frequency Amplifier attachable to any make of receiving set. It brings in with tremendous volume those you can't hear without it. Brings in with tremendous volume those you can hear only faintly. Makes your set selective. Prevents re-radiation.  
Price, complete with tube, prepaid  
**\$25.00**  
Diagram of circuit, \$1.00  
**S. A. TWITCHELL CO.**  
1830 Western Ave. Minneapolis, Minn.

**Where Resonance "Hurts"**  
To understand the loud speaker the meaning of resonance must be thoroughly appreciated. Distortion may occur in a telephone receiver or head set. This is another example of resonance which may be termed the friend and foe of radio. Without it we could not efficiently transmit or receive, yet with it we may have distortion. Hence, resonance is a friend only while the energy exists at radio-frequencies (example, tuning and selectivity) and a foe while it exists at audio-frequencies (example, distortion).

**Likes the Reflex**  
With improper apparatus or connections, distortion may occur at the following points: Tuner, radio-frequency amplifying transformer, telephone receiver, loud speaker, or horn.

If you are going to build a set, the reflex set is strongly recommended on account of the economy of vacuum tubes, a greater over-all efficiency than the same number of stages of amplification in a straight radio and audio set, the excellent results, the ease of construction, the lack of tricky connections and the ease and selectivity of tuning.

The reflex circuits lend themselves readily to board or panel and cabinet mounting, and when constructed the operation is extremely simple and the range and selectivity on both antenna and loop astonishing. Furthermore, they do not distort.

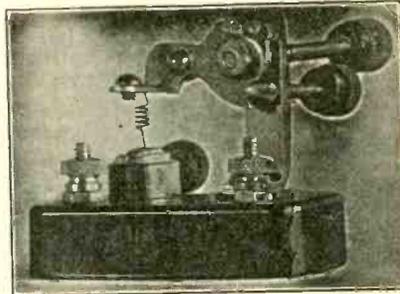
No matter what radio set is built or purchased it should have the following features for satisfaction: Quality, volume, range, ease of operation, ease of construction, non-radiating, sharpness of tuning, ruggedness, small upkeep expense, low cost and reliable manufacturers' products. The reflex set fills these points best of all.

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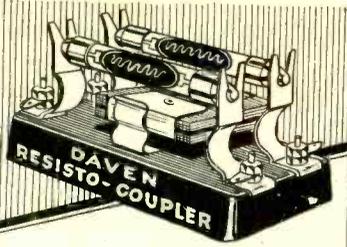
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ARTHUR BERNARD NELSON, of Aberdeen, S. Dakota.

This invention relates to an electric soldering iron, and the object is to provide a quick heating device, with no exposed flame or arc, which may be used where certain other type cannot be employed.

ERNEST ARTHUR BAYLES and HAROLD HIGHAM, of England. Their invention has

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reference to electrical condensers of the kind in which a liquid impregnating dielectric is used, and the condenser units or bodies are formed of laminae of papers and metal.

ALFRED H. HAAG, of Baltimore, Md., invented a design for cabinets for combined radio and phonograph.

RUDOLF WOLFE, of New York city, and HENRY G. PIERSON, of South Orange, N. J., invented an improved lightning arrester.

ALFRED L. ATHERTON, of Pittsburgh, Pa., The invention relates to protective devices and it has particular relation to lightning arresters of the multiple-gap type that are enclosed in casings and adapted for outdoor service, the casings operating also, to protect or shield the active elements thereof from unauthorized and improper interference when in a charged condition.

RAYMOND G. MCKEE, Delhi, N. Y. Invention relates to transformer cores for radio work, and the principal object is to produce a device of this nature which shall be a completely closed core device.

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This wonderful 8-tube super heterodyne is the greatest radio receiver in the world. The most amazing value ever offered in RADIO. Black or mahogany panel finish, can be mounted on 7x26 inch standard, or fitted in cabinet. Makes a beautiful appearance, worthy of any home. All material the finest obtainable, workmanship that will stand any test. This set will last for years and give perfect satisfaction.

Any beginner can assemble it properly. Diagrams absolutely self-explanatory. Book of directions easy to follow. You can build the set in very short time, and enjoy doing it.

Send no money at all. Just fill in the coupon and then pay the express man when he delivers it. Try it in your home for two weeks. If it is not all and more than we claim, return it and get your money back. You get the complete kit for \$85.00, plus the small express charge.

Every part in this kit has been thoroughly tested in the factory. All parts are perfectly adjusted to fit, as shown in the diagram. Our guarantee protects you against parts injured or broken in shipment. New parts will be sent to you upon receipt of defective units.

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## Amateurs to Keep Short Waves, Says Hoover

**Broadcast Stations Do Not Want to Get Down to Lower Level, He Reveals**

**By L. S. Hillegas-Baird**

MILWAUKEE.

SECRETARY HOOVER has said that the short waves allotted to radio telegraph amateurs, including their accustomed band between 150 and 200 meters, would not be altered for some time. Very few broadcast stations are desirous of getting down to the short waves, he said, most of the applications being for assignments between 400 and 526 meters. Only a few so-called "super" stations want short waves.

He said that the cooperation of various radio services had been so good that new radio legislation was not immediately necessary, at least until more data could be gathered.

When asked about the troublesome spark interference experienced by listeners in the Great Lakes region, he replied that the Department of Commerce had done all it could to get the co-operation of the shipping interests, but unfortunately the waves for commercial radio were fixed by law, and the government at present cannot shift ship stations to 800 meters, as is desired.

## Matching Speaker

Editor, RADIO WORLD:

REGARDING your Oct. 18 issue, accept my thanks for following articles which are certainly of general interest and important to those who wish best results. Glad I subscribed.

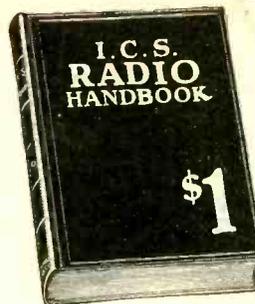
Revised Station List.  
Facts for Users of 201A Tubes.  
Trouble Shooting.  
Loudspeaker Article (page 33).

In regard to loud speaker article the writer should have mentioned that it is important to try out speaker desired on the particular set it is to be used with, since many speakers do not give the desired results on sets of large volume, such as Neutrodyne and Super-Het of five tubes and up. The article is otherwise correct and accurate. I also verify "Ideal Antenna Length," page 27, from experimentation as giving best results on all broadcasting wavelengths.

A recent article in a radio magazine explaining capacity of batteries stated that a 60-amp. hr. rating meant that battery would deliver 1 amp. for 60 hours. I have been using 150-amp. hr. battery on Fada 160 about 8 hours per day since Aug. 15, and find repeatedly that when battery becomes lower than 1/2 discharged (hydrometer test) that result becomes noticeable in performance of set proportionately. Therefore, seemingly, an A battery is actually only good for 1/2 rated capacity, in use.

ARCHIE H. KLINGBEIL,  
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### INDEX TO VOL. 5, RADIO WORLD

A complete index covering all the articles that appeared in Radio World from Jan. 5 to Sept. 20, appeared in Radio World dated Oct. 18, mailed on receipt of 15c., or start subscription with that number. RADIO WORLD, 1493 Broadway, New York City.



## Do You Operate a Ford or a Rolls-Royce in Radio?

SMALL cars are good enough for "hacking" around town. An inexpensive or old-fashioned set may satisfy you for most local radio reception. But when you want to tour long distances, climb steep hills or travel on bad roads in unfrequented places, you want the finest car that's made. And when you want to take your pick of radio reception, listening in comfort and enjoyment to an ever-broadening circle of the stations that your neighbors never hear—you want a—



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