

THE 3-TUBE DX 'WIZ'

A SELECTIVE 2-TUBE SUPERDYNE

CROSS WORD PUZZLE

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RADIO WORLD

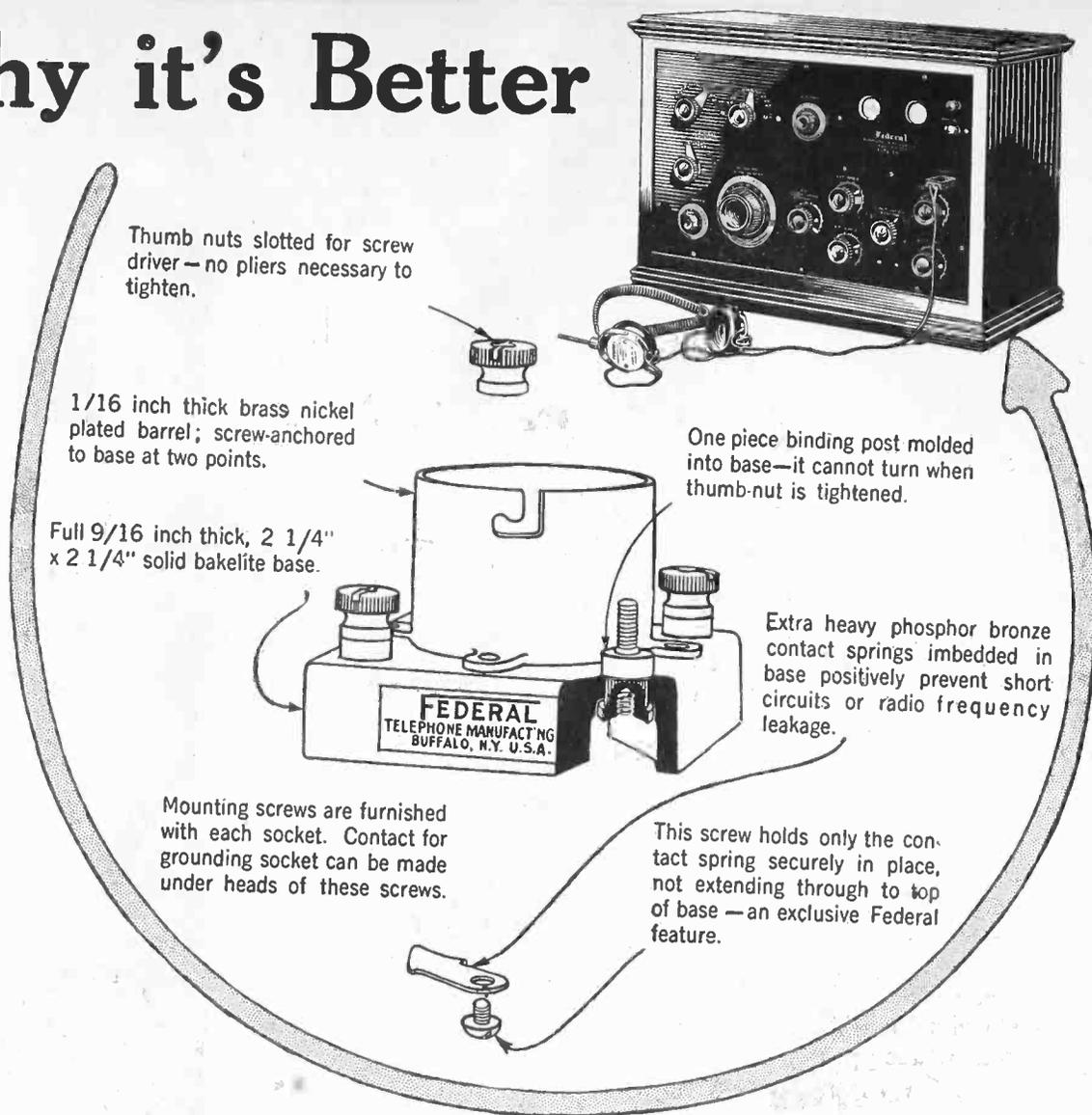
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VOLUME SIX OF
RADIO WORLD

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The 3-Tube 'Wiz' a DX Set of Enormous Volume

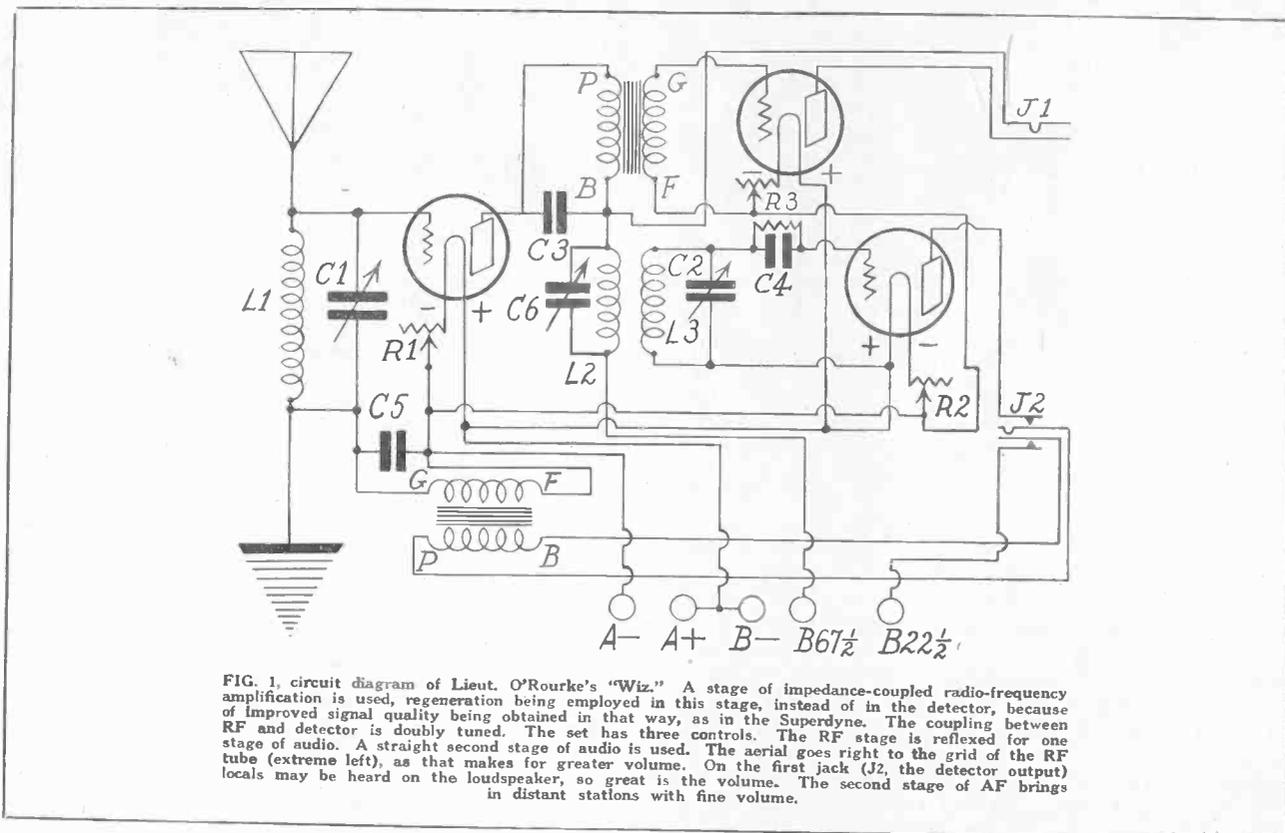


FIG. 1, circuit diagram of Lieut. O'Rourke's "Wiz." A stage of impedance-coupled radio-frequency amplification is used, regeneration being employed in this stage, instead of in the detector, because of improved signal quality being obtained in that way, as in the Superdyne. The coupling between RF and detector is doubly tuned. The set has three controls. The RF stage is reflexed for one stage of audio. A straight second stage of audio is used. The aerial goes right to the grid of the RF tube (extreme left), as that makes for greater volume. On the first jack (J2, the detector output) locals may be heard on the loudspeaker, so great is the volume. The second stage of AF brings in distant stations with fine volume.

By Lieut. Peter V. O'Rourke

THE addition of a stage of regenerative tuned radio-frequency amplification to a detector tube aids the possibilities of reaching greater distance and increases volume quite noticeably. For instance, in the present circuit, the way the antenna circuit is connected to the radio-frequency tube, at extreme left, Fig. 1, makes for greater signal strength, although selectivity would be a little more if inductive coupling were used there, instead of conductive coupling. The underlying idea of making this circuit, however, was to obtain as much volume as is possible from three tubes, and to obtain the stage of RF. Hence the standard regenerative circuit, with its detector tube and two tubes for the two audio

stages, is convertible into the circuit herewith presented, and a set that functions dependably is the result. Stations of 500 watts or more, if they are less than ten miles away, may be operated on the loudspeaker direct from the detector tube, so great is the volume. That is what happened in the set I built and the tubes used were the 12 type, operated from three 1½-volt dry cells connected in parallel. Jack is included in the detector output because of this fact and also because earphone reception may be desired, especially at those DX-hunting hours when the rest of the family is abed and likely to be annoyed if the speaker were used.

The other jack is for the output of the second audio tube, no jack being included for the first audio stage because of the unlikelihood of any great demand for it.

The DX Record of the "Wiz"

This is a set designed especially for volume, while improving the DX possibilities of the circuit were the RF stage not included. Due to the increased sensitiv-

Set Got 1,200 Miles on Speaker

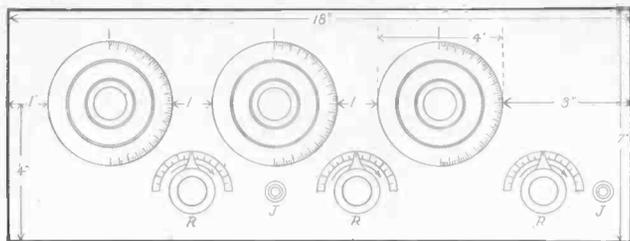


FIG. 2. panel layout. The dial at left is the one turning the condenser in the RF stage (L_1), that in the center is to tune the detector circuit coil (L_3) and the one at the right governs the plate coil (L_2). Three rheostats are used, one for each tube.

ity a greater distance range may be expected, but in some instances this increase, with the set in question, has not been so considered over a straight regenerative detector as to cause any shouting. Nevertheless there will be an increase. One friend of mine who built this set on my advice reported that he could easily get the Chicago stations from his home in New York City while the locals were operating, and there were twelve locals in New York at that time. He proved his assertion to my satisfaction. It is the experience of many that they can get distance on their set but it does not come in loud enough to operate a speaker. On this set 800 miles on a speaker is nothing uncommon, and I myself have on a dozen different occasions heard Hastings, Neb., on the speaker with this set, and Hastings is 1,200 miles from where I live.

The object of leading the aerial right into the grid is to get the benefit of the volume thus occasioned. In no other way can you get more volume. You may have a grid return to the plate and increase selectivity, but the volume will be either the same or less, never more, so far as my experiences show. Also, a grid return to the plate is out of consideration in this circuit, which handles as much regeneration as is feasible.

Equals a 5-Tube Set

Rating this circuit at its theoretical value, it equals five tubes—(1) a stage of RF, (2) a regeneration in the RF stage, (3) the RF tube is used for the first audio stage, (4) detector and (5) the straight stage of audio in the third tube. Regeneration in point of amplification factor, is equal to one tube. The set is akin to the Neutrodyne in volume, its signal quality is good, but a well-made Neutrodyne will get greater distance. However, one must remember that here are only three tubes and that the chief advantage is the great efficiency, obtained from the same parts as an ordinary 3-tube set, excepting the addition of a variable condenser and a home-made RF transformer.

Superdyne Principle Applied

The regeneration was used in the RF stage, instead of in the detector, because steadier results were thus obtained, the oscillations being sufficiently controlled to render the set easily workable by resorting to the Superdyne principle. In the Superdyne the feedback from plate to grid is in the radio-frequency tube, not in the detector. In the present circuit the plate coil has its leads reversed.

Filter Effect in Coupling

An odd feature of the circuit is the coupling between the RF and detector tubes. It carries the radio currents from the RF tube to the detector tube by induction, which usually accomplished through an untuned primary, but here the both coils are tuned. In 1-tube 3-circuit regenerative set using honeycomb coils it was common practice to have the primary, secondary and plate coils in inductive relationship, although all three were tuned. This set carries out somewhat the same idea, the plate coil L_2 representing the primary in the honeycomb set whose secondary is rep-

resented by L_3 . Hence C_6 , while causing regeneration in tuning the plate and transferring the energy back to the grid through the tube element capacities, also has a tuning effect on L_3 , which is tuned by C_2 , and L_3 has a mutual effect on L_2 . The net result that one circuit helps to serve as a rejector circuit or filter for the other and from this and regeneration the set obtains good selectivity.

Not As Hard As It Looks

While the circuit diagram looks more fearsome than I expected it would, the set is not difficult to build, although some attention will be needed to see that it works properly. That is true of almost any reflex.

If you could only take a look at my set and then at the diagram you might wonder, as I did, how anything that looks so simple in a state of completion and operation can look so complicated in a wiring diagram. But it is one of the eccentricities of wiring diagrams to make any reflex look complicated. Anybody who has built the straight regenerative 3-tube set can build this one.

Making the Coils

The coils should be low-loss. They may be constructed by any experimenter without much trouble. The variable condensers should be low-loss, too, and there are quite a few excellent ones on the market and their number is growing. The audio transformers may be of the same ratio. The grid leak should preferably be variable, not that it need be varied after the correct value is obtained but because to get just the right value of fixed grid leak you would have to get a supply of leaks. A variable grid condenser is advisable for the same reason. The .00025 mfd. fixed condenser is all right, but some times different capacity would improve reception, and this capacity will remain fixed after once being determined.

The coils used in the circuit are basket-woven. To make them you need a form, which you may construct by using a 4" square piece of wood, preferably 1" or more in thickness, and fifteen $\frac{1}{4}$ " dowel sticks, 4" long. The dowel sticks may be bought in any hardware store, as they are commonly used by carpenters. Half a dozen sticks, 3 or 4 feet long, usually cost about a quarter and give you an all-sufficient supply. With compass describe a 3" diameter circle on the wooden block or base. Reduce the compass points until $\frac{5}{8}$ " wide, then mark the circumferences with equidistant intersections. The points where these tiny arcs touch the circumference are where you will drill holes just large enough to accommodate the dowels. Do not drill the holes all the way through the base, but leave a solid bottom. If a handdrill is used you will find it difficult to keep the drill just at right angles to the base. All the fifteen resulting drill holes should be such as to permit all dowels to be at right angles to the base, that is, parallel with one another. But this is indeed difficult with a handdrill, therefore it is advisable to use glue in the drill holes to keep the dowels in position. The dowels may be placed in their correct position after the glue has been inserted in the drill holes. If the dowels do not hold their position (which position they should hold without difficulty) you may wait until the glue begins to harden sufficiently, then straighten the dowels and they will remain firmly upright, due to the semi-hardened glue. Machine drilling, however, would save you all this trouble, and maybe you would prefer to let a carpenter do this for you. The first coil to wind is L_1 , which consists of 35 turns of No. 22 double cotton covered wire. Leave 5" for later connections, then loop the wire to hold it to one dowel temporarily. Then wind in and out of

O'Rourke's Low-Loss 'Wiz'

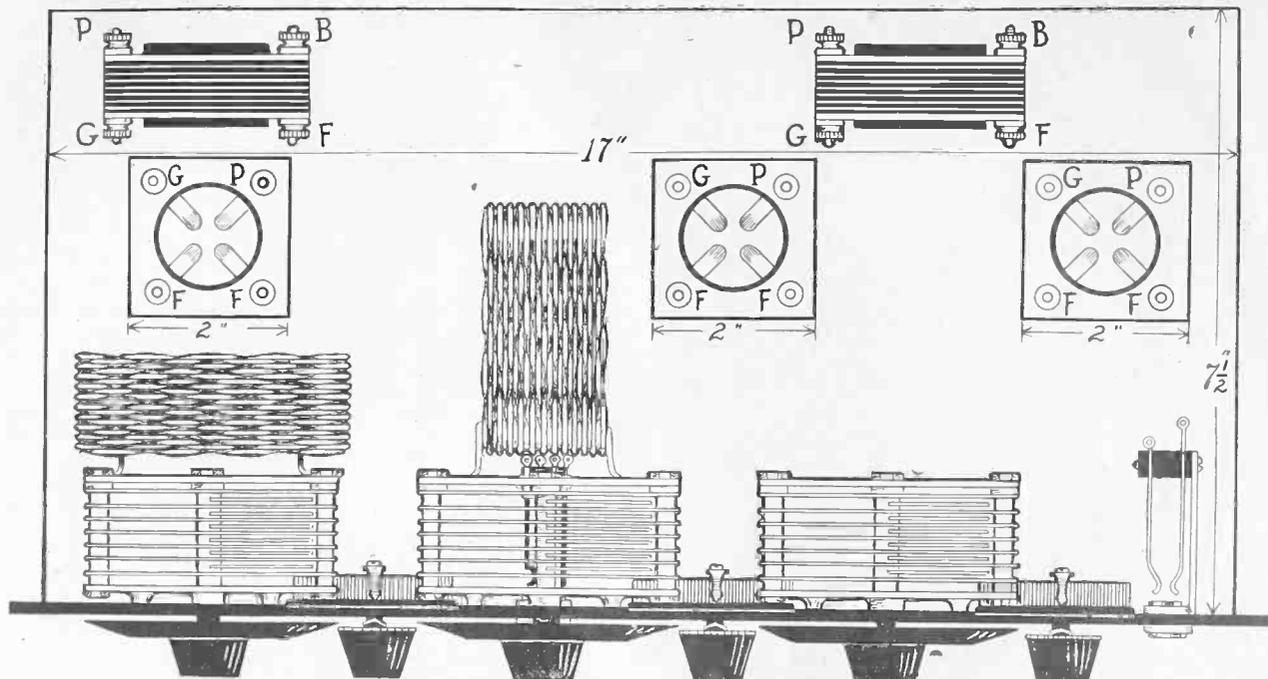


FIG. 3, assembly plan of Lieut. O'Rourke's "Wiz." The AFT for the first audio stage, which is reflexed in the first tube, is at left, rear. The second audio tube is at extreme right and its AFT is behind it. The coil-and-condenser combination at extreme left is for the radio-frequency stage. The one in center is for tuning the detector circuit coil, which is the inductance shown. The plate coil is not visible, as it is a duolateral coil inserted in the detector circuit coil. The three rheostats are shown.

every two turns, not in and out of every other turn. Thus you will pass the wire to one side (say the inside) of two of the rods and to the other side of the next two, and so on, the odd number of rods causing the successive turns to be inside and outside respectively for any given pair of rods.

You will find a perpendicular airgap where the wire has been wound at any given dowel, and through each such gap, making 15 places in all, pass some thread and tighten it, binding the end of the thread with a knot. Thus the thread goes around the winding in a direction at right angles to the direction of the winding. This is just a makeshift to insure security when the coil is removed from the form. The coil is gently worked up from the rods, a little at a time, the pressure being slightly applied at varying points of the circumference. Once the coil is off the form, use a crocheting needle and sew the coil permanently. Pick out the triangular meshes and thread the twine through one air gap, then to the left (or right, depending on how you proceed), past the point of the triangle, and back again, until you have gone from top to bottom of the coil, when the same procedure is repeated for the other side or remaining part of the windings at this same perpendicular line. Otherwise only either the outside or inside of the windings at this point would be fastened. Thus thirty times must you do this sewing, to bind the entire coil at the fifteen points of the circumference. Then cut away the makeshift thread used at first. When the coil is completed you will have a low-loss inductance of great efficiency. The exact method of binding with the twine is not very important and the experimenter may prefer to use some scheme of his own. Also, as he makes the coil the binding directions will begin to gather some significance.

The coil L_2 is made the same way. It consists of 47 turns.

A 50-turn duolateral or honeycomb coil may be used for L_2 , as in the original set, this coil being placed inside of L_3 , thus accounting for the visibility of only two coils on the assembly plan printed at the top of this page. The

leads from L_2 , the plate coil, are brought to the right-hand variable condenser. The end of this coil, that lead emerging from the top of the winding, goes to the RF tube plate and the beginning of the coil, or that lead emerging from under the duolateral winding, going to amplifier B+. The rest of the wiring is orthodox and Fig. 1 shows it clearly.

Some compensated tuning may be expected of C_2 and C_6 , the variable condensers tuning the plate coil and the detector circuit respectively.

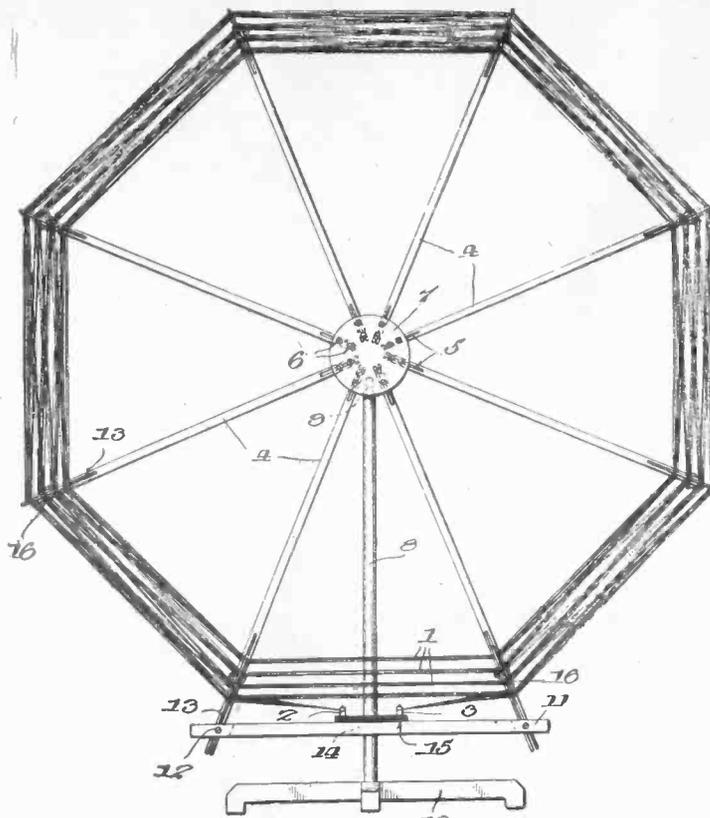
LIST OF PARTS

- | | |
|---|---|
| One-half lb No. 22 double cotton covered wire. One 4x4" wooden block and fifteen 4" high dowel sticks. Three variable condensers, each .0005 mfd., 23 plates. They need not be vernier. | Two audio-frequency transformers, 5-to-1 ratio or less. |
| Two fixed by-pass condensers, .001 mfd. (C_3 and C_5). | One double-circuit jack. |
| One grid condenser, .00025 mfd., with leak. | One single-circuit jack. |
| Three tubes. | One A battery to match tube. |
| Three sockets. | One 45-volt B battery and one 22½ volt B battery, in series. |
| Three rheostats to match tubes. | One pair of earphones. |
| | One loudspeaker. |
| | One hundred feet of 7-strand aerial wire, 50 feet No. 14 insulated lead-in wire, ground clamp, connecting wire, hardware. |

Tell What Results You Get

[Those who construct any circuit or unit from data in RADIO WORLD are requested to write to Results Editor, RADIO WORLD, 1493 Broadway, New York City, and state how they fared. When possible give the trade names of the parts you use, or the manufacturers' names. Results letters will be published, including trouble-shooting letters. Readers may include questions in the same letter. The questions will be answered in the Radio University Department.]

Doctor Invents a New Loop



INVENTOR'S sketch of new loop

WASHINGTON

THE loop aerial, invented by Dr. James Harris Rogers, of Hyattsville, Md., upon which a patent has just been granted by the Patent Office, can be readily constructed by any fan. Dr. Rogers' invention is based on a loop antenna structure which possesses great advantages over the ordinary form. The underlying feature of this

antenna is that a multiple turn loop is arranged whereby a very compact form of antenna is produced, which nevertheless, Dr. Rogers claims, has a very low distributed capacity.

In the illustration No. 1 is a composite of conductors formed into a multiple-turn loop having its ends at binding posts No. 2 and 3. The composite conductor consists

of a plurality of strands, eight being illustrated, and the loop also comprises eight turns. The loop is supported by a plurality of radial arms No. 4, each of which is slotted at its inner end, No. 5. Screws No. 6 passing through the slots No. 5 serve to secure these arms adjustably to the central hub or disc No. 7. A vertical support or rod No. 8 journaled in the hub No. 7 is itself secured to the base No. 10. A brace No. 11 is secured to two of the arms No. 4, which may be made longer than the rest by means of screws No. 12 passing through slots No. 13. This brace No. 11 has an aperture No. 14 fitting the rod No. 8 loosely so that the whole structure may rotate about rod No. 8. A piece of insulation No. 15 may be provided as a mounting for the binding posts Nos. 2 and 3.

Each arm No. 4 has a slot No. 13 at its outer end. Supports are held in these slots by means of screws. These supports are circular discs but the shape is subject to modification within wide limits. Each support No. 16 carries a plurality of conductor holding discs which are secured to the supports by screws. These discs are provided with a plurality of holes to receive the strands of conductor. These holes are arranged in circular series.

The composite conductor comprises eight strands, each strand being held in one of the holes in each disc. This composite conductor passes successively around the supports, and when the whole is wound it will be seen that the turns of the cage itself form a still larger cage. The strands are transposed regularly in their courses from disc to disc and the cage is also transposed around supports 16 in a manner so that in the finished device all the strands are substantially symmetrically arranged and of similar electrical properties. The resulting structure will be called a "polygonal torc." The larger the number of arms, the closer will be the approach to its true circular torc. In order to avoid the rod No. 8, it is preferred to omit transposing the lower sections of the cage, which are adjacent to the rod.

(Copyright, 1924)

Meeting New Wave Band Discussed by Bureau of Standards

The following statement on changing your receiver to meet the new wave band, 200 to 545 meters, to go into effect about January 1, was issued by the Bureau of Standards:

SOME broadcast receiving sets now in use cannot be tuned conveniently to stations broadcasting on frequencies higher than 1,000 or 1,200 (not below 300 or 250 meters). The Third National Radio Conference recommended that the broadcast band of frequencies be extended to 1,500 kilocycles (200 meters). This emphasizes the importance of the production of sets which will tune conveniently at the higher frequencies, and the desirability of information on how to use existing sets so that all stations may be tuned in. The range of receiving sets which employ a single tuned circuit (where the antenna is part of the tuned circuit) may be extended to the higher frequencies without much difficulty. This applies both to crystal and tube sets. It can be done very simply by providing a fixed condenser (about .002 microfarad) in series with the antenna which may be switched in or out of the circuit. The settings of the dials are different when the condenser is in and out of circuit. Shortening the antenna

likewise reduces the capacitance and consequently increases the maximum frequency (minimum wavelengths) to which the set will tune.

In the two-circuit and other more complicated receiving sets the extension of the frequency range may not be so convenient. A general rule, however, may prove useful. The natural frequency of a circuit is determined by the product of the inductance and the capacitance of the circuit, the larger this product, the lower the frequency (higher the wavelength). To increase the frequency to which a circuit will tune it is only necessary to decrease either the inductance or capacitance or both. The inductance may be reduced by reducing the number of turns, while a reduction in the number of plates or increase in spacing of the plates reduces the capacitance of a condenser. The effective capacitance in a circuit may also be reduced by using two condensers in series. Changes in receiving sets of this type, in general can be readily made by radio listeners who construct their own sets.

[EDITOR'S NOTE—The first publication of an article on how to meet this problem was made in RADIO WORLD, issue of November

1. The comprehensive article, "How to Make Your Receiver Respond to the New Wave Band," was by J. A. Anderson, noted radio engineer.]

WBZ RETAINS TITLE IN STANDARD FREQUENCY TESTS

WASHINGTON.

WBZ at Springfield, Mass., continues to be the most constant transmitting station of those measured by the Bureau of Standards. During 13 measurements in October, it was found that there was no deviation of WBZ signals from the assigned frequency. Other stations were found to be sufficiently constant during October to be useful as frequency standards were: NSS, U. S. Navy, Annapolis, Md.; WGG, Radio Corp., Tuckerton, N. J.; WIL, Radio Corp., New Brunswick, N. J.; WSO, Radio Corp., Marion Mass.; WWJ, Detroit News, Detroit, Mich.; WCAP, C. & P. Tel. Co., Washington, D. C.; WRC, Radio Corp. Washington, D. C.; WSB, Atlanta Journal, Atlanta, Ga.; WGY, General Elec. Co., Schenectady, N. Y., and KDKA Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.

A Selective 2-Tube Superdyne

Two Stages of Radio-Frequency Amplification and Crystal Detector Used—150-Mile Steady Range, But Under Best Conditions 1,000 Miles Is Obtainable.

PHONE VOLUME GREAT

By Herman Bernard

FOR earphone service two tubes are needed for any Superdyne that uses a tube as detector, for the Superdyne principle of reverse feedback is employed in a radio-frequency stage. Two tubes may still be employed, however, in conjunction with a crystal detector, to gain considerably even over the

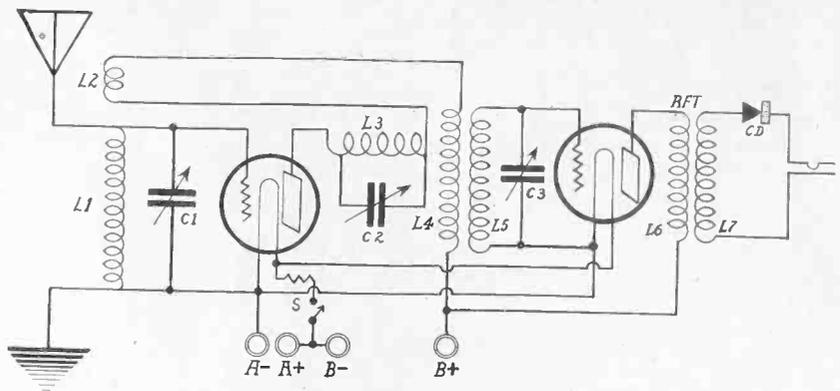


FIG. 1—Wiring diagram of two-tube-and-crystal Superdyne, embodying two stages of tuned radio-frequency amplification. The Superdyne principle is employed in the first stage. L1L2 are wound on a cylindrical form. L3 is a duolateral coil, L4L5 a radio-frequency transformer of the tunable type, made with a duolateral coil as the secondary and a home-made primary. L6L7 is a fixed radio-frequency transformer. All the variable condensers are .0005 mfd., normally 23 plates. The crystal should be of the adjustable type for best results. The set is easy to tune and is fairly good at DX, 150 miles being the constant receiving range, but 1,000 miles being obtained frequently under best conditions. The DX element depends on the location in which the receiver is operated and the efficiency of the aerial. The condensers may be tuned virtually in step. Thus the set may be logged.

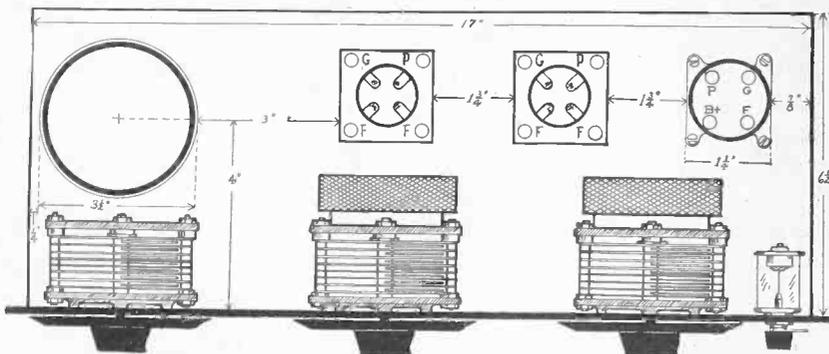


FIG. 2—Assembly plan of the two-tube-and-crystal Superdyne. The cylindrical form for L1L2 is at left, rear, and C1 is in front of it. Next, in center, are C2 and C3. The duolateral coils may be mounted on the backs of the condensers with bus bar, but must be at least 1", preferably 1 1/2", away from the condenser. They may be mounted parallel with the baseboard, if more convenient. This depends largely on the construction of the condensers, as some lend themselves more readily to such mounting. The first RF tube is at left, the second RF tube at right. The fixed RF transformer is at extreme right, rear.

fine quality of the standard Superdyne. The advantage of the present circuit over that using merely one tube for a stage of RF with crystal detector, is that the volume is increased, the range is considerably extended and excellent selectivity is achieved. Three controls are used in the present set, one each for the two RF tubes and the third for tuning the plate coil (L3).

The fact that the first radio RF stage is regenerative does not occasion squeals or howling or tuning in by the whistle. If the set is properly constructed there are no whistles present at any time, with the barely possible exception that some may be encountered on waves of 300 meters or under, due to a careless manner of construction, rather than to anything inherent to the circuit. The coils L1 L2 are on the same form, inductively coupled. The output of the plate, through the tuned coil L3, is to L2, the reverse feedback coil. It is largely through this reversed coil's action that the oscillations are suppressed. This is due mostly to the reversal itself, but it is a fact that sending the current through an extra coil of itself has a choking effect, and the combination brings about the most desirable result. This set tunes selectively enough

for almost anybody's needs. But there is one class of sufferers for whom there seems to be no remedy save the Super-Heterodyne, and they constitute fans who live within a mile or so of some powerful station. This set will be useless to them. But others may build it and get fine earphone volume from stations up to 150 miles away. Much greater distances have been heard on this set, but the DX element is always uncertain when fans at large are to be considered, because special advantages or

disadvantages play a vital part in the result. Under the best of conditions this set can bring in stations clearly that are 1,000 miles away.

Winding the Coils L1, L2

On a 3 1/2" diameter tubing 4" high wind L2 on top, terminate after putting on 22 turns of No. 22 double cotton covered wire, and leave 1" space. Then begin winding L1, which has 35 turns. Both windings are in the same direction. It is a good plan to lay the cylinder on a table, so that the circumference rests flat on the table, and draw a little arrow pointing to the right. Drill two tiny holes side by side, to the left of the arrow, thread the part of the wire that is to be used for connections, passing the wire through the right-hand holes to the inside of the cylinder and through the left-hand hole to the outside. Now the connecting wire is at left and points to the left. The winding for L2 is then begun in the direction in which the arrow points. L1 is wound in the same manner. Notice that L2 is above L1. Cardboard tubing will do very well for these windings. Bakelite is good also, especially on account of its comparatively low resistance at high frequencies (low wave lengths).

L3 is the plate coil. Use a 75-turn duolateral coil, or, if you can not conveniently get that type, a 75-turn honeycomb coil. The number of turns is too great, in conjunction with a .0005 mfd. variable condenser (normally 23 plates), and usually about 12 turns

(Continued on page 28)

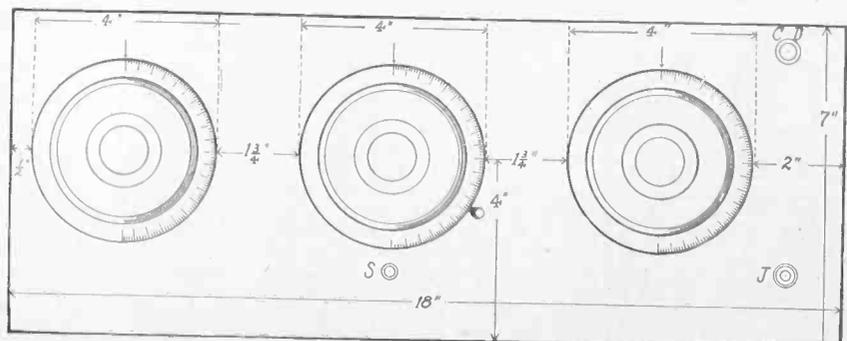
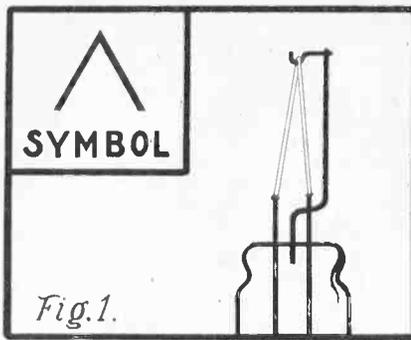


FIG. 3—Panel layout for the two-tube-and-crystal Superdyne. The dials, left to right, actuate the variable condensers C1, C2 and C3. The jack is J, the crystal detector CD. S is the battery switch, cutting off A and B batteries. The distances are marked on the basis of 4" dials. The wheel vernier on the centre dial is not necessary.

The Inside Story of the Tube



THE FILAMENT is rendered incandescent by a battery. When the battery is connected to the filament there is really a short circuit. The article tells you why the battery is not harmed as much as if a direct wire were connected across the poles.

The Principle of the Operation of Vacuum Tubes Explained—The Functions of Plate and Grid.

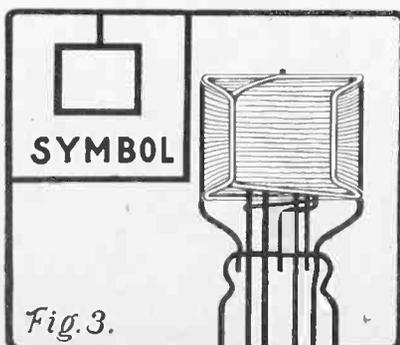
TIPS BY AN EXPERT

By Abner J. Gelula

THE set is installed. What tubes are you putting in the sockets? Are you going to use a tube designed for radio-frequency amplification as a detector? Will you get the volume and clear tone from the audio frequency? Tubes are especially designed for such use. The correct tube in the proper place spells efficiency.

Operation

All vacuum tubes operate on the same principle. An understanding of the principles will greatly aid in obtaining maximum results from a set. Fig. 1 shows the filament in place. It requires three supports: one for each lead from the battery and the extension which holds the filament in place. The filament, rendered incandescent by a battery, emits electrons which act as carriers of the current. Fig. 2 is the grid. It is wound around the filament, but not touching it. It acts as an electrical shutter controlling the electronic flow from the filament whenever an incoming signal is impressed upon it. Fig. 3 is the plate which surrounds both the grid and filament but does not touch either. It acts as a terminal for the positive B battery and the current flowing toward the filament. Fig. 4 shows the three elements sealed in a glass bulb which has been carefully exhausted. Four wires from the elements are hermetically sealed in the glass stem of the tube. The



THE PLATE is a metallic envelope surrounding the grid and filament. The plate is the terminal of the positive B battery.

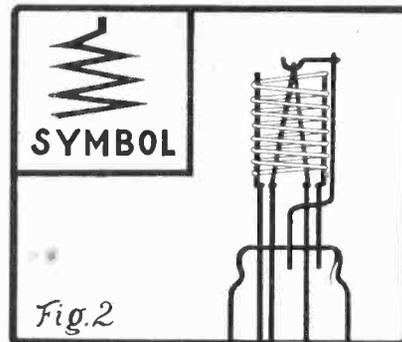
wires lead out to four prongs on the base of the tube, which connect to the socket. Fig. 5 indicates the tuner connected to the grid and filament. Next the telephones and then the B battery are connected in series with the filament and plate. The filament is lit by a battery, storage or dry cell.

In Fig. 6 current from the B battery is shown in its quiet flow through the telephones and through the space between plate and filaments. The diaphragms of the telephone receivers are therefore held in as shown in the illustration. Even when the weakest current is impressed upon the grid this electrical shutter closes, stopping the flow of current through the receivers. This causes the diaphragm to snap back to its normal position, causing an audible sound (Fig. 7). With each vibration of voice or music the telephone diaphragm produces one pulsation and thus the incoming current is converted into a reproduction of the originally broadcast sound.

Four Different Kinds

Every tube is different. There are no two individual tubes that have exactly the same characteristics. Two tubes of the same rating, same type and same manufacture may be as different as day and night, but this is unusual. The standard tubes on the market today are, on the whole, reliably alike.

There are four different types of tubes: (1) Those burning with a bright light like



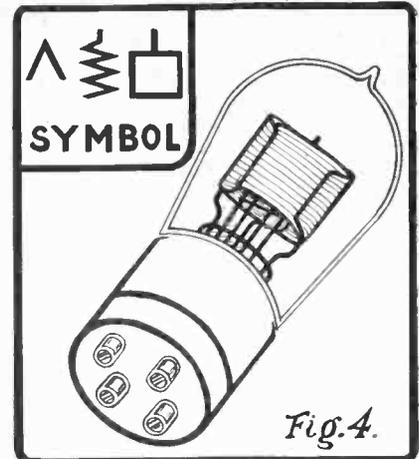
THE GRID is a spiral wire surrounding the filament. It acts as a shutter in controlling the electronic flow.

the incandescent lamp. Examples, the UV200 and the UV201; (2) treated tungsten filament tubes, resulting in more efficient emission; (3) the platinum filament tubes, such as are found in the Western Electric tubes; and (4) the tube employing secondary electron emission, using sodium or potassium or a compound to increase electron emission, as in the Sodian tube.

Current Consumption

The amount of current that a tube draws from a battery is an important item in up-keep expense. The tube that draws one ampere will draw the battery down four times as fast as a tube drawing only a quarter ampere, or, four tubes of the quarter-ampere type may be operated as economically as one tube drawing one ampere. This means that, tube for tube, the battery will stand up longer and operate the set at one-fourth the expense. Of course, there are circuits in which a certain kind of tube will operate most effectively, despite the amount of current it draws. The UV200 is best as a detector because of its gas content. It is known as a "soft" tube. Tubes that are highly evacuated are known as "hard" tubes. Thus, the soft tube makes the better detector, while the hard tube is the better amplifier.

Dry cell operation is a great convenience. But tubes requiring the 1-ampere current of



THE THREE ELEMENTS are placed in a glass bulb, sealed in a base and carefully exhausted to a high vacuum. The four leads—two filaments, a grid and a plate—are brought out to the prongs or contact points at the base.

the 200 and 201 obviously cannot be supplied by dry-cells. A very good dry-cell combination is two UV199 tubes as detector and first audio, with a 201A for the last stage of audio. The DV3 can be used in 1-tube sets with a flashlight battery supplying A battery current. Proper rheostat values should be used with the various types of tubes.

Gelula's Tube Preferences

A really wonderful radio-frequency tube is the Meyers tube. It is of Canadian manufacture and of novel construction. It also operates efficiently as a detector. It is very ruggedly built and the ordinary jar that would break the filament of most tubes doesn't affect the Meyers.

In my opinion, the best detectors run in this order: UV200, DV2, UV201A, WD12, Meyers, Mullard (English) Western Electric VT1 and UV199. The proper value of grid-leak and condenser is very important on maximum results.

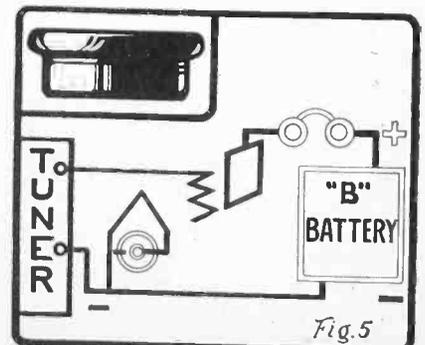
The best amplifiers for radio frequencies, in the order named, are: Meyers, UV199, DV3, Western Electric Peanut, UV201A.

The best amplifiers for audio frequencies, in the order named, are: Western Electric VT2, UV201A, UV201, DV3, UV199, Meyers.

The best reflex tubes, in the order named, are: UV199 (for one tube reflex only), UV201A, Western Electric VT2, DV2, DV3 and Meyers.

The "Any-Tube" Set

Many claim a set will work equally well using "any tube." This is often a fallacy. Every tube has its particular place in the



THE TUNER is connected to the grid and filament. The phones and B battery are connected between the filament and the plate.

Which Tubes Are Best and Why

"Soft" Tubes Have Gas Content and Are Best as Detectors, While "Hard" Tubes Are Greatly Evacuated.

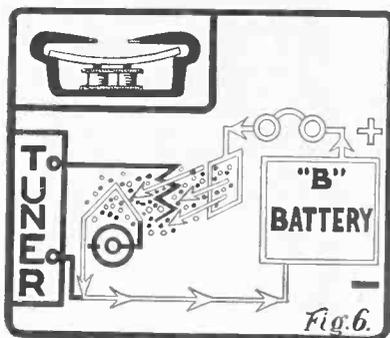
HOW TO MATCH BULBS

circuit. This does not imply that certain tubes will not function no matter where placed, but it does mean that a picked set of tubes, used for their designed position, will give far better results.

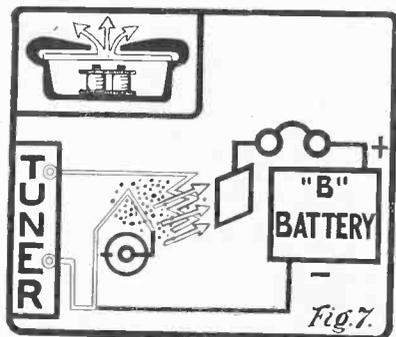
You should match your tubes to the transformers—especially for audio frequencies. Every tube has a certain impedance or internal resistance that should be matched with the audio transformer.

B Battery Drain

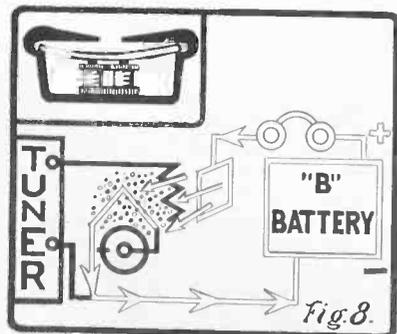
On circuits using less than three tubes



CURRENT from the B battery flows quietly through the telephones and the space between the plate and the filament. The diaphragms of the phones are therefore drawn in and held.



EVEN WHEN the weakest current, such as an incoming signal, is impressed on the grid, the phones snap back to a normal position, making an audible sound.



WITH each vibration of the human voice, the phone diaphragm pulsates once, thus converting the incoming impulse to the original sound.

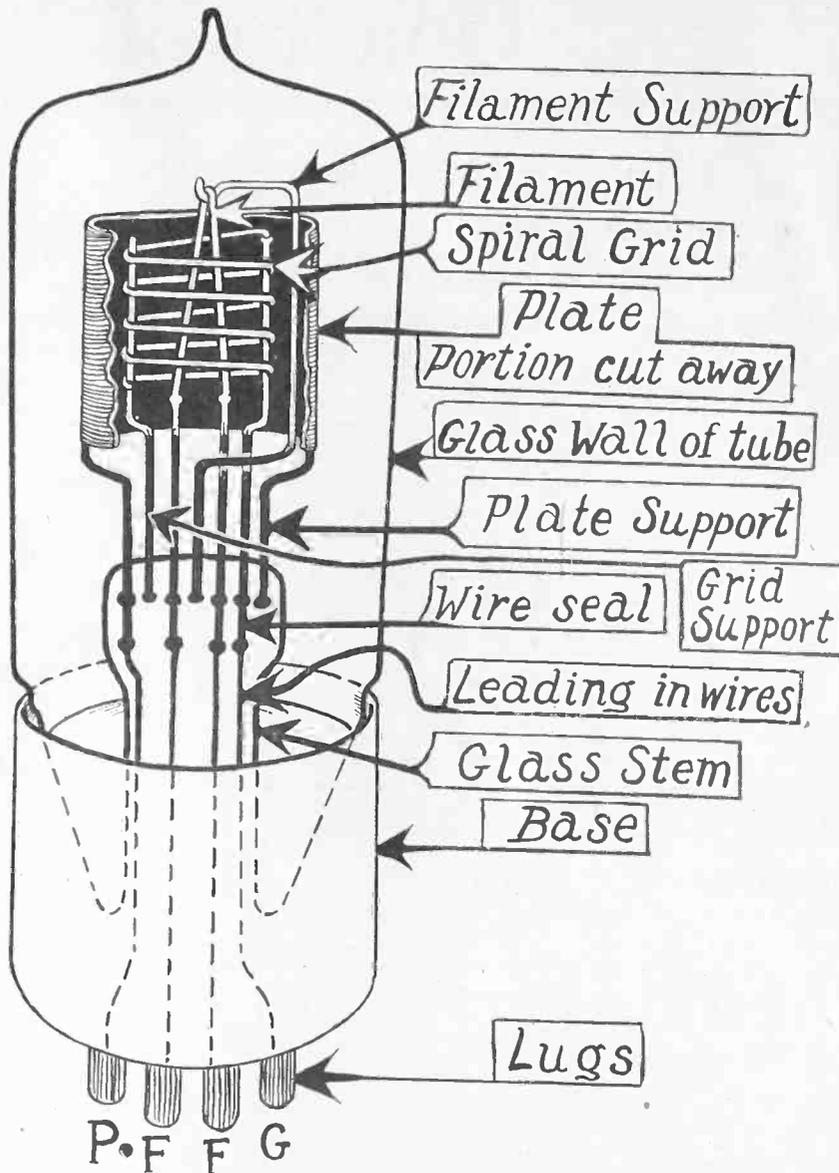


FIG. 10—A self-descriptive illustration of the vacuum tube. Would you make a tube yourself for \$4.00?

the B battery drain is hardly noticeable, i.e., the B batteries would deteriorate nearly as much if stored away. The C battery saves B battery current and cuts down distortion.

To get the proper results from radio and audio-frequency amplification it is necessary to boost the B battery current. This increases volume but it also increases the drain, unless the proper C battery potential is used. Care should be taken that the voltage impressed is not too high or the supports of the elements will heat up to the point of melting.

Tubes for the Super Heterodyne

For the Super-Heterodyne the oscillator should be either a 201A or 199. For the radio amplification (intermediate RF) use Meyers or 201A or 199. For the detectors use 200 or 201A. For the audio amplification use Western Electric VT2 or the UV201A.

It is always well to have one or two spare tubes on hand, in case one of the tubes in the set blows out. Never put a low voltage tube in a socket that has a high voltage tube current connected to it.

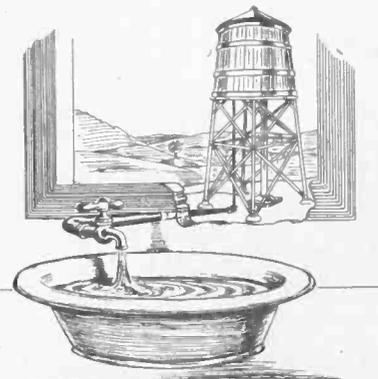


FIG. 9—An analogy: The reservoir, is the filament; the faucet is the grid; the basin is the plate; the water is the electrons. When the water is turned on from the reservoir, as the filament is turned on, the water flows to the faucet, as the electrons flow to the grid. If the faucet is closed, the water will not flow into the basin, or, if the grid is positive (closed) the electrons will not flow to the plate. Upon opening the faucet, the water flows into the basin, or, as the grid is made negative, the electrons continue their journey to the plate.

A 4-Tube RF Set of Fine Quality of Tone

The Radio University

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

I BELIEVE that clear tone is the greatest advantage a set can have. There are no broadcasting stations within 50 miles of my home so I do not believe that I need worry about extreme selectivity. I desire to use 4 tubes.—Lester David, 25 S. Richmond Ave., Atlantic City, N. J.
Fig. 57 is the circuit you desire.

all over the dial. Can I cut it out in any way?—G. W. Ewing, Boston, Mass.
Use 45 volts (2 batteries) and tap at about 30 volts for plate; 1½-volt dry cell for filament. (2) About 75 feet with a 25-foot or shorter, leadin. (3) 10-ohm rheostates are easily procured, and better control of the tube will result. (4) No, but keep them all in same direction. (5) A 23-plate

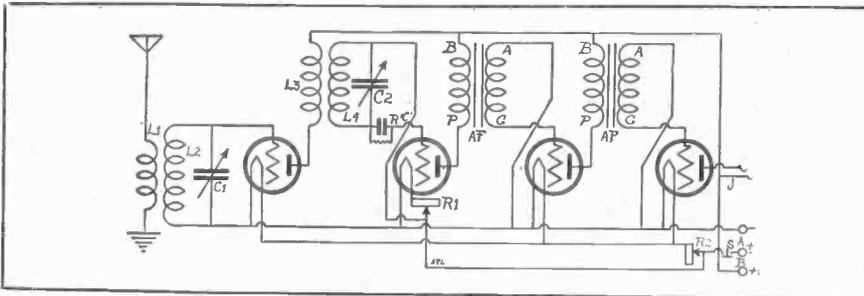
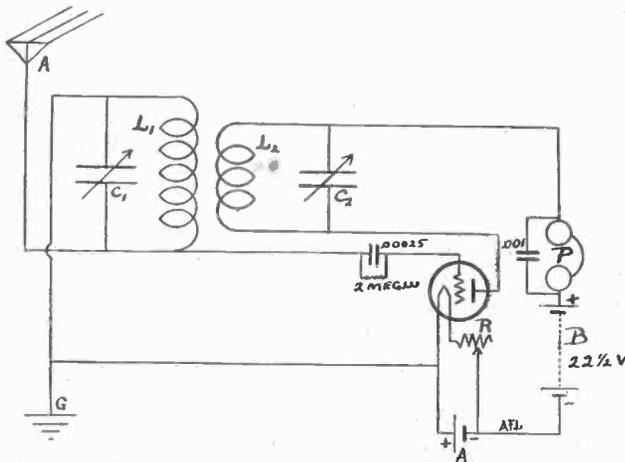


FIG. 57—One stage of RF, detector, two stages of AF. A wonderful set for all-around use. It is fairly selective, quite sensitive and its tone is unusually clear. L2 is a 45-turn coil wound on a form 3½" diameter. L1 is 10 turns wound right over L2. Use number 20 DCC wire. L3L4 is the same as L1L2. A 23-plate variable condenser tunes each secondary. Type 201A tubes may be used throughout.

IS there any such thing as a 1-tube set that you can log? I should certainly appreciate a diagram of such a set, if one is known.—Charles Hg, S. Carolina Ave., Atlantic City, N. J.
See Fig. 56.

FIG. 56—Here is a 1-tube set that you can log. It is extremely sensitive, but not enough so for use in large cities. This set is excellent material for the experimenter. L1 is a 35-turn coil wound on a 3½" diameter form. L2, 35 turns wound on the same form. Both C1 and C2 are 23-plate variable condensers. The fixed condenser across the phones is of .001 mfd. capacity.



REFERRING to Herbert E. Hayden's 1-tube DX set, issue of Oct. 4: I am using a type 11 tube. What is the best voltage to apply? (2) What length aerial shall I use? (3) I couldn't get a 15-ohm rheostat, so I got a 6 ohm. Is that right? (4) Does it matter which direction the coils are wound? (5) In Boston, WEEI comes in

variable condenser placed across the 34-turn selector rotor may help.

SHOULD I use bakelite panel? (2) Is there an advantage in using bakelite forms for the coils? (3) What is a good make of low-loss condenser? (4) Is an attic aerial all right? (5) I am going to put up a four-wire braided copper aerial. Is that

good? (6) Are anti-capacity switches good for changing the wave length from high to low?—Ward A. Ryan, Box 1010, Milwaukee, Wis.
(1) Yes, or hard rubber. (2) A self-supporting coil is better. (3) See last week's issue for a comprehensive article on selecting good parts. (4) One with metal end plate. See advertising columns. (5) It will be just as good if you use one wire, well insulated. (6) Yes.

I BUILT the 3-tube Super-Heterodyne set in the issue of August 9 RADIO WORLD, and after building and rechecking have given it up as an absolute failure. Do you agree with me?—C. S. Culp, Salineville, O. Also: J. Ippolito, 588 Niagara St., Buffalo, N. Y.
No. We expect to publish soon an article on how to clear up difficulties on this set.

I HAVE a 3-tube Ambassador set, but am unable to get wavelengths above 500. (2) Local stations come in loud and distance ones weak. Can I increase the power in any way? (3) My aerial is 80 feet long.—Theo. J. Peterson, 740 Maple Ave., Blue Island, Ill.
(1) Put a .001 mfd. fixed condenser across aerial and ground. (2) Quite a natural occurrence.

REFERRING to the 1-Tube Dandy by Herbert E. Hayden, in the issue of Oct. 4, RADIO WORLD: Is there any way that I can stop the whistle in the set. (2) When I place my hand near the panel I can actually tune stations in and out, according to the proximity of my hand to the panel.—E. L. Crawford, 275½ Braddock Ave., Turtle Creek, Pa.

If the set is working efficiently no annoying whistle should result. Reserve the plate coil leads. The whistle may be eliminated often by careful regulation of the rheostat. (2) It will be well if you shield the entire back of the panel with a copper or aluminum plate, grounding it.

WHERE does the primary of the first audio-frequency transformer connect? (2) Do by-pass condensers help anywhere? (3) on high waves, WWJ for instance, the signals are weak. What is the trouble? (4) Is the 201A a good detector?—G. H. Stevens, 2136 Brick Ave., Scranton, Pa.
The primary is connected in place of the phones, the detector plate to P on AFT, the BX22½ to B. (2) You may place a .001 fixed condenser across the transformer primary or phones. (3) You are not able to get quite high enough. The fact that your set tunes broadly enables you to hear stations that cannot be tuned in on their exact wave. If you use a tuned primary, add five turns. Otherwise add them to secondary. (4) Yes.

PLEASE inform me how to make my present condensers low-loss.—Earnest Leuschner, 4155 Langland Ave., Cincinnati, Ohio.
See University Department of Radio World, issue of Nov. 15.

HOW can I get WHN, WFBH, WBS, WRW, WJY, and WGBS around here? I have already received Chicago, but I cannot get these stations.—WJM, Bay Ridge, N. Y.
Your set is tuned unusually high. If your aerial is longer than 100 feet, cut it down. This includes leadin. Place a 43-plate variable condenser in series with the ground lead.

CAN you give me any special circuit that uses the coil suggested by Abner J. Gelula in the issue of November 1? How many turns difference is there usually in this coil and others?—John J. Griffiths, 2782 Rouen St., Montreal, Can.
This coil will work in any circuit to advantage. The same number of turns is used on this coil as on others.

HOW CAN I operate a Neutrodyne on a loop?—W. P. Pearsall, Juniper and Chestnut Sts., Philadelphia, Pa.
Complete instructions were published in the Nov. 15 issue of RADIO WORLD.

CAN YOU give me a complete list of parts necessary to build the 1-tube DX set by Neal Fitzalan in the issue of Nov. 1?—Harry Dunn, 320 Hancock St., Ithaca, N. Y.
One variocoupler, one split-variometer, one 23-plate variable condenser, one .001 mfd. fixed condenser, one vacuum tube socket, one type 200 vacuum tube, one 6-ohm rheostat, one pair phones, six binding posts, one 22½-volt B battery, one 6-volt A battery and aerial and ground equipment.

IN MY SUPERDYNE receiver I must keep my hand near the dial when tuning in a station. Is there a remedy for this?—Arthur Koenig, 9 Britton Ave., Elmhurst, L. I., N. Y.
Yes; shield the panel with metal, or a heavy foil, then grounding it.

CAN YOU suggest anything that would help me clear up the howling that comes from the low-loss Neutrodyne, described in the issue of Oct. 18? It seems that between the wavelengths of 250 and 450 the set is all right, but above this I

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and Get your own number. Put the number on your queries and they will be answered personally the same day as received.

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

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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.

A Selective Crystal Set Using Three Controls

have great trouble tuning.—William S. Trezise, 1768 58th St., Brooklyn, N. Y.

Howling in the Neutrodyne is due to the interaction between coils. Place metal shields, grounded, between each stage of radio-frequency amplification. Be sure the coils are mounted at the correct angle and the Neutrodyne properly adjusted.

I WANT to invest about \$15 in a selective, sensitive crystal set. Can you help me out?—Samuel Sherman, Mountain Ave., Summit, N. J. See Fig. 58.

WILL you kindly print a crystal circuit that would be simple enough for a novice to begin learning to build sets? Please make it very elementary.—Jos. Sternberg, Asheville, N. C. The circuit you desire is Fig. 55.

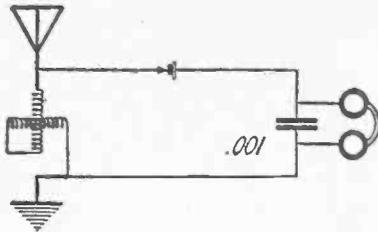


FIG. 55 (above)—The simple crystal set, an excellent circuit for one who has never built a set and wants to get started. It is not selective enough for permanent use.

IN REFERENCE to Lieut. Peter V. O'Rourke's crystal set in the issue of Aug. 28, I have a Hilco type E variocoupler. Is it all right? It has 12 taps. How do I hook them up? O'Rourke says, "Connect the end of the variocoupler stator to the ground." I take it that by "the end," he means the tap near the front (or top) of the stator.—C. Pomeroy, 100 208th St., Bellaire Park, L. I.

The Hilco variometer is very good. Half the taps are tapped at every turn, the others at every 3 to 5 turns or so. Two sets of switches are necessary. Every tap of the stator connects to a separate switch-point on the panel. The two

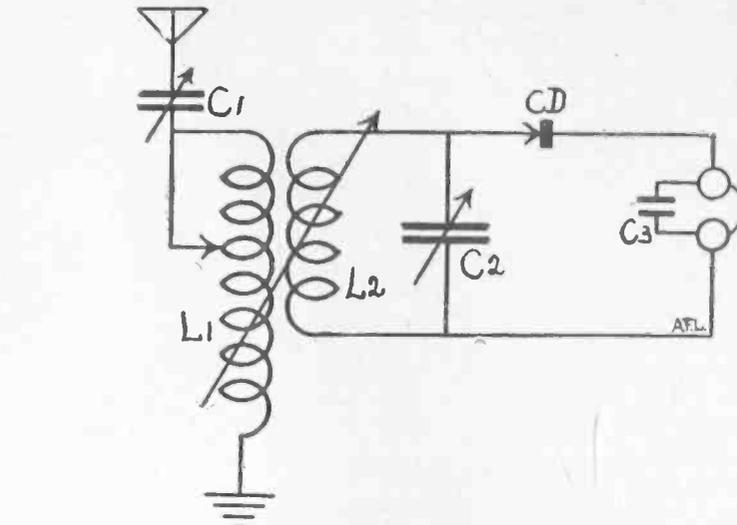


FIG. 58—A selective crystal set L1 is a 50-turn coil, or the stator of a variocoupler. The coil is tapped every tenth turn. L2 is the variable secondary or rotor of the coil. It has 40 turns. C1 is a 43-plate variable condenser; C2 is a 23-plate variable condenser; C3 is a .001 fixed mica condenser. CD may be a fixed crystal, but the galena or silicon, with the gold catswhisker, will give better results. With all crystal circuits a good aerial and ground is imperative.

switches connect to the aerial and ground respectively.

HOW can I add a fixed condenser to lower the wavelength of a variable condenser?—Wm. O. Gresens, 1006 Clinton Ave., S. Rochester, N. Y. Place the fixed capacity in series with the variable. To raise the capacity of the variable condenser shunt a fixed capacity across the variable.

IN reference to the circuit described by Neal Fitzalan, issue of Nov. 1, is there any way in which I can better control the oscillations of this set? It is very critical.—R. F. Howland, Box 61, Hyde Park, Mass.

Insert a .0025 mica grid condenser, shunted by a 1 megohm grid-leak, in series with the grid lead. Carefully control the plate voltage.

I HAVE a 1-tube 3-circuit tuner. How can I make it regenerative?—Walter Pearson, 59 1/2 Orchard St., Pittsfield, Mass. Your set is regenerative.

CAN a factory-made radio frequency transformer be used in place of the home-made one described by Herman Bernard in the issue of Oct. 18?—John J. McLaughlin, 501 Tyler St., Trenton, N. J. Yes, get an open-core type.

Marching Onward:

A Great Issue Next Week

AN extraordinary product indeed will be the next issue of RADIO WORLD, dated December 6 and on sale Wednesday, December 3. It will be the Holiday Gifts Number. The gift that our editors have prepared for our readers is the extra quality and quantity of constructional articles by experts of recognized standing. Here is a glimpse of the contents:

BY BYRT C. CALDWELL, one of the most popular contributing editors of RADIO WORLD: "My Favorite Receiver," consisting of five tubes—three stages of radio-frequency amplification, crystal detector and three stages of audio. ("Stations 1,000 miles away," Mr. Caldwell writes, "were received with sufficient volume to be heard all over an 11-room house!" This is one of the best reflexes extant.

BY CHARLES H. M. WHITE, consulting engineer, noted radio authority and former instructor of electrical engineering at the Massachusetts Institute of Technology: "The DX-cellent Receiver," which holds its own for DX against any other 2-tube set. Mr. White has constructed more than 1,200 experimental and other receivers and knows as much about this particular subject as anybody else.

BY J. E. ANDERSON, consulting engineer: "A Variometer-Tuned Super-Heterodyne." There are six tubes and the set works a speaker. Mr. Anderson is an authority on the Super-Heterodyne

and frequently acts in an advisory capacity to important radio interests.

BY HERMAN BERNARD: "A 1-Tube Reflexed Superdyne," consisting of a stage of RF, crystal detector and a stage of reflexed audio. This set produces wonderful quality of signal and strong ear-phone volume.

BY HERBERT E. HAYDEN: "How to Build a Coil Winder." Mr. Hayden's practical articles are among the most popular published. The author of the Dandy 1-Tube DX receiver, published in RADIO WORLD, issue of October 4, and which has brought in 1,000 to 2,500 miles for hundreds of fans, has worked out an inexpensive time-saver and illustrated the article handsomely.

BY ABNER J. GELULA: "How to Construct Two Stages of Audio-Frequency Amplification, to Work a Speaker." This article, in The Radio Primer Department, is for beginners.

BY LIEUT. PETER V. O'ROURKE, former ship radio operator, later a naval lieutenant and now an officer of the New York Police Reserve: "DX On One Tube With One Dial." This is another feature for novices.

BY NEAL FITZALAN: "Why a Tuned Plate Sometimes Fails to Cause Regeneration."

BY WAINWRIGHT ASTOR: "Superdyne Trouble Shooting." How to perfect

ease of tuning, eliminate howls and control squeals in this set.

BY BREWSTER LEE: "Which is Better, the Superdyne or the Neutrodyne?"

BY ALL STANDARDS this surely will be a remarkable number, including such puzzles as the Radio Cross-Word, Rebus, Wrong Diagram and Scrambled Diagram. Comic drawings, cartoons, news of radio happenings the world over, trade news and an impressive array of editorials add to the attractiveness of this extraordinary number.

RADIO WORLD IN THE HUB OF WORLD'S TRAFFIC

It is interesting to know that RADIO WORLD offices are in the Putnam Building, No. 1493 Broadway, Times Square, N. Y. C., and in the very hub of the world's highest tide of traffic.

Our publication office is within 60 seconds walk of the subway at 42nd St. and Broadway.

During the past year 120,777,098 passengers used the transfer facilities at Times Square. Brooklyn's passenger traffic, hitherto considered the heaviest in the world, was 6,500,000 for the same period.

ALL ABOUT VACUUM TUBES. A. B. C. of Vacuum Tubes. Price \$1.00. The Columbia Print, 1493 Broadway, N. Y. C.

OFFICIAL LIST OF STATIONS

Complete, Accurate, Up To Date

HEREWITH is published a complete and accurate list of the program broadcasting stations of the United States and Canada. The European and other foreign stations will be published soon. The list below was compiled and corrected up to November 19, 5 P. M. From week to week station deletions, additions and changes are published in RADIO WORLD and the following list should be retained and the amendments made thereon. The list will be revised again and published in a few weeks.

Station	Owner	Location	Meters
KDKA	Westinghouse Co.	E. Pittsb'gh, Pa.	326
KDPM	Westinghouse Co.	Cleveland, O.	240
KDPT	Southern Elec. Co.	San Diego, Cal.	240
KDYL	Newhouse Hotel	Salt Lake City, U.	360
KDYM	Savoy Theatre	San Diego, Cal.	280
KDYQ	Oregon Inst. Tech.	Portland, Ore.	360
KDZB	F. E. Siefert	Bakersfield, Cal.	240
KDZE	Rhodes Co.	Seattle, Wash.	270
KDZR	Bell'gham Co.	Bell'gham, Wash.	261
KFAD	M'Arthur Bros. Merc. Co.	Phoenix, Arizona	360
KFAE	State College	Pullman, Wash.	330
KFAF	Western Radio Corp.	Denver, Col.	278
KFAJ	Univ. of Col.	Boulder, Col.	261
KFAN	Electric Shop	Moscow, Idaho	360
KFAR	Studio Light Co.	Hollywood, Cal.	280
KFAU	Boise H. S.	Boise, Idaho	270
KFAW	Radio Den	Santa Ana, Cal.	280
KFAY	W. T. Virgin Co.	Medford, Ore.	283
KFBB	F. A. Buttrely Co.	Havre, Mont.	275
KFBE	W. K. Azbill	San Diego, Cal.	278
KFBC	R. Horn	Church, Tacoma, Wash.	242
KFBD	1st Pres. Church	Tacoma, Wash.	360
KFBE	K'hall-Upson Co.	Sacramento, Cal.	283
KFBL	Leise Bros.	Everett, Wash.	224
KFBS	Trinidad G. E. Co.	Trinidad, Col.	280
KFBU	The Cathedral	Laramie, Wyo.	283
KFCB	Nielson Radio Co.	Phoenix, Ariz.	238
KFCF	F. A. Moore	Walla Walla, Wash.	360
KFCL	L. E. Rice	Los Angeles, Cal.	236
KFCP	R. W. Flygare	Ogden, Utah	360
KFCV	F. Mahaffey	Houston, Texas	360
KFCD	Omaha Cen. H. S.	Omaha, Neb.	258
KFDD	St. Michael's Cath.	Boise, Ida.	252
KFDE	Univ. of Ariz.	Tucson, Ariz.	268
KFDJ	Oregon Agri. Col.	Corvallis, Ore.	226
KFDD	Knights Campbell	Denver, Col.	226
KFDX	1st Baptist Ch.	Shreveport, La.	250
KFDY	S. D. State College of Ag.	Brookings, South Dakota	273
KFDZ	H. O. Iverson	Minneapolis, Minn.	231
KFEA	Meier & Frank Co.	Portland, Ore.	248
KFEL	Winner Radio Corp.	Denver, Col.	254
KFEJ	J. L. Scroggin	Oak, Neb.	268
KFER	Auto E. S. Co.	Ft. Dodge, Ia.	231
KFEX	Augsburg Sem.	Minneapolis, Minn.	261
KFFF	Jenkins Furn. Co.	Boise, Idaho	240
KFFE	East. Ore. R. Co.	Pendleton, Ore.	360
KFFF	1st Bap. Church	Moberly, Mo.	266
KFFR	State Journal	Sparks, Nev.	226
KFFV	Graceland Coll.	Lamoni, Ia.	290
KFFY	Louisiana Coll.	Alexandria, La.	275
KFGD	Coll. for Women	Chickasha, Okla.	252
KFGH	Leland Stanford, Jr.	Univ., Stanford University, Cal.	273
KFGL	Snell & Irby	Arlington, Ore.	234
KFGQ	Crary Co.	Boone, Ia.	326
KFGX	1st Pres. Church	Orange, Tex.	250
KFGZ	Emmanuel Missionary College	Berrien Springs, Mich.	286
KFHA	Western State College	Gunnison, Col.	252
KFHL	Penn Coll.	Oskaloosa, Ia.	240
KFHM	Fallon & Co.	Santa Barbara, Cal.	360
KFHR	Star Elec. & Radio Co.	Seattle Wash.	263
KFI	E. C. Anthony, Inc.	Los Angeles	469
KFIF	Benson Insti.	Portland, Ore.	360
KFIO	N. Cen. H. S.	Spokane, Wash.	242
KFIQ	1st Mth. Church	Yakima, Wash.	252
KFIU	Alaska Elec. Co.	Juneau, Alaska	226
KFIX	Church of Latter Day Saints	Independence, Mo.	268
KFIZ	Daily Commonwealth	Fond du Lac, Wisconsin	273
KFJB	Marshall Elec. Co.	Marshalltown, Ia.	248
KFJC	Post-Intelligencer	Seattle, Wash.	270
KFJD	National Radio Co.	Oklahoma City, Oklahoma	261
KFJI	Liberty Theatre	Astoria, Ore.	252
KFJK	Delano Radio & Elec. Co.	Bristow, Oklahoma	233
KFJM	Univ. of N. D.	Grand Forks, N. D.	280
KFJO	Electric Const. Co.	Grand Forks, N. D.	260
KFJR	Dixon & Son	Stevensville, Mont.	280
KFJX	State Teacher's College	Cedar Falls, Iowa	280
KFJY	Trenwall Radio Co.	Fort Dodge, Iowa	246
KFJZ	Texas Natl. Gd. (112th Cav.)	Fort Worth, Texas	254
KFKA	State Teach. Coll.	Greeley, Col.	273
KFKB	Brinkley-Jones Hosp.	Milford, Kan.	286
KFKC	Conway Radio Lab.	Conway, Ark.	250
KFKV	F. Gray	Butte, Mont.	283
KFKX	Westinghouse E. & M. Co.	Hastings, Nebraska	291
KFKZ	Nassau Bros.	Colorado Springs, Colo.	234
KFLA	A. R. Wilson	Butte, Mont.	293
KFLB	Signal Mfg. Co.	Memoince, Mich.	248
KFLC	Natl' Educational Serv.	Denver	268
KFLQ	Bizzell Radio Co.	Little Rock, Ark.	261

Station	Owner	Location	Meters
KFLR	Univ. of New Mex.	Albuquerque	254
KFLU	San Benito Radio Co.	San Benito, Texas	236
KFLV	Swedish Evang. Church	Rockford, Ill.	229
KFLW	Missoula Elec. Co.	Missoula, Mont.	234
KFLX	Geo. R. Clough	Galveston, Texas	240
KFLZ	Atlantic Auto Co.	Atlantic, Iowa	273
KFMB	Christian Churches	Little Rock, Ark.	254
KFMQ	Univ. of Ark.	Fayetteville, Ark.	263
KFMR	Morningside Coll.	Sioux City, Ia.	261
KFMT	Dr. G. W. Young	Minneapolis	231
KFMW	M. G. Sateren	Houghton, Mich.	266
KFMX	Carleton Col.	Northfield, Minn.	283
KFNF	H. Field Seed Co.	Shenandoah, Iowa	266
KFNG	Wooten Radio Shop	Coldwater, Miss.	254
KFNJ	Teachers Coll.	Warrensburg, Me.	234
KFNL	Radio Broadcast Association	Paso Robles, Cal.	240
KFNV	L. A. Drake	Santa Rosa, Cal.	234
KFNY	Montana Photo. Co.	Helena, Mont.	261
KFNZ	Royal Radio	Burlingame, Cal.	231
KFOA	Rhodes Co.	Seattle, Wash.	455
KFOC	First Christian Church	Whittier, Cal.	236
KFOD	Radio Shop	Wallace, Idaho	224
KFOF	Roher Elec. Co.	Marshfield, Ore.	240
KFOJ	Moberly H. S. Radio Club	Moberly, Missouri	246
KFOL	L. M. Schafbuch	Marengo, Ia.	234
KFON	Echophone Radio Shop	Long Beach, California	234
KFOO	Latter Day Saints Univ.	Salt Lake City, Utah	261
KFOR	David City Tire & Elec. Co.	David City, Nebraska	226
KFOT	College Hill Radio Club	Wichita, Kan.	231
KFOU	Hommel Mig. Co.	Richmond, Cal.	254
KFOX	Bd. of Ed. Tech. H. S.	Omaha, Nebr.	248
KFOY	Hudson Radio Soc.	St. Paul, Minn.	226
KFOZ	Hudson Real Estate Co.	Fort Smith, Arkansas	233
KFPG	O. S. Garretson	Los Angeles	238
KFPH	H. C. Mailander	Salt Lake City	242
KFPL	C. C. Baxter	Dublin, Texas	252
KFPN	New Furn. Co.	Greenville, Tex.	242
KFPQ	Missouri Nat'l Guard	Jefferson City, Missouri	242
KFPO	Col. Nat. Guard	Denver, Col.	231
KFPP	G. & G. Radio & Elec. Shop	Olympia, Washington	236
KFPR	Forestry Dept.	Los Angeles, Cal.	231
KFPT	Cope & Johnson	Salt Lake City, Utah	268
KFPV	Heintz & Kohlmoos	San Francisco, California	236
KFPW	M. E. Church	S. Carterville, Mo.	286
KFPX	1st Pres. Church	Pine Bluff, Ark.	242
KFPY	Symonds Inv. Co.	Spokane, Wash.	283
KFQA	The Principia	St. Louis	261
KFQB	Searchlight Pub. Co.	Ft. Worth, Tex.	234
KFQC	Kidd Bros.	Taft, Cal.	227
KFQD	Chovin Sup. Co.	Anchorage Alaska	260
KFQE	Dickinson-Henry Radio Lab.	Colorado Springs, Col.	224
KFQF	D. A. Boutt	Minneapolis, Minn.	224
KFQG	So. Cal. Radio Ass.	Los Angeles	226
KFQH	Albert Sherman	Hillsborough, Cal.	211
KFQI	Thoa H. Ince Co.	Culver City, Cal.	234
KFQJ	Harbour-Lengmire Co.	Oklahoma City, Okla.	236
KFQK	Democrat Leader	Fayette, Mo.	236
KFQL	State Fair Assn.	Muskogee, Okla.	252
KFQM	Tex. Highway Bulletin	Austin, Tex.	268
KFQN	Third Bap. Church	Portland, Ore.	283
KFQO	Meier Radio Shop	Russell, Kans.	261
KFQP	G. S. Carson, Jr.	Iowa City, Ia.	224
KFQQ	W. L. Ellis	Oklahoma City, Okla.	250
KFQT	National Guard	36th Sig., Denison, Texas	252
KFQU	W. Riker	Holy City, Cal.	234
KFQV	Omaha Grain Exch.	Omaha, Neb.	231
KFQW	A. F. Knierim	North Bend, Wash.	248
KFQX	C. M. Hubbard	Seattle, Wash.	233
KFQY	Farmers State Bank	Belden, Neb.	273
KFQZ	Taft Radio Co.	Hollywood, Cal.	240
KFRB	Hall Bros.	Beeville, Tex.	248
KFRC	Radioart Studio	San Francisco, Cal.	285
KFRF	W. R. Brown	Alexandria, La.	242
KFRG	Radio Ser. Co.	Portland, Ore.	213
KFRH	M. F. Monson	Grafton, N. D.	268
KFRI	Reynolds Radio	Denver, Col. (port.)	224
KFRJ	Guy Simmons, Jr.	Conway, Ark.	250
KFRM	J. F. Boland	Sill, Okla.	263
KFRN	M. L. Short	Hanford, Cal.	224
KFRQ	Curtis Print Co.	Ft. Worth, Tex.	246
KFRP	Trinity Church	Redlands, Cal.	211
KFRR	Radio Ser. Co.	Portland, Ore.	213
KFRS	Nebo Buick	Lincoln, Neb.	240
KFSG	Echo Park Evang. Assn.	Los Angeles	278
KFSY	Van Blaricom Co.	Helena, Mont.	261
KGCB	Ledger	Tacoma, Wash.	251
KGO	Hallock & Watson	Portland, Ore.	360
KGO	Gen. Elec. Co.	Oakland, Cal.	312
KGU	M. A. Mulrony	Honolulu, Hawaii	360
KGW	Oregonian	Portland, Ore.	492
KGY	St. Martin's College	Lacey, Wash.	258
KHJ	Times	Los Angeles	395
KHQ	Louis Wasmer	Seattle, Wash.	360
KJQ	C. O. Gould	Stockton, Cal.	273
KJR	Northwest Radio	Seattle, Wash.	283
KJS	Bible Inst. of L. A.	Los Angeles	360
KLS	Warner Bros. Rad. Co.	Oakland, Cal.	360
KLX	Tribune Pub. Co.	Oakland, Cal.	309
KLZ	Reynolds Rad. Co.	Denver, Colo.	283

Station	Owner	Location	Meters
KMJ	San Joaquin Lt. & Pr. Corp.	Fresno, California	248
KMO	Love Elec. Co.	Tacoma, Wash.	360
KNT	Walt. Herrlich	Kukah, Alaska	263
KNX	Express	Los Angeles	337
KOB	N. M. Col. of Ag. & Mec. Arts	State College, N. M.	360
KOP	Detroit Police Dept.	Detroit, Mich.	286
KPO	Hale Bros.	San Francisco	423
KQF	Apple City Rad. Club	Hood River, Ore.	360
KQV	Doubleday-Hill	Pittsburgh, Pa.	270
KQW	C. D. Herrold	San Jose, Cal.	360
KRE	Gazette	Berkeley, Cal.	271
KSD	Post Dispatch	St. Louis	546
KTW	1st Presb. Church	Seattle, Wash.	360
KUO	Examiner Ptg. Co.	San Francisco	360
KWG	Portable Wireless Tel.	Stockton, Cal.	360
KWH	Examiner	Los Angeles	360
KYQ	Electric Shop	Honolulu	270
KYW	Westinghouse Co.	Chicago	536
KZM	P. D. Allen	Oakland, Cal.	360
WAAB	Jensen	New Orleans	268
WAAC	Tulane Univ.	New Orleans	360
WAAD	Ohio Mech. Inst.	Cincinnati	360
WAAF	Drovers Journal	Chicago	286
WAAM	I. R. Nelson Co.	Newark, N. J.	260
WAAN	Univ. of Mo.	Columbia, Mo.	254
WAAW	Omaha Grain Ex.	Omaha, Neb.	286
WABB	Har. Sptg. Gds.	Harrisburg, Pa.	266
WABD	Parker High School	Dayton, O.	283
WABH	Lake Shore Tire Co.	Sandusky, O.	240
WABI	Bangor Rail & Elec. Co.	Bangor, Me.	240
WABL	Agric. Coll.	Storrs, Conn.	283
WABM	F. E. Doherty Rad. Sup. Co.	Saginaw, Mich.	254
WABN	Ott Radio	La Crosse, Wis.	244
WABO	Lake Ave. Bap. Church	Rochester, N. Y.	263
WABP	R. F. Weing	Dover, O.	286
WABQ	Haverford Col. Rad. Club	Haverford, Pennsylvania	261
WABR	Scott H. S.	Toledo, Ohio	270
WABU	Victor Talking Mach. Co.	Camden, N. J.	226
WABW	College of Wooster	Wooster, O.	234
WABX	H. B. Joy, Mt. Clemens	Mish.	270
WABY	John Magaldi	Philadelphia	242
WABZ	Coliseum Pl. Bap. Church	New Orleans	263
WAHG	A. H. Grebe Co.	Richmond Hill, N. Y.	316
WBAA	Purdue Univ.	W. Lafayette, Ind.	283
WBAN	Wireless Phone Corp.	Paterson, N. J.	244
WBAO	James Millikin Univ.	Decatur, Ill.	273
WBAP	Star-Telegram	Fort Worth, Tex.	476
WBAV	Erner & Hopkins Co.	Columbus, O.	423
WBAW	J. H. Stenger, Jr.	Wilkes-Barre, Pa.	360
WBAZ	Western Electric Co.	N. Y. C.	492
WBBA	Radio Lab.	Newark, O.	234
WBBD	Barbery Bat. Ser.	Reading, Pa.	240
WBFB	Georgia Tech.	Atlanta, Ga.	270
WBBC	Irving Vermilya	Mattapoisett, Mass.	248
WBBI	J. Irving Bell	Port Huron, Mich.	246
WBBL	Grace Covenant Presbyterian Church	Richmond, Va.	283
WBBS	High School	Potoskey, Mich.	246
WBBS	People's Pulpit Assn.	Rossville, N. Y.	273
WBBS	1st Bap. Church	New Orleans, La.	252
WBBT	Lloyd Bros.	Philadelphia	234
WBBU	Jenks Mfg. Co.	Monmouth, Ill.	284
WBHV	Johnstown Rad. Co.	Johnstown, Pa.	248
WBHW	Ruffner Jr. H. S.	Worlot, Va.	322
WBHY	Washington Light Infantry	Charleston, S. C.	268
WBIZ	N. B. Watson	Indianapolis, Ind.	287
WBL	T. & H. Rad. Co.	Anthony, Kan.	354
WBS	D. W. May, Ins.	Newark, N. J.	360
WBT	Southern Radio	Charlotte, N. C.	360
WBZ	Westinghouse	Springfield, Mass.	137
WCAD	St. Lawrence Univ.	Canton, N. Y.	482
WCAE	Kaufman & Baer	Pittsburgh	260
WCAH	C. R. Randall	New Orleans	268
WCAI	Entrekin Elec. Co.	Columbus, O.	286
WCAJ	Neb. Wesleyan Univ.	University Place, Neb.	280
WCAK	A. P. Daniel	Houston, Texas	263
WCAL	St. Ofaf Col.	Northfield, Minn.	360
WCAO	Sanders & Stayman Co.	Baltimore, Maryland	275
WCAP	Chesapeake & Potomac Tel. Co.	Washington, D. C.	469
WCAR	Southern Radio	San Antonio, Tex.	360
WCAS	Dunwoody Inst.	Minneapolis	280
WCAT	South Dakota School of Mines	Rapid City, S. D.	340
WCAU	Durham & Co.	Philadelphia, Pa.	286
WCAV	Dice Elec. Co.	Little Rock, Ark.	360
WCAX	Univ. of Vt.	Burlington, Vt.	360
WCAY	Civic Broadcasting Station	Milwaukee	266
WCBA	C. W. Heimbach	Allentown, Pa.	280
WCBC	Univ. of Mich.	Ann Arbor, Mich.	380
WCBD	W. G. Voliva	Zion, Ill.	245
WCBE	Uhalt Radio	New Orleans	263
WCBG	H. S. Williams	Pacagoula, Miss.	263
WCBH	Univ. of Mississippi	Oxford, Miss.	242
WCBJ	Nicoll, Duncan & Rush	Bemis, Tenn.	240
WCBK	J. C. Mans	Jennings, La.	244
WCBL	E. R. Hall	St. Petersburg, Fla.	266
WCBM	N. Radio Mfg. Co.	Houlton, Me.	280
WCBN	Lt. J. P. Boland	Ft. Ben Harrison, Ind.	266

Station	Owner	Location	Meters	Station	Owner	Location	Meters	Station	Owner	Location	Meters		
WCBO	Radio Shop, Inc.	Memphis, Tenn.	250	WHAS	Courier-Journal Times	Louisville, Ky.	400	WRAX	Flexon's Garage	Gloucester City, N. J.	268		
WCBS	1st Baptist Ch.	Nashville, Tenn.	236	WHAU	Wilmington Elec. Spec. Co.	Wilmington, Del.	266	WRBC	Emmanuel Lutheran Church	Valparaiso, Ind.	278		
WCBR	C. H. Messter	Providence, R. I.	246	WHAZ	Rensselaer Pol. Inst.	Troy, N. Y.	380	WRC	Radio Corp. of Am.	Washington	469		
WCBT	Clark Univ.	Worcester, Mass.	254	WHB	Sweeney Sch. Co.	Kan. City, Mo.	411	WREO	Reo Motor Co.	Lansing, Mich.	288		
WCBU	Arnold Wireless Co.	Arnold, Pa.	254	WHK	Radio Box Co.	Cleveland, Ohio	283	WRK	Doron Bros. E. Co.	Hamilton, O.	369		
WCBV	Tullah's R. C.	Tullahoma, Tenn.	252	WHN	Loew's State Theatre	N. Y. C.	360	WRL	Union Col. Schenectady, N. Y.	360			
WCBW	G. P. Rankin, Jr.	Macon, Ga.	226	WHO	Bankers Life Co.	Des Moines, Ia.	526	WRM	Univ. of Ill., Urbana	Ill.	273		
WCBY	Forbes Elec. Shop	Buck Hill Falls, Pa.	268	WIAB	Johnson Auto Co.	Rockford, Ill.	252	WRR	City of Dallas	Dallas, Tex.	360		
WCBZ	Copocelli Bros.	Chicago Hts., Ill.	248	WIAC	Gal'ston Tribune	Galveston, Tex.	360	WRW	Tarrytown Radio Res.	Tarrytown, N. Y.	273		
WCCO	Washburn-Crosby Co.	Minneapolis	417	WIAD	H. R. Miller	Philadelphia, Pa.	254	WSAB	S. E. Mo. State Teachers Col.	Cape Girardeau, Mo.	275		
WCK	Stix-Baer & Co.	Fuller Co., St. Louis, Mo.	360	WIAK	John'l-Stock'n Co.	Omaha, Neb.	278	WSAC	Clemson Agr. College	Clemson College, S. C.	360		
WCM	Texas Market Dept.	Austin, Tex.	265	WIAS	Home Elec. Co.	Burlington, Ia.	283	WSAD	J. A. Foster Co.	Providence, R. I.	261		
WCX	Detroit Free Press	Detroit	517	WIK	K. & L. Elec. Sup. Co.	McKeesport, Pa.	234	WSAI	U. S. Play. Card Co.	Cincinnati	309		
WDAE	Tampa Daily Times	Tampa, Fla.	273	WIP	Gimbel Bros.	Philadelphia, Pa.	509	WSAJ	Grove City Col.	Grove City, Pa.	258		
WDAF	Kan. City Star	Kan. City, Mo.	411	WJAB	Ann. Elec. Co.	Lincoln, Neb.	229	WSAP	City Temple, N. Y. C.	263			
WDAG	J. L. Martin	Amarillo, Texas	263	WJAD	Jackson's R. E. L.	Waco, Tex.	300	WSAR	Doughty & Welch Elec. Co.	Fall River, Mass.	254		
WDAH	Trinity Meth. Church (So.)	El Paso, Texas	268	WJAG	Norfolk D'y News	Norfolk, Neb.	263	WSAU	C. Maricel	Chesham, N. H.	220		
WDAR	Lit Bros.	Philadelphia	395	WJAK	C. L. White	Greentown, Ind.	254	WSAV	Vick Radio	Houston, Tex.	360		
WDAS	S. A. Waite	Worcester, Mass.	360	WJAM	D. M. Perham	Cedar Rapids, Ia.	268	WSAX	Chicago Radio Lab.	Chicago	268		
WDAU	Slocum & Kilburn	New Bedford, Mass.	360	WJAN	Peoria Star	Peoria, Ill.	280	WSAZ	Chase Radio Co.	Pomeroy, O.	258		
WDAY	Radio Equipment	Fargo, N. D.	229	WJAR	Outlet Co.	Providence, R. I.	360	WSB	Atlanta Journal	Atlanta, Ga.	429		
WDBB	A. H. Waite Co.	Taunton, Mass.	258	WJAS	Pittsburgh Radio Sup. House	Pittsburgh, Pa.	286	WSL	J. & M. Elec. Co.	Utica, N. Y.	273		
WDBE	H. E. Burns	Martinsburg, W. Va.	268	WJAX	Union Trust Co.	Cleveland, Ohio	390	WSOE	School of Engin.	Milwaukee	246		
WDBF	R. G. Phillips	Youngstown, O.	246	WJAZ	Chicago Rad. Lab.	Chicago	268	WSY	Ala. Pow. Co.	Birmingham, Ala.	360		
WDBH	C. T. Sherer	Worcester, Mass.	268	WJDD	Loyal Order of Moose	Mooseheart, Ill.	278	WTAB	Fall River Daily Herald	Fall River, Mass.	266		
WDBI	Radio Sp. Co.	St. Petersburg, Fla.	268	WJD	Dennison Univ.	Granville, O.	229	WTAC	Penn. Traf. Co.	Johnstown, Pa.	270		
WDBJ	Richardson-Wayland Elec. Co.	Roanoke, Va.	229	WJY	Radio Corp. of Am.	N. Y. C.	405	WTAF	L. J. Gallo	New Orleans, La.	268		
WDBN	Elec. Light & Power Co.	Bangor, Maine	252	WKAA	H. F. Paar	Cedar Rapids, Ia.	278	WTAL	Toledo Rad. & Elec. Co.	Toledo	232		
WDBO	Rollins College	Winter Park, Fla.	240	WKAD	Chas. Looff	E. Providence, R. I.	240	WTAM	Willard Stge. Bat. Co.	Cleveland	398		
WDBP	State Normal School	Superior, Wis.	261	WKAF	U. S. Radio Sup. Co.	Wichita Falls, Texas	360	WTAP	Cambridge Rad. Elec. Co.	Cambridge, Ill.	242		
WDBQ	Morton Radio Sup. Co.	Salem, N. J.	234	WKAN	Un. Bat. Co.	Montgomery, Ala.	226	WTAQ	S. Van Gorden	Oscoda, Wis.	234		
WDBR	Tremont Temple	Boston, Mass.	256	WKAP	D. W. Flint	Cranston, R. I.	360	WTAR	Reliance Rad. & Elec. Co.	Norfolk, Virginia	280		
WDBS	S. M. K. Radio Corp.	Dayton, Ohio	283	WKAQ	Radio Corp. of P. R.	San Juan, Porto Rico	360	WTAS	Chas. E. Erbstein	Elgin, Ill.	290		
WDBT	Taylor's Book Store	Hattiesburg, Mississippi	236	WKAR	Mich. Agr. Col.	E. Lansing, Mich.	280	WTAT	Edison Co. (portable)	Boston, Mass.	244		
WDBW	Radio Den	Columbia, Tenn.	268	WKAV	Laconia R. C.	Laconia, N. H.	254	WTAU	Ruegg Bat. & Elec. Co.	Tesumseh, Nebraska	242		
WDBX	Otto Baur	New York City	233	WKBF	D. W. Flint	Cranston, R. I.	286	WTAW	Agr. & Mech. College	College Station, Tex.	288		
WDBZ	Boy Scouts Am.	Kingston, N. Y.	233	WKBY	Radio Shop	Oklahoma City, Okla.	360	WTAX	Williams Hdwe. Mfg. Co.	Streator, Ill.	231		
WDM	Ch. of Covenant	Washington, D. C.	234	WLAL	Naylor Elec. Co.	Tulsa, Okla.	360	WTAY	The Oak Leaves	Oak Park, Ill.	293		
WDM	Ch. of Covenant	Washington, D. C.	234	WLAP	W. V. Jordan	Louisville, Ky.	286	WTAZ	T. J. McGuire	Lambertville, N. J.	261		
WDM	Ch. of Covenant	Washington, D. C.	234	WLAX	Putnam E. Co.	Greencastle, Ind.	231	WTG	Kans. State Agr. College	Manhattan, Kansas	273		
WDM	Ch. of Covenant	Washington, D. C.	234	WLBL	Wisconsin Markets Dept.	Stevens Pt., Wis.	278	WWAD	Wright & Wright, Inc.	Philadelphia, Pa.	250		
WDM	Ch. of Covenant	Washington, D. C.	234	WLS	Sears Roebuck Co.	Chicago, Ill.	345	WWAE	Alama Ballroom	Joliet, Ill.	242		
WDM	Ch. of Covenant	Washington, D. C.	234	WLW	Crosley Mfg. Co.	Cincinnati, O.	423	WWAO	Coll. of Mines	Houghton, Mich.	344		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAC	C. B. Meredith	Cazenovia, N. Y.	261	WWI	Ford Motor Co.	Dearborn, Mich.	273		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAF	Round Hills Radio Corp.	Dartmouth, Mass.	360	WWJ	Detroit News	Detroit	517		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAH	Gen. Sup. Co.	Lincoln, Neb.	254	WWL	Loyola Univ.	New Orleans	280		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAK	Norton Laboratories	Lockport, N. Y.	254						
WDM	Ch. of Covenant	Washington, D. C.	234	WMAN	Broad St. Bap. Ch.	Columbia, O.	286	CANADIAN STATIONS					
WDM	Ch. of Covenant	Washington, D. C.	234	WMAQ	Chicago Daily News	Chicago	448	CFAC	Calgary Herald	Calgary, Alberta	430		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAV	Ala. Poly. Inst.	Auburn, Ala.	250	CFCA	Star Pub. & Printing Co.	Toronto, Ont.	400		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	Kingshighway	Bresbyterian Church, St. Louis, Mo.	280	CFCD	Marconi	Vancouver, B. C.	440		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	Mercer Univ.	Macon, Ga.	261	CFCE	Marconi	Halifax, N. S.	440		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	Com. Appeal	Memphis, Tenn.	500	CFCH	Abitibi Power & Paper Co.	Iroquois Falls, Ont.	400		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	Ainsworth-Gates Radio	Cincinnati	309	CFCL	La Cie de L'Evenement	Quebec, Que.	410		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	Doubleday-Hill Elec. Co.	Washington, D. C.	261	CFCL	Radio Supply Co.	Edmonton, Alberta	410		
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAC	Shepard Stores	Boston, Mass.	278	CFCL	Centennial Methodist Church	Vancouver, B. C.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAD	Univ. of Okla.	Norman, Okla.	254	CFCN	W. W. Grant Radio, Ltd.	Calgary, Alberta	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAL	Omaha Central H. S.	Omaha, Neb.	258	CFCQ	Semmelhack-Dickson, Ltd.	Bellevue, Que.	450	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAP	Wittenberg Col.	Springfield, O.	275	CFCR	Laurentide Air Service	Sudbury, Ont.	420	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAR	1st Christian Church	Butler, Mo.	231	CFCW	Radio Shop	London, Ontario	420	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAT	Lenning Bros. Co.	Philadelphia	250	CFDC	Sparks Co.	Nanaimo, B. C.	430	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAW	Henry Kunzmann	Pt. Monroe, Va.	240	CFDC	International Radio Development Co.	Ft. Frances, Ont.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNAX	Dakota Radio Ap. Co.	Yankton, South Dakota	244	CFQC	The Electric Shop	Saskatoon, Sask.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNJ	Radio Shop	Newark, N. J.	233	CFRC	Queens University	Kingston, Ontario	450	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WNYC	Municipal Station	N. Y. C.	526	CFRC	Bell Telephone Co.	Toronto, Ont.	410	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAC	Page Organ Co.	Lima, Ohio	266	CFUC	University of Montreal	Montreal, Que.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAE	Midland Col.	Fremont, Neb.	280	CGAC	G. Melrose Bell	Calgary, Alberta	430	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAF	Tyler Com. Col.	Tyler, Tex.	360	CGAC	G. Melrose Bell	Vancouver, B. C.	430	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAI	Southern Equip. Co.	San Antonio, Tex.	385	CHAC	Radio Engineers	Halifax, N. S.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAJ	Ervin Elec. Co.	Parsons, Kan.	258	CHBC	Albertan Pub. Co.	Calgary, Alberta	410	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAN	Vaughn Cons. of Music	Lawrenceburg, Tenn.	360	CHCB	Marconi	Toronto, Ontario	440	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAR	H. P. Lundskow	Kenosha, Wis.	229	CHCD	Canadian Wireless & Elec. Co.	Quebec, Que.	410	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAW	Penn. Nat. Guard	Eric, Pa.	242	CHCE	Western Canada Radio Supply, Ltd.	Victoria, B. C.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAW	W'men of World	Omaha, Neb.	526	CHCF	G. Melrose Bell	Winnipeg, Manitoba	430	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	F. J. Wolff	Trenton, N. J.	280	CHCL	Vancouver Merchants Exchange	Vancouver, B. C.	440	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	Palmer Sch. of Chiro.	Davenport, Ia.	484	CHCO	London Radio Shop	London, Ont.	410	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	Low State College	Ames, Iowa	360	CHCQ	Western Radio Co.	Calgary, Alberta	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	John Wanamaker	Philadelphia	509	CHCV	Metropolitan Motors	Toronto, Ont.	410	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	Unity School	Kansas City, Mo.	275	CHCX	J. R. Booth, Jr.	Ottawa, Ont.	400	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	Bamberger & Co.	Newark, N. J.	405	CHCY	Northern Electric Co.	Montreal, Que.	420	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	Mo. State Market Bureau	Jefferson City, Mo.	441	CJBC	Deplus Freres	Montreal, Que.	420	
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAB	Penn. State Col.	State Col., Pa.	283	CJCA	Edmonton Journal	Edmonton, Alberta	450
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAZ	Donaldson Radio	Okmulgee, Okla.	360	CJCB	J. G. Bennett	Nelson, B. C.	400
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAJ	Donalittle Radio Corp.	New Haven, Connecticut	268	CJCD	T. Eaton Co.	Toronto, Ont.	410
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAK	North Dakota Agricultural College	Agricultural College, N. D.	283	CJCE	Sprott Shaw Radio Co.	Vancouver, B. C.	420
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAR	Ward Bat. Co.	Beloit, Kan.	236	CJCF	The News Record, Ltd.	Kitchener, Ont.	420
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAU	Concordia Col.	Moorhead, Minn.	286	CJCG	Manitoba Free Press	Winnipeg, Man.	410
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WPAZ	Dr. J. R. Kosh	Charleston, W. Va.	275	CJCI	Maritime Radio Corp.	St. John, N. B.	400
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAA	H. A. Beale	Parkeburg, Pa.	360	CJCN	Simens Agnew & Co.	Toronto, Ont.	410
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAE	E. B. Gish	Amarillo, Texas	234	CJCS	Eastern Tel. & Tel. Co.	Halifax, N. S.	410
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAE	Moore Radio	Springfield, Vt.	275	CJCX	Perival Wesley Shackleton	Olds, Alb.	400
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAF	Sandusky Register	Sandusky, O.	240	CJCY	Free Press Printing Co.	London, Ont.	430
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAM	Elec. Equip. Co.	Miami, Fla.	283	CJNC	Tribune Newspaper Co.	Winnipeg, Manitoba	400
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAN	Scranton Tim s.	Scranton, Pa.	280	CKAC	La Press Pub. Co.	Montreal, Que.	430
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAO	Calvary Baptist Chr.	N. Y. C.	360	CKCD	Daily Province	Vancouver, B. C.	410
WDM	Ch. of Covenant	Washington, D. C.	234	WMAZ	WOAX	WQAO	W. Tex. Rad. Co.	Ablene, Tex.	360				
WDM	Ch. of Covenant	Washington, D. C.	234										

The 4-Tube DX Superdyne

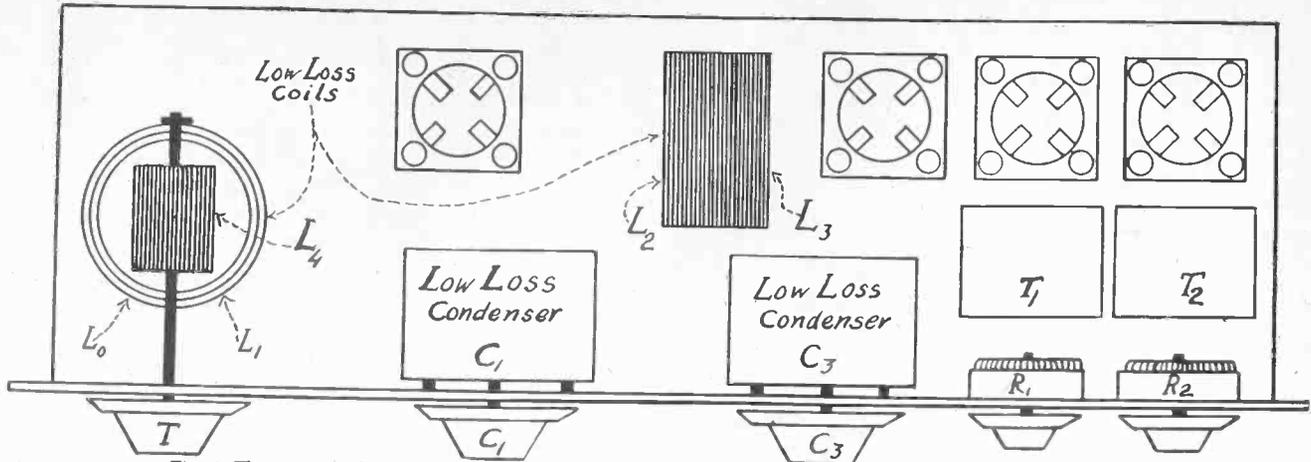


Fig. 4—The parts on the baseboard may be arranged as shown for efficiency in operation and simplicity of wiring.

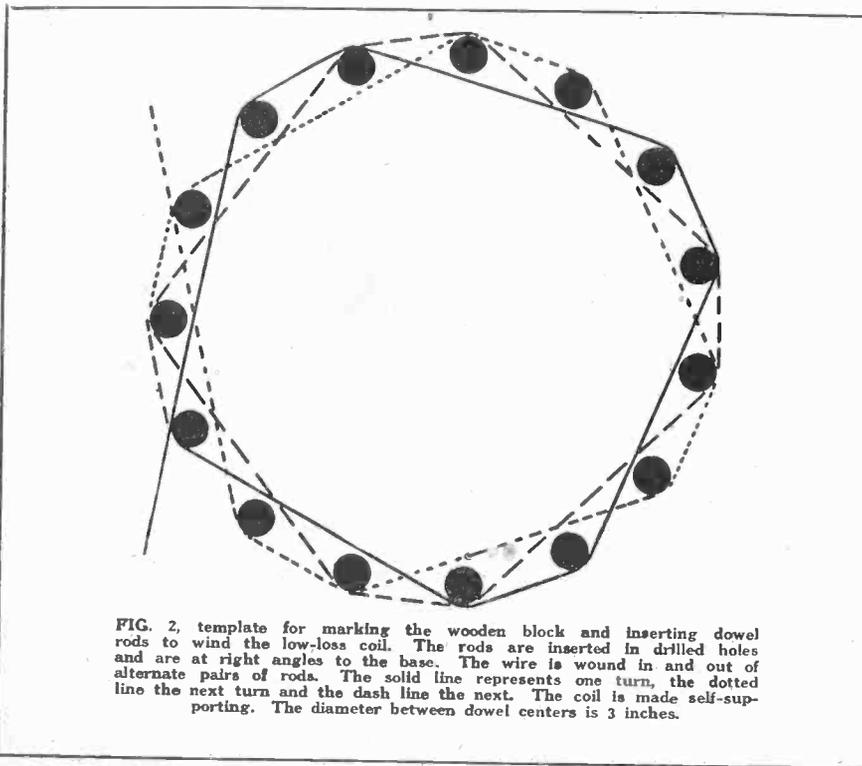


FIG. 2, template for marking the wooden block and inserting dowel rods to wind the low-loss coil. The rods are inserted in drilled holes and are at right angles to the base. The wire is wound in and out of alternate pairs of rods. The solid line represents one turn, the dotted line the next turn and the dash line the next. The coil is made self-supporting. The diameter between dowel centers is 3 inches.

By J. E. Anderson
Consulting Engineer

PART II

(Concluded from last week)

AS soon as the coils have been wound and all the parts of the receiver have been collected, the builder is ready to assemble the receiver. It is assumed he will want to put it in an attractive cabinet. The appearance of a receiver greatly depends on the arrangement of the parts that go on the panel, but unfortunately the neatest arrangement of the panel is not always consistent with greatest efficiency of the set.

One popular arrangement of the dials on the panel for a set of this type is shown in Fig. 3. This allows all the radio-frequency parts to be on one side and the audio-frequency on the other. While it is not symmetrical, it is a natural arrangement and is consistent with simplicity in wiring. In this arrangement the first tuning coil and the tickler are placed at the extreme left of the cabinet, the two condensers in the middle, and the audio-frequency amplifier and the rheostats at the right. In Fig. 4 is shown the baseboard layout consistent with

the panel shown in Fig. 3. The first tuning unit with the tickler is shown at the left, well away from the panel and not too close to either the tube socket or the first tuning condenser C1. The first radio-frequency tube is directly behind the first tuning condenser. The second tuning coil or coupler L2L3 is placed between the first and the second tube sockets, directly behind the tuning condenser C3.

Placing the Coils

The two tuning coils are so placed that their axes are at right angles to each other. This should always be observed even if the coils are placed in different positions. It may be more convenient in some cases to mount the first tuning coil with its axis parallel to the baseboard instead of to the panel. If that is done the axis of the second should be turned so that it is perpendicular to the baseboard. The reason for this is to minimize inductive coupling between the two tuning coils. Even in a Superdyne circuit this is desirable.

Shielding

For reduction of losses due to eddy cur-

rents, all metal should be removed from the magnetic fields as far as possible. If a sheet of metal is placed with its plane at right angles to the magnetic field it acts as a short-circuited turn of very low resistance, and the eddy currents set up in it will be considerable, thus adding very greatly to the effective resistance of the tuning coil. This applies particularly to the plates and end plates of the tuning condensers and to any shielding which may be used. This effect is not very great if the metal is 2" or farther away from the nearest point of the coil, but it is very great if the sheet of metal is placed near the end of the coil and perpendicular to its axis.

Shielding for the reduction of body capacity effects should be used sparingly. If low-loss condensers which have metal end plates are used, and if these and the rotor are grounded, no shielding should be required. If, however, it is found that the body capacity effects are troublesome, a small shield in front of each condenser may be employed. There will also be some body capacity effect at the tickler, even if the first tuner is placed several inches from the panel. This effect will be reduced by the use of a non-conducting rod, as suggested in last week's instalment. If the shaft or any part of it is of metal, this should be grounded. A small shield similar to that suggested for each condenser may be used for the tickler if the effect is troublesome. All shielding should of course be grounded.

Assembly Plan

The position of the two audio-frequency transformers T1 and T2 is shown in Fig. 4. The two audio amplifier tubes are directly behind the transformers. The two rheostats R1 and R2 are placed near the bottom of the panel in front of the transformers. The three jacks shown in Fig. 3 are not shown in Fig. 4, but they are placed over the rheostats and they also extend over the transformers. The height of the transformers used in the circuit will determine how low it is possible to place the jacks. The position of the by-pass condenser C2, Fig. 1, is not shown in Fig. 4. It may be placed in the most convenient position between the plate of the detector and the grounded bus-bar. One side of it may be connected to the plate binding post on the detector socket or to the plate terminal lug on the first jack, but not to one of the terminals of the first transformer. The other side of the condenser may either be connected to the negative or the positive filament terminals of the detector, whichever happens to be the most convenient.

The grid battery E shown in Fig. 1 is not represented in Fig. 4. There are several
(Continued on page 24)

MR. DX HOUND

A Character Created
by RADIO WORLD Artist

By HAL SINCLAIR



RADIOCAST PROGRAMS

Thursday, November 27

KYW, Chicago, 536 (C. S. T.)—11 A. M., Thanksgiving services from Methodist Episcopal Church, Rev. Burr R. McKnight, Minister. 11:55, time. 12, weather. 2 P. M., Pitt-Penn State football game from Forbes Field. 6:30, KDKA Little Symphony Orch, Victor Saudek, conductor. 7:15, Uncle Ed Thanksgiving program. 7:30, feature. 8, feature. 8:30, KDKA Little Symphony Orch, and Chimes, Victor Saudek, conductor; Gilbert Morris, tenor. 9:55, time; weather.

WJZ, New York City, 455 (E. S. T.)—10 A. M., special Thanksgiving services direct from St. George's Episcopal Church. 1445 P. M., play by play description of the Cornell Pennsylvania football game by J. Andrew White, direct from Philadelphia. 7, Bernhard Levitov's Hotel Commodore Orch. 8, special Thanksgiving program. 10:30, Waldorf-Astoria Orch.

WOC, Davenport, Ia., 484 (C. S. T.)—6:45 P. M., sport news and weather. 9, orch. program; special program for Thanksgiving.

WCCO, Minneapolis, 417 (C. S. T.)—11 A. M., House of Hope Presbyterian Church, Rev. H. C. Swearingen, pastor. 6:30 P. M., concert. 7:30, feed talk. 8:30, musical program.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., program of news items and music. Karl Brandenburg. 2:30, Edward Murphy, dramatic reader. 6, Art Hickman's concert orch. 6:30, Prof. Walter Sylvester Hertzog telling stories of American history. 7:30, talk on "Art" by Harold Swartz. 8, Los Angeles Soap Company program. 10, Art Hickman's dance orch.

WOO, Philadelphia, 509 (E. S. T.)—11 A. M., organ. 11:30, weather. 11:55, time. 12, luncheon music by the Tea Room Orch. 5:10 P. M., sports results and police reports. 5:15, organ and trumpets. 9:55, time. 10:02, weather.

WEEL, Boston, 303 (E. S. T.)—6 P. M., Jack Renard and his Mansion Inn Orch. 7, Boston Edison Big Brother Club. 7:30, musicale. 8:30, Boston Federation of Churches Program. 9, program from N. Y.

WIP, Philadelphia, 395 (E. S. T.)—8:15 P. M., Maunder's sacred cantata. 10:30, Harvey Marburger and his orch.

WGBS, New York City, 316 (E. S. T.)—1:30 P. M., Armand Vesceys, Ritz-Carlton Hotel Orch. 3, interview by Terese Rose Nagel with Karl Kitchin, writer. 3:10, Olga Halasz, pianist. 3:20, Leila Tyndall Moses, "The Indian Idyll." 3:30, Gite Rathob, operatic singer. 3:40, Olga Halasz, pianist. 3:50, Richard Gilbert, tenor. 4, Uncle Geebee. 6:30, Loretta Ellen Braday, children stories. 6:45, Larry Funk's Dance Orch. 8:30, Oliver M. Saylor, WGBS critic, abroad on the theatrical mission; cables. 9, the 104th Engineers Band. 9:25, Belle Bart, "The New Astrology."

WRC, Washington, 469 (E. S. T.)—7 P. M., children's stories. 7:15, Meyer Davis' Willard Hotel Orch. 8:15, motoring talk. 8:45, talk under auspices of Smithsonian Institute. 9:20, concert by Lee House Trio. 9:55, time. 10, special program.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., morning gym class. 2:30 P. M., "Jes Nacherly Beh' Grateful," by Rev. John S. Carliha. 2:45, program by Mme. Clara Novello Davies, composer and coach, ladies' chorus and soloists. 3:30, Walter Feldkamp and Alan Moran, on two pianos. 6:15, Albert E. Sonn, technical editor, Newark Sunday Call, "Radio for the Layman." 6:30, Jimmie Lent and his orch. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

Friday, November 28

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., Almanac. 12:02 P. M., organ recital; features

from the Studio; Arcadia Concert Orch., Feri Sarkozi, director. 2, Arcadia Concert Orch.; playlet by member of the National School of Elocution and Oratory. 4:30, dance program. 5:45, sporting results. 7:30, with the boys and girls. 8, "Turning the Pages," a book review, Arnold Abbott; artist recital. 10, meeting of the Morning Glory Club; Arcadia Cafe Dance Orch, Salvatore Pizza, director; features from the Studio.

WCCO, Minneapolis, 417 (C. S. T.)—10:45 A. M., Betty Crocker, "Are You Underweight?" 2 P. M., "The Child's Right to Health and Character"—Caroline Crosby. 2:30, musical program. 4, magazine hour. 5:30, children's hour, Tess Cooperman. 6, sport hour. 6:30, concert. 7:30, Badger Clark, "Cowboy Poet of S. D." 7:45, "Flashlight on the Farm," Conrad Hoff. 8:30, musical program.

KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., program of news items and music. 2:30, musicale. 6, Art Hickman's concert orch. 6:30, Prof. Walter Sylvester Hertzog telling stories of American history. 8, Globe Ice Cream Company program. 10, Art Hickman's dance orch.

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Edison Big Brother Club. 7:30, musicale. 8:15, Weltman Conservatory of Music Program. 9, program from New York. 10, musicale.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., Gimbel Tea Room. 1:30, weather. 3, artists from the Frank Oglesby Studios. 6, weather. 6:15, Harvey Marburger and his orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Story.

WGBS, New York City, 316 (E. S. T.)—10 A. M., talks with Terese. 10:10, Valeria M. Seitz, mezzo soprano. 10:20, Haryot Holt Dev, women's business chat. 10:30, Valeria M. Seitz, mezzo soprano. 10:40, Gertrude Tucker in "The Romance of the Age." 10:50, Valeria M. Seitz, mezzo soprano. 1:30 P. M., Parodi's Dance Orch. 3, interview by Terese Rose Nagel with Jimmy Hussey of "Izzy." 3:10, Detborn and Howard, guitar duo. 3:20, Heineke Hoffman, star of "Old Familiar Faces." 3:30, Detborn and Howard, guitar duo. 6, Uncle Geebee. 6:30, Nat Martin's "I'll Say She Is" Orch. 9:35, The 104th Engineers Band. 10, Eddie Mayo, novelty whistler. 10:10, the Phillips Mixed Quartet; Caroline Reynolds, soprano; Louise Sherer, contralto; George Owens, tenor and Charles Carver, bass. 10:45, Wit and Humor with Judge Magazine. 12, music from Picadilly Theatre.

WRC, Washington, 469 (E. S. T.)—3 P. M., "Women's Wear." 3:10, song recital. 3:20, "Beauty and Personality." 3:25, current topics. 3:35, piano recital. 3:50, Magazine of Wall Street. 4, song recital. 6, stories for children.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., calisthenics. 9:30, late news and comment of the markets. 11:35, table talk by Mrs. Anna J. Peterson. 6 P. M., news, financial and final markets; Dun's and Bradstreet's Weekly Review. 6:35, children's bedtime story. 7, Joska DeBabary's orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBabary's orch. 7:30, KYW's studio. 8:20, speeches from American Farm Bureau Federation. "A. F. B. F. Radio Community Meeting." 9, midnight revue.

KDKA, E. Pittsburgh, 326 (E. S. T.)—7 A. M., morning exercises. O. Shannon, physical director. 8, morning exercises. 9:45, stockman reports. 11:55, time. 12, weather; stockman reports. 12:20 P. M., Sunday School lesson. 3:30, closing quotations. 6:30, Meyers Davis Orch. 7:15, Daddy Winkum, the Radio Rhythmer. 7:30, business review. 7:40, stockman reports. 8:15, second of a series of health talks, "Danger of the Common Cold." 8:30, concert by employees of Pennsy R. 9:55, time; weather.

WJZ, New York City, 455 (E. S. T.)—10 A. M., Housewives Menu, Mrs. Julian Heath. 10:20, book review by Grace Isabel Colborn. 10:30, "The Woman's Exchange." Mrs. Mickle. 10:40, Arts and Decorations, by Mrs. Mary Roberts. 10:50, Eleanor Gunn's fashion talk. 11, "The Supernatural in Fiction," by Walter De La Mare. 1 P. M., Hotel Ambassador Trio, Henry Vander Zanden, director. 4, Waldorf-Astoria Tea Orch. 5,

Hock and Jerome, popular songs. 5:15, Della Riordau, lady baritone. 5:30, State and Federal agricultural reports; stock and market. 7, Savarin ensemble. 8, Wall Street review. 8:10, Chas. Fleischman, violinist. 8:30, Frank Anderson, baritone. 8:45, Looseleaf Current Topics, William H. Allen. 9, Frank Anderson, baritone. 9:15, U. S. Navy Band.

WJY, New York City, 405 (E. S. T.)—7:30 P. M., Wynne's Greenwich Village Orch. 8:15, specialty number. 9:45, the Radio Franks; Wright and Bessinger. 10, Hotel Netherland Trio.

WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M., opening market. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 12, chimes. 12:15 P. M., weather. 2, closing markets. 6:45, sport news and weather. 7, Sandman's Visit, by Val McLaughlin. 7:20, educational lecture. 9, musical program.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., morning gym class under the direction of Arthur E. Bagley, director of physical education, Y. M. C. A., Newark, N. J. 2:30 P. M., Rac Russell Lauer, soprano. 2:45, Dorothy Wilder, pianist. 3, "The Obliging Relative," by Florence E. Hunt. 3:15, soprano. 3:30, Nichol's Manor Farm orch. 6:15, Vincent Buono, cornetist, and Leonora Buono, pianist. 6:30, "Man-in-the-Moon" stories. 7, Vincent Buono, cornetist, and Leonora Buono, pianist, in a joint program. 7:15, resume of the day's sports by "Jolly Bill" Steinke.

WHN, New York City, 360 (E. S. T.)—6:30 P. M., Vincent Catanese's orch. 7, Harry Richman and his entertainers; Eddie Elkins and his orch. 9:30, news. 9:37, Dan Gregory and his Crystal Palace orch. 10, fashion chats by Mme. Belle. 10:10, Bob Miller and Ira Schuster, songs. 10:25, "Storage Batteries," by H. B. Shontz. 10:30, Sam Lannin and his Roseland dance orch. 12, Joe Cook, star of "Vanities," interviewed by Nanett Kutner. 12:15 A. M., Sam Wooding and his Club Alabam orch. 12:45, Ted Lewis and his Symphonic Clowns with the revue "Intime."

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, organ and trumpets. 7:30, sports results and police reports; A. Candelori and his orch. 8:30, Fox Theatre studio. 9:10, musical program, Audrey Williams, soprano; Anna March Jenkins, contralto; Alma W. Wilson, accompanist. 9:55, time. 10:02, weather. 10:03, organ recital, Harriette G. Ridley. 10:30, Vincent Rizzo and his orch.

Saturday, November 29

WDAR, Philadelphia, 395 (E. S. T.)—11:45 A. M., Almanac. 12:02 P. M., organ recital; features from the Studio; Arcadia Concert Orch., Feri Sarkozi, director. 2, Arcadia Concert Orch.; artist recital. 4:30, dance program by the Cotten Pickers. 5:45, sporting results. 7:30, With the Boys and Girls.

WCCO, Minneapolis, 417 (C. S. T.)—10:45 A. M., Betty Crocker, "Getting Ready for Christmas." 8 P. M., "Radio Experiences Around the North Pole," Donald Mix, radio operator; Steamship "Bowdoin." 8:30, musical program. 11, dance program.

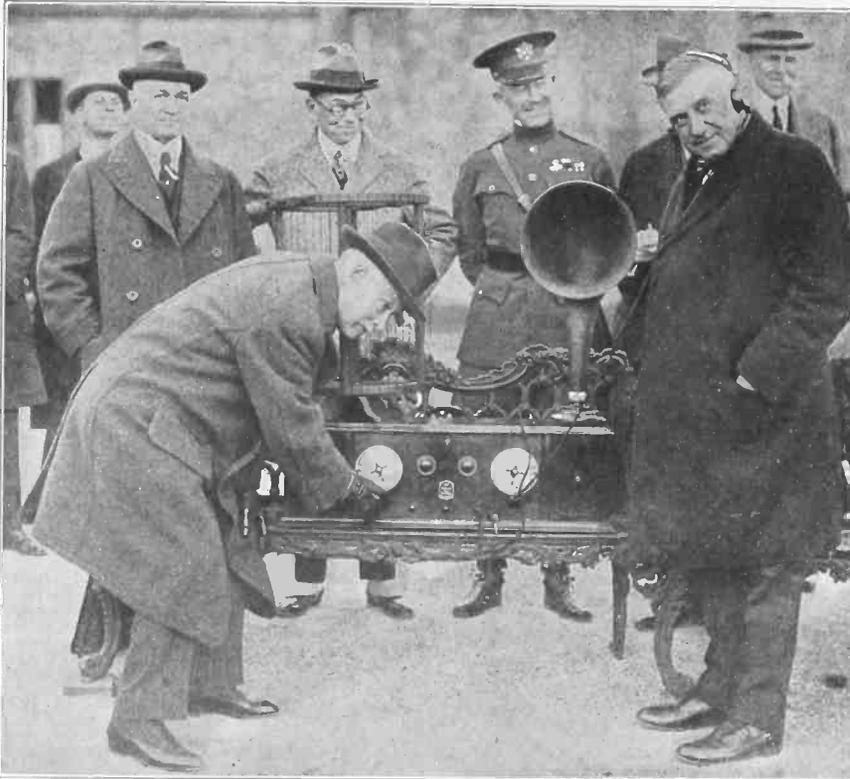
KHJ, Los Angeles, 395 (P. S. T.)—12:30 P. M., broadcasting the Rotary Club luncheon. 2:30, Charlie Wellman's Saturday afternoon frolic. 6, Art Hickman's Concert Orch. 6:30, Prof. Walter Sylvester Hertzog telling stories of American history. 8, Eagle Radio Store program. 10, Art Hickman's dance orch.

WEEL, Boston, 303 (E. S. T.)—2:30 P. M., Army vs. Navy football game at Baltimore, Md.

WIP, Philadelphia, 509 (E. S. T.)—1 P. M., organ recital by Karl Bonawitz. 1:30, weather. 3, dance music by Dal Ruch and his Arcadians. 6, weather. 6:05, Hotel St. James Orch. 6:45, livestock and produce market reports. 7, Uncle Wip's Bedtime Stories. 8, "Chemistry In and About the Home," by Prof. Freeman P. Stroup. 8:15, "Physical Efficiency," by Frank H. Baker, physical instructor. 8:30, a play, "The Twelve-Pound Look," by Sir James Matthew Barrie. 9, artist recital by Helen A. Coles, violinist; Prof. Roger

(Continued on page 18)

Test by Gary and Schwab



WHEN two "big boys" of radio fandom got together the other day at West Point it was decided that by virtue of his chronic optimism Judge Elbert H. Gary, chairman of the board of the U. S. Steel Corporation, was the better of the two for trying to tune in anything. Also it was agreed that Charles M. Schwab, president of the Bethlehem Steel Corporation, was the better listener. So the right combination was happily struck and preparations made for receiving messages from a squadron of planes. The receiving set was a Radiola Super-Heterodyne, one of the most sensitive sets in the world. The R. C. A. circular loop was used as the collecting agency. (International Newsreel.)



"MY DEAR," the wife of tomorrow (who today is a college student) may say to her husband, "I'm sorry the cookies turned out so poorly. I—I didn't keep my eye on the oven. I was busy trying to reflex the Superdync for a stage of radio-frequency amplification in the detector tube itself. And, dear, it worked perfectly charming! This cooking is getting to be more of a problem every day. I think we'll have to get a cook. I was too busy at radio at college to pay much attention to cooking!" All this is inspired by the sight of students at Mt. Holyoke College, Holyoke, Mass., shown above at their radio experiments. While the subject is not a part of the curriculum it has proven so fascinating that the girls are studying it on their own hook. The five girls, left to right, are Emily Miller, Reading, Pa.; Louise Claw, Terryville, Conn.; Janet Evans, Erie, Pa.; Valda Lyons, Bennington, Vt., and Ruth Whitney, Derby, Conn. (Fotograms.)

Officers Ta



THE ARMY'S contribution to the advance of radio is one of the most important in the history of that young science. Here are officers of the Signal Corps being examined for proficiency in receiving dots and dashes. A central phonograph plays a record, the music of which is code, and the officers copy the signals. A set of earphones is at each "desk". (United.)



ENORMOUS VOLUME, enough to fill the New York Hippodrome or the Chicago Coliseum, reproduced without distortion by this induction loudspeaker, most powerful in the world. C. W. Hewlett, of the General Electric Company, maker of this sound giant, is pictured with the speaker. One bad feature of this speaker is that it can not be used as a roulette wheel, said a sportsman who viewed it and noted the similarity. (Wide World.)



FOR THE FIRST TIME election returns were received aboard a train by radio, the set being installed in a coach, and the honor falls to the Twentieth Century Limited, (above), Chicago to New York. "Coolidge wins," the passenger heard the announcer say. And when the train turned curves the station was not tuned out, because of the non-directional antenna used.

Code Test



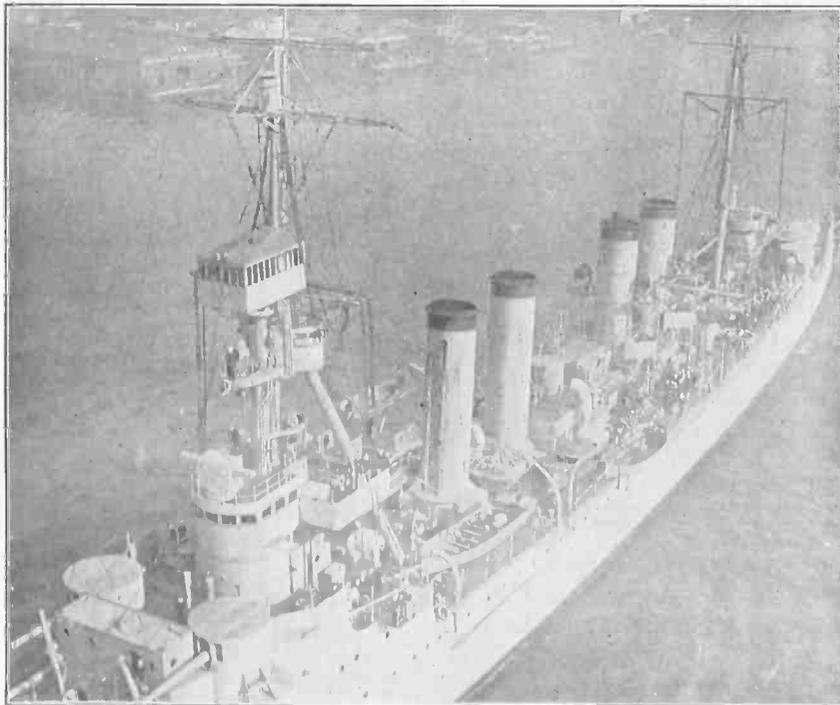
Alumni Cheer Alma Mater



"YEA, BO!"—When an Alma Mater football team needs encouragement, the radio is a friend indeed. Even if the encouragement is not needed it never is superfluous. Here are Ohio State University alumni, residing in New York City, sending good cheers to their Alma Mater in Columbus, through the microphone of station WHN, atop Loew's State Theatre Building, New York City. The cheering was picked up on a speaker at the college. The peppy individual at right, wearing the trick hat, is Ted Lewis, jazz orchestra leader, who is, nevertheless a graduate of the University. (Wide World).



"FUNNY-FACED radio set," some might say, but the natural rejoinder would be, "sour grapes" or maybe "sour milk," for the cabinet, panel and dials were indeed made of sour milk. Louis Abrams is shown with his Grade A product. (Kadel & Herbert).



THE TOWERS and antennae of the U. S. S. Marblehead, latest addition to the Navy and fastest warship afloat, were plainly visible from Brooklyn Bridge when the giant craft steamed down the East River, New York City, at the start of a 20,000-mile test voyage. (Kadel & Herbert.)



"AIN'T WE GOT FUN," says John Robert Nevins, Long Island prize baby, speaking by means of facial expression only, no other means being available yet. However, John's listening propensities are acute and he gets lots of fun from his radio. (Foto Topics).

Programs

Saturday, November 29

(Continued from page 15)

E. Clapp, pianist; Galileo Romanelli, baritone; C. A. Young at the piano. 10:05, Art Cogan and his Club Madrid Orch. 11:05, organ recital by Karl Bonawitz.

WGBS, New York City, 316 (E. S. T.)—10 A. M., talks by Terese. 10:10, program by Eleanor Schorer. 10:50, Augusta Cooper, contralto. 1:30 P. M., Tennesseans Dance Orch. 3, Woman's Club Period. 3:10, Lyra Nicholas, soprano. 3:20, Lucy Stone League Symposium. 3:30, Lyra Nicholas, soprano. 3:40, Pearl Sindelar, Children's Citizenship Hour. 3:50, Lyra Nicholas, soprano. 6, Uncle Geebie. 6:30, York Trio. 6:45, May Singhi Breen, banjo; Peter De Rose, pianist. 7, Trio. 7:15, May Singhi Breen, banjo; Peter De Rose, pianist. 9:30, Sam Comly's Movie Chats. 9:40, Kay Macrae, coloratura soprano. 10, Royal Male Quartet. 10:20, Mark Wornow, violinist. 10:40, Bernard Mann, pianist.

WRC, Washington, 469 (E. S. T.)—7 P. M., children's stories. 7:15, Irving Boernstein's Orch. 8:15, table talk. 8:30, "Musical Appreciation." 9, Caroline McDonnell, mezzo-soprano. 9:15, piano recital by Katherine Cullen. 9:30, to be announced. 9:55, time. 10, special program.

KYW, Chicago, 536 (C. S. T.)—6:30 A. M., calisthenics. 8:30, late news and comment of 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 story. 7, Joska DeBarby's Orch. 7:10, Coon-Sanders Original Nighthawks. 7:20, Joska DeBarby's Orch. 8, musical program. 9:05, Youth's Companion. 9:35, late show. 12, continued.

KDKA, E. Pittsburgh, 326 (E. S. T.)—9:45 A. M., stockman reports. 11:55, time. 12, weather; stockman reports. 1:30 P. M., Daugherty's Orch. 2, Carnegie Tech-Notre Dame football game from Forbes Field. 6:30, dinner concert by the Westinghouse Band. 7:15, Richard the Kidder. 7:30, sport review by James J. Long. 7:45, feature. 8:30, concert by the Westinghouse Band, T. J. Vastine, conductor. 9:55, time, weather.

WJZ, New York City, 455 (E. S. T.)—2 P. M., play by play description of the Army-Navy game by J. Andrew White by direct wire from Baltimore. 7, Waldorf-Astoria Orch. 8, Mrs. Ethel Watts Mumford, "Faery Tales and History of the South Seas." 8:10, Sandu Albu, violinist; Mrs. Nicholasoff, accompanist. 8:25, Myrtle Maughan, soprano; Keith McLeod, accompanist. 8:45, Sandu Albu, violinist. 9:15, Lew Gold's Cameo Orch. 9:45, program arranged by Ed Squires. 10:30, Hotel Astor Orch.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., H. F. West, "Pressure Cookers" Mrs. Kate Gray, "Public Health"; W. P. Heath, "The Nutritive Value of Butter." 3 P. M., "Koffee Klatsch"; special musical features. 8, Williams and his Rainbo Garden Orch.; Herman J. Techtent, baritone; playlet, "Where, But in America," Oscar M. Wolf. 10, Williams and his Rainbo Skylarks; Jerry Sullivan, writer of "Dad," "Whistle"; the Melodians; Laurie, Eddie and Bennie; Sandy Meek, Scotch tenor; Lindsey Coons, baritone.

WOC, Davenport, Ia., 484 (C. S. T.)—10 A. M., opening market. 10:05, household hints. 10:55, time. 11, weather and river forecast. 11:05, market. 11:10, agricultural bulletins. 12, chimes. 12:17 P. M., closing markets. 6:45, sport news and weather. 7, Sandman's Visit by Val McLaughlin. 7:30, discussion of the International Sunday School Lesson by Rev. M. A. Getzen-dancer. 9, orch. program.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., morning gym class. 2:30 P. M., Walter S. Ansbro, baritone. 2:45, violin selections by Harold Cutler, Oliver Simpson at the piano. 3, Walter S. Ansbro, baritone. 3:15, violin. 3:30, Goldfarb and Bluebird orch. 6:15, Krickett's Palais de Dance orch. 7:15, resume of the day's sports by "Jolly Bill" Steinke. 8, Schubert string quartet. 8:30, concert by Cathedral Choral Club. 8:50, "Twenty-five Years Theatre in New York." 9:05, Schubert string quartet. 9:30, Edward E. Davis, "Tackle Talk." 9:45, popular program by Sanchez and Milstead. 10, concert by Choral Club. 10:30, popular program. 10:45, Murray "Pep" Wachsmann's entertainers.

WHN, New York City, 360 (E. S. T.)—5 P. M., Tangaloo ballroom orch. 6:30, Vincent Catanese's Alamac orch. 7:30, Hotel Carlton terrace orch. 8, Arthur Stone, blind pianist. 8:15, joint recital by George Cameron-Emslie, pianist. 8:50, Metropolitan trio. 9, Alfred Dulin, pianist. 9:15, Richard B. Gilbert, songs. 9:30, "What Thanksgiv-ing Means to America," by Geo. N. Sage. 9:45, Fitzpatrick Brothers, melodies. 10, Jimmy Clarke and his entertainers. 10:30, Sam Lannin and his 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, organ, trumpets, R. C. O. band, J. Lawrence Grinnell, director. 9:55, time. 10:02, weather.

Sunday, November 30

WEEL, Boston, 303 (E. S. T.)—3:45 P. M., Sunday Men's Conference, Bedford Branch Y. M. C. A., Brooklyn, N. Y. 7, musical program.

WIP, Philadelphia, 509 (E. S. T.)—10:45 P. M., morning service, broadcast from Holy Trinity Church. 4 P. M., "Sunday Talk" Meeting, under the auspices of the Germantown Y. M. C. A.

WGO, Oakland, Cal., 312 (P. S. T.)—11 A. M., service of the First Congregational Church, Rev. James L. Gordon, D. D., pastor. 3:30 P. M., KGO

Little Symphony Orch. 7:45, service of the First Congregational Church, James L. Gordon, D. D., pastor.

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30 P. M., The Bankers Life Radio Artists; C. A. Lampman, tenor; Westerville, baritone.

WQJ, Chicago, 448 (C. S. T.)—10:30 A. M., Dr. Preston Bradley's sermon. 8 P. M., Williams and his Rainbo Garden Orch.; Maria Dneprova, Russian soprano; Alma Wilson McMahill, soprano; Eleanor Wilson, cello; Ruth Wilson, piano; Faculty of Wilson School of Music; Carl G. Linner, pianist.

KGW, Portland, Ore., 492 (E. S. T.)—6 P. M., church services; "Church of Our Father," Rev. W. J. Eliot, pastor. 7, Colburn Concert Orch.

WBZ, Springfield, Mass., 337 (E. S. T.)—10:55 A. M., church services from the South Congregational Church. Rev. James Gordon Gilkey, pastor. 3:30 P. M., Peoples Symphony orch. 7:30, musical program. 8, "What is Civilization," by Arthur E. Morgan. 9:30, Estey Organ Studio, Mrs. Zula Sanders, organist, and the quartet of the First Congregational Church.

WOO, Philadelphia, 509 (E. S. T.)—2:30 P. M., Sunday afternoon session of Sunday school. 6, sacred recital on Wanamaker grand, Clarence K. Bawden at the console. 7:30, evening services from Bethany Church.

Monday, December 1

WEEL, Boston, 303 (E. S. T.)—6 P. M., Jack Renard and his Mansion Inn Orch. 7, Big Brother Club. 7:30, musicale. 7:50, talk, Stanton H. King. 8, F. L. Huddy, baritone. 8:45, "Buddy's Bostonians." 9:30, Dr. Leo Patterson—Mars and Other Planets. 9:40, Jack O'Brien.

KGO, Oakland, Cal., 312 (P. S. T.)—9 A. M., music and lectures. 10:40, classroom instruction by Oakland schools. 1:30 P. M., N. Y. and S. F. stock reports and weather. 3, Studio musical program. 4, Henry Halstead's Dance Orch. 5:30, Aunt Betty stories. 6:45, stock reports; weather; S. F. produce news; baseball scores; news. 8, educational program. 10, Henry Halstead's Orch. and soloists.

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30 P. M., Emma Weisgerber, on "Care of Teeth"; Hibbard Cleveland, bass. 8, musical program by Dean Holmes Cowper. 11:15, L. Carlos Meier, organist.

WHAZ, Troy, N. Y., 350 (E. S. T.)—9 P. M., Criterion Four; Doris Schaller, soprano; Vida Miller, violinist; Lucia T. Walter, pianist, and Ann Geisler Klose, reader; talks, "Tell 'em About Apples," B. D. Van Buren, and "Furs and Fur Bearers," George B. Roth. 10:30, Rex Brown's Orch.

CKAC, Montreal, 425 (E. S. T.)—1:45 P. M., Mount Royal Hotel concert. 4, weather and stock reports. 4:30, 10 lessons.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., Marcia Meadows, "Interior Decorations"; Mrs. Bertha M. Harris, "A Cake Making Secret"; L. J. Andruss, "The Care of Canaries in the Home."

WFAA, Dallas, Tex., 476 (E. S. T.)—12:30 P. M., address, Dr. J. D. Boon, Southern Methodist University. 8:30, musical recital, J. Abner Sage, director of music.

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

WWJ, Detroit, 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's Dinner" and a special talk. 9:45, health bulletins and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market. 8:30, News Orch.; F. Eugene Wilson, baritone.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, Springfield market. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, "Bringing the World to America," by Our World; news from the N. I. C. Board. 7:30, lesson in modern literature, Robert Emmons Rogers, professor. 8, program by Charles Wagner. 8:40, concert by George Post. 8:50, soprano, Vera K. Ferris. 9, concert by Aleppo Drum Corps. 9:30, Westinghouse Philharmonic trio, and Mrs. Irene Rommel, pianist. 9:55, time, weather. 10:01, continuation of program. 11:30, McEnelly's singing 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, organ and trumpets. 7:30, sports results and police reports; A. Candelori and his orch. 8:30, Dr. F. T. Hess, Civil War drummer boy; P. R. C. A. D. Glee Club, Henricque Kennedy, Jr., director; Wm. K. Sherwin, violinist; W. G. Sherwin, accompanist; W. R. Evans, tenor; Ida Kathryn Cash, soprano; W. E. Kelly, pianist; Hawaiian orch., Jos. W. Kidd, director. 9:25, Fox Theatre orch. 9:55, time. 10:02, weather. 10:03, organ, Mary E. Vogt. 10:30, dance program by Vincent Rizzo orch.

WMAQ, Chicago, 447.5 (C. S. T.)—4 P. M., Mothers in Council. 4:30, one of the series of talks on English. 6, organ recital. 6:30, Hotel LaSalle orch.

Tuesday, December 2

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, musicale. 8, Miss Ruth Eastman, soprano. 8:30, C. L. Lyons. 9, program from New York. 10, musicale.

KGO, Oakland, Cal., 312 (P. S. T.)—10:40 A. M., classroom instruction by Oakland schools. 1:30 P. M., N. Y. and S. F. stock reports and weather. 4, Orch. of the Hotel St. Francis, Vinton La Ferrara conducting. 6:45, stock reports, weather, S. F. produce news, baseball scores and news. 8, four-act comedy, "Merely Mary Ann," by Israel Zangwill. 10, Henry Halstead's Orch.

CKAC, Montreal, 425 (E. S. T.)—4 P. M., weather and stock reports. 7, kiddies' stories. 7:30, Rex Battle and his orch. 8:30, French Canadian Folklore. 10:30, Joseph C. Smith and his Mount Royal Hotel Dance Orch.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., Miss Edith Houston, "Our Language," Agnes M. Olson "Replacing Chance with Certainty in Cooking," Anna E. Boller, Rush Medical College, "A Talk On Diet." 3 P. M., Miss Cora Beeman, "Winter Squash Dishes." Mrs. Lee Mida, "Women's Golf." 7, Williams and his Rainbo Garden Orch. Excelsior Quartette, A. Snavey, First Tenor; Rudolph Meyer, Second Tenor; L. J. Booth, Baritone; David Middleton, Bass; Dorothy Davie Wilk, Soprano. 10, Williams and his Rainbo Skylarks—James Mitchel, Baritone; Merrie Boyd Mitchell, Soprano; Carl G. Linner, Pianist; Harry Geise and his "How-Do-You-Do" Song; Nubs Allen, Contralto; Viola Graff, Soprano; Rogers Boys, Larry and Billy; Will Rossiter.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., Musical recital by the Red Head Girl. 8:30, The Culom Sisters, Kinkel Banjo Quintet. 11, Organ recital and varied acts from the Palace Theatre.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., Calisthenics. 9:30, "Tonight's dinner" and a special talk. 9:45, Fred Shaw, pianist and popular songster. 10:25, weather. 11:55, time. 3:50 P. M., market. 8:30, Clyde Nichols.

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

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, Springfield market. 6 P. M., Leo Reisman ensemble. 6:30, Copley-Plaza orch. 7, market report. 7:05, bedtime story. 7:15, world market survey. 7:30, Leo Reisman and his orch. 8:15, ballet music from Don Quixote ballet. 9:30, Taylor trio. 9:55, time, weather.

WMAQ, Chicago, 447.5 (C. S. T.)—12 M., Illinois Manufacturers' association program. 4 P. M., American Red Cross home nursing talk by Estelle Weltman. 4:30, musical program. 6, theatre organ. 6:30, Hotel LaSalle orch. 8, Harry Hansen, literary editor. 8:20, Broadcasting orch.

Wednesday, December 3

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, cooking class. 7:10, Big Brother Club. 7:30, musicale. 8, Lynn night. 9, Madame Galbraith, contralto. 9:30, musicale. 10, musicale. 11, Dok-Eisenbourg and his Sinfonians. 11:30, midnight organ recital, Lloyd Del Castillo at the Console.

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30 P. M., The Bankers Life Radio Orch., W. L. Marsh, director. Dancing instructions, prepared by Arthur Murray. Myrtle Williams, soprano, accompanied by Helen Birmingham.

CKAC, Montreal, 425 (E. S. T.)—12:30 A. M., Frolics. 1:45 P. M., Mount Royal Hotel concert. 4, weather and stock reports.

WQJ, Chicago, 448 (E. S. T.)—7 P. M., Williams and his Rainbo Garden Orch.; Lancaster Smith, bass; Mrs. Lancaster Smith, accompanist; Maxine Mordy, violinist; Sheppard Levine, tenor. 10, Williams and his Rainbo Skylarks: Fred Jacobson, monologues; Sandy Meek, Scotch tenor; the Melodians, Laurie, Eddie and Bennie; Clarence Theders, tenor; Rita McFawn, soprano.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., Mrs. Wilbur E. Fribley, "Budgets for the Housewife." Leona A. Krag, "Parliamentary Law." Dr. I. S. Abel, "Does the Rubber Corset Do All That is Claimed for It?" 3 P. M., "Timely Vegetables for Cold Weather Menus." Martha Logan, "Planning the Menu."

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., Address, Charles E. Osborne.

KOW, Portland, Ore., 492 (E. S. T.)—11:30 A. M., weather. 12:30 P. M., Bill Darby's orch. 5, children's program. 7:15, markets, weather, news bulletins, and police reports. 8, concert. 10, George Olsen's orch.

WWJ, Detroit 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's dinner" and a special talk. 9:45, bulletins and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 9:30, News Orch. Templeton Moore, tenor.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, Springfield market. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, Civil Service examinations. 7:30, Westinghouse Philharmonic trio, Louis H. Stocking, baritone; Mrs. Charles B. Toleman, soprano; Mrs. Helen L. Fowler, accompanist. 8:30, talk on "Starlore." 9, Mrs. Hazel Brook, coloratura soprano; Ruth Masters, cellist; Mildred Tenney, piano. 9:55, time, weather. 11, Leo Reisman and his orch. 11:30, popular songs. 11:45, Leo Reisman and his orch.

WMAQ, Chicago, 447.5 (C. S. T.)—1 P. M., speeches from Association of Commerce. 4, beauty talk by Mme. Grace Earl. 4:30, Cosmopolitan School of Music. 6, theatre organ. 6:30, stories for the children by Georgene Faulkner. 8, weekly lecture from Northwestern University. 8:30, musical program. 9, WMAQ "play-night." 9:45, talk from one of Chicago charities.

Thursday, December 4

WEEL, Boston, 303 (E. S. T.)—6 P. M., Jack Renard and his Mansion Inn Orch. 7, Big Brother Club. 8:12, musicale.

CKAC, Montreal, 425 (E. S. T.)—4 P. M., weather and stock reports. 8:30, Canadian National Railways.

WQJ, Chicago, 448 (E. S. T.)—11 A. M., Miss Erna Bertrams, "Come to Tea Informally"; Miss Eleanor Chalmers, "The Foundation for the Smartly Dressed Woman"; Walter Murray, "In-

(Continued on next page)

terior Decorating." 3 P. M., Cora Beeman, "Eat for Heat and Energy"; Charles T. Wolf, "Shoes"; W. B. Peterson, "The Care and Use of Aluminum Cooking Utensils." 7, Williams and his Rainbo Garden Orchs.; Manual Rodriguez, tenor; Mrs. Lydia Lochner, contralto; Marion Henry, accompanist; Kathryn Snyder, reader. 10, Williams and his Rainbo Skylarks: Axel Christensen, pianologues; Grace Wilson, contralto; Hill Hirsch and Gorny, harmony singers; Edna Solomon, contralto; Rosemary Hughes, soprano; Will Rossiter.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, De Witt McMurray, editor, The Semi-Weekly Farm News. 8:30, Midnight Melody Men Orch. 11, Adolphus Hotel Orch.

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

WWJ, Detroit, 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's inner" and a special talk. 9:45, health bulletin and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, market reports. 8:30, News Orch.: Graeme Gillies, bass; Mrs. Claudine Secor, soprano. 10, Jean Goldkett's Victor Recording Orch. 11, News Orch.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, market report. 6 P. M., Schrafft ensemble. 6:30, Leo Reisman ensemble. 7, market report. 7:05, bedtime story. 7:15, letter from the Homestead; "At the Theatres" with A. L. S. Wood. 7:45, Charles R. Hector with his orch. 8:15, concert by DeLancey Cleveland. 9:15, concert by the Senior Choir. 9:55, time, weather. 10:01, program continued.

WMAQ, Chicago, 445.5 (C. S. T.)—4 P. M., household hour, direction of Mrs. Elizabeth Hiller. 4:30, Federation of Women's Clubs. 6, organ recital. 6:30, Hotel La Salle orch. 8, Western railway convention. 8:15, Clara E. Laughlin. 8:30, Rockwell Stephens, auto editor. 9, lecture from University of Chicago. 9:15, program under Chicago Association of Credit Men.

Friday, December 5

WEEL, Boston, 303 (E. S. T.)—6:30 P. M., Dok-Eisenbourg and his Sinfonians. 7, Big Brother Club. 7:30, musicale. 8, Priscilla Quartet. 9, program from New York. 10, musicale.

WHO, Des Moines, Ia., 526 (C. S. T.)—7:30 P. M., "The Novelty Entertainers": Mrs. F. B. Simpson, soprano; Master Fox and Margaret Simpson, four-hand piano selections.

CKAC, Montreal, 425 (E. S. T.)—1:45 P. M., classical concert. 4, weather and stock reports. 4:30, 10 lessons.

WQJ, Chicago, 448 (E. S. T.)—11 A. M., Fred Mann and his Sunday Dinner Menu. 3 P. M., Dorothy McLain Dicken, "Home for the Holidays"; Mrs. Harry T. Sanger, "Travelogue"; Miss Sarah Place, Infant Welfare Society. 7, Williams and his Rainbo Garden Orchs.: Dorothe Schubert, soprano; Ingram Cleveland, violinist; George Chovance, tenor; Carl G. Linner, pianist; 10, Williams and his Rainbo Skylarks; Verdi Trio, mandolin, guitar and accordion; Nubs Allen, contralto; Monogram Trio; Rogers Boys, Larry and Billy.

KGW, Portland, Ore., 492 (C. S. T.)—11:30 A. M., weather. 12:30 P. M., Original Serenaders. 5, children's program. 7:15, markets, weather, news and police reports. 8, lecture by University of Oregon. 10:30, Hoot Owls.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Robert Stewart Hyer. 8:30, musical recital: Mrs. J. Roscoe Golden, contralto.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's Dinner," and a special talk. 9:45, health bulletin and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:30, weather. 3:55, market reports. 8:30, News Orch.; Anne Campbell, News poet; Albion College program.

WMAQ, Chicago, 445.5 (C. S. T.)—2 P. M., broadcasting football game from Stagg field. 6, St. John's military academy. 8, Hotel LaSalle orch. 8:40, "Guam," by James Abbott. 9, theatre revue.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather, Springfield market. 6 P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, current book review. 7:30, lesson of a course in "Musical Appreciation." 9:55, time, weather. 10, to be announced. 11, Westinghouse Philharmonic trio. 11:30, McEnelly's singing orch.

Saturday, December 6

CKAC, Montreal, 425 (E. S. T.)—7 P. M., kiddies' stories. 7:30, Rex Battle and his Mount Royal Hotel ensemble. 8:30, "Black Cat Night." 10:30, Joseph C. Smith and his danche orch.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30 P. M., address, Dr. Ellis W. Shuler, geologist. 8:30, Dr. Richard Mandell, tenor. 11, Adolphus Hotel Orch.

KGW, Portland, Ore., 492 (E. S. T.)—11:30 A. M., weather. 10 P. M., George Olsen's Orch.; weather and news bulletins.

WWJ, Detroit, 517 (C. S. T.)—8 A. M., calisthenics. 9:30, "Tonight's Dinner" and a special talk. 9:45, health bulletin and talks of general interest. 10:25, weather. 11:55, time. 3 P. M., News Orch. 3:50, weather. 3:55, markets.

WMAQ, Chicago, 447.5 (C. S. T.)—12 M., Y. M. C. A. forum. 4 P. M., one of a series of talks on English. 4:30, pupils of Bush conservatory. 6, organ recital. 6:30, Hotel LaSalle orch. 8, weekly Wide Awake Club, Mrs. Frances Ford. 8:30, musical geography. Mr. and Mrs. Marx E. Oberdorfer. 9, musical program.

WBZ, Springfield, Mass., 337 (E. S. T.)—11:55 A. M., time, weather. 6 P. M., Leo Reisman ensemble. 6:30, Copley-Plaza orch. 7, market report. 7:05, bedtime story. 7:30, Hotel Kimball trio. 8, program by Mme. Duchesne, Helen Norwood,

soprano, and Charles Kallmann, baritone. 9, members of the Durant, Inc., Women's Health and Recreation Organization. 9:55, time, weather. 10, concert by Mme. Eugenie Tessier Sirois (the blind prima donna), Irene Bourke, Mrs. Josephine Froulx Sizer, Mrs. Albertine Gagnou Jean, soprano; Ernestine Alexandre, pianist; Bernadette Bourbonnaia, accompanist. 11:30, Leo Reisman and his orch.

Sunday, December 7

WEEL, Boston, 303 (E. S. T.)—3:45 P. M., Men's conference in Bedford Branch, Y. M. C. A. 7:20, program from New York.

CKAC, Montreal, 425 (E. S. T.)—4:30 P. M., Christie and his Italian Band.

WFAA, Dallas, Tex., 476 (C. S. T.)—6 P. M., Radio Bible Class, Dr. William M. Anderson, pastor. 7:30, service at First Baptist Church, Dr. George W. Truett, pastor. 9, Choristers from East Dallas Christian Church. 9:30, Ray Jones and his Heavenly Seven Orch.

WWJ, Detroit, 517 (C. S. T.)—11 A. M., services at St. Paul's Episcopal Cathedral. 2 P. M., News Orch.

Monday, December 8

CKAC, Montreal, 425 (E. S. T.)—1:45 P. M., concert orch. 4, weather and stock reports. 4:30, 10 lessons.

WHAZ, Troy, N. Y., 380 (E. S. T.)—9 P. M., Elks Night. 12, Campus Serenaders, Rensselaer Polytechnic Institute orch.

Civil Service

THE United States Civil Service Commission announces the following open competitive examination:

JUNIOR PHYSICIST

An examination for junior physicist will be held throughout the country on January 7, 1925. It is to fill vacancies in the Bureau of Standards, at an entrance salary of \$1,860 a year. Advancement in pay may be made without charge in assignment up to \$2,400 a year. Examination will be given in the following optional subjects: Electricity, heat, mechanics, optics, physical metallurgy and radio. Applicants must have been graduated with a degree from a college of recognized standing with the completion of at least 118 semester hour credits, such course to have included as a minimum mathematics through elementary differential equations and at least 18 semester hours of physics, or be senior students in such an institution and furnish proof of actual graduation within three months from the date of examination. Competitors will be rated on general physics, mathematics through calculus, practical questions on each optional subject chosen, and education, training and experience.

Full information and application blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or the secretary of the Board of U. S. Civil Service Examiners, Post Office or Custom House in any city.

FARM CONFERENCE SET ON DEC. 4 WASHINGTON.

THE maximum benefit from radio for the farmers is the object of a conference which has been called by the Department of Agriculture to meet in Chicago on December 4 to consist of representatives of agricultural colleges, state departments of agriculture, state bureaus of markets, farm organizations, farm papers, and broadcasting stations which emphasize the dissemination of agricultural material.

New Corporations

Borlin Co., Manhattan, make radio apparatus, \$10,000; H. W. and A. B. Linch, A. Borras. (Attorneys, Berger & Hartmann, 217 Broadway.)

Teitler—Nemard Realty Co., Inc., \$406.15. Sta Brito Electric Corp. and Max T. Krumko (Freeport Electric Radio Co.)—P. W. Reynolds, \$597.00.

Arco Radio Corp., Brooklyn, \$5,000; J. E. and I. Ginsburg, O. C. Palmieri. (Attorney, H. Shapiro, 100 Joralemon St., Brooklyn.)

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.

BRAINARD FOOTE, noted radio authority, describes his favorite receiver in Radio World, issue of Oct. 18. One stage of impedance RF, one transformer RF stage, crystal detector and two audio stages. Four tubes. Great quality set. Send 15 cents for copy of issue or start subscription with that number. Radio World, 1493 Broadway, N. Y.



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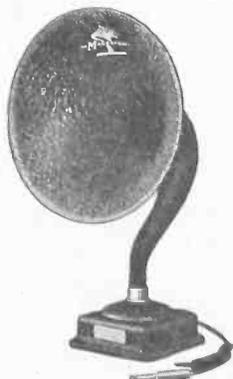
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RADIO WORLD

The Reg. U.S. Pat. Off.

TELEPHONE LACKAWANNA 6976, 2063
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(Dated Saturday of same week)

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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 29, 1924

The Pointed Program

8 P. M.—Radio waves don't care where they go, so you may as well get your share. 8:25—If the set is hooked up wrong, soft tubes are hard to get working right. 8:30—Sets that are the most successful performers are silent on Tuesday, Thursday, Friday and Sunday afternoon; mats. Mon., Wed. & Sat. 8:45—Nobody ever built a good set who didn't secretly imagine that he invented a good part of the circuit himself. 9:00—If you confine your bootleg buying to tubes alone you won't be doing so bad, but if you carry it any farther, better tune in some Sunday morning on church services, if you can't attend in person. 9:15—Many a good cook and bottle washer has wasted his time trying to make a set work without the formality of connecting the B battery. 9:20—Evidence is accumulating that simple crystal sets cut through powerful locals, but that kind of evidence is like dust; it just keeps on accumulating until somebody takes the trouble to clean it out. 9:45—It's a shame the way some persons waste good connecting wire and lugs on 8-tube sets they don't know how to build. 10:00—(By courtesy of Burntbean Coffee Company, at \$10 per minute for courtesy, showing it's more economical to be just curt). Sugar sediment in your coffee cup may be used instead of collodion to keep soil windings together.

Man-Made "Static"



A FAN (not shown) experiences some all-directional interference from an inquisitive boarder.

Education via Radio

EDUCATORS are watching the effects of broadcast reception in the schools of Oakland, Calif.

One expert teacher stands before the microphone at station KGO and instructs pupils in classrooms. This is but a beginning. Dr. V. E. Dickson, deputy superintendent of Oakland schools and originator of the idea, is to be congratulated on his foresight, for radio is destined to become the greatest factor for education that the world has ever known.

Columbia University, New York University, as well as many other educational institutions in the United States, are aroused to the fact that education via the microphone proclaims the advent of a new era in education. Higher education by radio for all who desire it is a possibility of the near future.

Join the A. B. C. S-U-P-E-R-D-Y-N-E Specialists

A. B. C. stands for the American Broadcast Club. Join it today. It involves no dues or payment of any kind, and no obligations. It was founded by RADIO WORLD simply to unite the broadcast listeners and radio fans in general in a common bond to promote their welfare as occasion requires. Send your name and address to A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

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- Paul A. Meunier, 2801 Colburn Ave., Cleveland, Ohio.
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- SUPERDYNE KITS. Kits consisting of two Flewelling Condensers and complete set of coils (with diagram). SPECIAL PRICE FOR THE MONTH OF NOVEMBER. COMPLETE PARTS FOR SUPERDYNE. Easily recognized as the products of leading manufacturers, assembled on engraved Radlon front panel, and base panel with necessary bus bar ready to wire (technical and schematic diagram furnished). Schematic diagram drawn to actual size in minutest detail showing wiring above and below base panel. Using this diagram you can build a set equal to the best expert, particularly as to appearance and results. Contrary to usual practice, all parts included in this kit are the very best quality on the market, and workmanship first class. **\$18.00**
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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.

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(Continued in next column)

General Electric

Paid Income Tax

of \$6,313,129

THE corporation income tax records of Up-State New York show that the General Electric Co., of Schenectady, paid \$6,313,129, the largest payment in the district and one of the largest in the country.

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EXPORTS AT \$567,434 FOR SEPTEMBER, NEW HIGH MARK

WASHINGTON.

EXPORTS of radio apparatus from the United States during September reached a new high level for the year, the total being \$567,434, which is more than twice the total for September, 1923, and about \$26,000 above the figure for August.

During September, Canada was the largest purchaser, with a total of \$204,320. Other countries purchasing large amounts of radio apparatus during September were: Australia, \$196,585; Chile, \$20,555; Brazil, \$20,187; Argentina, \$19,660; Mexico, \$19,013; England, \$13,247; and Sweden, \$10,479.

FIL-KO-STAT 70% METALLIC NOT A CARBON POWDER RHEOSTAT

FIL-KO-STAT is a variable resistance that is very finely controlled rheostat. Its resistance element is more than 70% metallic substance, hence it is not a carbon powder rheostat. The principle it employs is superior to that used in carbon powder and carbon disc rheostats.

(Tested and approved by RADIO WORLD)

THE Chicago Radio Show opened at the Coliseum with a record-breaking attendance. The one desire was to make this show bigger than either of the New York shows. About 230 manufacturers of international repute had booths that were beautifully decorated, but the decorations did not out-shine the many fine radio instruments displayed. There are also displays from foreign countries. Italy, Japan, France and Germany were especially well represented.

The Amateur Builders contest has far surpassed all former competitions of the kind. Twenty-five cash awards will be given for sets selected by the judges.

Stations WLS, WGN, WMAQ and KYW broadcast special programs from 2 to 11 P. M. daily. The station extensions were located on the balcony.

Chicago's most popular radio entertainers appeared in person and popular receptions were held in their honor.

STANDARDS BUREAU CANCELS TESTS FOR MANUFACTURERS.

WASHINGTON.

BECAUSE of limited facilities the Bureau of Standards has been compelled to announce that in the future it cannot respond to requests from radio concerns and individuals for the testing of radio apparatus and material, when such service is intended for use in advertising or sales promotion.

Coming Events

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

DEC. 1-7—Newark Radio Fair.

DEC. 1 TO 4, INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum, \$1.00

YOUNG MAN, married, wants position with reliable radio concern; 7 years' electrical experience, 3 years telephone work. E. Lauer, 140 Milford St., Brooklyn.

BATTERIES recharged, repaired, rented. Van's Battery Station, 2,082 Amsterdam (163rd), N. Y. C. Washington Heights 1399.

AETNA FINANCE CO., 40 WEST 33RD, N. Y. C. Manufacturers, jobbers financed; new plan; advances on accounts, merchandise. CASH, IMMEDIATE CASH.

GOING CONCERN MARKETING A WONDERFUL radio product; sells on sight; several thousand sold; require \$10,000 to fill orders; call in person; don't write. E. S. Aker, Grand Hotel, Broadway and 31st St., N. Y. C.

RADIO ROYALTY AGREEMENT FOR SALE; article in large production; advertising and distribution national in scope; asking price \$30,000; wonderful bargain. Box IX, Radio World.

EXCLUSIVE DISTRIBUTORS FOR RADIO loudspeaker, cabinet form. Box IIX, Radio World.



HARP TUBES

\$1.50

6 Volt, 1/4 Amp. Detector
Regular price \$3.75
Every tube guaranteed
new and perfect.

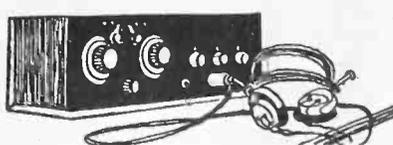
6 V. AMPLIFIER \$1.75

Royal Mfg. Co.

206 BROADWAY

Dept. 3, cor. Fulton St., N. Y.

Getting the Signal Across



**The
RADIO PRIMER**
*Information and Instruction
for the Beginner*

THE observing radio novice often questions as to how a received signal can get across the gap between a primary and secondary coil. The fact that the result is an increased power, in the case of the radio and audio-frequency transformer, makes the principle involved still more puzzling.

Whether it be a tuning primary and secondary or transformer primary and secondary, the action is the same. The action is known as magnetic induction.

Let's consider the action, rather than the theory.

The aerial and ground absorb signals in the ether. However, all of these impulses are not heard because the aerial and ground (primary) are tuned so that signals having a wave length of the tuned primary are the only ones heard. A good analogy would be a stone sieve, having a certain size mesh. When the sieve is shaken, only stones of a certain size will pass through it.

Now that we have the signal in the tuned primary, let's get down to the subject and find out how it gets to the secondary.

In the primary circuit that is tuned, say, to approximately 360 meters, there are also signals having a wavelength of 345 to 375 meters passing through the coil.

Now, the signals will not get over to the secondary coil unless the secondary is tuned to the same signal as the primary, or approximately the same as the primary. The ability of the secondary to tune close to the desired wavelength is known as "sharp tuning," which, in turn, greatly aids selectivity.

A field is set up by the primary coil when a signal is passing through it. A field is also set up in the secondary coil. To make the principle easily comprehensible, we may say that when the two fields are tuned to the same wave, the primary induces the sec-

ondary. However if the secondary is not tuned exactly to the incoming wave the result is a loss of sensitivity and signal strength, for the set is now tuned to another wave.

The nearer the set is tuned to the exact

ACME 4-Tube REFLEX

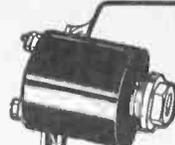
We will build this set for you, using a genuine ACME KIT-SET assembled and wired in a beautiful mahogany cabinet, ready to operate, with loop.

\$65.00

3 Days' Trial—Refund if Not Satisfactory

GABE RADIO CO.
1261 BROADWAY NEW YORK CITY
Mail Orders Given Prompt Attention

wave, the greater will be the signal strength as well as the selectivity.



TRI-JACK
90¢

A combination 3 in 1 jack that can be used as single open, single closed or double closed jack.

BROOKLYN METAL STAMPING CO.
115 Atlantic Avenue - Brooklyn, N.Y.

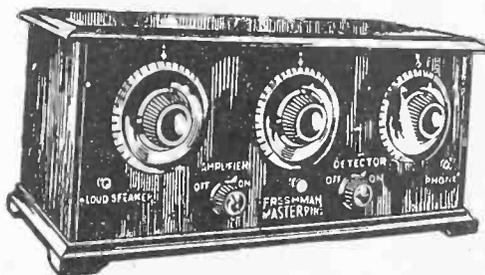
WINDING A LOOP ON A PHONOGRAPH RECORD, by Herbert E. Hayden, Sept. 13 issue. Radio World, 15 cents.

SEND FOR FREE CATALOG of Radio, Electrical and other technical books. The Columbia Print, 1493 Broadway, N. Y.

FRESHMAN MASTERPIECE YOU CAN USE DRY BATTERY TUBES

equally as well as storage battery tubes because the FRESHMAN MASTERPIECE is balanced within itself and **Does Not Require Neutralizing or Balancing Condensers**

We have made the great discovery that U. V. 199 and other dry battery tubes give practically the same marvelous results as are obtained with storage battery tubes.



No Distortion—No Squealing
Real enjoyable radio with plenty of volume and great distance.

The Greatest Value Ever Offered



A 5-tube tuned radio frequency set, costing only *sixty dollars*,

that is the equal, if not the superior, to any 5-tube set in existence, regardless of price. Not only the simplest set in the world to operate, but so selective that stations once logged can be brought in night after night at the same dial settings.

All genuine Freshman Masterpiece Sets have a serial number and trademark riveted on the sub-panel. The Receiver is not guaranteed if number has been removed or tampered with.

CHAS. FRESHMAN CO., INC., 106 Seventh Ave., New York

HENLEY'S WORKABLE RADIO RECEIVERS



An Authoritative 240-Page Book on Practical Receiving Sets of Modern Design with Complete and Explicit Directions for Building Them. Written and Edited by a Staff of Radio Engineers of Practical Experience and Best Theoretical Training.

Price \$1.00

150 Diagrams and Illustrations Specially made for this book.

THIS new book contains complete and detailed descriptions of many types of receivers which, by long experience, have proved to be the most satisfactory from the viewpoints of selectivity, sensitivity, convenience and economy of operation, dependability, and signal quality. It gives in great detail, circuit and wiring diagrams, panel and baseboard layouts, and drilling templates, so that any amateur may build a successful receiver from the directions given.

It also includes a discussion on the principles underlying each circuit, and shows clearly how to test and calibrate the receivers.

In order to help the Workable Radio Set builder, who may not be familiar with the conventional symbols used, in hooking up a set, each of the receiving sets is illustrated by a complete full page diagrammatic drawing, showing just where to attach the wires, location of condensers, rheostats, transformers, vacuum tubes, plugs, jacks, etc.

Sent FREE if, as a new Radio World subscriber, you send this clipping and \$6.

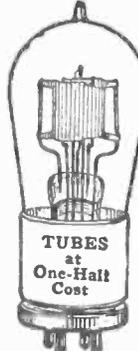
THE COLUMBIA PRINT
1493 BROADWAY NEW YORK CITY

A ONE-TUBE SET YOU CAN LOG, cost of construction \$25. Two honeycomb coils and two condensers used. Full data in RADIO WORLD, issue of July 12. Send 15c for a copy.

Wiring Anderson's Circuit

(Continued from page 14)

places where that might be placed. One is between the transformers and the rheostats, another is under the second condenser and to the left of T1, a third place is between the detector and the condenser, and a fourth is between the two condensers. One side of the battery is connected to the ground, and this is always convenient. The other side is connected to the low sides of the two



Save 1/2 Cost of New Tube

Guaranteed Vacuum Tube Repairs at Popular Prices

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Parts Needed for Superdyne

- One low-loss tuner with tickler.
- One low-loss tuner without tickler, for interstage coupling.
- Two low-loss condensers, maximum capacity 500 micromicrofarads (normally 23 plates).
- One grid condenser, .00025 mfd., mica, with clips for grid leak.
- One grid leak, 2 megohms.
- One by-pass condenser, .001 mfd., mica.
- Two 10 to 20 ohm rheostats.
- Two double-circuit jacks and one single-circuit jack.
- Two audio-frequency transformers.
- One grid biasing battery, 4.5 to 6 volts.
- Four standard tube sockets and four 201A or 301A tubes.
- Six binding posts.
- One 7x24 in. panel, with baseboard and cabinet to match.
- One sub panel for binding posts, 6x1.5 in.
- Three 3 in. or 4 in. dials.
- Two 2 in. dials.
- Bus wire, solder, 100 feet of aerial wire, 50 feet No. 14 insulated lead-in wire, phones, loudspeaker, 90 volts B battery, storage A battery, screws, hardware.

audio-frequency transformers. The lead connecting the battery to the transformers will be at low A. C. potential, and no bad effects will result if it is several inches long.

The binding posts of the receiver should be placed on a sub-panel on the back wall of the cabinet, as this will remove unsightly wires and batteries from the front. The arrangement of the binding posts should be B2, B1, A, (—), GND, and ANT, reading left to right from the rear of the set. As a matter of convenience in case it is desired to remove the circuit from the cabinet it is well also to have a corresponding terminal strip on the baseboard back of the sockets and coils. Connections may be made between the two terminal strips by means of flexible connectors supplied with copper lugs at the ends. Removal of the circuit

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from the cabinet may then be done without recourse to a soldering iron.

As much of the wiring and soldering of the set as possible should be done before the

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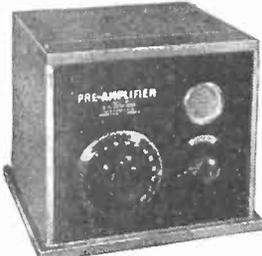
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4-Tube Superdyne Connections

panel has been attached permanently to the baseboard, because then the various terminals are more accessible with soldering iron or screwdriver. On the panel will be

the two tuning condensers, the three jacks, and the two rheostats, together with optional shields. About the only wiring that may be done on the panel is running a short lead from one rheostat to the other, using corresponding binding posts, connecting the positive springs on jacks J2 and J3, and connecting all the shields together, and possibly connecting the rotor of condenser C1 to the shields, but not that of C3.

all joints, then mount the panel on the baseboard, and proceed with the wiring.

The remaining connections to be made are the two variable condensers to the secondaries of the coils, the plates of the three
(Concluded on next page)

For Maximum Amplification Without Distortion and Tube Noises
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On the baseboard first run a straight bus-bar from the minus side of filament of the last tube to that of the first. To this bus-bar connect the negative filament terminals of the two remaining tubes, the positive terminal of the grid battery, the (-) post on the terminal strip, the GND post on the strip, and the tap on the first tuning coil unit, in each case using the shortest and most direct lead, and soldering well. Also if convenient connect one side of C2 to the same bus-bar. Then connect by means of short pieces of bus-bar wire the positive terminals of the first and the second tubes, and of the third and fourth tubes. Then connect the two F terminals of the transformers and run lead to negative side of the grid battery, and connect the G terminals of the transformers to the proper grid binding posts on the sockets. Then run a flexible lead from the plate of the first tube to the tickler and another from the tickler to the first terminal of the second tuning unit. Connect the second terminal of this unit to the B1 post on the terminal strip, the third to the positive filament bus-bar, the fourth to the grid condenser and grid leak, using bus-bar wire. Connect the other side of the grid condenser to the grid of the second tube.

The ANT binding post on the terminal strip is connected to the first terminal of the first tuning unit. If wound and mounted as suggested, this should be nearest the baseboard. The top terminal of the first tuning unit goes to the grid of the first tube. Solder



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The names of those sending the solution will be published.

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Anderson's Superdyne for DX

(Concluded from preceding page)

last tubes to the jacks, the jacks to the audio transformers, the jacks to the proper plate battery terminal on the binding post strip, the A post to the common lead on the rheostats, and the unused terminals on the rheostats to the proper bus-bar in the filament circuit.

Inspect the wiring carefully to see that no leads have been omitted and that no unsoldered joints remain. Then test circuit with a buzzer to make sure that all joints are good, and that there are no open circuits where they should be closed. The set is then placed in the cabinet and the connectors suggested above put in place. The set is then ready to be tested on signals.

Getting Reverse Feedback

Connect up the batteries, the antenna and ground. Then plug in the headset in jack J1 and tune in. Set the tickler at maximum, that is, so that if connected up correctly it will be most effective in damping out oscillations in the first tube. If the carrier whistle is heard as the condensers are turned it indicates that the tickler is causing regeneration, and the tickler leads should be reversed. When the tickler is connected correctly it should be effective in stopping oscillations. With the tickler set at maximum, set the second condenser on about 10 degrees and then turn the dial of the first from zero up. If a signal is heard retune C3 until the signal is loudest and then finish tuning with C1. Increase strength by turning tickler down until near oscillation. Signals of other wavelengths may be picked up in the same way by setting C3 at higher values to begin with. After a few stations have been tuned in it is easy to estimate where on the two dials intermediate stations should come in, and this will simplify the tuning-in process. For future reference in tuning in, the settings should be recorded for a given position of the tickler, preferably one for which the circuit will not oscillate for any of the wavelengths within the tuning range of the receiver.

This receiver is capable of reaching out great distances and it is very selective as well as sensitive. Whatever signals can be heard on the head set on the detector alone will be strong enough to operate a loud speaker from jack J3.

[This concludes the article on the 4-tube DX Superdyne. Part I was published in the November 22 issue.]

International Radio Week Begins

INTERNATIONAL Radio Week, which ends Sunday, began very auspiciously as this edition of RADIO WORLD went to press, with interest centered on the international broadcasting tests. The lure of hearing Swiss, Dutch, German and French stations in the United States, by virtue of rebroadcasting from England, proved strong indeed.

International Radio Week is the outgrowth of the National Radio Week suggested by RADIO WORLD and which on two successive occasions proved its value so successfully that the international idea was introduced. Moreover the rapid strides of radio meanwhile had made this development inevitable.

Details of International Radio Week happenings will be published in the next issue of RADIO WORLD.

CANADIAN STATIONS

(Concluded from page 13)

Call	Owner and Location	Meters
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The Radio Cross-Word Puzzle

A RADIO cross-word puzzle is published on the front cover of this issue. Each word or letter of the horizontal group interlocks with the vertical group. As you determine what word is correct, remember that the sentence given must be correct from a radio viewpoint as well as being correct according to the puzzle.

Each space represents a letter. The word is terminated by a black space. If you get all of the words in horizontally you may prove your result by checking vertically, and vice versa. If a space or spaces block your progress, go ahead to the next set, as you will usually be able to check up when you work the puzzle in the opposite direction. Fill in the blank words in the following sentences, where the key is given that way, and in the other instances follow the directional hints.

A number always begins a word, and is terminated only by a black space, or the end of the box. This is true both for solving horizontally or vertically. All the words in this case are radio terms. If you cannot get the correct term by horizontal computation, solve another word vertically. All words solved will fit into the accompanying sentence, and complete it, making it technically correct. The numerical rotation is from left to right. The missing numbers can thus be easily supplied. These numbers are omitted only in instances where they do not start a word horizontally.

Send your solution to Radio Cross-Word Puzzle Editor, Radio World, 1493 Broadway, New York City. The names of those sending the correct solution will be published. Refer to Radio Cross-Word Puzzle No. 1.

The key to the solution follows:

HORIZONTAL

- 1—Radio operates on an.....magnetic principle.
- 8—Indoor reception requires a.....
- 12—The abbreviation for electromotive force.
- 15—The fifth letter of the alphabet.
- 16—The abbreviation for anode.
- 17—The 15th letter of the alphabet.
- 18—The abbreviation for centigrade.
- 19—The same as 15.
- 20—The symbol for resistance.
- 21—The abbreviation for current.
- 22—The first letter in the abbreviation for double cotton covered.
- 23—A letter commonly used to designate inductance or a coil.
- 24—The same as 19.
- 25—The symbol for time.
- 26—The symbol used to indicate current intensity.
- 27—A.....connection is used in places where two transformers, rather than three, make the desired voltage change.
- 28—The letter designating amperage.
- 29—I equals.....over R.
- 30—J.....equals E over R.
- 31—The same as 29.
- 32—The same as 18.
- 33—A variable coil is called a
- 38—The symbol for volt.
- 39—I equals E over
- 40—The same as 25.
- 41—A dielectric used in transmitting condensers.
- 44—The same as 12 except leave off last letter.
- 45—The symbol for watt.
- 46—The abbreviation for increase.
- 47—The abbreviation for the north pole of a magnet.
- 48—The symbol used in the measurement of inductance.
- 49—The abbreviation for power.
- 50—We should all like to see static....
- 52—A system whereby a station may

transmit and receive at the same time is known as

VERTICAL

- 1—The filament of the vacuum tube emits the
- 2—The is used for raising the wavelength.
- 3—The abbreviation for energy.
- 6—When the phones are on our head we signals.
- 13—It is safe to have a to indicate the filament voltage.
- 14—Static electricity is generated by
- 45—Symbol for wavelength.
- 51—The first letter in the abbreviation for British Association.

NO NEW LOW-CURRENT TUBE
 IN the October 18 issue of Radio World, there appears an article written under the heading "Low-Current Tube." The General Electric Co. has no such "new tube" in the process of manufacture nor has the Radio Corporation of

America any plan in view for marketing the "new tube." The use of so-called "XL" in Radiotrons was announced by both the General Electric Co. and the Radio Corporation with the introduction of Radiotron UV-199 many months ago. Sincerely yours, BOUCHEON, Radio Corporation of America.

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A Set for Wonderful Quality

(Continued from page 7)

would have to be removed, so that the plate coil and L1 may be tuned virtually in step. However, it is the better practice to leave the 75 turns on the coil, make the set and reduce the number of turns after the set is in operation. This is indeed a simple

matter and will take you about five minutes. The sealing wax is removed from the point where it anchors the terminal of the coil and a piece of string is wrapped around the winding a few times, so that when turns are being removed there will be no danger of wire automatically springing loose from the winding. The wire being should be removed one turn at a time, being pulled through from under the string. This reduction therefore is made from the end of the winding. The beginning of a duolateral or a honeycomb coil emerges from underneath.

goes to the fixed resistance, the other side the fixed resistance going to each of the F+ posts of the battery. If 199 or equal tubes are used this resistance should be 15 ohms. For 201A it would be 10 ohms. If the 12 or 11 type tubes are used no fixed or

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L4 L5 is a tunable radio-frequency transformer. The secondary is a 75-turn duolateral honeycomb coil, inside of which the primary is secured. This primary is wound of No. 22 wire on a form of slightly smaller diameter than the inside of the duolateral coil, or about $1\frac{3}{4}$ ". If a small vaseline bottle is handy, cleanse it thoroughly and use that for the form. Five thin strips of adhesive tape are laid the length of the bottle, with the gummy side up. These strips are laid parallel and equi-distant. The wire is wound in either direction until twenty turns are put on. The coil when inserted in the duolateral coil will spring just enough to be flat against the inside or form of the duolateral coil. The tape terminals are now doubled back against the inside of the newly-wound coil so they will just overlap, say $\frac{1}{2}$ ". The excess tape is cut away. Now look at the duolateral secondary and notice the direction in which the terminal of this coil points, that is, the excess wire on top. The end of the primary is the lead that points in the same direction as the end of the secondary. It is easier to determine direction by the method of connection than by winding coils backhand and figuring out what is what. With the secondary of this RFT the experience of too much inductance may be encountered and if so the same remedy applied as before, but there will be a difference of only a few turns, depending on the actual maximum capacity of the variable condenser. All three variable condensers should be 23-plate, and preferably of the same make. No vernier is required.

Wiring Directions

1 Connect the A— direct from battery to the two F— posts on the respective sockets and also to ground and to the movable plates of C1. Connect the A+ to B and to one side of switch, the other side of which

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Sept. 27 issue of Radio World contained the following important features: "A New 1-Tube Reflex," by A. P. Peck; "The Best Set for Your Location," by N. N. Barnstein, Technical Editor; "Three Stages of Resistance-Coupled AF," by Wainwright Astor; "A 2-Tube and Crystal Reflex Using Only One Control," etc. Full list of Broadcasting Stations. 15c. per copy, or start your subscription with that number.
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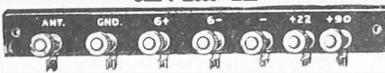
Wiring the Selective Superdyne

Circuit Not Difficult to Construct — Fixed RF Transformer Used in Coupling the RF Stages to the Crystal Detector — Three Controls Afford Selectivity.

SET MAY BE LOGGED

other resistance is necessary, the switch alone being used to light the tubes. Any of these tubes work well. Connect the ground to the beginning L1, the lower coil

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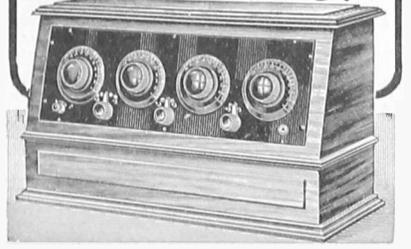
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 Two 75-turn duolateral coils.
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 One 7 x 18" panel.
 One 6½ x 17" baseboard.
 100 ft. 7-strand aerial wire, 50 ft. No. 14 insulated lead-in wire, ground clamp, connecting wire, one dozen spring clips, hardware.

on the cylindrical form. This is the terminal of the lower coil nearest the upper coil. The aerial goes to the bottom of L2, to the stationary or fixed plates of C1 and to the grid of the first tube (at extreme left in Fig. 1).

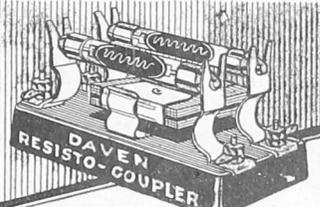
2 The plate of the first tube goes to the inside terminal of L3, the single duolateral coil, the end of which goes to one side of C2. The other side of C2 goes to the end or outside terminal of L3 and then on to the bottom of L2. The top terminal of L2 goes to the beginning of L4 (the primary of the RFT) and the end of L4 goes to B+. Try various voltages for B+ from 45 to 67½. The reverse feedback is thus obtained by reversing the connections to L2, rather than having L2 wound in reverse fashion and the connections made conventionally. The input to L2, from the end of L3, is therefore made at that terminal of L2 nearest the L1 winding.

3 The beginning of L5 (inside terminal) goes to the stator plates of C3 and to the grid of the second tube. The end of L5

goes to the rotor plates of C3 and to the F— post of the socket.
 4 L6 L7 is a fixed or so-called untuned radio-frequency transformer and is a commercial product.

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Plan 100,000-Watt Stations

By Thomas Stevenson

WASHINGTON.

A WORLD-WIDE broadcasting service may be created within the next year if a plan which will be suggested to the Stand-

Broadcasters to Be Situated Near Big Cities and Five Programs Heard "Round the World," if Experts' Ideas Prevail

OUTCOME OF PARLEY

ing Committee appointed by the Third National Radio conference to consider problems of interconnection is approved.

The plan which is considered by radio officials and experts to have great merit may solve the problem of interconnection of stations for national and international programs and at the same time establish the status of the super-power station.

Under the plan, a new type of super-power broadcasting stations would be created with power ranging from 50,000 to 100,000 watts. The function of these giant stations would be to create and sell programs to the local station for rebroadcasting.

Must Be Near Big Cities

Necessarily, the stations must be located near great centers of population where the best talent for programs is available. These programs would be broadcast with sufficient power to carry them to almost every nook and corner of the globe.

These super-power stations would send out rival programs each night from which the smaller-power local station could choose. It would be a comparatively simple matter for apparatus to be installed in the local station to pick up the programs of the super-power stations and rebroadcast them.

One of the super-power stations might be located at London; another at Paris; another at Rome; another at Berlin; another at Vienna; one or more at New York, and others located in various cities of the United States.

How System Would Work

Programs of the super-power stations would be made up weeks in advance and schedules of them sent to the local station. The operator of the local station could examine the schedules of super-power stations throughout the world and pick out the features which might appeal to his audience. If the station at Rome had a particularly attractive feature, he could pick it up and rebroadcast it, the same thing applying to all other stations.

If the programs of the super-power stations were broadcast on long or short wave lengths the ordinary receiving set could not pick them up. Special apparatus would have to be installed in the broadcast-

ing stations so that the programs could be picked up and rebroadcast on wavelengths within the range of crystal and tube sets. Of course, sets could be made which would



Bracket mounting type, complete, \$4.50.

One Pull on the Jones MULTI-PLUG instantly disconnects antenna, ground, A and B batteries from your set. One push reconnects. And it can't be plugged in wrong! Eight foot cable permits placing batteries out of way—in basement, closet or elsewhere. Makes your set portable. All leads plainly coded.

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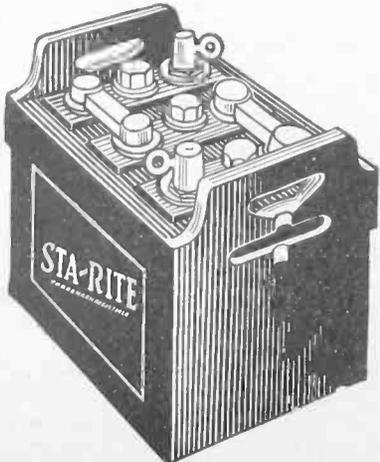
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Kodak Receivers, completely wired, in cabinet. Picks up stations 1,000 miles away on one tube and no antenna, when conditions are right. Add tubes and increase distance and volume to 3,000 miles on loud speaker. Operates on storage or dry battery sets.

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World Programs to Be Offered for Local Re-broadcasting

enable the fan to tune in on the super-power stations themselves; but if such sets were not manufactured, the use of them would be limited.

Reduction of Interference

One advantage would be clearer reception. It is very rare that the local station cannot be brought in without interference except on hot summer nights. Dr. George K. Burgess, Director of the Bureau of Standards, explains this phenomena in this way:

"The reason why the local stations give technically superior quality and satisfactory reception is simply because they deliver a radio wave to the receiving antenna of an intensity greater than that of the atmospheric disturbance.

"Since the most satisfactory quality of reception is obtained when the incoming signal is relatively strong, the person interested primarily in radio broadcasting as an actual service, the delivery to him of agreeable entertainment and important news and instruction, is served best at the present time by the local stations. There is on the other hand a vast proportion of the people who derive their chief satisfaction from radio through the thrill of listening to broadcasting from great distances. The satisfying of this interest must and will continue, through the operation of many stations of about the power and location of present stations.

DX Reception a Pastime

"It must be recognized, however, that all long distance radio reception is now more of a pastime than a service, since long distance reception is necessarily subject to the inter-

ruptions and disturbances from atmospheric discharges and electrical interference. There is always a certain amount of random electrical disturbance in the atmosphere, and to insure radio reception of high quality not vitiated in part by these disturbances it is necessary that the received signal have a signal intensity above a certain minimum value. It is therefore not the power of the transmitting station nor the sensitivity of the receiving set which gives the real limit to the distance of reception but rather the

general level of intensity of atmospheric disturbances."

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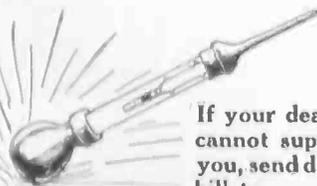
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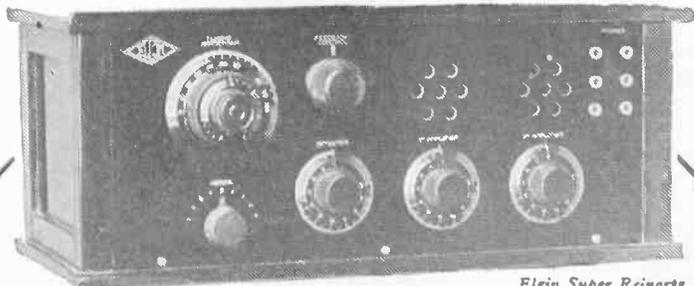
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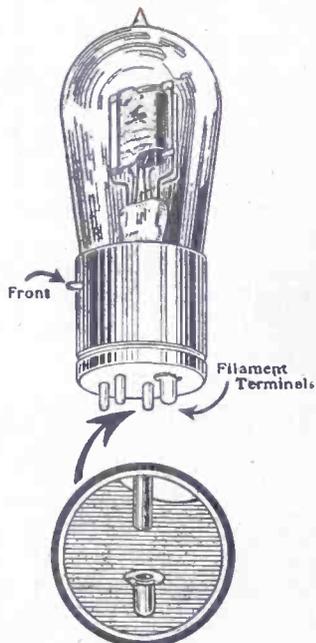
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There are five principal causes of blown-out vacuum tubes.

1. By misplacing "B" Battery leads.
2. By accidental crossing of "B" Battery leads through metallic contact with filament wires.
3. By placing charger on Battery forgetting to turn off tubes.
4. By exchanging tubes in set; for instance, substituting WD12s for UV201As without changing Rheostats.
5. Allowing a lighting circuit wire to fall on some metal part of the receiver.



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