September 6 1924 SIMPLIFIED NEUTRODYNE 15 Cents

FIRST INSIDE STORY OF THE NEW 6-TUBE SUPER-HETERODYNE

RADIO WORLD

Title Reg. U. S. Pat. Off.

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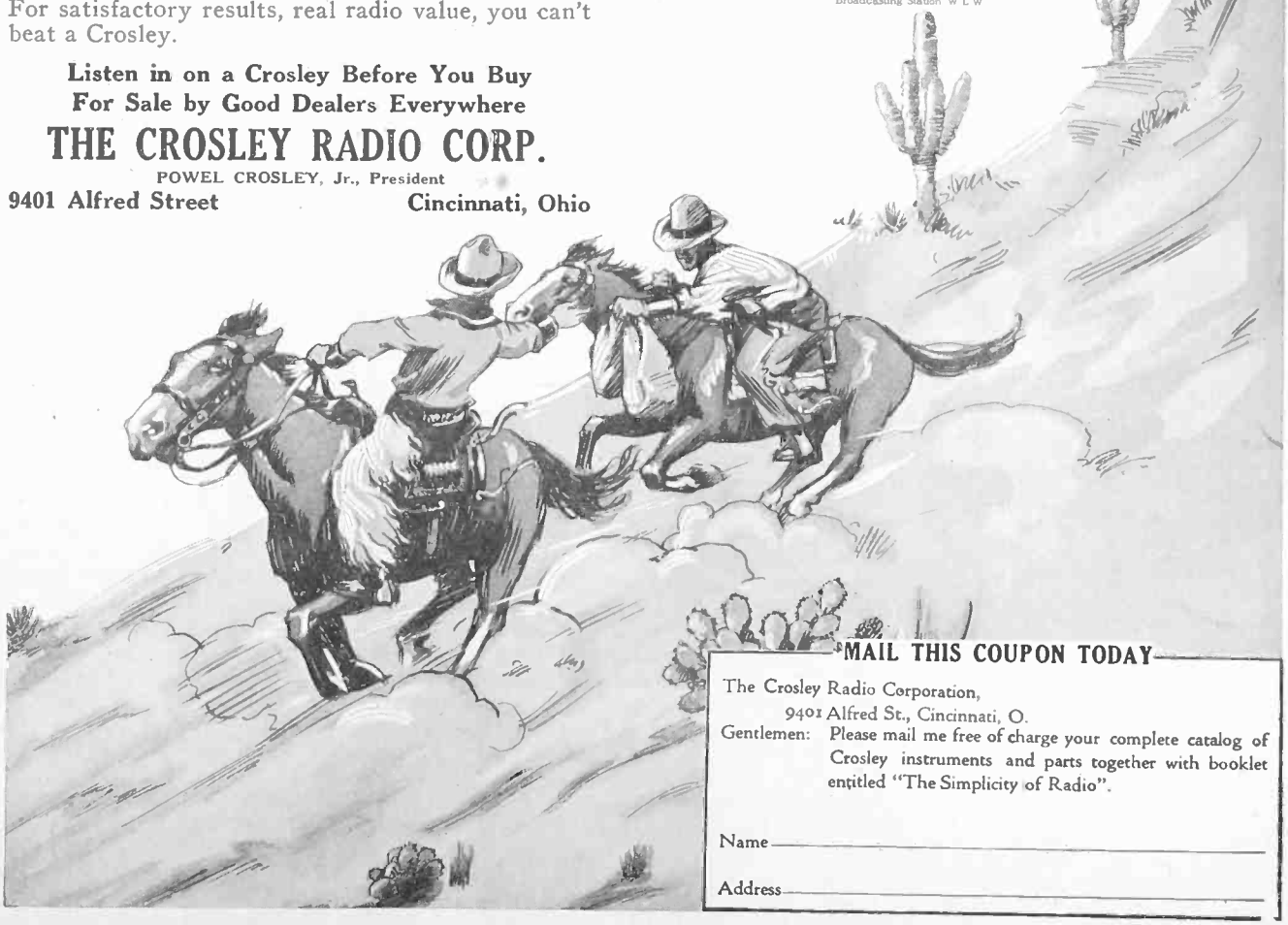

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VOLUME FIVE OF

RADIO WORLD

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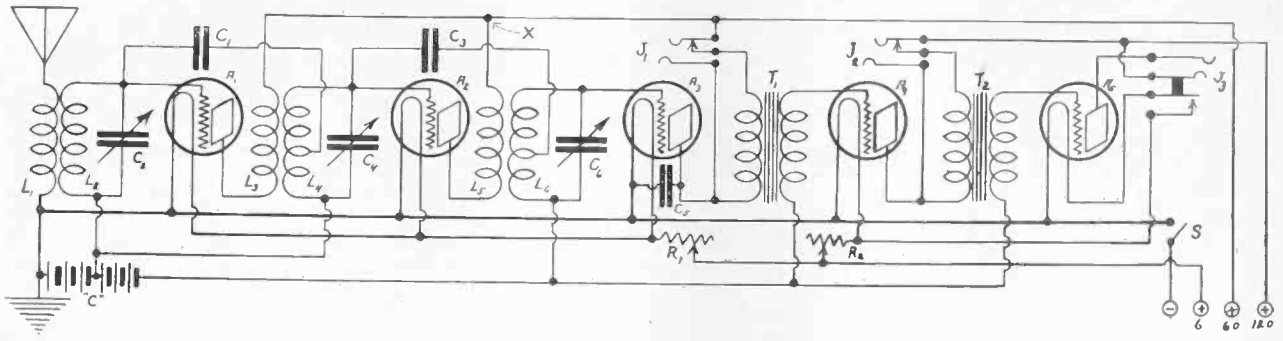
A Simplified Neutrodyne with Grid-biased Detector



CIRCUIT NETWORK (Fig. 1) of the Simplified Neutrodyne that uses a grid-bias in the detector. L1L2 is the tuning coil. L3L4 and L5L6 are the radio-frequency transformers for the two stages of such amplification. C1 and C3 are the neutralizing condensers. "Most stable and most reliable" is what J. E. Anderson, noted radio authority, says of this circuit. Five tubes are used, A1, A2, A3, A4 and A5, the last two being for audio-frequency amplification.

By J. E. Anderson

Consulting Engineer

THE Neutrodyne circuit described herewith employs the grid bias method of detection, which, on strong signals in particular, is usually the most stable and reliable arrangement. I believe it is a simpler arrangement, especially when a grid bias battery is employed for the amplifier tubes.

Another simplification is in the manner in which the radio-frequency coupling transformers are made, and another in the fact that only two rheostats are used in the circuit, one for the filaments of the radio-frequency tubes and one for the filaments of the audio-frequency tubes.

The circuit diagram of the receiver is shown in Fig. 1. There are three identical coupling and tuning units, namely, $L_1L_2C_2$, $L_3L_4C_4$, and $L_5L_6C_6$. There are also two identical audio-frequency transformers. The set comprises the standard number of tubes, two of radio, a detector, and two of audio, jack being provided so that the telephones or the loud speaker may be plugged in at either the detector, the first stage of audio or the second stage. The last jack is of the automatic filament control type so that the second audio amplifier is not lighted except when the plug is in that jack, while the first two are ordinary double-circuit jacks. A filament switch S is provided so that all the tubes may be extinguished conveniently without disconnecting the batteries.

The three tuning condensers C_2, C_4, and C_6 should all be of the 23-plate size, or variable condensers having a maximum capacity of .0005 microfarad. Condensers C_1 and C_3 are neutralizing condensers, which may be of the two insulated wire with brass sleeve type, or any other variable condensers of very small capacity. C_5 is a by-pass condenser across the first audio-frequency transformer to provide a low impedance path for the high frequency current in the plate circuit of the detector tube. Its value should be .001 microfarad.

The two audio-frequency transformers T_1 and T_2 should have a turns ratio not exceeding 5 to 1 and not less than 3 to 1. It is essential that the primary impedance of these transformers be as high as possible if good quality is expected.

The two rheostats R_1 and R_2 need not have a resistance more than 10 ohms each, but if 20 ohm rheostats are available they may be used.

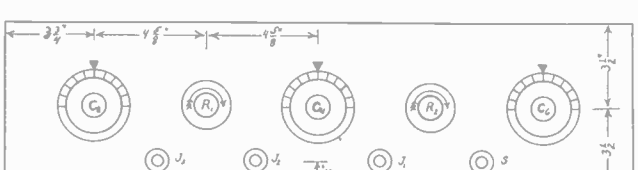
The only kind of tubes that should be used in the circuit are the 201A or tubes of like capacity, except that WE216A tubes may be used in the two audio stages for improved quality when the signals are very loud.

For filament current supply a 6-volt storage battery should be used, as this will give best service over the longest period of time. The plate voltage recommended are 60 volts on the two radio-frequency amplifiers and on the detector, and 120 volts on the two audio-frequency amplifiers. These plate voltages require that the grid bias voltage be 4½ volts on the two radio-frequency amplifiers and 9 volts on the detector and on the two audio-frequency amplifiers. These voltages are provided by the battery marked C, which is made up of two 4½-volt flashlight battery units. These voltages are necessary because the set will not work satisfactorily without them, especially the detector and the audio amplifiers. The bias on the other two tubes is not essential but it improves results considerably. It saves B battery consumption and improves the selectivity of the tuned circuits.

The resign and construction of the three radio-frequency coupling transformers follows:

The coils L_1, L_3, and L_5 consist of 12 turns each and

Winding the Neutroformers



PANEL LAYOUT (Fig. 2) for J. E. Anderson's Simplified Neutrodyne. C2, C4 and C6 are the variable condensers for tuning. The dimensions for center shafts for drilling are marked on the diagram. The panel is 7 x 26 inches. J1, J2 and J3 are jacks and S is a switch.

the coils L_2, L_4, and L_6, of 45 turns each; L_1 and L_2 are wound on the same tube, side by side, without any separation between the nearest turns. The pairs L_3L_4 and L_5L_6 are wound in the same manner, on two other tubes. A tap is brought out at the 12th turn on each of the coils L_4 and L_6, the first turn in each case being the one nearest to the primary winding. No tap need be brought out on L_2 as this coil is not connected to any neutralizing condenser.

The diameter of the tubing upon which the coils are wound, is 3". The tubing may be of any good insulating material such as cardboard, bakelite, hard rubber micarta or formica. The length of each of the three pieces of tubing should not be less than 2½" and 3" will be more convenient for mounting. Use No. 26 double cotton covered magnet wire for all the windings. This will make each pair of windings approximately 1¼" in length.

Before starting the winding drill small holes and insert small machine screws for binding posts at the proper distances from the ends of the tubes. Four binding posts on each tube, two at each end, should be provided. Small holes should also be drilled at the line of separation of the primaries and the secondaries so the wire may be threaded through the tubing and brought to binding posts on the inside of the tubes.

Start winding by securing the end of the wire to one of the binding posts. Label this post P, because it is to be connected to the plate of the vacuum tube. Put on 12 turns as evenly as possible, cut the wire and fasten the end to one of the binding posts at the farther end of the tube. Label this B because it is to be connected to the B battery. Then start the secondary by fastening the wire to the remaining post at the P end of the tube. Put on 12 turns, winding in the same direction as before, and bring out a tap. Leave this in the form of a small loop. Continue winding until 45 turns have been put on. Then fasten the end of the wire to the remaining binding post. This is to be connected to the grid and should be labelled G. The first terminal of the secondary, which is at the opposite end of the tube, should be labelled F, because it is to be connected toward the filament of the tube, or to the grid bias battery.

When the coils have been completed they may be mounted in the usual way on the tuning condensers. For this six small brackets are required. These may be made of brass strip 1/32"x⅜". If the construction of the tuning condensers is such that the coils cannot be mounted conveniently on them the coils may be mounted on the baseboard. Whichever way is used, the coils should be mounted with their axes inclined from the horizontal by an angle of 57°.

The panel arrangement of the various knobs and dials may be like that shown in Fig. 2. This panel is 7"x26". The condensers are placed with their shafts along the middle line of the panel and 9¼" apart and the two rheostats are placed midway between them. The jacks J_1, J_2, and J_3 and the jack switch S are placed in a row below the condensers and just above the top of the baseboard. The panel is symmetrical so that the dimensions are only given on one half of it. The legends on the panel correspond with those of the circuit diagram.

With the panel arrangement shown in Fig. 2, the baseboard layout may be something like that shown in Fig. 3. The condensers and coils, the jacks and the rheostats are all in the same relative positions as they are shown in the panel layout. The tubes, audio frequency transformers, the grid bias battery, and the three fixed condensers are arranged so that all these parts are entirely clear of the parts that are mounted on the panel. The positions are only approximate, but give the general location of the parts. Considerable rearrangement may be allowed without altering the panel layout. Condensers C_1, C_3, and C_5 are not shown in Fig. 3, but they should be so placed that the leads are as short as possible. As is indicated in Fig, 1, C_5 should be connected directly between the plate terminal of A_1 and the negative terminal of that tube.

All the parts on Fig. 3 are labelled to correspond with the same parts on Figs. 1 and 2.

In wiring the set make all leads which carry radio-frequency current as short and direct as possible, and avoid running them parallel with any other leads, or close to them. Leads which carry audio-frequency current and direct current should be run so that a lead to a given piece of apparatus and its return lead are close together; that is, leads to the jacks, rheostats, and the switch should be close together. This also holds for the leads to the audio frequency transformers; but the secondary leads should be kept away from the primary of the same transformer. The positive and the negative bus bars, and the leads to and from the tubes and the batteries should be as close together as is practicable without danger of a short circuit. These precautions are to prevent coupling between one part of the set and another, which may make it difficult to neutralize the set.

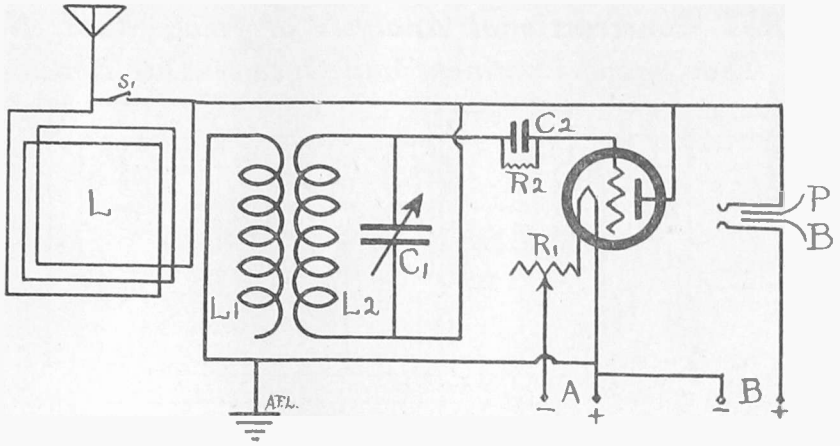
The neutralization of the circuit is done in the usual way; that is, the filament circuit of the first tube is opened by inserting a small bit of paper between one of the filament prongs on the tube and the contact spring on the socket, but in other respects leaving the circuit as it will be under normal operation. The set is then turned on and tuned in on some strong signal in the middle of the radio casting frequency band or a higher frequency. A signal will probably be heard, indicating that there exists some coupling between the input side of A_1 and the output side of the tube. Now adjust condenser C_1 until this signal disappears or until it is at minimum. When this has been done fix the position of that condenser so that it will stay in that adjustment. Now remove the bit of paper from the tube, and the adjustment of the first tube is complete. Adjust the second tube similarly.

The tuning of the circuit is done in this way. Set condensers C_4 and C_6 at the same capacity value, say at 10°. Then tune with C_2. If there is a signal on the lower wavelengths it should be heard. Leave C_2 in the position in which this signal is loudest, and retune slightly the other two condensers. Record the settings of the three condensers for future reference, together with the wavelength of the signal, provided it can be identified. Then set the two condensers C_4 and C_6 at various other positions and tune as before

Loop Quells Radiation

By Herman Bernard

A LOOP connected in series with the antenna lead acts as on the absorption principle and is an offset to radiation. A switch enables the loop to be cut out of the circuit. The radiation that does occur is confined largely to the home in which the set is operated, hence neighbors are not molested. However, tuning is made somewhat critical, as it is always better to tune a loop with a variable condenser. Some directional effect is obtained when the loop is used as shown in Fig. 1.



ABSORPTION LOOP (Fig. 1) used on 1-dial set. L is the loop, S1 a switch, L1L2 the tuning coil, C1 a 23-plate variable condenser, C2 a grid condenser, .00025 mfd., with leak (R2) mounted thereon; R1 is a carbon-pile or compression rheostat. A 4½-volt C battery would be used as the A battery for 199 or 299 tube. The plate voltage then should be 45 instead of the usual 22½ volts.

The circuit used is the Improved Solodial. It is regenerative and gets DX. Tone quality is excellent. Full directions for making such a set were published in the August 23 issue of RADIO WORLD and two stages of AF described in the August 30 issue.

The loop may be any standard one or may be the Ideal Loop, described in the August 30 issue.

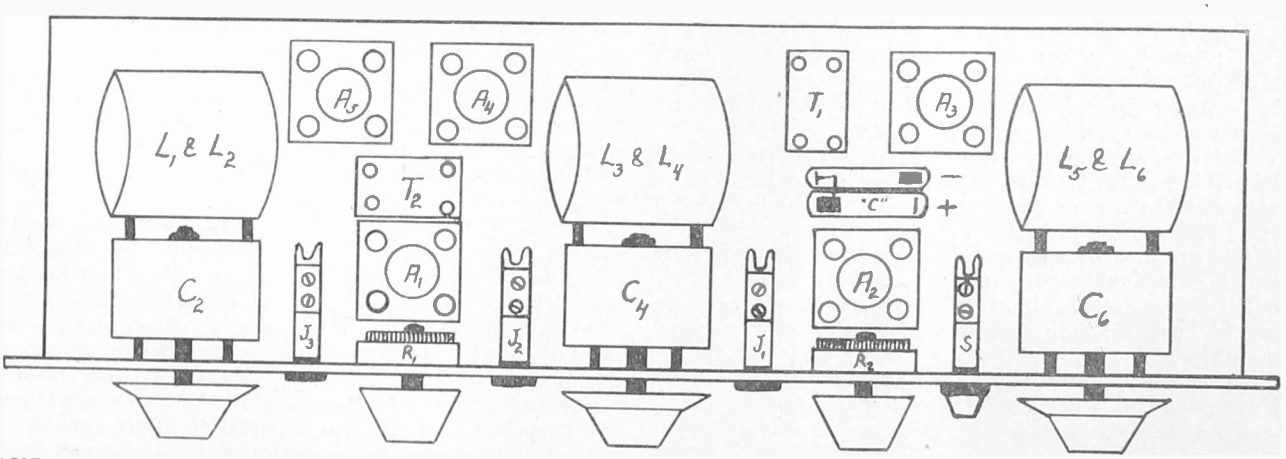
The circuit in Fig. 1 is constructed on low-loss principles, the coil being wound on a spider-web form and the windings, tied with thread, the form being then cut away. L1 is 11 feet of No. 22 SCC wire and L2 is 38 feet of the same wire. C1 is a 23-plate low-loss condenser. P and B represent the output of the detector, which should be connected to the AF amplifier circuit for loud speaker operation. If 199 or 299 tube is used, the grid return is to the A+, as shown.

Assembly for Simplified Neutrodyne

(*Concluded from preceding page*)

for the longer wavelengths. Record the settings and the wavelengths each time.

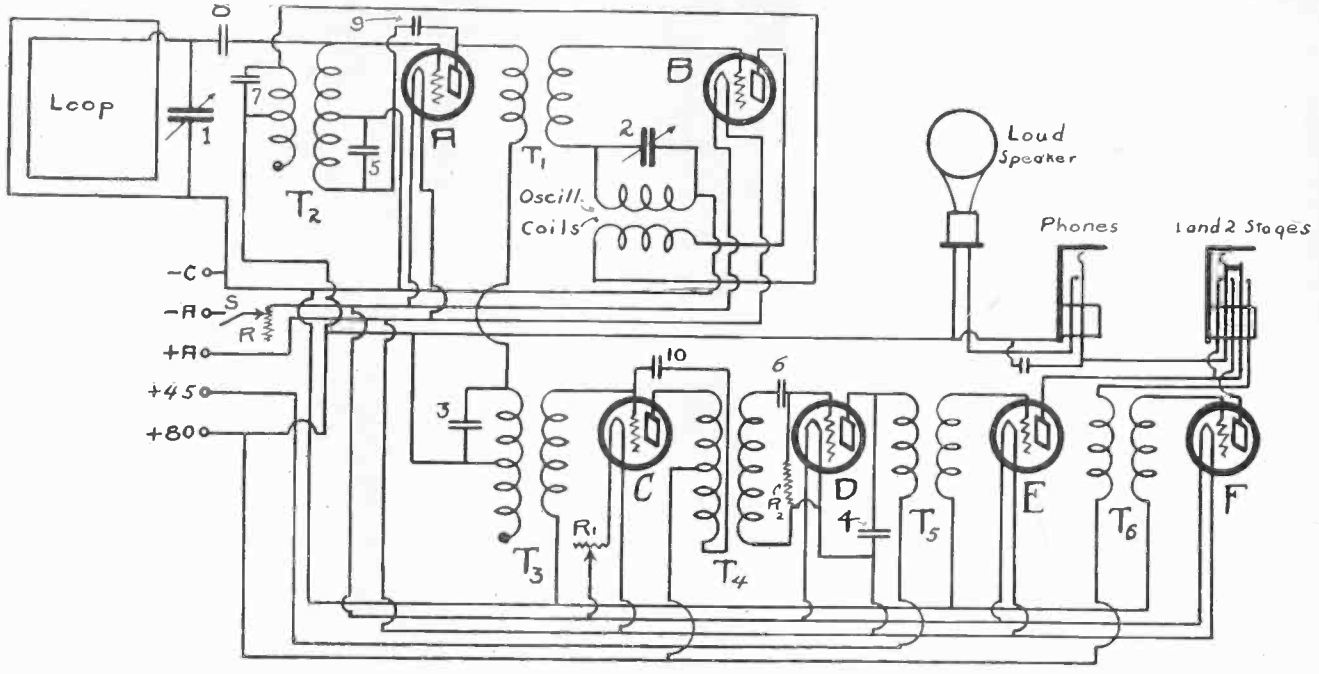
It is well to sound a precaution in regard to the operation of the automatic filament control jack J_3. When the plug is inserted into this jack the last tube lights. When it is withdrawn the tube is extinguished. If the filament currents in the two audio-frequency amplifiers is just right when the plug is in, the filament current in the first will increase when the plug is withdrawn, due to the fact that both tubes are on a common rheosat. To protect the tube from burning too brightly, more resistance should be put in the circuit just before the plug is withdrawn from J_3. If 201A tubes are used the increase in the filament current of the first audio-frequency tube is 10%. This is not enough to burn the filament out, but overheating does it no good. If a WE216A tube is used in the last stage it is imperative to insert more resistance if the tube is to be saved. However, if WE216A tubes are used in both of these stages, the precaution is not necessary because these tubes do not require any rheostat when they operate on a 6-volt battery.



ASSEMBLY LAYOUT for the simplified neutrodyne. The wide spacing of the tuned radio frequency transformers prevents intercircuit oscillation. The C battery has a total of nine volts which is necessary for the amplifier grid bias when more than 67½ volts are used on the AF tubes. The AF transformers are also widely spaced. The binding posts may be mounted on a bakelite strip at the rear of the baseboard.

The New Super-Heterodyne

FIRST Constructional Analysis of Neutralized, Non-Distorting, 6-Tube Set That Spans Continent and Ocean—This Receiver Approaches the Ultimate



CIRCUIT NETWORK OF THE 6-TUBE SUPER-HETERODYNE (Fig. 5). A loop is used, but if aerial is to be substituted a tuning coil secondary would be in shunt with condenser 1, with a 15-turn primary as pickup coil connected to aerial and ground. The tuning condensers, 1 and 2, are the only controls and are independent. Nos. 3, 4, 5, 6, 7 and 8 are fixed condensers. The neutralizing condensers are 9 and 10. The six tubes are lettered from A to F. The signal enters the loop and passes through tube A at the frequency of the incoming wave. B is the oscillator tube, from which the signal is passed on at the intermediate frequency, i. e., the one produced by heterodyning. The signal is reflexed to tube A for RF amplification at the intermediate frequency. Thus there is one stage of short wave RF, neutralized (see fixed condenser 9) and radiation is prevented. Tube C is also neutralized (10). The RF transformers are T1, T2, T3 and T4, the oscillator being in series with the secondary of T1. Tube D is the second detector and T4 its tuning coil. T5 and T6 are audio transformers, though their cores are not designated in diagram. E and F are the audio tubes. A filament control jack is used for the AF stages. The second harmonic principle is employed by using special RF transformers, T2 and T3, with a resonant frequency of about 40,000 cycles per second, but having a curve that passes between 35,000 and 45,000 cycles. Passing this 10,000 band prevents distortion and makes music come in beautifully, with all the rich overtones or harmonics.

By Walter Scott, Jr.

A FEW years ago the Super-Heterodyne receiver was thought to be a plaything for the advanced radio experimenter and as such was never considered as a possible receiver for the average radiocast listener. The first Super-Heterodynes to be built were eight and ten-tube affairs, were difficult to operate, radiated energy at all times, required a radio engineer for their construction and a young power plant to supply the filament current. With the new tubes, public interest in the Super-Heterodyne was revived. Most ot the receivers built, however, follow the lines laid out by the original experimenters and contain no radical departures from their circuits.

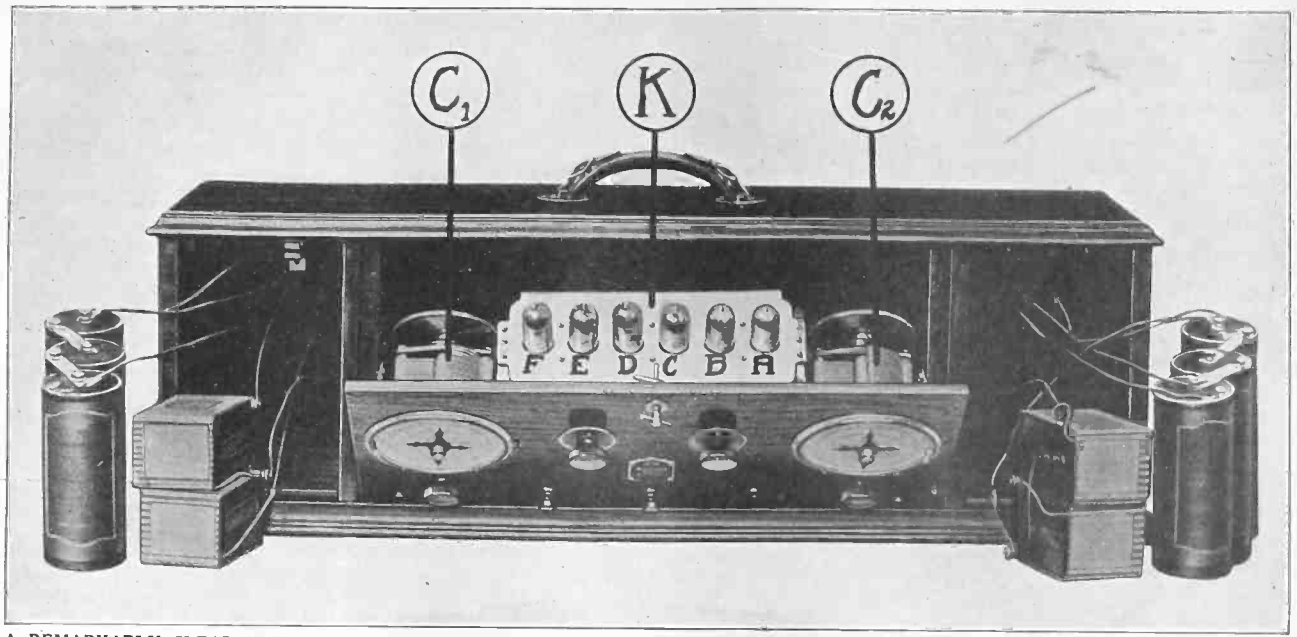
The first commercial Super-Heterodyne receiver to be marketed has aroused further public interest in these sets and has proven that they make ideal receivers for the radiocast listener.

The purpose of this article is to describe this new and highly developed Super-Heterodyne and to bring out certain radical improvements as to circuit, apparatus and operation which have been incorporated therein.

To review briefly the principle upon which the Super-Heterodyne receiver operates we shall start with the well-known fact that vacuum tube amplifiers are much more efficient when amplifying currents of low or intermediate frequencies than when amplifying currents with high or radio frequencies. Thus it is evident that the usual radio-frequency amplifiers are very inefficient and that if great amplification is desired preceding a detector, currents with some low frequency must be obtained. In the Super-Heterodyne receiver the incoming radio signal waves, of high frequency, are changed into waves with a low or intermediate frequency for amplification before detection. This is illustrated by Fig. 1, from which it can be seen that the signals picked up by the antenna are fed into a tuner and thence to a frequency changer where their frequency is changed to a lower value at which the signals are amplified by the intermediate frequency amplifier. From the intermediate frequency amplifier the signals are next detected and then amplified at audio-frequencies. Fig. 1 represents the layout for the majority of Super-Heterodynes which require two tubes for the frequency changer, three for the intermediate frequency amplifier and three more for the detector and two-stage audio-frequency amplifier, making eight tubes for the set.

The new Super-Heterodyne, marketed by the Radio Corporation of America and technically known as the "Second Harmonic Regenoflex Super-Heterodyne Receiver," uses only six tubes, which are lettered from A to F in Fig. 2 and in Figs. 4 and 5. From Fig. 2, the path of the signal currents can be traced from the loop antenna to the loud speaker. The radio-frequency currents from the loop are amplified at the radio-frequency by the tube A and go to the tube B, where their frequency is changed to an intermediate frequency, then to tube A again, where the intermediate frequency currents are amplified, then to tube C, which is the second intermediate frequency amplifier, then to tube D, which is a detector, and then to the two tubes E

Secrets of Set Are Revealed



A REMARKABLY CLEAR VIEW of the layout of the new Super-Heterodyne (Fig. 4) shows the tubes lettered to correspond to the designations in the circuit diagram (See page 6)) Notice that six dry cells are used for supplying the A battery current and four B batteries are used. The batteries are placed in the two compartments at the sides. Note the handle. This set is rated as a "portable." The condenser dials are shown at left and right of the rheostats. C1 is the tuning condenser, C2 the oscillator condenser, the only control in the set. K is the catacomb in which "the works" are sealed. The set is thus fool-proof.

and F, where the audio-frequency currents are amplified.

In this new Super-Heterodyne one stage of radio-frequency amplification has been added to prevent radiation, a one-tube frequency changer is used, the first tube is reflexed and many other new features, to be described later, have been added.

The new Super-Heterodyne circuit has been housed in two different types of cabinets (Figs. 3 and 4). In both cabinets space has been provided for the necessary batteries and for the loop and into the larger of the two models a loud speaker has been built..

The circuit apparatus, exclusive of the batteries and loop, is mounted on the back of the panel. This apparatus consists of a "catacomb," K, in Fig. 4, and other of the larger and more rugged elements which are less easily damaged. In the manufacture of the set most of the essential parts of the circuit are placed within the catacomb, which is a heavy metal box, where they are adjusted and wired. A metal cover, the top of which is shown in Fig. 4, is then fastened on and the box is filled with a special wax. The receiver unit is thus made into one solid block which is mounted on shock-absorbing springs, thus insuring quiet operation.

Among the apparatus which is mounted on the panel are the tuning condensers, C_1 and C_2 in Fig. 4 or 1 and 2 in Fig. 5, the oscillator coils, the rheostats R and R_1 and the loop, all of which are shown in Fig. 5.

One of the most interesting features of the set is the manner in which the transformers T_1, T_2, T_3 and T_4 are built. All these transformers use a common stack of steel stampings for their cores as illustrated in Figs. 6 and 7. The transformer T_1 in Figs. 5 and 6 is a radio-frequency transformer broadly tuned for wavelengths between 220 and 550 meters. The transformer windings are wound around the perpendicular tongue in a manner indicated by P and S in Fig. 6, P designating the end of the tongue for the primary winding and S the secondary end of the tongue. The transformers

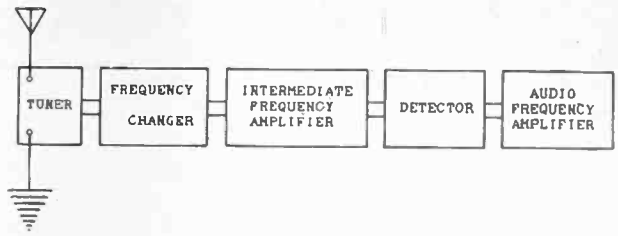


FIG. 1—How the usual type of Super-Heterodyne handles a signal, requiring two tubes for the frequency changer or eight tubes in all.

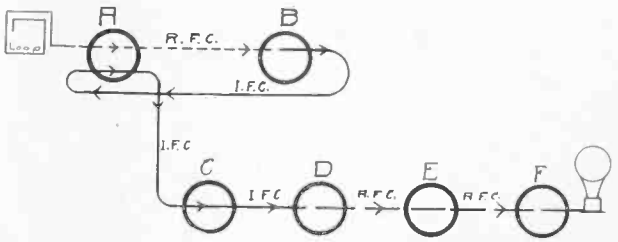


FIG. 2—The path of the signal in the new Super-Heterodyne. A, B, C, D, E and F are the tubes. RFC is RF current and IFC is intermediate frequency current. E and F handle AF current.

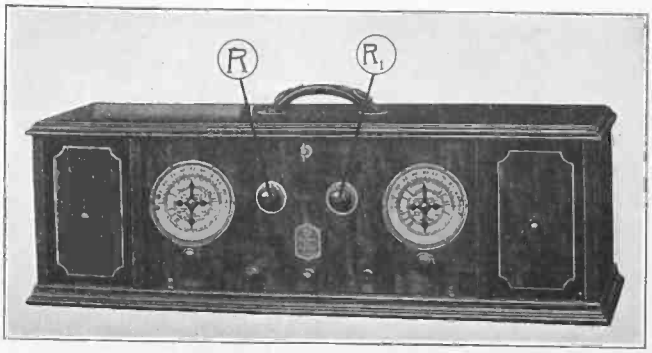


FIG. 3—Front view of the set. R and R1 are rheostats.

Expert Analysis of Transformers

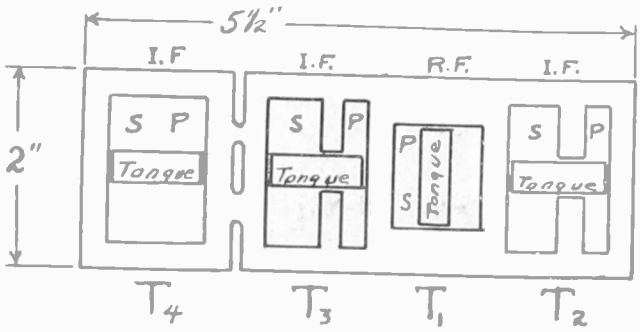


FIG. 6—Dimensions and shape of the components of the intermediate frequency transformers. These transformers pass side bands that bring the second harmonics through the loud speaker for quality reception of music. The transformers are designated to correspond with the lettering in the circuit diagram on page 6.

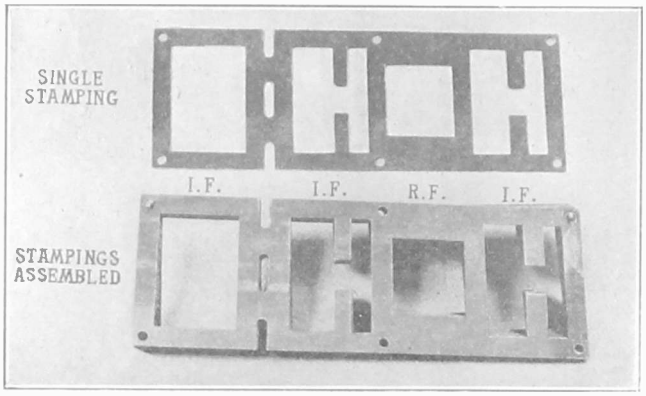


FIG. 7—Stampings used in the construction of the intermediate transformers. These transformers represent an engineering feat and the details of their construction are herewith presented for the first time.

T_2, T_3 and T_4 are the intermediate frequency transformers and are wound around the horizontal tongue as indicated by P and S in Fig. 6. It should be noted that there is a small air gap between the tongues and the return magnetic circuits. This air ga, ●is given one of the final adjustments in manufacturing the transformers, for upon its length depends the electrical properties of the transformers, such as the winding impedences and the resonant frequency. Some idea as to the size and appearance of the core can be obtained from Figs. 6 and 7. The stack of stampings shown in Fig. 7 is riveted together by copper rivets which go through the small, round holes seen near the edges of the stampings. Each stamping is about .005 inches thick and some eighty of them are used to build up a core approximately ¼" thick. The long oval shaped holes between T_3 and T_4 help to eliminate magnetic coupling between these two transformers. It might be interesting to note that all four transformers work efficiently and none of them has any detrimental effect upon the operation of the others.

From Fig. 5 it is apparent that the windings of the transformers T_2 and T_3 form tuned circuits with the condensers bridged around them. These circuits have their resonant frequency at about forty kilocycles per second and their resonant curve is of such a shape that all frequencies between 35 and 45 kilocycles are passed equally well. This insures passing a frequency band 10 kilocycles wide, the band being just sufficient to prevent distortion of music. Were the circuits to be more sharply tuned the higher voice freuencies would be cut out and hence music would be distorted, while were the circuits to be less sharply tuned the set would lose its selectivity. The engineers who designed these transformers have approached very closely the theoretically correct resonant curve shape.

These tuned circuits are adjusted at the factory and add greatly to the selectivity of the set, although the set owner or operator does not need to bother with them. By manipulating the two tuning condensers he takes advantage of the tuned circuits within the set and thus obtains greater selectivity.

All the transformer coils are wound with copper wire .005 inches in diameter, some of the coils having as many as 2,000 turns. The compactness of these coils can be judged from the fact that one of the coils with 2,000 turns has an outside diameter of only about one and one-eighth inches.

From Fig. 5 it may be noted that part of the primary coils of transformers T_3 and T_2 are dead-ended. These dead-ended coils are known as pick-up coils, the purpose of which is to help in obtaining the correct resonant curves for the tuned transformer circuits and thus help to obtain maximum selectivity with minimum distortion.

It may also be noted that the transformers T_2 and T_3 have extra windings connected to the condensers 9 and 10. These windings in conjunction with the small neutralizing condensers 9 and 10, neutralize the detrimental effects of the inter-tube capacities of the tubes A and C. By thus neutralizinz the capacitances of these two tubes the set as a whole is made much more stable than could otherwise be accomplished. One of the worst features of the first Super-Heterodynes was their instability and the difficulty with which they were operated. Both of these disadvantages have been eliminated by neutralization.

On the panel of the set are mounted two rheostats R and R_1 in Figs. 3 and 5. The rheostat R controls the filament current of all tubes, the tube C having, in addition, the rheostat R_1 for controlling its filament current. It is by means of the rheostat R_1 that the volume of the output is controlled, this control being of course quite independent of the tuning or selectivity. In addition R_1 can never be adjused to the point of causing the distortion so often heard with regenerative receivers when the operators try to increase the output. The quality of the reproduced signals from this Super-Heterodyne is independent of anything that the set owner may do.

It is quite impossible for any experimenter to duplicate this set. Even the capacitances of the condensers numbered in Fig. 5 are not the same in all sets that the Radio Corporation produces, the variations being the result of perfect matching for each set on rigid test. The impossibility of duplication by the experimenter is due largely to the special material used in the transformer cores, the peculiar machine-wound coils and the effect of the wax. Only exact duplication of the manufacturing processes will bring results worth while. Such duplication is beyond the fondest dreams or widest reach of the experimenter, if for no other reason than the huge cost involved. Before you could build this Super-Heterodyne satisfactorily you would have to build a factory.

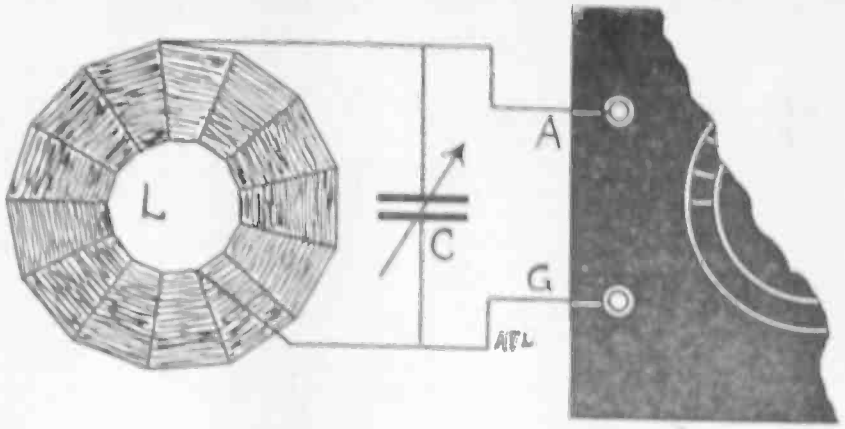
The jack switch drawn over tube F, in Fig. 5, allows the operator of this set to connect the loud speaker in the plate circuit of either tube E or tube F. If the switch is pulled out only one stage of audio-frequency amplification is used, while if the switch is in two stages are available. A headset, plugged in the jack marked "phones," will disconnect the loud speaker and connect the headset in its place.

The advantages gained by the use of the Super-

Making a Low-Loss Wave Trap

By Brewster Lee

A WAVE trap consists of an inductance and a capacity and is used to trap out undesired signals that come through radio receivers, overlapping on other wavelengths. The inductance is a coil of wire, and may be a 50-turn honeycomb. The honeycomb type of inductance is admirably adapted for this duty on account of its high efficiency and low-loss characteristics. A spider-web, using 40 feet of No. 22 DCC wire, works well. The capacity may be a 23-plate (.0005 mfd.) variable condenser of the low-loss type. The old style of solid end condensers, now rapidly becoming obsolete, should not be used, as the losses more than counteract any beneficial effects that may be obtained through the use of a wave-trap.



HOW to connect the coil and condenser of the wave trap to your receiver. The coil may be a spider-web, as shown, or a 50-turn honeycomb and the condenser a 23-plate variable. The wave trap is effective when located at a fair distance from powerful radiocasting stations.

The coil and condenser are connected in parallel as shown in the diagram. Both these units may be placed in a separate small box with the dial for the condenser showing, for convenient manipulation. The leads of the wave trap are then brought directly to the A and G posts of the receiving set, as are the antenna and ground wires. This places the primary inductance of the receiver in parallel with the inductance and condenser of the wave trap. The action of the wave trap is as follows:

The receiver proper is tuned to the incoming signal to maximum strength. Should there be any interference, that is, another station overlapping onto the wave you are receiving, tune the wave trap dial close onto the desired wave until part or all the undesired signal is blocked out. Some slight readjustment of the receiver may then be necessary to bring the desired signal in at its best value. It must be understood, however, that when the receiver is situated right close to several stations, the wave trap may not be successful in eliminating all the interference. Furthermore, it is not very effective with receivers using untuned or aperiodic primaries.

Radiation Prevented by Neutralized RF

(*Concluded from preceding page*)

Heterodyne circuit and by the highly developed apparatus incorporated in the set are many and very important. One of these receivers can be installed as easily as one would install a phonograph. The energy collective agency is built into the set in the form of a loop antenna, thereby eliminating all unsightly wires.

The set is most simple to tune, having only two controls, each being independent of the other. After a station has been picked up it may be logged by marking the position of the pointers on the dials and thereafter that same station may be picked up by setting the pointers to the marked positions.

As explained above, the set is made very selective by the use of several tuned circuits, only two of which must be adjusted by the set owner. With this set local stations can positively be eliminated when programs from distant stations are desired. The selectivity of the set is, in fact, the ultimate possible without distortion with the existing type of radiocasting transmitter.

One of the most important advantages of this set is the fact that it is non-radiating. Today the radiation of receiving sets is one of the most prevalent causes of interference and it can be eliminated only by the passing of sets which radiate, replacing them by sets which do not. Radiation has been eliminated in this Super-Heterodyne by the use of one stage of neutralized radio-frequency amplification between the oscillating frequency changer and the loop antenna. This neutralized stage might be called a muffler tube, for it prevents or muffles radiation. The writer has been advising the use of such a muffler stage of neutralized radio-frequency amplification in conjunction with all the present types of radiating receivers.

The portability of the set is one of its best features. As all the necessary apparatus and accessories are contained within the set, it may be carried about and placed anywhere. The smaller of the two models, shown by Fig. 3, was designed with the portability feature in mind, as is evident by the handle on the cabinet cover.

As far as sensitivity goes, the Super-Heterodyne receiver needs little discussion. It was with a Super-Heterodyne that the first amateur trans-Atlantic telegraph was heard and in the last tests another such set logged quite a few of the foreign amateur transmitters. From a New York steel apartment house, Pacific coast radiocasting stations have been heard with the set I have described. Several persons have picked up 2LO in London with the same receiver. In fact, it appears that if any signal is stronger than static or other interference, the new Super-Heterodyne will pick it up.

With the most vital and easily damaged parts of the set enclosed in a metal box and buried in wax, it would seem that this set is almost damage and fool proof. If damage is done the catacomb can easily be replaced.

Dry cell tubes are used throughout. This receiver approaches the ultimate in radio reception for the radiocast listener.

Making a Low-Loss RF Coil

By Neal Fitzalan

FEW pieces of radio apparatus which were "the thing" a few years ago would now be allowed to go into the construction of even the cheapest of the modern receivers. Instruments have gradually been improved in design and efficiency since the very beginning of the science of radio, but only during the last year have real strides been taken. The first step was taken by a New York firm which placed on the market a low-loss variable condenser so much better than existing types that the difference in results was about equivalent to the addition of an extra tube. The selectivity of the receiver was also greatly increased. Since that time a dozen or more low-loss condensers have appeared on the market. Most of them, fortunately, are good. Radio engineers are also improving inductances of all kinds. The older forms of inductances seem to have crowded on every piece of insulation which their designer could add.

Tuned radio-frequency transformers are often very inefficient in this respect. At first glance one would think that it would be almost impossible to remove the insulating support for the windings. However we do not have to adhere to that particular form of winding. As was mentioned in one of RADIO WORLD's editorials, the standard tubular form of wiring is poor. Not only is there too much insulation but there is a large magnetic field about the coil. Objects of any kind which are in this field introduce other losses.

The diagrams which accompany this article illustrate the construction of tuned radio-frequency transformers which may be used for Neutrodyne receivers or any other kind of receiver which employs tuned RF.

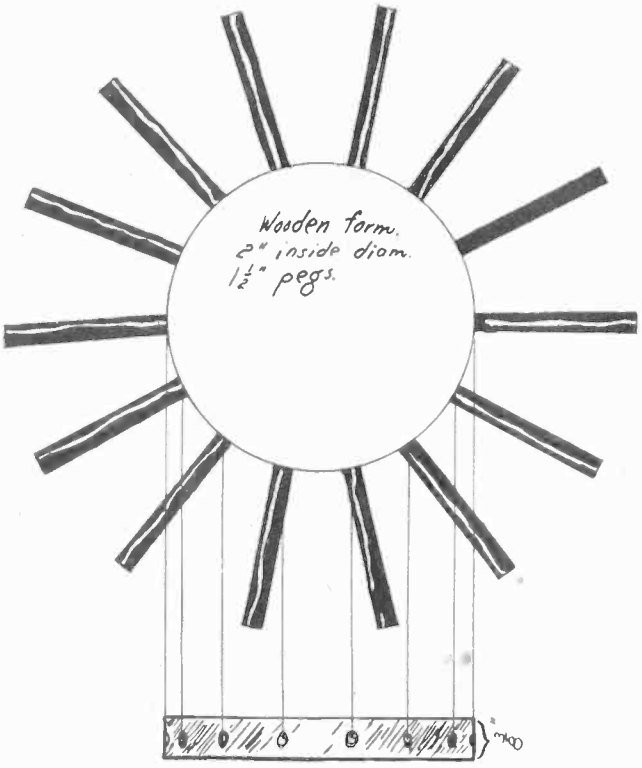
The winding form is made of wood. These forms can be purchased in most radio stores or they may be made by the constructor himself. Fig. 1 shows the appearance of this form. The dimensions do not have to be exactly as given.

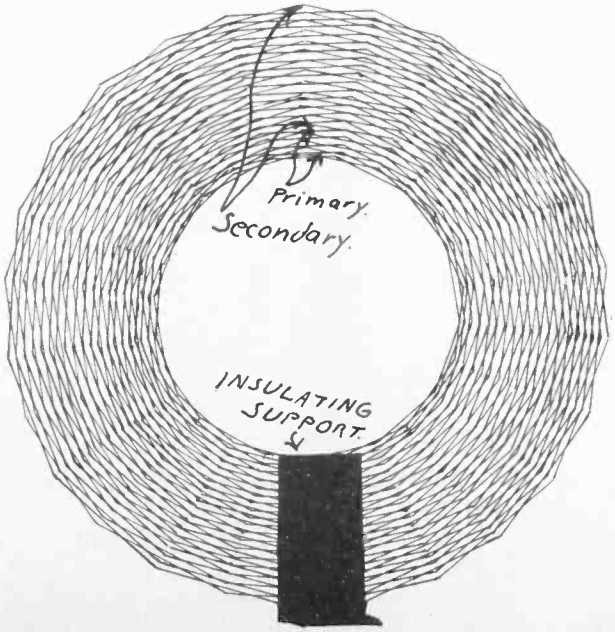
The winding is done in the regular spider-web fashion. The primary is wound first and consists of about 10 turns of No. 24 DSC wire. The secondary is wound right next to this and consists of about 50 turns of No. 26 DS wire. (The number of turns will vary slightly, according to the size of the form.) When the windings are completed the whole coil is painted with collodion, and when this is dry, the pegs are pulled out, and the coil is slipped off the center board.

The coils are fastened to the baseboard by means of insulating supports which are fastened to the coils with machine screws. The wires are pushed apart carefully for these screws. Fiber or cardboard washers are used so that the metal does not touch the wires.

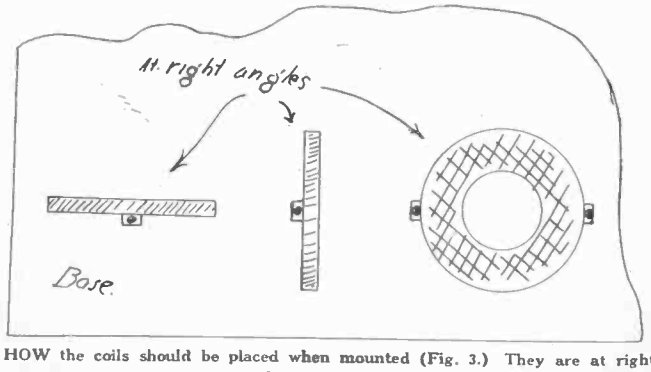
When these coils are mounted they should be placed as shown in Fig. 3, that is, at right angles to each other. As many as three may be placed at right angles to one another and as the magnetic fields around these coils are all small no trouble will be experienced with oscillation in a set using them, provided care is exercised in the wiring.

Any receiver will be improved with the use of these transformers and it will be found in the Neutrodyne that the neutralizing condensers are unnecessary, and that even in this receiver, selectivity is greatly increased.





AT TOP, Fig. 1, the winding form. Fig. 2 shows the completed coil, with insulating support, the only insulation in contact with the coil.



HOW the coils should be placed when mounted (Fig. 3.) They are at right angles to each other.

DON'T DESERT BATTERY

A STORAGE battery should not be left in a discharged condition or left idle. It should be placed in care of a service station.

Tools and How You Should Use Them

By A. F. Lapierre
Consulting Engineer

TO construct a set properly pay attention to theory and accepted practice for best results, especially in the grouping of instruments, for a lead may be shortened several inches by simply twisting a socket around a quarter turn.

The home constructor does not need many tools. The following list should not cost more than $20:

One 2-ounce ball pein hammer.
One center punch.
One pair 4 inch dividers.
One 6 inch steel scale.
One combination square (a Starrett depth gauge is just the thing).
One scriber.
One hand drill 0¼ capacity.
One bit brace.
One counter sink.
One taper reamer, ⅛ inch to ⅝ inch.
Drills, Nos. 33, 27, 26 and 18.
Taps, Nos. 6-32 and 8-32.

The above suffice for panel layout and drilling.

One soldering iron.
Solder and flux.
One pair of diagonal cutting pliers.
One pair of long nose pliers.
One pair of parallel jaw pliers.
One 4 inch screwdriver.
One 7 inch screwdriver.
One set of hexagon socket wrenches.
Sturdy pair of shears.
A knife.

All sets should be laid out either on paper or on the table before drilling the panel. This is essential as the position of the instruments on the baseboard dictates the appearance of the panel and if care is not taken one will find himself trying to put two instruments in the same place.

To do your work intelligently, study the wiring diagram so that the circuit may be visualized. Fig. 3 illustrates how an audio-frequency transformer may be associated with its corresponding sockets. The leads are only a couple of inches long, hence no howl or squeal. Fig. 2 shows another method.

After an arrangement has been agreed on see what the panel layout looks like. Arrange dials, etc., in the panel corresponding to the relative position of the instruments on the baseboard. Now a rough sketch is drawn of the panel showing the controls in their approximate positions.

All dials should be centered 4" from the bottom edge of the panel. This height is chosen because most all other panel mounted instruments having controls are generally mounted low. The main dials at this height give the panel a well-balanced appearance.

In Fig. 1 we see how the Starrett depth gauge is employed. Suppose we wish to drill a hole 3" from the bottom and 4" from the left hand edge of the panel. First set the guage at 3" and place it along the bottom as illustrated. With the ruler measure off 4" and hold at that position. Slide the gauge over until the top end of the gauge and the ruler meet. There make a point with the scratch awl. Now remove the gauges and holding the center punch absolutely perpendicular, give it a smart tap with a hammer. This hole is now ready for drilling. Now we want to drill another hole 4½" to the right of the one just marked at the same height from the base. The ruler is now placed so that the 4½" mark coincides with the center punch mark just put in and the scale is brought up against it as were shown previously, and marked and center punched as before. Holes to be drilled at different distances from the base or top of the panel are laid out in the same fashion.

Most experimenters and constructors have trouble in measuring the distance between centers of holes accurately. Fig. 4 shows how to do the job right. The scale is laid as shown in the diagram and the reading taken in the usual fashion. This method is simple and accurate enough. It should be used only if holes are

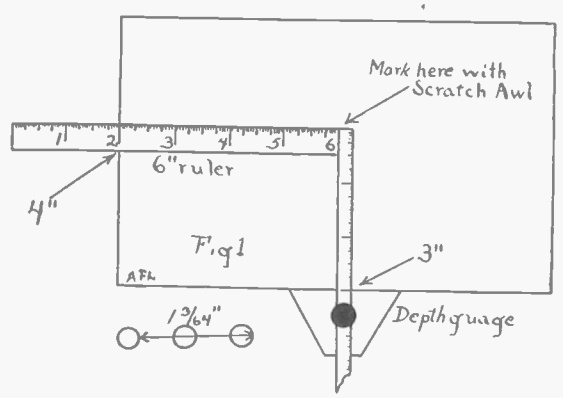


Fig 1

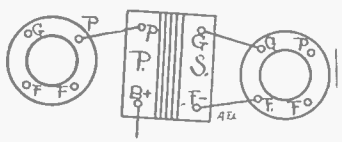


Fig 3.

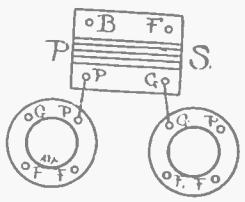


Fig 4.

HOW to use a depth gauge is shown in Fig. 1. Two ways of placing the AF transformers are represented in Figs. 3 and 4, while Fig. 2 shows how to measure distances between holes. Fig. 2 is the small template under Fig. 1.

of the same size, which they generally are in radio apparatus.

Templates are furnished with most parts and should be used. The shaft hole is laid off first on the panel. With the square the other holes may be lined up parallel with the sides of the panel using the scriber as the axis. Then holding the template firmly against the panel remove the scriber and mark in the exact center of the remaining holes. Remove the template and center punch and we now have all the holes marked for one instrument ready for drilling. The other instruments are laid out in the same fashion.

The following table is for drill sizes.

Screw	Full Clearance	Tap
6-32	No. 27	No. 33
8-32	No. 18	No. 26

A tap hole is one which must be threaded and is therefore drilled somewhat smaller than the screw which it is to accommodate. The tap that makes the threads is then run through and the screw is screwed in. A clearance hole is one in which the screw passes freely without forcing or twisting, and without threading.

In drilling the panel holes passing No. 6 screws are drilled with the 27 drill and those passing 8 screws are drilled with the 18 drill. Seldom will it be necessary to tap the panel. The larger holes such as shaft, jack, and switch holes, are drilled No. 18 and then reamed out with the taper reamer and bit brace. This insures a hole that fits, that is accurately centered and does not necessitate the use of large size drills with the extra energy necessary to push through the panel with the heavy drills. A good reamer almost works itself through by its own weight. All screw holes which are to be used with flat head or oval head screws should be countersunk. The exact depth is determined by removing the countersink and dropping the screw in the hole. Pass the finger over it, and if the edge is above the surface, the hole needs more countersinking. Give the countersink a couple of more twists and repeat the test. A hole that is properly countersunk leaves the screw edge absolutely flush with the surface of the panel.

The Use and Care of a Storage Battery

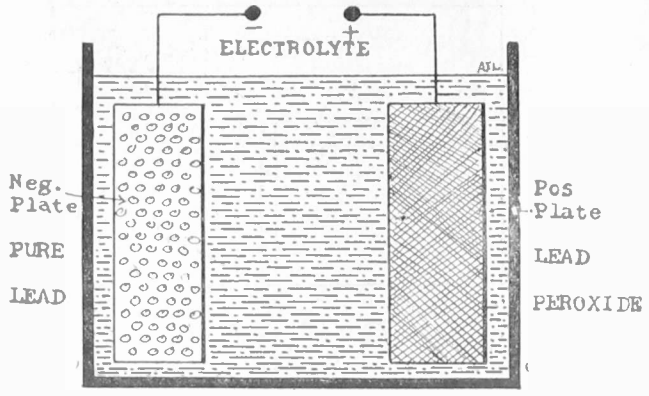


FIG. 1, storage battery cell. When the battery is charged the negative plate becomes spongy and the positive plate becomes covered with a coating of lead peroxide. The 20% solution of sulphuric acid should cover the top of the plates.

By N. N. Bernstein

Technical Editor.

ALTHOUGH there has been much talk recently about apparatus taking the A and B battery current from the city lighting mains there has been, in my opinion, scarcely any practical device yet presented and furthermore thousands of radio users are located in sections of the country where there are no service lines. One of the great questions before that radio public is "How can I best take care of my storage battery, so that I can get the most out of it?" Another vital problem is "How can I charge the battery myself at reduced cost to lower the upkeep expense of my radio?"

These questions must be treated carefully because the answers concern nearly everyone that has a radio. First, some knowledge of what a storage battery is, what it does and how it does it, is interesting and valuable. There are two general types of storage batteries in use. They are the lead plate or sulphuric acid type and the Edison type. The latter, however, is seldom used with radio sets, therefore, this article will treat with the lead plate type.

The common belief is that the unknown substance or force called electricity is stored away in the cells of the storage battery when properly connected to an electric current. The fact is that the plates of the battery are acted upon chemically by the imposing current of electricity, and that chemical changes only occur in the formation of the cells. However, this chemical action is again available in the form of electricity when connected through a metallic circuit externally. The storage battery discussed consists of two sets of lead plates suspended in a 20 per cent. solution of sulphuric acid in distilled water (see Fig. 1). When this combination is placed in a proper electric circuit, one of the plates will turn spongy and the other will receive a coating of lead oxide. When one set of plates becomes well covered with the lead oxide and the other becomes very porous or spongy, the cell is said to be charged, and the supply of charging electricity is discontinued. The plate coated with the lead peroxide becomes the positive plate, and the other the negative plate. When placed in a discharging circuit, such as to light the tube filaments in the radio set, another chemical change takes place which in effect undoes the work of forming the plates when they were on the charging line. Some of the lead oxide which covers the positive plate and some of the active material in the porous negative plate and also the acid in the solution are chemically converted into lead sulphate, which comes out and covers the surface of both sets of plates. When the 20 per cent. solution of sulphuric acid combines with the active material in the battery plates, the chemical known as lead sulphate is formed, due to the current discharging action. When the plates are covered with sulphate the battery is in a state of discharge. The scientific reason for this is that as the discharge progresses the acid solution becomes weaker by the amount of acid used in the plates, which, incidentally, produces the chemical called lead sulphate. This sulphate continues to increase in quantity and bulk, filling the pores of the negative plate. As the pores become filled with sulphate the circulation of the acid is retarded and the battery becomes less active, as indicated by a drop in the voltage of the battery. The object of charging the battery is to drive the sulphate from the plates back into the solution.

The battery electrolyte, which is the solution of pure sulphuric acid in distilled water, becomes weakened as the battery discharges, thereby losing density or weight. We can easily tell the exact condition of the storage battery with the aid of a hydrometer. This is composed of a glass tube, made water tight and weighted at one end. A scale is marked at the opposite end of the tube as shown in Fig. 2.

The hydrometer scale reading is governed by the density or specific gravity of the electrolyte. When the battery is discharged the electrolyte loses density and the hydrometer sinks down. But when the battery is fully charged the hydrometer will float high. The scale will show the exact density of the solution and naturally the state of charge of the battery. The specific gravity of different makes of batteries vary between 1.250 and 1.300, the Exide type reading highest.

Of course larger size batteries than those designated for specific sets may be used. If you should use a 120 ampere-hour battery for the 3-tube set it could go without charging for three weeks. In the table it is assumed 20 hours per week, or about 3 hours every day, is the average amount of time that the set is in operation. Investigation and research proves that 20 hours per week is a very fair average.

You will note that after two weeks' use at 20 hours per week only 60 ampere-hours, in the case of the 3-tube set, will be the drain on the 90 AH battery. You say: "Why not let the battery run for another week and use up the other 30 ampere-hours?" The answer is that a storage battery must never be completely exhausted, because that spoils the plates and materially shortens the life of the battery. Furthermore it will take much longer to bring the battery back to full charge should it run down completely. Therefore charge the battery before it has a chance to drop too low. When the hydrometer reads below the half-way mark (about 1.140 on the scale) it should be immediately put on charge. Following these directions you may put the battery on charge at night before retiring and leave it on charge until well into the next day, when it will again be full and ready for efficient use.

A storage battery is charged by connecting the positive terminal of the battery to the positive lead of a source of direct current and the negative lead of the battery to the negative current lead. Should the battery be connected the other way a short circuit would result, due to the current passing in series through the battery, which has a very low internal resistance. Fig. 3 A shows the old method of charging a 6-volt storage battery with a bank of ordinary electric light lamps

Bernstein's Advice on Battery

How Often You Should Recharge

Note: AH stands for ampere hours, i.e., number of hours used, x number of amperes.

Number of Tubes in Set	*Type of Tubes*	*Total Rated Amperage*	*With 200 as Detector Instead of 201A*	*Average Drain Per Week*	*Capacity of Battery*	*Elapsed Time Between Changes*
3	201A	.75	1.5	30AH	90AH	2 weeks
4	201A	1.	1.75	35AH	90AH	2 weeks
5	201A	1.25	2.	40AH	100AH	2 weeks
8	201A	2.	2.75	55AH	120AH	10 days

connected to a 110-volt direct current feed line. The combination in Fig. 3 A will charge a 6-volt battery at about 6 amperes. Fig. 3 B is much the same and shows how to charge a 6-volt storage battery from a 32-volt farm lighting system. Fig. 3 C portrays the common type of alternating current charging device which charges the storage battery from any 110-volt alternating current line. Another type of alternating current charger, the Tungar rectifier, is described by Brewster Lee in an article in RADIO WORLD, issue of August 16.

The cost of charging the battery at home is much less than taking it to a service station and also avoids a loss of time for using the radio. The cost of having the battery charged outside ranges from 50 cents to one dollar, while at home the cost seldom runs over 12 cents. The care of the battery at home is quite simple, and a few common-sense rules should be learned for the proper care of the batttery. With proper care good makes of storage battery will last at least two years and they have been known to stand up for as long as five years.

The capacity of a storage battery is rated in terms of ampere-hours. The ampere-hour is the unit expressing the quantity of current of one ampere flowing through an electrical circuit for a period of one hour. Batteries used generally on radio sets range from 60 to 150 ampere-hours, and you should use one of sufficient capacity to work your set properly. The table published at the top of this page shows clearly the size battery to use with your set.

Referring to the table, you will note that the elapsed time in the case of the 3-tube set is 2 weeks. However, when a 201A is used as the detector there will be ¾ of an ampere less drain on the battery, in which case it may go for three weeks without recharging. The actual drain on the battery is slightly higher than the combined rated amperage of all the tubes.

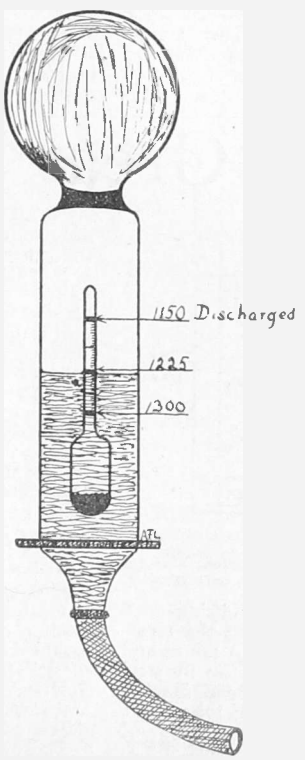


FIG. 2—Showing how to read the hydrometer. The rubber tube is placed in the storage cell and some of the electrolyte drawn into the glass tube.

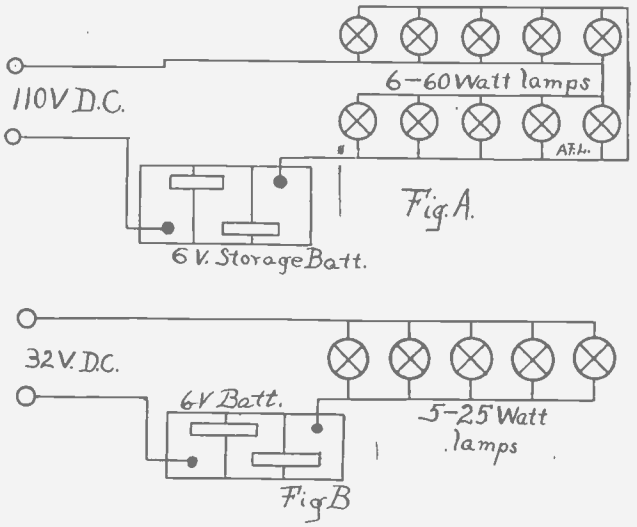


FIG. 3A—Circuit for charging the battery at home off a 110-volt direct current line. After 12 hours on the line one bulb is taken out, and one each 2 hours thereafter. This reduces the charging rate. Altogether the battery should stay on the line about 20 hours. Fig. 3B is almost identical except that it is for charging the battery on a 32-volt farm lighting generator. Always put positive to positive and negative to negtaive when charging.

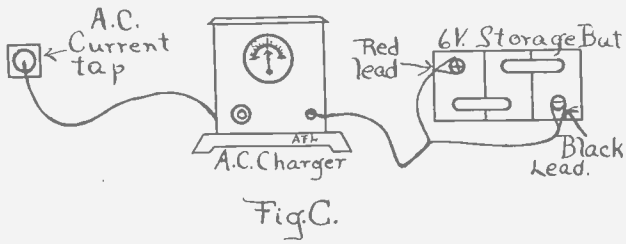


FIG. 3C—Alternating current charging device which works on the magnetic rectification principle. With this type of charger the battery is left on the line about 24 hours in most cases.

DOS AND DONT'S

Don't let the battery run down too low.

Don't add acid to the electrolyte in any event. If that becomes necessary, let the repair station do it.

Don't put too heavy a load on the battery.

Use well-insulated leads to prevent short-circuiting.

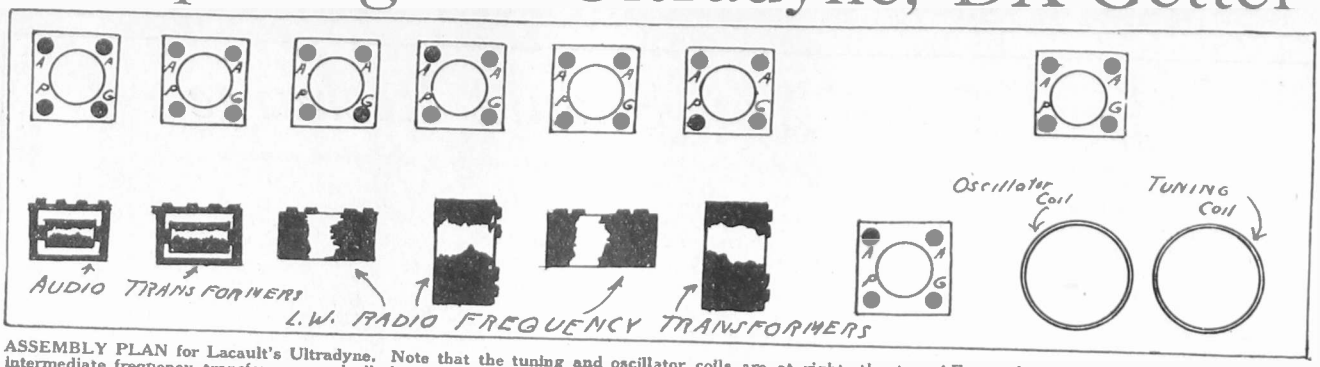
Keep the battery terminals free from sulphate by spreading a thin coat of vaseline over them.

Keep the solution in each cell a little above the top of the plates by adding distilled water whenever necessary.

When charging the battery keep the vent holes open.

Stand the battery on a glass or other waterproof tray to prevent creeping acid from spoiling the floor or cabinet.

Completing the Ultradyne, DX-Getter



ASSEMBLY PLAN for Lacault's Ultradyne. Note that the tuning and oscillator coils are at right, the two AF transformers at left. Between are the intermediate frequency transformers and all the sockets except the two for the first detector tube and the oscillator tube. This arrangement makes for neatness and efficiency.

By Byrt C. Caldwell

This is the second and final article on How to Build the Ultradyne. Part I was published last week.

THIS week we will complete the construction of Lacault's Ultradyne Receiver. From the description given in last week's RADIO WORLD, the tuning and oscillator coils and the long-wave radio-frequency transformers should have been made.

After the apparatus has been mounted on the panel the sockets, transformers and coils should be mounted on the base, which is of the same length as the panel, and 7" or 8" wide. The tuning and oscillator coils are placed at the end of the panel, close together, with the tuning coil directly in back of the first variable condenser. Seven of the tube sockets are placed on a line near the panel, and the other, the second one, is placed in a line with the radio-frequency and audio-frequency transformers. It will be noticed that the radio-frequency transformers are placed so as to reduce interaction among them.

A jack may be inserted at the left-hand end of the panel, so that a loop may be used in place of the antenna.

The wiring should be done very carefully, following the diagram in every detail. Solder all of the connections and where a wire is to be placed under a binding post, solder it to a copper terminal, and fasten this terminal under the binding post. Use tinned bus wire for connections and do not use insulation except where two wires cross close together. When wires are to be bent, bend them at right angles, and do not run two wires parallel for any distance. Where wires are brought to jacks, keep them as far apart as possible. Wire the panel and the base separately as much as possible, and then screw the panel to the base and complete the wiring. The small fixed condensers, etc., are not shown in the panel lay-out, but they should be inserted as shown in the wiring diagram.

The loop should be two or three feet square, and should have eighty or ninety feet of No. 18 or 20 wire.

To operate the receiver, proceed as follows:

Place all of the tubes in their sockets and then connect the filament battery in turn to the binding posts for both B batteries. If the tubes do not light it is safe to connect the B batteries in place. Both B batteries should be made up of three 22½-volt block batteries connected in series. The filament battery should be a 6-volt storage battery, and the C battery is one of the small 4½-volt batteries.

When the antenna is connected the batteries are attached, and the phones are plugged in. The receiver is ready for use.

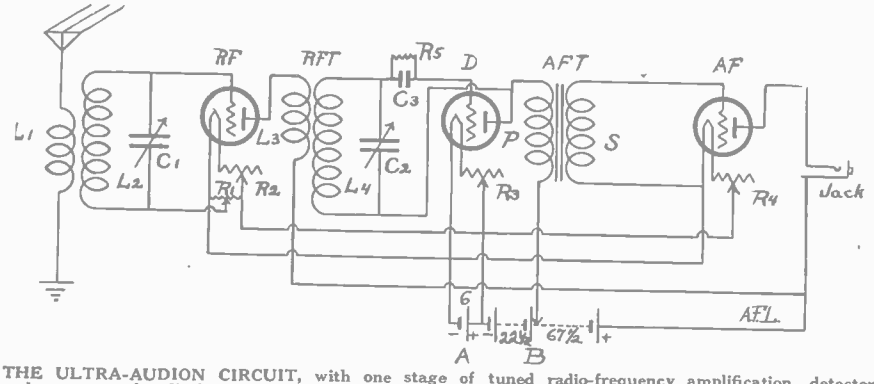
To tune, place the tuning dial at any position, and then, very slowly, go over the entire range of the oscillator condenser. If no station is heard, move the tuning dial one or two degrees, and try again with the oscillator dial. No whistles should be heard. If they are, turn the potentiometer to the positive side until they stop. There is a hiss when the carrier wave of a station is tuned in. When a station is found both dials may be very carefully turned to bring it in as loud and clear as possible. The potentiometer may now be used to increase the volume.

Great care is required in the tuning of this receiver as it is extremely selective. If the dials are turned carelessly, nothing will be heard, as the stations will go by without being noticed, except for a slight click. It is most advisable that vernier dials be used.

This receiver may readily be made in portable form, as it only requires a loop as antenna.

When completed, if carefully made, exactly to specifications, and from good apparatus, this receiver is an extremely satisfactory instrument. For distance, it cannot be beaten. Its tone is very good and it is easily the most selective receiver yet.

Ultra-Audion Gives Great Volume



THE ULTRA-AUDION CIRCUIT, with one stage of tuned radio-frequency amplification, detector and one stage of audio-frequency amplification, designed for volume, and bringing in locals on a speaker.

By Sheppard Brooks

ONE stage of audio-frequency amplification, following RF and detector tubes, produces enough volume to operate a loud speaker on locals, if the Ultra-Audion circuit is used. L1 is the pick-up coil, consisting of 20 turns of No. 22 SCC wire, rewound on a 3-inch tube 5 inches long. Terminate, and, leaving a ¼-inch space, start a new winding of 50 turns, same wire, this constituting L2. The variable condenser, C1, is .0005 mfd. capacity (normally 23 plates) and bridges L2. R1 is a 400-ohm potentiometer, the terminals connected to A plus and A minus and the slider to the end of L2. Thus the grid return is to the slider. The beginning of L2 goes to the grid of the RF tube. The plate of this tube connects to the P of the radio-frequency transformer, RFT, the other terminal of the RF transformer primary (marked B on the commercial products) going to B plus, 67½ volts. Try 90 volts, too. The primary is L3 in the diagram. L4 is the secondary of the RFT. The beginning of L4 (the G post) goes to one side of the grid condenser C3, the other side going to the G post of the socket (the grid of the tube). The end of L4 (F on the transformer) goes to the plate of tube No. 2 (D, or detector). This grid return to the plate is the ultra-audion characteristic. C2 is a 17-plate variable condenser across L4 (secondary of RFT). The plate of D goes to the P of audio-frequency transformer AFT. The other terminal of the AFT primary, B, goes to B plus, 22½ volts. G of AFT goes to the grid of the third tube, F to filament minus. The plate of the last tube and B plus 67½ volts go to the jack, or direct to loud speaker tips. R2, R3 and R4 are rheostats and R5 the grid leak. These should match the tubes.

This circuit is noted for its volume and is classed as an "ear-buster." The Ultra-Audion is not rated as a DX getter, but as the circuit described here has a stage of RF, distance is obtainable. Volume, however, is the chief characteristic. The set should have a range of over 1,000 miles.

Those desiring to wind their own radio-frequency transformer may do so on a 3-inch tube, 5 inches long, in the same fashion as L1, L2 was wound, except that L4 should be 60 turns, instead of 50. L3 should have 12 turns.

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.

Will you please publish a hook-up of the Reinartz tuner with two stages of AF amplification? Is this set selctive enough to use near several powerful radiocasting stations without interference? I would also like to use a C battery with the two AF stages. Jerome Ash, 1348 48th St., Brooklyn, N. Y.

Fig. 32 is the Reinartz regenerative circuit you ask for. The coils are sold ready-made with taps in any radio supply store. The condensers are 23-plate low-loss variables. The C battery is shown connected to both stages of AF. This circuit, when used with a 40-foot outdoor antenna, should be selective enough to enable you to tune out any undesirable signals.

* * *

With reference to the Dynoflex Circuit published in RADIO WORLD *for August 9, would a 23-plate or a 41-plate condenser work as efficiently as the 17-plate condensers which are recommended in the article? I have the above condensers on hand and would like to use them if possible.—John J. Cherry, 19 West 15th St., Tyrone, Pa.*

You cannot use the 41-plate variable with the Dynoflex circuit because the tuning would be too difficult to bring the desired stations in with desirable efficiency. However, the 23-plate condenser may be used with good success, although the tuning will be slightly more difficult than with with a 17-plate one.

* * *

Will you kindly advise me whether the Signal Corps VT2 tube makes a better detector than the 201A amplifier tube? How do they compare? M. H. Lewis, P. O. Box 457, Lake Placid, N. Y.

The VT2, while it makes a very excellent amplifier and oscillator, is not a particularly good detector. The 201A performs welf as a detector but is not quite as good as the VT2 as an amplifier. The 201A draws only ¼ ampere while the VT2 draws a little over 1 ampere filament current.

* * *

1. *I am located a half-block away from a 110-volt Delco lighting plant and the commutating brush sparks interfere with my radio reception. Is there any way that I can overcome this difficulty? 2. What is the best way to charge my storage battery from this current supply, which is direct? What would be the approximate cost of charging a 6-volt battery from this supply?—T. L. Finch, Lookeba, Okla.*

1. You have a very difficult proposition regarding the interference from the electric light plant. The use of a loop antenna is recommended, or if not practical for your purposes, run your outdoor antenna with the free end pointing towards the source of interference. 2. An article on the care and charging of storage batteries, by N. N. Bernstein, Technical Editor, appears elsewhere in this issue of RADIO WORLD. The approximate cost of charging the batteries at home is also discussed in the article.

* * *

Please publish diagram and data for hooking up a 2-tube set, using a fixed RF transformer for one stage of RF, this tube reflexed for a stage of AF, and the second tube used as detector.—H. T. Hadden, P. O. Box 621, Bluefield, W. Va.

Fig. 31 is the circuit you ask for. Coil L1 is a 25-turn honeycomb from which 13 turns are removed. L2 is a 75-turn honeycomb. Both are close coupled. RF is a transformer. 201A tubes are best for this circuit. It is advisable to use a short antenna, indoor or outdoor, with this circuit as no advantage is gained by the use of a long antenna. With 90 volts on the first tube plate, good loud speaker volume will be had on stations as far as 200 miles away, using a short antenna.

1. *The party moving into our upper flat would like to have a radio set installed in their apartment. My aerial poles are 60 feet high. If I put up another aerial ten or twelve feet below mine, would it interfere in any way? 2. Is it possible to have blown out tubes repaired, and if so could you give me some firm names that do so?—L. J. Cole, 62 North Brockett St., Kenosha, Wis.*

1. You can put up another antenna on the same poles, but advise you to keep it about 25 feet away. It would be much better to run the new one at an angle different from the one now up to avoid any possibility of interference. There should be no bad effects from having the two antennae on the one set of masts, however, provided they are 25 feet apart. 2. For the names of firms repairing tubes, see the advertising columns of RADIO WORLD.

* * *

I would like to get a hook-up of a 1-tube set. I have made my own two crystal sets, but would like to venture out with a tube circuit.—G. R. Durbin, 5105 West Huron St., Chicago.

See the reply to Hugh Doherty.

RADIO WORLD'S

Radiocast University

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

I have a 3-tube regenerative set and have never heard a set that is plainer or more reliable in operation. However, I cannot tune out WLS when I wish to hear other stations. Although I like WLS very much sometimes I prefer to listen in on some other station. Is there anything I can do to make the set tune sharper?—S. L. Hettich, 6115 Justice St., Chicago.

Many of the 3-tube sets are not very selective but you can make yours fairly so by the addition of a Selectocoil, the complete construction of which is described in the Jul 26 issue of RADIO WORLD. The Selectocoil is easy to make and requires no extra tubes or batteries and yet will enable you to tune sharply.

* * *

Does a 201A tube amplify?—Chas. Jones, Highland Park, Ill.

Yes.

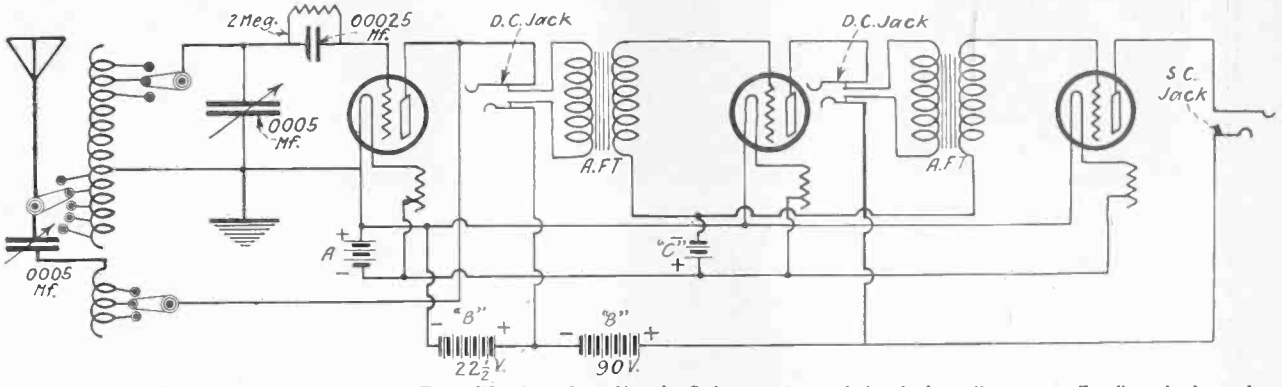


FIG. 32—Reinartz hook-up with two sages of AF amplification. One 4½-volt C battery is used for both audio stages. Excellent loud speaker volume may be had from local and distant stations with this circuit.

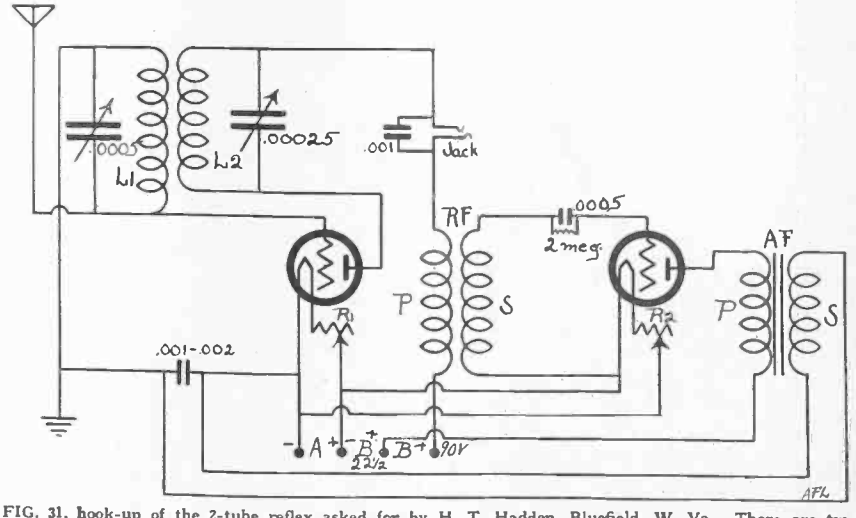
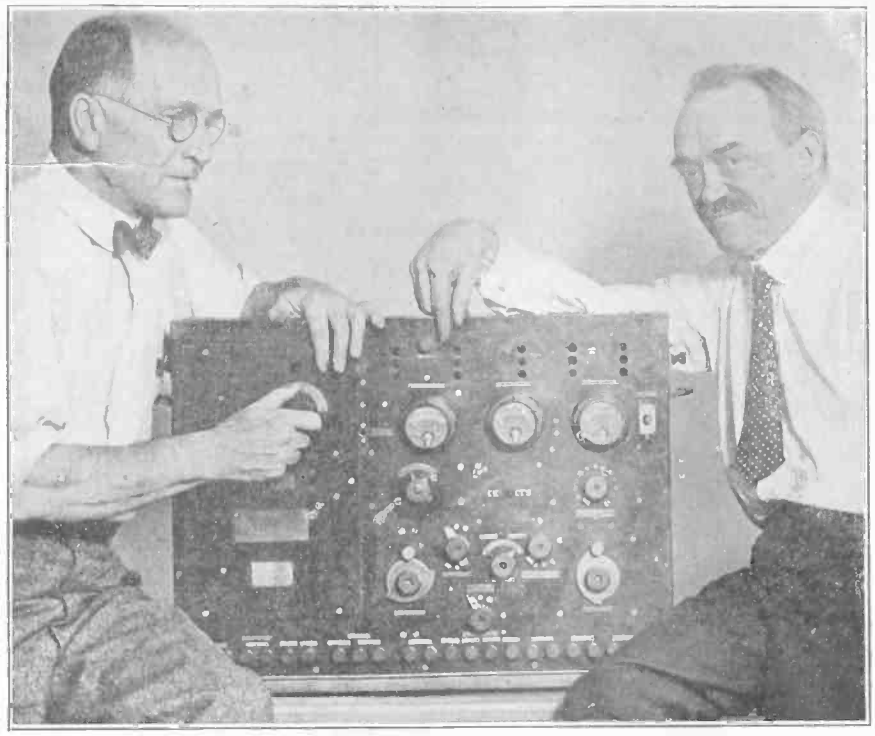


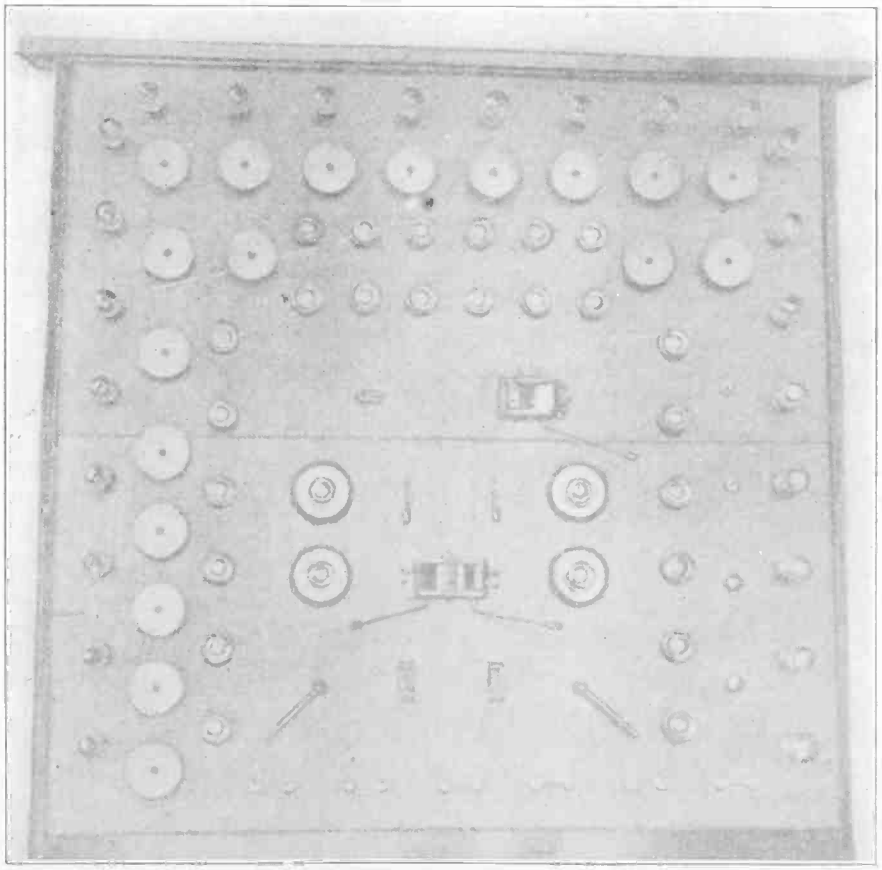
FIG. 31, hook-up of the 2-tube reflex asked for by H. T. Hadden, Bluefield, W. Va. There are two tuning controls, one for the first tube at radio frequency, and the other for the detector tube. The signal is reflexed back into the first tube and amplified at audio-frequency.

Listening for Mars—Beauty



(International Newsreel)

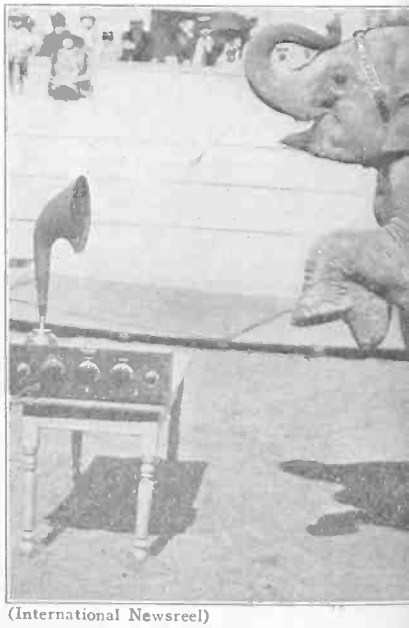
THIS RECEIVER was designed specially by Washington, D. C., scientists to pick up any possible signals from Mars. However, station MARS was not "on the air" apparently, maybe because super-audible 500,000 kilowatt transmitter was not feeding back properly. C. Francis Jenkins, of Washington, one of the many scientists who is endeavoring to gather up some Martian sound waves, built the above outfit specially to record any ciphers which may emanate from that planet. Mr. Jenkins is at left. Dr. David Todd, former head of the astronomy department of Amherst College, is with him.



OUR ENGLISH COUSINS also had the DX fever when they built this marvelously complicated appearing receiver with which they expected to coax a few signals from Mars out of the ether. This set uses 24 vacuum tubes and any number of controls. Count 'em. To make the tuning more mysterious the bulbs are all set around the outside as a sort of frame, possibly to act as footlights when the interplanetary signal comes out to make its bow. It is not known whether the tuning commences from left to right or vice-versa. This is the receiver that brought in the now famous four dashes.

(Gilliams)

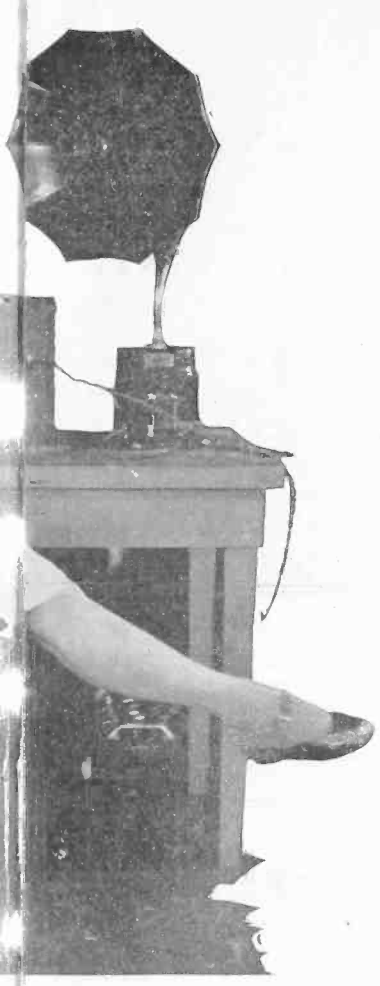
MISS HELEN LYNCH, dancer, has neither pian either, because the radio takes the place of b when the terpsichorean strains come out of the he



(International Newsreel)

MAUDE, a great favorite of the children, wh Luna Park, Coney Island, is a great admirer her dance—and laugh. She's just picking 'em one, two. That peculiar expression of joy y features is not much different from those seen jazz. Maude shakes a wick

l Beast Dance—Happy Hours



…graph in her apartment. She doesn't need …lance music is her especial favorite, and …er she is right up on her feet to practice

BOY SCOUTS of the Brooklyn Edison Company assembled a radio set while at camp near Lincoln Park, N. J., and spent the evenings listening to programs. Note the extreme attentiveness of the boys. One of them is trying to tune in a DX station and is reporting results. As soon as he succeeds, the loud speaker will be turned on. The speaker is hidden by the shadow cast by the set. Tuning in DX is serious business to the youth of the land, as the solemn mien of this prospective audience exemplifies. The set is regnerative, with a tap switch conncted to the primary of the variocoupler, to which the aerial lead is connected.

ERNIE YOUNG, who will present a Radio Revue over Westinghouse Station KYW, Chicago, every Wednesday evening for 30 consecutive weeks. Then entertainments will run two and a half hours each.

(Kadel & Herbert)

THE RADIO FAN who is constantly working to improve quality of his radio music will be interested in this latest type of cone loud speaker. A large pleated paper cone is made as shown in the photograph and a pin firmly fastened to the exact center. The other end of the pin is soldered to the center of the diaphragm of any earpiece. The paper diaphragm produces remarkably clear music and speech. The paper does not necessarily have to be pleated, but may be smooth if desired. Sterling G. Sears, a well-known Brooklyn experimenter, is the designer of this model.

…summer home at …an ragtime. See …aying 'em down, … her Elephantine …dance hall. Just

(Foto Topics)

MORE one-armed driving. Miss Mildred Anderson of Wilkes-Barre, Pa., equipped her sedan with a 3-tube reflex to which she listens while driving her car over the country roads. A fixed crystal is used. Signs along the road reading danger or sharp curve ahead are nevertheless duly respected.

RADIOCAST PROGRAMS

Abbreviations Explained

G. M. T.—Greenwich Meridian Time
E. S. T.—Eastern Standard Time
C. S. T.—Central Standard Time
M. T.—Mountain Time
P. T.—Pacific Time
m.—meters
k.—kilocycles

[If the station you want comes under daylight saving time, add one hour to the time on the program.]

Thursday, September 4

WHN, New York, 360m (830k), E. S. D. S. T.—2:15 P. M., popular songs and dance. 3:45 P. M., classical. 5 P. M., dance orchestra. 6:30 P. M., classical and popular from Hotel Alamac. 9:30 P. M., Palisades and Roseland Orchestras.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—11:45 A. M., daily almanac. 12 noon, organ recital from Stanley Theatre; features from studio; rcaldia Cafe Concert Orchestra. 2 P. M., Arcadia Caft Concert Orchestra, Prof. Feri Sarkozi, director; artist recital from studio. 4:30 P. M., artist recital from the studio. 5:45 P. M., baseball scores and other sport results.

KHJ, Los Angeles, 395m (760k), P. T.—12:20 P. M., Piggly-Wiggly Girls. 2:30 P. M., Miss Bess Daniels, pianist. 6 P. M., Art Hickman's Concert Orchestra from the Biltmore Hotel. 6:30 P. M., children's program presenting Prof. Walter Sylvester Hertzog, stories of American history; Dickie Brandon, screen juvenile. 8-10 P. M., Gaylor Trio, courtesy Gaylord Apartments; J. Edwin Gooderidge, baritone.

WAAM, Newark, N. J., 360m (830k), E. S. D. S. T.—6:30 P. M., Ray Southwick's Commodore Orchestra, special dinner hour concert. 8 P. M., James Vincent Moore and Al Lang, Broadway song team. 8:30 P. M., Harry Knox and his entertainers—vaudeville harmony artists, including Violet Russel, Joe Montgomery and George Walters. 9:15 P. M., Catello's Syncopators in their one-hour dance program of "Zippy Jazz."

WJY. New York, 405m (740k), E. S. D. S. T.—7:30 P. M., weekly French lesson. 9 P. M., Al Reiser's Club Ferreri Orchestra.

WJZ, New York, 455m (660k), E. S. D. S. T.—1 P. M., Nathan Abas' Hotel Pennsylvania Orchestra. 4 P. M., Eleanor Gunn's fashion talk. 4:10 P. M., daily menu. 4:15 P. M., "The Progress of the World," a Review of Reviews talk. 5:30 P. M., State and Federal agricultural reports; farm and home reports; closing quotations New York Stock Exchange; foreign exchange quotations; Evening Post news. 7 P. M., Hotel Gotham Orchestra. 7:55 P. M., Collier's Weekly, Jno. B. Kennedy, associate editor. 8 P. M., Wall Street Journal review. 8:30 P. M., Wanamaker concert. 10:30 P. M., Waldorf-Astor Dance Orchestra.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour by Madge Beck. 8 P. M.—talk on motoring, auspices American Automobile Association. 8:15 P. M., song recital. 9 P. M., violoncello recital by Alden Finckel. 9:30 P. M., concert of Hawiian music by Sohphocles Papas. 9:55 P. M., time signals and weather forecasts.

WLW, Cincinnati, O., 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., business reports. 3 P. M., market reports. 4 P. M., piano solo by Miss Adelaide Apfel. 10 P. M., three minute message from the United States Civil Service. 10:03 P. M., concert program by the Milnor Instrumental Trio; popular program and entertainment "Par Excellence" by the Doherty Melody Boys.

WEAF, New York, 492m (610k), E. S. D. S. T.—11-12 A. M., Teresa Wolfe-Rashkis, soprano, and Jacqueline De Moor, pianist; "Shell Fish Recipes" by Mrs. Ada B. Vail; talk on "Lace for House Linen" by Sarah C. Curtis. 4-5 P. M., Grete Birk, Danish soprano, accompanied by Ingeborg Svendsen tune; talk to children by Colin A. Scott. 6-11 P. M., dinner music from the Rose Room, Hotel Waldorf-Astoria; mid-week services, Greater New York Federation of Churches; Elmer Grosso and his orchestra; "The Movement Toward Currency Stability" by Dudley Fowler; May M. Hughes, soprano; Elliott Griffis, composer-pianist; Jascha Gurewich, saxophonist; Vincent Lopez and his orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets, including weewly report of wool market. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School Radio Orchestra.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., Albert E. Sonn, technical editor, in his weekly talk on "Radio for the Layman." 6:30 P. M., "Music While You Dine," Jimmie Lent and his famous society orchestra. 7:15 P. M., resume of the day's sports with "Jolly Bill" Steinke.

KYW, Chicago, 536m (560k), C. S. D. S. T.—5:18 P. M., news, financial and final markets. 6 P. M., dinner concert broadcast from the Congress Hotel. 7 P. M., "Twenty Minutes of Good Reading" by Rev. C. J. Pernin. 7:20 P. M., musical program. 8:30 P. M., "Safety First" talk by Mr. Z. C. Elkin. 9-10:30 P. M., "At Home" program.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—6:30 P. M., "Let's sing some old songs, kiddies." 6:45 P. M., "A Week-End Trip via Automobile," A. G. Seiler. 7 P. M., baseball scores; "Shade and Ornamental Trees for Street and Lawn," prepared by the Fruit Growers' Nurseries. 7:15 P. M., pogram arranged by the National Stockman and Farmer. 7:40 P. M., Stockman reports of the primary livestock and produce markets. 8 P. M., concert by the KDKA Little Symphony Orchestra, Victor Saudek, conductor; Rose Leader Chislett, contralto, and Earl Mitchell, accompanist. 9:55 P. M., time signals. 10 P. M., weather forecast; baseball scores. 10:05 P. M., popular concert, featuring Fred Hughes, exclusive Cameo artist.

WBZ, Springfield, Mass., 337m (890k), E. S. T.—6:40 P. M., Leo Reisman and his Hotel Brunswick Orchestra. 7 P. M., results of games, Eastern, American and National Leagues. 7:10 P. M., Letter from the New England Homestead; "At the Theatres" with A. L. S. Wood, dramatic editor. 7:30 P. M., bedtime story for the kiddies. 8 P. M., recital by Albert Faucon, violinist, accompanied on the organ by Lena B. Knox. 9:30 P. M., recital by Alice Delano Gurney, soprano; Alice Eldridge, accompanist. 10:5 P. M., time signals; weather reports.

Friday, September 5

WHN, New York, 360m (830k), E. S. D. S. T.—2:15 P. M., popular music. 3:45 P. M., classical program. 6:30 P. M., Alamac Orchestra.

WDAR, Philadelphia, 395m (760k), E. S. D. S. T.—2 P. M., Arcadia Cafe Concert Orchestra; artist recital. 4:30 P. M., Peerless Orchestra, Pat Graham, director. 5:45 P. M., baseball scores and other sport results. 7:30 P. M., Dream Daddy with the Boys and Girls. 8 P. M., book review by Arnold Abbott; dance music by the Benson Chicago Orchestra, Victor Record artists and Charley Fry and his Million-Dollar Pier Orchesta, Pathe Record artists. 8:30 P. M., World Famous Emmett Welch Minstrels direct from Hippodrome Theatre; "Talk," WDAR Sportsman's Fishing Forecast—a report on the week-end fishing conditions along the New Jersey coast.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., program of news items and music. 2:30 P. M., Miss Bess Daniels, pianist. 6 P. M., Art Hickman's Concert Orchestra from the Biltmore Hotel. 6:30 P. M., children's program presenting Prof. Walter Sylvester Hertzog, stories of American history; Richard Headrick, screen juvenile. 8-10 P. M., program by Paul G. Hoffman Co.

WIP, Philadelphia, 509m (590k), E. S. D. S. T.—3:30 P. M., concert by Comfort's Philharmonic Orchestra, Roy B. Comfort, conductor; soloists, Miss Bessie Crown, soprano, and Mr. Frank Nicoletta, harpist. 6 P. M., weather forecast. 6:05 P. M., dinner music by Eddie Elkin's Orchestra from the El Kadia Gardens. 6:45 P. M., agriculture livestock and produce market reports. 7 P. M., Uncle Wip's bedtime stories and roll call for the children of Uncle Wip's Kiddie Klub.

KSD, St. Louis, Mo., 546m (550k), C. S. T.—8 P. M., concert by Abergh's Concert Ensemble, Arne Arnesen, violinist; broadcast direct from Hotel Statler Roof Garden. 9 P. M., address by Lieut. Colonel Clendenin.

WJY, New York, 405m (740k), E. S. D. S. T.—7:30 P. M., Leonard Nelson's Knickerbocker Grill Orchestra. 8:15 P. M., Time Pop Question Game.

WJZ, New York, 455m (660k), E. S. D. S. T.—1 P. M., Hotel Ambassador Trio. 4 P. M., Eleanor Gunn's fashion talk. 4:10 P. M., daily menu. 4:15 P. M., arts and decorations talk. 4:30 P. M., Hotel Astor organ recital 5:30 P. M., State and Federal agricultural reports; farm and home reports; closing quotations New York Stock Exchange; foreign exchange quotations; Evening Pst news. 7 P. M., Lafayette Htel Orchestra. 8 P. M., Wall Street Journl rview. 8:30 P. M., Looseleaf Current Topics, William H. Allen. 10:30 P. M., Harold Stern's Belleclair Towers Orchestra.

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

WLW, Cincinnati, O., 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., market reports. 3 P. M., stock quotations. 4 P. M., piano recital by pupils of the Stoffregen Studio.

WEAF, New York, 492m (610k), E. S. D. S. T.—11-12 A. M., Eugenie Ferrer, pianist; market and weather reports. 4- P. M., Samuel Chisholm, pianist; club program for women consisting of two current topic talks. 6-10 P. M., dinner music from the Rose Room, Hotel Waldorf-Astoria; May Singhi Breen and Her Syncopators; Kathleen Stewart, pianist; Harry Hock and L. H. Jerome, popular entertainers; Guy Hunter, blind entertainer; B. Fisher's "Astor Coffee" Orchestra.

WWJ, Detroit, 517m (80k), E. S. T.—9:30 A. M., Public Health Service bulletins, talks of general interest. 10:2 A. M., weatber forecast. 11:55 A. M., time relayed by Western Union. 12 P. M., Detroit News Orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News Orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—11 A. M., weather and river forecast. 11:05 A. M., market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 1 P. M., closing stocks and markets. 7 P. M., sport news and weather forecast. 8 P. M., musical program; Gladys Malone Kamback, reader; Robert Dougan, baritone; Ralph S. Bacon, pianist; Katherine Herl, mezzo-soprano. 9 P. M., weekly tourists' road bulletin.

WOO, Philadelphia, 509m (590k), E. S. D. S. T.—7:30 P. M., sports results and police reports; dinner music by A. Candelori and his Hotel Adelphia Roof Garden Orchestra. 8:30 P. M., musical program. 9:30 P. M., grand organ recital, Harriette G. Ridley. 10 P. M., dance program by A. Candelori and his Hotel Adelphia Roof Garden Orchestra. 10:55 P. M., time signal. 11:02 P. M., weather forecast.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., George Perry, tenor and Russell Blumstein, pianist, in a joint recital. 6:30 P. M., "Man in the Moon" stories for the children by Josephine Lawrence and William F. B. McNeary. 7:20 P. M., resume of the day's sports with "Jolly Bill" Steinke.

KYW, Chicago, 536m (560k), C. S. D. S. T.—5 P. M., news, financial and final markets. 5:45 P. M., children's bedtime story told by "Uncle Bob." 6 P. M., dinner concert broadcast from the Congress Hotel. 6:30 P. M., program from Duncan Sisters' Music Co. 7:20 P. M., speeches under auspices American Farm Bureau Federation. 8-11:30 P. M., midnight revue.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T.—5 P. M., baseball scores. 5:30 P. M., organ recital by Paul E. Fleeger, from the Cameo Mo-

Who Is America's Most Popular Radio Entertainer?

Everybody is interested in this query: Who is America's most popular radio entertainer? You have your favorite. Who is she or he? Let us know your choice, whether a comedian, an opera singer, a jazz band, or a story-teller.

RADIO WORLD wants to be able to tell the world the name of the entertainer who stands highest in the regard of listeners-in.

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Cut off. Fill out. Mail today.

RADIOCASTING MANAGER, RADIO WORLD,
1493 Broadway, New York City.

Dear Sir:

My favorite entertainer is.....Station.....

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

Yearly subscribers for RADIO WORLD may, when sending in their $6.00 for a yearly subscription, vote the entire fifty-two issues in advance for their favorite entertainer, when they so designate their desire to do so. In the August 16 issue was published a tally showing H. M. Snodgrass, of WOS, Jefferson City, Mo., leading.

Another tally will be made and published in RADIO WORLD soon and an important announcement made.

tion Picture Theatre. 6 P. M., baseball scores; dinner concert. 6:30 P. M., "Listen to the Adventures of Tom Thumb, Radio Children." 6:45 P. M., news bulletin. 7 P. M., baseball scores. 7:40 P. M., reports of primary livestock and wholesale produce markets. 8 P. M., concert, "All Sorts Program" presented by Kazoo Symphony; the V. and X. Saxophone Band; the Jews Harp Quintet; "The Musical Saw"; the world's premier sweet-potatoist; and the Edgar Thompson Xylophonists, Evan Lloyd, club swinger. 9:55 P. M., time signals. 10 P. M., weather forecast; baseball scores.

WBZ, Springfield, Mass., 337m (890k), E. S. T. —6 P. M., dinner concert by the WBZ Trio. 7 P. M., result of games, Eastern, American and National Leagues. 7:05 P. M., market reports 7:10 P. M., "Tires" by Harold Martin; Current Book Review by David C. Buist. 7:30 P. M., bedtime story for the kiddies. 10 P. M., recital by Joseph Murray, pianist. 10:30 P. M., dance music by the Copley Plaza Orchestra. 10:55 P. M., time signals; weather reports. 11 P. M., concert by the WBX Trio and Mrs. Charles Weston, soprano; Zo Elliott, noted pianist and composer.

Saturday, September 6

WHN, New York, 360m (830k), E. S. D. S. T. —2:15 P. M., poplar music. 3:45 P. M., classical. P. M., dance orchestra. 6:03 P. M., Alamac Orchestra. 7:30 P. M., dance orchestra. 8 P. M., classical music and talks. 10 P. M., popular songs and Roseland Orchestra.

KHJ, Los Angeles, 395m (760k), P. T.—12:30 P. M., program of news items and music. 6 P. M., Art Hickman's Concert Orchestra from the Biltmore Hotel. 6:30 P. M., children's program presenting Prof. Walter Sylvester Hertzog; Helen Pirie, screen juvenile. 8-10 P. M., program by the Wiley B. Allen Music Co.

WIP, Philadelphia, 509m (590k), E. S. D. S. T. —6:45 P. M., agriculture livestock and produce market reports. 7 P. M., Uncle Wip's Bedtime Stories and Roll Call for the Children of Uncle Wip's Kiddie Klub. 8 P. M., activities of the Atlantic City pageant. 8:30 P. M., concert by Comfort's Philharmonic Orchestra, Roy B. Comfort, conductor; soloist, Miss Bessie Crown, soprano. 8:45 P. M., "What the Wild Waves are Saying." 8:50 P. M., concert by Vessella's Concert Band, Oreste Vessella, conductor; soloist, Olive Marshall, soprano. 10 P. M., dance music by Bob Lehman's Dance Orchestra. 10:30 P. M., announcing the name of the winner—Miss America, 1924. 11:05 P. M., organ recital by Karl Bonawitz, from the Germantown Theatre.

KSD, St. Louis, Mo., 546m (550k), C. S. T.—8:30 P. M., Missouri Theatre Orchestra and specialties broadcast direct from Missouri Theatre.

WRC, Washington, 469m (640k), E. S. T.—5:15 P. M., instruction in international code. 6 P. M., children's hour by Madge Beck. 7:45 P. M., Bible talk. 8 P. M., piano recital by Mildred Ensign. 9 P. M., "Keeping Radio Sets in Order" by Robert Leslie Bellem. 9:30 P. M., musical jrogram. 9:55 P. M., time signals and weather forecasts.

WLW, Cincinnati, O., 423m (709k), C. S. D. S. T.—11 A. M., weather forecast and business reports. 1:30 P. M., market reports.

WEAF, New York, 492m (610k), E. S. D. S. T. 4-5 P. M., Bruno Brothers Orchestra. 6-11 P. M., dinner music from the Rose Room, Hotel Waldorf-Astoria; Miriam Witkin, soprano; Gene Austin, popular pianist and singer; L. Clair Case, baby trombone player; Ramos Family Orchestra; Vincent Lopez and His Orchestra.

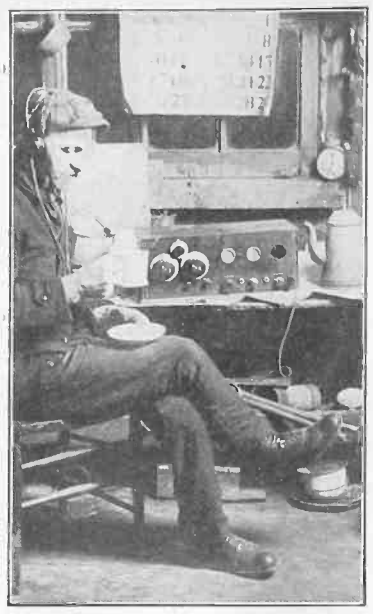
WWJ, Detroit, 517m (580k), E. S. T.—9:30 A. M., "Tonight's Dinner" and a special talk by the woman's editor. 9:45 A. M., Public Health Service bulletins and talks of general interest. 10:25 A. M., weather forecast. 11:55 A. M., Arlington time. 12 P. M., Detroit News Orchestra. 3:50 P. M., weather forecast. 3:55 P. M., market reports and baseball scores. 5 P. M., baseball scores. 7 P. M., Detroit News Orchestra.

WOC, Davenport, Ia., 484m (620k), C. S. T.—9 A. M., opening market quotations. 10 A. M., household hints. 10:55 A. M., time signals. 11 A. M., weather and river forecast. 11:05 government bulletins. 11:15 A. M., closing market quotations. 12 noon, chimes concert. 12:15 P. M., weather forecast. 7 P. M., sport news and weather forecast. 9 P. M., orchestra program, the Palmer School Radio Orchestra.

WOO, Philadelphia, 509m (590k), E. S. D. S. T. —11 A. M., grand organ. 11:30 A. M., weather forecast. 12 noon, luncheon music by the Tea Room Orchestra. 12:55 P. M., time signal. 4:45 P. M., grand organ and trumpets. 7:30 P. M., sports results and police reports. 10:55 P. M., time signal. 11:02 P. M., weather forecast.

WOR, Newark, N. J., 405m (740k), E. S. D. S. T.—6:15 P. M., "Music While You Dine"; Ernie Krickett's Cinderella Orchestra. 7:1 P. M., resume of the day's sports with "Jolly Bill' Steinke. 9:10 P. M., concert by the orchestra of the S. S. Roosevelt. 9:50 P. M., joint recital by Anne B. Tyndall, soprano, and George Vause, pianist. 10:10 P. M., recital by Hosrof Bagraduni, baritone; William Kummer at the piano. 10:30 P. M., popular program by Messrs. Breau and Tobias.

KYW, Chicago, 536m (560k), C. S. D. S. T. —5:02 P. M., news, financial and final markets. 5:45 P. M., children's bedtime story told by "Uncle Bob." 6 P. M., dinner concert broadcast from the Congress Hotel. 7 P. M., musical program. 8 P. M., talk by Vivette Gorman of the Home



(Kadel & Herbert)
Programs are enjoyed by the lighthouse keeper who otherwise would be lonely.

Economics Dept. 8:05 P. M., Youth's Companion, including short stories, articles and humorous sketches. 9:15 P. M.-12:30 A. M., late show.

KDKA, Pittsburgh, 326m (920k), E. S. D. S. T. —5 P. M., baseball scores. 5:30 P. M., dinner concert by the Westinghouse Band, T. J. Vastine, conductor. 6 P. M., baseball scores. 6:30 P. M., two English stories for boys—the children's period. 6:45 P. M., last minute helps to teachers. 7 P. M., baseball scores; sports review by James J. Long, sport editor. 7:15 P. M., feature. 8 P. M., concert by the Westinghouse Band and Edward Repper. baritone. 9:55 P. M., time signals. 10 P. M., weather forecast; baseball scores.

WBZ, Springfield, Mass., 337m (890k), E. S. T. —6:30 P. M., Leo Reisman and his Hotel Brunswick Orchestra. 7 P. M., results of games, Eastern, American and National Leagues. 7:05 P. M., market reports. 7:30 P. M., bedtime story for the kiddies. 7:45 P. M., concert by the Hotel Kimball Trio. 9 P. M., recital by Mrs. F. D. Osborne, soprano; Anna Emerson, accompanist. 9:15 P. M., violin recital by Clarence R. Cruikshank, accompanied by Helen Morrison Dunlap. 10:55 P. M., time signals; weather reports.

Sunday, September 7

WOS, Jefferson City, Mo., 441m (680k), C. S. T. —7:30 P. M., complete religious service of the Methodist Church of Jefferson City, Rev. J. E. McDonald, pastor.

WIP, Philadelphia, 509m (590k), E. S. D. S. T. —11 A. M., morning service, broadcast from Holy Trinity Church, Rittenhouse Square, Philadelphia, Rev. Floyd W. Tompkins, D. D., rector. 3 P. M., a special program featuring Miss America, 1924, who will broadcast a greeting to the radio fans of America.

KGW, Portland, Ore., 492m (610k), P. T.—6 P. M., church services.

WGY, Schenectady, N. Y., 380m (790k), E. S. T. 9:30 A. M., service of First Presbyterian Church, Albany; sermon by Rev. Dr. William Herman Hopkins. 6:30 P. M., service of First Methodist Church, Schenectady; sermon by Rev. Dr. Philip L. Frick.

WWJ, Detroit, 17m (580k), E. S. T.—7:30 P. M., services at St. Paul's Episcopal Cathedral, broadcast from the cathedral. 5 P. M.—Detroit News Orchestra.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T. —3:30 P. M., People's Radio church services by Rev. Fred Helfer. 7 P. M., dinner concert transfitted from William Penn Hotel.

KYW, Chicago, 536m (560k), C. S. D. S. T. —10 A. M., Sunday morning service broadcast from St. Chrysostom's Episcopal Church, Chicago. 1:30 P. M., studio chapel service conducted by the Chicago Church Federation.

Monday, September 8

WMC, Memphis, Tenn., 500m (600k), C. S. T.—8:30 P. M., request program by the Hotel Gayoso Orchestra.

WOS, Jefferson City, Mo., 441m (680k), C. S. T. —8 P. M., address by Arthur T. Nelson, state marketing commissioner. 8:20 P. M., musical program by the Junior Serenaders' Orchestra of Herman, Mo.

WHN, New York, 360m (830k), E. S. D. S. T. —2:15 P. M., popular music. 3:45 P. M., classical. 5 P. M., dance orchestra. 6:30 P. M., classical and popular. 7:30 P. M., screen celebrites (miscellaneous). 8 P. M., Roseland Dance Orchestra. 8:30 P. M., talk and classical. 9 P. M., Palisades Park Orchestra and popular songs. 12 P. M., midnight Bohemia show.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M. weather forecast. 3:30 P. M., literary program by Portland Library Association. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast and market reports. 8 P. M., concert by Mme. Freida Stejerne, soprano.

WFAA, Dallas, Tex., 476m (630k), C. S. T. —12:30 P. M., address, Judge Ed Sewell, managing director of the Texas Museum of Natural History on "Recent Discoveries in Dallas County." 8:30 P. M., musical recital by T. N. Musgrove, baritone, and co-operating musicians of Dallas.

WGY, Schenectady, N. Y., 380m (790k), E. S. T. —11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:50 A. M., report on farm movement of lettuce. 11:55 A. M., time signals. 1 P. M., music and talk, "How to Buy Outside Clothing." 5 P. M., produce and stock market quotations; news bulletins; baseball results. 7:15 P. M., address, "Planting Wheat to Avoid the Hessian Fly." 7:40 P. M., baseball results. 7:45 P. M., movie talk, "Movie Notions" by Quinn Martin; Fort Orange Society Dance Orchestra.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T. —3:30 P. M., baseball scores; library news. 4:30 P. M., stock market reports; the Sunshine Girl; livestock quotations. 6:30 P. M., dinner concert from William Penn Hotel. 7:30 P. M., Uncle Kaybee. 7:45 P. M., baseball scores. 9:30 P. M., musical program. 11 P. M., late concert by the Chilcott Family quartet, father and three sons.

Tuesday, September 9

WMC, Memphis, Tenn., 500m (600k), C. S. T.—8:30 P. M., program by the Bluff City Quartet, arranged by George W. Hughes.

WHN, New York, 36m (830k), C. S. D. S. T. —2 P. M., Loew's State vaudeville. 3:45 P. M., classical. 5 P. M., dance orchestra. 6:30 P. M., classical and popular from Hotel Alamac. 9:30 P. M., orchestral and popular songs, including Club Alabam Revue.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., children's program. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast and market reports. 8 P. M., concert by George Weber and his orchestra.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., address by DeWitt McMurray, in a medley of humor, pathos and wisdom. 8:30 P. M., musical recital by Count Ignace Rubinoffsky, specializing in the composition of Russian masters. 11 P. M., Aida Choral Club, Portia Washington Pittman, directing, in vocal and piano recital.

WGY, Schenectady, N. Y., 380m (790k), E. S. T. —11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:50 A. M., report on farm movement of lettuce. 11:55 A. M., time signals. 1:00 P. M., music and address, "Do You Vote?" Mrs. F. K. Taylor. 5 P. M., produce and stock market quotations news bulletins; baseball results. 6 P. M., dinner music by Joseph A. Chicken and his Clover Club Orchestra. 7:40 P. M., baseball results. 7:45 P. M., minstrel program by the Georgia Minstrel Boys.

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T. —3:30 P. M., baseball scores. 4:30 P. M., stock market reports; the Sunshine Girl; livestock quotations. 6:30 P. M., dinner concert from the William Penn Hotel. 7:30 P. M., Uncle Kaybee, 7:45, baseball scores. 9:30 P. M., musical program, the Osburn Club. 11 P. M., late concert by "Sid" and his gang from Loew's Aldine Theatre.

Wednesday, September 10

WOS, Jefferson City, Mo., 441m (680k), C. S. T. —6 P. M., agricultural address by a specialist of the Missouri College of Agriculture. 8:20 P. M., musical program consisting of old time square dance and quadrille tunes played by the Old Time String Trio, Louie Barton, George Schrimpf and Bryan Williams.

WHN, New York, 360m (830k), E. S. D. S. T. —2:15 P. M., popular songs and dance orchestra. 3:45 P. M., classical. 5 P. M., dance orchestra. 6:30 P. M., classical and popular from Hotel Alamac. 8 P. M., talks and classical. 9 P. M., Palisades Dance Orchestra. 10 P. M., Clover Gardens Orchestra.

KGW, Portland, Ore., 492m (610k), P. T.—11:30 A. M., weather forecast. 3:30 P. M., talk by Jeanette P. Cramer, home economics editor of The Oregonian. 7:15 P. M., police reports. 7:30 P. M., baseball scores; weather forecast; market reports. 8 P. M., concert by Louis Kaufman, violinist. 10 P. M., dance music by George Olsen's Metropolitan Orchestra.

WFAA, Dallas, Tex., 476m (630k), C. S. T.—12:30 P. M., musical recital by entertainers from a Dallas theatre.

WGY, Schenectady, N. Y., 380m (790k), E. S. T. —11:30 A. M., stock market report. 11:40 A. M., produce market report. 11:45 A. M., weather report. 11:50 A. M., report on farm movement of lettuce. 11:55 A. M., time signals. 2 P. M., intfernational polo match between Great Britain and United States at Meadowbrook. J. Andrew White and Major A. W. Rudd. 5 P. M., produce and stock market quotations; news bulletins; baseball results. 5:30 P. M., "Adventure Story" (courtesy of Youth's Companion).

WCAE, Pittsburgh, 462m (650k), E. S. D. S. T. —3 P. M., piano recital by Fred Rosenfeld. 3:30 P. M., baseball scores. 4:30 P. M., stock market reports; Uncle Kaybee; livestock quotations. 6:30 P. M., dinner concert from the William Penn Hotel. 7:30 P. M., the Sunshine Girl. 7:45 P. M., baseball scores. 9:30 P. M., musical program.

A THOUGHT FOR THE WEEK—*I turn a dial and I bring the world to my doorstep. So slight a motion never accomplished more.*

RADIO WORLD
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EDITOR, Roland Burke Hennessy
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TECHNICAL EDITOR, N. N. Bernstein

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SEPTEMBER 6, 1924

Mars Ahoy!

SIMILAR signals—four dashes—heard in Great Britain and in Canada at the same minute for each of several succeeding days give rise to the speculation as to whether Mars is trying to signal the earth. Scientists are answering the speculative invitation very seriously and even a confident expert of the United States government stands ready to decode the ciphers! If radio communication is established with Mars it will constitute the greatest scientific feat in history. It is well that earnest response has been accorded to the mysterious signals by giving them scientific attention and it is to be hoped that the next response will be in the the nature of an intelligible and successfully received reply. If earth could thus wish Mars a Merry Christmas the achievement would be momentous. Would the Martians know what it is all about? The fascination of the goal is positively thrilling and a deeply interested world eagerly awaits the outcome.

Nine Superdyne Fans Make Comparisons

(Foto Topics)

MEMBERS of the Electric Wireless Club, Bronx, New York City, meeting in Public School No. 2, compare set. Left to right the sets on the table are a 1-tube standard regenerator, with tuned plate; 3-tube 3-circuit honeycomb tuner and the Superdyne. Atop the honeycomb set is a 1-dial circuit. Another regenerator built by I. Katz, President, is resting on the Superdyne. The nine like the Superdyne best.

Tubeless Set Works Speaker

A MAN in holy orders has come forward with a striking achievement—a set that operates a loud speaker yet uses no tubes! You cannot consider yourself "up" in radio unless you are fully informed on this new, important subject. You may well wonder how this is done. Begin the article by Father Henry A. Judge, S.J., in next week's RADIO WORLD and satisfy yourself the feat has been accomplished successfully. Father Judge is chaplain at Welfare Island, New York City, and has been a radio experimenter for many years. He has made his treatise "so simple that even a child can understand." The whole solution is fully presented, with comprehensive text and diagrams.

The same issue, September 13, on sale Wednesday, September 10, will contain an article by Byrt C. Caldwell on "A 1-Dial, 1-Tube Set." This solves a problem many have pondered over who desire RF ahead of a 1-dial detector circuit. "A Real Circuit on a 4"x4" Panel," by Herman Bernard; "Rheostats," by A. P. Peck, wherein is told, among other things, how to use dry-cell tubes on a 6-volt storage battery; "A 3-Tube Reflexed Neutrodyne That Works Speaker," by N. N. Bernstein, Technical Editor, and other features will be in that issue.

RADIO WORLD

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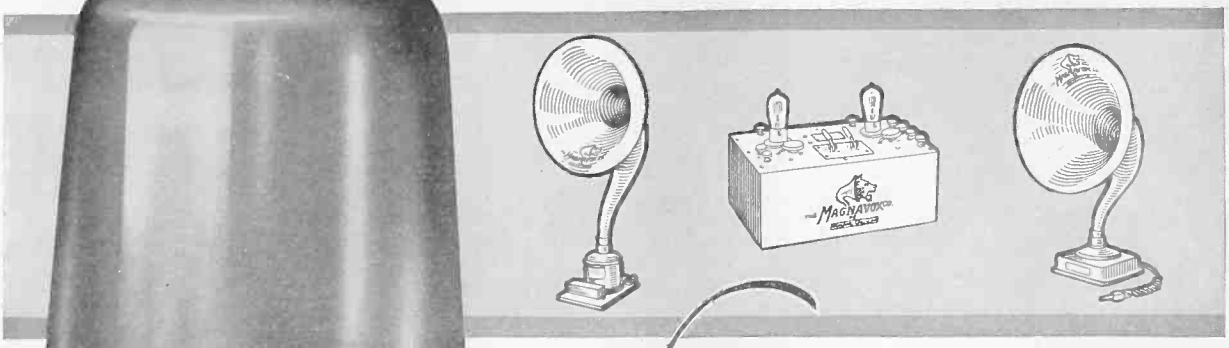
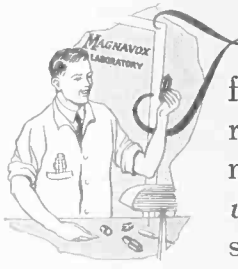
September 6, 1924
Vol. 5 No. 24
15 Cents.



Now a MAGNAVOX Tube



THE engineers who developed the famous Magnavox line of radio reproducing and amplifying equipment have now produced a *vacuum tube* equally distinctive and successful in its own field.

One trial convinces the most exacting user that the Magnavox will replace ordinary tubes to great advantage in any receiving set.

$5.00

MAGNAVOX RADIO VACUUM TUBE TYPE A is a storage battery tube for use as audio frequency and radio frequency amplifier in all standard circuits. Highly recommended also for detector use. This tube is not critical of adjustment either as to plate or filament. Filament consumption one quarter of an ampere.

The most notable feature of the new Magnavox Radio Tube consists in eliminating the grid.

Unlike the ordinary storage battery tube, Magnavox Tubes give the electrons an unobstructed passage between filament and plate, with the result that the Magnavox has less than one half the internal capacity of other tubes of similar type.

Magnavox Products

Reproducers of electro-dynamic and semi-dynamic type, for all vacuum tube receiving sets; $25.00 to $50.00

Combination Sets combining a Reproducer and Power Amplifier in one unit; $59.00, $85.00

Power Amplifiers for audio-frequency amplification, one, two, and three-stage; $27.50 to $60.00

Vacuum Tubes: A storage battery tube of new and approved design for all standard circuits . . . $5.00

Magnavox Radio Products are sold by reliable dealers everywhere. If unacquainted with the Magnavox store in your vicinity, write us for information.

The name Magnavox is your assurance of quality and efficiency.

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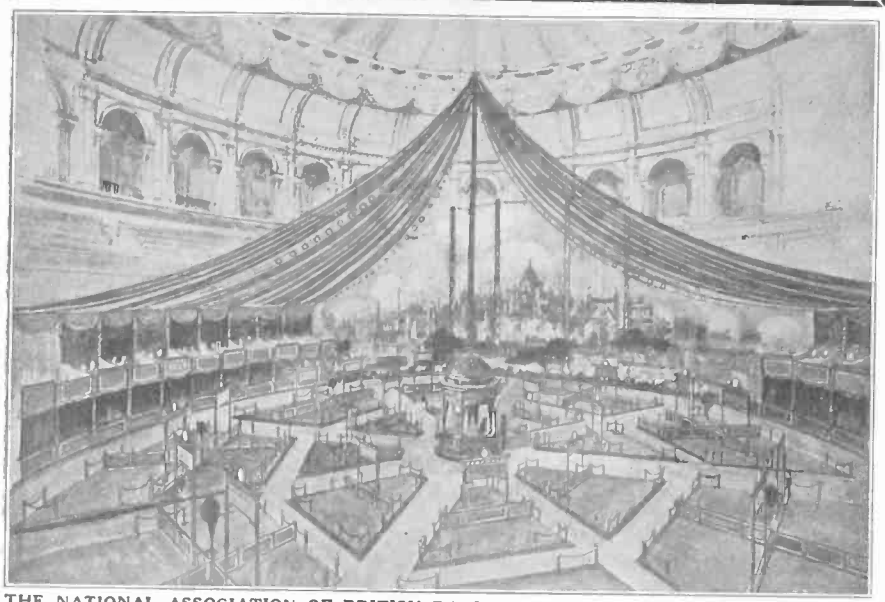
9R

The Radio Trade



THE NATIONAL ASSOCIATION OF BRITISH RADIO MANUFACTURERS will hold an exhibition in Albert Hall, London, September 27 to October 8. Photo shows the floor plan, which the promoters think is quite the thing. And it certainly looks good. American exhibition managers say that the floor layout for the four exhibitions to be held n New York Cty this Fall and Winter will surpass the British effort. Nevertheless they are studying the above arrangement.

HOOVER ADDRESSES PACIFIC EXHIBIT

ADDRESSING the Pacific Radio Exposition, held in the Civic Auditorium, Secretary of Commerce Hoover, in an address radiocast by KPO, said that the proposed conference to standardize the industry will be comprehensive. The conference, he said, "will shape positive and exact rules for the benefit of the radio game. It is expected the conference will begin in October and the date will be announced very soon. It will be held in Washington under the auspices of the Department of Commerce.

The commodious auditorium presented a brilliant appearance with its multi-colored decorations and lighting effects which served to add a vivid background to the elaborate displays of radio sets, accessories, and transmitting apparatus which were arranged in over 200 booths and sections in every part of the building.

Among the concerns exhibiting at the show were the following: F. A. D. Andrea, Inc., Magnavox Co., Eisemann Magneto Corp., Atlantic-Pacific Agencies Corp., Great Western Radio Corp., Carter Radio Co., Western Electric Co., Radio Corporation of America, Pacific Radio Publishing Co., Inc., Baldwin Pacific & Co., Parkin Mfg. Co., The San Francisco "Examiner," The San Francisco "Call-Post," Frederick H. Thompson Co., The Rolla Co., American Radio & Research Corp., Olin S. Grove Co., Prest-O-Lite Co., Sadler Mfg. Co., Quality Radio Co., Globe Commercial Co., Apco Mfg. Co., Wholesale Electric Co., R. E. Thompson Mfg. Co., Day Radio Labs., De Forest Radio Tel. & Tel. Co., National Carbon Co., Inc., Gallagher & Eiferle, Electric Storage Battery Co., The Spector Co., Acme Apparatus Co., Alden Mfg. Co., C. Brandes, Inc., C. D. Tuska Co., Colburn Radio Lab.

Kilbourne & Clark Mfg. Co., Durkee Thomas Products Co., United Radio Supplies Co., F. L. Tomlinson Co., Chelsea Radio Co., Modern Electric Mfg. Co., Radio Units, Inc., Ross Braid Co., Hartford Instrument Co., Electric Products Mfg. Co., Cannon Miller Sales Co., E. T. Cunningham, Inc., Remler Radio Mfg. Co., Zemansky & Fass., Dept. of Electricity, "Radio Pioneeers" Assoc., San Francisco Radio Club, Inc., L. A. Music Trade Association, Pacific Radio Trade Association, Herbert H. Frost, Peerless Radio Co., A. S. Lindstrom, Dudlo Mfg. Co., Sleeper Radio Corp., Sansom Electric Mfg. Co., Fansteel Products Co., Inc.

Precise Mfg. Co., Kellogg Switchboard Supply Co., The Radio Shop, Braun Corp., Freed-Eisemann Radio Corp., Warner Bros., Jefferson Electric & Mfg. Co., Zenith Radio Corp., Dunham, Carrigan & Hayden Co., Gilfillan Bros., Inc., Amsoc Products, Inc., Willard Storage Battery Co., Julius Brunton Co., Weston Electric Instrument Co., Rudolph Wurlitzer Co., Carl A. Stone Co., Shamrock Mfg. Co., Chelten Electric Co., Dubilier Condenser & Radio Corp., Marshall & Co., H. Earle Wright Co., Radio Art Studio, Automotive Service Co., Atwater-Kent, California Photograph Co., Keeler White Co., Wm. J. Murdock Co., Kennon Radio Labs., Offenbach Electric Co., H. F. Haverkamp.

Conrad Richter, Chester N. Weaver Co., Lee Electric & Mfg. Co., W. A. Vetter, Reliable Radio Service, Federal Telegraph Co., Electric Appliance Co., Alexander & Lavenson Electric Supply Co., Universal Agencies, Work-Rite Mfg. Co., Schwabacher-Frey Co., Eagle Radio Co., Garod Corp., Heintz and Kohlmoos, B-Metal Refining Co., Maitland and Spencer Roach, Martin Copeland Co., Experimenter Pub. Co., Inc., California Electric Supply Co., Kingston Radio Co., Goodyear Rubber Co., Marathon Radio Co.

A-C Electrical Mfg. Co., Aerovox Wireless Corp., American Art Mache Co., Auburn Button Works, Auto Indicator Co., Alpha Radio Supply Co., Automatic Electrical Devices Co., Baker Smith Co., Inc., Best Mfg. Co., Brooklyn Metal Stamping Co., Bell Mfg. Co., Bosserman Radio Labs., Braun Corp., Bristol Co., Christian Science Monitor, Columbia Radio Corp., Clapp Eastham Co., Como Apparatus Co., Connecticut Instrument Co., Chronicle, Dudlo Mfg. Co., Dayton Fan and Motor Co., Dixie Supply Co., Dodson and Dodson, Diamond State Fibre Co., Department of Commerce, United States Radio Service, Durham & Co.

Eby Co., Electrad, Inc., Electrical Supply Co., Electric Sales Corp., Electrose Mfg. Co., Electric Research Labs., Eastman Co., Charles H. Freshman, Federal Telephone and Telegraph Co., Garnett-Young Co., Gibson and Glamze, General Radio Co., Gardiner and Hepburn, Golden Gate Brass Co., Hart & Hegeman, Hartsell Sales Co., Heath Radio & Electric Co., Hammarlund Mfg. Co., Hale Bros., Inc., Jackson Co., W. E. Jackson Jewell Electrical Instrument Co., Howard B. Jones, Kardon Products Co., Kodel Mfg. Co., Klosner Improved Apparatus Co., Lagbein and Kaufman, Liberty Transformer Co., Marion Electrical Co., Muter Co., Multiple Electrical Products Co., Morrison Labs., Meyerburg Co.

Martin-Copeland Co., Mitchell Co., Marshall & Co., National Radio Trade Association, Niagara Sales Corp., Norris-Allister-Ball Co., Offenbach Electric Co., Pathe Phonograph & Radio Corp., Patton-MacGuyer Co., Puritan Distributors, Philadelphia Storage Battery Co., Portal Co., Practical Electrics, Radio Dealer, Radio Manufacturer, Radio Manufacturers Agents, Association of Southern California, Radio Headquarters, Radio Club of San Francisco, Radiall Co., Radio Equipment Co., Radio Products Mfg. Co., Radiogram Corp., Reliable Parts Mfg. Co., Ritter Radio Corp., P. C. Rubold, Radio Receptor Co., Radio News, Radio Shop, Rice-Hitt Co., Samson Electric Co., Simplex Radio Co., Sargent Co., Stevens & Co., Shickerling Products Co., Stentofore Co., Springfield Wire and Tinsel Co., Signal Electric Mfg. Co., Spartan Electric Corp., Frank Smith, Science and Invention, Stromberg-Carlson Telephone Mfg. Co., Thornton & Everest, Transtrom Mfg. Co., Thor Radio Co., Tribune, United Scientific Labs., Universal Agencies, U. C. Battery and Electric Co., United Mfg. and Dist. Co., U. S. L. Battery Co., United States Navy, Van-Le Corp., Walbert Mfg. Co., Walker Co.

Literature Wanted

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

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

Name .....

City or town .....

State .....

J. L. Albert, 2750 W. Adams St., Chicago.
Fred Marconi, Jr., 1169 Dufferin St., Toronto, Ont.
Wm. Ritzert, 8909 Crane Ave., Detroit.
Karl Brandt, 17 Pearl Ter., Cambridge, Mass.
Clyde T. Jones, 74 S. 19th St., Pittsburgh.
Frank Murphy, 193 Springdale Ave., Meriden, Conn.
L. B. Dean, 1540 5th St., Alameda, Cal.
E. Sullivan, care Saenger Theatre, Texarkana, Texas.
H. B. Hull, Box 671, Dayton, O.
Theo. E. French, Montgomery, Minn.
Guy K. Fuller, Bicknell, Ind.
Miller Radio Co., Richmond, Va.
C. W. Johnson, 4628-30 Avenida 63, 9th Floor, Havana, Cuba.
Chas. H. McLain, Box 92, Oak Hill, W. Va.
R. O. Humbert, 92A Calle Secortamelenes, Havana, Cuba.
J. P. Neighbers, Caddo, Okla.
Rel Ross, Booneville, Ark.
Robt. H. Layman, 702 W. 6th St., Bloomington, Ind.
J. P. Hauer, 1440 Summit Ave., St. Paul, Minn.
A. F. Hierommus, Jr., 700 Cherry St., N. E., Canton, O.
Geo. L. Schmidt, Salem, Mass.
A. E. Hodson, 139 Rawson St., Farnsworth, Lancashire, England.
M. L. Lujan, 255 W. 80tth St., Los Angeles.

Coming Events

SEPT. 22-28—First Annual Radio World's Fair, Madison Square Garden, New York City.

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

OCT. 4-11—Radio and electrical exhibition by the Radio Institute, 309 West Cordova St., Vancouver, B. C.

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

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

DEC. 1 TO 6. INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

Business Opportunities Radio and Electrical

Rates: 40c a line; Minimum 3 lines.

ESTABLISHED RADIO MANUFACTURER wants live wire take financial interest in business; must be bookkeeper, stenographer; curiosity seekers don't apply. Box 999, RADIO WORLD.

WE ARE radio and electrical parts manufacturers, with excellent Dun and Bradstreet ratings and banking references; established five years; our business last year was over $180,000.00; we have exceeded this amount so far this year and will do over $400,000.00 for the entire year; unfilled orders on hand now total $120,000.00. We require additional capital to increase quantity production and will accept a few partners with funds in limited amounts. Complete details will be given those interested by addressing P. O. Box 35, Trinity Station, New York City.

MANUFACTURERS' REPRESENTATIVES, old-established producers, invite correspondence from progressive manufacturers requiring productive sales representation for domestic and export trade. 504 Tribune Building, New York.

WHAT

do you think of the advance programs published in RADIO WORLD? Are they serviceable to you? If not, why not? If so, how much? YOUR views will be appreciated. Mail replies before September 15, 1924.

Address PROGRAM EDITOR, Radio World, 1493 Broadway, New York City.

An autographed photo of "Roxy" (S. A. Rothafel, WEAF) will be sent to everyone replying.

Message Awaited from Mars

Two-Way Talk a Success at Night in Aero Test

UNDER the auspices of the Army, a De Haviland airplane, equipped with a receiving and transmitting set, and piloted by Lieut. S. M. Connell, flew from Mitchel Field, L. I., at night and radiocast to a special apparatus equipped with loud speakers erected at Palisades Amusement Park, N. J., also receiving messages from the ground through WHN station. Lieut. Howard Brandt radiocast from the plane. Announcer N. T. G. (N. T. Granlund), and Lieut. F. L. Rash, Camp Vail, N. J., will handle the ground work. This was the first such occasion that a night flight was made by a "radio plane." The experiment was under direction of Commanding Officer W. N. Hensley, Jr., of Mitchel Field.

Conversation was carried on successfully for about half an hour, the plane being 4,000 feet above the park and out of sight. When finally, near the end, the plane came within 500 feet and the crowd saw it plainly, cheers resounded, these being heard in the plane because they were radiocast.

Two program receiving sets were on the bandstand in the park. One of these was used for receiving the voice messages from the plane on 324 meters. These were amplified by power AF and 1,000 persons present heard the messages. A telephone land wire, with mouthpiece near the horn, delivered the messages to WHN station, Broadway and Forty-fifth street (just across Broadway from RADIO WORLD's office). From WHN the messages were radiocast on its usual 360-meter wave. When talking was done from the park the voice was delivered into the telephone mouthpiece and into the local amplifier and got to the crowd and the station as in the case of speech from the plane. Thus persons within 150 miles were able to hear the plane on 324 meters (generator hum and propeller whirring included) but could not hear the two-way communication. That could be heard only on the WHN wave because only on that wave was N. T. G.'s voice carried by land wire and then transmitted from WHN.

A FREAK HOOK-UP

U. S. Warns Against Deceptive Schools

WASHINGTON.

HUNDREDS of persons of limited means are enrolled each year in so-called civil-service schools, under the erroneous impression that they will receive lucrative positions in the government service upon the completion of a course, the success of which is "guaranteed." The U. S. Civil Service Commission and National Vigilance Committee have issued a warning against coaching courses for government positions, denying that any "school" of this kind has any connection with any branch of the government and declaring that "no school can give advance information regarding examination questions." It is understood that a number of complaints have been received regarding alleged "radio schools" offering to teach construction and operation of a limited number of lessons and which have fallen short of making "honor students" of ambitious individuals.

When feeling for loose joints, take off your ring to avoid the possibility of getting the B battery current into the tube filament. Do not use a screwdriver or similar instrument for testing.

Four Strange Dashes Heard Regularly in London and Vancouver Puzzle Scientists Trying to Reach Planet.

LONDON.

STRANGE noises heard at 1 a. m. one recent day were the mysterious reward of scientists trying to hear Mars.

The attempt was made on a twenty-four tube set erected on a hill at Dulwich. Representatives of the Marconi Company and of London universities were present.

Tuning in started at 12:30 a. m., and at 1 a. m., on a 30,000-meter radius, sounds were heard which could not be identified as coming from any earthly station.

VANCOUVER, B. C.

The regular signals blotting out other messages, which have led radio experts here seriously to consider the theory that Mars is trying to "tune in," were received at the Point Grey wireless station again today, and also were heard by the wireless expert of the Merchants' Exchange.

"The signal has been noticed at the same hour practically every day for four weeks or more," declared C. W. Mellish, wireless operator at the Government station at Point Grey. "It is absolutely distinctive and cannot be attributed to any known instrument, or to static or to leaking transformers in Vancouver."

The signal, which dominated the air lines, was heard at 6:20 and at 7:12 a. m., at the same time to the minute that they came in on the previous days. It again came in four groups of four dashes so powerful that they could not be tuned out.

The sounds had not been considered seriously by the operators until recently, Mr. Mellish stated.

WASHINGTON.

William F. Friedman, Chief of the Code Section in the office of the Chief Signal Officer of the Army, was standing by ready to translate any peculiar messages that might come by radio from Mars.

Pictures on page 16

Radio Conference Open to Public

WASHINGTON.

ANNOUNCEMENT was made by Secretary of Commerce Hoover of the calling of the Third National Radio Conference for the Better Voluntary Regulation of Radio. The Conference will be held at Washington, beginning September 30.

Two such conferences have already been held, one in February, 1922, the other in March, 1923. The growth of radio, and particularly the multiplication of stations and the consequent congestion of the air, has made necessary a consideration of many subjects and perhaps a revision of some present methods, it was sadi. Some of the matters which will be discussed and considered at the conference are:

Revision of the present frequency or wavelngth allocations, to reduce interference; use of high frequencies or short waves; classification of stations; possible discontinuance of Class C stations; interconnection of stations; limitation of power; division of time; zoning of stations; means for distinguishing the identity of amateur calls from foreign countries; interference by electrical devices other than radio transmitting stations, and relations between government and commercial services.

To facilitate the work of the conference the various groups in the radio field will be asked to name representatives who will constitute the formal advisory committee of the conference. As at present planned the groups to be represented will be as follows: Listeners, Marine Service, radiocasting (one from each inspection district); engineering, transoceanic communication, wire inter-connections, manufacturers, amateurs, point-to-point communication, Government departments.

The committee so constituted will hold public hearings. All persons or organizations having suggestions are urged to attend.

Some of the matters suggested for consideration are not within the regulatory control of the Secretary. As to such matters, any conclusions reached by the Conference can become effective only by voluntary adoption by the interests affected. As to the features falling within the powers of the Secretary the recommendations of the conference will be advisory to the Department.

Financiers Interested In Radio World Fair

THE First Radio World's Fair to be held under the direction of James F. Kerr and U. J. Herrmann in Madison Square Garden and the 69th Regiment Armory, New York City, Sept. 22nd to 28, is rapidly assuming an international importance which promises to make it an epochal event in the history of radio. The fair may serve to establish the radio business on a financial basis similar to that now enjoyed by the automobile industry.

More than a dozen important European and American financiers will begin extensive surveys of the wireless field at the First Radio World's Fair and if they are duly impressed scores of able inventors and manufacturers who are now handicapped by a lack of capital may soon find themselves in a position to expand.

THEIR RADIO REPUTE AIDS THE FRANKS AND HAPPINESS BOYS

FRANK WRIGHT and Frank Bessinger, song pluggers for a music publishing house and known as the Radio Franks, are now recording for a phonograph company under the name of The Radio Franks.

Billy Jones and Ernest Hare, two veteran disk artists, who have been radiocasting as the Happiness Boys, are also burying their individual identities in favor of the radio billing.

The Franks are reported having asked $350 weekly for a cabaret engagement.

Cousin Ayeno to Woo DX with Geisha Girl Set

(Collect)
SANFRANAUG 2724 24 X1I2G1I479
Eletto Oatanno,
Care Laundry Low Prices,
Continental Hotel, Salt Lake City, Utah.

Have perusal most interesting letter care in of RADIO WORLD respective paintings most fine Japanese artist front magnificent radio set stop Will take most Christian advice bible and go do likewisely stop Will let you know handsomest results if some stop hope also get most lovely Geisha girl and may be perhaps tremendous outburst big Yamashayto volcano so often busy our hon. country stop most elegant American lady telegrammer who so graciously take this telegram say I make too many words stop I say her my hon. cousin very successful merchant tea fans and kimonos most reasonable prices and so I truthfully can orate and most fully stop write pay own poster stamp how you get one tube I difficulty get Sacramento four tubes stop will telegram you results how noise hits eardrums when my elegant set all dressed up frontwards stop pay this not wireless telegraph which make you much more appreciate

AYENO TAMMAYATO Per H
Not far Nob Hill S. F.

This postscripter extra money charge so I can say I send noble regards and Valentino love your lovely sister Eshiyama stop show her truly this hotspeed telegraph when immediately following you pay rush boy this message.

NEWS OF STATIONS

THE Los Angeles Evening Express Radio Station will "go on the air" for the first time during the first week in September.

WORK on the studio of station WEEI, Boston, is rapidly nearing completion, and it is expected that the station will go "on the air" early next month. WEEI, which is operated by the Edison Company, will have a power of 500 watts and will radiocast on the 303-meter wavelength.

I Prefer Mica Dielectric

By Richard Ross

IT is generally conceded by all radio engineers that air is the best insulator that can be used. It might be said that any gas is the best insulator for air contains oxygen, hydrogen, helium, argon, etc., in a very even mixture.

When we are comparing air as an insulator with any solid material such as hard rubber, Bakelite, porcelain, etc., we are not making a proper distinction between equivalents because the air used very seldom is the insulator, but only may extend into part of the field, whether that field is magnetic or capacitive.

For example, we may say that a huge switch used in a power house is insulated by air when it is mounted on a solid Bakelite panel. It is true that as long as the switch is open the air is insulating the contacts, but if we close the switch and allow a heavy current to flow through it, the moment we endeavor to open that switch the current may flash across and in fact break down the air completely.

That is why air as an insulator is good for certain types of work. In the case of the power switch, it has been found necessary to submerge many switches under coil. This is because of the arcing across the contacts when a circuit is made and broken.

As a matter of fact, the real insulation on the switch is the Bakelite on which it is supported and across which the potential stresses exist at all times.

When we talk about air being used as dielectric or insulation of a variable condenser, we are not scientifically accurate if we do not specify in what manner the condenser walls are separated. In every instance you will find that while air is used in the field of the condenser it is not the insulator for the walls.

The question has arisen whether or not air does furnish the best dielectric for a variable condenser. In the first place there is no standard or fixed equivalent or formula for air. It contains variable quantities of different gases, as well as varying quantities of moisture.

The air in the vicinity of some large industrial centers carries an enormous amount of soot and dust which in itself is a menace to any delicate measuring apparatus which is not absolutely sealed in.

In the vicinity of some chemical plants highly corrosive gases are allowed to leak into the air which are so active that they have been known to destroy all vegetable life in the vicinity, and anyone living in a city can generally be sure that the composition of the air in his neighborhood will be at best saturated with a great deal of dust and gases from thousands of heating plants, etc.

Even assuming a certain average composition for air, we cannot neglect the fact that it carries a very considerable amount of moisture under normal conditions. This moisture is a desirable part of the air mixture, as far as having a tendency to increase the specific inductive capacity of air and making it receive a much higher charge of electrical energy, but the serious effects are always in evidence on the separate insulation where the moisture will always collect on the surface, affording short circuiting paths across terminals.

A factor often overlooked is that air, being a very good insulator, forces the electrostatic charges to seek paths of escape through the solid insulation.

Certain interesting tests have been performed to show that for average operating conditions mica affords a much better dielectric than air. Mica has a high inductive capacity, that is, it will absorb and unspend a greater amount of electrical energy than any other dielectric, and at the same time has a higher break down strength than any other insulator. Its mechanical characteristics are especially valuable, being semi-flexible, light and it must be used in flat sheets.

No New Radiocasters in Three Weeks

By Carl H. Butman

WASHINGTON.

NO applications for radiocasting licenses have come to the Department of Commerce in three weeks. This is the first time in the history of the now popular game that this has occurred. The fact that no new concerns or institutions seek licenses is held as the answer that there are enough now—544 stations in operation and 54 of them of the high-powered Class B stations. About a year ago there were 591, and certainly the situation is better today than ever.

The big radio interests, manufacturers, and many retailers and educational institutions will never stop; the good will and advertising are too valuable. Churches, theaters and some business organizations find it profitable in one way or another and will continue to function. Some private and smaller stations may close down.

The only thing to be regretted in the present situation is the distribution of stations. Some communities, like New York, have a dozen stations, while another center has a single station or none at all. However, the more powerful stations are solving this difficulty and it is doubtful if there are many spots in the United States where some stations cannot be picked up on a fairly good set.

BEAT INTERFERENCE PRODUCED BY RADIO TRANSMITTING STATIONS

ONE type of interference to radio reception that is sometimes noticed is the constant pitch whistle produced by the "beating" of the carrier waves of two transmitting stations. However, the Bureau of Standards says that the assignment of frequencies to the Class B broadcasting stations is such that this interference should not occur. Radio supervisors assisted by the Bureau of Standards are doing their best to set and keep transmitting stations on their assigned frequencies and so eliminate this type of interference. If radio listeners will identify any two stations producing beat interference and report them to the Supervisors of Radio, Bureau of Navigation, it will help very much in this work.

Letters from Our Readers

EDITOR, RADIO WORLD:

THE editorial in RADIO WORLD of July 26, "Radiocasting of Franks Murder Trial a Vicious Idea," was read before the members of the Radio Club, and every one approves your editorial heartily. We unanimously disapprove of such stuff on the radio. We think that radio should work for the betterment of folk, for their entertainment and their instruction, but not to disseminate such sordid things as murder trials, which are disgusting, and this last word does not adequately describe our idea of the subject.

THETFORD RADIO RESEARCH CLUB,
Thetford Mines Co., Megantic Canada.
ALPHY BLAIS, President.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

5 CENTS A WORD. 10 WORDS MINIMUM. TELEPHONE YOUR CLASSIFIED IF IN A HURRY.
RADIO WORLD'S PHONE NOS. ARE LACKAWANNA 2062-6976.

FOR SALE—Western Electric loud speaker and power amplifier; used very little. $100.00. J. M. Abbott, Wapinitia, Ore.

FOR SALE—4 tube Superdyne, $35.00; genuine Tuska Coils. Edward Tischler, Plymouth, Penna.

AGENTS WANTED TO ADVERTISE OUR goods and distribute free samples to consumers; 90c. an hour; write for full particulars. American Products Co., 2144 American Bldg., Cincinnati, O.

THE WORLD'S LARGEST DOG KENNELS offer for sale Oorang Airedale watch dogs, automobile dogs, children's companions, farm dogs, stock drivers, hunters and retrievers. Also Big Game Hounds, Coon Hounds, Fox Hounds, Rabbit Hounds and thoroughbred Hounds, and Airedale puppies. Satisfaction and safe delivery guaranteed to any point in the United States. Large illustrated, descriptive catalog mailed free. OORANG KENNELS, Box 139, La Rue, Ohio.

AN ALL-AROUND PORTABLE for Home or Outdoor Use, by Herbert E. Hayden. Three tubes. Send 15 cents for copy of Aug. 16 issue, or start your subscription with that number. Radio World, 1493 Broadway, New York City.

M. B. SLEEPER'S DESIGN DATA FOR RADIO TRANSMITTERS AND RECEIVERS—Sent postpaid on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

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.

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

WIRELESS IN THE HOME. By DeForest. Sent postpaid on receipt of 15c. The Columbia Print, 1493 Broadway, N. Y. C.

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

RADIO WORLD'S CLASSIFIED DEPARTMENT. If you want to buy, sell or exchange anything, use RADIO WORLD'S Quick-Action Classified Department, 5 cents per word, 10 words minimum. RADIO WORLD, 1493 Broadway, New York City.

PATENTS—SEND DRAWING OR MODEL FOR EXAMINATION AND OPINION. Booklet free. WATSON E. COLEMAN, Patent Lawyer, 644 G Street, Washington, D. C.

SUPERHETRODYNE FILTER. Eliminates noises and distortion. An essential finishing touch. Consists of choke coil, non-inductive resistors and diagram, $6.25. RADIO CENTRAL, Abilene, Kan.

SPECIAL SUPERDYNE CONDENSERS, transparent, enclosed, $3.50 each. Complete (Original Specification) Coil set, $4.00. Pauer, 152 Dewitt St., Buffalo, N. Y.

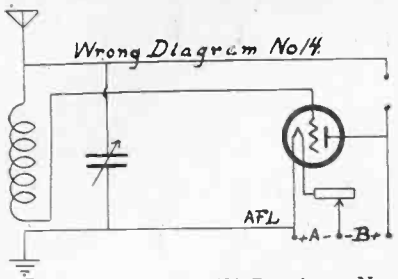
COMMERCIAL TYPE RADIO APPARATUS, by M. B. Sleeper. Mailed on receipt of 75c. The Columbia Print, 1493 Broadway, N. Y. C.

THE 3-TUBE SUPER-HETERODYNE by A. F. Laplerre, consulting engineer. It functions without any detector. Complete construction article, with diagrams, in Radio World, issue of Aug. 2. Send 15 cents for a copy or start your subscription with that number. Radio World, 1493 Broadway, N. Y. C.

BE A DETECTIVE. Work home or travel. Experience unnecessary. Write, Dept. 171, American Detective System, 1968 Broadway, N. Y.

WHAT'S WRONG HERE?

THE wiring in the accompanying diagram is wrong. If you find what you think is the error, write to Wrong Diagram



Editor, RADIO WORLD, 1493 Broadway, New York City. Mention Wrong Diagram

RESULTS

WHAT Results Did You Obtain from Constructing Sets or Parts Following Data Published in Radio World? Write to Results Editor, Radio World, 1493 Broadway, New York City

RESULTS EDITOR:

YOU will no doubt recall my former letter in which I advised you of the success I had with the hook-up outlined by Herman Bernard in your issue of July 12, the article entitled "A 1-Tube Set You Can Log." With it I have repeatedly brought in Springfield, Mass., and Jefferson City, Mo., as well as WHAS at Louisville, Ky., the first Southern station I have ever been able to bring in on any set.

However, I will not take up your time extolling the merits of a set which you already know to be a knockout, but will relate an experiment which I made with it. I had equipped my set with one stage audio and was quite satisfied with it until I read Mr. Bernard's second article, "1,500 Miles on Two Tubes," in the July 26 issue, in which he hooked up a stage of RF. However, I did not like the idea of the extra controls so set out to see if I could make it work with the same number as before, yet embodying one stage of RF.

I therefore removed my grid condenser from the first tube and made direct connection to the tube. Also I removed the audio transformer and in its place installed an Acme R-4 RF transformer, making a connection from L2 to the P and from the G to A .0005 grid condenser and leak to the G of the second tube. To my surprise, signals came in even louder than before.

Can you suggest a way by which I can reflex the first tube so as to use my audio transformer?

H. T. HADDEN,
P. O. Box 621, Bluefield, W. Va.

[*Mr. Hadden's query is answered in the Radio University, this issue.*]

* * *

RESULTS EDITOR:

I BUILT the 1-dial set described by Herman Bernard in the August 9 issue of RADIO WORLD ("Playing With the Kiddie Kar of Radio," Fig. 5). I got nine stations in less than an hour—KWKA, WGN, WLS, WLW, WOS, WHAS, WEBH, WTAM and KSD. I wound my coil in the Dynocoil fashion. I used a $1.75 condenser and a socket I made out of a grease cup. I like the circuit very well and am going to make one with good parts. I. SKELTON,
34 E. Lyndale Ave. Vincennes, Ind.

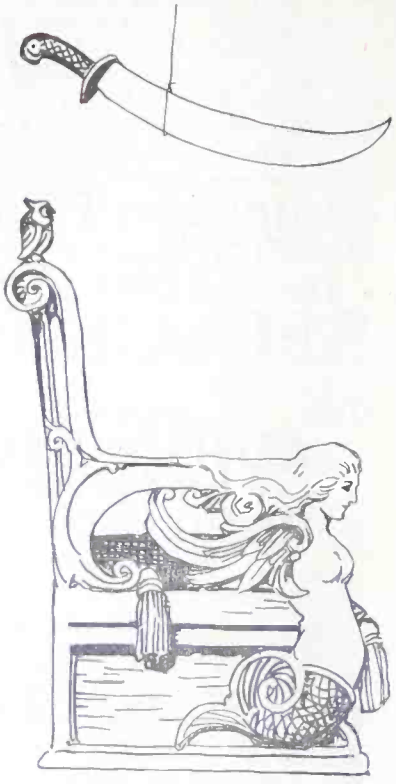
[The Dynocoil referred to is described in the same issue by N. N. Bernstein in his article, "Tube and Crystal Set Works Loud Speaker."]

POLAND STILL AT IT

ANOTHER warning has been issued by Poland calling attention that the installation of radio receiving and transmitting sets is forbidden by the Government.

Fast Progress

ONLY a few months ago radio experts would have laughed at the idea of working even close by locals with any success on a loud speaker with a 1-tube set. But now it is an accomplished fact and RADIO WORLD is glad to have been the one to present the circuit to the public in its August 9 issue.



RADECO FOR SECURITY

Thin threads of chance are all that separate your tubes from destruction

Like Damocles, seated under the sword suspended by a single hair, your tubes, unless protected by RADECO SAFETY FUSES are always in danger.

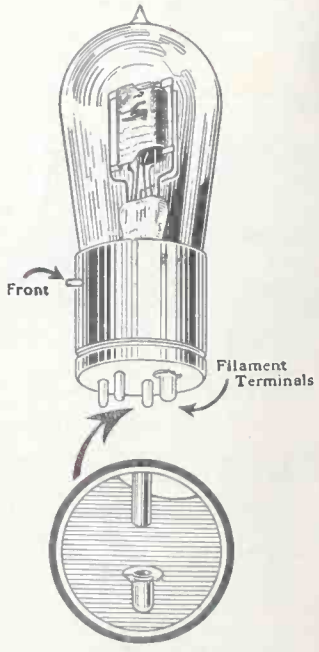
Many Radio users forget the tremendous losses from tubes needlessly blown out. Conservative estimates place this unnecessary loss at 91½% of all tubes.

RADECO SAFETY FUSES

offer absolute protection at negligible cost.

They have been approved by the leading scientific authorities. They are the only fuses which slip on the filament prong of the tube and protect it against all causes of blow outs.

RADECO FUSES are 50 cents each. Only one is necessary for the protection of the tube. If your dealer cannot supply you, order direct. Fuses will be sent post paid. In ordering, state type of tube used.



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