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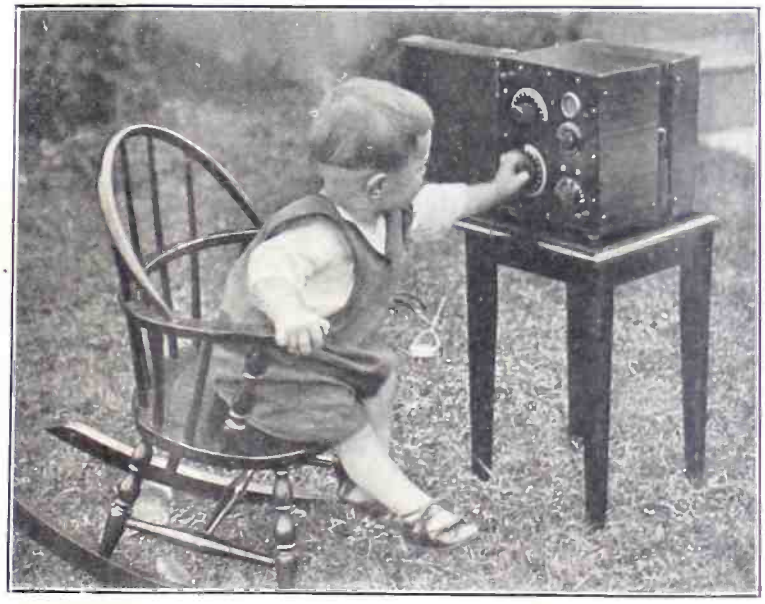
A SET A BABY CAN BUILD

By Herbert E. Hayden



"SOME BABY"—The parents may think this applies to the child exclusively, but probably impartial outsiders will consider the descriptive phrase deservedly applicable to both the child and the set, after they have constructed the hookup. (Fig. 1).

THE 1-DIAL, 5-TUBE POWERTONE

WGY's Test of 50,000 Watt Transmission

A HANDY METER SWITCHBOARD

RADIO WORLD

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The 1-Dial Powertone

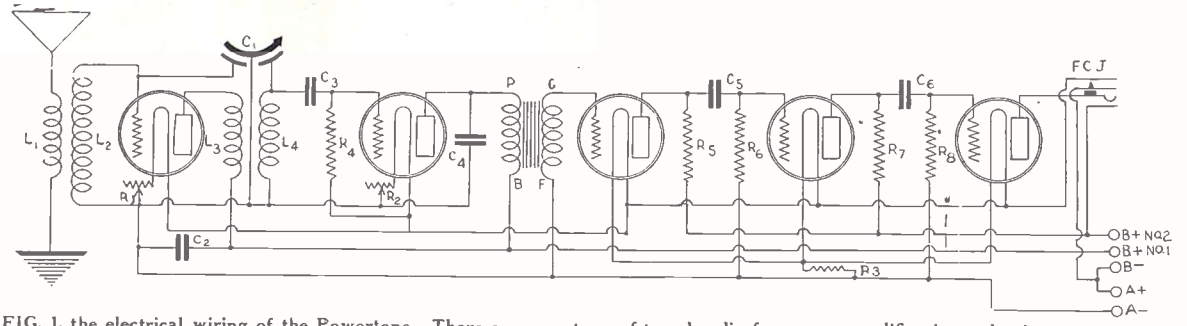


FIG. 1, the electrical wiring of the Powertone. There are one stage of tuned radio-frequency amplification, tube detector, one stage of transformer-coupled audio and two steps of resistance-coupled audio. The rheostat R1 controls oscillations very successfully. A double condenser tunes both the RF and detector input coils, L2 and L4, thus affording an efficient single-control set.

One Stage of Tuned RF Made to Do All That Two RF Steps Perform in Most 5-Tube Sets—The Tube Thus Saved Is Put in the Audio Circuit, to Afford the Finest Possible Richness of Tone.

By Herman Bernard

Associate, Institute of Radio Engineers

IT has always been my theory that the manner in which two stages of tuned radio-frequency amplification are included in many sets today does not give any greater amplification than would a single low-loss tuned stage. The losses encountered in the Neutrodyne, for instance, are due partly to the presence of the neutralizing capacities, whereby the set is stabilized for a low wavelength, where over-oscillation otherwise would be a vice, while the higher wavelengths suffer. The neutralization adjustment is made just once whereas greatest efficiency is obtainable only when the tubes are permitted to come just below the oscillation point for any wave length. In the Neutrodyne (which is nevertheless a fine set) the proximity to the oscillation point on the higher waves is not nearly what it should be. Therefore some adjustable control is necessary for attainment of highest efficiency over the whole wavelength belt.


Herman Bernard

Fixed Stability Is Easy

Now, in the present circuit, called the Powertone, you may have Neutrodyne results or you may go considerably beyond that, just as you choose. All you need do, for instance, to have your set strictly one-control is to set the RF rheostat, R1, so that the lowest wavelength station comes in without over-oscillation. Then you may be sure that the other stations you receive, irrespective of wavelength, will be tuned in with quietness. To achieve that you make some sacrifice, but for reception within a few hundred miles of a station you can fare comfortably and sucessfully in that manner. But suppose you want to adjust volume? and suppose a station's carrier wave can be sensed by your receiver, and yet you cannot hear the program? You turn up the rheostat R1 just a little and the tube it governs seems to gain new life. Indeed, the amplification at radio frequencies increases several hundred times by proper adjustment of this rheostat, while the volume is controlled with the same motion. The whole set seems to center about this rheostat. Hence, even for operation at maximum efficiency, you use your dial for wavelength tuning and the RF rheostat for oscillation and volume control. The rheostat functions with great success in that manner, although solely theoretical considerations (innocently apart from laboratory proof), might lead some to suspect otherwise. Great distances may be covered with this set, using a moderate-sized outdoor antenna. The aerial wire itself need not be more than 65 feet. If you can avoid using more than a total of 35 feet for the leadin and the connection from ground (say, cold water pipe) to set. do so. However, the set is selective enough to withstand a longer aerial.

The tuning is done solely with the double condenser, C1, which varies the capacity equally for its two sections, although there is only one motion. This is due to the common rotor. If the set is made as specified there need be no trouble about failure to get the same frequency for both sections at a given dial reading.

The set, therefore, on the RF side, does all that can be expected of any receiver using no more than five tubes. The tube gained on the RF side was utilized in the audio circuit.

As the set may be encompassed on a 7x18" panel, this possibility will appeal to space conservationists.

LIST OF PARTS

Two RF transformers, L1L2, L3L4.

One .001 mfd. double condenser, two sections, each .0005 mfd.; C1.

One 7x21" panel.

Two 20-ohm rheostats, R1, R2.

One ballast resistor, R3.

Two .1 megohm resistors, R5 and R7.

Three grid leaks: R4, 2 megohms; R6, .1 megohm; R8, .5 megohm.

Five fixed condensers: C2, C4, .001 mfd. each; C5, C6, .006 mfd. each; C3 (grid condenser), .00025 mfd.

One 4" dial with pointer.

One audio-frequency transformer, PBGF.

One single open-circuit filament-control jack, FCJ.

Five sockets.

One socket strip (otherwise use a baseboard 7x20" baseboard).

One terminal strip or six separate terminal binding posts.

Accessories: Five storage battery tubes, one storage battery of 100 ampere-hours or more; two 45-volt B batteries, one speaker, 100 feet of aerial wire, 50 feet of lead-in wire, ground clamp, lightning arrestor, one jack plug for speaker tips, cabinet.

The Coils For the Set

The single-layer solenoid coil was used in the circuit. The 3½" diameter form may be employed. The wire is No. 24 silk over cotton. If that is not easily obtainable use No. 22 single cotton covered. Both coils are wound alike. Each form is at least 3½" high, preferably 4". Wind 10 turns near the top of one form. This is the aperiodic primary, say L1. Leave ¼" space and wind 43 turns for the secondary. Each of the four terminals (two of primary and two of secondary) is secured to the form. If bakelite, fibre or even cardboard is used, then two tiny parallel holes may be punched. The wire is threaded through these. Naturally the holes to secure the beginning of the primary will be made before the winding is started and the holes to keep the end in place will be made after the ten turns are put on. The same procedure is fol-

Why the Set Has Rich Tone

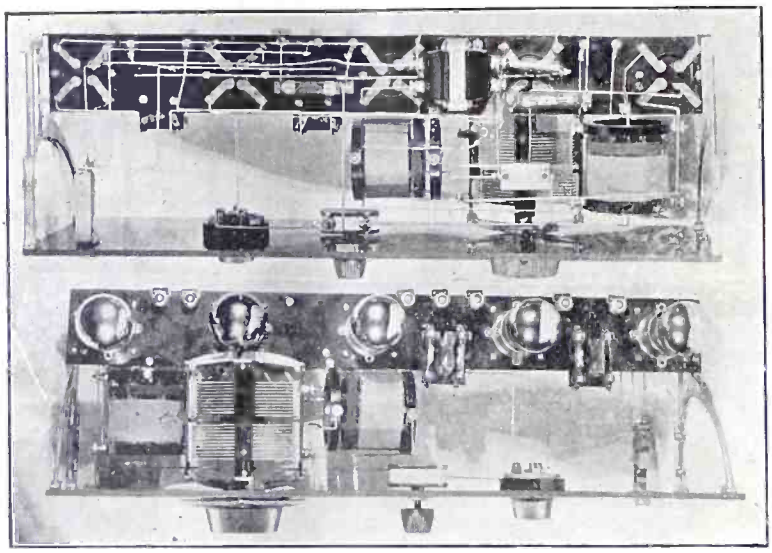


FIG. 2 (top) is a view of the bottom of the set. The lower photo (Fig. 3) shows the top view. Note that a 5-gang socket strip was used.

"No Better Compromise Between Volume and Quality Seems Possible Than That Incorporated in the Audio Hookup"—Amplification Strength Compared With That of Two Transformer Stages.

lowed for the secondary. The inductance of the secondary will be sufficient to tune in the entire range of broadcast wavelengths in conjunction with a .0005 mfd. variable condenser, hence the double condenser will have a rated capacity of .001 mfd., consisting of two separate sections, each .0005 mfd.

The coils are the simplest that are required for any set and even persons inexperienced in radio will be able to make very efficient coils. The low-loss idea should be followed in coil construction, and for this reason the forms used in the laboratory model consisted of two insulated rings, supporting quartzite rods, the wire being wound on the rods and the terminals secured to binding posts fastened on the rings.

If you wish to wind the coils on smaller forms such as a 2" diameter, use a 12-turn primary and a 60-turn secondary. This may be accomplished on a 4" high form if the turns are placed very close together, and even the separation between primary and secondary reduced. There is no absolute necessity for adhering to the separation, since its only object is to insure selectivity and the set will be amply selective even with close coupling, provided the number of turns on the primary is as specified.

Coil Mounting and Connections

The coils should be mounted at right angles.

The connections to the respective coil terminals should be such that the fields aid. Otherwise there might not be sufficient oscillation to produce highest efficiency and enable the rheostat R1 to function as a control of the tendency to over-oscillate, due to a constant condition of sub-oscillation. The "aiding" method of connection is as follows: Consider the coil standing on a table, on its circumference, the primary winding on top. The upper terminal of the primary is the beginning and goes to aerial. The lower terminal goes to ground. Look at the terminal of L2 (secondary) that adjoins the end of the primary. This secondary terminal goes to A minus and the other or bottom secondary terminal to grid. The same system applies to the interstage coupler, the beginning of L1 going to plate, the end to B plus 45 volts, the beginning of the secondary, L4, to F minus and the end of the secondary to the coil side of the grid condenser C5. Remembering that ground and battery are low potential, keep the low potentials side by side, as to coil terminal connections. Those not conversant with radio had better put tags on the coil terminals and discard the tags when the connections are actually made in the wiring of the set.

The Rheostat R1

Use a 20-ohm rheostat for R1 if storage battery type tubes are used, otherwise a rheostat the resistance of which is suitable to the type of dry cell tube used. Be very sure to connect the grid return (terminal of each secondary other than the one that goes to grid) not to the negative filament but to the negative A battery. The filament is a post on the socket and represents the voltage left after the drop in the rheostat is taken care of, and is always less than the voltage at the battery.

The Grid Leak

Connect the grid leak from the grid post of the socket to the positive A battery. Thus a special leak mount is necessary, as the leak-condenser combination mount will not afford facility in making this connection. The grid of the detector tube is thus made slightly positive. The manner of connection thus defined is made necessary by the employment of a double condenser, which forces connection of the two secondaries to minus A. In this circuit no other manner of connecting the leak will afford the same high net gain, whatever may be said of the leak connection in shunt with the grid condenser if separate tuning condensers were used.

The detector rheostat, R2, should be 20 ohms also, if the storage battery type tube is used here. R3 is a ballast resistance and may be a No. 1 Amperite. If a rheostat is to be used it should be 10 to 15 ohms and of the power type, so it will be sure to handle the .75 ampere flow for three storage battery tubes. If 99 tubes are used R3 may be 20 ohms and if the 11 or 12 type is employed, 6 ohms. In any event this resistance, if a rheostat, need not be mounted on the panel, but could be placed on the gang socket strip or baseboard, its setting determined once and never changed thereafter. Incidentally, any oscillating tubes may be used anywhere in the circuit, but the storage battery type is to be preferred, because the larger elements within the tube afford greater volume and the amplification factor is likely to be higher, which is important in the audio stage.

The Audio Hookup

If Hi-Mu tubes are used, two would be the limit and they would be inserted in the second and third sockets from the left (first and second audio stages).

No better compromise between volume and quality seems possible than that incorporated in the audio hookup. One transformer stage seems necessary, if volume is to be ample under all conditions, because the audio current (which is of a direct pulsating nature, i.e., oscillating at low frequencies) is stepped up by the transformer. Let us assume the step-up to be four and the amplification of the tube to be 6. If each of the other two audio tubes accounts for 6 likewise, instead of an amplification of 216, such as three resistance stages would afford, you have 515, as compared with 576 for two transformer-coupled stages. Thus, it is obvious that two transformer stages give a little more amplification on two tubes than the present hookup on three tubes. But it is in the quality domain that the difference is more than made up. Those who have not heard this audio hookup work should prepare for a very delightful experience.

The computations are rough and theoretical, but they serve the purpose of illustration. They take no account of the amplification, at audio frequencies, obtained from the radio-frequency and detector tubes, and this would change the net result somewhat.

The resistors in the last two audio stages should be .1 megohm (100,000 ohms) in the plate circuit in both cases. The grid leak connected to the second audio tube should be 1 megohm (1,000,000 ohms) and that in the grid circuit of the final audio tube .5 megohm (500,000 ohms). Lower values should not be risked in the plate circuit, but if leaks of values other than those stated are on hand and the constructor desires to try them out in the grid circuits, he may do so, putting the higher resistance (if there is a difference between the two) in the prior stage.

One may use 90 volts B battery on the audio side and the set will give fairly good volume, but much greater volume and richness of tone will result if an extra 45-volt B battery is used, giving 135 volts here. The actual voltage at the plate is much less, of course, being 90 or under, due to the drop in the resistor. The actual current consumption (in amperes) on the resistance stages may be expected to be considerably less than if a final (second) transformer stage were used. The maintenance of this audio circuit may be a little more expensive than that of the conventional two transformer

How a Filament Jack Works

Operation of the Double Condenser Explained—Drilling Advice Given—How to Solve Trouble Problems.

stages, but you get your full money's worth. Even if you use the set every night the B batteries should last two to three months.

The Filament Control Jack

As the set is shown in Fig. 1 you turn it on by inserting the jack (speaker) plug and turn it off by pulling out the plug, because a filament-control jack is used. This embodies the features of a regulation single-circuit jack, superimposed on which is an insulated external open circuit. Note that the A battery positive lead, instead of going direct to the positive filament, connects to the prong adjoining that connected to the plate (the two being insulated from each other in the jack). The remaining prong (extreme top) is connected to positive filament. Thus when the plug is inserted it makes connection with plate and B plus. The action of inserting the plug pushes up the leaf that is joined to the positive A battery and closes it upon its neighbor, which goes to positive filament, thus completing the filament circuit. See that you get a jack that works smoothly, otherwise you may jar the set when forcing the plug in and out.

Fixed Condenser

There are three fixed condensers. C2 is a .001 mfd. by-pass condenser. Test this with earphones and dry cell, connecting one tip of the phones to positive A post of the dry cell, the other phone tip to one side of the fixed condenser, the other side of the fixed condenser to negative post of the dry cell. No sharp click should be heard. A very slight dull one may be audible, due to the charging and discharging effect on the condenser. But there can be no mistaking the loud click. It is strong enough to startle you if you never heard it before. If you hear the loud click the condenser is shorted. Get another. Pains must be taken in testing this condenser, because it is to be included in the circuit in such a manner that if it is shorted the tubes will blow out. The same applies to C4, the .001 mfd. by-pass condenser from the detector plate output to negative A.

C5, the grid condenser, should be .00025 or mfd. or less. It is all right to use .0001 mfd.

The Double Condenser

Be sure that the tuning condenser, C1, is of reputable manufacture, for if such an instrument is poorly made more than likely a given setting of the dial here and there may represent divergent capacities in the respective sections of the condenser. A very slight lead and lag is permissible, indeed unavoidable, but it must be so slight as to have no effect on tuning. Most of the double condensers put on the market by firms of standing are of such desirable quality.

All types of double condensers have at least three binding posts. We will assume only three exist. One is a connection to the common rotor. The low potential terminal of the two respective secondaries is connected here and to A minus. The remaining binding posts represent the two stators. One of these posts is joined direct to the grid of the RF tube and to the end of L2, the other to the coil side of the grid condenser and to the end of L4. The coil side of the grid condenser is that side opposite to the socket post side.

The Audio Transformer

It is well to have as good an audio transformer as you can afford. Federal No. 65, General Radio No. 285, Kellogg, Acme, Stromberg-Carlson and the Rauland Lyric are examples, although of course other good transformers may be used.

Constructional Advice

Lay out the panel first. Decide whether you prefer 7x18" or 7x21". Those not very familiar with radio set construction should use the larger size. The solitary dial may be placed either in the exact center or 6" from the left. The center hole for the shaft would be on a midline, 3½" from top and bottom of the panel. The centrally located dial gives the panel a more symmetrical appearance. The rheostats may be placed on the same alignment as the condenser shaft, 6" distant therefrom. All that appear on the panel are the dial, the two rheostats and the jack, about the simplest arrangement consistent with high efficiency.

The condenser and rheostat shaft holes should be made oversized. It is well to use ¼" drill for the rheostat shaft hole and even as much as ½" for the condenser shaft hole. Then, if the holes for the mounting screws are not just exactly right, the condenser or rheostat may be mounted correctly, without any further drilling, because the shaft is not restricted to an aperture only wide enough to pass it through, but has convenient "play."

Wire the filament leads first, including both positive A battery, negative A, rheostats and jack (which may be placed at any convenient point in the lower right-hand corner of the panel). Be sure you know just where the coils are to be placed before you drill for rheostats, a precaution addressed to those who may care to mount one of the coils on the panel, the other on the socket strip or baseboard. In the 7x21" laboratory set no baseboard was used, but the socket strip was made to contain all the apparatus not otherwise provided for. If 7x18" is used, then a subpanel would be advisable to accommodate the audio hookup, or at least the two resistance-coupled stages.

Trouble Shooting

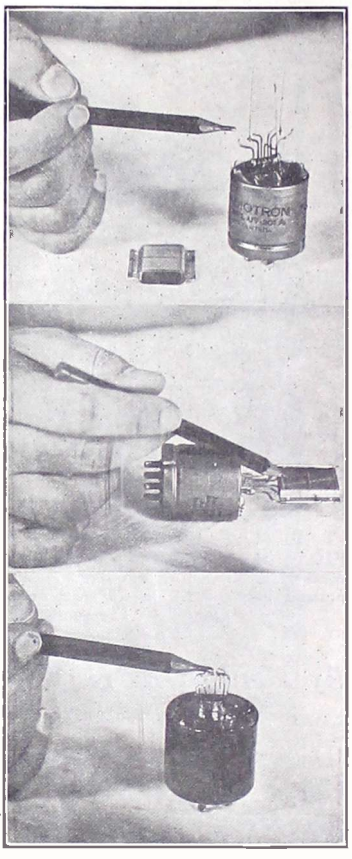
Two possible sources of trouble are (1) a given reading of the dial representing two different wavelengths, or, to say it differently, one station being heard at two slightly different settings), and (2), failure of the set to oscillate.

The first trouble would be due to the secondaries not being matched, which is possible even if the number of turns on both is the same. Where a station is heard loudest will represent the secondary of the interstage coupler, and if the dial reading is higher for the louder signal, then remove a turn from the secondary L2 (in the RF grid circuit), and, if the fault is not remedied, still another turn, etc., until the error factor is eliminated. As the louder signal required a higher setting, then the inductance on the interstage coupler secondary was less than that on the other secondary. As it is easier to remove turns than to add them to a coil already completed, it is better to take some off L2 rather than to add any to L4. The danger of not covering the entire range is not great, so long as not more than three turns must be removed, and it will scarcely happen that removal of more than three will be required. In nine cases out of ten the same number of turns on each secondary will give you thoroughly satisfactory matching.

As for oscillation, it must be understood that if the RF tube can not be brought to that point just below the saturation or spilling-over level, the set will not be as sensitive or as loud as otherwise. Hence there should be a "plop" when the rheostat is turned too high. The rheostat is turned back until the "plop" is gone, then slowly brought back again just a little, until the point of maximum response is reached. In some cases it will be advisable, due to too great volume produced, to burn the RF tube lower than the point of maximum efficiency. But assuming that the rheostat fails to function as an oscillation control, due to the absence of appreciable oscillation, reverse the leads of the secondary L2, lest you have made some mistake in coil connections. If this does not bring about the remedy, tilt one of the coils slightly out of right-angle position in relation to the other.

The plain object of doing this is to accomplish purposeful interstage magnetic coupling, which the right-angle position or the Neutrodyne angle position seeks to avoid. If this does not cause oscillation very probably the tube in the RF socket is not a good oscillator, or won't oscillate at all.

Change tubes around under any circumstances until you get each one in the socket where it serves best.



INSIDE the tube, in a radio set, current flows from plate to grid. Top photo shows pencil pointing to the grillwork that is the grid. The plate is on the table (where it should be). Center photo shows external position of the plate, in respect to the grid. In bottom photo are shown the leads from the elements. Here is where the plate-to-grid condenser effect takes place, at the seal. The Powertone controls this condenser effect by regulating the electronic flow with a rheostat.

A Set a Baby Can Make

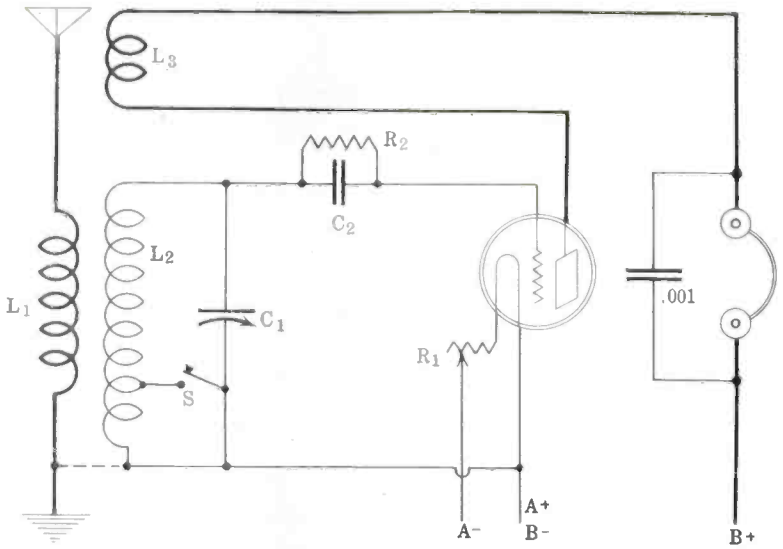


FIG. 2, the diagram of the circuit wiring. S is a short-circuiting switch. This method of switching avoids dead-end losses, as the current that escapes into the unused part of L2 is still retained in the circuit. The switch makes tuning in shorter-wave stations much easier.

By Herbert E. Hayden

Photographs by the Author

THE regenerative set may be safely regarded as the best 1-tuber that a person can build to meet the requirements of selectivity, sensitivity and volume. Thus reception of distant stations is assured, even if receiving conditions are only fair. The volume in the earphones will be ample.

HERBERT E. HAYDEN

This set, as constructed, is portable and self-contained. The cabinet has over-all dimensions as follows: Height, depth 7″. The panel 9″, width 8″ and itself therefore may be 7x8″, an odd size, but can be cut down from a 7x10″ panel.

The cabinet has two doors, one in front, to afford access to the panel, the other in the back, so you can reach the wiring or replenish batteries. The "stator" part of the cabinet is 5″ deep and the remaining 4″ are divided as follows: 1½″ depth for the front door and 2½″ depth for the rear door. If one of the batteries is wider than the depth of the battery compartment, as shown in Figs. 4 and 5, then the extra rom inside the main part of the cabinet is automatically utilized.

Frequency Dial Effect

The hinges differ for the two doors. The front door has two separate hinges, externally placed, while the rear door has a single long hinge, also external. There is no reason, however, why the two doors can not have the same kind of hinges, if the constructor so desires.

The circuit used is the standard regenerator with tickler coil for feedback, but an extra device, the switch S, is included to facilitate tuning in the lower wave stations. As it is assumed that many will desire to build such a set from parts they have around the house, these instruments most likely will include a straight-line capacity condensers. The tuning on the lower waves is rather difficult with this type of instrument, since the stations are crowded together. The switch arrangement does not enhance the selectivity, for that is an inherent asset of the set anyway, but saves you the backbreaking ordeal otherwise suffered in tuning in distant stations that are under 400 meters.

Thus the switch has somewhat the same effect as a straight-line frequency condenser, the only practical object for general fan use, being to spread out those low wave stations on the dial.

The manner of including the switch takes into account the dead-end losses often sustained when the conventional connections for such a switch are followed. Look at Fig. 2. Notice the end of L2, at bottom. A wire, called a jumper, is connected from the end of the coil to the movable arm of the switch. Normally this jumper is omitted and so much of the coil as is not in use for tuning captures and holds some of the radio-frequency current. The jumper, however, keeps in the circuit even that part of the coil not used for tuning purposes. In other words, the switch operates on the short-circuiting principle without leaving unused or dead ends at any place.

Variety of Switch Choice

This switch, therefore, may even be the kind usually employed for the A battery lead. In that case one tap would be taken off the coil, as will be explained later, and the switch used simply for short-circuiting the part of the coil below the tap when tuning in low-wave broadcasters. If multi-tap points are desired, then a tap switch with about a dozen switch points may be used. Such a switch is commercially obtainable, or may be made up of the twelve switch points, which are flat-head screws (without the slot) and have lock nuts, and usually lugs, supplied with them. The leads from the coil are connected to the lugs and the movable arm is connected to the stator plates of C1 and to A battery positive. As the setting of the switch changes the dial reading of the tuning condenser, most fans probably will prefer only one tap, hence may use the A battery switch method. (Fig. 3). If so an anti-capacity switch is to be preferred. Many may care to use a small single-pole single-throw (SPST) switch.

Panel Directions

The panel is shown in Fig. 1. The tickler dial is the lower one at left, the tuning condenser dial the upper one. At right is a smaller dial. This is for the rheostat, but the usual knob will suffice. Above the rheostat dial is an optional bezel. The tapswitch is at right, bottom. Two plain binding posts or two phone tip jacks or a single-circuit jack may be used for the earphone connections. If the SCJ is used a plug will be necessary, but not so if binding posts of phone tip jacks are employed.

How to Make the Coils

The coil and condenser combination for tuning will rest largely with the personal choice of the constructor or depend on what he has on hand. The set illustrated herewith used a .0005 mfd. variable condenser, which usually has 23 plates. If such a condenser is to be embodied in the set, and the stator tubing on which the primary L1 and secondary L2 are to be wound is 4″ diameter and 4″ high, then

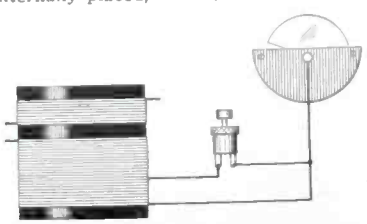


FIG. 3, detail of push-pull switch used for tapping.

THE set in conventional form would look like this. (But what's he doing up so late?) International Newsreel.

Hayden's Easy-Tuning Set

LIST OF PARTS

One 3-circuit tuning coil (L1L2L3).
One .0005 mfd. variable condenser (C1).
Two 3" dials.
One switch (S).
One 7x10" panel.
One .00025 mfd. fixed grid condenser (C2).
One 2-megohm grid leak (R2).
One rheostat (R1), 30 ohms for 99 type tube.
Two binding posts (for phones).
One .001 mfd. fixed by-pass condenser.
Accessories: One dry cell battery for tube filament, one 22½-volt B battery, one cabinet, with hardware; subpanel for socket; right angles; screws, nuts, aerial wire, lead-in wire, wire for connections inside set.

use No. 22 double cotton covered wire. Wind 8 turns for L1. Cut the primary winding. Begin the secondary, ¼" away from where the primary ends. Wind 18 turns of the same kind of wire in the same direction, make a small loop and twist it around twice, then continue, applying 17 turns more. The terminals may be secured to the form through tiny drill holes made parallel in pairs and the respective terminals threaded through each. It is not absolutely necessary to have the ¼" separation, but well to include it if there is room. The primary, instead, may be placed right over the secondary. In that case the secondary would be wound first and the primary right over it, near the upper end. Another method would be to employ only one winding, consisting of 43 turns. Tap at the eighth turn and again at the 26th turn. Connect A battery positive and ground both to the 8th-turn tap, the switch as shown in Fig. 3, to the 26th turn and end. This method grounds the positive A and reads the dotted line into Fig. 2.

The tickler form would be 3" diameter and comprise 20 turns of the same kind of wire. If one is converting an old coupler he will be guided by the forms he has, hence the tickler coil even may be near the top of the stator form. Some who simply use two plain forms may prefer to put the tickler coil in the center. (Figs. 3 and 4). Thus they would have to divide the stator winding (but not cut it) preferably at the switch tap, to provide room for the rotor shaft to pass through at one side of the stator and accommodate the diametrically opposite rotor rod. It makes small difference, if any, in which relative position the tickler is placed, although some experts prefer it nearer the low potential end (ground or A battery lead) of the secondary.

The tube used was the 199 but the 11 or 12 (which two have the same characteristics) or may be employed with equal success. A small subpanel, about 3x4" is fastened to the panel by two brass right angles, machine screws and nuts, and on this subpanel the socket is mounted. The mounting screws show on the panel. See them under the rheostat in Fig. 1.

The grid-leak condenser combination are mounted above the coil (Figs. 4 and 5). Be careful to connect the stator plates of the variable condenser to the grid condenser.

Figs. 4 and 5 show a 4½-volt C battery used as the A battery, to heat the tube filament up. Beside it is an upright type of 22½-volt B battery. There is room, as you will see, for a substitute 1½-volt (No. 6) dry cell to light the 11 or 12 type of tubes.

Use flexible wire for the battery leads and be sure they are made longer than the extreme distance that the rear door sweeps from closed to wide open position, otherwise the batteries will fall out if you jerk the back door open.

Such refinements as a hook catch to keep the doors closed, brass corners to insure the cabinet against edge damage due to rough handling, bezel, etc., may be included as the constructor desires.

The set is very easy to make. Even a baby can make it, I should say, figuratively speaking, but certainly even a baby can tune it (as did my chee-ild). The conventional panel and cabinet idea may be substituted for the self-contained model, if desired. The set will work just as well either way.

The wavelength is controlled by the variable condenser, C1. The tickler governs volume and should never be placed in such a position as to cause whistles, except when trying to get a dis-

(Concluded on page 28)

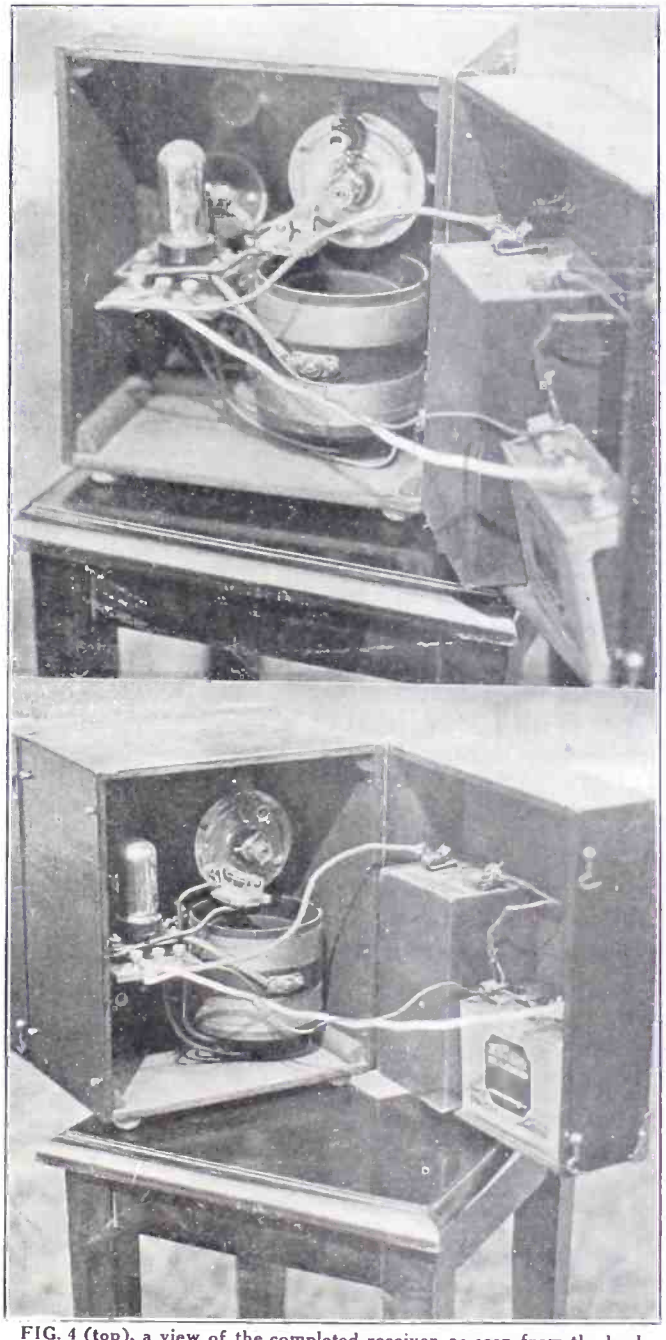
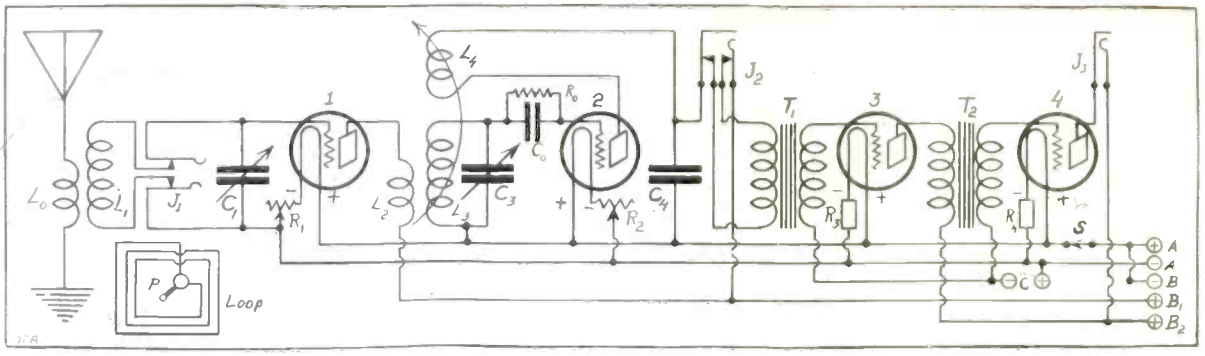


FIG. 4 (top), a view of the completed receiver, as seen from the back, with the battery compartment, really a door, wide open. Fig. 5 (lower photo) shows detail of how the leak-condenser combination is mounted and gives a clearer view of the introduction of the flexible battery leads to the special socket subpanel.

How I Built My Diamond



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Consulting Engineer.

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The interstage coupling transformer L2L3L4 is wound on a hard rubber form about 3" in diameter. The primary contains 10 turns and the secondary 43 turns of No. 24 double silk covered wire. The tickler consists of 30 turns on a 2" diameter.

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The amplification obtainable with this combination of RF and regenerative detector is enormous, but owing to the many variable factors it is not a definite quantity. It depends on the amplification constant of the tube, on the grid, plate and filament D.C. voltages, on the degree of coupling between the tubes, on the values of grid leak and grid condenser, and finally on the degree of coupling between the tickler coil L4 and the secondary L3. The amplification introduced by the first tube is effectively about as much as a stage of audio and the amplification introduced by the tickler is many times this amount.

In assembling this receiver it is important that the tuning coil L3 be with its axis vertical, because in this position its loop effect is minimum; that is, it then picks up the least energy directly, and this makes the selectivity of the set as a whole greater.

Separate Rheostats for RF

It frequently happens that the detector and the audio amplifier become overloaded

Tips on the Audio Circuit

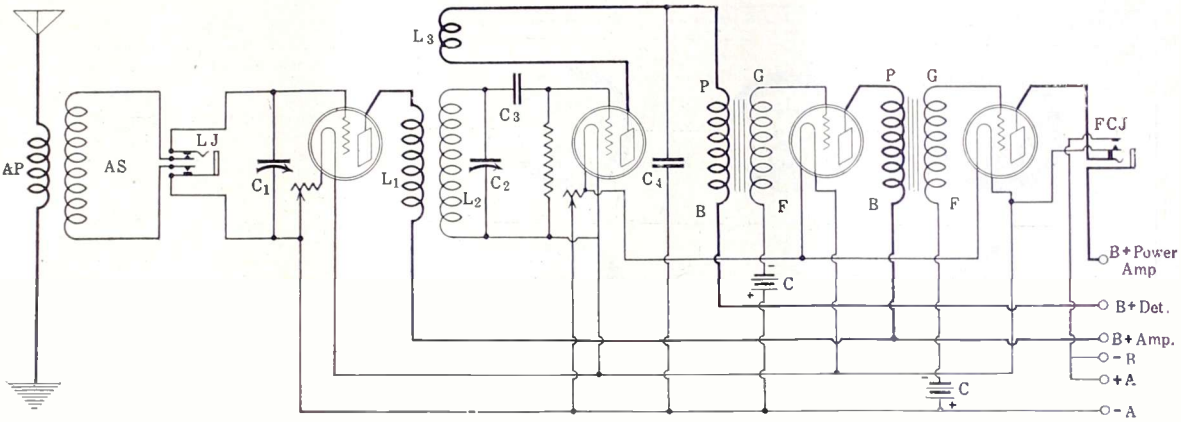

FIG. 2, showing how Bernard connected the leak and hooked up the AF on the detector rheostat. This model omits the detector jack and uses a filament-control jack in the last stage, being a variation from the original to this extent. AP and AS are aerial transformer primary and secondary.

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The audio-frequency amplifier is a very important part of the circuit. It either retains the good quality of the signals or it spoils it. The choice of transformers will determine which it will do. The writer uses a Federal 65 for T1 and a Federal 65A for T2. These make a very good combination when quality is the main consideration. There are other transformers which also may be used with excellent results. For instance a General Radio Type 285 ratio 6:1 for T1 and the same type ratio 2:1 for T2 is one combination. and another is two Rauland Lyrics. Attempts at economizing on the price of audio-frequency transformers almost invariably lead to intolerably bad quality of signals.

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Also in the interest of quality, high plate voltages with suitable grid voltages should be used in the audio stages. The higher the plate voltage the greater will be the volume and the better will be the quality.

A voltage of 150 may well be used with ordinary receiving tubes of the 201A type. This would require a grid bias of from 12 to 15 volts. Voltages less than 90 should never be used if the set is to operate a loud speaker. The plate voltage on the detector should be 45, as it should be on the RF tube when no other grid bias than that obtained from the voltage drop in the rheostat R1 is used.

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Thank you for all the valuable information I get from your magazine. Thank Herman Bernard for his wonder hook-up. —Philip Muller, 2145 Amsterdam Ave., New York City.

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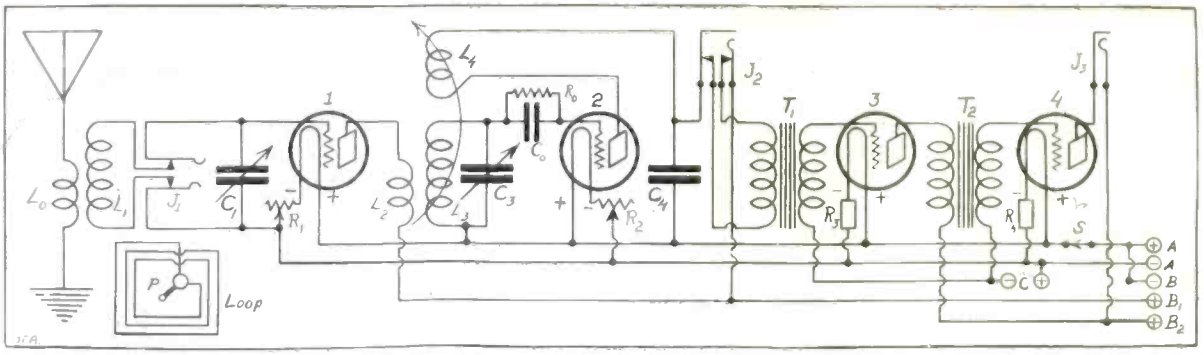

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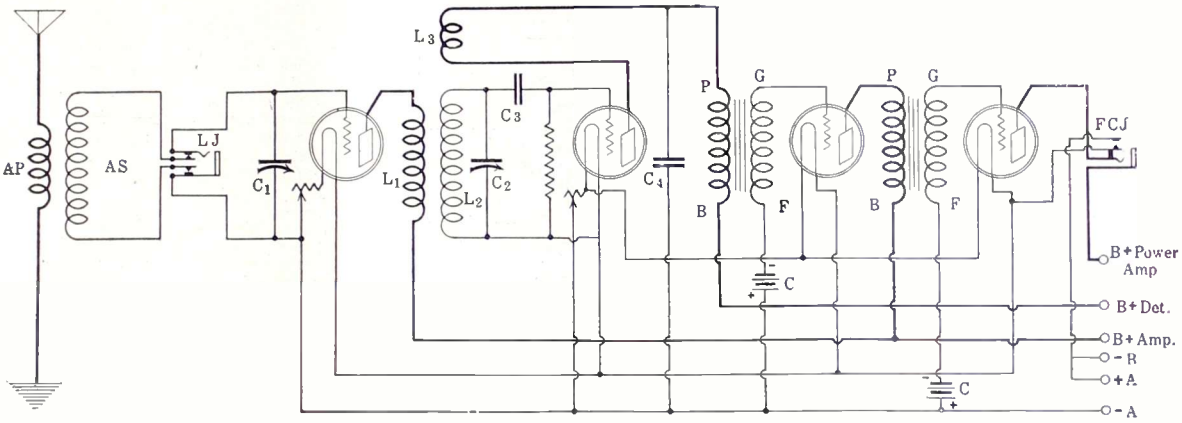

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A Fine Meter Switchboard

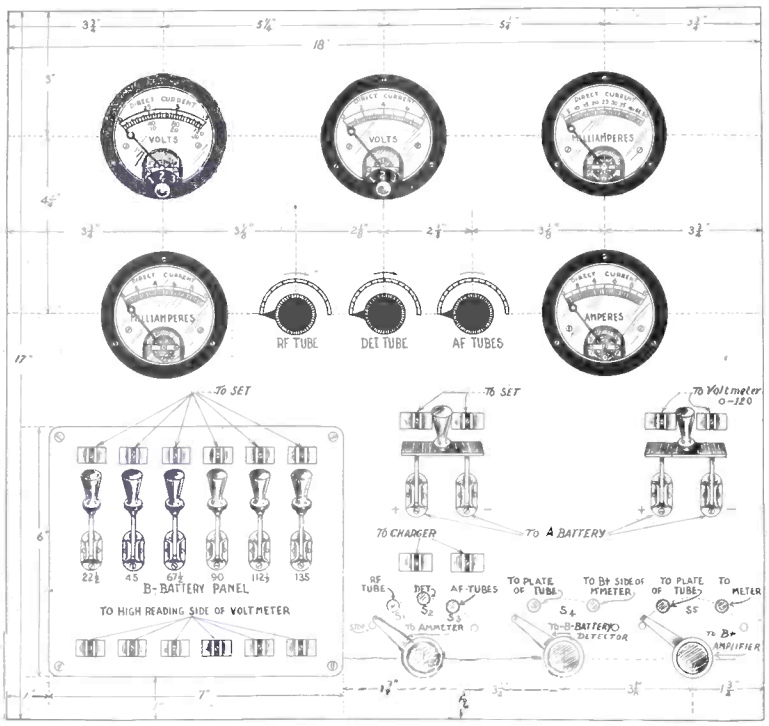


FIG. 1, showing the panel view of the 5-meter switchboard. The first meter on the extreme upper left is the high and low reading voltmeter. There are three positive connections on this voltmeter, while only two are used, that is, the middle tap is not used. This is done away with by the use of the switches on the B battery panel. The negative portion of the meter is on the back of the meters. The next meter is the filament voltmeter. All the terminals are used here. The next meter is the milliameter. As you see, this reads from zero to fifty milliamperes. When using the UV201A tubes in the amplifying circuit, the reading without the C battery in the AF stages should be 16 to 20 milliamps, using 90 volts. With the C battery the reading should be about 8 or 9 milliamps. In other words the life of the B battery is doubled. The next meter (optional) is another milliameter, which reads from 0 to 10. This is placed in the detector circuit.

By Lewis Winner

Associate, Institute of Radio Engineers

A FEW weeks ago one of my friends asked the following question: "Is there any testing instrument on the market which contains enough meters to test the number of milliamperes flowing in the plate circuit of each individual tube as well as all the tubes at one time, the voltage consumed by the filaments; the number of amperes expended by the filaments of each tube, as well as all the tubes at one time; the number of volts in the storage battery after a charge, as well as before charge; and finally test the number of volts in each individual bank of B battery cells?"

LEWIS WINNER

I designed such an instrument for him. A few companies that do this work, make instruments. The price is high. There is much more knowledge gained when building your own outfit. If some wire breaks internally there is no necessity for asking a company to fix it, which again saves you some money. One might say that it is expensive to build this set. It is. This instrument should cost about $50 when completed. This includes everything that is to be had, including the baseboard.

This instrument is very useful to the well advanced experimenter as well as to the plain broadcast listener. The BCL can learn what actually happens inside the tube, and also at a glance tell if his A and B batteries are in condition. The operation and the building of this machine is so simple that one who has not the least bit of electrical knowledge can build it right. Unlike the radio receiver, there is little trouble-shooting to be looked out for here. This instrument is made for trouble-shooting elsewhere than inside itself. There is a lot of worry saved also. If you think that your B batteries are run down, there is no necessity for you getting out a voltmeter and putting it across the terminals, all of which causes a lot of discomfort. The result is also poor, as the electrical contact made with the meter is not as good as should be. However, with the tester, pull the switch which goes to the section that you want to test, and the reading that you desire is at hand, without any fussing around. The result is accurate, as the connections are electrically correct.

Very Handy Indeed

There are some things here that are not on the commercial testers. One of the novelties is the charging switch. As you will note in Fig. 1, a double throw, double pole switch is used. The top pair of contacts goes to the set battery terminals. The two middle terminals go to the A battery proper. The last pair of contacts goes to the charger. When the charger is on, the battery has to be disconnected from the set. This is an automatic device which prevents the battery from being charged at the same time that the set is being used.

This testing panel can be put to several other uses, besides measuring the current and voltage flow in different parts of the tube and battery circuit. The B battery is tapped by a set of switches. If you want to use 45 volts on the plate of the tube, pull the second switch up and 45 volts are on the plate. The bottom of this switch goes to the voltmeter. Remember one thing. This panel is designed to be used with a set using four tubes only. When the receiver is in use there are many things on the panel which should not be used. The plate milliameter should be disconnected from the set, as there is resistance present here which decreases the actual efficiency of the set. The same applies to the ammeter. The high and low reading voltmeter is disconnected from the set automatically by the switches. The only meter that is used when the set is in actual operation is the filament voltmeter. Even this meter takes some current, but there was no provision made for a disconnection for this meter, as the loss is very small and there is more need for this meter. There was one thing left out and that was the ammeter for the charger. This was done on purpose, as most of the chargers have ammeters already installed inside. The ones that haven't a meter, have a standard rate at which the battery is charged, viz., the Tungar chargers are made to charge the battery at a 2.1-ampere and 5-ampere clip. The Rectigon charges the battery at a 2½-ampere and a 6-ampere clip. What actually happens when these batteries are put on charge, say at 6 amperes is at the start of the charge the number of charging amperes is about 8, but it immediately drops to 6, and keeps up that way, until the battery is three-quarters filled. It then drops to 3 amperes and stays at this rate until the finish, when the charge is automatically cut off. The cut off comes when the battery is usually overcharged, about five hours after complete charge.

What to Buy

Since the meters are the most expensive and also the most important articles in the set they are the first to be purchased. The first meter on the panel is the combination panel voltmeter, which as you see on the diagram has three readings 0 to 7.5 volts; 0 to 30; and 0 to 120. The first reading is used for measuring the number of volts in the A battery. The second reading is for measuring the number of volts in the detector B battery circuit, and the third reading is for measuring the B battery voltage in the amplifier circuit.

The next voltmeter is the filament voltmeter, with a reading from 0 to 8 volts. By the special internal as well as the external switches, we can measure the terminal filament voltage of each individual tube, that is, the voltage across either of the tubes may be measured so that the correct adjustments may be made at all times. The next meter to purchase is the plate milliameter. This one reads from 0 to 50 milliamperes. This is used for the amplifier tubes.

The next milliameter reads from 0 to 10. This is used for the detector tube. Very seldom do we take readings of the number of milliamperes flowing in the plate circuit of the detector tube. The last meter to purchase is the ammeter which should read from 0 to 10. With this instrument the number of amperes consumed by the filament of the radio-frequency tube, the

Making a Scientific Tester

detector tube, and two audio-frequency amplifier tubes may be known. The switches may be shorted and the number of amperes consumed by all the tubes together may be read on the one meter. Due to small amount of current taken by the present-day tubes it will be difficult to note the wiggle of the needle when only one tube is hooked up to the meter, as the graduations on a great many of the meters are very small, that is, there are four graduations from 0 to 1 ampere. This means that the first line will be ¼ of an ampere. These meters cost about $7.50 apiece. This means that for the five meters the cost will be $37.50. However, there are some meters that can be left out, if the builder thinks that he cannot afford to spend so much money. The efficiency of the instrument will be impaired very little. The detector milliameter and filament voltmeter may be left out. This means that $15 will be saved.

Before going any further it is well to note that in the diagram Fig. 2, there are only four tubes shown and referred to. This does not mean that these meters may not be used for any amount of tubes. The fundamental principles are all that have to be followed.

Making the Panel Layout

The next thing to get is the panel. Here you will hit some trouble. This panel is not of a stock size. It will have to be cut specially. As you will note, it is 17 x 18 in., or nearly square. Hard rubber is the best material. Next get the switches. There are six double-throw single-pole switches, which have a hard rubber base. If you are a good enough mechanic, you can mount the contacts right on the panel. In this case, it does not matter what the base is. The next type of switch required is double-throw, double-pole type. The last one needed is a single-throw, double-pole switch. There are three rheostats on the panel. They all should have a resistance of 10 ohms. Three switch arms and seven taps conclude the list of parts.

There will be quite some difficulty when drilling this panel. I am referring to the large holes for the voltmeters. These are all 2 in. in diameter. There are no convenient drills that can drill a hole 2 in. in diameter, with the result that small holes will have to be drilled all around the outside diameter of the 2 in. diameter and then the center will have to be pushed out. Take care not to snap the panel, when doing this. After this is done, file off the rough edges.

The rest of the drilling is systematically shown in Fig. 1.

The switches are placed right on the panel. The six switches (single-pole, double-throw) are lined up right next to each other. Be sure that they are all in line. Otherwise the panel will look very bad. The diameter of the rheostat holes are 3/16 in. The diameter of the switch arms is 14/32 in. The diameter of the holes for the taps is ¼ in.

How to Wire the Instrument

Fig. 3 shows the complete A and B battery wiring, which is very simple. The first thing that will be wired is the B battery set of switches. All the upper terminals of the double-throw, single-pole switch go to the set proper. The middle terminals all go to the B battery while the end terminals go to the voltmeter. The first terminal from the left-hand side of the panel goes to the 22½-volt post on the set. The second post goes to the 45-volt post of the set. The third terminal goes to the 67½-volt post on the set. The fourth terminal goes to the 90-volt posts of set. The fifth terminal goes to the 112½-post on the set and the last terminal goes to the 135-volt post on the set. There is no need for all that voltage, but at present there are many sets that use up to 135 volts. Connect all the bottom terminals to the high voltage side of the voltmeter.

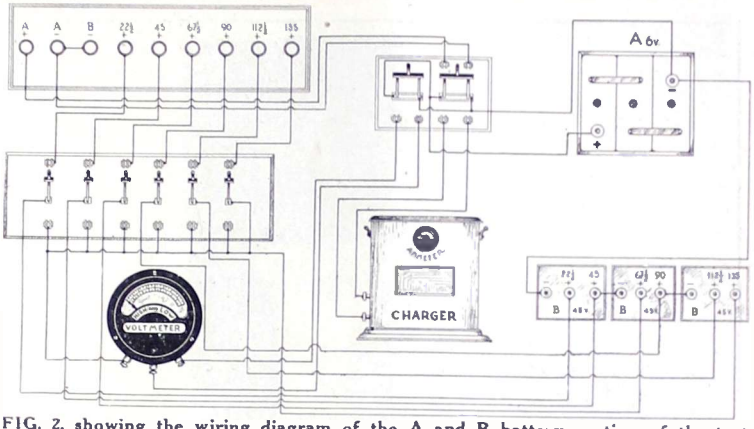


FIG. 2, showing the wiring diagram of the A and B battery portion of the test-board. Note that the middle tap of the voltmeter is the minus post and is only shown that way so that the person wiring this instrument will not be stuck and look for this post on the real meter.

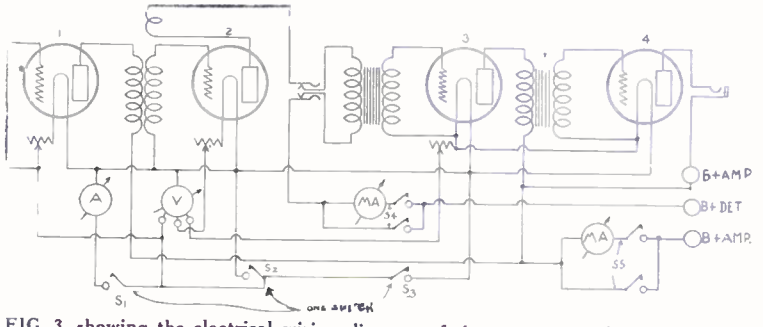


FIG. 3, showing the electrical wiring diagram of the ammeter, milliameter and the filament voltmeter. No provision is made for the C battery in the AFT or the RFT stages. This is easily installed.

The double-throw, double-pole switch is next to be wired. The left-hand terminal on the top goes to the plus A post on the set. The other terminal goes to the minus A of the set. This post also goes to the A minus and to the B minus. The second terminal from the top and on the left goes to the plus A of the battery. The other terminal going to the A minus of the battery. The third terminal from the top and on the left, goes to the positive side of the charger. The cords usually come from the charger and are colored red. The remaining terminal goes to the negative terminal of the charger, cord colored black. There remains only one switch to be wired up and that one is the voltmeter switch. The second terminal from the top and on the left goes to the A plus, while the other one which is directly opposite goes to the A minus. The upper terminal on the left goes to the plus low voltage side of the voltmeter. The only terminal left goes to the middle or the minus of the voltmeter.

Fig. 2, shows the wiring of the tube circuits. The first meter that is to be wired up is the ammeter. The manner in which this circuit is wired up is not for working purposes. You will note that the grid returns of the audio-amplifier tubes go to the positive side instead of the usual negative. In other words, the rheostats are placed in the positive side instead of the negative side of the line. The set will work this way, but not as efficiently as vice versa. The first meter that will be wired up is the ammeter. Bring the negative terminal to the minus post of the socket. Bring the positive post to the switch arm. Now take a tap off the positive lead of the RF tube, off the detector tube, and off the two amplifier tubes simultaneously. When you bring the arm to the RF tube tap, the number of amperes consumed by the filament of that tube will be read. This no doubt will be ¼ of an ampere, or just one space. Bring the arm to the second tap (detector tube), the reading here will be 1 ampere if you are using the UV200 tube. The same method is carried out for the amplifier tubes.

The voltmeter is the next to connect up. Connect the minus to the minus of the filament post on the sockets (all the tube sockets or the bus bar line). Connect the end terminal of the voltmeter to the arm of the rheostat. The next terminal goes to the arm of the next rheostat, and the last terminal to the arm of the rheostat which controls the filament of the last two tubes. This means that the individual amount of voltage across the terminals of the tubes can be read, except in the last tubes where the reading of the two tubes will be had at the same time.

The detector milliameter is the next in line to be attended to. Bring the switch arm to the B plus lead. Bring the B plus terminal of the milliameter to one tap, and bring the other terminal of the meter marked plate to the other tap (this goes to the bottom of the jack).

The last meter is the milliameter which is in series with the plate of the amplifier tubes. The switch arm goes to the B plus amplifier lead. One tap goes to the B plus lead of the meter and the other goes to the plate terminal of the meter. This same terminal goes to the bottom terminal of the

(Continued on page 30)

Winding a Coil "On Air"

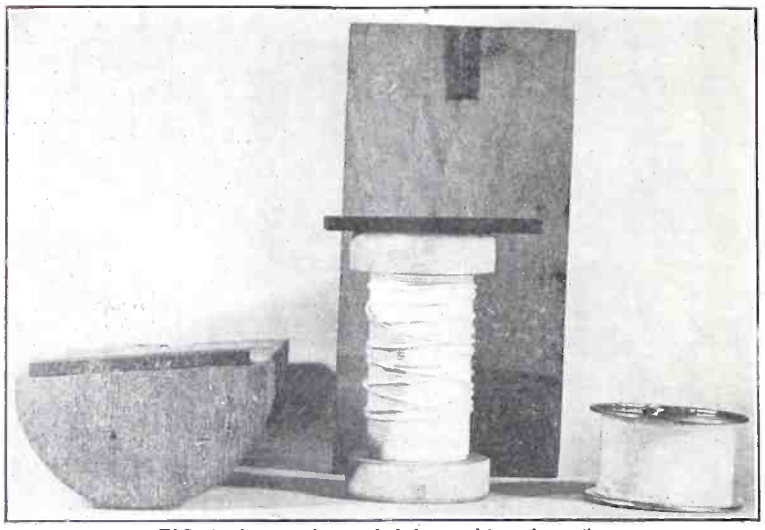


FIG. 1, the supply needed for making the coil.

FIG. 2, how the form is prepared for winding.

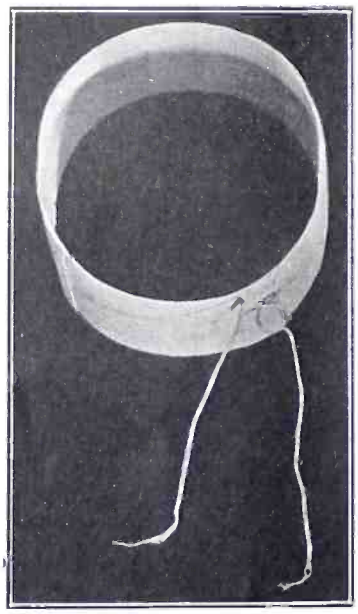


FIG. 4, the completed low-loss coil.
(Katel & Herbert photos)

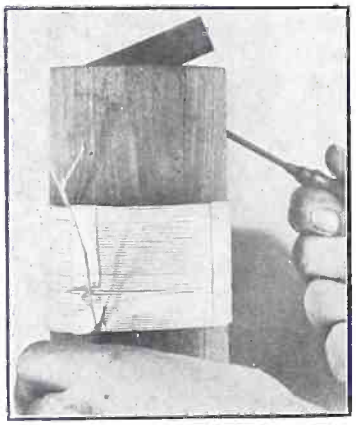


FIG. 3, the winding put on, the tape is flapped back.

By the Masked Man

ONE of the most difficult of things in radio is to wind your own coils on an air form. It is easy enough to wind it on a tubing, but when it comes to using air as a form you are up against a problem. But, this is the era of wonders.

THE MASKED MAN

The first thing to do is to obtain the necessary materials. Get a half pound of No. 22 double cotton covered wire, a wooden cylinder 6" in length and 3" in diameter, two small wedges 3" long, 1" in width and 1⅛" in depth, two heavy rubber bands, and some adhesive tape. These are shown in Fig. 1.

Take the cylinder and at one end insert both wedges. (Fig. 2). Place five strips of adhesive tape the whole length of the cylinder, each one spaced 2" apart. Now place the rubber bands over both ends of the cylinder so as to hold the wedges. The cylinder of course is hollow and may be hard rubber, bakelite, or cardboard.

Procure the roll of wire and cut off a 6-foot length and a 21-foot length. About two inches down the way from the top of the form or from the opposite end that has the wedges inserted, start winding. Wind 10 turns. Leave the end of the wire out for connecting purposes. This is also true of the beginning of the wire. Right close next to this winding take the 21-foot length, wind 45 turns. Leave about 5" at the beginning and the end of the winding for connecting purposes.

A good way to prevent the wire from unraveling is to tie the beginning and the end of both windings together. Now take the rubber bands off. Put the adhesive tape over the windings, making sure that the tape covers the entire length of the coil.

Take out the wedges. The cylinder will now decrease in size at least enough to make the winding slide off without any difficulty. Fig. 3 shows the wedges being taken out of the top of the form. Fig. 4 shows the completed form. Note that there is a tap made. This tap can be made while winding the coil, at the end of the 10th turn or the winding can be broken while the coil is still on the form. If you have made the tap, cut the tap in half and you now have a 10-turn primary and a 45-turn secondary. This can be used as a radio-frequency transformer, and as the wavetrap coil.

A .0005 mfd. variable air condenser shunted across the secondary will tune to the broadcast waveband, that is, from 200 to 550 meters. If you find that the set will not receive the high wavelengths, insert a .0005 mfd. fixed condenser across the antenna and the ground. If you do not receive the low wavelengths, insert a .0001 mfd. fixed condenser in series with the antenna.

RESULTS

FORESTER IN MAINE WOODS FINDS JOY IN HOOK-UPS

RESULTS EDITOR:

To keep us alive on radio subjects we carried a dozen RADIO WORLDS 35 miles to camp. We have no writing paper, but that is not half as important as having RADIO WORLD so that we may try out all the hook-ups of such men as Bernard, Hayden, Winner, Lee, etc. We have made up five of the different hook-ups and have met with due success. We have built on the working bench, which by the way is made out of a cedar tree, and covered with oil cloth, a set which was described by Brewster Lee. This was the 2-Tube Tone Beauty (May 9 issue of RADIO WORLD). It is the best set that I have built, for clear tone and selectivity. It has plenty of volume on the phones.—Fred L. Hutchins, Camp of the Maine Forestry Service, Tumbeldown Mt., via Skinner, Maine.

Power and DX on One Tube

By Percy Warren

SIMPLICITY and cheapness appeal to nearly everybody. It is true, too, in regard to the building of a radio set.

PERCY WARREN

There is no doubt that a 4 or 5 tube set is better than a 1-tube set, but at a disproportionate difference in price and also difficulty in building. There is as much fun to be derived from a 1-tube set as from an elaborate affair. Beside the set (Fig. 1) being cheap to build it is cheap to operate, that is, there are no big batteries to buy.

The only type of 1-tube set that gives entire satisfaction is one that employs regeneration. More volume will be obtained when the plate is capacatively coupled to the antenna and electromagnetically coupled back to the grid than by any other method. As you will notice in the diagram, the secondary of the 3-circuit tuner is reversed. In other words, the polarity is reversed. The high potential side (the antenna) is opposite the low potential side (the ground). The high potential side (the grid side) is opposite the low side (the ground). With this method the selectivity of the set was increased while the volume was decreased a little. However, the person building this set may follow his own preference. If he is very close to a broadcasting station and desires to have extreme selectivity, the method employed here is preferable, but if he is about 15 miles away from any station, the reversing of the secondary will be better in this set. The selectivity is good either way.

What Is Needed

The coils can be very successfully made at home. Are 3½" diameter, tubing is 4" high, another 3" diameter, is 2" high. Get ½ lb. of No. 22 cotton covered wire for winding the coils. The only so-called expensive thing in the set is the variable condenser. If you are buying any kind of a condenser, purchase the best, because it will be cheaper in the long run. This condenser has a capacity of .0005 mfd. (c1), usually 23 plates. However, some condensers have 20 and 21 plates and have a capacity of .0005 mfd. Do not buy a condenser by the number of plates, but by the capacity. If there is no statement on the front of the box, do not purchase the condenser unless the capacity is stamped on it. Next is the tube, which can be either a 200 (soft detector tube) or a 201A (hard amplifier tube). I would advise the 201A. However, dry cell tubes work well. The grid condenser (C3) has a capacity of .00025 mfd. This should be mica and strongly constructed. R1, the grid leak, is variable and is one of the determining factors in the success or failure of the set. C2 is a .0005 mfd. fixed mica condenser. R2 the rheostat can be either a 6-ohm for the V200, 11 or 12 tube, or a 20-ohm for the 201A. A panel and cabinet, both of which should be 7x12", connecting wire, a terminal strip, two 4" dials, a baseboard, screws, nuts, and some solder complete the buying list.

Winding the Coil

Take the 3½" tubing and ½" from any edge start winding the primary. This consists of 12 turns (L). The wire used exclusively is No. 22 DCC. Leave the beginning and the end of this winding out for connecting purposes. They should be at least 3" in length. Leave

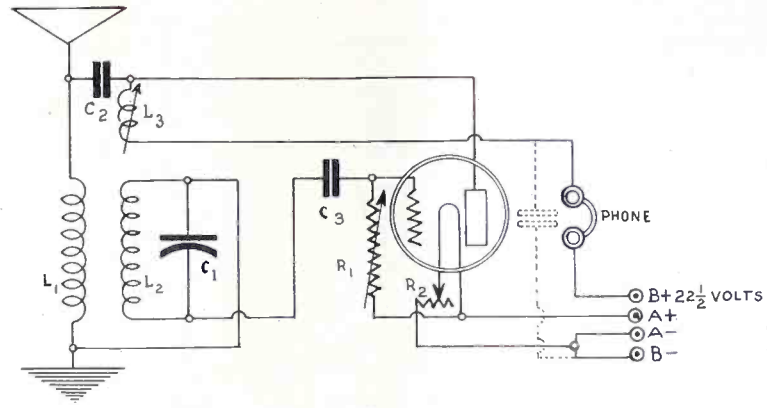


FIG. 1, showing the electrical diagram of the set described by Percy Warren.

no space and wind 47 turns of wire for the secondary 12. Again leave out two ends (the beginning and the end of the coil for connecting purposes). Near the 23d turn of the secondary drill a hole which is 3/16" in diameter. This hole should be drilled right through the cylindrical form. Procure the tubing 3" in diameter and 2" high. Wind 46 turns. Leave two terminals out for connecting purposes (the beginning and the end of winding). Drill a 3/16" hole through this form near the 23d turn. This also goes through the form. Procure a piece of brass tubing 6" in length and 3/16" in diameter. Put this through the hole on the larger tubing. Now get some coil spring about 1" long and slip it over the tubing. Put the brass tubing through the smaller tubing. Now drop a piece of solder before the brass tubing enters the smaller tubing and after it goes through the tubing, close to the side of the tubing. The same is done on the opposite side, that is the coil spring is inserted and the soldering is done on each side of the tubing. This may be a little difficult to do, but if a little pains is taken a very nice-looking job can be accomplished. As a matter of fact the coil when completed ought to look like a commercially wound coil. The commercial coils can be used, of course.

Drilling the Panel

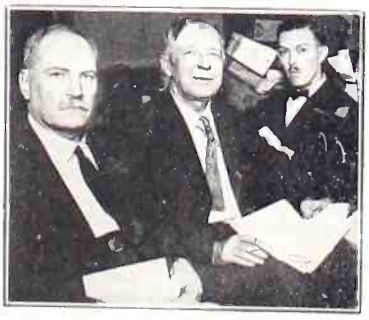
The next mechanical thing to do is to drill the panel. There are only two major controls on the panel. Three and one-third inches from the right-hand side of the panel and 3½" from the top and the bottom drill a hole 3/16" in diameter for the tickler shaft. Five and one-third inches from this hole and 3½" from the top and the bottom of the panel drill the hole for the variable condenser shaft. This should be also 3/16" in diameter. Six inches from the right and left hand side of the panel and 1" from the bottom drill a hole for the rheostat shaft. The dimensions for this hole will be dependent upon the type of rheostat used. Two-third inch from the left hand side of the panel and 1" from the bottom, drill a ¼" hole for the variable grid leak. The jack is placed anywhere according to the discretion of the builder. Do not jam any of the parts too close together. The socket should be placed between the condenser and the coil, or directly in back of the rheostat. The grid leak leads may be a trifle longer than is usually wanted, but that does no harm in this receiver. A phone jack may be used, but if the builder wants to have phone tips, the efficiency of the set will not be impaired in any way. As a matter of fact the phone tips are advisable, because there is a much cleaner contact made, than with the ordinary jack and plug. The terminal strip is placed on the extreme end of the baseboard opposite the tuner. The condenser C2 is placed as near to the tickler coil lead as is possible.

Wiring the Set

The most difficult part of the mechanical construction of the set is now at hand. That is the wiring. The beginning of the coil L1 goes to the antenna post on the terminal strip and also to one terminal post of the fixed condenser C2. The other terminal of the condenser goes to one lead of the tickler coil. This same lead goes to the plate post on the socket. The other end of the tickler coil goes to the top terminal of the phone jack or to one terminal of the phone tips. The other tip goes to the B plus. The end of the primary coil L1 goes to the ground terminal of the terminal strip. Connect this same post to the rotor plates and not as per diagram, which shows them going to the stator plates. This same terminal goes to the beginning of the coil L2. The end of the coil L2 goes to the stator plates of the condenser. This same connection

(*Concluded on page 23*)

Executives Meet in Move for Strike of Chicago Fans



THE EXECUTIVE COMMITTEE of the Broadcast Listeners' Association of America, left to right: Frank W. Ingram, vice-president; Frank H. McDonald, president; and J. R. Coakley, assistant treasurer. They are circulating petitions among radio fans to strike against broadcast stations in and about Chicago that continue to broadcast on Monday evening, which is decreed silent night. (Underwood & Underwood.)

THE RADIO UNIVERSITY

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

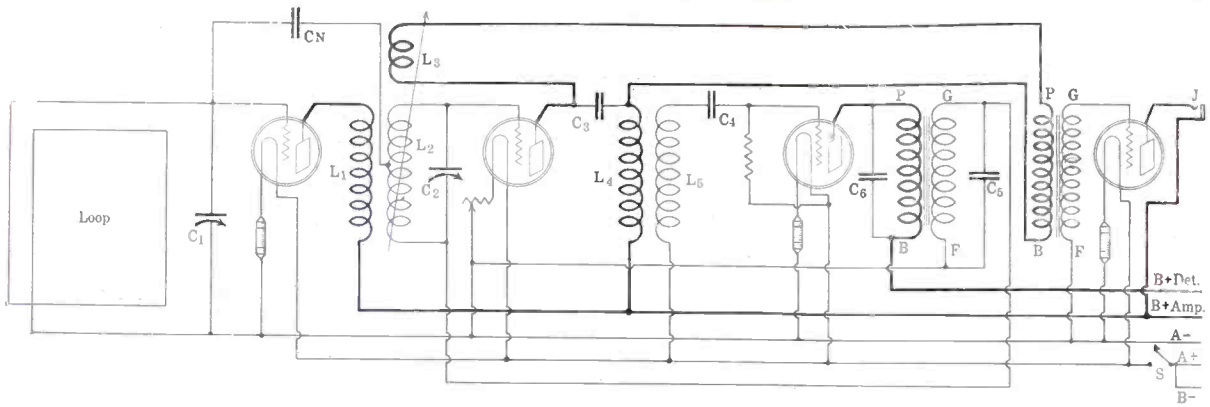


FIG. 193, the diagram of the Handsome Portable. The complete story regarding this receiver was published in the July 4 issue of RADIO WORLD. These coils are wound on larger forms than was stated in the original text, so as to make the winding of the coils simpler. L1 has 10 turns, wound on a 3½" tubing, 4" high, using No. 22 DCC wire. L2 has 45 turns, wound right next to L1, using same wire. L3, the tickler has 35 turns wound on 2½" tubing, 2½" high. Use same number of wire. L4L5 is a commercial fixed radio-frequency transformer. C1 is a .0005 mfd. variable condenser. CN is the neutralizing variable condenser. C2 is a .0005 mfd. variable condenser. C3 is a .001 mfd. fixed condenser. C4 is a .00025 grid condenser. C5 and C6 are both .001 mfd. fixed condensers. Use hard tubes (UV201A type). The grid leak (The zig-zag wire coming from the grid terminal post of the 3rd tube to the A plus post) has a resistance of 2 megohms. The AFT are both of the low ratio type.

PLEASE GIVE me a diagram of the Handsome Portable.—T. L. Coakley, Des Moines, Ia.

See Fig. 193.

* * *

REGARDING THE Diamond of the Air, may I use the Ambassador coil of which has on the 42-turn tickler, 41 turns on the secondary and 15 turns on the primary?—J. B. Monell, 10742-122nd St., Richmond Hill, N. Y.

Yes.

* * *

DOES IT make any difference if the primary of the 3-circuit tuner is on top or bottom of the stator coil? (2) In reference to The Diamond is the set regenerative or reverse feedback?—W. N. Payne, Howell, Mich.

(1) No. (2) Straight regeneration.

* * *

IN REFERENCE to "Wright's Powerful 3-Tube Reflex," published in the May 23 issue of RADIO WORLD, how could all the coils be wound on tubing 3" in diameter, instead of spiderweb coil?—E. I. Considine, Philadelphia, Pa.

L1 has 14 turns, wound on a 3" tubing, 3" high. Use No. 22 DCC wire. L2 has 60 turns, wound right next to L1. L3 has 10 turns, no spacing, L4 has 60 turns (another 3" tubing). Use No. 22 DCC wire. L5 has 10 turns, no spacing, L6 has 60 turns, (third 3" tubing). Use No. 22 DCC wire.

* * *

CONCERNING the "1-Tube DX Circuit' using a tuned plate, published in the July 18 issue of RADIO WORLD; (1) Can this tubing be round and cardboard? (b) Why is not the 10 turns for primary coil (A and B) connected to set instead of to aerial and ground? Does this coil have a rotor? (2) How many plates must the variable condensers contain (C1 and C2) and can a vernier be used on them also? (3) How many volts has the B battery? (4) How many mfd. has the grid condenser C3? (5) How many mfd. must the phone condenser "C4" contain? (6) Can UV199 tubes be used in this hookup also? (7) How many miles can a radio fan receive with this style of hookup on good weather conditions?—Carl Boehm, 60 Roth St., Rochester, N. Y.

(1) You may use cardboard. There would then be no necessity for a variable primary coil. (2) Normally 23. (3) 90. (4) .00025. (5) Yes. (6) 1,500.

* * *

IN REGARD to The Diamond. (1) Is there any spacing between the primary and the secondary of the coils? (2) Where should the tickler be placed, in inductive relation to the secondary or to the primary?—Martin Flagherty, 2630 Webster St., Philadelphia, Pa.

There is no necessity for the spacing although selectivity results may be better with ¼" spacing. (2) In inductive relation to the secondary.

* * *

WILL YOU please tell me if the rotor shaft on the coupler coils of the Marconi 3-Tube Receiver, described in the July 18 issue of RADIO WORLD passes through the center of the stator coils or at the end? If it goes through the center of the stator, do you wind half above or half below the rotor shaft?—J. L. Schneider, 348 Pleasant Ave., N. Y. City.

The rotor shaft goes through the form.

* * *

HOW MANY feet of wire will be required on a loop to be used with The Diamond.—R. Pierson, Balston, N. Y.

About 100 feet.

* * *

I AM very much interested in O'Rourke's favorite amplifier, which I saw in the Aug. 15 issue of RADIO WORLD. (1) Can I use a Federal transformer?—Chas. H. Miller, 100 Vernon Ave., Brooklyn, N. Y.

(1) Yes. No. 65

* * *

I BUILT the 5-tube receiver described by Capt. P. V. O'Rourke, and find that in tuning in on nearly all the low-wave stations there is too much distortion, that is, the beat notes of the stations cause a peculiar whistle which causes the signals to distort. (2) How can I make my set more selective? (3) What is the best tubes to use in the set?—A. H. Jacob, 79 East 32nd St., Brooklyn, N. Y.

(1) This has nothing to do with the set. The stations cause it. (2) Use a shorter aerial. (3) The storage battery tube.

* * *

IN THE July 25 issue of RADIO WORLD The Diamond of the Air was published. I have a breadboard hookup of this receiver and I am very much pleased with it. I have purchased a large cabinet for this hookup and I wish to know is it

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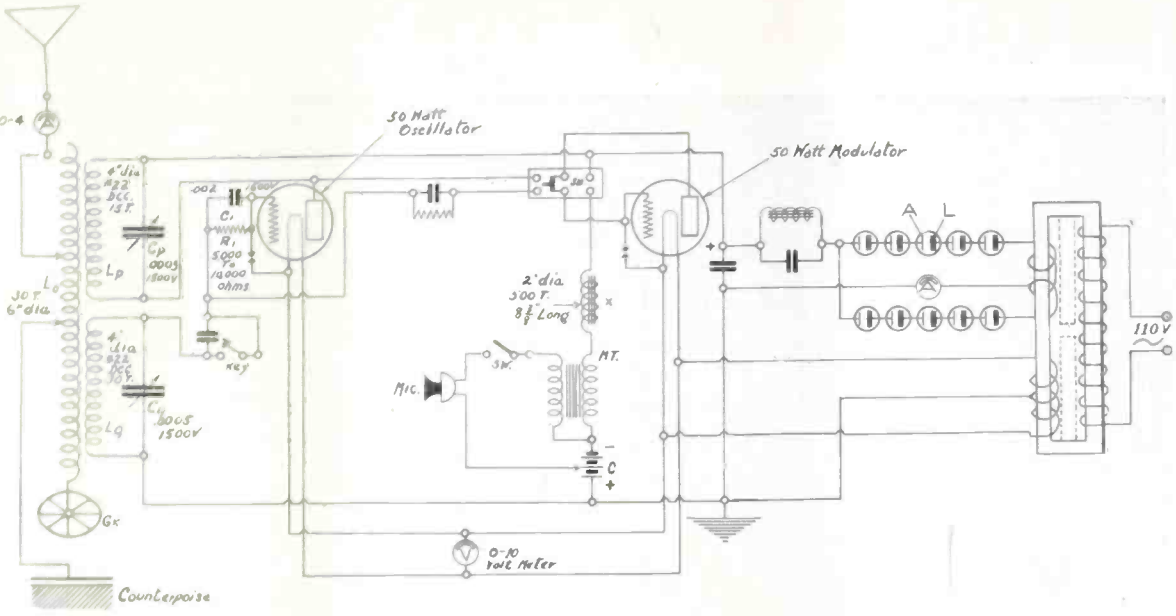


FIG. 195, showing the electrical diagram of the Meissner Transm tter, using the Heising System of Modulation. Note that X is a choke coil. The number of turns as stated here is for a radio frequency choke, to be placed in series with plate lead, so as to produce more oscillations. For complete data on how to build this set, see the June 27, July 4, 11 and 18 issues of RADIO WORLD. Two 5-watt tubes may be used, instead of the two 50-watt tubes.

possible to add another stage RF thus making this a 5-tube set. My thought is that for local reception, use the regular 4-tube set, at other times when fishing for DX use five tubes.—Wm. A. Sitzler, 384 Main St., Paterson, N. J.

The 4-tube set will give you as much volume and DX as the 5-tube set. The added tube of radio frequency helps very little, if any at all.

* * *

A DIAGRAM of a 4-tube set employing the push-pull reflex method is requested.—S. L. Tompkins, Beucherie, Ia.

See Fig. 194.

* * *

PLEASE GIVE me the diagram of the Meissner Transmitter using the Heising System of Modulation.—O. C. Klein, Jersey City, N. J.

See Fig. 195.

* * *

IN REGARD to the 1-Tube DX set, described in the Radio University, Fig. 168, July 18 issue of RADIO WORLD I would like to know if there are any changes necessary, if I use a UV200 instead of a UV201A?—D. F. Eranhardt, 2104 Grayland Ave., Richmond, Va.

Use less plate voltage (about 19½) on 200; make grid turn negative.

* * *

IN REGARD to an article in RADIO WORLD of June 27 by Prof. P. M. Ginning on "Reverse Feedback Improved by Condenser Compensation." In Fig. 2 it does not give the condenser capacities.—Philip Kramer, 8493 129th St., Richmond Hill, N. Y.

C1 and C2 are both .0005 mfd. variable condensers. C3 is a .00025 mfd. grid condenser. C4 is a .001 mfd. fixed condenser.

* * *

I WISH to make a spiderweb RFT. How many turns should I wind on primary and secondary?—D. Van Wyning, 2525 Detroit Ave., Cleveland, O.

Get a form with a 5" outside diameter and a 1" inside diameter. Starting from the inside, wind 10 turns. Use No. 22 DCC wire. This is the primary. The method of winding is under two sticks and over two sticks. Next to the primary wind 50 turns for the secondary. Use No. 22 DCC wire. The secondary of this coil can be tuned to the broadcasting wave

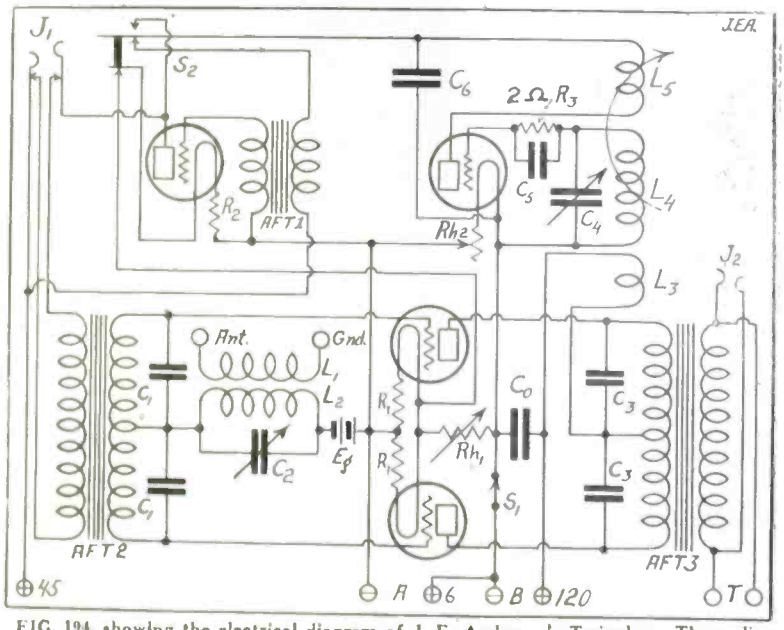


FIG. 194, showing the electrical diagram of J. E. Anderson's Twinplex. The radio-frequency stage is in parallel and reflexed in the push-pull stages. L1 consists of 10 turns round a form 3" in diameter, 4" high, with No. 22 DCC wire. Leave ¼" and wind L2, the secondary. There are 43 turns here. L3L4L5 is a commercial 3-circuit tuner. L3 has 10 turns, L4 has 45 turns, both wound on a 3½" tubing, 4" high using No. 22 DCC wire. L5, the tickler is wound on a tubing 2½" in diameter, 2½" high, contains 35 turns, using No. 22 DCC wire for winding. C4 is a .0005 mfd. variable condenser. R1, R1, R2 are all Amperites resistance subject to type of tube used. Rh2 is a 30-ohm rheostat. Rh1 is a 6-ohm rheostat. C1C1 and C3C3 are all .001 mfd. fixed condensers. C5 is a .008 mfd. grid condenser. C6 is a 005 mfd. fixed condenser. AFT2 and AFT3 are both push-pull AFT. AFT1 is an ordinary low ratio AFT. Co is a .001 mfd. fixed condenser. Use UV201A type tubes.

length band by a .0005 mfd. variable condenser.

* * *

WILL YOU please explain the variable leak across the transformer secondary in the Ultra-Audion Reflex published in July 18 issue of RADIO WORLD. (2) I would like to know how to make the variable leak. (3) Will the hookup run a loud speaker on one tube? (4) Will The Diamond of the Air run a loud speaker if the last stage of amplification is taken off?—J. B. Smith, 4732 Rising Sun Ave., Philadelphia, Pa.

(1) This is another method of connecting the grid leak. (2) It is not advisable to make a variable grid leak, as there are too many electrical difficulties encountered. (3) No. (4) Yes, on local stations only.

THE RADIO UNIVERSITY

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

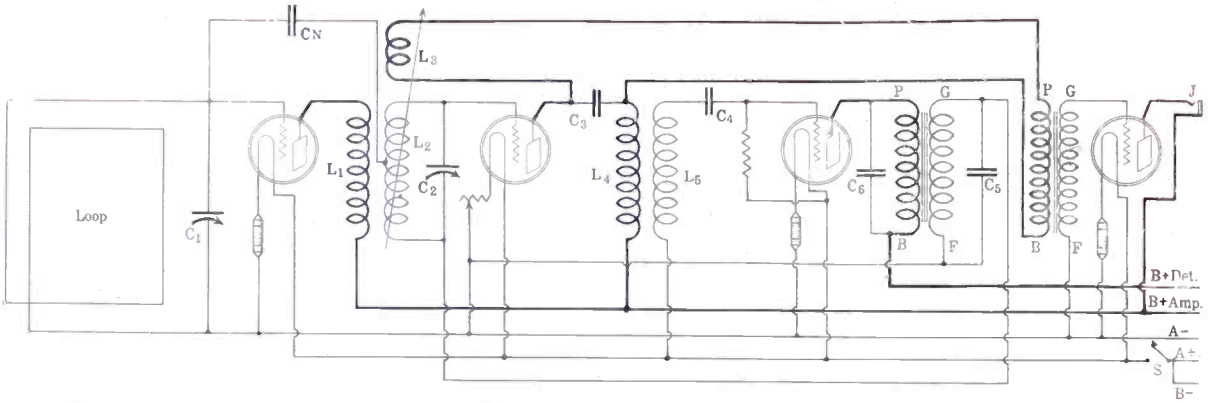


FIG. 193, the diagram of the Handsome Portable. The complete story regarding this receiver was published in the July 4 issue of RADIO WORLD. These coils are wound on larger forms than was stated in the original text, so as to make the winding of the coils simpler. L1 has 10 turns, wound on a 3½" tubing, 4" high, using No. 22 DCC wire. L2 has 45 turns, wound right next to L1, using same wire. L3, the tickler has 35 turns wound on 2½" tubing, 2½" high. Use same number of wire. L4L5 is a commercial fixed radio-frequency transformer. C1 is a .0005 mfd. variable condenser. CN is the neutralizing variable condenser. C2 is a .0005 mfd. variable condenser. C3 is a .001 mfd. fixed condenser. C4 is a .00025 grid condenser. C5 and C6 are both .001 mfd. fixed condensers. Use hard tubes (UV201A type). The grid leak (The zig-zag wire coming from the grid terminal post of the 3rd tube to the A plus post) has a resistance of 2 megohms. The AFT are both of the low ratio type.

PLEASE GIVE me a diagram of the Handsome Portable.—T. L. Coakley, Des Moines, Ia.

See Fig. 193.

* * *

REGARDING THE Diamond of the Air, may I use the Ambassador coil of which has on the 42-turn tickler, 41 turns on the secondary and 15 turns on the primary?—J. B. Monell, 10742-122nd St., Richmond Hill, N. Y.

Yes.

* * *

DOES IT make any difference if the primary of the 3-circuit tuner is on top or bottom of the stator coil? (2) In reference to The Diamond is the set regenerative or reverse feedback?—W. N. Payne, Howell, Mich.

(1) No. (2) Straight regeneration.

* * *

IN REFERENCE to "Wright's Powerful 3-Tube Reflex," published in the May 23 issue of RADIO WORLD, how could all the coils be wound on tubing 3" in diameter, instead of spiderweb coil?—E. I. Considine, Philadelphia, Pa.

L1 has 14 turns, wound on a 3" tubing, 3" high. Use No. 22 DCC wire. L2 has 60 turns, wound right next to L1. L3 has 10 turns, no spacing, L4 has 60 turns (another 3" tubing). Use No. 22 DCC wire. L5 has 10 turns, no spacing, L6 has 60 turns, (third 3" tubing). Use No. 22 DCC wire.

* * *

CONCERNING the "1-Tube DX Circuit" using a tuned plate, published in the July 18 issue of RADIO WORLD; (1) Can this tubing be round and cardboard? (b) Why is not the 10 turns for primary coil (A and B) connected to set instead of to aerial and ground? Does this coil have a rotor? (2) How many plates must the variable condensers contain (C1 and C2) and can a vernier be used on them also? (3) How many volts has the B battery? (4) How many mfd. has the grid condenser C3? (5) How many mfd. must the phone condenser "C4" contain? (6) Can UV199 tubes be used in this hookup also? (7) How many miles can a radio fan receive with this style of hookup on good weather conditions?—Carl Boehm, 60 Roth St., Rochester, N. Y.

(1) You may use cardboard. There would then be no necessity for a variable primary coil. (2) Normally 23. (3) 90. (4) .00025. (5) Yes. (6) 1,500.

* * *

IN REGARD to The Diamond. (1) Is there any spacing between the primary and the secondary of the coils? (2) Where should the tickler be placed, in inductive relation to the secondary or to the primary?—Martin Flagherty, 2630 Webster St., Philadelphia, Pa.

There is no necessity for the spacing although selectivity results may be better with ¼" spacing. (2) In inductive relation to the secondary.

* * *

WILL YOU please tell me if the rotor shaft on the coupler coils of the Marconi 3-Tube Receiver, described in the July 18 issue of RADIO WORLD passes through the center of the stator coils or at the end? If it goes through the center of the stator, do you wind half above or half below the rotor shaft?—J. L. Schneider, 348 Pleasant Ave., N. Y. City.

The rotor shaft goes through the form.

* * *

HOW MANY feet of wire will be required on a loop to be used with The Diamond.—R. Pierson, Balston, N. Y.

About 100 feet.

* * *

I AM very much interested in O'Rourke's favorite amplifier, which I saw in the Aug. 15 issue of RADIO WORLD. (1) Can I use a Federal transformer?—Chas. H. Miller, 100 Vernon Ave., Brooklyn, N. Y.

(1) Yes. No. 65

* * *

I BUILT the 5-tube receiver described by Capt. P. V. O'Rourke, and find that in tuning in on nearly all the low-wave stations there is too much distortion, that is, the beat notes of the stations cause a peculiar whistle which causes the signals to distort. (2) How can I make my set more selective? (3) What is the best tubes to use in the set?—A. H. Jacob, 79 East 32nd St., Brooklyn, N. Y.

(1) This has nothing to do with the set. The stations cause it. (2) Use a shorter aerial. (3) The storage battery tube.

* * *

IN THE July 25 issue of RADIO WORLD The Diamond of the Air was published. I have a breadboard hookup of this receiver and I am very much pleased with it. I have purchased a large cabinet for this hookup and I wish to know is it

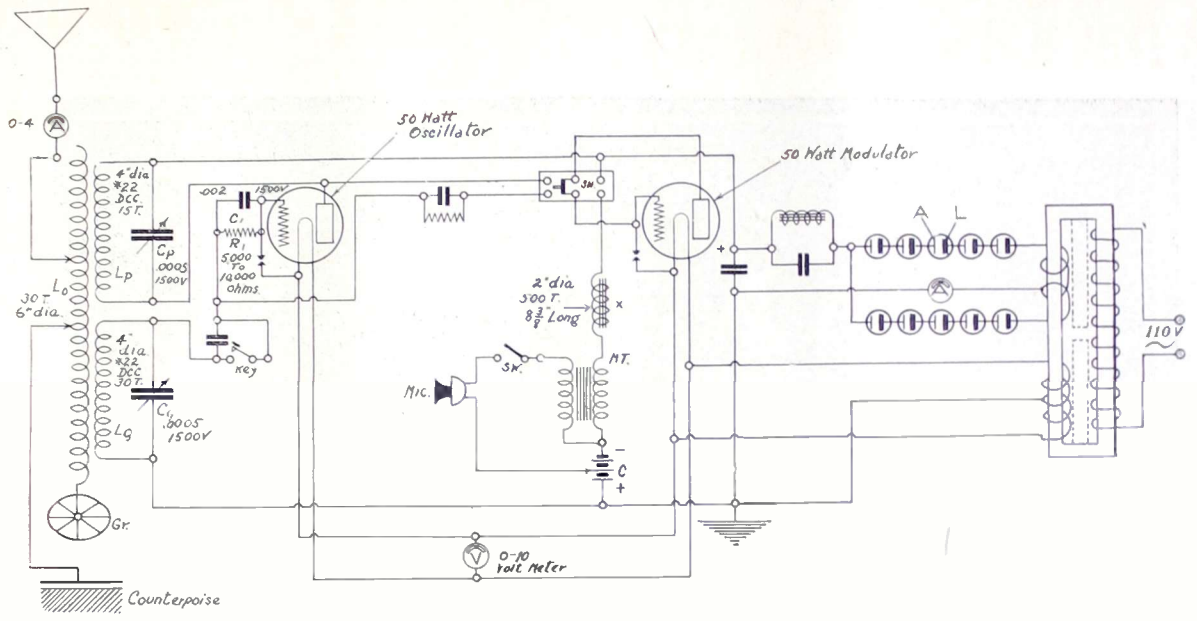


FIG. 195, showing the electrical diagram of the Meissner Transm tter, using the Heising System of Modulation. Note that X is a choke coil. The number of turns as stated here is for a radio frequency choke, to be placed in series with plate lead, so as to produce more oscillations. For complete data on how to build this set, see the June 27, July 4, 11 and 18 issues of RADIO WORLD. Two 5-watt tubes may be used, instead of the two 50-watt tubes.

possible to add another stage RF thus making this a 5-tube set. My thought is that for local reception, use the regular 4-tube set, at other times when fishing for DX use five tubes.—Wm. A. Sitzler, 384 Main St., Paterson, N. J.

The 4-tube set will give you as much volume and DX as the 5-tube set. The added tube of radio frequency helps very little, if any at all.

* * *

A DIAGRAM of a 4-tube set employing the push-pull reflex method is requested.—S. L. Tompkins, Beucherie, Ia.

See Fig. 194.

* * *

PLEASE GIVE me the diagram of the Meissner Transmitter using the Heising System of Modulation.—O. C. Klein, Jersey City, N. J.

See Fig. 195.

* * *

IN REGARD to the 1-Tube DX set, described in the Radio University, Fig. 168, July 18 issue of RADIO WORLD I would like to know if there are any changes necessary, if I use a UV200 instead of a UV201A?—D. F. Eranhardt, 2104 Grayland Ave., Richmond, Va.

Use less plate voltage (about 19½) on 200; make grid turn negative.

* * *

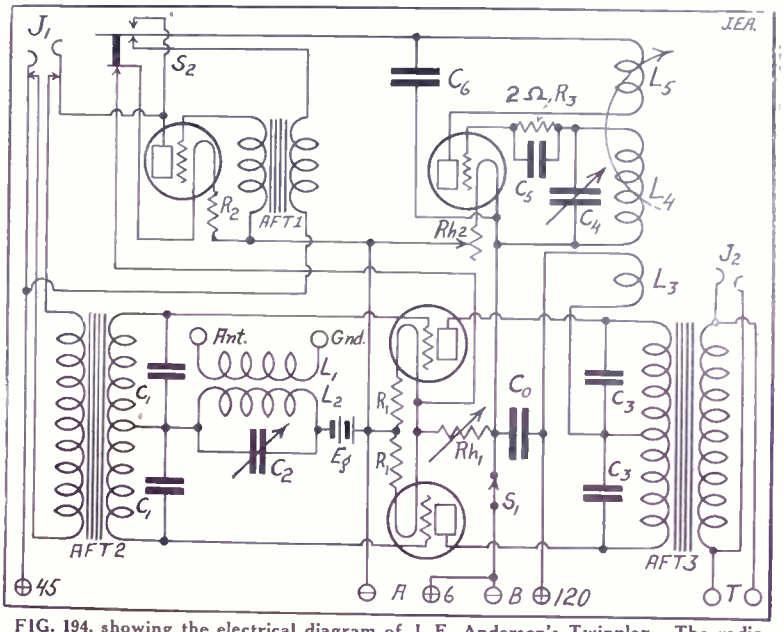
IN REGARD to an article in RADIO WORLD of June 27 by Prof. P. M. Ginning on "Reverse Feedback Improved by Condenser Compensation." In Fig. 2 it does not give the condenser capacities.—Philip Kramer, 8493 129th St., Richmond Hill, N. Y.

C1 and C2 are both .0005 mfd. variable condensers. C3 is a .00025 mfd. grid condenser. C4 is a .001 mfd. fixed condenser.

* * *

I WISH to make a spiderweb RFT. How many turns should I wind on primary and secondary?—D. Van Hyning, 2525 Detroit Ave., Cleveland, O.

Get a form with a 5" outside diameter and a 1" inside diameter. Starting from the inside, wind 10 turns. Use No. 22 DCC wire. This is the primary. The method of winding is under two sticks and over two sticks. Next to the primary wind 50 turns for the secondary. Use No. 22 DCC wire. The secondary of this coil can be tuned to the broadcasting wave-



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length band by a .0005 mfd. variable condenser.

* * *

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With
IRVING F. HOFFMAN
at

WJY

New York City

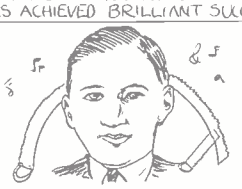
KEITH McLEOD, MUSICAL DIRECTOR IS AN ACCOMPLISHED PIANIST

NORMAN BROKENSHIRE, POSSESSOR OF THE PERFECT RADIO VOICE.

J. LEWIS REID, ANNOUNCER A.L.N. OF WJY AND WJZ

DR. WILLIAM T. HORNADAY, OF THE N.Y. ZOOLOGICAL PARK, TALKED ON BEARS

GODFREY LUDLOW, CONCERT VIOLINIST WHO HAS ACHIEVED BRILLIANT SUCCESS.



CHARLES J. GUGLIERI, WHO PLAYED THE MUSICAL SAW—VERY ENTERTAINING

MAURICE L. SALET, TENOR SANG WELL SELECTED SONGS

A 1-CONTROL PORTABLE, by Capt. P. V. O'Rourke; A Baby Super-Heterodyne, only 4 Tubes, by J. E. Anderson; A More Powerful Diamond, Still only 4 Tubes, by Herman Bernard. Other features in RADIO WORLD, dated July 11, 1925, 15c a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

Use Kilocycle Designation, Not Wavelength, Renewed Plea by Standards Bureau

WASHINGTON.

In radio, "kilocycle" is gradually taking the place of "wavelength," says the Bureau of Standards. All listeners and users of sets will want to know and understand the new rating which increasingly governs their tuning in. The making or logging of dials is found to have certain advantages when in the newer terms. Already one of the oldest stations is announcing its broadcasts on the "kilocycle" or frequency rating. It is really quite simple, for frequency (waves per second) replaces wavelengths (in meters).

Just as a musician can vary the number of oscillations of his vocal chords but cannot control the length of the sound waves, which vary with the medium, so a radio station can vary the number of oscillations per second, and let the wavelengths be what they will. A high tenor "C" gives sound waves 2 ft. in length but the standard rating is frequency, or pitch, in this case 512 vibrations per second. Frequency is the number of waves produced per second, the number of waves on the air after one second of transmission. "Kilocycle" means a thousand cycles, hence a broadcast on a 500-kilocycle frequency emits 500,000 radio waves per second.

To aid radio novices and experts the Bureau of Standards is about to issue a table so that at a glance all can translate from the old rating by "wavelength" (in meters) into the new rating by frequency (in kilocycles), and vice versa. Radio waves travel with the speed of light, about 300,000 kilometers per second. This is the sum of all the waves emitted in one second. Dividing 300,000 by the wavelength gives the frequency; dividing 300,000 by the frequency gives the wavelength.

The bureau gives a simple rule to obtain the frequency when the wavelength (in meters) is known: Divide 300,000 by the wavelength in meters. The answer is in kilocycles. Likewise the other way around: Divide 300,000 by the number of kilocycles to get meters. The ratio is the same both ways; 100 meters equals 3,000 kilocycles; 100 kilocycles is 3,000 meters.

As the new system proposed sometime ago by the international and national radio conferences is taken up by the broadcasting stations and placed into effect by the Government in assigning station frequencies, it will become increasingly important to translate from wavelength to frequency in order to tune in at all. It is easy to get familiar with the frequency method.

Eight New Stations

Eight new class A and one new class B broadcasting stations were licensed by the Department of Commerce while one station was transferred from class A to B.

NEW STATIONS

Call	Owner	Meters	Watts
KMA	May Seed & Nursery Co., Shenandoah, Ia.	252	500
WIBZ	Powell Elec. Co., Montgomery, Ala.	231	10
WRHM	Rosedale Hospital, Inc., Minneapolis, Minn.	252	50
KTAB	Tenth Ave. Baptist Church, Oakland, Cal.	215.7	500
WOCG	Triple Alliance Radio Station, Sycamore, Ill.	205.4	10
KUPR	Union Pacific R.R. Co., Omaha, Neb.	270	50
WKAF	WKAF Broadcasting Co., Milwaukee, Wis.	261	250
KFWC	L. E. Hall, Upland, Cal.	211.1	50
WLWL	Missionary Society of St. Paul the Apostle, New York, N. Y.	288.3	1000

TRANSFER, CLASS A TO CLASS C

WOK	Neutrowound Radio Mfg. Co., Homewood, Ill.	217.3	1500

As It Recently Was

EARPHONES used to be all the range even for multiple listening, but now the speaker is more popular for "crowd reception."

Lock and Key For Set When Kids Should Study Is Headmaster's Advice

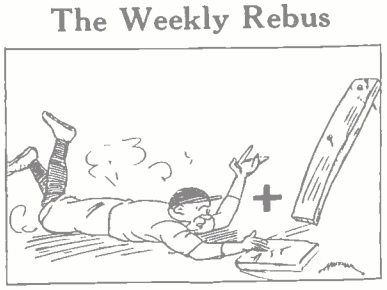
Radio broadcasting keeps children from studying, according to Walter F. Downey, headmaster of the English High School, Boston. Many failures in studies have been traced directly by Mr. Downey to radio. First, says he, the boy spends the two or three hours necessary for his home-work in listening to a concert, and second, he goes without sleep in order to get a distant station.

"With the exception of honor students," says Mr. Downey, "nearly every pupil in the school has been affected by the radio distraction. I would not ask parents to deny themselves the pleasure of owning a radio, but I would advise them to keep their radio under lock and key while their children are supposed to be studying."

POLAND PERKING UP

It is necessary to be of age to procure a license to operate a receiving set in Poland. In spite of this rather peculiar requirement, which is unexplained by the Consular report to the Department of Commerce containing the information, radio is becoming very popular in Poland.

The Weekly Rebus



WGY Uses 50,000 Watts In First Great Test While Listeners Note the Effects

The entire nation became a radio laboratory and every radio fan had an opportunity to be a laboratory worker on Saturday, Monday and Tuesday evenings, August 22, 24 and 25 when WGY, broadcasting through 2XAG, transmitted programs on 50 kilowatts, at 379½ meters wavelength, at the request of the United States Department of Commerce.

For the purpose of making a thorough investigation of super-power, that its policy with regard to high power may be intelligently shaped, Secretary Hoover of the Department of Commerce requested that the General Electric Company conduct a series of tests during the hours when the maximum number of stations were on the air. The radio listener, wherever located, was asked to comment on the quality and strength of the super-power signal as compared with the signal strength and quality when normal power is used.

Information is sought on the fading characteristics of super and normal signals and data will be sought on the question "Does super-power prevent reception of other stations?" The success of the tests will depend upon the response of the radio listeners for the conclusions reached will be based upon the reports received.

Every half hour WGY switched over from its normal power, 2,500 watts, to 50,000 watts. This enabled the listener to make comparisons on reception on intermediate and high power. Radio listeners were asked to report on the following:

Did you receive WGY on both high and low power? What was the comparative strength of signal with high and low power? What was the comparative quality with high and low power? Comparative interference from other stations on high and low power; give names of stations; what effect did high power have on static? What effect did high power have on fading? Comparative ability to tune out WGY on high and low power and receive other statjons; was weather clear or stormy?

No final statements of the benefits of super-power have as yet been made. The engineers of the General Electric Company are feeling their way in uncharted fields and they propose by tests on various wavelengths, with high and low power and with a variety of antenna systems to contribute something to the radio art which will redound to the benefit of the radio public.

On July 25, WGY, using 2XAG, broadcast programs on 50 kilowatts, the first time this was done in this or any other country. The program was put on the air at midnight because the effects of super-power were uncertain. There is every indication, from reports received after the original tests, that little difficulty need be experienced in tuning out the high power signals, even within thirty miles of the transmitter, greater distance may be reached and static is proportionately less. Fading is reduced somewhat under special circumstances.

The reception of the high and low power signals, through the dead spot areas of the country, will be awaited with great anxiety by all radio engineers.

What Will Super-Power Do?

By Adam Stein, Jr.

Managing Engineer

The ultimate object we hope to obtain by superpower broadcasting is, of course, an appreciable improvement in the service to listeners. To what extent super-power alone can accomplish this result has not been definitely determined. While some phenomena in radio transmission are unquestionably a function of the power of the transmitter, other characteristics are a function of the frequency and the relative location of the transmitting and receiving stations.

Realizing the limitations of the present broadcast service, and appreciating the vast amount of work that remains to be accomplished, the General Electric Company has established what is undoubtedly the largest and most powerful broadcasting transmitting laboratory in the world devoted to developmental work.

This laboratory is designed to permit a thorough study of radio transmission in general, and broadcast transmission in particular. It provides equipment for obtaining the transmission characteristics of wavelengths between 5 meters and 3,000 meters, at powers up to 100 KW. In addition there have been provided sufficient antenna structures so that the best type of antennas or radiators can be determined for the various wave lengths.

The laboratory occupies 54 acres of land and consists of 13 buildings, three towers 300 ft. high, one tower 150 feet high and some smaller towers ranging from 60 to 100 feet in height. From and between the towers is arranged a network of antennas with which we hope to obtain fundamental data on the most efficient antenna for a given wave length and power.

To return to the subject of what super-power can do for broadcast reception: First, it is obvious that increased power at the transmitter will provide increased energy at the receiving station, thus raising the level of the signal above that of the noise. This should, to some extent, tend to decrease the effect of static and other disturbances; second, it may appreciably decrease the extent to which fading interferes with reception; third, it may increase the range of the transmitter so that programs can be satisfactorily received over a greater area, and hence provide better service both day and night.

At present when "super-power" is applied to so many projects, it is perhaps difficult for the broadcast listener fully to appreciate the technical difficulties that must be overcome in building a transmitter of this size. Some idea of the problem may be gained from the fact that such a transmitter must be capable of receiving an extremely small amount of sound energy, converting it to electrical energy, and amplifying it fifty thousand million times without distortion.

Some apprehension has been felt, and suitably so, by the Department of Commerce, as to the use of appreciably higher power for broadcasting, believing that it might result in the program of a super-station crowding out the programs of the lower power stations, particularly in the vicinity of the station itself.

With
IRVING F. HOFFMAN
at

WGY

Schenectady, N. Y.

M.P RICE, BROADCASTING MANAGER FOR THE GENERAL ELECTRIC CO.

KOLIN HAGER, CHIEF ANNOUNCER AND STUDIO MANAGER AT WGY.

FRANK OLIVER, CHARACTER MAN OF THE WGY PLAYERS

ROSALINE GREENE, LEADING WOMAN OF THE WGY PLAYERS

OLLIE G. YETRU, PIANIST AT STATION WGY

STEPHEN E. BORSCLAIR, WHOSE ORGAN RECITALS ARE POPULAR

EDWARD RICE, VIOLIN SOLOIST AT THIS STATION.

A THOUGHT FOR THE WEEK

Those who declare that certain radio problems now before the public cannot possibly be worked out are probably survivors of the obstinate, wilful ones who a few years ago insisted that it was and always would be impossible to navigate and control airships.

RADIO WORLD

Radio World's Slogan: "A radio set for every home."

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(Dated Saturday of same week)
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EDITOR, Roland Burke Hennessy
MANAGING EDITOR, Herman Bernard

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Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

ADVERTISING RATES

General Advertising

1 Page, 7¼"x11"	462 lines	$300.00
½ Page, 7¼"x5⅛"	231 lines	150.00
¼ Page, 4⅛" D. C.	115 lines	75.00
1 Column, 2¼"x11"	154 lines	100.00
1 Inch		10.00
Per Agate line		.75

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52 consecutive issues	20%
26 times consecutively or E. O. W. one year	15%
4 consecutive issues	10%

WEEKLY, dated each Saturday, published Wednesday. Advertising forms close Tuesday, eleven days in advance of date of issue.

CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; minimum, $1.00.

Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the act of March 3, 1879.

AUGUST 29, 1925

Something to Worry About

Nobody who ever had a radio set was ever known to enjoy life better when deprived of a set.

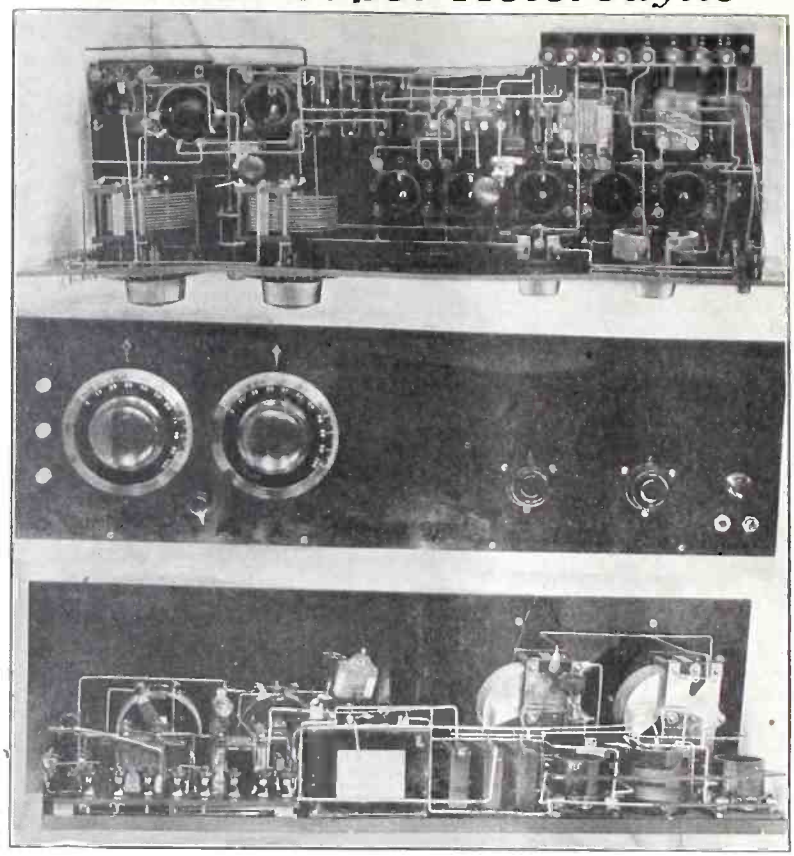
* * *

Persons who build their sets get out of them only so much as they put into them.

* * *

The worst set is better than none at all, for it merely means a man's waiting until he can afford a better one.

A Neat Super-Heterodyne



THREE views of the Portable Silver Super-Heterodyne employing 7 tubes, which was described by Wainright Astor in the June 13 issue of RADIO WORLD, and built by Fred Pridham, 294 West 92nd Street, N. Y. City. Notice Mr. Pridham's very neat work. The top photo shows how cleverly the set was wired. Note the fine arrangements of the parts. The middle photo shows the panel layout. The two dials on the left are the oscillator and modulator controls. The small knob in between the two dials at the bottom controls the rotary plates of a midget variable condenser. The next knob that you see is the potentiometer. The other one is the rheostat. One controls all the tubes. The bottom photo shows the back of the interior of the set. Note the large intermediate frequency transformer (has a white paster on it) in the center of set.

Justice to Super-Power

THE tests of super-power at WGY, where 50,000 watts are used, have received official sanction of Secretary of Commerce Hoover. Every possible angle of super-power effect should be tested, for here may lie a boon to radio. Just what the effect of super-power will be no one can tell right now. Small stations expressed the fear, almost a year ago, when the subject was first considered in a really serious way, that they would be blanketed. Nothing has happened yet to substantiate that fear.

Perhaps we are led to expect too much from super-power, or to fear it where it should be welcomed. The "cut and try" method is the only solution.

At several reception points in New York City, when WGY was using 50,000 watts, about the same fading was experienced as under normal however, which is not to be considered conclusive. But unexpected effects of super-power may be produced, either favorable or otherwise, and after we have all the facts we will be better fortified in defense of our opinion, whatever it may be.

Secretary Hoover deserves congratulations for taking such a deep and active interest in super-power, although this is merely consistent with the beneficent zeal he has bestowed on radio problems ever since he tackled them in an executive capacity.

Thick Skulls

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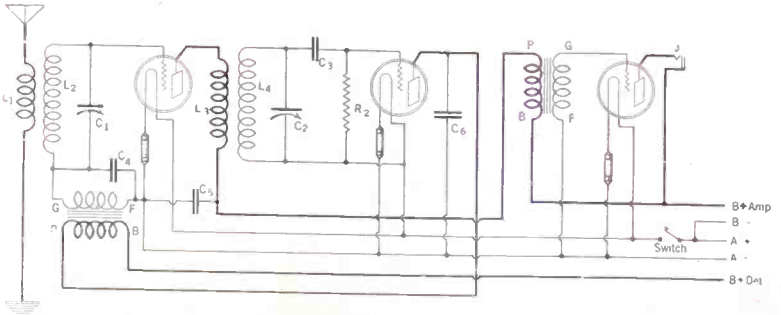

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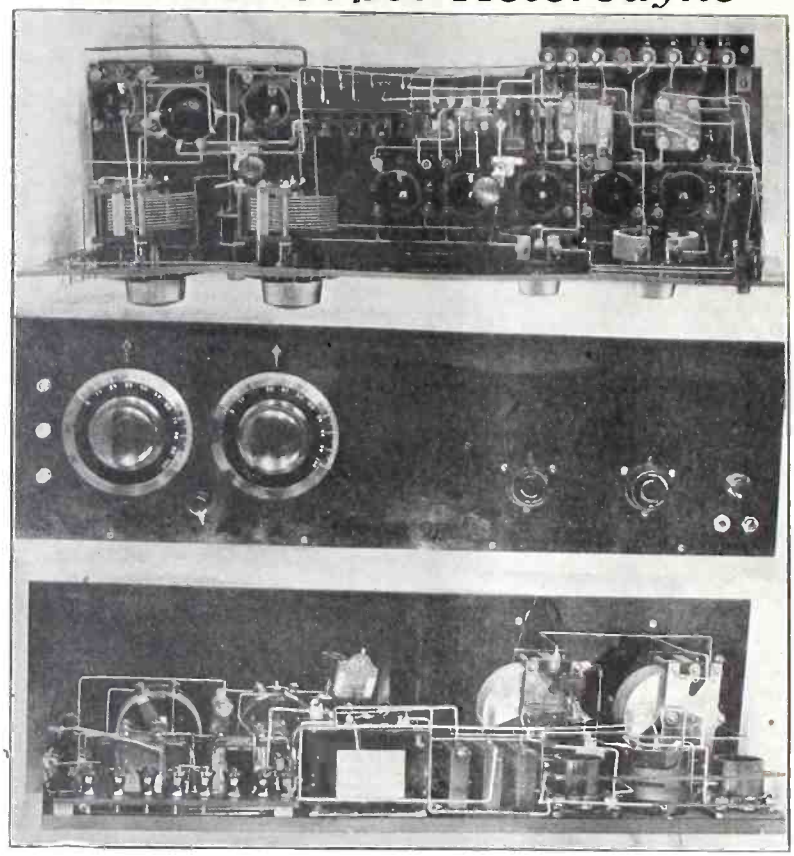

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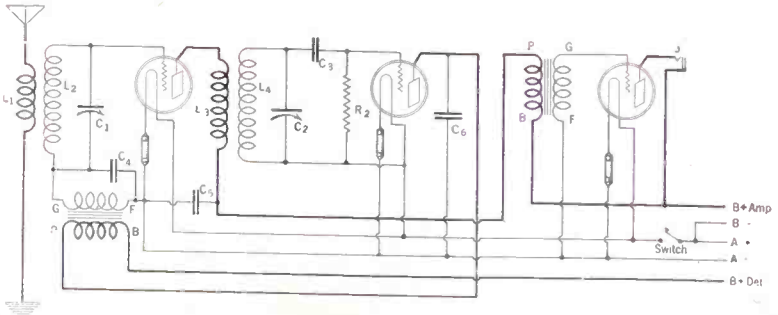

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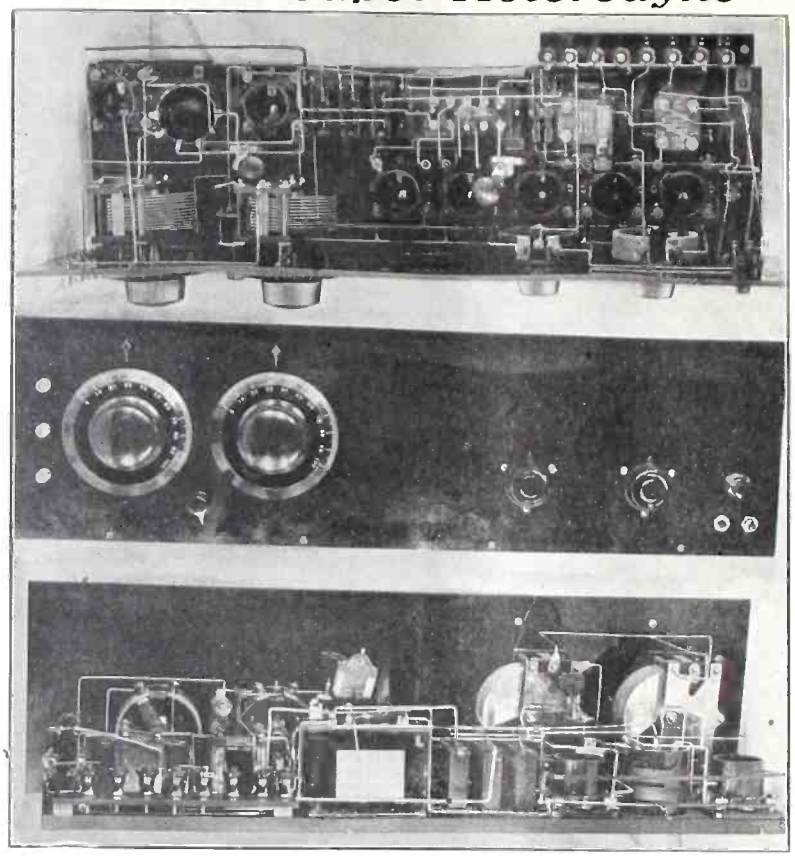

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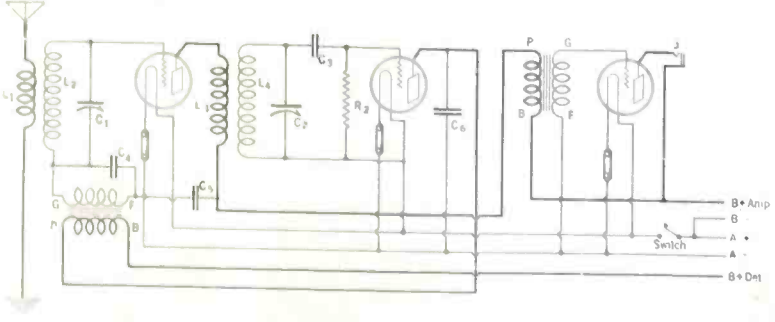
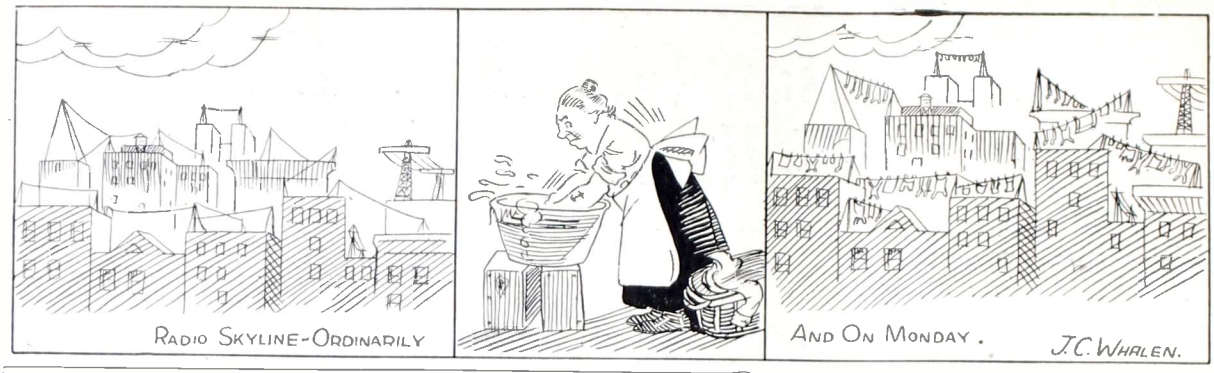
Battle Impending

"It was overpowering in its simplicity and read: 'Urgent. Battle of the fleet impending.' This was sent about two hours before the commencement of the main action; it was followed barely ten minutes later—5 p. m.—by a communication from the Admiralty giving the position of the German battle fleet which it had obtained from the directional stations. Even course and speed was stated. One fault in using the bearings taken by the directional stations was that the bearings of the British were not also taken, consequently the German position given was inexact in relation to the British ships' reckoning, which had been affected by tide and current after practically twenty-four hours constant zig-zag sailing. That was probably the real reason why, when the battle fleet came into action, Jellicoe did not find the enemy exactly where he had expected him, and consequently was unable to employ his entire striking force at once, a point which has so often been debated since then, both in and outside professional journals."



THIS is one of the most desirable of reflex circuits. It is quiet in operation, voluminous and a DX getter. L1 is wound on a tubing 3" in diameter and 3" high. It contains 10 turns. L2 is wound on the same tubing, with no spacing between, and has 45 turns. se No. 22 DCC wire to wind the coils. L3 is the same as L1 and L4 is the same as L2. C1 and C2 are both .0005 mfd.variable condensers. C3 is a .00025 grid condenser. C4 is a .001 mfd. fixed condenser. R2 is a 2 megohm grid leak C6 is a .001 mfd. fixed condenser. C5 is a .001 mfd. fixed condenser. The first AFT is of the high ratio type, while the other AFT is of the low ratio type

THE TRANSFORMATION —By J. C. Whalen



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.
Trade Service Editor,
RADIO WORLD,
1493 Broadway, New York City.

I desire to receive radio literature.

Name .....

City or town.....

State .....

Are you a dealer?.....

If not who is your dealer?

His Name .....

His Address .....

Chas. W. Dixon, 440 N. Pennsylvania Ave., Wilkes-Barre, Pa.
Henry Center, 749 Park Ave., Dunkirk, N. Y.
Bob Scaland, 1278 W. 115th St., Cleveland, O.
R. M. Craig, Box 1785, Houston, Tex
Myron Gury, 1442 East 14th St., Brooklyn, N. Y.
George Paro, Jr., Greenville, N. H. (Dealer).
D. M Collins, Mullins, S C.
Don Florence, Cisco, Tex.
William Maher, 536 East 79th St., N. Y. City.
H. J. Jackson, Bradinton, Fla.
Charles Bernstein, Sea View Hospital, Staten Island, N. Y.
Frank E. Wood, Rossville, Kan. (Dealer).
Kirk L. Taylor, Loraine, Tex.
Walter Enoch, Milwaukee, Wis.
E. A. Simmonds, 4831 Laurel, New Orleans, La.

Business Opportunities Radio and Electrical

Rates: 50c a line; Minimum, $1.00.

MANUFACTURING CONCERN, radio department, requires $25,000 additional capital to fill orders; offers good opportunity either as an investment or active participation. Box 10, Radio World.

NEW RADIO SET READY FOR PRODUCTION; radio engineer and production manager seeks reputable manufacturer; royalty and salary basis; immediate connection desired; give details first letter. Box 20, Radio World.

OUTSTANDING ACCOUNTS FINANCED; liberal terms, lowest rates; confidential; quick service assured. Mercantile Factors Corporation, 212 5th Ave., New York. Phone Ashland 9506.

NATIONALLY KNOWN RADIO COMPANY of well repute is ready to market complete line of radio sets backed by a national advertising campaign; substantial interest in the company offered for capital investment of $25,000 to $50,000; company well established with wonderful record of earnings; a splendid opportunity for investment. Box 30, Radio World.

PROMINENT Corner Store, 25x100, LOCATED on the main business street and car line intersections at Union Hill, N. J., few minutes from New York; suitable for any business; long lease; moderate rent. Kramer & Co., 213 Newark Ave., Jersey City, N. J.

RADIO NOVELTY EXTRAORDINARY — Working partner wanted; Canadian territory available; exceptionally meritorious article; small capital. Box 102, Radio World.

THE RADIO TRADE

Why French Market is Poor

Radio broadcasting and reception by telephone in France, compared with the United States and other countries, is thus far undeveloped upon a commercial scale, Consul C. D. Westcott, Paris, advises the Department of Commerce. That fact restricts present opportunities for the sale of American radio sets and accessories although the possible market therefore in the near future should not be disregarded.

At present there are in France only four long-range broadcasting stations. They are located in Paris. Two are operated by the Government, one by a private company dealing in radio equipment and one by an enterprising newspaper. The variety, selection and technical rendition of programmes broadcasted by them are of a high order. Operating expenses of the private company are defrayed in part by competing French radio manufacturers and dealers. Recently regional stations, of limited range, have begun operating at Lyon, Toulouse and Agen. But it is generally conceded by the trade that the commercial development of radio in France will require the regular operation of from 15 to 20 stations for long-range broadcasting. They should be so located that every section of the country will be assured of good reception at all hours, but apparently there is no immediate prospect that such a project will be realized.

French radio receiving sets are complicated by the great range in wavelength to which they must tune in. That obstacle has retarded commercial development from the beginning. The Eiffel Tower station operation on a 2,600 meter wave, and the others above noted on 1,750, 450 and 345 meters. Due to the extra long operating waves, which are now obsolete, the receiving set requires a multiplicity of coils, switches, plugs and other accessories. If broadcasting were limited to waves of 300-500 meters the cost of a set would be much less, its operation simplified and the demand therefore increased.

Safe to Buy Sets

THE 1926 radio season is upon us. Some who may not have receivers or who, having them, are thinking of buying a new one, may hesitate because they expect something revolutionary in radio. If there is to be any revolution—and none is in sight—it is bound to be at the transmission end. Radio receivers have reached a state that approaches perfection, and wonderful ones are on the market now, or ready to appear. Many manufacturers are not pushing their new sets at this moment, thinking there will be a psychological advantage in introducing the 1926 models at the radio shows that will be running in New York City in September.

The 1926 models may be purchased with full assurance that they will be serviceable for years to come. Talk of changes in wavelength assignment contemplates the continued existence of the present scale until the Fall of 1927, at least, and even then it would take only a few minutes' work to accommodate any 1926 receiver to the requirements of possibly shorter waves.

Buy a 1926 receiver and you will make no mistake.

Five Tubes and Up

HOW many tubes should a set have? On the radio-frequency side there should be enough so that the receiver will be sensitive and selective. On the audio side there should be enough to assure fine quality of magnification. For most horn type speakers two transformer-coupled stages will work nicely, giving great volume. For cone type speakers it is usually better to have some resistance stages on the audio side, for these match the requirements of the speaker.

Commercially produced sets for speaker operation will have five or six tubes, unless of Super-Heterodyne construction, when they will have from six to eight. The regenerative RF set is an exception, as three or four would be sufficient.

Coming Events

AUG. 22 to 29—3d Annual Pacific Radio Exposition, Civic Auditorium, San Francisco. Write P. R. E., 905 Mission St., San Francisco.

AUG. 23 to SEPT. 6—Canadian National Expos., Exposition Coliseum, Toronto, Can.

SEPT. 5 to 12—Third annual National Radio Exposition, Ambassador Auditorium, Los Angeles, Cal. Address Waldo K. Tupper.

SEPT. 9 to 20—International Wireless Exposition, Geneva, Switzerland.

SEPT. 12 to 19—Fourth Annual National Radio Exposition, Grand Central Palace, N. Y. C. Write American Radio Exp. Co., 522 Fifth Ave., N. Y. C.

SEPT. 14 to 19—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Road and Jerome Ave., N. Y. C. Write Radio World's Fair, Times Bldg., N. Y. C.

SEPT. 14 to 19—Pittsburgh Radio Show, Motor Square Garden. Write J. A. Simpson, 420 Bessemer Bldg., Pittsburgh, Pa.

SEPT. 14 to 19—Radio Show, Winnipeg, Can., Canadian Expos. Co.

SEPT. 21 to 26—First Annual Radio Expos., Broadcast Listeners' Association, Cadle Tabernacle, Indianapolis, Ind. Write Claude S. Wallin, Hotel Severin.

SEPT. 21 to 29—International Radio Exposition, Steel Pier, Atlantic City, N. J.

SEPT. 28 to OCT. 3—National Radio Exposition, American Exp. Palace, Chicago. Write N. R. E., 440 S. Dearborn St., Chicago, Ill.

SEPT. 28 to OCT. 3—Midwest Radio Week.

OCT. 3 to 10—Radio Exposition, Arena, 46th and Market Streets, Philadelphia, Pa., G. B. Bodenhof, manager, auspices Philadelphia Public Ledger.

OCT. 5 to 10—Second Annual Northwest Radio Exposition, Auditorium, St. Paul, Minn. Write 515 Tribune Annex.

OCT. 5 to 11—Second Annual Radio Show, Convention Hall, Washington, D. C. Write Radio Merchants' Association, 233 Woodward Bldg.

OCT. 10 to 16—National Radio Show, City Auditorium, Denver, Colo.

OCT. 12 to 17—Boston Radio Show, Mechanics' Hall. Write to B. R. S., 209 Massachusetts Ave., Boston, Mass.

OCT. 12 to 17—St. Louis Radio Show, Coliseum. Write Thos. P. Convey, manager, 737 Frisco Bldg., St. Louis, Mo.

OCT. 12 to 17—Radio Show, Montreal, Can., Canadian Expos. Co.

OCT. 17 to 24—Brooklyn Radio Show, 23d Regt. Armory. Write Jos. O'Malley, 1157 Atlantic Ave., Brooklyn, N. Y.

OCT. 19 to 25—Second Annual Cincinnati Radio Exposition, Music Hall. Write to G. B. Bodenhof, care Cincinnati Enquirer.

NOV. 2 to 7—Radio Show, Toronto, Can., Canadian Expos. Co.

NOV. 3 to 8—Radio Trade Association Exposition, Arena Gardens, Detroit. Write Robt. J. Kirschner, chairman.

NOV. 19 to 25—Milwaukee Radio Exp., Civic Auditorium. Write Sidney Neu, of J. Andrae & Sons, Milwaukee, Wis.

NOV. 17 to 22—4th Annual Chicago Radio Exp., Coliseum. Write Herrmann & Kerr, Cort Theatre Bldg., Chicago, Ill.

New B Battery Type

The New Battery

The new flat cell B battery recently announced by the National Carbon Company, makers of Eveready batteries, utilizes the new principle of patented battery construction by substitution of flat cells for cylindrical cells. There is about 30% more active electricity-producing material than in the Heavy Duty battery No. 770 of identical external dimensions. It is guaranteed to give considerably longer life than other B batteries of the same dimensions. More than 30,000 of these batteries have been tested by users in actual service and from 30 to 52% longer life has been obtained under the same conditions of service as compared with any cylindrical cell batteries of the same external dimensions.

NEW CORPORATIONS

Guaranteed Radio Tube Mfg. Co., New York City $5,000; G. Mantani, S. Weil, A. Weinberger. Atty., M. A. Glassberg, 291 Broadway, New York City.

Electric Light Radio Corp., N. Y., $1,060,000; John J. Furia, J. C. McCormick, New York; Clarence S. Stone, Mt. Vernon, N. Y. (Corp. Trust Co. of America)

New Amsco Condenser Is of the SLF Type

The Amsco Allocating Condenser allocates apportions or "spreads" the stations evenly over the tuning dial, correcting the customary congestion among the lower numbers and greatly simplifying tuning.

But what will especially commend the Amsco Allocating Condenser to the set-builder is that unlike other straight-line frequency condensers, it is economical of space, requiring less room in the cabinet.

This is due to the scientific design of the plates. The rotor plates are half a heart in shape, electrically and mechanically the correct solution of the straight-line frequency problem.

A special feature of this design is that effective use is made of the first 15 divisions on the tuning dial, eliminating a hitherto wasted area.

Over sharp or over-broad tuning is corrected by the use of the Amsco Allocating Condenser and all stations tune in with equal ease.

The variation from the SLF curve is less than 10%.

The use of the Amsco Allocating Condenser results in greater set efficiency on high frequencies (low wavelengths). Tuning will be found to be free from body capacity effects or electrical noises. Amsco engineering insures true low-loss construction.

The Amsco Allocating Condenser is made in three sizes, single or Siamese (twin). It will be found electrically accurate and uniform in capacity ratings.

The manufacturers, Amsco Products, Inc., Lafayette St., New York, back this fine produce with their usual strong guarantee.

The Aurora Jack

The Aurora Electric Co., 100 South 6th St., Brooklyn, N. Y., submitted to RADIO WORLD's laboratories for test of their single open circuit jack. This jack has a very handy feature, as it has several advantages over regular style jack: takes less space, no screw to get loose, very small amount of metal in that it takes one single hole to mount it securely. It is durably constructed. The contacts are strong and are efficient for all sizes of plugs. Special clips are used for connecting purposes. The contacts are made out of phosphor bronze, with nickel plating to prevent corrosion. The total depth of the jack is only 1½".

(Tested and approved by RADIO WORLD laboratories.)

Trouble-Shooting Advice for Warren's 1-Tube Set

(*Concluded from page* 13)

goes to one terminal of the grid condenser C3, the end of this condenser going to the grid post of the socket and to one terminal of the variable grid leak. The end of the variable grid leak goes to the A plus on the socket, which in turn goes to the A plus on the terminal strip. Connect the resistance of the rheostat to the A minus on the terminal strip. This also goes to B minus. The rheostat arm goes to the negative filament on the socket.

All of the internal wiring should be done with No. 18 bell wire. Try not to use bus bar, as this decreases the efficiency of the set.

Trouble Shooting

Since the tube sets attract the novices more than any other sets, there is more possibility that the first time the set is wired up there will be some difficulty in making it work properly.

The first thing that should be done upon completion of the set is to connect the antenna and ground. Then the A battery. See if the tube lights. If it lights connect the B plus to its proper terminal. Now insert the phone tips or the plug. You should hear a loud click, provided the tube is lit. If you hear the click when the tube is not lit, there is some error in the B battery (plate circuit) wiring. Test all the coils for an open or short circuit in that case. This very seldom happens but when it does happen it is very puzzling to find. A 1½ volt battery connected in series with the phones is all that is necessary to test the coils. Put one terminal of the phones to the A battery. You now have two open leads, one from the battery and one from the phones. Put one of these terminals to a part of the coil and the other terminal on the other terminal of the coil. If you hear a click, the circuit is O. K., if not, form your own conclusions.

Provided you get a click when the tube is lit, turn the dials slowly, both at the same time, until a station is heard.

LIST OF PARTS

One variable grid leak. (R).
One .00025 mfd. grid condenser (C3).
One .0005 mfd. fixed condenser. (C2).
One .0005 mfd. variable condenser. (C1).
One .001 mfd. fixed condenser. (Dotted lines indicate condenser).
Two 4" dials.
One 3-circuit tuner. (L1L2L3).
One rheostat (R2).
One socket.

JOIN THE A. B. C.

A. B. C. stands for American Broadcast Club, an organization of fans banded together to promote the welfare of radio. There are no dues, no obligations. Address A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

Wilson Andrews, 7198 Clarington Ave., Culver City, Cal.
Ivan Emelio Dominquez, Hostos 71, Mayaguez, P. R.
John R. Stevens, 193 W. Brookline St., Boston, Mass.
Charles Bernstein, Sea View Hospital, Staten Island, N. Y.
Richard Zehrt, 903 Chicago St., Racine, Wis.
William Kettler, East Main St., St. Clairsville, Ohio.
Wm. S. Koneeczny, 2225 Belmont St., Hamtranilk, Mich.

A. B. C. Editor, RADIO WORLD.
1493 Broadway, New York City.
Please enroll me as a member of the American Broadcast Club.
Name .....
Address .....
City or Town .....
State .....

THE KEY TO THE AIR

KEY

Abbreviations: EST, Eastern Standard Time; CST, Central Standard Time; MST, Mountain Standard Time; PST, Pacific Standard Time; DS, Daylight Saving Time.

How to tune in a desired distant station at just the right time—Choose your station from the list published herewith. See what time division the station is under (EST, CST, etc.); then consult the table below. Add to or subtract, as directed from the time as given on the PROGRAM. The result will be the same BY YOUR CLOCK that you should tune in, unless daylight saving time intervenes, as explained below.—The table:

If you are in	*And want a station in*	*Subtract*	*Add*
EST	CST	..	1 hr.
EST	MST	..	2 hrs.
EST	PST	..	3 hrs.
CST	EST	1 hr.	..
CST	MST	..	1 hr.
CST	PST	..	2 hrs.
MST	EST	2 hrs.	..
MST	CST	1 hr.	..
MST	PST	..	1 hr.
PST	EST	3 hrs.	..
PST	CST	2 hrs.	..
PST	DST	1 hr.	..

If you are under DST and the station you want is under that time, too, or if both are under ST, the above table will hold.

If you are under DST, and the station operates under ST, add one hour to the table result.

If the station uses DST, and you are under ST, subtract one hour from the table result.

FRIDAY, AUGUST 28

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 1:05 PM; 8 to 12 PM.
WAMD, Minneapolis, Minn., 243.8 (SCT)—12 to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 to 10 PM.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 10.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—7:30 PM to 11:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 10.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 to 1:30 PM; 4:30 to 5:30; 6:30 to 11.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 to 7 M; 8 to 10; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 8 to 11.
WEAO, Ohio State University, 293.9 (EST)—8 PM to 10.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7:45; 2 PM to 3:15; 5:30 to 10.
WEMC, Berrien Springs, Mich., 286 (CST)—9 PM to 11.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 11.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15; 8 to 11.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 7:30 to 11.
WGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2; 5:30 to 10:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8:30 to 10.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 5; 7 to 11; 12 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—7 PM to 9; 11 to 12; 12:30 to 1:30; 4:30 to 5:30; 6:30 to 9:30.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 8:45 to 10:05; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:50; 6 to 7.
WJY, New York City, 405 (ESTDS)—7:30 PM to 11:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 10:30.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 1 AM.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15; 1:30 PM to 2:30.
WMCA, New York City, 341 (ESTDS)—11 AM to 12M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:45 PM to 4:45; 6:20 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1; 5:45 to 7:10; 9 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 12.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 8:30; 10 to 12.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—4:30 PM to 5; 6:45 to 12.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:45.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 10; 12 PM to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:20 PM; 1:30 to 3:20; 3:30 to 11.
KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
KFDY, Brookings, S. D., 273 (MST)—8 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 10.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
KGO, Oakland, Cal., 361.2 (PST)—11:10 AM to 1 PM; 1:30 to 3; 4 to 7.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:30 PM; 5:30 to 11:30.
KJR, Seattle, Wash., 484.4 (PST)—10:30 AM to 11:30 AM; 1 PM to 6:30; 8:30 to 11.
KNX, Hollywood, Cal., 337 (PST)—11:30 AM to 12:30 PM; 1 to 2; 4 to 5; 6:30 to 12.
KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 8:45; 11 to 12 M.
KPO, San Francisco, Cal., 429 (PST)—7:30 AM to 8; 10:30 to 12 M; 1 PM to 2; 4:30 to 11.
KSD, St. Louis, Mo., 545.1 (CST)—4 PM to 5.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:20 to 10.
KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:25 to 3:30; 6:02 to 7:20; 9 to 1:30 AM.
CNRA, Moncton, Canada, 313 (EST)—8:30 PM to 10:30.
CNRE, Edmonton, Canada, 516.9 (MST)—8:30 PM to 10:30.
CNRS, Saskatoon, Canada, 400 (MST)—2:30 PM to 3.
CNRT, Toronto, Canada, 357 (EST)—6:30 PM to 11.

SATURDAY, AUGUST 29

WAAM, Newark, N. J., 263 (EST)—7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 to 2 AM.
WAMD, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 1 AM.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—11 AM to 12:30 PM; 7 to 9.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—10:45 AM to 12M; 3 PM to 4; 6:30 to 7:30.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12:30 PM; 2:30 to 5; 6 to 10.
WEAF, New York City 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 12.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 7 AM.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
WEMC, Berrien Springs, Mich., 286 (CST)—11 AM to 12:30 PM; 8:15 to 11.
WFAA, Dallas, Texas, 475.9 (CST)—12:30 PM to 1; 6 to 7; 8:30 to 9:30; 11 to 12:30 AM.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30; 11:30 to 12:30 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 12.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 2:30 PM; 3 to 5:57; 6 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—8:45 to 10:15 PM, U. S. Army Band.
WGY, Schenectady, N. Y., 379.5 (EST)—7:30 PM to 10.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:30 PM; 4 to 5; 6 to 7:30.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 10.
WHO, Des Moines, Iowa, 526 (CST)—11 AM to 12:30 PM; 4 to 5:30; 7:30 to 8:30.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 2; 3 to 4; 6 to 11:30.
WJY, New York City, 405 (ESTDS)—2:30 PM to 5; 8 to 10:30.
WJZ, New York City, 455 (ESTDS)—9 AM to 12:30 PM; 2:30 to 4; 7 to 10.
WKRC, Cincinnati, O., 326 (EST)—10 to 12 M.
WLWC, Cincinnati, O., 422.3 (EST)—9:30 AM to 12:30 PM; 7:30 to 10.
WMAK, Lockport, N. Y., 265.5 (EST)—10:25 AM to 12:30 PM.
WMCA, New York City, 341 (ESTDS)—3 to 5 PM; 6:30 to 2.
WNYC, New York City, 526 (ESTDS)—1 to 3 PM; 7 to 11.
WOAW, Omaha, Neb., 526 (CST)—10 AM to 1; 2:15 to 4; 9 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 5:45 to 7:10; 9 to 12.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 5; 10:55 to 11:02.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7:30; 8 to 11.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 3 AM.
WPG, Atlantic City, N. J., 299.8 (CST)—7 PM to 12.
WRC, Washington, D. C., 469 (EST)—4:30 to 5:30 PM; 6:45 to 12.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 12.
WRNY, New York City, 258.5 (ESTDS)—11:59 to 2 PM; 7:59 to 9:30; 12 M to 1 AM.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 3 to 4; 5 to 6; 10:45 to 12.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10; 11:55 to 1:30 PM; 3 to 4.
KDKA, Pittsburgh, Pa., 309 (EST)—10 AM to 12:30 PM; 1:30 to 6:30; 8:45 to 10.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 9:30 to 12:30.
KFNF, Shenandoah, Iowa, 268 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10:30.
KFOA, Seattle, Wash., 455 (PST)—Silent.
KGO, Oakland, Cal., 361.2 (PST)—11 AM to 12:30 PM; 3:30 to 5:45; 7:30 to 9.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 6 to 7; 10 to 11.
KHJ, Los Angeles, Cal., 405.2 (ESTDS)—7 AM to 7:30; 10 to 1:30 PM; 2:30 to 3:30; 5:30 to 2 AM.
KJR, Seattle, Wash., 484.4 (PST)—1 PM to 2:45; 6 to 6:30; 8:30 to 10.
KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 6:30 to 2 AM.
KOA, Denver, Colo., 322.4 (MST)—11:30 AM to 1 PM; 7 to 10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9.
KPO, San Francisco, Cal., 429 (PST)—8 AM to 12M; 2 PM to 3; 6 to 10.
KSD, St. Louis, Mo., 545.1 (CST)—7 PM to 8:30.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10:30.
KYW, Chicago, Ill., 536 (CSTDS)—11 AM to 12:30 PM; 4 to 5; 7 to 8.
CKAC, Montreal, Canada, 411 (EST)—4:30 PM to 5:30.
CNRO, Ottawa, Ontario, Canada, 435 (EST)—7:30 PM to 10.
PWX, Havana, Cuba, 400 (EST)—8:30 PM to 11:30.

SUNDAY, AUGUST 30

WBBM, Chicago, Ill., 226 (CST)—4 PM to 6; 8 to 10.
WBBR, New York City, 272.6 (ESTDS)—10 AM to 12 M; 9 PM to 11.
WCCO, St. Paul and Minneapolis, Minn., 416 (CST)—11 AM to 12:30 PM; 4:10 to 5:10; 7:20 to 10.
WDAF, Kansas City, Kansas, 365.6 (CST)—4 PM to 5:30.
WEAF, New York City, 492 (ESTDS)—3 PM to 5; 7:20 to 10:15.
WEAR, Cleveland, O., 390 (EST)—3:30 PM to 5; 7 to 8; 9 to 10.
WFBH, New York City, 272.6 (ESTDS)—5 PM to 7.
WGBS, New York City, 316 (ESTDS)—3:30 PM to 4:30; 9:30 to 10:30.
WGCP, New York City, 252 (ESTDS)—8 PM to 11.
WGN, Chicago, Ill., 370 (CST)—11 AM to 12:45 PM; 2:30 to 5; 9 to 10.
WGR, Buffalo, N. Y., 379.5 (EST)—9:30 AM; 7:15 to 8 PM.
WGY, Schenectady, N. Y., 379.5 (EST)—9:30 AM to 12:30 PM; 2:35 to 3:45; 6:30 to 10:30.
WHAD, Milwaukee, Wis., 275 (CST)—3:15 PM to 4:15.
WHN, New York City, 360 (ESTDS)—1 PM to 1:30; 3 to 6; 10 to 12.
WHT, Chicago, Ill., 238 (CSTDS)—9:30 AM to 1:15 PM; 5 to 9.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—10:45 AM to 12:30 PM; 4:15 to 5:30.
WKRC, Cincinnati, O., 326 (EST)—6:45 PM to 11.
WMCA, New York City, 341 (ESTDS)—11 AM to 12:15 PM; 7 to 7:30.
WNYC, New York City, 526 (ESTDS)—9 PM to 11.
WOCL, Jamestown, N. Y., 275.1 (EST)—9 PM to 11.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—10:45 AM to 12:30 PM; 2:30 to 4.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—3:15 PM to 5; 9 to 11.
WQJ, Chicago, Ill., 448 (CST)—10:30 AM to 12:30 PM; 3 PM to 4; 8 to 10.
WREO, Lansing, Michigan, 285.5 (EST)—10 AM to 11.
WRNY, New York City, 258.5 (ESTDS)—3 PM to 5; 7:59 to 10.
WSBF, St. Louis, Mo., 273 (CST)—9 to 11 PM.
WWJ, Detroit, Mich., 352.7 (EST)—11 AM to 12:30 PM; 2 to 4; 6:20 to 9.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 10:30; 11:55 to 12 M; 2:30 PM to 5:30; 7 to 11.
KFNF, Shenandoah, Iowa, 266 (CST)—10:45 AM to 12:30 PM; 2:30 to 4:30; 6:30 to 10.
KOA, Denver, Col., 322.4 (MST)—10:55 AM to 1 PM; 4 PM to 5:30; 7:45 to 10.
KOIL, Council Bluffs, Iowa, 278 (CST)—11 AM to 12:30 PM; 7:30 to 9.
KGW, Portland, Oregon, 491.5 (PST)—10:30 AM to 12:30 PM; 6 to 9.
KHJ, Los Angeles, Cal., 405.2 (ESTDS)—10 AM to 12:30 PM; 6 to 9.
KJR, Seattle, Wash., 384.4 (PST)—11 AM to 12:30 PM; 3 to 4:30; 7:15 to 9.
KTHS, Hot Springs, Ark., 374.8 (CST)—11 AM to 12:30 PM; 2:30 to 3:40; 8:40 to 11.

MONDAY, AUGUST 31

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.

WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 2 to 2 AM.
WAMB, Minneapolis, Minn., 243.8 (CST)—10 PM to 12.
WBBM, Chicago, Ill., 226 (CST)—6 PM to 7.
WBBR, New York City, 272.6 (ESTDS)—8 PM to 9.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM 11:30.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 12.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416 (CST)—9:30 AM to 12 M; 1:30 PM to 6:15.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 8 to 10; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 4 PM to 5; 6 to 11:30.
WEAR, Cleveland, O., 300 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 7 to 8.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
WEMC, Berrien Springs, Mich., 286 (CST)—8:15 PM to 11.
WFAA, Dallas, Texas, 475.9 (EST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 to 3:10; 6 to 7:30.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:18; 8 to 10:45.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 3:30 to 5:57.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:30 PM; 2:30 to 4:30; 7:30 to 11.
WGY, Schenectady, N. Y., 379.5 (EST)—1 PM to 2; 5:30 to 8:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8 to 10.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 6:30 to 12.
WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 7:30 to 9; 11:15 to 12.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30, 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 8.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 5:30; 6 to 6:30; 7 to 11.
WKRC, Cincinnati, O., 326 (EST)—8 PM to 10.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 1; 2 to 3; 4:30 to 6; 7:30 to 11:30.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 12:15 PM; 1:30 to 2:30; 3 to 5; 6 to 10.
WMAK, Lockport, N. Y., 265.5 (EST)—8 PM to 12.
WMCA, New York City, 341 (ESTDS)—11 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:20 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 10:30.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 6.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4:40 to 6; 7:30 to 11.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 to 4; 6:15 to 11:30.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
WQJ, Chicago, Ill., 488 (CST)—11 AM to 12 M; 3 PM to 4.
WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:30 to 11.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 10:30; 12 to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—6 AM to 7; 9:45 to 12:15 PM; 2:30 to 3:20; 5:30 to 10.
KPAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:45 PM to 1:30; 4 to 5:15; 6 to 10.
KGO, Oakland, Cal., 361.2 (PST)—9 AM to 10:30; 11:30 AM to 1 PM; 1:30 to 6; 6:45 to 7; 8 to 1 AM.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30; 5 to 8.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 10.
KJR, Seattle, Wash., 384.4 (PST)—1 PM to 2:45; 6 to 6:30; 7 to 11.
KNX, Hollywood, Cal., 337 (PST)—12 M to 1 PM; 4 to 5; 6:30 to 12.
KOB, State College of New Mexico, 348.6 (MST)—11:55 AM to 12:30 PM; 7:30 to 8:30; 9:55 to 10:10.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 10.
KPO, San Francisco, Cal., 429 (PST)—10:30 AM to 12 M; 1 PM to 2; 2:30 to 3:30; 4:30 to 10.
KSD, St. Louis, Mo., 545.1 (CST)—7:30 PM to 10.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10.

Features of the Week

FRIDAY, AUGUST 28

WWJ, Detroit, Mich., 352.7 (EST)—8 PM to 9 PM, Goldman's Band concert from N. Y.
WEAF, New York City, 492 (ESTDS)—9:15 to 10:15, Goldman Band Concert.
WHT, Chicago, Ill., 238 (CSTDS)—8:45 to 10:15 PM, Elmer Kaiser's Review Park Ballroom orch.
WGBS, New York City, 315.6 (ESTDS)—7 PM to 7:10, Herman Bernard, "Your Radio Problem."
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

SATURDAY, AUGUST 29

WEAF, New York City, 492 (ESTDS)—11 PM to 12 PM, Vincent Lopez orch.
KGW, Portland, Ore., 491.5 (PST)—10 PM to 12 PM, dance music from Portland Hotel by Jackie Souders' orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.

SUNDAY, AUGUST 30

WEAF, New York City, 492 (ESTDS)—9:15 PM to 10:15, Goldman Band Concert.
WBBM, Chicago, Ill., 226 (CST)—12 PM to 2 AM—Sunday, Midnight Nut Club Feature, Sanovar Orch.

MONDAY, AUGUST 31

WWJ, Detroit, Mich., 352, (EST)—8 PM to 9, Goldman Band Concert from N. Y.
WEAF, New York City, 492 (ESTDS)—9:15 PM to 10:15, Goldman Band concert; 11 to 12, Jack Alben and his Hotel Bossert orchestra.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

TUESDAY, SEPTEMBER 1

WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WEAF, New York City, 492 (ESTDS)—9 PM to 10, "Everday Hour,"; 11 to 12 PM Vincent Lopez Hotel Pennsylvania orchestra.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.
WEEI, Boston, Mass., 476 (ESTDS)—10 PM to 11—From New York, WEAF Grand Opera Company.

WEDNESDAY, SEPTEMBER 2

WHO, Des Moines, Ia., 526 (CST)—10 to 11:30 PM—The Barret-Philbreck Orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WEEI, Boston, Mass., 476 (ESTDS)—8:30 PM to 9—"Earl Nelson and His Uke," courtesy Radio Equipment Company.

THURSDAY, SEPTEMBER 3

WEAF, New York City, 492 (ESTDS)—11 PM to 12 PM, Vincent Lopez Hotel Pennsylvania orch.
WGR, Buffalo, N. Y., 319 (ESTDS)—8 to 11 PM—Joint broadcasting with WEAF, N. Y. City, Atwater Kent Radio Artists, and Goodrich Silvertown Chord Orch.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—3 PM to 4, "Song of the Surf,"—surf sounds of Atlantic Ocean, picked up by special microphone, underneath the breakers of Steel Pier at Atlantic City, N. J.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—7:30 PM to 8:30, dinner music by the Hotel Adelphia Roof Garden orch.

KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:55 to 1 PM; 2:15 to 3:30; 6:02 to 7.

TUESDAY, SEPTEMBER 1

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 PM to 1:05 AM.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 12.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:30 to 10.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 7 to 10; 10 to 11.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 1 PM to 2; 6:30 to 10.
WFAA, Dallas, Texas, 457.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 12.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 6:30; 11:30 to 12:30 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 3; 6 to 11:30.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—11 AM to 12:45 PM; 7:30 to 11.
WGY, Schenectady, N. Y., 379.5 (EST)—11 PM to 2:30; 5:30 to 7:30; 9:15 to 11:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—12:30 PM to 1; 2:15 to 3:15; 4 to 5:30; 7:30 to 10:45; 11:30 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 7:30 to 9; 11 to 12.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 508.2 (ESTDS)—7 AM to 8; 1 PM to 2; 3 to 4:30; 6 to 11.
WJY, New York City, 405 (ESTDS)—7:30 PM to 1:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 11.
WKRC, Cincinnati, O., 326 (EST)—6 PM to 12.
WLIT, Philadelphia, Pa., 395 (EST)—11 AM to 12:30 PM; 2 to 3; 4:30 to 7.
WLW, Cincinnati, O., 422.3 (EST)—10:45 AM to 1 PM; 1:30 to 2:30; 3 to 5; 6 to 11.
WMCA, New York City, 341 (ESTDS)—11 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—3:45 PM to 5; 6:50 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 5:45 to 10.
WOO, Philadelphia, Pa., 508.2 (ESTDS)—11 AM to 1 PM; 4.40 to 5; 10:55 to 11:02.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 7:30.
WPG, Atlantic City, N. J., 299.8 (ESTDS)—7 PM to 11.
WQJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—4:30 PM to 5:30; 6:45 to 11.
WREO, Lansing, Michigan, 285.5 (EST)—8:15 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 4:30 to 5; 8 to 11.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 8 to 9; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 8 to 10; 11:30 to 1 AM.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30 PM; 3 to 4; 6 to 10.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 PM to 12 M; 1:30 PM to 3:20; 5:30 to 10:45.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFMQ, Fayettville, Ark., 299.8 (CST)—9 PM to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 11.
KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 8 to 1 AM.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:20 PM; 5:30 to 11.
KJR, Seattle, Wash., 384.4 (PST)—9 AM to 6:30 PM; 8:30 to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—9 AM to 10; 1 PM to 2; 4 to 5; 6:30 to 12.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9; 11 to 12 M.
KPO, San Francisco, Cal., 429 (PST)—7 AM to 7:45; 10 to 12 M; 1 PM to 2; 3:30 to 11.
KSD, St. Louis, Mo., 541.1 (CST)—6 PM to 7.
KTHS, Hot Springs, Ark., 374.8 (CST)—12:30 PM to 1; 8:30 to 10:30.
KYW, Chicago, Ill., 536 (CSTDS)—6:30 AM to 7:30; 10:30 to 1 PM; 2:15 to 4; 6:02 to 11:30.
CNRA, Moncton, New Brunswick, Canada, 313 (EST)—9:30 PM to 11.
CNRR, Regina, Saskatchewan, Canada—8 PM to 11.

(Continued on next page)

THE KEY TO THE AIR

(Continued from preceding page)

WEDNESDAY, SEPTEMBER 2

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (ESTDS)—12 M to 1:05 PM; 8 to 12.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11.
WCAE, Pittsburgh, Pa., 461.3 (ESTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 to 4; 5:30 to 11.
WDAF, Kansas City, Kansas, 365.6 (CST)—3:30 PM to 7; 8 to 9:15; 11:45 to 1 AM.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAO, Ohio State University, 293.9 (EST)—8 PM to 10.
WEAR, Cleveland, O., 390 (EST)—11:30 AM to 12:10 PM; 3:30 to 4:10; 6:45 to 7:45.
WEEI, Boston, Mass., 476 (ESTDS)—6:45 AM to 8; 3 PM to 4; 5:30 to 10.
WEMC, Berrien Spring, Mich., 266 (CST)—8:15 PM to 11.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1.
WFBH, New York City, 270.6 (ESTDS)—2 PM to 7:30; 12 M to 1 AM.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:18; 8 to 10.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 7; 10:30 to 1 AM.
WGBS, New York City, 316 (ESTDS)—10 AM to 11 PM; 1:30 to 4; 6 to 7.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2:30 to 4:30; 6:30 to 11.
WGY, Schenectady, N. Y., 379.5 (CST)—5:30 PM to 7:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8 to 10; 11:30 to 12:30 AM.
WHAS, Louisville, Ky., 399.8 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 368 (ESTDS)—2:15 PM to 5:30; 7:30 to 11; 11:30 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—12:15 PM to 1:30; 6:30 to 12 M.
WHT, Chicago, Ill., 400 CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WIP, Philadelphia, Pa., 568 (ESTDS)—7 AM to 8; 10:20 to 11; 1 PM to 2; 3 to 4; 6 to 8.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 6 to 11:30.
WKRC, Cincinnati, Ohio, 326 (EST)—8 PM to 10.
WLIT, Philadelphia, Pa., 395 (EST)—12:02 PM to 12:30; 2 to 3; 4:30 to 6; 7:30 to 9.
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WMCA, New York City, 341 (EST)—10:45 AM to 12 M; 6:30 PM to 12.
WNYC, New York City, 526 (ESTDS)—6:30 PM to 11.
WOC, Davenport, Iowa, 484 (CST)—12:57 PM to 2; 3 to 3:30; 4 to 7:05; 9 to 11.
WOR, Newark, N. J., 405 (ESTDS)—6:45 AM to 7:45; 2:30 PM to 4; 6:15 to 12 M.
WPAK, Fargo, N. D., 283 (CST)—7:30 PM to 9.
WOJ, Chicago, Ill., 448 (CST)—11 AM to 12 M; 3 PM to 4; 7 to 8; 10 to 2 AM.
WRC, Washington, D. C., 469 (EST)—1 PM to 2; 4 to 6:30.
WREO, Lansing, Michigan, 285.5 (EST)—10 PM to 11.
WRNY, New York City, 258.5 (ESTDS)—11:59 AM to 2 PM; 7:59 to 9:55.
WSB, Atlanta, Ga., 428.3 (CST)—12 M to 1 PM; 2:30 to 3:30; 5 to 6; 10:45 to 12.
WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 7:30 to 9.
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KFAE, State College of Wash., 348.6 (PST)—7:30 PM to 9.
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KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30 AM.
KFMQ, Fayettville, Ark., 299.8 (CST)—7:30 PM to 9.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 PM to 1:15; 3 to 4; 6:30 to 10.
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KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 1:30 PM; 5:30 to 12.
KJR, Seattle, Wash., 484.4 (PST)—9 AM to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—1 PM to 2; 7 to 12.

1925 BACK NUMBERS OF RADIO WORLD WANTED

Mail us copies of any of the following 1925 issues of RADIO WORLD, and we will send you a copy of a current issue for every copy sent us: January 10, February 7, March 21, 28; April 4, 11; May 30.

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THE KEY TO THE AIR

CNRO, Ottawa, Ontario, Canada, 435 (EST)—7 PM to 11.

THURSDAY, SEPTEMBER 3

WAAM, Newark, N. J., 263 (ESTDS)—11 AM to 12 M; 7 PM to 11.
WAHG, Richmond Hill, N. Y., 316 (EST)—12 PM to 1:05.
WAMB, Minneapolis, Minn., 243.8 (CST)—12 M to 1 PM; 10 to 12 M.
WBBM, Chicago, Ill., 226 (CST)—8 PM to 10.
WBOQ, Richmond Hill, N. Y., 236 (ESTDS)—3:30 PM to 6:30.
WBZ, Springfield, Mass., 333.1 (ESTDS)—6 PM to 11:45.
WCAE, Pittsburgh, Pa., 461.3 (CSTDS)—12:30 PM to 1:30; 4:30 to 5:30; 6:30 to 11.
WCBD, Zion, Ill., 344.6 (CST)—8 PM to 10.
WCCO, St. Paul and Minneapolis, Minn., 416.4 (CST)—9:30 AM to 12 M; 1:30 PM to 4; 5:50 to 10.
WEAF, New York City, 492 (ESTDS)—6:45 AM to 7:45; 11 to 12 M; 4 PM to 5; 6 to 12.
WEAR, Cleveland, O., 390 (EST)—10:30 AM to 12:10 PM; 3:30 to 4:15; 7 to 11.
WEEI, Boston, Mass., 467 (ESTDS)—6:45 AM to 7:45; 1 PM to 2; 2:30 to 10.
WFAA, Dallas, Texas, 475.9 (CST)—10:30 AM to 11:30; 12:30 PM to 1; 2:30 to 6; 6:45 to 7; 8:30 to 9:30; 11 to 1 AM.
WFBH, New York City, 272.6 (ESTDS)—2 PM to 7:30.
WGBS, New York City, 316 (ESTDS)—10 AM to 11; 1:30 PM to 4; 6 to 7:30.
WGCP, New York City, 252 (ESTDS)—2:30 PM to 5:15.
WGES, Chicago, Ill., 250 (CSTDS)—5 PM to 8; 10:30 to 1 AM.
WGN, Chicago, Ill., 370 (CST)—9:31 AM to 3:30 PM; 5:30 to 11:30.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 11:30; 6 PM to 7:15; 8:30 to 11.
WGR, Buffalo, N. Y., 319 (ESTDS)—12 M to 12:45 PM; 2 to 4; 7:30 to 11.
WHAD, Milwaukee, Wis., 275 (CST)—11 AM to 12:15 PM; 4 to 5; 6 to 7:30; 8 to 10.
WHAS, Louisville, Ky., 399.6 (CST)—4 PM to 5; 7:30 to 9.
WHN, New York City, 360 (ESTDS)—2:15 PM to 5; 7:30 to 11; 11:30 to 12:30 AM.
WHO, Des Moines, Iowa, 526 (CST)—7:30 PM to 9; 11 to 12.
WHT, Chicago, Ill., 400 (CSTDS)—11 AM to 2 PM; 7 to 8:30; 10:30 to 1 AM.
WJY, New York City, 405 (ESTDS)—7:30 PM to 11:30.
WJZ, New York City, 455 (ESTDS)—10 AM to 11; 1 PM to 2; 4 to 6; 7 to 12 M.
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WLW, Cincinnati, O., 422.3 (EST)—10:40 AM to 12:15 PM; 1:30 to 5; 6 to 8; 10 to 11.
WMAK, Lockport, N. Y., 265.5 (EST)—11 PM to 1 AM.
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WNYC, New York City, 526 (ESTDS)—3:15 PM to 4:15; 6:50 to 11.
WOAW, Omaha, Neb., 526 (CST)—12:30 PM to 1:30; 5:45 to 11.
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(Concluded on next page)

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KSD, St. Louis, Mo., 595.1 (CST)—7:30 PM to 9.
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HAYDEN'S SET

(Concluded from page 7)

tant station, when no other method can be relied on. The wavelength dial readings always will be the same for a given setting of the switch.

When the shorter waves are to be tuned in the switch is closed on the desired tap (if only one tap, the push-pull switch simply would be pulled out), and one has

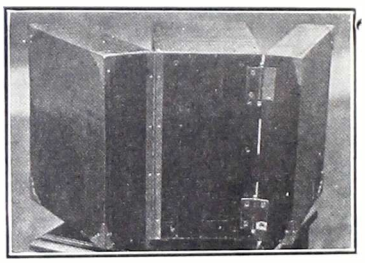

FIG. 6, the hinged side of the cabinet. The door at the right is opened to gain access to the panel for tuning, etc., while the one at left is opened to get at the batteries or the wiring of this self-contained outfit.

virtually the whole sweep of the wavelength dial for the stations below 400 meters. The higher stations can be reached by pushing in the switch. Even with the switch not in use the whole band of broadcast wavelengths would be covered, only with the attendant difficulty of shorter-wave tuning.

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THE DIAMOND DELIGHTS FANS

(*Concluded from page 9*)

trouble to get it to work properly at first, but after a little checking up I found my mistake and now it is doing justice to the name Herman Bernard gave it.

I am a constant reader of RADIO WORLD and I get more information out of it than from any other magazine.

Thanks to Mr. Bernard and RADIO WORLD —Russell Black, 5 McClintic Ave., Lewistown, Pa.

* * *

TUNES OUT STRONG STATION THAT'S JUST ACROSS STREET

DIAMOND EDITOR:

I have constructed The Diamond and to say it is a real machine would be putting it mildly. I have a broadcasting station right across the street from me and an Edison generating plant at my back door, so good distance reception is hard. Have no trouble cutting out KFON across the street from me and receiving Los Angeles, Oakland, San Francisco and Denver. I desire to thank Herman Bernard for his wonderful circuit. I have built about seventy-five different machines and The Diamond is surely entitled to rank among the best.—A. V. Groat, 127 E. Ocean Blvd., Long Beach, Calif.

* * *

SOME STATIONS TOO LOUD EVEN FOR FAN'S SPEAKER

RESULTS EDITOR:

I have just finished The Diamond of the Air and it is a peach. Some stations come in too loud on the speaker. I got 26 stations the first week.

I am now making a small Diamond set to put in my auto so when I go on a long trip I will have it with me. I just got through making a cabinet for the large set to hold the set, speaker and all batteries (console type). I have built about 10 different hookups and this is the best yet.—H. K. Voss, 1837 Horton Ave. S. E., Grand Rapids, Mich.

The first supply of nameplates for The Diamond of the Air, consisting of 5,000, is exhausted. A new stock is being manufactured, but this supply will not be ready for a few weeks. A new call for nameplate requests will be issued when these are ready, and readers who sent in requests too late to be supplied from the first shipment are asked to be indulgent meanwhile. These nameplates are free. Do not send in any requests now.

Those desiring to construct The Diamond of the Air will find full data by Herman Bernard in the May 23, July 25 and August 15 issues of RADIO WORLD.

SWISS MUST USE SETS OF THE BETTER CLASS

Static caused by the many high tension power lines in Switzerland necessitates the use of receiving sets that will minimize this disturbance and consequently precludes the possibility of the sale of the cheaper make of receiving equipment, Consul William H. Mather, Zurich, advises the Department of Commerce.

The prospects for a very large sale of American equipment in Switzerland is not bright. Foreign apparatus controlled the market until it was believed that inferior equipment was being offered for sale. Then public favor turned to home manufacture.

THE ELEVATING INFLUENCE

A receiving set has been placed in an English cafe (or "pub," as it is called). The magistrate who granted the license remarked that it was desirable for sets to be installed in "pubs" because it would be far better for people who came to drink to listen to the educational matter broadcast than to sit about telling barroom stories.

Getting Best Results From Meter Switchboard

(*Concluded from page 11*)

last jack, which in turn is connected to the plate of the RF tube and the first amplifier tube. When you put the arm on the B plus lead in either case the meter is in the circuit. When you put it on the other terminal tap, the meter is shorted and is out of the circuit, that is, no reading is had. That is all there is to the wiring of the testing instrument.

How to Get Results

All the wiring of the set should be done with No. 18 annunciator wire. There is no need for making the leads short here. Solder all the connections. See that the arm of the switches make good contact with the terminal contacts on both sides of the switch. See that the contact arm makes a good wiring contact with the taps. Don't make the arm too tight, as it will be difficult to turn the arm, and it is liable to get stuck in between the taps thereby causing a short. If all the leads are brought to their proper places the set should work without any difficulty at all, unless the meters are shorted or there are loose connections made to the meters.

This panel can be mounted on a bracket or a baseboard. This is up to the builder. I personally think that the brackets make a much neater appearance. There is no need for the wiring being neat, that is the high voltage leads can be bunched together and the low voltage leads bunched together. Don't by any means get this twisted around and put the high voltage leads with the low voltage leads. See that the plus leads of the A battery goes to the plus lead of the meter and the set. The same applies to the meter.

This panel should certainly serve a neat purpose in any laboratory. I am using one of these constantly every day and it certainly saves me a lot of trouble.

Attention, Readers and Newsdealers!

READERS: If you are going away on your vacation, and wish to have a complete file of RADIO WORLD, be sure to tell your newsdealer to put aside a copy of each issue until you return.

NEWSDEALERS: Your regular RADIO WORLD customers will undoubtedly want for file copies that they have missed while away on their vacations. The publisher suggests that each week you put aside copies of RADIO WORLD for these customers. They will consider this service.

Readers and newsdealers can get back numbers of any issue for the summer of 1925 at our regular price; or a subscription can be started with any back number published during the summer.

Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

A 1-CONTROL PORTABLE by Capt. P. V. O'Rourke; A Baby Super-Heterodyne, by J. E. Anderson; A More Powerful Diamond, Still only 4 Tubes, by Herman Bernard. Other features in RADIO WORLD, dated July 11, 1925, 15c a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

FOR SALE—Brand new 5-Tube DX volume set. One untuned RF, one balanced tuned RF, tube detector, two transformer audio, complete in cabinet, with five 199 tubes, $47.50. Money back guarantee on five-day test. Radiola Speaker, Model UZ-1325, adjustable, list $25. Brand new at $18.95. Same guarantee. Box 199, RADIO WORLD.

DINING AND SLEEPING CAR CONDUCTORS (White). Exp. unnecessary. We train you. Send for book of Rules and application. Supt. Railway Exchange, Sta. C, Los Angeles.

PATENTS—Write for free Guide Books and "Record of Invention Blank" before disclosing inventions. Send model or sketch of your invention for our Inspection and Instructions Free. Terms reasonable. Radio, Chemical, Mechanical, Electrical and Trademark experts. Victor J. Evans & Co., 924 Ninth, Washington, D. C.

RADIUMART REMOVES Warts, Moles, Superfluous Hair, Coal Powder and Tattoo Marks. Particulars sent free. Radiumart Co., 1416 Cadwallader St., Philadelphia, Pa.

HOOK-UPS

A lot of them, some of which are sure to suit your purpose, appeared in RADIO WORLD dated August 15. 15c a copy, or start your subscription with that number.
RADIO WORLD, 1493 Broadway, New York City

CRYSTAL SETS FOR USE TODAY, by Lewis Winner with diagrams in RADIO WORLD, dated July 25, 1925, 15c a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

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RADIO HOSPITAL: Specialists in Neutrodynes and Super Heterodynes. Dept. 4, Abilene, Kansas.

MAKE MONEY! RADIO BUSINESS. Write Konkle, 192 Market St., Newark, N. J.

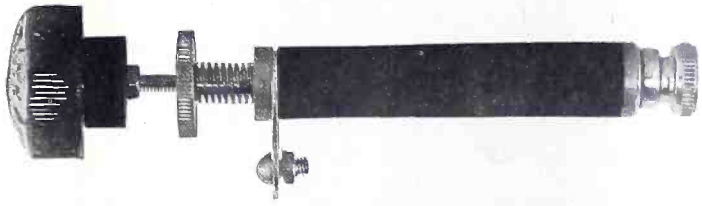
FINEST HARD RUBBER PANELS—7x24, $2.00; 7x18, $1.50, postpaid. Drilled to specifications, $1.00 extra. Leitch, Ruston, Louisiana.

HOOK-UPS!—A lot of them, some of which are sure to suit your purpose, appeared in RADIO WORLD dated Aug. 15. 15c. a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

Americans Are Buying Them By the Thousand and Reporting Remarkable Increase in Efficiency of Sets

The "BRETWOOD"

Pulls in inaudible stations



Eliminates tube noises

Range 300,000 to 10,000,000 ohms

Variable Grid Leak

Bretwood, Ltd., London, Eng., Sole Patentees and Owners.

Used in eighty per cent of all receiving sets in Great Britain

The Bretwood Variable Grid Leak used in a detector tube circuit, strengthens weak signals, makes DX easier, eliminates tube noises and internal howling, due to incorrect leakage from the grid of the tube.

By simply turning the knob the carrier wave may be tuned from the silent point to maximum audibility.

The Bretwood is absolutely noiseless in operation and will hold any given setting indefinitely. It is a single-hole panel mount leak.

The Bretwood Variable Grid Leak, tested in the National Physical Laboratory (the official laboratory of Great Britain) and by RADIO WORLD'S Laboratory, proved to be a scientifically accurate instrument. The total range, 9,700,000 ohms, produced by 25 turns of the knob, make a minute adjustment very simple.

The Bretwood Variable Grid Leak is constructed on a different principle and produces better results than any other grid leak. In its specially-constructed barrel is a patented plastic, non-drying resistance material, in which there is a small movable plunger which again moves freely in an absorbent cartridge which gives the setting of the instrument great stability, making it far superior to the graphite, carbon or fibre, compressed or decompressed, resistance elements. It can be used in the most critical circuits with the greatest success.

Sent You on a Money Back Absolute Satisfaction Guarantee

The Bretwood Variable Grid Leak will be immediately shipped on receipt of order to any address in the United States, prepaid for $1.50. After 10 days' trial if it is not 100% better than any grid leak you have ever had and does not in every way substantiate all claims made for it, your money will be refunded without question.

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Gentlemen:

Enclosed find $1.50 for which you will please send me one Bretwood Variable Grid Leak prepaid. Satisfaction guaranteed or my money back after trial within ten days of receipt by me.

NAME.....

STREET.....

CITY.....STATE.....

THE KEY TO THE AIR

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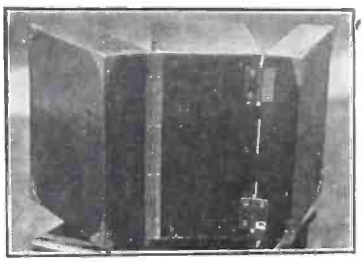

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A receiving set has been placed in an English cafe (or "pub," as it is called). The magistrate who granted the license remarked that it was desirable for sets to be installed in "pubs" because it would be far better for people who came to drink to listen to the educational matter broadcast than to sit about telling barroom stories.

CRYSTAL SETS FOR USE TODAY, by Lewis Winner, with diagrams, in RADIO WORLD, dated July 25, 1925. 15c a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

THE KEY TO THE AIR

(Concluded from preceding page)

WSBF, St. Louis, Mo., 273 (CST)—12 M to 1 PM; 3 to 4; 8 to 9.
WWJ, Detroit, Mich., 352.7 (EST)—8 AM to 8:30; 9:30 to 10:30; 11:55 to 1:30; 3 to 4; 6 to 7; 8 to 9.
KDKA, Pittsburgh, Pa., 309 (EST)—9:45 AM to 12:15 PM; 2:30 to 3:30; 5:30 to 10:15.
KFAE, State College of Washington, 348.6 (PST)—7:30 PM to 9.
KFI, Los Angeles, Cal., 467 (PST)—5 PM to 11.
KFKX, Hastings, Neb., 288.3 (CST)—12:30 PM to 1:30; 5:15 to 6:15; 9:30 to 12:30.
KFNF, Shenandoah, Iowa, 266 (CST)—12:15 to 1:15 PM; 3 to 4; 6:30 to 10.
KFOA, Seattle, Wash., 455 (PST)—12:30 PM to 1:30; 4 to 5:15; 6 to 7.
KGO, Oakland, Cal., 361.2 (PST)—11:30 AM to 1 PM; 1:30 to 3; 4 to 6:45; 7:15 to 10.
KGW, Portland, Oregon, 491.5 (PST)—11:30 AM to 1:30 PM; 5 to 11.
KHJ, Los Angeles, Cal., 405.2 (PST)—7 AM to 7:15; 12 M to 3:20; 5:30 to 11:30.
KJR, Seattle, Wash., 484.4 (PST)—9 AM to 1 AM.
KNX, Hollywood, Cal., 337 (PST)—11 AM to 12:05 PM; 4 to 5; 6 to 12.
KOIL, Council Bluffs, Iowa, 278 (CST)—7:30 PM to 9.
KPO, San Francisco, Cal., 429 (PST)—7 AM to 8; 10:30 to 12 M; 1 PM to 2; 3:30 to 11.
KSD, St. Louis, Mo., 595.1 (CST)—7:30 PM to 9.
CNRA, Calgary, Alberta, Canada, 435.8 (MST)—9 PM to 11.

HAYDEN'S SET

(Concluded from page 7)

tant station, when no other method can be relied on. The wavelength dial readings always will be the same for a given setting of the switch.

When the shorter waves are to be tuned in the switch is closed on the desired tap (if only one tap, the push-pull switch simply would be pulled out), and one has

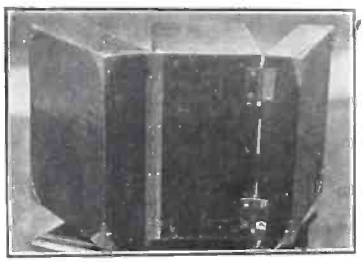

FIG. 6, the hinged side of the cabinet. The door at the right is opened to gain access to the panel for tuning, etc., while the one at left is opened to get at the batteries or the wiring of this self-contained outfit.

virtually the whole sweep of the wavelength dial for the stations below 400 meters. The higher stations can be reached by pushing in the switch. Even with the switch not in use the whole band of broadcast wavelengths would be covered, only with the attendant difficulty of shorter-wave tuning.

Optional Coil Data

Should other than a .0005 mfd. variable condenser be available, say .001, then the secondary would have 28 turns, tapped at the same place as if the other size inductance were used, and the primary would be the same, too. A .00035 mfd. condenser would require 45 turns, secondary, the rest of the directions the same. A .00025 would require a 50-turn secondary. All these apply to 4" diameter stator. The tickler would be the same. If a 3½" diameter is used, put on 45 turns secondary for .0005, 55 for .00035 and 62 for .00025. The tickler form diameter would be 2¼" and the wire in this one case No. 24 SSC, 26 turns being applied. In all other cases use No. 22 DCC.

THE DIAMOND DELIGHTS FANS

(*Concluded from page 9*)

trouble to get it to work properly at first, but after a little checking up I found my mistake and now it is doing justice to the name Herman Bernard gave it.

I am a constant reader of RADIO WORLD and I get more information out of it than from any other magazine.

Thanks to Mr. Bernard and RADIO WORLD —Russell Black, 5 McClintic Ave., Lewistown, Pa.

* * *

TUNES OUT STRONG STATION THAT'S JUST ACROSS STREET

DIAMOND EDITOR:

I have constructed The Diamond and to say it is a real machine would be putting it mildly. I have a broadcasting station right across the street from me and an Edison generating plant at my back door, so good distance reception is hard. Have no trouble cutting out KFON across the street from me and receiving Los Angeles, Oakland, San Francisco and Denver. I desire to thank Herman Bernard for his wonderful circuit. I have built about seventy-five different machines and The Diamond is surely entitled to rank among the best.—A. V. Groat, 127 E. Ocean Blvd., Long Beach, Calif.

* * *

SOME STATIONS TOO LOUD EVEN FOR FAN'S SPEAKER

RESULTS EDITOR:

I have just finished The Diamond of the Air and it is a peach. Some stations come in too loud on the speaker. I got 26 stations the first week.

I am now making a small Diamond set to put in my auto so when I go on a long trip I will have it with me. I just got through making a cabinet for the large set to hold the set, speaker and all batteries (console type). I have built about 10 different hookups and this is the best yet.—H. K. Voss, 1837 Horton Ave. S. E., Grand Rapids, Mich.

The first supply of nameplates for The Diamond of the Air, consisting of 5,000, is exhausted. A new stock is being manufactured, but this supply will not be ready for a few weeks. A new call for nameplate requests will be issued when these are ready, and readers who sent in requests too late to be supplied from the first shipment are asked to be indulgent meanwhile. These nameplates are free. Do not send in any requests now.

Those desiring to construct The Diamond of the Air will find full data by Herman Bernard in the May 23, July 25 and August 15 issues of RADIO WORLD.

SWISS MUST USE SETS OF THE BETTER CLASS

Static caused by the many high tension power lines in Switzerland necessitates the use of receiving sets that will minimize this disturbance and consequently precludes the possibility of the sale of the cheaper make of receiving equipment, Consul William H. Mather, Zurich, advises the Department of Commerce.

The prospects for a very large sale of American equipment in Switzerland is not bright. Foreign apparatus controlled the market until it was believed that inferior equipment was being offered for sale. Then public favor turned to home manufacture.

THE ELEVATING INFLUENCE

A receiving set has been placed in an English cafe (or "pub," as it is called). The magistrate who granted the license remarked that it was desirable for sets to be installed in "pubs" because it would be far better for people who came to drink to listen to the educational matter broadcast than to sit about telling barroom stories.

Getting Best Results From Meter Switchboard

(*Concluded from page 11*)

last jack, which in turn is connected to the plate of the RF tube and the first amplifier tube. When you put the arm on the B plus lead in either case the meter is in the circuit. When you put it on the other terminal tap, the meter is shorted and is out of the circuit, that is, no reading is had. That is all there is to the wiring of the testing instrument.

How to Get Results

All the wiring of the set should be done with No. 18 annunciator wire. There is no need for making the leads short here. Solder all the connections. See that the arm of the switches make good contact with the terminal contacts on both sides of the switch. See that the contact arm makes a good wiring contact with the taps. Don't make the arm too tight, as it will be difficult to turn the arm, and it is liable to get stuck in between the taps thereby causing a short. If all the leads are brought to their proper places the set should work without any difficulty at all, unless the meters are shorted or there are loose connections made to the meters.

This panel can be mounted on a bracket or a baseboard. This is up to the builder. I personally think that the brackets make a much neater appearance. There is no need for the wiring being neat, that is the high voltage leads can be bunched together and the low voltage leads bunched together. Don't by any means get this twisted around and put the high voltage leads with the low voltage leads. See that the plus leads of the A battery goes to the plus lead of the meter and the set. The same applies to the meter.

This panel should certainly serve a neat purpose in any laboratory. I am using one of these constantly every day and it certainly saves me a lot of trouble.

Attention, Readers and Newsdealers!

READERS: If you are going away on your vacation, and wish to have a complete file of RADIO WORLD, be sure to tell your newsdealer to put aside a copy of each issue until you return.

NEWSDEALERS: Your regular RADIO WORLD customers will undoubtedly want for file copies that they have missed while away on their vacations. The publisher suggests that each week you put aside copies of RADIO WORLD for these customers. They will consider this service.

Readers and newsdealers can get back numbers of any issue for the summer of 1925 at our regular price; or a subscription can be started with any back number published during the summer.

Circulation Manager, RADIO WORLD, 1493 Broadway, New York City.

A 1-CONTROL PORTABLE by Capt. P. V. O'Rourke; A Baby Super-Heterodyne, by J. E. Anderson; A More Powerful Diamond, Still only 4 Tubes, by Herman Bernard. Other features in RADIO WORLD, dated July 11, 1925, 15c a copy, or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

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FOR SALE—Brand new 5-Tube DX volume set. One untuned RF, one balanced tuned RF, tube detector, two transformer audio, complete in cabinet, with five 199 tubes, $47.50. Money back guarantee on five-day test. Radiola Speaker, Model UZ-1325, adjustable, list $25. Brand new at $18.95. Same guarantee. Box 199, RADIO WORLD.

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RADIUMART REMOVES Warts, Moles, Superfluous Hair, Coal Powder and Tattoo Marks. Particulars sent free. Radiumart Co., 1416 Cadwallader St., Philadelphia, Pa.

HOOK-UPS

A lot of them, some of which are sure to suit your purpose, appeared in RADIO WORLD dated August 15. 15c a copy, or start your subscription with that number.
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MAKE MONEY! RADIO BUSINESS. Write Konkle, 192 Market St., Newark, N. J.

FINEST HARD RUBBER PANELS—7x24, $2.00; 7x18, $1.50, postpaid. Drilled to specifications, $1.00 extra. Leitch Ruston, Louisiana.

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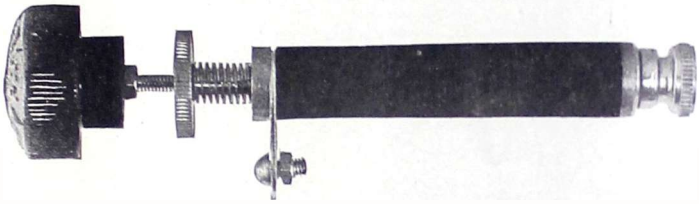
The "BRETWOOD"

Pulls in inaudible stations



Eliminates tube noises

Range 300,000 to 10,000,000 ohms

Variable Grid Leak

Bretwood, Ltd., London, Eng., Sole Patentees and Owners.

Used in eighty per cent of all receiving sets in Great Britain

The Bretwood Variable Grid Leak used in a detector tube circuit, strengthens weak signals, makes DX easier, eliminates tube noises and internal howling, due to incorrect leakage from the grid of the tube.

By simply turning the knob the carrier wave may be tuned from the silent point to maximum audibility.

The Bretwood is absolutely noiseless in operation and will hold any given setting indefinitely. It is a single-hole panel mount leak.

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The Bretwood Variable Grid Leak is constructed on a different principle and produces better results than any other grid leak. In its specially-constructed barrel is a patented plastic, non-drying resistance material, in which there is a small movable plunger which again moves freely in an absorbent cartridge which gives the setting of the instrument great stability, making it far superior to the graphite, carbon or fibre, compressed or decompressed, resistance elements. It can be used in the most critical circuits with the greatest success.

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The Bretwood Variable Grid Leak will be immediately shipped on receipt of order to any address in the United States, prepaid for $1.50. After 10 days' trial if it is not 100% better than any grid leak you have ever had and does not in every way substantiate all claims made for it, your money will be refunded without question.

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1505 Broadway, New York City
Room 326

Gentlemen:

Enclosed find $1.50 for which you will please send me one Bretwood Variable Grid Leak prepaid. Satisfaction guaranteed or my money back after trial within ten days of receipt by me.

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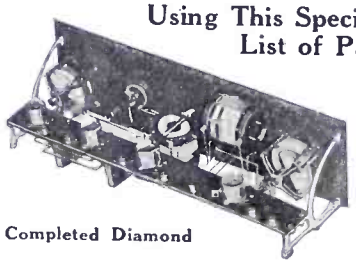
DIAMOND OF THE AIR

Using This Specified List of Parts



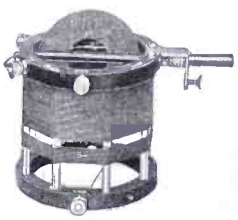
The Completed Diamond

Two .0005 mfd. Bruno low-loss variable condensers, C1, C2.
One radio-frequency transformer, LLo (Bruno 55).
One 3-circuit tuning coil, L1L2L3 (Bruno 77).
One double-circuit jack, J1.
One single-circuit jack, J2.
One 20-ohm Bruno rheostat, R1.
One 15-ohm Bruno rheostat, R2.
Two battery switches, S1, S2.
One .0025 mfd. fixed grid condenser, C3.
One .001 fixed condenser, C4.
Two radio-frequency transformers AFT1, AFT2.
One 4-gang socket strip.
One pair of Bruno brackets.
One set of terminal posts.
One 7x24" panel.
Three 4" dials.
Three dial pointers.
One 2-meg. grid leak.

$41.50

The Powertone $39.50

Each Set Is In a Mahogany-Finished Cabinet



Bruno "77"—3 circuit tuner wound on Quartzite for use in Diamond of the Air. New List Price..... $5.50

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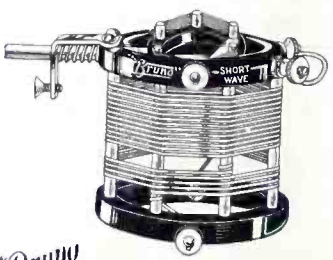

Bruno short wave coil tunes from 25-110 meters. Wound on Quartzite glass, minimizing losses..... $5.50

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