A SPECIAL 4-TUBE DX SET

By Herbert E. Hayden

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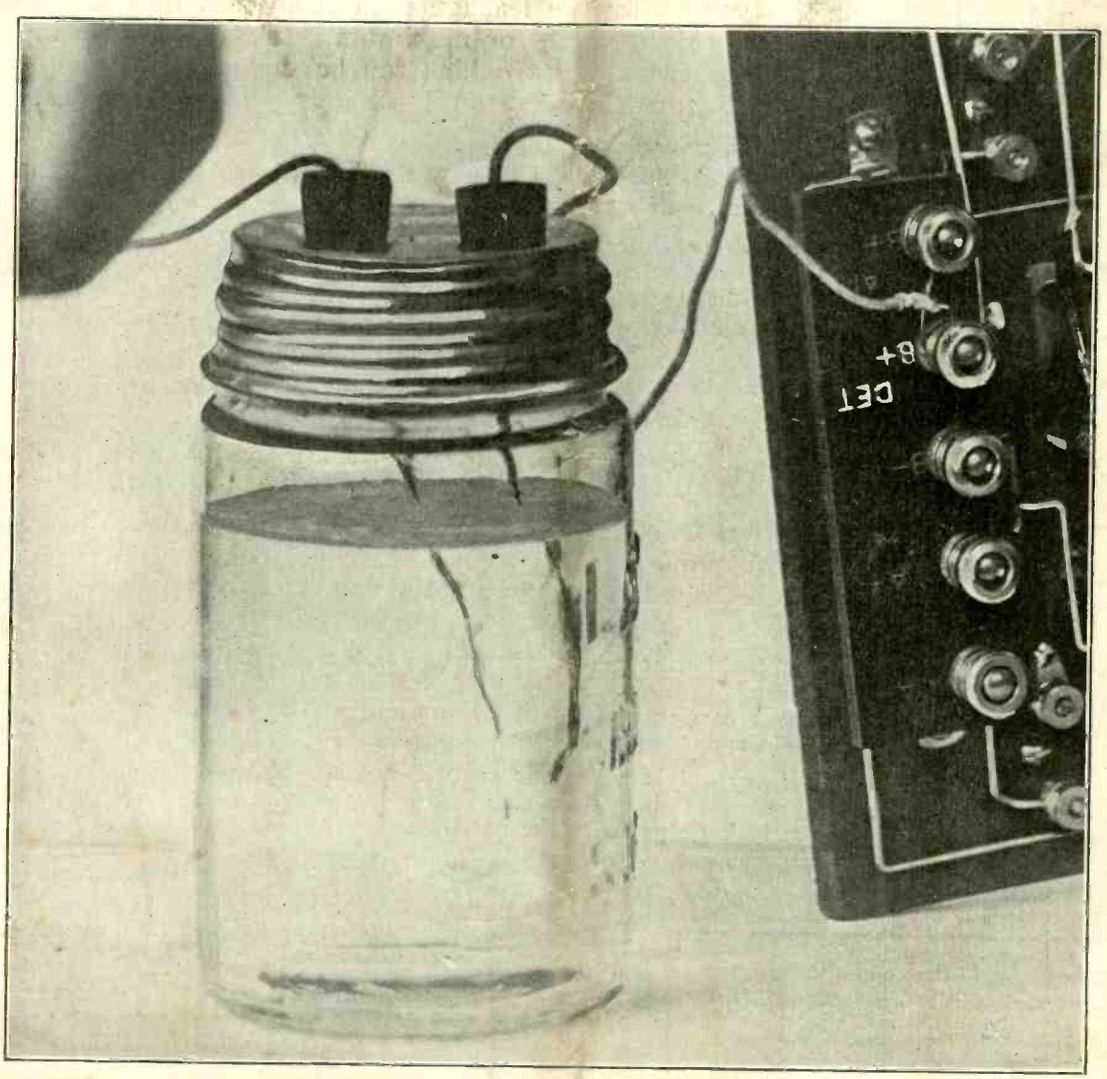
JAR OF WATER SWELLS VOLUME!



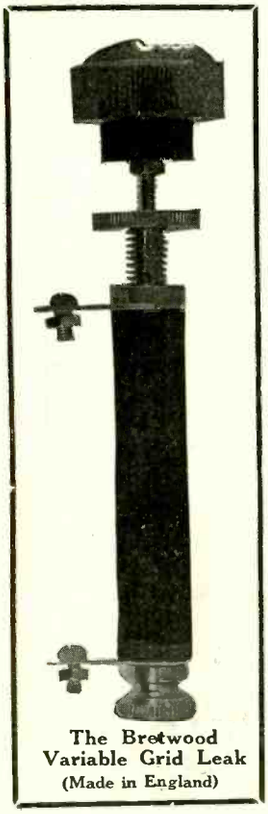
HOW a jar of water is used to make the volume go up 50 per cent. in a set.
See Capt. Peter V. O'Rourke's article on page 7.

THE OFFICIAL LIST OF STATIONS

"Absolutely the Finest"

North American Bretwood Co.:

Please send me by return post two more Bretwood Variable Grid Leaks. They are absolutely the finest on the market, and I have tried all others.—J. P. Holloway, 170 Marsden St., Pittsburgh, Pa.



The Bretwood Variable Grid Leak
(Made in England)

PEOPLE who like jazz want to hear it come through with all possible pep. And that's where the Bretwood Variable Grid Leak comes in! It enables you to fix the leakage path from grid of the detector tube at exactly the right value for maximum results. It is easy to do. You install the Bretwood Leak, which can be done in five minutes in any set, then simply turn the knob until the music comes in loudest. The setting is left that way.

Some people do not like jazz. But all people do like to get the best possible results from their receivers, and that is what the Bretwood enables them to do.

It makes no difference what kind of set you have, so long as it uses a tube as the detector the Bretwood is the thing to use. In a Super-Heterodyne it is important to have two Bretwood leaks, one for the first detector, one for the second, so that the inherent sensitivity of the receiver may be realized to its utmost advantage.

In regenerative sets the Bretwood takes away critical tickler tuning due to incorrect leak value.

You must use a variable grid leak for efficiency, if you use a tube detector, unless you have a large assortment of fixed leaks, which costs five times as much.

The Bretwood has a guaranteed precision range of from ¼ to 10 megohms (250,000 to 10,000,000 ohms). Each leak is twice tested, to assure scientific fidelity to the promised range, and receipt in perfect condition. *And each leak is sold on a 10-day money-back guarantee.*

Those proud of their DX record had better get the Bretwood leak to help them swell up that record to hitherto unrealized enormity. The Bretwood often will enable one to exclude the whistling carrier wave of a DX station, and confine to the loudspeaker only the signals, clear and strong.

This slight adjustment is necessary only for distant reception. Otherwise the leak need not be touched, once it is installed, unless a fresh detector tube is installed, whereupon you watch the leakage path for the new one.

The world waited long for a scientific variable grid leak—
and then along came Bretwood!

North American Bretwood Co., 145 W. 45th St., New York City:—Enclosed find $1.50. Send one Bretwood Variable Grid Leak on 10-day money-back guarantee.

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RADIO WORLD

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The 4-Tube DX Special

Through Service to Far Distant Stations

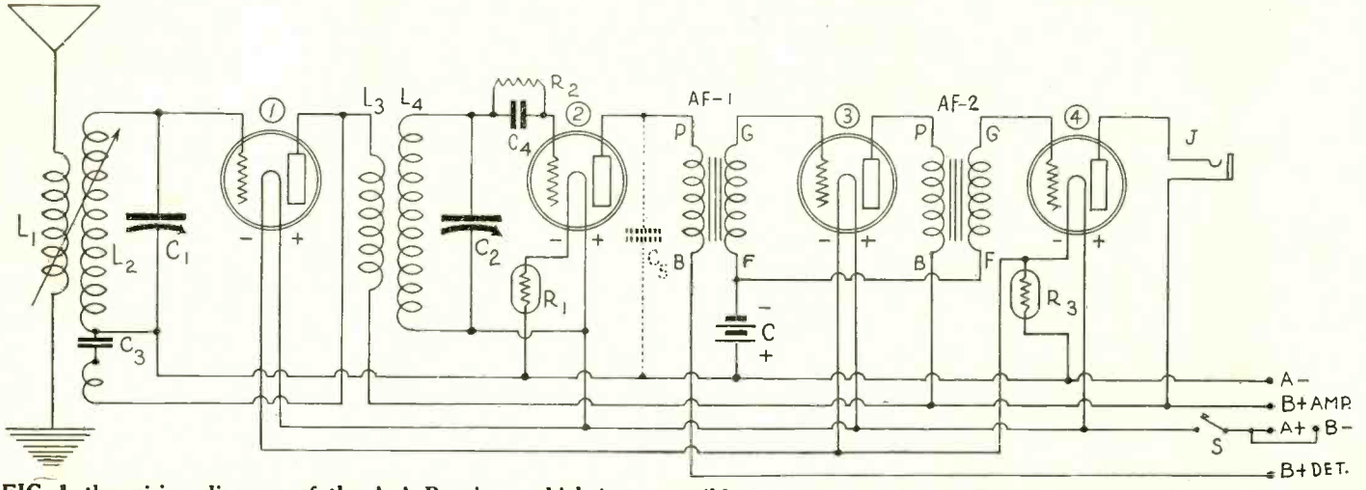


FIG. 1, the wiring diagram of the A-A Receiver, which is convertible in a moment from a DX set to a strictly quality receiver. Thus it may be made as selective as needs require. The antenna coil is variable and may be used for regeneration control.

Embodying a Novelty in Hookups, Makes Its Bow — Finely Selective, It Cuts Through Locals and Brings in the Far-off Stations With Volume.

By Herbert E. Hayden

PART I

THE compromise between tonal quality and distance reception is one not easy to achieve in all cases. Where one lives fairly close to local stations and uses a very selective receiver the tone quality will be very good, due to the power of the transmitters and the drowning effect of the locals. They push their way in, so that the real problem may be to cut them out when desired. Nevertheless, they assure themselves of being satisfactorily received, so that the necessary side bands are accommodated in the set, instead of being chopped off, as is the case when a very selective receiver does not encounter such powerful transmitters of proximate location.

But not everybody lives near to many powerful locals. Such a condition exists only in a few large cities. Therefore it is gratifying to have a receiver that is splendid for the reception of distant stations, when one if after DX, but which receives stations, say 100 or 150 miles away without any sacrifice of quality. This is done by employing regeneration when it is needed and omitting it when it is not. No alteration of the wiring is necessary to achieve this goal. All one need do is regulate the B battery voltage, particularly on the detector plate. As a rule, if 22½ volts are used here, not even free oscillations on the lower broadscast wavelengths will be encountered. But by increasing this voltage to 45 or just a little more, the regeneration will be ample. It is controlled then by adjustment of the variable primary, L1.

The important part of the radio set, in this case, is in the radio-frequency stage. It is imperative to have a tube that is a ready oscillator. The output of this tube is delivered to two points: (1) back to the grid, through the fixed plate coil, not designated by letter in Fig. 1, and then across the fixed condenser, C3, to the low potential end of the secondary, L2; (2) to the primary, L3, of the interstage coupler, so that the energy is passed on to the second tube for detection.

LIST OF PARTS

One Aero antenna coupler, L1L2.
One Aero Wave Trap Unit, L3L4.
Two .0005 mfd. Amsco Allocating Straight-line Frequency Condensers, C1, C2.
One Daven Leakandenser, R2, C4.
Seven engraved G-K Spring Cap binding posts.
Two Fynur dials.
One knob for ¼" shaft.
One .0005 mfd. Hilco fixed condenser, C3.
One .001 mfd. Hilco fixed condenser, C5.
Four standard sockets.
One 7 x 21" Radion panel.
One 7 x 19" baseboard.
Two Ambasador Low-Boy AF transformers, AF1, AF2.
One ¾-amp. Daven ballast, R3.
One 1-A Amperite, R1.
One Yaxley filament-control jack (or one A battery switch and single-circuit jack, J).
Two Eureka dial pointers.
Accessories: Two 45-volt B batteries, one 4½-volt C battery, one jack plug, one speaker, one storage A battery, aerial wire, lead-in wire, ground clamp, lightning arrestor, four tubes.

Feedback Features

Whether there is any feedback depends much on the plate voltage on the detector and, to a lesser extent, on the amplifier plate voltage, and on the C3 capacity.

All three amplifier tubes—one radio and two audio—are connected to the same B plus lead, normally 90, but for louder signals this voltage may be increased, and the grid bias on the audio tubes made greater. For 90 volts on the plates of the two audio tubes 3½ negative grid volts will usually be found all right, while 4½ to 6 may be used if the voltage is increased to 135 (three 45-volt B batteries in series).

Without regeneration, you still have a sensitive receiver, one that is bound to pick up some distant stations, and still without any of those common muffling effects due to the elimination of side bands of the audio-frequency supplement of the carrier wave.

The Hookup Novelty

The set uses standard coils. For instance, the one in the antenna circuit is a regulation 3-circuit tuning coil, while the other is a radio-frequency transformer of the tuned type. The novelty surrounding the use of the 3-circuit tuner lies in the connections of the rotary coil, L1, and the small fixed coil (not designated). Normally, the rotary coil is used, in other sets, as a tickler to supply inductively fedback plate current. This is the most common way of using regeneration. But in Fig. 1 the rotary coil, instead of being

Tuned Aerial Sensitizes Set

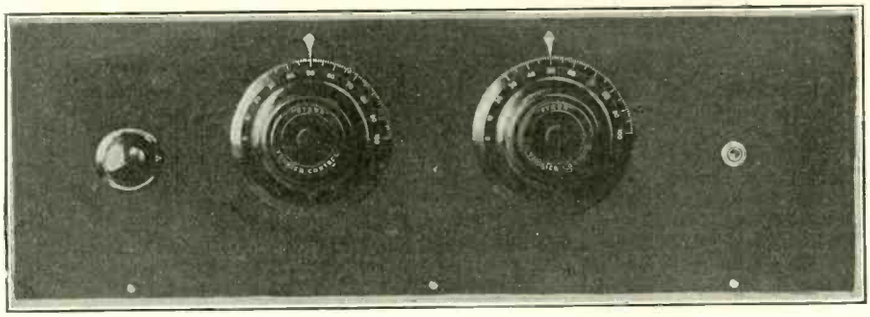


FIG. 2, the panel layout. Note the utter simplicity. Vernier dials are necessary.

in the plate circuit, is put in the antenna circuit and used both to regulate the antenna input and to control regeneration because of varying the effective resistance of the antenna upon the tuned secondary. This is a very easy way of handling regeneration, and no dial is necessary, a knob serving the purpose excellently. Even when the set is put in a regenerative state, L1, the rotary coil, may be put in a given position so as to avoid self-oscillation even on the lower broadcast waves. Thus the set, in two ways, may be operated as a neutrodyne would be.

The coil that in the 3-circuit tuner hookup is conventionally the aperiodic primary is here put in the plate circuit of the RF tube, to help build up the natural period, so that regeneration will be assured. The result is not achieved, however, unless C3 is sufficiently high enough in capacity. As it is a series condenser, it will reduce the natural period of the plate circuit unless it is of higher value than the reactance in the plate circuit, made up, in this case, of the inductance of the fixed coupling coil in the plate circuit, the capacity of the plate electrode of the tube, and the resistance in those two components.

This small coil conected to C3 is called fixed because it is left in one position, although if it is of the adjustable variety, its position may be varied until best results are obtained, and then the coil is locked at that angle. However, there is nothing critical about this particular coil, and unless the set is fiercely oscillating, it matters little what position the coil occupies. This is because it is used for its inherent self-inductive value, no reliance being placed on the chance mutual inductive coupling that may result between it and L2. The 3-circuit coil used in the set shown in the photographs was the Aero antenna coupler, while the interstage transformer was the Aero wave trap unit. These have on inductance rendering them available for tuning with .0005 mfd. straight-line frequency condensers. The Amsco allocating type was used and the circuit called the A-A, for the Amsco and Aero instruments.

Tuning In Step

The two condensers will tune approximately in step. If there is any divergence, readjust the dial that gives the lower reading, to make it conform for some midway station with the reading on the other dial for that same station. This will mean a station of about 300 meters wavelength. For instance, if the reading is 45 for the left-hand dial and 50 for the right-hand one, then leave the right-hand dial alone and adjust the other so that it reads 50 also for the same station. The synchrony at one point may not be preserved all the way through, but the divergence will be slight.

The idea of simplicity was carried out, so far as possible, in the entire A-A set. No rheostats were used. A ¾-ampere ballast was employed to regulate the filament heating of all three amplifier tubes. This was a Daven product. The detector tube filament voltage was cut down to the required amount by using the 1-A Amperite. The set employed 6-volt storage battery tubes. The 201A, 301A or DV5 may be used throughout or interchangeably, but remember that the detector plate voltage may have to be changed for best results if you change tubes.

Another item of simplicity is the use of the Daven Leakendenser, a combination grid condenser and grid leak (2 meg.).

The constructor may use an A battery switch to turn the set on and off as a unit, as shown in Fig. 1, or may use instead of a filament control jack. The diagram shows a switch, the A minus lead being interrupted therefor, but the photographs reveal a filament-control jack. With a switch there is, of course, that extra item on the panel, not shown in the photographs, while with the FCJ it is necessary to remove the speaker plug when the set is not in operation.

Panel Data

The set is constructed on a panel, 7 x 21", with the variable condenser shafts well spaced apart, to allow sufficient room for unrestricted operation of the Amsco allocating straight-line frequency condensers. You may follow the same layout as shown on the panel, or may change it sightly to meet any particular choice of your own, but it is well to play safe and use the panel arrangement as revealed in the photographs. The dimensions will be all right if you measure them in the photograph of the panel view and multiply by 5.

The baseboard is 7 x 20" and most of the parts are laid out thereon. The full-length picture, more than half the original size, plainly exposes the location of the board-mounted parts. Note the manner in which the interstage coupler is mounted on the backs of the two variable condensers.

C Battery Wiring

The C battery leads are not shown photographically as they would have obscured part of the pictures. Flexible wire is used. There are two leads, each 6" long. The wire must be insulated. At both ends of each lead scrape off a little insulation. Connect one end of one of the flexible leads to A minus. If a FCJ is used, this may be done at the jack. One end of the other lead is soldered to the F posts of the two audio transformers. Identify the lead from the A minus as C plus and the other as C minus and connect to C battery accordingly.

Binding Posts

The binding posts have a secure grip and may be used for either plain wire, in which case the wire tip is passed through the hole in the binding post shaft and the sprung knob is released upon it, or if lugs are used, lift the knob. insert the lug and let go. These posts are G-K Spring Caps.

Precautions

See that the variable primary L1 is nearer the A minus connection, which goes to the rotor plates of C1. The C3 connection, therefore, also is made at the L2 terminal nearest the primary. If a home-made 3-circuit coil is used, you should put the rotor shaft just above the secondary, which would force the plate coil at bottom, next to the end of the primary. The end of the plate coil goes on C3. In the Aero coils, made by the Aero Products Co., the small windings are inside the large ones.

The Coils

The correct inductance will be the result if one uses a 3¼" outside diameter, 4½" high, and winds 60 turns of No. 22 double cotton covered wire for the secondary, L2. Leave ¼" space, wind 8 turns for the plate coil. The rotary coil is wound on a form 2¼" outside diameter. The same kind of wire is wound until the form is covered. In other words, get on as much as you can, without starting another layer. Remember to leave room at the center for the rotor shaft to protrude.

The interstage coupler may be wound on a 3¼" outside diameter, 4½" high, and comprise 8 turns for the primary and 63 for the secondary.

The Filament Jack

To wire the set with a filament jack, omit the switch.

(Part II, dealing with the wiring, tuning and trouble-shooting, will be published next week.)

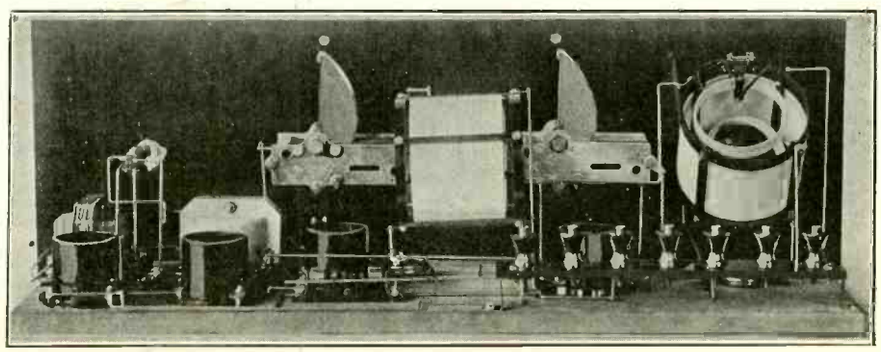


FIG. 3, the rear view of the A-A. The flexible C battery leads should be brought out between the third and fourth tubes (at left). Note particularly how L3L4 is mounted on the backs of the two SLF condensers.

How to Mount Parts on Baseboard and Panel for the A-A Receiver

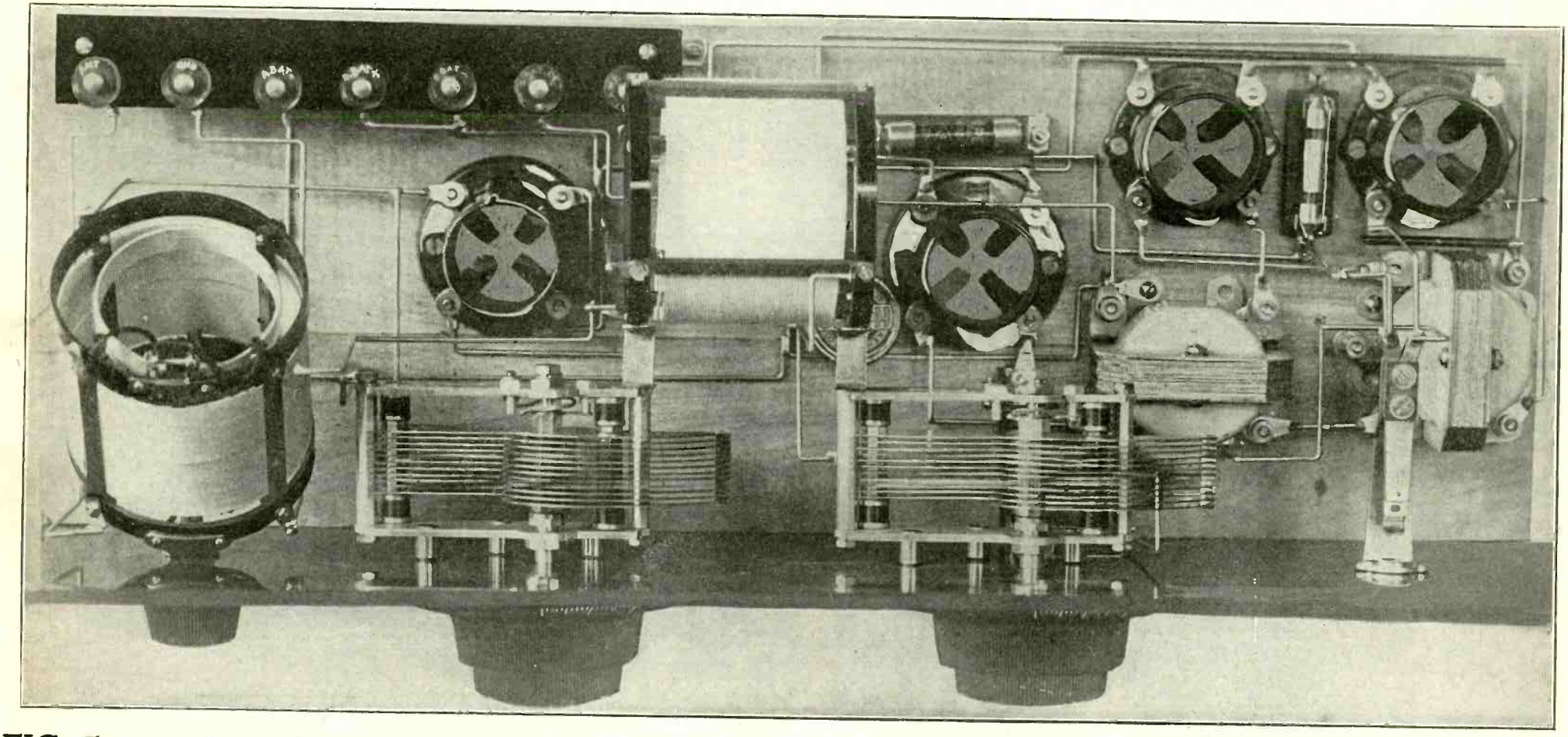


FIG. 5, top view of the receiver, showing the location of all the parts, both on panel and baseboard, and plainly revealing the wiring. One fixed condenser, C3, is obscured by the coil at left.

A Receiver for Music Lovers

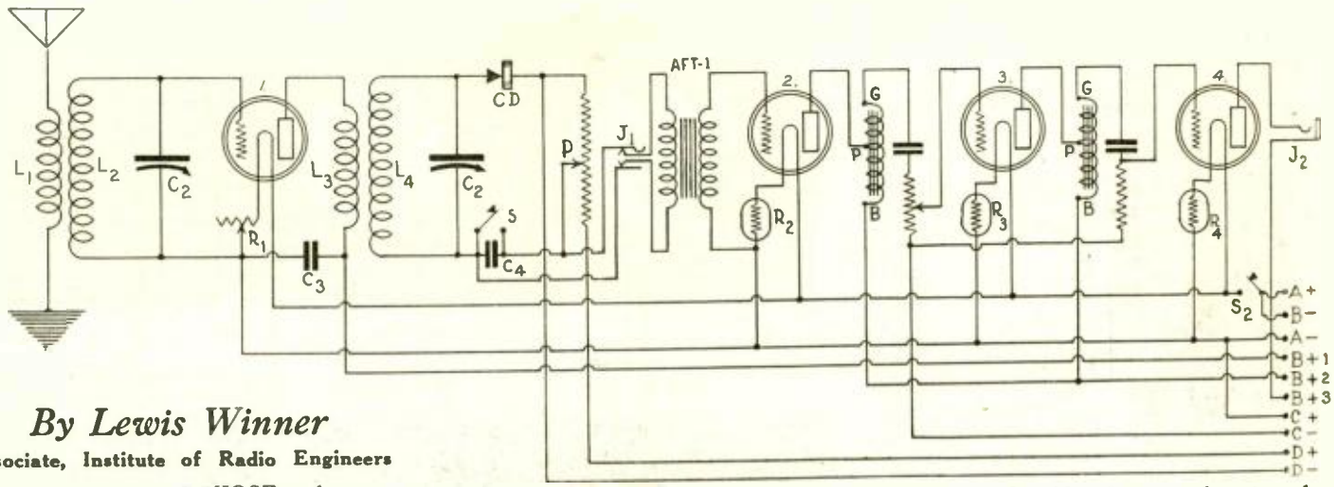


FIG. 1, showing the electrical diagram of the receiver. Consider the potentiometer of third tube R5 and the one in the last tube R6.

By Lewis Winner

Associate, Institute of Radio Engineers

LEWIS WINNER

THOSE who are satisfied with listening to reception from the local broadcasting stations and who demand nothing but finest tone quality, will be interested in the receiver, Fig. 1. The farthest-off station that was received with this set in New York City was WGY. This receiver gives forth the most nearly perfect reception that I have ever had the pleasure of listening to. This is due to the crystal detector and the audio-frequency amplification. In the last two stages autoformers are used. The set is a bear on volume.

Of course, a person who owns a set that employs a crystal as a detector is usually sure of sweet reproduction.

The set is selective, another good characteristic, which is not true of all crystal sets using a crystal rectifier.

This set is not difficult to wire or assemble. In fact many folk will have all the necessary parts to make this set, with the exception of the auto-transformers. In this circuit, we have a fixed condenser, C4, across the phones or the primary of the first audio-frequency transformer, for by-pass action.

Making the RFT

The radio-frequency transformers used here are of the standard commercial type. Those desiring to construct their own should follow the instructions with care. The two forms should both be 3¼" in diameter and 4 to 4½" high. The height is not important. This depends upon the manner in which the coil is wound, that is, tightly or space-wound. If you have a machine, the complete coil can be put on a form 3" high, and still have plenty of room for spacing the wires, after the coil is wound. If the coil is wound by hand the form preferably should be 4½" high.

These forms can be of the air, bakelite or hard rubber type. I used the air type, which I made, and which are very simple to make. All you need are two pieces of white pine, ¾" thick and 9" square, two strips of hard rubber, 9" long and ¾" wide. The accessories, such as a hack saw, vise, and drill are taken for granted, that they are in the workshop.

First saw the piece of wood in half, making each piece 4½" square. Place the wood in a pair of small vises, one end gripped in one vise, and the other end gripped by the other vise. In the center, place a small box, so that the wood will not crack when subjected to pressure, due to the pull on both sides, and then weighing down later on under the drill pressure. Exactly in the center make a dot. Now take your ruler and measure off from this dot 3⅝". Make a dot at this point. This dot can be anywhere in the square as long as it is in that specified distance from that point. Now in a circular row, make dots at 6 or 7 different points. All these points are 3⅝" from the center, and are approximately equally spaced. Take a compass, adjust it, and draw a circle through these dots. The center of these dots should all be hit during the passage of the needle of the compass around the circle. From the center again measure off 2⅞". Make dots all around the form, all of which are 2⅞" from the center point. Between the inside and the outside circular line you will have a ⅝" diameter form. Make holes all around the inner and the outer circumference. These holes should be very close to each other, and may be of any size, the bigger the better. First drill the inner holes. When you have completed drilling the inner holes, take a hammer. Knock out the center. Now saw off the outer portion which is out of the outer circumferenc line. When completed file off the rough edges.

Do the same with the other three portions of wood. This will give you four pieces of wood all ⅝" in width all around. Now cut four slots in each piece of wood. These slots should be ⅜" deep, and 3/16" wide. They should also be equally spaced. Now take the strips of bakelite, and saw off portions 4½" in length and ⅜" wide. There should be eight pieces sawed off. These pieces should fit into the slots of the circular form, four for each form. This will give you a perfect air form. Place four binding posts on each form, two on each end.

That is all there is to the mechanical portion of the making of the transformer. The winding of the coil now takes place. The primary is wound on one end, the beginning of the wire being ½" from the edge. There are 10 turns wound. This constitutes L1. The secondary L2 is wound right next to the primary. There are 45 turns put on. The beginnings and the ends of the wire are brought to the binding posts on the circular strip. The primary of the other coil, L3, also has 10 turns, which are put on the other form in the same manner. The secondary is wound right next to the primary and has 45 turns, the beginnings and the ends of the coils being brought to the binding posts on the circular portion. It is a good plan to mark these posts, with the letters Beg. and End, so that you will know where to bring the various connections when wiring the set. No. 22 double cotton covered wire is used when winding these coils. Try to make the windings as tight as possible, so that you will not need to place any holding material on the wire to hold it in place. See that the leads of the windings which go to the binding posts are properly tightened down. That is, see that the insulation is off the wire and making perfect contact with the screw of the post. Many times the insulation only touches the screw and causes a great deal of trouble. Keep all the windings in the same direction.

Drilling the Panel

There are only two major controls on the panel. These are the condensers which tune the secondaries of both radio-frequency transformers. The panel is 7" high and 24" long. The shaft of the first variable condenser, C1, is placed through a hole which is drilled in the panel, this hole being 4" from the right-hand edge and 3½" from the top and the bottom. The hole for the shaft of the other variable condenser, C2 is 6" from the one just drilled and also 3½" from the top and the bottom of the panel. The holes are 5/16" in diameter. The center hole of the template is then laid over the hole drilled, and the other holding holes drilled. The hole for the arm of the potentiometer is 6" from the left hand edge. It is also 2½" from the bottom. Three inches from the left hand edge of the panel, drill a hole for the arm of the high resistance potentiometer, R5. Four inches from this hole drill a hole for the arm of the rheostat, R1. Both these holes are 2½" from the bottom or in line with the plain potentiometer arm. The holes for the brackets are next. The bottom one is 19/32" from the bottom, and ⅞" from the left hand edge.

The one on the top is 5 1/32" from the one just drilled and ⅞" from the left hand edge. Now on the other side, the bottom hole is 19/32" from the bottom, and ⅞" from the right hand edge. The only remaining hole is 5 1/32" from the bottom one and also ⅞" from the right hand edge. Now the switch, S, is placed directly underneath the potentiometer arm, which is 6" from the left hand edge. This hole is also ½" from the bottom. The jack, J1, is ½" from the bottom, and 2" from the left hand edge. The switch, S2, is ½" from the bottom, and 11" from the right hand edge. The jack, J2, is ½" from the bottom, and 7" from the right

Wiring the Tone-Charm Set

hand edge. That is all the holes that are to be drilled in the panel. The next important thing to do is to mount the parts for which the holes have been drilled. After this has been done, the laying out of the parts on the socket shelf is executed.

What to Place on The Shelf

The socket shelf strip is 23" long and 2½" wide. The figure diagram Fig. 3, gives you one method of placing the parts on the shelf without any crowding. The radio-frequency transformers are mounted behind the variable condensers. The two Autoformers are placed on the top of the shelf, while the small regular transformer is placed underneath the shelf. The ballast resistors are placed right near the filament posts of the last three tubes. The binding posts strip is placed all the way in the back of the shelf, on the condenser-transformer side. All the other parts, such as the two large fixed condensers, and grid resistances, are placed according to the sketch. The crystal detector can either be put underneath the panel, or on the top of the shelf, this depending upon the type of crystal detector that is used. If you are going to use one which is adjustable, it is best to mount it on top of the shelf, so that you will be able to regulate it, while if you are going to use one which is fixed, it may be placed underneath the shelf. The transformers are shown mounted parallel to each other. They may be placed in this fashion or at right angles. If you are going to place them at right angles, you will have to place the transformer, L3 L4 between the panel and the shelf, with angle irons for holding, as there will not be enough space on the surface of the shelf. Screw all parts down securely.

Wiring The Set

After you have everything mounted, and placed, the wiring is the next thing to be thought of. Procure about 1 dozen strips of bus bar or a roll of annunciator wire. Now start the wiring, and take your time. Make one connection, go over it, and then test it for conductivity. That is see if the wire is not broken. Sometimes the insulation will just have been connected to the lead, etc. The beginning of the primary of the first radio-frequency transformer, L1 goes to the antenna binding post on the terminal strip. The end goes to the ground post on the strip. The beginning of the secondary, L2 goes to the rotary plates of the variable condenser, C2, to the arm of the rheostat, R1, and to one terminal of the fixed condenser, C3. The end terminal of the secondary L2, of the first RFT goes to the stator plates of the variable condenser, C2, and to the grid post on socket, 1. The beginning terminal of the primary L3 of the second RFT goes to the plate post on socket, 1. The left off terminal of the fixed condenser, C3 goes to the end of the primary winding. This same terminal goes to the B+ 1 post on the terminal strip. The F+ post on the socket goes to the F+ post on socket 2. The beginning of the secondary, L4 of the second radio-frequency transformer goes to the rotary plates of the variable condenser, C2, to one terminal of the fixed condenser, C4, and to one terminal of the switch, S. This same connection also goes to the top terminal of the jack, J1. The end of this winding goes to the stator plates of the variable condenser, C2 ,and to the cat-whisker of the crystal detector. The base of the crystal detector goes to the D— post on the terminal strip. It also goes to one of the resistance terminals on the potentiometer. This is situated on either end of the 3 posts, which are on the potentiometer. The other terminal of the fixed condenser, C4, goes to the arm of the potentiometer, which is in the center. It also goes to the bottom terminal of the jack, J1. The other terminal of the potentiometer goes to the D— post on the terminal strip. The next portion to be wired is the amplification unit, which consists of 3 stages of audio. The top terminal of the two inner terminals of the double circuit jack, J1 goes to the P post of the audio-frequency transformer, AFT1. The only other terminal left, or the bottom inner terminal goes to the B post on the AFT. The grid post on this same AFT goes to the G post on socket 2. The F— post on the AFT goes to one terminal of the ballast resistance, R2. This same connection also goes to the A— post on the terminal strip. The other terminal of the ballast resistance goes to the F— post on the socket. The F+ post goes to the F+ post of socket 2. The P post on this socket goes to the P post on the Autoformer. The B post of this AF goes to the B post on the second AF. This common terminal goes to the B+ 2 post on the terminal strip. The G post of the first Autoformer goes to one terminal of the large fixed condenser. The other terminal of this large fixed condenser goes to one terminal of the high resistance potentiometer, R5. The other terminal, end post of this resistance goes to the C— post on the terminal strip. The arm of the potentiometer goes to the grid post on socket 3. The F— post of this same socket goes to one terminal of the ballast resistance, R3. The other terminal of this resistance goes to the A— post on the terminal strip. The F+ post on this socket goes to the F+ post on socket 4. The plate post of this socket, 3 goes to the P post on the Autoformer. The G post on the Autoformer goes to one terminal of the large fixed condenser. The other terminal of this condenser goes to the G post on the socket. It also goes to one terminal of the resistance, R6. The other terminal of this resistance goes to the resistance terminal of the resistance, R5 which goes to the C— post on the terminal strip. One terminal of the ballast resistance goes to the A— post on the terminal strip. The other terminal goes to the F— post on the socket, 4. The F+ post of this socket goes to the F+ post of all the sockets. This we did as we were wiring up the receiver. This common lead goes to one terminal of the switch, S2. The other terminal of the switch goes to the A+ lead on the terminal strip. This same lead also goes to the B— lead on the terminal strip. The top terminal of the single circuit jack, J2 goes to the plate post of the 4th socket. The bottom terminal goes to the B+3 post on the terminal strip. The C+ post is connected to the A— post on the terminal strip. There are 3 leads from the B batteries.

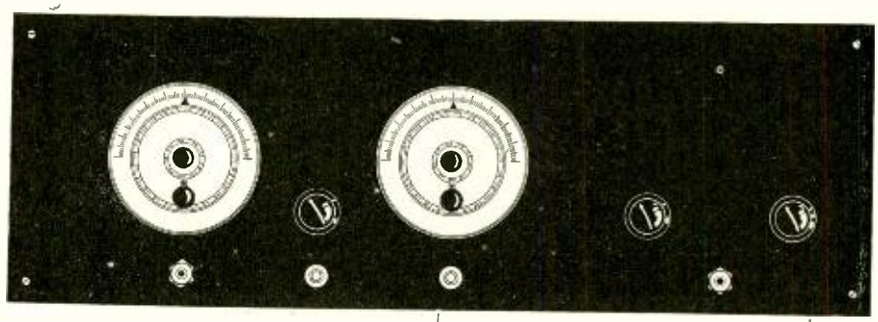


FIG. 2, showing the panel layout.

LIST OF PARTS

Two R F transformers (L1, L2, L3, L4).
Two variable condensers, of .0005 mfd. capacity (C1C2).
One 10 ohm rheostat (R1).
One 400 ohm potentiometer (P).
One 500,000 ohm potentiometer (R5).
One 500,000 ohm leak (R6).
Two .001 mfd. fixed condensers (C3C4).
One fixed or variable crystal detector (CD).
Two filament switches, (S, S2).
One low ratio AFT, (AFT1).
Two Autoformers.
Two 1 mfd. fixed condensers (C).
Three ¼ ampere ballast resistances (R2R3R4).
One double circuit jack (J1).
One single circuit jack (J2).
Five sockets.
Two 3½" dials.
One 7x24" panel.
Accessories, 5 tubes, A, B, C and D batteries, aerial and ground wire, connecting wire, nuts, bolts, etc.

Interesting Points to Note

There are four batteries used here, A, B, C, and a new one to the family D. A switch is placed across the fixed condenser, C4 so that this may be shorted and therefore be omitted. There are two potentiometers, one with a comparatively low resistance and one with a high resistance, the latter being used in the audio-frequency amplification unit. There is a C battery used for the last two tubes only. The first audio tube employs no C battery. In order to obtain the proper voltage for the crystal, place 6 dry cells in series. This will give you a total voltage of 9 volts and is known as the D battery. These batteries will last indefinitely. There is no need for worrying about them depreciating in voltage. The length of time that they stand up will about determine the life of the battery, more than how much it is used. There is a condenser, which acts as an electrostatic coupler of the plate and the grid of the first tube. This makes the first tube regenerative, and gives us a regenerative RF tube. The oscillatory action of this tube depends upon the amount of temperature that the filament of this same tube is heated to. In other words, by placing more or less voltage upon the filament of the tube, the squealing of the tube can be controlled.

Obtaining the Maximum Results

There are many things that determine the success of this receiver. First you want to carefully wire up the receiver, using either bell wire or bus bar. Wherever possible solder connections, provided you know how to solder. If you do not, better tighten all connections by means of a nut and bolt. Make all these connections very tight. See that the filament and the plate connections of the first tube do not run parallel to each other. Test all the leads from the point where they start, to the point where it is brought to, with a battery and phones. Test all the coils,

Curing Trouble in the Set

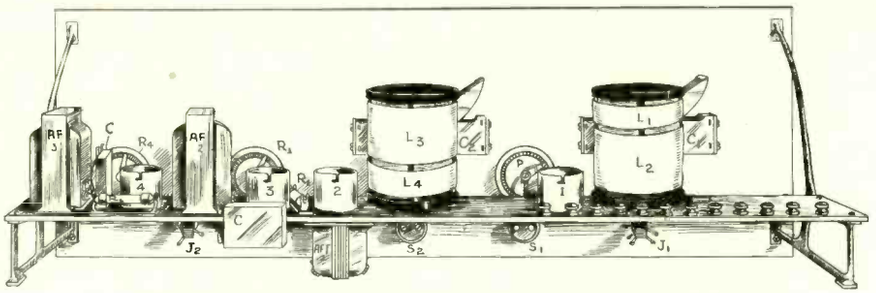


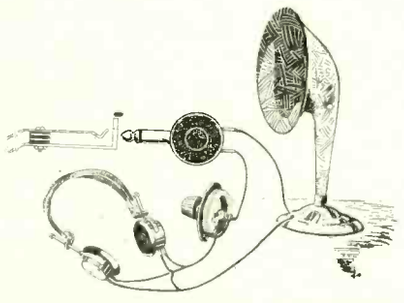
FIG. 3, showing suggested layout of the parts, R4 is R5.

condensers, and resistances for short or open circuits. The aerial for this set should be 100 feet in length. This is the length of the antenna on the roof. The lead in depends upon what floor you live. The longest lead in using this 100 foot antenna that you can possibly have is when you are living on the ground floor of a 5 story apartment. If you live in a house, where the lead is to be much longer, then the length of the antenna on the roof will have to decrease accordingly, e. g. if you live on the third floor of a 10 story house, then the antenna should be 80 feet long. These little things do a great deal in determining the success of the set. Make solid connections on the antenna lead-in. If possible see if you can make the lead-in a portion of the antenna proper. The ground wire should be brought to a water pipe. I have always used a water pipe as a ground as no matter where I went, I always found it to be the best bet. However my curiosity was aroused recently by one of my friends, who said that he found that a steam pipe ground was as good as a water pipe.

He did not try the water pipe as it was too far away from the set, and he was obtaining wonderful results with the steam pipe ground. I went over to his house, and saw that a 30 foot lead was necessary, if the water pipe was to be used. I just scraped the paint lightly off the pipe, and made a very poor electrical connection on this pipe. I then connected it to the set, and what a difference. The volume increased at least 40%. This was a convincing enough test for him. He then made a real good connection, etc., and the results obtained were truly marvelous. So the water pipe still is the best ground no matter how long the lead is. Of course solder or tighten all the connections, making sure that all the paint of the pipes is off, and that the clamp is making perfect contact. When running the lead from the pipe in the room, try not to place the ground wire parallel to the antenna lead-in wire. If you are one of those fortunate persons, who are living in the country, and can make the ground directly in the earth, then the antenna and the ground lead should run in the same line, until the lead hits the earth. For a conductor to place in the earth, use a copper piping about 1" in diameter and 6" long. Attach the wire to this pipe, and then cover it with tin foil. Now cover this tin foil with tape, making sure that no bare piece of the wire touches the earth. This is to prevent corrosion of the wire, which is much thinner than the copper pipe. It is a good policy anyway to clean the pipe off every now and then, as it will become covered with carbon, and not be a good conductor. This will be noted by the sudden decrease in volume. In between the antenna and the ground place a small single throw, single pole knife switch. Solder a piece of wire on to the antenna, about 4" long, and a piece of wire onto the ground wire, the same length as the antenna wire. These leads go to a terminal on the switch, one to one terminal and one to the other of the switch. When the switch is closed, the aerial and the ground are connected together. This is not absolutely necessary, but is a little preventive device. A lightning arrestor should be installed in place of this if so desired. The latter is passed by the Underwriters Board, while the switch is not. Therefore the arrestor keeps your house insured. They both serve the same purpose though.

Now the first thing to do, after you have installed your antenna and ground, is to connect up your A battery. Get a tube which is not in a good oscillatory state, that is one which will not oscillate, but which still has a good filament. This is a dummy tube. Turn the rhoestats on. Place the tube in each socket ,and see if the tube lights when placed in each socket. If it does, attach the B battery, still keeping the dummy tube in. Again turn on the rheostats. If after you have placed the tube in all the sockets and found that the tube has not blown, then place your good tubes in all the 4 sockets. Attach the C, and D battery. Also attach the aerial and the ground. Now put in the phones in the last jack, J2, jam the needle in the carborundum crystal, turn the potentiometer in the crystal circuit, until you hear a rush, and then turn the two condenser dials. Keep the high resistance potentiometer low, that is, do not turn it up very high, as you will hear no signals, due to the choking effect. Turn both dials at the same time, keeping the numbers also the same, e. g., 50, 50, etc. This set is one you can log, as the stations will always come in at the same point and approximately on equal numbers. If the signals are not loud, reverse the A battery, cut out the small condenser, C4 and increase the high resistance potentiometer. Signals of no great intensity will be obtained from the crystal detector, and the RF tube. Don't forget to vary the resistance of the RF rheostat. This will sometimes bring in stations louder. This set will absolutely not work without an antenna, so don't hook on the ground and expect to receive signals, because you won't. I did and thought the set was no good, but as soon as I attached the antenna, the stations came in like a "ton of bricks." Use the 201A type of tubes throughout. The last tube should have a plate voltage of 135. The two tubes preceding this one should have a voltage of 90 applied to the plate. The first RF tube should have a voltage of 67½ applied to the plate. The C battery should have a voltage of 4½.

How Those Who Hear Poorly May Use Phones With Ease



THE pictorial diagram of the special loud speaking regulator, whereby a person with impaired hearing may use phones while the others listen to the music from the speaker.

Those who have trouble in hearing radio programs on a speaker may use phones even while the speaker is operated. The signals from the average set are too loud on the head phones at the final output. However, the volume can be regulated to suit the listener.

With most devices only one earphone or speaker operation is satisfactory, and the speaker has to be disconnected from the set so phones can be used comfortably. By the method employed, we save all this trouble. A potentiometer is inserted in series with the loud speaker and the telephone lead. The resistance of this potentiometer is about 6,000 ohms, but the instrument is used as a rheostat, center arm joined to one terminal.

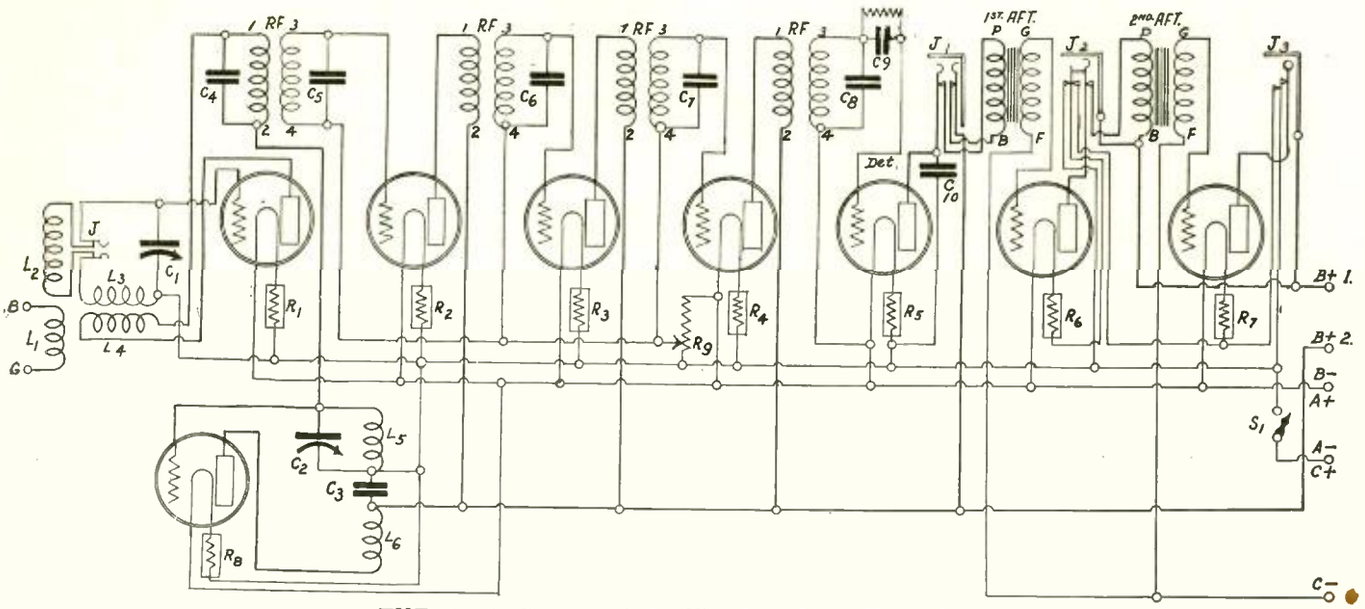
This little regulator may be placed on the arm of the chair and the person listening in on earphones can regulate the volume. He can cut in or out as much resistance as is necessary for his purpose. The volume from the speaker is not impaired and the rest of the folk, of course, hear the speaker only.

One terminal of the loudspeaker goes to the resistance wire post of the potentiometer. The arm of the potentiometer goes to one terminal of the phones. The other terminal of the phones goes to one terminal in the plug. The other terminal from the loud speaker goes to the other terminal in the plug.

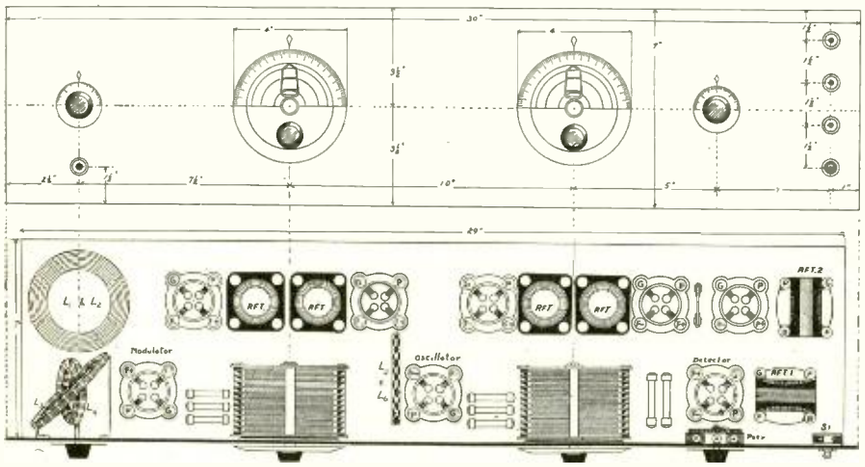
The Poet Speaks

EDGAR A. GUEST, famous poet, whose poems every day in many daily papers, are read by hundreds of thousands, has become an ardent broadcaster. He is shown here at WERC, Cincinnati, Ohio. (Fotograms.)

How to Build the Ultradyne



THE circuit diagram of the Ultradyne Super-Heterodyne.



THE Panel plan and the baseboard constructional layout.

By Brunsten Brunn

THE standard circuit diagram of the Ultradyne is shown in Fig. 1. In this diagram L1 is the antenna or primary coil. B is the antenna terminal and G the ground terminal. This coil may consist of about 5 turns of wire on the same form as the secondary coil L2. The secondary should be wound for a .0005 mfd condenser. There are many good radio-frequency tuning transformers on the market which may be used here. J is a double circuit jack which may be used for substituting a loop for the antenna. Coil L4 is a tickler to make the first detector or modulator regenerative, and L3 is a coupling coil for introducing the fed-back energy into the first tuned circuit. This coil is necessary when a loop is employed, but could be dispensed with if L2 alone were used, since L4 could then be placed in inductive relation with it. L3 and L4 may each have about 20 turns of wire on 2.5″ tubing or its equivalent, and the coupling between them should be fairly close when set at maximum. In the layout drawing, Fig. 2, L3 and L4 are spiderweb coils and L4 turns inside L3.

L5 and L6 are the oscillator coils, of the same type as the tuning coils in the modulator circuit. They may, however, be of the regular solenoidal type, in which case L5 should consist of about 43 turns of No. 24 double cotton covered wire wound on a 3″ diameter. L6, the plate coil, may be wound on the same form with the same kind of wire, and it should consist of about 35 turns.

Easy Tuning

The two tuning condensers, C1 and C2, should have a maximum capacity of .0005 microfarad each, and for the sake of ease of tuning they should either be straight-line wavelength or straight-line frequency, unless an SLF dial is used on semi-circular plate condensers.

The four intermediate frequency transformers marked RF may be the regular Ultradyne transformers if these are available, otherwise a set of any good make may be employed. General Radio 30 kc transformers are especially suitable. The first of these transformers, that is, the one which connects the modulator to the first IF stage, should be of the air core type, while the rest may be of the iron core type. The condensers across the secondaries may or may not be necessary. It depends on the type and make of transformers that are used. In this respect it is best to follow the recommendations of the manufacturers. In some transformers these are built in and in others distributed capacity is depended on entirely. The condenser C4 across the primary of the first IF transformer is usually necessary to ensure proper operation of the modulator tube. Best results will be obtained if this condenser is adjusted to such a value as to tune the primary of the transformer to the intermediate frequency employed, that is, to the same frequency as the secondaries of the other transformers. This, however, requires a number of fixed condensers as well as a variable condenser of fairly wide range, and the adjustment is not very easy. Hence it may be best to use a by-pass condenser of about .001 microfarad capacity. This is large enough to ensure proper operation of the modulator, yet it is usually not large enough to seriously change the frequency of the intermediate filter.

The grid condenser C9 should be a good mica condenser of .00025 mfd. or somewhat less capacity. The grid leak across it should be about one megohm. A variable leak like the Bretwood, which can be adjusted for most satisfactory results, is recommended.

The AF Transformers

The two audio-frequency transformers should be the best that can be obtained. The success or failure of the receiver from the view of quality depends on the proper selection of these parts. The old-time transformers with small core and smaller windings should be avoided. A good transformer almost invariably is built in generous proportions. In the list of parts a few suggestions are made as an aid in selecting them.

It will be observed that no filament rheostats are used in the set, but that automatic current controls are employed. This is in line with sound practice and with the trend of good design. The particular filament controls used in this receiver are Amperites, but there are others which may be used with equally good results. Although there is one of these in each filament branch, some of them may be combined so as to decrease the number of parts required. For instance the two high frequency tubes may be put on one, the four intermediate frequency tubes on a second, and the two audio frequency tubes on one each. The latter two tubes require one each on account of the filament control jacks which are employed. If it is decided to combine some of these ballast resistances it is of course necessary to select them with due regard to current carrying capacity.

The by-pass condenser C10 should have

(*Concluded on page 24*)

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, 145 West 45th St., New York City.

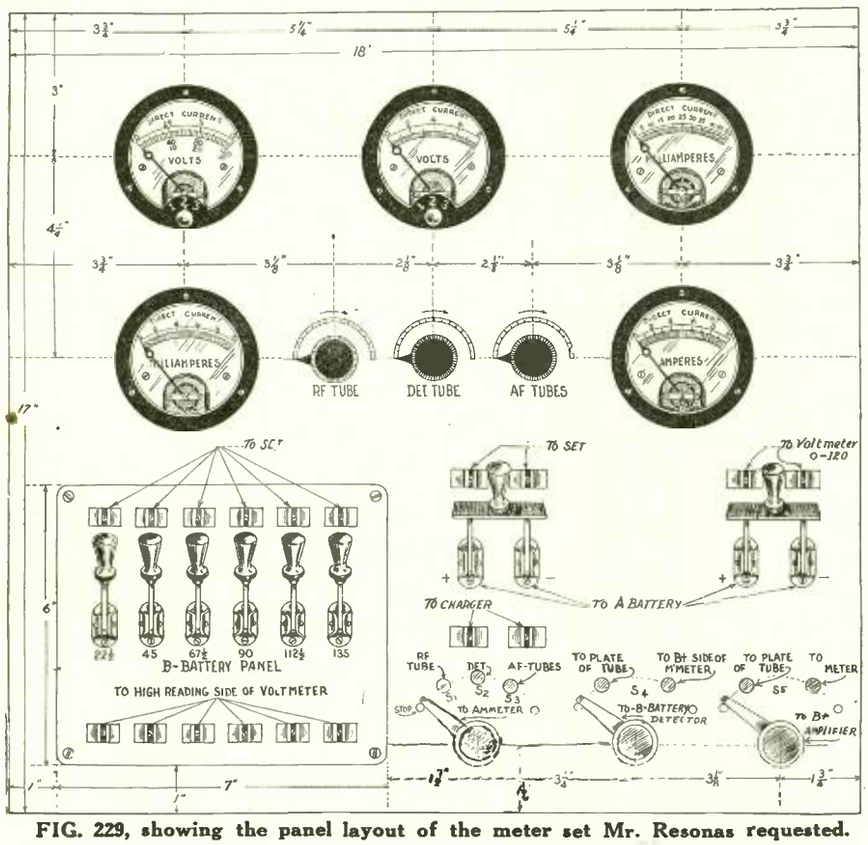


FIG. 229, showing the panel layout of the meter set Mr. Resonas requested.

I HAVE mislaid my August 29 issue of RADIO WORLD, and, therefore, cannot build the meter switchboard that I was contemplating on making. I have the electrical diagrams, but not the panel layout. I especially wanted that one. Would you please reprint the panel layout for me in the Radio University?—T. H. Resonas, Buena Vista, N. M.

Fig. 229 shows the panel layout that was requested. This is self explanatory.

* * *

I BUILT the Powertone, which appeared in the August 29, September 5 and 12 issues of RADIO WORLD, but am having quite some trouble with it. (1) I cannot control the oscillations. (2) The set is subject to hand capacity. I think there is an open circuit somewhere, because I also get a hum on some points of the dial. (3) Would you suggest something better?—A. B. Painter, 26 W. 4th St., Williamsport, Pa.

(1, 2 and 3) Move the radio-frequency transformers further apart. Place the coils at right angles. See that the grid and the plate leads of the RF tube are not parallel to each other or facing the panel. Reduce the filament voltage on the RF tube. Turn the detector tube rheostat all the way on. See that you have the proper grid returns on the RF tube and the detector. A negative return for the RF tube and a positive return for the detector tube. See that all the leads are making positive contact, especially the variable condenser lead. Reduce the voltage which is applied to the plate ofthe RF tube.

* * *

I HAVE just completed the 1926 Diamond of the Air, but am having trouble in making the tickler coil have any effect. That is it increases the oscillations, but not the volume. I placed a .001 mfd. across the primary of the AFT. (2) When I get down as low as 275 meters the regeneration is uncontrollable. (3) How can I make my set louder?—Clarence Brandt, 408 Montana Ave., South Milwaukee, Wis.

(1 and 3) The tickler only increases the regeneration, and not the volume. Of course the more regeneration the more sensitive and, therefore, the louder the set will be, up to a certain point, where the signal strength will decrease. If you take the condenser which is shunted across the primary of the AFT out, and add on more turns to the tickler, the volume will be increased. Reverse the primary windings of the AFT. Use 135 volts on the plate of the amplifier tubes. Test the B batteries for this rated voltage. They may be run down. (2) Use a SLF condenser or a SLF dial, either one of which will separate the high frequency or low wavelength stations.

* * *

WHAT IS meant by a Class A station? (2) What is meant by a Class B station? —Max H. Hopf, Harper, Tex.

(1) According to the rules and regulations of the U. S. Government, the following is the regulations governing Class A stations: "Class A stations will be issued to stations equipped to use power not exceeding 500 watts in the antenna. When more than one station of this class is licensed in the same city or locality, a division of time will be required if necessary." (2) The following is the regulation governing the Class B station: "The power supply must be dependable and non-fluctuating. The minimum required will be 500 watts in the antenna. The system must be so arranged as to cause the generated radio-frequency current to vary accurately according to the sound impressed upon the microphone system. Sufficient tubes and other material must be readily available to insure continuity and reliability of the announced schedule of service. The antenna must be so constructed so as to prevent swinging. The radio equipment in the studio must be limited to that essential, for use in the room. The room shall be so arranged as to avoid sound reverberation and to exclude external and unnecessary noises.

"The programs must be carefully supervised and maintained to insure satisfactory service to the public. The use of mechanically operated musical operated instruments is prohibited.

"Licenses issued for the use of Class B stations shall specifically provide that any failure to maintain the standards prescribed for such stations may result in the forfeiture of the Class B privilege."

* * *

I CONSTRUCTED the Ultradyne, which was described in the January 19, 1923 issue of RADIO WORLD. I used spider web forms. The last stage of audio has the two tubes connected in parallel. This gives better tone quality. The receiver tunes very sharply and gives the greatest volume I ever heard. (1) I cannot tune higher than 455 meters. (2) The stations are crowded on the lower portion of the dial. Will you please offer some help?—Dr. J. R. Boyd, Box 98, Oakville, W. Va.

(1) Place a .000375 variable condenser across the antenna and the ground. When this is done you will be able to tune as high as 600 meters. (2) There are two cures for this. Either use a SLF variable condenser or a SLF dial. Any of the advertised SLF adjustments in this magazine will do.

* * *

I WOULD like to build the 3-tube Reflexed Neutrodyne, which was described by Percy Warren, in the May 16 issue of RADIO WORLD. (1) I would like to know if I can use the low-loss basket weave coils described by Neal Fitzalan, in the June 13 issue of RADIO WORLD. I am going to tune the secondaries of these coils with a .0005 mfd. variable condenser. (2) Can I use the Acme AFT in this set with success? (3) Can I use 201A tubes throughout this set. (3) What can be applied to No. 18 copper wire to keep it bright after it is once sandpapered. (4) Is this set a good distance-getter?—George G. Fabel, 7024 W. Lafayette Blvd., Detroit, Mich.

(1) Yes. (2) Yes. (3) There is no substance that you can apply to keep it bright. You will spoil the metal if you do place any chemical on the surface. The chemical will also form a coating of tarnish which will prevent radio-frequency current from flowing on the surface. (4) Yes.

* * *

I WOULD like to have complete instructions as how to place a set in a console phonograph. (2) I would like to try to place the Diamond in such a form. Can this be done conveniently?—Otto Riche, 2216 Clifton Ave., Clifton Heights, Cincinnati, O.

(1) In the October 24 and 31 issues of RADIO WORLD there appeared a complete description of such a receiver. In the November 7 issue, pictures of the receiver appeared. The description was written by Lewis Winner. (2) Yes, follow the same scheme, as in the above prescribed issues. Use only two dials in-

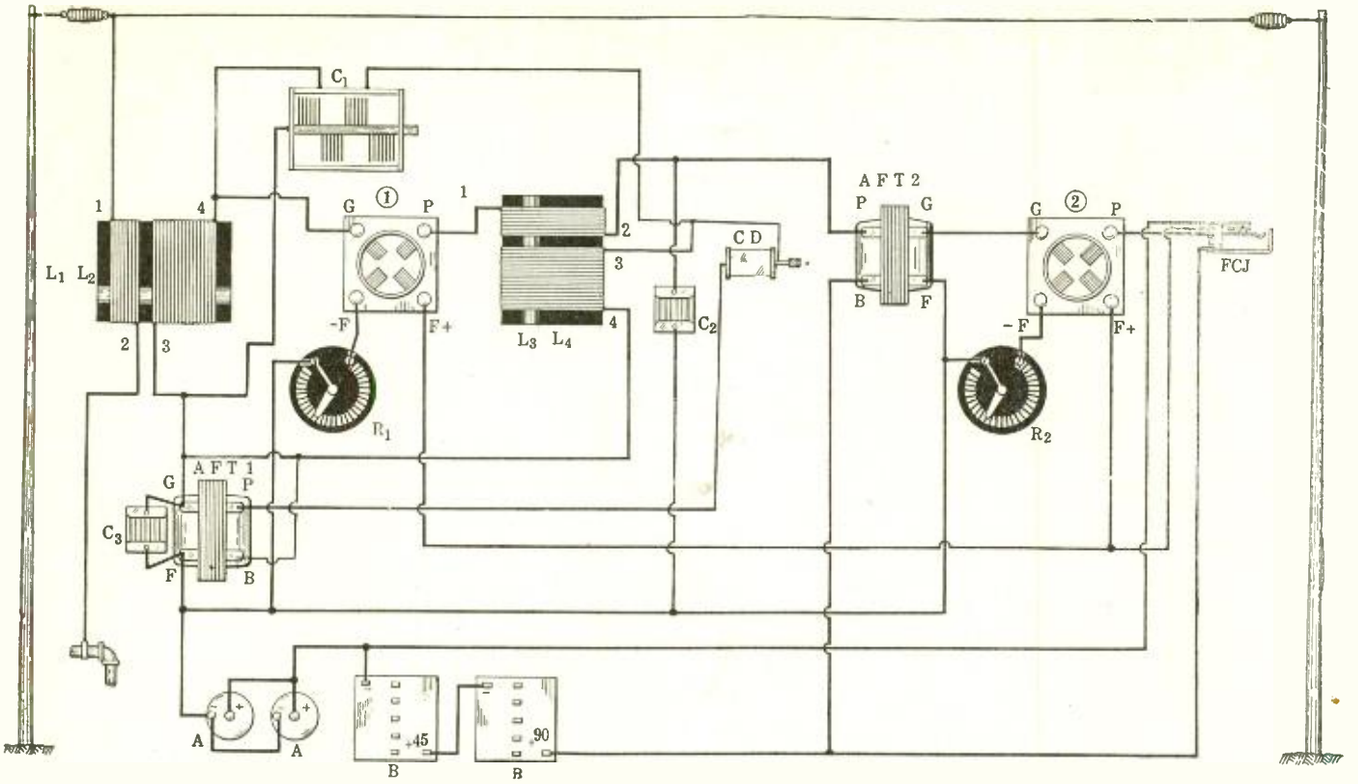


FIG. 230, shows the diagram requested by Mr. Thomas.

stead of 3. That is, use a double condenser.

* * *

I WOULD like to have a diagram of a 2-tube 1-control reflex set, using a crystal as a detector.—Y. Thomas, Leavenworth, Kan.

Fig. 230 shows the electrical diagram that you requested. L1, the primary, is wound on a tubing 3½" in diameter and 4" high. There are 10 turns wound. The secondary, L2, is wound on the same tubing and consists of 45 turns. The primary of the second RFT is also wound on a tubing 3½" in diameter and 4" high. The primary, L3, also contains 10 turns, while the secondary contains 45 turns. No. 22 double cotton covered wire is used. The condenser, C1 is a double condenser, each section having a capacity of .0005 mfd. The first AFT is of a high ratio, while the second AFT is of a low ratio type. The fixed condenser, C3, has a capacity of .001 mfd. The condenser, C2, also has a capacity of .001 mfd. Both the rheostats have a value of 10 ohms. The UV201A tubes are used in this set.

* * *

I HAVE just read the October 10 issue of RADIO WORLD. There is a description of a 3-tube set, by Captain P. V. O'Rourke. (1) There seems to be some contradiction as to the grid return. In the diagram, the grid return is brought to the F plus, while in the text, it says bring it to the F minus. Which is correct? (2) In the list of parts, 11 and 12 are not stated. Are they audio-frequency transformers. If they are, what is the ratio of them? (3) Is it right to use a 20-ohm rheostat for the detector tube and a 10-ohm rheostat for the amplifier tube? (4) If I wish to use the UV200, what changes do I have to make if any?—R. E. Croften, R.F.D. No. 1, Monson, Mass.

(1) The grid return should go to the plus post of the A battery as on the diagram. (2) Yes, they are both low ratio transformers. (3) Yes. (4) Place the grid return to the negative side of the A battery. Decrease the plate voltage to 22½. Use a 6-ohm rheostat. although the present rheostat is O. K.

* * *

PLEASE GIVE me the correct winding data for the coils to be used in the old styled Neutrodyne, using a 17 plate condenser to shunt the secondary of this coil. (2) Give me the same information, when using the 13 plate condenser across the secondary.—J. H. Johnson, 1224 Taylor St., San Francisco, Cal.

(1) There are 12 turns on the primary, this being wound on a form 3½" in diameter and 4" high. Use No. 22 double cotton covered wire when winding the form. The secondary is wound on the same form, and contains 65 turns. (2) The primary and the secondary is wound on a form, the same size as the primary and the secondary of the coil above. The primary has 15 turns. The secondary has 75 turns. Use No. 22 DCC wire.

* * *

IS IT a better plan to place the filament switch in the A positive or the A negative side of the battery?—C. Clarke, Palenville, N. Y.

It will make no difference. The set will work just as good either way.

* * *

I BUILT "The Set That Thrilled Jack," which was described in the October 10 issue of RADIO WORLD by Lewis Winner, but cannot get any kind of volume although I receive the locals fair. I am using an Amperite to control the filament of the first tube.—B. M. Perham, 169 Gates Ave., Brooklyn, N. Y.

First put a variable grid leak in place of R8. This should have a resistance of 500,000 ohms. It is connected as per: One terminal of the resistance wire goes to one terminal of the fixed condenser, C4. The other resistance terminal of the potentiometer as it is called, is connected to the C— post. The arm of the potentiometer goes to the G post on socket 5. Next see if you have connected the chokes properly. I don't think you have connected them in series aiding. Try connecting the B and the F, and if this don't work connect the B and the G. Reduce the resistance of first and the second RFT. Use a rheostat for the first tube and not a ballast resistance.

* * *

I AM going to build the Diamond of of the Air. (1) Could I use a 17-plate variable condenser to tune the secondary of the first radio-frequency transformer? (2) Could a 23-plate variable condenser tune the secondary of the 3-circuit tuner? (3) These coils are to be wound on a tubing 3" in diameter and 4" high. I wish to use No. 22 double cotton covered wire. J. A. Gundermann, 317 South Telemachus St., New Orleans, La.

(1) If you are going to use the .00035 mfd. variable condenser (17 plates), the primary will consist of 12 turns, the secondary of 50 turns. (2) When using the

(*Continued on page 29*)

Operator Explains Pick-up of Programs Outside Studio

By G. William Lang

Operator, Station WBZ

The wide variation in broadcasting programs now available to radio audiences is probably the chief major step in the development of radio that has increased its popularity so greatly. This great variation could hardly have been attained if all the programs sent out on the air were restricted to a station's studio. The natural result was that most broadcasting stations looked to the opera houses, theaters, concert halls, arenas, and athletic centers, where the public attend regularly in quest of pleasure, for feature broadcasting programs. For this reason the greatest number of programs are transmitted from those centers attended by large audiences, as the station is certain of catering to the tastes of the majority.

Different from Outside

Conditions entirely different from those in the main studios are encountered when programs are broadcast from some outside place. Consequently, the engineering and operating staffs of the broadcasting station found it necessary to develop suitable equipment and obtain data for these special transmissions.

Station WBZ has approximately forty lines terminating at either the Hotel Brunswick or Hotel Kimball Studios in Boston and Springfield. The majority of these lines terminate in the Boston Studio, and are used exclusively for broadcasting WBZ programs. With so many lines connecting the important outside centers and places of interest, with the station's two studios, Boston and Springfield are completely encompassed, so that practically every event originating in these two cities may be broadcast for the benefit of the radio listeners.

Setting up a Theatre

The radio audience, I am sure, has but the faintest idea of the necessary preparation in arranging and setting up an outside "pick-up" station as these outlying broadcasting points are called, it will doubtless interest many to accompany me while I "set up" a theatre for the musical comedy the town is talking about.

Starting from the Boston Studio, our equipment will include a storage battery, heavy-duty "B" battery, microphones, control board, amplifier, wire, and tool-kit. This equipment must be installed in the theatre and connected by line to the main studio so that the show may be broadcast direct from the pick-up point to the studio. The "material" is picked up from the line at the studio and is again amplified before putting it on the 100-mile line to the WBZ transmitter at Springfield.

Critical Microphone

At the pick-up the microphones are sometimes placed in the footlights, sometimes suspended, or both. The location of the microphones depends entirely upon the nature of the broadcast and the acoustical qualities of the theatre. For broadcasting purposes, poor acoustical qualities are sometimes encountered, and in such cases perfect transmission is difficult if not impossible. Through long experience and testing the pick-up man is generally able to determine the proper location for the installation of the microphone and the undesirable locations are reduced to a minimum. At times, however, places are encountered from where it is practically impossible to make a perfect broadcast, but the engineering personnel of the broadcasting station strives constantly to minimize this condition.

In the theatre which I am taking as an example, the apparatus must be so situated to enable the operator to have a clear view of the soloist and chorus. With four microphones installed, let us say, in the footlights, the operator by means of a switching arrangement on the control panel can use the microphone nearest the artist who is performing. Frequently the artist goes from one end of the stage to the other, but through the switching of microphones from one to the other, the operator creates the impression over the air that the artist is always properly "placed" for perfect broadcasting.

The elaborate equipment used at the pick-up point is essential so that the quality at the origin of the broadcast is correct, as the quality of the transmission cannot be changed at any other point. The high quality microphones used by Station WBZ are necessarily insensitive to sounds, which factor necessities high amplification at the pick-up point. Due to the ability of the line connecting the pick-up point with the transmitter to pick up extraneous noises, acting in a similar manner to the antenna of a radio receiving set, high amplification is also necessary to build up the volume of the "material" to a point overshadowing this very undesirable effect.

Same Line for Both

By means of wired wireless, the operator at the pick-up point maintains constant contact with the operator at the transmitting station. This use of wired wireless eliminates the necessity of an additional pair of wires for talking purposes as the wired wireless is impressed on the same line used for transmitting the program. This does not affect the quality of the broadcast as the two are of different characteristics.

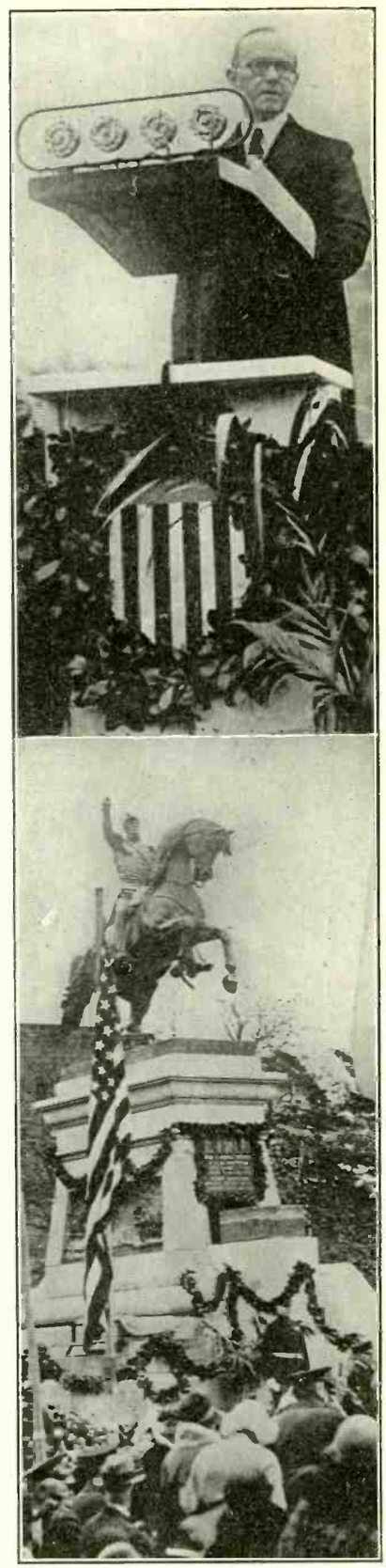
The operator at the transmitter, in addition to sending the program out through the ether, checks the quality of the programs by means of his receiving set at the station. The pick-up operator, however, is unable to check the program which he is transmitting as satisfactorily as the station operator. For this reason the two operators must maintain constant communication, and the pick-up operator is guided in the regulation of his equipment according to the reports of the station operator.

Many organizations, such as the Aleppo Drum Corps, are too large to be accommodated in the broadcasting studio. From 125 to 165 musicians are heard regularly over station WBZ when the Aleppo Band transmits programs. This organization has a special band room and by means of installing a pick-up station, listeners are able to hear this and similar organizations over the air which otherwise would be impossible if broadcasting were confined to the studio.

Dead Spots Puzzle

"Dead spots" are still a mystery to radio scientists. There are many stations in New York City which will come in very loud in one portion, yet within 100 feet the same station with the same set cannot be heard at all. An example of this peculiar action was recently demonstrated in the upper part of the Bronx, where WGBS, the Gimbel Brothers' Station, located at Thirty-third Street and Sixth Avenue, was tuned in on a portable Super-Heterodyne. The set was installed in a motor car with a small directional loop on top of the hood. A 100-ft. ride caused WGBS reception to end.

Coolidge Speaks



BEFORE a great crowd which assembled at Judiciary Square, Washington, D. C., the statue of General Jose de San Martin was dedicated and President Coolidge made the principal address. The picture above shows the President speaking to the crowd before the statue and also via the radio. Note the four microphones. The picture below shows the view of the dedication exercises, which were attended by thousands, on the spot, and a hundred times as many by radio. (Acme.)

The Chief Announcer's Lament

The Inside Story of What It Means to Retain That "Pleasant Voice," Though the Soul Is Rankled by Despair—Above Adversity the Hopeful Spirit Rides, Despite All Trials—An Intimate Article, Skillfully Written, by Floyd Neale, of the Gimbel Bros. New York Station

By Floyd Neale

Chief Announcer and Director of Programs, WGBS, New York City

THE most satisfying compliment to an anouncer of radio programs came to me in a letter from the depths of the Maine woods one suffocating day last summer. It was from a highly trained nurse, only a passing acquaintance, met only once or twice in one of New York's great hospitals. She was attending an invalid gentleman, she wrote. One night they were listening to their radio when her patient spoke up with vibrations of interest in his voice:

"There's that pleasant voice again!"

The nurse wrote on that although she had never heard the voice over the air until then, and no name or initials were used by the announcer, she recognized it. The same week, a keen-eared man of the theatre paid a similar compliment, when he wrote:

"One thing I have remarked about your voice in your announcing, and I have seen you working steadily long hours for a week, you never allow a tone of fatigue to get into your announcements."

The invalid and nurse knew nothing of the trials and tribulations of an announcer. Her patient had ordered his Superheterodyne and had had it installed. He had learned how to manipulate its dials. Lying in his chaise longue out on his cool, screened verandahs, recuperating among his tube of blue and rosy hydrangeas, the strengthening redolence of balsam woods blowing through the quiet, noiseless halls of his summer residence, he was able to listen to grand opera, string quartets, choirs of woodwinds, whistled birdcalls of the United States, drama, oldtime minstrels, sympathetic mezzos and contraltos, the richest of vocal combinations, male quartets, finely blended female quartets, news items right off the ticker, and always, "that pleasant voice" in and out of the mysterious silences before and after each.

The other, behind the sound-proof studio walls, where even the paint on the ceiling has been "acoustically treated," where only sounds to be sent out through the ether may be permitted, where only thirty seconds of delay may go unlogged. knew the constant trials and tribulations of an announcer.

On the Multiplicity of Sets

To illustrate the incredible obtuseness of the listening radio audience, one day two elderly ladies nervously entered the reception room of the broadcasting station and asked timidly if they might see how "it was done." They were shown into the draperied studio. The red signal lights were up. The announcer was "on the air." His face was an inch from the host-like microphone. He was speaking in a gentle voice. The spinster-looking ladies lingered, amazed, for a brief gaze. When the padded door of the studio had been closed into its felt packing and they were out of the double-doored vestibule, one was heard to whisper affrightedly to the other:

"Did you get that funny smell?"

The sister nodded big-eyed behind her steel rims.

"You know what that was, don't you? That was the ETHER they sing on!"

The piano had been polished with furniture oil that morning!

Another day one of the young women on the staff came to the announcer and asked with foreboding sériousness if he would talk to this lady, another caller. A stately and distinguished woman in dress and manner was presented and asked if she might talk privately where no one might overhear. The station happened to be silent. She was invited into the studio. Her face was hardened with desperate determination, although her brows were steamed with lines of deep distress.

"I want to talk with someone who knows all about the workings of this radio business," she said.

The unscientific announcer modestly but sympathetically assured her that he would try to explain as far as he understood the broadcasting procedure. The woman went on quietly yet firmly with her problem:

"I hear these different voices all the time. Where do they come from? Why do they do it?" The anouncer pointed out the microphone, illustrating the method of broadcasting, explaining simply as he could, tactfully side-stepping the latter query of why they did it, a question that often weaves itself into the nightmare of every announcer and program director. But the woman interrupted petulantly:

"This thing has been going on long enough. It's got to stop. I can't get away from it. I sit on my porch and I hear it everywhere. I go into my library. There I hear them. I go into my bedroom, into my bathroom, into my attic. Still I hear them. I can't stand it any longer. Everybody's got a radio set—but the only one I enjoy is my own!"

The announcer himself lives in an apartment house composed of four units, each built about its own courtyard, 400 families living off sixteen vaulted, tiled open stairways. where the roof-gardens are not unlike one of those good innocent social dissipations of a score of years ago, a cobweb party—so many serials have been strung aloft. The rare nights that are passed without the reverberations of New York's sixteen broadcasting stations throughout the kitchens, the living rooms, the bedrooms, the bathrooms and even the tree and river bordered balconies, is seldom as a total eclipse.

On the Variety of Talent

To be sure, these episodes are the infrequencies that alternate the current of the announcer's daily experiences. The reception of "artists'" (?) who drop in for auditions is one of the most exacting trials of one's social, artistic and radio breeding. The frock-coated applicant for the position of floor-walker, balancing a cup of tea while eating a meringue at the same instant he is being presented to an elegant, hatted creature of chiffon, in the sanctum of the dour president of the department store, wot not of the ordeal of an announcer or program director hearing an audition.

Let it be told and retold wherever radio, in its broadcasting aspect, is discussed that the daily and nightly and all-nightly entertainment the listener receives for no other reciprocation than the cost and upkeep of his set is freely given away by the broadcaster with no other audience than his imagination can supply, so far as he is concerned (commercial stations and artists excepted). These artists have been selected by one whose inborn taste, musical and otherwise, whose background of experience, and whose sensitive ear and comprehensive imagination all work together within a few moments while he keeps his ear to a loud speaker outside the studio, with the studio transmission carrying the sound no farther until the artist has been booked and is scheduled to be broadcast to a million listeners with a million varieties of tastes.

Let the statisticians tell the world of the tremendous preponderance of soprano voices in the fair throats of women. Let vocal teachers tell their pupils, as often as they tell them to drop the jaw, to listen lest the vibrato or tremulo flutter in and ruin singing. And as for pitch, or singing on the key, if it can't be done, it simply cannot, at least over the radio, where vibrations are amplified and multiplied hundreds of times after they come from the throat. The listening public determines this if the audition is let through without discrimination. Tuning out is so simple! The listener's auditory patience is so ruthless! So many radio bills of fare are under the thumb and forefinger, even as many as the dial markings. The really great opportunity of the little or unknown artist whose chance to broadcast to an audience far outnumbering any

(*Continued on page* 30)

The New Voice at WDAF is Fitzer's

The new voice that is heard frequently these days and nights from the studio of WDAF, the broadcasting station of the Kansas City Star, home of the famous Nighthawks, is that of H. Dean Fitzer, who has succeeded Leo Fitzpatrick as director. Mr. Fitzer is both director and announcer.

H. DEAN FITZER

Mr. Fitzer is a baritone. He was formerly a member of The Star's reportorial staff. In that capacity he directed for three years the Midwestern Zone in the National Oratorical contest on the Constitution. His management of that project extended from Canada to the Gulf of Mexico, and from the Mississippi River to the Rockies. Throughout the war, Mr. Fitzer served as a musician aboard the U. S. S. Dixie, stationed in foreign waters.

The power of WDAF is to be increased to 1,000 watts. This station operates on 336 meters and is located in Kansas City, Mo.

Roxy Back on the Air Again!

ROXY and some of the girls in his new gang, which is on the air from WEAF and allied stations Thursday nights. Left to right—Ann Robinson, Phoebe Crosby, Flo Mulholland, Beatrice Belkin, Celia Branz, Dot Miller, Jessica Dragonette and Gamby.—(Foto Topics.)

Three Stars o

FIRST of a series of musicals from the together Fraser Grange, noted barito Mengelberg, conductor of the Ph (Fot

Call Letters of the World Are Assigned by Fixed Plan

The fact that broadcasting stations in the United States and Canada announce themselves by means of groups of letters, apparently following no logical system, has caused a good deal of confusion among radio listeners; but the various "call letters" employed by the stations are really arranged in conformance with a definite international schedule of identification, according to a bulletin issued by the National Radio Service League, of New York.

The call letters are distributed among the various civilized countries of the world, each country possessing certain combinations. Germany leads the list and its radio stations have all the three letter mixtures between AAA and AMZ, and also DAA-DSZ, DUA-DZZ, KAA-KAY and KBA-KBZ.

Great Britain has all calls beginning with B. M. Y and Z, and all combinations between COA-COZ, EIA-EZZ, GAAA-GWBB, GWKA-GZZZ, LSA-LUZ, OCA-OFZ, XEA-XMZ and XTA-XZZ. British protectorates and colonies have CFA-CKZ and VXA-VZZ, which take in the Canadian broadcasters.

The United States has all the W's and N's, the latter being reserved exclusively for the United States navy, and also K calls between KDA-KZZ. We therefore share some of the K's with Germany. The distribution continues among the other countries. There is a total of 107 groups for some 84 nations of the world.

The United States, Great Britain, Canada, France and Belgium also have a number system wherein a set of call letters consists of one numeral followed by two or three letters; such combinations are assigned only to amateurs in the United States and to both amateurs and broadcasters in the other countries. The United States has the largest number of these stations—about 17,000—which are divided among nine geographical districts.

Lamp Cone Speaker

A NEW lamp loud speaker which uses a paper cone instead of a horn. Miss Nancy Slavin of Brooklyn, is demonstrating what it looks like when the shade is removed. (Kadel & Herbert.)

What Causes E to Flow T

By Dr. Peter I. Wold

Professor of Physics, Union College, Schenectady, N. Y.

How many of you have ever asked th question as to how electricity is broug through the copper wires to your hous or how it is conducted through the fi tungsten wire in your lamps? For good many years we have been able generate electricity in large quantities, control it by switches, to carry it from o place to another, to make it do work f us in various ways; but until rece years, we had no theory, even approx mately satisfactory, for explaining ho electricity is transferred through a co ductor.

In the case of electrolysis in liquids w knew that charged atoms moved in o direction or another, carrying their ele tric charges with them, but it was in possible to think that in a copper wi the atoms could be moving in sufficie numbers or with sufficient velocities b

Scientist in Arctic Hears Breathing of Studio Artis

Pittsburgh.—How a geologist, spending lonely months in Baffinland making a survey of the mineral resources of this polar territory, got diversion by the radio, is told in a letter from the naturalist, Dewey Soper, who is spending two years in the interior of southern Baffinland at the Arctic Circle for the Canadian government.

Soper is at Pangnirtung, where the Royal Canadian Mounted Police and a large fur company maintain posts. Except for the few white traders and police the population is Esquimo. Soper's letter says: "Some music and singing was clear and loud as though coming from th next room. We got every imaginable ki of entertainment, from jazz to solem classics, lectures, political speeches, play etc.. One night we got a girl singer think from Westinghouse station KFK Hastings, Neb.) whose voice was so cle that she seemed standing among u even her breathing could be detect How is that for the Arctic Circle?"

One of the stations heard by the p was KDKA, the Westinghouse station cated in East Pittsburgh.

n One Program

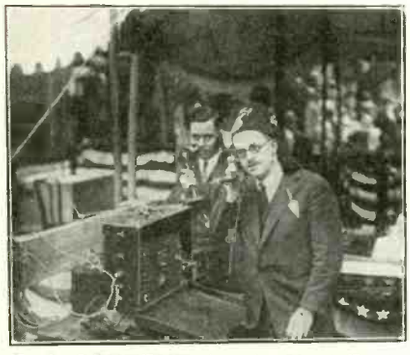
new Steinway salon through WJZ, brought
ıe; Josef Hofmann (seated), and William
lharmonic. They gave a joint recital.
› Topics.)

Electricity Through a Wire?

cause of their size and the strong forces holding them in place.

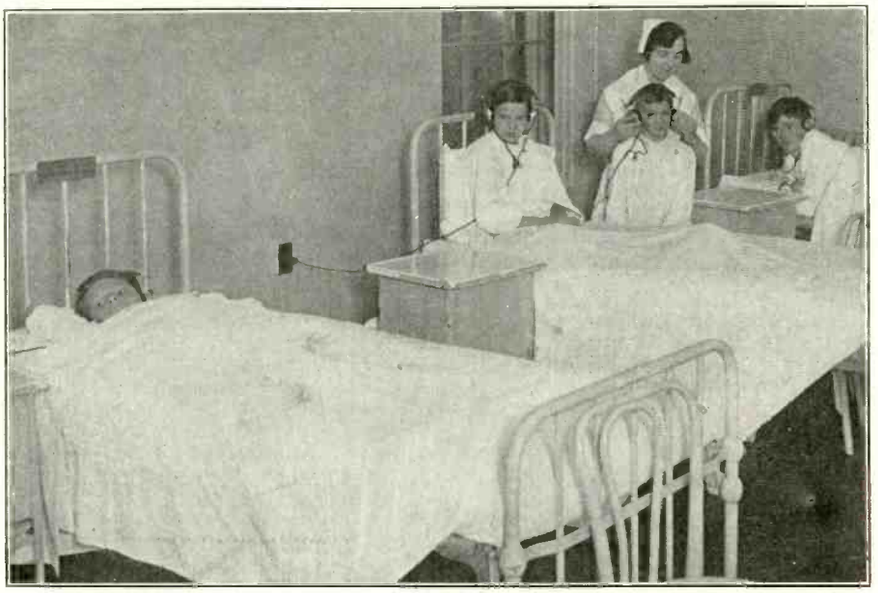
With the discovery of the electron, however, we had very much smaller particles and these might work their way between the much larger atoms. The present theory of conduction through metals, then, is that metal atoms are able to lose an electron quite readily and that in a copper wire, for example, there are present a large number of free, or nearly free, electrons. When an electric field or voltage is applied to this wire, the electrons move in large numbers through the wire and thus bring to us the electricity, and, through this, the electrical power which we so much desire.

Brethren at Work



E. J. CONTENT (rear), Chief Engineer of WGBS, Gimbel Bros. store in New York City, and Noble E. Wallace, Engineer of the same station, were in charge of the broadcasting of the ceremonies held in connection with the cornerstone laying of the Level Club in New York City. This is to be the new $3,000,000 Masonic Hotel and club house at Seventy-third Street. Photo shows the engineers testing the line for modulation. (Fotograms)

Radio Curative Effects Proved



AN ELABORATE radio installation has been completed at the Orthopedic Hospital of Orange, N. J. This consists of a powerful 5-tube receiver, the output which is connected to fifty sets of headphones. These are used by both patients and the nurses. The physicians of the institution say that the radio is aiding them greatly in their treatment of the patients. There are a number of headsets installed in the nurses' rest rooms, so that the proper relaxation can be enjoyed in leisure hours. The photo shows one of the wards in the hospital where patients are listening in. Note how the phones are plugged in the wall jack. (Kadel & Herbert.)

British Station Opens; Uses 25,000 Watts Power

WASHINGTON.

A new high-power station, 5XX, of the British Broadcasting Company, was recently opened at Daventy, England. This station will replace the one at Chelmsford.

The power of the new station is 25 kilowatts, and its wavelength, 1,600 meters. The owners claim that the station is as technically perfect as it is possible in the present state of knowledge.

The crystal range area, it is estimated, will contain a population of about 22,000,000 persons. It includes Manchester on the north, London on the southeast, Ipswich on the East, and Cardiff on the west. Sheffield is well within the range. One tube sets should be able to receive Da entry programs within a radius of 150 to 200 miles, according to conditions, while the multi-tube sets should be able to receive them anywhere in England.

It is reported that the Broadcasting Company intends to erect a big receiving station in Kent. It is said that by September next, through cooperation with the Radio Corporation of America, American programs will be broadcast through Daventry.

A Low-Wave Stunt

Those who are of the experimental type will find a great deal of fun from the following suggestion. If you find that you cannot receive the low wavelength stations, take off your antenna lead, and use only the wire in house, which comes from the window. This means that you will only be using the ground, and a small indoor aerial which has a low fundamental wavelength. This also increases selectivity. Volume is reduced, but not materially. If you are using a 5-tube receiver you will find that this lost volume can easily be made up by increasing the filament temperature of the RF tubes.

2,000 ARE MANUFACTURERS, OF WHOM 400 MAKE SETS

The number of radio manufacturers, including parts and sets, exceeds 2,000. Of these more than 400 make sets. This is 100 more than last year.

The Face in the Loop

A RADIO LOOP which, although only fifteen inches in diameter, is said to be more efficient than the conventional type. It is stagger-wound. This reduces the distributed capacity. Above William Burtenshow is shown framed in the loop. (Kadel & Herbert)

The Official List of Stations

Corrected and Revised Up to November 4

Station	Owner and Location	Meters
KDKA	Westinghouse E. & M. Co., Pittsburgh, Pa.	309
KDLR	Radio Elec. Co., Devils Lake, N. D.,	231
KDPM	Westinghouse E. & M. Co., Cleveland, Ohio	250
KDYL	Newhouse Hotel, Salt Lake City, Utah	246
KDZB	F. E. Seifert, Bakersfield, Cal.	210
KFAB	Nebraska Buick Auto Co., Lincoln Neb.	340
KFAD	Electrical Equipment Co., Phoenix Ariz.	273
KFAE	State College, Pullman, Wash.	349
KFAF	Western Radio Corp., Denver, Colo.	278
KFAJ	University of Colorado, Boulder, Colo.	261
KFAU	Boise High School, Boise, Idaho	278
KFAW	Radio Den, Santa Ana, Cal.	214
KFBB	F. A. Buttry Co., Havre, Mont.	275
KFBC	W. K. Asbill, San Diego, Cal.	224
KFBG	1st Presbyterian Church, Tacoma, Wash.	250
KFBK	Kimball Upson Co., Sacramento, Cal.	248
KFBL	Leese Bros., Everett, Wash.	224
KFBS	School District No. 1, Trinidad, Col.	238
KFBU	Bishop N. S. Thomas, Laramie, Wyo.	270
KFCB	Nielson Radio Co., Phoenix, Ariz.	238
KFCF	F. A. Moore, Walla Walla, Wash.	256
KFCY	Western Union College, Lemars, Iowa.	252
KFCZ	Central High School, Omaha, Neb.	258
KFDD	St. Michael's Cathedral, Boise, Idaho.	278
KFDH	University of Arizona, Tuscon, Ariz.	258
KFDJ	Oregon Agricultural College, Corvallis, Ore.	254
KFDM	Magnolia Petroleum Co., Beaumont, Texas	316
KFDX	1st Baptist Church, Shreveport, La.	250
KFDY	State College of Agriculture, Brookings, S. D	273
KFDZ	H. O. Iverson, Minneapolis, Minn.	231
KFEC	Meier & Frank Co., Portland, Ore.	248
KFEL	Winner Radio Corp., Denver, Colo.	254
KFEQ	J. L. Scroggin, Oak, Neb.	268
KFEY	Bunker Hill & Sullivan, Kellog, Idaho	233
KFFP	1st Baptist Church, Moberly, Mo.	242
KFFV	Graceland College, Lamoni, Iowa	250
KFGC	Louisiana State University, Baton Rouge, La.	268
KFGD	College for Women, Chickasha, Okla.	252
KFGH	Leland Stanford Junior University, Stanford University, Cal.	270
KFGQ	Crary Co., Boone, Iowa	226
KFGX	1st Presbyterian Church, Orange, Texas	250
KFHA	Western State College, Gunnison, Colo.	252
KFHL	Penn College, Oskaloosa, Iowa	240
KFI	E. C. Anthony, Inc., Los Angeles, Cal.	469
KFIF	Benson Institute, Portland, Ore.	248
KFIO	North Central High School, Spokane, Wash.	266
KFIQ	1st Methodist Church, Yakima, Wash.	256
KFIU	Alaska Elec. Co., Juneau, Alaska	226
KFIZ	Daily Commonwealth, Fond du Lac, Wis.	273
KFJB	Marshall Elec Co., Marshalltown, Ia.	248
KFJC	R. B. Fegan, Junction City, Kan.	219
KFJF	National Radio Co., Oklahoma City, Okla.	261
KFJI	Liberty Theatre, Astoria, Ore.	246
KFJM	University of N. D., Grand Forks, N. D.	278
KFJR	Ashley C. Dixon & Son, Portland, Ore.	263
KFJX	State Teachers College, Cedar Falls, Ia.	258
KFJY	Tunwall Radio Co., Ft. Dodge, Iowa.	246
KFKA	State Teachers College, Greeley, Colo.	273
KFKQ	Conway Radio Laboratory, Conway, Ark.	250
KFKU	University of Kansas, Lawrence, Kans.	275
KFKX	Westinghouse E. & M. Co., Hastings, Neb.	288
KFKZ	F. M. Henry, Kirksville, Mo.	226
KFLP	Everett M. Foster, Cedar Rapids, Ia.	256
KFLR	University of N. M., Albuquerque, N. M.	254
KFLU	Rio Grande Radio Sup. Co., San Benito, Texas	236
KFLV	Swedish Evangelist Church, Rockford, Ill.	229
KFLX	George R. Clough, Galveston, Texas	240
KFLZ	Atlantic Auto Co., Atlantic, Iowa.	273
KFMB	Christian Churches of Little Rock, Little Rock, Ark.	254
KFMO	University of Ark., Fayetteville, Ark.	300
KFMR	Morningside College, Sioux City, Iowa	261
KFMT	Dr. G. W. Young, Minneapolis, Minn.	263
KFMW	M. G. Sataren, Houghton, Mich.	263
KFMX	Carleton College, Northfield, Minn.	337
KFNF	Henry Field Seed Co., Shenandoah, Iowa	266
KFNG	Wooten Radio Shop, Coldwater, Miss.	254
KFNL	Union High School, Paso Robles, Cal.	240
KFNV	L. A. Drake, Santa Rosa, Cal.	229
KFOA	Rhodes Company, Seattle, Wash.	454
KFGN	Echophone Radio Shop, Long Beach, Cal.	233
KFOO	Latter Day Saints University, Salt Lake City, Utah	236
KFOR	David City Tire & Elec. Co., David City, Neb.	226
KFOT	College Hill Radio Club, Wichita, Kan.	231
KFOX	Technical High School, Omaha, Neb.	248
KFOY	Beacon Radio Service, St. Paul, Minn.	252
KFPG	Oliver S. Garretson, Los Angeles, Cal.	238
KFPL	C. C. Baxter, Dublin, Texas	252
KFPM	New Furniture Co., Greenville, Texas	242
KFPR	Forestry Department, Los Angeles, Cal.	231
KFPW	St. John's Church, Carterville, Mo.	258
KFPY	Symonds Investment Co., Spokane, Wash.	266
KFQA	The Principia, St. Louis, Mo.	261
KFQB	Searchlight Publishing Co., Ft. Worth, Texas	263
KFOC	Kidd Bros., Taft, Cal.	231
KFQH	Radio Service Co., Burlingame, Cal.	220
KFQP	G. S. Carson, Jr., Iowa City, Ia.	224
KFQT	National Guard, Denison, Tex.	252
KFQU	W. Riker, Holy City, Cal.	222
KFQW	F. C. Knierim, North Bend, Wash.	216
KFOZ	Taft Radio Co., Hollywood, Cal.	226
KFRB	Hall Bros., Beeville, Texas	248
KFRC	Paris Dry Goods Co., San Francisco.	268
KFRM	First Field Artillery, Fort Sill, Okla.	242
KFRW	United Churches, Olympia, Wash.	220
KFRX	J. G. Klemgard, Pullman, Wash.	217
KFRY	College of Agriculture, State College, N. M.	266
KFRZ	The Electric Shop, Hartington, Neb.	222
KFSG	Echo Park Evangelistic Ass'n., Los Angeles, Cal.	275
KFUJ	Hoppert P. and H. Co., Breckenridge, Minn.	242
KFUL	T. Goggan & Bro., Galveston, Tex.	258
KFUM	W. D. Corley, Colorado Springs, Colo.	242
KFUO	Concordia Theo. Seminary, St. Louis, Mo.	545
KFUP	Fitzsimmons General Hospital, Denver, Colo.	234
KFUR	H. W. Peery and R. Redfield, Ogden, Utah	224
KFUS	Louis L. Sherman, Oakland, Cal.	233
KFUU	Colburn Radio Laboratories, San Leandro, Cal.	224
KFUV	G. P. Ward, Springfield, Mo.	252
KFVD	Chas. & W. J. McWhinnie, San Pedro, Cal.	205
KFVE	Film Corp., St. Louis, Mo.	240
KFVF	Clarence B. Juneau, Hollywood, Cal.	208
KFVG	1st Meth-Epis. Church, Independence, Kan.	236
KFVH	Herbert Whan, Manhattan, Kans.	219
KFVI	56th Cav. Brigade, Houston, Tex.	240
KFVN	C. E. Bagley, Welcome, Minn.	227
KFVO	F. M. Henry, Kirksville, Mo.	226
KFVR	Moonlight Ranch, Denver, Col.	246
KFVS	Cape Girardeau Battery Station, Cape Girardeau, Mo.	224
KFVU	The Radio Shop, Eureka, Cal.	210
KFVW	Airfan Radio Corp., San Diego, Cal.	246
KFVX	Radio Shop, Bentonville, Ark.	236
KFVY	Radio Supply Co., Albuquerque, N. M.	250
KFVZ	Glad Tidings Tabernacle, Inc., San Francisco, Cal.	234
KFWA	Browning Bros. Co., Ogden, Utah.	261
KFWB	Warner Bros. Pictures, Inc., Hollywood, Cal.	252
KFWC	L. E. Wall & C. S. Myers, Upland, Cal.	211
KFWF	St. Louis Truth Center, St. Louis, Mo.	214
KFWH	F. Wellington Morse, Jr., Chico, Cal.	254
KFWO	Lawrence Mott, Avalon, Cal.	211
KFWP	Rio Grande Radio Supply House, Bronsville, Texas	214
KFWI	Radio Entertainers, Inc., South San Francisco, Cal.	220
KFWM	Oakland Educational Soc., Oakland, Cal.	207
KFWU	Louisiana College, Pineville, La.	238
KFWV	Wilbur Jerman, Portland, Ore.	213
KFYN	Carl E. Bagley, Welcome, Minn.	227
KFYF	Carl's Radio Den, Oxnard, Cal.	205
KFPX	B. O. Heller, Big Bear Lake, Cal.	203
KFXC	Santa Maria Valley R. R. Co., Santa Maria, Cal.	210
KFXD	L. H. Strong, Logan, Utah.	205
KFXE	Electric Research and Mfg. Co., Waterloo, Ia.	236
KFXH	Bledsoe Radio Co., El Paso, Texas.	242
KFXJ	Mt. States Radio District, Inc., (Portable), Col.	216
KFXF	Pikes Peak Broadcasting Station Co., Colo. Springs, Colo.	250
KFXM	Neches Electric Co., Beaumont, Tex.	227
KFXY	Mary M. Costigan, Flagstaff, Ariz.	205
KGB	The Ledger, Tacoma, Wash.	250
KGO	General Electric Company, Oakland, Cal.	361
KGU	M. A. Mulrony, Honolulu, Hawaii	270
KGW	The Oregonian, Portland, Ore.	492
KGY	St. Martin's College, Lacey, Wash.	246
KHJ	The Times, Los Angeles, Cal.	405
KHO	Louis Wasmer, Seattle, Wash.	273
KJBS	J. Brunton & Sons Co., San Francisco, Cal.	236
KJR	Northwest Radio Co., Seattle, Wash.	384
KLDS	Reorganized Church of Jesus Christ of Latter Day Saints, Independence, Mo.	441
KLS	Warner Bros. Radio Co., Oakland, Cal.	242
KLX	Tribune, Oakland, Cal.	508
KLZ	Reynolds Radio Co., Denver, Col.	266
KMA	May Seed & Nursery Co., Shenandoah, Ia.	252
KMJ	San Joaquin Corp., Fresno, Cal.	234
KMO	Love Elec. Co., Tacoma, Wash.	250
KNX	Express, Hollywood, Cal.	337
KOA	General Electric Co., Denver, Col.	322
KOB	College of Agri., State College, N. M.	349
KOIL	Monarch Manufacturing Co., Council Bluffs, Ia.	278
KOP	Detroit Police Department, Detroit, Mich.	278
KPO	Hale Brothers, San Francisco, Cal.	429
KPPC	Pasadena Presbyterian Church, Pasadena, Cal.	229
KPRC	Houston Print Co., Houston, Tex.	297
KQV	Doubleday Hill Elec. Co., Pittsburgh, Pa.	275
KQW	First Baptist Church, San Jose, Cal.	227
KRE	Gazette, Berkeley, Cal.	258
KSAC	Kansas State Agricultural College, Manhattan, Kans.	341
KSD	Post Dispatch, St. Louis, Mo.	545
KSL	Radio Service Corp., Salt Lake City, Utah	300
KTAB	Tenth Ave. Baptist Church, Oakland, Cal.	240
KTBI	Bible Inst., Los Angeles, Cal.	294
KTBR	Brown's Radio Shop, Portland, Ore.	263
KTCL	American Radio Tel. Co., Inc., Seattle, Wash.	306
KTHS	New Arlington Hotel, Hot Springs, Ark.	375
KTW	1st Presbyterian Church, Seattle, Wash.	454
KUO	Examiner, San Francisco, Cal.	246
KUOM	State University of Montana, Missoula, Mont.	245
KUPR	Union Pacific R. R. Co., Omaha, Neb.	270
KUT	University of Texas, Austin.	231
KWG	Portable Wireless Tel. Co., Stockton, Cal.	248
KWKC	Wilson Duncan Studios, Kansas City, Mo.	236
KWKH	W. K. Henderson I. W. & S. Co., Kennonwood, La.	273
KWSC	State College, Pullman, Wash.	349
KWWG	City of Brownsville, Brownsville, Tex.	278
KYW	Westinghouse E. & M. Co., Chicago, Ill.	535
KZKZ	Electric Supply Co., Manila, P. I.	270
KZM	Western Radio Inst., Oakland, Cal.	241
KZRQ	Far Eastern Radio, Inc., Manila, P. I.	222
WAAB	V. Jensen, New Orleans, La.	268
WAAC	Tulane University, New Orleans, La.	275
WAAD	Ohio Mech. Institute, Cincinnati, O.	258
WAAF	Drovers Journal, Chicago, Ill.	278
WAAM	I. R. Nelson Co., Newark, N. J.	263
WAAW	Omaha Grain Exchange, Omaha, Neb.	278
WABB	Harrisburg Sporting Goods Co., Harrisburg, Pa.	266
WABC	Asheville Battery Co., Inc., Asheville, N. C.	254
WABI	Bangor Ry. & Elec. Co., Bangor, Me.	240
WABL	Agricultural College, Storrs, Conn.	275
WABO	Lake Avenue Baptist Church, Rochester, N. Y.	278
WABQ	Haverford College Radio Club, Haverford, Pa.	261
WABR	Scott High School, Toledo, O.	263
WABW	College of Wooster, Wooster, O.	207
WABX	H. B. Joy, Mt Clemens, Mich.	246
WABY	John Magaldi, Philadelphia, Pa.	242
WABZ	Coliseum Place Baptist Church, New Orleans, La.	275
WADC	Allen Theatre, Akron, Ohio.	258
WAFD	A. B. Parfet Co., Port Huron, Mich.	275
WAHG	A. H. Grebe Co., Richmond Hill, N. Y.	316
WAIT	A. H. Waite & Co., Taunton, Mass.	229
WAMD	Hubbard & Co., Minneapolis, Minn.	244
WAPI	Alabama Polytechnic Inst., Auburn, Ala.	248
WARC	American Radio Res. Corp., Medford Hillside, Mass.	261
WBAA	Purdue University, West Lafayette, Ind.	273
WBAK	State Police, Harrisburg, Pa.	276
WBAO	James Millikia University, Decatur, Ill.	270
WBAP	Star Telegram, Fort Worth, Tex.	476
WBAV	Erner Hopkins Co., Columbus, O.	294
WBAX	J. H. Stenger, Jr., Wilkes-Barre, Pa.	256
WBBA	Plymouth Congregational Church, Newark, O.	226
WBBG	I. Vermilyea, Mattapoisett, Mass.	248
WBBL	Grace Covenant Presbyterian Church, Richmond, Va.	229
WBBM	H. L. Atlass, Chicago, Ill.	226
WBBP	Petoskey High School, Petoskey, Mich.	238
WBBR	Peoples Pulpit Ass'n., Rossville, N. Y.	273
WBBS	1st Baptist Church, New Orleans, La.	252
WBBU	Jenks Motor Sales Co., Monmouth, Ill.	224
WBBW	Ruffner City High School, Norfolk, Va.	222
WBBY	Washington Light Infantry, Charleston, S. C.	268
WBBZ	C. L. Carrell, (Portable). Chicago, Ill.	216
WBCN	Southtown Economist, Chicago, Ill.	266
WBDC	Baxter Laundry Co., Grand Rapids, Mich.	256
WBES	Bliss Electrical School, Takoma Park, Md.	222

Station	Owner and Location	Meters
WBOQ	A. H. Grebe & Co., Richmond Hill, N. Y.	236
WBNY	Miss S. Katz, New York City	210
WBR	State Police, Butler, Pa.	203
WBRC	Bell Radio Corp., Birmingham, Ala.	248
WBRE	Baltimore Radio Ex., Wilkes-Barre, Pa.	231
WBZ	Westinghouse E. & M. Co., Springfield, Mass.	333
WBZA	Westinghouse Electric and Mfg. Co., Boston, Mass.	242
WCAC	Agricultural College, Mansfield, Conn.	275
WCAD	St. Lawrence University, Canton, N. Y.	263
WCAE	Kaufman & Baer, Pittsburgh, Pa.	461
WCAH	Entrekin Electric Co., Columbus, O.	266
WCAJ	Nebraska Wesleyan University, University Place, Neb.	254
WCAL	St. Olaf College, Northfield, Minn.	337
WCAO	Sanders & Stayman, Baltimore, Md.	275
WCAP	C. & P. Tel. Co., Washington, D. C.	469
WCAR	Southern Radio Corp., San Antonio, Texas.	263
WCAT	School of Mines, Rapids City, S. D.	240
WCAU	Universal Broadcasting Co., Philadelphia, Pa.	278
WCAX	University of Vermont, Burlington, Vt.	250
WCAZ	Carthage College, Carthage, Ill.	246
WCBA	C. W. Heinbach, Allentown, Pa.	254
WCBD	W. G. Voliva, Zion, Ill.	345
WCBE	Uhalt Radio Co., New Orleans, La.	263
WCBG	H. S. Williams, Pascagoula, Miss.	268
WCBH	University of Mississippi, Oxford, Miss.	242
WCMB	C. Schwartz, Baltimore, Md.	229
WCBQ	1st Baptist Church, Nashville, Tenn.	236
WCBR	C. H. Messter (Portable), Providence, R. I.	205
WCBY	Fcrks Electrical Shop, Buck Hill Falls, Pa.	231
WCBZ	Neutrowound Radio Mfg. Co., Chicago Heights, Ill.	217
WCCO	Washburn Crosby Co., Anoka, Minn.	416
WCEE	C. E. Erbstein, Elgin, Ill.	275
WCK	Stix Baer & Fuller Co., St. Louis, Mo.	273
WCLO	C. E. Whitmore, Camp Lake, Wis.	231
WCLS	H. M. Church, Joliet, Ill.	214
WCM	Texas Market Department, Austin, Texas	268
WCSH	Henry P. Rines, Portland, Me.	256
WCSO	Wittenberg College, Springfield, Ohio.	248
WCUW	Clark University, Worcester, Mass.	238
WCWS	C. W. Selen, Providence, R. I.	210
WCX	Detroit Free Pres & Jewitt Radio and Phonograph Co., Pontiac, Mich.	517
WDND	Dod's Auto Accessories, Inc., 160-164 8th Ave., N., Nashville, Tenn.	226
WDZ	J. L. Bush, Tuscola, Ill.	278
WDAD	Dad's Auto Accessories, Inc., Nashville, Tenn.	226
WDAE	Tampa Daily News, Tampa, Fla.	273
WDAF	Kansas City Star, Kansas City, Mo.	366
WDAG	J. L. Martin, Amarillo, Tex.	263
WDAY	Radio Equipment Corp., Fargo, N. D.	261
WDBC	Kirk, Johnson & Co., Lancaster, Pa.	258
WDBE	Gilham-Schoen Elec. Co., Atlanta, Ga.	278
WDBF	R. G. Phillips, Youngstown, O.	222
WDBJ	Richardson Wayland Elec. Co., Roanoke, Va.	229
WDBK	M. F. Broz, Furn., Cleveland, O.	227
WDBL	Department of Markets, Stevens Point, Wis.	278
WDBO	Rollins College, Winter Park, Fla.	240
WDBQ	Morton Radio Supply Co., Salem, N. J.	234
WDBR	Tremont Temple Baptist Church, Boston, Mass.	261
WDBS	S. M. K. Radio Corp., Dayton, O.	275
WDBX	Dyckman Radio Shop, New York, N. Y.	233
WDBY	North Shore Congregational Church, Chicago, Ill.	258
WDBZ	Boy Scouts of America, Kingston, N. Y.	233
WDCH	Dartmouth College, Hanover, N. H.	250
WDOD	Chattanooga Radio Co., Chattanooga, Tenn.	256
WDRC	Doolittle Radio Corp., New Haven, Conn.	268
WDWF	Dutee Wilcox Flint, Inc., Cranston, R. I.	441
WDZ	J. L. Bush, Tuscola, Ill.	278
WEAA	F. D. Fallain, Flint, Mich.	234
WEAF	A. T. & T. Co., New York, N. Y.	492
WEAH	Hotel Lassen, Wichita, Kans.	268
WEAI	Cornell University, Ithaca, N. Y.	254
WEAJ	University of South Dakota, Vermillion, S. D.	278
WEAM	Borough of North Plainfield, N. Plainfield, N. J.	261
WEAN	Shepard Co., Providence, R. I.	270
WEAO	Ohio State University, Columbus, O.	294
WEAR	Goodyear T. and R. Co., Cleveland, O.	390
WEAU	Davidson Bros. Co., Sioux City, Ia.	275
WEBA	The Electric Shop, Highland Park, N. J.	233
WEBC	W. C. Bridges, Superior, Wisc.	242
WEBD	Elec. Equipment & Service Co., Anderson, Ind.	246
WEBE	Roy W. Waller, Cambridge, Ohio.	234
WEBH	Edgewater Beach Hotel, Chicago, Ill.	370
WEBJ	Third Avenue R. R. Co., New York, N. Y.	273
WEBK	Grand Rapids Radio Co., Grand Rapids, Mich.	242
WEBL	Radio Corp. of Ama. (Portable).	226
WEBM	Radio Corp. of Ama., Portable Mobile Station	226
WEBP	E. B. Peddicord, New Orleans, La.	280
WEBO	Tate Radio Co., Harrisburg, Ill.	226
WEBR	H. H. Howell, Buffalo, N. Y.	244
WEBT	Dayton High School, Dayton, Ohio.	256
WEBW	Beloit College, Beloit, Wisc.	268
WEBZ	Savannah Radio Corp., Savannah, Ga.	263
WEEI	Edison Electric Illuminating Co., Boston, Mass.	476
WEHS	Robert E. Hughes, Evanston, Ill.	203
WEMC	Emm. Missionary College, Berrien Springs, Mich.	286
WENR	All-Amer. Radio Corp., Chicago, Ill.	266
WEW	St. Louis University, St. Louis, Mo.	248
WFAA	Dallas News & Journal, Dallas, Texas	476
WFAM	The Times, St. Cloud, Minn.	273
WFAV	University of Nebr., Lincoln, Nebr.	275
WFBB	Eureka College, Eureka, Ill.	240
WFBC	1st Baptist Church, Knoxville, Tenn.	250
WFBD	Gethsemane Baptist Church, Philadelphia, Pa.	234
WFBE	J. V. De Walle, Seymour, Ind.	226
WFBG	W. F. Gable Co., Altoona, Pa.	278
WFBH	Concourse Radio Corp., New York, N. Y.	273
WFBI	Galvin Radio Supply Co., Camden, N. J.	236
WFBJ	St. Johns University, Collegeville, Minn.	236
WFBL	Onondaga Hotel, Syracuse, N. Y.	252
WFBM	Merchants Lighting Co., Indianapolis, Ind.	268
WFBQ	Wynne Radio Co., Raleigh, N. C.	252
WFBR	Maryland National Guard, Baltimore, Md.	254
WFBY	Signal Corps, Ft. Ben Harrison, Ind.	258
WFBZ	Knox College, Galesburg, Ill.	254
WFBK	Francis K. Bridgman, Chicago, Ill.	217
WFDF	F. D. Fallain, Flint, Mich.	234
WFI	Strawbridge & Clothier, Philadelphia, Pa.	395
WFKB	F. K. Bridgman, Chicago, Ill.	217
WFKJ	Chronicle, Houston, Texas	238
WFRL	R. M. Lacey, Brooklyn, N. Y.	205
WGAL	Lancaster Elec. Supply Co., Lancaster, Pa.	248
WGAQ	W. G. Patterson, Shreveport, La.	263
WGAZ	The Tribune, South Bend, Ind.	275
WGBA	Jones Elec. & Radio Co., Baltimore, Md.	254
WGBB	H. H. Carman, Freeport, N. Y.	244
WGBC	1st Baptist Church, Memphis, Tenn.	266
WGBF	The Finke Furniture Co., Evansville, Ind	236
WGBI	Frank S. Megargee, Scranton, Pa.	240
WGBK	L. W. Campbell, Johnstown, Pa.	248
WGBL	Elyria Radio Assn., Elyria, Ohio.	227
WGBM	T. N. Saaty, Providence, R. I.	234
WGBN	Hub Radio Shop, La Salle, Ill.	256
WGBO	Dr. Roses Artlan, San Juan, P. R.	275
WGBQ	Stout Institute, Menomonie, Wis.	234
WGBU	Florida Cities Finance Co., Fulford By-the-Sea, Fla.	278
WGBR	Marshfield Broadcasting Association, Marshfield, Wis.	229
WGBS	Gimbel Brothers, New York, N. Y.	316
WGBW	Hub Radio Shop, Spring Valley, Ill.	256
WGBX	University of Maine, Orono, Maine.	252
WGES	Oak Leaves Broadcasting Station, Oak Park, Ill.	250
WGN	The Tribune, Chicago, Ill.	370
WGMU	A. H. Grebe & Co., Inc., Richmond Hill, N. Y.	236
WGNP	George H. Phelps, Inc., Detroit, Mich.	270
WGCP	Grand Central Palace, N. Y. City.	252
WGHP	G. H. Phelps, Inc., Detroit, Mich.	270
WGR	Federal Telephone Mfg. Co., Buffalo, N. Y.	319
WGST	Ga. School of Tech., Atlanta, Ga.	270
WGY	General Elec. Co., Schenectady, N. Y.	380
WHA	University of Wisconsin, Madison, Wis.	535
WHAD	Marquette University, Milwaukee, Wis.	275
WHAG	University of Cincinnati, Cincinnati, Ohio	233
WHAM	University of Rochester, Rochester, N. Y.	278
WHAP	Wm. H. Taylor Finance Corp., Brooklyn, N. Y.	240
WHAR	F. P. Cooks Sons, Atlantic City, N. J.	275
WHAS	The Courier Journal-Times, Louisville, Ky.	400
WHAT	Dr. G. W. Young, Minneapolis, Minn.	263
WHAV	Wilmington Elc. Spec. Co., Wilmington, Del.	266
WHAZ	Rensselaer Polytechnic Institute, Troy, N. Y.	280
WHB	Sweeney School Co., Kansas City, Mo.	366
WHBA	Shaffer Music House, Oil City, Pa.	250
WHBC	Rev. E. P. Graham, Canton, Ohio.	254
WHBD	Charles W. Howard, Bellefontaine, Ohio	222
WHBF	Beardsley Specialty Co., Rock Island, Ill.	222
WHBG	John S. Skane, Harrisburg, Pa.	231
WHBH	Culver Military Academy, Culver, Ind.	222
WHBJ	Laver Auto Co., Ft. Wayne, Ind.	234
WHBK	Franklin St. Garage, Ellsworth, Me.	231
WHBL	J. H. Slusser, Logansport, Ind.	216
WHBM	C. L. Carroll (Portable), Chicago, Ill.	233
WHBN	1st Ave. Methodist Church, St. Petersburg, Fla.	238
WHBO	Y. M. C. A., Providence, R. I.	231
WHBP	Johnstown Auto Co., Johnstown, Pa.	256
WHBQ	St. John's M. E. Church, Memphis, Tenn.	233
WHBR	Scientific E. & M. Co., Cincinnati, O.	216
WHBS	E. W. Loche, Mechanicsburg, Ohio.	208
WHBU	B. L. Bing's Sons, Anderson, Ind.	219
WHBW	D. R. Kienzle, Philadelphia, Pa.	216
WHBY	St. Norbert's Coll., West DePere, Wis.	250
WHDI	Wm. Hood Dunwoody Ind. Inst., Minneapolis, Minn.	278
WHEC	Hickson Elec. Co., Rochester, N. Y.	258
WHN	George Schubel, New York, N. Y.	361
WHO	Bankers Life Co., Des Moines, Ia.	526
WHT	Radiophone Corp., Deerfield, Ill.	238
WIAD	H. R. Miller, Philadelphia, Pa.	250
WIAS	Home Elc. Co., Burlington, Iowa.	254
WIBA	Capital Times, Madison, Wis.	236
WIBC	L. M. Tate Post, V. F. W., St.	
WIBD	X-L Radio Service, Joliet, Ill.	203
WIBG	St. Paul's P. E. Church, Elkins Park, Pa.	222
WIBH	Elite Radio, New Bedford, Mass.	210
WIBI	Fredk. B. Zittell, Flushing, N. Y.	219
WIBJ	C. L. Carrell, Chicago (portable).	216
WIBO	Nelson Bros., Chicago, Ill.	226
WIBQ	F. M. Schmidt, Farina, Ill.	205
WIBN	Elite Radio Stores, New Bedford, Mass.	210
WIBM	Billy Maine, Chicago, Ill.	216
WIBO	F. M. Schmidt, Farina, Ill.	226
WIBR	Thurman A. Owings, Weirton, W. Va.	246
WIBS	N. J. National Guard, Elizabeth, N. J.	203
WIBU	The Electric Farm, Faynette, Wis.	222
WIBW	Dr. L .L. Dill, Logansport, Ind.	220
WIBX	Grid-Leak, Inc., Utica, N. Y.	205
WIBZ	Powell Electric Co., Montgomery, Ala.	231
WIL	Benson Radio Co., St. Louis, Mo.	273
WIP	Gimbel Brothers, Philadelphia, Pa.	508
WJAD	Jackson's Radio Elec. Co., Waco, Tex.	353
WJAG	Norfolk Daily News, Norfolk, Nebr.	270
WJAK	Rev. C. L. White, Greentown, Ind.	225
WJAM	D. M. Perham, Cedar Rapids, Ia.	268
WJAR	The Outlet Co., Providence, R. I.	306
WJAS	Pittsburgh Radio Supply House, Pittsburgh, Pa.	275
WJAZ	Zenith Radio Corp., Chicago, Ill.	322
WJBA	D. H. Lentz, Jr., Joliet, Ill.	207
WJBB	L. W. McClung, St. Petersburg, Fla.	254
WJBC	Hummer Furniture Co., 2nd and Joliet Sts., La Salle, Ill.	234
WJBD	Ashland Broadcasting Committee, Ashland, Wis.	223
WJBG	Interstate Radio, Inc., Charlotte, N. C.	224
WJBI	R. S. Johnson, Red Bank, N. J.	219
WJBL	Wm. Gushard Dry Goods Co., Decatur, Ill.	270
WJBN	St. John's Ev. Lutheran Church, Sycamore, Ill.	256
WJBR	Ernest F. Goodwin, Ypsilanti. Mich.	233
WJD	Dennison University, Granville, O.	217
WJJD	Loyal Order of Moose, Mooseheart, Ill.	303
WJY	Radio Corp. of Ama., New York, N. Y.	405
WJZ	Radio Corp. of Ama., New York, N. Y.	455
WKAA	H. F. Paar, Cedar Rapids, Iowa.	278
WKAF	WKAF Broadcasting Co., Milwaukee, Wis.	261
WKAP	D. W. Flint, Cranston, R. I.	234
WKAQ	Radio Corp. of Porto Rico, San Juan, P. R.	341
WKAR	Mich. Agricultural College, Lansing.	285
WKAV	Laconia Radio Club, Laconia, N. H.	210
WKBB	Sanders Bros., Joliet, Ill.	214
WKBE	K. & B. Electric Co., Webster, Mass.	231
WKBG	C. L. Carrell, (Portable) Chicago, Ill.	216
WKRC	Kodel Radio Corp., Cincinnati, O.	326
WKY	C. E. Hill and H. S. Richards, Oklahoma City, Okla.	275
WLAL	1st Presbyterian Church, Tulsa, Okla.	250
WLAP	W. V. Jordan, Louisville, Ky.	275
WLAX	Greencastle Commun. Broad. Sta., Greencastle, Ind.	231
WLB	University of Minneapolis, Minneapolis, Minn.	278
WLBL	Wisconsin Department of Markets, Stevens Point, Wis.	278
WLIT	Lit Brothers, Philadelphia, Pa.	395
WLS	Sears Roebuck Co., Chicago, Ill.	345
WLTS	Lane Technical High School, Chicago, Ill.	258
WLW	Crosley Radio Corp., Cincinnati, O.	422
WLWL	Missionary Society of St. Paul the Apostle, N. Y. City.	288
WMAC	C. B. Meredith, Cazenovia, N. Y.	275
WMAF	Round Hills Radio Corp., Dartmouth, Mass.	441
WMAK	Norton Laboratory, Lockport, N. Y.	266
WMAN	1st Baptist Church, Columbus, Ohio	278
WMAQ	Chicago Daily News, Chicago, Ill.	448
WMAY	Kings Highway Presbyterian Church, St. Louis, Mo.	248
WMAZ	Mercer University, Macon, Ga.	261
WMBB	American Bond and Mortgage Co., Chicago, Ill.	250
WMBB	Trianon Ball Room, Chicago, Ill.	250
WMBF	Fleetwood Hotel, Miami Beach, Fla.	384
WMC	The Commercial Appeal, Memphis, Tenn.	500
WMCA	Hotel McAlpin, N. Y. C.	341
WNAB	Shepard Stores, Boston, Mass.	250
WNAC	Shepard Stores, Boston, Mass.	280
WNAD	University of Okla., Norman, Okla.	254
WNAL	Omaha Central High School, Omaha, Nebr.	258
WNAP	Wittenberg College, Springfield, O.	248
WNAR	1st Christian Church, Butler, Mo.	231
WNAT	Lenning Bros. Co., Philadelphia, Pa.	250
WNAX	Dakota Radio App. Co., Yankton, S. D.	244
WNJ	Radio Shop, Newark, N. J.	252
WNOX	Peoples Tel. & Tel. Co., Knoxville, Tenn.	268
WNYC	Municipal Station, New York, N. Y.	526
WOAC	Page Organ Co., Lima, Ohio.	261
WOAI	South East Equipment Co., San Antonio, Texas	395
WOAN	Vaughan Con. of Music, Lawrenceburg, Tenn.	283
WOAW	Woodmen of the World, Omaha, Neb.	526
WOAX	F. J. Wolff, Trenton, N. J.	240
WOC	Palmer School of Chiro, Davenport, Ia.	484
WOCG	Triple Alliance Radio Station, Syca- Ind.	227

(Concluded on page 28)

A THOUGHT FOR THE WEEK

Some music publishers think broadcasting hurts the sales of their songs; others are equally convinced that it helps. Some listeners-in, after hearing some of the slush that publishers are putting out, retort: "A plague on both your houses."

RADIO WORLD
Trade Reg. U. S. Pat. Off.

The Link Connecting Radio Fan, Dealer, Jobber, Distributor and Manufacturer

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

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1 Page, 7¼"x11"	462 lines	$300.00
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NOVEMBER 14, 1925

Reckless Pair?

THE CARLSON SISTERS, of Brooklyn, N. Y., professional fat women, join WOR's Early Bird Gym. Class. Dot, left, weighs 521; Elsie, 541. Dot is 19; Elsie, 21. They may reduce themselves out of a job if they don't take care. (Foto Topics.)

Hundreds Clamor for Station As Fourth Conference Meets

By Thomas Stevenson

WASHINGTON.

What does the National Radio conference mean to the listening public generally? How will fans owning crystal and tube sets be affected by its decisions? What were the problems that make it necessary for Secretary Hoover to call representatives of various radio groups together? How do the problems of today compare with those of one and two years ago?

These four questions were put to Acting Secretary of Commerce S. B. Davis, who is in active charge of the Government's supervisory activities, and Chief Radio Supervisor W. D. Terrell. There follows a summary of their views:

Improvement of service to the public is the chief motive which prompted Secretary Hoover to call the Fourth National Radio Conference. Since the inception of radio broadcasting, the Department of Commerce has had to deal with the many problems arising in the new art. This is because the law of 1912 enacted before broadcasting was ever dreamed of, assigned to the Bureau of Navigation of the Department of Commerce the task of licensing radio stations, inspecting ship and land equipment, and exercising a limited amount of supervisory authority over them.

No Laws Since 1912

There has been no radio legislation since 1912, and broadcasting has been regulated by the law which was enacted solely for the control of code stations. It has been possible only through the cooperation of all factions of the radio industry and the desire of manufacturer and broadcaster alike to render the best service to the public. Since the fate of the industry now and at all times depends on the interest of the public, this desire is not hard to understand.

But were it not for the conferences called by Secretary Hoover at which the manufacturers, broadcasters and the public were represented, cooperation might not have been possible.

The problems which hold the attention of the Fourth National Radio conference do not differ materially from those considered by the Third National conference one year ago, or those of the conference two years ago. As a matter of fact, until Congress passes a law authorizing some agency to regulate broadcasting, these problems never will be solved.

A Guide to Congress

The chief significance of the Fourth National Radio conference is that its recommendations will probably have considerable weight with Congress this winter when radio legislation is considered. Limitation of stations is still the most important subject. Necessity for this step is due to the limited number of ether channels at present. On an average, there are nearly four stations for every wavelength. So that more channels might be used, the separation between stations has been reduced to the minimum. In many cases, interference has resulted.

To make matters worse, there is a waiting list of several hundred applicants for wavelengths for new stations. The Department of Commerce has not the authority to refuse a license to any station that meets the 1912 law. Sometime or other, these applicants may take it into their heads that they are just as much entitled to broadcast as the present stations. It is believed that if taken to the courts under the present law, a decision might result which would be very harmful to the industry.

Super-Power Discussed

The second problem in importance is higher-power or super-power. Experience during the past summer taught that fading and static might be overcome to a certain extent through the use of higher power. The absolutely reliable service area of any broadcasting station depends on its power. Tests have shown that super-power stations, if removed from cities, will not spread a blanket over others.

The advent of super-power probably will mean that multi-tube sets will no longer be necessary to get good programs. Obviously, the best programs are going to be available in the large cities. With super-power stations near these cities, the best talent of America will be available to fans with tube sets, no matter where located.

At the previous conference, objections were made to super-power on the ground that it would result in a monopoly through blanketing other stations. For this reason, a number of tests were made during the summer, and the conference this year had considerable data instead of theories upon which to base its recommendations.

Inter-Connection Develops

Third in importance is inter-connection. There are several methods of inter-connection of stations for national programs and each is developing along its own natural lines.

The Fourth National Radio conference differed from those preceding in at least one respect. This year, Secretary Hoover invited radio editors from all localities to attend as delegates. He believed the editors were in a better position to know just what the fans of their community want than anyone else.

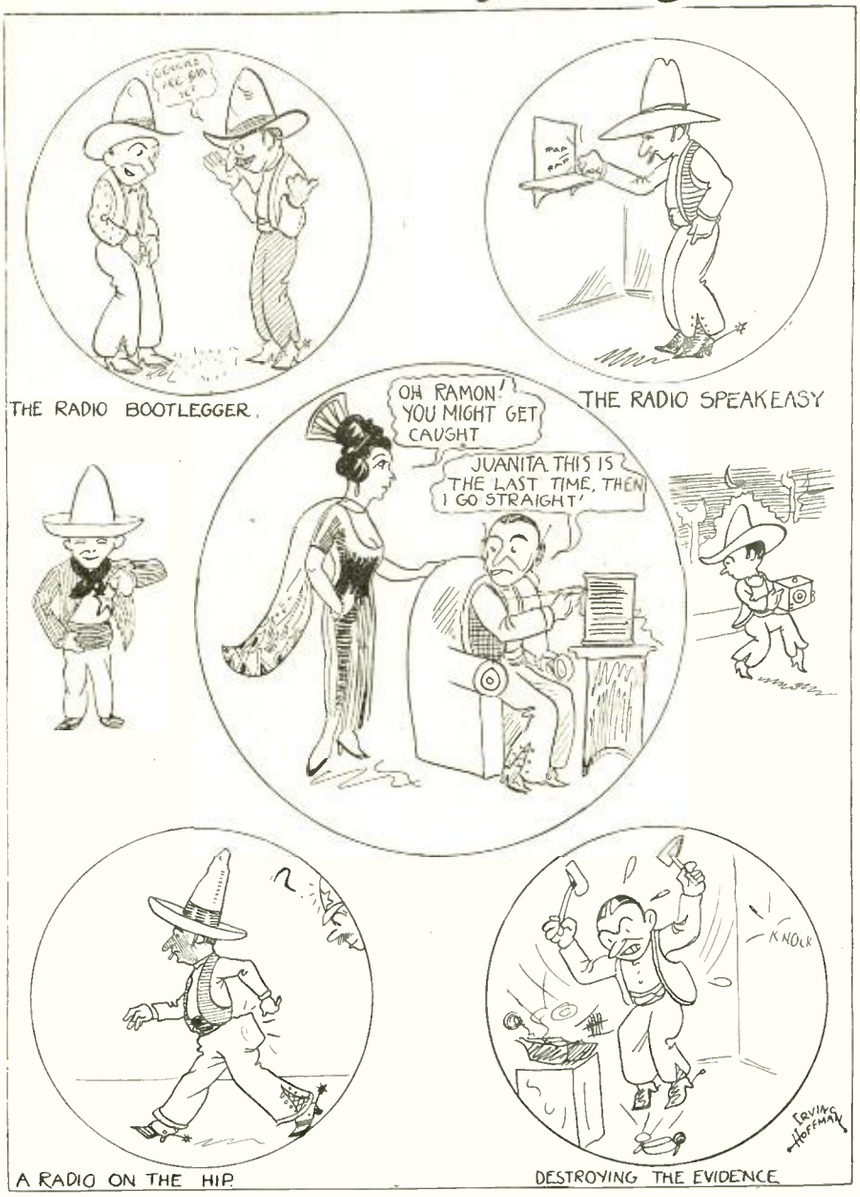
Opera Stars Rehearse Songs Before the Microphone

The terrors of broadcasting for the first time are not confined to amateurs. A performance in a radio studio, without the inspiration of a visible audience and with dead acoustics so different from the concert hall, is just as baffling for the great stars. Therefore, to accustom them to these new conditions, they are required to have a dress rehearsal. There is so much volume to a piano or 'cello or violin energetically played that there isn't the noticeable difference in tone in the broadcasting studio. But the voice as a rule stands weak and unnatural to the singer.

These rehearsals also give the radio operators an opportunity to determine what is known as the microphonic balance of sound. That includes the position and distance of the singer from the microphone and some indication of the volume of tone.

The day preceding the broadcasting of Mme. Louise Homer's recital in New York she spent two hours in the radio studio, says the New York "Times." Her singing of "The Battle Hymn of the Republic," the next to the last number, proved that one more great artist had been heard to as good advantage over the radio as in the theatre.

Venezuela Bans Radio Because All Fans Prefer It to Merely Doing Work



By Herman Bernard

THE republic as a form of government has failed in Venezuela. The popular will, in favor of listening to radio sets all the time, particularly during working hours, has been flagrantly flaunted by the Government. Twenty years ago there would have been a revolution over it. Today the defiance of the public will is met with the reigning conventionalism of bootlegging.


HERMAN BERNARD

Ramon smuggles in his set to charm Juanita during the courtship. After marriage she asks him if she or the set was married to him, and threatens to sue for divorce, naming the set by trade name and serial number, to its everlasting disgrace. And he promises faithlessly to listen in only once more—and then go straight. Then he goes right along, listening in, and his wife threatens to tell the police, hesitating only because the fine would have to come out of her weekly allotment. At the present rate of exchange of 4 milliamps to a bolivar this would consume her entire allowance for thirty weeks, because although the South Americans dearly love the women, they place a low financial value on them. This is not as it should be, judging from the Venezuelan girl dancers I saw very much of in a Broadway cabaret last night.

Radio Bootlegging

The radio bootlegging industry is growing fast. It is patterned after the more famous and differently complexioned bootlegging industry in the United States. One point of very marked difference is that the Venezuelan bootleg product is never guaranteed as of the pre-war variety and never is fatal.

The collegiate son of a Venezuelan banker bought a bootleg radio set and listened in on the strict Q. T. Overjoyed that the set worked so well, he staged a special party in its honor and invited some Government officials with native impunity.

The Government ban on sets includes importation and utter use of any sort, kind, nature or description. Concededly only a temporary writ, it is nevertheless one that has reached the eyes of the multitudes much as pepper scattered in retributive anger. It has not succeeded as a total ban, but it has improved DX reception, because of lessened interference.

The Awful Effect

A few weeks ago the Government found it necessary to overcome the temptation to idleness that radio sets presented to the lazy majority in fields and factories. Listening to tango-like music was found ever so much more attractive than listening to the harsh commands of the boss. Road construction almost ceased, and the motor car owners voiced a protest so loudly that it drowned out the signals on their own radio receivers.

People cried for bread, only to learn that the bakers were radio addicts, and when they were not building sets were listening to sets they had built or bought, hence there was no bread. It was useless to advocate in queenly fashion the substitution of cake, for the Venezuelans are literal constructionists and many of those against whom the ban is particularly directed had never heard of the historic advice, nor the more recent denials of its authenticity. Besides, Venezuelans do not like cake.

Half a Loaf

There is a raging feeling of rancor in the breast of the populace which began its gestative course when transmission of programs was prohibited for afternoons only. Half a loaf is better than none, even in Venezuela, and the natives frolicked as they listened to Government ships and other vessels sending forth the bleatings of their gaudily-uniformed bands. This left no time for work, either, hence the sweeping order prohibiting everything affecting radio transmission, reception, instruction and construction.

The Announcers' Association has filed a formal protest against the radio prohibition order. The Workingmen's Union of Venezuela has passed a resolution demanding that members who took afternoons or days off be given a raise and their former jobs back, on the principle that all radio and no work makes Jack a bright boy.

Against these and other firm resolutions there stand only the decision of the Government and the plea of the Radio Bootleggers' League that nothing be done to interfere with the wholesome writ that permits industry to prosper.

The Situation Summed Up

Meanwhile sheriffs are flashing their badges with greater zeal than ever, people are being ridden in Black Marias for turning an attentive though unruly ear to the headphones, secret radio listening places have sprung up all over the land, passwords resembling call letters are on everyone's lips, hips bulge with 1-tube radio sets a l'Americaine, and the raiding squad is adding much to the prospects of a better market for American radio sets and parts in Venezuela for years to come.

The people are demanding a referendum and threaten to listen in to get the returns.

THE ULTRADYNE

(*Concluded from page* 11)

a capacity of about .002 mfd. A larger value is not desirable because then the high audio frequencies would be by-passed as well as the intermediate frequency, and distortion would result. The by-pass condenser C3 in the oscillating circuit should be not less than .005 microfarad, and it may be as large as one miscrofarad to good advantage.

Oscillations in the intermediate frequency amplifier are controlled by means of the potentiometer R9, which is connected across the filament battery. The resistance of this instrument should not be less than 400 ohms in order to minimize the current drain on the A battery.

S1 is the filament switch for turning on and off the current. It is inserted in the negative leg of the filament battery.

It will be observed that the plate return lead of the first tube goes to the grid of the oscillator tube and thence through the grid coil to the negative side of the A battery. Hence there is no positive plate voltage on the modulator. This is the distinguishing characteristic of the Ultradyne. The plate return may also go to the positive side of the filament battery, and this will put a positive voltage of about six on the modulator plate, but at the same time it will make the grid of the oscillator positive.

Fig. 3 shows the panel layout which is ordinarily used in connection with the Ultradyne. It is based on a panel 30" long. This is a very good arrangement of the binding posts. It is much better from an aesthetic point of view to put all posts at the rear of the set where all unsightly leads may be concealed. It would also be better electrically unless the batteries and the loud speaker also are to be placed in front. That is not done these days. It is suggested that the filament switch be placed directly under the potentiometer to balance the loop jack.

Fig. 2 shows the baseboard layout as it was conceived by one constructor of this set.

The circuit has been wired for 45 volts on the plates of all the high-frequency tubes except the modulator, that is the voltage on B2 should be 45. The voltage on B1, or on the plates of the audio-frequency tubes should be much higher than this, from 90 to 150. The negative bias on the grids of these two tubes should be adjusted to fit whatever voltage is used.

LIST OF PARTS

One two circuit RF tuning coil, L1, L2.
One RF coupler, L3, L4.
One oscillating coil, L5, L6.
Two tuning condensers, C1, C2, each .0005 mfd.
One by-pass condenser, C4, .001 mfd.
One by-pass condenser, C3, .005 to 1 mfd.
One grid condenser, C9, .00025 mfd.
One by-pass condenser, C10, .002 mfd.
Two double circuit jacks, J and J1
One 6-spring filament control jack, J2.
One 4-spring filament control jack, J3.
One variable grid leak resistance, Bretwood.
Eight Amperites, R1 to R8.
One 400-ohm potentiometer, R9, with knob.
One air-core intermediate frequency filter.
Three intermediate frequency transformers.
Eight standard tube sockets with eight tubes.
Two audio-frequency transformers, General Radio 285 and 285L, Federal 65 and 65A, or Rauland Lyric.
One filament switch, S1.
Five binding posts.
A panel 7x30x3/16".
A baseboard 7x29" and a cabinet to match.
Two vernier dials and one small knob for tickler.

Stage to Microphone, Career of Rodgers

Frederick G. Rodgers is a very well-known announcer to the fans of KDKA, The Westinghouse Electric and Manufacturing Company's broadcasting station, East Pittsburgh, Pa. He is chiefly known for his clever announcing of the artists appearing on the Dutch Half Hour of Music given each Friday.

FREDERICK G. RODGERS

Mr. Rodgers, in addition to being an announcer, is a fine baritone. He has appeared many times before the microphone as a soloist. He received his musical education at the Durham University, England. He has had considerable stage experience both abroad and in America, in light opera, and also has done church musical work.

Navy Using Tube Transmitters; Expect Cut in Interference

WASHINGTON.

Installation of vacuum tube sets for transmitting by a large number of Navy stations is expected to reduce interference from spark harmonics. Bids for the purchase of fifty short wave vacuum tube transmitting sets have been requested by the Navy, and upon their installation interference to broadcasting services will be minimized, it is believed.

The fifty short-wave transmitting outfits will have a rating of 100 watts power output. The effective daylight range, at the best guess, will be approximately 150 miles, with a radius of around 1,000 miles or more after nightfall. The spark transmitters now in use are limited to a transmission range of about fifteen miles.

Europe Has Wave Trouble; Curative Tests Under Way

WASHINGTON.

The wavelength problem is also beginning to prove troublesome in Europe. The International Radio Conference, held at Geneva recently, discussed several schemes for the allotment of wavelengths among various countries. Tests will be made and another conference held.

The difficulty is that many stations in Europe, especially in Spain and Germany, have been operating on the same wavelength. The plan presented for discussion was brought forward by British broadcaster interests and represented almost no changes in wavelengths for the British stations. New wavelengths were assigned to others, especially the German stations which have been the latest to enter the field.

As a result of the Geneva conference almost all of the European stations undertook to operate contemporaneously on the wavelengths between 200 and 600 meters assigned to them during a series of trials.

Theoretically, there should have been no interference and in practice little developed. The trials demonstrated that a difference in frequency of 10 kilocycles is sufficient to avoid interference.

1,560-Meter Wave Received by WCAD, Then Rebroadcast

Station WCAD, St. Lawrence University, N. Y., for forty minutes, from 8 p. m. to 8:40, received from 2XAH, the developmental station of the General Electric Company at Schenectady, the WGY musical program sent out from that station on 1,560 meters and rebroadcast it so clearly that messages were received from Canton, Ogdensburg and other points reporting the clearness of the program and the surprise of the recipients that the WGY program was coming in to them.

Preparations for the test consumed over a month. H. K. Bergman, operator of WCAD, had been listening to the long wavelength from WGY station to assure himself of the regularity of its wavelength. That station, using 40½, 109, 380 and 1,560 meter wavelengths, had previously rebroadcast on the short but not from the long length. A test made from the radio room in Carnegie Hall at St. Lawrence University was unsuccessful, due, as Professor Ward C. Priest, of the chair of physics at St. Lawrence, determined, to interference from power lines. For the recent test the instruments, a special set loaned for the occasion by the General Electric Company, were taken down into the fields of the open country behind the college and set up in a barn.

HAVE YOU BEEN AWAY?—Have you missed any of the summer copies of RADIO WORLD. We can supply you with any copies of RADIO WORLD published during the summer at our regular price of 15c per copy, or any seven copies for $1.00, or start your subscription with any number. NEWSDEALERS: We will fill your orders for back numbers at regular wholesale price. RADIO WORLD, 145 West 45th St., N. Y. City.

RECENT BACK NUMBERS of RADIO WORLD, 15c each. RADIO WORLD, 145 West 45th Street, New York City.

Capitol Newcomer

CELIA TURRILL, mezzo soprano, Major E. Bowes' new find, who will sing through WEAF every Sunday evening.

THE WATER JAR SET

(*Concluded from page 7*)

pass condenser, but if you have .006 or a little higher capacity about the house, you may press that into service without fear of receiving no signals.

LIST OF PARTS

One 3-circuit tuning coil, L1 L2 L3.
One .001 mfd. variable condenser, C1.
One 2-meg. grid leak, R1.
Three 99 type sockets.
Two 4 Vernier dials.
One .00025 mfd. grid condenser, C2.
One 0.1 meg. plate resistor, R2.
One 1.0 meg. grid leak, R3.
One 20-ohm rheostat, R4.
One 0.25 mfd. fixed condenser.
One A battery switch, S.
One single circuit jack, J.
One 7x18 panel.
One 7x17 baseboard.
One audio-frequency transformer.
One terminal strip (binding posts).
One double mounting for R2 and R3.

STATIONS

(*Concluded from page* 15)

Station	Owner and Location	Meters
WOCL	Hotel Jamestown, Jamestown, N. Y.	275
WOI	Iowa State College, Ames, Iowa	270
WOK	Neutrowound Radio Mfg. Co., Homewood, Ill.	217
WOKO	Otto Baur, N. Y. City	233
WOO	John Wanamaker, Philadelphia, Pa.	508
WOQ	Unity School of Christianity, Kansas City, Mo.	278
WOR	L. Bamberger & Co., Newark, N. J.	405
WORD	Peoples Pulpit Assn., Batavia, Ill.	275
WOS	Mo. State Marketing Bureau, Jefferson City, Mo.	441
WOWL	Owl Battery Co., New Orleans, La.	270
WOWO	Main Auto Supply Co., Ft. Wayne, Ind.	227
WPAK	N. D. Agricultural College, Agricultural College, N. D.	275
WPAZ	Dr. John R. Koch, Charleston, W. Va.	268
WPDO	Hiram L. Turner, Buffalo, N. Y.	205
WPG	Municipality, Atlantic City, N. J.	300
WPRC	Wilson Printing & Radio Co., Harrisburg, Pa.	216
WPSC	Penn State College, State College, Pa.	261
WQAA	H. A. Beale, Jr., Parkersburg, Pa.	220
WQAC	Gish Radio Service, Amarillo, Texas	234
WQAE	Moore Radio News Station, Springfield, Vermont	246
WQAM	Electric Equipment Co., Miami, Fla.	263
WQAW	Scranton Times, Scranton, Pa.	250
WQAO	Calvary Baptist Church, New York, N. Y.	360
WQJ	Calumet Rainbo Broadcasting Co., Chicago, Ill.	448
WRAF	Radio Club, Inc., Laporte, Ind.	224
WRAK	Economy Light Co., Escanaba, Mich.	256
WRAM	Lombard College, Galesburg, Ill.	244
WRAV	Antioch College, Yellow Springs, O.	263
WRAW	Avenue Radio Shop, Reading, Pa.	238
WRAX	Flexon's Garage, Gloucester City, N. J.	268
WRBC	Immanuel Lutheran Church, Valparaiso, Ind.	278
WRC	Radio Corp. of America, Washington D. C.	469
WRCO	Wynna Radio Co., Raleigh, N. C.	252
WREC	Wooten's Radio Shop, Coldwater, Miss.	254
WREO	Reo Motor Co., Lansing, Mich.	286
WRHF	Radio Hospital Fund, Washington, D. C.	256
WRHM	Rosedale Hospital, Minneapolis, Minn.	252
WRK	Doron Bros., Elec. Co., Hamilton, O.	270
WRNY	Experimenter Publishing Co., (Radio News) N. Y. City	258
WRM	University of Illinois, Urbana, Ill.	273
WRMU	A. H. Grebe & Co., Inc., Motor Yacht Mu-1, N. Y. City	236
WRST	Radiotol Mfg. Co., Inc., 5 First Ave. Bay Shore, N. Y.	216
WRW	Tarrytown Research Laboratory, Tarrytown, N. Y.	273
WSAI	U. S. Playing Card Co., Cincinnati, O.	326
WSAJ	Grove City College, Grove City, Pa.	229
WSAN	Allentown Call, Allentown, Pa.	229
WSAP	City Temple, New York, N. Y.	263
WSAR	Doughty & Welch Elec. Co., Fall River, Mass.	254
WSAV	C. W. Vick Radio Construction Co., Houston, Tex.	248
WSAX	Zenith Radio Corp., Chicago, Ill.	268
WSAZ	Chase Electric Shop, Pomeroy, Ohio.	244
WSB	The Atlanta Journal, Atlanta, Ga.	428
WSBC	World Battery Co., Chicago, Ill.	210
WSBF	Stix Baer and Fuller, St. Louis, Mo.	273
WSBT	South Bend Tribune, South Bend, Ind.	275
WSDA	Seventh Day Adventist Church, N. Y. City	263
WSKC	World's State Knitting Co., Bay City, Mich.	261
WSM	National Life and Accident Ins., Nashville Tenn.	283
WSMB	Saenger Amusement Co., New Orleans, La.	319
WSMH	Shathick Music House, Owosso, Mich.	240
WSMK	G. M. K. Radio Corp., Dayton, O.	275
WSOE	School of Engineering, Milwaukee, Wisc.	246
WSRO	H. W. Fahlander, Hamilton, Ohio.	251
WSUI	State University of Iowa, Iowa City, Iowa	484
WSY	Alabama Polytechnic Institute, Auburn, Ala.	250
WTAB	Fall River Daily Herald, Fall River Mass.	266
WTAC	Penna. Traffic Co., Johnstown, Pa.	268
WTAD	R. E. Compton, Carthage, Ill.	236
WTAG	Worcester Telegram Publishing Co., Worcester, Mass.	268
WTAL	Toledo Radio & Elec. Co., Toledo, O.	252
WTAM	Willard Storage Battery Co., Cleveland, Ohio	389
WTAP	Cambridge Radio Elec. Co., Cambridge, Ill.	242
WTAQ	S. Van Gordon & Son, Osseo, Wis.	254
WTAR	Reliance Radio & Elec. Co., Norfolk, Va.	261
WTAS	Charles E. Erbstein, Elgin, Ill.	303
WTAT	Edison Elec. Ill. Co. (Portable), Boston, Mass.	244
WTAW	Agricultural & Mech. College, College Station, Tex.	270
WTAX	Williams Hardware Mfg. Co., Streator, Ill.	231
WTAZ	T. J. McGuire, Lambertville, N. J.	261
WTG	Kansas State Agricultural College, Manhattan, Kas.	273
WTIC	Travelers Insurance Co., Hartford Conn.	349
WWAD	Wright & Wright, Inc., Philadelphia, Pa.	250
WWAE	Electric Park, Plainfield, Ill.	242
WWGL	Radio Engineering Corp., Richmond Hill, N. Y.	213
WWI	Ford Motor Co., Dearborn, Mich.	266
WWJ	Detroit News, Detroit, Mich.	353
WWL	Loyola University, New Orleans, La.	275

RADIO UNIVERSITY

(*Continued from page* 13)

23-plate variable condenser, which has a capacity of .0005 mfd., the primary will consist of 10 turns, while the secondary will consist of 45 turns. The tickler will have to be wound on a tubing 2" in diameter and 1½" high. There will be 35 turns wound on this form. Use No. 26 SSC wire here. (3) All these coils can be wound with the wire you desire to use, but the 26 wire is more convenient on the tickler. The primary and the secondary portions of the RFT are to be wound on the forms that you have.

* * *

I HAVE built the 4-tube Diamond and find it is a most satisfactory receiver. However, with any set that I build, could not get better control of the oscillatory action in the first tube? (2) Is it a good policy to use the method of tapping the coil (used in the Thordarson-Wade) in the Diamond? (3) I find it a little difficult to clear up the regeneration with the tickler. That is, it is hard to control.—R. A. Cogan, 2002 Mance St., Montreal, Quebec, Canada.

(1) Yes. (2) No. (3) Reduce the number of turns on the tickler. Reverse the tickler connections.

* * *

I AM building the Diamond which appeared in the July 25 issue of RADIO WORLD, but since that issue is out of print, I would like to know the following information. (1) Can SLF variable condensers be used with success? (2) Can neutralizing condensers be used with success in this set? (3) How far apart should the coils and the condenser be? (4) Should the RFT be placed at any special angle?—F. W. Collingwood, 3442 Sacramento St., San Francisco, Cal.

(1) Yes. (2) No, it will decrease the volume of the set. (3) About 5" apart. (4) No.

The Chief Announcer's Story of His Life Work

(*Continued from page* 15)

possible to bring together in a given place, is made or lost. Someone has said two things are lost forever: one, the spoken, or, in the case of radio, the sung word!

One of the sorest tribulations of an announcer is the last-moment cancellation or the default of a scheduled artist. He may be left entirely alone in charge of the studio to keep the program flowing without cessation through the microphone for six hours. His one responsibility is, of course, not to lose his station's audience.

On Retaining the Balance

His program, made up carefully with an ear to balance, variety, popularity of an artist and countless other standards, is before him. The evening opens with a half-hour for the little tots who are fortunate enough to have considerate mothers strengthening their nervous systems for greater twentieth-century irritants than can be foretold, whose supper is over, whose baths have been taken and who are within earshot of the family loudspeaker, waiting to be amused or diverted by the invisible "uncle" or bed-time story-spinner.

That is a regular feature. The announcer has no care there. Then the band, jazz or otherwise, for dinner and dance! The better the jazz, the livelier and more volatile the players! Seven to twelve hard-working young brass-tooters shut up in a sound-proof studio all for the love and the glory of it throughout an hour with no responsive forms moving before their vision to their rhythm is no deep source of satisfaction to the jazz-band musician. The announcer must see that all the band are in their places (which he has arranged for balance of sound, according to the instrument's volume or vibrations). He must see that the musicians are tuned up between very brief anouncements over the air, never giving the monitor at the control-board occasion to write a delay of more than thirty seconds in his watchfully kept log-book. The listening jazzites are slow to realize the duties and responsibilities, the trials and tribulations of the announcer who must keep the weary tone out of his announcements, must be firm yet considerate of the time-giving artists, when he cuts the studio transmission with the control switch in his hand and asks if the band is ready, what is the next selection, will the trumpet please turn away from the microphones in that direction so not to blast? Then, while he is announcing the name of the selection, the name, in full, of the band, the station's letters, CRASH! The trap drummer has let drop cymbals, wood-box, tom-tom, tincan and whatnot, accidentally, because time and care were not taken to clamp them securely. Instinctively, even between the syllables of a word in the announcement, the announcer pushes the control button to prevent the cacophony from shocking the ears of the radio listeners. This type of trial and tribulation happened twice within fifteen minutes in my experience.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM.

RADIO HINTS. Follow my simple hints when building, to Avoid Losses, Increase Volume, Obtain clear Music. Surprising results guaranteed or Money Back. Copy 10c. Lipinski, Distributor, 39 Highland Street, Pawtucket, R. I.

WE REACTIVATE your 3-, 5- or 6-volt tubes. 500-hour guarantee. Just pay postman $1.50 each, receiving, extra, a splendid Combination Bill Fold and Coin Purse free. T E. Brandon, Fourth and Union, Nashville, Tenn.

LIST OF RADIO BOOKS sent free. The Columbia Print, 145 West 45th Street, New York City.

FOR SALE—New Brandes Phones in original cartons. $3.50 pair. All shipments C. O. D., unless money order accompanies order. Economic Appliance Company, Irwin, Penna.

LISTEN IN every Friday at 7 P. M. and hear Herman Bernard, managing editor of RADIO WORLD, discuss "Your Radio Problem," from WGBS, Gimbel Bros., New York City, 315.6 meters.

ATTENTION RADIO DEALERS!! A 5-tube low-loss tuned R. F. long-distance set for $16.85. Absolutely guaranteed. J. S. Radio Co., 86 East 4th Street, New York.

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.

RADIO FANS WANTED to sell Standard Radio apparatus. H. Roberts & Co., 180 Broadway, New York.

HOW TO BECOME AN AMATEUR OPERATOR—A comprehensive, illustrated article appeared in issue of June 27, 1925. 15c per copy, or start your subscription with this number. RADIO WORLD, 145 West 45th St., N. Y. C.

HAVE YOU ANYTHING TO SELL OR EXCHANGE? Use RADIO WORLD'S Classified Department and get great results. 10c a word. RADIO WORLD, 145 West 45th St., N. Y.

HELP!! The Bruno Radio Corp. of New York needs a reliable, capable, honest radio man in every city, town and village of the U. S. to build the Bruno Powertone from the Bruno Powertone Kit. We are literally swamped with orders for the Powertone. We need help quickly! We want to organize a number of young men to build it for our customers—give them a chance to earn real money in their spare time with no investment and with the backing of a reputable concern. A postal card will bring you further details. Give us your references in the first letter to save time. Bruno Radio Corp., 221 Fulton Street, New York City.

"LIBERTY AFLAME" and other patriotic verses. By Roland Burke Hennessy. In cloth, $1.00. Columbia Print, 145 West 45th St., N. Y. C.

HOW TO BUILD THE POWERTONE, 1 dial, 5 tubes, described in RADIO WORLD, issues of Aug. 29 and Sept. 5. Powertone Trouble-shooting, Sept. 12. Send 45c for all three. Special diagrams and "blueprint in black" included among the many illustrations. RADIO WORLD, 145 West 45th St., N. Y. C.

Yet only the "pleasant voice" must go out to the listener!

On the Wonders of the Blind

After the band a drama given by blind girls is scheduled. The blind are noted for their uncanny radio sense. They must be led to their chairs at a long table. They must be placed where they may run their hands like birds' wings over the braille scrip, as they follow their cues and lines. They must touch the several microphones placed to pick up voices of varying volume and quality and character. This, that they may sense the direction of their voices. If the cast is numerous, all the more swiftly the announcer must work, to clear out the jazz band who have finished their broadcasting, and noiselessly move away the music-stands and chairs, to make room for the blind actors. Thirty seconds silence only!

The gentle sightless ones are a restful contrast to the dynamic jazzites. But next on the program follows a lame soprano with a timid, small voice of which she is so pitifully conscious when deprived of the natural vibrations and overtones when before the nicely placed microphone in a sound-blotting room, she is not unlike a drowning person by reckless instinct. The announcer has made his announcement, possibly in a foreign language with which he is not very familiar, maybe in one of the Scandinavian tongues, he is accompanying the frightened singer at the pianoforte. Out of the corner of his rigid eye, as he perhaps reads a tricky accompaniment at sight, he sees the singer make a sudden grab for the none-too-steady tall wooden standard on which the microphone is placed, to drag it closer to her so she'll feel more at home or so her poor little voice will! To explain to the layman the sensitive construction of the $200 microphone would be farther out of the grasp of the announcer's understanding than this situation. Moving a microphone when it is transmitting sound causes a noise through the loud speakers or ear phones comparable only to the crack of doom. Just as thoughtlessly as the poor little lame girl grabbed the mike did the accompanist-announcer cut the melody in the right hand just long enough to slap smartly the singer's offending member. This was, in truth, tit for tat with no hard feelings unless it had chanced to be on the part of the listener-in.

On the Promise of To-morrow

What the announcer will be metamorphosed into, not even so sagacious a man as Mr. Hoover can foretell. Whether it will be into a "Mr. Talkinghorn," a grand, central announcer, a formal head butler in the salon of ethereal music, or into a cultivated, distinguished lady—who knows? Until then, despite his trials and tribulations, it is easy to keep "that pleasant voice."

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