APRIL 17 1926 15 CENTS

RADIO WORLD

Vol. 9. No. 4. ILLUSTRATED Every Week

THE NEW 1-DIAL 5-TUBE POWERTONE

SMOOTHING OUT CONTROL OF TICKLER

A NEW METHOD OF POWER BOOSTING

How to Build a 5-Tube Super-Heterodyne Set

CODE OF ETIQUETTE FOR LISTENERS-IN

THE UTMOST IN CONVENIENCE!—A switch in a box, secured to the floor, under the table permits Milady to turn the set on or off with no more movement or effort than summoning the maid. (Hayden)

RESULTS

Readers report on their experiences with sets built from hookups published in RADIO WORLD. *Address Results Editor,* RADIO WORLD, 145 *West 45th Street, New York City, and send photographs of sets, if possible.*

RESULTS EDITOR:

Using the article that appeared in the November 21 issue of the RADIO WORLD, I have constructed the 8-tube DX Super-Heterodyne. I wish to state that for distance, selectiveness, volume and clearness of tone, it has everything beat that I have heard so far, and I have heard some of the highest priced sets.

In this construction I have used the twin .0005 mfd. condensers, manufactured by the General Radio Company; one .0005 mfd. condenser manufactured by the Marco Co. the intermediate frequency in-put transformer and the three intermediate transformers are of the Remler 610 and 600 type, while the oscillator is the Remler 620 coupling unit. The coils used are the General Radio 277-D with the two additional turns added to the secondary as recommended by the manufacturers.

California, Texas, Florida, Cuba, Canada and Atlantic City stations come singing in strong over the loud speaker, without the slightest distortion, be the note high or low. The words are not yet coined, that can express the pleasure in listening to such reproduction.

LESTER C. GELSON.
Castle Shannon, Pa.

* * *

RESULTS EDITOR:

I have been a steady reader of RADIO WORLD and must say that it is a real magazine for the radio experimenter. I have constructed the 1-Tube Loud Boy receiver described by Herman Bernard, in the Feb. 6 issue. Using only one tube, which is of the 99-type, I am consistently receiving stations 50 miles distant on the loudspeaker. I am surrounded on three sides by high tension power lines, but still all the Chicago stations come in on the loudspeaker. All the connections were brought directly to the posts. This did away with soldering.

GEORGE A. WOLFORD,
660 Mott Ave.,
Waukegan, Ill.

* * *

RESULTS EDITOR:

I have recently completed the 4-Tube Amsco-Aero Receiver, described by Herbert E. Hayden in the Nov. 14 and 21 issues of RADIO WORLD and it is without question the greatest receiver that I have ever seen. The readings on both dials always are alike. I have received stations located in every portion of the country. The selectivity is all that could be desired of any receiver. I live about 2½ miles from stations KSD, WIL and WSBF and find it very easy to tune in distant stations. All the stations are heard on the loudspeaker with plenty of volume to spare.

I wish to thank Mr. Hayden for the designing of this remarkable set.

DR. R. J. THOGMORTON,
4049a Botanical,
St. Louis, Mo.

* * *

RESULTS EDITOR:

I have built the 1926 Model Diamond of the Air and am well pleased. The volume and the quality are marvelous.

J. A. McBAIN,
125 Viola St.,
St. Paul, Minn.

RADIO WORLD

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The New 1-Dial Powertone A Set With a Lot of Kick

By Capt. P. V. O'Rourke

THE electrical circuit diagram of the improved Powertone is shown in Fig. 1. In the old Powertone, fixed condensers were in shunt to the plate and negative filaments of the radio frequency and the detector, so as to obtain greater signal strength and also a higher oscillatory action for these tubes. However, it was found that when this was done unless the utmost care was taken in placing the coils. the receiver became very unstable and difficult to operate. Consequently a system of neutralization was sought, which would give the same volume as with the fixed condensers. The coil, L5, which is nothing more than a rotary coil of a simple 3-circuit tuner, when its turns were shorted and placed in conductive relation to the secondary of the interstage coupling radio frequency transformer and then varied so as to obtain the same action as if the leads of the coil were reversed, the capacities of the tubes become as if neutralized.

The volume obtained when using this method is tremendous. The amplifier portion of the circuit remains the same, e.g., one stage of transformer coupling and two stages of resistance coupling. Only one ballast resistor is used to control the filament action of the tubes. This does away with the two rheostats, with which the oscillatory action of the RF and the detector tubes was possible. A C battery is also employed. This reduces the tremendous amount of milliamperes usually drawn by the plate of the last tube, using resistance coupled amplification.

The tuning is done solely again by the double condenser, C1. This varies the capacity equally for its two sections, although there is only one motion. This is due to the common rotor. If this receiver is made with the coils, and other parts are specified, there need be no trouble about failure to get the same frequency for both sections, at a specified dial reading.

The two radio frequency coils are of the same construction and consist of the same number of turns, as in the old model Powertone, thus, the primaries, L1 and L3, consist of 10 turns; the secondaries, L2 and L4, consist of 53 turns; a 2½" diameter and 4" high tubing being used. No. 22 DCC or No. 24 S over C wire is used. The rotary or balancing coil, consists of 40 turns of No. 26 single silk covered wire, wound on a tubing 1" in diameter and 2" high. This of course is placed inside of the secondary winding of the second RFT.

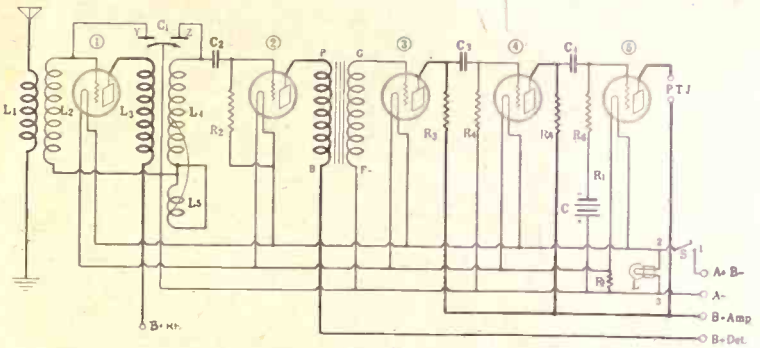


FIG. 1.

The special feature of the 1-Dial Powertone, new model, is the rotary coil connected to the secondary of the interstage coupler. This coil serves as a volume control and balancing agent, bringing out full, deep volume. The audio amplifier preserves the excellent quality of the received signal and works splendidly on horn or cone.

The panel layout is somewhat changed by the absence of both rheostats and the presence of the light switch. A 7x18" panel is employed. The shaft for the condenser is placed in the center. The shaft for the tickler knob takes the place of the rheostat controlling the filament of the detector tube. That means that this RFT is placed here also. The light switch may be placed over the center dial, or 1½" to the right of and 2" from the top of the panel. The switch is underneath the shaft of the variable condenser and ¾" from the bottom. The socket strip is mounted on angle brackets. The socket holding the RF tube is at the left, the detector socket comes next, followed by the three audio sockets, the transformer stage being first. The resistors, fixed condensers and transformer, are all mounted on the bottom. With the set face up, only the shells, the two phone tips and the antenna and the ground posts are seen.

Bring all the F plus posts together, and bring to one terminal of a filament switch and to one terminal of the filament of the pilot light, L, point 2. The other terminal of the switch (1) goes to the A plus B minus post. Bring the F minus posts of the five tubes (including the RF, detector and the three AF tubes) to one terminal of the ballast resistor, R1. Connect other terminal of resistor to one terminal of the filament light terminal of the pilot light, L, point 3, and to the A minus post. Now connect the beginning of the primary winding, L1, to the antenna post. Bring the end of this winding to the ground post. Bring the beginning of the secondary winding, L2. to the A minus post, to the common rotor of the double condenser, C1, and to one terminal of the shorted tickler winding, L5. Bring the end of the secondary winding to the stationary plates of the condenser, known as section Y and to the G post on socket 1. Bring the other staton, section Z, to the end of the secondary winding of the second RFT and to one terminal of a fixed grid condenser, C2. The other terminal of this condenser goes to the G post on socket 2 and to one terminal of a fixed leak, R2. The other terminal of this leak goes to the F plus post on the same socket. The beginning of this secondary winding, L4, goes to the same connection that the beginning of the secondary, L2, went. The beginning of the primary, L3, goes to the P post on socket 1, while the end goes to the B plus RF amplifier lead.

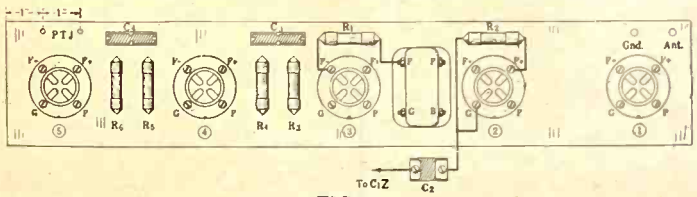


FIG. 2.

A bottom view of the subpanel or socket shelf, helpful in locating the parts. While the audio transformer is placed underneath, if a large sized one is used it will not fit in, so in that case put it on top of the shelf. Brackets support this shelf on the front panel. This diagram is ¼ scale.

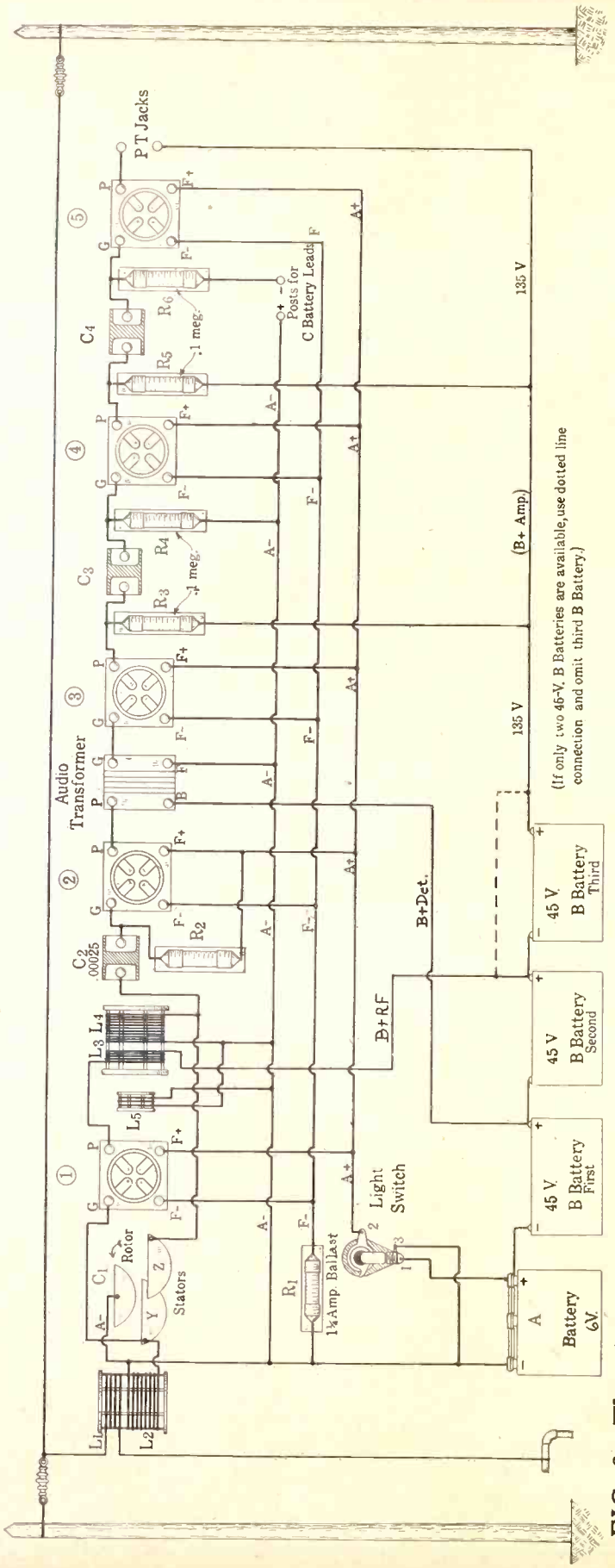


FIG. 3—The pictorial representation of the 1927 Model Powertone, a single tuning dial set, corresponds to the schematic diagram in every particular, and will be of special aid to novices.

LIST OF PARTS

One RFT, L1L2.
One 3-circuit tuner, L3L4L5.
One .001 mfd. variable condenser, two sections, each .0005 mfd., C1.
One ballast resistor, R1.
One .00025 mfd. grid condenser, C2.
One 2 megohm grid leak, R2.
Four .1 megohm resistors, R3, R4, R5, R6.
Two .006 mfd. fixed condensers, C3, C4.
One AFT.
One 4″ dial.
One pair of phone tip jacks.
One pilot light and switch, LS (Bruno).
One 2″ knob for tickler.
Five sockets.
One socket strip, 16x2½″.
One 7x18″ panel.
Two brackets.
One battery cable.
Accessories. Five storage battery tubes, one storage battery, two 45-volt B batteries or a B eliminator, one speaker, 100 feet of aerial wire, 50 feet of lead-in wire, ground clamp, cabinet, connecting wire, etc.

The P post on the AFT goes to the P post on socket 2. The B post goes to the B plus detector lead. The G post on this AFT goes to the G post on socket 3. The F post goes to the A minus post. One terminal of the fixed resistor, R3, goes to the P post on socket 3. The other terminal of this resistor goes to the B plus amplifier lead. The P post on socket 3, also goes to one terminal of the fixed condenser, C3. The other terminal of this condenser goes to the G post on socket 4 and to one terminal of the fixed resistor, R4. The other terminal of R4 goes to A minus. The P post on this socket goes to one terminal of C4 and to one terminal of R5. The other terminal of R5 goes to the B plus amplifier lead. The other terminal of the fixed condenser, C4, goes to the G post on socket 5 and to one terminal of R6. The other terminal of R6 goes to the C minus post. The plus post of this battery goes to the A minus. The P post on the last socket, 5, goes to one tip jack, while the other tip jack goes to the B plus amplifier lead.

(*Continued next week*)

GAMBY ON TOUR

Gamby, probably the only dancer in the world famous on the air, is now on tour in vaudeville with her own company. Mlle. Gambarelli appeared for several years consecutively on Broadway as the head of the ballet of a large motion picture theatre. It was while there that Roxy introduced her to radio listeners.

CAPTURING THE ENEMY

Wifey: Fancy you buying that loudspeaker! The people underneath worry us nearly to death with theirs!

Hubby: Don't worry, dear. This is it! —*Passing Show.*

NEW CRYSTAL HOLDER

Much promise is held forth for an improved crystal holder invented at the Naval Research Laboratory.

TELEVISION, HURRY UP!

It is too bad listeners may not see the gorgeous new uniforms of the Navy Band when it broadcasts from Washington.

HEADPHONES REPLACE FEZZES

The Constantinople Chamber of Commerce has decided to get into the game by purchasing wireless apparatus so that it may receive information regarding world markets.

The Power Booster Set

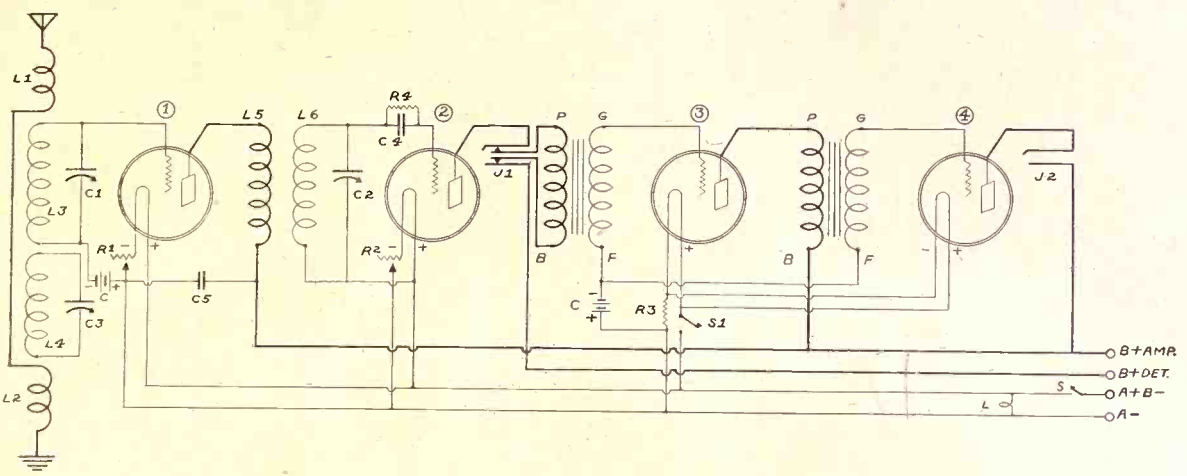


FIG. 1.

An unusual method of employing the acceptor method of tuning (C3. L4), although at first blush it looks like a rejector wavetrap, is shown above. The amplification is at least doubled and selectivity enhanced greatly. The winding L5 is an important factor in the system.

By Mary C. Drew

THE rejector wave trap, consisting of a fixed coil tuned by a variable condenser, the coil being in inductive relationship to some winding of the receiver proper, is familiar to all. But its possibilities and variances are not so well known. For instance, under certain conditions, this trap system functions as an acceptor, not as a rejector, and improves the selectivity to a marked degree, while boosting the power of the set, too. Thus even a stage of tuned radio frequency amplification preceding a non-regenerative detector tube is made to function with surprising efficiency. How this is done I shall describe.

The heart of the circuit is the tuned circuit L4C3 and the primary winding L5 of the interstage coupler. L4C3 is the seeming wave trap rejector circuit. Under ordinary conditions it would reject, but it is made to accept by virtue of the oscillatory tendency of the radio frequency tubes, particularly tube 1. It delivers current, instead of extracting it. A detector tube may be rated as a radio frequency tube, also, since it performs both functions.

The Power Booster Coil

The coil system, L1L2L3L4, consists of windings put on a form in the order suggested in Fig. 1. For instance, if you take a 3½" diameter form, 6" long, you wind the coil as follows: Using No. 24 double cotton covered wire throughout, leave a 1" space from top. Put on 47 turns for L3. Terminate the beginning and the end of the winding. Allow a foot or so excess wire for connections to the set in every case. Now leave ¼" space and start winding the other large coil, L4. This, although tuned by a condenser of the same capacity as C1, must have more turns than L3, hence for L4 put on 55 turns. Now go back to the 1" space, and drill an insertion hole for the primary wire you are about to put on. This hole will be ¼" away from the beginning of L3, the first coil you wound. Thread five feet of wire through, from the inside of the form, so that the wire passed through the hole may be wound on the form. As you are moving upward, whereas formerly you were moving downward in the wiring, put the wire on in the opposite direction. so that the net result will be that all windings are in the same direction. This may be determined easily by assuming that the wire terminals are arrows. The like terminals, for instance, the top ones, of all coils should point in the same direction, and so will the bottom terminals, of course. The only proviso is that the terminals must be on the same side of the circumference, and this will be so, since only unit number of turns is used. Drill two anchorage holes for L1.

Now unravel 5 feet of wire and cut the wire from the spool. Bring the wire that represents the end of L1, the 5-foot coil already wound, straight down to ¼" from the end of L4, drill a hole, thread through and wind the remaining stretch of wire on the form. Anchor the new terminal. The more important coil is now complete, with L1 at top, L3 adjoining it, L4, the power booster coil, only the winding is physically separated, so that half of it is at top of coil and half at bottom. The connection or continuation is made through the inside of the form, called the core.

The Other Coil

The only other radio coil in the circuit is L5L6. If .0005 mfd. is used for C2, then on a 3½" diameter put 47 turns of No. 24 double cotton covered wire for L6.

LIST OF PARTS

One power booster coil, L1L3L4L2.
One tuned radio frequency transformer, L5L6.
Two audio frequency transformers, PBGF.
Two 30-ohm rheostats, R1, R2.
One No. 112 Amperite, R3.
One light switch, LS.
One push-pull switch, S1.
One double circuit jack, J1.
One single circuit jack, J2.
One .00025 mfd. fixed grid condenser, C4.
One grid leak, 2 to 9 meg., R4.
Three .0005 mfd. variable condensers, C1, C2, C3.
One 7x21" panel.
One 7x20" baseboard.
Three 4" vernier dials.
One 1.0 mfd. fixed condenser, C5.

The number of turns on L5 can not be definitely given so as to assure utmost satisfaction in all instances. Experiment is advisable. The number of turns must be greater than the conventional 8 or 10-turn primary, hence it is suggested that 14 turns be used here, and that the separation between L5 and L6, instead of being the usual ¼", be nearer ½". For utter ease of arriving at the correct number of turns for L5 it is suggested that a ½" separation be maintained, as outlined, and that the 14 turns be put on, so that turns may be taken off at the end where this may be done without affecting the separation between the two windings. The sole determining factor is the result in terms of efficiency, hence no one need hesitate removing turns, as occasion demands, even unto reaching the 12 or 10-turn primary if necessary.

Points of Interest

Two interesting points in reference to this hookup are that the coils in the radio circuit need not be placed at any sacred angle, but may be in parallel formation, although preferably not close together, and also that the method of connection of L5 is often vital. Hence if instability develops, simply reverse the connections to L5.

It seems hardly probable that instability will trouble any one who builds this receiver, beause the very idea of the power booster, the goal that Herman Bernard sought in designing it, was to afford a very satisfactory control of the stability of a receiver. The system works out beautifully with one stage of RF, as diagrammed, and the selectivity is all sufficient for the most exacting conditions, such as those existing in the Borough of Manhattan. I have been using this set in my apartment on Park Avenue, with WJZ, WHN, WLWL, WMSG, WRNY, WBNY and other stations close by, in fact almost radio neighbors of mine, and I am not troubled with interference. If you get it working properly, that is, in acceptor style, I assure you that you will have a wonderful receiver. And to make it work that way requires no further information than what I have imparted so far.

As for the theory of the power booster

(*Concluded on page 15*)

A 5-Tube Super Receiver

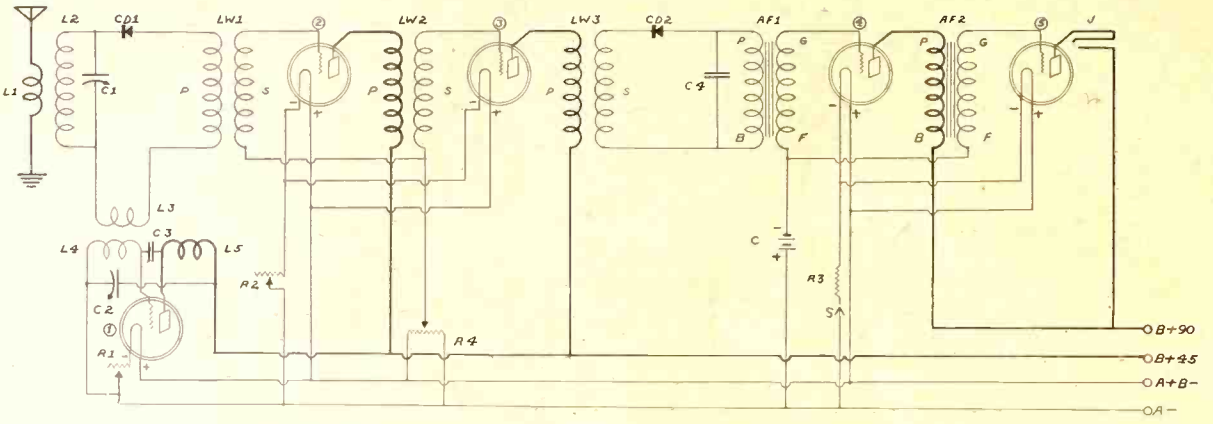


FIG 1.
THE schematic diagram of the 5-tube Super-Heterodyne.

By Jasper Jellicoe

UNTIL very recently the answer to the popular query regarding the type of receiver at home, was, "I have a 5-tube set." The exact type of receiver was not asked. However, the trend is to cite the specific type. If you have a 5-tube set it may be even a Super-Heterodyne. Such a circuit is shown in Fig. 1. Crystal detectors are employed as first and the second detectors. The coupled Hartley oscillator system is used to produce the oscillations for beating the incoming frequency. There are only two major controls. These are the variable condensers, C1 and C2. A rheostat, R1, is employed to control the temperature of the filament of the oscillator tube. One rheostat, R2, is used to control the filament temperature of the two intermediate frequency amplifiers. The filaments of the amplifier tubes are controlled by the automatic ballast resistor, R3. A potentiometer, R4. is connected with movable arm to the grid returns of the two intermediate amplifiers, to divide the voltage or bias. Transformer coupled audio frequency amplification is used.

Coil Winding

The primary of the antenna coil, L1, consists of 10 turns, wound on a tubing 3½" in diameter. The secondary of this same coil, L2, consists of 45 turns, wound on the same tubing, with a ⅛" separation between the two windings. No. 22 or 24 double cotton covered wire is used. The primary of the oscillator coil, L3, consists of 10 turns. This is also wound on a tubing 3¼" in diameter. Now the grid and the plate windings, L4 and L5 respectively, are really like the secondary winding of an antenna tuner. The turns are 45. The grid part, L4, consists of 30 turns. The plate coil, L5, is made up of the other 15 turns. The two windings are separate, with a fixed condenser between. The long wave (abbreviated LW) transformers are of the standard make. Fixed crystal detectors may be used.

The entire set may be housed in a cabinet 7x21". The sockets, transformers and crystal detectors (if not the panel mounting type), may be either mounted on a socket strip or on a baseboard. If the baseboard is used, it should be 20" long and 6" wide. If the strip is to be used, it should be 20" long and about 2½" wide. The two variable condensers should be mounted on the opposite portions of the panels, with the two rheostats and potentiometer lined up in the center in the same line as the shafts of the condensers. The switch, S, should be placed in exactly the center and about 1½" from the bottom (depending upon the portion used for the placing of the board or strip). The jack should be placed in the right hand corner of the panel.

Hooking up the Receiver

First wire the filament circuits. All the F plus posts on the sockets are connected together. This common lead goes to the A plus B minus post on a terminal strip. One terminal of the potentiometer, R4, carrying the resistance wire, goes to this A plus lead. The resistance terminal of R1 goes to the F minus post on socket 1. The resistance terminal of R2, goes to the F minus posts on sockets 2 and 3. The arms of both these rheostats are connected together. These go to the left-off resistance terminal of R4, the potentiometer, to the C plus terminal, to one terminal of the switch and to the A minus post on a terminal strip. The F minus posts of sockets. 4 and 5, are connected together and also to one terminal of a ballast resistor, R3. The other terminal of the ballast resistor, R3, goes to the other terminal of the switch. The successive circuits beginning with that of the antenna are now wired up. The beginning of the primary, L1, in the antenna coil, goes to the antenna post. The end of this coil goes to the ground. The beginning of the secondary winding, L2, goes to the variable plates of C1 and to the beginning of the primary of the oscillator coil, L3. The end of this coil goes to the B plus post on LW1. The P post on LW1, goes to the high potential point of the crystal detector, CD1. The low potential side of the detector goes to the end of the secondary winding, L2 and to the stationary plates of the variable condenser, C1. The beginning of L4, the grid winding, goes to the variable plates of the condenser, C2, and to the arm of the rheostat, R1. The beginning of this coil goes to the G post on socket 1 and to one terminal of a fixed condenser C3. The other terminal of this fixed condenser goes to the beginning of the plate winding, L5. The end of this winding goes to the stationary plates of C2 and to the B plus 45 volt post. The G post on LW1, goes to the G post on socket 2. The F minus post, here, goes to the F minus post on LW2 and to the middle post on the potentiometer, R4, making contact with the arm.

The P post on LW2, goes to the P post on socket 2. The B+ post on LW2 goes to the B plus 45 volt post. The G post on LW2 goes to the G post on socket 3. The P post on LW3 goes to the P post on socket 3. The B plus post goes to the B plus 45 volt post. The G post on LW3, goes to the low potential side of the crystal detector. The high potential side of the crystal detector goes to the P post on AF1 and to one terminal of the fixed condenser, C4. The B plus post on LW3, goes to the B plus on AF1. The G post on this AFT goes to the G post on socket 4. The F minus post goes to the minus of the C battery. The F minus post of AF2 also goes to this same point. The P post on AF2 goes to the P post on socket 4. The B plus post on this AFT goes to the B plus 90 volts post. The G post on AF2, goes to the G post on socket 5. The P post on socket 5, goes to the top terminal of a single circuit jack. The bottom terminal of this jack goes to the B plus 90 volt post. You will note that the plates of the two AF tubes receive 90 volts, while the plates of the oscillator and the intermediate tubes receive 45 volts. The C battery should be of the 4.5 volt type.

If the intermediate transformers are of the shielded type, then they may be placed parallel to each other. Otherwise place them at right angles. The oscillator coils should be paced at right angles to the antenna coil.

LIST OF PARTS

One antenna coil, L1L2.
One special oscillator coil, L3L4L5.
Two .0005 mfd. variable condensers, C1C2.
Two crystal detectors, CD1, CD2.
Three medium frequency transformers, LW1, LW2, LW3.
One .006 mfd. fixed condenser, C3.
One 6 ohm, ¼ ampere rheostat, R1.
One 6 ohm, ½ ampere rheostat, R2.
One 400 ohm potentiometer, R4.
One ½ ampere ballast resistor, R3.
The low ratio AFT.
One .001 mfd. fixed condenser.
One switch.
Five sockets.
One 7x24" panel and cabinet.
Two 4" dials.
One terminal strip.
One baseboard or strip as per text.
Accessories: Connecting wire, five tubes, A, B and C batteries, etc.

Smoothing Out the Tickler

By Jackson Lee

SOMETIMES a fan builds a set with a stage of tuned radio frequency amplification ahead of a regenerative detector and finds that the tickler is critical, extremely so. It should not be, but it is. The reason may lie in poor judgment or lack of knowledge or care, resulting in high potential leads running close together or parallel to one another, e.g., grid and plate leads. Maybe, besides, the fan has a tickler coil with too many turns of wire on it. The tickler should have only enough turns to produce regeneration on the highest broadcast wavelength, or, even up to 555 meters. In that way the tickler construction is generous to the feedback adjustment for the lower wavelength levels, and the coil may be relied upon to produce regeneration at any wavelength lower than any other wavelength on which it produces feedback. A wider dial separation for feedback on the lower waves is thus enjoyed, and it is a distinct advantage.

Help From a Dial

One point not often raised is that any existing set, where one finds the tickler is too confined in its dial settings, that is, covers the feedback for all useful frequencies over only 10 or 20 degrees of the dial, is the cure of this crowding by using a dial ordinarily designed to convert a semi-circular plate condenser into straight line frequency tuning characteristics. This serves convenience, in giving one more room on the dial in which to work, and it may be regarded as alleviative of the critical condition.

A simple method of smoothing out regeneration control, which works well in many sets, is that shown in Fig. 1. There regeneration really takes place in two tubes, but in a manner that abstracts the "untunability" usually attaching to such a circuit. It is not to be supposed, from this statement, that more distance will be received. Indeed, the better practice is to have a nonregenerative tuned RF stage, and put the regeneration only in the detector tube. But the fact taken for granted is that a fan has run into some trouble with this and wants to remedy it.

In Fig. 1 you see the tickler coil T feeding back into the secondary L2 of the radio frequency transformer. The feedback is not from the radio frequency tube but from the plate of the detector tube. The radio current undergoes a phase change by virtue of this skip method of feedback. Remember that the 3-circuit coil L1L2T comes first, despite T being connected to detector plate.

Change Coils About

To make the change it is necessary to remove the coils from their present position, as they change places. That is, the 3-circuit tuner is placed first, at left, as you look at the panel or baseboard front, and, following the first tuning condenser, C1, comes the radio frequency transformer, which previously was first. The primary and secondary of the 3-circuit tuner (L1 and L2) are connected respectively to aerial ground, grid and negative filament. The primary L3 of the radio frequency transformer goes to plate and B plus amplifier, while the secondary L4 is connected to one side of the grid condenser, C3, and to positive A battery. Of course the tuning condensers, C1 and C2, are connected across the respective secondaries, with stator plates to the grid side of the secondary in each instance. The tickler coil is wired with one terminal to the plate of the detector tube and the other to B plus detector voltage. The amplifier B voltage may be 90, with not more than 4½ volts negative bias on the audio grids, while the detector voltage may be any voltage that suits your taste best, although normally 45 is to be recommended for best volume.

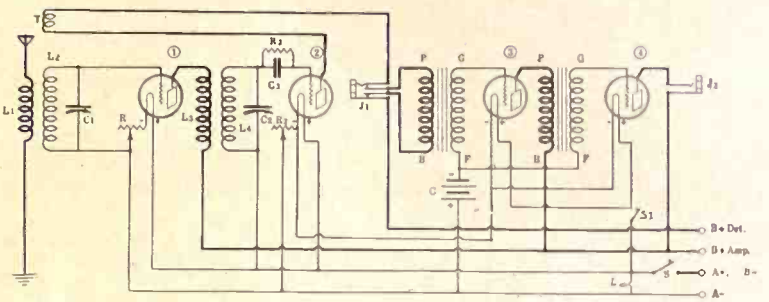


FIG. 1.
THE TICKLER COIL is used in both the radio frequency and detector stages by the method shown in the diagram. The method is a departure from the conventional in hookups, and is suggested by the author as a means of remedying critical tickler adjustment.

Wiring Details

The rest of the wiring is orthodox. LS is a light switch, in which a Mazda or other flashlight bulb is inserted, so that the light shines through the facets of a red "jewel" that is a part of the panel-mounted switch. This particular switch is the master one and if any tubes are alight, the red signal will be there. Turn off the tubes and the switch light goes out. The other switch, S1, is a toggle or push-pull switch, also panel mounted, which turns out the audio tubes, in case you want to listen in only on the earphones from the detector output. T

The tubes are (1), radio frequency; (2), detector; (3), first audio and (4), second audio.

Those who desire to build the set de novo may care to wind their own coils, although commercial coils are to be preferred. Using two forms, each 3½" diameter and 3" or so high, the primaries and secondaries are wound alike. L3 has 8 turns of No. 24 double cotton covered wire. Terminate this winding. Leave ¼" space and wind the secondary, L4, which consists of 47 turns of the same kind of wire, wound in the same direction. This completes the radio frequency transformer. For the 3-circuit coil, L1L2T, repeat the process, and remember that a shaft has to go through the secondary, and must be attached to the third coil in this unit, the tickler T, to rotate it, and this shaft must extend through the panel. T is wound on a 2¾" or somewhat smaller diameter, and if the same size and kind of wire is used, may comprise 38 turns. The secondaries are for .0005 mfd. condensers. For .00035 add 10 turns. Smaller wire may be used, if desired.

DX and Tuning Out Local Delight Victoreen Fan

Several weeks ago Leo Fenway, designer of the Fenway, a 9-tube Super-Heterodyne, with 4-tube option, in a sporting spirit asked readers of RADIO WORLD to compare results obtained from the Fenway with those obtained from the Victoreen, an 8-tube Super-Heterodyne of entirely different design. His request was published in RADIO WORLD and evoked many replies. One of them was a prompt acceptance of the challenge by George W. Walker himself, Mr. Walker being the manufacturer behind the Victoreen. Some time was permitted to elapse so that a genuine survey of the field would result. More letters were received boosting the Victoreen than the Fenway, while few gave actual comparison of the two since few possess both sets. Here is one letter from a Victoreen fan. Others from Victoreen and Fenway fans will be published soon.

Editor RADIO WORLD,

The challenge of Mr. Leo Fenway to determine the most popular radio, in issue of Feb. 27, has been noticed.

I want to cast my vote for my Victoreen 8.

During the International Test Week I brought in Bournemouth, Eng.; Madrid, Spain, Stuttgart, Germany, and Lima, Peru, each of which has been officially verified and I have my certificate of audition from authorized judges.

Naturally I am proud of having accomplished what so many failed to do. To accomplish what others gave up as impossible is always pleasing.

But there are other features of the Victoreen which I consider even more pleasing. On ten consecutive nights I heard Mexico City and then failed on the eleventh because of a violent thunder storm. Havana, Cuba, is as easy to bring in as Chicago; Denver is local to me. Stations in Florida, Texas, New Orleans, Atlanta, New York, Boston, etc., come booming in with ample power and without distortion.

My set is located less than a mile from the powerful KMOX, "The Voice of St. Louis." I have no trouble in tuning out this station and bringing in great distances without the semblance of interference.

A street car booster station is only 200 feet distant and two heavy duty lines are 40 feet away. This causes interference, but the "Victoreen" overcomes all this.

My set logs so perfectly that I use a chart of kilocycles only. Opposite each ten kilocycles I have marked the dial settings.

FRANK E. GOODWIN,
Editor, Messenger Newspaper League,
Kirkwood, Mo.

The Action of Transformers

By Lewis Winner

Associate, Institute of Radio Engineers

ONE of the most interesting subjects in the study of alternating current and its branches is that of transformers. It should be remembered that the transformers employed in the radio and audio frequency circuits are styled upon the same fundamental principles as the power transformers that will be discussed. A transformer is a device made up usually of two windings, wound upon a core, except for radio frequency, when a core is not used.

Suppose we place a conductor in a magnetic field and move it about. We find that an electromotive force is induced. This can be told by the use of a small galvanometer in series with the conductor, where a deflection of the needle will be noted. Now, if we rotate a simple coil in a field which has no variations, in such a way that lines of force surrounding the coil have a tendency to increase or decrease, an electromotive force is also induced. This varies according to the rate of change of the total amount of magnetic lines. By some very simple experiments the induction of the currents, by the aid of magnetic fields going in and out of a coil, can be determined. Connect a coil in shunt to an instrument that measures very small quantities, such as a galvanometer. Place a permanent magnet bar through the windings of the coil. The needle in the galvanometer will deflect.

Deflection and Otherwise

As long as the bar is kept still in the coil there will be no deflection noted. However, as soon as the bar is taken out, the needle in the meter will deflect in the opposite direction. This of course shows that when the flux cuts through a coil, a current is induced also. As the current changes from one direction to the other, so does the flux reverse its action. However in this case, the bar has to be removed and then put back again, in order to get a reversal of voltage. So let us place this same winding in series with a key and a battery of cells, in magnetic relation to a winding having a greater number of turns than on the coil with the bar through its center. In shunt with the larger coil, not the one with the bar through it, place a sensitive meter. Now, as soon as you press the key you will note a slight deflection of the meter. This is caused by he lines of force expanding from the coil with the magnet and weaving through the winding with the larger amount of turns. Leaving the key closed gives no deflection of the meter, but as soon as the key is opened, the needle deflects in the oposite direction. This is the same as that which took place in the first experiment. Now, if the source of current is such that it alternates back and forth in the same manner as the open and closing action of the key, the lines of force about the larger winding will rise and fall. The current then moves about in this winding. With a smaller winding in the input and a greater winding in the output, a consequent step up of the impressed voltage will be obtained. The voltage cannot be stepped up or down unless the input winding is cut by current that is alternating, pulsating or of a direct interrupted character. Every power transformer consists of a primary winding, secondary winding, and a core of laminations of iron, etc. The ratio of the current in the secondary winding to that in the primary winding is equal to the ratio between the number of turns in the secondary and the number in the primary. There are three types of transformers commonly used in power work: (1), open core; (2), closed core, and (3), auto-transformer.

What They Are

The open core transformer type has to do with constant current transformers. These are used for lighting of the street lamps, etc. The core consists of a bundle of soft Swedish iron. This is covered with several layers of insulating material. Over this the primary winding is placed. This consists of several layers of heavy wire, usually the No. 14 bare copper type. Over this winding a tubing is placed. Then the secondary is wound, consisting of six or seven layers, wound in pan-cake style. Each layer consists of several thousands of turns of wire. Most of these are made with movable secondary coils, so that a constant current at various voltages can be supplied to the line. The core is so made; as previously described, as to keep the secondary away from the primary. A counterweight is attached to the secondary windings. This is so made that a balance is at hand, when the current is at the correct value. If the ratio of the impressed emf to the current, which is made in the secondary winding, should slip, the current would rise for that time above the value at which it is supposed to be. The secondary coil will then move away from the primary. This is caused by the action of the pulley. This lowers the emf force induced in the secondary coil. The current then falls to its normal value.

The constant voltage transformer will be now discussed. Here the alternating current is impressed upon the primary winding. This magnetizes the core at certain periods. A flux, which is varying according to the alternations of current impressed, then flows through the core. By mutual induction an electromotive force is induced into the secondary winding. The current flowing in the secondary circuit, is opposite to that flowing in the primary circuit. As this current increases, a magnetic field is set up which acts in total opposition to that present in the core. The self-induction of the primary winding is also reduced by this action. This permits more current to flow in the primary winding. In this way, a rise in the secondary current causes a rise in the primary current, thereby balancing the input current with that of the output.

"The term ideal transformer," says Eric Hausmann, E.E., Sc.D., in his book on Dynamo Electric Machinery, "may be applied to one possessing neither hysteresis and eddy current losses in the core, nor ohmic resistance in the windings and having all the flux set up by the primary link with the secondary also."

Resistance, Reactance, Impedance

The flow of a direct current through a stated circuit is only opposed by plain ohmic resistance. However, when dealing with alternating current, an entirely different proposition is met. The flow is held back by the counter-electromotive force of the self-induction of the wire, as well as by plain resistance. This extra resistance of self-induction is commonly known as reactance. However, the combined opposition of the resistance and the reactance of this circuit is commonly known as impedance. The flow of current is governed by the impedance, as well as the ohmic resistance. When inductance is present, in the circuit, the reactive pressure predominating, inductive reactance is present.

The impedance of the usual windings is very high. This is due to the high inductive reactance and small resistance.

Ready for Polar Talk

E. A. BROWN, Chief Operator at station 2CV, Richmond Hill, N. Y., at the apparatus, with which he will pick up and relay messages received from the Navy Arctic Expedition, being headed by Lieut. Commander Byrd. The transmitter will also send messages to the fliers in the far North. (International Newsreel).

Wrapper of the Panel Makes a Good Template

MARKING THE cover of the panel.

Most panels, when purchased, are enclosed in a heavy manila cover. These covers can be used as templates. The material to be placed on the panel is put on the cover, as if it were the panel. All the marking are then made. The panel is then mounted and points registered on the panel, through the paper, using a scriber. In this way danger of defacing the panel by erroneous markings is avoided. Also, the covering provides a rougher surface than the panel itself. This prevents slipping of the pencil, enabling more exact markings. A punch or the needle point of a pair of dividers also may be used for transcribing the markings from the cover to the panel.

A Neutralized TRF Set

By Ben Aplin

TO neutralize a stage of tuned radio frequency amplification, grid-to-grid method, is difficult for some home constructors. The method shown in Fig. 1 does the trick more handily. The first thing that is done is to place a neutralizing condenser between the grid post of the RF tube and the end of the plate or primary winding (L3) of the tuner. This primary winding is tapped at the midpoint, which lead goes to the B plus 135-volt terminal.

BEN APLIN

A tapped primary L1 is for the antenna system as a means of increasing or decreasing the selectivity of the set as well as affecting the degree of wave length response for volume reasons. A 3-circuit tuner is employed in the detector circuit. No rheostats are employed to regulate the filaments of the tubes. This is taken care of by the automatic ballast resistors. Auto-transformers are employed in the audio-frequency amplifying portion of the circuit. These assure fine quality of amplification. With the first tube acting as a radio-frequency amplifier only, the second tube as a regenerative detector and the three tubes in the stages of AF a good receiver is the result. It is patterned after "Radio Broadcast's" Aristocrat.

The coils are a radio frequency transformer, with tapped primary (L1L2) and a 3-circuit tuner (L3L4L5) with tapped primary.

They are for tuning with two .0005 mfd. condensers, and the Sickles pair of Aristocrat coils are shown.

Wiring Data

Only the wiring of the detector and the RF tubes will be discussed, as the wiring of the AF stages is standard.

The beginning of the primary, L1, goes to the antenna post. The end of this winding goes to the ground post and to the arm switch. The tapped windings go to the various taps on the switch. Either a switch arm as shown in the photographs, with the taps enclosed, or a switch with the taps on the outside of the panel may be employed. The beginning of the secondary winding, L2, goes to the variable plates of the condenser, C1, and to a C minus post. The end of this winding goes to the stationary plates of the same condenser to the G post on the first socket and to the stationary plates of a midget neutralizing condenser. The variable plates of the condenser N go to the end of the primary winding, L3, 3. The beginning of this winding (5) goes to the P post on the first socket. The tapped portion of this winding goes to the B plus 135 volt post on the strip. It also may go to a terminal of a fixed condenser, C5, while the other terminal of the condenser may go to the A minus B minus post on the strip. The beginning of the secondary winding, L4, 6, goes to the variable plates of the condenser, C2, and to the F plus post on the second socket. Point 7 goes to leak and condenser.

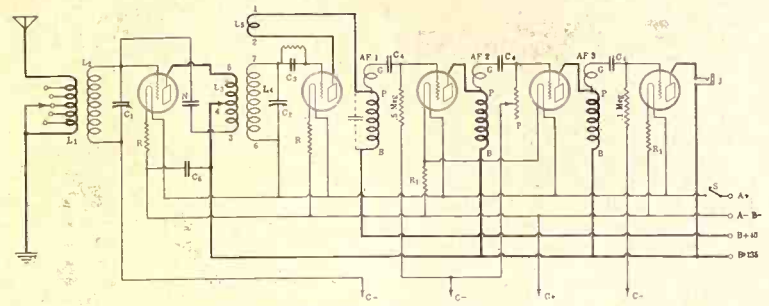


FIG. 1, showing the wiring of the receiver.

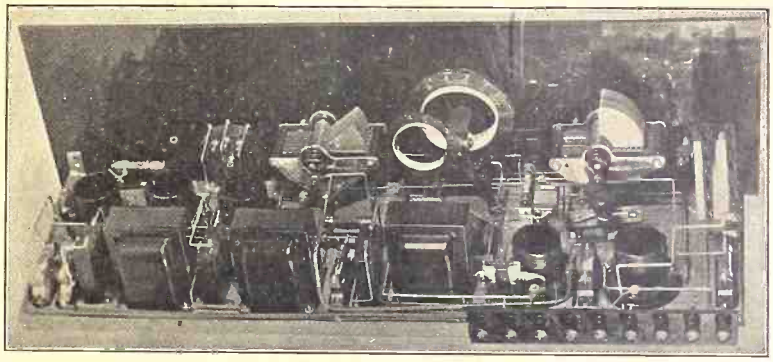


FIG. 2, showing the back view of the receiver.

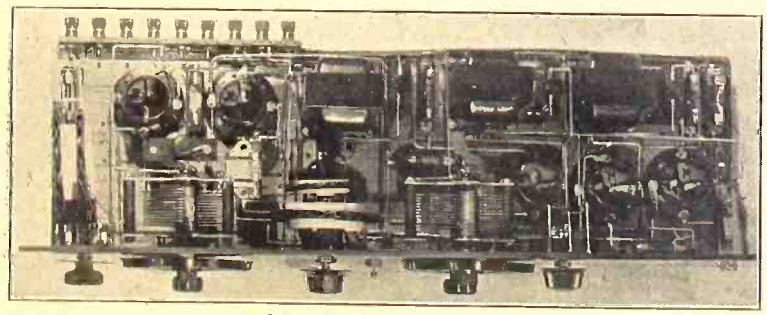


FIG. 3, looking down on the set.

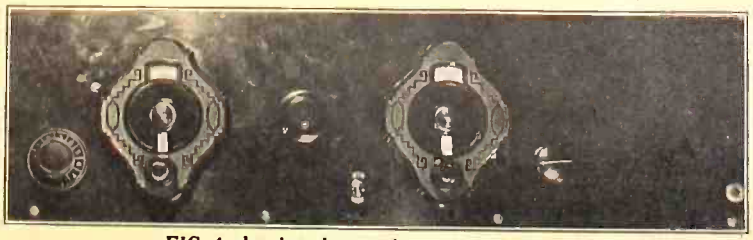


FIG. 4, showing the panel view. (Photo by Hayden).

LIST OF PARTS

One TRFT with a tapped primary, L1L2.
One 3-circuit tuner, L3L4L5.
Two .0005 mfd. variable condensers, C1C2.
Three Thordarson Autoformers, AF1, AF2, AF3.
Two ¼ ampere ballast resistors, R.
Two ½ ampere ballast resistors, R1 (for power tube in last stage).
One midget variable condenser, N.
Three .25 mfd. fixed condensers, C4.
One .001 mfd. fixed condenser, C5.
One .0005 mfd. fixed condenser (across P and B of AF1), optional.
One .5 megohm grid leak.
One .1 megohm fixed resistor.
One Centralab 500,000 ohm variable resistor, P.
One .00025 mfd. fixed grid condenser, C3.
One 2 megohm grid leak.
Five sockets.
One tickler knob.
Two dials.
One tap switch.
One filament switch.
One 7x24" panel.
One 6 x 23" baseboard.
One terminal strip.
One single circuit jack.
Accessories: A, B and C batteries, four 01A type tubes, one 112 tube, screws, nuts, connecting wire, etc.

Wiring the Portable Set

FIG. 5.
The rear view of the portable receiver.

[The following is the third article on the construction of the Bernard portable, an 8-tube Super-Heterodyne. Part I was published in the April 3 issue. Part II appeared April 10. Next week details on trouble shooting and operation will be discussed.]

By Herman Bernard

Associate, Institute of Radio Engineers

IN the construction of the Bernard Portable, or any other set encompassed in small space, the panel layout determines to some extent the layout of other parts, and if not taken care of properly will lead to considerable trouble. The following panel directions, and none other, must be followed.

The rheostat is on a midline, 9" from either side of the 18" panel. The central shaft of the rheostat is exactly 2" up from the bottom. The condenser shafts are 4½" from left and right respectively. If constructional details are followed exactly all the way through, unless a suggestion is accepted which will be presented later, these three parts are all that appear in any form on the panel. The holes for mounting the panel to the baseboard may well be four, 3" apart.

Baseboard Layout

In laying out the baseboard these special precautions are vital: The three Meloformers (audio frequency transformers) must have the circumference of their bases no less and no more than ½" from the back of a 7½" wide baseboard. The first two medium frequency transformers (MF1, MF2) must be mounted so that their bases are just flush with the rear of the baseboard. This means the line farthest from the panel.

The necessity for these precautions on the baseboard is that the General Radio condensers are provided with counterweights, and if the proper space is not allowed the counterweights would hit two tubes, if the —01A type is used. In any case, the receiver must be sufficiently flexible to allow room for the larger tubes. Remember the point stressed in a previous instalment, that if the interchangeable option is desired a rheostat must be used that will pass 2 amperes, at least, and not heat up. The Centralab will just about do that, without serious overheating, but if a power tube with double the usual .25 ampere drain is used in the last stage, when the set is modified for home use, the 2¼ ampere drain would be too heavy for that rheostat, and the General Radio type should then be used instead.

The Front

We will now change our position, figuratively speaking, and assume we are laying out the baseboard with the panel part farther away from us, and the back of the baseboard nearer us, so that when we say "front" we mean the plane nearer us, and when we say "back" we mean the plane at the subsequent joint of the panel to the baseboard.

The panel mounting to the baseboard should be deferred until later, to allow free and easy movement in establishing the baseboard parts in their proper positions, and for most of the wiring.

First mount the audio transformers. As Meloformers are used, because of their small size and the efficiency of their flux, due to a new solid core, we find we have three mounting holes on each of the bases. These are triangularly located. Mount the transformers so that the B plus posts are at right front. This automatically locates the P posts at right rear, the G posts at left rear and the F posts at left front. Remember that front really means the back of the baseboard!

Take the left-hand audio transformer (AF3). One mounting screw is toward the front, the others on the side, at rear. This front screw is 1¼" to the right of the 17" wide baseboard, and its center just a trifle less than ¾" back. The other audio transformers, second (AF2) and first (AF1) stages, are placed on a line with the first one, left to right, and with 3/16" separation between the circumference of the bases.

Tips, Sockets, Transformers

Next locate the speaker output, consisting of phone tip jacks. Usually only the jacks are procurable, so cut a piece of hard rubber, 2½" wide by 1" high, and mount on the baseboard with angle irons with ½" arms. Two such brass or other metal angles are necessary, and the phone tip jack strip is so mounted that the tips are inserted from the front (really what will be the rear of the set). If pressed for room you may bend the phosper bronze connecting lugs of the phone tip jacks so that they turn upward. This will not be necessary, however, unless directions are ignored, or unusually large jacks employed. Those in the laboratory model were the Pacent product.

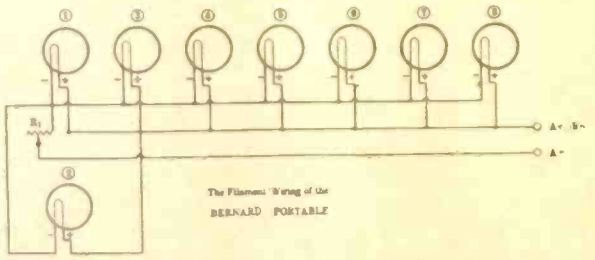
Next arrange the three audio sockets, (6), (7) and (8), each socket exactly in back of an audio transformer. The circumference of the base of the socket may touch the circumference of the base of the audio transformer behind which the socket is placed. The sockets are of the X type, the Klosner product being used. The arrow, representing the "pin" side of the tube, should point toward the front, i.e., toward you, if you are working as suggested. That puts plus to the left, minus to the right, at the rear side of the socket, while grid is at right and plate at left, at front.

The MF Channel

Now mount the first medium frequency transformer (MF1) at right, with the secondary (marked "Sec.") at left rear, and the base flush with the front of the baseboard, but not overlapping it. On this item of overlapping, be sure to take this precaution all the way through, starting with the phone tip jack strip, at left. Even the heads of the screws that bind the strip to the brass angles should not extend beyond the baseboard front line, because so many cabinets are just 7½" deep that any obstruction will cause the front panel to stick out from the intended notch or groove of the cabinet. Most cabinets, however, are 8" deep, many are 8½", but we are working on a 7½" basis, and also we may care to build a special cabinet with portability stressed.

The next medium frequency transformer (MF2) is mounted so that the U-shaped extension of the one (MF2) just barely misses touching the same corresponding extension of the other (MF1). As General Radio Type 271 medium frequency transformers are used, the reference applies only to them, and the U-pieces are the curvatures through which the mounting holes are driven. The two medium frequency transformers are mounted in line.

You now have ample room to place the filter transformer, (MF3), which is also a medium frequency amplifier coupler,



DETAIL OF WIRING of the filament circuit of the Bernard Portable. The arrangement is very simple indeed. A minus is connected to one side of the rheostat, the other side of which goes to F minus on all eight sockets. The A plus lead goes direct from battery to the F plus posts of the eight sockets. In making grid return leads to negative, be sure to distinguish between negative filament and negative A battery, as these represent different sides of the rheostat, hence different DC voltage and resultant bias on the grids.

Full Textual Directions

but larger in physical size, and sharply tuned electrically. While the others (MF1, MF2) have iron core, this one (MF3) has an air core. There is much dispute as to whether the filter should be first or last in the chain, and the only comment needed here is that if the filter is placed first the directions herewith given should be modified accordingly. Any one may consult his own preference on the filter sequence. The U-piece of the filter (MF3) almost touches that of the neighboring 271 transformer (MF2). By the way, the filter's designation is type 331.

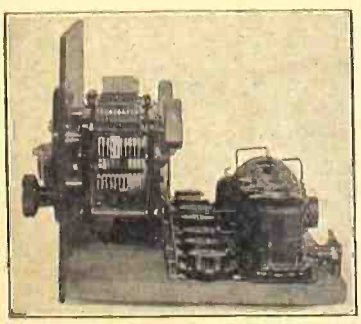
The oscillator socket (2) is located with center 7¾" from the left and 1½" from the back, with arrow pointing toward you, thus giving the same relative location of all the socket arrows.

This leaves four more sockets to mount, (1), (3), (4) and (5). The one at extreme right (1), has its central point 1⅜" from right, and is placed as close to the first medium frequency transformer as is practical. This may be determined by putting a large size tube in the socket, or may be decided empirically by locating the center 4" from the back of the baseboard, or 3½" from the plane nearer you, which is exactly the same point. Skip the second socket (3) for the moment and mount the two others (4) and (5). These are aligned with the first socket. The third socket has its center 6" from right, while the fourth socket is 8½" from right.

Now, mount the variable condensers and rheostat on the panel, if you have not done so already, and provisionally hold the panel in the position it will occupy against the baseboard. Put an —01A tube in the remaining unlocated socket (3), and so place the socket on the baseboard that the condenser shaft may be turned, when the counterweight is attached, without striking the tube. If you are to use the —99 type tubes, and have no large tube handy, mount the remaining socket out of alignment with the others by just ⅜", the socket being that much nearer you, that is, the theoretical "front." All sockets are in line except this one and the oscillator.

The Jones multi-plug is mounted between the filter and the first audio transformer, so that the eight holes face you, and this plane is just inside of the front of the baseboard.

Only the loop jacks, also of the phone tip variety, and the oscillator coil need to be mounted. The same sort of strip and angles are necessary for the loop jacks as were used for the output. This is located 1" from the back of the baseboard and with right-hand side, or "outside," only ⅜" in from the right-hand side of the baseboard. The condenser-leak combinations will be mounted as part of the wiring job.



Looking Toward the Audio Channel

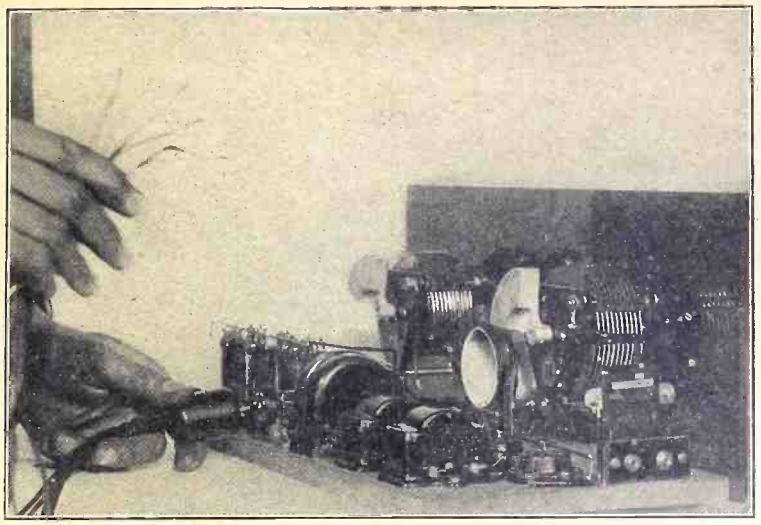


FIG. 6.

Corner view of the set, showing the manner of connecting from batteries to set. The exposed leads go to the batteries. It is impossible wrongly to connect the plug. Note the loop jacks in foreground.

The oscillator coil need not be mounted until some of the wiring has been done.

Wiring Data

Connect together the F minus posts of the sockets. Then connect together all the F plus posts of all the sockets. Connect this lead also to the red prong of the plug. Do not connect the F minus and F plus leads together. Connect the P posts of the two medium frequency transformers MF1, MF2 to the P posts of the sockets that are behind them. The P posts are not marked, but the side they are on is marked "Pri" on the transformer, so regard the post nearer you (right front) as the P post of the transformer. Connect the P posts of the audio frequency transformers, so marked, to the appropriate socket P posts. In each case this will be the socket slightly to the right of the transformer, because the P post of the final socket (last audio, extreme left) goes to a phone tip jack, so your sockets are always "one ahead" of your transformers. Connect the P of the final socket to the tip jack at left, rear. Join together the F posts of the three audio transformers and carry this lead to the green lug of the plug. Join together the B posts of the second and third audio transformers (those at left) and carry this lead to the remaining open phone tip jack for the speaker output and to the pink post of the Jones Multi-Plug. Join the B posts of the remaining transformers, the two medium frequency MF1, MF2, the filter, MF3, and the first audio, AF1, and carry this lead to the blue lug of the plug. The B posts of the medium frequency and filter transformers are at right, rear, while the B post of the first audio transformer is marked.

Join the grid-leak-condenser combination C3R2, a single Micamold unit, so that one side goes to the G post of the first socket, extreme right, and the other side goes to the rear loop jack, to which later will be connected to the stator plates of the variable condenser C1.

The G posts of the next two sockets in line, tubes (3) and (4), right to left, go to the plainly marked G posts of the medium frequency transformers nearest them, while the G post of the filter connects to one side of the second grid-leak-condenser combination, C4R3, the other side of which combination goes to the grid post of the nearest socket (5), fourth socket from right in the same line. The unconnected side of the secondary of the filter goes to A plus.

Working from right to left, the G Posts of the second and third audio sockets go to the G posts of the audio transformers that are in front of them. G of AF1 goes to G of socket (6), third from left. The open ends of the secondaries of the medium frequency transformers and, MF1, MF2, go to a lead which is joined to green lug of the plug was previously connected also to the common lead of the F posts of the three audio transformers. The A plus lead to all sockets (F+) went to the red lug of the plug.

Now place the panel against the baseboard in trial position again and locate the oscillator coil between C1, the right-hand variable condenser, and the oscillator socket. A 1½" wood screw, with a bushing between the baseboard at the coil itself, is driven into the baseboard to keep the coil in place. The hole for this was located in a previous instalment.

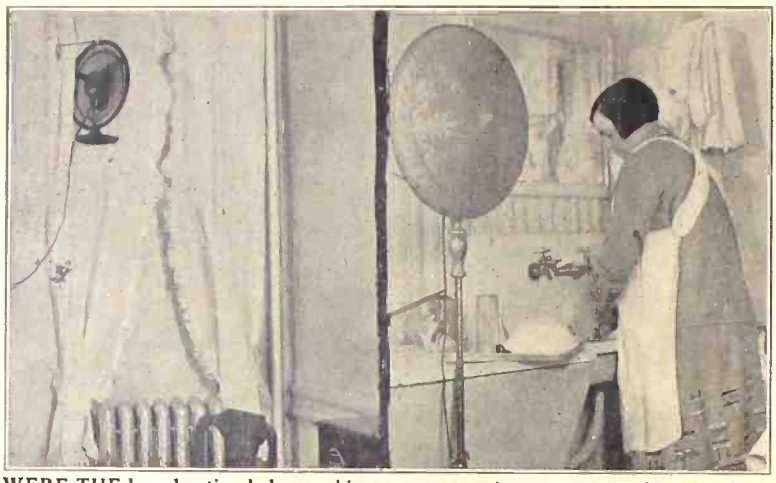
Connect the nearer loop tip to the beginning of the primary L1, of the oscillator coil, which is the terminal at the inside, close to the celluloid collar. The end of this winding, A plus, joins to the nearest F plus socket post. The beginning of the secondary of the oscillator coil, L2, which is near the end of the primary, goes to the grid post of the oscillator socket.

The other end of the secondary goes to A minus.

Now mount the panel to the baseboard. Connect one side of the rheostat to the lead going to the F minus posts of all the sockets, and the other side of the rheostat to A minus, represented by the green post of the plug. Now connect the variable condensers. There are two stator points and one rotor point on these, so select a stator post on C1, at right, join this to the grid leak-condenser combination, R2C3, other than the socket side. This is the tip jack at right rear.

(*Concluded next week*)

Etiquette of Listening



WERE THE broadcasting lady, speaking on art or recipes, present at the same time as was her voice in this kitchen would she become highly insulted? Is it polite to turn even one's side to a cone when some one is talking? Is it proper to clean dishes then? What are the etiquette rules? Placing the speaker on the bird hanger in the next room might soften the "offense." (Hayden)

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By Dr. Alfred N. Goldsmith

Chief Broadcast Engineer, Radio Corporation of America

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It is first necessary to consider carefully where to place a radio receiving set and its loudspeaker. This is not a matter of indifference—quite the contrary. The receiving set, particularly if provided with a loop instead of an outside antenna, should be located so that the loudest signals are received and with the least amount of interference from electrical circuits in the building. It will certainly pay to spend a portion of an evening moving a loop receiver around the living rooms to determine the location where the best signals are produced. Generally this is near a window and away from the main electric lighting circuits. Furthermore, the receiver should, if possible, be located where the dials are well illuminated so that stations can be readily located and fine tuning can be conveniently carried out.

Speaker Location

The loudspeaker need not be near the receiving set and there are, in fact, some advantages in having it at a distance from the receiving set (for example, across the room). If the receiving set is near the audience and the loudspeaker is across the room, the user of the set will perforce tune it in such a way as to give maximum satisfaction to the audience. In other words, wherever possible, the receiving set should be located where it gets the best signals and the audience should be grouped around it if a louspeaker at a distance is used. If an outside aerial is used, the exact location of the receiving set is perhaps less important than in the case of a loop receiver.

It is desirable not to have the audience near an open window fronting on a noisy street, because outside disturbances invariably detract from the full enjoyment of reception. Fresh air in the room should be admitted through a side window of the main street where less noise will come in as is always desirable.

Some rooms are far better than others when it comes to obtaining excellent musical reproduction. No general rule is possible at present, but it may be said that open or shut doors, the presence or absence of heavy hangings, the nature and solidity of the walls, the amount of wall space taken up by windows, the area of carpeted floor, and even the nature of upholstery of the furniture and the number of listeners in the room, all have a perceptible influence on the tone quality.

Consultation Valuable

It certainly pays to experiment by moving the loudspeaker on a long flexible cord around the room, placing it in various parts of the room and on various levels though in general pointing at the audience. A radio installation should not be hastily and carelessly made—it should rather be the result of numerous, careful experiments, and the combined opinion of a number of listeners who will doubtless be glad to cooperate for an evening or two in the interesting experiment of testing out their own sharpness of hearing and musical taste.

Assuming that the receiver and loudspeaker have now been most advantageously located, it is still necessary to handle the receiving set carefully to get acoustic synchronizing. To begin with, really selective receivers frequently give tone qualities which depend on the exact setting of the tuning dials. In such cases careful tuning is very important. Impatient manipulators, who carelessly spin the adjusting dials of the set and who simply will not take the necessary trouble to tune carefully for best quality, must be content with consistently inferior results. In radio, as in other fields, it is useless to expect fine effects as a result of carelessness or indifference. It is positively necessary to be patient.

The discriminating user of a receiving set will tune slowly and thoughtfully, listening, (perhaps with eyes shut), to the tone quality and to the relative suppression of disturbances, such as static or interference. He or she will take every possible care to get the best quality first, then adjust the volume of the sound to the most natural value, carefully avoiding overloading and resulting rattles or tone distortion.

Must Be Local For Quality

The careful listener also will choose his preferred broadcasting station, which must generally be local (except in the case of super-power stations) so that he can be sure of getting signals uninterrupted by obnoxious disturbances. The reception of strong signals is always preferable to that of weak and disturbance-mangled signals.

After the set is tuned, it is desirable for the manipulator of the set not to sit in front of the loudspeaker. While this may not interfere with the sound reaching the audience in many cases, it almost always has a psychological disturbing effect. It is better if there is no one near the loudspeaker. If the loudspeaker is a part of the receiving set, after the receiving set has been thoroughly tuned, the user will be well-advised to leave it alone and join the remainder of the audience. Continual fussing or tinkering with a receiving set during a program is the most disturbing influence imaginable. When we consider how irritating it would be if, during a theatrical performance, the stage electrician appeared in full view of the audience at the side of the stage and continually and ostentatiously adjusted the lights in the auditorium, raising and lowering them in an exasperating way throughout the thoroughly ruined performance, it will be appreciated how desirable it is that the owner of the receiving set should carefully adjust it and then go into the background and stay there. Once the receiving set is really tuned it is extremely desirable to "let well enough alone." The radio audience should be permitted to listen to music and not be compelled to watch a radio juggler.

In this connection a simple piece of radio stagecraft, and a desirable one, may be mentioned. If possible the room in which one listens to radio programs should, during the performance, be dimly lit from shaded lamps in soft colors. In the restful atmosphere of a softly lit room one can much more easily appreciate a musical masterpiece. Glaring, vivid illumination

(*Continued on page 26*)

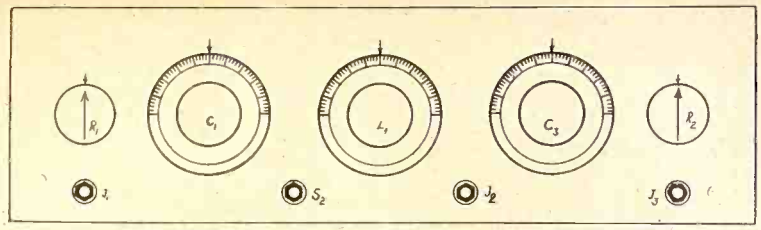

FIG. 296, showing the panel layout desired by Mr. Marks.

Radio University

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PLEASE GIVE a panel layout for a 5-tube receiver, employing a stage of tuned RF amplification, a regenerative detector, one stage of transformer coupled and two stages of autotransformer coupled AF amplification. A 3-circuit tuner is used in the detector stage. Variable condensers shunt the secondaries of the antenna coil and the tuner. A rheostat controls the filament of the RF tube. A rheostat also controls the filament of the detector tube. The three other tubes are controlled by ballast resistors. On the output of the detector circuit there is a double circuit jack. On the output of the second stage of AF amplification there is another double circuit jack. On the output of the last stage of AF amplification there is a single circuit jack. A switch is inserted in series with the A plus lead. State the length of the panel and positions of the parts that are to be placed on the panel.—Judson Marks, Briley, Mont.

Fig 296, shows the suggested panel layout. C1 and C2 illustrate the first and second variable condensers, respectively. Let R1 be the arm of the rheostat controlling the filament of the RF tube. Let R2 be the arm of the rheostat controlling the filament of the detector tube. Let J1 be the jack in the detector output. Let J2 be the jack in the second stage of AF amplification. Let J3 be the jack in the last stage of AF amplification. A 7x24" panel is used. The shafts for the variable condensers, C1 and C2, and also for the tickler, L4, are all 6" from each other and from the left and right hand sides, as well as 3½" from the top and bottom. The hole for the rheostat, R1, is 3" from the left and 3½" from the top and the bottom. The hole for the rheostat, R2 is 3" from the right and 3½" from the top and the bottom. The hole for J1 is 3" from the left and 1" from the bottom. The hole for the switch S2, is 9" from the left and 1" from the bottom. The hole for the jack, J2 is 9" from the right and 1" from the bottom. The hole for the last jack, J3, is 3" from the right and 1" from the bottom.

* * *

I DESIRE to have a diagram of a quality receiver employing five tubes The first tube should be employed as a non-regenerative radio-frequency amplifier, the second as the regenerative detector, with a 3-circuit tuner, followed by three stages of impedence coupled audio amplification. A filament control jack should be installed in the output of the detector stage. A filament control jack should be installed in the amplifier output also. State the data on the coils, condensers, tubes, etc.—Wesley Branstone, Saco, Mont.

Fig. 297 shows the electrical diagram of the circuit which you desire. A regulation tuned RFT and 3-circuit tuner are employed. Tubings 3¼" in diameter and 4" high are employed for the primary and secondary windings. The tickler is wound on a tubing 2¾" in diameter and 2" high. L1, consists of the primary and secondary winding in one. It has 55 turns. L2, the primary of the tuner, consists of 8 turns. L3, the secondary, is wound on the same tubing and consists of 45 turns. L4, the tickler, consists of 36 turns. No. 22 double cotton covered wire is used to wind the primary and secondary windings. The tickler is wound with No. 26 single silk covered wire. The secondary winding portion of the antenna coil, L1, and the secondary winding, L3, are shunted by .00005 mfd. variable condensers. The antenna coil is tapped at the 6th turn. This turn is brought to one terminal of the fixed condenser, C1, which has a capacity of .0005 mfd. The end of this 6-turn portion goes to the ground post. The G connection should, of course, go to the last terminal, adjacent to the antenna terminal. R1 and R2 are both 6 ohm rheostats, passing ¼ ampere. R3, which controls the filaments of the three audio tubes is also a 6 ohm rheostat, being capable of passing ¾ ampere. C4 is a .00025 mfd. fixed grid condenser. R5 is a 2 or 3 megohm grid leak. L5, L6, L7 and L8 are all 200 henry choke coils. R6 and R7 are .5 megohm resistors. R4 is a 500,000 ohm variable resistor. C5, C6, C7 and C8 are .25 mfd. fixed condensers. The —01A type tubes are employed throughout. A 6-volt storage battery is employed used to light the filaments of the tubes. The plate of the RF tube receives 67½ volts. The plate of the detector tube receives 45 volts. The plates of the amplifier tubes receive 90 to 135 volts. If 90 volts are to be used, then a 4.5 volt C battery should be used. If 135 volts are to be used, then a 9 volt C battery should be used.

* * *

I HAVE a 1-tube 3-circuit tuner regenerative receiver, to which I have added four stages of AF amplification, e. g., one transformer and three resistance stages. The volume is great, but the B batteries deteriorate very quickly. I use 135 volts on the plates of the three tubes in the resistance stages. Now, if I place a 9 volt C battery in series with the grid resistance returns of these three tubes, will the batteries last longer?—Grant Bleeker, Jersey City, N. J.

Use 9 volts on the final audio grid only. The other stages need no bias. Great B battery economy will result.

* * *

ARE .0005 mfd. variable condensers employed in the Handsome Portable, which was described in the July 4 issue of RADIO WORLD by Herbert E. Hayden?—W. M. Wise, 24 28th St., Wheeling, W. Va.

Yes.

* * *

IS IT necessary to use a separate rheostat when employing a —112 type tube in the last stage of transformer coupled AF amplification? If so, what type should be employed?—W. Bemhard, Bergen Station, Jersey City, N. J.

A 6-ohm rheostat, passing ½ ampere, or a 112 Amperite should be employed.

* * *

I HAVE a 4-tube receiver, employing one stage of tuned radio-frequency amplification, a regenerative detector (using the 3-circuit tuner), and two stages of transformer coupled AF amplification. The filaments of the RF and the AF tubes are controlled by a 6-ohm rheostat. The detector tube is controlled by a 20-ohm rheostat. The —01A type tubes are employed in the RF and detector stages, while power tubes are employed in the two AF stages. The volume and the DX are great, but I am troubled quite frequently with frying noises. Is it possible that the trouble

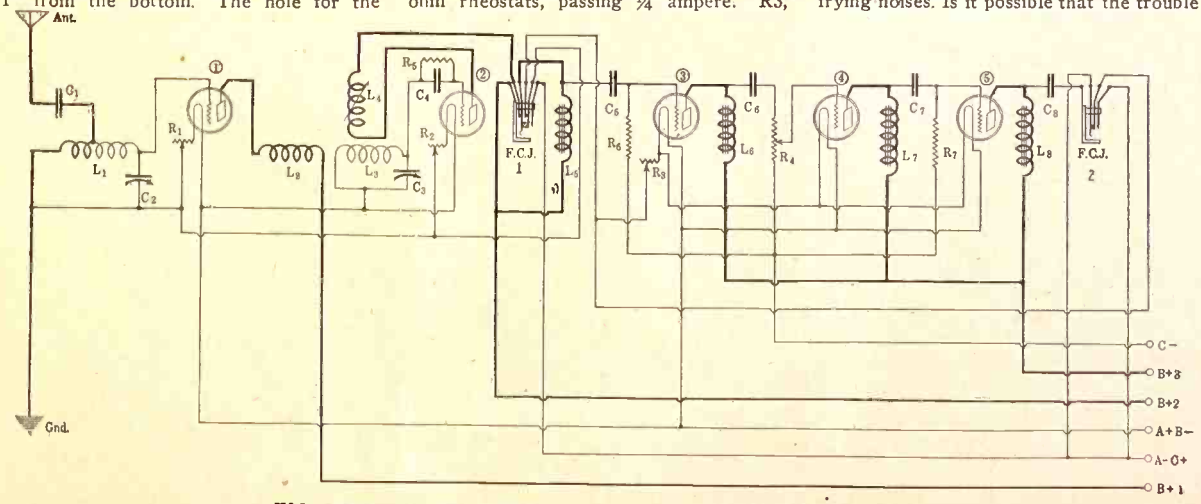

FIG. 297, showing the quality receiver, requested by Wesley Branstone.

Etiquette of Listening

WERE THE broadcasting lady, speaking on art or recipes, present at the same time as was her voice in this kitchen would she become highly insulted? Is it polite to turn even one's side to a cone when some one is talking? Is it proper to clean dishes then? What are the etiquette rules? Placing the speaker on the bird hanger in the next room might soften the "offense." (Hayden)

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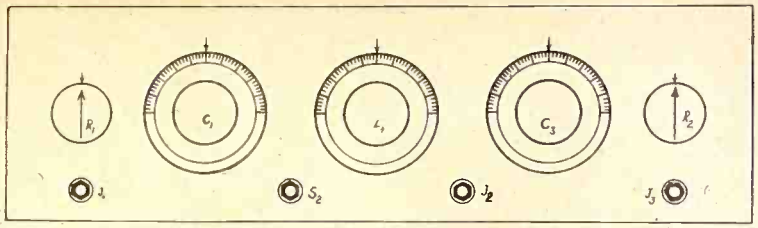

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I DESIRE to have a diagram of a quality receiver employing five tubes The first tube should be employed as a non-regenerative radio-frequency amplifier, the second as the regenerative detector, with a 3-circuit tuner, followed by three stages of impedence coupled audio amplification. A filament control jack should be installed in the output of the detector stage. A filament control jack should be installed in the amplifier output also. State the data on the coils, condensers, tubes, etc.—Wesley Branstone, Saco, Mont.

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* * *

I HAVE a 1-tube 3-circuit tuner regenerative receiver, to which I have added four stages of AF amplification, e. g., one transformer and three resistance stages. The volume is great, but the B batteries deteriorate very quickly. I use 135 volts on the plates of the three tubes in the resistance stages. Now, if I place a 9 volt C battery in series with the grid resistance returns of these three tubes, will the batteries last longer?—Grant Bleeker, Jersey City, N. J.

Use 9 volts on the final audio grid only. The other stages need no bias. Great B battery economy will result.

* * *

ARE .0005 mfd. variable condensers employed in the Handsome Portable, which was described in the July 4 issue of RADIO WORLD by Herbert E. Hayden?—W. M. Wise, 24 28th St., Wheeling, W. Va.

Yes.

* * *

IS IT necessary to use a separate rheostat when employing a —112 type tube in the last stage of transformer coupled AF amplification? If so, what type should be employed?—W. Bemhard, Bergen Station, Jersey City, N. J.

A 6-ohm rheostat, passing ½ ampere, or a 112 Amperite should be employed.

* * *

I HAVE a 4-tube receiver, employing one stage of tuned radio-frequency amplification, a regenerative detector (using the 3-circuit tuner), and two stages of transformer coupled AF amplification. The filaments of the RF and the AF tubes are controlled by a 6-ohm rheostat. The detector tube is controlled by a 20-ohm rheostat. The —01A type tubes are employed in the RF and detector stages, while power tubes are employed in the two AF stages. The volume and the DX are great, but I am troubled quite frequently with frying noises. Is it possible that the trouble

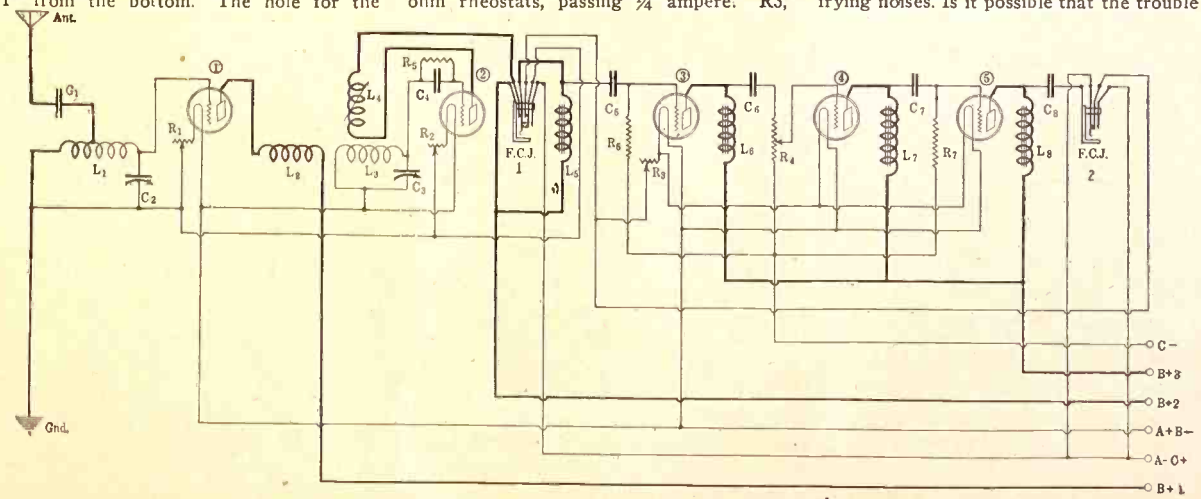


FIG. 297, showing the quality receiver, requested by Wesley Branstone.

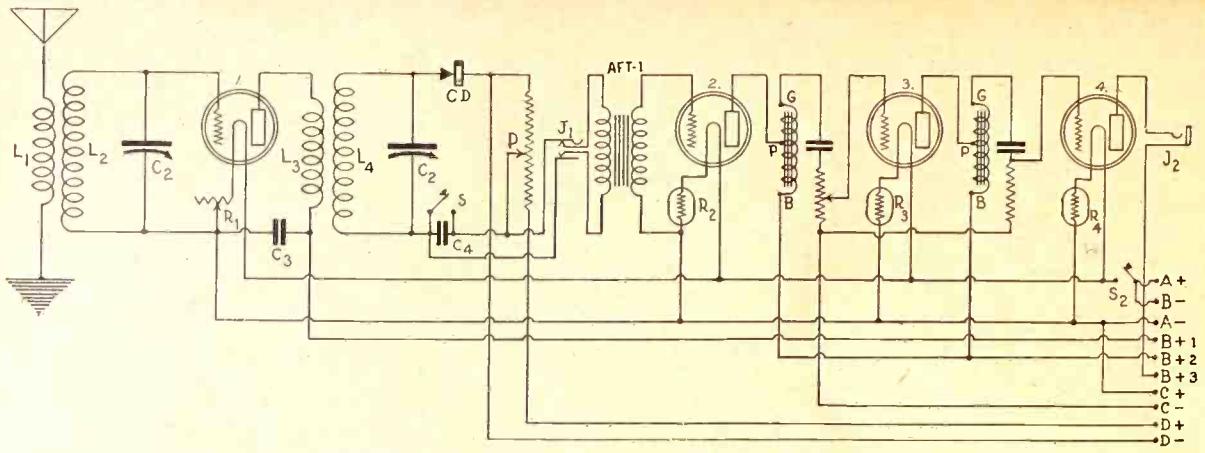


FIG. 297, showing the diagram, requested by J. L. Kramer.

may be in run down B batteries? What are other causes and remedies of these noises?—Thomas Trainson, 1301 DeKalb Ave., Brooklyn, N. Y.

The trouble probably lies in your B batteries. However, you should be sure that all the prongs of the tubes are making perfect contact with the terminals of the sockets. Also be sure, that you have a noiseless grid leak. Be sure that the grid of the tube is not sagging over so that it makes and breaks contact with the plate, whenever the set is jarred. Also shake the tubes and listen for loose elements. Loose contacts or broken connections in the tickler leads are also common causes of frying noises. A bypass condenser, 1.0 mfd., from A minus to B plus amp. often helps get rid of noises.

* * *

IN REFERENCE to the Victoreen Super-Heterodyne, described in the Feb. 20, 27, March 6 and 13 issues of RADIO WORLD: (1) Can I use a 7x21" panel, instead of the 7x24" panel? (2) Will it be O. K. to place the antenna coupler in a separate cabinet so that it can be used whenever desired? I wish to place this unit in a special battery compartment which I have in my table. (3) Will the set work all right to use the loop described in the Oct. 31 issue of RADIO WORLD by Herbert E. Hayden?—Fred W. Kernber, 220 Lincoln Ave., Endicott, N. Y.

(1, 2 and 3)—Yes.

* * *

I WOULD like to have a description of the wiring of the old type Harkness 2-tube reflex. I would also like to have the constants of the coils, condensers, AFT, rheostats, etc.—Roger Stryker, N. Y. C.

Two radio-frequency transformers are employed. Let the primary of the first RFT be known as L1 and the secondary of the same coil as L2. Let the primary of the second RFT be known as L3, the secondary as L4. The secondaries, L2 and L4, consist of 62 turns of No. 22 DCC wire wound on a form 2½ in. high and 3 in. in diameter. L1, the primary of the first RFT, is wound over the secondary, L2, and consists of 10 turns. L3, the primary of the second RFT is wound over the secondary, L4, and consists of 10 turns also. Empire cloth is used as an insulating medium between the primary and the secondary windings on both RFT. Variable condensers having a capacity of .00035 mfd. maximum, are employed to shunt the secondaries L2 and L4. The first RFT is mounted on the end plate of the variable condenser shunting its secondary and at right angles to the condenser shunting the secondary of the second RFT, which is also mounted on the end plate. The AFT employed for reflexing is of a high ratio type, e. g., 6 to 1. The AFT used in the stage of standard AF amplification is of the low ratio, variety, e. g., 3 to 1. Tubes of the —01A type should be used. The wiring will now be taken up. Consider the variable condenser shunting the secondary of the first RFT as C1, the other condenser, as C2. The beginning of the primary winding L1 goes to the antenna post. The end of this same winding goes to the ground post. The beginning of the secondary winding L2, goes to the G post on the high ratio AFT and to the variable plates of the variable condenser, C1. The F post on this AFT goes to the ground post. The end winding of the secondary L2 goes to the stationary plates of C1 and to the G post on the first socket. The beginning of the primary, L3, goes to the P post on this same socket. The end of this winding goes to the P post on the low ratio AFT. The beginning of the secondary winding, L4, goes to the rotary plates of C2 and to the base of the crystal detector or low potential point. The end of the secondary winding goes to the stationary plates of C2 and to the B post on the high ratio AFT. The P post on this AFT goes to the catwhisker or low potential point of the crystal detector. The B post on the low ratio AFT goes to the B plus 67½ volts post. The G post on this AFT goes to the G post on the second socket and to one terminal of a .001 mfd. fixed condenser. The F post on this AFT goes to the arm of a rheostat, which also goes to the A minus post. It also goes to the other terminal of the fixed condenser. The resistance wire terminal of this rheostat, which is a 6 ohm, ¼ ampere type, goes to the F minus posts of both sockets. The F plus posts of both sockets are connected together. They then go to the A plus and B minus posts. The F post of the high ratio AFT, besides going to the ground, also goes to the A minus post. The P post on the second socket goes to the top terminal of a single circuit jack. The bottom of this jack goes to the B plus 67½ volt post.

* * *

I HAVE built Wright's Reflex, as described by H. E. Wright, in the January 31, 1925, issue of RADIO WORLD. The signals of stations below 460 meters are very loud. However, above that I cannot hear a station. What can I do to remedy this?—C. M. Parker, 100 King St., Burlington, Vt.

Add 8 turns to the secondaries, L2 and L4, and lengthen your antenna.

* * *

I WOULD like to have the electrical diagram of a 4-tube receiver employing a crystal as the detector, a stage of tuned RF amplification, a stage of transformer coupled AF amplification and followed by two stages of autotransformer AF coupling. The data on the coils and condensers, etc., would be very much appreciated.—J. L. Kramer, 939 Longwood Ave., Bronx, N. Y. City.

Fig. 297 shows the schematic diagram of a receiver based upon the requisites you state. The primaries L1 and L3 consist of 10 turns. The secondaries, L2 and L4, consist of 45 turns. Tubings 3¼" in diameter and 4" high are employed. No. 22 double cotton covered wire is used. There is a ⅛" spacing between the primary and the secondary windings. C1 and C2 are both .0005 mfd. variable condensers. C3 is a .001 mfd. fixed condenser. C4 is also a .001 mfd. fixed condenser. P is a 400 ohm potentiometer. CD is a fixed or adjustable crystal detector. R1 is a 10 ohm rheostat, passing ¼ ampere. R2, R3 and R4 are all ¼ ampere ballast resistors. The variable resistor in shunt to the grid circuit of the third tube is a 500,000 potentiometer. The fixed resistor in shunt

to the grid of the last tube is of the .5 megohm type. Fixed condensers of the 1 mfd. type are used as stopping condensers. The —01A type tubes are used throughout. You will note that although there is a double circuit jack in the detector output, according to wiring diagram, the audio tubes will have to burn all the time if the reception from the detector is to be obtained. However, by installing a switch in series with the filaments of the audio amplifier tubes only and another in series with the filament of the RF tube, you may listen to the RF and the detector separately, the filaments of the AF tubes being turned off.

* * *

INFORMATION AS to the 1926 Model Diamond would be greatly appreciated. (1) Will it be all right to use a 199 type tube as a radio-frequency amplifier, the proper filament resistances being used? (2) Would it be all right to purchase two 3-circuit tuners, use one as a regulation 3-circuit tuner, omit the ticker coil from the other and use it as on RFT? (3) Is it O. K. to use the Birnbach tuner? (4) About how far should the RFT and the 3-circuit tuner be from each other? (5) Will a 7x21 in. panel be large enough to hold the parts to constitute this receiver? (6) Can a baseboard be used instead of a sub-panel? (7) Could two transformers be used instead of the resistances in the AF stages? (8) It is all right to use a rheostat to control the filament of the detector, a rheostat to control the filament of the RF tube and one rheostat to control the filament of the two AF tubes? (9) Could the double circuit jack be placed after the first stage of AF amplification instead of after the detector as is usually done? (10) Would the Freshman Variable grid leak and condenser be satisfactory to use?—August Steve, 120 Clare St., Buffalo, N. Y.

(1) Yes. (2) Yes. Use the "vacant" tickler in the aerial circuit. (3) Yes. (4) About 6½ in. (outer circumferences). (5) Yes. (6) Yes. (7) Yes. See the Jan. 23 issue of RADIO WORLD. (8) Yes. (9) Yes. (10) Yes.

* * *

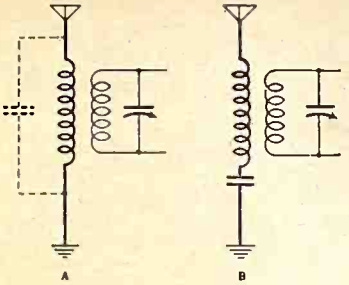
PLEASE publish types of coils, distinguishing binocular, solenoid and toroid. —Henry Johnson, Oil City, Pa.

Fig. 298, shows the four popular types of coils. The coil at the left is known as a figure eight or astatic type. Here the fields of both the primary and secondary windings oppose each. This prevents inter-stage coupling. It is also very economical as to space. The next one is the popular solenoid coil, wherein a large diameter and spaced windings are used. The next coil is also a solenoid. Here however, a smaller diameter is employed, with no spaced windings. The efficiency of both these coils is approximately the same. The last coil is a toroid.

FIG. 298, showing the four types of coils.

External Units Require Care in Battery Leads

When connecting external units, such as wavetraps and loop attachments employing a tube, radio-frequency amplifiers and audio-frequency amplifiers to a single detector unit, etc., it is always advisable to watch the A and B battery connections. That is, if in the detector unit the A plus is connected to the B minus, be sure that when you connect the external unit, the A minus doesn't go to the B minus, as this will cause a short.



IN A we have one method of increasing the wavelength of an antenna, by the insertion of a fixed condenser in shunt to the antenna and the ground. This has the same effect in some instances as adding turns to the secondary or increasing the physical length of the antenna. In B we have a method of decreasing the wavelength of the aerial by inserting a fixed condenser in series with the ground lead. In both instances the condenser should be of small capacity, say not more than .00025 mfd.

Carnegie Institute To Give a Radio Course

As a result of the demand that has been developing during the past few years, a course in Radio Communication, it is announced, is included in the plans for the summer session this year at the Carnegie Institute of Technology in Pittsburgh. According to the plans, the College of Industries will give a six weeks' course in Radio Communication from June 28 to August 6 under the direction of the Department of Electric Equipment and Construction.

Although the course is offered primarily for the benefit of teachers of industrial education, anyone, the announcement points out, is eligible to take the work. No special restrictions have been placed on a prospective student's educational training in order to enroll.

New System of Radio Uses 3 Frequencies

VIENNA.

A marvelous system of transmission and reception on three separate frequencies that change places 60,000 times a second, though used for simultaneous work, has been invented by Emil Marek, it is announced. Each frequency is used 20,000 times a second. Utter privacy is assured by this system, which is thus unlike broadcasting, says the inventor.

Marek has had a varied career. He is accused of cutting off his leg to collect $400,000 insurance.

Robbers Warn Engineer Resistance is Perilous

CHICAGO.

Robbers kidnapped J. Elliott Jenkins, radio engineer and husband of Alexandra Carlisle, former actress. They wanted his automobile and drove him off in it. He asked them for carfare home, which they gave him, but kept the car.

A newspaper reporting the happening, said: "The robbers warned Jenkins against resistance."

Lighter Element is Found For Storage Batteries

VIENNA.

Lighter weight storage batteries are made possible by an element discovered by Gunther Polech, of the Polythechnical School. It is one-fifth the weight of lead and is said to have greater capacity and power. It is particularly suitable for radio uses, says the inventor.

HOOVER'S ENCOMIUM

Secretary Hoover declares the regulation of radio is the greatest example of self-government in business.

RADIO TICKERS NEXT

There is talk of radio eventually replacing stock tickers.

The New Power Booster

(*Concluded from page* 5)

system, and the comparison of that invention with the rejector wave trap function, I need say only this: The circuit L4C3, if working as a rejector, would absorb from the antenna circuit and the secondary L3 the energy radiated on the wavelength to which C3 is tuned. Thus, if WEAF interferes, setting C3 to WEAF's wave would leave the receiver proper free to bring in other stations clear of interference from WEAF. But when the acceptor system is at work, C3 must be tuned to WEAF's wave, or ever so slightly off that wave, for greatest response, indeed, if it is not, the station may not be heard. In other words, the power booster is tuned like the other tuned circuits, those of the receiver proper L3C1 and L6C2. I have been distinguishing between the power boster L4C3 and the "receiver proper" only for the sake of clarity. Such a distinction is quite correct, if L4C3 functions in rejector style, for then the circuit is tuned independently of the receiver, or, rather, at variance with it. In the power booster plan, L4C3 is really a part of the receiver itself, as it offers a path of low impedance to the radio current, which flows back to the grid circuit in the familiar fashion of such oscillating circuits. Hence, with more stages, the system still would be applicable, and with only one stage, as here, it is yet of fine service, due to the special construction of L5, as already discussed. The power booster is known technically as a reflector circuit and little ever has been said of this phenomenon.

The Rest of It

The rest of the circuit presents features familiar to all who know radio. After the detector tube come two stages of audio amplification, where transformers are the coupling media. The C battery in the first RF stage is principally a B battery current saver, but may be omitted. The C battery in the audio stages must be included, if one has any interest in conserving B battery consumption and improving quality.

The fast-growing popularity of the light switch, which makes a red light glow on the panel when the set is on, impelled me to include this attractive item. The switch is primarily an off-and-on switch, and may be used exclusively for that, without the light. By putting a flashlight bulb in the special socket with which each such switch is provided, you have the light feature. The flashlight bulb will not draw more than .25 ampere at 6 volts.

In the list of parts it is assumed 5-volt tubes are used. If otherwise, select the proper rheostats and ballast accordingly.

Signals 600 Miles Away Better Than at Half That

Radio signals are better 600 miles from a broadcast transmitter than they are 300 miles away, according to engineers of the radio department of the General Electric Company, under whose supervision an exhaustive investigation of radio wave propagation is now being made.

For several weeks thousands of radio listeners have been cooperating with the General Electric Company by reporting on reception of signals on broadcast bands. These cooperative tests are still under way and the conclusions are only such as suggest themselves from the preliminary reports. The engineers do not claim that the conclusions are absolute and caution that more exhaustive investigation may reveal some facts not yet apparent.

The Average Result

In observing the variation of signal strength, it was found that the strength of the signal drops off rapidly during the first 300 miles from the station and that, contrary to what might be expected, the signal strength actually increases and is apparently a little stronger at 600 miles than at 300 miles. Beyond the 600 mile point, the strength decreases again slowly to the limit of the range of the station. These distances are not definite values; they are averages from a large number of reception reports.

A study of the zones in which fading occurs shows that it is worst at about 200 to 500 miles from the station and this zone, from 200 to 500 miles, is the territory in which there is the greatest percentage of rapid-fading reports. Broadcast service is better at 600 miles than 300 from a station because fading is less and the signal strength is slightly greater. These distances vary slightly with the power of the transmitter. Rapid fading is not often observed, however, and in this respect the regular broadcast waves seem to be different from the short waves. The reports indicate that the rate of fading increases steadily as the wave length grows shorter.

Effect of the Weather

The main objective of the investigation in cooperation with widely scattered, volunteer assistance, is an answer to the question: What is the relation between weather and radio reception, or do weather conditions influence radio? Variations of signal strength, static and fading are all bugaboos of the listeners and an effort is being made to relate these irregularities to changes in barometric pressure and temperature. If definite relationships between radio reception and weather conditions can be established, it will be possible to predict receiving conditions in any part of the country as reliably as it is now possible to forecast weather conditions.

Thus far investigations by General Electric engineers indicate that the connection between barometric pressure and temperature with radio conditions is not definite, or if it is definite, that it is so complex that it is not yet understood.

Temperature of Little Effect

Temperature seems to have no effect on the signals themselves, although it is known that in Summer there is an increase in static. The study so far shows that the barometer makes little difference when both transmitter and receiver are at the same pressure. When transmission is from a high to a low area transmission is best at short and at long distances, but at medium distances of about 60 miles it is best from an area of low pressure to an area of high pressure. The phenomena is apparently related to the distribution of storm areas over the country and requires a great deal more study.

Another Station Squats On Barred Wavelength

WASHINGTON

Fire has broken out in a new place among broadcasters who are dissatisfied with the wavelength assigned them by the Department of Commerce and who have taken the law into their own hands and selected an air channel more to their liking.

According to reports to the Department of Commerce, Station KWKH, owned by the W. K. Henderson Iron Works and Supply Company, at Shreveport, La., has followed the example of WJAZ, owned by E. F. MacDonald, Jr., and is operating on 329.5 meters, which is assigned exclusively to Canadian stations.

At the present time there is pending in the Chicago courts a suit against Mr. MacDonald for violation of the law in operating on 329.5 meters without authority. The case hinges on the right of the Department of Commerce to assign wavelengths to stations. A court decision is expected soon.

Before it decided to take matters into its own hands, KWKH operated on 261 meters, as did 14 other stations. Dissatisfied, KWKH applied to the Department of Commerce for permission to increase its power. The request was denied by the Department of Commerce on the ground that with higher power KWKH would drown out the other stations on 261 meters. The inevitable result, according to Department of Commerce officials, would have been that the other stations also would have likewise increased their power in an effort to drown out KWKH.

No action will be taken on the Shreveport case by the Department until a decision is made on the Chicago case.

"If all the bad actors would go ahead and operate on 329.5 meters," said Chief Radio Supervisor Terrell, "it would solve a big problem for us. We could ask the Canadian Government to release that wavelength and give them another in exchange for it."

BASEBALL MOST POPULAR

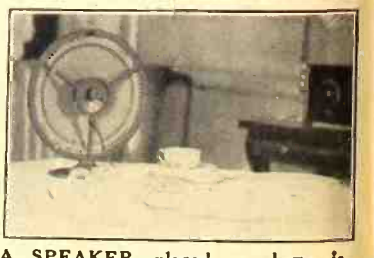
In the remarkable development of daylight broadcasting during the past year, baseball has proved the most popular feature. Probably more than anything else, it was baseball along with football, that brought broadcasting stations to realize what a good bet was being overlooked if they closed down during daylight hours.

Japan's Announcerette

HERE SHE IS—Madame Akiko Midorikawa, the first and only woman announcer in Japan, standing before the microphone in the studio of station JOAK, Tokio. As may be seen, JOAK seriously avoided picking a flapper. (Kadel & Herbert).

Analyzes Human Nature

Cynthia GREY, newspaper columnist of the "Denver Express," before the microphone of KOA, conducting a new matinee attraction for women, known as "microphone snap-shots of human nature." (Richard Beghtol).



A SPEAKER, placed as above, is too close to the listener, when he leaves the table. (Hayden).

Programs Delight Baby

ANYBODY who thinks that a radio receiver is something to delight only the adult and the adolescent is much mistaken, as these photographs of Norma Hayden, taken by her father, Herbert E. Hayden, prove. The rapt attention of a doubting listener, goo-goo glee over some funny animalistic noise by an imitator, and profound serenity at the strains of a sentimental waltz are emphatically registered in the photographs.

Headsets for Patients

THE SOJOURNERS, a Masonic organization of Army, Navy and Marine officers, are to supply headsets for stricken service men. Photo shows Capt. N. Blackwood at Naval Hospital, Brooklyn, N. Y.; W. E. Harkness and Major E. Bowes. (Foto Topics).

Sets at Efficiency Peak, Dr. Dellinger Announces

By Thomas Stevenson

WASHINGTON.

Too much credit cannot be given radio engineers for achievements in broadcast transmission, reception and apparatus, according to Dr. J. H. Dellinger, Chief of the Radio Laboratory of the Bureau of Standards.

Dr. Dellinger believes that the newest and most recently designed sets on the market cannot be improved to any considerable extent so far as service is concerned. He thinks future improvements in broadcasting will be in the transmitting rather than receiving end. He believes the radio engineers will eventually overcome most of the outstanding problems and that broadcasting service may become as reliable as the telephone.

The Miraculous Feature

"In the past three or four years there has been widespread popular mystification over how radio is done," says Dr. Dellinger. "People have been inclined to classify it along with the acts of the conjurer or in some cases to link it closely with the deeds of the Almighty.

"The miracles of radio, actually and in the truest sense, are produced not from batteries, coils and electrons, but from the brain of the radio engineer, and when the processes of radio are analyzed they are no more mysterious than any other familiar process.

"This is the day of the radio engineer, in still another sense. Progress in radio has been up to the present by empiricism. Its foundations have now been laid. The outlines of its major forms of service to humanity now appear and the task of perfecting this service and its instrumentalities is the task of the radio engineer. He must and he can apply the principles of science and technology to advance beyond the empirical foundations of the subject and obtain from it, by both logical and laborious procedure, all of its possibilities.

Task an Important One

"Those who work in radio belong to a recognized branch of engineering which has a unique responsibility. It has been said that the progress of civilization consists in learning how to better employ and transform energy. Such words as those state the mission of all engineers, but the material with which he works takes the radio engineer beyond even this control of physical energy, for the uses of radio today have vitally to do with the use and control also of human energy.

"A well-known radio engineer in one of his moments of tribulation said that these days a radio engineer must be all of the following things: an electrician, a physicist, an expert in acoustics, a mechanical engineer, a musician and a diplomat. It is a fact that radio has become a large subject. A few years ago, within our own lifetimes, it was an apt saying that no one person could know all the sciences. The multiplication and ramification of knowledge has now become so great that as any of us in our more ingenuous moments will admit, no one person can even know all of radio. I suppose that we can say that this branch of engineering has arrived, when it has become so specialized that a person working in one branch of it can give an intelligent disquisition that his fellow members in the profession are not able to understand.

Progress Is Excellent

"Radio engineers can take great satisfaction not only in the particular field that lies before them but also in the substantial manner in which progress is going forward. We have perhaps gone beyond the point where the daily newspapers turn to radio for the creation of a daily sensation, but to the engineer who really knows what is being done there are many substantial advances and improvements in active progress at the present time. The uniform forward movement along the whole front of radio problems and activities is a genuine cause for optimism, and optimism is conspicuously the attitude of all workers in radio whether in its engineering, scientific, commercial or social aspects. I would not be misunderstood as intimating that its problems are solved —by no means. The existence of a number of healthy man-sized problems is what gives zest to the game.

"The chief concerns of radio engineering just now are: perfection of broadcasting and the penetrating of the mysteries of radio wave propagation. These can be considered as, in a sense, a single problem since the first cannot go very far forward without the second, yet these two comprehend broadly the two major streams of engineering thought and effort at present. There have been great progress and fine achievement in both of them during the past year."

South Is Enthusiastic; New Orleans Static Bound

WASHINGTON

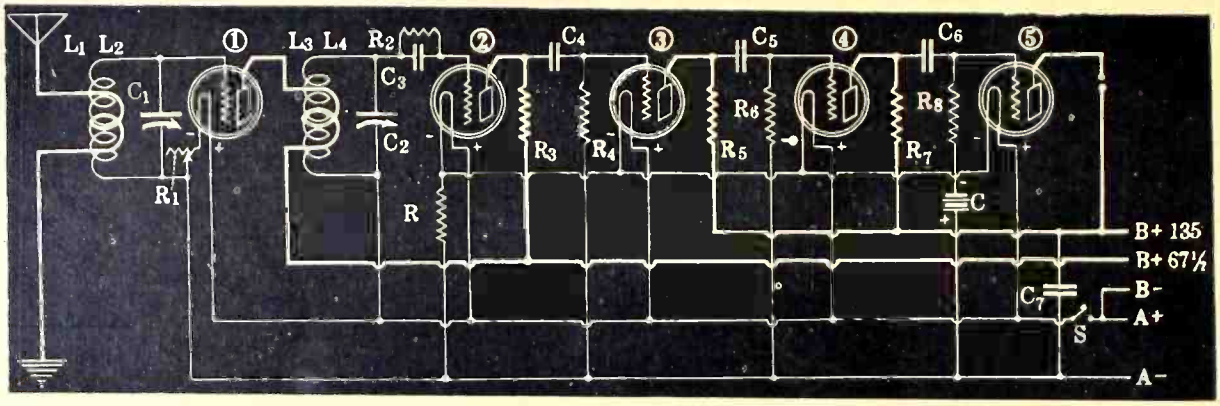
Returning from a trip to Atlanta, Nashville, New Orleans, Jacksonville, Tampa, and Miami, W. E. Downey, Technical Radio Expert of the Department of Commerce, reports enthusiasm for radio at all points excepting Key West.

"The stations I visited are doing good work," Mr. Downey said, "and programs are very much appreciated by the people in those vicinities."

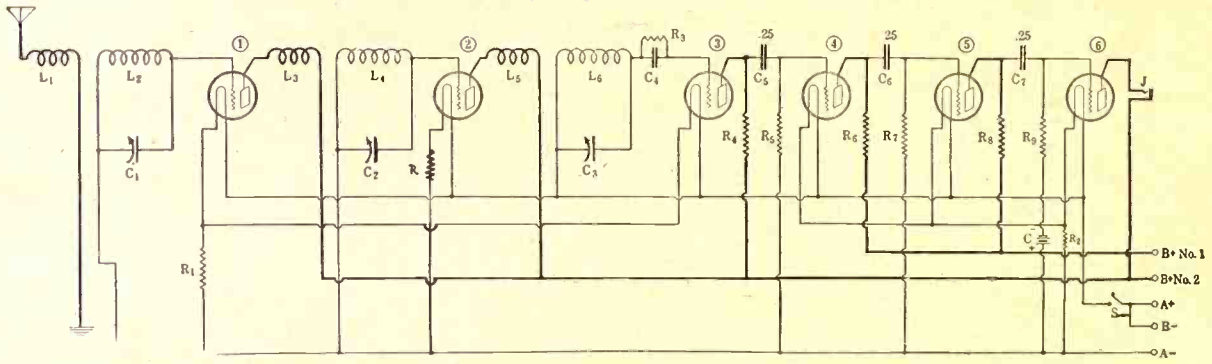
Mr. Downey also reported that static conditions were giving some trouble. He found it worst in New Orleans, where it was frequently impossible for them to get anything outside of Texas and a few Chicago stations. KDKA, he added, was the most constantly heard. Mr. Downey said that New Orleans seemed to be in a sort of static pocket at the present time.

His trip was part of a program mapped out by the Department of Commerce to see what the needs of certain radio districts might be, on the chance the Department of Commerce secures the added appropriations, in a Senate bill.

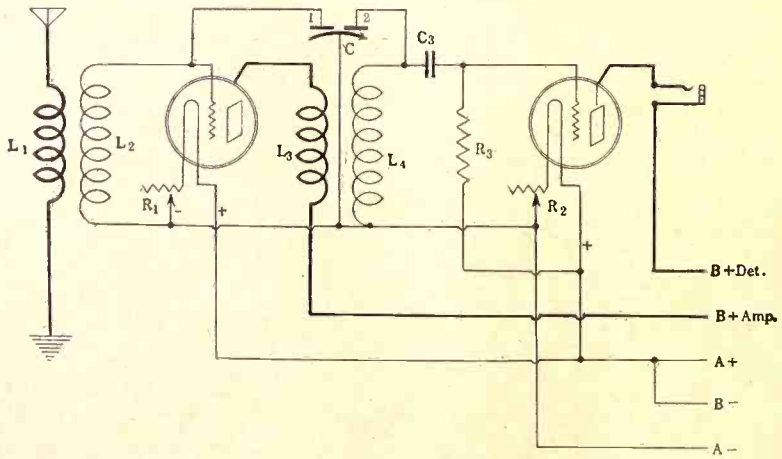
Sets Using 1, 2, 5 or 6 Tubes



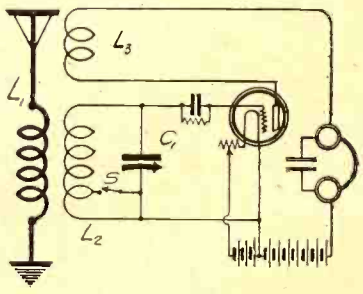
THE ELECTRICAL diagram of the 2-C, 5-tube receiver, described in the January 2 issue of RADIO WORLD by Capt. P. V. O'Rourke. L1 and L3, the primaries shown by the heavy white lines, are wound in the middle of the secondary and side by side with the continuation of the secondary winding. The secondary, using .00035 mfd. variable condensers, consists of 65 turns on 3" diameter.



THE SCHEMATIC electrical diagram of a 6-tube quality receiver, employing two stages of tuned radio-frequency amplification, a non-regenerative detector and three stages of resistance coupled audio-frequency amplification, described in the December 19 issue of RADIO WORLD. R1 is a ½ ampere ballast resistor controlling the filaments of the first RF and the detector tubes. The filament of the second RF tube is controlled by a ¼ ampere ballast resistor. A ¾ ampere ballast resistor controls the filaments of the three audio tubes.



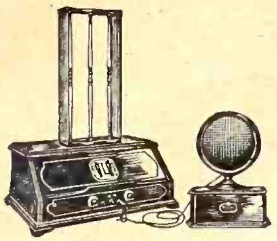
THE ELECTRICAL diagram of a 2-tube, 1-control receiver. A stage of tuned radio-frequency amplification and a non-regenerative detector are employed. A double condenser, C, with each section having a capacity of .0005 mfd., is employed to tune the secondaries of the two RFT. Standard radio-frequency transformers, with secondaries wound so that they will cover the entire wavelength from 200 to 550 meters, when shunted by .0005 mfd. variable condensers, should be employed. Two 20-ohm rheostats are used to control the filaments of the tubes. A .00025 mfd. grid condenser, C3, and a standard 2 megohm grid leak, R3, are used. Note that the grid leak is in shunt to the grid return instead of in shunt to the condenser.



THE CIRCUIT diagram of the popular 1-tube regenerative 3-circuit tuner receiver. This receiver is adapted for reception on either the short or the long waves. This is done with the aid of the switch, S. If the secondary consists of 45 turns and when shunted by a .0005 mfd. variable condenser as above, tunes from 200 to 550 meters, a tap at the 20th turn will enable you to receive signals from stations operating from about 100 to 200 meters. The —01A type tube works very satisfactorily in this set, having a plate voltage of 45. A 6-ohm, ¼ ampere rheostat is placed in series with the negative leg of the filament, A .001 mfd. fixed condenser is placed in shunt to the phones.

FACTORY SETS

A DEPARTMENT Conducted for Present and Prospective Owners of Manufactured Receivers and Equipment. Address Questions to Factory Set Editor, RADIO WORLD, *145 West 45th Street, New York City.*



RADIOLA NO. 25 is a second harmonic 6-tube Super-Heterodyne equipped with the new UX 120 dry battery power amplifier tube. The new R. C. A. uni-controlled mechanism employed on all its new models allows sensitive tuning by means of a single control.

WHEN the Radio Corporation of America announced its new line of Radiolas, Radiotrons, Rectrons, Loudspeakers and Current Supply Devices; E. E. Bucher, General Sales Manager, said the new sets, tubes and loudspeakers were the most complete with regard to technical performance of the individual items in the line, price range and quality, which the R. C. A. had thus far offered the public.

The Super-Heterodyne circuit, with refinements, remains the standard of the R. C. A. receiving sets. The loudspeakers of a new type, which the R. C. A. and its associates have been developing in the laboratory, made their appearance as a commercial product for the first time, in three types.

When the Radio Corporation of America perfected the Super-Heterodyne circuit, sealed it into a catacomb and placed it on the market early in 1924, part of the announcement read:

"After years of experiment and observation, and after a long look into the future, the keen eyes of radio experts and the alert minds of technical and sales engineers agree that, as far as they are now able to determine, the Super-Heterodyne is and will remain the ultimate circuit for all radio broadcast listening."

Speaker Design

"Equally impressive advances have been made in the design of loudspeakers," said Mr. Bucher. "These speakers embody entirely new principles. One is intended for direct operation of Radiolas, eliminating dry batteries or storage batteries. Another operates from an AC driven rectifier-power-amplifier unit known as the 'Uni-Rectron,' and the third, the most powerful of all, is of such design that we claim for it the full volume of an orchestra or band, in the home, without distortion.

"Keeping pace with the tremendous advances in loudspeaker design was the production of three new Radiotrons. These new tubes are all power amplifiers. The UX120, for use in the last stage of audio-frequency amplification of a broadcast receiver, is designed for the improvement of volume and quality of dry battery operated receivers. The UX112, a storage battery operated Radiotron, for increasing the volume and quality of storage battery operated sets; and the UX210, giving loudspeaker volume and distortionless reproduction far in excess of that provided by any amplifying tube heretofore produced.

"We have spent many months in perfecting current supply devices, and are now convinced that the faults common to such devices have been overcome. Important among the improvements are the ability of the instrument to deliver sufficient output and to maintain the plate voltage under load. The most difficult obstacle to overcome was the elimination of the hum from lighting circuits which, with modified cone type loudspeakers is amplified to a much greater degree than in the horn type of speaker. The Duo-Rectron is a B battery eliminator that will supply plate current for any receiver known to the industry, even experimental types of receivers where as many as ten UV201A tubes are employed."

Sets R. C. A. Features

A brief description of the new R. C. A. apparatus follows:

Radiolas 30 is completely AC operated and uses the new 8-tube Super-Heterodyne. A self-contained Radiola Loudspeaker Model 100 of the Cone type is used, being driven by a rectifier-power-amplifier unit termed a "Multi-Rectron," which provides plate, grid and filament voltages for the entire combination. This set therefore presents complete operation from 110 volt 60 cycle AC lighting circuits, eliminating all batteries. Requiring no antenna, the set operates from a self-contained loop, and according to the manufacturer, provides unusual performance under the most exacting conditions imposed by broadcast transmitting stations.

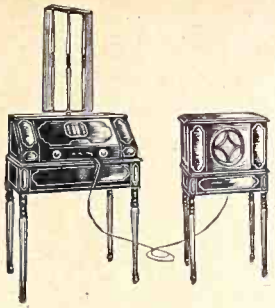
Another 8-tube Super-Heterodyne is the Radiola 28, built in accordance with the conceptions of radio engineers who have made a specialty of this type of circuit. Every element of the set has been designed and installed with a thought for supreme sensitivity, selectivity and convenience.

It operates in conjunction with a loop antenna which is mounted on the top of the cabinet which has sufficient space to accommodate all of the necessary dry batteries, if used. The new uni-control tuning mechanism is employed in this instrument together with straight line frequency variable condensers giving equal spacing of channels on the tuning scale. A special protective tube (UV877) is used to protect the set and Radiotrons from accidental contact with the high voltage B battery leads.

When this set is used with Model 102 loudspeaker, the set itself is dry battery operated. The Loudspeaker, however, is driven from the lighting mains. When used with model 104 Loudspeaker, the rectifier power-amplifier unit, which is a part of the Model 104 cabinet, may be connected to the set by a special cable furnished with the equipment so that they are both operated completely from A. C. lighting mains. The novelty of placing super-power loud-speakers at a distance from the broadcast receiver is a practice which is meeting with growing popularity.

The 6-Tube "Super"

Radiola 25, another of the new models announced by the Radio Corporation of America, is a low-priced, 6-tube Super-Heterodyne. It is, fundamentally, the well-known second-harmonic circuit upon which improvements have been made and set is equipped with five UX 199 Radiotrons and one new Radiotron UX 120 dry battery, power amplifier. Space is provided in the cabinet for housing all the batteries.



DESK model of the new 8-tube Super-Heterodyne circuit with sufficient space to accommodate all necessary batteries. No external connections required for antenna or ground.

The new RCA uni-control mechanism, with straight-line frequency condensers, is employed. Thus, for most purposes, local or long distant stations may be tuned in by a single tuning control, thus giving the maximum refinement in tuning. The special protective tube (UV877) is also used to protect the set and Radiotrons from accidental contact with the high voltage B battery leads. As in the case of all R. C. A. Super-Heterodynes, no antenna is required, the loop mounted immediately on top of the case providing reception over extreme distances under favorable conditions.

When the Radiola 25 is used with the Model 102 loudspeaker, the set itself is dry battery operated. The loudspeaker, however, is supplied with energy from a rectifier-power-amplifier unit (Uni-Rectron) which operates from the 110-volt 60 cycle house lighting mains. When used with Model 104 loudspeaker a more powerful rectifier-power-amplifier unit, which is a part of the Model 104 loudspeaker, may be connected to the Radiola 25 by a special 30-ft. cable furnished with the set so that Radiola 25 and the Loudspeaker unit are completely operated from 110 volt 60 cycle lighting mains.

Considerable interest has been shown in the new Radiola 20, which is a non-radiating 5-tube tuned radio frequency receiver, with regeneration. It uses five dry-cell tubes, four of them being UX199s and the fifth the new power amplifier for the last audio stage, Radiotron UX120. Batteries are external to the set but are easily connected by means of a 5 ft. cable which contains all leads distinctively colored and plainly tagged.

The main distinguishing features about this set are the combination of tuned radio frequency with regeneration, which provides greater sensitivity and selectivity, and the fact that there is but one main tuning control. On the Radiola 20, as on the new Super-Heterodynes, the tuning dials are a new departure from the ordinary type of dial. A large bakelite disc with knurled edge is mounted with the movable plates of tuning condensers. A segment of the disc protrudes a fraction of an inch through a slot in the panel and is tuned by a slight pressure up or down. Mounted on the same shaft is a cylinder, part of which shows through a window in the panel. On this cylinder the location of the tuning points for all stations is to be marked, and as the tuning values of Radiola 20 are constant, the stations can be located at the same spot every time they are tuned in.

A THOUGHT FOR THE WEEK

JAZZ, classic music, recitations, talks, technical addresses—which? What's the difference, so long as some of them are favorites with a good percentage of listeners-in? Radio is not raw, nor will it ever be, for the few.

RADIO WORLD

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

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

TELEPHONE BRYANT 0558, 0559
PUBLISHED EVERY WEDNESDAY
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ADVERTISING RATES

General Advertising

1 Page, 7½"x11"	462 lines	$300.00
½ Page, 7½"x5⅛"	231 lines	150.00
¼ Page, 3⅝" D. C.	231 lines	150.00
⅛ Page, 4⅛" D. C.	115 lines	75.00
1 Column, 2⅛"x11"	154 lines	100.00
1 Inch		10.00
Per Agate Line		.75

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

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

CLASSIFIED ADVERTISEMENTS

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APRIL 17, 1926

A Simple Wavetrap

HERE is the set-up for a simple wavetrap. (Hayden).

How to Solve Problem of the Station Nearby

THE number of persons living in locations that require special receivers for satisfactory reception is still growing. A year ago the growth was more rapid, as new stations were being licensed, whereas in the last six months not one such has been licensed. Every time a new station opens it means that quite a number of persons have trouble.

In New York City, for instance, there are too many stations with antennas in the Borough of Manhattan, although it has become fashionable and also profitable to remove the antenna to some open space not very far away, and send the programs from the metropolitan studio to the transmitter by telephone. At the transmitting plant the programs are "etherized" and become radio. This develops a new crop of sufferers, those who can not tune out the newly located antenna. One might suppose that the burden merely has been transferred, but such is not quite the case, for the congested Borough from which the antenna was moved still has an abundance of the same sort of interference, although from other stations.

It Is Painful

The condition of those newly annoyed by a neighboring transmitting aerial may justly be described as suffering, since radio reception is such a great joy that to have it spoilt or severely circumscribed is indeed painful. It is so no matter how good a station moves its antenna across the way from your back yard. Take WJZ, for instance. That is undoubtedly one of the world's finest and greatest stations, from the excellence of its entertaining and educating programs, to the beautiful skill of its modulation. Yet if one is precluded from hearing any station except one, however good that one may be, he has a just grievance. What good is the distance-getting set, if a neighboring antenna kills off even all the other locals? And why have a set that needs be tuned, when the only station it can tune in, while the interferer is on the air, is that station? A push-pull switch, fixed coils, fixed condensers, tubes, sockets, batteries—and there's your set! Talk about single control! Zero control would answer the purpose!

WJZ found itself up against severe local opposition. The transmitter at Bound Brook, N. J., often outputting 50,000 watts, the greatest in the history of American broadcasting, behaved like a magnet, attracting vituperative letters. There was talk even of Federal legislation to restrict the new monster of the air.

Kind Words from Others

On the other hand, farmers and others from far-off points, even cattle men on the Plains, wrote that they were hearing WJZ regularly for the first time, and super power certainly won many friends thus. Super power is sound economic theory, since it is too much to expect even the Radio Corporation of America to run a station with a steady daylight radius of 30 miles or so, at $250,000 a year or more, when at a disproportionately increased cost the area is trebled. Super power means sorrow for some, joy for many. Stations can not be expected to locate their aerials in the wilds, while the studios are in the "tames."

The problem of final disposition by municipalities is something like that of super power. Final disposition is a polite name for the disposal of the population's garbage. Any mention of locating an incinerator near anybody's home, present or prospective, is met with a howl of protest, yet urgent necessity compels some action, and the good of the many should be the controlling factor. The answer is that incinerating plants finally are located somewhere, just as radio transmitters find a place in the sun, at whatever spot.

Many Disgruntled

There must ever be the disgruntled, as it is not pleasant to endure either annoyance—aerial or incinerator. In the municipal problem, the only solution may be for the individual to move, but in regard to the radio question, this certainly would be absurd, as the sufferers live in high-class residential districts, and residence is more important than radio. Hence the question: What's to be done?

With a powerful or even non-powerful transmitter close at hand, the sufferer should provide means for eliminating the interferer.

The First Recommendation

The first suggestion inevitably is to install a wave trap. This consists of a variable condenser connected across a coil. The aerial is introduced at one end of another and smaller winding, while the end of the winding goes to the antenna post of the set. By setting the condenser so that the trap circuit is tuned to the wave of the interferer, this wave is absorbed by the trap, and the actual receiving circuit is left free to bring in other stations, without crosstalk from the neighboring one. This is beautiful theory, but where the station is using 50,000 watts, or even 1,500 watts, anything like proximity makes it next to impossible to trap out the interference in this manner. The best that can be expected under most of the adverse conditions is that the volume of the interference will decline considerably, which it is bound to do, and perhaps other stations may be heard without audible interference, while they are sending, even though a moment's silence from that source might enable one to hear the undertone of the interferer. Such a solution should be satisfactory enough, indeed it is no more than most of the complainants ask, but one must live perhaps a mile or so from the station.

Where Matters Are Worse

For the severer cases the same sort of wave trap, but used in conjunction with an extra tube, and with a variometer in the plate circuit, will give very much better results. This is known as the Rider Wave Trap and was described in the December 26 issue of RADIO WORLD. It is in reality a 1-tube regenerative set, used as a wave trap, hence a regulation set may be employed by those who do not care to build their own, e.g., a Crosley Pup. As the Radio Corporation of America owns WJZ and also is a licensee under the regenerative patent, it is surprising that the corporation does not market such a regenerative trap, and stop the appeals and trips to Washington.

The Better Set

Another method of attacking the problem of such interference is by supplanting one's present set with a far more selective, hence more rigorously excluding one. A stage of tuned radio frequency amplification ahead of a Super-Heterodyne receiver, or a regenerative wave trap used in conjunction with a Super-Heterodyne, will do the trick. The TRF Super Heterodyne may well be along the lines established by Leo Fenway, and described in the February 6, 13, 20 and 27 issues of

(*Continued on page* 21)

THE RADIO TRADE

No Fear of a Monopoly, Says Free, Citing Sales

WASHINGTON

Representative Arthur M. Free recently gave the following data on the absence of danger of a radio monopoly, incorporating interesting trade information:

"In my judgment we already have sufficient governmental machinery to prevent manufacturing monopoly. The Federal Trade Commission and the courts can stop any monopoly under the laws already in existence, and the Interstate Commerce Commission has full jurisdiction in the matter of rates.

"We have today some 35 manufacturers of tubes, 350 manufacturers of sets, and 1,600 manufacturers of radio parts.

"In 1925 the Radio Corporation sold about one-tenth of the radio apparatus sold in the United States.

"There are many very dependable radio sets on the market today in addition to those made by the Radio Corporation, such as the sets made by the Crosley Radio Corporation, the Atwater Kent Manufacturing Co., A. H. Grebe & Co. In fact, the Radio Corporation is third in the sale of sets.

"In the year 1925 the Radio Corporation sold over 16,000,000 tubes, of which only 1,620,640 were to equip its own sets and 15,537,446 were for sets made by other manufacturers and for replacements.

"In 1925 the Radio Corporation sold tubes direct to 40 different set manufacturers—the total number of tubes sold to them being 1,363,150, or nearly as many as those sold by the Radio Corporation itself in connection with its own sets. Practically all the other manufacturers sold their sets without tubes but equipped with standard sockets for the insertion of tubes by the purchasers.

"The stock of the Radio Corporation of America is owned today as follows:

	Per Cent
By the General Electric Co.	15.68
By the Westinghouse Elec. & Mfg. Co.	6.63
By individuals allied with the Westinghouse interests	9.69
By various other stockholders, approximately 33,000 in number	68.00

(*Concluded from page 20*)

RADIO WORLD. The Fenway, properly built, tunes out WHN, New York, at a point of reception right next door to the station. Other well-constructed Super-Heterodynes will do the same, e.g., the Radiola line and the Victoreen, the latter a home-constructed receiver. But of course WHN does not use 50,000 watts, indeed only a hundredth of that.

All over the United States and in many parts of Canada are radioists who suffer from station interference along the lines discussed, and the same remedies are applicable to them.

Cheap Sets Won't Do It

It is idle to attempt to find satisfaction in a cheap and poorly built set of indifferent design where one is so unfortunately located, although quite a few fans besiege dealers with demands that sets that sell for a few dollars do more in the direction of elimination than do the best receivers on the market or within the scope of home construction. Asking too much is a favorite pastime of a few, or perhaps of many. A prospective purchaser begins by reciting his grievance against the offender and demanding that he be sold a set, say for $35, that will tune out locals, including the transmitter next door, and bring in DX. While fans may be pardoned this over-expectancy, dealers who encourage them in the belief that an ordinary set will meet these demands deserve censure. And indeed they get it—when the customer comes back with the set!

Jobbers and Dealers to Visit Radio Center

More than a thousand radio dealers and jobbers from every part of the country have requested admission passes to the Radio Center, Bush Building, New York City, says Col. S. H. Mapes, president of the Center.

With this intense interest in the Center displayed almost a month before the formal opening date it is expected that the number of dealers and jobbers visiting the Center during 1926 will be even greater than had been originally expected by the officials of the organization.

Twenty thousand dealers a year are estimated as the total number of visitors to New York radio concerns, and a large portion of these will likely come to other eastern buying centers during the spring and summer months.

Knockdown Console

A new line of consoles for those who wish to beautify their radio sets has now been placed on the market. A striking feature is that they are knockdown and can be easily and quickly put together by anyone without the aid of bolts, nails, screws or glue. At the same time the finished product is strong and rigid. The finish is rich American walnut or mahogany on Southern gum wood. The No. 6 size is 36" high by 34" long, 14½" wide. Panel sizes fit any set from 7x12" to 7x30". Full information and pictures may be had from Cleverly & Cross, 321 Broadway, New York City. Mention RADIO WORLD.

Literature Wanted

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

Trade Service Editor,
RADIO WORLD,
145 West 45th St., N. Y. City.

I desire to receive radio literature.

Name .....
City or town .....
State .....
Are you a dealer? .....
If not, who is your dealer?
His Name .....
His Address .....

H. R. Mercadal, 315 U. S. Custom House, New Orleans, La.
F. Wilhelmi, 5 Pine St., Boston, Mass.
E. Nelson, Alexandria Bay, N. Y.
Chas. A. Fisher, Selinsgrove, Pa. (Dealer).
F. P. Scriters, 2854 Montgomery Road, Shaken Heights, Cleveland, O.
The Radio Shoppe, 1836 N. Bond St., Baltimore, Md. (Dealer).
C. A. Halsterd, 5716 Normal Boulevard, Chicago, Ill. (Dealer).
Donald Hiller, 6614 South Sacramento Ave., Chicago, Ill. (Dealer).
A. Karsch, 2177 Pacific St., Brooklyn, N. Y.
William Smith, 58 Grant St., Akron, O.
M. J. Claypoole, Kittanning, Pa. (Dealer).
C. H. Bradbrook, 116 N. Topping St., Kansas City, Mo.
J. A. Gronin, 1 Wilcox St., Worcester, Mass.
Arthur McKelson, Valley City, N. D.
W. J. Lyons, 3824 Prytania St., New Orleans, La. (Dealer).
Wesley A. Scott, 117 Lark St., Albany, N. Y.
M. D. Frink, 717 Central Ave., Charlotte, N. C. (Dealer).
Chas. Apgar, Fairmount, N. J. (Dealer).

United States Is Unique In Absence of Radio Fee

The public in the United States today is in a unique position. Anyone can make his own set and listen in on a program without charge. This is not true of any other large country. Great Britain licenses both sending and receiving sets and collects through the British Broadcasting Company a certain percentage of the sale price of each piece of apparatus and limits the number of broadcasting stations. Canada, under its Minister of Marines and Fisheries, licenses both broadcasting and receiving sets. Australia levies a tax on receiving sets.

A Selling Point

Do you realize that no one would be without a radio if he knew about the wonderful things now on the air? Here are some of the headliners appearing on the programs:

President Coolidge, Ignace Paderewski, Joseph Hofmann, John McCormack, Walter Damrosch, Arturo Toscanini, Mme. Schumann-Heink, Mary Garden, Titta Ruffo, Frances Alda, Louise Homer Tito Schipa, Irvin S. Cobb, Will Rogers, Philharmonic Orchestra, and U. S. Marine Band.—*Radio Retailing.*

Business Opportunities Radio and Electrical

Rates 10c per word; Minimum, $1.00; Cash with order

WELL-KNOWN FURNITURE INSTALMENT HOUSE DESIRES TO LEASE OUT ITS RADIO DEPARTMENT; PERMANENT WINDOW DISPLAY AND AMPLE FLOOR SPACE; ONLY EXPERIENCED RETAIL RADIO MAN WILL BE CONSIDERED; NO BEGINNERS; RESPONSIBLE PARTY WITH PERSONAL CREDIT RATING; CASH GUARANTEE WILL BE ESSENTIAL; VICTOR AGENCY INCLUDED. BOX 292, 228 WEST 42D, N. Y. C.

Why So Many Who Knock?

It seems only yesterday, although it is possibly a year ago, that department stores in page advertisements were telling of the terrible sacrifices on Freed-Eisemann sets and how their neutrodyne sets were being retailed at less than manufacturer's costs.

At the time there were many unconfirmed rumors not only of distress of radio manufacturers. Now Joseph D. R. Freed says that the Freed-Eisemann Radio Company has no debts of any kind and have cash in the bank and on hand of $523,610. How many businesses can show a finer statement than this? Many radio manufacturers are in equally good condition. Why should the radio industry have more knockers than any other?

No industry is progressing so rapidly as radio and holds such a bright future for the coming year. Any concern producing good radio apparatus at a fair price cannot help meet with success.

New Plug Controls Both Tone and Volume

THE volume control.

AN adequate volume control is needed now more than ever before. If the rheostats are turned low, volume will be reduced, but perhaps at the expense of clarity. If turned too low on the audio side, distortion results. Partially detuning the receiver helps, but in this day of congested broadcasting, such a procedure will usually result in interference between stations.

Several of the best radio receivers incorporate a tone control on the panel. Now an accessory has just been marketed that provides successful control of tone and volume and can be added to any receiver by the simple expedient of substituting it for the old loud speaker plug. It is called a Modulator Plug and is manufactured by the Central Radio Laboratories of Milwaukee. The size is little larger than that of a standard phone plug. Inside the body of the plug is a non-inductive graphite type of variable resistance controlled by means of a small knob on the plug. When attached to the receiver, it provides an additional tone control that can be adjusted to give any degree of tone volume from a whisper right up to maximum.

An outstanding advantage of this type of control is the apparent reduction of static interference. As volume is reduced by turning the knob, the signal to static radio seems to increase, until a point is reached where the program can be enjoyed without either detuning the set or reducing the filament pressure below the temperature needed for best reproduction.

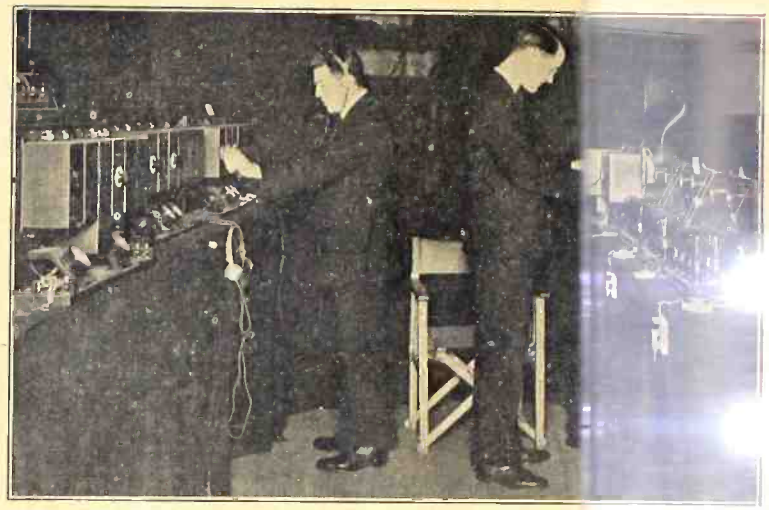
Little Sleep, Much Speed, Ted Nelson's Easy Task

TED NELSON, co-director and announcer, WMCA, New York City, is an expert on remote control, and succeeded in some of the most difficult tasks undertaken in this line anywhere in the country. Everything has to work out just exactly on time, or Nelson's task is a fizzle. By carrying a microphone and stand with him as a precaution, and going in heavily for fast taxi rides, he achieves that synchrony of time and place that makes him successful. Often he has to work 12 hours a day. On one occasion he went without sleep for 36 hours. And it was not a case of insomnia. He says:

TED NELSON (Harold Stein Photo).

"Employes who close down their desks and rush into their street coats promptly at 5.30 P. M., no matter how much work remains to be done, should get a job as a radio installation supervisor on remote control work."

Homes Exhibit Compares Speakers



THE AMPLIFYING control room, from which visitors to the Ideal Homes Exhibition in Olympia, London, were supplied with music and educational entertainment and demonstration of speakers. Station 2LO broadcast the speech programs. These were caught by the receiver at the left and then amplified the apparatus at the right. (Kadel & Herbert.)

Madison Square Garden Station Goes on the Air

Madison Square Garden's new station WMSG was opened officially with a program of speeches and music. The station operates on a 212.6-meter wavelength. Speakers at the inaugural included Tex Rickard, John Ringling and James A. Farley of the State Athletic Commission.

In tests conducted prior to the official opening programs were picked up in California and Texas, according to letters received at the studio.

Walter J. Neff is studio director and announcer; J. Bernhart, manager, and E. W. Dannals, chief engineer of the new station. The station will devote itself primarily to broadcasting sporting events.

Tuning Fork Frequency Steadied by New Device

WASHINGTON

The Electrical Division of the Bureau of Standards reports that a new method, exceptionally accurate, has been developed to measure the frequency of tuning forks, used by broadcasting stations and others.

The old system of driving the tuning fork by the "make and break" method has been done away with, and an arrangement whereby a "continual drive" is substituted, which gives much greater accuracy.

Prof. Hazeltine Patents the Sacred Angle of Coils

Prof. Louis A. Hazeltine, inventor of the Neutrodyne, has obtained patents on the placement of coils at angles to prevent inductive feed back and interplay of fields. The 57 degree Neutrodyne angle and the right angle are covered, in fact virtually all angles.

TWO STATIONS FOR INDIA

WASHINGTON

The Indian Radio Telegraph Co. is planning the construction of a 12-kw. broadcasting station at Calcutta, according to a consular report to the Department of Commerce. It is understood this is one of two stations to be built in India, the other to be at Bombay.

New Czech [illegible] Opens [illegible] Meters

The new broadca[illegible] Stras-nice-Prague was re[illegible] in operation, states a repo[illegible] Department of Commerce from [illegible] Attache J. F. Hodgson, Pra[illegible] Czecho-Slovakia.

The international [illegible] station call [illegible] new station is OK[illegible] It was erected by an American firm [illegible] uses a 513 meter wavelength. The power at the antenna is 5 kw.

During the week following the official opening of the new station lectures were broadcasted for the purpose of stimulating the development of radio in this country.

The Ministry of Posts and Telegraphs announced a broadcasting subscription fee of 15 Czechoslovak crowns (or 30 cents) per month, a considerable reduction. The number of broadcasting subscribers in Czecho-Slovakia was estimated at 30,000.

His Best in [illegible] Years, Fan Says of 4-Tuber

RESULTS EDITOR:

Can't we rename our latest circuit by Edgar Collin "The Efficiency Four?" It sure is a whiz, knockout and—well, words fail me. You can count on me as one of your boosters for the circuit and your magazine. Neither can be beat that's all. The set (described in March 27 issue) pick stations off on all waves with great efficiency and DX.

In my twelve years of radio this is the best circuit I have been able to get hold of.

R. H. LUCAS,
1217 Jackson Ave.,
Wichita, Kans.

Specializ[illegible] on S-C 4

Radio Mail Order House is putting out a special value in parts for the new S-C 4-tube Single Control. The best parts are used as specified by Silver and Cockaday. This concern has literature on this and other interesting radio lines, which may be had from them by addressing P. O. Box 129, Times Square Station, New York City. Mention RADIO WORLD.

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His Name .....
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Business Opportunities Radio and Electrical

Rates 10c per word; Minimum, $1.00; Cash with order

WELL-KNOWN FURNITURE INSTALMENT HOUSE DESIRES TO LEASE OUT ITS RADIO DEPARTMENT; PERMANENT WINDOW DISPLAY AND AMPLE FLOOR SPACE; ONLY EXPERIENCED RETAIL RADIO MAN WILL BE CONSIDERED; NO BEGINNERS; RESPONSIBLE PARTY WITH PERSONAL CREDIT RATING; CASH GUARANTEE WILL BE ESSENTIAL; VICTOR AGENCY INCLUDED. BOX 292, 228 WEST 42D, N. Y. C.

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

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(*Concluded from page 20*)

RADIO WORLD. The Fenway, properly built, tunes out WHN, New York, at a point of reception right next door to the station. Other well-constructed Super-Heterodynes will do the same, e.g., the Radiola line and the Victoreen, the latter a home-constructed receiver. But of course WHN does not use 50,000 watts, indeed only a hundredth of that.

All over the United States and in many parts of Canada are radioists who suffer from station interference along the lines discussed, and the same remedies are applicable to them.

Cheap Sets Won't Do It

It is idle to attempt to find satisfaction in a cheap and poorly built set of indifferent design where one is so unfortunately located, although quite a few fans besiege dealers with demands that sets that sell for a few dollars do more in the direction of elimination than do the best receivers on the market or within the scope of home construction. Asking too much is a favorite pastime of a few, or perhaps of many. A prospective purchaser begins by reciting his grievance against the offender and demanding that he be sold a set, say for $35, that will tune out locals, including the transmitter next door, and bring in DX. While fans may be pardoned this over-expectancy, dealers who encourage them in the belief that an ordinary set will meet these demands deserve censure. And indeed they get it—when the customer comes back with the set!

Jobbers and Dealers to Visit Radio Center

More than a thousand radio dealers and jobbers from every part of the country have requested admission passes to the Radio Center, Bush Building, New York City, says Col. S. H. Mapes, president of the Center.

With this intense interest in the Center displayed almost a month before the formal opening date it is expected that the number of dealers and jobbers visiting the Center during 1926 will be even greater than had been originally expected by the officials of the organization.

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Jobbers and Dealers to Visit Radio Center

More than a thousand radio dealers and jobbers from every part of the country have requested admission passes to the Radio Center, Bush Building, New York City, says Col. S. H. Mapes, president of the Center.

With this intense interest in the Center displayed almost a month before the formal opening date it is expected that the number of dealers and jobbers visiting the Center during 1926 will be even greater than had been originally expected by the officials of the organization.

Twenty thousand dealers a year are estimated as the total number of visitors to New York radio concerns, and a large portion of these will likely come to other eastern buying centers during the spring and summer months.

Knockdown Console

A new line of consoles for those who wish to beautify their radio sets has now been placed on the market. A striking feature is that they are knockdown and can be easily and quickly put together by anyone without the aid of bolts, nails, screws or glue. At the same time the finished product is strong and rigid. The finish is rich American walnut or mahogany on Southern gum wood. The No. 6 size is 36" high by 34" long, 14½" wide. Panel sizes fit any set from 7x12" to 7x30". Full information and pictures may be had from Cleverly & Cross, 321 Broadway, New York City. Mention RADIO WORLD.

Literature Wanted

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

Trade Service Editor,
RADIO WORLD,
145 West 45th St., N. Y. City.

I desire to receive radio literature.

Name .....
City or town.....
State .....
Are you a dealer?.....
If not, who is your dealer?
His Name .....
His Address .....

H. R. Mercadal, 315 U. S. Custom House, New Orleans, La.
F. Wilhelmi, 5 Pine St., Boston, Mass.
E. Nelson, Alexandria Bay, N. Y.
Chas. A. Fisher, Selinsgrove, Pa. (Dealer).
F. P. Scruers, 2854 Montgomery Road, Shaken Heights, Cleveland, O.
The Radio Shoppe, 1836 N. Bond St., Baltimore, Md. (Dealer).
C. A. Halsterd, 5716 Normal Boulevard, Chicago, Ill. (Dealer).
Donald Hiller, 6614 South Sacramento Ave., Chicago, Ill. (Dealer).
A. Karsch, 2177 Pacific St., Brooklyn, N. Y.
William Smith, 58 Grant St., Akron, O.
M. J. Claypoole, Kittanning, Pa. (Dealer).
C. H. Bradbrook, 116 N. Topping St., Kansas City, Mo.
J. A. Gronin, 1 Wilcox St., Worcester, Mass.
Arthur McKelson, Valley City, N. D.
W. J. Lyons, 3824 Prytania St., New Orleans, La. (Dealer).
Wesley A. Scott, 117 Lark St., Albany, N. Y.
M. D. Frink, 717 Central Ave., Charlotte, N. C. (Dealer).
Chas. Apgar, Fairmount, N. J. (Dealer).

United States Is Unique In Absence of Radio Fee

The public in the United States today is in a unique position. Anyone can make his own set and listen in on a program without charge. This is not true of any other large country. Great Britain licenses both sending and receiving sets and collects through the British Broadcasting Company a certain percentage of the sale price of each piece of apparatus and limits the number of broadcasting stations. Canada, under its Minister of Marines and Fisheries, licenses both broadcasting and receiving sets. Australia levies a tax on receiving sets.

A Selling Point

Do you realize that no one would be without a radio if he knew about the wonderful things now on the air? Here are some of the headliners appearing on the programs:

President Coolidge, Ignace Paderewski, Joseph Hofmann, John McCormack, Walter Damrosch, Arturo Toscanini, Mme. Schumann-Heink, Mary Garden, Titta Ruffo, Frances Alda, Louise Homer Tito Schipa, Irvin S. Cobb, Will Rogers, Philharmonic Orchestra, and U. S. Marine Band.—*Radio Retailing.*

(*Concluded from page 20*)

RADIO WORLD. The Fenway, properly built, tunes out WHN, New York, at a point of reception right next door to the station. Other well-constructed Super-Heterodynes will do the same, e.g., the Radiola line and the Victoreen, the latter a home-constructed receiver. But of course WHN does not use 50,000 watts, indeed only a hundredth of that.

All over the United States and in many parts of Canada are radioists who suffer from station interference along the lines discussed, and the same remedies are applicable to them.

Cheap Sets Won't Do It

It is idle to attempt to find satisfaction in a cheap and poorly built set of indifferent design where one is so unfortunately located, although quite a few fans besiege dealers with demands that sets that sell for a few dollars do more in the direction of elimination than do the best receivers on the market or within the scope of home construction. Asking too much is a favorite pastime of a few, or perhaps of many. A prospective purchaser begins by reciting his grievance against the offender and demanding that he be sold a set, say for $35, that will tune out locals, including the transmitter next door, and bring in DX. While fans may be pardoned this over-expectancy, dealers who encourage them in the belief that an ordinary set will meet these demands deserve censure. And indeed they get it—when the customer comes back with the set!

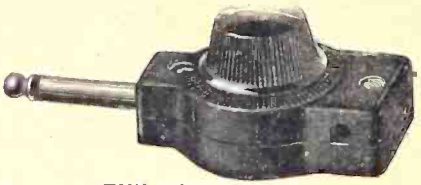
Why So Many Who Knock?

It seems only yesterday, although it is possibly a year ago, that department stores in page advertisements were telling of the terrible sacrifices on Freed-Eisemann sets and how their neutrodyne sets were being retailed at less than manufacturer's costs.

At the time there were many unconfirmed rumors not only of distress of radio manufacturers. Now Joseph D. R. Freed says that the Freed-Eisemann Radio Company has no debts of any kind and have cash in the bank and on hand of $523,610. How many businesses can show a finer statement than this? Many radio manufacturers are in equally good condition. Why should the radio industry have more knockers than any other?

No industry is progressing so rapidly as radio and holds such a bright future for the coming year. Any concern producing good radio apparatus at a fair price cannot help meet with success.

New Plug Controls Both Tone and Volume



THE volume control.

AN adequate volume control is needed now more than ever before. If the rheostats are turned low, volume will be reduced, but perhaps at the expense of clarity. If turned too low on the audio side, distortion results. Partially detuning the receiver helps, but in this day of congested broadcasting, such a procedure will usually result in interference between stations.

Several of the best radio receivers incorporate a tone control on the panel. Now an accessory has just been marketed that provides successful control of tone and volume and can be added to any receiver by the simple expedient of substituting it for the old loud speaker plug. It is called a Modulator Plug and is manufactured by the Central Radio Laboratories of Milwaukee. The size is little larger than that of a standard phone plug. Inside the body of the plug is a non-inductive graphite type of variable resistance controlled by means of a small knob on the plug. When attached to the receiver, it provides an additional tone control that can be adjusted to give any degree of tone volume from a whisper right up to maximum.

An outstanding advantage of this type of control is the apparent reduction of static interference. As volume is reduced by turning the knob, the signal to static radio seems to increase, until a point is reached where the program can be enjoyed without either detuning the set or reducing the filament pressure below the temperature needed for best reproduction.

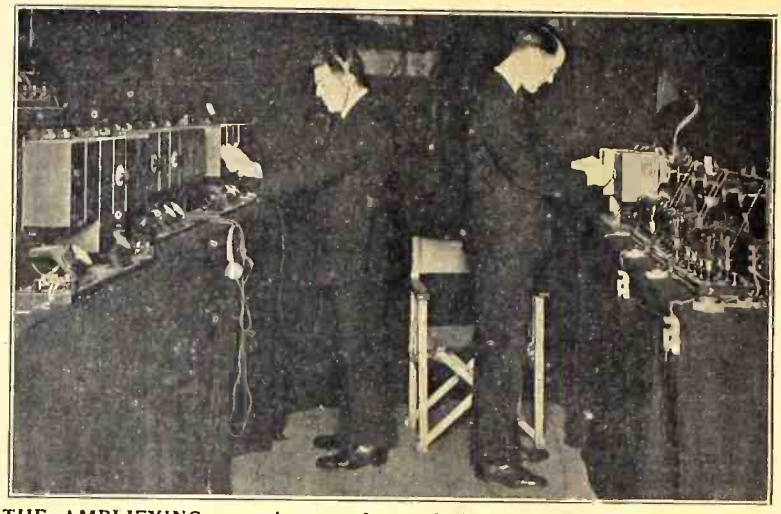
Little Sleep, Much Speed, Ted Nelson's Easy Task

TED NELSON, co-director and announcer, WMCA, New York City, is an expert on remote control, and succeeded in some of the most difficult tasks undertaken in this line anywhere in the country. Everything has to work out just exactly on time, or Nelson's task is a fizzle. By carrying a microphone and stand with him as a precaution, and going in heavily for fast taxi rides, he achieves that synchrony of time and place that makes him successful. Often he has to work 12 hours a day. On one occasion he went without sleep for 36 hours. And it was not a case of insomnia. He says:

TED NELSON
(Harold Stein Photo).

"Employes who close down their desks and rush into their street coats promptly at 5.30 P. M., no matter how much work remains to be done, should get a job as a radio installation supervisor on remote control work."

Homes Exhibit Compares Speakers



THE AMPLIFYING control room, from which visitors to the Ideal Homes Exhibition in Olympia, London, were supplied with musical and educational entertainment and demonstration of speakers. Station 2LO broadcast the special programs. These were caught by the receiver at the left and then amplified by the apparatus at the right. (Kadel & Herbert).

Madison Square Garden Station Goes on the Air

Madison Square Garden's new station WMSG was opened officially with a program of speeches and music. The station operates on a 212.6-meter wavelength. Speakers at the inaugural included Tex Rickard, John Ringling and James A. Farley of the State Athletic Commission.

In tests conducted prior to the official opening programs were picked up in California and Texas, according to letters received at the studio.

Walter J. Neff is studio director and announcer; J. Bernhart, manager, and E. W. Dannals, chief engineer of the new station. The station will devote itself primarily to broadcasting sporting events.

Tuning Fork Frequency Steadied by New Device

WASHINGTON

The Electrical Division of the Bureau of Standards reports that a new method, exceptionally accurate, has been developed to measure the frequency of tuning forks, used by broadcasting stations and others.

The old system of driving the tuning fork by the "make and break" method has been done away with, and an arrangement whereby a "continual drive" is substituted, which gives much greater accuracy.

Prof. Hazeltine Patents the Sacred Angle of Coils

Prof. Louis A. Hazeltine, inventor of the Neutrodyne, has obtained patents on the placement of coils at angles to prevent inductive feed back and interplay of fields. The 57 degree Neutrodyne angle and the right angle are covered, in fact virtually all angles.

TWO STATIONS FOR INDIA

WASHINGTON

The Indian Radio Telegraph Co. is planning the construction of a 12-kw. broadcasting station at Calcutta, according to a consular report to the Department of Commerce. It is understood this is one of two stations to be built in India, the other to be at Bombay.

New Czech Station Opens on 513 Meters

WASHINGTON

The new broadcasting station at Strasnice-Prague was recently placed in operation, states a report to the Department of Commerce from Commercial Attache J. F. Hodgson, Prague, Czecho-Slovakia.

The international station call of the new station is OKP. It was erected by an American firm and uses a 513 meter wavelength. The power at the antenna is 5 kw.

During the week following the official opening of the new station lectures were broadcasted for the purpose of stimulating the development of radio in this country.

The Ministry of Posts and Telegraphs announced a broadcasting subscription fee of 15 Czechoslovak crowns (or 30 cents) per month, a considerable reduction. The number of broadcasting subscribers in Czecho-Slovakia was estimated at 30,000.

His Best in 12 Years, Fan Says of 4-Tuber

RESULTS EDITOR:

Can't we rename your latest circuit by Edgar Collin "The Efficiency Four?" It sure is a whiz, knockout and—well, words fail me. You can count on me as one of your boosters for the circuit and your magazine. Neither can be beat that's all. The set (described in March 27 issue) pick stations off on all waves with great efficiency and DX.

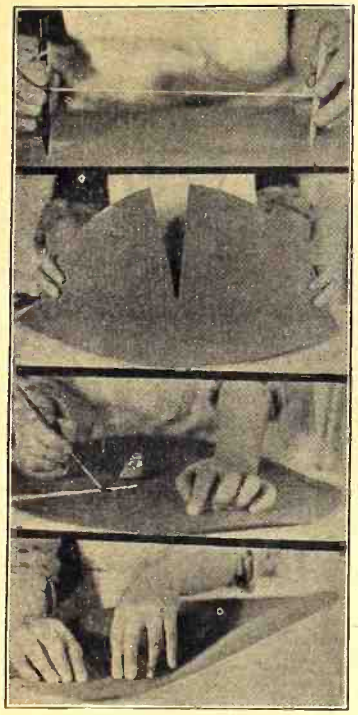
In my twelve years of radio this is the best circuit I have been able to get hold of.

R. H. LUCAS,
1217 Jackson Ave.,
Wichita, Kans.

Specialize on S-C 4

Radio Mail Order House is putting out a special value in all parts for the new S-C 4-tube Single Control. The best parts are used as specified by Silver and Cockaday. This concern has literature on this and other interesting radio lines, which may be had from them by addressing P. O. Box 129, Times Square Station, New York City. Mention RADIO WORLD.

Making a Cone Speaker



FIGS. 1, 2, 3, and 4.

By Herbert E. Hayden

Photographs by the author

BECAUSE of the nature of the material used, and the comparatively larger surface vibrated, in order to produce the best results, it is advisable to use a more powerful unit to drive a cone than is required for horn operation.

The first step necessary for the construction of a cone speaker will be to get a large sheet of thin parchment paper, large enough to cut two circles about 20" in diameter.

The actual size of the circle will be eighteen inches, and since the ordinary kitchen workshop does not have a compass large enough to make this dimensional spread, a piece of string and two lead pencils are used, the string being tied around one pencil, which acts as the center point, and then 9" distant, the other pencil, which in this case is the marking pencil, is carried around, and the 18" circle on the parchment made. Two such circles are made (Fig. 1). This will make a finished product considerably under eighteen inches, but is must be remembered also that we are to work with the average loud speaker unit, which does not have the power and pep of the large cone speaker magnet.

Having cut the circles out, we next cut

FIG. 5

FIG. 6.

FIG. 7.

out a little angle as shown in Fig 2, about 2" at the circumference and running back to the apex at the center of the circle.

Next coat one side of the "cut out section" (Fig. 3), with some good grade of glue (not paste). The two sides of the circle are brought together and firmly glued down (Fig. 4). This gives the cone shape. Allow to dry thoroughly.

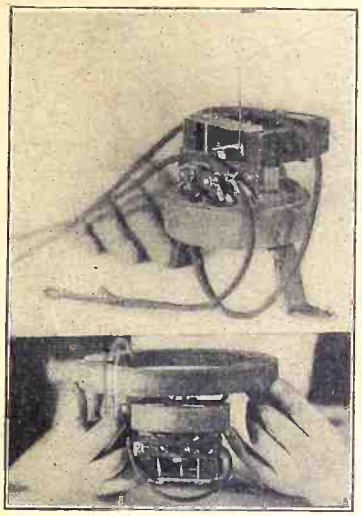
Next prepare the speaker unit for operation in the new form, by soldering a piece of number 18 brass wire or copper if you can't get the wire about 6" long. Some diaphragms have a coating of enamel to prevent rust. Scrape the surface slightly, down to the bright metal. Solder the wire, called the reed, to the diaphragm (Fig. 5).

Two little thin brass thimbles are next prepared by cutting from sheet metal, much in the fashion of the parchment circles, and soldering them at the radius joints. These little brass "cones" will be used at the center or apex of the parchment cone, one outside and one inside, and will receive the end of the 6" reed. If your speaker unit is of the adjustable type, so much the better. The inset (lower left) in Fig. 6 shows how the brass circles appear on the cone when completed.

Now the other large parchment circle is prepared the same as the first, and is placed and glued into position as shown in Fig. 7. A circle about 7" has been cut from this cone, and strengthened by a wooden ring about 1" thick, which has also been cut to fit, and also glued to the parchment. Across this ring a strip of thin wood has been placed, being fastened to the ring by two suitable wood screws. The purpose of this strip is to form a support for the speaker unit and its extending wire, which passes through a hole in the stick directly under the speaker, and continues to the apex of the parchment cone directly ahead, and is secured to the two little brass thimbles, by a drop of solder.

Figs. 8 and 9 show how a cone speaker unit looks when taken out of a standard speaker. Notice the wire sticking up. In Fig. 9 we see how this big unit is placed on the wooden supporting ring. A big unit of this type gives considerable power.

Since it is rather a difficult problem to produce a suitable mount for the finished speaker, in order to place it on a table or other similar support, the easiest way,



FIGS. 8 and 9.

FIG. 10.

and popular at this time, is to hang it on the wall (Fig. 10). A 20-foot extension cord is used to connect it to the set.

The edges of the cone can be made more pleasing in appearance by gluing on a thin narrow art ribbon or gold braid.

The foregoing accounts for everything except the bushing (inset Fig. 6). This is a cylinder in Fig 6, but may be any small price of metal, with a 1/16" or 1/8" hole drilled through, and the piece soldered to the small outside metal "cone." Through this the reed protrudes and is secured by a set screw in the bushing.

Not One New Station Licensed in Six Months

No new licenses having been granted since last September, the list of applicants for broadcasting privilege now numbers 519. Those which have been received recently are:

Paul Thompson, Chester, Pa.; Weber Laboratories, Lancaster, Pa.; Reading Times, Reading, Pa.; Chamber of Commerce, Anderson, S. C.; C. M. McClung & Co., Knoxville, Tenn.; Braid Electric Co., Nashville, Tenn.; Piney Woods School, Piney Woods, Miss.; Burton Springfield Corp., Tulsa, Okla.; F. D. Kalama, Kalama, Wash.; Harold Kants, Springfield, Ohio; and S. E. Missouri State Teachers College.

Farmers Find Receivers Save Them Much Money

Radio is changing the marketing methods of entire groups of farmers, according to nation-wide survey recently concluded by the National Farm Radio Council.

Importance of radio in the marketing of farm products is illustrated in the National Farm Radio Council survey by reports from 43 states, more than 46 per cent of the replies giving specific examples of cash savings effected by the use of radio. Practically every report indicated the importance and value to the farmer of having market reports from 24 to 48 hours earlier than they are obtainable through any other medium.

Typical of hundreds of reports of the farmer's use of radio in marketing is this one from a farmer living near Keytesville, Missouri: "Radio reported hogs due to drop in two days. Shipped at once. Saved $150. In same week put off haying because of storm warning. This prevented heavy loss of hay."

Made Extensive Tally

In conducting this nation-wide radio survey the National Farm Radio Council gathered and tabulated 44,550 individual expressions. The survey was conducted by the National Farm Radio Council in co-operation with 15 farm publications with an aggregate circulation of 3,086,409; 450 county agents; 200 boys' and girls' club leaders; 150 home demonstration agents; the National Grange; the American Farm Bureau Federation; several hundred teachers of vocational agriculture; deans of 37 colleges and several radio stations.

The purpose of the survey was to determine just what radio means to farmers and also to find out the exact time in the day or evening when farmers make the greatest use of their receiving sets.

"Ninety-five per cent of the farmer-radio owners," the survey shows, "think of their radios as a utility as well as an amusement device. They think of it as a utility because it brings to them market reports from 24 to 48 hours earlier than obtainable in any other way. These enable the farmer to market his produce to his greatest advantage.

"Weather reports, particularly in truck

CHANGES OF ADDRESS

should be sent to Subscription Department at least two weeks in advance of publication in order to insure early and proper attention. RADIO WORLD'S subscription list is so large that it is necessary that changes be sent in as requested. Address, Subscription Department, RADIO WORLD, 145 W. 45th St., New York.

and fruit territory, enables protective measures which yearly save hundreds of thousands of dollars.

"The farmer considers his radio receiver as a utility also because it enables him to keep in touch with his leaders, to hear their talks on matters of current importance to the agricultural industry. The radio is breaking down the isolation which has heretofore prevented farmers from interchanging ideas."

Results of the survey to determine just when the farmer listens in on his radio shows the maximum farm audience somewhere between 8 and 8:30 in the evening. Starting at 6:30, the audience rapidly increases up to 8 o'clock. After 8:30 there is a sharp decline. The size of the noon farm radio audience is one of the outstanding results of the survey. A little more than 60 per cent of farm radio owners are on the air at 12 noon. In some states, notably Illinois, Kansas, Pennsylvania and New York, the noon audience approaches 75 per cent. Very few farm folks, according to the survey, listen to radio programs before noon. There is practically no farm afternoon audience. A small percentage of replies from farm women indicated some interest in household talks and other home features.

Farmer Likes Punctuality

With the facts established that radio market reports mean dollars and cents to American farmers, the Radio Council set about finding out just when the farmer wanted his market reports. Tabulation of many thousands of replies left no doubt as to the time when market reports should go on the air. The farmer wants his market reports at exactly 12 noon and exactly at 7:30 in the evening.

Orchestra or band, educational talks, weather reports, market reports and singing are the features with the greatest appeal to the farm audience. The orchestra leads, with farm talks second. Weather reports and market reports have about the same general appeal. A wide decline of interest was registered regarding vocal efforts.

While the orchestra and band are given first place, a general objection by farmers was made to jazz and there was a wide demand for more Hawaiian and old time music. Vocal selections were not popular. Male quartettes were preferred and soprano voices found general disfavor. News bulletins were in general demand.

Manners for Listeners Discussed by Goldsmith

(*Continued from page* 12)

is hostile to complete absorption in a radio program.

Leaving the receiving set for the moment, it is also important to see that the audience is properly placed and in a receptive mood. The audience should be in front of the loudspeaker and not too close to it. All members of the audience should be nearly at an equal distance from the loudspeaker. If any one is at a considerable distance, he may not get the best results and may therefore lose interest and become a source of disturbance to the program. It is desirable to experiment in advance as to the proper location of the audience and to place chairs for a "radio evening" so that the audience will not only be comfortable, but properly located relative to the loudspeaker. In other words, it is useless to expect artistic and satisfactory results unless one takes some trouble, which is a fact long since discovered by those who have brought the theatre and concert hall to their present advanced stage.

A few words of kindly advice to radio audiences may also be helpful in this connection. Radio audiences would do well to avoid just those acts and mental attitudes which would ruin their enjoyment under similar conditions during a theatrical performance. Imagine what would happen in a theatre if the audience, instead of being properly seated in full view of the stage and where they could hear everything easily, were located in remote corridors where they could see little and hear only an occasional garbled play extract.

Everybody knows that an audience which was uninterested in a play from its very beginning would generally be hard to please and unlikely to become enthusiastic. It is well to ask a radio audience, before beginning a program, whether they really want to hear it and to be governed by the majority decision. In fact, something better than a majority decision (and almost a unanimous decision) is a requisite justification for starting a radio program. Certainly more than half of the average theatrical audience is convinced that it wants to see the performance, and the same rule should govern radio performances.

Let The Audience Choose

If there is a choice of available programs, the actual selection should be made

by the audience. Musical democracy is a fine thing in connection with radio performances. The user of a radio set who forces his particular preferences on the audiences is making a great mistake. Of course, it may sometimes be necessary frankly to tell the audience that a certain program which they desire cannot be satisfactorily reproduced that evening because of interference or otherwise, but if it is available with satisfactory quality and the audience desires it, it should be given to them.

There is a reciprocal obligation upon the audience, once the performance has started, to listen quietly unless the quality of the performance deteriorates to the point where they no longer enjoy it. It would be impossible to conduct a theatrical enterprise if the audience consistently shuffled their feet, talked across the aisles, and generally broke up the stage performance. If the radio audience does not seem to pay attention to the program, it is always advisable frankly to ask them if they still want to hear any more of the performance. There is no use forcing a program on an unreceptive group. However, radio audiences have been somewhat remiss in the past in that they have not given really superb programs anything like the same respectful attention which they would accord to an equivalent performance in a theatre or concert hall. One is sometimes tempted to wish that every member of a radio audience had to pay several dollars for his seat during the program and that a husky usher was standing near him ready to take decisive measures in case of continued interruption of the program. There is an obligation upon the audience as well as upon the transmitting station, and the dignity and value of radio broadcasting will never be fully realized until cooperation exists between radio audiences and broadcasting stations, as well as in the reverse direction.

It is fortunately true that if one has an excellent receiving set, carefully installed and manipulated, and a receptive audience, one does achieve not only acoustic synchronizing, but also an artistic triumph. Radio is capable of giving these benefits to its myriad listeners.

In concluding this series of articles, it may be added that, in common with the other engineers working to provide the improved physical agencies for the listener's enjoyment of the best broadcast music and speech, the author extends to the listeners his wishes for the best of radio luck. And the object of this series on "Radio Music In The Home" has been to make good luck in radio less a matter of chance and more a matter of planning and certainty.

A MAN-SIZED JOB

What a task faces the program manager of a broadcasting station who must keep track of which copyright pieces of music may be played and which may not, may be judged when it is learned that no less than 21,850 musical compositions have been copyrighted during the past three months.

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One Year, 52 Issues..... 6.00
Add $1.00 a Year for Foreign Postage; 50c for Canadian Postage.

End Copyright Chaos Is Broadcasters' Plea

By Paul B. Klugh

Executive Chairman, National Association of Broadcasters

When broadcasters started to use copyright music, none of them had any idea of its ramifications. In those days broadcasters considered themselves in the light of public benefactors, as they were all rendering a public service with no visible means of income. It seemed impossible to collect from the listeners, and money for the upkeep of stations was hard to find.

At this particular period the American Society of Authors, Composers and Publishers came down so heavy for license fees, and there is little wonder that broadcasters rebelled.

Now that at least 70 per cent of the regular broadcasters of the country are charging for the use of their facilities by advertisers, and now that a part solution of the troublesome matter of income has been developed, broadcasters have come to the conclusion that they should pay for the use of copyrighted music.

90% Music in Programs

Radio programs are 90 per cent music, and nine-tenths of this music is controlled by the American Society, through its pooling arrangement with copyright owners. A broadcasting station cannot successfully operate without the music of this Society. It is as necessary as raw material to the manufacturer. Supposing a furniture manufacturer finds that 90 per cent. of his raw material consists of lumber, and ten per cent of casters, hinges, hardware and mirrors. Then supposing he finds that his lumber is controlled by an organization who pool their interests and charge what their fancy dictates. Would that be a sound position for the furniture manu-

QUICK ACTION CLASSIFIED ADS

10 CENTS A WORD. 10 WORDS MINIMUM. CASH WITH ORDER

1925 BACK NUMBERS OF RADIO WORLD WANTED

Mail us copies of any of the following 1925 issues of RADIO WORLD, and we will send you a copy of a current issue for every copy sent us: January 10, February 21, March 21, 28, April 4, 11, 25; May 16, 23, 30; June 6, 13, 20; July 4, 11, 18, 25; Aug. 8, 15, 29; Sept. 5, 26; also Jan. 23, 1926.

Good Back Numbers of RADIO WORLD

The following illustrated articles have appeared in recent issues of RADIO WORLD:

1925:

Sept. 12—The 1926 Model Diamond of the Air, (Part (1), by Herman Bernard. A 25-to-110 Meter Receiver, by Sidney E. Finkelstein.

Sept. 19—Diamond of the Air (Part 2), by Herman Bernard. A Tube B Battery Eliminator, by Louis Winner.

Sept. 26—Diamond of the Air (Part 3), by Herman Bernard. The 5-Tube Browning-Drake, by Capt. P. V. O'Rourke.

Oct. 3—The Thordarson-Wade Set (Part 1), by Herman Bernard.

Oct. 10—The 3-Tube, 3-Circuit Tuner, by Capt. P. V. O'Rourke. The Thordarson-Wade Set (Part 2), by Herman Bernard.

Oct. 17—The Thoroughbred (1-Tube DX Set), by Herbert Hayden. The Thordarson-Wade Set (Part 3), by Herman Bernard. Trouble Shooting Article.

Oct. 24—A Phonograph Cabinet Set, by Lewis Winner. The Thoroughbred, by Herbert Hayden (Part 2).

Nov. 7—A 3-Tube Dry-Cell Circuit, by Capt. P. V. O'Rourke. One of the Best Crystal Sets, by Herbert E. Hayden. 1-Tube DX Set, Herman Berand.

Nov. 21—A DX Super-Heterodyne, by J. E. Anderson. A 4-Tube A-A Receiver, by Herbert E. Hayden.

Dec. 5—A Toroid RF Set, Using Crystal, by Lewis Winner. The Diamond of the Air (in Text and Diagram), by Herman Bernard.

Dec. 12—A Self-Contained Receiver, by H. E. Hayden (Part 1). B Battery Eliminator, by Lewis Winner (Holiday Gifts No.).

Dec. 19—The Lemnis Entertainer, by Ed. Spiegler. Feldman 5-Tube Set, by Lewis W. Feldman.

Dec. 26—The Regenerative Wave Trap, by John F. Rider. The 5-Tube Tuned RF Set, by Capt. P. V. O'Rourke.

1926:

Jan. 2—The 2-C Set for Simplicity, by Capt. P. V. O'Rourke.

Jan. 9—The 4-Tube DX Symphony Set, by A. Irving Witz. A Skillfully Made 1-Dial Set, by Herman Bernard.

Jan. 16—Anderson's 5-Tube Quality Receiver, The Raytheon B. Eliminator, by Lewis Winner.

Jan. 23—The 4-Tube Diamond of the Air, by Herman Bernard. The Antennatrol, by Herbert E. Hayden (Part 1). B Batteries Last Six Months, by S. E. Finkelstein.

Jan. 30—An Individual AF Amplifier, by H. E. Hayden. The Antennatrol, by Herbert Hayden (Part 2). Trapping Out Super-Power in New Jersey, by Capt. P. V. O'Rourke.

Feb. 6—The Fenway (4 or 9 tubes), by Leo Fenway (Part 1). The Great 1-Tube DX Set, by Herman Bernard.

Feb. 13—Anderson's 5-Tube Economical Receiver, Trouble Shooting for Novices, by M. B. Strock. The Fenway, by Leo Fenway (Part 2).

Feb. 20—The 8-Tube Victoreen, by Herbert E. Hayden. The Fenway, by Leo Fenway (Part 3). Quality Stressed in 3-Tube Set, by Brainard Foote.

Feb. 27—The 4-tube DX Dandy, by Herbert E. Hayden. Umbrella Aerial for DX, by Hugo Gernsback. Part 2 of The Victoreen.

Mar. 6—The 1-tube Set, by Capt. O'Rourke. The Chemistry of Batteries, by A. R. Reid. The Victoreen Set (Part 3), by Herbert E. Hayden.

Mar. 13—The Non-Regenerative Browning-Drake Set, by M. B. Sleeper. The Tectron Eliminator (Part 1), by Lewis Winner. Curing Victoreen Trouble, by Herbert E. Hayden.

Mar. 20—The Super-Heterodyne, by J. E. Anderson. A 2-Tube Speaker Set, by Percy Warren. The Browning-Drake Set (Part 2), by M. B. Sleeper. A 2-tube Eliminator, by Lewis Winner.

Mar. 27—An Economical 4-Tube Set, by Edgar T. Collins. A Practical B Battery, by Capt. P. V. O'Rourke. Tectron Trouble Shooting, by Lewis Winner.

April 3—The Bernard Portable, by Herman Bernard (Part 1). How to Get Dx, by Capt. P. O'Rourke. A Compact B Supply, by Lewis Winner.

April 10—The Bernard Portable, by Herman Bernard (Part 2). Two Eliminators for DC, by Lewis Winner. A Super From An Old Set, by C. King.

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facturer? Broadcasters are in no different position with respect to music.

If broadcasters wanted to obtain music without payment, or at a low payment, then there would be some basis for the opposition which comes from the American Society. We cannot, however, discover one valid argument which can be advanced against a proposal to pay fairly and liberally for the use of copyrighted music to every copyright owner, whenever copyrighted music is used, whether he be a member of the American Society or not. We have no desire to obtain this music upon a low basis, but on the contrary are willing to pay fully and fairly for its use. What we do desire is permanency, so that a broadcaster may know whether he will be in business next year or the year after.

Condition Called Chaos

Furthermore, any arrangement made with the American Society does not take into consideration those writers outside of the American Society, who often are more in need of payments than the established members of the Society. Therefore, we believe our proposal is fair from every standpoint. Then there is the public interest to consider. As matters stand at present, the American Society withdraws musical numbers from their licensed users at will. This was done in the cases of Rose Marie, Nanette, and others. As far as the public interest is concerned, it is made up of a desire to hear the music it wants to hear. If the public knows that the broadcaster pays for the use of his music, then he sees no reason why certain popular numbers should be withdrawn at the height of their popularity.

In 1909 a Copyright Law was passed. It contains a so-called mechanical paragraph covering the use of copyright music by mechanical reproducers such as phonograph records, player piano rolls and others. If radio had been known at that time, it would undoubtedly have been included, because radio is a mechanical reproduction.

Broadcasters are trying to have this mechanical paragraph enlarged so that it includes radio. We have no interest in the rate paid by phonograph record manufacturers. All we wish is the principle applied to radio, and a new rate set for the use by radio, which may be as high as Congress or any other constituted authority may, in its judgment, determine as being fair and equitable. The career of radio has been one of chaos extending in a long line from the producer of supplies of manufuacturing down to the ultimate listener. It is time that at least one portion of this chaos be removed, and that a fair and just settlement be made of a matter which has been acutely controversial ever since broadcasting started.

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Equipped with the famous BST-6, a six-tube tuned radio frequency receiver of astonishing volume; of clear, rich, beautiful tone. The circuit consists of two stages of tuned radio frequency, tube detector and three steps of balanced audio.

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Direct from factory to you

$85.00 Includes the BST-6 Receiver Installed in Highboy Period Cabinet, as illustrated and loud speaker. F.O.B. New York

GUARANTEE

Each HIGHBOY is carefully examined so we know that the wood, carving, finish and trimmings are flawless and in perfect condition. It is packed by experts in a separate, specially-built, padded, wooden packing case, so that it must reach you in perfect condition.

The radio and loud-speaker are tested and inspected for workmanship, volume, tone and distance reception, so you will receive as nearly as is humanly possible a perfect radio in this BST-6 Highboy.

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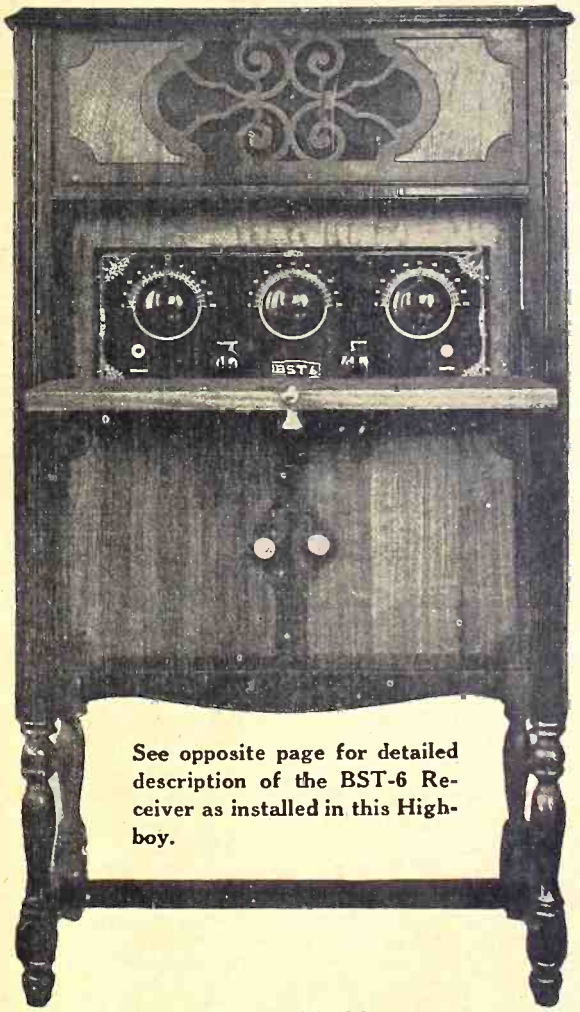

See opposite page for detailed description of the BST-6 Receiver as installed in this Highboy.

BST-6 Highboy
Height 45¼", width 25¼", depth 14¼"

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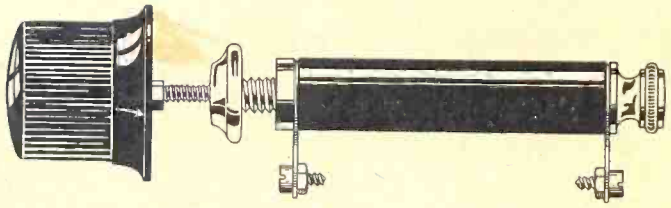

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E. HIGGINS,
130 Washington Ave.,
Elizabeth, N. J.

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An obligation of gratefulness impels me to write you that any one who has not used the Bretwood does not know what a grid leak is.

BRUNO GONZALEZ,
General Staff Sergeant,
Cuban Army.
P. O. Box 910,
Havana, Cuba.

* * *

I think the Bretwood is the best grid leak I have ever used. Have made quite a few sets and this beats them all. Get DX very plainly and clearly.

WM. HEBERSON,
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Philadelphia, Pa.

* * *

Bretwood Grid Leak received and tested out. I find it is the only variable leak I ever used that is really variable.

Enclosed find $1.50, for which please send me another one.

F. E. STAYTON,
Box 240, Ardmore, Okla.

* * *

With your grid leak I was able to bring in with good volume 15 W stations in one week with a Diamond of the Air set from a city hard to get out of.

Thanking you.

F. W. COLLINGWOOD,
3442 Sacramento St.,
San Francisco, Cal.

* * *

I received the Bretwood Variable Grid Leak last night and it sure did bring in stations. Denver was as far as I could get until last night, when, with the Bretwood in my set, I brought in KFI, Los Angeles, and KPO, San Francisco, Cal., clear and fine.

JOS. L. MARIE,
4026 Grezella St.,
Pittsburgh, Pa.

* * *

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