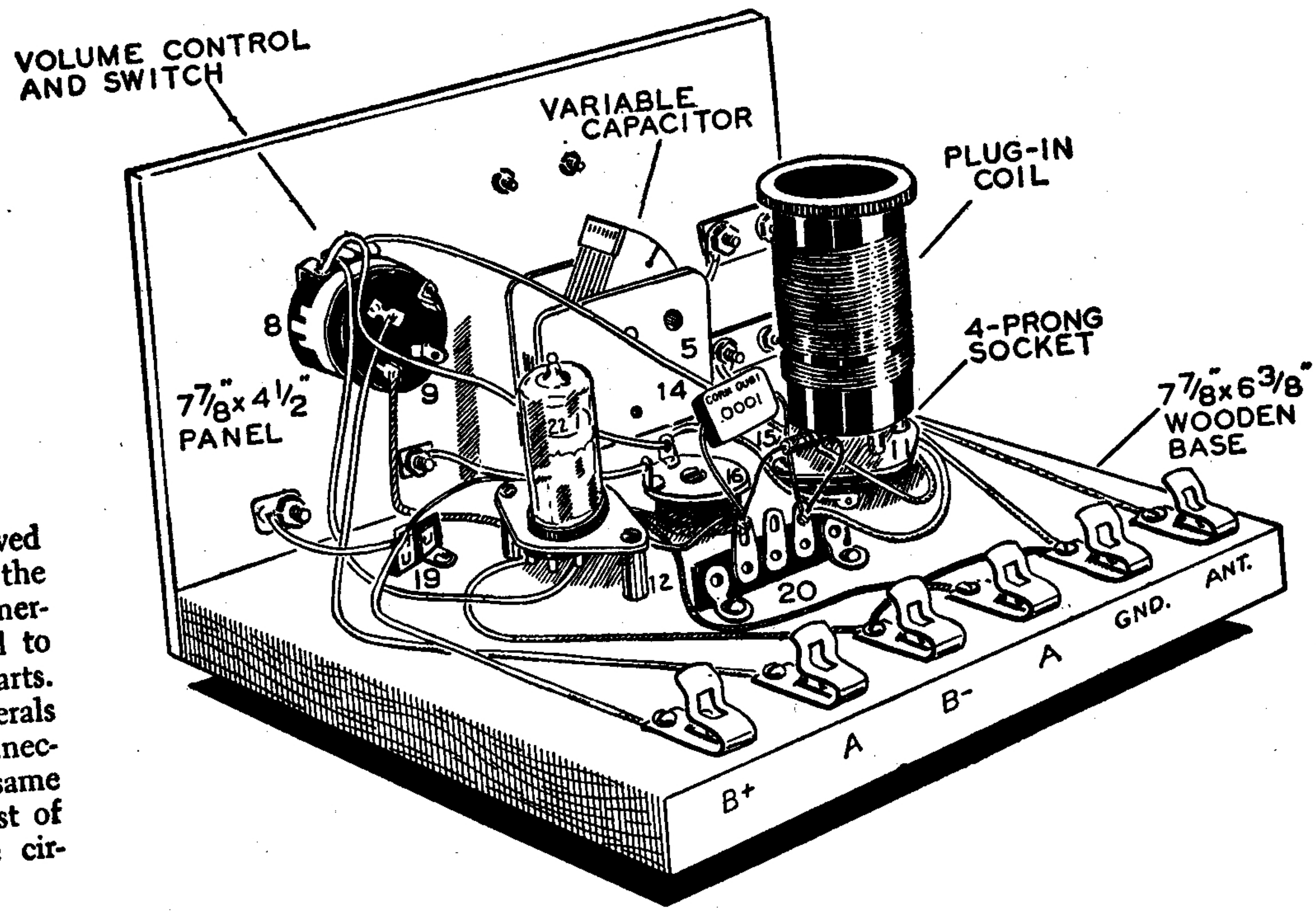
Chapter Nine

HOW TO BUILD A ONE-TUBE REGENERATIVE RECEIVER

None of the receivers with crystal detectors in this book are elaborate. They are not difficult to make and the parts and materials required for their construction do not cost much. These are good designs for anyone who is building a radio receiver for the first time. Their only disadvantage is that sometimes they will bring in more than one station simultaneously. A more sensitive and more selective receiver can be built by using a vacuum tube detector in a feedback or regenerative circuit.

If you have read Chapter Four you will remember that regeneration in a radio circuit consists of feeding back current from the plate circuit to the grid circuit. Regeneration in a receiver greatly strengthens and amplifies signals.

The one-tube regenerative receiver described in this chapter will bring in the signals of amateur, police, aviation, ship and broadcast stations from stations hundreds of miles away. It responds to a wider range of frequencies and tunes more sharply than any of the crystal detector receivers. It utilizes a "low drain" vacuum tube which consumes very little current and so is especially suited to operation on batteries. When provided with a complete set of plug-in coils, the receiver will tune in all wavelengths from 16 to 550 meters. It will produce

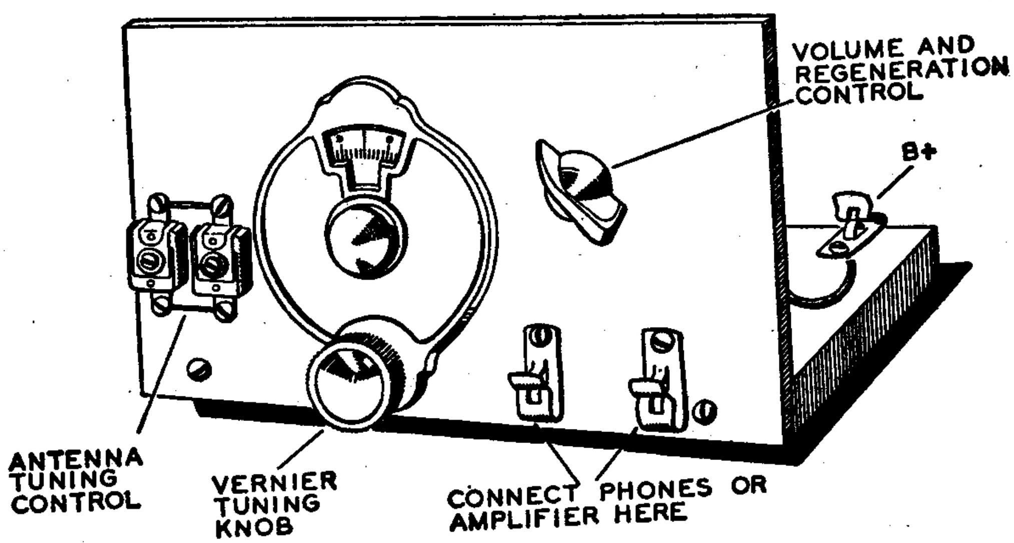


The receiver viewed from the back of the panel. The numerals can be used to identify the parts. The same numerals are used in connection with the same parts in the list of parts and the circuit diagrams.

ONE-TUBE REGENERATIVE RECEIVER

loud signals in a pair of headphones but does not have enough signal strength to operate a loudspeaker unless connected to an amplifier.

A one-tube receiver is the best model for a beginner. The circuit is less complicated than that of a receiver using more than one tube and there is less chance of making a mistake in the wiring. The parts are less expensive and can be assembled more easily. You do not actually "build" a receiver of this type. You cannot make satisfactory variable capacitors, volume controls, etc. They must be factory made. The only homemade parts are the wood base, panel, ground plate, connecting strips and a wooden bolster. The other parts can be purchased from a dealer in general radio supplies. Such firms advertise in the radio magazines and are glad to send you their catalog if you write them for it. The necessary screws can be obtained at a hardware store. Here is a list of the parts and materials needed:



ONE-TUBE REGENERATIVE RECEIVER

The receiver from the front of the panel. This view reveals parts which cannot be seen in the preceding sketch.

1 6BF6 Receiving tube (22)
1 Wood base 7⅞ in. x 6⅝ in. x ¾ in. (2)
1 Wood panel 7⅞ in. x 4½ in. x ¼ in. (3)
1 Piece of wood 1 in. x 2½ in. x ¼ in. to be used as a bolster for the variable capacitor * if necessary
5 Connecting strips 1⅛ in. x ⅜ in. cut from thin sheet metal
1 Piece of thin sheet metal 7¼ in. x 5¾ in.
1 500,000-ohm volume control (8)
1 Switch to fit volume control (9)
1 Knob for volume control (10)
1 Vernier knob and dial (6)
2 4-prong plug-in coils for broadcast band when used with a 365-MMFD tuning capacitor
1 10 to 365-MMFD variable tuning capacitor
1 4-prong socket (77)
1 Socket for 7-pin 6BF6 tube (12)
2 4-80 MMFD-mica trimmer capacitors (7)
1 2.5-millihenry radio frequency choke (16)
1 2.2-megohm ¼ watt resistor (15)
1 .0001-MFD mica capacitor (14)
1 .0025-MFD mica capacitor (13)
1 6-volt battery or 6.3-volt filament transformer
1 67½- or 90-volt B battery
8 Binding posts or Fahnestock connectors (17)
1 Single-terminal Bakelite terminal strip (19)
1 Three-terminal Bakelite terminal strip (20)
14 ⅝-in. No. 6 round head brass wood screws
4 ½-in. 6-32 round head brass machine screws with brass nuts to fit
2 ¾-in. 6-32 round head brass machine screws
1 2000-ohm radio headset
4 Rubber head tacks; 8 Small tacks
Shellac, sandpaper, rosin-core solder, push-back wire
4 Round head screws and spacers for mounting sockets

* Let's call condensers by their accurate scientific name from now on.

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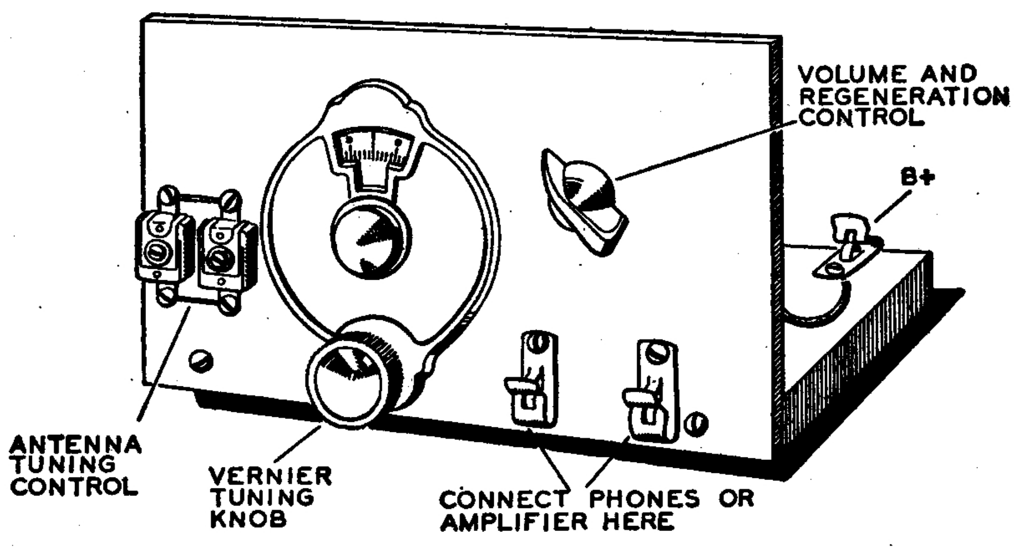


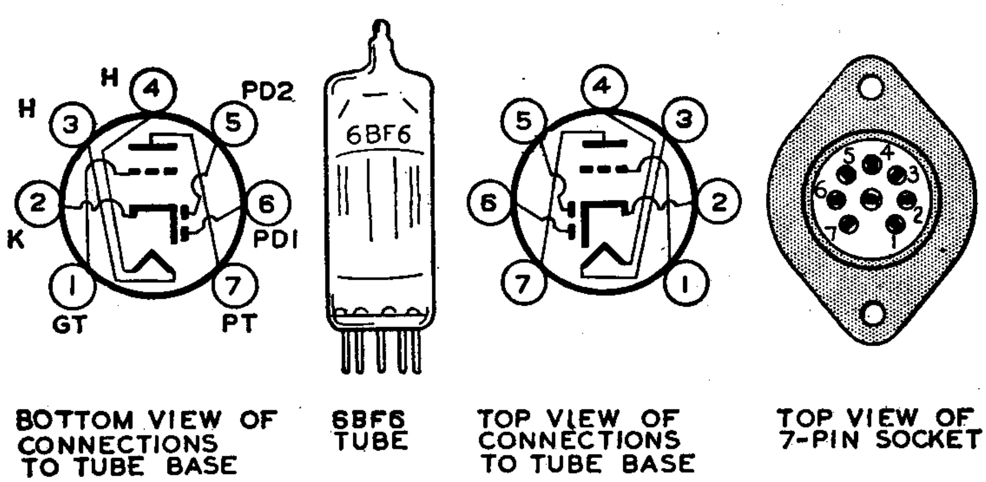
ONE-TUBE REGENERATIVE RECEIVER

The receiver from the front of the panel. This view reveals parts which cannot be seen in the preceding sketch.

The numbers in parentheses following some of the items in the list on page 163 identify these parts on the plan and in the wiring diagrams.

DESCRIPTION OF SOME OF THE PARTS

The Tube. When this book was first published, small low-current-consuming triode tubes for use in battery-operated receivers as detectors and amplifiers were manufactured. They are no longer available. The triode used in the one-tube regenerative receiver described in this chapter and in the amplifiers in the chapter following is the triode section of a 6BF6 tube. The 6BF6 is a multi-unit tube technically described as a twin



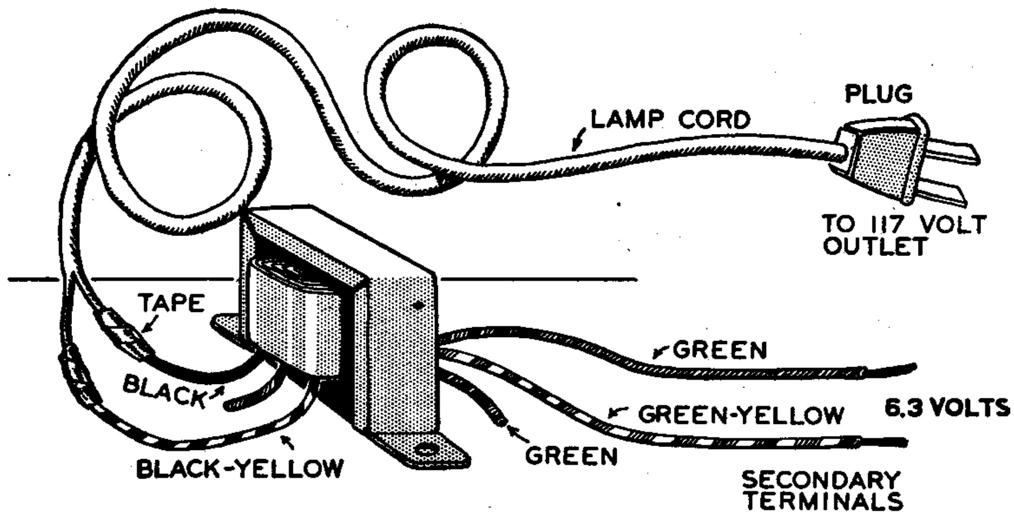
BASING DIAGRAMS AND SOCKET FOR 6BF6 TUBE

diode and medium-mu triode. It is a miniature type normally used as a combined detector, amplifier and automatic volume control (avc) tube. It consists of a triode (three elements) and two diodes (two elements) in the same glass envelope. Only the triode section is used by the regenerative receiver and by the amplifiers. The tube requires a miniature sevencontact socket and may be mounted in any position. Only five of the contact pins (Nos. 1, 2, 3, 4 and 7) are used in the apparatus described in this book.

6BF6 has no filament. A filament in a tube usually serves both as a cathode and a source of heat. 6BF6 has a cathode (pin No. 2) and a heater (pins Nos. 3 and 4) common to the triode and diodes. The heater is designed to be operated on 6.3 volts. Either AC or DC may be used. The heater current is 0.3 amperes at 6.3 volts.

Current Supply. Four new size D flashlight cells or four new No. 6 dry cells connected in series will operate the heater of a 6BF6 tube. The voltage of four new dry cells in series will be slightly more than 6 volts. The voltage will drop with use and with age. When the voltage of four cells drops below 5½ volts the tube will probably not function well. A set of No. 6 dry cells will outlast many size D flashlight cells discharged at an 0.3 ampere rate.

The most satisfactory source of 6.3-volt heater current is a small 6.3-volt filament transformer. The primary of the transformer should be connected to an attachment cord and plug which can be plugged into a 117-volt AC outlet. The secondary is connected to contacts 3 and 4 on the socket. The transformer which you buy may be one which has three wires connected to the primary and three to the secondary. The electric wiring in many homes with a two-wire feeder is inadequate. The result is that when lamps, radios, etc. are turned on the line voltage is only 105 to 107 volts. An adequate wiring system with a three-wire feeder supplies current at 117 to 120 volts. The black primary wire and the black yellow wire are used when the house voltage is approximately 107. When 117 to 120 volts current is available, the black and the red and black primary wires are used. The green and yellow secondary wire is a "center tap." It, together with either one of the green wires will deliver 6.3 volts if the correct pair of primary wires are connected to the lighting circuit.



6.3-VOLT FILAMENT TRANSFORMER

Sockets. Eby one-piece molded Bakelite sockets for the tube and coil can be mounted more easily than other types. They can be fastened directly to the wood base with two screws. Amphenol "MIP" sockets and Eby wafer sockets made of laminated Bakelite cost less than other sockets. They can be used if mounted on spacers which raise them about ⅜ inch above the base.

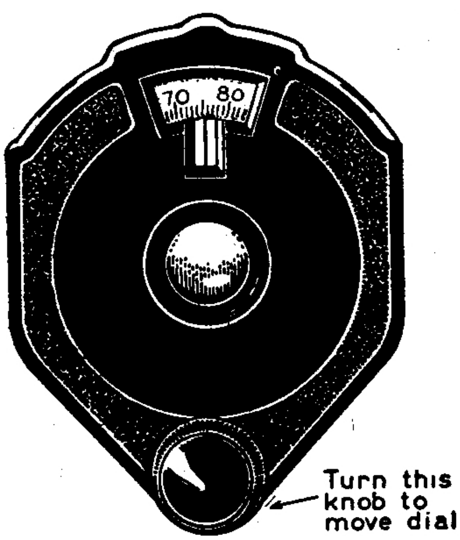
The Volume and Regeneration Control. This should be the type to which a switch can be attached. Purchase a switch also. The switch is connected in series with the tube filament and the battery which heats the filament. Then the same knob which controls the volume and regeneration can be used to turn the receiver on and off.

Variable Capacitor. Purchase a standard midget single gang TRF type variable capacitor with two bearings. It is more rugged than a single bearing capacitor. The maximum capacity should be 365 micromicrofarads (abbreviated MMFD) and the minimum when the plates are not intermeshed about 10 MMFD. TRF is the abbreviation for "tuned radio frequency."

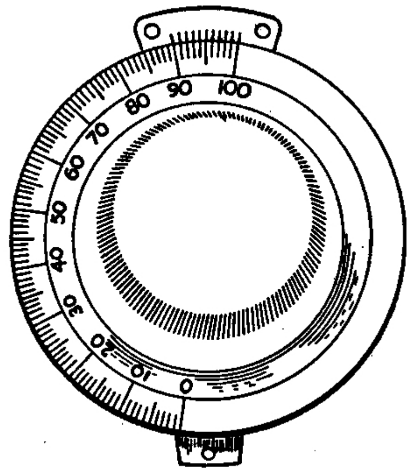
There is space for trimmers provided on the TRF capacitors but trimmers are not used at that point in the circuit of a regenerative receiver. Small rotary variable capacitors are usually so built that the capacity increases when the shaft is turned in a counterclockwise direction. The shaft can be rotated 180°.

Capacitors are sometimes listed in catalogs as condensers. Capacitor is a better term and is gradually replacing the older word.

The Dial and Knob. Any of several types of knobs which fit a ¼-inch round shaft can be used to turn the variable capacitor. Some are equipped with pointers designed to swing over a dial plate attached to the panel. Others have a dial which moves with the knob and a marker on the panel indicates the position of the dial. It is difficult to make a close adjustment of the variable capacitor with any of these direct drives. A



VERNIER DIAL



BAKELITE KNOB AND DIAL

TUNING DIALS AND KNOBS

The knob and dial at the right is a direct drive device. Any rotation of the knob moves the tuning capacitor an equal amount. The vernier knob and dial is an indirect drive. The knob and dial are geared to the capacitor so that the knob must be turned a considerable distance in order to turn the capacitor a short distance.

vernier dial is more satisfactory. It should have a 0-180° counterclockwise scale to fit the capacitor. The knob on a vernier dial does not drive the condenser shaft directly. It is geared. The knob on the type of vernier dial in the illustration must be turned several revolutions in order to turn the condenser shaft one-half revolution. This permits very fine adjustment of the condenser and close tuning.

Trimmer Capacitors. Trimmer and padder capacitors are commonly used in radio receivers to adjust circuits which include radio frequency transformers and variable capacitors. In the one-tube regenerative receiver, two trimmer capacitors connected in parallel are used to tune the antenna circuit. They are adjusted with a screwdriver. It is necessary to use a different adjustment for each plug-in coil.

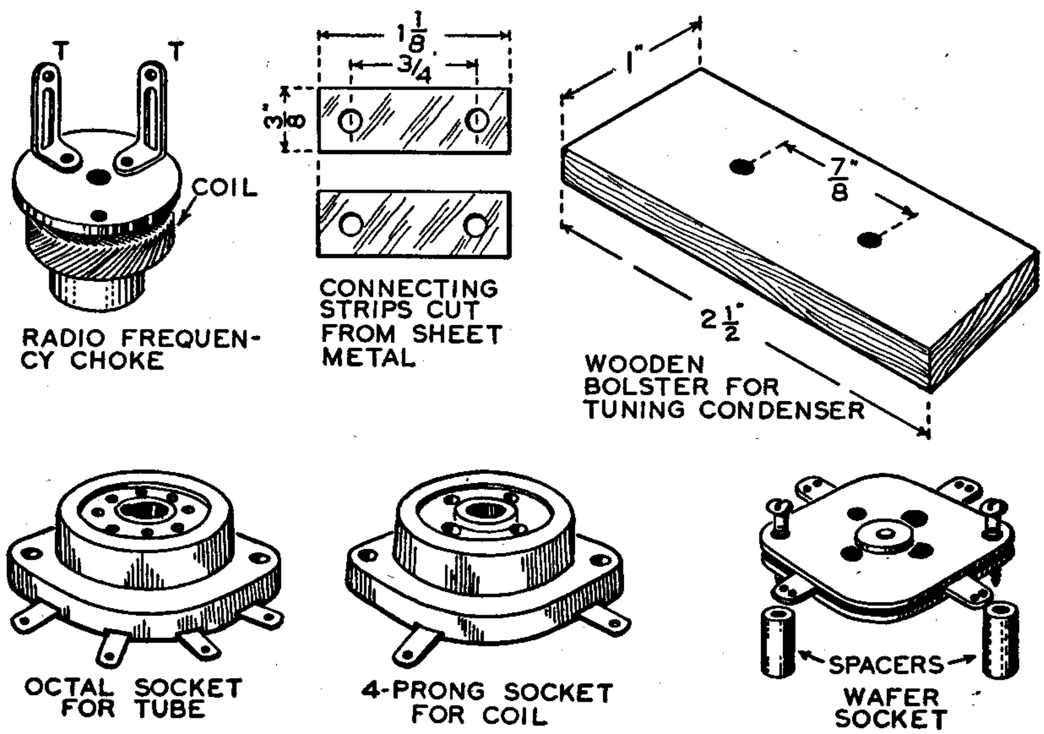
A small variable capacitor which has a capacity range of 10 to 200 micromicrofarads can be used in place of the two trimmer capacitors. It is easier to adjust (adjustment is made by turning a knob) than trimmer capacitors but costs five times as much as a pair of trimmer capacitors. Trimmer capacitors are used in the one-tube regenerative receiver to keep the cost low.

The Plug-in Coils. It is advisable to purchase factory made plug-in coils for the receiver. Several mail order firms sell completed coils and also unwound coil forms. 4-prong, 5-prong and 6-prong coils are available but only 4-prong coils will fit this one-tube regenerative receiver. Each 4-prong plug-in coil consists of two separate windings wound on a molded Bakelite form. The terminals of the windings are connected to the prongs. The prongs fit the standard 4-prong tube socket. The upper (and longer) winding is called the antenna and grid coil. The lower and smaller winding is the "tickler" coil.

The size of the coils plugged into the 4-prong socket determines the frequency range of the receiver. You will need two readymade 4-prong plug-in coils with proper windings so that when used with a 365-MMFD tuning condenser, the frequency band of the receiver will cover the broadcast band. Coils covering the higher frequencies or shorter wavelengths are also obtainable.

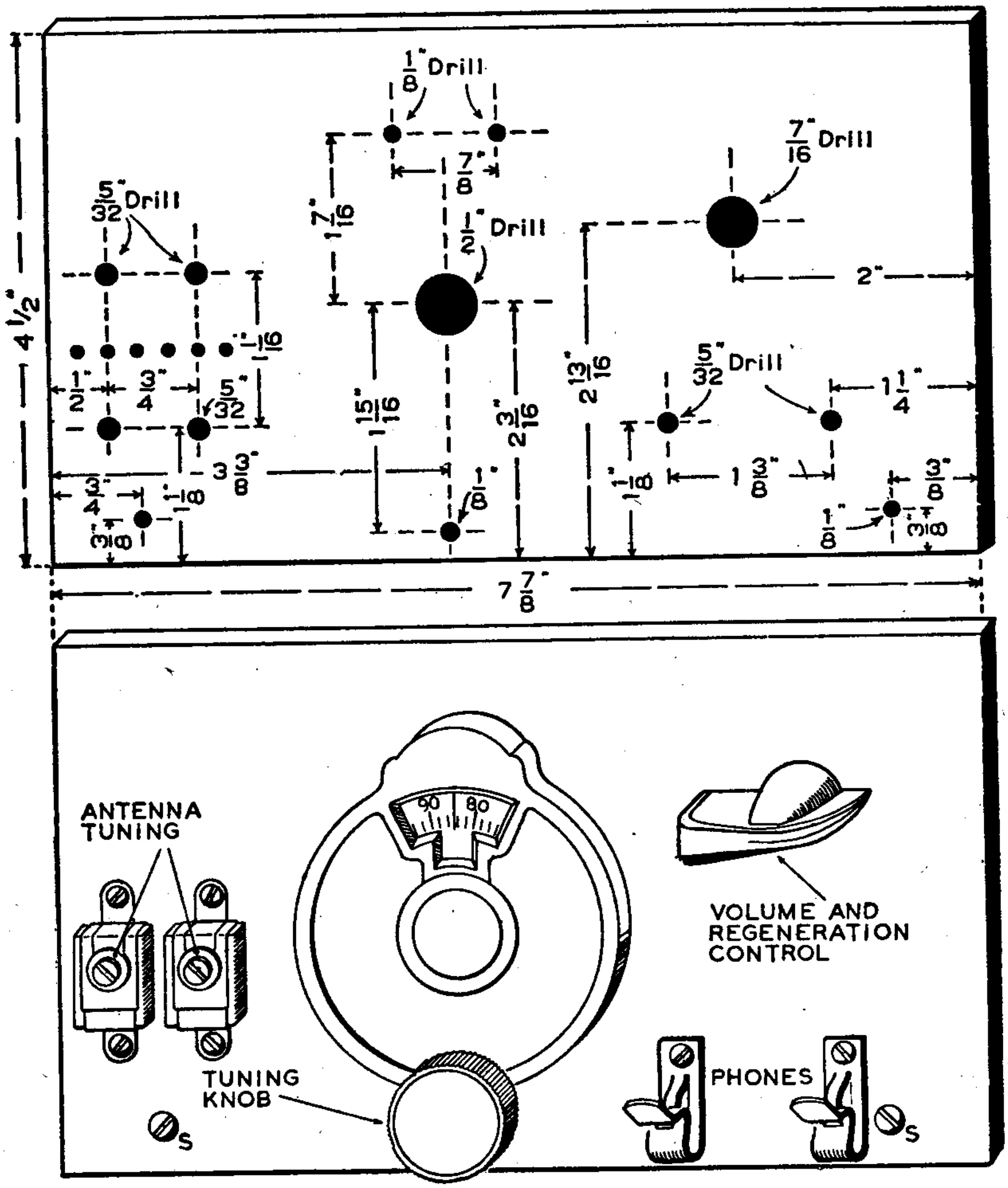
Some radio parts can be scarce and it can be difficult to find readymade plug-in coils,for example. It may be necessary then to buy empty coil forms and wind them. The method of winding is described later in this chapter.

The Homemade Parts. The base of the receiver is a piece of pine 7⅞ in. x 6⅜ in. x ¾ in. Smooth it with sandpaper and finish all surfaces including the underside with two coats of white shellac. The shellac will seal the wood against moisture and reduce its tendency to warp. The panel is a piece of ply-



PARTS FOR THE RECEIVER

Two connecting strips are used to connect the trimmer condensers in parallel. Three of the connecting strips are used as terminals. Use one under each of the nuts on the back of the panel which hold the PHONE posts, and one to make connection to the frame of the tuning capacitor. The two sockets at the lower left are Eby sockets. The letter "T" indicates the terminals on the high-frequency choke.



THE PANEL

The panel is made of ¼ in. to ⅜ in. plywood, drilled as shown in the top drawing. The drawing at the bottom shows the front of the panel after the parts have been mounted on it. The position of the holes drilled in the panel and used to mount the capacitors and dial may differ from the locations shown in the upper sketch. They should be located to fit the particular capacitors and dial which you use.

wood measuring 7⅛ in. x 4½ in. The thickness is unimportant. Plywood ranging from ¼ in. to ⅜ in. thick will make a satisfactory panel. The panel should be shellacked on both sides and all edges. It is fastened to one edge of the base by three No. 6 round head brass wood screws (marked S in illustration).

The ground plate is a piece of thin sheet metal (galvanized iron or tinplate) 7¼ in. x 5¾ in. It can be cut out of a one-gallon can with a pair of snips. Cut a small piece off each corner so as to eliminate the sharp points. Flatten the metal by pounding it with a block of wood and then punch eight small holes, one in each corner and one near each edge midway from the corner, with the point of a small nail.

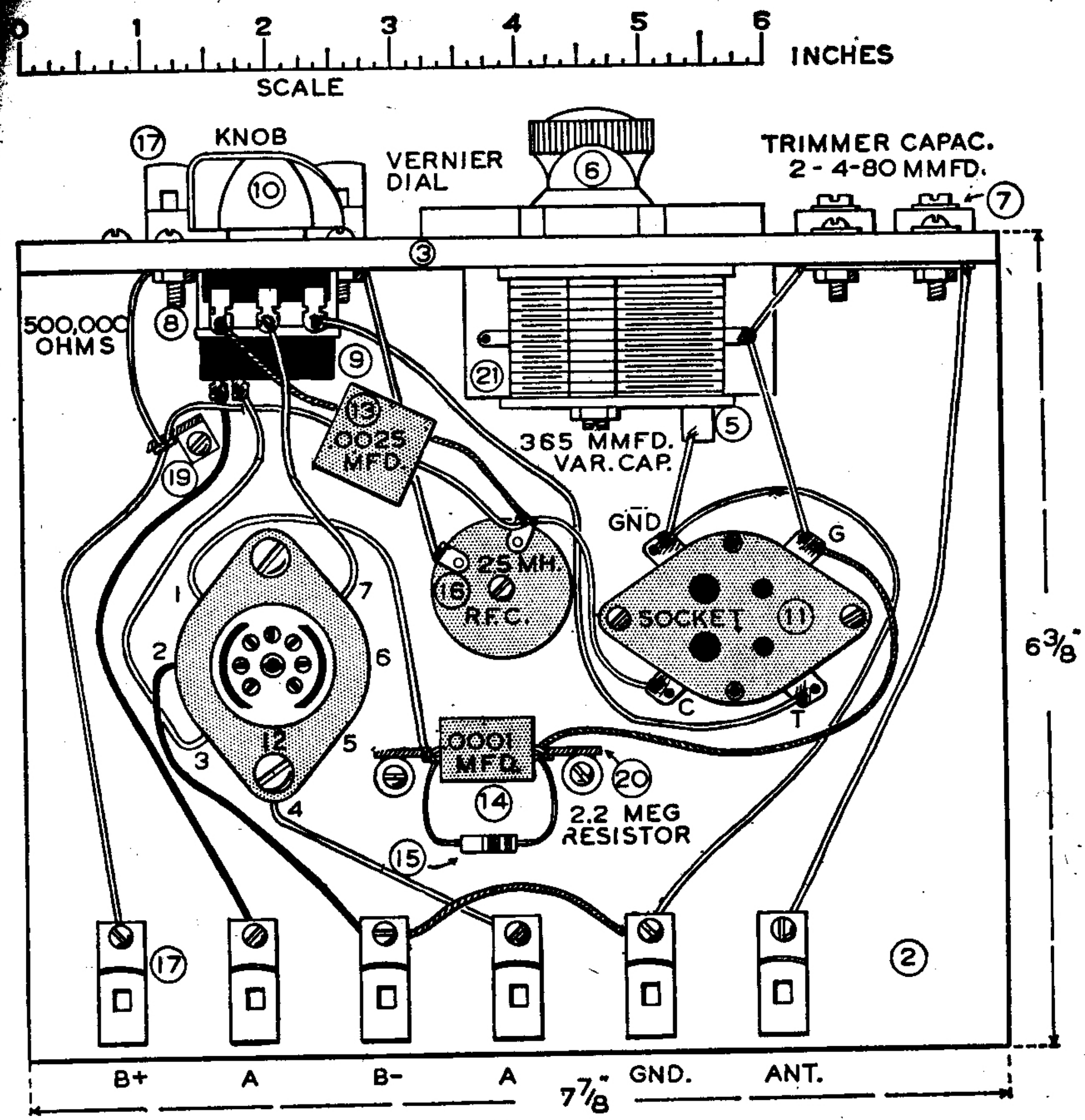
The ground plate is fastened to the underside of the base by eight small tacks which pass through the holes punched in it with a nail. If the receiver is equipped with the type of variable capacitor which must be fastened to the base, the ground plate cannot be attached to the base until after the capacitor has been mounted. If a panel-mounted capacitor is used, the ground plate can be attached before the panel is put in place.

The ground plate reduces "body effect." This is a disturbance in the tuning which may take place when a hand is moved either toward or away from the receiver.

If a panel-mounting variable capacitor is used, it will not be necessary to make a small wood bolster. This 2½ in. x 1 in. x ¼ in. wood strip is required only for a base-mounting variable capacitor. The holes in the bolster should be the same distance apart as the mounting holes in the condenser so they will align.

ASSEMBLING THE RECEIVER

The plan of the receiver in one of the illustrations is the best guide for assembling the parts on the base and panel. At the top is a scale for use in determining the exact location of the parts. This scale can be used to measure inches in the same



PLAN OF THE RECEIVER

manner as the scale on a map is used to measure distance in miles. For example, to determine the exact location of the center of the tube socket (12), measure the distance on the plan from the left hand edge of the base to the center of the socket and from the back edge of the base to the center of the socket. Use a ruler, a pair of dividers or a strip of paper to measure these distances, whichever is convenient, and then compare them with the scale. This will show the center of the socket to be 2⅛ in. from the left hand edge and 3½ in. from the back edge.

The Fahnestock Connectors (17) or binding posts are mounted near the back edge of the base so that wires from the batteries, etc., can be attached to them without disturbing any of the receiver wiring.

The Radio-Frequency Choke (16) is held to the base by a BRASS screw which passes through a hole in the center of the choke. Do not use an iron screw.

The Resistor (15) is not fastened down to the base. It is supported by its own terminal wires.

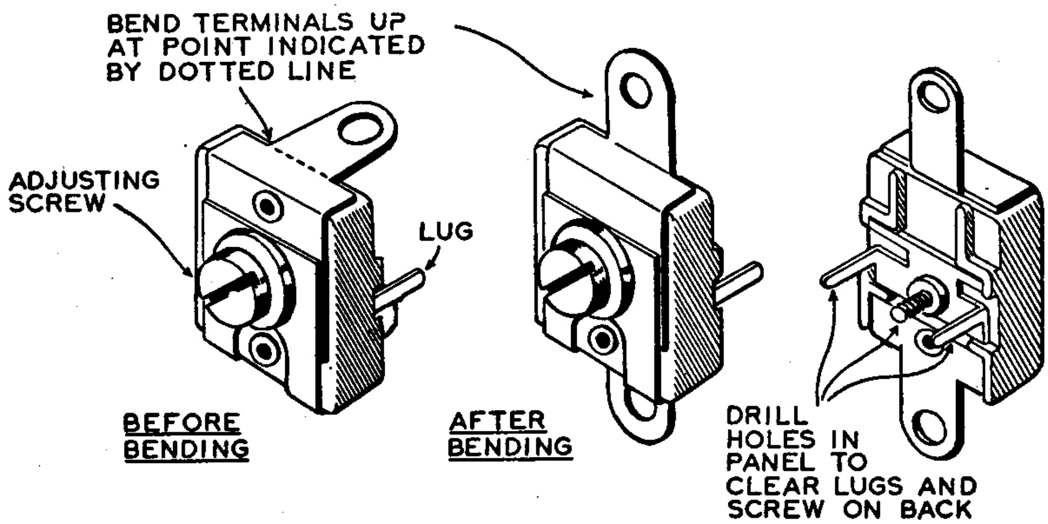
The Mica Fixed Capacitors (14) and (13) are also supported by their own terminal wires and not fastened down to the base.

Variable Capacitor. The variable capacitor (5) in the model receiver which was used to make the illustrations is fastened to the wooden base close to the panel. At first glance, it may appear to be supported on the panel. The shaft extends through the panel but the capacitor rests on a small wood bolster strip (21) which measures approximately 2½ in. x 1 in. x 14 in. The strip rests on the base, between the base and the condenser. Two ¾-inch, 6-32 round head machine screws pass upward from the bottom of the base through the bolster strip and into threaded holes in the bottom of the capacitor frame. The underside of the base is counterbored ⅜-inch deep so that the heads of the screws are below the surface and cannot come into contact with the ground plate. The screws should not be long enough to project through the capacitor frame more than 1/16 inch. If too long they will touch the stator plates and short circuit the capacitor.

Some variable capacitors are designed to be mounted on a panel. If you obtain a capacitor of that type, you will not need to make a bolster strip. Bore a hole in the panel just large enough to pass the threaded bearing. Push the bearing through the hole from the rear of the panel and place the threaded nut on the bearing from the front. Tighten the nut until the capacitor is pulled firmly against the rear of the panel.

To Mount a Vernier Knob and Dial. Screws, nuts and a paper mounting template are packed with each vernier dial of the type shown in the illustrations.

1. Place the mounting template on the panel so that its center coincides with the center of the variable capacitor shaft.
2. Use a sharp scriber or a prick punch to mark all hole centers through the template onto the panel.
3. Remove the template and drill the holes of the diameter specified on the template.
4. If the capacitor shaft projects more than ⅜ inch beyond the front of the panel cut the surplus length off with a hacksaw.
5. Remove the hub cap from the dial by pulling it out.
6. Slip the dial over the end of the capacitor shaft that projects through the panel and fasten it in place by means of the four small screws, lock washers and nuts furnished with the dial.
7. Set the capacitor at its zero or position of minimum capacity and rotate the dial until it also is at zero before tightening the set-screw.
8. Tighten the hub set-screw but when doing this make certain that the dial disk is pushed back far enough so that it does not rub against the inside of the dial casing.



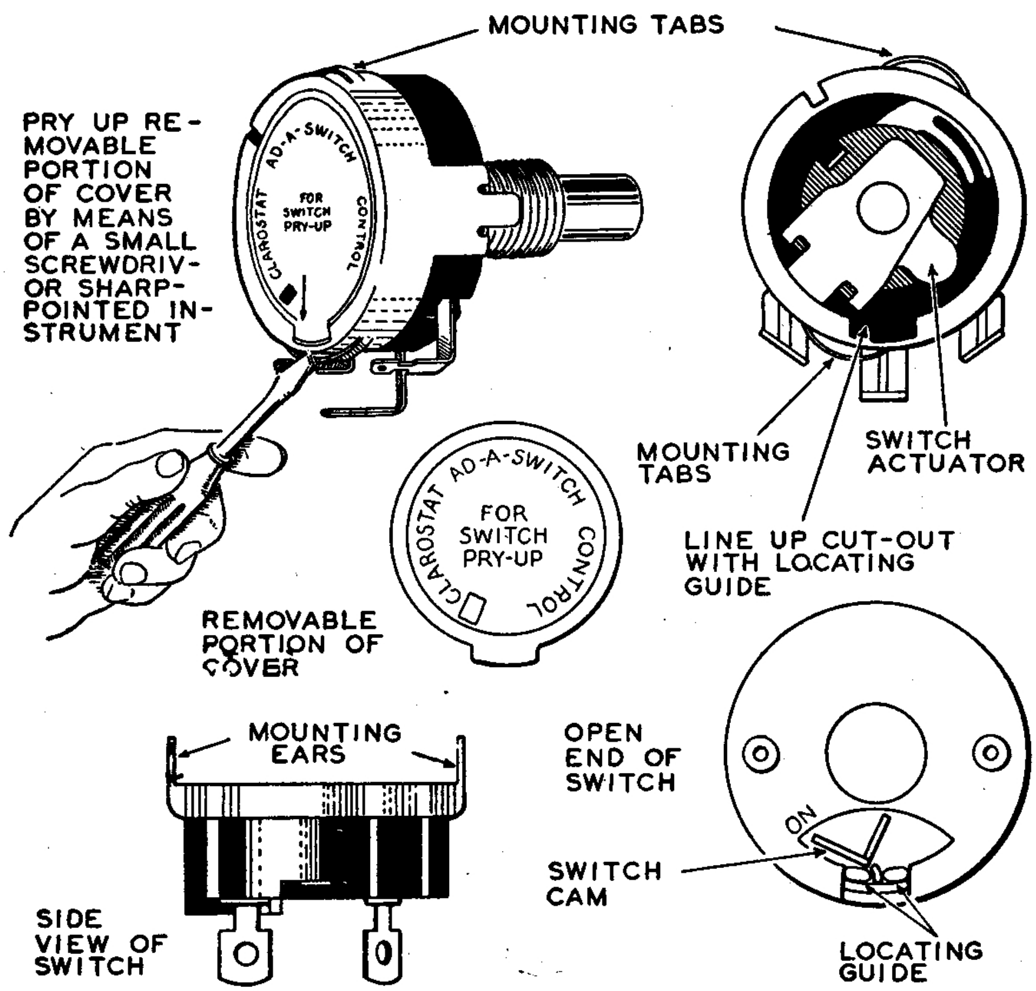
TRIMMER CAPACITORS

Holes must be drilled in the panel and the terminals on the trimmer capacitors must be bent as shown in the illustration before the capacitors can be mounted.

9. Replace the hub cap by pushing it into place.

The drive ratio of the vernier dial is variable. It provides 6 to 1 gearing in the fast position and 20 to 1 gearing in the slow position. Intermediate ratios can be selected by proper positioning of the small metal ball directly above the tuning knob.

How to Attach the Switch to the Volume Control. Pry off the removable portion of the metal cover on the volume control. Hold the control in your left hand so that the shaft points toward you. Use your right hand to turn the shaft in a clockwise direction as far as it will go.



HOW TO ATTACH THE SWITCH TO THE VOLUME CONTROL

This is described fully in the text.

Notice that there are two projecting metal tabs or "ears" on the metal rim of the switch—also that there is an opening in the switch cover. Inside the switch and visible through the opening is a "V"-shaped cam. Moving the cam operates the switch. Move the cam until it is in the center of the opening. Line up the projecting ears on the switch housing with the metal guides in the control case. Then press the switch firmly against the control and while holding it in that position bend the ears so that the switch cannot slip away from the control.

The control is mounted on the back of the wood panel with the shaft projecting from the front of the panel. Drill a hole in the panel just large enough so that the shaft bushing will pass through. Slip the bushing into the hole from the back of the panel and put the nut on from the front. Tighten the nut until the control is held firmly against the panel. Before tightening the nut turn the control so that the terminals are at the top.

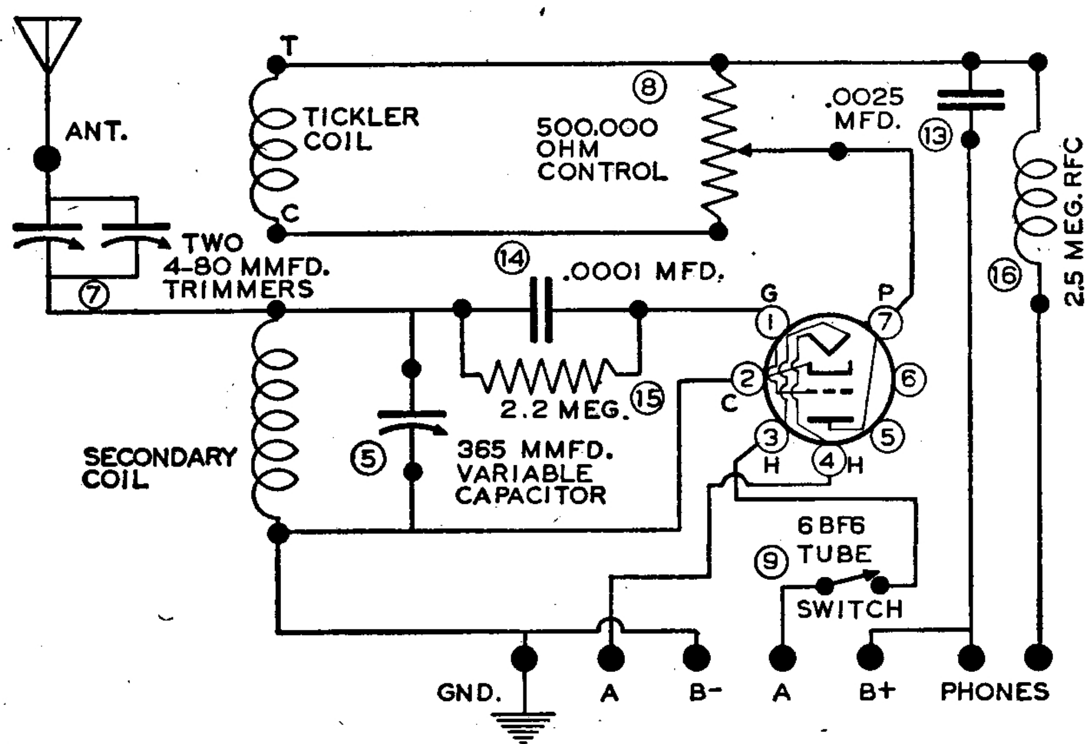
The shaft provided on the control will probably prove to be longer than is necessary and it must be cut off so that the control knob will be close to the panel. If the shaft is the notched type, it can be shortened by holding it in a pair of pliers and breaking it at the notch which will reduce it to the correct length. If the shaft is not notched, cut off the surplus length with a fine tooth hacksaw.

Fasten a molded Bakelite knob of the set screw type to the control shaft. Slip the "U"-shaped adapter which comes with the control over the end of the shaft. Loosen the set screw in the knob until it will not prevent the knob from sliding on the shaft. Set the knob where it belongs and tighten the set screw with a small screwdriver.

WIRING THE RECEIVER

When all parts have been fastened in position on the panel and base, the receiver is ready for wiring. Use push-back wire for the connections. The ends of all wires except those which can be clamped firmly under a screw or nut should be soldered with rosin core solder only. Acid core solder may cause short circuits which will prevent the receiver from operating. Instruction in soldering is found in another chapter at the end of this book.

The schematic circuit diagram, pictorial circuit diagram and the plan show how to make the connections. Have a pencil handy and as each connection is made, make a check mark alongside the equivalent connection on the circuit diagrams and plan. Check each connection in this manner and it will help to insure that none are overlooked. The wires should be as short as possible. Some wires in the plan are shown longer than is necessary from the standpoint of good wiring. They were drawn that way so that each wire can be traced from one end to the other. Follow the circuit diagrams and the plan with the utmost care. After completing the wiring, check it



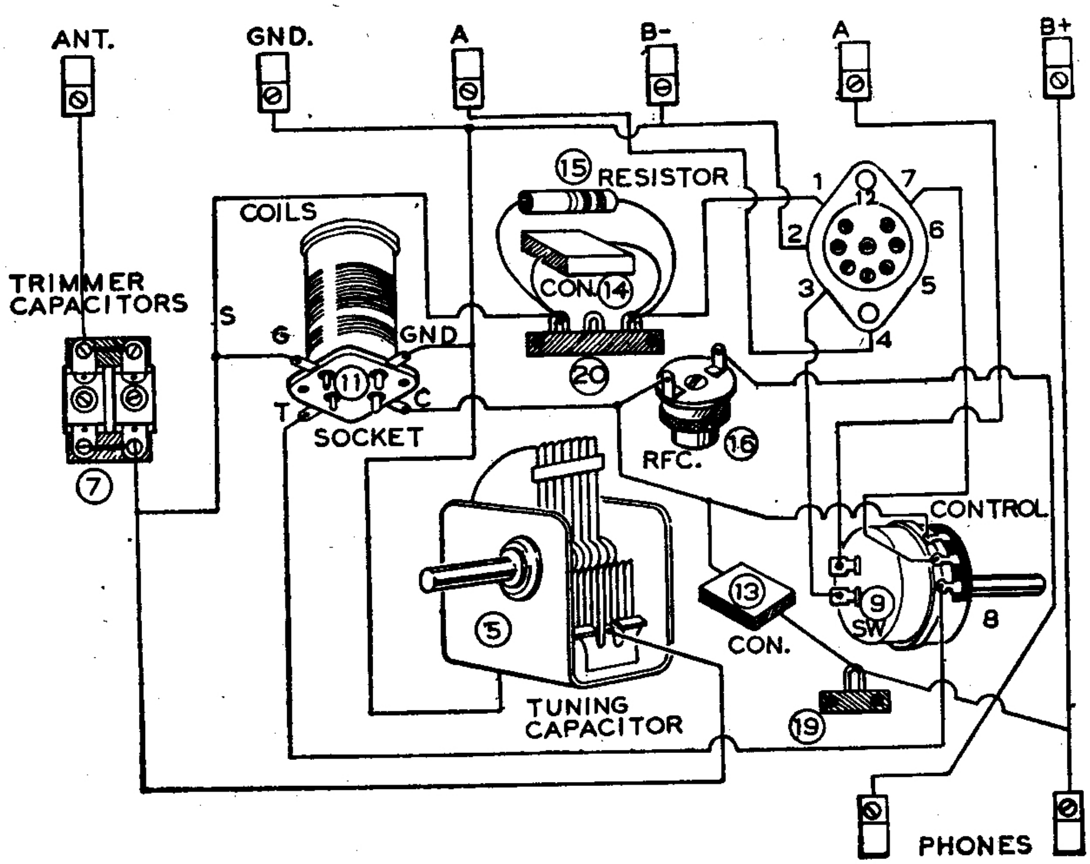
SCHEMATIC CIRCUIT DIAGRAM
FOR THE ONE-TUBE REGENERATIVE RECEIVER

carefully the second time. If a single wire is omitted or connected to the wrong place the receiver will not operate. The black wires in the plan are filament circuit connections.

HOW TO OPERATE THE RECEIVER

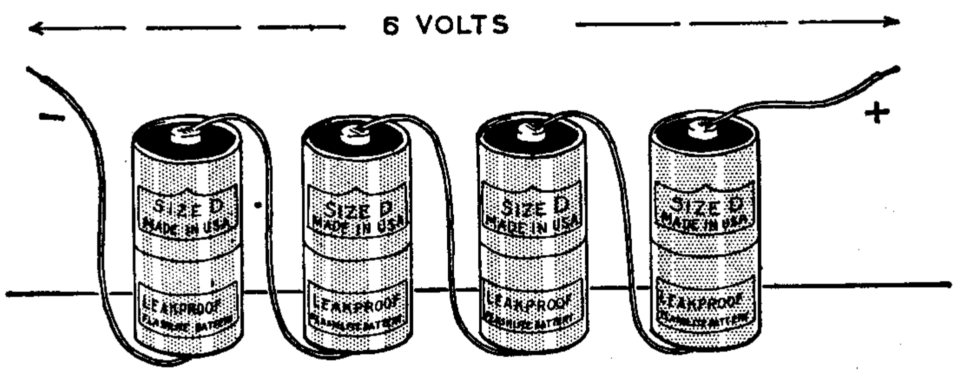
When the wiring is complete and has been checked, the receiver is ready for use.

Connect a 2,000-ohm radio headset to the PHONE terminals on the front of the panel. Place a type 6BF6 tube in the tube socket (12) and a 4-prong broadcast coil in the 4-prong socket (11). Mark the wooden base near each terminal so that the terminals can be readily identified as in the plan. Connect an antenna to the ANT terminal and a ground wire to the GND terminal.



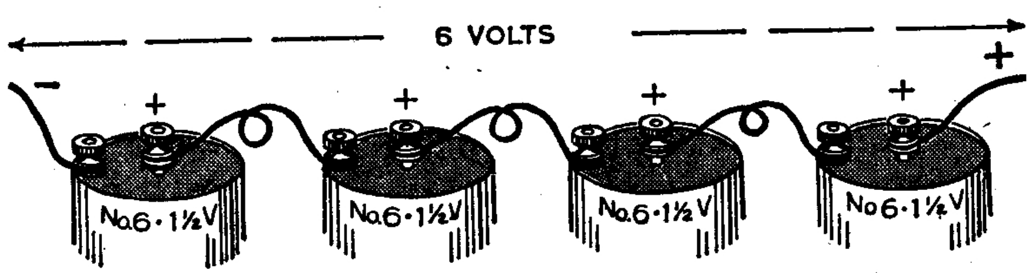
PICTORIAL CIRCUIT DIAGRAM
FOR THE ONE-TUBE REGENERATIVE RECEIVER

The antenna should be a 50-75 foot horizontal wire carefully insulated from surrounding objects.



Four size D flashlight cells connected in series will operate the heater in a 6BF6 tube, but No. 6 dry cells will give much longer service.

A 6-volt A battery or a 6.3-volt filament transformer and a 67½-volt B battery are required. The terminals on a B battery may require a three-prong plug or a pair of snap-ons in order to connect them to the receiver. If they are the type which requires a plug, solder two wires about 12 inches long to the plug terminals marked positive and negative. If snap-on terminals are provided solder a male snap-on to a 12 inch length of flexible wire and a female snap-on to a second wire of the same length. Connect the free ends of the wires to the B— and B+ terminals. This must be done correctly because the receiver will not operate if the positive wire is connected to the



FOUR NO. 6 DRY CELLS CONNECTED IN SERIES

These large cells cost much more than size D cells but are more economical if the regenerative receiver or amplifiers are used frequently.

terminal intended for the negative wire and vice versa. It is of no importance how the terminals of the transformer or of a 6-volt battery are connected to the A terminals. The center terminal on a flashlight cell and on a No. 6 dry cell are positive. The terminals on a B battery are marked with plus (+) and (−) signs to indicate respectively positive and negative.

Adjust the headset to fit your ears snugly. Then turn the regeneration control knob in a clockwise direction so as to close the filament switch and light the tube. Allow a few seconds to pass so that the tube warms up. Then turn the regeneration control knob until a distinct hiss is heard in the phones. The hissing sound is called "spilling over." With the set spilling over, adjust the trimmer capacitors (7) with a screwdriver. This can be done most satisfactorily with a non-metallic screwdriver, a fiber screwdriver used by radio service men and called an alignment tool. Turn the adjusting screw on each of the trimmer condensers in a clockwise direction until it will go no farther. Then turn it two or three complete turns in the reverse direction (counterclockwise). Adjust both condensers very slowly, turning the alignment tool first in one direction and then in the other until you find the adjustment which produces the loudest hiss in the headphones. Slowly rotate the knob on the tuning capacitor and as the capacitor turns a series of whistles and squeals will be heard, each indicating a different broadcast station. Turn the tuning knob until a spot is found where a continuous whistle can be heard and where it is loudest. The whistle can now be eliminated and replaced by signals from a radio station by a slight adjustment of the regeneration control. Turn the control counterclockwise until all whistling and hissing stops and radio signals can be heard. The volume of the signals can be regulated by the regeneration control.

When a station has been tuned in and the signal strength adjusted, a slight readjustment of the tuning control may be necessary. If signals are weak and whistling sounds do not disappear when the regeneration control is turned back almost to the off position, try tightening the adjusting screws on the trimmer capacitors.

When you have learned how to tune in stations in the broadcast band, you may wish to listen to stations on other frequencies—police, amateur, ship-to-shore, etc. Remove the broadcast band coil from the 4-prong socket and replace it with a coil intended for the frequencies you are interested in. The trimmer condensers must be adjusted for each coil. The adjustment of the trimmers need not be close, except for weak signals. Weak signals require careful and close adjustment of all three controls, namely; the tuning capacitor, the trimmer capacitors and the regeneration control. Careful tuning is required to bring in signals from amateur stations. The frequency of an amateur station is always much higher than that of a broadcast station. Amateur stations operate on much lower power than broadcast stations and their signals must be built up by careful adjustment of the receiver controls. It requires some experience and skill to tune the receiver so as to secure its best performance. So don't expect to pick up stations all over the world the first time you have the set in operation.

Signals from broadcasting and amateur radiotelephone stations come in best when the regeneration control is adjusted just below the point where whistling is produced. Telegraph signals ("dits and dahs") from code stations come in best when the regeneration control is adjusted just above the point where whistling is produced.

TROUBLE SHOOTING

Suppose that you have completed your receiver, hooked it up according to directions but do not pick up any signals. What then? You will have to go trouble shooting and find the cause. There are several things to do which may locate the trouble.

1. Disconnect the headphones from the PHONE post and touch

the terminals of the phone cord to the terminals of the filament (A) battery. If you do not hear a click each time you make and break the circuit, there is a loose or broken connection in the phone cord or in the receivers.

2. Turn the volume control switch so that the tube heater is lighted. Disconnect the positive B battery wire from the B+ binding post on the receiver. Tap the bare end of the wire against the B+ post and listen in the headphones. If you do not hear distinct clicks in the headphones, there is a connection missing or broken. Look for it.

If clicks can be heard in the headphones when you disconnect the B battery, it is a good omen and you can proceed to test other parts of the receiver.

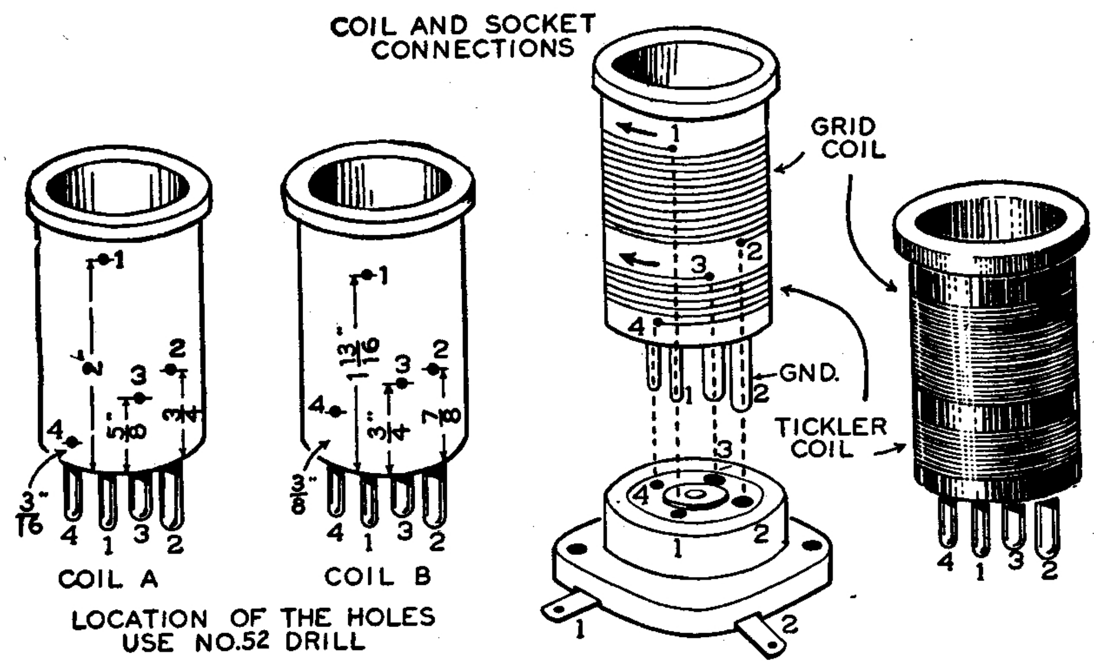
If no whistles or squeals are heard in the headphones when a broadcast coil is in the coil socket and the tuning control and regeneration control are moved back and forth (as far as they will go), the receiver is not regenerating.

1. The trimmer capacitors may be set up too tight to permit the receiver to regenerate. Loosen the adjusting screws on both capacitors and try tuning the receiver again.
2. If the receiver will not regenerate and produce squealing and whistling sounds when the controls are moved, check all connections and also check the batteries. Both A and B batteries should be fresh and connected properly.
3. Examine the variable tuning capacitor. Check it carefully. Make certain that there is no dirt, a small piece of wire or metal between the plates and short circuiting the rotor and stator.
4. Failure to regenerate may be caused by a tickler coil winding which is reversed. It is then necessary to reverse the connections which lead from the regeneration control to the coil socket. Unsolder the wires connected to the socket terminals marked T and C in the plan and solder to T the wire formerly connected to C. The wire formerly attached to T should be soldered to C. Do not make this change, however, until it is

certain that failure of the receiver to regenerate is not due to other causes.

HOW TO WIND A PLUG-IN COIL

Smooth and ribbed molded Bakelite coil forms of several lengths and diameters are listed in radio catalogs. To make the coils for the one-tube regenerative receiver which will enable it to tune in the broadcasting frequencies, buy two 4-prong, smooth rim coil forms, either 1¼ inches or 1⅜ inches in diameter and with a winding space 2⅛ inches long. About 75 feet of No. 34 B.S. gauge enameled wire and 35 feet of No. 30 B.S. gauge are also required. A ¼-lb. spool of each size is the smallest quantity sold and is more than sufficient.



COILS FOR THE BROADCAST BAND

The forms must be drilled so that the ends of the windings can pass through to the prongs. The left-hand sketches show the distance of the holes from the bottom of the forms. The holes can be spaced farther apart around the circumference of the form so that each is above its corresponding prong. The holes and corresponding prongs are marked with the same numerals in the illustration.

Four holes to anchor the ends of the windings must be drilled through the side of each form. The location of the holes is indicated in one of the illustrations. Bore the holes with a No. 52 twist drill held in a drill press or hand drill. The drill may have a tendency to slip away from the spot where a hole is to be made. This difficulty can be avoided by marking the spots where the holes are to be drilled and making a small indentation at each of these spots with the point of a penknife. Twist the knife blade until the point makes an indentation in the Bakelite form deep enough so that when the point of the drill is placed in it, the drill will not slip or "walk" away.

When all four holes have been drilled, turn the coil form so that the prongs point toward you and the two large prongs are at the bottom. Mark the prongs 1, 2, 3, 4, starting with the upper right hand small prong and proceeding in a clockwise direction. Use the point of a penknife blade to scratch the numerals on the base close to the prongs exactly as shown in the illustration. Notice that the upper left hand prong (one of the small ones) is No. 1; the lower left hand prong (large) is marked 2, etc. It is necessary for these numbers to correspond with those in the illustration or the circuit will be incorrect and the receiver will not operate.

Wind 150 turns of No. 34 on the grid coil (upper winding) and 45 turns on the tickler coil (lower winding). Use No. 30 B. S. enamel for coil B. Wind 70 turns on the grid coil (upper winding) and 20 turns on the tickler coil (lower winding). Wind all the coils in the direction indicated by the arrow in the illustration.