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BROADCAST BAND RECEIVER

MODEL BR-2

AMATEUR RADIO
VE3TS
P.O. Box 662, SARNIA, ONT.

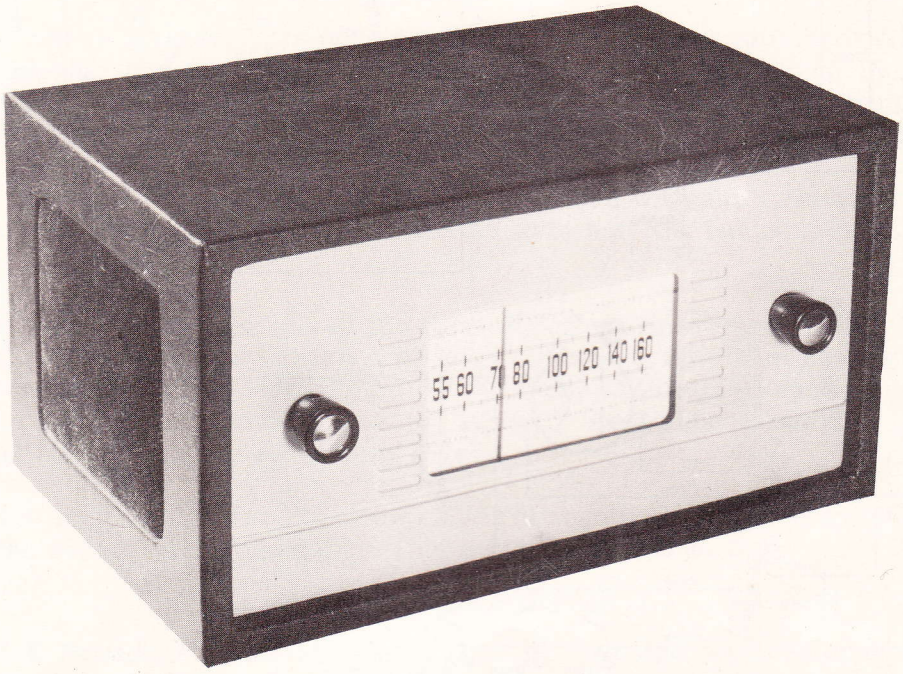
HEATH COMPANY
BENTON HARBOR, MICHIGAN

595-62

THE WORLD'S *Finest* TEST EQUIPMENT IN KIT FORM

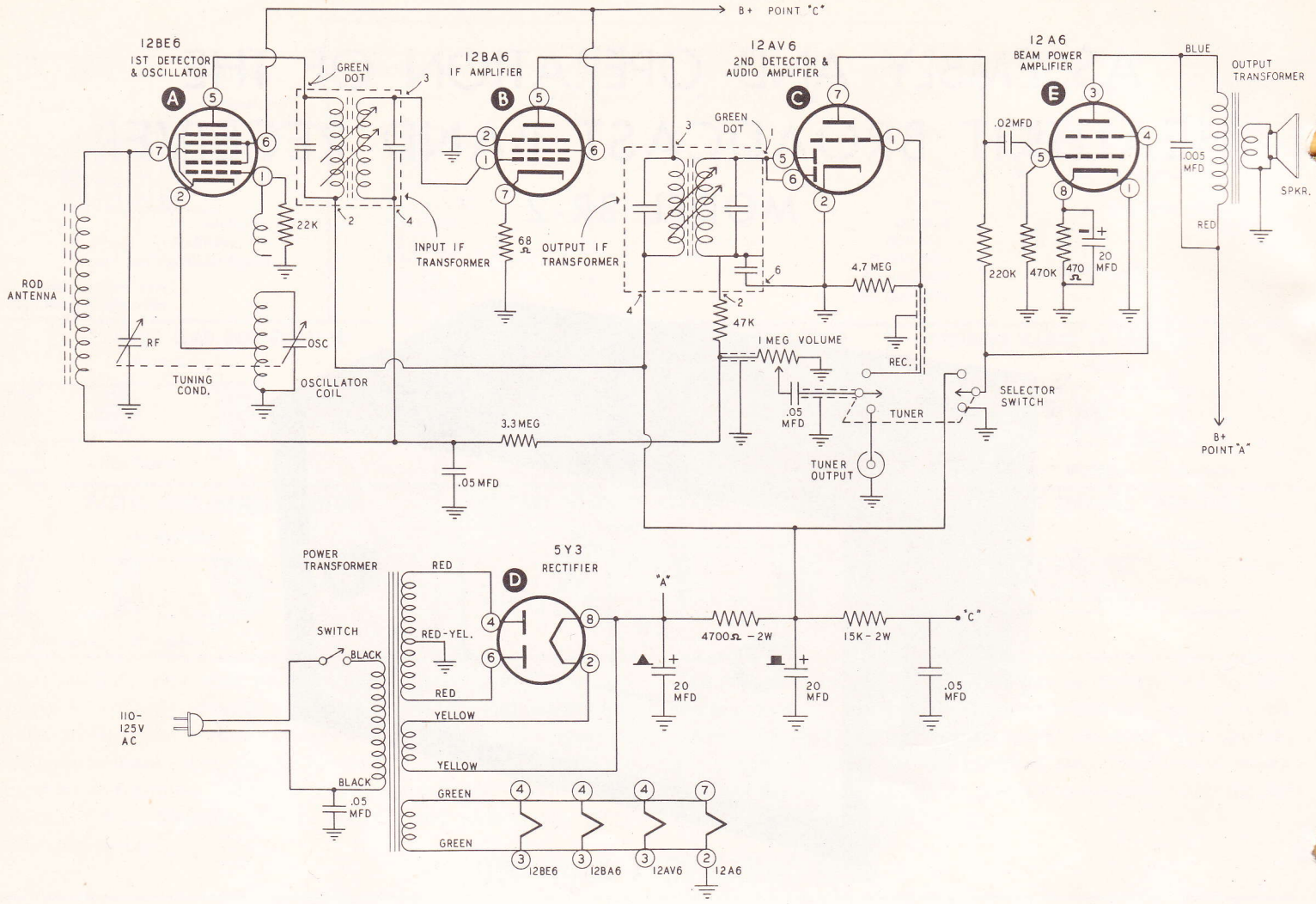
ASSEMBLY AND OPERATION OF THE HEATHKIT BROADCAST BAND RECEIVER

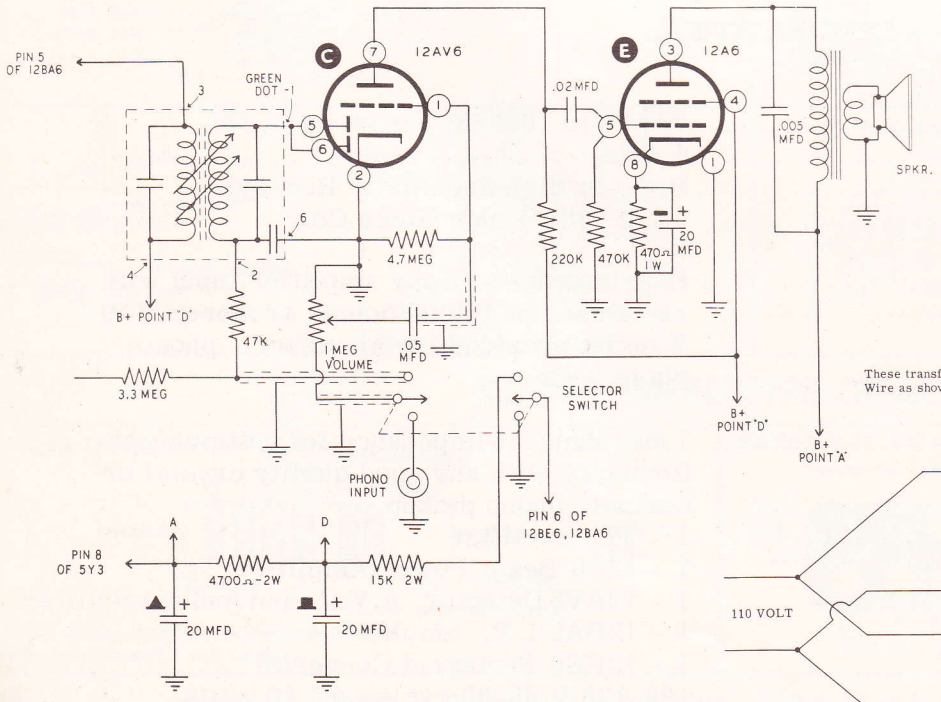
MODEL BR-2



SPECIFICATIONS

Radio	
Tuning Range	550 kc to 1620 kc
I. F. Frequency	455 kc
Antenna	Built-in High Sensitivity Rod Type
Speaker (included)	5 1/2" PM 4 ohm Voice Coil
Tuner Operation	
Output	High impedance to any amplifier input with resistance of 100,000 ohms or more. 110 V outlet provided for amplifier, phono player, etc.
Phonograph	
Input	1 megohm high impedance for optimum performance with any good quality crystal or ceramic phono pickup.
Tube Complement	1 - 5Y3 Rectifier 1 - 12A6 Beam Power Amplifier 1 - 12AV6 Detector, A.V.C. and Audio Amplifier 1 - 12BA6 I. F. Amplifier 1 - 12BE6 Pentagrid Converter
Power Requirements	105-125 V 50-60 cycles AC 40 watts
Dimensions	11 1/2" wide, 5 3/4" high, 6 3/4" deep



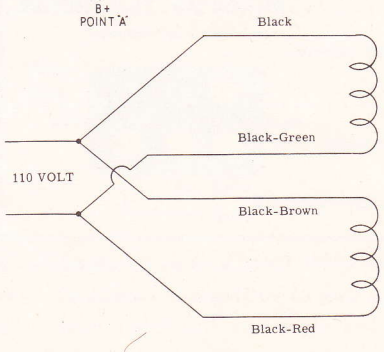


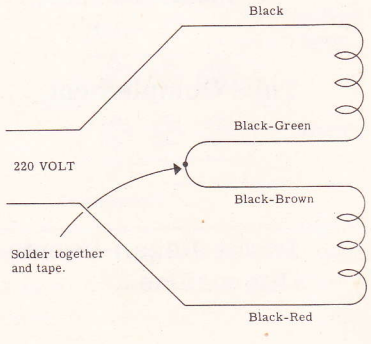
WIRING OF EXPORT TYPE

110/220 VOLT POWER

TRANSFORMERS

These transformers have a dual primary for use on either 110 Volts or 220 Volts. Wire as shown.





INTRODUCTION

Although low in price, the Heathkit Model BR-2 Broadcast Receiver is soundly engineered and is capable of excellent performance. Careful chassis layout, straightforward circuit design, and specially selected components contribute to this result.

The phono socket at the rear of the chassis can be wired either as a tuner output or a crystal pickup input for phonograph reproduction, as desired. Complete instructions regarding both methods of wiring are furnished with the manual.

If the BR-2 is wired as a tuner, it is only necessary to connect a shielded wire between the phono socket at the rear and any amplifier having a tuner or crystal pickup input. The switch at the back of the BR-2 must be placed on the downward position when the unit is used in this manner. The BR-2 will operate as a conventional receiver when the switch is up.

When wired as a phonograph amplifier, the BR-2 can be used with any good quality crystal pick-up. It will reproduce phonograph records with the switch at the back placed in the downward position.

The volume control is effective for any of the three functions described above. When used as a tuner, the control can be set to any convenient level so that the amplifier can be switched to any function without change in output level. This feature allows elimination of annoying "blasting" when the amplifier is switched from "phono" to "tuner." As a phonograph reproducer, the volume control is set to a comfortable listening level.

A 110 V AC outlet is provided for convenience. The amplifier or phonograph player will be turned off when the receiver is turned off if this outlet is used.

CIRCUIT DESCRIPTION

The Heathkit BR-2 Broadcast Receiver is a 5 tube AC operated superheterodyne employing a highly sensitive built-in rod type antenna. This antenna is a new type allowing performance comparable to receivers with outside antennas.

The 12BE6 is a multi-grid tube commonly known as a pentagrid converter. Its function is to amplify the incoming radio frequency (RF) signals and mix them with a signal from the oscillator, which is also contained in this stage. The cathode, grid 1 and grid 2 make up the oscillator, which is the standard Hartley type. Grid 3 is the RF input. Since the oscillator signal and the RF signal are both fed to the tube, both will be present. These signals mix in such a manner that the sum and the difference of the two frequencies are present, as well as the RF and oscillator signal. The oscillator frequency is selected so that it is always 455 kilocycles (kc) higher than the frequency that the RF section is tuned to. Therefore, the difference frequency will always be 455 kc and it is to this frequency that the intermediate frequency (IF) transformers are tuned. This function of changing frequencies is known as the Superheterodyne Principle. Improved selectivity is obtained due to the fixed tuned IF transformers, which are designed to give optimum performance at one frequency only.

Amplification of the IF takes place in the 12BA6 stage. The first IF transformer passes the 455 kc signal and rejects almost all unwanted signals. This signal is connected to the grid of the 12BA6 tube. The tube boosts or amplifies the signal and feeds it to the second IF transformer, which is connected to the plate circuit of the 12BA6. Any residual unwanted signal that might remain is eliminated by this transformer.

Detection of the signal takes place in the diode section of the 12AV6. When the polarity of the IF signal is positive, the diodes draw current. When the polarity is negative, the diodes will not conduct. Therefore, an unidirectional or DC current will flow through the diode load, which is formed by the output section of the second IF transformer, the 47 KΩ isolating resistor and the 1 megohm volume control. The high frequency energy is bypassed to ground through a condenser in the second IF transformer which has very low resistance, or impedance to these fre-

quencies. The value of this condenser is selected so that it will not affect the audio frequencies and so the audio will remain and is passed on to the volume control.

The volume control is a fixed resistor with a sliding tap which allows any desired portion of the signal to be selected. The tap connects to the grid of the 12AV6 through a condenser which keeps the negative voltage present at the control away from the tube. Audio amplification takes place in the triode section of the 12AV6 and the boosted signal is fed to the grid of the 12A6 beam power amplifier through an isolating capacitor. The condenser keeps the high voltage present at the plate of the 12AV6 from the grid of the 12A6 but passes the audio signal. This method of energy transfer is known as resistance-capacity coupling, or, just resistance coupling.

A small amount of voltage at the grid of the 12A6 controls a substantial amount of current in the tube. When the audio voltage becomes positive, the current increases, and the current decreases when the voltage becomes negative. These current variations pass through the primary of the output transformer, which steps the high voltage down and couples it to the loudspeaker.

The speaker is an electrical-mechanical device. When a voltage is presented to its voice coil, the paper cone moves. A permanent magnet is installed in the speaker. The voice coil is an electromagnet. Any voltage applied will cause the magnets to attract or repel each other, depending on the polarity of the voltage. Since the electromagnet coil is connected directly to the paper cone, it will move proportionally to the voltage applied. Motion of the cone causes air to move in a similar manner. Air movement of this type is detected by the ear as sound.

Power for the receiver is obtained from the power supply, which involves the power transformer, the 5Y3 tube, and the electrolytic filter condenser. The transformer supplies filament voltage for all tubes, and high AC voltage to the plates of the rectifier. The rectifier action is exactly the same as that taking place in the diode section of the 12AV6, described above. The output voltage is a series of positive pulses, one for each half of the 60 cycle line waveform. The voltage applied to the tubes must be free of these pulses, or ripple, or only a load buzz will be heard in the speaker. It is for this reason that the high capacity filter condenser is used. The first section of the condenser charges to the voltage from the 5Y3 tube. When the tube is not conducting, the condenser starts to discharge through the load presented by the other tubes in the receiver. However, the next positive charge takes place before the condenser has time to discharge fully, and so the voltage is smoothed out somewhat. Final filtering action takes place in the second section of the filter condenser. This section is isolated from the first by the 4700 Ω resistor which tends to help smooth the voltage because it resists current variations in the filter circuit. The second section of the condenser smooths out any variations passed by the first part of the condenser, and the voltage output is "pure" direct current (DC).

An automatic volume control (AVC) circuit is employed in the BR-2 receiver. Fading, blasting and other undesirable effects are eliminated or substantially reduced by the action of this circuit. AVC operates on the principle of reduced tube gain when negative voltage or "bias" is applied to the control grid. In this case, the negative voltage is obtained from the second detector stage of the receiver. As previously mentioned, the diodes of the 12AV6 tube draw current when a station is tuned in. The stronger the signal strength of the station, the more current the diodes will conduct. This current develops a negative voltage across the volume control which is proportional to the current. An isolating network consisting of a 3.3 megohm resistor and a .05 μfd condenser is used to filter out the audio voltage, and one end of the network is connected to the "hot" side of the volume control. The grids of the 12BE6 and 12BA6 RF and IF tubes connect to the opposite side of the network. When a strong station is tuned, the negative voltage is relatively high, and so the gain of the RF and IF tubes will be low. If a weak station is tuned, the voltage is lower, and the gain of the tubes higher. Therefore, strong and weak stations will tend to maintain approximately the same output level. Also, station fading is reduced, due to the reduction in bias when the signal becomes weaker, etc.

The 12AV6 and 12A6 audio amplifier stages operate at a "fixed" bias level. "Contact bias" is used in the 12AV6. A very high value of resistance in the grid circuit of a tube will cause the

grid to become negative. This is due to the fact that the grid of the tube always draws a minute amount of current caused by collection of stray electrons from the cathode by the grid. 4.7 megohms is connected between the grid of the 12AV6 and ground and this allows the grid to develop a relatively high negative voltage.

"Cathode bias" is employed in the 12A6 stage. A 470 Ω resistor is connected between the cathode of the 12A6 and ground. The tube draws a large amount of current and the drop across the resistor will cause the cathode of the tube to be positive in respect to ground. The grid returns to ground through a relatively low resistance to avoid contact bias effects. Since bias is always the voltage between the cathode and the grid of a tube, the grid is negative in respect to the cathode, and the stage is properly biased. A large capacity condenser is connected across the cathode resistor to bypass the audio voltage around the resistor.

NOTES ON ASSEMBLY AND WIRING

The Heathkit BR-2 Broadcast Receiver, when constructed in accordance with the instructions in this manual, is a high quality receiver capable of many years of trouble free service. We therefore urge you to take the necessary time to assemble and wire the kit carefully. Do not hurry the work, and you will be rewarded with a greater sense of confidence both in your receiver and your own ability.

This manual is supplied to assist you in every way to complete the receiver with the least possible chance of error. We suggest that you take a few minutes now and read the entire manual through before any work is started. The enlarged pictorials are handy to attach to the wall above your work space. Their use will greatly simplify the completion of the kit. The diagrams are repeated in smaller form within the manual. We suggest that you retain the manual in your files for future reference, both in the use of the BR-2 and for its maintenance.

UNPACK THE KIT CAREFULLY AND CHECK EACH PART AGAINST THE PARTS LIST. In so doing, you will become acquainted with each part. Refer to the charts and other information shown on the inside covers of the manual to help you identify any parts about which there may be a question. If some shortage is found in checking the parts, please notify us promptly and return the inspection slip with your letter to us. Hardware items are counted by weight, and if a few are missing, please obtain them locally if at all possible.

CAUTION: The rod antenna, tuning condenser, loudspeaker, and oscillator coil are quite delicate, and should be handled with care. The tuning condenser should be kept fully meshed until construction is completed, to avoid bending the plates. The rod antenna can be damaged by a sharp blow of any kind, so it should be placed where it will not be disturbed or accidentally dropped.

Read the note on soldering on the inside of the back cover. Crimp all leads tightly to the terminal before soldering. Be sure both the lead and the terminal are free of wax, corrosion, or other foreign substances. Use only the best rosin core solder, preferably one containing the new activated fluxes such as Kester "Resin Five," Ersin "Multicore," or similar types.

NOTE: ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE INSTRUMENTS IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. WHEN IN DOUBT ABOUT SOLDER, IT IS RECOMMENDED THAT A NEW ROLL PLAINLY MARKED "ROSIN CORE RADIO SOLDER" BE PURCHASED.

Resistors and controls generally have a tolerance rating of ±20% unless otherwise stated in the parts list. Therefore a 100 KΩ resistor may test anywhere from 80 KΩ to 120 KΩ. (The letter K is commonly used to designate a multiplier of 1000.) Tolerances on condensers are generally even greater. Limits of +100% and -50% are common for electrolytic condensers. The parts furnished with your Heathkit have been specified so as to not adversely affect the operation of the finished receiver.

In order to expedite delivery to you, we are occasionally forced to make minor substitutions of parts. Such substitutions are carefully checked before they are approved and the parts supplied will work satisfactorily. By checking the parts list for resistors, for example, you may find that a 5.1 megohm resistor has been supplied in place of a 4.7 megohm as shown in the parts list. These changes are self evident and are mentioned here only to prevent confusion to you in checking the contents of your kit.

We strongly urge that you follow the wiring and parts layout shown in this manual. The positioning of wires and parts is quite critical in this instrument, and changes may seriously affect the characteristics of the circuit.

STEP-BY-STEP ASSEMBLY INSTRUCTIONS

The following instructions are presented in a simple, logical, step-by-step sequence to enable you to complete your kit with the least possible confusion. Be sure to read each step all the way through before you start to do it. When the step is completed, check it off in the space provided.

We suggest that you do the following before any work is started:

1. Select from the large fold-in pictorials included with this manual the diagram applying to the steps being worked on. Study them carefully so that you are completely familiar with the layout. Attach these diagrams to the wall above your work bench.
2. Go through the entire assembly and wiring instructions and cross out the steps that do not apply to the type of wiring you have chosen in respect to "tuner" or "phonograph reproducer" operation. This is an excellent time to read the entire instruction section through and familiarize yourself with the procedure.
3. Lay out all parts so that they are readily available. Refer to the general information inside the front and back covers of this manual to help you identify the components.

In assembling the kit use lockwashers under all nuts. Tube sockets are mounted inside the chassis; the condenser mounting wafer is mounted above or on top of the chassis. All screws are mounted with the heads on top of the chassis, except those that mount the tuning condenser assembly. Other details of construction are included where pertinent in the instructions.

The hardware can be identified as follows: 3-48 screws and nuts — smallest size. 6-32 x 3/16 screws — medium size, short length. 6-32 x 3/8 screws and nuts — medium size, long length. 8-32 screws and nuts — large size.

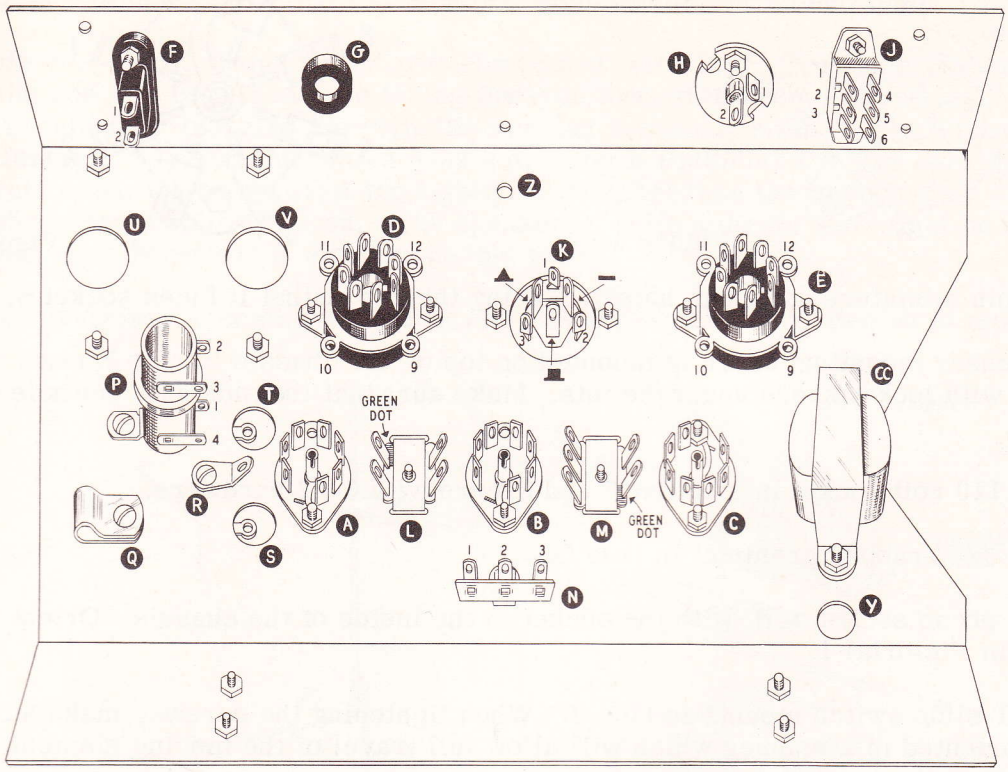
( ) Place the chassis upside down on the bench. Note that one apron on the chassis has six small identical holes located in it. Place this side nearest you. The chassis will then be oriented correctly with the bottom chassis diagram, Pictorial 1 appearing on the large fold-in sheet.

( ) Refer to Figures 1 and 2, and note that the contacts on the tube sockets are numbered consecutively in clockwise sequence when viewed from the bottom of the socket. Also, note the keyway between contacts 1 and 8 on the octal sockets. Mount an octal socket in hole D, locating this keyway as shown in Pictorial 1. Use 6-32 hardware, place a lockwasher under the nut, and tighten securely.

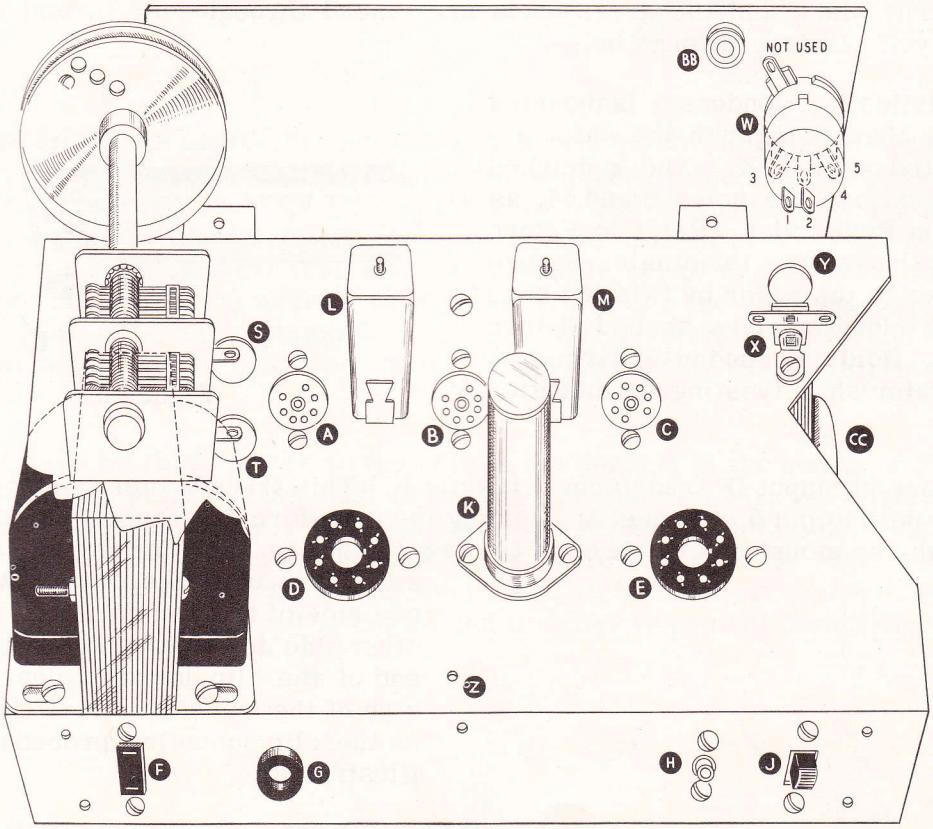
( ) In similar fashion, mount octal tube socket E so that its keyway is properly oriented. Note that this socket is mounted with the keyway in the same direction as D.

( ) Mount a 7 pin miniature socket in hole A, making sure that the gap between pins 1 and 7 is located as shown. Use 3-48 hardware. No lockwashers are used with the 3-48 screws.

( ) Mount 7 pin miniature socket B in a similar manner, noting that the gap between pins 1 and 7 is located in the same direction as A.



PICTORIAL 1



PICTORIAL 2

Note: The above diagrams are repeated in the large fold-in pictorials included with this manual.

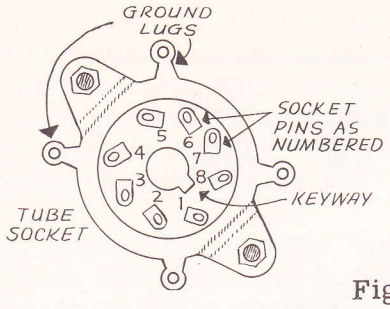


Figure 1

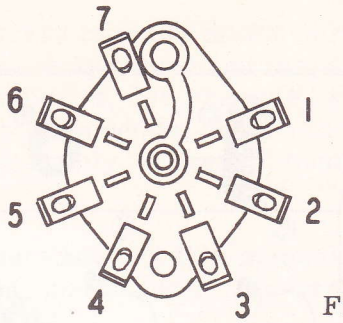


Figure 2

( ) Place a 7 pin miniature socket in hole C, placing the gap so that it faces socket E, as shown.

( ) The condenser mounting wafer is mounted on top of the chassis in hole K next. Use 6-32 hardware with lockwashers under the nuts. Make sure that the side with one hole in it faces hole Z.

( ) Place the 110 volt socket in location F and secure with 6-32 hardware.

( ) Insert the 3/8" rubber grommet in hole G.

( ) Mount the phono socket at H, with the socket on the inside of the chassis. Orient the socket as shown in Pictorial 1.

( ) The DPDT slide switch mounts in hole J. When tightening the screws, make sure that the nuts are oriented in a manner which will allow full travel of the moving element.

( ) Secure the power transformer on top of the chassis as shown in the pictorials. Use 8-32 hardware. The black and the green leads are placed through hole U, and the red, red-yellow, and yellow wires through hole V.

( ) The electrolytic filter condenser is mounted on top of the chassis through the wafer already mounted at hole K. The ■ marked terminal must face the holes B and M, as illustrated on Pictorial 1. Refer to Figure 3 to identify the various terminals. Secure the condenser to the wafer by twisting each of the three mounting lugs about 1/8 turn with pliers. Hold the condenser firmly against the wafer while twisting the mounting lugs.

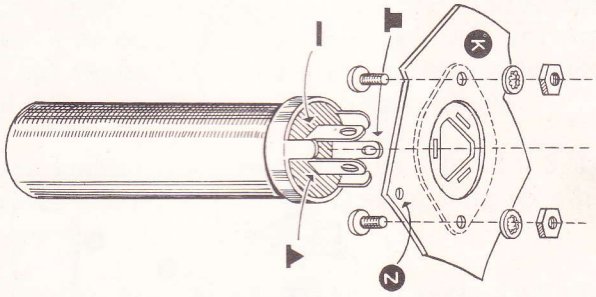


Figure 3

( ) Mount the four lug input IF transformer in hole L. This transformer is placed so that the green dot is next to pin 5 of socket A. Holding the transformer securely in place with your fingers, push the mounting clip through the two remaining slots in the chassis. Push one side down until the clip locks in place on one side of the transformer. Then push the other side down with a screwdriver until the end of the clip locks in place at the other side of the transformer. Refer to Figure 4 as the clip mounting procedure is clearly illustrated.

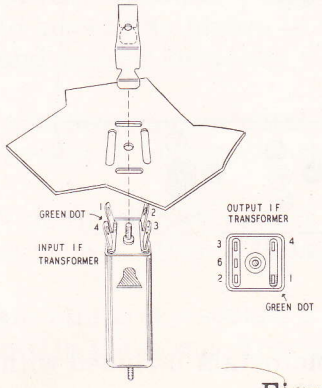


Figure 4

( ) In a similar manner, mount the 5 lug output IF transformer in hole M. The green dot must be located next to pins 5 and 6 of tube socket C.

( ) Mount the multi-lug terminal strip at hole N, using 6-32 screw, lockwasher and nut. Check Pictorial 1 to make sure that the terminal strip is correctly positioned.

( ) Identify the output transformer, the component with four wire leads. Mount this unit so that the red and blue leads are facing inwards toward the tube sockets. The bolt nearest hole Y should be inserted through the one-lug terminal strip X, the chassis, the output transformer, a lockwasher and a 6-32 nut. Check Pictorial 2 to see how lug X is located. The nuts need not be secured too tightly as yet, because the loudspeaker will be mounted with these same bolts later on. The speaker is quite delicate and might be damaged in the process of construction if mounted at this time.

( ) Tuning condenser assembly mounting now takes place. The condenser is mounted on top of

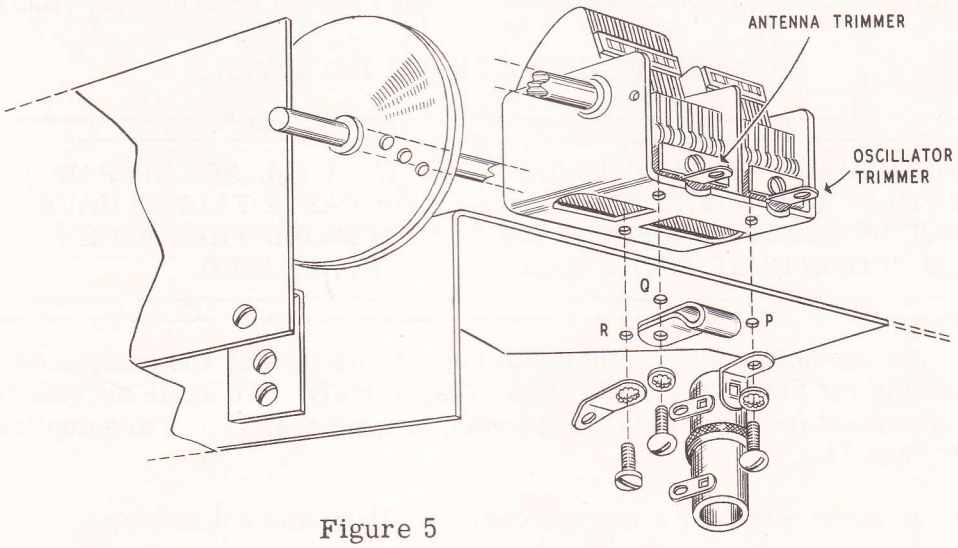


Figure 5

the chassis with the shaft pointing outward, as shown on Pictorial 2. Refer to Figure 5 to see how the various components are mounted underneath the chassis by the tuning condenser assembly mounting screws. A 6-32 x 3/16 screw is pushed through a lockwasher, the mounting lug on oscillator coil P, the chassis hole nearest hole U and into the appropriate hole in the tuning condenser frame. A 6-32 x 3/16 screw is placed through the solder lug R, the hole in the chassis nearest tube socket A and into the corresponding hole in the condenser frame. The cable clamp Q is secured by a 6-32 x 3/8 screw and lockwasher in the remaining hole. Leave this screw loose, for it will be necessary to run wires through the clamp later on.

( ) Place the 8-32 x 1/8 set screw in the hole in the bushing at the center of the large dial pulley and place the pulley on the shaft of the tuning condenser with the bushing pointing toward the tuning condenser frame. The opening in the pulley should be pointing straight up when the tuning condenser plates are fully meshed. With the outside edge of the bushing flush with the edge of the large tuning condenser shaft, tighten the set screw. Leave the condenser plates meshed until the set is completed in order to protect them from damage.

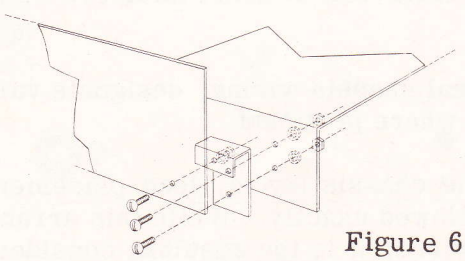


Figure 6

( ) Install the two dial plate mounting brackets on the dial plate, using 6-32 hardware. Refer to Figure 6.

( ) Mount the dial plate as shown and secure the assembly in place on the chassis. Four screws are used to stabilize the entire assembly.

( ) Mount the volume control W in hole Z, placing the 3/8 lockwasher under the nut as shown in Figure 7. The three lugs should face down toward the hole Y in the chassis.

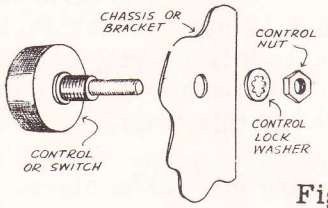


Figure 7

The preliminary assembly is now completed, and the chassis is ready for wiring.

WIRING OF THE BR-2 RECEIVER

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The figures on the opposite page are pictorial representations of the completed BR-2 receiver wired for tuner and for phonograph operation, respectively. We again suggest that you use the large fold-in pictorials for reference as the work progresses. They are duplicates of the figures shown on Page 11.

Read the notes on the inside rear cover concerning wiring and soldering.

Refer to Pictorial 1. Note that each component part has been given a code designation which corresponds with the identification used during the assembly of the kit. In addition, each terminal on the part has also been assigned a number.

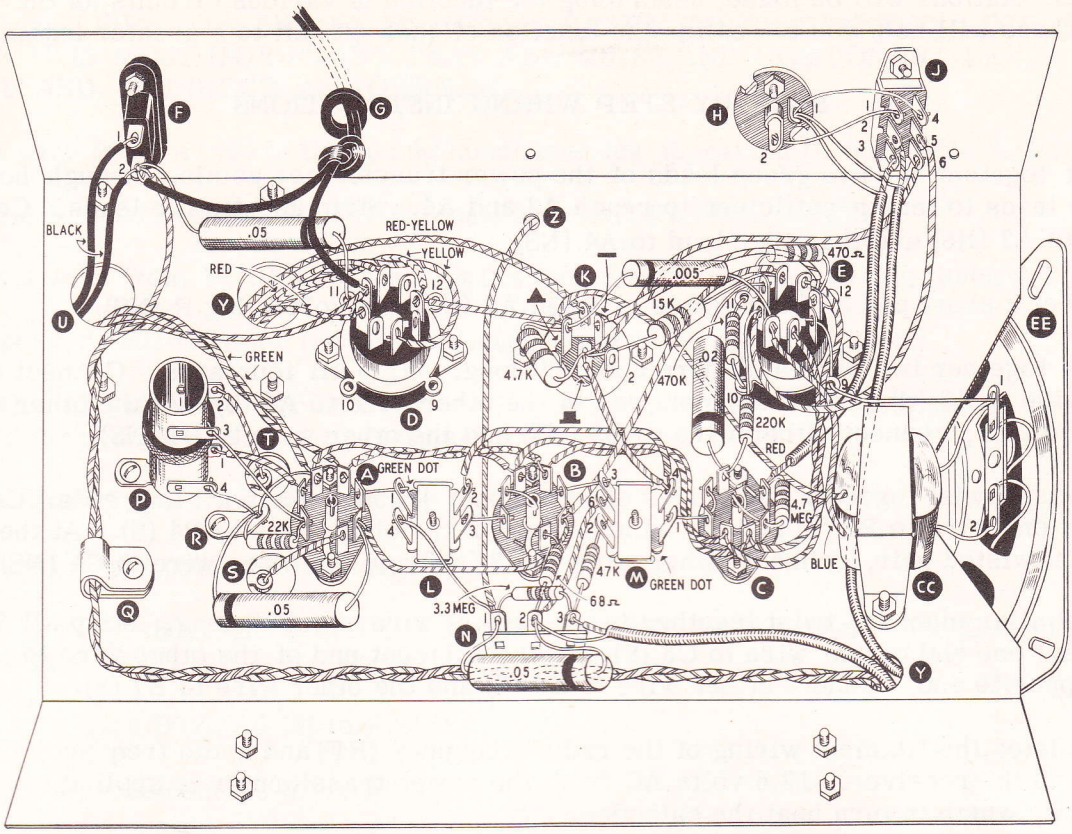
When the wiring instructions read, "Connect one end of a 470 Ω resistor to E8 (S)," it will be understood that the connection is to be made to contact number 8 on socket E. The abbreviation "S" indicates that the connection should be soldered. In some cases, more than one lead is connected to the same terminal. The terminal should not be soldered until the last lead is connected, and the abbreviation "NS" is used to indicate this.

Unless otherwise indicated, all wire used is insulated. Bare wire is used only where the lead lengths are short and the possibility of short circuits non-existent.

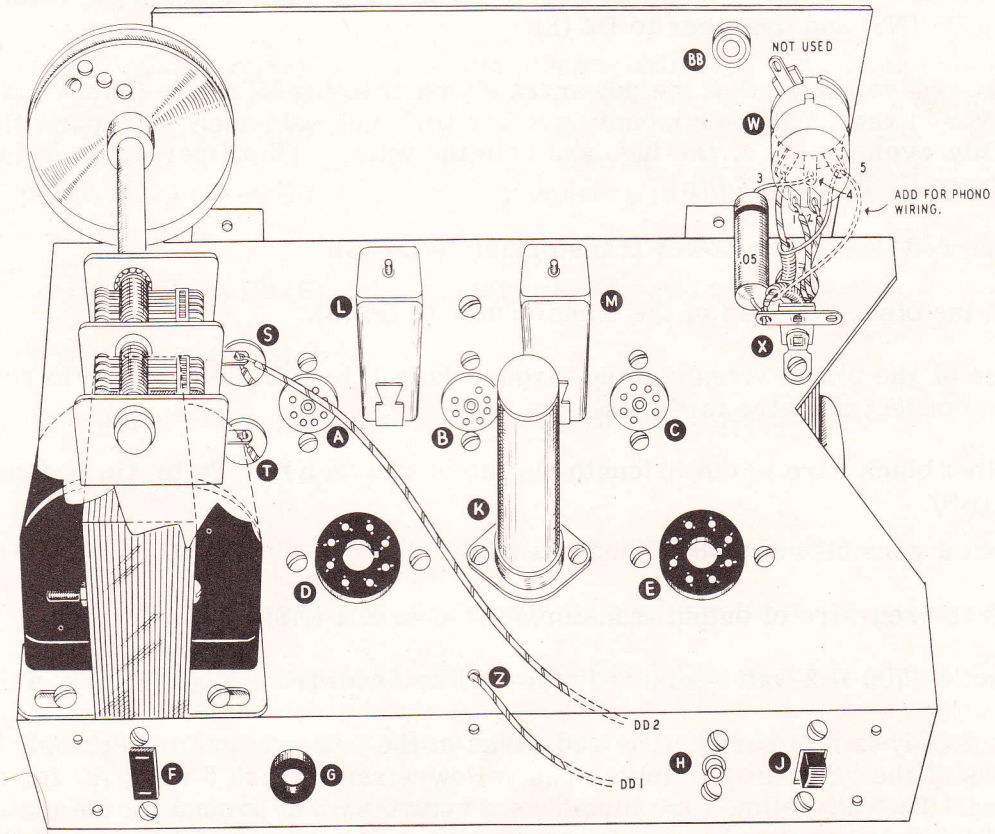
Leads on resistors, condensers and transformers are generally much longer than they need to be to make the indicated connections. In these cases, the excess leads should be cut off before the part is added to the chassis. Not only does this make the wiring much neater, but in many instances the excessively long leads will actually interfere with the proper operation of the receiver.

Pictorials 3 and 4 indicate actual chassis wiring, designate values of the component parts, and show the color coding of leads where pertinent.

We very strongly urge that the chassis layout, lead placement, and grounding to chassis, as shown in these diagrams be followed exactly. While this arrangement may not be the only way in which the receiver may be wired, it is the result of considerable experimentation and trial. If followed carefully, it will result in a highly sensitive receiver, free of instability and hum.



PICTORIAL 3



PICTORIAL 4

Occasional notations will be made, describing the function of various circuits as they are completed. These will help you to realize the function of each circuit to a greater extent.

STEP-BY-STEP WIRING INSTRUCTIONS

( ) Twist together the two green leads of the power transformer coming through hole U. Cut these leads to length sufficient to reach A3 and A4. Strip and tin the leads. Connect one lead to A3 (NS) and the other lead to A4 (NS).

( ) Connect a short piece of bare wire between A3 (NS) and solder lug R (NS).

( ) Twist together two pieces of wire about 3" long. Strip all four ends. Connect one end of one wire to A3 (S) and the adjacent end of the other wire to A4 (S). At the other end of this twisted pair, connect either wire to B3 (NS) and the other wire to B4 (NS).

( ) Likewise, twist together two pieces of wire about 4" long. Strip all four ends. Connect one end of one wire to B3 (S) and the adjacent end of the other wire to B4 (S). At the other end of this twisted pair, connect either wire to C3 (NS) and the other wire to C4 (NS).

( ) In a similar manner, twist together two pieces of wire about 5" long. Strip all four ends. Connect one end of one wire to C3 (S) and the adjacent end of the other wire to C4 (S). At the opposite end, connect either wire to E2 (S) and the other wire to E7 (S).

This completes the filament wiring of the radio frequency (RF) and audio frequency (AF) amplifier tubes in the receiver. 12.6 volts AC from the power transformer is applied to the heaters of the tubes, which in turn heat the cathodes.

( ) Twist together the two yellow leads of the power transformer coming through hole V. Cut these leads to length sufficient to reach D8 and D2. Strip and tin the leads. Connect one lead to D8 (NS) and the other to D2 (S).

( ) Run the red-yellow lead of the power transformer to lug K1 on the filter condenser (S). Heat the lug and the condenser mounting wafer with the soldering iron until the solder flows smoothly over the wire, the lug, and onto the wafer. (If a fiber wafer is furnished, run a wire from K1 (S) to D12 (S).

( ) Run one red lead of the power transformer to D4 (S).

( ) Attach the other red lead of the transformer to D6 (S).

( ) Cut one of the black wires coming through hole U to sufficient length to reach F2. Strip, tin and connect the wire to F2 (NS).

( ) The other black wire is cut to length sufficient to reach F1. Strip, tin and connect this wire to F1 (NS).

( ) Connect a wire between D8 (S) and K ▲ (NS).

( ) Attach the red wire of output transformer CC to K ▲ (NS).

( ) Connect a 4700 Ω 2 watt resistor (yellow-violet-red) from K ▲ (NS) to K ■ (NS).

The power supply is now wired. The red wires of the power transformer apply high AC voltage to the plates of the 5Y3 rectifier tube. The yellow wires furnish 5 volts AC for the filaments of the rectifier. The red-yellow wire furnishes a return path to ground for the plate current drawn by the 5Y3 tube. The ▲ terminal of filter condenser K is the input filter, and the ■ terminal is the output filter section. The 4700 Ω resistor isolates the two sections and tends to resist any AC variations superimposed on the DC, thus providing "pure" or well filtered DC voltage for the high voltage circuits.

NOTE: THE WIRING OF THE RF STAGES IS READY TO BE STARTED. FOR THE BEST RESULTS, IT IS MOST IMPORTANT THAT ALL WIRES AND COMPONENT LEADS BE KEPT AS SHORT AND AS DIRECT AS POSSIBLE.

( ) Run a wire from A7 (S) to the tuning condenser lug appearing through hole S (NS).

( ) Connect a short piece of wire from oscillator coil P1 (S) to A2 (S).

( ) Place a wire from P2 (S) to the lug on the tuning condenser appearing through hole T (S).

( ) Connect a 22 KΩ resistor (red-red-orange) from lug R (NS) to A1 (NS).

( ) Install a .05 μfd condenser between lug R (NS) and A6 (NS). The outside foil, or black band should face lug R as shown in Pictorial 1.

( ) Run a short piece of bare wire from P4 (S) to lug R (S).

( ) Connect a short piece of bare wire from P3 (S) to A1 (S).

( ) Place a very short piece of bare wire from A5 (S) to IF transformer L lug 1 (green dot marked terminal) (S).

( ) Connect a wire from A6 (S) to B6 (NS).

( ) Connect a wire from L2 (S) to M4 (NS).

( ) Run a piece of bare wire from L4 (S) and terminal lug N1 (NS).

( ) Place a very short piece of bare wire from L3 (S) to B1 (S).

The first detector-oscillator-mixer stage is now completed. The oscillator coil, the 22 KΩ resistor, and the rear section of the tuning condenser make up the oscillator circuit. The rod antenna, which will be installed later, and the front section of the tuning condenser tune the frequency of the desired station and so act as the first detector. Mixing action takes place within the 12BE6 tube itself, and the resultant 455 kc IF frequency is selected by input IF transformer L.

( ) Connect a bare wire from B2 (S) to the center post of socket B (S).

( ) Place a bare wire from B5 (S) to M3 (S).

( ) Install a 68 Ω resistor (blue-gray-black) from B7 (S) to N2 (NS).

( ) Connect a wire from M6 (S) to N2 (NS).

( ) Install a 47 KΩ resistor (yellow-violet-orange) from M2 (S) to N3 (NS).

( ) Run a bare wire from M1 (green dot) (S) through C5 (NS) and to C6 (S). Now solder C5.

( ) Place a .05 μfd condenser between N1 (NS) and N2 (NS). The black band faces N2.

( ) Install a 3.3 megohm resistor (orange-orange-green) from N1 (NS) to N3 (NS).

The 12BA6 IF amplifier stage is almost complete at this time. The function of this stage is to amplify the 455 kc signal that has been pre-selected by the first IF transformer. The output of the 12BA6 tube drives the output IF transformer at a considerably higher level than that found in the first IF transformer, for the tube has a substantial amount of gain.

( ) Install a 220 KΩ resistor (red-red-yellow) from C7 (NS) to E4 (NS).

( ) Place a 470 KΩ resistor (yellow-violet-yellow) from E5 (NS) to lug E10 on the tube socket mounting bracket (S).

( ) Connect a .02 μfd condenser from C7 (S) to E5 (S). The black band faces C 7.

( ) Run a short piece of bare wire from C2 (NS) to the center post of socket C (S).

( ) Install a 4.7 megohm resistor (yellow-violet-green) from C1 (NS) to C2 (S).

( ) Cut the blue lead of the output transformer CC to length sufficient to reach E3. Strip and tin the lead. Connect this wire to E3 (NS).

( ) Install a 470 Ω 1 watt resistor (yellow-violet-brown) from E8 (NS) to lug E11 (S).

( ) Connect a wire from E8 (S) to filter condenser terminal K ▬ (S).

( ) Place a short piece of bare wire between E1 (S) and lug E9 (NS).

( ) Connect a 15 KΩ 2 watt resistor (brown-green-orange) from K ■ (NS) to E6 (NS). This pin makes no connection to the 12A6 tube and so is used as a tie point.

( ) Install a .005 μfd condenser from E3 (S) to K ▲ (S). The black band faces condenser K.

( ) Run a wire from K ■ (NS) to output IF transformer M lug 4 (S).

( ) Connect a bare wire from slide switch J4 (S) to phono socket H1 (NS).

IF THE RECEIVER IS TO BE USED AS A TUNER THE STEPS LISTED BELOW SHOULD BE FOLLOWED. IF DESIRED TO USE THE RECEIVER AS A PHONOGRAPH REPRODUCER, THESE STEPS DO NOT APPLY. STEPS APPLYING TO PHONO WIRING FOLLOW AND ARE MARKED WITH AN ASTERISK (*).

( ) Run a wire from E6 (S) to B6 (S).

( ) Connect a wire from E4 (S) to slide switch J5 (S).

( ) Connect a wire from K ■ (S) to J6 (S).

( ) Cut a piece of Spirashield to a length of 4". Strip out 1 1/2" at each end as shown in Figure 8. Note that the wire is unrolled, not pulled out.

( ) Cut a piece of wire to a length of 5 1/2". Strip and tin both ends. Push this wire through the length of Spirashield previously prepared.

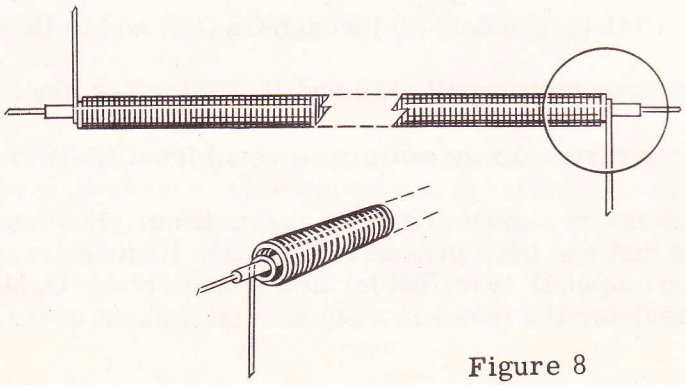


Figure 8

( ) Connect one end of the wire to N3 (S).

( ) Connect the adjacent end of the Spirashield to N2 (S).

( ) At the opposite end, connect the center wire to W3 (S) on the volume control. The shield and wire assembly is placed through hole Y.

( ) The adjacent end of the Spirashield connects to W5 (S).

( ) Install a .05 μfd condenser from W4 (S) to terminal lug X (NS).

( ) Cut a piece of Spirashield to a length of 4 3/4". Strip out about 2" at one end only.

( ) Cut a piece of wire to a length of 6 1/2". Strip and tin both ends and push the wire through the 4 3/4" length of Spirashield just prepared.

( ) Place the wire and shield assembly underneath the red and blue wires from output transformer CC with the stripped out end of the shield facing switch J. Connect the center conductor wire to J2 (S).

( ) Connect the end of the shield to phono socket H1 (NS).

( ) Run the opposite end of the wire through hole Y and connect the wire to terminal lug X (S).

( ) Cut a piece of Spirashield to a length of 2 3/4". Strip out about 2" at one end only.

( ) Cut a piece of wire to a length of 4". Strip and tin both ends and push the wire through the shielding. Connect the end of the shield to H1 (S).

( ) Attach the adjacent end of the center wire to J3 (S).

( ) Connect the opposite end of the wire to tube socket C1 (S).

( ) Run a short piece of bare wire from H2 (S) to J1 (S).

PHONO WIRING

IF THE RECEIVER IS TO BE WIRED FOR USE WITH A PHONOGRAPH, THE FOLLOWING STEPS SHOULD BE OBSERVED. CROSS OUT THE PROCEEDING STEPS REGARDING TUNER WIRING TO ELIMINATE ANY CHANCE OF ERROR. SEE PICTORIAL 5.

*( ) Run a wire from E6 (S) to slide switch J6 (S).

*( ) Connect a wire from J5 (S) to B6 (S).

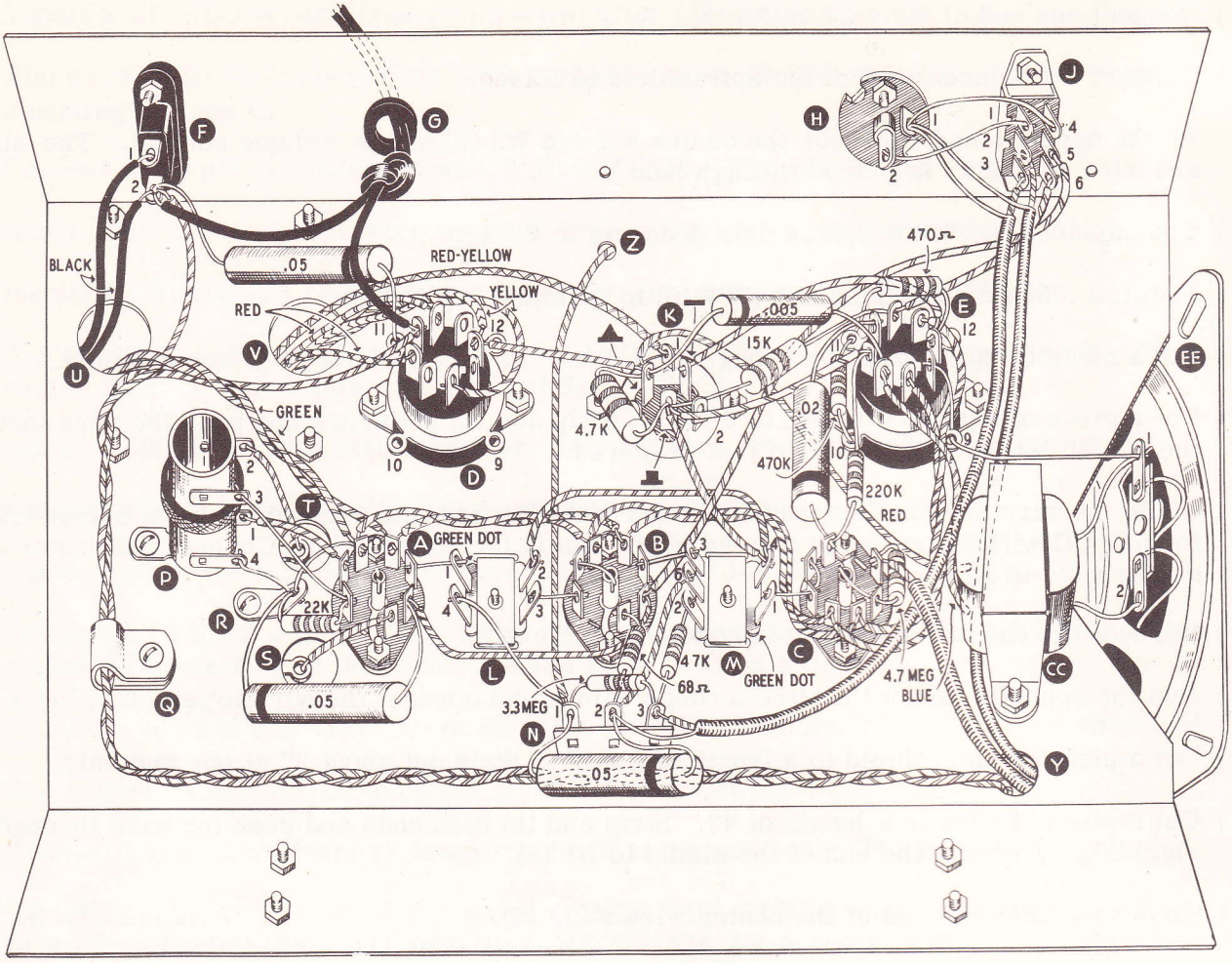
*( ) Connect a wire from K ■ (S) to E4 (S).

*( ) Cut a piece of Spirashield to a length of 5 3/4". Strip out about 2" at one end as shown in Figure 8. Note that the wire is unrolled, not pulled out.

*( ) Cut a piece of wire to a length of 8 1/2". Strip and tin both ends. Push this wire through the 5 3/4" length of Spirashield previously prepared.

*( ) Push the wire and Spirashield underneath the output transformer and connect one end of the wire to switch J3 (S). Connect the adjacent end of the Spirashield to H1 (NS).

*( ) At the opposite end, connect the wire to N3 (S) and the Spirashield end to N2 (S).



PICTORIAL 5

*( ) Cut a piece of Spirashield to a length of 4". Strip out about 2" at each end.

*( ) Cut a piece of wire to a length of 7". Strip and tin both ends. Push this wire through the 4" length of Spirashield previously prepared.

*( ) Push the wire and Spirashield underneath the output transformer and connect one end of the wire to switch J2 (S). Connect the adjacent end of the Spirashield to H1 (S).

*( ) Place the wire and Spirashield through hole Y and connect the wire to control W3 (S). Connect the adjacent end of the Spirashield to W5 (NS).

*( ) Install a .05 μfd condenser from W4 (S) to terminal lug X (NS).

*( ) Strip out about 2" at one end of the remaining piece of Spirashield. Cut a piece of wire to a length of 4". Strip and tin both ends and push the wire through this piece of Spirashield.

*( ) Place the wire and unstripped end of the Spirashield down through hole Y and connect the end of the Spirashield to W5 (S). The adjacent end of the wire connects to terminal lug X (S).

*( ) Connect the opposite end of the wire to C1 (S).

*( ) Run a short piece of bare wire from H2 (S) to J1 (S).

The wiring of the second detector stage is now complete. The IF signal from output IF transformer M is connected to the two diode plates of the 12AV6 tube. These plates rectify or detect the IF signal. The current drawn by the diodes is passed through a 47 KΩ isolating resistor to the volume control and to ground. The moving arm of this control taps off a portion of the audio voltage, the amount of voltage depending on the control setting. The output of the control connects to the control grid of the 12AV6 through a .05 μfd condenser which isolates the control from the tube. Resistance-capacity coupling is used to get the audio voltage to the grid of the 12A6 beam power output tube. DC voltage is kept from the grid of the 12A6 by a .02 μfd condenser, but the AC audio voltage passes without being seriously impeded. Power amplification takes place in the 12A6 circuit which drives the loudspeaker through the output transformer CC .

When used as a tuner, the audio voltage from the volume control connects directly to the output through a .05 μfd condenser and the selector switch. Placing the switch in the "tuner" position also removes the high voltage from the screen of the 12A6 and the plate of the 12AV6 tubes, thus effectively cutting them off.

The circuit is much the same if phonograph wiring is followed, except that the voltage is removed from the 12BE6 and 12BA6 tubes when the switch is moved to the "phono" position. Voltage from the crystal phonograph pickup goes directly to the volume control through the switch, and is amplified by the 12AV6 and 12A6 tubes.

( ) Install a .05 μfd condenser from 110 volt socket F2 (NS) to D11 (S).

( ) Twist together two pieces of wire about 20" long. Strip all four ends. Connect one end of one wire to W1 (S) and the adjacent end of the other to W2 (S). Run these wires down through hole Y, along the front edge of the chassis, and through cable clamp Q. At the other end of this twisted pair, connect either wire to F1 (S) and the other wire to D5 (NS). This is a blank pin and is used as a tie point. Tighten screw Q.

( ) Pass a line cord through the grommet at G. Tie a knot in the cord for strain relief at a point about 3" from the stripped ends. Connect one of the leads to F2 (S) and the other to D5 (S).

( ) Install the rod antenna assembly DD at the back of the chassis using #6 sheet metal screws. Make sure that the rod faces inward toward the tubes. Handle this assembly with care, for a sharp blow of any kind can seriously affect the characteristics of the antenna. Refer to Figure 9.

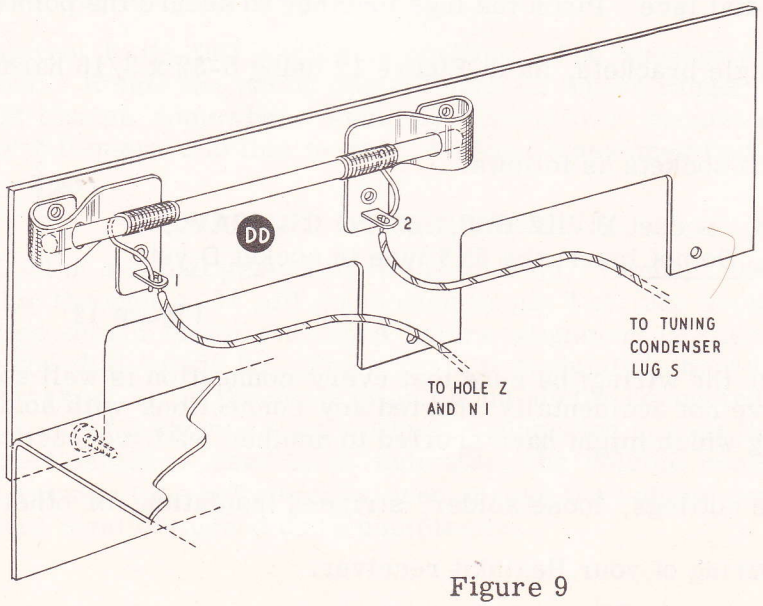


Figure 9

( ) Connect a wire to terminal N1 (S). Run this wire along the chassis under all other wires and up through hole Z. Connect the other end to DD1 (S).

( ) Run a wire from DD2 (S) to the lug at the front of the tuning condenser over hole S (S). Leave enough slack for the wire to clear the 5Y3 and 12BE6 tubes.

( ) Remove screws that hold the output transformer and terminal lug in place and mount the loudspeaker EE on top of the chassis. Note that the terminal lug is mounted on top of the speaker mounting bracket. Observe Figure 10.

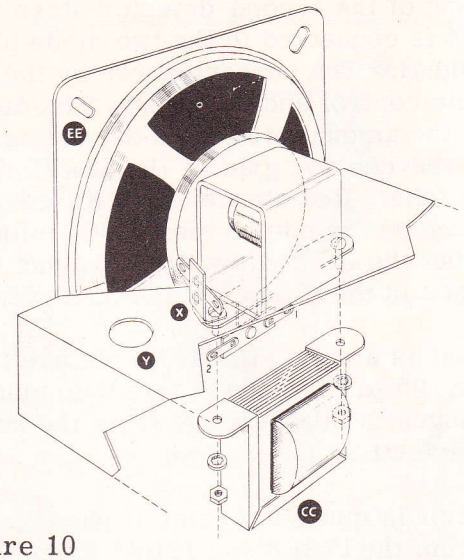


Figure 10

( ) Connect the output transformer wire nearest EE2 to EE2 (S). Make sure that the wire is free of enamel or other insulating material at the point of contact.

( ) In a similar manner, connect the other wire to EE1 (NS).

( ) Connect a bare wire from EE1 (S) to lug E9 (S). Run the bare wire over the Spirashield.

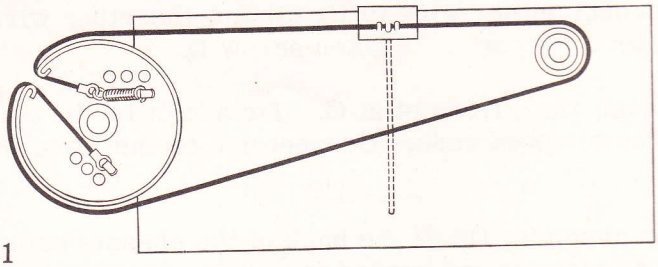


Figure 11

( ) String up the dial drive as shown using dial cord and the dial cord tension spring. Hook the dial pointer over the edge of the dial plate and slip the dial cord between the lugs on the pointer. With the tuning condenser fully closed, set the pointer over the end of the marks at the left of the dial face. Pinch the lugs together to secure the pointer in place.

( ) Mount the four angle brackets, as in Figure 12 using 6-32 x 3/16 hardware. The brackets face inward.

( ) Insert tubes in the sockets as follows:

Socket A - 12BE6, Socket B - 12 BA6, Socket C - 12AV6,
Socket E - 12A6. Do not insert the 5Y3 tube in socket D yet.

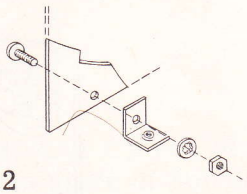


Figure 12

( ) Carefully inspect the wiring; be sure that every connection is well soldered. Check to be sure that you have not accidentally shorted any connections with solder splashes, or displaced any wiring which might have shorted to another lead, connection, or chassis.

( ) Remove any wire cuttings, loose solder, stripped insulation, or other loose material.

This completes the wiring of your Heathkit receiver.

TESTING THE COMPLETED RECEIVER

Before connecting the receiver to the AC outlet, check the following points:

1. Be sure the 5Y3 rectifier is not in its socket.
2. Check the selector switch at the rear of the chassis to be sure that it is in the upward position.
3. If an ohmmeter is available, check the DC resistance from terminal 8 on socket D to ground. The reading should be at least 100,000 ohms. (Allow time for the condensers to charge to the ohmmeter voltage.) If lower, carefully recheck wiring for an error. Give special attention to pins 5 and 6 at sockets A and B, pins 3, 4, and 6 of socket E, and pins 2 and 8 of socket D. Also, check the location of the 2 watt resistors connected to the filter condenser K. These should be bent up from the chassis slightly to avoid the possibility of shorts. If this procedure fails to disclose anything wrong, remove all tubes from their sockets and check the resistance once again. If normal, one of the tubes might be shorted, or an error in wiring might exist at one of the sockets. The trouble can be located by replacing the tubes one at a time, making checks after each tube is installed. The troublesome tube or wiring is located when the short re-occurs.
4. Be sure that the switch is off by rotating the volume control to its full counterclockwise position.

Connect the line cord to a 110 to 125 volt 50/60 cycle AC outlet. DO NOT CONNECT THE RECEIVER TO A D-C (DIRECT CURRENT) LINE. SERIOUS DAMAGE TO THE POWER TRANSFORMER WILL RESULT. No attempt should be made to use this amplifier on 25 cycle AC lines, since the transformer may be seriously damaged, and the receiver will not operate.

Turn the receiver on by rotating the volume control clockwise until a click is heard. The filaments of the 12BE6, 12BA6 and 12AV6 tubes should show color. Now insert the 5Y3 tube in its socket. This tube should also show filament color. If the 5Y3 plates show a red color or if the tube shows a bright violet glow internally, turn the receiver off immediately and recheck the wiring for an error. Any such action indicates that excessive current is being drawn from the power supply.

This can be caused by errors or shorts in the wiring, or by a defective tube. The procedure described under step 3 above will help locate the source of difficulty.

NOTE: The 5Y3 tube normally becomes quite hot due to the relatively large amount of current drawn through it. This characteristic is typical of any rectifier or power output tube and does not indicate anything wrong with the receiver.

Rotate the volume control to its full clockwise position. The speaker should now produce a rushing or "live" sound. Rotate the tuning control over its entire range. The sound produced by the speaker should change somewhat. Possibly strong local broadcasting stations will be heard. If the receiver will operate in this manner, it may be assumed that it is operating properly.

ALIGNMENT OF THE RECEIVER

Connect the ground lead of a signal generator to the chassis. Connect the output or "hot" lead of the signal generator through a .01 μfd condenser to pin 7 of tube socket A. (12BE6). The tuning condenser plates should be fully meshed before alignment is started. Turn the signal generator on and set the dial to 455 kc. The signal, if modulated, may be observed by noting the loudness at the speaker, or on the scale of an output meter connected across the speaker terminals, or with the aid of a vacuum tube voltmeter connected across the volume control. If the speaker or an output meter is used as an indicator, the volume control should be turned fully clockwise. If a vacuum tube voltmeter is used across the volume control, the control can be set to any convenient level or turned down completely.

Start the procedure by turning the brass screw at the bottom of output IF transformer M for maximum indication. Next, adjust the top screw of transformer M for maximum indication. The bottom screw of input IF transformer L is adjusted next. Finally rotate the top screw of transformer L for maximum output. Use as low an indication as possible by reducing the output of the signal generator as the receiver sensitivity increases.

To touch up the alignment, repeat this procedure one more time, using as little signal as possible from the signal generator. This completes the IF alignment.

For RF alignment, clip the output lead of the signal generator to the paper back of the rod antenna assembly, near the end of the rod closest to the 12BE6 tube. Set the generator to 1620 kc. Turn the tuning condenser all of the way to the right so that the plates are fully open. Adjust the oscillator trimmer condenser (nearest the power transformer) for maximum indication. Next, set the receiver dial and the signal generator to 1400 kc and adjust the antenna trimmer (nearest the front) on the tuning condenser assembly for maximum indication. This completes the alignment.

ALIGNMENT WITHOUT A SIGNAL GENERATOR

If a signal generator is not available, temporary adjustments can be made. However, for best results it is recommended that the receiver be aligned with a signal generator as previously described. A local serviceman will usually perform this service for a reasonable fee.

To align the receiver without a generator, tune in a strong station, preferably near the low end of the dial. Adjust the IF transformer tuning screws for maximum indication, starting with IF transformer M and finishing with IF transformer L, as before. Next, tune in a station of known frequency at the high end of the dial, as near to 1600 kc as possible. Adjust the oscillator trimmer condenser (nearest the power transformer) until the station appears at the correct frequency on the receiver dial. To complete this procedure, tune to a station near 1400 kc and adjust the antenna trimmer on the front section of the tuning condenser for maximum signal strength.

IN CASE OF DIFFICULTY

1. Recheck the wiring. Trace each lead in colored pencil on the pictorial as it is followed in the receiver. Most cases of difficulty result from wrong connections. Often having a friend check the wiring will reveal a mistake consistently overlooked.

2. If possible, compare tube socket voltages with those shown in the table. The readings should be within 20% of those tabulated if a vacuum tube voltmeter is used. Other type meters may give lower readings, due to loading effects. If the voltage fails to compare with the value shown, check further into the circuit involved by checking the various components (resistors, condensers, tubes, etc.)

SOCKET VOLTAGES

SOCKET	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
A	12BE6	4-8V Neg.	NS	Fil.	Fil.	250-280	100-120	.5-5V Neg.	
B	12BA6	.5-5V Neg.	0	Fil.	Fil.	250-280	100-120	.4-.9	
C	12AV6	.4-.7V Neg.	0	Fil.	Fil.	.5-5V Neg.	.5-5V Neg.	90-100	
D	5Y3	NC	370*	NC	300-340 V. AC	Tie Point	300-340 V. AC	NC	370*
E	12A6	0	Fil.	360	250-280	NS	Tie Point	Fil.	10-15V

All readings taken with a Heathkit vacuum tube voltmeter. All readings are DC voltages measured to chassis, unless otherwise specified.

NC - No connection to this contact.

Fil. - Voltage between two terminals so marked approximately 12V. AC.

NS - Not significant

Line voltage - 115 V 60 cycles

*Voltage between pins 2 and 8 - 5.0 AC

3. If the socket voltages are within 20% of the values indicated, or are well out of tolerance for no apparent reason, and the trouble still persists, remove all of the tubes and have them checked by a competent serviceman.

4. Carefully recheck the color codes on resistors and transformer leads. If there is a question concerning the color of a transformer lead, scraping the insulation lightly with a knife may help to identify the color quickly.

Some common troubles are listed below along with simple trouble shooting procedures which are often helpful in locating the source of difficulty.

RECEIVER COMPLETELY INOPERATIVE

If no sound of any kind is evident when the volume control is turned fully clockwise, check the 5Y3 rectifier tube visually once again to be sure that the filaments are lit and that the plates are not red. The rectifier filaments do not glow brightly, so it may be necessary to observe them in a darkened room. When sure that everything is all right at this point, check the selector switch to be sure that it is in the upward position. Make sure that the switch is mounted so that the moving parts are allowed full travel.

The screwdriver is a useful tool for making simple disturbance tests. If a stage in the receiver is operating normally, a sound will be heard in the speaker when the grid of this stage is touched by the metal part of the screwdriver. This procedure should be started at the 12A6 stage. Touch the screwdriver to pin 5 of the 12A6 tube socket E. A click should be heard in the speaker. If not, check the wiring to this stage once again. If the wiring appears to be correct, check the tube. Disconnect the .02 μfd condenser from pin 5 and repeat the procedure. If a click is heard when the condenser is disconnected, the condenser is probably leaky and should be replaced. Should the stage still fail to operate, disconnect the .005 μfd condenser from pin 3 of socket E and again touch the grid. Proper operation indicates that this condenser is shorted.

When everything is operating normally in the 12A6 stage, the 12AV6 stage should be checked in the same manner. Rotate the volume control fully clockwise and touch pin 1 of socket C with the screwdriver. Loud sound indicates proper action. If this stage is inoperative, follow the same procedure described above. Special attention should be given to the shielded leads to make sure that no short circuits exist.

Leaving the volume control turned all the way up, check the 12BA6 stage in a similar manner by touching the grid of the tube (pin 1) with a screwdriver. If everything is operating properly here, touch pin 1 of the 12BE6 socket. If no reaction, touch pin 7. Again, follow the procedure described above to localize the trouble. Carefully check the connections to the IF transformers, as any error at these points can disable the receiver. If a "click" is heard when pin 7 of the 12BE6 is touched, but the receiver will not operate, there is a chance that the oscillator is not functioning properly. This can be checked by shorting one of the lugs on the rear section of the tuning condenser to ground with the screwdriver. No response indicates that the oscillator is not operating, and the connections to the oscillator coil should be checked.

If a signal generator or signal tracer is available, the same procedure can be observed by injecting the appropriate signal at the points indicated above. The use of such instruments is highly recommended, if possible, but the screwdriver disturbance tests will suffice.

OSCILLATION OR "SQUEALING"

If the receiver operates, but tends to whistle when the volume control is turned up, it is likely that the audio or IF amplifier stages are oscillating. The source of trouble can usually be localized by measuring the voltage developed across the 470 KΩ grid resistor connected between pin 5 and lug 10 of socket E. If a negative voltage is evident, the audio amplifier is oscillating, if not, the IF stages are unstable. In either case, the trouble can usually be eliminated by shortening all leads as much as possible, and dressing them as shown in the pictorials. In the case of audio oscillation, special attention should be given to the blue lead of the output transformer. This wire must be kept well away from pin 1 of socket C to maintain stable operation.

HUM AND NOISE

High hum levels may result when the BR-2 is used as a tuner or as a phonograph amplifier. If this occurs, the line cord should be reversed in the outlet for minimum hum. In some cases it may be necessary to reverse the line cord of the amplifier or phonograph player to keep unwanted noise at low level. Placing the receiver in a strong AC static field, such as near a television receiver or fluorescent fixture can cause excessive noise. The receiver should always be placed in a location where the reception is quietest.

LOW SENSITIVITY

Lack of sensitivity might be traced to improper alignment or to a defective tube. Both should be checked if optimum performance is to be obtained. Also, the rod antenna is directional and so the receiver should be oriented for best signal reception.

Poor sensitivity at the low end of the dial can sometimes be remedied by "rocking in" the oscillator. This is done by tightening or loosening the oscillator trimmer a slight amount at a time, at the same time rocking the tuning control back and forth until a point is found where the signal strength is strongest at the low end of the dial. If the signal drops off when the trimmer is turned in one direction, reverse the direction of rotation. After this procedure is completed, it will be necessary to re-adjust the antenna trimmer at 1400 kc. The high end of the dial may be off calibration somewhat after this procedure is completed, but the overall sensitivity will be improved to a large extent.

INSTALLATION

The 5Y3 and 12A6 tubes, as well as the power transformer become quite warm after a sustained period of operation. Therefore, adequate ventilation should be provided to dissipate the heat. The top of the enclosure should clear the paper back by at least one inch, and the back should be open to allow the heat to escape.

If desired, a matching cabinet for this receiver can be purchased from the Heath Company for $4.50. This cabinet is attractively finished with dark gray proxylin and has a contrasting front panel. A speaker opening is provided at the appropriate location.

REPLACEMENTS

Material supplied with Heathkits has been carefully selected to meet design requirements and ordinarily will fulfill its function without difficulty. Occasionally improper instrument operation can be traced to a faulty tube or component. Should inspection reveal the necessity for replacement, write to the Heath Company and supply all of the following information:

A. Thoroughly identify the part in question by using the part number and description found in the manual parts list.
B. Identify the type and model number of kit in which it is used.
C. Mention the order number and date of purchase.
D. Describe the nature of defect or reason for requesting replacement.

The Heath Company will promptly supply the necessary replacement. Please do not return the original component until specifically requested to do so. Do not dismantle the component in

question as this will void the guarantee. If tubes are to be returned, pack them carefully to prevent breakage in shipment as broken tubes are not eligible for replacement. This replacement policy does not cover the free replacement of parts that may have been broken or damaged through carelessness on the part of the kit builder.

SERVICE

In event continued operational difficulties of the completed instrument are experienced, the facilities of the Heath Company Service Department are at your disposal. Your instrument may be returned for inspection and repair for a service charge of $3.00 plus the cost of any additional material that may be required. THIS SERVICE POLICY APPLIES ONLY TO COMPLETED INSTRUMENTS CONSTRUCTED IN ACCORDANCE WITH THE INSTRUCTIONS AS STATED IN THE MANUAL. Instruments that are not entirely completed or instruments that are modified in design will not be accepted for repair. Instruments showing evidence of acid core solder or paste fluxes will be returned not repaired.

The Heath Company is willing to offer its full cooperation to assist you in obtaining the proper operation of your instrument and therefore this factory repair service is available for a period of one year from the date of purchase.

SHIPPING INSTRUCTIONS

Before returning a unit for service, be sure that all parts are securely mounted. Attach a tag to the instrument giving name, address and trouble experienced. Pack in a rugged container, preferably wood, using at least three inches of shredded newspaper or excelsior on all sides. DO NOT SHIP IN THE ORIGINAL KIT CARTON AS THIS CARTON IS NOT CONSIDERED ADEQUATE FOR SAFE SHIPMENT OF THE COMPLETED INSTRUMENT. Ship by prepaid express if possible. Return shipment will be made by express collect. Note that a carrier cannot be held liable for damage in transit if packing, in HIS OPINION, is insufficient.

SPECIFICATIONS

All prices are subject to change without notice. The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

WARRANTY

The Heath Company limits its warranty of parts supplied with any kit (except tubes, meters and rectifiers, where the original manufacturer's guarantee only applies) to a period of three (3) months from the date of purchase. Replacement will be made only when said part is returned postpaid, with prior permission and in the judgment of the Heath Company was defective at the time of sale. This warranty does not extend to any Heathkits which have been subjected to misuse, neglect, accident and improper installation or applications. Material supplied with a kit shall not be considered as defective, even though not in exact accordance with specifications, if it substantially fulfills performance requirements. This warranty is not transferable and applies only to the original purchaser. This warranty is in lieu of all other warranties and the Heath Company neither assumes nor authorizes any other person to assume for them any other liability in connection with the sale of Heathkits.

The assembler is urged to follow the instructions exactly as provided. The Heath Company assumes no responsibility for the operation of the completed instrument, nor liability for any damages or injuries sustained in the assembly or operation of the device.

HEATH COMPANY
Benton Harbor, Michigan

PARTS LIST

HEATHKIT BROADCAST RECEIVER

MODEL BR-2

PART No.	PARTS Per Kit	DESCRIPTION
Resistors		
1-1A	1	470 Ω 1 watt
1-2	1	68 Ω
1-2B	1	4700 Ω 2 watt
1-4B	1	15 KΩ 2 watt
1-22	1	22 KΩ
1-25	1	47 KΩ
1-29	1	220 KΩ
1-33	1	470 KΩ
1-38	1	3.3 megohm
1-71	1	4.7 megohm
Condensers		
23-2	1	.005 μfd
23-8	1	.02 μfd
23-10	4	.05 μfd
25-6	1	20-20 μfd 450 V 20 μfd 25 V
26-13	1	Dual tuning condenser
Coils		
40-30	1	Oscillator coil
40-31	1	Rod antenna assembly
52-4	1	Input IF transformer
52-5	1	Output IF transformer
Controls-Switches		
19-4	1	1 megohm with SPST switch
60-2	1	DPDT slide switch
Tubes		
411-3	1	5Y3
411-21	1	12A6
411-50	1	12BE6
411-51	1	12BA6
411-52	1	12AV6
Grommets-Wafers-Clips-Lug		
73-1	1	3/8" grommet
207-5	1	3/16" cable clamp
259-1	1	Solder lug
260-7	2	IF transformer mounting clip
481-2	1	Condenser mounting wafer
Sockets-Terminal Strips		
431-1	1	1 Lug terminal strip
431-10	1	3 Lug terminal strip
434-2	2	Octal socket
434-18	1	Phono socket
434-20	1	110 volt socket
434-37	3	7 Pin miniature socket

PART No.	PARTS Per Kit	DESCRIPTION
Dial Parts-Knobs-Brackets		
100-M24	1	Dial plate assembly
100-M25	1	Dial pulley assembly
100-M27	1	Dial cord assembly
204-9	4	Angle bracket
204-M46	2	Dial plate mounting bracket
258-4	1	Dial cord spring
462-14	2	Knob
463-1	1	Dial pointer
Transformers-Speaker		
51-3	1	Output transformer
54-3	1	Power transformer
401-9	1	5 1/2" PM loudspeaker
Hardware		
250-2	6	3-48 x 1/4 screw
250-7	6	6-32 x 3/16 screw
250-8	3	#6 x 3/8 sheet metal screw
250-9	22	6-32 x 3/8 screw
250-15	1	8-32 x 1/8 set screw
250-18	4	8-32 x 3/8 screw
252-1	6	3-48 hex nut
252-3	25	6-32 hex nut
252-4	4	8-32 hex nut
252-7	1	3/8-32 control nut
254-1	27	#6 lockwasher
254-2	4	#8 lockwasher
254-4	1	3/8" lockwasher
Wire		
89-1	1	Line cord
206-6	1	12" length Spirashield
340-2	1	length Bare wire
344-1	1	length Hook-up wire
Miscellaneous		
200-M48	1	Chassis
595-62	1	Manual