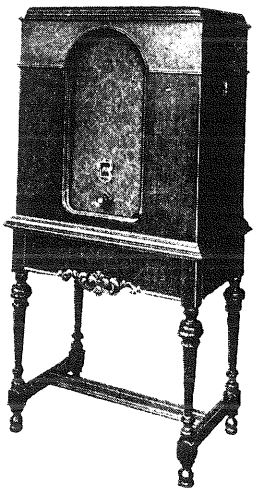
RCA
Radiolas 44 and 46

SERVICE NOTES



RCA Radiola 46

Second Edition—2M
March, 1931

RCA Victor Company, Inc.
RADIOLA DIVISION
Camden, New Jersey
REPRESENTATIVES IN PRINCIPAL CITIES

PREFACE

Service goes hand in hand with sales. The well-informed RCA Authorized Dealer renders service at time of sale in affording information as to proper installation and upkeep. Subsequent service and repair may be required by reason of wear and tear and mishandling, to the end that RCA Loudspeaker and Radiola owners may be entirely satisfied.

Obviously, this service can best be rendered by properly equipped service organizations having a thoroughly trained personnel with a knowledge of the design and operation of RCA Loudspeakers and Radiolas.

Such service organizations have been established by RCA Distributors, and RCA Authorized Dealers are advised to refer any major work or replacement to their selected Distributors. Minor replacements and mechanical and electrical adjustments may be undertaken by the RCA Dealer.

To assist in promoting this phase of the Dealer and Distributor's business the RCA Service Division has prepared a series of Service Notes—of which this booklet is a part—containing technical information and practical helps in servicing RCA Loudspeakers and Radiolas.

This information has been compiled from experience with RCA Dealers and Distributors' service problems and presents the best practice in dealing with them. A careful reading of these Service Notes will establish their value, and it is suggested they be preserved for ready reference.

In addition to supplying the Service Notes, the RCA Service Division maintains a corps of engineers who are qualified to render valuable help in solving service problems. These engineers call upon the trade at frequent intervals to advise and assist RCA Distributors in the performance of service work.

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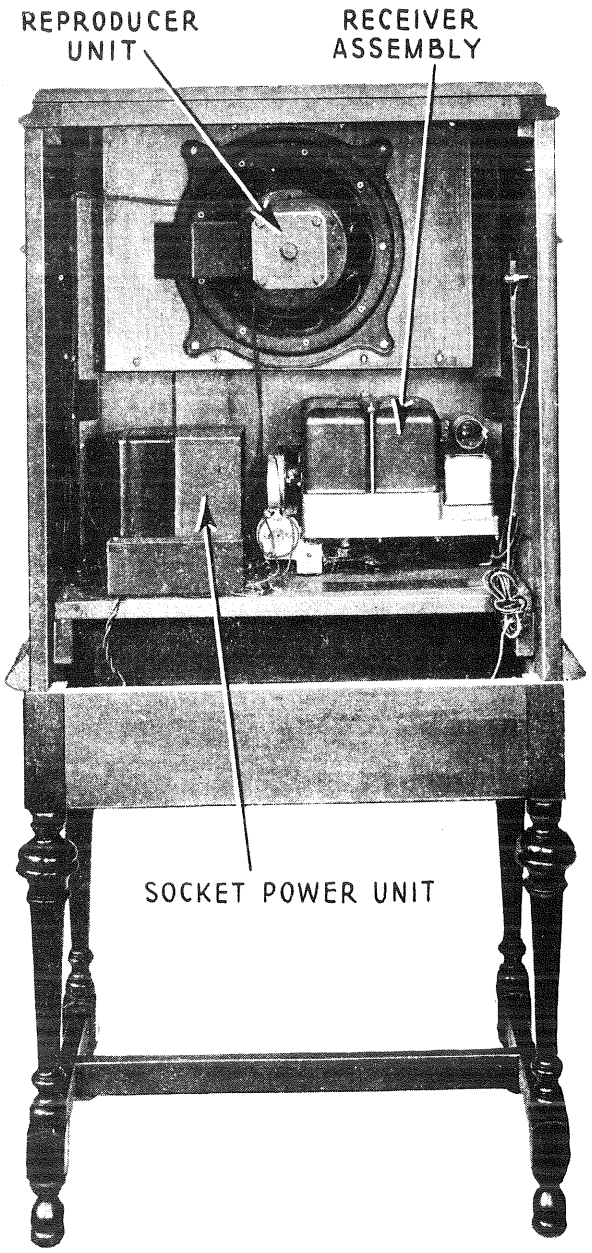

Figure 1—Rear interior cabinet view of Radiola 46

RCA RADIOLAS 44 and 46

SERVICE NOTES

Prepared by RCA Service Division

RATING

105-125 Volts—50-60 Cycles—100 Watts

Models are also available for 105-125 volt 25-40 cycle A.C. lines. The difference between the 50-60 cycle models and the 25-40 cycle models is the power transformer and an additional condenser bank.

INTRODUCTION

RCA Radiolas 44 and 46 are radio receivers utilizing the new A.C. screen grid Radiotrons UY-224, the new power amplifier Radiotron UX-245, and the full wave rectifier Radiotron UX-280. The Radiola 44 is a table model receiver which may be used with either a magnetic or dynamic type loudspeaker, and has special provision for energizing the field of a dynamic speaker that uses 40 milliamperes at 300 volts. The Radiola 46 is a console model utilizing the same chassis and having incorporated therein an RCA dynamic type loudspeaker. Figure 1 shows the rear interior view of Radiola 46 and Figure 2 the parts in the receiver assembly. Figure 3 shows the parts in the S.P.U. of Radiola 44. Figure 4 shows the construction of Radiotron UY-224.

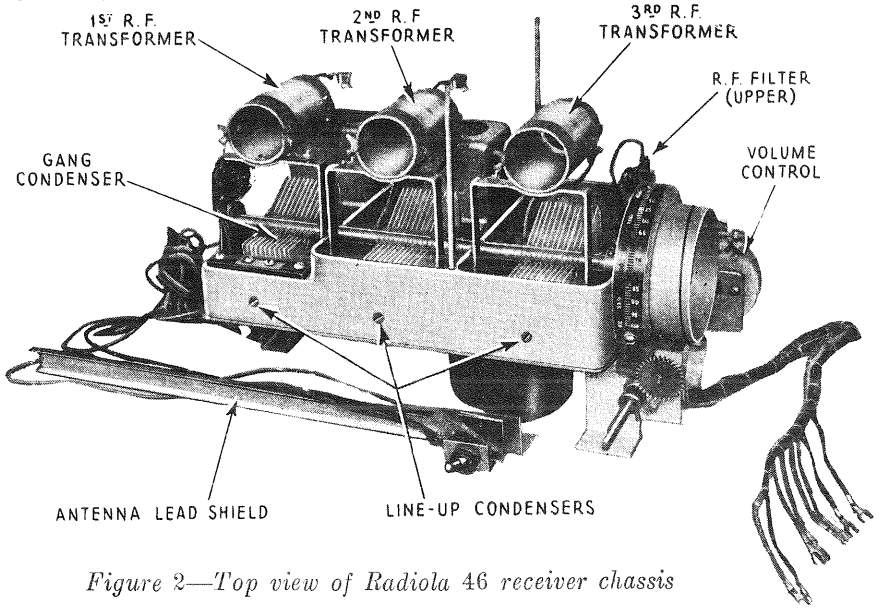

Figure 2—Top view of Radiola 46 receiver chassis

The sensitivity and selectivity of these Radiolas are sufficient for excellent reception and the fidelity is exceptionally good. The use of the power amplifier Radiotron UX-245 gives a large reserve of power that contributes to the quality of reproduction at low as well as high volume.

The following principles are incorporated in the design of Radiolas 44 and 46. Figure 5 shows the schematic circuit diagram of Radiola 44. Figure 6 is a schematic circuit diagram of the socket power unit in Radiola 46, the receiver being the same as Radiola 44.

(a) Three Radiotrons UY-224, one Radiotron UX-245 and one Radiotron UX-280 are used. Two Radiotrons UY-224 are tuned R.F. amplifiers and one Radiotron UY-224 is the power detector. The Radiotron UX-245 is the power amplifier and the UX-280 is the full wave rectifier for converting the A.C. to D.C. for use as plate and grid supply to all other Radiotrons, and field supply to a dynamic reproducer unit.

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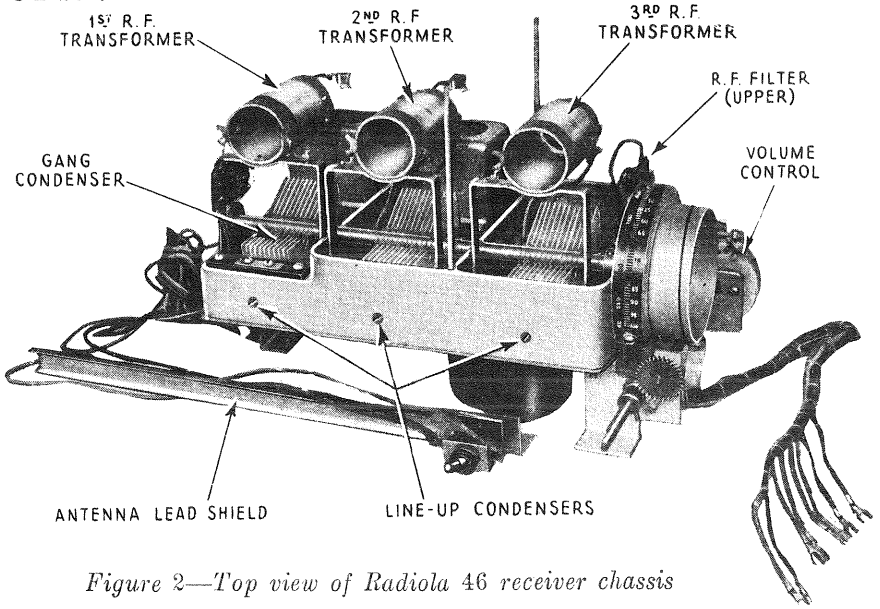

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(b) The circuit consists of two tuned radio frequency stages, a power detector and a power amplifier. The detector has sufficient output to drive the power amplifier without an intermediate audio stage.

(c) By using a high inductance antenna loading coil, variations in antenna constants have little effect on the tuning of the circuits. This eliminates the necessity for a coupling tube or different antenna length connections. In addition this circuit resonates in the broadcast band at about 700 K.C. The purpose of having such a characteristic is to bring up the sensitivity at the low frequency end of the band and thus give the receiver equal sensitivity at all wavelengths.

(d) A Local-Distant Switch is provided which disconnects the antenna at the local position and connects a condenser in its place from the antenna end of the loading coil to ground. The use of this switch gives the best possible operation from both local and distant stations.

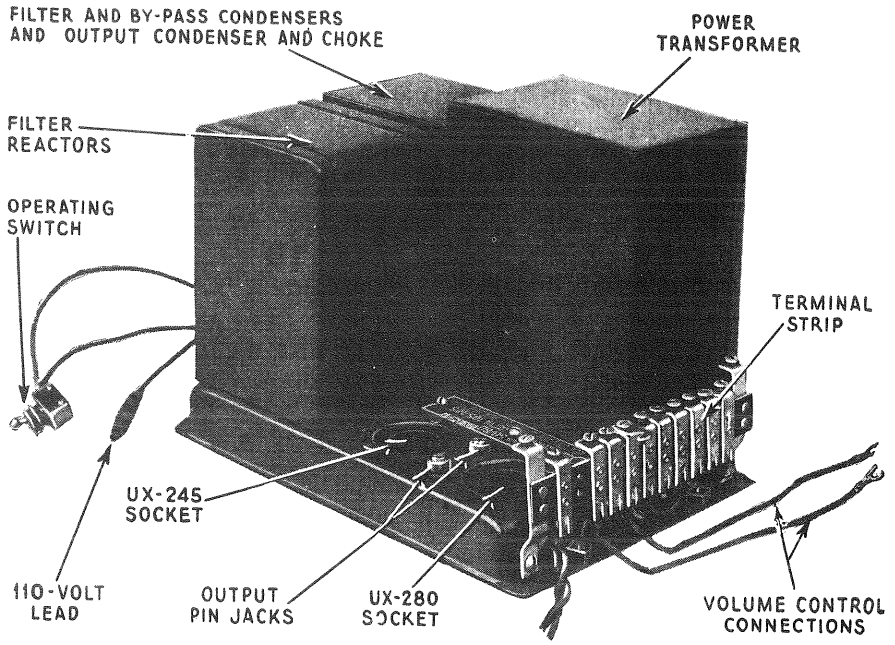


Figure 3—Top view of Radiola 44 socket power unit

(e) The use of screen grid tubes together with proper shielding eliminates the necessity of neutralizing, or other methods of stabilizing.

(f) A high voltage type detector gives improved quality and sufficient output to directly drive the power amplifier. No audio transformer is used in Radiola 44 and 46. The detector is coupled to the power amplifier by means of impedance coupling which eliminates any distortion that might occur if a transformer were used.

(g) The volume control varies the voltage on the screen grid of the two R.F. amplifiers. This provides a smooth means of controlling volume without distortion and gives a positive cut-off even on loud local stations.

Figure 5 shows the sequence of the Radiotrons. The first and second tuned radio frequency stages and the tuned detector, using Radiotrons UY-224, are in the receiver assembly. The power amplifier UX-245 and the full wave rectifier UX-280 are in the Socket Power Unit.

THEORY OF OPERATION OF A. C. SCREEN GRID RADIOTRON

Since the A.C. screen grid Radiotron UY-224 is a new type of tube a brief discussion of the theory on which it and the surrounding circuits operate will give the service man an understanding of the principles involved in the design of Radios 44 and 46.

Radiotron UY-224 has five elements compared with the usual three in battery, or amplifier tubes, and four in the UY-227 indirectly heated cathode type. These elements are namely: a heater, a cathode—both similar with that used in Radiotron UY-227—a plate, a control grid and a screen grid placed on both the inside and outside of the plate. Figure 4 shows the internal construction of Radiotron UY-224.

The outstanding features of the screen grid tube are as follows:

(a) The screen grid effectively shields the control grid from undesirable feed-back effects caused by plate voltage variations through inter-element capacity.

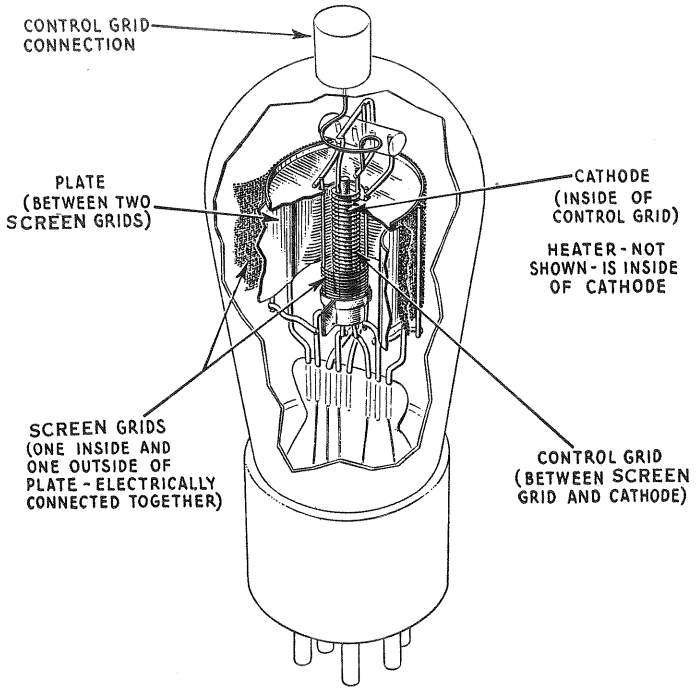


Figure 4—Internal construction of Radiotron UY-224

(b) Placing the control grid close to the cathode and relatively far from the plate increases the amplification constant of the tube enormously which, together with the insertion of the screen grid, increases the A.C. plate resistance. The plate resistance is so high that it is difficult to design an output circuit to obtain full advantage of the amplification of the tube. However, while actual amplification is less than the amplification constant of the tube it is much greater than that obtained with other types of tubes. An example of this amplification in practice is presented in Radiola 44 which with two R.F. stages, has a sensitivity approximately the same as receivers using other tubes in four R.F. stages. This high plate resistance and high impedance output circuit also causes the grid circuits to have considerably less R.F. resistance which, together with decreased coupling between the primary and secondary of the R.F. transformer, gives the receiver good selectivity.

The advantages of high plate resistance are obtained in this tube without sacrificing the additional advantages of high mutual conductance. The positive potential impressed on the screen grid accelerates the flow of plate current and since it is much closer to the cathode than is the plate, it produces a greater acceleration than does the higher voltage impressed upon the plate. The mechanical construc-

tion of the screen grid does not permit it to collect many of the electrons composing the plate current, hence, practically the entire plate current passes on through the screen grid to the plate.

(c) The positive potential on the screen grid in relation to the cathode is necessary. Variations of this voltage affect the mutual conductance of the tube in accordance with the above explanation, hence, affords an excellent means of controlling the volume without introducing distortion. The variation in screen grid voltage in the Radiola 44 and 46 is from zero volts at minimum volume to 70 volts positive at maximum volume.

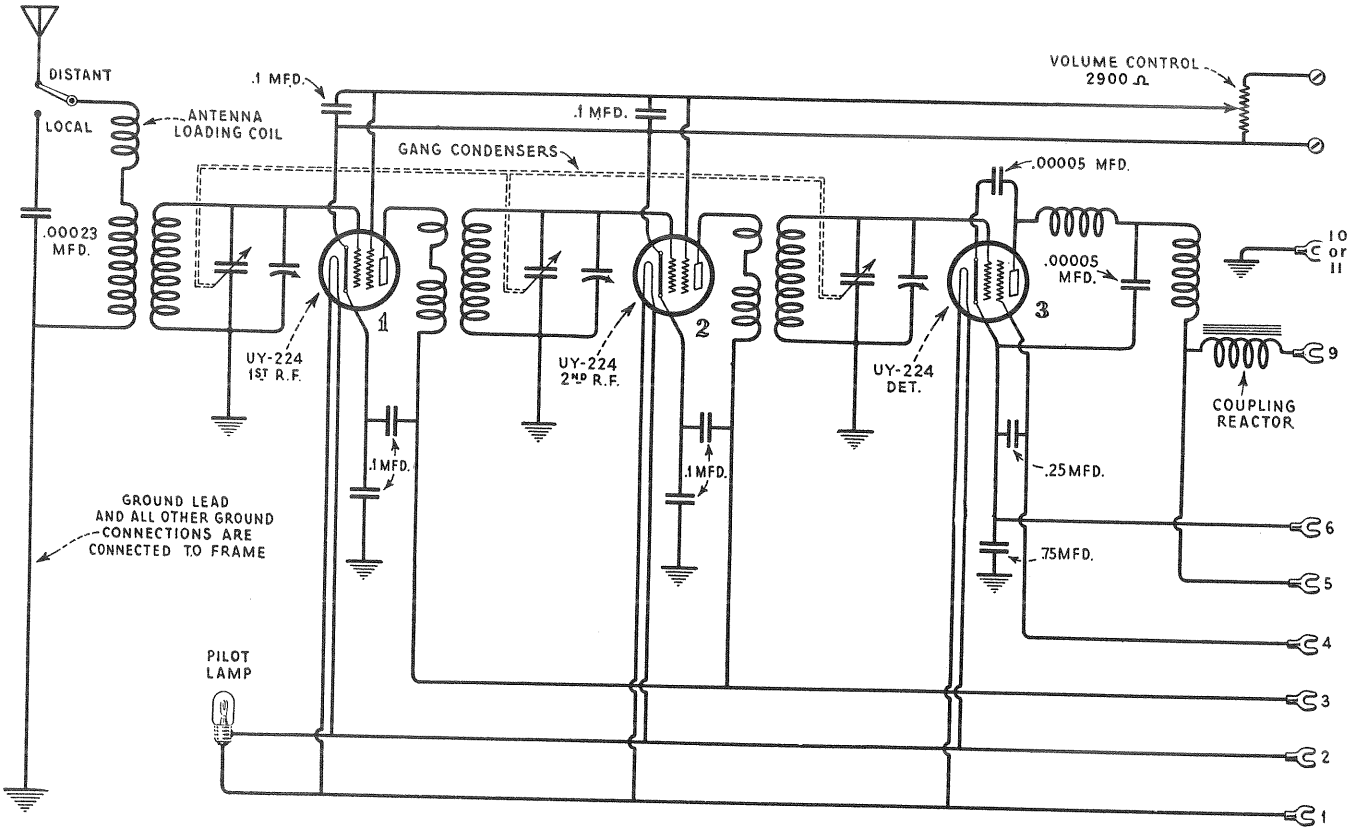


Figure 5—Schematic circuit diagram of

The advantage of the effect noted in (a) is that, provided all external circuits are shielded, there is no feed-back or regeneration, which might cause oscillation in any of the circuits. This eliminates the need for neutralizing condensers, grid resistors and other methods of preventing oscillation in the R.F. circuits. As most of these methods reduce the efficiency of the circuits, their absence means a distinct gain in the performance of the receiver.

PART I—INSTALLATION

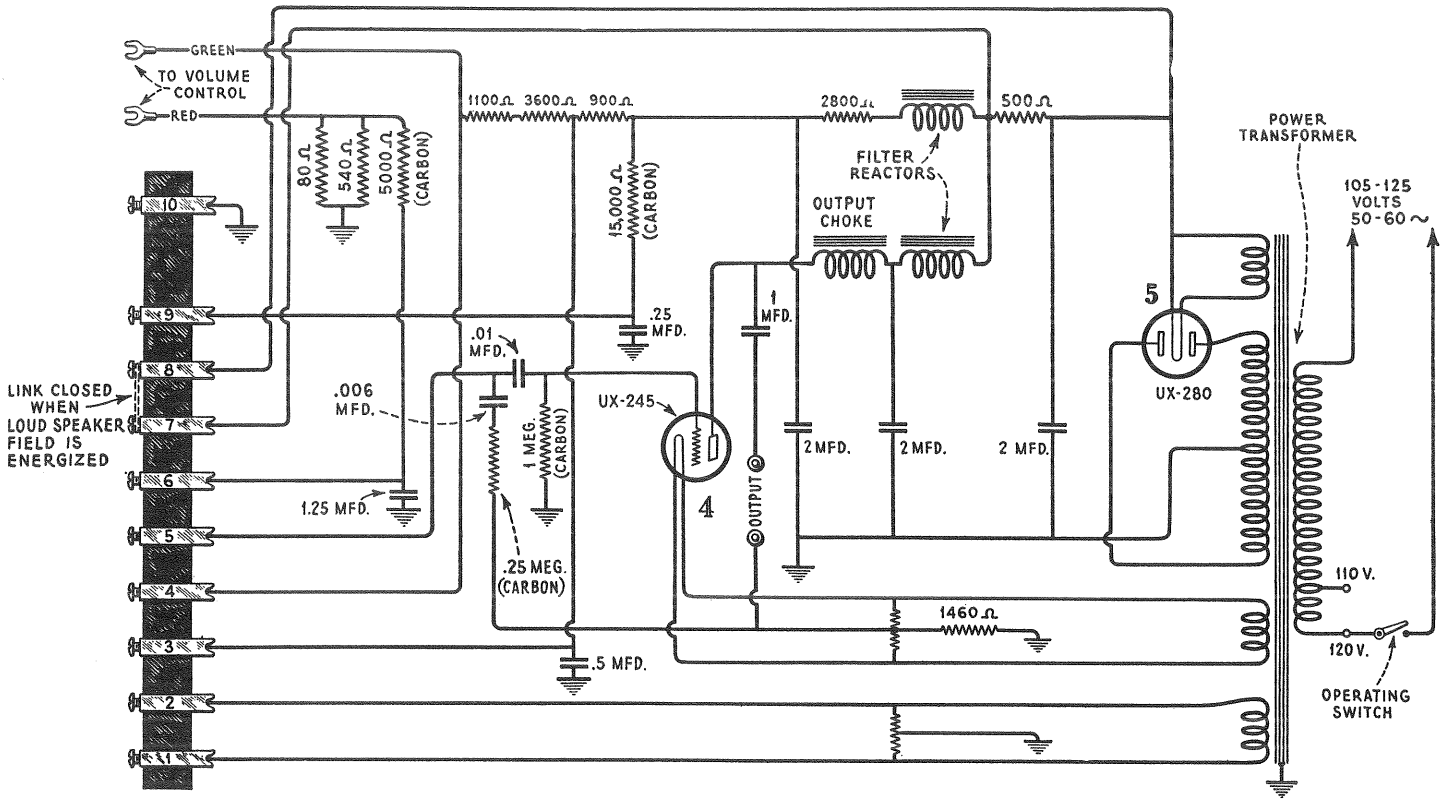
[1] ANTENNA

RCA Radiolas 44 and 46 are somewhat more critical to specific antenna requirements than the usual radio receiver. The antenna installation should therefore be erected with care and kept within specific requirements set for this receiver. The requirements of such an antenna are as follows:

The antenna should be at least 30 feet and not greater than 60 feet long, the best results being obtained with one of approximately 50 feet in length, measured from far end to the ground connection.

A shorter antenna than that suggested will result in possible oscillation at the shorter wavelengths and low sensitivity at the higher wavelengths.

A long antenna will result in low sensitivity in the middle of the scale and if sufficiently long, at the higher wavelengths. Also the long antenna may cause a secondary modulation effect on strong local stations. However should a long antenna be already in use it may be adapted to Radiolas 44 and 46 by inserting a small condenser in series with it and thereby reducing the effective capacity to the receiver. This condenser should be from .00025 mfd. to .0005 mfd. in capacity, the larger condenser being suitable for antennas of 100 feet in length and the small condenser for antennas of greater length. In locations where the pick-up of a



Radiola 44 receiver and socket power unit

short antenna is not sufficiently great, a long antenna and series condenser will probably give the desired results.

The antenna should be erected as high as possible and be removed from all obstructions. The lead-in should be a continuation of the antenna itself, thus avoiding all splices which may introduce additional resistance and in time corrode sufficiently to seriously affect reception. If it is absolutely necessary to splice the lead-in to the antenna, the joint must be soldered to insure a good electrical contact. Clean off all excess flux and tape the connection to protect it from the oxidation effects of the atmosphere.

High grade glass or porcelain insulator supports are required, and at no point should the antenna or lead-in come in contact with any part of the building. Bring the lead-in wire through a porcelain tube insulator to the inside of the house for connection to the receiver. The antenna should not cross either over or under electric light, traction or power lines, and should be at right angles to these lines and other antennas. An outdoor antenna should be protected by means of an approved lightning arrester in accordance with the requirements of the National Fire Underwriter's Code.

[2] ANTENNA (Indoor Type)

Where the installation of an outdoor antenna is not practical, satisfactory results may generally be obtained by using an indoor antenna of 30 to 60 feet of insulated wire strung around the picture moulding or placed under a rug. In buildings where metal lathing is employed satisfactory results are not always possible with this type of antenna. Under such conditions various arrangements of the indoor antenna should be tried to secure satisfactory results. An indoor antenna is not as efficient as a properly installed outdoor antenna.

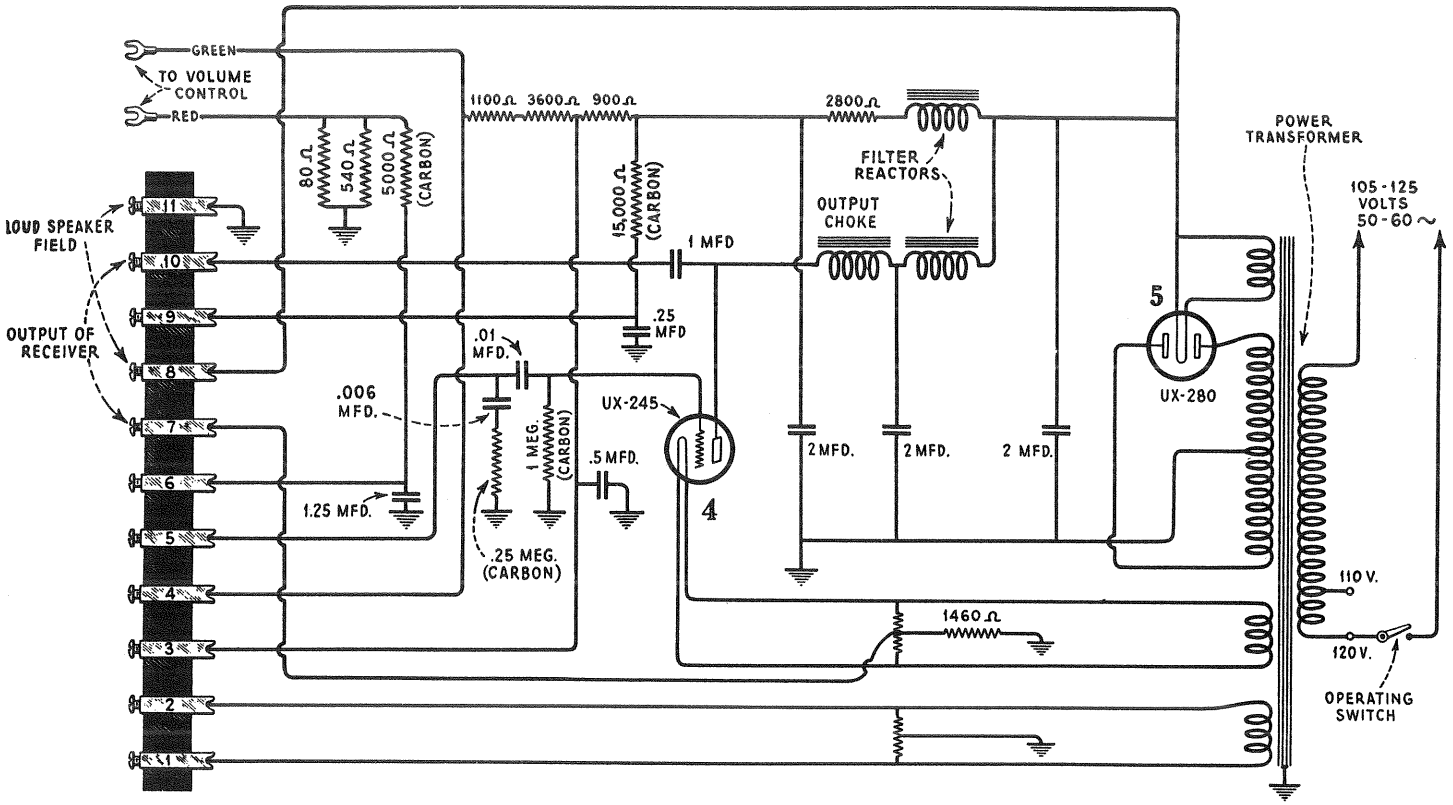


Figure 6—Schematic circuit diagram of Radiola 46 socket power unit

[3] GROUND

A good ground is quite as important as the antenna. Lack of a ground connection will reduce the sensitivity at the low frequencies. No specific recommendations can be given in this matter as conditions vary in different locations. Water and steam pipes usually make good grounds. Gas pipes usually make poor grounds and as a rule, are to be avoided. If neither water nor steam pipes are available, a pipe or metal rod may be driven into the ground to a depth of several feet. The success of this type of ground depends upon the moisture present in the soil. The ground lead should be connected by means of an approved ground clamp to a section of pipe that has been scraped and thoroughly cleaned. The connection should be inspected from time to time to make certain that a clean and tight electrical contact exists between the clamp and pipe. The service man should experiment with various grounds, and employ the one giving the best results.

[4] SPECIAL ANTENNA INSTALLATIONS FOR NOISY LOCATIONS

In line with other receivers, when Radiola 44 or 46 is installed in some city locations, such as apartment houses, hotels and office buildings, it is possible that the level of noise compared with the signal strength of the desired station may be such that the station cannot be received without an objectionable noise background. This noise may be defined as inductive interference from electrical devices such as elevator motors, generators, violet ray machines, professional equipment etc. It may have no apparent radio frequency peak, or it may have a broad peak.

A simple method that will usually increase the ratio of signal to noise and thereby obtain satisfactory reception is as follows:

Erect as long and high an antenna as possible, and then couple it to the antenna lead of the receiver through a small coupling condenser. This condenser with a 200-foot antenna should be about .0003 mfd. and smaller with larger antennas. The effect of the long antenna is to increase the pick-up to a point where it will be proportionately higher than the noise level. The series condenser then reduces the effective antenna capacity and limits the input energy to the receiver. It does not however change the noise to signal ratio and generally a setting of the volume control that will give room volume, will not be sufficiently advanced to give a noise background. If the foregoing suggestion does not remedy the trouble the problem may be analyzed as follows:

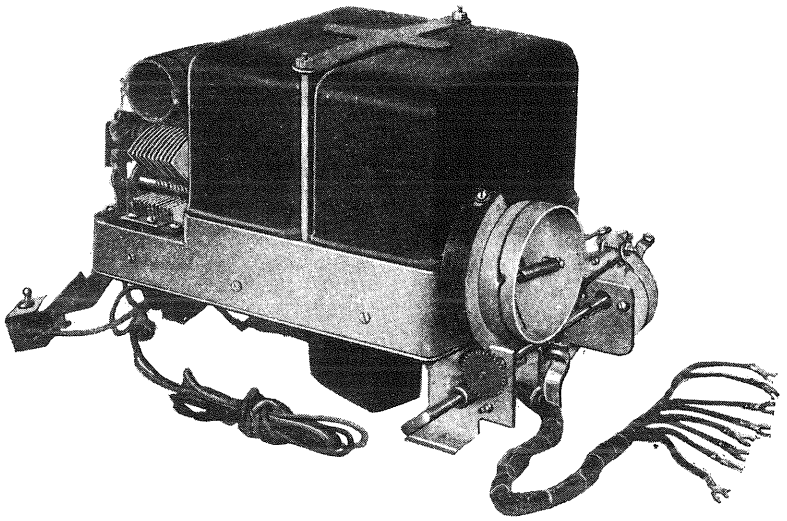


Figure 7—Top view of receiver assembly with shields in place

The effect of the noise may be divided into the following three general classes:

(a) Where the noise level is zero with no antenna or ground, but is equally great on either an indoor or outdoor antenna.

(b) Where the noise is equally great with the antenna and ground either connected or disconnected.

(c) Where the noise level is greater when the outside antenna is connected than when an inside antenna is used; the inside antenna, however, not giving sufficient pick-up for satisfactory reception.

In (a) where the noise level is zero with no antenna or ground connected, but equally great with either an indoor or outdoor antenna, it is at once apparent that the interference is not being brought into the receiver over the power supply lines. It has been found in such cases that an antenna five feet long inside the room picked up as much noise as when an entire outside antenna lead-in were used. This indicates that the noise is within the building and, in the case of the outside antenna, is being picked up on that portion of the lead-in that enters and goes through the building. In such cases the receiver should be

located close to the point where the outside lead-in enters the building. If this is impractical the Radiola can be placed in any location and a copper braid placed over the inside portion of the lead-in wire. This braid is not grounded. If the noise level is still appreciable a good receiver ground with a short lead must be obtained. A long lead is not desirable, as it may pick up noise.

In (b) the noise is picked up with no antenna or ground connected to the receiver. This indicates the noise is entering the receiver through the power lines. In this case filters must be placed in the power supply at the source of the noise or at the receiver, depending on conditions. If the trouble is cleared up in this manner when the antenna and ground are disconnected, but again appears with the use of the antenna system, the remedies suggested in (a) must also be applied.

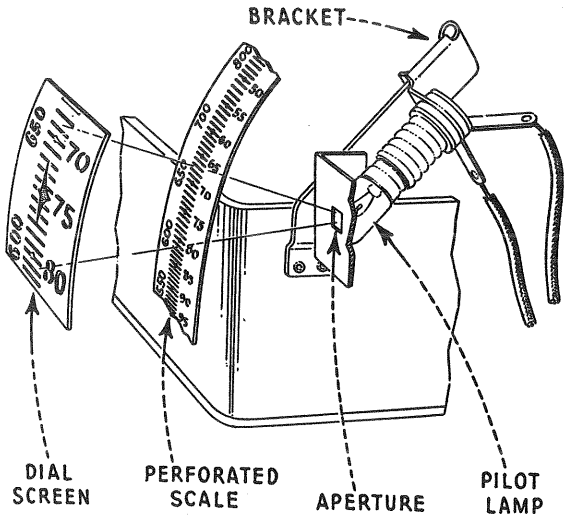


Figure 8—Tuning scale and pilot lamp assembly

In (c) the noise is greater when the outside antenna is connected than when an inside antenna is used. The use of the inside antenna, however, does not give sufficient pick-up for satisfactory reception. In this case the pick-up is probably occurring on the lead-in wire between the Radiola and the antenna. Copper braid should be placed over the entire lead-in from the receiver to the flat portion of the antenna. Also changing the direction of the antenna should be tried and the lead-in connected from the end of the antenna that gives the best results. The copper braid should not be grounded. The conditions existing in any locality must be analyzed and placed in its correct category. A little patience and experimenting will usually result in a satisfactory installation.

[5] RADIOTRONS

The correct location of the tubes is plainly indicated in Figures 15 and 16. Remove the two copper shields by releasing their clamp and place the three UY-224 Radiotrons in the sockets of the receiver assembly. Replace the shields and tighten clamp sufficiently to make good contact between the shield and the main casting. Figure 7 shows the shields in their correct position in the receiver assembly. Care should be taken not to place the Radiotron UX-245 in the UX-280 socket as filament damage will result when the current is turned "On."

Interchanging the three Radiotrons, UY-224, may have considerable effect on the sensitivity of the receiver. It is therefore recommended, when installing the Radiola, that these Radiotrons be interchanged until a combination is found that will give best results.

If, when adjusting the station selector and volume control, no stations are heard examine the Radiotrons. Possibly a Radiotron has been damaged in transit. Interchanging with others of the same type known to be in good condition will isolate the damaged one.

[6] ADJUSTMENT FOR LOW LINE VOLTAGES

A lead is provided on the side of the S.P.U. for use when Radiolas 44 and 46 are connected to lines, the voltage of which never exceeds 115 volts. A good plan is to allow the lead to remain as connected in manufacture unless unsatisfactory operation is experienced. Should adjustment be necessary, however, proceed as follows:

(a) Open the top of Radiola 44 or the rear panel of Radiola 46.

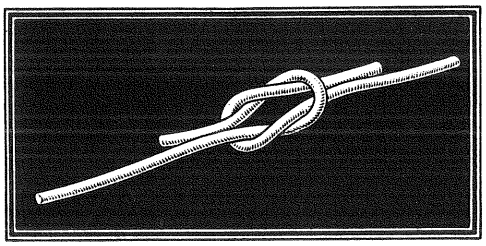


Figure 9—Square knot used in repairing drive cord

(b) Connected to the operating switch will be found two soldered connections, one of which has a transformer lead (black with red tracer) connected to the switch. Unsolder this connection and tape up the lead so that it will not ground or short to other parts.

(c) A black and red lead will be found taped up and not used. Untape this lead and clean the end for soldering.

(d) Solder this lead just untaped to the switch connection from which the black with red tracer lead has been removed.

In the case of Radiola 46 the leads are not soldered directly on the switch but to two taped connections instead.

The 110-volt tap of the transformer is now properly connected and the Radiola may be used on 105-115 volt lines with maximum efficiency. Figures 20 and 21 illustrate the changes to be made.

[7] JERKY ACTION OF STATION SELECTOR

Should operation of the station selector be stiff or jerky a little oil dropped on each condenser bearing will effectively remedy this condition. When experiencing this trouble it is also well to check the cable tension spring to make sure that suitable tension is being applied to the condenser drive cable.

[8] USE OF LOCAL-DISTANT SWITCH

A switch is provided on Radiolas 44 and 46 termed the Local-Distant Switch. This switch at the local position disconnects the antenna and connects a .00023 mfd. condenser across the antenna point of connection to ground. The purpose of this switch is to prevent the strong carrier of a local station from overloading the tubes, thereby causing distortion. Also under certain conditions a very powerful local station may impose its modulation frequency upon the carrier wave of a station to which the receiver is tuned. Both of these conditions happen only when the switch is improperly operated. Keep the switch as a general rule at the local position, unless sufficient pick-up is not obtained to receive the desired signal, when the switch may be thrown to the distant position.

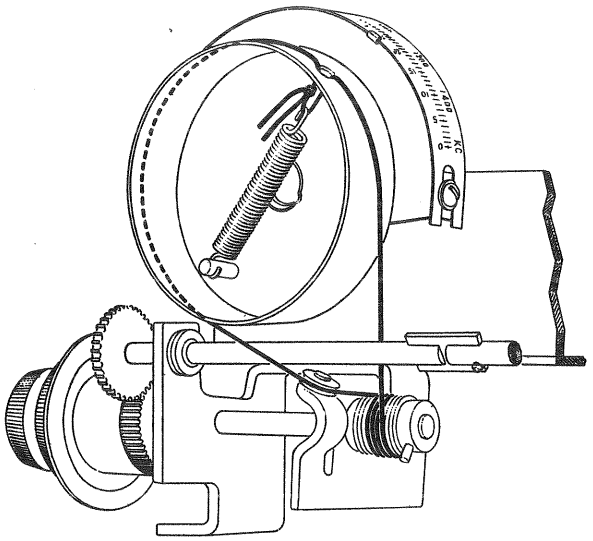


Figure 10—*Drive cord arrangement*

[9] INSTALLATION OF PILOT LAMP

A projection type of dial lighted by a small concentrated filament lamp is used in Radiolas 44 and 46. The lamp is mounted so that its rays pass through the pierced scale of the dial and then project the scale divisions on an amber window on the front of the cabinet. It is therefore important to mount the lamp so that its rays will pass through the correct openings to fully illuminate the scale readings on the window. Figure 8 shows the general arrangement of the pilot lamp and dial.

To install the pilot lamp proceed as follows:

Turn the station selector counter-clockwise to its extreme position so that the pilot lamp mounting will be accessible. Open the lid of Radiola 44 or remove rear panel of Radiola 46 and remove the socket clamp from its bracket and screw the lamp firmly into the socket. Replace the socket clamp on its bracket.

Now turn the power "On" at the operating switch. With the station selector in the extreme counter clockwise position adjust the socket clamp on its bracket until the zero mark on the scale projected on the dial screen is about ¼ inch below the index pointer.

To replace a bulb pull the socket back from its position and remove the old bulb. Place the new one in the socket and screw in tightly. The socket is then pushed down until the front window is properly illuminated. There may be a slight variation in the centering of the filaments of various lamps which might tend to throw the light too much to one side of

the window. If this happens pull the socket out and bend the metal arm that holds the socket to one side until the rays of the lamp properly illuminate the scale window. Now tune in a station, the dial setting of which is known. If the dial setting for the station tuned in is different from that formerly obtained pull the lamp back or push it forward until the dial reads the same as that previously obtained for that station. Also in some cases it may be necessary to remove a little solder from the base of the bulb with a file or knife.

[10] SHIELDS

Two large shields are used to cover the second R.F. and detector stages. Also two tube shields are placed around the first and second R.F. tubes. The two tube shields fit snugly in place into the base casting. The two large shields over the second R.F. and detector stages have clamps on each side that make contact with the rotor shaft of the gang condenser. Also an external clamp is provided to hold the shields in place.

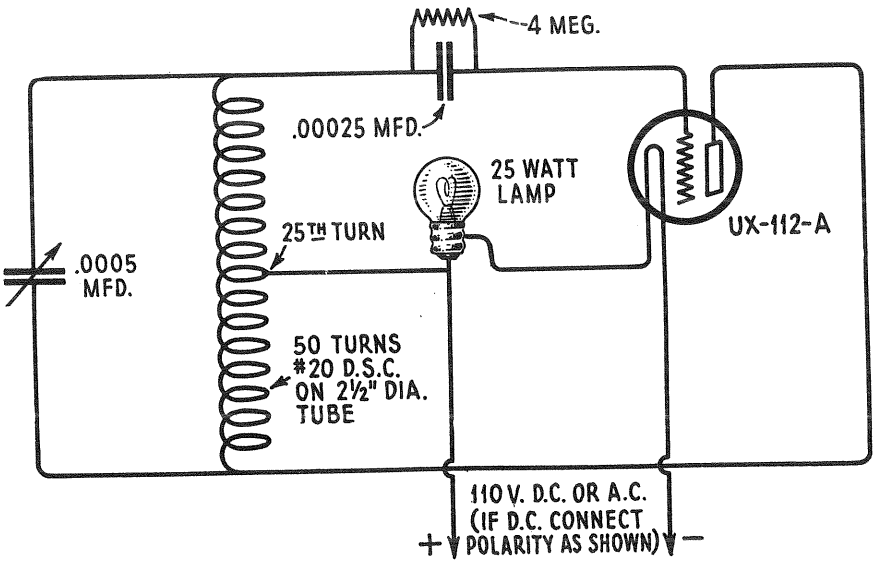


Figure 11—Schematic circuit diagram of modulated oscillator

The proper placing of the shields is very important, because unless the circuits are shielded as intended oscillation will occur. Therefore, whenever replacing tubes, or whenever the shields are removed for any reason, see that they are properly returned to their normal position.

[11] CONNECTIONS FOR SUPPLYING FIELD CURRENT TO EXTERNAL DYNAMIC LOUD SPEAKERS—RADIOLA 44 ONLY

Provision is made in Radiola 44 for supplying the field current to a dynamic loudspeaker the field of which has a rating of 300 volts, 40 milliamperes. In order to make such a connection to the receiver proceed as follows:

(a) Lift lid of cabinet and remove the cover of the S.P.U. terminal strip.

(b) Close the link between terminals 7 and 8, counting from the terminal nearest the front of the Radiola.

(c) Connect the loudspeaker field leads to terminals 7 or 8 (connected by link) and terminal No. 10. Be careful not to disturb the connection already connected to terminal No. 10.

The field is now properly connected and the terminal strip cover should be replaced and the lid closed. The output of the receiver is connected in the usual way to the loudspeaker by connecting the loudspeaker input leads to the output pin jacks on the S.P.U. of Radiola 44.

PART II—SERVICE DATA

[1] ANTENNA SYSTEM FAILURES

A grating noise may be caused by a poor lead-in connection to the antenna, or the antenna touching some metallic surface, such as the edge of a tin roof, drain pipe, etc. By throwing the "local-distant" switch to the "local" position and noting whether the noise decreases or not, the service man can determine whether the cause of the noise is within or external to the receiver and plan his work accordingly.

[2] RADIOTRON SOCKETS AND PRONGS

The sockets used in Radiolas 44 and 46 are three single UY sockets in the receiver assembly and a two-gang UX socket used in the S.P.U. A socket contact may not be in its correct

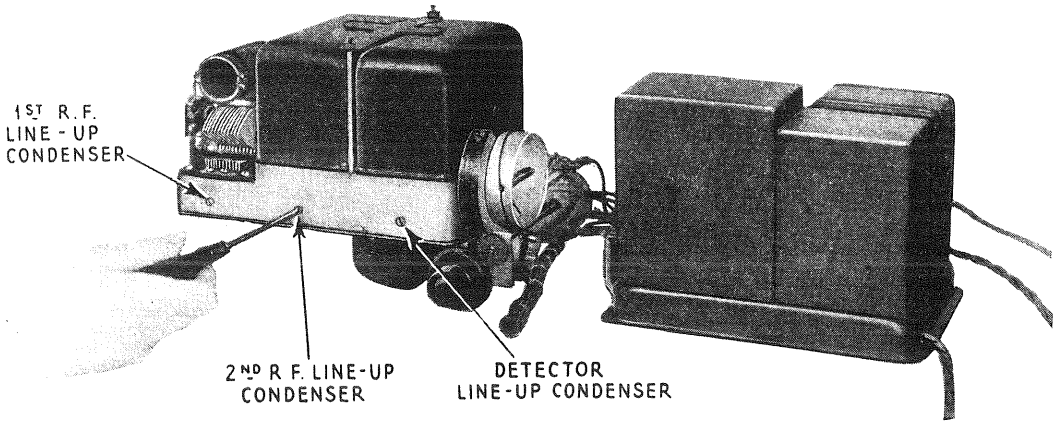


Figure 12—Method of adjusting the line-up condensers

position and the forced insertion of a tube will bend or break it. If care is exercised and the Radiotron inserted gently, little trouble will be experienced with socket contacts. A bent one will be noticed on inspection and may be corrected by inserting a narrow instrument in the socket hole and pushing the contact into its correct position. A badly bent or broken socket contact must be replaced either individually or by replacing the socket.

In addition to the tube contacts there are provided small spring clips that connect to the control grid connection at the top of the Radiotrons UY-224. These must fit snugly and make good connection. Whenever a tube is replaced care should be taken to make sure that the spring clip is replaced on the tube and that it makes a good clean tight connection.

Dirty Radiotron prongs or contacts may cause noisy or intermittent operation in the receiver. It is therefore advisable to periodically clean them with fine sandpaper to insure good contact. The use of emery cloth or steel wool is not recommended. Before re-inserting the Radiotrons in their sockets wipe the prongs carefully to make certain that all particles of sand are removed.

If a Radiotron will not fit into a socket without considerable pressure, look for excessive solder on one or more of the prongs. Excessive solder on the prongs may be removed with a file or knife.

[3] IMPROPERLY OPERATING VOLUME CONTROL

The volume control in Radiolas 44 and 46 is operated through a gear arrangement, half of which is the control knob. The shaft is broken with an insulating strip as the rotating arm is not at ground potential.

Should the volume control slip and not follow the control knob first make sure the knob is tight against the cabinet and the station selector knob tight against the volume control knob. Then examine the insulating strip and make sure it is still in its correct position.

Noise or grating noises occurring when the volume control is adjusted can generally be remedied by turning the control knob to each extreme position several times. If this does not clear up the trouble a little alcohol applied with a smoking pipe cleaner to the resistance strip will dissolve any dirt or rosin.

Excessive pressure applied after the control has been moved to the stop position may bend the moving arm and subsequent use may wear and cut the wire. Users should therefore be cautioned not to try to turn the knob beyond the stops at each extreme.

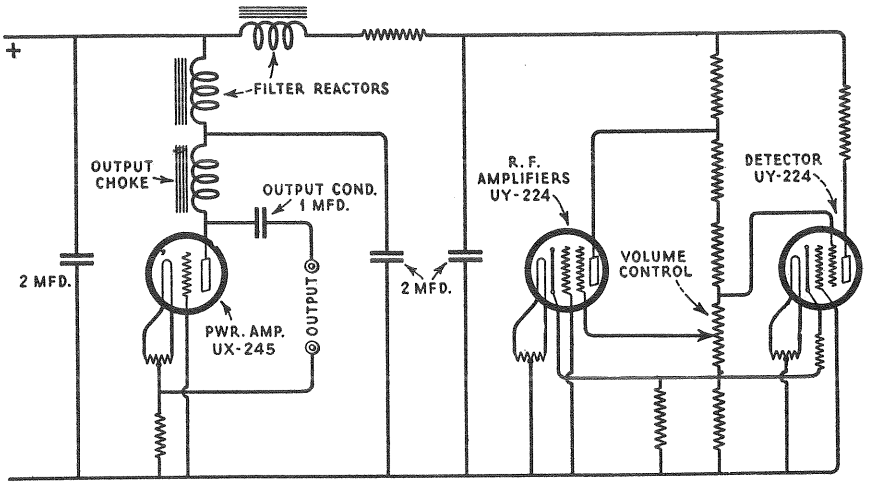


Figure 13—Abridged schematic circuit diagram of voltage supply system

[4] BROKEN CONDENSER DRIVE CORD

The main tuning condensers are controlled by the station selector knob, the motion of which is transmitted by means of a rugged fish line to the drum on the end of the tuning condensers. Should this cord become broken, and a new one not be available, a temporary repair may be made by tying the two ends together by means of a square knot (see Figure 9), and then replacing the cord in its correct position as shown in Figure 10. The shortening caused by the knot can be compensated for by untying the knot at the tension spring end and using a part of the spare length. The tying of the knot at the ends of the cord should be the last operation, because the correct amount of tension can then be obtained at the tension spring. Figure 10 shows the arrangement of the drive cord over the drums. This should be followed when replacing the cord.

[5] ADJUSTING LINE-UP CONDENSERS

Three small adjustable condensers are provided on the receiver assembly for lining up the three tuning circuits. These condensers are in parallel to the main tuning condensers and compensate for small variations in the tuning circuits—which are made noticeable by the receiver becoming insensitive. The following procedure may be used to readjust them.

(a) Remove the receiver assembly and S.P.U. from the cabinet as described in Part IV, Sections 1 and 2 and place the units in operating condition.

(b) Procure a modulated oscillator that will give a signal at 1500 K.C. and 600 K.C. or, if such an oscillator is not available, tune to a broadcast signal. The circuit diagram and electrical constants of a suitable oscillator are shown in Figure 11. The General Radio Test Oscillator Type 360 is suitable for this purpose. If the oscillator is available, place it in operation at 1500 K.C. or tune in a signal of approximately this frequency.

(c) After tuning in the signal adjust the volume control so the signal is of moderate strength.

(d) Place Local-Distant Switch at "local" position and adjust the three condensers successively from the detector stage to the antenna stage (See Figure 12), for the position of the loudest signal. This may be done with any type of screwdriver, as the adjusting screws are at ground potential.

(e) After adjusting at 1500 K.C. the various adjustments should be checked at 600 K.C. Should an increase (turning condenser to the right) or a decrease of capacity be necessary at 600 K.C. leave the line-up condensers in the position previously found at 1500 K.C. The adjustment required should then be made by removing the second R.F. and detector stage shields, and bending the end plates of the tuning condensers. Bending the end plate toward the adjacent plate increases the capacity of the condenser and bending it in the opposite direction decreases its capacity.

(f) After lining up at 600 K.C. by bending the condenser plates a re-check should be made at 1500 K.C. Any re-adjustments found necessary should be made. The use of a 1500 K.C. signal is very important because if the adjustment is made at a lower frequency the amount of capacity used at the line-up condensers may be such that the receiver will not tune as high as 1500 K.C.

The two chassis units should now be returned to the cabinet in the reverse manner of that used to remove them.

[6] EXCESSIVE HUM

Should excessive hum develop during operation it may be caused by one of the following conditions:

(a) External pick up. Throw switch to local position and see if hum disappears.

(b) A.C. input plug reversed. Try reversing its position.

(c) Open center tapped resistance unit in S.P.U.

(d) Shorted by-pass and filter condensers. This will generally be accompanied by inoperation in addition to hum.

(e) Low emission Radiotron UX-280.

(f) Defective dynamic speaker, if used.

(g) Open resistance unit. This will generally be accompanied by inoperation.

(h) By-pass condenser improperly connected. If the .25 mfd. and .75 mfd. tapped connections of the receiver 1 mfd. by-pass condenser are reversed a loud hum may be present. Connect correctly.

(i) Loudspeaker hum. Hum may also be caused by the loudspeaker cone being out of center. Check on this condition by releasing the center screw so that the cone can find its own center, and then tighten the center screw.

(j) Hum present only when a loud signal is tuned in. Should a hum be obtained when a loud signal is being received from a nearby carrier it may be due to the generator hum of the station being impressed on the carrier wave of the station. Due to the excellent low frequency response in Radiolas 44 and 46 the hum may be objectionable. In other cases the hum may be present in the receiver. In such cases connecting a 1 mfd. condenser from S.P.U. terminal No. 3 to ground will remedy this condition.

(k) 25-cycle flutter and hum. In some 25-cycle locations, a flutter or hum may be experienced. This may be cured by connecting a 2 mfd. condenser from terminal No. 8 to ground and a 1 mfd. condenser from terminal No. 3 to ground. The RCA Service Division is prepared to furnish a unit containing these capacitors, having three 12-inch leads for making suitable connections. This is known as RCA Part No. 6082.

[7] ACOUSTIC HOWL

Acoustic howl is caused by the sound waves generated by the loudspeaker vibrating the elements in the Radiotrons. This vibration is amplified electrically and reproduced in the reproducer unit. Conditions being favorable the howl may increase in intensity and drown out the broadcast signal.

In Radiola 44 this can be remedied by changing the position of the loudspeaker or its relative angle in relation to the receiver. Also interchanging the Radiotrons in the receiver assembly will help.

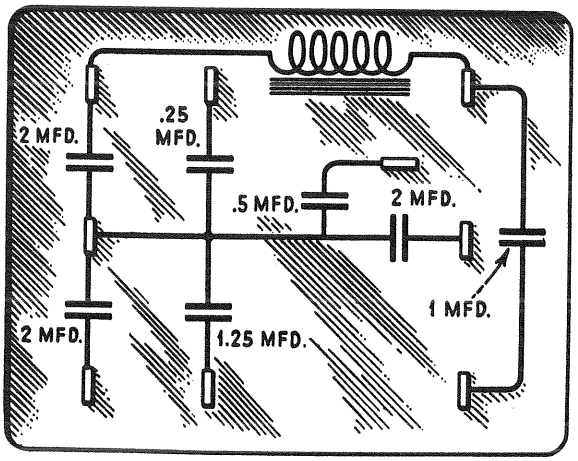


Figure 14—Internal connections of the condenser bank

[8] LOW VOLUME

Low volume may be caused by any of the following conditions:

(a) Defective Radiotrons. Check and make any replacement necessary.

(b) Poor antenna system. Install antenna as suggested in Part I, Section 1.

(c) Defective receiver assembly. Check by means of continuity test and make any replacement necessary. Also check adjustments of line-up condensers as described in Part II, Section 5.

(d) Defective S.P.U. Check by means of Continuity Test, Part III, Section 4, and make any repairs necessary.

(e) Defective loudspeaker. Check the loudspeaker by substituting one known to be in good condition.

(f) Incorrect number of turns in twisted portion of leads under shield to local-distant switch. The loading coil and condenser leads (green and black) should make two complete turns inside of the shield with the antenna lead making one turn.

[9] DISTORTED OR NOISY REPRODUCTION

Poor quality or noisy reproduction may be caused by:

(a) Defective Radiotrons. Though the Radiola may be in operating condition a defective Radiotron in any stage will cause distortion. Excessive noise may be due to a defective Radiotron UX-245 or UX-280.

(b) Defective coupling choke, output choke, output condenser, coupling condenser, UX-245 grid resistor or the resistor and condenser used to tune the coupling choke. These parts are all associated with the output tube and a defect in any of them will cause distortion.

(c) Receiver Oscillation. Signals received while the receiver is oscillating will be distorted. Reduce the volume control or apply the remedies suggested in Part II, Section 11.

(d) Defective loudspeaker. Make the necessary repairs.

(e) Defective S.P.U. Check by means of continuity test as described in Part III—Section 4.

[10] AUDIO HOWL

Audio howl may be caused by any of the following conditions:

(a) Receiver oscillation. Check as described in Part II, Section 11.

(b) Open by-pass condensers. An open in any of the by-pass condensers may cause howl.

(c) Vibrating elements in the receiver Radiotrons. A gradually developed howl may be due to the loudspeaker causing the receiver Radiotron elements to vibrate. Check as described in Part II, Section 7.

[11] UNCONTROLLED OSCILLATIONS

Should Radiola 44 or 46 oscillate throughout or in any part of the tuning range, it may be due to:

(a) Shields not properly in place or not making contact with the base because of dirt. The correct placing of the shields both around the tubes and over the entire stage is important to prevent oscillation. Remove all dirt with fine sandpaper.

(b) Shield over antenna lead to local distant switch not grounded or properly covering the leads.

(c) Defective R.F. filter in detector plate circuit. There are two filters, one of which is shunted by two condensers in the plate circuit of the detector. Should the filters become defective or the condensers open, oscillation will occur.

(d) Contact clips between shield and condenser shaft broken or not making good contact.

(e) Open by-pass condenser. Should any of the by-pass condensers in the receiver assembly be open, oscillation will occur.

(f) Defective Radiotron UY-224. A defective Radiotron UY-224 may cause oscillation and should be replaced by a Radiotron known to be in good operating condition.

(g) In some cases interchanging the three Radiotrons UY-224 will be necessary to stop oscillation at the maximum setting of the volume control.

[12] VOLTAGE SUPPLY SYSTEM

The voltage supply system used in Radiolas 44 and 46 is a combination parallel arrangement, with some circuits also using series resistors. Figure 13 is an abridged schematic circuit that illustrates the method employed to obtain the correct potentials.

PART III—ELECTRICAL TESTS

[1] TESTING FILTER CONDENSERS AND OUTPUT CONDENSER AND CHOKE

The filter condensers and output condenser and choke are all in one metal container. The internal wiring diagram is shown in Figure 14.

The choke can best be tested by clicking across the ends. The condensers are tested by charging them with approximately 200 volts D.C. and then noting their ability to hold the charge. After charging, short circuiting the condenser terminals with a screwdriver should produce a flash, the size of the flash depending on the capacity of the condenser and the voltage used for charging. A condenser that will not hold its charge, or a choke that clicks open is defective and requires replacement of the entire unit.

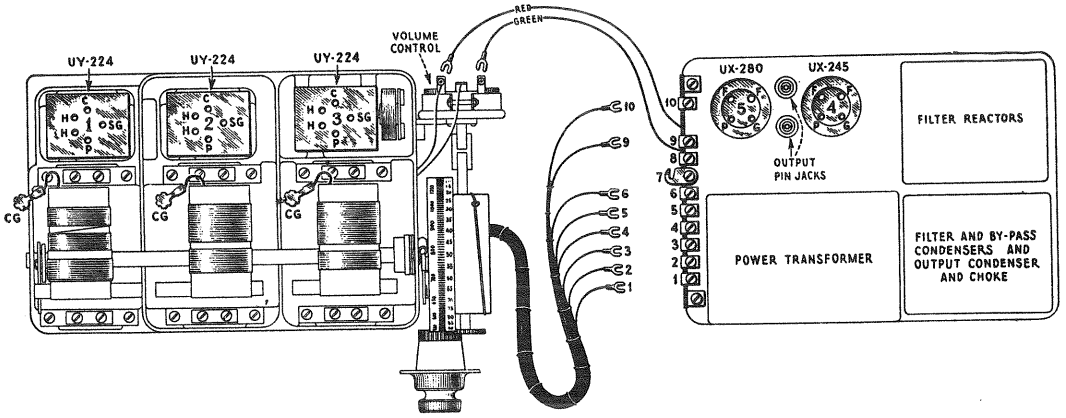


Figure 15—*Layout showing location of the various Radiotron sockets, S.P.U. terminal numbers, and main parts of Radiola* 44

[2] CHECKING RESISTANCE VALUES

The values of the various resistance units of Radiolas 44 and 46 are shown in the schematic diagram, Figures 5 and 6. When testing a receiver for defects the various values of resistance should be checked. This may be done by a resistance bridge; the voltmeter-ammeter method shown in previous Service Notes, or by the following method.

For resistances of low value, 5000 ohms or less, use a voltmeter having a resistance not greater than 100 ohms per volt. For high values of resistance use a meter of 1000 ohms or more per volt. The Weston Meters, Type 301 or 280, each have a resistance of 62 ohms per volt and are satisfactory for the low values. Use sufficient battery to give a good deflection on the meter, for example, a 45-volt "B" battery for a 0-50 volt meter. Take two readings, one of the battery alone, and one of the battery with the unknown resistance in series. Then apply the following formula.

$$\left(\frac{\text{Reading obtained of battery alone}}{\text{Reading obtained with resistance in series}} - 1 \right) \text{Resistance of meter} = \text{Unknown Resistance}$$

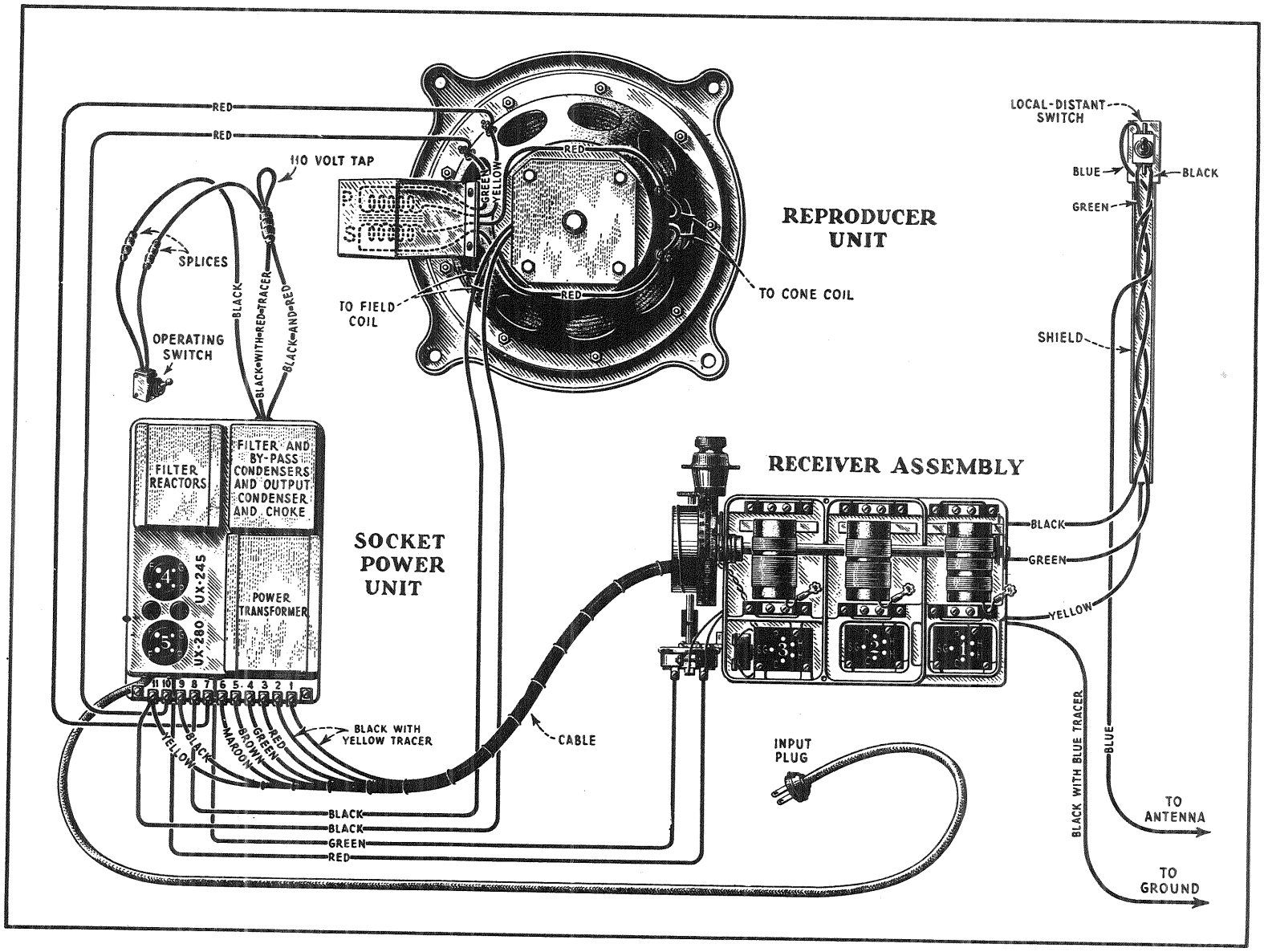


Figure 16—Radiola 46 Radiotron sockets, socket power unit terminals and main assemblies

[3] VOLTAGE READINGS

The following readings are taken with a Weston Model 537, Type 2, or other test set giving similar readings. These voltages are not exactly correct, due to the oscillating condition of the circuits. However, they enable the service man to obtain an accurate check on the continuity of the circuits to the various sockets. The screen grid voltages are not readable, due to the reversal of the polarity at the contact points.

When making tests remove only the shield and control grid connection of the tube whose voltage is under measurement. Do not tie the control grid connection to the control grid cap of the tube in the test set. It is not practical to test the control grid voltage directly at the sockets.

SOCKET VOLTAGES—RADIOLAS 44 OR 46

Volume Control at Minimum

Socket No.	*Cathode to Heater Volts*	*Fil. to control grid Volts*	*Cathode or fil. to plate Volts*	*Plate Current Millamperes*	*Filament or Heater Volts*
1	2.1	—	190	0	2.35
2	2.1	—	185	0	2.35
3	18	—	120	3.0	2.35
4	—	6.0	225	29.0	2.35

Volume Control at Maximum

Socket No.	*Cathode to Heater Volts*	*Fil. to control grid Volts*	*Cathode or fil. to plate Volts*	*Plate Current Millamperes*	*Filament or Heater Volts*
1	2.1	—	165	3.5	2.35
2	2.1	—	165	3.0	2.35
3	16	—	115	2.0	2.35
4	—	6.0	225	29.0	2.35

TERMINAL STRIP VOLTAGES

Radiola 44

The following voltages taken at the S.P.U. terminal strip with the receiver operating and all tubes and shields in place are correct when the line voltage is within the limits for the transformer tap being used.

Terminals	*Volume Control at*		*Voltage Measured*
	Minimum	*Maximum*	
1 to 2	2.5 A.C.	2.5 A.C.	Heater voltage of Radiotrons UY-224
3 to red V.C. lead	185 D.C.	170 D.C.	Plate voltage of Radiotrons Nos. 1 and 2
4 to 6	70 D.C.	60 D.C	Screen grid voltage of Radiotron No. 3
6 to 9	195 D.C.	180 D.C.	Plate voltage of Radiotron No. 3
6 to 10	5.0 D.C.	5 D.C.	Control grid voltage of Radiotron No. 3
8 to 10	330 D.C.*	330 D.C.*	Total D.C. output from rectifier
Red V.C. lead to 10	2.1 D.C.	2.1 D.C.	Control grid voltage of Radiotrons Nos. 1 and 2
Arm of V.C. to red V.C. lead	0	70 D.C.	Screen grid voltage of Radiotrons Nos. 1 and 2

* This voltage is 320 when link is closed and dynamic type loudspeaker is used.

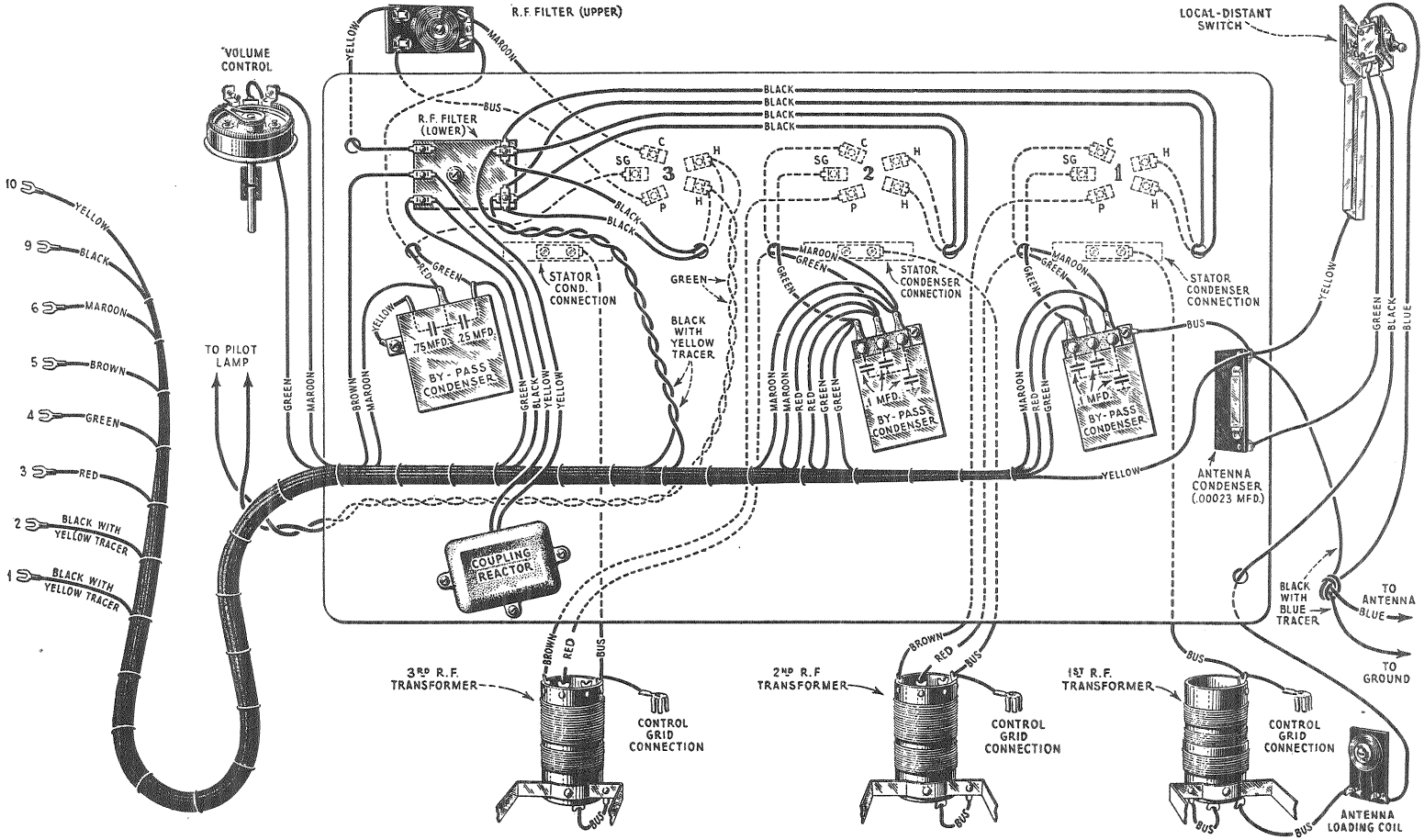


Figure 17—Wiring diagram of Radiola 44 receiver assembly

Terminals	*Volume Control at*		*Voltage Measured*
	Minimum	*Maximum*	
1 to 2	2.5 A.C.	2.5 A.C.	Heater voltage of Radiotrons UY-224
3 to red V.C. lead	185 D.C.	170 D.C.	Plate voltage of Radiotrons Nos. 1 and 2
4 to 6	70 D.C.	65 D.C.	Screen grid voltage of Radiotron No. 3
6 to 9	195 D.C.	180 D.C.	Plate voltage of Radiotron No. 3
6 to 11	5.0 D.C.	5 D.C.	Control grid voltage of Radiotron No. 3
8 to 11	320 D.C.	320 D.C.	Total D.C. output from rectifier
Red V.C. lead to 11	2.1 D.C.	2.1 D.C.	Control grid voltage of Radiotrons Nos. 1 and 2
Arm of V.C. to red V. C. lead	0	70 D.C.	Screen grid voltage of Radiotrons Nos. 1 and 2

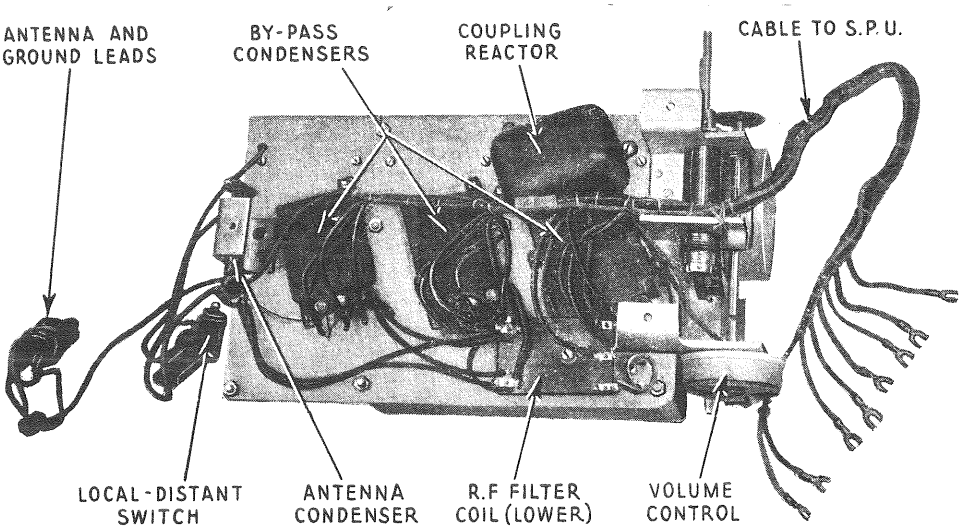


Figure 18—Sub-chassis view of receiver assembly

[4] RADIOLAS 44 AND 46 CONTINUITY TESTS

The following tests will show complete continuity for the receiver assembly and socket power unit of Radiolas 44 and 46. Disconnect the antenna and ground leads; the cable connections at the terminal strip of the S.P.U.; the loudspeaker cord, and the A.C. supply cord at its outlet.

A pair of headphones with at least 4½ volts in series; or a voltmeter with sufficient battery to give a good deflection when connected across the battery terminals should be used in making these tests.

The resistance of the various circuits are also shown in the column "Correct Effect." Checking the resistance of the circuits adds an additional check on their correct functioning. This may be done by means of direct reading "Ohmmeter," a resistance bridge, the voltmeter ammeter method or the method suggested in Part III, Section 2.

The receiver and S.P.U. Radiotron sockets, numbers, lugs and terminals used in making these tests are shown in Figure 15 for Radiola 44 and Figure 16 for Radiola 46. The Radiola 44 S.P.U. wiring diagram is shown in Figure 20 and the receiver assembly wiring diagram in Figure 17. The Radiola 46 S.P.U. wiring diagram is shown in Figure 21 and the receiver assembly in Figure 19.

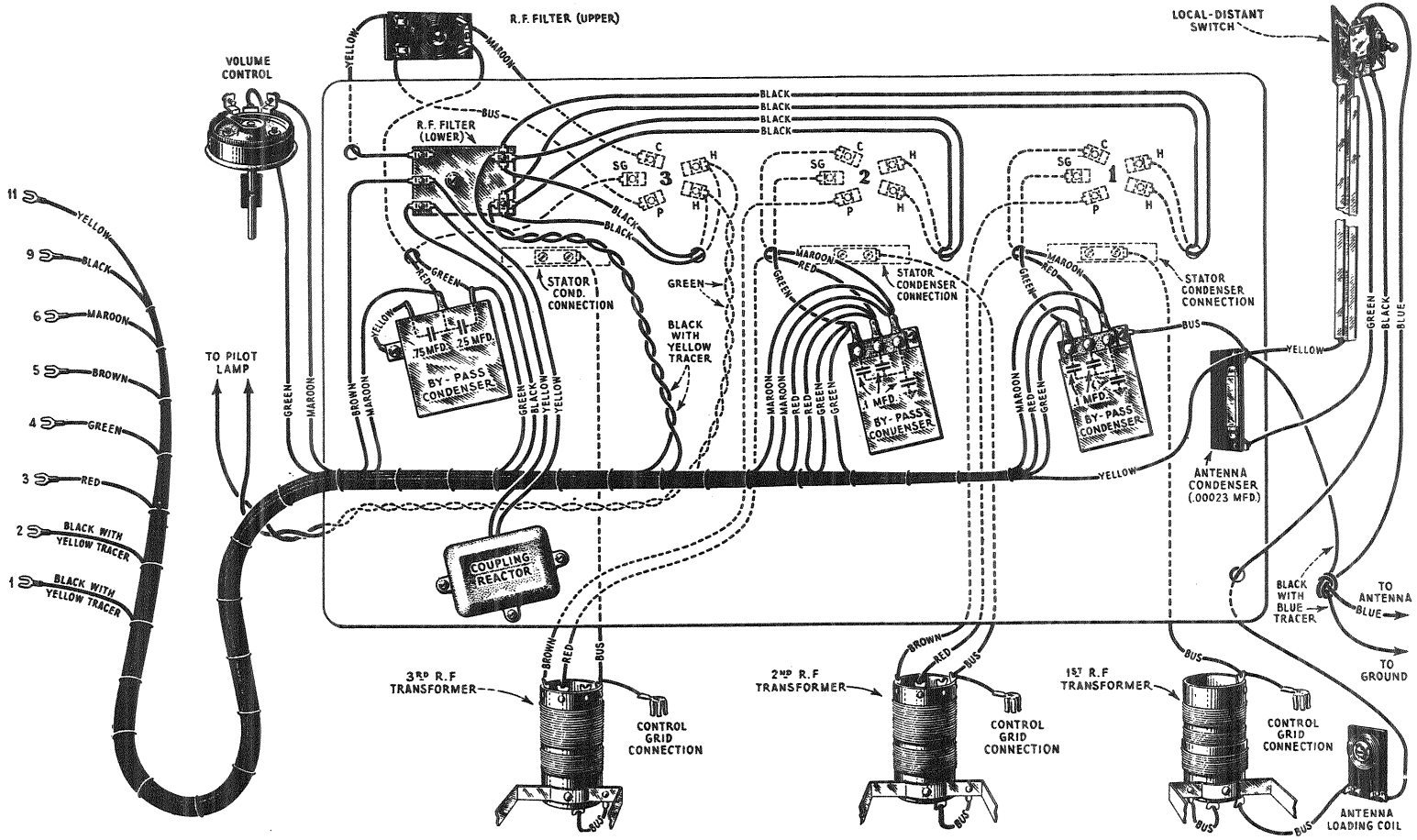


Figure 19—Radiola 46 receiver assembly wiring diagram

CONTINUITY TESTS
Radiola 44 or 46 Receiver Assemblies

Circuit	*Test Terminals*	*Correct Effect*	*Incorrect Effect*	
			Indication	*Caused by*
Grid	CG1 to Gnd.	Closed (3 Ohms)	Open	Open secondary of 1st R.F. transformer
			Short	Shorted tuning or trimming condenser
	SG1 to Arm of Volume Control	Closed (Short)	Open	Open connection
	CG2 to Gnd.	Closed (3 Ohms)	Open	Open secondary of 2nd R.F. transformer
			Short	Shorted tuning or trimming condenser
	SG2 to Arm of Volume Control	Closed (Short)	Open	Open connection
	CG3 to Gnd.	Closed (3 Ohms)	Open	Open secondary of 3rd R.F. transformer
	SG3 to Lug No. 4	Closed (Short)	Open	Open connection
	Across Volume Control	Closed (2900 Ohms — V.C. at max. volume)	Open	Open volume control
			Short	Shorted 1 mfd. condenser
Plate	P1 to Lug No. 3	Closed (60 Ohms)	Open	Open primary of 1st R.F. transformer
	P2 to Lug No. 3	Closed (60 Ohms)	Open	Open primary of 2nd R.F. transformer
	P3 to Lug No. 5	Closed (400 Ohms)	Open	Open R.F. filter coils
			200	Both .00005 mfd. condensers shorted
	P3 to Lug No. 9	Closed (6000 Ohms)	Open	Open R.F. filter coils or coupling reactor
			5800	Both .00005 mfd. condensers shorted
Heater	*Unscrew Pilot Lamp*			
	One heater contact of sockets 1, 2 and 3 to Lugs 1 or 2	Closed (Short)	Open	Open connection
	Other heater contact of sockets 1, 2 or 3 to Lugs 1 or 2	Closed (Short)	Open	Open connection
Miscellaneous	Ant. to Gnd. (switch at "distant" position)	Closed (30 Ohms)	Open	Open antenna loading coil or primary of 1st R.F. transformer
	C1 to Gnd.	Open	Closed	Shorted .1 mfd. condenser
	C1 to P1	Open	Closed	Shorted .1 mfd. condenser
	C2 to Gnd.	Open	Closed	Shorted .1 mfd. condenser
	C2 to P2	Open	Closed	Shorted .1 mfd. condenser
	C3 to Gnd.	Open	Closed	Shorted .75 mfd. condenser
	C3 to SG3	Open	Closed	Shorted .25 mfd. condenser
	C3 to P3	Open	Closed	Either .00005 mfd. condenser in R. F. filter shorted
	C3 to Lug No. 6	Closed (Short)	Open	Open connection

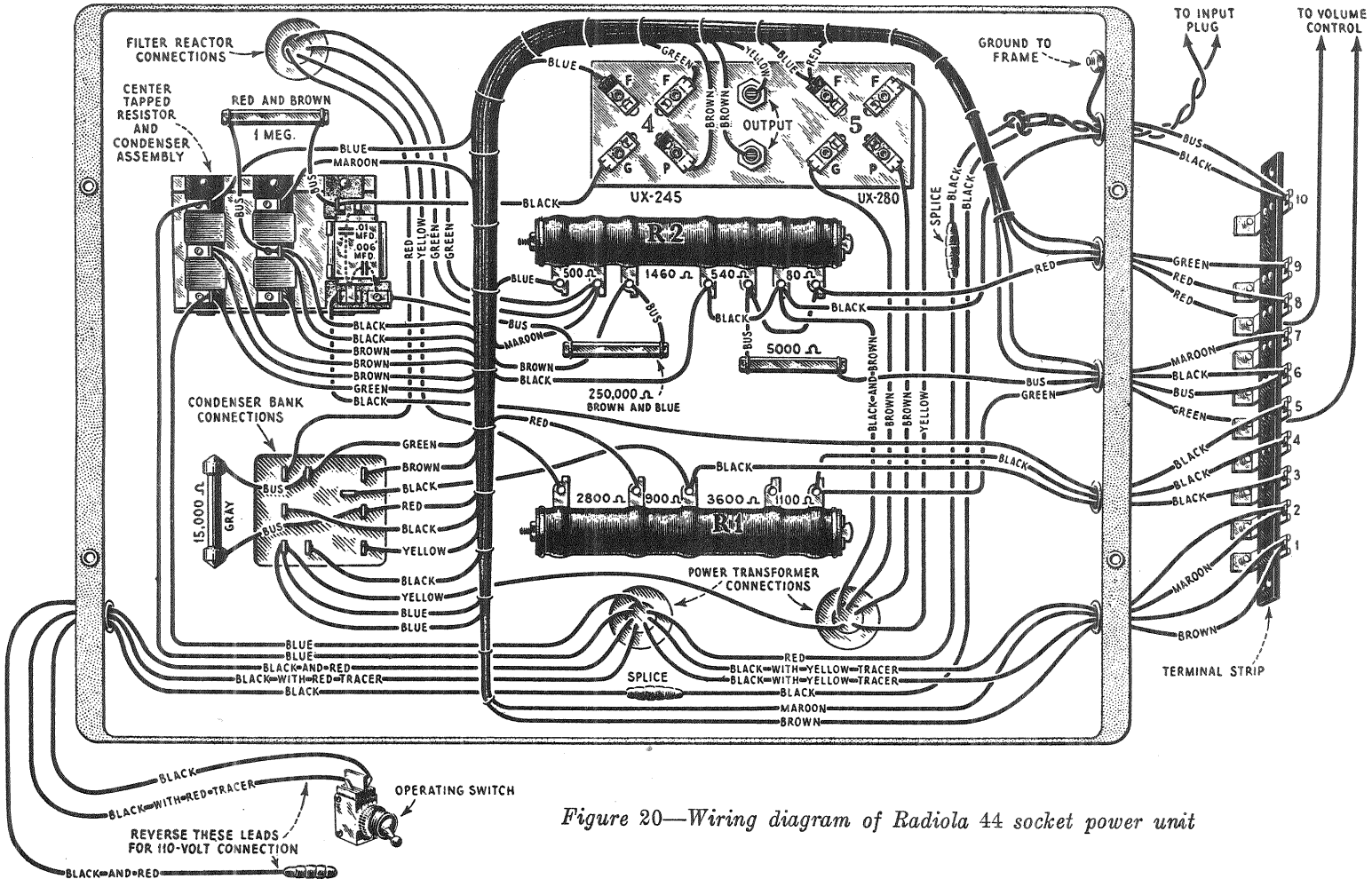


Figure 20—Wiring diagram of Radiola 44 socket power unit

CONTINUITY TESTS

Radiola 44 Socket Power Unit

Test Terminals	*Correct Effect*	*Incorrect Effect*	
		Indication	*Caused by*
1 to 2	Closed (Short)	Open	Open UY-224 heater winding and center tapped resistance unit
		50 Ohms	Open UY-224 heater winding
3 to 4	Closed (4700 Ohms)	Open	Open 3600 or 1100-ohm section of R-1
3 to 7	Closed (5400 Ohms)	Open	Open 2800 or 900-ohm section of R-1 or filter reactor
3 to 9	Closed (15,900 Ohms)	Open	Open 15,000-ohm resistor or 900-ohm section of R-1
5 to G4	Open	Closed	Shorted .01 mfd. condenser
5 to 10	Open	Closed (weak)	Shorted .006 mfd. condenser
		Short	Grounded .006 mfd. condenser or connections
6 to 10	Closed (5070 or 5420 Ohms)	Open	Open 5000-ohm resistor or 540 and 80-ohm section of R-2 (in some receivers the 5000-ohm resistor is replaced by two, one being 2000 ohms and one 3350 ohms connected in series)
7 to 8 (Link open)	Closed (500 Ohms)	Open	Open 500-ohm section of R-2
7 to P4	Closed (1400 Ohms)	Open	Open filter reactor or output choke
10 to G4	Closed (weak) (1 meg.)	Open	Open 1 meg. resistor
		Short	Shorted or grounded 1 meg. resistor or connection
P5 to G5	Closed (250 Ohms)	Open	Open high voltage winding of power transformer
Across fil. contacts of socket No. 4	Closed (Short)	Open	Open UX-245 filament winding and center tapped resistor
		50 Ohms	Open UX-245 filament winding
Across fil. contacts of socket No. 5	Closed (Short)	Open	Open UX-280 filament winding
One output jack to 10	Closed (1460 Ohms)	Open	Open 1460-ohm section of R-2
Other output jack to P4	Open	Closed	Shorted 1 mfd. output condenser
Red. V.C. lead to 10	Closed (70 Ohms)	Open	Open 80 and 540-ohm sections of R-2
Across A.C. input plug (Op. Sw. "On")	Closed (4 Ohms)	Open	Open primary of power transformer or defective operating switch

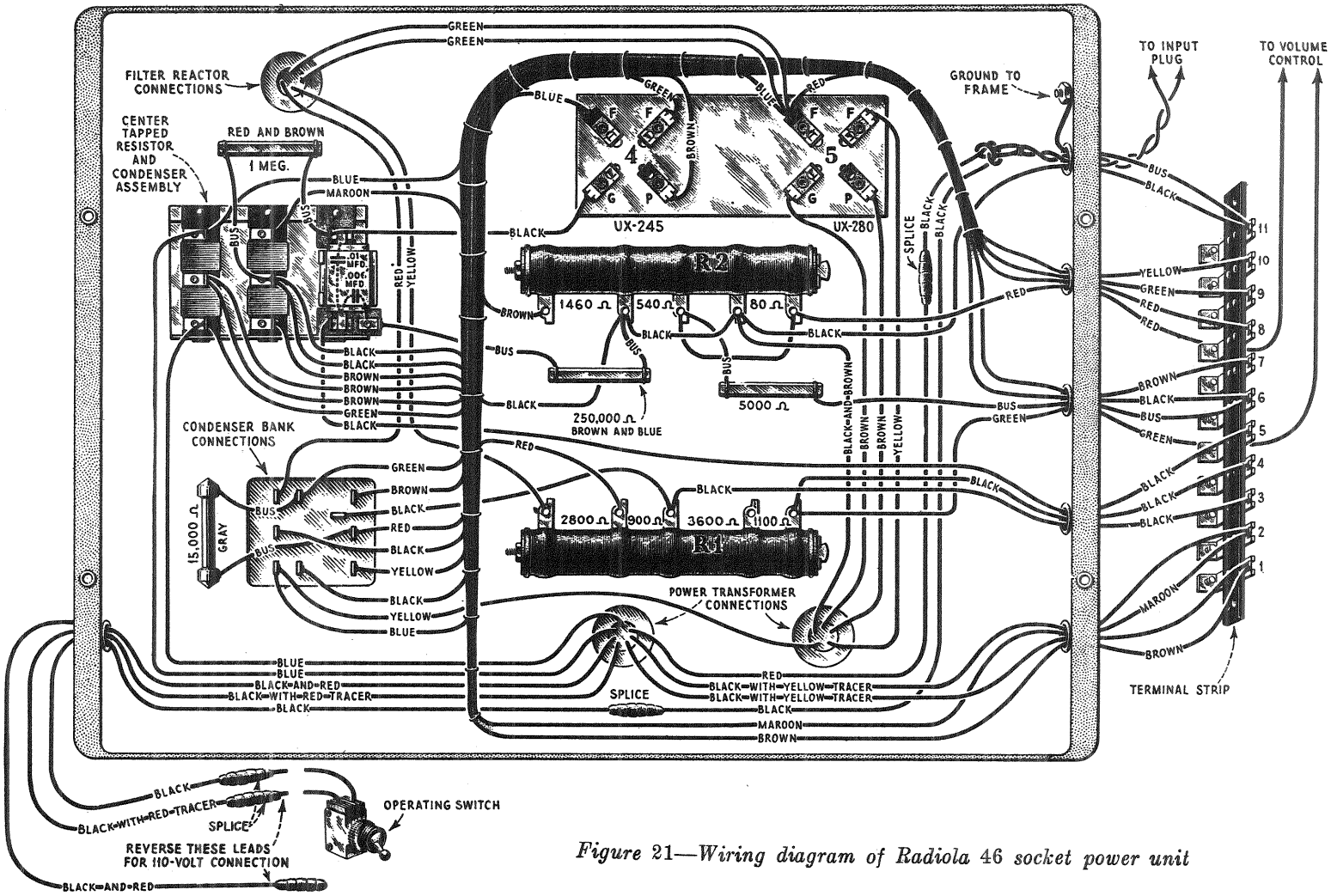


Figure 21—Wiring diagram of Radiola 46 socket power unit

CONTINUITY TESTS

Radiola 46 S. P. U.

Test Terminals	*Effect Correct*	*Incorrect Effect*	
		Indication	*Caused by*
1 to 2	Closed (Short)	Open	Open UY-224 heater winding and center tapped resistance unit
		50 Ohms	Open UY-224 heater winding
3 to 4	Closed (4700 Ohms)	Open	Open 3600 and 1100-ohm section of R-1
3 to 8	Closed (5400 Ohms)	Open	Open 2800 or 900-ohm section of R-1 or filter reactor
3 to 9	Closed (15,900 Ohms)	Open	Open 15,000-ohm resistor or 900-ohm section of R-1
5 to G4	Open	Closed	Shorted .01 mfd. condenser
5 to 11	Open	Closed (weak)	Shorted .006 mfd. condenser
		Short	Grounded .006 mfd. condenser or connections
6 to 11	Closed (5070 or 5420 Ohms)	Open	Open 5000-ohm resistor or 540 and 80-ohm section of R-2 (in some receivers the 5000-ohm resistor is replaced with two, one being 2000 ohms and one 3350 ohms connected in series)
7 to 11	Closed (1460 Ohms)	Open	Open 1460-ohm section of R-2
10 to P4	Open	Closed	Shorted 1 mfd. output condenser
11 to Gnd.	Closed (Short)	Open	Open connection
G4 to 11	Closed (weak) (1 meg.)	Open	Open 1 meg. resistor
		Short	Shorted or grounded 1 meg. resistor or connections
P4 to 8	Closed (1400 Ohms)	Open	Open filter reactor or output choke
P5 to G5	Closed (250 Ohms)	Open	Open high voltage winding of power transformer
Red. V.C. lead to 11	Closed (70 Ohms)	Open	Open 80 and 540-ohm section of R-2
Across fil. contacts of socket No. 4	Closed (Short)	Open	Open UX-245 filament winding and center tapped resistor
		50 Ohms	Open UX-245 filament winding
Across fil. contacts of socket No. 5	Closed (Short)	Open	Open UX-280 filament winding
Across A.C. input plug (Op. Sw. "On"	Closed (4 Ohms)	Open	Open primary of power transformer or defective operating switch

PART IV—MAKING REPLACEMENTS

The various assemblies and parts of Radiolas 44 and 46 are readily accessible and replacements can be made easily. The following detailed procedure outlines the simplest methods to be used when making replacements.

[1] REMOVING R-44 RECEIVER ASSEMBLY FROM CABINET

When making any replacements in the receiver assembly it is first necessary to remove it from the cabinet. The following procedure should be used:

(a) Remove the escutcheon that holds the Local-Distant Switch in place and then remove the switch and shield from the escutcheon by removing the collar that holds the switch.

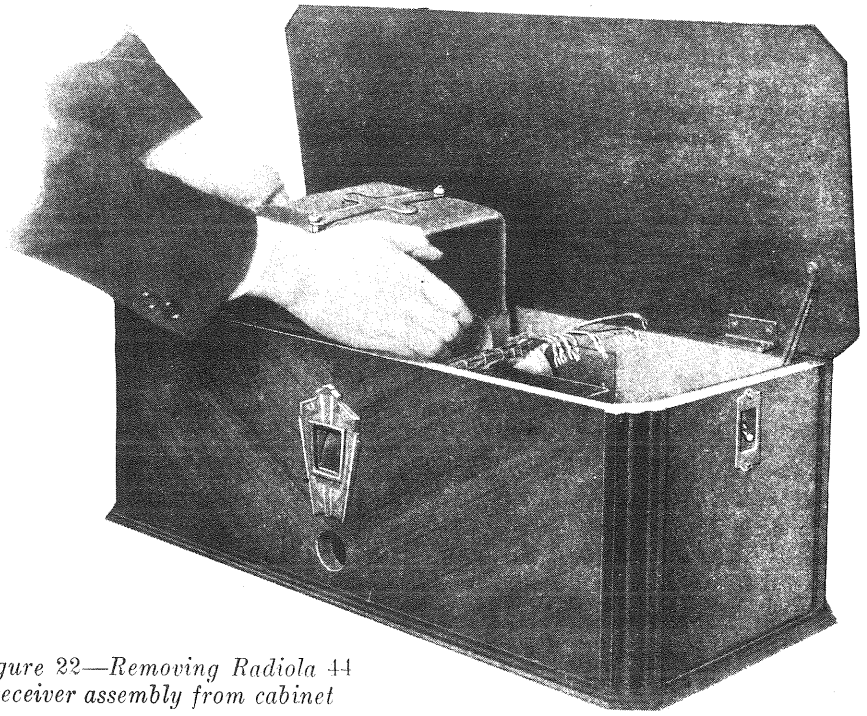


Figure 22—Removing Radiola 44 receiver assembly from cabinet

(b) Remove the cable connections to the S.P.U. terminal strip. Also remove the two S.P.U. connections to the volume control.

(c) Remove the two knobs from the station selector shaft. These are just pulled "off."

(d) Remove the three machine screws and washers that hold the receiver assembly to the bottom of the cabinet. The chassis may now be lifted clear of the cabinet and placed in a position convenient for work. (See Figure 22.) After the replacement has been made it should be returned to the cabinet in the reverse manner of that used to remove it. When replacing the tuning control and volume control knobs make certain that the gear teeth on the volume control knob meshes with the gear on the volume control shaft.

(e) Just before tightening the screws that hold the receiver assembly to the cabinet place the Radiola in operation and note whether or not the dial screen is properly illuminated. Should the light be off to one side the chassis may be shifted slightly until the screen is properly illuminated. The screws are then tightened.

[2] REMOVING R-44 S. P. U. FROM CABINET

To remove the S.P.U. from the cabinet proceed as follows:

(a) Remove the operating switch from its escutcheon plate by removing the escutcheon and then twisting the switch mechanism until the collar and the switch will come clear of the escutcheon.

(b) Remove all connections to the S.P.U. terminal strip and the two leads to the volume control.

(c) Remove the four machine screws that hold the S.P.U. to the bottom of the cabinet. The S.P.U. may now be lifted clear of the cabinet (See Figure 23) and placed in a position convenient for work. It is replaced in the cabinet in the reverse manner of that used to remove it.

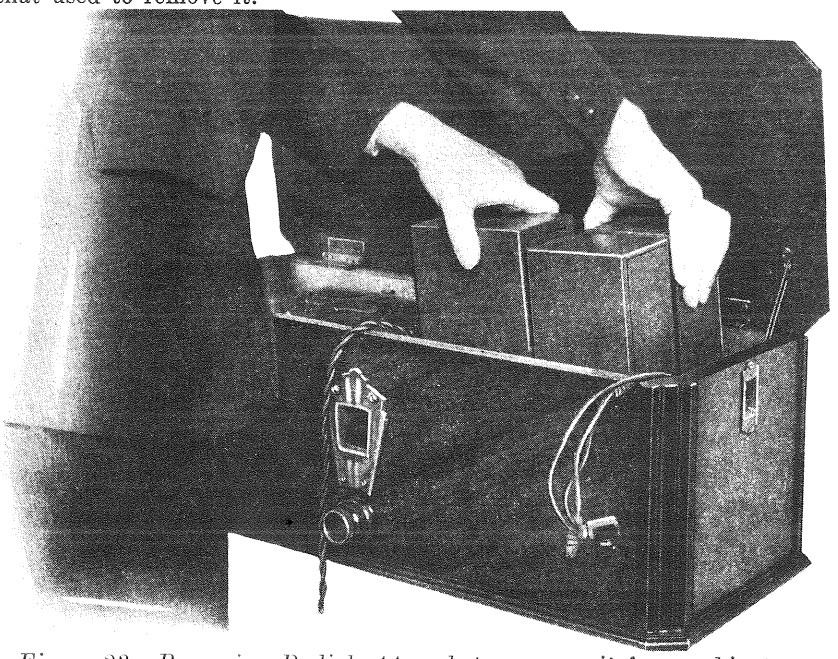


Figure 23—Removing Radiola 44 socket power unit from cabinet

[3] REMOVING R-46 RECEIVER ASSEMBLY FROM CABINET

To remove the receiver assembly from Radiola 46 proceed as follows:

(a) Remove the back from the cabinet by pulling at top and lifting clear.

(b) Remove the shield and all receiver connections to the S.P.U. terminal strip. Also remove the two S.P.U. connections to the volume control.

(c) Remove the volume control and station selector knob. These are merely pulled "off" the shaft.

(d) Remove the escutcheon that holds the "Local Distant" switch in place and then remove the switch and shield by removing the collar that holds the switch. It will also be necessary to remove the staples that hold the shield to the side of the cabinet.

(e) Remove the three machine screws and washers that hold the receiver assembly to the bottom of the cabinet. The chassis may now be lifted clear of the cabinet, and placed in a position convenient for work (see Figure 24). After the replacement has been made it should be returned to the cabinet in the reverse manner of that used to remove it. When replacing the tuning control and volume control knobs make certain that the gear teeth on the volume control knob meshes with the gear on the volume control shaft.

(f) Just before tightening the screws that hold the receiver assembly to the cabinet, place the Radiola in operation and note whether or not the dial screen is properly illuminated. Should the light be off to one side the chassis may be shifted slightly until the screen is properly illuminated. The screws are then tightened.

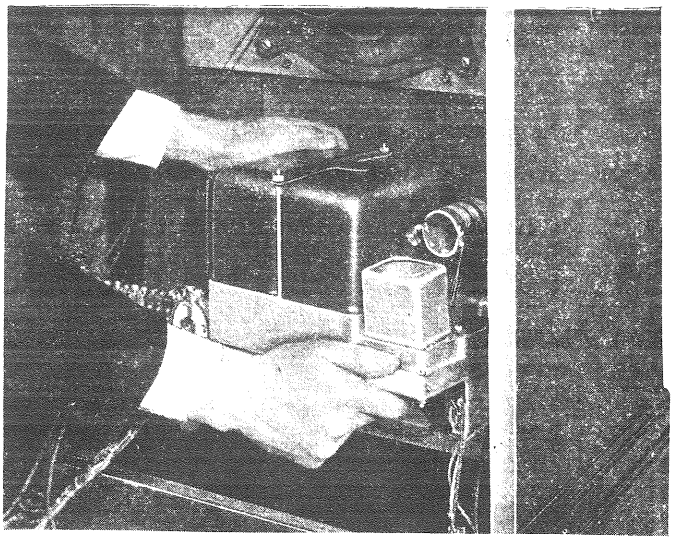


Figure 24—Removing receiver assembly from Radiola 46

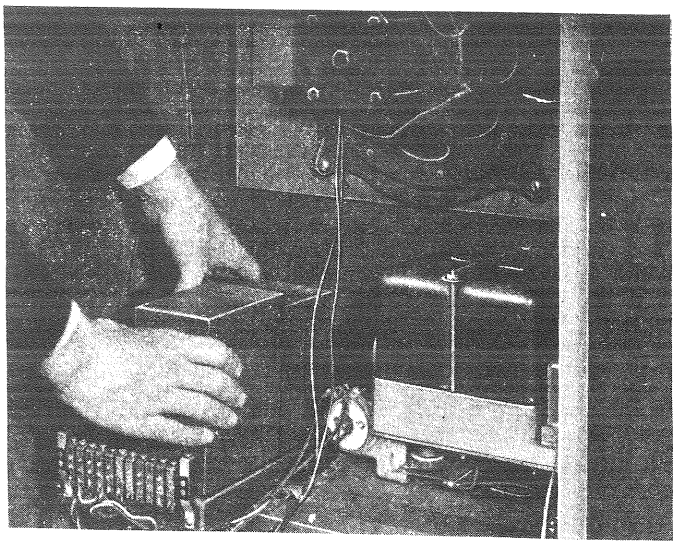


Figure 25—Removing socket power unit from Radiola 46

[4] REMOVING R-46 S. P. U.

To remove the Radiola 46 S.P.U. proceed as follows:

(a) Remove the back from the cabinet by pulling it at the top and lifting clear.

(b) Remove the operating switch from its escutcheon plate by removing the escutcheon and then twisting the switch mechanism until the collar and switch will come clear of the escutcheon.

(c) Remove all connections to the S.P.U. terminal strip and the two leads to the volume control.

(d) Remove the four machine screws that hold the S.P.U. to the cabinet. The S.P.U. may now be lifted clear of the cabinet and placed in a convenient place for work (Figure 25).

It is replaced in the cabinet in the reverse manner of that used to remove it.

[5] REMOVING R-46 REPRODUCER ASSEMBLY

To remove the Radiola 46 reproducer unit proceed as follows:

(a) Remove back from cabinet by pulling at top and lifting clear.

(b) Release the field coil leads at the S.P.U. terminal strip and the input leads of the terminals on the reproducer frame.

(c) Remove the four screws that hold the reproducer assembly to the baffle board, being careful to hold the assembly to prevent falling. It may now be removed to a place convenient for work and any necessary repairs made (Figure 26).

(d) After the necessary work has been completed the assembly may be replaced in the reverse manner of that used to remove it.

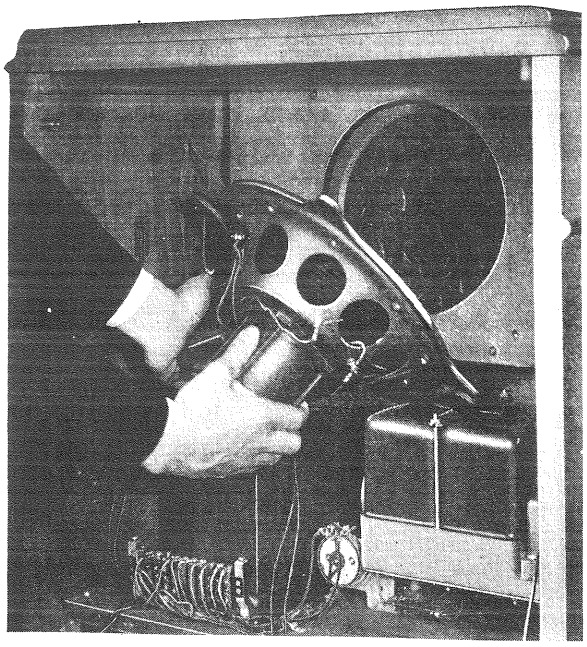


Figure 26—Removing reproducer unit from Radiola 46

To center the cone of the reproducer unit proceed as follows:

(a) Remove reproducer assembly as described above.

(b) Loosen center screw of cone, but do not remove it.

(c) Insert three cardboard strips about the thickness of a visiting card, 1½" x ¼" in size, through the center web of the cone into the space between the pole piece and the cone. This will give the same clearance on all sides of the pole piece.

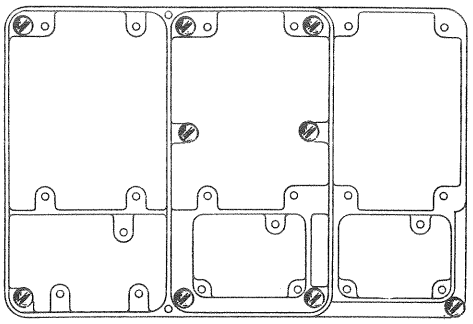


Figure 27—Screws to be removed in replacing trimming condenser

(d) Tighten the center screw holding the web of the cone and remove the three strips. The cone is now properly centered.

(e) Replace the reproducer unit in the reverse order of that used to remove it.

[6] REPLACING R. F. LINE-UP CONDENSERS

Three line-up condensers are used to properly align the R.F. stages. These are small adjustable condensers, that are paralleled across the three tuning condensers. Should replacement be necessary proceed as follows:

(a) Remove receiver assembly from cabinet as described in Part 4, Sections 1 and 3.

(b) Remove the shield and eight machine screws and nuts as shown in Figure 27. This allows the bottom plate of the assembly to be dropped sufficiently to gain access to the tuning condenser.

(c) The trimming condenser is now released by removing the adjusting screw and the two screws that hold the trimming condenser and one end of the variable condenser to the small dilecto strip. The new condenser may now be inserted in place of the old one, making sure the mica piece is next to the side of the casting. Replace all screws, being careful not to disturb the alignment of the tuning condenser, one end of the stator of which has been released.

(d) After reassembling, the receiver must be placed in operation and the tuning condenser just replaced adjusted as described in Part II, Section 5.

(e) All units may now be replaced and the Radiola returned to normal operation.

SERVICE DATA CHART

Before using the following Service Data Chart, when experiencing no signals, weak signals, poor quality, noisy or intermittent reception, howling and fading, first look for defective tubes or a poor antenna system. If imperfect operation is not due to these causes the "Service Data Chart" should be consulted for further detailed causes. Reference to Part No. and Section No. in the "Service Notes" is also noted for further details.

Indications	*Cause*	*Remedy*
No Signals	Defective operating switch	Repair or replace switch
	Defective volume control	Replace volume control
	Defective R.F. transformer	Replace R.F. transformer
	Defective coupling reactor	Replace coupling reactor
	Defective by-pass condenser	Replace by-pass condenser
	Defective S.P.U.	Check S.P.U. and replace any defective part. P. III, S. 3
Weak Signals	"Local Distant" switch not on "Distant" position	Throw switch to "Distant" position P. I, S. 8
	Line-up condensers not adjusted properly	Adjust line-up condensers properly. P. II, S. 5
	Defective main tuning condensers	Check main tuning condensers and make adjustments necessary. P. II, S. 5.
	Defective parts in receiver assembly	Replace any defective parts in receiver assembly
	Defective parts in S.P.U.	Replace any defective parts in S.P.U.
	Low line voltage	Adjust transformer for low line voltage. P. I, S. 6
Poor Quality	Defective coupling reactor, condenser or resistor in coupling circuit	Replace any defective parts
	Defective output condenser or choke	Replace output condenser and choke
	"Local Distant" switch not properly operated	Operate "Local Distant" switch correctly. P. I, S. 8
Audio Howl	Receiver oscillating	Correct cause of oscillation. P. II, S. 11
	Defective audio system	Correct and repair any defect
	Open grid in any stage	Check circuit and repair defect. P. III, S. 4
Uncontrolled Oscillation	Shields not in place or making good contact	Place shield correctly and secure good contact. P. I, S. 10
	Tube shields not in place	Place tube shields correctly. P. I, S. 11
	Defective R.F. filter	Replace defective R.F. filter. P. II, S. 11
Radiotrons fail to light	No. A.C. line voltage	Turn A.C. line voltage "On"
	Operating switch not "On"	Turn operating switch "On"
	Defective A.C. input cord	Repair or replace defective cord
	Defective power transformer	Replace defective power transformer