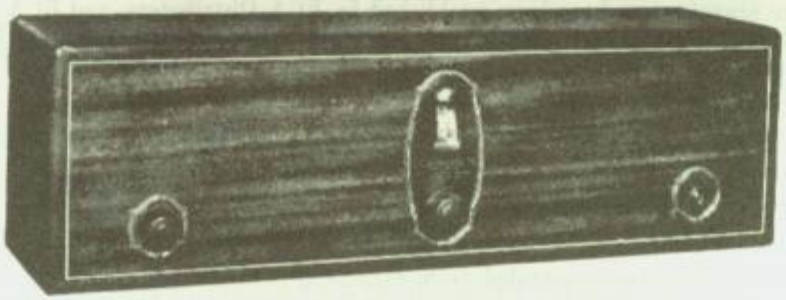
RCA
Radiola 18

SERVICE NOTES



RCA Radiola 18

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

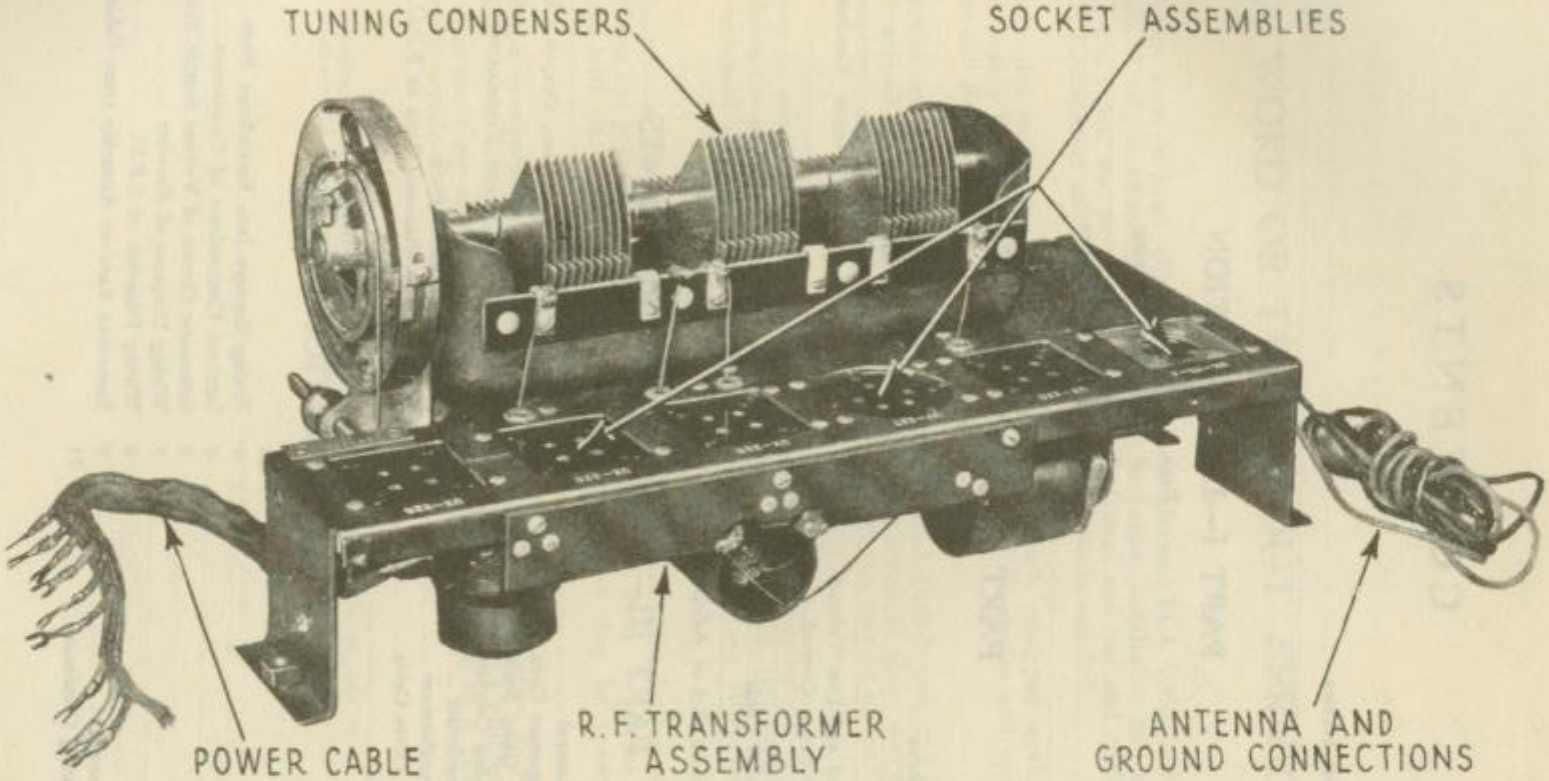


Figure 1—Top view of chassis assembly showing principal parts.

RCA RADIOLA 18

(105-125 Volts, 50-60 Cycle A.C.)

SERVICE NOTES

PREPARED BY RCA SERVICE DIVISION

INTRODUCTION

RCA Radiola 18 is a socket powered six-tube, tuned radio frequency receiver utilizing RCA Radiotrons UX-226, UY-227, UX-171A and the full wave rectifier Radiotron UX-280 in the Socket Power Unit. It operates on 105-125 volts, 50 to 60 cycle A.C. lines. Figure 1 illustrates the various units of the receiver assembly and Figure 2 the main parts of the Socket Power Unit.

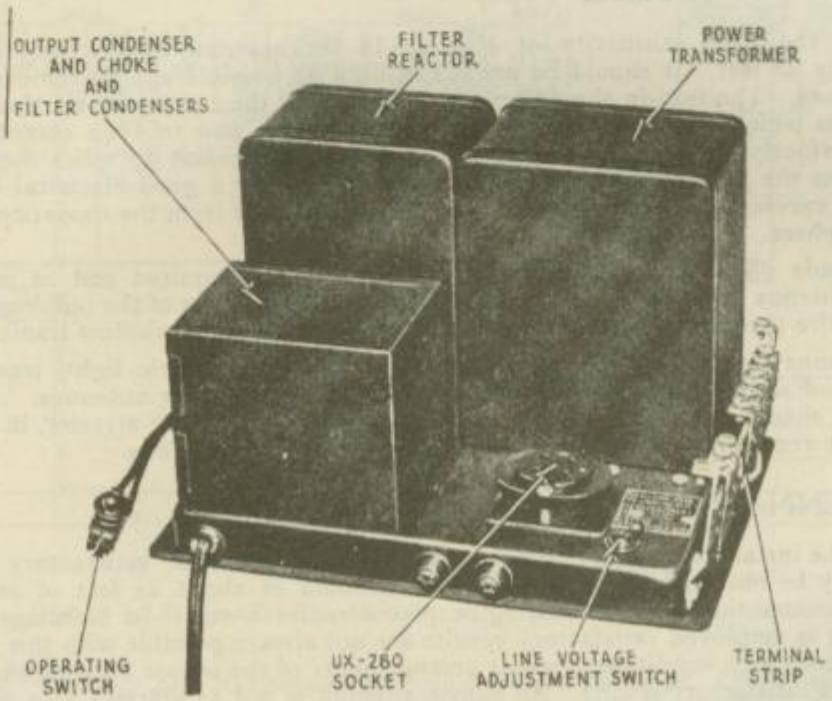


Figure 2—Socket power unit showing various parts.

The following principles are incorporated in the circuit design. (See Fig. 3.)

(1) A single control, three-gang condenser is employed to tune two of the radio frequency circuits and the detector circuit.

(2) An aperiodic antenna or first R.F. circuit, eliminates the necessity for a separate antenna tuning control.

(3) The volume control regulates the input grid voltage to the first R.F. amplifier stage. This is the most practical method of volume control for use with A.C. Radiotrons and gives a smooth control of volume without distortion.

(4) Raw A.C. of the correct voltage is used for filament heating of all Radiotrons. This eliminates the use of "A" batteries.

(5) The three R.F. stages and the first audio stage receive a plate voltage of 135 volts in conjunction with a negative grid bias of 9 volts. The detector receives 45 volts

plate supply. The last audio stage receives a plate voltage sufficient to provide ample loudspeaker output. The plate and grid voltages are supplied by means of a built-in "B" and "C" power supply unit using Radiotron UX-280 as the rectifying device.

(6) A new method of stabilizing the tuned R.F. circuit gives improved sensitivity and selectivity.

The following notes are published for the guidance of those called upon to locate and remedy any trouble that may occur. The text is divided into three parts, Part I—Installation; Part II—Service Data, and Part III—Making Replacements.

PART I—INSTALLATION

(1) ANTENNA (Outdoor Type)

Due to the high sensitivity of Radiola 18 the antenna length need only be approximately 25 feet. It 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 might 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 carefully 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 wire come in contact with any part of the building. Bring the lead-in wire through a porcelain tube penetrating the wall or window frame.

The antenna should not cross either over or under any electric light, traction or power line 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 Underwriters' 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 about 25 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.

(3) GROUND

A good ground is quite as important as the antenna. 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) RADIOTRONS

Four Radiotrons UX-226, one UY-227, one UX-171A and one UX-280 are used. The locations of these Radiotrons are plainly designated on each socket. Be careful not to insert a Radiotron UX-226 in the UX-171A socket, as immediate filament burn-out will result when the current is turned "ON".

Connect the loudspeaker to the output pin terminals and insert the input plug into a socket outlet of correct voltage and frequency, namely 105-125 volts, 50-60 cycles A.C. supply. Turn "ON" the operating switch. After about 30 seconds the Radiotron UY-227 will glow dimly, indicating that the receiver is in operating condition. If no signals are heard when tuning to a station known to be broadcasting examine the

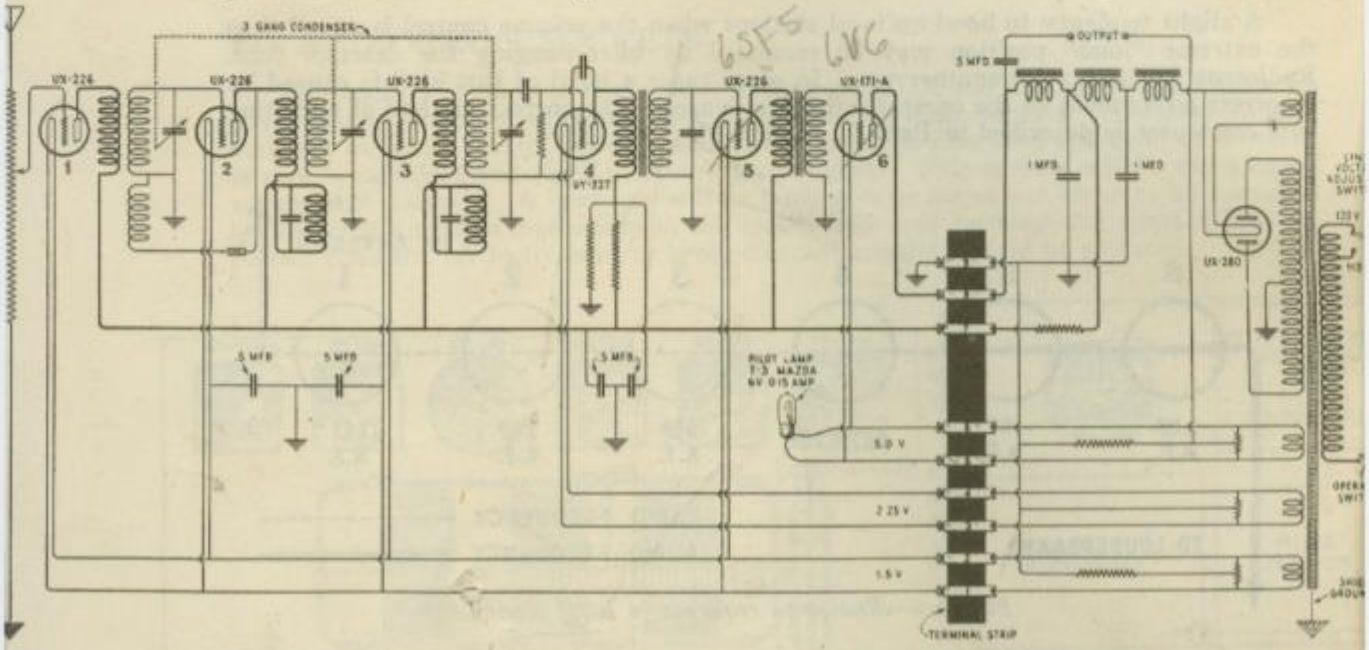


Figure 3—Schematic diagram of receiver and socket power unit.

Radiotrons. Possibly one Radiotron has been damaged in transit. Interchanging with one or more known to be in operating condition will isolate the damaged one.

If there is an excessive hum present during operation:

(a) Reverse the A.C. input plug at the socket outlet.

(b) Interchange the Radiotrons UX-226 in the R.F. stages with the one in the first A.F. stage, and use the combination that gives least hum. Then interchange the three in the R.F. stages for the best results while tuned to a broadcast station.

(5) LINE SWITCH

A two-way switch is provided in the S.P.U. for adjustment to line voltages. A shield over the terminal strip holds this switch in the 120-volt position. Unless it is definitely known that the line is *always* below 115 volts the switch should be left in its original position. It is a good plan to leave this switch at the 120-volt position on all lines unless unsatisfactory operation is experienced. If the switch is set at the 110-volt position on supply lines exceeding 115 volts the Radiotrons in the receiver will be damaged.

(6) SUB-CHASSIS WIRING

The sub-chassis wiring of Radiola 18 consists of a combination of bus-bar and flexible braid covered wire utilizing a color scheme of connections. It is placed in a very definite position in the sub-chassis assembly. When testing and making replacements this wiring is apt to become displaced, which in some instances, may seriously affect the operation of the Radiola. It is important that any displaced wiring be returned to its original position. The sub-chassis assembly should be examined for this condition as a preliminary to any test made to check on poor operation.

(7) HOWL

A slight tendency to howl on local stations when the volume control is adjusted to the extreme "loud" position may be remedied by interchanging the detector tube, Radiotron UY-227, with another one. In some cases a howl of this kind is caused by incorrect adjustment of the compensating condenser. The correct method of adjusting this condenser is described in Part II, Section 10.

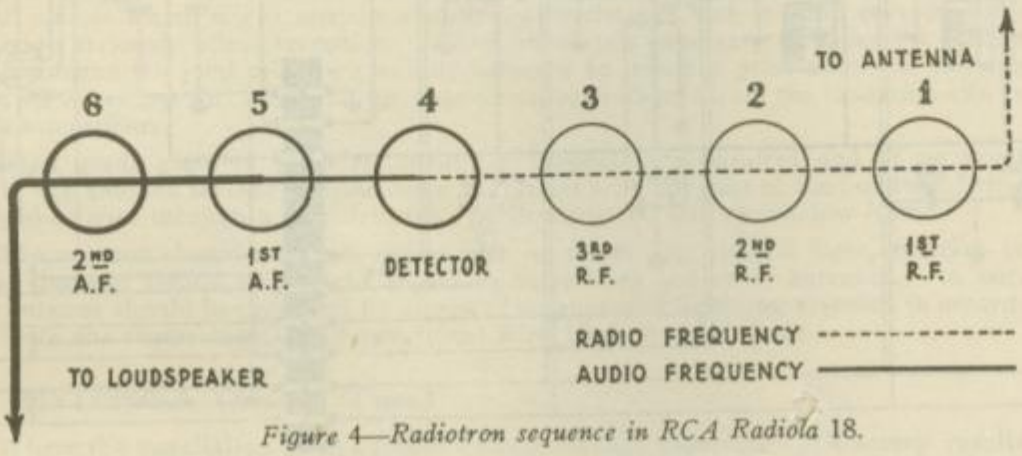


Figure 4—Radiotron sequence in RCA Radiola 18.

(8) RADIOTRON SEQUENCE

Figure 4 illustrates the sequence of the Radiotrons in the receiver, omitting Radiotron UX-280 in the socket power unit. From right to left, when facing the front of the Radiola, the Radiotron sequence is as follows:

Radiotron No. 1 is an untuned stage of radio frequency amplification. It is coupled directly to the antenna and ground and is not tuned in any way.

Radiotron No. 2 is a stage of tuned radio frequency amplification, and is tuned by the first of the gang condensers.

Radiotron No. 3 is the second stage of tuned radio frequency amplification. It is tuned by the second of the gang condensers.

Radiotron No. 4 is the detector and is tuned by the third of the gang condensers.

Radiotrons Nos. 5 and 6 are respectively, the first and second stages of audio frequency amplification. The last stage, Radiotron No. 6, employs power amplifier Radiotron UX-171A. An output filter protects the loudspeaker windings from excessive D.C. current.

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 disconnecting the antenna and ground leads the service man can soon determine whether the cause of complaint is within or external to the receiver and plan his service work accordingly.

(2) RADIOTRON SOCKETS

The sockets in Radiola 18 are the standard gang UX and UY type (See Figure 5). Care must be exercised when inserting Radiotrons in their sockets. A socket contact may not be in its correct position and 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 noticeable 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 should be replaced.

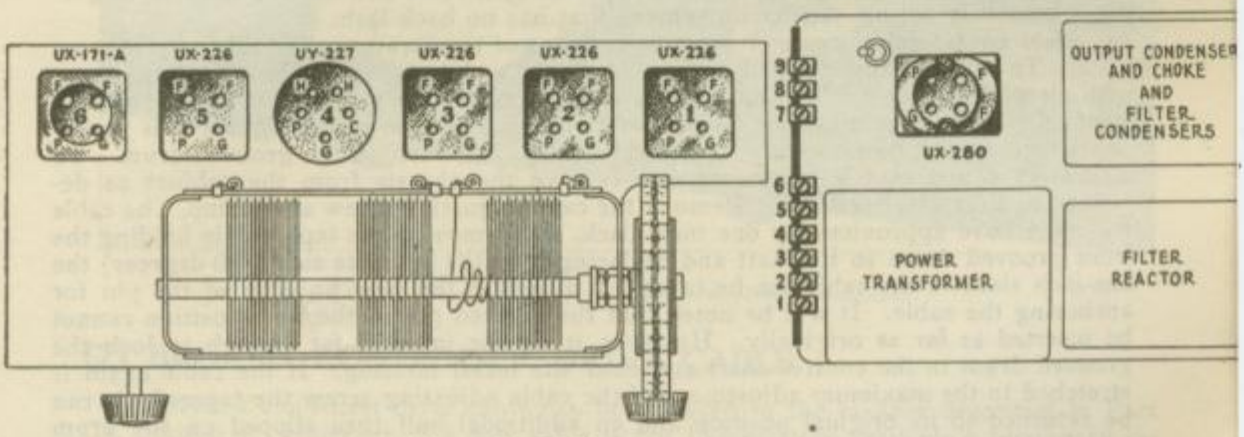


Figure 5—Radiotron socket contacts.

(3) RADIOTRON PRONGS

Dirty Radiotron prongs may cause noisy operation or change the resistance of the filament circuit sufficiently to cause a hum in the loudspeaker. They should therefore be cleaned with fine sandpaper periodically to insure good contact.

The use of emery cloth or steel wool is not recommended. Before reinserting Radiotrons in their sockets wipe the prongs and base carefully to make certain that all particles of sand are removed.

Care should be exercised to see that the two large pins and two small pins of the Radiotrons match the socket holes. The UY-227 Radiotron has five prongs, all of the same size, and will fit in the socket only one way. 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.

(4) LOOSE VOLUME CONTROL AND LOW VOLUME

A loose volume control contact arm may cause noisy or intermittent operation. It should be bent slightly so that it makes firm contact against the resistance strip. To do this it is necessary to remove the chassis from the cabinet as described in Part III, Section 1. The volume control is then accessible. It can be released by removing the two screws that hold it to the metal frame.

Low volume even on local stations may be due to one of the following causes:

(a) Defective antenna and ground system. A poor antenna and ground system or one in a shielded locality may cause weak signals. The suggestions given in Part I, Sections 1, 2 and 3 should be followed if trouble of this kind is experienced.

(b) Compensating condenser out of adjustment. If this condenser is badly out of adjustment it will have the effect of making the Radiola very insensitive. To adjust correctly refer to Part II, Section 10.

(c) Defective R.F. transformers. Should the R.F. transformers become damaged so that they do not properly match, weak signals may be the result.

(d) Defective A.F. transformer. An open or short in the A.F. transformers may cause weak signals and distorted reproduction.

(5) ADJUSTMENT FOR SLACK DRUM CONTROL

The main tuning condensers are controlled by a cable and drum arrangement giving a smoothly acting vernier movement that has no back lash.

After considerable wear, or extreme changes of temperature the cable may become slack. To take up this slack open lid of cabinet and turn the cable adjusting screw with clamp until the cable is taut. This screw may become seated after several adjustments are made thus allowing no further tightening of the cable. When this condition occurs it will be necessary to slip the cable a half turn on the grooved drum. To make this adjustment it is necessary to remove the chassis from the cabinet as described in Part III, Section 1. Remove the cable adjusting screw and clamp. The cable will then have approximately one inch slack. By removing the tapered pin holding the front grooved drum to its shaft and replacing it on the opposite side (180 degrees) the one-inch slack in the cable can be taken up by using the new position of the pin for anchoring the cable. It will be noted that the tapered pin in the new position cannot be inserted as far as originally. However, it can be inserted far enough to lock the grooved drum to the control shaft and clear the metal housing. If the cable again is stretched to the maximum adjustment of the cable adjusting screw the tapered pin can be returned to its original position and an additional half turn slipped on the drum which will provide for taking up all slack. Sufficient grooves are provided on the drum for this purpose.

(6) HUM

Part I, Section 4, describes the method to eliminate ordinary hum in Radiola 18 when making an installation. If a pronounced hum develops during operation check the following:

(a) Low emission Radiotron UX-280. A low emission rectifying tube will cause excessive hum and unsatisfactory operation.

(b) Shorted filament condenser. There are two ½ mfd. condensers hooked in series across the UX-226 filaments with the center tap grounded. A short of either of these condensers will cause loud hum and imperfect operation of the Radiola.

(c) Defective center tapped resistance. A short or open in any of the center tapped resistances connected across the various filament supplies will cause a loud hum.

(d) Any open of the several grounding connections in the Radiola or defective voltage supply resistances may cause a certain amount of hum. These defects will have a pronounced effect on the general operation of the Radiola which will be more noticeable than the additional hum. Check by means of the continuity test given in Part II, Section 16.

A mechanical hum caused by vibration of loose laminations in the power transformer may be corrected by removing the power transformer from the S.P.U. as described in Part III, Section 11, and heating it in a slow oven. The open end should be kept up and the compound heated sufficiently to allow it to adhere to the laminations of the transformer. After heating, the transformer should be allowed to cool for at least 24 hours and then returned to the S.P.U.

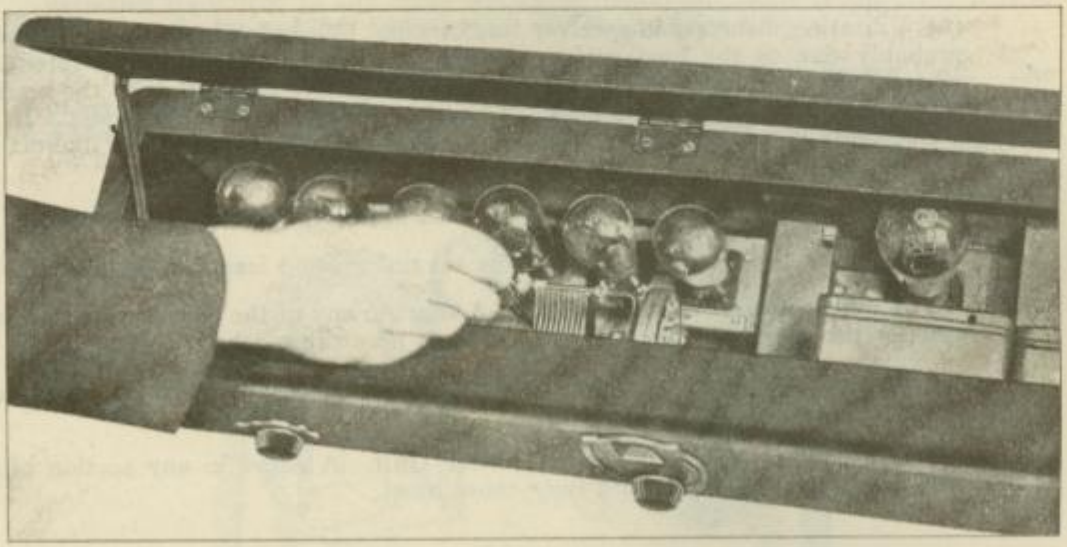


Figure 6—Adjusting the compensating condenser.

(7) BROKEN CONDENSER DRIVE CABLE

A broken condenser drive cable can be replaced in the manner described in Part III, Section 4. However, if a new cable is not immediately available a temporary repair can be made in the following manner, provided the break in the cable is not in that section that passes over the small grooved drums.

Splice and solder the two ends together. Splicing consists of interweaving the strands, as with rope, and not just twisting the cable ends together as in an electrical wiring splice. Splicing gives greater strength and forms a smaller body on the cable. When soldering use plenty of flux and a small amount of solder. Heat sufficiently so the solder adheres to all the strands of the cable. Placing the splice in an alcohol or bunsen flame affords sufficient heat and allows excess solder to drip away. This is but a temporary repair to be used only until a new cable can be procured.

(8) LOUDSPEAKER POLARITY

The use of an output filter in Radiola 18 makes unnecessary any adjustment for polarity of the output current. Any type of loudspeaker (either horn or cone) can be connected in the manner that gives the most pleasing reproduction.

(9) AUDIO HOWL

Audio howl may be caused by:—

(1) Incorrect adjustment of compensating condenser. The correct procedure for adjusting the compensating condenser is given in Part II, Section 10.

(2) Open A.F. condenser connections. An open connection to either of the A.F. condensers may cause a howl.

(3) Open by-pass condensers. An open by-pass condenser connection may cause a howl.

(4) Vibrating elements in receiver Radiotrons. A gradually developed howl is probably due to the loudspeaker causing the receiver Radiotron elements to vibrate. To overcome this condition, interchange the Radiotrons in the receiver or change the relative angle between the loudspeaker and the Radiola. In extreme cases it will be necessary to increase the distance between the Radiola and the loudspeaker.

(5) Poor ground. Install ground system as indicated in Part I, Section 3.

(6) An open connection in any of the several ground leads in the Radiola.

(7) A defect in the R.F. coil system. A short in any of the concentrated primary coils or the condenser shunted around them may cause a howl.

(8) Poorly soldered or corroded joints. Any high resistance joint throughout the Radiola may cause howl.

(9) Defective resistance in Socket Power Unit. A short in any section of the plate and grid resistance unit may cause howl.

(10) COMPENSATING CONDENSER OUT OF ADJUSTMENT

The compensating condenser should not be touched until it is definitely ascertained that no other defect exists. If the condenser needs adjustment observe the following procedure: Obtain a small non-metallic screw-driver (either bakelite or wood will do) having a shaft less than ¼" in diameter.

(a) Put Radiola in operation in usual manner and tune in some station preferably at the lower wavelengths.

(b) To reach the adjusting screw of the compensating condenser, break the brown paper seal and insert the screw-driver through the hole at the bottom of the tuning condenser assembly. (See Figure 6.)

(c) With the volume control at maximum intensity, turn this screw to the right until the Radiola goes into oscillation. Then turn the screw to the left until all oscillation and any howl is eliminated, with the volume control at maximum. In some cases it will be necessary to interchange the Radiotrons UX-226 in the R.F. stages before the proper adjustment is found. This is the correct adjustment to obtain maximum sensitivity and tone quality in the operation of Radiola 18.

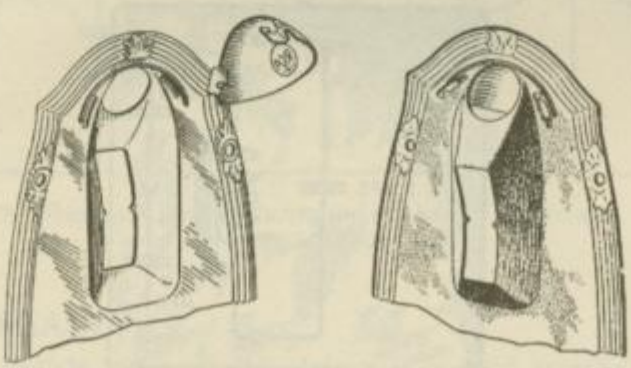
(d) The brown paper seal should be replaced by another seal dated and initialed to prevent tampering with the adjustment.

(11) DISTORTED REPRODUCTION

Under normal conditions Radiola 18 will deliver a strong signal of good quality to the loudspeaker. The high sensitivity of Radiola 18 makes it undesirable to operate the set at full volume when receiving from a nearby broadcasting station. The volume control should be adjusted to secure maximum quality, for the volume will be found ample for all requirements. If the loudspeaker production is poor test the loudspeaker output from the receiver. A pair of phones or loudspeaker of known quality may be used for this purpose. Poor quality or distortion may be due to any of the following causes:

(1) Defective Radiotrons. Though the Radiola may be in operating condition a defective Radiotron in any stage will cause distortion. This is especially true of the detector, 1st and 2nd audio stages and the rectifier tube.

(2) High or low plate and grid voltages from the Socket Power Unit. The cause may be a defective Radiotron UX-280 or resistance unit. Replace the Radiotron UX-280 with one of known quality and check the various resistances for a possible short or open.



FRONT VIEW OF ESCUTCHEON PLATE WITH CANOPY REMOVED

REAR VIEW WITH CANOPY HOOKED IN PLACE

Figure 7—Method of fitting canopy into escutcheon plate.

The cause of noisy operation and intermittent signals with periods of hum or no reception may be traced in the following manner:

(1) Disconnect the antenna and ground leads. If the Radiola becomes quiet and signals from local stations, though weak, are received the trouble is in the antenna system, or is caused by nearby interfering electrical apparatus. In the first case repair the antenna system and in the second case place radio frequency chokes on any offending nearby apparatus. The location of interfering electrical machinery will require patience, skill and experimenting.

(2) If disconnecting the antenna and ground does not eliminate the noise the trouble is in the Radiola. A defective tube, one having poorly welded elements will cause a disturbance of this kind, and this point should be checked by interchanging the Radiotrons in the Radiola with others of the same type. If it is definitely established that the Radiotrons are O. K. the Radiotron prongs and the socket contacts should be examined for dirt or poor contact. The volume control should be examined for poor contact between the contact arm and the resistor strip.

(12) PILOT LAMP AND CANOPY

Radiola 18 is equipped with a small pilot lamp operating from the Radiotron UX-171A filament winding. Its purpose is to illuminate the tuning dial and act as a current supply indicator. The latter use is quite important because the time required for Radiotron UY-227 to develop normal operation, which is approximately 30 seconds, can be checked.

The lamp and canopy are packed separately and must be installed when the Radiola is first placed in operation. The pilot lamp is a standard T-3 Mazda miniature base, 6 volt, 0.15 ampere lamp which can be procured on the open market if replacement becomes necessary. It is screwed into its base directly over the tuning dial. The projections on the canopy fit into the holes in the escutcheon plate directly over the light. A slight side shift locks it securely in place. (See Figure 7.)

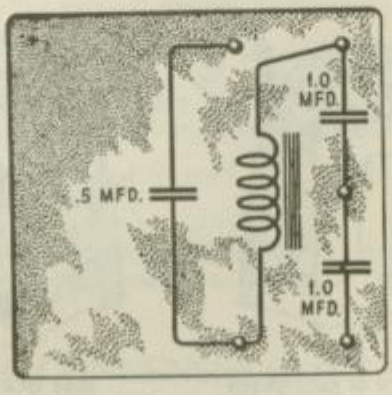


Figure 8—Internal connections of condensers.

(13) FILTER CONDENSER AND OUTPUT CONDENSER AND CHOKE

The output choke and condenser and the two filtering condensers are located in one container in the S.P.U. Figure 8 shows the internal connections. The procedure for testing this unit is to "click test" the choke for an open, and charge and discharge the condensers individually by shorting their terminals with a screw-driver. A condenser that will not retain its charge is defective. Approximately 200 volts D.C. should be used when making this test.

An open output condenser or an open or shorted choke will cause weak and distorted reproduction. A defective filter condenser is indicated by excessively hot plates, possibly showing color, in Radiotron UX-280.

(14) VOLTAGE SUPPLY SYSTEM

It is well to understand the various voltage supply systems incorporated in Radiola 18 as they differ somewhat from the systems normally used. Generally speaking, Radiola 18 uses what is known as the series resistance method of obtaining its various voltages. This series arrangement makes it possible to use small filter condensers. Figure 9 shows the connections. The grid bias voltages are obtained by using the drop across a resistance connected in the plate return lead.

With this arrangement the correct grid or plate voltage is dependent on the Radiotrons being in good condition. A low emission tube will cause the voltage to rise on all tubes. It is important to note that when interchanging Radiotrons all tubes should be in their respective sockets before turning "on" the current supply.

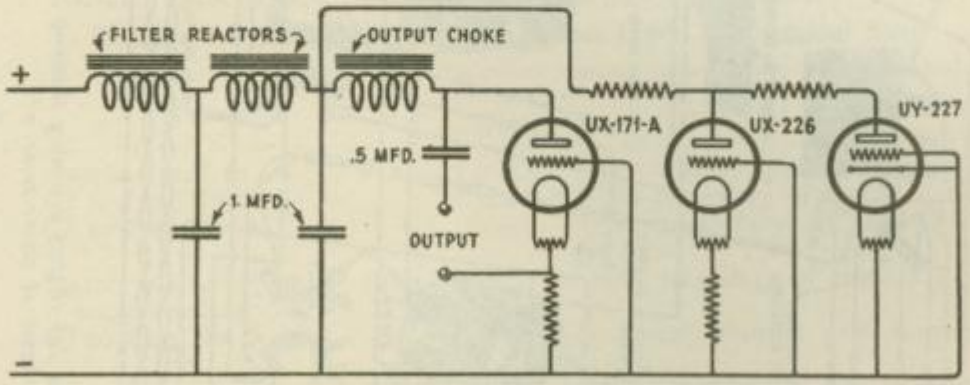


Figure 9—Schematic circuit illustrating method of obtaining grid and plate voltages.

(15) VOLTAGE READINGS

When checking a Radiola 18 for possible defects it is good practice to check the voltage of the various sources of current. To do this a service man will need both an A.C. and a D.C. voltmeter, the D.C. meter being 600 ohms per volt or higher in resistance. The following voltages at the terminal strip of the S.P.U. are correct with all tubes in place and a normal load on the S.P.U. The tubes used must be in good condition, otherwise the D.C. voltages may be excessively high. The shield over the terminal strip will have to be removed before any readings can be made. Keep the line adjustment switch in the normal position for the particular line to which the set is connected.

The terminal strip numbers are read from front to rear of the Radiola, No. 1 being toward the front and No. 9 toward the rear.

TERMINALS	CORRECT VOLTAGE
1 to 2	1.5 A.C.
3 to 4	2.25 A.C.
5 to 6	5.0 A.C.
7 to 9	145 D.C.
8 to 9	165 D.C.

Any serious variations from these voltages, not caused by defective Radiotrons, indicates a defective resistance unit, condenser or power transformer.

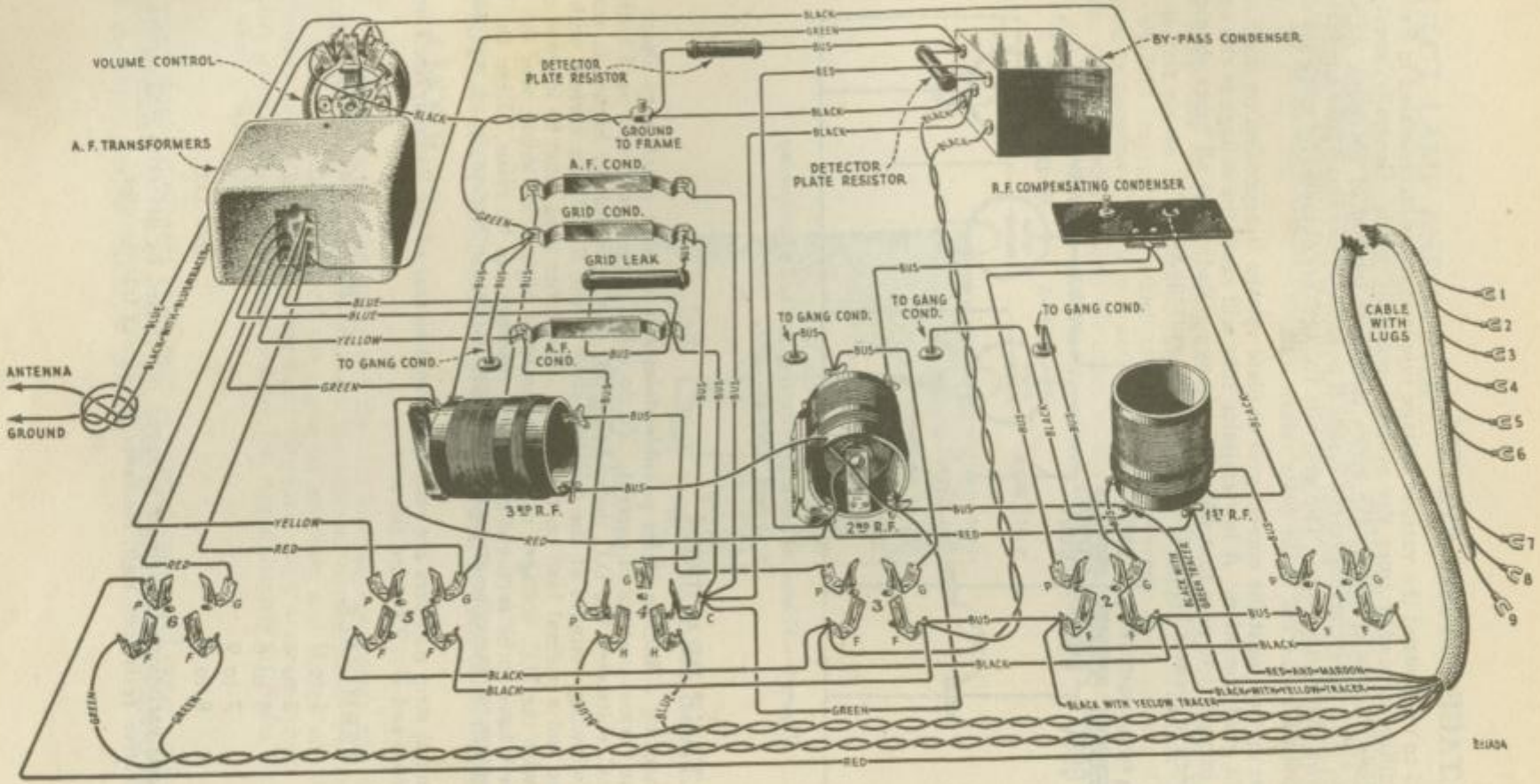


Figure 10—Wiring diagram of receiver sub-chassis assembly showing location of parts and color scheme of connections.

(16) RADIOLA 18 CONTINUITY TESTS

The following tests will show complete continuity for the receiver assembly (Figure 10) and the Socket Power Unit (Figure 11). Disconnect the antenna and ground leads; the cable connecting the S.P.U. to the receiver assembly, 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 voltage to give a full scale deflection when connected directly across the battery terminals should be used in making these tests. The receiver sockets, numbers and lugs used in these tests are shown in Figure 10. The S.P.U. terminals are shown in Figure 11.

RECEIVER ASSEMBLY CONTINUITY TESTS

Remove All Radiotrons and Disconnect Cable at Terminal Strip

Circuit	*Terminals*	*Correct Effect*	*Incorrect Effect Caused by*
Grid	Antenna lead to G1	Closed	Open volume control or loose contact arm
	G2 to Lug No. 9	Closed	Open secondary of first R.F. transformer
	G3 to Lug No. 9	Closed	Open secondary of second R.F. transformer
	Stator plates of third condenser to Lug No. 9	Closed	Open secondary of third R.F. transformer
	G4 to Lug No. 9	Open or very weak	If closed, shorted grid condenser or grid leak
	G5 to Lug No. 9	Closed	Open secondary of first A.F. transformer
	G6 to Lug No. 9	Closed	Open secondary of second A.F. transformer
Plate	P1 to Lug No. 7	Closed	Open primary of first R.F. transformer
	P2 to Lug No. 7	Closed	Open primary of second R.F. transformer or concentrated coil
	P3 to Lug No. 7	Closed	Open primary of third R.F. transformer or concentrated coil
	P4 to Lug No. 7	Closed (Weak)	Open primary of first A.F. transformer or detector plate resistance
	P5 to Lug No. 7	Closed	Open primary of second A.F. transformer
	P6 to Lug No. 8	Closed	Open connection
Filament	One filament contact of sockets Nos. 1, 2, 3 and 5 to Lug No. 1	Closed	Open filament connection
	Other filament contact of sockets Nos. 1, 2, 3 and 5 to Lug No. 2	Closed	Open filament connection
	Lug No. 1 to Lug No. 9	Open	Shorted by-pass condenser
	Lug No. 2 to Lug No. 9	Open	Shorted by-pass condenser
	Lug No. 3 to one filament contact of socket No. 4	Closed	Open filament connection
	Lug No. 4 to other filament contact of socket No. 4	Closed	Open filament connection
	Lug No. 5 to one filament contact of socket No. 6	Closed	Open filament connection
	Lug No. 6 to other filament contact of socket No. 6	Closed	Open filament connection

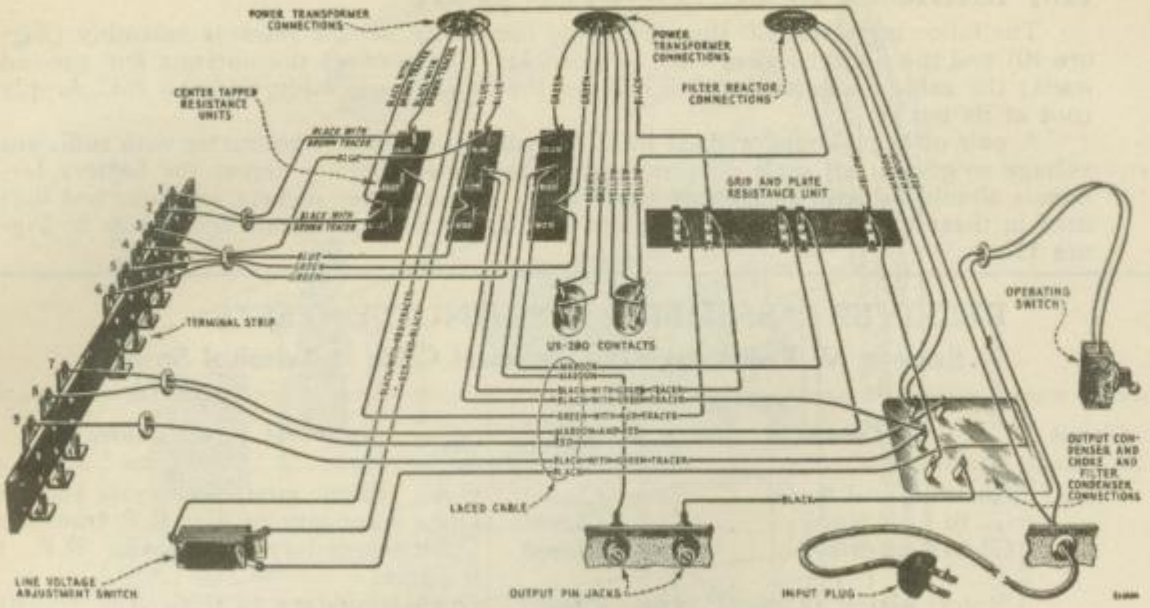


Figure 11—Wiring diagram of socket power unit showing location of parts and color scheme of connections.

SOCKET POWER UNIT CONTINUITY TESTS

Remove Radiotron UX-280 and Disconnect Cable at Terminal Strip

Circuit	*Terminals*	*Correct Effect*	*Incorrect Effect Caused by*
S.P.U.	Terminal No. 9 to terminals Nos. 1 or 2	Closed	Open UX-226 grid bias resistance
	Terminal No. 9 to terminals Nos. 5 or 6	Closed	Open UX-171A grid bias resistance
	P to G of UX-280 socket	Closed	Open high voltage winding of power transformer
	Across UX-280 filament contacts	Closed	Open UX-280 filament winding
	Across terminals 1 and 2	Closed	Open UX-226 filament winding and center tapped resistance
	Across terminals 3 and 4	Closed	Open UY-227 filament winding and center tapped resistance
	Across terminals 5 and 6	Closed	Open UX-171A filament winding and center tapped resistance
	Terminal No. 8 to either filament contact UX-280 socket	Closed	Open output choke or filter reactor
	Terminal No. 7 to terminal No. 8	Closed	Open output choke or resistance unit
	Terminal No. 8 to terminal No. 9	Open	Shorted filter condensers
	One output pin jack to terminal No. 8	Open	Shorted output condenser
	Other output pin jack to terminal 5 or 6	Closed	Open center tapped resistance unit or connection

PART III—MAKING REPLACEMENTS

The various assemblies and parts of Radiola 18 are easy of access and replacements can be made quickly.

(1) REPLACING VOLUME CONTROL

The following procedure should be used when replacing the volume control:

(1) Remove the seven screws that hold the wooden back to the cabinet.

(2) Remove knobs on "Station Selector" and "Volume Control."

(3) Remove the shield located on the terminal strip by loosening the screws at each end and slipping the screw heads through the larger openings.

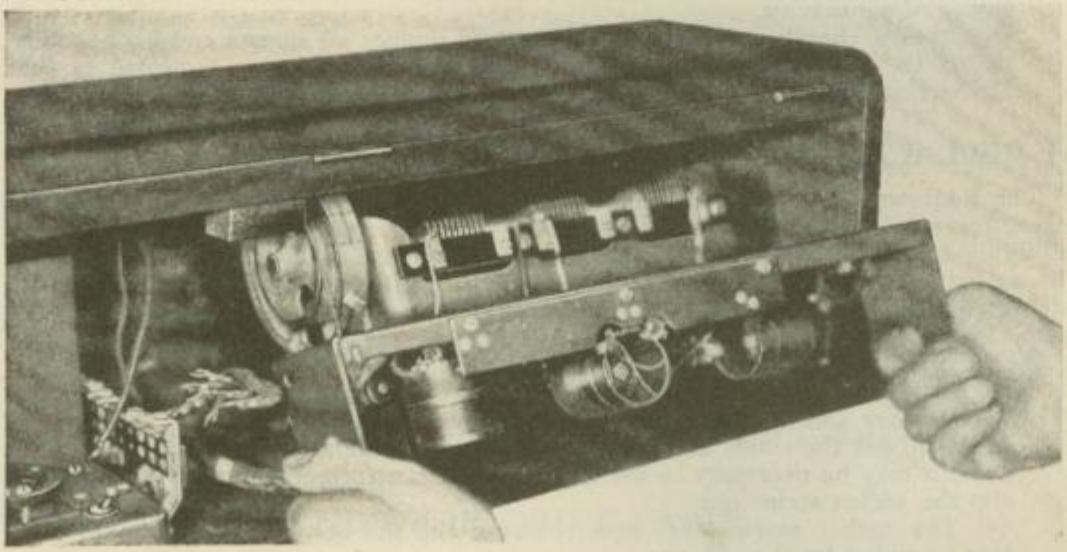


Figure 12—Removing receiver chassis assembly from cabinet.

(4) Release the cable connecting the socket power unit to the chassis assembly and the two leads to the pilot lamp. This is done by loosening the screws holding them to the terminal strip of the socket power unit.

(5) Remove the four screws holding chassis in place to bottom of cabinet. The chassis may now be removed by rocking it in the cabinet and slipping it out of the back opening. (See Figure 12.)

(6) Unsolder and tag the leads to the volume control.

(7) Remove the two screws that hold the volume control to the metal chassis. The volume control may now be removed and the new one fastened in place. The connections to the new volume control should be made as indicated on the tags attached to the wires, or refer to Figure 10.

(8) The Radiola is reassembled in the reverse order of that already given.

(2) REPLACING RADIO FREQUENCY COILS

The three radio frequency transformers together with small fixed condensers across the concentrated primary coils are mounted on one strip and must be replaced as a unit. The following procedure is used:

(1) Remove the chassis assembly from the cabinet as described in Part III, Section 1.

(2) Unsolder and tag all connections to the three transformers.

(3) Remove the three screws that hold the mounting strip to the metal chassis. The entire assembly can now be removed. The new assembly is placed in the position occupied by the old one.

(4) Replace the screws that hold the mounting strip to the metal chassis.

(5) Replace and resolder all leads to the three transformers as indicated on tags previously attached to them. These connections are shown in Figure 10. When making this replacement be careful not to disturb the two condensers connected across the concentrated coils. Placing these condensers closer to the coils than their normal position will affect the inductance of the coil with a resulting decrease of sensitivity.

(6) Return chassis assembly to cabinet and replace all screws and knobs. Now adjust the compensating condenser to the correct position as indicated in Part II, Section 10.

(3) REPLACING RADIOTRON GANG SOCKETS

The Radiotron sockets of Radiola 18 are of the gang variety, using one detector socket; two A.F. socket strips, and one three-gang socket strip for the radio frequency amplifying tubes. There is a small bakelite shield placed over the rivets of the UX-171A socket which is used to identify the socket. This shield is supplied separately and does not come with the socket. The sockets are riveted to the metal chassis. To replace them, drill out the old rivets and use screws, nuts and lock washers for securing the new sockets. A step by step procedure follows:

(1) Remove chassis assembly from cabinet as described in Part III, Section 1.

(2) Remove and tag all leads to the terminals of the sockets.

(3) Drill out the rivets holding the sockets to the metal chassis frame. In some cases it may be necessary to loosen the R.F. transformer assembly in order to slip the socket strips out.

(4) The socket assembly is now removed and the new one placed in the position occupied by the old one.

(5) Fasten new socket in place by using small head machine screws, nuts and lock washers in place of the rivets previously removed.

(6) Replace connections as indicated on tags attached, or refer to Figure 10 for the correct socket connections.

(7) Return chassis to cabinet.

(4) REPLACING MAIN TUNING CONDENSERS AND DRIVE

The main tuning condensers and the driving mechanism are replaced as one complete unit. The step by step procedure follows:

(1) Remove chassis assembly from housing as described in Part III, Section 1.

(2) Unsolder four connections to condensers.

(3) Remove three screws, nuts and lock washers that hold the assembly to the frame.

(4) The assembly may now be removed and the new assembly placed in the position occupied by the old one.

(5) Replace the three screws, nuts and lock washers and resolder the leads.

(6) Replace chassis assembly in cabinet.

(5) REPLACING BY-PASS CONDENSER

This condenser, located on the under side of the chassis frame is held in place by four metal tabs that are a part of the condenser case and are bent over on the upper side of the metal chassis. A step by step procedure for making this replacement follows:

(1) Remove chassis from cabinet as described in Part III, Section 1.

(2) Remove tuning condenser assembly from chassis as described in Part III, Section 4.

(3) Unsolder the leads connected to the defective condensers.

(4) The four tabs holding the condenser to the chassis may now be bent up with a screw-driver and the old condenser replaced by the new one. Insert the tabs in the holes and bend them over on the upper side of the chassis assembly. Resolder the leads to their correct terminals. The connections are shown in Figure 10.

(5) Replace the tuning condenser assembly as described in Part III, Section 4.

(6) Return chassis assembly to cabinet in reverse order of that used to remove it.

(6) REPLACING AUDIO TRANSFORMERS

The audio transformers of Radiola 18 are built together in one unit. In making a replacement the following procedure should be used:

(1) Remove receiver chassis from cabinet as described in Part III, Section 1.

(2) Unsolder and tag all leads to the audio transformers.

(3) Use a screw-driver to turn up the tabs that hold the transformer assembly to the chassis frame and remove it.

(4) Place the new transformer in the position occupied by the old one, bend over the tabs and resolder all connections. The correct connections are shown in Figure 10.

(5) Replace chassis in cabinet in the reverse order of that used to remove it.

(7) REPLACING CONDENSER DRIVE CABLE

The condenser drive cable of Radiola 18 is very rugged and should give good service. If replacement becomes necessary proceed as follows:

(1) Remove the receiver assembly from the cabinet as described in Part III, Section 1. Place chassis on table with controls to the front.

(2) Release the cable adjusting screw and clamp, and remove old cable from large drum and grooved drums completely.

(3) Starting from the rear grooved drum place eye of cable over pin, which should be in a horizontal position facing the socket power unit, and wind on three complete turns, and then bring cable up to large drum.

(4) Now bring cable over the large drum. Turn drum so that cable adjusting screw is on top. Pass cable over groove until point is reached where there is a slot in the drum for passing cable to the track on other side of drum.

(5) Follow on around other track in same direction until point is reached where cable is directly above front grooved drum.

(6) Starting on the third groove back from the front of the grooved drum wind on two and a half turns and slip eye over pin. The cable is now in the correct position, although probably slack.

(7) The cable adjusting screw and clamp that were previously removed to allow the cable to pass along the groove are replaced. By slipping the clamp over the cable and gradually turning up on the cable adjusting screw, the cable may be tightened until there is no lost motion in any of the controls. Care should be taken not to take up too much as the cable may be stretched or possibly broken.
(8) Return receiver assembly to cabinet in the reverse order used to remove it.

(8) REPLACING DIAL SCALES

After considerable use a dial scale may become dirty or illegible and a new scale desired. A step by step procedure for making replacement follows:

(1) Open lid of cabinet of Radiola.
(2) Turn dial so that the two screws that hold the dial in place are on top.
(3) Remove screws, washer and nuts that hold dial in place.
(4) Replace old dial with new one and replace screws, but do not tighten.
(5) Examine new dial from front of Radiola to see that numbers on dial are in the correct position.
(6) Tighten screws holding dial in place and close lid of cabinet.

(9) REPLACING POWER CABLE

Attached to the receiver is a heavy cable used to conduct all current supplies from the S.P.U. Replacement is made as follows:

(1) Remove receiver assembly from cabinet as described in Part III, Section 1.
(2) Turn assembly so that bottom side is exposed and unsolder all connections to the cable. Attach tags to points of connection.
(3) Replace old cable with the new one. Solder the connections of the new cable as indicated on the attached tags, or as shown in Figure 10.
(4) Return receiver assembly to cabinet in reverse order of that used to remove it.

(10) REPLACING FILTER CONDENSER, OUTPUT CHOKE AND CONDENSER ASSEMBLY

The filter condensers, together with the output choke and condenser, are all contained in one metal container and must be replaced as a unit. The replacement procedure follows:

(1) Remove the seven screws holding the wooden back to the cabinet.
(2) Remove collar on operating switch at front of Radiola.
(3) Release the cable connecting the socket power unit to the receiver assembly and the two leads to the pilot lamp. This is done by first removing the metal shield placed over the terminal strip and then loosening the nine screws on the terminal strip.
(4) Remove four screws at the bottom of the cabinet holding S.P.U. in place. The Socket Power unit may now be removed by slipping it out of the back opening. This will allow an examination of parts and provide access to the units it is desired to replace.
(5) Unsolder and tag the connections to the filter condenser unit.
(6) Turn up the tabs that hold this unit to the S.P.U. base with a screw-driver. The entire assembly may now be removed and the new one placed in the position occupied by the old one.

(7) Clamp the assembly in place by turning the tabs over on the under side of the base. Solder the connections as indicated on tags attached, or as shown in Figure 11.
(8) Return the S.P.U. to the cabinet and reassemble in the reverse order of that used to remove it.

(11) REPLACING EITHER POWER TRANSFORMER OR FILTER REACTOR

The power transformer and the filter reactor are each encased in a metal container. Either unit may be replaced in the following manner:

(1) Remove S.P.U. from cabinet as described in Part III, Section 10.
(2) Unsolder the leads of the unit being replaced and tag connection points.
(3) Bend up the tabs holding unit to the base. It may be necessary to remove the resistance unit in order to bend all the tabs. The particular assembly being replaced may now be removed and the new assembly placed in the position occupied by the old one.
(4) The tabs on the new assembly should be bent so as to properly fasten the unit to the S.P.U. base.
(5) Connect all leads from the assembly to the points of connection as indicated by tags previously attached. These connections are shown in Figure 11, which should be followed exactly when any S.P.U. parts are replaced.
(6) Return to cabinet in the reverse order, and connect to receiver assembly.

(12) REPLACING TERMINAL STRIP

Should a terminal strip on the socket power unit require replacement use the following procedure:

(1) Remove S.P.U. from cabinet as described in Part III, Section 10.
(2) Unsolder and tag all leads to terminal strip.
(3) Release two screws holding strip to S.P.U. base.
(4) The strip may now be removed and replaced by a new one.
(5) Fasten new strip in position occupied by old strip by means of two machine screws, lock washers and nuts previously removed.
(6) Solder all leads to terminal strip as indicated on tags attached. The color scheme and correct connections are shown in Figure 11.
(7) Return S.P.U. to cabinet in the reverse order and connect to receiver assembly.

(13) REPLACING MISCELLANEOUS PARTS IN S.P.U.

The center tapped resistors, plate and grid supply resistors, line switch and UX-280 socket in Radiola 18 may become defective and require replacement. They are all attached to the base by means of machine screws and nuts, and replacement is very simple. The following general outline will apply to all these units:

(1) Remove S.P.U. from cabinet as described in Part III, Section 10.
(2) Unsolder leads from defective unit and tag each lead.
(3) Remove defective unit from base and replace with new unit.
(4) Solder leads to new unit as indicated on tags or see Figure 11.
(5) Return S.P.U. to cabinet in reverse order of that used to remove it.

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.

Indication	*Cause*	*Remedy*
No Signals	Defective operating switch	Repair or replace switch
	Loose volume control arm	Tighten volume control arm, P. II, S. 4
	Defective power cable	Replace power cable, P. III, S. 9
	Defective R.F. transformer	Replace R.F. transformer assembly, P. III, S. 2
	Defective A.F. transformer	Replace A.F. transformer assembly, P. III, S. 6
	Defective By-pass condenser	Replace By-pass condenser, P. III, S. 5
	Defective socket power unit	Check socket power unit by means of continuity test and make any repairs or replacements necessary, P. II, S. 16
Weak Signals	Compensating condenser out of adjustment	Adjust compensating condenser correctly, P. II, S. 10
	Defective power cable	Repair or replace cable, P. III, S. 9
	Defective line switch	Clean contacts or replace line switch
	Defective R.F. transformer	Replace R.F. transformer assembly, P. III, S. 2
	Defective A.F. transformer	Replace A.F. transformer assembly, P. III, S. 6
	Dirty prongs of Radiotrons	Clean prongs with fine sandpaper, P. II, S. 3
	Defective By-pass condenser	Replace defective By-pass condenser, P. III, S. 5
	Defective main tuning condensers	Replace defective tuning condensers, P. III, S. 4
	Low voltages from socket power unit	Check socket power unit voltages with high resistance D.C. voltmeter and A.C. voltmeter, P. II, S. 15
	Defective socket power unit	Check socket power unit by means of continuity test and make any repairs or replacements necessary, P. II, S. 16
Poor Quality	Defective A.F. transformer	Replace A.F. transformer assembly, P. III, S. 6
	Defective By-pass condenser	Replace defective By-pass condenser, P. III, S. 5
	Dirty contact arm of volume control	Clean contact arm of volume control, P. II, S. 4
	Dirty prongs on Radiotrons	Clean prongs with fine sandpaper, P. II, S. 3
Howling	Compensating condenser out of adjustment	Adjust compensating condenser correctly
	Radiotron UY-227 howl	Interchange Radiotron UY-227 with another, P. I, S. 7
	Defect in audio system	Check and repair any defect, P. II, S. 16
	Open grid circuit in any stage	Check circuit and repair defect
Excessive Hum	Defective center tapped resistance unit	Replace defective resistance unit, P. III, S. 13
	Socket plug position	Reverse socket plug, P. I, S. 4
	Line voltage low	Set line switch for low line voltage, P. I, S. 5
Radiotrons fail to light	Operating switch not "On"	Turn operating switch "On"
	Defective operating switch	Replace operating switch
	Defective input A.C. cord	Repair or replace A.C. input cord
	Defective power transformer	Replace power transformer, P. III, S. 11
	No A.C. line voltage	Turn A.C. line voltage "On"
Play in Station Selector	Loose knob	Tighten or replace knob
	Slack cable	Take up on cable adjusting screw, P. II, S. 5