RCA

MAGNETIC PICK-UP

MODEL AZ-1604

SERVICE NOTES

Prepared by

RCA VICTOR SERVICE DEPARTMENT

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FOREIGN DEPARTMENT

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GENERAL DESCRIPTION

This pick-up is of the intermediate impedance type. It is intended for use with broadcast radio receivers which use the grid leak and condenser type of detection, and have two stages of audio frequency amplification. When used in this manner it gives excellent reproduction and ample volume. Figure 1 shows the schematic diagram of the pick-up connected to a radio receiver.

The kit consists of the pick-up, tone arm, supporting base, which acts as a pivot for the tone arm, a potentiometer type volume control mounted in the base, a two-conductor connecting cord and an adapter.

(1) ADJUSTMENT OF ARMATURE

Adjustment of the armature consists essentially of having it in its electrical center between the two pole pieces. Need for this adjustment is usually evidenced by distortion during phonograph reproduction with blasting, especially on the low notes. The following procedure should be adopted when making this adjustment.

(a) Remove the needle set screw. Remove the two screws in the face of the pick-up and remove the pick-up cover.

(b) Remove the nut "D" (see Figure 3) that holds the magnet bracket and fibre spacers. Mark the magnet poles and the pole pieces so that when they are replaced they will be in their original position. The magnet is now

free to be released. Place a keeper such as a large nail across the magnet poles and remove it from the pole pieces.

(c) With a small screw driver loosen screws E and F. The small piece of metal that holds the clamping block may now be moved either way until the armature is approximately centered between the two pole pieces. Judging the center by the eye is sufficiently accurate for this adjustment.

(d) After the center has been located the two screws, E and F should be tightened. The magnet may now be replaced, the keeper removed and the pick-up re-assembled in the reverse manner of that used to remove it. While re-assembling be sure that all dirt is completely removed from any part of the magnet armature or other parts of the pick-up.

(2) RESISTANCE VALUES

Resistance of pick-up coil 55 ohms.
Resistance of volume control potentiometer 2350 ohms.

(3) REPLACING RUBBER PIVOT SUPPORTS AND DAMPING BLOCK

After considerable time, or due to climatic conditions, the rubber pivot supports and the rubber damping block may become hardened and require replacement. Such hardening is usually evidenced by the armature being set to one side and not moving easily. As with other rubber articles, these parts give best life when used frequently. Also the pick-up should not be supported by the needle resting against the record or turntable as such use will tend to set the armature to one side. The pick-up should hang free.

Usually the rubber pivot supports and damping block will require replacement at the same time and are therefore supplied in sets of three. When a replacement is necessary such a set should be procured. If such a set is not available and a repair is urgently needed the damping block may be cut from a piece of automobile inner tube. The pivot supports may be small strips cut from the thin portion of a baby's rubber nipple making sure it is the best quality obtainable.

Use the following procedure when making these replacements

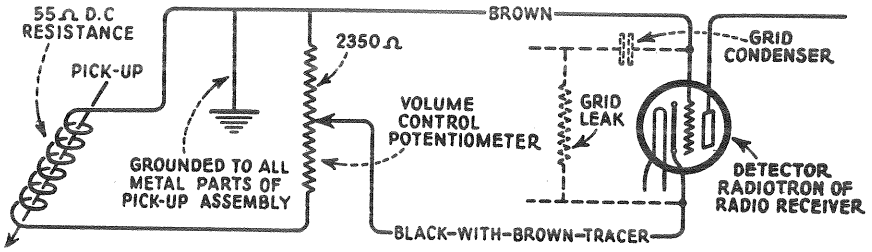


Figure 1—Schematic diagram showing connection of the pick-up in the circuit of a radio receiver

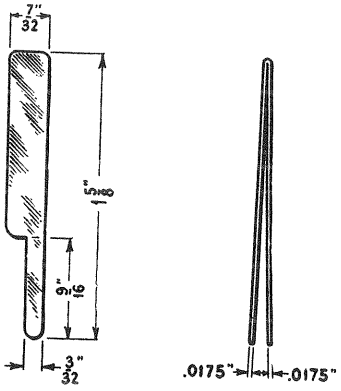


Figure 2—Magnetic pick-up armature spacing tool

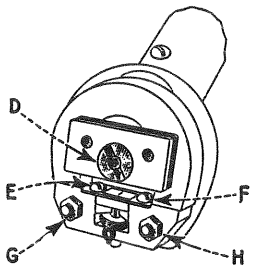


Fig. 3A

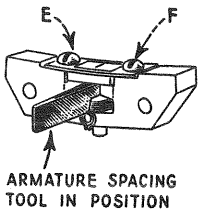


Fig. 3B

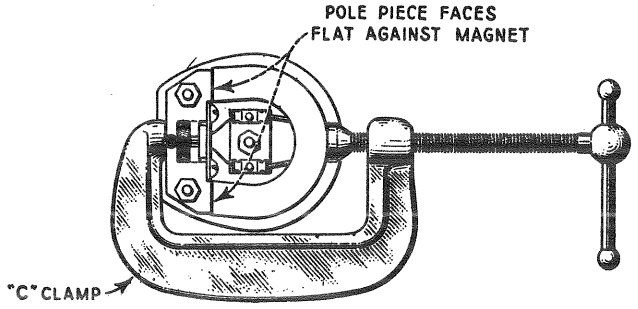


Fig. 3C

Figures 3A, B and C—Details of adjustment and replacement operations

(a) Procure an RCA magnetic pick-up feeler tool. This is RCA Part No. 2677, or it may be easily constructed by referring to Figure 2.

(b) Remove the pick-up case and the magnet from the pole pieces as described in Sec. 1.

(c) Disconnect the output leads and remove screw holding the pick-up to the tone arm and remove the pick-up.

(d) Unsolder the leads to the coil at the terminal strip inside of the pick-up case. Remove nuts G and H, Figure 3, and release the pole pieces from the back support. Now remove screws E and F and disassemble the pole pieces, armature and coil. The old rubber should be completely removed from all parts and the parts should be scraped clean with a knife.

(e) Place the new rubber pivot supports in their proper place. This may be either tubing or strips. Re-assemble the pole pieces and coil and new rubber damping block in place with armature spacing tool as shown in Figure 3. Hold together as tight as possible. Tighten screws E and F. Now remove tool. Be sure the cambric cover is in place between the coil and pole pieces.

(f) Place the assembled mechanism against the magnet, making sure the poles are against the proper pole pieces, and replace assembly on tone arm correctly. Put on the nuts G and H, but do not tighten. Place the magnet bracket and fibre spacers in place and tighten in their correct position. Now with 2-inch "C" clamp tighten the pole pieces as shown in Figure 3 until the faces of the pole pieces are flat against the magnet pole. Now tighten nuts G and H. The pick-up is now re-assembled and the cover may be replaced and the Radiola returned to normal operation. If the cover does not fit properly it may be necessary to relocate the position of the magnet clamp.

(4) REPLACING PICK-UP COIL

The pick-up coil may be replaced in the same manner as the rubber supports and damping blocks, the difference being that the coil is replaced instead of the rubber pieces. The cambric cover between the coil and pole pieces should be removed from the old coil and placed around the new one. All adjustments are the same.

(5) REPLACING PICK-UP ARMATURE

The pick-up armature may be replaced in the same manner as the rubber supports or coil, the difference being that the armature is the part replaced. All adjustments are the same. In some cases replacement of the armature is made necessary due to rust. If a new armature is not available, the old one may be temporarily repaired by removing all rust with sand-paper. This is not a permanent repair due to the fact that the sand-papered surface will rust quickly. Therefore a new armature should be installed as soon as available.

(6) REPLACING VOLUME CONTROL POTENTIOMETER

Remove pull-off knob. Remove the nut which holds the potentiometer in place. Remove washer. Disconnect the leads to the potentiometer and remove. Re-connect and re-assemble a new potentiometer in the reverse manner. The black with brown tracer lead of cord connects to the arm of the potentiometer and the brown lead should connect to the terminal near the arm of the potentiometer where the volume control is turned to the "off" position. (Turned to the extreme counter-clockwise position).

SERVICE DATA CHART

Indication	Cause	Remedy
No Reproduction	Poor volume control contact arm and resistance	Clean volume control resistance with a pipe cleaner and any cigarette lighter fluids Tighten contact arm by bending it slightly to make firm contact
	Open pick-up coil or connections	Repair any loose connection by resoldering, or replace an open coil as described in Sec. 4
Volume changes suddenly from no reproduction to maximum volume	Open volume control	Replace volume control potentiometer
Weak or distorted reproduction	Loose needle	Tighten needle in socket with needle set screw
	Dirty contact in volume control	Clean volume control resistance and contact arm
	Armature out of adjustment	Center armature as described in Sec. 1
	Defective rubber damping block or pivot supports	Replace rubber damping block and pivot supports as described in Sec. 3
	Dirt in armature gap	Clean all dirt from gap by means of a compressed air jet, or disassemble pick-up and clean. Remove rust from armature if necessary
	Weak magnet	Re-magnetize magnet taking to magneto repair shop. Place soft iron keeper across the poles until the magnet is again in place in the pick-up. Making repairs without placing a keeper on the magnet will cause the magnet to lose a large part of its strength
	Needle holder rattle	If the edge of the needle hole in the pick-up cover touches the needle set screw, a rattle will result. Re-locate the cover by shifting the magnet clamp

VICTOR MICRO-SYNCHRONOUS RADIO
R-32, R-52, RE-45 and RE-75

The Victor Micro-Synchronous Radio is a power operated tuned radio frequency receiver of the antenna type, employing an antenna coupling stage and four stages of tuned and neutralized radio frequency amplification, a detector, a first stage audio, and a power stage of push pull amplification.

A high degree of sensitivity is made possible by means of a system of micrometer adjustments on the tuning condensers, permitting precision automatic alignment or synchronization of the tuned radio frequency stages thruout the entire tuning range at all times. Each set of condensers is thus properly aligned at the factory and locked into position. A new method of stabilizing the radio frequency circuit permits a high degree of selectivity without causing any decrease in sensitivity.

The instrument comprises three standard units as follows:

(1) Radio, in which are contained the R. F. stages and the detector; (2) Power Amplifier, containing the first audio, the power stage of push pull amplification, and the rectifier; (3) Electro Dynamic Reproducer. The units are so designed that all parts are readily accessible for servicing.

Six Radiotrons UX-226 are used in the R. F. and first audio amplifier stages, a UY-227 detector, and two UX-245 in the power stage. The Radiotron UX-280 is used as a rectifier.

The Victor Radio is designed for operation on 105 to 120 volts, 50 to 60 cycles, alternating current. Special equipment is available for operation on 105 to 120 volts, 25 to 40 cycles. The power consumption when operating the radio is approximately 105 Watts, and approximately 160 watts when operating the Electrola.

PARTS LIST RADIO UNIT.

Name of Part

1. Twin Binding Post (Antenna and Ground)
2. Nut
3. Lock Washer
5. Cable Clamp
6. Nut
   Lock Washer
7. Screw
   Nut
   Lock Washer
8. Tuning Condenser Spring
9. Cam Adjusting Screw
10. By-Pass Condenser (3 of .25 Mfd. each)
11. Twin Pin Jack, Input Unit
12. Rivet
13. Detector Input R. F. Transformer Coil
14. Rivet
15. By-Pass Condenser, Plate Circuit UY-227 (.001 Mfd.)
16. Rivet
17. Grid Leak (½ Meg.)
18. Grid Condenser (.00025 Mfd.)
19. UY-227 Hum Control with Bracket
20. Rivet
21. Detector Plate Choke Coil
22. Rivet
23. Tuning Lever Roller
24. Transfer Switch (complete)
25. Nut
26. Washer
27. Nut
28. Knob
    Set Screw
29. Nut
    Lock Washer
30. Pilot Lamp Socket Cover
31. Pilot Lamp Socket Screw
32. Pilot Lamp
33. Pilot Lamp Socket
34. Pilot Lamp Socket Insulating Strip
35. Pilot Lamp Socket Base
36. Stabilizer Resistor (800 Ohms)
37. R. F. Transformer (Volume Control) (2nd R. F.)
38. Nut
39. Knob
40. Nut
41. Washer
42. Volume Control (Radio) (complete)
43. Mid-Tap Resistor Across UX-226 Fil. (20 Ohms)
44. UX-226 Grid Bias Resistor
45. Rivet
46. Antenna Choke Coil
47. Nut
48. Lock Washer
49. Tuning Condenser (One Complete)
50. R. F. Coil (3 per Unit)
51. Radio Panel (Wood Only)
52. Toggle Switch Insulator
53. Nut
54. Toggle Switch (Off and On)
    Metal Shield for UY-227 (RE-45 only)
    Tuning Dial Scale
    Multiple Plug (12 Prong)

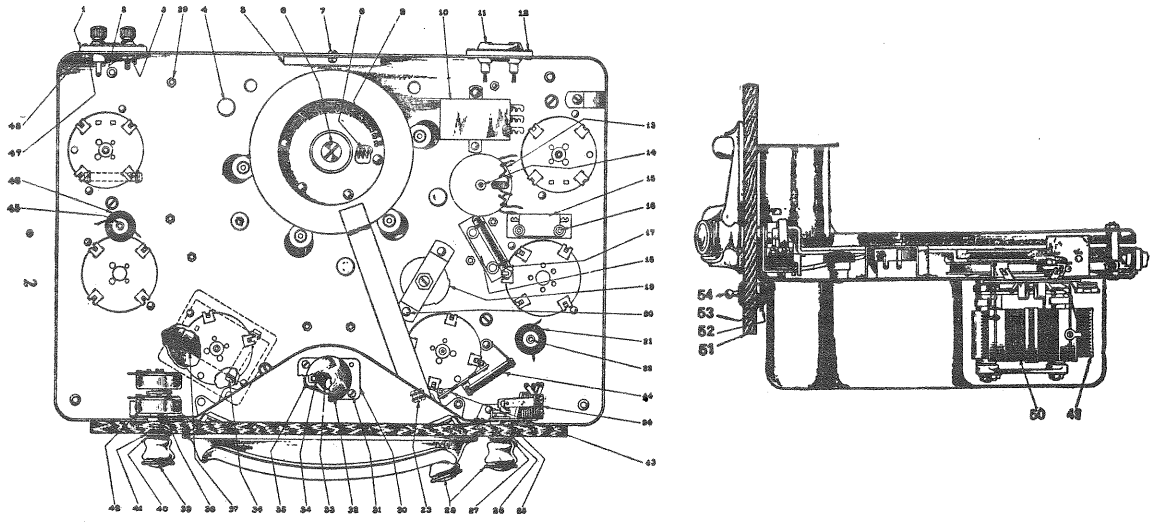


Fig. 1—Top and Side Views of Radio with Cover Removed, Showing Parts

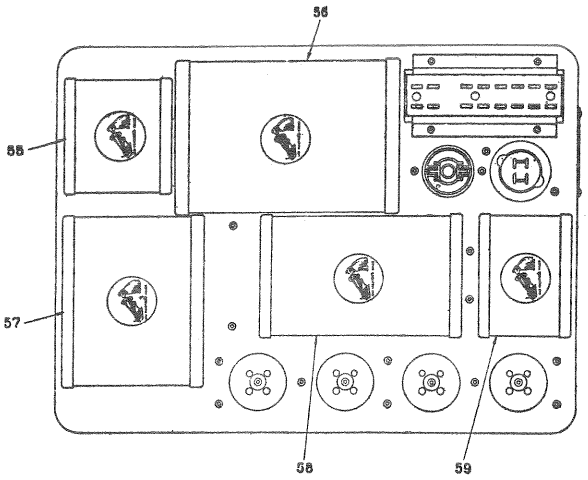


Fig. 2—Top View of Power Amplifier Unit, Showing Parts

PARTS LIST POWER AMPLIFIER UNIT

55. Filter Choke Coil
56. Filter Condenser Bank
57. Power Transformer (60 Cycles)
    Power Transformer (25 Cycles)
58. Interstage and Output Transformer
59. Input Transformer

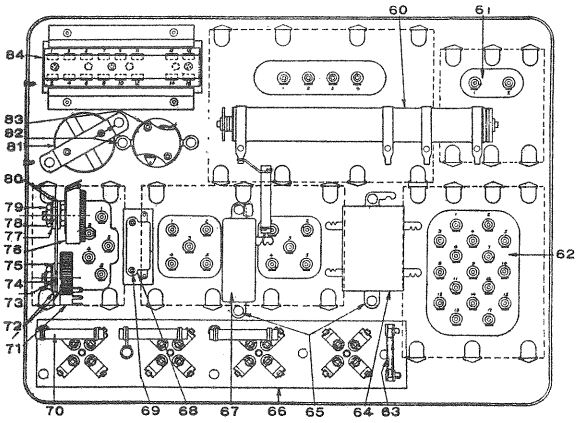


Fig. 3—Bottom View of Power Amplifier Unit, Showing Parts

60. Voltage Divider Resistor
61. Filter Choke Coil (Same as 55)
62. Power Transformer (Same as 57)
63. 2 Ampere Fuse
64. By-Pass Condenser (Two of .1 Mfd. each and one of .125 Mfd.)
65. Rivet
66. Socket Strip
67. By-Pass Condenser (½ Mfd.)
68. By-Pass Condenser (.002 Mfd.)
69. Rivet
70. Grid Leak, ½ Meg. (3 Used)
71. Hum Control Potentiometer (20 Ohms) UX-226
72. Fibre Washer (2 Used)
73. Nut
74. Washer
75. Lock Washer
76. Tone Control
77. Lock Washer
78. Washer (Same as 74)
79. Nut
80. Fibre Washer (Same as 72)
81. Power Input Plug
82. Rivet
83. Motor Plug
84. Multi-Plug Socket
85. Clamp (2 Used)

1. ANTENNA—For best average sensitivity and selectivity the antenna should be from 50 to 75 feet long including the lead-in and ground wires, and should be as high above ground as possible. A short antenna tends to decrease the sensitivity and increase the selectivity) a long antenna tends to increase the sensitivity and decrease the selectivity. For local reception sufficient sensitivity can usually be obtained except in shielded locations by using a five or six foot length of wire as an antenna.

2. GROUND—A good ground connection is highly important for the proper operation of the instrument and must be used at all times. The connection should be made to a well scraped and cleaned portion of a water pipe by clamping with a ground clamp. If such a connection is not available, a pipe or metal rod may be driven three or four feet into the ground, preferably where the soil is moist. Attention is called to the fact that a spark may be produced if the ground is connected to the instrument while the power plug is attached. This condition, which is caused by the condenser discharge from the power line, is quite normal and will cause no harm to the instrument.

3. POWER LINE VOLTAGE—The power line voltage should be measured with an A. C. voltmeter at the time of installation; If the voltage is above 125 volts, a tapped resistor such as stock No. A-310 should be connected in series with one side of the power line and the resistance varied until input voltage at the instrument is 115 volts. If the voltage fluctuates badly, the co-operation of the power company should be secured, and an attempt made to eliminate such fluctuation.

4. ADJUSTING HUM CONTROLS—The two hum control potentiometers,

should be adjusted at the time of installation in the following manner:

a. Place the transfer switch in the "record" position to the right.
b. With a small screw driver turn the UX-226 hum control in the base of the power amplifier unit slightly in either direction as required until the hum is a minimum.
c. Turn the transfer switch to the left to the "radio" position, turn the radio volume control to minimum, and adjust the UY-227 hum control near the UY-227 in the radio set until the hum is a minimum.

5. ADJUSTING HARMONIC MODULATOR—The harmonic modulator or tone control in the bottom of the power amplifier controls emphasis on the bass section of the scale, increasing the bass and decreasing the high notes as the adjusting screw is turned to the right. Ordinarily, the control will not require any change in setting from that made in the factory.

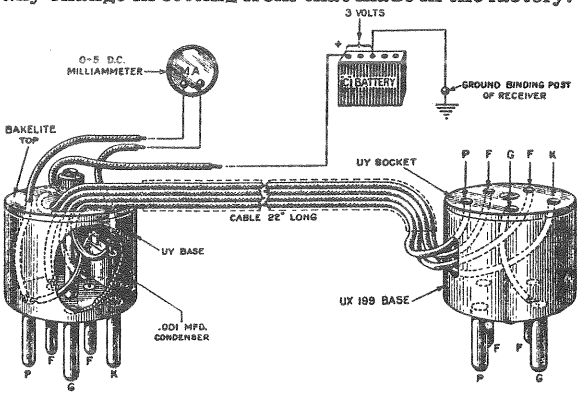


Fig. 4—Circuit for Tube Voltmeter, Na-Ald. No. 982

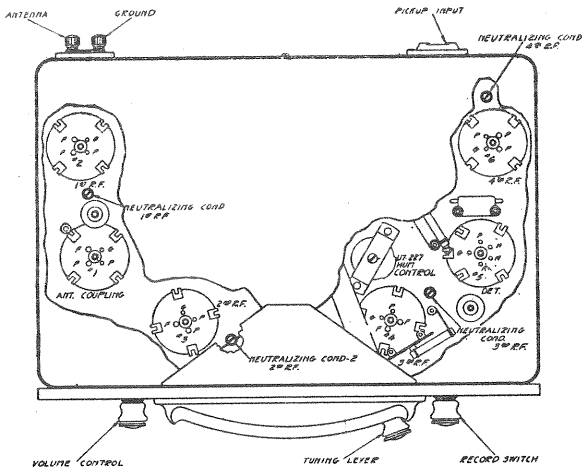


Fig. 5—Top View of Radio, Showing Radiotron Sockets

It may be desirable in some cases, however, to change the adjustment because of unusual room characteristics, a customer's preference for stronger bass, or to reduce record scratch and static. The control arm can be turned with a small screw driver as desired.

GENERAL TESTS

1. EXCESSIVE HUM—This condition can be caused by:
   a. Improperly adjusted or faulty hum controls. See subject 4, under Installation.
   b. Defective UX-280 or UY-227.
   c. Wire or terminal grounded to the frame, or open circuit in any of the various ground connections.
   d. Shorted condenser, 10, Fig. 1, across UX-226 filament supply.
   e. Open or shorted center tap resistor, 43, Fig. 1, across UX-226 filament supply.
   f. Shorted condenser, 64, Fig. 3, across power line in power-amplifier unit.
   g. Shorted condenser in condenser bank, 56, Fig. 2, of power-amplifier unit.

2. HOWL—Microphonic howl can be traced to:
   a. Defective Radiotron, particularly in the detector or audio stages.
   b. Improper neutralization. See subject 1 under Special Adjustments below.
   c. Speaker not felt insulated from baffle. Remove speaker and arrange felt properly.
   d. Open condenser, 15, Fig. 1.
   e. Loose metal parts such as shielding, screws, etc., or improperly centered cone may set up a howl or mechanical rattle. See subject 2 under Special Adjustments for method of centering cone.

3. DISTORTED REPRODUCTION—Distortion may be caused by any of the following:
   a. Low emission Radiotron, particularly in the detector or in the power supply unit. For best reproduction the plate currents of the two UX-245 should balance within 2 milliamperes.
   b. Operation with volume control advanced too far on powerful local stations, causing overloading of the detector.
   c. Incorrect setting of the tone control in the base of the power-amplifier. See subject 5, under Installation.
   d. Improper neutralization. See subject 1, under Special Adjustments.
   e. Cone in speaker unit improperly centered. See subject 2 under Special Adjustments.

4. NOISY REPRODUCTION—Station carrier noise, static, and power line disturbances should not be confused with noise which is set up within the receiver. This latter condition may be caused by any one of the following:
   a. *Volume Control.* Dirt or corrosion on the resistance wire or contact arms of the volume control will produce noise when the control is operated. This condition can usually be corrected by rubbing the parts lightly with very fine sandpaper and then cleaning with gasoline.
   b. *Shorted Tuning Condenser.* If the plates of one or more of the tuning condensers are shorted, noise will

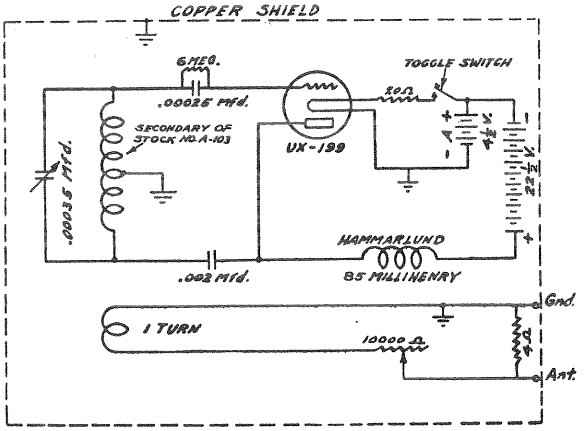


Fig. 6—Schematic Wiring Diagram, Modulated Oscillator

be produced when the tuning lever is operated. If such a condition is found, the faulty condenser should be replaced.
   c. *Intermittent short or open circuit* in any of the various soldered connections or in power switch.
   d. *High resistance grid leak.* Any of the grid leaks which have developed an excessive high resistance will produce a "frying noise."
   e. *Faulty power or audio transformer* will also produce this same type noise.

5. WEAK RECEPTION—This condition can be caused by:
   a. Faulty antenna, characterized by weak reception, intermittent reception, or grating noise. Examine the antenna for poor contact at the lead-in connection to the radio set, poor soldered connections, grounded or partially grounded lightning arrester, or contact with surrounding objects. See subject 1, under Installation for further details of antenna.

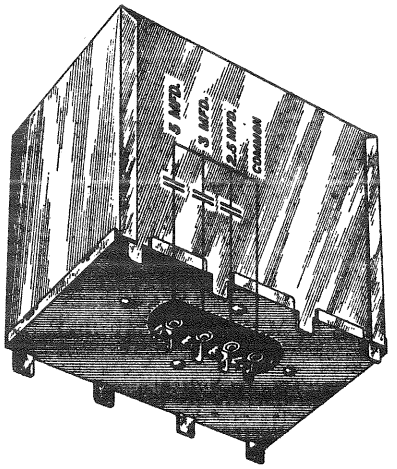


Fig. 7—Internal Connections of Filter Condenser Bank

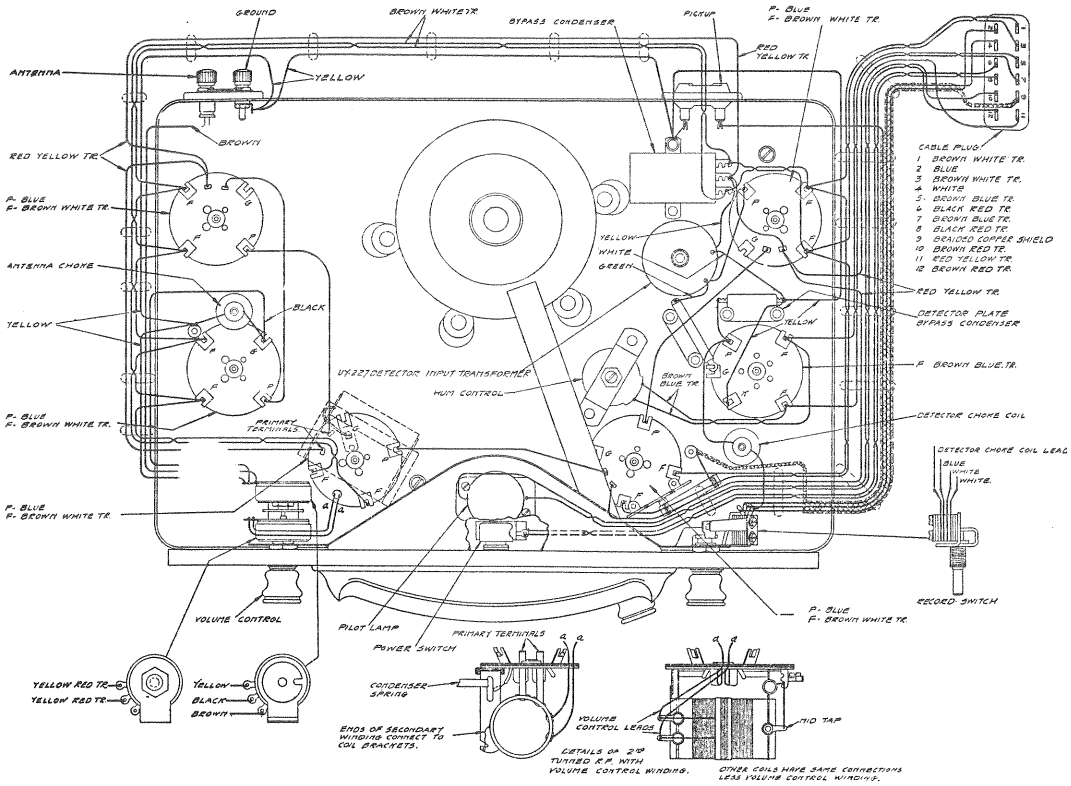


Fig. 9—Top View of Radio, Showing Wiring Between Terminals

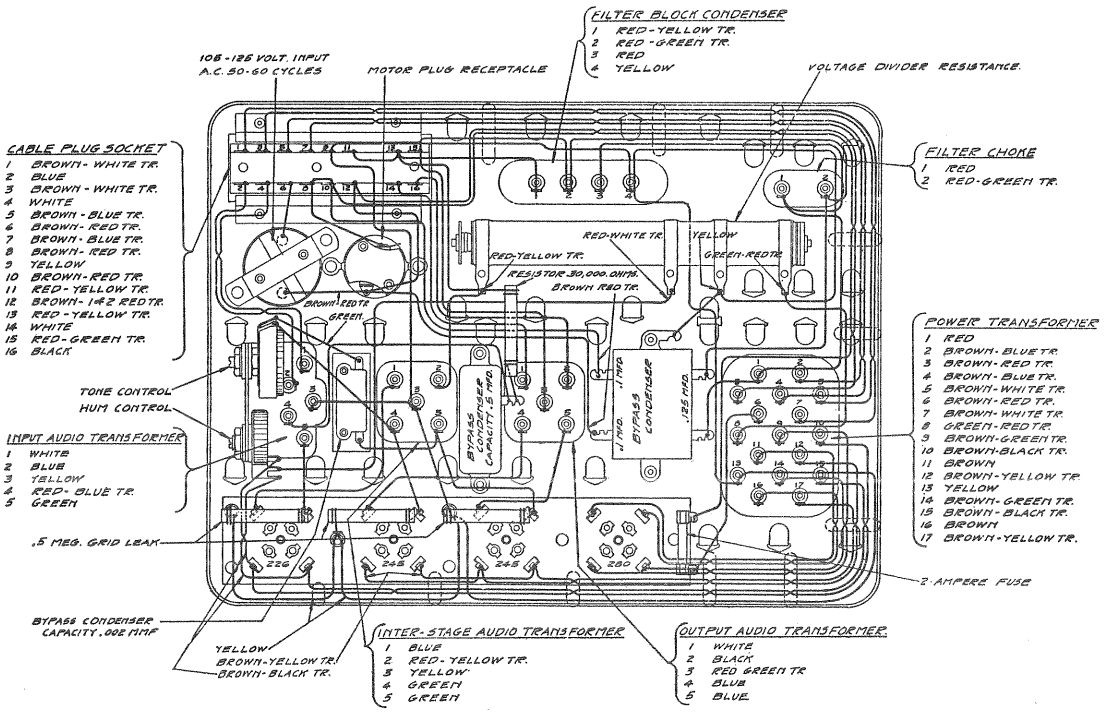


Fig. 11—Bottom View of Amplifier, Showing Wiring Between Terminals

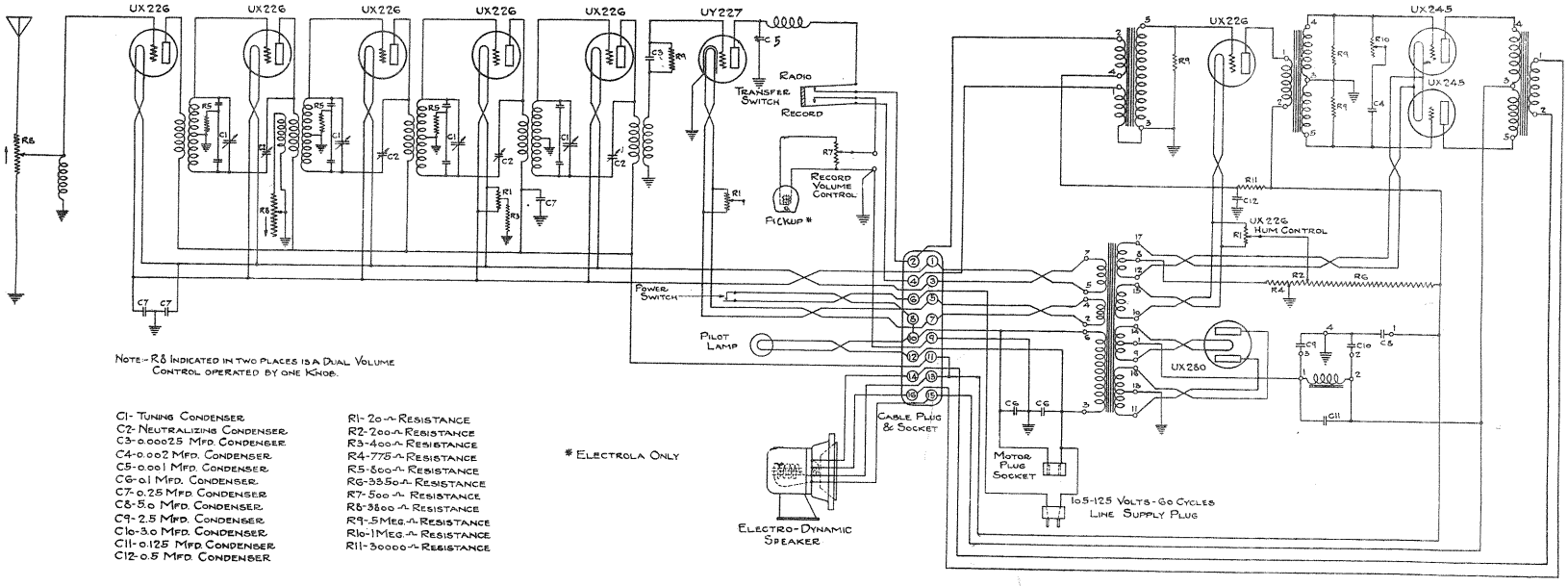


Fig. 10—Schematic Wiring Diagram Victor Radio and Victor Radio with Electrola
Model R-32, R-52, RE-45, RE-75

b. Faulty ground, characterized by weak reception, intermittent reception, grating noise, or oscillation. Examine the ground wire for poor contact at the ground binding post connection the the radio set, poor soldered connections, corroded connection at ground clamp.

c. Low power line voltage. Test power outlet with A. C. voltmeter. Voltage should be between 105 and 125 volts, for radio instruments and between 105 and 120 volts for instruments with Electrola.

d. Defective Radiotron in any of the various sockets.

e. Defect in radio set or power amplifier. See subjects 5, 6 and 8 below for method of isolating trouble.

Improper neutralization. This condition is characterized by a tendency of the set to oscillate. See subject 1 under Special Adjustments for method of neutralizing.

g. Improper alignment of tuning condensers. This adjustment requires special attention and IT IS RECOMMENDED THAT YOU CONSULT YOUR DISTRIBUTOR BEFORE MAKING ANY CHANGES IN THE CONDENSER ALIGNMENT.

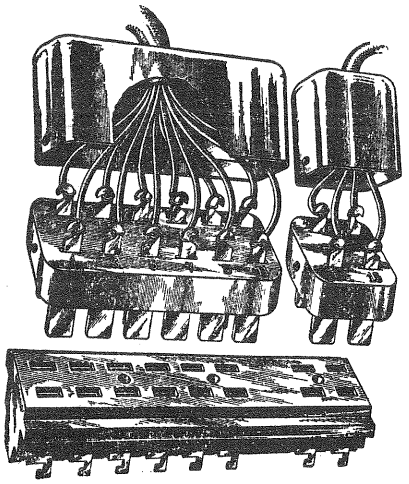


Fig. 8—Multi-Plug Terminals

1. Brown-white tracer—UX-226 Filament
2. Blue—Transfer Switch
3. Brown-white tracer—UX-226 Filament
4. White—Transfer Switch
5. Brown-blue tracer—UY-227 Filament
6. Black-red tracer—Power Switch
7. Brown-blue tracer—UY-227 Filament
8. Black-red tracer—Power Switch
9. Braided Copper Shield—Ground
10. Brown-red tracer—Pilot Lamp
11. Red-yellow tracer—B UX-226
12. Brown-red tracer—Pilot Lamp
13. Red-yellow tracer—Field
14. White—Voice Coil
15. Red-green tracer—Field
16. Black—Voice Coil

6. LACK OF REPRODUCTION—PRELIMINARY TESTS—After it has been definitely determined that the trouble is not due to a faulty tube, antenna or ground, place the instrument in operation with the transfer switch in the "record" position. Note that all tubes are lighted, and that all cables are connected. In the combination models, play a record in the usual manner with the volume control advanced to maximum. On the radio models without Electrola, connect two wires to the terminals of a dry cell or to the 1½ volt terminals of a "C" battery. Touch these wires across the two pin jack terminals marked "Phono," and note any click in the reproducer when this is done. If the record reproduction is correct, or if there is a noticeable click when the pickup pin jack terminals are tested in this manner, the trouble must lie in the radio set, and reference should be made to subject 7 below. If there is no record reproduction, reference should be made to subjects 8 and 9 below. It is recommended that a tube voltmeter, such as shown in Fig. 4 and a Weston or Jewell test box be used for isolating trouble in the radio set.

SOCKET NO.	READING NO SIGNAL	READING WITH SIGNAL
1	.45 Milliamperes	.45 Milliamperes
2	.45 Milliamperes	.50 Milliamperes
3	.45 Milliamperes	.65 Milliamperes
4	.45 Milliamperes	1.80 Milliamperes
5	.45 Milliamperes	4.50 Milliamperes

7. LACK OF REPRODUCTION—RADIO—After definitely determining that the trouble lies in the radio set, make the following tests with the tube voltmeter and test box:

a. Place the transfer switch in the "radio" position.

b. Remove the UY-227 detector tube, and insert the UY adapter in this socket.

c. Remove the tube in socket No. 1, Fig. 5, (coupling stage), place the UX adapter in this socket with the UY-227 in the socket of the adapter. Note the meter reading when all connections are made in accordance with Fig. 4 and no station is being received.

d. Place the UX adapter in socket No. 2, Fig. 5, (1st R. F.), and note a slight increased meter reading when a powerful local station is tuned in. Note: If such a broadcast signal is not available, a modulated oscillator, such as shown in Fig. 6, can be used.

e. Take readings in this same manner for sockets 3, 4, and 5. An additional increase, corresponding to an increase in signal strength, should be noted as readings are taken progressively, from one socket to another. In the first R. F. socket which does not show any further increase in meter reading from that of the preceding socket will be found the source of trouble. These readings are entirely arbitrary and are intended to indicate gain per stage only. They will vary with different stations and with different milliameters. The following is a typical set of readings obtained in this test.

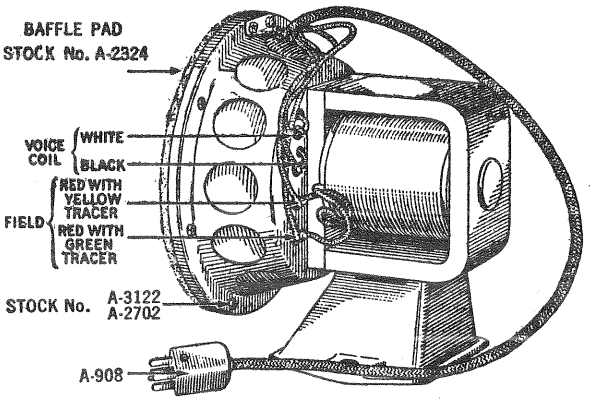


Fig. 12—Terminal Strip and Parts of Electro Dynamic Reproducer

f. After locating the particular stage in which the trouble exists, test with the Weston or Jewell test box to determine the exact location of the faulty part or connection. The "Radio Voltage Tests" table lists the approximate voltage readings which should be obtained in each of the sockets at 110 volts power input and the possible location of the fault if these readings are not obtained.

If the above tests do not locate the trouble the fault must then be caused by improper neutralization, defective volume control, or improper alignment or shorted plates of tuning condensers.

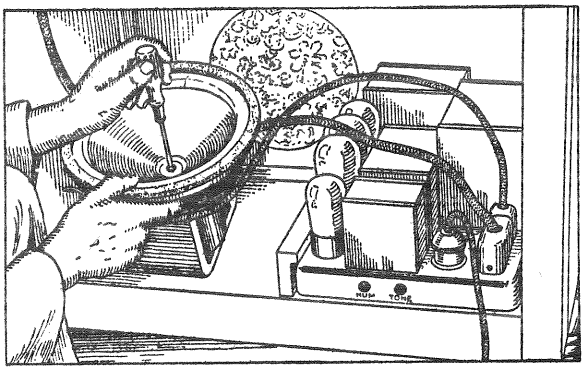


Fig. 13–Centering Cone in Electro Dynamic Reproducer

8. LACK OF REPRODUCTION—SPEAKER—If there is no reproduction on either radio or record, the trouble may be in the field or voice coil or in the cable leads of the speaker. Turn off the power switch, remove the speaker cable plug from the amplifier, test for voice coil continuity between terminals 14 and 16 (black and white), and for field continuity between terminals 13 and 15 (red with green tracer and red with yellow tracer).

POWER AMPLIFIER CONTINUITY TESTS
(Transfer switch in "Radio" position)

TEST BETWEEN TERMINALS	LACK OF VOLTAGE INDICATES
4 and 9	Open record primary of input transformer, 59, Fig. 2.
10 and 12	Open primary of power transformer, 62, Fig. 2.
14 and 16	Open secondary of output transformer, 58, Fig. 2.

9. LACK OF REPRODUCTION—POWER AMPLIFIER UNIT—If the speaker has been found correct, the trouble must then lie in the power amplifier unit, which should be tested in the following manner:

a. Make the power-amplifier socket voltage tests with the Weston or Jewell test box. The "Power-Amplifier Voltage Tests" table lists the approximate voltage readings which should be obtained in each of the sockets at 110 volts power input, and the possible location of the fault if these readings are not obtained.

b. If the trouble is not yet located, remove the screws in the metal cap over the terminal connections in the multi-plug, and make the Cable Terminal Voltage Tests with the plug in its socket of the amplifier, and the radio set in operation.

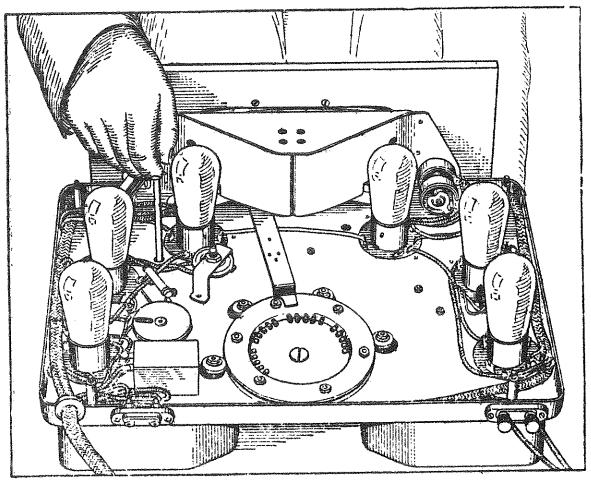


Fig. 14—Method of Neutralizing Victor Radio

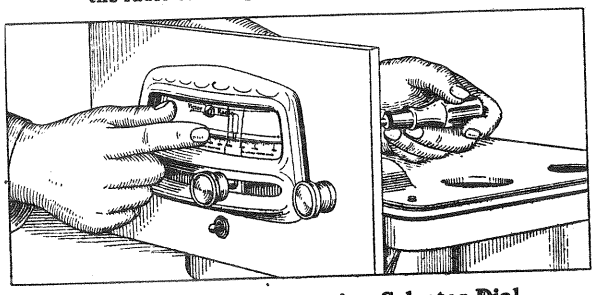
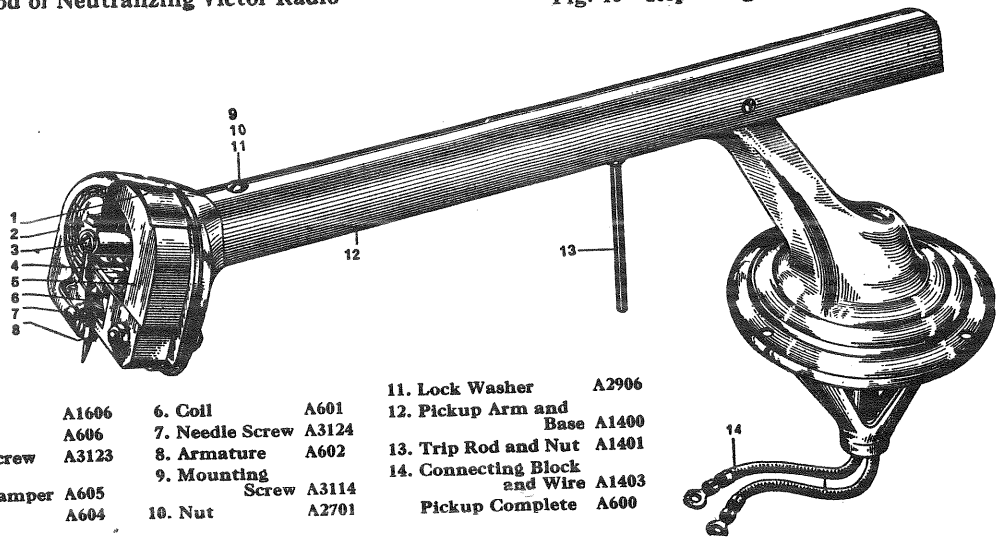


Fig. 15—Replacing Station Selector Dial



1. Spring	A1606	6. Coil	A601	11. Lock Washer	A2906
2. Cover	A606	7. Needle Screw	A3124	12. Pickup Arm and Base	A1400
3. Cover Screw	A3123	8. Armature	A602	13. Trip Rod and Nut	A1401
4. Rubber Damper	A605	9. Mounting Screw	A3114	14. Connecting Block and Wire	A1403
5. Magnet	A604	10. Nut	A2701	Pickup Complete	A600

Fig. 16—Electric Pickup, Pickup Arm, and Base

c. Connect a 4½ volt "C" battery in series with the voltmeter binding posts of the test box, and with the cable plugs disconnected from the amplifier, test between the following multi-plug socket terminals for continuity.

SPECIAL ADJUSTMENTS

1. NEUTRALIZING—Improper neutralization is characterized by oscillation and lack of sensitivity. First be sure that the instrument has a good ground connection, since a poor ground will also cause oscillation. If oscillation still persists, the set should be neutralized in the following manner, using a dummy tube, made by cutting off one of the filament prongs of a UX-226, and a neutralizing screw driver such as Stock No. A6000.

a. Remove the four hex nuts which hold the plate.

b. Tune in a powerful local station, preferably near the high frequency end of the scale. If such a signal is not available, a modulated oscillator, such as shown in Fig. 6, can be used to supply the signal. If the oscillator is used, it should be placed near the radio set and approximately three feet of wire used as an antenna on the set.

c. Remove the UX-226 from the first tuned R. F. stage (socket No. 2, Fig. 5), replace with the dummy UX-226, and adjust the corresponding neutralizing condenser to give minimum signal in the loudspeaker. The volume control may be set to obtain a signal loud enough for accurate neutralization, but not so loud as to cause the minimum to be blurred.

d. Replace the UX-226 in socket No. 2, and repeat the procedure for sockets 3, 4 and 5, adjusting the corresponding neutralizing condenser in each case. After completing the neutralization in this manner, turn back the neutralizing condenser for socket No. 5 approximately ½ turn counter-clockwise.

Note:—The first UX-226, antenna coupling stage, is not neutralized.

If the instrument continues to oscillate, it is probable that the condensers are out of alignment. This adjustment requires special attention, and it is recommended that you consult your distributor before making any changes in the setting.

2. CENTERING CONE IN ELECTRO DYNAMIC REPRODUCER—Improper centering of the fabric cone in the speaker is characterized by a noticeable rattle or buzz when the volume control is advanced. Such a rattle can sometimes be traced to faulty tubes in the detector or audio stages; this possibility should first be eliminated before attempting to center the cone. If the voice coil is improperly centered,

a. Remove the two large mounting screws in the base of the speaker and pull the unit away from the front of the cabinet.

b. Place the instrument in operation with the transfer switch in the "record" position.

c. Turn the UX-226 hum control all the way to the right or left to produce a loud 60 cycle hum.

d. Loosen the center screw as shown in Fig. 13, and then re-tighten the screw.

e. Ordinarily, the cone should now be properly centered, which condition can be determined by the sound of the 60 cycle vibration. When the cone is improperly centered, a 60 cycle mechanical buzz will be heard as contrasted with a 60 cycle musical note when the coil is free and properly centered. In some cases it may be necessary to press the outer edge slightly while tightening the center screw in order to obtain proper voice coil clearance.

f. Replace the speaker and re-adjust the UX-226 hum control.

3. REPLACING CLOTH CONE—Should it become necessary to replace the cloth cone because of an open voice coil or other defect, the following procedure should be used:

a. Unsolder the voice coil leads (black and white) from the terminals on the side of the frame.

b. Carefully pull the felt insulating material away from the frame flange.

c. Remove the eight screws which hold the retaining ring against the cone, and also remove the center screw and washer.

d. Remove the retaining ring, and lift the old cone from the unit.

e. Replace with the new cone and assemble in the reverse order from that given above, using Victor turntable cement to fasten the felt to the metal flange.

f. Center the cone as described in subject 2 above.

4. REPLACING AND RE-ADJUSTING SELECTOR SCALE—The following procedure should be used when replacing or shifting the selector scale.

a. Disconnect the cable and wires to the radio set, and remove the set from the cabinet.

b. Insert a screw driver through the holes in the back of the pilot lamp compartment as shown in Fig. 16, and loosen the clamps on the old scale.

c. Remove the old scale, and place the new one in position with the ends under the metal clamps.

d. Before tightening the clamps, tune in a station of known broadcast frequency, and slide the scale slightly to the right or left until the number corresponding to the known frequency of the station is in line with the center mark of the celluloid indicator.

e. Check this position on one or two other stations of known broadcast frequency.

f. Holding the scale in the proper position, re-tighten the screws as shown in Fig. 16.

5. ADJUSTING ELECTRIC PICKUP—Faulty record reproduction with noticeable blasting, particularly on the bass notes, may be caused by worn records, needles, or by improper centering of the pickup armature. If such a condition is traced to improper adjustment of the pickup, the armature should be centered in the following manner:

1. Remove the cover by taking out the needle screw and the cover screw, taking care that the magnet is not pulled away from the assembly.
2. Loosen both round head screws in the armature adjusting plate with a small screw driver.
3. Move the plate until the armature is properly centered between the pole pieces.
4. Hold the plate securely in its centered position, and re-tighten the screws.
5. When certain that the armature is properly centered, replace all parts of the pickup assembly.
6. While making adjustments to the pickup, the lubrication between the pickup arm and base should be checked. Victor Motor Grease should be placed on the bearing surface to insure free motion of the arm.

RADIO VOLTAGE TESTS

NOTE:—The following tests are to be made after determining that the trouble lies in the radio receiver and not the power amplifier unit as described in subject 6 above.

TEST	SOCKET NO.	NORMAL VOLTAGE	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament	1	1.40 Volts A. C.	Poor socket contact, broken connection, shorted condenser, 10, Fig. 1.
	2	1.40 Volts A. C.	
	3	1.40 Volts A. C.	
	4	1.45 Volts A. C.	
	5	2.1 Volts A. C.	
	6	1.50 Volts A. C.	
Plate	1	105 Volts D. C.	Poor socket contact; broken connection; open 20 ohm resistor, 43, Fig. 1; open grid bias resistor, 44, Fig. 1; shorted condenser, 10, Fig. 1; open primary R. F. transformer; shorted neut. condenser open R. F. choke, 22, Fig. 1; faulty transfer switch; shorted .001 mfd. condenser, 15, Fig. 1.
	2	105 Volts D. C.	
	3	105 Volts D. C.	
	4	105 Volts D. C.	
	5	40 Volts D. C.	
	6	105 Volts D. C.	
Grid	1	9 Volts D. C.	Poor socket contact; broken connection; open 20 ohm resistor, 43, Fig. 1, across filament UX-226; open grid bias resistor, 44, Fig. 1; shorted condenser, 10, Fig. 1; open secondary R. F. transformer; shorted neut. condenser; faulty volume control and R. F. choke, 42 and 46, Fig. 1.
	2	9 Volts D. C.	
	3	9 Volts D. C.	
	4	9 Volts D. C.	
	5	0 Volts D. C.	
	6	9 Volts D. C.	

POWER AMPLIFIER VOLTAGE TESTS

TEST	SOCKET	NORMAL VOLTAGE	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament	UX-226	1.40 Volts A. C.	Poor socket contact; broken connection; defective UX-226 (ampl.) filament winding of power transformer, 57, Fig. 2.
	UX-245	2.2 Volts A. C.	Poor socket contact; broken connection; defective UX-245 filament winding of power transformer, 57, Fig. 2.
	UX-280	4.6 Volts A. C.	Poor socket contact; broken connection; defective UX-280 filament winding in power transformer, 57, Fig. 2.
Plate	UX-226	100 Volts D. C.	Low emission UX-280; poor socket contact; broken connection, open primary, interstage transformer, 58; defective voltage divider resistor, 60; shorted condenser in condenser bank, 56; open filter choke, 55; open or poor connection in UX-226 hum control 68, Figs. 2 and 3.
	UX-245	230 Volts D. C.	Low emission UX-280; poor socket contact; broken connection; open primary, output transformer, 58; open filter choke, 55; shorted condenser in condenser bank, 56; defective voltage divider resistor, 60, Figs. 2 and 3.
Grid	UX-226	6 Volts D. C.	Low emission UX-280; poor socket contact; broken connection; open secondary, input transformer, 59; defective voltage divider resistor, 60; poor or open contact in UX-226 hum control, 68i shorted condenser in condenser bank, 56, Figs. 2 and 3.
	UX-245	40 Volts D. C.	Low emission UX-280; poor socket contact; broken connection; open secondary, interstage transformer, 58; defective voltage divider resistor, 60; shorted condenser in condenser bank, 56, Figs. 2 and 3.

CABLE TERMINAL VOLTAGE TESTS

TEST BETWEEN TERMINALS	NORMAL VOLTAGE	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
1 and 3	1.70 Volts A. C.	Broken connection; defective UX-226 (radio) secondary winding of power power transformer, 57, Fig. 3.
5 and 7	2.35 Volts A. C.	Broken connection; defective UY-227 secondary winding of power transformer, 57, Fig. 3.
2 and 9	39 Volts D. C.	Defective UX-280; broken connection; open radio primary, input transformer, 59, open filter choke; 61, defective voltage divider resistor, 60, shorted condenser, 56, Figs. 2 and 3.
9 and 11	105 Volts D. C.	Defective UX-280; broken connection; defective voltage divider resistor; open choke 61; shorted condenser, 56, Figs. 2 and 3.
13 and 15	185 Volts D. C.	Low emission UX-280; poor socket contact broken connection; open choke, 61, defective voltage divider, 60; shorted condenser in condenser bank, 56, Figs. 1 and 2.

VICTOR MICRO-SYNCHRONOUS RADIO
R-35, R-39, RE-57

The new Victor Micro-Synchronous Radio is a screen grid five circuit tuned radio frequency receiver of the antenna type. It employs three stages of tuned radio frequency amplification and a power detector, all of which are screen grid Radiotrons UY-224. A UY-227 Radiotron is used as a first stage audio amplifier, resistance coupled; two UX-245's are used in the push-pull power amplifier stage, and a UX-280 as rectifier.

Through the use of the screen grid Radiotrons, which produce an extremely high degree of amplification, and the five circuits, tuned with the micro-synchronous principle, extremely high sensitivity and selectivity are obtained without sacrifice of tone quality.

Both the radio and the combination instruments contain two standard interchangeable units. The radio chassis contains the r. f. amplifiers, the power detector, and the first audio amplifier. The amplifier-speaker unit contains the push-pull stage of audio amplification, the rectifier-power supply, and the new Victor electro-dynamic speaker.

The Victor Micro-Synchronous Radio is designed for operation on 105 to 125 volts, 50 to 60 cycles, alternating current. Special instruments are also available for 25 to 30 cycle operation.

Models R-35 and R-39 consume a maximum power of 120 watts, and the RE-57 a maximum of 170 watts when operating the Electrola.

RADIO CHASSIS PARTS

Radio Chassis Complete

Name of Part

1. Cam wheel cover plate
2. Cam wheel cover plate screw
3. Filter coil and condenser shield
4. Filter coil shield eyelet screw
   Filter coil shield eyelet screw rivet*
5. Filter coil shield nut
   Filter coil shield lockwasher*
6. Condenser shield (4 used)
7. Escutcheon panel (less dial)*
   Escutcheon panel bracket (R.H.)*
   Escutcheon panel bracket (L.H.)*
   Escutcheon panel bracket rivet*
8. Pilot lamp shield
9. Condenser shield (1 used)
10. 1st R.F. Coil
11. Coil shield base rivet
12. Coil shield base (4 used)
13. Antenna coupling coil
14. Twin binding post (ant. & grd.)
15. Coil mounting screw
    Coil mounting lockwasher*
    Coil mounting nut*
16. Cam roller shaft
    Cam roller shaft "C" washer*
17. Cam wheel (complete)
    Cam wheel indicator bracket rivet*
    Cam wheel and clamp indicator*
18. Cam wheel adjusting screw
19. Cam wheel plate
20. Cam wheel plate screw
21. Pilot lamp socket
    Pilot lamp*
22. Link coil
23. UY-224 tube socket (4 used)
24. UY-224 tube socket clip rivet
25. UY-224 grid connector
26. Filter coil and condensers
    Filter coil condenser (2 used)*
    Filter coil mounting screw*
    Filter coil mounting nut*
    Filter coil mounting lockwasher*
27. 5 contact terminal strip
28. 5 contact terminal strip rivet
    5 contact terminal strip link*
    (2 used on straight radio models)
    5 contact terminal strip screw*
29. 3rd R.F. Coil
30. Tube shield base (4 used)
31. Tube socket clip (4 used)
32. Tube shield body (4 used)
33. Coil shield body (4 used)
34. Tube shield cap (4 used)
35. Coil shield cap (4 used)
36. Escutcheon panel screw
    Escutcheon panel nut*
    Escutcheon panel lockwasher*

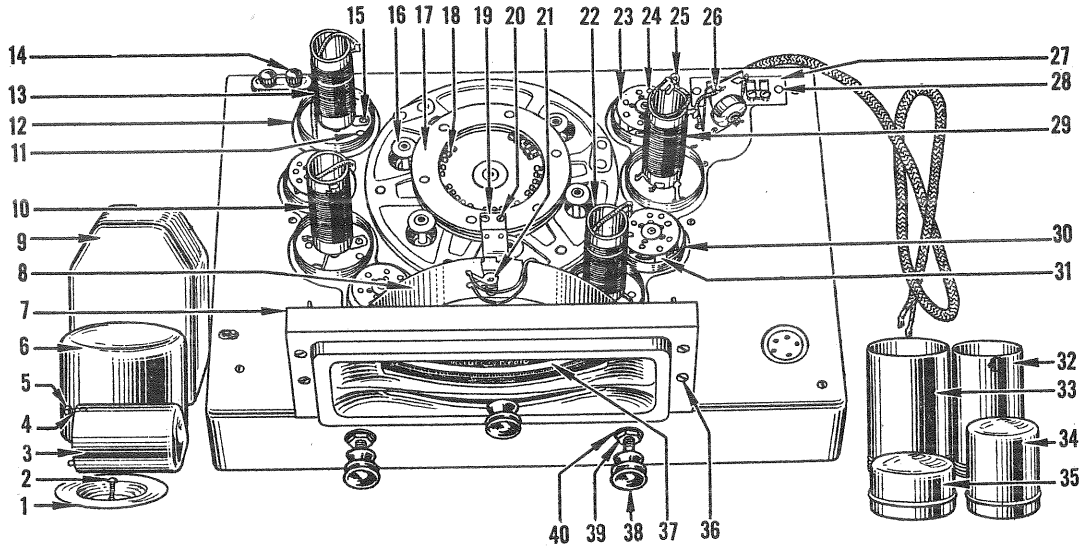


Fig. 1—Top View of Radio Chassis, showing parts.

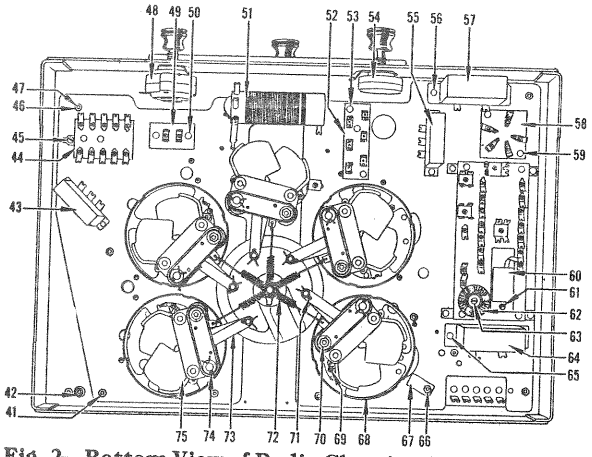


Fig. 2—Bottom View of Radio Chassis, showing parts.

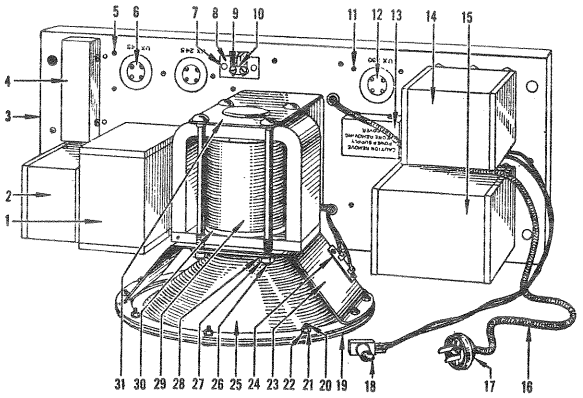


Fig. 3—Top View of Amplifier-Speaker Unit, showing parts.

RADIO CHASSIS PARTS—Continued

Name of Part

37. Dial scale
    Dial clamp*
    Dial clamp wood screw*
    Dial clamp washer*
38. Wood knob (all except receiver tuning)
    Wood knob (receiver tuning)*
39. Tone and volume control nut
40. Tone and volume control washer
    Tone and volume control locking plate*
    Tone control washer*
41. Twin binding post lockwasher
42. Twin binding post nut
43. By-pass condenser, three units of .1 mfd. each with common ground
    By-pass condenser rivet*
44. Stabilizing inductor (complete)
    Resistor (9000 ohms) (brown & blue)*
    Resistor (130 ohms) (blue & gray)*
45. Stabilizing inductor mounting screw
    Stabilizing inductor mounting lockwasher*
    Stabilizing inductor mounting nut*
46. Mounting plate nut
47. Mounting plate screw
    Mounting plate lockwasher*
48. Volume control (complete less knob)
49. 2 contact terminal strip
50. 2 contact terminal strip rivet
51. 2nd R.F. Coil
    10 mmf. Condenser
52. 6 contact terminal strip
53. 6 contact terminal strip rivet
54. Tone control (complete less knob)
55. By-pass condenser (3 units of .1 mfd. each with common ground)
    By-pass condenser rivet*
56. By-pass condenser rivet
57. 1.0 and .1 mfd. by-pass condenser
58. 1st A.F. tube socket (complete)
59. 1st A.F. tube socket rivet
60. .01 mfd. resistor board condenser
61. .01 mfd. resistor board condenser rivet
62. Resistor board coil
63. Resistor board coil rivet
    Resistor board condenser "AC" 100 MMF*
    Resistor board condenser "AD" 1200 MMF*
    Resistor board rivet*
    1½ Meg resistor (red & white)* under res. bd.
    1 Meg resistor (green & white)* under res. bd.
    ½ Meg resistor (blue & green)* under res. bd.
    2800 ohm resistor (blue & white)* under res. bd.
    28000 ohm resistor (buff & brown)* under res. bd.
64. .25 and .75 mfd. by-pass condenser
65. .25 and .75 mfd. by-pass condenser rivet
66. Cable clamp nut
    Cable clamp screw*
    Cable clamp lockwasher*
67. Cable clamp
68. Condenser shield base
69. Condenser shield base rivet
70. Cam roller shaft nut
    Cam roller shaft washer*
    Cam roller shaft lockwasher*

RADIO CHASSIS PARTS—Continued

Name of Part

71. Cotter pin
    Washer (between condenser links)*
    Washer (on top of condenser links)*
    Condenser spacer washer*
72. Condenser spring (spiral)
73. Condenser link (one piece) Bakelite
    Condenser link rivet*
    Condenser link bushing*
74. Condenser washer
    Condenser cotter pin
75. Tuning condenser (one complete)

AMPLIFIER-SPEAKER PARTS

Name of Part

Victor Amplifier with Speaker (60 cycle)
Victor Amplifier with Speaker (25 cycle)
Victor Electro Dynamic Speaker (only)

1. Condenser Bank
   Extra condenser for 25 cycle only*
2. Interstage & Output Transformer
3. Amplifier Base
4. Terminal strip cover
5. UX-245 Tube socket rivet
6. UX-245 tube socket (2 sockets complete)
7. Two contact terminal strip rivet
8. Two contact terminal strip (complete)
9. Terminal strip screw (2 used)
10. Terminal strip link
11. UX-280 tube socket rivet
12. UX-280 tube socket (complete with terminal board)
13. Fuse Cover
    Fuse Cover insulation*
    Fuse cover bushing*
    1½ amp. fuse*
14. Reactor
15. Power transformer (60 cycle, 120 volt)
    Power transformer (25 cycle, 120 volt)
16. Amplifier power cord (with male connector)
17. Power cord male connector
18. Toggle switch (complete with nuts)
19. Speaker cone retaining ring
20. Speaker cone retaining ring screw
21. Speaker cone retaining ring nut
22. Speaker cone retaining ring lock washer
23. Speaker cone housing
24. Cone housing terminal strip
25. Speaker cone
26. Speaker bolt
27. Speaker nut
28. Speaker lock washer
29. Speaker field coil
30. Speaker felt spacing ring
31. Speaker base
32. Resistor 730 ohms (UX-245 grid bias)
33. Resistor rivet
    Resistor wood spacer*
34. Resistor (UX-245 filament center tap) 55 ohms
35. Eight contact terminal strip
36. Eight contact terminal strip rivet
37. Resistor (8000 ohms) (gray & brown)
38. Wood End

*Not illustrated

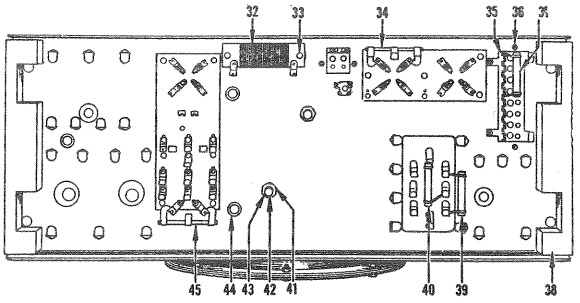


Fig. 4—Bottom View of Amplifier-Speaker Unit, showing parts.

AMPLIFIER-SPEAKER PARTS—Continued

	Name of Part
	Wood end wood screw*
39.	Resistor (8000 ohms) (gray & brown)
40.	Resistor (70,000 ohms) (red & green)
41.	Speaker mounting nut
42.	Speaker mounting screw
43.	Speaker mounting lock washer
44.	Insulation bushing
45.	Resistor (UY-224 filament center tap) 55 ohms
	Speaker cone center screw*
	Speaker cone center washer*
	Amplifier mounting screw*
	Amplifier mounting nut*
	Amplifier mounting lock washer*
	Amplifier mounting plate*

*Not Illustrated

INSTALLATION

1. ANTENNA AND GROUND—A good antenna and ground installation is most essential to the correct performance of the instrument. The antenna should be from 30 to 100 feet long, depending upon the proximity to nearby powerful stations. It should be as high above ground or the roof as possible, and should be held at both ends with good quality glass or porcelain insulators. The ground wire should be connected to a well scraped section of a water pipe. If such a connection is not available, a hot water or steam radiator pipe will be satisfactory.

A good ground connection is essential and must be used at all times.

If the instrument is being connected to an antenna and ground installation which was used with a previous set, make a careful inspection of all lead-in and ground wires and connections to see that they are properly insulated and free from broken or corroded joints. Check the lightning arrestor, making sure that it is not grounding the antenna. This can best be accomplished by using a "C" battery in series with a low range voltmeter (see Fig. 11). With the antenna and lead-in wires disconnected from the arrestor, there should be no continuity between the antenna and ground terminals of the lightning arrestor.

2. POWER LINE VOLTAGE—The power line voltage should be measured with an A.C. voltmeter at the time of installation. If the voltage is consistently below 115 volts, turn off the power, pull out the power plug, remove the metal cover over the fuse in the amplifier unit (see 13, Fig. 3), and change the fuse position to the 110 volt side. If the voltage is 115 volts or above, the fuse should be left in the 120 volt position. If the voltage is above 125 volts, a good grade self adjusting voltage regulator, such as the Amperite 9-V-10, or a tapped resistor such as stock No. A310, should be connected in one side of the power line. If the voltage fluctuates badly, it is essential that the self adjusting voltage regulator be employed.

3. LOCATION IN ROOM—When installing the instrument, it should be so located in the room that it will face the length of the room rather than the width. The back of the cabinet should be at least four inches away from the wall. Best acoustic results will be obtained if these suggestions are followed.

GENERAL TESTS

1. EXCESSIVE HUM—This condition can be caused by—

a. Faulty UY-224 in detector socket. (See Fig. 5 for location of various sockets.) At least one UY-224 out of the four will usually be found which will produce a minimum hum in the detector socket.
b. Faulty UX-280 or UY-227.
c. Unbalance in plate currents of two UX-245 Radiotrons. Try a new UX-245 first in one socket and then the other.
d. Wire or terminal grounded to chassis, or open circuit in any of the various ground connections to chassis.
e. Open or shorted center tap resistor in amplifier unit. (Shown at 34 and 45, Fig. 4.)
f. Short or partial short in one of the resistors, mounted on the under side of the resistor board. (See Fig. 18 for proper resistance values.)
g. Shorted or open condenser in condenser bank or faulty connection to condenser bank 1, Fig. 3 and Fig. 15.
h. Defective UX-280 socket—one plate not making contact.
i. Faulty connection to tapped section of filter reactor, 14, Fig. 3.

2. HOWL—Microphonic howl may be caused by—

a. Defective Radiotron, particularly in the detector or first audio sockets.
b. Speaker not properly felt insulated from baffle on front of cabinet. Raise the amplifier—speaker unit to obtain access to the felt and readjust the felt properly, making sure that the rim of the speaker is tight against the felt.

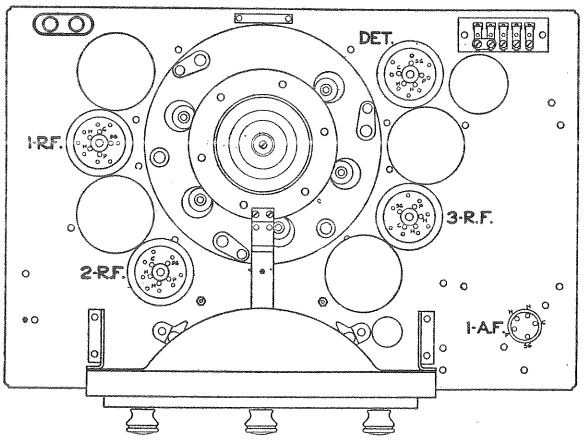


Fig. 5—Location of Radiotron Sockets in Radio Chassis.

c. Loose metal parts such as shields, screws, etc., or an improperly centered cone may set up a howl or mechanical rattle, depending upon the nature of the fault. See subject 2 under Special Adjustments for the proper method of centering cone.
d. On home recording, an open in either of the resistors of the microphone reactor, Fig. 19, may cause a howl.

3. DISTORTION—Distortion may be caused by—

a. Tone control knob turned too far to the left.
b. Radio volume control advanced too far to the right on local stations, causing overloading of the detector. The customer should be thoroughly instructed on this point, as well as on the importance of tuning exactly to the station.
c. Faulty Radiotron, particularly in the audio amplifier sockets. For best quality reproduction, the plate currents of the two UX-245's should balance within 5 milliamperes. This test can be made with a Weston Test Box or similar radio set analyzer.
d. Cone in speaker unit improperly centered. See subject 2 under SPECIAL ADJUSTMENTS, page 31.

4. EXCESSIVE NOISE—Excessive Noise may be caused by some external source, or it may be within the set. If the noise stops or is reduced when the antenna is disconnected, it will be known that the source is external, being caused by defective electrical or power equipment of some kind. If there is no apparent change when the antenna is disconnected, the cause may be:

a. Intermittent short or high resistance contact in any of the soldered joints or in the power switch connections.
b. Loose or defective pilot lamp or pilot lamp socket.
c. Shorted plates in one or more of the tuning condensers. This will be most noticeable when the tuning lever is operated, and should be corrected by replacing the faulty condenser.
d. Faulty power or audio transformer.
e. Intermittent short on filter or by-pass condensers.

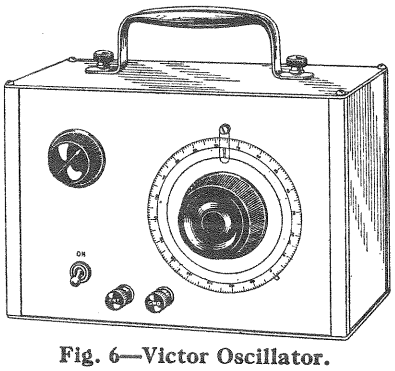


Fig. 6—Victor Oscillator.

5. OSCILLATION—Oscillation in the radio set, characterized by a generally unstable condition while tuning, may be caused by—

a. Ungrounded or poorly grounded chassis. A good ground connection as described on page 8 is essential even for local reception.
b. Removal of shielding from any of the condensers, coils or tubes.
c. Too much unshielded exposure of green lead between control grid of UY-224 and coil. The unshielded portion of this wire should be as short as possible.
d. Open circuit in any of the .1 Mfd. by-pass condensers 43 and 55 Fig. 2, or poor ground (loose rivet) in any of these condensers.
e. Ungrounded shield on shielded lead of radio chassis.

6. WEAK RECEPTION—This condition may be traced to—

a. Faulty antenna characterized by weak reception, intermittent reception, or a grating noise. Examine the antenna for poor connections, poor contacts, grounded lightning arrestor or antenna contact with surrounding objects.
b. Faulty ground connection, characterized by weak reception, intermittent reception, grating noise, or oscillation. Examine the ground wire for poor contact at the ground binding post connection, poor soldered connections, corroded connections at ground clamp.
c. Low power line voltage. Test the line voltage at the power outlet by means of an A.C. voltmeter of the proper range. The voltage should be within the range of 105 to 125 volts with the instrument in operation. The position of the fuse is important in this respect. For 105 to 115 volts, the fuse should be placed in the 110 volt position) between 115 and 125 volts, in the 120 volt position.
d. Low emission Radiotron in any of the various sockets.

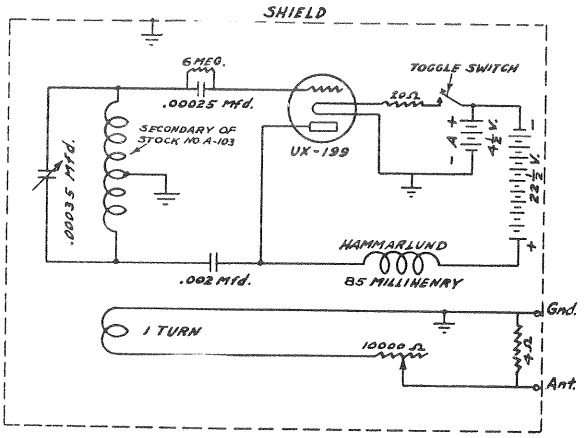


Fig. 7—Wiring Diagram of Victor Oscillator.

e. Defect in radio chassis or in amplifier-speaker unit. See subjects 7 and 8 below for method of isolating trouble.
f. Improper alignment of tuning condensers. This adjustment requires special attention and equipment. See subject 1, page 29, under SPECIAL ADJUSTMENTS for the proper method of re-aligning.

7. FAILURE IN RADIO OPERATION—PRELIMINARY TESTS—The most probable causes for failure in operation are—

a. No power from power supply line. See that the power plug is plugged into the wall socket, and that it is making proper contact. See that the instrument power switch is making proper contact.
b. Open fuse in amplifier-speaker unit. Pull out wall plug, turn off switch, remove fuse cover, and examine fuse: if necessary make a continuity test with a D. C. voltmeter and a 4½ volt "C" battery in series as shown in Fig. 11.

IMPORTANT:—The insertion by mistake of a UX-245 in the UX-280 socket, or of the UX-280 in a UX-245 socket will cause the fuse to burn out.

c. Faulty antenna or lead-in connection. See the discussion of this subject under INSTALLATION, page 8.
d. Defective Radiotron. Examine all Radiotrons, noting that they light properly. If visual examination does not reveal the faulty Radiotron, replace each one successively with a new tube of the proper type until operation is restored.
e. Poor contact in Radiotron socket or in grid cap connections. Move each Radiotron in and out of its socket in order to locate any loose socket contacts. In some cases it may be necessary to remove the Radiotrons and clean the contact pins. See that the control grid clip attached to a green wire is making proper contact to the cap on top of each UY-224 Radiotron. Also see that the wire is properly connected from the clip to the associated coil.

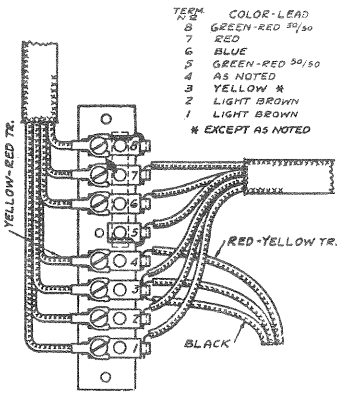


Fig. 8—Top View of Amplifier Terminal Strip.

CAUTION:—When replacing coil or tube shield caps, always be sure that the slots are aligned with the green wire before the cap is forced into position. To avoid damage to the wire or coil, never turn the cap once it is in place.

Before attempting to locate the trouble in the chassis or the amplifier, make sure that the difficulty is not traceable to any of the points listed above.

8. LOCATING TROUBLE—Trouble in the radio chassis or the amplifier-speaker unit can be isolated in the following manner:—

a. ***Terminal Strip Tests.*** **Test the voltages at the terminal strip, Fig. 8, with all tubes in place and compare the readings with those listed in chart No. 1 on page 15. This will tell in a general way if the proper voltages are being delivered to the chassis from the amplifier.**

Touch a wire across terminals 4 and 6 of the amplifier terminal strip as shown in Fig. 8. If there is a noticeable click in the speaker as this is done, it will be known that the audio amplifier and speaker system is functioning properly.

If the terminal voltages obtained are not in accordance with those listed in chart No. 1, disconnect all terminals from the terminal strip and make the terminal strip voltage tests in accordance with chart No. 2. If the voltages obtained are in approximate agreement with those listed in chart No. 2 and the click test described in the previous paragraph indicates that the amplifier and speaker are operating correctly, it will be known that the trouble lies within the radio chassis. If the voltages do not agree with chart No. 2, the trouble must then be in the amplifier unit.

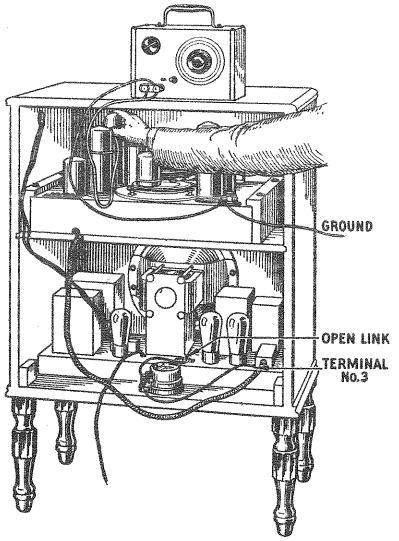


Fig. 9—Using Exploring Coil for Circuit Tests.

b. ***Radio Chassis Tests with Test Box.*** **If the fault is in the radio chassis, replace the terminal strip connections and check the voltages in the various sockets by means of a test box such as the Weston 547 or equivalent. Average voltage readings and possible causes of improper readings are listed in chart No. 3 page 16.**

c. ***Radio Chassis Tests with Exploring Coil and Oscillator.*** **If an oscillator such as shown in Fig. 6 and a 0-4 volt A. C. voltmeter (in Weston 547) are available, a quick and simple test can be made to locate any defect in the R. F. circuit between the detector and the antenna binding post. An exploring coil is used, consisting of several turns of No. 18 insultated solid copper wire fitted into a UY-227 tube shield, stock No. A2319. The shield is equipped with a set of antenna and ground binding posts as shown in wiring diagram, Fig. 10. One end of the coil is connected to the "ANT." post and the other end is left disconnected. The "GND." post is grounded to the shield. The meter is connected to terminal 3 of the amplifier terminal strip, Fig. 8, and to the link terminal on the amplifier base, nearer the UX-245 Radiotron. The link is left disconnected.**

With the power turned on, if the shield cap is removed from any of the R. F. tubes and the exploring coil brought over the tube and the set then tuned to the frequency of the oscillator, the oscillator signal will be induced into the grid of that tube and will be indicated on the voltmeter, providing all tubes and circuits, including and beyond the particular stage under test, are functioning properly.

(1) Set the oscillator and radio volume controls at maximum, remove the shield cap from the third R. F. tube (see Fig. 9) and place the exploring coil over this tube. If a readable signal is indicated on the A.C. voltmeter, it will be known that the third R. F. and the detector tubes are O. K., that the grid circuits of the two are correct, and the plate circuit of the third R. F. is correct. If no readable signal is obtained, however, it will be known that a defect such as an open or short circuit or a faulty tube exists at some point in the circuits or tubes just mentioned. Such defects can be isolated by replacing the tubes in question and then by making the voltage tests as described in b. above.

(2) If the third R. F. tests O.K., replace the shield cover over this tube and then make a similar test on the second R. F. An increased meter reading will be obtained, as indicated in the tabulation below, if this circuit is O.K. If no meter reading is obtained, however, it will be known that the second R. F. tube, the plate or grid circuit of this tube, or the link circuit is not functioning correctly. Again the defect can be isolated by replacing the tube in question and by testing the voltages in the tube sockets.

0-4 SCALE

Det.	0.0
3rd R. F.	1.1
2nd R. F.	2.0
1st R. F.	2.6
Ant. Binding Post	2.6

(3) A lack of reading when the exploring coil is placed over the first r. f. tube will indicate a poor r. f. tube or faulty connection either in the secondary of the antenna coupling coil, or in the plate circuit of the first r. f. tube. To test the circuit between the antenna binding post and the primary of the antenna coupling coil, it will be necessary to disconnect the oscillator leads from the exploring coil, and connect them direct to the antenna and ground binding posts.

(4) After a number of such readings have been taken on good sets, a knowledge of the approximate gain per stage with the particular oscillator being employed will be obtained. A lower gain in any particular stage than that which should be expected will indicate a low emission tube or improper alignment of the tuning condensers, which latter adjustment is described in Subject 1 under SPECIAL ADJUSTMENTS, page 29.

d. ***Amplifier Speaker Test.*** **If it is found in "a" above that the source of trouble is in the amplifier unit, make the socket voltage tests of the UX-245 and UX-280 sockets by means of the test box. The average voltages and possible causes of trouble for incorrect voltages are listed in chart No. 4.**

If the socket voltages are correct, shut off the power switch, disconnect amplifier-speaker unit, remove it from the cabinet and make the continuity tests with a D.C. voltmeter and a 4½ volt "C" battery in accordance with chart No. 5. A more accurate test can be made with the Weston No. 547 test box by changing the voltmeter readings to ohms resistance in accordance with the conversion chart accompanying the test box.

Explanation of Charts:—All tests made with Weston No. 547 Radio Set Tester. Power line voltage 110 volts, 60 cycle, A.C. volume control at maximum in all cases.

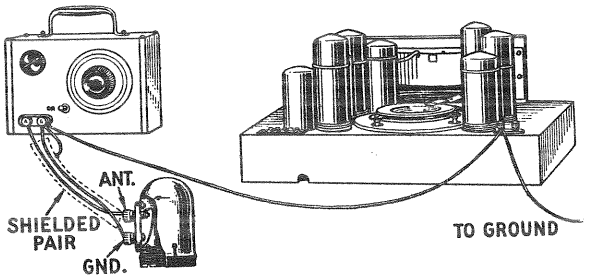


Fig. 10—Wiring for Exploring Coil Tests.

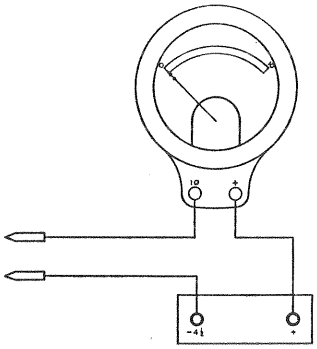


Fig. 11—Wiring Diagram Simple Continuity Test Circuit.

CHART No. 1

Amplifier Terminal Strip

(CAUTION—High Voltage)

TEST ACROSS AMPLIFIER TERMINALS	VOLTAGE SUPPLY	NORMAL VOLTAGE
1 and 2	UY-224 and UY-227 Filament	2.4 Volts A.C.
3 and 7	UY-224 Plate	170 Volts D.C.
3 and 6	UY-227 Plate	65 Volts D.C.
3 and 8	Screen Grid	89 Volts D. C.

CHART No. 2

Amplifier Terminal Strip with Radio Chassis Disconnected

(CAUTION—High Voltage)

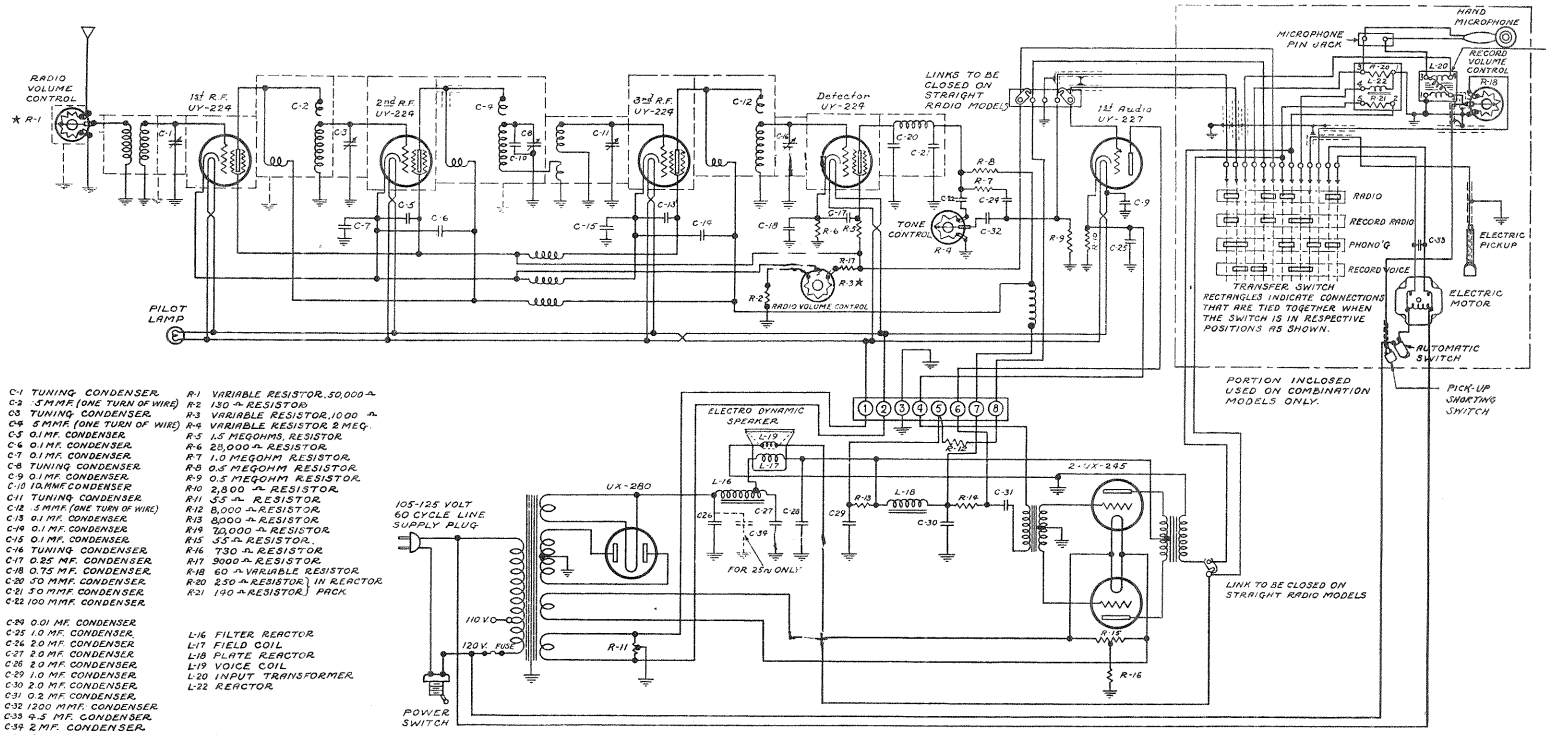
TEST ACROSS AMPLIFIER TERMINALS	VOLTAGE SUPPLY	NORMAL VOLTAGE
1 and 2	UY-224 and UY-227 Filament	2.6 Volts A.C.
3 and 7	UY-224 Plate	300 Volts D.C.
3 and 6	UY-227 Plate	275 Volts D.C.
3 and 8	Screen Grid	295 Volts D.C.

CHART No. 3

Radio Chassis Tube Socket Tests

TEST	SOCKET NUMBER	TUBE	NORMAL VOLTAGE	NORMAL CURRENT	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament "A"	1 2 3 4 5	UY-224—1st R. F. UY-224—2nd R. F. UY-224—3rd R. F. UY-224—Detector UY-227—1st Audio	2.1 2.1 2.1 2.0 2.1		Open or shorted wire or contact in filament supply.
Plate "B"	1 2 3 4 5	Same as above	173 173 173 50* 67	3.1 3.1 3.1 .3 1.5	Open or grounded wire or contact in plate supply. Open plate coil 44, Fig. 2) short in any of the by-pass condensers 43, 55, 57, 60, 64, Fig. 2. Open or shorted resistor board (see Fig. 18). Open in plate winding of any of the R. F. coils. Short between plate and grid section of R. F. coils. On detector, open or shorted plate filter 26, Fig. 1) open choke 62, Fig. 2) open .5 meg. resistor, Fig. 18.
Control Grid "C"	1 2 3 4 5	Same as above	3.1 3.1 3.1 1.5 .2		Open or shorted wire or contact in grid voltage supply. Open or ungrounded R. F. coil, Fig. 1. Open or shorted resistor on resistor board (see Fig. 18). Open in control grid section of volume control. Any defect listed above which would cause an abnormal plate voltage would also cause an abnormal grid voltage. On UY-227 an open link in radio terminal strip (radio only) or open in wiring or poor contact in control switch (combination).
Screen Grid	1 2 3 4	Same as above	89 89 89 3.4		Open or shorted wire or contact in screen grid voltage supply. Open link in radio terminal strip (radio only) or open in wiring or poor contact in control switch (combination). Open in coil 44, Fig. 2. Any defect listed above which affects plate and control grid voltages will also affect the screen grid voltages.

*250 V Scale



C-1 TUNING CONDENSER
C-2 .5 MMF. (ONE TURN OF WIRE)
C-3 TUNING CONDENSER
C-4 .5 MMF. (ONE TURN OF WIRE)
C-5 0.1 MF. CONDENSER
C-6 0.1 MF. CONDENSER
C-7 0.1 MF. CONDENSER
C-8 TUNING CONDENSER
C-9 0.1 MF. CONDENSER
C-10 10 MMF. CONDENSER
C-11 TUNING CONDENSER
C-12 .5 MMF. (ONE TURN OF WIRE)
C-13 0.1 MF. CONDENSER
C-14 0.1 MF. CONDENSER
C-15 0.1 MF. CONDENSER
C-16 TUNING CONDENSER
C-17 0.25 MF. CONDENSER
C-18 0.75 MF. CONDENSER
C-20 50 MMF. CONDENSER
C-21 50 MMF. CONDENSER
C-22 100 MMF. CONDENSER

C-24 2.0 MF. CONDENSER
C-27 2.0 MF. CONDENSER
C-28 2.0 MF. CONDENSER
C-29 1.0 MF. CONDENSER
C-30 2.0 MF. CONDENSER
C-31 0.2 MF. CONDENSER
C-32 1200 MMF. CONDENSER
C-33 4-5 MF. CONDENSER
C-34 2 MF. CONDENSER

R-1 VARIABLE RESISTOR, 50,000 Ω
R-2 130 Ω RESISTOR
R-3 VARIABLE RESISTOR, 1000 Ω
R-4 VARIABLE RESISTOR 2 MEG.
R-5 1.5 MEGOHMS, RESISTOR
R-6 28,000 Ω RESISTOR
R-7 1.0 MEGOHM RESISTOR
R-8 0.5 MEGOHM RESISTOR
R-9 0.5 MEGOHM RESISTOR
R-10 2,800 Ω RESISTOR
R-11 35 Ω RESISTOR
R-12 8,000 Ω RESISTOR
R-13 8,000 Ω RESISTOR
R-14 70,000 Ω RESISTOR
R-15 35 Ω RESISTOR
R-16 730 Ω RESISTOR
R-17 9000 Ω RESISTOR
R-18 60 Ω VARIABLE RESISTOR
R-20 230 Ω RESISTOR } IN REACTOR
R-21 190 Ω RESISTOR } PACK

L-16 FILTER REACTOR
L-17 FIELD COIL
L-18 PLATE REACTOR
L-19 VOICE COIL
L-20 INPUT TRANSFORMER
L-22 REACTOR

★ R-1 AND R-3 ARE DUAL TYPE, BOTH OPERATED BY THE SAME KNOB

NOTE—Broken lines along wires indicate grounded shielding.

Fig. 12—Schematic Wiring Diagram Victor Mico-Synchronous Radio, Models R-35, R-39, and RE-57.

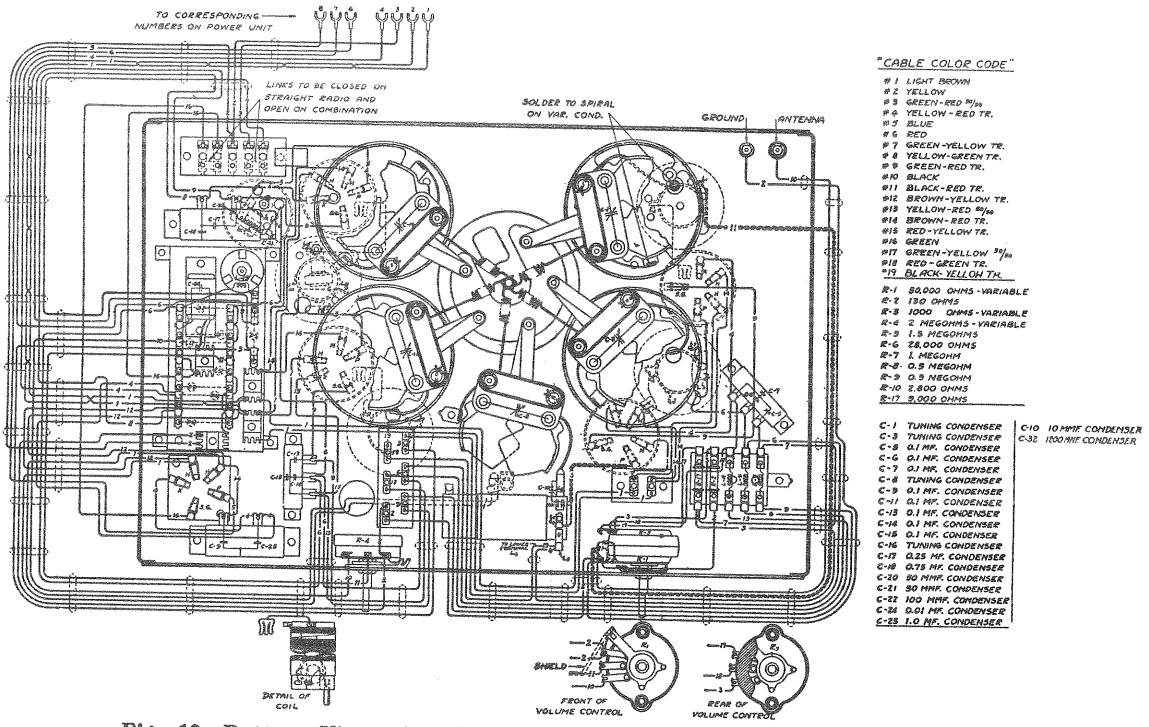
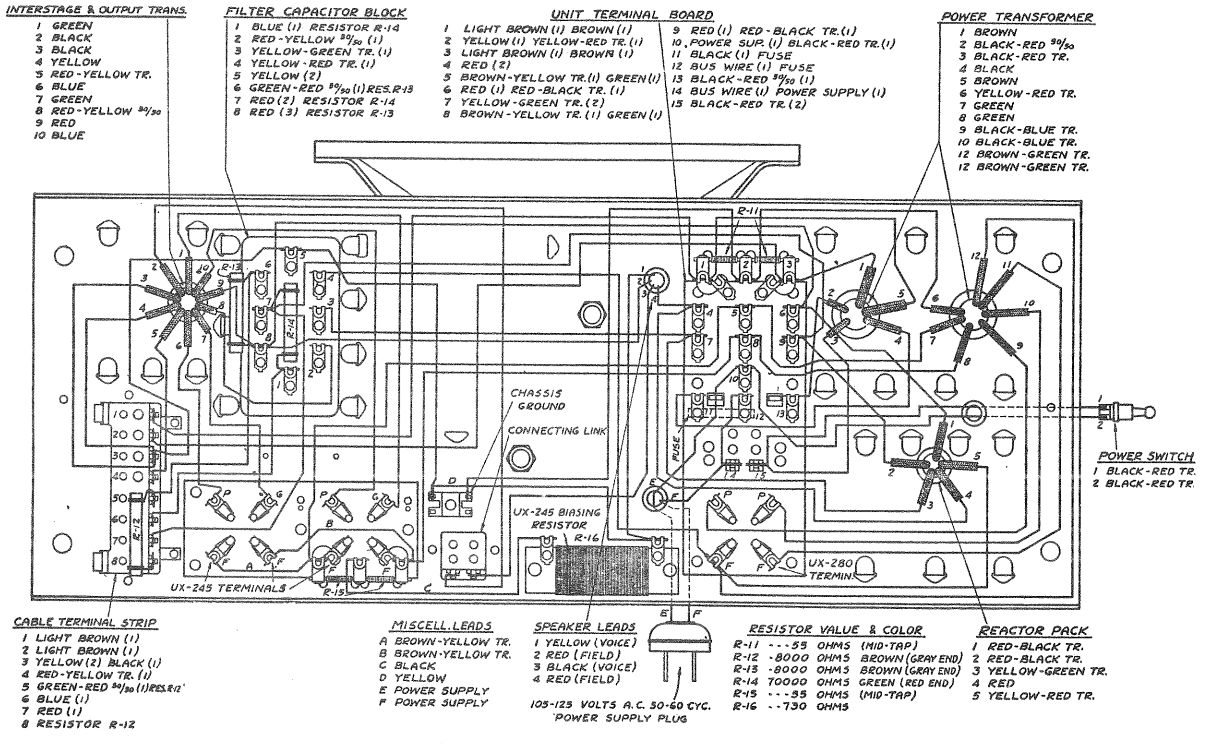


Fig. 13—Bottom View of Radio Chassis, Showing Wiring Between Terminals.

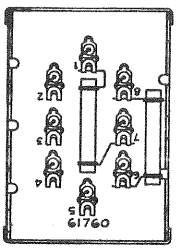


NOTE:—Filter Condenser Bank and Cable Terminal Strip are the only parts having numbers. All other numbers are given for reference only.

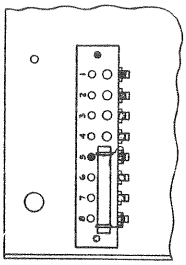
Fig. 14—Bottom View of Amplifier-Speaker Unit, showing Wiring between Terminals.

CHART No. 4
Amplifier Tube Socket Tests

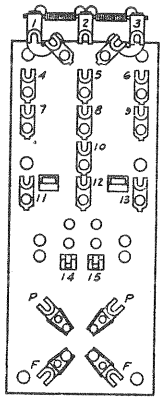
TEST	SOCKET	NORMAL VOLTAGE	LACK OF VOLTAGE OR ABNORMAL VOLTAGE INDICATES
Filament	UX-245 UX-245	2.25 2.25	Open or shorted wire or secondary winding in filament supply.
	UX-280	4.9	
Plate	UX-245 UX-245	222 222	Open or shorted wire in plate supply; open primary of output transformer 2, Fig. 3; open or shorted field or reactor coil; shorted condenser in condenser bank 1, Fig. 4.
	UX-280	40 M. A.	Open or shorted wire in plate circuit. Open high voltage secondary of power transformer; any items listed above which affect UX-245 plate supply; any items listed in Chart No. 3 which affect UY-224 plate supply.
Grid	UX-245 UX-245	37 37	Open or shorted wire in grid circuit; open secondary of interstage transformer; open or shorted grid bias resistor 32, Fig. 4; faulty ground in center tap of secondary interstage transformer 2, Fig. 3, or faulty ground in grid bias resistor 32, Fig. 4.



Condenser Bank Terminals



Under Side of Terminal Strip



Terminal Board

CHART No. 5
Continuity Test of Amplifier-Speaker Unit
IMPORTANT NOTES

Meter used, 10 volt scale of Weston test box 547. Open circuit voltage on continuity test 9.0 volts when reading on 10 V scale. Readings will vary with different meters and batteries, but relative proportions will be the same as those listed in chart below. Approximate resistance values are given, corresponding to the direct reading ohmeter conversion chart for the Weston 547 test box. Terminals on terminal board are not numbered) numbers in the illustration to the left are for convenience in reference to this chart only. Lack of voltage, or voltage readings which vary considerably from those listed below will indicate open circuits or other irregularities in the parts under test.

TEST BETWEEN TERMINALS	PART	APPROXIMATE VOLTAGE (10 V SCALE)	APPROXIMATE RESISTANCE (OHMETER)
F and 7 of Terminal Board	Tapped Choke	8.4 Volts	300 Ohms
4 and 6 of Terminal Board	Speaker Field	7.2 Volts	1,500 Ohms
Brown-Grey Resistor	8000 Ohm Resistor	3.4 Volts	8,000 Ohms
Brown-Grey Resistor	8000 Ohm Resistor	3.4 Volts	8,000 Ohms
Green-Red Resistor	70,000 Ohm Resistor	.5 Volts	70,000 Ohms
7 and 8 of Condenser Bank	Plate Choke	4.0 Volts	6,000 Ohms
2 of Condenser Bank and 4 of Terminal Strip	Primary Interstage Transformer	6.4 Volts	2,000 Ohms
UX-245 Grids	Secondary Interstage Transformer	2.4 Volts	14,000 Ohms
UX-245 Grids to Chassis	One-half Secondary Interstage Transformer	4.4 Volts	5,500 Ohms
UX-245 Plates	Primary Output Transformer	3.6 Volts	7,500 Ohms
UX-245 Plates and No. 3 of Condenser Bank	One-half Primary Output Transformer	8.4 Volts	330 Ohms
Voice Coil	Speaker Voice Coil	8.8 Volts	165 Ohms
14 and 15 of Terminal Board	Primary Power Transformer	9.0 Volts	0 Ohms
P and P	High Voltage Secondary Output Transformer	9.0 Volts	0 Ohms
F and F	UX-280 Filament Secondary Output Transformer	8.4 Volts	340 Ohms
UX-245 Grid Bias Resistor 32, Fig. 4	UX-245 Grid Bias Resistor	9.0 Volts	0 Ohms
		8.0 Volts	700 Ohms

Note:—To test continuity of UY-224 and UX-245 filament windings of power transformer and the respective center tap resistors, it will first be necessary to unsolder the transformer leads from the resistors, and then test each part separately. Readings in all cases will correspond to a 9.0 volt reading under the test conditions listed above.

CHART No. 6

Voltmeter Continuity Test of Electrola Parts

TEST	TERMINALS	APPROXIMATE Voltage (10 V. Scale)
Electric Pickup	On P. U. Connector Block	9.0 Volts
Record Volume Control	Two Ends	8.6 Volts
Input Transformer	*1* and *2*	9.0 Volts
	1 and *3*	8.5 Volts
	1 and *4*	4.4 Volts

CHART No. 7

Voltmeter Continuity Test of Recording Parts

TEST	TERMINALS	APPROXIMATE Voltage (10 V. Scale
Microphone	Cord Tips	8.4 Volts
150 Ohm Resistor	Term. 245 Two Ends	8.5 Volts
Input Transformer	*1* and *3*	8.5 Volts
	1 and *4*	4.4 Volts
Coil	*4* and *1* on Ter. Board, Fig. 19	9.0 Volts
250 Ohm Resistor	Two Ends *1* and *3* on Ter. Board	8.4 Volts

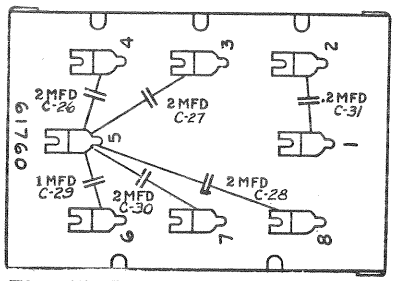


Fig. 15—Internal Connections of Filter Condenser Bank.

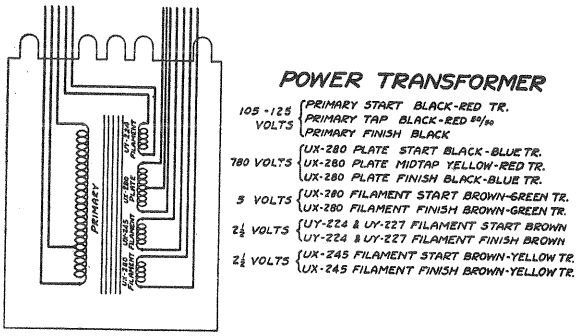
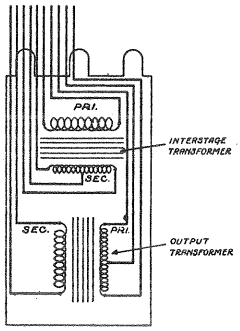


Fig. 16—Internal Connections of Power Transformer.



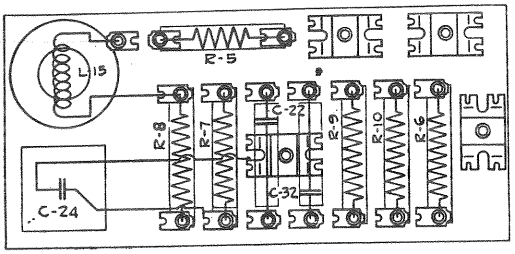
COLOR CODE OF LEADS

INTERSTAGE TRANSFORMER	OUTPUT TRANSFORMER
PRIMARY START - RED-YELLOW 60/90	PRIMARY START - BLUE
PRIMARY FINISH - RED-YELLOW TR.	PRIMARY FINISH - BLUE
SECONDARY START - GREEN	PRIMARY MIDTAP - RED
SECONDARY FINISH - GREEN	SECONDARY START - BLACK
SECONDARY TAP - YELLOW	SECONDARY FINISH - BLACK

Fig. 17—Internal Connections of Interstage and Output Transformer.

9. FAILURE IN ELECTROLA OPERATION—Failure in operation of the Electrola may be traceable to any of the following defects. See chart No. 6 for continuity tests on Electrola parts:—

a. Broken wire or connection. Examine all leads carefully and if necessary use the continuity test meter and battery as shown in Fig. 11.



CAPACITORS	
C-22	100 MMF.
C-24	0.01 MF.
C-32	1200 MMF.

RESISTOR COLOR CHART

R-5	1500000 OHMS	WHITE (WITH RED END)
R-6	28000 OHMS	BUFF (WITH BROWN END)
R-7	1000000 OHMS	GREEN (WITH WHITE END)
R-8	500000 OHMS	BLUE (WITH GREEN END)
R-9	500000 OHMS	BLUE (WITH GREEN END)
R-10	2800 OHMS	BLUE (WITH WHITE END)

Fig. 18—Resistor Board on Radio Chassis

b. Open or short circuit in electric pickup. Remove the pickup from the pickup arm by taking out the screw 11, Fig. 29, and pulling the connector block from the pickup terminals. Test for continuity by means of the meter and battery shown in Fig. 11. If no reading is obtained, pickup is open.

c. Faulty contact in control switch. Remove the switch from the motor board, by taking off the knob and the mounting nut. Remove the cover from the switch and examine all contacts carefully.

d. Open or short circuit in record volume control. Remove the lead on terminal No. 2 of the input transformer. Test for continuity through each of the side connections with the pickup removed.

e. Open or short circuit in the input transformer. With the wire still removed from terminal No. 2 of the input transformer, test for continuity between terminals No. 1 and No. 2 and between No. 1 and No. 4. See Fig. 21 for Electrola connections.

Distortion in the Electrola may be caused by the armature of the electric pickup being improperly centered (see subject No. 7 under SPECIAL ADJUSTMENTS) or by an open grid resistor, R-9, mounted on the resistor board, Fig. 18.

10. FAILURE OF HOME RECORDING—Failure of the home recording feature can be traced to any of the following. (See chart No. 6 Page 22 for continuity tests on home recording parts.)

a. Poor contacts in microphone pin jack terminals.
b. Loose or broken wire or connection.
c. Open or short circuit in microphone.
d. Short in either of the resistors on reactor unit Fig. 19.
e. Shorted or open record-microphone input transformer on motor board.
f. Faulty contact in control switch.
g. Open reactor coil on reactor unit, Fig. 19.
h. Weak magnet in electric pickup. See note under b, subject 7, page 35.
I. Reversed leads on two contact terminal strip 8, Fig. 3. Black with red tracer lead should connect to the terminal nearer the two UX-245 Radiotrons.

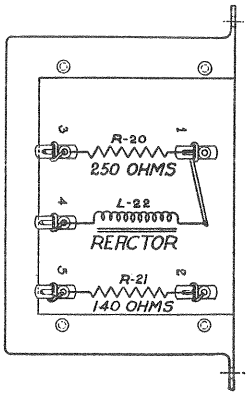


Fig. 19—Microphone Reactor Terminals and Connections

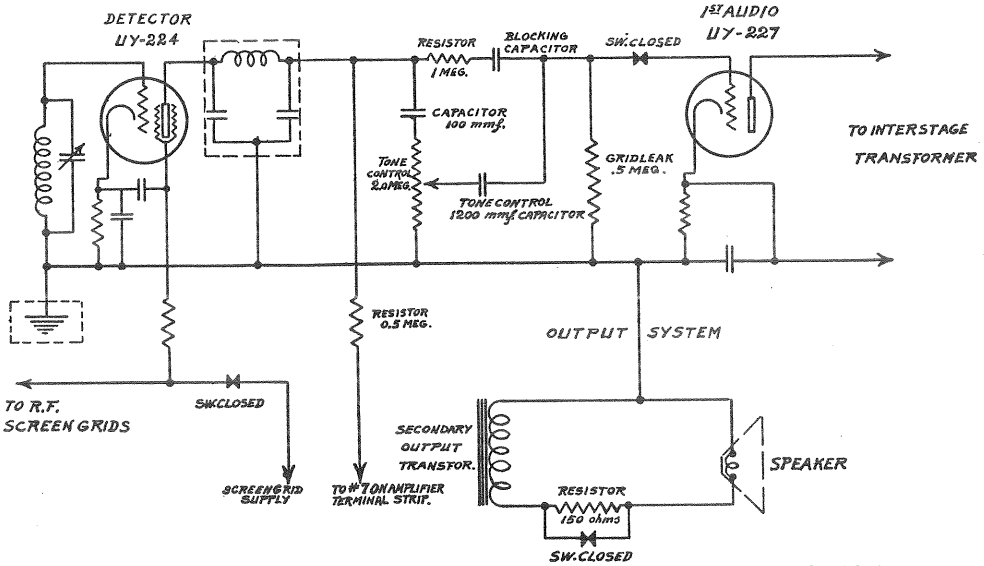


Fig. 20—Schematic Connections Between Detector and First Audio Tubes with Transfer Switch in "Radio" Position.

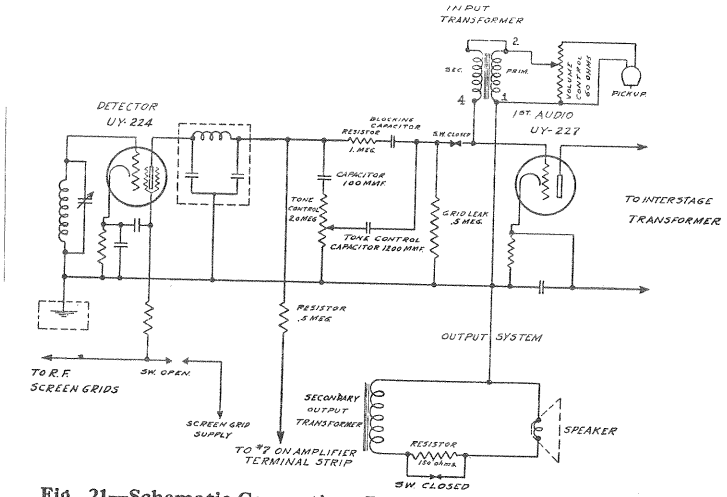


Fig. 21—Schematic Connections Between Detector and First Audio Tubes with Transfer Switch in "Record Reproduction" position

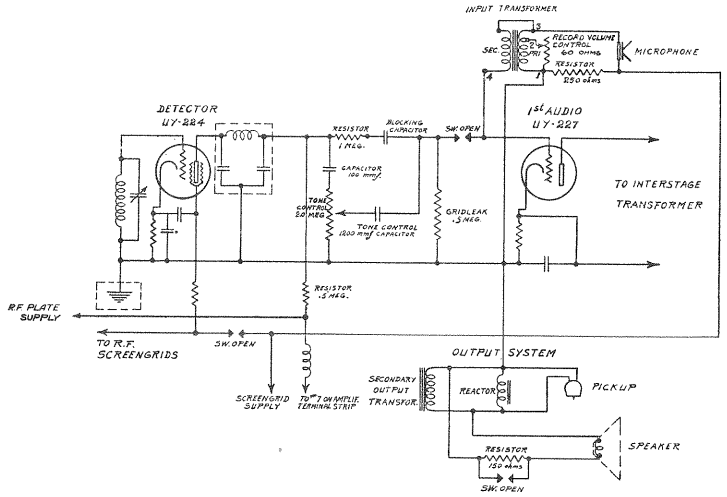


Fig. 22—Schematic Connections Between Detector and First Audio Tubes with Transfer Switch in "Home Recording" position.

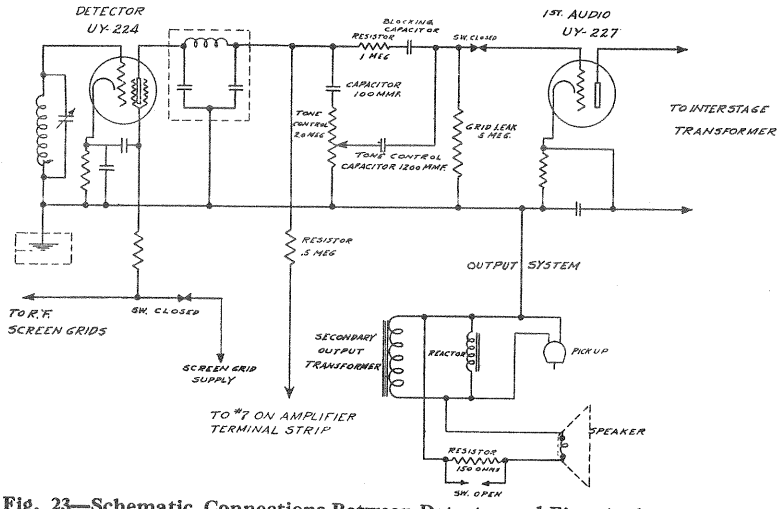


Fig. 23—Schematic Connections Between Detector and First Audio Tubes with Transfer Switch in "Radio Recording" position.

SPECIAL ADJUSTMENTS

1. RE-ALIGNING TUNING CONDENSERS—Under normal conditions, the occasion will seldom arise when it will be necessary to re-align the tuning condensers. Low sensitivity and selectivity and improper dial settings over certain sections of the dial for stations of known broadcast frequencies are indications that the tuning condensers are out of line. Before assuming that the instrument requires re-alignment, investigate such possible causes of weak reception as outlined under the subject of GENERAL TESTS, beginning on page 9.

NOTE:—Improper dial settings should not be confused with improper location of selector scale, the adjustment for which is described in Subject 5 below.

The parts required for re-aligning consist of a modulated oscillator, such as stock No. A-6004; a special aligning wrench, stock No. A-6085; and a 0-8 volt a.c. voltmeter. All of these parts are shown in Fig. 24. The meter which is available in the Weston test box can be used if desired.

The Victor oscillator is accurately calibrated at 550, 710, 1000, 1300 and 1500 kilocycles. These aligning frequencies, which are the correct values used in the factory, must be employed in all cases. If it is desired to build an oscillator in accordance with the diagram Fig. 7, it should be constructed of the best grade materials available in order to hold its calibration properly, and should be calibrated at the frequencies listed above. If a standard wavemeter is not available for calibrating, the signals from a number of reliable broadcasting stations, operating on known frequencies from 550 to 1500 KC can be used by plotting a curve of oscillator dial settings against frequencies.

Proceed to re-align the tuning condensers in the following manner:

a. Disconnect the link (on straight radio models) across the two terminals on the base of the amplifier (see Fig. 24), and connect one side of the 0-8 volt a.c. voltmeter to the terminal nearer the UX-245 Radiotrons. Connect the other side of the a.c. voltmeter to No. 3 terminal (ground) on the amplifier terminal strip or clip to any clean metallic part of the amplifier base. The meter is thus connected in the speaker output circuit but the voice coil is out of the circuit. Silent aligning can thus be accomplished.

b. Connect the shielded leads from the oscillator terminals to the antenna and ground terminals of the radio set, making sure that the ground wire is still connected to the radio chassis.

c. Remove the small metal plate in the center of the cam wheel by taking out the retaining screw.

d. Place the radio set in operation with the volume control turned to maximum.

e. Set the tuning lever at 550. Place the oscillator in operation and set the dial at this same frequency. Adjust the oscillator output volume control to the lowest setting possible to obtain a reading on the A. C. voltmeter.

f. It will be noted on the inside of the cam wheel that there are five groups of five screws each, and that the first screw of each group is opposite a cam roller. Using the special socket wrench, stock No. A-6085, adjust each of the first screws until the reading on the A.C. voltmeter is a maximum. As the condensers are brought into alignment, it may be necessary to decrease the setting of the oscillator volume control in order to prevent the voltmeter from going off scale.

g. Move the tuning lever of the Victor Radio to 710 KC and set the oscillator dial at this same frequency. Now adjust the second screw of each group until a maximum reading is obtained on the voltmeter.

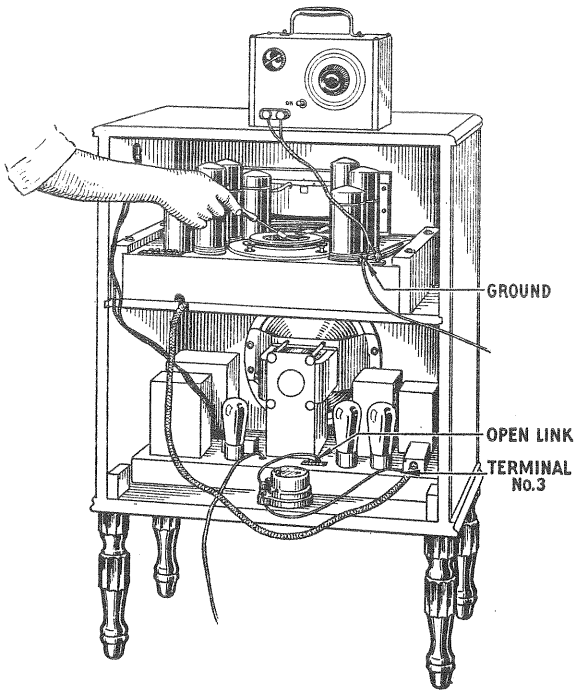


Fig. 24—Re-aligning the Tuning Condensers

h. Repeat this procedure for 1000 KC, 1300 KC, and 1500 KC. The alignment is now complete. The flexible cam strip around the outer edge of the cam wheel assures perfect alignment between the aligning frequencies mentioned.

i. Remove all oscillator and meter connections, and reconnect the link (or wire in the case of combination models).

It will be desirable to check the oscillator calibrations from time to time with signals from reliable broadcasting stations. Dial settings may otherwise be incorrect because of rough handling of the oscillator or capacity changes in the UX-199 Radiotron.

2. CENTERING CONE OF SPEAKER—Improper centering of the cone in the electro dynamic speaker is characterized by a noticeable rattle or buzz, particularly when the volume control is advanced. Such a rattle can sometimes be traced to faulty tubes in the detector or audio stages or to loose metal parts. This possibility should first be eliminated before attempting to center the cone. If the voice coil is improperly centered:

a. Remove the mounting screws which hold the amplifier-speaker unit to the base of the cabinet, and turn the unit on its side as shown in Fig. 25.

b. Remove one of the R. F. tubes from its socket and place a short piece of wire in the cathode and one of the filament terminals of a UY-224 socket to produce a 60 cycle hum. See Fig. 5 for location of these terminals.

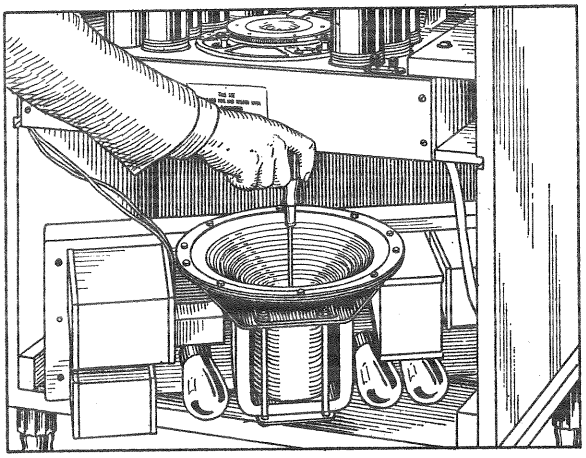


Fig. 25—Centering Speaker Cone.

CAUTION—Great care should be exercised not to touch any of the high voltage terminals on the under side of the amplifier.

c. Place the instrument in operation in the usual manner.

d. Loosen the center screw in th speaker cone and then re-tighten the screw.

e. Ordinarily the cone should now be properly centered, which condition can be determined by the sound of the A.C. hum. When the cone is improperly centered, an A.C. mechanical buzz will be heard as contrasted with a clear low frequency musical note when the coil is free and properly centered. In some cases it may be necessary to remove the retaining ring, loosen the outer edge of the cone, replace the ring without tightening the screws, center as described above, and then retighten the ten retaining screws.

Remove the wire across the cathode and filament of the R. F. tube and then replace the amplifier-speaker unit in the cabinet.

3. REPLACING CONE OF SPEAKER—Should it become necessary to replace the speaker cone because of an open voice coil or other defect, the following procedure should be used:

a. Unsolder the voice coil leads (black and yellow) and the two fine black wires attached to the cone, from the terminals on the side of the speaker frame.

b. Using a No. 4 Spintite socket wrench, remove the ten screws which hold the retaining ring against the cone and also remove the center screw and washer.

c. Remove the retaining ring and lift the old cone from the unit.

d. Replace with the new cone, but before complete assembly is made, center the cone as described in 2, above.

4. ADJUSTING TUNING LEVER TENSION—Should the tuning lever fail to operate freely, or should the vernier roller fail to track when turned, adjust the tension of the lever on its track by means of the adjusting nut which will be found on the lever midway between the cam wheel and the dial. To assure free movement of the lever, a small amount of grease should be placed on both the top and bottom of the roller track.

5. READJUSTING AND REPLACING SELECTOR SCALE—Should it be necessary to shift the selector scale so as to obtain correct dial readings, or to replace a damaged scale, proceed in the following manner:

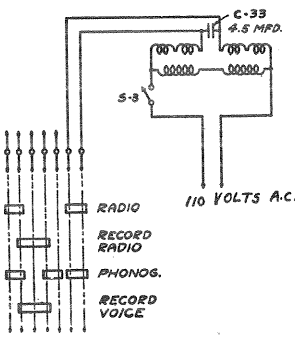


Fig. 26—Electric Motor Connections for 60 cycles.

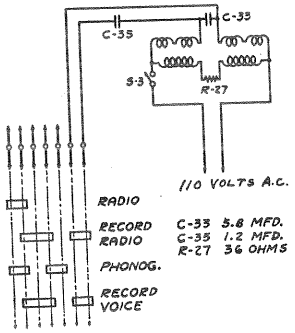


Fig. 26A—Electric Motor Connections for 25 Cycles.

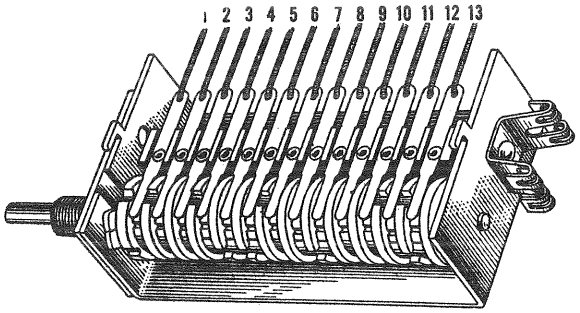


Fig. 27—Control Switch

COLOR CODE

1. Black
2. Black
3. Black—Yellow Tracer
4. Pickup Lead
5. Yellow—Black Tracer
6. Black and Red—50–50
7. Black—Red Tracer
8. Green—Yellow Tracer
9. Green and Red—50–50
10. Black and Yellow—50–50
11. Green and Yellow—50–50
12. Green
13. Green—Red Tracer

Connection to Switch Case—Yellow

a. Reach in from the back of the cabinet, insert a screw driver through the holes in the back of the pilot light compartment, and loosen the clamps at each end of the scale.

b. Remove the old scale if a replacement is being made, and place the new one in position with the ends under the clamps.

c. Before tightening the clamps, tune in a station of known broadcast frequency and slide the scale to the right or left until the number corresponding to the known frequency of the station is in line with the station indicator.

d. Check this position on two or three other stations of known broadcast frequency at different sections of the scale.

e. Holding the scale in position, re-tighten the screws in the scale clamps.

6. ADJUSTING PILOT LAMP—If the pilot lamp is mounted off center, the dial readings at certain sections of the scale, particularly at the extreme ends, will be incorrect. The lamp is clamped on the back of the pilot lamp compartment in a position which will be obvious upon exam-

ination. Always be sure that the lamp is exactly in the rear of the center of the dial and that the hair line station indicator is vertical at the center and the extreme ends of the dial.

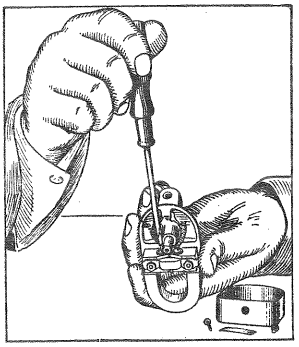


Fig. 28—Adjusting Electric Pickup.

7. ADJUSTING ELECTRIC PICKUP—Faulty record reproduction with noticeable blasting, particularly on the bass notes, may be caused by worn records or needles, or by improper centering of the pickup armature. If such a condition is traced to the pickup, center the armature in the following manner:

a. Remove the pickup from the pickup arm by taking out the retaining screw and nut, 11, Fig. 29. Pull the pickup away from the connector block.

b. Remove the cover by taking out the needle screw and the cover screw, taking care not to lose the phosphor bronze clamp which holds the magnet in place.

NOTE—IT IS HIGHLY IMPORTANT that the magnet be in contact with the pole pieces or with a small iron or steel keeper at all times. Even a momentary break in the magnetic path of the pickup magnet will produce a noticeable loss of magnetism which is reflected in decreased efficiency of the pickup, ***particularly in home recording.***

c. Place a steel keeper 1 5/16" x 1/2" x 1/8' across the two ends of the magnet, and carefully slide the magnet from the pole pieces onto the keeper.

d. Slide the magnet back onto the under side of the pole pieces as shown in Fig. 28.

e. Loosen both round head screws in the armature adjusting plate with a small screw driver as shown in Fig. 28.

f. Insert the pickup gauge, stock No. A-6074, between the armature and the pole pieces and re-tighten the round head screws in the adjusting plate.

g. When the armature is properly centered, replace all parts of the pickup assembly.

h. While making adjustments to the pickup, it will be well to place a small amount of Victor Motor Grease on the bearing surface between the pickup arm and the base at the rear of the arm to insure free motion of the arm.

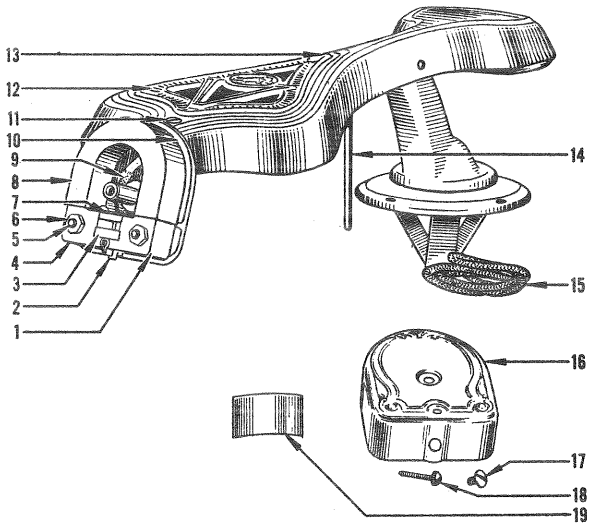


Fig. 29—Parts of Electric Pickup.

ELECTRIC PICKUP PARTS

	Name of Part
	Pick-up unit (complete)
	Pick-up arm and base (less unit)
1.	Pick-up pole piece (R.H.)
2.	Pick-up armature
	Pick-up armature rubber pivot*
3.	Pick-up coil (low impedance)
4.	Pick-up pole piece (L.H.)
5.	Pick-up pole piece screw
6.	Pick-up pole piece nut
	Pick-up pole piece lock washer*
7.	Pick-up damper and plate
	Pick-up damper (rubber)*
	Pick-up damper screw*
8.	Pick-up magnet
9.	Pick-up insulating sleeve
10.	Pick-up unit back
11.	Pick-up mounting screw
	Pick-up mounting nut*
	Pick-up mounting lock washer*
12.	Pick-up arm escutcheon
13.	Pick-up arm escutcheon rivet
14.	Pick-up arm trip rod and nut
	Pick-up arm trip rod nut*
15.	Pick-up connector block and wire
16.	Pick-up unit cover
17.	Pick-up unit cover screw
18.	Pick-up needle screw
19.	Pick-up spring (flat)
	Pick-up arm mounting screw*

*Not Illustrated.

VICTOR RADIO WITH ELECTROLA RE-17

The Victor Radio with Electrola RE-17 is a combination of the four circuit radio equipment in the R-15, with the Electrola equipment, less home recording, of the RE-57. A transfer switch controls the change-over from radio to record operation. When the switch is in the "Electrola" position, the power detector Radiotron becomes a first stage audio amplifier, transformer coupled, by a change in the grid bias of this tube when a 600 ohm resistor is connected into the grid bias circuit. The screen grid voltage supply to the R. F. tubes is opened during record reproduction to prevent the possibility of obtaining both radio and record reproduction simultaneously.

The RE-17 operates on 105 to 125 volts, 50 to 60 cycles, alternating current. Special instruments are also available for 25 to 30 cycle operation. The maximum power consumption of the instrument is 170 watts.

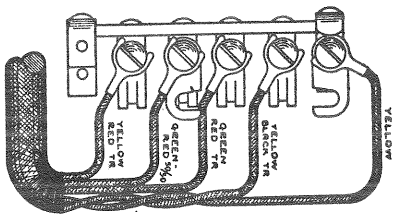


Fig. 3—Electrola Terminal Strip

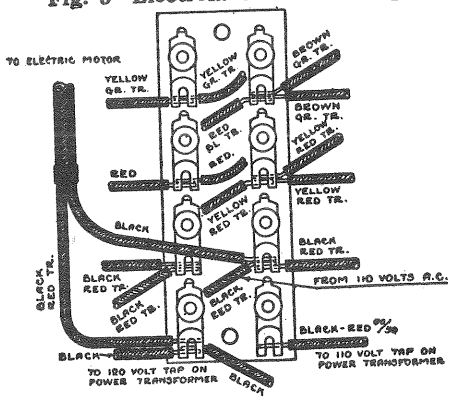


Fig 4.—Radio Chassis Terminal Board, showing Additional Connections for Motor

Voltmeter Continuity Test of Electrola Parts
Using 10 volt scale of Weston 547 Test Box and 4½ volt "C" battery.

TEST	TERMINALS	APPROX. VOLTAGE (10 Volt Scale)
Electric Pickup	On P. U. Connector Block	9.0 Volts
Record Volume Control	Two End Terminals	8.6 Volts
Input Transformer	1 and 2 3 and 4	9.0 Volts 7.2 Volts

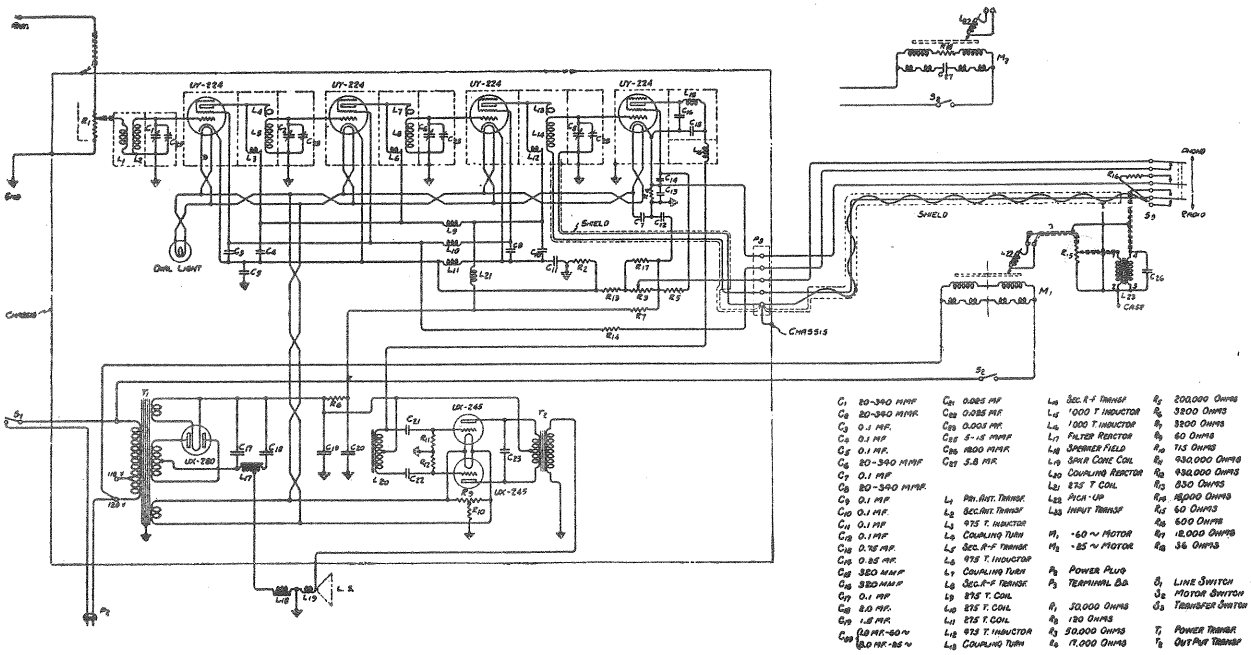


Fig. 5—Schematic Wiring Diagram Victor Radio with Electrola RE-17