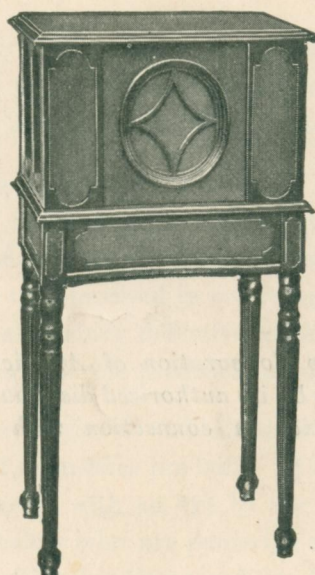


RCA LOUDSPEAKER MODEL 104

SERVICE NOTES

Instructions NS-104-1



RADIO CORPORATION OF AMERICA

Prepared By

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in furnishing service in connection with its apparatus.*

A Word or Two About Service

RCA Loudspeaker Model 104 Service Notes have been prepared by the National Service Division of the Radio Corporation of America to assist Authorized Dealers to render a prompt and efficient service to the retail customer.

It is of paramount importance that Service be rendered at point of sale. It is obvious that where the dealer is thoroughly conversant with repairs to be made that a more prompt response to a customer's appeal for service can be given. The inconvenience to the customer caused by the time involved in returning a set to an RCA Service Station is only justifiable in the case of factory defective material or due to some trouble that the dealer or his distributor has not the facilities to adjust.

The value of direct dealer service to individuals is based on good will, and it is good will upon which all large retail businesses are built. It is also obvious that efficient dealer service assures for the wise dealer with an eye to the future, the replacement sales of Radiotrons and batteries. Dealers who are rendering such service soon become known in their localities by word of mouth advertising and are thus well rewarded with increased Radiola sales as well as accessories.

Service engineers at any of the RCA District Service Stations are ready at all times to assist National Distributors and Authorized Dealers in solving any service problems that may arise and to co-operate with them in their service work.

RCA Loudspeaker Model 104 Service Notes

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INTRODUCTION

RCA Loudspeaker, Model 104, consists essentially of two main parts, the Reproducer unit and the Rectifier-Power-Amplifier unit. It is designed to operate from an alternating current supply of 105 to 125 volts, 40 to 45 cycles (using Ballast tube, Radiotron UV-886) and 50 to 75 cycles (using Ballast tube, Radiotron UV-876, such as is available for lighting and general household uses in the majority of American homes. Should there be any doubt in the mind of a dealer concerning the rating of the local electric power supply of a prospective purchaser, he should immediately consult the company supplying electric lighting service in his customer's locality who will furnish the correct information.

The Rectifier-Power-Amplifier unit of RCA Loudspeaker Model 104 will supply 45 and 90 volts direct current for the plate or "B" battery supply of any Radiola or other Radio Receiver, thus eliminating all "B" batteries except when a so-called "soft tube," such as Radiotron UV-200, is used as a detector. In the latter case a local 22½ volt "B" battery will be necessary to supply the correct plate potential for the detector tube only.

When connected to Radiola 25 with the A.C. package Model UP-971, or to Radiola 28 with A.C. Package Model UP-972 Model 104 Loudspeaker furnishes the proper filament, plate and grid potentials for all the Radiotrons, except UX-120 which is not used, thus eliminating *all* batteries in these two Radiolas.

There are three Radiotrons and two Rectrons supplied with RCA Loudspeaker Model 104, which serve the following purposes:

ONE RADIOTRON UX-210:

This Radiotron is a super-power Amplifier, capable of handling great volume without distortion.

TWO RECTRONS UX-216-B:

These are rectifying tubes which convert the alternating current into pulsating direct current, which is smoothed out by the filter system to continuous direct current of approximately constant flow.

ONE RADIOTRON UX-874 VOLTAGE REGULATOR TUBE:

This Radiotron maintains constant "B" voltages to the receiving set under varying load currents. When the Model 104 Loudspeaker is used in conjunction with Radiola 25 or 28 equipped with the proper A.C. Package to supply "A," "B" and "C" potentials for these receivers, Radiotron UX-874 is replaced with a model UP-591 Resistor Unit.

ONE RADIOTRON UV-876 OR UV-886:

This Radiotron, known as the "Ballast Tube" is connected in the primary circuit of the power transformer. The resistance of its filament rises and falls rapidly with increase or decrease of current flowing through it, thus maintaining a substantially constant input current. Radiotron UV-876 is used when the frequency of the house lighting current is between 50 and 75 cycles, and Radiotron UV-886 when the fre-

quency is between 40 and 45 cycles. A ventilating stack is provided to enclose this tube and the R.P.A. unit should not be operated unless this is in place.

The 30-foot Input Cable attached to the Loudspeaker terminates in a branch telephone cord and also an input terminal board. The plug attached to the branch telephone cord should be inserted only in the *first stage* of Audio Frequency Amplification of the Radiola or other Radio Receiver in use.

The input terminal board may be conveniently installed in the cabinet of the Radiola as outlined in the RCA Loudspeaker Model 104 Instruction Book, or in the case of other Receivers wherever most convenient. The 8-foot power supply cable with plug attached should not be connected to a source of 105 to 125 volts alternating current (having the correct frequency rating) until the Loudspeaker has been properly connected to the Receiver.

PROTECTIVE DEVICES:

It should be understood that the electrical protective devices as adjusted by the factory have been set. If for any reason a service man finds it necessary to remove them to adjust or replace a defective part, great care should be taken in reassembling to see that they are returned to proper operation. Dealers should caution their customers not to attempt to render these protective devices inoperative or to experiment with the apparatus inside the cabinet.

The lead seals placed on the Rectifier-Power-Amplifier unit by the RCA are for the protection of the dealer. When seals are found broken it is an indication that tampering has occurred.

However, when an instrument is found inoperative and the trouble is believed to lay within the R.P.A. unit, it will be apparent that the dealer's service man cannot make necessary tests unless the seals are broken.

When dealer's service men find it necessary to break these seals for test purposes, some sort of seal should be reaffixed. In this manner, should the service man be required to make a return visit and finds the seals broken, the dealer has the advantage of knowing that the trouble may be due to tampering rather than to ordinary wear and tear. This places the dealer in a preferred position when it is found necessary to render a bill for the service work performed.



Fig. 1

SERVICE DATA

(1) RADIOTRONS AND RECTRONS:

Should RCA Loudspeaker Model 104 suddenly cease to operate satisfactorily, look through the cane side of the cabinet and note whether or not the filaments of the first three tubes from the left, when facing the back of the cabinet, are burning. Replace any of these whose filaments are not burning.

The Voltage Regulator tube, Radiotron UX-874 (fourth from the left) should show a pink or violet glow. Should this Radiotron fail to show any glow when the three tubes to its left are lighted, replace it with a new one. If this one also fails to glow the house lighting line voltage may be below 105 volts or the Ballast tube, Radiotron UV-876 or UV-886 may be defective or a filter condenser shorted. Check line voltage with a high resistance type voltmeter. If it reads between 105 and 125 volts replace Ballast tube and as a last resort test filter condensers as outlined in paragraph 10.

If Radiotron UX-874 flashes intermittently while the branch telephone cord is disconnected from the Receiver, this tube should be replaced. Loud signals or strong static discharges, will however, cause it to flicker somewhat when the telephone cord is connected to the Receiver. A prolonged loud signal will decrease the brilliancy of the glow.

There is little or no visual filament indication when Radiotron UV-876 or UV-886, the Ballast Tube (large one enclosed in ventilating stack) is functioning properly. This Radiotron, however, dissipates a considerable amount of heat in operation.

Should all Radiotrons and Rectrons fail to light or operate as indicated in the preceding paragraphs, look for:

- (a) House lighting current not on or loose connection at convenience outlet.
- (b) Operating switch not functioning properly.
- (c) Blown fuse in house lighting circuit.
- (d) Loose protective plug.
- (e) Terminal door switch not making proper contact.
- (f) Burnt out filament of Ballast tube.
- (g) Poor contact in Ballast tube socket.
- (h) Defective Voltage Regulator tube or poor contact in its socket.
- (i) House lighting current not A.C. (this condition would be manifested by the filament of the Ballast tube lighting a bright red).

Fig. 1 shows position of various parts of Model 104 Loudspeaker in cabinet.

(2) NO SIGNALS WHEN RADIOTRONS AND RECTRONS O.K.:

Should all Radiotrons and Rectrons appear to be functioning properly but no signals are heard from the loudspeaker, first, with a pair of headphones, make certain that the Receiver is operating. If O.K., carefully check the telephone plug on the branch cord to see that it is making proper connection to the receiver. If the plug is making proper contact, look for:

- (a) Loose connection in telephone plug.
- (b) Loose connection on terminal board of Rectifier-Power-Amplifier Unit.
- (c) Open in 30-foot input cable.
- (d) Filament to grid short in Radiotron UX-210.
- (e) Dirty contacts in socket of Radiotron UX-210.
- (f) Burn out or open in movable coil of reproducer unit circuit.

Before removing Radiotrons or Rectrons from their sockets to examine contacts, the power supply cable should be disconnected from the house lighting circuit.

(3) OPEN FIELD OF REPRODUCER UNIT:

An open field circuit of the reproducer unit is indicated by Radiotron UX-210 and Rectrons UX-216-B lighting up very brightly and Radiotron UX-874 going out. Although the field winding of the pot magnet might be open, the probable cause of such a condition is a loose connection on the terminal board of the R.P.A. unit. Keep all connections tight.

(4) EXCESSIVE HUM:

Should there be an excessive hum from the reproducer unit when connected to a Radio Receiver employing a ground connection, reverse the protective plug. The frequency of the house lighting current should also be checked.

(5) RADIOTRONS AND RECTRONS HEAT UP EXCESSIVELY:

Should the plates of Radiotron UX-210 and Rectrons UX-216-B heat up brighter than a very dull red shortly after the house lighting current is applied, disconnect power supply cord and look for a plate to filament short in one of the above mentioned tubes. If all tubes are O.K. the abnormal condition is likely due to a defective 2 or 7 mfd. filter condenser. A method of locating a defective filter condenser is covered in paragraph 10. *Do not attempt to operate RCA Loudspeaker Model 104 until this condition has been corrected.*

(6) HEAT FACTOR:

The design of the Ballast Tube, Radiotron UV-876 or UV-886 is such that it dissipates considerable heat in normal operation. Customers should be acquainted with this fact to avoid any future misapprehensions.

(7) R. P. A. UNIT TALKING:

If the loudspeaker fails to operate, but the Rectifier-Power-Amplifier unit appears to talk, there is an open connection to the movable coil of the reproducer unit or the movable coil itself may be open.

(8) WEAK SIGNALS:

When the Radio Receiver and the Rectifier-Power-Amplifier unit are apparently operating satisfactorily, weak signals may be caused by an open movable coil attached to the cone of the reproducer unit, or the cone itself having warped in such a manner as to prevent the free movement of the movable coil. The latter condition may be accompanied by distortion. A defective Radiotron UX-210 may also cause weak signals.

(9) HOWLING OR "FLUTTERING":

Howling may be caused by a defective Voltage Regulator Tube, a poor connection in the plug of the branch telephone cord or the Loudspeaker installed too near to the Radio Receiver. "Fluttering" may be eliminated by a judicious manipulation of the battery and volume control rheostats or reversing the input terminals at the telephone plug. This condition will only be encountered when Radiola 25 or 28 is entirely A.C. operated.

It must be borne in mind, however, that RCA Loudspeaker Model 104 will amplify and faithfully reproduce any howls or distortion originating in the Radio Receiver.

(10) BLASTING OR RATTLING:

This condition may be due to one or more of the following causes and eliminated as noted.

(a) Loose strap on R.P.A. terminal board between the negative filament terminal and center terminal. Keep all connections tight.

(b) Overloading amplifier tube in Radio Receiver caused by too high a setting of the battery or volume control rheostat.

(c) Misalignment of reproducer cone.

(d) Defective Radiotron UX-210, occasionally manifested by a pronounced blue glow around the plate. Replace Radiotron UX-210.

(e) Defective 7 or 2 mfd. filter condenser.

(f) Leads from movable coil broken away from cone. Make these fast with a little shellac.

(g) Shorting of movable coil to pole piece of pot magnet. Replace cone.

The reproducer cone may be readily realigned by removing the front grille and very carefully adjusting the small round headed screw in the center of the cone. In making this adjustment the service man should take great care that the cone is not damaged by the screw driver being pulled out of his hand by the strong magnetic flux from the pole piece of the pot magnet.

A leakage in one of the small 2 mf. filter condensers may cause the cone to rattle. Such a failure in these condensers will generally be accompanied by a loss in filament voltage. To determine the defective condenser it will be necessary to remove the metal case and reconnect the power unit. Disconnect one of these condensers, operate loudspeaker and note the result. If the rattle is not eliminated, turn off house lighting current, replace the connection and try the next one, repeating this process until all the filter condensers have been tested. If the rattling ceases after a certain condenser has been disconnected, that condenser is defective and must be replaced.

This filter condenser test should only be employed as a last resort, after all other methods have been tried to eliminate rattling.

(11) CONNECTIONS TO BRANCH TELEPHONE PLUG:

The phone tips of the branch telephone cord should be connected to the plug one way and then reversed, using the connection that gives the better reproduction.

(12) TERMINAL DOOR:

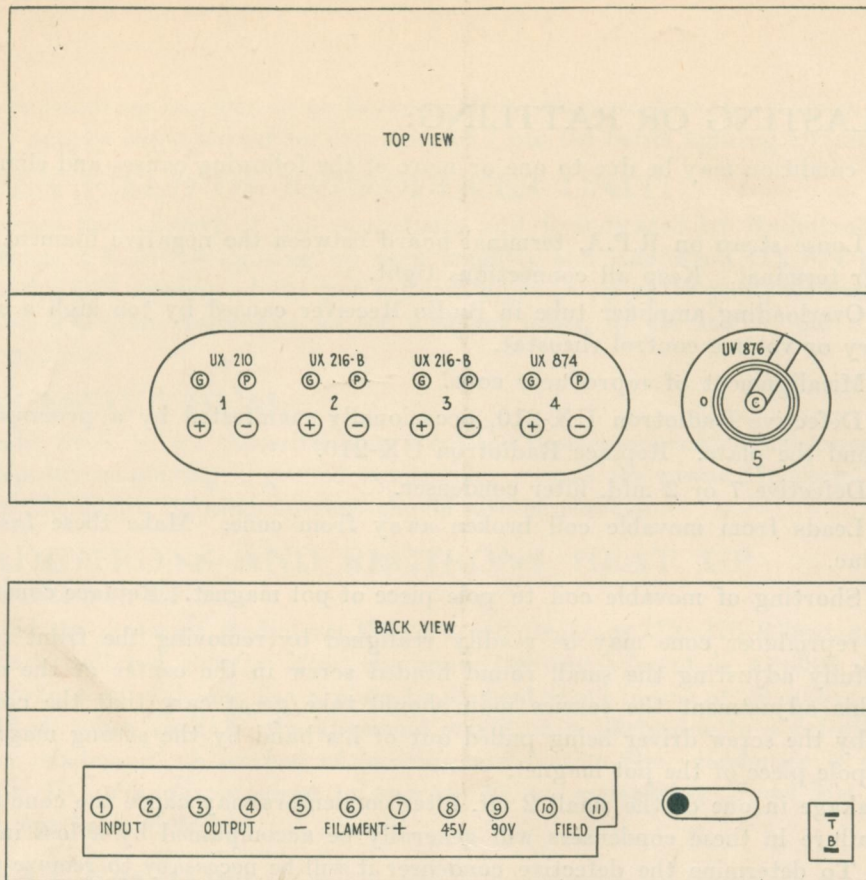
Failure to operate may result unless the terminal door is closed in such a manner that the projecting metallic arm at the upper right hand corner enters the slot in the lock switch.

(13) VIBRATION:

If RCA Loudspeaker Model 104 is installed in a location subject to considerable vibration it is suggested that rubber mats be placed under the legs of the cabinet.

(14) EXCESSIVE HUM IN R. P. A. UNIT:

This condition may be due to any of several causes, the most likely of which is a broken down filter condenser. Run complete continuity test and replace defective part as disclosed by this test.



Socket and Terminal Layout
Fig. 2

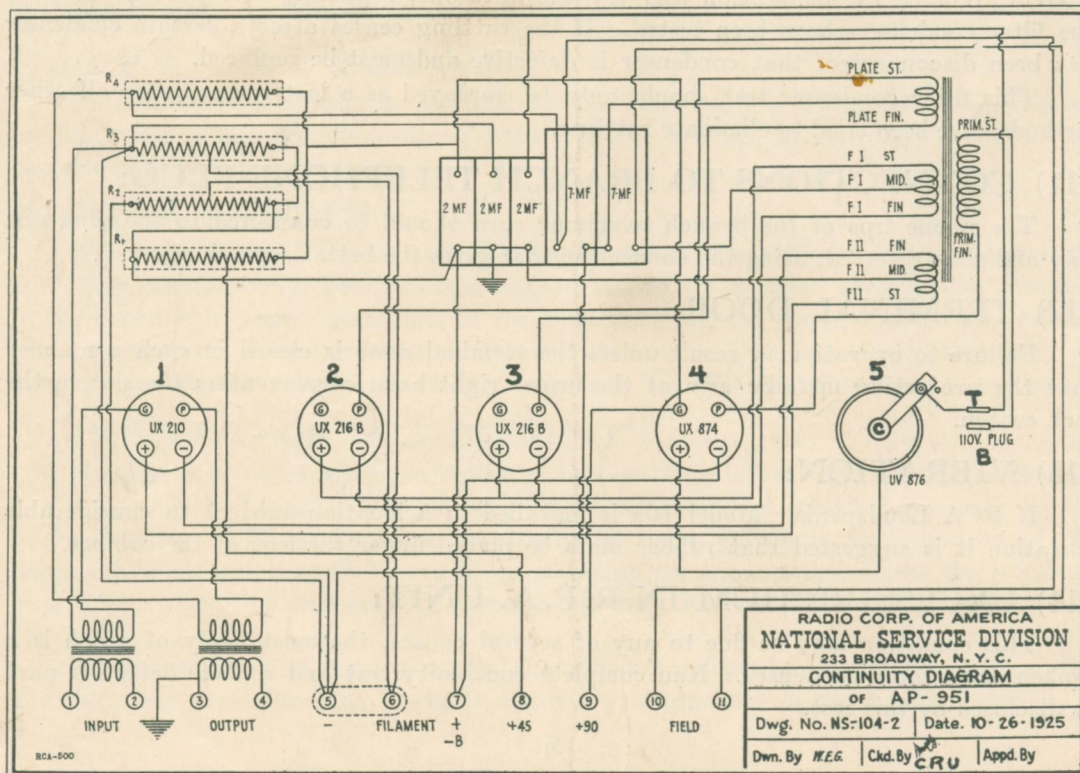


Fig. 3