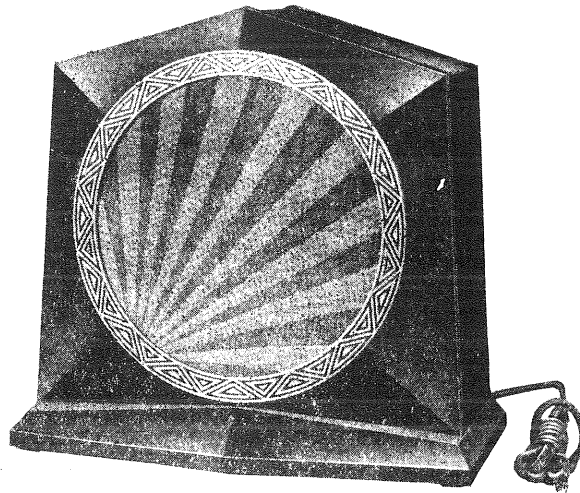


RCA

Loudspeaker 100B

SERVICE NOTES



RCA Loudspeaker 100B

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Radio Corporation of America
233 BROADWAY, NEW YORK CITY

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PREFACE

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

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

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

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

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

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

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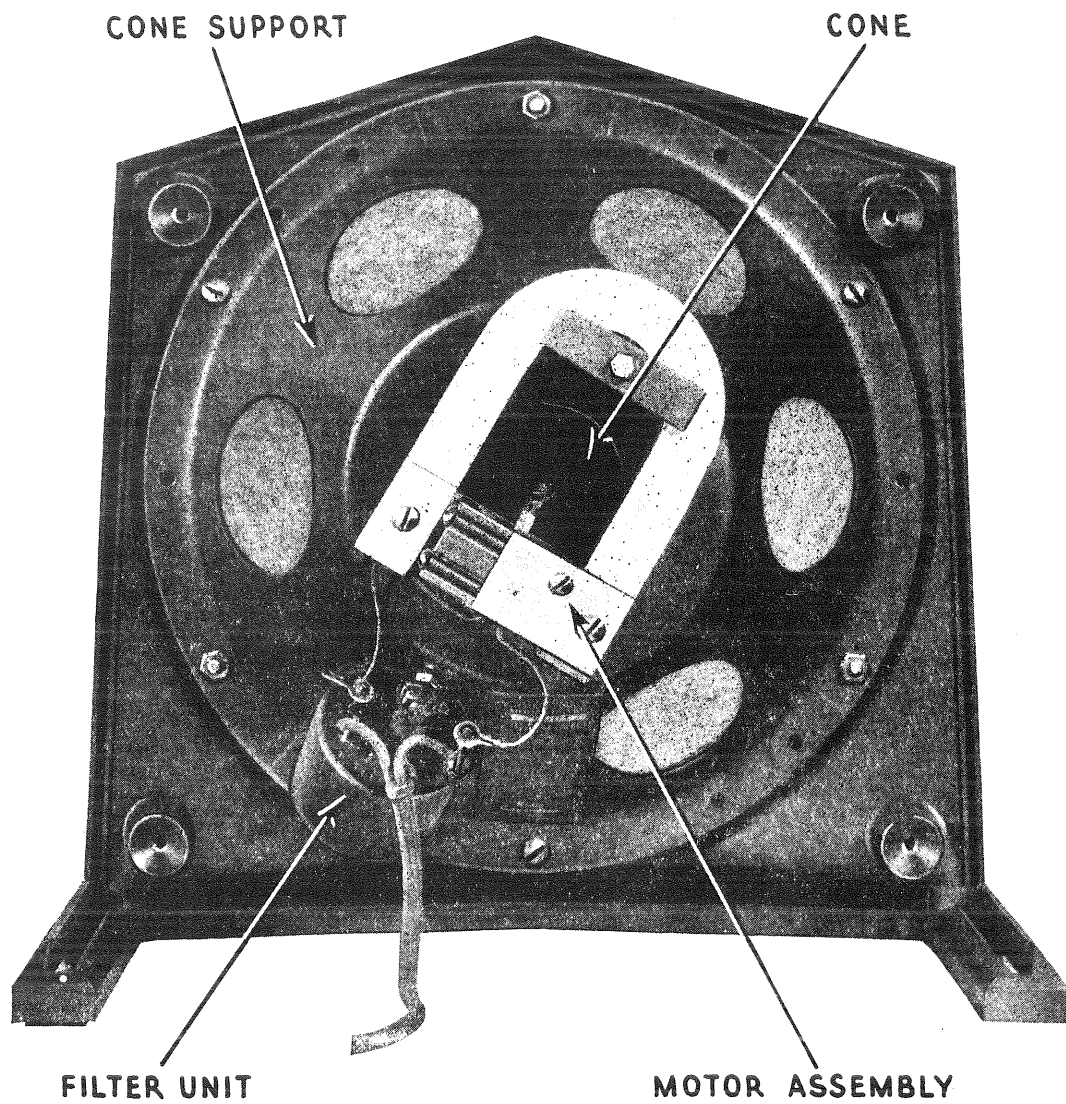
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*Figure 2—Rear view of mechanism with back
and sides removed*

RCA LOUDSPEAKER 100B

SERVICE NOTES

Prepared by RCA Service Division

INTRODUCTION

RCA Loudspeaker 100B is a simplified design of the famous model 100A. It is housed in a newly designed cabinet that fits in appropriately with home furniture and harmonizes in particular with Radiola 33.

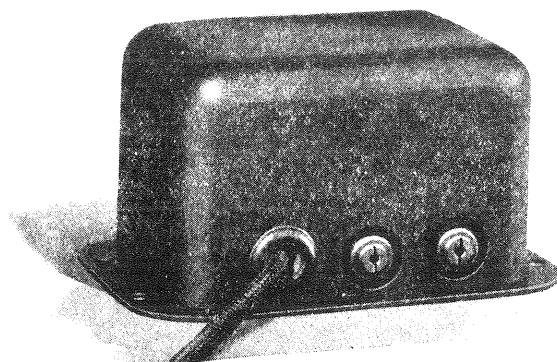


Figure 3—RCA Output transformer

Acoustically Loudspeaker 100B gives an excellent response to all frequencies employed in the broadcasting of both music and speech. Electrically it is of the electromagnetic type and is provided with a filter for eliminating high frequencies that are not in the acoustical range, which would be reproduced as noise and distortion if the filter were not used. Figure 2 shows a rear view with the various parts exposed.

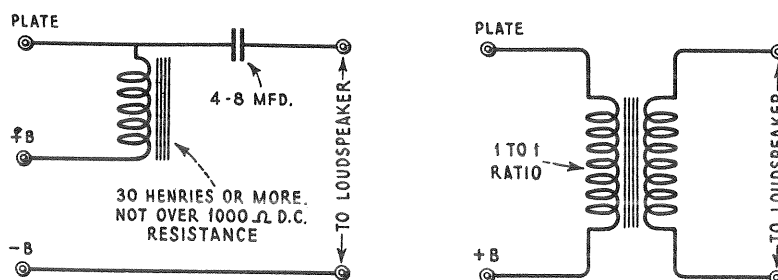


Figure 4—Schematic circuit diagrams of output devices

Some method of coupling the output of the receiver to the loudspeaker should be employed when Loudspeaker 100B is used in conjunction with receivers using output tubes, passing current in excess of 10 milliamperes through the loudspeaker windings. Such output devices are usually incorporated in modern receivers. However, if no coupling is incorporated in the receiver the RCA output transformer (Figure 3) may be used. It is

especially designed for this purpose. A choke and condenser arrangement will also give satisfactory results for this purpose when properly connected. Figure 4 shows the correct values and connections of either a transformer, or choke and condenser to the loudspeaker.

PART I—SERVICE DATA

The service problems of loudspeakers deal with conditions evidenced by weak reproduction, no reproduction, distortion, noise and rattle. These conditions and their attending causes, while not common to Loudspeaker 100B, are explained in these notes and corrections noted so that service men may be provided with helpful information in any service work that may be required on Loudspeaker 100B.

[1] RECEIVER OUTPUT

Before inspecting the loudspeaker for imperfect reproduction check the receiver output with headphones or another loudspeaker known to be in good operating condition. Any

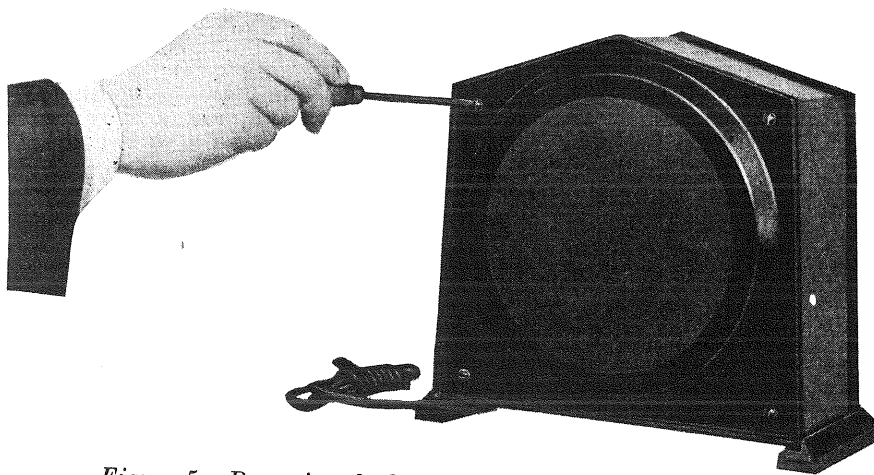


Figure 5—Removing the housing assembly extension bolts

distortion in the receiver will be faithfully reproduced in the loudspeaker. If a signal of good quality and volume is being delivered by the receiver, the loudspeaker must be examined for the cause of any imperfect reproduction that may occur.

[2] GAINING ACCESS TO MOTOR MECHANISM

To examine the motor mechanism it is first necessary to disassemble the housing so that the mechanism will be accessible. Proceed as follows:

- (a) Turn the loudspeaker so that the rear is accessible.
- (b) With a screw-driver remove the four screws that hold the housing together. (See Figure 5). The back, top and sides can then be lifted clear leaving the mechanism accessible for any adjustment or repair that is necessary. (See Figure 6).

[3] FOREIGN MATERIAL INTERFERING WITH ARMATURE ACTION

An inspection of the armature will generally disclose any foreign matter interfering with the armature action, resulting in poor reproduction. A small piece of heavy paper or a piece of copper or brass not over .010" thick may be used between the armature and pole pieces to remove dirt, dust or other interfering substances. The spacer tool, described in Section 4 may also be used for this purpose.

[4] ARMATURE STRIKING POLE PIECES

Distortion and rattle may be caused by the armature striking either or both of the pole pieces. This is generally determined by inspection, though in some cases the contact may be so slight it may be necessary to adjust the armature to check on this condition. In any case an adjustment of the armature is necessary.

To adjust the armature use a set of spacer tools. Figure 7 illustrates the general appearance and correct dimensions of these tools. They may be purchased from the RCA Service Division (Stock No. 2321). The material—obtainable on the open market—should be phosphor bronze strip .010" thick and .25" wide. It is bent as illustrated and soldered to hold the ends fairly rigid. The two ends are tapered as illustrated to a .15" width at their extremities.

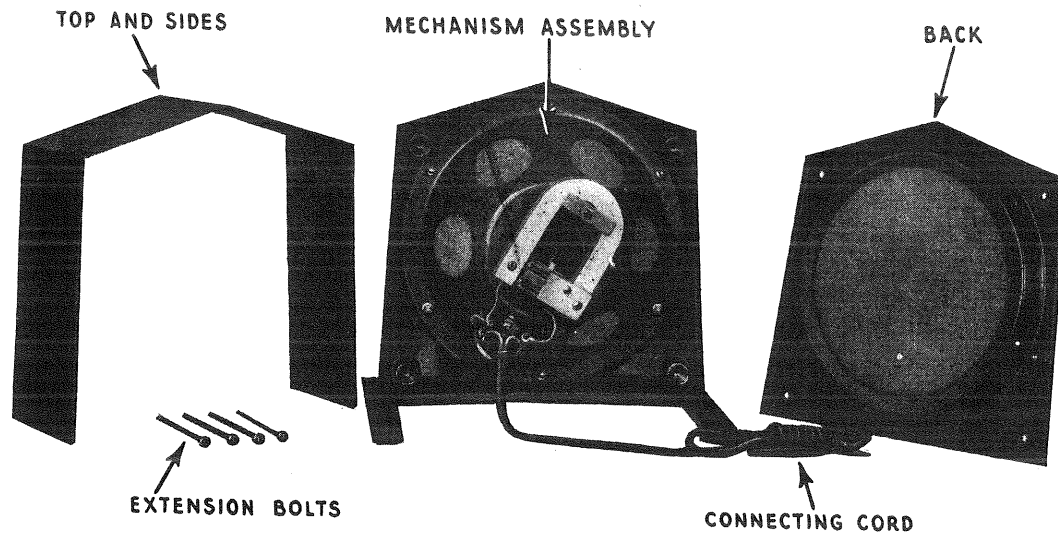


Figure 6—Housing dismantled

Two of these tools are necessary when adjusting the armature. Place one tool in the space between the armature and pole pieces of the motor mechanism at the end next to the filter unit. This is shown in Figure 8. The other tool is placed at the other end of the armature a little to one side in order to clear the drive pin located at this end of the armature. By loosening the two screws A and B, Figure 9, any tension in either direction, that may be on the armature is released, and the spacer tools will provide the correct clearance or spacing. Now while the spacer tools are in place apply a hot soldering iron to the drive pin thrust lever connection point C, Figure 10, and heat the solder sufficiently to allow the drive pin to find its normal position with regard to the thrust lever. The iron is then removed, screws A and B are tightened and the spacer tools removed. This adjustment correctly aligns and balances the armature so that no abnormal strain is imposed upon it in any direction.

[5] CONE IMPROPERLY SEATED

In order to inspect the cone it is necessary to remove the mechanism assembly from the front of the housing in the following manner:

- (a) Remove the back, sides and top as described in Part I, Section 2.
- (b) Remove the three screws that hold the mechanism to the front of the housing. (See Figure 11.) Be careful to support the assembly so that it will not fall and become damaged.

(c) Remove the mechanism assembly to a place convenient for work and repair.

A cone may be off center or improperly seated. This is most likely to occur when replacing a cone. Poor reproduction is the result and inspection of the armature drive-pin may indicate a slight torque or twist during operation.

The new cone should be carefully seated by placing the cone over the driving rod and adjusting the cone seating nut located on the driving rod next to the thrust lever. (See Figure 12.) Then attach the cone lock nut and washer lightly on the inside of the cone before fastening the edge of the cone. The holes on the edge of the cone can now be lined up with those of the metal frame and the three screws, washers and nuts placed in position, but not

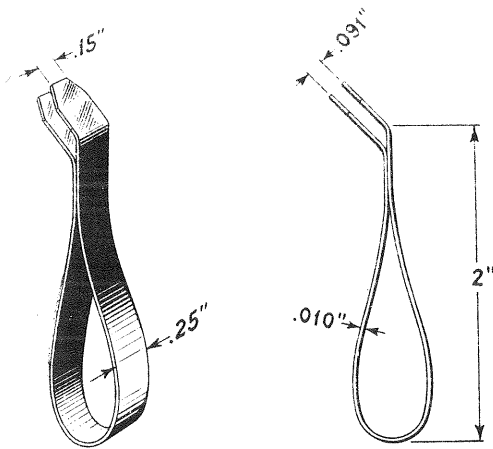


Figure 7—Dimensions of armature spacing tools

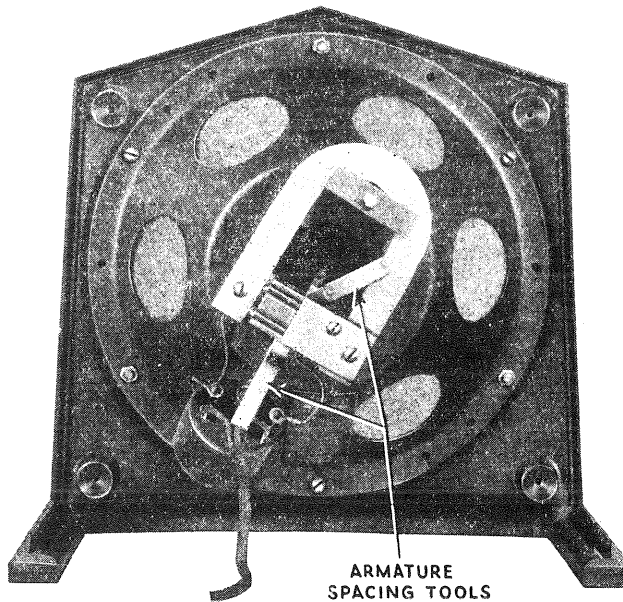


Figure 8—Armature spacing tools in place for adjustment of armature

tightened. (See Figure 13.) The cone lock nut is then tightened and sealed in place with ordinary sealing wax so that the vibration of the cone will not cause it to loosen. This nut can best be tightened by means of a small socket wrench made to fit a $\frac{3}{16}$ " hex nut. (Stevens "Spintite" No. 3 can be used.) The assembly should then be attached to the housing and the three mounting screws drawn tight. They also help clamp the cone in place. It is important to see that no foreign material lodges between the cone edge and the front of the housing to which it is clamped because an imperfect clamping of the cone may cause rattle.

[6] LOOSE THRUST LEVER, NUTS AND SCREWS

Rattle and noisy reception are sometimes caused by a loose thrust lever. To correct this condition tighten the thrust lever mounting screw by means of screw D, Figure 14. Sometimes when this is done a readjustment of the armature as described in Part I, Section 4, may be necessary. Any loose screw or nut in the motor mechanism may cause an audible rattle when the speaker is in operation. If any trouble is experienced along this line all the screws and nuts in the motor mechanism should be gone over and the loose ones tightened.

[7] FILTER UNIT AND MAGNET COIL TESTS

A defective filter unit, or a filter unit not properly connected in the circuit will cause distortion. Open magnet coils will cause no reproduction. The circuit diagram and correct connections are shown in Figure 15. The reference letters in the circuit diagram refer to the filter terminals shown in the small halftone illustration in Figure 15. These should correspond electrically, otherwise distorted or no reproduction will occur. A click test will indicate whether or not the unit is electrically O. K. The following continuity tests will indicate an electrical defect either in the coils or in the filter unit.

A pair of headphones and a $4\frac{1}{2}$ -volt battery connected together in series or a voltmeter and sufficient battery to give a full scale deflection should be used.

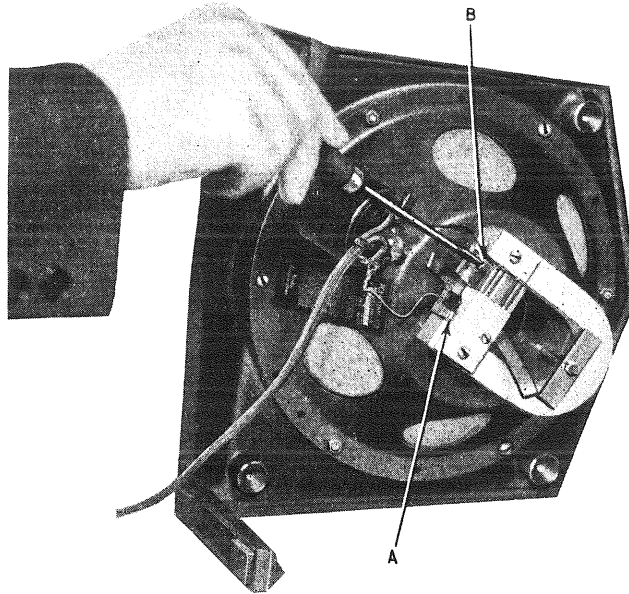


Figure 9—Loosening screws A and B to relieve tension on armature

FILTER UNIT CONTINUITY TESTS

Unsolder all connections and refer to Figure 15.

Test	Correct Effect	Incorrect Effect Caused By
G to H F to H	Open Closed	Shorted Condenser Open Coil

A shorted condenser across the coil can be determined by checking the resistance of the coil with a resistance bridge. The correct resistance of the coil is approximately 230 ohms. If a resistance bridge is not available the following method may be used.

Use a voltmeter having a resistance of not greater than 100 ohms per volt. The Weston Meters, Type 301 or 280 both have a resistance of 62 ohms per volt and are satisfactory for this purpose. Use sufficient battery to give a good deflection of the meter, for example a

45-volt "B" battery with a 0-50 volt meter. Then take two readings, one of the battery alone and one of the battery with the unknown resistance in series, that is, the coil in the filter unit. Then apply the following formula.

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

The magnet coils may be checked for an open by testing from one lead to the other. An open indicates a defective coil which must be replaced. The coils should measure 1000 ohms D.C. resistance.

8] LOUDSPEAKER CORD AND CONNECTIONS

A defective connection, either in the loudspeaker cord or coil connections may cause distorted, noisy or no reproduction. As there is not much wear and tear on the coil connections,

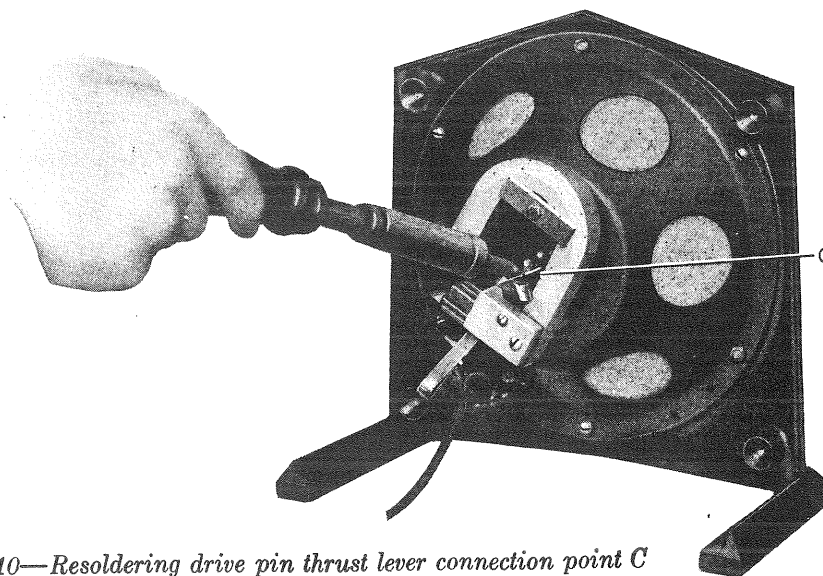


Figure 10—Resoldering drive pin thrust lever connection point C

the most likely place to find trouble of this nature is in the connecting cord. The point where the cord enters the loudspeaker housing and the ends on which the pin terminals are located may become frayed and worn, causing a possible short or open circuit. If these points prove O. K. and there are no indications of any defects external to the speaker housing, the cover should be removed and the lugs of the cord soldered to the filter unit examined. If there is no apparent defect the cord should be disconnected and tested by means of a battery and pair of phones. It should be click tested for the continuity of the leads and also for a short between the leads. Shake the cord while conducting the continuity test to disclose any breaks which will be indicated by interrupted clicks.

[9] REMAGNETIZING LOUDSPEAKER MAGNETS

At times there may be occasion to remagnetize the large permanent magnet used in Loudspeaker 100B. In order to do this a powerful electro-magnet is necessary. The construction of such a magnet is quite difficult and requires direct current of considerable amperage. It is suggested that this work be turned over to automobile or ignition shops specializing in the repair of magnets. Distributors maintaining contact with shops of this character are in a position to obtain immediate service on remagnetizing jobs.

[10] CHECKING OUTPUT OF REPAIRED LOUDSPEAKERS

After a repair job has been completed it is always desirable to have a definite means of checking the output of the speaker against a speaker known to be in good condition. Two general methods can be used to accomplish this—one by alternately connecting each speaker to a radio receiver tuned to a nearby broadcasting station, the other by alternately connecting each speaker to the output of a power amplifier being driven from a phonograph pick-up. The latter method is preferable as a standard record may be used that has a much wider frequency range than would be obtained by random tuning with a broadcast receiver. When checking a speaker under these conditions a volume control should be used and the speaker checked at both the soft and loud positions. At the minimum position the speaker under test can be compared with the standard for sensitivity and at the loud position a check can be made on its ability to handle volume without distortion or rattle. These

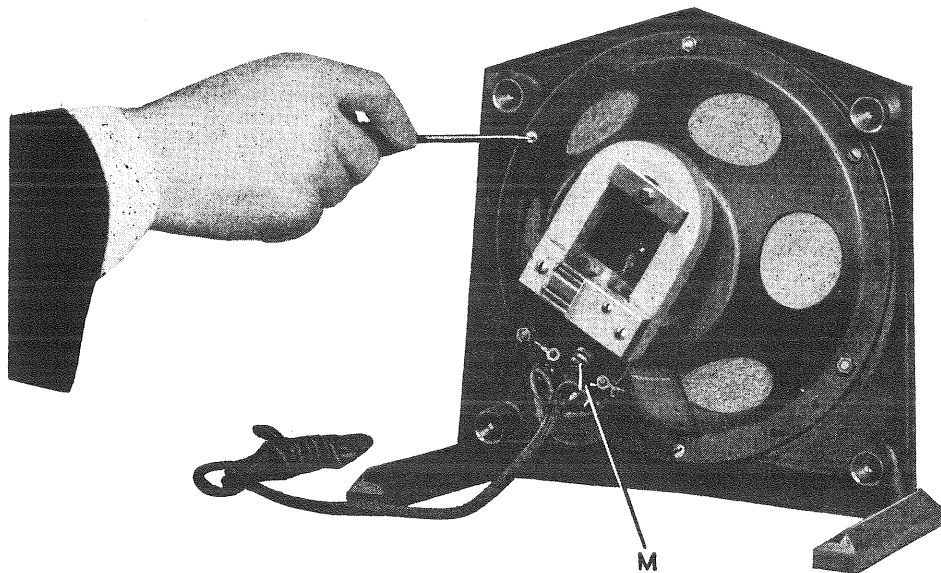


Figure 11—Removing mechanism from front of housing

checks should be made at both high and low frequencies. The sections of the record containing these frequencies can be indicated to run such a test.

A test of this kind is quite conclusive for quality and volume of reproduction and will indicate if further repair work or adjustments are necessary.

PART II—MAKING REPLACEMENTS

Due to the simple design of Loudspeaker 100B, replacement of any particular part is easily and quickly accomplished. The following detailed procedure should be used when performing work of this kind.

[1] REPLACING MAGNET COILS

If the magnet coils require replacement, proceed as follows:

- (a) Remove back and sides of housing as described in Part I, Section 2.

- (b) Remove the three screws that hold the mechanism assembly to the front of the housing and then remove the three screws, nuts and washers that hold the cone to the cone support. Then remove the center nut and washer that hold the cone to the driving rod.
- (c) The motor mechanism may now be removed from the magnet by releasing nuts *I*, *J* and *K*, Figure 16. The magnet coil leads must be unsoldered from the filter unit before the motor can be cleared of the frame. Place a large nail or soft iron bar across the poles of the permanent magnet to act as a keeper. (See Figure 14.)
- (d) Remove the thrust lever supporting screw *D*, Figure 14, and apply a hot soldering iron to the thrust lever armature drive pin connection point *C*, Figure 10. The thrust lever and driving rod may now be removed.

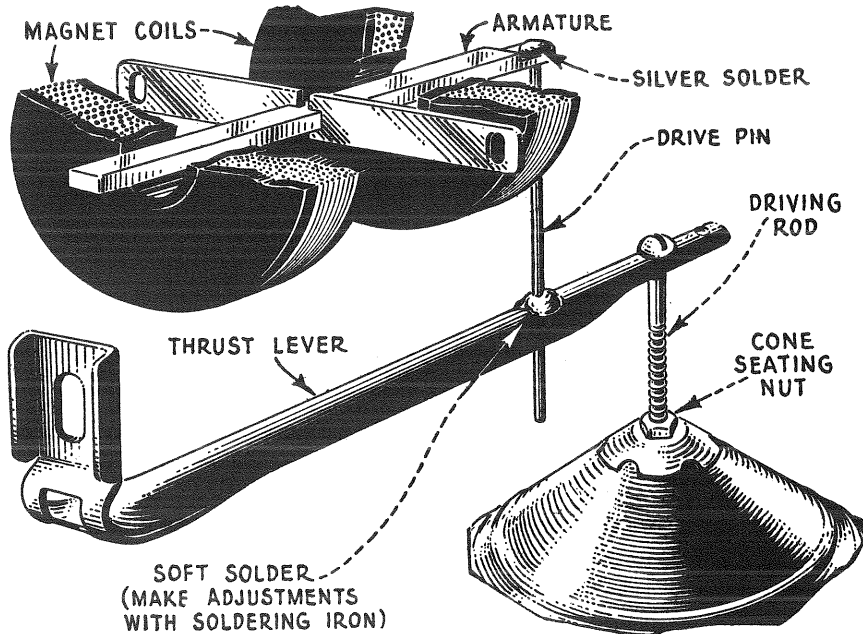


Figure 12—Constructional details and operating principle of the motor mechanism—Note cone seating nut

- (e) Disassemble the motor mechanism by removing screw *L*, Figure 14, and the corresponding screw on the other side of the mechanism. Also remove screws *A* and *B*, Figure 14. The magnet coils may now be removed by slipping one off the armature and the other off the drive pin.

To reassemble reverse the preceding operation.

- (a) Place the new coils over the armature in the same position occupied by the old ones.
- (b) Reassemble the motor mechanism and replace the thrust lever. Do not solder the thrust lever to the drive pin at this time.
- (c) Remove keeper and replace motor mechanism on magnet with supporting screws and bushings. Mount the reassembled unit in its correct position on the frame.
- (d) Replace cone and center carefully. Replace, but do not seat the three screws, nuts and washers around the edge. Tighten the cone lock nut and seal with sealing wax. Seat screws around edge.

- (e) Place spacer tools in position to adjust the armature and tighten screws *A* and *B*, Figure 9.
- (f) Resolder drive pin to thrust lever and allow it to find its normal position. Remove spacer tools.

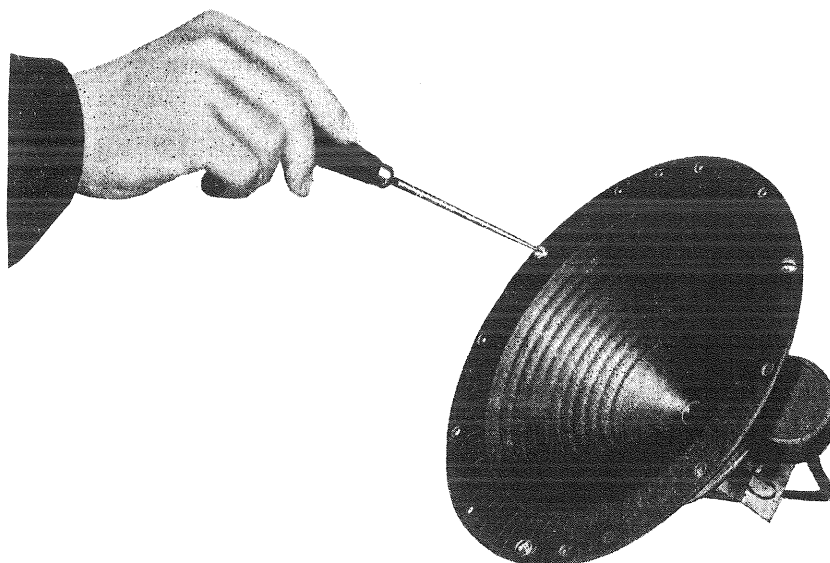


Figure 13—Tightening cone clamping screws

- (g) Solder coil leads to filter unit as indicated in Figure 15. At this point it is good practice to test the mechanism on a receiver of good quality and make any further adjustments that may be necessary.
- (h) Fasten mechanism to front of housing and reassemble the housing in the reverse manner of that used to disassemble it.

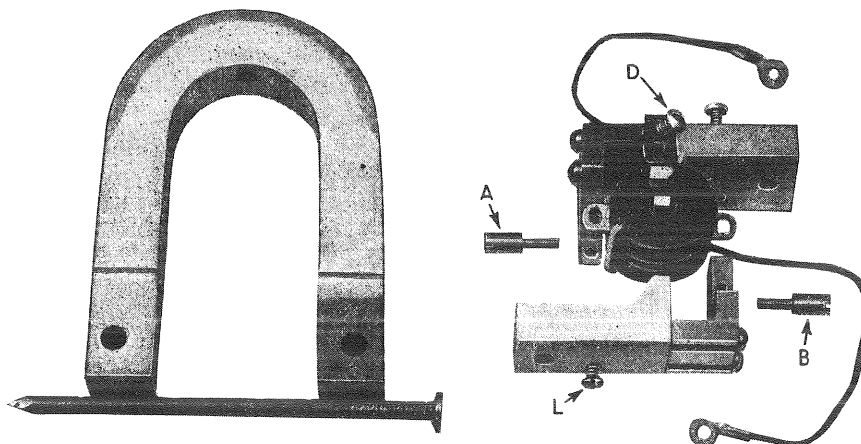


Figure 14—Motor mechanism partly dismantled

[2] REPLACING ARMATURE AND DRIVE PIN

The procedure for replacing the armature and drive pin is identical with that of replacing the magnet coils with the exception of the new part substituted. The new armature should be clean and free from any dust or dirt.

[3] REPLACING THE THRUST LEVER AND DRIVING ROD

Ordinarily the driving rod and thrust lever are not likely to become damaged or require replacement. However, should it be necessary, disassemble the housing and mechanism as described in Part II, Section 1, until the thrust lever and driving rod are removed. The new one should be placed in the position occupied by the old one and the mechanism reassembled in the reverse order of that used to disassemble it. The armature should be checked for adjustment as described in Part I, Section 4. The housing should then be assembled and the speaker returned to normal operation.

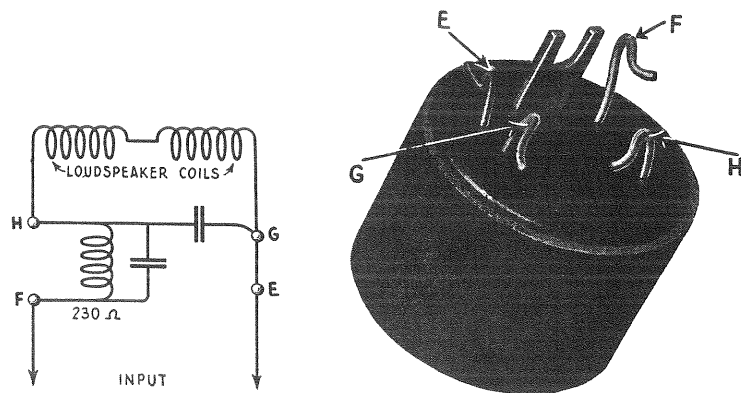


Figure 15—Schematic circuit of Loudspeaker 100B coils and filter and photo of filter unit

[4] REPLACING THE MOTOR ASSEMBLY COMPLETE

When replacement of the complete motor mechanism is necessary disassemble the housing as described in Part I, Section 2. Then remove the cone, the motor and magnet and install the new motor.

The reassembly will be a reversal of the foregoing procedure.

[5] REPLACING CONE

When replacing a cone remove the old one as described in Part II, Section 1. The installation of the new cone is a reversal of the removal procedure.

- (a) Place cone over driving rod in center.
- (b) Adjust the cone seating nut so as to properly seat the cone and provide clearance for the thrust lever from the pole piece.
- (c) Tighten cone lock nut and then replace the three screws, washers and nuts that hold the cone to the cone support.
- (d) Fasten mechanism to housing and reassemble housing in the reverse manner of that used to disassemble it.

[6] REPLACING FILTER UNIT

The following procedure should be used when replacing the filter unit.

- (a) Remove back and sides from housing as described in Part I, Section 2.
- (b) Unsolder all leads to the filter terminals.
- (c) Remove the filter unit mounting nut and washer and the nut and washer on the opposite end of the filter unit. (See Figure 11.) The unit may now be removed and replaced by a new one.
- (d) Replace the mounting nuts and washers previously removed. Then resolder the leads that were removed from the filter terminals.
- (e) Reassemble the housing in the reverse manner of that used to disassemble it.

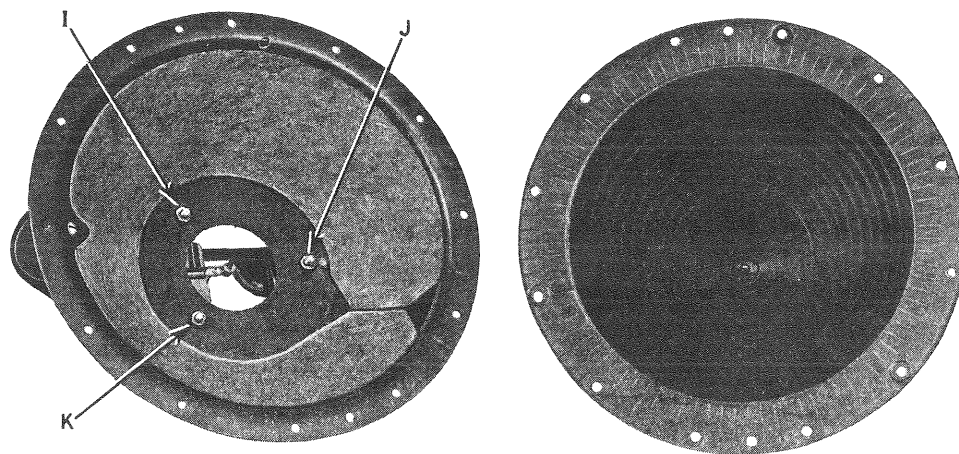


Figure 16—Cone support and cone

[7] REPLACING GRILLE CLOTH

Loudspeaker 100B has an ornamental grille cloth on both the front and rear. Should replacement be necessary proceed as follows:

- (a) To replace the back grille, remove the back from the housing as described in Part I, Section 2. To replace the front grille remove the mechanism from the housing as described in Part II, Section 1.
- (b) Remove the old grille cloth and cardboard ring by pressing the cloth away from its shellacked surface. That is if the housing were assembled the front cloth would be pressed toward the rear and the rear toward the front. Press close to the edge of the cardboard ring and it will break away easily.
- (c) After the old cloth and ring have been removed, shellac the housing edge for mounting the cardboard ring and firmly hold the new cloth and ring in place until dry. Be sure and have the design of the front grille in the correct position.
- (d) The housing should now be reassembled in the reverse manner used to disassemble it.

SERVICE DATA CHART

The following table of information provides a handy reference when servicing Loudspeaker Model 100B, and a working knowledge of it will enable service men to handle service problems readily and efficiently. Reference to Part No. and Section No. in the "Service Notes" is noted for detailed information.

<i>Indication</i>	<i>Cause</i>	<i>Remedy</i>
No Reproduction	No output from receiver Defective coils Defective filter Defective cord Loose or broken connections Drive pin not soldered	Examine receiver, Part I, Sec. 1 Replace coils, Part I, Sec. 7; Part II, Sec. 1 Replace filter, Part I, Sec. 7; Part II, Sec. 6 Repair or replace cord, Part I, Sec. 8 Repair connections, Part I, Sec. 8 Solder drive pin, Part I, Sec. 4
Weak Reproduction	Weak receiver output Dirt interfering with armature action Loose thrust lever mounting screw Improperly aligned cone Drive pin poorly soldered Weak magnet	Examine receiver, Part I, Sec. 1 Remove foreign matter from mechanism, Part I, Sec. 3 Tighten screw and resolder drive pin, Part I, Sec. 6; Part II, Sec. 3 Align cone correctly, Part I, Sec. 5 Solder drive pin, Part I, Sec. 4 Remagnetize, Part I, Sec. 9
Distorted or Noisy Reproduction (Rattle)	Distorted output from receiver Improperly adjusted cone Filter incorrectly connected Filter defective Loose screws or nuts in assembly Armature striking pole piece Excessive pressure on drive pin Filter unit not connected	Examine receiver, Part I, Sec. 1 Adjust cone correctly, Part I, Sec. 5; Part II, Sec. 5 Connect filter correctly, Part I, Sec. 7; Part II, Sec. 6 Replace filter, Part I, Sec. 7; Part II, Sec. 6 Tighten all loose screws or nuts, Part I, Sec. 6 Adjust armature correctly, Part I, Sec. 4; Part II, Sec. 1 Resolder drive pin to thrust lever, Part I, Sec. 4; Part II, Sec. 1 Connect filter unit, Part I, Sec. 7; Part II, Sec. 6

RCA

Electric Phonograph and Power Amplifier Equipment

MODEL AZ-774B

SERVICE NOTES

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RCA Victor Company, Inc.

FOREIGN DEPARTMENT

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