

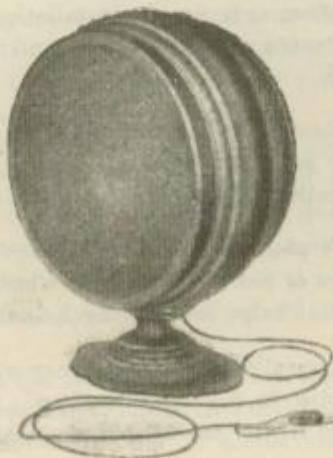
# RCA LOUDSPEAKER MODEL 100

Reg. U. S. Pat. Office

## SERVICE NOTES

NS-100-2

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## RADIO CORPORATION OF AMERICA

*Prepared by*

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## A Word or Two About Service

Service goes hand in hand with sales. The well informed Radiola 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 Radiola owners may be entirely satisfied.

Obviously this service can best be rendered at point of contact and therefore, Dealers and Distributors, who are properly equipped with a knowledge of the design and operation of Radiolas, occupy a favorable position to contract for this work.

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

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

In addition to supplying the Service Notes the RCA, through its Service Stations, has available to Dealer and Distributor the services of engineers who are qualified to render valuable help in solving service problems.

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# RCA Loudspeaker Model 100 Service Notes

NOTE.—Cone assembly of RCA Loudspeaker Model 102 is identical to Model 100 less the filter unit

Prepared by

## NATIONAL SERVICE DIVISION

Instructions NS-100-2

### PART I

RCA Loudspeaker Model 100 is of the free floating cone type. It is suspended at the outer edge by means of a strip of soft kid which holds the cone in a central position but does not impede its movement to any great degree. The cone is attached rigidly to the speaker mechanism at the center.

In servicing Model 100 Loudspeaker always make certain that the output of the Radio Receiver used in conjunction with it, is of good quality. If distortion is present in the Radio Receiver, RCA Model 100 Loudspeaker will reproduce that distortion as faithfully as it does the tone variations of the program.

Rattling sounds, or the so-called "paper rattles," are generally caused by a distortion in the lower tone registers of the amplifying system of the Radio Receiver. It is therefore quite important to first check the Receiver for quality of signal. This may be done by substituting another loudspeaker of known quality or else by replacing the loudspeaker with a pair of headphones. If distortion is present either in the second loudspeaker or the headphones it is a positive indication that the trouble is originating in the Radio Receiver.

Similarly, if the Radiotrons in the Receiver are overloaded by an abnormally strong signal being forced through the amplifiers, distortion will follow.

If it is definitely established, however, that the distortion or rattle complained of is not due to a defect or improper adjustment of the Radio Receiver, but is apparently caused by the Loudspeaker itself, it may be the result of one of the following conditions:

- (A) Foreign material interfering with armature vibration.
- (B) Armature striking the pole piece.
- (C) Cone misaligned.
- (D) Excessive pressure on the stylus.
- (E) Bent stylus.
- (F) Loose or bent connecting rod.

Figure 1 shows a rough sketch of the complete armature assembly and its relation to the cone. The armature vibrates between the pole pieces (not shown), this motion being transmitted through the stylus to the thrust lever. The thrust lever is held rigidly to one of the motor side pieces. It is attached rigidly to the cone by the connecting rod. Dirt at any of these points may cause distortion.

On inspecting the RCA Model 100 Loudspeaker, note whether or not the stylus is bent, if so straighten it. The cone is attached to the connecting rod by means of a small nut "B", Figure 1. The end of the connecting rod is threaded. Make certain that the cone is drawn up tight to the connecting rod.

If the two foregoing points have been checked and found to be O.K., note whether or not the armature is striking the pole pieces. Figure 1a and Figure 2 show the relation of the armature to the pole pieces. There should be a space approximately .010 inch between the armature and the pole pieces, Figure 1a. This is true at both ends of the armature.

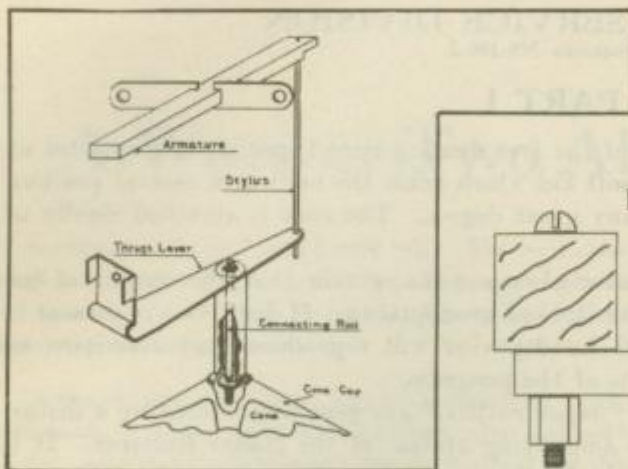


Fig. 1—Moving part of motor

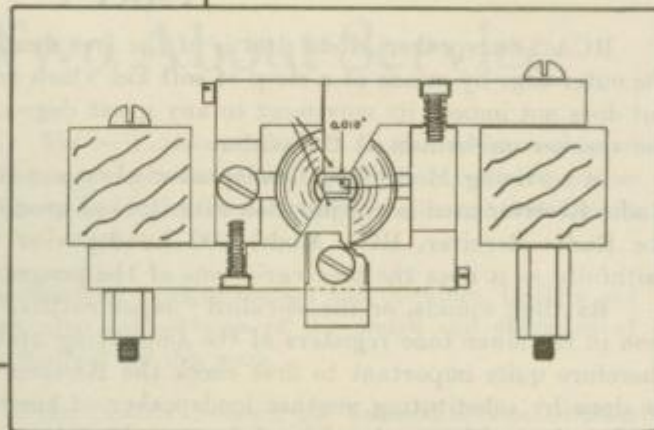
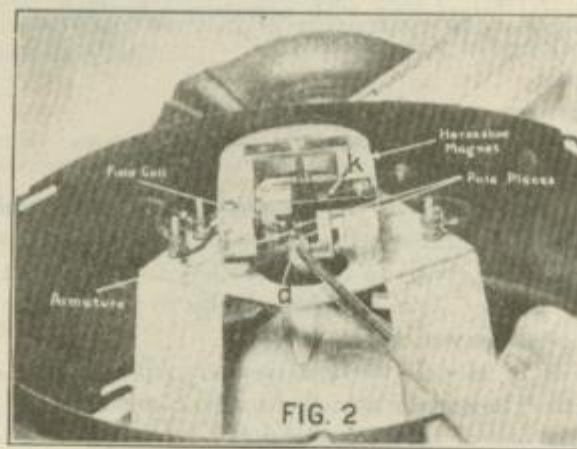


Fig. 1a—End view of motor



Method of adjusting armature clearance



If either end of the armature strikes the pole piece a very disagreeable rattle will result. To correct a misalignment of the armature a pair of spacer tools, shown in Figure 3, and a screwdriver will be necessary. These spacer tools should be made of .010 phosphor bronze stock about  $\frac{1}{8}$  inch wide. The distance between the open ends of the tool should be .091 inches. See Figure 3a.

Any loose screws, nuts or parts in the speaker may cause rattles and for that reason in making adjustments all screws should be seated properly, which means that all screws and nuts should be drawn up firmly enough to prevent their loosening when the speaker is placed in operation. Care should be taken to prevent stripping of the threads on the screws and nuts as well as to prevent torsion of the elements held in place by such screws and nuts.

To readjust the armature it will be first necessary to free it. Figures 4 and 5 show the method of doing this. The screws shown as "C" should be backed off about two turns. Do not remove them entirely.

When the two screws are loosened it is a simple matter to insert one of the spacer tools between each of the two armature ends and the pole pieces as shown in Figures 6 and 7.

When the spacing tools are inserted the clearance between the armature and the pole pieces must necessarily be the required ten thousandths as this is the thickness of the blades of the two spacers.

After the spacer tools have been inserted, one at each end, the two screws "C" that were loosened (Figures 4 and 5) should be tightened firmly. Figure 8 shows the method of tightening the upper screw with the spacers in place.

After the two screws have been tightened the spacer tools should be removed and the Loudspeaker tested. If the rattle has been eliminated no further adjustment will be necessary. If, however, the rattle is still present it may be due to the fact that the cone is out of centre with respect to the connecting rod.

To correct this, again refer to Figure 2. The screw "d" holds the thrust lever. When this screw is loosened the cone will automatically assume the proper position and the screw "d" should then be tightened down. Care should be taken that the sides of the thrust lever, visible in Figure 2, be held at right angles to the pole pieces as shown when tightening "d".

The Loudspeaker should again be tested. If the rattle still persists it is probably due to an excessive pressure on the connecting rod which may be corrected as shown in Figure 9. A soldering iron should be applied to the point where the inner end of the stylus is soldered to the thrust lever. The solder at that point should be softened sufficiently to allow free movement of the stylus. Here again the adjustment is automatic and it is only necessary to keep the solder soft until this readjustment takes place.

## PART II

Should it become necessary to replace the field coils due to burn-out or other causes, it will be necessary to remove the entire reproducer unit.

The procedure is as follows:

1. Remove the flexible leads of the coils from the binding posts. Tag the leads as they are removed so that when the unit is reassembled they may be connected to the proper binding posts. **THIS IS IMPORTANT.**
2. Remove the small nut holding the cone to the connecting rod shown in Figure 1.

3. Remove the nuts F, Figure 10, from the upper supporting screws "H". A small open end wrench will be necessary for this operation as it is necessary to remove these nuts by inserting the wrench between the cone and the frame.

4. Unscrew the lower supporting screw G, Figure 9, and remove the strap "N".

5. Remove the unit by pulling out. Do not strain the cone or the connecting rod when removing the unit. Make certain that the connecting rod slides out freely as the unit is removed.

6. Remove the two screws "H", Figure 10, holding the motor in place. These screws thread into the spacer bushings "E".

7. Place a piece of iron on the ends of the horseshoe magnet and slide the motor off. The piece of iron takes the place of the motor and acts as a keeper on the magnet.

8. Remove the screw holding the thrust lever to the motor frame "D", Figure 2.

9. Unsolder the thrust lever from the stylus and remove Point "E", Figure 1.

10. Remove the two armature screws "C", Figures 4 and 5.

11. Disassemble the motor by removing the two countersunk screws. One of these screws "K" is shown in Figure 2. The coils are then accessible, but the armature is still in position in the center of the coils. Figure 11.

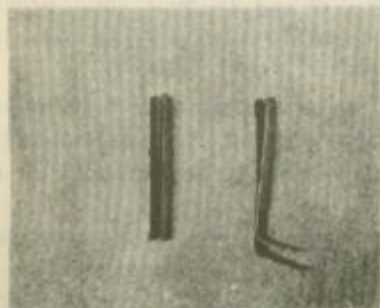


Fig. 3—Spacer tools

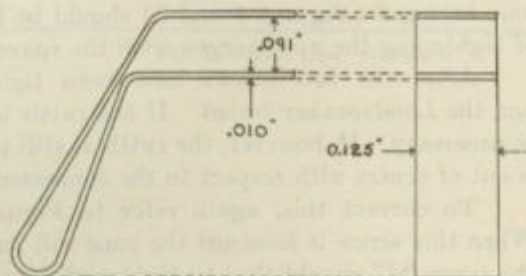


Fig. 3a—Spacer tool dimensions

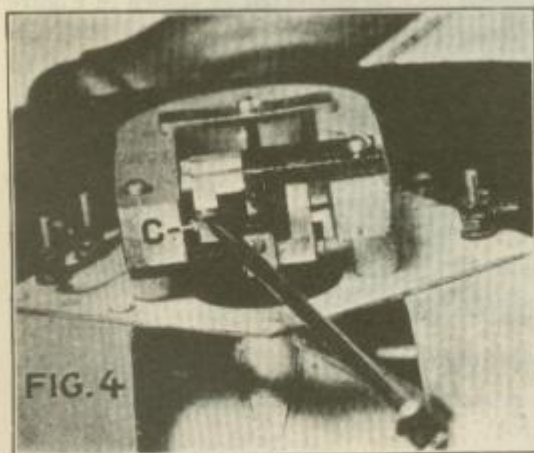


FIG. 4

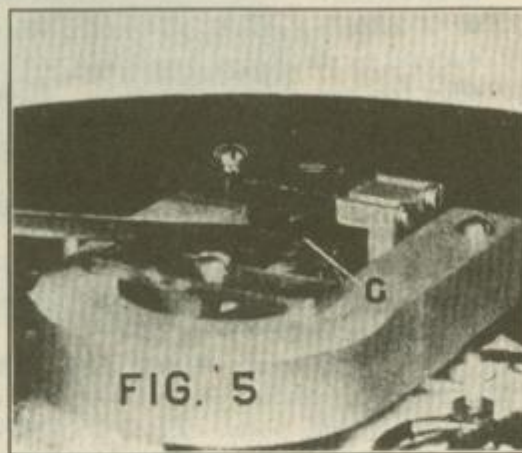


FIG. 5

Freeing the armature



12. Slip one coil over the free end of the armature and then slip the second coil off the armature and stylus. All parts before re-assembling should be thoroughly cleaned and freed from all traces of dust or dirt and metal filings, etc. Use a brush to remove foreign matter from the parts. Avoid the use of liquid cleaners as they often induce corrosion.

The re-assembly should be a reversal of the operation just described.

1. Place the coils "P"-*"P"*, Figure 11, in proper position around the armature. The small length of wire connecting the two coils in series should be at the outside of each coil when assembled, *"L"*, Figure 11.

2. Place the coils with armature in position on one of the motor side pieces, Figure 12. Place the other motor side pieces in place and screw the assembly together by means of the screw. In making this assembly make certain that the small pins *"M"*, Figure 12, projecting from the inner side of the motor side piece, separate the two field coils as shown in *"B"*, Figure 12.

3. Place the thrust lever in position and screw it in place *"d"*, Figure 2, but do not solder to the stylus at this time.

4. Replace the armature screws *"C"*, Figures 4 and 5, but do not seat them firmly.

5. Insert the spacer tools (Figure 3) in position at the top and bottom of the armature and tighten down the armature screws as described for adjusting the armature in Part I of these instructions.

6. It will sometimes happen that in tightening the armature screws the armature may be strained slightly and when the spacer tools are removed the strain causes the armature to spring out of the central position. Remove the spacer tools and note carefully whether or not the armature is centered between the pole pieces. If not repeat operation No. 5.

7. Remove the keeper and place the motor in position on the horseshoe magnet. Before seating the screws *"H"*, Figure 10, that hold the motor to the magnet push both sides of the motor down toward the curved part of the magnet. The motor should be horizontal with respect to the sides of the magnet.

8. Replace these assembled units on the Loudspeaker frames. Place the connecting rod through the cone. Place the lower supporting strap *"N"*, Figure 9, in place and tighten screw *"G"* until the unit is held in position, but not firmly.

9. Adjust the position of the unit until the connecting rod in passing through the center of the cone does not exert a vertical or horizontal pressure on the cone.

10. Seat the screw *"G"* holding the lower strap *"N"*, Figure 9, and then fasten the upper portion of the unit to the frame by means of the nuts *"FF"*, Figure 10, on the upper screws *"HH"*. When tightening these last two mentioned nuts be careful not to disturb the central position of the unit as established in 9.

11. Lock the cone to the connecting rod by the nut provided for that purpose. The thread on this nut has a pitch of 80 threads to the inch and it may be stripped very easily if too great a pressure is applied to it.

12. Solder the stylus to the thrust lever (Figure 1).

13. Reconnect the leads to the binding post.

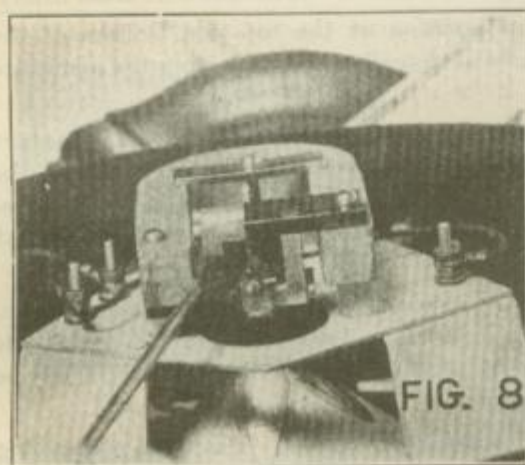
14. Test the loudspeaker and if further adjustments are necessary follow the procedure outlined in Part I of these instructions.



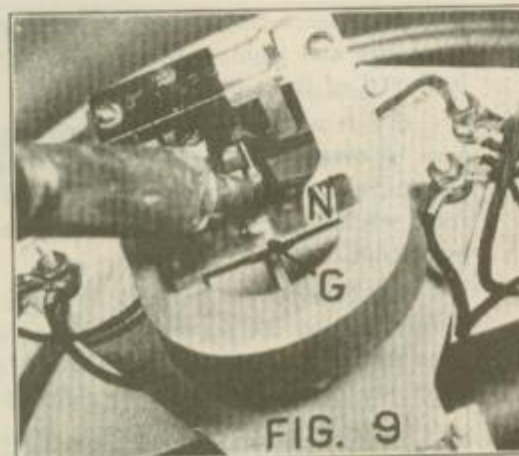
Fig. 6—Spacer tool in place, upper armature end



Fig. 7—Spacer tool in place, lower armature end



Tightening upper armature holding screw



Soldering the stylus to the thrust lever

### PART III

To replace a defective cone:

1. Remove the small nut that holds the cone to the connecting rod.
2. Remove the four screws "a", "b", "c" and "d" shown in Figure 13. When these screws are removed the entire aluminum frame may be removed from the casing. If desirable, the leads may be disconnected, but this is not necessary.
3. Remove the remaining eight screws shown in Figure 13 as "e", "f", "g", "h", "i", "j", "k" and "l".
4. Remove the outer clamping ring.
5. Remove the cone.



6. Put new cone in place. Make certain that the connecting rod passes through the center hole in the aluminum cone cap.

7. Place the cone and outside clamping ring so that all screw holes correspond with the screw holes in the casing.

8. Replace the screws, "e", "f", "g", "h", "i", "j", "k" and "l" (Figure 13). These screws should be tightened down uniformly. Do not seat one screw at a time, but tighten each little by little until all are seated properly.

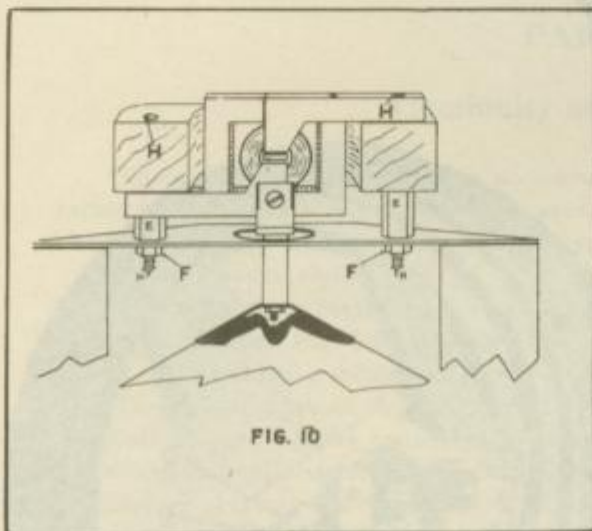
9. Provide supports and lay the casing on them in a horizontal position.

10. Allow the aluminum frame to rest on the four cleats "O", Figure 13, on the front edge of the casing.

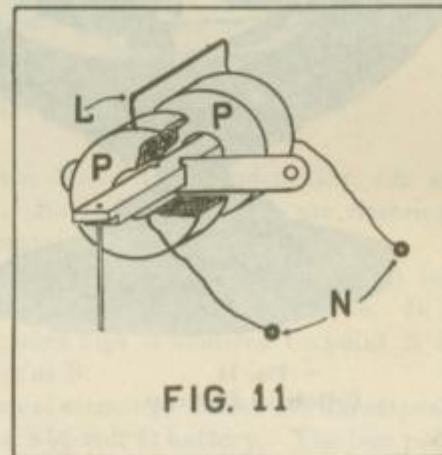
11. Center the frame in the center of the casing and replace the four screws "a", "b", "c", "d", Figure 13.

12. Test the speaker and make final adjustments.

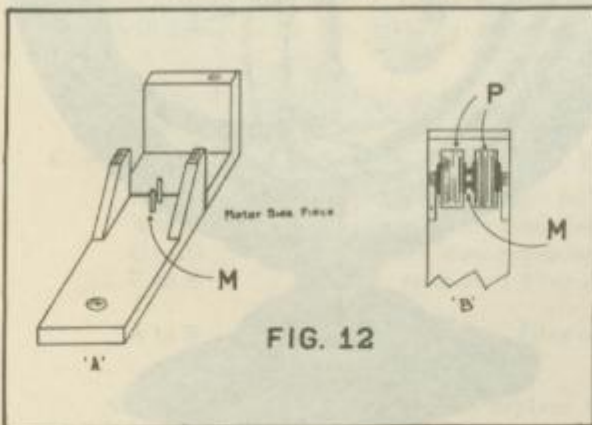
While making these adjustments the loudspeaker should be kept in a clean place free from dirt or filings. Small particles of metal are easily attracted to the mechanism in the loudspeaker due to its magnetic qualities.



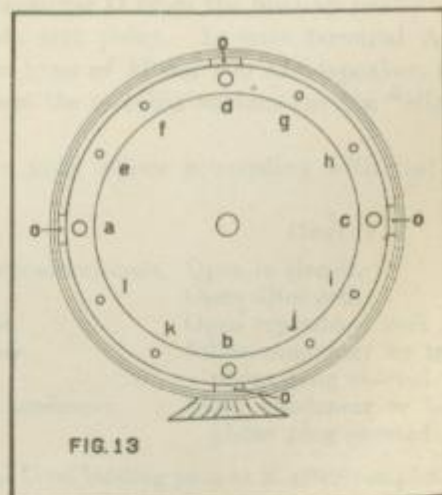
Motor and connection to cone



Coils in place around armature



Motor side piece showing separator pins



Frame, front view

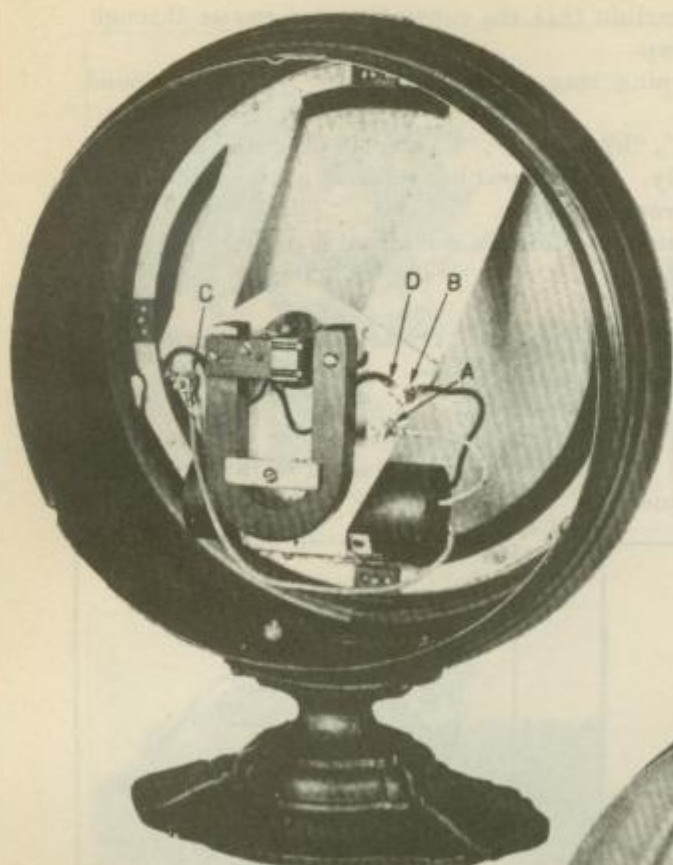


Fig. 14  
Cylindrical filter type

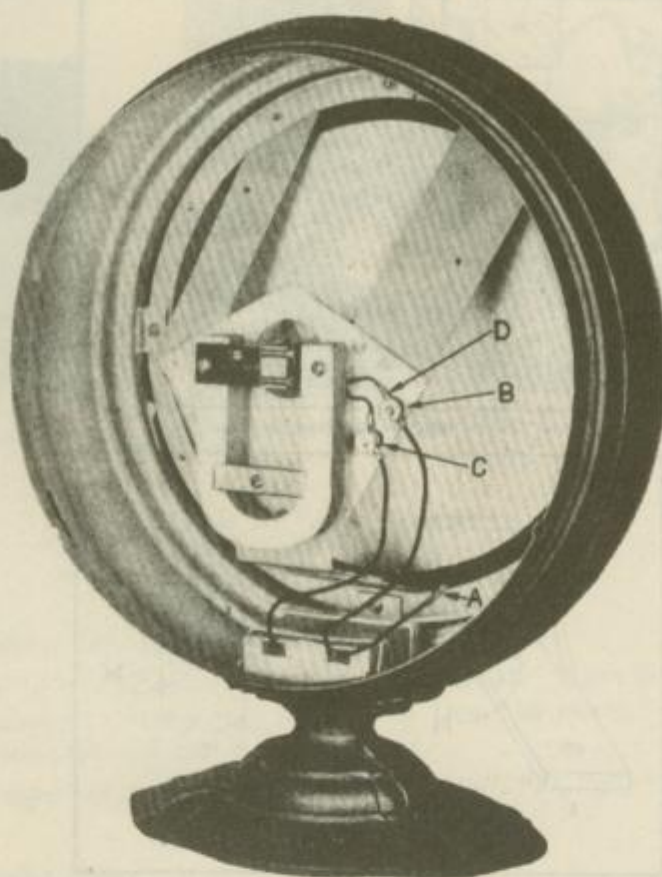
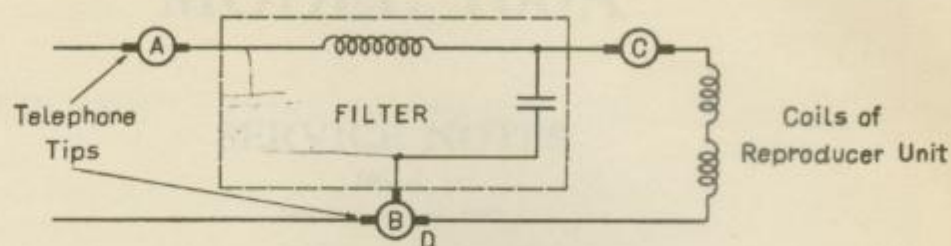


Fig. 15  
Square filter type



## CONTINUITY DIAGRAM



MODEL 100 LOUD SPEAKER

FIG. 16

## PART IV

### Continuity and Filter Tests

There are two types of filters appearing in the Model 100 Loudspeaker, one contained in a cylinder and the other in a square box. Both of these filters are electrically identical, the only difference being in the type of container employed.

In the model employing the cylindrical type of filter (Fig. 14) the input leads (phone tips) are connected to the two binding posts at A and B on the frame. In the square filter type (Fig. 15), however, one of the phone tips is soldered to point A and taped, the other being connected to the binding post at B.

The only equipment required to test the electrical circuit of Model 100 Loudspeaker is a pair of head phones connected in series with a  $4\frac{1}{2}$ -volt C battery. The test points are shown in capital letters in the circuit diagram and illustrations, Figs. 14, 15 and 16.

Before starting the "click" test, disconnect terminal D from the binding post at B. This free terminal D will then become a separate test point. In case terminal A is a taped connection, as it is in the square box filter type of Model 100 Loudspeaker, the tape will have to be temporarily removed to expose the metallic surface for the "click" test.

Remove loudspeaker plug from radio receiver jack before proceeding with test.

CONTACT POINTS	CORRECT EFFECT	DEFECT
A to D	Click, closed thru filter coil and reproducer coils.	Open in circuit.
A to C	Click, closed thru filter coil.	Open filter coil.
C to D	Click, closed thru reproducer coils.	Open reproducer coil.
C to B	No click, open thru filter condenser.	Filter condenser or telephone plug shorted.
A to B	No click, open thru filter coil and condenser.	Filter condenser or telephone plug shorted.

**NOTE.**—Care should be taken to replace terminal D on binding post at B after completion of "click" test.

# CONTINUITY DIAGRAM



MODEL 100

100-10

PARTS

Continuity and Bell



There are two types of continuity tests. One is a test for continuity between two points. The other is a test for continuity between a point and ground. The test for continuity between two points is done by connecting the two points to the terminals of the continuity tester. The test for continuity between a point and ground is done by connecting one terminal of the continuity tester to the point and the other terminal to ground. If there is continuity, the lamp will light and the bell will ring. If there is no continuity, the lamp will not light and the bell will not ring.

The continuity tester is a very useful tool for checking the continuity of electrical circuits. It can be used to check the continuity of wires, switches, and other electrical components. It can also be used to check the continuity of the ground connection. The continuity tester is a simple and easy-to-use tool that can be used by anyone with a basic understanding of electricity.