

## Philco Radio & Television Corp.

	<b>Model:</b> <a href="#">M-9C</a>	<b>Chassis:</b>	<b>Year:</b> <a href="#">Pre 1950</a>
	<b>Power:</b>	<b>Circuit:</b>	<b>IF:</b>
	<b>Tubes:</b>		
	<b>Bands:</b>		

### Resources

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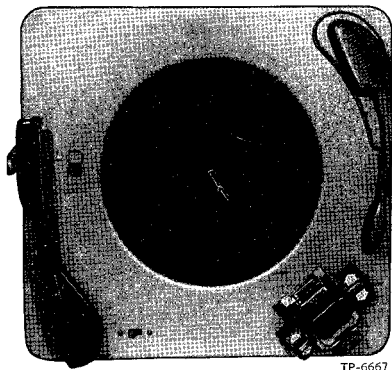
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TP-6667

**Figure 1. Philco Record Changer and Record Player Combination, Model M-9C**

## INTRODUCTION

The Philco Automatic Record Changer and Record Player Model M-9C, figure 1, which is used in several 1949 Philco radio-phonograph combinations, incorporates the use of

two tone arms. One tone arm is used in conjunction with the record-changer mechanism, which plays ten 12" records or twelve 10" records automatically at the standard speed of 78 r.p.m. The other tone arm is used manually, to play the new Columbia Long Playing Records at a speed of 33-1/3 r.p.m.; the record player shuts off automatically at the end of the Long Playing Record.

## DESCRIPTION OF OPERATING CYCLES

Power is applied to the motor through an off-on switch and a mercury switch which is controlled by the position of the record-player tone arm. The two switches are connected in series.

A control is mounted on each side of the record-shelf assembly. The REJ.—AUT.—MAN. control controls the record-changer section of the combination. The STD. PLAY—LONG PLAY control has two functions. When it is pushed to LONG PLAY, a link underneath the base plate pulls a selector lever mounted on the base plate. The selector lever is connected to a shift lever which is part of the motor. On this shift lever is mounted a pulley which is connected

by a belt to the motor shaft, as shown in figure 2. When the control is in LONG PLAY position, this pulley, which is larger in diameter than the motor shaft, engages and drives the idler wheel, which in turn drives the turntable at the slow speed of 33-1/3 r.p.m. When the control is at STD. PLAY, the larger pulley is retracted and the motor shaft engages the idler wheel, to provide a turntable speed of 78 r.p.m. By action of the STD. PLAY—LONG PLAY control, the double-pole, single-throw switch, mounted on the base plate under the turntable, is actuated. To this switch are connected the output leads of the two tone arms. When the control is at LONG PLAY position,

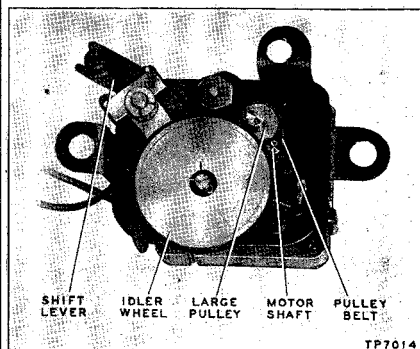


Figure 2. Motor, Showing Pulley, Bolt, and Shift Lever

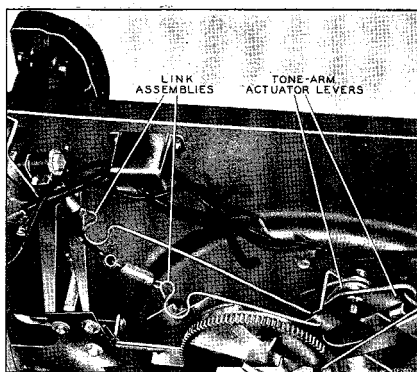


Figure 4. Link Assemblies and Actuator Levers

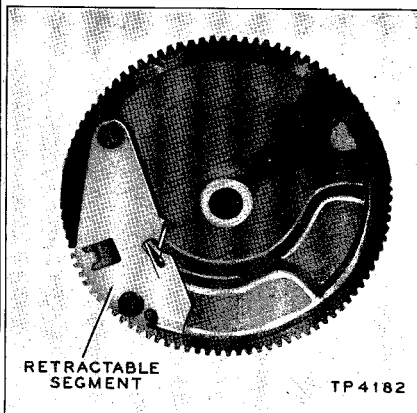


Figure 3. Cam Gear, Showing Retractable Segment

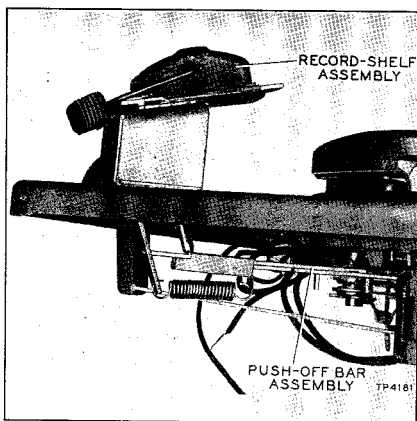


Figure 5. Record-Shelf and Push-Off Assemblies

the switch cuts out the output from the record-changer tone arm and closes the circuit for the record-player tone arm. When the control is at STD. PLAY, the reverse action takes place.

The record-changer change cycle takes place when the turntable hub gear, which is part of the turntable shaft, engages the cam gear through a retractable segment mounted on the cam gear; see figure 3. This retractable segment is brought into position by the action of the trip mechanism. The cam then operates the changer mechanism.

The record-changer tone arm is operated by two link assemblies (figure 4) attached to actuator levers,

which are in contact with the cam surface of the cam gear. The record-shelf push-off mechanism is connected through a series of bars, to a push-off actuator (figure 5). The mechanism is operated when a roller, mounted on the cam gear, comes in contact with the actuator. The trip mechanism is operated by a trip finger riding over a ratchet screw (figure 6), which starts the change cycle when the needle is traveling in the eccentric finish groove of the record. The trip mechanism is locked in a disengaged position when the REJ.—AUT.—MAN. control is in the MAN. position.

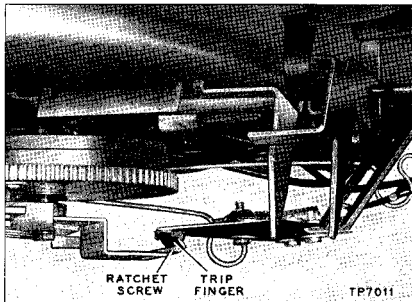


Figure 6. Trip Finger and Ratchet Screw

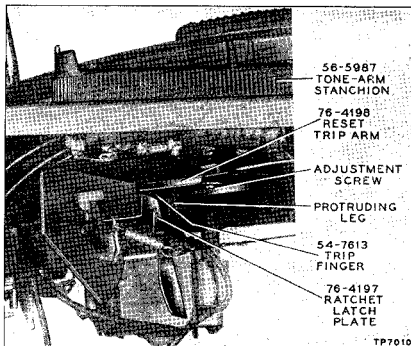


Figure 7. Trip Assembly, Showing Trip Finger Riding Over Ratchet Plate

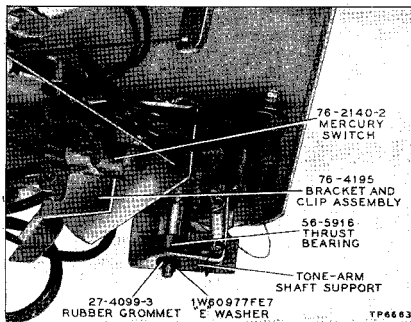


Figure 8. Mercury Switch, Shown in ON Position

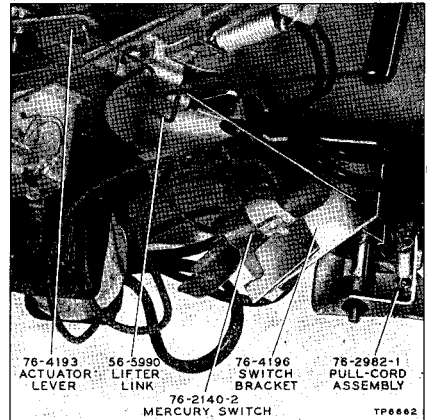


Figure 9. Mercury Switch, Shown in OFF Position

The record-player section contains a separate tone arm. Attached to this tone arm is a reset and trip-arm assembly, which has a protruding leg and trip finger (figure 7). When the tone arm of the record player is resting on the rest post, the leg on the reset trip arm contacts an ear of the bracket-clip assembly (mounted on the switch bracket), and this tips the mercury switch mounted on it to the ON position, (figure 8). The motor circuit is now controlled only by the on-off switch.

When the record-player tone-arm needle is traveling in the eccentric finish groove of the record, the trip finger, which is mounted on the reset trip arm, rides over a ratchet on the ratchet latch plate. The ratchet latch plate is mounted on the switch assembly (figure 7), and trips the latch, causing the bracket-clip assembly to drop and tip the mercury switch to the OFF position (figure 9). This opens the motor circuit and stops the turntable.

A pull cord and link assembly is attached to the record-player tone arm, and is connected to a link-actuator lever. This permits the tone arm to be lifted and set on its rest post if the record changer is put into a change cycle. The pull-cord assembly, Part No. 76-2982-1, and the link-actuator lever, Part No. 76-4193, are shown in figure 9.

## RECORD-CHANGER TESTING AND TROUBLE-SHOOTING PROCEDURE

### Pickup Test

Play a familiar record on the phonograph and note the volume and tone quality.

#### NOTE

It is advisable to carry a familiar record as a part of the service test equipment.

If distortion is noted, try a new needle. If the distortion persists, a faulty crystal pickup is indicated; refer to page 12.

### Changer-Mechanism Test

The following series of record-changer operating tests is given for quickly locating any trouble that may be encountered. Each test should be performed with several records before making any adjustments.

Set the record shelf to the 10" position and place the tone arm on the rest post. Place a 10" record over the spindle and onto the record shelf. Push the STD. PLAY—LONG PLAY control to STD. PLAY.

Push the REJ.—AUT.—MAN. control to REJ. and observe the record-dropping action. The record should fall smoothly, with the edge of the record leaving the lips of the record shelf *after* the center has started to fall. Adjustment of the record shelf is given on page 9.

The tone arm should rise from the rest post, and the needle should come down on the record, about  $\frac{1}{8}$ " from the outer edge. The index adjustment is given on page 7.

Play the record through and observe the tripping action; the trip mechanism should operate within the first two or three revolutions after the needle has entered the eccentric finish groove. Trip adjustments are given on page 9.

Remove the record from the turntable and set the record shelf to the 12" position. Place a 12" record over the spindle and onto the record shelf. Push the

REJ.—AUT.—MAN. control to REJ., and observe the record-dropping action. The edge of the record should leave the lips of the record shelf *after* the center has started to fall. (Refer to page 9 for the record-shelf adjustment, if needed.) The tone arm should rise from the rest post and the needle should come down on the record, about  $\frac{1}{8}$ " from the outer edge. If the index adjustment is required, refer to page 7.

Observe whether the lower edge of the tone arm, during a change cycle, clears the top of the hook on the tone-arm rest post by a minimum of  $\frac{1}{8}$ ". Take the tone arm off the rest post, and place the pickup over the changer base plate; the needle point should clear the base plate by at least  $\frac{1}{16}$ ", and should be no higher than the turntable top. Lift and height adjustments are given on page 7.

### Turntable and Motor Test

#### NOTE

Before making this test, warm up the motor by allowing it to run for at least ten minutes.

Set the REJ.—AUT.—MAN. control to MAN., and set the STD. PLAY—LONG PLAY control to STD. PLAY. Load the turntable with ten 12" records, and place the tone arm on the top record.

Place a stroboscope disc, such as Philco Part No. 45-1614, on the record, and illuminate the disc with a lamp (preferably a neon bulb) operated on 60-cycle a.c. The dots in the row calibrated for 78 r.p.m. should appear to remain stationary, or to drift very slowly, but smoothly, backward or forward.

If the turntable speed is steady, but is appreciably below 78 r.p.m., refer to the lubrication data on the turntable upper bearing, and check the idler wheel, idler spring, wiring, etc.

Unsteady drift of the dots on the stroboscope disc indicates uneven turntable speed, which is the cause of wows; see UNEVEN TURNTABLE SPEED (WOWS), page 11.

## RECORD-CHANGER CLEANING AND LUBRICATION

The Model M-9C record changer, like any other mechanism, requires lubrication after long periods of use. Whenever a major part or an assembly is to be replaced, the changer should be cleaned and lubricated. Carbon tetrachloride or other similar cleaning fluids may be used to remove old grease, oil, and dirt. Apply lubricants sparingly.

All lubrication points are shown in figures 10 and 11. It may be necessary to remove some parts and as-

semblies in order to lubricate their bearings—for example, the actuator and cam gear must be removed to lubricate the actuator stud and the cam-gear spindle.

### PARTS NOT TO BE LUBRICATED

The following parts should not be lubricated at any time: Trip receiver, trip finger, ratchet screw on trip plate, selector, and all parts of the record-player section.

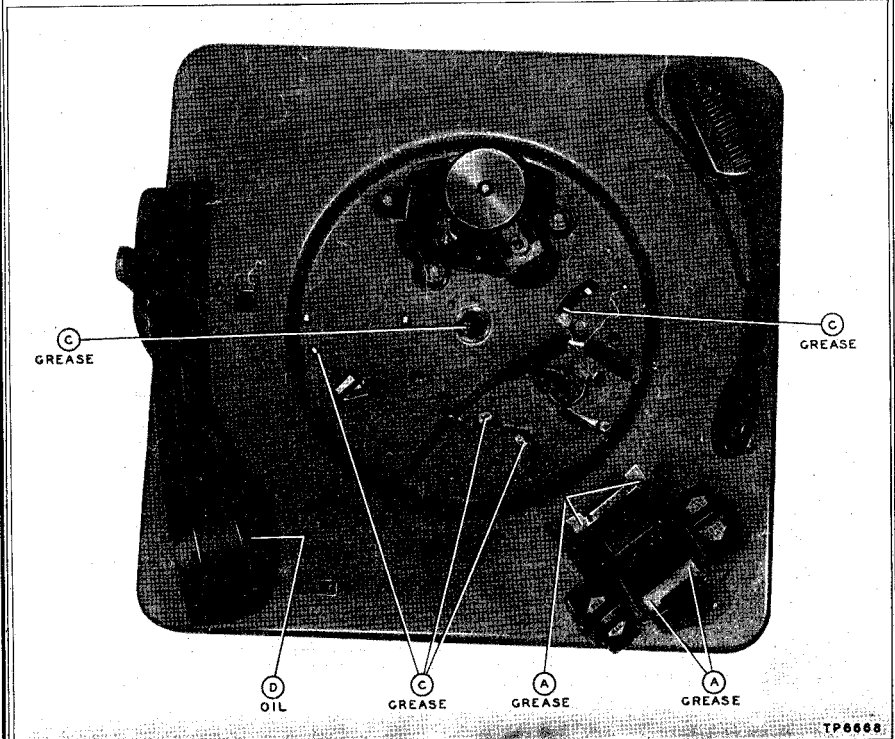


Figure 10. Top View, Showing Lubrication Points

### PARTS TO BE GREASED

The following parts are to be lubricated with a grease having the consistency of vaseline:

#### Record-Shelf Assembly (Point A of Figure 10)

Four protruding dimples.

#### Bridge Assembly and Slider Control Bar (Point B of Figure 11)

Three dimples and four upturned ears.

#### Cam Gear (Point C of Figure 11)

Cam-gear teeth, cam surfaces, and cam-gear spindle.

#### Main Assembly (Points C of Figures 10 and 11)

Trip-plate ear where contact is made with gear segment.

Actuator stud.

All parts with ears sliding on changer base plate.

Index-lever surface which slides on base plate.

Push-off-actuator dimples which slide on base plate.

Turntable shaft (upper bearing).

Tone-arm shaft.

### PARTS TO BE OILED

The following parts are to be lubricated with S.A.E. 20 oil:

#### Tone Arm (Point D of Figure 10)

Tone-arm pivot pin where pin rides in elongated hole of tone arm—apply one drop with a pointed rod.

#### Trip-Plate Bushings (Point E of Figure 11)

#### Spindle (Point E of Figure 11)

#### Cam-Gear Roller (Point E of Figure 11)

### CAUTION

Do not get any oil or grease on the motor shaft or the idler-wheel tire. Should this occur, remove the oil or grease immediately with carbon tetrachloride.

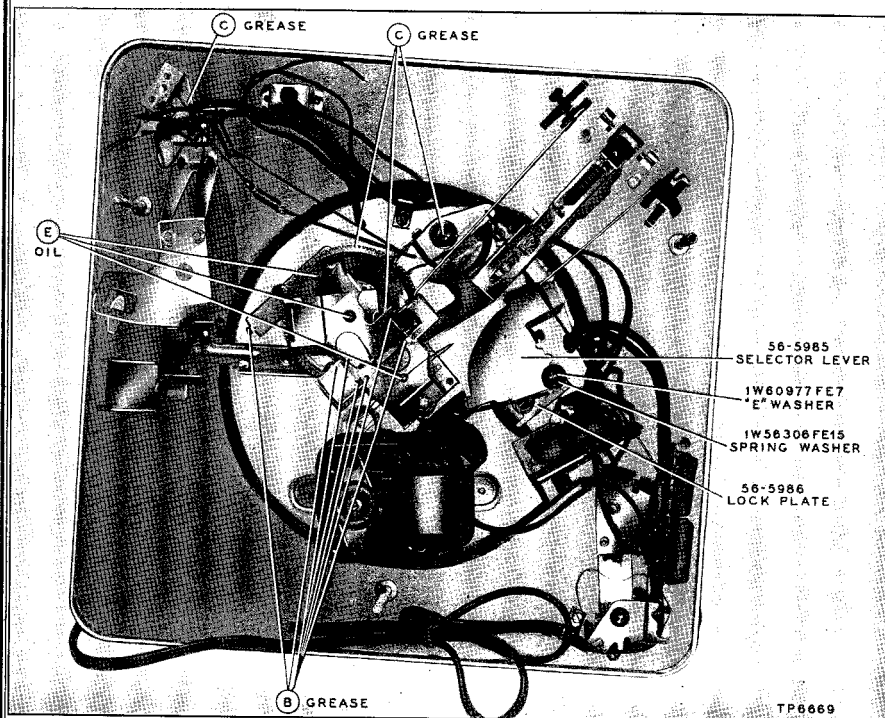


Figure 11. Bottom View, Showing Lubrication Points

## RECORD-CHANGER ADJUSTMENTS

### 10" Index Adjustment

Place a 10" record on the turntable, push the REJ.—AUT.—MAN. control to REJ., and rotate the turntable  $4\frac{1}{2}$  turns by hand. The tone arm should then be approximately  $\frac{1}{2}$ " above the record.

Loosen the clamp screw on the trip arm (figure 12). Hold the tone arm (steady)  $\frac{1}{8}$ " in from the edge of the record, and set the trip arm so that the trip-arm stop is in contact with the selector hinge (Part No. 56-4617FA3). See figure 13.

Tighten the clamp screw, leaving  $\frac{1}{32}$ " vertical play, or clearance, between the trip arm and the base plate.

### 12" Index Adjustment

Make the 10" index adjustment first. The 12" indexing will ordinarily be satisfactory after the 10"

adjustment is made; if not, bend the selector, Part No. 56-4618FE15, slightly to the right or left as required for proper indexing of the needle on the record, as shown in figure 14.

### Tone-Arm Height and Lift Adjustments

With the changer out of cycle (change cycle completed; tone arm lowered), and the tone arm off the rest post, the needle point should clear the changer base plate by at least  $\frac{1}{16}$ ", and should not be higher than the turntable top. To adjust the height, shape the top ear of the tone-arm swivel, shown in figure 15 (bending the ear downward raises the tone arm).

To adjust the lift, take the tone arm off the rest post, push the REJ.—AUT.—MAN. control to REJ., and rotate the turntable approximately  $1\frac{1}{2}$  turns by

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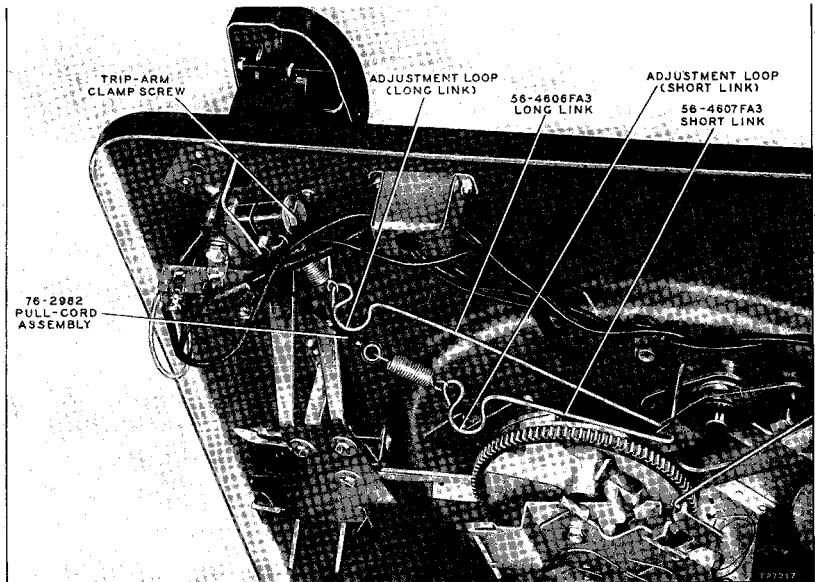


Figure 12. Loop Adjustments and Trip-Arm Clamp Screw

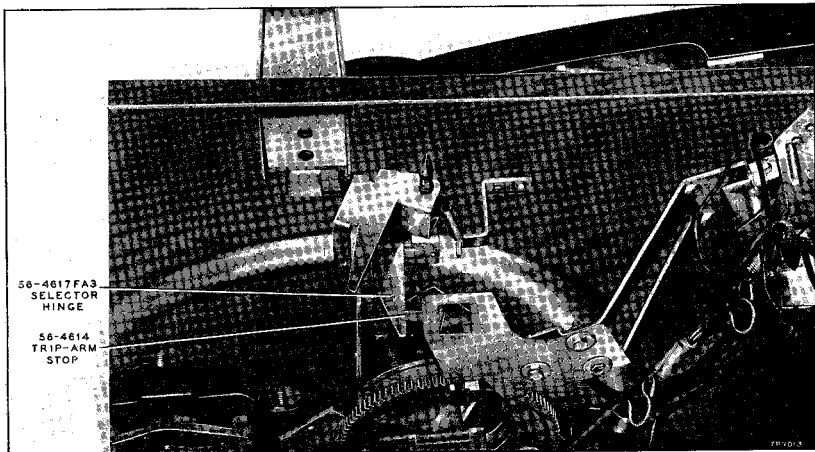


Figure 13. 10' Indexing Adjustment



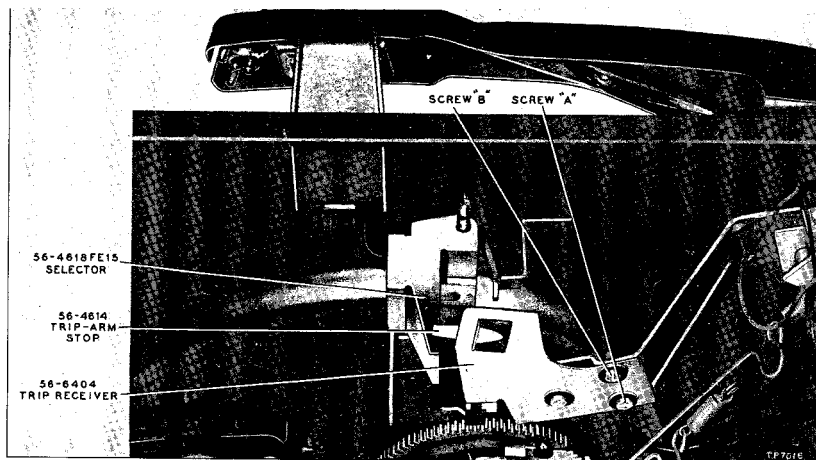


Figure 14. 12" Indexing Adjustment, Showing Trip Stop Arm in Contact with Outside Selector

hand until the tone arm comes against the rest post. The lower edge of the tone arm should clear the top of the protruding hook on the rest post by not less than  $\frac{1}{8}$ ", and not more than  $\frac{1}{4}$ ". Adjust by shaping the lower ear of the tone-arm swivel, shown in figure 16 (bending the ear downward raises the tone arm).

### Tone-Arm Vertical and Horizontal Timing Adjustments

#### NOTE

Before making these adjustments, make the tone-arm height and lift adjustments given above.

For the vertical adjustment, start with the changer out of cycle. Push the REJ.—AUT.—MAN. control to REJ., and rotate the turntable, by hand, three-quarters of a revolution; this setting can be obtained more accurately by making a mark on the turntable to coincide with some starting point. At the three-quarter-revolution point, the leading edge of the cam surface is approximately  $\frac{1}{4}$ " from the end of the lift actuator lever, Part No. 76-4193; this is the lower actuator lever, shown in figure 17. Adjust the wire loop of the short link, cord, and spring assembly (figure 12), attached to the tone-arm lift pin, by squeezing or opening the loop until the tone-arm lift pin makes contact with the lower ear of the tone-arm swivel.

For the horizontal adjustment, rotate the turntable another three-quarters revolution from the point at which the vertical adjustment was made. At this point, the leading edge of the cam surface is approximately  $\frac{1}{4}$ " from the end of the horizontal-return actuator lever; this is the upper actuator lever, Part No. 76-2987, shown in figure 18. Adjust the wire loop of the long link and spring assembly (figure 12), attached

to the trip arm, by squeezing or opening the loop until the tone arm makes contact with the rubber bumper on the tone-arm rest post.

### Trip-Finger and Trip-Receiver Adjustments

For the trip-finger adjustment, move the tone arm toward the spindle. Adjust the screw on the trip-receiver plate (figure 19) so that the trip finger, when riding over the ratchet screw on the trip plate, assumes an angle of  $25^\circ$  to  $30^\circ$  with respect to the screw.

For the trip-receiver adjustment, place the tone arm on a record with the needle in the eccentric finish groove. The vertical center line of the trip finger should coincide with the center line of the ratchet screw. To adjust the centering of the trip finger over the ratchet screw, loosen screw B slightly, and screw A completely; see figure 19. Rotate the trip receiver about screw B, as a center. Tighten the screws when the trip finger is centered.

Approximately  $\frac{1}{8}$ " of the trip-arm stop should engage the selector; see figure 19. To adjust the engagement of the trip-arm stop, loosen screw A slightly, and screw B completely. Rotate the trip receiver about screw A, as a center, to obtain the correct adjustment. Tighten the screws.

The above adjustments will affect each other slightly; therefore, it may be necessary to repeat each adjustment until both are correct. After making the above adjustments, it will be necessary to correct the index adjustments.

### Record-Shelf Adjustment

Place the shelf in the 10" position, and the changer out of cycle. Place the Philco record-shelf gauge, Part No. 45-1470 (also used for M-4), over the spindle and

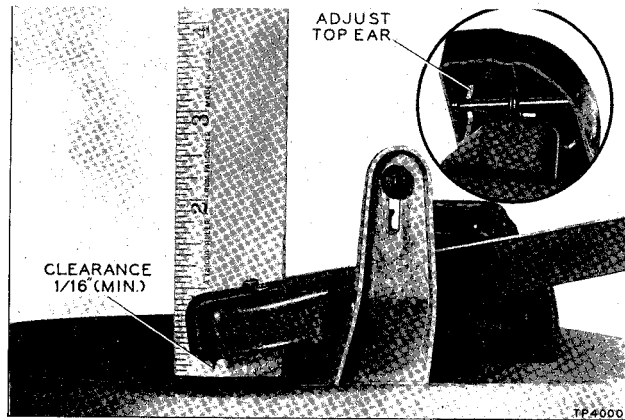


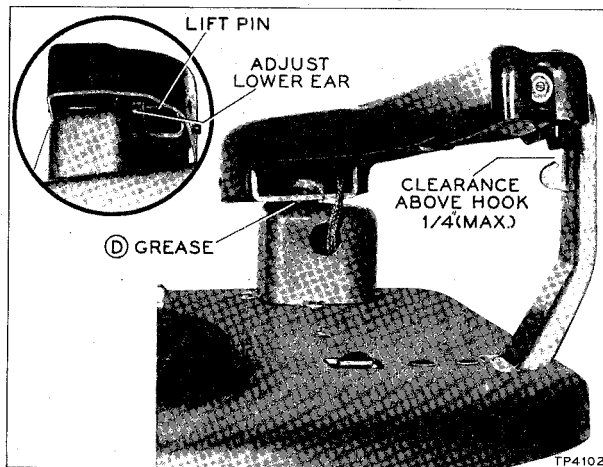
Figure 15. Tone-Arm Height Adjustment

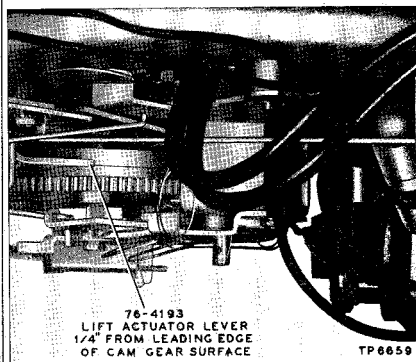
onto the record shelf, as shown in figure 20. Loosen the two hex-head screws which hold the record-shelf assembly to the changer base plate. Move the record-shelf assembly away from the record spindle until the large curved part of the gauge drops even with the record-shelf lips, as shown in figure 20. Now push the record shelf and gauge lightly against the spindle, taking out all play toward the spindle; keep the lips of the record shelf in even contact with the edge of the gauge. Tighten the two hex-head screws.

#### Push-Off Adjustment

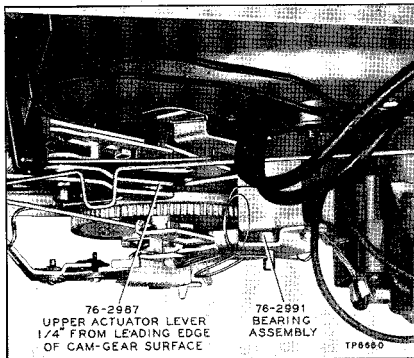
Push the REJ.—AUT.—MAN. control to REJ., and rotate the turntable  $2\frac{1}{2}$  revolutions, by hand; at this point, the push-off actuator, Part No. 56-4588FA3, is in its most forward position, in contact with the roller on the cam gear; see figure 21. Loosen the push-off-bar locking screw, shown in figure 21. Squeeze the push-off-bar ears toward each other to the point where the slider blade on the record shelf extends  $\frac{1}{32}$ " beyond the lips of the shelf. Tighten the hex-head locking screw.

Figure 16. Tone-Arm Lift Adjustment





**Figure 17. Tone-Arm Vertical Timing Adjustment, Showing Lower Actuator Lever in Contact with Cam Gear**



**Figure 18. Tone-Arm Horizontal Timing Adjustment, Showing Upper Actuator Lever in Contact with Cam Gear**

### Uneven Turntable Speed (Wows)

Uneven turntable speed (wows) may be caused by the following:

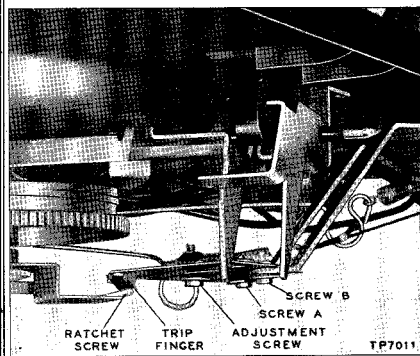
Dirt under and around the turntable or idler-wheel assembly. Remove the turntable and clean out the dirt. Be careful to lift the turntable straight up after removing the spindle first (see page 12). When replacing the turntable, be sure that the idler is behind the turntable rim before the turntable is fully lowered

(the spindle may be used to hold the idler back).

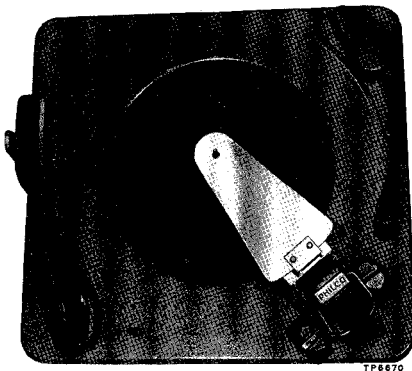
Flat or worn spots, or grease, on the rubber tire of the idler wheel.

Defective turntable shaft or bearing assembly.

Replace the defective parts as directed under REPLACEMENT OF PARTS AND ASSEMBLIES, page 12. If the 33-1/3 r.p.m. speed is incorrect, replace pulley belt, Part No. 45-6479 (remove idler wheel to replace belt).



**Figure 19. Trip-Finger and Trip-Receiver Adjustments**



**Figure 20. Shelf Gauge, Shown in Correct Position on Record Shelf and Spindle**

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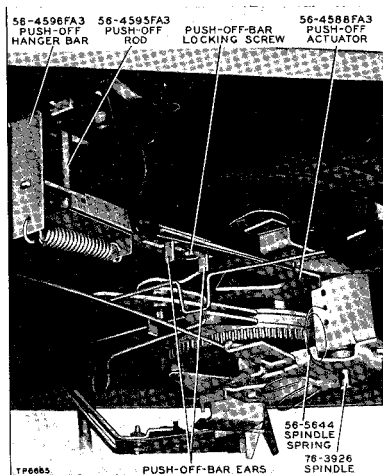


Figure 21. Push-Off Adjustment, Showing Push-Off Actuator in Contact with Roller on Cam Gear

## REPLACEMENT OF PARTS AND ASSEMBLIES ON RECORD CHANGER

The following procedures are recommended for correct replacement of parts and assemblies on the record changer. The part should be replaced by reversing the order of removal, and adjusted according to the directions given in the RECORD-CHANGER ADJUSTMENTS section of this manual.

When any part is to be removed, the REJ.—AUT.—MAN. control should be in the AUT. position, and the changer should be out of cycle.

### 1. Needle, Part No. 45-1597

To remove needle, loosen knurled nut under crystal cartridge, and pull needle out.

### 2. Crystal-Pickup Cartridge, Part No. 35-2671-1

- Bring tone arm toward center of turntable.
- Remove the two screws, nuts, lock washers, and spacers which hold cartridge to tone arm.
- Drop cartridge below tone arm sufficiently to allow removal of the two clips from cartridge, as shown in figure 22. If pickup leads are shielded, unsolder shield.

#### NOTE

When mounting cartridge, be sure to insert long spacer in side toward spindle.

### 3. Spindle, Part No. 76-3926

- Unhook both ends of spindle spring, Part No. 56-5644, from "U"-shaped bracket mounted under changer base plate (figure 21).
- Uncoil ends of spring through spindle.
- Pull out spindle.

### 4. Motor, Part No. 35-1371

- Push REJ.—AUT.—MAN. control to MAN. position.
- Remove spindle as directed in paragraph 3 above.
- Unsolder motor lead from mercury switch.
- Disconnect second motor lead by unsoldering it at splice from switch lead. The motor assembly is shown in figure 23.
- Remove ground lead from lug on motor.
- Remove the three screws, washers, and bushings from motor frame (figure 23), and lift out motor.

### 5. Tone-Arm Assembly, Part No. 35-2663-2

- Unsolder tone-arm leads from terminal panel on underside of changer base plate.
- Loosen clamp screw which holds trip arm to tone-arm shaft, Part No. 76-2983FA2 (figure 12). Lift out tone arm and shaft. The tone-arm assembly is shown in figure 22.

### 6. Bridge Assembly, Part No. 76-2978

- Remove the two hex-head screws from bridge plate.
- Remove link rod, Part No. 56-4589FA3, from slider control bar. Complete assembly of bridge is shown in figure 24.

### 7. Trip Plate, Part No. 76-2990

- Remove bridge assembly, Part No. 76-2978, as directed in paragraph 6 above.
- Slide trip plate, Part No. 76-2990, off cam-gear spindle.

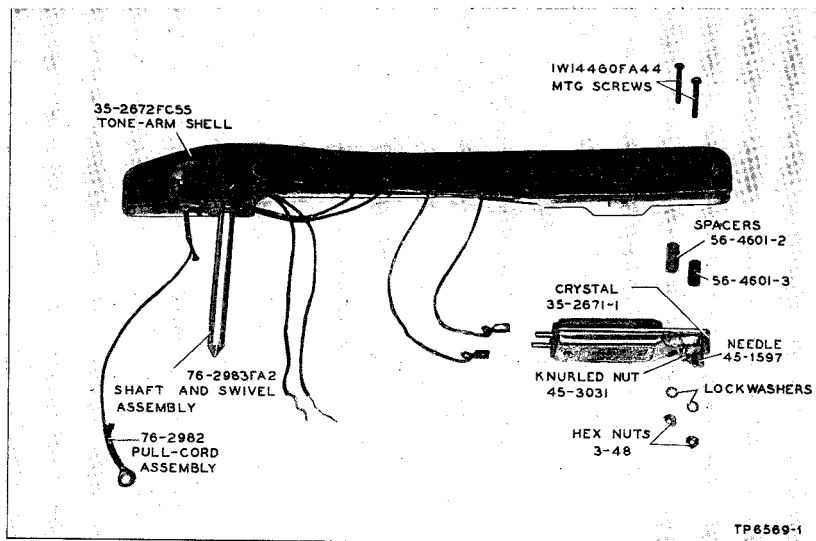


Figure 22. Record-Changer Tone-Arm Assembly, Part No. 35-2663-2

**8. Cam-Gear Assembly, Part No. 76-2989**

a. Remove bridge assembly and trip plate as directed in paragraphs 6 and 7 above.

b. Remove ball-bearing assembly, Part No. 76-2991 (figure 18), by pulling it off.

c. Remove large "E" washer, Part No. 1W60980FE5, from cam-gear spindle, and slide off cam washer, Part No. 1W52627.

d. Slide cam gear off spindle. The cam-gear assembly is shown in figure 25.

**9. Tone-Arm-Actuator Levers, Part No. 76-2987**

a. Remove "E" washer, Part No. 1W60980FE5, from actuator stud.

b. Disengage short link, Part No. 56-4607FA3, from link spring.

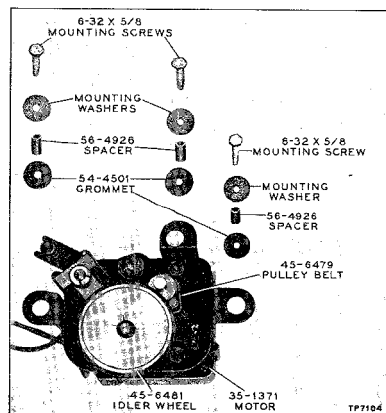


Figure 23. Motor Assembly

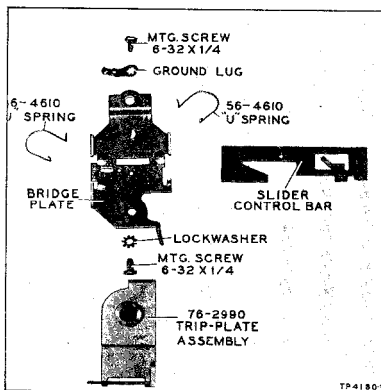


Figure 24. Bridge Assembly

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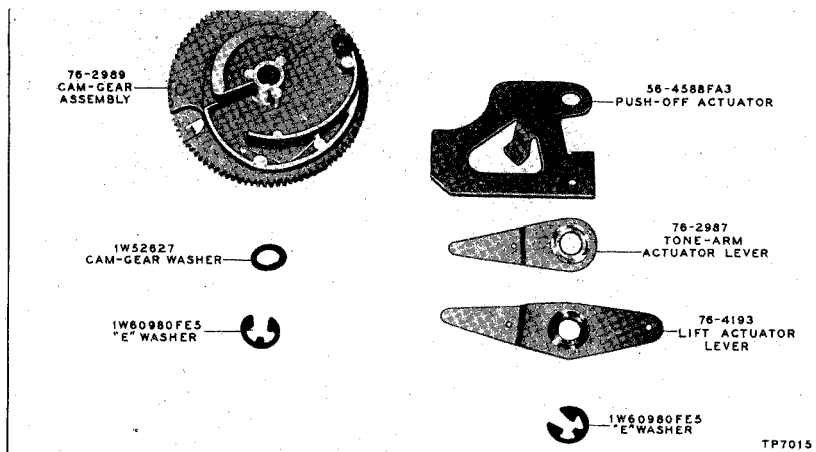


Figure 25. Cam-Gear Assembly and Actuator Levers

- c. Slide lower actuator lever from stud.
- d. Disengage lifter link, Part No. 56-5990, from actuator lever.
- e. Remove upper actuator lever from stud, and disengage long link, Part No. 56-4606FA3. The actuator-lever assembly is shown in figure 25.

#### 10. Push-Off Actuator, Part No. 56-4588FA3

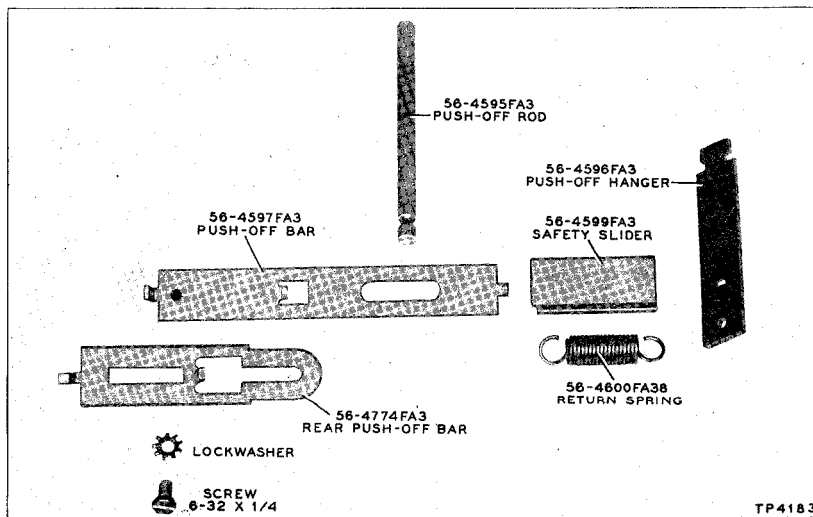
- a. Remove selector lever, Part No. 56-5985, as directed on page 20, paragraph 8.

- b. Remove tone-arm actuator levers as directed in paragraph 9 above.

- c. Press push-off rod, Part No. 56-4595FA3, and push-off hanger bar, Part No. 56-4596FA3 (figure 21), together and pull downward, to release the entire assembly.

- d. Slide push-off actuator, Part No. 56-4588FA3, over, to align upturned ears with cut out in base plate. Slide actuator off stud.

Figure 26. Push-Off Assembly



## NOTE

After removing the push-off actuator and push-off-bar assembly, the slider blade on the record shelf may slide out of the assembly. When reassembling, this blade should be inserted in the record-shelf assembly, with the elongated hole toward the 12" position of the record shelf. The push-off assembly is shown in figure 26.

## 11. Record-Shelf Assembly

- Remove push-off assembly as directed in step c of paragraph 10.
- Remove the two hex-head screws which hold record-shelf assembly to base plate.
- Align ears on record-shelf assembly with cut out on base plate. Lift out record-shelf assembly. The record-shelf assembly is shown in figure 27.

## 12. REJ.—AUT.—MAN. Control Assembly, Part No. 54-4479-1

- Remove flat spring, Part No. 56-4778FA38, by sliding it laterally through underside of button (figure 21).
- Remove the two hex-head screws, and drop bridge assembly, Part No. 76-2978.
- Disengage control link, Part No. 56-4589FA3, from underside of control button (figure 8). Lift out control button.

## 13. STD. PLAY—LONG PLAY Control, Part No. 54-4634

- Remove flat spring, Part No. 56-4778FA38, by sliding it laterally through underside of button.
- Remove selector lever, Part No. 56-5985, as directed in paragraph 8, page 20.
- Disengage selector link, Part No. 56-5991, from selector lever (figure 8).
- Lift out control button.

## 14. Trip-Arm Assembly

- Loosen clamp screw on trip arm, Part No. 76-4204 (figure 12).
- Raise tone arm and shaft sufficiently to clear trip arm. Remove trip arm, and disengage link spring.

## NOTE

When assembling, maintain  $\frac{1}{32}$ " vertical play (clearance between trip arm and base plate) in tone-arm shaft.

## 15. Trip-Receiver Assembly, Part No. 56-6404

- Remove the three screws, washers, and nuts from trip arm (figure 28).
- Remove trip receiver.

## 16. Selector Assembly

Remove cam gear as directed in paragraph 8. Remove feeler spring from attachment point on motor board. Tilt selector assembly, and remove from base plate.

## NOTE

When assembling selector assembly, be sure to maintain .005" clearance between selector hinge, Part No. 56-4617FA3, and washer, Part No. 2W53954. For correct assembly, refer to figure 29.

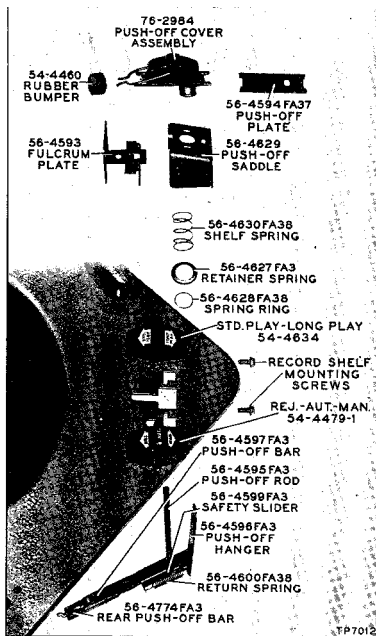


Figure 27. Record-Shelf Assembly

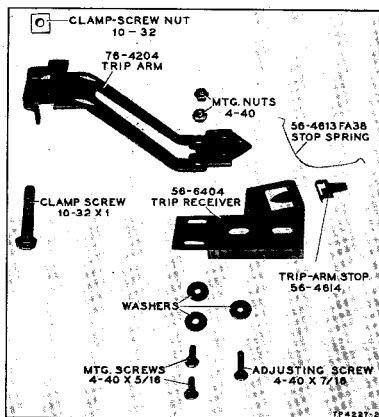


Figure 28. Trip-Arm and Trip-Receiver Assemblies

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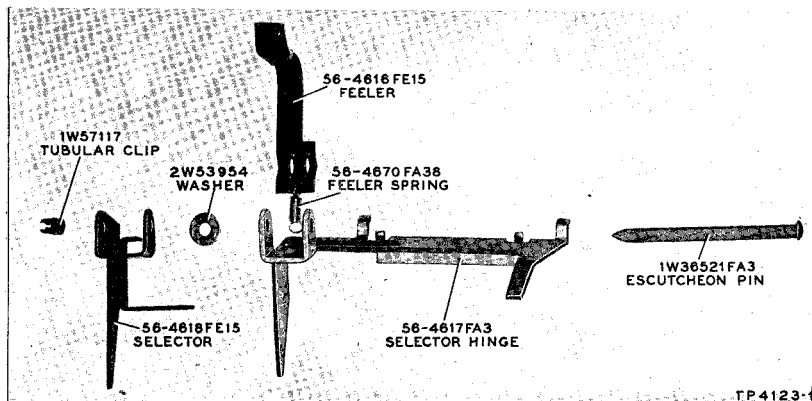


Figure 29. Selector Assembly

## RECORD-PLAYER TESTING AND TROUBLE-SHOOTING PROCEDURE

### Pick-Up and Needle Test

Place a 12" Columbia Long Playing Record on the turntable, lift the tone arm from the rest post, and place it on the starting groove of the record. Listen to the tone of the record. If distortion is noted, replace crystal cartridge as directed on page 12. If trouble persists, check for loose wiring, bad contact points, etc.

### Shut-Off Test

Place the tone arm in the finish groove of the record and observe the shut-off action. The record player should shut off within three revolutions of the turntable, after the pickup needle has entered the finish groove of the record. The trip adjustments are shown on page 9.

### Clearance Test

Remove the record from the turntable and place the tone arm over the base plate. Observe whether there is a minimum of  $\frac{1}{4}$ " clearance between the needle point and base plate. Refer to page 7 for adjustment.

### Turntable and Motor Test

Allow the motor to run for at least five minutes; then place a stroboscope, such as Philco Part No. 45-1614, on the turntable, and illuminate the disc with a lamp operating on 60-cycle a.c. The dots in the row calibrated for  $33\frac{1}{3}$  r.p.m. should appear to remain stationary or to drift very slowly, but smoothly, forward and backward. If the dots are moving in either direction very fast or with a jerky motion, refer to UNEVEN TURNTABLE SPEED (WOW'S), page 11.

## RECORD-PLAYER ADJUSTMENTS

### Tone-Arm Needle Pressure and Vertical Friction

Hold the Philco Gram Scale, Part No. 45-9531, on its side and set the pointer to the center line of the scale. This is the 0 point, and each small division on either side of 0 is equal to one gram. After the scale has been set to 0, place it on the turntable with the guard on the scale in an open position, at right angles to the scale, as shown in figure 30. Now set the needle of the tone arm into the hole at the end of the pointer and observe the reading on the scale. This reading is the needle pressure; the correct needle pressure is 6 to  $7\frac{1}{2}$  grams.

To determine the vertical friction proceed as follows: Press down on the head of the pickup, then let it return to its normal position, and note the reading. Raise the pickup slightly, then gently lower it to the normal position, and again note the reading. The vertical friction is the difference between the two readings obtained. For example: if the scale reading is  $7\frac{1}{4}$  grams after the pickup is depressed and released, and is  $6\frac{3}{4}$  grams after the pickup is raised and lowered, the vertical friction is  $7\frac{1}{4}$  minus  $6\frac{3}{4}$  or  $\frac{1}{2}$  gram. The vertical friction should not exceed 2 grams.



### Tone-Arm Horizontal Friction

Hold the gram scale flat in the palm of the hand and set the pointer to "0". Take the tone-arm off the rest post, and place a counterweight on top of the rear end until the tone arm is balanced in a horizontal position. Place the pointer of the scale against the side of the pickup head (figure 31) and move the pickup toward the center of the turntable. Then move the pickup outward, away from the center of the turntable. The horizontal friction is the average of the two readings taken, when the pickup is moved both inward and outward. At no time should it take more than 2 grams pressure on the pointer to move the tone arm.

### Pickup Holder

The pickup holder should be centrally spaced between the walls of the tone arm so that there is no binding or rubbing against the inside of the tone arm when the pickup cartridge is moved vertically. To obtain proper spacing, first remove the tone arm (see page 19); loosen the screw which holds the pickup bracket mounting. Move the mounting until it is centrally spaced between the walls of the tone arm, and maintain  $\frac{1}{32}$ " clearance between the tip of the ears on the holder and the inside surface at the front end of the tone arm, as shown in figure 33.

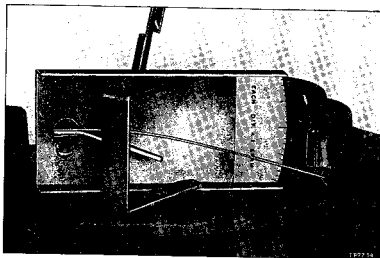


Figure 30. Measurement of Needle Pressure and Vertical Friction with Gram Scale

### Pickup-Base-Plate Clearance and Height Adjustment

With the tone arm off the rest post and resting over the base plate, the needle should be at least  $\frac{1}{16}$ " and not more than  $\frac{3}{16}$ " above the base plate, as shown in figure 34. To adjust, grasp the tone arm and raise or lower (whichever is required) with a little pressure

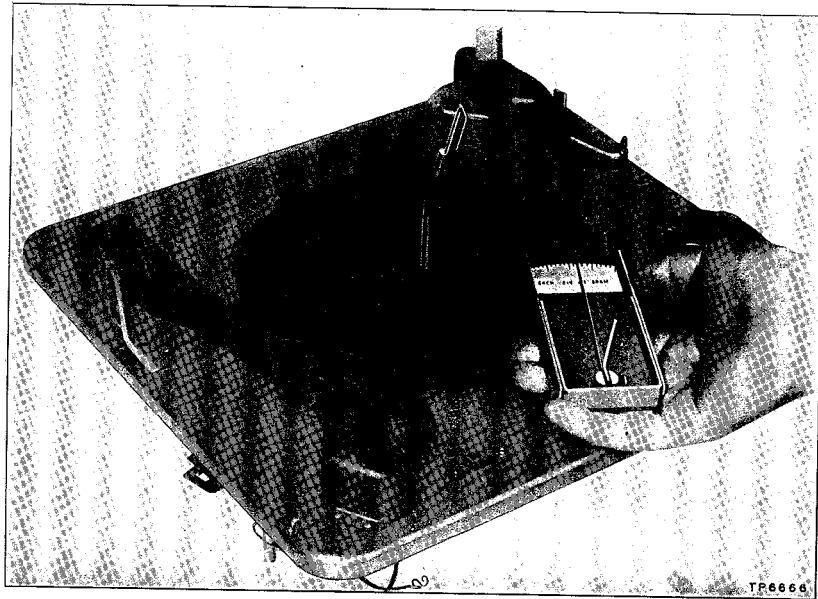


Figure 31. Measurement of Horizontal Pressure

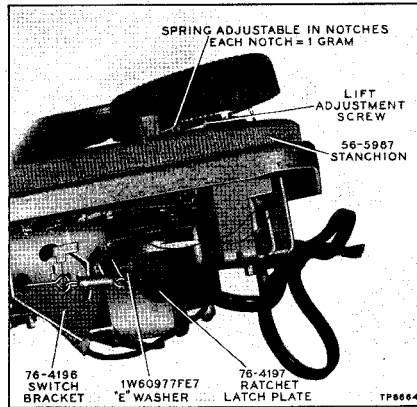


Figure 32. Needle-Pressure Adjustment

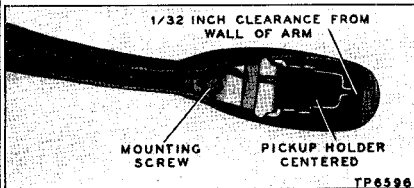


Figure 33. Pickup-Holder Adjustment

to obtain the correct clearance. Then adjust the screw on the pivot assembly (figure 32) so that the tone arm will clear the rest hook on the stanchion, Part No. 56-5987.

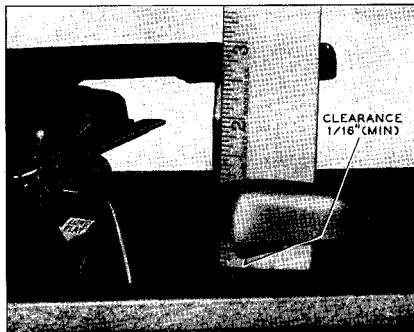


Figure 34. Tone-Arm Height Adjustment

### Trip-Switch Adjustments

With the tone-arm on the rest post, the mercury switch attached to the bracket-and-clip assembly, Part No. 76-4195, should be in a horizontal or ON position, as shown in figure 8. To adjust, loosen the reset-trip-arm clamp screw (figure 35), and while holding the tone arm on the rest post, move the trip arm until the leg on the reset trip arm engages the bracket-and-clip assembly, and at the same time, the long ear of the bracket and clip is approximately  $\frac{1}{32}$ " above the cut-out notch on the ratchet-plate assembly, Part No. 76-4197, as shown in figure 35.

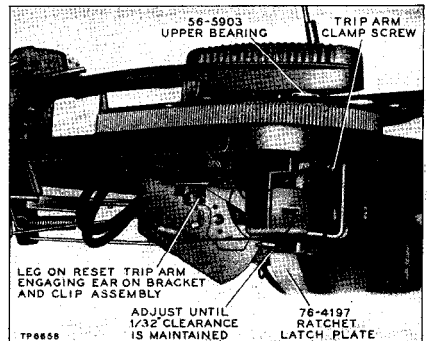


Figure 35. Trip-Switch Adjustment

### Trip-Finger Adjustments

Place the tone-arm needle in the finish groove of a record, and observe the trip finger riding over the ratchet on the ratchet-plate assembly, Part No. 76-4197. The trip finger should assume an angle of  $25^{\circ}$  to  $30^{\circ}$  while riding over the ratchet, as shown in figure 7. Adjust the screw on the trip-arm receiver to obtain the proper angle.

### Selector-Lever Stop Adjustment

The selector-lever "throw" is adjusted by loosening the screw in the lock plate, Part No. 56-5986 (figure 11), and centering the lock plate so that when the STD. PLAY—LONG PLAY control is in either position, the shift lever on the motor will not bind against either side.

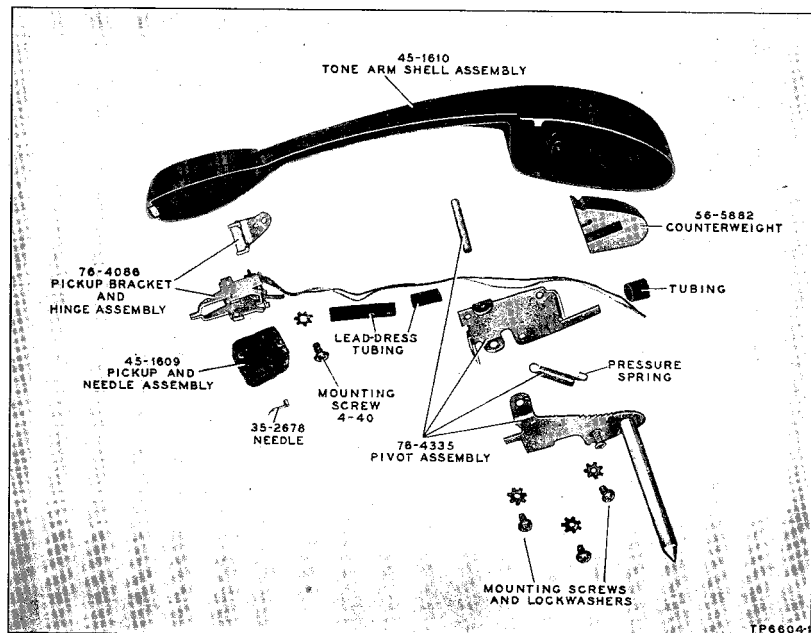


Figure 36. Record-Player Tone-Arm Assembly, Part No. 35-2686

## REPLACEMENT OF PARTS AND ASSEMBLIES ON RECORD PLAYER

### 1. Crystal-Cartridge Assembly, Part No. 45-1609

To remove the crystal cartridge, grasp the crystal by its sides, and pull it down and out. When replacing the cartridge, push it up into the head of the tone arm, until it is seated in position.

### 2. Tone-Arm Assembly, Part No. 35-2686

a. Unsolder tone-arm leads from terminal panel on underside of changer base plate. The tone-arm assembly is shown in figure 36.

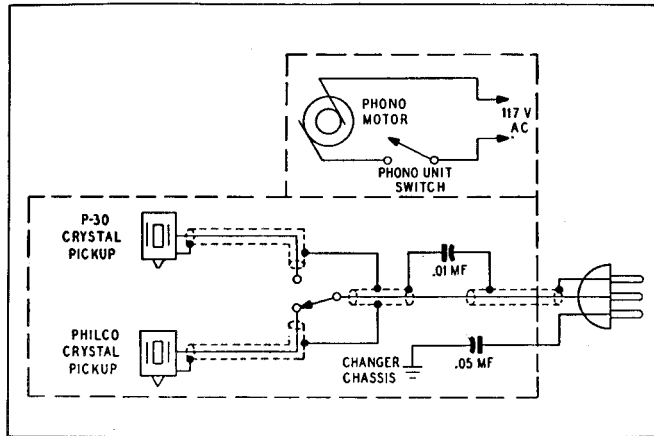
b. Unhook pull cord, Part No. 76-2982-1, from spring and link assembly, Part No. 56-5990 (figure 9).

c. Loosen clamp screw which holds reset trip arm to tone-arm shaft.

d. Lift out tone arm.

### 3. Tone-Arm Thrust Bearing, Part No. 56-5916

a. Remove tone arm as directed in paragraph 2 above.



TP-6447

Figure 37. Model M-9C, Wiring Diagram

b. Remove "E" washer, Part No. 1W60977FE7, from bearing shaft (figure 8).

c. Lift bearing out of rubber grommet, Part No. 27-4099-3, mounted on tone-arm-shaft support.

#### 4. Tone-Arm Stanchion; Part No. 56-5987

a. Remove tone arm as directed in paragraph 2 above.

b. Remove hex-head screw from each end of tone-arm stanchion, under changer base plate.

c. Lift out stanchion (figure 7).

#### 5. Tone-Arm Upper Bearing, Part No. 56-5903

a. Remove tone-arm stanchion, Part No. 56-5987, as directed in paragraph 4 above.

b. Remove "E" washer, Part No. 1W60981FE7, from bearing shaft mounted on tone-arm stanchion (figure 35).

c. Remove bearing from grommet, Part No. 54-4624, by sliding it out from underside of stanchion.

#### 6. Ratchet Latch Plate, Part No. 76-4197

a. Remove "E" washer, Part No. 1W60977FE7, from switch bracket, Part No. 76-4196 (figure 32).

b. Slide ratchet plate off switch bracket.

#### 7. Switch Bracket, Part No. 76-4196

a. Remove mercury switch, Part No. 76-2140-2, from clip.

b. Unhook pull-cord spring, Part No. 76-2982-1, from link.

c. Remove two hex-head screws which hold switch bracket to base plate.

d. Unhook link from actuator.

#### 8. Selector Lever, Part No. 56-5985

a. Remove "E" washer, Part No. 1W60977FE7, from stud which mounts selector lever, Part No. 56-5985, underneath base plate (figure 11).

b. Remove spring washer, Part No. 1W56306FE15, from stud.

c. Remove "U"-shaped spring, Part No. 56-5995, between selector lever and base plate.

d. Loosen lock-plate screw (figure 11).

e. Loosen motor-mounting screws and cock motor to one side.

f. Set STD. PLAY—LONG PLAY control to STD. PLAY position.

g. Align ears of selector lever with cut out on base plate, and pull out selector lever from stud on underside of base plate.

h. Disengage selector lever from control-button link.

MODEL M-9C

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## REPLACEMENT PARTS LIST

Service Part No.	Description	Service Part No.	Description
35-1371	Motor	56-4631FA15	Pin, tone-arm lift
35-2663-2	Tone-arm assembly, record changer	56-4670FA38	Spring, feeler (selector assembly)
35-2671-1	Crystal, standard	56-4774FA3	Bar, push-off (rear)
35-2672FC55	Tone-arm shell	56-4778FA38	Spring, control knob
35-2678	Needle for special crystal	56-4926	Spacer, motor
35-2686	Tone-arm assembly, record player	56-5644	Spring, spindle
35-3066-2	Turntable	56-5882	Counterweight
41-3869-2	Cable and plug	56-5903	Bearing, upper
42-1750-3	Switch, motor	56-5916	Thrust bearing
42-1873	Switch	56-5981	Trip receiver, record-player tone arm
45-1597	Needle	56-5985	Lever, selector
45-1609	Pickup-and-needle assembly	56-5986	Plate, lock
45-1610	Tone-arm assembly (shell)	56-5987	Stanchion, record-changer tone arm
45-3031	Nut, knurled	56-5990	Link, lifter
45-6479	Pulley belt	56-5991	Link, selector
45-6481	Idler wheel	56-5995	Spring, "U" (selector lever)
54-4479-1	Control, REJ.—AUT.—MAN.	56-6404	Trip receiver, record-player tone arm
54-4460	Bumper	76-2140-2	Switch, mercury
54-4501	Motor-mounting grommet	76-2978	Bridge assembly
54-4634	Control, STD. PLAY—LONG PLAY	76-2982	Pull-cord assembly, record-changer tone arm
54-7613	Trip finger	76-2982-1	Pull-cord assembly, record-player tone arm
56-1880	Cover, switch	76-2983FA2	Shaft and swivel, record-changer tone arm
56-2832FA3	Clamp, cable	76-2984	Push-off, cover
56-4585FA3	Index lever	76-2987	Actuator lever, record-changer tone arm
56-4588FA3	Actuator, push-off	76-2989	Cam-gear assembly
56-4589FA3	Link, control	76-2990	Trip-plate assembly
56-4593	Plate, fulcrum	76-2991	Bearing assembly
56-4594FA37	Plate, push-off slide	76-3926	Spindle
56-4595FA3	Rod, push-off	76-4086	Bracket (pickup and hinge)
56-4596FA3	Hanger, push-off	76-4192	Base plate
56-4597FA3	Bar, push-off	76-4193	Actuator, lift lever
56-4599FA3	Slider, safety	76-4194	Trip-switch assembly
56-4600FA38	Spring, return	76-4195	Bracket-and-clip assembly
56-4601-2	Spacer	76-4196	Switch-bracket assembly
56-4601-3	Spacer	76-4197	Ratchet latch plate
56-4603FA38	Index spring	76-4198	Reset trip arm
56-4604FE15	Pin, tone-arm pivot	76-4204	Trip arm (subassembly)
56-4606FA3	Link, long	76-4335	Pivot assembly, record-player tone arm
56-4607FA3	Link, short	1W14460FA44	Screw (3-48x $\frac{3}{8}$ "), crystal mounting
56-4608FA38	Spring	1W36521FA3	Pin, escutcheon
56-4610	Spring, "U" (bridge assembly)	1W52627	Cam-gear washer
56-4613FA38	Stop spring	1W56306FE15	Spring washer, selector-lever assembly
56-4614	Trip-arm stop	1W57117	Tubular clip
56-4616FE15	Feeler (selector assembly)	1W60977FE7	"E" washer (for selector lever, ratchet plate, and thrust bearing)
56-4617FA3	Hinge (selector assembly)	1W60980FE5	"E" washer (for cam and actuator stud)
56-4618FE15	Selector	1W60981FE7	"E" washer (for upper bearing)
56-4626-1FA7	Record shelf	2W53954	Washer, selector assembly
56-4627FA3	Retainer, spring (record-shelf assembly)		
56-4628FA38	Spring, ring		
56-4629	Saddle, push-off (record-shelf assembly)		
56-4630FA38	Spring, record shelf		