

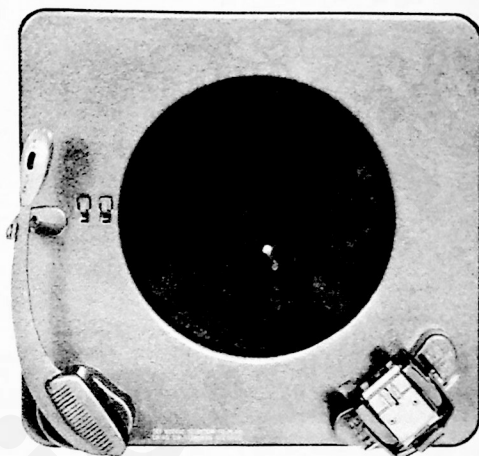
PHILCO MODEL M-20 ALL-SPEED AUTOMATIC RECORD CHANGER

INTRODUCTION

This de luxe record changer is designed to automatically play 78, 45, or $33\frac{1}{3}$ r.p.m. records of 7", 10", or 12" size. It operates from a 105—125 volt, 60-cycle a-c supply. If operation is desired on a 50-cycle supply, the 50—60-cycle motor assembly, Part No. 35-1442, must be used with the 50-cycle conversion Kit, Part No. 40-7848. The tone arm employs the Philco Balanced-Fidelity Reproducer, which applies an extremely low needle pressure of approximately $\frac{1}{8}$ ounce.

The following 1950 Philco Television Models use this record changer:

50-T1476	50-T1482
50-T1478	50-T1483
50-T1479	50-T1484
50-T1481	



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MODEL M-20

DESCRIPTION OF OPERATIONAL CYCLES

Power for the motor is obtained through the on-off switch mounted on the bridge assembly. This switch is operated manually by the control button with positions OFF-MAN-AUT-REJ. This button is located to the left of the record-shelf assembly, on the top of the Record Changer.

The Record Changer has three speeds, controlled by the Speed Selector located to the right of the record-shelf assembly. The positions of the Speed Selector are STD PLAY-45-LONG PLAY. These speed changes are brought about by the shift lever, which changes the positions of the idler wheel and pulley with respect to the motor shaft.

The changer mechanism of the Record Changer is brought into action when a small retractable gear segment, mounted on the cam gear, is released, and engages the hub gear of the turntable shaft, causing the cam gear to be driven. While a record is playing, the retractable gear segment is held in the retracted position by the trip-plate retaining wall, which engages the roller of the gear segment. The segment is released either manually, by pushing the OFF-MAN-AUT-REJ control to REJ, or automatically, when the changer tone arm reverses direction as the needle follows the eccentric finish groove of a record. For 45 r.p.m. automatic operation, an additional trip mechanism is brought into play. This trip mechanism is actuated by a trip stop, mounted on the trip receiver. When the needle of the tone arm enters the finish groove of a 45 r.p.m. record, the trip stop engages the trip lever, which releases the hammer; this hammer strikes the trip plate, and pushes it aside. The gear segment is then released, as explained above, for either the standard or long-play operations.

The tone arm of the Record Changer is operated

by two link assemblies attached to actuator levers, which are in contact with the cam surfaces of the cam gear. When the cam gear starts rotating, the lower actuator lever is pushed outward first, and the link assembly with the long cord attached to it raises the tone arm off the record. As the cam gear continues to turn, the upper actuator lever is pushed outward, and its link assembly pulls the tone arm out against the rest post. At this instant, a roller on the cam gear makes contact with the push-off actuator (which is connected to the record-shelf assembly through a series of push-off bars), and operates the record-dropping mechanism.

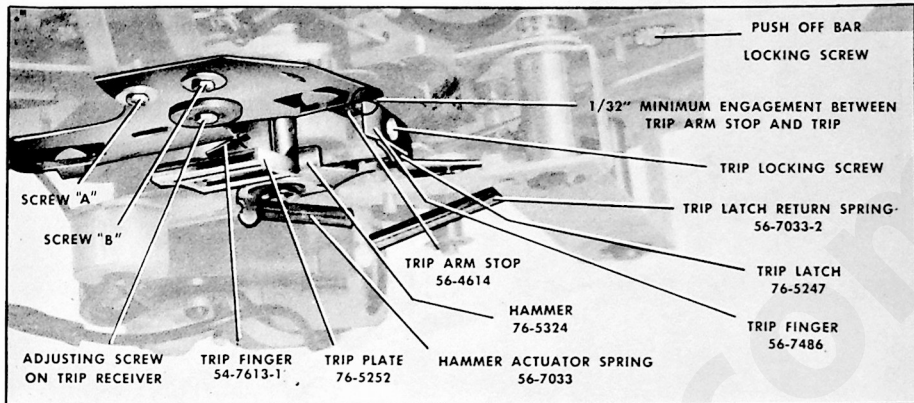
After the record has dropped to the turntable, the cam releases the upper actuator, permitting the tone arm to move inward. As the tone arm moves toward the center of the turntable, the index finger engages one of the selectors, which stops the tone-arm travel at a point just above the start groove of the record. Following this action, the lower actuator, which is engaged with the lower cam surface of the cam gear, starts riding inward, relaxing the long cord and link assembly, allowing the tone arm to set down onto the record.

ADJUSTMENTS

INDEXING OR SET-DOWN

7" Record

Set a 7" record on the turntable, push the OFF-MAN-AUT-REJ control to REJ, and rotate the turn-



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Figure 3. Trip Adjustments

the above adjustments. Remember that these three adjustments are interrelated, and that, when any one of them is made, the other two should be rechecked.

7"—45 R.P.M. Records

Place a 7", 45 r.p.m. record, with adaptor insert, on the turntable. Set the Speed Selector to 45, and the OFF-MAN-AUT-REJ control to AUT position. Set the tone arm on the portion of the record which contains the lead-in grooves. The mechanism should trip when the needle reaches a point approximately $\frac{1}{8}$ " from the last groove (which is concentric). If it trips before reaching this point, bend the trip finger, Part No. 56-7486, away from the trip-arm stop. If it fails to trip when this point is reached, bend in the opposite direction.

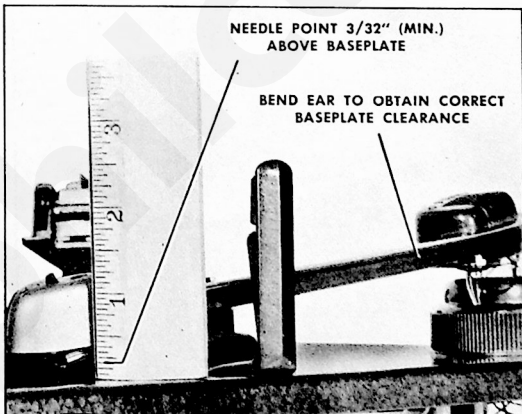
The trip-arm stop should engage the trip by a minimum of $\frac{1}{32}$ " in both the horizontal and vertical

planes, as shown in figure 3. This may be adjusted by loosening the trip locking screw, and sliding or raising the trip to the desired position.

The horizontal force required to trip the changer and initiate the change cycle should not exceed 2 grams at any turntable speed.

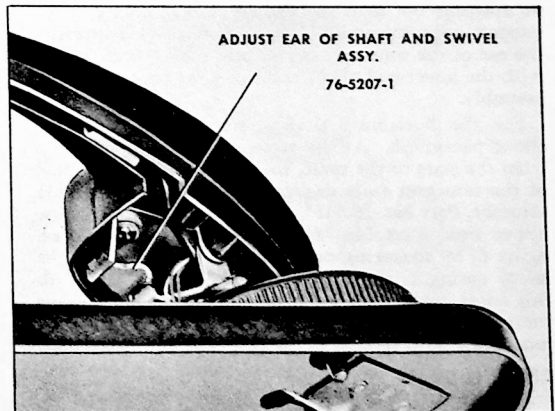
TONE-ARM HEIGHT AND LIFT

With the changer out of cycle, and the tone arm free, set the arm over the base plate. The needle point should be approximately $\frac{3}{16}$ " above the base plate, as shown in figure 4. To adjust the clearance, bend the protruding ear of the swivel post (bending the ear upward increases the clearance, downward decreases the clearance), as shown in figure 5. Now raise the tone arm to its maximum height, and place it against the rest post. There should be a minimum of $\frac{1}{8}$ "



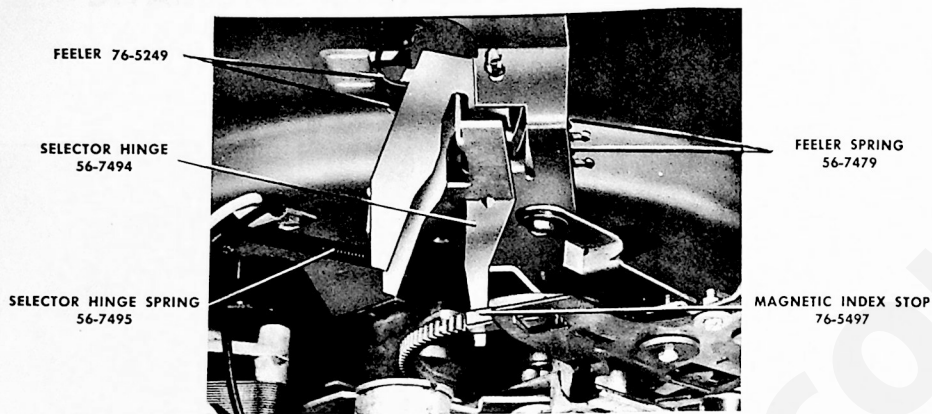
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Figure 4. Base-Plate-Clearance Adjustment



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Figure 5. Tone-Arm Height and Lift Adjustment



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Figure 1. 7" Index Adjustment

table by hand approximately $4\frac{1}{2}$ turns. The tone-arm needle should be approximately $\frac{1}{2}$ " above the record at this point. Loosen the clamp screw on the trip arm slightly (figure 9); then hold the tone arm steady, $\frac{1}{8}$ " in from the edge of the record, and set the trip arm so that the magnetic index stop, Part No. 76-5497, is in contact with the selector hinge (inside selector), Part No. 56-7494, as shown in figure 1. The index stop should engage the selector hinge by a minimum of $\frac{1}{8}$ ".

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

10" Record

Make the index adjustment for 7" records first. Check 10" indexing by the same method as that outlined above. With the needle point $\frac{1}{2}$ " above the record, and $\frac{1}{8}$ " in from the outside edge, the index stop should be in contact with the middle selector, Part No. 56-7478, as shown in figure 2.

Ordinarily, the 10" index is satisfactory after the 7" index adjustment is made; if not, bend the selector *slightly* to the right or left, as required, for the proper set-down of the needle.

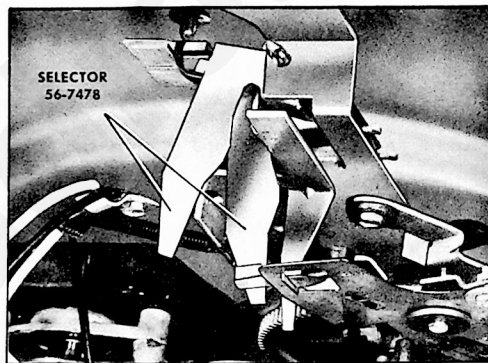
12" Record

Adjust as given above for 10" records, except that the index stop should contact the outside selector, Part No. 56-7478. If the indexing is incorrect, bend the selector hinge *slightly* to the right or left, as required, for proper set-down.

TRIP ACTION

10" or 12" Standard or Long-Play Records

With a 10" or 12" record on the turntable, the Speed Selector set to either **ST'D PLAY** or **LONG PLAY**, and the **OFF-MAN-AUT-REJ** control in **AUT** position, place the tone arm in the finish, or eccentric, groove of the record. The trip finger, Part No. 56-7486, now rides over the ratchet of the trip plate,



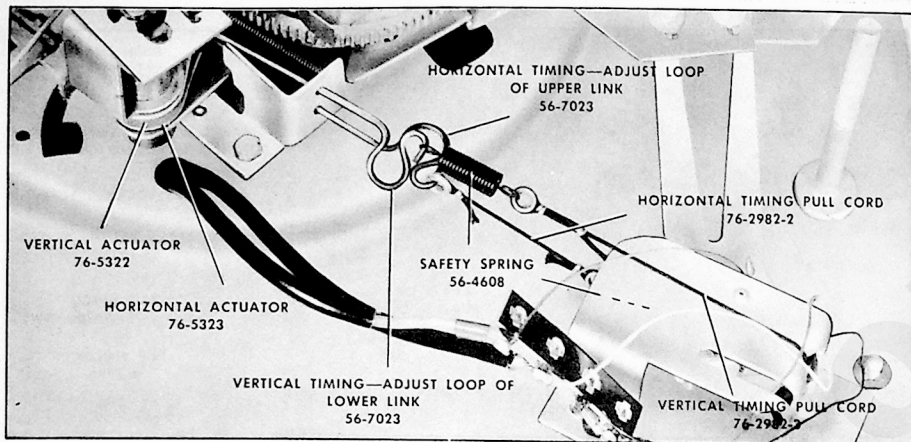
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Figure 2. 10" Index Adjustment

Part No. 76-5252, as shown in figure 3. The trip finger should ride at an angle of 25° to 30° with respect to the ratchet. To obtain the correct angle, adjust the screw on the trip receiver, Part No. 56-7491, as indicated in figure 3. Make certain that the vertical center line of the trip finger coincides with the center line of the ratchet. To obtain this alignment, loosen screw "A" slightly, and screw "B" completely, on the trip receiver, and swing the trip receiver to the right or left, rotating about point "A" until the trip finger is centered over the ratchet; then tighten the screws.

When this adjustment is made, care should be taken to prevent the trip receiver from being pulled in toward the trip arm too far, as this will prevent the trip-arm stop from engaging the selector hinge by a minimum of $\frac{1}{8}$ ". A compromise between these two adjustments should be reached.

The index adjustment will be affected when making



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Figure 6. Horizontal and Vertical Timing Adjustments

clearance between the lower edge of the tone arm and the top of the rest-post hook. Adjust the ear on the swivel post until a mean is reached between the correct rest-post clearance and base-plate clearance.

TONE-ARM HORIZONTAL AND VERTICAL TIMING

Before making the vertical and horizontal adjustments, make the tone-arm height and lift adjustments described above.

For the vertical timing, start with the changer out of cycle and the tone arm on the rest post, push the OFF-MAN-AUT-REJ control to REJ, and rotate the turntable approximately $1\frac{1}{2}$ revolutions by hand. At this point, the lower eccentric portion of the cam-and-gear assembly, Part No. 76-3995-2, fully engages the lower (vertical) actuator (the actuator with the cord), Part No. 76-5322. Adjust the wire loop of the lower link, Part No. 56-7023, figure 6, by squeezing or opening the loop so that the safety spring is expanded approximately $\frac{1}{32}$ ". With this adjustment, the ear of the tone-arm swivel post makes firm contact with the lower end of the cutout on the tone-arm pivot assembly.

For the horizontal timing, start as given in the above paragraph. At the same point, $1\frac{1}{2}$ revolutions from the start of the cycle, the upper eccentric portion of the cam gear fully engages the upper (horizontal) actuator, Part No. 76-5323. Adjust the wire loop of the upper link, Part No. 76-7023, with the short cord, figure 6, by squeezing or opening the loop so that the safety spring is expanded approximately $\frac{1}{32}$ ". With this adjustment, the tone arm should be snug against the rest post, but not so tight as to cause undue slapping as the arm returns to the rest post during cycling.

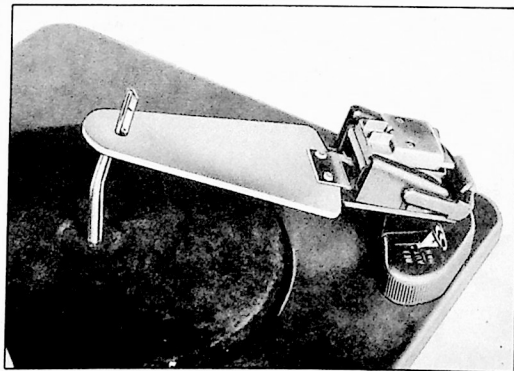
RECORD SHELF

Set the record shelf to the 10' position, with the changer out of cycle. Loosen the two hex-head drive screws that hold the record-shelf assembly to the

changer base plate just sufficiently to allow movement of the record-shelf stanchion. Place the Philco record-shelf gauge, Part No. 45-1672, over the spindle and onto the record shelf, as shown in figure 7. Move the record-shelf assembly away from the spindle until the large, curved part of the gauge drops even with the record-shelf lips. 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.

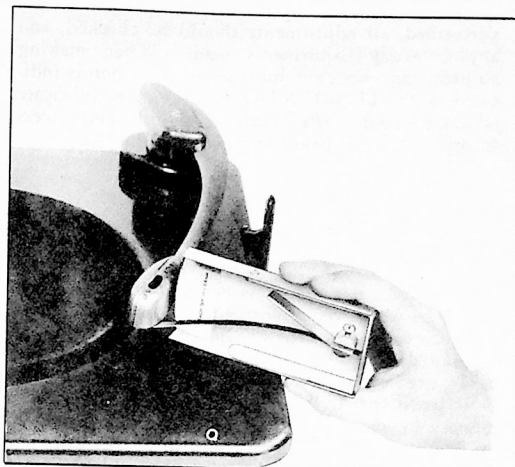
PUSH-OFF

With the changer out of cycle, push the OFF-MAN-AUT-REJ control to REJ, and rotate the turntable 2 revolutions by hand. At this point, the push-off actuator, Part No. 56-4588, is in its most forward position, in contact with the roller on the cam gear. Loosen the



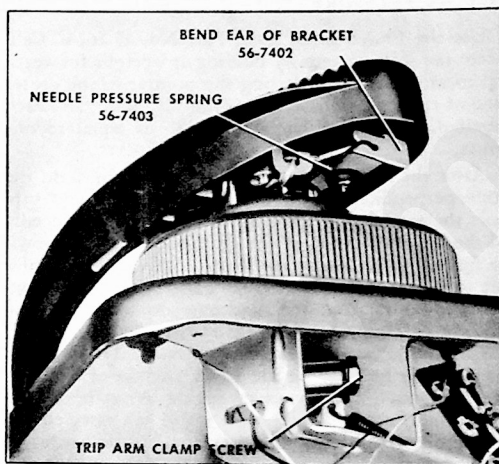
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Figure 7. Special Record-Shelf Gauge, Shown in Correct Position



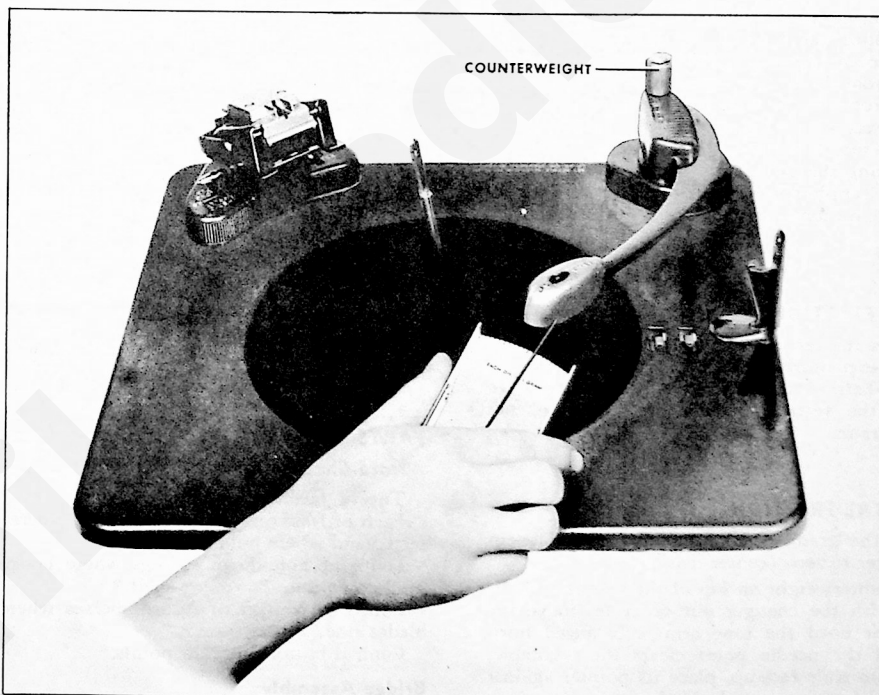
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Figure 8. Measuring Vertical Friction



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Figure 9. Needle-Pressure Adjustment



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Figure 10. Measuring Horizontal Friction

push-off-bar locking screw (indicated in figure 3) slightly (just sufficiently to allow adjustment), and squeeze the push-off ears toward each other until the

slide plate on the record shelf extends between $\frac{1}{64}$ " and $\frac{1}{32}$ " beyond the lips of the shelf. Tighten the hex-head push-off-bar screw.

NEEDLE PRESSURE

Use the Philco gram scale, Part No. 45-1614. Calibrate the scale to zero by holding it upright for vertical measurement, and setting the pointer to the center line of the scale. The center is the "0" point, and each small division on either side of "0" is equal to one gram.

After the scale has been calibrated to zero, hold the scale perpendicularly to the tone-arm head, and support the tone arm by placing the standard-play needle in the hole at the end of the gram-scale arm, as shown in figure 8. By lifting the gram scale carefully, raise the tone arm approximately $\frac{1}{2}$ ", and note the reading. Then lower the tone-arm, and note the reading. The average of these two readings is the needle pressure, which should be between 7 and 9 grams. The pressure is adjustable by bending the ear at the rear of the tone arm to which the tone-arm spring is anchored, as shown in figure 9. Bending the ear so as to stretch the spring decreases the needle pressure; bending so as to relax the spring increases the needle pressure. If the needle pressure is out of tolerance, make the above adjustments gradually, and recheck after each change, as a small movement gives a rather large variation in needle pressure.

When making this adjustment, be careful not to bend or distort the bracket. If this bracket is deformed, the needle pressure on the last record of a stack will differ from the needle pressure on the first record. When the proper needle pressure is attained, the upper edge of the ear should be parallel to the rear, lower edge of the tone-arm shell. If the bracket was bent while adjusting the ear, gently pry down or push up the bracket (applying even pressure on both sides) until the ear and tone-arm shell are in proper relationship.

VERTICAL FRICTION

To measure the vertical friction, take two gram-scale readings as explained above under NEEDLE PRESSURE. One-half of the difference between the two readings is the vertical friction, which should not exceed 1.5 grams.

HORIZONTAL FRICTION

Calibrate the gram scale by laying it flat, face-up. Set the pointer to zero (center mark).

Place a counterweight on top of the rear end of the tone arm, with the changer out of cycle; move the counterweight until the tone arm is balanced horizontally, and the needle point clears the turntable. Hold the gram scale face-up, place its pointer against the side of the pick-up, and slowly move the gram scale so as to push the tone-arm horizontally with the pointer, as shown in figure 10. Note the reading of the gram scale while moving the tone arm throughout its entire travel (outside the trip range). At no time should the horizontal friction (the force required to move the tone arm) exceed $1\frac{1}{2}$ grams, nor be less than $\frac{3}{4}$ of a gram.

NOTE: Whenever any repairs or replacements are performed, all adjustments should be checked, and any necessary adjustments made. When making adjustments, check the lubrication at all points indicated in the LUBRICATION section, and lubricate where necessary, after cleaning off old and excess grease with a soft brush and carbon tetrachloride.

LUBRICATION

When the Record Changer is brought in for service, it should be well cleaned with a fine brush and carbon tetrachloride. Remove the needle guard and clean out accumulated dust with a fine brush. Remove all dirt and old grease and oil. When applying new grease and oil, use it sparingly. Lubrication points are shown in figures 11 and 12. It may be necessary to remove some parts and assemblies in order to properly lubricate them. For example, the cam gear and actuator levers should be removed to lubricate the cam-gear spindle and the actuator stud. The lubrication points that cannot be reached without some degree of disassembly are indicated in the following list with an asterisk, and are also indicated in the breakdown views of their respective assemblies.

LUBRICANTS

Oil—S.A.E. 20.

Grease—Texaco Motor Cup Grease (unless otherwise specified).

PARTS NOT TO BE LUBRICATED

The following parts should not be lubricated at any time:

- Trip receivers.
- Trip fingers.
- Selector assembly (except specific points indicated).
- Ratchet portion of trip plate.
- Trip-latch assembly.
- Idler tire.
- Drive belt.
- Drive-pulley shaft.

PARTS TO BE GREASED

Record-Shelf Assembly

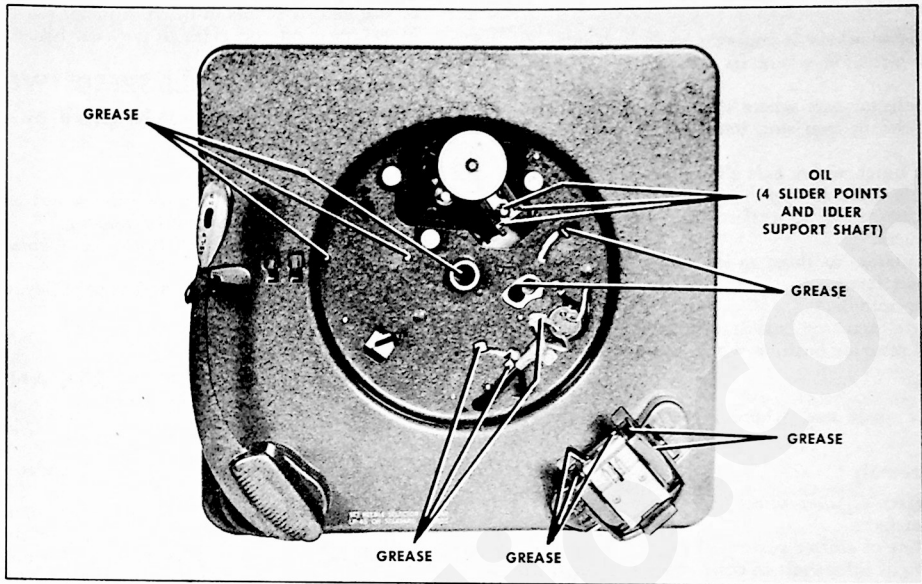
- Top of push-off saddle.
- Each of four cast lugs on 10" shelf where pin is inserted and where hold-down pivots.*
- Loops of hold-down springs where hooked to 10" hold-down and 7" record shelf.*
- Points of contact of record shelves where push-off blades ride.*
- Control button fulcrum points.*

Bridge Assembly

- Three dimples and two upturned ears.
- End and detent notches of control slider.

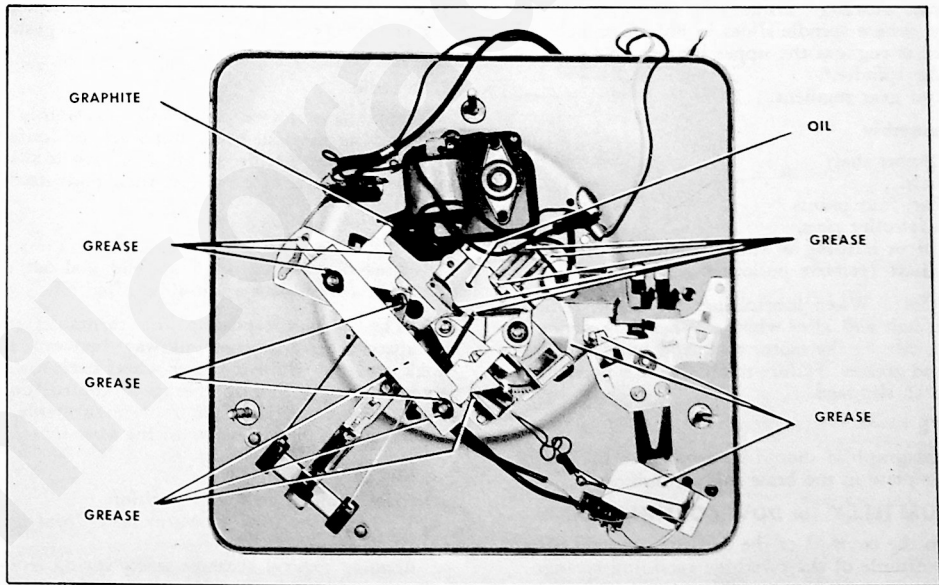
Cam Gear

- Between roller and gear surface.
- Gear teeth and two lateral cam surfaces.
- Upper cam surface where selector hinge rides.*



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Figure 11. Top View, Showing Lubrication Points



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Figure 12. Bottom View, Showing Lubrication Points

Main Assembly

- Push-off bar where it connects to its actuator.
- Push-off actuator where its dimples slide on base plate.
- Speed Selector ears where they slide on base plate.
- Speed Selector cam slot, detent surfaces, and pivot point.
- Selector hinge where ears slide on base plate.
- Turntable shaft at upper outside bearing *only*.*
- Detent assembly; to roller stud, ear, and sliding guide surfaces.
- Trip actuator, to three guide surfaces and ear operating reset lever.
- Actuator spindle.*
- Horizontal actuator bushing, outside.*
- Vertical actuator bushing where trip reset arm rides.

Tone Arm

- Point of shaft and where it rotates in tone-arm stanchion.

Motor Assembly

- Cam surface of idler-wheel lifter.
- Detent surfaces.
- Guide slots of shifter plate.
- Extension of idler shaft in contact with lower shifter plate.

PARTS TO BE OILED

- Tone-arm pivot pin.*
- Trip-plate bushing (inside).*
- Spindle; where spindle slides in hole in the bridge, and where it engages the upper bearing of turntable.
- Cam-gear spindle.*
- Roller on gear segment.

Motor Assembly

- Idler support shaft.
- Idler shaft.
- Slider bar; four points.
- Two shift roller pins.
- Under pivot bushing of shifter plate.*
- Pulley shaft (remove pulley).*

CAUTION: When lubricating the motor, remove the rubber belt and idler wheel. When lubrication is completed, be sure the motor shaft and pulley are free from oil and grease. Failure to observe this precaution may result in slippage.

GRAPHITE

Powdered graphite should be applied to the ear of the selector plate in the brass shifter bushing.

PETROLEUM JELLY (or DOW CORNING "DC-4")

Apply to the contacts of the cartridge contact plate, and to the dimple of the cartridge retaining spring.

SERVICE NOTE: After long usage, the push-off bar may develop squeaks while cycling. If this is encountered, the following points should be greased sparingly.

- Both ends of return spring.
- Fulcrum of push-off rod.
- Point of contact between push-off bar and hanger.

- Where hanger pivots in fulcrum plate.
- Where push-off rod rides in push-off bar.

UNEVEN TURNTABLE SPEED (WOWS)

Uneven turntable speed may be caused by the following conditions.

1. Dirt under and around the idler-wheel assembly.
2. Idler-wheel spring loose or missing.
3. Flat spot on idler-wheel tire or on turntable.
4. Loose or worn pulley belt.
5. Oil or grease on idler-wheel tire, pulley, or drive shaft.

REPLACEMENT OF PARTS AND ASSEMBLIES

The following procedures are recommended for the correct removal of parts and assemblies. The parts should be replaced by reversing the order of removal. Adjustments should be made according to the directions given in the ADJUSTMENTS section of the manual.

1. Crystal

Grasp crystal with fingernails. With the other hand, hold tone arm and apply slight pressure on switch lever. Pull down and to the outside. Replace by holding crystal contacts toward spindle, and pushing upward until firmly seated.

2. Needle

Remove crystal (see paragraph 1). Gently lift out with prying motion, using fingernail or knife point. When replacing needle, align key of needle shaft with keyway in chuck of cartridge, then push needle into cartridge.

3. Spindle

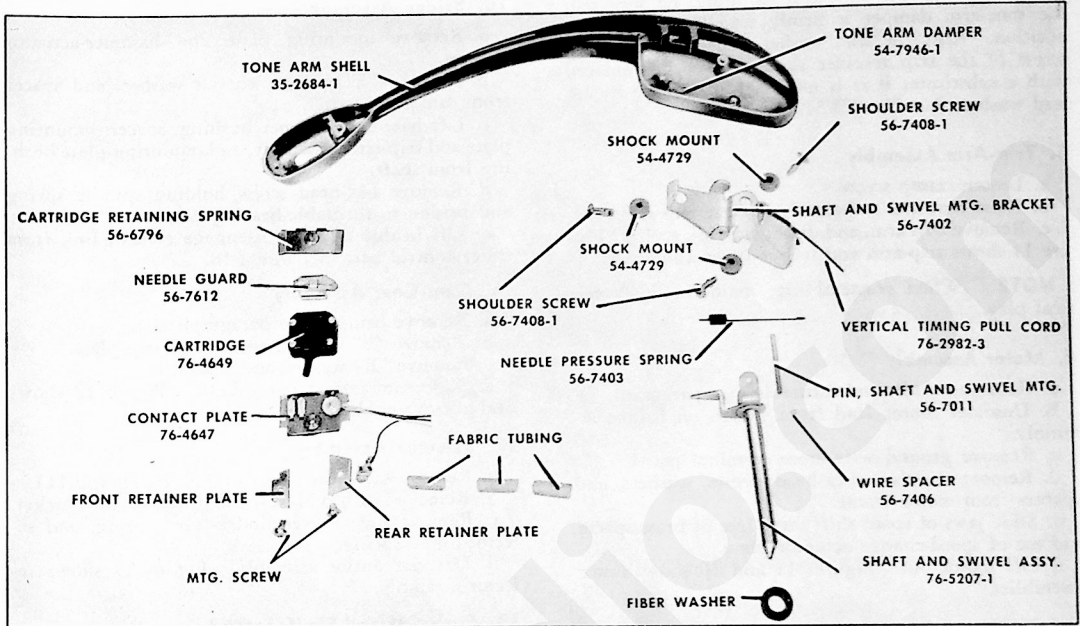
Remove cotter pin from lower end, and pull spindle out. The turntable may now be lifted off.

NOTE: When replacing the turntable, position the speed-control button midway between LONG-PLAY and 45. Hold the idler wheel back toward the center while positioning the speed control until the idler stays retracted. Then replace turntable. This method will *prevent damage* to the *idler-wheel tire*.

4. Tone-Arm Assembly

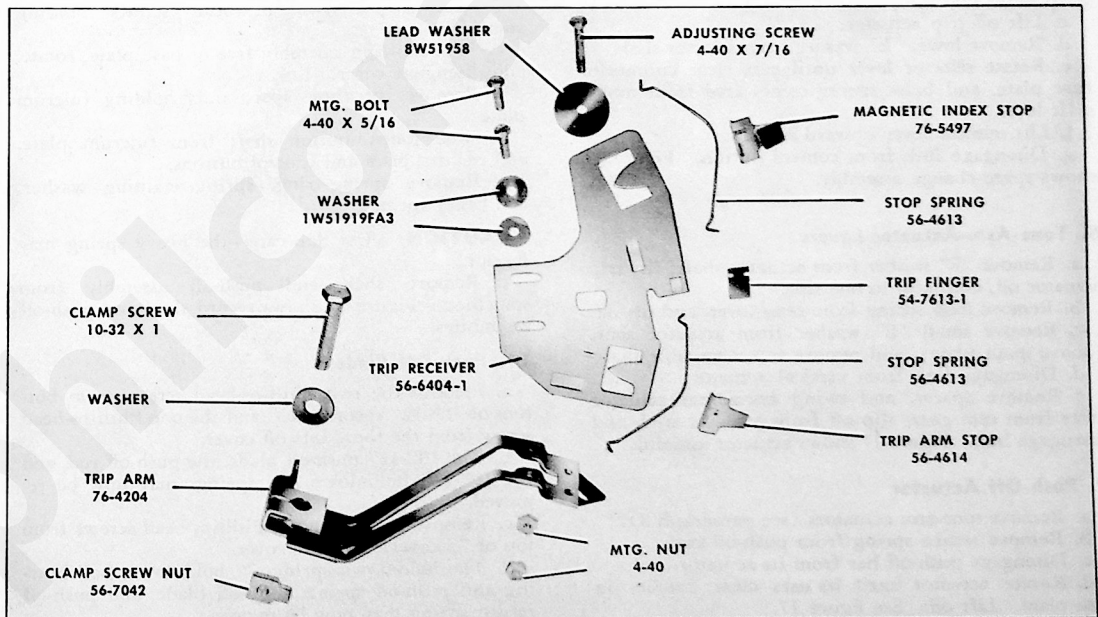
- a. Place changer in MAN position.
- b. Unsolder the four tone-arm leads from terminal panel.
- c. Remove vertical actuator safety spring from long cord.
- d. Loosen trip-arm clamp screw.
- e. Lift out tone arm. Figure 13 shows tone-arm assembly.

NOTE: When the tone arm is replaced, be sure to maintain $\frac{1}{32}$ " vertical play between the trip arm and the fiber washer.



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Figure 13. Tone-Arm Assembly



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Figure 14. Trip-Arm and Trip-Receiver Assemblies

To insure proper tone-arm damping, be sure that the tone-arm damper is firmly seated in its proper position. Also, the lead washer under the adjusting screw of the trip receiver should never be replaced with a substitute; if it is necessary to replace it, use lead washer, Part No. 8W51958.

5. Trip-Arm Assembly

- a. Loosen clamp screw.
- b. Raise tone arm sufficiently to clear trip arm.
- c. Remove trip arm, and disengage link spring. Figure 14 shows trip-arm and trip-receiver assemblies.

NOTE: When reassembling, maintain $\frac{1}{32}$ " vertical play.

6. Motor Assembly

- a. Remove spindle and turntable (see paragraph 3).
- b. Unsolder motor lead from switch on bridge assembly.
- c. Remove ground wire from terminal panel.
- d. Remove the three hex-head screws, washers, and spacers from motor frame.
- e. Slide jaws of speed-shift lever free of brass spacer and ear of speed-change actuator plate.
- f. Lift motor out. Figures 15 and 16 show motor assemblies.

7. Speed-Change Assembly

- a. Remove "E" washer and washer from actuator shaft.
- b. Remove "E" washer and detent spring from selector-lever shaft.
- c. Lift off trip actuator.
- d. Remove lower "E" washer from selector shaft.
- e. Rotate selector lever until ears clear cutouts of base plate, and brass spacer comes free from motor shift lever.
- f. Lift selector lever upward and off.
- g. Disengage link from control button. Figure 17 shows speed-change assembly.

8. Tone-Arm-Actuator Levers

- a. Remove "E" washer from actuator shaft; lift trip actuator off, and push to one side.
- b. Remove long spring from reset lever, and lift off.
- c. Remove small "E" washer from actuator shaft (above main plate), and remove inner actuator shaft.
- d. Disengage link from vertical actuator.
- e. Remove spacer, and swing horizontal actuator away from cam gear; slip off from actuator stud, and disengage link. Figure 17 shows actuator assembly.

9. Push-Off Actuator

- a. Remove tone-arm actuators (see paragraph 8).
- b. Remove return spring from push-off bar.
- c. Disengage push-off bar from its actuator.
- d. Rotate actuator until its ears clear cutouts in base plate. Lift off. See figure 17.

10. Bridge Assembly

- a. Remove mounting plate and hammer-actuator springs.
- b. Remove "E" washer, curved washer, and spacer from cam-gear shaft.
- c. Lift hammer, hammer bushing, spacer, mounting plate and trip-latch assembly, and mounting-plate bushing from shaft.
- d. Remove hex-head screw holding spindle spring and bridge to turntable-bearing bracket.
- e. Lift bridge off, and disengage control link from slider control bar. See figure 18.

11. Cam-Gear Assembly

- a. Remove bridge (see paragraph 10).
- b. Remove "E" washer, and lift off trip plate.
- c. Remove "E" washer and spacer.
- d. Slide cam gear from spindle. Figure 18 shows cam-gear assembly.

12. Selector Assembly

- a. Remove cam-gear assembly (see paragraph 11).
- b. Remove hex-head screws holding selector bracket.
- c. Remove index lever, index-lever spring, and selector-hinge spring.
- d. Lift out entire assembly. Figure 19 shows selector assembly.

13. Push-Off and Shelf Assembly

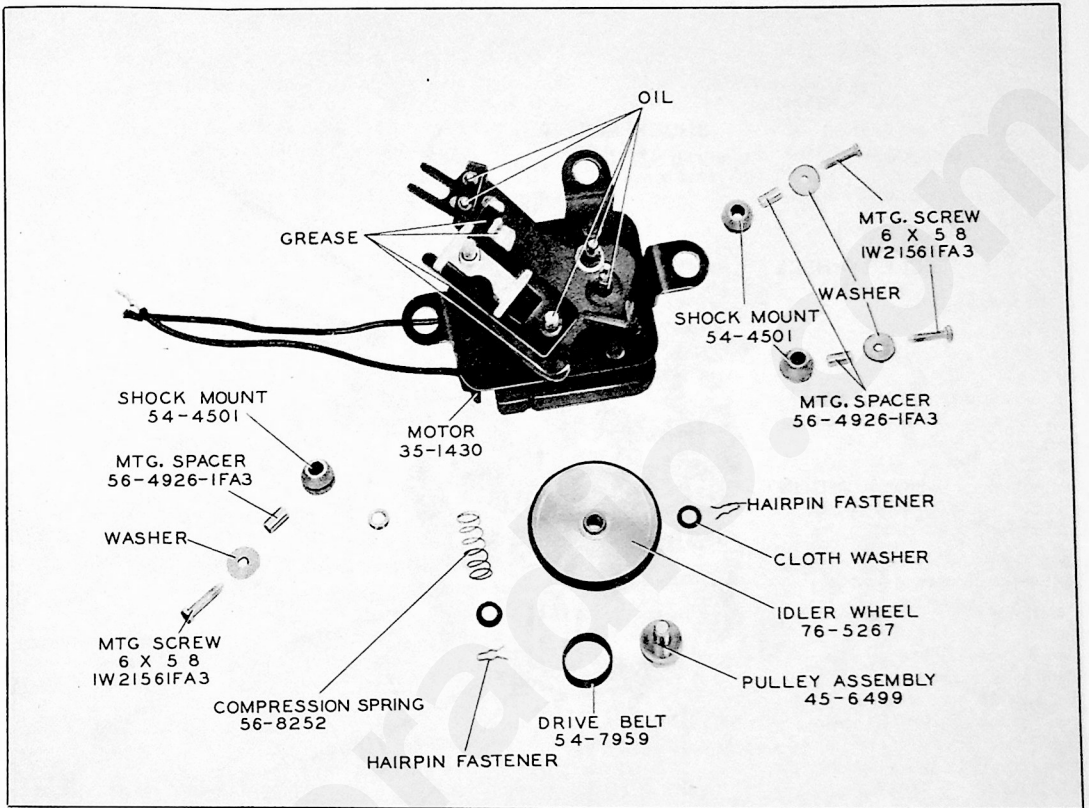
- a. Remove push-off return spring, push-off bar, and hanger.
- b. Remove selector-link bar from selector lever, then disengage from control button.
- c. Remove the two hex-head screws holding stanchion.
- d. While lifting assembly free of base plate, rotate, and disengage control link.
- e. Remove the three speed nuts holding fulcrum plate.
- f. Slide control-button shaft from fulcrum plate, and remove plate and control buttons.
- g. Remove spring ring, spring-retaining washer, and heavy spring.

CAUTION: Use due care—the heavy spring may fly out.

- h. Remove shelf and push-off assembly from stanchion. Figure 20 shows record shelf and push-off assemblies.

14. Push-Off Blades

- a. Remove the two Phillips-head screws from bottom of 10"-12" record shelf, and the one Phillips-head screw from the top. Lift off cover.
- b. The 10"-12" push-off blade, the push-off rod, and the 10"-12" hold-down and springs may now be removed.
- c. Remove the two small Phillips-head screws from top of 7" cover. Remove cover.
- d. The hold-down spring, 7" hold-down, ball bearing and push-off spring, push-off blade, and push-off return spring may now be removed.



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Figure 15. Motor Assembly—Part No. 35-1430

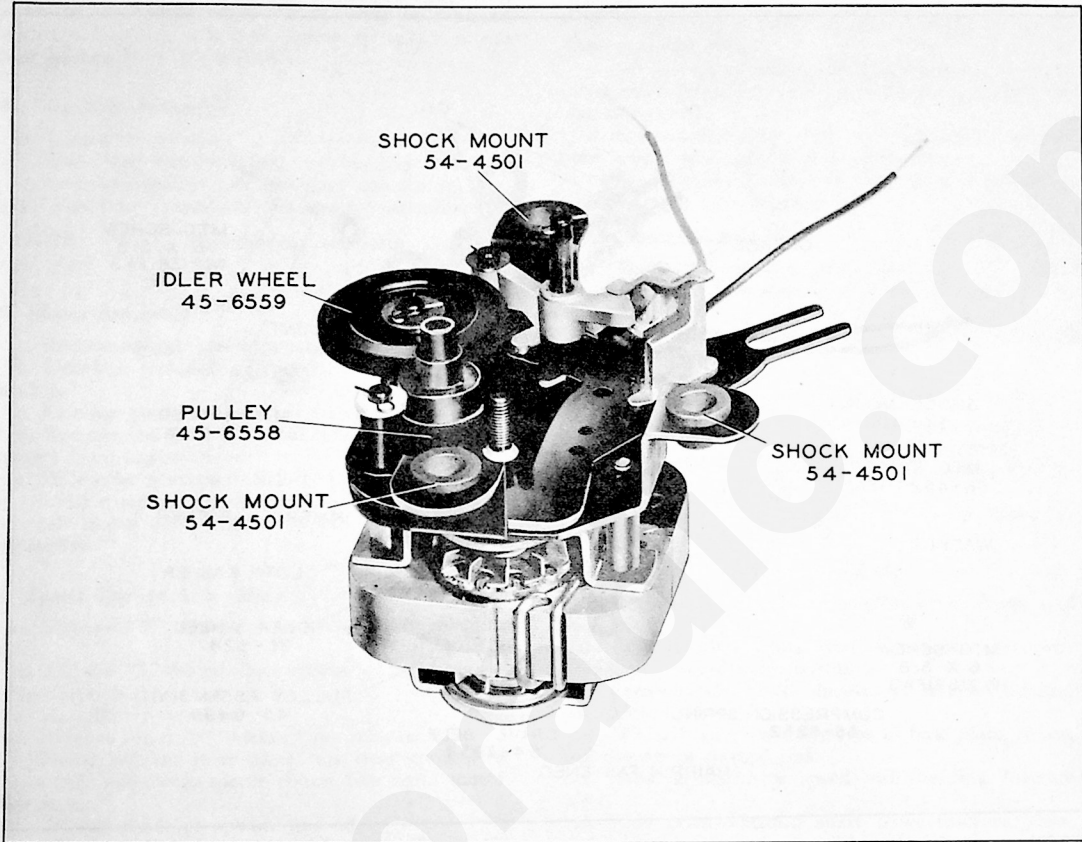
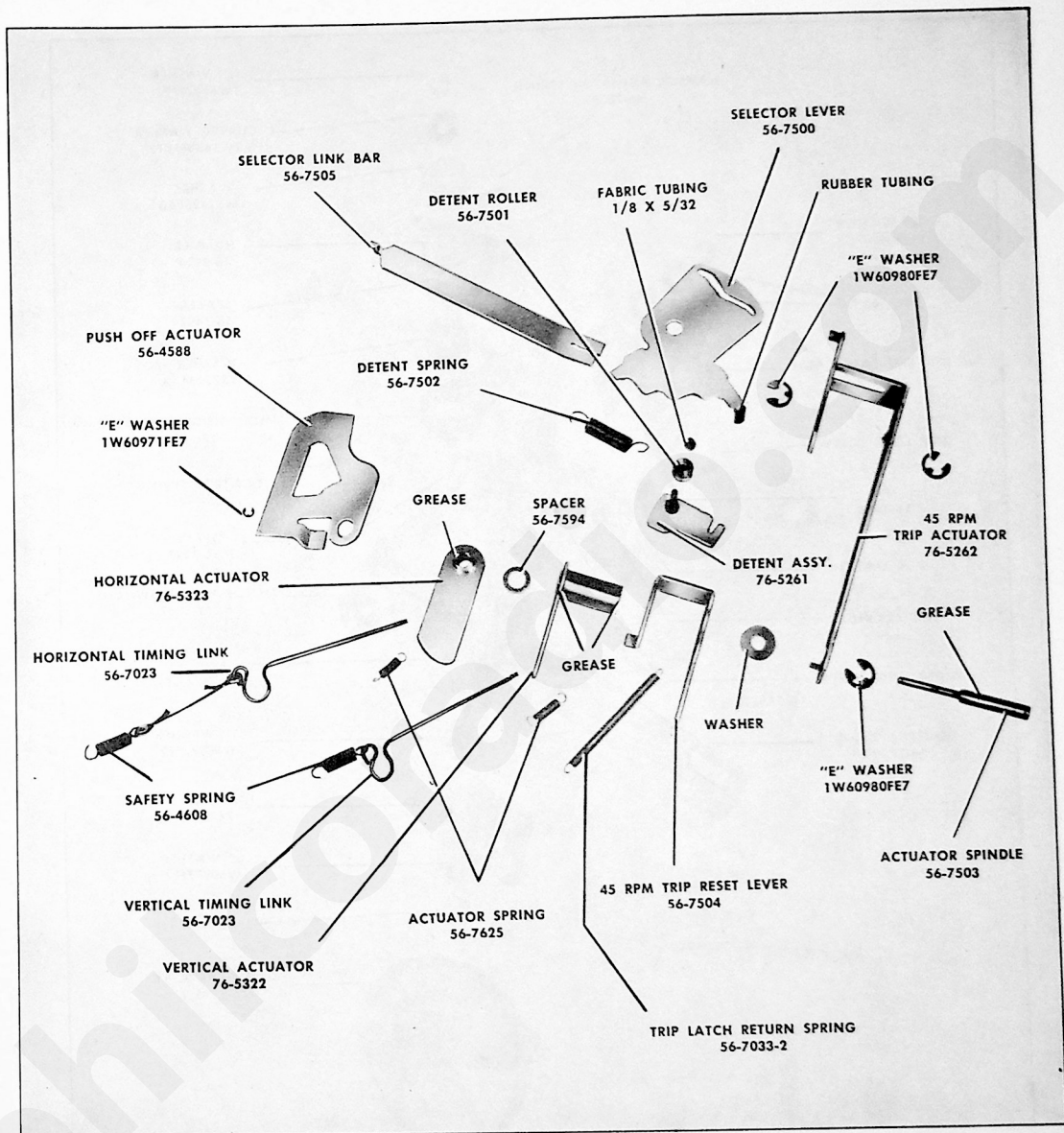


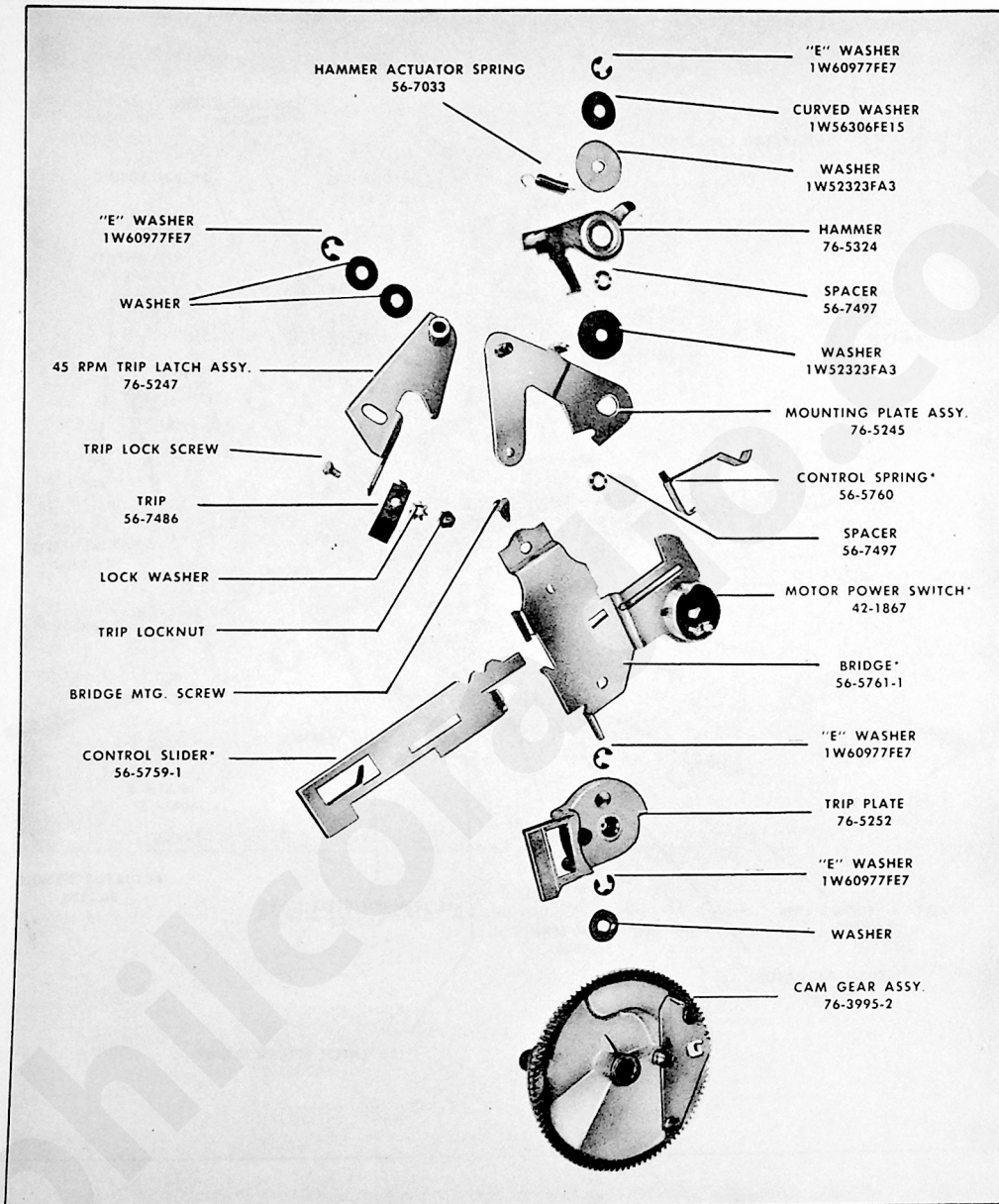
Figure 16. Motor Assembly—Part No. 35-1433

TP9-456



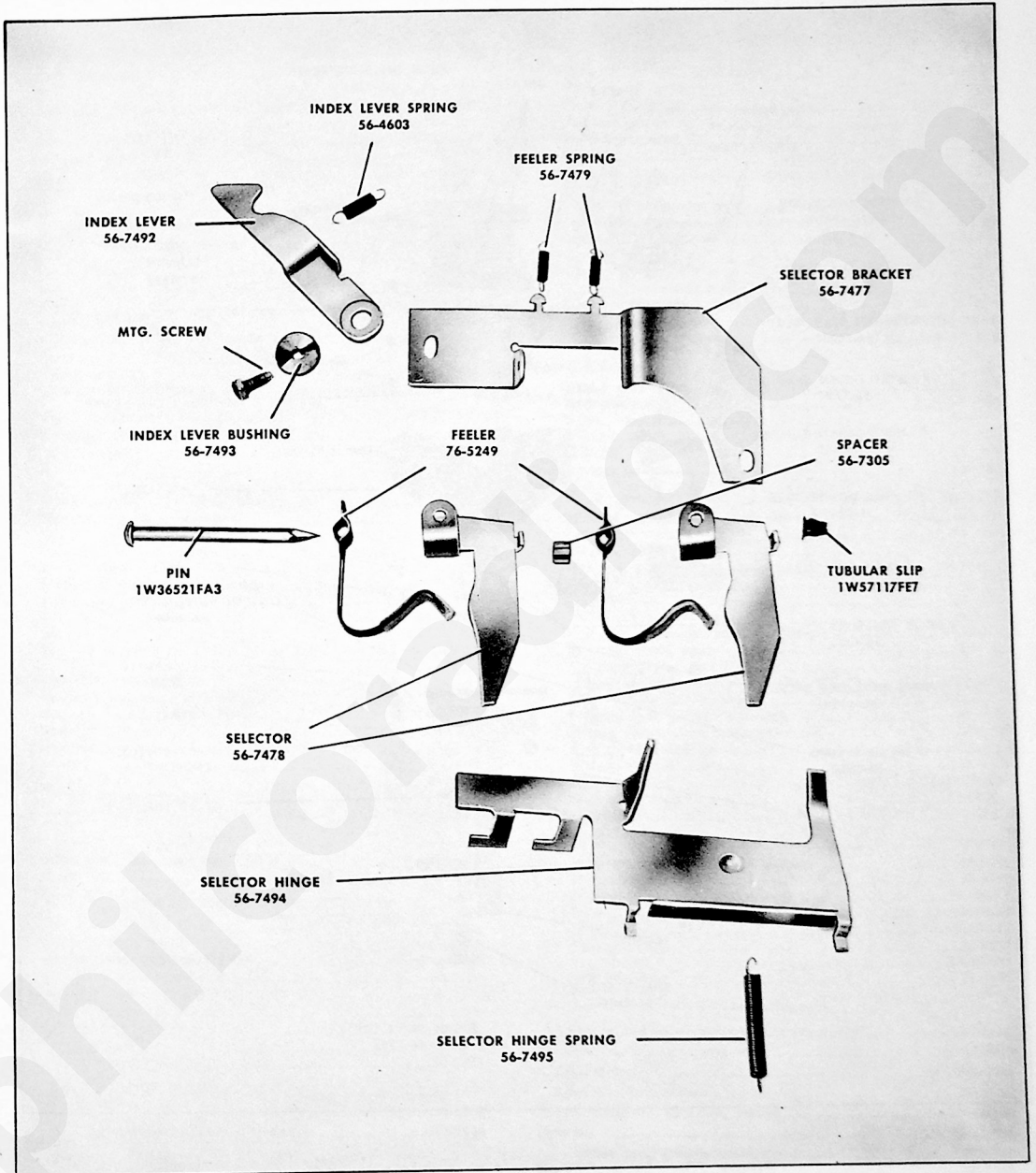
TP9-220

Figure 17. Actuator and Speed-Change Assemblies



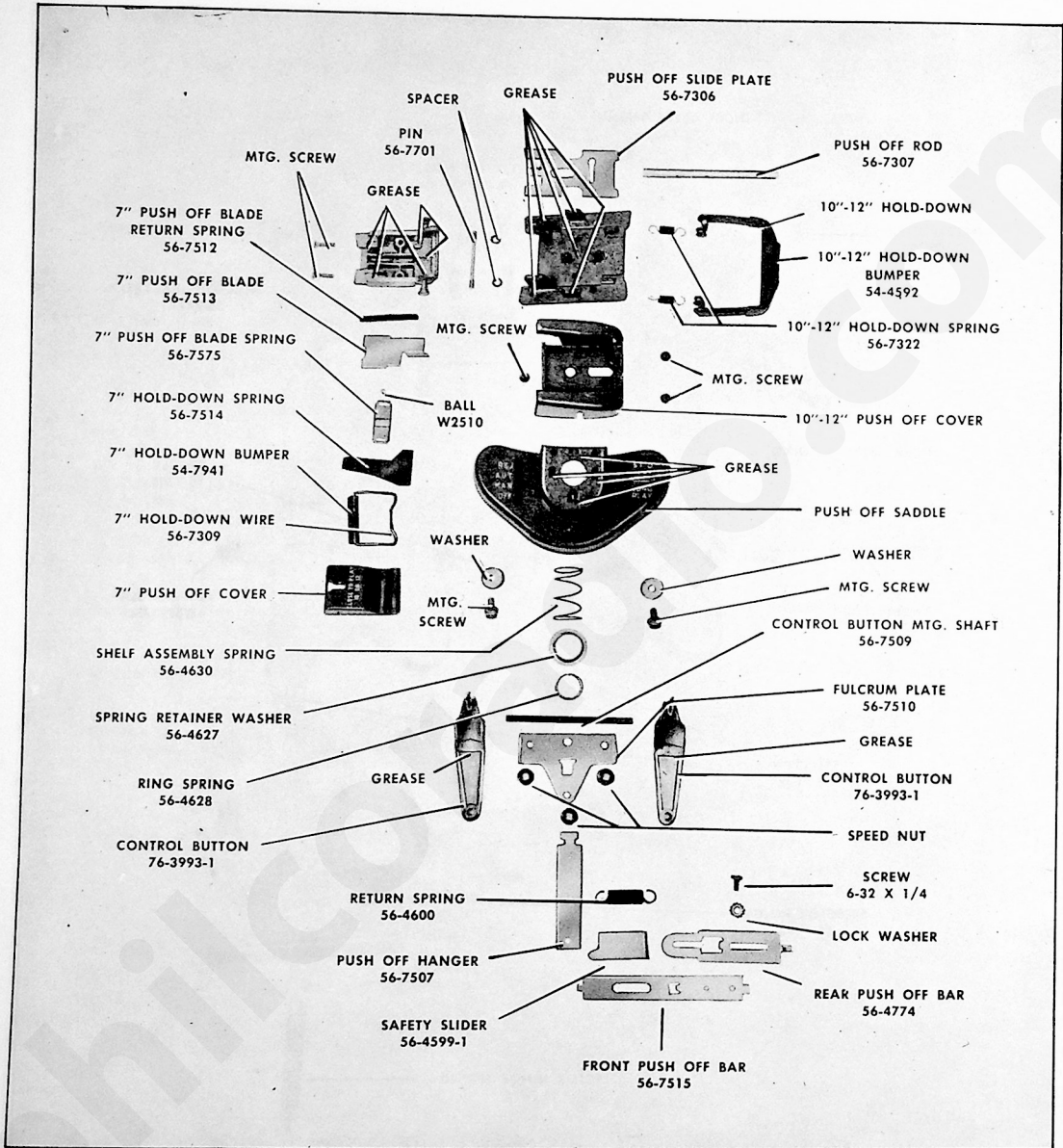
TP9-221

Figure 18. Cam-Gear and Bridge Assemblies (Bridge Assembly Parts Are Identified By *)



TP9-222

Figure 19. Selector Assembly



TP9-203

Figure 20. Record-Shelf and Push-Off Assemblies

SUPPLEMENTARY INFORMATION

NEW POSITION TRIP FOR 45 R.P.M. RECORDS

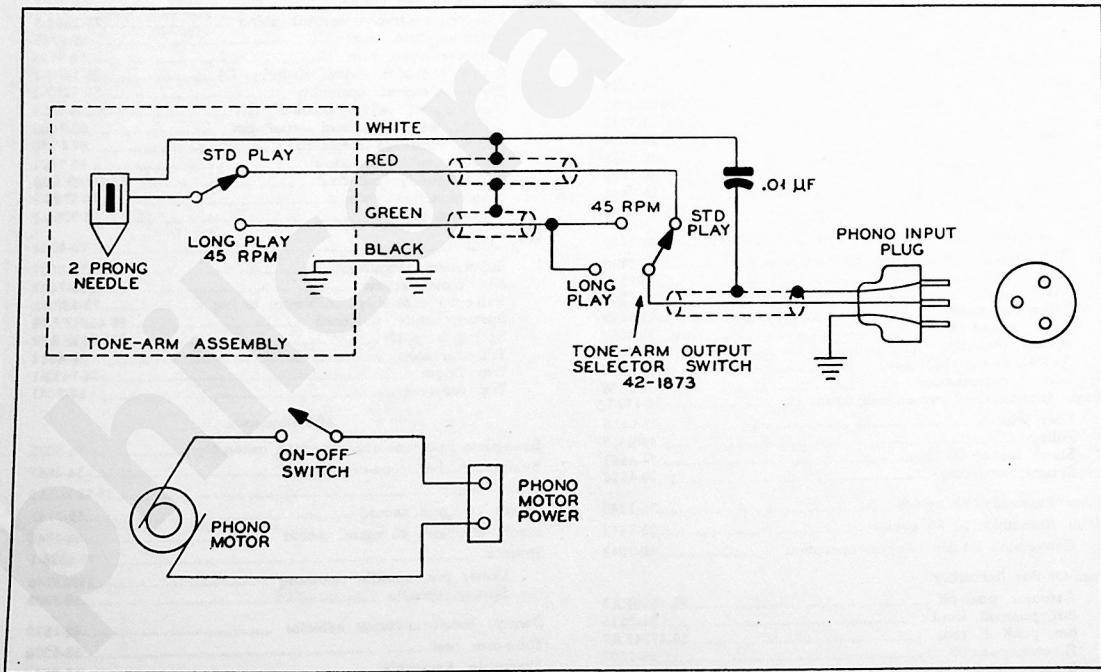
To accomplish the trip modification the following changes were made:

Description	Service Part No.
Trip-Arm and Trip-Receiver Assemblies (Figure 14).	
Trip arm stop, 56-4614	dropped
Stop spring, trip arm, 56-4613	dropped
Trip receiver part number changed to 56-6404-1.	
Actuator and Speed-Change Assemblies (Figure 17).	
Actuator spindle, 56-7503	dropped
"E" washer (2), 1W60980FE7	dropped
Trip actuator, 76-5262	dropped
Washer	dropped
45 r.p.m. trip reset arm, 56-7504	dropped
Trip latch return spring, 56-7033-2	dropped
Pivot and spindle assembly added in place of actuator spindle	76-5759
Position link (connects between selector control button and pivot and spindle assembly)	56-7987FA3
Cam Gear and Bridge Assemblies (Figure 18).	
Mounting plate assembly 76-5245	dropped

Description	Service Part No.
Trip locknut	dropped
Lockwasher	dropped
Trip, 56-7486	dropped
45 r.p.m. trip latch assembly, 76-5247	dropped
Trip lock screw	dropped
Washer (2)	dropped
"E" washer, 1W60977FE7	dropped
Washer, 1W52323FA3	dropped
Spacer, 56-7497	dropped
Hammer, 76-5324	dropped
Hammer actuator spring, 56-7033	dropped
Washer, 1W52323FA3	dropped

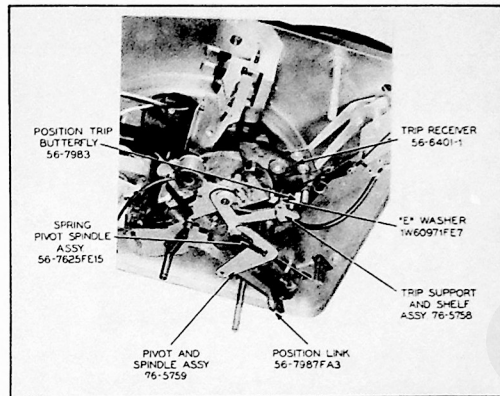
The following parts are added. The list is given in order of assembly, starting from below the bridge. See Figure 22.

Spacer	56-7497
Trip support and shelf assembly	76-5758
Position trip (butterfly) (not carried; do not order)	56-7983
"E" washer	1W60971FE7
Washer (not carried; do not order)	1W52005FA3
Curved washer	1W56306FE15
Washer (not carried; do not order)	1W52394FA3
"E" washer	1W60977FE7



TP 9-543

Figure 21. Wiring Diagram of Model M-20



TPO-2432

Figure 22. Bottom View, Model M-20, Showing Parts Placement