AUTOMATIC RECORD CHANGERS
Part No. 35-1285, 35-1286, 35-1289

The service information in this bulletin covers the adjustments and replacement parts for Philco automatic record changers Part No. 35-1285 (standard changer) and Part No. 35-1286, 35-1289 (Deluxe changers).

These record changers are identical with the exception of the color of the mounting plate, plating of parts on top of changers, motor, Light Beam Reproducer, and electrical wiring circuits for operation. The differences are indicated in the Replacement Part List, page 4, and the Electrical wiring diagrams, page 5.

CHANGERS USED IN PHILCO MODELS

Changer Part No.	Philco Models
35-1285	42-1008, 42-1009, 42-1010, 42-1011, 42-1012, 42-1013
35-1286	42-1016
35-1289	42-1015

GENERAL DESCRIPTION OF CHANGE CYCLE

An automatic record changer performs three principal functions.

1—Places record on turn table.

2—Lowers tone arm on record in playing position.

3—Raises tone arm at end of record or on reject.

These functions are controlled by three mechanisms, interconnected and built together, but each separate in its operation. The motion for each is orginated in one central cam gear which has three different and individual cam surfaces. The cam gear is normally at rest while a record is being played, but is put into operation by a saw tooth clutch which takes its power from the turntable and drives an intermediate drive gear. This only takes place when the record changer is put into a change cycle. The cam gear then makes one full revolution to complete the change cycle and comes to rest in a normal position.

The record changing mechanism which places a record on the turntable is brought into operation by a lever with a roller at one end. The lever is attached to the shelf plate mounting post and is operated by a notch under the cam gear. This causes the mounting post to move slightly, pushing the bottom record off the stack onto the turntable.

The pick-up operating mechanism is likewise brought into operation by the cam gear surface on the top side of the cam gear. The raising lever, when removing the pick-up from the record, receives a swinging motion from the cam gear through an eccentric track on the top outside surface of the cam gear. This eccentric track causes the pick-up to be carried out beyond the turntable while a record is being dropped on the turntable. The light beam pick-up is then brought back into playing position for 10″ or 12″ records (depending on the shelf positions on the shelf carrier.

The travel of the pick-up arm towards the turntable for lowering on a 10 or 12 inch record is stopped at the proper point for lowering by a movable track on the cam gear. This movable track is operated by a lever which is moved by a spring lever connected through a cord and spring attached to the 10″ shelf plate. When the 10″ shelf plate is lifted up the movable track is allowed to shift to the outer groove of the cam gear surface so that the pick-up needle will set properly on the outer edge of a 12″ record. When the 10″ shelf plate is in place for playing 10″ records, the cord holds the spring lever and causes the movable track lever to shift to the inner groove as the cam gear revolves.

The electric reject trip causes the clutch to engage and allow the tone arm to be removed from the record by the cam gear. The reject trip operates through a pulsating plate and movable contact on the tone arm raising lever. When the pulsating plate and movable contact make connection, the solenoid is energized, releasing the clutch so that the cam gear can be revolved.

OILING

These record changers should be lubricated once a year with a few drops of good light machine oil at the following points: Motor bearings, drive disc bearings and cam gear bearing.

CLUTCH ROLLER AND LEVER ADJUSTMENT

The teeth of the clutch should have approximately 1/16 inch clearance, when the lever roller is engaged snuggly in the cam gear. If the clutch does not have 1/16 inch clearance the clutch bracket should be slightly bent as indicated in Figure 1. Place ten, 12" records on turntable when this adjustment is made.

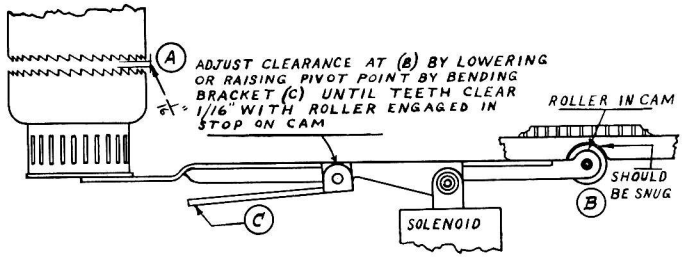


FIG. 1

SOLENOID ADJUSTMENT

The solenoid Armature should set properly in the coil in order to prevent hum and chatter when the solenoid is energized. To make this adjustment, loosen solenoid mounting bracket screws and raise or lower solenoid until armature is set correctly in the coil. See Figure 2.

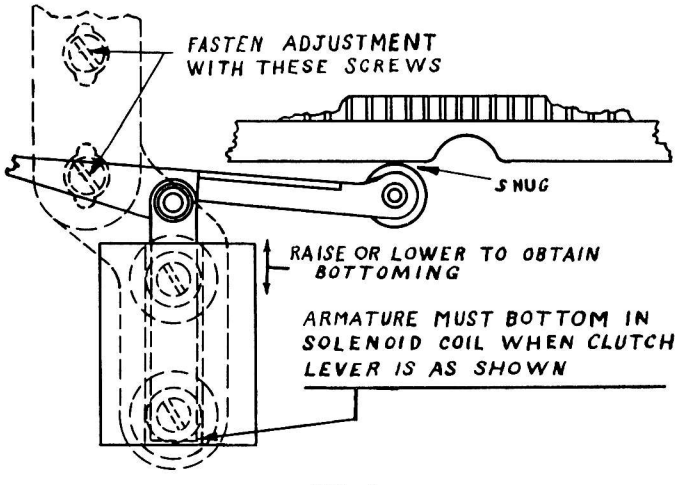


FIG. 2

BUMP LEVER ADJUSTMENT

Set 12" shelf eccentrics bumper in outer position, neutral (large part of cam away from shelf) and then equalize each Bumper to touch edge of 12" record. See Figure 3.

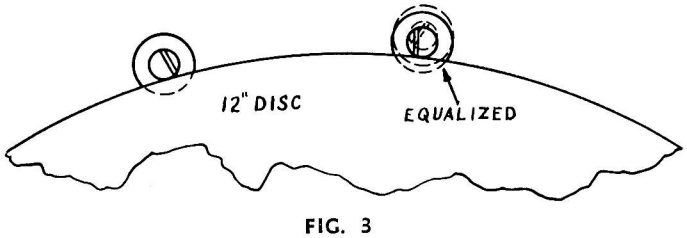


FIG. 3

FORWARD SHELF MOTION ADJUSTMENT— MINIMUM SIZE

(12" Record Push-Off)

1. Place 12" record on spindle and 12" shelf as shown in Figure 4. Start changer in cycle and then stop the change cycle when the crown on the cam gear touches the roller on the shelf lever as shown in Figure 4.
2. In this position loosen screw "A" and lock nut on screw "C"; turn out screw "C" slightly and then retighten screw "C" until eccentric record bumpers fit snuggly against 12" record. Then tighten screw "A" and lock nut of screw "C."

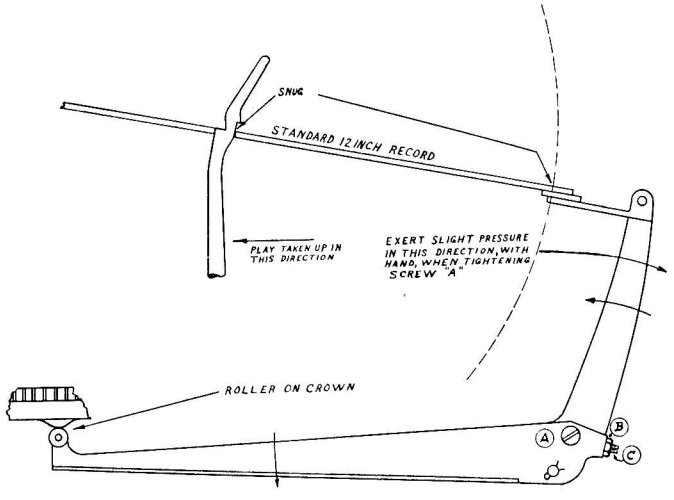


FIG. 4

NEUTRAL SHELF POSITION

(Bump Lever Eccentric)

When the changer is in Neutral position (out of change cycle) the shelf lever should be in the position as shown in Figure 5. To make this adjustment, proceed as follows:

1. Place standard 12" record on the turntable spindle and 12" record shelf plate as shown in Figure 5. The roller of the shelf lever must be off the crown of the cam gear when this adjustment is being made.
2. Hold record snuggly against the spindle and shelf bumpers.
3. Loosen screw and adjust eccentric (A) Figure 5, until it touches shelf lever.

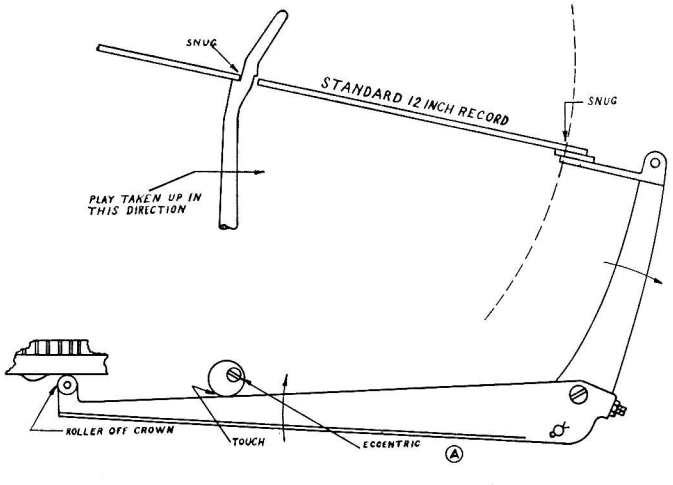


FIG. 5

10″ SHELF ECCENTRIC ADJUSTMENT

The 10″ shelf bump buttons are equalized as follows:

Place standard 10″ record on spindle and 10″ record shelf. The record should be snug against spindle notch as shown in Figure 5 for 12″ records.

Adjust 10″ shelf bump buttons so that they are equalized and just touch record.

Do Not Change "Bump Lever Eccentric" shown in Figure 5 and which should be adjusted as given in paragraph "Neutral Shelf Position."

TONE ARM HEIGHT

1. Load the turntable with twelve 10″ records.
2. Start changer through its cycle, then stop when tone arm is in full raised position and swinging towards records on turntable. If adjustment is correct, the jewel needle will clear the top record by ⅛″ as the tone arm swings into position for landing on record. If it does not clear top record by ⅛″, adjust screw No. 14 in top of tone arm (see Figure 9) until distance is obtained.

ADJUSTING TONE ARM TO INDEX ON 10″ AND 12″ RECORDS

The position at which the pick-up jewel lowers on the edge of the record is controlled by a vernier adjustment screw on the raising lever. This screw is reached through the hole (12) Figure 9 in the top of the base plate near the tone arm pivot. This screw is used for normal adjustments of the tone arm set down and moves the pick-up approximately ¼″. Adjust the screw so that the tone arm needle will set down approximately ⅛″ in on record edge. When set for either size record, the adjustment will also take care of the other size record positioning point.

When the tone arm is removed for replacement or greater movement of the tone arm is desired, beyond that obtainable with the preceding vernier adjustment, the two set screws in the collar of the pull-in lever underneath the changer should be adjusted. This is done by loosening one set screw and tightening the other, depending on which way the tone arm is to be moved. Under ordinary circumstances this adjustment will not be required as it has been preset at the factory for proper positioning. When making this adjustment, a .005 shim gauge should be placed between the ball race washer and the tone shaft bearing.

PULSATING PLATE ADJUSTMENT

When the turntable is revolving the pulsating plate of the reject mechanism should clear the main plate by 1/32 of inch when the crown on the cam attached to the underside of the turntable touches the pulsating lever roller at its highest point. See Figure 6. To make this adjustment proceed as follows:

1. Rotate turntable until the crown of the cam under turntable touches roller of pulsating lever as shown in Figure 6.
2. Adjust screw on pulsating lever until pulsating plate is 1/32 of an inch from main plate (use gauge).

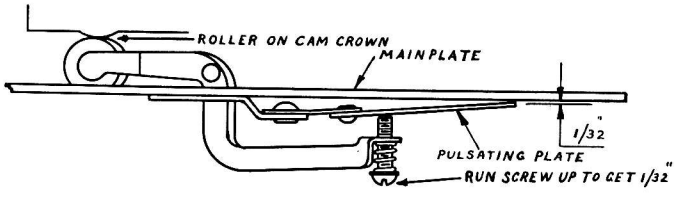


FIG. 6

TRIP ARM ADJUSTMENT

1. Rotate turntable so that the crown on the cam under the turntable is OFF roller of pulsating lever. (See Figure 7.)
2. Move tone arm in towards record until the rubber roller and contact is at the outer edge of pulsating plate. See Figure 7.
3. Turn screw (A) Figure 7 on trip arm until rubber roller just touches pulsating plate, then turn screw (A) slightly further so that the plate moves slightly.

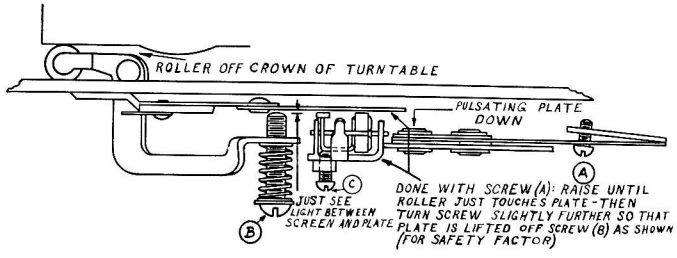


FIG. 7

REJECT CONTACT TRAVEL ADJUSTMENT

Place a record on turntable and tone arm in playing position about halfway in on playing lines of the record. In this position the contact operated by the rubber roller on the trip arm should be carried to within 1/16 to 3/32 of an inch of the pulsating plate as the roller moves towards center of changer. (See Figure 8). If contact does not have this spacing as the roller moves and pulls contact up, then adjust screw (C) Figure 8 until correct spacing is obtained.

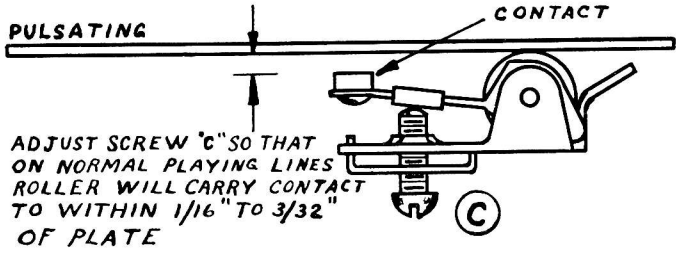


FIG. 8

TURNTABLE SPEED ADJUSTMENT

To set the turntable speed control for the speed range covered by the control, proceed as follows:

1. Push speed lever knob to the "normal" position. Turn ball knob until the motor mounting plate drops to its lowest position. In this position the turntable should be turning at approximately 77 R.P.M. This is indicated by the lines on the edge of the turntable appearing to be slightly moving backwards (counter-clockwise). In order to see these lines move the neon lamp must be energized.
2. If the lines do not travel slightly backward, the nuts on the motor mounting plate retaining shaft should be loosened and the plate moved up or down to get the proper speed, then tighten nuts.
3. After this adjustment, set ball knob to the point where lines on turntable appear to be standing still.

REPLACEMENT PARTS
AUTOMATIC RECORD CHANGER
PART NUMBERS 35-1285, 35-1286, 35-1289

Photo No.	Description	Part No.
1.	10 inch Record Shelf (Changer 35-1285)	318-2805
	10 inch Record Shelf (Changer 35-1286)	35-2545
	10 inch Record Shelf (Changer 35-1289	35-2545
	String Guide (Plastic)	
2.	Record weight assembly (Changer 35-1285)	318-2804
	Record weight assembly (Changer 35-1286, 1287)	35-2559
	Mtg. Screws	W-685FA9
3.	12 inch Record Shelf (Changer 35-1285)	318-2806
	12 inch Record Shelf Changer 35-1286, 1289)	35-2546
	Mtg. Shaft (Changer 35-1285)	218-1440
	Mtg. Shaft (Changer 35-1286, 1289)	35-2550
	Mtg. Spring	218-1439
4.	Speed Control Knob (Changer 35-1285)	318-2815
	Speed Control Knob (Changer 35-1286-128	35-2548
	Escutcheon (Changer Standard)	218-1473
	Escutcheon (Changer Deluxe)	35-2558
	Mtg. Screws	218-1474
5.	Mtg. Screws	218-1471
6.	Mtg. Springs	218-1470
7.	Changer Carrier Assembly	318-2818
8.	Automatic-Manuel — Off Plate	
	(For Changer Standard)	218-1444
	(For Changer Deluxe)	35-2557
9.	Knob (Standard)	217-1393
	Knob (Deluxe)	35-2552
10.	Reject Switch (For Changer Standard)	412-1025
	(For Changer Deluxe)	35-2555
11.	Tone Arm Support (For Changer 35-1285)	318-2796
	(For Changer 35-1286)	35-2549
	Mtg. Rivet	W-2293FA3
12.	Tone Arm Positioning Adjusting Hole	
13.	Tone Arm Assembly (For Changer 35-1285)	35-2518
	Tone Arm Assembly (For Changer 35-1286, 1289)	35-2519
	Tone Arm Support Bracket	318-2790
	Tone Arm Adjusting Ratchet and Shaft Assy.	318-2800
	Tone Arm Bracket	218-1424
	Tone Arm Stem	218-1425
	Screw (Adjusting Tone Arm)	218-1428
	Nut (Adjusting Screw)	218-1426
	Snap Ring	218-1431
	Ratchet Spring	218-1427
	Counter Weight	318-2799
	Mtg. Screw	218-1432
	Tone Arm Ball Bearings	218-1466
	Retainer Assembly (Balls)	218-1465
	Washer (For Bearing Retainer)	218-1464
	Tone Arm Shaft Bearing (Deluxe)	35-2551
	Tone Arm Shaft Bearing (Standard)	218-1467
	Mtg. Nut	218-1468
	Mtg. Lockwasher	218-1469
14.	Tone Arm Height Adjusting Screw	
15.	Turntable (For Record Changer 35-1285)	318-2807
	Turntable (For Record Changer 35-1286)	35-2554
16.	Spindle Assembly (Standard)	318-2794
	Spindle Assembly (Deluxe)	35-2560
	Spindle Nut	218-1408
	Spindle Sleeve Nut	218-1409
	Ball Bearing and Retainer Assembly	318-2793
	Washer	218-1406
	Clutch and Gear (Bakelite)	218-1401
	Spring	218-1403
	Washer	218-1405
	Sleeve (For Top of Spindle)	218-1402
	Turntable Cone and Spindle Sleeve	318-2795
17.	Manuel-Automatic Positioning Plate (Part of 50)	
18.	Motor (115 Volts, 60 cycles, for changer 35-1285)	318-2802
	(115 Volts, 60 cycles for changer 35-1286, 35-1289)	35-2553
	Connectors Solderless (cable)	217-1395
	Motor Mtg. Plate Assembly	318-2803
	Mtg. Washers (Copper)	218-1433
	Rubber Mtg. Grommets (Light Color)	217-1390
	Rubber Mtg. Grommets (Black)	217-1391
	Mtg. Sleeves	218-1434
	Mtg. Screws	W-1649FA3
19.	Spring (Drive Tension)	218-1458
20.	Upper Bearing Support	218-1478
21.	Spring (Upper Bearing Support)	218-1459
22.	Screw	218-1460
	Nuts	W-317FA3
23.	Motor Mtg. Plate	318-2803
	Screws	W-1475FA3
	Nuts	W-317FA3
24.	Screw (Shelf Lever)	W-1475FA3
	Nut (Shelf Lever)	W-544FA3
25.	Shelf Lever Adjusting Screw	35-2567
	Nut	35-2568

Photo No.	Description	Part No.
26.	Shelf Lever and Roller	318-2814
27.	Spring	
28.	Eccentric Cam (Adjusting Shelf Lever)	218-1404
	Mtg. Screw	W-453FA3
29.	Male Plug (Phono Input)	217-1396
30.	Intermediate Gear (2 required)	218-1391
	Screw	W-2150FA3
	Washer	218-1392
31.	Shelf Lever Roller (Part of 26).	
32.	Cam Gear Assembly	318-2787
	Mtg. Screw	W-2284
32A.	Mtg. Bracket (Intermediate and Cam Gears)	318-2768
	Mtg. Screw (Brackets to spindle bracket)	W-685FA3
33.	Cam Switch Assembly	318-2816
	Mtg. Ring	218-1461
34.	Shelf Lever Bump (Part of 32).	
35.	Clutch Lever and Roller Assembly	318-2810
	Mtg. Screws	W-685FA3
35A.	Solenoid Armature (Part of 35)	
36.	Reject Solenoid	312-1011
	Mtg. Screws	218-1398
	Mtg. Washers	218-1397
37.	Manual Switch Lever and Bracket Assembly	318-2813
	Mtg. Screws	W-2150FA9
38.	Spring (Manual Switch Lever)	35-2565
39.	Pulsating Plate and Lever Assembly	318-2785
	Mtg. Screws	W-2150FA3
	Pulsating Spring	218-1378
40.	Spring (Positioning Lever)	35-2566
41.	Trip and Positioning Assembly	318-2786
41A.	Lead in Spring	218-1463
41B.	Lead in Spring Link	218-1462
42.	Velocity Trip Lever (Part of 41)	
43.	Tone Arm Positioning Lever (Part of 41)	
44.	Selector Cam	217-1386
	Mtg. Screw	97-0138FA3
	Spring	218-1393
45.	Spring (Cam Switch)	35-2562
46.	Spring (Shelf Plate String)	318-2817
47.	Adjusting Screw (Pulsating Lever)	218-1384
	Spring Adjusting Screw	218-1382
48.	Trip Switch Assembly	35-2563
	Roller Hub	218-1387
	Screw	218-1385
	Lock Nut	218-1386
	Contact Lever	318-2770
	Contact Lever Shaft	218-1388
	Insulator	217-1383
	Pigtail	218-1375
	Rubber Roller	217-1385
49.	Pulsating Lever (Part of 39)	
50.	Automatic Changeover Switch	35-2547
51.	Pulley Assembly (Cord Guide)	318-2798
	Mtg. Screw	218-1415
52.	Rubber Grommet (Black)	217-1391
	Grommet Sleeve	218-1434
53.	Rubber Grommet (Light Color)	217-1390
	Mtg. Screw	W-1649FA3
	Grommet Sleeve	218-1434
54.	Drive Disc Assembly (Motor)	35-2564
55.	Turntable Drive Disc Assembly	318-2811
	Bearing	218-1449
	Brass Cup Washer	218-1447
	Collar and Screw	318-2812
	Washer (2 required)	218-1446
	Turntable Drive Wheel	218-1448
	Screw	218-1450
56.	Neon Lamp Socket	318-2808
	Neon Lamp (Standard)	34-2482
	Neon Lamp (Deluxe)	35-2556
57.	Clutch and Gear (Part of 16)	
58.	Turntable Hub and Core (Part of 15)	
59.	Shelf Carrier and Stud Assembly (Standard)	318-2755
	Shelf Carrier and Stud Assembly (Deluxe)	35-2561
	Carrier Shaft	218-1451
	Carrier Clips	218-1452
	Rubber Bump	217-1392
60.	Spring (Speed Adjusting Knob)	218-1453
61.	Washer (Holds 60 in place)	218-1456
	Wire Pin (Holds 60 in place)	218-1457
62.	Speed Control Hook	218-1454
63.	Spring (Speed Lever)	218-1455
64.	Motor Control Assembly (Includes Shaft and Bracket)	318-2820
65.	Motor Control Adjusting Nuts	W-317
	Washers	218-1442

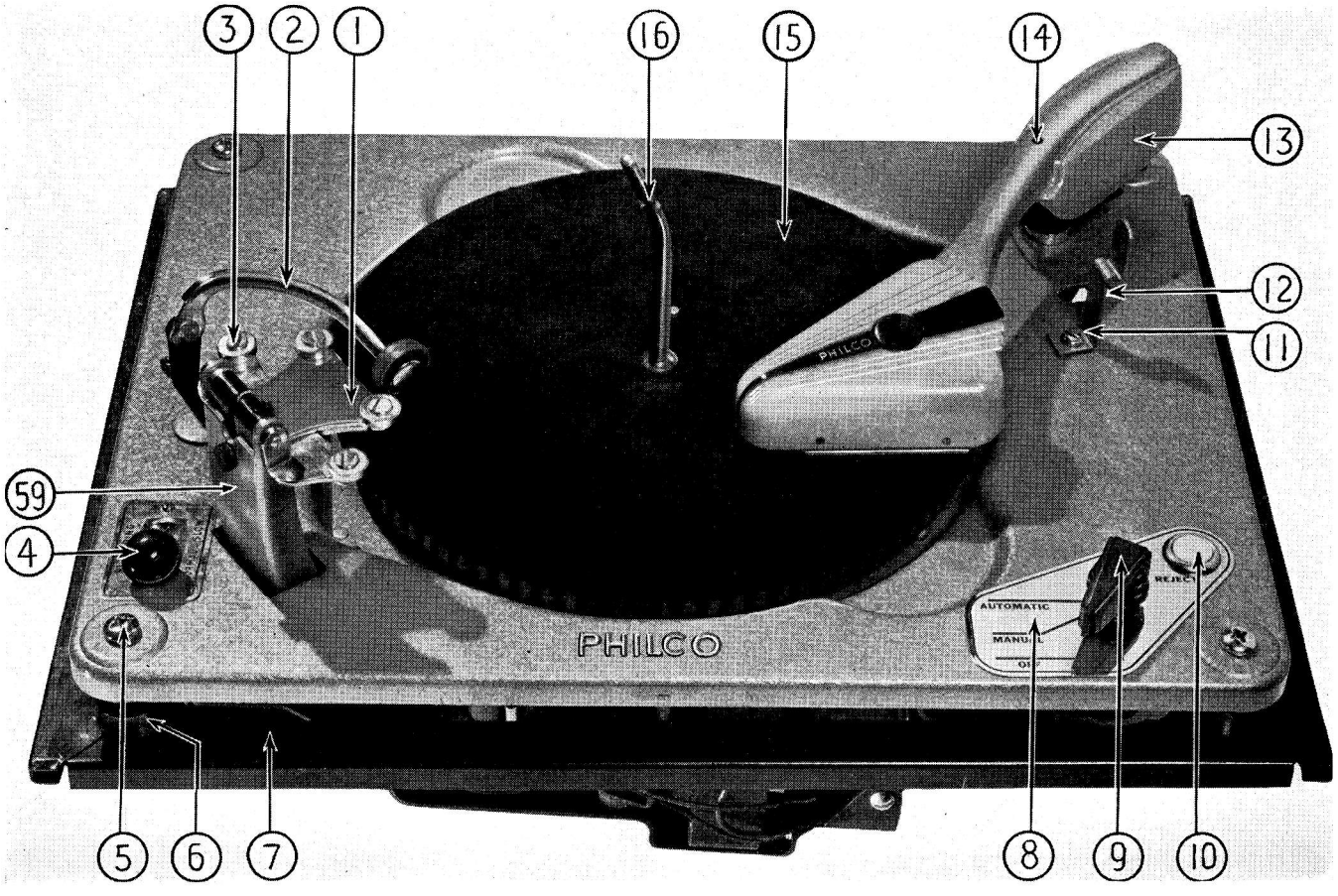
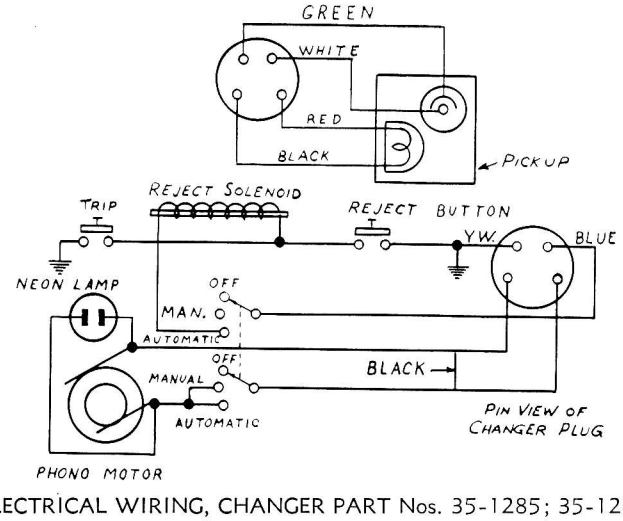
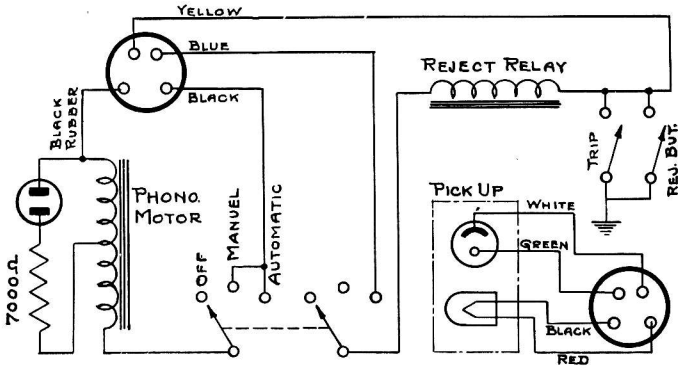


FIG. 9



ELECTRICAL WIRING, CHANGER PART Nos. 35-1285; 35-1289



ELECTRICAL WIRING, CHANGER PART No. 35-1286

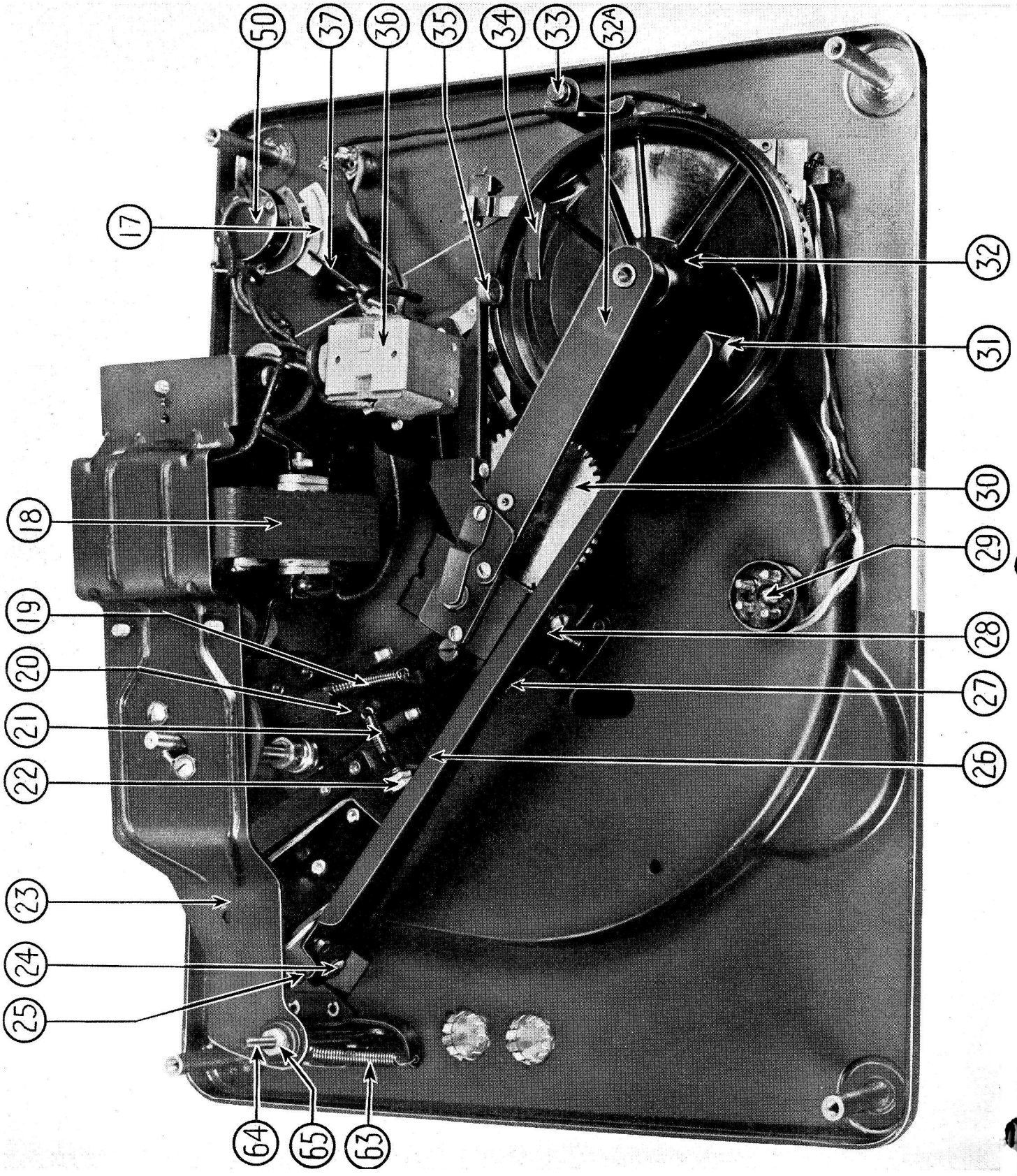

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FIG.

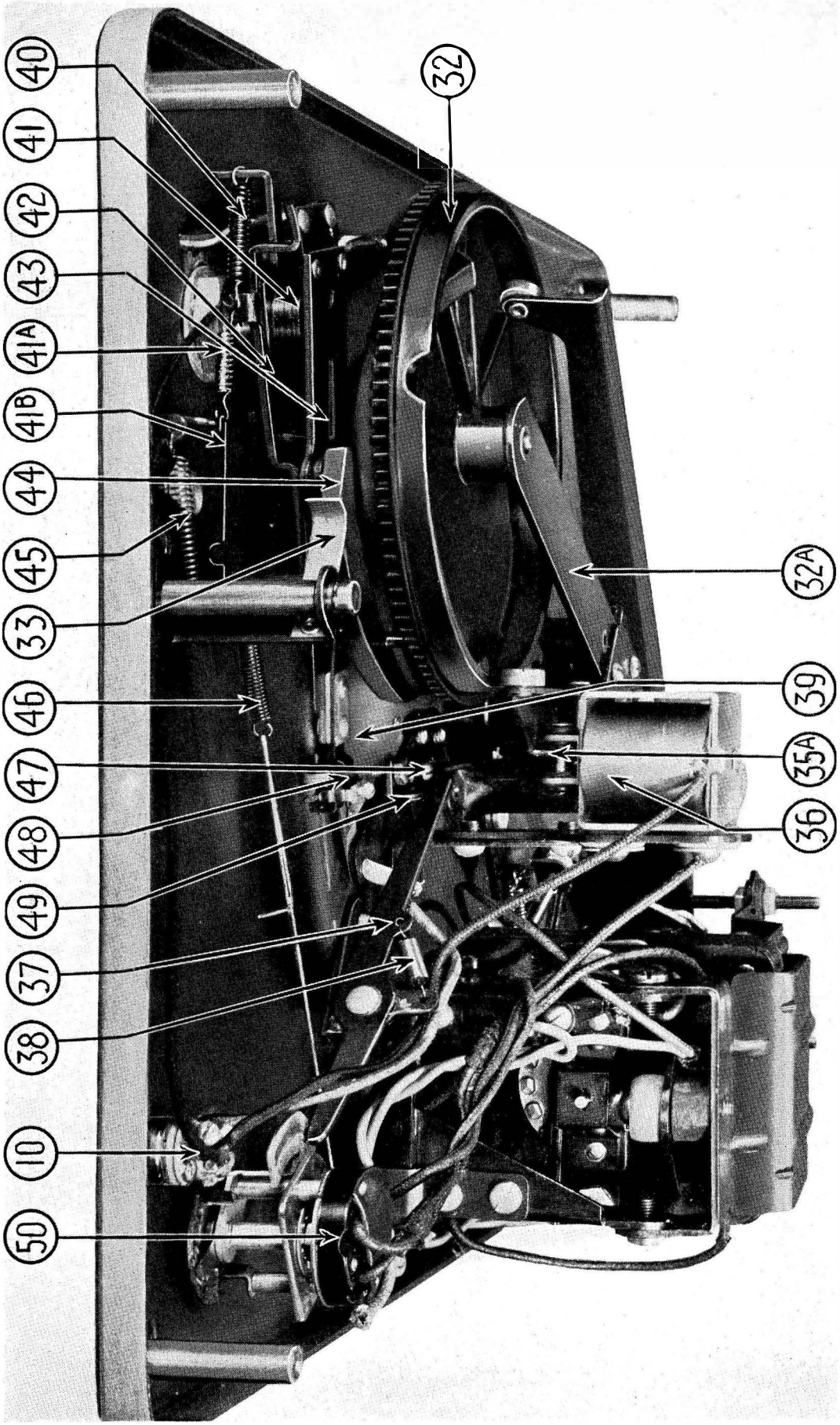

FIG. 11

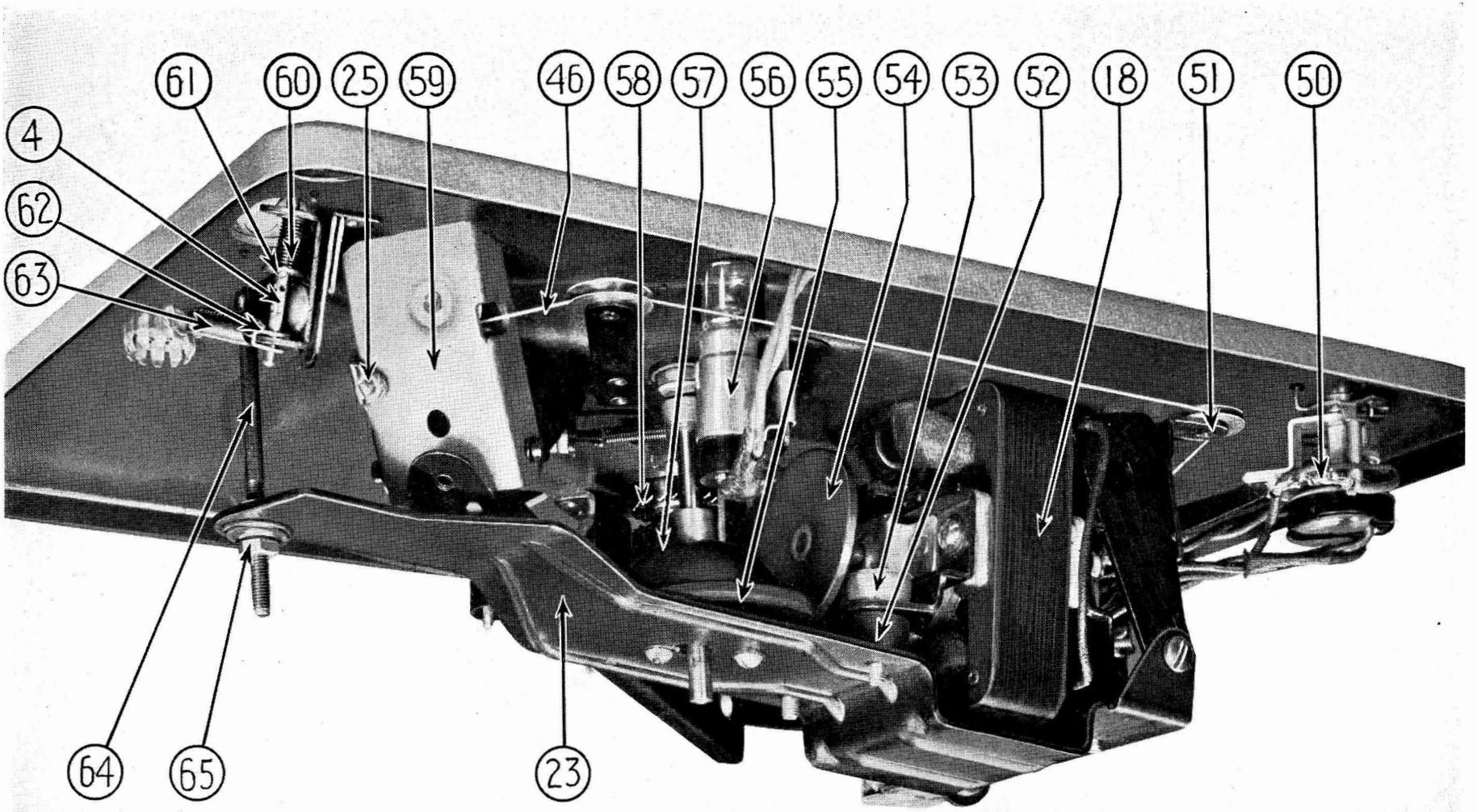

FIG. 12

CONFIDENTIAL SERVICE SUMMARY

PHILCO

RADIO MANUFACTURERS SERVICE — Your Guarantee of Best Radio Service — A PHILCO SERVICE PLAN

TO ALL PHILCO DISTRIBUTORS' SERVICE MANAGERS

RADIO No. 26

DATE: 9-16-41

THIS SPECIAL ISSUE OF THE CONFIDENTIAL SERVICE SUMMARY IS BEING SENT TO ALL RMS MEMBERS

COMPLETE INFORMATION ON THE 1942 RECORD CHANGERS

The Record Changer is an electrically powered, mechanical device performing a varied number of functions. It must be used by all kinds of people, on all kinds of records and under these conditions, the mechanical adjustments are quite critical. It is only reasonable to assume that a record changer must be tried out in the owner's home by the dealer and re-adjustments made wherever necessary.

The first requisite when installing a radio phonograph is to remove all of the packing material. Then loosen the four shelf mounting screws. The record changer must float freely on the four mounting springs.

All adjustments are carefully made at the time the record changer is assembled and it is given other thorough check tests when it is installed in the phonograph cabinet. These checks are actual working checks using records, and the operation of the record changer is carefully observed. When a record changer is finally delivered and set up in the home, it is possible that it may be necessary to touch up some of the adjustments. These adjustments are fully covered in the Radio Service Bulletin No. 402, dated August, 1941, and every serviceman should be thoroughly familiar with all of these adjustments.

THE NEW PHILCO RECORD CHANGER FOR 1942 is such a big improvement over all other record changers, in its simplicity of design and construction, that all of the adjustments are easy to make and there is no likelihood of any particular part failure. Some changes were made in production to further improve the performance and reliability of the record changers. It will not be necessary to add these improvements to all record changers, but each serviceman should be aware of them and should take advantage of these improvements in case of some serious service complaint.

Basically, changes were made to overcome three conditions:

A — Rumble in the early production sets, particularly on the Models 42-1010 and 1016.
B — Erratic operation of the trip mechanism.
C — Flutter and change of speed.

A. The rumble in the Models 42-1010 and 1016 can be easily corrected by replacing the turntable bearing. Remove the turntable and the spindle and then take out the brass cone and the ball bearings and washers. Rebuild the bearing, using the old washers and the new flat fiber washer and the concave steel washer. (See Figure 1). Add "Stay-Put Grease" or "Lubriplate" between the washers to eliminate friction. When replacing the spindle assembly, the spindle must be more than ½ turn loose while lining it up with the record support shelf.

PHILCO
CONFIDENTIAL SERVICE SUMMARY

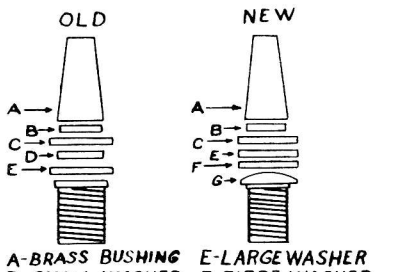

FIGURE 1

B. The pulsating plate in the trip mechanism is actuated by the pulsating arm and the cam on the underside of the turntable. If the pulsating arm is loosely riveted to the bracket, the screw on the end of the pulsating arm will move back and forth over the pulsating plate. This changes the distance the plate is lifted by the pulsating arm and affects the trip adjustment. A spring has been added in production to hold the end of the lever under tension so that it does not move "in" and "out" and change the trip adjustment. On record changers not equipped with this spring, use the lead spring Part No. 28-8919 and connect as shown in Figure 2. Attach the spring to the wiring terminal on the end of the bracket and to the adjusting screw. Check to make sure that the pulsing roller does not scrape the hub on the under side of the turntable.

C. Flutter and change of speed is caused by friction in the vertical drive assembly and by the action of the regeneration spring (item 21 in Service Bulletin No. 402). The following changes involving the regeneration spring and the vertical drive assembly should be made on every changer on which there in an opportunity to do so.

Remove the regeneration spring and the threaded adjusting screw and nuts. (See Figure 3).

Loosen the two, bell drive disc bearing screws on the bottom of the motor mounting bracket.

Push the motor drive disc and armature to the extreme right, against the thrust spring. Allow 1/16" clearance between the rim of the bell drive disc and the motor drive disc and tighten the two bearing screws securely. (See Figure 4).

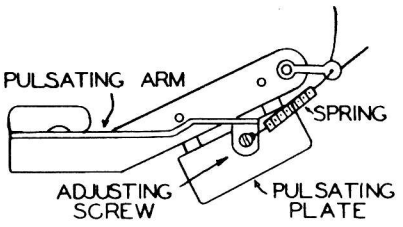

FIGURE 2

The change consists of removing the cupped washer and the flat washer below the upper bearing plate and adding two fiber washers, one on each side of the steel washers above the oilless bearing. The collar should be reset allowing approximately 1/8" clearance between the collar and the upper bearing support. The oilless bearing should seat in the upper bearing support and should not turn with the vertical shaft. (Figure 5).

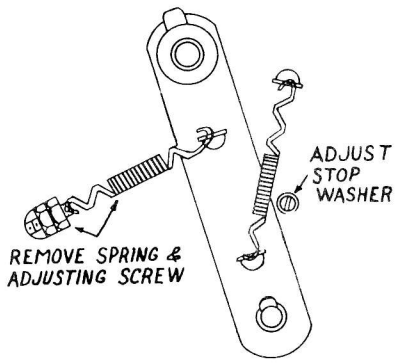

FIGURE 3

There is a small fiber washer which is used to limit the motion of the upper bearing support assembly. (See Figure 3). Loosen the screw holding this eccentric washer. Hold the vertical drive shaft at approximately 3° to the right of perpendicular and adjust the washer and fasten in place. (See Figure 6).

REFER TO ADJUSTMENTS GIVEN IN RADIO SERVICE BULLETIN 402

CLUTCH ROLLER AND LEVER ADJUSTMENT — The only change in the adjustment as given in the record changer bulletin 402 is that instead of spacing the clutch teeth 1/16" apart, the clutch should be adjusted in the cycling position. The teeth should be meshed but should have a slight clearance between the upper and lower teeth. In the playing position there should be 1/16" or more clearance between the two sections of the clutch.

The purpose of the clearance between the teeth when they are meshed is to insure that the turntable will not be lifted by the operation of the solenoid. Turntables are not interchangeable without readjusting the clutch lever and also the trip mechanism.

SOLENOID ADJUSTMENT — There are no changes to the instructions given in the bulletin. The action of the clutch and lever assembly should be checked for free operation. It should not require a pull of more than seven or eight ounces at the roller to bottom the solenoid. Solenoid brackets are easily bent out of adjustment when handling record changers. When a record changer is removed from

a radio phonograph, set it down on its front edge, never lay it down on the top or bottom.

FORWARD SHELF MOTION ADJUSTMENT — There may be a tendency when making this adjustment, to overpush the record against the spindle, causing wear of the hole in the record.

ADJUST TONE ARM TO INDEX ON 10" AND 12" RECORDS — If the shelf plate string is loose, the spring will not change the guide track properly on the large cam. The pulley on the corner of the motor mounting bracket can be moved to take up the slack.

PULSATING PLATE ADJUSTMENT — The spring should be installed to take up side play in the lever. The roller may roll freely or it may be tight and bind. Either way will be all right. Simply put some "Lubriplate" on the cam on the bottom of the turntable hub.

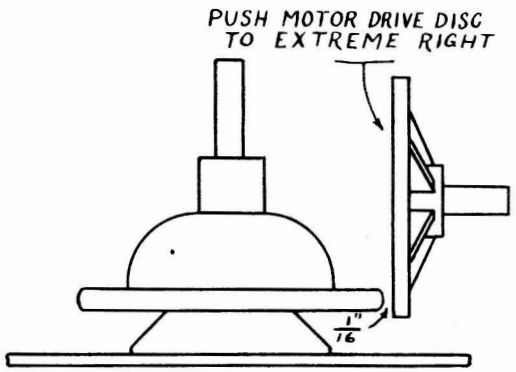

FIGURE 4

It is important that clearance be maintained between the pulsing plate and the main plate to prevent clicking but, in conjunction with this adjustment, the pulsing plate should first be checked for tension. Rotate the turntable until the roller is off the crown on the cam. Place the tone arm on the rest and back up the adjusting screw. The pulsing plate should project down at an angle of approximately 30°. Then proceed with the adjustments given in Bulletin 402. If for any reason, a turntable is replaced, readjust the pulsing plate.

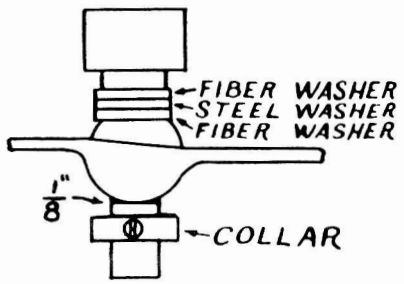

FIGURE 5

TRIP ARM ADJUSTMENT — Particular attention should be paid to obtain a slight clearance between the plate adjusting screw and the pulsing plate when adjusting the screw on the trip arm for the correct roller height. The edge of the pulsing plate should be parallel to the record changer base.

REJECT CONTACT TRAVEL ADJUSTMENT — It often is necessary to disregard the adjustment as given in the Radio Service Bulletin 402. Some records are known as swingers because the playing grooves are not concentric with the hole in the record. These records cause the tone arm to swing back and forth with each revolution, requiring more latitude in this adjustment. Turn the screw back and, in severe cases, remove the screw entirely. If the adjustment originally specified is maintained, a swing record may cause pre-trip and will cause the tone arm drag and light beam pull-off.

TURNTABLE SPEED ADJUSTMENTS — In addition to the adjustments given in Radio Service Bulletin 402, there are some other precautions to observe. First, the change for the vertical drive assembly specified in the first part of this Service Summary should be made on all record changers worked on.

The record changers are adjusted for a minimum speed of 78 RPM and, in the slow speed position they can be adjusted for 39 RPM. The Neon lamp should be turned so that one of the plates faces the rim of the turntable, otherwise it will not indicate the markings on the turntable when running at slow speed.

Excess paint on the inside of the turntable rim will cause WOW's. A flat on the rim on the turntable, due to its being dropped, will cause the same trouble.

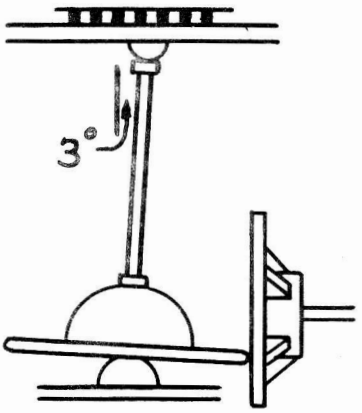

FIGURE 6

The upper bearing bracket of the vertical drive should have a soft gentle action against the turntable rim. If the action of this bracket is stiff the result will be WOW's. This can be freed up by striking the rivet with a center punch.

Flutter is caused by vibrations set up in the changer drive mechanism which in turn are transmitted to the tone arm and cause the light beam to shift back and forth across the photo electric cell at the frequency of the vibrations.

A flat or nick on the rim of the bell drive assembly or on the rim drive pulley will cause flutter. It can usually be discovered by a visual inspection of the parts. An unbalanced bell drive disc will wobble while turning and will cause flutter also.

If the flat, motor drive disc is not assembled properly on the motor shaft and is not true, this will cause flutter. This condition will probably only occur on the earlier models on which the drive disc was fastened to the motor shaft with a set screw. It can be detected with the motor running, since it will cause the vertical drive assembly to oscillate. The correction for these conditions is to replace the faulty part.

SERVICE HINTS

The brass sleeve used on the shaft of the motor is to prevent the armature from slipping out of line. Some steel sleeves were also used, but these sleeves are apt to be noisy with the motor running. To overcome this, the steel sleeve can be cemented to the end of the armature with Philco Speaker Cement.

Due to the difficulty in getting materials, three different tone arms have been used:

1 — An aluminum arm.
2 — A zinc arm.
3 — A moulded bakelite arm.

Since the weight of each kind of arm is different, three counterbalance weights are required. The aluminum arm requires a 1½ ounce weight, the zince arm a 5 ounce weight and the bakelight a 3 ounce weight. The zinc arm has a yellow paint mark under the tone arm.

Regardless of which tone arm is used, the weight of the tone arm on the record should be 1¼ ounces. The correct counterbalance weight must be used and the final adjustment made with the screw on the side of the tone arm swivel assembly. Do not use the incorrect counter balance weight and then adjust for the balance with the spring in the tone arm swivel, since this puts a side thrust on the tone arm spindle and will very likely cause tone arm drag.

Use only a 20 SAE grade oil mixed with ⅓ special Shaler Rislone oil for lubricating the spindle. Other lubricants will cause the spindle assembly to stick, resulting tone arm drag. Tone arm drag may also be caused by the dress of the leads at the back of the tone arm. They should be dressed towards the turntable spindle at the end of the tone arm.

The tone arm spindle must be absolutely free. Any binding in either direction will cause the light beam to pull off the cell and produce WOW's and distortion. The drag should not exceed ⅛ ounce.

Do not, under any circumstances, try to adjust the angle of the jewel. The jewel normally extends 1/32" below the guard. It should be vertical with respect to the surface of the record when viewed from in front of the pick-up head. When viewed from the side, the jewel is at quite an angle to the surface of the record. On ⅓ stack of records, the jewel should be at an angle of approximately 20°. When playing the bottom record, the jewel will be at an angle of approximately 13°. Do not attempt to change this angle. It permits the jewel to track in the groove with a minimum surface noise. Any change from the original setting will affect the frequency response, and if the angle of the jewel is less than given above, it will cause record wear.

Flutter, mistracking and distortion can all be caused by a stiff mirror and jewel assembly. Check the flexibility of this assembly. With the record changer stopped, put a record on the turntable and place the tone arm on the record. Open the peep hole in the pick-up cover — the light beam should be 5/32" wide and should be half "on" and half "off" the photo-electric cell. Hook the Philco Scale, Part No. 45-2851, under the cover at the nose and pull laterally, first toward the spindle and then away from the spindle. The jewel assembly should be sufficiently flexible to allow the light beam to be pulled completely off the cell and completely on the cell with less than 1 ounce of lateral pull — from ½ ounce to ¾ ounce is the most desirable. Replace the mirror and jewel assembly if more than 1 ounce pull is required.

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PHILADELPHIA, PA.

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