



Automatic Record Changers

Part Nos. 35-1231, 35-1233, 35-1239, 35-1241

The four changers covered in this bulletin are similar mechanically but differ as to electrical characteristics and type of reproducers:

- 35-1231 — 115 volt 60 cycle —
Crystal Reproducer
- 35-1233 — 115 volt 60 cycle —
Philco Light Beam Reproducer
- 35-1239 — 115 volt 50 cycle —
Philco Light Beam Reproducer
- 35-1241 — 115 volt 50 cycle —
Crystal Reproducer

The Changer plays twelve 10" or ten 12" records To reload, revolve the two posts slightly, grasping them underneath the Shelf Plates. Turn them back after the played records are removed; they will fall and lock when in proper position. Then place the new records on the Shelf Plates, and push "R" button to put Changer in operation To play the other size records, turn the knob at top of each post until proper figure is opposite pointer, and press the "10" or "12" button, to agree with pointer setting To reject a record (or to start a change cycle as for testing purposes)

simply press the "R" (Release or Reject) button, at any time while needle is upon a record To play manually, turn plates out of the way as for reloading, and press "M" button.

ILLUSTRATIONS

The three photos illustrate all vital parts of the Changer. Letters are used alphabetically, to refer to points on the photos; thus, Motor Oiling Holes "AI" are found simply glancing down Column A (right side of Photo A-B) to letters AI.

REPLACEMENT PARTS

When ordering parts for this mechanism, refer to the part number of the entire mechanism in addition to the letters and names of the parts shown in the figures of this bulletin.

OILING

The Changer should be lubricated once a year with about a dozen drops of a good light machine oil at each of the following 6 points. All points can be reached from above, through holes in the mounting plate as follows:

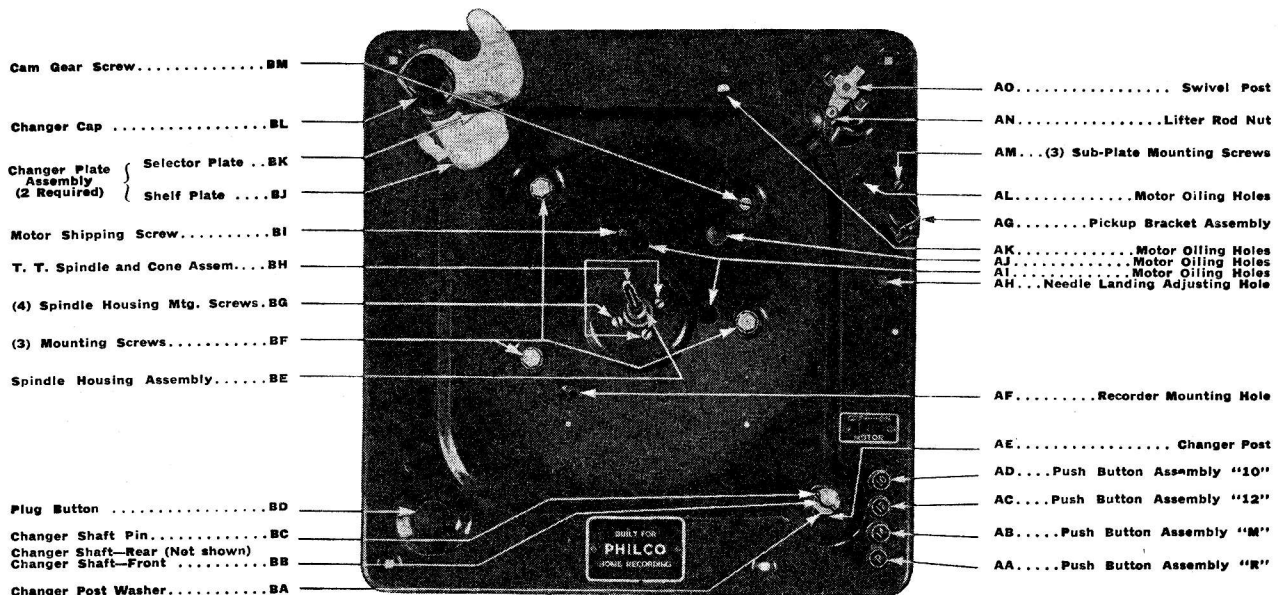


PHOTO A-B. TOP VIEW.

- Nos. 1, 2, 3: Three oil holes on motor gear housing. Reach all three through two holes AI.
- No. 4: Through hole marked AJ, drop the oil upon flat surface of cam. It will distribute itself to proper points.
- No. 5: Through hole marked AM, see felt wick, and drop the oil directly upon it.
- No. 6: Through hole marked AL, see felt wick, and drop the oil directly upon it.

TO CHECK OILING

If squeaks are heard compare the squeak with and without a load of records; any stack of records in motion is likely to squeak a little against a pin through their center. See that all five wicks are in position, including three $\frac{1}{4}$ " round wicks in frame of Motor, one washer-shaped wick on Lift, and one on Cam Lever DI. See that each wick is thoroughly saturated (as it may not be if insufficient oil or too heavy oil has been used). Lift out all three motor wicks, with tweezers; see if old oil has become gummy (commonly due to use of low-grade oil or low-viscosity oil). If necessary, **clean gummed-up wicks with kerosene**. See that each is saturated with good oil; then, before replacing them, **drop** a little good oil into the holes. The gearbox of the Motor is packed with a semi-fluid grease at the factory, and it should never be necessary to take it apart for lubrication purposes.

GENERAL DESCRIPTION OF THE CHANGE CYCLE

An automatic record player for records of two sizes has three principal duties to perform. These duties are here performed by three mechanisms, interconnected and built together but largely separate in their operation.

(1) The record-changing mechanism — brought into operation originally by the contact of Lifter Cam DG with Pawl DI — is the simplest of the three. It is driven by the cam groove (not visible) on **under side** (in Photo C-D) of Cam Gear DC. As Cam Lever is forced, by the Pawl, out underneath Lift DJ (which is shown revolved to the right for visibility) the Lift rises and forces roller DE into the under groove in Cam Gear. The motion is transferred to Rear Changer Shaft (at ED) through Cam Connecting Rod EH, thence through Changer Connecting Rod FG to Front Changer Shaft at FJ.

(2) The pickup-operating mechanism — likewise brought into operation originally by the cam-and-pawl action upon Cam Lever — is driven in part by the groove in upper (visible) side of Cam Gear. As Cam Lever is forced out, at the beginning of the

change cycle, against Link at FO, it causes the Link to push upward upon Pickup Plunger CA, thus lifting needle from record. The same pressure upon Link works, through Guide Arm at FO, to force Stud on Guide Arm down into the groove on the Cam Gear. This **rotates** the pickup arm, while Pickup Plunger **holds it up** off record. It is rotated first out beyond the turntable until Selector Plates BK have dropped the next record, then rotated back to proper position to start playing.

(3) The mechanism for bringing needle into correct **starting** position must operate accurately for both 10" and 12" records. Partly due to this requirement, the starting position is **not determined by the cam action**. The upper groove on Cam Gear is designed so that it, acting alone, would carry the needle **farther** back toward record pin than would ever be desirable as a starting adjustment. Travel of pickup arm toward Record Pin is then stopped, at proper point for lowering onto the record, by action of Lever Hub at CQ. The stopping takes place as lug (upon the Lever Hub) strikes the shoulder on Rod FP. This enables the entire mechanism rotated by cam action on Guide Arm to travel on **past** the proper point of rotation for record-starting, while the pickup arm itself, which is held rigid to Lever Hub, is accurately stopped at proper record-starting point.

Correct adjustment for starting position of needle requires therefore only correct adjustment of Rods FL and FP; the radial difference of 1 inch between correct starting position for 10" and 12" records is taken care of by exact dimensioning, at the factory, of surfaces at right end of Rod FP which stop against the "10" and "12" key stems. Due to this, when Adjusting Cam at FM is turned (as directed below under Adjustment A) the starting position of needle is simultaneously altered for **both 10" and 12" records**.

ADJUSTMENTS

There are two adjustments that can be made, **FROM ABOVE: CHANGER NEED NOT BE REMOVED FROM CABINET**. All adjustments are correctly made at the factory, and ordinarily need never be altered. Should it become necessary to readjust, due to accident or tampering, proceed as follows:

A. **ADJUSTING LANDING POSITION OF NEEDLE ON THE RECORD**. If needle comes down on the sound track, playing of records will not start at their beginning. Insert screw driver through hole AH. Turn screw head on Needle Landing Adjusting Cam FM very slightly counter-clockwise. If needle comes down too close to outer edge of record, or out beyond edge of record, turn Adjusting Cam clockwise.

- Pickup PlungerCA
- Lifter Guide (Specify Type of Reproducer).....CB
- Hinge Spring Screw (Specify Type of Reproducer).....CC
- Hinge Spring (Specify Type of Reproducer).....CD

- Key Control Assembly.....CE
- Pickup Plunger Spring (Inside Sleeve).....CF
- Manual Key Rod.....CG
- Rejection Key Rod.....CH
- Pickup Plunger Sleeve.....CI
- Lifter Rod Nut (AN).....CJ
- Swivel Tube and Trunnion Assembly.....CK
- Trunnion Shoulder Screw (2 Required).....CL
- Clutch Release Roller.....CM
- Guide Arm Spring.....CN
- Swivel Spreader Spring.....CO
- Spring.....CP
- Clutch Assembly.....CQ
- Clutch Lever and Sleeve Assembly.....CR
- Clutch Lever and Sleeve Spring.....CS
- Clutch Spring Retainer.....CT

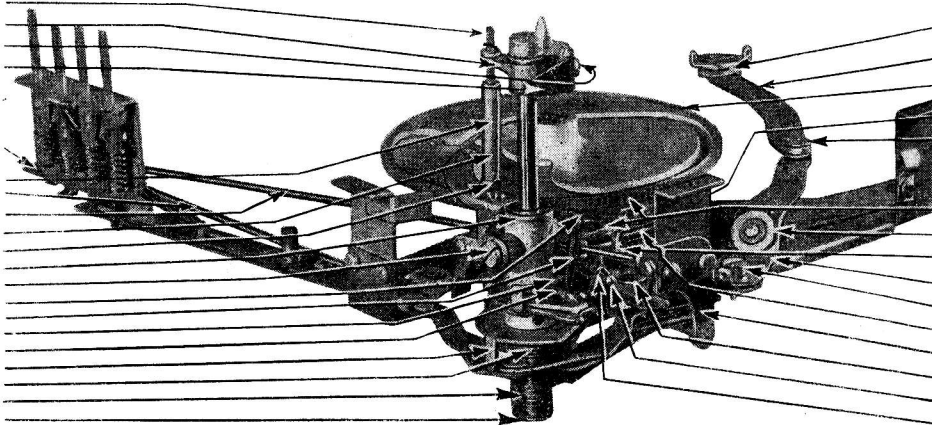


PHOTO C-D. VIEW OF SUB-PLATE ASSEMBLY, TOGETHER WITH CERTAIN OTHER

- Motor (Give Model No., Voltage and Frequency).....EA
- Main Mounting Plate (Give Model No.).....EB
- Plug and Shell.....EC
- Changer Shaft Collar.....ED
- Spreader and Hub Assembly.....EE
- Spring Roller.....EF
- Changer Spreader Spring.....EG
- Return Spring.....EI
- Return Spring Catch.....EJ
- Lever Pin.....EK
- Clutch Release Assembly.....EL
- Connecting Rod Nut.....EM
- Clutch Retainer Screw.....EN
- Clutch Release Adjusting Screw.....EO
- Cam Connecting Rod Lift Spring.....EP
- Changer Serial Number.....ER
- Adjusting Rod Assembly.....ES
- Lower Swivel Spreader.....ET
- Pickup Leader Spring.....EU
- Upper Swivel Spreader.....EV
- Post Nut (3 Required).....EW
- Lock Washer (3 Required).....EX

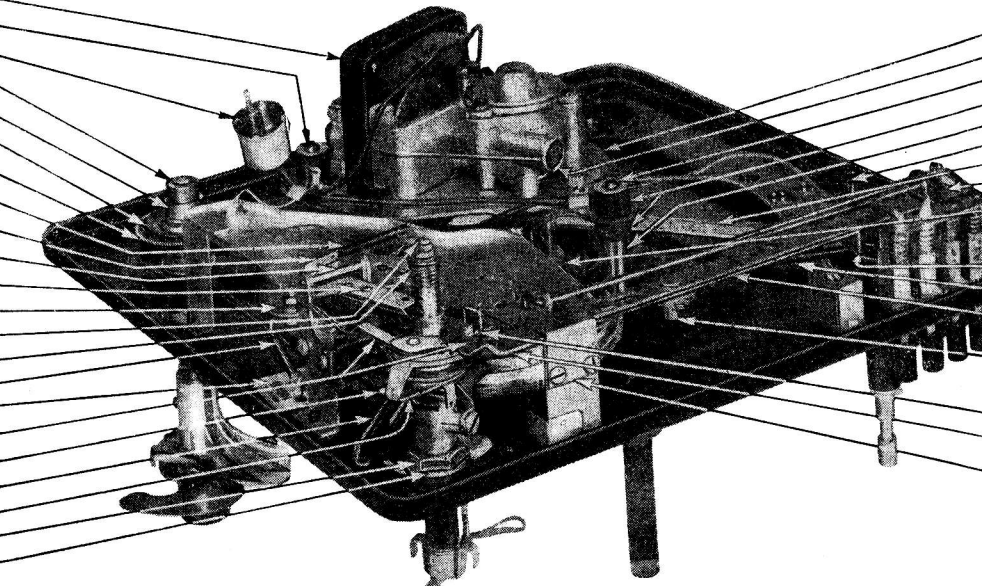


PHOTO E-F. BOTTOM VIEW.

The factory adjustment of needle landing is 1/8" in from outer edge of record.

Compare also Paragraph 12 on page 5.

B. ADJUSTING HEIGHT TO WHICH PICKUP ARM RISES.

The arm should rise, during the change cycle, high enough so that it clears by only 1/4" the record above it, next to be played. (Be careful, before deciding that readjustment is necessary, to see that the record at bottom of stack is not a warped one. To make this adjustment, loosen Lock Nut C1 and turn Pickup Sleeve C1 to lengthen or shorten Pickup Plunger CA. However, if Pickup is made to rise too close to bottom record, Stud on Guide Arm at FO may not clear the groove in Cam Gear. In making this adjustment, therefore, care must be taken to see that Pickup Arm does not keep moving back and forth continuously (due to Stud remaining in engagement with groove). When correct adjustment is found, tighten Lock Nut securely.

REPLACING MOTOR

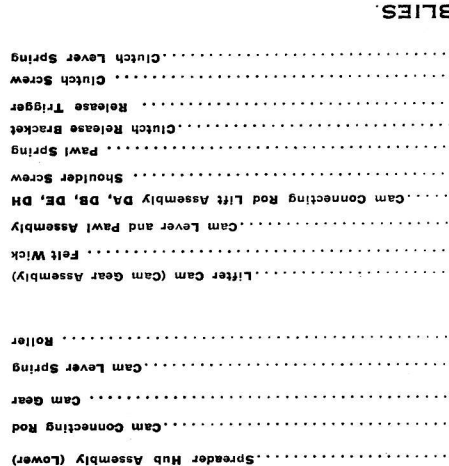
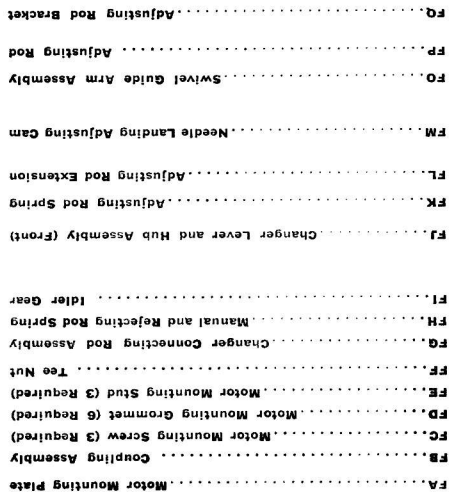
To adapt the Changer to a different power supply, or in case of any serious fault within Motor, remove entire Motor EA from the Changer, and replace it with a suitable new Motor. (In ordering a replacement Motor, specify the power supply and give Model Number.

In wiring up, use only Underwriters' Approved wire. See that Motor Frame is well grounded by wire soldered to lugs, as shown on bottom view photo.

TROUBLE SHOOTING

Cases of failure to operate satisfactorily will generally be found due either to neglect of proper lubrication, or to tampering with the mechanism after it leaves the factory, or to injuries accidentally sustained as by external vibration or by impact of some heavy object. In addition, there is always the possibility that any kind of spring may "go dead" (cease to operate without any visible breakage) even though the utmost factory precautions are taken against it — or that set screws may work loose due to some external vibration. For tightening set screws, a No. 8 size Allen (hexagon) wrench is required: Be sure that set screws are properly seated on the holes or flats provided. Damage from tampering is likely to take the form of bent parts; never bend any part during examination.

Among the principal trouble symptoms to which such causes may arise, are the following:



MAIN OTHER ASSEMBLIES.

1. MECHANISM IS SLOW IN STARTING, OR MOTOR GETS HOT.

May be caused by:

- a. Failure to lubricate properly. Oil thoroughly. See oiling instructions.
- b. Check voltage. Line voltage may be abnormally low or high.
- c. Motor windings damaged. If windings are found damaged, replace motor.

2. MOTOR FAILS TO RUN, EVEN WHEN IT IS ENTIRELY DISCONNECTED FROM OTHER WIRING AND PROPER VOLTAGE IS APPLIED DIRECTLY TO THE TWO ENDS OF ITS WINDINGS.

This indicates trouble in Motor windings. Unless the damage is easily seen and repaired, replace motor.

3. MOTOR IS SLOW IN STARTING.

- a. Check oiling, as directed on page 2. It may not have been properly done; old oil may have become gummy.
- b. Changer may have been in a very cold place, and may not yet have reached room temperature. Give it a fair chance to get warmed up before concluding that Motor is defective.

4. SQUEAKS OR OTHER NOISES, DURING PLAYING OF RECORDS.

Check oiling, as directed on page 2. (If squeaks are heard, they will usually be found to come from the records — not from the mechanism.) See "To Check Oiling."

5. CHANGER IS NOISY WHEN IN CYCLE.

Check oiling. Also see if any part has become loose or bent and is rubbing against a moving part such as the Swivel Guide Arm against the Cam Gear.

6. MOTION OF PICKUP TOWARD RECORD PIN WILL NOT TRIP CHANGER MECHANISM.

Manual button down. See that shipping bolts are removed.

If trigger is being properly actuated, probably Cam Lever at EL is binding against Sub-plate. Look for dirt or obstructions; See that Pawl and Trigger DN are working freely on their rivets. If the Lever engages the Pawl so that Lift forces roller up into the under groove on Cam Gear, and if set screws are

tight, the change cycle must operate as Cam Gear turns.

7. PRESSING "R" BUTTON DOESN'T TRIP CHANGER MECHANISM.

- a. Due to shipping bolts not being removed, causing a bind on manual rod, or manual button is down.
- b. Check Key Control Unit CE: See whether there is an obstruction or a bent part which prevents "R" button from going clear down to the end of its travel.
- c. Examine Reject Rod CH. If it does not trip, even when properly revolved by complete depressing of "R" button, the rod has probably been bent, and must be restored in some way. Grasp the two ends and twist it slightly.
- d. If Trigger DN is being properly actuated but without starting a change cycle, see directions, Paragraph 6.

8. PRESSING "M" BUTTON FAILS TO PUT CHANGER MECHANISM OUT OF ACTION SO AS TO ENABLE MANUAL OPERATION.

- a. First see that button goes clear down; then follow its action through Manual Rod CH.
- b. Also caused by the manual rod being bent and not projecting up through Sub-plate and stopping Cam Lever when it is released from the Trigger.

9. TRIPS TOO SOON OR BEFORE RECORD HAS FINISHED PLAYING.

This caused by too little clearance between the trigger and the clutch lever assembly. To get more clearance on this adjustment, turn the adjusting screw DO in a clockwise direction a half-turn or whatever is necessary to make tone arm trip on $\frac{1}{4}$ " motion.

10. TONE ARM FALLS OFF RECORD.

Needle sits down too close to edge of records, not adjusted in far enough, or needle landing adjusting cam reversed. It should contact lug on adjusting rod on the long side of cam. Check pick-up leader spring EU. It may have become loose; more tension can be given it by bending down lug.

11. TONE ARM SITS DOWN TOO FAR IN.

Due to adjusting rod bending and not measuring properly. If found to be bent, should be straightened to correct shape so that it will operate freely.

12. NEEDLE LANDS PROPERLY ON RECORD BUT FAILS TO MOVE OVER INTO RECORD GROOVE.

Pickup arm is normally impelled toward center of records by Lead Spring EU. Should a slight increase in its tension be found necessary, this can be easily obtained by slightly bending the lug, to which it is attached, down against Main Plate.

13. WOW IN RECORD REPRODUCTION.

a. Record is warped or otherwise defective or instrument is not being operated at normal room temperature, 70 F°.

b. Motor mounting plate being bent will cause "wow." Straighten it if possible or replace with new plate if too badly bent to warrant straightening. This is only found where rough handling is evident.

c. Motor shaft out of alignment with the turntable shaft (also due to rough handling). To correct, move the motor on its mounting until motor shaft is parallel to the turntable shaft and the Universal coupling is exactly at right angles to motor and turntable shafts, then tighten motor mounting screws **securely**.

14. LAST RECORD DROPS ON ONE SIDE ONLY.

This suggests a Changer Post bent out of perpendicular to Main Plate. If Post must be straightened, be careful not to bend other parts.

15. CHANGER CONTINUES CYCLING.

a. Probably due to failure of Lift at DJ to be drawn back out of engagement with Cam Gear. Check the various rivets at which motion occurs, to find the point where friction or binding is interfering with freedom of motion.

b. Make sure that trigger spring is not disconnected. Also that clearance between trigger and clutch lever is sufficient. A sticking pawl will also cause this condition.

16. RECORD IS DRIVEN, BUT NOT HEARD, OR NOT HEARD WITH PROPER VOLUME.

See that Pickup cord is plugged in. Check amplifier and speaker and connections to them, thoroughly. If then trouble is still suspected in pickup, test its output with a vacuum-tube voltmeter. Playing an average record, output should test 1 to 2.5 volts if pickup cartridge is of crystal type. If pickup cartridge is found not to deliver proper output, remove it and install another.

See Service Bulletin No. 354 for Philco Photoelectric Reproducer adjustments.

17. RECORD JAMS.

Most slicing trouble (record jams) is due to off-size or defective records, and is no fault of the record changer or record changer adjustment. Properly manufactured records have a uniform semi-circular edge and can be successfully handled by record changers, even though the records vary considerably in thickness.



Cross section of record edge showing a perfect and three imperfect edges.

Records that prove troublesome in the selecting or slicing process can usually be corrected by using a piece of fine sand paper or emery cloth to touch up the edge.

18. AUDIO HOWL.

Record changer not floating on cushions or spring mounting. See that shipping bolts are removed. If unit still does not float, loosen the nuts or mounting assembly allowing unit to rise and float.

19. TURNTABLE IS TIGHT.

This turntable is assembled to the turntable shaft with a taper lock fit in the center. To remove, grasp turntable with both hands, turn slightly forward and backward at the same time pulling upward, or run motor and grasp the turntable while it is revolving, and pull up.

20. THUMP HEARD IN RECORD REPRODUCTION.

This is caused by the motion of the friction clutch when it is momentarily released by the motion of the release lever, which in turn is actuated by the hump on the cam gear. If thump is objectionable, it can be reduced by adjusting the clutch lever at EO to allow only a slight amount of motion of the clutch assembly; also if the clutch spring is too strong, replace with a new spring or cut one-quarter of the length of the old spring or whatever is necessary to assure satisfactory operation. Be sure that clutch assembly parts are free from dirt and burrs and work freely without binding.