PHILCO . . . . RADIO SERVICE BULLETIN No. 329

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

Radio-Phonograph

Model 701

SPECIFICATIONS

Model 701 is a radio-phonograph combination consisting of an 8 tube electric push button tuning superheterodyne radio and an automatic record changer.

Model 701 employs an improved type automatic record changer, which plays twelve 10" records or ten 12" records at one loading. The electrical connections to the receiver are shown on the schematic diagram on page 2.

The radio receiver of this model contains 8 electric push buttons; 6 of the electric push buttons are used for reception of stations, one for television sound and one to switch to dial tuning.

The adjustment procedure of the R.F. and I.F. compensating condensers, and the procedure for adjusting the electric push buttons to radio stations is the same as that given in Service Bulletin 323 for Model 19.

In addition, the Philco Built-In Super Aerial System is included in these models. This system eliminates an outside aerial and reduces local static interference to a minimum. Included in the Built-In Super Aerial System is a statically shielded loop for broadcast band reception and a short-wave receiving loop. A feature of the built-in broadcast band statically shielded loop is that it may be turned to the position in which it picks up a minimum amount of interference or if interference is not present, the loop may be set in the position where best reception is obtained. Outside aerial connections are also provided for remote localities where signal strength is weak.

POWER SUPPLY: 115 volts, 25 cycle A. C.
115 volts, 60 cycle A. C.

POWER CONSUMPTION:
Model 701—90 watts.

TUNING RANGES: Three
540 to 1550 K.C. 1.5 to 3.4 M.C. 6 to 18 M.C.

INTERMEDIATE FREQUENCY: 460 K.C.

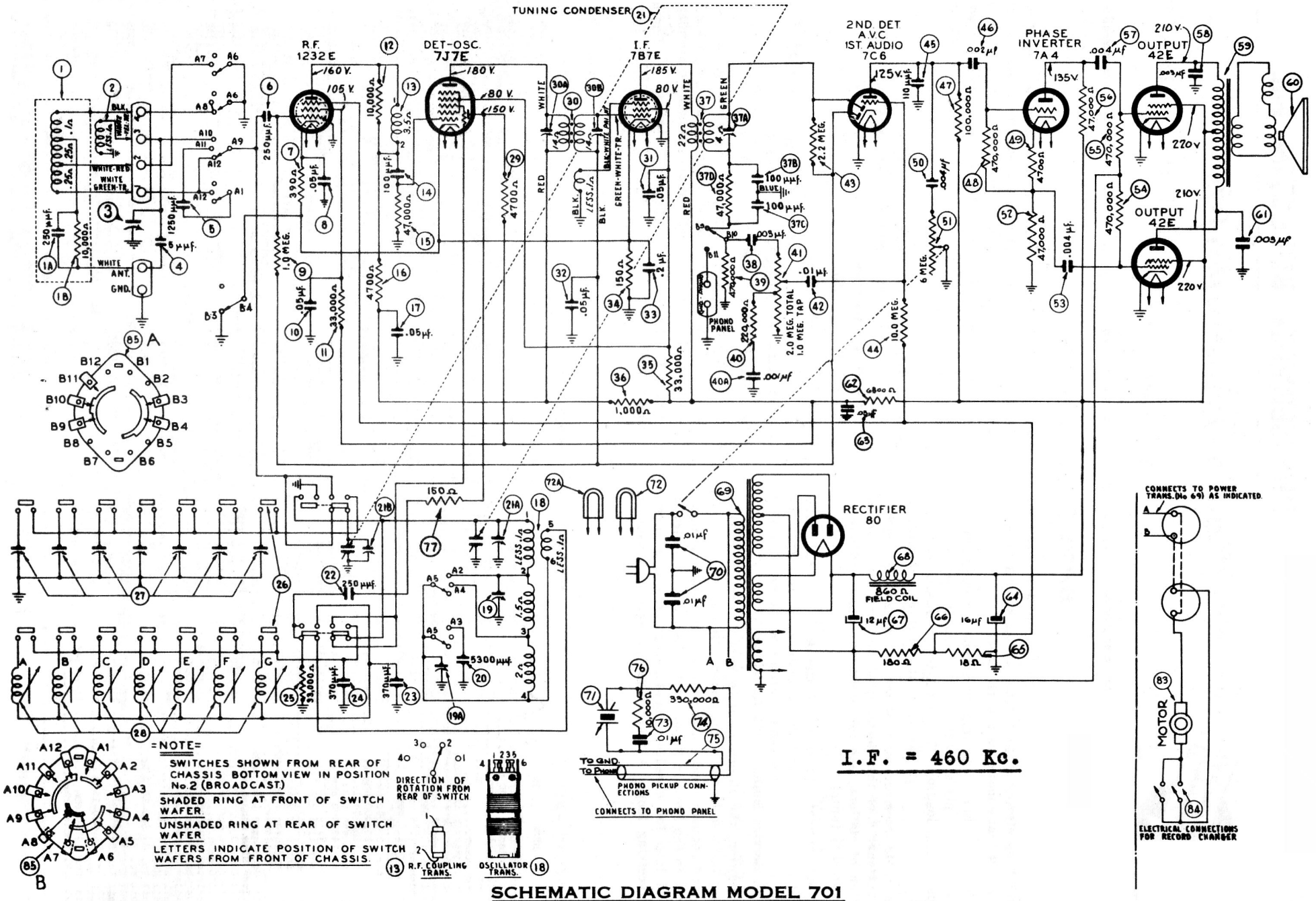
AUDIO OUTPUT: 2 watts.

PHILCO TUBES USED: 1232E, R. F.; 7J7E, converter; 7B7E, I. F.; 7C6, second detector, first audio and A.V.C.; 7A4, phase inverter; two 42E, audio output; 80, rectifier.

CABINET DIMENSIONS:	Height	Width	Depth
Model 701	35"	32¾"	16"

REPLACEMENT PARTS — MODEL 701

Sche. No.	DESCRIPTION	Part No.
1	Broadcast Loop Assy.	38-9940
1A	Mica Condenser (250 mmfd.)	61-0033
1B	Resistor (10,000 ohm)	33-310344
2	Short wave Loop Assy.	38-9941
3	Compensator	31-6308
4	Mica Condenser (5 mmfd.)	30-1097
5	Mica Condenser (1250 mmfd.)	5886
6	Mica Condenser (250 mmfd.)	61-0033
7	Resistor (390 ohms)	33-139336
8	Condenser (.05 mfd.)	30-4444
9	Resistor (1.0 meg.)	33-510344
10	Condenser (.05 mfd.)	30-4123
11	Resistor (33,000 ohm)	33-333344
12	Resistor (10,000 ohm)	33-310344
13	R.F. Coupling Coil	32-3194
14	Mica Condenser (100 mmfd.)	30-1128
15	Resistor (47,000 ohm)	33-347344
16	Resistor (4,700 ohm)	33-247344
17	Condenser (.05 mfd.)	30-4123
18	Oscillator Coil	32-3195
19	Compensator (2 section)	31-6298
20	Mica Condenser (5300 mmfd.)	30-1134
21	Tuning Condenser	31-2391
22	Mica Condenser (250 mmfd.)	61-0033
23	Silver Mica Condenser (370 mmfd.)	30-1110
24	Silver Mica Condenser (370 mmfd.)	30-1110
25	Resistor (33,000 ohm)	33-333344
26	Push-button switch	42-1489
27	Padder Strip	31-6299
28	Coil Strip	32-3193
28A, 28B, 28C	Coil No. 1, 2, 3 — 540-1060 Kc	32-3042
28D, 28E, 28F	Coil No. 4, 5, 6 — 650-1100 Kc	32-3042
28G	Coil No. 7 — 920-1600 Kc	32-3041
29	Resistor (4700 ohm)	33-247344
30	1st I.F. Transformer	32-3245
31	Condenser (.05 mfd.)	30-4123
32	Condenser (.05 mfd.)	30-4519
33	Condenser (.02 mfd.)	30-4536
34	Resistor (150 ohm)	33-115336
35	Resistor (33,000 ohm)	33-333344
36	Resistor (1,000 ohm)	33-210344
37	2nd I.F. Transformer	32-3246
38	Condenser (.003 mfd.)	30-4580
39	Resistor (470,000 ohm)	33-447344
40	Resistor (220,000 ohms)	33-422344
40A	Condenser (.001 mfd.)	30-4453
41	Volume Control	33-5275
42	Condenser (.01 mfd.)	30-4479
43	Resistor (2.2 meg.)	33-522344
44	Resistor (10.0 meg.)	33-610344
45	Mica Condenser (110 mmfd.)	30-1130
46	Condenser (.002 mfd.)	30-4579
47	Resistor (100,000 ohms)	33-410344
48	Resistor (470,000 ohms)	33-447344
49	Resistor (4,700 ohms)	33-247344
50	Condenser (.004 mfd.)	30-4456
51	Tone Control and Switch	33-5314
52	Resistor (47,000 ohms)	33-347344
53	Condenser (.004 mfd.)	30-4456
54	Resistor (470,000 ohm)	33-447344
55	Resistor (470,000 ohm)	33-447344
56	Resistor (47,000 ohm)	33-347344
57	Condenser (.004 mfd.)	30-4456
58	Condenser (.003 mfd.)	30-4469
59	Output Transformer	32-3070
60	Cone & Voice Coil Assembly	36-4089
61	Condenser (.003 mfd.)	30-4469
62	Resistor (6,800 ohm)	33-268344
63	Condenser (.05 mfd.)	30-4123
64	Electrolytic Cond. (16 mfd.)	30-2412
65	Resistor (18 ohm)	33-018336
66	Resistor (180 ohm)	33-118436
67	Electrolytic Condenser (12 mfd.)	30-2413
68	Field Coil	Replace Speaker
69	Power Transformer (25-40 cycles)	32-8098C
	Power Transformer (50-60 cycles)	32-8069C
70	Condenser (.01-.01 mfd.)	3903-0C
71	Crystal Cartridge	35-2030
72	Pilot Lamp	34-2210
72A	Pilot Lamp	34-2210
73	Condenser (.01 mfd.)	30-4581
74	Resistor (330,000 ohm)	33-433344
75	Phono pickup cable	41-3514
76	Resistor (10,000 ohm)	33-310344
77	Resistor (150 ohm)	33-115344
83	Phono Motor (25 cycle)	35-1224
	Phono Motor (60 cycle)	35-1223
84	Phono Motor Switch	
85	Wave Switch	42-1530
	Automatic Record Changer Unit (25 cycle)	35-1213
	Automatic Record Changer Unit (60 cycle)	35-1212
	Bezel Assembly	40-6489
	Bezel Gasket	27-9175
	Speaker Cable	41-3491
	A.C. Cord	L-3199C
	Cabinet	10410A
	Dial Scale	27-5508
	Drive Cord	31-2383
	Drive Cord Drum	38-9856
	Jewel (Cabinet Pilot Lamp)	27-4777
	Knob (Tuning, etc.)	27-4332
	Knob (Push-button)	27-4866
	Knob (phono Switch)	27-4627
	Dial Pointer	56-1516
	Tuning Shaft	38-9874
	Loktal Socket (R.F., I.F., Aud.)	27-6131
	Loktal Socket (Det.-Osc.)	27-6129
	6 Prong Socket	27-6036
	5 Prong Socket	27-6035
	4 Prong Socket	27-6044
	Complete Speaker	36-1500
	Television Tab	27-9449
	Dial Tab.	27-5530
	Tab Kit	40-6501



=NOTE=

SWITCHES SHOWN FROM REAR OF CHASSIS BOTTOM VIEW IN POSITION No.2 (BROADCAST)

SHADED RING AT FRONT OF SWITCH WAFER

UNSHADED RING AT REAR OF SWITCH WAFER

LETTERS INDICATE POSITION OF SWITCH WAFERS FROM FRONT OF CHASSIS.

SCHEMATIC DIAGRAM MODEL 701

SEE RADIO SERVICE BULLETIN NO. 323 FOR INSTRUCTIONS ON THE ALIGNMENT OF COMPENSATORS

THE VOLTAGES INDICATED ON THE DIAGRAM WERE MEASURED WITH A 1000 OHMS PER VOLT METER SUCH AS PHILCO MODEL 028. LINE VOLTAGE 115 A. C.

Automatic Record Changer

PHILCO AUTOMATIC RECORD CHANGER automatically changes either twelve 10″ or ten 12″ records. The service information contained in this bulletin covers the operation, care, and adjustments that may be necessary if the mechanism ceases to function properly.

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

PHILCO RECORD PLAYER NEEDLES

To obtain brilliant life-like tone quality, PHILCO needles are recommended. These needles are especially designed to give high fidelity tone reproduction—less record wear and less surface noise. One needle plays 15 to 20 records. The use of inferior needles in the pick-up of this mechanism will greatly affect the tone reproduction performance.

CHANGER OPERATION

Setting for Record Size

This changer plays up to twelve 10-inch records or ten 12-inch records at one loading.

On each post you will see two plates. The lower one, on which the records rest, is the **shelf plate.** The upper one is the **selector blade** which selects the next record to be played from the bottom of the stack.

To set for record size. (1) Clasp one of the posts just underneath the shelf plate, with thumb and finger of left hand. With right hand, lift knob and turn selector plate until the figure 10 or 12 (whichever size you want to play) is opposite the pointer. Do the same with the other post. Both selector plates must be in 10 or 12 position. (2) Push button marked 10 or 12, as required (see Figure 1).

Loading

See that both shelf plates are turned toward center of turntable. As shelf plates near correct position you will feel the shelf plates drop into their indexing slots. Make sure both posts have dropped into their slots, if one is not in the slot, records may be damaged. Place the stack of records over center pin so they will rest on the two shelf plates.

Starting the Mechanism

To start motor and turntable (1) turn the switch to "ON" position. (2) Then push button "R". This will release the first record and start the record-changing mechanism.

Rejecting a Record

To reject a record press the "R" button. This can be done any time after the needle has come into contact with that record.

Turning Off

Turn changer switch to "OFF" position. Lift pickup arm, place it on the pickup rest. (If you happen to turn off the changer switch while the mechanism is going through a "change cycle", you will notice that it does not stop until the cycle has been completed, and pickup is again in playing position, ready to be lifted over onto the pickup rest.)

To avoid warping of records, **never leave records resting on the shelf plates.**

Removing Played Records

To remove records make sure motor switch is off, then take hold of both posts, just below the shelf plates, and turn them out of the way. Lift the played records from the turntable. Taking hold of posts as before **(below** shelf plate) move plates until post again falls into indexed position as outlined under loading. The changer may then be loaded with a new stack of records.

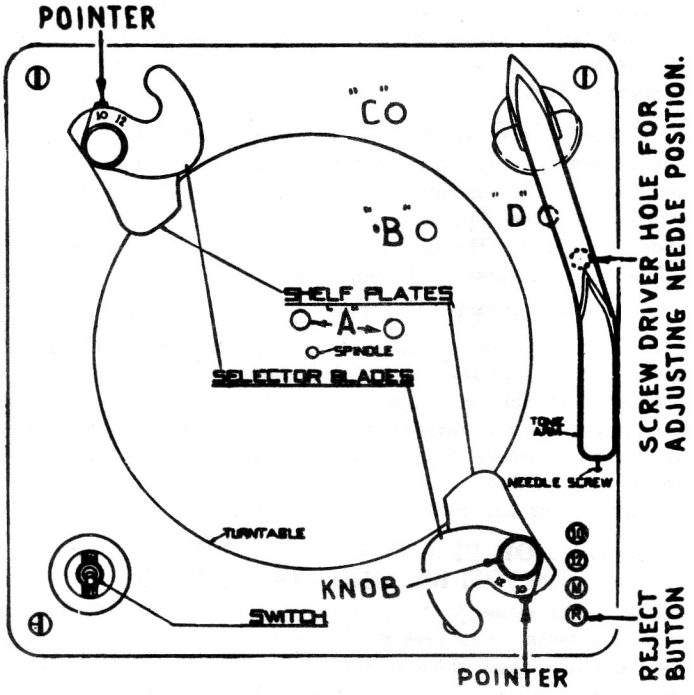


FIG. 1 SHOWS SELECTOR BLADES IN POSITION FOR 10-INCH RECORDS.

Manual Operation

To play records one at a time as in an ordinary phonograph: (1) Remove any records remaining on the turntable, leave plates turned outward as for removing played records. Do not turn them back toward center of turntable. (2) Press button marked "M". Then place a record on the turntable, switch on motor and lift pickup into position.

LUBRICATION

The record changer will not need lubrication more than once a year and should be lubricated with a good light machine oil such as S.A.E. 10. There are 6 locations that will need oiling. These are shown in Figure 1. These lubricating holes can be reached from the top of the mechanism and are as follows:

1. The motor gear housing contains 3 lubricating wicks. These wicks are shown at "A" in Figure 1. Two of these wicks are reached through the hole directly in back of the turntable spindle and the other wick to the right of the turntable spindle.

2. A small quantity of oil should be dropped through hole marked "B" in Figure 1. Lubricating this point distributes oil to the various moving surfaces of the mechanism.

3. A felt wick directly below the hole marked "C" in Figure 1 should also be oiled.

4. Another felt wick marked "D" in Figure 1 should also be well oiled.

After long periods of use the oil becomes gummed in the above mentioned wicks. The wicks should be removed and cleaned with kerosene or carbon tetrachloride.

SQUEAKS OR OTHER NOISES DURING PLAYING OF RECORDS

If squeaks or various noises are heard from the mechanism during the playing of records or changing of records, the following items should be checked:

1. In the majority of the cases, these squeaks will be usually found to come from the friction between the stacked records and the turntable spindle. To check for this trouble, operate the mechanism with and without a load of records. To eliminate this condition, apply a very thin coat of light motor grease or vaseline to the turntable spindle.

2. Check the 5 wicks given under the paragraph on "Lubrication." Each wick should be thoroughly saturated with oil. All 3 motor wicks should be removed from the retaining holes with tweezers and examined to see if the oil has become gummy. In this case, the wicks should be thoroughly cleaned and relubricated with oil and replaced in their sockets.

3. Check all set screws to see that they are in place and tight.

4. Check motor windings. If coils have been jarred loose they should be tightened in place. The shading coils which encircle a portion of each laminated pole, the purpose of which is to make the motor self-starting, should be rigidly held in place by the retaining tape.

TURNTABLE SPEED VARIES

The turntable speed should be 78 R.P.M. + or — 2 R.P.M. when a record is being played, and the mechanism will operateate satisfactorily. If the speed is below or above these limits, it indicates either trouble in the motor windings or bearings of the motor. Sometimes a few drops of oil on the bearings will increase the speed to normal. If upon investigation the normal speed cannot be obtained, replace the motor.

ADJUSTING LANDING POSITION OF NEEDLE ON RECORD

Adjustment of the landing position of the needle on records is controlled by the adjusting screw located in the hole shown in Figure 1. This adjustment is made with a screw driver from the top of the mechanism and does not require the removal of the changer from the cabinet. If the needle comes down too far from the edge of the record, playing of records will not start at their beginning. In this case, turn the needle positioning adjustment screw very slightly counter-clockwise. If the needle comes down too close to the edge of the record, the pickup may slip off the record. To adjust this condition turn the adjusting screw clock-wise. If adjustment screw is too far to rear and cannot be adjusted through hole in base plate, depress "Manual" push button, and push bracket —Forward.

NEEDLE FAILS TO MOVE INTO RECORD GROOVE AFTER LANDING ON RECORD

Generally when the needle will not pull into the groove after landing on the record, trouble may be found due to lead spring (97) being weak. Increasing the tension of this spring or replacing spring will generally eliminate the trouble.

If after adjusting the lead spring (97) it is found that the needle jumps across the record, it may be necessary to adjust the angle of the pickup in relation to the turntable spindle. This procedure is covered under paragraph "Mechanism Will Not Reject at the End of Records".

TONE ARM SLIDES INWARD ACROSS RECORD

This is caused by the guide arm stud (12) not releasing from the grooves in the upper side of the large cam gear (11). This may be due to friction at the shoulder screw (26) or the coil spring lifting the arm may be weak.

If the coil spring appears to be weak, it may be strengthened by shortening. If there is binding at the bearing, a little oil will help; also, a few movements by hand under considerable pressure will relieve the binding. If the binding is caused by the arm being twisted out of line, the trouble can be cured by straightening up the parts.

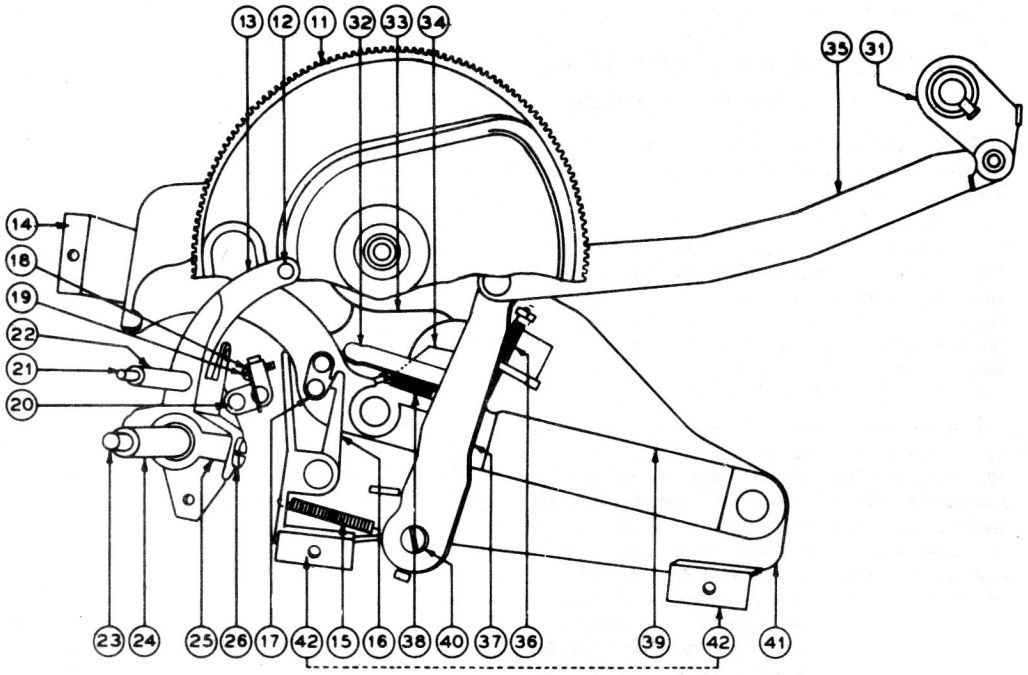


FIG. 2. CUTAWAY VIEW SHOWING PARTS UNDER SUB-PLATE ASSEMBLY (83) FIG. 3

Numbers on Figs. 2 and 3	PART DESCRIPTION
11	Cam Gear
12	Stud
13	Guide Arm
14	Bracket
15	Trigger Spring
16	Trigger
17	Trigger Catch
18	Trip Adj. Screw
19	Lock Spring
20	Release Lever
21	Pickup Plunger
22	Pickup Sleeve
23	Swivel Shaft
24	Swivel Tube
25	Swivel Trunnion
26	Shoulder Screw
31	Spreader-Hub Assem.
32	Bridge
33	Lifter Cam
34	Pawl
35	Cam Connecting Rod
36	Spring
37	Lift
38	Spring
39	Cam Lever
40	Shoulder Screw
41	Sub-Plate
42	Bracket
51	Grommet Sleeve
52	Shim
53	Main Plate
54	Changer Switch
55	Motor
56	Connecting Plug
57	Changer Connect. Rod
58	Cam Connecting Rod
59	Spreader-Hub Assem.
60	Shaft
61	Spring Roller
62	Spreader Spring
71	Post Nut
72	Lever-Hub Assem.
73	Flat Spring
74	Shaft
75	Key Unit
76	Key Bracket
77	Manual Rod
78	Reject Rod
79	Extension Rod
80	Truss Bar
81	Adjusting Cam
82	Cam Gear
83	Sub-Plate Assem.
84	Spring
85	Cycling Switch
86	Bracket
87	Spring
88	Link
89	Release Lever
90	Upper Spreader
91	Lower Spreader
92	Rod
93	Lever-Hub Assem.
94	Lever
95	Swivel Spring
96	Lever Spring
97	Lead Spring

ADJUSTING THE RISING HEIGHT OF PICK-UP ARM

The pick-up arm should rise high enough during the change cycle so that the top of the tone arm clears the record resting on the support arms by ⅛". When the maximum load of records are on the turntable, the needle should clear the top record, if not adjust as follows:

Loosen the lock nut in pick-up sleeve (22). Turn the sleeve in the direction necessary to lengthen or shorten the pick-up plunger (21). After correct adjustment is found, tighten lock nut.

ADJUSTING DISTANCE FROM TURNTABLE SPINDLE AT WHICH REJECT WILL OPERATE AND CYCLE WILL BEGIN

The mechanism is designed to reject records of all types whether they are provided with special grooves or not. The mechanism is adjusted to operate 1⅞" from the center of the record spindle; this distance has been found to be the most satisfactory point for all modern records so that they will be rejected after they have been played through. To adjust the reject mechanism for this distance or any distance that may be desired, a trip adjusting screw (18) is provided. By turning this screw toward the trip trigger (16), the mechanism is caused to operate at a closer distance from the spindle. Turning the adjusting screw (18) away from the trip trigger, operates the reject closer to the turntable spindle.

It may be found on some records of very early manufacture that it will not be possible to obtain a satisfactory adjustment that will always operate the changer mechanism.

MECHANISM WILL NOT REJECT AT THE END OF RECORDS

There are several parts that will cause the mechanism to fail in the operation of rejecting of records. These items are listed as follows:

1. Examine swivel spring (95) for stretching. This spring is attached to the lugs at the end of the swivel spreaders (90) (91). The purpose of this spring is to keep the swivel spreaders (90) (91) closed, so that the trip trigger can be actuated. Increasing the tension of the spring (95) will prevent the swivel spreads from opening, allowing the trip trigger to actuate properly.

If after increasing the tension of the spring (95) it is found that the needle jumps across the record, it may be necessary to adjust the horizontal level of the pickup. Sometimes the pickup leans towards the center of the record. To remedy this condition, the pickup mounting post should be examined for proper mounting position or the pickup arm may be twisted out of shape. In either of these cases the pickup arm should be replaced or adjusted to its original position. When the pickup arm is properly adjusted, it should lean slightly in an outward direction (toward the edge of the record).

2. After it is found that the trip trigger (16) is operating properly, trouble may be found due to the cam lever (39) binding against sub-Plate (41). In this case, look for some obstruction or foreign material on these two parts. Also see that the rivets are operating freely. If lever (39) engages cam lever pawl (34) so that lift (37) forces its rollers up into the groove on cam gear (82) and if the set screws are tight, the change cycle should go into motion as the cam gear (82) turns.

3. Sometimes friction between the trigger (16) and trigger catch (17) due to burrs or rough surfaces may also prevent the reject from operating. If the trigger unlatches but the cam lever (39) does not move, it indicates binding between sliding surfaces. This may be caused by above mentioned burrs or by the cam lever being slightly warped.

To eliminate this condition, locate the position where there is excessive friction. If it is found that the parts are out of shape due to being bent, new parts should be added or the old ones straightened. When it is found that trouble is due to a burr on the edge of the metal parts, burrs should be removed with a very fine file or scraper. After eliminating this trouble, a small amount of oil should be applied to the sliding surfaces.

REJECT BUTTON "R" WILL NOT OPERATE MECHANISM

If the "R" button does not cause the mechanism to go through a change cycle check the following parts:

a. Examine key control unit (75) for parts that have become out of shape or any obstruction that will prevent the "R" button from moving to its maximum length of travel.

b. Inspect reject rod (78). If this rod does not trip the mechanism even when properly revolved by complete depressing of "R" button, the rod has probably been bent out of shape. Replace the rod or reshape it to its former position.

c. If trigger (16) is properly actuated but without starting a change cycle see instructions as given under "Mechanism Will Not Reject at End of Records" paragraph 3.

PRESSING "M" BUTTON DOES NOT CHANGE MECHANISM FROM AUTOMATIC TO MANUAL POSITIONS

Observe action of "M" button. Button should travel far enough down when depressed to cause the manual rod (77) to actuate the key control unit. The key control unit (75) should also be checked for parts which have become out of shape or any foreign obstruction.

MOTOR STOPS IMMEDIATELY WHEN CHANGER SWITCH IS TURNED OFF DURING A CHANGE CYCLE

The normal action of the mechanism when the changer switch is turned off during a change cycle is to continue to operate until the needle is again on the record. The mechanism should then stop. This action is caused by the cycling switch (85) short circuiting the manual changer switch during a change cycle. The switch should be changed when the above mentioned trouble develops.

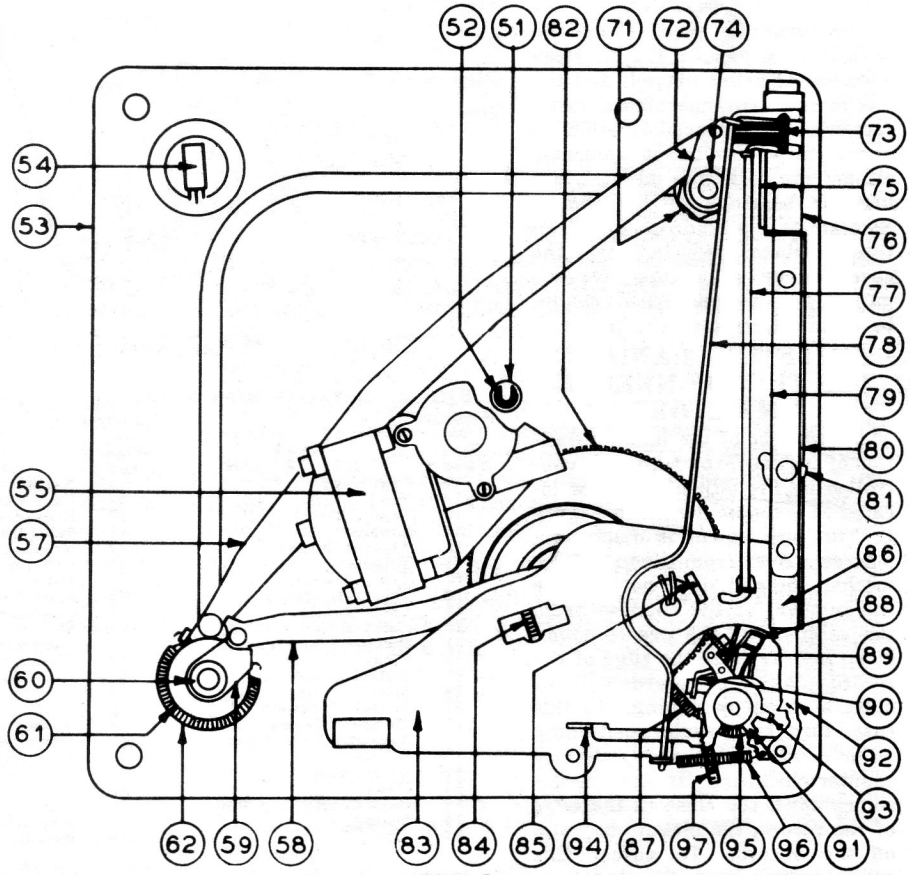


FIG. 3

TURNING CHANGER SWITCH OFF FAILS TO STOP MECHANISM

If after turning the changer switch off the mechanism continues to operate it indicates trouble in the cycling switch (85). Replace the switch when this trouble develops.

MECHANISM DOES NOT REPEAT THE LAST RECORD

If the mechanism does not repeat the last record, any one of the parts listed under "Mechanism Will Not Reject at End of Records" may be causing the trouble.

RECORDS FALL UNEVENLY ON THE TURNTABLE

Records falling unevenly on the turntable is generally due to the turntable spindle not being correctly centered between the record loading posts. To correct this trouble, see "Replacing Motor."

LAST RECORD DROPS ON ONE SIDE

This trouble is due in most cases to the loading posts being bent out of perpendicular to the main plate. To check for this trouble, test the posts with a steel square as directed under "Replacing Motor". Replace or adjust post so that it will be perpendicular to the main plate.

CHANGER CONTINUES CYCLING

If the mechanism continues to change records constantly, it indicates trouble in the lift (37). Failure of this lift to disengage with the cam gear (11), Fig. 2, will cause the trouble. Check the various rivets at which motion occurs to find a point where friction or binding is interfering with freedom of motion. The cam lever (39), Fig. 2, should also be checked for too much friction. Oil this part if necessary.

SELECTOR BLADE FAILS TO SEPARATE BOTTOM RECORD FROM STACK

This is due either to a badly warped record or to its being of a thickness considerably different from records now in standard use. The selector blade and shelf blades are designed to accommodate a maximum variation in thickness and flatness of records now in standard use. There are certain records, however, that may be found which vary in thickness so much as to be impracticable for use in the automatic changers.

SELECTOR BLADES JAM INTO EDGE OF RECORD

This is generally caused by too small a spacing between the selector plate and the spacing between the selector plate and the shelf plate. This space should never be less than .050 inch when selector plate is in 10" position. Another cause of jamming is too sharp an edge on the selector plate.

To eliminate this trouble, check spacing of plates. Bend the selector plate slightly, if necessary. Smooth up the edge of the selector plate by means of a piece of fine emery cloth.

MECHANISM SLOW IN STARTING OR STALLS DURING A CHANGE OF CYCLE

Trouble is probably due to:

a. Motor mechanism is not thoroughly lubricated. See heading "Lubrication".

b. Check for loose set screws.

c. Line voltage may be abnormally low or motor windings damaged. If the windings of the motor are damaged, replace motor. To remove motor, see heading "Replacing Motor".

REPLACING MOTOR

Replacing the motor necessitates extreme care in aligning and correctly mounting the new motor. The procedure listed below should be followed closely. When replacing a new motor or ordering a new one from your distributor, specify the power supply from which the motor is to be operated. The motor electrical wiring is shown in Fig. 4.

When mounting replacement motor, it is most important to see that record pin is centered between the two posts of the changer, that it stands perpendicular to main plate (53), and that it has not become bent so as to wobble. Even though the posts are stout and not easy to bend, it is well to check them also, with a 12" combination square laid clear across the concave upper surface of main plate. When the new motor has been attached, with three screws through grommet sleeves (51) (spacers) into its frame, and record pin is seen to revolve without appreciable wobble, the correct position of the record pin between the record-mounting posts can be accurately checked as follows: Place a single 12" record on the shelf plates, press "R" button, and turn turntable forward by hand. Immediately after the shelf plates open and allows the record to fall, turn turntable slightly backward, and with other hand support the record between the shelf plates; it can then be readily seen whether record pin is off center. If the record pin is found to be off center, remove the record and turntable, and loosen slightly the motor mounting screw or screws nearest the shelf plate to which record appeared closest. This should improve evenness of operation. However, unless the unevenness was very slight, it will be necessary for a permanent repair to insert a shim or two on one or more of the three screws (or change shims from one screw to another). The shims used are shaped like an ordinary washer, cut out at one side (see cut-away view at 52 on photo, showing a shim in place upon one of the grommet sleeves). Shims can readily be cut out with shears and punch from thin metal or cardboard—or an assortment of shims of different thicknesses can be had from your distributor. (Order "Assortment of Part No. 45-2785"). They should be inserted, around proper screws (when screws have been sufficiently loosened) between motor frame and the metal grommet sleeve. Do not insert shims next to rubber grommet.

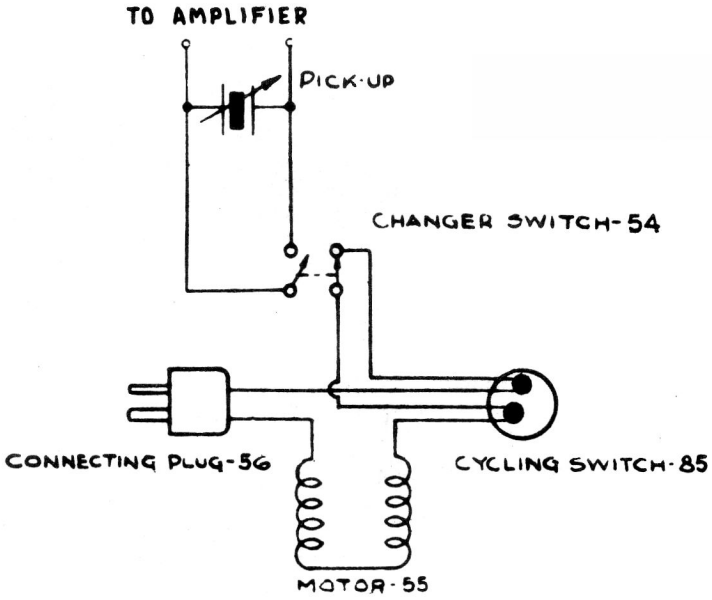


FIG. 4. MOTOR ELECTRICAL CONNECTIONS

DISASSEMBLING THE CHANGER

Before attempting to remove sub-plate assembly (83) detach key control unit (75) from main plate. To do this, start with control unit truss bar (80). Then take out the screw which holds left end of adjusting rod lever (94). Next remove adjusting rod (92) and adjusting rod extension (79). Take out the screw holding spring (73); then the screws holding key control unit (75) to main plate. Rods (77) and (78) can then, with due care, be extracted without bending. Free the cam connecting rod (58) by loosening setscrew holding spreader and hub assembly (59). Sub-plate assembly can then be detached without bending parts. In reassembling, reverse the procedure.