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SERVICE NOTES

FOR

DU MONT TELESETS



ALLEN B. DU MONT LABORATORIES, INC.

Teleset Service Control Department

MARKET STREET

EAST PATERSON, N. J.

RECORD CHANGERS

Service Manual
DUMONT 45 R.P.M. RECORD CHANGER*

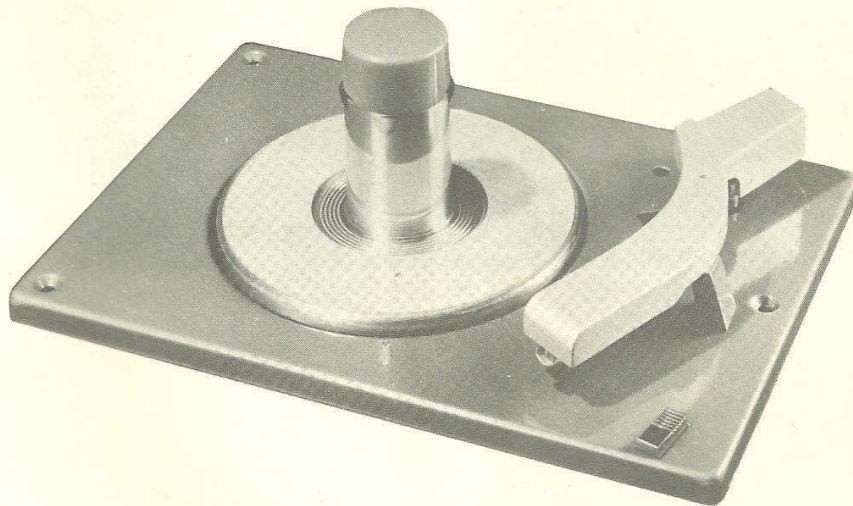


FIGURE 1—TOP VIEW

GENERAL INFORMATION

The Du Mont 45 RPM changer is designed to play and change automatically the new small-diameter ($6\frac{7}{8}$ "), fine-groove phonograph records. It will handle up to eight records, in sequence, at a loading. This changer is of the new "Spindle-Loading," rapid-changing type. It is designed to operate from a supply of 110-volt, 60-cycle AC. The last record will be repeated until the changer is turned off.

* (Used in the model RA-108A Bradford Teleset.)

ALLEN B. DUMONT LABORATORIES, INC.

— TELESET SERVICE CONTROL DEPT. —

35 MARKET STREET, EAST PATERSON, NEW JERSEY

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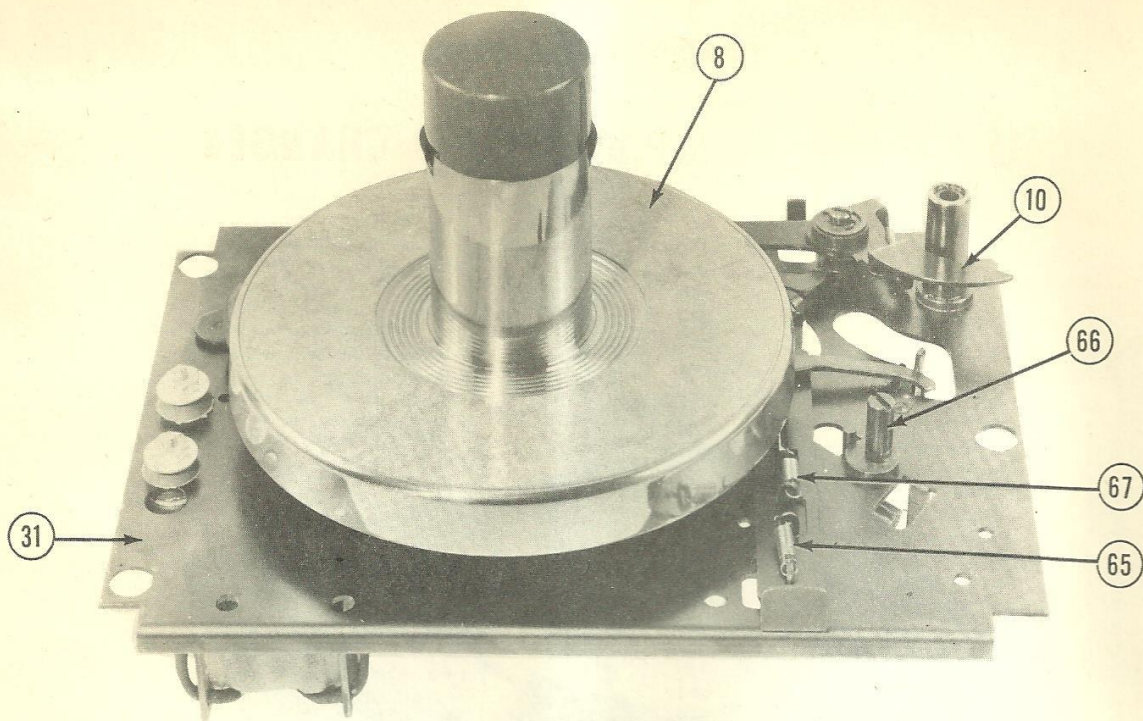


FIGURE 2

AUTOMATIC OPERATION

To operate this changer, be sure the mechanism is out of cycle and the pickup arm is on the arm rest before loading.

2. Remove the needle guard.
3. Place a series of the new small-diameter ($6\frac{7}{8}$ "), fine-groove records on the spindle, allowing them to come to a rest on the record supports (6)—part of assembly (5 and 6).
4. Apply power to the drive motor (80).
5. Push the reject control knob (18) forward and let go. The mechanism will automatically play, in sequence, one side of each record stacked on the separator shelves. The last record will be repeated until the changer is turned off.
6. To reject a record being played, pull the reject knob (18) away from tone arm reset and release.
7. To repeat a record being played, remove all remaining records from the separator shelf (6). The remaining record will continue to repeat until addi-

tional records are replaced on the spindle, or the changer is turned off.

8. At conclusion of playing and as the last record is being repeated, lift the tone arm from the record and place on arm rest; then turn the changer off.

Caution

1. Do not handle the tone arm while the mechanism is in cycle.
2. Do not use force to release a jam.
3. Do not try to remove the records on the turntable if the turntable is stopped in cycle.
4. Do not try to operate the mechanism if the separator knives (4) protrude from the center post when the mechanism is out of cycle.

Apply power to the turntable; as the turntable revolves, press gently against the protruding discs (4) until they disappear inside the spindle. Do not do this during a change cycle.

CHANGE CYCLE

The change cycle is started by either pulling the reject control knob (18) away from the tone arm rest, which actuates the reject plate (63 and 64) mov-

ing the trip pawl (76) into tripping position, or by the action of the trip lever assembly (53), pushing the trip pawl (76) into tripping position, as the tone

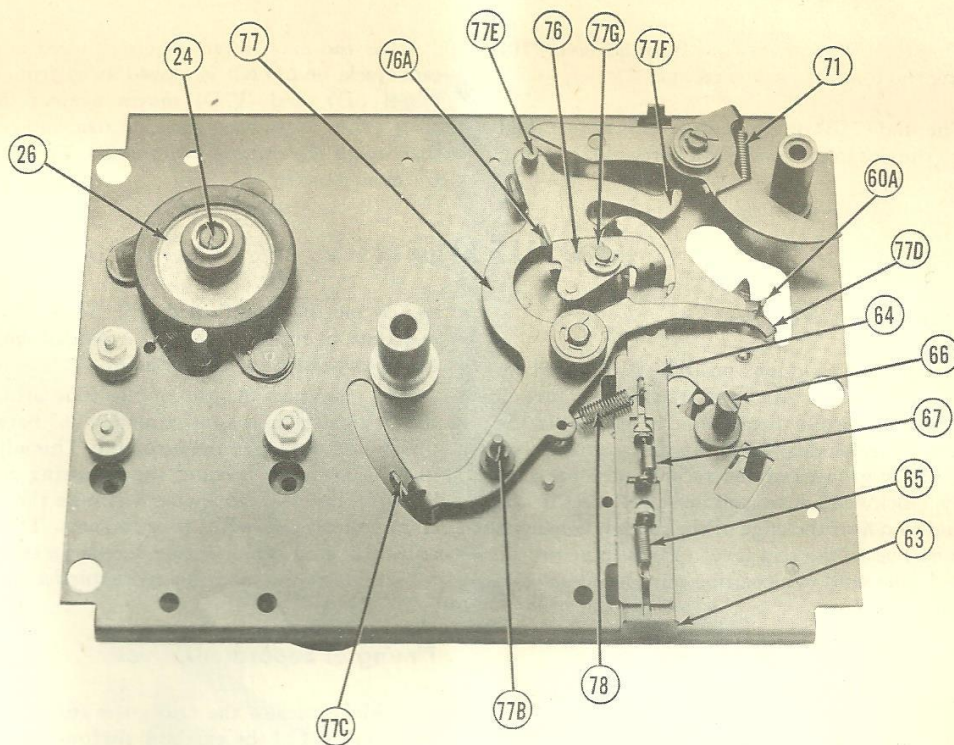


FIGURE 3

arm moves into the tripping groove of the record.

As the turntable rotates, a small projection (8A) extending from the underside of the turntable contacts the end of the trip pawl (76). Upon contact, the stud on the trip pawl (76) is forced against the main lever assembly (77) causing the follower stud (77B), Figure 3, of the main lever (77) to be forced through the slot and into the cycling cam groove (8B), Figure 5, thus starting the change cycle.

The change cycle operation is very rapid, due to the fact that it takes only one revolution of the turntable to complete a cycle. Therefore, as the follower stud (77B) moves in the cam track (8B), the following operations take place:

1. Finger (77D) of the main lever (77) moves away from the pawl (60A).
2. The end of the main lever (77C), extending below the motor board, moves away allowing the muting switch (49) to close.
3. At the same time, the stud (77E) pushes against the tone arm lift lever (70), which, in turn, raises the tone arm.
4. The end (77F) of the main lever (77) contacts the stud (53A) on the trip lever (53), starting the

tone arm on its outward movement and end (77G) resets the trip pawl (76). The stud (53A) then moves against the lever assembly (60); therefore, as the tone arm reaches its outermost position, the tone arm is locked in position by the latch (60A), clamping the stud (53A) on the tone arm return lever (53).

5. While the tone arm is moving outward, the end (77C) moves in to block the rotation of the star wheel (43) and the shaft and gear assembly (7). Since the turntable continues to rotate while the star wheel and shaft remain stationary, the two small gears of the assembly (5 and 6) rotate around the gear of the gear and shaft assembly (7). This action is necessary to cause the shelves to recede, due to the eccentricity of the two small gears (6A), and the shelves to pivot out to select the lower record of the stack and to support the remaining records while the bottom record drops to the turntable.

At this point of rotation of the turntable, the main lever (77) is reversed in direction.

1. The end (77F) retains contact with the stud (53A) on the trip lever to stabilize the inward movement of the tone arm which is being pushed in by the return lever (60). This inward movement of the tone arm is stopped by stud (60B) of the return lever (60) coming in contact with the eccentric adjusting stud (66), thus positioning the tone arm for set down.

2. The stud (77E) moves away from the lever (70) lowering the tone arm to the record.

3. The stud (77B) of the main lever is now pulled through the slot in the cam by the force of the spring (78).

4. As the main lever is being pulled out of the cam track, end (77C) is moved away from the star wheel (43), end (77D) moves against the pawl (60A), thus unlatching the tone arm, and end (77C) then opens the muting switch (49). This completes the change cycle.

ADJUSTMENTS

Tone Arm Set Down

Normally, the set-down position is adjusted by turning the eccentric adjusting stud (66), Figures 2 and 3, made accessible through the hole (AA) in the motorboard (exploded view). If the pickup lands on the music grooves of the record, turn the stud slightly clockwise; turn counter-clockwise if the arm lands too near the edge of the record. However, if for any reason the trip lever (53) is loose on the shaft (15), the set-down position must be adjusted as follows:

1. Place a record on the turntable.
2. Set the adjusting stud (66) in a neutral position.
3. Move the reject knob (18) forward and release.
4. Turn the turntable clockwise, by hand, until the tone arm starts to lower. At this point, the lever (53) is held by the pawl (60A) of the lever assembly. Be sure screw (56) is loose enough to slide lever (53).
5. Push up on the lever (53) and down on the tone arm (11), leaving approximately .010" vertical play.
6. While holding the lever (53) in position, move the tone arm over the starting groove of the record.
7. Tighten the clamp screw (56).
8. Turn the power on, push the reject knob forward, and observe the landing point.
9. A finer adjustment may be made by turning the adjusting stud (66) as described in the first part of the set-down adjustment.

Tone Arm Height

The correct height of the tone arm (11), while out of cycle, is approximately 1/16" between the

needle and the motorboard (17). To obtain this adjustment, bend the lug (15A) *exploded view* in the direction needed for proper height.

The maximum height of the tone arm, during the change cycle, is approximately 3/4" between the needle and the top of the turntable. This adjustment may be made by turning the adjusting stud (68). Turning the stud clockwise will raise the arm, and counterclockwise will lower the arm. This height-adjusting stud (68) is made accessible through the hole (BB) in the motorboard (exploded view).

Timing of Separator Knives

1. Make certain the two gears (6A) are meshed with the gear of the gear and shaft assembly (7).
2. Loosen the two set screws (42) sufficiently to permit the star wheel (43) to rotate without disturbing the shaft (7).
3. Position the separator knives as shown in Figure (6).
4. Move the reject knob (18) forward and release. Rotate the turntable slowly, by hand, until the end (77C) of the main lever moves in far enough so when the star wheel (43) is rotated it contacts the end (77C).
5. Tighten the set screws and check the adjustment by running the changer through several change cycles.
The separator knives must rotate 360° and return to the starting position, as indicated in Figure (6).

Automatic Tripping Adjustment

The changer should trip when the needle leaves the last playing groove. The adjustment is obtained by bending the long end of the trip pawl (76).

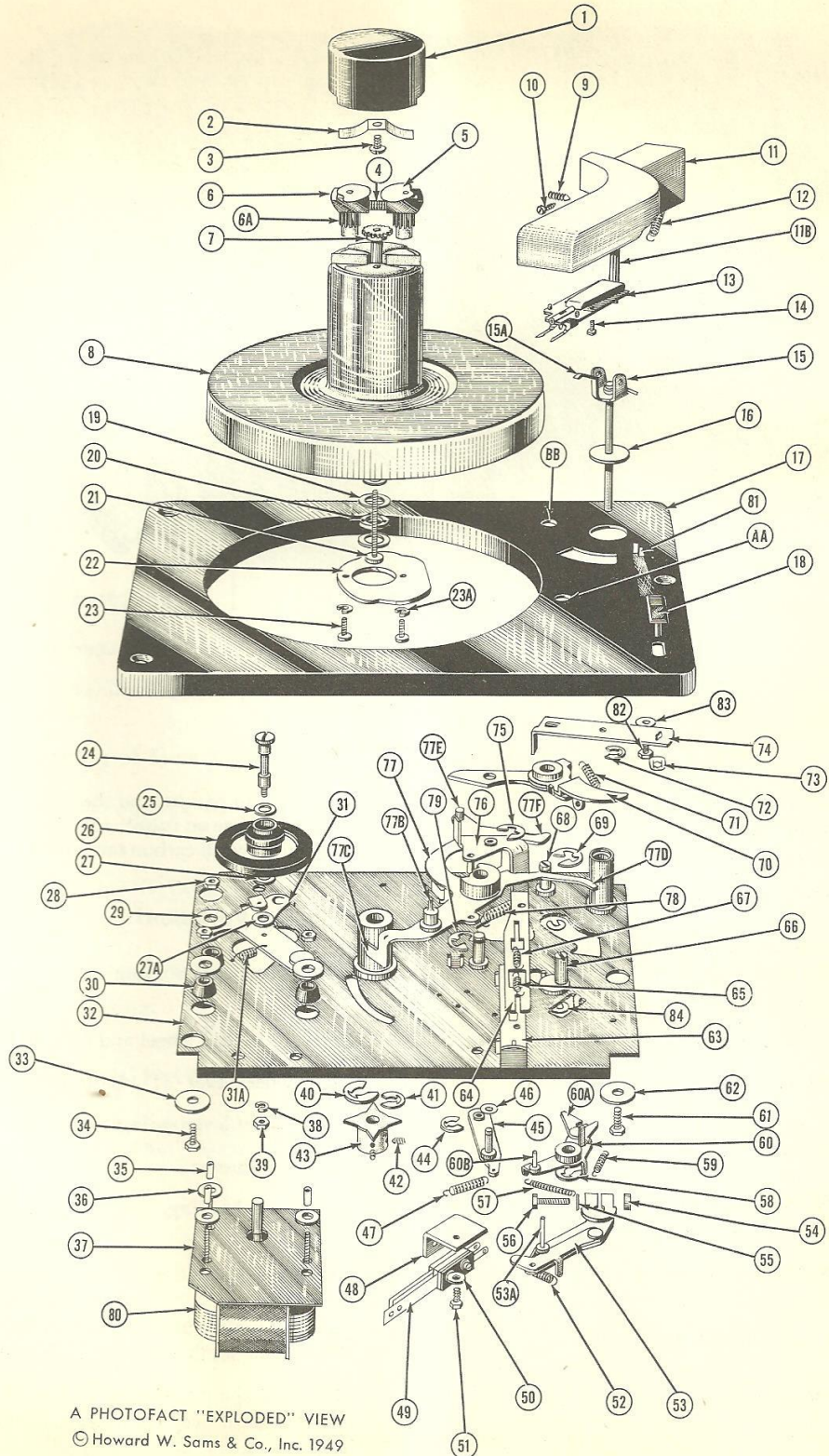
TROUBLES

Fails to Trip

1. Stud (8A) of the turntable, Figure 5, broken off.

2. The dog (76A), Figure 3, bent, thereby not coming in contact with the stud (8A).

3. The long end on the trip pawl (76) bent away



A PHOTOFACT "EXPLODED" VIEW
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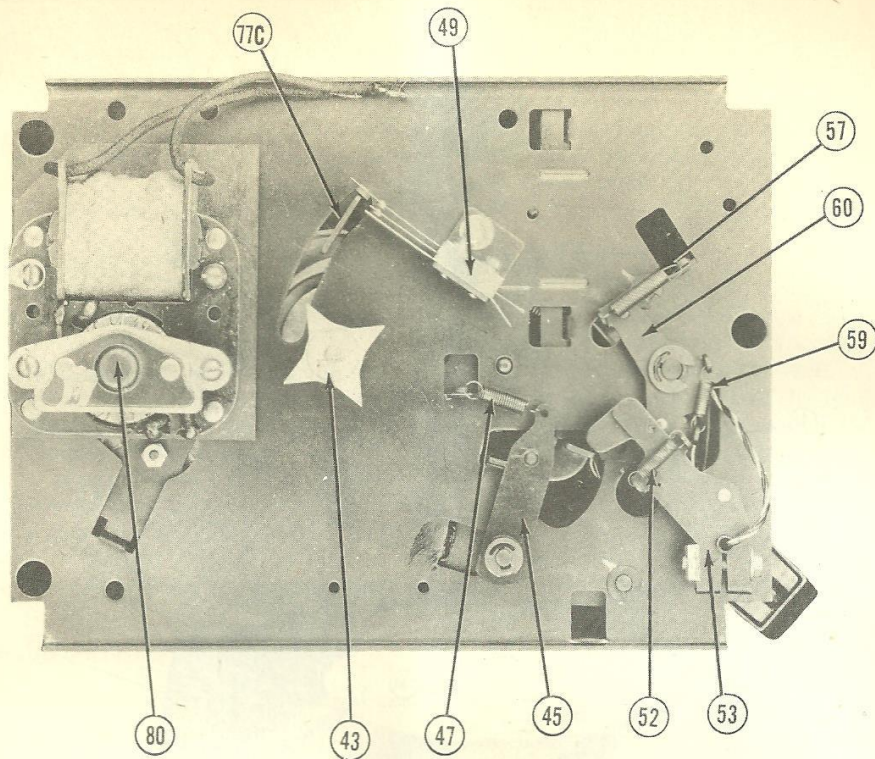


FIGURE 4

from the point of contact of the trip lever (53) for automatic tripping and the reject plate (64) for manual tripping.

4. Trip lever (53) loose on the tone arm shaft (15).

(a) For proper adjustment of this trouble, see "Tone Arm Set Down" under "ADJUSTMENTS."

5. Spring (52) loose.

6. Spring (47) loose.

Failure to Cycle

1. The stud on the trip pawl (76) that actuates the main lever bent or broken.

2. Follower stud (77B) broken.

Stalling During the Change Cycle

1. Turntable cam (22) off center, not leaving enough space for the follower stud (77B) to pass in the groove.

2. Spring (57) loose. This condition may allow

the stud (53A) to pass behind the pawl (60A).

3. Oil and grease on rubber idler wheel and turntable rim; clean with carbon tetrachloride.

Wow (Speed Variation)

1. Idler wheel (26) binding on tight bearing stud (24).

2. Grease on idler wheel and turntable rim.

3. Idler wheel lever (31) binding.

4. Idler wheel lever spring loose.

5. Defective motor.

6. Turntable binding.

Repeats Grooves

1. Bind in tone arm pivot shaft, no vertical play. See "Tone Arm Set Down"—Items (4 and 5).

2. Lug (15A) bent too high not allowing tone arm to rest on record. See "Tone Arm Height" under "ADJUSTMENTS."

3. Spring (12) tension too great.

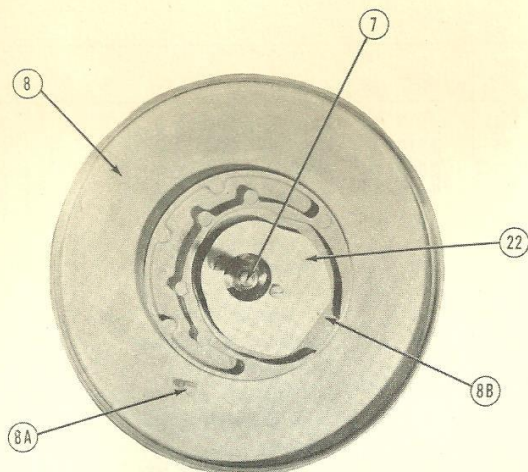


FIGURE 5

4. Pivot stud (9) too tight causing binding.

Continuous Tripping

1. Spring (78) missing.
2. Trip plate (63) binding.

Improper Landing of Tone Arm

1. Lever (60) binding in pivot.
2. Spring (59) loose.
3. Main lever end (77D) bent.
4. Stud (53A) loose.
5. Eccentric stud (66) loose.
6. Spring (57) missing.

Record Fails to Drop to Turntable

1. Star wheel (43) loose on shaft (7). See "Timing of Separator Knives" under "ADJUSTMENTS."

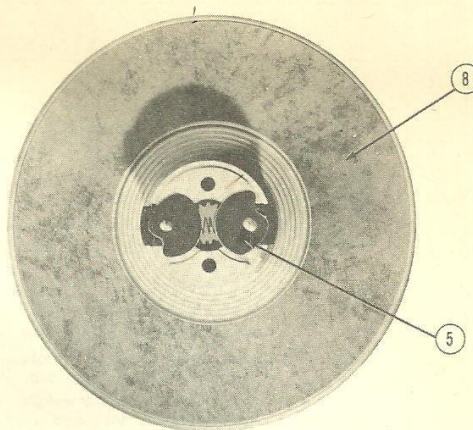


FIGURE 6

Records Drop On or Hit Tone Arm

1. Star wheel (43) improperly timed. See "Timing of Separator Knives" under "ADJUSTMENTS."

No Sound During Playing

1. Defective Cartridge (13).
2. Defective wiring.
3. Check position of muting switch (49) with changer out of cycle.
4. Defective amplifier.

Changer Trips Before End of Cycle

1. The long end of the trip pawl (76) bent. See "Automatic Tripping Adjustment."

Failure to Trip Manually

1. Spring (67) loose.
2. Turned up end of slide (63) bent in.

LUBRICATION

Additional lubrication should not be required for a long period of time; however, in cases of unusual use, or high operating temperature, the changer should be lubricated as follows:

1. Light machine oil (SAE No. 10) should be used to oil the bearings of the drive motor.
2. Use a good light grease on all bearing surfaces except the motor bearings; on all other sliding surfaces.

Caution

Do not oil or grease the record separator knives. Avoid over lubrication. Do not allow grease or oil to come in contact with rubber idler wheel (26), the drive motor shaft, or the turntable rim. All grease, oil, or any other foreign material should be cleaned from these parts with carbon tetrachloride or naphtha.

PARTS LIST

Ref. No.	Part No.	Description	No. Used	Ref. No.	Part No.	Description	No. Used
1	3R3	Spindle nose	1	33	5R16	No. 8 flat washer	3
2	4R9	Flat spring, spindle nose	1	34	6R10	8-32 x 3/8" hex hd. screw	3
3	6R9	6-32 x 1/4" RHM screw	1	35	2R2	Motor spacer bushing	3
4	4R7	Coil spring (separator bolt spring)	1	36	5R10	Washer	3
5	RA18	Separator and bolt assembly	1	37	1R24	Deflection plate	1
6	RA18	Separator and bolt assembly	1	38	5R5	No. 4 split lockwasher	1
7	RA19	Gear and shaft assembly	1	39	7R1	4-40 hex nut	1
8	RA20	Turntable and shaft assembly (less mat)	1	40	5R1	"C" washer	1
	7R7	Turntable mat.	1	41	5R2	"C" washer	1
9	2R3	Tone arm pivot stud	1	42	6R8	Bristol cup pt. set screw	2
10	6R3	4-40 x 3/16" fil. hd. m. screw	1	43	3R7	Star wheel	1
11	RA50	Tone arm, pivot, stud, weight assembly R.C.A. tone arm	1	44	5R2	"C" washer	1
	RA51	Tone arm, pivot, stud, weight assembly E.V. tone arm	1	45	RA8	Lever assembly	1
	RA52	Tone arm, pivot, stud, weight assembly Shure tone arm	1	46	5R19	Washer	1
12	4R6	Coil spring, counterbalance	1	47	4R3	Coil spring (safety lever)	1
13	8R1	RCA cartridge, sapphire needle	1	48	1R10	Mounting bracket (muting switch)	} Assembly 1
	8R4-2	Electro-Voice cartridge, sapphire needle	1	49	7R13	Muting switch	
	8R4-3	Electro-Voice cartridge, sapphire needle (with ground lug)	1	50	5R15	No. 6 flat washer	1
	8R5-2	Shure Bros. cartridge, sapphire needle	1	51	6R2	No. 6 x 5/16" hex head screw self tapping	1
	8R4-1	Electro-Voice cartridge, osmium needle	1	52	4R11	Coil spring (trip cushion spring)	1
	8R5-1	Shure Bros. cartridge, osmium needle	1	53	RA3	Trip lever assembly	1
14	6R4	2-56 x 3/16" flat hd. m. screw (RCA cartridge)	2	54	7R6	No. 8 square nut	1
	6R13	4-40 x 5/32" slotted fil. hd. m. screw (Shure Bros. cartridge)	2	55	5R14	No. 8 flat washer	1
	6R16	4-40 x 1/8" slotted fil. hd. m. screw (Electro-Voice cartridge)	2	56	6R5	8-32 x 3/4" hex hd. m. screw	1
15	RA16	Tone arm support bracket and shaft assembly	1	57	4R4	Coil spring (tone arm return)	1
16	5R18	Washer (tone arm) (thrust)	1	58	5R4	"C" washer	1
17	RA23	Motor board—RCA	1	59	4R8	Coil spring (tone arm recoil)	1
	37	Motor board—Crescent	1	60	RA9	Lever assembly	1
	RA36	Motor board—Crescent 1 1/8" AC switch mounting bracket	1	61	6R10	6-32 x 3/8" hex head screw (see item 34 for quantity)	1
18	3R10	Reject control knob	1	62	5R16	No. 8 flat washer (see item 33 for quantity)	1
19	5R3	Washer	2	63	1R13	Reject plate	1
20	7R12	Ball thrust bearing	1	64	1R18	Reject plate	1
21	6R7	6-32 x 1 3/4" slotted fil. hd. screw	2	65	4R2	Coil spring (reject assembly)	1
22	1R4	Turntable cam	1	66	RA21	Set-down adjustment stud	1
23	6R6	4-40 x 1/4" fil. hd. screw	2	67	4R2	Coil spring (reject assembly)	1
23A	5R5	No. 4 split lock washer	2	68	2R23	Height adjustment stud	1
24	2R1	Idler wheel stud	1	69	5R4	"C" washer	1
25	5R7	Washer (idler)	1	70	RA5	Bushing and lever assembly	1
26	RA10	Idler wheel and bearing assembly	1	71	4R10	Coil spring (tone arm safety spring)	1
27	5R6	Washer (idler)	1	72	5R2	"C" washer	1
27A	1R23	Spring washer	1	73	7R11	Speed nut	1
28	7R2	6-32 hex nut	3	74	1R21	Reject coupling lever	1
29	5R10	No. 6 flat washer	3	75	5R2	"C" washer	1
30	7R4	Rubber grommet	3	76	RA6	Trip pawl assembly	1
31	1R12	Idler wheel lever	1	77	RA7	Main lever assembly	1
31A	4R5	Coil spring (idler pulley plate)	1	78	4R1	Coil spring (main lever)	1
32	RA12	Sub-base assembly	1	79	5R4	"C" washer	1
				80	7R3	Motor 110-volt, 60-cycle	1
				81	3R9	Tone arm rest	1
				82	6R2	No. 6 self tapping screw	1
				83	5R15	Flat washer	1
				84	5R17	Spring lock washer	2

SERVICE MANUAL

for

DUMONT

THREE SPEED RECORD CHANGER*



(*AS USED IN THE MODEL RA 104 WELLINGTON TELESET)

ALLEN B. DuMONT LABORATORIES, INC.

TELESET SERVICE CONTROL DEPT.

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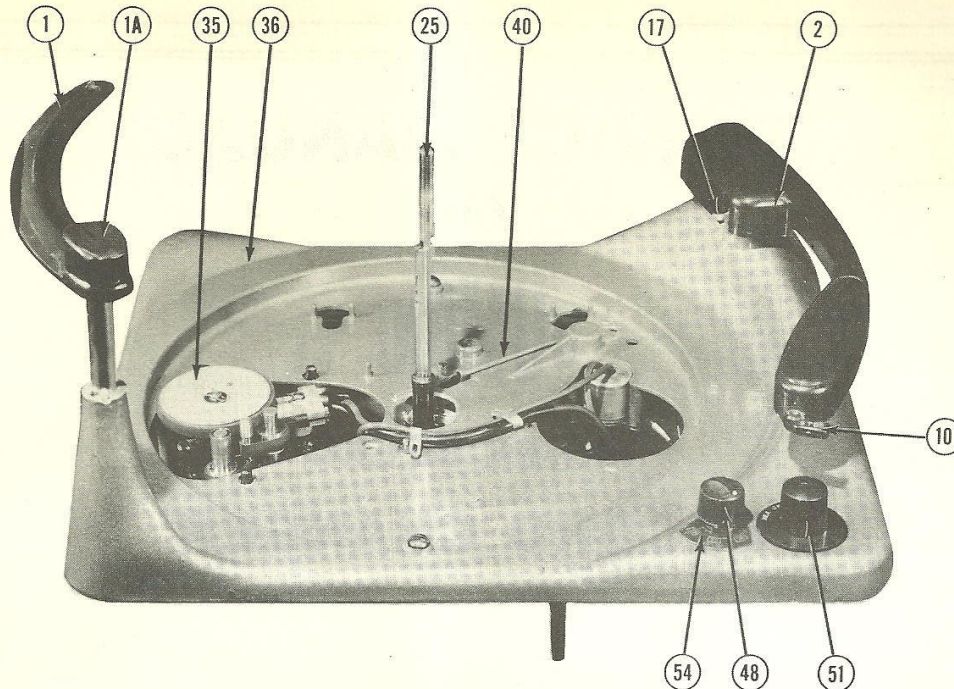


FIGURE 3

SPECIFICATIONS

The Dumont Three-Speed Record Changer Intermix model is designed to play standard 78 RPM, 45 RPM and 33 $\frac{1}{3}$ RPM records of standard commercial dimensions. Records up to 12" diameter can be played manually.

Features of this changer include playing and automatically changing as many as ten 12", twelve 10", or any assortment of ten records, intermixed. Intermix only ten-inch and twelve-inch records of the same type, either standard (78 RPM) or long play (33 $\frac{1}{3}$ RPM).

A full stack of 12-7", 33 $\frac{1}{3}$ RPM records, or a full stack of 12-7", 45 RPM records (with the adapter inserted in the record) will also play on this changer. Changer shuts off after the last record has been played.

Connect this changer only to an outlet supplying 117 volts, 60-cycle AC unless otherwise specified. Power consumption 25 watts.

PREPARING FOR OPERATION

SHIPPING BOLTS: Before placing in operation, the machine must be floated freely on the mounting springs. During shipping, the mechanism is secured by means of the two shipping bolts. To float the changer, remove the turntable by lifting it straight up the spindle. Turn the two shipping bolts in a clockwise direction as far as they will go and replace the turntable. Before the turntable can be fully seated, the drive wheel must be gently pushed back out of the way to prevent damage to rubber tire.

LEVELING RECORD CHANGER: It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to achieve perfect level.

OPERATING

Loading

1. Pull straight up on record support knob until record support clears spindle. Swing record support to the left until pin in shaft drops into locating groove.

2. Changer will automatically play ten 12" either standard or long play, twelve 10" either standard or long play, any assortment of ten 12" and 10" records intermixed, or twelve 7" long play or fine groove records.

NOTE: Standard, fine groove and long play records cannot be played in same stack of records. Motor speed and needle control knobs must be reset for each type of recording.

3. Place records on spindle and lower to offset shelf. Hold records level and replace record support over spindle.

To Play Standard Recordings

1. Motor speed control knob must be in the "78" position.
2. Dual-needle-reversible cartridge control must be in "Std." position.
3. To start, turn changer control knob to "Rej." and release. Changer will operate automatically until the last record has been played. Pickup arm returns to rest and the control knob to "Off" position. Changer automatically stops.

To Play Long-Play (33 $\frac{1}{3}$ RPM) Records

1. Motor speed control knob must be in the 33-10"-12" position for 10" or 12" long play 33 $\frac{1}{3}$ RPM records, or in the 33-7" position for 7" long-play 33 $\frac{1}{3}$ RPM records.
2. Dual-needle-reversible cartridge control lever must be in "Slow" position.

To Play Fine-Groove (45 RPM) Records

1. Motor speed control knob must be in the 45 position for 7" fine groove 45 RPM records; however, these records are manufactured with a 1 $\frac{1}{2}$ " spindle hole. It is essential that a record adapter be inserted into each 45 RPM record to be played. This is necessary to reduce the spindle hole to the conventional size.
2. Dual-needle-reversible cartridge control lever must be in "Slow" position.

REJECTING: To reject a record at any time while changer is operating, turn changer control knob to "Rej." and release.

STOPPING: To turn off changer before automatic shut-off, turn changer control knob to "Off." Lift pickup arm and place on rest.

UNLOADING: Lift the record support and swing to left until pin on shaft drops into locating groove. Lift stack of records straight up off spindle.

MANUAL OPERATION: To play single records or home recordings, lift up the record support arm and move it to left, clear of the turntable. Place record on spindle and lower to spindle

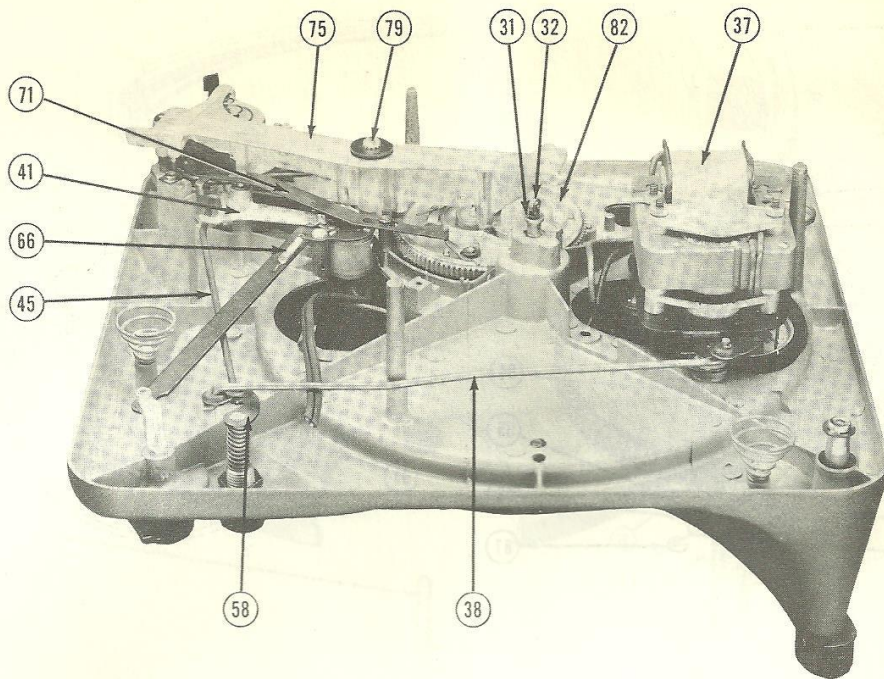


FIGURE 4

shelf. Tilt record down toward the rear of pickup arm and lower record to turntable. Turn changer control knob to "On" position, and trip index trigger on inside rear of pickup arm. Raise pickup arm and place the needle in lead-in groove of record.

REPEATING OF 7", 10" OR 12" RECORDS: To repeat, place record on the turntable, the record support off spindle, start changer. Record repeats until control is turned to "Off." If a 12" record is repeated, wait for the changer to finish cycling and reposition the pickup arm manually to the 12" position.

SUGGESTIONS: When loading and unloading the changer, use care to prevent bending of spindle. Records should not be left on the spindle except during operation of changer. Records will warp. When machine is not in use, it is suggested that speed control be left in "78" position and cartridge control lever be left in the "Std." position. For best reproduction, keep needle and records clean. Store records flat, in folders or in albums. Do not lay record on record.

CAUTION: When changing needles, be certain that slow needle is placed in the slow side of cartridge and standard needle in the standard side. A distinctive color identifies the slow side of the cartridge and slow needle.

Velocity Trip

This changer is provided with what is commonly known as a velocity trip rather than a ratchet and positive trip mechanism. A velocity trip depends, for the tripping action, on the rate of forward motion of the pickup arm with respect to the turntable rotation. The changer will trip only when the pickup arm advances more in one revolution of the turntable than the distance between normal grooves in a record. Only records having fast finishing grooves before the eccentric cycling groove will operate the velocity trip.

FUNCTION OF VELOCITY TRIP: During the normal playing cycle, the trip pawl (84) is contacted with a wiping action by a small projection on the turntable hub. This repeated action prevents the trip pawl from engaging the projection while the pickup arm moves *slowly* toward the spindle.

A stud on the locator housing (59) contacts the trip link (71) when the pickup arm nears the end of a record. The end of the trip link nearest the spindle contacts the trip lever and turns it as the pickup arm advances. The trip lever, through spring washer tension, turns the trip pawl. Small motions of the trip

pawl are not sufficient to cycle the mechanism because, on each revolution of the turntable, the wiping contact by the hub projection moves the trip pawl back to clear the projection.

In the first revolution of the turntable, during which the pickup arm advances rapidly, the trip pawl is moved far enough for the sharp point at the end to definitely engage the projection on the turntable hub, thereby turning the cam to start the change cycle.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use, or high operating temperature, the changer should be lubricated as follows (refer to the exploded view):

Apply Lubriplate to

1. Hinge bearing (21).
2. Locator housing (59) and set-down locator plate (67).
3. Cam faces on lift arm (75), lift arm bearing and lift arm cutoff rod bearings.
4. Between lever spring (70) and cutoff rod (69).
5. Heart-shaped cam track on cam (82) and cam bearing.
6. Spindle between roller plunger and roller spring housing and between the roller spring housing and the spindle body.
7. Turntable ball bearing.

Apply a Small Quantity of Light Mineral Oil to

1. Pickup arm locator assembly bearing (55) and ball bearing in pickup arm post.
2. Control lever bearing (41).
3. Turntable and spindle bearing.

ADJUSTMENTS

Needle Set Down (refer to the exploded view)

The set-down position of the needle is adjusted by means of the two adjusting screws (11). If the needle is setting down too far out on the record, loosen the back screw about $\frac{1}{4}$ turn and tighten the front screw to lock the adjustment in place. If the needle is setting down too far in on the record, loosen the front screw and tighten the back screw. When correct set down is

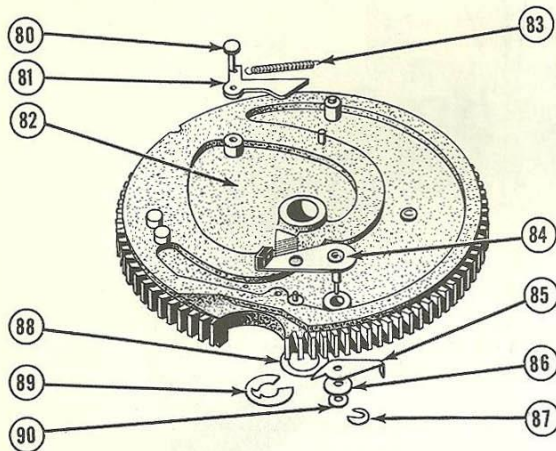


FIGURE 5

obtained for the 10" position, the 12" and the 7" needle set down will also be correct.

Pickup Arm Height (refer to the exploded view)

The pickup arm height is adjusted by the screw (19) located on top of the pickup arm lift rod (62). Turn the screw out or in until the underneath side of the pickup arm clears the rest by $\frac{1}{8}$ " to $\frac{3}{16}$ ".

NEEDLE PRESSURES: With the pickup arm control lever in "Std." position, the needle pressure should be between 1 and 1.25 oz. There is no adjustment for "Std." play pressure inasmuch as the pickup arm is designed to give this needle pressure.

With the pickup arm control lever in the "Slow" position, the needle pressure should be between 7 and 12 grams. If the pressure is in excess of 12 grams, the drilled end of the hinge bracket (18A) should be bent back away from the hinge bearing assembly (21). **NOTE:** A very slight bend of this bracket will cause a considerable change in needle pressure. If the pressure is less than 7 grams, correction may be made by bending the drilled end of the hinge bracket forward in the direction of the hinge bearing assembly.

In no case should the needle pressure in the "Slow" position be less than 7 grams. If this pressure is lower than 7 grams, the needle will not track in the record grooves. This may be recognized by "skidding" of the pickup arm across the record and by failure of the changer to cycle at the end of the record. Improper tracking may be due to other causes. (See heading "Needle Does Not Track Across Record Properly.") An accurate scale, calibrated in grams, must be used in checking this needle pressure.

1. Defective Cartridge (Shure P 77-A)

To remove cartridge, proceed in the following manner:

1. Remove the plastic cartridge control lever.
2. Carefully pull the cartridge lead up from the rear section of the arm until adequate slack is obtained.
3. Remove the two screws that are used to attach pickup cartridge to the pickup cartridge mounting bracket.
4. Disconnect the pickup leads and remove cartridge.
5. Replace cartridge and connect pickup leads.
6. Secure pickup cartridge to pickup cartridge mounting bracket.
7. Push excess pickup lead into rear section of pickup arm and reinstall plastic cartridge control lever.

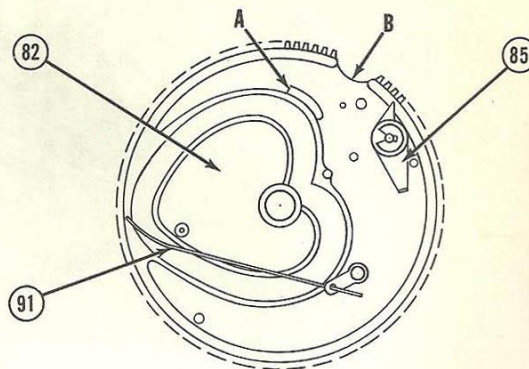


FIGURE 6

Damaged Needle (Shure-P 77 A)

To remove needle, proceed in the following manner:

1. Rotate cartridge control lever to correspond with needle to be removed.
2. Loosen knurled thumb nut that secures needle to the cartridge.
3. Carefully remove the needle and replace with a new needle of the same part number.

CAUTION: Make sure that the colored needle is used on the side of the pickup cartridge having the corresponding color spot. The replacement needle will have to be adjusted, before it is tightened in the pickup cartridge, to assure that the needle shank is securely held by the knurled thumb nut. Do not use pliers on knurled thumb nut. Tighten with fingers only.

2. Defective Cartridge (Webster F-14)

To remove cartridge, proceed in the same manner as described in (1—"DEFECTIVE CARTRIDGE").

Damaged Needle (Webster F-14)

To remove needle, proceed in the following manner:

1. Remove plastic cartridge control knob (10).
2. Using a jeweler's screwdriver, loosen the set screw in the end of the cartridge enough to remove the dual needle.
3. Replace with new needle, making sure the red-coated needle is on the same side as the red dot on the cartridge.
4. Center needle in cartridge and tighten set screw.
5. Replace cartridge control knob.

3. Defective Cartridge (Astatic LQD)

To remove cartridge, proceed in the same manner as described in (1—"DEFECTIVE CARTRIDGE").

Damaged Needle (Astatic LQD)

1. Rotate cartridge control knob to correspond with needle to be removed.
2. The needle may now be removed by pulling it straight out of its mounting.
3. In replacing the new needle, make sure that the colored needle is used on the side of the pickup cartridge having the corresponding color spot.

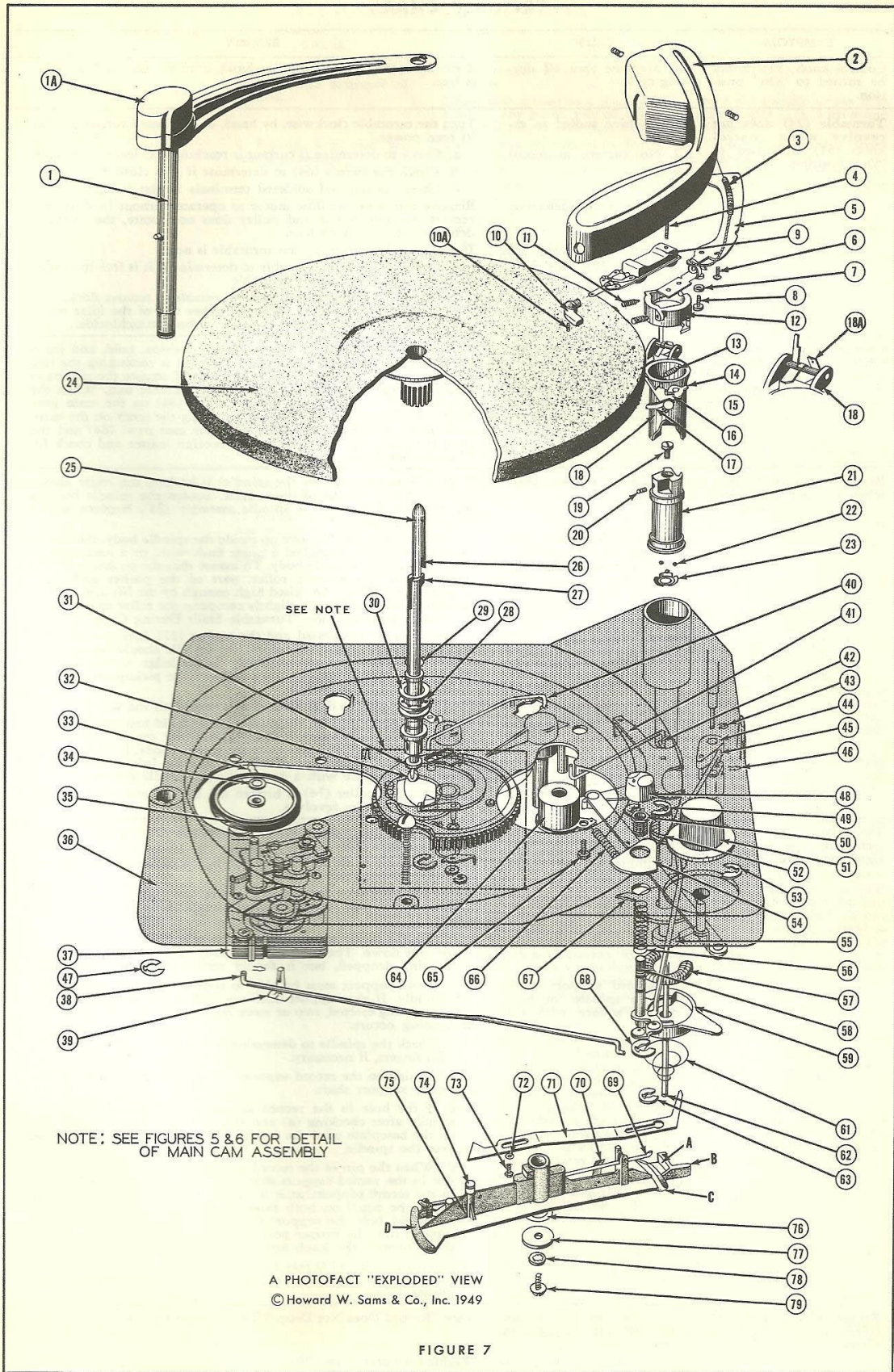


FIGURE 7

TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Control knob (51) cannot be turned to "On" position.	1. Machine shut off during cycle.	Turn the turntable clockwise, by hand, until the control knob (51) is free.
Turntable (24) does not revolve when control knob (51) is turned to "On" position.	1. Machine stalled in cycle. 2. No current at motor (37). 3. Motor (37) defective. 4. Motor idler wheel (35) not engaging turntable rim.	Turn the turntable clockwise, by hand, until it starts rotating under its own power. a. Check to determine if current is reaching A.C. leads of changer. b. Check the switch (64) to determine if it is closing. c. Check wiring and soldered terminals in the changer. Remove turntable to allow motor to operate without load. If current is reaching motor and pulley does not rotate, the motor is defective. Repair or replace. If motor pulley is turning but turntable is not: a. Check motor idler assembly to determine if it is free to contact the motor pulley and the turntable. b. Wipe off the inside rim on the turntable to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel (35), shown in exploded view, with carbon tetrachloride.
Changer does not cycle when the control knob is turned to the "Rej." position (refer to exploded view).	1. The manual reject not actuating the trip.	Turn the control knob (51) to the reject position, hold, and see if the reject link (40) on the control lever (41) is contacting the trip pawl (84) on the main cam (82). This should actuate the trip pawl (84) to engage with pinion gear on the turntable hub. When the trip rod (40) is turned and the cam pawl (84) on the main gear figure (5) does not move forward, engaging the teeth on the turntable hub, check for binding between the cam pawl (84) and the cam. If binding occurs, clean out all foreign matter and check for freedom, but do not lubricate.
Record does not drop when changer cycles (refer to figure [4] and exploded view).	1. Spindle pusher shaft broken. 2. Pusher in spindle not moving far enough forward to eject a record. 3. Lift screw loose. 4. Pusher raises outside spindle body. 5. Lift arm roller broken off.	If the pusher shaft (inside the spindle) is broken, the roller assembly (32) will drop out of the spindle. Loosen the spindle holding set screws and remove the spindle assembly (25). Replace with a new spindle unit. The pusher (27) should move up inside the spindle body, then move forward until it has reached a point flush with, or a maximum of .010" beyond the spindle body. To assure that the pusher is all the way forward, the spindle roller, part of the pusher and roller assembly (32), should be raised high enough by the lift arm (75), at the top of the cam face, to slightly compress the roller spring inside the pusher housing. (See "Turntable Stalls During Cycle.") If the roller is compressed and the pusher (27) does not move far enough forward to eject a record, the spindle should be replaced. If a record is not pushed completely off the ledge, it may hang up on the spindle momentarily, then drop on the pickup arm when it moves in over the turntable. Check screw (79) to determine if it is turned all the way in. When the changer cycles, the pusher (27) should first rise inside the spindle body, then move forward inside the center hole in the record. If the pusher rises outside the spindle body, it will raise the record instead of pushing it off the spindle ledge. Remove the spindle and replace with a complete new spindle assembly. If the lift arm roller (74) is broken off, the lift arm (75) will not turn when the cam revolves.
Two records drop at once (refer to the exploded view and figure [3]).	1. Hole in record too large. 2. Spindle slide not fully down. 3. Record support binding on spindle, or bent out of square with the shaft. 4. Record pusher defective.	Check the diameter of the hole in the record. An oversize hole will cause two records to drop at once. If spindle slide is not all the way down, more than one record may be dropped at a time. a. Check the slide to be sure it is free and does not bind at any point. Clean out foreign matter, or straighten if necessary. Do not oil. b. When records are placed on the spindle, be sure the slide is all the way down. The slide will normally raise slightly as a record is being dropped, but it should return to place immediately. The record support must be able to slide freely, by gravity, down the spindle. If the support does not follow the records down as they are being ejected, two or more records may be ejected at once. If binding occurs: a. Check the spindle to determine if it is straight. Bend carefully with fingers, if necessary. b. Straighten the record support (1) if it is not square with the record support shaft. c. If the hole in the record support is not centered over the spindle after checking (a) and (b), bend the support shaft post on the baseplate until the hole in the record support is centered over the spindle. d. When the pin in the record support shaft has just entered the slot in the record support post on the baseplate, the play in the record support, as it is swung from one side to the other, should be equal on both sides of the spindle. To correct bent condition, hold the support shaft and carefully force the record support into the proper position. If the support is loose on the shaft, remove the knob and restake with hammer and punch. The record pusher (27) may be deformed, etc. This may cause two records to drop at once. Replace with a new spindle assembly or pusher (27).
Record hits pickup arm (refer to the exploded view).	1. Pusher in spindle not moving far enough to eject record. 2. Lift arm screw loose.	(See "Record Does Not Drop When Changer Cycles"—2.) Tighten lift arm screw (79).

TROUBLE CHART—Cont.

SYMPTOM	CAUSE	REMEDY
	3. Pusher extending beyond outside diameter of spindle.	Cycle changer, by hand, until roller assembly (32) is at the top of its travel. Using new record as a gauge, pass it over the spindle to see if it binds at any point. File off high points on pusher (27), with a fine file, until record will pass freely over spindle.
	4. Pickup arm not adjusted properly.	The adjustment procedure for the needle set-down point is given under "ADJUSTMENTS." If the hinge bearing (21) has been removed, or the hinge bearing set screw (20) has been loosened, the relationship between the hinge bearing and the pickup arm locator assembly (55) must be reset. The procedure is as follows: a. Loosen the set screw (20) sufficiently to allow the hinge bearing to slide on the pickup arm locator assembly shaft. The set screw may be adjusted with an Allen wrench through the hole in the adjusting ring (12) located between the two adjusting screws (11). b. Place a 1/32" shim between the set-down locator (67) and the locator housing (59). c. Turn the control knob to the "Off" position. d. Raise the pickup arm and rotate the hinge assembly counter-clockwise as far as it will go. In this position, the arm extending from the set-down locator should be engaged by the turned-down leg on the control lever (41). e. Take up all the play between the parts by pressing up on the bottom of the locator housing and down on the top of the hinge bearing. f. Tighten the hinge body set screw (20) and remove the shim.
Needle does not set down on 10" record in proper position (refer to the exploded view).	1. Pickup arm not adjusted properly. 2. Hinge catch (14) does not return to 10" record position when changer cycles.	(See "Record Hits Pickup Arm"—4.) a. Stop the machine in mid-cycle when the lift arm (75) has moved as far out as it will go and is about to move back to its starting position. Lift the pickup arm and see if there is a gap of at least 1/64" between the end of the leg on the catch (14) and outside step on the adjusting ring (12). The catch should be free to allow it to be pulled forward against the stop at the end of the leg on the adjusting ring. If there is not enough gap, check the setting of the hinge body and the pickup arm locator. (See "Record Hits Pickup Arm"—4.) If the setting is incorrect, the cam face on the lift arm (75), which contacts the round stud on the bottom of the locator housing (59), may be bent. The locator housing should be forced around far enough to bring the pickup arm out until the stop on the bottom of the hinge casting meets the stop in the baseplate; then, to assure that the pickup arm is out as far as it will go, the lift arm should move the locator housing a few degrees farther around, which will slightly compress the safety spring (57) and hold the pickup arm out firmly against the stop. b. Lubricate the hinge bearing with lubriplate. Do not use heavy grease. If the bearing between the hinge bearing and hinge body binds, the safety spring will compress instead of bringing the hinge body around firmly against the stop.
	3. Binding between safety spring and locator housing.	a. If the safety spring (57) binds against the locator housing and does not hold the casting on the bottom of the pickup arm locator assembly (55) against the stop inside the locator housing, irregular needle set down will result. Disassemble the pickup arm locator assembly (55) by removing the lift arm (75) loosening the hinge bearing set screw (20), and pulling the locator housing and pickup arm locator assemblies down from the bottom of the changer. Hold the pickup arm locator shaft in one hand, turn the locator housing assembly to slightly compress the safety spring release, and see if the safety spring returns the pickup locator casting firmly against the stop surface in the locating housing assembly. If binding occurs, remove the safety spring to see if the pickup arm locator casting turns freely in the locator housing casting. Remove burrs or sharp edge on end of safety spring, stretch safety spring a little to increase tension, and replace. b. Check to see if the locator plate (67) is meshing with the locator housing when the lift rod (62) is positioned at the beginning of the sloping cam surface (C) of the lift arm (75) in the final stage of the cycle. To test the meshing of the locator plate and the locator housing, swing the pickup arm half way in toward the spindle. If the locator plate and locator housing disengage when in the above position, it is necessary to reset the clearance between the locator plate and the locator housing. Also, it may be necessary to file off any burrs which may be present on the mating surfaces of the locator plate and the locator housing.
	4. Hinge catch does not disengage from the hinge cam.	When the index lever (17) has been depressed, it is held in the position until the catch (14) is disengaged. (See "Needle Does Not Set Down on 12" Record in Proper Position"—6.) When the cycle is completed, if the catch does not disengage from the hinge cam (16): a. Check to determine if the leg on the catch (14) is sliding down the incline on the leg of the adjusting ring (12). (See "Needle Does Not Set Down on 12" Record in Proper Position"—7.) b. The catch (14) and the hinge cam (16) are not disengaging when the catch leg is resting on the inside step on the adjusting ring. If this occurs, file the edge of the catch which contacts the hinge cam until the two parts have a clearance between them of about 1/64" when the leg on the catch is on the inside step on the adjusting ring.

TROUBLE CHART—Cont.

SYMPTOM	CAUSE	REMEDY
	5. Needles may be bent.	If the set-down point of the needle is different in the "Slow" play from the "Std." play, it is possible that one or both needles may become bent through rough handling. <i>Do not attempt to straighten the needle while it is mounted in the pickup cartridge case.</i> (Refer to "Damaged Needle" for instructions in needle removal.) Place bent needle on hard, flat surface and carefully straighten until ends of needle are symmetrical. Do not attempt to straighten any needle that has been in use for a considerable period of time, but rather, replace with a new needle.
Needle does not set down on 12" record in proper position (refer to the exploded view).	<p>1. Diameter of 12" record undersize.</p> <p>2. Enlarged center hole in record.</p> <p>3. Pickup arm not adjusted properly.</p> <p>4. Binding between safety spring and locator housing.</p> <p>5. Index lever does not cock when 12" record drops.</p> <p>6. Hinge catch does not go into inside step on adjusting ring when index lever is depressed.</p> <p>7. Needles may be bent.</p>	<p>The set-down position of the needle for 12" records is determined by the edge of the record striking the index lever (17). If a 12" record has a diameter of less than the standard size of 11$\frac{7}{8}$", plus or minus 1/32", it may fail to depress the trip lever far enough. An enlarged center hole might fail to set the trip lever because it could produce the same effect as a small record. (See "Record Hits Pickup Arm"—4.)</p> <p>(See "Needle Does Not Set Down on 10" Record in Proper Position"—3.)</p> <p>Allow a 12" record to drop to the turntable and stop the changer just after it falls, before the pickup arm has a chance to move in over the record. The index lever should be forced down until the step on the hinge cam (16) passes the edge of the catch (14), preventing the hinge cam and the index lever from returning to their original position. If the trip lever does not stay down in a depressed position:</p> <ol style="list-style-type: none"> a. Check the catch (14) to see if it is free to move forward and engage the hinge cam. b. If the stop on the hinge body (18) is defective, it might allow the pickup arm to move too far out, thus moving the index finger away from the spindle. This would produce the same effect as an undersize record. <p>When the index lever (17) is tripped by a falling 12" record, the leg on the catch (14) should be moved out over the incline between the inside and outside steps on the adjusting ring leg and held in that position by the shoulder on the hinge cam (16) until the pickup arm starts to move in over the record. When this occurs, the leg on the catch should contact the incline and be moved out as it slides down the incline until the catch is disengaged and the index lever can snap back up to a horizontal position. If the leg on the catch is not moved out far enough to enable it to slide down the incline, file about a 1/64" chamfer on the edge of the catch leg which contacts the incline. Check for binding between hinge body (18) and hinge bearing (21). Burrs on the bearing surfaces or lack of lubrication may prevent the hinge bearing from turning freely. Refer to paragraph 5 under "Needle Does Not Set Down on 10" Record in Proper Position."</p> <ol style="list-style-type: none"> a. Clean foreign material from around needle. b. Check needle to see if the tip is bent or broken. Replace if necessary. Refer to paragraph on "Damaged Needle." <p>There should be a 1/32" gap between the locator housing and the set-down locator when the machine is not in cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the hinge bearing must be reset. (See "Record Hits Pickup Arm"—4.)</p> <p>Place a block under the back end of the pickup arm to prevent the needle from touching the turntable. With sensitive gram scale, check the amount of force required to move the pickup arm across the turntable. The force required should not exceed 3 grams. If the pressure required is excessive:</p> <ol style="list-style-type: none"> a. Check the locator housing and set-down locator for binding. (See 1, above.) b. Check the bearing in the pickup arm post for binding. The bearing is located below the hinge bearing (21). To inspect it, loosen the set screw (20) in the hinge bearing. Unsolder the pickup leads and pull them out. Pull up on the hinge and pickup assemblies. Clean foreign matter or corrosion from the bearings; lubricate with light mineral oil. (To reset position, see "Record Hits Pickup Arm"—4.) <p>(See "Leveling Record Changer During Long Play" under "Preparation for Operation.")</p> <p>Any vibration caused by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.</p>
Needle does not track across record properly.	<p>1. Needle may be clogged by accumulation of lint, dirt, etc., or sapphire tip may be chipped.</p> <p>2. Locator housing does not disengage from the set-down locator when a cycle is completed.</p> <p>3. Hinge bearing binds.</p> <p>4. Changer not level.</p> <p>5. Excessive vibration during a long play.</p>	<p>a. Clean foreign material from around needle.</p> <p>b. Check needle to see if the tip is bent or broken. Replace if necessary. Refer to paragraph on "Damaged Needle."</p> <p>There should be a 1/32" gap between the locator housing and the set-down locator when the machine is not in cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the hinge bearing must be reset. (See "Record Hits Pickup Arm"—4.)</p> <p>Place a block under the back end of the pickup arm to prevent the needle from touching the turntable. With sensitive gram scale, check the amount of force required to move the pickup arm across the turntable. The force required should not exceed 3 grams. If the pressure required is excessive:</p> <ol style="list-style-type: none"> a. Check the locator housing and set-down locator for binding. (See 1, above.) b. Check the bearing in the pickup arm post for binding. The bearing is located below the hinge bearing (21). To inspect it, loosen the set screw (20) in the hinge bearing. Unsolder the pickup leads and pull them out. Pull up on the hinge and pickup assemblies. Clean foreign matter or corrosion from the bearings; lubricate with light mineral oil. (To reset position, see "Record Hits Pickup Arm"—4.) <p>(See "Leveling Record Changer During Long Play" under "Preparation for Operation.")</p> <p>Any vibration caused by (1) unsteady mounting, (2) floor vibration, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.</p>
Changer trips before needle reaches end of record.	<p>1. Hole in record too large.</p> <p>2. Binding of trip link.</p>	<p>If the hole in record is too large, the groove may turn eccentric with the spindle and cause premature tripping.</p> <p>With the trip link released, check the trip link for freedom of motion. It should be free to move without binding.</p>
Changer does not cycle when record has been played.	<p>1. No eccentric trip groove on record.</p> <p>2. Needle jumps out of grooves in record.</p>	<p>All standard records made today have a finishing groove, but some records made in the past did not have this groove. When records of this type are being played, the control knob must be turned to "Rej." at the end of the record.</p> <ol style="list-style-type: none"> a. Check trip pressure—the lateral pressure should not exceed 3 grams. (If the pressure is excessive, see "Changer Trips Before Needle Reaches End of Record.") Suspend the pickup approximately 2" to 5" above the record changer. Using a gram scale, measure the amount of horizontal pull on the pickup arm after the arm has become engaged with the locator trip assembly.

TROUBLE CHART—Cont.

SYMPTOM	CAUSE	REMEDY
		<p>b. The record may be defective. The finishing groove is often too shallow. Check with a record which is known to be good.</p> <p>c. The needle point may be damaged or affected by an excessive accumulation of dust, lint, etc. Check needle pressure as described under "Adjustments."</p> <p>d. There may be binding in the pickup bearing or locator housing. (See 1 and 2—"Needle Does Not Track Across Record Properly.")</p>
	3. Trip pawl binding on cam face.	The trip pawl (84) must be free to move forward and engage the teeth of the turntable hub when the trip link releases it. Check for burrs or foreign matter lodged between the pawl and the cam. Do not oil as this might collect dirt and gum up the pawl.
Pickup arm sticks records on spindle when it raises, or pickup arm rest when it moves out.	1. Pickup arm height not adjusted properly.	(See instructions for adjusting the pickup arm height under "Adjustments.")
Turntable speed too slow (refer to the exploded view).	<p>1. Binding in turntable bearing.</p> <p>2. Motor pulley too small in diameter.</p> <p>3. Line voltage too low.</p> <p>4. Operating temperature too low.</p>	<p>Check the turntable bearing for freedom. Hold the motor idler wheel (35) out of engagement with the turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, foreign matter, and lubricate with light mineral oil.</p> <p>Replace the motor pulley with one having a greater diameter.</p> <p>The line voltage should not be less than 105 volts or the turntable may be too slow.</p> <p>If the machine has been stored in a cold place, or operated in surroundings at a temperature of less than 60°F., the turntable speed may be too slow.</p>
Turntable speed too fast.	Motor pulley too large in diameter.	Replace the pulley with one having a smaller diameter, or grind one or two thousandths off the pulley.
Turntable stalls during cycle (refer to the exploded view).	<p>1. Motor idler not engaging turntable.</p> <p>2. Turntable bearing tight.</p> <p>3. Operating temperature too low.</p> <p>4. Line voltage too low.</p> <p>5. Binding in drive mechanism.</p>	<p>(See "Turntable Does Not Revolve When Control Knob Is Turned to 'On Position'"—4.)</p> <p>(See "Turntable Does Not Revolve When Control Knob Is Turned to 'On Position'"—5.)</p> <p>(See "Turntable Speed Too Slow"—4.)</p>
	6. Binding between pickup arm lift rod and lift arm cam face.	<p>The line voltage should not be less than 105 volts.</p> <p>a. Remove lift arm (75) and hold idler (35) away from turntable, or remove idler wheel. Cycle machine, turning turntable slowly, by hand. The cam should turn freely for the complete revolution without binding at any point. If binding occurs, check for foreign matter in the gear teeth, a bent cam bearing or bent spindle bushing.</p> <p>b. Replace lift arm, loosen spindle set screw and raise spindle high enough to clear the lift arm cam when the machine cycles. Hold the pickup arm lift rod (62) up so the end of the lift rod does not contact the lift arm cam. Cycle the machine, by hand. The entire cycle should be free without binding at any point. If binding occurs, check the lift arm bearing for freedom, and the lift arm roller to be sure it is not bent causing binding in the cam track.</p>
	7. Spindle roller spring compressed too far.	<p>Cycle machine, stopping it half way through the cycle just as the lift arm is about to return. Lift pickup arm and raise lift rod (62) by pulling up on the adjusting screw (19) as high as it will go. Feel the lift arm (75) for play. The lift rod may still touch the lift arm cam face, but it should not bind. If binding occurs, the lift arm bearing may be bent or the fiber washer (76) under the lift arm should be removed to lower the lift arm.</p> <p>Cycle the changer and watch the relationship between the bottom of the pusher housing (part of pusher and roller assembly) (31), and the roller (32). Just before the top of the lift arm cam is reached, the pusher housing should stop its upward motion and the roller should continue up .005" to .047" more, slightly compressing the roller spring. If the spring compresses too much, the changer may stall on the shut-off cycle:</p> <p>a. Check the lift arm bearing to determine if it is square with the baseplate. It should be 90° to the baseplate within ¼°. If it is bent, carefully point it into place with a soft mallet.</p> <p>b. If it is straight and the roller spring is being compressed too much, remove the fiber washer (76) between the lift arm and the steel washer. The dimension on the spindle, between the shoulder on which it rests and the bottom of the roller, should be 1⅞" plus or minus .010". An oversize could cause a binding condition.</p>
	8. Motor weak.	In cases where everything checks all right, but the changer still stalls in cycle, the motor may be weak.
Changer continues to cycle.	<p>1. Reject spring (66) loose.</p> <p>2. Locator spring (83) loose.</p> <p>3. Trip link (40) frozen.</p> <p>4. Trip pawl (84) binding.</p>	<p>Make certain that the reject spring (66) is secured in position at both ends.</p> <p>Check the cam locator spring (83) to make certain it has not fallen off or has become unfastened at either end.</p> <p>Make certain that the trip link (40) is not frozen in the reject position.</p> <p>Check the trip pawl (84) on the main cam (82) figure (5) to make certain it does not bind and that it is free of all foreign matter.</p>
Noise during playing of record.	1. Rumble from motor.	If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check the motor grommets to be sure the motor is freely suspended on them. The motor lead wires

TROUBLE CHART—Cont.

SYMPTOM	CAUSE	REMEDY
	<ul style="list-style-type: none"> 2. Defective turntable bearings. 3. Defective motor idler wheel (35). 4. Defective record. 5. Turntable scrapes. 6. Squeaks. 	<p>should have slack to allow the motor to float. Motor rumble may also come from an out-of-balance motor rotor. In this case, the motor should be replaced.</p> <p>Defective turntable bearings can cause rumble. Check for foreign matter in the bearing, defective balls, binding between balls and ball retainer; rough surface on washers. Clean ball bearings, sleeve bearing and washers; lubricate with lubriplate or light mineral oil.</p> <p>A rapid thumping sound, while the motor is running, may indicate a flat spot on the motor idler wheel (35). If this condition does not clear up after ten minutes of running time, remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler. Should the bearing of the idler wheel show signs of excessive wear, or be extremely wobbly, the idler wheel should be replaced.</p> <p>Worn or defective records cause needle scratch and distortion of the recorded sound. If the record is warped, it may slip on the other records causing "Wow," a waver in the recorded sound. An enlarged hole in the record can also cause "Wow."</p> <p>If a scraping sound occurs as the turntable revolves, check:</p> <ul style="list-style-type: none"> a. Turntable warped, causing outer rim to rise and fall. b. Motor idler or mounting plate bent. c. Wires beneath turntable rubbing. <p>Squeaking sound as changer operates indicates lack of oil. Lubricate points indicated under "Lubrication."</p>
Distortion of recorded sound.	<ul style="list-style-type: none"> 1. Defective record. 2. Defective amplifier. 3. Bad cartridge. 	<p>(See 3—"Noise During Playing of Record.")</p> <p>Check phonograph amplifier and speaker.</p> <p>Replace.</p>
No sound during playing.	<ul style="list-style-type: none"> 1. Defective cartridge. 2. Defective wiring. 3. Defective amplifier. 	<p>Replace. (See "Defective Cartridge.")</p> <p>Check pickup leads for a shorted or open lead.</p> <p>Check phonograph amplifier and speaker.</p>
Excessive record wear.	<ul style="list-style-type: none"> 1. Binding in pickup arm. 2. Use of "Std." needle on long-play record. 	<p>(See 1 and 2—"Needle Does Not Track Across Record Properly.")</p> <p>Use of "Std." needle on long-play records will cause excessive wear.</p>
Changer does not shut off after last record has been played (refer to the exploded view).	<ul style="list-style-type: none"> 1. Record support binding on spindle. 2. Cut-off rod (69) not engaging shoulder pusher housing. 	<p>The record support (1) must rest on the offset shoulder of the spindle or the changer will not shut off. (See 3—"Two Records Drop at Once.")</p> <p>On the shut-off cycle, the end of the cut-off rod (69) should contact the shoulder on the bottom of the spindle pusher housing, part of pusher and roller assembly (31), and turn the cut-off rod over 90°. If the end of the cut-off rod passes under the pusher housing as the machine cycles on the shut-off cycle, check:</p> <ul style="list-style-type: none"> a. The record support to be sure it is resting on the spindle. (See 1, above.) b. The spindle to see if it is being held in place by the spindle set screws. c. The lift arm screw (79) to be sure it is tight. d. The bent-up end of the cut-off rod (69) may be short. Replace, if necessary.
Changer shuts off prematurely (refer to the exploded view).	<ul style="list-style-type: none"> 1. Spindle roller spring compressed too far. 2. Roller spring in spindle too weak. 3. Record too thick. 4. Cut-off rod not being reset. 	<p>(See 7—"Turntable Stalls During Cycle.")</p> <p>When the bottom record of a stack of ten 12" records is being ejected from the spindle ledge, the roller spring (in the housing) should not compress until just before the roller reaches the top of the cam incline on the lift arm. If the roller spring is compressed under the load of a full stack of records, it may cause premature shut-off. Replace with a complete spindle assembly (25).</p> <p>The changer is designed to play standard records. If an old-style 1/8" thick record is used, the changer will shut off instead of dropping the record.</p> <p>After the shut-off cycle, when the cut-off rod (69) has been turned to throw the switch to the "Off" position, it should be returned to its original position, the next time the machine cycles, by the bent-up end of the cut-off rod contacting the round stud on one leg of the control lever (41). The flat spring (70) acting against the cut-off rod should throw the rod against its stop on the lift arm (75) and hold it there. If the cut-off rod is not fully turned, the bent-up end next to the spindle may stick up high enough to prematurely contact the shoulder on the pusher housing, part of pusher and roller assembly (31):</p> <ul style="list-style-type: none"> a. Check the lever spring (70) for tension. Remove and bend slightly to increase tension if necessary. b. Lubricate the cut-off rod bearings, and around the lever spring, with Lubriplate or light mineral oil. c. Check the clearance between the end of the cut-off rod (69), which passes under the control lever (41), and the bottom of the round stud on the control lever. When the cut-off rod is in its normal operating position, it should not clear the bottom of the round stud by more than enough to completely turn the end of the cut-off rod from vertical position back to a horizontal position.
Turntable continues to rotate when control knob is turned to "Off" position.	<ul style="list-style-type: none"> 1. Switch defective. 	<p>Check switch for defect and replace if necessary.</p>
Needle does not set down on 7" record in proper position.	<ul style="list-style-type: none"> 1. Tail on set-down locator plate (67) damaged or bent out of position. 	<p>Straighten or replace.</p>

PARTS LIST

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Ref. No.	Part No.	DESCRIPTION	List Price	Ref. No.	Part No.	DESCRIPTION	List Price
1	1799-A	Record support assembly	\$1.50			2772 Idler wheel	\$1.61
		1711-B Knob	.21			2773 Mounting grommet	.06
		1716 Cross pin	.05			2797 Drive belts, 2 used	.65
		1925 "J" support	.42			Motor (Gen. Industries 117 V.—60 cycle)	17.50
		2111 Rod	.76			2772 Idler wheel	1.61
1A	1711-B	Knob	.21	3129		2773 Mounting grommet	.06
2	2883	Tone arm and hinge assembly	18.62			3139 Drive pulley 78 RPM	.70
		713 Screw	.05			3140 Drive pulley 45 R.P.M.	.70
		2306 Spacer	.02	38	2823	3141 Drive Pulley 33 1/3 R.P.M.	.70
		2308 Screw	.02			Index rod	.10
		2310 Pivot screw	.06	39	1685	Motor fastener	.06
		2370 Knob screw	.03	40	2764	Reject rod	
		2377 Strengtheners assembly	.28	41	2425	Control lever assembly	1.81
		2392-B Tone arm	1.12			1725 Control link	.09
		2399 Hinge assembly	2.70			1726 Control crank	.38
		2493 Spring and chain assembly	.41			1727 Rivet	.03
		2753 Cartridge with needles (Astatic)	12.11			2424 Control lever	1.26
		2754 One-Mil needle (Astatic)	1.89	42		Reject rod (same as 40)	
		2755 Three-Mil needle (Astatic)	1.68	43		"C" washer	.02
		2606 Cartridge with needles (Shure)	12.11	44		Index cam	
		2608 One-Mil needle (Shure)	1.89	45	2643	Index lever	.16
		2629 Three-Mil needle (Shure)	1.68	46	2661	Hairpin clip	
		3063 Cartridge with sapphires (Shure P77-A)	13.65	47	2110	"C" washer	.02
		3119 Three-Mil sapphire stylus (Shure)	2.80	48	2198	Knob for speed change	.38
		3120 One-Mil sapphire stylus (Shure)	2.80	49		"C" washer	
		2197 Cartridge with needles (Webster F-14)	12.25	50	2354	Speed control shaft bearing	.10
		2630 Dual needle for Webster F-14	3.62	51	2054-B	On-Off reject knob	.38
		2817 Cartridge screw	.03	52		Locator spring	
		2820 Cable and clip assembly	.37	53	1652	"C" washer for control crank	.02
		2860-G Cartridge control knob	.17	54	2822	Escutcheon for speed control	.15
3	2493	Spring and chain assembly	.41	55	1522	Pickup locator assembly	.84
4	2817	Cartridge screw	.03			1612 Pickup shaft	.49
5	2377	Strengtheners assembly	.28			1634 Pickup locator	.16
6	713	Screw	.05	56		Control shaft spring	
7	2306	Spacer	.02	57	1638	Safety spring	.06
8	713	Screw for mounting strengthener		58	2834	Speed control crank	.23
9		Cartridge (see item 2)		59	2891	Locator housing and lift rod	
10	2860-G	Cartridge control knob	.17			Assembly	1.75
11	1580	Adjusting screw	.09			1513 Lift rod assembly	.28
12	1840	Adjusting ring assembly	.79			1522 Pickup locator assembly	.68
		1574 Spring	.09			1620 Spring	.02
		1577 Adjusting ring	.55			1638 Safety spring	.06
		1580 Adjusting screw	.09			1650 "C" washer	.02
13	1574	Adjusting ring assembly spring	.09			1652 "C" washer	.02
14	1578	Catch (part of item 18)	.07			2793 locator housing	.63
15	1581	Index cam (part of item 18)	.13	61	1620	Spring	.02
16	1583	Spring catch (part of item 18)	.14	62	1513	Lift rod assembly	.28
17	1582	Index lever (part of item 18)	.07			1613 Lift rod	.23
18	2043	Complete hinge assembly	3.29			1616-B Adjusting screw	.02
		1512 Hinge bearing assembly	1.27	63	1650	"C" washer for lift rod	.02
		1547 Drive pin	.02	64	1519	Switch assembly	.84
		1575 Spring index cam	.06			467 Switch only	.58
		1578 Catch	.07			1629 Switch plate	.06
		1579 Drive pin	.06	65	709-A	Screw No. 6 x 1/4" type "Z"	
		1581 Index cam	.13	66	1721	Reject spring	.05
		1582 Index lever	.07	67	2648	Set-Down locator plate	.10
		1583 Spring catch	.14	68	1650	"C" washer	.02
		1621 Spring lever return	.09	69	1595	Cut-Off rod (part of item 75)	.12
		1840 Adjusting ring assembly	.79	70	1599	Spring (part of item 75)	.03
		1846 Washer-selector	.02	71		Link	
		2042 Hinge body	.33	72		Flat washer	.02
19	1616-B	Adjusting screw	.02	73	2275	Hex screw	.02
20	1610	Set screw	.10	74	1597	Roller	.03
21	1512	Hinge bearing assembly	1.27	75	2887	Lift arm assembly	1.86
		1609 Hinge bearing	.89			68 Roller drive pin	.05
		1610 Set screw	.10			1595 Cut-Off rod	.12
		3056 Bearing cone	.17			1596 Pin	.03
22	724	Ballbearing for tone arm	.02			1597 Roller	.03
23		Bearing spacer				1589 Spring	.02
24	2885-A	Turntable assembly	4.20			2185 Rivet	.02
25	1566	Spindle assembly	8.05			2886 Lift arm	1.12
		1518 Spindle shaft	3.50	76	1637	Fiber washer 1/64" thick	.02
		1524 Spindle base	1.50	77	1922	Fiber washer 3/64" thick	.02
		1527 Pusher spring	.09	78		Internal tooth lock washer	.02
		1535 Pin—spindle roller	.13	79	277	Screw No. 8-32 x 3/8"	.03
		1536 Spindle roller	.13	80	94	Rivet	.02
		1552 Record pusher	.35	81	2789	Cam locator	.09
		1557 Spindle pusher shaft	.68	82	2796	Cam assembly	1.96
		1559 Pusher pin	.02			94 Rivet	.02
		1560 Pusher shaft spring	.05			120 Lug	.02
		1561 Roller spring housing	.63			419 Spring	.13
		1562 Roller spring	.07			1547 Drive pin	.02
		1564 Groove pin	.07			1588 "C" washer	.02
		1565 Roller plunger	.63			2388 Wire	.02
		1676 Guide	.30			2516 Spring washer	.03
		1687 Spring guide	.03			2760 Trip lever	.05
26	1687	Spring guide (part of item 25)	.02			2763 Cam only	.10
27	1552	Record pusher (part of item 25)	.35			2789 Cam locator	.09
28	2624	Bearing	.37			2795 Pawl assembly	.35
29	2078	Retaining ring	.02			2829 Fiber washer	.02
30	2639	Turntable washer	.14	83	419	Spring	.13
31	1561	Roller spring housing (part of item 25)	.63	84	2795	Trip pawl assembly	.35
32	1536	Spindle roller (part of item 25)	.13	85	2760	Trip lever	.10
33		Hairpin clip		86	2516	Spring washer	
34		Fiber washer		87	1588	"C" washer for trip pawl assembly	.02
35	2772	Idler wheel	1.61	88	1653	Fiber washer	.02
36	2659	Baseplate assembly	9.40	89	1651	"C" washer for main cam	.02
37	2727	Motor (Gen. Industries 117 V.—60 cycle)	11.35	90		Flat washer	.02
			17.50	91	2388	Wire	

SEE PAGE 12 FOR ADDITIONAL PARTS INFORMATION

<i>Part No.</i>	<i>DESCRIPTION</i>	<i>List Price</i>	<i>Part No.</i>	<i>DESCRIPTION</i>	<i>List Price</i>
3211	Motor (Russell Turret 110 V.-60 cycle)	\$17.50	3362	Motor (Russell Turret Deep Stack for G. E. 110 V. 60 cycle)	\$19.00
	3353 Idler Wheel	1.61	3393	Motor (Russell Turret 110 V.-50 cycle)	19.00
	3354 Drive Pulley 33 $\frac{1}{2}$ RPM	.70	3394	Motor (Russell Turret 220 V.-50 cycle)	19.00
	3356 Drive Pulley 45 RPM	.70			
	3357 Drive Pulley 78 RPM	.70			
	2638 Mounting Grommet	.06			
	2765 Lever Grommet	.06			
	NOTE: Above parts may also be used to service the following motors:			NOTE: Manufacturers of the various motors are designated by the following code:	
				Letter "G" on the mounting plate—General Industries	
				Letter "R" on the mounting plate—Russell Electric	