



Figure 1

#### GENERAL INFORMATION

The Garrard Model R. C. 90 Record Changer is designed to play standard 78RPM, fine-groove 45RPM, or micro-groove 33 1/3RPM records of standard commercial dimensions. Records up to 12 inches in diameter can be played.

Features of Model R. C. 90 Changers include playing and automatically changing as many as 10 records, 10" or 12", not mixed. A full stack of ten 7", 33 1/3RPM records or a full stack of ten 7", 45RPM records (using the "45" Adaptor Spindle) will also play on this changer.

A short spindle for use when playing small hole records manually and an adaptor for playing large hole 45RPM records manually is supplied with the changer.

This changer automatically shuts off after the last record has been played.

Model R. C. 90 is suitable for use on 100/130 or 200/250 volts, at either 50 or 60 cycles according to the motor pulley supplied, and the links on the terminal block must be set to the correct position to correspond with the voltage of the power supply.

#### Manufactured by:

Garrard Engineering & Mfg. Co. Ltd.  
Newcastle Street  
Swindon, Wilts - England

#### U. S. Distributor:

Garrard Sales Corp.  
164 Duane Street  
New York 13, N. Y.

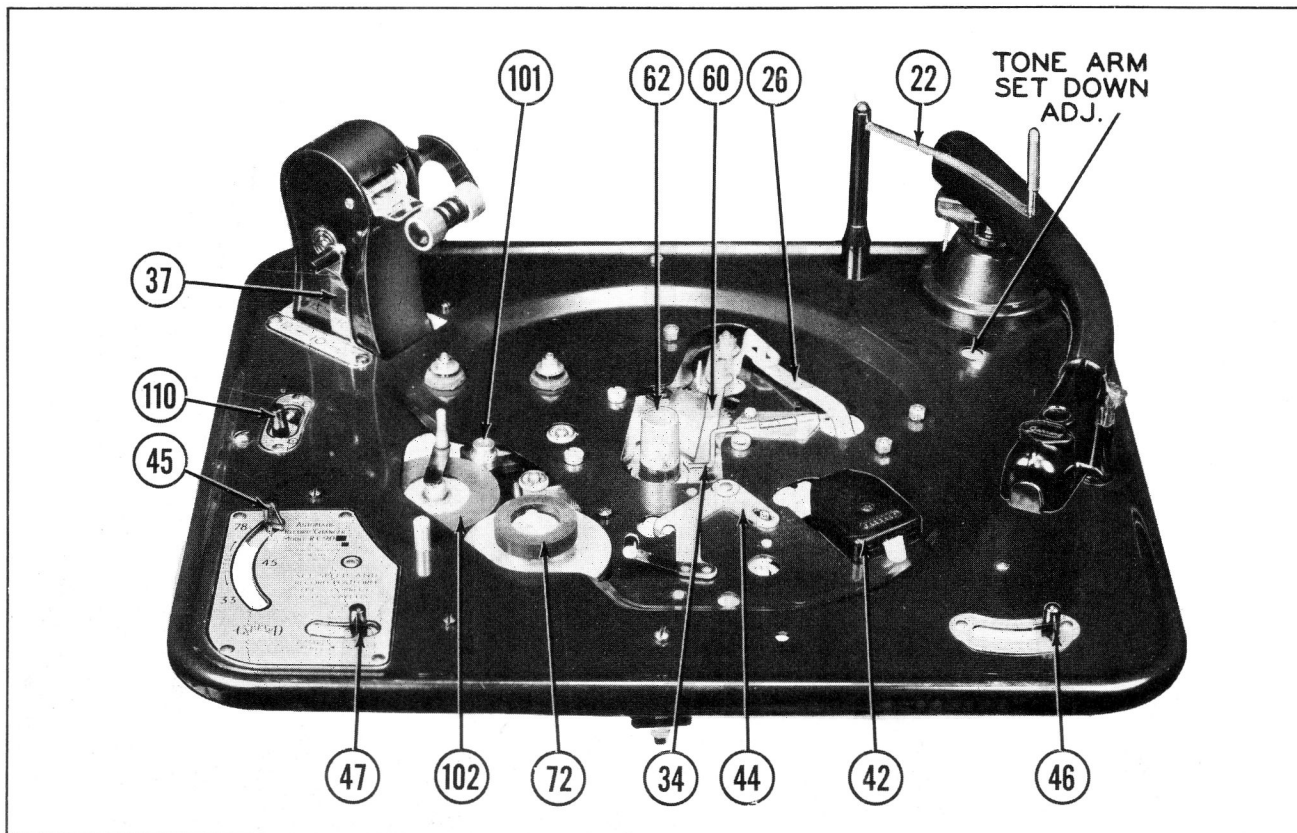


Figure 2

#### OPERATING INSTRUCTIONS

1. Insert the correct pickup head into position for type record to be played; i. e. , one having a .002" to .003" radius needle for 78RPM records, or a .001" radius needle for 33 1/3 and 45RPM records.

2. Place the correct spindle in position, the stepped sloping spindle for 78 or 33 1/3RPM records, or the large spindle for 45RPM records.

3. Set lever (37) at side of record platform (53) to position corresponding to size of record to be played.

4. Move speed control knob (45) to desired speed, 78, 45, or 33 1/3RPM.

5. Place any number of records up to ten, on the record spindle, lower record clip, and switch on by moving the front left hand knob (47) to "Start".

NOTE: When playing 7" 45RPM records the record clip must be in the rear position.

#### To Reject A Record-

To reject a record at any time while changer is operating, move front left hand knob (47) to "Reject" and release.

#### Stopping-

The changer can be switched off by moving the left hand knob (47) to "Stop" position. If this is done while a record is playing, when switching on again, that record will be automatically rejected and the next record commenced.

#### Speed Regulation-

A variable speed control is fitted to this changer and to set the speed accurately proceed as follows:

Proceed as instructed under "Operating Instructions". Place one record on spindle and switch changer on. When pick-up lands on record, place stroboscope disc on record and move speed adjustment knob (110) until the ring of dots on the stroboscope, coinciding with the speed indicated by the speed control knob (45), appears to remain stationary when viewed by light from a lamp on the appropriate AC supply.

The speed will now be correct, the stroboscope should be removed and the changer operated as instructed. Once the speed has been set no further adjustment need be made.

#### Manual Operation-

The purpose of the manual control is to disconnect the changing, automatic trip, and reject mechanism so that single records can be played as on a single record player. To use this feature, move the Manual-Auto knob (46) to the "Manual" position, switch on changer to enable the mechanism to complete its cycle, the pickup can then be handled and the changer used as a single record player using the short spindle for 78 or 33 1/3RPM records. Place the 45 adaptor over the short spindle for playing large hole 45RPM records.

NOTE: Should the record changer be stopped in the "Auto" position with the pick-up arm not on

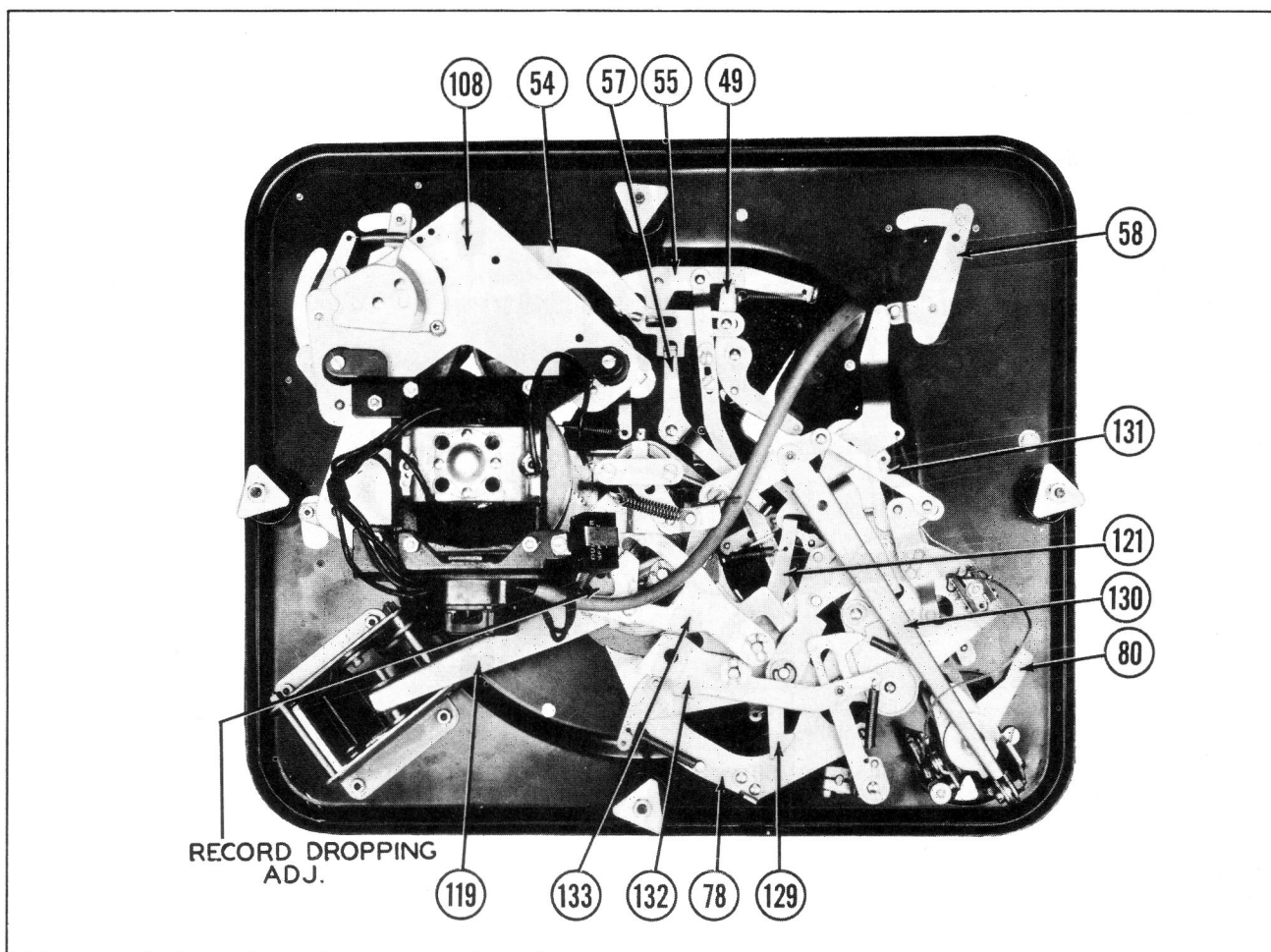


Figure 3

its rest, the pick-up should not be handled, but the left hand knob moved to "Start". The pick-up will now automatically lift and return to its rest position and the changer will stop if no records are on the spindle.

The pick-up arm will not move from its rest unless one or more records are placed on the spindle. This is a safety device designed to prevent the pick-up being damaged should the changer be switched on without being loaded with records.

#### CHANGE CYCLE

The change cycle is put into operation by moving the "Stop-Start-Reject" knob (47) to "Reject". As knob (47) is moved to "Reject" position several associated parts move simultaneously. Switch lever (49) latches with switch catch lever (55), closing switch (42). The motor is started and inter wheel (102) makes firm contact with motor pulley (101) and drive wheel (72), thru tension applied by inter wheel tension spring (63), thus starting the rotation of turntable (24). Reject lever (57) moves against trip lever (79), unlatching impulse lever (121) which, in turn, moves against the pin located on top of cycling cam (120). Tension applied to the impulse lever (121) by the impulse lever actuating spring (157) is sufficient to move cycling cam (120) far enough to unlatch gear mounting plate (109) from cycling gear (97). This permits gear mounting plate (109) to be pivoted forward, by action of gear plate actuating spring (158), moving cycle

idler wheel (100) into firm contact with motor pulley (101). This action starts the rotation of cycling gear (97) and cycling cam (120), which are secured together and move in unison.

As the cycling gear (97) and cycling cam (120) revolve, the lifting lever (151) is pivoted, due to the cam roller on lever (151) following the contour of cycling cam (120). This, in turn, through its connected levers, closes the muting switch (86) and actuates the lifting crank (127) which raises the lifting plate and spindle (85), thus raising the tone arm.

At this time, cycling cam (120) pivots shut-off cam lever (132) which pulls discriminating lever (22) inward; however, with records on the spindle, the discriminating lever (22) is blocked from making its full inward travel, thereby preventing the shut-off operation.

At this position of cam rotation, cycling cam (120) pushes coupling link (119) back. This, in turn, actuates the record dropping mechanism, thus selecting the bottom record and dropping it to the turntable. At the same time, the 45RPM spindle actuating lever assembly (133) is pivoted by cycling cam (120). This actuates the 45RPM spindle when it is used.

Cycling cam (120) pivots the tone arm actuating lever (78), causing its roller to engage the pickup lever (81) which, in turn, moves the tone arm outward. Now, the stud on index lever assembly (81A) makes contact with the pickup lever (81) and moves the tone

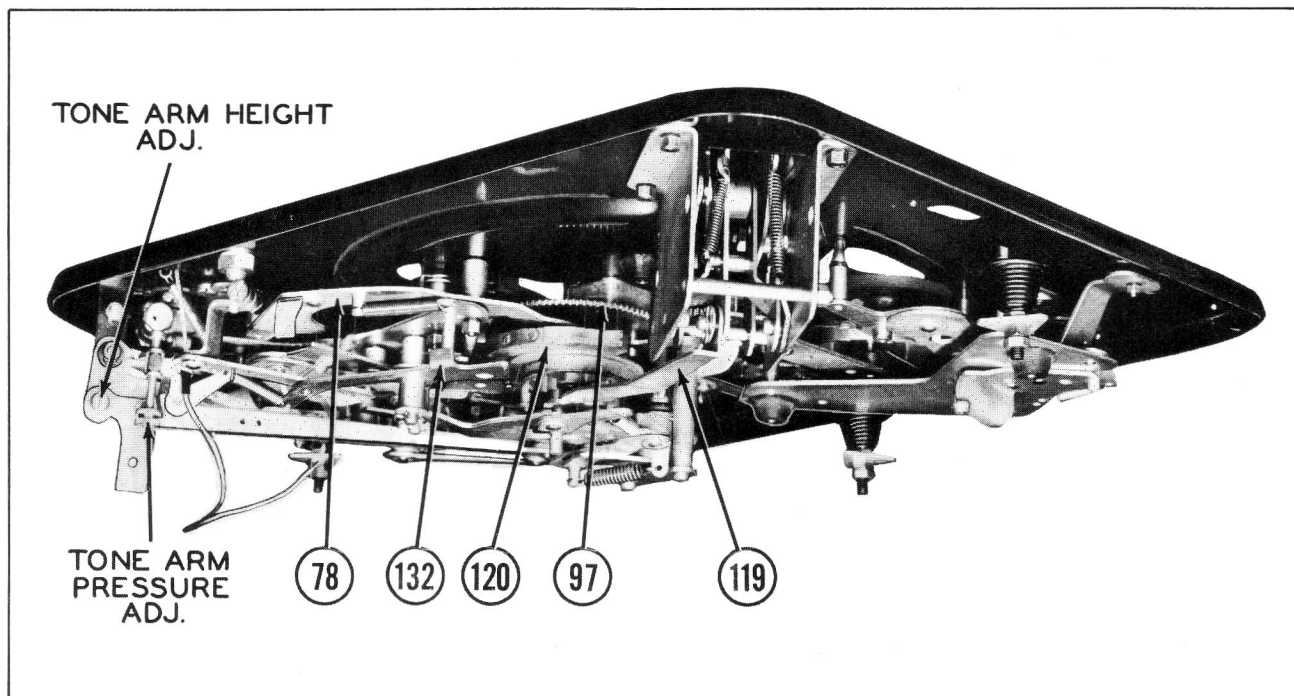


Figure 4

arm inward, by action of index lever spring (88), until the ear on index lever (81A) contacts one of the set-down steps on tone arm locator lever (129). The set-down step in which the ear of index lever (81A) engages is determined by the size record being played. This positions the tone arm for set down.

Lifting lever (151) now returns to its normal position; and, through the connected parts, the tone arm is lowered to the record and the muting switch is opened.

At this time, by action of cycling cam (120), impulse lever (121) is reset with trip lever (79). Simultaneously, the pin located on the bottom of cycling gear (97) moves against gear mounting plate (109) and moves it far enough to disengage cycle idler wheel (100) from motor pulley (101), thereby completing the change cycle.

As the needle follows the grooves of a record and moves the tone arm in toward the spindle, trip arm (80), which is secured to the tone arm shaft (29), engages and moves the velocity trip link (26). This, in turn, pivots friction plate (25) and automatic trip lever (60) toward main spindle (62). While a record is playing, the slight inward movement by automatic trip lever (60) is not sufficient to trip the mechanism, because, on each revolution of main spindle (62), the wiping contact by the spindle striker moves the automatic trip lever (60) back.

When the tone arm reaches the end of the music grooves, its movement is accelerated. This increases the movement of the automatic trip lever (60) which is caught by the striker on main spindle (62) and lifted on its cam face. This, via trip rod (34), moves trip lever (79) thus releasing impulse lever (121) which, in turn, gives cycling cam (120) a push and causes cycle idler wheel (100) to again engage with motor pulley (101) and drive the mechanism through its cycle.

#### AUTOMATIC SHUT-OFF

When the last record has been played, the change cycle starts again. Since there are no records on the spindle, the discriminating lever (22) is allowed to move in far enough for link (132A) to pivot tone arm locator lever (129) so that its hooked end will engage with the ear on tone arm actuating lever (78). This prevents the tone arm actuating lever (78) from following the contour of cycling cam (120), but holds it in a position so that the outermost cam surface on cycling cam (120) strikes the tone arm actuating lever (78) and in so doing causes it to contact and move trip link (59) which, in turn, releases switch lever (49), shutting off the changer.

#### ADJUSTMENTS

##### Tone Arm Height- (See Fig. 4)-

The tone arm should be adjusted so that it will clear a stack of ten records on the turntable. To adjust, loosen nut (144) and turn screw (142) until the eccentric pivot is in the desired position. After adjustment is made, re-tighten nut (144).

##### Tone Arm Set-Down Point- (See Fig. 2)-

If, for any reason, the tone arm lever assembly (81) has been removed, the tone arm set-down point may be readjusted as follows:

1. Place a 10" record on the spindle.
2. Move the platform lever (37) to 10" position.
3. Start a change cycle; when the tone arm has moved in as far as it will go, shut-off the changer. Loosen tone arm lever clamp nut (156) and while holding tone arm lever (81) in position,

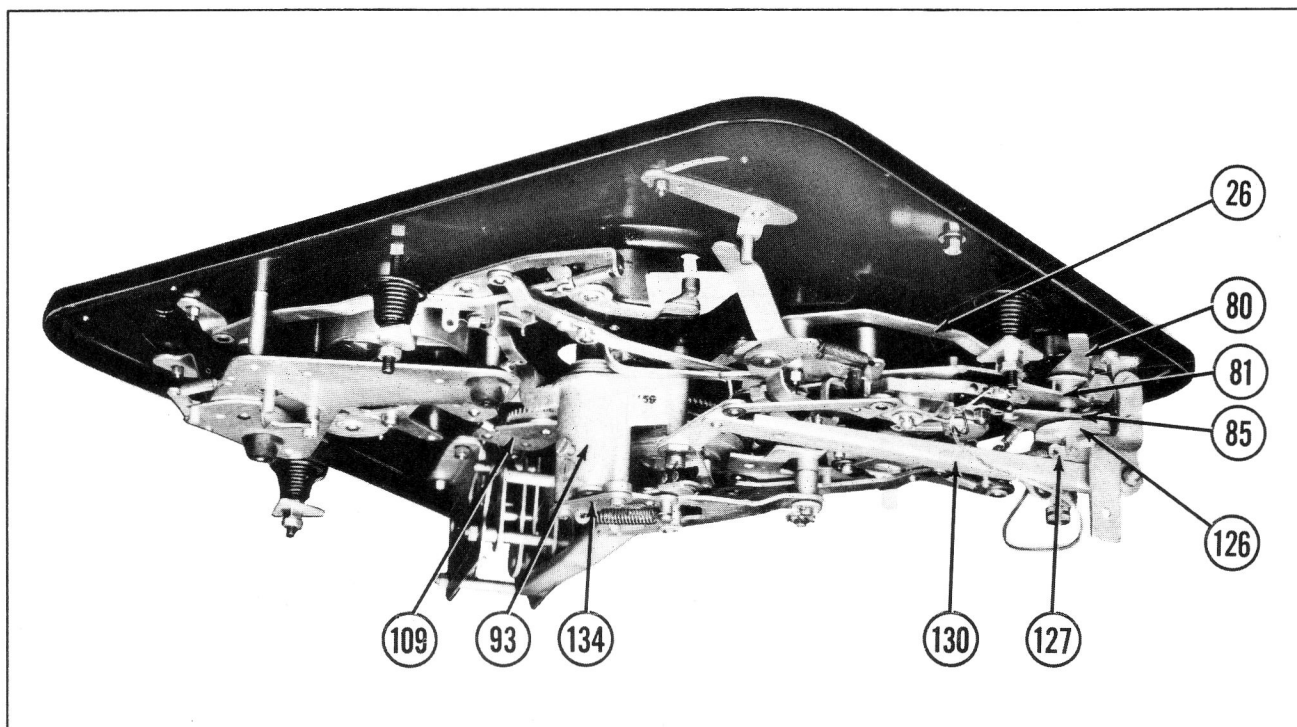


Figure 5

move the tone arm in or out until the needle is positioned directly over the starting groove of the record. Tighten clamp nut (156) and check adjustment.

Should a minor adjustment be required, rotate the screw accessible through the hole in the baseplate as shown in Figure 2. This adjustment can be made only when the tone arm is in the rest position.

#### Needle Pressure- (See Fig. 4)-

The needle pressure adjusting screw is located under the baseplate at the rear of the tone arm. To adjust the needle pressure the knurled knob should be turned to give either an increase or decrease in spring tension. Alternatively, the screw head at the top of the knurled knob is accessible by inserting a screw-driver through the slot at rear of tone arm base.

Before attempting to adjust the needle pressure refer to the cartridge manufacturers specifications for the recommended needle pressure.

#### Record Dropping- (See Fig. 3)-

If the changer fails to drop any records other than the 45RPM type having a large center hole, first make sure that the records are not badly warped. If they are reasonably flat, the record pushing pawl setting should be checked and adjustments made if necessary. To adjust the position of the record pushing pawl the star adjusting wheel located on coupling link (119) should be turned. This adjustment wheel is spring loaded and should be lifted by prying up with a screw driver to clear its locating pin and turned to an adjacent hole. Also check the record spindle to see that it is not bent out of position.

Should records fail to drop correctly when using the large diameter spindle, replace this spindle with

the sloping one and see if it leans towards the record platform and is exactly in line with it. If this spindle is out of position it should be set correctly by loosening the two screws located on front of main spindle housing (93) and turning the record spindle until it leans toward the center of the record platform. After tightening the screws, see that main spindle (62) has a small amount of end play by first removing the turntable and gripping main spindle (62), lift it up and down. If no end play is felt, adjust as follows:

Loosen the two screws, located on front of the main spindle housing (93), which hold the fixed portion of main spindle (62). Raise the main spindle a very small amount and retighten the screws.

#### Velocity Trip Adjustment-

Should the trip commence to operate too early or too late (in the latter case it would fail to operate) check the radius at which it commences. Set the changer in the playing position, remove the turntable and, holding the tone arm in the hand, slowly move it towards the record spindle as if playing a record. When the needle point is nearly  $2 \frac{7}{8}$ " from the record spindle the friction lever (25) should start to move carrying with it automatic trip lever (60). At  $2 \frac{7}{8}$ " radius auto trip lever (60) should touch the striker on main spindle (62). A quick inward movement of the tone arm should then cause the trip to operate if the main spindle (62) is turned by hand.

If this dimension is not correct, loosen the two screws on trip arm (80) and move trip arm (80) in the required direction. If the screws are left partially tight, trip arm (80) can be tried for position as described above, re-adjusted and the screws finally tightened.

If the trip still fails to operate, it may be caused by the automatic trip lever (60) being too low and,

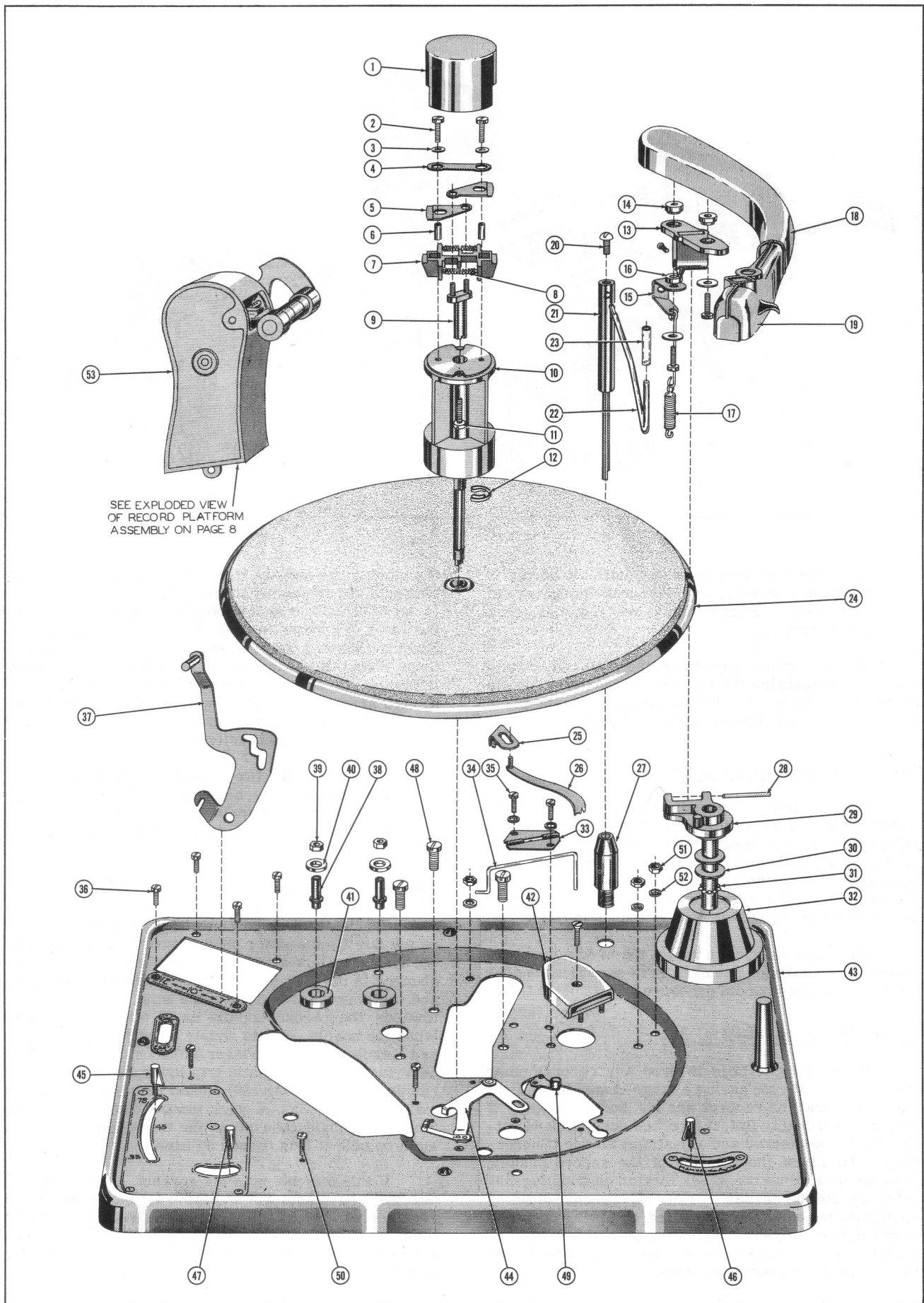


Figure 6A. Exploded View Of Parts Above Baseplate.

This diagram is an exploded view of a complex mechanical assembly, likely a camera or projector. It shows the internal components and their relative positions. The parts are numbered as follows:

- 54, 63, 64, 57, 55, 49, 56, 58
- 72, 73, 62, 89, 75, 76, 74, 100, 101, 99, 98, 94, 95, 96, 97, 109, 117, 120, 111, 113, 114, 115, 112, 116, 119, 145, 118, 146, 147
- 66, 69, 67, 68, 80, 81, 156, 84, 87, 83, 82, 85, 86, 148, 149, 150, 126, 127, 128, 130, 144, 143, 142, 131, 132, 136, 137, 133, 134, 135
- 60, 61, 59, 70, 71, 77, 79, 65, 78, 93, 81A, 157, 88, 123, 121, 124, 125, 122, 129, 132A, 151, 139, 152, 140, 141, 153, 154, 155

Figure 6B. Exploded View Of Parts Below Baseplate.

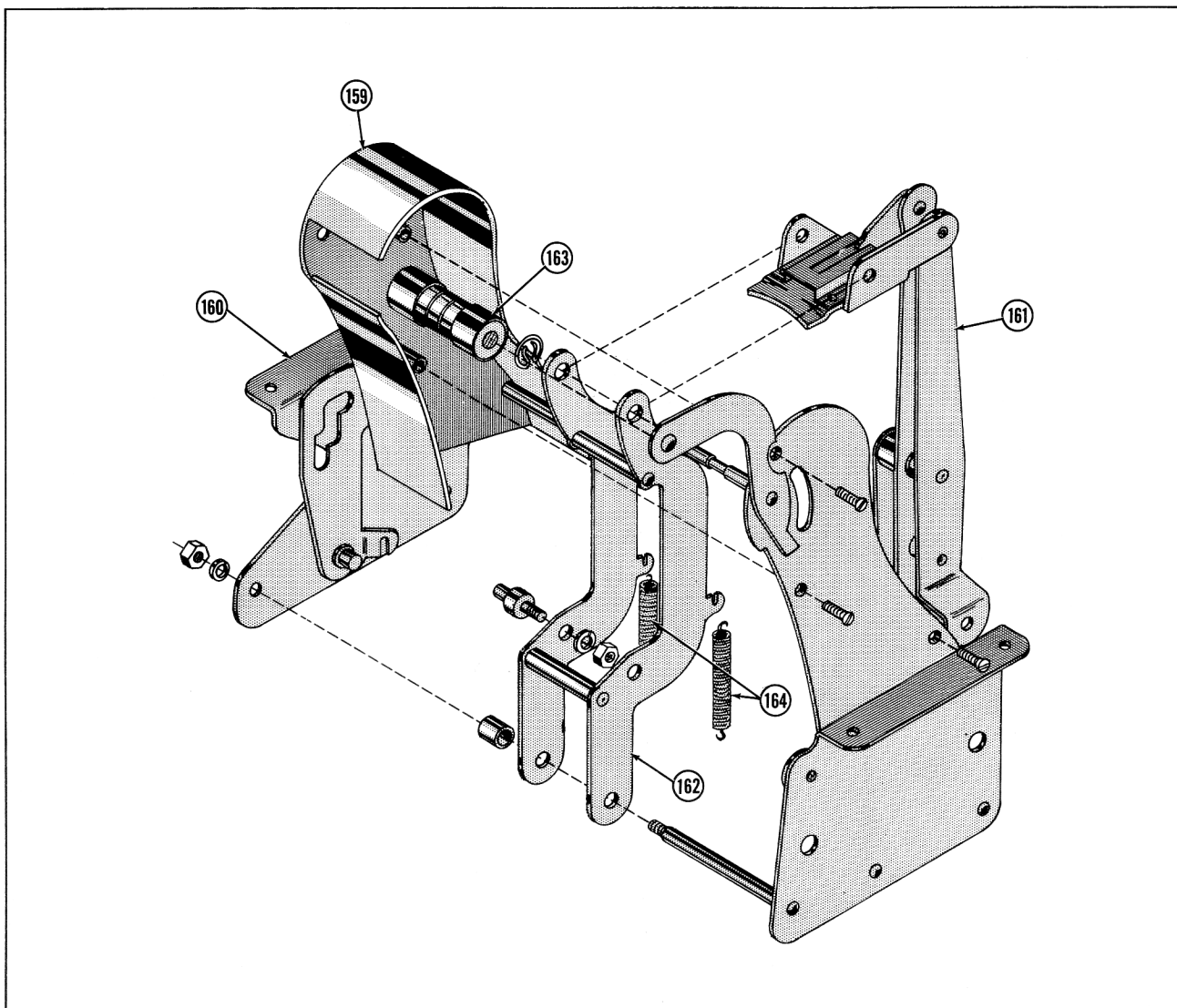


Figure 7. Exploded View Of Record Platform Assembly.

consequently, not riding up the incline of the striker. To adjust, turn the screw on automatic trip lever (60) about half a turn in a clockwise direction.

#### Cartridge Muting Switch-

A cartridge muting switch (86) is connected across the pick-up cartridge to short circuit the pick-up except when the changer is in the playing position. It is important to note that no sound will be obtained from the pick-up by flicking the needle when the pick-up is on its rest. The muting switch contacts should be closed except when the changer is in its playing position. Should this switch fail to operate, clean the contact faces, and insure that they make and break according to the position of the changer mechanism.

### TROUBLES

#### Speed Variation-

1. It is essential that driving surfaces of brass motor pulley, rubber tired idler wheels, and turntable drum be kept absolutely free from oil or grease. This is the first point which should be checked if the turntable

speed varies. The pulleys and idlers should be cleaned with a dry cloth if contamination with oil is suspected.

2. If a thick oil has been used to lubricate the motor bearings, the motor will appear weak or will not start. It will then be necessary to dismantle the motor and clean away all traces of the thick oil. It is, therefore, essential to lubricate the motor bearings with a good quality thin oil.

3. Main spindle (62) has no end play and, therefore, will not permit the turntable to run freely. To adjust, refer to "Record Dropping" paragraph 3.

#### Changer Fails To Reject Or Trip-

1. Impulse lever actuating spring (157) loose or missing. If this spring is missing the impulse lever (121) will not move cycling cam (120) to start the change cycle.

2. Check velocity trip as described under "Velocity Trip Adjustment".

### Needle Does Not Track Across Record Properly-

1. Needle may be clogged by accumulation of lint, dirt, etc.
2. Check condition of needle tip.
3. Check tone arm weight as described under "Needle Pressure".
4. Check tone arm pivot points for freedom of movement.
5. See that the changer is floating freely on its suspension springs, otherwise, the slightest vibration can cause the needle to skip across grooves.
6. Check the pick-up lead to see that it has enough slack to allow the needle to fully seat in the record grooves.

### Turntable Does Not Revolve When Control Is Moved To "Start"-

1. No current at motor.
  - (a) Check that current is reaching terminal block.
  - (b) Check that switch (42) is operating properly.
  - (c) Check wiring and terminal connections in changer.
2. Motor defective.
  - (a) Remove turntable and allow motor to operate without load. If current is reaching motor and drive shaft does not rotate, the motor is defective. Repair or replace.
3. Inter wheel (102) not contacting motor shaft.
  - (a) Check that spring (63) is not loose or missing.

### Tone Arm Strikes Records On Spindle During Cycle-

1. Tone arm height not adjusted properly.
  - (a) See instructions for adjusting tone arm height under "Adjustments".

### Noise During Playing Of Record-

1. Motor rumble.
  - (a) If a low-pitched rumbling sound comes from the loudspeaker while a record is being played, check motor grommets to be sure

the motor is freely suspended on them. The motor leads should have slack to allow the motor to float. Motor rumble may also come from an unbalanced motor rotor; in this case, replace the motor.

2. Defective turntable bearings (90).
  - (a) 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 bearing assembly and lubricate with light mineral oil.
3. Defective drive wheel tire.
  - (a) A rapid thumping sound while the motor is running may indicate a flat spot on one of the drive wheel tires. If this condition does not clear up after a few minutes of running time, remove the turntable and inspect all rubber tires. If the tire surface is not even and smooth, replace the part. Should the bearing of the part show signs of excessive wear or be extremely wobbly, the defective drive wheel should be replaced.
4. Defective record.
  - (a) Worn or defective records cause needle scratch and distortion of the recorded sound. If a record is warped, it may slip on the other records causing "Wow" (a waver in the recorded sound). A chipped or enlarged center hole in a record can also cause "Wow".
5. Defective needle.
  - (a) A defective needle will cause an excessive scratchy sound and will greatly reduce record life. Do not permit the use of a needle to its complete limit of wear. Best results are obtained by installing a new stylus periodically before defective reproduction becomes apparent.

### LUBRICATION

The motor and drive wheel bearings are of the oilite type and rarely need lubricating. When the need for oil is apparent use a good grade of light machine oil.

**CAUTION:** Apply only one or two drops of oil on each bearing surface. Carefully remove every trace of surplus oil before operating the changer.

Occasionally, especially if the changer mechanism becomes rather noisy, put a smear of grease such as Lubriplate on all cam faces, and lightly lubricate all lever pivots.

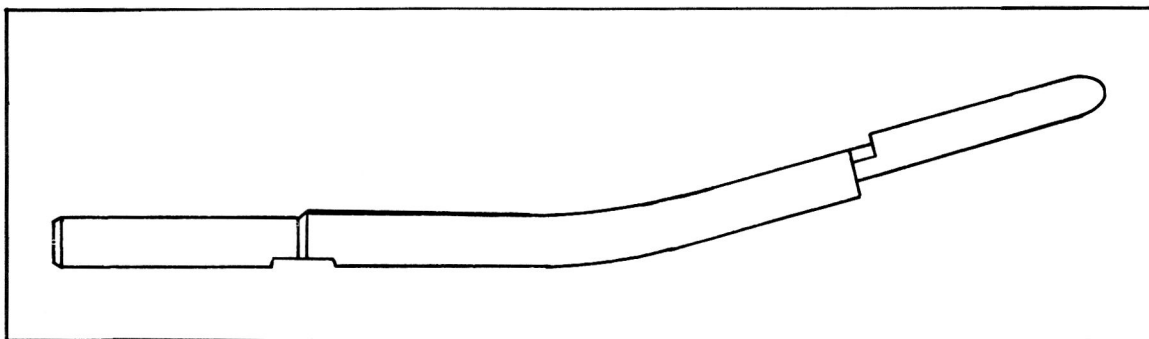


Figure 8. Template for Record Spindle. If records fail to drop or more than one record drops at a time, check record spindle by laying it on above template to see that it is not bent out of position.

#### PARTS LIST

Ref. No.	Description	Ref. No.	Description
1	Spindle Cap	50	Screw
2	Pawl Unit Mounting Screw	51	Nut
3	Spring Washer, Two Used	52	Washer
4	Retaining Plate	53	Record Platform Assembly
5	Separator	54	Switch Link
6	Pawl Bushing	55	Catch Lever With Trip Link Extension
7	Pawl, With Spring Pins	56	Spring For Catch Lever
8	Spring, Two Used	57	Reject Lever
9	Crank, With Pins	58	Manual & Automatic Selector Lever
10	Support, With Spindles & Operating Collars	59	Trip Link
11	Spindle Cap Mounting Screw	60	Automatic Trip Lever
12	Spring Clip	61	Fixed Spindle
13	Pickup Arm Mounting Bracket	62	Main Spindle
14	Shoulder Washers, Two Used	63	Spring, Inter Wheel Tension
15	Anchor Plate	64	Spring
16	Spacer Washer	65	Spindle
17	Counterbalance Spring	66	Ball Bearings
18	Pickup Arm	67	Thrust Washers
19	Pickup Head Complete	68	Support
20	Screw	69	Screw
21	Bushing, Discriminating Lever	70	Washer
22	Discriminating Lever	71	Nut
23	Plastic Sleeve, Discriminating Lever	72	Drive Wheel And Tire
24	Turntable, Complete	73	Mounting Bracket, Record Platform Assy.
25	Friction Lever	74	Support Plate
26	Velocity Trip Link	75	"C" Clip
27	Discriminating Lever Mounting Base	76	Washer
28	Pivot Pin, Pickup Arm Mounting Bracket	77	Spindle
29	Pickup Arm Shaft, Includes Pivot Bracket	78	Tone Arm Actuating Lever
30	Thrust Washers	79	Trip Lever With Bushing
31	Ball Bearings	80	Trip Arm
32	Pickup Arm Mounting Base	81	Tone Arm Lever Assembly
33	Mounting Plate For Trip Rod	81A	Index Lever Assembly
34	Trip Rod	82	Bridge With Pivot Pins
35	Trip Rod Mounting Plate Screw	83	Spring
36	Mounting Screw, Record Platform Assembly	84	Screw
37	Change-Over Lever, Record Size	85	Lifting Spindle With Lifting Plate
38	Spacing Collar	86	Muting Switch
39	Spacing Collar Nut	87	Lifting Spring
40	Spacing Collar Washer	88	Spring, Index Lever
41	Rubber Bushing	89	Washer
42	Switch Assembly	90	Ball Bearings
43	Baseplate Assembly	91	Ball Bearing Holding Washer
44	Spring Tension Lever, With Felt Pad	92	Washer
45	Knob, Speed Control	93	Main Spindle Housing
46	Knob, Manual-Auto.	94	Washer
47	Knob, Off-On, Reject	95	Nut
48	Screw	96	Spacer
49	Switch Lever With Roller	97	Cycling Gear

PARTS LIST - Con't.

Ref. No.	Description	Ref. No.	Description
98	Cycle Drive Gear	132	Link & Muting Switch Lever
99	Gear, Double	133	Shut-Off Cam Lever
100	Cycle Idler Wheel & Gear	134	45RPM Spindle Actuating Lever Assembly
101	Pulley, Motor	135	Center Plate
102	Wheel, Inter, With Rubber Tire	136	Center Plate Mounting Screw
103	Inter Wheel Mounting Bracket	137	Washer
104	Nut	138	Retaining Clip
105	Washer	139	Washer
106	Spacing Collar	140	Retaining Clip
107	Spring	141	Washer
108	Motor Mounting Plate, Complete	142	Retaining Clip
109	Mounting Plate For Cycling Gears	143	Screw, Height Adjustment
110	Knob, Magnetic Speed Adjust	144	Washer, Flat Steel
111	Washer	145	Nut, Hex
112	Nut	146	Screw, Magnetic Speed Adjust Plate
113	Retaining Clip	147	Motor With Mounting Bracket
114	Washer	148	Screw, Mounting Bracket
115	Spring	149	Switch Ground Lug
116	Magnetic Speed Adjust Assembly	150	Lockwasher, Split
117	Magnetic Speed Adjust Wheel	151	Nut
118	Magnetic Speed Adjust Spindle & Plate	152	Lifting Lever
119	Coupling Link	153	Washer
120	Cycling Cam	154	Screw
121	Impulse Lever	155	Washer
122	Locator Stop Lever	156	"C" Retaining Clip
123	Shut Off Lever	157	Nut, Hex
124	Washer	158	Spring, Impulse Lever Actuating
125	Nut	159	Spring, Gear Plate Actuating
126	Lifting Disc.	160	Record Platform Cover
127	Lifting Crank	161	Mounting Bracket & Change-Over Lever
128	Lifting Crank Spring	162	Push-Off Lever Assembly
129	Tone Arm Locator Lever	163	Positioning Lever Assembly
130	Lifting Link	164	Record Hold-Down Arm
131	Lifting Lever With Lifting Link, Connecting		Spring, Positioning Lever

**GARRARD  
MODEL RC90**