

ADMIRAL CORPORATION

OPERATING INSTRUCTIONS**1. SETTING FOR SIZE OF RECORD**

The size of record for which the record changer is set to play is indicated by the position of the size-change knob (96). The record size is stamped on the housing (94) of the head assembly.

To change the setting, slide the size-change knob backward or forward to the numeral corresponding to the size of records to be played. Slide the knob to "M" for manual play.

If the size-change knob does not slide back freely, the setting may be changed by pushing against the front of the record clip (83) when it is in the downward position as shown in Figure 1.

2. STARTING THE RECORD CHANGER

To load the Record Changer, lift the record clip (83) to its upright position and place the records on the center post (27). The bottom record is supported by the shoulder of the center post and the push plate (79A).

Lower the record clip gently, using care not to let it snap onto the records or damage may result.

THE CHANGE CYCLE**6. DESCRIPTION OF CHANGE CYCLE**
(See Figures 7 and 8)

If at all possible, we recommend that you carefully observe the operation of a changer that is in normal operating condition. It is a good idea to rotate the turntable by hand and repeat the changing cycle until you understand the function of each part.

The changer operates as follows: The changer mechanism is driven during its change cycle by the knurled hub of the turntable rotating the rubber-tired drive wheel (28). During normal playing, the drive wheel is held in a neutral position as illustrated in Fig. 8 so that the indentation prevents the tire from contacting the knurled hub. The drive wheel (28) is held in this position by the trip lever (63) and the stop stud (65) on the main cam (66).

When a record has finished playing and the needle has reached the trip point, the arm control lever roller (48C, Fig. 7) makes contact with reject link (43A), moving the trip arm (43) which releases trip lever (63). The trip lever spring (62) moves trip lever (63) freeing cam stop stud (65) and allows spring (69) to pull the main cam clockwise (bottom view). Since the main cam (66) and the drive wheel (28, Fig. 8) are on the same shaft, the drive wheel is thus turned so its rubber tire is against the knurled hub of the turntable. The turntable now rotates the drive wheel (28) which in turn rotates the main cam (66). Roller (68), Fig. 7) riding on the main cam, moves arm control slide (52), and the raised portion (52A) of this slide raises arm lift shaft (This shaft is 19 on the RC170 and 103 on the RC170A.) which lifts pickup arm from the record. Stud (52C) moving with slide (52) pushes arm control lever (48A) causing the pickup arm to move to the right, clearing the record. The movement of roller (68) also causes trip lever (63) to re-engage in the recess of trip arm (43). Trip spring (61) holds the trip arm (43) and trip lever (63) together.

Roller (70), also riding against main cam (66), moves push-off arm (71). This movement is transmitted through the linkage of 79F, 79D (Fig. 7) to the

Turn the Phono-Motor switch (33) to the ON position. Move the switch button to the left (REJECT) momentarily and release. The bottom record will drop to the turntable and the Record Changer will play the entire stack of records automatically.

3. REJECTING A RECORD

To reject a record at any time, move the Phono-Motor switch button (33) to the left (REJECT).

4. STOPPING AND UNLOADING

It is advisable to stop the Record Changer when the Changer mechanism is out of cycle (playing a record). To remove the records, lift the record clip to its upright position and move the pickup arm to the right so that it clears the records. Lift the records straight up by supporting the bottom one. Do not tilt or squeeze the records when lifting.

5. REPLACING CARTRIDGE AND NEEDLE

Before replacing, see cartridge service data on page 5.

Remove the old cartridge (3) by getting your finger nails or a small screwdriver under it as shown in Figure 2 and pull down on the back edge. Press new cartridge into place again, making sure to push near its back edge where its pins go into the socket.

push-off plate 79A, Fig. 8. (Note that the record stack rests on plate 79A.) The shape of the main cam (66) is such that the push-off plate (79A) first moves back, allowing the bottom record to drop onto the record support plate (79B). Then the push-off plate (79A) slides forward and drops the next record to be played but only after the pickup arm has cleared the record stack. The little slide in the top end of the center post holds back all records other than the bottom one.

As the main cam continues its rotation, the arm control slide (52) moves back following the cam since it is kept in contact with it by slide spring (76). Stud (52C) moving with the arm control slide (52) allows arm control lever (48A) to move back. The tension of the set-down spring (55) moves the arm control lever through set-down lever (54B) and roller (48D). This moves the pickup arm to the set-down point for the record to be played. This set-down point is governed by the set-down adjustment screw (25) for 12-inch records and screw (26) for 10-inch records.

When the record changer is set to play 10-inch records, the arm control lever roller (48D) moving along the edge of the set-down lever (54B) and on reaching the shoulder of the set-down lever, moves this lever and the set-down arm (54) until they are stopped by the set-down adjustment screw (26) making contact with the rear flange of the record changer pan (24). At this point the pick-up arm is above the starting groove and is lowered by the action of the arm control slide as explained above.

When the record changer is set to play 12-inch records, the size change link (75) removes the tension from the change link spring (74) allowing the set-down arm (54) to move so that the set-down adjustment screw (25) makes contact with the rear flange, instead of screw (26). This movement of the set-down arm is caused by spring (55) when the arm is in its change cycle. This changes the set-down of the pick-up arm for 12-inch records.

While the needle is held in position above the starting groove, the safety arm (52B) pushes stud (54A)

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IMPORTANT

These two models are very similar. The differences are illustrated in Figures 3 and 4. To be certain which model changer you are servicing, look for the changer model number which appears on the underside of the changer mechanism.

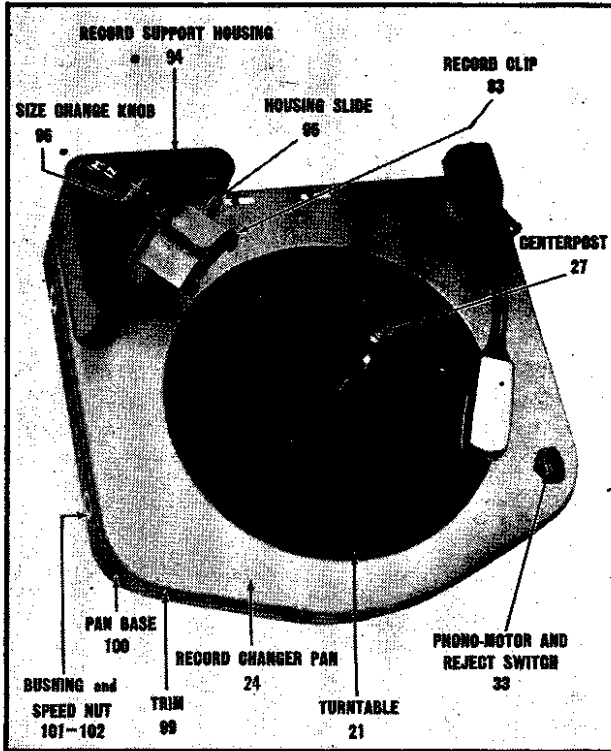


Figure 1. Record Changer, Top View

Figures 3 and 4 show major differences between models RC170 and RC170A. In addition, differences occur in parts carrying reference numbers 49, 50 and 52 (see parts list).

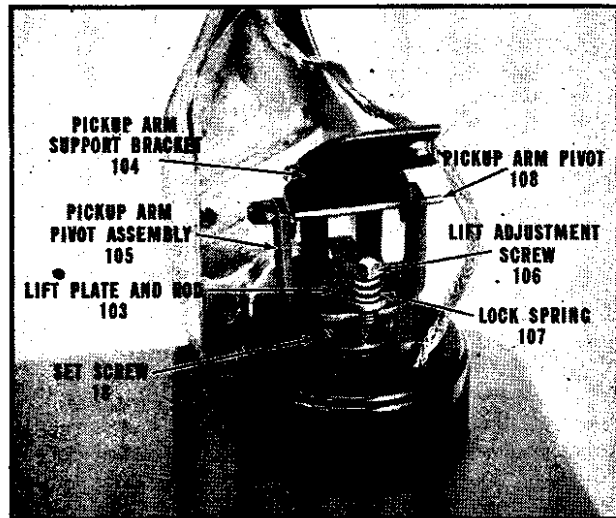


Figure 4. Pickup Arm Hinge Assembly for RC170A

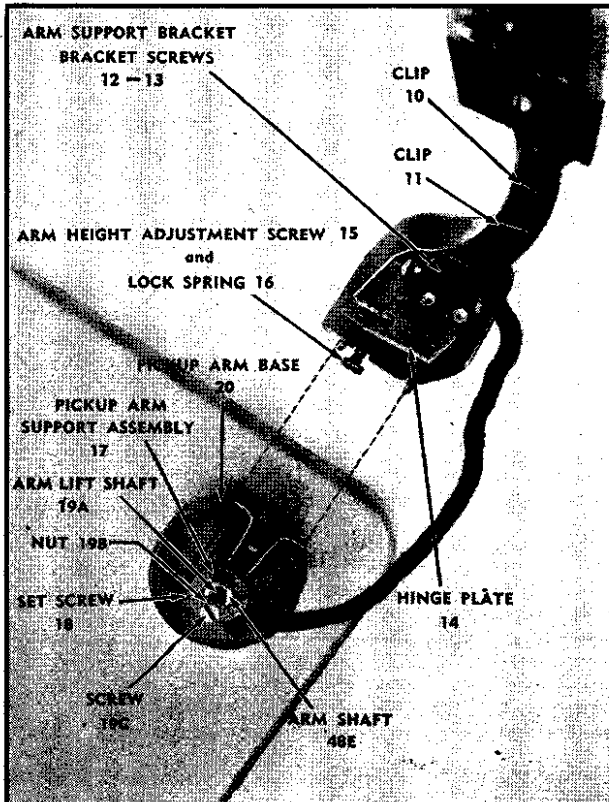


Figure 3. Pickup Arm Hinge Assembly for RC170

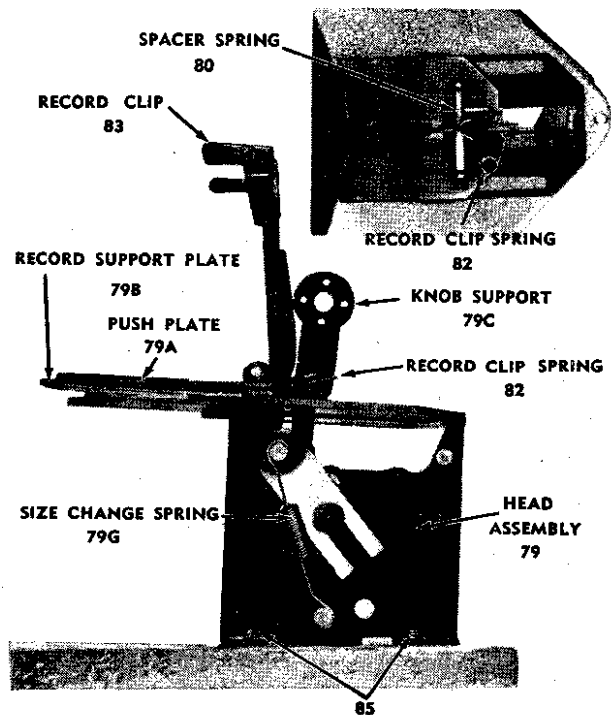


Figure 5. Head Assembly

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releasing the pickup arm so that it has a free sideward movement to follow the record groove. About one revolution of the turntable after the releasing of the pickup arm, the arm is lowered by the downward movement of arm lift shaft (19).

When the reject is used, the movement of the reject knob (33) forces stud (39A) against the reject link (43A) moving trip arm (43) which releases trip lever (63) and the cycle of record change proceeds in the same manner as for automatic changing.

ADJUSTMENTS

TOOLS REQUIRED { No. 8 Allen Set Screw Wrench (Part No. P-5825. List price \$0.10)
3/16 inch Open End Wrench (Part No. P-5807. Net price \$0.39)

7. ADJUSTMENT OF SET-DOWN POINT (See Figures 1 and 8)

Adjustments for 10-inch records are made by the screw (26) which can be seen through the right hand slot at the top rear of the record changer. Turning this screw in moves the set-down point of the pickup arm closer to the center post and turning the screw out moves it further away. The proper set-down point is between $4\frac{5}{8}$ " and $4\frac{1}{16}$ " from the needle to the near side of the center post.

Adjust the 12-inch set-down with screw (25), Fig. 8. Turning screw (25) in (as seen through the left hand slot) moves the set-down point for 12-inch records further from the center post and turning the screw out moves it closer to the center post. The proper set-down point is between $5\frac{5}{8}$ " and $5\frac{1}{16}$ " from the needle to the near side of the center post.

If either adjusting screw has reached the end of its travel so that it is not possible to get a proper set-down, it will be necessary to re-set the assembly (17) or (105) as follows:

7A. SETTING PICKUP ARM SUPPORT ASSEMBLY (17) IN RC170 OR (105) IN RC170A

- Set adjusting screws (25) and (26) half-way in.
- With the set screws (18) loose, move the pickup arm so that the pickup arm cap (2) rests against the top portion (above the shelf) of center post.
- Holding the pickup arm in this position, move the arm control lever (48B) so that it is $\frac{3}{64}$ " from the rear flange of the pan (24); always keep this spacing less than $\frac{1}{16}$ " but more than $\frac{1}{32}$ " (between .04 and .06" is correct).
- Press the arm control lever assembly (48) up into the pickup arm base (20). Press the pickup arm support assembly (17) or (105) down against the pickup arm base (20), leaving a .006 to .008 inch clearance between them. This clearance is necessary to prevent binding. The spring washer (part number 405A27) should be slightly compressed between the top of the pickup arm base and the bottom of the collar.
- Tighten the two set screws (18).
- Make final set-down adjustments with adjustment screws (25) and (26). (See page 2)

8. ADJUSTMENT OF PICKUP POINT (See Fig. 7)

The pick-up or tripping point adjustment is made by screw (45). Turning the screw in brings the pick-up point closer to the center post and turning the screw out moves it further away. The proper pick-up point is between $1\frac{1}{16}$ " and $1\frac{3}{4}$ " from the needle to the near edge of the center post.

On the late production of the record changer used with the console radios, a hole has been made in the bottom cover so that this adjustment can be made without removing the bottom cover from the changer. As the table models do not use the bottom cover, this adjustment is easily made.

In adjusting the pick-up point it will be found that an occasional record does not have the groove run in far enough so that the pick-up arm will be carried close enough to the center post to actuate the reject link. If adjustments are made to accommodate these few records, it will be found that the changer starts its change cycle with some normal records before they are finished playing. In adjusting for this type complaint, it is wise to let the customer decide for which side the adjustment should be made.

9. ADJUSTMENT OF PICKUP ARM HEIGHT (See Figures 3 and 4)

Before adjusting arm height, be sure needle is properly adjusted (see paragraph 18).

With the record changer out of cycle and the pick-up arm clear of the turntable, adjust screw (This adjustment screw is 15 on the RC170 and 106 on the RC170A.) so that the tone arm needle is approximately $\frac{1}{8}$ " above the top of the pan. Turning the screw in raises the arm and turning it out lowers the arm.

The model RC170 also has an adjustment screw (19C) to adjust the maximum height that the pickup arm should reach. The maximum height of the pick-up arm during the change cycle should be from $1\frac{3}{8}$ " and $1\frac{1}{2}$ " between the needle and turntable. After making this adjustment tighten locking nut (19B) and again check the adjustment.

10. ADJUSTING DISTANCE BETWEEN HEAD ASSEMBLY (79) AND CENTERPOST (See Figs. 7, 8)

Do not bend the centerpost to make this adjustment; adjust as described below.

The adjustment of the head assembly (79) is made by loosening the three screws, 85, (underneath the changer) and moving the assembly closer or further away from the center post as the case may be. The head assembly is in proper relationship to the center post when it is set with a dimension of $4\frac{7}{8}$ " from the front edge of the record support plate (79B, Fig. 8) to the rear of the center post (side nearest the record support plate) and at a point on the center post of the same height as the record support plate. This dimension is taken with the changer set to play 10-inch records.

After adjusting, check as follows:

- Place a 10-inch record (with a true center hole) on the centerpost to a point in line with the record support plate (79B). Holding the record horizontal and exerting force on it toward the head assembly, the record should just clear the record support plate (79B). Exerting force away from the head assembly should give a small gap between the record support plate (79B) and the record. **Repeat with a 12-inch record.**
- Load the changer with a stack of records; push record stack toward head assembly. Start the changer mechanism, and check push-off for several 10-inch records. **Repeat for 12-inch records.**

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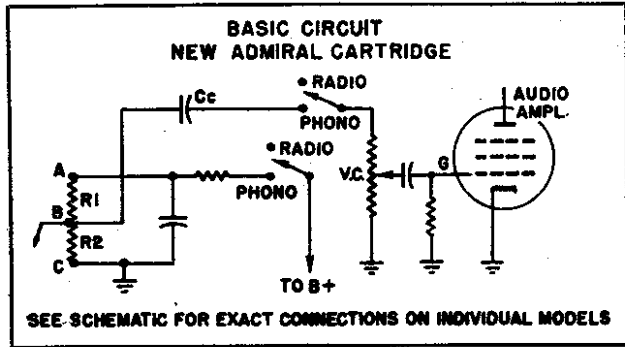
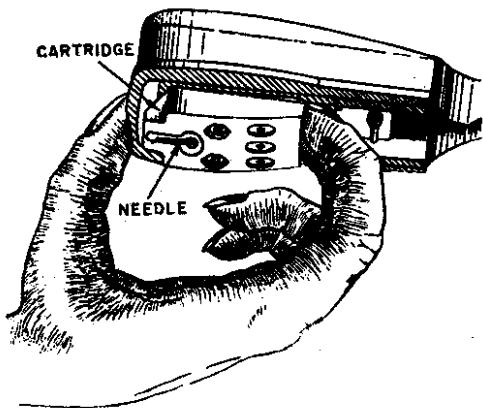


Figure 6. Basic Circuit for New Admiral Cartridge

Figure 2: Removing Cartridge by Pulling Down on Back Edge

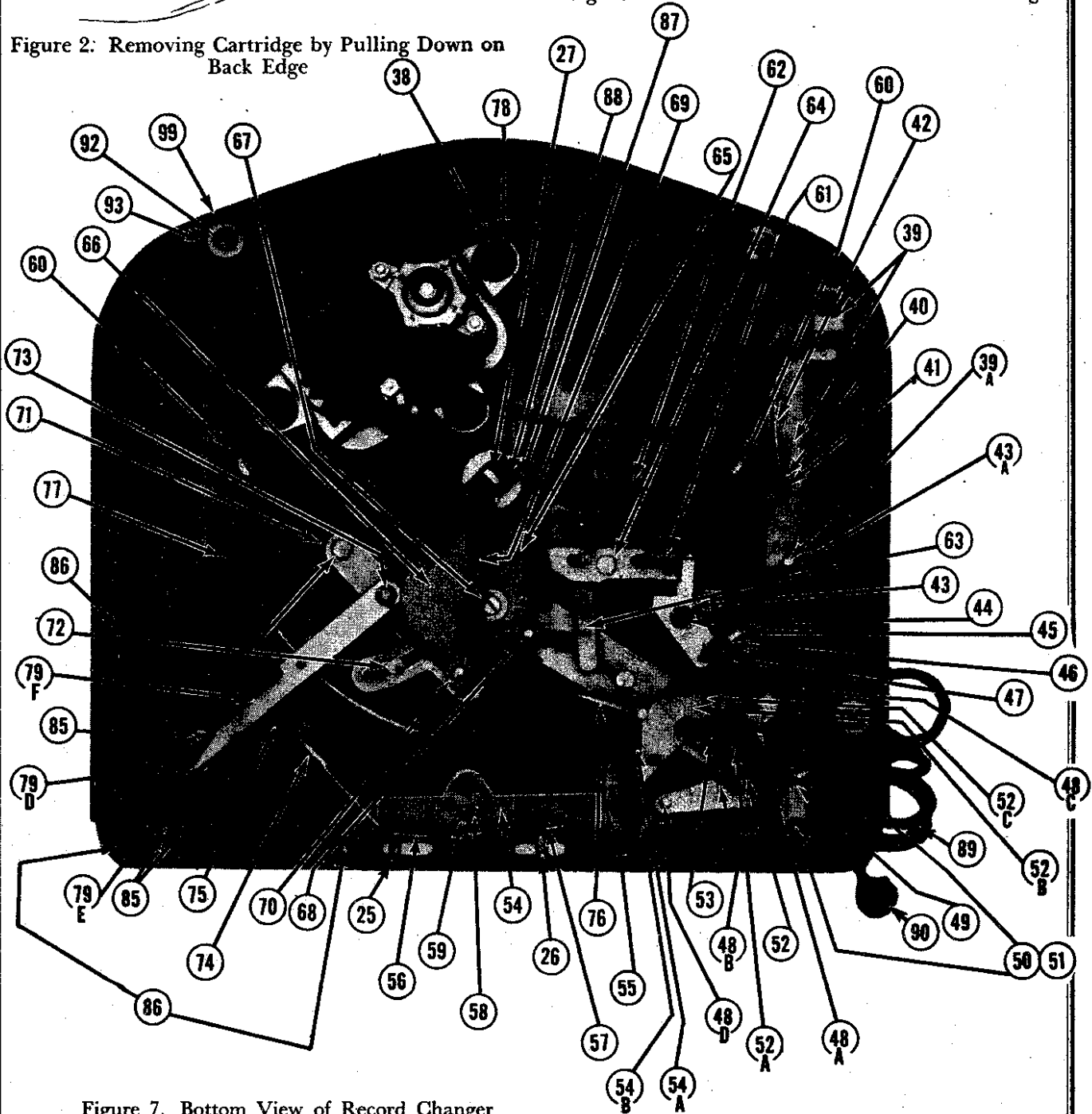


Figure 7. Bottom View of Record Changer

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Reference numbers 12, 14, 17, and 19 apply to RC 170 only; see Figs. 3 and 4 and note marked † in parts list.

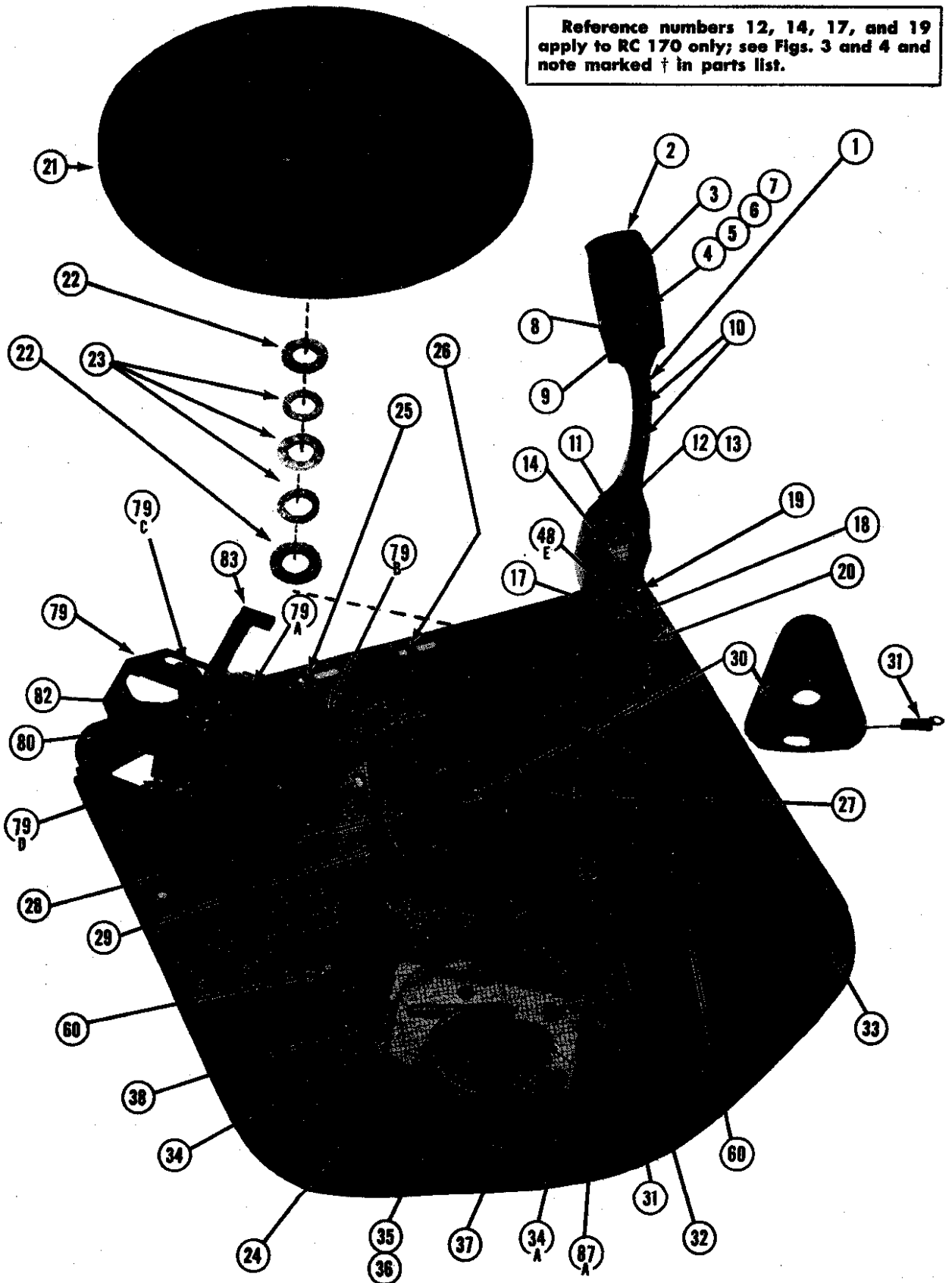


Figure 8. Top View of Record Changer

SERVICE PARTS LIST FOR RC170 & 170A RECORD CHANGER

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
1	G400A177	Pickup Arm Casting Only (painted)	52A		Inclined (raised) Portion of Arm Control Slide (part of 52)
2	403B16-1	Pickup Arm Cap (clear plastic)	52B		Safety Arm (part of 52)
3	A1372	Cartridge and Needle	52C		Stud (part of 52)
4	G400A198	Cartridge Holder (socket with contacts)	53	405A58	Relief Spring
5	401A192	Plate (for mounting cartridge holder to pickup arm)	54	G400A152	Set Down Arm Assembly
6	20-312-C2-6	Screw #2-56x5/16" R.H.M.S. (4 required)	54A		Stud (part of 54)
7	2A1-1-6	Nut #2-56 (4 required)	54B		Set Down Lever (part of 54)
8	401A115	Cap Clamp	55	405A56	Set Down Spring
9	20-312-C2-6	Screw for Cap Clamp #2-56x3/8" R.H.M.S.	56	405A44	Lock Spring
10	414A17	Pickup Arm Wire Clip (.359"x.047"; 3 required)	57	405A44	Lock Spring
11	414A17-1	Pickup Arm Wire Clip (.506"x.047"; 1 required)	58	405A22	Spring Washer
12	†401A134	Arm Support Bracket (see note †)	59	405A78	Hairpin Spring
13	65-250-C2-39	Arm Support Bracket Screw #6-32x1/4" B.H.M.S.	60	1A80-5	Mounting Screws
14	†G400A165	Pickup Arm Hinge Plate (see note †)	61	405A68	Trip Spring
15	†65-625-C2-47	Pickup Arm Adjustment Screw #6-32x5/8" (see note †)	62	405A75	Trip Lever Spring
16	†405A70	Lock Spring for Pickup Arm Adjustment Screw (see note †)	63	401A153-1	Trip Lever (includes shoulder rivet #64)
17	†G400A168	Pickup Arm Support Assembly (see note †)	64	402A97	Shoulder Rivet (See Note A)
18	1A43-14	Allen Set Screw #8-32x3/16" Cone Point (2 required)	65		Cam Stop Stud (part of 66)
19	†G400A172	Arm Lift Shaft (includes screw and lock nut) (see note †)	66	G400A163	Main Cam
19A		Arm Lift Shaft	67	85-375-C2-39	Main Cam Screw #8-32x3/8" B.H.M.S.
19B		Nut #6-32	68	415A9	Roller
19C		Screw #6-32x3/8" Fil. H.M.S.	69	405A79	Push Off Arm Spring
20	G400A173	Pickup Arm Base	70	415A9	Roller
21	G400A167	Turntable	71	G400A154-1	Push Off Arm (includes 2 shoulder rivets, #72)
22	412A1	Cork Washer (2 required)	72	402A97	Shoulder Rivet
23	415A2	Thrust Bearing Assembly (replace as a unit)	73	405A78	Hairpin Spring
24	G400A195	Record Changer Pan with Studs and Welded Parts	74	405A54	Change Link Spring
25	402A87	Set Down Adjustment Screw	75	401A159	Size Change Link
26	402A87	Set Down Adjustment Screw	76	405A60	Slide Spring
27	G400B137-1	Center Post (includes 405A62 speed nut)	77	88A8-1	Motor Plug (male)
28	G400A179	Drive Wheel (includes tire)	78	G400A196	Rubber Mounting Grommet and 401A106 fastener (for 407B3-2 and 407B4-2 motor) (3 required)
29	406A13	Drive Wheel Tire Only		G400A203	Rubber Mounting Grommet, spacer, and fastener (for 407B1-2 motor)
30	G400A149-1	Drive Wheel Support Assembly	79	G400A186-1	Head Assembly (includes 79A to 79G; does not include #80, 82 or 83)
31	405A54	Drive Wheel Spring	79A		Push Plate
32	402A76	Spring Stud	79B		Record Support Plate
33	403A23	Reject Knob	79C		Knob Support
33A	405A80	Reject Knob Retaining Spring	79D		Push Off Lever
34	*407B3-2 or **407B1-2 or *407B4-2	Motor with Idler Wheel and fasteners; 105-125 V, 60 Cycle	79E	405A69	Size Change Lever Spring
		Motor with Idler Wheel and fasteners; 105-125 V, 50 Cycle	79F		Push Off Link (See Note B)
			79G	405A57	Size Change Spring
34A	401A48	Drive Pulley (Part of 34. For motors 407B3, 407B4. In addition, motor 407B4 includes a coil spring, part number 405A32.)	80	405A74	Spacer Spring
	405A32	50 Cycle Conversion Spring (this spring used to convert 407B3 motor)	82	405A73	Record Clip Spring
	G400A23	Idler Wheel Assembly (used with either 407B3 or 407B4 motor)	83	G400A190	Record Clip (does not include #405A73, 405A74 springs or 406A16 rubber bumpers)
	G400A57	Idler Wheel Assembly (for 407B1 motor)	84	406A16	Rubber Bumpers for Record Clip
36	405A15	Hairpin Spring for Idler Wheel	85	62-375-C2-39	Screw #6-32x3/8" Fil. H.M.S. (3 required)
37	405A14	Spring, Idler Wheel (for 407B3 or 407B4 motor)	86	62-375-C2-39	Screw #6-32x3/8" Fil. H.M.S. (3 required)
	405A67	Spring, Idler Wheel (for 407B1 motor)	87	G400A146-1	Center Post Bracket Assembly (includes 1-#405A-62 speed nut)
38	401A106	Shakeproof Motor Fastener	88	405A62	Speed Nut for Fastening Center Post
39	G400A162	Switch and Lever (ON-OFF-REJECT)	89		See Radio Service Manual for Proper Cable and Part Number
39A		Spring Stud (Part of 39)	90	98A19	Plug, 3 contact
40	405A78	Hairpin Spring		88A8-5	Plug, 4 contact
41	405A22	Spring Washer	92	G400A197	Mounting Screw (for mounting bottom cover to pan)
42	405A77	Switch Lever Spring	93	19A10-3	Mounting Spring (for mounting bottom cover to pan)
43	G400A181	Trip Arm Assembly	94	403C14	Record Support Housing Plastic (does not include #95)
43A		Reject Link (part of 43)	95	403B15	Housing Slide, Blastic
44	405A78	Hairpin Spring	96	403A20	Size Change Knob (2 required)
45	402A96	Trip Adjustment Screw	97	402A81	Knob Spacer
46	481-34-37	Washer (2 required)	98	443-312-C2-34	Screw (size change knob) #4-40x5/16" Phillips
47	405A76	Adjustment Lock Spring	99	403A24	Trim
48	G400A175	Arm Control Lever Assembly	100	G400A143	Bottom Cover (consoles only)
48A		Arm Control Lever	100A	413A7	Grommet (1") for bottom cover
48B		Arm Control Lever	101	27A24	Bushing in Bottom Cover (consoles only; 4 required)
48C		Arm Control Lever Roller	102	2A10-10-59	Speed Nut for Bushing (consoles only) (4 required)
48D		Arm Control Lever Roller	103	†G400A201	Lift Plate and Rod (See Note ††)
48E		Pickup Arm Shaft	104	†401A162	Arm Support Bracket (See Note ††)
49	401A143	Slide Support (RC170 only)	105	†G400A200	Arm Pivot Assembly (See Note ††)
	401A143-1	Slide Support (RC170A only)	106	†402A104	Lift Adjusting Screw, #6-32x3/8" cap screw (See Note ††)
50	402A85-1	Slide Spacer (RC170 only; See Note C)	107	†405A81	Lock Spring (See Note ††)
	402A85-2	Slide Spacer (RC170A only)	108	†414A18	Pickup Arm Pivot (See Note ††)
51	C2-1000-C2-39	Spacer Screw #6-32x1/4" Fil. H.M.S. (2 required)	109	405A27	Washer, spring
52	G400A159	Arm Control Slide Assembly (RC170 only)			
	G400A159-1	Arm Control Slide Assembly (RC170A only)			

*407B3-2 and 407B4-2 are the same as #407B3 and 407B4 respectively except that 3 #401A106 fasteners are included.
 **407B1-2 is the same as #407B1 except that three spacer washers and three #401A106 fasteners are included.

† Parts marked † are used in the RC170 only. See Figure 3. See Ref. numbers 103, 104, 105, 106, 107, 108 for RC170A parts.

†† Parts marked †† are used in the RC170A only. See Figure 4. See Ref. numbers 12, 14, 15, 16, 17, 19 for RC170 parts.

NOTE A: The rivet (64) has been replaced on the late RC170 and all of the RC170A by a stud the same as spring stud #32. A spring washer (41) and a hairpin spring (40) is used to hold the trip lever (63) in place. The trip lever (63) remains the same in either case.
 NOTE B: Three different type push off links (79F) have been used. The one shown in figure 7 is the latest but is now installed with its offset to the rear of the changer. In other words it is turned over on its axis 180°. This latest type can be used on all earlier changers.
 NOTE C: The model RC170 uses two different type spacers (50). However, 402A85-1 can be used to replace either type. In re-assembling be sure that the spacer with the cut down section is used near the spring mounting bushing (front).

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If the setting of the head assembly does not give proper push-off for both 10-inch and 12-inch records, vary the spacing slightly and re-check.

It should be noted that the records do not rest on the record support plate (79B) during normal playing of the changer; but rest on top of the push off plate

(79A). During record change the push off moves back and allows the records to drop to the record support plate (79B). The push off plate now moves forward pushing the bottom record off. The remaining records are being supported by the push off plate itself. This is done to reduce any tendency for two records to drop to the turntable at the same time.

SERVICE AND REPAIR

CAUTION

See that the rubber tires on both the drive wheel (28) and the idler wheel (35) are kept clean and free from oil, grease, dirt, or any foreign material. Carbona or carbon tetrachloride may be used for cleaning these parts.

11. REMOVING PLASTIC HOUSING FROM HEAD ASSEMBLY (See Figures 1 and 7)

The housing (94) of the head assembly can be taken off by removing the two size change knobs (96) and the three screws (86). With the record clip (83) in the down position, the housing can be lifted from the assembly. The housing slide (95) will drop out as the housing is removed.

12. REPLACING A PICKUP ARM BASE (See Figures 3, 4 and 7)

When installing a pick-up arm base (20) and before tightening the two screws (51), exert pressure on the base towards the front of the changer and at the same time rotate it in a clockwise (bottom view) direction. Tighten the screws while holding the base in this position. If this is not done properly, the arm control slide (52) may bind between the two slide spacers (50).

After replacing the pickup arm base, re-set the pickup arm support assembly as in paragraph 7A.

13. REPLACING SIZE CHANGE SPRING (See Figure 5)

Whenever it is necessary to remove or replace the size change spring (79G) care must be taken to re-install it in its proper position. See Figure 5 for its mounting position.

14. REPLACING HEAD ASSEMBLY

Remove the assembly housing as explained in No. 11. Release the push-off link (79F) from the push-off arm (71) by removing the hairpin clip (73) and washer. Remove three screws and washers (85) and the assembly is free from the pan.

When re-installing the head assembly, replace the three screws and washers but do not tighten them. Reconnect the push-off link and arm. Adjust the head assembly as explained in paragraph 10.

15. REMOVING TURNTABLE AND BEARING ASSEMBLY

To remove the turntable it is only necessary to grasp the table by its edges and lift up. **Before replacing the turntable, make sure that the recessed part of the drive wheel (28) is towards the centerpost. If necessary, turn drive wheel counter clockwise about a turn so it locks in this position.** The pickup arm should be positioned away from the turntable to avoid the possibility of accidentally tripping the changer mechanism. In replacing the turntable force

is not needed to seat it. Make sure, however, that the drive wheel of the motor has been pushed in towards the centerpost and that the wheel is making contact with the inner side of the turntable flange. In some cases it may be found that the two cork washers, after considerable use, are compressed so the turntable will rub. To build the stack up, an extra cork washer should be used. This third cork washer may be placed at the top or bottom of the stack.

The washers (22) and thrust bearing assembly (23) are removed by sliding them off of the centerpost. In replacing, have them in the order shown in Figure 8.

16. REMOVING BOTTOM COVER (100)

To remove the bottom cover (100) from the record changer, remove the two rear screws (92) through the bottom. Then press on the front edge of the bottom cover; this frees the changer from the slotted mounting brackets at the front of the bottom cover. To replace bottom cover, reverse above operations.

The changer must float on the springs (93) to prevent microphonic feedback, thus the springs (93) must be re-installed properly. The wider end fits around and hugs the extrusion in the mounting brackets in the bottom cover. The narrow end of the spring fits over the threaded bushing on the changer pan (24). In some changers it has been necessary to add spacer washers beneath the narrow portion of the spring (93) to assure "free floating" of the changer.

17. MOUNTING 407B1 MOTOR TO CHANGER

The model 407B1 motor may be used with this record changer but it is necessary that a fibre or felt washer be used as a spacer between the motor mounting grommet and the changer pan. The No. 401A106 shakeproof motor fastener can be used to then mount the motor.

18. CARTRIDGE (See Figure 6)

The new Admiral pick-up cartridge uses an entirely new principle since it is not a crystal, magnetic, or capacitive device. The pick-up element is made of special rubber which is a high resistance electrical conductor (R-1 & R-2). The resistance varies as the length of the rubber is changed. A Monel metal needle, osmium tipped, is clamped to the center of the resistive rubber as shown at B. As the needle moves back and forth in the record groove, it alternately lengthens the rubber on one side and shortens the rubber on the other side.

A DC voltage is applied at A. The voltage drop from B to C varies as the resistance changes due to the "back and forth" movement of the needle. The varying voltage drop is in reality an alternating voltage of audio frequency. This voltage is applied through the coupling condenser (Cc) to the grid (G) of the audio amplifier tube.

Trouble Shooting: If you suspect the cartridge or needle and have a replacement cartridge available, the quickest test is to try the other cartridge. This is very simple since the Admiral cartridge plugs in. Remove

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the old cartridge as described on page 1 and plug in the replacement cartridge. If replacing cartridge does not correct the trouble or if no replacement is available, proceed as follows:

1. Make sure radio operates satisfactorily on radio stations.
2. Turn switch to Phono and turn volume control up high. Touch the needle with finger. If a loud hum is heard, circuit from B to G is not open or shorted. If hum is not heard, check circuit from B to G.
3. If hum is heard, check voltage across outer terminals on bottom of cartridge. Generally it should measure from 80 to 100 volts DC. See circuit diagram for individual chassis. If voltage is correct, cartridge should be replaced.
4. If voltage is not correct, check circuit for fault. In case of distortion, check coupling condensers.
5. If the needle is bent, it can be straightened by bending it down so that it projects $\frac{1}{16}$ " from cartridge. It should then be pressed back several times with a flat object.

Do not attempt to repair cartridges or remove the cap on the cartridge assembly as this will void the warranty.

19. LUBRICATION

Under normal operating conditions, the motor

should never require oiling. The rest of the changer, however, should be lubricated with grease whenever it comes into the shop for repairs or adjustment. A good grade automobile chassis grease may be used for this purpose.

The oilite bearings, used in the turntable hub and pick-up arm base, may be lubricated with SAE No. 20 motor oil.

Care should be taken to prevent any of the lubricant from coming into contact with the drive or idler wheel tires. Also be careful, when using oil, that an excess does not seep into the felt of the turntable.

Use grease sparingly on stud (64) of trip lever (63); excessive lubricant may cause suction binding and subsequent failure of the trip mechanism.

20. REPLACEMENT PARTS

In some cases replacement parts from the factory may be a different type than those being replaced. These parts will be of a later production but may be used as replacement parts. In cases where rivets or adapting parts are needed, they will be included with the replacement part.

Note that when replacements involve loosening or removing set screws (18) in assemblies (17) or (105), it will be necessary to re-set the assembly as described in paragraph 7A.