

COLLARO CHALLENGER



RCA VICTOR



HI-FIDELITY RECORD CHANGER

Model Collaro Challenger Service Data

— 1957 No. 16 — (Revised)

ISSUED BY

GENERAL SERVICE DEPARTMENT
RCA VICTOR COMPANY, LTD.
MONTREAL, CANADA

GENERAL DESCRIPTION

The Model Challenger record changer is a four speed record changer designed to play in automatic sequence a total of ten of either 7 inch, or 10 inch and 12 inch records intermixed, providing they are of the same speed and same type of groove, and to shut off automatically.

The record changer is provided with two control knobs. The Motor Speed control is located on the left hand corner of the turntable board and the Start-Stop-Reject control on the Right hand corner.

Turning the Start control gently to the left will cause the turntable to start rotating. At this time the control may be released.

The Turntable Speed control makes possible the selection of the four speeds, 16-2/3, 33-1/3, 45 and 78 R. P. M. by rotating the knob to the desired position.

To increase the versatility of this record changer, an Auto-Manual Lever has been added, thus allowing the mechanism to be operated either automatically or manually.

Connect this changer to an outlet supplying 100-125 volts, 60 cycle A.C. only, unless otherwise specified.

OPERATING INSTRUCTIONS

RECORD LOADING. - Hold Record Balancing Arm near wide end, lift clear of 78 R. P. M. Spindle and swing out over Pick-Up arm. Place records on spindle and lower to offset step. Replace Record Balancing Arm on 78 R. P. M. Spindle.

NOTE. - 7 inch, 10 inch and 12 inch records can be intermixed on this changer, but be certain that they are of the same playing speed and same type of groove.

TURNTABLE START. - After setting the stylus and speed control to their proper position, turn the Start-Stop-Reject control knob to the left and release when turntable is in motion. The Changer will operate automatically until the last record has been played, at which time, the Pick-Up Arm is returned to its Rest Post and the Motor is switched off.

RECORD REJECT. - A record may be rejected at any time by turning the Start-Stop-Reject control fully to the left and releasing it. The Pick-Up Arm will immediately lift from the record and the next record will drop and begin to play.

STOPPING. - The changer may be stopped at anytime by turning the Start-Stop-Reject control fully to the right and releasing. The Pick-Up Arm will remain on the record and may be returned to the Rest Post by hand, as the supply to the Motor will be automatically switched off.

RECORD UNLOADING. - Lift the Record Balancing Arm and swing out over Pick-Up Arm. Using both hands, with fingers under the edge of bottom record, lift records straight up off Spindle.

SPECIAL FEATURES

MUTING EFFECT. - The Pick-Up Cartridge is muted during the change cycle, thus avoiding the reproduction of undesirable noises during the interval between records, and also avoiding the unpleasant "running down" effect due to slowing of turntable when a record is rejected or when the "Stop" control is actuated.

RETRACTING DRIVES. - Rubber tired Drive Wheels are automatically retracted when the unit is switched off. The development of flats on the Drive Wheels due to constant contact under pressure during periods of disuse, noisy running and uneven turntable speed are prevented.

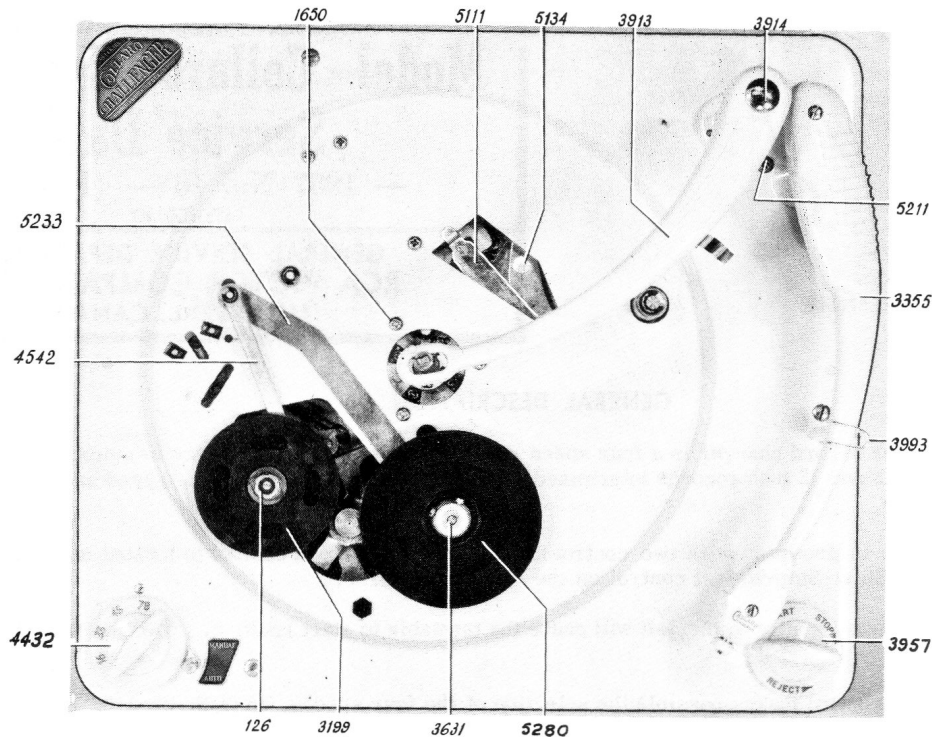


FIG. 1 TOP VIEW WITH TURNTABLE REMOVED

SERVICE INSTRUCTIONS

SECTION 1

PICK-UP SET DOWN POSITION

This is adjusted before leaving the factory so as to set the stylus down 1/8" from the outside edge of the record. To alter the set down position proceed as follows:-

A) Remove the turntable. See Section 1.

B) With the machine in the switched off position an eccentric roller (Ref 5134 Fig. 1) with a screwdriver slot can be seen on the top face of the cam gear. This eccentric when turned will make the test track wider or narrower. Before moving the eccentric, mark cam and track adjuster with a pencil. To make the set down position further in from the edge of the record, the test track should be made wider.

C) It is possible to carry out this adjustment from the under-side, if there is room in the cabinet to use a screwdriver. First disconnect the power supply. Operate the starting switch and turn the cam anticlockwise as viewed from below, until the eccentric appears, and then proceed as in paragraph B.

It may be necessary to perform this operation several times, testing after each adjustment.

The machine gives automatic positioning for all sizes of record by feeling the diameter of the bottom record of a loading, and then setting down on a diameter 1/4" smaller.

SECTION 2

PICK-UP MUTING

The pick-up is short circuited during the entire change cycle to prevent reproduction of undesirable noise. When

the cam gear (Ref 5270 Fig. 2) is in the playing position, there should be between .01 and .025" clearance between contact strips. This can be adjusted by slight bending of either contact.

SECTION 3

PICK-UP TRACKING ADJUSTMENTS

Should the pick-up at any time fail to track correctly it may be due to one of the following causes:-

- (a) Pick-up lead trapped or tight.
- (b) Cam following pin touching bottom of cam groove.
- (c) Striker feed lever resting on sub plate.
- (d) Chipped or damaged stylus.
- (e) Insufficient stylus pressure.

To cure any of the above possible faults proceed as follows:-

- (a) Check that pick-up lead is free and that there is sufficient slack when connected to muting switch.
- (b) Make sure that the cam following pin is not fouling the bottom of the cam when in the playing recess. To adjust, turn screw 5595 Fig. 4. Do not give too much clearance or the follower pin may jump out of the cam groove when cycling. The correct setting for the pin is to touch halfway up ramps A and C and to be clear in position B (see Fig. 2).
- (c) The striker feed lever must be free on its pivot (point A Fig. 4) and should touch the sub plate at the end under

SERVICE INSTRUCTIONS

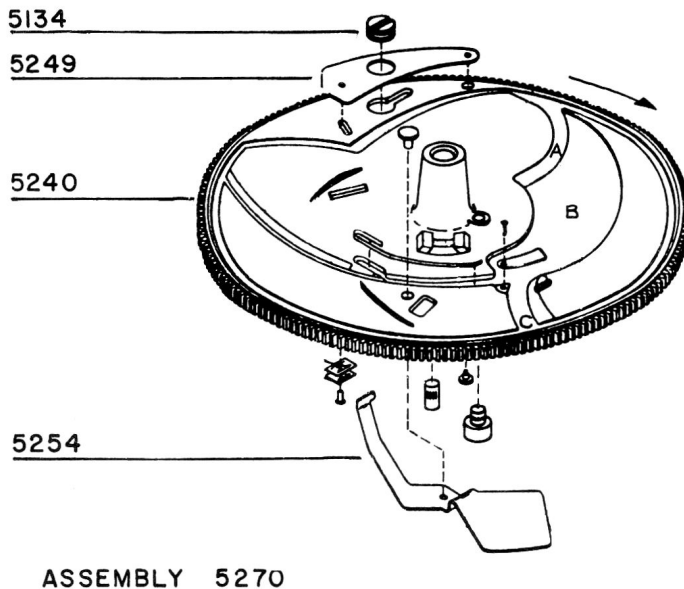


FIGURE 2 CAM GEAR ASSEMBLY

the strike arm (5115 Fig. 3). It should clear the sub plate by about 1/16" at the other end. If the clearance is too small, increase it by levering up the end of the striker feed lever with a screwdriver.

(d) To remove cartridge undo screw (2954 Fig. 7). Cartridge assembly will drop out. Pull lead sockets from cartridge. Reverse procedure to fit new cartridge.

WARNING: To avoid damaging cartridge, always remove sockets before soldering leads.

(e) Stylus pressure is controlled by spring 2958 Fig. 7. Adjustment is made by turning screw 2720, first loosening the locking screw. When using any of the "Studio" range of cartridges, the pressure of the stylus should not exceed 8 grammes.

SECTION 4

PICK-UP HEIGHT ADJUSTMENT

As the pick-up swings out over its rest during the change cycle, the top of the pick-up head should clear the underside of the next record by about 1/8".

To adjust this setting turn screw 2063 Fig. 4 clockwise to increase the height to which the pick-up rises. In counter-balanced arms a fine adjustment is provided through a hole in the top of the pick-up arm. When adjusting by the latter method ensure that depth of drop is sufficient, and that a single record can be played.

SECTION 5

RECORD DROPPING CHECK

Adjustment of the mechanism should not normally be necessary unless the machine has been dismantled. To check the adjustment, operate the start control, and turn the cam gear in the direction of the arrow (see Fig. 2) until the large diameter post on the cam gear pushes the dropping bar (Ref 5172 Fig. 4) to its extreme position. The record selector pawl (Ref. 4535 Fig. 4) should rise nearly to the top of the slot above the step on the spindle, and the pushing tip of the pawl should protrude slightly beyond the outer edge of the shelf.

NOTE: No more than the pushing tip of the pawl must protrude beyond the diameter of the spindle.

WARNING: Damage will occur if cam gear is turned in wrong direction.

SECTION 6

RECORD DROPPING ADJUSTMENT

A) Set diagonally slotted plate (Ref. 5172 Fig. 4) half way up its slot and lightly tighten the screws. By means of the cam, make sure the dropping slide is pushed forward to its fullest extent and adjust the pawl upwards by means of the self locking nut (Ref. 1276 Fig. 4) until a clearance of .015" is obtained between the pushing top of the pawl and the slot above the spindle step. Adjust the diagonally slotted plate until it can be pushed forward no further. Adjust stop (Ref. 3719 Fig. 4) to give .015" clearance between it and the bottom end of the pawl, and tighten the lock nut.

B) To remove the spindle and turntable spigot (Ref. 5624 Fig. 4) remove four socket head screws and lift the assembly clear of the dropping pawl. To replace, reverse this procedure. Adjust as in paragraph A.

C) To remove the record dropping pawl assembly (Ref. 4535 Fig. 4) unclip the spring (Ref. 2840) and remove the split pin from the pawl. Remove the spindle and spigot as in paragraph B and lift the pawl assembly clear. To replace reverse the procedure. Adjust as in paragraph A.

SECTION 7

SWITCHING ON FAILURE

Failure to start may be caused by bent or damaged switch spring contacts. DISCONNECT THE ELECTRIC MAINS. To examine, remove the cover of the switch. To increase contact pressure, bend both contacts towards each other.

SECTION 8

AUTOMATIC TRIP

This is a very sensitive velocity type trip. Failure to function may be due to tightness or dirt on the members. To correct this, remove the members and clean thoroughly. The members are held in place by circlips. Light oil may be applied at the pivots ONLY. Insure that no oil gets to the striker roller (on Ref 5115 Fig. 3) as oil causes the rubber roller to swell.

To check the action, tilt the sub plate 45°. Both levers should move through their full range by their own weight.

SECTION 9

PICK-UP REMOVAL

- Unsolder leads from muting contacts.
- Release leads from clip under sub plate.
- Lift pick-up arm high and slacken screws (Ref. 2608 Fig. 7).
- Lift pick-up clear of base plate.

SERVICE INSTRUCTIONS

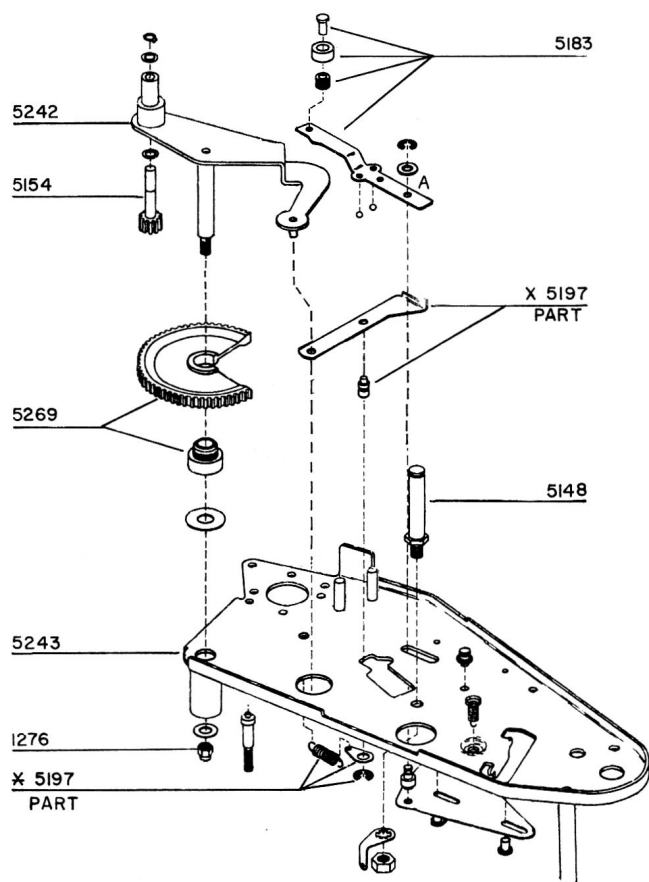


FIGURE 3 SUB PLATE ASSEMBLY

SECTION 10

PICK-UP REFITTING

- A) Thread leads through hole in base, and set swivel bracket (Ref. 1993 Fig. 7) over hexagon headed swivel (Ref. 5336 Fig. 4).
- B) Hold bracket down on swivel and tighten screws 2608.
- C) Check that pickup will sit on its rest and also travel to within 1" of record dropping spindle. To adjust this position, slacken the two set screws in the boss (Ref. 5339 Fig. 4), move the pick-up to its rest, and tighten the screws.
- D) Fix leads under clip and resolder to muting contacts.
- E) Check pickup height and adjust as in SECTION 4.

SECTION 11

REMOVING SUB PLATE

- A) Remove pick-up (see SECTION 9).
- B) Remove turntable (see SECTION 1).
- C) Remove the drive pulley, the larger of the two rubber pulleys, by loosening the two screws in the boss and lifting pulley off spindle.
- D) Remove three self tapping screws from turntable spigot housing, and two 4BA screws from around pick-up base.
- E) Unclip motor leads from clip near record spindle.

A hand should be placed under the sub-plate, as it is now free of the base plate.

SECTION 12

REPLACING SUB PLATE

- A) Reverse removal procedures C, D, E.
- B) Adjust drive pulley to contact the 45 RPM surface of the motor pulley, with ample clearance between bottom of rubber and top face of 78 RPM diameter.
- C) Refit turntable (see SECTION 1).
- D) Refit pick-up (see SECTION 10).
- E) Adjust pick-up height (see SECTION 4).
- F) Check record dropping (see SECTION 6).

SECTION 13

REMOVING CAM GEAR

- A) Lift pick-up positioning lever (Ref. 5343 Fig. 4) and turn clear of cam gear.
- B) Remove circlip at centre boss of cam gear.
- C) Lift cam gear clear of spindle.

SECTION 14

REPLACING CAM GEAR

- A) Push record dropping slide (Ref. 5172 Fig. 4) towards record spindle.
- B) Place cam gear on spindle and turn until locating roller (Ref. 5113 Fig. 4) fits into slot in cam.
- C) Replace washer and circlip.
- D) Replace positioning lever on cam.

SECTION 15

REMOVING INTERMEDIATE GEAR

- A) Remove cam gear (see SECTION 13).
- B) Remove nut (Ref. 1276 Fig. 3).
- C) Lift drive wheel release lever (Ref. 5242 Fig. 3) and lift intermediate gear from its spindle.

SECTION 16

REPLACING INTERMEDIATE GEAR

- A) Make sure steel washer is on spindle and place intermediate gear on spindle of drive wheel release lever, with small boss towards lever.
- B) Place the assembly on the sub plate with the spindle through the long boss on the sub plate and the pin of part 5242 through the hole in part 5197 (Fig. 3).
- C) Replace self locking nut 1276 and tighten to give .005" clearance between gear boss and sub plate.
- D) Replace cam gear (see SECTION 14).
- E) Check for reasonable backlash between gears.

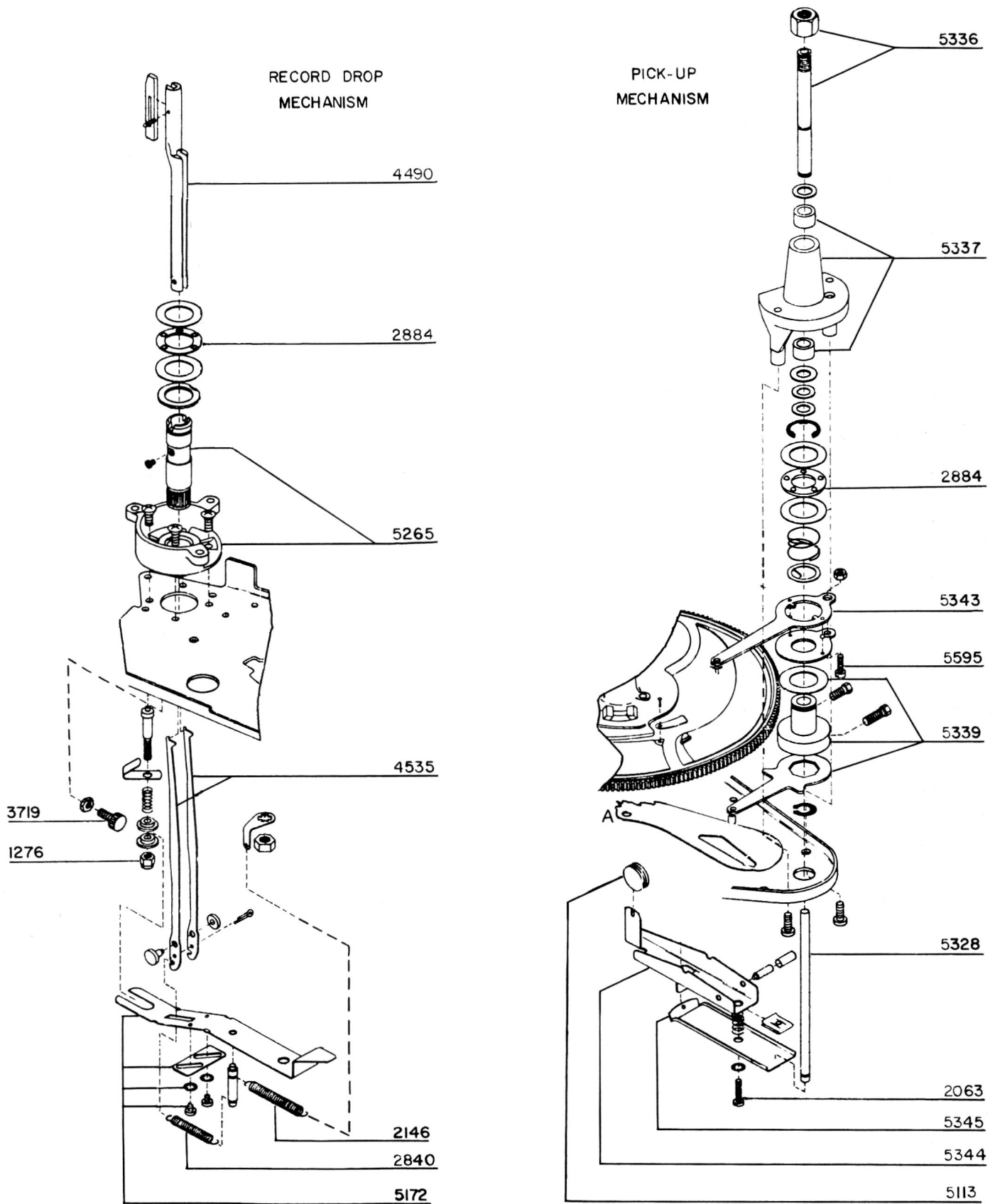


FIGURE 4

INSTRUCTIONS FOR DISMANTLING AND RE-ASSEMBLING 4-SPEED MOTOR UNITS

Figure in parentheses refer to the part numbers in Figure 5.

I TURNTABLE

REMOVAL

Remove circlip from turntable spigot. Lift turntable straight up with slight to and fro rotary movement.

REPLACEMENT

A) Check that ball thrust cage and washers are clean and lubricated with a small amount of light grease. Place ball race open side down with a steel thrust washer above and below. Neoprene washers are fitted outside the steel washers. The upper neoprene washer has a larger centre hole, and should be fitted in the boss of the turntable.

B) Check that fan and motor pulley are correctly located (see SECTIONS IV and V).

C) Check that the two large rubber wheels are retracted clear of the turntable rim (START-STOP switch to STOP).

D) Fit turntable on spigot and replace circlip. Check for free rotation of turntable.

NOTE: Take great care to keep oil or grease from the rubber pulleys and the inside rim of the turntable. Also keep the slider at the top of the record spindle clean. If the slider sticks, more than one record will drop.

II IDLER WHEEL (3199)

REMOVAL

A) Remove screw (126 and fibre washer (2514).

B) Withdraw idler wheel upwards from its spindle. Take care of fibre washers (2473) under the idler wheel.

REPLACEMENT

A) Reverse the removal procedure, taking care that all washers are correctly placed.

B) Check that idler wheel spins freely. Screw (126) should not be too tight.

C) Check that idler wheel runs true within the limits shown in SERVICING 4-SPEED MOTOR UNIT paragraphs 11-17.

III MOTOR UNIT

REMOVAL

A) Disconnect mains lead to motor.

B) Remove turntable (see SECTION I).

C) Remove switch cover, and slide the spring contacts off their locating lugs. Take care not to distort the contacts.

D) Uncouple the speed control link (3664) by removing the circlip.

E) Remove idler wheel (see SECTION II).

F) Detach circlip from post on idler slide arm (4403) and lift idler withdrawal link (4542) clear of post.

G) Remove the three bolts which secure the motor to the base plate. **NOTE.** ONE shakeproof washer is used under the head of the bolt nearest the turntable centre, and must be replaced there.

REPLACEMENT

Reverse the above procedure, and check SECTIONS II and I when replacing the idler wheel and turntable. Check also that fan and motor pulley comply with the requirements of SECTIONS IV and V.

IV MOTOR PULLEY

REMOVAL

A) Hold cooling fan (4429) stationary by inserting finger tip between blades.

B) Grip the motor pulley (4396) with thumb and finger, turn anti-clockwise and pull gently upwards. The coupling spring (3104) should come off with the pulley, but in any case should be separated from the fan boss for reassembly.

REPLACEMENT

A) Press the motor pulley (4396) into the coupling spring (3104) with an anti-clockwise twisting motion. The end of the spring without the projecting tail should sit firmly against the shoulder of the pulley.

B) Hold the cooling fan (4429) stationary with the finger tip.

C) Slide the pulley on to the motor spindle, so that the open end of the spring engages with the neck of the fan boss. Turn pulley anti-clockwise pressing gently down until the bottom of the pulley is firmly pressed against the top of the fan boss.

D) Check that motor spins freely, and that pulley runs true within the limits shown in SERVICING 4-SPEED MOTOR UNIT paragraphs 8-10.

NOTES:

1) Do not distort fan blades (see SECTION V).

2) The cooling fan is a drive fit on the motor spindle. It is located so that the motor pulley is at the correct level when pulley and fan touch. Do not press too hard on pulley.

3) To check the correct height of the motor pulley, make a tool from a piece of metal .049" x 5" x 3/8" (18 gauge). This should be laid flat on the unit plate so that it bridges the largest hole in the plate. The upper surface of the tool should just pass under the large flange of the motor pulley.

V COOLING FAN

REMOVAL

A) Remove idler wheel (3199) and motor pulley (4396) (see SECTIONS II and IV).

B) With a pair of bent levers, prise off the cooling fan (4429), pressing simultaneously on opposite sides directly under the fan boss. Take great care not to bend the motor spindle.

REPLACEMENT

A) If the fan boss is loose on the motor spindle pinch the split boss slightly to make a tight drive fit. Do not make too tight, or undue force will be required to fit the fan.

B) If the fan boss is too tight, drive a 3/16" rod with a tapered end through the boss before fitting to the spindle.

C) To fit the fan, use a driving tube of 9/32" bore, and tap gently on the fan boss, until the top of the split neck is 13/32" above the flat face of the motor frame. If the fan is too low, prise up as detailed in removal instruction.

D) Check all fan blades for correct clearance. The lower edge of each blade should be parallel to the motor frame with a gap of about 1/16" .

COLLARO CHALLENGER

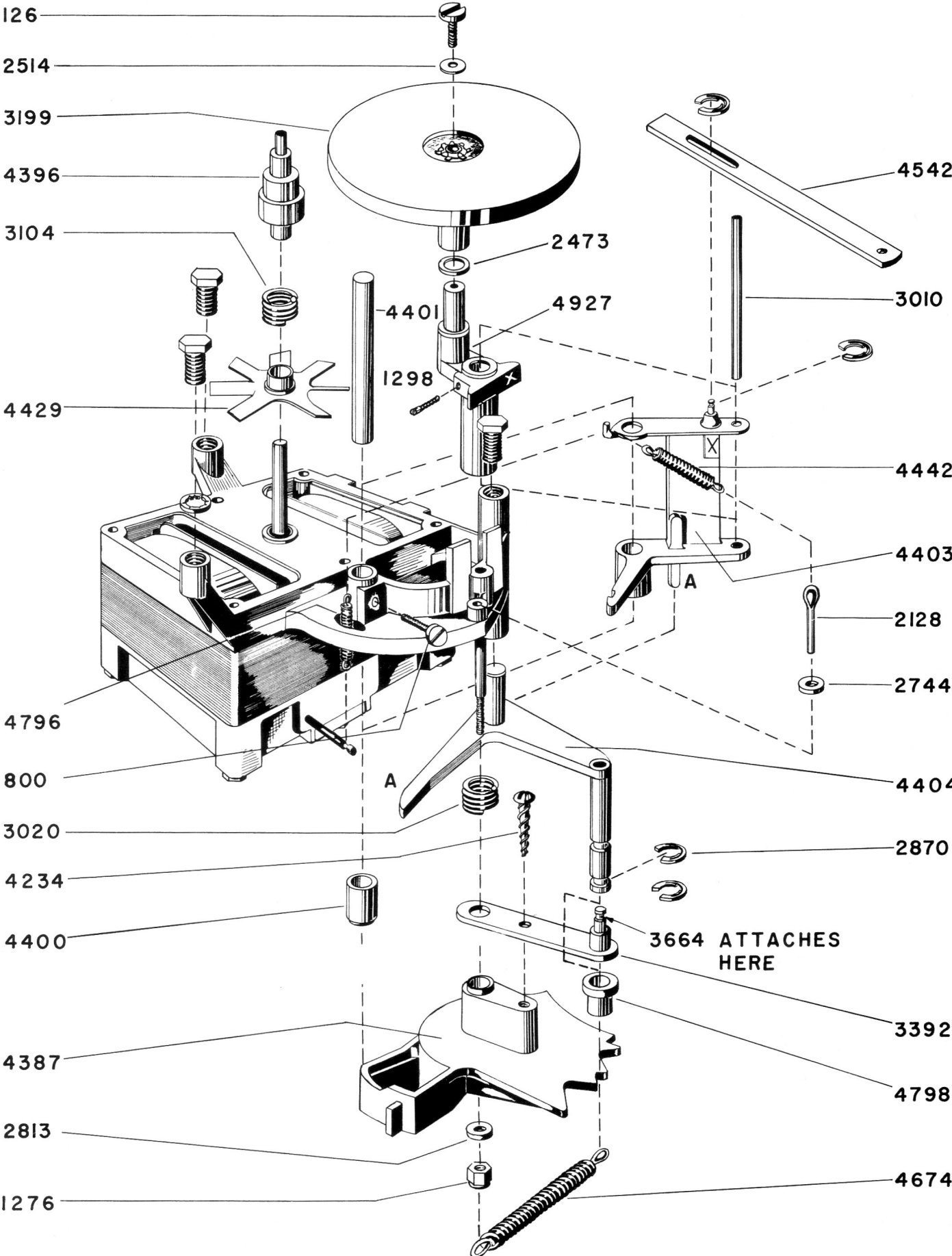


FIGURE 5 - MOTOR ASSEMBLY

COLLARO CHALLENGER

INSTRUCTIONS FOR DISMANTLING AND RE-ASSEMBLING

-(CONT'D.)

VI IDLER SWIVEL ARM

REMOVAL

- Remove idler wheel (3199) (see SECTION II).
- Loosen set screw (1298) two or three turns.
- Withdraw spindle (3010) upwards, and remove idler swivel arm (4927) sideways from idler slide arm (4403).

REPLACEMENT

- Reverse removal procedure.
- Spindle (3010) should be set with its ends equally proud of the outside of the idler slide arm (4403).
- Tighten set screw (1298) and check that swivel arm moves freely in slide arm.

VII IDLER SLIDE ARM

REMOVAL

The idler swivel arm may be removed or left attached to the idler slide arm.

- Remove idler wheel (see SECTION II).
- Detach circlip from post in idler slide arm (4403) and lift idler withdrawal link (4542) clear.
- Loosen set screw (800) two or three turns.
- Withdraw spindle (4401) upwards and remove idler slide arm (4403). The thrust collar (4400) is also released at the same time.

NOTE: Before pulling spindle (4401) through the top fork of the idler slide arm (4403) check for burrs caused by the set screw (800). If burrs are present, rub down with a small smooth file.

REPLACEMENT

- Reverse the removal procedure.
- The bevelled end of the thrust collar (4400) should be downward and in contact with the 4-speed control cam (4387).
- Set the spindle with its lower end flush with the flat bottom of the motor frame.
- Tighten set screw (800).

VIII 4-SPEED CONTROL CAM, IDLER WITHDRAWAL LEVER, etc.

REMOVAL

- Remove circlip and swing control link (3664) clear.
- Detach spring (4674).
- Remove self-locking nut (1276).
- Detach parts numbered 4400, 3020, 3392, 4387, 2813, 4234, 2870, 4798, 4404.

REPLACEMENT

- Assemble parts 4404, 4798, 2870 and fit assembly to motor frame. Ensure that limb A of idler withdrawal lever (4404) is behind peg A on the bottom of the idler slide arm (4403).
- Slide thrust collar (4400) on spindle (4401), bevelled end downward.
- Slide spring (3020) on to the plain portion of the spindle with the threaded end. This spindle projects down from the motor frame.
- Assemble parts 4387, 3392, 4234 and slide on to spindle with threaded end. Follow with washer (2813), self locking nut (1276) and spring (4674). Make sure that flange of roller (4798) rides on top surface of 4-speed control cam (4387).
- Replace control link (3664).
- Adjust working level of 4-speed control cam by means of self locking nut, (1276). Select speed 16 RPM. Adjust nut (1276) so that idler wheel (3199) is level with the top of motor pulley (4396). Check on all four speeds that idler wheel lines up with the appropriate surface of the motor pulley without touching the top face of the next diameter.

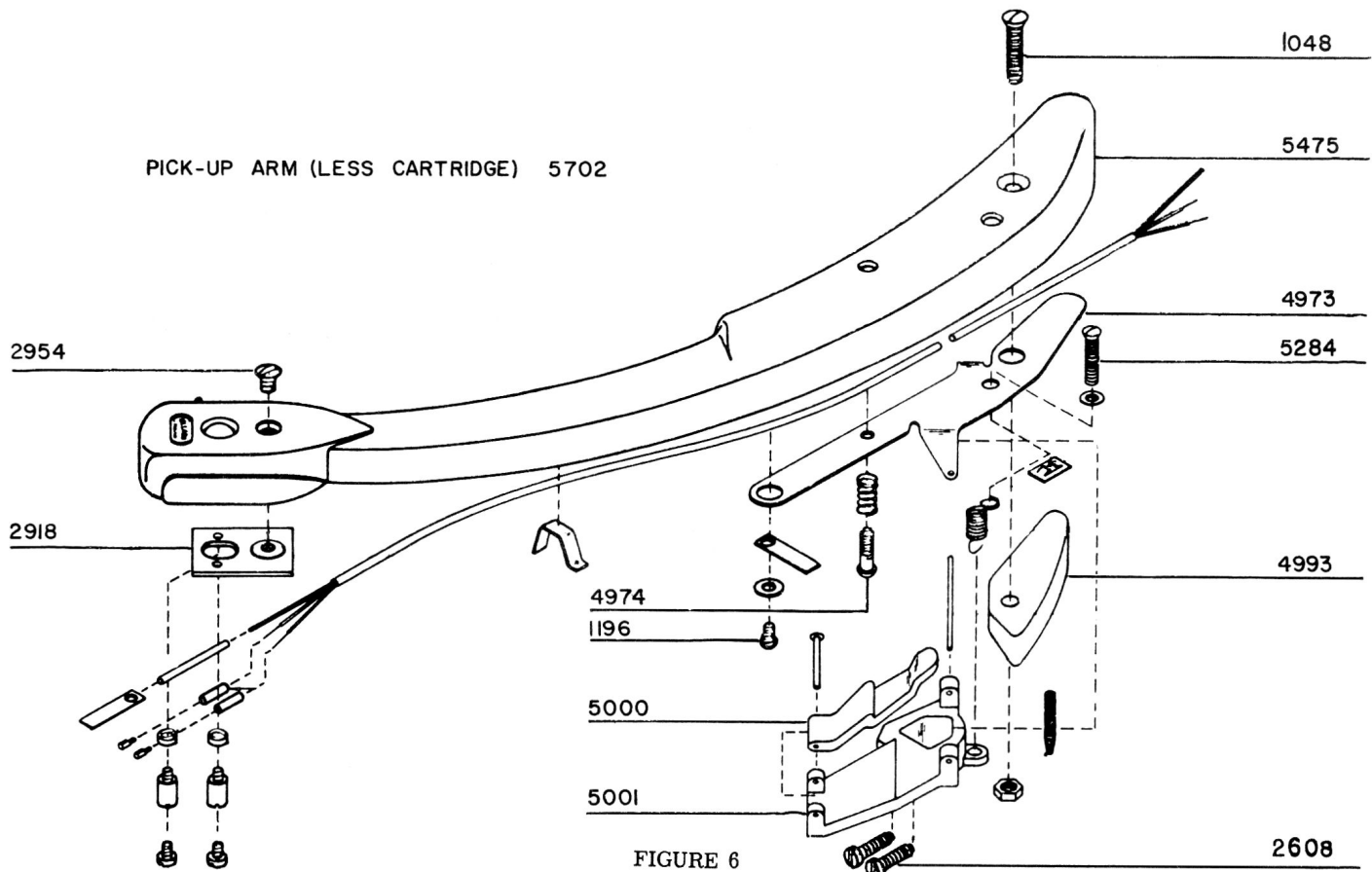


FIGURE 6

COLLARO CHALLENGER

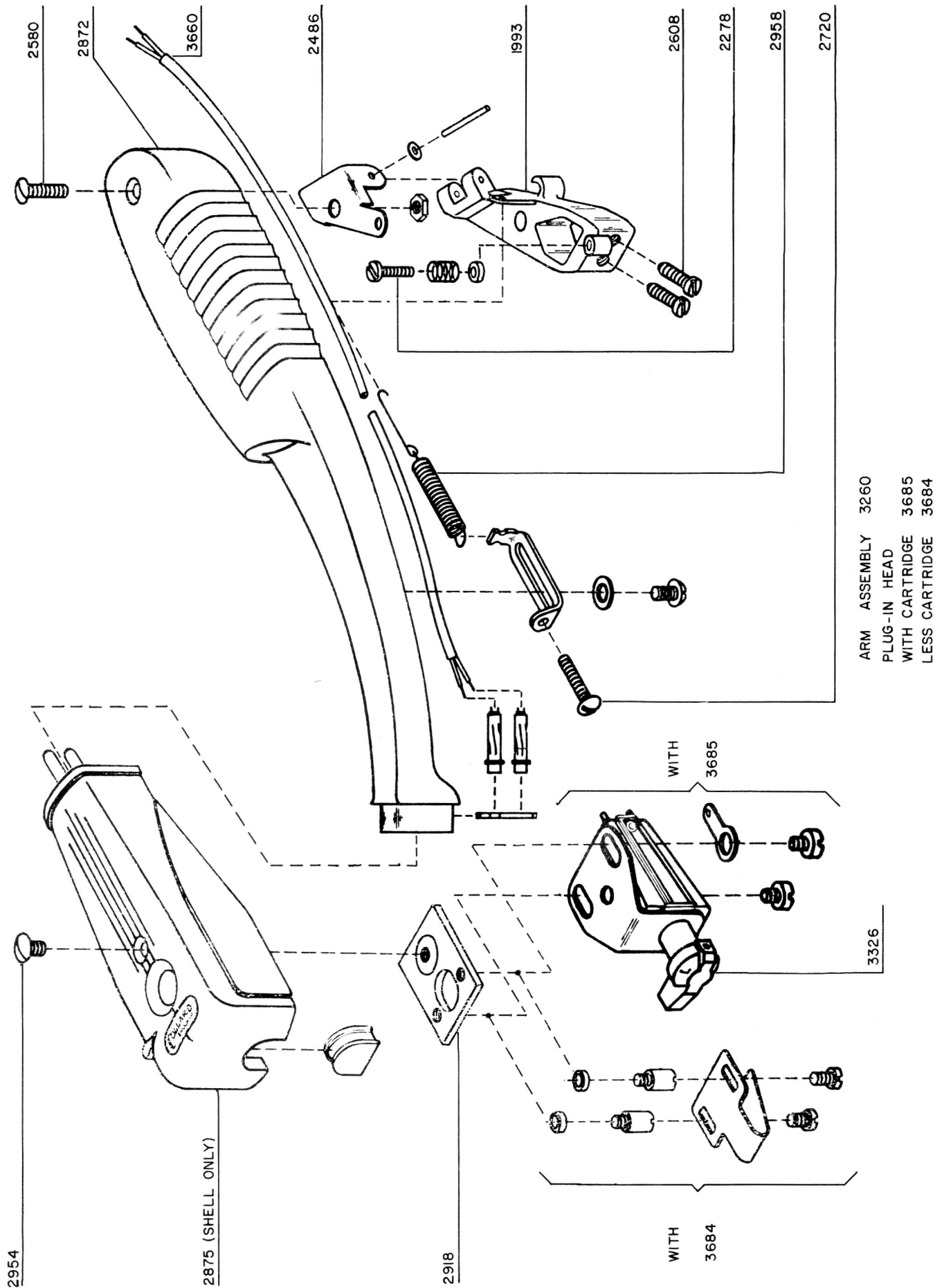


FIGURE 7

COLLARO CHALLENGER

CONDITIONS ESSENTIAL FOR SATISFACTORY OPERATION OF MOTOR UNIT. — The information given in the following pages is based on the tolerances and precautions actually observed in manufacture and assembly. While the Service man may not always have means at his disposal for

checking all the tolerances quoted, the information will, nevertheless, give a useful indication of the degree of accuracy considered necessary to ensure satisfactory reproduction of records, and so help him in the diagnosis of any faults encountered.

DIAGNOSIS OF FAULTS AND SUGGESTED REMEDIES

CONDITION	DEFECT	PROBABLE CAUSE	CORRECTIVE ACTION
<u>MOTOR</u>			
1 Motor must spin freely	Slow running Uneven speed	Bearings out of alignment	Tap motor lightly on all sides whilst running to align bearings.
2 Motor must run quietly	Noisy running Background rumble	Rotor not central in tunnel of stator	Loosen 6 clamp bolts(heads on under-side of frame). Insert 2 shims 1" by .01" between stator and rotor. Tighten clamp bolts. Remove shims.
<u>TURNTABLE</u>			
3 Inside or rim must be concentric within .006" and be free of irregularities.	Wow	Distorted turntable. Foreign matter on inside of rim.	Change. Clean.
4 Face (near rim) must run true within .01".	Wow	Distorted turntable. Displacement of rubber mat.	Test with truly flat 10" disc on turntable. Change. Correct.
5 Turntable bearing, with circlip in place, must have small end play - .015" maximum.	Slow running. Noisy running. Wow	Extra steel or neoprene washers, under turntable bearing. Incorrect washers.	If this is the cause, the fault will disappear when the circlip is removed from the turntable spigot.
6 Turntable must spin freely(a tight spot is indicated by a tendency to come to rest predominantly in one position).	Background rumble. Wow Slow running.	Dirty or dry bearing. Damaged steel thrust washer(3894). Damaged ball in thrust race. Ball binding in thrust cage(2884). Damaged ball cage binding on spigot No end play in bearing.	Clean and lubricate. Change. Change. Lubricate or change. Change. See 5.
7 Bearing must run silently and smoothly.	Noisy running. Rumble.	Same as 6. Omission of neoprene washer.	Fit neoprene washer.
<u>MOTOR PULLEY</u>			
8 Driving surfaces must be concentric to .002" and free of flats.	Flutter. Cross modulation.	Bent motor spindle. Enlarged bore in motor pulley. Burr on motor spindle.	Straighten or renew motor. Change motor pulley. File off burrs.
9 Must be close fit on motor-spindle.	Noisy running. Probably intermittent light rattling.	Enlarged bore in pulley. Undersized motor spindle.	Change motor pulley. Change motor.
10 Must be at correct level(controlled by position of fan). Must engage idler wheel correctly.	Wow. Slow running.	Upper face of idler wheel overlapping step of pulley. Lower face of idler wheel contracting flange of pulley.	Adjust position of idler wheel (See SECTION VIII). Adjust position of idler wheel (See SECTION VIII).
<u>IDLER WHEEL</u>			
11 Rim must be concentric to .002" and be free of flats.	Wow. Noisy running. (probably regular low thumping).	Distorted idler wheel. Rubber damaged at rim. Boss loosened in idler wheel. Foreign matter on rim.	Change idler wheel. Change idler wheel. Carefully peen over upper edge of boss. Clean.
12 Face (near rim) must run true within .005".	Wow.	Rim overrides step of motor pulley or touches top of next step.	Change distorted idler wheel. Tighten loose boss in idler wheel.
13 Wheel must spin freely.	Wow. Slow running.	Bush tight on spindle. Dry bearing. No end play.	Ream out or change idler wheel. Lubricate. Check washers.

DIAGNOSIS OF FAULTS AND SUGGESTED REMEDIES (CONT'D)

CONDITION	DEFECT	PROBABLE CAUSE	CORRECTIVE ACTION
IDLER WHEEL-Cont'd.			
14 Bearing must have end play .005" maximum.	Wow. Slow running.	Excessive end play. Tightness.	Replace missing washer(above or below) Remove extra washer.
15 Plane of wheel must be square to motor spindle.	Slow running and scurfing of rubber.	Distorted idler swivel arm(4927).	Replace.
16 Wheel must be centrally located on each diameter of motor pulley.	Slow running. Wow. Fails to engage at 78 RPM.	Rim overrides step of motor pulley or touches top of next step. Idler swivel arm(4927) fouls motor frame.	Check motor pulley height (See SECTION IV). Adjust position of 4-speed control cam (see SECTION VIII)
17 Wheel must clear top of spindle (4401) on 78 RPM.	No drive or uneven speed at 78 RPM.	Incorrect spindle (4401) position. 4-speed control cam wrongly set.	Locate spindle correctly (See SECTION VII). Adjust position of 4-speed control cam (See SECTION VIII).
IDLER SWIVEL ARM			
18 Must pivot freely on idler slide arm(4403). Max. end play .005" .	Low or uneven speed. Turntable not rotating.	Distortion of idler slide arm (4403). Spindle (3010) bent. Idler slide arm forks bent, pinching boss of idler swivel arm. Spindle (3010) fallen out of top fork of idler slide arm.	Check alignment of holes through which spindle (3010) passes. Straighten or change. Change idler slide arm. Relocate, and tighten grub screw (1298).
IDLER SLIDE ARM			
19 Must pivot and slide freely on spindle (4401) and move easily with spring (4442) when machine is switched on.	Low or uneven speed. Turntable not rotating.	Idler slide arm distorted. Idler wheel fails to engage.	Check alignment of holes. Check for bent spindle (4401).
20 Spindle (4401) must be at correct level in motor frame.	Uneven speed at 78 RPM. No rotation at 78 RPM.	Top of spindle touching idler wheel.	Locate spindle correctly (See SECTION VII).

GENERAL INFORMATION. - Apart from faults arising directly from the Pickup, the satisfactory reproduction of records is basically dependent upon the maintenance of correct and uniform speed. In order to achieve this, it is obviously necessary to maintain correct and uniform speed of the Turntable itself, but it is important to remember that uneven speed of the record track as it passes the stylus may arise from other causes such as:-

1. Enlarged centre holes in records resulting in eccentric rotation, causing excessive sideways swing of the Pickup Head.
2. Warping of records causing excessive up and down movement of the Pickup Head.
3. High spots on records or distortion, resulting in failure of the records to drive each other when used more than one at a time on Record Changers.

Before proceeding to investigate any faults on the basis

of the information above, it is essential to eliminate the above three possible sources. For this purpose the Service man is recommended to select and carefully preserve a set of test records in which he knows these defects to be wholly absent.

It is also important to make sure that the drive to the Turntable is not slipping, due to the presence of grease or oil on the driving surfaces of the Pulleys or the inside rim of the Turntable (See instructions for cleaning in Section I).

It will be of great assistance to the Service Engineer when tracing the source of "Wow" to remember that defects in the Turntable itself will, in general, cause "Wow" to occur regularly at Turntable speed whilst defects in the Idler Wheel will generally cause it to occur at approximately four times Turntable speed. These are not invariable rules; for example, the Turntable bearing may have tight spots in two diametrically opposite positions, thus causing "Wow" at twice Turntable speed.

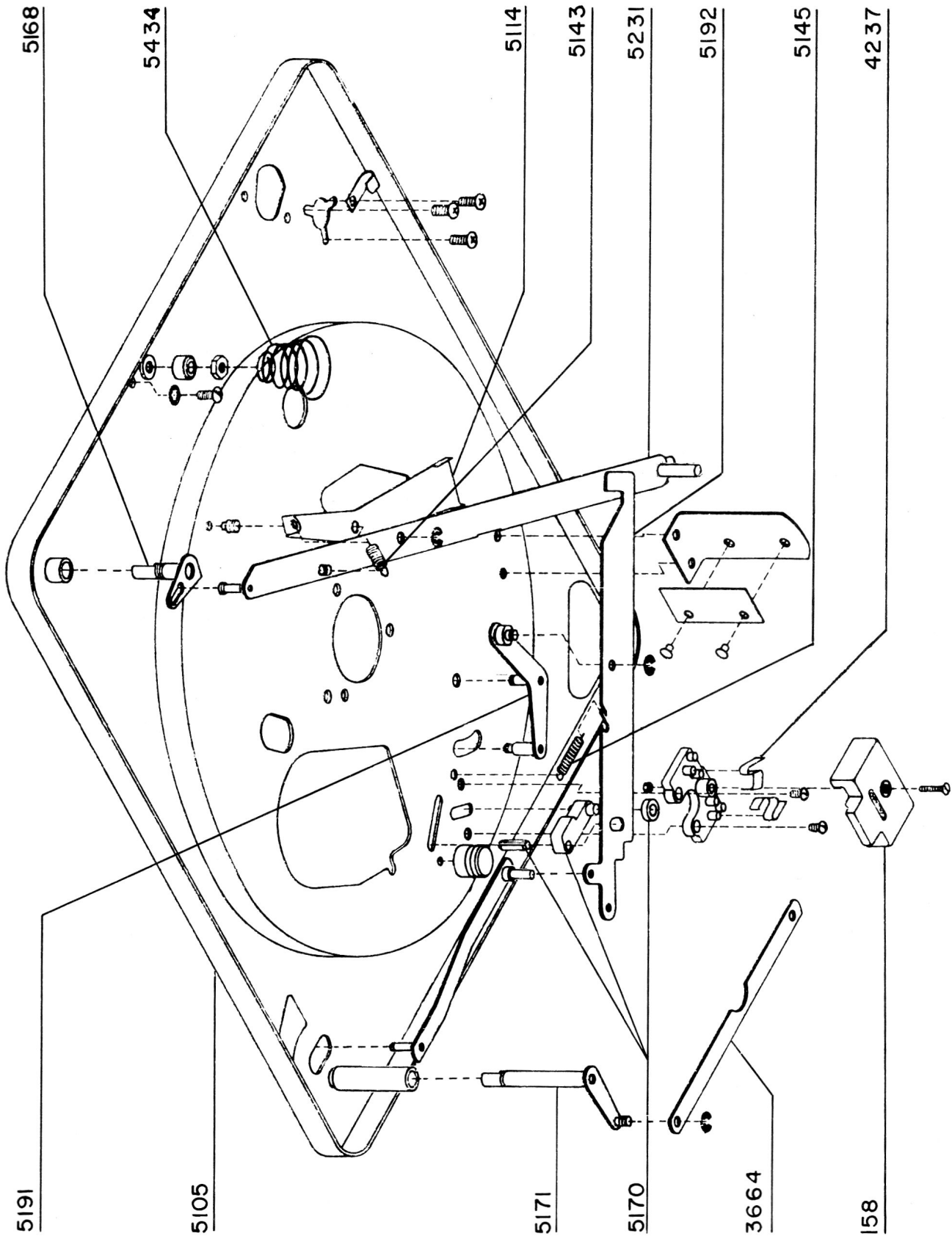


FIGURE 8 UNIT PLATE - UNDERSIDE

REPLACEMENT PARTS LIST

Insist on Genuine Factory Tested Parts, which are readily identified and may be purchased from Authorized Dealers.

REF. NO.	STOCK NO.	DESCRIPTION	REF. NO.	STOCK NO.	DESCRIPTION
		<u>MOTOR</u>			<u>SUB PLATE - Cont'd.</u>
800		Screw-4BA	3020	S-21186	P.U. Lift lever spring (adjusting)
1276	S-21597	Nut, Self-Locking - 4BA	3638	S-21594	Compression Spring (height adjustment)
1298		Screw-4BA	3785		Shakeproof terminal - 2BA
2128		Split Pin	5098	S-22158	Pawl adjusting plate
2744		Washer	5113	S-22161	Cam gear locating roller
2813		Washer	5117	S-22163	Striker feed lever
2870		Circlip	5141	S-22562	P.U. Lift lever spring (holding)
3010	S-21663	Spindle	5148	S-22146	Cam gear spindle
3020	S-21186	Spring, Compression	5154	S-22166	Drive pinion
3104	S-21183	Spring, Coupling	5172	S-22169	Slide and post assembly
3392		Speed Control Lever	5183	S-22170	Striker arm assembly
3664	S-21587	Speed Control Link	5197	S-22424	Gear lever link assembly
4234		Screw	5242	S-22179	Intermediate gear bracket assembly
4387	S-22149	4-Speed Control Cam	5243	S-22317	Sub plate assembly
4400	S-21698	Thrust Collar	5246	S-22180	Muting contact assembly
4401	S-22150	Spindle, Slide Arm	5269		Intermediate gear assembly
4403	S-21619	Idler Slide Arm	5342		Captive nut - 6BA
4404	S-21617	Idler Withdrawal Lever	5344	S-22430	P.U. Lift lever
4423	S-21677	Motor	5345	S-22431	P.U. Lift lever extension
4429	S-21616	Cooling Fan	5442		Tension spring (gear lever link)
4442		Spring Idler Tension	5594		Selector pawl stop
4463	S-22152	Swivel Bracket Assembly	5598		Cable Clip
4516	S-22154	Cam Lever Assembly	5673	S-22435	P.U. Lift Lever assembly
4674	S-22156	Spring, Compression	5134		Cam gear eccentric roller
4796	S-22157	Spring, Tension	5270	S-22171	Cam gear assembly
4798		Roller	5286		Cam gear spring blade
4927	S-22417	Idler Swivel Arm			
		<u>MOTOR PULLEYS - 50 CYCLE</u>			<u>PICK-UP PIVOT ASSEMBLY</u>
4389	S-21669	Red	1650		Screw
4390	S-21670	Blue	2262		Washer
4391	S-21671	Green	2278		Screw - 6BA x 3/8
4392	S-21672	Yellow	2884	S-21164	Ball race
5304	S-22426	Black	3894	S-21580	Thrust washer
			4998		Self-locking nut
			5013	S-22421	Ball 3/32
			5124		Washer
			5131		Circlip
4393	S-21665	Red	5212	S-22563	P.U. Feed lever compression spring
4394	S-21666	Blue	5298		Washer
4395	S-21667	Green	5328	S-22427	P.U. Lift spindle
4396	S-21668	Yellow	5329		Friction washer
5445	S-22432	Black	5334		Fluon washer
			5335		Hex, bolt
			5336		Tube and nut assembly
			5337	S-22428	Housing and bush assembly
126	S-21718	Screw-8BAx1/8	5339		Auto stop feed lever assembly
2473		Washer, Fibre 5/32	5343	S-22429	P.U. Positioning lever
2514		Washer, Fibre 3/32	5593		Felt washer
3199	S-20778	Idler Pulley	5595		Screw
3631		Screw-6BAx1/4	5597		Circlip
4542	S-22155	Idler Withdrawal Link	5679		Wavy friction washer
5102	S-22159	Drive Pulley-50 cycle	5690		P.U. Pivot assembly
5280	S-22425	Drive Pulley-60 cycle	5698	S-22436	Friction sub assembly
		<u>RUBBER PULLEYS</u>			<u>TURNTABLE SPIGOT, RECORD SPINDLE AND PAWL ASSEMBLY</u>
134		Nut - 2BA	1103		Washer
1251		Nut - 4BA	2825		Spindle locating screw
1252		Washer	2884		Ball race
1276	S-21597	Self-Locking Nut - 4BA	3894		Thrust washer
1979		Screw - 6BA x 1/8	4490	S-22153	Spindle and slide assembly
1992		Shakeproof Washer - 6BA	4491	S-21596	Selector pawl assembly
2063		P.U. Height adjusting screw	5096		Washer
2064		Striker rubber	5157		Circlip
2128		Split pin	5255		Self-tapping screw #6 x 3/8
2146	S-21174	Slide return spring	5261	S-22181	Spigot housing and spindle assembly
2298	S-21750	Washer	5265		Spigot housing assembly
2463	S-21595	Pivot boss (lift adjustment)			
2646		Washer			
2840	S-21177	Spindle pawl return spring			<u>UNIT PLATE AND CONTROLS</u>
2870		Circlip	158	S-22192	Switch cover
2871		Circlip	2052		Support bracket

Only items listed under stock numbers are available as Replacement Parts.

All parts subject to change or withdrawal without notice.

COLLARO CHALLENGER
REPLACEMENT PARTS LIST

Insist on Genuine Factory Tested Parts, which are readily identified and may be purchased from Authorized Dealers.

REF.NO.	STOCK NO.	DESCRIPTION	REF.NO.	STOCK NO.	DESCRIPTION
		<u>UNIT PLATE AND CONTROLS-Cont'd.</u>			<u>PICK-UP ARM (FIXED HEAD) Cont'd.</u>
2649		Switch base speed fix		S-22186	Cartridge - Collaro Studio 'O'
2839		Control knob clip		S-22187	Stylus 78 RPM
2870		Circlip 1/8		S-22188	Stylus 16, 33, 45 RPM
2871		Circlip 3/16			
2996	S-21191	Switch base			<u>PICK-UP ARM (DETACHABLE HEAD) -</u>
3297		Circlip 3/32			<u>(ALTERNATIVE PARTS)</u>
3395		Screw - 2BA x 5/16			
3409	S-22644	Switch base screw	46	S-21566	Screw
3957	S-21168	Control knob assembly (state colour)	1032		Connector clamp screw (head)
3991	S-21167	Pick-up rest (state colour)	1052		Soldering tag
3993		Pick-up rest clip	1197		Screw
4237	S-22454	Switch contact	1842		Compression spring (arm)
4432	S-22018	Speed control knob assembly	1971		Lead (head)
4542	S-22155	Idle withdrawal link	1993	S-21176	Counterweight (arm)
4642	S-21584	Manual control lever assembly	2251		Connector pin (head)
4900		Screw-6BAx1/2 countersunk (switch cover)	2252		Connector socket (arm)
		Unit plate	2253		Connector plate
5105		Manual control link	2278		Height adjusting screw
5111	S-22160	Control switch-off lever	2486	S-21157	Mounting plate (arm)
5114	S-22162	Control lever spring	2505	S-21558	Horizontal pivot pin (arm)
5143	S-22556	Control lever spring	2580		Screw
5145	S-22422	Manual control link spring	2720		Weight adjusting screw
5168	S-22167	Control plate and spindle assembly	2813		Washer
5170	S-22818	Switch link and contact assembly	2872	S-21562	Pick-up arm shell (state colour)
5171	S-22168	Speed control lever and spindle assembly	2875		Pick-up head shell (state colour)
5181		Unit plate assembly (state colour)	2916		Connector clamp (head)
5191	S-22172	Switch control lever assembly	2918		Cartridge attaching plate (head)
5192	S-22173	Manual operating link assembly	2953		Adaptor plate (head)
5231	S-22177	Control lever assembly	2958	S-21163	Tension spring (arm)
5434		Unit plate suspension spring	3260		Pick-up arm (less head)-(state colour)
5598		Cable clip	3325		Washer
		<u>PICK-UP ARM (FIXED HEAD)</u>	3326	S-22410	Cartridge knob
1048		Weight securing screw	3421	S-21564	Weight adjusting plate (arm)
1103		Washer	3684	S-21620	Plug-in head (less cartridge)- (state colour)
1196		Screw - 6BA x 3/16			Plug-in head (with cartridge) - (state colour)
1251		Nut - 4BA			
1739		Insulating sleeve			<u>BALANCING ARM</u>
1979		Cartridge holding screw			
2608		Swivel screws	3913	S-22145	Plastic shell
2649		Speed nut - 6BA	4205		Lift clip
2917		Screwed spacer	4975	S-22419	Compression spring
2952		Spacer	5131		Circlip
2954		Screw - 4BA x 1/2	5202	S-22174	Column assembly
3440	S-22413	Cartridge socket	5204	S-22175	Spindle
3660		Screened lead	5283		Pad
3834		Lead retaining clip	5284		Screw
4973		Mounting plate	5287		Cam
4974	S-22418	Height adjusting screw	5288		Buffer
4975	S-22419	Height adjusting lock spring	5291		Balancing arm assembly
4986		Horizontal pivot pin	5296		Screw
4993		Counterweight			
4999		Horizontal pivot retaining spring			
5000	S-22420	Lift cantilever			<u>TURNTABLE</u>
5001		Mounting bracket			
5003		Cantilever pivot			
5093		Lead clip	3574	S-21187	Turntable cover (maroon)
5284		Pressure adjusting screw	4368	S-22147	Turntable cover (black)
5475		Arm moulding (state colour)	4369	S-22148	Turntable cover (cream)
5596	S-22434	Pressure adjusting spring	4407	S-22151	Turntable assembly
5702	S-22437	Arm complete (less cartridge)	5131		Turntable retaining clip

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