

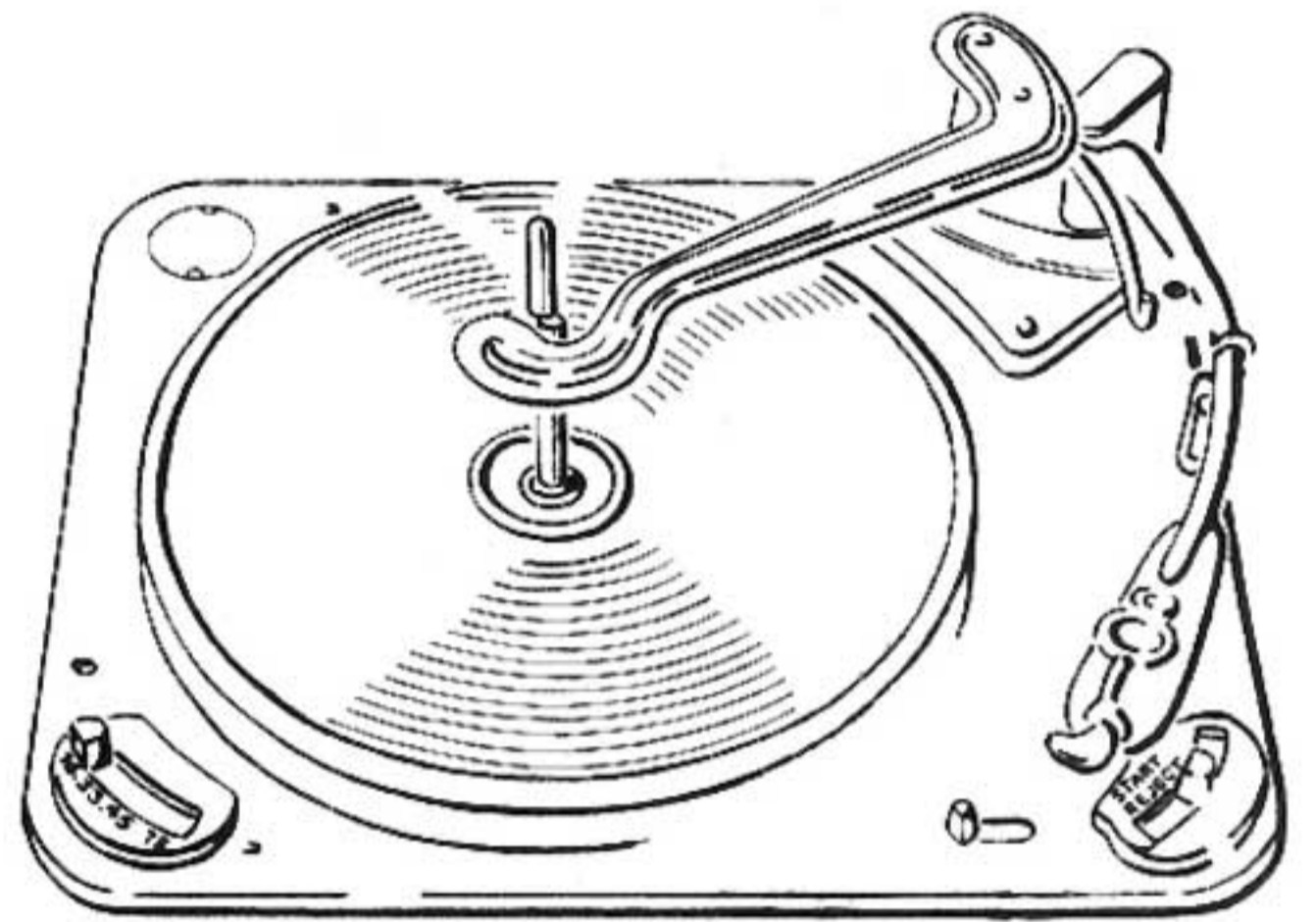


MODEL RC120/4H

S E R V I C E M A N U A L

FOUR SPEED AUTOMATIC RECORD CHANGER

MODEL RC120/4H



C O N T E N T S

	Page
Introduction	2
Operation	2
Principle of Operation	4
Installation	10
Maintenance	10
Reference numbers and description of parts ...	16

INTRODUCTION

This instrument is for operation on 195-255 volts, 50 cycles per second alternating current and will automatically or manually play any number of records, up to ten, of any one of the following types, at each loading :-

78 r.p.m. records, 10-inch or 12-inch; 45 r.p.m. records, 7-inch; 33 1/3 r.p.m. records, 7-inch, 10-inch or 12-inch; 16 2/3 r.p.m. records, 7-inch, 10-inch or 12-inch.

OPERATION

General

Do not operate the mechanism until you have carefully read the following instructions :-

1. Release the Pick-up Arm by unhooking its retaining device.
2. Ensure that the Stylus Control is in the correct position, and the Speed Change Switch correctly set.
3. Each loading of records for playing a programme of records automatically should be of the same playing speed and size.
4. Before placing any record on to the record spindle, lift the Record Steady Arm and move it to the right.
5. The Pick-Up Arm will not operate unless a record is placed on to the Record Spindle.
6. The mechanism may not operate on a few old records which have no lead-in and/or a concentric finishing groove.
7. Do not change the speed whilst the mechanism is operating.

Playing a Programme of Records

16 2/3 r.p.m., 33 1/3 r.p.m., 45 r.p.m. and 78 r.p.m. 7-inch, 10-inch and 12-inch records.

1. Set Manual/Auto control to "Auto".
2. Set the Speed Change Control to the required position.
3. Rotate the Stylus Control to the correct position so that the RED "33-45" marking is uppermost for 16 2/3, 33 1/3 and 45 r.p.m. records, and the GREEN "78" marking is uppermost for 78 r.p.m. records. Be very careful not to damage the stylus.
4. Place on to the Record Spindle, ten or fewer records of the same speed and size. The records should rest over the Record Latch near the top of the Record Spindle.
5. Move the Record Steady Arm, swing it inwards and rest it on top of the stack of records.
6. Move the START/STOP/REJECT control to the "START" position; the mechanism will play the programme of records and then come to rest.

7. When removing the records, do not grip but hold the records loosely and gently slide off the Record Spindle.

To Reject a Record

A Record can be rejected at any time during its playing by moving the START/STOP/REJECT Control to the "REJECT" position. The next record in the stack will then take its place.

Stopping the Mechanism

To stop the mechanism before all records have been played, remove the records stacked on the Record Spindle and move the START/STOP/REJECT Control to "REJECT". The pick-up will then lift off the record, return to its rest and the mechanism will switch off.

Playing a Single Record (Automatically)

To play a single record automatically, proceed as in "Playing a Programme of Records".

Playing a Single Record (Manually)

To play a single record manually, move MANUAL/AUTO Control to "MANUAL". Place record on turntable, carefully guiding it through contours of the record spindle.

Move START/STOP/REJECT Control to "START". The turntable will commence to revolve and the mechanism will go through a cycle of operation, then the Pick-up Arm will again return to its rest position and will be free to be operated by hand, and the turntable will still be revolving.

Carefully lift and place the pick-up on the smooth outer edge of the record where the run-in groove will guide the pick-up into the playing groove. At the end of the record, the pick-up will lift and return to its rest position. The turntable will still continue to revolve until the START/STOP/REJECT Control is moved to the "STOP" position. To revert to automatic working, move the MANUAL/AUTO control to "AUTO". If this is done whilst a record is playing, the pick-up will return to its rest position and the auto-stop will switch off the mechanism, after the record has been played.

If the control is moved to "AUTO" when the pick-up is on its rest, move the START/STOP/REJECT Control to "REJECT" position, and the mechanism will move into "AUTO" working condition and then switch off.

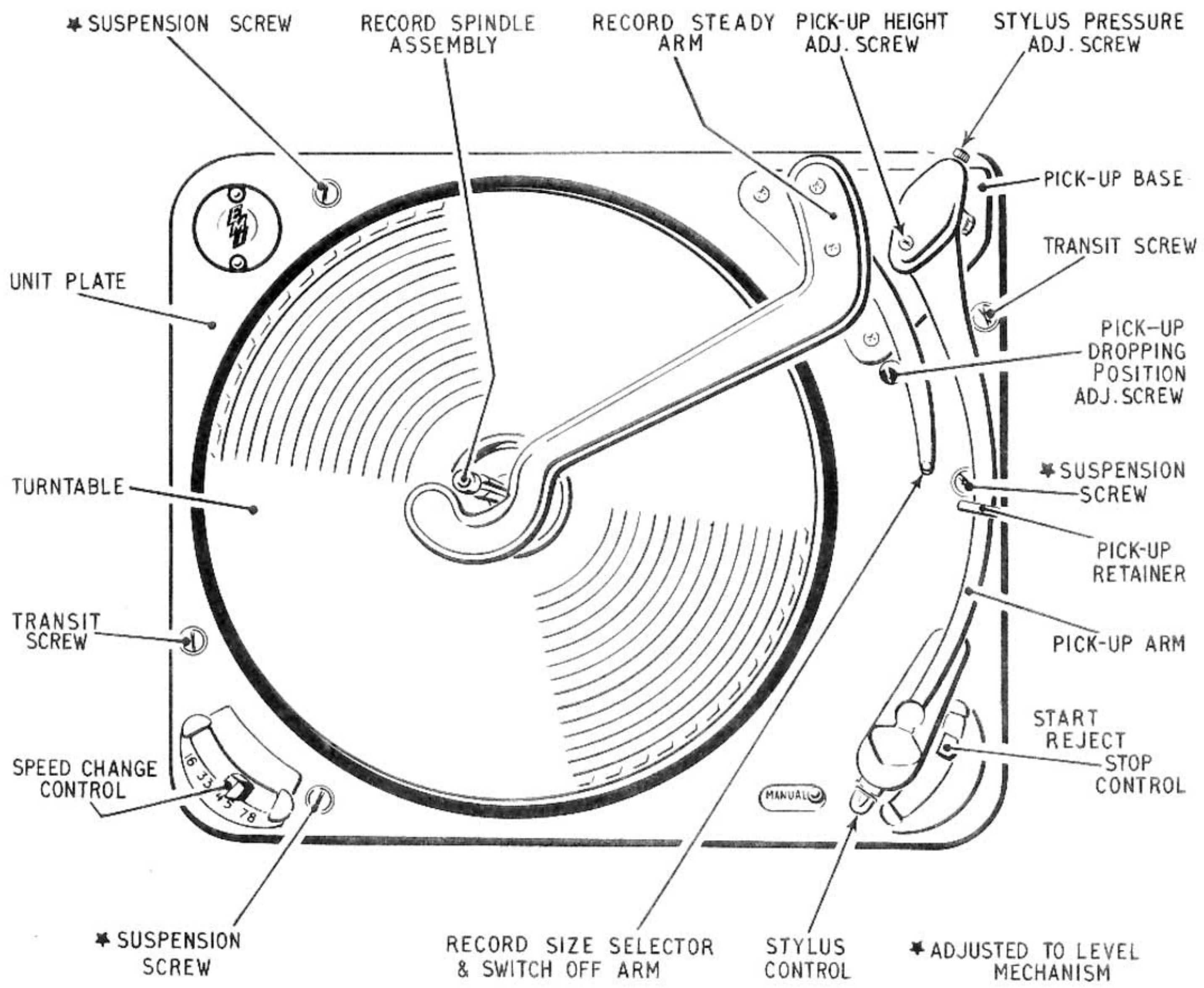


FIG. 1

PRINCIPLE OF OPERATION

(Figs. 2 & 4)

The complete changing mechanism centres round one cam and gear assembly, the gear being driven by a pinion milled in the turntable spindle and all the levers actuated by the two cams of the assembly. Approximately half an inch of the gear periphery is devoid of teeth and the mechanism is so timed that this gap in the periphery is adjacent to the turntable spindle pinion when a record is playing, also when the record changer is switched off, therefore the gear is not driven by the pinion and the changing mechanism is stationary.

One revolution of the main cam takes the unit through one complete changing cycle. Starting from the switched off position with the gap in the gear periphery coincident with the turntable spindle pinion, and a number of records on the record spindle, move the control knob to "Start". Via the system of levers Nos. 34 and 18, the switch dolly is moved into the switch, to switch on the motor, and the intermediate wheel is pulled by its spring No.40 and tension lever 24 into contact with the now revolving motor pulley and the turntable rim. The switch is held in the "On" position by the lip on the lever 18 engaging in the slot in lever 6 and being held therein by the tension on spring No.16.

A fraction of a second later the same initial movement of the control knob is communicated to the lever No.38 lifting it out of the hole in the main gear plate thereby releasing the gear plate and allowing the Impulse Lever No.66 to impulse the gear into mesh with the rotating pinion on the Turntable Spindle No.101 and so setting the changing mechanism into motion.

The impulse lever is under tension from the spring No.31 and performs the dual function of impulsing the gear into mesh with the turntable spindle pinion and at the end of the changing cycle acts as an overthrow lever to impulse the cam gear into the correct position to be ready for the next impulse to start the next changing cycle. This is done as follows :-

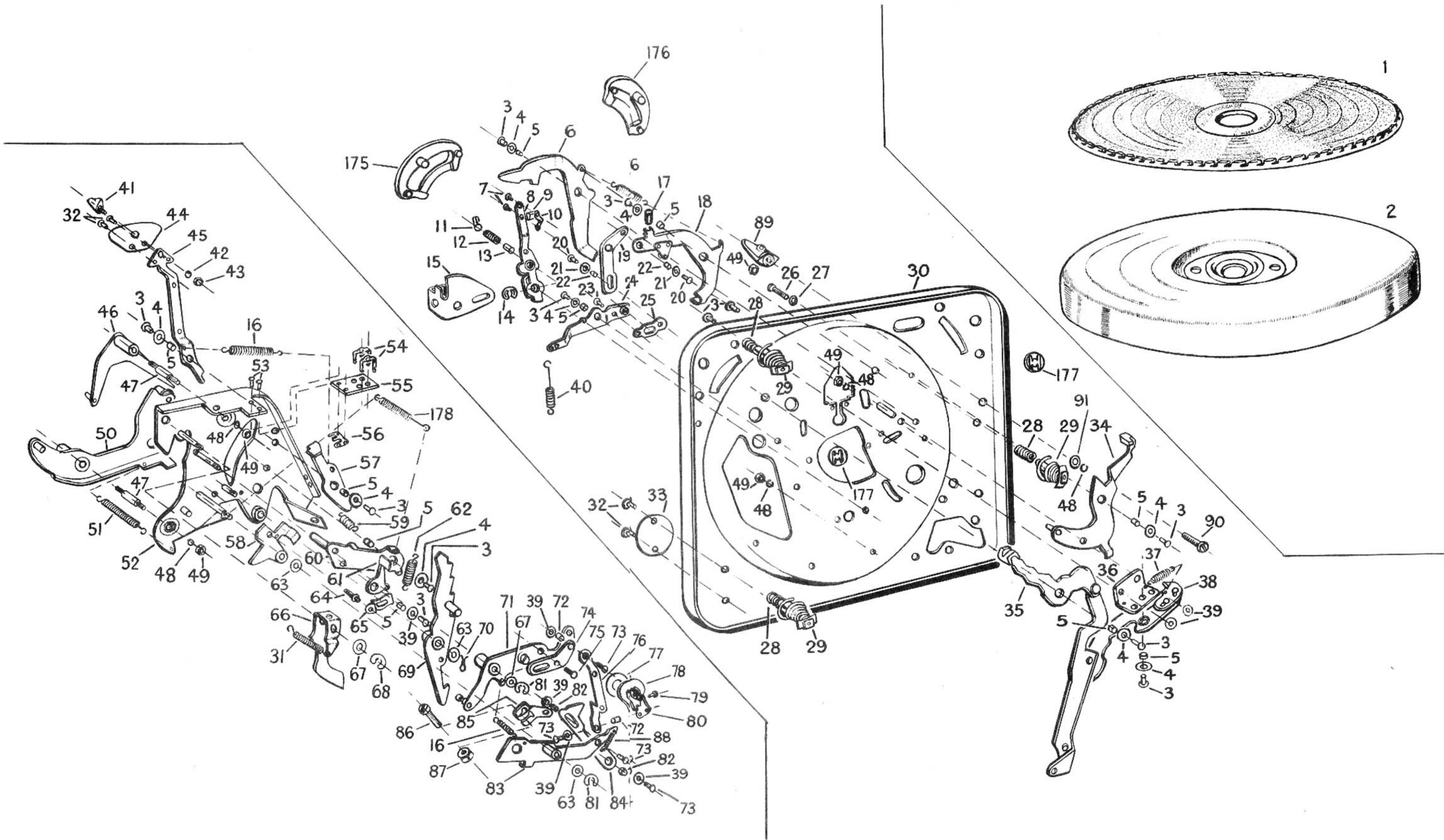
As the cam gear comes near the end of one complete revolution and thus one changing cycle, a peg on the cam makes contact with the impulse lever and by moving along an inclined face on the lever gradually moves it against the pressure of the controlling spring. The peg is timed to reach the end of the inclined face just after the changing cycle has finished, and the stylus has started playing the record, or the auto stop has switched off the motor, when the peg having passed beyond the end of the impulse lever releases the lever which now, under the power stored in its controlling spring, gives the peg an overthrow impulse so moving the cam gear assembly further round into its correct position.

Sequence of Changing Cycle with Records on the Record Spindle

As the cam gear commences to revolve the first motion is imparted by the lower cam to the lever No.71 and this lever via lever 76, lifting discs No.78 and lifting spindle 163 lifts pick-up arm off the pick-up rest. Next a peg protruding downwards from the upper cam makes contact with and pivots the re-setting lever No.58 which in turn moves the selector lever 69 into the manual position. The peg revolving beyond the re-setting lever and releasing it next makes contact with and pivots the lever No. 83, this lever via the spring 88, pulls inward the lever 84. This lever in turn moves the selector lever until the lever 84 is stopped by the Record Size Selector Arm coming into contact with the edge of the records on the record spindle, the bottom of the spindle from the Record Size Selector Arm carrying the pivot of lever 84. At this point the selector lever is in the correct position for the size of the record to be played. In order that the peg on the cam can continue to pivot the lever 83 after lever 84 has been stopped the spring No.88 relaxes allowing the two levers a measure of independent movement. The lever 83 is so shaped that after the peg on the cam has pivoted it and so brought the Record Size Selector Arm to the edge of the records on the record spindle, lever 83 is released quickly, and under tension of spring 16 the record Size Selector Arm is drawn clear of the record which is now due to drop to the turntable.

A peg on the lower cam now commences to move the lever 117 which controls the record pushing pawl situated inside the record spindle. This pawl, the lower end of which protrudes downwards through a hole in lever 117, when pivoted by the lever 117 moves outward from its slot in the record spindle and pushes the lowest record off the step in the record spindle whereupon the record descends down the spindle to the turntable, the dispersion of air underneath the record acting as a cushion to ease the descent of the record. The remaining records on the record spindle press down the pawl until the lever 117, under the control of the peg on the lower cam, moves the pawl back into the slot in the record spindle when the pawl, under the controlling pressure of a small spiral spring 111 fitted on the lower end of the pawl and held in position by the face of lever 117, pops up inside the centre hole of the next record ready to push that record off the spindle step in the next changing cycle.

Immediately the record has descended to the turntable, the contour of the upper cam commences to release the swing lever No.50 which



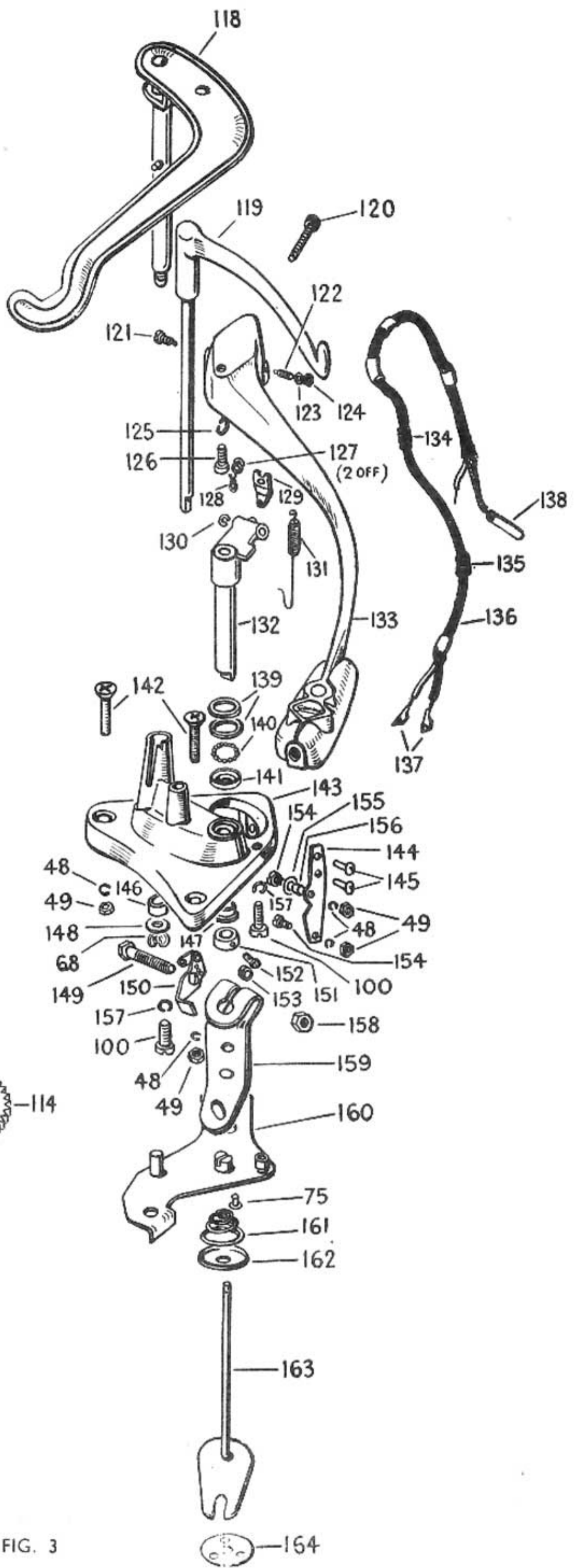
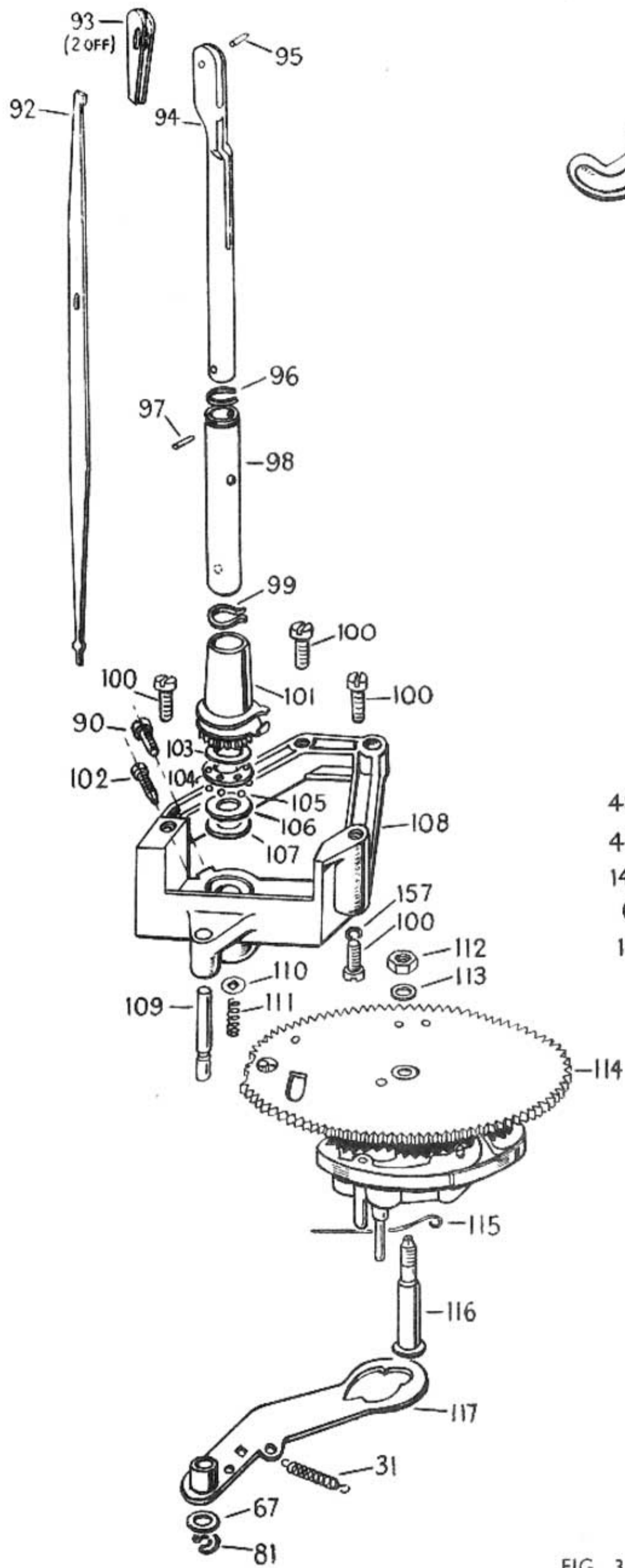


FIG. 3

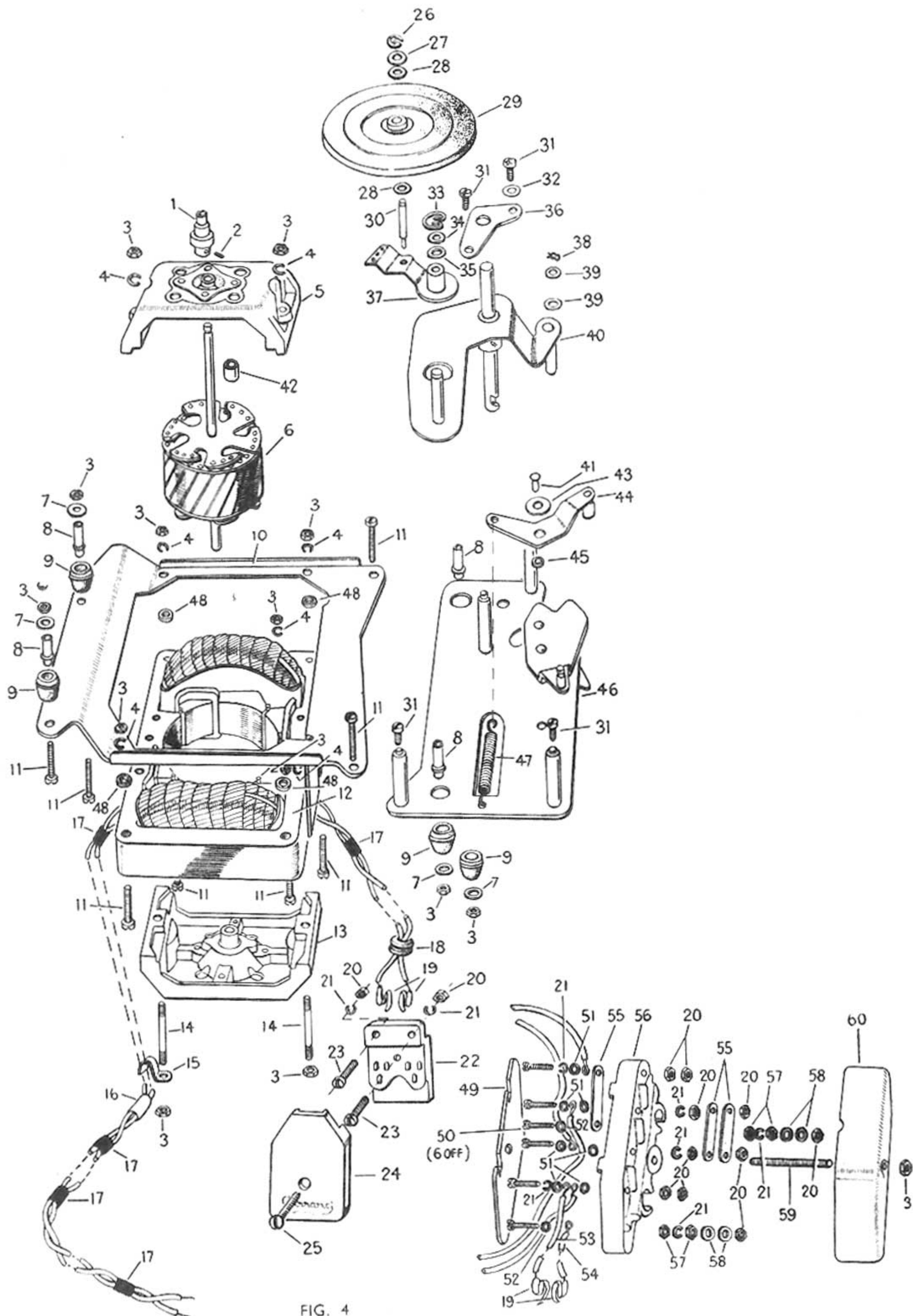


FIG. 4

in turn releases the pick-up arm mechanism thereby allowing spring 178 to pull in the pick-up arm until lever 61 is engaged by the step on the selector lever corresponding to the size of the record to be played. Whilst the swing lever continues to move completely clear of the pick-up arm mechanism to allow the pick-up arm complete freedom to play the record, the lower cam via lever 71, link 76, lifting pad 78 and lifting spindle 163 gently lowers the pick-up on to the record. Immediately the pick-up has been lowered to the record, the cam commences to tension the impulse lever, under pull from spring 31, which lever a fraction of a second later impulses the cam into the free position, the lever 38, dropping into the slot in the cam gear plate to hold it in this position leaving the turntable free to revolve and play the record.

Final Switch-Off Mechanism

If there are no records on the record spindle, the lever 84 moves right in moving the selector lever 69 far enough to engage the swing lever 50 thus preventing the swing lever 50 from following the usual playing track in the cam unit and causing it to travel round the outer switch-off track instead. In this track there is a high node which moves swing lever 50 a little more than when the records prevent the switch-off arm travelling right in. This extra movement engages 50 with the formed end of the catch lever 6 giving it a slight push which releases the switch lever 18 from the slot in the end of the catch lever 6 thus switching off the motor and applying the turntable brake.

Action of Manual Control

Move Auto/Manual lever to manual position. This action moves lever 57 slightly towards the centre of the unit under the pull of spring 16 which is attached to the Auto/Manual Control lever 45 and to the pin on the end of the lever 57 protruding through a hole in the mounting plate. Move Start/Stop/Reject knob to start position when the normal sequence of operation follows except that the selector lever 69 moves by the re-setting lever 58 contacts the tail of lever 57 which relaxes under spring 16 allowing the tail of the selector lever 69 to pass. Immediately lever 57 springs back into position locking the selector lever in the manual position, leaving the pick-up arm mechanism free and turntable revolving. The Record Size Selector Arm is unable to move in normally as lever 84 is locked against the pin on the selector lever 69 spring 88 relaxing in the normal manner as previously described. At the end of the record the auto-trip will operate normally and return the pick-up arm to the pick-up rest ready to be placed on the next record.

Speed Change Mechanism

The speed change is effected by means of a series of levers, controlled by the speed change knob, which move the position of the intermediate wheel in relation to the stepped motor pulley. The controlling factor of the speed obtained is in the size of the steps of the motor pulley. The diameter of the intermediate wheel having no relation.

Auto Trip

The automatic trip mechanism operates on the velocity principle, i.e., it is brought into operation by the acceleration of the pick-up as the stylus enters the run off or eccentric groove on the record.

When playing a record, the operating lever 8 is moved towards the turntable spindle by the movement of the pick-up arm and is set to come within the orbit of the striker on the turntable spindle when the stylus point has reached a radius of $2\frac{1}{8}$ " from the turntable spindle centre. As the pick-up arm moves inward lever 160 being attached to the pick-up spindle also moves inward. The lever 160 makes contact with one end of the V shaped interlever 46 and commences to move it. The other end of V shaped interlever carries a pin which passes up through the unit plate and is linked to the friction plate 15 which in turn slowly moves under the impulse of the tracking pick-up. The operating lever 8 is delicately pivoted on the friction plate and is moved by the friction between the surface of the friction plate and the small felt pad 13 in the bottom of the screw 12 in the operating lever.

This screw is easily recognisable by the spring clip 11 surrounding it. As the friction plate is moved inwards it carries in the operating lever until the felt pad 9 in the end of the operating lever nearest to the turntable spindle comes within the orbit of the revolving striker on the turntable spindle. As long as the pick-up is only advancing towards the centre at the rate of one playing groove per revolution of the turntable, the felt pad is brushed back by the striker out of its orbit, the delicate friction drive between the felt pad in the screw and the surface of the friction plate relaxing to allow the two contrary movements to take place together. When the pick-up enters the run-off groove on the record, the increased velocity imparted to the pick-up and from the pick-up, via the lever previously mentioned from the operating lever, moves the felt pad in the operating lever completely inside the orbit of the striker which now, instead of brushing the pad back out of its orbit, passes underneath the clip holding the felt pad and lift up the operating lever. The operating lever then in turn lifts lever 38 which releases the cam gear and impulse lever so recommencing the changing cycle as described under "Principle of Operation".

INSTALLATION

Auto-Mechanism Transit Screws (Fig. 5)

Remove the two transit screws from the Base Plate so that the mechanism is free to float on its mounting. These screws are :-

- (a) The only screw on the left side edge of the Base Plate.
- (b) The same type of screw on the right side

edge of the Base Plate adjacent to the Pick-Up base assembly.

Then check the level of the unit, when the unit is finally installed, by placing a spirit level on a record on the turntable. If incorrect, the unit can be adjusted by turning the suspension screws - clockwise to lower the unit, and anti-clockwise to raise it.

MAINTENANCE

GENERAL

Oiling

The Motor and intermediate wheel bearings being of the oil retaining type rarely need lubricating.

When the need for oil is apparent, hold the intermediate wheel out of the way and lubricate the top and bottom motor bearings with a spot of fine grade of light machine oil. The main oiling points are indicated in Fig. 2 and care should be taken to remove all traces of surplus oil before running the unit.

It is essential that the intermediate wheel rubber tyre, motor pulley and inside of turntable rim must be kept free from oil or grease, otherwise the drive will slip.

It is recommended that occasionally a smear of light grease, such as vaseline, be applied to all cam faces, and all lever pivots light lubricated.

Pick-up Stylus Pressure (Fig. 1)

When playing microgroove records, it is important that the stylus pressure should be adjusted for 10 grammes and it is recommended that the stylus pressure be checked with a good quality pressure gauge, when setting up the changer for use after having carried out any adjustment. The stylus pressure can be adjusted by turning the screw at the rear of the pick-up arm to which the counter-balance spring is attached. This screw should be turned clockwise to reduce pressure and anti-clockwise to increase it.

Care of Stylus

The stylus point may collect dust, etc., and cause poor reproduction. If this should occur, the point should be carefully cleaned by brushing with a small soft brush.

Replacement of Stylus

Should reproduction become rough or distorted, the unit should be switched off and the pick-up stylus examined under a microscope to check up for wear or damage. A fracture of the point is quite easily discernible, but a chip, especially on the .001" radius microgroove sapphire, is very difficult to

observe. If suspected, try playing an old microgroove record and carefully note if any cutting is taking place. However, the most satisfactory and safest method if the stylus is suspect, is to replace it with a new one.

Note: A continuity test cannot be carried out on crystal cartridges with an ohmmeter.

When it becomes necessary to replace a stylus, the following method should be adopted.

Lift the pick-up arm to a semi-vertical position where the pick-up cartridge will be seen on the underside.

Grip the rear of the stylus blade by the thumb and forefinger and withdraw from the plastic retaining block.

Care should be taken when fitting the replacement stylus to ensure that it is properly seated on the plastic coupling block.

When replacing a stylus, use the correct type, i.e., GC2/3 stylus (Green) for 78 r.p.m. records, GC2/1 stylus (Red) for 16 2/3, 33 1/3 and 45 r.p.m.

RECORD CHANGER UNIT

To Remove Turntable

To lift off the turntable remove the retaining clip, and the turntable can then be removed by carefully lifting with equal pressure on diametrically opposite sides. Turntable should be replaced with the changer in switched off position.

If the turntable cannot be lifted, while maintaining upward pressure around the rim, an assistant should give the record spindle a light downward blow with the wooden handle of a screw-driver, when the turntable will lift easily.

Auto Trip Adjustment

When the Auto trip does not operate, first see that the records in use have a run-off groove - eccentric or otherwise - of at least 3/16" as there are a few records of old recordings still in existence with run-off grooves under this dimension

and some without a run-off groove. The auto trip may not operate with these non-standard records and the reject knob should be used at the end of the record. If the records are correct, check the position of the operating lever in relation to the cam face on the striker. The height of the operating lever is correctly set when the thin edge of the felt pad in the end of the operating lever engages approximately half-way up the cam face on the striker as it revolves. To obtain the correct setting, turn the adjusting screw 12 to raise or lower the lever as required. See also that the felt pad in the end of the operating lever is projecting a small amount from the lever face - $3/64$ " maximum - and that its surface is clean and free from ragged edges.

Examine the operating lever to ensure that it is perfectly free on its pivot by lifting it off the friction plate. The surface of the friction plate should be perfectly clean and the use of oil at this point is not recommended as it will in all probability produce a sticky surface on the friction plate and make the action of the auto trip heavy.

A grating noise from the motor may be due to foreign matter in the air gap between the rotor and stator. To correct this, first remove the motor pulley, unscrew the two nuts holding the bottom rotor bearing bracket and withdraw the rotor.

Clean the rotor and the tunnel in the stator and carefully examine for small metal chips. A metal chip causing a grating noise may not be too easy as it sometimes rests against the lamination and only projects when the current is switched on. Clean the bearings and before replacing the rotor, put a spot of fine machine oil on the bearing surfaces of the shaft.

Should an intermittent squeak be heard when the changing cycle is taking place, observe which lever is moving at the time the noise is heard and lubricate its pivot. If it is engaging with another lever, put a drop of oil on the point of engagement.

When testing the speed of the turntable, check the speed when the pick-up is playing a record. It will be noticed that the motor speeds up slightly when the pick-up is removed. Great care must be taken to see that the surfaces of the motor pulley, intermediate wheel and turntable rim are kept free of oil.

Speed Variation

If the speed of the first record played is correct, but the speed of succeeding records becomes erratic, the trouble is almost certainly due to record slip taking place.

Record slip may be due to warped records or incorrect stylus pressure. If the stylus pressure on microgroove records is in excess of the recommended 10 grammes, they will tend to slip and the pressure should be adjusted with an accurate pressure gauge. With slightly warped records, slip can be

greatly reduced by sticking a small transparent stamp hinge or piece of stamp edging on the outer edge of each record label. These stamp hinges will tend to key together on adjacent record surfaces and will usually provide sufficient key to drive the records. Should speed variation occur with the first record on the turntable, which cannot slip, the driving surfaces of the intermediate wheel, motor pulley and turntable rim should be examined for the presence of oil or grease which could cause the drive to slip. If any trace is found it should be removed by thorough cleaning.

Mechanical Noise (Fig. 5)

Should the changer become noisy when running, the cause may be dry bearings and all points indicated on lubrication chart should be lubricated with fine machine oil. All surplus oil must be carefully wiped off.

Flats on the rubber tyre of the intermediate wheel will cause a bumping noise when the unit is running and to cure this trouble, the intermediate wheel should be replaced. The flats can be caused by holding the turntable stationary with the motor switched on and this should be avoided.

Should a bump be heard every revolution of the turntable within the commencing radius of the auto trip mechanism, the cause will in most cases be dirt or congealed oil and foreign matter on the friction plate. To cure this trouble, the adjusting screw No.12 should be removed, the felt pad 13 in the end cleaned or replaced and the surface of the friction plate cleaned. A spot of medium grade oil may be applied to the operating lever pivot.

Motor Speeds

The Motor used on this mechanism is of the induction type and the frequency of the supply is the principal controlling factor in maintaining the correct motor speed. However, as the motor is not completely synchronous, the load applied to the motor also affects the speed and should the turntable run slow, first see that the motor shaft, intermediate wheel and turntable spindle are free.

See that the cam faces are not dry - they should have a smear of light grease such as vaseline on the bearing faces.

Electrical Noises (Fig. 7)

After switching off, examine the switch contacts by removing the bakelite cover of the switch. It is held in position by one screw. Examine the make and break of the contacts by operating the switch knob and if necessary carefully bend the contacts so that they move outwards about $1/32$ " when the moving contact moves between them. All the contacts should be thoroughly cleaned and a very light trace of vaseline put on the contact surfaces of the two switch blades.

Bad contact in the pick-up circuit may also be the cause of crackle in the reproducer and the plug connections, soldered

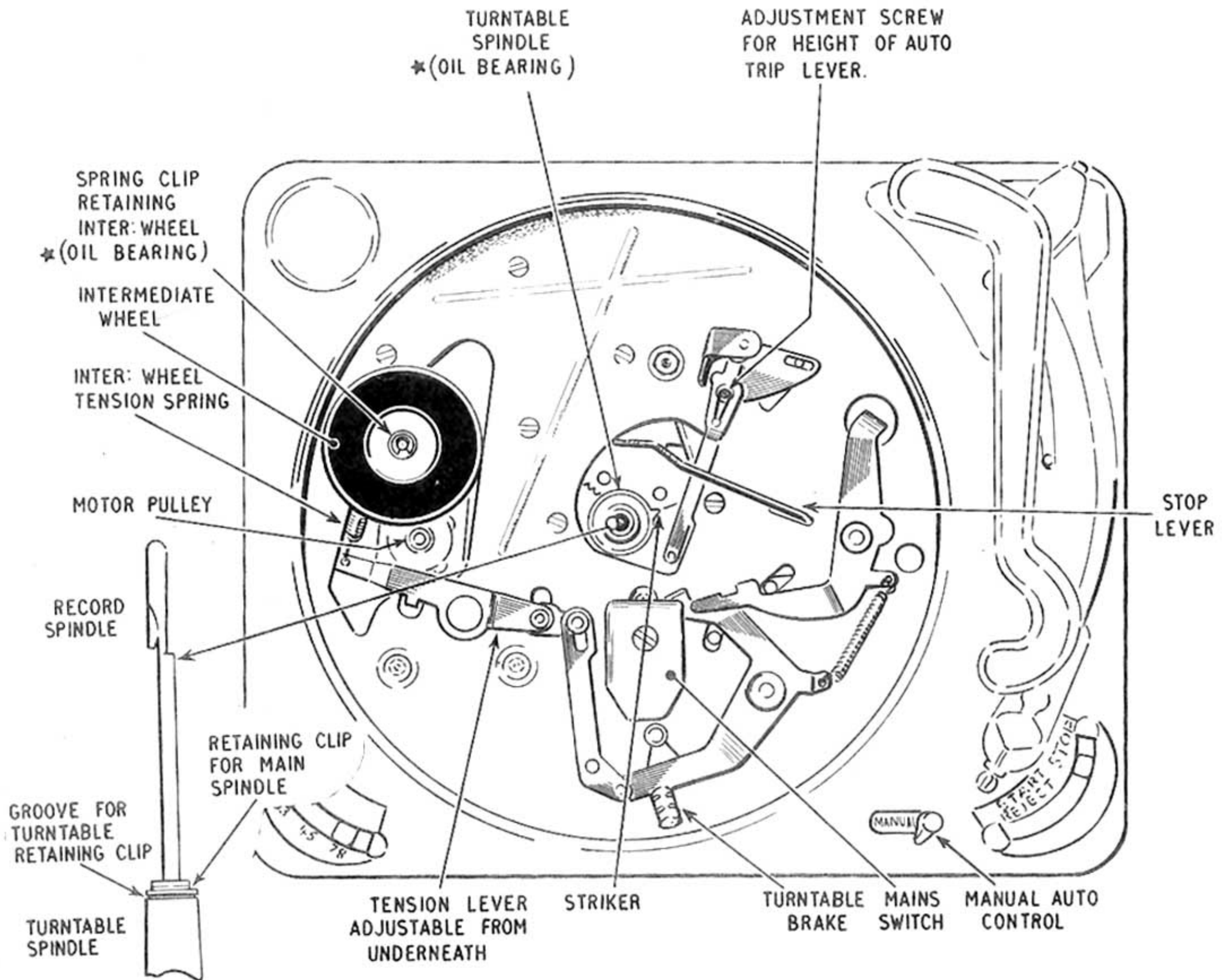
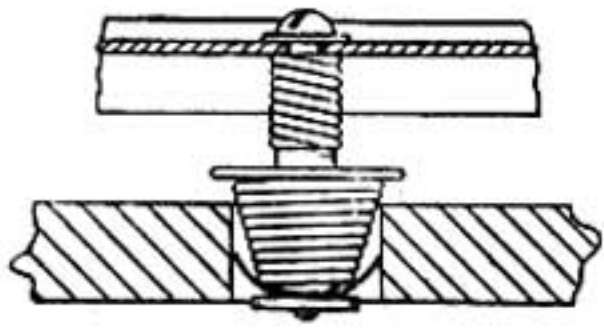
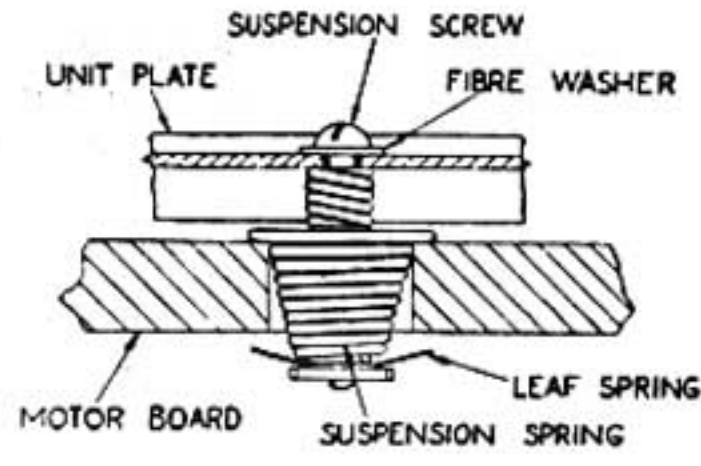


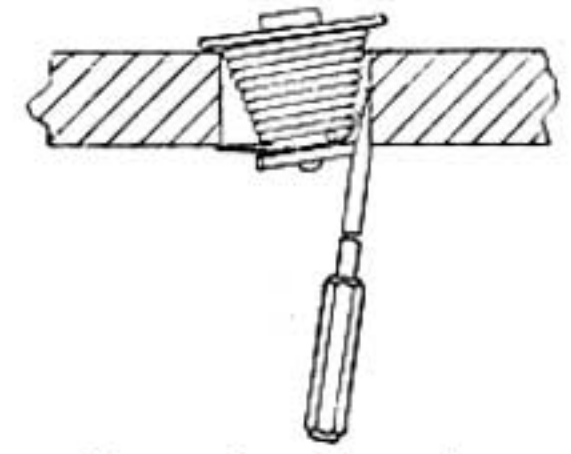
FIG. 5



Snap-in Spring Suspension being pressed into position



Assembly of Snap-in Spring Suspension



Removing Snap-in Spring Suspension from Motor Board

FIG. 6 THE METHOD OF ASSEMBLING AND REMOVING SPRING SUSPENSION.

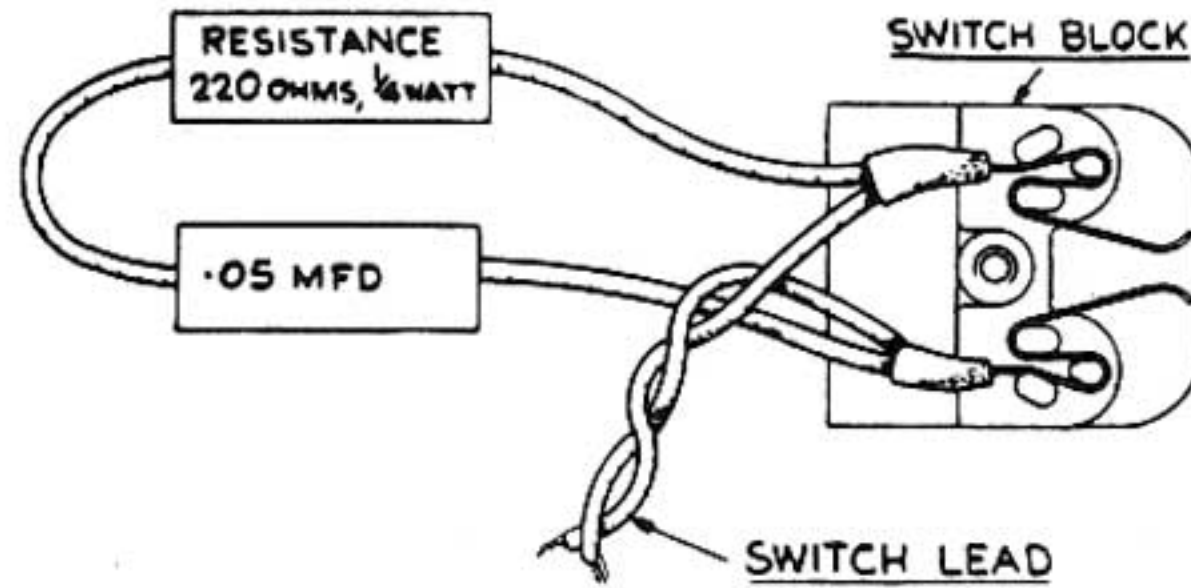


FIG. 7

joints, etc. should be checked. The lead should also be examined and replaced if found to be faulty.

Should the "plop" in the amplifier prove objectionable when the unit switches off, a 0.05 uF capacitor with a working voltage of at least 1,000V in series with a 220 ohm $\frac{1}{4}$ watt resistor can be connected across the switch contacts to eliminate this noise.

Rumble

Rumble may be due to excessive bass response of the pick-up and the amplifier circuit. Ensure that the value of the pick-up load resistor is correct.

A background of rumble may occur if the motor bearings become dry and when this occurs, the motor should be lubricated as shown in the lubrication chart. Also the turntable spindle thrust bearing may need lubricating (Fig.5). It is important to see that the motor suspension is free.

Should the motor leads be strained or the motor touch some component, this will cause hum and low frequency vibration to reach the pick-up. If in the course of time the rubber motor mountings harden due to ageing, they should be replaced.

If the above suggestions are not effective, the trouble may be due to dirt or a rough thrust washer, in which case the turntable spindle must be dismantled. Remove the turntable, loosen the two screws holding the record spindle location then withdraw the turntable spindle. Carefully note the position of the washers, ball race, etc., so that they can be replaced correctly, (Fig.3). Thoroughly clean the balls and thrust washers, then examine the bearing faces of the thrust washers. They should be smooth, flat and free from blemishes.

Hum During Record Reproduction

First check that the pick-up leads are correctly connected to the mechanism and that the other ends are connected correctly to the amplifier. Hum in the reproducer when the Record Changer is switched off may be due to insufficient screening of the pick-up lead. To check this, disconnect the pick-up lead from the pick-up input terminals on the amplifier chassis and short these terminals together. If the hum is still apparent, the trouble generally lies in the amplifier system. If it ceases, the pick-up lead should be examined and replaced if necessary.

If the pick-up connections or the plugs in the amplifier chassis become reversed, hum may be heard or in some cases there will be no reproduction. Try changing over the pick-up connecting plugs in the chassis.

On the unit itself, if twin core screened lead is used and where the colour of these two cores are red and black, the red lead should be connected to the contact to which

the red lead from the pick-up is soldered. See that the screening of the pick-up lead is connected to a chassis point. The pick-up lead from the unit to the amplifier should be kept as short as possible but sufficient slack must be left to allow the unit to float quite freely on its spring suspension and apply no bias to the free movement of the pick-up arm.

Hum which is sometimes noticeable when playing a record may be due to acoustic feed-back and attention should be paid to the freeness of the spring suspensions.

Turntable Brake (Figs. 2 & 5)

The turntable brake, 17, checks the movement of the turntable rim when the unit switches off.

If it fails, inspect the felt pad and if this is worn or has moved flush with the surface of the brake lever, push it through the curl in the lever until it protrudes approximately $\frac{3}{32}$ " then slightly tighten the curl with a pair of pliers.

If the felt pad is too badly worn it should be renewed.

Record Dropping

Should records fail to drop, first make sure that they are not badly warped and that their centre holes are in good condition and not worn. If these points are in order, check that the record pushing pawl is engaging correctly in the record centre hole. The pawl is spring loaded and after pushing a record off the spindle step, it is pushed down by the weight of the records remaining on the spindle.

PICK-UP

Pick-up Fails to Track Correctly

Should trouble be experienced with the pick-up failing to track correctly, i.e., it jumps out of the record groove or has a tendency to rise in the record groove, giving rise to distortion of the reproduction, each of the undermentioned points should be carefully checked.

Make sure that the unit is correctly mounted and floating quite freely on its spring suspensions. Check the level of the unit by placing a spirit level on a record on the turntable and if out of true, adjust the spring suspensions as necessary. See "Installation".

Examine the pick-up lead where it emerges from the rear of the pick-up arm and passes down through the unit plate, to ensure that it has not been pulled tight or twisted, or is in any way touching the changer mechanism and creating a bias on the free movement of the pick-up arm. Check that the pick-up arm is quite free in both its vertical and lateral movements. If the vertical movement appears sluggish, adjust the pivot at the rear of the pick-up arm in the following manner: Slacken the lock

nut 124 and loosen the screw 122 a slight amount, tighten the screw to be found on the other side of the pivot to its fullest extent, re-tighten the screw 122 as far as it will go, then releasing this screw approximately 1/8th of a turn, hold it in this position and carefully re-tighten the locknut 124. The pick-up arm should now pivot quite freely.

Make sure that the stylus pressure is set at the recommended 10 grammes for microgroove and turnover pick-up heads and also that the correct stylus is presented to the record surface for the type of record being played.

Finally, examine the stylus under a microscope to ascertain if it has been chipped or damaged in any way.

Pick-Up Dropping Position (Fig. 1)

The pick-up dropping position is factory set for optimum accuracy. Should any minor adjustment be required, rotate the adjusting screw accessible through a hole in the unit plate, to give the correct position.

Adjustment can only be made with the pick-up arm on its rest.

If the pick-up arm has been strained beyond the scope of the previous adjustment, first set this adjustment in its centre position then loosen the nut on the bolt clamping pick-up lever. Whilst holding the pick-up lever move pick-up arm the required amount then re-tighten nut. Any final adjustment can then be made in the normal manner.

Should the pick-up tend to "wander" whilst lowering on to a record, first check the pick-up lead to ensure that it is not creating a bias on the free movement of the pick-up arm. The pick-up lifting pads should also be examined. The lower pad is felt and pushes against the top one which is leatheroid. The friction between these two pads holds the pick-up arm steady while it is being raised or lowered and they must be kept perfectly dry. On no account should lubrication be applied. Should one of the pads come adrift from its plate, re-fix with suitable adhesive. If the

friction does not appear sufficient to hold the pick-up arm steady, set the changer in the playing position, insert a thin rough file between the pads and rough up the surface of the leatheroid pad.

Pick-Up Lift (Fig. 1)

The distance the pick-up lifts can be adjusted by turning the screw on top of pick-up arm with a small screwdriver. Ten 12" 78 r.p.m. records should be placed on the turntable and the pick-up height adjusted so that as the pick-up returns to the rest on completion of the top record, the tip of the pick-up stylus clears the record surface by $\frac{1}{8}$ ".

If found necessary, further adjustment may be obtained by turning the eccentric screw in lever 71 accessible underneath the changer.

MOTOR

Should the motor be suspect, check the stator coil resistance. Each coil should be 360 ohms, giving a total of 720 ohms.

If the coils are faulty remove them by first undoing the two nuts holding the top and bottom bearings together then remove them and the rotor. To remove the coils, carefully tap out the four small brass pins which hold the poles of the stator in position. When these pins are removed the pole pieces can be pushed out complete with coil, which can then be replaced. When disconnecting the faulty coil, note the connection in the terminal block so that the new coil can be replaced in the same way.

Note: If a polarity check is made, the coils should indicate the same polarity, i.e., they should be both north or both south. Should both stator poles be removed, be sure to re-assemble them as found, and also see that the stator is assembled in the same way, if not the motor will run in reverse.

The motor winding may be checked by insertion of an A.C. Ammeter in either of the motor leads which should be in the region of 0.13 amp at 200/250 volts, 50 cycles. If readings in excess of these figures are obtained, the motor should be returned for examination.

RECORD CHANGER UNIT

Reference numbers and description of parts illustrated (Figs. 2 & 3)

REF.	DESCRIPTION	REF.	DESCRIPTION
1	Turntable Cover	65	Friction Spring
2	Turntable Unit	66	Impulse Lever
3	Rivet	67	Washer
4	Washer	68	Spring Clip
5	Collar	69	Selector Lever Unit
6	Catch Lever	70	Split Pin
7	Rivets	71	Lifting Cam Lever Unit
8	Operating Lever	72	Collar
9	Felt Pad	73	Rivet
10	Pad Clip	74	Lift Adjusting Lever
11	Locking Spring	75	Rivet
12	Friction Pad Cup	76	Lifting Link
13	Friction Pad	77	Friction Washer
14	Spring Clip	78	Lifting Disc
15	Friction Plate	79	Bracket Spindle
16	Spring	80	Lifting Crank
17	Felt Pad	81	Spring Clip
18	Switch Lever Unit	82	Collar
19	Tension Link	83	K.O. Cam Lever Unit
20	Rivets	84	K.O. Link
21	Washer	85	K.O. Lever
22	Collar	86	Screw
23	Rivet	87	Nut
24	Tension Lever	88	K.O. Spring
25	Tension Adjusting Lever	89	P.U. Rest
26	Screw	90	Screw
27	Washer	91	Washer
28	Spring	92	Pawl
29	Spring Mounting Assembly	93	Latch
30	Unit Plate	94	Record Spindle Stem
31	Spring	95	Pin
32	Rivets	96	Spring Clip
33	Name Plate 4speed	97	Pivot Pin.
34	Control Lever Unit	98	Fixed Spindle
35	Speed Control Lever Assembly	99	Spring Clip
36	Stop Lever Bracket	100	Screws
37	Spring	101	Turntable Spindle
38	Stop Lever	102	Screw
39	Washer	103	Washer
40	Spring	104	Cage for Ball Race
41	Knob	105	Ball Bearings
42	Spring Washer	106	Washer
43	Nut	107	Washer
44	Manual Plate	108	Turntable Spindle Housing
45	Manual Lever	109	Release Spindle
46	Inter Lever Unit	110	Washer
47	Pillars	111	Spring
48	Spring Washers	112	Nut
49	Nuts	113	Washer
50	Swing Lever Unit	114	Cam and Gear
51	Spring	115	Segment Spring for Cam Unit
52	Bridge Unit	116	Cam Stud
53	Rivets	117	Release Lever Unit
54	Tags	118	Overarm Unit
55	Connector Plate	119	Selector Arm Unit
56	Tag	120	Counterbalance Screw
57	Manual Catch Lever Unit	121	Pivot Screw
58	Resetting Lever Unit	122	Adjustable Pivot Screw
59	Spring	123	Shakeproof Washer
60	Inter Selector Lever Unit	124	Lock Nut
61	Selector Pawl	125	Locking Spring
62	Spring	126	Height Adjusting Screw
63	Washer	127	Washer
64	Adjusting Screw	128	Split Pin

REF.	DESCRIPTION	REF.	DESCRIPTION
129	Counterbalance Arm	155	Washer
130	Spring Clip	156	Collar
131	Spring	157	Spring Washer
132	P.U. Spindle Unit	158	Nut
133	P.U. Arm	159	P.U. Lever
134	Retaining Spring for Lead	160	P.U. Setting Lever
135	Retaining Spring for Lead	161	Lifting Spring
136	Pick-up Leads Single Conductor, Screened Sheathed. Twin Conductor, Screened Sheathed.	162	Locating Cup
137	Terminal Lugs	163	Lifting Spindle
138	Tube	164	Lifting Washer
139	Washers	165	P.U. Arm
140	Ball Bearings	166	Pick-Up Leads Single Conductor, screened, sheathed. Twin Conductor, screened, sheathed.
141	Ball Race	167	Pad for P.U. Arm
142	Screws	168	Brass Cup
143	P.U. Base	169	Ball
144	Extension for P.U. Base	170	Connector
145	Rivets	171	Contact Springs
146	Bush	172	Spring
147	Bush	173	Screws
148	Washer	174	Grub Screw
149	Screw	175	Speed Cover
150	Anchor Bracket	176	Control Cover
151	Collar	177	Spire Fix
152	Screw	178	Spring, fitted prior to April 1956, later models with Ref No.59.
153	Collar		
154	Screw		

MOTOR

(Fig. 4)

REF.	DESCRIPTION	REF.	DESCRIPTION
1	Pulley. 50 cycles, 4 speed.	23	Screws
2	Grub Screw	24	Cover for Switch Block
3	Nut	25	Screw
4	Spring Washer	26	Spring Clip
5	Motor Cover (Top) Assembly	27	Washer
6	Rotor and Shaft, 4 speed	28	Washer
7	Washer	29	Intermediate Wheel, 4 speed
8	Bush	30	Pivot Pin
9	Grommets	31	Screw
10	Motor Bracket	32	Washer
11	Screws	33	Spring Clip
12	Stator Pack Assembly Coil L.H. Coil R.H. Stator Pack Assembly Bobbin L.H. Bobbin R.H.	34	Washer
13	Motor Cover (Bottom) Assembly	35	Washer
14	Studs	36	Top Plate
15	Lead Clips	37	Support Plate
16	Tubing for Leads	38	Spring Clip
17	Rubber Sleeves	39	Washer
18	Grommet	40	Support Lever Assembly
19	Contact Springs	41	Rivets
20	Nuts	42	Distance Piece
21	Spring Washer	43	Washer
22	Switch Block	44	Index Lever
		45	Collar
		46	Mounting Plate Assembly 4 speed
		47	Index Lever Spring
		48	Spacing Washers, 4 speed only

The Company reserves the right to make any modification without notice.

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