

Garrard

SERVICE MANUAL

FOR

GARRARD ZERO 100, 100C, 100S AND 100SC



Zero 100C

AUTOMATIC TRANSCRIPTION TURNTABLES

(including module versions)

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1 Introduction

This manual provides instructions for servicing the Garrard Zero 100, Zero 100C, Zero 100S and Zero 100SC automatic transcription turntables. The information contained in it refers to all models unless specified otherwise.

The Zero 100 is the original model, with tangential tracking pickup arm, synchronous motor and fine speed control. It will play a sequence of up to six records automatically.

The Zero 100C has an automatic record counter built into the pickup arm to give an indication of elapsed stylus playing time, but is otherwise similar to the Zero 100.

The Zero 100S plays single records automatically but is otherwise similar to the Zero 100.

The Zero 100SC plays single records automatically and has an automatic record counter but is otherwise similar to the Zero 100.

Module versions are identical, but are equipped with mounting base, moulded cover, connecting leads and, when ordered, a pickup cartridge.

The Garrard Zero 100 Automatic Transcription Turntable will play –

- (a) single 33 $\frac{1}{3}$ or 45 rev/min records manually.
The pickup arm is lowered by hand or by fluid-damped cue and pause control.
 - (b) six 12" diameter 33 $\frac{1}{3}$ rev/min records, supported at their outside edges by a platform and released by an angled automatic record spindle.
 - (c) single 12", 10" and 7" diameter records automatically.
For playing a 7" record with 1 $\frac{1}{2}$ " diameter centre hole, a record spindle adaptor (Part No. 72698) is provided.
 - (d) six 7" records with 1 $\frac{1}{2}$ " diameter centre holes using a record spindle (Type LRS100) available as an optional extra.
 - (e) six 7" diameter records with $\frac{3}{8}$ " diameter centre holes, using a record platform adaptor (Part No. 75189) available as an optional extra.
- and
- (f) repeat a single record or the top record of a sequence as often as required. It can also reject a record or interrupt play and will switch off at the end of play with the pickup arm on its rest.

It has –

- (a) a four-pole synchronous motor suspended resiliently.
- (b) two nominal speeds: 33 $\frac{1}{3}$ and 45 rev/min, each continuously variable by approximately $\pm 3\%$. An illuminated stroboscope is viewed from the front of the unit.
- (c) a pivoting pickup head, giving minimal lateral tracking error to the cartridge. Adjustment is provided for the vertical angle of the cartridge when playing a single record or a sequence of records (Zero 100 and 100C).
- (d) a pickup arm with adjustable decoupled counter-balance weight and calibrated stylus force setting. It operates down to $\frac{3}{4}$ gramme stylus force with a suitable cartridge. The slide-in cartridge carrier accepts most modern cartridges with $\frac{1}{2}$ " fixing centres.
- (e) a magnetic pickup arm bias compensator calibrated for both conical (spherical) and elliptical (bi-radial) styli.
- (f) a rotating single record spindle to minimise record wear and an interchangeable automatic record spindle (Zero 100 and 100C).

- (g) an integral record size and speed control. This can be set for:-
 - 7" diameter, 45 rev/min,
 - 12" diameter, 33 $\frac{1}{3}$ rev/min,
 - 10" diameter, 33 $\frac{1}{3}$ rev/min or
 - 7" diameter, 33 $\frac{1}{3}$ rev/min records.
- (h) an 11 $\frac{1}{2}$ " diameter turntable of double construction with a sturdy steel inner driving section and a non-magnetic outer section.
- (i) four foam-damped spring mountings to absorb extraneous vibration and counteract acoustic feedback.
- (j) separate automatic, manual and cue/pause controls conveniently grouped together.

Garrard record playing equipment is designed to play records complying with BS1928/1965, IEC Publication 98 and similar standards.

Power Supply Voltage

Each unit has one of the following three voltage requirements:

- 110/125V a.c. (low voltage)
- 110/120 and 220/240V a.c. (dual voltage)
- 220/240V a.c. (high voltage).

Identification is by means of information on the bottom bearing cover of the motor.

Power Supply Frequency

50 or 60Hz, dependent on the diameters of the motor pulley and the number of strobe markings on the disc under the turntable. The 50Hz pulley has a $\frac{1}{16}$ " deep collar turned in its base below the fixing screws, the 60Hz pulley has no collar. The operating frequency of the stroboscopic disc is shown on it.

Power Consumption

Approximately 9 Watts.

Warning: To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

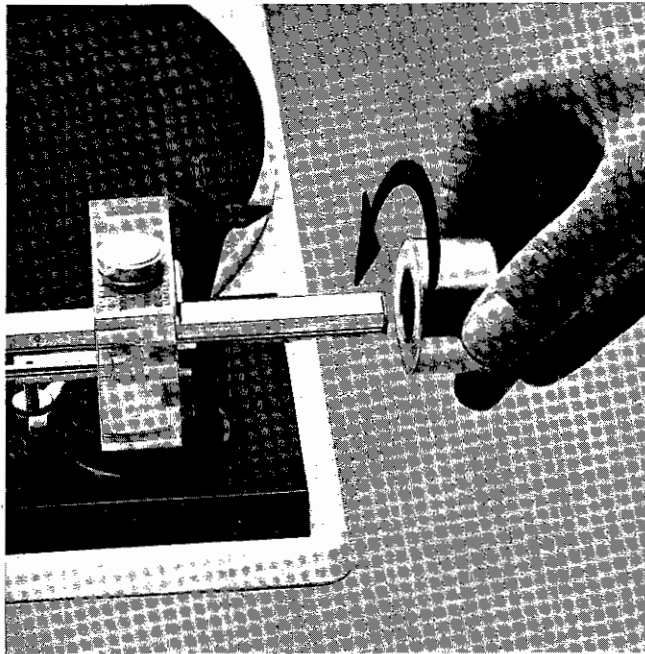
Because of a policy of continuous development, Garrard reserve the right to modify specifications.

2 Installation

Packing List

The carton contains the following accessories in addition to the Zero 100 and its turntable, with packing pieces. Most will be found in cavities in the polystyrene inserts.

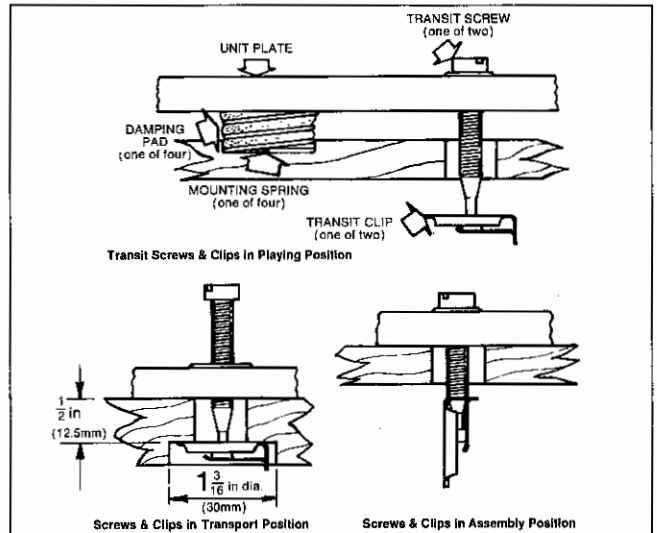
1. A long record spindle for playing a stack of up to six records automatically (Zero 100 and 100C only).
This is fitted by locating it in the centre of the turntable and rotating the spindle until it can be pressed down and held in place by the turntable retaining clip. It can be removed again by a straight upward pull.
2. A pickup arm counterbalance weight. Wind this on to the rear extension of the pickup arm, rounded or chamfered corner first, to secure it before setting stylus force. Do not push it on since this could damage the flexible isolating member.
3. A kit of parts in a small plastic envelope comprising:
 - (a) a short record spindle for playing single records. This is fitted by locating it in the centre of the turntable and pressing it down into place. It turns with the record to minimise wear.
 - (b) an adaptor for playing records with large centre holes. This fits over the short spindle when playing records with $1\frac{1}{2}$ " (38mm) centre holes.and
 - (c) spring clips and wood screws (if provided). The screws can be used to secure the clips in a convenient place for storing the unused record spindle and the record centre hole adaptor.
4. A kit of cartridge fixing parts in a small plastic envelope comprising:
 - (a) various lengths of 6BA screws to secure most current pickup cartridges to the detachable carrier in the pickup arm.and
 - (b) a clear plastic gauge to be used for setting the position of the cartridge on the carrier precisely for optimum tracking geometry.
5. A rubber mat for the turntable. If this is not already fixed in position, place the mat concentrically on the turntable. Press the central area of the mat gently downwards until the circular ribs underneath it engage the recesses on top of the turntable. The mat will then slope downwards slightly towards the middle, so that the record is supported at the maximum radius.



Fitting Pickup Arm Counterbalance Weight

Instructions for cabinet mounting (For installation of Module versions see Section 8).

1. The following clearances are minimum requirements:
 - (a) For Zero 100 and 100C – allow $4\frac{1}{2}$ in (114.5mm) above the top of the mounting board for a stack of six records. If space above the unit is restricted, an extra $2\frac{1}{2}$ in (63.5mm) will be needed to remove the automatic record spindle.
For Zero 100S and 100SC – allow $3\frac{1}{2}$ in (89mm) above the top of the mounting board for the pickup arm.
 - (b) For all models – allow $2\frac{1}{8}$ in (74.5mm) below the top of the mounting board for the mechanism. The top of the board is chosen as a reference point since it is not affected by the thickness of the board or whether the unit is floating on its springs or held down for transit.
 - (c) For all models – allow an extra $\frac{1}{4}$ in (6.5mm) all round the outside of the unit to allow it to float freely on the mounting springs.
 - (d) For all models – if the mounting board is more than $\frac{1}{2}$ in (12.5mm) thick, enlarge both transit screw holes from underneath to a diameter of at least $1\frac{3}{16}$ in (30mm) and to a depth sufficient to reduce the effective thickness of the board to $\frac{1}{2}$ in at the holes. This will keep the transit clips clear of the mounting board when they are in the playing position.
 - (e) For all models – the area through which the pickup arm counterbalance weight moves while playing a record will depend on the weight of the cartridge. To check the clearance required in any specific case, balance the arm as described in the 'Adjustments' section and measure the overhang at both extremes of the arm's sideways movement. Further clearance of $\frac{1}{4}$ in (19mm) is required behind if the counterbalance weight is to be removed to protect the arm in transit.
2. To prepare the mounting board:
 - (a) Place a Garrard paper template (Part No. 77235) on the mounting board in the desired position and secure it with strips of self-adhesive tape. Glue would moisten and so distort the paper.
 - (b) Prick around the outline of the cutout to be made in the board, using a scribe or other pointed instrument. Similarly, prick the centres of the four mounting spring recesses and both transit screw holes. Remove the template.
 - (c) Bore the recesses $1\frac{1}{8}$ in (27mm) diameter, $\frac{1}{8}$ in (3mm) deep and drill the holes $\frac{1}{8}$ in (15mm) diameter. Saw around the marked cutout.
 - (d) Varnish or otherwise finish the mounting board as required.



3. Check that all four damping pads are firmly in place in the mounting springs. Turn both transit screws fully clockwise and transit clips vertical.
4. Attach power supply, earth and phono leads to the unit (see wiring instructions) and pass them down through the cutout in the mounting board. Make sure that all leads are clear of any moving parts under the unit plate, particularly in the area underneath the pickup arm.
5. Place the unit in position on the mounting board, aligning both transit screws with their holes and locating all mounting springs in their recesses.
6. Press the unit down on its springs, then turn both transit clips to the horizontal playing position. Release the unit.
7. Carry out the wiring instructions for connecting leads to the power supply outlet and the amplifier.

FITTING THE PICKUP CARTRIDGE

The fixing screws and cartridge setting gauge provided enable a wide range of high quality cartridges to be fitted in their correct operating position in the carrier. Great care must be taken when fitting the cartridge since it forms an integral part of the extremely precise pickup arm design essential to the exceptional degree of tracking accuracy.

To fit the cartridge proceed as described below:

1. Remove the pickup cartridge carrier.
2. Attach the cartridge to the carrier.
3. Align the cartridge.
4. Connect leads to the cartridge.
5. Refit the carrier.
6. Set stylus force and pickup arm bias compensation.

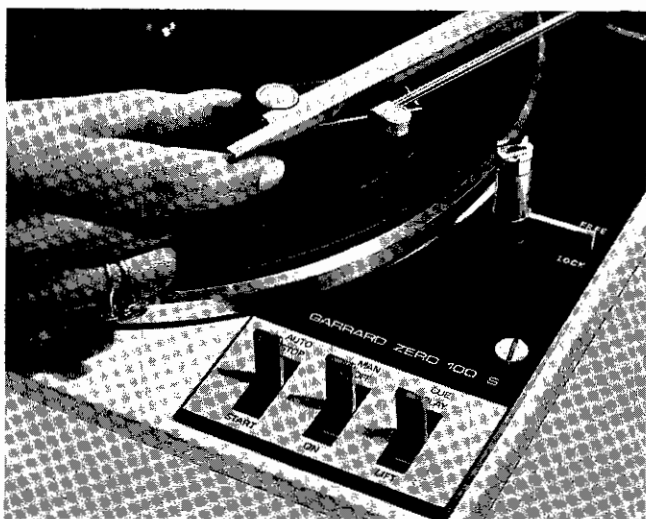
1. Removing the pickup cartridge carrier

Support the pickup arm above the turntable with one hand, to avoid strain, and withdraw the carrier with the other hand. Turn the carrier over and peel off any adhesive tape used to hold the coloured leads during transit. When removing the carrier with a cartridge fitted, support the arm well clear of the operating controls to avoid risk of damage to the cartridge.

2. Attaching the cartridge to the carrier

- (a) Secure the cartridge to the carrier by passing a pair of screws through the cartridge mounting (see 'Note'), then screwing them into the threaded holes in the locking plate which slides in the channel on the opposite side of the carrier. The screws must not protrude through the far side of the locking plate sufficiently to touch the setting gauge.
- (b) Tighten the screws just sufficiently to hold the cartridge in place.

Note: The table shows the fixing screws recommended for a typical range of cartridges. These screws have British Association No. 6 (6 B.A.) threads and are supplied in a set of six pairs of the length shown.



Removing and Refitting the Cartridge Carrier

3. Aligning the cartridge

Slide the carrier into the slots in the clear plastic setting gauge. Take care that the stylus does not catch on the gauge as the cartridge enters. The stylus tip must be vertically above the point at which the lines on the gauge cross. If it is not, move the cartridge until it is correctly aligned.

4. Connecting the cartridge

When the alignment is satisfactory, tighten both fixing screws, remove the gauge, and connect the insulated leads on the carrier by pushing their tags onto the cartridge output pins. Use the following colour code in conjunction with the cartridge manufacturer's instructions:

- Red - Right hand channel signal.
- Green - Right hand channel ground.
- White - Left hand channel signal.
- Blue (or Black) - Left hand channel ground.

Note: If a cartridge has only three pins or tags, use the green lead, or green and blue (or black) joined together. Insulate and tuck away any lead not required.

5. Refitting the carrier

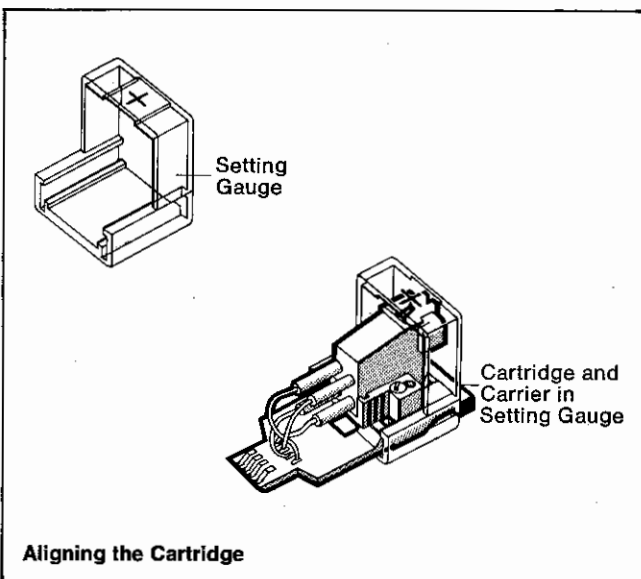
- (a) Move the pickup arm locking lever to 'Free', support the tonearm over the turntable away from the operating controls with one hand, to avoid risk of damage to the cartridge.
- (b) Guide the contact portion of the carrier into the guide slot under the rear of the head. The carrier should now be supported by the head and protrude approximately $\frac{1}{4}$ in from the front of the head; gently push the carrier into the head. It does not matter whether the cartridge tilting lever is at M or A at this stage (Zero 100 and 100C only).

6. Stylus force and bias compensation

Set these as instructed in the 'Adjustments' section.

Recommended Screw Length

CARTRIDGE (inches)	1/8	3/16	1/4	7/16	1/2	9/16
ADC (All Models)				X		
Decca (London)			X			
Empire 90, 909, 999, and 1000		X				
Ortofon SL-15		X				
Pickering XV-15 V-15, and P Series V-15 Phase IV	X		X			
Shure V15 Type II M91E and M93E M75E, M44E, and M55E	X				X	X



Aligning the Cartridge

WIRING CONNECTIONS

1. Audio

Connect the stereo phono lead by plugging one end into the twin phono sockets underneath the unit plate and the other end into the pickup input sockets on the amplifier.

(a) Turntable connections

The twin phono sockets are located either on a support leg under the unit plate below the pickup arm pivots, or in the unit plate adjacent to the leg.

The right- and left-hand channel output sockets are marked R and L respectively.

The right- and left-hand channel phono plugs (RCA type) are coloured brown (or black) and grey respectively.

If more permanent connections are preferred then a stereo lead can be soldered to the same tags on the back of the phono sockets as the leads from the pickup arm, provided they are accessible. The following colour code is used:

- Red – Right-hand channel signal.
- Green – Right-hand channel ground.
- White – Left-hand channel signal.
- Blue (or black) – Left-hand channel ground.
- Yellow – Internal connection only. This grounds the pickup arm to the unit plate.

(b) Amplifier connections

The end of the stereo connecting lead remote from the turntable is terminated either at two phono plugs (RCA type) or a 5-pin plug (DIN, Type A) according to territorial usage.

The right- and left-hand channel phono plugs are coloured brown (or black) and grey respectively.

The 5-pin plug is connected as follows:

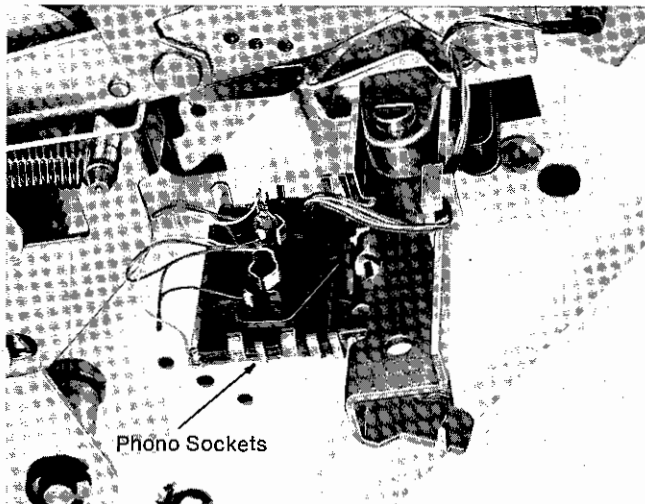
- Pin 2 – Left- and right-hand channel ground.
- Pin 3 – Left-hand channel signal.
- Pin 5 – Right-hand channel signal.

The plugs are connected to the appropriate input terminals on the amplifier according to whether a magnetic or ceramic pickup cartridge is in use.

(c) Signal ground connections

Units for North America have a green signal ground lead. This is terminated at a spade lug for attachment under the head of a grounding screw on the amplifier chassis, in accordance with its manufacturer's instructions.

Many units sent to Europe with a two-wire power supply lead have a 'ground strap' linking the unit plate to the right-hand channel ground terminal on the phono socket. This connects the unit plate to the amplifier chassis by way of an audio lead screen, so minimising the risk of hum.



2. Power Supply and Safety Earth

Warning: Disconnect the unit completely from the power supply before making any connections.

(a) Connecting leads to the turntable

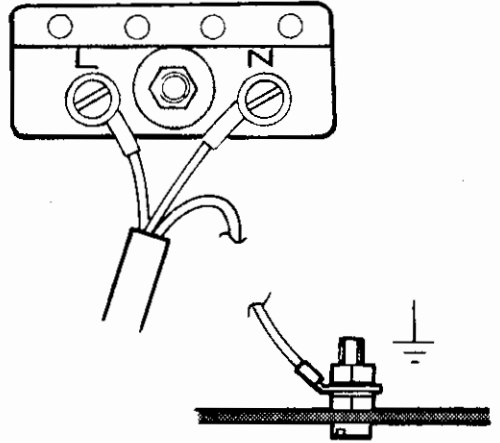
Leads from the double-pole motor switch are terminated at a connecting device to which the lead carrying the incoming power can be readily attached. This device varies in detail according to the requirements of the territory into which the turntable is sent from the factory. However, with minor exceptions, it takes one of the following forms.

220/240V a.c. (high voltage models)

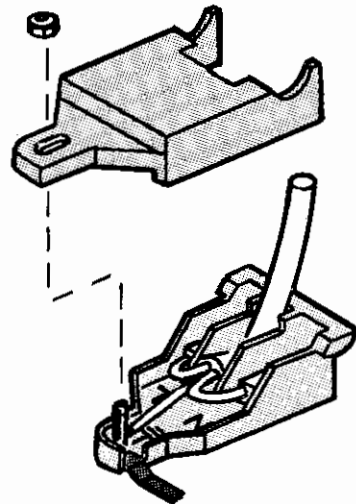
These are for the United Kingdom and other European countries. The power supply lead connecting block contains two mains terminal screws and, where appropriate, an adjacent safety earth terminal screw. These screws are marked with the following code:

- L = Live connection.
- N = Neutral connection.
- ⊥ = Safety earth connection.

The removable cover of the block is secured by a nut. Two types of block are in service, the later model having an integral earth screw.



High Voltage Connecting Block with cover removed



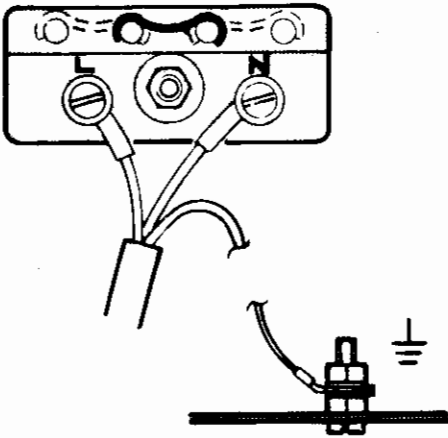
High Voltage Connecting Block - later version

110/120 and 220/240V a.c. (dual voltage models)

These are sent to American Forces in Europe.

The power supply lead connecting block for dual voltage motors is basically similar to that for high voltage types. The difference is that the voltage range can be changed by prising both wire links off the four terminal studs on the block and moving them to an alternative setting. For 110/120V a.c. supplies both links are connected separately across the outer pairs of studs, as shown on the diagram on the cover of the block. This connects both stator coils of the motor in parallel. For 220/240V a.c. supplies the links are connected, one on top of the other, across the centre studs as shown on the block cover. This connects both stator coils in series. Dual voltage models are set for 220/240V a.c. operation as a safety precaution before leaving the factory.

Power supply leads are connected as for high voltage models, except that an earth terminal screw is less usual.



Dual Voltage Connecting Block with cover removed

110/125V a.c. (low voltage models)

These are supplied to the U.S.A. and Canada.

The connecting socket is of the 4-contact Amplok type, incorporating both power supply and signal ground connections. A power supply cord and ground lead terminated at a corresponding Amplok plug are normally provided.

(b) Connecting leads to the power supply and safety earth

Any leads fitted by Garrard are appropriate for the territory into which the turntable is sent by us and comply with national safety standards.

3-core lead for use on 220/240V a.c. (United Kingdom)

Important: If a mains lead is provided, its wires are coloured in accordance with the following code:

Green-and-Yellow - Earth.

Blue - Neutral.

Brown - Live.

As the colours of the wires in the mains lead may not correspond to the coloured marks identifying the terminals in your power supply plug, proceed as follows:

The green-and-yellow wire must be connected to the terminal in the plug marked by the letter E or by the safety earth symbol \perp or coloured green or green-and-yellow.

The blue wire must be connected to the terminal marked by the letter N or coloured black.

The brown wire must be connected to the terminal marked with the letter L or coloured red.

Similar markings are used for the terminals on the turntable.

If a mains lead is not provided, use a suitable length of 3-core P.V.C. insulated flexible lead with a current rating of not less than 3A and attach it in the manner previously described to the turntable and a 3-pin plug.

Warning: This apparatus must be earthed. It must also be protected by a 3A fuse.

2-core lead for use on 220/240V a.c. (Europe, other than U.K.)

If a mains lead is provided, its wires are coloured in accordance with the following code:

Blue - Neutral.

Black - Live.

If a power supply plug is not already fitted connect the wires to a 2-pin plug as its maker specifies.

If a mains lead is not provided, use a suitable length of 2-core P.V.C. insulated flexible lead with a current rating of not less than 3A and attach it to the turntable and plug.

2-core lead for use on 110/120 and 220/240V a.c. (U.S. Forces in Europe)

The wires in this mains lead are coloured and should be connected as the European models already described.

2-core lead (line cord) for use on 110/125V a.c. (U.S.A. and Canada)

This brown (or white) lead is terminated at a standard 2 flat-pin power supply plug for attachment to a wall or amplifier-mounted receptacle. A green signal ground lead is also provided. This has a spade lug terminal to be attached under the head of a screw on the chassis of an amplifier in accordance with its maker's instructions.

POWER SUPPLY FREQUENCY

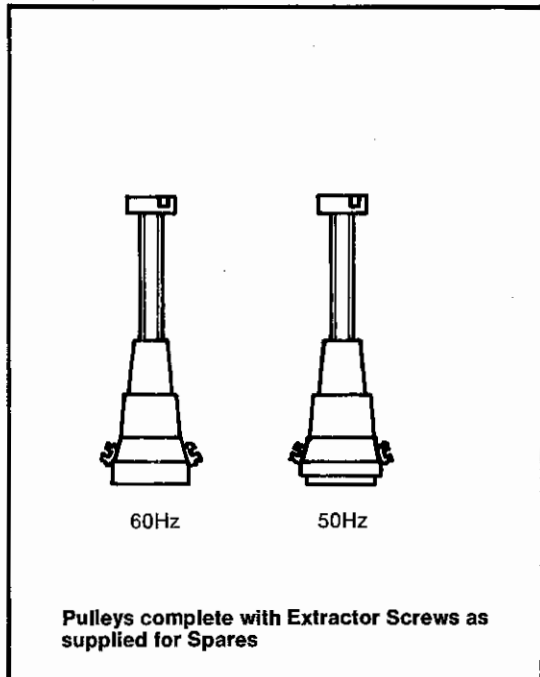
50 and 60Hz motor pulleys

Both types of pulley are made of brass and are tapered to provide the fine speed adjustment. As the intermediate wheel is raised, it contacts the smaller diameter on the pulley and, as a result, turntable speed is reduced. The reverse also applies. It is essential that the intermediate wheel is quite horizontal to avoid irregular turntable speed caused by the wheel scuffing against the pulley.

The 50Hz pulley has a $\frac{1}{32}$ in deep collar turned in its base below the fixing screws.

The 60Hz pulley has no such collar.

Pulley removal instructions are given in Section 9.



50 and 60Hz stroboscopic discs

These are fixed to the underside of the turntable and seen, in the stroboscope viewing window at the front of the unit plate, through a lens system.

The operating frequency is marked on each self-adhesive disc.

Two rows of bars are printed, the inner for the 45 rev/min image and the outer for the $33\frac{1}{3}$ rev/min image.

To fit a new disc, simply peel off its protective backing paper and press it into place exactly on top of the original disc.

This will help ensure the concentricity needed for a clear image.

3 Operating Instructions

OPERATING INSTRUCTIONS

To play a single record manually

1. Fit the short, single record spindle into the centre of the turntable and press it down into place.
2. Place a record on the turntable using the adaptor provided if the record has a large centre hole.
3. Set the record speed selector to $33\frac{1}{3}$ or 45 rev/min as required by the record to be played, and the cartridge tilting lever to M.
4. Move the manual operating control tab fully to ON.
5. (a) Lower the pickup arm onto the record by hand lifting it at the front of the arm
or
(b) Move the cueing control tab to LIFT, then place the pickup arm over any desired point on the record and return the control tab towards PLAY to lower the pickup arm gently.

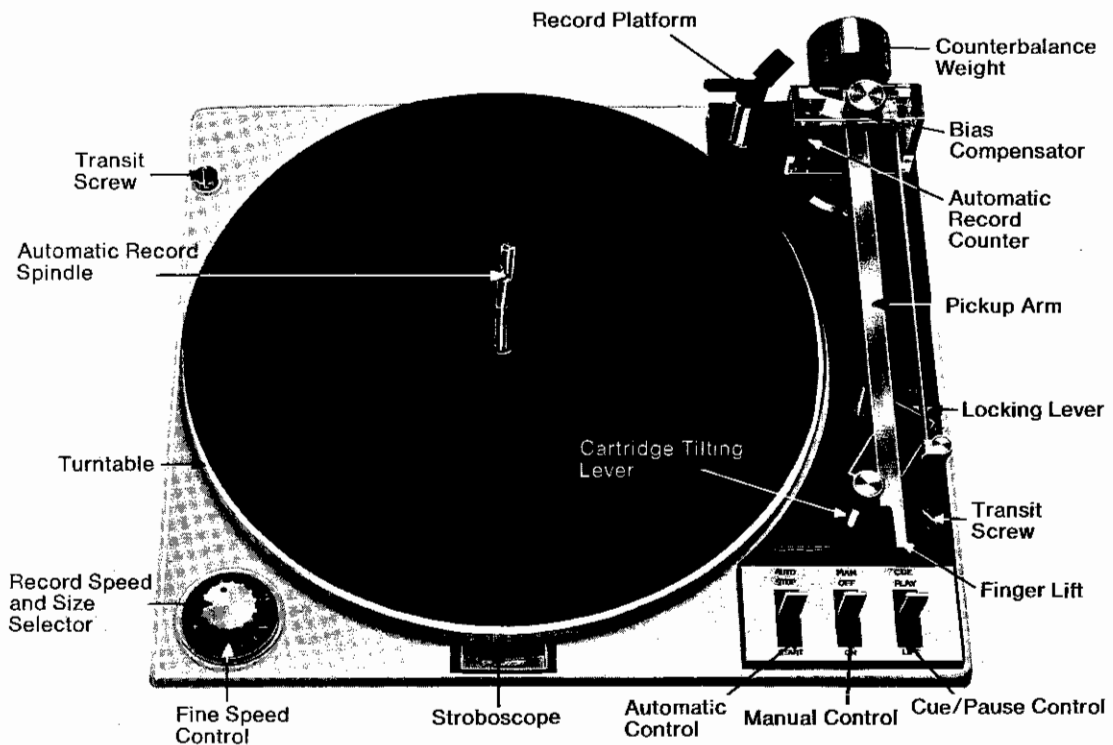
After playing the record the pickup arm will return to its rest and the unit will switch off.

To play a single record automatically

1. Fit the short, single record spindle and place the record on the turntable using the adaptor provided if the record has a large centre hole.
2. Set the record speed and size selector for the record to be played. For example, 33 12 for a $33\frac{1}{3}$ rev/min 12in record.
3. Set the cartridge tilting lever to M. (Zero 100 and 100C only).
4. Move the automatic operating control fully to START and hold it there for a second or two before releasing it. After playing the record the pickup arm will return to its rest and the unit will switch off.

To play a stack of records automatically (Zero 100 and 100C only)

1. Fit the long automatic record spindle into the centre of the turntable and turn the spindle until it can be pressed down to be held in place.
2. (a) 12in records – load up to six records onto the step of the spindle with the edge of the stack resting on the record platform. Pull the record steady upwards then inwards and release it to return to the top of the records to stabilise them.
(b) 7in records with large centre holes. Place the LRS100 large record spindle (available from your supplier as an optional extra) over the automatic record spindle and load a stack of up to seven 7in records level onto its step.
(c) 7in records with small centre holes. Use the Garrard Type A6 record platform adaptor (available from your dealer as an optional extra complete with instructions for use).
3. Set the record speed and size selector for the records to be played. For example, set 33 12 for $33\frac{1}{3}$ rev/min 12in records.
4. Set the cartridge tilting lever to A.
5. Move the automatic operating control tab fully to START and hold it there for a second or two before releasing it. When the records have all been played the pickup arm will return to its rest and the unit will switch off.
6. To unload the records – lift them clear of the record spindle, even if they are to be replayed immediately. When using the LRS100 spindle lift the records with the fingers of both hands while pressing down on the top of the spindle with the thumbs.



ADDITIONAL USES OF THE CONTROLS

Cue and Pause

The pickup arm can be raised while a record is playing by using the cue control tab to LIFT, and lowered again by moving it back to PLAY.

This feature is particularly useful for repeating or passing over any passage of music, and to interrupt play (pause) for a short time without switching off.

Repeat

A single record being played automatically, or the last record of a stack, can be replayed by moving the automatic control to START before the pickup arm lifts at the end of the record.

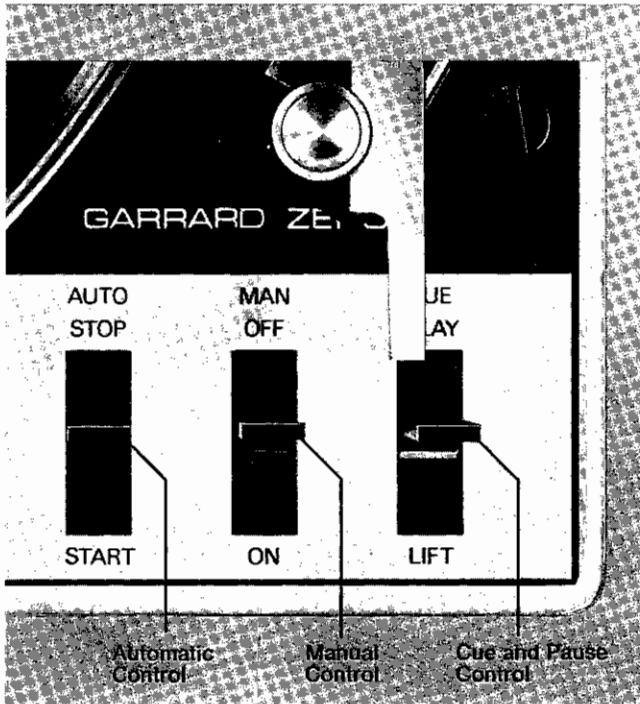
Reject

Any record of a stack (except the last), can be rejected by moving the automatic control to START. To reject a single record or the last of a stack move the tab to STOP.

Stop

While playing a single record, or the last record of a stack, moving the automatic control tab to STOP will return the pickup arm to its rest and switch off. While playing a stack of records this will cause the next record to be lowered before switching off.

To lower the next record and play it, move the control tab to START.



4 Adjustments

Adjustments

Relatively few adjustment facilities are needed. They fall under two broad headings – (1) those that an individual user may need to set during initial installation and (2) factory settings which should not need to be disturbed unless associated parts have been replaced.

The first category includes:

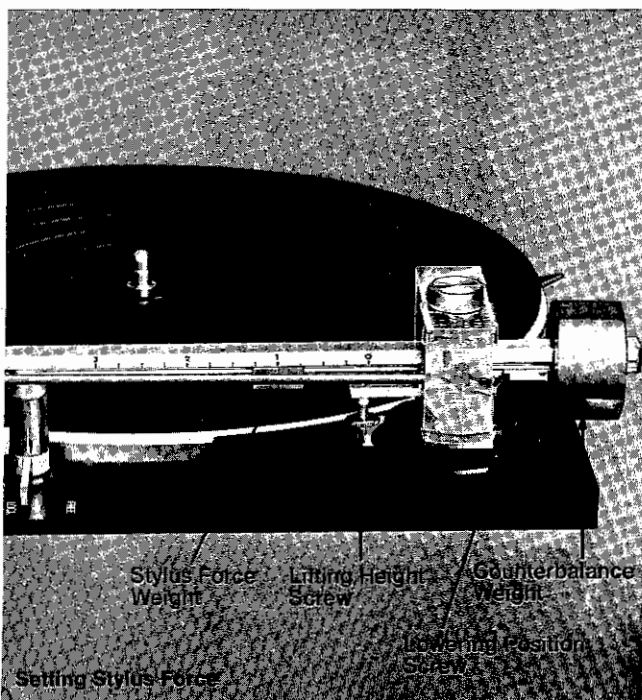
Stylus force, pickup arm bias compensation, pickup arm lowering position, pickup arm lifting height, lifting height restriction, fine speed control and automatic record counter zero (Zero 100C and 100SC only).

The second category includes:

Record support platform position (Zero 100 and 100C only), bias compensator magnet gap, intermediate wheel height, motor pulley height and pickup arm cueing height.

Stylus force:

- Move the stylus force weight so that its centre line is at 0 on the scale at the outside of the pickup arm. Move the magnetic shield of the bias compensator so that its red calibration line is at 0 on both scales on top of the pickup arm bearing surround.
- With the cartridge fitted, remove the stylus guard, move the pickup arm locking lever to 'FREE' and move the pickup arm inwards so that it pivots freely. Take care to prevent the stylus from being damaged by touching the turntable mat.
- Wind the pickup arm counterbalance weight backwards or forwards until the arm is in balance with the stylus at the height of the top face of a record on the turntable. Do not push or pull the weight since this could damage its internal resilient isolating member. Lock the pickup arm to its rest.
- Set the stylus force to the figure recommended by the maker of the cartridge fitted. To do this, slide the stylus force weight along the scale on the pickup arm until its centre line is at appropriate position. The scale is calibrated from 0 to 3g at intervals of $\frac{1}{4}$ g. The minimum recommended setting for the Zero 100 range of models is $\frac{1}{4}$ g, when a suitably compliant cartridge is used.



Pickup arm bias compensation:

This compensating force is necessary to counteract the well-known tendency of a pickup arm to be drawn inwards across the surface of a rotating record. The Garrard system which avoids mechanical linkage is simple but ingenious and operates on the principle that similar magnetic poles repel each other. It comprises two ceramic disc magnets, one mounted on the rotating pickup arm bearing housing, the other on the static gimbal bearing surround. Their mutual torsional repulsion is controlled by a ferrous screen sliding between them and moving against scales calibrated in grammes of stylus force for cartridges with either conical or elliptical styli.

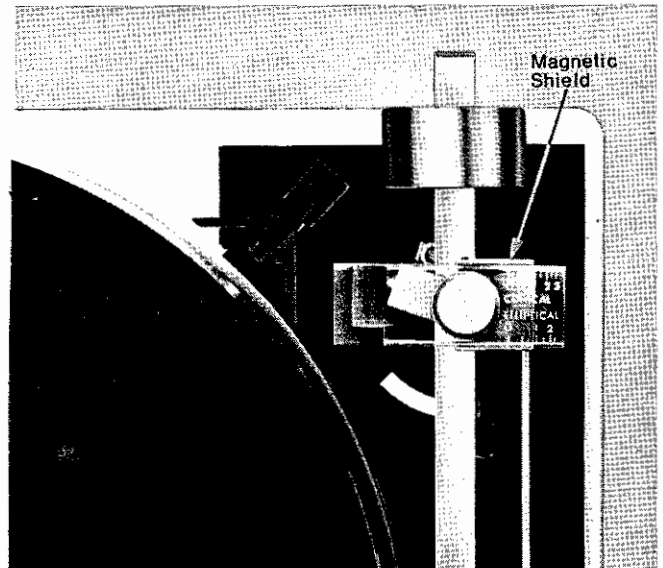
To set the device move the shield along the pickup arm bearing surround until its red line is at the position on the appropriate calibrated scale corresponding to the stylus force already set. (The scale for use with conical, or spherical, stylus tips is calibrated from 0 to 3g at intervals of $\frac{1}{2}$ g. The scale for use with elliptical, or bi-radial, stylus tips is calibrated from 0 to 2 $\frac{1}{2}$ g at intervals of $\frac{1}{2}$ g.) Thus, if a stylus force of 2g has been set, move the red line to the figure 2 on the "conical" or "elliptical" scale depending on the stylus in use.

Pickup arm lowering position:

The stylus should land on the record at a radius of 5 $\frac{1}{4}$ in \pm $\frac{1}{8}$ in when the control is set for a 12in record and the automatic control is moved to 'Start'. This can be adjusted while the pickup arm is on its rest by turning the screw clockwise to move the lowering position inwards or counterclockwise to move it outwards.

Pickup arm lifting height:

While travelling from the centre of the record back to its rest under automatic control the top of the pickup arm finger lift should rise 1 $\frac{1}{2}$ in \pm $\frac{1}{2}$ in above the turntable mat. This can be adjusted by turning the screw clockwise to increase lift or counterclockwise to reduce it.



Setting Tonearm Anti-skating Device

Restriction of lifting height:

The purpose of this is to prevent the pickup arm from rising too high. It is controlled by the setting of a screw at the back of the pickup arm.

Restriction should be such that the arm cannot rise more than $\frac{1}{16}$ in higher than the lifting height already set.

Turn the screw clockwise to increase and counterclockwise to reduce pickup arm movement.

Fine speed control:

While playing a record with the motor warmed up look at the image seen in the stroboscope viewing window. When turntable speed is set at '33' the row of alternate black and red bars nearer the front of the unit will appear stationary when speed is exactly $33\frac{1}{3}$ rev/min. Similarly, when turntable speed is set at '45' the row of bars nearer the record spindle will appear stationary when speed is exactly 45 rev/min.

If they move clockwise, then speed is slightly high and the knurled control ring should be turned counterclockwise until the apparent motion ceases. If they move counterclockwise then the control ring should be turned clockwise to increase speed until motion ceases.

The range of control is approximately $\pm 3\%$ at $33\frac{1}{3}$ rev/min and $\pm 2\frac{1}{2}\%$ at 45 rev/min which represents a total variation in pitch of almost a semi-tone.

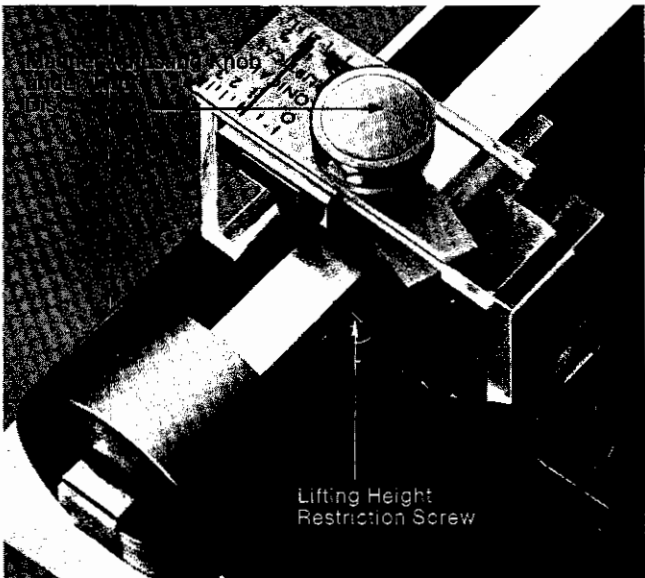
Automatic record counter setting (Zero 100C and 100SC only):

The pointer on the automatic record counter should be set to zero when (a) a unit is first put into use, (b) a new stylus is fitted and (c) the pointer reaches the top of the calibrated scale.

To do this, release the pickup arm from its rest, then support the pickup arm over the turntable to disengage the ratchet wheel and turn the wheel counterclockwise until the red pointer is against the lowest black line. 1,600 cycles of the pickup arm will move the pointer from zero to the top of the scale. The black lines on the scale indicate 0, 400, 800, and 1,200 cycles of the pickup arm in ascending order. The red lines indicate 1,300, 1,400, 1,500 and 1,600 cycles.

The record counter is intended to register the number of record sides played by a stylus and hence its approximate elapsed playing life. It acts as a reminder to examine the stylus under a microscope at regular intervals for signs of wear according to its makers suggestions.

In view of the many variable factors involved, such as stylus force, shape and material, it will not indicate when a stylus should be replaced.

**Record support platform position (Zero 100 and 100C only):**

A 12in diameter record should overlap both top front edges of the platform by $\frac{1}{8}$ in. This will ensure that the record is supported adequately but allow it to clear the platform as it slides down the automatic record spindle. To reset the position of the platform, slacken both Philips-head fixing screws on the underside of the unit plate and ease the platform into place. The record clip must, when lifted by hand onto the top of a record or stack of records, maintain sufficient downward pressure to hold the records stably to the top of the support platform under the influence of its tension spring.

Bias compensator magnet gap:

The gap between the top face of the ceramic disc magnet which rotates with the pickup arm and the lower face of the similar static magnet immediately above it should be 0.105/0.110in.

To reset the gap, carefully prise off the trim disc from the top of the gimbal bearing surround and slacken the brass screw then visible. The adjusting knob can now be rotated until the gap is correct, the locking screw re-tightened and the trim replaced. The sliding magnet shield should be moved fully to the right to facilitate measurement.

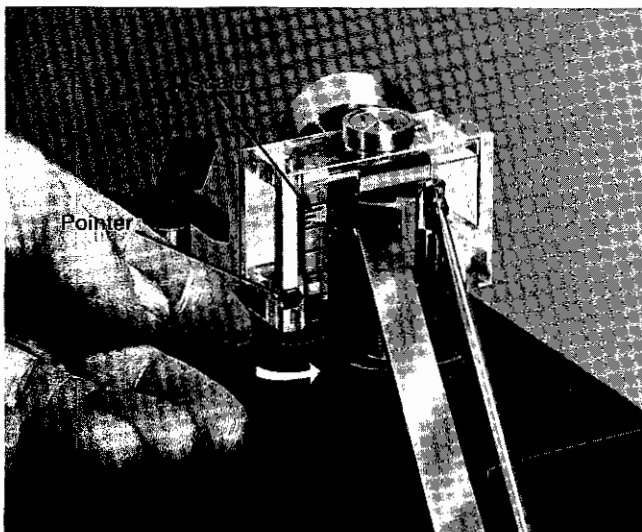
Intermediate wheel and motor pulley heights:

These are related since the rubber wheel is set in relation to the tapered pulley. Setting instructions will be found in the 'Fitting new Parts' section under the heading 'Motor Pulley'.

Pickup arm cueing height:

Moving the cueing control fully to the 'Lift' position should raise the pickup arm until the top of the finger lift at the front of the arm is at least $1\frac{3}{32}$ in above the top of the turntable mat.

Rotate the recessed grub screw in the top of the lifting platform clockwise to increase or counterclockwise to reduce cueing height.



Automatic Record Counter

MAINTENANCE

(Numbers in brackets are those used on the exploded views in Section 7.)

LUBRICATION

The bearings of the intermediate wheel (45), and motor (289) are made of oil-retaining material which rarely requires re-lubrication. However, if after long use, the need for oil becomes apparent, remove the turntable and lubricate the bearings very sparingly as described below. Apply a trace of thin oil to lever pivots at the same time, except plastic pivots and slides in the automatic trip mechanism which must not be lubricated.

A thin, high-grade machine oil such as that used on sewing machines or a non-detergent SAE 20W oil is suitable.

A smear of light grease should be applied at extended intervals as necessary to all cam faces, pins and rollers after cleaning off the original grease. A general purpose calcium or lithium-based grease similar in consistency to or lighter than petroleum jelly is suitable.

CAUTION. Take great care to prevent any lubricant from coming into contact with the driving surfaces of the motor pulley, intermediate wheel or turntable since this could cause slippage resulting in speed variation. Do not over-lubricate and wipe off any surplus before running the unit again after maintenance.

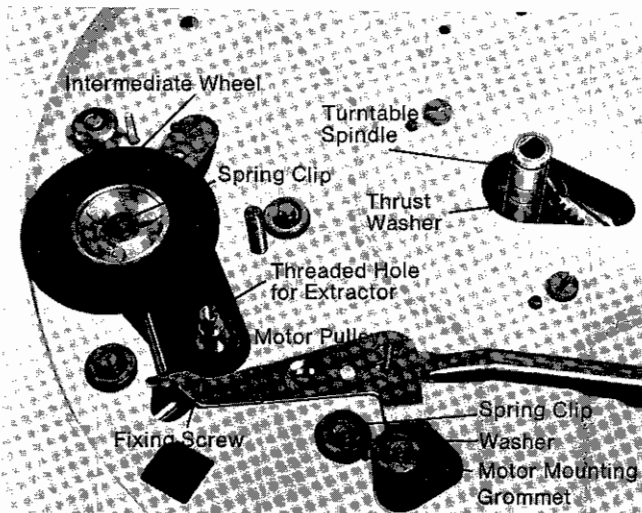
The rotation of the cueing cam (237) is retarded by a silicone viscous damping fluid sealed into a cavity in the lower casting (242) during manufacture: it must not be lubricated with oil or grease.

To remove the turntable

Pull out the record spindle (55 or 56), carefully lever up the inside edge of the rubber mat (50) if this is fixed in place and prise out the plastic centre disc (52) with a small screwdriver. With the same tool, pull off the wire retaining clip (51) – noting its position for re-assembly – and lift off the turntable (49) by lifting equally at opposite sides.

CAUTION. Do not switch on when the turntable has been removed and the speed control is set at 45 rev/min.

When refitting the turntable rotate it steadily clockwise for one revolution as soon as it is on the spindle in order to ease the rubber intermediate wheel into place.



View with turntable removed

Intermediate Wheel Bearing

Remove the spring clip (47), plastic washer (46), intermediate wheel (45) and fibre washer (44) to clean the spindle and bearing before applying a thin smear of oil to their running surfaces and reassembling in reverse order. Make sure that the wheel is pulled freely against the motor pulley when the manual operating control is moved to ON and that it is fully released again when the control is moved to OFF.

Oil must not come into contact with the rubber surface of the wheel.

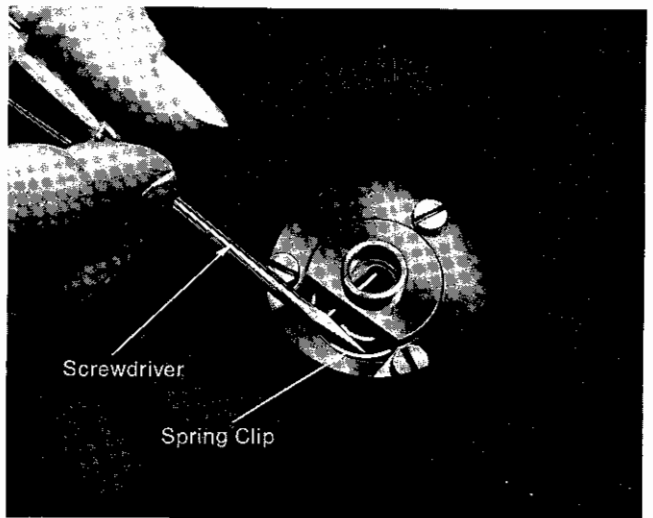
Motor Bearing (Top)

Run a drop or two of oil down a long needle (or similar object) onto the motor spindle below the pulley (295) so that it will flow into the top bearing of the motor. This bearing is concealed below the motor mounting plate. Oil must not come into contact with the motor pulley.

Motor Bearing (Bottom)

Apply oil to the lower end of the rotor spindle, as for the top bearing, through a corner of the motor body. Raise and lower the rotor a few times to pump oil into the bearing. If cleaning is also necessary, dismantle the motor as follows:

1. Take off three spring clips (41) and washers (35) then pull the motor downwards out of its mounting grommets (290 and 292).
2. Pull out both plugs (298) from the sides of the motor.
3. Pull off the green earth lead from the tag under the head of one of the motor fixing belts. The connector on this lead has a locking tab which must be disengaged from a slot in the earth tag before the lead can be released.
4. Unscrew and take out both long bolts securing the motor and turn it upside down. Be careful to avoid damaging the rotor spindle and note the position of the earth tag for reassembling.
5. Lift off the bottom motor screen (if fitted) and the bearing cover. Clean with a cloth slightly moistened with cigarette lighter fuel.
6. Apply a drop or two of lubricating oil to the porous bearing in the bottom cover and smear it over the lower end of the rotor spindle.
7. Before reassembling, the bearing in the top cover can also be lubricated if this has not already been done.
8. Reassemble in the reverse order. If the motor is now noisy, rap the side of the laminations with a wooden screwdriver handle (or similar object) to reset the self-aligning bearings.



Removing the turntable clip

Turntable Bearing

Apply a thin smear of oil to the inside bearing surface of the turntable. Oil must not come into contact with the driving rim.

Turntable Spindle Bearing

Apply a thin smear of oil to the spindle and a drop or two of oil to the bearing (345).

CLEANING**Stylus of a Magnetic Cartridge**

Keep the cartridge clean by periodically removing its carrier (see 'Fitting the Pickup Cartridge') and blowing any accumulated dust off the stylus tip or by gently stroking it away with a very soft brush. Stroke only from back to front of the stylus to avoid bending it. Avoid using spirit solvents, as these could attack the adhesive securing the stylus tip.

Turntable Mat

Clean this with a soft brush when necessary. The mat is designed to facilitate this.

Turntable Drive Mechanism

After a long period of use it is often worthwhile to wipe the driving surfaces of the motor pulley (295), intermediate wheel (45) and turntable rim with a clean lint-free cloth to remove rubber particles. The stroboscope ring (48) can be wiped at the same time.

6 Servicing

THE UNIT SHOULD BE DISCONNECTED FROM ITS POWER SUPPLY AND THE STYLUS PROTECTED BEFORE MAKING SERVICE ADJUSTMENTS. NUMBERS IN BRACKETS REFER TO PARTS SHOWN ON THE EXPLODED VIEWS (SECTION 7).

FAULT	CAUSE	CORRECTION
No. 1 Turntable Speed (a) Turntable fails to start, or runs slowly, when switched on.	1. Oil or dirt on driving surfaces.	1. Take off centre disc (52) and spring clip (51), remove turntable (platter) and clean inside rim, intermediate wheel (45) and motor pulley (295) with a lint-free cloth.
	2. Faulty intermediate wheel spring (42).	2. Check that spring is secured. Move manual control to 'Play' – spring should extend. If it does not, fit a new spring.
	3. Intermediate wheel support lever (43) not free.	3. Wheel (45) should engage motor pulley (295) firmly when switched on and retract when switched off. Lubricate spindles; replace parts as necessary.
	4. No power supply, or low voltage.	4. Remove power supply plugs from motor (289), switch on, and check them with a voltmeter. If no power, check back to source outlet, looking for loose connections, faulty switch contacts, etc. If power supply voltage falls below 105V (60Hz) or 200V (50Hz) operation can be adversely affected.
	5. Faulty motor coil(s).	5. Remove power supply plugs from motor (289) to check continuity of each coil with ohm-meter. Fit new motor if necessary.
	6. Bearings of motor out of line.	6. If rotor spindle is tight, tap the motor body with a small block of wood (e.g. screwdriver handle) to re-align bearings. Use only thin machine oil on these bearings. See 'Maintenance' section.
	7. Motor pulley (295) or intermediate wheel height set incorrectly.	7. See 'Adjustments'. Check that both motor pulley screws are tight.
	8. Catch lever (228) not holding switch lever (225).	8. Check that catch lever pivots freely under influence of tension springs (224 and 230).
	9. Bearings not free.	9. Check motor, intermediate wheel and turntable bearings for free running. Clean and lightly oil, if necessary – see 'Lubrication'.
No. 2 Turntable Speed (b) Wow and Flutter.	1. Various.	1. See 'Turntable Speed', Causes and Corrections 1, 7 and 8.
	2. Warped records in stack causing slipping. Record centre holes may be worn or oversize.	2. It is not advisable to play badly warped or 'dished' records automatically, although small strips of adhesive paper on their labels may help adjacent records to key together.
	3. Damaged rotor spindle.	3. Fit new motor (289).
	4. Flats on driving surface of intermediate wheel (45).	4. If running unit for a few hours does not cure the fault fit a new wheel.
	5. Worn intermediate wheel.	5. If the intermediate wheel runs erratically replace it and/or its support lever (43).

FAULT	CAUSE	CORRECTION
No. 3 Record Lowering (a) Records fail to lower. (Zero 100 and 100C only).	<ol style="list-style-type: none"> 1. Damaged record spindle (56). 2. Moulding flash or label paper in centre hole of new record. 3. Non-standard records. 4. Insufficient tension in leaf spring supporting pawl of record spindle. 5. Record spindle not seated properly. 	<ol style="list-style-type: none"> 1. Remove spindle and check that its record pushing pawl moves freely. If not, fit new spindle. 2. Remove carefully with a pen-knife. 3. Records with over-sized centre holes or more than 0.090" thick at centre hole may fail to drop. Play them singly. 4. Tighten screw (279) to apply light pressure. 5. Press it down until a light click is felt as spring clip (51) holds it in position.
No. 4 Record Lowering (b) Two or more records lower together.	<ol style="list-style-type: none"> 1. Damaged record spindle (56). 2. Non-standard records. 3. Platform (85) position incorrect or record clip faulty. 	<ol style="list-style-type: none"> 1. Check that both latches at the top of the spindle fall freely. Do not oil them. Fit a new spindle, if faulty. Latches should be flush with top of a spindle when records are loaded. 2. If records are less than 0.053" thick at their centre holes, play them singly. 3. Make sure that the clip on the record support platform steadies a stack of records and that the platform supports a record on its rim adequately. Adjust the platform if necessary by loosening its fixing screws (87) and moving it, before re-tightening the screws.
No. 5 Pickup Arm Movement (a) Pickup tracks incorrectly.	<ol style="list-style-type: none"> 1. Dust accumulated around stylus tip. 2. Stylus force too low. 3. Leads tight or trapped at rear of arm. 4. Worn or wrong size stylus tip. 5. Groove guard on record. 6. Automatic trip links (338, 349, 355 and 356) not free. 7. Damaged spindle bearing (328). 8. Body of cartridge touching record. 9. Cueing height set too high. 	<ol style="list-style-type: none"> 1. Clean carefully, by blowing or by stroking it from back to front with a camel-hair brush. 2. Check that force is not lower than cartridge manufacturer's recommended figure. Adjust if necessary – see 'Setting Up'. Make sure that the counterbalance weight has not been moved accidentally. 3. Make sure leads are slack and check that they are not caught in mechanism below unit plate. 4. Replace stylus. 5. If stylus lands too far out it may slide down the slope of the raised rim and jump the first playing grooves. Set arm lowering position so that stylus lands inside the rim – see 'Adjustments'. 6. Move arm inwards by hand checking for damaged or tight linkage. Reshape, clean or replace, as necessary, but do not lubricate. 7. Fit new part as necessary. 8. Tighten cartridge fixing screws, fit new stylus or reshape cartridge mounting bracket. 9. Turn adjusting screw (20) one half turn at a time counterclockwise until friction cap (19) is disengaged from the underside of the pickup arm.

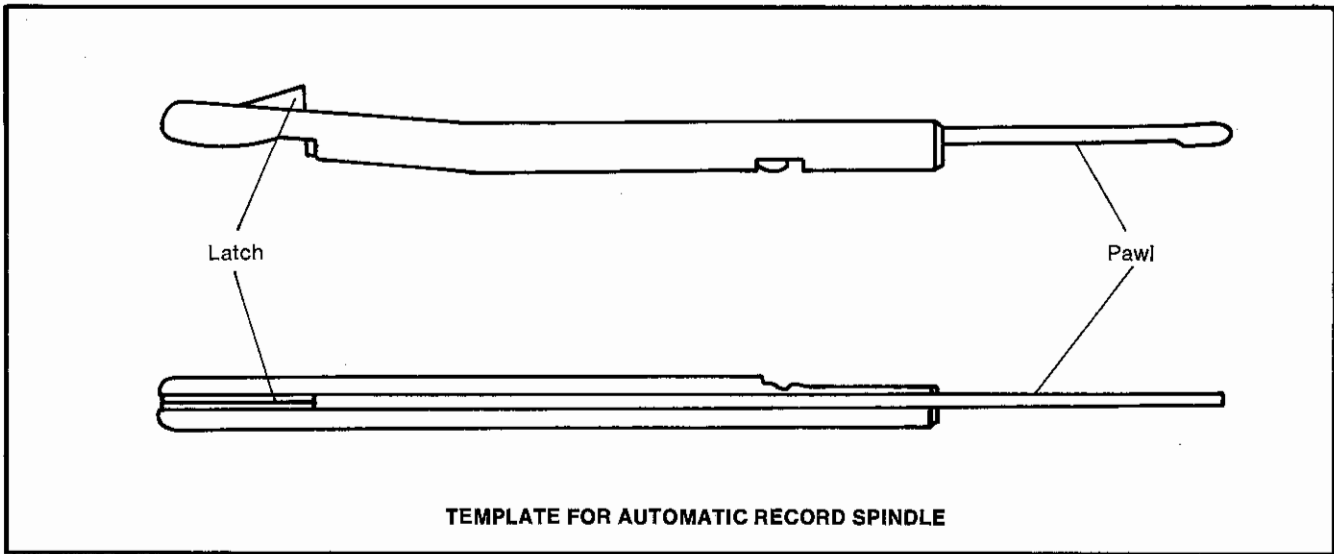
FAULT	CAUSE	CORRECTION
No. 6 Pickup Arm Movement (b) Pickup lands on record too far out or in.	1. Mechanism beneath unit touches mounting board. 2. Lowering position incorrectly set. 3. Tails of pickup lever (263) not square.	1. Check mounting board cutout to template diagram, particularly in top right-hand corner near mounting spring. 2. See 'Adjustments'. 3. Reshape it or fit a new lever.
No. 7 Pickup Arm Movement (c) Arm fails to lower.	1. Spring (233) controlling cueing cam (237) disengaged. 2. Spindle of lifting platform (21) not free. 3. Pickup arm pivot (79) not free. 4. Pickup arm rest safety catch (22) not released.	1. Anchor spring to cueing cam and trip lever (232) being careful not to over-stretch it. 2. With pickup arm raised, lift platform moulding at top of spindle. It should spring back. If not, check for damage or restriction. Clean and oil if necessary. 3. Clean and fit new part. 4. Turn it to 'Free'.
No. 8 Pickup Arm Movement (d) Arm begins to lower, then swings in.	1. Pickup leads tight or trapped.	1. Make sure the leads are slack, and see that they are not caught up in mechanism below unit plate.
No. 9 Pickup Arm Movement (e) Arm fails to lift when Auto control is moved to 'Start' or to return at end of record.	1. Damaged trip pawl (338). 2. Auto trip rod (349) bent, or disengaged.	1. Reshape vertical lug or fit new pawl. 2. Reshape it or fit new link.
No. 10 Pickup Arm Movement (f) Arm lands on record and immediately or prematurely rejects, next record lowers and fault repeats until normal switch-off at end of stack.	1. Spring (236) disengaged. 2. Automatic operating control remains at 'Start'. 3. Outer end of auto trip rod (349) bent out of square.	1. Anchor spring to hole in trip operating lever (234) and to switch-off return lever (241). 2. Check operation of return spring (236) and free movement of trip operating lever (234). Grease sliding surfaces if necessary. 3. Reshape link. Do not lubricate trip rod or associated levers on main cam (341).

FAULT	CAUSE	CORRECTION
No. 11 Noise (a) Rumble, heard through speaker(s) while stylus is in record groove.	<ol style="list-style-type: none"> 1. Recorded rumble. 2. Need for lubrication. 3. Intermediate wheel (45) rubbing against step of motor pulley (295) or dirt on running surfaces. 4. Driving surface of intermediate wheel dirty, indented or hardened. 5. Faulty installation. 6. Worn turntable spindle bearing. 7. Dirty thrust washers (344 and 346), ball race (345) or cushion ring. 8. Motor mounting grommets (290 and 292) damaged. 	<ol style="list-style-type: none"> 1. If consistent rumble is heard on one record, but not on others, then the record is faulty. 2. See 'Maintenance'. 3. Check heights of wheel and pulley - see 'Adjustments'. Clean periphery of wheel. The intermediate wheel should be horizontal. 4. If running the unit for a while and cleaning the surface of the wheel does not help, fit a new wheel. 5. Check that unit floats freely on its mounting springs, that the motor hangs freely in its rubber grommets and that no parts of the mechanism except the mounting springs are in contact with the mounting board. 6. Fit new bearing components (344-346) and/or cushion ring (348) as necessary. 7. Clean and oil bearings. Fit a new cushion ring if hard. 8. Fit new grommets. Note that there are two types of grommets with different elasticity. The motor must hang level and free.
No. 12 Noise (b) Electrical hum, heard through speakers.	<ol style="list-style-type: none"> 1. Faulty earthing system. 2. "Hum loops" in the earthing system. A point connected to ground by two separate paths (probably in the pickup circuit) can create a "hum loop". 3. Faulty magnetic pickup cartridge. 	<ol style="list-style-type: none"> 1. Check that earthing leads have been connected as described in "Setting Up" section. Check continuity and secureness of leads, particularly those connecting the pickup arm and the motor frame to the unit plate and the unit plate to the earth point. 2. Disconnect and remove or secure the second lead, possibly a lead to one of the cartridge's common output terminals. 3. If this is suspected, the cartridge should be checked by its manufacturer or their service agent. Make certain that the cartridge has been connected as its makers intended, particularly if it has a short-circuiting link or earth strap.
No. 13 Noise (c) Interference, heard as crackles etc. through speaker(s).	<ol style="list-style-type: none"> 1. Faulty contact in power supply circuit, pickup circuit or earth. 	<p style="text-align: center;">N.B. DISCONNECT POWER BEFORE OPENING SWITCH</p> <ol style="list-style-type: none"> 1. Examine all leads and connections for damage. Check screws and push-on terminals for tightness. Remove screws (319) holding motor switch, take off cover and check for good contact between blades. Clean and form blades as necessary. Fit a new loom assembly (219) if necessary.

No. 14 Automatic Switch

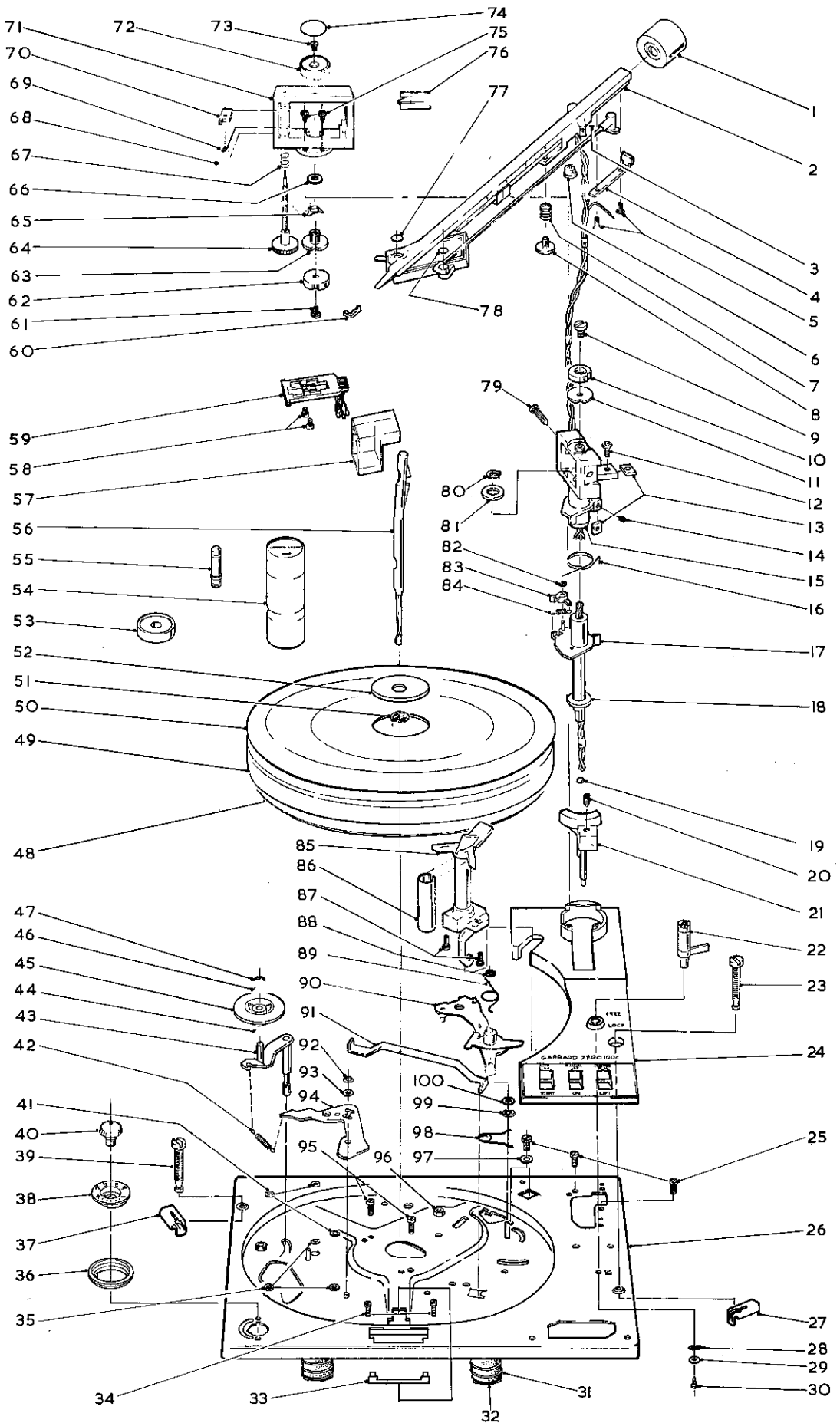
Fails to switch off when last record has played or switches off without playing.

1. Automatic operating control tight.
2. Damaged record spindle.
3. Action of stop lever (90) impeded.
1. Check operation of return spring (236) and free movement of trip operating lever (234).
2. Check shape to template below.
3. Dismantle and clean off grease.



Garrard Zero 100, 100C, 100S and 100SC exploded view

Parts above unit plate



Garrard Zero 100, 100C, 100S and 100SC spare parts list

Parts above unit plate Parts are common to all models unless specified otherwise.

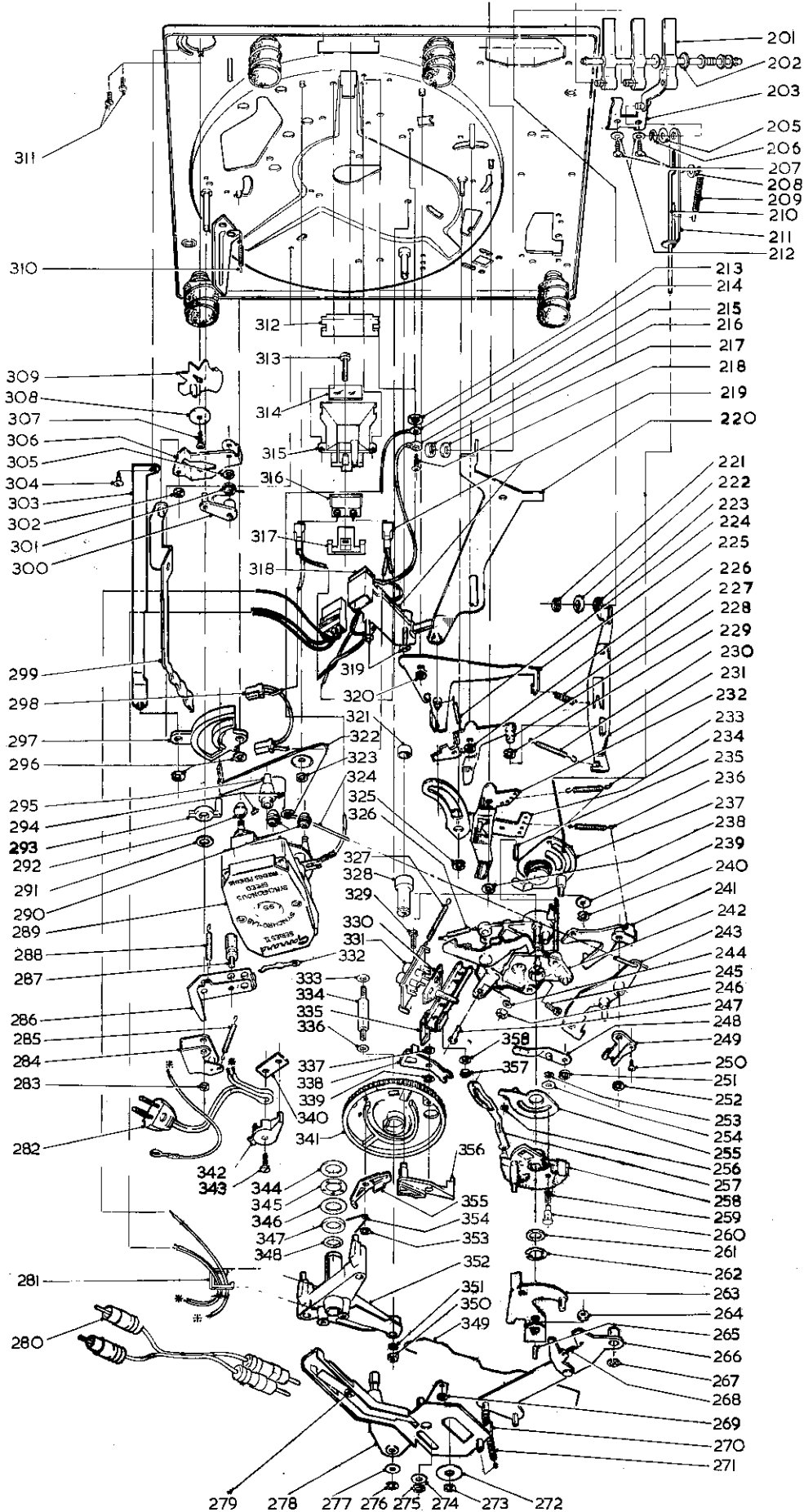
Ref. No.	Garrard Part No.	Description	Ref. No.	Garrard Part No.	Description
1	76092	Counterbalance weight	54	75461	Type LRS100 record spindle (Optional extra) (Zero 100 & 100C)
2	76721/001	Pickup arm, comprising items 2-8, 60, 77 and 78 (Zero 100 & 100C)	55	75196	Single record spindle
	76721/002	Pickup arm (Zero 100S & 100SC)	56	72340	Automatic record spindle (Zero 100 & 100C)
3	00525/101	Screw	57	75291	Setting gauge
4	75112	Weight guide	58	59048/113	Cartridge fixing screws, with setting gauge and tilt wedge
5	01515/002	Screw	59	75149/001	Type C3A cartridge carrier (Zero 100 & 100C)
6	75309	Lead clamp		75903/001	Type C3A cartridge carrier (Zero 100S & 100SC)
7	44972	Spring	60	75259	Trim
8	75249	Screw	61	44356	Screw
9	44356	Screw	62	75232	Magnet, adjusting screw and fixing screw
10	75234	Magnet	63	75233	Adjusting screw
11	41227	Washer	64	76570	Ratchet screw (Zero 100C & 100SC)
12	44352	Screw	65	44498	Spring
13	40906	Locking washer (2)	66	41218/018	Washer
14	00525/105	Screw	67	44557	Spring (Zero 100C & 100SC)
15	76582	Gimbal and pickup spindle (Zero 100C & 100SC)	68	41219/026	Washer (Zero 100C & 100SC)
	75135	Gimbal and pickup spindle (Zero 100 & 100S)	69	00431/010	Spring clip (Zero 100C & 100SC)
16	44585	Spring	70	76573	Indicator nut (Zero 100C & 100SC)
17	76578	Pickup spindle, with catch lever and spring (Zero 100C & 100SC)	71	76580	Gimbal surround with counter and magnet (Zero 100C & 100SC)
18	41218/079	Washer		75230	Gimbal surround with magnet (Zero 100 & 100S)
19	73873	Friction cap (not currently used)	72	75235	Adjusting knob
20	44210	Screw	73	44356	Screw
21	75177	Lifting platform with screw	74	75154/003	Trim disc
22	75156	Arm rest	75	44378/001	Screw (2)
23	44350	Transit screw	76	75236	Magnet shield
24	76587/001	Control panel moulding assembly (Zero 100C)	77	75154/001	Trim disc
	76587/004	Control panel moulding assembly (Zero 100SC)	78	75154/002	Trim disc
	75168/001	Control panel moulding assembly (Zero 100)	79	74407	Pivot screw
	75168/003	Control panel moulding assembly (Zero 100S)	80	02651/013	Spring clip
25	00245/010	Screw (3)	81	41218/066	Washer
26	606/SC/76720	Unit plate, with pins and bushes	82	00431/010	Spring clip (Zero 100C & 100SC)
27	43855	Transit clip	83	76577	Catch lever (Zero 100C & 100SC)
28	02293/012	Bowed washer	84	44558	Spring (Zero 100C & 100SC)
29	41218/014	Washer	85	75161	Platform with trim (Zero 100 & 100C)
30	01577/066	Screw	86	74285	Trim (Zero 100 & 100C)
31	71084	Damping pad (4)	87	44348	Screw (2) (Zero 100 & 100C)
32	44889	Mounting spring (4)	88	00432/007	Spring clip
33	75251	Window trim	89	44952	Torsion spring
34	00245/035	Screw (2)	*90	72256	Stop lever with spring
35	41218/026	Washer (3)	91	72255	Tension link
36	75240	Speed control knob	92	00432/007	Spring clip
37	43855	Transit clip	93	41218/046	Washer
38	76243	Graphics disc, with bearing	94	72254	Tension lever
39	44350	Transit screw	95	00245/010	Screw (2)
40	75207	Speed selection knob	96	00451/001	Nut
41	00432/007	Spring clip (3)	97	41218/042	Washer
42	44819	Spring	98	44953	Torsion spring
43	75264	Support lever	*99	42561	Bowed washer
44	41219/005	Fibre washer	*100	41218/046	Washer
45	75625	Intermediate wheel			
46	41219/010	Plastic washer			
47	00431/010	Spring clip			
48	75191	Stroboscope ring, 60Hz			
	75445	Stroboscope ring, 50Hz			
49	76667/001	Platter, with mat and 60Hz ring			
	76667/002	Platter, with mat and 50Hz ring			
50	75193	Mat			
51	43857	Retaining clip			
52	75194	Centre disc			
53	72698	Adaptor, for single large hole records			

*In an alternative assembly

- 1 Stop lever 90 is replaced by stop lever 77656 and compression spring 44557.
- 2 Washer 100 is fitted beneath spring clip 88 and
- 3 Bowed washer 99 is not used.

Garrard Zero 100, 100C, 100S and 100SC exploded view

Parts below unit plate



Garrard Zero 100, 100C, 100S and 100SC spare parts list

Parts below unit plate Parts are common to all models unless specified otherwise.

Ref. No.	Garrard Part No.	Description	Ref. No.	Garrard Part No.	Description
201	77171/001	Control paddles with spindle	280	74760	Audio lead (4ft. long, 4 phono plugs)
202	41220/009	Washer	281	73807	Clip for lead
203	74306	Clamp plate	282	72192/002	Line cord with grip
204		Not allocated	283	01166/002	Spring clip
205	41218/092	Washer	284	58211	Index bracket
206	00432/007	Spring clip	285	41848	Spring
207	44348	Screw (2)	286	75266	Support bracket
208	41218/035	Washer	287	44353	Adjusting screw
209	45000	Spring	288	44708	Spring
210	77167	Cueing rod	289	60810	Motor (Quote details on bottom bearing cover)
211	77169	Cueing bracket	290	43129/003	Motor mount (2)
212	41218/017	Washer (2)	291	41218/013	Washer
213	00852/012	Washer	292	43129/002	Motor mount
214	60391/002	Earth lead	293	75243	Speed control saddle
215		Part of 219	294	44052	Screw (2)
216	00432/007	Spring clip	295	60903	50Hz pulley, with extractor
217	41218/090	Washer		60902	60Hz pulley, with extractor
218	44348	Screw	296	00432/007	Spring clip (2)
219	60365	Loom assembly (quote No. on tape around switch)	297	75213	Speed control cam
220	74332	Auto operating lever	298		Part of 219
221	00432/007	Spring clip	299	75255	Speed cam
222	41218/090	Washer	300	72366	Index lever
223	74302	Manual operating lever	301	44927	Torsion spring
224	44363	Spring	302	00432/007	Spring clip
225	74331	Switch lever with spring (item 227)	303	75244	Speed control link
226	00432/007	Spring clip	304	75214	Pivot screw
227	44445	Spring	305	00432/007	Spring clip
228	74334	Catch lever	306	72354	Speed lever
229	00432/007	Spring clip	307	01242/035	Screw
230	44444	Spring	308	41218/053	Washer
231	74302	Manual operating lever	309	75245	Selector cam
232	74300	Trip lever	310	44718	Spring
233	44948	Spring	311	40454/005	Screw (2)
234	74333	Trip operating lever	312	75200	Viewing window
235	74871	Cueing plunger	313	00245/063	Screw
236	44503	Spring	314	75202	Mirror
237	74335	Cueing cam	315	75198	Stroboscope housing
238	00432/007	Spring clip	316	75327	Neon lamp, industrial devices Type 2340
239	41219/010	Washer	317	75203	Clamp
240	00431/010	Spring clip	318	73599	Insulating plate
241	73495	Switch - off return lever	319	01574/010	Screw (2)
242	75180	Pickup base, with levers, etc.	320	00432/007	Spring clip
243	75186	Selector lever	321	43622	Bearing (top)
244	00852/012	Washer	322	72445	Selector follower
245	00245/058	Screw	323	00431/015	Spring clip
246	00451/002	Nut	324		Part of 322
247	00245/037	Screw	325	00431/015	Spring clip
248	72467	Retracting lever	326	44951	Spring
249	72278	Link guide	327	44870	Spring (Zero 100 & 100C)
250	01145/028	Screw	328	77211/001	Bearing housing assembly
251	00432/007	Spring clip	329	00247/057	Screw
252	00432/007	Spring clip	330	75985	Grommet, for lead
253	00432/007	Spring clip	331	75919	Twin phono socket
254	40975	Washer	332	44488	Setting blade
255	72421	Friction lever	333	41218/013	Washer
256	43809	Spring clip	334	72233	Cam stud
257	74309	Auto cueing link	335	75920	Leg
258	74370	Pickup cam comprising items 253 - 260	336	41218/013	Washer
259	44975	Spring	337	00431/002	Spring clip
260	77054	Pin	338	75228	Trip pawl
261	41218/054	Washer	339	00431/002	Spring clip
262	00431/029	Spring clip	340	73821	Insulating plate
263	75765	Pickup lever	341	75222	Main cam, with levers
264	00451/001	Nut	342	73791	Grip, for line cord
265	00245/032	Screw	343	01515/022	Screw
266	73504	Cam link, with spring	344	75417	Thrust washer
267	00432/007	Spring clip	345	75285	Ball race
268	44981	Spring	346	75417	Thrust washer
269	00432/007	Spring clip	347	74870	Spacer
270	75709	Release lever (Zero 100 & 100C)	348	58174	Cushion ring
	77151/001	Release lever (Zero 100S & 100SC)	349	75229	Trip rod
271	41631	Spring	350	00451/001	Nut
272	41218/058	Washer	351	00201/003	Spring washer
273	00432/007	Spring clip	352	75219	Housing
274	41218/026	Washer	353	43864	Spring clip
275	00432/007	Spring clip	354	44973	Torsion spring
276	00290/004	Spring clip	355	72404	Cam index lever
277	41218/039	Washer	356	75226	Friction lever
278	72328	Cam lever	357	00451/003	Nut
279	00245/035	Screw (Zero 100 & 100C)	358	00852/006	Washer

8 Module Versions

Module Versions

These comprise the record playing deck assembled to a base and complete with a cover and connecting leads. A Shure stereo magnetic pickup cartridge is also fitted when ordered – details of both types used are shown below.

Cartridge Data

	SHURE M75B Type 2	SHURE M93E
STYLUS FORCE	1½-3g	1½-3g
OPTIMUM LOAD (per channel)	47000 ohms	47000 ohms
OUTPUT (per channel at 5cm/s)	5mV	6.2mV
WEIGHT OF CARTRIDGE	6g	6g
STYLUS: TIP RADIUS (DIAMOND)	.0006" spherical	.0007" x .0004" elliptical
MAKER'S REPLACEMENT TYPE	N75B Type 2	N93E
TYPE FOR 78 REV/MIN	N75-3	N91-3

This information is for guidance only – more details are available from Shure Brothers Inc. or their agents.



To prepare a module for use

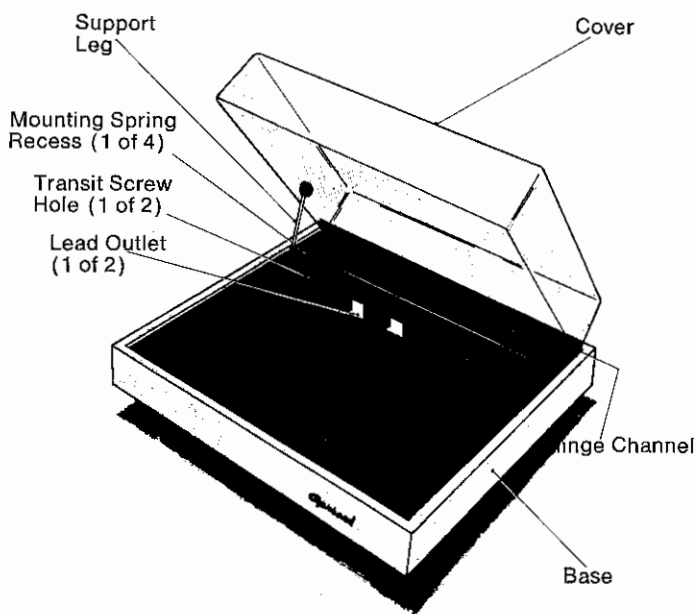
- Fit a pickup cartridge as described in Section 2 if this has not already been done.
- Set the pickup arm adjustments as described in Section 4.
- Connect the power supply, earth and audio leads as described in Section 2.

The Base

This is made of low resonance material with either a wood-style or aluminium finish. Supports are provided for the deck's mounting springs and two holes for its transit screws. A channel along the back of the base acts as a hinge for the cover and two snap-in clamps behind it provide secure and convenient outlets for connecting leads.

The Cover

This is a tinted moulding with a self-lowering support leg. The design of its hinge allows the cover to be lifted off for cleaning or for use where overhead clearance is restricted. The low cover for single record playing units is about 3¼" (80mm) deep and the high cover for record changers is about 3⅞" (100mm) deep to allow additional clearance for the record stack.



To Assemble the components (when obtained separately)

1. Unpack the record playing deck, base and cover from their respective cartons in accordance with the instructions provided with them.
2. Release both lead clamps from the base by pressing their catches outwards from inside and sliding them out of their locating grooves.
3. Uncoil the connecting leads attached to the deck and turn the spring clips on both transit screws into a vertical position. Check that both screws are turned fully clockwise until they are down in the playing position.
4. Place the deck alongside the base and pass the power supply lead and earth lead through the left-hand opening at the back of the base as viewed from the inside front. Then pass the audio lead(s) through the right-hand opening and make sure that all leads are clear of the mechanism.
5. Fit the deck to the base with the mounting springs resting in their recesses and the transit screws and clips passing through their holes. Reaching up from underneath the base, turn both transit clips horizontal. On no account must the base be tipped up at a sharp angle before the deck has been secured by turning the clips.
6. Gently pull the connecting leads out from inside the base leaving enough slackness in them to allow the deck to float freely on its mounting springs.
7. Slacken one cross-head (Pozidrive type) screw holding the white strain relief to the clamp and remove the other. Press the clamp back into the base until it clicks into position. Pass the power supply lead and earth leads down over the clamp and secure them in position with the strain relief by tightening both screws.

8. Locate the audio lead in the elongated centre slot at the top of the opening of the base so that it is lightly held in place. Press the remaining clamp back into the base until it clicks into position.

To connect the leads

Carry out the instructions provided in Section 2.

To fit the cover

Remove the adhesive tape holding back the support leg. Hold the leg in the same position while lowering the cover horizontally into its recess in the base with the leg at the back left hand corner.

To open the cover

Lift the front until the leg can spring forward, then lower it until the leg supports the cover. The module is ready for use when a pickup cartridge has been fitted and the pickup arm adjustments set – see Section 4.

While the cover is open it is locked to the hinge channel running along the back of the base.

To close the cover

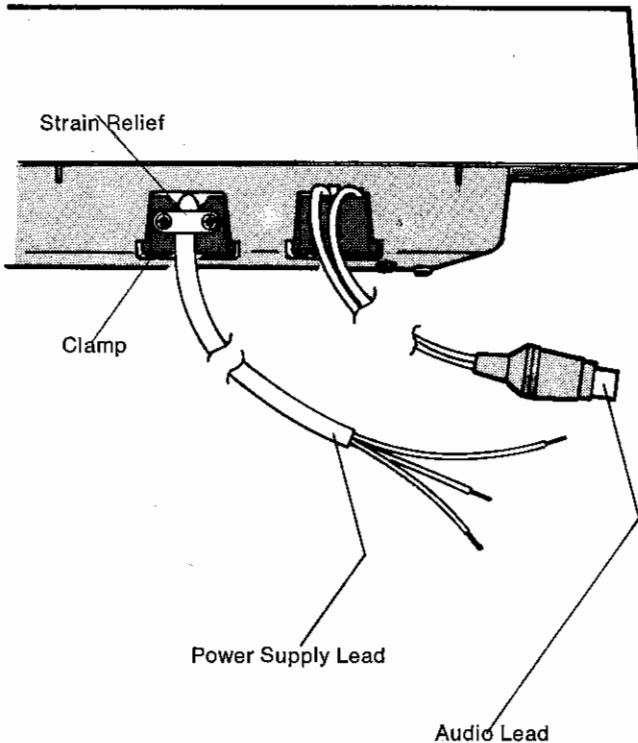
Raise the front slightly, ease the leg backwards and lower the lid.

To remove the cover

Close and lift it off.

WARNING: To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

- * For best operating conditions, place the assembly on a reasonably flat and level surface.
- * Retain the original packing material for possible future use.
- * While transporting the deck on its base, both transit screws should be turned fully counterclockwise to prevent the unit from vibrating on its mounting springs.



9 Fitting New Parts

FITTING NEW PARTS

Before any parts are fitted, disconnect the unit from its power supply completely.

Motor Pulley (295 on the exploded view)

This fits closely on the motor spindle to maintain true running. If the pulley cannot be lifted off without undue difficulty after slackening both its fixing screws (294), insert a 4BA screw, 1 inch or more long, into the tapped hole in the top of the pulley. This screw will act as an extractor if it is turned clockwise until the pulley is driven off the motor spindle. A suitable screw is provided with a new pulley.

The new pulley should be fitted using moderate pressure to push it onto the spindle until the bottom of the pulley is $\frac{1}{4}$ in above the top of the motor screen plate. Retighten both fixing screws. If the close fit of the pulley causes difficulty, heat it on an electric hot-plate for a few minutes. This should expand the pulley sufficiently to facilitate fitting. Finally, check that the intermediate wheel is drawn against the centre of each pulley step when the fine speed control is set to its mid-position. A fine adjustment to the height of the wheel can be made by turning the screw in its support bracket under the unit plate.

If a new pulley is to be fitted as a result of a change in power supply frequency, say from 60Hz to 50Hz, then a stroboscopic turntable ring (48) should be obtained at the same time.

Stroboscopic Ring (48)

This ring has a self-adhesive backing which is exposed after peeling off the protective paper. Remove the turntable, invert it, carefully place the new ring exactly over the existing one and press it firmly down into place.

Neon lamp for stroboscope (316)

Remove the fixing screw (313) from the recess in the lens housing to release the clamp and lamp. Slide back both insulated terminal covers and ease the slide-on lead connectors off the lamp terminals.

Reassemble in the reverse order, pressing the leads firmly onto the terminal tags on the new lamp and refitting the insulated terminal covers securely.

Intermediate Wheel (45)

Lever off the spring clip (47) securing the wheel to its spindle, then lift off the plastic washer, intermediate wheel and fibre washer.

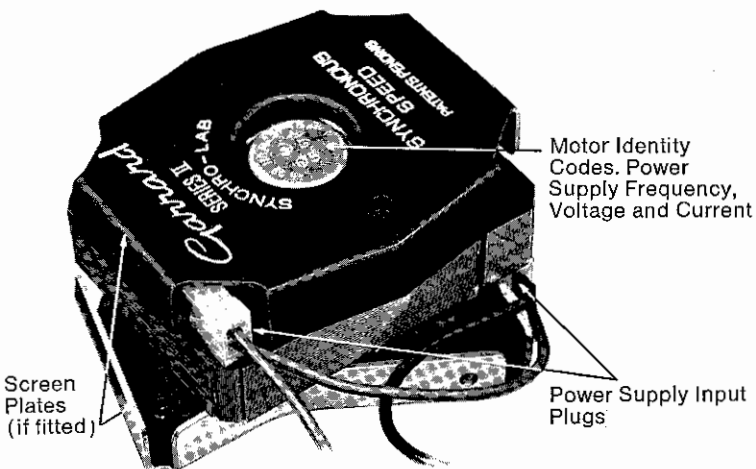
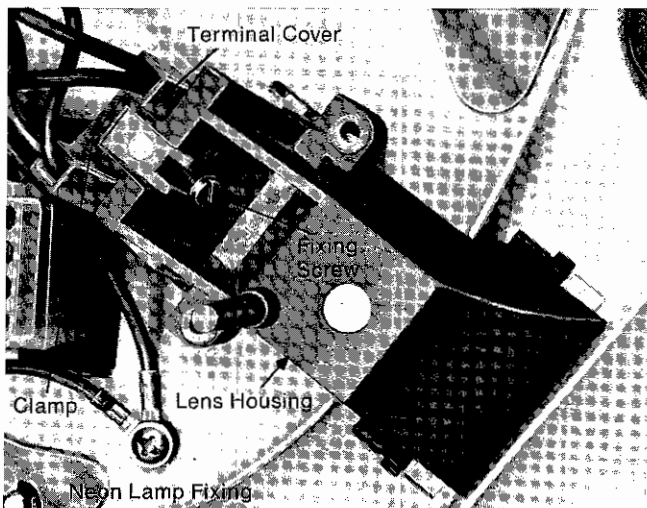
Apply a film of light machine oil, such as non-detergent SAE 20W oil, inside the bearing of the new wheel before re-assembling, using a matchstick or similar object.

Any trace of oil on the rubber can result in erratic turntable speed.

Motor (289)

Disconnect the power supply, pull out both power supply plugs from the body of the motor and remove the three spring clips (41) and washers (35). The motor can then be pulled out from its rubber mountings. To fit the new motor, orientate it so that it can be pushed up into the three rubber mountings until it remains evenly suspended when released. Refit the washers, spring clips and power supply plugs. Then, if necessary, fit the motor pulley (295) as described earlier in this section.

Before reconnecting the power supply, check that the motor's operating voltage range, shown on its bottom bearing cover, is correct for the power supply to be used.



Pickup arm gimbal bearing surround (71)

To prevent accidental damage be particularly careful when handling the pickup arm.

Lock the pickup arm on its rest (22), wind its counterbalance weight (1) off the back of the arm and remove the cartridge on its carrier (59) for safety.

Take out both Philips-head screws (75) securing the gimbal. Turn the pickup arm lifting height and lifting height restriction screws (8 and 12) counterclockwise to provide greater clearance and arm movement if necessary to guide the surround forward. Move the pickup arm locking clip to 'Free', raise the arm and withdraw the surround.

When fitting the new surround make sure that the correcting arm situated alongside the pickup arm is located on its rear pivot. In the case of models with automatic record counters, easing the pickup arm outwards over its rest then inwards to a radius of approximately $6\frac{1}{2}$ inches from the turntable centre must produce movement of one tooth of the ratchet screw (64) and one audible click.

Reassemble in the reverse order and refit the cartridge.

Finally check the following settings and correct them, if necessary, in accordance with instructions in the 'Adjustments' section.

- (a) stylus force
- (b) bias compensator magnet gap
- (c) pickup arm lifting height
- (d) lifting height restriction and
- (e) bias compensator magnet gap.

In the case of a model with an automatic record counter, release the pickup arm from its rest, support it with one hand over the turntable and rotate the ratchet wheel (64) clockwise until the pointer is at the same position on the new scale as it was on the old. This will ensure continuity of the record counting device.

Pickup arm (2)

Remove the gimbal bearing surround (71) as instructed in the preceding paragraphs. Unsolder the leads from the phono socket (331) under the unit plate and release them from the clip on the support leg (335). Remove the left hand horizontal pivot screw (79) from the gimbal bearing, free the pickup from its rest and lift the correcting arm alongside the pickup arm from its rear pivot pin. The pickup arm can now be tilted upwards at the right hand side to about 45° and withdrawn from the front of the gimbal whilst feeding its connecting leads up through the vertical spindle (17) from underneath. Reassemble in the reverse order, being careful to avoid damage to the fine, flexible pickup arm leads and precise pivots. The leads must be quite slack so that they do not impede the arm's movement.

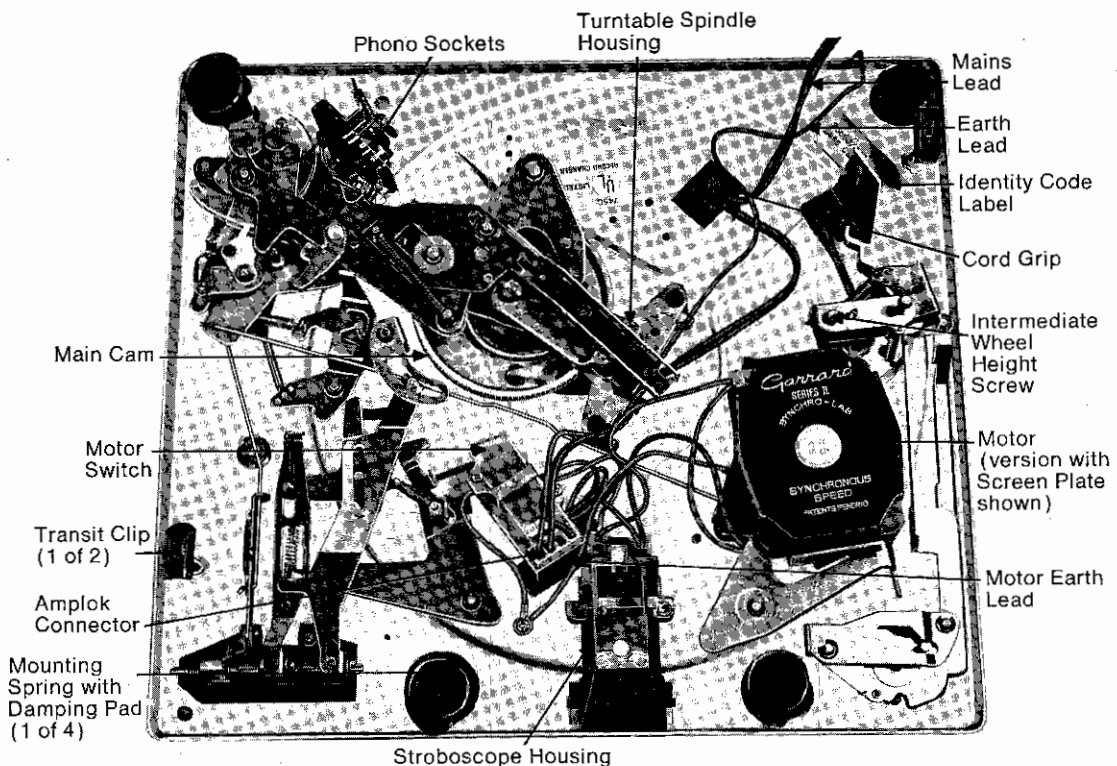
Reset adjustments as described in the section dealing with reassembling the gimbal bearing surround.

Turntable spindle and/or bearings

The spindle is integral with its housing (352) and cannot be separated from it.

Remove the turntable and take out both screws (95) securing the spindle housing. From below the unit plate, take off the nut and spring washer holding the cam stud (334) to the housing, then both spring clips and washers from the release lever (270) and disengage one end of the blue tension spring. Take off the trip rod link guide (249) by removing the spring clip and Philips-head screw, then release the rod (349). After releasing the black plastic lead clip (281), the housing incorporating the spindle can now be lifted clear complete with the release lever. Be careful not to lose the ball race (345) or thrust washers (344 and 346) from the spindle. Slide the release lever off the housing and onto the new housing if this is to be fitted.

When a unit has given service over a considerable period it will be worthwhile to replace the thrust washers and ball race at this time in order to avoid dismantling for this purpose at a future date. The thrust washers are lapped on one side only. This side should contact the balls and has a matt appearance.



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