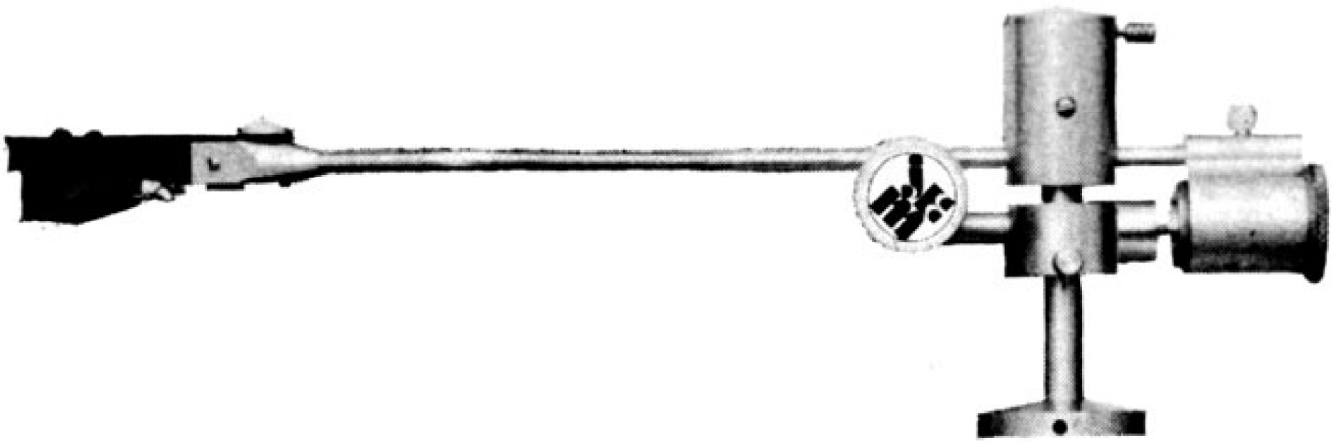
J A MICHELL ENGINEERING LIMITED

The reference electronic turntable manual



The Reference Electronic Turntable and associated Fluid Arm represent the very latest in record player engineering techniques and are designed to complement the finest stereo reproducing equipment. The complete unit is free-standing on adjustable acoustic feedback damping legs.

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Reference Electronic Turntable

The Reference Electronic Turntable employs a pancake type d.c. brushless motor encapsulated within a detachable sealed drive and control module mounted in the motorboard. Drive to the platter is via a neoprene belt, thereby providing complete vibration insulation.

Two-speed action (45 and 33$\frac{1}{3}$ r.p.m.) is achieved electronically with On/Off and speed change set by a single knob. As the knob is turned, cam and magnetic switching obtains the required setting. Fine control for each speed is achieved independently via two micro-potentiometers located one each side of the main control knob. Once set, the control permits speed changing without the need for further fine adjustment. A neon-lit stroboscope is provided for accurate speed setting.

This arrangement provides a neat, virtually maintenance free, package with infinitely variable speed control.

In order to eliminate completely any mechanical shock to the equipment, on/off switching of the drive motor is accomplished by means of a magnetically-actuated vacuum switch. The sintered gold contacts on this switch guarantee an extremely long operational life.

The Reference Electronic Turntable also has provision for the unique Sweep Arm representing a great advance in the field of record cleaning devices. This consists of a fine squirrel hair brush mounted on a balanced beam so that the brush tracks the record at a downward force of less than 1 gramme. Thus, the use of the Sweep Arm ensures that the record is cleaned thoroughly whilst in use without producing any wear on the record or causing any noticeable amount of static.

A squirrel hair brush is also available as an accessory for cleaning dust from the stylus assembly.

The Fluid Arm

The Fluid Arm has been developed specifically for use with modern cartridges of not more than 16 grammes weight, tracking at not more than 2 grammes.

The Fluid Arm employs a unipivot working in an oil-filled well, so that the arm beam assembly relies for its lateral support, stability and resonant damping on the fluid surrounding the pivot. This results in a substantially friction-free pivot of high stability.

An adjustable eccentric counterweight allows both lateral and longitudinal balancing of the arm. Fine control of longitudinal balancing to allow adjustment of the stylus tracking force within a fraction of a gramme is provided by a screwed counterweight.

Also provided is a bias compensating device so designed as to use a rolling motion. An adjustable bias weight operating through a pulley gives correct compensation as the stylus moves towards the centre of the record.

A lifting and positioning (or "cueing") device is provided incorporating a hydraulic lowering handwheel which lowers the arm onto the record automatically, but which can be over-ridden when required for accurate manual positioning.

A plug-in headshell is fitted for mounting the cartridge, no soldering is required, and the signal outputs are taken via a pair of 4-feet (1219 mm) long screened leads terminated in phono plugs.

SPECIFICATION

Reference Electronic Turntable

Platter	12 in. (305 mm) diameter cast and machined aluminium alloy disc fitted with six gold-plated weights. Total weight 8 lb. approx, (5 kilogrammes), statically balanced to within 3 grammes. The record is supported on soft rubber pads thereby reducing rumble and induced static to an absolute minimum.
Main bearing	Slim section ball-ended ground and polished steel spindle running onto a hardened steel thrust pad and into PTFE bushes (PTFE is a plastic material having a lower coefficient of friction than any other solid).
Motor	Pancake type d.c. brushless motor. Integral solid state speed control. Mains isolated. Negative external field.
Power requirement	115V or 240V, single-phase, 50 Hz or 60 Hz. Fused on the drive and control module at 250 ma. (240V) or 500 ma. (110V).
Speeds	$33\frac{1}{3}$ and 45 r.p.m.
Speed control	$\pm 5\%$ of nominal.
Speed indication	Neon-lit stroboscope geared up 6 : 1 to give a 6° reading for a 1° variation in platter speed.
Wow and flutter	0·05% at $33\frac{1}{3}$ r.p.m.
Rumble	Not audible.
Dimensions	Width $17\frac{1}{4}$ in. (438 mm) Depth (lid closed) 17 in. (432 mm) Depth (lid open) $21\frac{1}{4}$ in. (540 mm) Height (lid closed) 7 in. (178 mm) Height (lid open) 20 in. (508 mm)

SPECIFICATION

Fluid Arm

Length	9 in. (229 mm)
Adjustment	Vertical : $2\frac{1}{2}$ in. (64 mm) Horizontal (all planes) : $\frac{1}{2}$ in. (13 mm)
Principal dimensions	**9 in. (229 mm) arm**
Counterweight overhang	$1\frac{1}{2}$ in. (38 mm)
Overall length	$10\frac{1}{2}$ in. (266 mm)
Pivot to turn-table centre	$8\frac{1}{2}$ in. (216 mm)
Lead capacitance	65 pF/ft.
Cartridge type	Not greater than 16 grammes in weight, tracking at not more than 2 grammes, with $\frac{1}{2}$ in. (13 mm) fixing centres. Compliance for 9 in. (229 mm) arms between 20 and 48×10^{-6} cm dyne.

User Information

After unpacking the equipment and removing all the obvious packing and retaining tape, proceed as follows with the fitting and setting-up instructions.

NOTE : The numbers given in brackets in the following instructions refer to the parts identified in the various illustrations.

Reference Electronic Turntable—installation instructions

1 Temporarily remove the perspex cover by pulling out the hinge rod.

2 Secure the platter, fig. 4(1), to the centre bearing with the knurled retaining nut, fig. 4(2), after first ensuring that the mating surfaces are clean.
CAUTION: (i) THE KNURLED RETAINING NUT SHOULD BE TIGHTENED ONLY "FINGER TIGHT". DO NOT USE FORCE ON THIS NUT AS THIS MAY DAMAGE THE MAIN SPINDLE ASSEMBLY.
(ii) IF AT ANY TIME THE MAIN BEARING SPINDLE SHOULD BE REMOVED, TAKE CARE NOT TO LOSE THE THRUST BALL.

3 Check that the drive and control module is correctly seated in the motorboard, fig. 3(1).

4 Lightly oil the stroboscope spindle and then fit the stroboscope, fig. 3(3), onto its bearing.

5 Fit the drive belt, fig. 2(2).

6 Ensure that the mains fuse link, fig. 3(2) has been set for the correct voltage (red spot holder active, plain holder dummy) and that a fuse of the correct rating has been fitted.

7 Assemble the top plate, fig. 4(3), onto the unit and secure it with the three retaining nuts, fig. 4(4).

8 Level the unit by means of the two knurled adjusting nuts, fig. 4(10), using the level indicator, fig. 3(5). This task will be eased if the weight is taken off the legs during adjustment.

9 Connect a suitable plug to mains cable.

10 Proceed now with the setting-up of the Fluid Arm as described below.

11 Re-fit the perspex cover.

JME Fluid Arm—setting-up instructions

1 Releasing the retaining nut, the headshell should be removed from the arm holding cone, fig. 1(4), carefully in one hand, using a side-to-side and easing movement, with other hand. Extreme care must be exercised as damage to the internal wiring could result, if force is used. Remove all transit rubber bands.

2 Release thumbscrew, fig. 1(7), and remove helmet cap and pivot assembly. From the small tube supplied, fill the well of the support tube to approximately half way, fig. 1(19). Refit cap and pivot securely.

3 The bias assembly is positioned by using cotton thread tied to the split pin and following a path around the back of the helmet to the small slotted screw. The angle of the bias weight should be set as in fig. 1(15) with the arm in a parked position.

4 Connect the cartridge to the left and right leads, which are marked on the underneath of the headshell, using the two red leads for signals and the two green for earthing. The cartridge can now be mounted, into the headshell, using the second pair of holes as viewed from the front. Replace headshell into arm and secure retainer.

5 Fit the eccentric counterweight with the knurled adjuster facing to rear, and lightly tighten the thumbscrew to hold in place. Turn adjuster fully anti-clockwise.

6 The thumbscrew should now be released and the counterweight moved along its shaft until the arm is in a state

of balance. Whilst moving the counterweight, it can be rotated in the desired direction to allow the helmet to remain vertical while playing.

7 The correct tracking weight can now be achieved by rotating the adjuster clockwise until stylus barely comes to rest on record. Now add exact cartridge tracking weight using coloured spots, each representing $\frac{1}{4}$ gramme.

8 Place the template over the centre spindle of turntable platter, and, after slackening thumbscrew, fig. 1(17), move arm across and place stylus tip on point indicated. The lines of the template and the headshell must run parallel to each other to ensure minimum tracking error. To correct any misalignment, slacken, with the aid of a suitable piece of $\frac{1}{8}$ in. (3 mm) rod or small screwdriver, the lower base nut using one of the holes for this purpose. The arm can now be moved until the correct alignment is achieved. Relock the arm, ensuring that the centre dot mark, fig. 1(13), on the support tube is facing the front of deck. At this stage the arm height can be set, using the lock screw, fig. 1(3), to ensure that the arm tube runs parallel to record, when in the playing position.

9 Should the need arise, there is provision to make lateral adjustments to the headshell assembly. The small grub screw, fig. 1(4), underneath the aluminium cone can be slackened and the assembly moved until the stylus plays in an upright position. This adjustment should not be made unless necessary, i.e. helmet and stylus must both be in vertical modes.

10 Correct bias compensation can be set, by moving the weight in or out of the roller, until there is a stationary action of the arm when placed on a blank disc (no grooves). Bias compensator is provisionally set for nominal working.

11 Re-check all the above instructions and make adjustments if necessary.

12 Connect ground wire from main bearing to fixing screw on arm lock nut, and connect phono plugs to amplifier—red plug to right and black to left.

Using the JME Fluid Arm

The whole lifting and cueing assembly, swings around the support tube, and a degree of damping is provided by applying the required tension to the thumbscrew, fig. 1(17).

With the lift/lowering device in its raised position, swing the whole assembly around, with the arm tube in its cradle groove, until the selected band of the disc is reached. Turn the lift/lowering device in an anti-clockwise direction until a point is reached when the arm will lower hydraulically, or alternatively, can be lowered manually. Once the stylus is on the disc, the cueing assembly should be returned to a frontal position to maintain the correct bias setting. To return arm to its parked position, simply reverse the above procedure, remembering to have the lift/lowering device in its lowered state. To obtain a clean and silent lift from the disc it is advisable to use the parallel and not grooved section of the lifter.

Sweep Arm—setting-up instructions

NOTE: The Sweep Arm is available separately as an accessory.

If the sweep arm (fig. 5) has not been fitted by the manufacturer, a pre-drilled fixing hole blanked off with a chromium screw, fig. 4(8), will be found on the left hand side of the motorboard. Remove this screw, insert the sweep arm support rod and secure with its wing nut under the motorboard.

The correct setting for the Sweep Arm is adjusted initially by the manufacturer. Slight readjustment will be necessary only after considerable use or after renewing a brush.

1 Slacken the conical lifting nut, fig. 5(1), and place the brush on the record.

2 Ensure that the brush is running vertically whilst in use. If necessary make a slight adjustment to the height of the brush by trimming away part of the plastic sheathing, fig. 5(2), around the support rod with a sharp knife or razor blade, and then tightening the securing nut under the motorboard.

Stylus Brush—setting-up instructions

NOTE: The Stylus Brush is available separately as an accessory.

If the stylus brush (fig. 5) has not been fitted by the manufacturer, a pre-drilled hole blanked off with a chromium screw, fig. 4(9), will be found on the right hand side of the motorboard. Remove this screw, insert the stylus brush support rod and secure with its wing nut under the motorboard.

The stylus assembly should pass through the brush about half-way up its length. If necessary, adjust the brush height by trimming away part of the plastic sheathing, fig. 5(4), around the support rod with a sharp knife or razor blade, and then tightening the securing nut under the motorboard.

Reference Electronic Turntable—operating instructions

Once it has been correctly set-up, the turntable is simple to use. The following are a series of guidance notes and general operating instructions.

1 Switching on and off and speed control.
The turntable drive is switched on or off and speed changed by rotating the central knob, fig. 4(7) on the top plate. 90° clockwise

step movements of the knob from the OFF mode will cause: (i) ON 45 r.p.m., (ii) OFF, (iii) ON $33\frac{1}{3}$ r.p.m., (iv) OFF.
Fine speed control is adjusted independently for each speed via two small knurled knobs, fig. 4(5) and 4(6), set one each side of the main control knob. The knob towards the back of the top plate, fig. 4(5) governs the 45 r.p.m. setting; the one at the front, fig. 4(6), the $33\frac{1}{3}$ r.p.m. setting.
The speed changes can be made with the turntable either stationary or moving and once set, the fine adjustments will permit changes without the need for re-adjustment.

2 Record cleaning.
When using the Sweep Arm, never use an impregnated cloth or antistatic fluid to clean records as these leave a deposit in the record grooves. Any advice to the contrary must be ignored. Use only the Sweep Arm, and use it always at each playing. The brush should then be flicked gently after each playing to release the dust collected. In the event of the brush becoming too dry it may track too quickly towards the record centre, in which case it must be damped slightly with plain water. Should the Sweep Arm fail to remove any spots or dirt on the record, the record should be wiped lightly in a circular direction following the grooves with a soft cloth and clean water.
When using the Sweep Arm always ensure that there is a gap between the main beam and the top of the conical lifter nut, fig. 5(1). To park the Sweep Arm when not in use, simply screw the conical nut up again.

CAUTION: SWING THE SWEEP ARM CLEAR OF THE RECORD BEFORE LIFTING THE PERSPEX COVER.

3 Stylus cleaning.
The stylus brush should be used before every playing of a record in order to ensure the maximum performance that the delicate cartridge assembly can achieve.

Hold the headshell in its rest position with the left hand. Then with the right hand, revolve the stylus brush first in a counter-clockwise direction so that the brush passes from back to front of the cartridge and then back again in the opposite direction. This will ensure that every particle of fluff and dust is removed from the stylus.

Routine maintenance and cleaning

Routine maintenance of your equipment is limited to only three items :

1. Periodically examine the drive belt, fig. 2(2), for signs of perishing or cracking. Renew if necessary.

2. Every 12 months, lightly oil the stroboscope and main bearings (use a sewing machine oil, or similar). Access to the main bearing is obtained by removing the platter, fig. 4(1). Re-adjust fine speed control as necessary.

   NOTE : To remove the platter, remove belt, fig. 2(2) ; unscrew platter retaining nut, fig. 4(2), then, placing fingers of both hands beneath rim and one thumb on main bearing spindle, lift with fingers and press down on main bearing spindle.

3. Whenever it starts to show signs of wear, turn the Sweep Arm brush round in its holder. This is done by unscrewing the brush holder from the arm and pulling the brush out.

Cleaning, other than regular dusting, should be carried out using a spirit or petroleum-base cleaning fluid on the metal parts and a warm, mild detergent solution on the plastic parts (e.g. the stroboscope and the perspex cover). Do not use an abrasive polish on any part of the equipment.

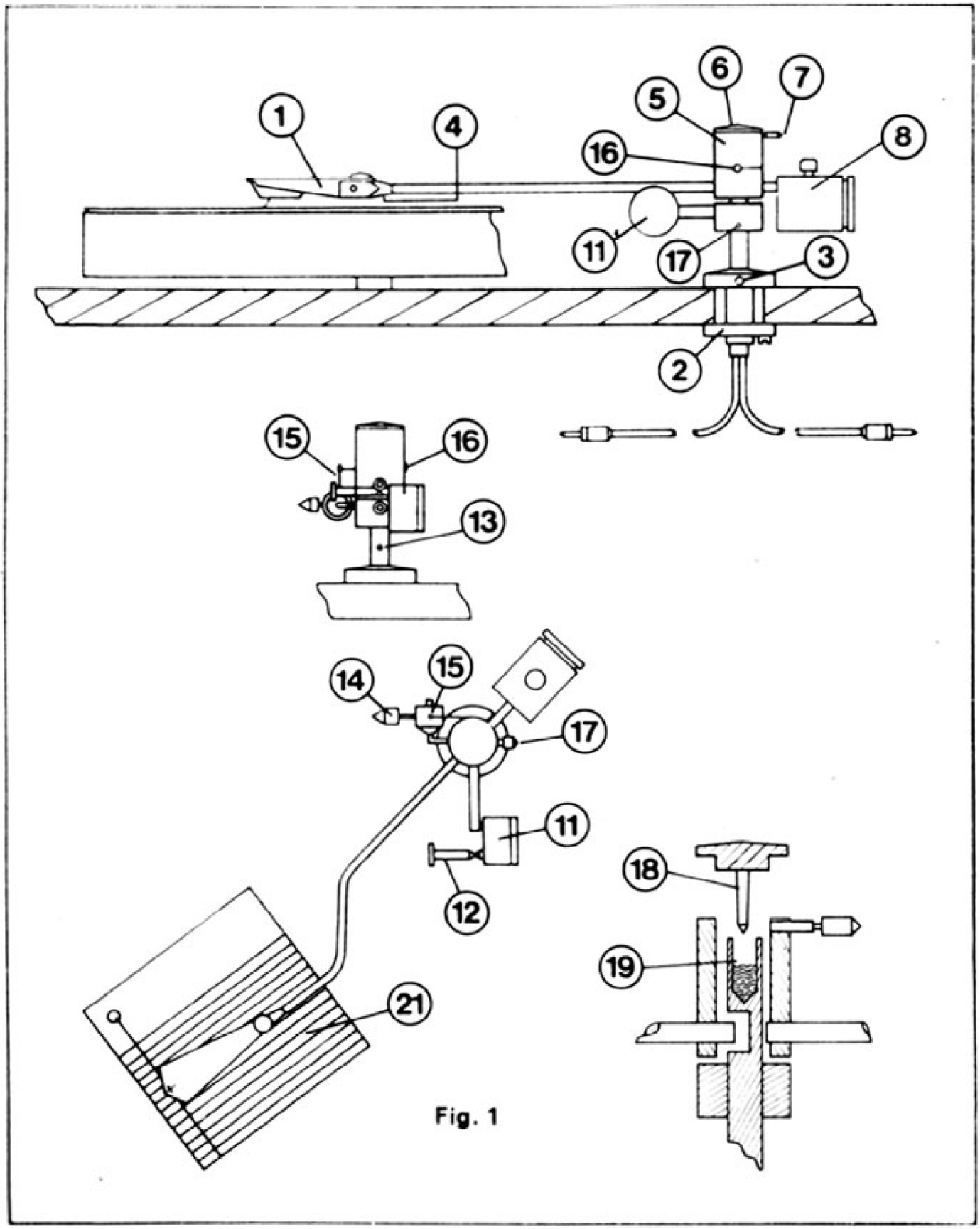

Fig. 1

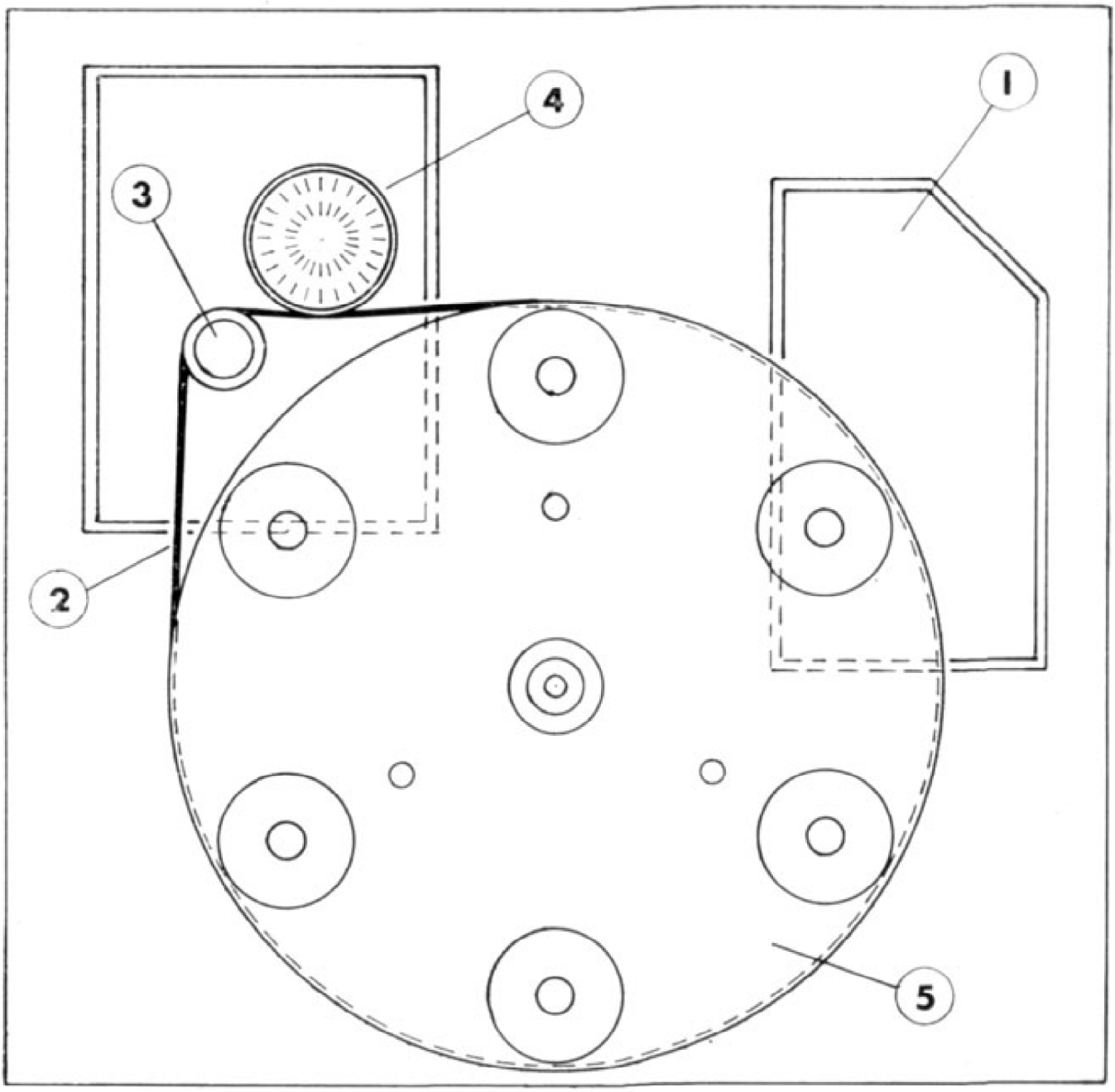

Fig. 2

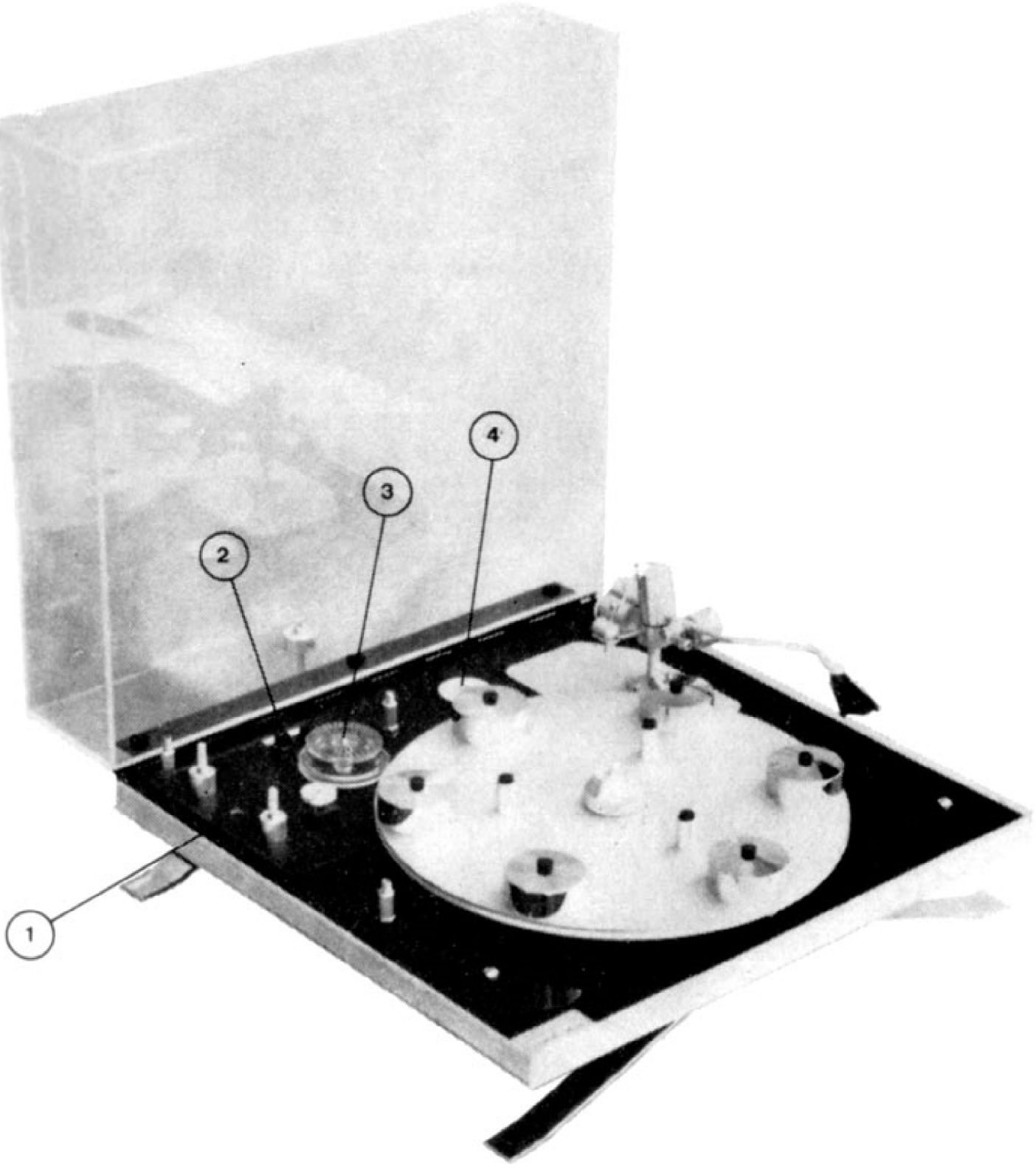

Fig. 3

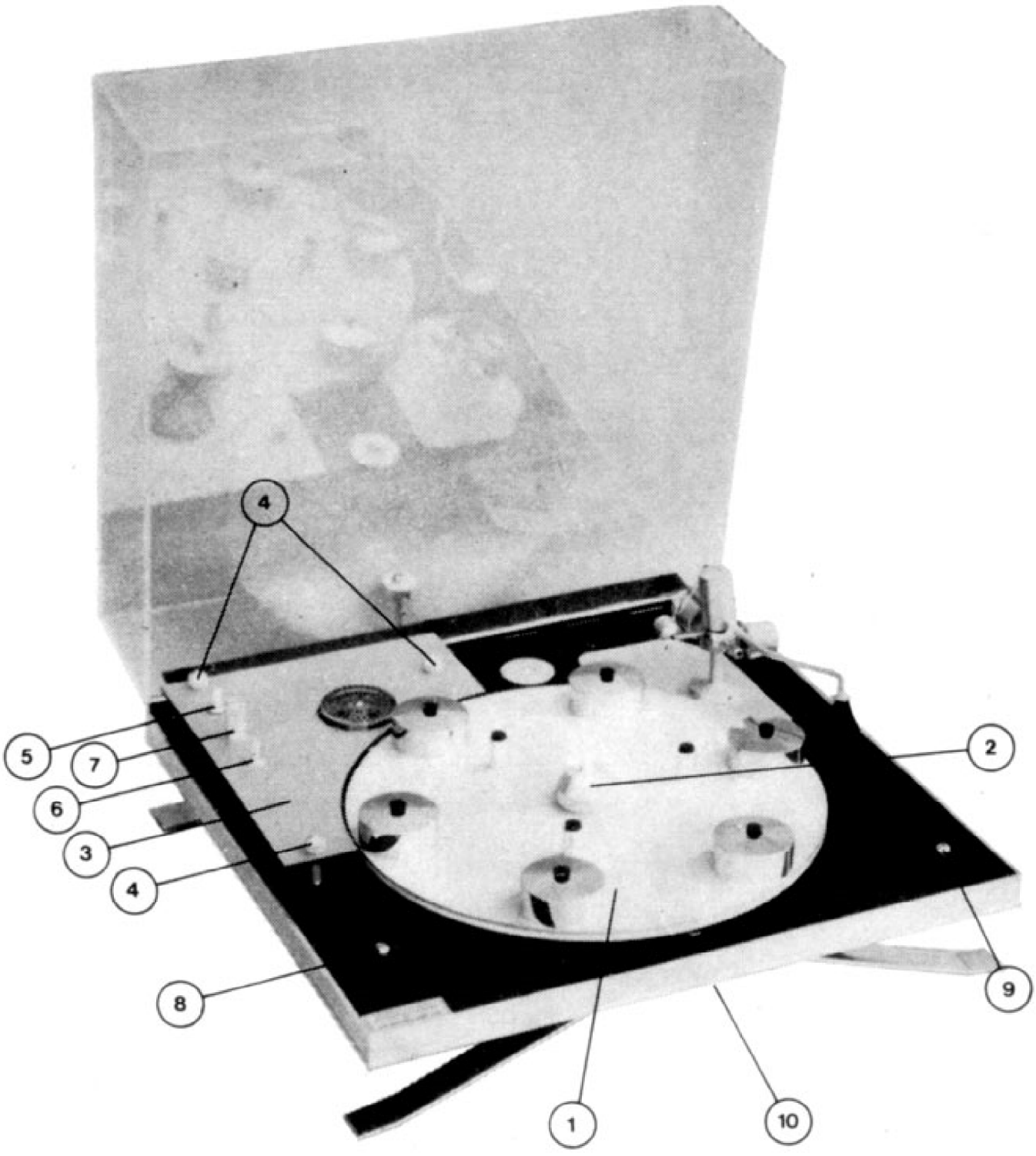

Fig. 4

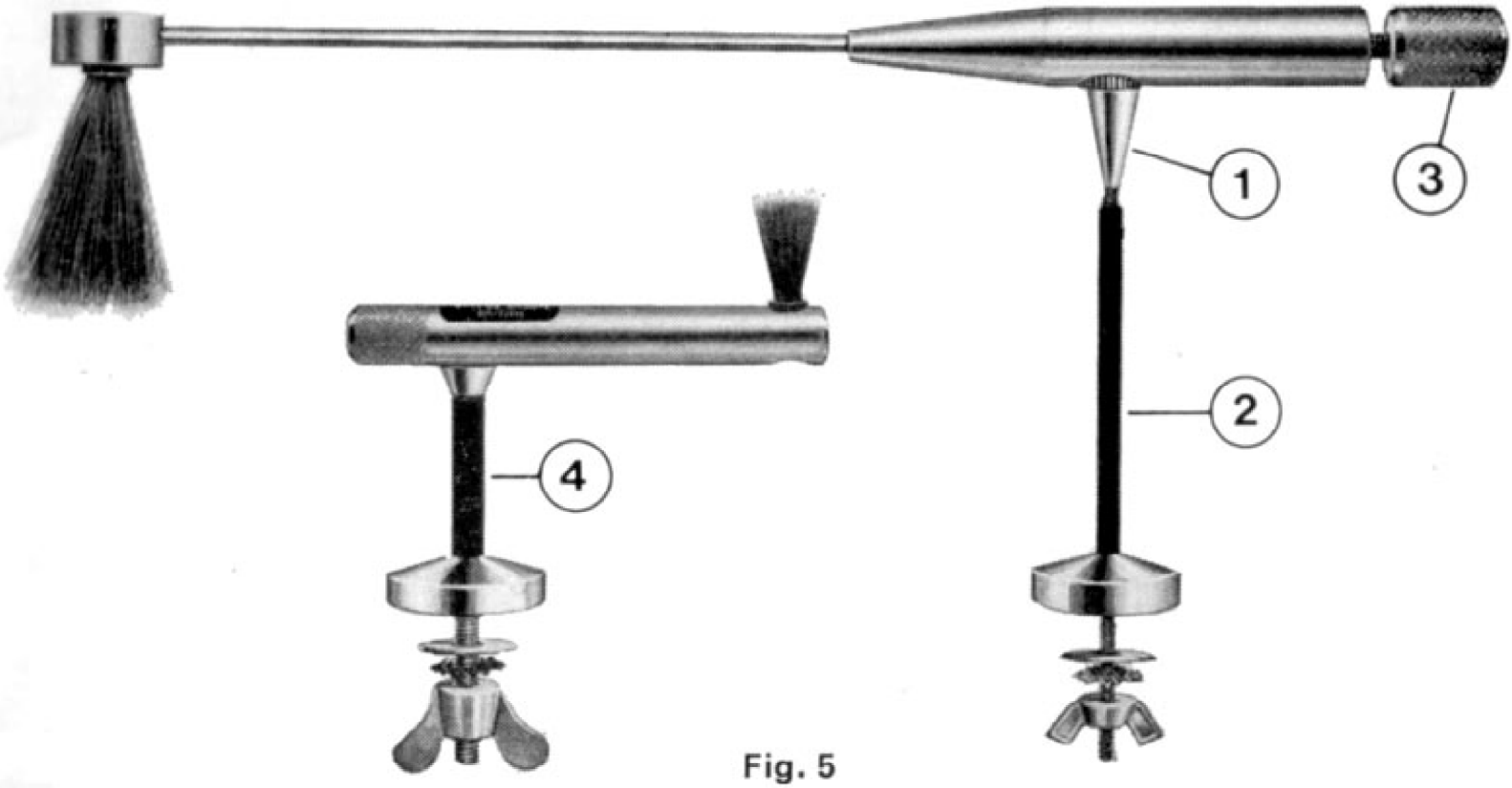

Fig. 5

Key to Fig. 1

ITEM NO.	TITLE	ITEM NO.	TITLE
1	Headshell	**12**	Lowering handwheel cradle
2	Base nut assembly	**13**	Arm tube alignment mark
3	Height adjustment screw	**14**	Bias weight
4	Cartridge fine adjustment screw	**15**	Split pin
5	Helmet	**16**	Bias weight anchor point (screw)
6	Helmet cap	**17**	Positioning damping adjustment
7	Helmet cap retaining screw	**18**	Pivot
8	Eccentric counterweight	**19**	Pivot fluid well
11	Lowering handwheel	**21**	Template protractor

Key to Fig. 2

ITEM NO.	TITLE	ITEM NO.	TITLE
1	Tone arm board	**4**	Stroboscope
2	Belt	**5**	Platter
3	Motor drive pulley		

Key to Fig. 3

ITEM NO.	TITLE	ITEM NO.	TITLE
1	Drive and control module	**4**	Level indicator
2	Mains fuse		
3	Stroboscope		

Key to Fig. 4

ITEM NO.	TITLE	ITEM NO.	TITLE
1	Platter	**6**	Fine speed adjuster ($33\frac{1}{3}$ r.p.m.)
2	Platter retaining nut	**7**	On/Off and speed change control knob
3	Top plate	**8**	Blanking screw for sweep arm
4	Top plate retaining nuts	**9**	Blanking screw for stylus brush
5	Fine speed adjuster (45 r.p.m.)	**10**	Level adjustment nuts

Key to Fig. 5

ITEM NO.	TITLE	ITEM NO.	TITLE
1	Sweep arm screwed lifter	**3**	Balance nut
2	Plastic sheathing around sweep arm support rod	**4**	Plastic sheathing around stylus brush support rod

You are now ready to enjoy many hours of Hi Fidelity sound. Your Reference Electronic turntable is of exceptional quality, however, in the interests of continually improving specifications we reserve the right to change the design or details without prior notice.

Designed & Printed by Bradleys, Reading & London, England