



**INSTRUCTION MANUAL
FOR
KUZMA TONEARMS**

**S T O G I A N D
S T O G I R E F E R E N C E**

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CONTENTS

I. GENERAL DESCRIPTION	3
II. PACKING LIST	4
III. UNPACKING	4
IV. MOUNTING AND ADJUSTING	5
A. Mounting Tonearm	5
B. Mounting Cartridge	8
C. Tracking Force Adjustment	9
D. Height (VTA) Adjustment	10
E. Tangential Cartridge geometry adjustment	11
F. Fine VTA Adjustment	15
G. Azimuth Adjustment	16
H. Bias Adjustment	18
I. Fine azimuth Adjustment	19
J. Cueing Device Adjustment	19
V. GENERAL MAINTENANCE	20
VI. MINOR PROBLEMS	21
A. Pin Connector Breaks Off from Internal Wiring	21
B. Broken Bias Thread	22
C. Hum and Buzz	23
VII. TRANSPORT AND PACKING	24
A. With tonearm on Turntable	24
B. Packing (Fig. 29)	24

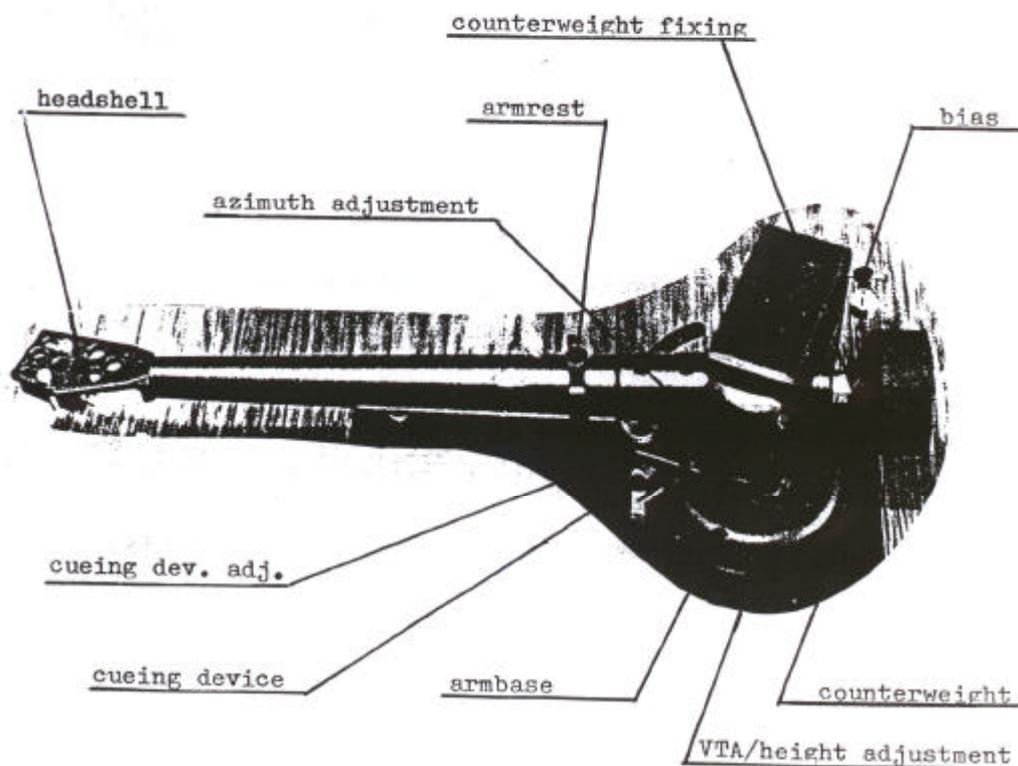
I. GENERAL DESCRIPTION

The main structure and headshell are both machined from solid aluminium blocks while the tube is of specially treated aluminium which is internally damped. The tube also allows rotation for azimuth adjustment. Stogi reference tonearm has conical tube with different adjustment.

The quality bearings are carefully selected and individually checked and tested before assembly. They can each support 20 Kg. and are mounted free of play with minimal friction in all planes.

Stogi incorporates a number of extra features including adjustable cueing device, removable finger lift, precisely calibrated counterweight and simply adjustable bias.

The arm is wired throughout with cardas wires or Van del Hul cables and comes equipped with its own full accessories kit. It will accept all cartridges and can be fitted most quality turntables.



II. PACKING LIST

1. Tonearm with fingerlift.
2. Counterweight.
3. Base.
4. In small bag:
 - a) Three socket head screws M5 x 35 mm and three washers for fixing base.
 - b) Allen keys: 5 mm for attaching base to armboard, 3 mm for height adjustment (VTA), 2,5 mm for fixing counterweight, bias and cueing device adjustment.
 - c) Bag containing two headsocket screws M 2.5 x 12 mm and nuts for fixing cartridge plus Allen key 0.7 mm for removing fingerlift.
5. Two protractors, one for mounting tonearm on turntable and the other for cartridge geometry adjustment.
6. Instruction Manual.

III. UNPACKING

1. Remove polystyrene container from box.
2. Remove tape from sides and lift top half of polystyrene container (marked TOP).
3. Remove small polystyrene insert.
4. Holding the pillar not tube, lift tonearm in one hand and remove from plastic bag with other, holding by pillar. Observe bias and thread while so doing.
5. At this stage tonearm can be rested upside down on C shape.
6. Remove all other parts. (See packing List).

IV. MOUNTING AND ADJUSTING

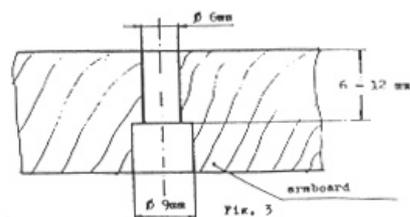
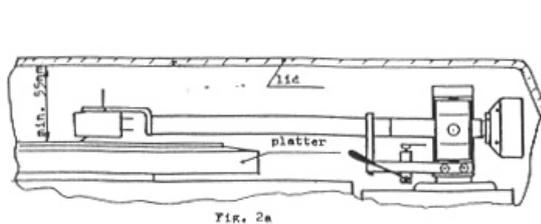
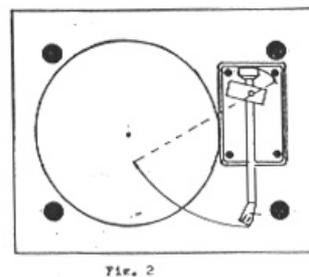
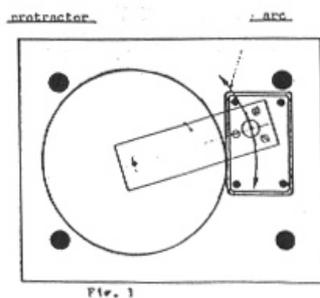
A. Mounting Tonearm

1. Take tonearm mounting protractor and place on spindle of turntable. The cut-out is similar to standard Linn cut-out. (Fig. 1)
2. Mark position of holes as indicated on protractor on tonearm mounting board. Ensure that there is adequate space in front for tube and headshell and behind for counterweight, in order to avoid problems of lid closure. Check also that screw positions will be over cut-out on subchassis, unless screws are to be sunk. It is wise before cutting to hold tonearm in position over marks and judge if position of tonearm on board will be correct, bearing in mind these criteria. (Fig. 2) Otherwise precise position of tonearm is unimportant providing it lies on protractor arc. The height of tonearm with cartridge mounted is 55 mm above record. (Fig. 2 a).
3. Remove tonearm board from turntable.
4. Check that thickness of board is between 6 mm and 12 mm, if so make cuts as marked.

NOTE: If board is thicker than 12 mm

Either a) obtain screws of length that will go through armboard and into base to a depth of approximately 5 mm, remembering washer or

- b) sink the screw heads by first drilling a large hole of about 9 mm with drill and then drilling hole of smaller dimension through this. (Fig. 3)



5. To fix base to armboard you will need the three socket head screws, spring washers and Allen key 5 mm. Fit washers on screws and insert into underside of tonearm board and up into tonearm base. (Fig. 4). Position base so that height adjustment (VTA adjustment) screw is at top right position, i. e. 2 o'clock and tighten screws using Allen key. Remember that screws are of harder material than tonearm (steel and aluminium) so do not overtighten as this could damage base. (Fig. 5)
6. Replace tonearm board on turntable.
7. Insert tonearm cable through hole in base, then the pillar and fix at suitable height using Allen key 3 mm at height adjustment screw in base. (Fig. 6)
8. Screw on counterweight so that thread is covered. This may take a little time.
9. It may now be necessary to adjust the suspension on the turntable due to the added weight of the tonearm.
10. Fix tonearm cable onto turntable ensuring that there is adequate cable to allow for height adjustment. If turntable has a suspended subchassis, position cable in such a way that subchassis has freedom of movement.
11. The phono plugs are marked in the standard way: left - white, right - red, and should be inserted into phono inputs. The connector at the end of the grounding wire should be connected to GND on preamplifier.
12. Check that bias and thread are correctly positioned (it may have tangled during handling). (Fig. 7)
13. For optimum performance you may wish to forego the convenience of the finger lift. If so, this should now be removed using Allen key 0.7 mm, loosening screw and easing out lift. Replace screw in hole. (Fig. 8)

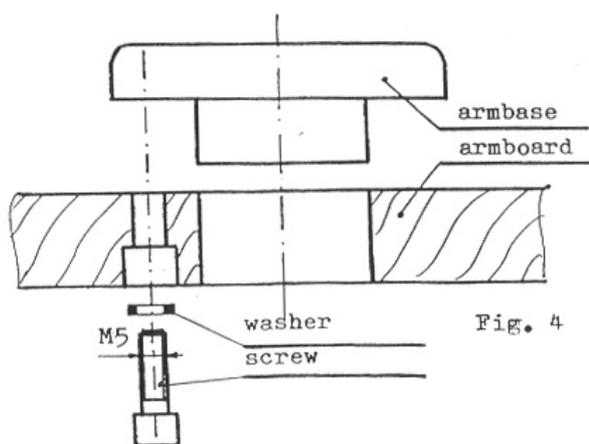


Fig. 4

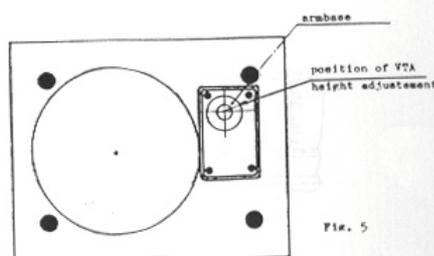
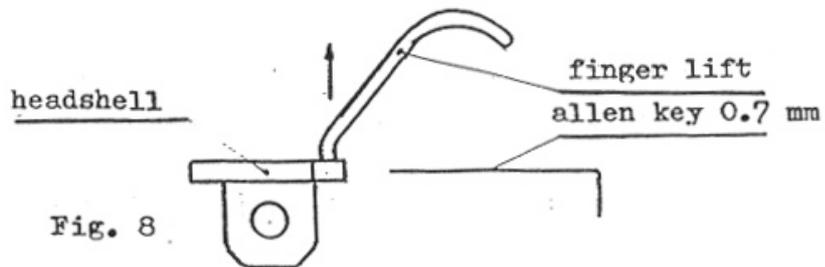
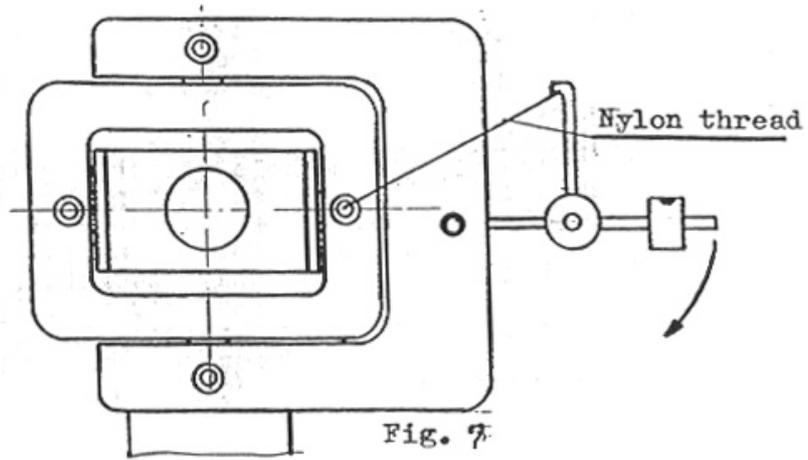
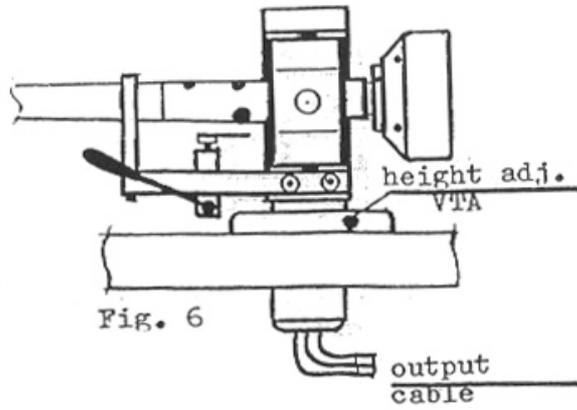


Fig. 5



B. Mounting Cartridge

You will need Allen key 2.5 mm plus the two screws and nuts M 2.5.

1. Keeping stylus guard on cartridge, insert screws from underneath cartridge through slots in headshell and screw on the two nuts manually. (Fig. 9) The tip of the cantilever should be level with the end of the headshell (viewed from side).
2. Fix by slightly tightening screws using Allen key. Ensure that nuts have fitted into ledge around slots.

NOTE: It may be found easier to remove tube from armrest to give a little more room.

3. Using tweezers, push the pin connectors into cartridge according to code

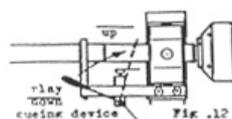
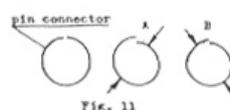
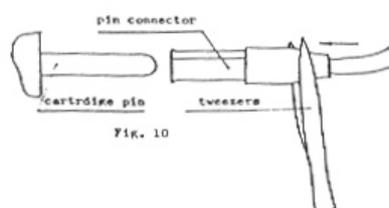
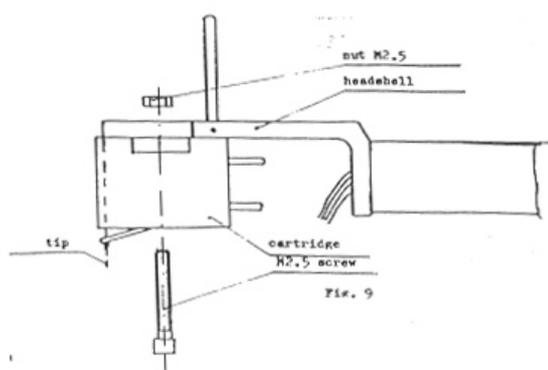
Red - right
Green - right ground
White - left
Blue - left ground

The connectors will slip snugly onto pins of the majority of cartridges, (Fig. 10) however:

If pins are too fat with tweezers firmly push connector onto pin. Connector will open slightly. Do be careful, however, that tweezers do not slip and damage cantilever.

If pins are too slim then connectors should be squeezed with tweezers to make hole slightly smaller. First squeeze as in A then as at B then slip connectors onto pins. (Fig. 11)

4. Put cueing device into 'play' position, ie. down, release tube from armrest and adjust counterweight until tube is balanced ie. floats in a horizontal position slowly back towards the armrest. Prior to final balancing remove stylus guard. (Fig. 12)



C. Tracking Force Adjustment

The instructions with your cartridge will recommend suitable tracking forces. We recommend you choose the highest force given and set arm to that amount. A higher tracking force causes less damage to the record as the stylus maintains more stable contact with the sides of the grooves.

The counterweight is marked with five red dots. (Fig. 13) One full rotation of the counterweight increases tracking force by 0.5 grams, therefore distance from one dot to another corresponds to 0.1 grams.

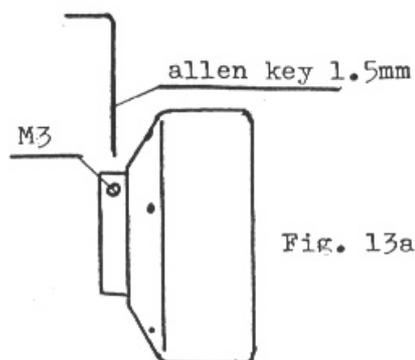
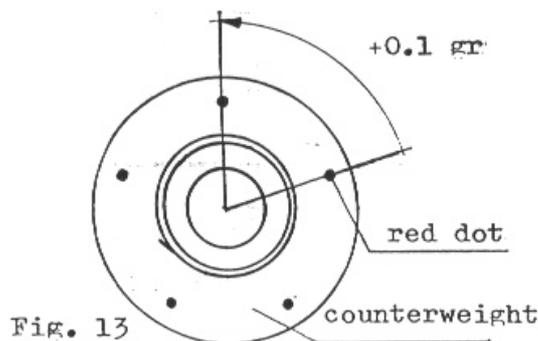
With the cueing device in the 'up' position and tube in armrest the counterweight is turned anticlockwise (from front view) to increase the tracking force.

As the tonearm is now balanced, the position of one dot should be noted and taken as zero, (any dot will do so choose the most easily visible). Then simply turn the counterweight anticlockwise counting each dot that passes that position as an increased tracking force of 0.1 gram. For example a tracking force of 1 gram will necessitate turning the counterweight past 10 dots or two complete turns the counterweight.

NOTE: An inaccuracy of a few mm. in the position of a dot is not critical.

Fixing the Counterweight

The counterweight is secured by gently turning one of the three screws M3 with the Allen key 1.5 mm. Do not, however fix securely at this stage until tangential tonearm adjustments are completed.

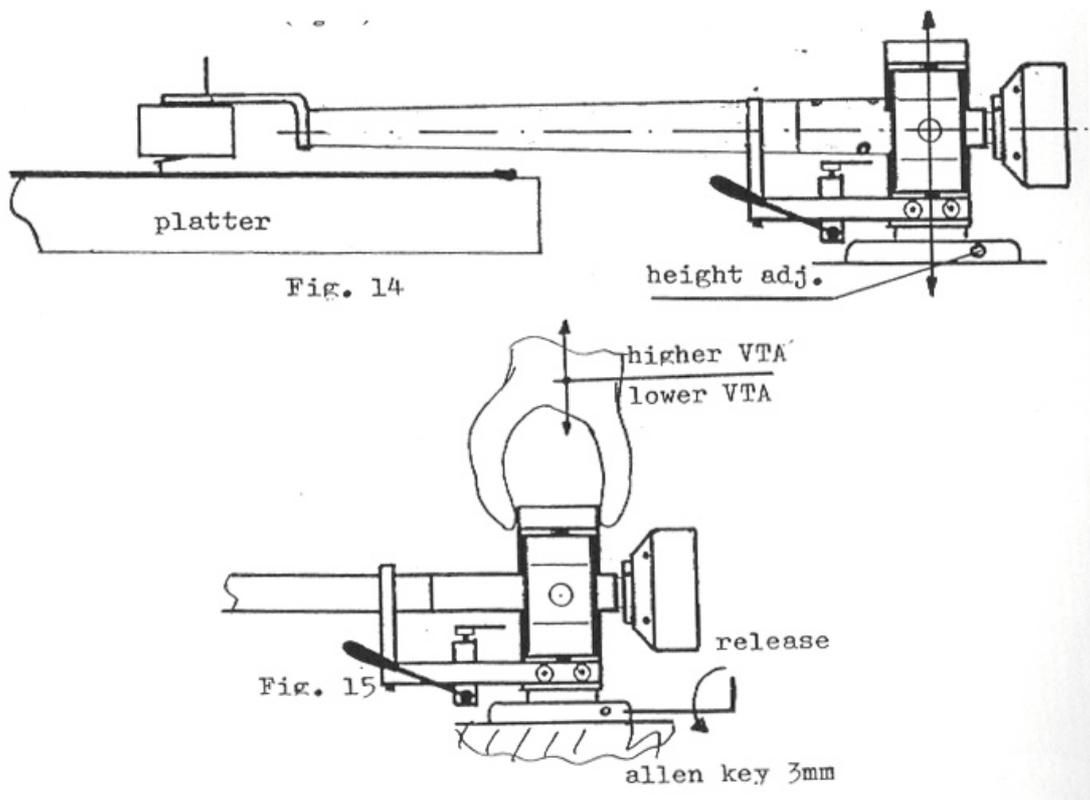


D. Height (VTA) Adjustment

(Fig. 14)

1. Put record on platter.
2. Remove tube from armrest with cueing device still in 'up' position.
3. Put stylus guard on.
4. Position needle in normal playing position above record with lift still up, to ascertain how low or high the arm is.
5. If tonearm is too low, then the tonearm must be raised by releasing the screw in the base while holding the tonearm by the 'C' shape and lifting up. (Fig. 15)
6. Tighten screw when tonearm is in position though do not overtighten.
7. Repeat process until arm is high enough to clear record.
8. Remove stylus guard and put cueing device in play position (down). The needle should be in the groove. If not the tonearm is too high and should be lowered.

NOTE: To ensure needle is properly in the groove observe headshell, cartridge body and (in standard Stogi) the tube, all of which should be parallel to the surface of the record. This is more easily seen if the stylus is in the middle grooves of the record side. (Fig. 14)



E. Tangential Cartridge geometry adjustment

Once the cartridge has been mounted, it is necessary to ensure that the cartridge is tangential to the record grooves in order to minimise tracking distortion during playing. As the cartridge moves in an arc across the record, tracking distortion occurs and is minimised by the tonearm geometry and the angle of the cartridge in the headshell.

With optimum tonearm geometry very low distortion levels (below 1 %) can be obtained across the entire playing surface. Cartridges have zero distortion at two points on a record and these points are used when aligning the cartridge. In practise these points lie at 66 mm and 121 mm from the record centre (see protractor). Other protractors make use of different zero points due to the use of different parameters in calculation. In this case 60 mm has been chosen as the inner groove and 146 mm as the outer groove which still has optimum tracking distortion.

(Fig. 16)

For a distance of 212 mm from record centre to centre of tonearms horizontal rotation the optimum overhang is 18 mm and the effective length, ie. distance from the centre of tonearm horizontal to the tip of the cartridge is 230 mm. This is gained with offset angle of 24° , and gives a maximum tracking error of under 2° and distortion of under 1 %. These are harmonics of the second order which are not so irritating as the third which are very common in amplifiers. (Fig. 16 a)

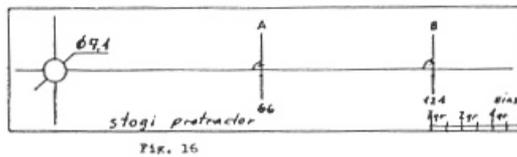


Fig. 16

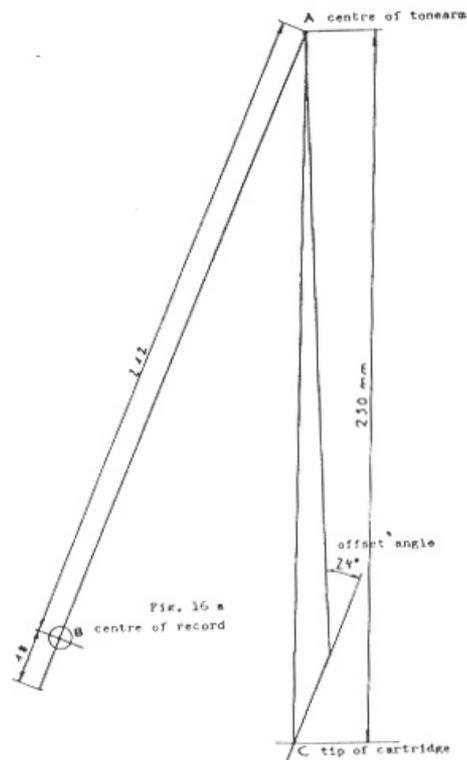


Fig. 16 a

1. Ensure bias is on minimum.
2. Place protractor over spindle on platter. (Fig. 16)
3. Alignment at zero point 66 mm (A)

Place tip of stylus on point A (ie. zero point 66 mm). With a strong light observe cartridge from front. The cantilever and the line on protractor (Fig. 17) should be in perfect alignment.

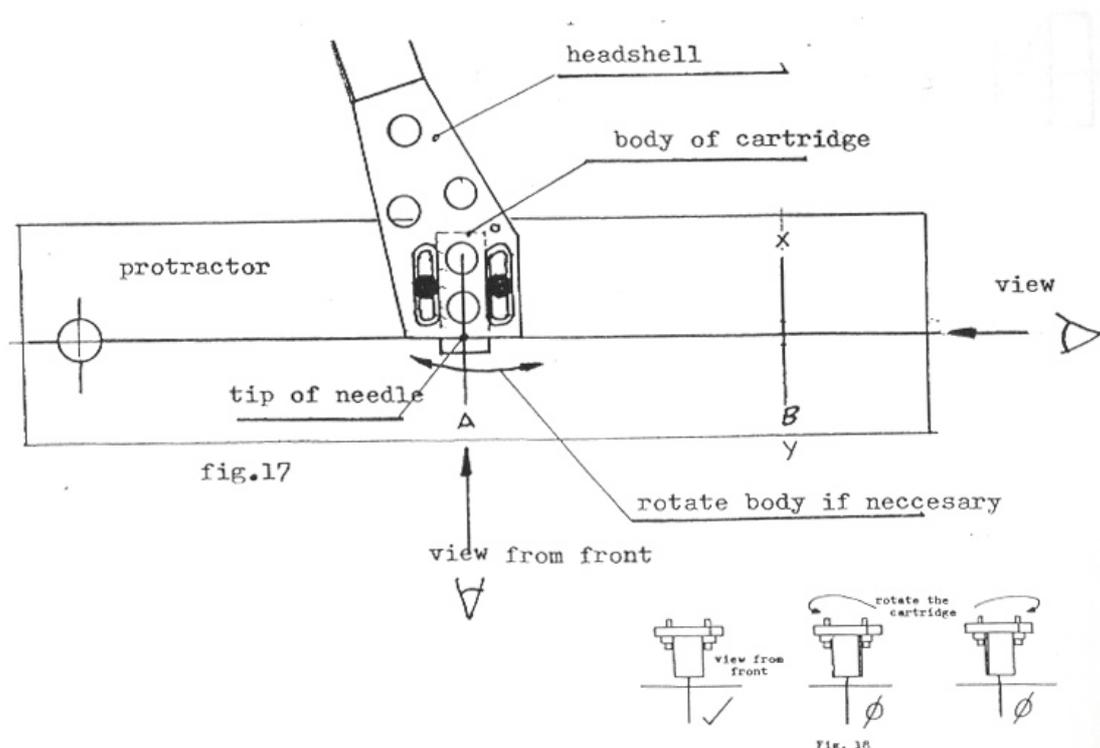
If the cantilever is not then the body of the cartridge will have to be turned slightly. (Fig. 18)

Do not adjust cartridge by observing body of cartridge only.

HINTS: If you have difficulty seeing the cantilever it may help to raise the arm a few mm. taking care that the protractor does not rotate. This also prevents tilting of the cantilever due to the effect of bias force. It may also be helpful to fix the platter by inserting a wedge between platter and plinth and by inserting a sheet of white paper to give a clear background while observing the cartridge.

To Adjust Cartridge

4. Slightly loosen the screws which attach the cartridge to the headshell.
5. Holding headshell in one hand slightly rotate the body of the cartridge.
6. Recheck alignment at position A and continue adjustment until line described in point 3 is achieved.



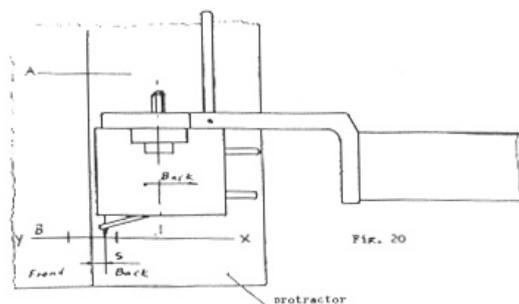
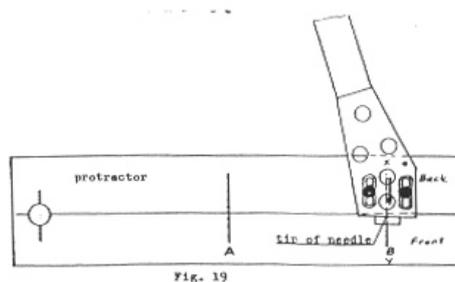
Alignment at zero point 121 mm (B) Fig. 19)

7. Reposition protractor and check alignment at position B in the same way as in position A.
8. If the cantilever is not in alignment then rotate protractor until it is in alignment somewhere along the line 'x y' though not necessarily at point B. (Fig. 20) Raise the cueing device.
9. If needle is in front of point B, pull the cartridge forward in the slots of the headshell for approximately the same distance. If it is behind point B, push cartridge backwards for distance 's'.
10. Now realign at point A as in 5 and 6 above ensuring that the position of the cartridge in the slots alongside is not changed.
11. Recheck alignment at point B. If cartridge is not aligned here rotate protractor to find where on line 'x y' the cantilever is aligned. If it is in front as before, but nearer to point B, then again pull cartridge slightly forward and repeat by aligning at point A. If stylus is further forward on line 'x y' then move cartridge in opposite direction to before, ie. backwards. (Fig. 20) If stylus is behind the B point, the cartridge should be pushed back. Realign at point A and then at B.
12. Continue until stylus is in alignment at both points.

- REMEMBER:**
- a) align at B by rotation
 - b) check at B
 - c) align on line 'x y' and move cartridge.

Repeat a, b, c until cartridge is in alignment at both points.

NOTE: Ensure that cantilever is not twisted due to bias force.



13. Securing Cartridge

The screws holding to the headshell must now be tightened and it is very important to avoid moving the position of the cartridge, so tighten in the following way: slowly, one screw at a time in extremely small stages. Before screws are completely tight check that cartridge is still in alignment at position B and then at position A. Then tighten screws firmly bearing in mind whether the cartridge body is made of metal or plastic!

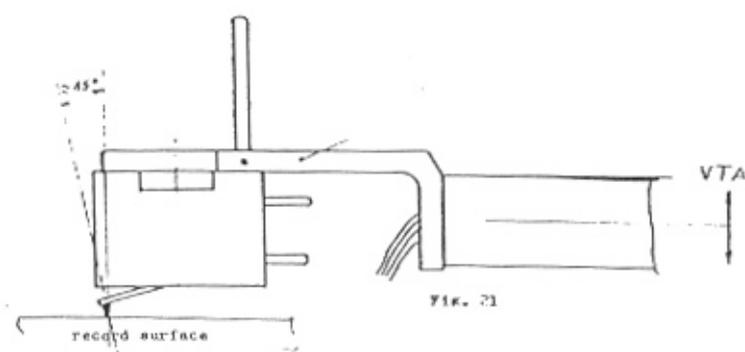
NOTE: If you find it impossible to align the cartridge, ie. the cartridge cannot move far enough forward in the slots of the headshell, then the tonearm is incorrectly positioned on the armboard, being too far from the record centre. If the cartridge cannot be moved far enough back in the headshell, then the arm is too near the centre of the record.

In either case the tonearm will have to be repositioned on the armboard. It should be noted however, that different cartridges allow for more or less movement than others.

F. Fine VTA Adjustment

VTA describes the angle between the record surface and the stylus (Fig. 21). This angle changes as the height of the tonearm is altered. The standard angle is 15° but cartridge manufacturers work with degrees of anything between 10° - 30° so only by listening tests can one ascertain the correct angle for your particular cartridge. The VTA also varies according to the tracking force and thickness of records. For your information to change the angle by 1° means a change in height of approximately 3 mm on the pillar. Some styluses need more precise adjustment of VTA than others. The most sensitive profiles are Van Den Hul and Microridge types.

1. With felt pen mark the position where the pillar meets the base as a point of reference.
2. Use a good recording, preferably acoustic instruments and listen.
If the tonearm is too low the sound has a tendency to have an overblown base and the stereo picture is imprecise.
If the tonearm is too high the sound tends to be too bright, ie. too aggressive, especially on acoustic strings.
3. Try moving the tonearm up for 3 mm and down for 3 mm to judge where the arm sounds most balanced with more precise stereo picture. (This is similar to focusing a camera). Fine adjustments can be made in the range of 0.5 mm.
4. VTA can also be altered by changing the tracking force. An increase in tracking force is equivalent to lowering the tonearm and vice-versa.
5. Now fix height firmly.



G. Azimuth Adjustment

Normally this is obtained automatically when the tonearm is mounted, providing the lines (Fig. 22 a) are in alignment.

Rough Adjustment (Fig. 22)

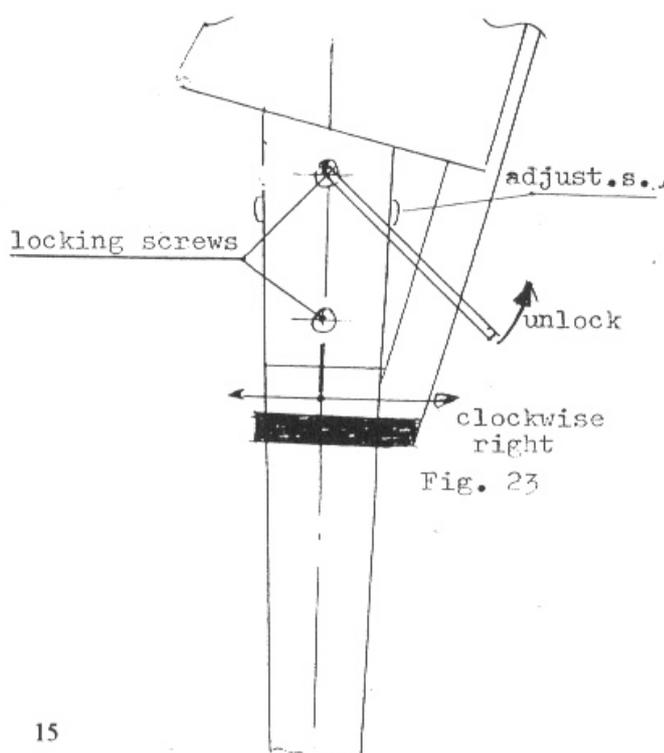
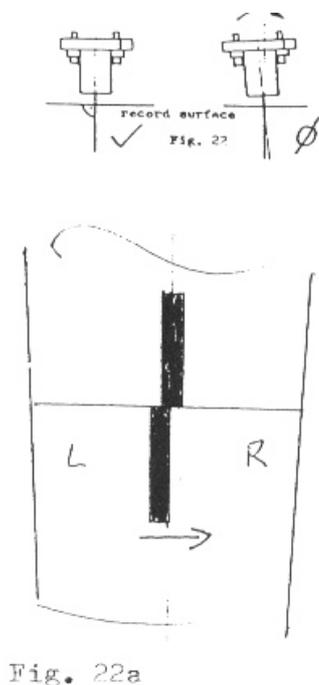
Azimuth describes the angle between the record surface and the stylus, viewed from the front of the cartridge. This should be 90° and can be checked by observing if the cartridge body is square with its mirror image on the blank part of a record or by putting a mirror under the stylus (taking care that the stylus does not slide). If using a mirror ensure that it is absolutely flat.

Stogi Reference:

If stogi reference the cartridge is not square, the tube can be rotated slightly to obtain the correct azimuth. Firstly the tube should be released by loosening the two screws on the top of the arm. (Fig. 23) Use Allen key 2.5 mm and turn screw for only 90° . Then (being careful not to push the tube off the armrest) insert the Allen key into the screw on the right side of the arm. (This screw is above the cueing device.) Observing the position of the marks on the tonearm and the cartridge body in a mirror, this screw should be turned for approximately 45° to alter the azimuth. A clockwise turn of the screw causes a clockwise rotation of the arm and vice-versa. When the cartridge body is square fix the top two screws firmly but do not overtighten as the locking mechanism holds very quickly.

Stogi:

The fixing screw is underneath the tube (Allen key 2.5 mm). Rotate key clockwise for 90° , then manually rotate tube and fix screw with anticlockwise action.



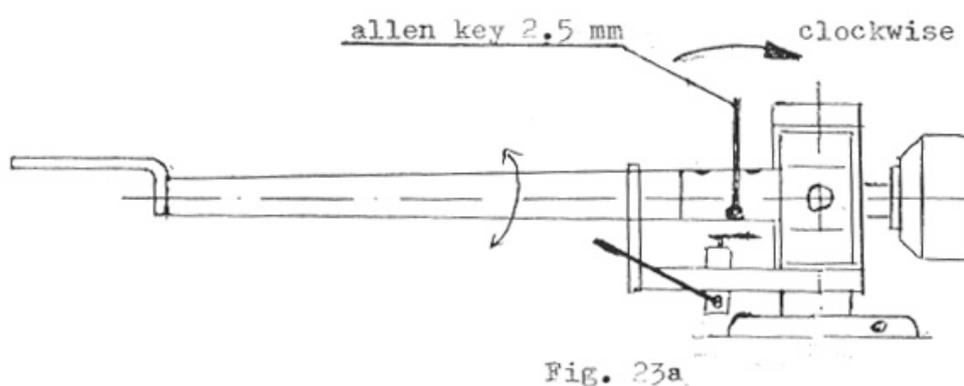
Fine Adjustment

This can be done using an oscilloscope (see p. 16) or by using good records in a good system and listening to the sound. Cartridges with fine profiles (VDH, Microline etc.) are more sensitive to this adjustment. On the other hand cheaper cartridges are not made so well, making fine adjustment more useful.

Start listening with the tube in zero position, ie. with the marking lines aligned. Listen to the sound-stage, the focus and the stability of the instruments. Release the two locking screws and rotate the Allen key so that tube rotates for approximately the width of the mark. Listen and then rotate tube for a similar amount in the opposite direction and again listen. Adjust the arm to the position in which the best sound was obtained. In this position make further adjustments by turning the Allen key for a quarter turn in one direction, listening and then turning a quarter turn in the other direction and listening.

Continue this process making ever decreasing adjustments, 1/8 of a turn, then 1/16 and so on. When optimum results are obtained fix the locking screws.

NOTE: During fine adjustment only gently fix locking screws during listening.



The adjustment screw is highly sensitive and the smallest pressure on the Allen key will alter the azimuth and sound.

Do not attempt any adjustment when the locking mechanism is locked. Although no damage can be done.

Significantly improved sound can be obtained by paying attention to azimuth adjustment prior to final VTA adjustment.

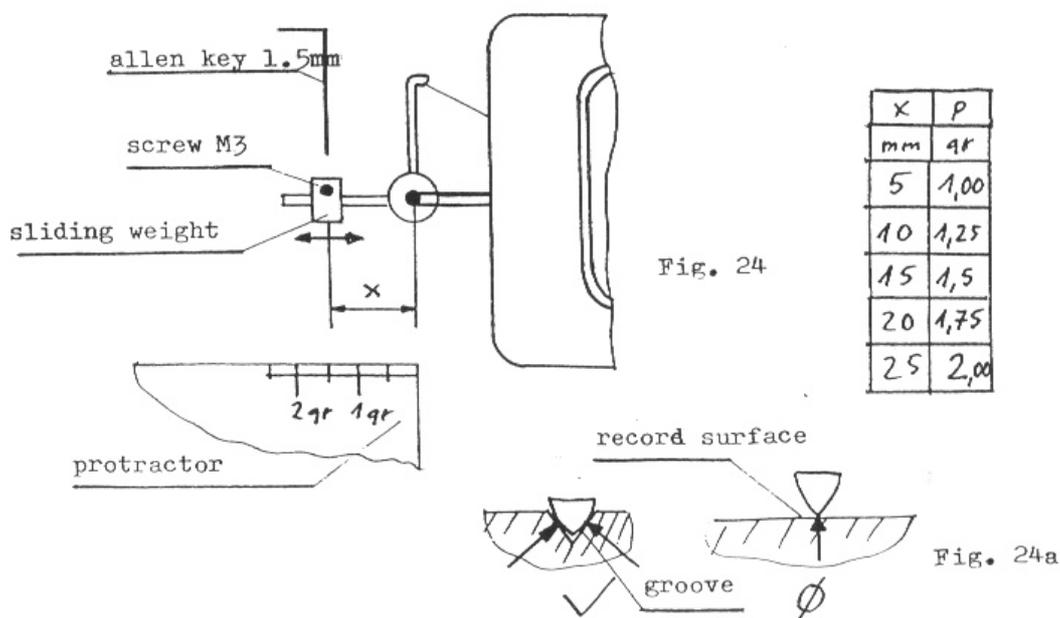
H. Bias Adjustment

The bias should be adjusted according to the tracking force. Using cartridge protractor provided you will see marked distance 'x' in grams equivalent to the tracking force. Hold protractor as in Fig. 24. Using Allen key 1.5 mm, until in the position equivalent to your chosen tracking force. Lock screw when in position.

For maximum trackability, it is advisable to set the bias by use of an appropriate test record, ie. those with tracking bands. Please do not use test records with blank space where the tip of the needle sits on the surface rather than in the groove. (Fig. 24 a)

1. Set bias and tracking force as previously described and listen to mistracking on highly modulated tracking bands. On higher modulated bands mistracking can be heard as impure tones and there will be more overtones. (See instructions on test record)
2. If mistracking is apparent, increase or decrease bias until minimum mistracking is found. If mistracking is heard on the right channel only then the bias is too low, if on both channels the bias is too high or the trackability limit of the cartridge has been reached.
3. Finally further decrease mistracking by increasing tracking force to the maximum recommended for the cartridge.
4. Again try to optimise bias.

NOTE: Mistracking is most easily observed by use of an oscilloscope.



I. Fine azimuth Adjustment

Using a Dual Trace Oscilloscope

Even if the cartridge body is square there is no guarantee that the generator within the cartridge is at the correct angle to the cartridge body. With an oscilloscope and test record which has channel separation tracks, one can measure how much of the signal from one channel crosses over to the other. This is called crosstalk and is always present to some extent, but it should be equalised.

Azimuth affects channel separation. If the cartridge is tilted to one side the separation will be very good on one channel but very bad on the other. Good sonic results are

gained when the separation is equal. Be sure to measure crosstalk only not output.

Readjustment of Tracking Force

It will now be necessary to readjust the tracking force. This can be done using scales, if available or by rotating counterweight back until tonearm is balanced (with stylus guard off) and applying the required tracking force as previously described. (IV C) Fix counterweight as described.

Final VTA Correction

Once the azimuth has been corrected the VTA should be checked. For optimum performance recheck VTA after 30 - 40 playing hours. This may be necessary due to 'settling' of cantilever suspension in the cartridge, the amount of which varies according to the make of cartridge.

J. Cueing Device Adjustment

Should you find that in the 'up' position the cartridge is too high or too low above the record then the cueing device can be raised or lowered. (Fig. 25) This can be done simply by using Allen key 1.5 mm.

1. Insert key into screw on left side of arm rest.
2. Release screw, raise or lower device and retighten.

NOTE: The cueing device may lift slightly as the screw is retightened. Do not overtighten as this may cause the cueing device to stick in the 'up' position. Should this occur, slightly release the screw.

V. GENERAL MAINTENANCE

1. Dust only with a soft brush, do not blow away dust.
2. If the tonearm is mounted on a wooden armboard the base may need to be retightened to the board after a few weeks.

Checking Tonearm Bearings for Play

Holding the headshell, gently try to rotate tube of arm. There should be no movement or audible clicking. If there is, consult your dealer.

NOTE: Ensure that Azimuth and height adjustment screws are fixed before attempting the above.

Checking Tonearm Bearings for Friction (Fig. 26)

1. Replace stylus guard and balance tonearm with bias at minimum. The arm should move slowly and smoothly from the inner groove towards the armrest.
2. Add tracking force of 0.1 gram. The tonearm should now go slowly down and outwards towards the armrest.
3. Balance tonearm again and set tracking force to -0.1 gram. Now the tonearm should move slowly up and out towards armrest.
4. If the tonearm does not behave in this way, repeat tests before consulting your dealer.

NOTE: Ensure that tube movement is unobstructed by the cueing device.

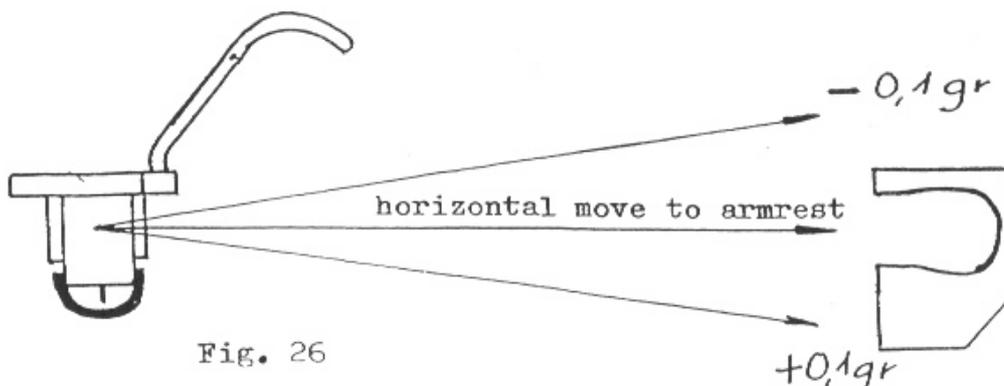


Fig. 26

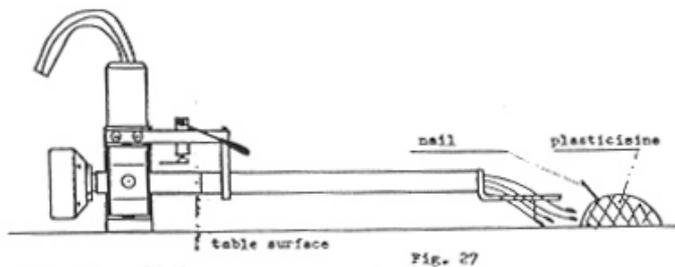
VI. MINOR PROBLEMS

If any problems occur with your tonearm please do not hesitate to contact your dealer. Many audiophiles do, however, find it convenient to try and solve small problems themselves and, therefore, the procedures outlined below may be followed if such difficulties should arise.

A. Pin Connector Breaks Off from Internal Wiring

To repair this you will need a small soldering iron, non acid solder, tweezers, sharp knife, uncut end of drill or nail about 1.3 mm dia. x 30 mm long minimum (of unsolderable material), blue tac or plastecine.

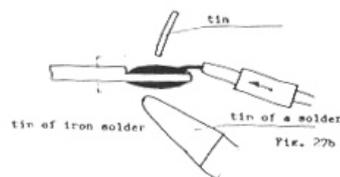
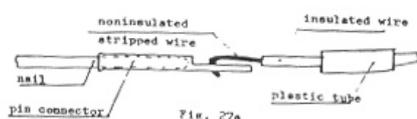
1. (Fig. 27) Remove tonearm from turntable and place upside down. Remove cartridge.
2. Remove insulation plastic from pin connector.
3. Insert nail or drill into connector in the way cartridge pins would connect. This prevents the connector becoming overheated and also stops solder entering the connector. Fix nail in blue tac or other material to hold pin in position.



4. Gently pull out about 20 - 25 mm of wire from tonearm and with sharp knife carefully strip insulation from wire for a length of about 3 - 4 mm.

NOTE: It is important not to cut the wires themselves as this will weaken the wire.

5. With clean solder tip, melt any solder left on the pin connector and blow away from hole.
6. Put plastic insulation tube on wire.
7. Place stripped end of wire through hole in connector and bend back to form hook to secure. (Fig. 27 a)
8. From underneath place iron tip and from the top the solder. (Fig. 27 b)
9. Replace insulation tube over solder joint and gently remove connector from nail or drill.



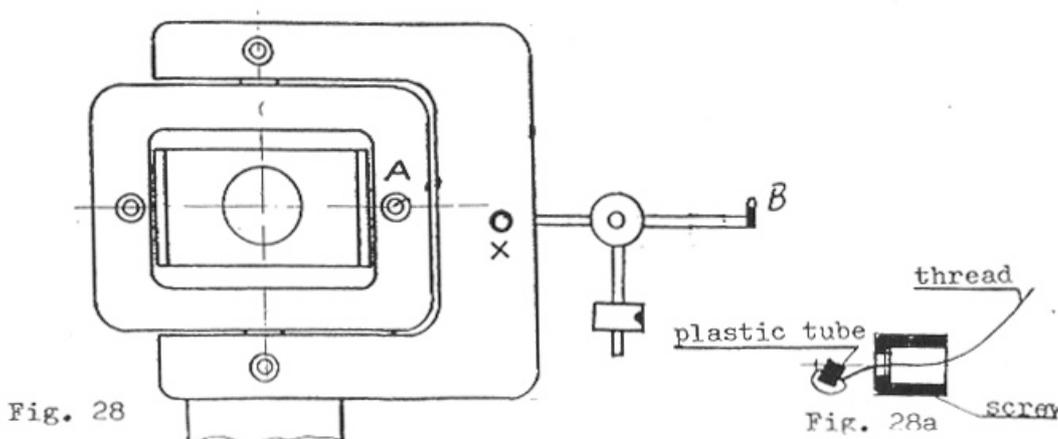
B. Broken Bias Thread

You will need about 100 mm of thin nylon fishing line, Allen key 2.5 mm and a sharp knife.

1. Remove counterweight.
2. With Allen key remove screw at point A (Fig. 28)

NOTE: This does not in any way affect the bearings.

3. At the end of the thread is a small plastic tube to which the thread is attached. Cut away the broken thread and tie and knot new thread around tube.
4. Pull thread through screw as in Fig. 28 a and replace screw with Allen key.
5. Remove broken thread at point B (Fig. 28) It may be necessary to pull aside the black plastic slightly to do this.
6. Put new thread through and replace black plastic.
7. Position tonearm as if in inner groove position and pull thread until rod with weight is in a horizontal position, ie. maximum bias. (Fig. 24)
8. Knot thread three times and trim surplus.
9. If absolutely necessary the length of thread can be shortened by loosening screw at point 'x' with Allen key 1.5 mm and pulling rod out slightly. (Fig. 28)



C. Hum and Buzz

1. Check to ensure that grounding wire has been connected.
2. If using an M. C. transformer, try connecting ground wire to this or to the preamplifier.
3. Alternatively, connect grounding wire to preamplifier and run another grounding wire from the M. C. transformer ground to the ground of the preamplifier.

Hum

This can be caused by the transformer in the power amplifier being situated too close to the cartridge or by the tonearm output cable being too close to the mains cable. If

VII. TRANSPORT AND PACKING

A. With tonearm on Turntable

The tonearm can be left on the turntable when being transported short distance by.

1. Placing tonearm in armrest.
2. Securing arm to armrest with elastic band or tape.
3. By removing counterweight and
4. Securing movement of subchassis by insertion of wedges.

Many turntables, however, cannot be properly packed for longer transport with the tonearm in position and the tonearm, therefore, must be removed and repacked in original packing.

B. Packing (Fig. 29)

If desired, cartridge can be left in place but a suitable cut will have to be made in polystyrene packing.

1. Remove counterweight and put in plastic bag in slot.
2. Fold cable so it is shorter than the tube and tie together.
3. Put cueing device in down position.
4. Holding by pillar, place tonearm into plastic bag taking care of bias.
5. Fit tonearm into polystyrene cut-out.
6. Replace securing insert and put two halves of packing together.
7. Secure and replace in box and sleeve.

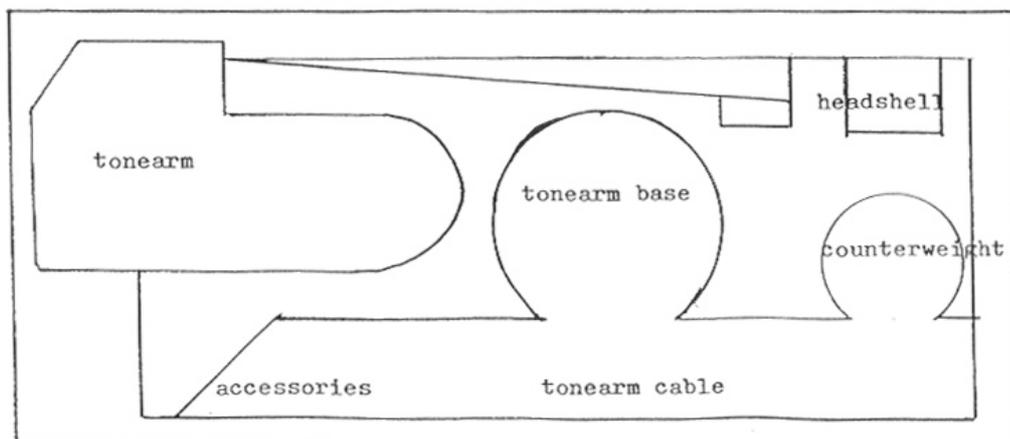


Fig. 29

CONTENTS

	<u>Page</u>
I. GENERAL DESCRIPTION	2
II. PACKING LIST	3
III. UNPACKING	3
IV. MOUNTING AND ADJUSTING	4
A. Mounting Tonearm	4
B. Mounting Cartridge	7
C. Tracking Force Adjustment	8
D. Height Adjustment	9
E. Tangential Cartridge Geometry Adjustment	10
F. Fine VTA Adjustment	14
G. Azimuth Adjustment	15
H. Bias Adjustment	17
I. Fine Azimuth Adjustment	18
J. Cueing Device Adjustment	18
V. GENERAL MAINTENANCE	19
VI. MINOR PROBLEMS	20
A. Broken Pin Connector	20
B. Broken Bias Thread	21
C. Hum and Buzz	22
VII. TRANSPORT AND PACKING	23