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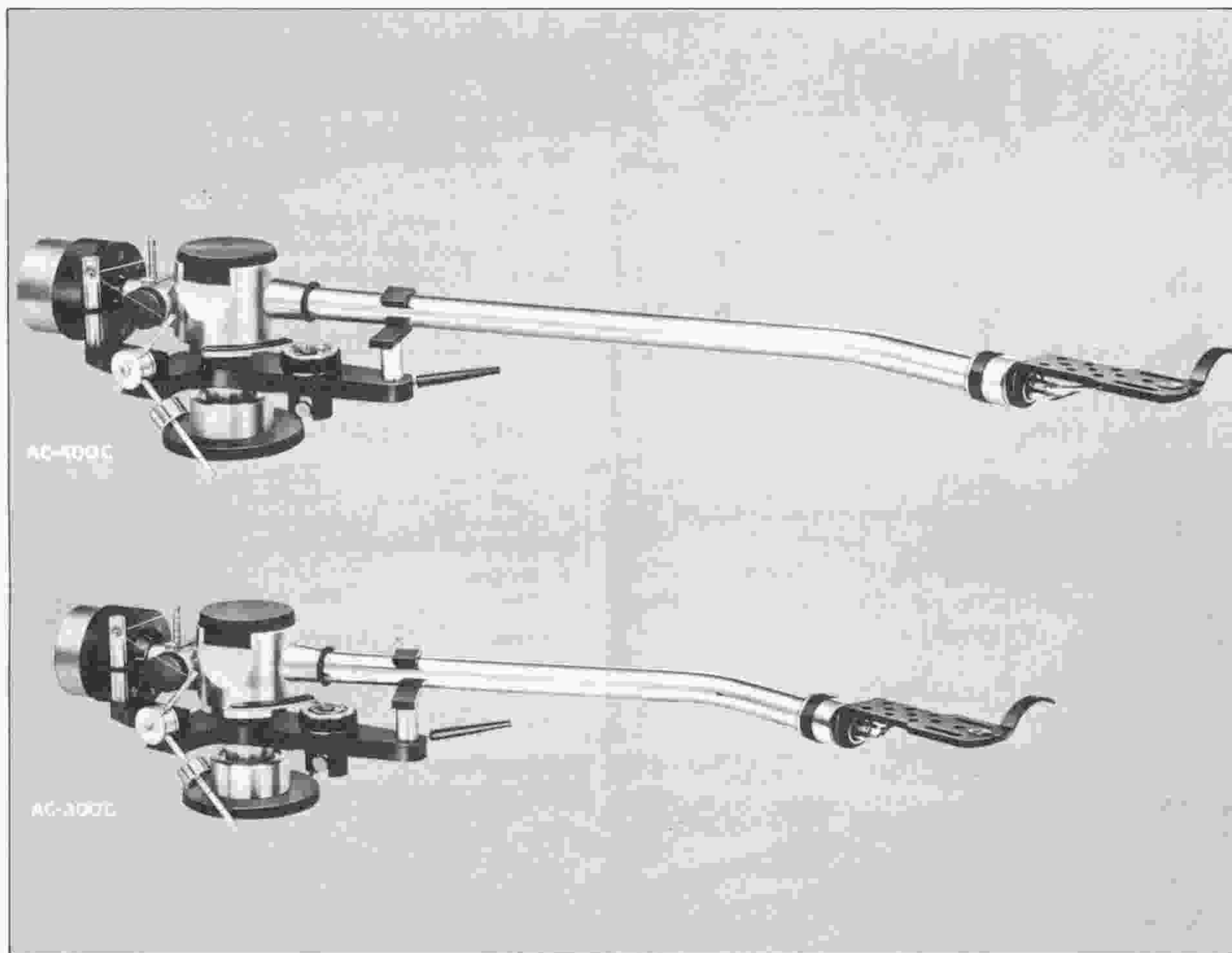


OIL DAMPED ONE-POINT SUPPORT
STEREO TONEARM

AC-300C, AC-400C

Audio Craft

2-29-3 Kakinokizaka,
Meguro-ku, Tokyo
Tel: 03-723-3358



Thank you for your purchase
of a Audio Craft tone arm.

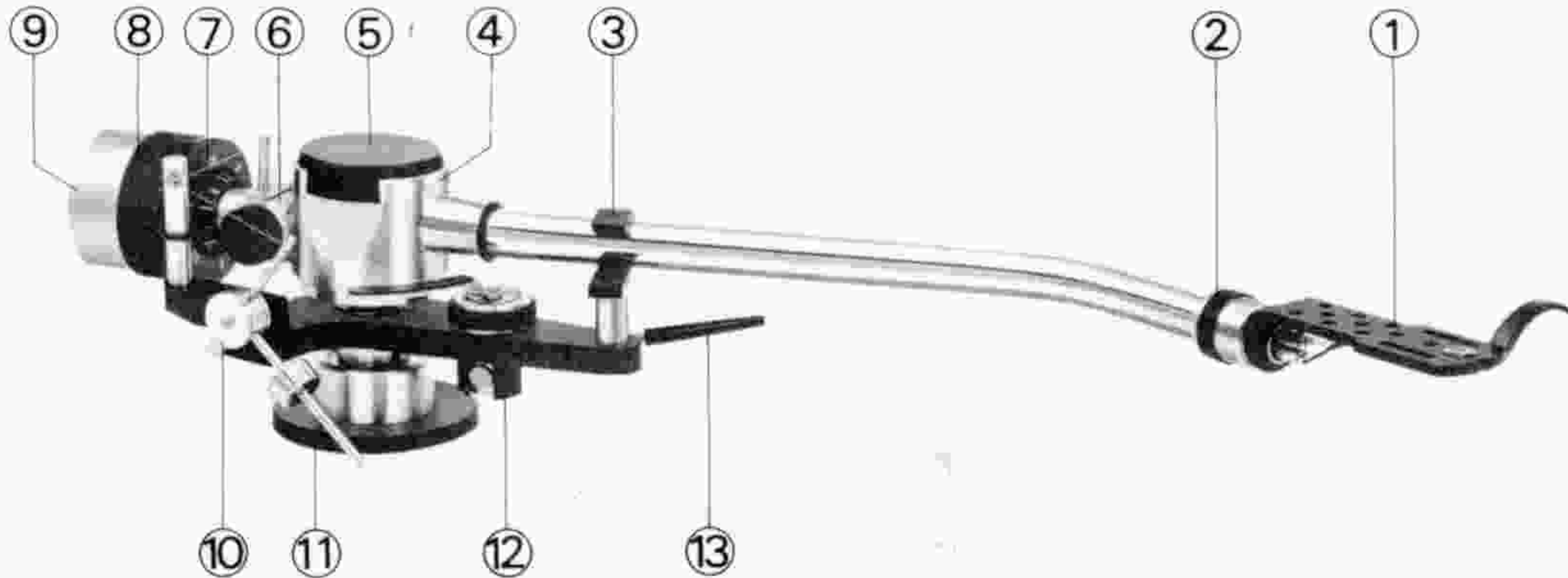
All models of the AC-400 and AC-300 series are viscous damped one-point support tone arms which feature extremely high tracking performance, products designed to retrieve and transmit to the amplifier accurately and with highest fidelity sounds contained in the record grooves. This booklet describes the correct manner in which the tone arms should be handled. Please be sure to read through it thoroughly before using your tone arm.

IMPORTANT – BE SURE TO READ BEFORE USE!!!

- Be sure to use the silicon oil provided with the tone arm (Audio Craft type AO-02) or the optional type AO-01 or type AO-03 oils. (Refer to the paragraphs on injecting the oil and optional parts for further details.)
- The optimum amount of silicon oil to be injected is 0.25cc to 0.3cc. Use the 1cc syringe provided, and inject the silicon oil after first metering the correct amount into the syringe. The amount of silicon oil should be neither less nor more than the figures mentioned above if the intended performance is to be achieved.
- In particular, excessive oil will result in leakage of the oil, deterioration of tracking performance, or poor electrical contacts. Be particularly careful to see that the correct amount of oil is used. (For further details, refer to the paragraph on injecting oil.)

COMPONENTS OF THE TONE ARM

- | | | |
|-------------------------------|---------------------------------|-------------------------|
| 1 Head shell (type AS-2 PLUS) | 6 Lateral balancer | 11 Tone arm base |
| 2 Head shell lock nut | 7 Tracking force scale ring | 12 Cueing control |
| 3 Tone arm rest | 8 Tracking force adjusting ring | 13 Cueing control lever |
| 4 Center block | 9 Main weight | |
| 5 Damping control knob | 10 Anti-skating device | |



SPECIFICATIONS OF AC-300 & AC-400 SERIES TONE ARMS

| | AC-300 SERIES | AC-400 SERIES |
|--|---|----------------------|
| Tone arm type | One-point support viscous damped tone arm | |
| Over all length | 333mm(13.11") | 379mm(14.92") |
| Effective length | 237mm(9.33") | 283mm(11.14") |
| Overhang | 15mm(0.59") | 13mm(0.51") |
| Distance from center shaft to turntable center | 222mm(8.74") | 270mm(10.63") |
| Tracking error | Less than 0.21°/cm | Less than 0.13°/cm |
| Maximum length of rear overhang | 85mm(3.35") | 90mm(3.54") |
| Tracking force | 0 – 3 grams (in increments of 0.25 grams); direct reading scale | |
| Weight range of cartridges | 3.5 grams – 15 grams | 3.5 grams – 17 grams |
| Lateral balancer | NLB (Neutral Lateral Balance) control | |
| Cueing control | Viscous damped (with height control) | |
| Anti-skating device | On AC-300C only | On AC-400 only |
| Head shell | AS-2 PLUS | |

CONTENTS OF PACKAGE

| | |
|--------------------------|--|
| Tone arm proper | Syringe (for injecting viscous fluid) |
| Head shell (AS-2 PLUS) | Low capacitance output cable (1.5m – 5') |
| Weight assembly | Lateral balance gauge |
| Tone arm base assembly | Lock nut tightening rod |
| Sub weight | Handling Instructions booklet |
| Sub lateral weight | Mounting template |
| Damping oil (type A)-02) | Customer card |

OPTIONAL PARTS FOR AC-300 & AC-400 SERIES TONE ARMS

- **Head shells**
 Type AS-2 PLUS (Head shell with twin locking pins)
 Type AS-2 (Standard head shell)
 (Contacts and lead pins for all four types are gold-plated)
- **Weights**
 AW-1 (For AC-300 series; sub weight for Ortofon SPU/GT type cartridges)
 AW-2 (For AC-400 series; sub weight for Ortofon SPU/GT type cartridges)
 AW-3 (For AC-300 series; weight for Ortofon SPU/GT type cartridges)
 AW-4 (For AC-400 series; weight for Ortofon SPU/GT type cartridges)
 AW-5 (Sub weight for head shell/cartridge assembly weighing from 24 to 27 grams; may be used for Ortofon type SPU/A or SL15A cartridges with head shell/cartridge assembly weight of 37 grams)
- **Viscous fluids (Silicon oil)**
 Type AO-01 (Viscosity unit: 100,000 cs)
 Type AO-02 (Standard type; viscosity unit: 200,000 cs)
 Type AO-03 (Viscosity unit: 300,000 cs)
- **Base for Three-point mounting (For laminated baseboards)**
 AB-2 (For AC-300C & AC-400C type tone arms)

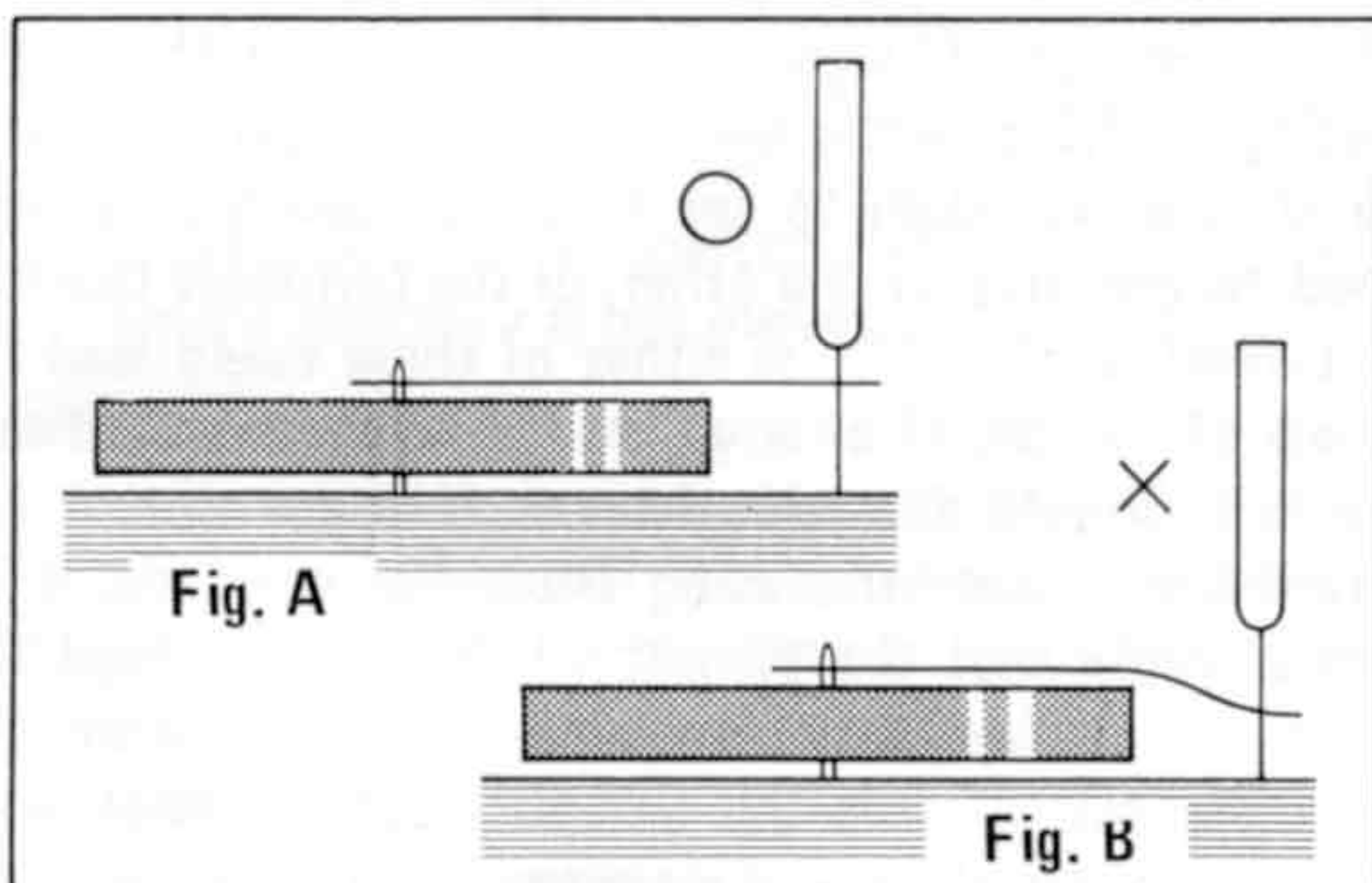
- Specifications are subject to change without prior notice due to improvements.

MOUNTING ON TURNTABLE BASEBOARD

The baseboard of the turntable should be as heavy and solid as possible, with a minimum thickness of 15mm (0.59"). The board on which the turntable motor is mounted should be free of any warpage, and should have true flat surface.

- (1) Determine the mounting position of the tone arm base by using the template enclosed.
- (2) Fix the center position of the arm base by inserting the turntable spindle into the spindle hole of the template.
- (3) Draw a circle with a diameter of 22mm across the center position and drill the hole for the arm base.
- (4) Insert the arm base into the hole and fix the base firmly by using the wave washer and lock nut as shown in Fig. 1. Use the iron bar enclosed to give a final turn to the lock nut.

NOTE: Stretch the template straight when marking the center position of the arm base (Fig. A). The center position will be out of place if the template is not straight as shown in Fig. B.



● Mounting on Turn Table Base Board.

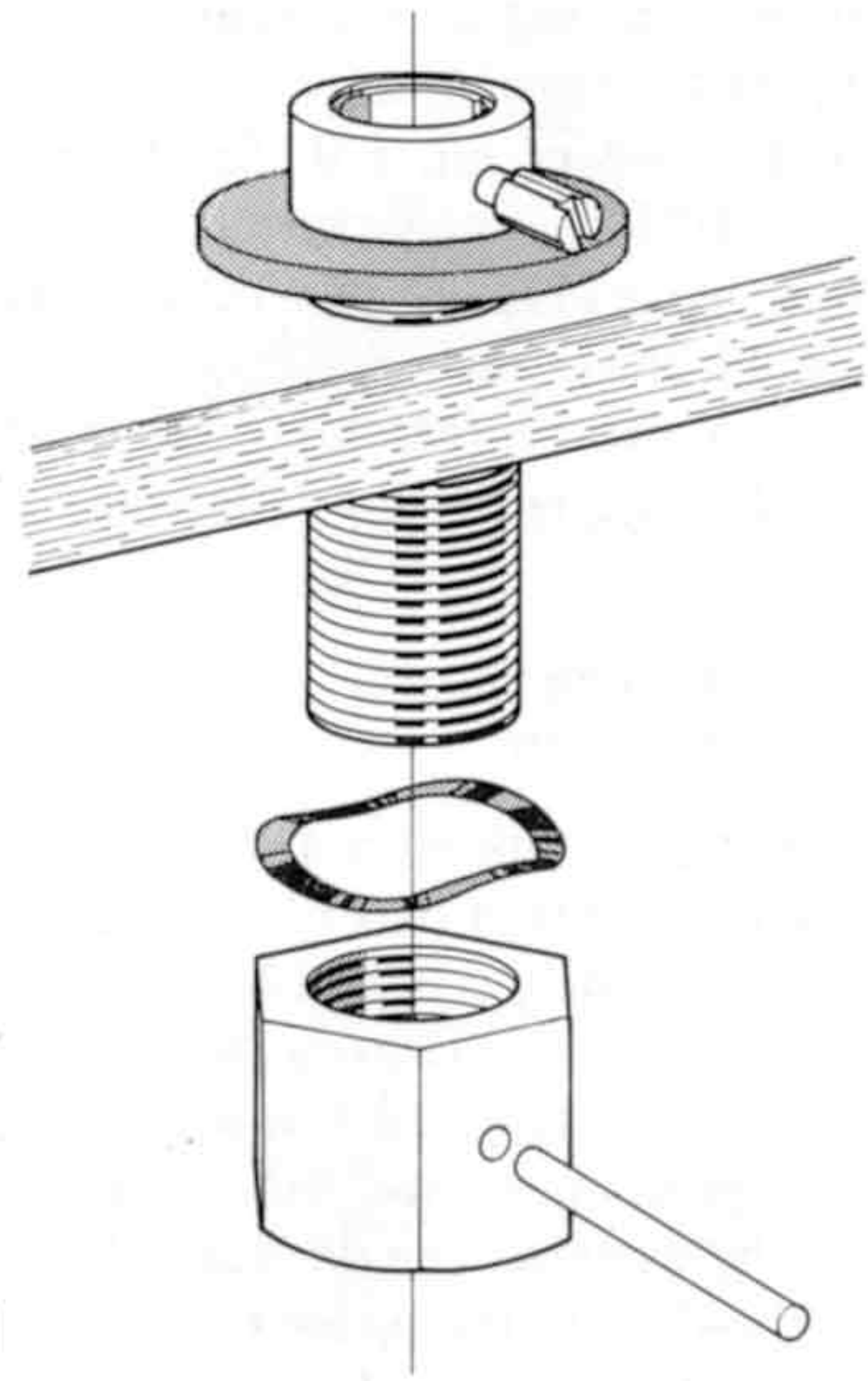


Fig-1

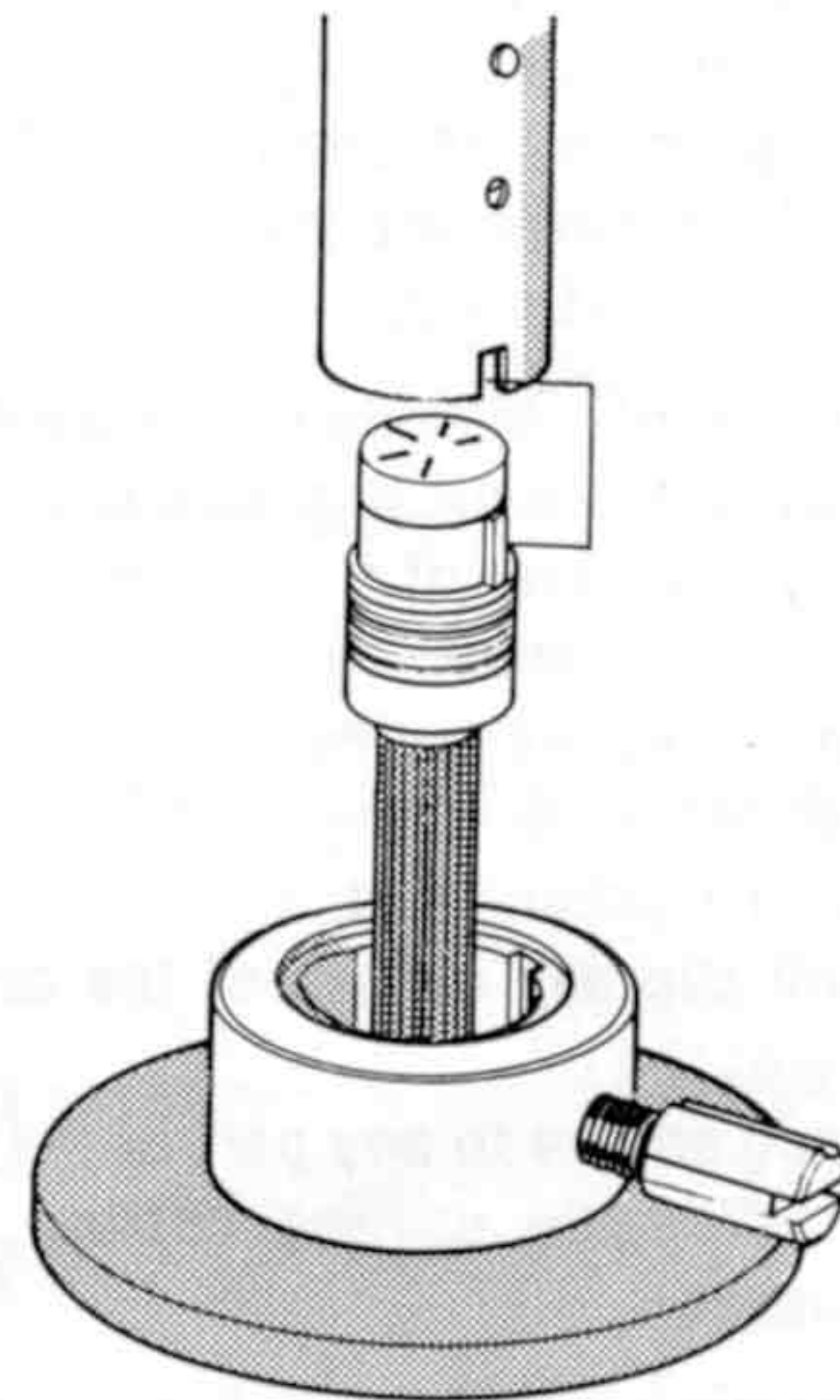


Fig-2

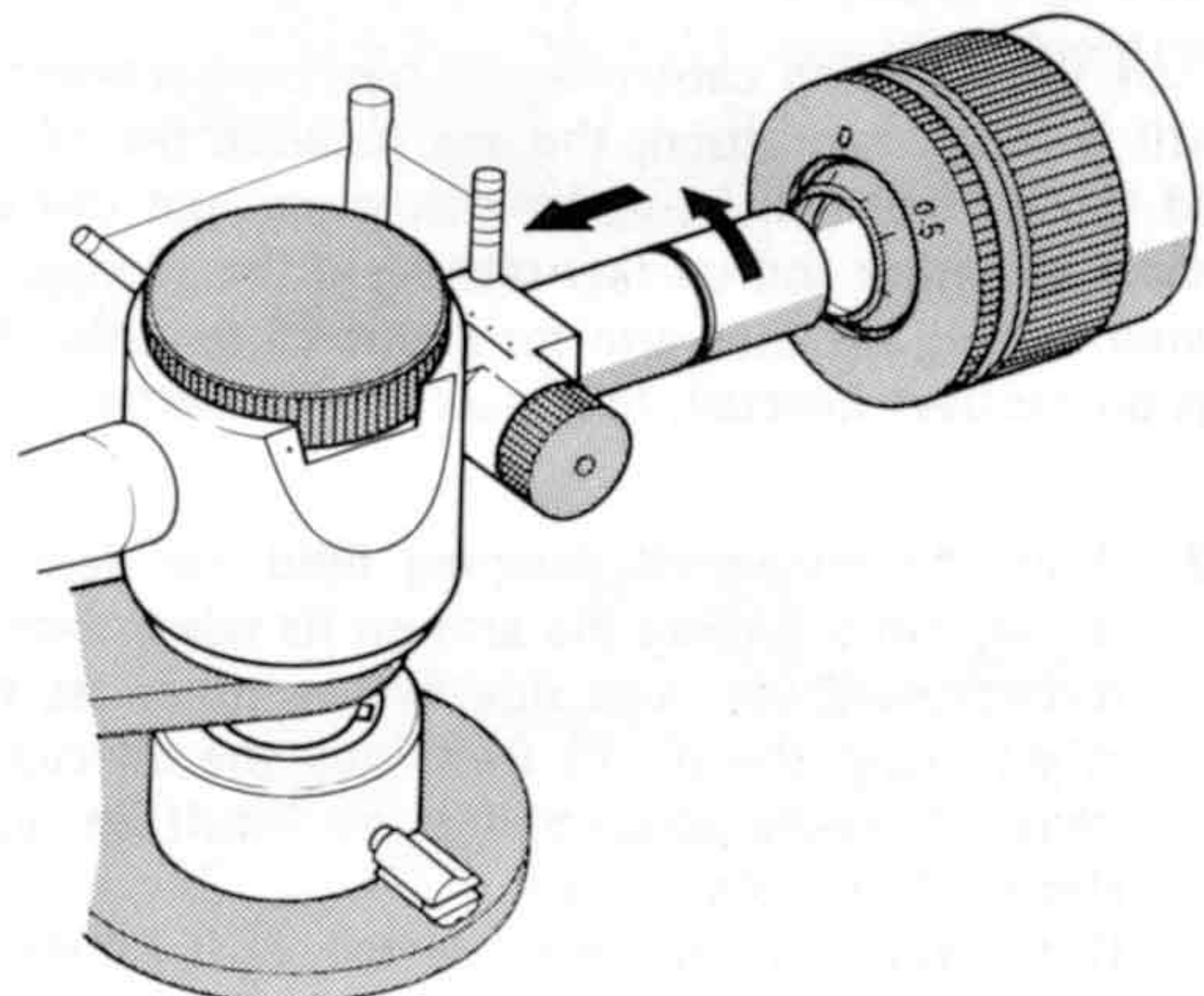


Fig.-3

INJECTING OIL

The AC-300 and AC-400 series tone arms are one-point support type tone arms that use silicon oil to provide viscous damping. Accordingly, the silicon oil provided (type AO-2) should be injected in the manner indicated below before placing the tone arm in use.

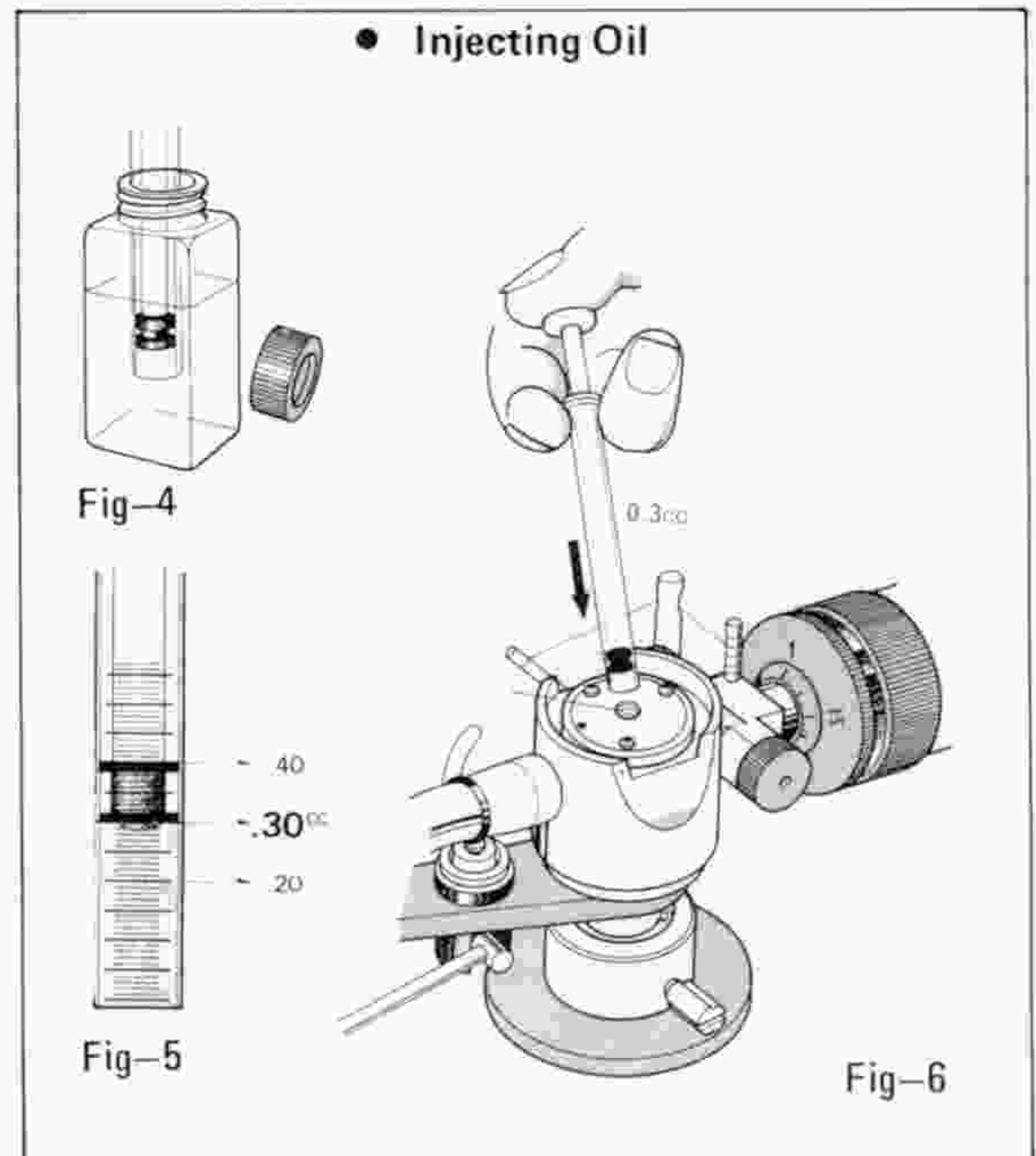
The optimum amount of oil is 0.25cc to 0.3cc. The tone arm will not perform satisfactorily if either more, or alternately, less, oil is used. In particular, if excessive oil is injected, it could either leak or impair tracking performance, or result in other problems such as poor electrical contacts. The oil is injected in the following manner.

- (1) Remove the damping control knob on the center block by turning it to the left.
- (2) Remove the cap of the silicon oil container, allow the oil to settle in the lower part of the container, and then draw up approximately 0.3cc of oil into the syringe. Silicon oil has a high viscosity, and cannot be drawn into the syringe readily like low viscosity fluids. Insert the tip of the syringe into the oil, and draw up the plunger of the syringe, and in due course, the oil will start rising slowly into the syringe barrel. The scale of the syringe has figures inscribed on it, from 20 to 40 to 60 and so on. 20 represents 20 milliliters or 0.2cc, 40 represents 40 milliliters or 0.4cc. A certain amount of air in the form of tiny bubbles will inevitable enter the syringe; allow approximately 0.3cc of oil to enter the syringe, allowing for and deducting the approximate volume of the air.
- (3) Now wipe off any oil adhering to the tip of the syringe, press the tip against the oil injection port that will have been exposed by removal of the damping control knob as described in (2) above, and holding the syringe vertically, apply pressure to the plunger to force the oil into the center block. In doing so, lift the center block upwards with the other hand; this will create a space between the oil cup and oil ball of the center block to facilitate entry of the oil. If any oil should adhere to any part of the center block, wipe it off thoroughly using a cotton bud or other suitable implement.
- (4) After the injection of the oil has been completed, replace the damping control knob on the center block, screwing it in until it locks in position.
- (5) When the damping control knob has been screwed in until it locks in position, the gap between the oil cup and the oil ball will be at its maximum, and this will enable smoother and quicker settling of the oil injected. Avoid moving the tone arm for about 15 minutes after the oil has been injected, to allow the oil to settle.

NOTE: Once the silicon oil damping fluid has been injected, avoid turning the arm on its side or leaning it excessively to one side or the other, as this might cause the oil to leak from the oil cup to impair tracking performance or result in poor electrical contacts.

If excessive oil has been injected, or if oil should leak because of tipping of the tone arm, wipe off the spilled oil and replace what oil is in the tone arm with the correct amount of oil. Refer to the section on replacing oil on Page 7.

• Injecting Oil



SILICON OIL DAMPING FLUID

• Oil viscosity

The damping fluid consists of silicon oil with a high degree of purity. The standard oil is Audio Craft's type AO-02 (viscosity unit: 200,000 cs). In addition, type AO-03 fluid (viscosity unit: 300,000 cs) which has a higher viscosity, and type AO-01 fluid (viscosity unit: 100,000 cs) which has a lower viscosity, are available as options.

Unlike other organic oils, the viscosity of silicon oil is not affected very much by temperature changes. If its viscosity at 25°C. were to be set at 1.00, its viscosity at 0°C. would be 1.75. Accordingly, it is affected, albeit slightly, by the room temperature in extremely cold climates. Therefore, if the room in which the tone arm is to be used is generally quite low, the use of type AO-01 fluid is recommended. (however, if the room temperature is acceptable for normal livelihood, then the standard type AO-02 fluid should provide satisfactory performance.)

• Oil leakage

The damping fluid consists of high viscosity silicon oil, while the oil cup is designed to inhibit leakage of oil, and so as long as the amount of oil is less than 0.3cc, there is little risk of leakage in normal use.

The amount of oil injected must be within the rated capacity of 0.3cc, while once the oil has been injected, care should be taken to see that the tone arm is not tipped to one side or the other, or the turntable itself is not turned on its side, as either of these could lead to leakage of the oil. If at any time the movements of the tone arm should feel sluggish, or if there should be untraceable noises emanating from the speakers, it is quite possible that the symptoms are being caused by excessive oil having been injected, or leakage of oil. In such instances, remove the damping control knob and check the center block and vicinity.

MOUNTING CARTRIDGE ON HEAD SHELL

The cartridge should be mounted on the head shell as shown in Figure 7.

White lead wire . . . Left channel signal connection (L+)
Blue lead wire . . . Left channel ground connection (L-)
Red lead wire . . . Right channel signal connection (R+)
Green lead wire . . . Right channel ground connection (R-)

The standard head shell is designed so that the position of the cartridge can be adjusted over a range of 15mm (0.59"). Correct overhang is 15mm (0.59") for the AC-400 series tone arms and 13mm (0.51") for the AC-300 series tone arms. Mount the cartridge accurately so that the correct amount of overhang is provided.

NOTE: In addition to the amount of overhang, another important point is that the cartridge is mounted with its fore-aft axis properly aligned with the head shell, as shown in Figure 8. If the cartridge is not mounted correctly on the head shell, it may not be possible to achieve accurate lateral balance.

● Mounting Cartridge on Head Shell

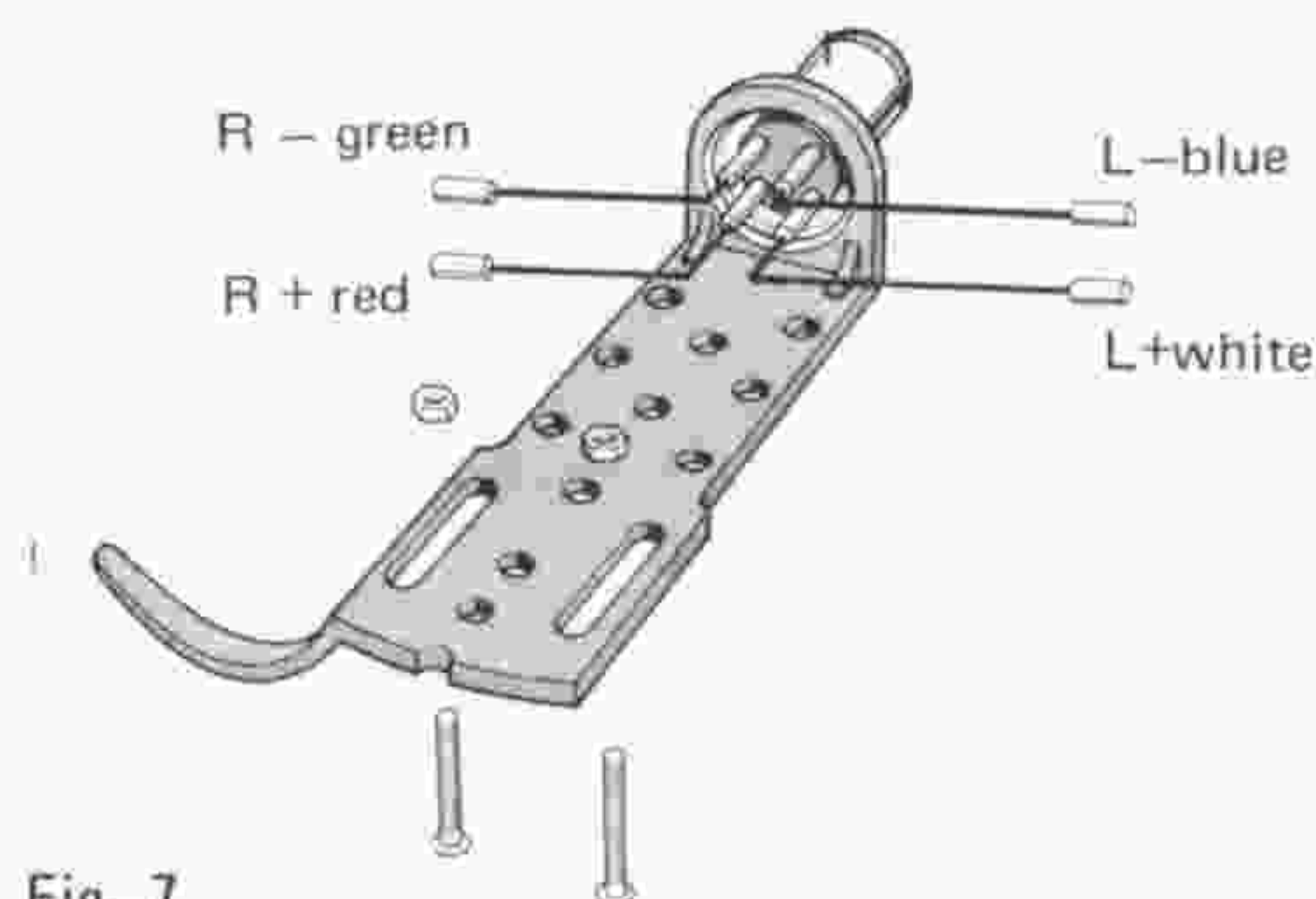


Fig-7

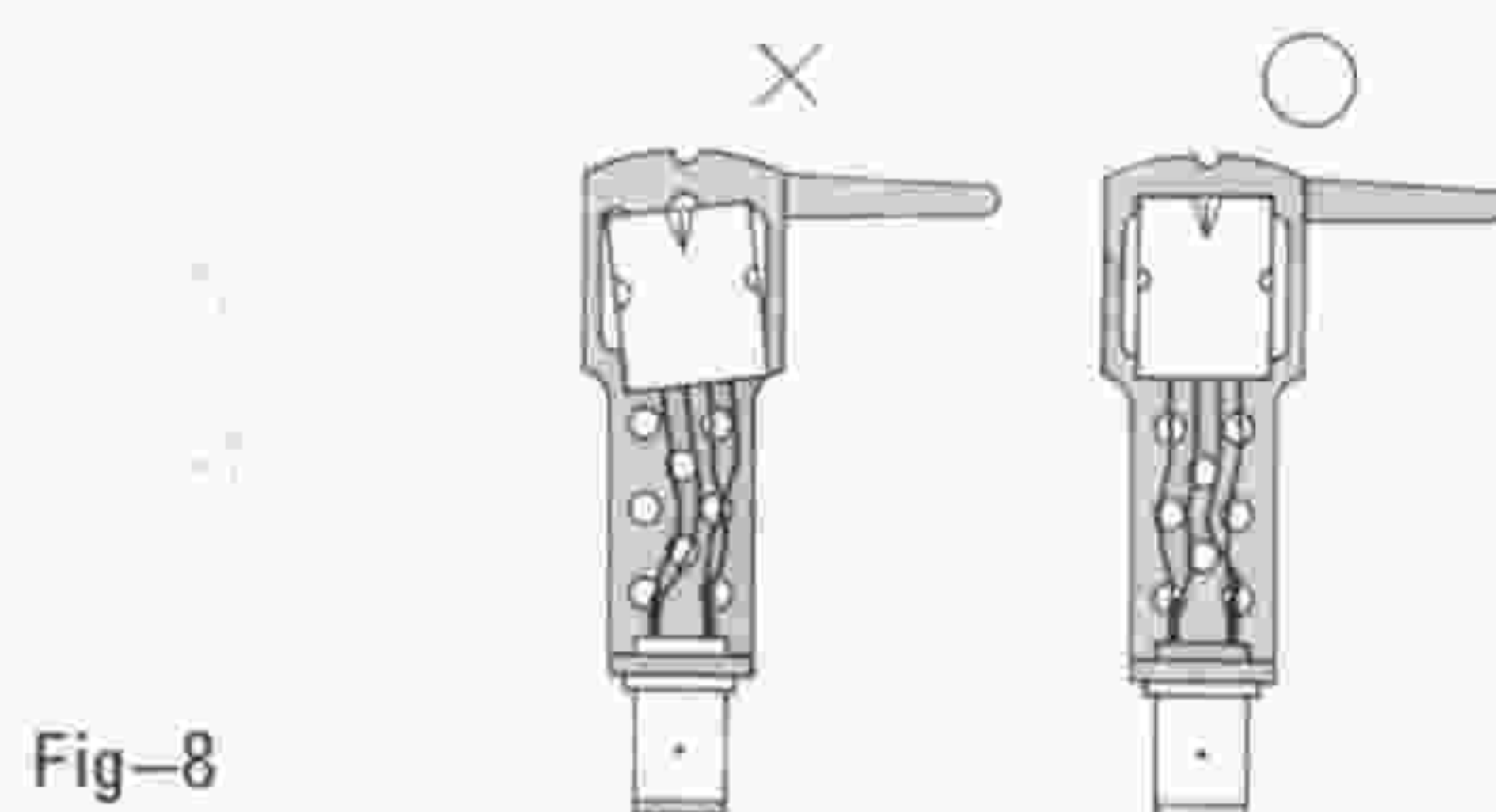


Fig-8

ADJUSTING TRACKING FORCE

Cartridges that may be mounted on the AC-300 and AC-400 series tone arms are those whose mounting dimensions conform to EIA standards and weigh anywhere from 3.5 grams to 12 grams (up to 15 grams if sub weight is used). Total weight of the head shell/cartridge assembly may be anywhere from 13 grams to 20 grams (up to 24 grams if standard sub weight is used). If the optional AW-5 sub weight is used, a total head shell/cartridge assembly weight of up to 27 grams is permissible.

When using heavy cartridges such as the Ortofon SPU/GT cartridge which weighs 32 grams, the optional Ortofon weight should be used. (See section on optional parts on page 2.

- (1) The weight assembly is a double weight type. Therefore it is very easy to balance the tone arm horizontally by turning the tracking force adjusting ring and sliding the main weight backwards or forwards.
- (2) When balancing the tone arm horizontally, lock the anti-skating device in the raised position as shown in Figure 9.
- (3) Once the tone arm has been balanced horizontally, turn the tracking force scale ring carefully so that the "0" inscribed on the ring is lined up with the pointer inscribed on the weight rod, while taking care that the weight assembly is not moved inadvertently.
- (4) Now by turning the tracking force adjusting ring to the left, the entire weight assembly including the tracking force scale ring will move forward, and tracking force will be applied on the stylus. The tracking force scale ring should be adjusted so that the desired tracking force figure is lined up with the pointer inscribed on the weight rod.

- (5) If the weight of the head shell/cartridge assembly exceeds 20 grams, screw the sub weight onto the end of the weight rod as shown in Figure 10 before balancing the tone arm horizontally.

● Adjusting Tracking force

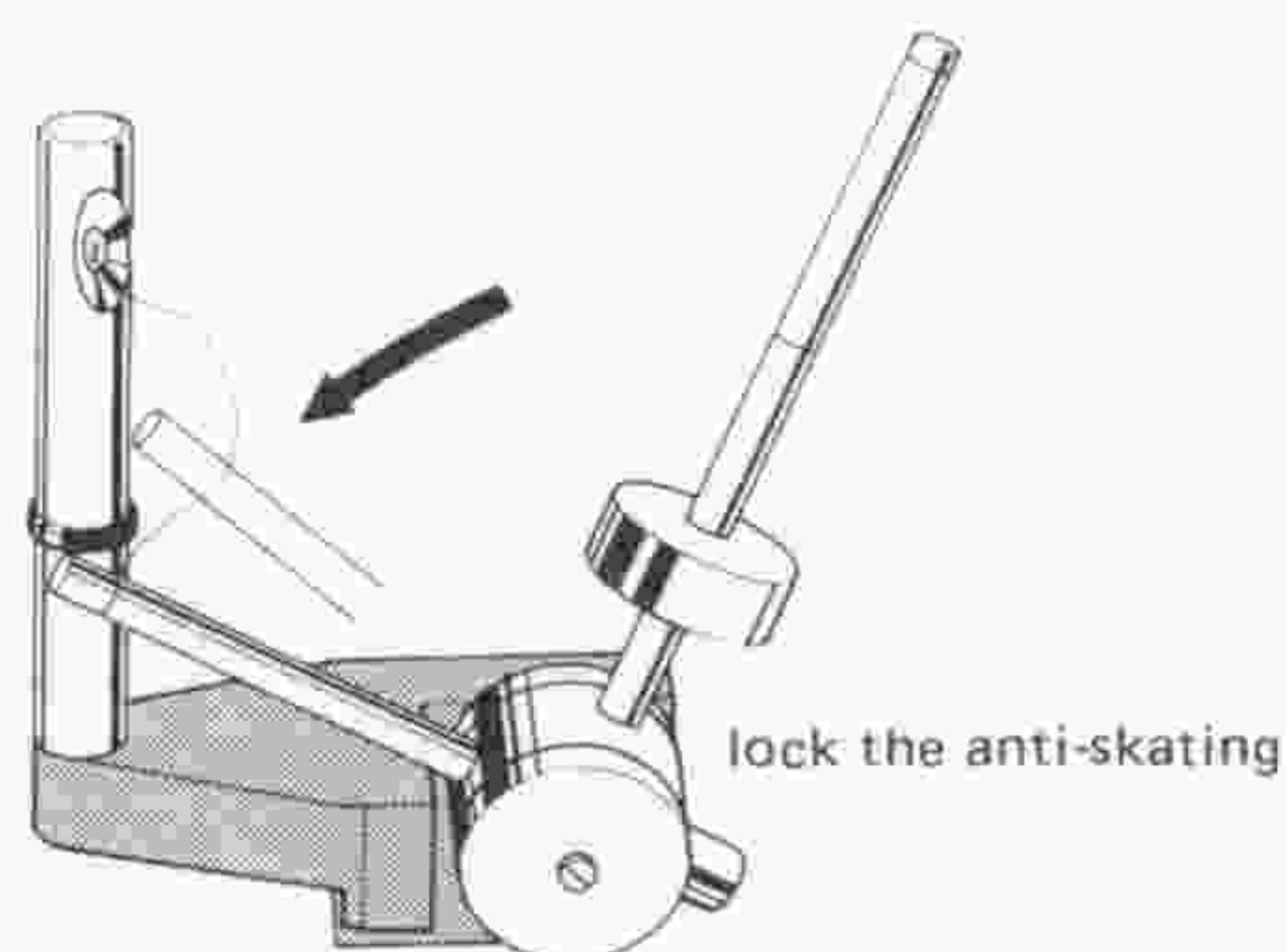


Fig-9

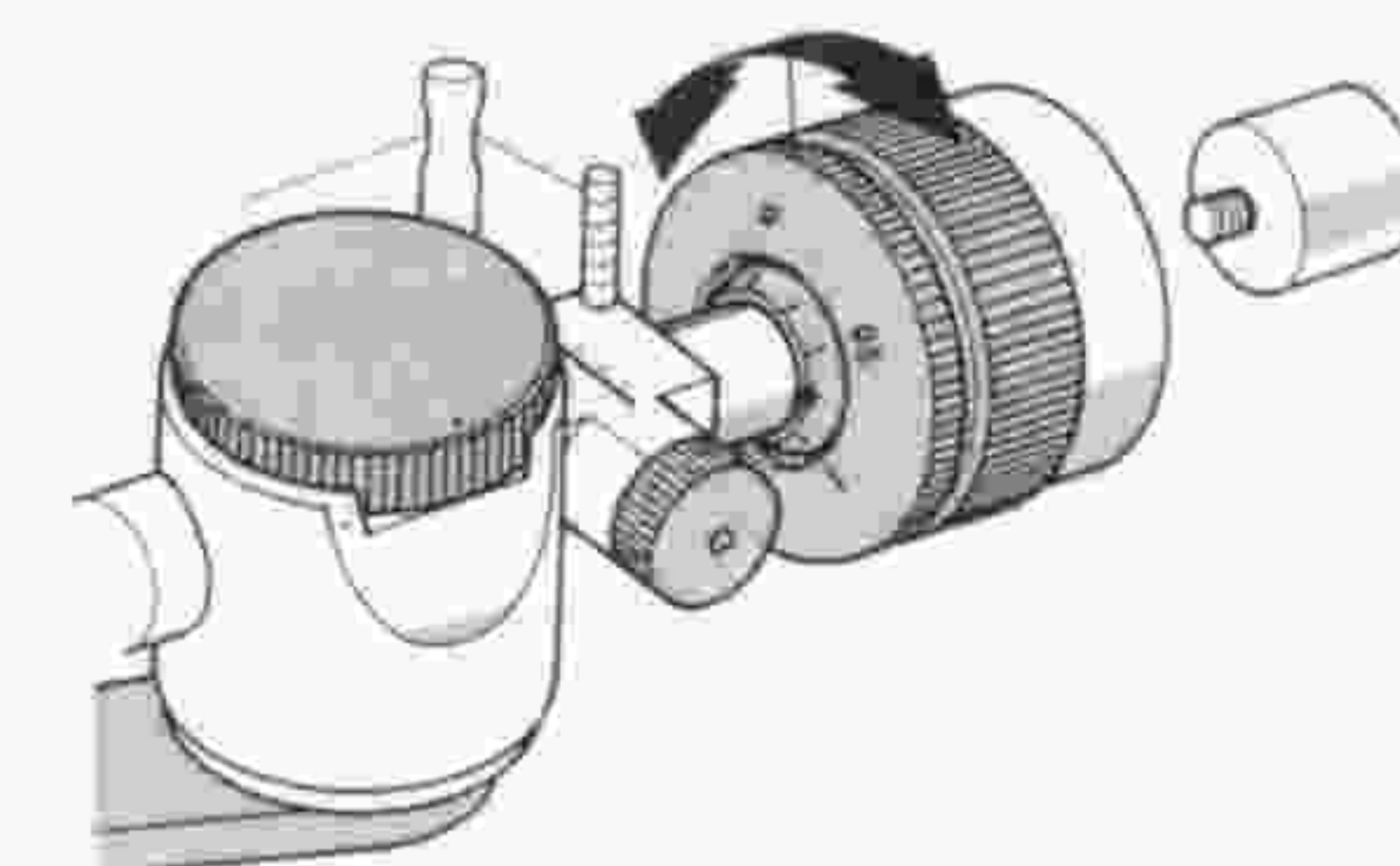


Fig-10

ADJUSTING LATERAL BALANCE

The AC-300 and AC-400 series tone arms are point support tone arms, and so their lateral balance will vary according to the weight of the cartridge mounted, to result in the tone arm leading to one side or the other. After the oil has been injected, the tracking force adjusted, and the height of the arm adjusted, adjust the lateral balance of the arm accurately in the following manner.

- (1) Turn the damping control knob all the way it will go to the right, to the LIGHT damping position. This will make it easier to balance the tone arm laterally.
- (2) Place the lateral balance gauge provided with the tone arm on the turntable as shown in Figure 11, and lower the tip of the stylus onto the horizontal surface of the gauge. (Some turntable platter mats have surface designs that make it difficult to place the gauge horizontally. In such instances, turn the platter mat upside down temporarily.)
- (3) Apply light pressure to the right side and the left side of the damping control knob at the top of the center block alternately using a matchstick or toothpick. If the tone arm can be tipped to both sides more or less equally, then the tone arm may be considered to be roughly balanced laterally, so now, facing the gauge squarely, observe the upper surface of the head shell. It should be parallel to the horizontal lines inscribed on the gauge. If it appears to be leaning to one side or the other, turn the lateral balancer control knob for fine adjustment of the lateral balance. Turning the knobs to the fore will move the weight to the left, and turning it to the rear will move the weight to the right. Lock to lock requires approximately nine turns; it should be possible to adjust the lateral balance by one half to one turn.
- (4) If for example the tone arm will lean only to the left when pressure is applied, and will not lean to the right, then the stylus will also be leaning to the left (this should be visible by observing the gauge). In such cases, turn the balancer control knobs to the fore to move the balancer weight to the left, to the point where the center block can be tipped to the left and to the right equally.
- (5) If the tone arm cannot be balanced laterally even if the weight of the balancer is moved all the way to the right or to the left, fit the sub lateral weight provided to the side opposite to the direction in which the tone arm is leaning, and then balance the tone arm laterally. Bear in mind that when the sub lateral weight is fitted, the tracking force will also be affected, so be sure to readjust the tracking force.

NOTE: When balancing the tone arm laterally the anti-skating device should be functioning, with the weight set at the position matching the tracking force. If it is extremely difficult to balance the tone arm laterally, it is possible that excessive oil has been injected, or that oil is leaking. Other possible causes could be that the turntable as a whole is not placed horizontally, or the record may be warped. Check each of these items once again and then try to balance the tone arm laterally.

● Adjusting lateral balance

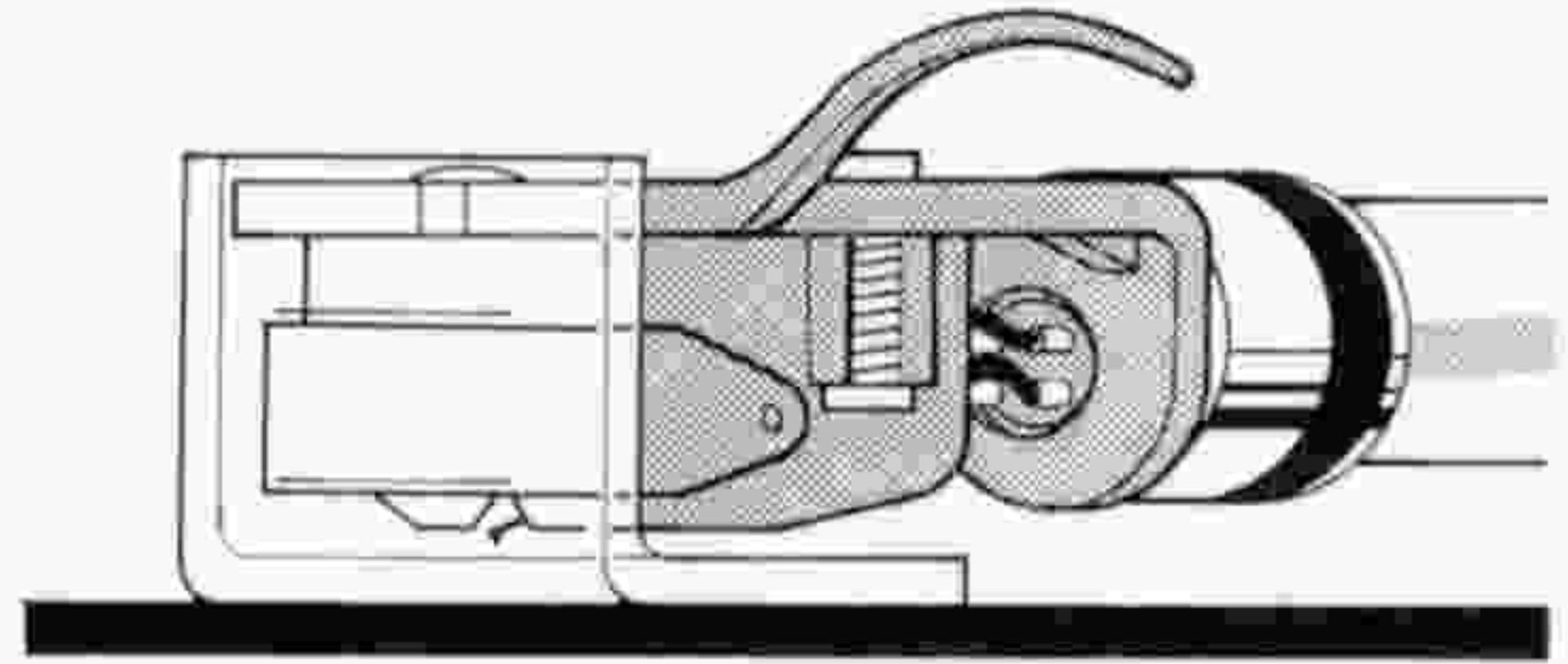


Fig-11

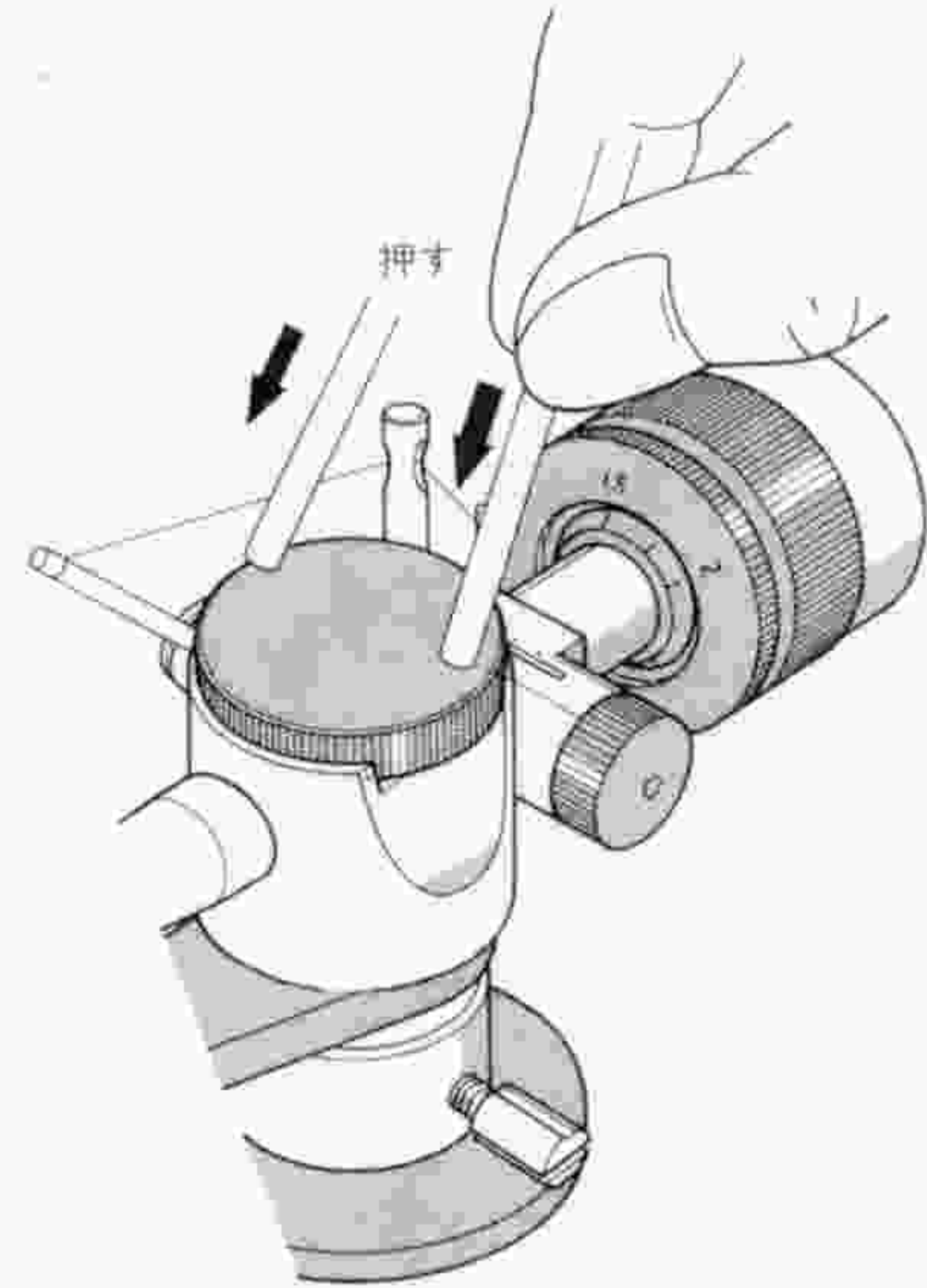


Fig-12

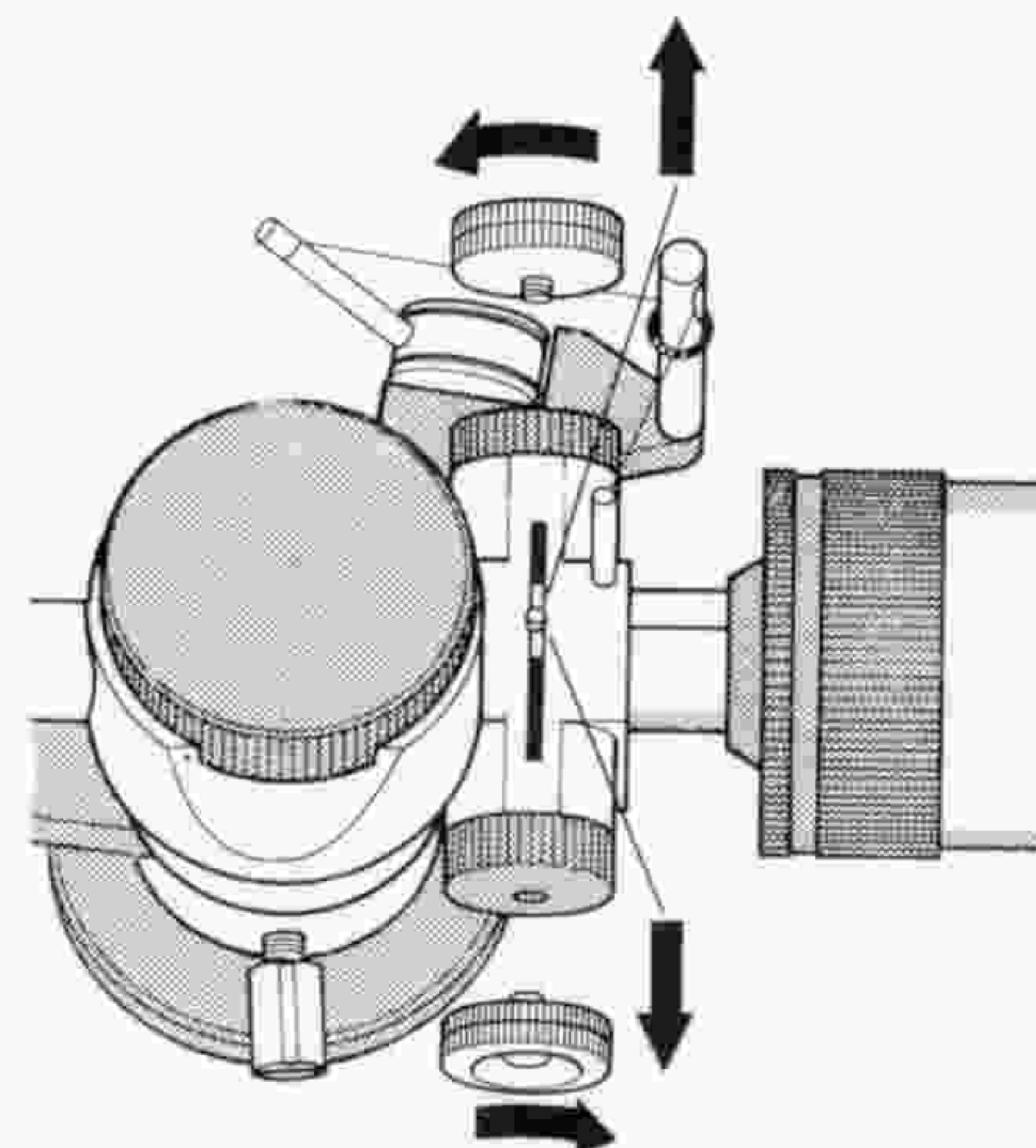


Fig-13

ADJUSTING AMOUNT OF DAMPING

A major feature of the AC-300 and AC-400 series tone arms is the fact that the amount of viscous damping can be adjusted in accordance with the characteristics of the cartridge to be used and its tracking force, to thus give full play to the inherent performance of the cartridge.

- Turning the damping control knob at the top of the center block all the way to the right until it locks will bring the white dot on the knob to the right. This is the position providing the least amount of damping, the LIGHT damping position, and is suitable for very high compliance, very light tracking force (around 0.75 to 1.25 grams) cartridges.
- Turning the damping control knob one turn to the left (so that the white dot makes one turn) sets the damping at the NORMAL damping position. This position is suitable for cartridges with tracking forces of around 1.25 to 2.5 grams, particularly moving coil type cartridges.
- Turning the damping control knob still another turn to the left will set the damping at the HEAVY damping position. When using cartridges with tracking forces of three grams or more, set the damping control knob to this position. When set to this HEAVY damping position, the gap between the oil ball and the oil cup is virtually zero; there is little more than a thin film of oil between the two components. The damping control knob cannot be moved any further to the left than this. The black dot at the right side of the center block is a warning mark that indicates that if the lower surface of the damping control knob should be any higher than this, the tone arm will no longer be capable of tracking properly. (See Figure 14)

• Adjusting Amount of damping

• Light ← → Heavy

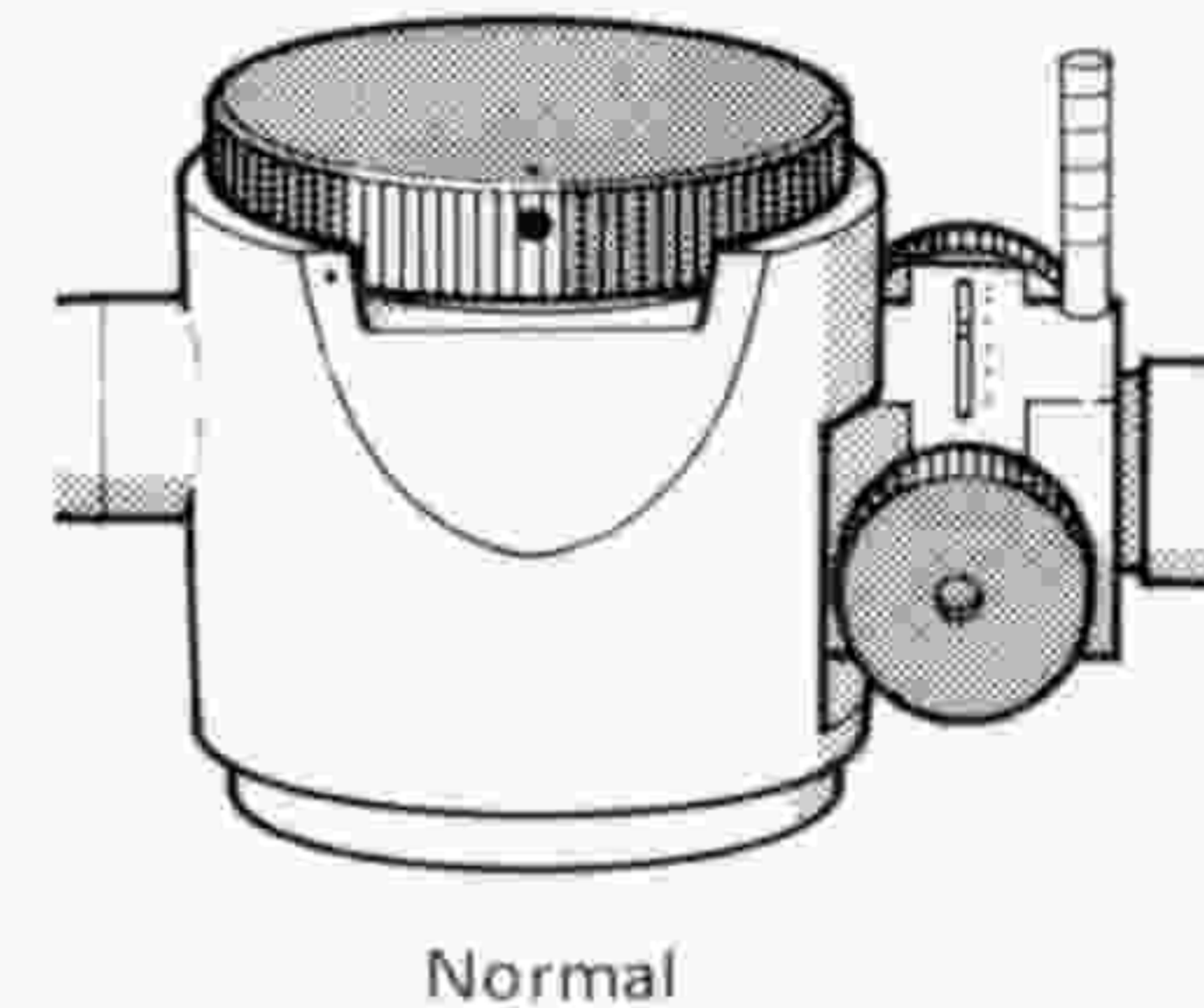


Fig-14

- The amount of damping may be adjusted continuously from LIGHT to HEAVY. Accordingly, the damping control knob should be adjusted while listening to a record whose sounds you are familiar with, and set at the position providing the optimum tonal quality.
- The height of the center block will vary over a range of plus or minus one millimeter from the NORMAL position, depending upon the amount of damping. Accordingly, depending upon what position the damping control is set at, it may be necessary to adjust the height of the cueing control. For details, refer to the section on adjusting the cueing control on Page 8 .

REPLACING DAMPING OIL

The viscous damping silicon oil has a useful life of anywhere from two to three years and need not be replaced during this period. However, if excessive oil has been injected inadvertently when assembling the tone arm, all the oil injected must first be removed and then the correct amount of 0.3cc of oil should be injected. The oil should be replaced in the following manner.

- (1) Remove the damping control knob.
- (2) Remove the three bolts on the upper surface of the oil bowl.
- (3) Now fit the damping control knob into the oil injection port once again, screw it in two or three turns, and then lift it up. The oil bowl will come off to reveal the oil cup.
- (4) Remove all of the oil adhering to the oil cup and the oil bowl using cotton buds or similar implements.
- (5) Now fit the oil back in position reversing the sequence described above. In doing so, secure the oil bowl in position with the red dot on its upper surface aligned with the shaft of the tone arm.

• Replacing damping Oil

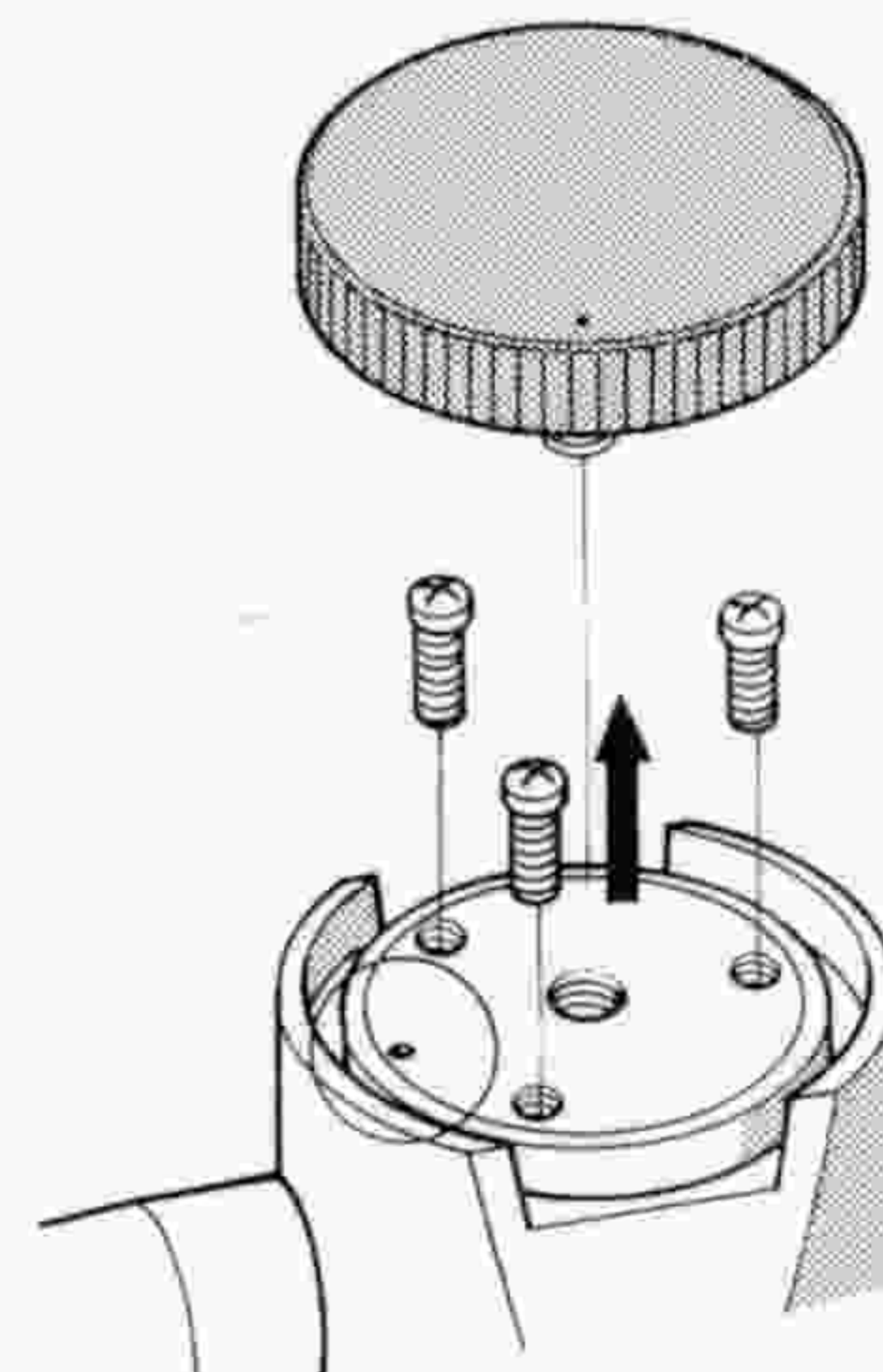


Fig-15

ADJUSTING ANTI-SKATING DEVICE

(Applies to AC-300C and AC-400C type tone arms only)

The type AC-300C and type AC-400C tone arms have anti-skating devices designed to offset any natural force directing the tone arm towards the inner wall of the groove. On these two types, the anti-skating device is fitted as standard equipment; for the type AC-300A and type AC-400A tone arms, the anti-skating device is available as an option which may be purchased and fitted at a later date when the need arises.

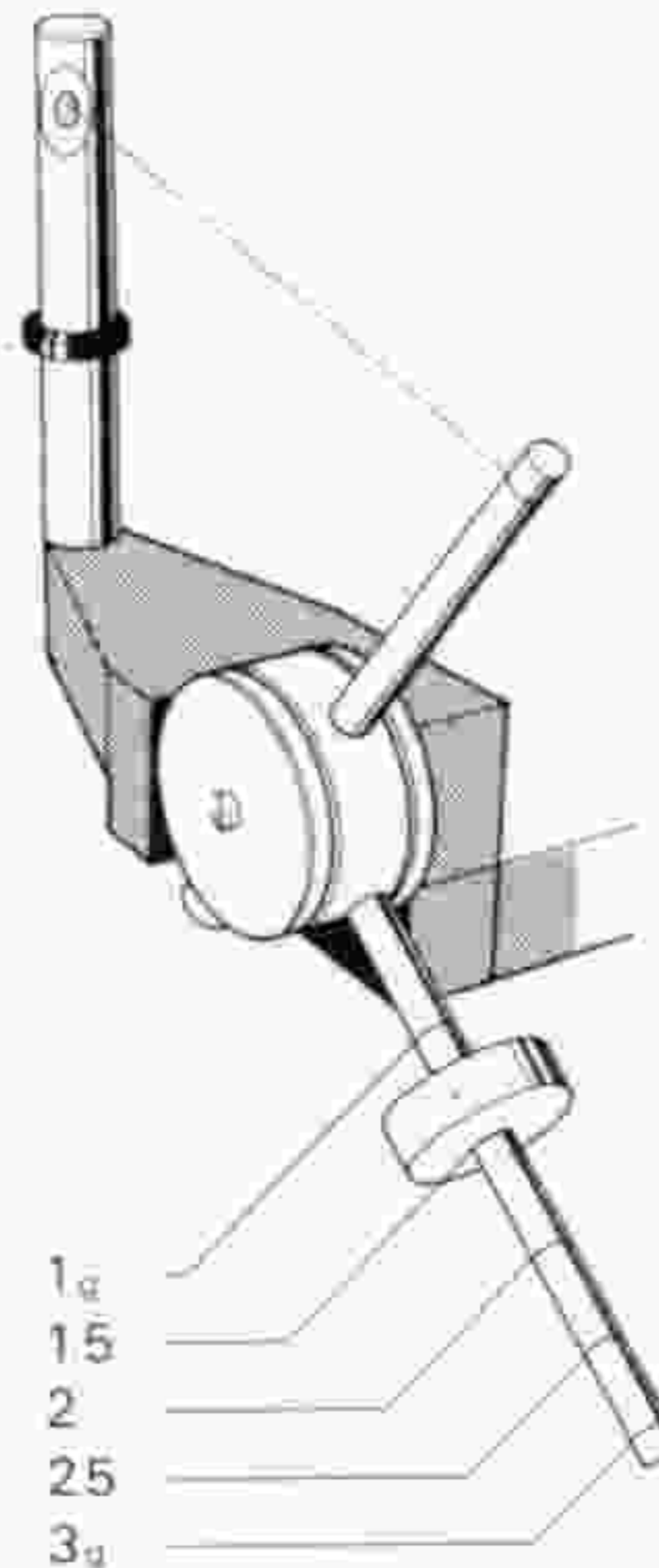
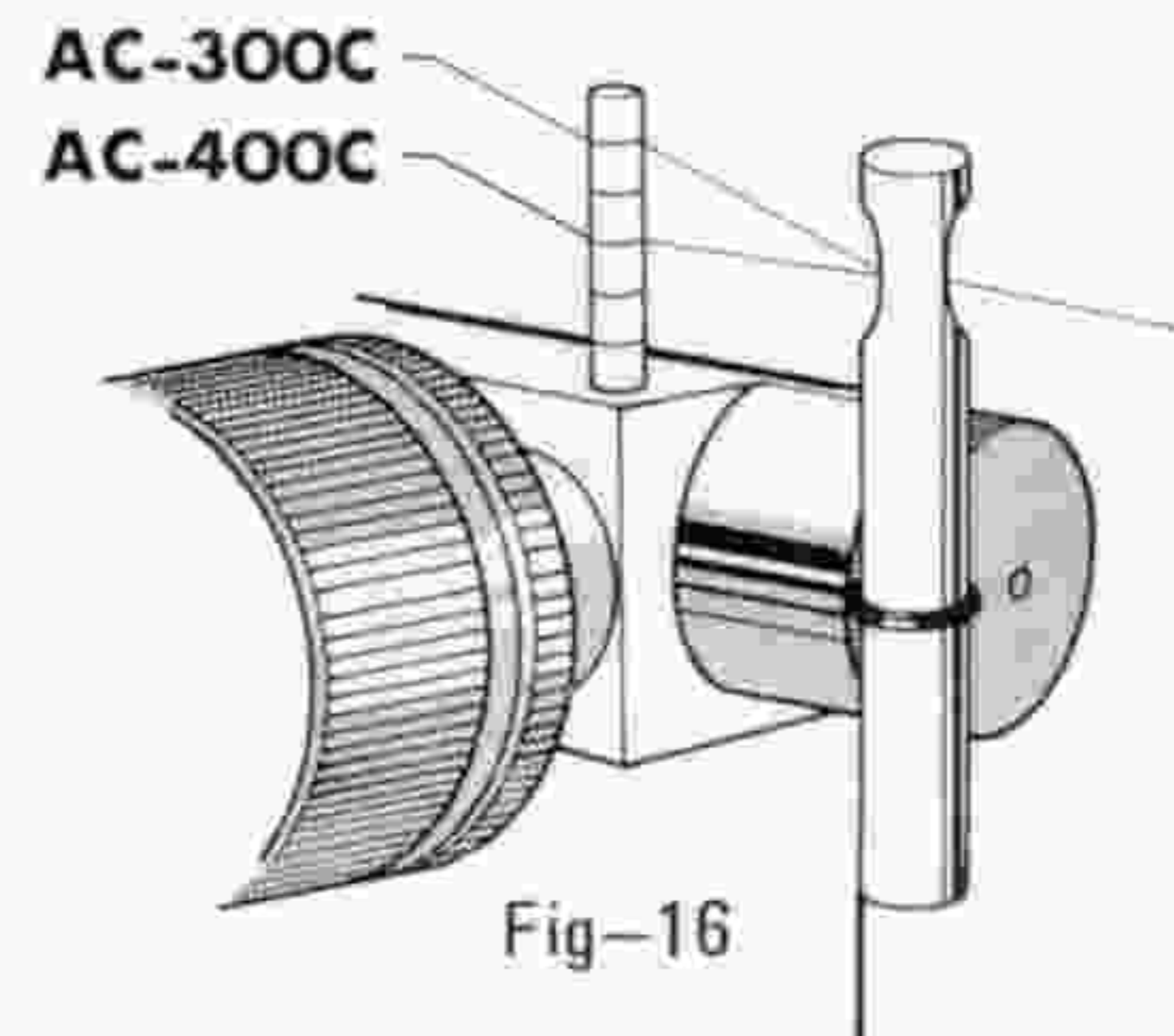
- (1) When balancing the tone arm horizontally to adjust the tracking force, the anti-skating device should be locked in the raised position so that it will not be functioning.
- (2) After the tracking force has been set at the desired force, the anti-skating device may be released.
- (3) The fine thread from the weight shaft of the anti-skating device should be fitted to the uppermost notch on the post fitted above the lateral balancer housing in the case of the AC-300C, and the third notch in the case of the AC-400C. (Figure 16)
- (4) The position of the weight of the anti-skating device varies according to the tracking force employed. The weight shaft has notches inscribed on it to serve as a scale for the positioning of the weight. If the tracking force is 1 gram, the front surface of the weight should be aligned with the first notch. Each successive notch is for each additional 0.5 gram of tracking force. (Figure 17)
- (5) When adjusting the lateral balancer, always be sure to first set the anti-skating device weight to the correct position for the tracking force being employed. If the tone arm is balanced laterally with the anti-skating force device raised in the locked position, the lateral balance will be upset when it is released.

NOTE: Some test records on the market will have a grooveless section provided for the testing of the anti-skating device. This section is provided to ascertain whether the tone arm will remain stationary, without drifting either towards the center or towards the outer circumference of the record with the record turning. However, if there is no groove for the stylus, the natural force directing the tone arm towards the inner wall of the groove will be reduced. For example, when the stylus is placed on the grooveless section with the tracking force set at 1.5 grams and the weight of the anti-skating device set at the 1.5 grams position, the tone arm will drift towards the outer circumference of the record, and will not remain stationary. This shows that there is less natural force directing the tone arm inwards than there would be with the stylus placed in a normal groove.

ADJUSTING CUEING CONTROL

The height of the cueing control will have to be adjusted to conform to the amount of damping. This is because when at the LIGHT damping position, the center block is one millimeter than the NORMAL position, and when at the HEAVY position, it is one millimeter lower than the NORMAL position. The cueing control cylinder will move vertically at a rate of three millimeters per turn of the rubber ring at the upper part of the cueing control. When shipped from the factory, it is set to the NORMAL damp-

• Adjusting Anti-Skating device.



ing position. Accordingly, if the damping control is adjusted to the LIGHT position, the rubber ring should be turned approximately one-third of a turn to the left, while if the damping control is adjusted to the HEAVY position, the rubber ring should be turned approximately one-third of a turn to the right.

The cueing control lever is a friction type lever, so to lower the tone arm, it should be moved all the way down as far as it will go.

• Adjusting Cueing Control

