

Quartz PLL

DIRECT DRIVE TURNTABLE

PL-550

OPERATING INSTRUCTIONS

HGT



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FEATURES

Quartz PLL Direct Drive Motor

Output waveform from the rotor frequency generator incorporated in the motor is compared with the waveform from a quartz crystal reference oscillator. Phase advance or delay is detected and a phase control (PLL) system regulates the motor speed. The quartz crystal oscillator is of the same precision as employed in fine timepieces and is impervious to fluctuations in power source voltage and frequency or variations in ambient temperature. Platter rotating speed becomes extremely accurate with excellent load response and drift characteristics. Outstanding transient response is obtained by including a bi-directional drive circuit with which the servo functions in both directions to compensate for rotational advance or delay. Specified rotation rate can be attained in an extremely brief time interval after desired speed is selected.

Precision Machined Center Shaft, Bearings and Platter

Circularity of the ultra precision machined center shaft is better than 0.2μ . This is combined with a superbly balanced large size platter and silky smooth bearings. Together with the quartz PLL system and large size motor performance, specifications such as wow and flutter of less than 0.025% (WRMS) and SN ratio of more than 70dB (DIN-B) are achieved that compare favorably with professional standards.

High Reliability Electronic Circuit

Two newly developed integrated circuits make up the quartz PLL control and drive sections. These high density ICs are a result of Pioneer's advanced motor and electronic circuit technologies and function to greatly enhance reliability and durability.

Easily Interpreted Single Pattern Stroboscope

Strobe lamp is illuminated by a pulse waveform obtained by frequency dividing the high precision crystal oscillator output. The stroboscope is clearly illuminated and since the lighting frequency changes according to the selected rotating speed (33-1/3 and 45rpm), a single stroboscope pattern can be employed for both speeds. This provides far easier interpretation in comparison with earlier types of stroboscopes.

New S-shape Tonearm for Improved Tracking

High precision angular bearings are employed in both vertical and horizontal tonearm axes, leading to superior sensitivity. Excellent tracking is exhibited even when light tracking forces are used with high compliance cartridges, while midrange break-up due to tonearm vibration is prevented. The 6mm thick aluminum plate at the tonearm base also eliminates effects at low frequencies.

Easily Operated Luxurious Functional Mechanisms

As appropriate in a high performance turntable, a full complement of auxiliary mechanisms is included. Among these are a quartz lock OFF switch and speed adjustment control for fine speed adjustment in the range of $\pm 6\%$, anti-skating and lateral balance mechanisms for improved tracking, and a tonearm height adjusting mechanism which enables the proper vertical tracking angle to match the present cartridge.

Cabinet Designed for Feedback Protection

Construction of the high specific gravity particle board cabinet was determined through a combination of theoretical and experimental evaluations. Together with the large size insulating feet, the cabinet provides complete protection against feedback howling.

ATTACHING THE CARTRIDGE

This turntable comes without cartridge, enabling the user to mount a cartridge of his choice. There are different kinds of cartridges available today, including moving magnet (MM), moving coil (MC) and induced magnet (IM) types. These types of cartridges can be used with the PL-550, but the cartridge selected should be between 4 and 14.5 grams in weight.

Since the tonearm of the PL-550 is a universal type, your optional cartridge with standard type headshell can be attached without difficulty.

When the cartridge is to be used in the headshell supplied with this turntable, install the cartridge very carefully as follows:

1. Take out the headshell, cartridge mounting screws, nuts, washers, and overhang gauge from the accessory box (Refer to page 5).
2. Being careful not to confuse the polarities, attach the lead wires to the cartridge.

The polarities are as follows:

white : L (left channel signal)

blue : LG (left channel ground)

red : R (right channel signal)

green : RG (right channel ground)

3. Attach the cartridge loosely to the headshell, using the screws, nuts, washers, etc.
4. Adjust the overhang using the accessory overhang gauge. To do this, hold the headshell against the overhang gauge as shown in Fig. 2, aligning the indicator line on the overhang gauge with the stylus position, tighten it firmly in place with the mounting screws, being careful that it does not tilt to one side.

USE OF SUB WEIGHT

When a heavy cartridge (over 9.5 grams) is used, attach the accessory subweight to the rear end of the counterweight shaft (Fig. 3).

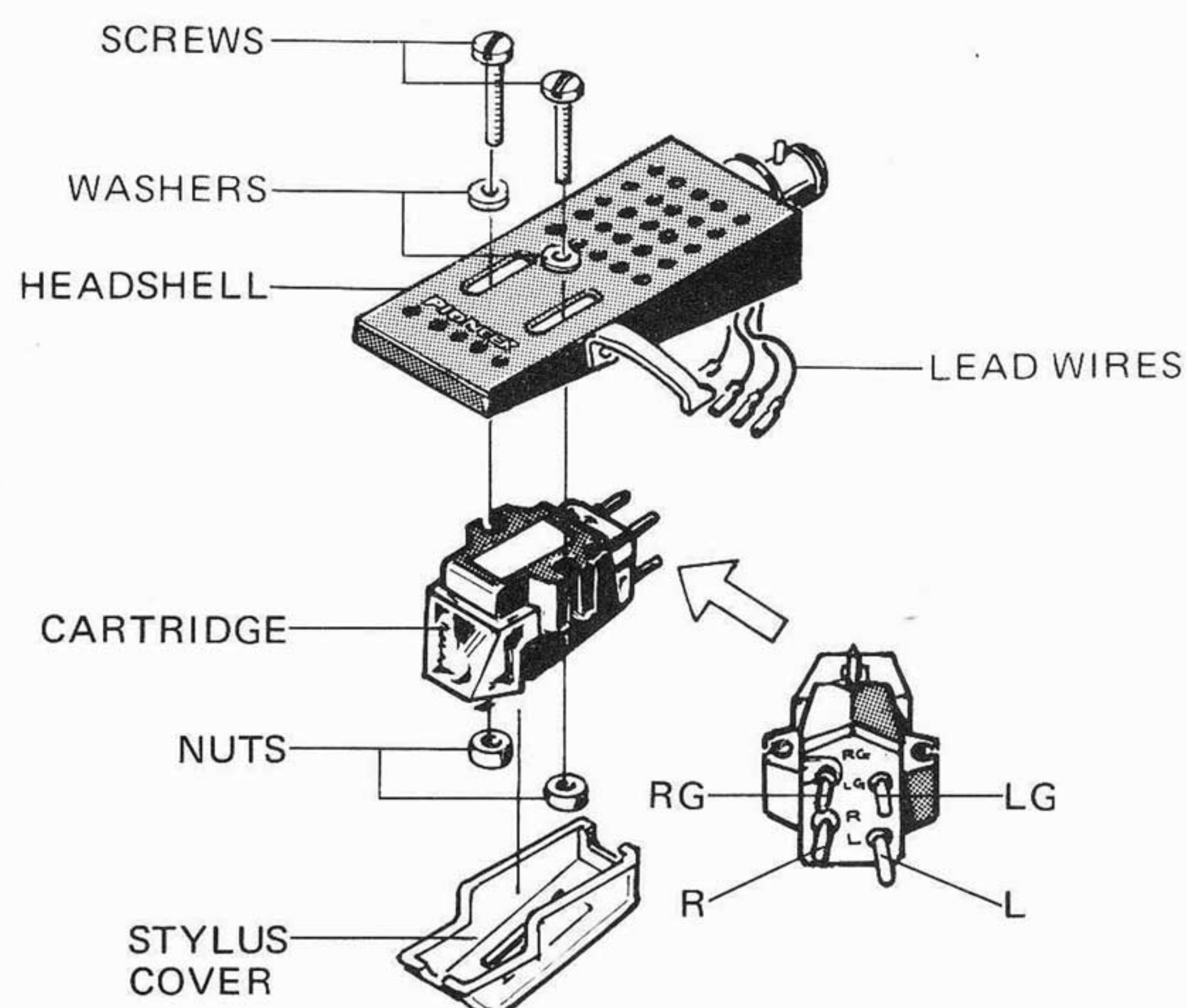


Fig. 1

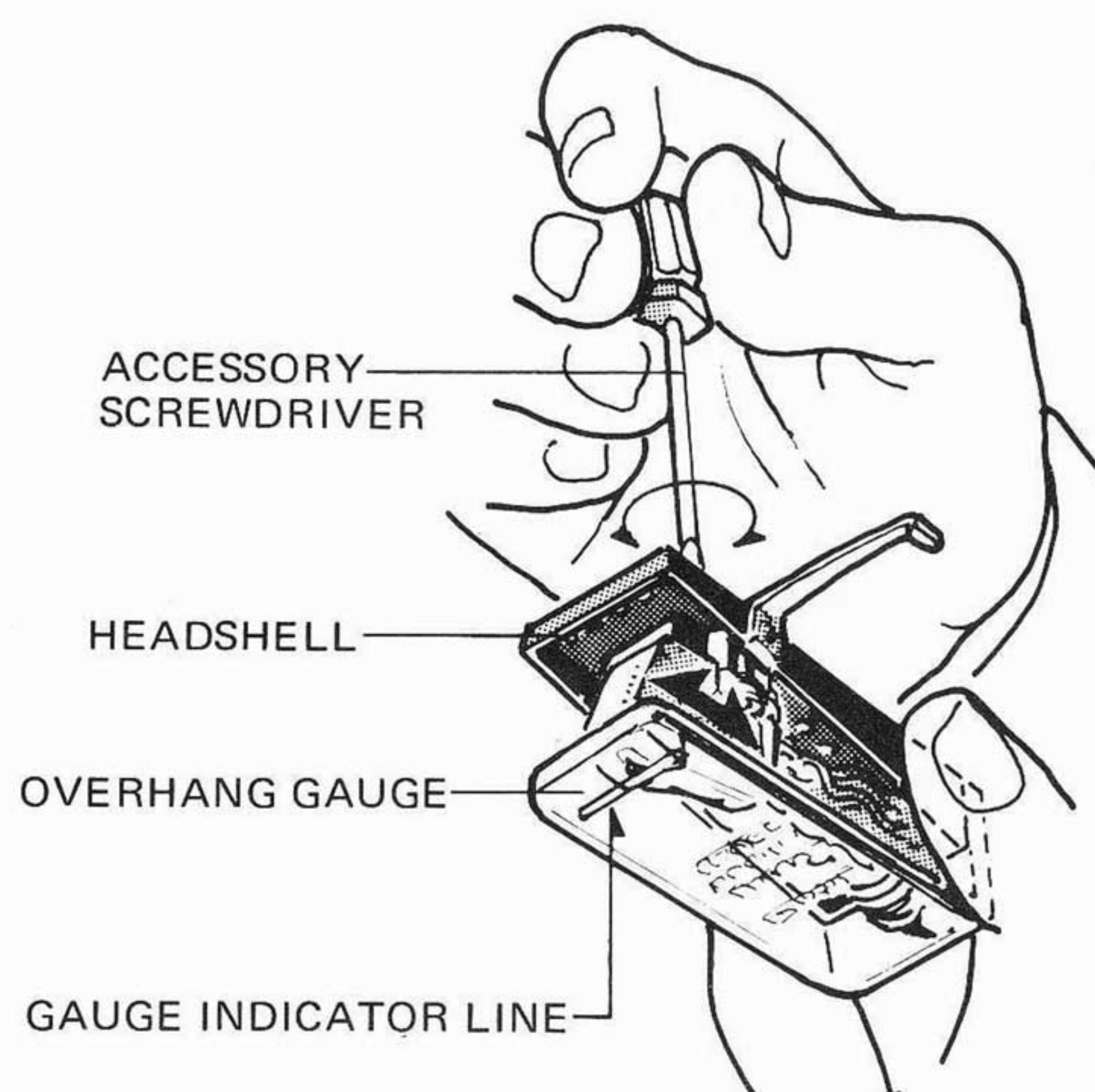


Fig. 2

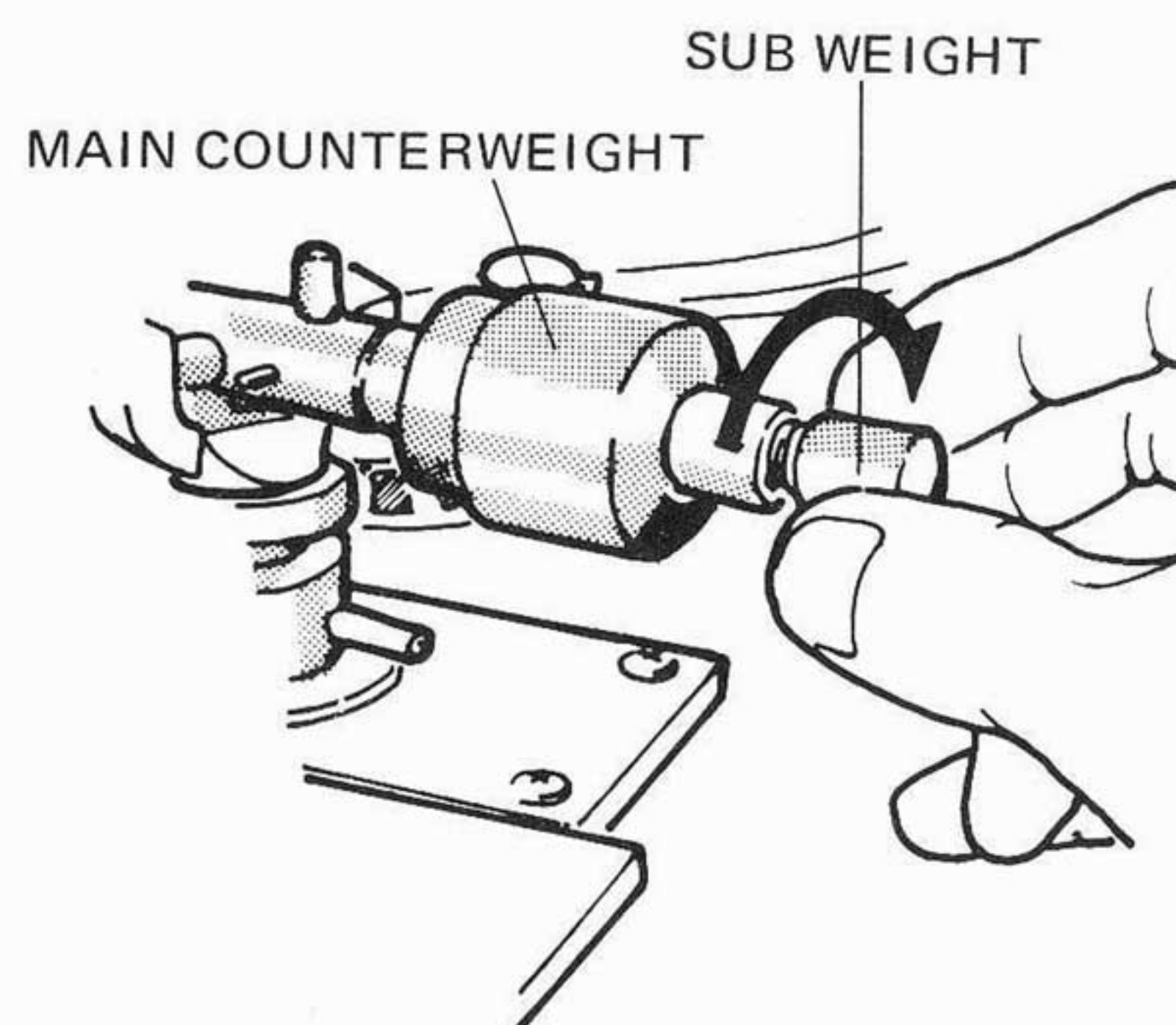


Fig. 3

ASSEMBLY STEPS

Precision items and heavy items such as the platter have been packed separately from the main unit. After unpacking, assemble carefully according to the following procedure.

1. CONFIRM VOLTAGE SELECTOR SWITCH

A voltage selector switch is provided to allow this turntable to be used in locations where the AC line voltage is 220V and 240V. Although this switch has been set at the factory prior to shipment according to shipping destination, before assembling, confirm that the switch (located on the rear panel of the cabinet) indicates the proper voltage. If the voltage selector switch is not set for the correct voltage, the setting should be changed as follows:

- (1) Using a phillips screwdriver, loosen the screw which attaches the locking plate to the voltage selector switch and remove both screw and plate.
- (2) Set the voltage selector switch to the voltage used in your locality(Fig. 4).
- (3) By turning the locking plate over, set it over the selector switch so that the switch is locked in position. Retighten the screw which attaches the locking plate.

2. MOUNT PLATTER

Since platter is heavy, employ the 2 finger holes shown in Fig. 5 and with both hands align the platter with the center shaft and set in place. Use care not to impart excessive force to the center shaft. Then place the platter mat and mat cover on the platter.

3. ATTACH HEADSHELL

Attach the headshell to the forward end of the tonearm. Secure by tightening the locking collar (Fig. 6).

4. INSTALL LATERAL WEIGHT

Use accessory screwdriver to mount lateral weight on lateral bar. Install with a spacing of 18~23mm between lateral weight and tonearm (Fig. 7). It is not necessary to readjust the lateral weight, even when changing cartridges.

5. INSTALL COUNTERWEIGHT

Attach counterweight to the rear end of the tonearm and turn 1 or 2 times in direction shown by arrow to engage the threads (Fig. 8).

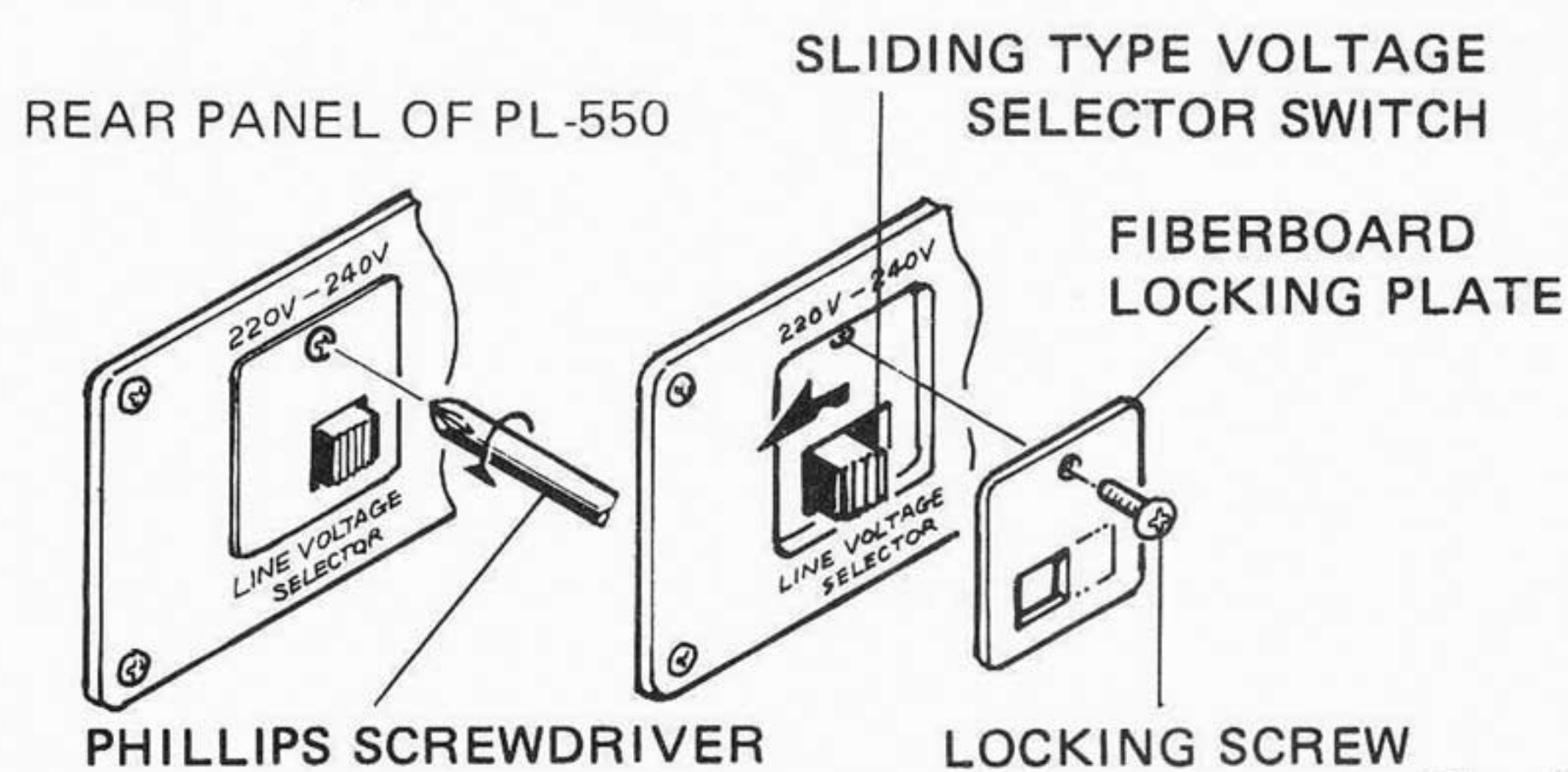


Fig. 4

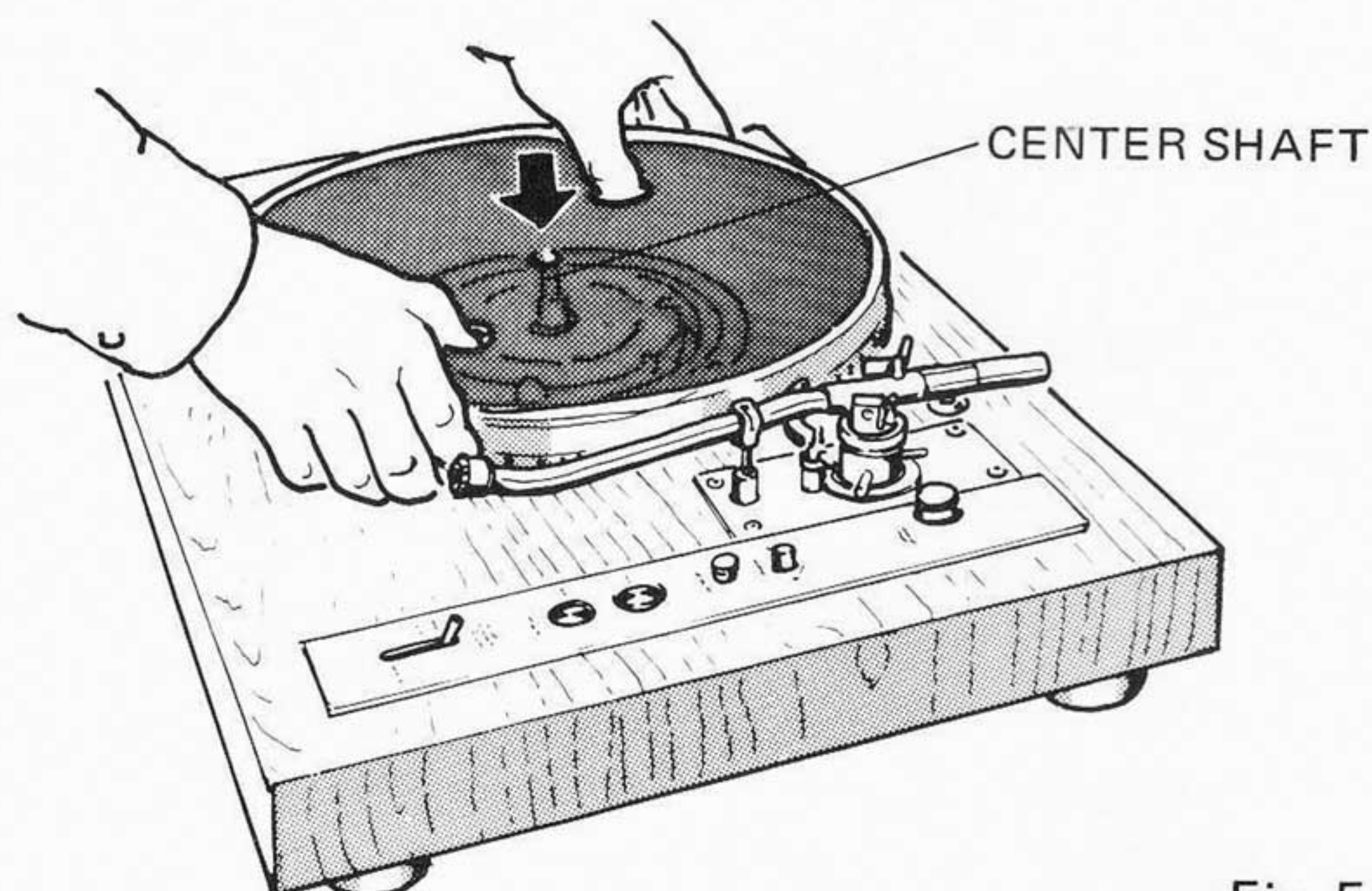


Fig. 5

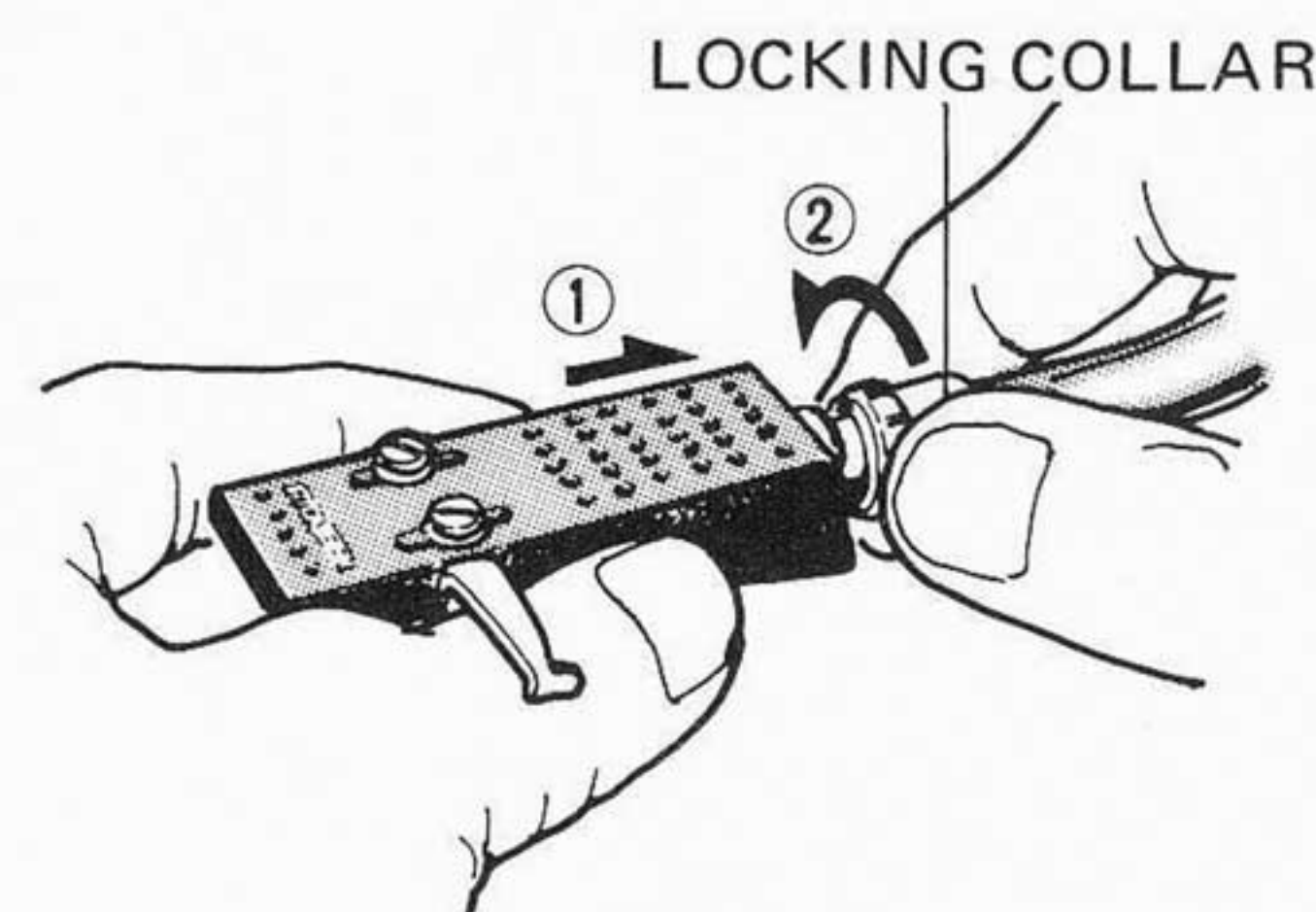


Fig. 6

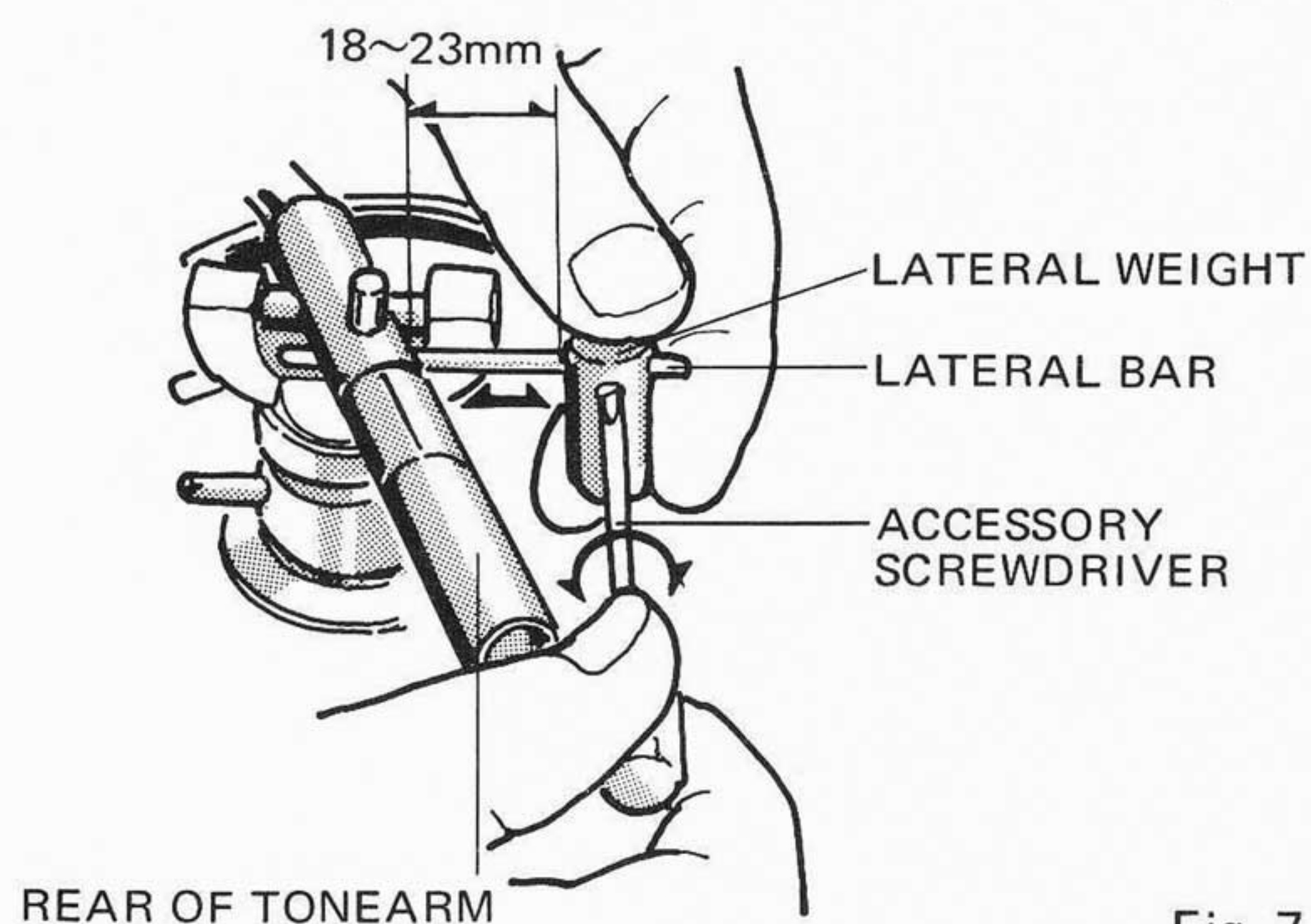


Fig. 7

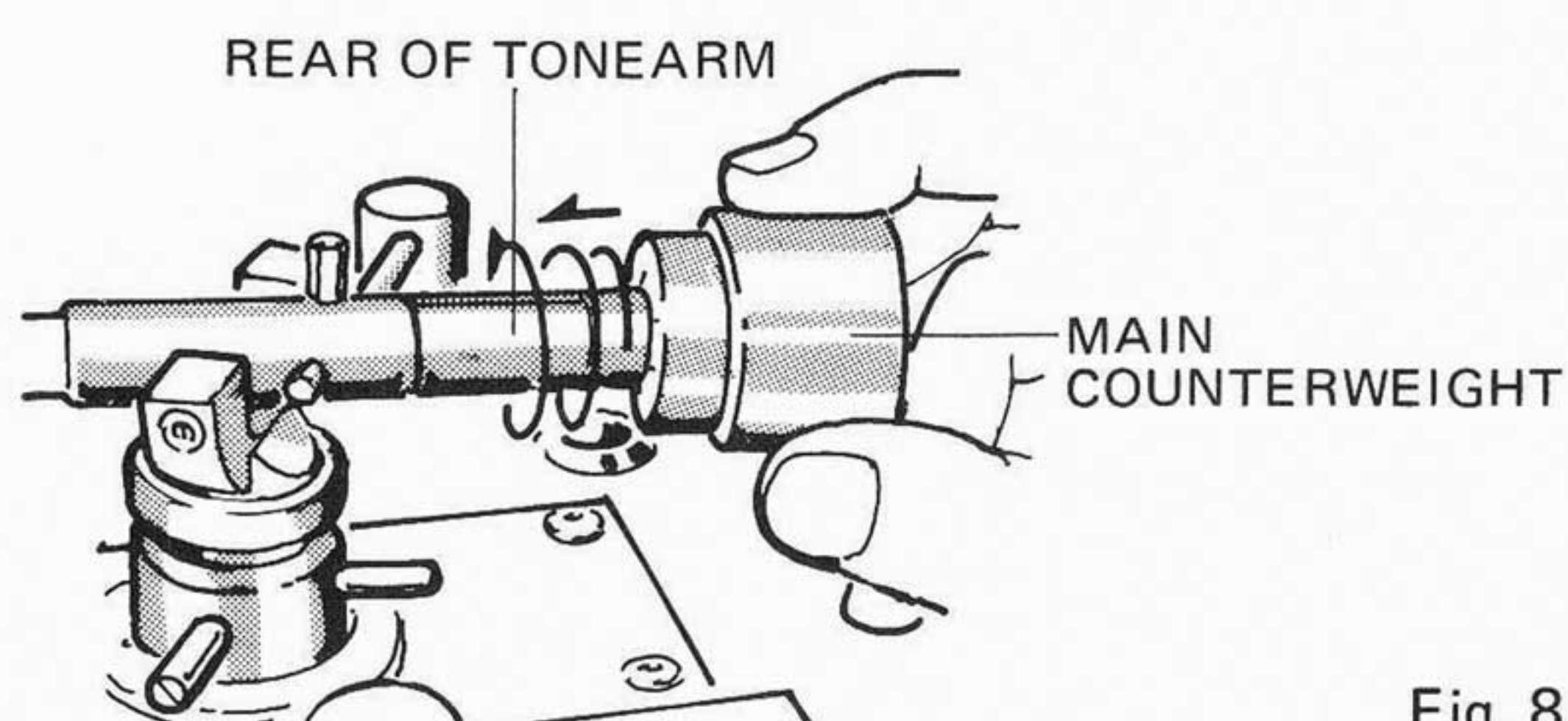
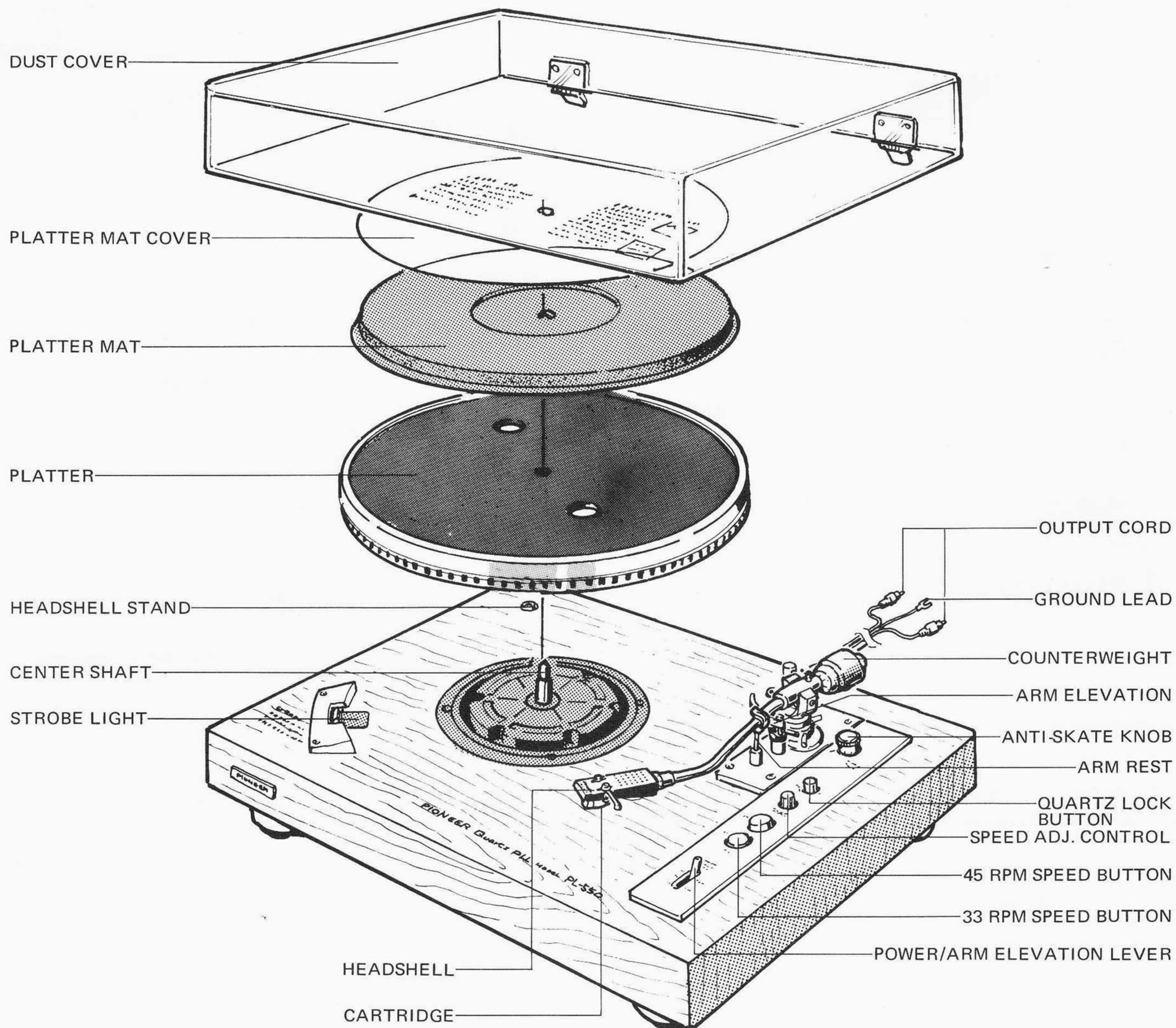


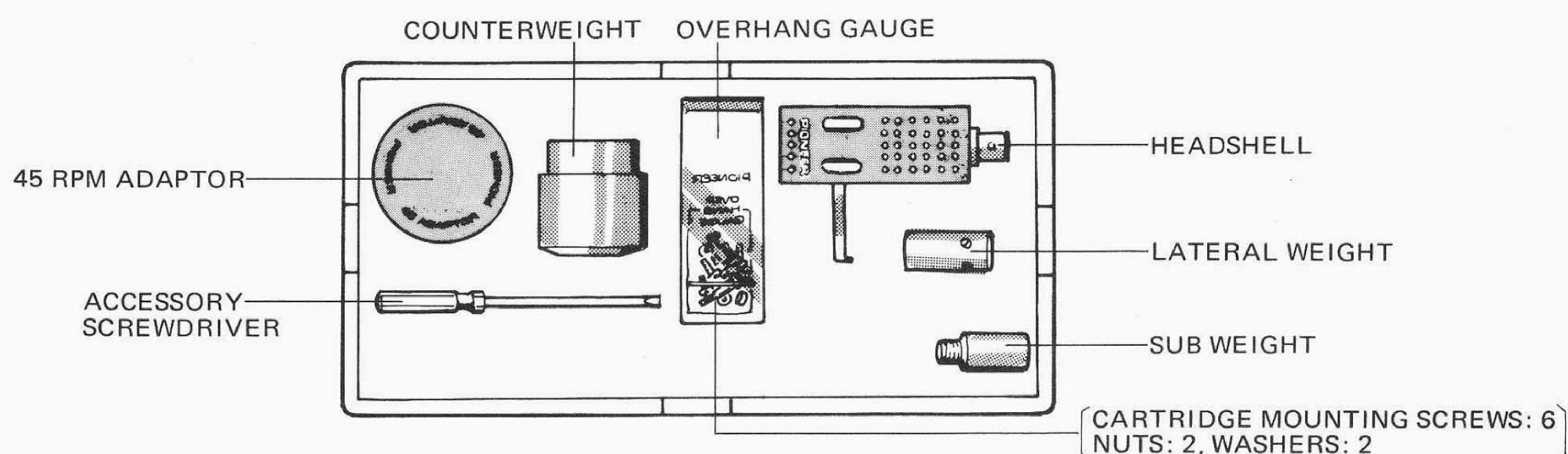
Fig. 8

SECTION NAMES

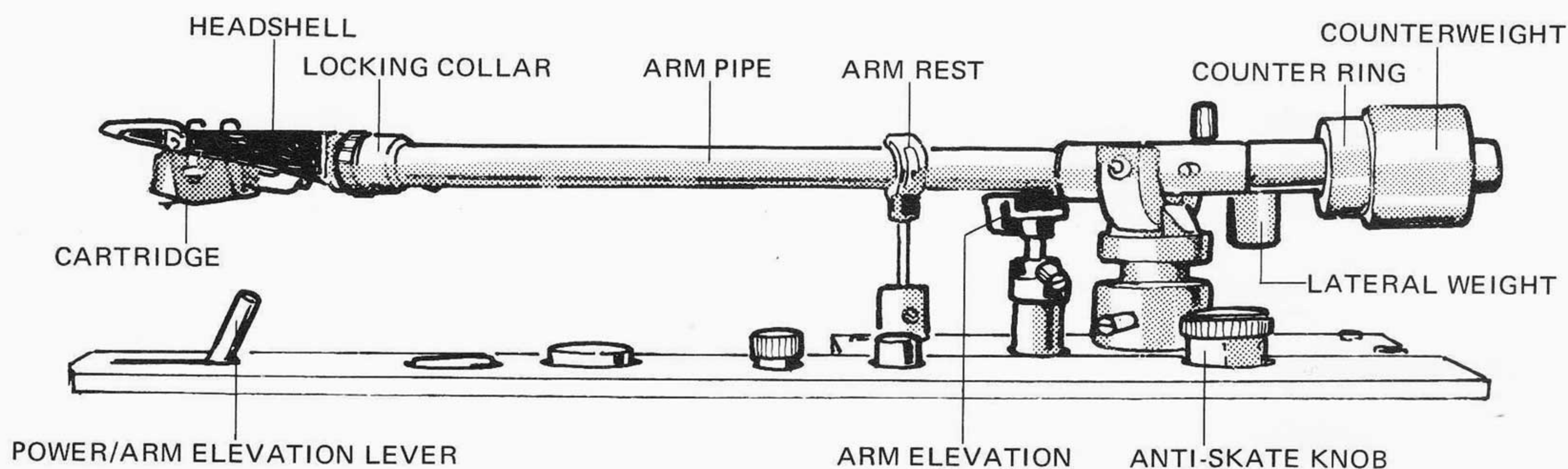


ACCESSORIES

The following items are contained in the accessory box.



TONEARM ADJUSTMENTS



Tonearm sections

After properly assembling the tonearm, perform adjustments according to the steps below. Do not plug in the power cord until all adjustments have been completed.

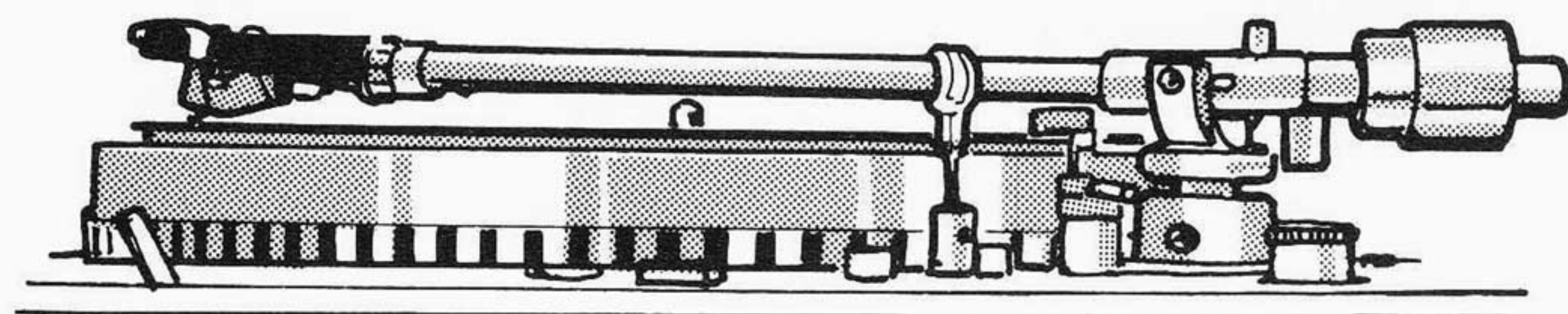


Fig. 9-A: Horizontal balance correctly obtained

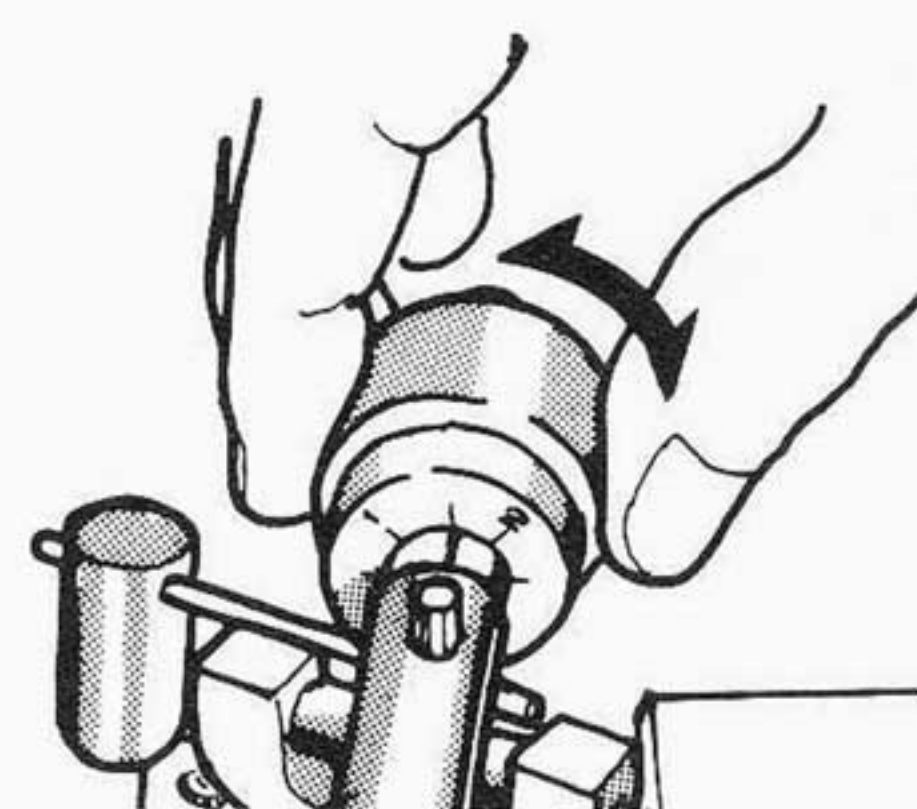


Fig. 9-B: Turn the counterweight

HORIZONTAL BALANCE

1. Set ANTI-SKATE knob to 0 (Fig. 10).
2. Remove stylus cover.
3. Set POWER/ARM ELEVATION lever to DOWN position.
4. Separate tonearm from arm rest. Since tonearm moves freely at this time, use care not to damage the stylus.
5. Turn the counterweight and adjust its position so that the tonearm becomes horizontal with the platter and does not incline either toward the headshell or counterweight (Fig. 9-A, B). Figs. 9-C and 9-D illustrate conditions where horizontal balance has not been obtained.
6. After balancing, return tonearm to arm rest and replace stylus cover.
7. Tracking force is 0 at the point where horizontal balance is obtained. Turn only the counter ring (use care not to turn counterweight at this time) and set its 0 indication to the tracking force reference line on the tonearm (Fig. 10).
8. Return POWER/ARM ELEVATION lever to the OFF position.

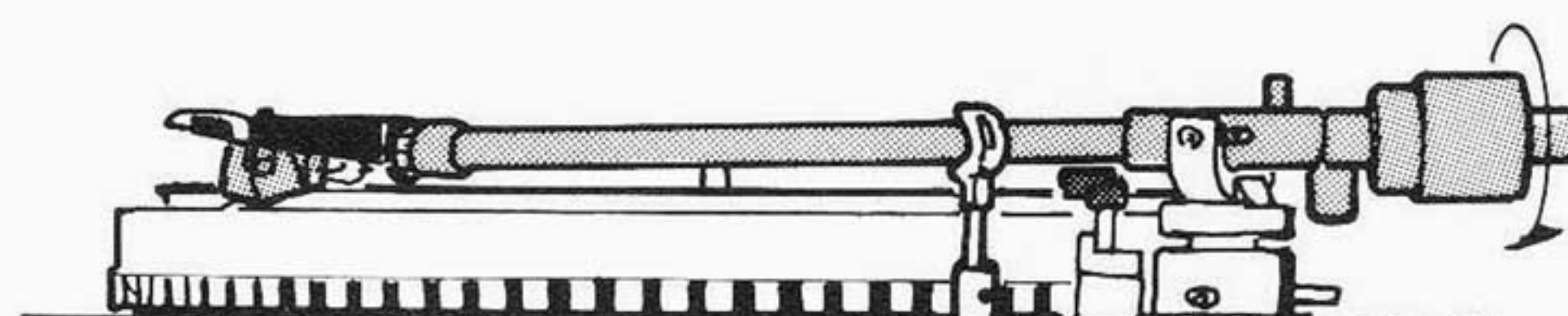


Fig. 9-C: Headshell end heavy; turn counterweight in direction shown by arrow.

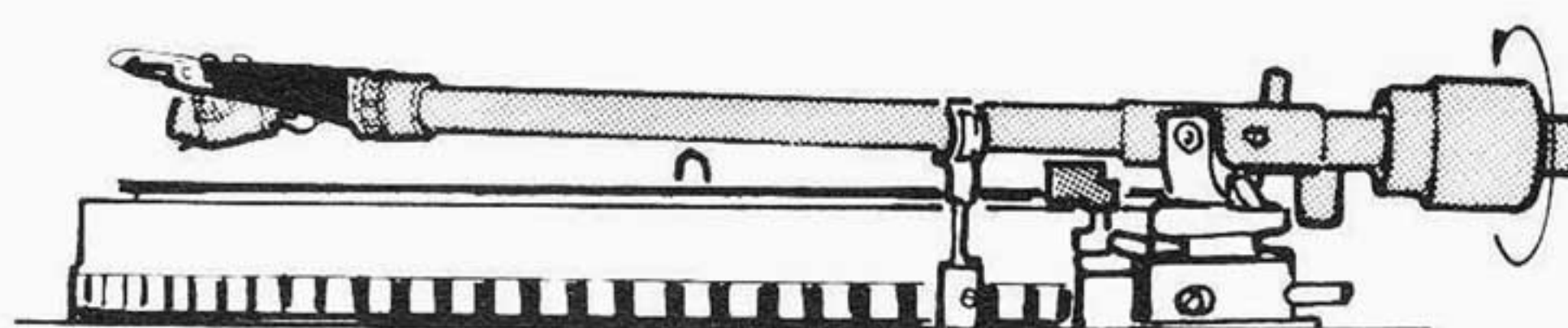


Fig. 9-D: Counterweight end heavy; turn counterweight in direction shown by arrow.

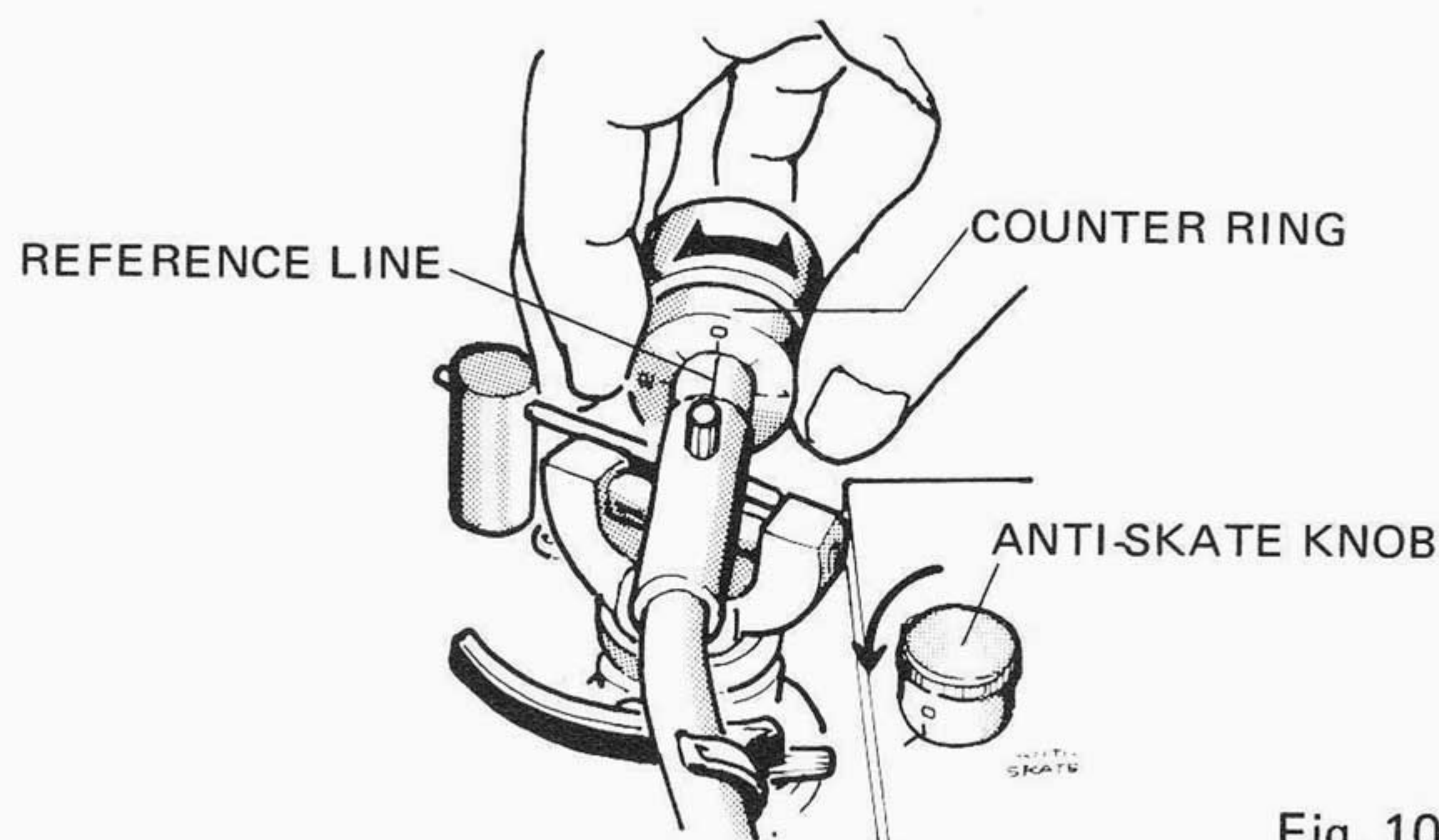


Fig. 10

TONEARM HEIGHT

Adjust tonearm height according to the installed cartridge as described below. Tonearm height can be adjusted in the range of $\pm 5\text{mm}$ with the support reference line as center (Fig. 11-B).

1. Place record on platter.
2. Set POWER/ARM ELEVATION lever to DOWN and lower stylus onto record.
3. Support tonearm by hand and use accessory screwdriver to loosen two setscrews of the arm stand. Slide the arm stand to adjust so that tonearm becomes horizontal with the record. Then tighten the setscrews (Fig. 11-A).

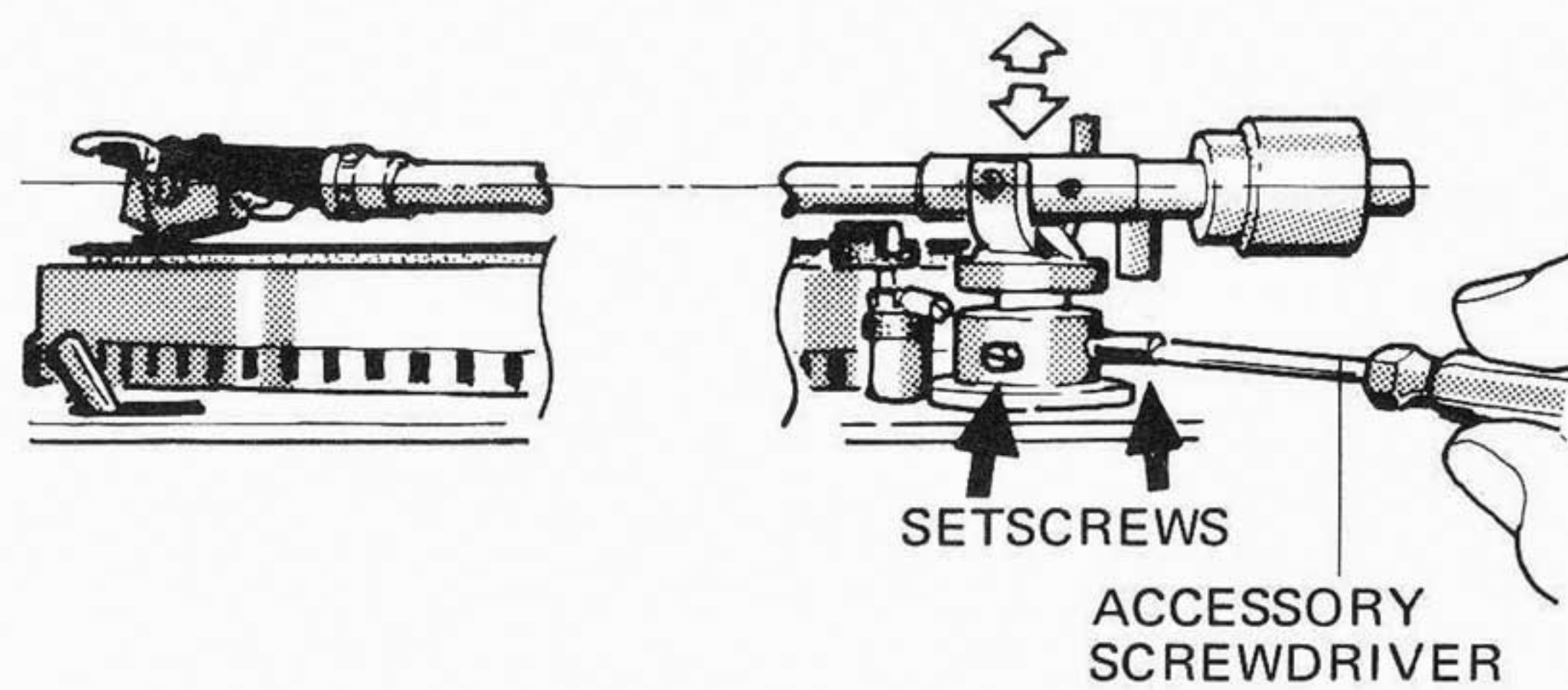


Fig. 11-A

TRACKING FORCE

Turn the counterweight and set to the reference line the number on the counter ring that corresponds to the tracking force required for the cartridge (Fig. 12).

The counter ring is graduated in 0.5 gram divisions and one complete turn applies 4 grams tracking force.

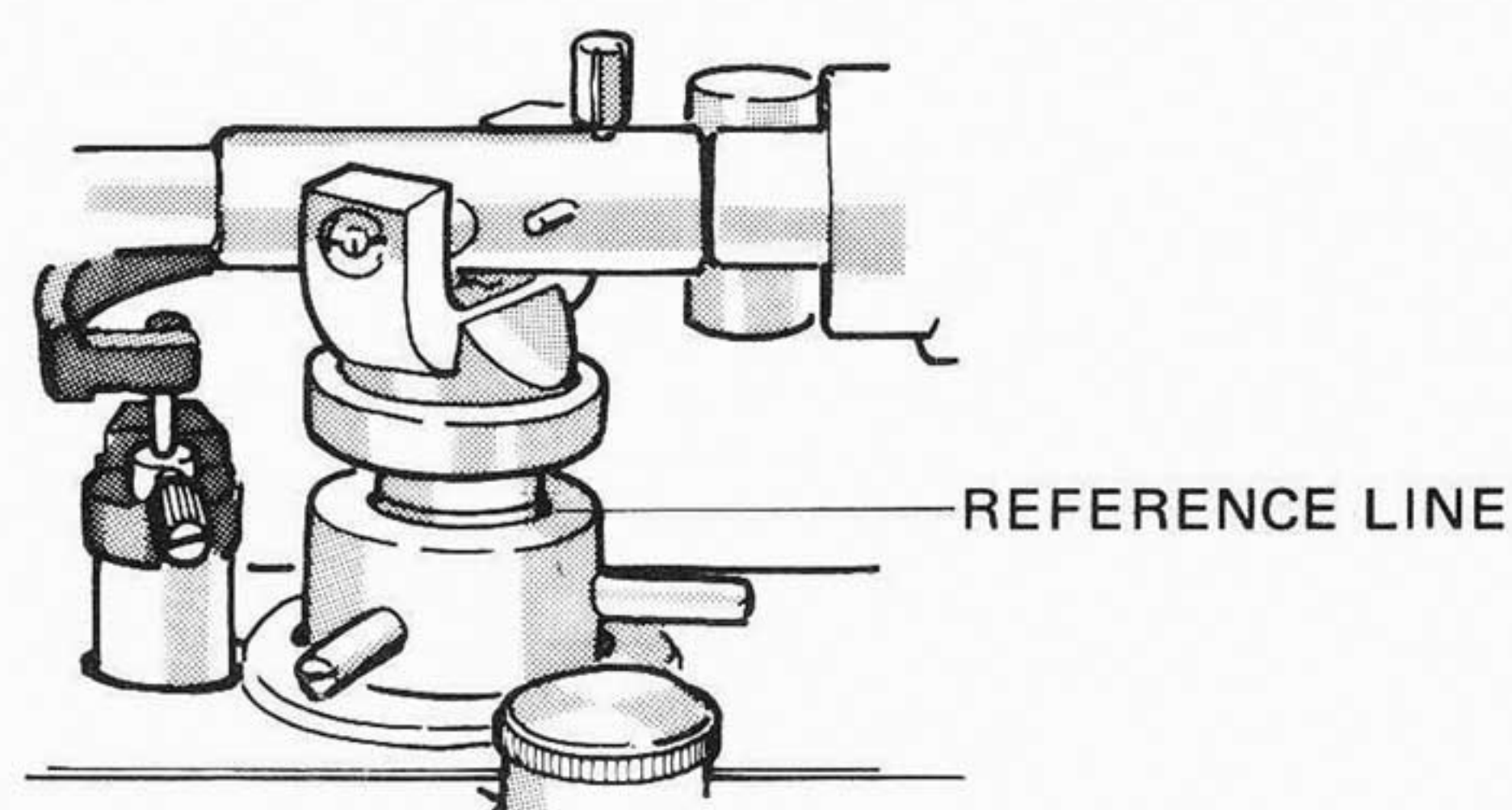


Fig. 11-B

ANTI-SKATING

Turn the ANTI-SKATE knob and set to the reference line the number corresponding to same value as the applied tracking force. (Fig. 13).

Anti-skating Mechanism Principle

While a record is being played, a force is produced due to record rotation, which tends to pull the stylus toward the center of the disc. Termed skating force, this effect causes a difference in stylus pressure (tracking force) between left and right record groove walls.

Among the resulting conditions detrimental to record playback are reduced tracing accuracy on the right channel, irregular stylus wear and increased distortion. The anti-skating mechanism functions to minimize this effect and becomes an important element particularly when playing records with cartridges that employ light tracking forces.

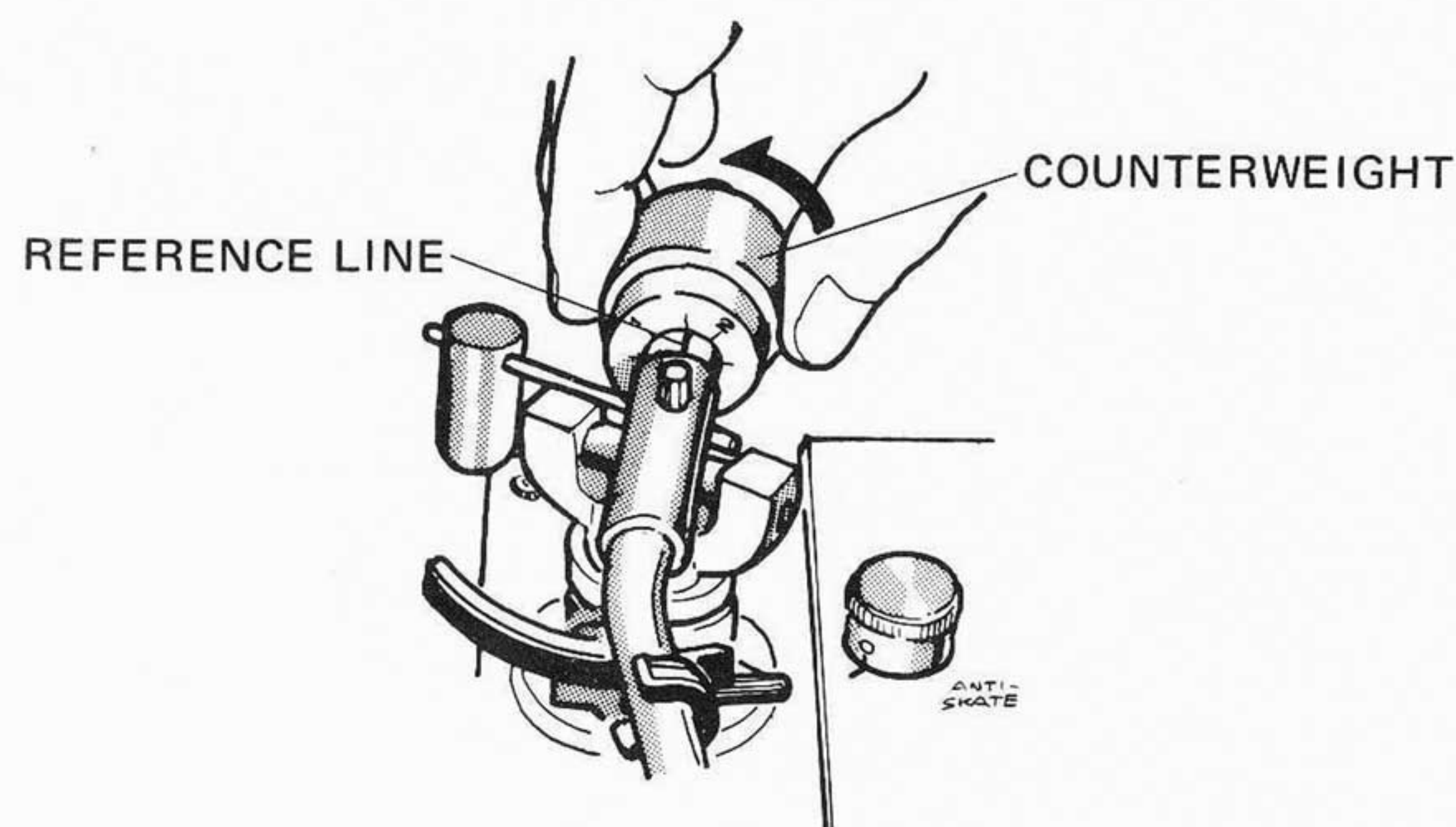


Fig. 12

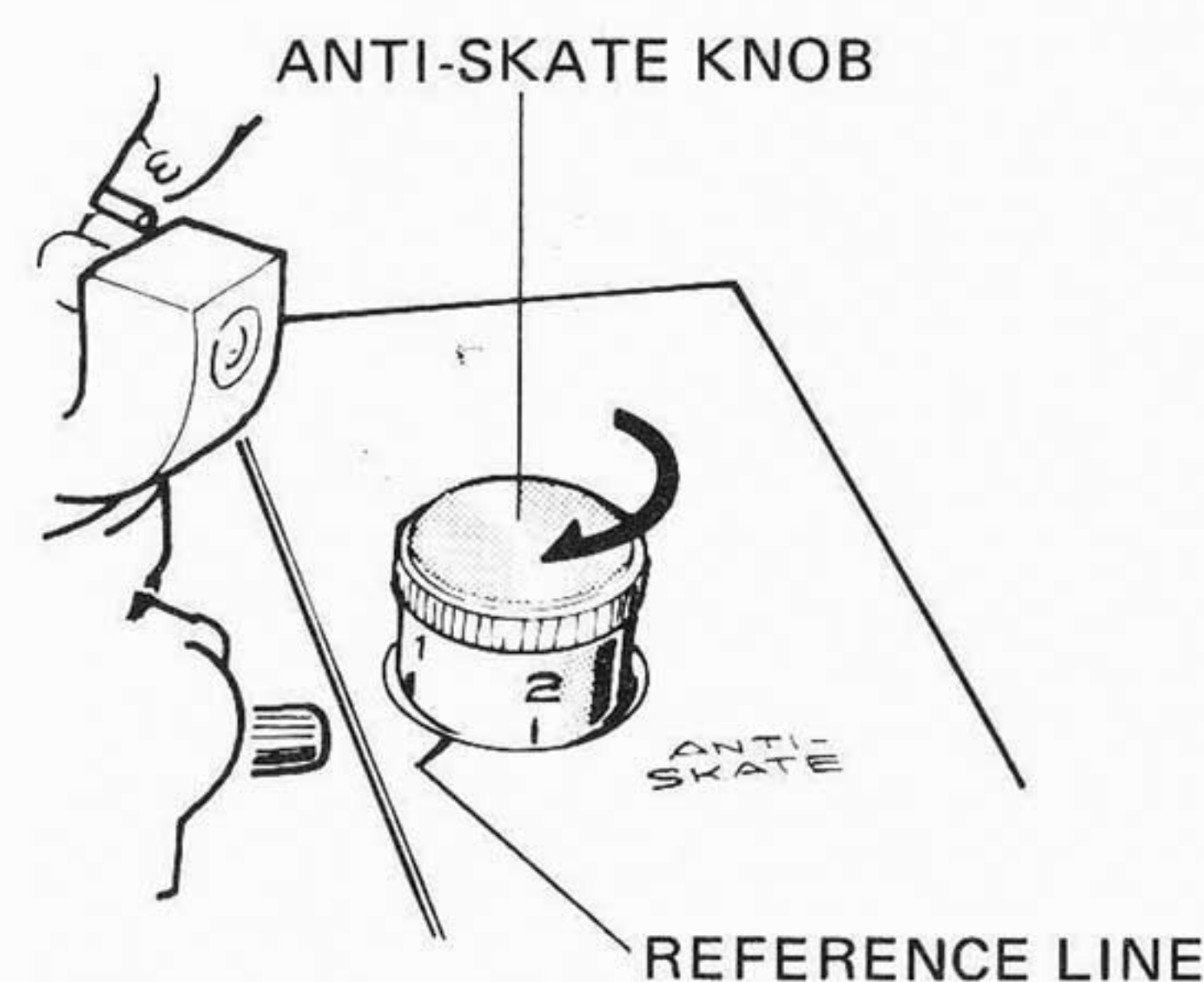


Fig. 13

ARM REST HEIGHT

Set POWER/ARM ELEVATION lever to UP and clamp tonearm in arm rest. Loosen the arm rest setscrew with the accessory screwdriver and adjust so that the tonearm pipe becomes parallel with the platter, then tighten the setscrew (Fig. 14).

TONEARM ELEVATION

Loosen knurled setscrew at side of arm elevation post. Clamp tonearm in arm rest and with the POWER/ARM ELEVATION lever set to UP, adjust so that the elevation prong contacts the tonearm pipe, then tighten the setscrew (Fig. 15).

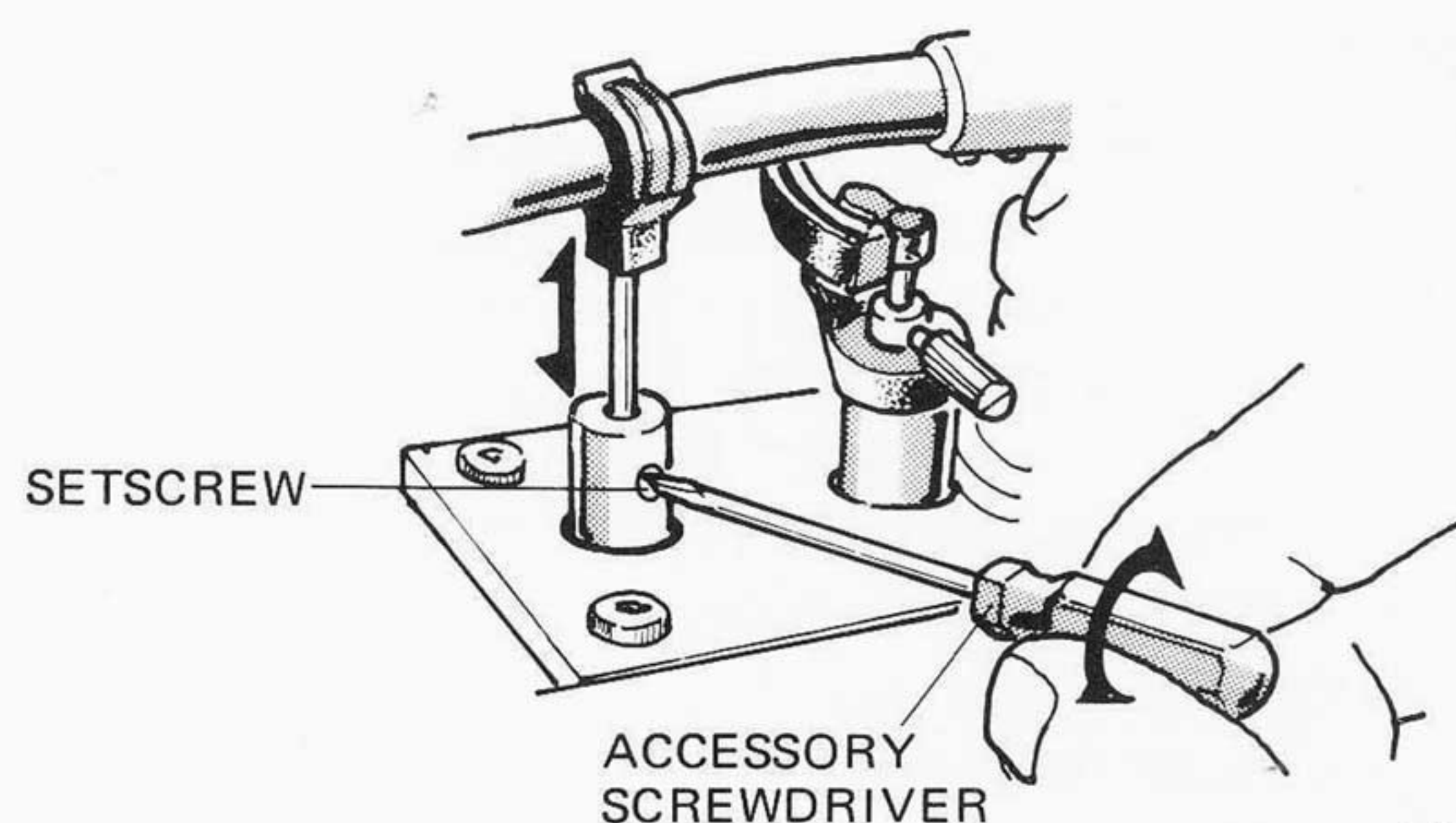


Fig. 14

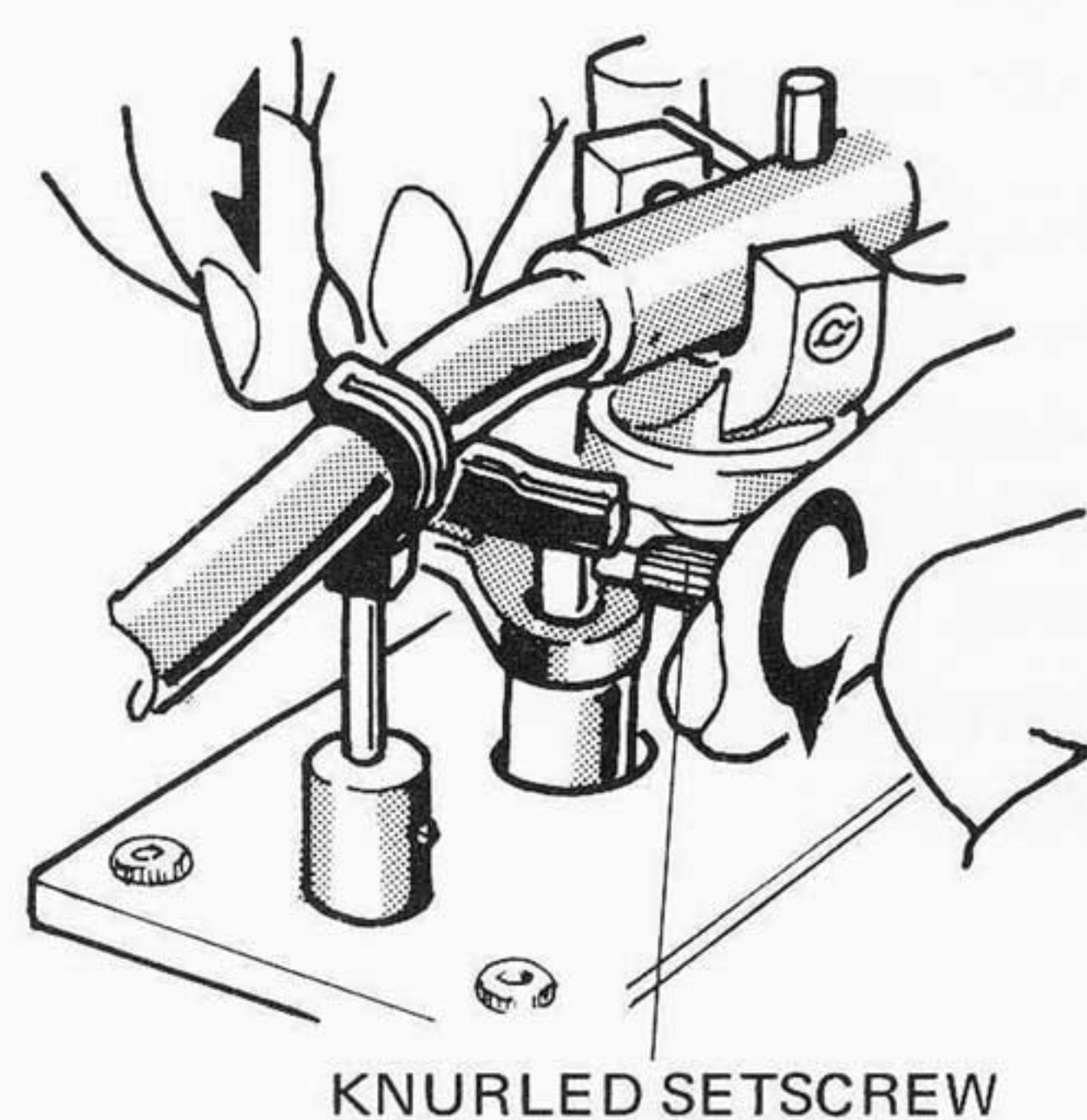


Fig. 15

CONNECTIONS TO STEREO AMPLIFIER

Output cord, ground lead and power cord are provided at the rear panel. Connection of the output cord varies according to the cartridge type.

- If cartridge is a moving magnet (MM) or induced magnet (IM) type, the output cord can be connected directly to the PHONO MAG (or PHONO) jacks of the stereo amplifier.
- When using a low output moving coil (MC) type cartridge, connect output cord to the PHONO MC jacks of the stereo amplifier. If the amplifier is not provided with MC input jacks, a special matching transformer is required.
- Other cartridge types in addition to these may require special connections and adaptors. Read the cartridge operating instructions carefully and connect the output cord properly.

White plug (marked L) of the output cord is for the left channel and red plug (marked R) is for the right channel. The thin black cord with the Y-shaped terminal lug is the ground lead. Connect it securely to the stereo amplifier ground terminal. Finally, connect the AC cord to an AC outlet.

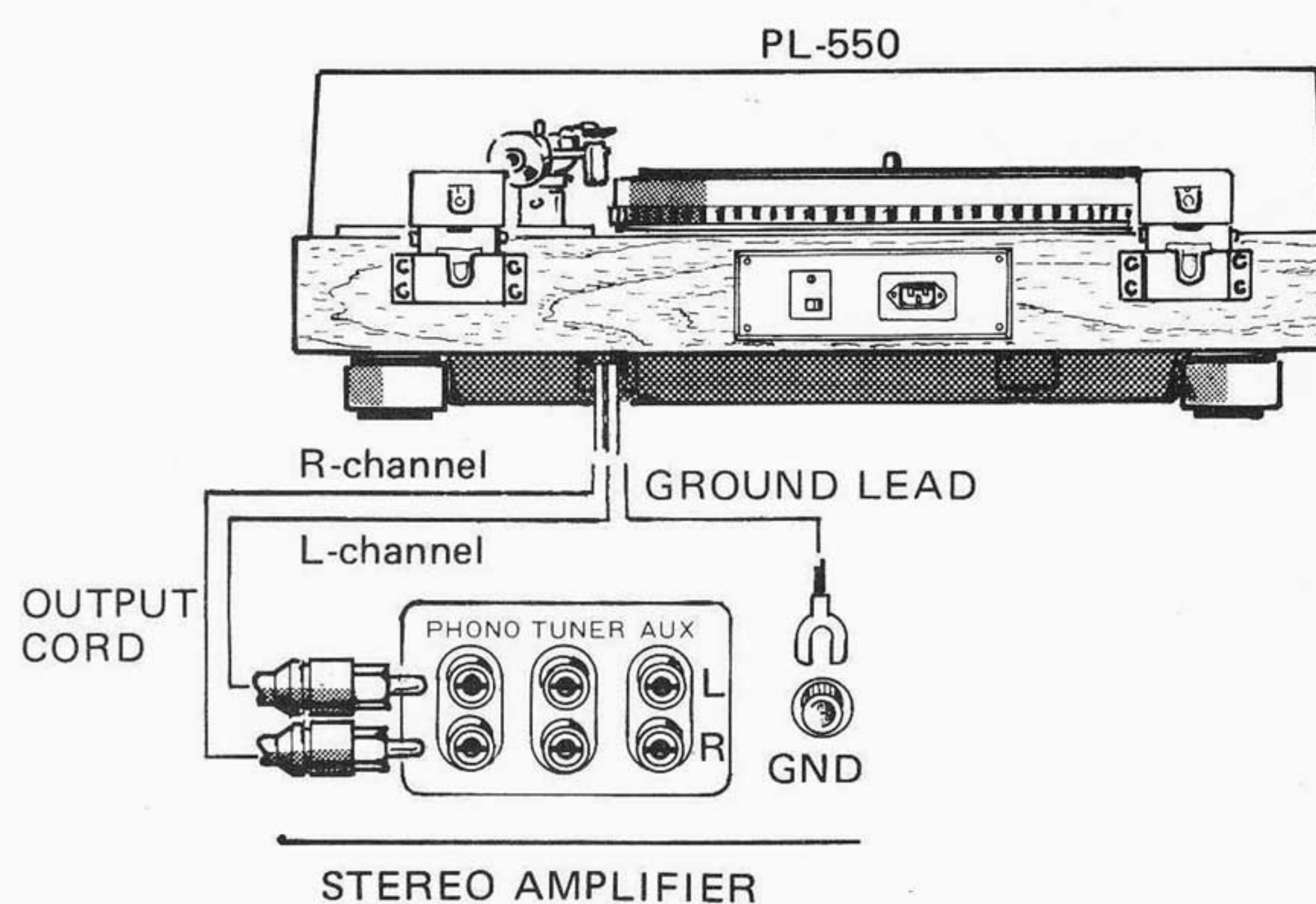


Fig. 16

DUST COVER INSTALLATION

Install dust cover by engaging its hinges with the brackets on the rear of the cabinet. As shown in Fig. 17, this can be performed smoothly by grasping the lower portion of the dust cover and installing from rear of the turntable. When removing, open the dust cover fully, grasp the bottom portion firmly as shown in the figure and pull straight upwards. Free-stop hinges are employed with this dust cover.

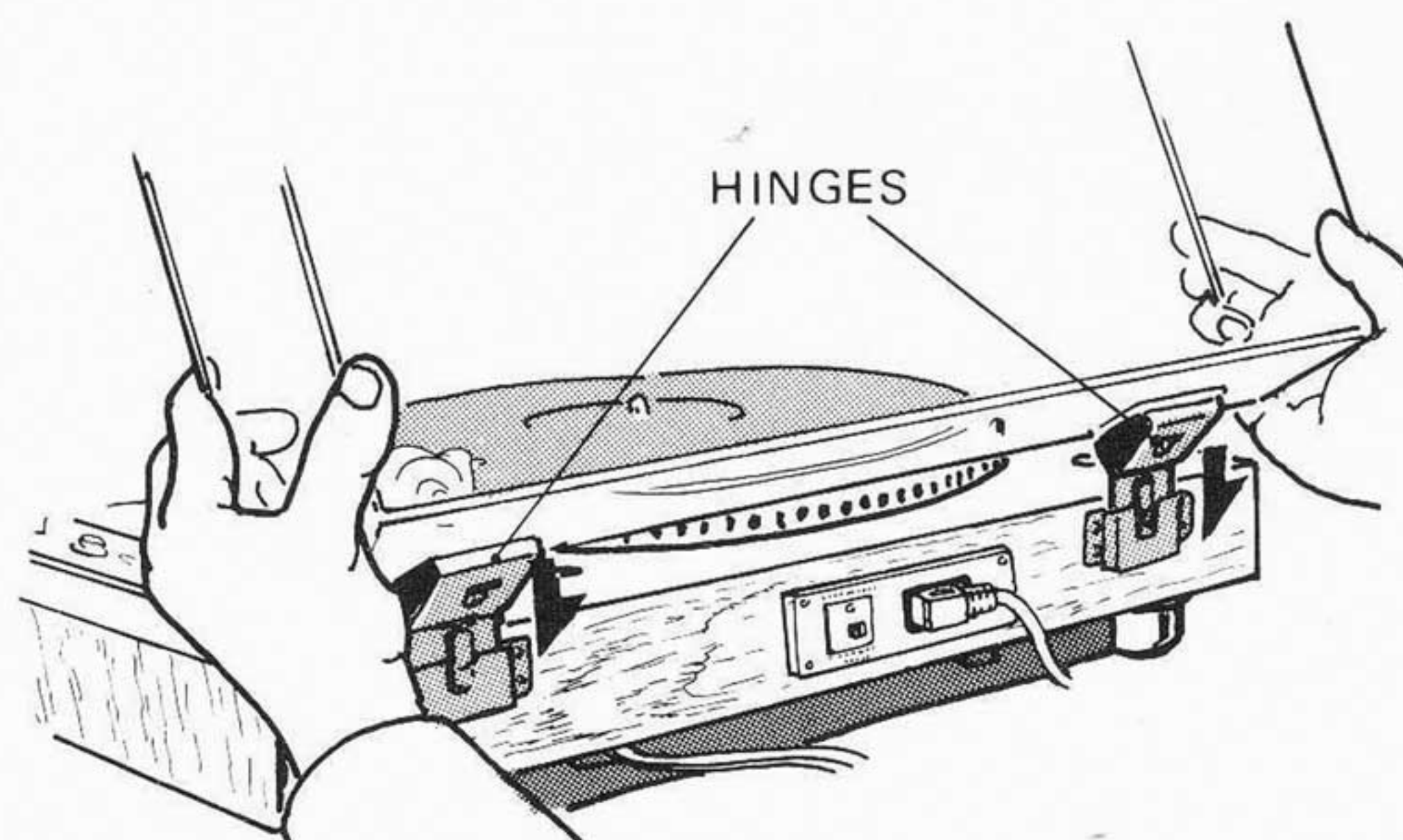


Fig. 17

SELECTING AN INSTALLATION SITE

To ensure continued high performance, observe the following points when installing this turntable:

CHOOSE A LEVEL LOCATION

It is important to install the turntable in a level condition as unlevel placement can cause the stylus to jump the grooves and interfere with proper tonearm operation. Since the height of the four insulator feet can be adjusted, perform fine leveling by turning each foot counterclockwise to extend it or clockwise to retract it as required (Fig. 18). One rotation extends or retracts a foot by approximately 0.5mm.

CAUTIONS IN PLACEMENT

Avoid placing the turntable in conditions such as the following which can lead to reduced performance or possible damage.

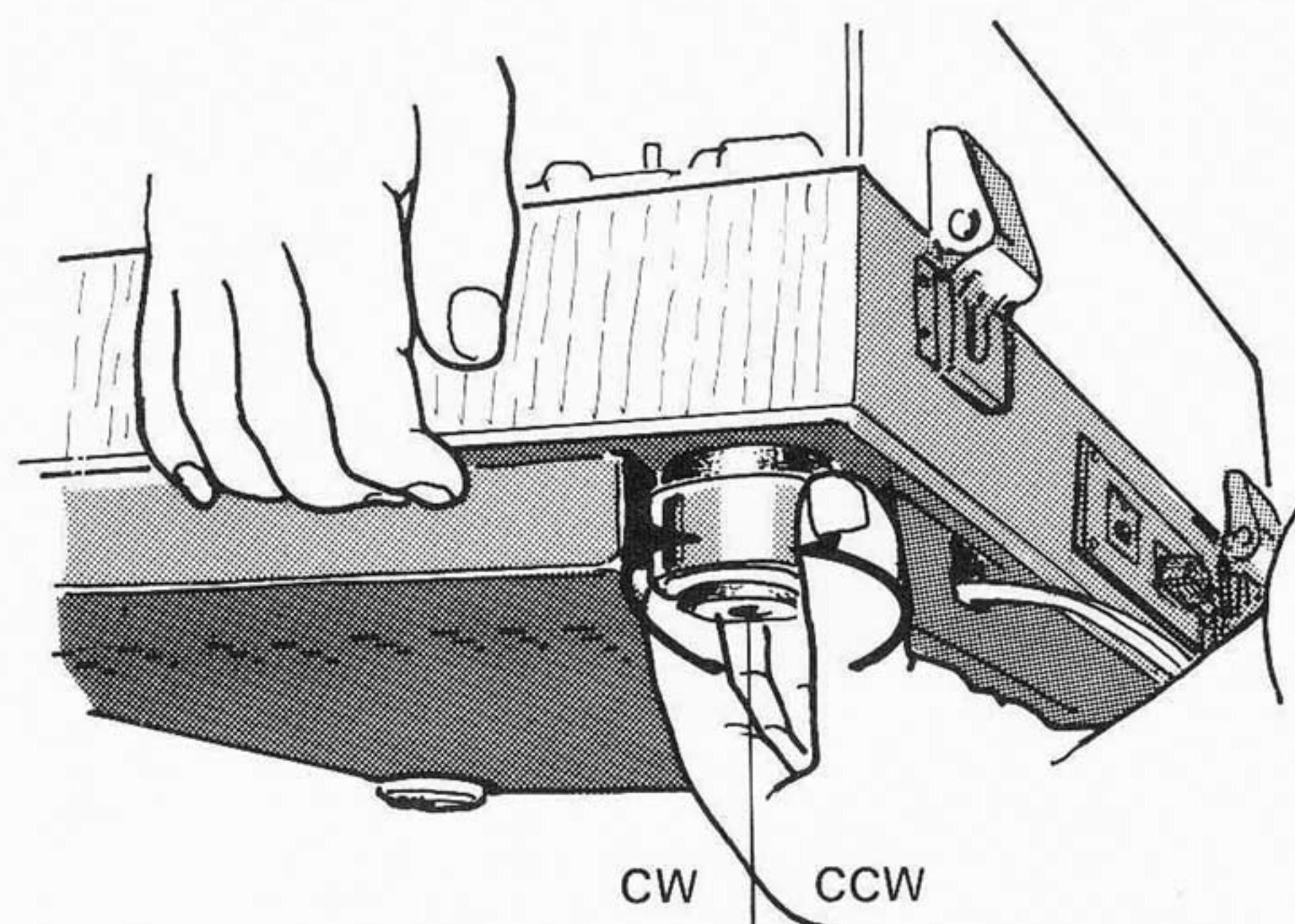


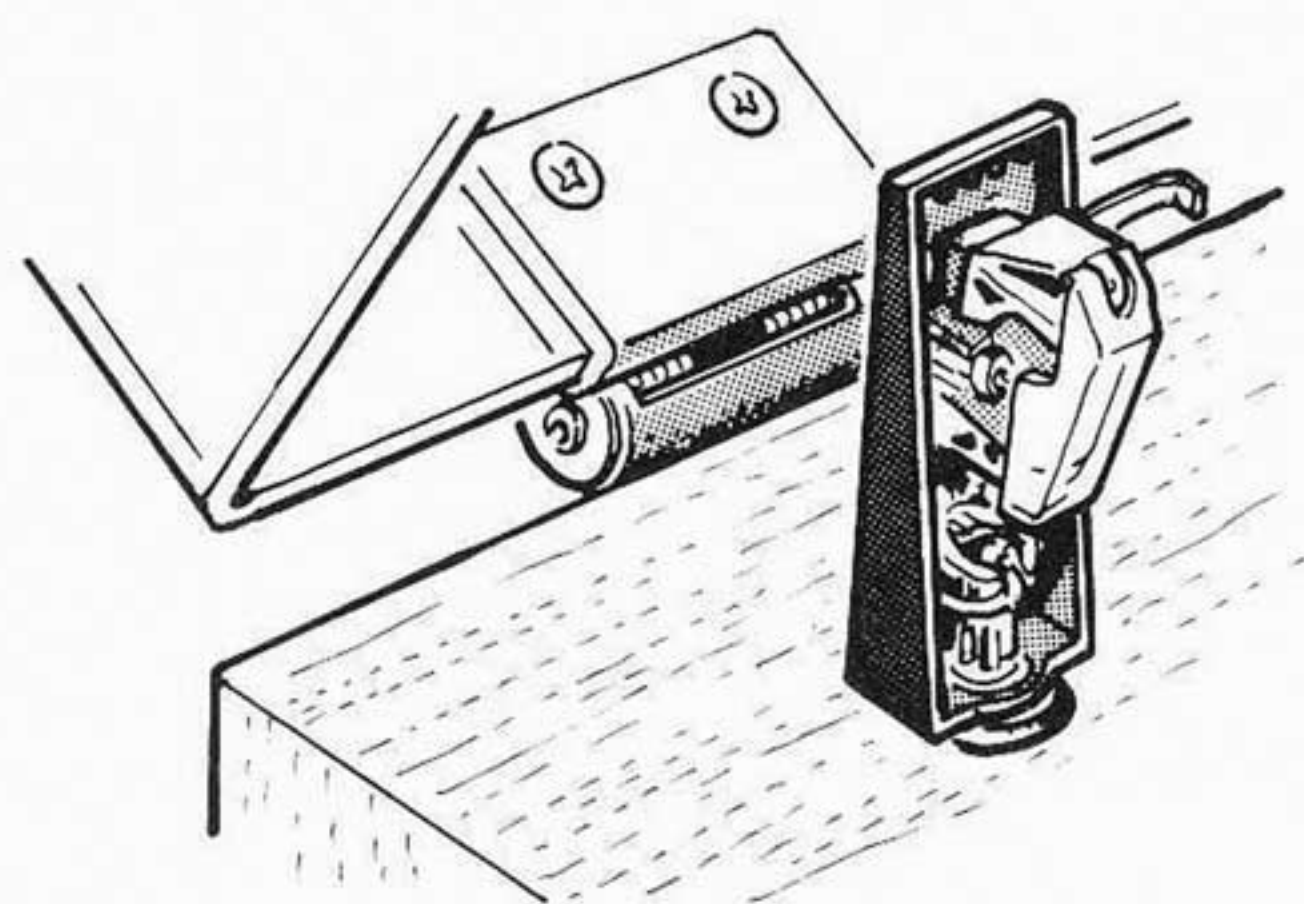
Fig. 18

Conditions to be Avoided	Possible Problems
<ul style="list-style-type: none"> • Direct sunlight, high temperature or humidity • Unlevel supports • Humid or dusty locations • Location subject to vibration, such as on top of speaker enclosure • Near amplifier power transformer • Where volatile materials such as alcohols or insect sprays are used or stored 	<ul style="list-style-type: none"> • Corrosion or defective insulation • Prevent proper operation (stylus jumping, etc.) • Scratches and noise • Feedback howling • Hum and noise • Marring of dust cover and cabinet finish

PANEL FACILITIES

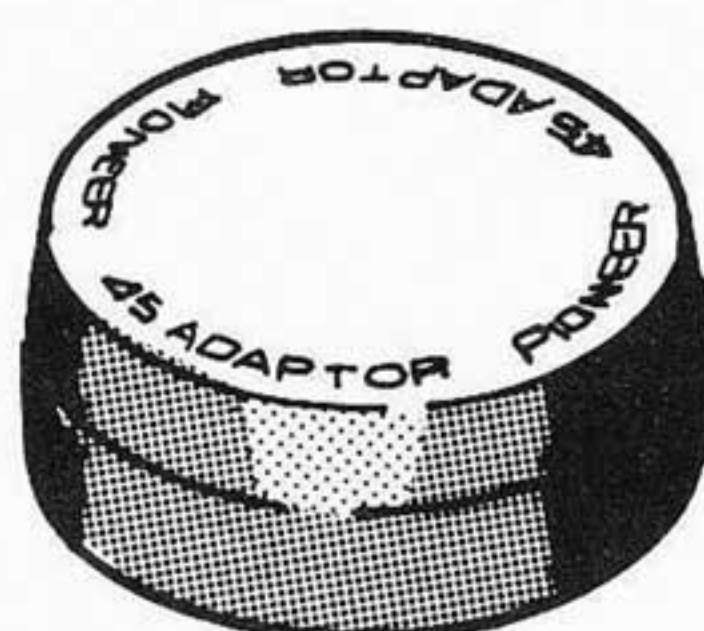
HEADSHELL STAND

Convenient stand for storing a spare cartridge. Align headshell guide pin with slot of stand and insert. Avoid storing here if the headshell is too large to allow the dust cover to be closed fully. The 45rpm adaptor can also be placed here.



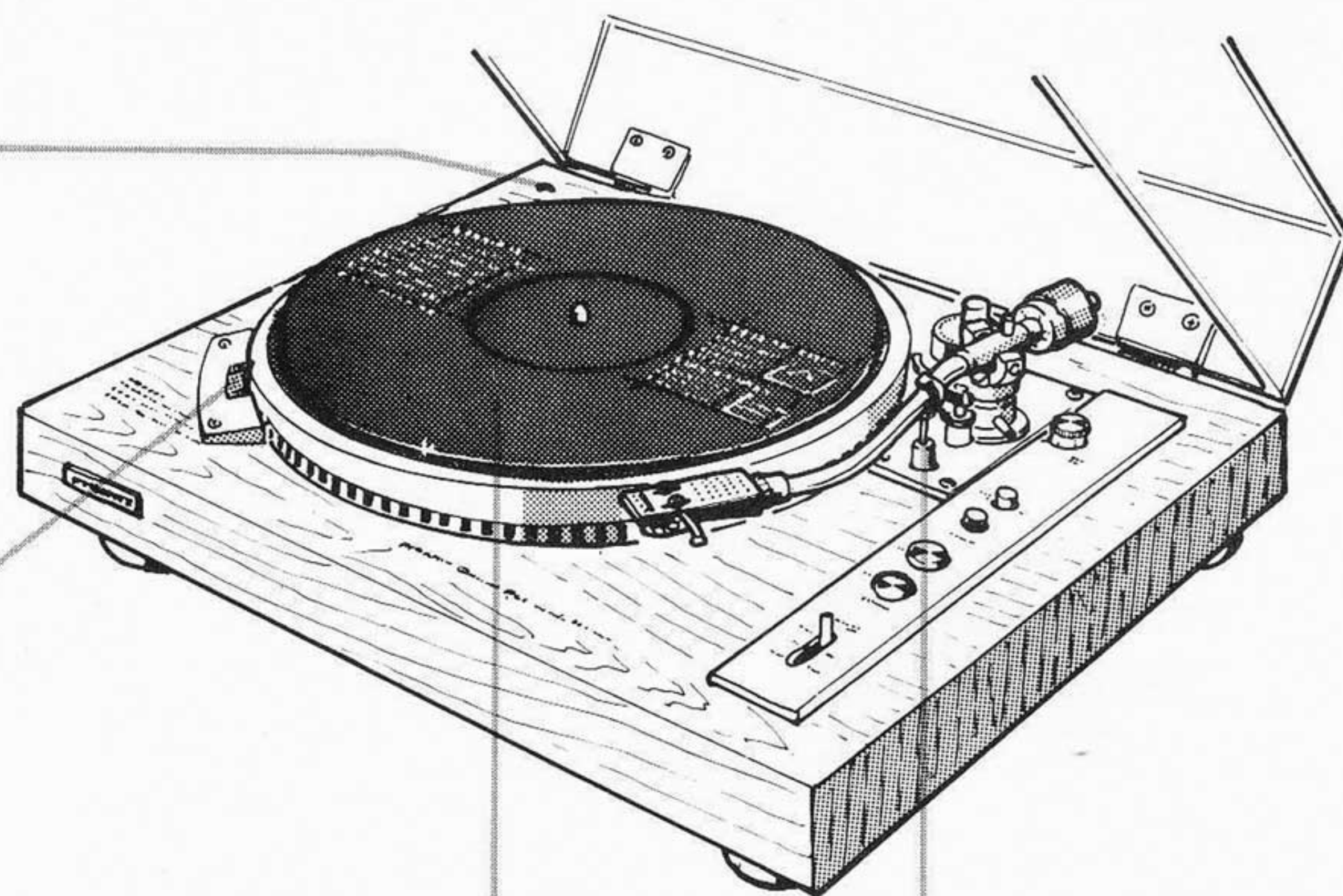
45 RPM ADAPTOR

Place on center shaft when playing 45 rpm records (with large center hole).



STROBE LIGHT

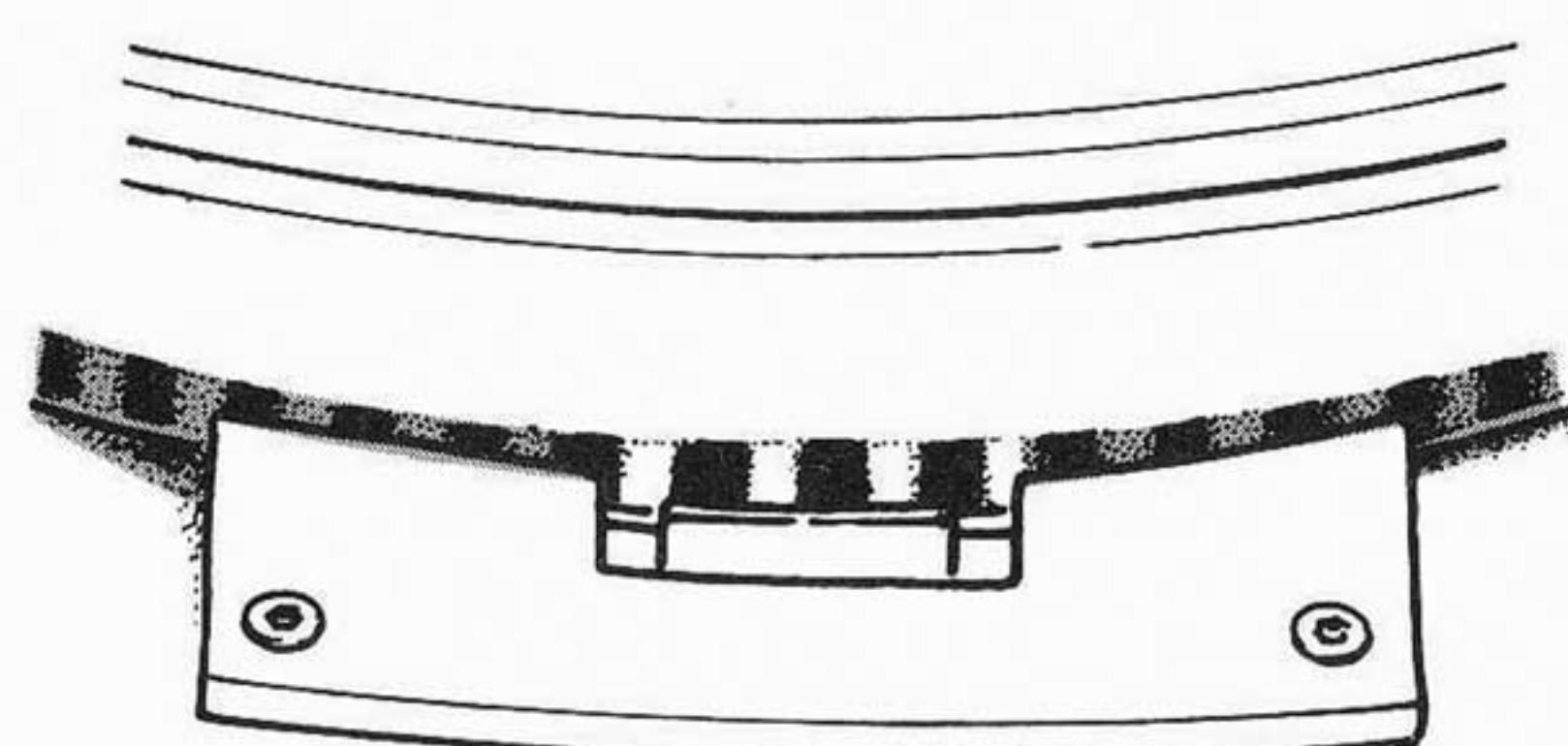
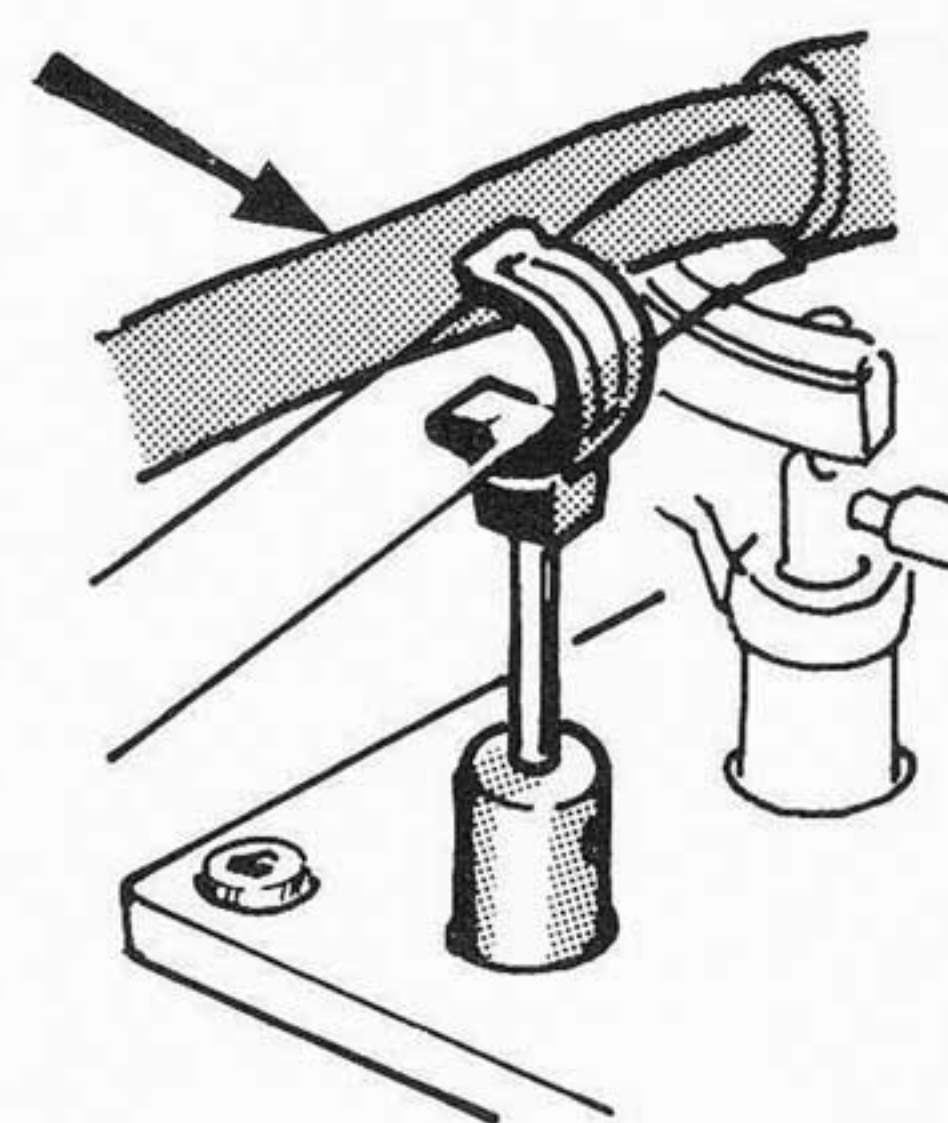
Lights to illuminate stroboscope when POWER/ARM ELEVATION lever is set to ON. The stroboscope appears to become stationary when the Quartz LOCK button is set to ON.



PLATTER MAT COVER

ARM REST

Supports the tonearm. Gently press tonearm in direction shown by arrow to clamp. Be sure to clamp when not playing records.



* Since placing the Quartz LOCK button in the ON position automatically assures correct turntable speed, strictly speaking, no further adjustment is necessary.

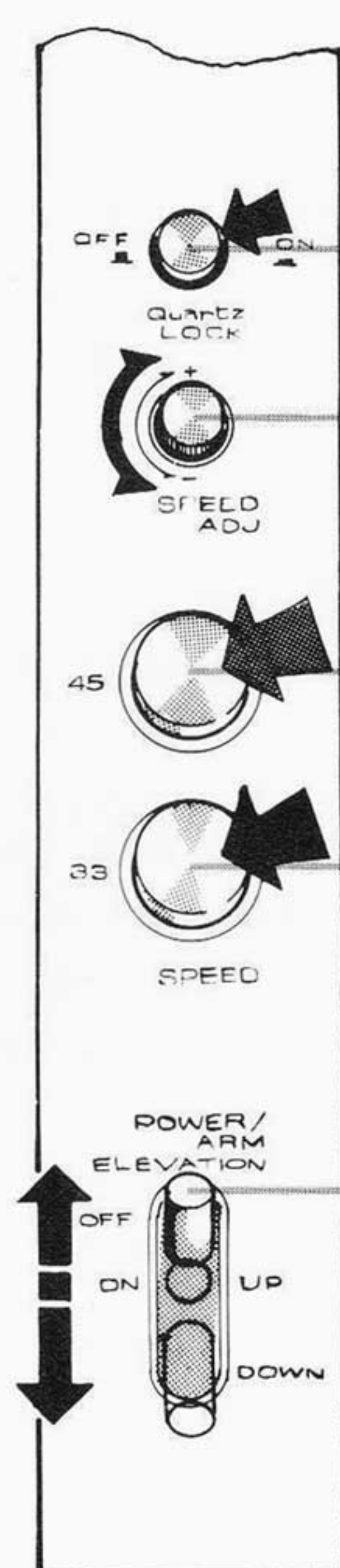
However, with the PL-550 it is possible to place the Quartz LOCK button to the OFF (undepressed) position and manually adjust turntable rotation speed with the SPEED ADJ. control.

Increasing the turntable rotation speed above the nominal value will raise the pitch of the recorded sound. Likewise, reducing the speed will lower the pitch of the recorded sound.

At present, there are invariably slight variations in the tuning of each orchestra, while domestic pianos are nearly all tuned to the same high international standard. When playing the piano in unison with recorded music, minute differences of pitch can be corrected by turning the Speed ADJ. control while listening to the sound.

Use of the SPEED ADJ. control on the PL-550 enables variations of up to 6% in turntable rotation speed.

In terms of pitch, this variation of 6% is equivalent to a rise or fall of one semi-tone.

**QUARTZ LOCK BUTTON**

Quartz PLL system functions when button is depressed to ON. Platter rotation becomes precisely locked to the speed selected by the SPEED buttons.

SPEED ADJ. CONTROL * (see page 10)

Can be used to increase or decrease the speed with respect to the selected rotation. Set Quartz LOCK button to OFF and turn this control toward the + direction to increase speed (maximum 6%) and toward the - direction to decrease speed (maximum 6%).

45 RPM SPEED BUTTON

Press to play 45 rpm records.

33 RPM SPEED BUTTON

Press to play 33-1/3 rpm records.

POWER/ARM ELEVATION LEVER

Combines power switch and tonearm elevation switch.

OFF Power is cut off.

ON-UP Power is turned on (platter rotates).
When moved from DOWN to this position, the tonearm is raised.

DOWN Tonearm is gently lowered.

OPERATING STEPS

1. Remove platter mat cover and place record on platter.
2. Set POWER/ARM ELEVATION lever to ON. Strobe lamp lights and platter rotates.
3. Press SPEED button (33 or 45) corresponding to record speed.
4. Press Quartz LOCK button to ON. The quartz PLL system then functions to provide the precise rotating speed.
5. Remove stylus cover, separate tonearm from arm rest and position it over desired starting point of record.
6. Set POWER/ARM ELEVATION lever to DOWN. Stylus will be gently lowered onto record.
7. Adjust volume and tone as desired with the controls of the stereo amplifier. If it is desired to change the sound pitch of the playback, set the Quartz LOCK button to OFF (underpressed) and adjust the SPEED ADJ. control while listening to the sound.
8. At the end of the playback, or when desiring to interrupt the record, set the POWER/ARM ELEVATION lever to UP. Stylus will be raised from the record.

9. Secure tonearm in arm rest and set POWER/ARM ELEVATION lever to OFF. Strobe light extinguishes, platter rotation stops and power is cut off.
10. Replace stylus cover to protect stylus.
11. Replace platter mat cover.

NOTE:

The platter mat cover is provided to protect the platter mat from dust and should be replaced if unit is idle for an extended period of time.

Operating Cautions

- Before and after playing, make it a point to use a soft stylus brush to clean the stylus and a good quality record cleaner to clean the records.
- Use care not to impart vibration to the turntable while a record is being played. This can cause damage to the stylus and the record.
- Do not disconnect the power cord while the stylus is in contact with the record. Damage to the stylus and record can be incurred.
- When exchanging headshells, perform with tonearm securely clamped in the arm rest in order to avoid application of excessive force to the tonearm bearings.

PREVENTIVE MAINTENANCE

PLATTER MAT

The platter mat is made from butyl rubber which possesses high internal loss and therefore functions to absorb external vibrations and vibrations due to record flexing and other causes. A cover is also provided to prevent soiling of the platter mat. If it becomes soiled, however, it can be washed gently in a lukewarm solution of a neutral detergent, employing a sponge or soft cloth. After washing, rinse thoroughly and allow to dry naturally. Do not use a hair dryer or direct sunlight for drying.

DO NOT OPEN MOTOR

The motor is highly precision machined. In event of suspected problems with the motor, do not open the motor cover or attempt to repair it yourself. Immediately contact a Pioneer Authorized Service Center.

STYLUS

Dust adhering to the stylus can detract from playback sound quality. Use a soft stylus brush to keep the stylus clean. Do not touch the stylus with the fingers, as this can cause damage.

LUBRICATION

Since PL-550 uses oil-less bearings, no lubrication is required. The high precision ball bearings and tonearm bearings also do not require lubrication.

CABINET

Cabinet and dust cover can be cleaned with a polishing cloth or a soft dry cloth. Do not use or place furniture waxes, solvents, insect sprays or other volatile materials on or near this unit.

Quartz PLL D.D. MOTOR OPERATING PRINCIPLE

A high precision servo system is employed in the PL-550 that incorporates electronic circuitry developed from new analogue and digital technology. The basic operating principle is described with reference to the block diagram.

1. **Crystal oscillator:** This generates reference signal for controlling platter rotation. This vital section contains a highly stable, precision circuit that employs a crystal frequency determining element which is resistant to temperature effects, humidity and aging.
2. **Frequency divider circuit I:** The 3.072MHz of the crystal oscillator is frequency divided (reduced to a fractional value) to 6kHz.
3. **Speed selection circuit:** This is an additional frequency divider circuit which allows a comparison to be made between the signal produced from the motor rotor frequency generator and the reference signal. Reference signal is selected by a switch according to the 2 specified rotational speeds (33-1/3 and 45rpm).
4. **Magnetic pulse detector type frequency generator:** This frequency generator produces an AC signal (voltage) proportional to motor rotation speed. Speed detector circuit board is

installed facing the magnetization direction of the lower plane of the rotor magnet.

5. **Phase comparator:** Phase of the AC signal obtained from the frequency generator is compared with the reference signal from the speed selector circuit. The control voltage is produced from the phase difference and sent to the bi-directional drive circuit. This produces phase lock and precise servo control is maintained.
6. **Frequency comparator:** In the same manner as the above, the reference frequency and the frequency of the AC signal from the frequency generator are compared. This circuit is operated in parallel with the phase comparator, improving PLL loop response with respect to motor transient characteristics, etc.
7. **Bi-directional drive circuit:** This Circuit controls motor rotation according to the control signals supplied by the phase and frequency comparators. Since control torque operates in both increasing and decreasing directions, superb control is provided with respect to transient motor speed variations due to external interference, switching time with speed selection, and other factors.

8. **Position detector:** Three Hall elements are installed in the motor at 120° phase angles. These elements produce sequential signal voltages with motor rotation and switch the bi-directional drive circuit transistor (control voltage switching).
9. **Frequency divider circuit II:** Strobe light power supply also uses the crystal oscillator frequency. This frequency divider circuit allows the required lighting cycle to be obtained.
10. **Pulse width control circuit:** Performs waveform shaping of the signal from the frequency divider II to produce an ideal short width

pulse signal for lighting the strobe light. Since lighting cycle is switched according to speed selection, two rotational speeds can be monitored with a single stroboscope pattern.

11. **Speed control sub oscillator:** This circuit is a type of variable frequency CR type oscillator. When desiring to vary the playback pitch, variation of the reference frequency becomes required. Motor rotation is synchronized to the frequency of this circuit when the Quartz LOCK switch is set to OFF. Frequency (rotation speed) can then be freely varied with the SPEED ADJ. control. Variation range is $\pm 6\%$.

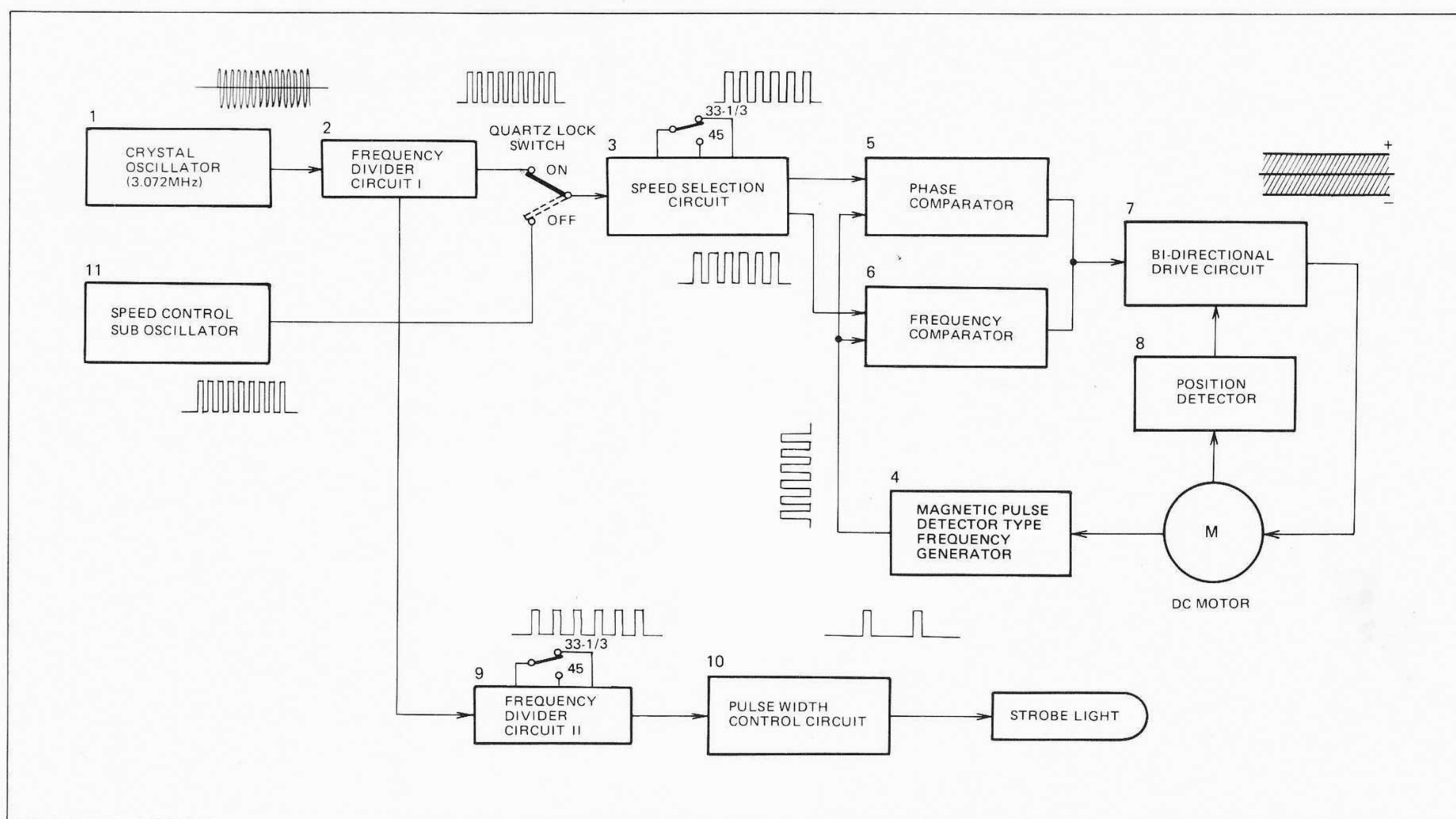


Fig. 19 PL-550 SERVO CONTROL SYSTEM BLOCK DIAGRAM

SPECIFICATIONS

Motor and Turntable

Motor Quartz PLL Hall motor
Turntable Platter . . 324mm diam. aluminum alloy die-cast
Moment of Inertia . . . 340kg-cm² (including platter mat)
Speeds 33-1/3 and 45rpm
Speed Control Range ±6%
Wow and Flutter Less than 0.025% (WRMS)
Signal-to-Noise Ratio More than 70dB (DIN-B)

Rotational Characteristics

Build-up Time Within 240° rotation at 33-1/3rpm
Speed Deviation Less than 0.003%
Speed vs. Load Characteristics Stable up to 120 grams
drag load
Speed Drift Less than 0.0003%/h at 33-1/3rpm
Less than 0.00004%/degree temp. change at 33-1/3rpm

Tonearm

Type Static-balance type, S-shaped pipe arm
Effective Arm Length 221mm
Overhang 15.5mm
Usable Cartridge Weight 4g (min.) to 14.5g (max.)
(For cartridge weighs over 9.5g, attach the sub weight)
Arm Height Adjust Range ±5mm

Subfunctions

Anti-skating force control
Lateral balancer
Stylus pressure direct-readout counter weight
Arm height adjusting device

Cueing device
Headshell stand
Strobe light
Free stop hinges
Insulator feet

Semiconductors

ICs	2
Transistors	9
Diodes	11
Hall elements	3

Accessories

45rpm Adaptor	1
Overhang gauge	1
Screwdriver	1
Sub weight	1
Cartridge mounting screws	6
Cartridge mounting nuts	2
Cartridge mounting washers	2
Operating instructions	1

Miscellaneous

Power Requirements	AC 220-240V 50/60Hz
Power Consumption	5W
Dimensions	490(W) x 185(H) x 390(D)mm 19-5/16(W) x 7-5/16(H) x 15-3/8(D)in.
Weight	12kg/26lb 6oz

NOTE:
Specifications and design subject to possible modification without notice, due to improvements.

For Use in United Kingdom and Australia
Please note:
Models employ 3-conductor mains leads. Please read the following instructions carefully before connecting.
WARNING: THIS APPARATUS MUST BE EARTHED.
CAUTION 240V: MAINS SUPPLY VOLTAGE IS FACTORY ADJUSTED AT 240 VOLTS.

IMPORTANT

The wires in this mains lead are coloured in accordance with following code:
Green-and-yellow: Earth
Blue: Neutral
Brown: Live
As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows. The wire which is coloured green-and-yellow must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol \perp or coloured green or green-and-yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N or coloured blue or black.
The wire which is coloured brown must be connected to the terminal which is marked with the letter L or coloured brown or red.
The power cord should be connected last, make sure that the Power switch is OFF.
First insert the female appliance connector of the mains cord into the AC inlet, then plug the cord to the wall socket.
Be sure the appliance connector is fully inserted into the AC inlet.
Unplug the set from the wall socket when it is not to be used for an extended period of time.

FOR YOUR SAFETY

- 1. Insert this plug only into effectively earthed three-pin plug-socket outlet.
- 2. If any doubt exists regarding the earthing, consult a qualified electrician.
- 3. Extension cords, if used, must be three-core correctly wired.

TROUBLE CHECKLIST

In event of operating difficulty, check the equipment according to the following list. If the problem cannot be corrected, contact a Pioneer Authorized Service Center.

- Platter does not rotate ————— Power cord not plugged in. → Insert firmly into AC outlet.
- Sound not obtained —————
 - Loose or faulty output cord connection → Connect properly and firmly (see Page 8).
 - Headshell improperly installed. → Tighten locking collar firmly.
 - Cartridge lead wires disconnected. → Connect lead wire pins firmly (see Page 3).
 - (Check for proper operation of the stereo amplifier (correct switch and control settings, etc.) See stereo amplifier operating instructions.)
- Sound tempo unnatural —————
 - Record being played at wrong speed. → Press 33 or 45 SPEED button according to record speed.
 - Quartz LOCK button OFF. → Set this button to ON (depressed) except for special situations.
- Excessive noise —————
 - Ground lead disconnected. → Connect firmly (see Page 8).
 - Record soiled. → Clean with good quality record cleaner.
 - Dust adhering to stylus. → Clean with stylus brush.
 - Tracking force too light. → Adjust tracking force correctly (see Page 7).
 - (If noise is produced even from unrecorded grooves of record, interference from stereo amplifier or other electrical appliances is indicated. Change turntable location or inspect other components.)
- Sound distorted —————
 - Stylus worn. → Replace with new stylus.
 - Dust adhering to stylus. → Clean with stylus brush.
 - Tracking force too light. → Adjust tracking force correctly (see Page 7.)

Feedback howling: Phenomenon caused when sound from speakers is conducted back to the cartridge via the air or a conducting structure to be again amplified to an extremely loud level. If this should occur, immediately turn off the stereo amplifier and relocate the turntable on a firm support where it is not subject to vibration.

TO USERS IN 50Hz AREAS

In 50Hz household power areas, if a conventional stroboscope sheet is placed on this turntable, the 45rpm pattern will appear to move. This is due to the fact that 45rpm element numbers of a conventional stroboscope cannot be divided evenly at 50Hz and the neglected remainder results in a degree of inherent error (in practice, this does not present any difficulty).

The stroboscope illuminating frequency in the PL-550 is derived from a crystal oscillator and the pattern inscribed on the platter rim is designed for a precisely even correspondence. Thus an extremely accurate rotational speed can be maintained when the stroboscope pattern appears to be stationary, eliminating need for concern.

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