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Thank you for your purchase of Pioneer Model PL-61. You will get many years of pleasure from this top-quality brushless low-speed DC Hall motor-equipped stereo turntable. Please read this manual and the directions indicated.

These instructions also apply to a variety of PL-61 supplied without a phono cartridge for the benefit of using your favorite cartridge. Any standard car-

tridge can be attached. In such cases, also observe the instructions furnished by the cartridge manufacturer.

FEATURES

LOW-SPEED BRUSHLESS "HALL" MOTOR

Model PL-61 is equipped with a brushless low-speed DC motor which utilizes "Hall" elements instead of brushes. (The production of these elements, based on a vacuum vapor coating process, is a Pioneer development.) As the motor runs at only ten times the revolutions of the turntable, speed reduction is greatly simplified, resulting in a remarkable reduction of vibrations. The drive system is the tried-and-true Pioneer belt drive. This and the absence of brush noise put this model in the class of professional record playing equipment.

ELECTRONIC SERVO CONTROL

The turntable speed is maintained constant by an elaborate electronic servo control circuit with a frequency generator. Outside factors such as the room temperature, the load, etc., cannot affect the turntable speed, as it is automatically kept at the correct rpms by the servo-controlled motor. What's more, switching from 33 to 45 rpm is also done electronically and without vibration-prone mechanical parts. The turntable speed can be finely adjusted within a range of $\pm 4\%$ at both 33 and 45 rpm. This feature is very useful, for example, when you wish to play an instrument along with a record.

EASY, ACCURATE SPEED ADJUSTMENT WITH STROBOSCOPIC PATTERN

The built-in fluorescent lamp and the stroboscopic patterns on the outer platter rim indicate accurately when the platter is revolving at the rated speed — 33-1/3 or 45 rpm. This permits records to be played at exactly the speed they were cut at.

S-TYPE TONEARM WITH LATERAL BALANCE WEIGHT AND ANTI-SKATING DEVICE

Supported by ultra-sensitive bearings, the S-type tonearm can trace all recorded information with accuracy and at very light tracking forces. To maintain optimum tracking conditions at all times, the arm is equipped with an easily adjustable lateral balance weight and an equally convenient anti-skating device. The arm of course accepts all standard pickup cartridges.

ANTI-SKATING EFFECTED BY MAGNETIC FORCE

Other than conventional anti-skating devices (which usually apply the required outside force by a weight suspended from a thread), this newly developed Pioneer system utilizes the attraction and repulsion of two magnets. This permits the precise required force to be applied irrespective of temperature variations and friction, and also simplifies the necessary adjustment considerably — simply turn the adjusting knob.

HIGH-QUALITY MAGNETIC CARTRIDGE SUPPLIED

The supplied phono cartridge (Pioneer model PC-50) is an induced magnet type of excellent compliance, 10-25,000Hz frequency response and over 25dB channel separation. Equipped with a 0.5 mil diamond stylus, it provides long service life while reducing record wear because of its excellent tracking at very light forces.

VERSATILE, CONVENIENT AUXILIARY FEATURES

The tonearm is raised and lowered by simple pushbutton action, saving both stylus and record wear. When using a cartridge other than the supplied one, the stylus overhang — an important factor for perfect tracking geometry — can be adjusted precisely with the overhang scale. The dust cover stays open at any angle for convenient operation. The turntable rests on height-adjustable feet with shock absorbers which help prevent howling. For accurate horizontal positioning of the turntable, a level is built in.

STYLED TO APPEAL TO PROFESSIONAL TASTES

The walnut-finished, silk-smooth cabinet and the dark motor panel and platter give a visual indication of this turntable's professional standards and precision.

INSTALLATION

Install the PL-61 with the following points in mind:

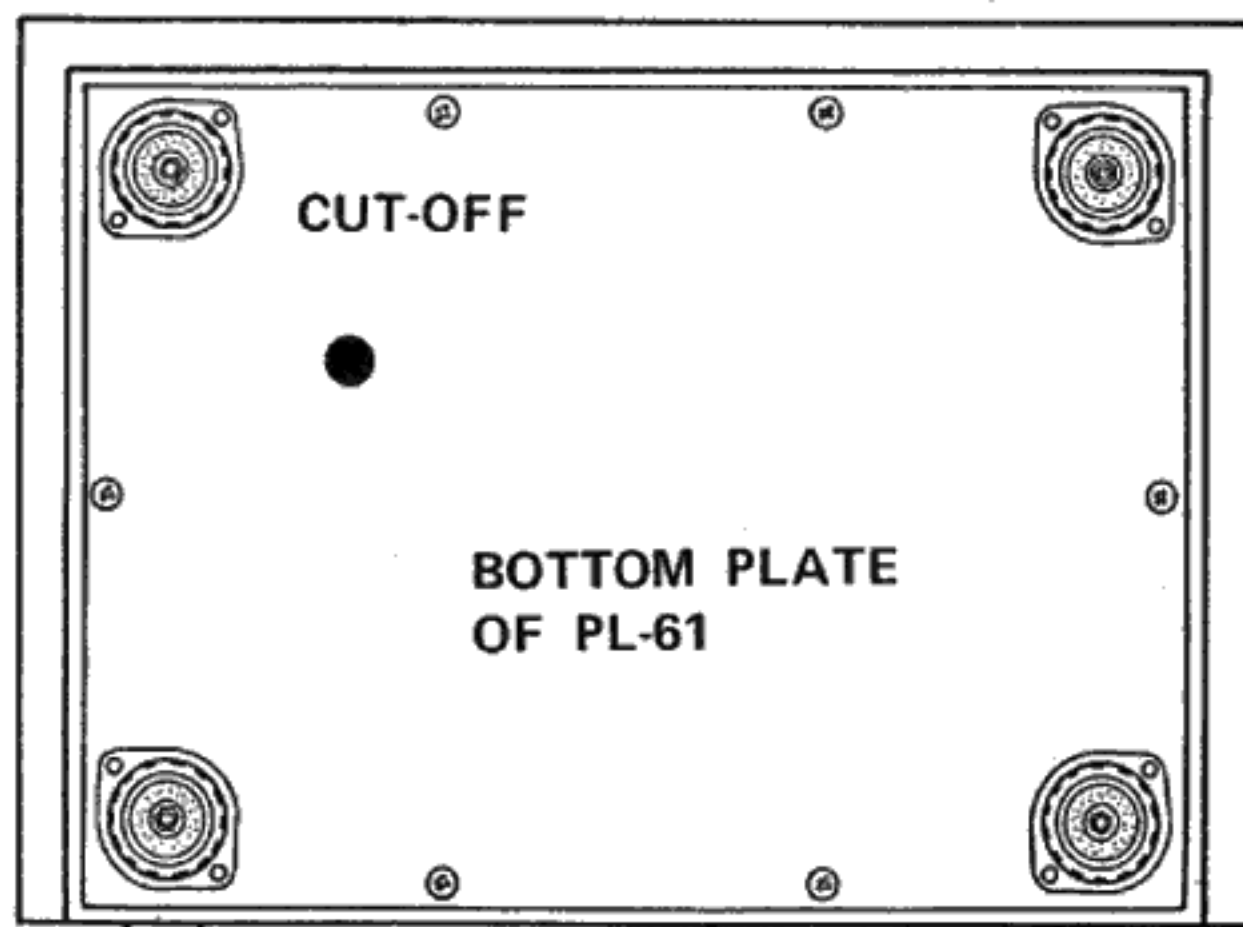
- The place must be well-ventilated and free from humidity and dust.
- The unit should not be exposed to direct sunlight.
- The unit should not be placed near a source of heat.
- The unit should be placed as far from the speaker systems as possible.

TYPICAL STEREO SETUP

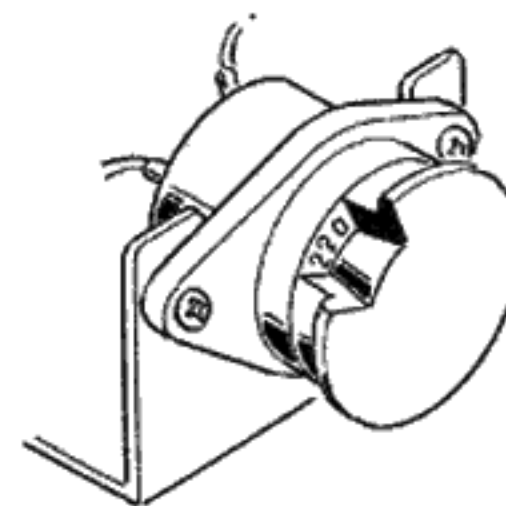
The PL-61 is a top-quality turntable and should be combined with other top-quality components. The drawings show a typical installation and the relationship of turntable, stereo amplifier or receiver, speakers, or stereo preamplifier, stereo power amplifier, etc. (Figs. 1 and 2)

LINE VOLTAGE

Confirm the line voltage of your house current before turning the power on, because your PL-61 may not be conditioned for operation with the local line voltage. The LINE VOLTAGE SELECTOR PLUG, provided inside the wooden base, can be seen when the bottom plate is opened (Fig. 3). The PL-61 is set for 240V operation when shipped. If the house-current voltage in your area is not 240V, pull out the line voltage selector plug and put it back as shown in Fig. 3 for operation on 220V, 130V, 120V, or 110V.



To remove bottom plate, unscrew 6 screws. When re-attaching, observe that motor comes over cut-off in bottom plate.



Insert selector plug so that correct voltage figure is visible in cut-off.

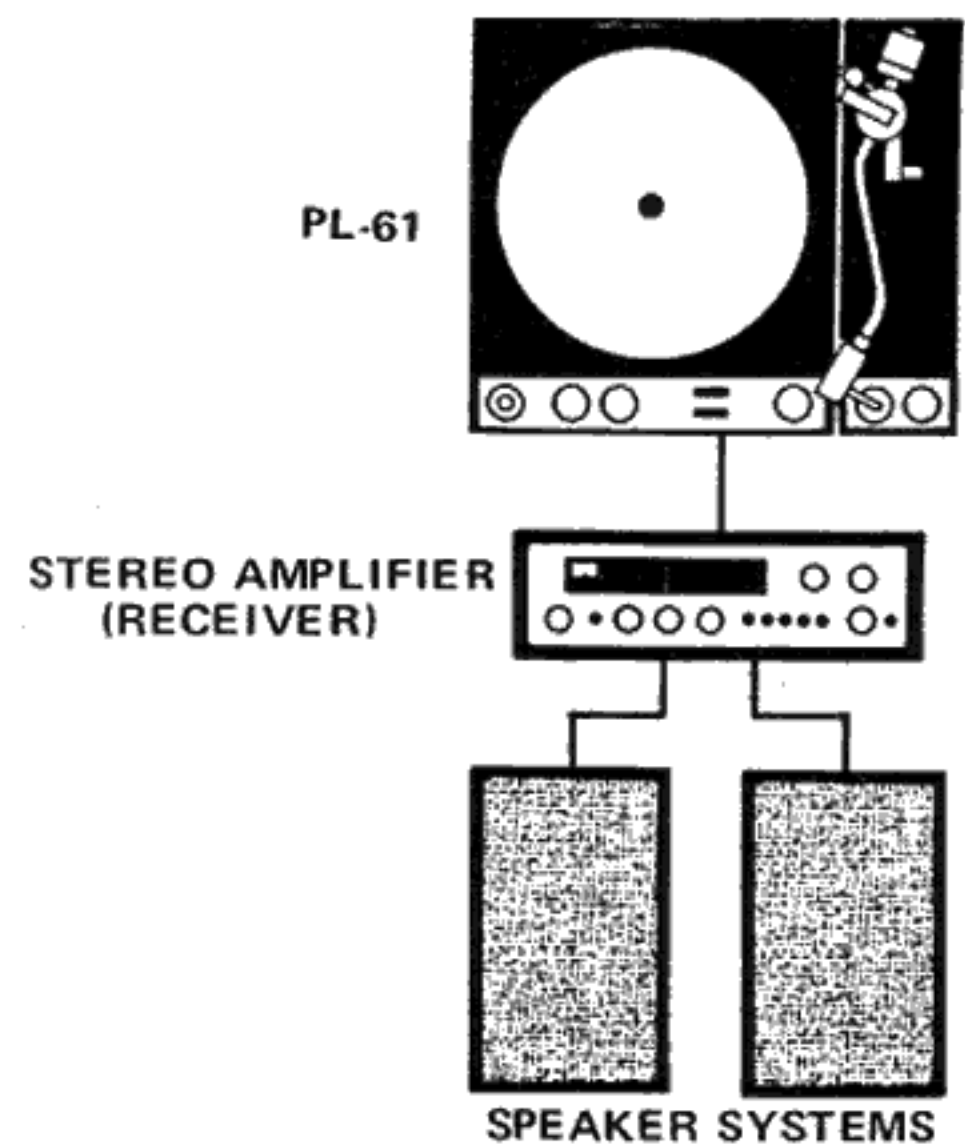
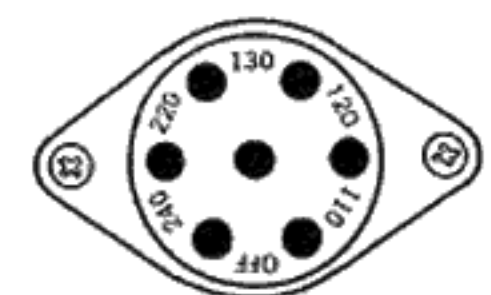


Fig. 1

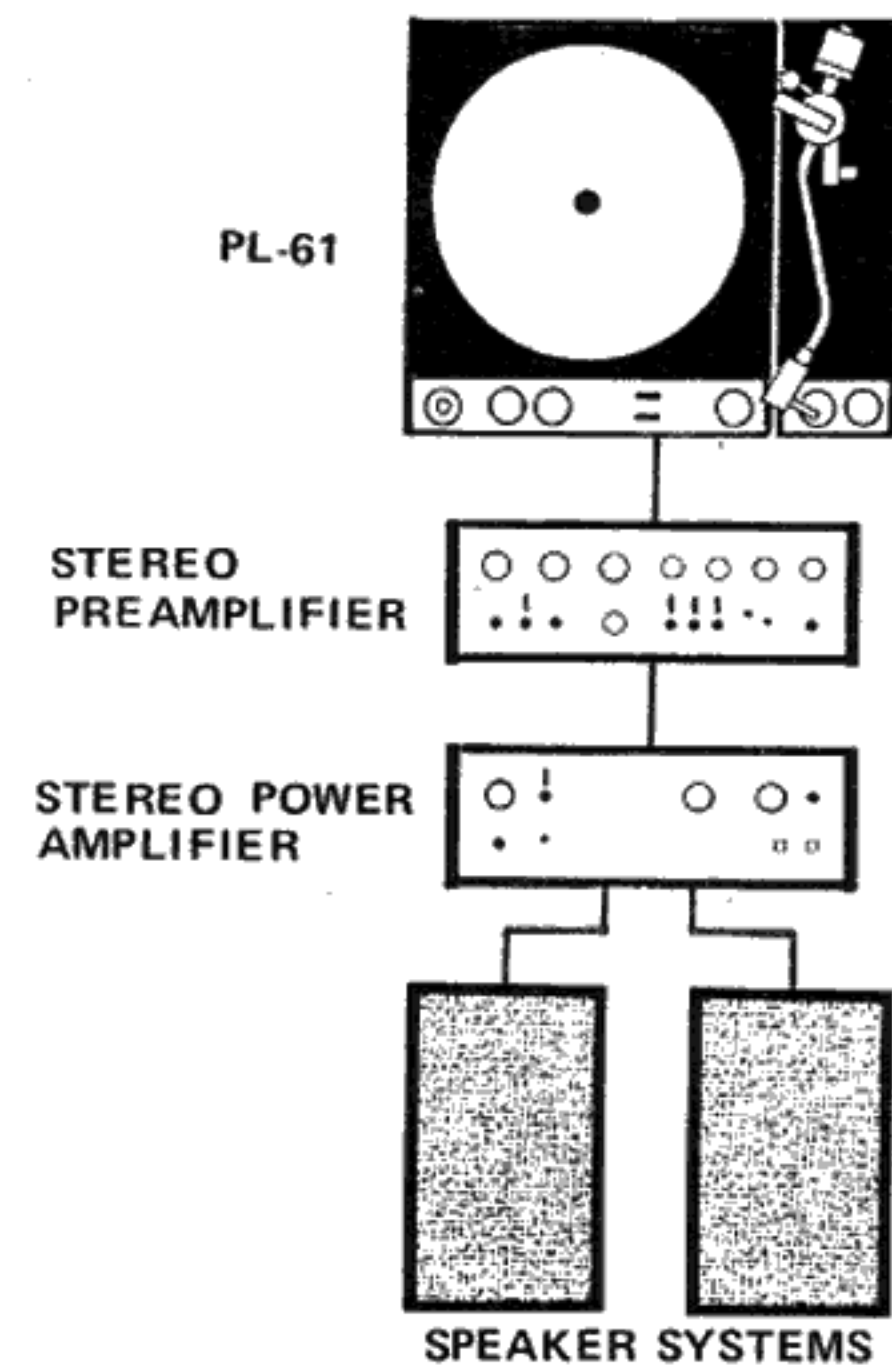


Fig. 2

Fig. 3

ASSEMBLY

To prevent possible damage in transit, precision parts and the turntable platter are packed separately from the wooden base in the same packing case. Unpack all parts carefully and assemble the unit as follows:

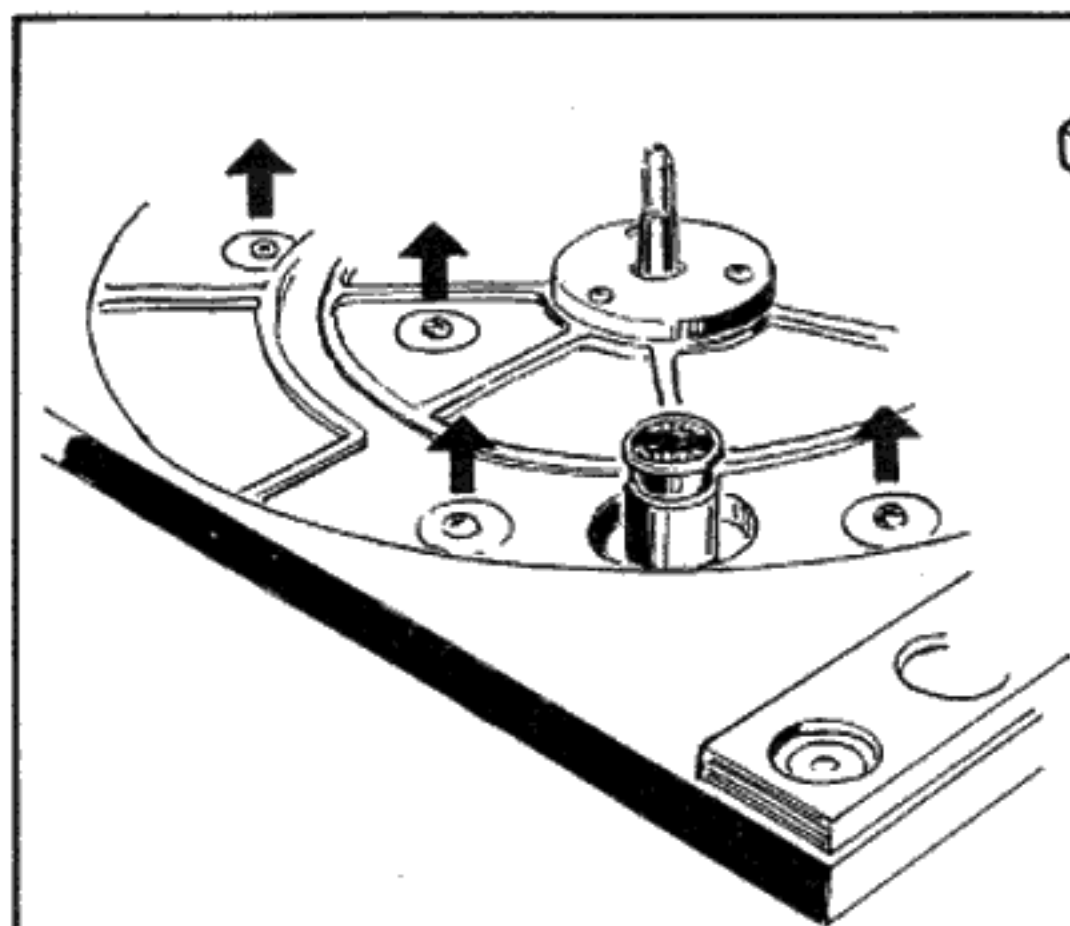


Fig. 4

REMOVE THE MOTOR-BOARD CLAMPING SCREWS

Unscrew the four clamping screws with a screwdriver (Fig. 4).

MOUNT THE TURNTABLE PLATTER

Unpack the turntable platter and place it on the center shaft. The ribbon under the belt is for convenience in pulling the belt (Fig. 5).

Lead the belt around the motor pulley, then remove the ribbon. Put the rubber mat on the turntable platter.

ATTACH THE DUST COVER

The plastic dust cover is attached by sliding the hinges sideways as shown in Fig. 6. Hold the dust cover as near the hinges as possible. Attach it firmly by pushing the hinges all the way as in Fig. 6.

The hinge design keeps the cover open in any position between 30 and 60 degrees.

ADJUST THE HEIGHT OF THE SHOCK ABSORBERS

The height of the shock absorbers of the PL-61 can be adjusted. Adjust them so that the bubble (on the top panel) comes to the center (Fig. 7).

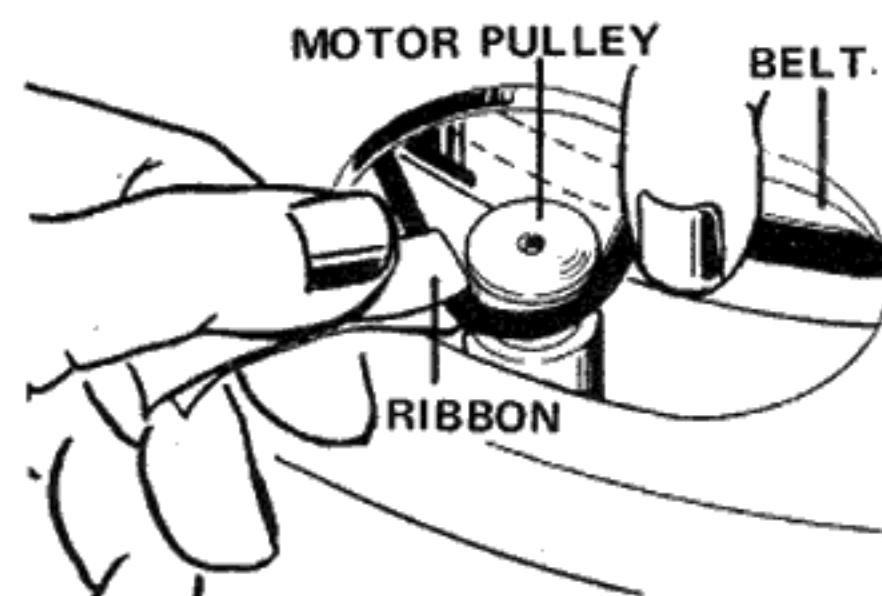
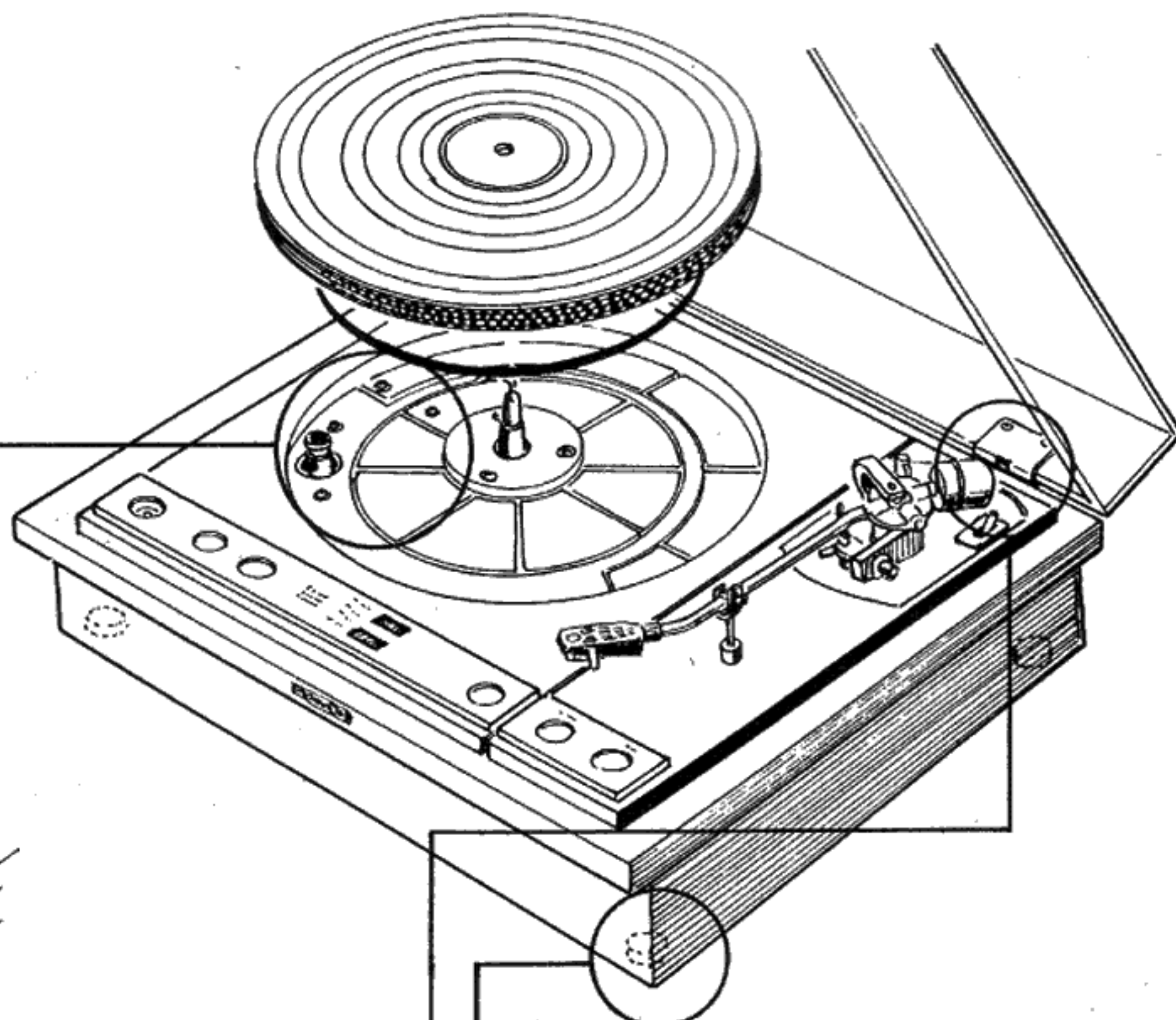


Fig. 5

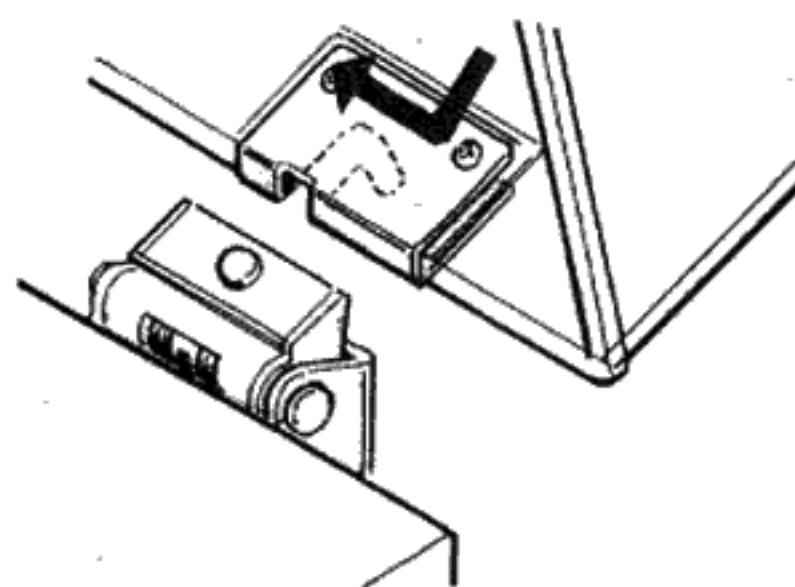
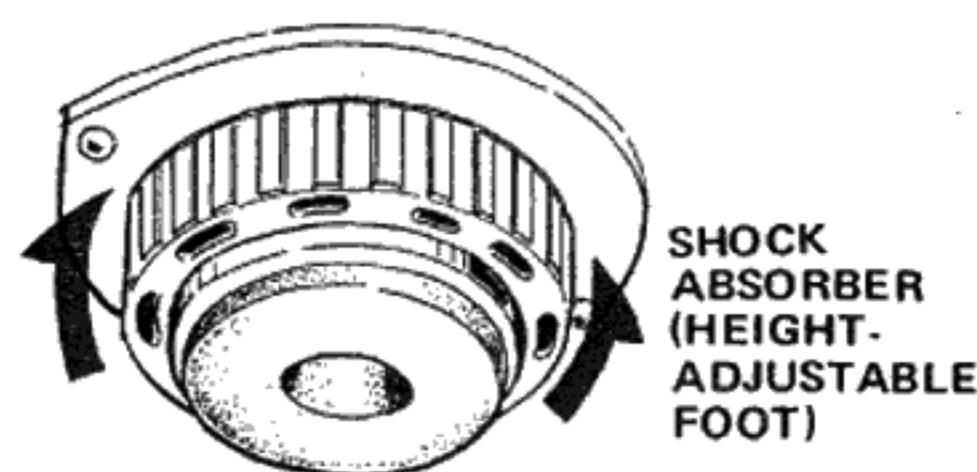
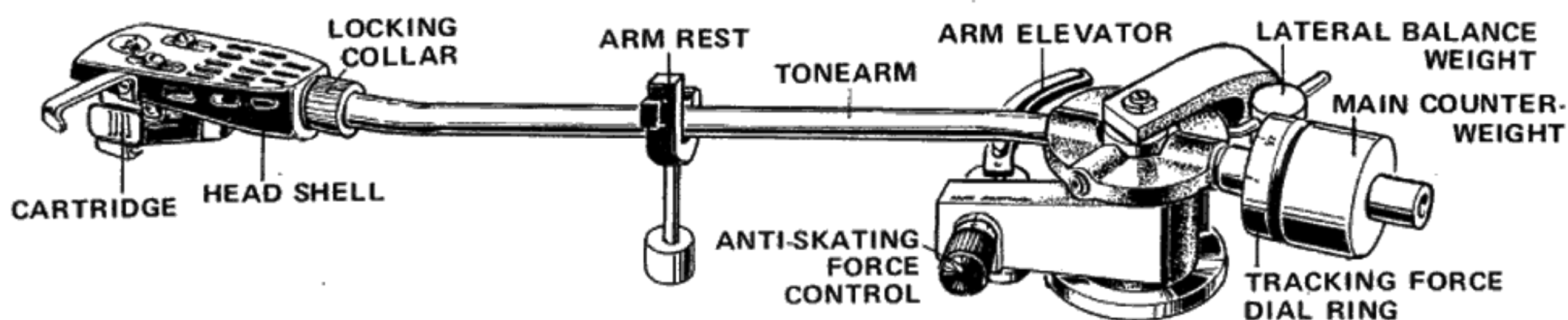


Fig. 6



TURN TO THE LEFT (RIGHT)
TO RAISE (LOWER) THE HEIGHT.

Fig. 7



UNPACK THE TONEARM

Take off the white packing fixed to the tonearm as shown in Fig. 8.

After assembling the tonearm, remove the ribbon which ties the tonearm to the arm rest.

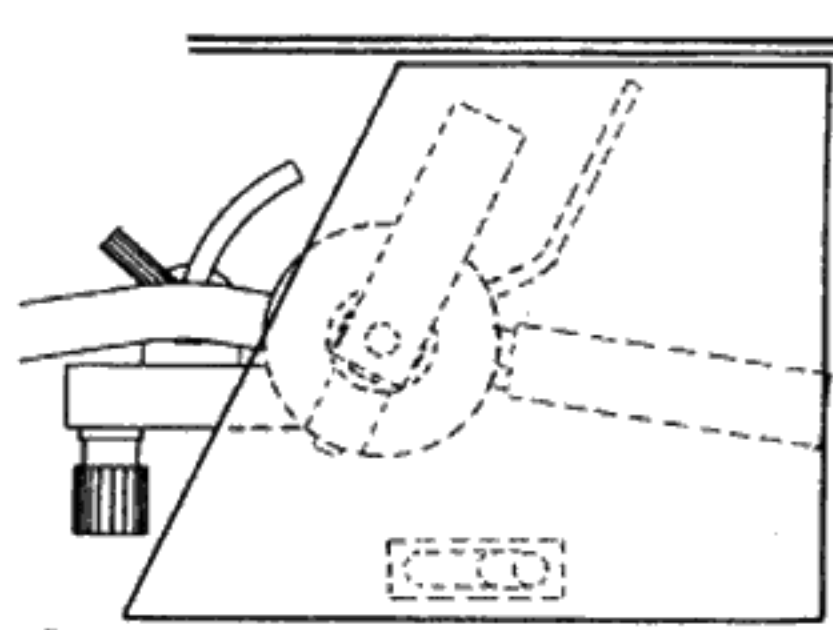


Fig. 8

ATTACH THE HEAD SHELL

Insert the connector into the socket at the end of the arm with the guide pin fitted in the groove of the socket and turn the locking collar to secure the head shell to the arm. The head can still be twisted a few degrees. Adjust it so that its upper surface is parallel with the platter surface (Fig. 9).

NOTE: If your turntable is not equipped with a cartridge or you wish to use your favorite cartridge instead, attach a cartridge to the head shell as just described referring to the "CHANGING THE CARTRIDGE" on page 10.

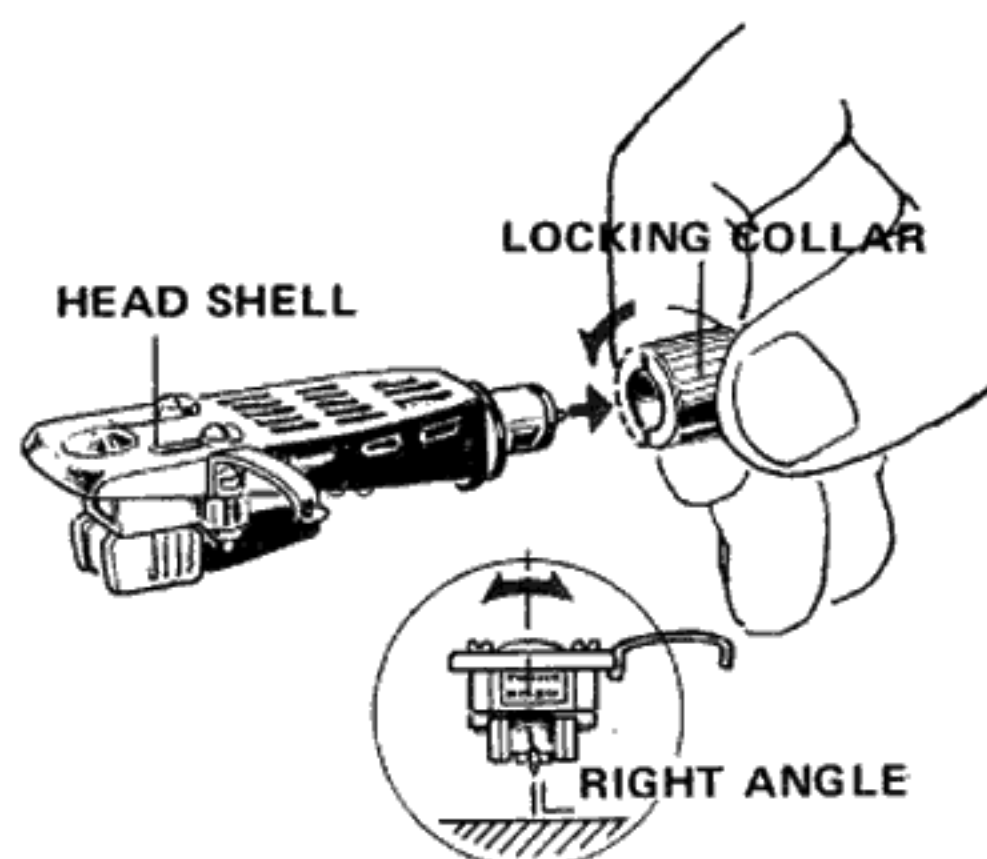


Fig. 9

ATTACH THE MAIN COUNTERWEIGHT

Mount the main counterweight on the rear of the tonearm and push it inward as far as it will go. Then, give it a few turns clockwise (Fig. 10).

ATTACH THE LATERAL BALANCE WEIGHT

Now, attach the lateral balance weight by inserting it as shown in Fig. 11.

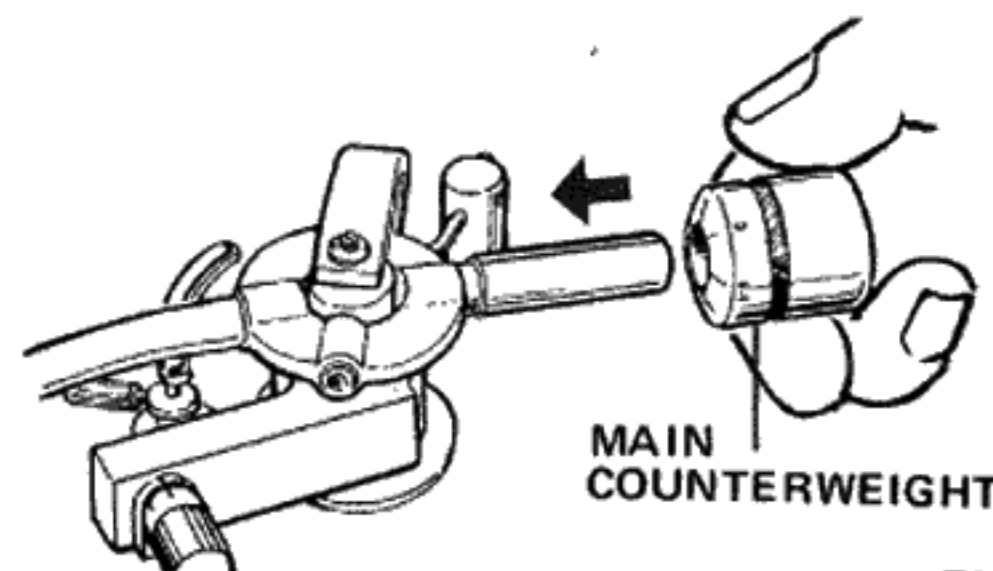


Fig. 10

ADJUST THE HEIGHT OF THE TONEARM

Adjust the height of the tonearm so that it becomes level with the turntable platter when playing. As shown in Fig. 12, move the tonearm locking lever to position OPEN.

Then move the arm up and down until it is level and return the lever to position LOCK. Also adjust the height of the arm elevator so that clearance between the tonearm and elevator becomes 1mm in the playing position.

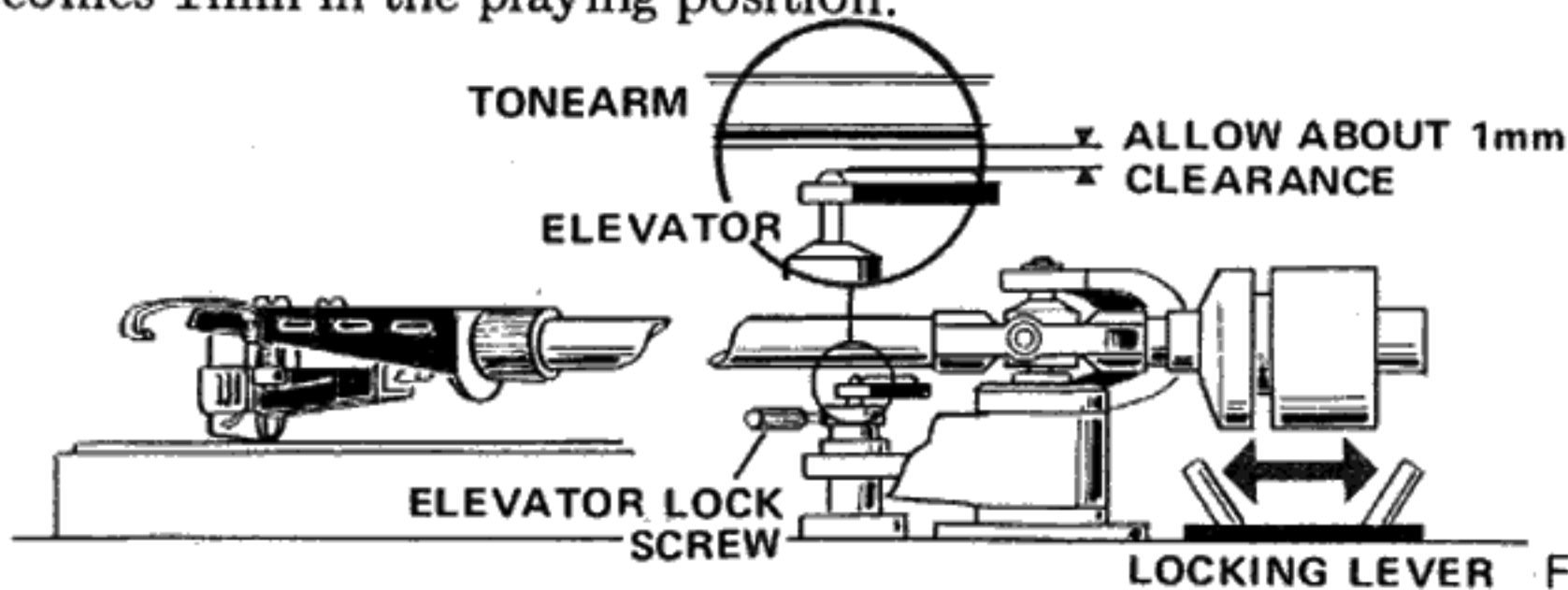


Fig. 12

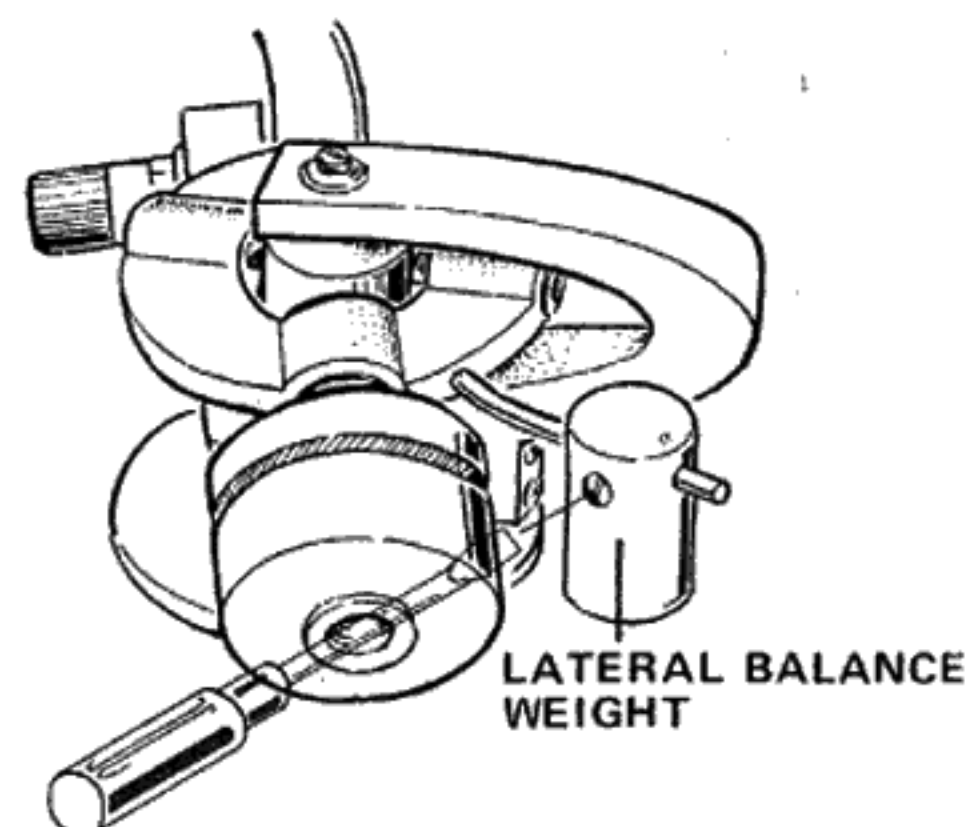


Fig. 11

TONEARM ADJUSTMENTS

HORIZONTAL BALANCE

1. With the tonearm off the arm rest and the stylus cover moved up, turn the main counterweight in either direction until the tonearm floats horizontally.
2. While holding the main counterweight in position, turn the dial ring until the 0 reading on the dial aligns with the black index line engraved on the tonearm. The tracking force is now zero (Fig. 13). Be careful not to move the main counterweight.

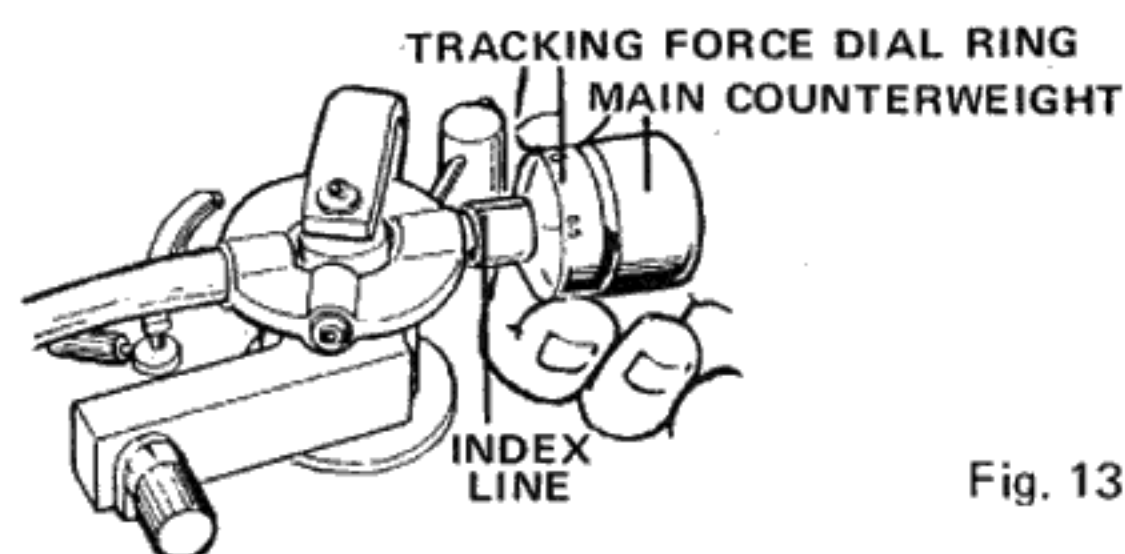


Fig. 13

LATERAL BALANCE

After the tonearm is balanced, turn the anti-skating force control dial all the way to "0." Lift the rear of the turntable with the aid of the furnished white polystyrol board (Fig. 14) so that the turntable is slanted about 20 degrees. See if the tonearm swings inward or outward. If the tonearm tends to swing toward the center of the turntable, slide the lateral balance weight toward "A" in Fig. 15; if the arm tends to swing toward the outside, slide the lateral balance weight toward "B." Repeat this adjustment until the tonearm completely balances laterally or shows only a very slight tendency to move outward.

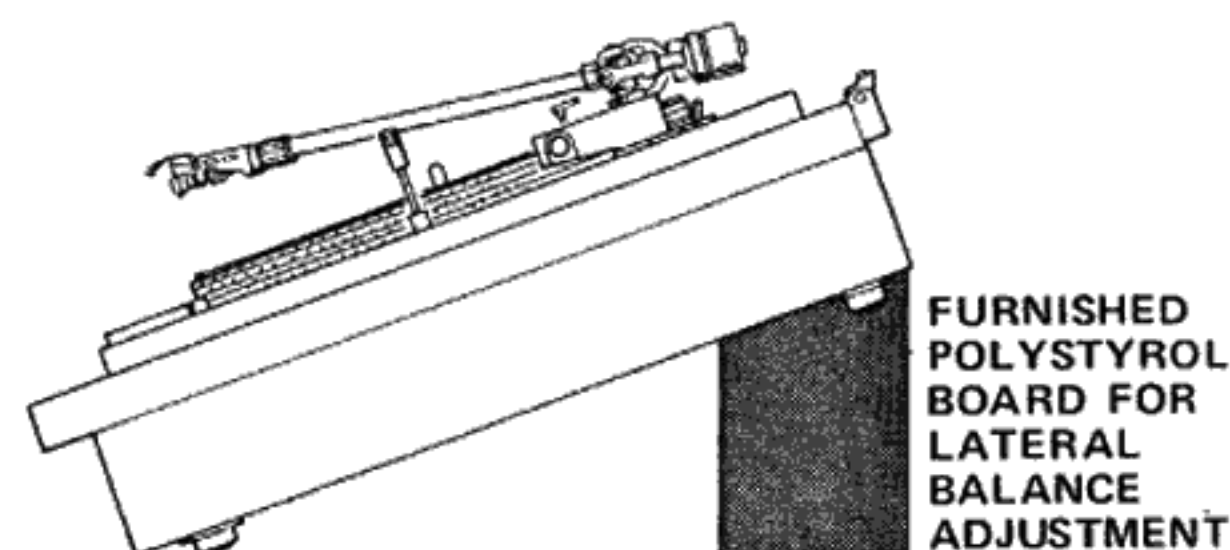


Fig. 14

ANTI-SKATING FORCE CONTROL

The relationship between optimum settings of the anti-skating force control and tracking force values on the PL-61 is plotted in Fig. 16. After the desired tracking force is set, find the optimum setting control from the curve plotted in Fig. 16, and rotate the anti-skating force control until the correct value is obtained (Fig. 17).

For example, if the tracking force is 2 grams, the optimum setting of the tracking balance control will be 2 as plotted in Fig. 16.

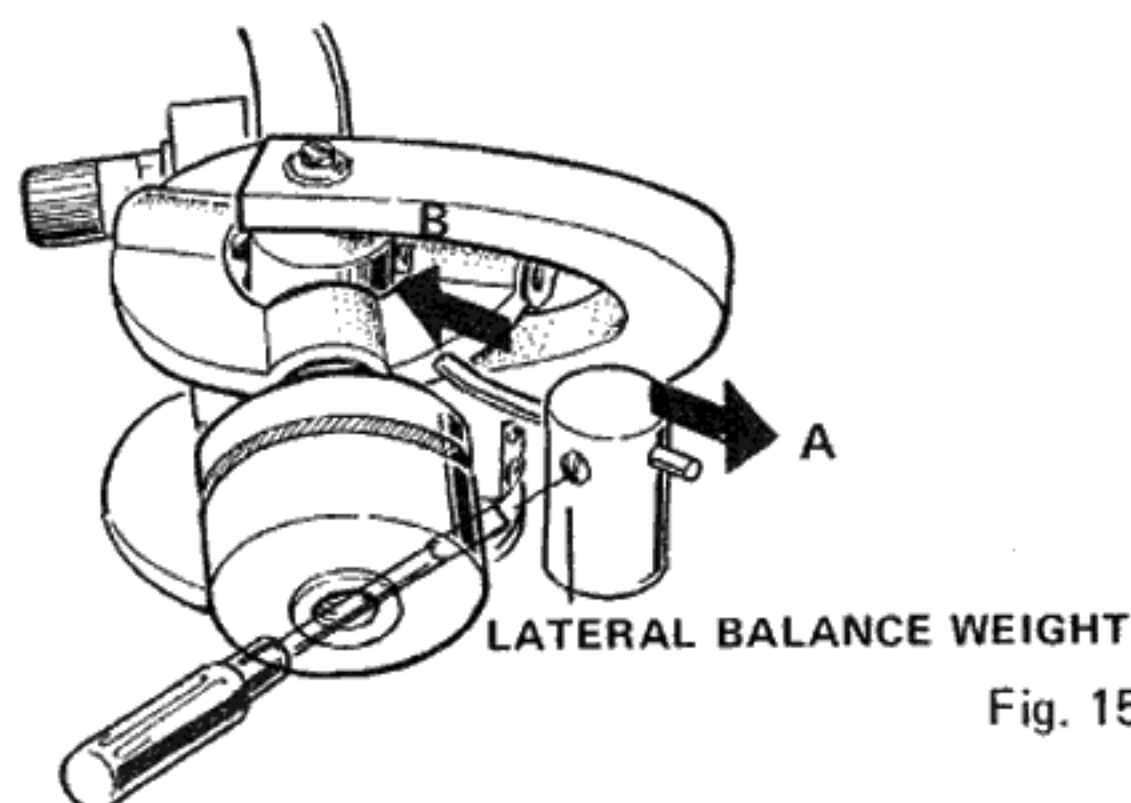


Fig. 15

TRACKING FORCE

After the lateral balance adjustment, turn the main counterweight together with the tracking force dial clockwise (the dial is direct reading up to 3g in 0.5g increments). Set the tracking force at 1.5~2.1 grams (optimum for the furnished PC-50 cartridge) to the index line engraved on the main counterweight.

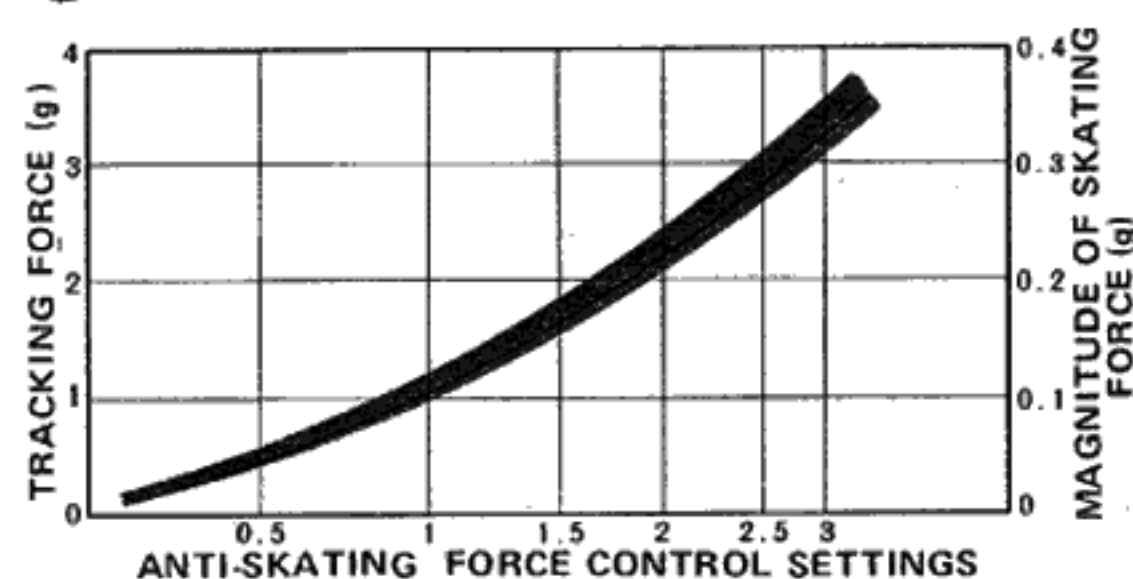


Fig. 16

NOTE: When attaching another cartridge, adjust the tracking force in accordance with the manufacturer's specifications. If this is not possible because the cartridge is too light or too heavy, refer to page 10.

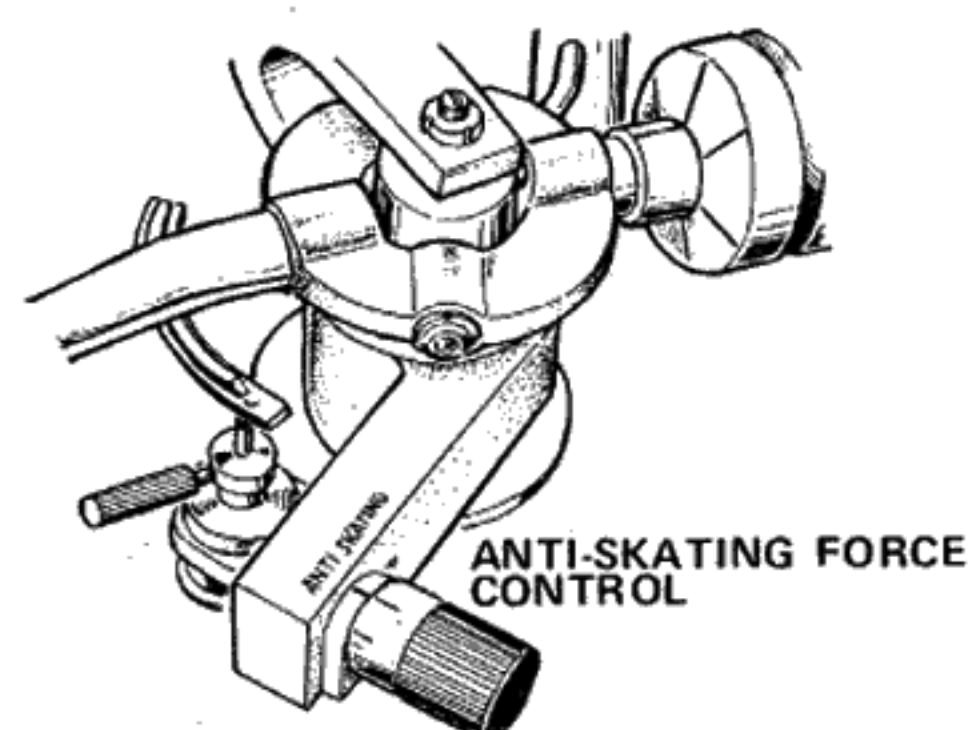
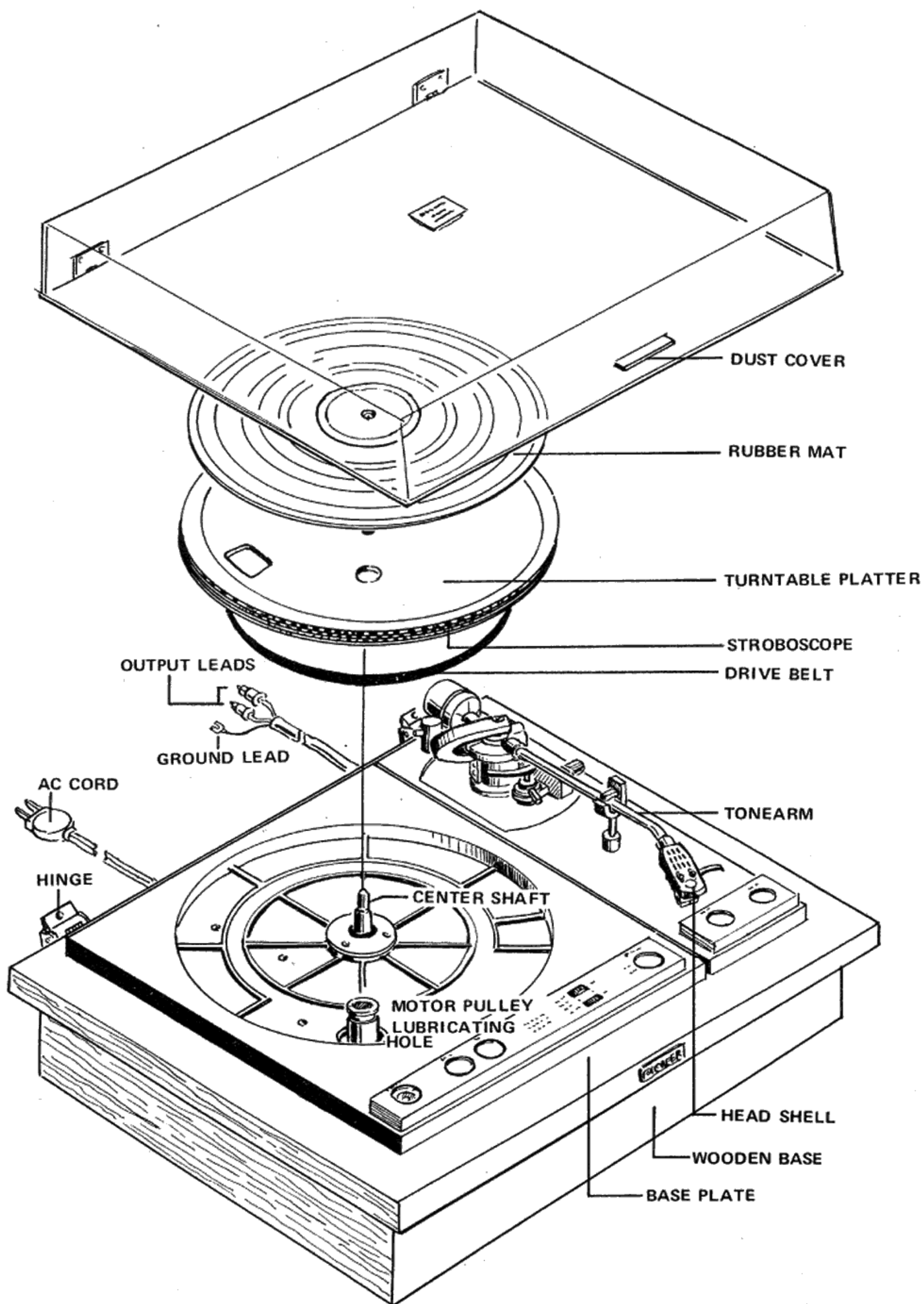


Fig. 17



CONNECTION TO STEREO AMPLIFIER OR RECEIVER

The cartridge supplied with the PL-61 is an induced magnet type.

For connecting the PL-61 to the PHONO MAG input jacks of your amplifier (receiver), use the connection cord furnished with the PL-61.

The cord has three leads at either end, the L-marked leads are for connection to the left channels, the R-marked leads for connection to the right channels, and the split lugs for connection to the ground terminals on the PL-61 and your amplifier (receiver). Confirm that all connections between the PL-61 and your amplifier (receiver) are correct.

IF HUM OCCURS . . .

If noticeable hum occurs, reverse the AC cord in the wall socket.

NOTE: When using another cartridge, observe the manufacturer's instructions with regard to amplifier connection.

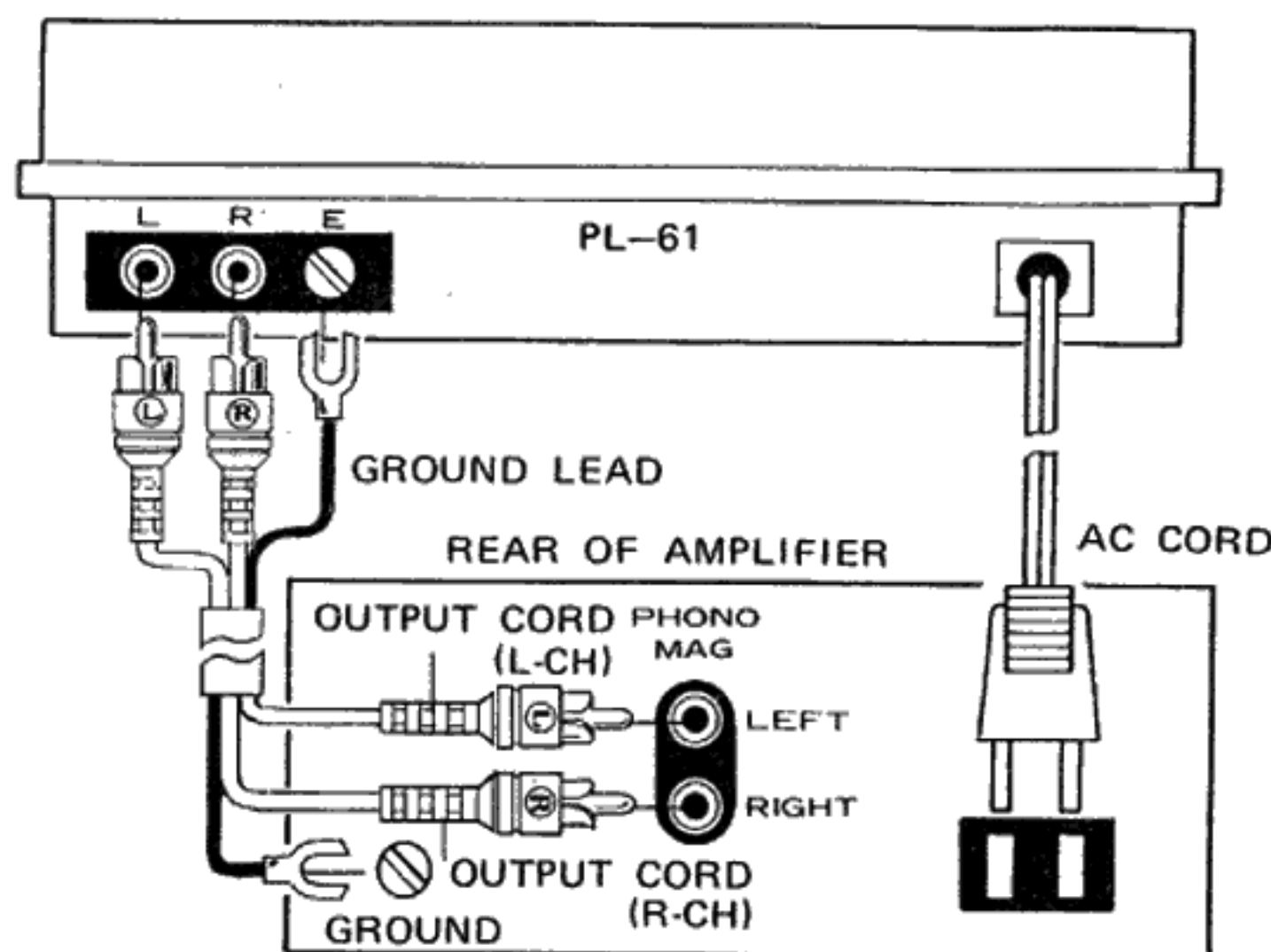


Fig. 18

CHECK POINTS BEFORE OPERATION

LEVEL PLACEMENT

Make sure that the turntable is level because otherwise its performance will suffer. Observe the LEVEL so that the bubble comes to the center.

DO NOT OBSTRUCT THE ROTATING TURNTABLE BY HAND

Holding the rotating turntable by hand may throw the belt.

ALWAYS KEEP THE STYLUS CLEAN

Dust on the stylus affects the sound quality and causes record wear. Clean records with a soft, clean cloth moistened with a record cleaning fluid. Never touch it with your fingers.

AVOID SHOCK AND VIBRATION

The PL-61 works with a very small tracking force. It should be placed on a stable surface. It is a good practice to keep the unit as far away from the speakers as possible.

DO NOT TOUCH THE INNER PARTS

Do not touch the precision inner parts except when a change of line voltage is required. Do not take off the cover or the turntable platter unless necessary.

CONDITIONS FREQUENTLY MISTAKEN FOR MALFUNCTION

IRREGULAR ROTATION

This happens when lubricating oil adheres to the inner platter rim, the motor pulley, or the belt. Clean these parts with a soft cloth moistened with pure alcohol. Never use benzine or the like.

HOWLING

Howling is caused by acoustical feedback transmitted to the tonearm or cartridge from the speakers. To avoid this, put the PL-61 as far away from the speakers as possible.

HUM

Hum is a low-pitched noise, often resulting from incomplete or no connection of the ground wire.

- Not ground to the amplifier.
- Output cord of the PL-61 too near to the amplifier's power transformer.
- Reversing of the AC cord may occasionally eliminate hum.

TOP PANEL FACILITIES

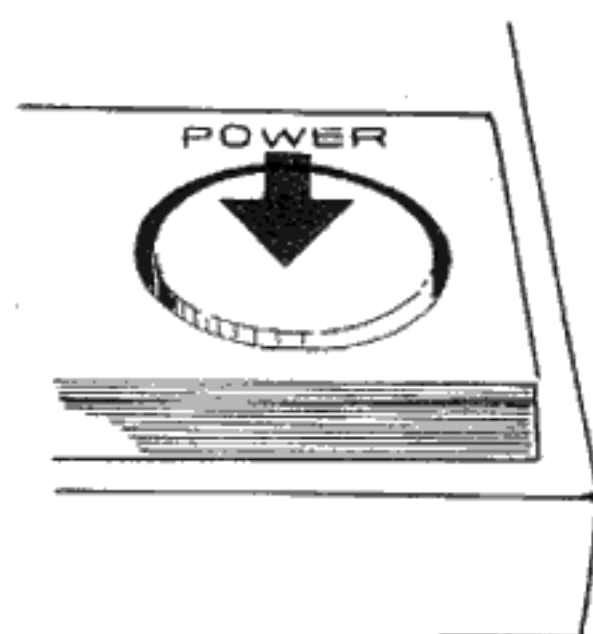


Fig. 19

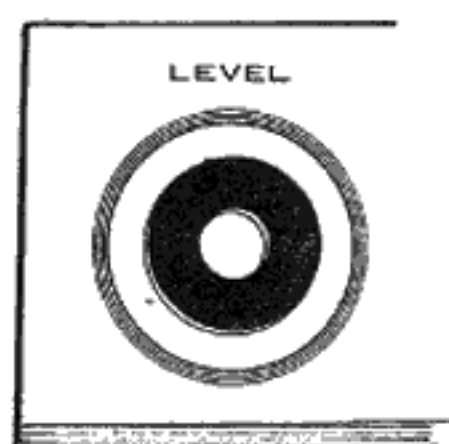


Fig. 20

PUSH THIS BUTTON
FOR 33-1/3 RPM

PUSH THIS BUTTON
FOR 45 RPM

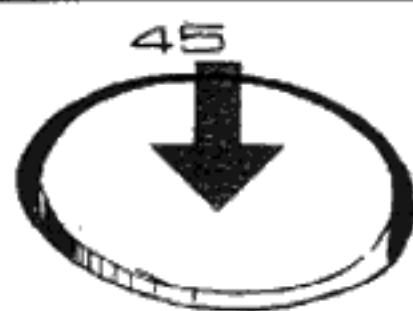
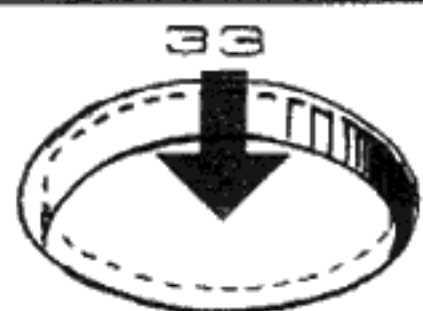
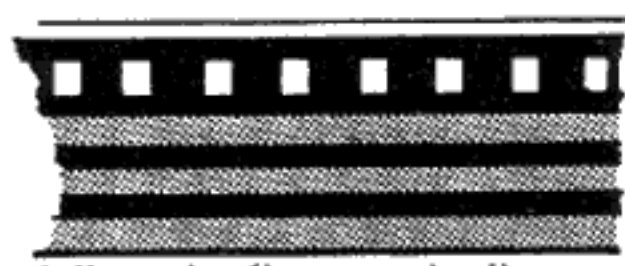
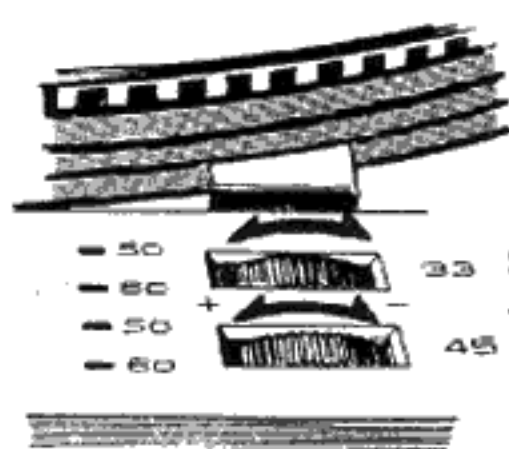


Fig. 21



Adjust the fine speed adjusters
so that the white squares appear
to stand still.

Fig. 22



FINE
SPEED
ADJUSTERS

Fig. 24

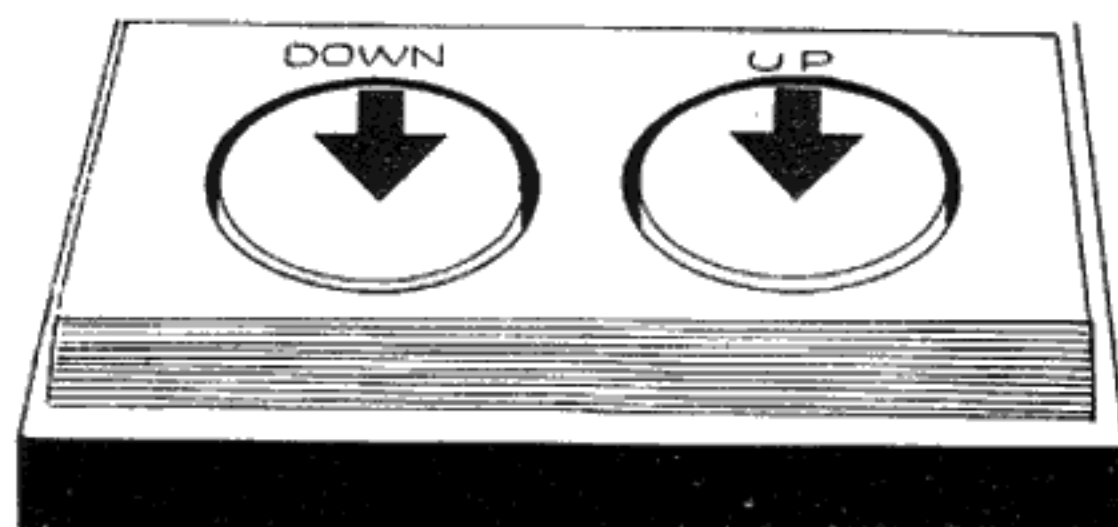


Fig. 25

POWER BUTTON

Push once to switch the power ON, once again to switch it OFF (Fig. 19).

LEVEL

Always use the LEVEL for correct placement of the turntable. The bubble should be in the center (Fig. 20).

33 RPM BUTTON

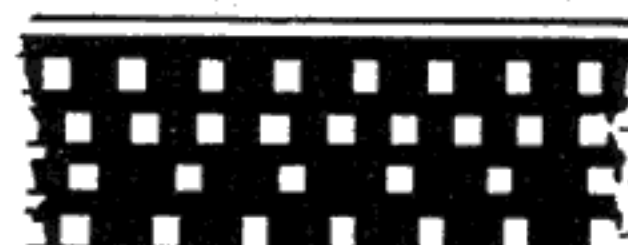
Push this button for playing 33-1/3 rpm records (Fig. 21).

45 RPM BUTTON

Push this button for playing 45 rpm records (Fig. 21).

STROBOSCOPE

As shown in Figs. 22 and 23, the positions of the stroboscope vary according to the frequency, and turntable speeds to be used.



50Hz: 33-1/3 RPM
60Hz: 33-1/3 RPM
50Hz: 45 RPM
60Hz: 45 RPM

Fig. 23

FINE SPEED ADJUSTERS FOR TURNTABLE SPEEDS

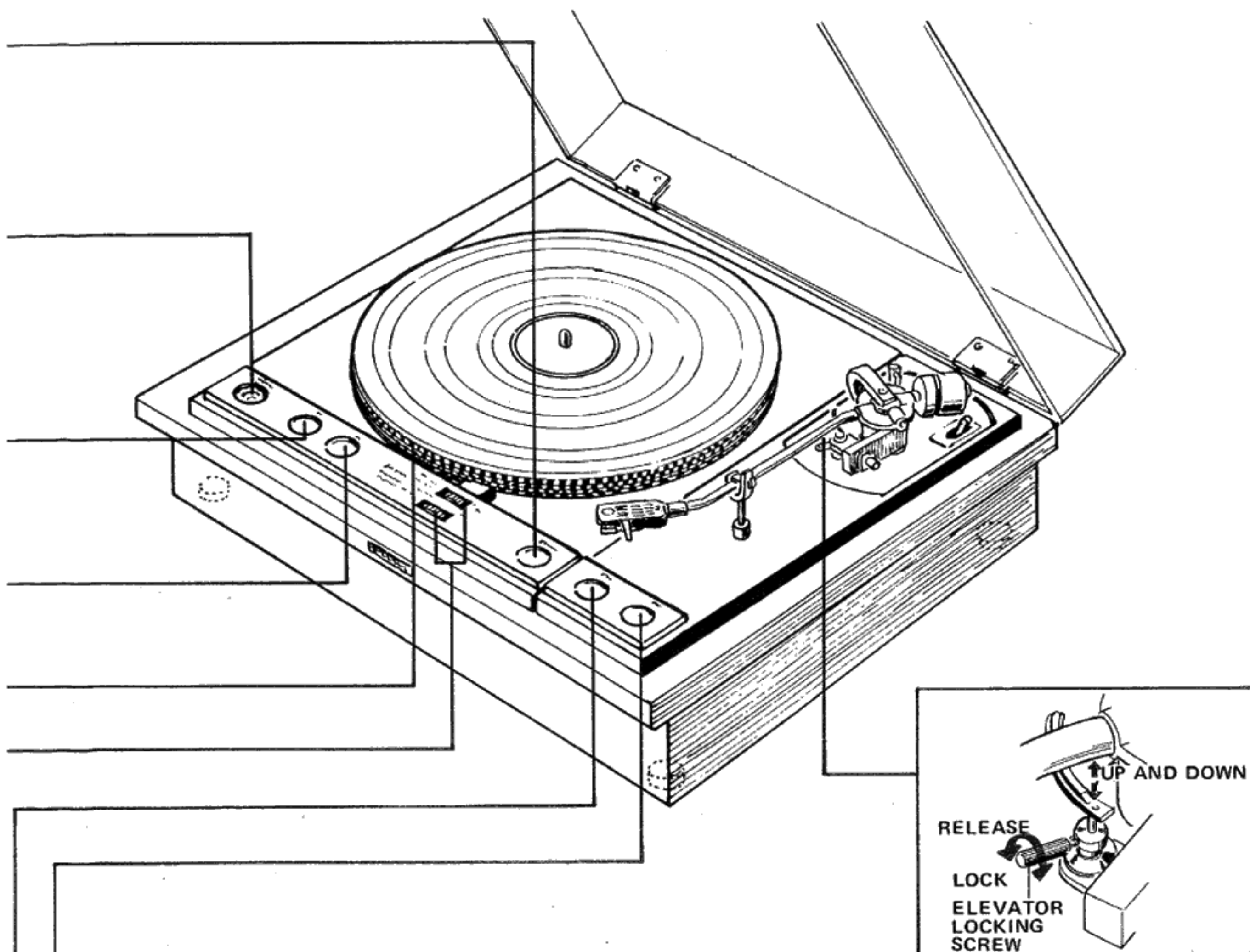
First push either the 33 RPM or the 45 RPM button. Adjust the fine speed adjuster while watching the stroboscope. Turning the fine speed adjusters to the left (right) will increase (lower) the turntable speed (Figs. 22, 23 & 24).

"DOWN" BUTTON

Push this button after bringing the tonearm over the record surface. The tonearm will float down gently and the record will start playing (Fig. 25).

"UP" BUTTON

Push this button to interrupt or stop playing. The tonearm will float up gently (Fig. 25).



RECORD PLAYING

1. Put a record on the turntable platter.
2. Move up the stylus cover. (Fig. 26)
3. Push the POWER button. Then push either the 33 rpm button or the 45 rpm button according to the record to be played.
4. Regulate the fine speed adjuster while watching the stroboscope. Turning the fine speed adjusters to the left (right) will speed up (slow down) the turntable.
5. After fine adjustment is completed (when the white squares appear to stand still), bring the tonearm carefully over the lead-in grooves of the record.
6. Push the DOWN button.
7. To interrupt a record in the middle, push the UP button. The tonearm will float up gently to stop playing.

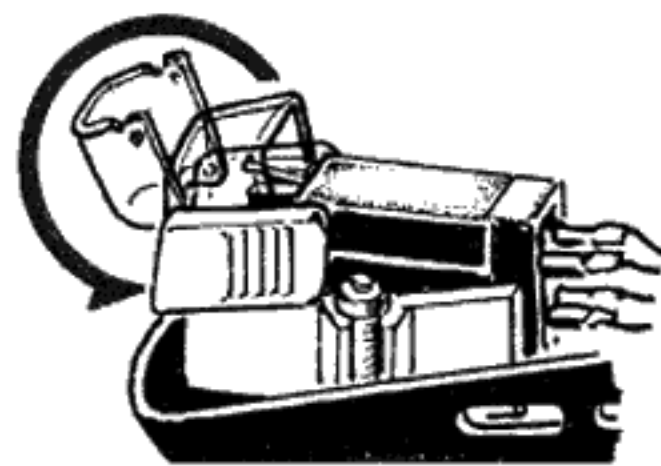


Fig. 26

WHEN THE RECORD IS OVER

Push the UP button and put the tonearm back onto the arm rest. Then push the POWER button to switch it OFF.

HOW TO USE THE UP AND DOWN BUTTONS BEST

Usually a popular music LP record contains several selections, of which you can select only your favorite music by quickly handling the UP and DOWN buttons.

PARTS REPLACEMENT

STYLUS REPLACEMENT

The furnished cartridge, model PC-50 uses a diamond stylus, model PN-50. This stylus should last for about 1,200 to 1,500 hours of operation. For record protection, it is recommended to replace it before it wears out completely. Replace the stylus as follows: remove the head shell from the tonearm. The stylus is held in position in a plastic holder. Pull out the holder with the stylus. Replace the stylus with a new one and put the holder back into the cartridge. When purchasing a replacement stylus, specify model PN-50 (Fig. 27).

NOTE: For other cartridges, observe the instructions furnished by the cartridge manufacturer.

CHANGING THE CARTRIDGE

If you want to use a different cartridge, use the furnished spare head shell. Fig. 28 illustrates the mounting procedure. Two cartridge mounting screws are also furnished in the accessory group. When changing a cartridge, be sure to connect the lead wires correctly between cartridge pins and pin plug. After a cartridge has been mounted in the head shell, the arm overhang must be re-adjusted as follows:

First tighten the cartridge mounting screws somewhat but not completely. Then, to obtain proper overhang, inch the cartridge back and forth so that the stylus tip comes to 14.5 on the OVERHANG CHECKER (commonly used as the 45 EP ADAPTOR) placed on the turntable (Fig. 29), and tighten the mounting screws.

If the cartridge is lighter than 6 grams, add the auxiliary weight (furnished in the accessory group) between the head shell and the cartridge. If the cartridge weighs 12~16 grams, mount the sub-counterweight (A) (also furnished in the accessory group) on the rear end of the tonearm.

Add the sub-counterweight (B) to the sub-counterweight (A) if the cartridge is heavier than 17 grams.

In any case, tonearm balancing (horizontal, lateral and tracking force adjustment) must be repeated.

LUBRICATION

Mechanical noise and wow and flutter sometimes result from insufficient lubrication in rotating parts. Be sure to lubricate the specified points as follows: (Fig. 31)

Lubricating hole for motor apply a few drops of oil once every three months.

Center shaft apply five to six drops of oil once every three to six months.

Care must be taken not to put any oil on the motor pulley or belt. If this should happen, wipe it off with a soft cloth moistened with alcohol.

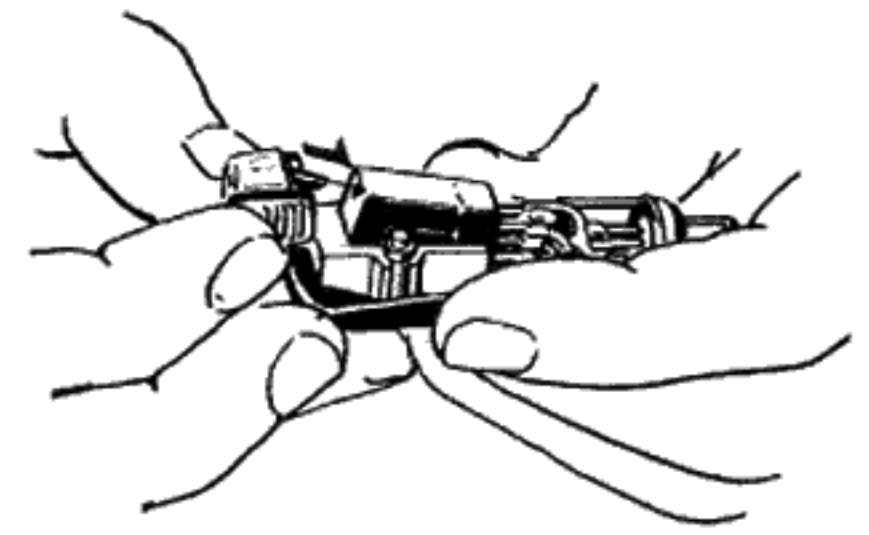


Fig. 27

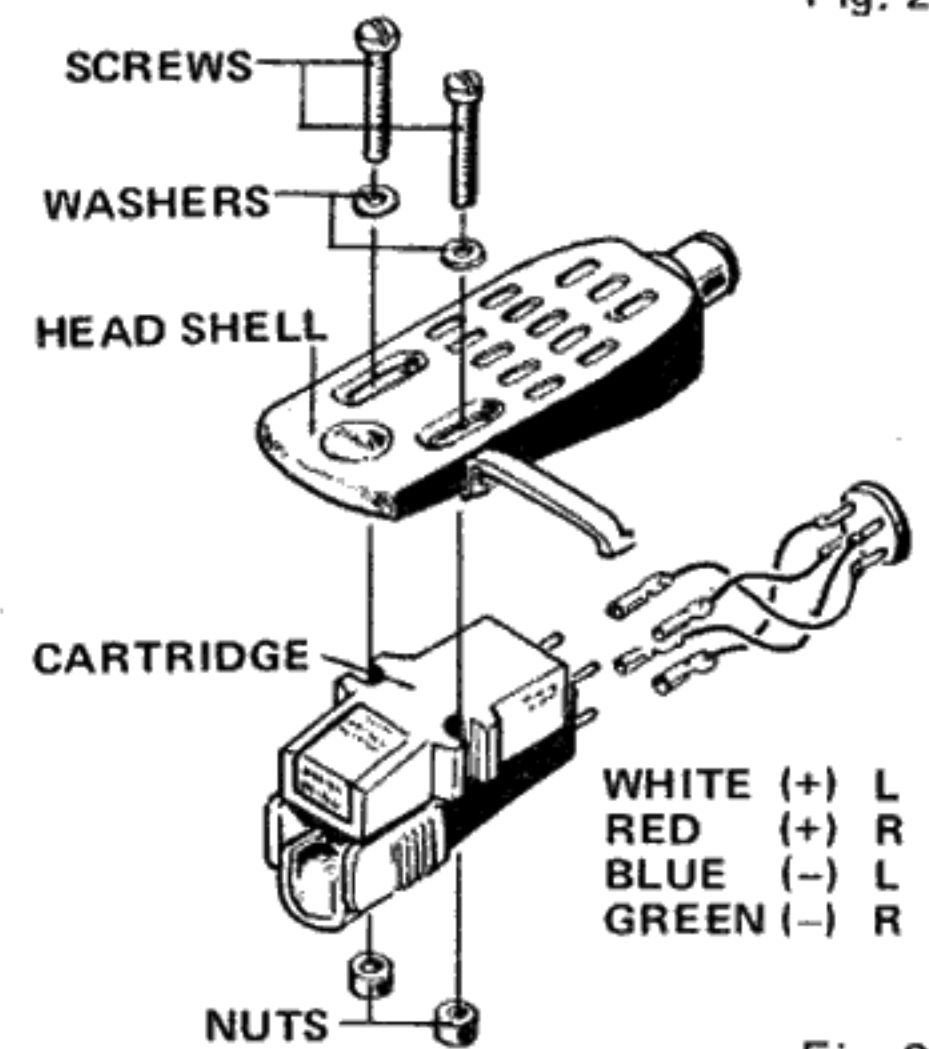


Fig. 28

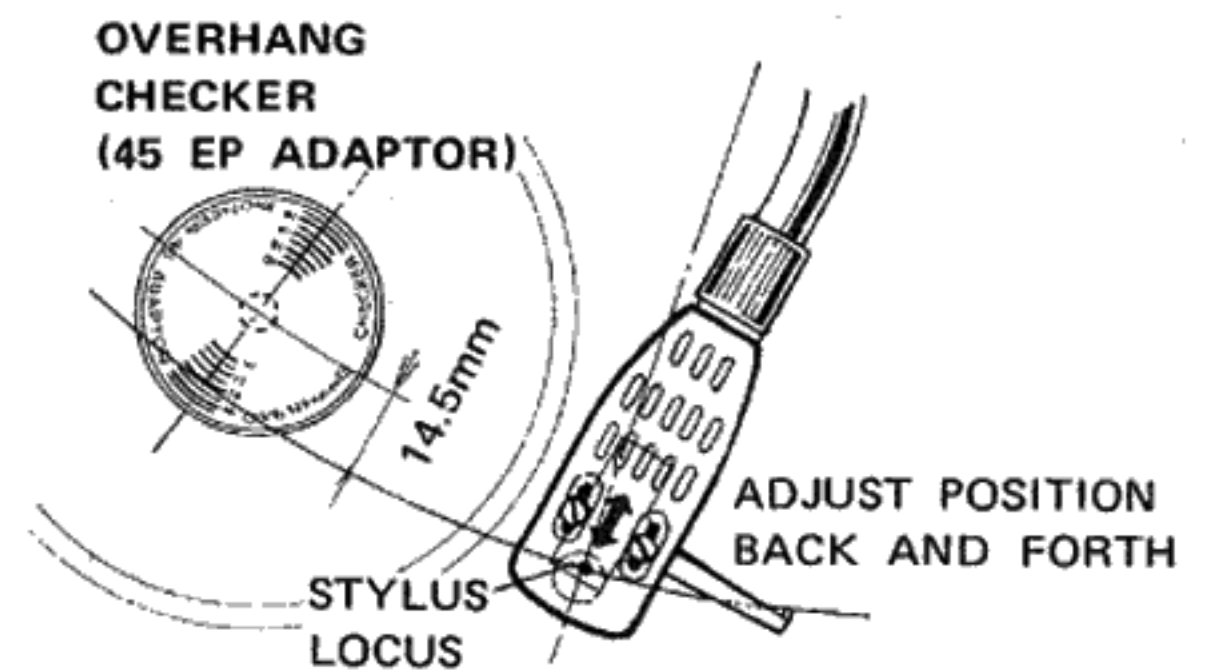


Fig. 29

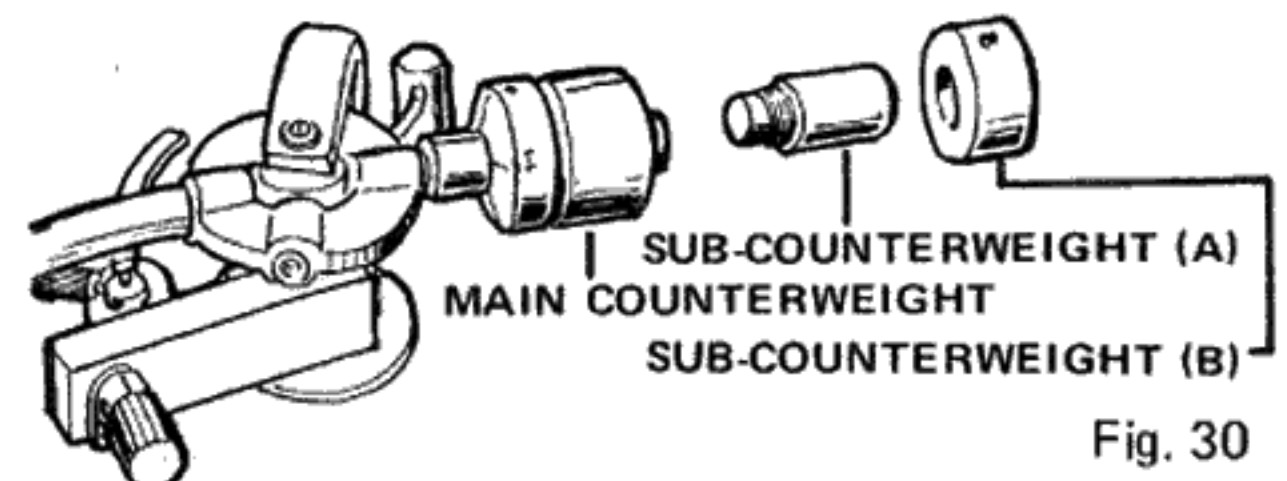


Fig. 30

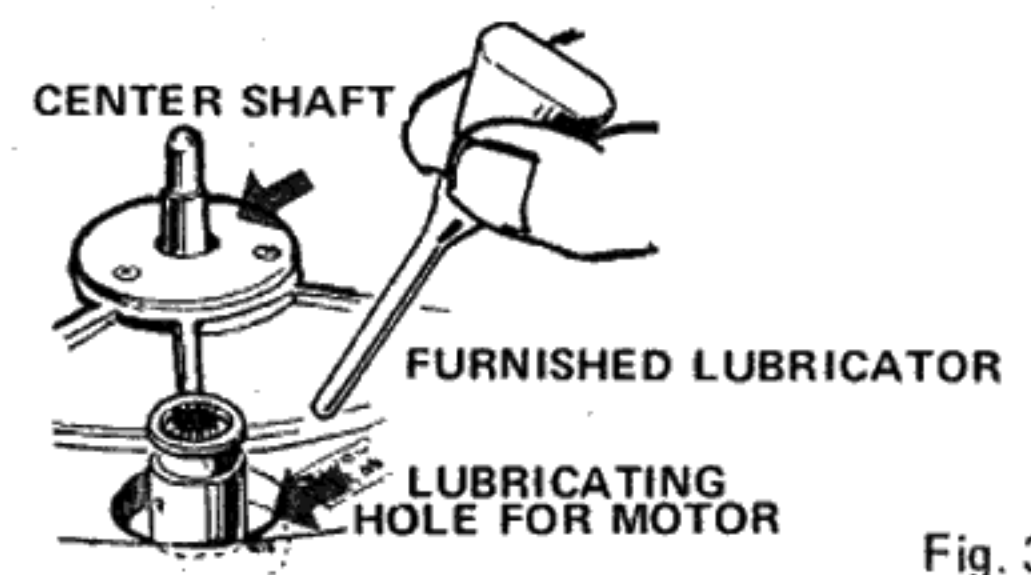


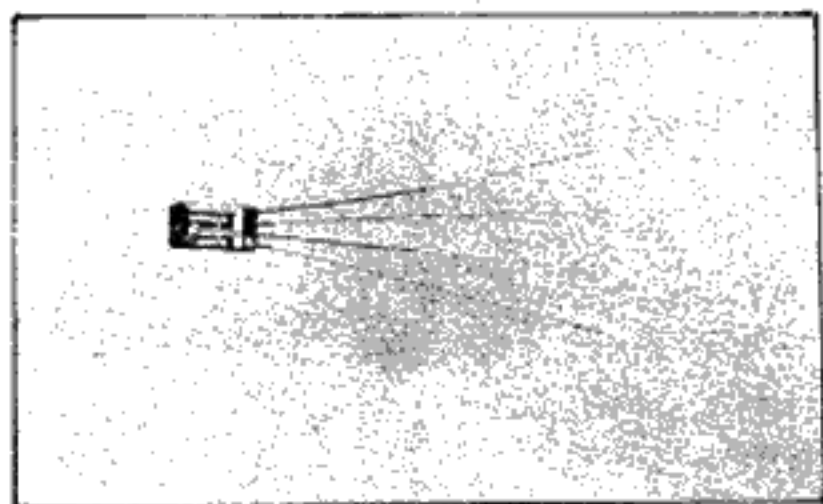
Fig. 31

FUNCTION OF THE HALL MOTOR AND ITS SERVO CONTROL

Among the many demands made upon phono motors for high-quality turntables, the most important three concern vibration, wow & flutter, and electrical noise. Unfortunately, the turntable designer is faced with a dilemma: freedom from vibrations is easier to obtain with a slow-moving motor (because only a simple or no speed reduction mechanism, the worst source of vibrations, is required), but wow & flutter increase (because of the lack of flywheel effect) at slow motor speeds. This problem is solved, i.e., constant speed is obtained with a slow moving motor in the PL-61, by the servo control system outlined below.

THE HALL ELEMENT

The Hall element, named after its inventor, is basically a transducer which "translates" changes in magnetic flux into corresponding voltage fluctuations. To understand its function in this phono motor, the basic principle of electric motors must be examined first.



Every motor operates on the principle that magnetic N and S poles attract and repel each other, and rotational movement can be obtained by switching these N and S polarities in a certain sequence. In AC motors, this switching is done by the (alternating) current itself. The motor speed is determined by the AC frequency (50 or 60Hz) and the number of poles, and very slow speed AC motors cannot easily be built.

In the DC motor (powered by direct current), the switching must be done by some device external to the motor, usually a combination of brushes and commutator. These, however, create a great deal of undesirable electrical noise.

This is where the Hall element comes in. Without direct electrical contact, and without generating any electrical noise, this semiconductor device produces a voltage signal when a magnet — in this case the magnetic rotor — moves past it. This signal can be amplified and used to switch the DC current on and off with the correct timing.

In the past, Hall elements were not used frequently because of difficulties in their production and their

considerable size. Pioneer has finally succeeded in developing a vacuum vapor coating process ("sputtering process") for producing very small Hall elements, and these have made possible the construction of the revolutionary motor used in the PL-61.

THE SERVO CONTROL SYSTEM

The need for a servo system controlling the motor speed is especially evident in slow-speed motors (without much flywheel effect). In the PL-61, it operates, briefly, as follows.

A copper film is attached to a stationary plate mounted on the motor's stator in a pattern as shown in fig. 32 (a), and a pattern as in fig. 32 (b) on a rotating plate fixed to the rotor. The two copper films, with a gap of less than 1 mm between them, act as a capacitor, and the capacitive value changes as one plate rotates.



Fig. 32 (a)



Fig. 32 (b)

This cycle of capacitive change which of course corresponds to the actual motor speed is used, via a field effect transistor, to generate a control signal. After converting this signal into a square wave, it is compared with the calibrated DC voltage that drives the motor, and subtly changes this voltage to return the motor to constant speed if it has deviated. This principle is illustrated in the block diagram (Fig. 33). Example:

Motor speed drops below rated value → Control signal frequency drops → Equivalent DC voltage drops → Comparison with calibrated value shows gap → Driving circuit increases motor current → Motor returns to rated speed.

BLOCK DIAGRAM OF SERVO SYSTEM

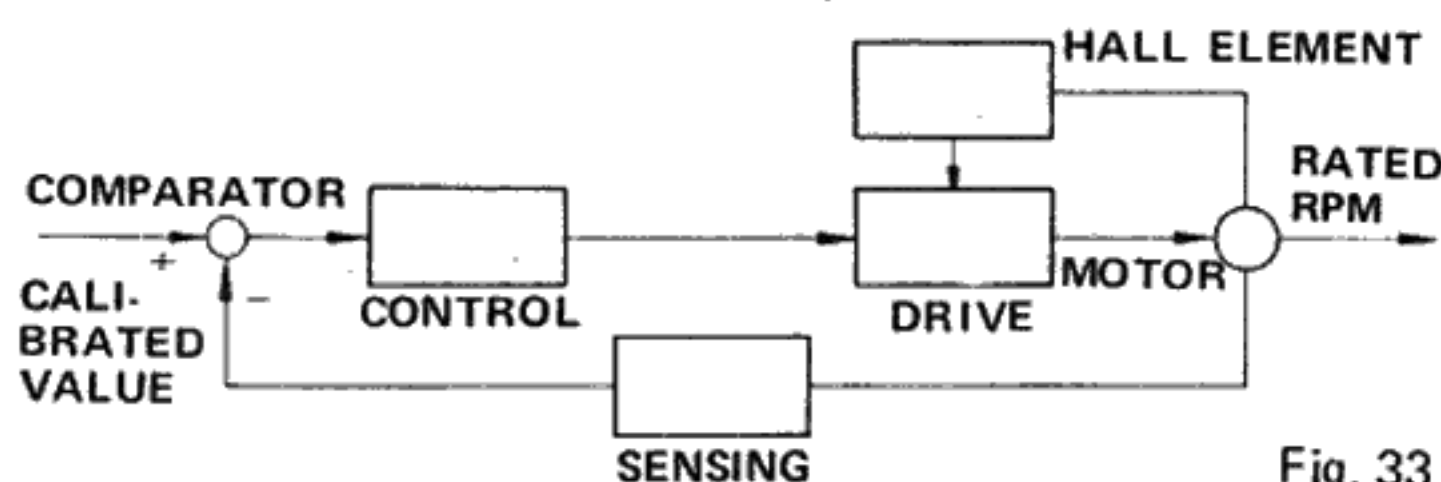


Fig. 33

SPECIFICATIONS

PHONO MOTOR and TURNTABLE

Motor	Brushless DC servo Hall motor
Turntable drive	Belt-driven
Speed	Two speeds: 33-1/3rpm; 45rpm
Wow & flutter	0.05 % (WRMS) or less
S/N	55dB or more (in case of using Pioneer cartridge model PC-50)
Turntable platter	31cm diam. aluminum-diecast alloy

ONEARM

Tonearm type	Static balance, S-type, pipe arm
Effective arm length	224mm
Tracking error	+3°, -1°
Tracking force range	0.5~8g
Usable cartridge weight	31g (max.)
Furnished cartridge	Pioneer cartridge model PC-50 (induced magnet type)

SUB-FUNCTIONS

Large-size shock absorbers	4 height-adjustable feet
Anti-skating force control	
Lateral balance control	
Oil-damping arm elevator	Push-button type
Hinges	Free-adjustable between 30~60°
Speed fine adjusters	33-1/3rpm, 45rpm: for use in turntable speed adjustment with stroboscope
Stroboscope	On turntable platter rim
Level	Provided on top panel: for use in correct placement of turntable

OTHERS (MISCELLANEOUS)

Power requirements	AC, 240V, 220V, 130V, 120V or 110V, 50/60Hz
Power consumption	7.5W (Max.)
Outer dimensions	19-19/32"(W) x 16-7/8"(D) x 7-29/32"(H) [498(W) x 429(D) x 201(H)mm]
Weight	26.5 lb (12 kg)

ACCESSORY GROUP

Lubricator	1
45 EP adaptor	1
(commonly used as overhang checker)	
Weight plate	1
(cartridge weight-adjustable)	
Head shell	1
Sub-counterweights	2
Screwdriver	1
Connection cord	1
Operating instructions	1

FURNISHED CARTRIDGE MODEL PC-50

Type	Induced magnet type
Construction	Super permalloy shield
Frequency response	10~25,000Hz
Output voltage	3.0mV (1kHz 50mm/sec.)
Channel separation	Better than 25dB at 1kHz
Load impedance	30~100kΩ
Impedance	4kΩ at 1kHz
DC resistance	1, 840Ω
Static compliance	22 x 10 ⁻⁶ cm/dyne
Dynamic compliance	12 x 10 ⁻⁶ cm/dyne at 100Hz
Stylus point	0.5 mil diamond
Stylus for replacement	Pioneer stylus model PN-50
Tracking force (stylus pressure)	1.5~2.1g
Weight	5.8 g
All conform to EIA specifications	

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

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