

# PS-T15

*US Model  
Canadian Model  
AEP Model  
UK Model  
E Model*



## STEREO TURNTABLE SYSTEM

### SPECIFICATIONS

#### GENERAL

<b>Power Requirements:</b>	120V ac, 60 Hz (US, Canadian model) 220V ac, 50/60 Hz (AEP model) 110–120 V or 220–240 V ac, 50/60 Hz (E model) 240V ac, 50/60 Hz (UK model)
<b>Power Consumption:</b>	6W (US, Canadian model) 8W (AEP, E, UK model)
<b>Dimensions:</b>	Approx. 445 (w) x 140 (h) x 375 (d) mm 17½ (w) x 5½ (h) x 14¾ (d) inches including protecting parts and controls
<b>Weight:</b>	Approx. 5 kg, 11 lb (net) Approx. 6.3 kg, 13 lb 14 oz (in shipping carton; US, Canadian model) Approx. 6 kg, 13 lb 4 oz (in shipping carton; AEP, E, UK model)

#### TURNTABLE


<b>Platter:</b>	31.3 cm (12 <sup>5</sup> / <sub>16</sub> inches), aluminum-alloy diecast
<b>Motor:</b>	DC servo-controlled motor (brushless and slotless)
<b>Drive System:</b>	Direct drive
<b>Speed:</b>	33 <sup>1</sup> / <sub>3</sub> rpm, 45 rpm
<b>Pitch Control Range:</b>	±4%
<b>Wow and Flutter:</b>	±0.065% (DIN) (AEP, E, UK model) 0.04% (WRMS)
<b>Signal-to-Noise Ratio:</b>	70 dB (DIN-8)
<b>Automatic System:</b>	Return, reject

— Continued on page 2 —

#### ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET UNE MARQUE  SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DES SUPPLÉMENTS PUBLIÉS PAR SONY.

#### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK  ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

**SONY**<sup>®</sup>  
**SERVICE MANUAL**



## TONEARM

**Type:** Statically balanced, universal  
**Pivot-to-stylus Length:** 216.5 mm (8 $\frac{1}{2}$  inches)  
**Overall Arm Length:** 300 mm (11 $\frac{7}{8}$  inches)  
**Overhang:** 16.5 mm ( $\frac{21}{32}$  inch)  
**Tracking Error:** +3°, -1°  
**Tracking Force Adjustment Range:** 0–3 g  
**Headshell Weight:** 8 g  
**Cartridge Weight Range:** 4–10 g

## CARTRIDGE

(VL-34G: Canadian model)

**Type:** Moving magnet  
**Frequency Range:** 10–30,000 Hz  
**Channel Separation:** 25 dB (1 kHz)  
**Output Voltage:** 3 mV (1 kHz, 5 cm/sec, 45°)  
**Load Impedance:** 50 k $\Omega$   
**Stylus:** ND-134G (Conical 0.6 mil diamond)  
**Tracking Force:** 1.5–2.5 g (2 g recommended)  
**Weight:** 5.5 g

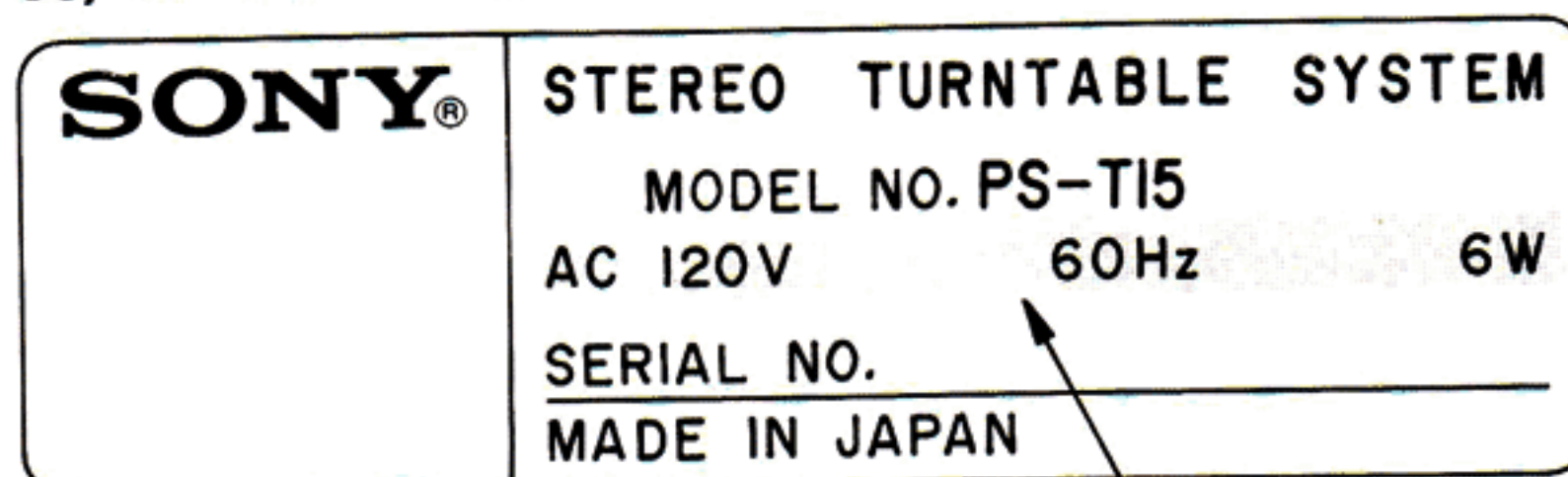
(XL-15: AEP, E, UK model)

**Type:** Moving magnet  
**Frequency Range:** 10–30,000 Hz  
**Channel Separation:** 25 dB (1 kHz)  
**Output Voltage:** 4 mV (1 kHz, 5 cm/sec, 45°)  
**Load Impedance:** 50–100 k $\Omega$   
**Stylus:** ND-15G (Conical 0.6 mil diamond)  
**Tracking Force:** 1.2–2.5 g  
**Weight:** 5.2 g

## MODEL IDENTIFICATION

– Specification Label –

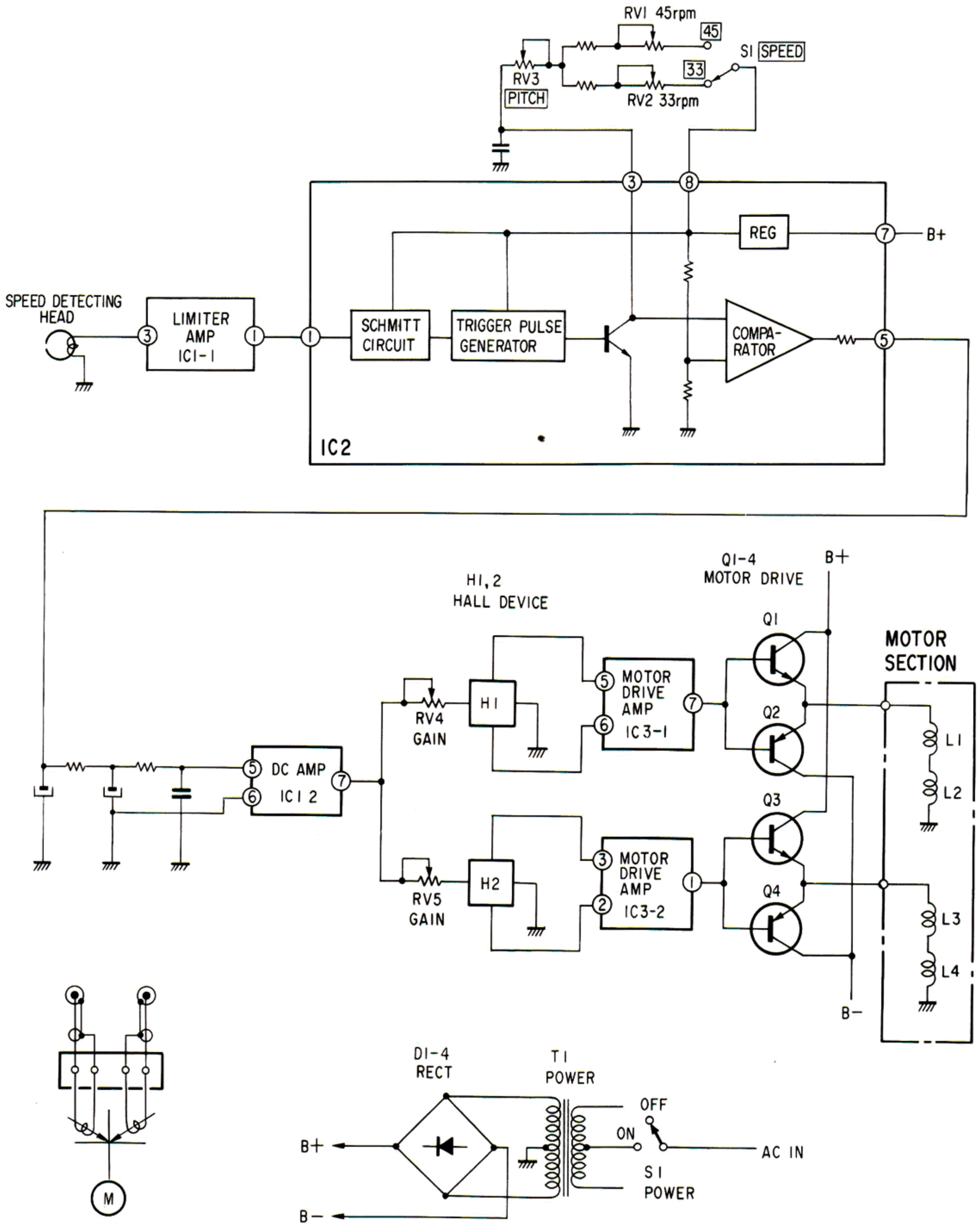
US, Canadian model



AC 120V                      60 Hz    6W ... US, Canadian model  
AC ~ 220V                    50/60 Hz 8W ... AEP model  
AC ~ 240V                    50/60 Hz 8W ... UK model  
AC 110–120V, 220–240V 50/60 Hz 8W ... E model

# SECTION 1 OUTLINE

## 1-1. BLOCK DIAGRAM





## General Description

Motor Servo System is explained in Block Diagram of Fig. 1-1.

Apply the voltage  $V_i$  to the motor coil to rotate at a given speed  $\omega$ , soon the motor reaches the speed  $\omega$ .

When any changes occur in the rotational speed, a detector reads the amount of the error and the feedback circuit produces the voltage  $V_f$  required to correct the speed, returning  $V_f$  to the input.

Servo System works to keep the speed constant by adding or subtracting a fraction  $V_f$  of the output to the input  $V_i$ .

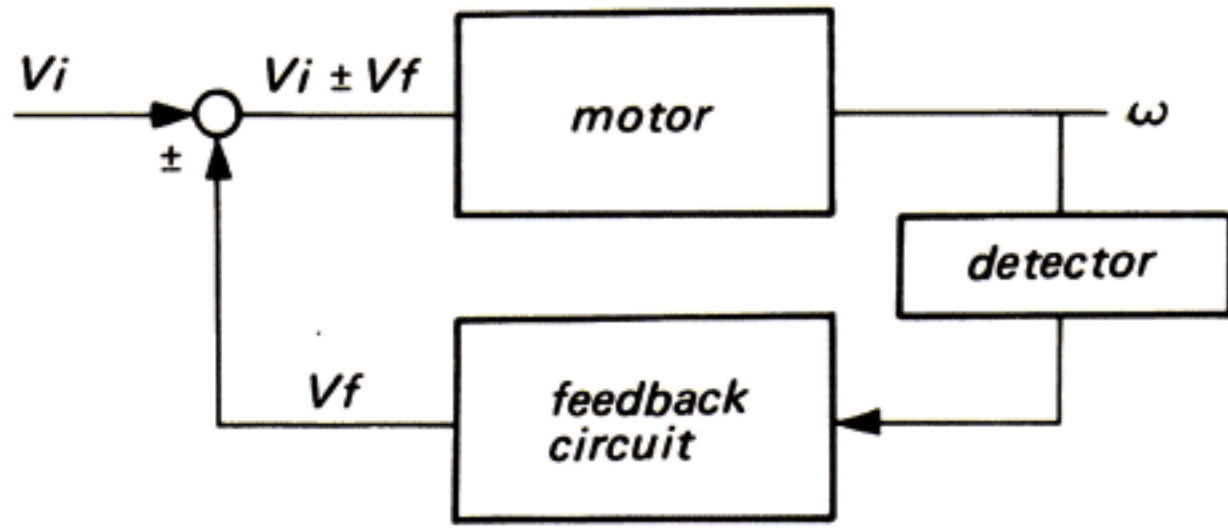


Fig. 1-1

The servo motor employs the frequency generator (FG) as a detector and the feedback circuit as shown in Fig. 1-2.

The signal voltage generated in FG is fed to the limiter amplifier to eliminate the voltage fluctuation, and in the next stage of the frequency discriminator the variation of the frequency is converted into the voltage proportioned to the rotational speed.

This voltage is rectified, amplified by DC amplifier and supplied to the motor.

The reference standard frequencies detected by the multi-gap head (MGH) are 284 Hz at 33 rpm and 384 Hz at 45 rpm.

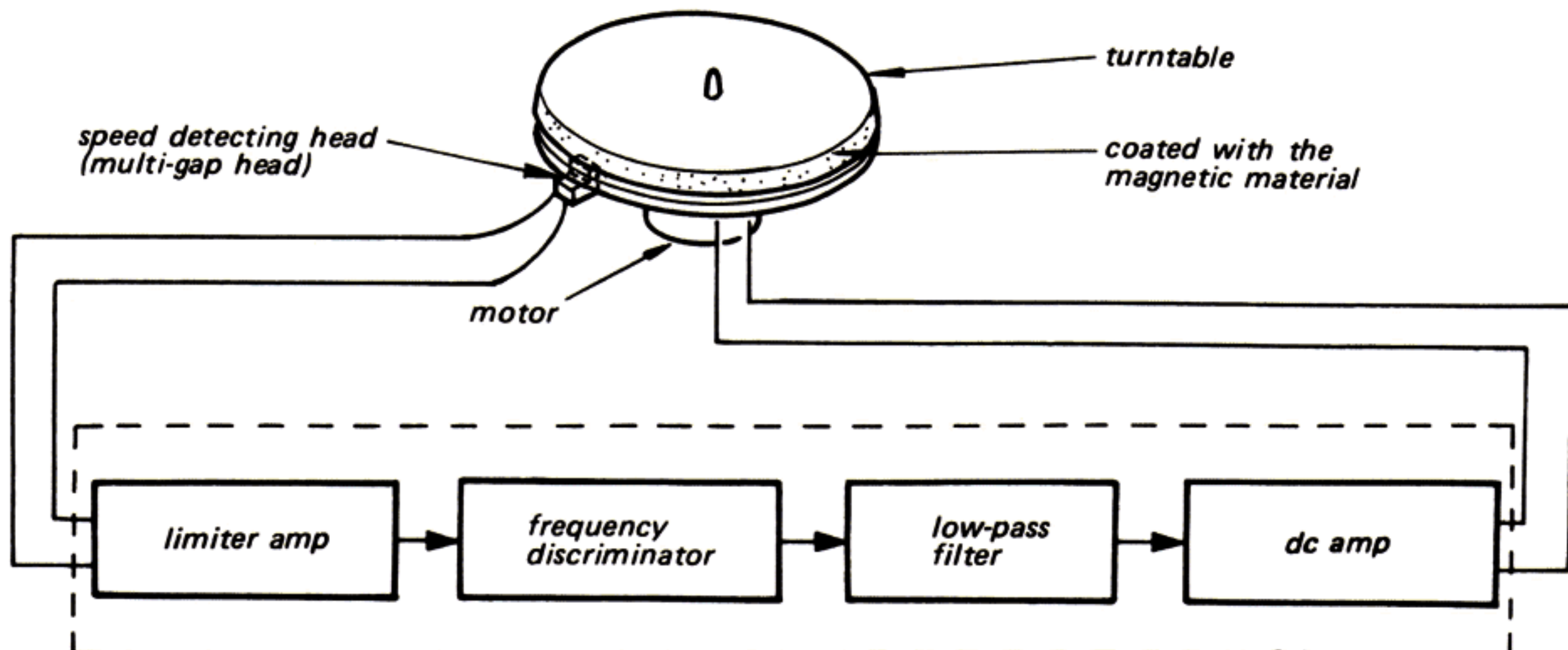


Fig. 1-2

## Limiter Circuit

1. Once the turntable starts to rotate, an output is produced by the MG head.
2. Although the MG head output signal is a sine wave, there is some fluctuation in amplitude. IC1-1 is employed to remove this voltage fluctuation. C1 serves to eliminate the radiating high-frequency noises picked up by the MG head.

## Sawtooth Wave Generator Circuit

1. The IC1-1 output signal is applied to the terminal 1 of IC2 (Schmitt circuit) to obtain a complete square wave signal. This signal is applied to the trigger-pulse generator circuit to produce the trigger signal for the sawtooth wave generator circuit IC2.
2. The sawtooth wave signal on the terminal 3 of IC3 is applied to the comparator circuit. The sawtooth wave level is compared with the reference voltage produced by voltage division of B+ voltage in the comparator.
3. The two output difference is extracted from the comparator output as a pulse-width. When the motor is rotating at a speed slower than the predetermined value, the output pulse-width is wider than the reference standard value. When the motor is rotating too fast, the operation of the circuit is vice versa.



## Smoothing Circuit (low-pass filter)

The smoothing circuit comprises C4, R4, C5, R5, C6 and IC1-2. This filter serves as an integrating circuit which converts the pulse signals into dc signals (the voltage level being in proportion to pulse width).

## DC Amplifier Circuit

IC1-2 is the dc amplifier (that also serves as a low-pass filter) and amplifies the dc output signals from the previous stage.

## Servo Control

If for any reason, motor speed decreases or increases, even by the slightest degree, the servo control mechanism is activated to correct for the deviation, and returns the speed to the reference standard value.

1. If the motor speed is decreased slightly, the frequency of the MG head output signal decreases, resulting in the width of the comparator output pulse being widened as described above.
2. The dc output voltage from the low-pass filter consequently decreases, thereby increasing the motor speed back to the original standard value.
3. If, on the other hand, the motor speed is increased by some external influence, the servo control mechanism reduces speed in the reverse manner of that described above.

## Servo System

Any changes in the rotational speed of the motor can be corrected in the servo circuit and the motor speed is kept constant.

The servo system works as follows.

1. When the speed of the motor slows down, the frequency of the signal generated by the speed detecting head (multi-gap head) becomes low and the pulse width obtained from the comparator becomes wide.
2. Consequently, dc voltage through the low-pass filter increases, the motor speed increases and reaches the given speed.

【SERVO AMP BOARD】

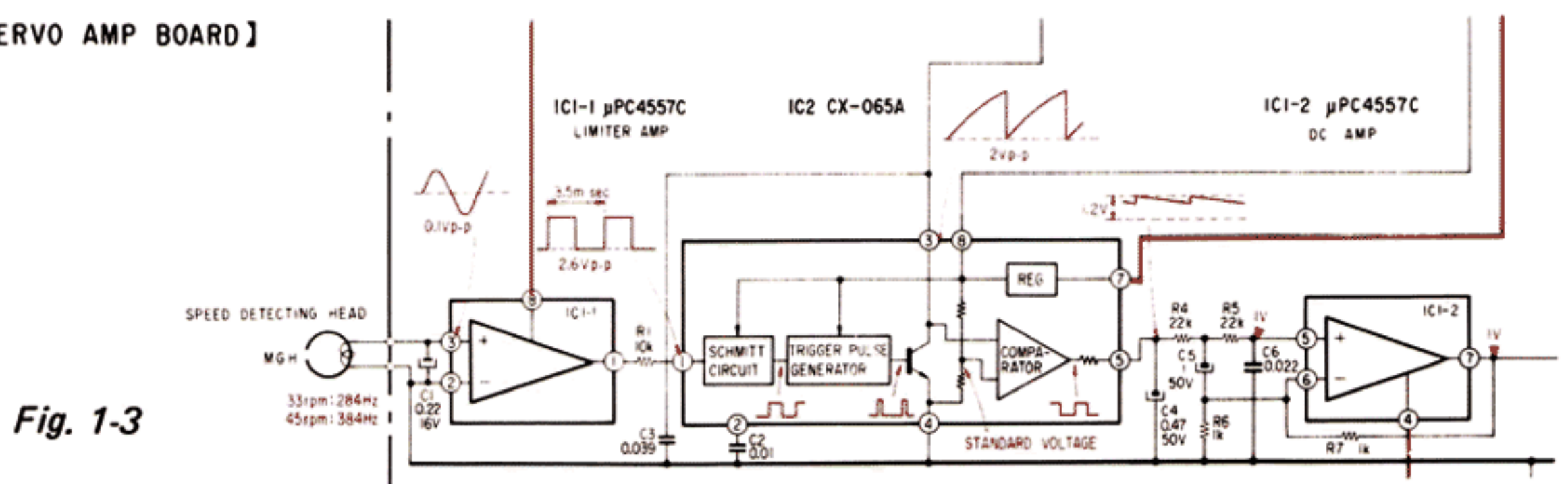


Fig. 1-3

## Hall Motor

The PS-T15 is equipped with the newly developed BSL (brush and slotless) dc servo motor, which has the following major advantages.—

- Extremely uniform torque.
- All-electronic switching (no mechanical contacts used at all), resulting in very little noise.
- Extremely stable performance, and long operational life.

### 1. Hall Element

The magnetic field strength is converted into electrical signals by employing the Hall Effect.

Hall Effect: When a metal strip is placed with its plane perpendicular to a magnetic field and an electric current flows longitudinally through the strip, a potential difference is developed across the strip at right angles to the current flow and to the magnetic field.

The potential is proportional to amounts of the current and a strength of the magnetic field.

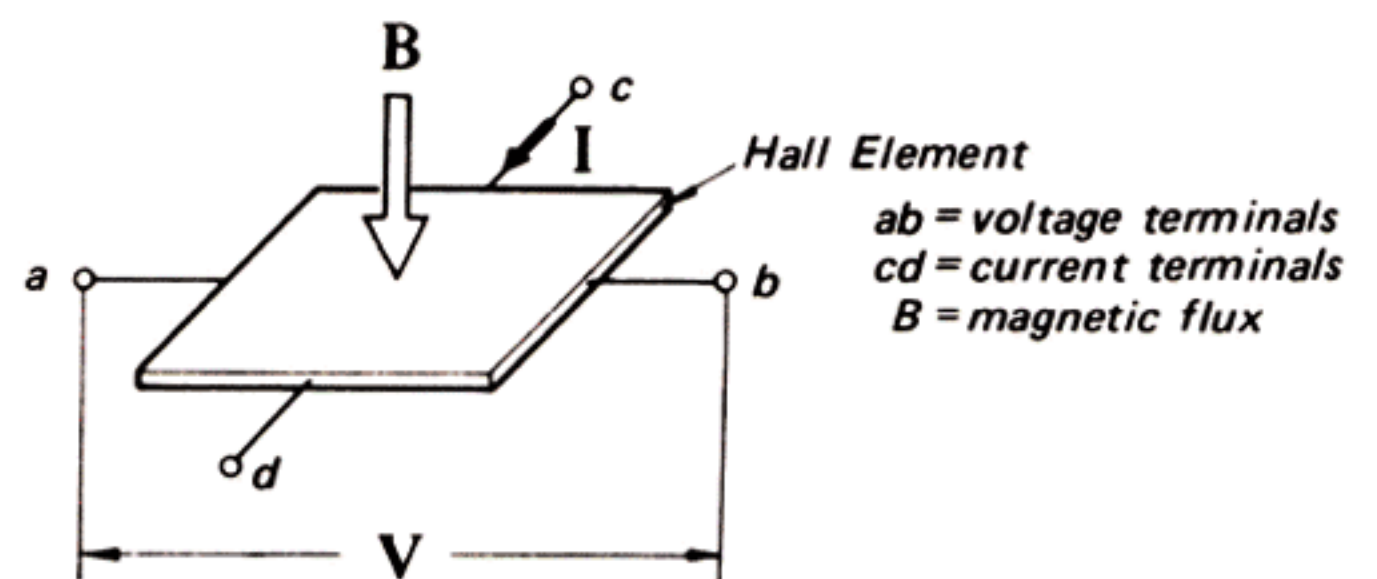


Fig. 1-4

When the N pole approaches.

When the S pole approaches.

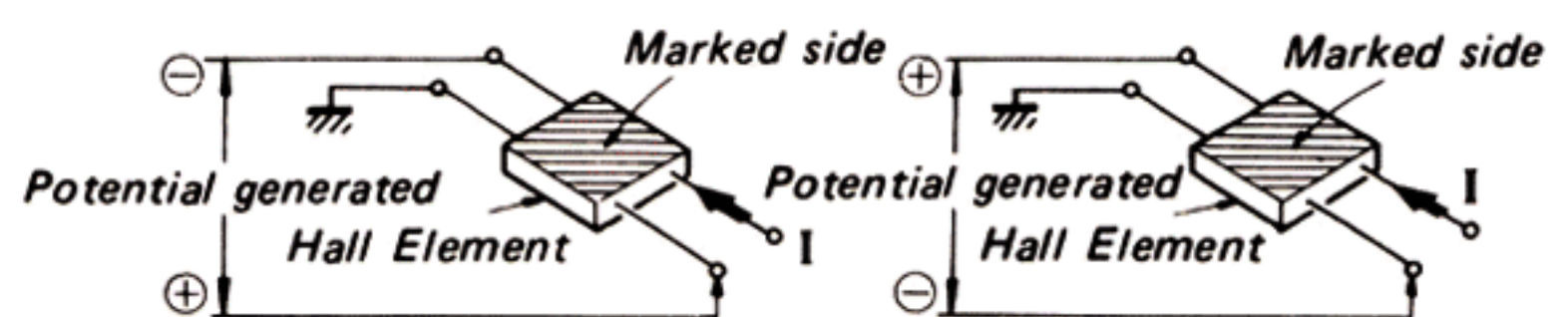


Fig. 1-5



## 2. Exploded View

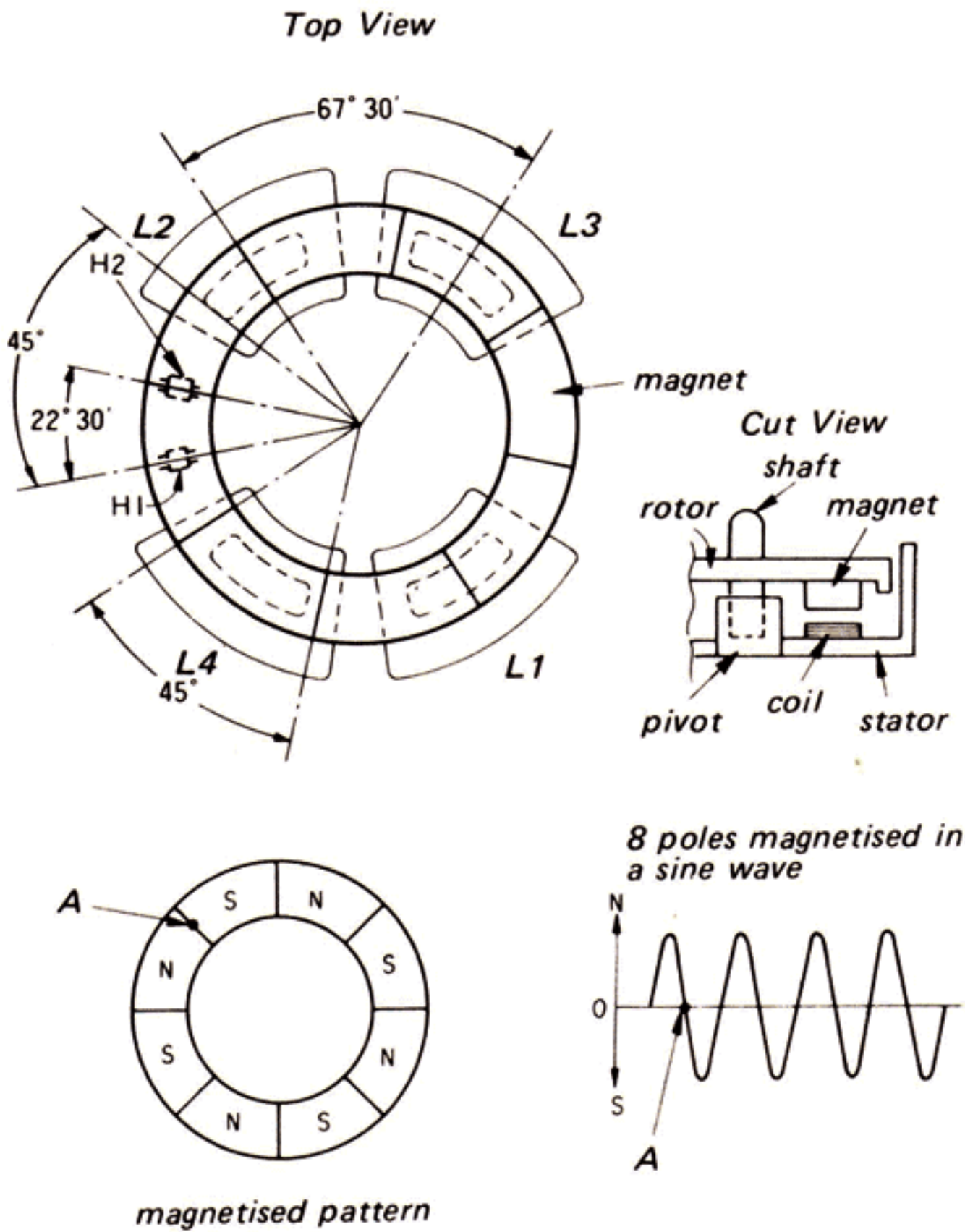


Fig. 1-6

- The motor coils L1 and L2 (L3 and L4) form a pair, in series.
- In order to change the phase of two signals by 90°, Hall elements H1 and H2 are positioned 22° 30' apart.
- In order to change the phase of two signals fed to L1 and L3 (L2 and L4) by 90°, coils are positioned at 67° 30' apart.
- The center angle of the coil is 45° so that the coil can face the magnets of which 8 poles are positioned every 45° apart.
- The angle between the Hall element and the coil is 45° so that the flux peak of the coil comes to the flux peak of the magnet.

## 3. Generation of Rotational Force

According to the Fleming's left-hand rule, the force generated in the motor coil is in the counterclockwise direction, but since the coils are fixed, so that the magnet (rotor) rotates clockwise.

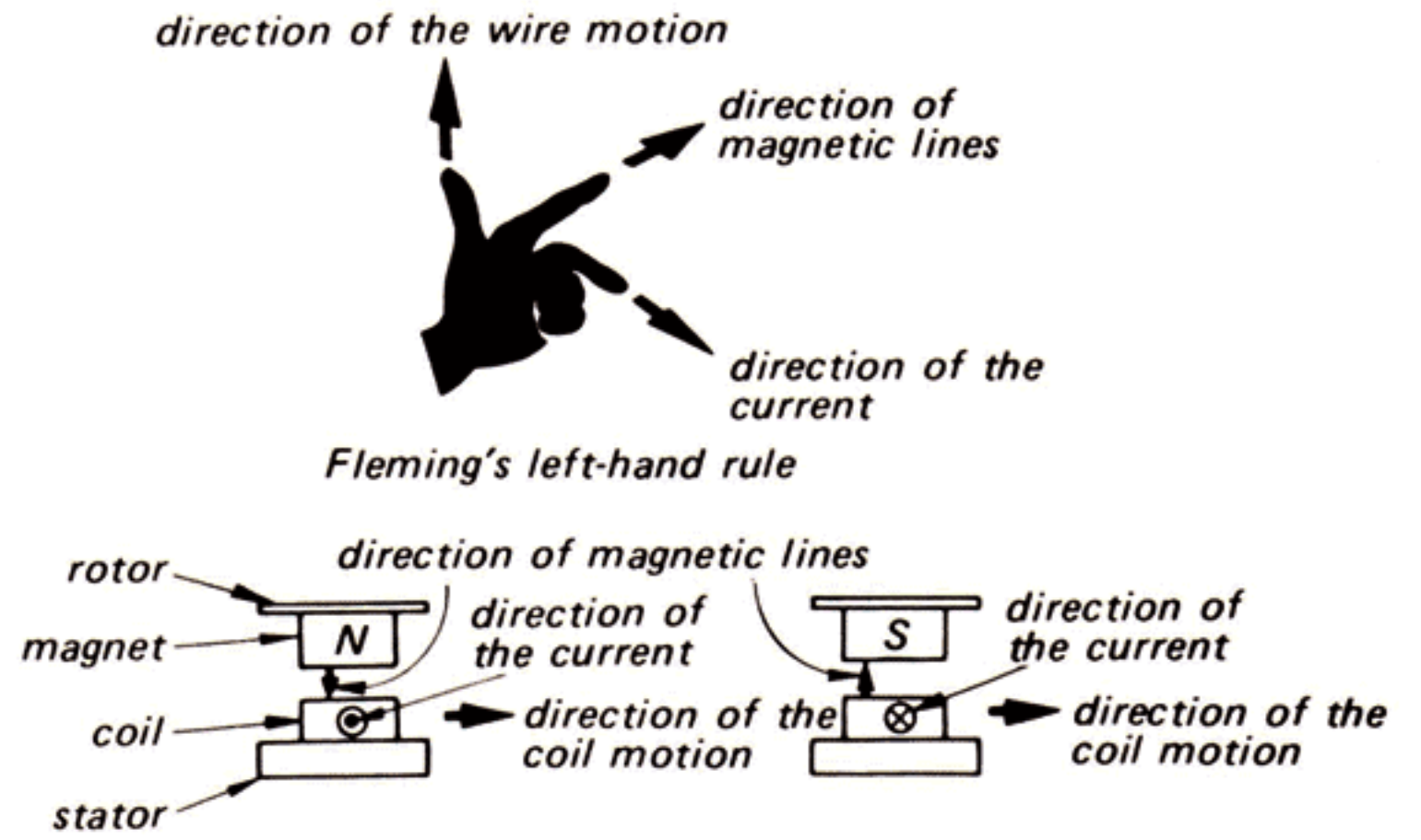


Fig. 1-7

When an S pole corresponds to the Hall element H1 (shown in the Fig. 1-8), a positive voltage is generated in H1. This voltage is then amplified by IC3-1, and applied to Q1.

When Q1 is turned on, B+ voltage is applied to L1 and L2. The current flowing through L1 and L2, and the magnetic field produce an electro-magnetic force which spins the rotor in the direction of the arrow as shown in Fig. 1-8.

When an S pole corresponds to the Hall element H2 as shown in Fig. 1-8, current flows through L3 and L4, thereby generating the same electro-magnetic force to continue spinning the rotor.

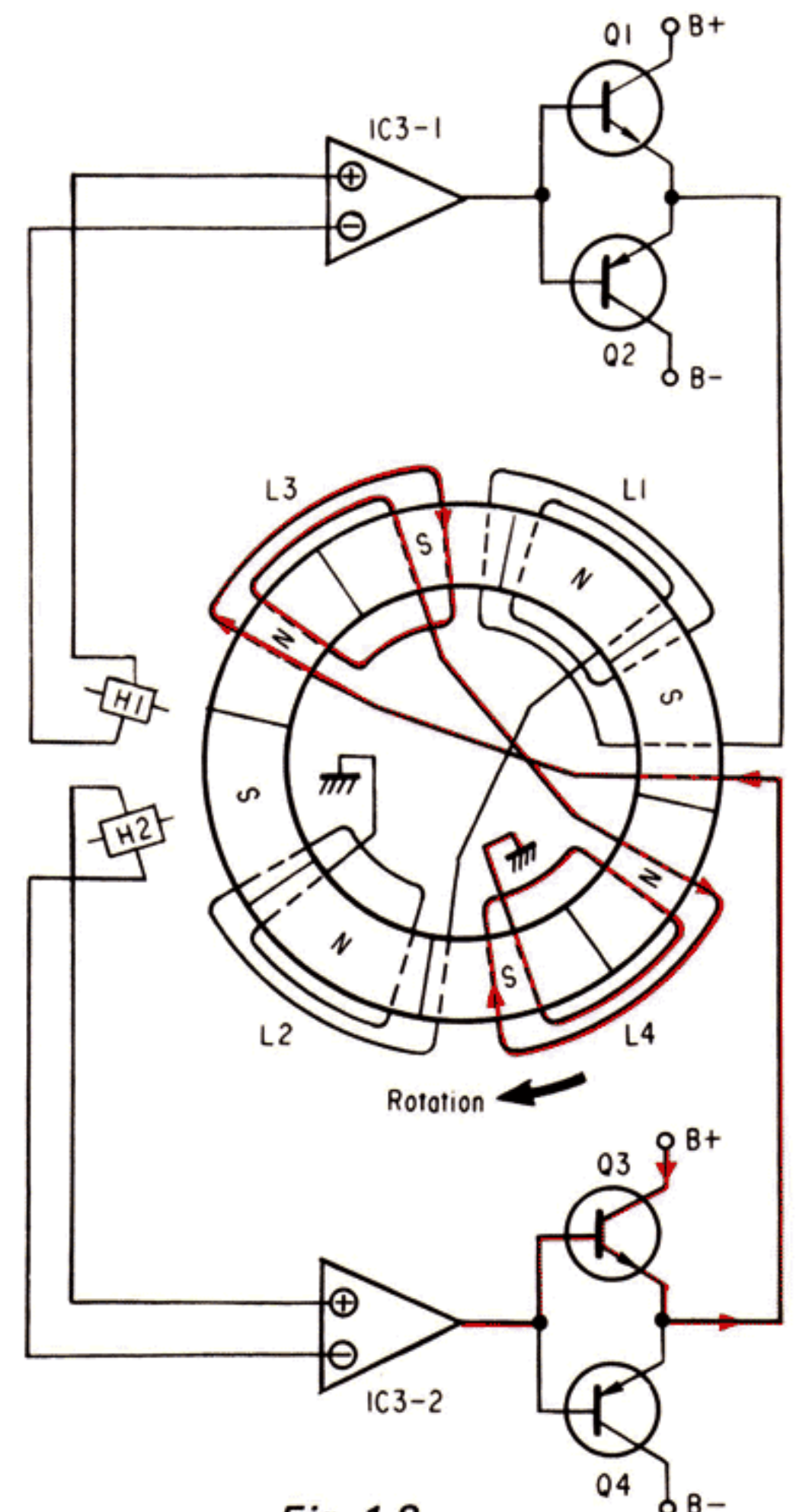


Fig. 1-8



When an N pole corresponds to the Hall element H1 (shown in Fig. 1-9), a negative voltage is generated in H1. This voltage is then amplified by IC3-1, and applied to Q2.

When Q2 is turned on, B- voltage is applied to L1 and L2. The current flowing through L1 and L2, and the magnetic field produce an electro-magnetic force which spins the rotor in the direction of the arrow as shown in Fig. 1-9.

When an N pole corresponds to the Hall element H2, current flows through L3 and L4, thereby generating the same electro-magnetic force to continue spinning the rotor.

Hence, N and S poles are repeatedly positioned oppositely to the Hall elements H1 and H2 every  $22^{\circ}30'$  of a rotation thereby generating the voltages in these elements, resulting in the production of a current in the motor coils, and subsequent rotation of the motor.

The phase relationship between coils L1, L2 and L3, L4 are as follows:

4. Torque

A motor torque is proportional to a strength of magnetic flux (B) and amounts of current which flows in coils.

Therefore,  $F = B I$

When the rotor which is magnetised in a sine wave pattern rotates, the Hall elements detect the variation of the magnetic flux ( $B_1 = B_0 \sin \omega t$ ).

This controlled current ( $I_1 = I_0 \sin \omega t$ ) is supplied to the one coil.

On the other hand, the current, which leads the phase angle by  $90^{\circ}$ , is supplied to the other coil.

Thus,  $B_2 = B_0 \sin (\omega t + 90^{\circ}) = B_0 \cos \omega t$ .

$$I_2 = I_0 \sin (\omega t + 90^{\circ}) = I_0 \cos \omega t.$$

And, when both torques ( $F_1 = B_1 I_1$ ,  $F_2 = B_2 I_2$ ) are produced simultaneously, their combined torque is constant as shown by the following formula.

$$\begin{aligned} F &= F_1 + F_2 \\ &= B_1 I_1 + B_2 I_2 \\ &= B_0 I_0 \sin^2 \omega t + B_0 I_0 \cos^2 \omega t \\ &= B_0 I_0 (\sin^2 \omega t + \cos^2 \omega t) \\ &= B_0 I_0 \text{ constant} \end{aligned}$$

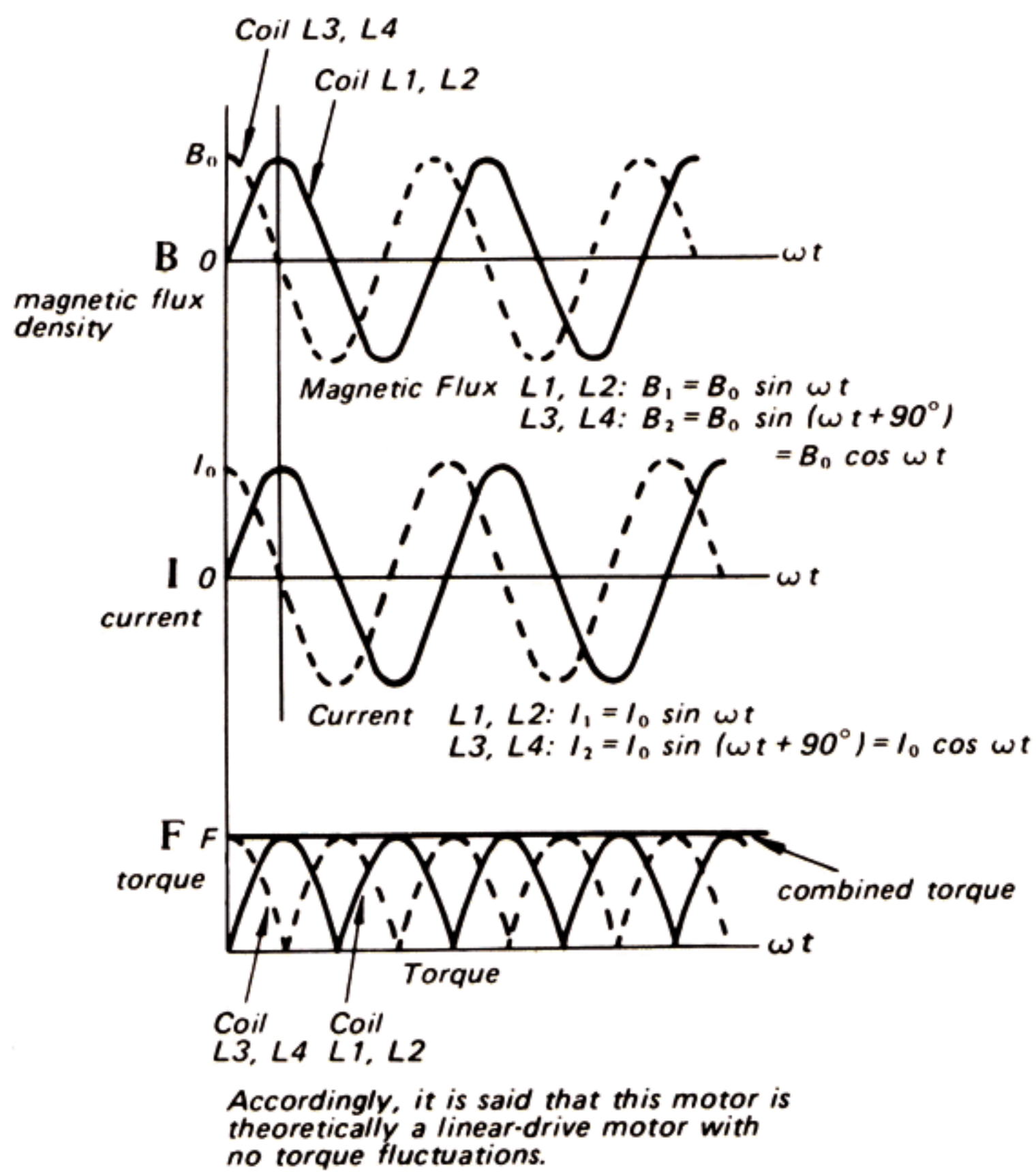


Fig. 1-11

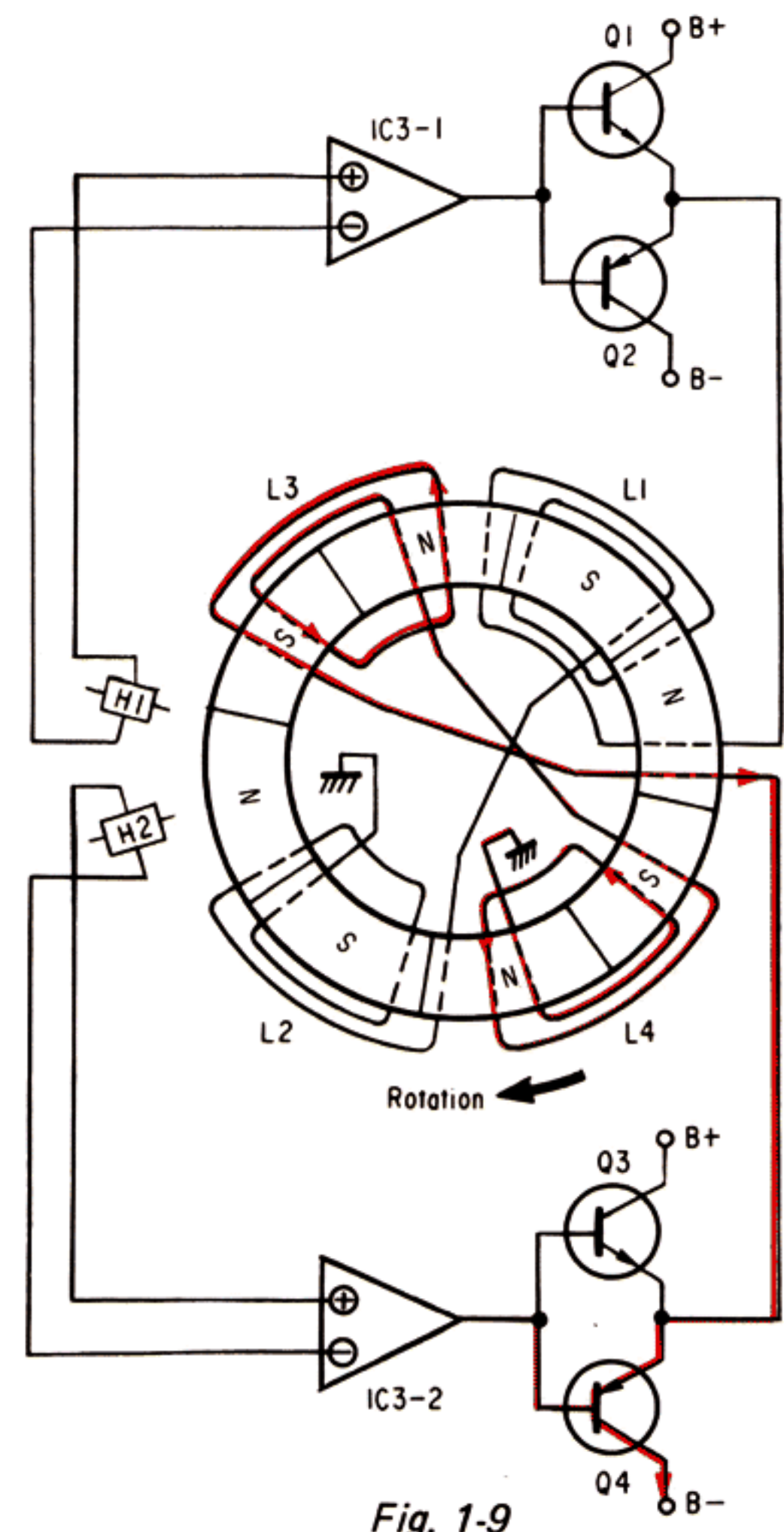


Fig. 1-9

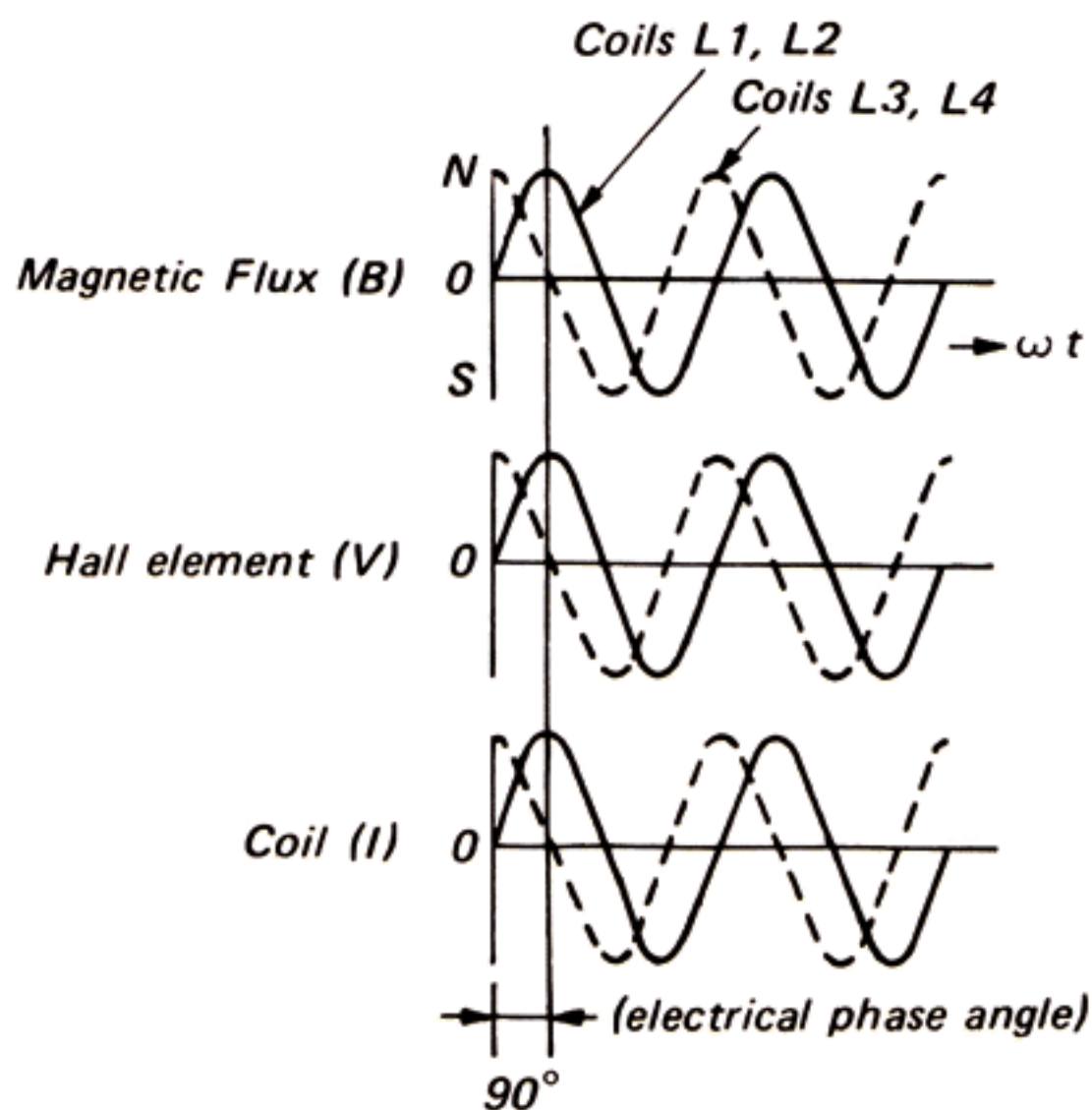


Fig. 1-10







Note: Follow the disassembly procedure in the numerical order given.

## SERVO AMP BOARD AND MOTOR SECTION REMOVAL

1. Remove four screws and straighten the hooks ① and ② as shown in Fig. 2-5.
2. Confirm that the positions of the center gear and the drive gear are as shown in Fig. 2-5. Then, remove the servo amp board and the motor section downward. (Enclosed by the broken line in Fig. 2-4.)



Fig. 2-4

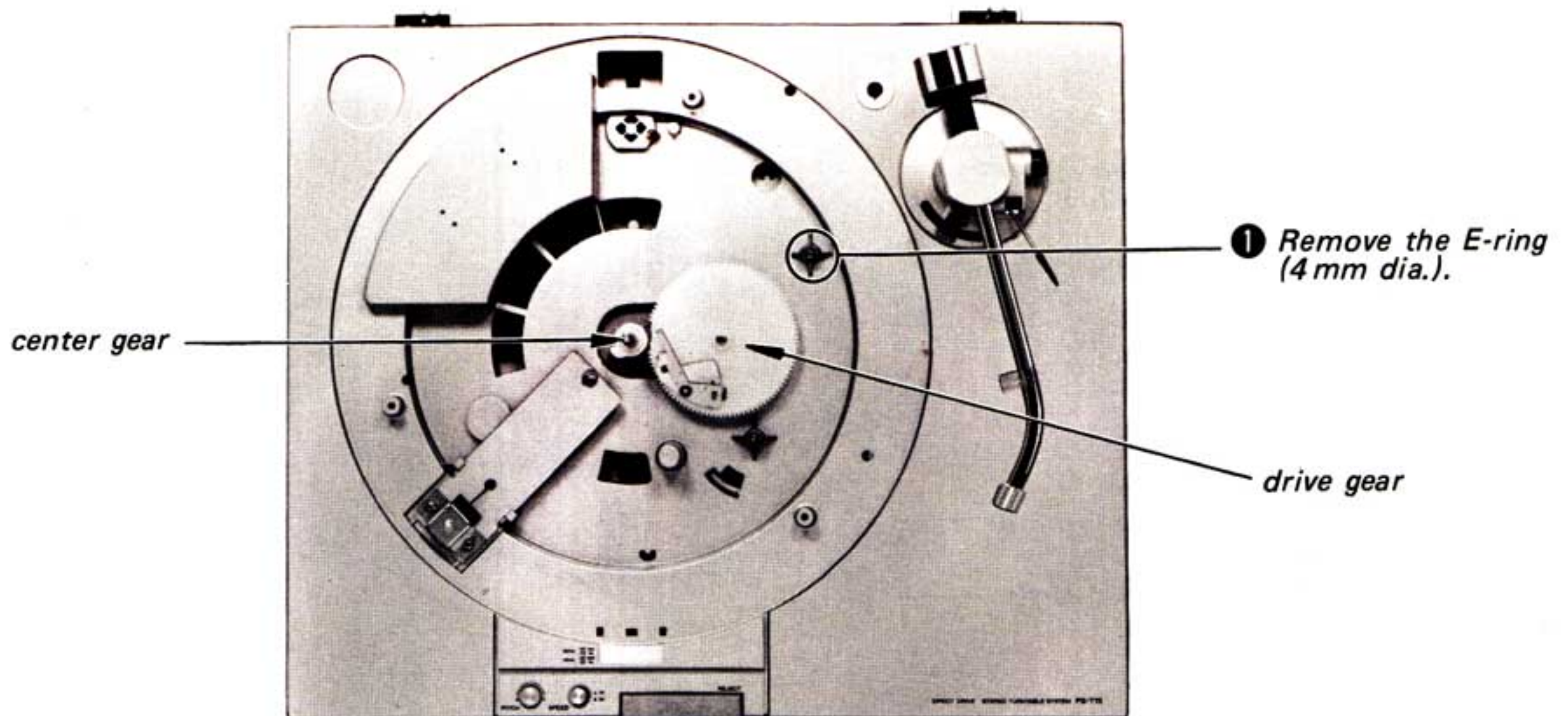


Fig. 2-5



**TONARM REMOVAL**

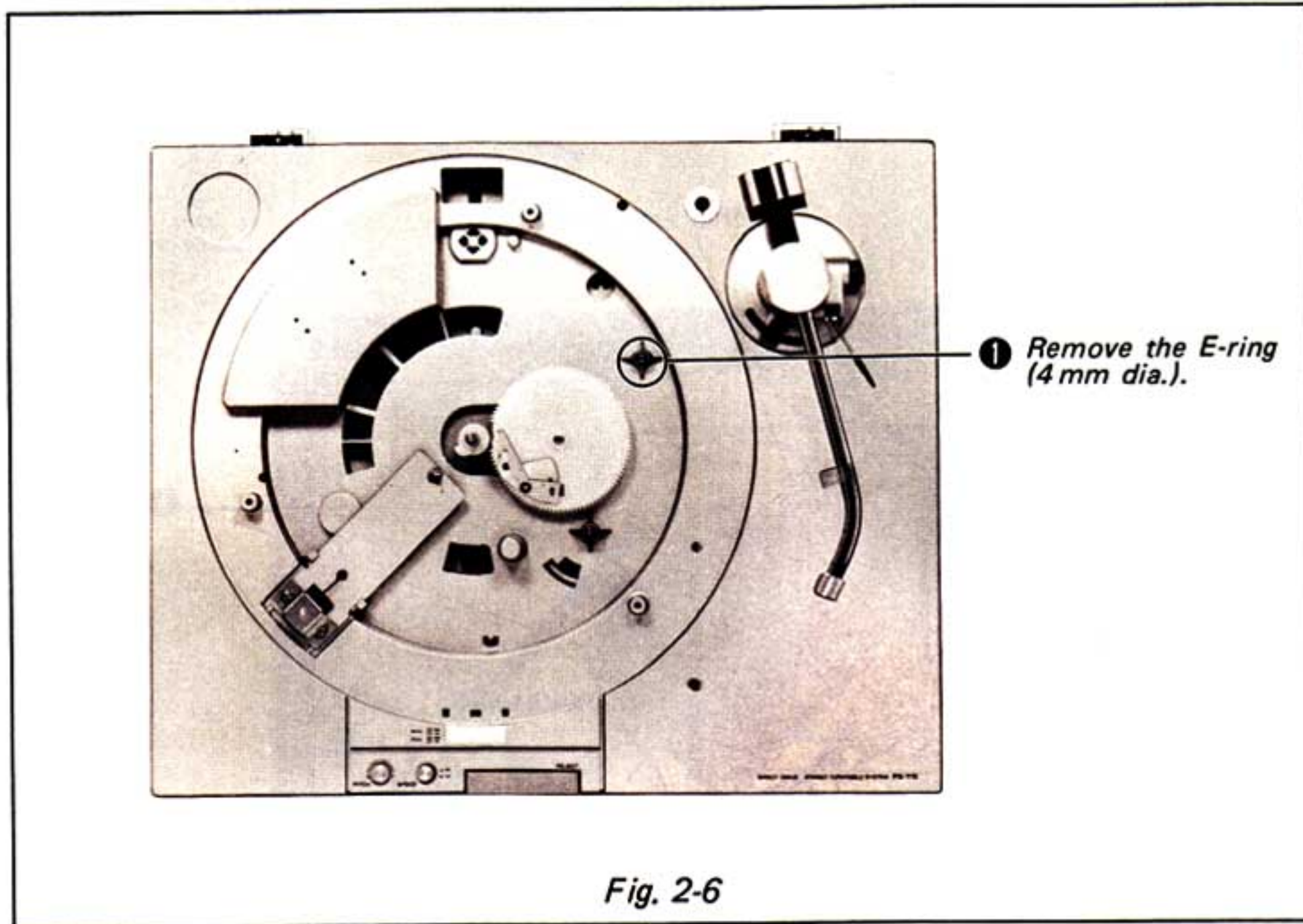


Fig. 2-6

Turn the set upside-down and proceed 2, 3, 4 and 5 as shown in Fig. 2-7.

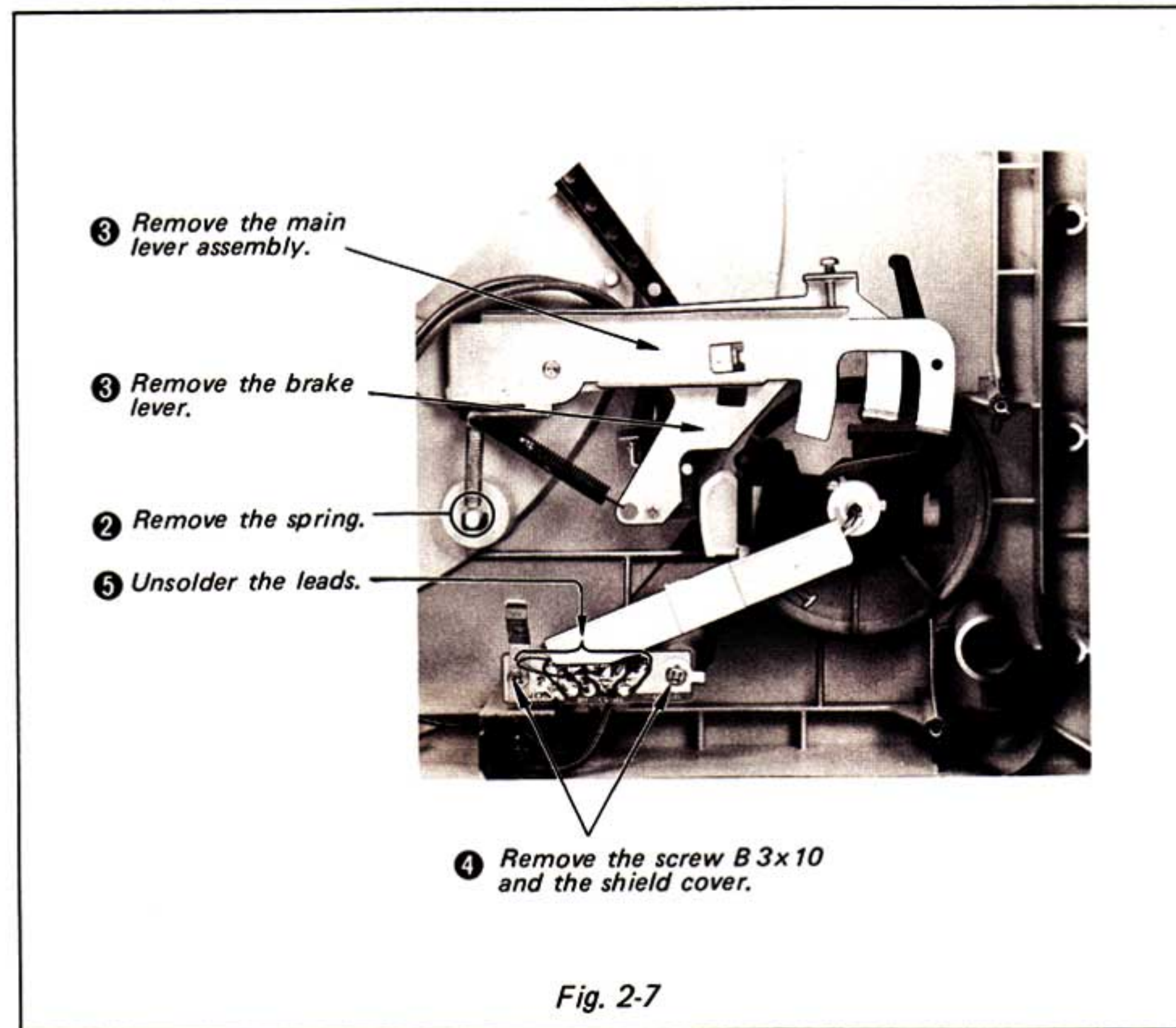


Fig. 2-7

Loosen the screw and pull up the arm lever assembly from the tonearm shaft.

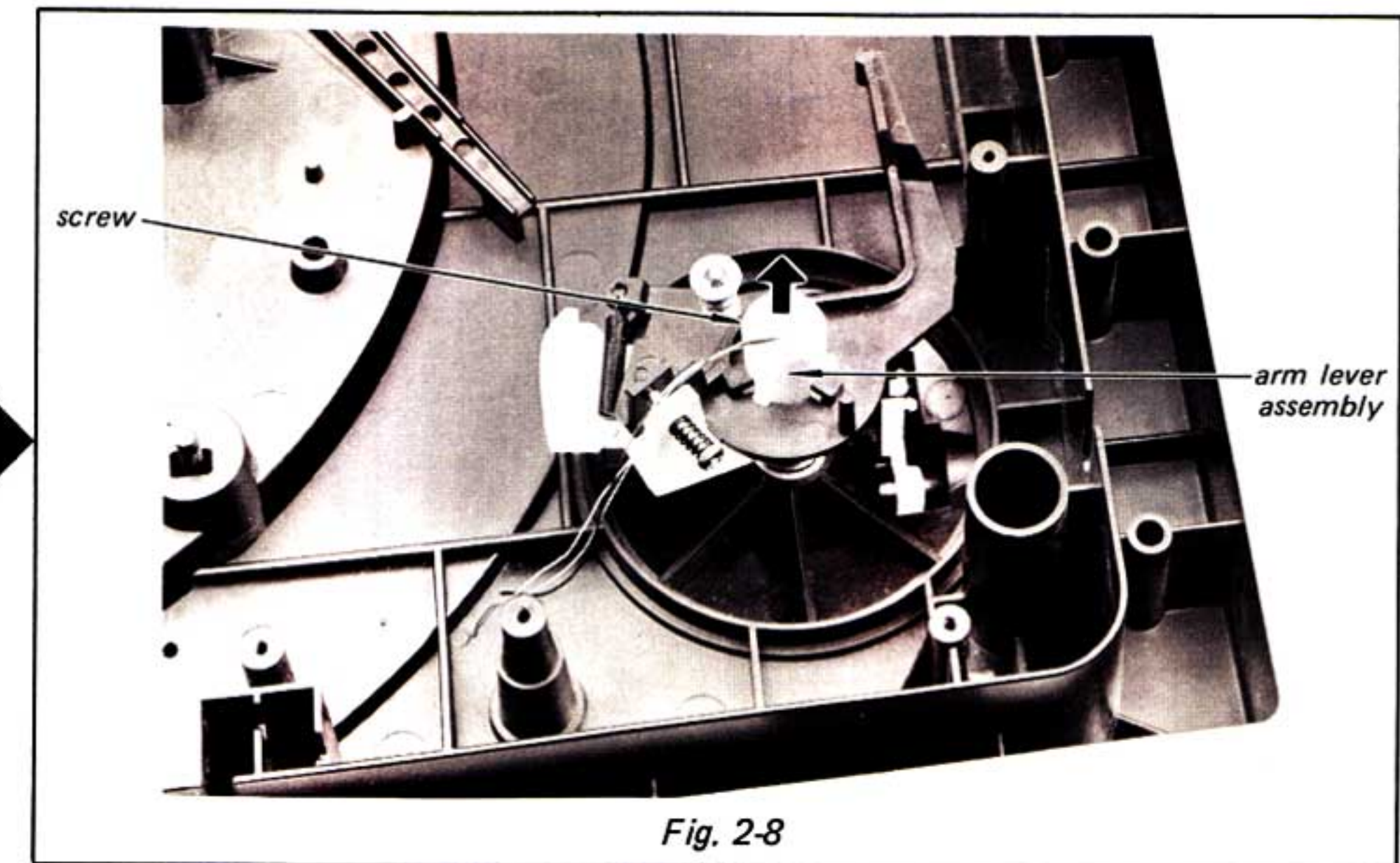


Fig. 2-8

1. Loosen the screw.
2. Hold the tonearm firmly by hand and pull up the thrust nut (D) by turning it counterclockwise.
3. Remove the steel-balls from the arm pivot.
4. Turn the set upside-down again and pull up the tonearm slowly.

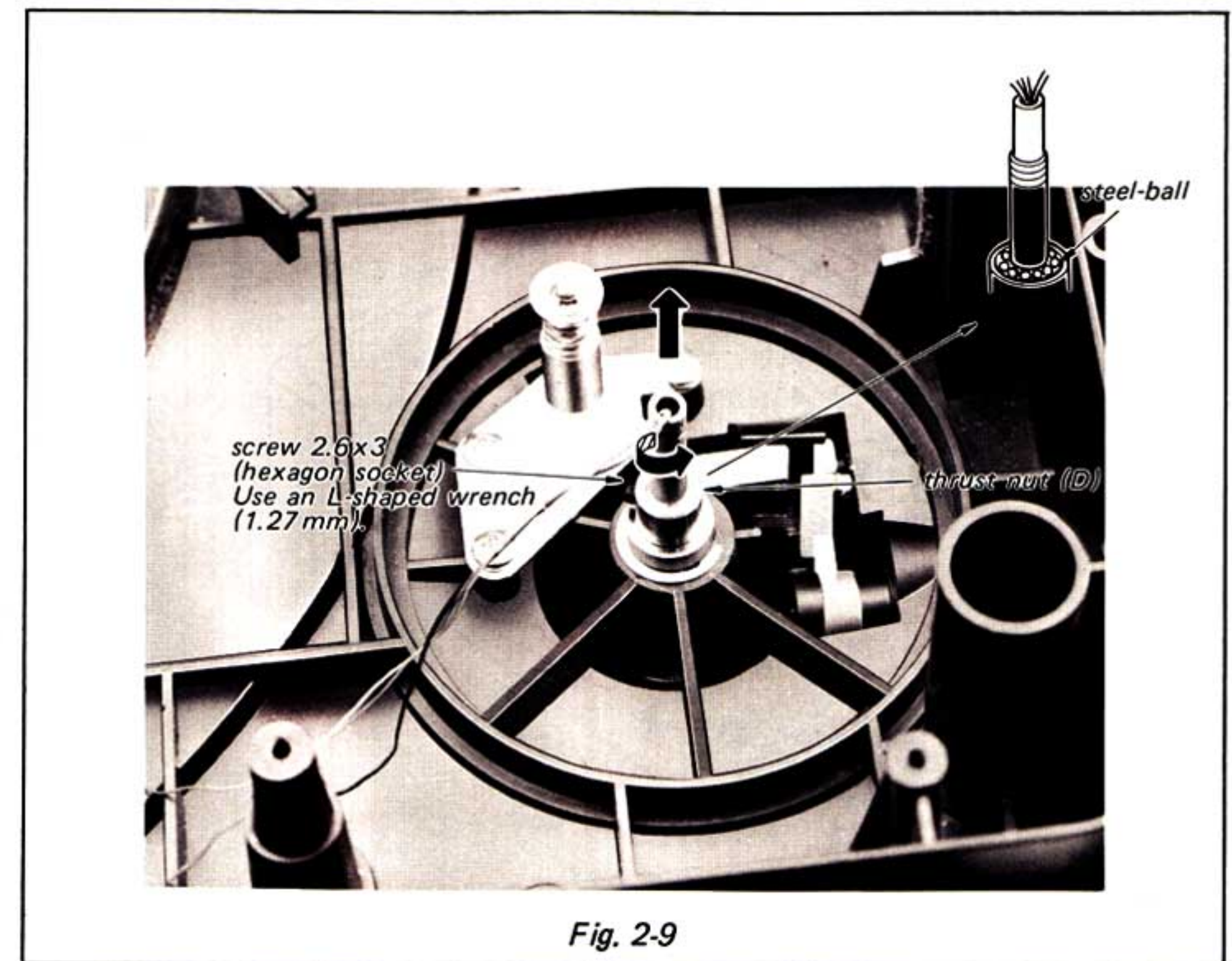


Fig. 2-9



## ARM LIFTER REMOVAL

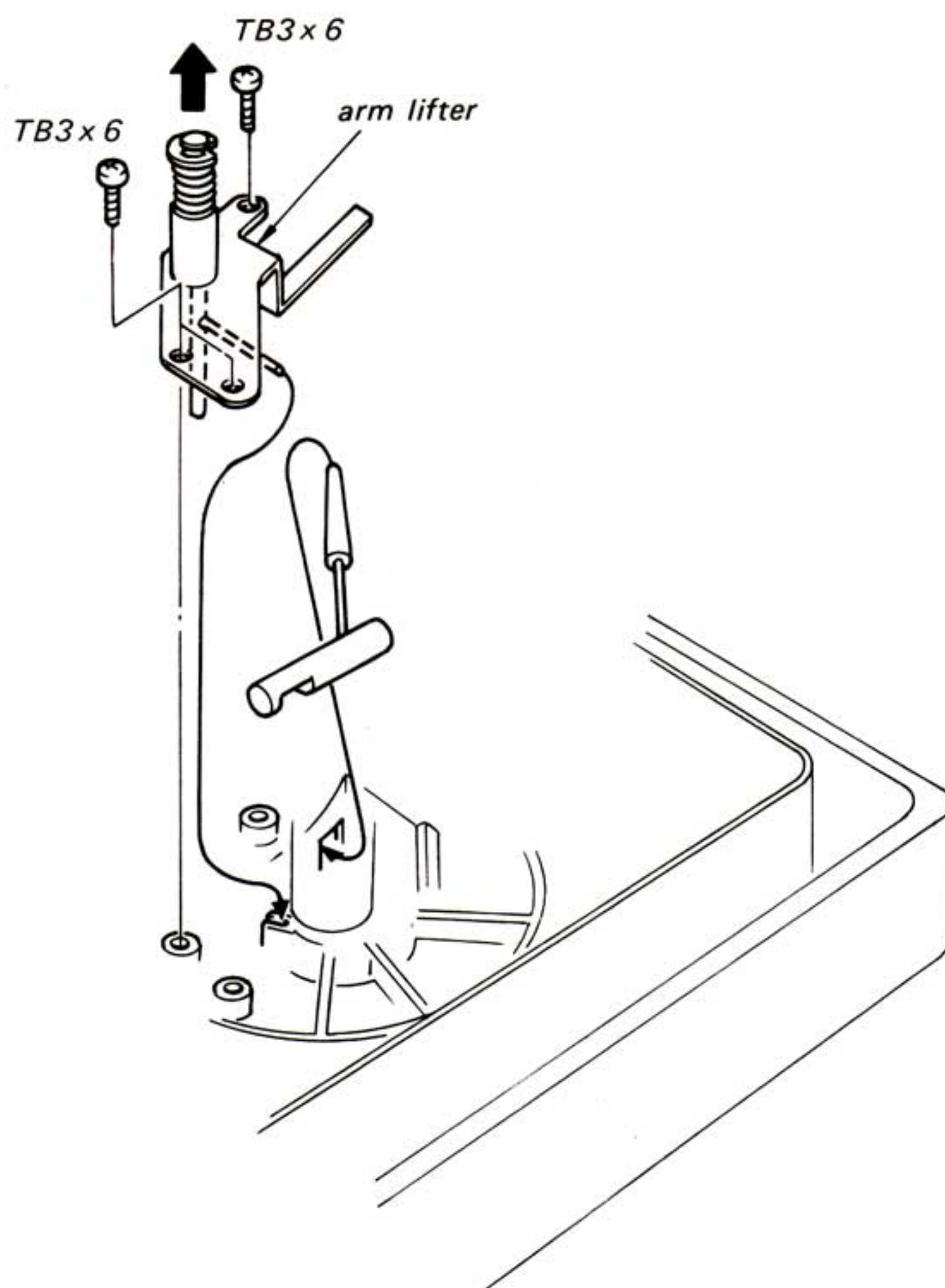
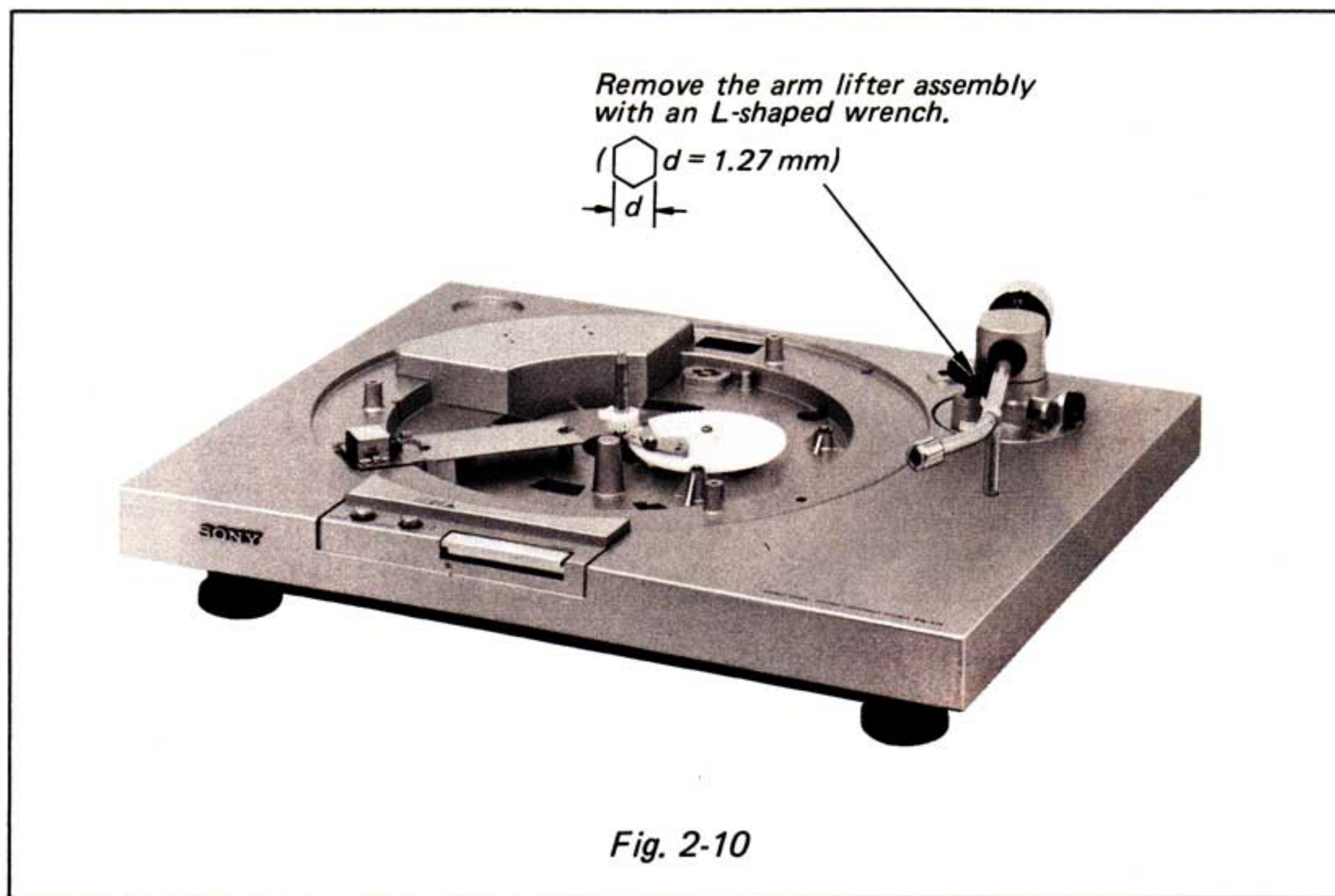


Fig. 2-11



# ONEARM DISASSEMBLY

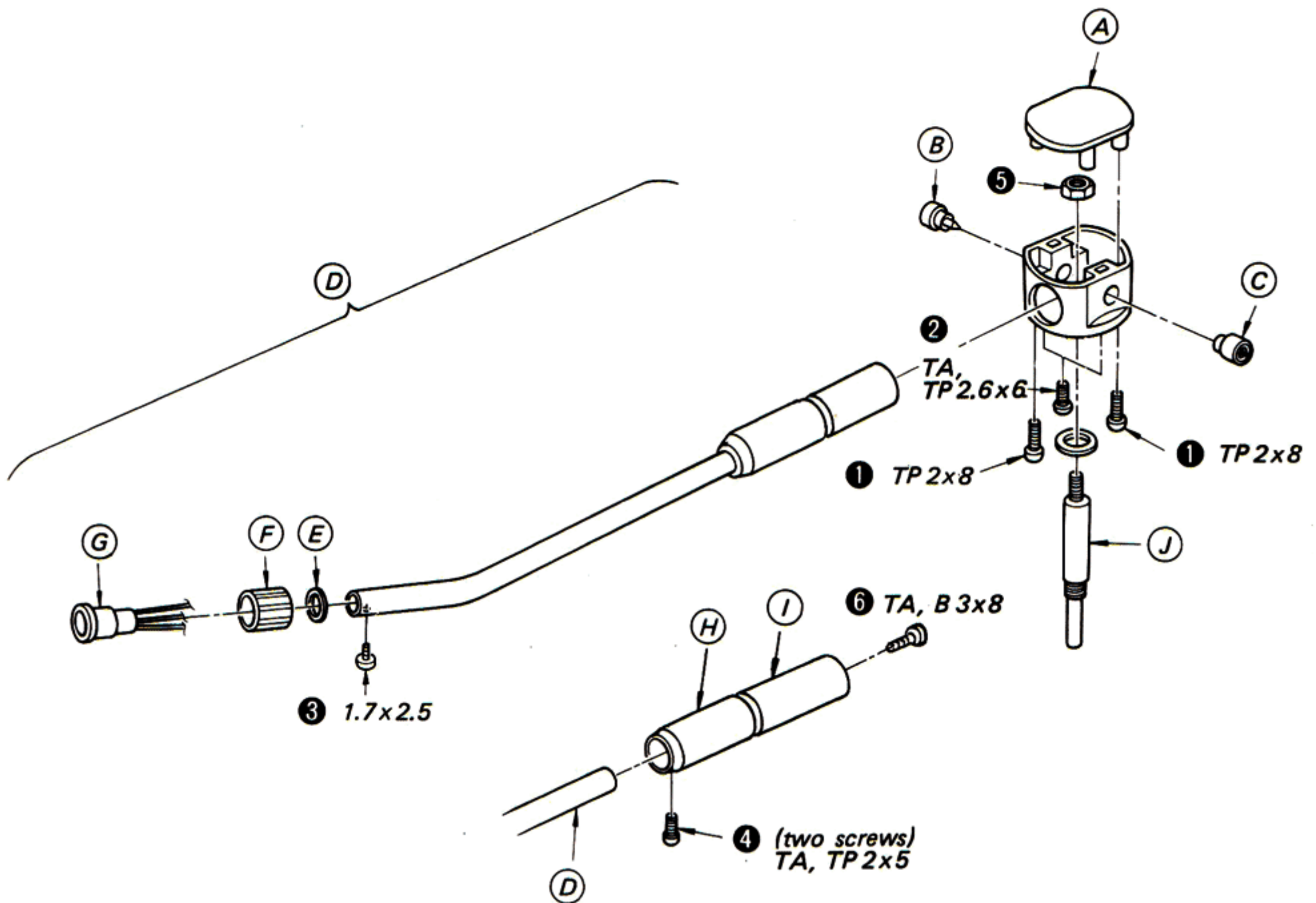
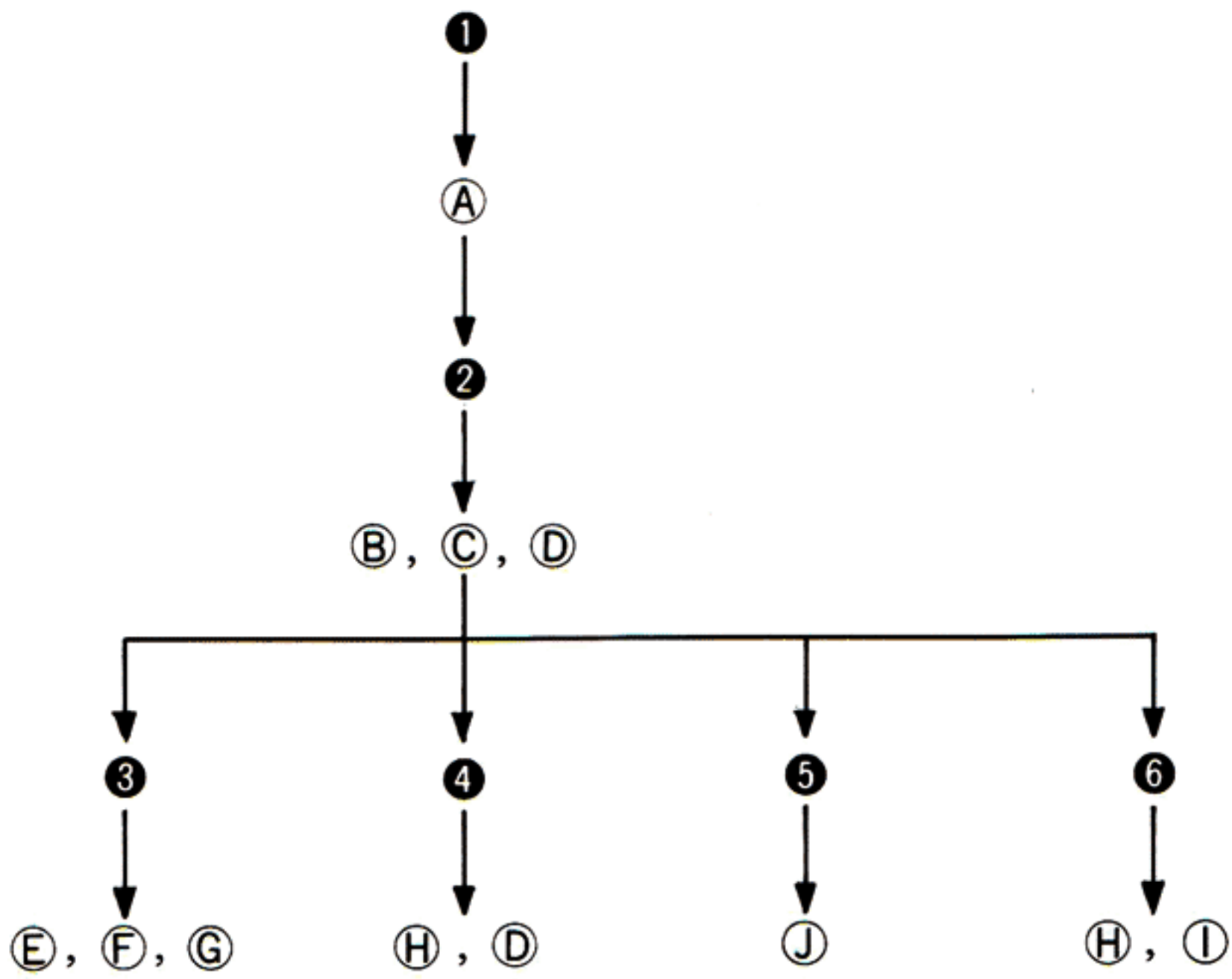


Fig. 2-12



## SECTION 3 ASSEMBLY

### 3-1. TONEARM ASSEMBLY

#### 1. Pipe Assembly (1)

1. Thread a wire in (D).
2. Thread the leads of (G) in (F) and (E), and hook the leads by the wire.
3. Insert (G) in (D) by pulling the wire in the direction shown by the arrow, align two holes marked \*1, \*2 and tighten the screw (3).

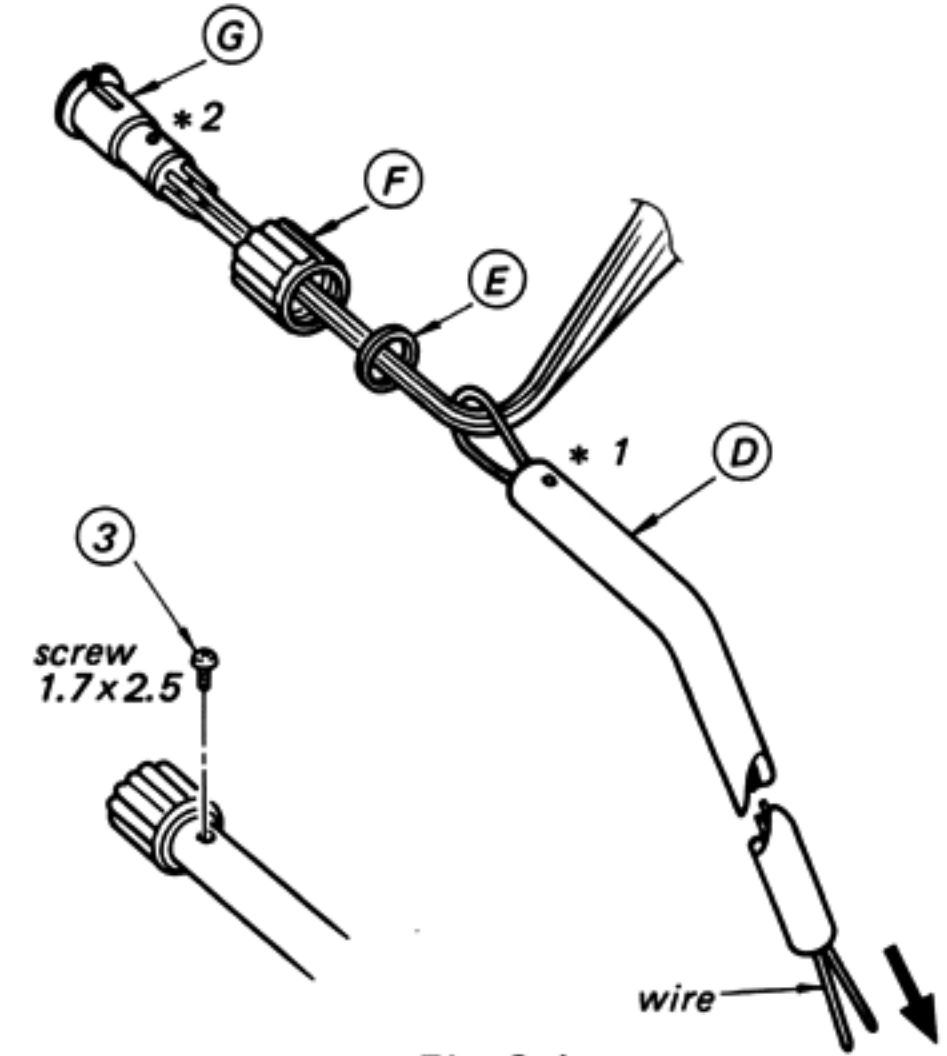


Fig. 3-1

#### 2. Pipe Assembly (2)

1. Thread a wire in (H) as shown below.
2. Hook four leads of (K) by the wire and pull the leads into (H).
3. Align three holes marked \*1, \*2, \*3 to tighten the screws (4).

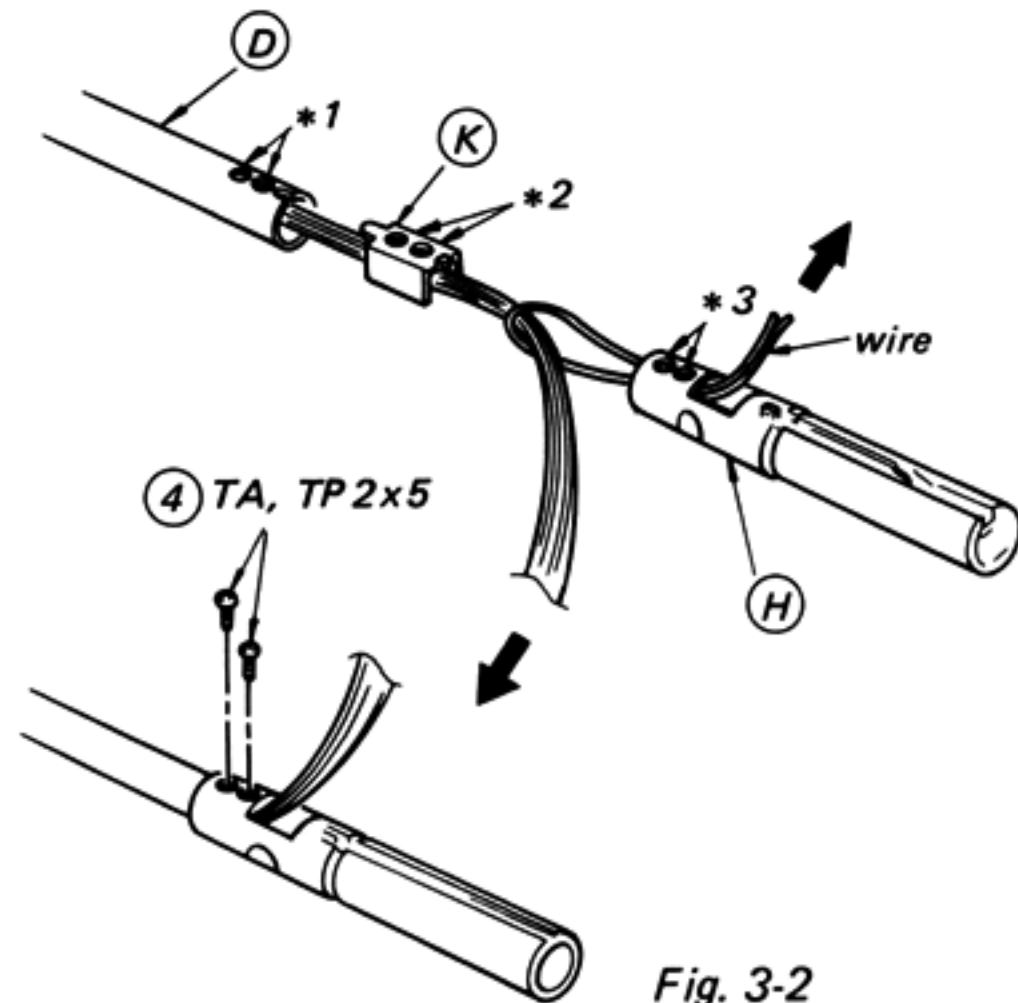


Fig. 3-2

#### 4. Setting of Pivot (A) and Pivot (B)

Push the pivot (A) and the pivot (B) into the holes of (L) strongly and tighten the screws (2).

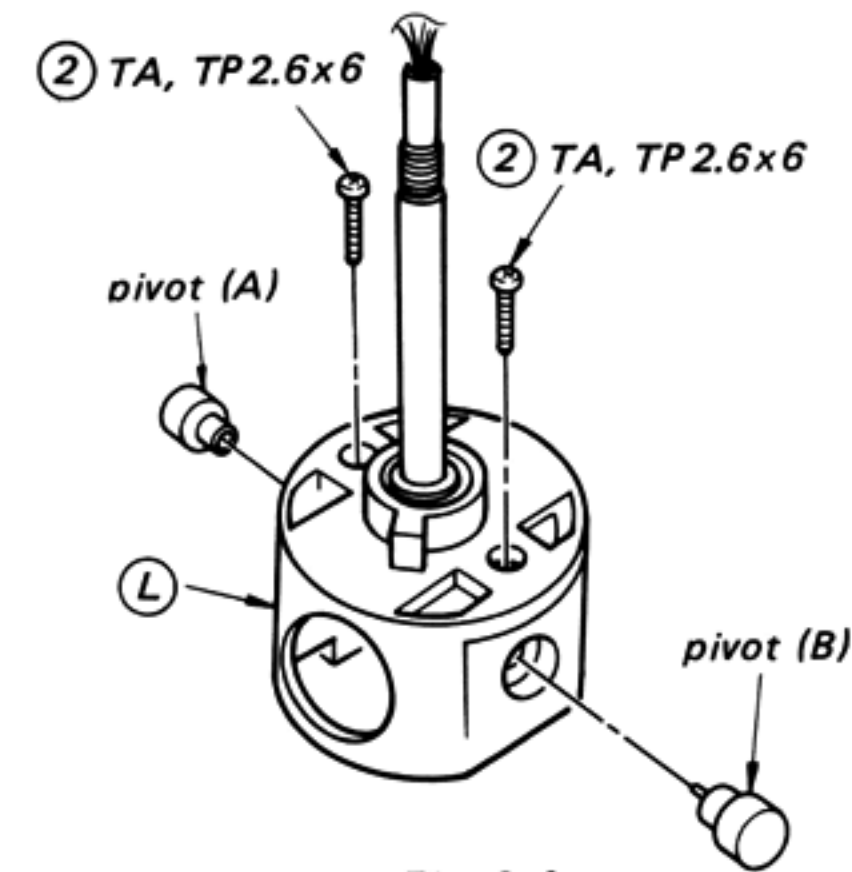


Fig. 3-4

#### 3. Installation of Pipe Assembly

1. Thread a wire in (J).
2. Hook five leads of the pipe assembly by the wire.
3. Insert the pipe assembly into (L), while pulling the leads.

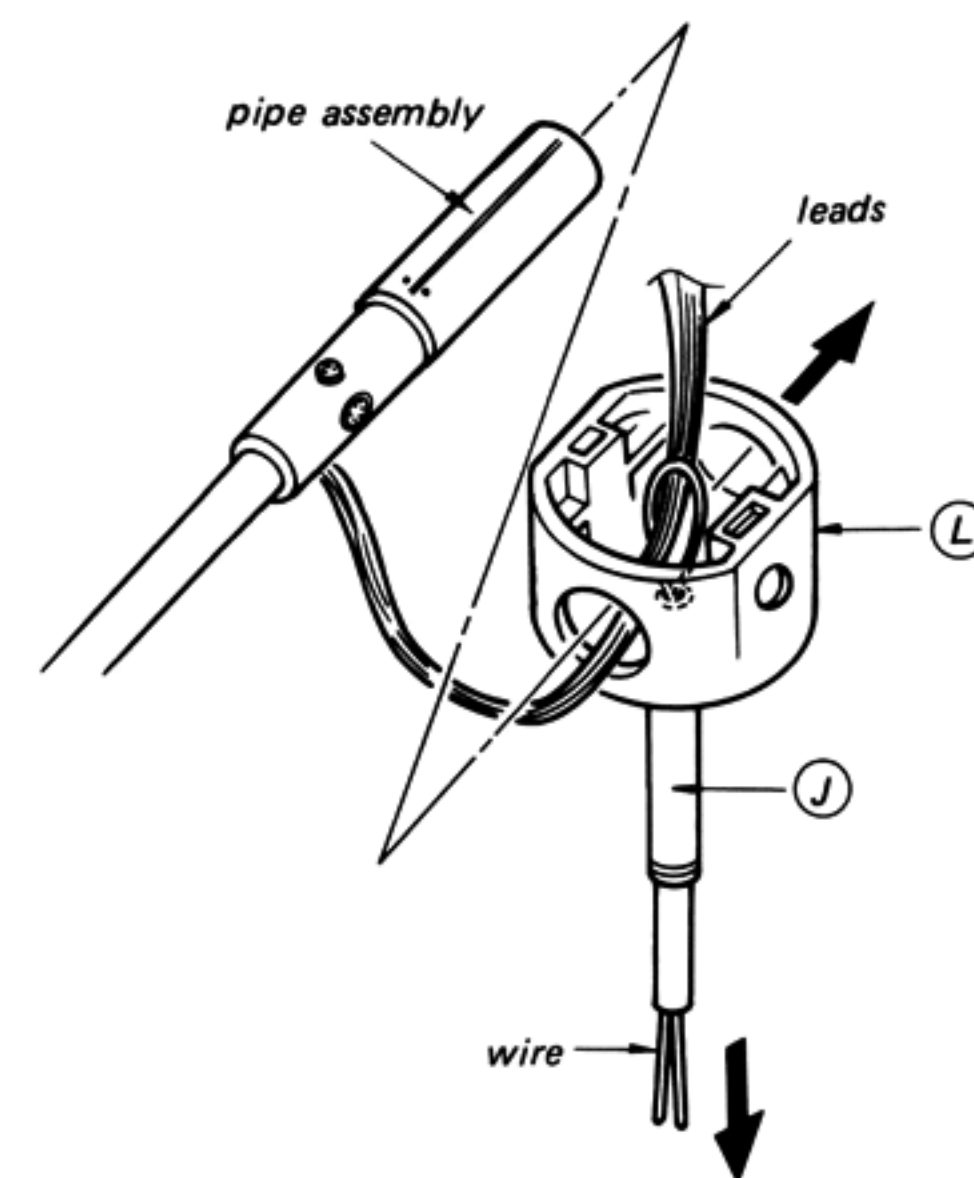


Fig. 3-3

#### 5. Setting of Pivot Screw and Lock Nut (A)

1. Adjust the positions of the pivot (A) and the pivot bearing of the center boss.
2. Tighten the screw (1) and the nut (2) temporarily.

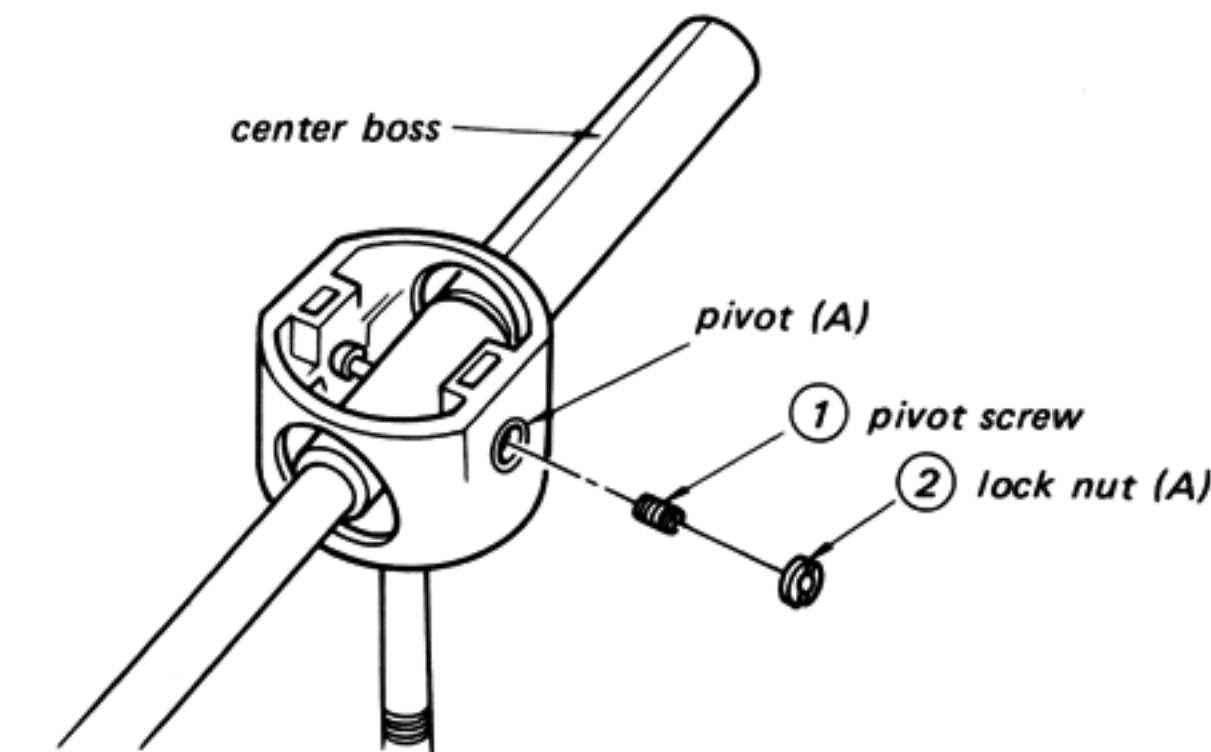


Fig. 3-5

3. Install the head shell (with a cartridge) and the counterweight to the tonearm.
4. In order to keep a balance, adjust the screw and the nut, repeating the following procedures.
  - a. When the 70 mg weight is placed on the top of the shell (just above a stylus), the tonearm sinks 5 mm (measured at the stylus-tip).
  - b. When the weight is removed, the tonearm returns horizontally.

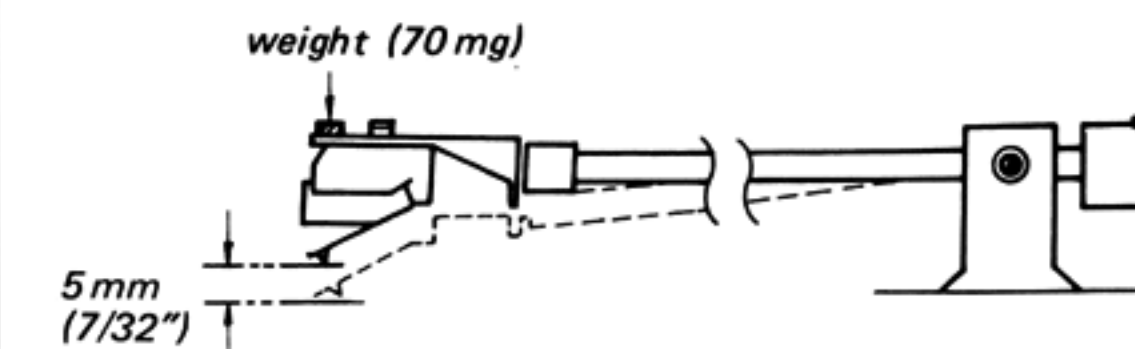


Fig. 3-6

### 3-2. INSTALLING TONEARM TO FRAME

1. Clean the portion of the arm pivot marked by \* in Fig. 3-7 with an alcohol-moistened swab.
2. Insert the arm shaft in the arm pivot by half.
3. Put fourteen cleaned steel-balls into the portion marked \*.
4. Insert the arm shaft in the arm pivot completely.
5. Hold the tonearm firmly by hand and turn the set upside-down.

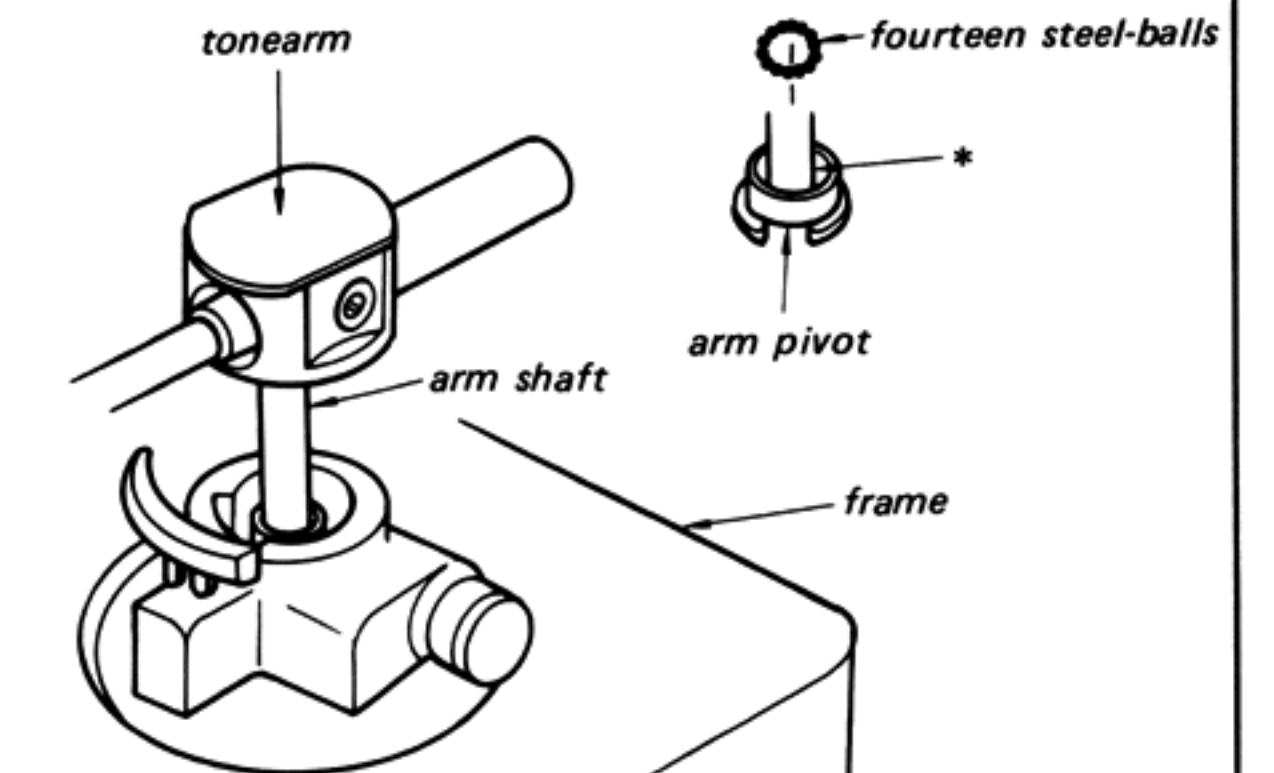


Fig. 3-7

6. Clean the portion marked ▲ in Fig. 3-8.
7. Put fourteen cleaned steel-balls into the portion marked by ▲ in Fig. 3-8.

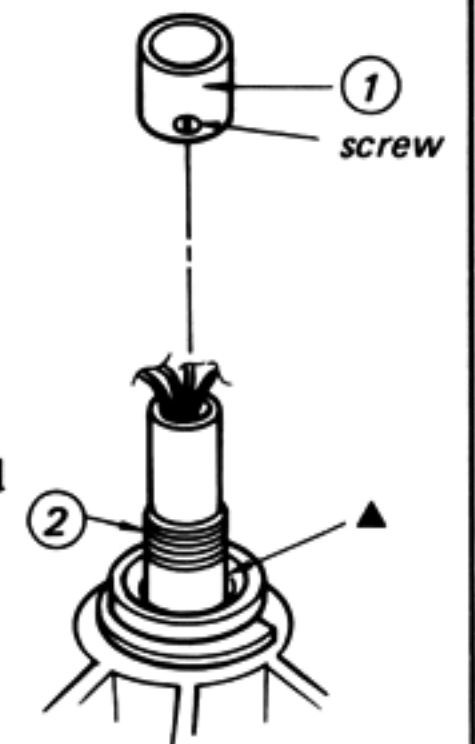


Fig. 3-8

8. Insert the (1) (with a screw side down) and screw up the (1) to the extent of (2) being movable slightly up and down.
9. Tighten the screw with an L-shaped wrench (dia. 1.27 mm).
10. Adjust the stylus-force to 750 mg and trace the stylus on the grooveless disk.
11. Confirm that the tonearm traverses smoothly from the outer track to the inner.
12. If not, readjust the (1).



### 3-3. INSTALLATION OF TONEARM

1. Hold the tonearm on the arm rest firmly.
2. Insert the arm lever assembly in the shaft of the tonearm and fix the arm lever assembly temporarily so that the white portion of the arm lever assembly comes off the miniature switch. (OFF position)
3. Move the tonearm by hand and confirm that the neon lamp lights up just when the side of the head shell comes to a distance of 15 mm from the turntable rim as shown in Fig. 3-10.
4. Return the tonearm and confirm that the neon lamp goes off just when the center of the tonearm pipe comes to the tip of the arm rest as shown in Fig. 3-10.
5. Fix the arm lever assembly in the shaft of the tonearm firmly.

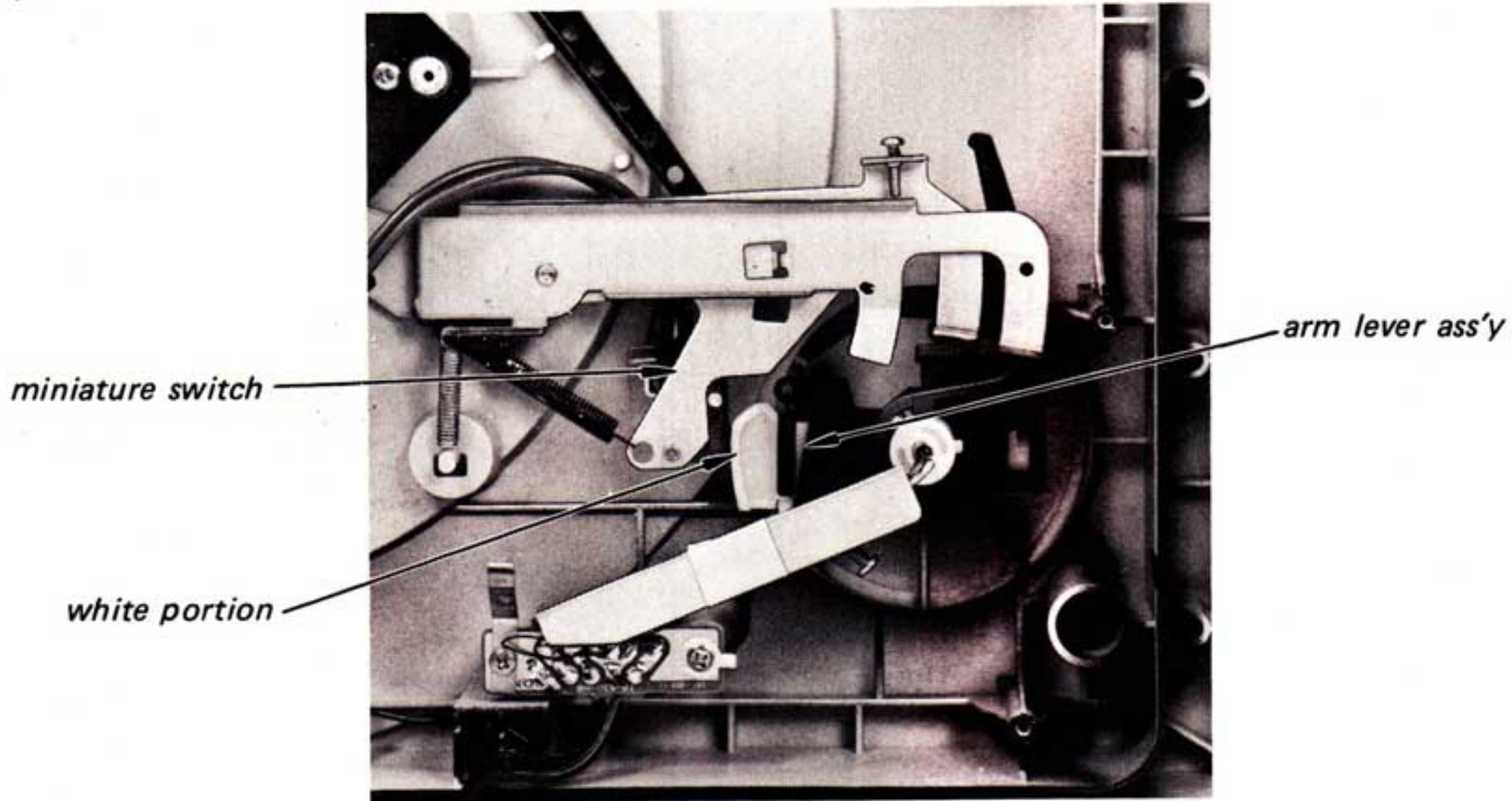


Fig. 3-9

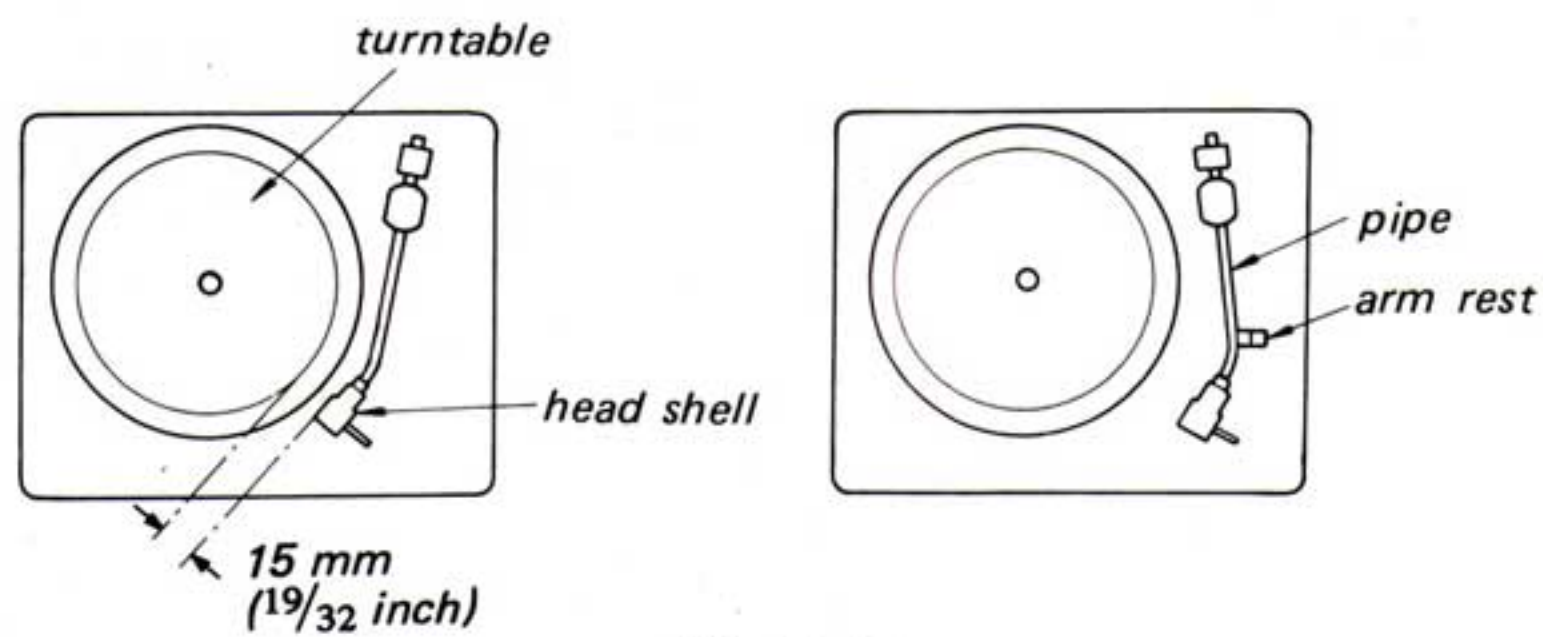


Fig. 3-10



# SECTION 4

## LUBRICATION AND CARTRIDGE REPLACEMENT

### 4-1. LUBRICATION

#### Drive Gear

Apply grease to the shaded portion .

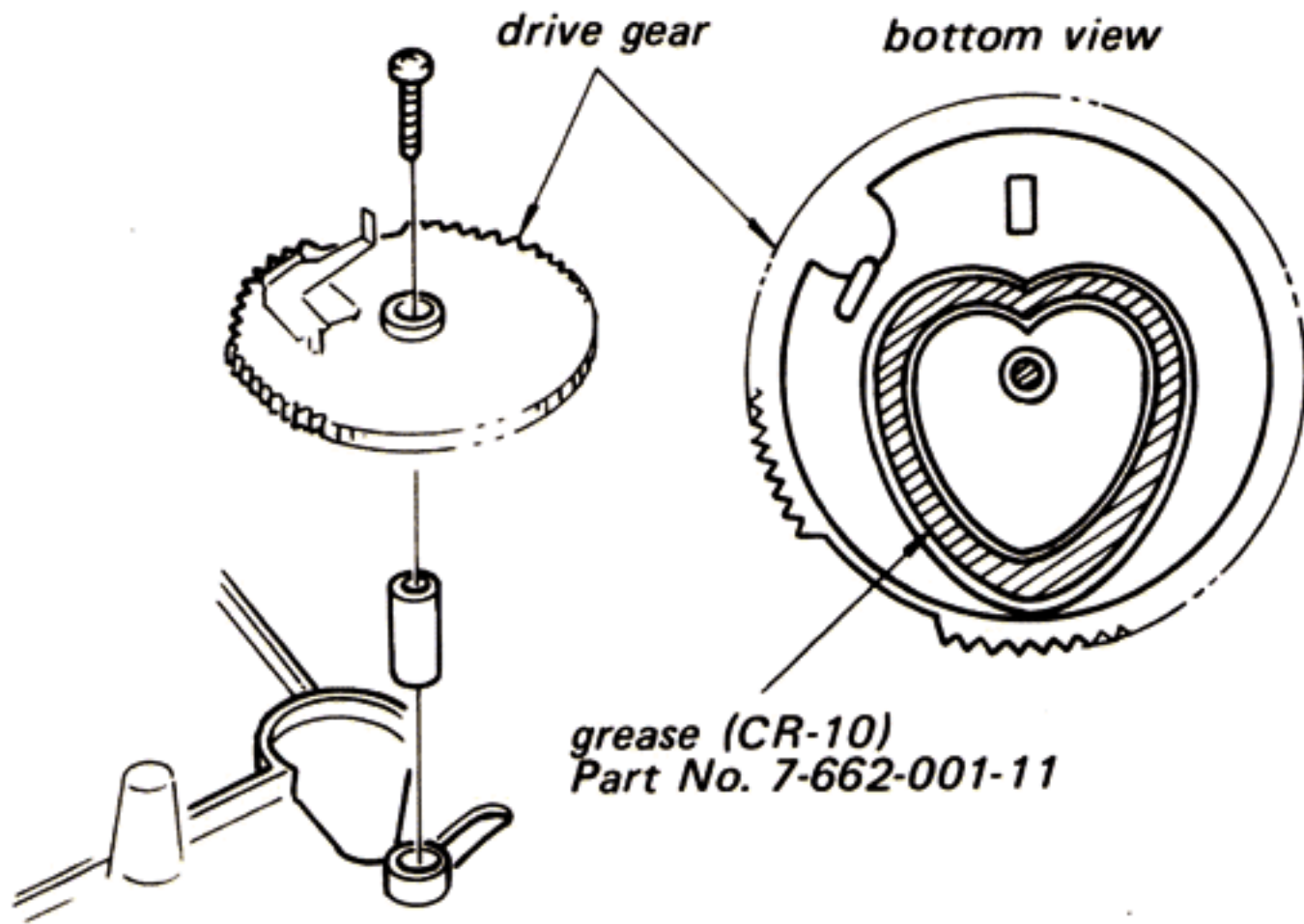


Fig. 4-1

#### Arm Lift

Apply silicone-oil to the shaded portion .

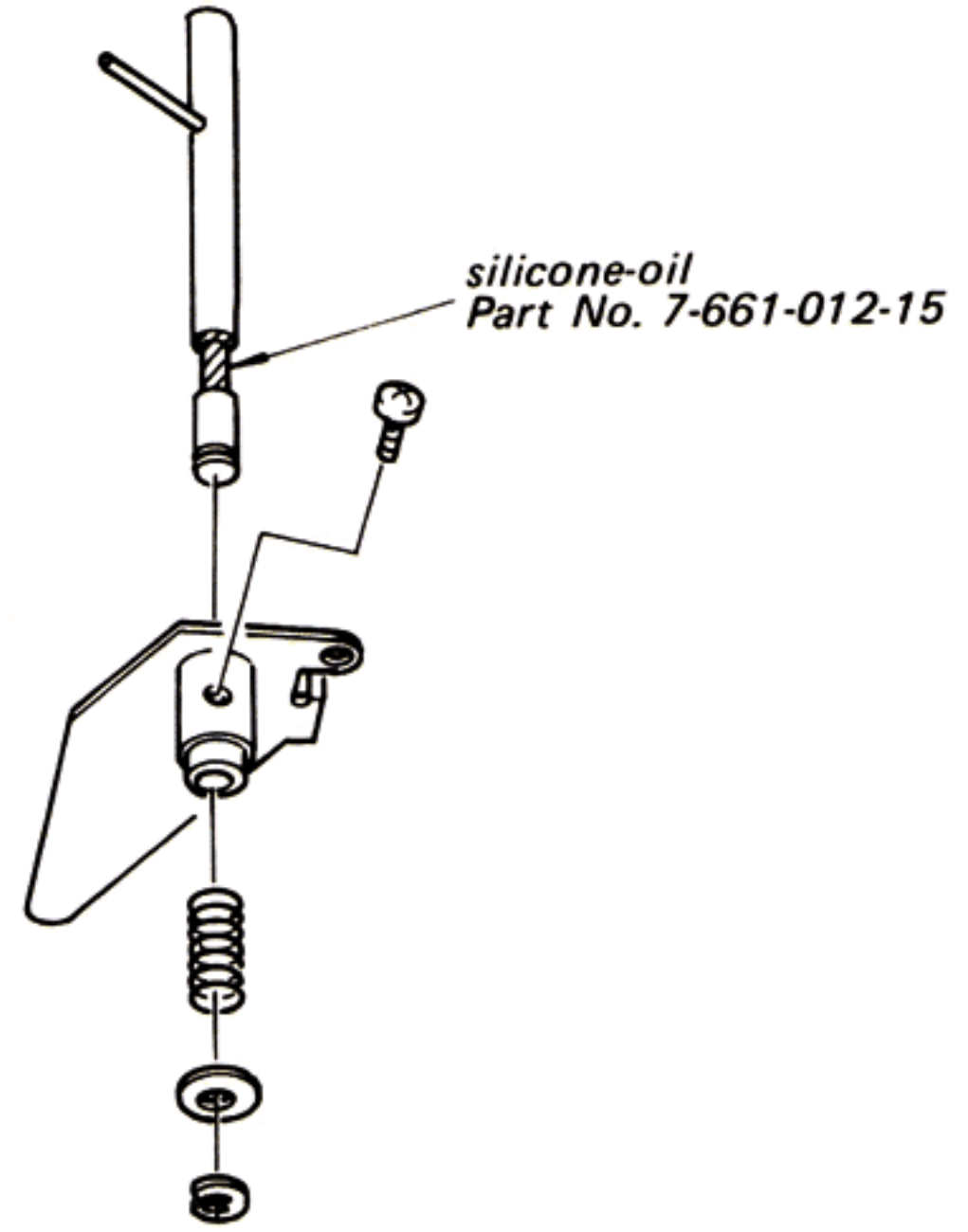


Fig. 4-2

### 4-2. CARTRIDGE REPLACEMENT

#### Position Adjustment

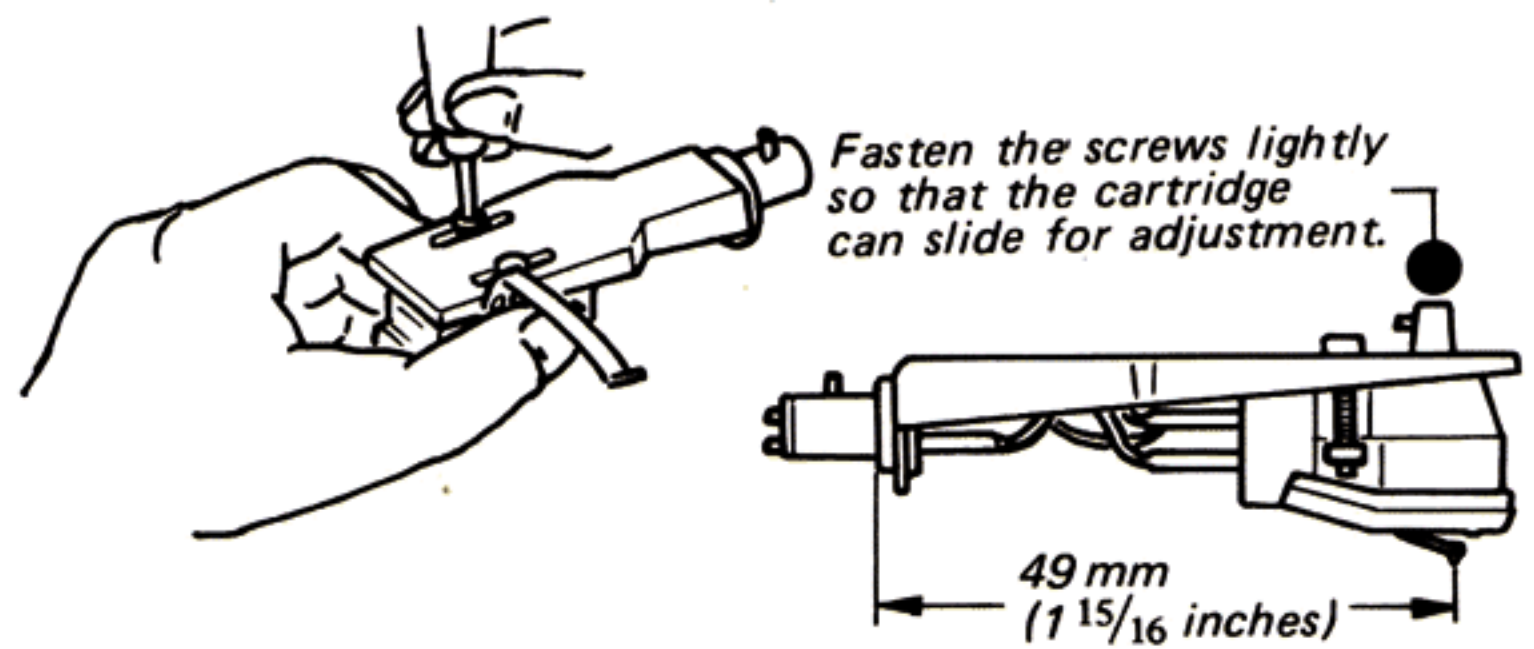


Fig. 4-3

#### Wiring

Wires	Cartridge pins
White .....	L (left channel signal)
Blue .....	LE or G (left channel ground)
Red .....	R (right channel signal)
Green .....	RE or G (right channel ground)

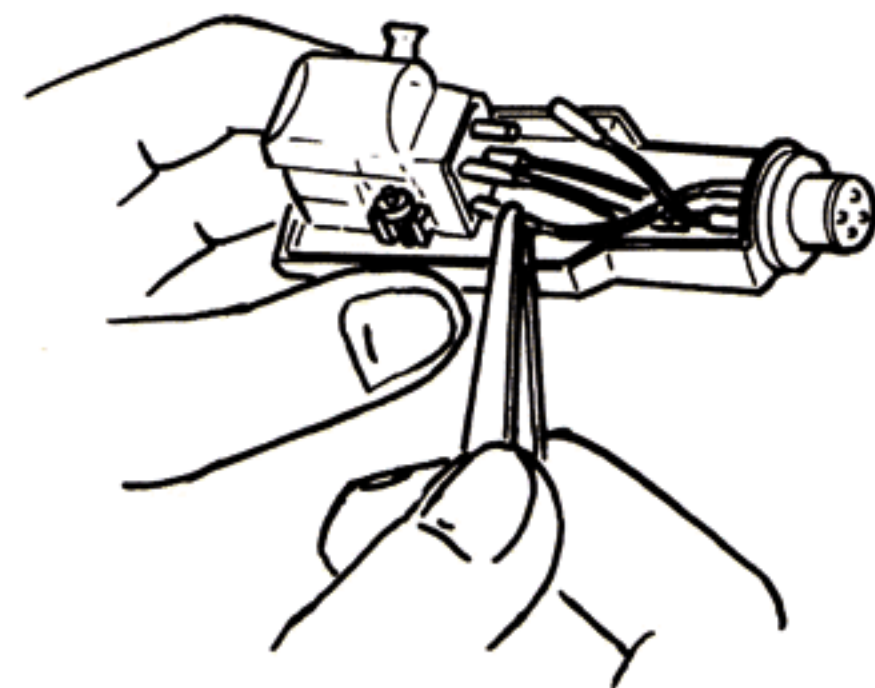


Fig. 4-4



## SECTION 5 MOTOR REPAIRING

The motor and the servo amp board are assembled together. If found defective, disassemble the motor block as shown in Fig. 5-1 and repair it.

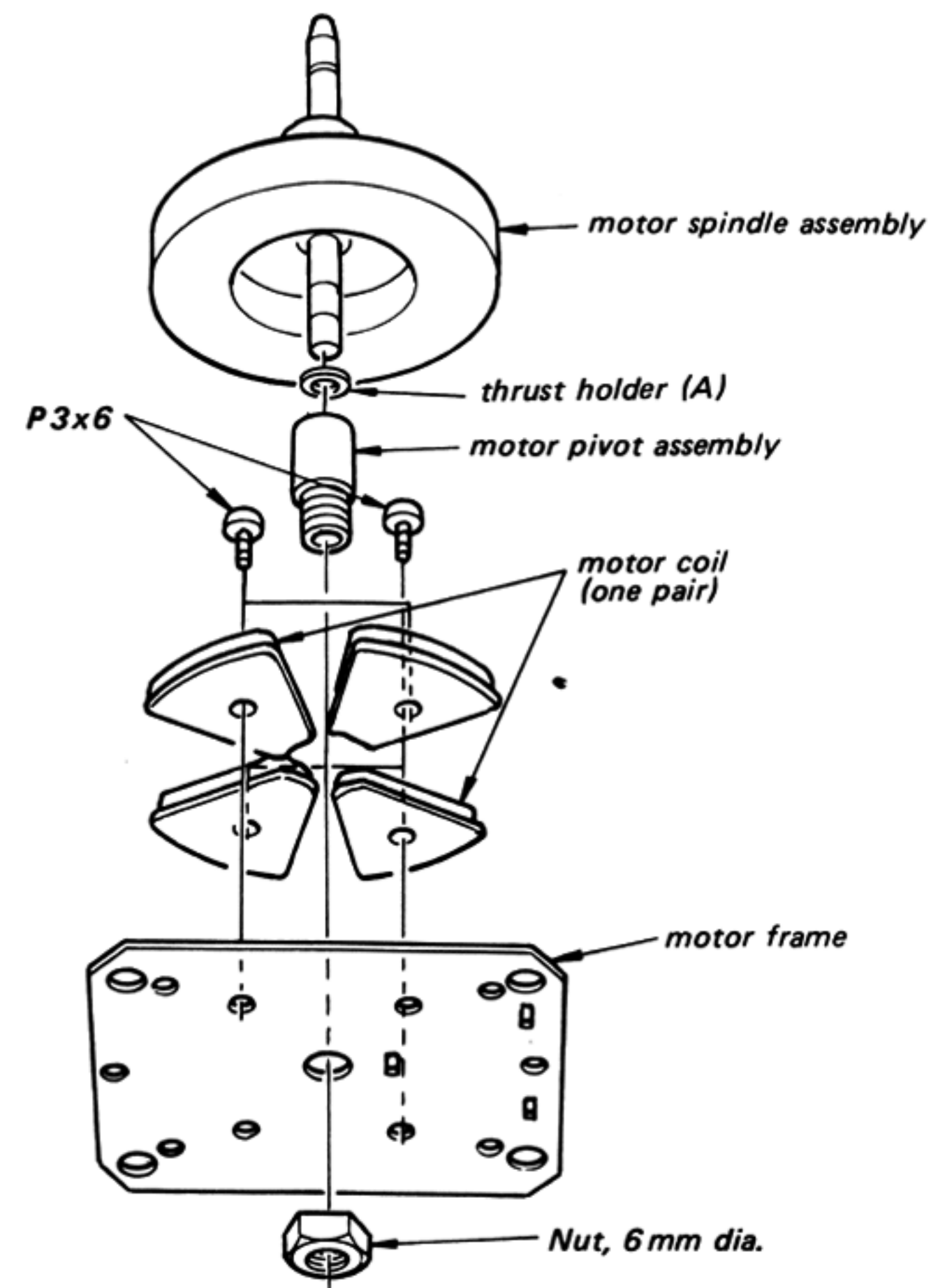


Fig. 5-1

1. When the motor shaft is replaced, apply a small amount of grease (CR-10) in the pivot and apply SONY oil (OL-2KA) to the portion marked by \* in Fig. 5-2.
2. When the motor pivot assembly is replaced, apply a small amount of grease (CR-10) in the pivot.

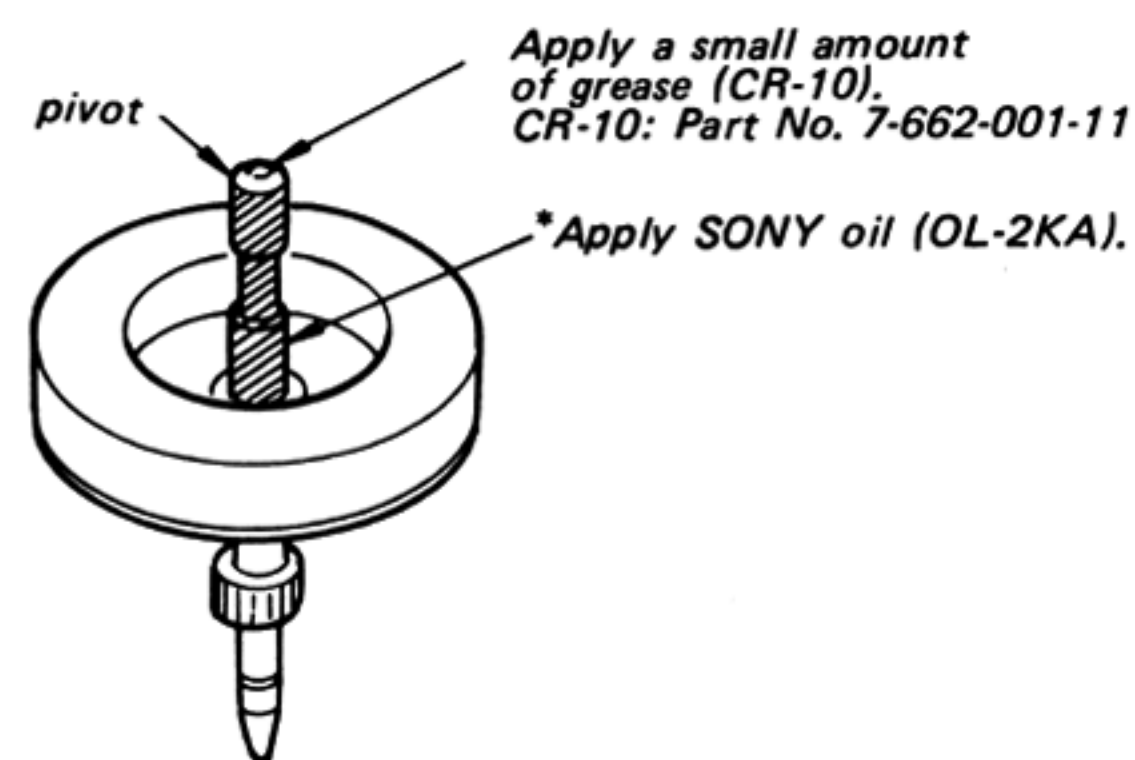


Fig. 5-2

3. Insert the motor spindle assembly slowly in the motor pivot assembly so that the motor shaft is not attracted by strong magnetic field strength.
4. The motor coils are composed of two pairs.
  - a. Mount the coils on the motor frame so that the boss of the coil is placed in the hole of

- the frame as illustrated in Fig. 5-3.
- b. Lay the leads of the coils as shown in Fig. 5-4 and fix the leads in the slot marked by \* in Fig. 5-5.

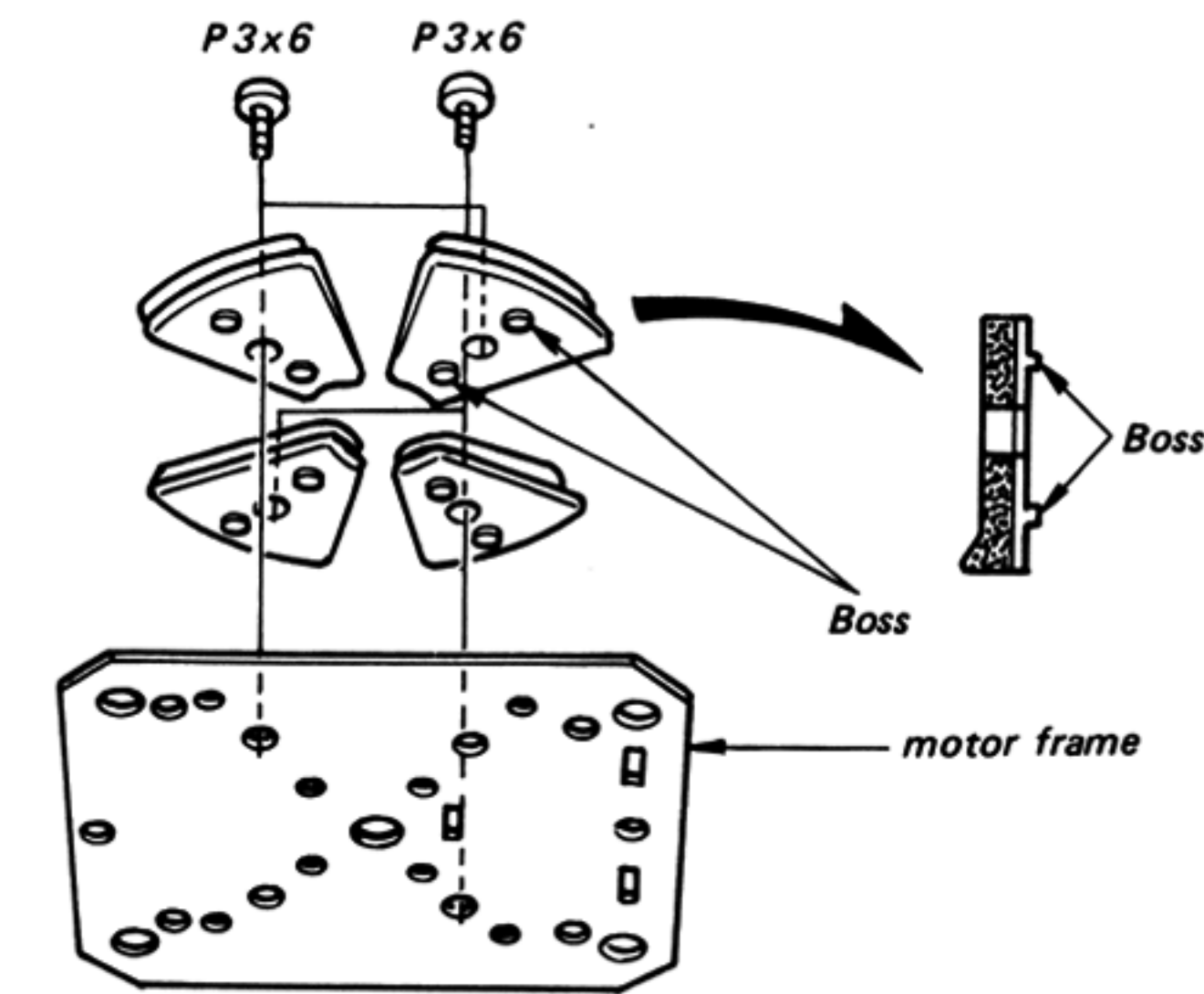


Fig. 5-3

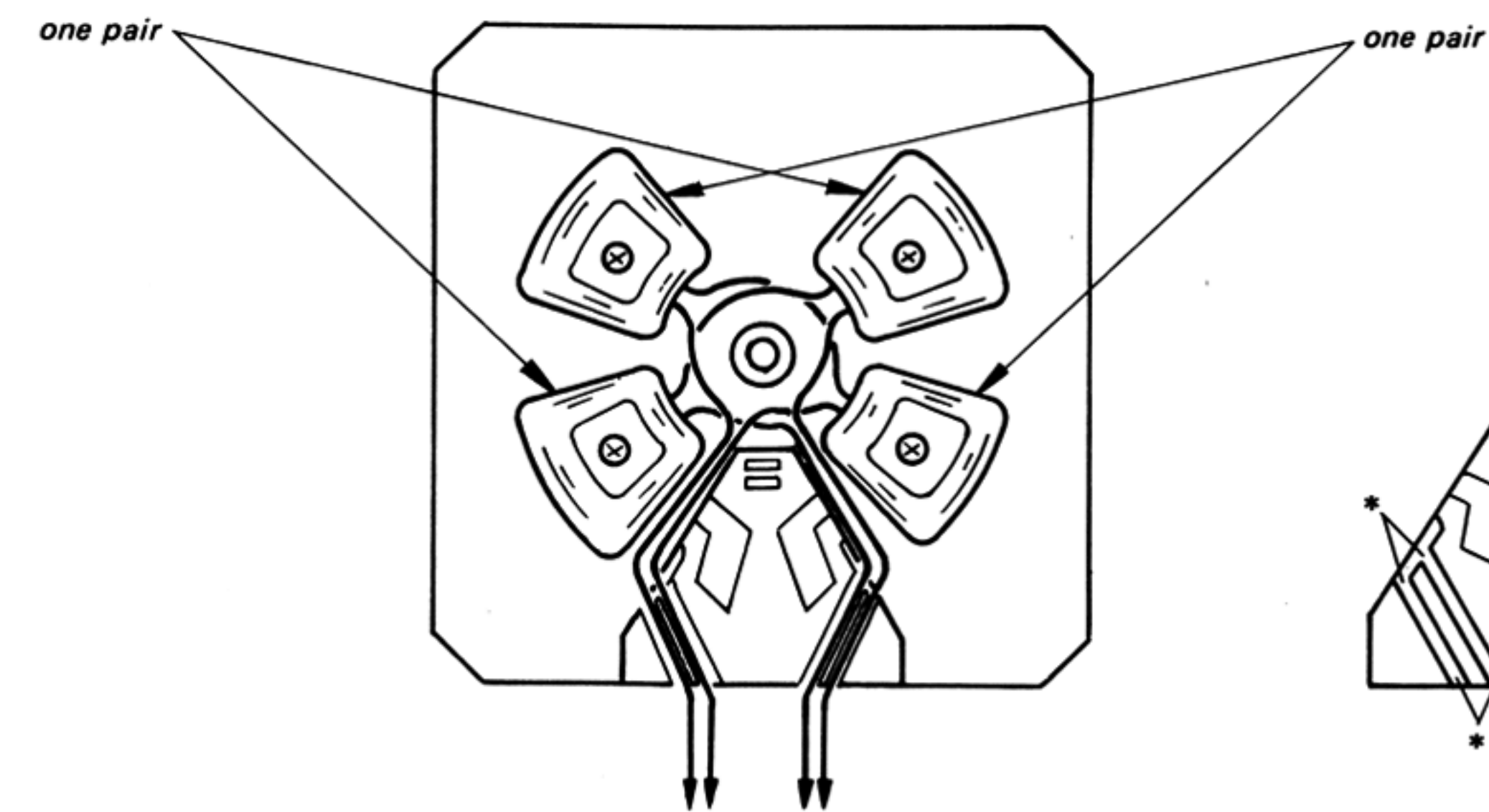


Fig. 5-4

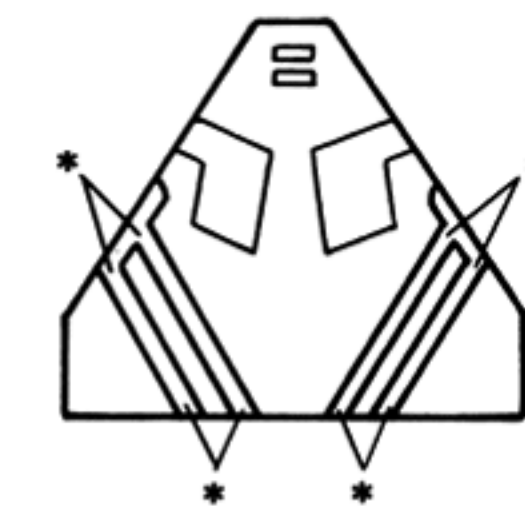


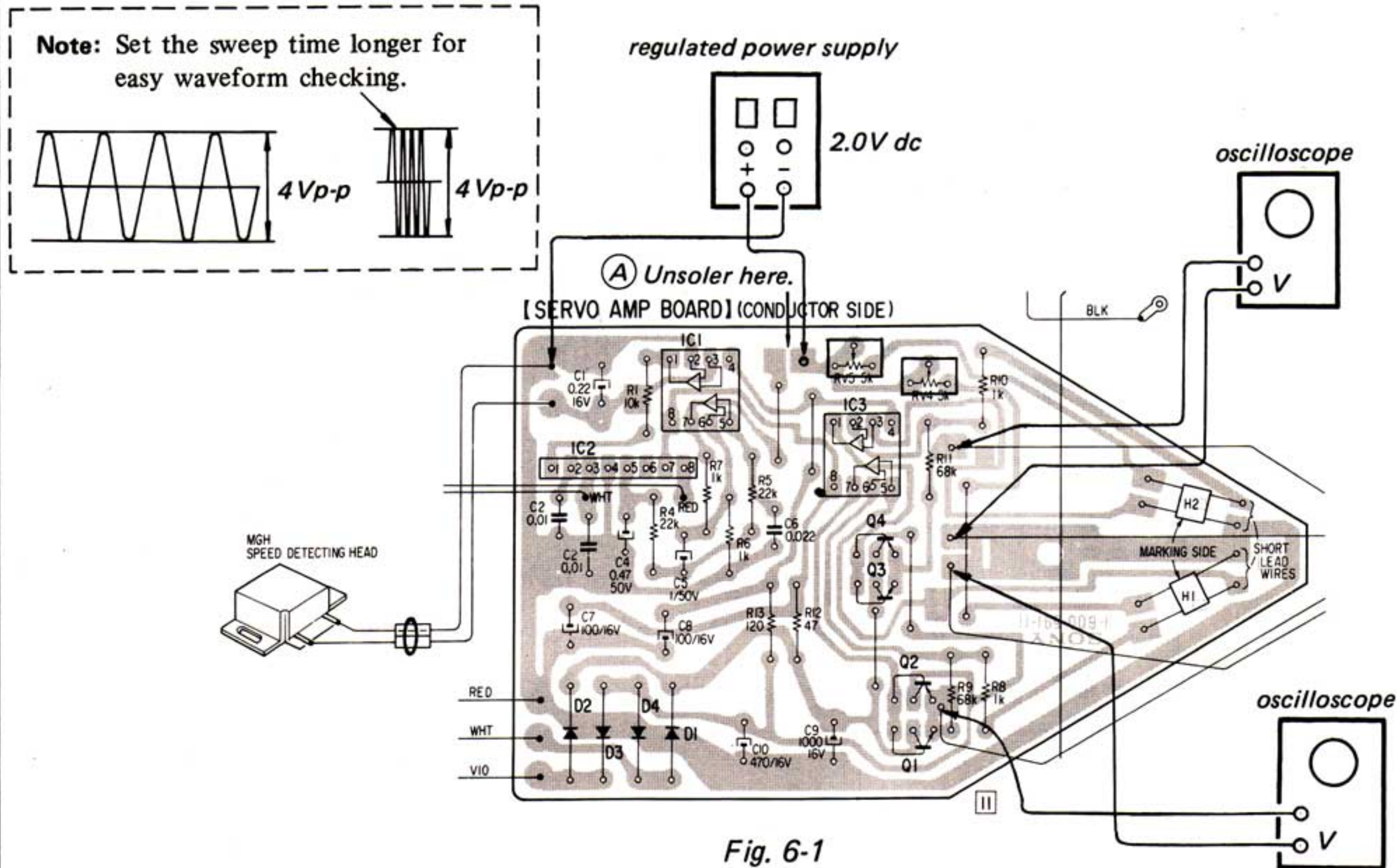
Fig. 5-5



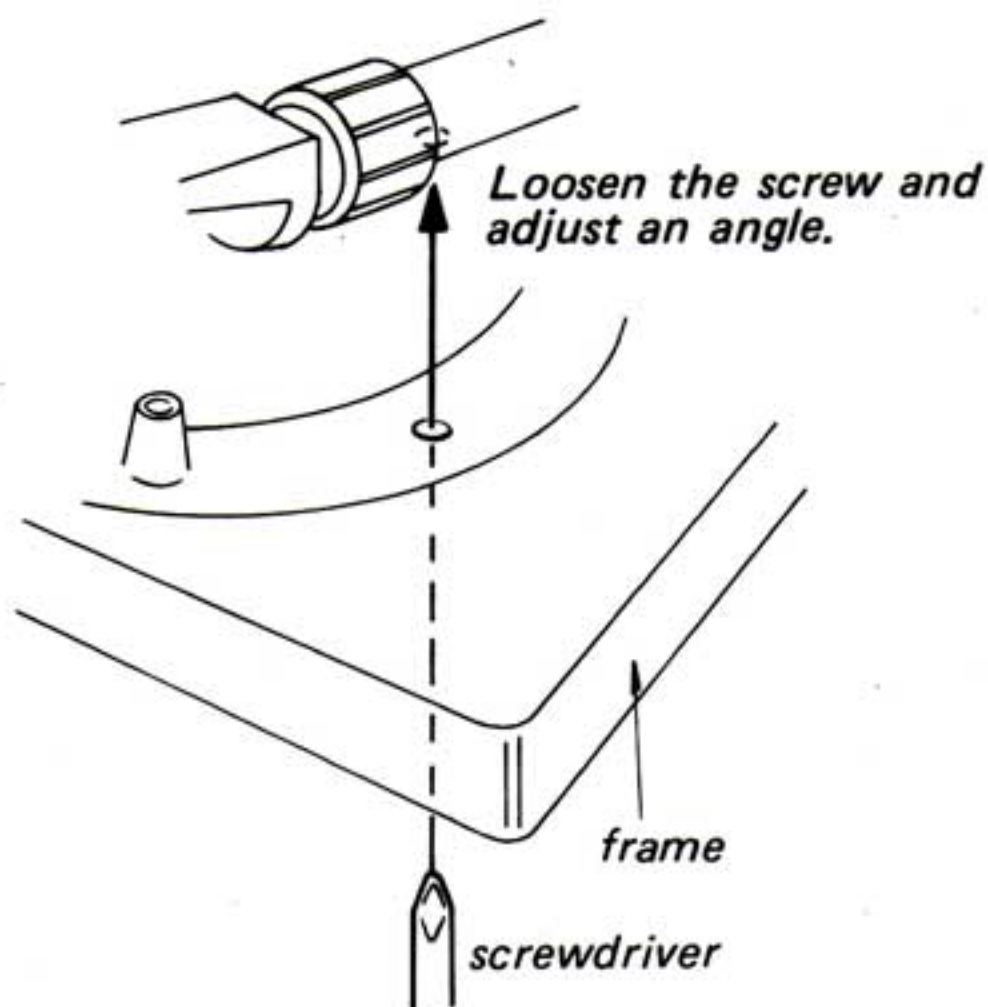
## SECTION 6 ADJUSTMENTS

### 6-1. GAIN ADJUSTMENT

1. Remove the turntable.
2. Unsolder the portion shown by (A) and connect the regulated power supply as illustrated in Fig. 6-1.
3. Connect an oscilloscope between the emitter of Q1/Q3 and the ground.
4. Adjust RV4/RV5 for the waveform on oscilloscope as shown below.

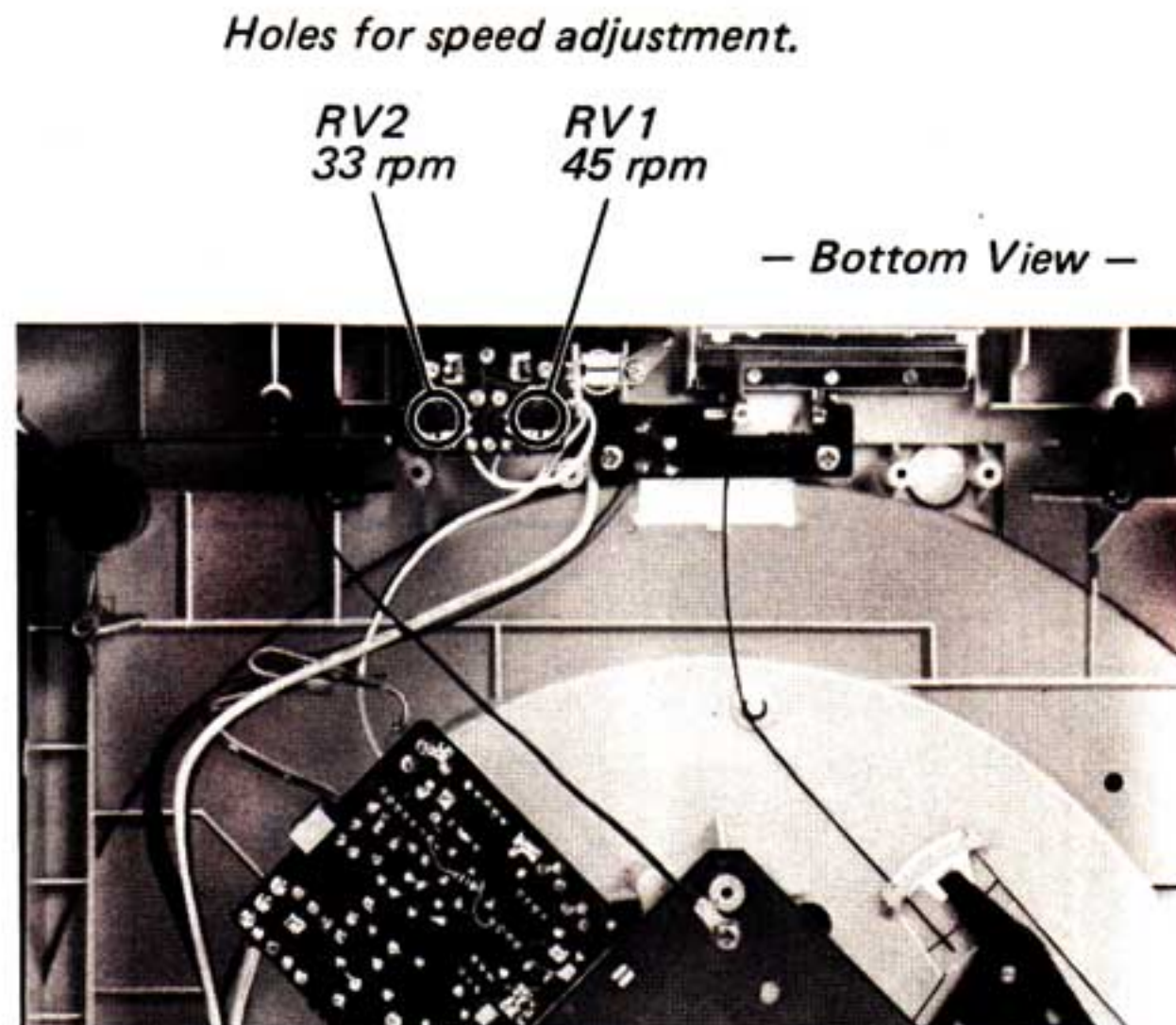


### 6-2. HEAD SHELL ANGLE ADJUSTMENT



### 6-3. SPEED ADJUSTMENT

In case of being unable to control the speed by the PITCH Control, adjust RV1/RV2 (Fig. 6-3) with a screwdriver until the respective stroboscope pattern appears stationary.





#### 6-4. AUTOMATIC RETURN POSITION ADJUSTMENT

1. Remove the turntable and the bottom cover.
2. Reset: Move the clutch A and the clutch B in the direction of arrow as shown in Fig. 6-4B.
3. Adjust the position of the stylus so that the stylus comes to the mark of the boss as shown in Fig. 6-4A and the hold the stylus.
4. Turn the adjustment screw in Fig. 6-5 so that the portion shown by \*1 of the center gear contacts the portion shown by \*2 of the clutch A as shown in Fig. 6-4B.

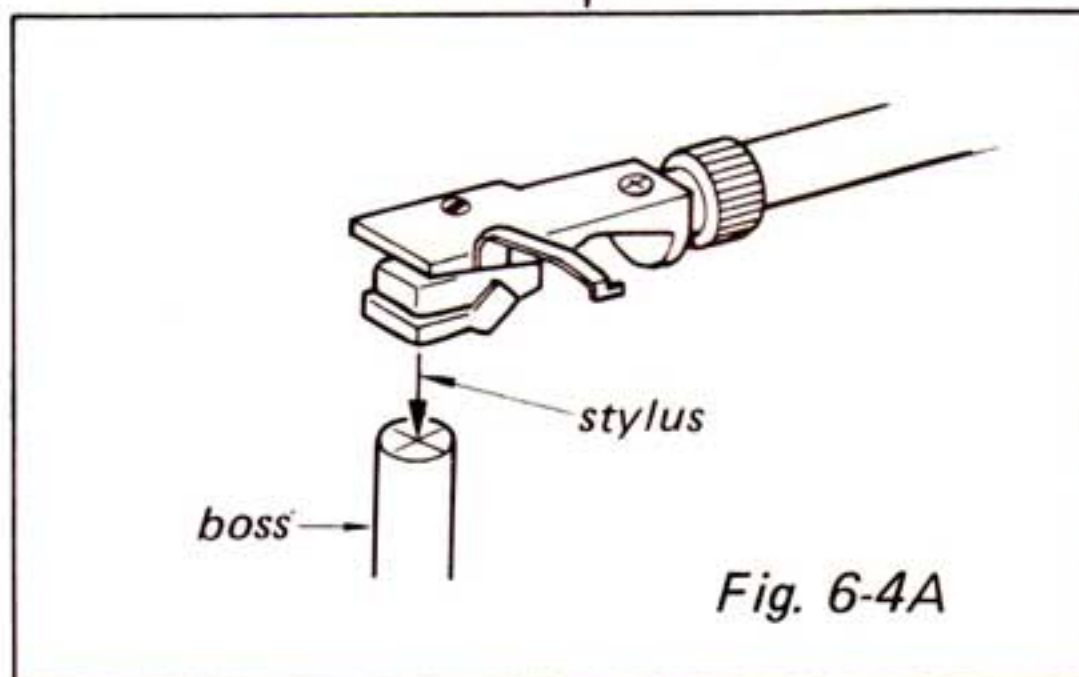
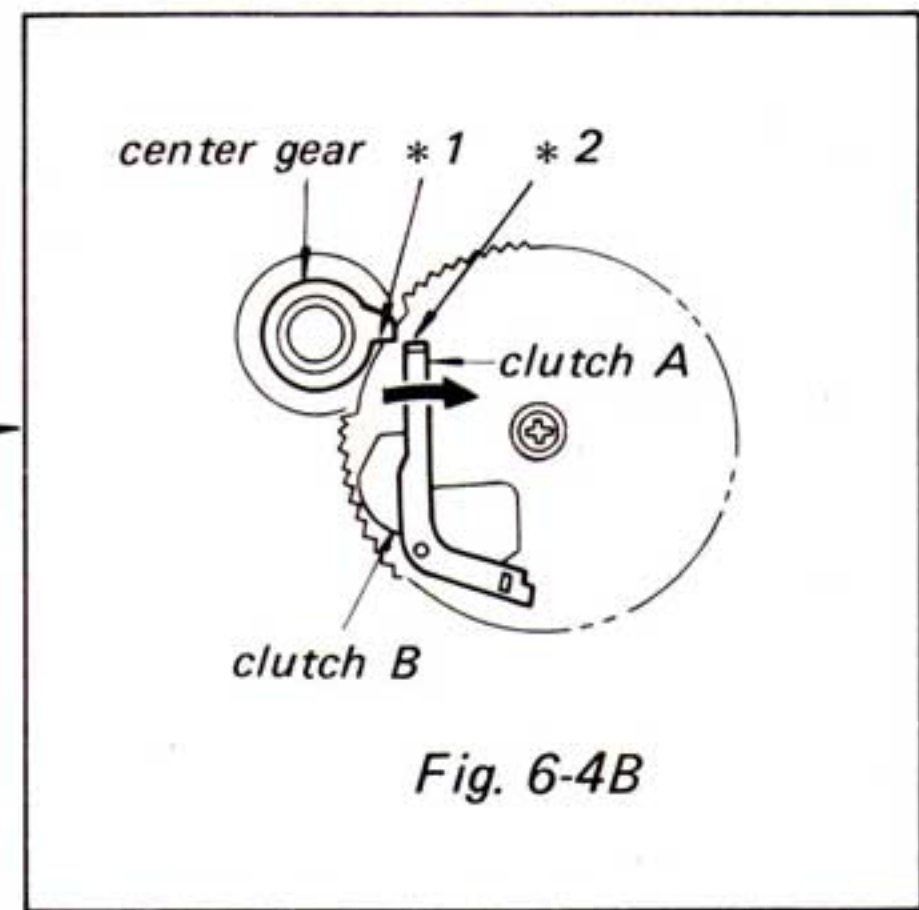
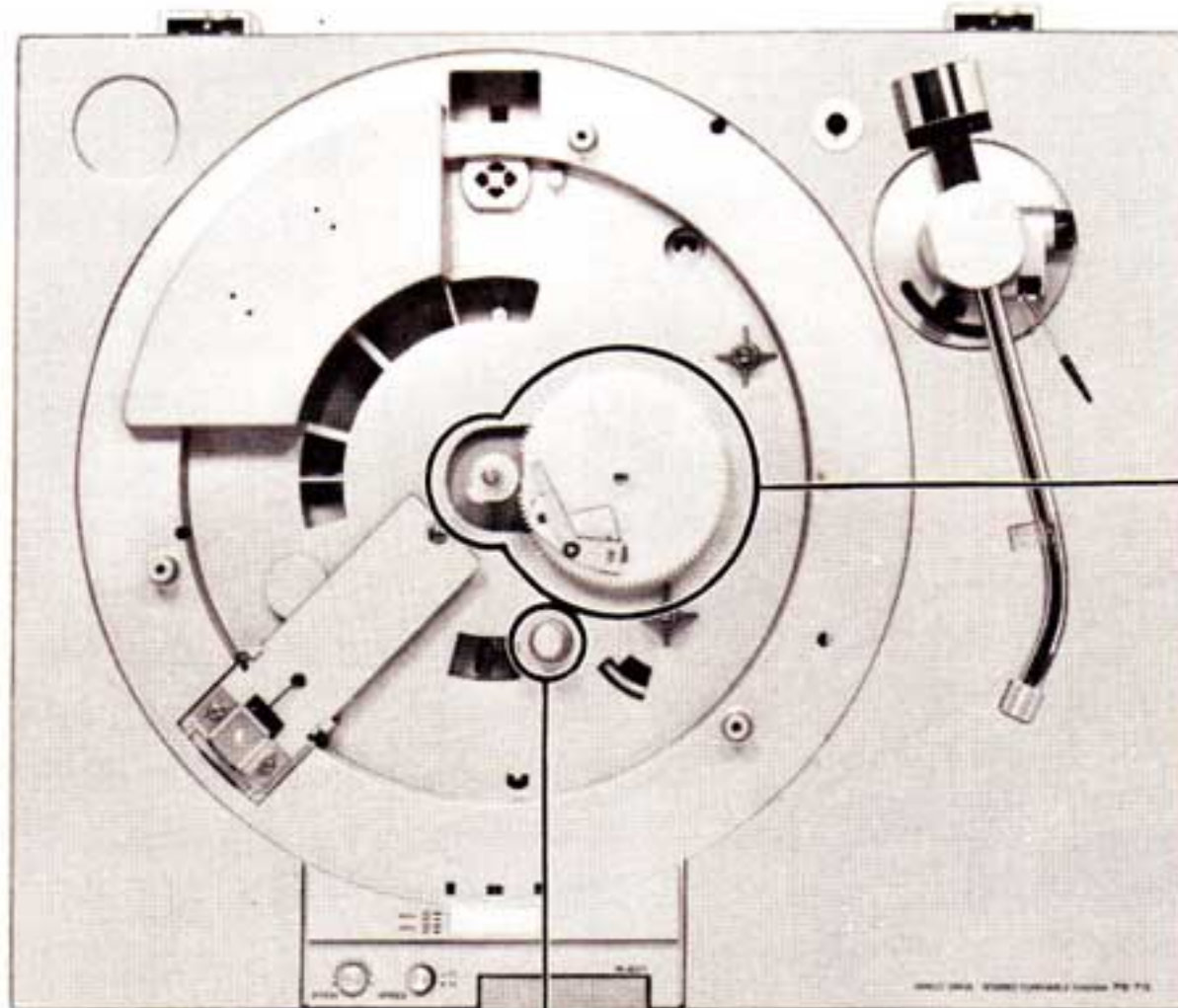


Fig. 6-4

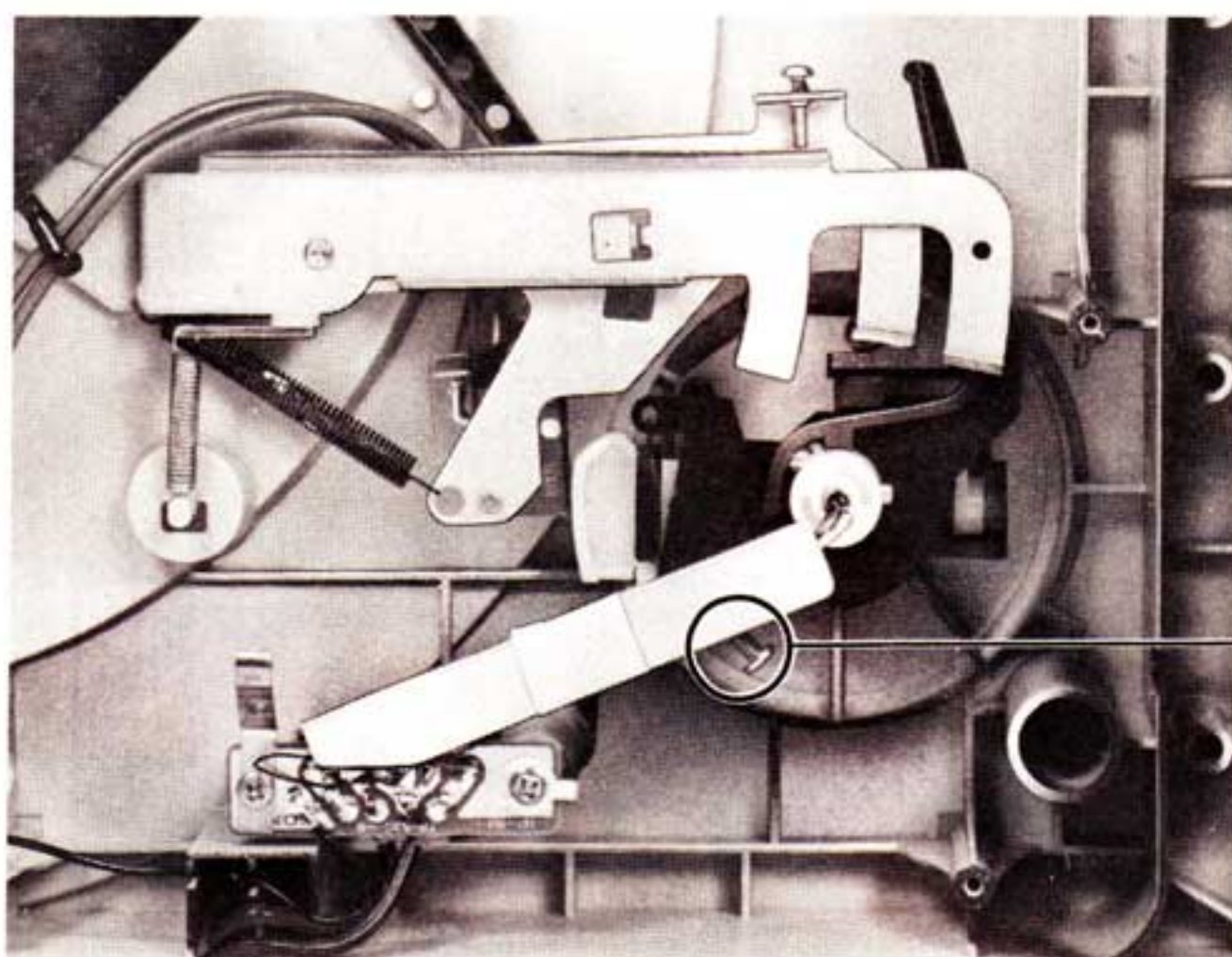


Fig. 6-5



## 6-5. SPEED DETECTING HEAD ADJUSTMENT

1. Fix the speed detecting head temporarily at a distance of 117 mm ( $4\frac{5}{8}$ " ) from the bracket hole to the head tip.
2. Adjust the head position so that the output level of the head exceeds 15 mV–50 mV ac (at 33 rpm) when the turntable is rotating.

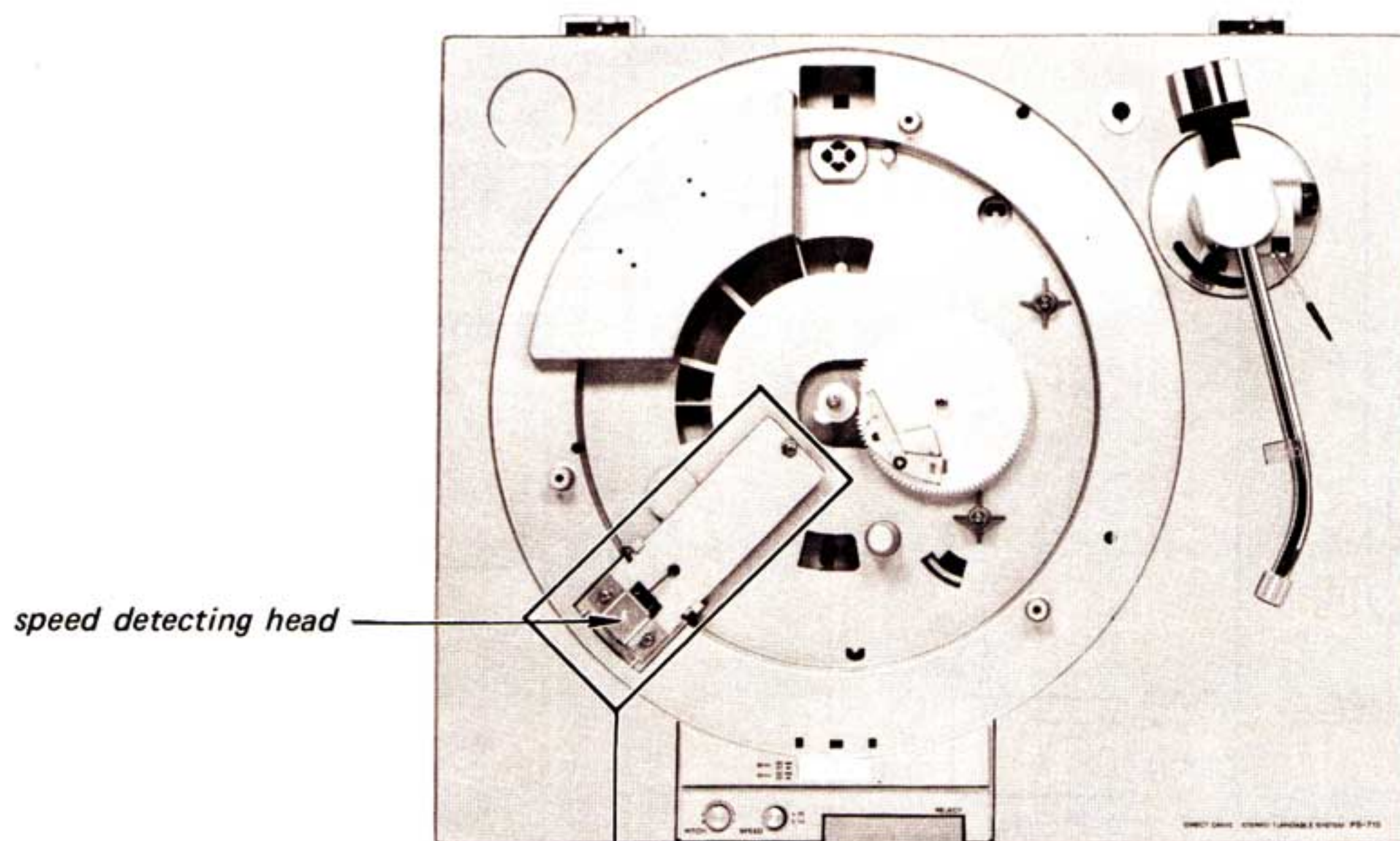


Fig. 6-6

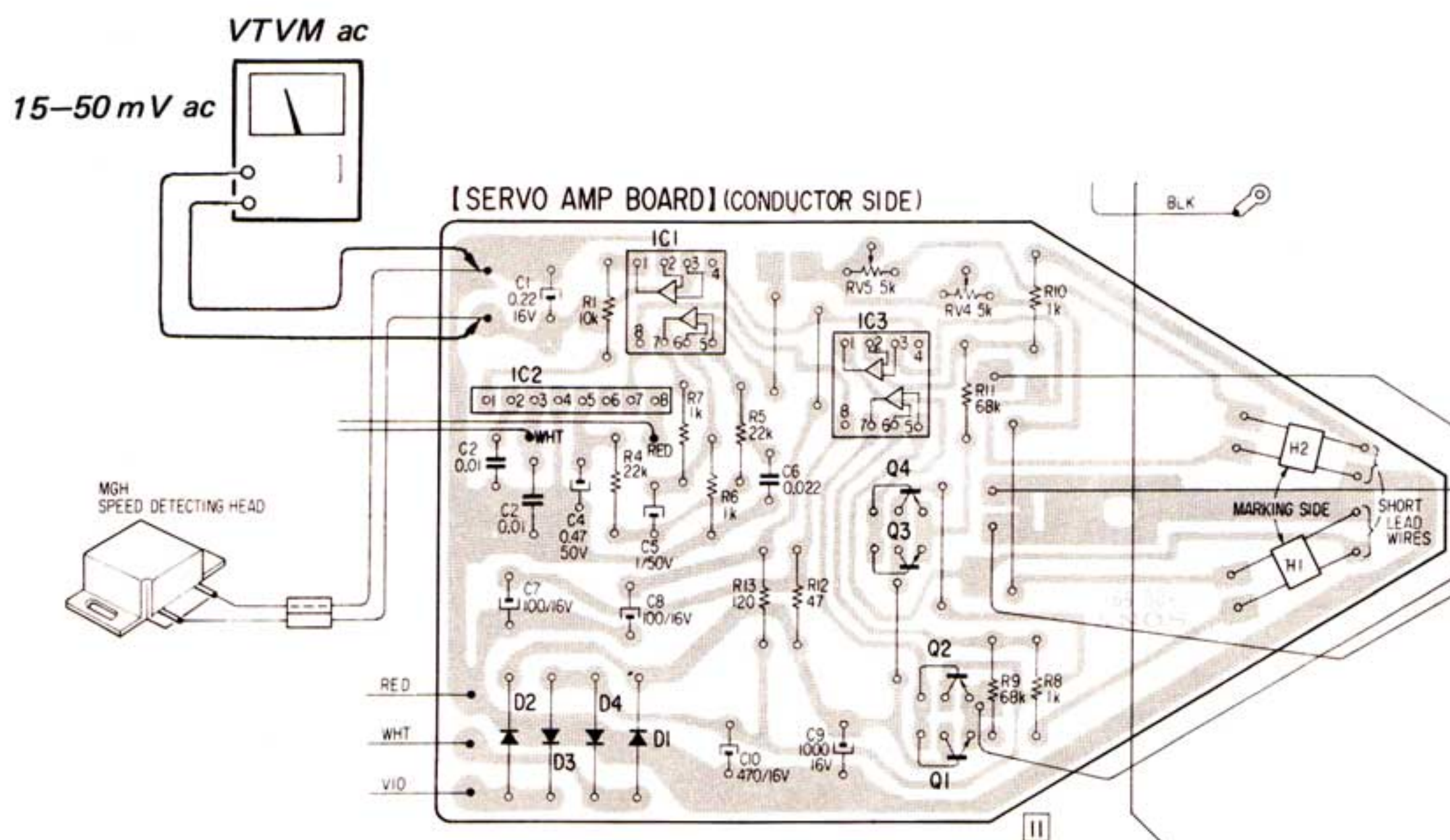
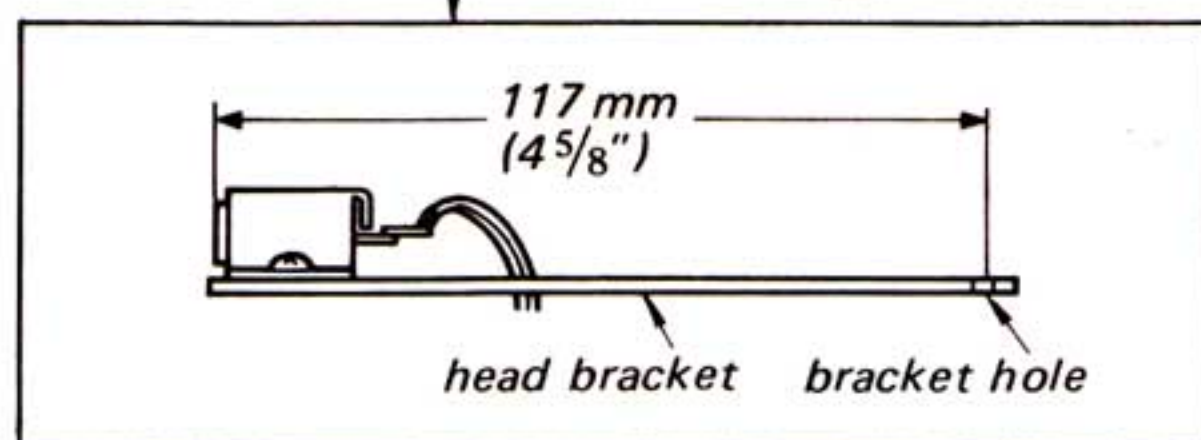


Fig. 6-7



## 6-6. MINIATURE SWITCH POSITION ADJUSTMENT

1. Place the tonearm on the arm rest.
2. Adjust the adjustment screw so that the positions of the miniature switch and the arm lever assembly are as shown in Fig. 6-8A.
3. Move the tonearm by hand and confirm that the neon lamp lights up just when the head
4. Return the tonearm and confirm that the neon lamp goes off just when the center of the tonearm pipe comes to the tip of the tonearm rest.

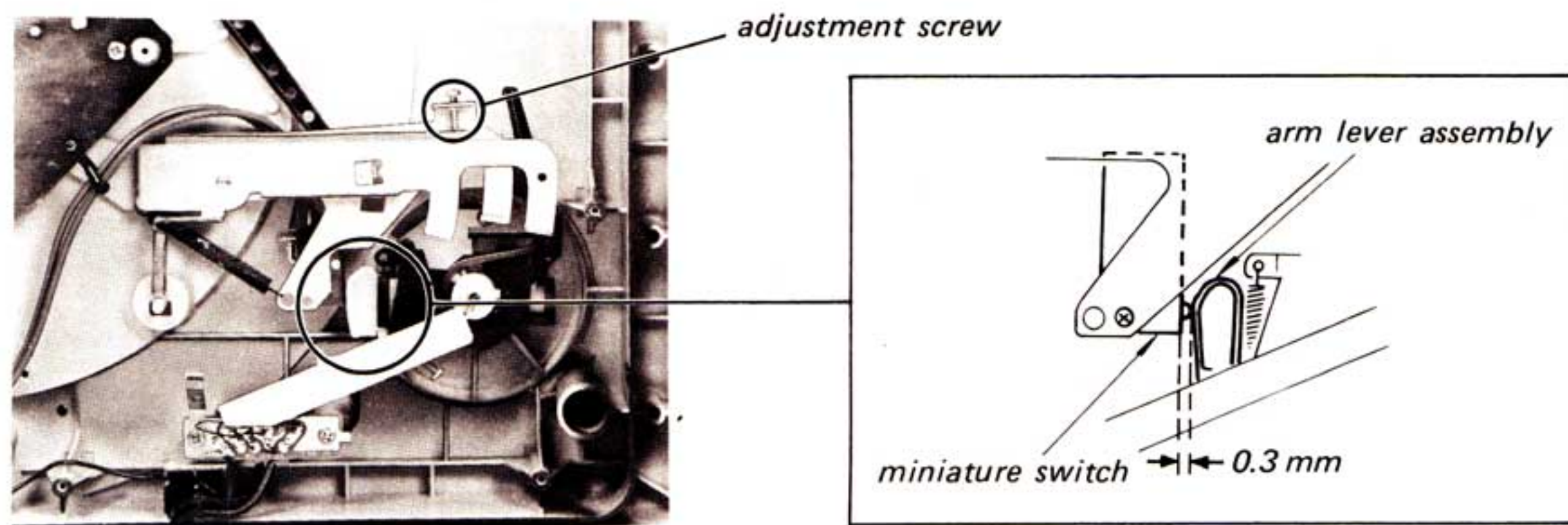


Fig. 6-8A

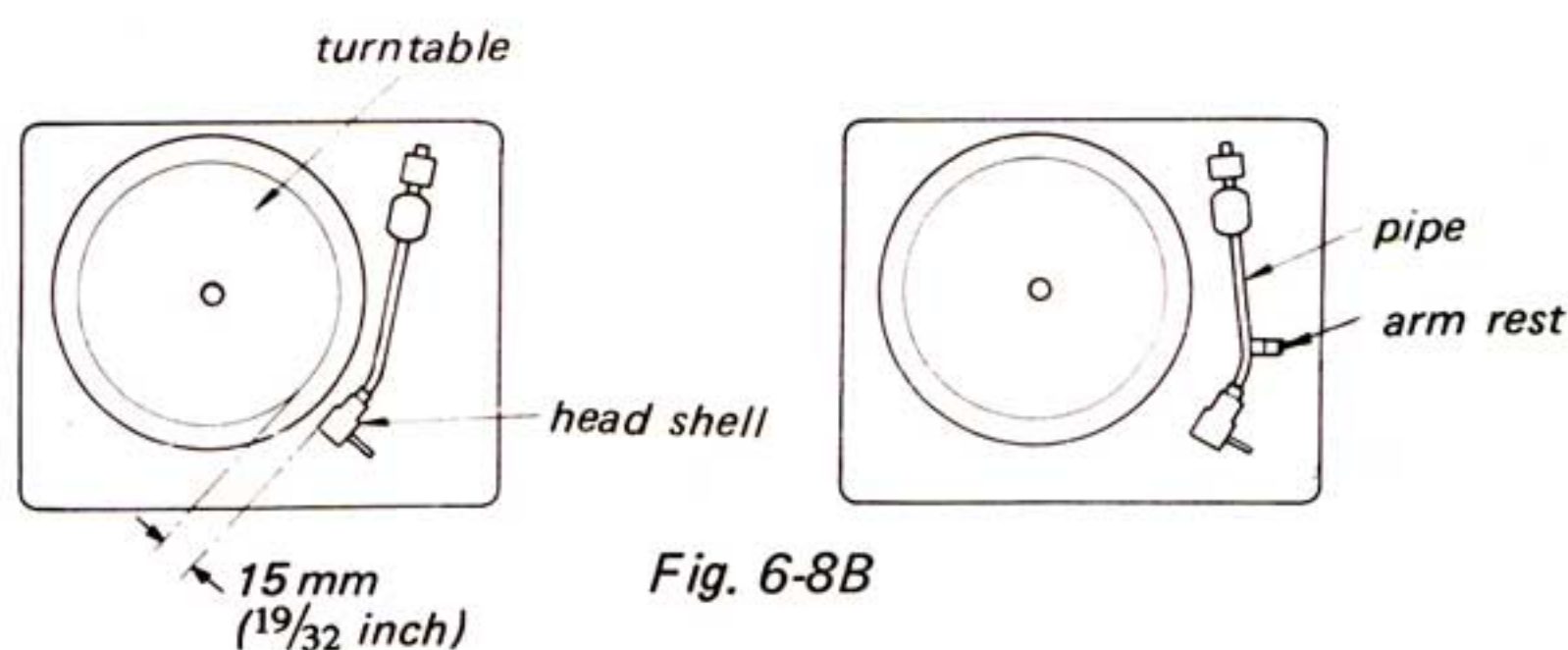


Fig. 6-8B

## 6-7. TONEARM HEIGHT ADJUSTMENT

### Automatic/Manual Return Operation

Adjust the height of the lift assembly by loosening the set screw so that the clearance between the stylus tip and the record is 4–12 mm, when the tonearm is raised by using the arm lifter after playing.

Check for the same result when the tonearm is automatically raised.

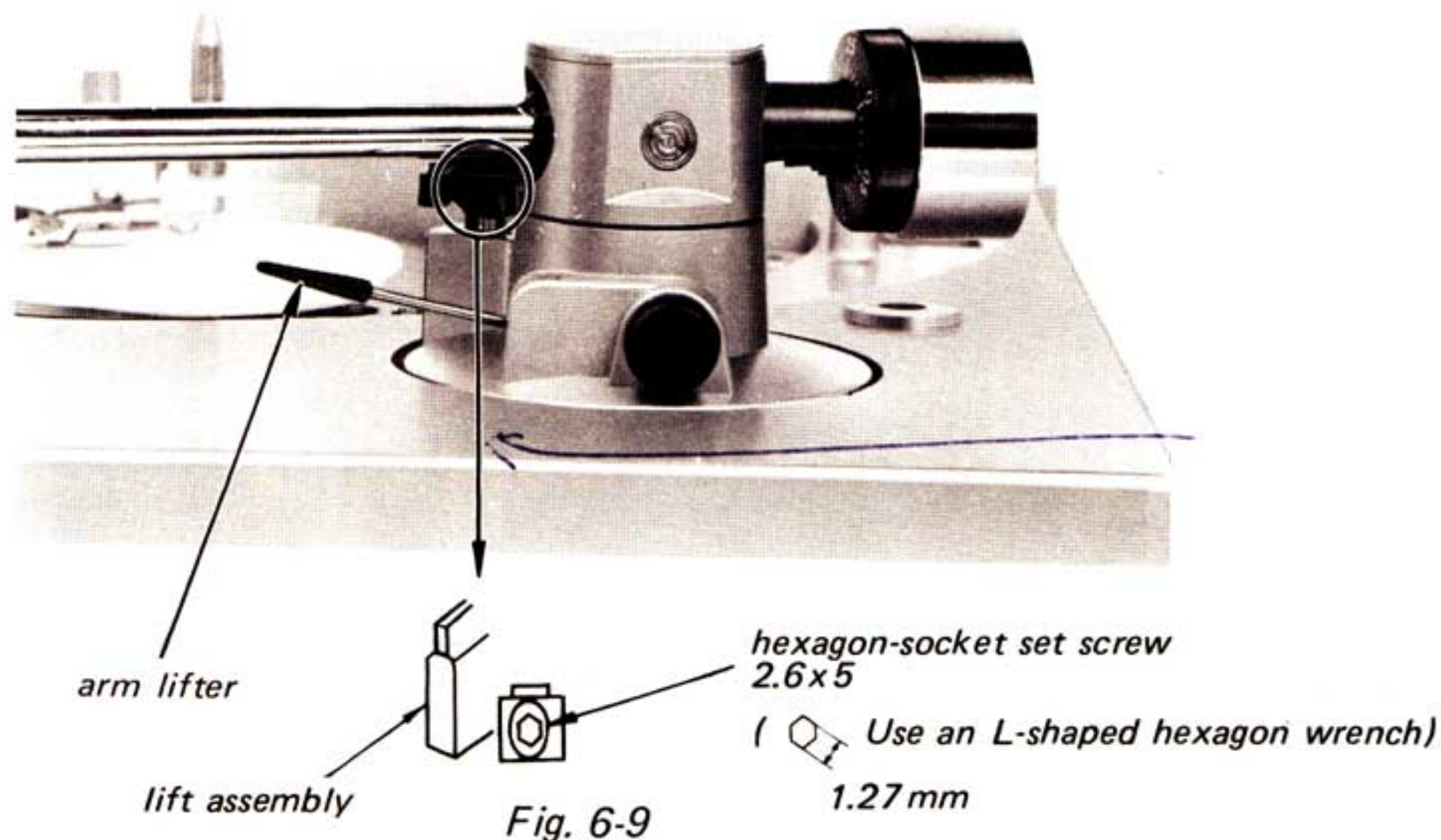


Fig. 6-9



SECTION 7  
DIAGRAMS

7-1. MOUNTING DIAGRAM

— Conductor Side —

Replacement Semiconductors

For replacement, use semiconductors except in ( ).

**Q1, 3: 2SD571**

**Q2, 4: 2SB605**

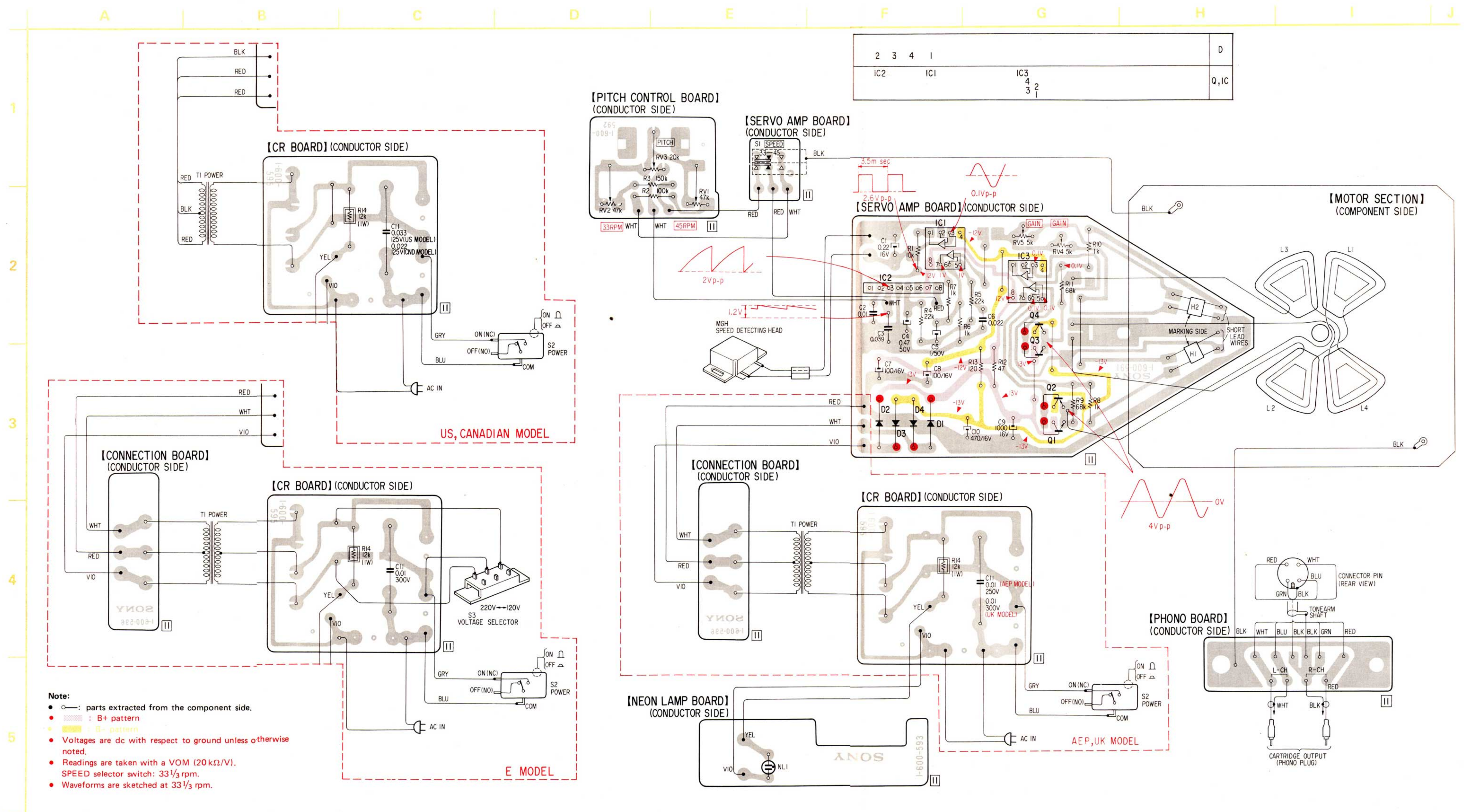
**IC1: μPC4557C**

**IC2: CX065A**

**IC3: μPC4558C**

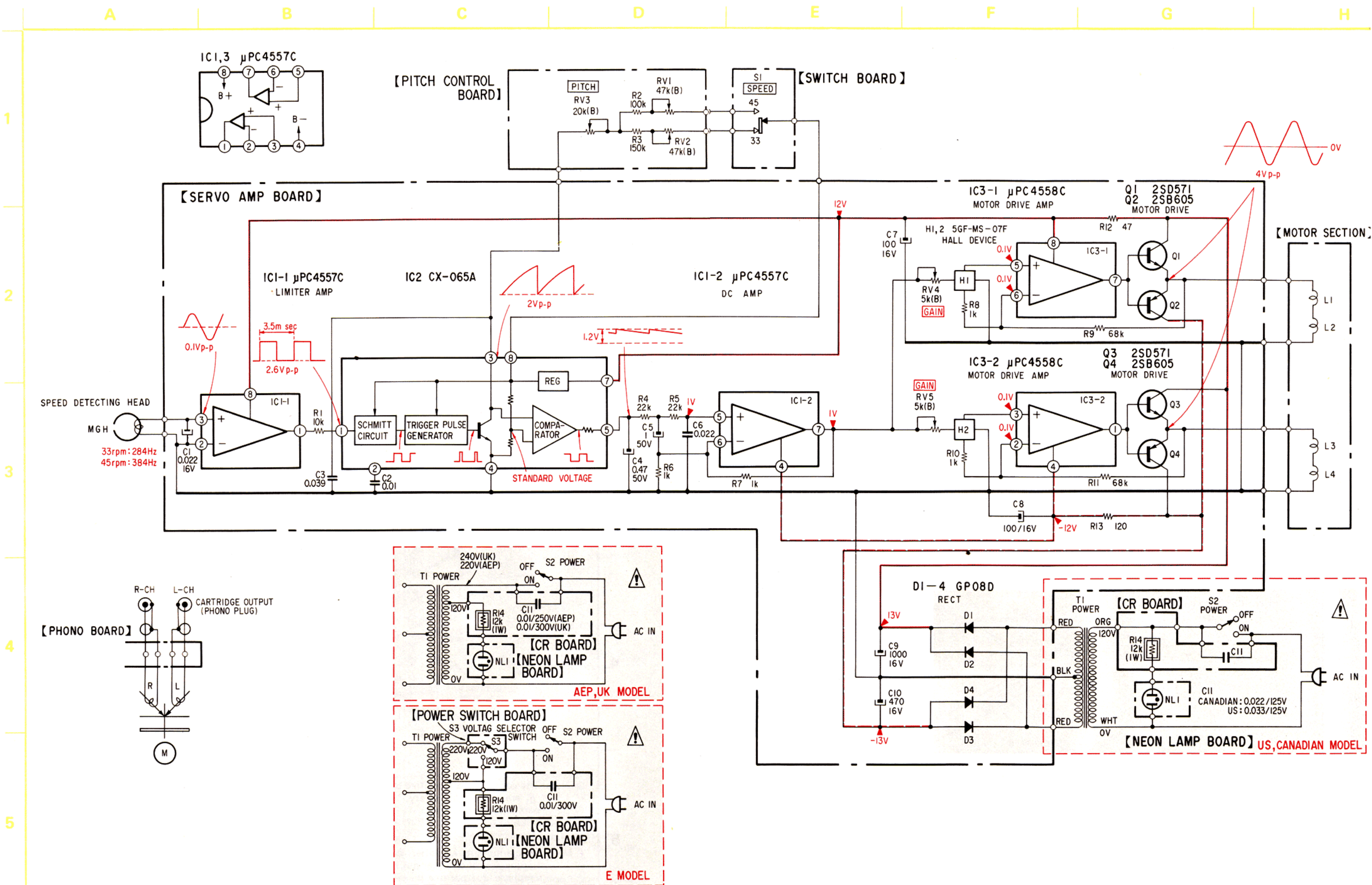
**D1-4: 10E2 (GP08D)**

**H1. 2: 5GF-MS-07F**







7-2. SCHEMATIC DIAGRAM










**Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.**

**Note: Les composants identifiés par un tramé et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.**

**Note:**

- All capacitors are in  $\mu\text{F}$  unless otherwise noted. pF:  $\mu\mu\text{F}$   
50WV or less are not indicated except for electrolytics.
- All resistors are in ohms,  $\frac{1}{4}\text{W}$  unless otherwise noted.  
k $\Omega$ : 1000  $\Omega$ ; M $\Omega$ : 1000 k $\Omega$
-  : nonflammable resistor.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken with a VOM (20 k $\Omega$ /V).
- Voltage variations may be noted due to normal production tolerances.
- Waveforms are sketched at 33 rpm.
-  : panel designation.
-  : adjustment for repair.
-  : B+ bus.
-  : B- bus.
- Switch

Ref. No.	Switch	Position
S1	SPEED	33
S2	POWER	OFF



# SECTION 8 EXPLODED VIEWS

A

B

C

D

8-1.

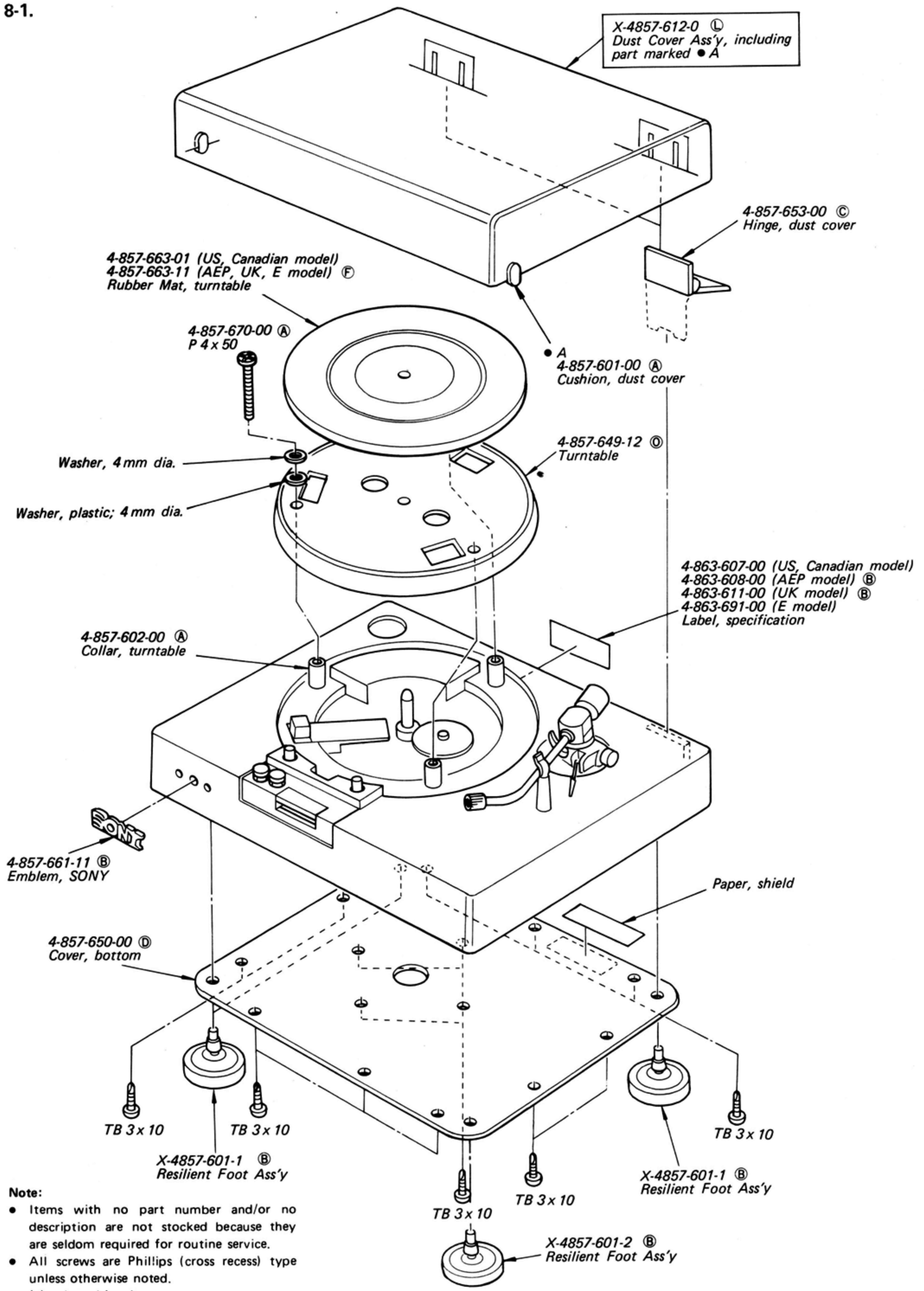
1

2

3

4

5



**Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.  
(-) = slotted head
- (□□T) shows the number of coils in spring.
- Circled letters (A) to (Z) are applicable to European models only.



A

B

C

D

8-2.

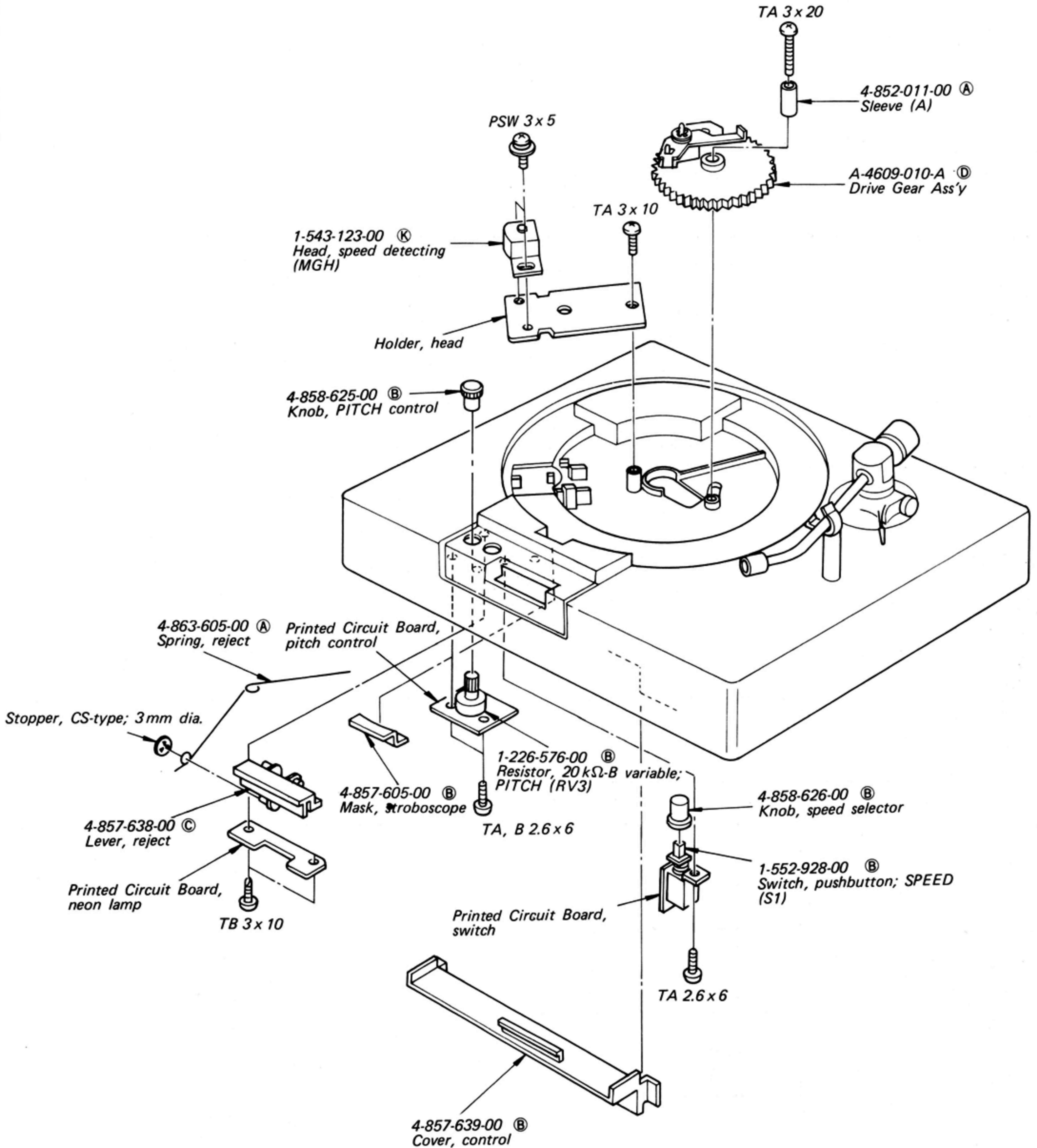
1

2

3

4

5

**Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.  
(-) = slotted head
- (□□T) shows the number of coils in spring.
- Circled letters (A) to (Z) are applicable to European models only.



A

B

C

D

8-3.

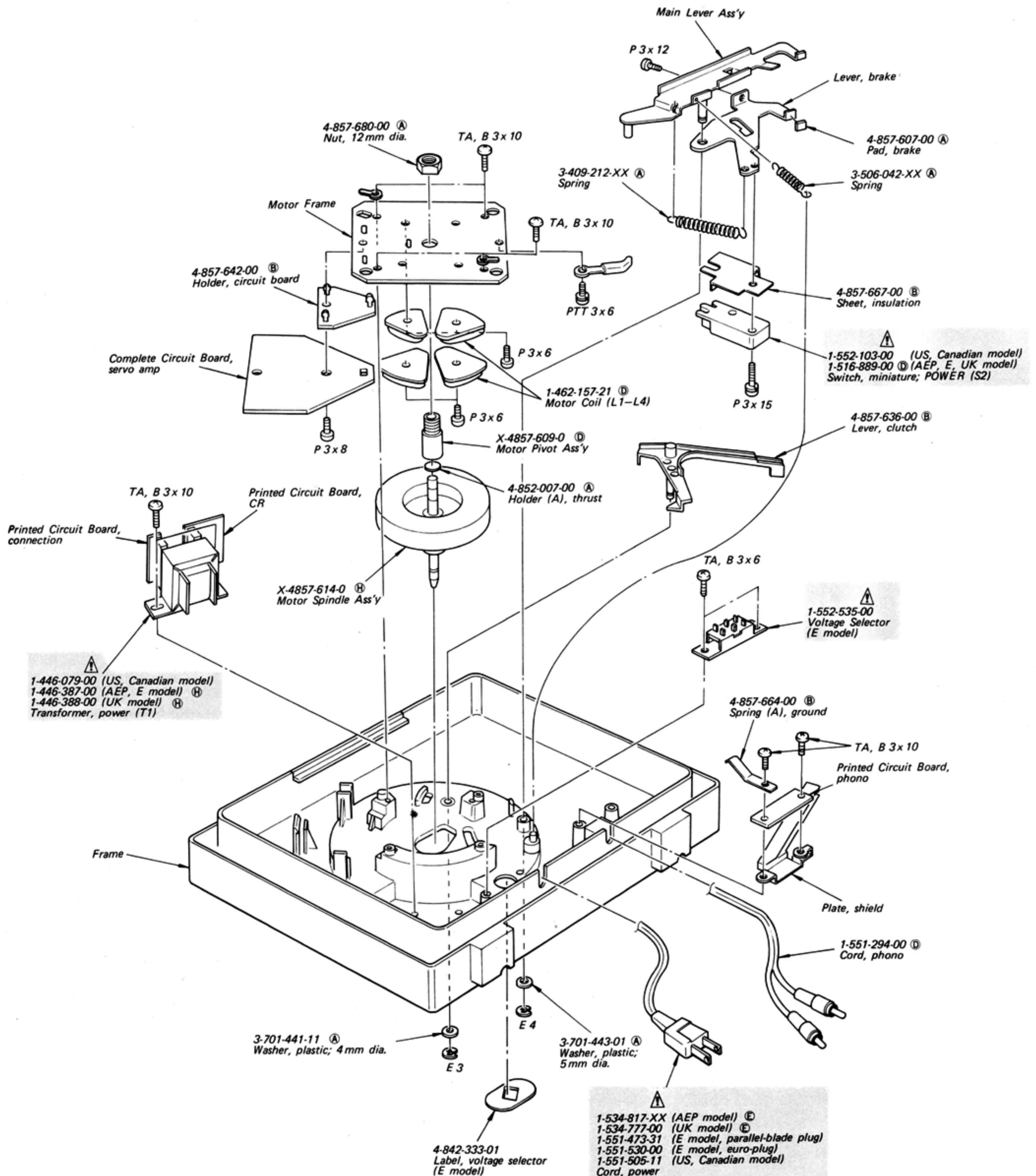
1


2


3

4

5



**Note:** The components identified by shading and mark  are critical for safety. Replace only with part number specified.

**Note:** Les composants identifiés par un tramé et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

**Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.  
(-) = slotted head
- (□□T) shows the number of coils in spring.
- Circled letters (A) to (Z) are applicable to European models only.



**A****B****C****D**

8-4.

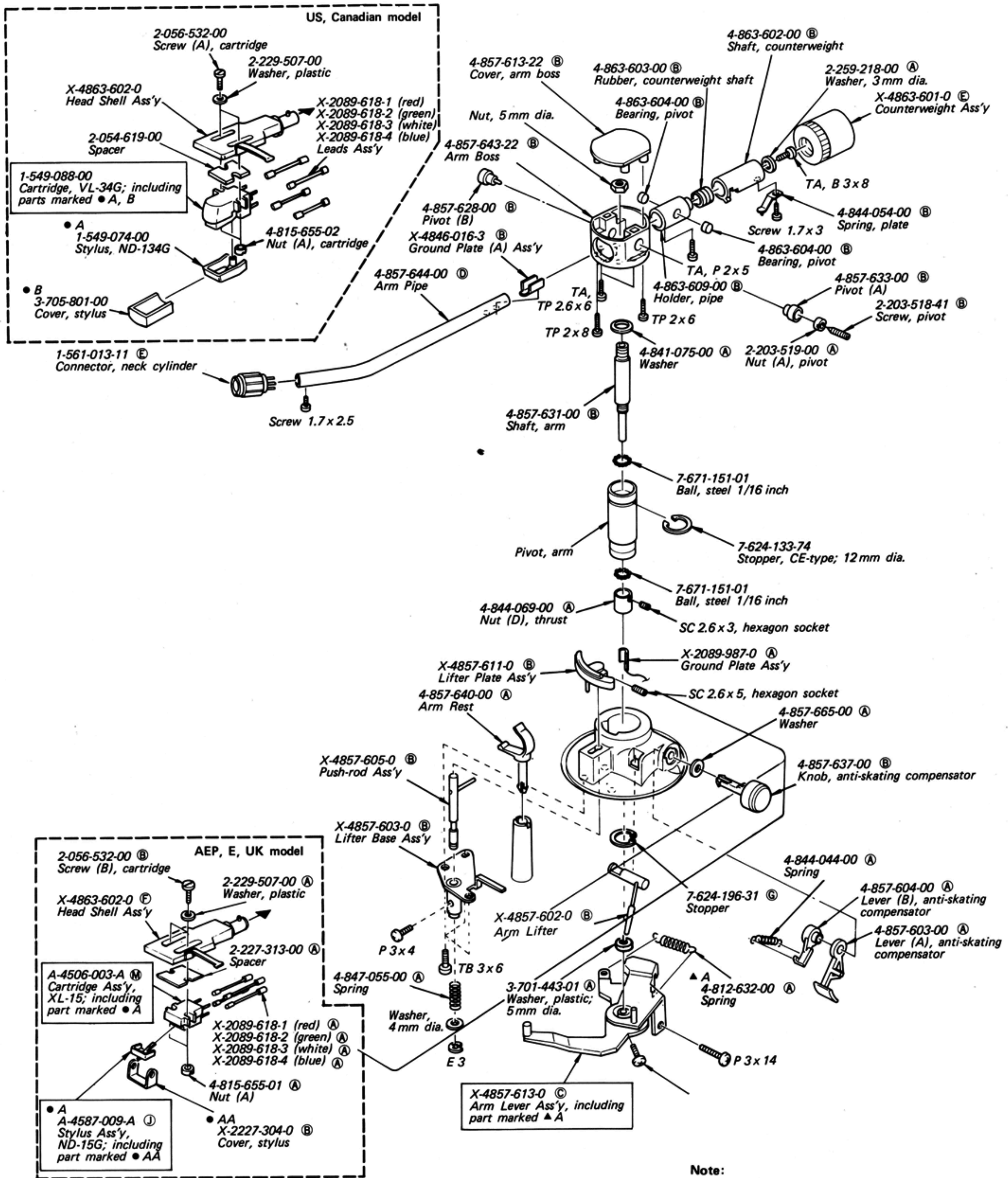
1

2

3

4

5

**Note:**

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.  
(-) = slotted head
- (□□T) shows the number of coils in spring.
- Circled letters (A to Z) are applicable to European models only.



# SECTION 9

## ELECTRICAL PARTS LIST

Note: Circled letters (A to Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
<b>SEMICONDUCTORS</b>		
<b>Transistors</b>		
Q1	8-729-157-11	(B) 2SD571
Q2	8-729-160-51	(B) 2SB605
Q3	8-729-157-11	(B) 2SD571
Q4	8-729-160-51	(B) 2SB605
<b>ICs</b>		
IC1	8-759-145-57	(D) $\mu$ PC4557C
IC2	8-759-600-65	(D) CX065A
IC3	8-759-145-58	(D) $\mu$ PC4558C
<b>Diodes</b>		
⇒ D1-4	(A) 8-719-200-02	(B) 10E2
<b>Hall Elements</b>		
H1,2	8-719-905-07	(D) 5GF-MS-07F
<b>COILS</b>		
L1-4	1-462-157-21	(D) Motor
<b>TRANSFORMERS</b>		
T1	(A) 1-446-079-00	Power (US, Canadian model)
T1	(A) 1-446-387-00	(H) Power (AEP, E model)
T1	(A) 1-446-388-00	(H) Power (UK model)
<b>CAPACITORS</b>		
All capacitors are in $\mu$ F. elect: electrolytic		
C1	1-131-453-00	(B) 0.22 16V tantalum
C2	1-101-923-00	(A) 0.01 25V ceramic
C3	1-108-593-00	(B) 0.039 50V mylar
C4	1-123-351-00	(B) 0.47 50V elect
C5	1-123-352-00	(B) 1 50V elect

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

**Note: The components identified by shading and mark (A) are critical for safety. Replace only with part number specified.**

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
C6	1-161-034-00	(A) 0.022 25V ceramic
C7,8	1-123-320-00	(B) 100 16V elect
C9	1-123-324-00	(B) 1000 16V elect
C10	1-123-323-00	(B) 470 16V elect
C11	(A) 1-130-098-00	0.022 125V polyethylene (Canadian model)
C11	(A) 1-108-750-00	0.033 125V mylar (US model)
C11	(A) 1-130-196-00	(D) 0.01 250V polyethylene (AEP model)
C11	(A) 1-130-230-00	(B) 0.01 300V film (UK, E model)

### RESISTORS

All resistors are in ohms. Common 1/4W carbon resistors are omitted. Check schematic diagram for their values.

R2	1-130-521-00	(A) 100k 1/4W carbon
R14	(A) 1-213-156-00	(A) 12k 1W metal oxide (nonflammable)
RV1,2	1-226-238-11	(B) 47k, adjustable; 45 rpm, 33 rpm
RV3	1-226-576-00	(B) 20k, variable; PITCH
RV4,5	1-226-430-11	(B) 5k, adjustable; gain

### SWITCHES

S1	1-552-928-00	(B) Pushbutton, SPEED
S2	(A) 1-516-889-00	(D) Miniature, POWER (AEP, E, UK model)
S2	(A) 1-552-103-00	Miniature, POWER (US, Canadian model)

### MISCELLANEOUS

MGH	1-543-123-00	(K) Head, speed detecting
NL1	(A) 1-519-135-11	(B) Lamp, neon; 5 mA
	A-4505-003-A	(M) Cartridge, XL-15 (AEP, E, UK model) including;
	A-4587-009-A	(J) Stylus, ND-15G (AEP, E, UK model)

**Note: Les composants identifiés par un tramé et une marque (A) sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.**



**Note:** Circled letters ( A to Z ) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
⚠	1-534-777-00	ⓔ Cord, power (UK model)
⚠	1-534-817-XX	ⓔ Cord, power (AEP model)
	1-535-172-00	ⓐ Lead, jumper
	1-549-088-00	Cartridge, VL-34G (Canadian model) including;
	1-549-074-00	Stylus, ND-134G (Canadian model)
	1-551-294-00	ⓓ Cord, phono
⚠	1-551-505-11	Cord, power (US, Canadian model)
⚠	1-551-473-31	Cord, power (E model, parallel-blade plug)
⚠	1-551-530-00	Cord, power (E model, euro-plug)
⚠	1-552-535-00	Voltage Selector (E model)
	1-561-013-00	ⓔ Connector, neck cylinder

### PACKING MATERIALS AND ACCESSORIES

<u>Part No.</u>	<u>Description</u>
3-701-616-00	ⓐ Bag, polyethylene
3-701-630-00	ⓐ Bag, polyethylene
3-701-632-00	ⓑ Bag, polyethylene
3-701-806-00	45 rpm Adaptor (E model)
3-705-801-00	Cover, stylus (Canadian model)
3-770-867-11	ⓑ Manual, instruction (AEP, E, UK model)
3-794-265-11	
3-794-232-11	
3-770-867-21	Manual, instruction (US, Canadian model)
3-794-521-31	
•	
3-794-233-21	
3-794-504-11	Notice (Canadian model)
4-857-655-00	ⓐ Plate (A), protection
4-857-656-00	ⓐ Plate (B), protection
4-857-657-01	ⓑ Bag, protection
4-857-658-00	ⓑ Spacer, TT sheet
4-858-796-00	ⓑ Plate (C), protection
4-858-658-00	ⓐ Carton (AEP, E model)
4-858-659-00	ⓐ Carton (US, Canadian, UK model)
4-858-661-00	ⓒ Cushion (right)
4-858-662-00	ⓒ Cushion (left)
4-858-663-00	ⓒ Cushion, stopper

**Note:** The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

**Note:** Les composants identifiés par un tramé et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.



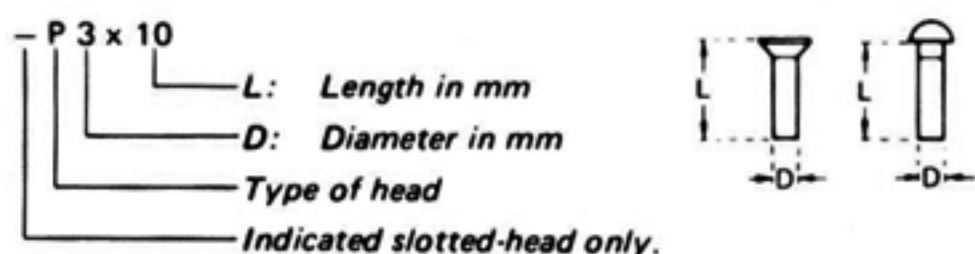
1/4 WATT CARBON RESISTORS <sup>Ⓐ</sup>

Note: Circled letter <sup>Ⓐ</sup> is applicable to European models only.

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

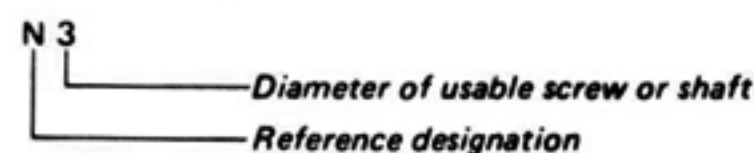
HARDWARE NOMENCLATURE

Screw:



Unless otherwise indicated, it means cross-recessed head (Phillips type).

Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
<b>SCREWS</b>			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
<b>SELF-TAPPING SCREWS</b>			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self-tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
<b>SET SCREWS</b>			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
<b>NUT</b>			
N		nut	
<b>WASHERS</b>			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
<b>RETAINING RINGS</b>			
E		retaining ring	
G		grip-type retaining ring	

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