PS-2251

USA Model

DIRECT DRIVE TURNTABLE SYSTEM

SPECIFICATIONS

GENERAL

Speed:	$33\frac{1}{3}$, 45 rpm ± 4 %, adjustable
Turntable drive:	Direct drive system
Wow and flutter: (weighted)	Less than 0.04 % (NAB)
Signal-to-noise ratio: (weighted)	Greater than 58 dB (NAB)
Motor:	AC servo-controlled motor
Turntable platter:	310 mm ($12\frac{3}{16}$") dia. 1.5 kg (3 lb 5 oz) diecasted aluminum
Start-up-time:	Less than 2.5 seconds
Power consumption:	15 watts
Power requirement:	120 V, 60 Hz
Dimensions:	491 (w) x 185 (h) x 410 (d) mm $19\frac{5}{16}$ (w) x $7\frac{5}{16}$ (h) x $16\frac{1}{8}$ (d) inches
Net weight:	15 kg (33 lb 1 oz)
Shipping weight:	17.4 kg (38 lb 6 oz)

TONEARM (PUA-113)

Type:	Static balanced
Arm length: (Pivot-To-Stylus)	245 mm ($9\frac{5}{8}$")
Over hang:	14 mm ($\frac{9}{16}$")
Stylus force adjustment range:	0 to 3 g. 0.2 g increments
Anti-skating force compensation range:	0 to 3 g. 0.2 g increments
Tonearm height precise adjustment range:	45.5 mm ~ 52.5 mm ($1\frac{25}{32}$") ~ ($2\frac{1}{32}$")
Cartridge weight range:	4 g to 17 g 8 g to 21 g (with subweight)

SONY®

SERVICE MANUAL

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SECTION 1
TECHNICAL DESCRIPTION

1-1. SPECIFICATIONS

General

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1-2. PRINCIPLE OF AC SERVO SYSTEM

Fig. 1-1 shows a simplified diagram of the ac servo system employed in this set. Since the ac motor speed is proportional to the applied ac voltage, it is controlled by varying the applied voltage (Em) to the motor. This is effectively performed by means of series resistor Rv.

In practice, series resistor Rv is replaced by the diode-bridge circuit and collector-emitter impedance of a power transistor as illustrated in Fig. 1-2. Note that the diode-bridge determines only the direction of the ac current which flows in the power transistor.

Motor speed is converted into ac signal by means of a direct-coupled frequency generator. The servo amplifier compares this signal against a very stable dc reference voltage, and then controls the collector-emitter impedance of power transistor. Any error in motor speed results in a correction voltage supplied to the motor.

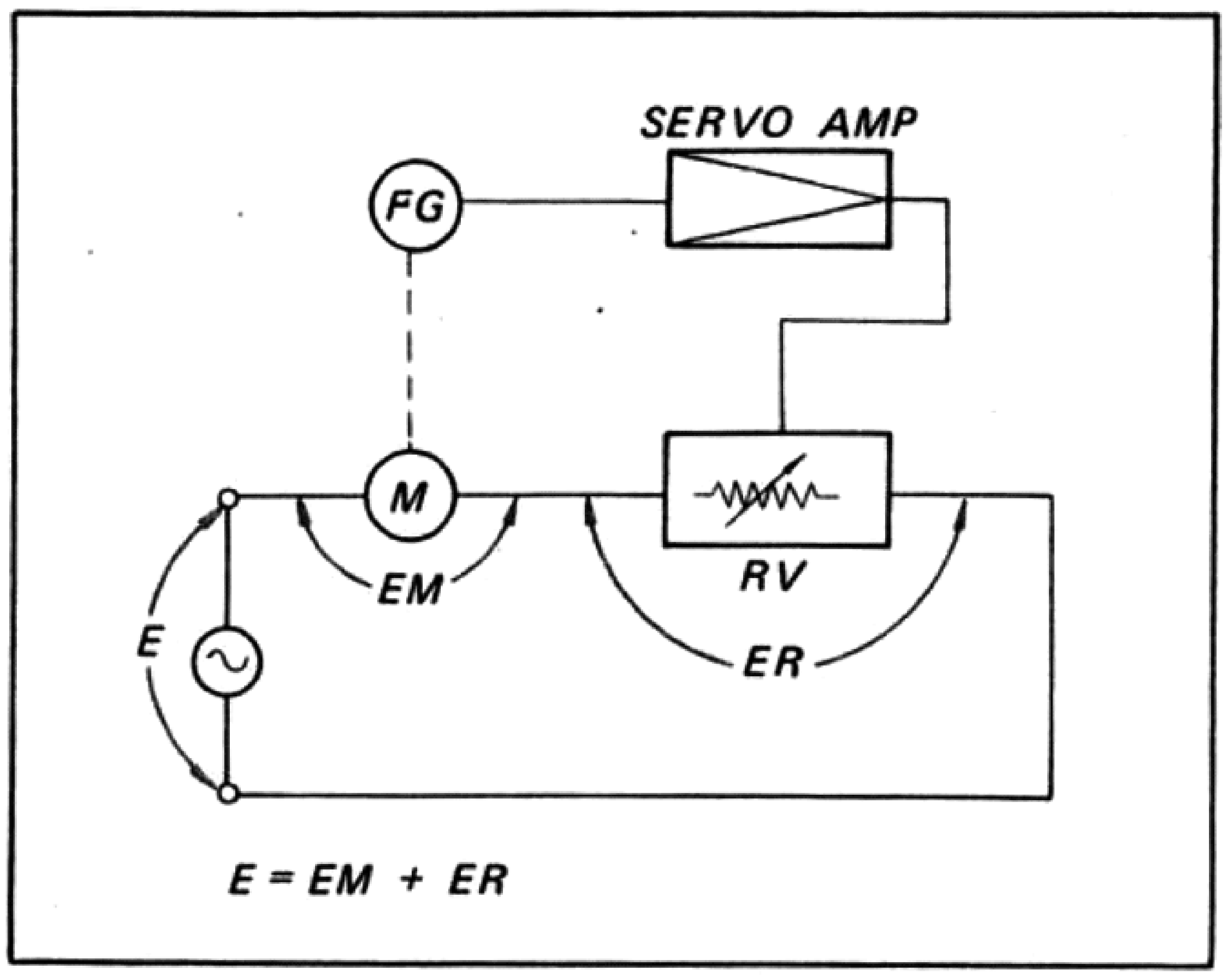


Fig. 1-1. Principle of ac servo system

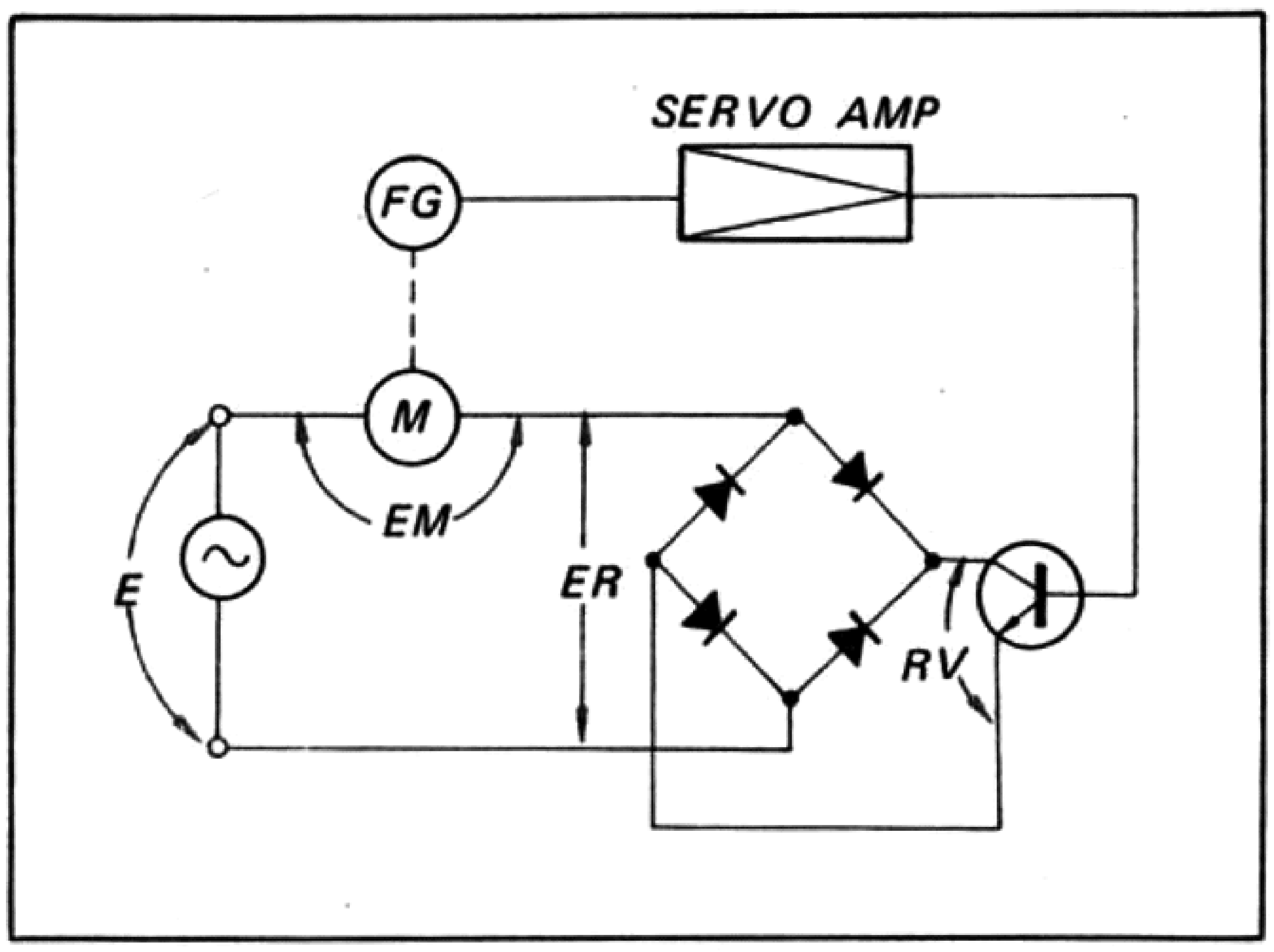


Fig. 1-2. Practical ac servo system

1-3. CIRCUIT DESCRIPTION

The following describes the functions of ac servo amplifier. Since stages are listed by transistor or IC reference designation, refer to the block or schematic diagram on page 4 and 15.

Stage/Control	*Function*
Start Operation	
	When the power switch is turned on, C8 is charged through R27, R8, VR2, R10, VR1 and R9 when the 33 rpm button is depressed. Note that VR2 and R10 are shorted during 45 rpm operation. Voltage comparator in IC1 is forced into conduction when C8 is charged up to some specified voltage. As a result Q3 ~ Q4 are ON, thereby a large ac voltage is supplied to the motor.
Correct Speed Condition	
Frequency generator	Frequency generator is installed in the motor (directly coupled to the drive motor shaft) and generates the ac voltage whose frequency is proportional to the motor speed.
Differential amplifier Q1, Q2	Q1 and Q2 form a differential amplifier which increases the input FG signal to the level required for the following limiter circuit.
Diode limiter D1, D2	Removes the amplitude variations from the signal. Each diode conducts when the signal across it exceeds the barrier potential (0.6 V) in a forward biased condition. Thus, the output signal is limited to about 1.2 V peak-to-peak.
IC1 (integrated circuit)	The integrated circuit used contains four circuit functions that is, flip-flop, dc buffer/phase inverter, saw-tooth wave generator and voltage comparator.
Flip-flop circuit	Flip-flop circuit generates square output in accordance with the input trigger signal (limiter output).
DC buffer/phase inverter	This supplies inverted flip-flop output to the differentiation circuit.
Differentiation circuit	Square wave is converted into spike pulses through the differentiation circuit formed by C7 and input impedance of saw-tooth wave generator.
Saw-tooth wave generator	The frequency of the saw-tooth wave is determined by the RC time constant circuit connected at terminal (6) of the IC1; C8, R9, VR1, R10 and VR2.
Voltage comparator	Generates the negative pulse of which width is proportional to the time when the saw-tooth voltage exceeds the reference voltage as illustrated in Fig. 1-3. The reference voltage is determined by the setting of Pitch Control (VR3 paralleled by R12).
Dc buffer/phase inverter	Supplying positive pulsating signal to the following filter circuit.
Low pass filter/buffer amplifier	Buffer amplifier Q3 and an RC network consisting of R15, C11, R16, C12, C13, R17 and C14 comprise a low-pass filter having a sharp rolloff characteristic. Notice that this stage acts as an integrator, converting the input positive pulses into a dc voltage proportional to the input pulse width.
Dc amplifiers Q4, Q5, Q6	Dc output from the low-pass filter is applied to the base of Q4. As Q4, Q5 and Q6 are directly coupled, a change in input dc voltage alters the conduction of Q6, controlling the voltage applied to the motor.
Servo Operation	
	When, by any cause, the motor speed becomes slightly faster or slower than the specified value, the servo system works as follows: Referring to Fig. 1-3, assume that the motor speed becomes faster. The FG output signal frequency becomes higher, resulting in a shorter interval between pulses for triggering the saw-tooth wave generator. The shorter interval between trigger pulses causes lower saw-tooth wave

Stage/Control	Function
	height, which in turn yeilds a shorter "ON" period for comparator. Therefore, the output pulse width becomes shorter, reducing the positive bias upon Q4. As a result, the collector-emitter impedance of Q6 increases, reducing the motor speed. Conversely, if the motor speed becomes slower, the collector-emitter impedance of Q6 decreases, increasing the motor speed.
Power supply D8, D9 C17, C19 D7	A positive 12 volts for the system is provided by the full-wave rectifier consisting of D8 and D9, filter capacitors C19, C17 and zener diode D7.
Speed selector switch S1	Speed changeover operation is performed by changing the saw-tooth wave frequency as previously described. Since the saw-tooth wave frequency is determined by the RC time constant circuit, a speed selector switch is connected in parallel with VR2 and R10. A smaller time constant results in faster motor speed and vice versa. So S1 is open when the speed selector switch is set to 33 rpm.

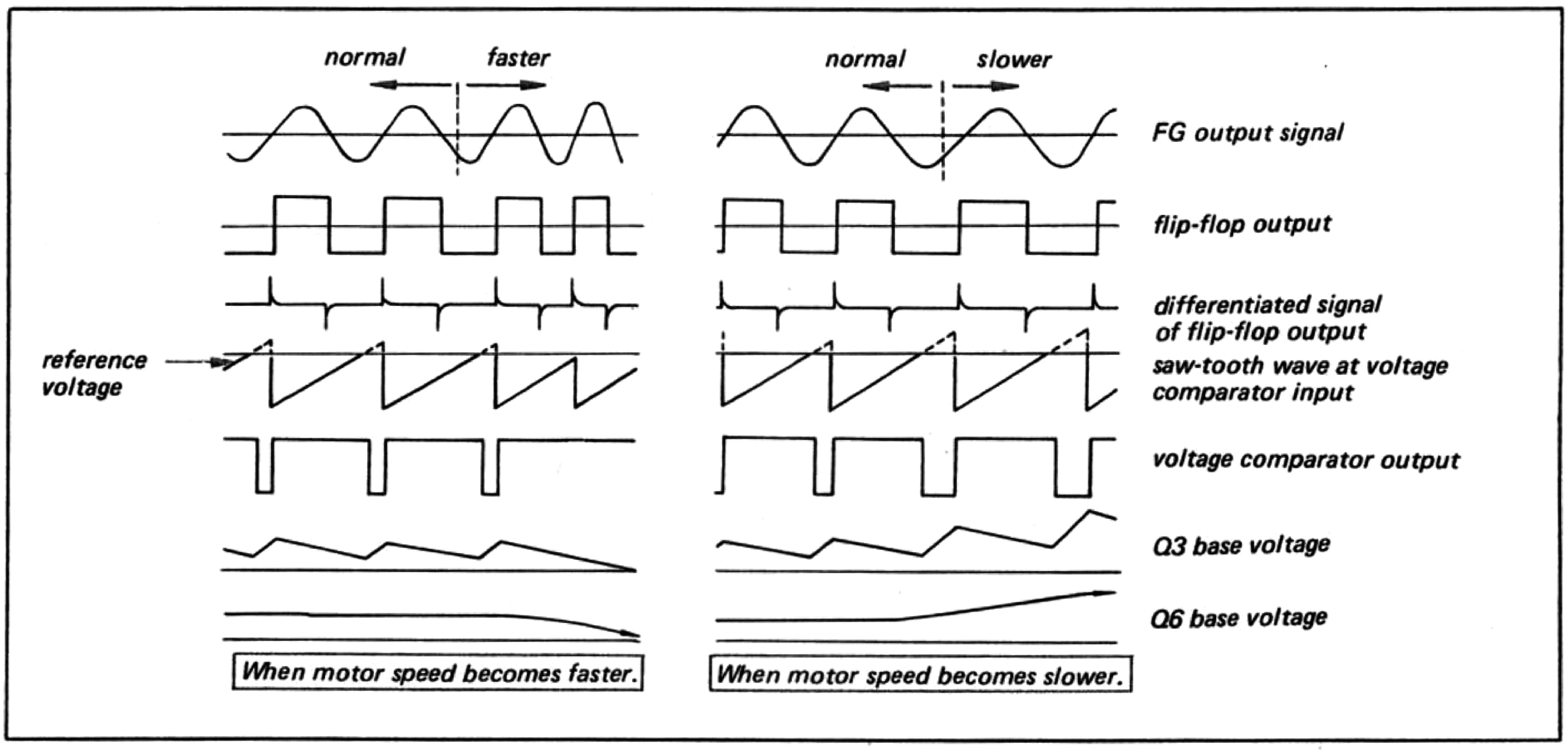
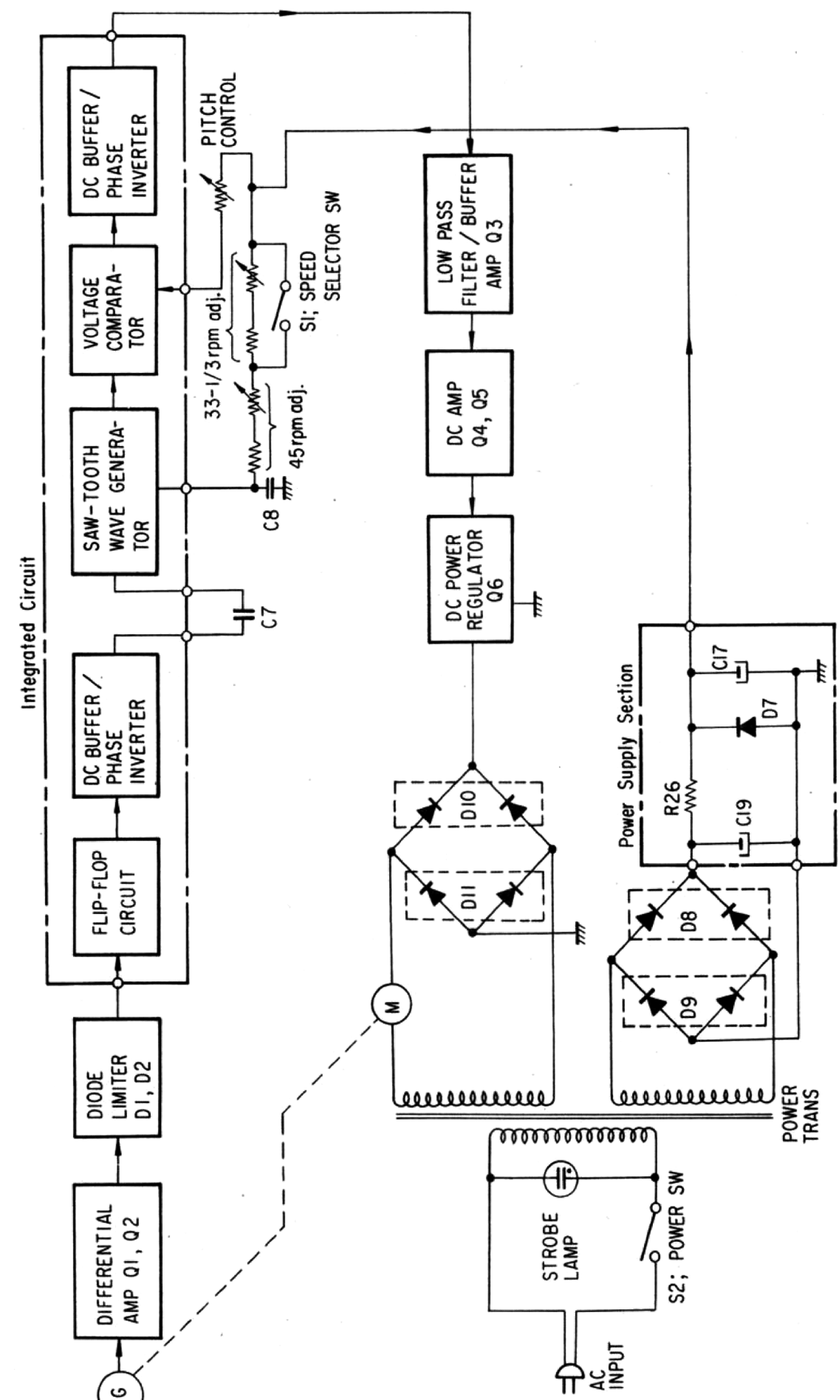


Fig. 1-3. Waveforms on servo control circuit

1-4. BLOCK DIAGRAM



SECTION 2

DISASSEMBLY AND REPLACEMENT

WARNING

Unplug the ac power cord before starting any disassembly or replacement procedures.

Note: All screws in this service manual are Phillips type (cross recess type) unless otherwise indicated.
(–): slotted head.
Tools required: Hex wrench set

2-1. TOP COVER REMOVAL

1. Open the top cover, and then carefully lift the top cover straight up as shown in Fig. 2-1.

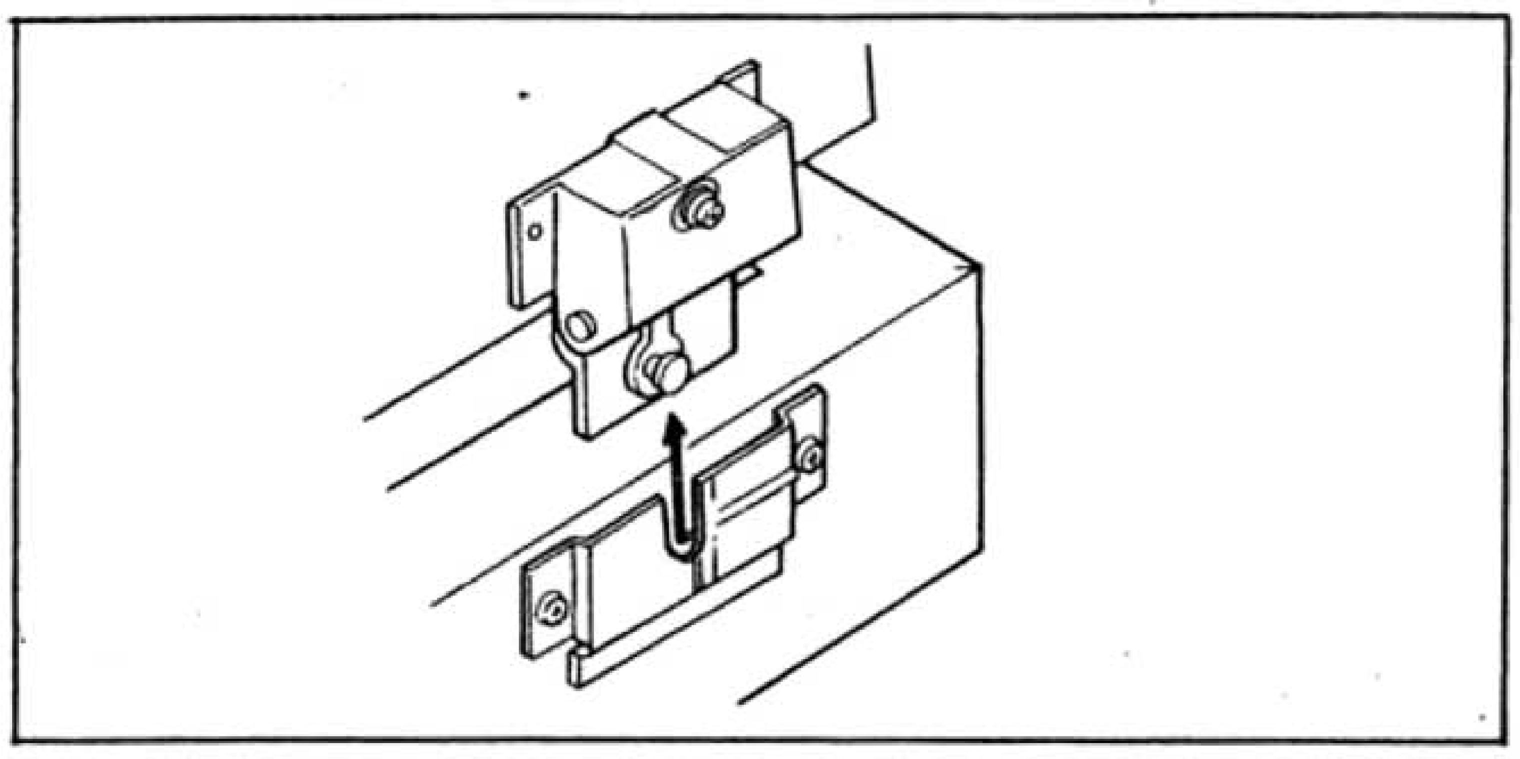


Fig. 2-1. Top cover removal

2-2. TURNTABLE PLATTER REMOVAL

1. Remove the top cover as described in Procedure 2-1.
2. Remove the rubber mat from the turntable platter, and then insert your fingers into the two holes of the turntable with both thumbs placed on the center spindle as shown in Fig. 2-2.
3. Carefully lift the turntable platter straight up.

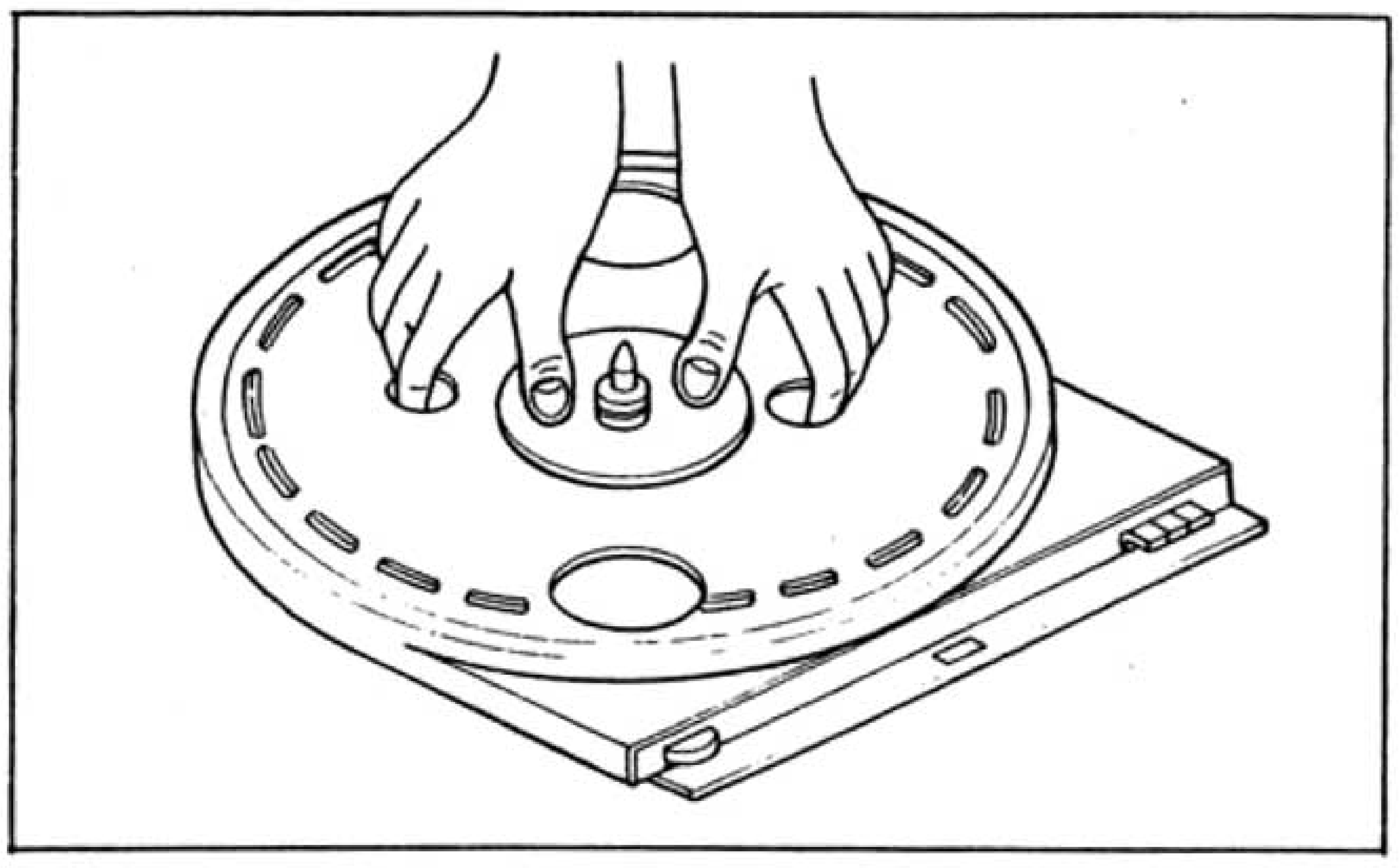


Fig. 2-2 Turntable platter removal

2-3. TURNTABLE ASSEMBLY REMOVAL

1. Remove the turntable platter as described in Procedure 2-2.
2. Remove the power cord strain relief at the rear with a pair of pliers.
3. Remove the three allen-head screws (M 6 x 20). See Fig. 2-3. This frees turntable assembly.

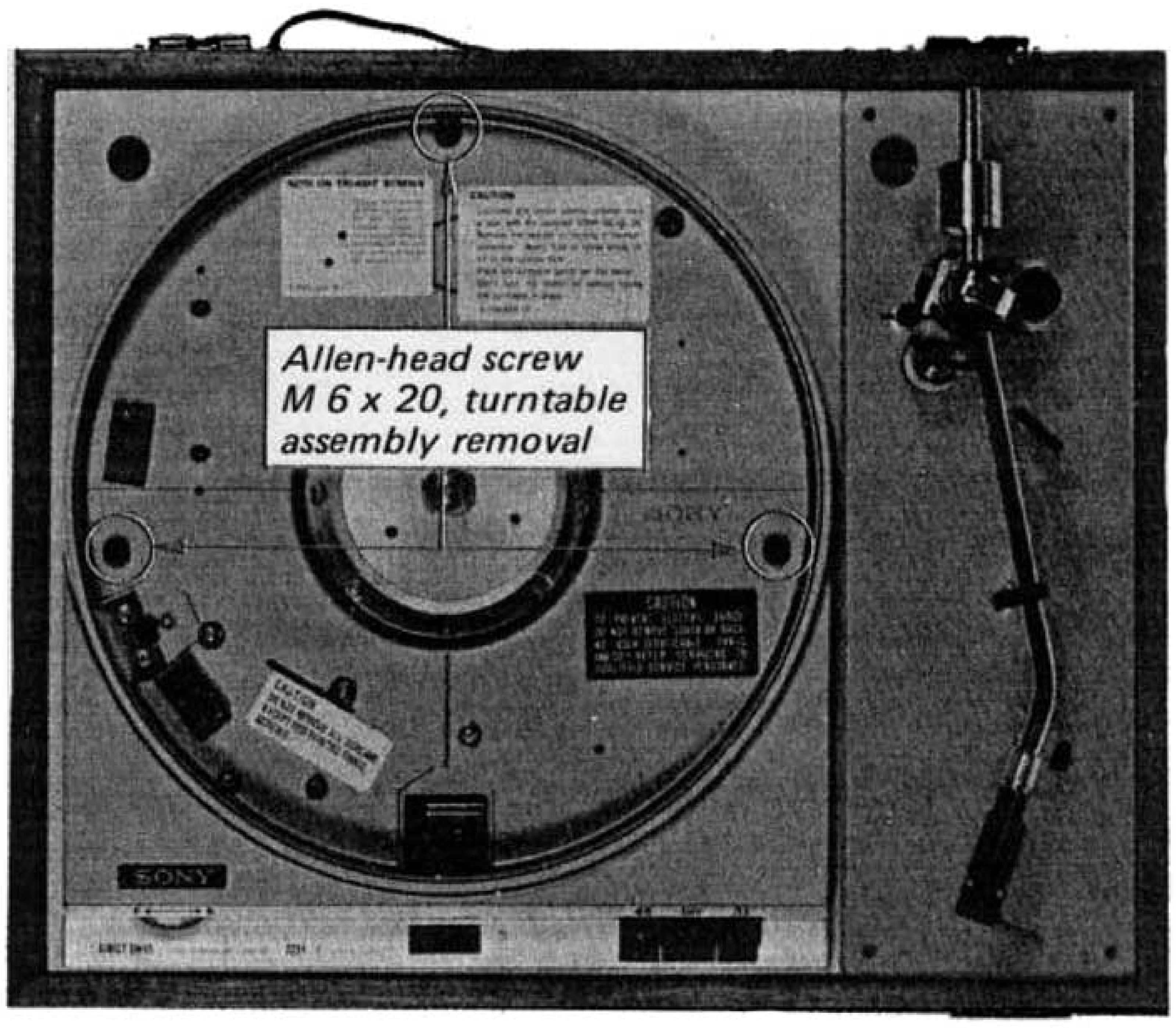


Fig. 2-3. Turntable assembly removal

2-4. SERVO AMPLIFIER COVER REMOVAL

1. Remove the turntable assembly as described in Procedure 2-3.
2. Remove the two self-tapping screws (T 4 x 16) shown in Fig. 2-4, and then slide it in the direction shown by the arrow as illustrated.
   This frees the cover.

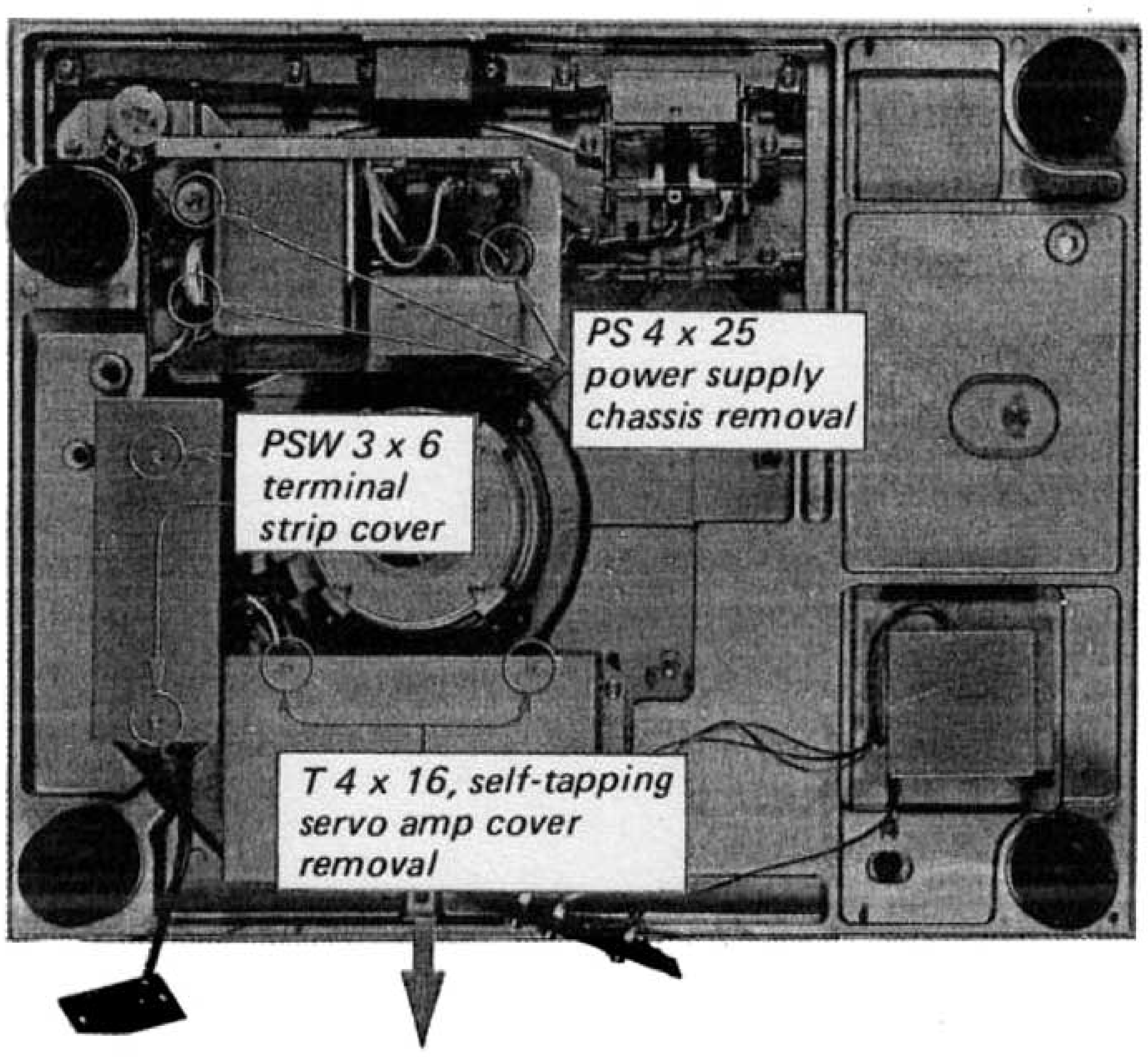


Fig. 2-4. Bottom view

2-5. SERVO AMPLIFIER CHASSIS REMOVAL

1. Remove the servo amplifier cover as described in Procedure 2-4.
2. Remove the four screws (PS 4 x 6) shown in Fig. 2-5. This frees the chassis.

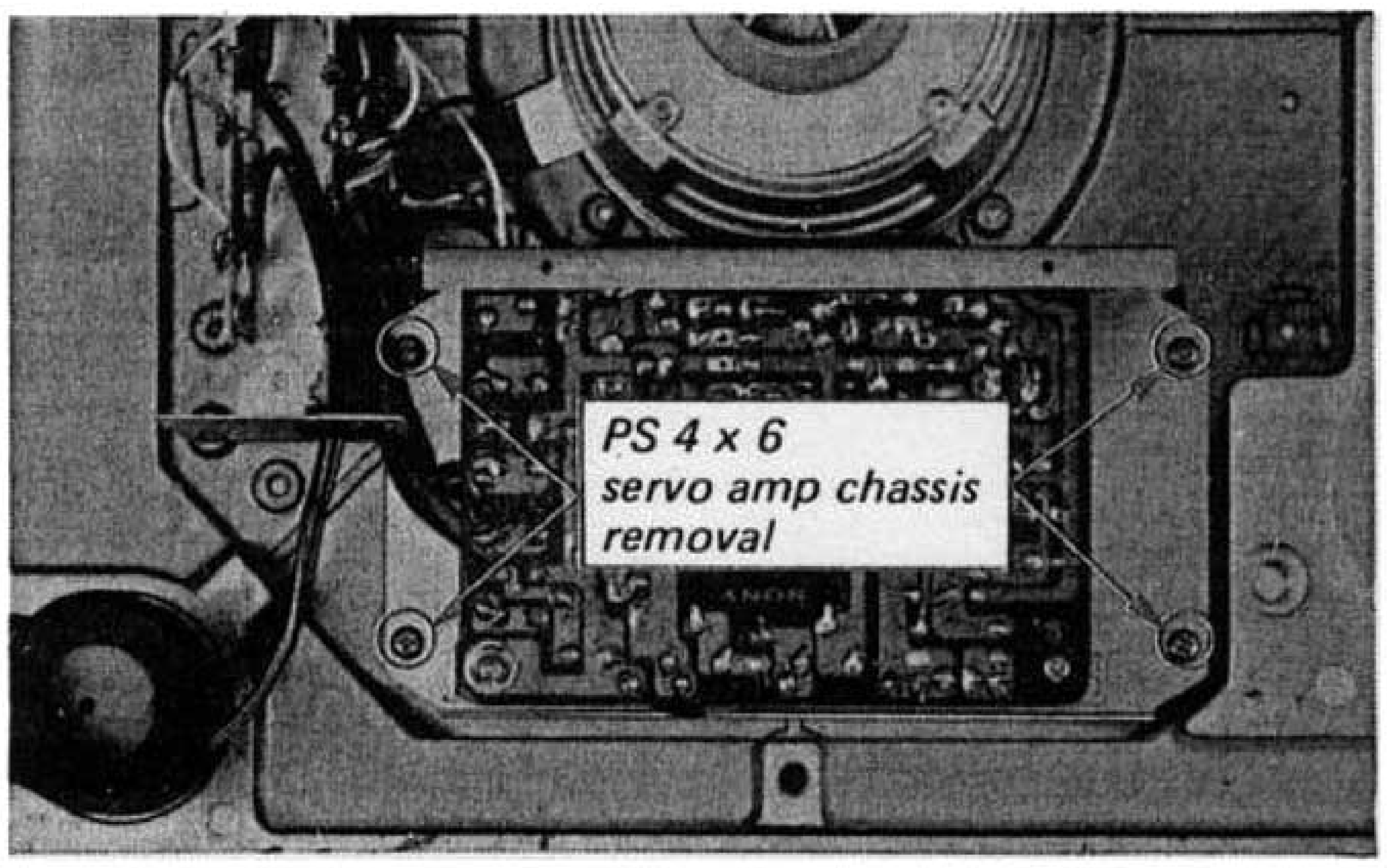


Fig. 2-5. Servo amplifier chassis removal

2-6. POWER SUPPLY CHASSIS REMOVAL

Note: The power supply chassis is an angled member on which the power transformer, power transistor and 2-P fuse holder are attached.

1. Remove the turntable assembly as described in Procedure 2-3.
2. Remove the three screws (PS 4 x 25) shown in Fig. 2-4. This frees the power supply chassis.

2-7. MOTOR REPLACEMENT

1. Remove the turntable assembly as described in Procedure 2-3.
2. Remove the two screws (PSW 3 x 6) securing the terminal strip cover as shown in Fig. 2-4.
3. Unsolder the motor lead wires at the terminal strip, and then remove the four screws (PS 4 x 12) from the top as shown in Fig. 2-6.
4. Install the replacement motor.

CAUTION

Electromagnetic brake adjustment (clearance between turntable and magnet mounted on turntable base) should be performed as follows after replacing the motor.

1. First of all, confirm that the turntable does not touch with the magnet on the turntable base (See Fig. 2-7). If it does, adjust the magnet height by replacing spacer. Three kind of spacer are available as specified in table below. To remove the magnet and spacer, apply a few drops of cement solvent to them.

Description	Thickness of spacer (mm)	Part Number
Magnet	1.6	4-808-445-02
spacer	1.0	4-808-445-11
	0.5	4-808-445-21

2. Set the turntable for 33⅓ rpm operation, and then measure the voltage applied to the motor at the 5-P terminal strip as shown in Fig. 2-8.
   It should be within the limits of 21 ± 2 volts ac.
   If not, readjust the clearance between the turntable and the magnet by replacing the spacer as previously described.

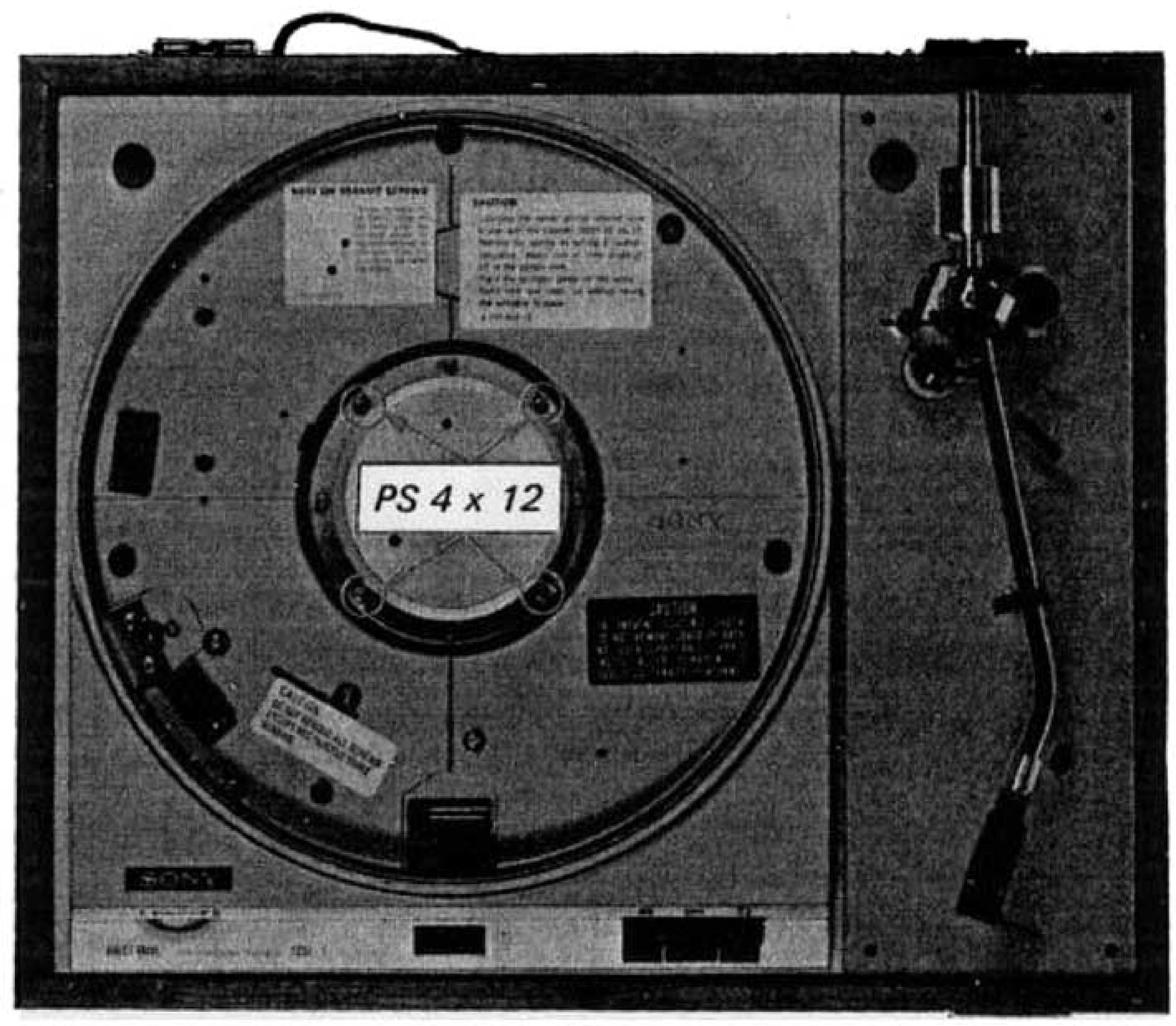


Fig. 2-6. Motor replacement

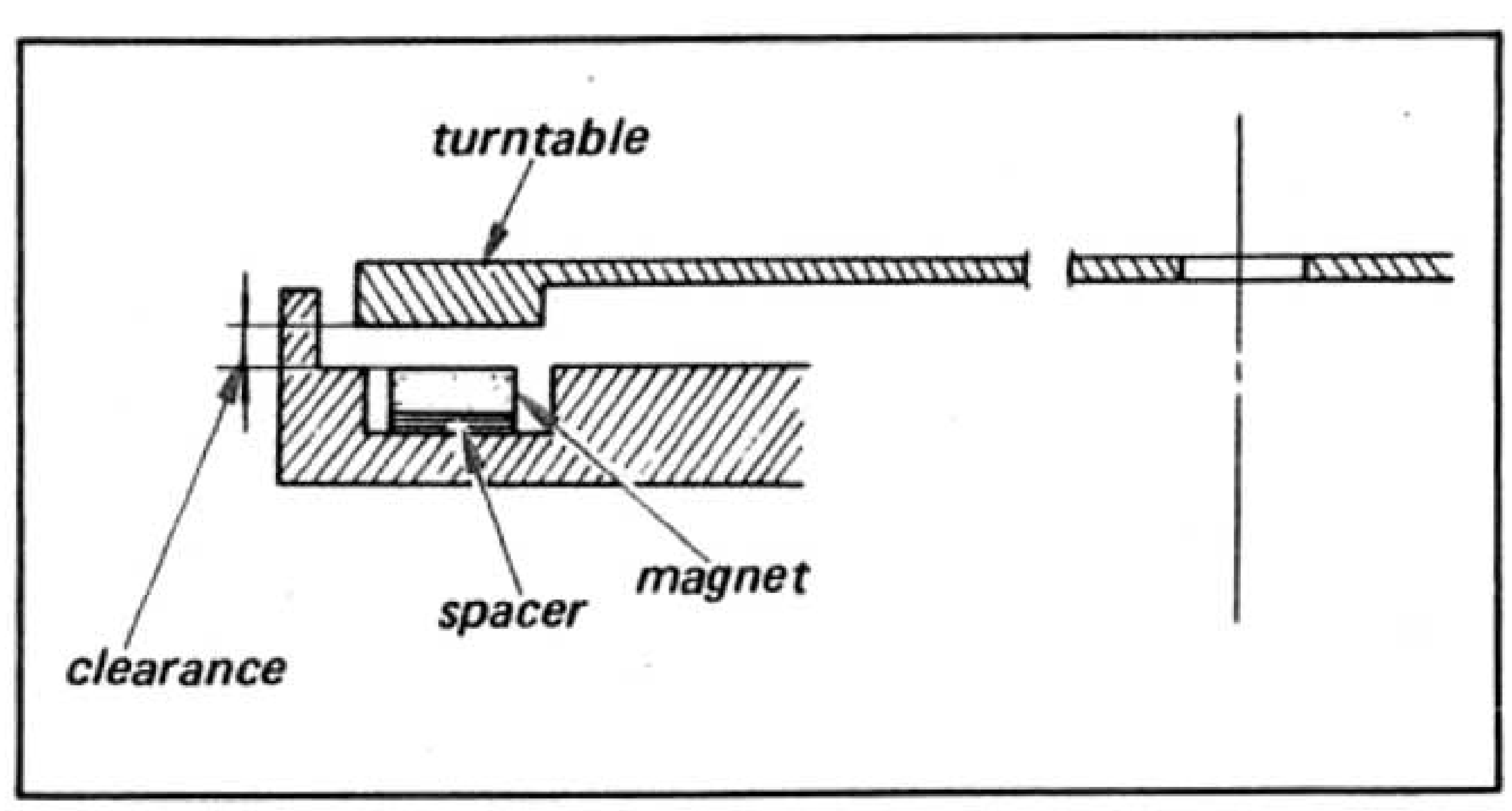


Fig. 2-7. Electromagnetic brake adjustment

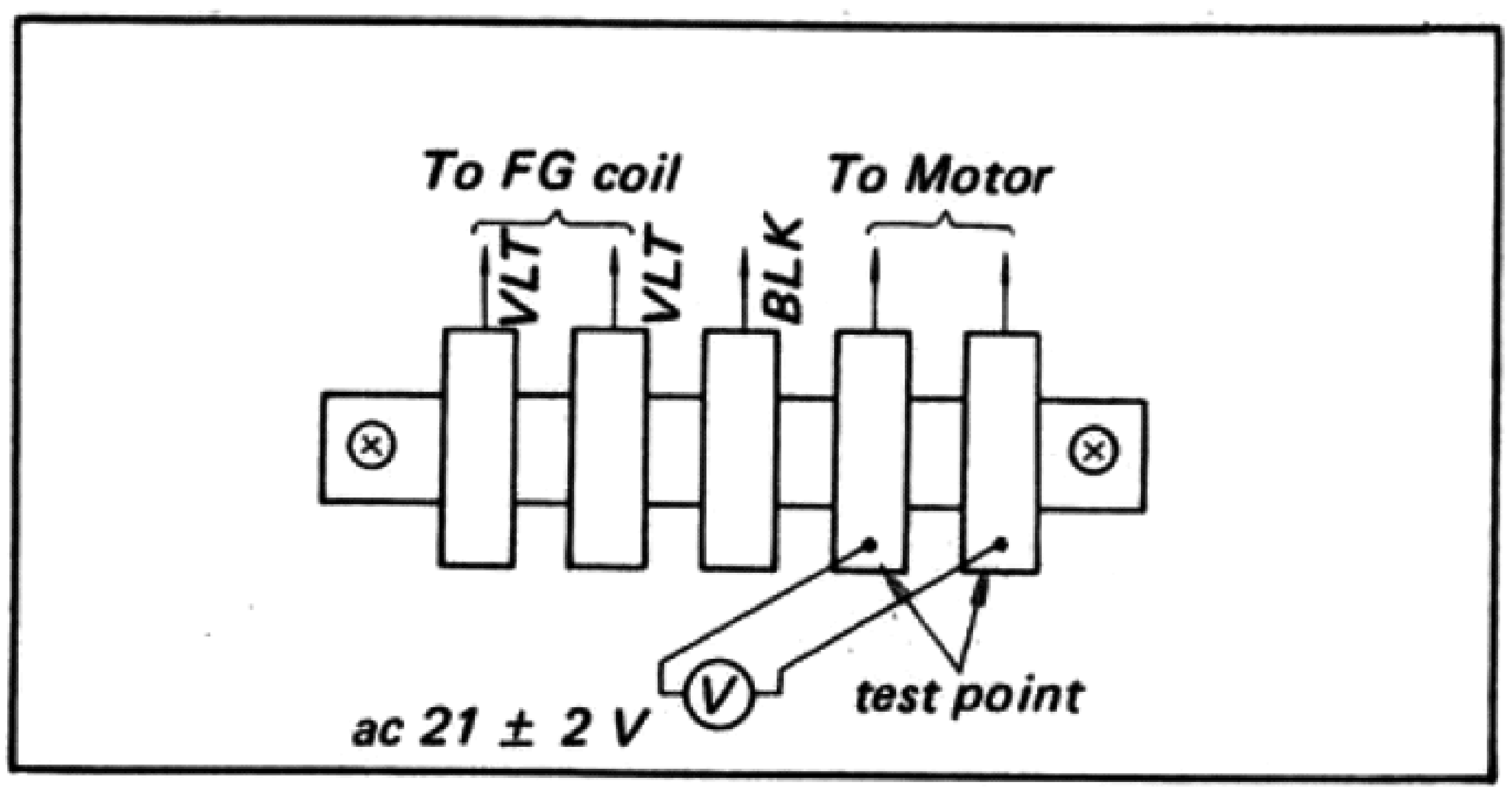


Fig. 2-8. Test point for electromagnetic brake adjustment

2-8. MICROSWITCH REPLACEMENT

1. Remove the turntable assembly as described in Procedure 2-3.
2. Unhook the spring pressing the microswitch holding shaft against its bracket. Carefully draw out the microswitches along with their holding shaft as shown in Fig. 2-9.
3. Remove the retaining rings at one side of the shaft, and then replace the defective microswitch as shown in Fig. 2-9. To reassemble, reverse the aforementioned procedures.

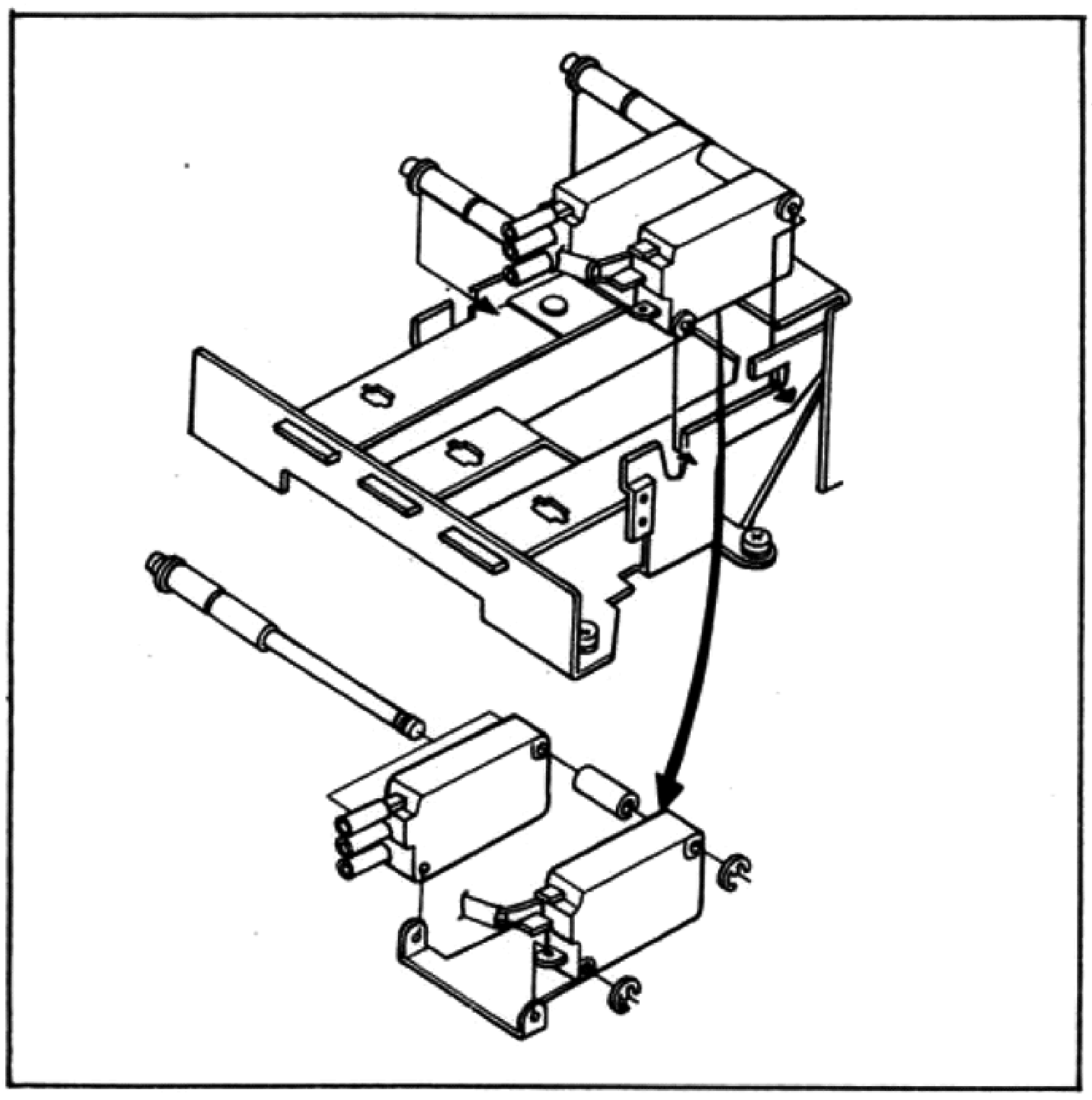


Fig. 2-9. Microswitch replacement

2-9. STROBE LAMP REPLACEMENT

1. Remove the turntable assembly as described in Procedure 2-3.
2. Remove the four screws (PS 4 x 6) securing the strobe unit to the turntable base.
   Pull out the unit.
3. Unhook the retaining spring from the lamp cover and then apply a drop of cement solvent to the lamp. Wait a few seconds, and then push out the defective lamp as shown in Fig. 2-10.

CAUTION

Too much cement solvent may cause damage to the unit. Only a few drops are required to dissolve the rubber-base adhesive.

4. Install a new strobe lamp. Take care that the glowing side (front) of the lamp is positioned as shown in Fig. 2-10.

Note: Apply a drop of rubber-base adhesive to the rear side of the lamp when installing the lamp.

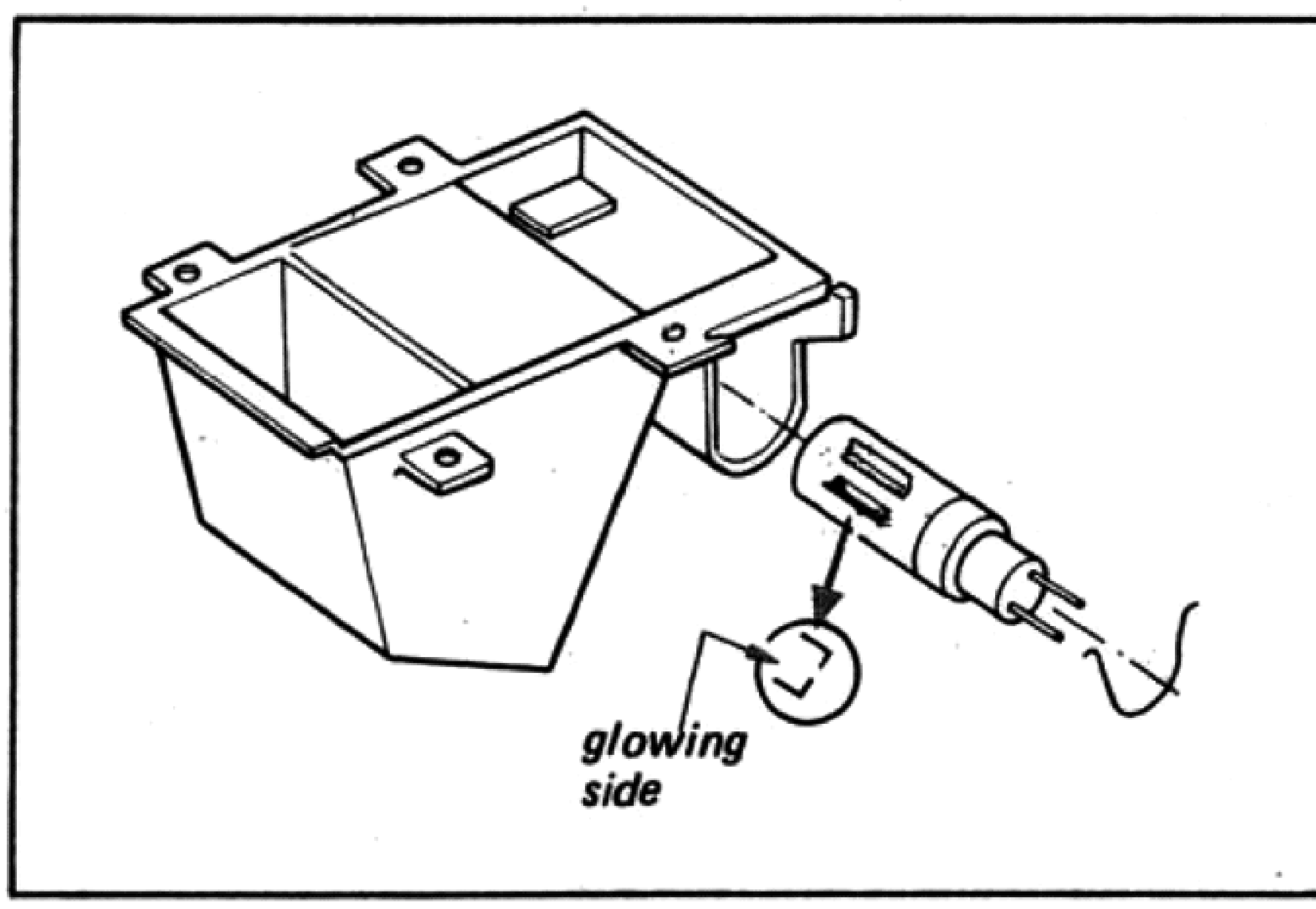


Fig. 2-10. Strobe lamp removal and installation

2-10. POWER TRANSISTOR REPLACEMENT

1. Remove the power supply chassis as described in Procedure 2-6.
2. Remove the screw (P 3 x 12) securing the power transistor to the heat sink.
3. Cut the emitter and base leads of the defective power transistor with a diagonal cutter.
   This prevents mica-washer damage when removing the defective power transistor.
4. When replacing the power transistor, apply a coating of heat-transferring grease to both sides of the mica washer. Any excess grease squeezed out when the mounting screw is tightened should be wiped off with a clean cloth. This prevents it from accumulating conductive dust particles that might eventually cause a short.

2-11. TONEARM ASSEMBLY REPLACEMENT

1. Remove the shell head.
2. Remove the four allen head screws (M 3 x 20). See Fig. 2-11. This frees the tonearm board.
3. Remove the two self-tapping screws (PS 3 x 6) securing the shield cover over the terminal strip as shown in Fig. 2-12.
4. Unsolder the leads from the terminal beneath the turntable base (See Fig. 2-13).
   The lead wires are color coded as follows:

   White . . . . L-CH
   Blue . . . . L-CH (ground)
   Red . . . . R-CH
   Green . . . . R-CH (ground)

5. Remove the hexagon nut securing the tonearm base to the tonearm board.
   This frees the tonearm assembly.

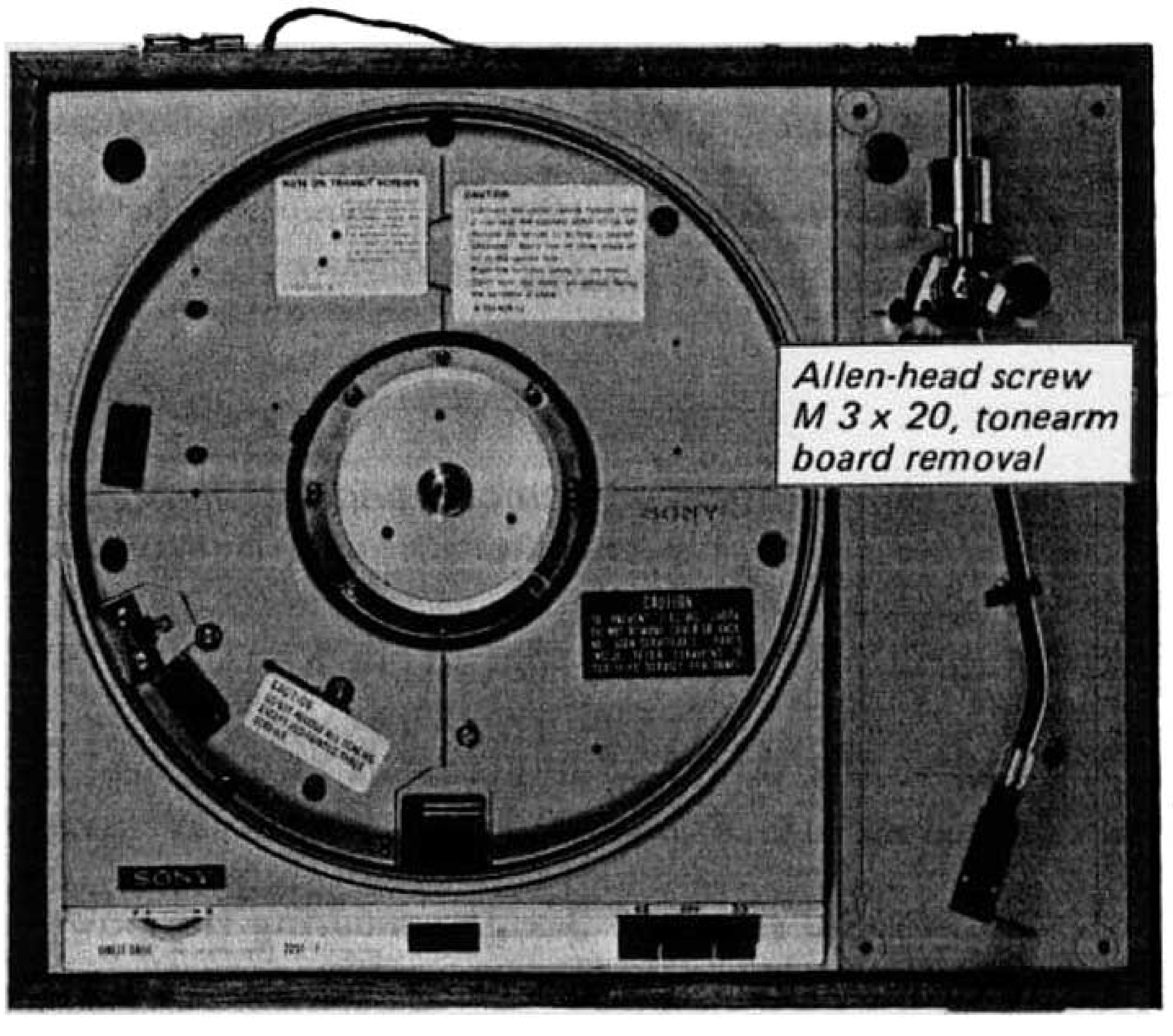


Fig. 2-11. Tonearm board removal

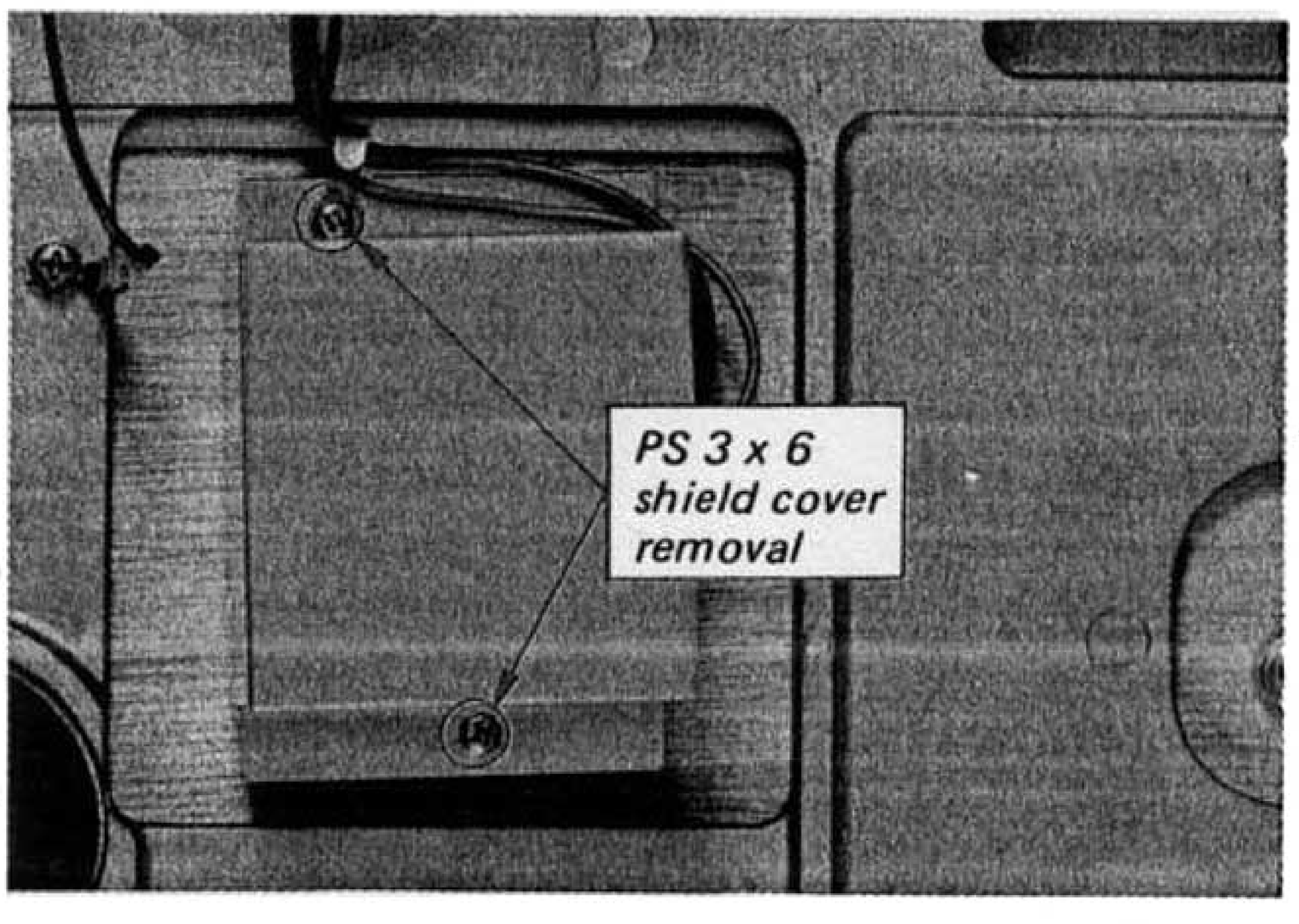


Fig. 2-12. Shield cover removal

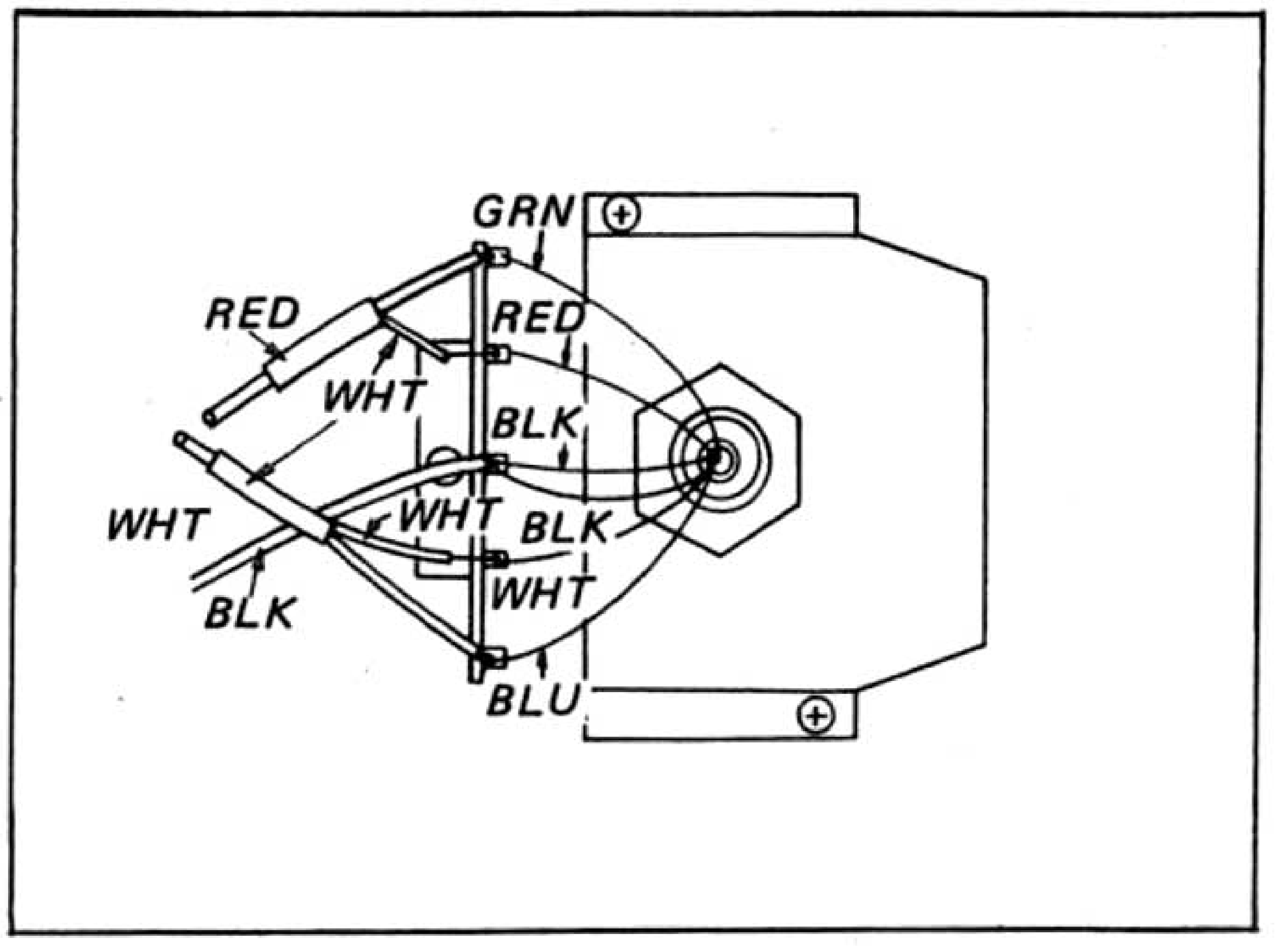


Fig. 2-13. Lead wire connection

2-12. TONEARM BASE REMOVAL

1. Remove the tonearm assembly as described in Procedure 2-11.
2. Remove the set screw by turning it counterclockwise as shown in Fig. 2-14.
3. The tonearm base can be removed by turning the tonearm height adjustment ring counterclockwise while holding the base.
4. When reassembling the base, care should be taken that the set screw meets with the slot on the tonearm shaft as shown in Fig. 2-14.

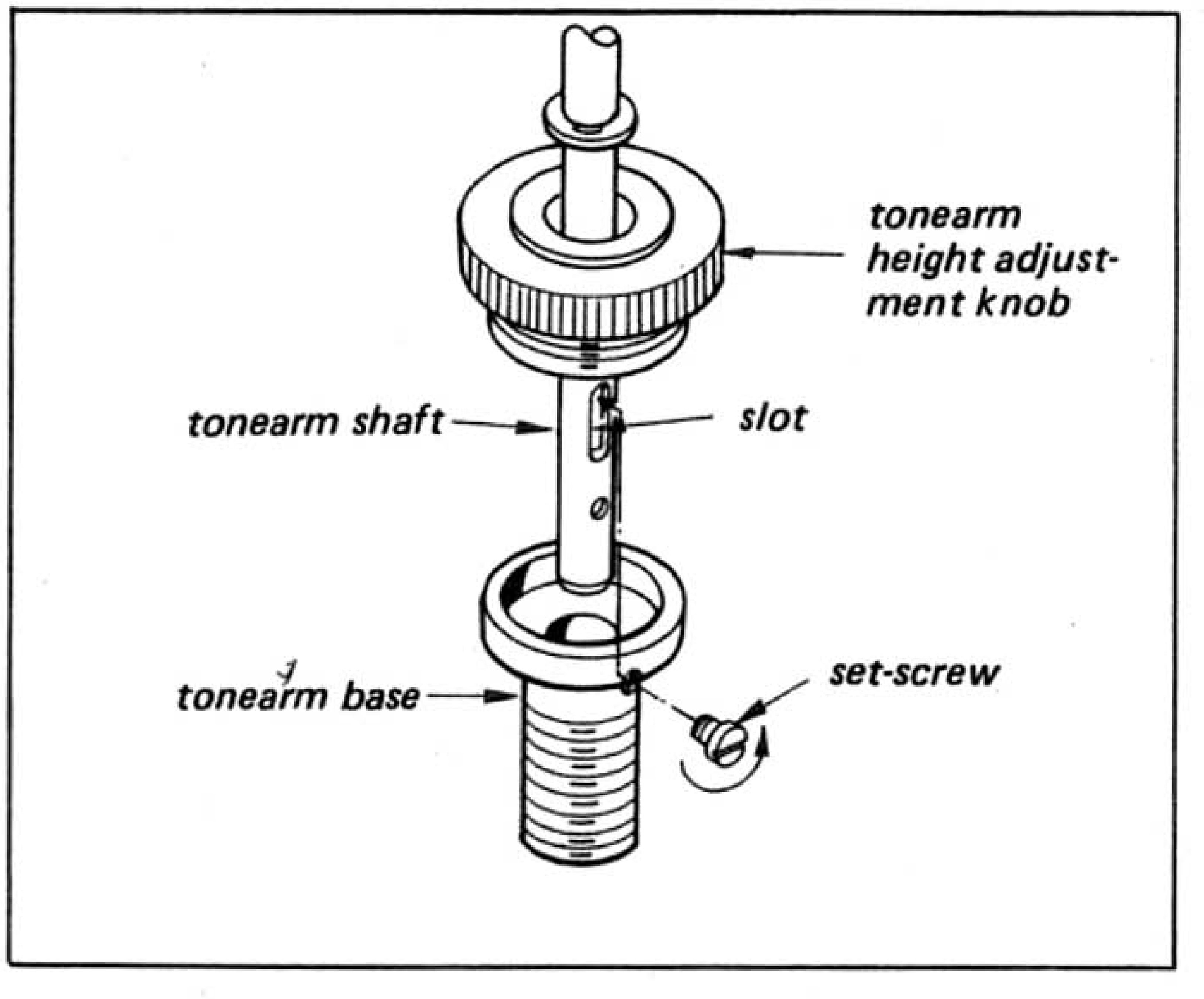


Fig. 2-14. Tonearm base removal

2-13. TONEARM LIFTER REMOVAL

1. Remove the tonearm assembly as described in Procedure 2-11.
2. Remove the set screw securing the tonearm lifting tab to the tonearm lifter as shown in Fig. 2-15.

3. Remove the tonearm lifting tab by turning it counterclockwise. This frees the lifting tab.

4. Remove the allen-head screw securing the tonearm lifter to the base plate as shown in Fig. 2-15, and then depress the lifter gently. This frees the lifter.

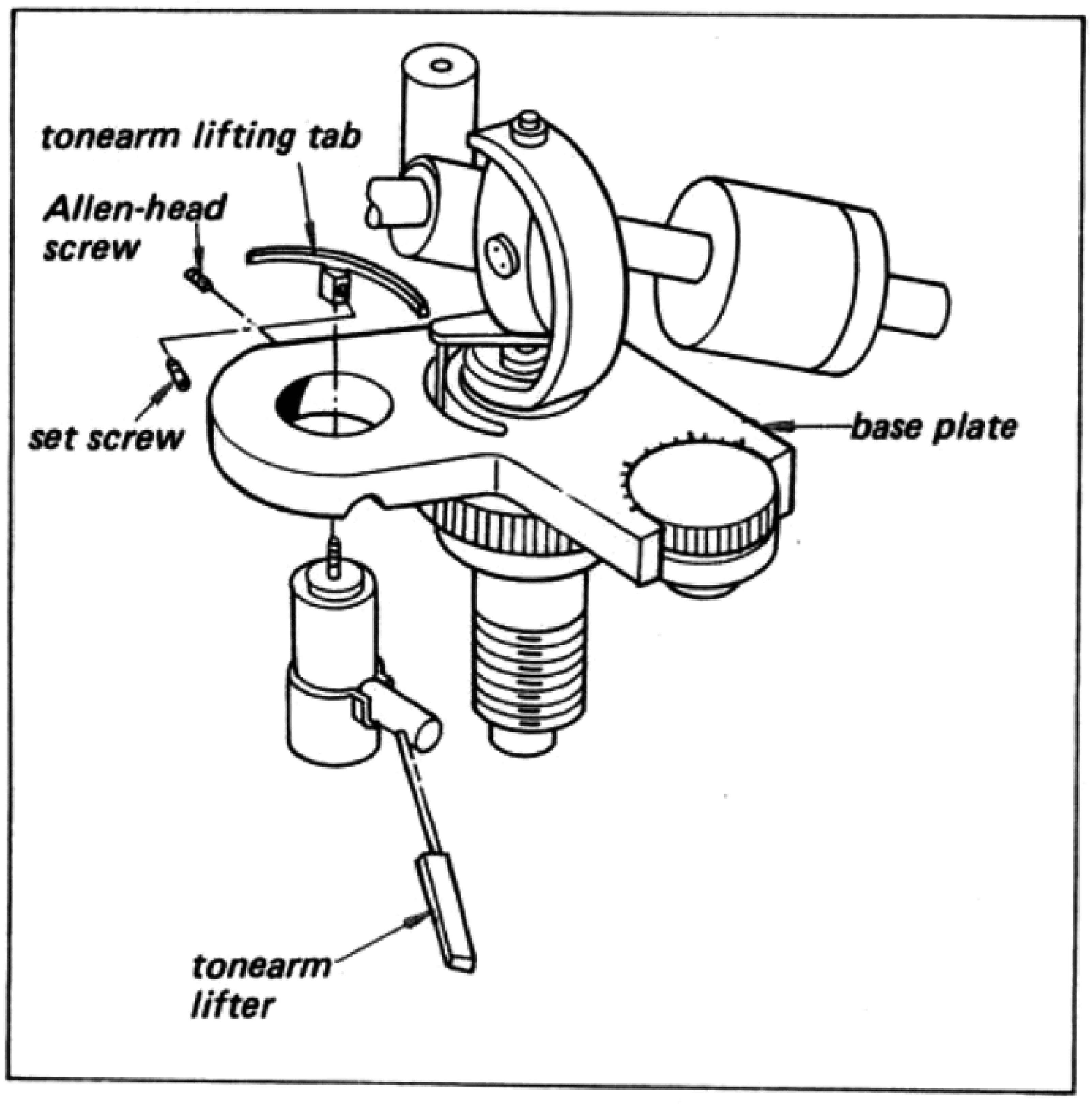


Fig. 2-15. Tonearm lifter replacement

2-14. BIAS CORD REPLACEMENT

Note: This should be performed if the bias cord of anti-skating force control mechanism breakes.
Tools required: Jeweller's screw driver, pair of tweezers

1. Remove the tonearm assembly and tonearm base as described in Procedures 2-11 and 2-12.

2. Prepare the anti-skating force pulley assembly (Part No. X-22024-08-1) including the bias cord and tension spring.

3. Remove the anti-skating force control knob by loosening the set screw with a jeweller's screw driver as shown in Fig. 2-16.

4. Remove the pulley by turning it counterclockwise from the bottom with a screw driver as shown in Fig. 2-17.

5. Install the new anti-skating force pulley assembly reversing the aforementioned procedures. Note that the pulley should be tightened as far as it will go.

6. Thread the tension spring through the opening of the base plate assembly as shown in Fig. 2-18.

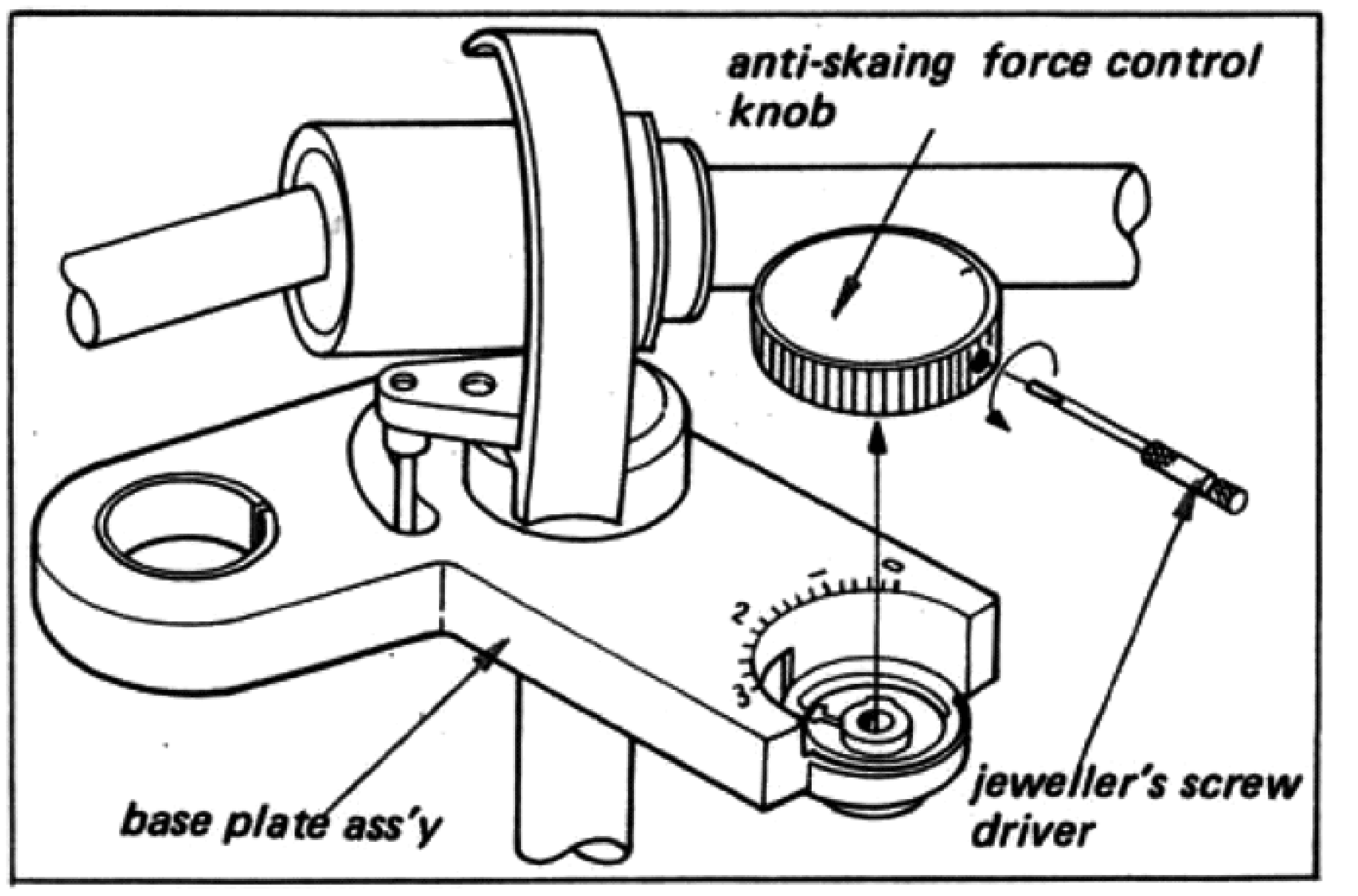


Fig. 2-16. Anti-skating force control knob removal

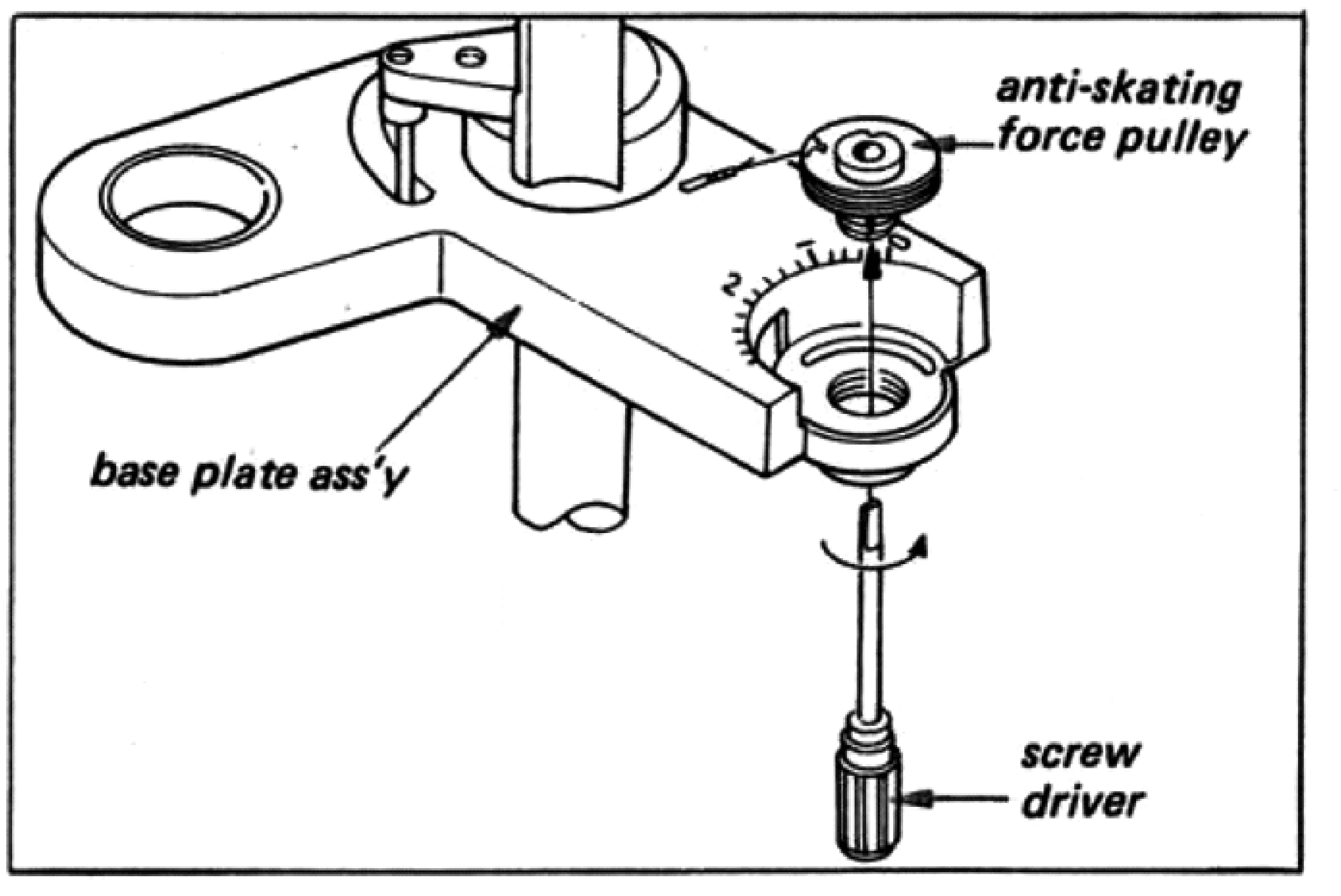


Fig. 2-17. Anti-skating force pulley removal

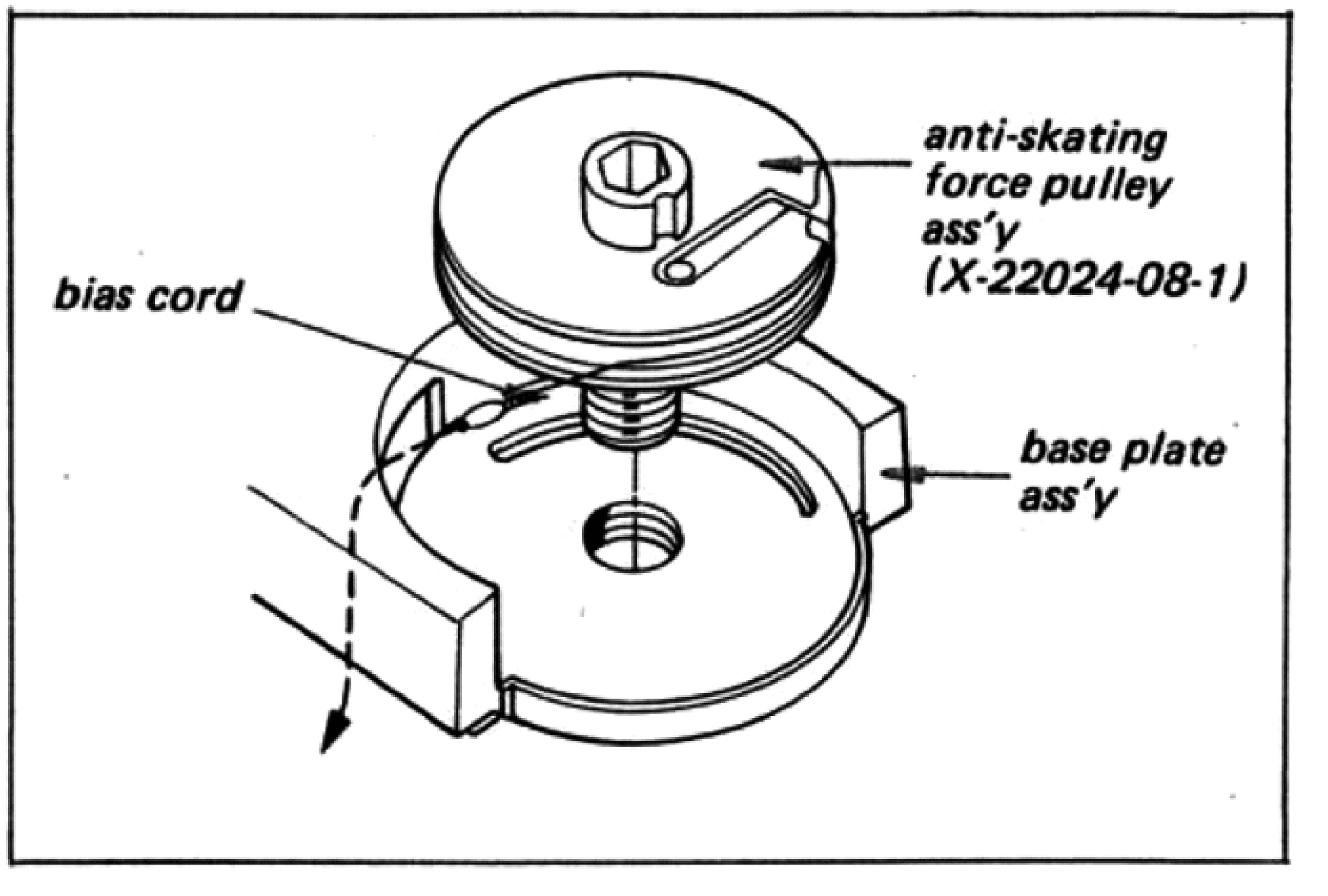


Fig. 2-18. Bias cord threading

7. Hook the tension spring to the groove on the anti-skating force arm rod with a pair of tweezers as shown in Fig. 2-20.

8. Slightly loosen the pulley and set to the position as shown in Fig. 2-19.

9. Set the anti-skating force arm rod to the position where it coincides with the mark on the base plate assembly as shown in Fig. 2-20, then adjust the pulley position as follows:

Lengthen the tension spring some extent by turning the pulley clockwise first, and then turn the pulley counterclockwise gradually until the tension spring becomes to its original length, as shown in Fig. 2-20.

10. Install the anti-skating force control knob as to indicate the zero reading.

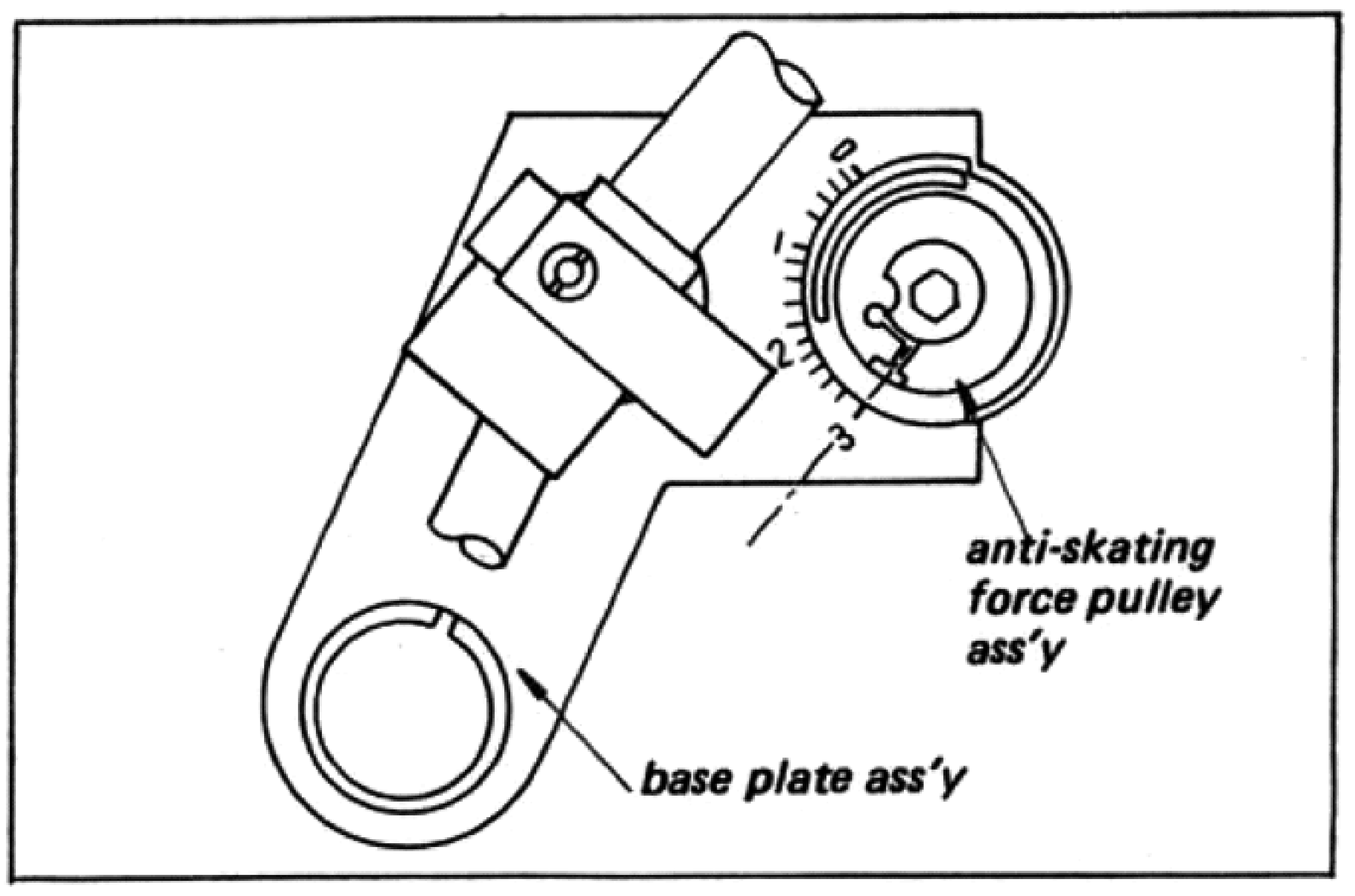


Fig. 2-19. Presetting of the pulley for calibration

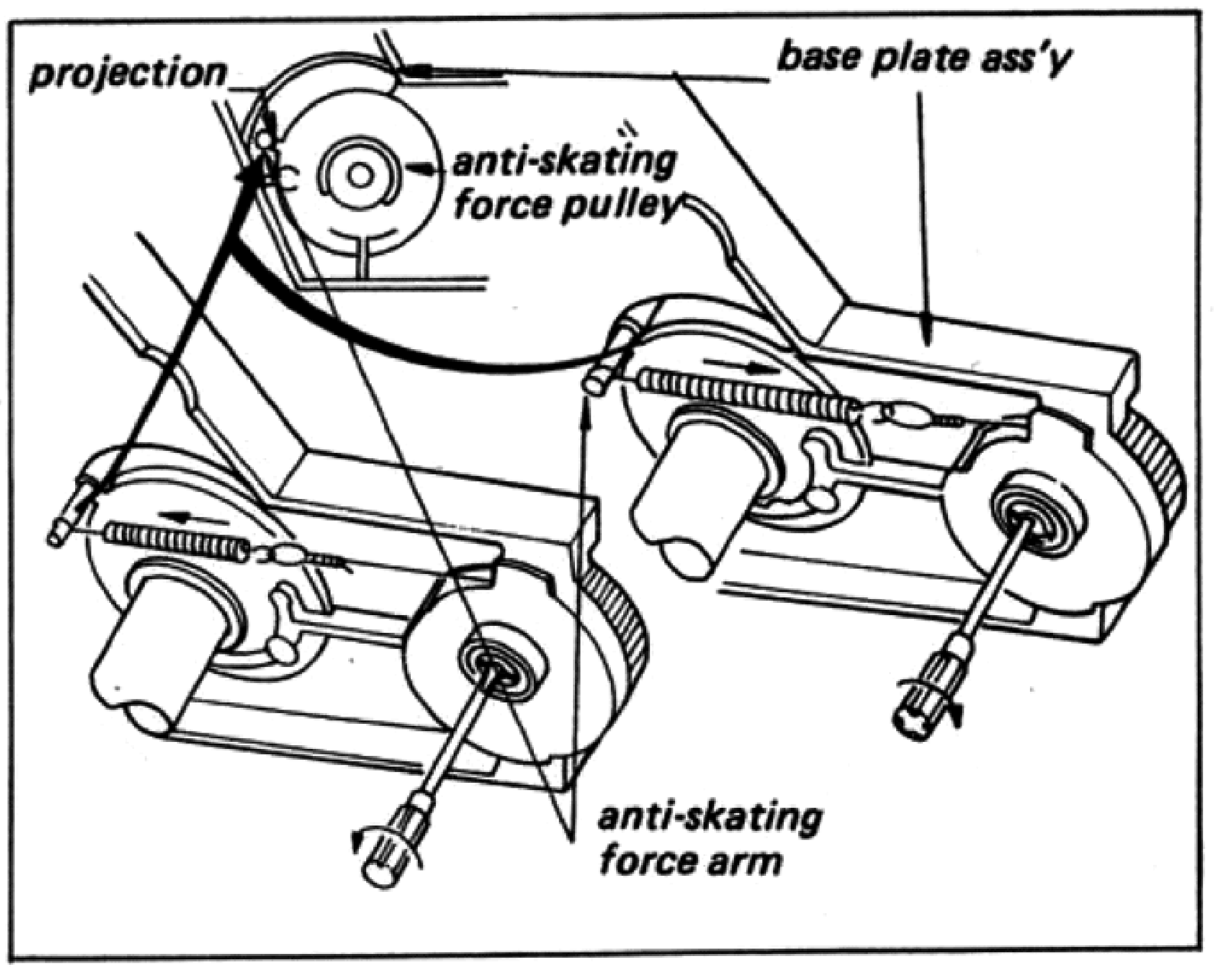


Fig. 2-20. Anti-skating force calibration

SECTION 3
ADJUSTMENTS

3-1. SPEED ADJUSTMENT

Note: Correct operating speed should be obtained when the front panel Pitch Control is at or near the midrange setting. If not, readjustment is needed.

Procedure:

1. Set the Pitch Control to mid position.
2. Place the turntable in the horizontal position.
3. Set the $^{33}/_{45}$ control to the 45 position and then turn adjustable resistor VR1 (See Fig. 3-1) to obtain the correct strobe indication.
4. After completing the 45 rpm adjustment, proceed to the 33 rpm adjustment as previously described, except turning adjustable resistor VR2 (See Fig. 3-1).

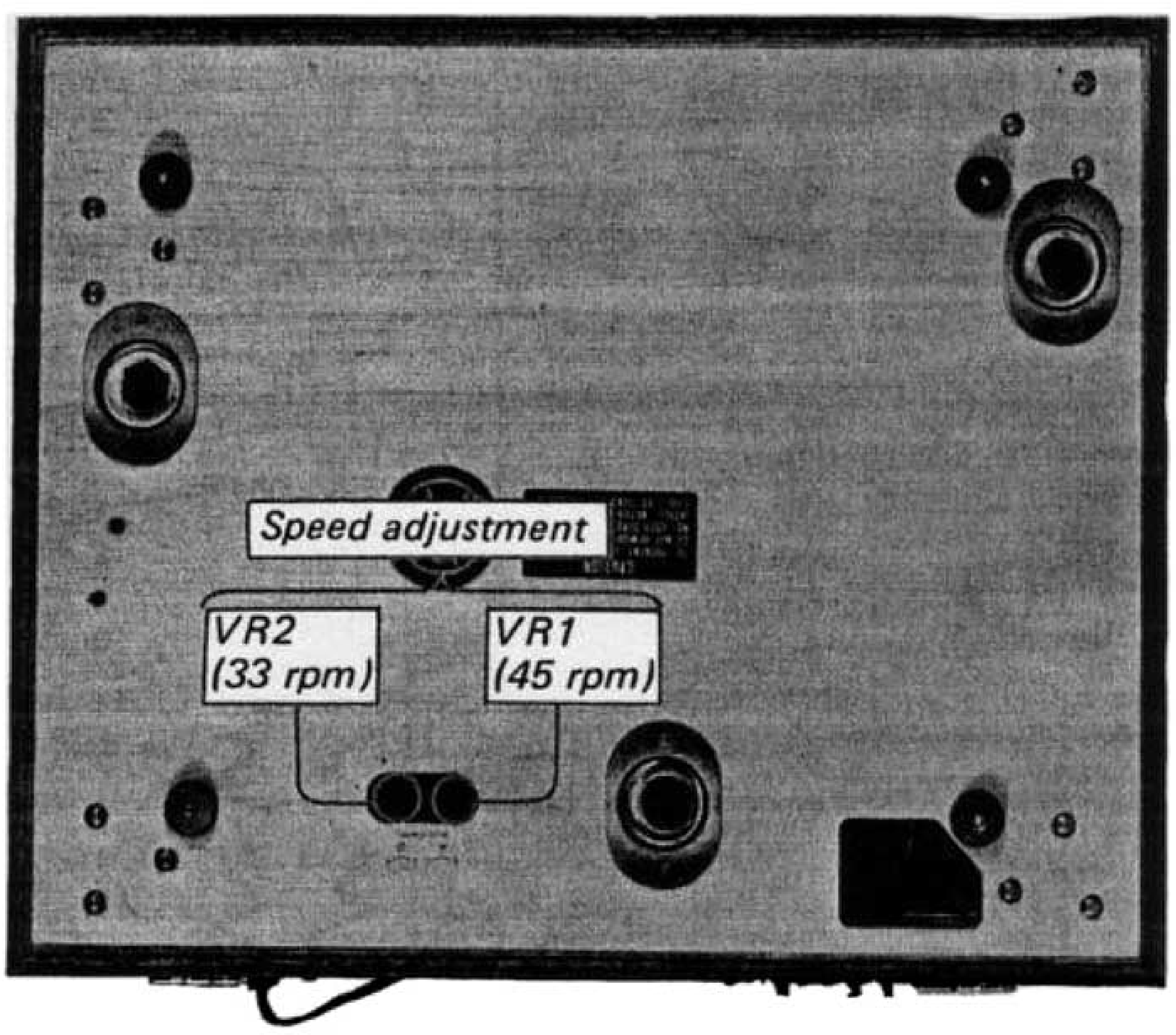


Fig. 3-1. Speed adjustment

3-2. TONEARM HEIGHT ADJUSTMENT

1. Loosen the tonearm height adjustment knob by turning it counterclockwise as shown in Fig. 3-2.
2. Tonearm height can be adjusted by simply pulling up or down the tonearm shaft as shown in Fig. 3-2.
3. Tighten the tonearm height adjustment knob by turning it clockwise.

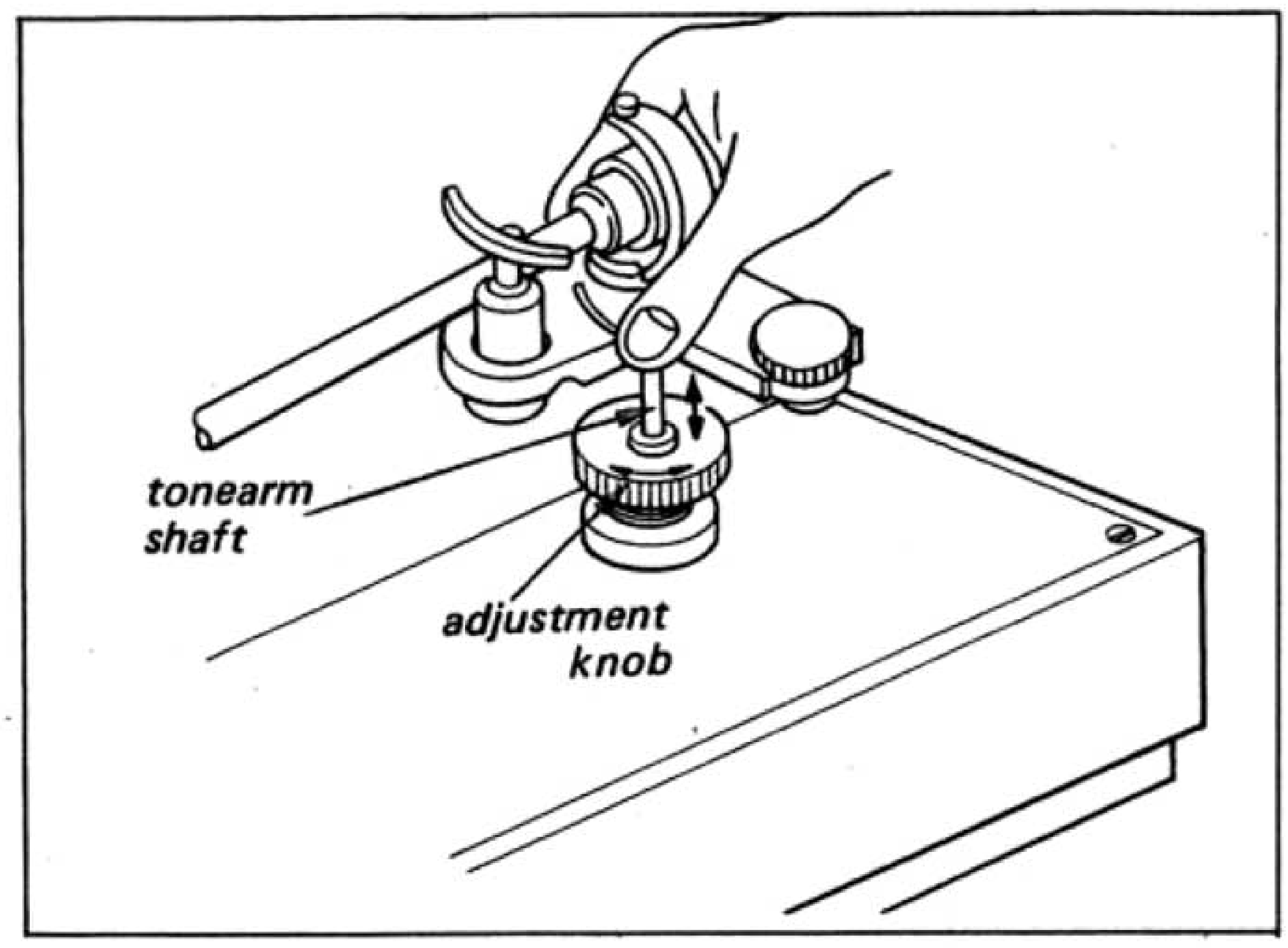


Fig. 3-2. Tonearm height adjustment

3-3. STYLUS-FORCE AND ANTI-SKATING FORCE ADJUSTMENT

1. Set the anti-skating compensator to its "0" position.
2. Release the tonearm from its arm rest. Make sure the tonearm floats freely.
3. Set the stylus force gauge to its "0" position.
4. Horizontally balance the tonearm by sliding the counter weight at the rear of the tonearm. Now the stylus force can be set by this scale.
5. Turn the stylus-force knob to obtain the proper (recommended) value of stylus force.
6. Set the anti-skating compensator to the same value set in step 5.

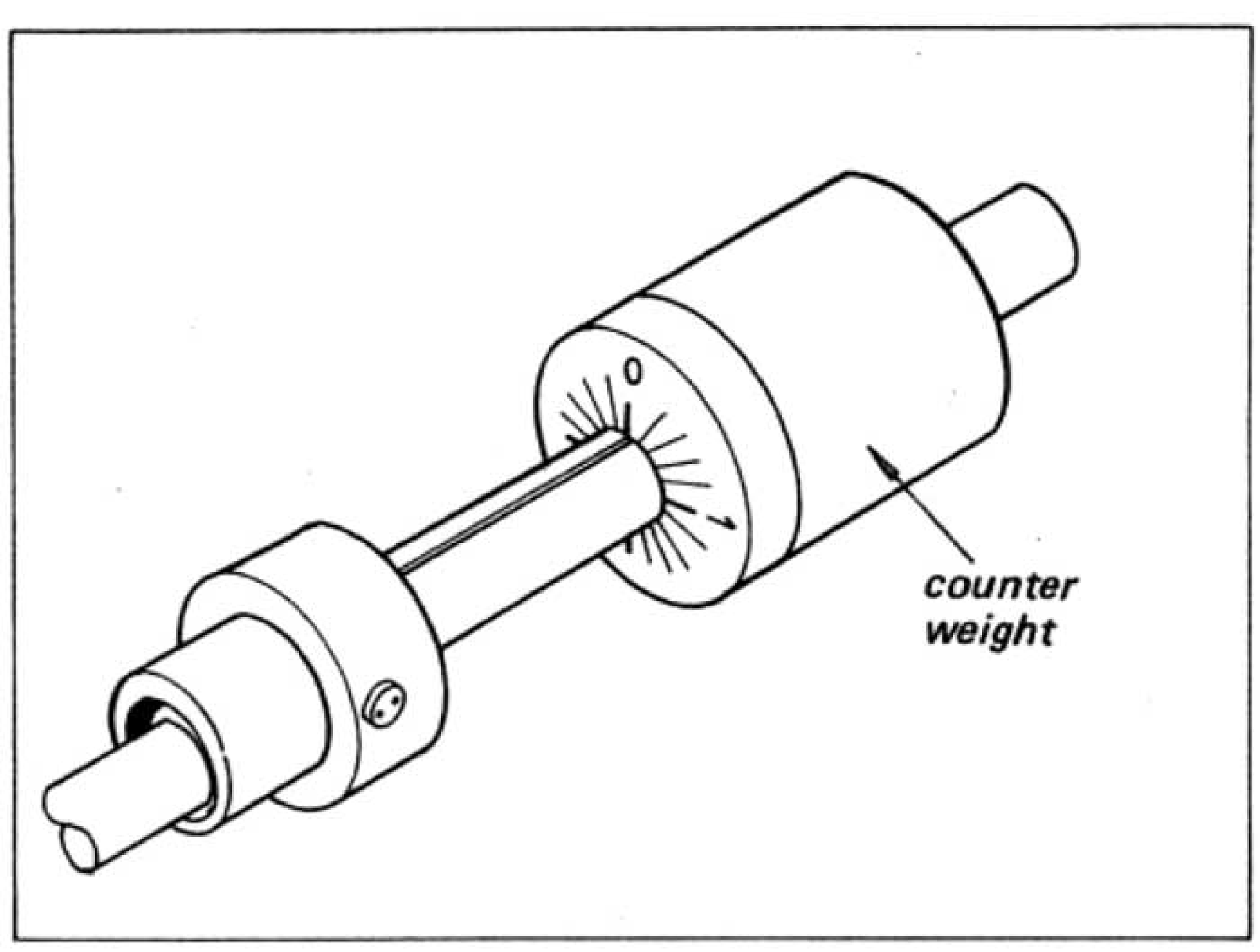


Fig. 3-3. Tonearm balance adjustment

3-4. LATERAL BALANCE ADJUSTMENT

1. Set the anti-skating compensator to its "0" position.
2. Release the tonearm from its arm rest, and then horizontally balance the tonearm.
3. Slowly lift the rear side of cabinet approximately 40 mm and observe the movement of the tonearm.
4. Slide the lateral balance weight towards the same direction as the tonearm movement until lateral balance is obtained (See Fig. 3-4.)

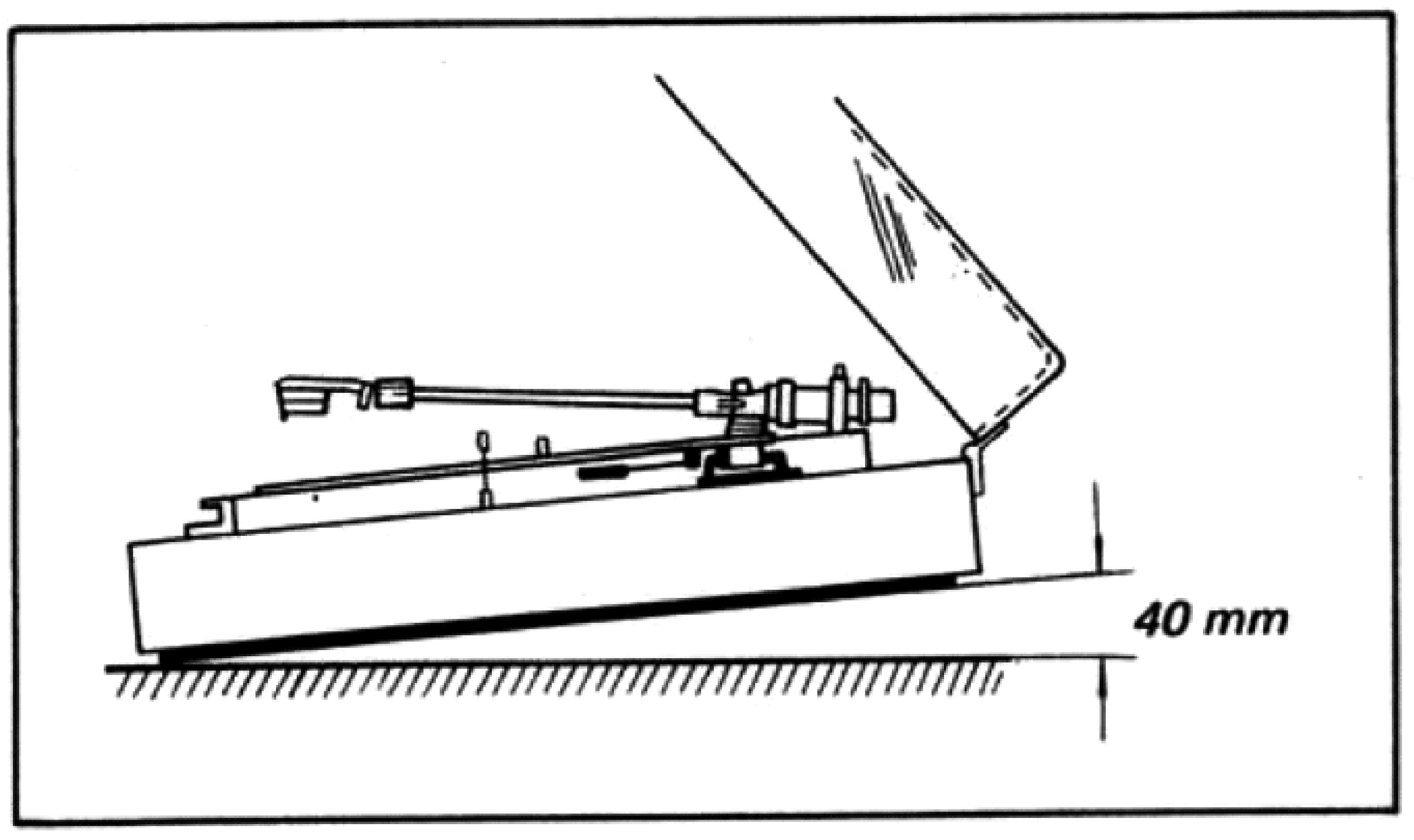


Fig. 3-4. Lateral balance adjustment

3-5. LUBRICATION

Lubricate the turntable shaft once a year. Use the SONY OL-2K oil supplied. Remove the top of the turntable shaft by turning it counterclockwise, and then apply two or three drops of oil to the opening of the shaft as shown in Fig. 3-5.

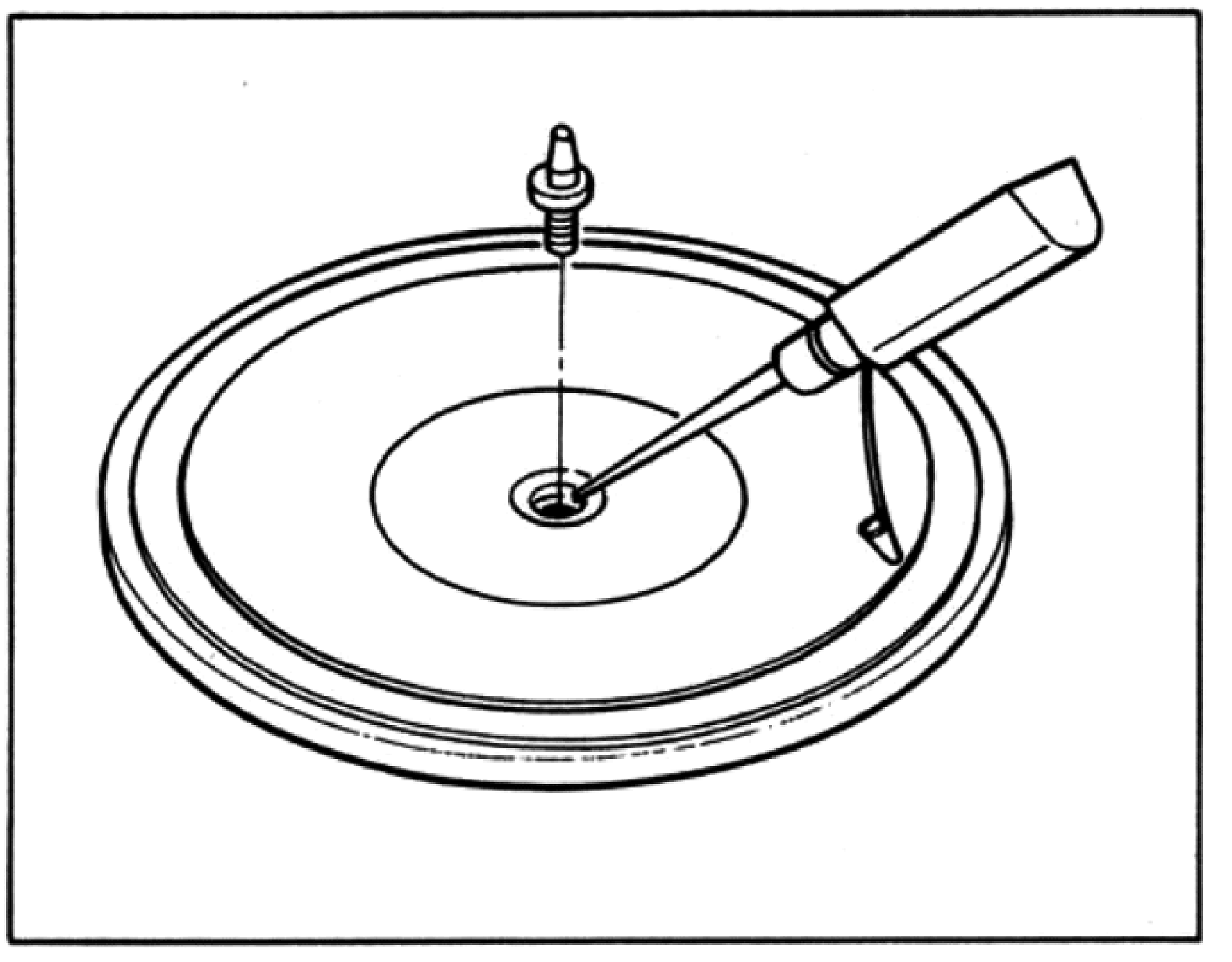
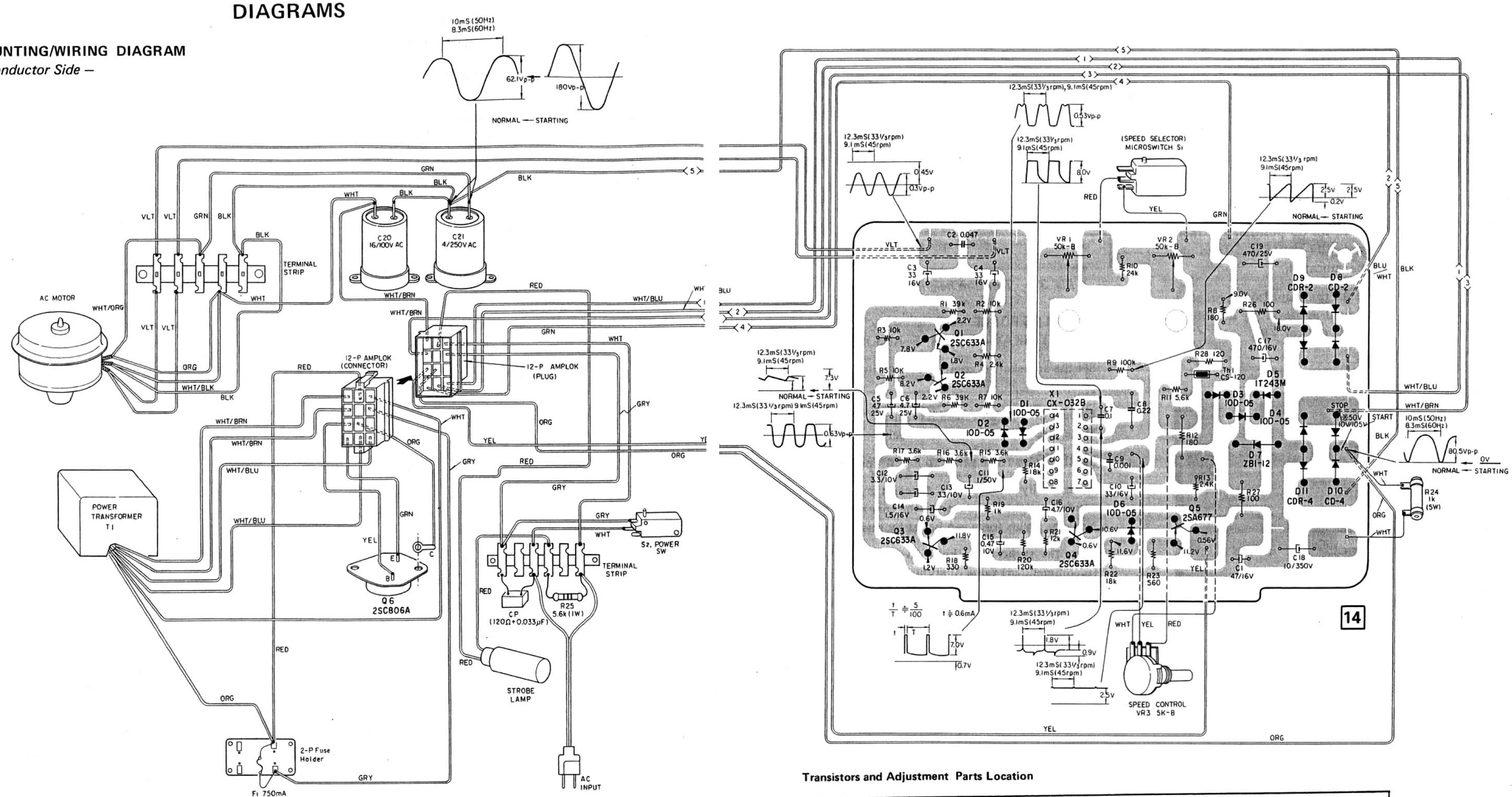


Fig. 3-5. Lubrication

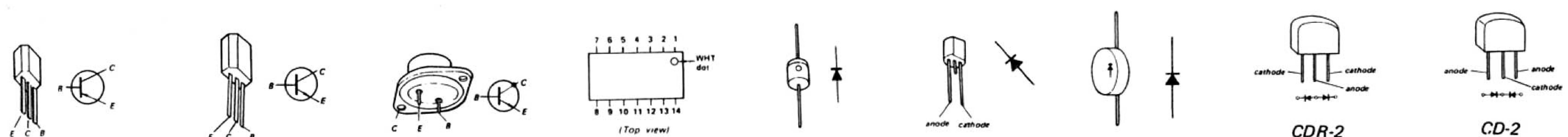
SECTION 4
DIAGRAMS

4-1. MOUNTING/WIRING DIAGRAM
– Conductor Side –



Transistors and Adjustment Parts Location

Q1	VR1	VR2
Q2		
Q3	Q4	Q5



2SA677 2SC633A 2SC806A CX-032B 10D-05 1T243M ZB1-12 CDR-2 CDR-4 CD-2 CD-4

Note:

All resistance values are in ohms. k = 1000, M = 1000 k

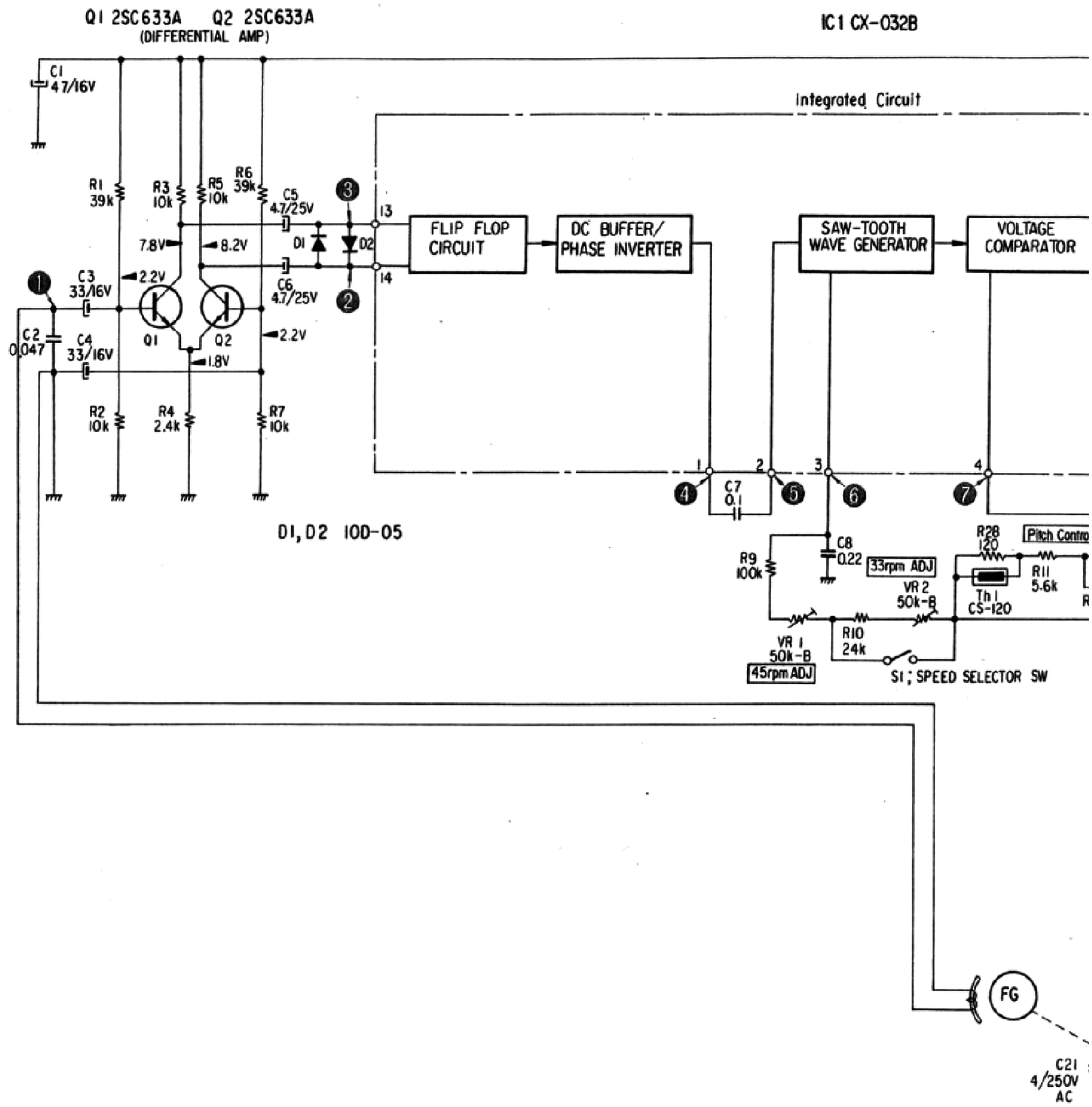
All capacitance values are in μF except as indicated with p, which means μμF.

All voltages represent an average value and should hold within ±20 %.

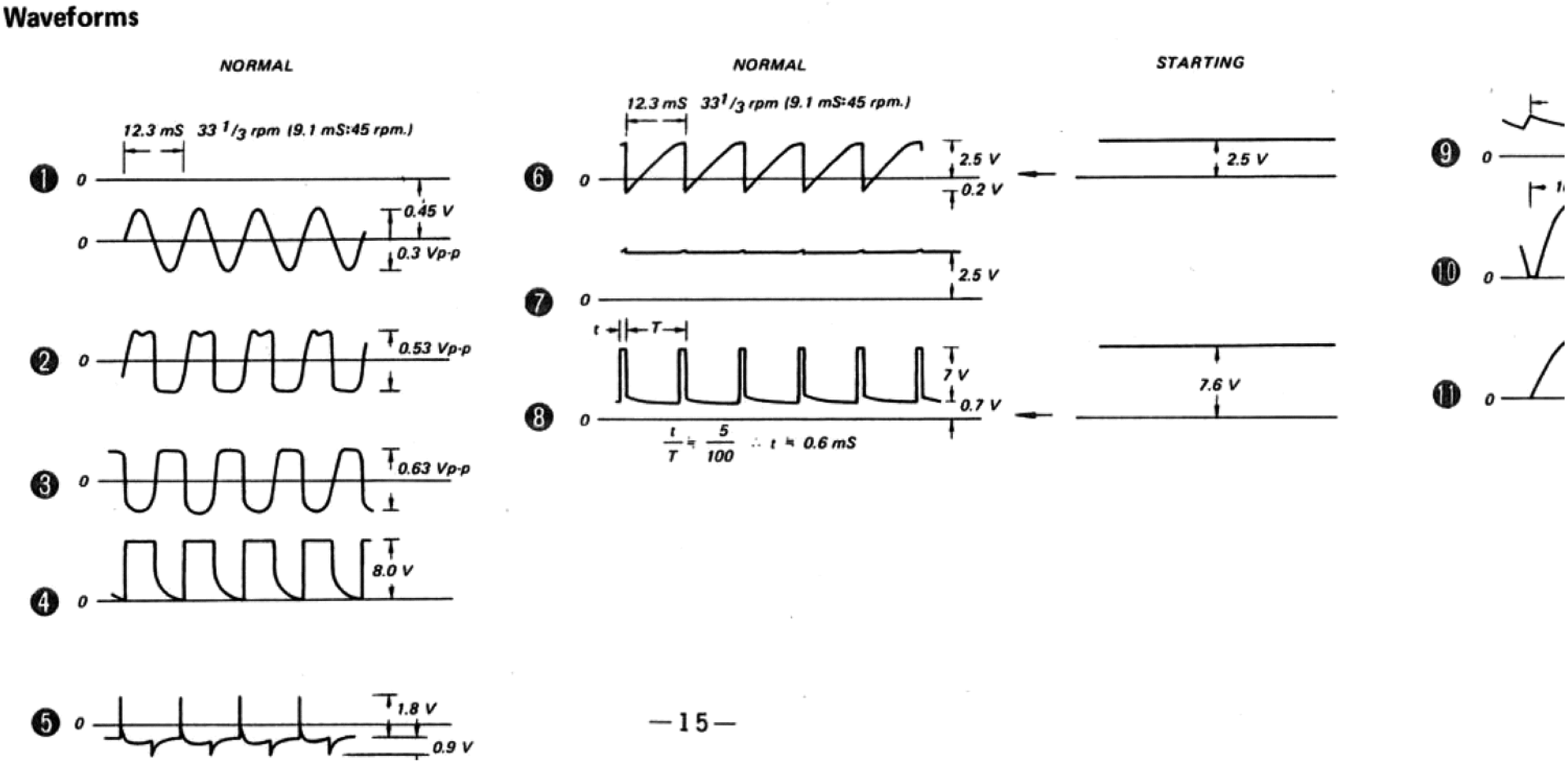
All voltages are dc measured with a VOM (DC 20 k ohms/V) at no signal.

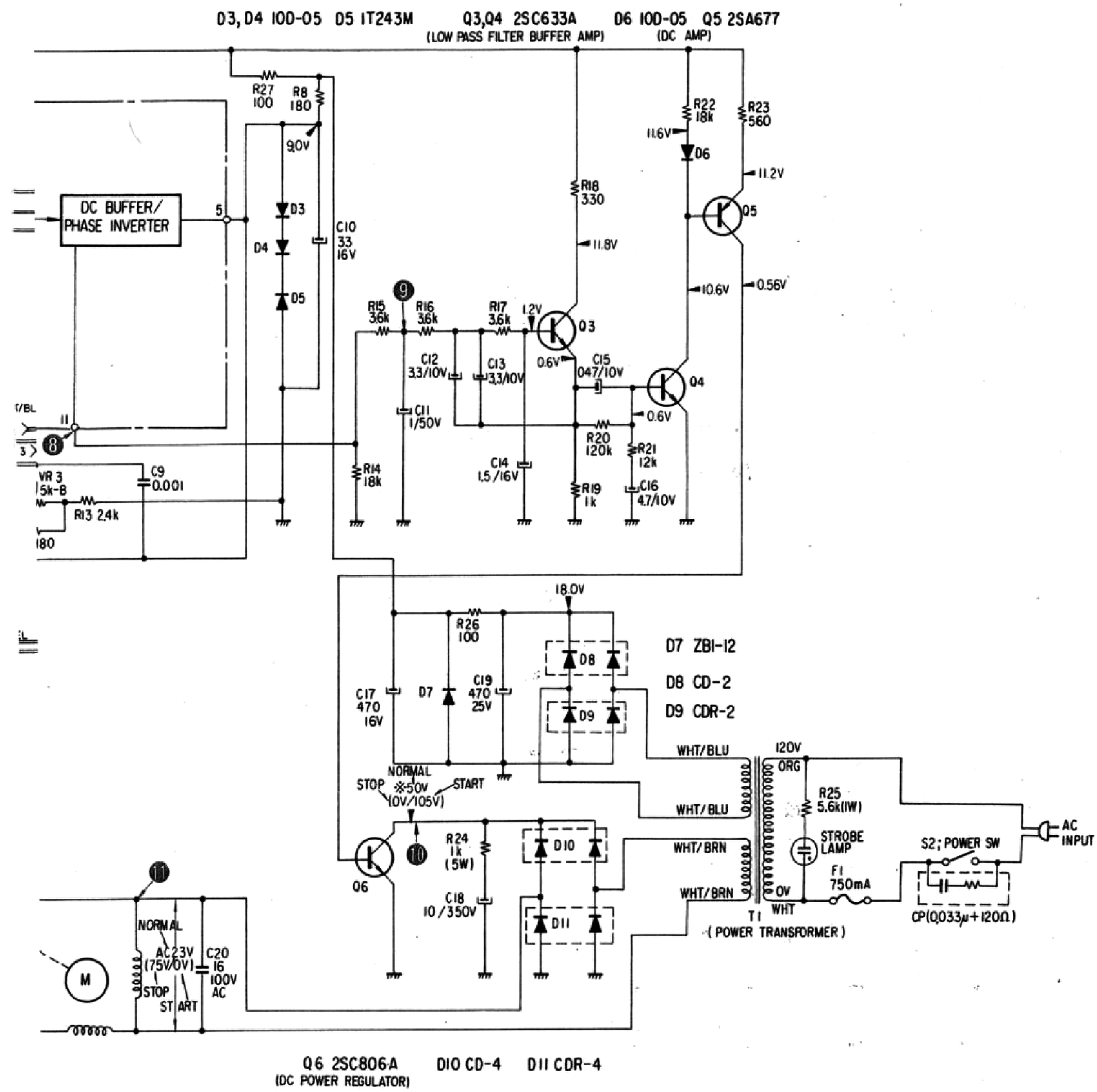
※ $33^1/_3$ or 45 rpm operation.

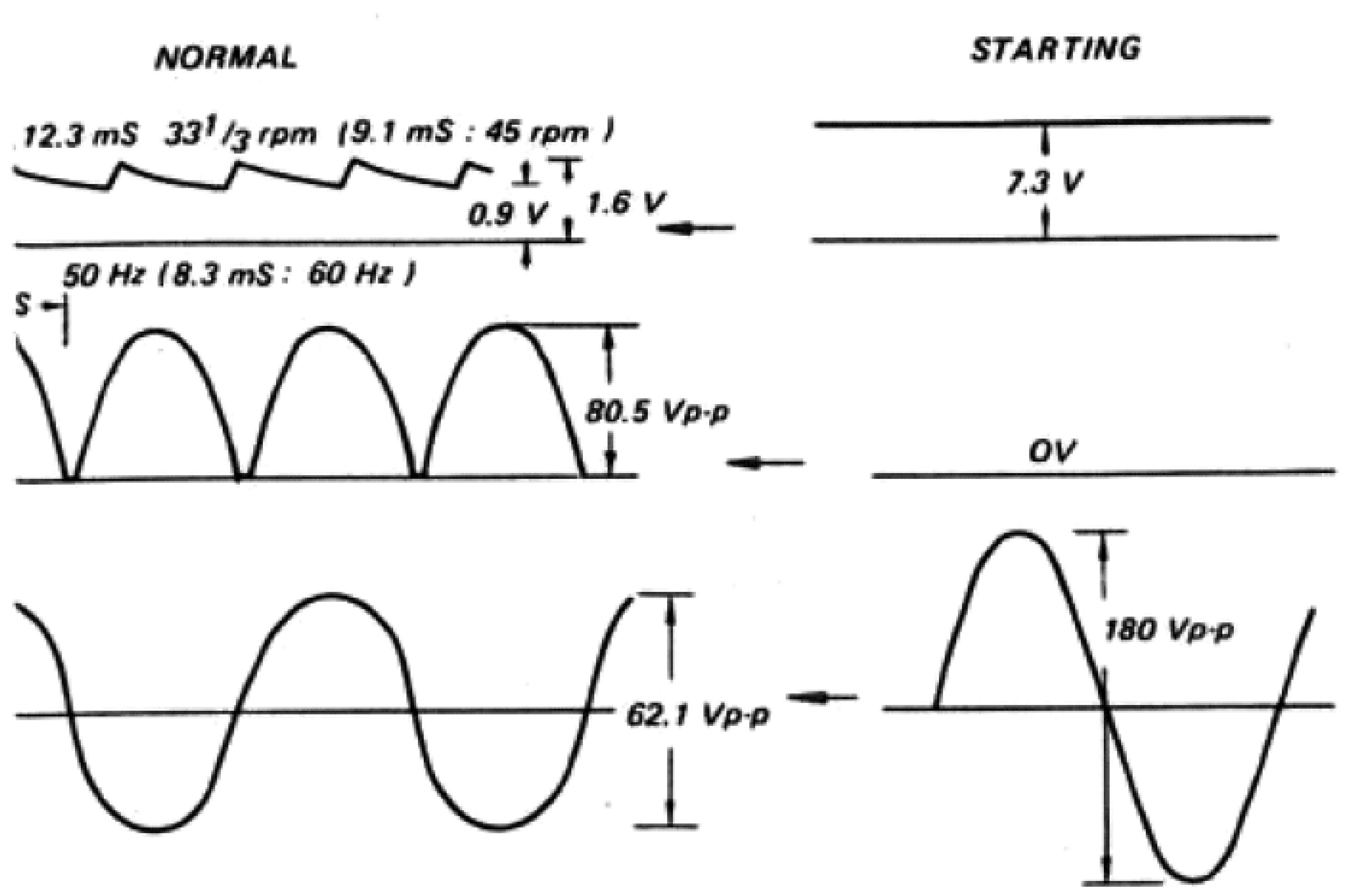
4-2. SCHEMATIC DIAGRAM



Waveforms







Note:

All resistance values are in ohms. k = 1000, M = 1000 k

All capacitance values are in μF except as indicated with p, which means μμF.

All voltages represent an average value and should hold within ±20 %.

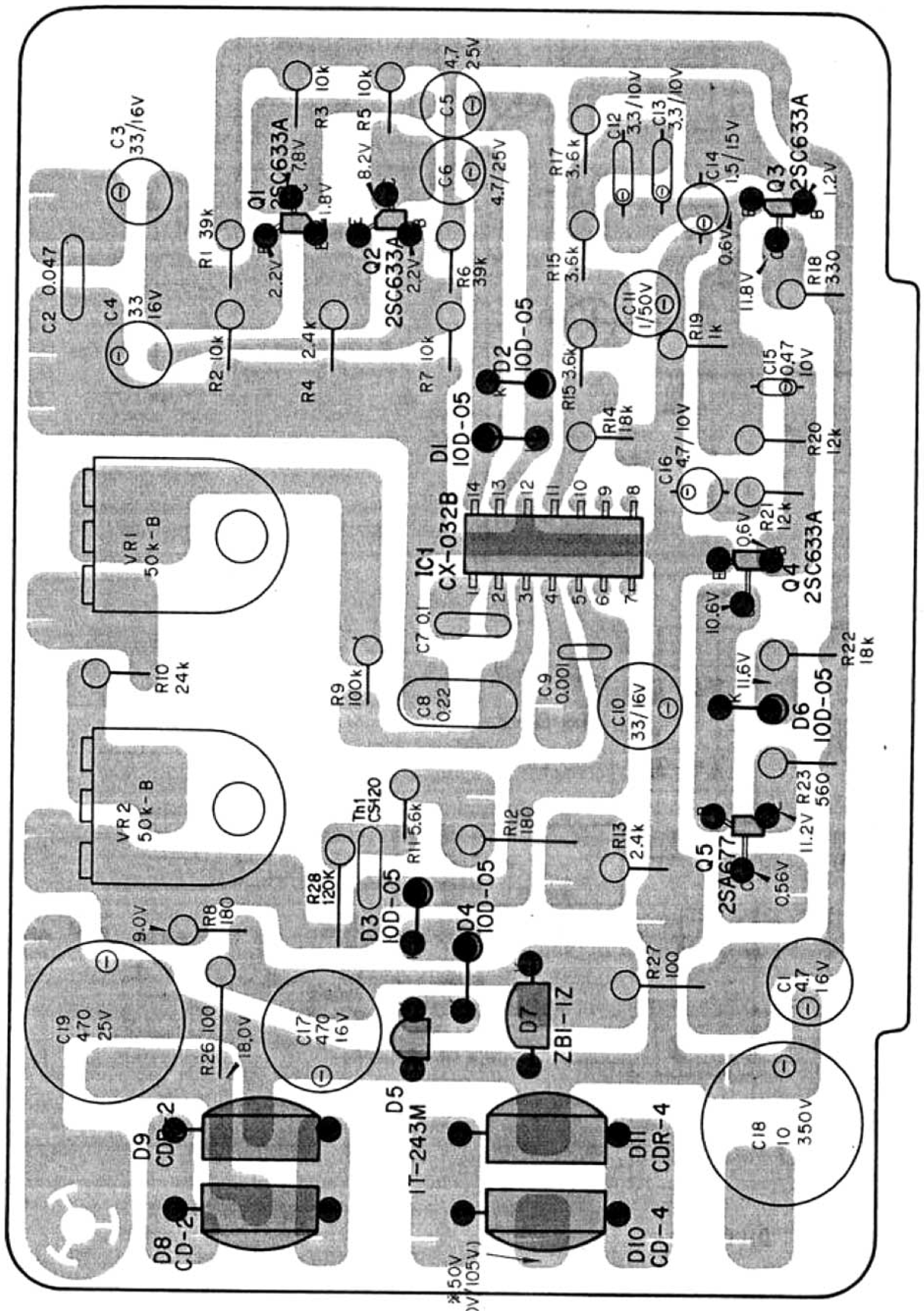
All voltages are dc measured with a VOM (DC 20 k ohms/V) at no signal.

Waveforms are measured by using an oscilloscope.

※ 33⅓ or 45 rpm operation.

4-3. MOUNTING DIAGRAM

– Component Side –



Note: ※ 33⅓ or 45 rpm operation

SECTION 5

EXPLODED VIEWS

(1) The following chart will help you to decipher the hardware codes given in the exploded views.

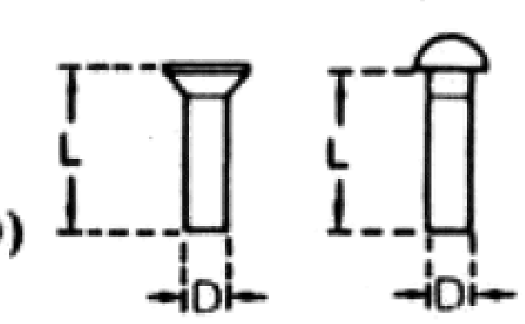
— Hardware Nomenclature —

P – Pan Head Screw	**SC** – Set Screw
PS – Pan Head Screw with Spring Washer	**E** – Retaining Ring (E Washer)
K – Flat Countersunk Head Screw	W – Washer
B – Binding Head Screw	SW – Spring Washer
RK – Oval Countersunk Head Screw	LW – Lock Washer
T – Truss Head Screw	N – Nut
R – Round Head Screw	
F – Flat Fillister Head Screw	

– Example –

⊕ P 3x10

- ⊕ – Type of Slot
- P – Type of Head
- 3 – Diameter in mm (D)
- 10 – Length in mm (L)

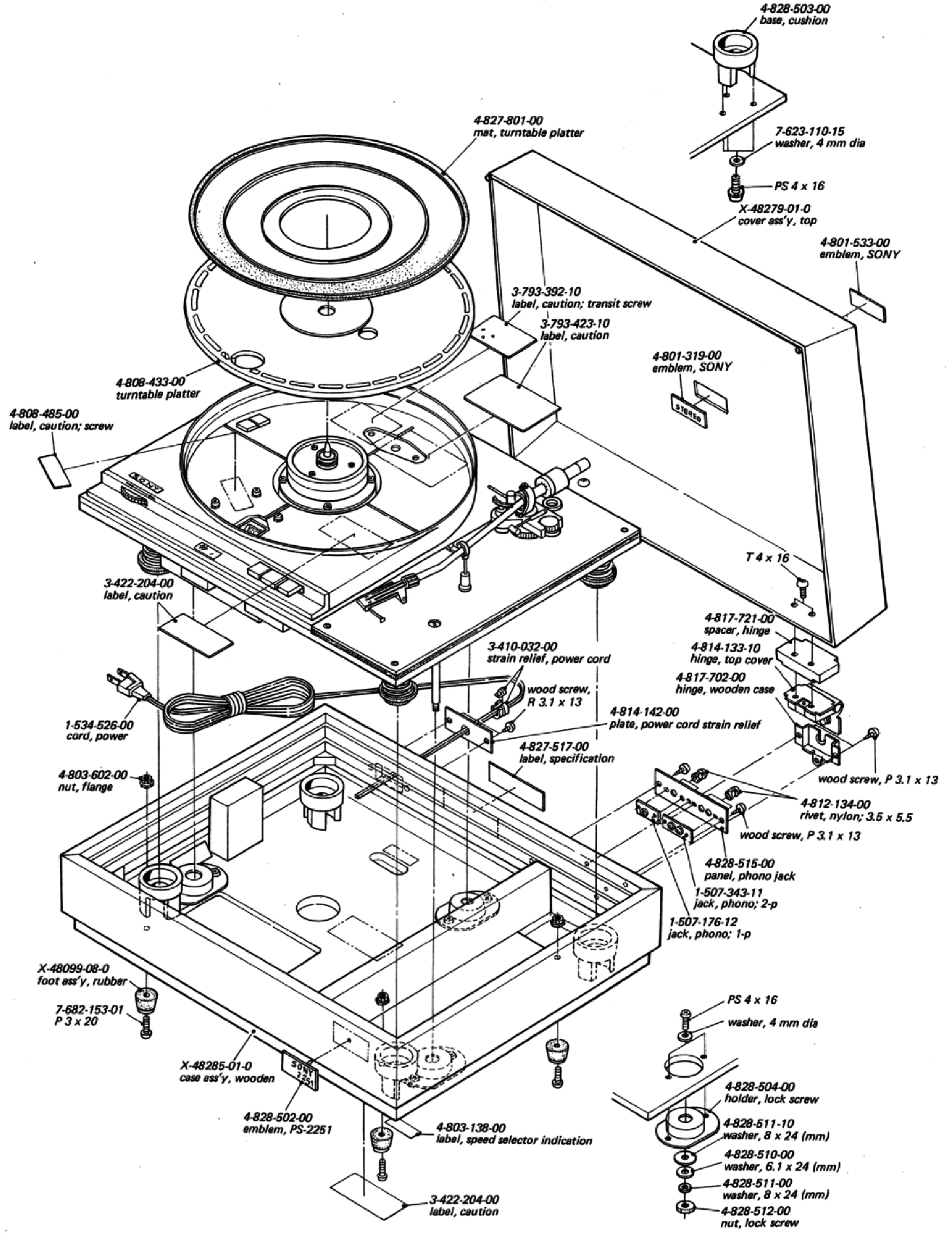


(2) To simplify the exploded view, the part numbers of normal screws, nuts, washers, and retaining rings are not expressed but summarized in the table below.

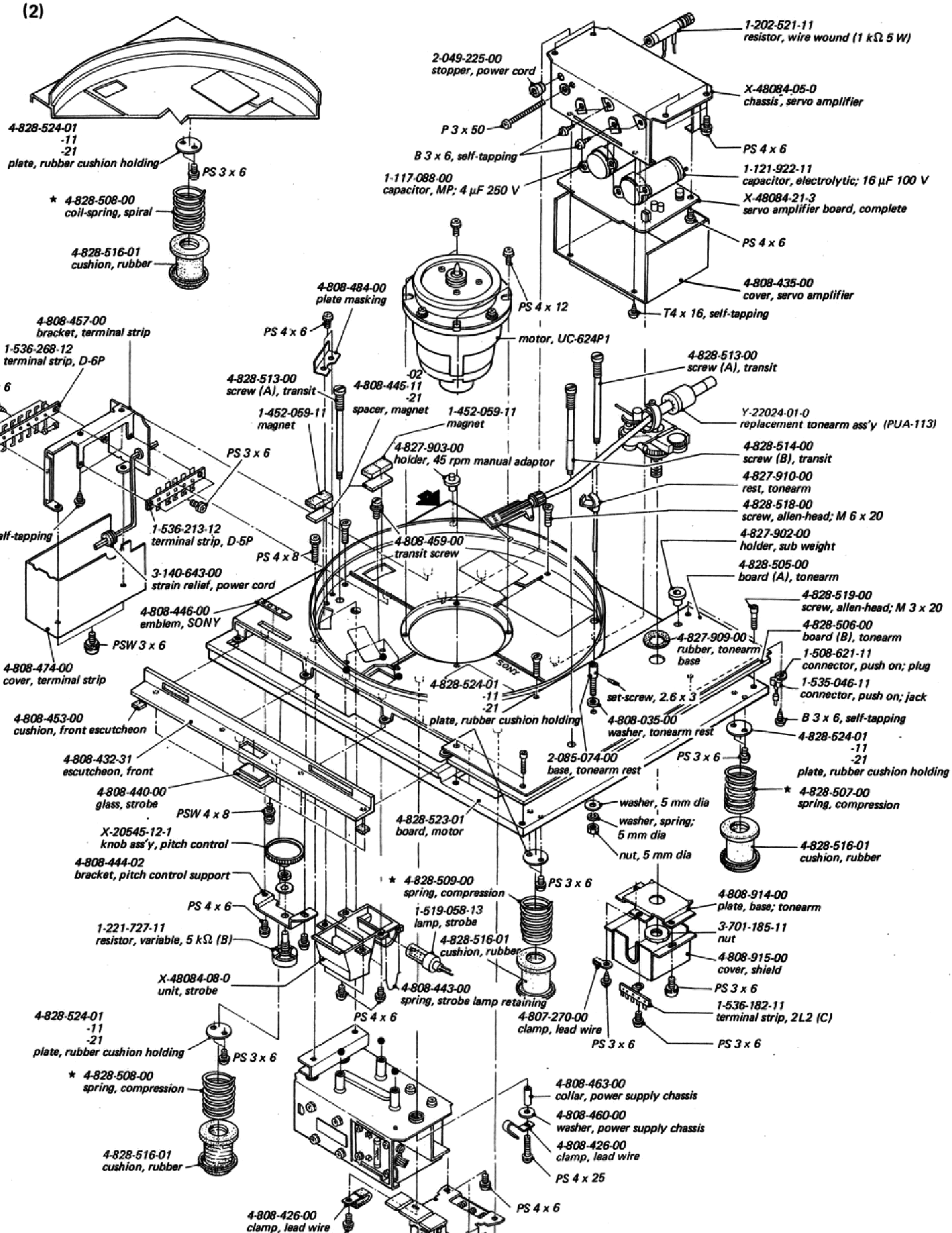
HARDWARES

Part No.	*Description*
	SCREWS
4-828-518-00	screw, allen-head; M 6 x 20
4-828-519-00	screw, allen-head; M 3 x 20
7-621-712-27	set screw, 2.6 x 3
7-621-843-39	screw, wood; R3.1 x 13
7-621-844-17	screw, wood; P 3.1 x 13
7-682-150-13	screw, P 3 x 12
7-682-198-01	screw, P 3 x 50
7-682-465-04	screw, T 4 x 16
7-682-545-21	screw, self-tapping; B 3 x 6
7-682-647-01	screw, PS 3 x 6
7-682-660-01	screw, PS 4 x 6
7-682-661-01	screw, PS 4 x 8
7-682-662-01	screw, PS 4 x 10
7-682-663-01	screw, PS 4 x 12
7-682-665-01	screw, PS 4 x 16
7-682-667-01	screw, PS 4 x 25
7-682-947-01	screw, PSW 3 x 6
7-682-961-01	screw, PSW 4 x 8
	NUT
7-622-212-05	nut, 5 mm dia
	WASHERS
7-623-112-12	washer, 4 mm dia
7-623-212-27	washer, spring; 5 mm dia
7-623-408-05	washer, lock; 3 mm dia
7-624-105-01	retaining ring, 2.3 mm dia

(1)

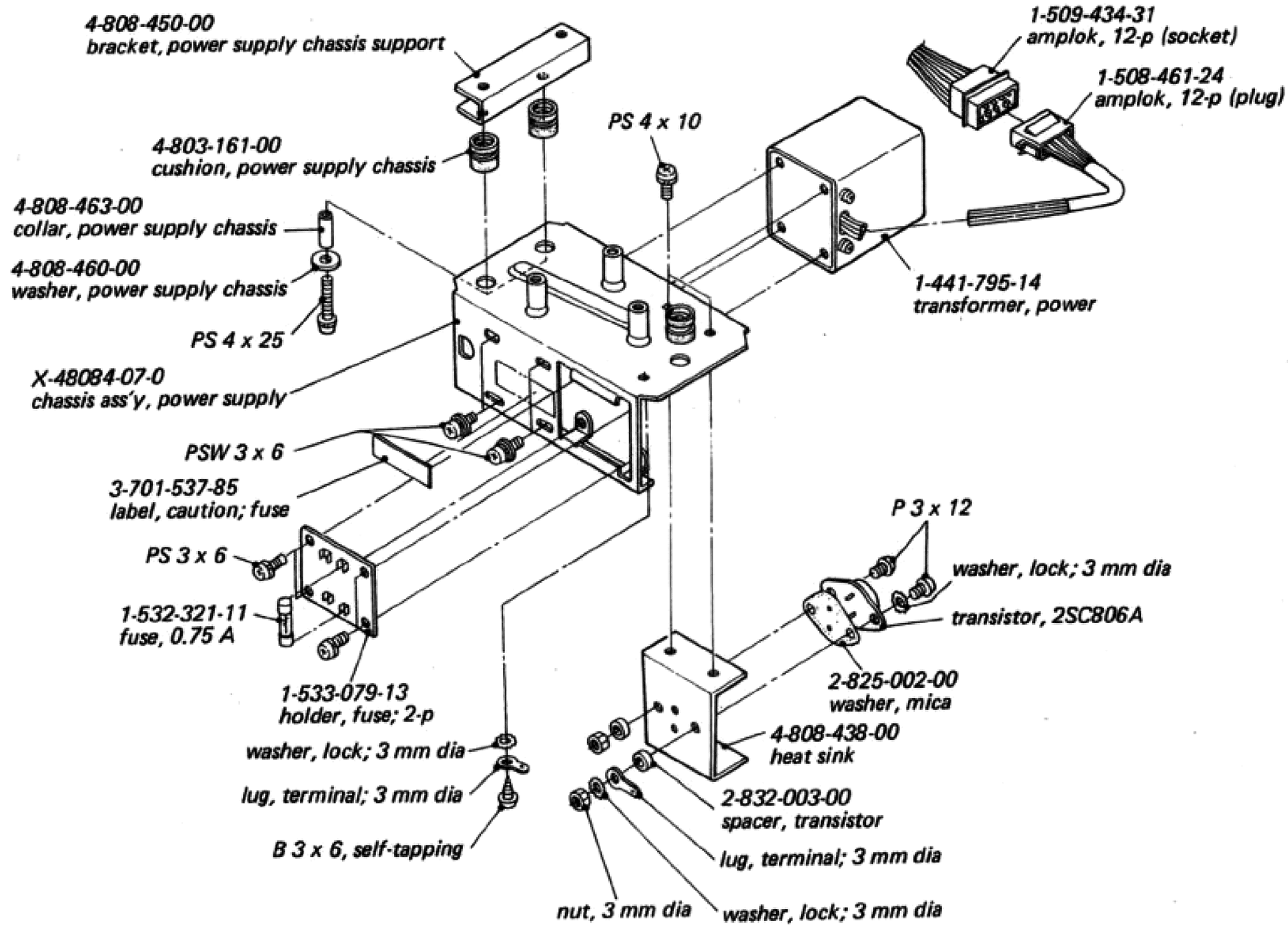

4-828-503-00
base, cushion
7-623-110-15
washer, 4 mm dia
PS 4 x 16
X-48279-01-0
cover ass'y, top
4-801-533-00
emblem, SONY
4-827-801-00
mat, turntable platter
3-793-392-10
label, caution; transit screw
3-793-423-10
label, caution
4-801-319-00
emblem, SONY
STEREO
4-808-433-00
turntable platter
4-808-485-00
label, caution; screw
SONY
T 4 x 16
3-422-204-00
label, caution
4-817-721-00
spacer, hinge
4-814-133-10
hinge, top cover
3-410-032-00
strain relief, power cord
4-817-702-00
hinge, wooden case
wood screw,
R 3.1 x 13
1-534-526-00
cord, power
4-814-142-00
plate, power cord strain relief
4-827-517-00
label, specification
4-803-602-00
nut, flange
wood screw, P 3.1 x 13
4-812-134-00
rivet, nylon; 3.5 x 5.5
wood screw, P 3.1 x 13
4-828-515-00
panel, phono jack
1-507-343-11
jack, phono; 2-p
1-507-176-12
jack, phono; 1-p
X-48099-08-0
foot ass'y, rubber
7-682-153-01
P 3 x 20
PS 4 x 16
washer, 4 mm dia
X-48285-01-0
case ass'y, wooden
SONY
2251
4-828-502-00
emblem, PS-2251
4-828-504-00
holder, lock screw
4-828-511-10
washer, 8 x 24 (mm)
4-828-510-00
washer, 6.1 x 24 (mm)
4-828-511-00
washer, 8 x 24 (mm)
4-803-138-00
label, speed selector indication
4-828-512-00
nut, lock screw
3-422-204-00
label, caution

(2)

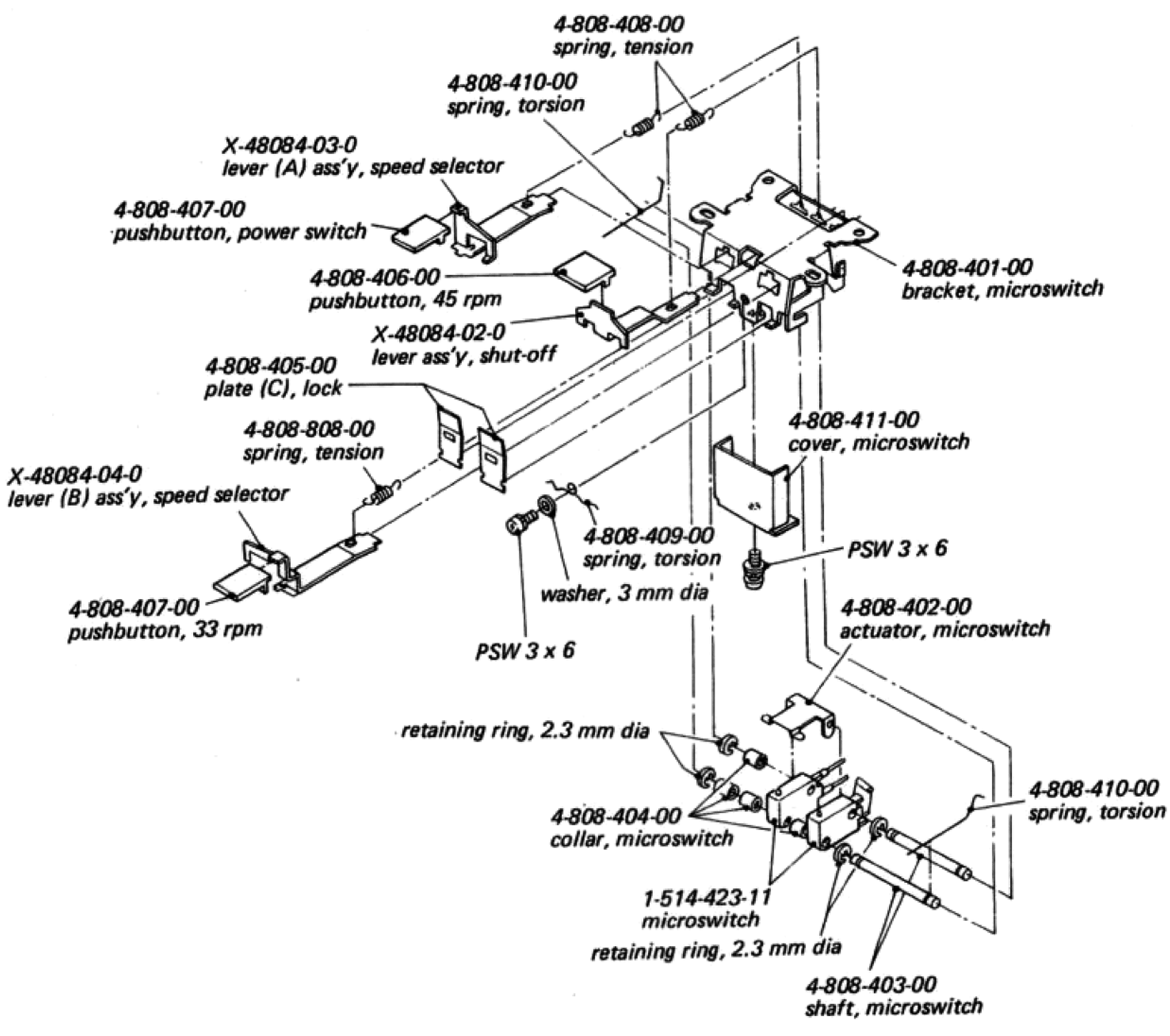


★ **Note:** Each compression spring part number is different corresponding to each mounting position.

(3)

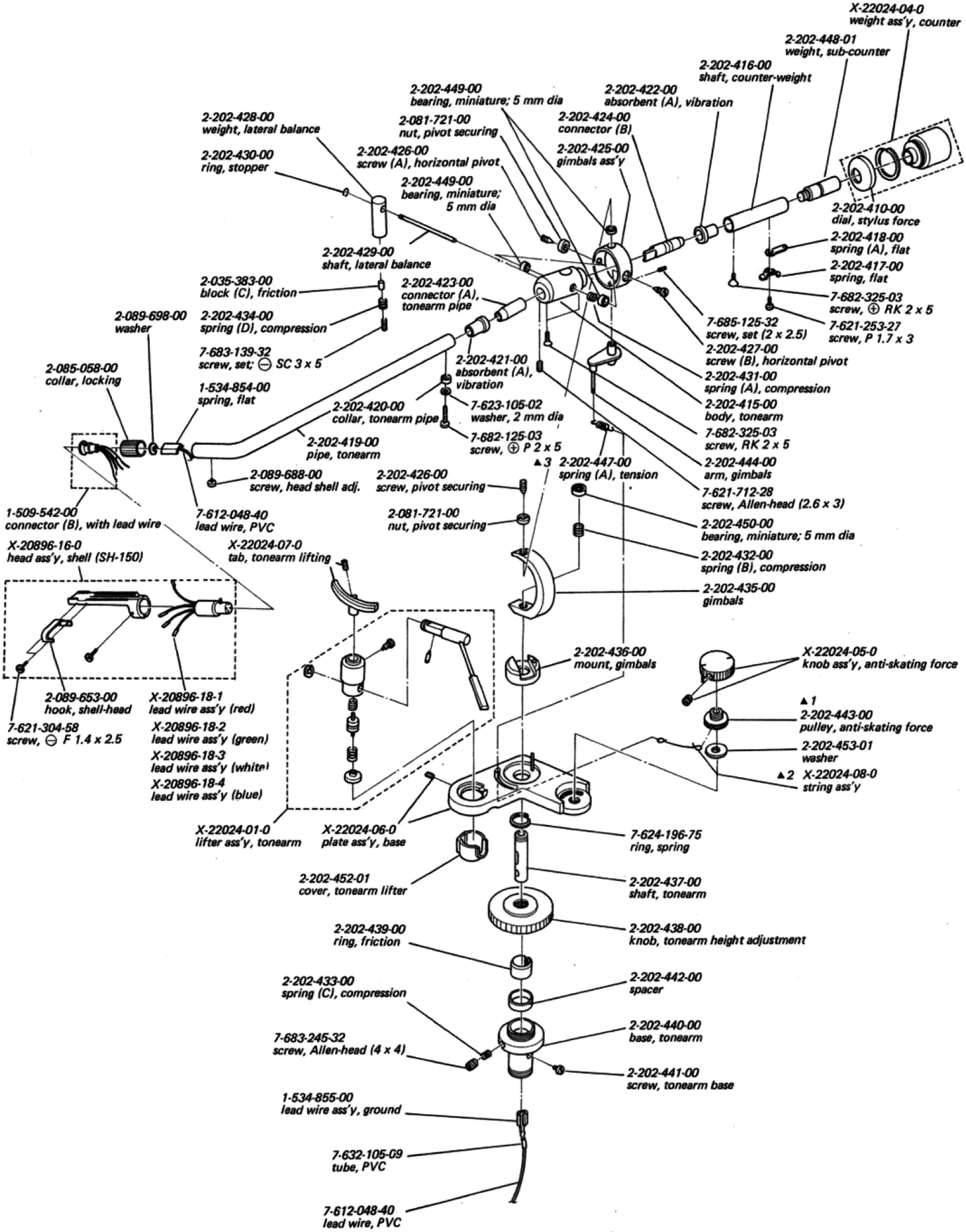


4-808-450-00
bracket, power supply chassis support
4-803-161-00
cushion, power supply chassis
4-808-463-00
collar, power supply chassis
4-808-460-00
washer, power supply chassis
PS 4 x 25
X-48084-07-0
chassis ass'y, power supply
PSW 3 x 6
3-701-537-85
label, caution; fuse
PS 3 x 6
1-532-321-11
fuse, 0.75 A
1-533-079-13
holder, fuse; 2-p
washer, lock; 3 mm dia
lug, terminal; 3 mm dia
B 3 x 6, self-tapping
PS 4 x 10
1-509-434-31
amplok, 12-p (socket)
1-508-461-24
amplok, 12-p (plug)
1-441-795-14
transformer, power
P 3 x 12
washer, lock; 3 mm dia
transistor, 2SC806A
2-825-002-00
washer, mica
4-808-438-00
heat sink
2-832-003-00
spacer, transistor
lug, terminal; 3 mm dia
nut, 3 mm dia
washer, lock; 3 mm dia



4-808-408-00
spring, tension
4-808-410-00
spring, torsion
X-48084-03-0
lever (A) ass'y, speed selector
4-808-407-00
pushbutton, power switch
4-808-406-00
pushbutton, 45 rpm
X-48084-02-0
lever ass'y, shut-off
4-808-405-00
plate (C), lock
4-808-808-00
spring, tension
X-48084-04-0
lever (B) ass'y, speed selector
4-808-407-00
pushbutton, 33 rpm
PSW 3 x 6
4-808-409-00
spring, torsion
washer, 3 mm dia
4-808-401-00
bracket, microswitch
4-808-411-00
cover, microswitch
PSW 3 x 6
4-808-402-00
actuator, microswitch
retaining ring, 2.3 mm dia
4-808-404-00
collar, microswitch
1-514-423-11
microswitch
retaining ring, 2.3 mm dia
4-808-403-00
shaft, microswitch
4-808-410-00
spring, torsion

(4)



Note: ▲ 1 ~ 3 Anti-skating force pulley ass'y (X-22024-08-1) includes all the part marked ▲.

SECTION 6
REPACKING

The PS-2251's original shipping carton and packing materials are the ideal containers for shipping the unit. However to secure the maximum protection, the PS-2251 must be repacked in these materials precisely as before. The proper repacking procedures are shown in Fig. 6-1.

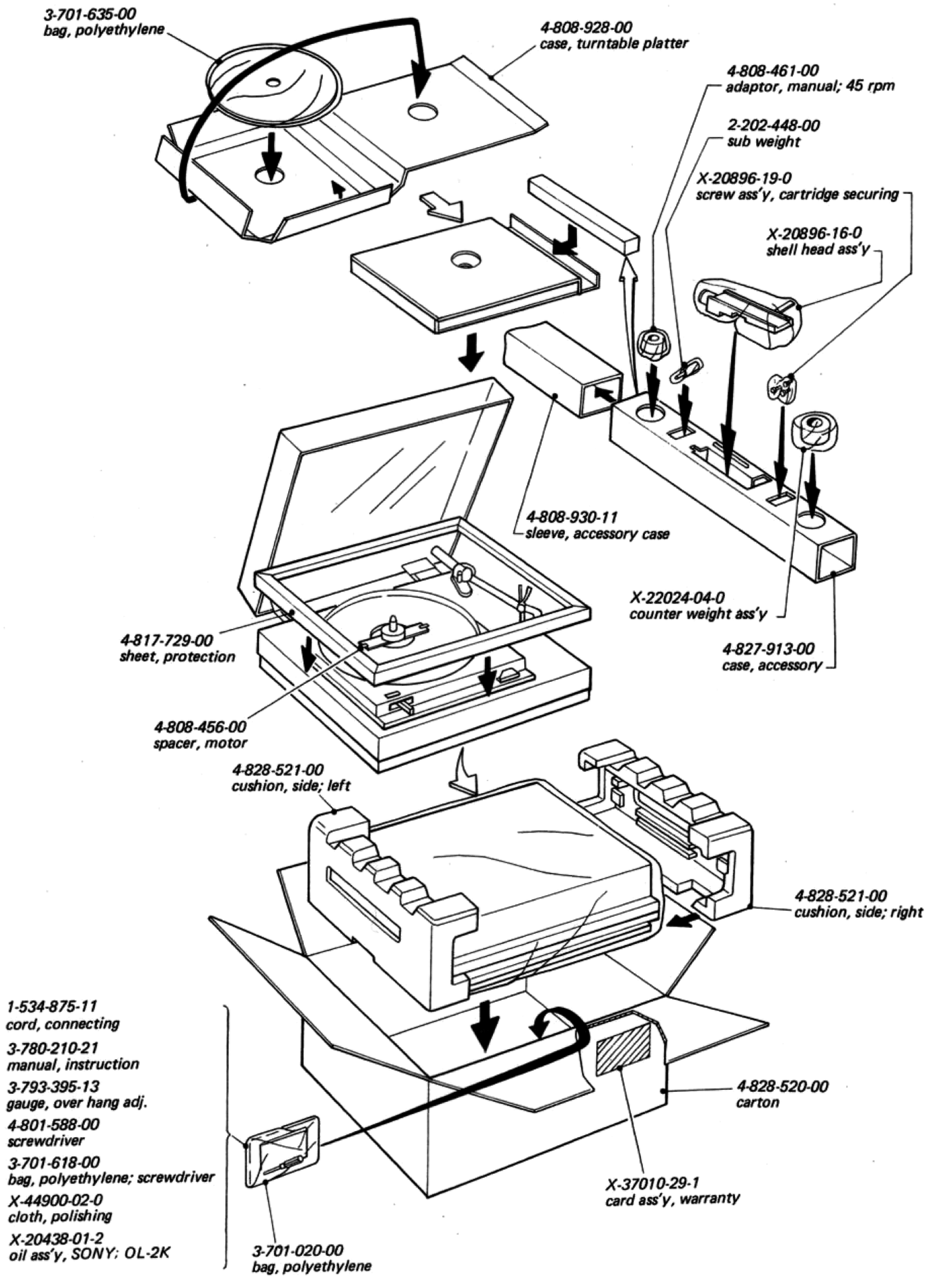


Fig. 6-1. Repacking

SECTION 7
ELECTRICAL PARTS LIST

COMPLETE CIRCUIT BOARD

servo amplifier circuit board

SEMICONDUCTORS

Ref. No.	Part No.	Description	
D1		diode	10D-05
D2		diode	10D-05
D3		diode	10D-05
D4		diode	10D-05
D5		diode	1T243M
D6		diode	10D-05
D7		diode	ZB1-12
D8		diode	CD-2
D9		diode	CDR-2
D10		diode	CD-4
D11		diode	CDR-4
Q1		transistor	2SC633A
Q2		transistor	2SC633A
Q3		transistor	2SC633A
Q4		transistor	2SC633A
Q5		transistor	2SA677
Q6		transistor	2SC806A
Th1		thermistor	CS-120
IC1		IC	CX-032B

TRANSFORMER

Ref. No.	Part No.	Description
T1	1-441-795-14	transformer, power

CAPACITORS

All capacitance values are in μF, except as indicated with p, which means $\mu\mu$F.

Ref. No.	Part No.	Value	Tolerance	Voltage	Type
C1	1-121-409-11	47		16 V	electrolytic
C2	1-105-681-12	0.047	± 10 %	50 V	mylar
C3	1-121-403-11	33		16 V	electrolytic
C4	1-121-403-11	33		16 V	electrolytic
C5	1-121-395-11	4.7		25 V	electrolytic
C6	1-121-395-11	4.7		25 V	electrolytic
C7	1-105-685-12	0.1	± 10 %	50 V	mylar
C8	1-105-689-12	0.22	± 10 %	50 V	mylar
C9	1-105-661-12	0.001	± 10 %	50 V	mylar
C10	1-121-403-11	33		16 V	electrolytic
C11	1-121-391-11	1		50 V	electrolytic
C12	1-127-025-11	3.3	± 20 %	10 V	solid, aluminum
C13	1-127-025-11	3.3	± 20 %	10 V	solid, aluminum
C14	1-131-157-11	1.5	$^{+40}_{-20}$ %	16 V	tantalum
C15	1-127-022-11	0.47	± 20 %	10 V	solid, aluminum
C16	1-131-140-11	4.7	± 20 %	10 V	tantalum
C17	1-121-426-11	470		16 V	electrolytic
C18	1-121-180-11	10		350 V	electrolytic
C19	1-121-733-11	470		25 V	electrolytic
C20	1-121-922-11	16		100 V	electrolytic
C21	1-117-088-11	4	± 10 %	250 V	MP

RESISTORS

All resistance values are in ohms, ± 5 %, ¼ W and carbon type unless otherwise indicated.

Ref. No.	Part No.	Value	Tolerance	Wattage	Type
R1	1-242-711-11	39 k			
R2	1-242-697-11	10 k			
R3	1-242-697-11	10 k			
R4	1-242-682-11	2.4 k			
R5	1-242-697-11	10 k			
R6	1-242-711-11	39 k			
R7	1-242-697-11	10 k			
R8	1-242-655-11	180			
R9	1-242-721-11	100 k			
R10	1-242-706-11	24 k			
R11	1-242-691-11	5.6 k			
R12	1-242-655-11	180			
R13	1-242-682-11	2.4 k			
R14	1-242-703-11	18 k			
R15	1-242-686-11	3.6 k			
R16	1-242-686-11	3.6 k			
R17	1-242-686-11	3.6 k			
R18	1-242-661-11	330			
R19	1-242-673-11	1 k			
R20	1-242-723-11	120 k			
R21	1-242-699-11	12 k			
R22	1-242-703-11	18 k			
R23	1-242-667-11	560			
R24	1-205-521-11	1 k	± 5 %	5 W	wire wound
R25	1-209-232-11	5.6 k	± 10 %	1 W	carbon
R26	1-244-849-11	100	± 5 %	½ W	carbon
R27	1-242-649-11	100			
R28	1-242-651-11	120			
VR1	1-222-781-11	50 k (B), adjustable			
VR2	1-222-781-11	50 k (B), adjustable			
VR3	1-221-727-11	5 k (B), adjustable			

SWITCHES

Ref. No.	Part No.	Description
S1	1-514-423-11	switch, micro (SPEED SELECTOR)
S2	1-514-423-11	switch, micro (POWER)

MISCELLANEOUS

Ref. No.	Part No.	Description
CP	1-231-057-12	encapsulated component, 0.033 μF + 120 Ω

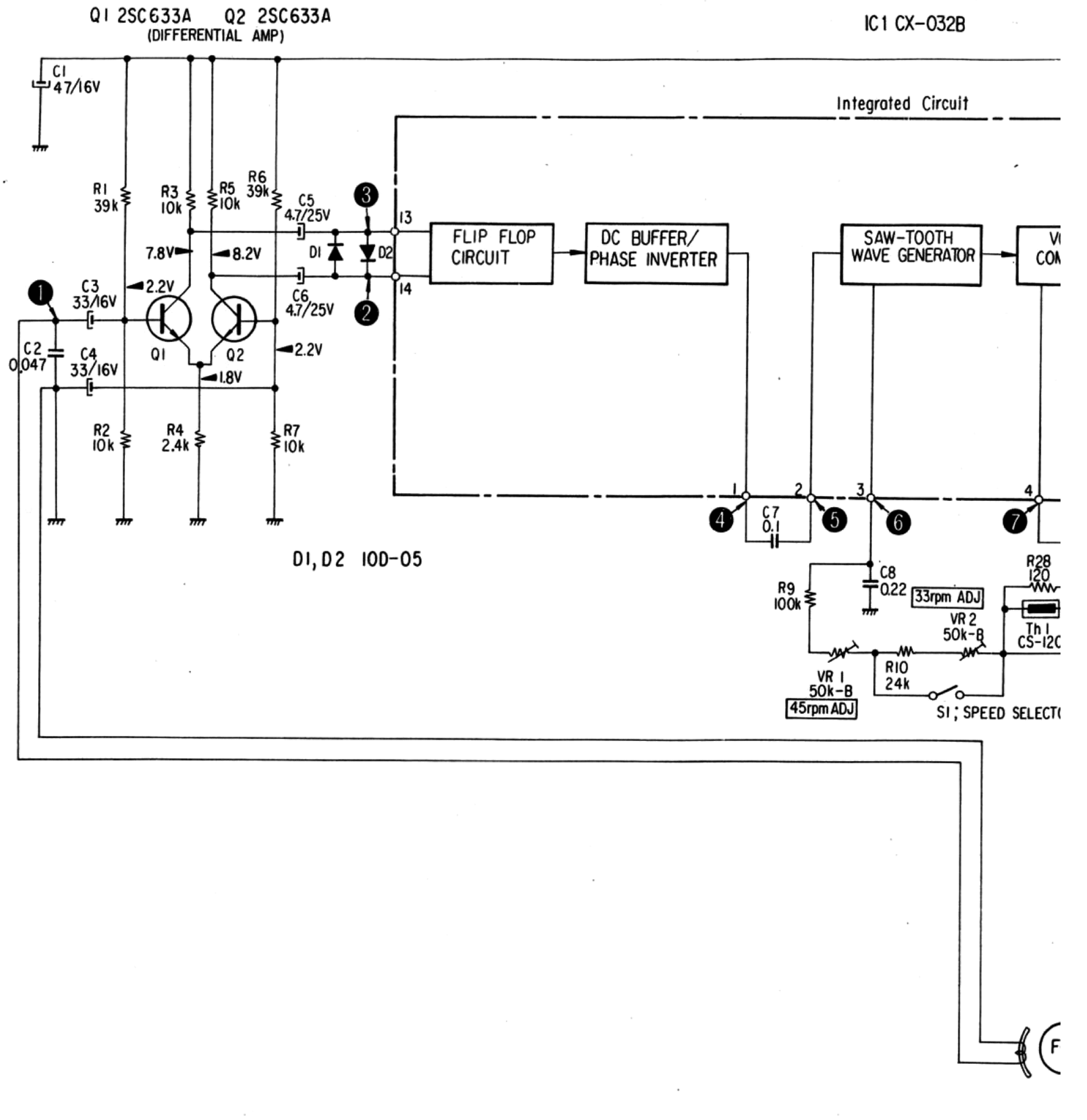
Ref. No.	Part No.	Description
F1	1-532-321-11	fuse, 0.75 A
M	8-836-624-15	motor, UC-624P1
	1-519-058-13	lamp, strobe
	1-452-059-11	magnet
	1-508-461-24	amplok, 12-p (plug)

Ref. No.	Part No.	Description
	1-509-434-31	amplok, 12-p (socket)
	1-533-079-13	holder, fuse; 2-p
	1-534-526-00	cord, power
	1-536-213-12	terminal strip, D-5p
	1-536-268-12	terminal strip, D-6p

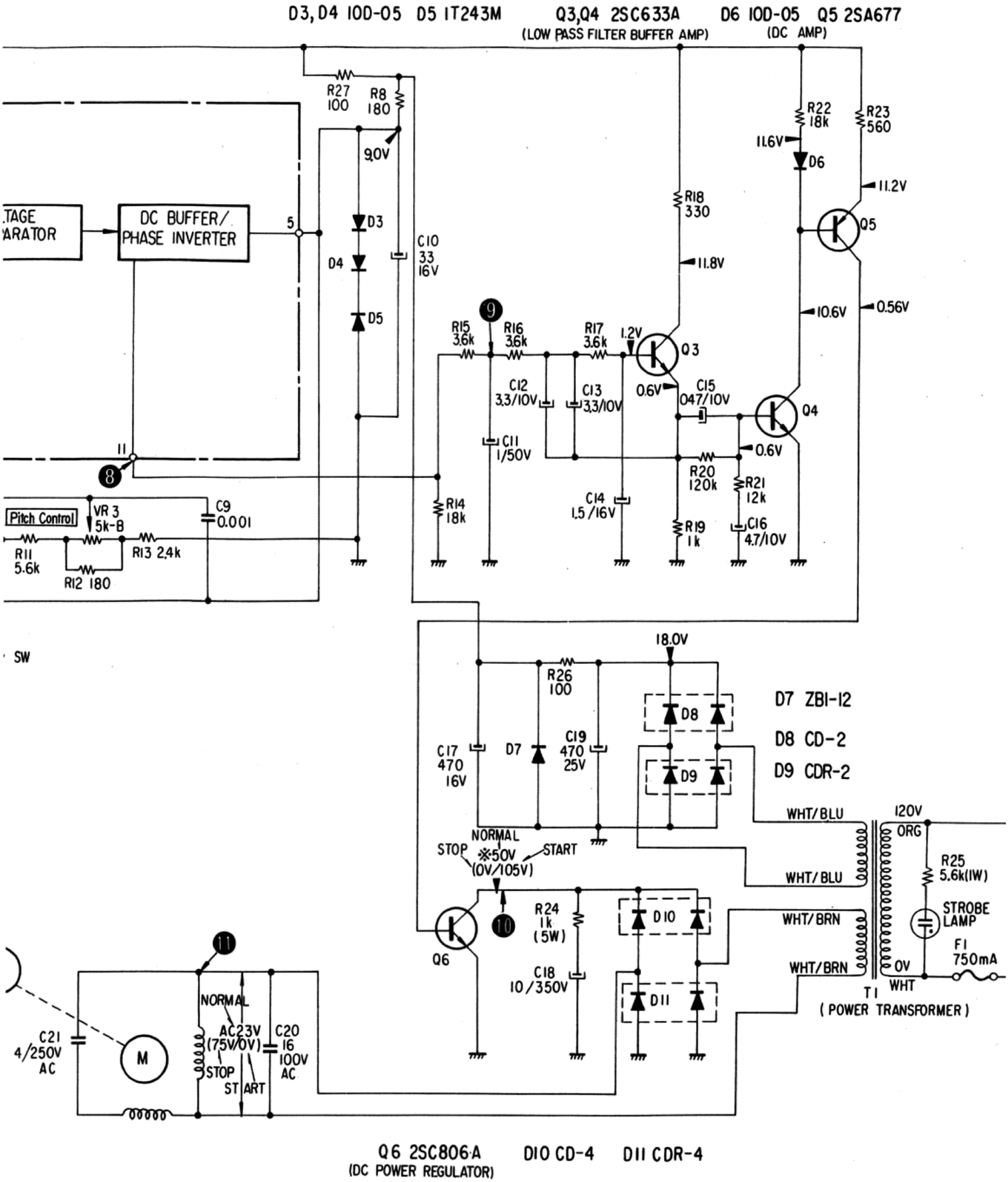
SONY CORPORATION

3B0514-1

Printed in Japan

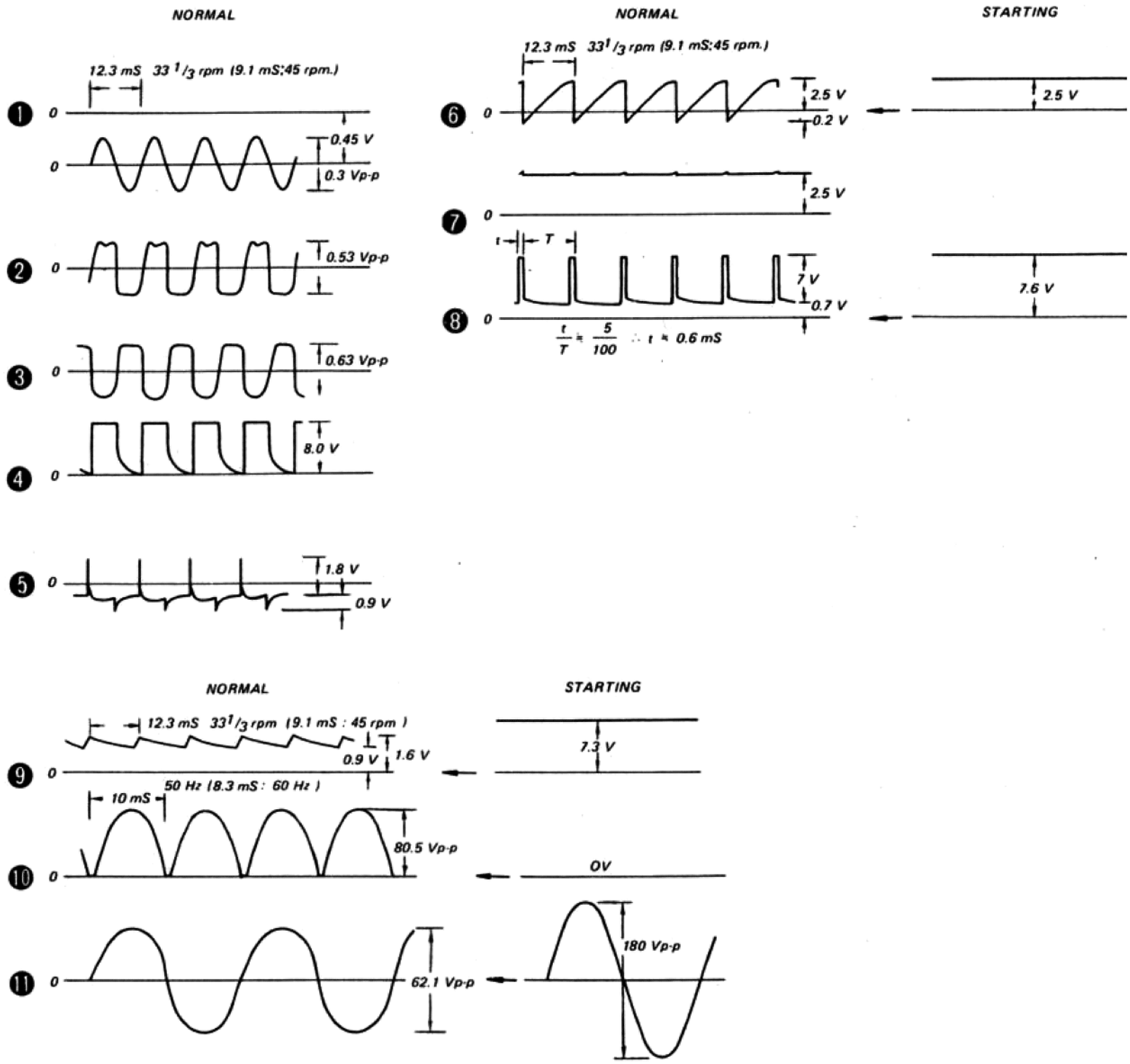


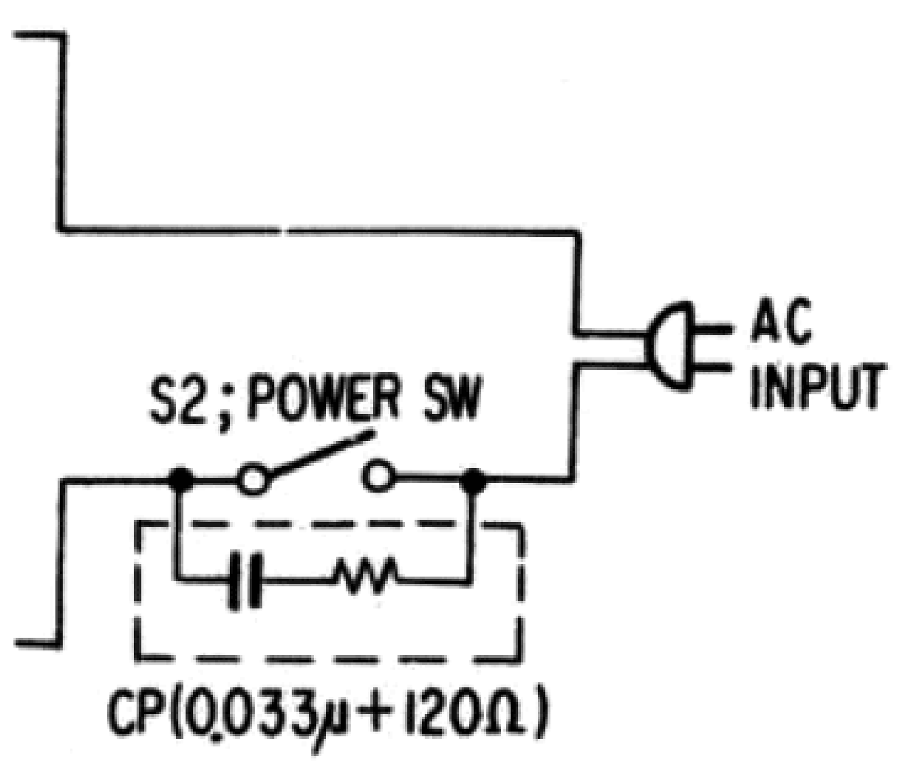
Q1 2SC633A Q2 2SC633A
(DIFFERENTIAL AMP)
IC1 CX-032B
Integrated Circuit
C1 47/16V
R1 39k
R3 10k
R5 10k
R6 39k
C5 4.7/25V
13
14
FLIP FLOP CIRCUIT
DC BUFFER/ PHASE INVERTER
SAW-TOOTH WAVE GENERATOR
7.8V
8.2V
2.2V
D1
D2
C3 33/16V
C6 4.7/25V
Q1
Q2
C2 0.047
C4 33/16V
2.2V
1.8V
R2 10k
R4 2.4k
R7 10k
D1, D2 10D-05
1
2
3
4
C7 0.1
C8 0.22
R9 100k
33rpm ADJ
VR 2 50k-B
R28 120
Th 1
VR 1 50k-B
45rpm ADJ
R10 24k
S1; SPEED SELECT



D3, D4 10D-05 D5 1T243M
Q3,Q4 2SC633A
(LOW PASS FILTER BUFFER AMP)
D6 10D-05 Q5 2SA677
(DC AMP)
R27 100
R8 180
9.0V
R22 18k
R23 560
11.6V
D6
11.2V
R18 330
Q5
11.8V
DC BUFFER/ PHASE INVERTER
5
D3
D4
D5
C10 33 16V
R15 3.6k
R16 3.6k
R17 3.6k
1.2V
Q3
10.6V
0.56V
C12 3.3/10V
C13 3.3/10V
0.6V
C15 0.47/10V
Q4
C11 1/50V
0.6V
11
R20 120k
R21 12k
Pitch Control
VR 3 5k-B
C9 0.001
R14 18k
C14 1.5/16V
R19 1k
C16 4.7/10V
R11 5.6k
R13 2.4k
R12 180
SW
18.0V
R26 100
D7 ZB1-12
D8
D8 CD-2
D9 CDR-2
C17 470 16V
D7
C19 470 25V
D9
WHT/BLU
120V
ORG
NORMAL
STOP
※50V
START
(0V/105V)
WHT/BLU
R25 5.6k(1W)
R24 1k (5W)
D10
WHT/BRN
STROBE LAMP
F1 750mA
Q6
C18 10/350V
WHT/BRN
0V
WHT
D11
T1
(POWER TRANSFORMER)
NORMAL
C21 4/250V AC
M
AC23V
(75V/0V)
C20 16 100V AC
STOP
START
Q6 2SC806A
(DC POWER REGULATOR)
D10 CD-4
D11 CDR-4

Waveforms





Note:

All resistance values are in ohms. k = 1000, M = 1000 k

All capacitance values are in μF except as indicated with p, which means $\mu\mu$F.

All voltages represent an average value and should hold within ±20 %.

All voltages are dc measured with a VOM (DC 20 k ohms/V) at no signal.

Waveforms are measured by using an oscilloscope.

※ $33\frac{1}{3}$ or 45 rpm operation.

PS-2251
SONY®
1973