

PS-X20

NOV 20 1979 US Model



STEREO TURNTABLE SYSTEM

SPECIFICATIONS

GENERAL

Power Requirements:	120 V ac, 60 Hz
Power Consumption:	8 W
Dimensions:	Approx. 445 (w) x 140 (h) x 395 (d) mm 17 1/2 (w) x 5 1/2 (h) x 15 1/2 (d) inches including projecting parts and controls
Weight:	Approx. 5.8 kg, 12 lb 13 oz (net) Approx. 7.1 kg, 15 lb 10 oz (in shipping carton)


TURNTABLE

Platter:	31.3 cm (12 3/8 inches), aluminum-alloy diecast
Motor:	Linear BSL (brushless and slotless) motor
Drive System:	Direct drive, Magnedisc servo control
Speed:	33 1/3 rpm, 45 rpm
Wow and Flutter:	0.03 % (WRMS)
Signal-to-noise Ratio:	73 dB (DIN-B)
Automatic System:	Lead-in, return, reject, repeat

TONEARM

Type:	Statically balanced, universal
Pivot-to-stylus Length:	216.5 mm (8 1/2 inches)
Overall Arm Length:	300 mm (11 7/8 inches)
Overhang:	16.5 mm (5/8 inches)
Tracking Error:	+3°, -1°
Tracking Force Adjustment Range:	0 - 3 g
Headshell Weight:	8 g
Cartridge Weight Range:	12 - 18 g (with headshell)

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.

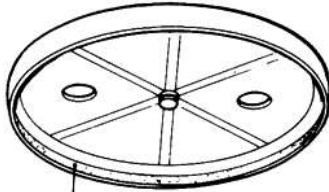
SONY®

SERVICE MANUAL

REPAIR CAUTION

1. Turntable handling

bottom view of turntable

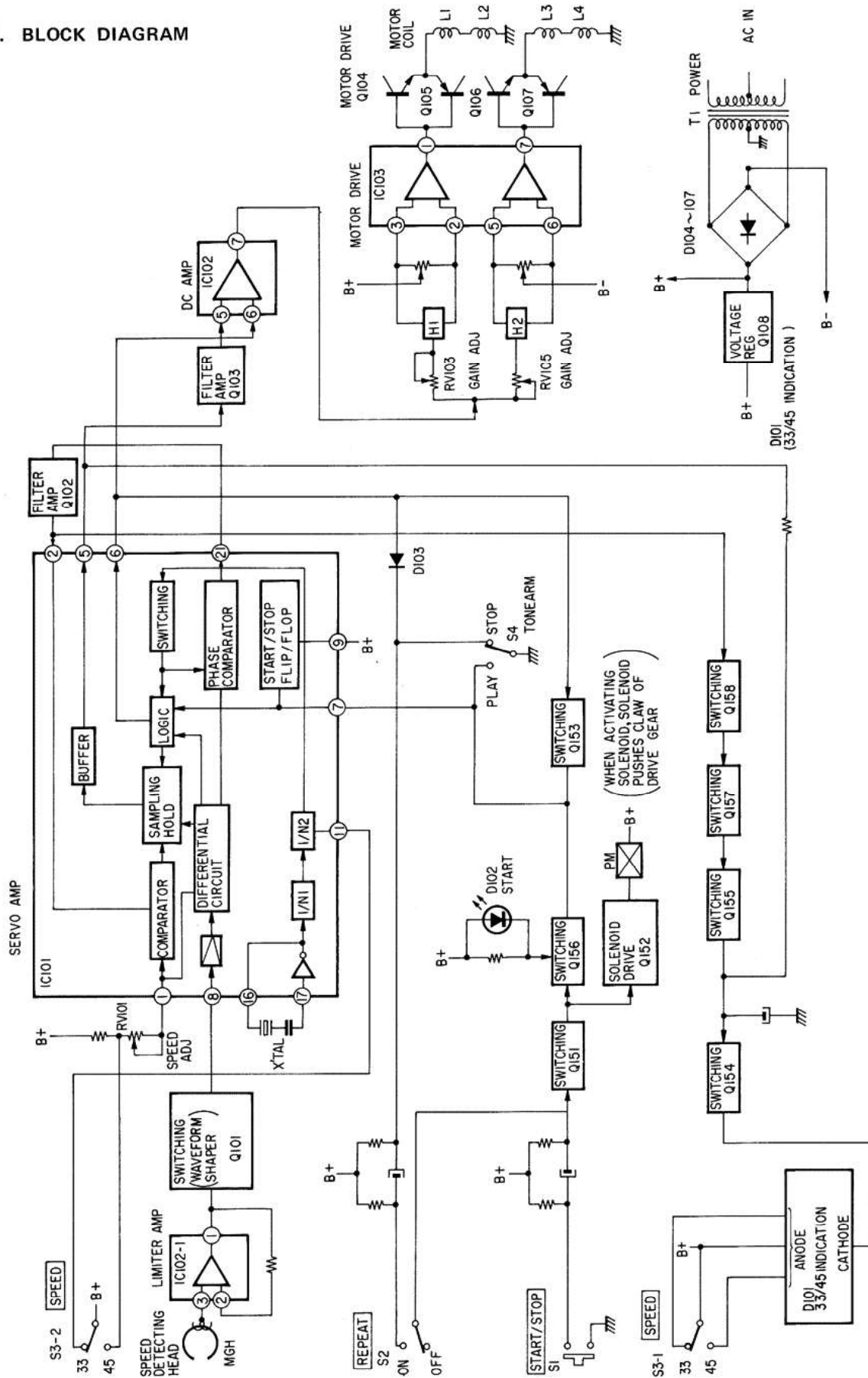


Be sure not to spoil the magnetic coating. (dark brown color)

2. Perform the adjustments and checks after the circuit becomes stable. (Wait several seconds after switching on the power.)

SECTION 1
OUTLINE

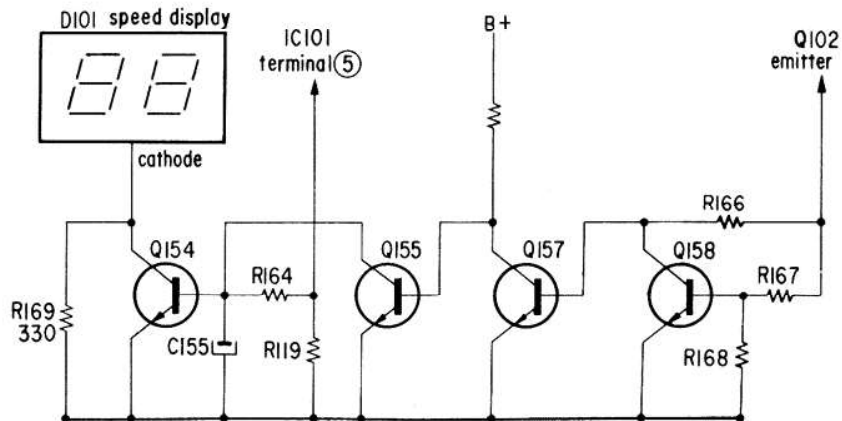
1-1. BLOCK DIAGRAM



1-2. CIRCUIT DESCRIPTION

Crystal-lock Detection Circuit

When the turntable has reached its designated speed this circuit indicates that the crystal-lock circuit is operating by increasing the brightness of the LED which indicates speed.



- When the turntable speed is not controlled by the crystal-lock circuit.

1. The emitter voltage of Q102 is zero and Q157 and Q158 are turned off. This turns Q155 on and Q154 off.
2. The cathode of D101 (LED) is grounded through R169, and D101 grows dim.

- When the turntable speed is controlled by the crystal-lock circuit.

1. The emitter voltage of Q102 is from 0.73 to 4.27V.
2. Q157 and Q158 are turned on. This turns Q155 off and Q154 on.
3. The cathode of D101 is grounded through Q154 and D101 brightens.

Note: When rotating the turntable clockwise, the voltage at terminal ⑤ of IC101 is from 0.6 to 3.5V. This potential turns Q154 on and D101 is brightly lit. When rotating the turntable in the reverse direction by hand, the voltage at terminal ⑤ of IC101 falls to zero, removing bias from the base of Q154 and turning it off. As a result, the cathode of D101 is grounded through R169, and D101 grows dim.

Start Operation : Refer to Fig. 1.

1. When START/STOP switch (S1) is depressed, currents (① to ④) flow for a moment.
2. As Q156 is on, terminal ⑦ of IC101 is grounded (LOW level), and IC101 operates. At the same time D102 lights.
3. Q152 turns on, activating solenoid PM. The solenoid causes the motor gear to engage the pawl of the drive gear.
4. The turntable's revolving motion is transmitted to the drive gear so that the drive gear starts rotating. The tonearm moves toward the lead-in groove of the record.
5. Tonearm switch (S4) is mechanically switched to the PLAY position when the drive gear rotates, and the collector of Q156 and terminal ⑦ of IC101 are grounded. While the tonearm is off the tonearm rest, D102 continues to light and IC101 remains operating.
6. Since approximately 5.3V is generated at terminal ⑥ of IC101 during play, Q153 is turned on.

- ating. The turntable keeps rotating. The drive gear rotates half a turn and the mechanism is completely reset. At the same time solenoid PM conducts because Q152 is on, and the motor gear is engaged with the pawl of the drive gear.
5. The turntable's revolving motion is transmitted to the drive gear, the drive gear starts rotating and the tonearm moves again toward the lead-in groove of the record.
6. The unit stops the repeat operation when REPEAT switch (S2) is turned off.

Stop Operation : Refer to Fig. 2.

1. When START/STOP switch (S1) is depressed, currents (① to ④) flow for a moment.
2. Q152 turns on, and this activates solenoid PM. The drive gear rotates and the tonearm starts the return operation.
3. The tonearm returns to its rest governed by the rotation of the drive gear. While tonearm switch (S4) is mechanically returned to its original position (STOP), Q153 is on, and this grounds terminal ⑦ of IC101. Accordingly, IC101 remains operating and the turntable keeps rotating.
4. C154 is discharged through D103 and Q153 is turned off when the mechanism is completely reset.
5. Terminal ⑦ of IC101 becomes HIGH level and the turntable stops rotating.

Repeat Operation : Refer to Fig. 3.

1. REPEAT switch (S2): ON. When the tonearm enters the lead-out groove of the record, the revolution of the turntable is mechanically transmitted to the drive gear. The drive gear rotates and the tonearm starts the return operation.
2. Tonearm switch (S4) mechanically returns to its original position (STOP) when the tonearm ends the return operation.
3. Current ① flows, and this turns Q151 on so that currents ②, ③, and ④ flow.
4. Since Q153 remains on, terminal ⑦ of IC101 is grounded (LOW level) and IC101 remains oper-

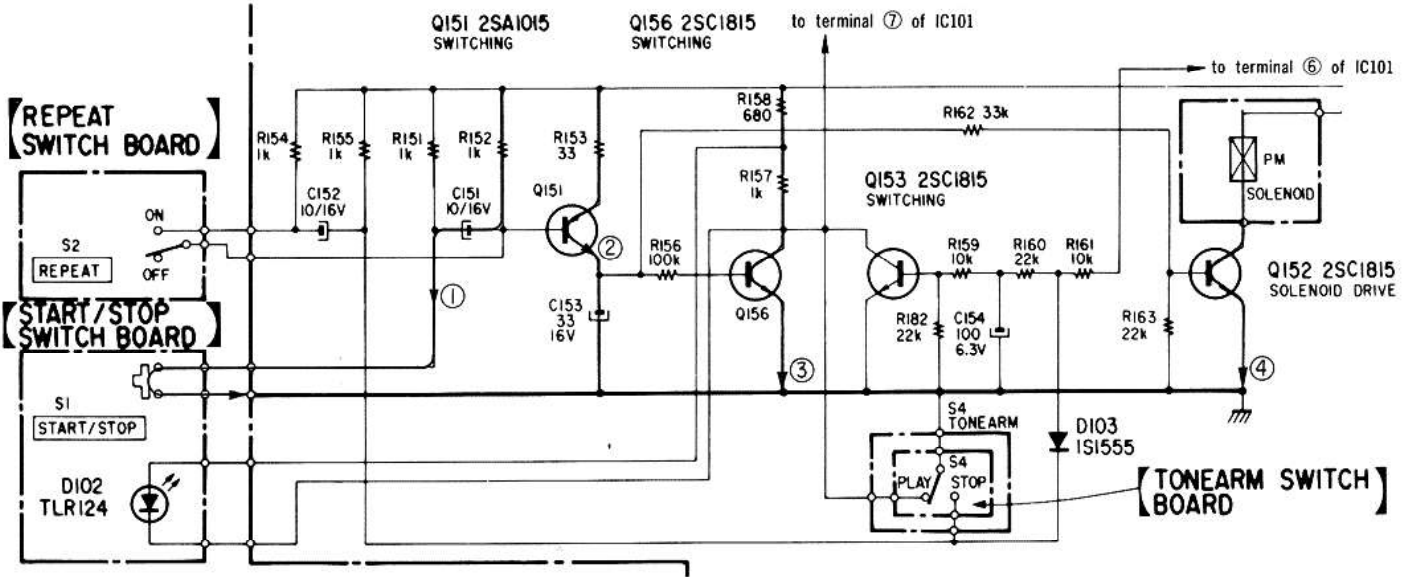


Fig. 1

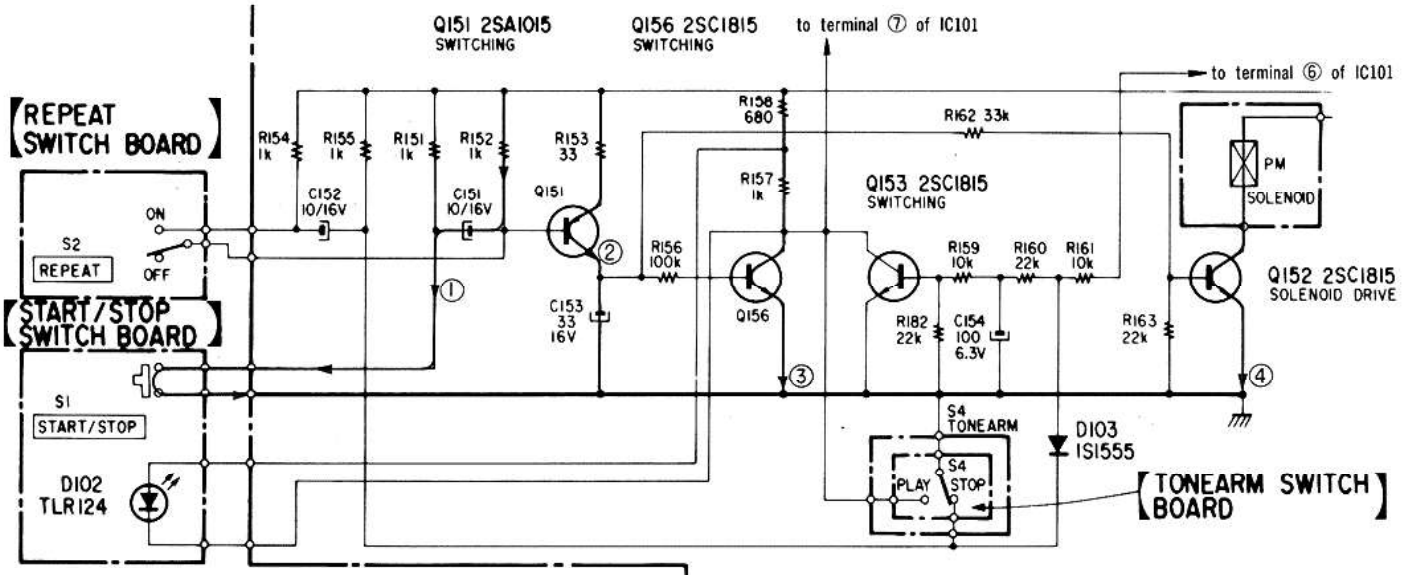


Fig. 2

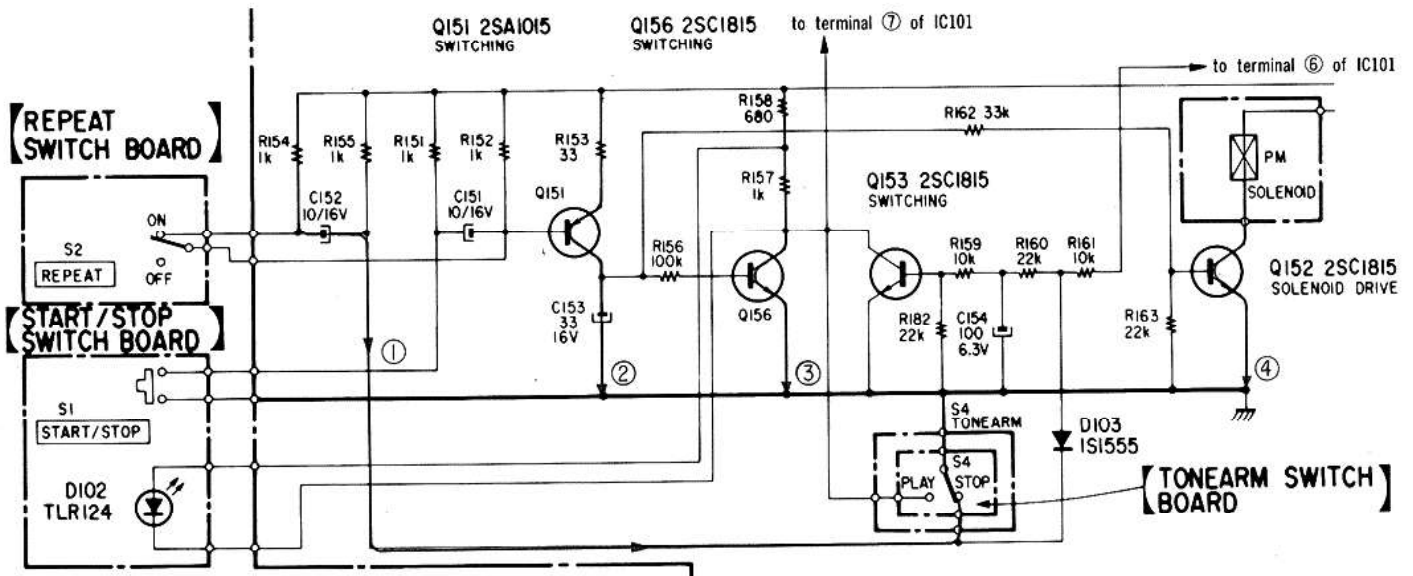
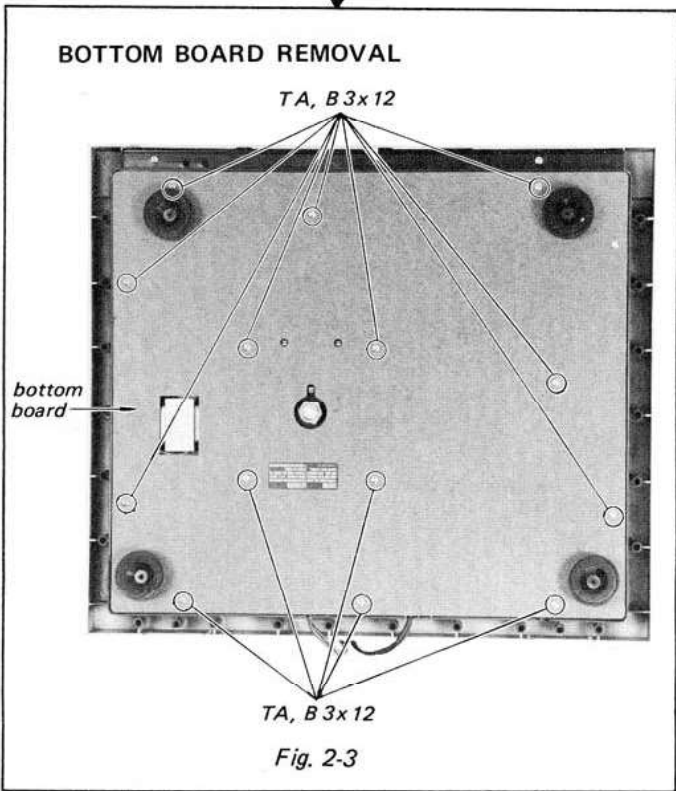
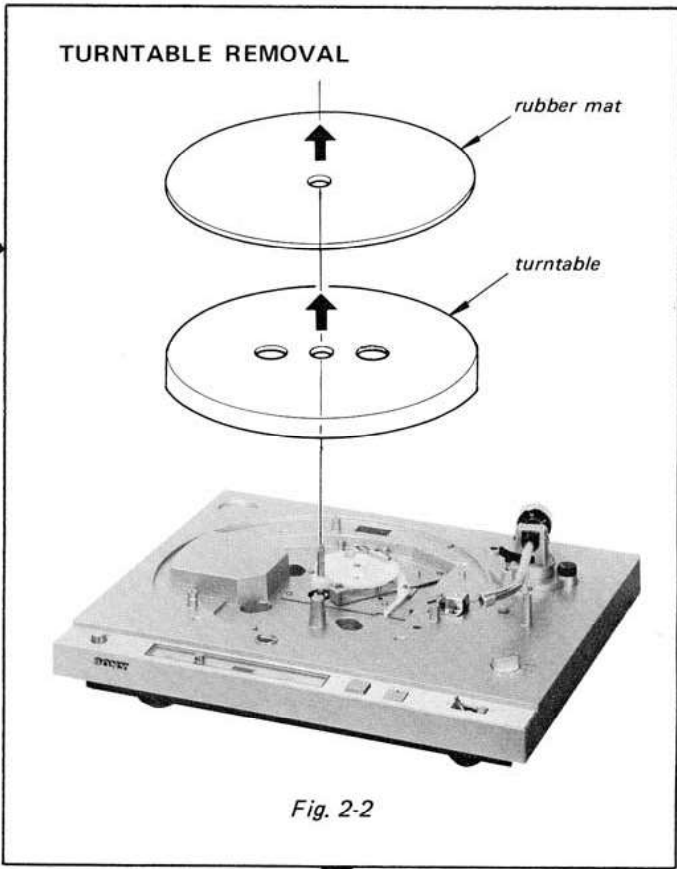
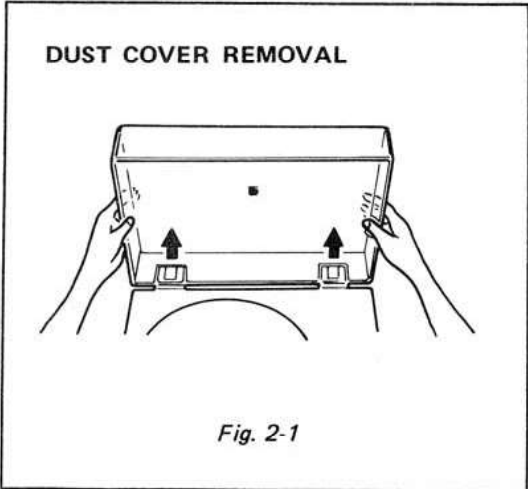


Fig. 3

SECTION 2
DISASSEMBLY



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

SERVO AMP BOARD AND MOTOR SECTION REMOVAL

1. Remove the screws marked ❶ in Fig. 2-4 and then perform ❷.
2. Confirm that the teeth on the turntable boss and the drive gear are positioned as shown in Fig. 2-5. Then, remove the servo amp board and the motor section downward.

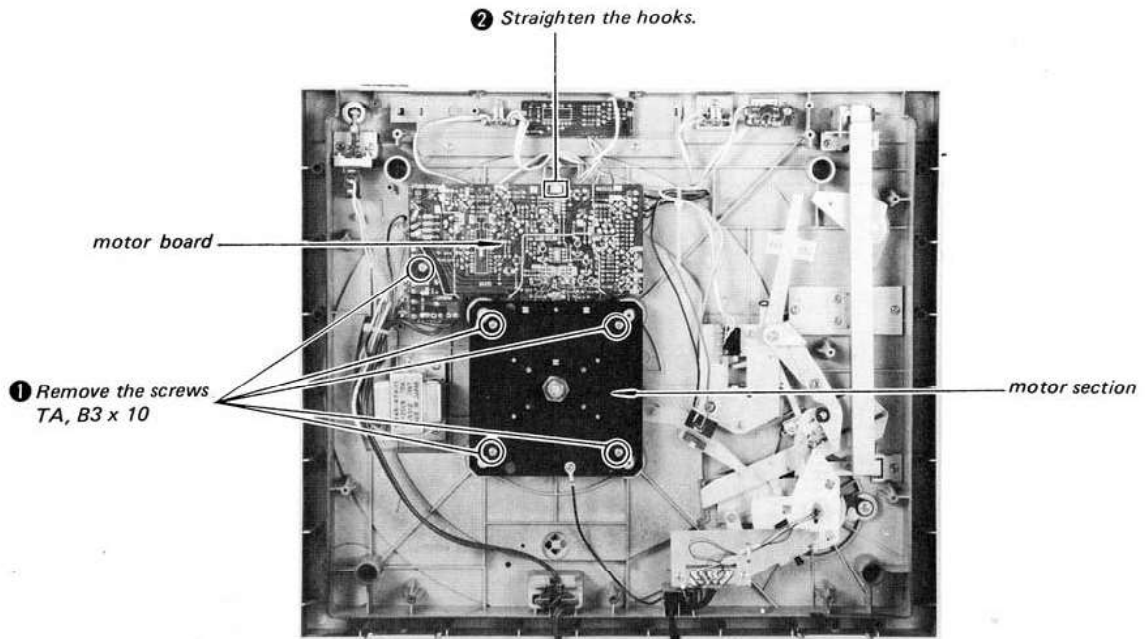


Fig. 2-4

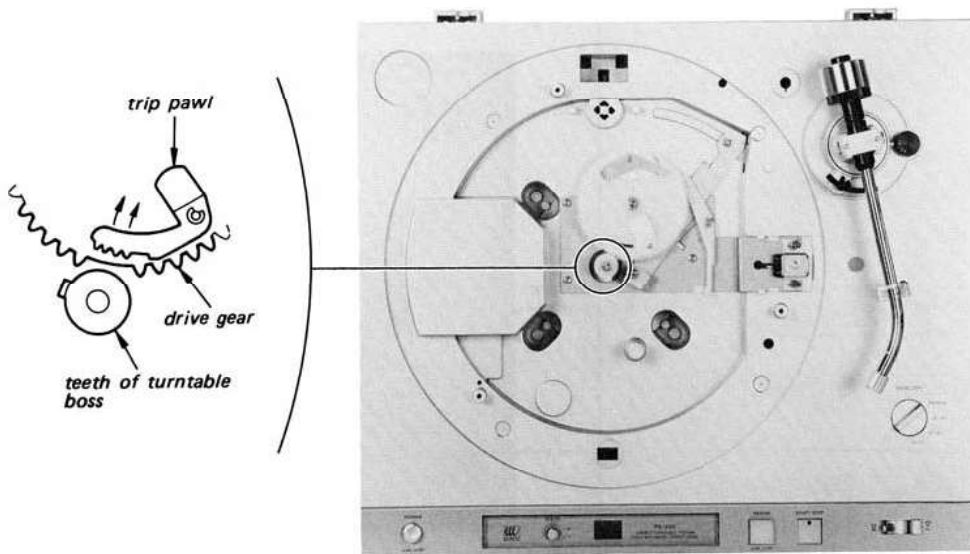
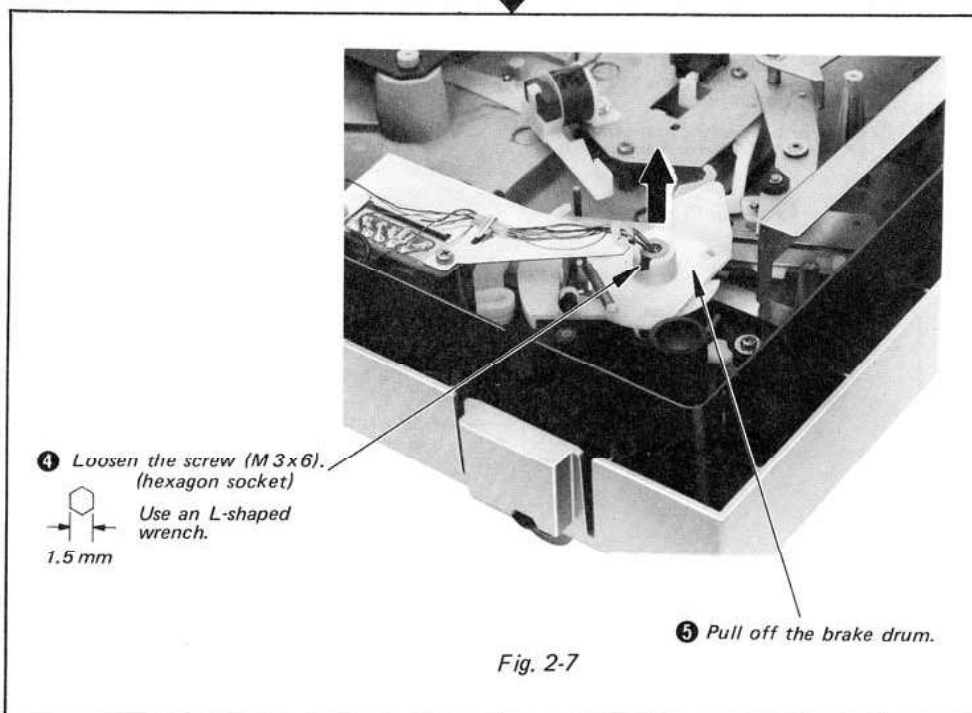
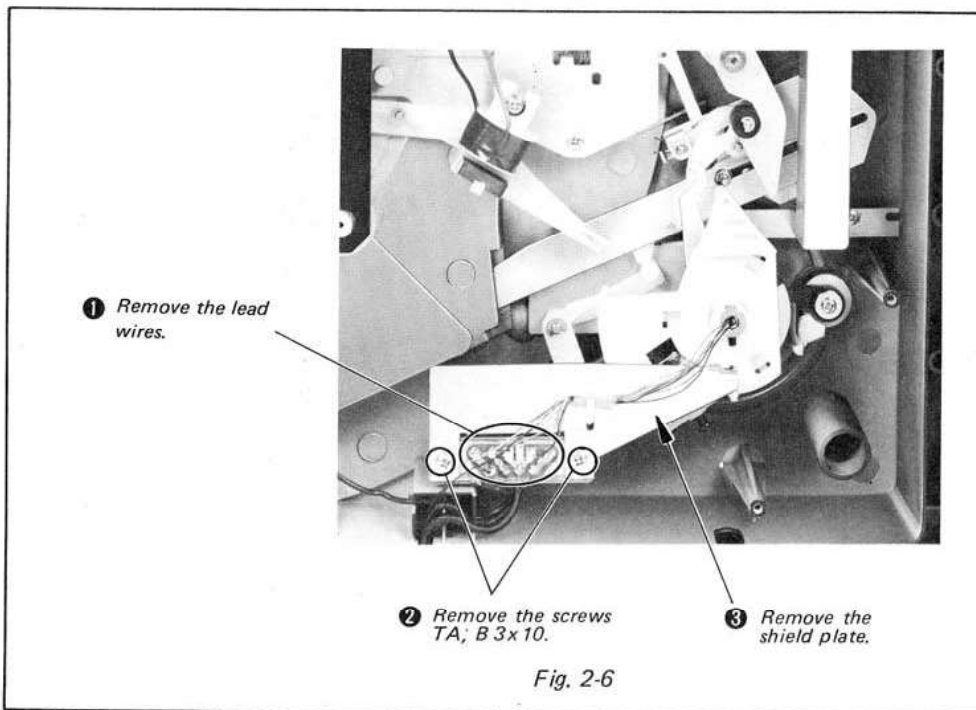
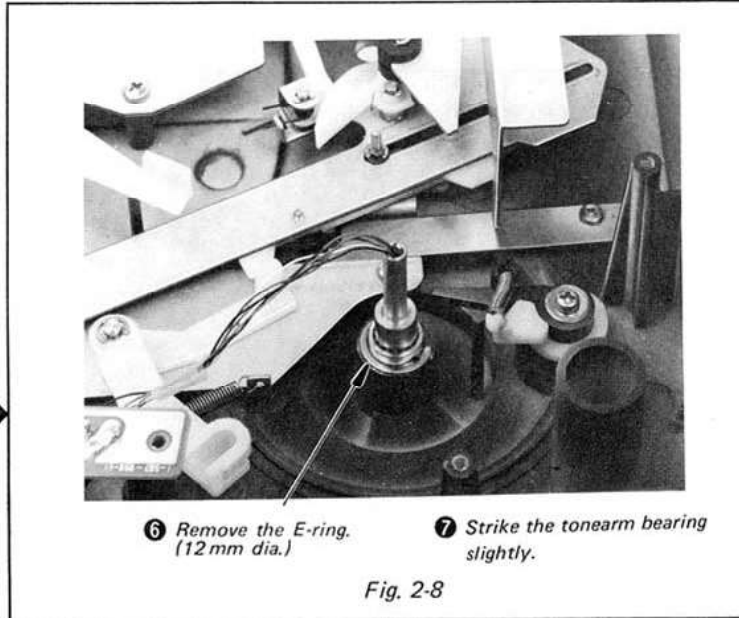


Fig. 2-5

TONEARM REMOVAL

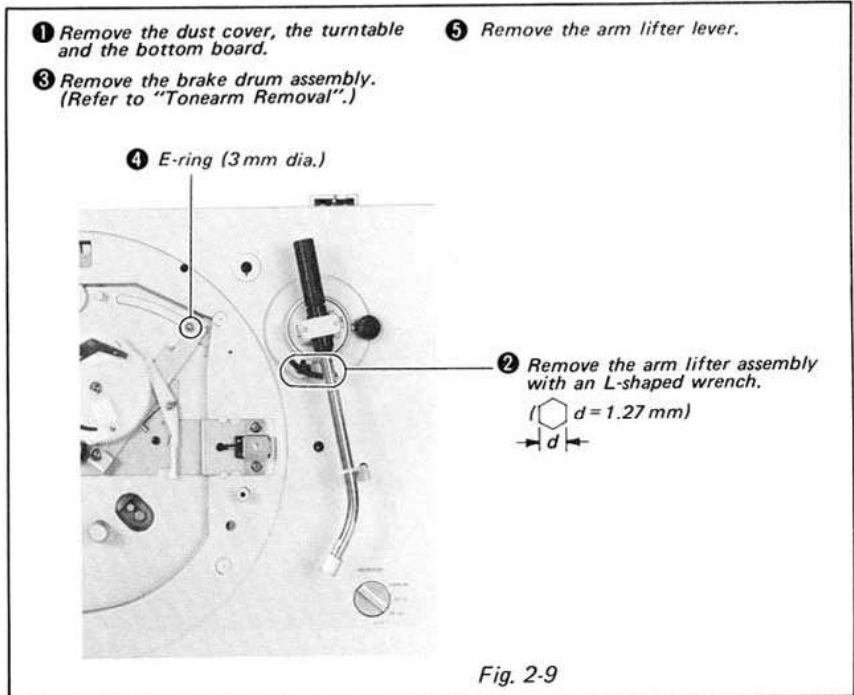
Turn the set upside-down and remove in the numerical order.

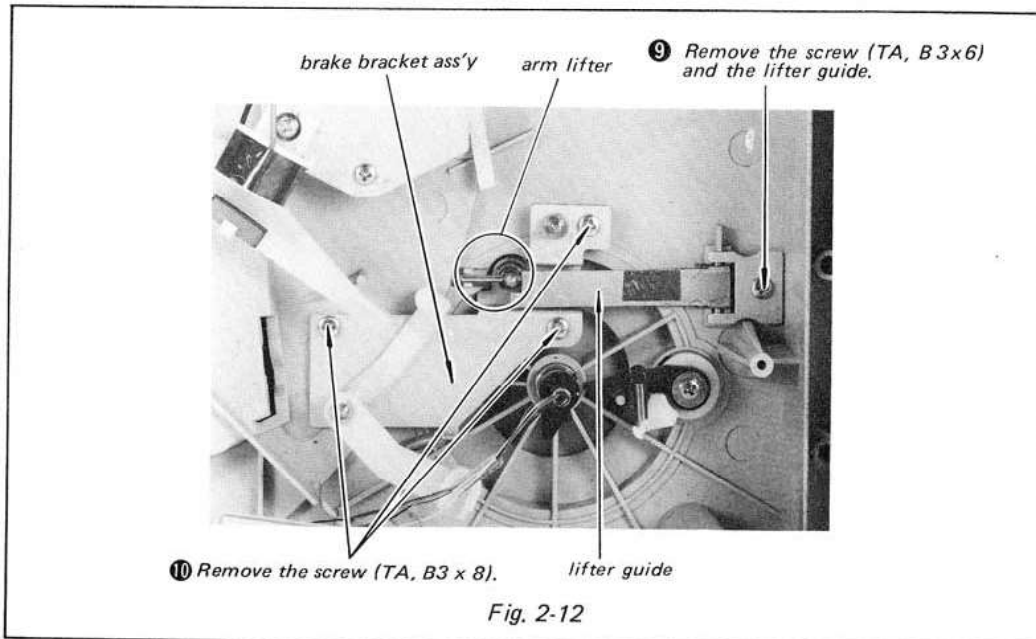
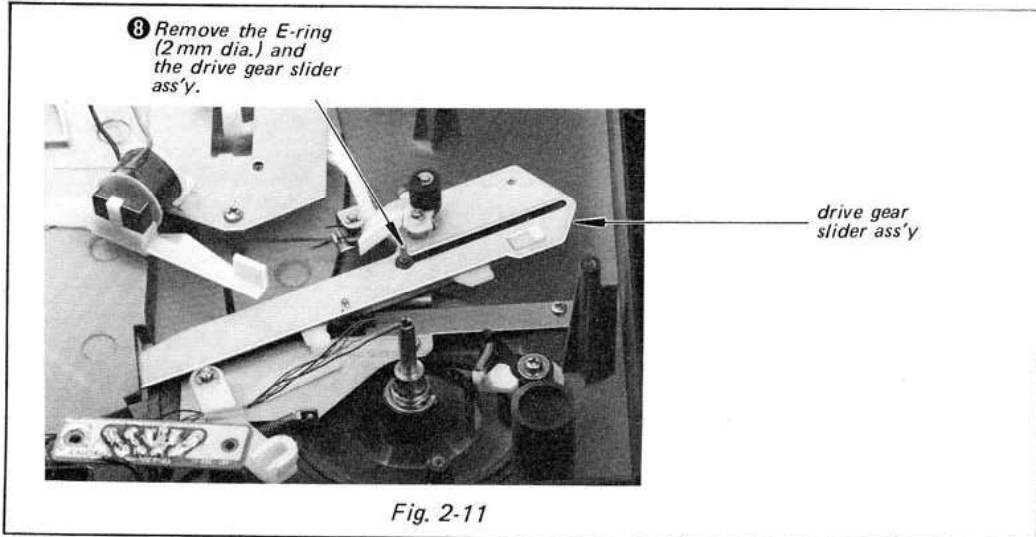
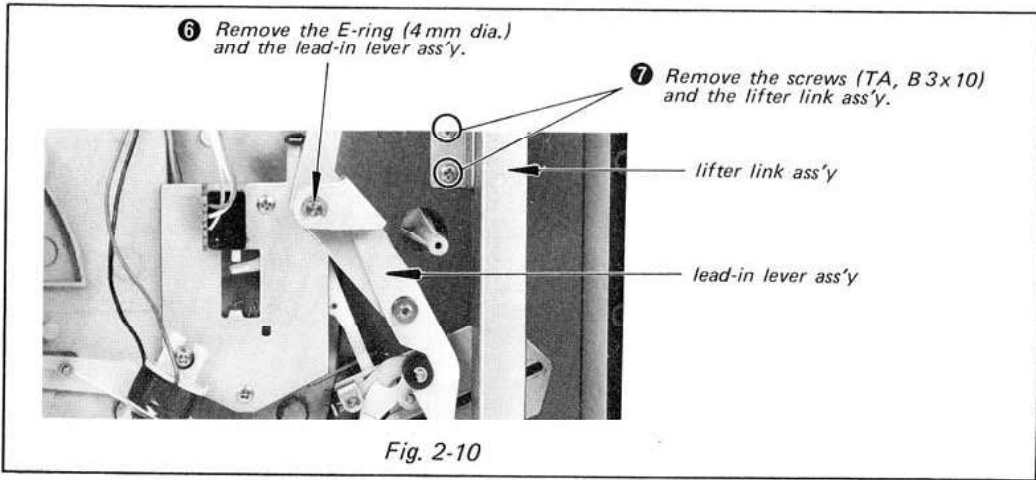




Take out the tonearm.

ARM LIFTER REMOVAL





TO NEARM DISASSEMBLY

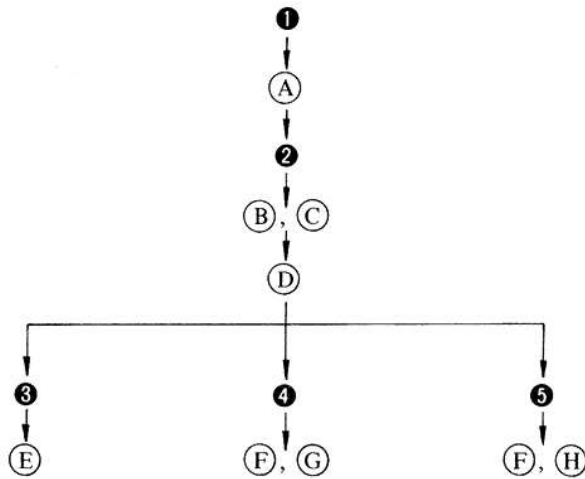


Fig. 2-13

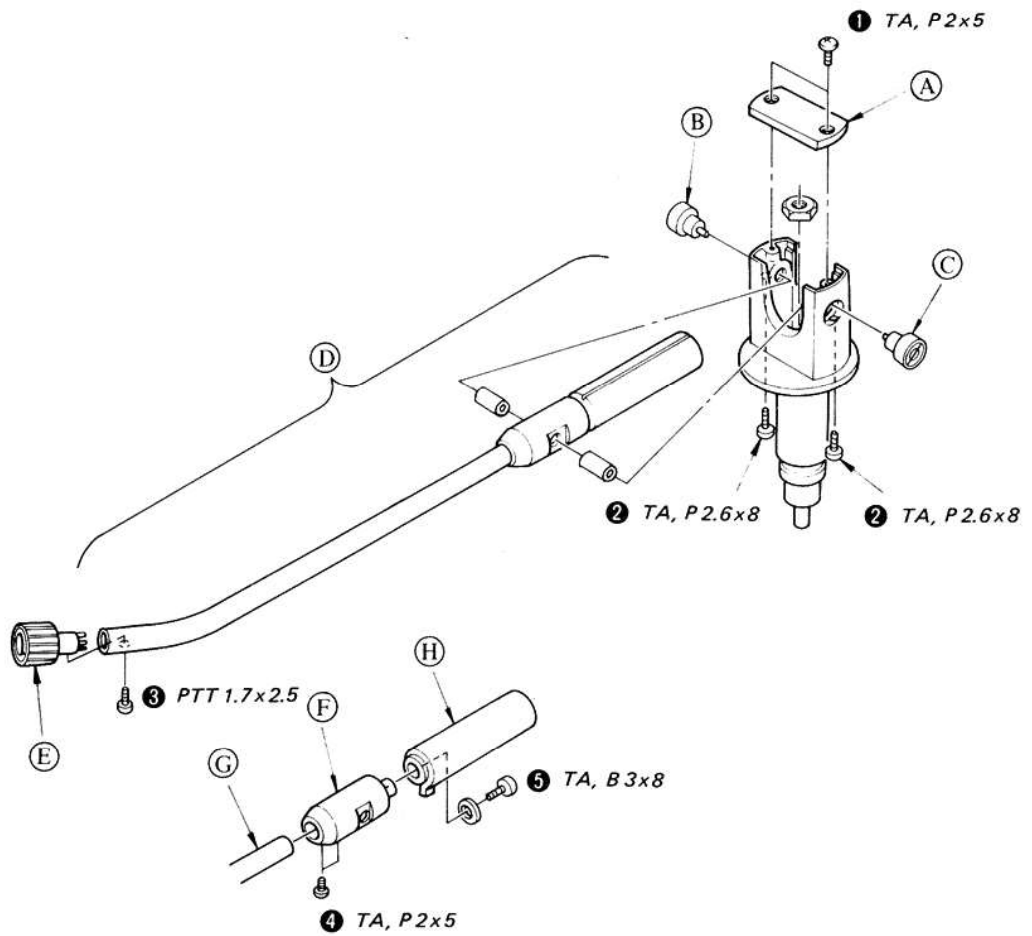


Fig. 2-14

SECTION 3
ASSEMBLY

3-1. TONEARM ASSEMBLY

Pipe Assembly (1)

1. Thread a wire in (D).
2. Thread the leads of (G) 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).

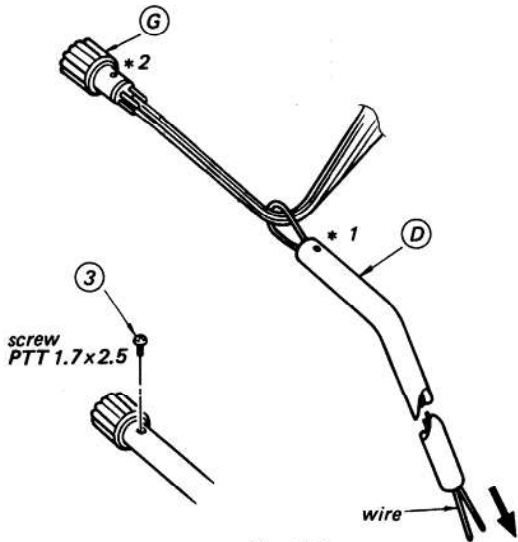


Fig. 3-1

Pipe Assembly (2)

1. Thread a wire in (H) as shown below.
2. Hook one lead of (K) and four leads of (G) to the loop of wire, and pull the wire as shown.
3. Align the holes marked *1, *2, *3 to tighten the screws (4).

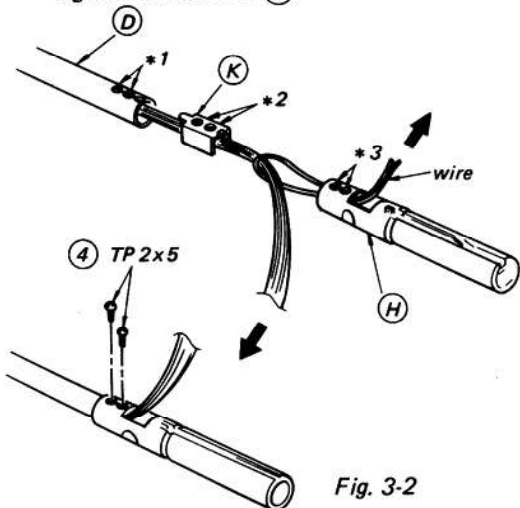


Fig. 3-2

Setting of Pivot (A) and Pivot (B)

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

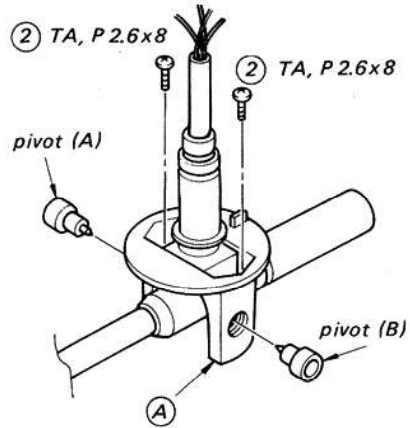


Fig. 3-4

Installation of Pipe Assembly

1. Thread a wire in (G).
2. Hook the five leads to the loop of wire.
3. Pull the wire in the direction shown by the arrow.

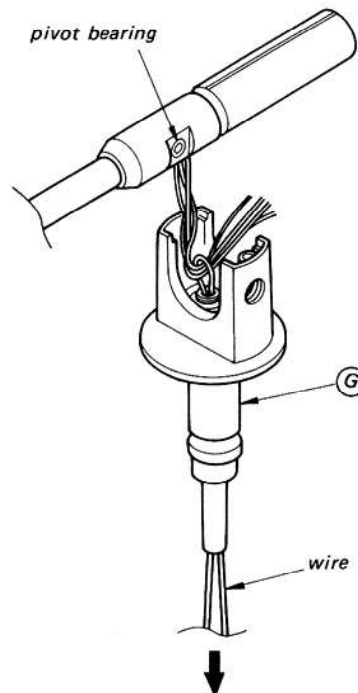
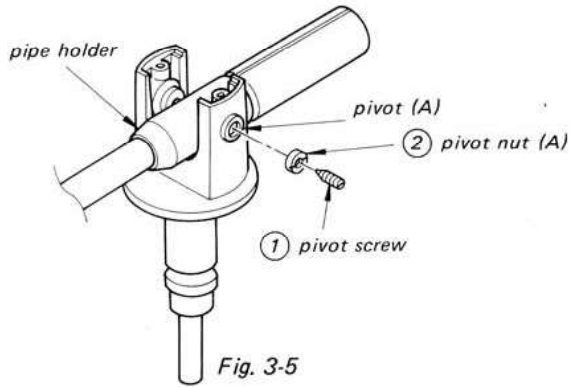


Fig. 3-3

Setting of Pivot Screw and Lock Nut (A)

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



3. Install the head shell (with a cartridge) and the counterweight to the tonearm.
4. Perform the balance adjustment with the screw and the nut, repeating the following procedures.
 - a. When the 80 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.

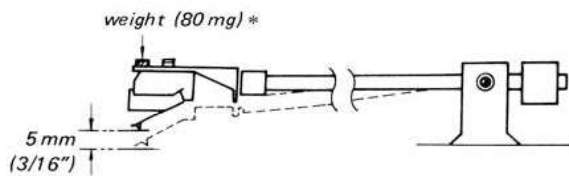


Fig. 3-6

3-2. INSTALLATION OF SOLENOID MAGNET

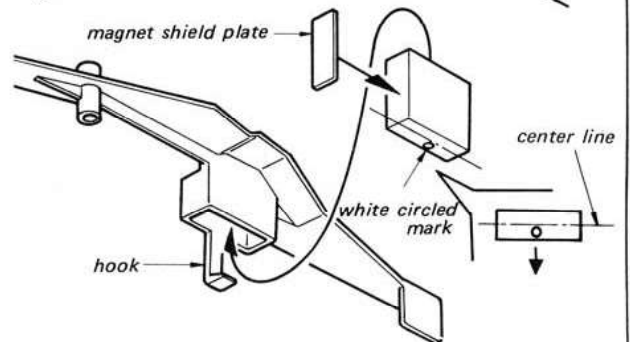
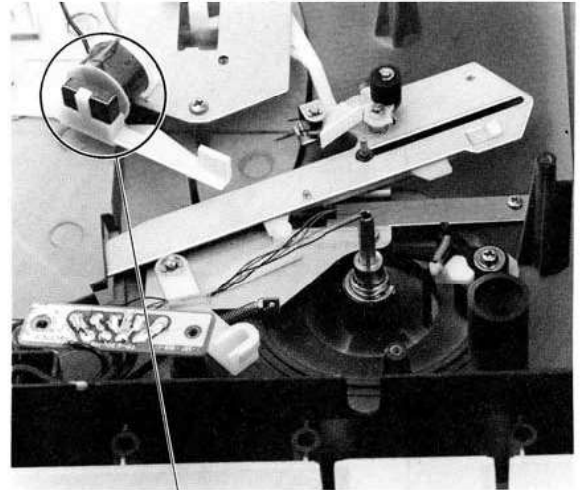


Fig. 3-7

3-3. ROLLER, SPRING AND RETURN CAM INSTALLATION

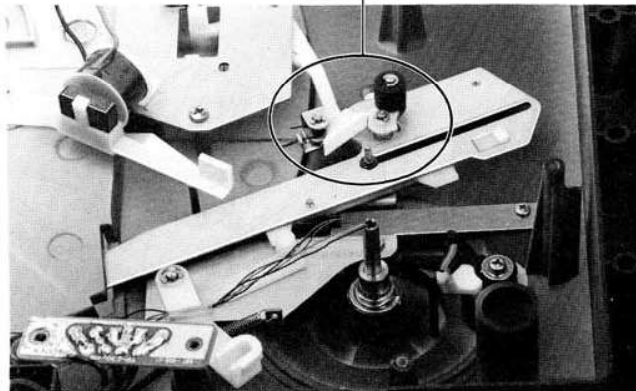
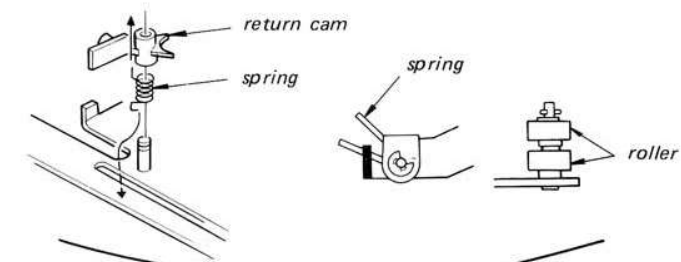


Fig. 3-8

3-4. IFC CAM INSTALLATION

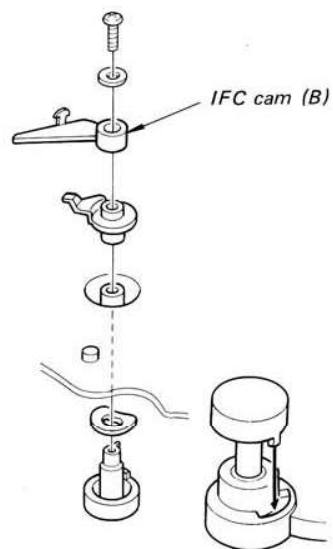
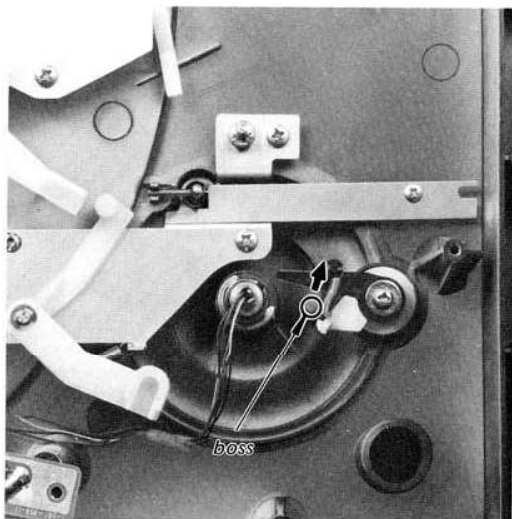
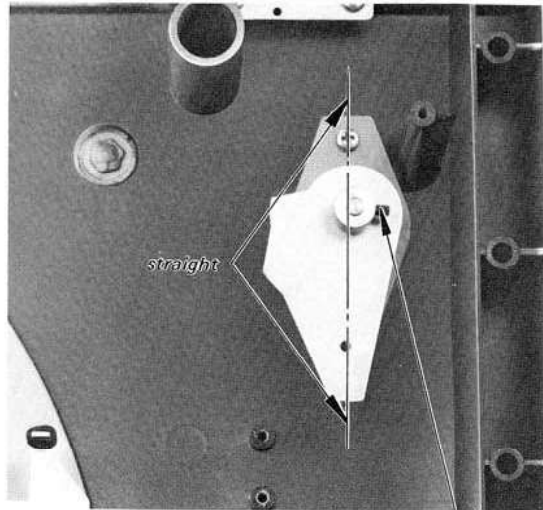


Fig. 3-9

3-5. SELECTOR CAM INSTALLATION



• Record size selector: 17

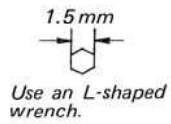


Fig. 3-10

3-6. DRIVE GEAR INSTALLATION

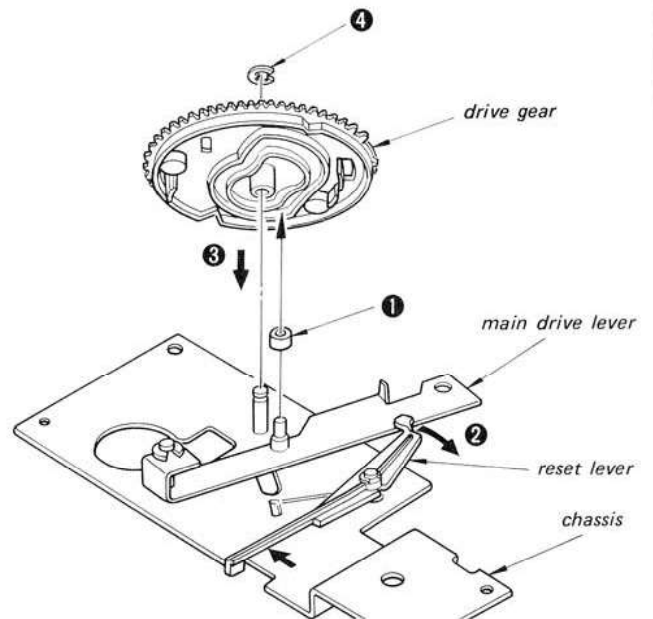


Fig. 3-11

3-7. BRAKE DRUM AND IFC LEVER INSTALLATION

1. When installing ①, refer to Fig. A and Fig. B.
2. Before installing ② to the shaft, perform ③ and ④.

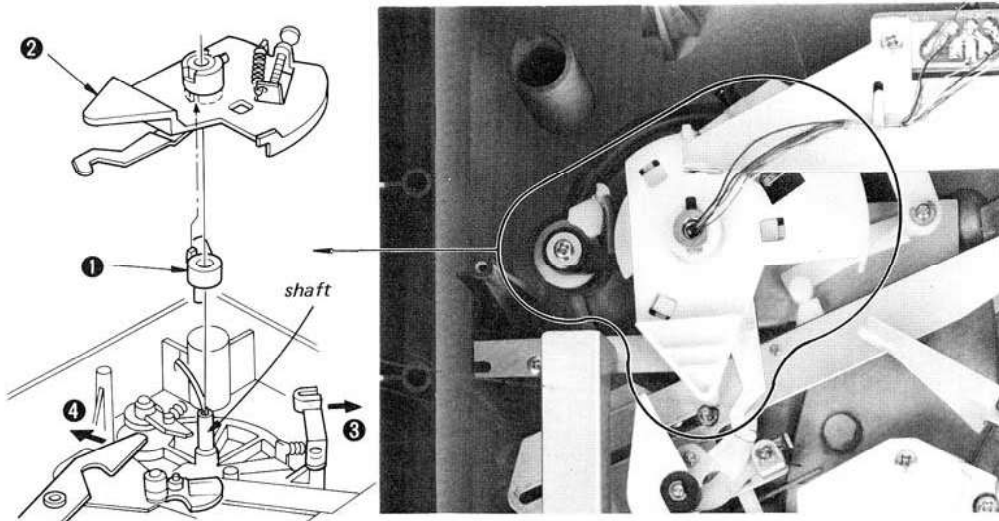
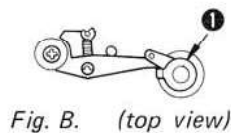
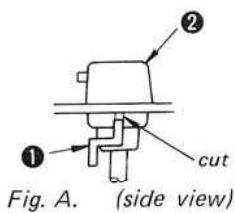


Fig. 3-12



SECTION 4 LUBRICATION AND CARTRIDGE REPLACEMENT

4-1. LUBRICATION

Drive Gear

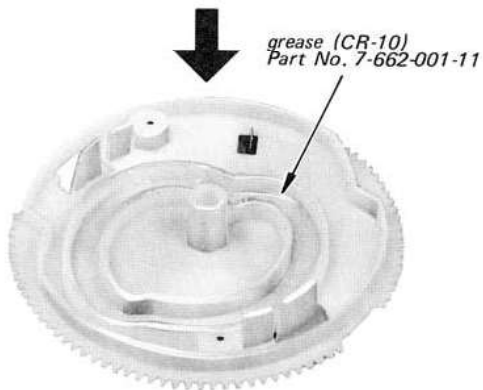
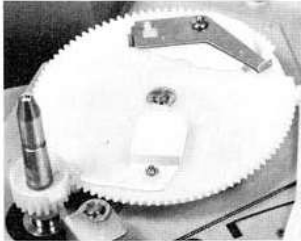


Fig. 4-1

Arm Lifter

Apply silicone-oil to the shaded portion .

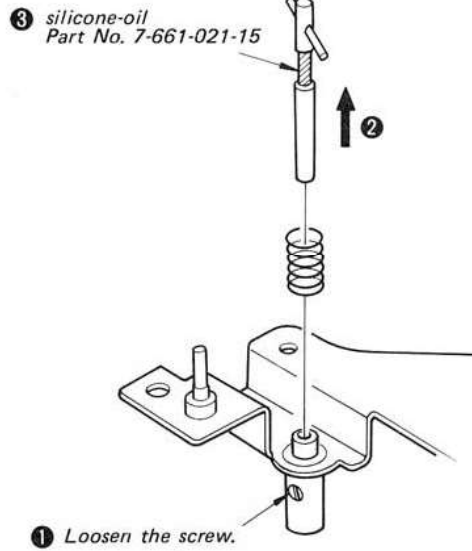


Fig. 4-2

4-2. CARTRIDGE REPLACEMENT

Position Adjustment

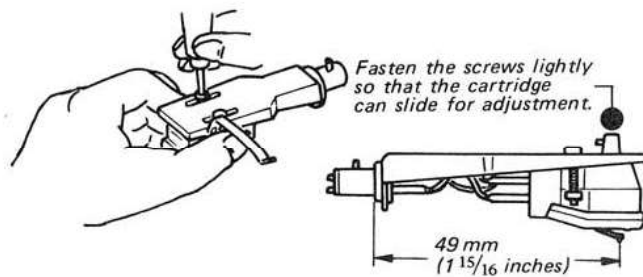


Fig. 4-3

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)

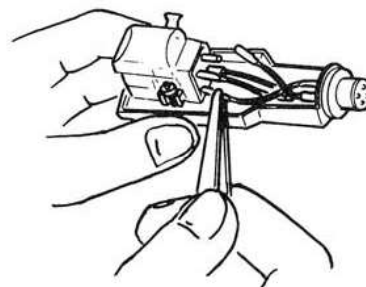


Fig. 4-4

**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.

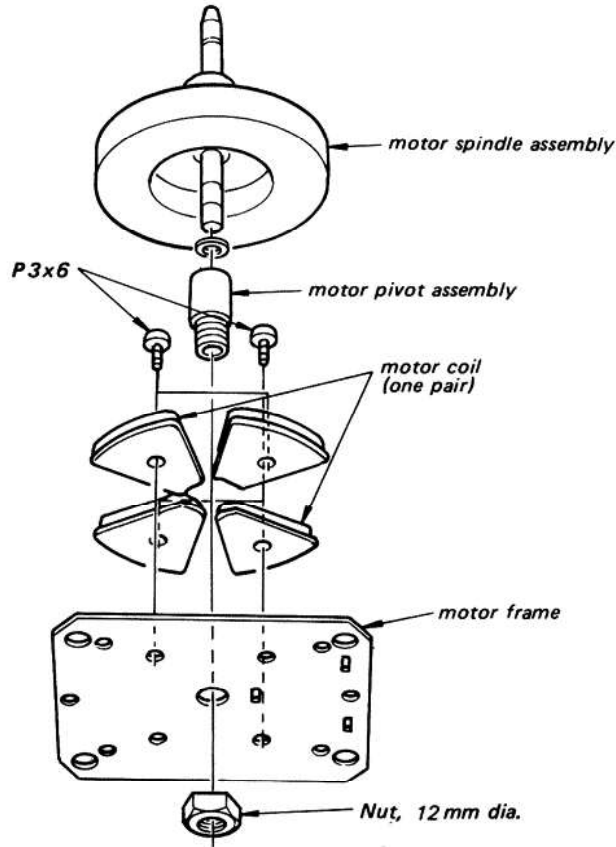


Fig. 5-1

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.

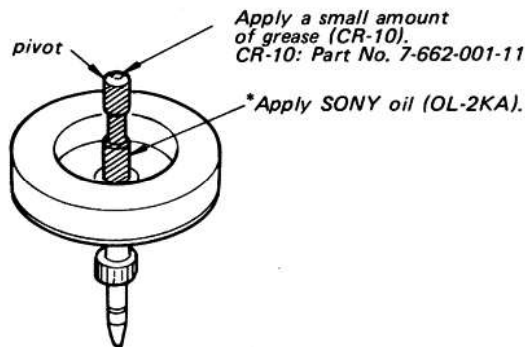


Fig. 5-2

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.

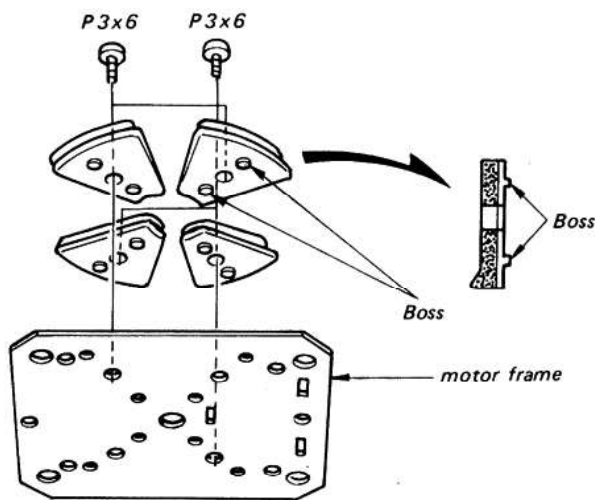


Fig. 5-3

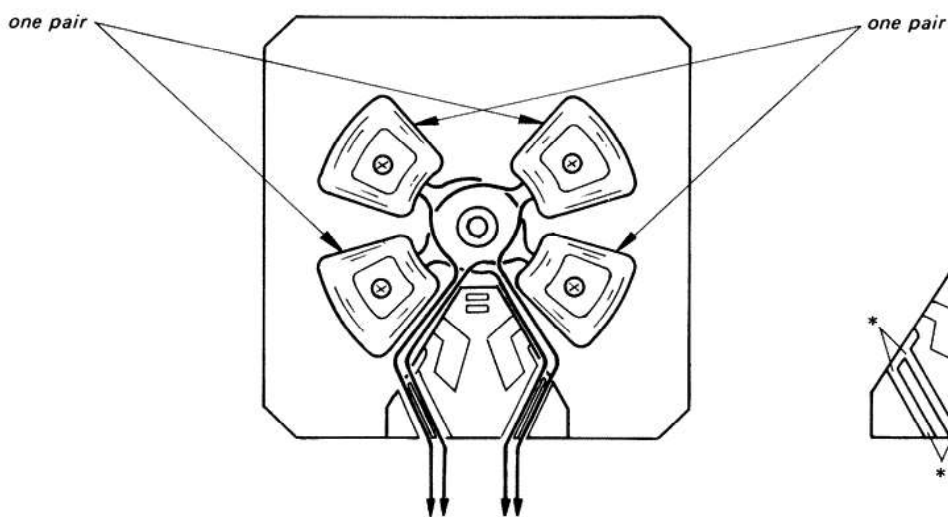


Fig. 5-4

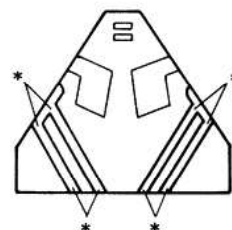


Fig. 5-5

SECTION 6 ADJUSTMENTS

6-1. MECHANICAL ADJUSTMENTS

Stylus Drop-point Adjustment

- Stylus force: 1.7 g

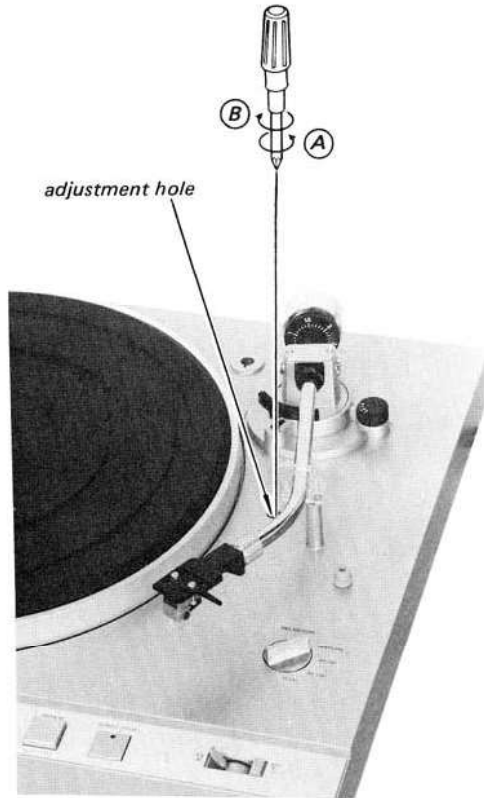


Fig. 6-1

1. Set the record size selector lever to the 30 (12") position and make sure that the stylus gets down on the specified point of the test record.

test record: YFSC-16

Record size selector lever position	Count of drop-point
30 (12")	4 to 16
25 (10")	6 to 24
17 (7")	7 to 25

2. If necessary, insert the screwdriver into the hole and adjust the drop-point by turning the adjustment screw.

To change the drop-point outward:

Turn the adjustment screw slightly counterclockwise (A).

To change the drop-point inward:

Turn the adjustment screw slightly clockwise (B).

Note: The stylus drop-point is changed about 12 mm (½") by one turn of the adjustment screw.

Head Shell Angle Adjustment

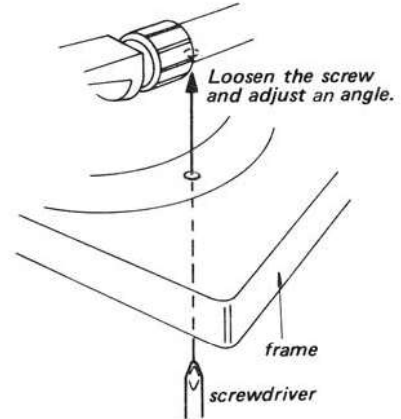


Fig. 6-2

Tonearm Height Adjustment

[At automatic operation]

Adjust the height of arm lifter by loosening the hexagon socket set screw so that the distance between the lead-in groove and lead-out groove of record and the stylus is 4–12mm with the stylus force of 1.7g.

[At manual operation]

1. Turn on the power switch and set the player in PLAY mode.
2. When the lifter lever is set to UP position, adjust the set screw (*) so that the distance between the stylus and the record is 4–12 mm.

Screw setting	Height of stylus
clockwise	down
counterclockwise	up

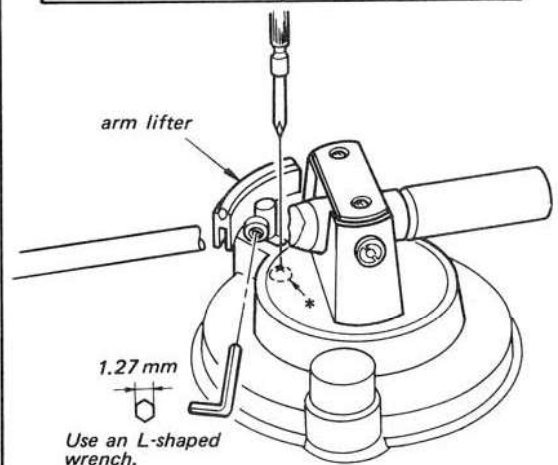


Fig. 6-3

Automatic Return Position Adjustment

1. Remove the turntable and the bottom board.
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 cartridge so that the stylus comes on the center of the boss as shown in Fig. 6-4C.
4. Turn the adjustment screw in Fig. 6-4D 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.
5. Use the test record (A side C-3 of the Sony test record YFSC-16) and confirm that the tonearm automatically returns within 3-12 counts.

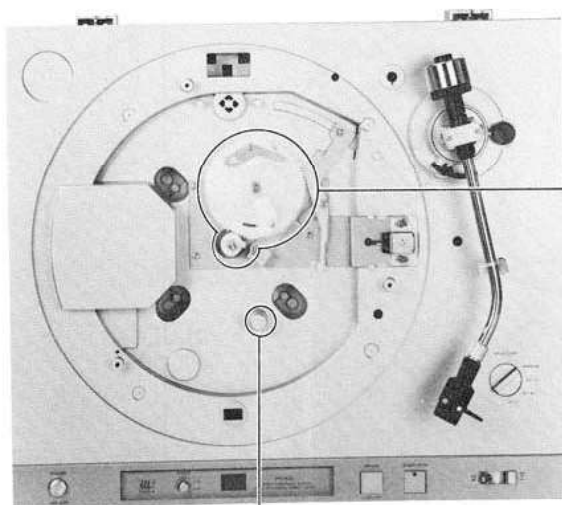


Fig. 6-4A

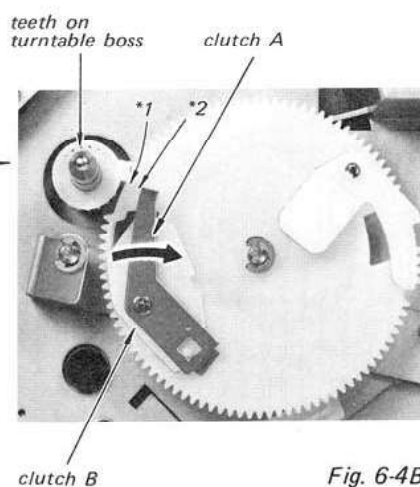


Fig. 6-4B

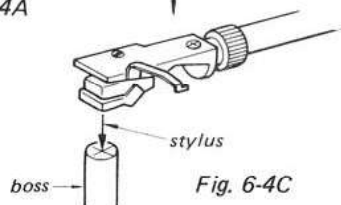


Fig. 6-4C

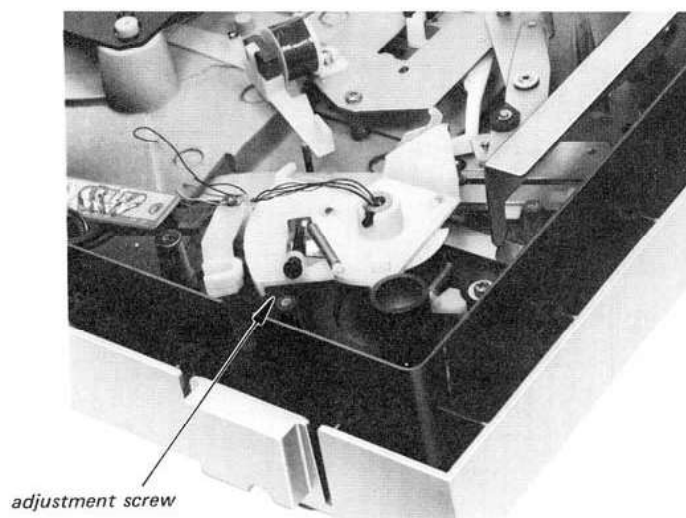
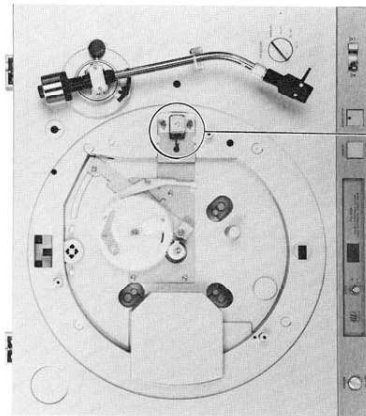


Fig. 6-4D

6-2. ELECTRICAL ADJUSTMENTS

Speed Detecting Head Output Level Adjustment (33 1/2 rpm)

1. Remove the bottom board and connect a VTVM between the output terminals (terminals ③ and ④ of the motor circuit).
2. Adjust the head position by moving it back and forth until the VTVM reading is between 15 and 50mVac at 33 1/2 rpm when the turntable is rotating. Make sure that the head does not touch the turntable.



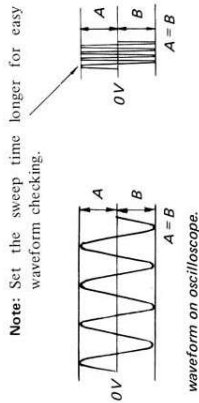
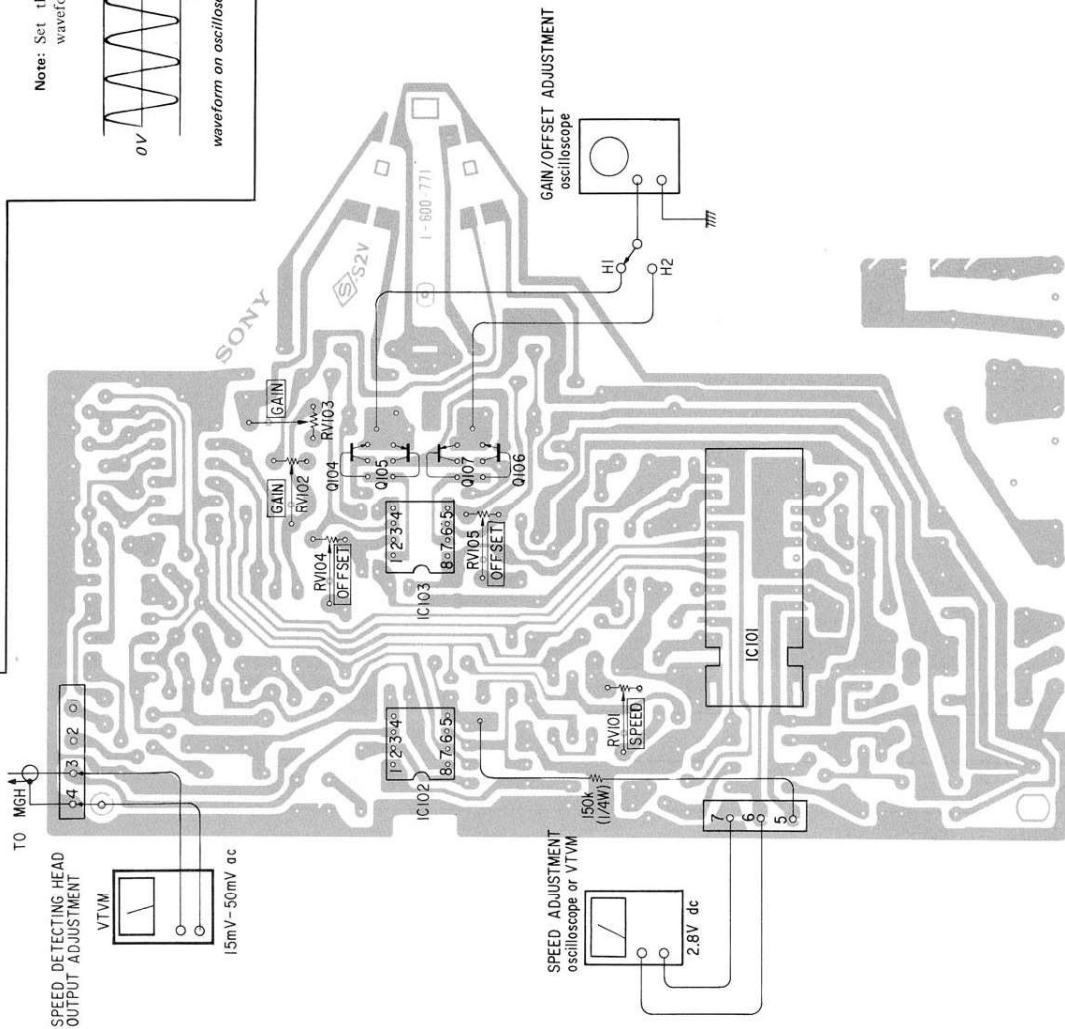
Loosen the screw then slide back and forth.

Speed Adjustment

1. Remove the bottom board.
2. Connect a VTVM or an oscilloscope between terminals ⑥ and ⑦ of the motor circuit.
3. Set to 33 1/2 rpm.
4. Adjust RV101 for 2.8V dc reading.

Gain/Offset Adjustment

1. Remove the bottom board.
2. Connect a 150kΩ resistor between terminal ⑤ (B+) of the motor circuit and terminal ⑤ of IC102.
3. Connect an oscilloscope between the emitter of Q104/Q107 and the ground.
4. Turn the POWER switch ON.
5. Set to the STOP mode.

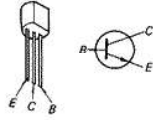


PS-X20

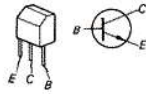
REPLACEMENT SEMICONDUCTORS

For replacement, use semiconductors except in ().

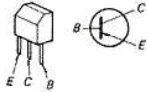
Q101-103 } : 2SC1364 (2SC1815)
Q152-158 }



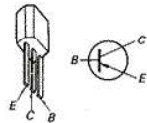
Q104, 106 : 2SD571



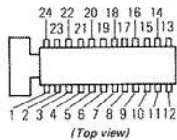
Q105, 107 : 2SB605



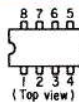
Q151: 2SA1027R (2SA1015)



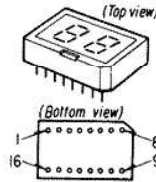
IC101: CX193



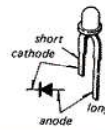
IC102: μ PC4557C
IC103: μ PC4558C



D101: TLR320



D102: TLR124



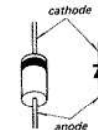
D103: 1S1555



D104-107 : 10E2



(GP08B)



H1, 2: 5GF-MS-07F



Note for schematic diagram:

- All capacitors are in μ F unless otherwise noted. pF : μ μ F
- 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, $\frac{1}{4}$ W unless otherwise noted.
- k Ω : 1000 Ω , M Ω : 1000k Ω
- Voltages are dc with respect to ground unless otherwise noted.
- : chassis ground.
- : B+ bus.
- : B- bus.
- : panel designation.
- : adjustment for repair.
- Voltage variations may be noted due to normal production tolerances.
- Waveforms are sketched at 33 rpm.

- Readings are taken under no-signal conditions with a VOM (20k Ω /V).
- no mark : 33 rpm
- () : STOP mode
- < > : When the turntable rotates counterclockwise.
- [] : The instant S1 is depressed.

• Switch

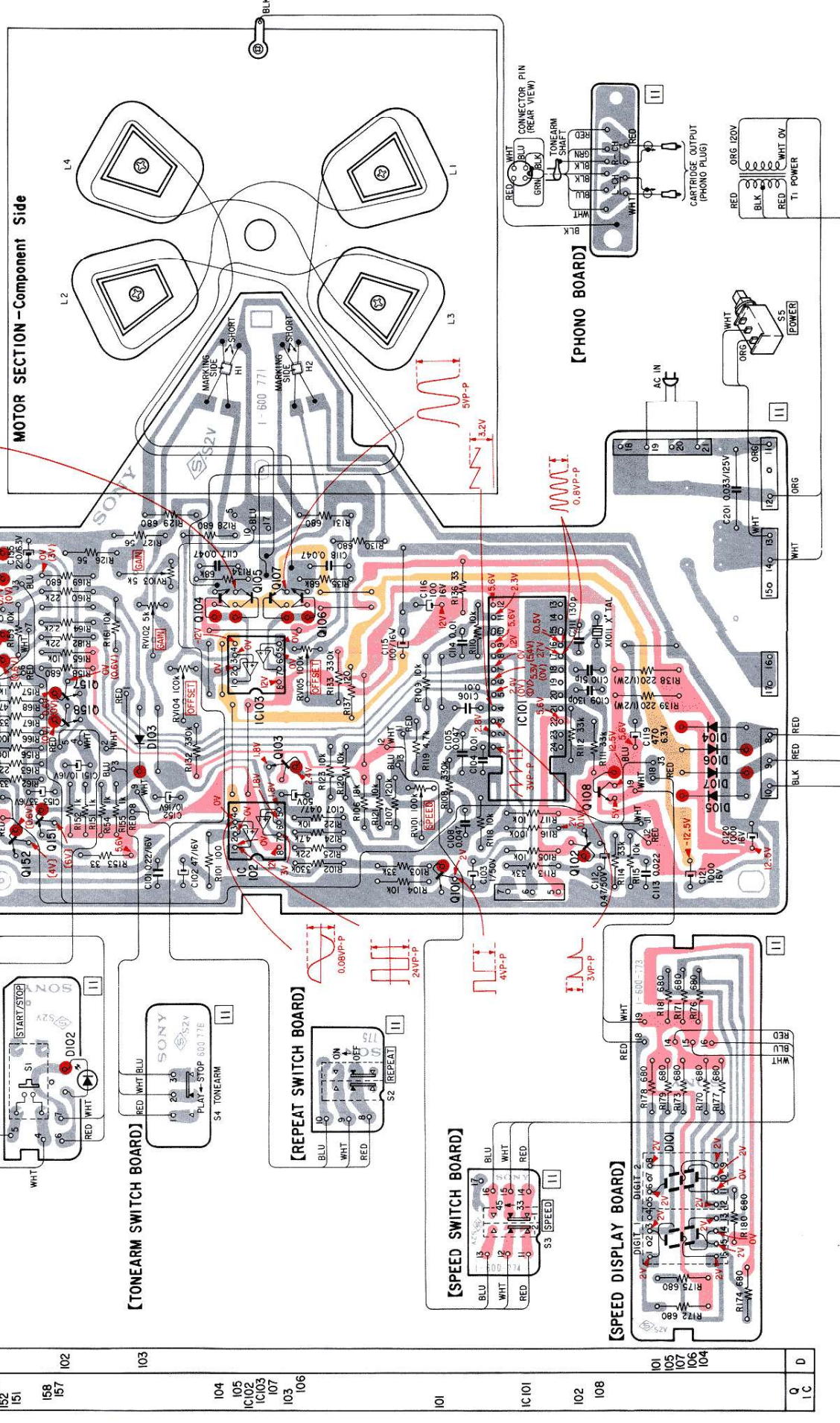
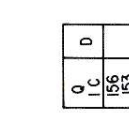
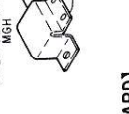
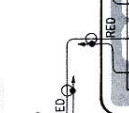
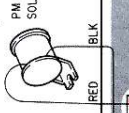
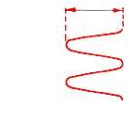
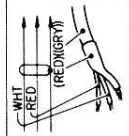
Ref. No.	Switch	Position
S1	START/STOP	START
S2	REPEAT	OFF
S3	SPEED	33
S4	TO NEARM	STOP
S5	POWER	OFF

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SECTION 7 DIAGRAMS

7-1. MOUNTING DIAGRAM
— Conductor Side —

- Note:**
- : parts extracted from the component side.
 - : parts extracted from the conductor side.
 - : Color code of sleeve over the end of the jacket.
 - : STOP mode
 - () : When the turntable rotates counterclockwise.
 - < > : The instant S1 is depressed.
 - [] : Waveforms are sketched at 33 rpm.
 - : B+ pattern
 - : REPEAT



Q	D
IC	101
156	105
153	107
154	106
155	
152	
151	
158	
157	
102	
103	
104	
105	
IC105	
IC103	
107	
103	
106	

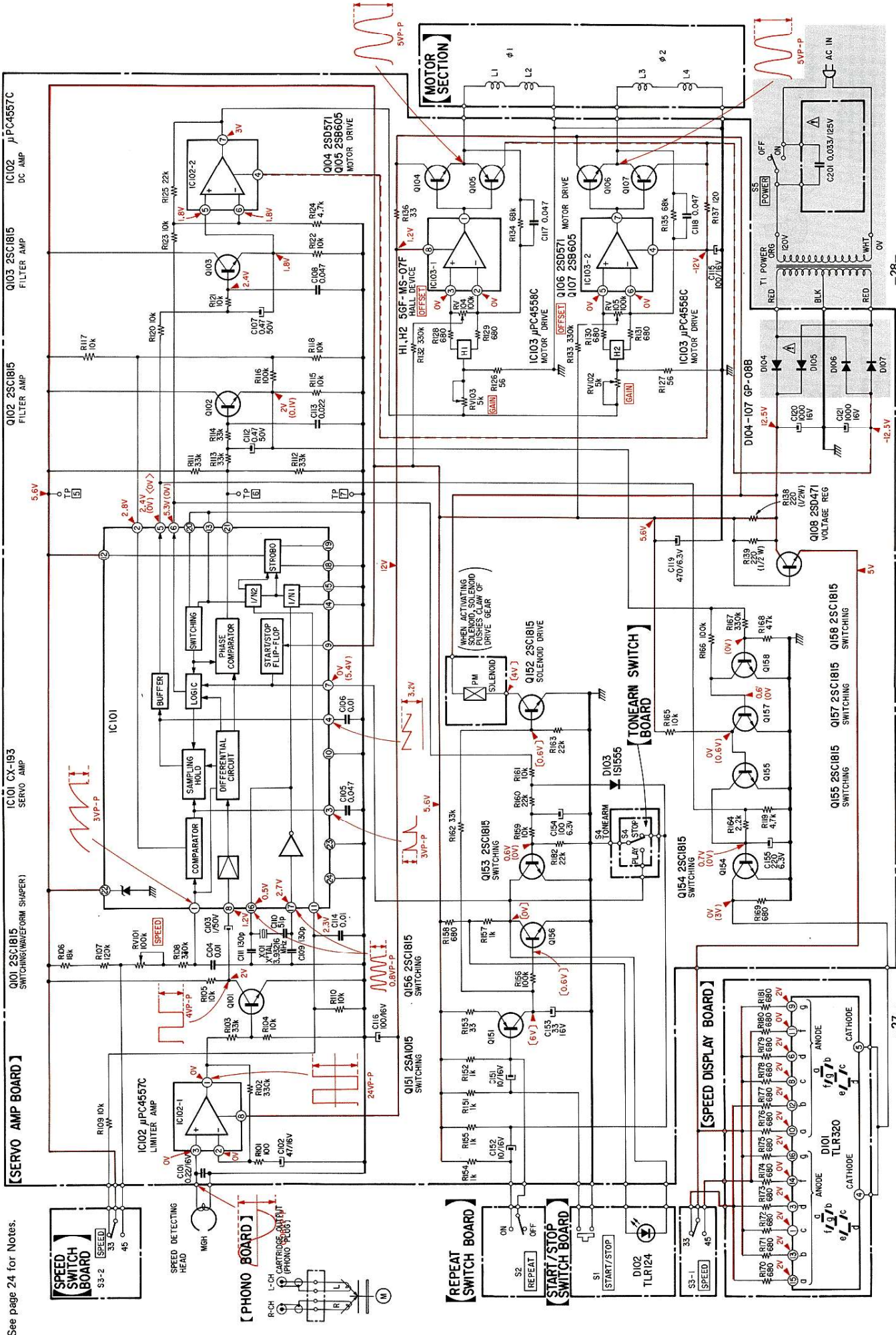
Q	D
IC	101
102	
108	
101	
105	
107	
106	
104	

Q	D
IC	101
102	
108	
101	
105	
107	
106	
104	

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7-2. SCHEMATIC DIAGRAM

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



See page 24 for Notes.

SECTION 8 EXPLODED VIEWS

PS-X20

A

B

C

D

(1)

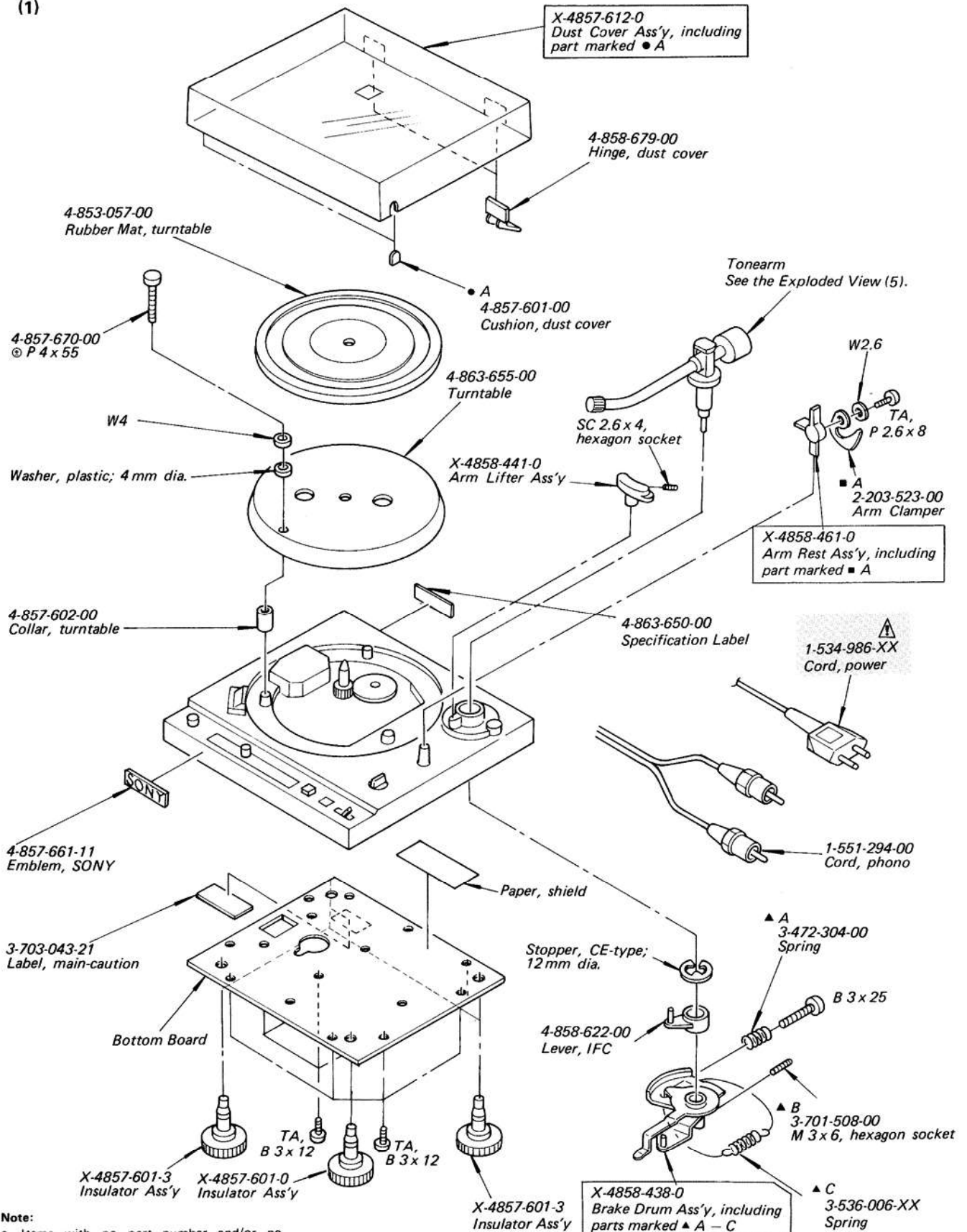
1

2

3

4

5

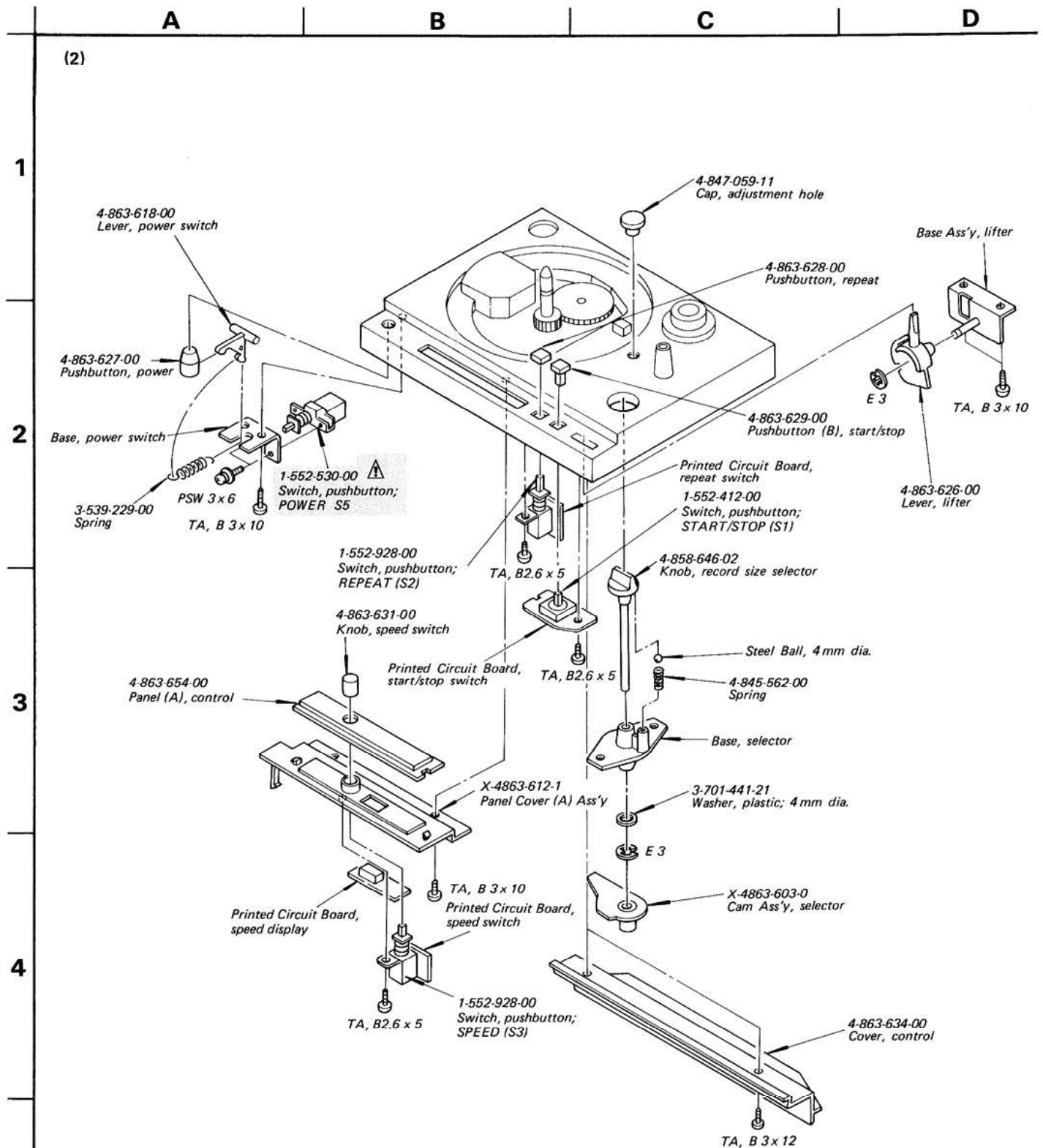


Note:

- 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


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

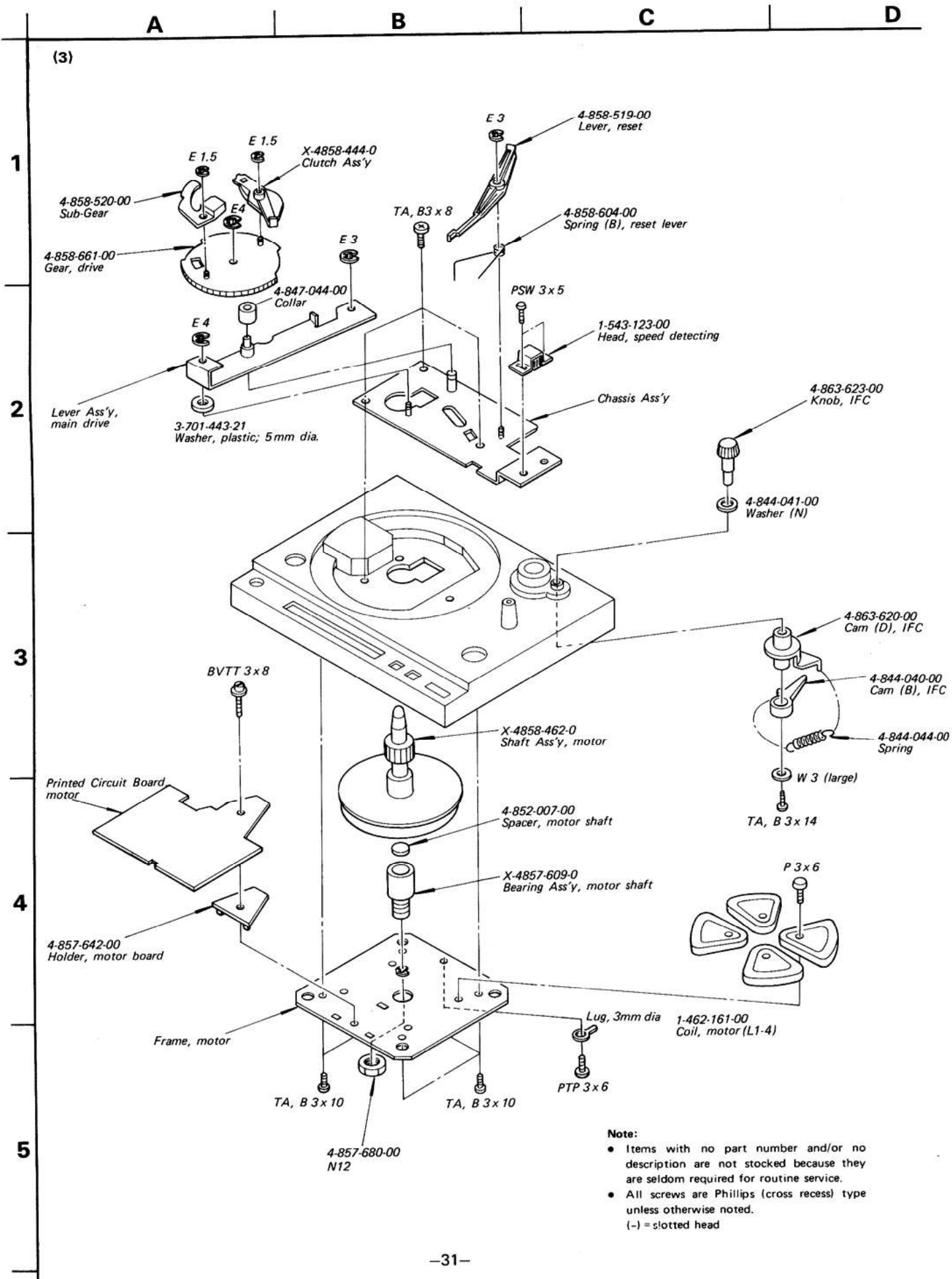
PS-X20



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

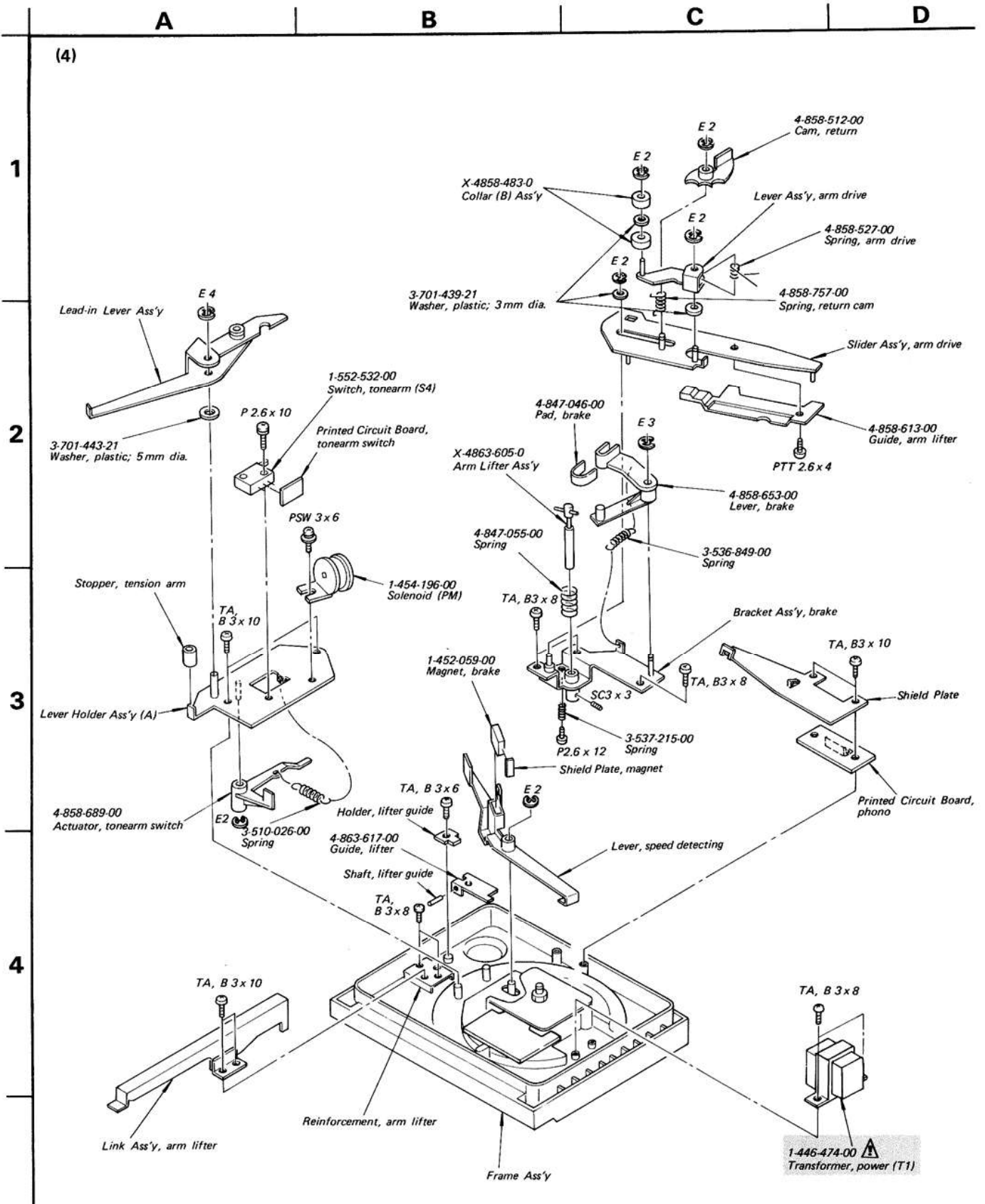
Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.




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

PS-X20



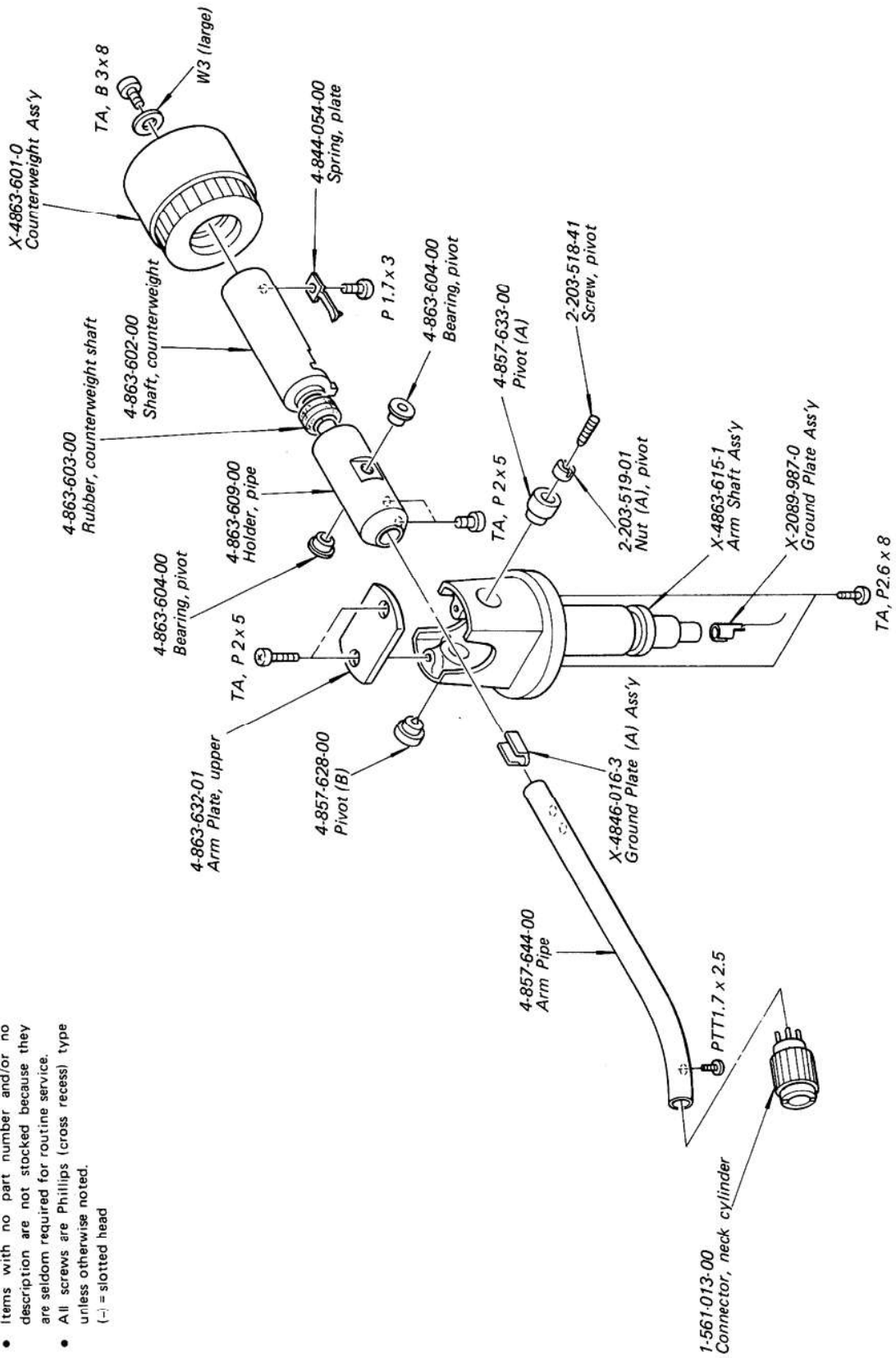
Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

A B C D E

(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



1

2

3

4

**SECTION 9
ELECTRICAL PARTS LIST**

Ref. No. Part No. Description

SEMICONDUCTORS

Transistors

⇒ Q101-103	8-729-663-47	2SC1364
Q104	8-729-157-11	2SD571
Q105	8-729-160-51	2SB605
Q106	8-729-157-11	2SD571
Q107	8-729-160-51	2SB605
⇒ Q151	8-729-612-77	2SA1027R
⇒ Q152-158	8-729-663-47	2SC1364

ICs

IC101	8-751-930-00	CX193
IC102	8-759-145-57	μPC4557C
IC103	8-759-145-58	μPC4558C

Diodes

D101	8-719-803-20	TLR320
D102	8-719-812-41	TLR124
D103	8-719-815-55	1S1555
⇒ D104-107	△8-719-200-02	10E2

Hall Elements

H1, 2	8-719-905-07	SGF-MS-07F
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COIL AND TRANSFORMER

L1-4	1-462-161-00	Motor Coil, stator
------	--------------	--------------------

T1	△1-446-474-00	Power, PT
----	---------------	-----------

CAPACITORS

All capacitors are in μF. 50WV or less are not indicated except for electrolytics. pF : μμF, elect : electrolytic

C101	1-131-453-00	0.22		tantalum
C102	1-123-319-00	47	16V	elect
C103	1-121-021-00	1	50V	elect
C104	1-108-239-00	0.01		mylar
C105	1-108-246-00	0.047		mylar

Ref. No. Part No. Description

C106	1-108-239-00	0.01		mylar
C107	1-123-351-00	0.47	50V	elect
C108	1-161-036-00	0.047		semiconductor ceramic
C109	1-101-081-00	130p		ceramic
C110	1-102-491-00	51p		ceramic
C111	1-101-081-00	130p		ceramic
C112	1-123-351-00	0.47	50V	elect
C113	1-161-017-00	0.022		semiconductor ceramic
C114	1-101-004-00	0.01		ceramic
C115, 116	1-123-320-00	100	16V	elect
C117, 118	1-108-246-00	0.047		mylar
C119	1-123-298-00	470	6.3V	elect
C120, 121	1-123-324-00	1000	16V	elect
C151, 152	1-123-316-00	10	16V	elect
C153	1-123-318-00	33	16V	elect
C154	1-121-414-00	100	10V	elect
C155	1-123-296-00	220	6.3V	elect

C201	△1-130-156-00	0.033	125V	film
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RESISTORS

All resistors are in ohms. Common 1/4W carbon resistors are omitted. Refer to the list on the last page for their part numbers.

R138, 139	1-244-857-00	220	1/4W	carbon
-----------	--------------	-----	------	--------

RV101	1-226-239-00	100k, adjustable
RV102,103	1-226-235-00	5k, adjustable
RV104,105	1-226-239-00	100k, adjustable

SWITCHES

S1	1-552-412-00	Pushbutton; START/STOP
S2	1-552-928-00	Pushbutton; REPEAT
S3	1-552-928-00	Pushbutton; SPEED
S4	1-552-532-00	Pushbutton; TONEARM
S5	△1-552-530-00	Pushbutton; POWER

MISCELLANEOUS

PM	1-454-196-00	Solenoid
X101	1-527-380-00	Crystal 3.93216MHZ

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

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
	1-452-059-00	Magnet, brake
	⚠ 1-534-986-XX	Cord, power
	1-543-123-00	Head, speed detecting
	1-551-294-00	Cord, phono
	1-561-013-00	Connector, neck cylinder

ACCESSORIES AND PACKING MATERIALS

<u>Part No.</u>	<u>Description</u>
3-701-613-00	Bag, polyethylene
3-701-634-00	Bag, polyethylene
3-701-806-00	Adaptor, 45 rpm
3-703-043-21	Label, main-caution
3-770-876-21	Manual, instruction
3-794-233-21	Leaflet
4-847-314-00	Bag, polyethylene (main)
4-848-002-00	Cushion, arm pipe
4-857-655-00	Plate (A), protection
4-858-789-01	Spacer (B), TT sheet
4-857-661-11	Emblem, SONY
4-858-407-00	Adjustor, drop-point
4-863-650-00	Label, specification
4-863-665-00	Cushion, right
4-863-666-00	Cushion, left
4-863-667-00	Plate (D), protection
4-863-668-00	Stopper, gear
4-863-670-00	Carton

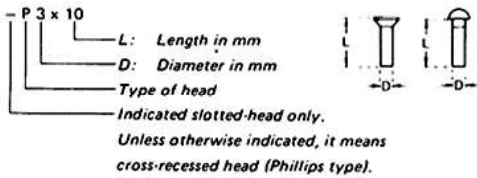
Note: The components identified by shading and mark **⚠ are critical for safety. Replace only with part number specified.**

1/4 WATT CARBON RESISTORS

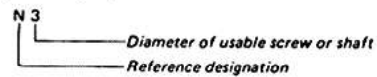
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	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:



Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
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
SELF-TAPPING SCREWS			
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
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	