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Service Manual

Direct Drive Turntable

SP-10MK2A

[M], [MC]



Areas

- [M] is available in U.S.A.
- [MC] is available in Canada.

Specifications

■ General

Power supply	120 V. AC 60 Hz
Power consumption	20 W
Dimensions: (W×H×D)	Turntable Only 36.85×10.25×36.85 cm (14-31/64×4-1/64×14-31/64 inches) Power Unit 110×8.35×37.0 cm
Weight:	Turntable Only 9.5 kg (20.9 lbs.) Power Unit 3.8 kg

■ Turntable section

Type	Direct-drive turntable
Turntable platter	Aluminum diecast, diameter 32 cm (12-19/32 inches), weight 2.9 kg (6.4 lbs.)
Moment of inertia	380 kg·cm ² (130 lbs·in ²)
Motor	Brushless DC motor, electronic rectification, quartz-controlled phase-locked servo circuit
Platter speeds	33-1/3, 45 and 78.26 r.p.m.

Starting torque	6 kg·cm (5.2 lbs·in)
Build-up time	0.25 sec. (25° rotation) to 33-1/3 r.p.m.
Braking time	0.3 sec. (30° rotation) from 33-1/3 r.p.m. to standstill
Speed fluctuation with load changes	0% within 5 kg·cm (4.3 lbs·in)
Speed drift	Within ±0.001% 0.01% WRMS*
Wow & Flutter	0.02% W.R.M.S. (JIS C5521) ±0.028% Peak (IEC 98A Weighted) *This rating refers to turntable assembly alone, excluding effects of record, cartridge or tonearm, but including platter. Measured by obtaining signal from built-in frequency generator of motor assembly.
Rumble	-58 dB (IEC 98A Unweighted) -86 dB (IEC 98A Weighted)

■ CONTENTS

	Page
SAFETY PRECAUTION	2
LOCATION OF CONTROLS	3~4
OPERATION PRINCIPLES OF SP-10MK2A	5
DISASSEMBLY INSTRUCTIONS	
(Main unit)	6~8
(Power unit)	9
MEASUREMENT AND ADJUSTMENTS	10~12
TROUBLE SHOOTING	12~15

	Page
RESISTORS AND CAPACITORS	16~17
BLOCK DIAGRAM	18, 19
CIRCUIT BOARDS AND WIRING	
CONNECTION DIAGRAM	20~22
SCHEMATIC DIAGRAM	23~27
REPLACEMENT PARTS LIST	27, 28, 31, 32
EXPLODED VIEWS	29~31
PACKING	32

Technics

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Carolina, Puerto Rico 00630

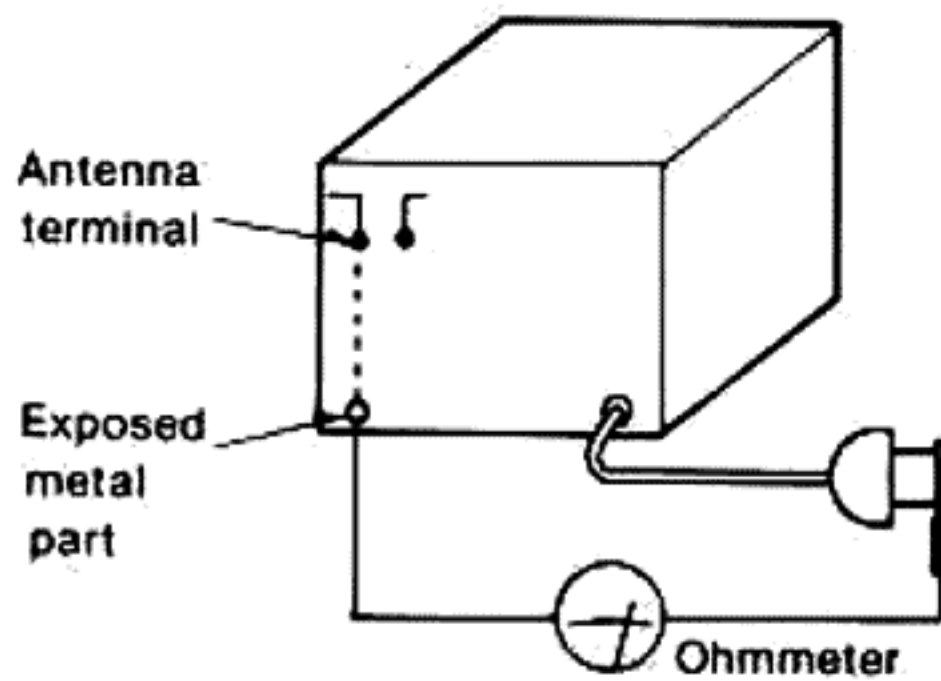
■ SAFETY PRECAUTION

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

▶ INSULATION RESISTANCE TEST

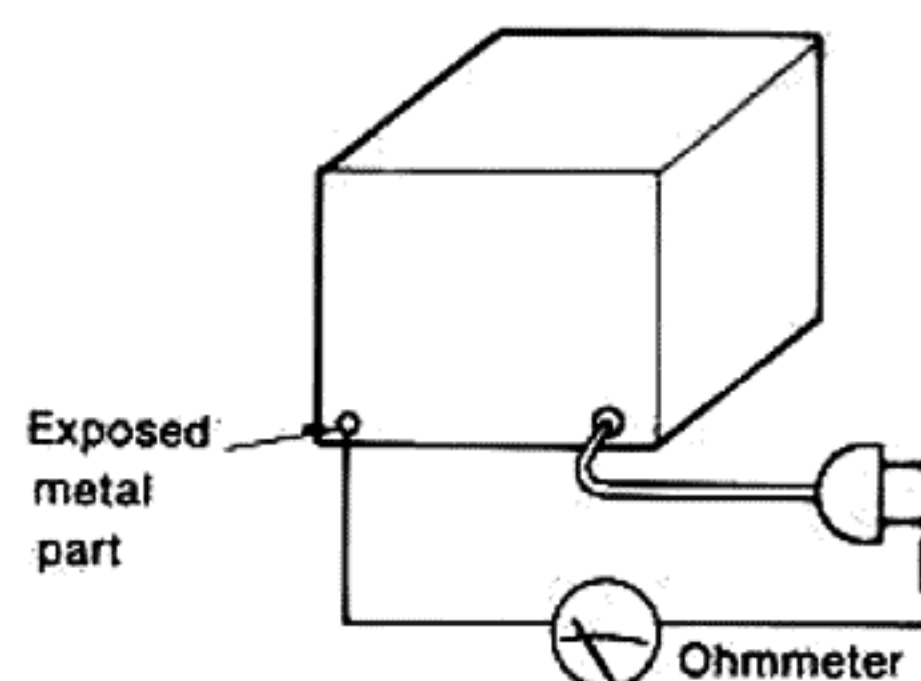
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between $3\text{M}\Omega$ and $5.2\text{M}\Omega$ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = $3\text{M}\Omega - 5.2\text{M}\Omega$



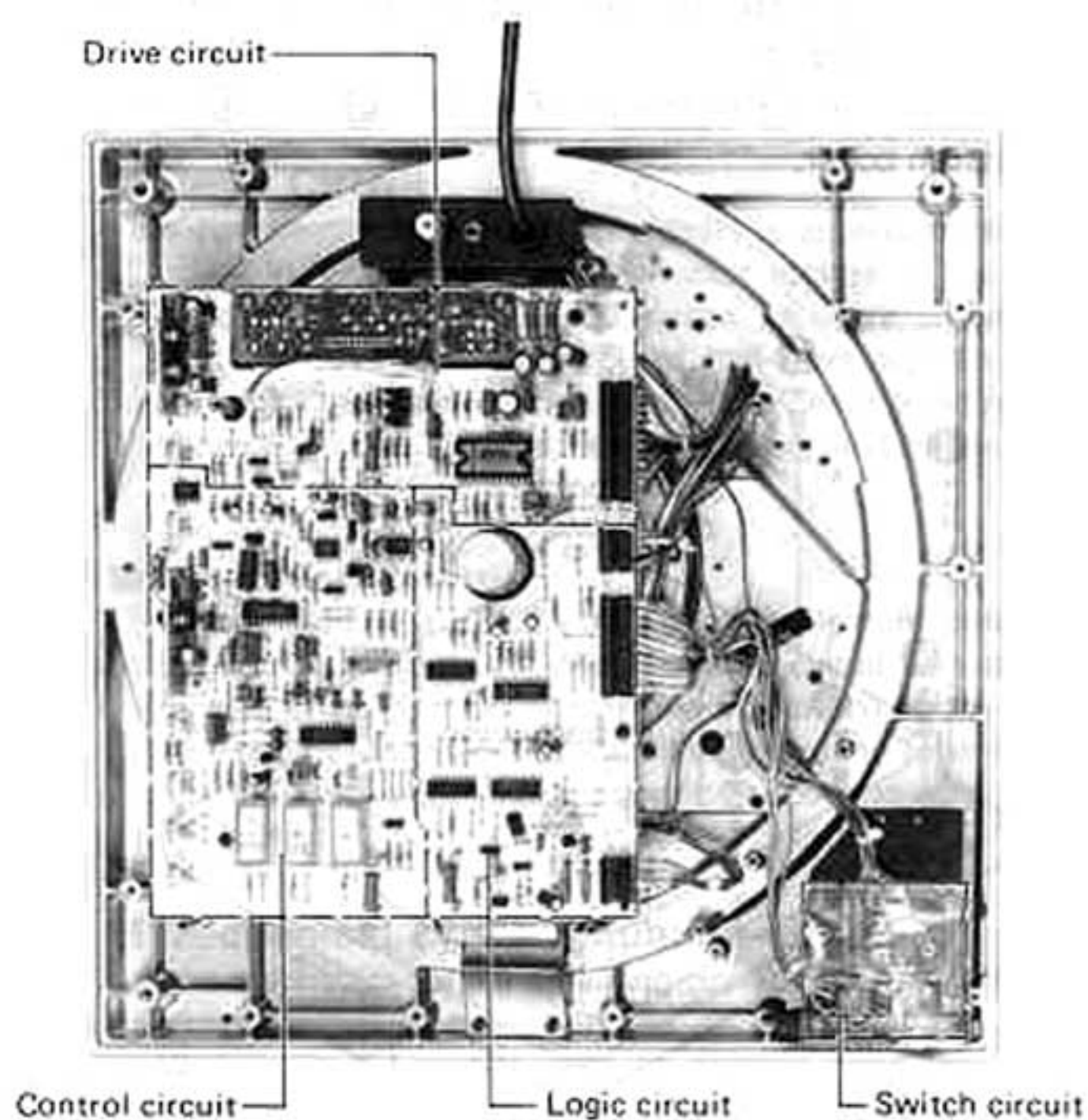
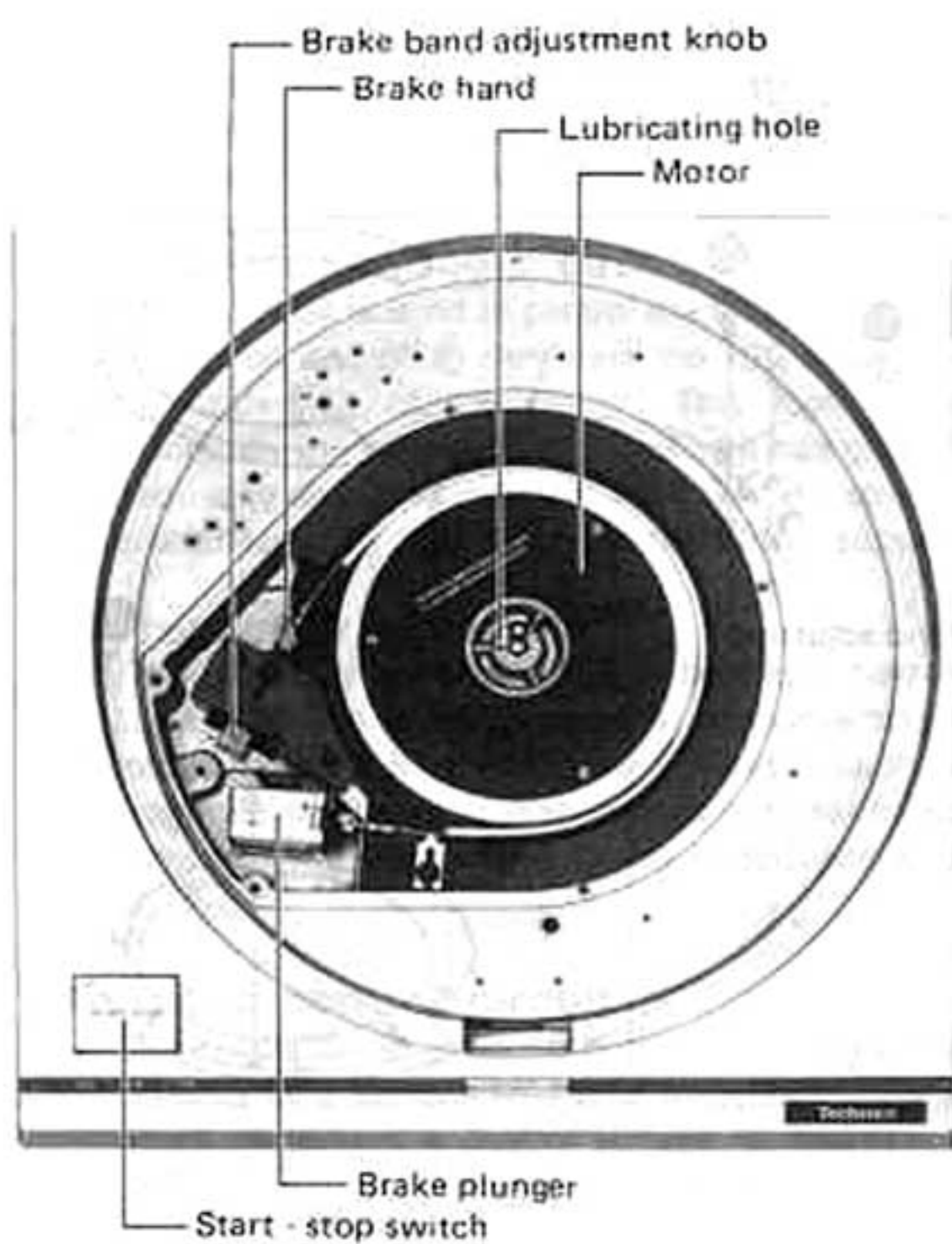
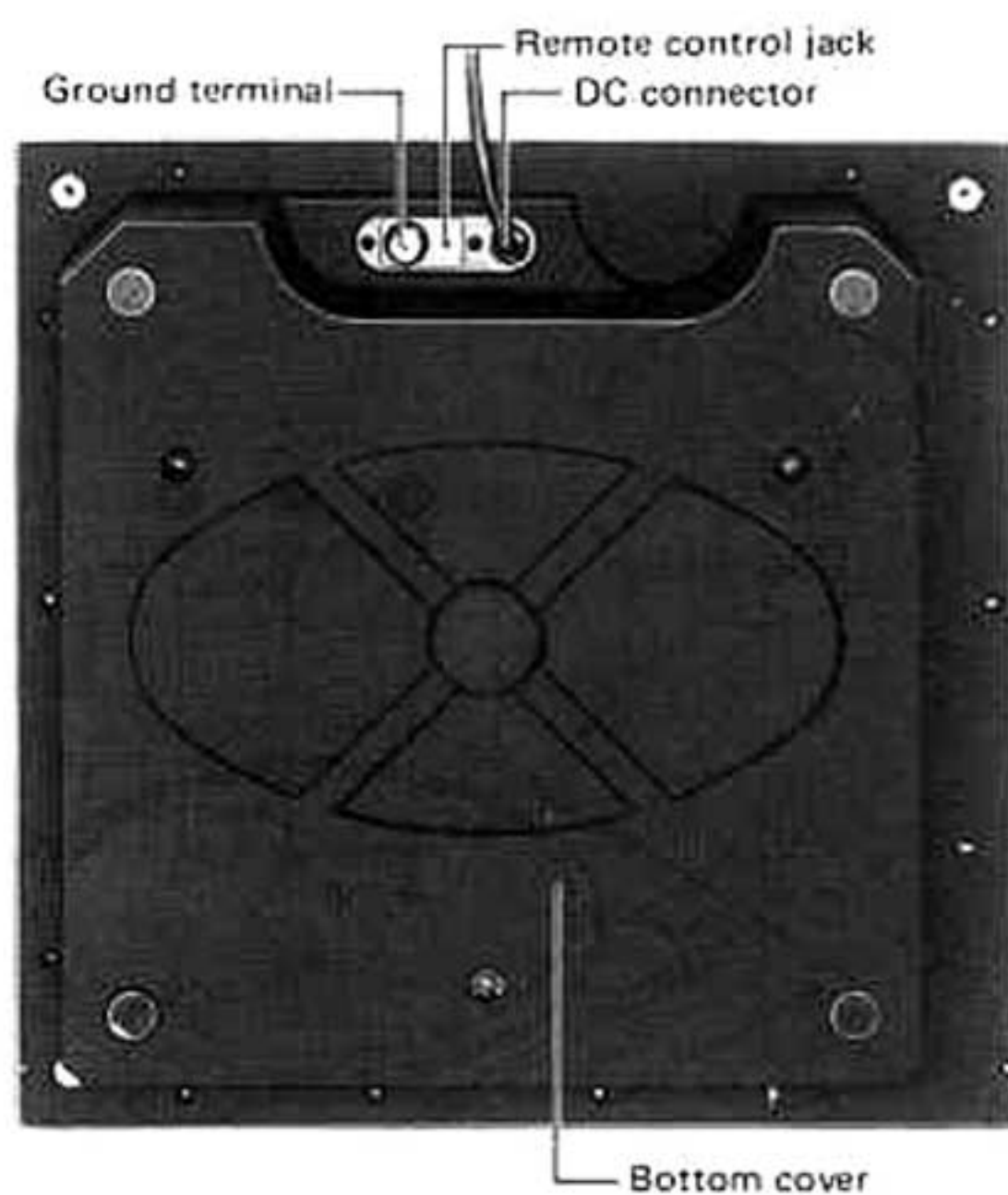
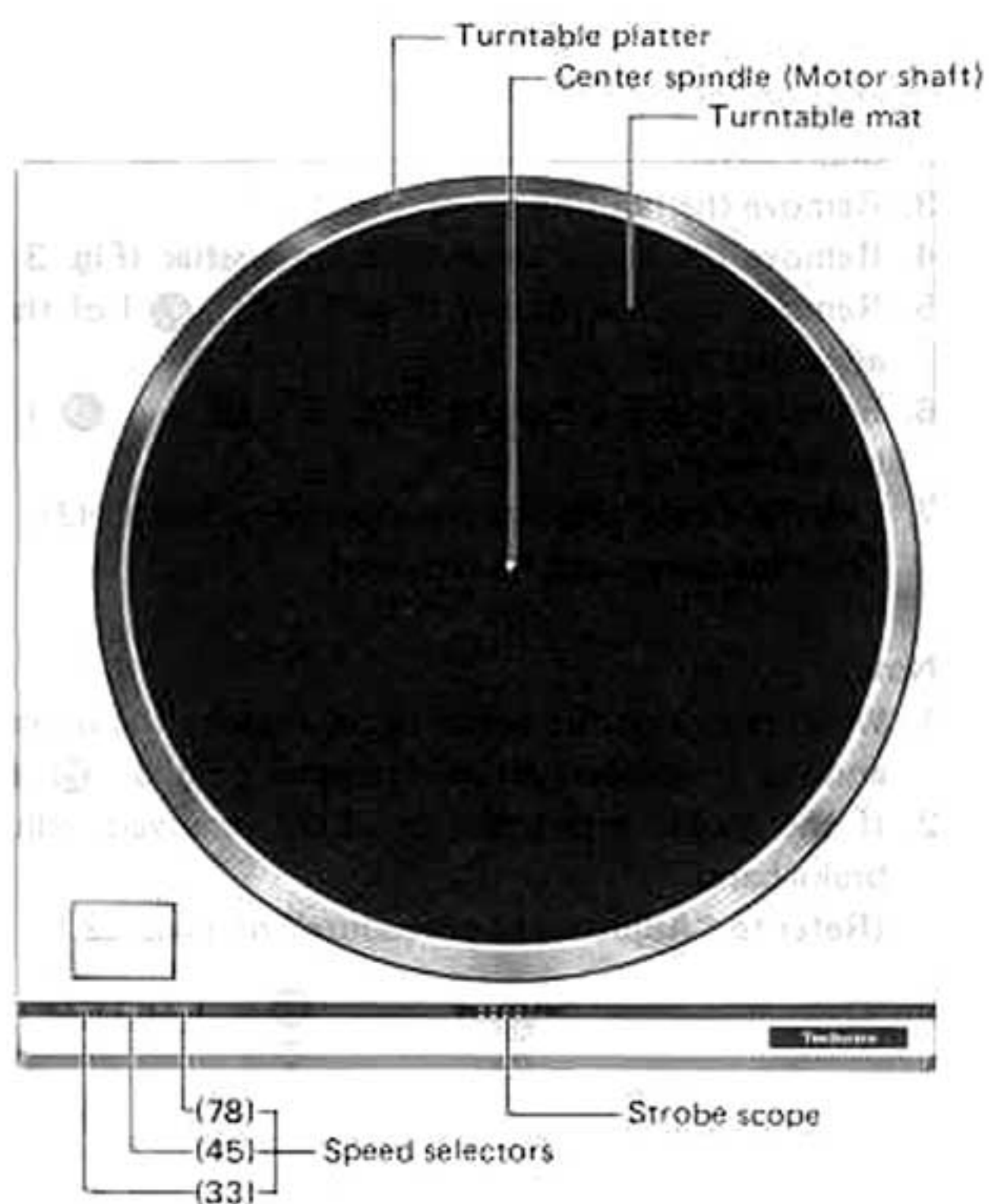
(Fig. B)

Resistance = Approx ∞

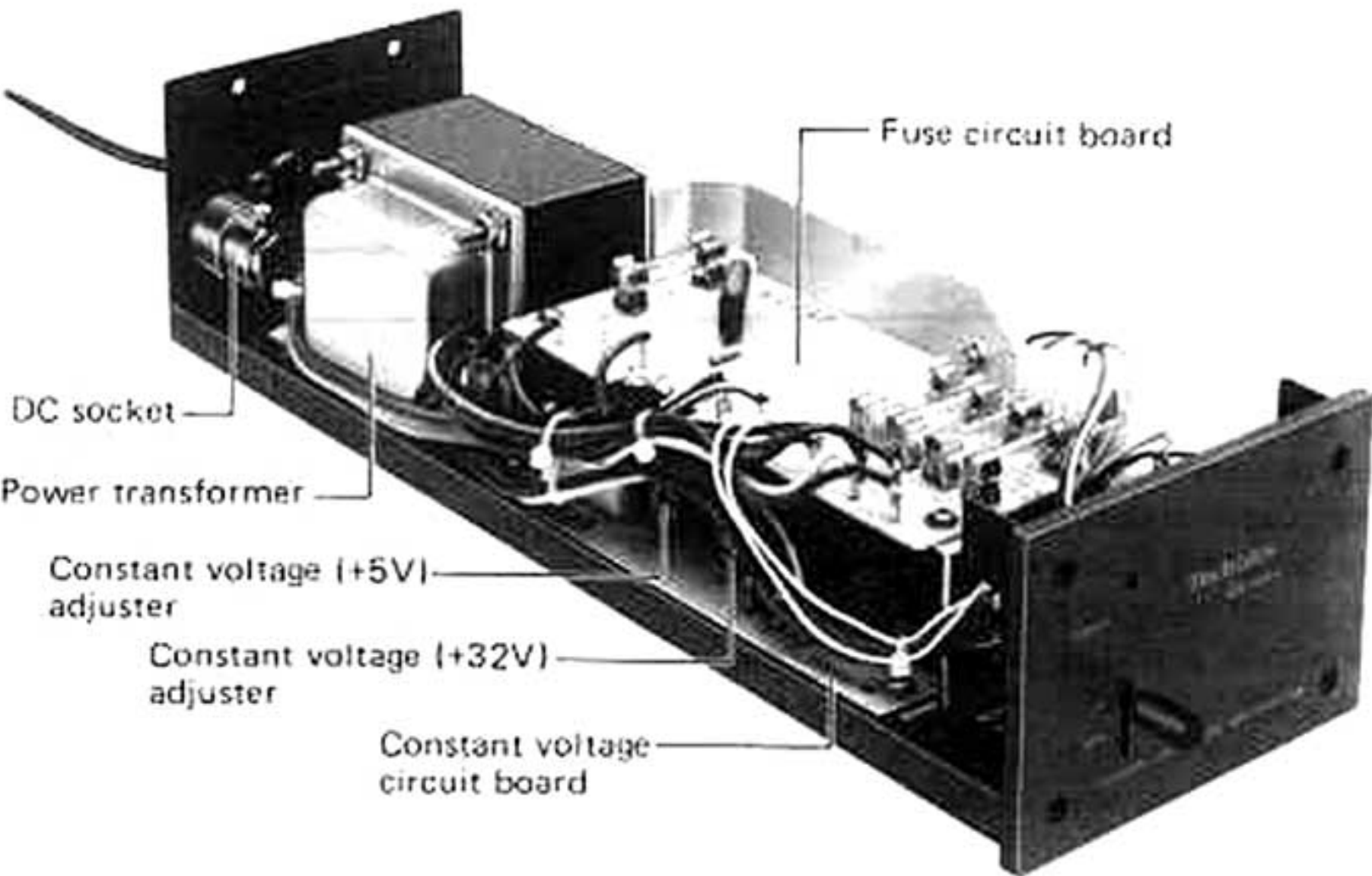
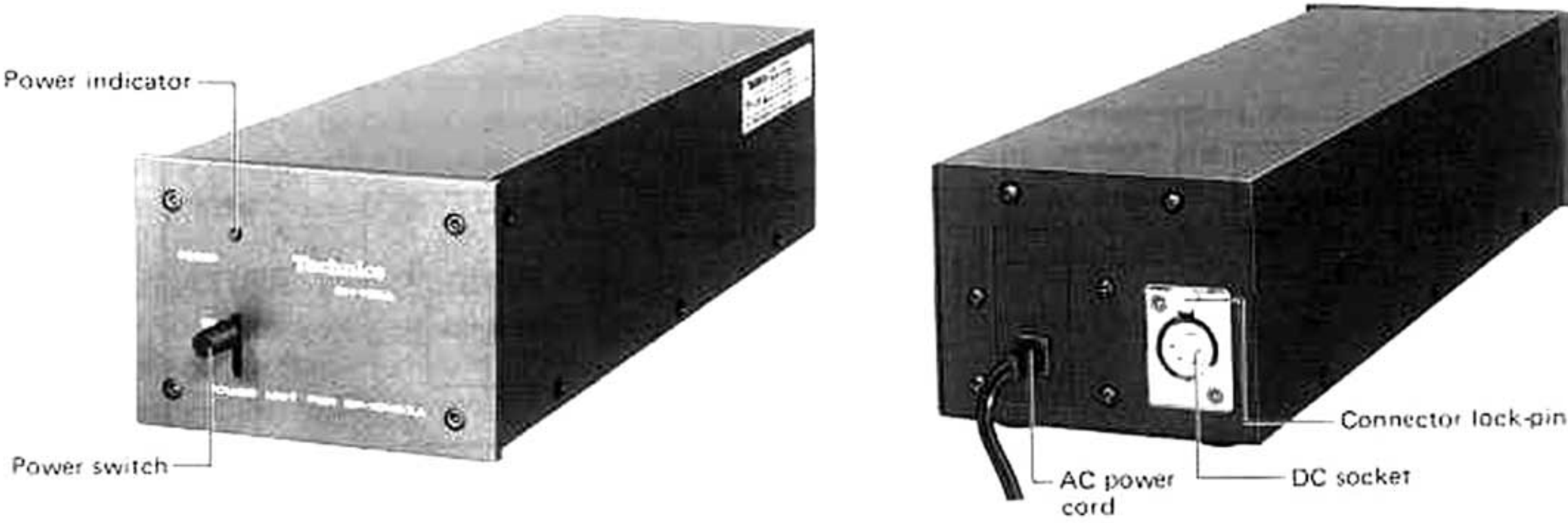
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ LOCATION OF CONTROLS

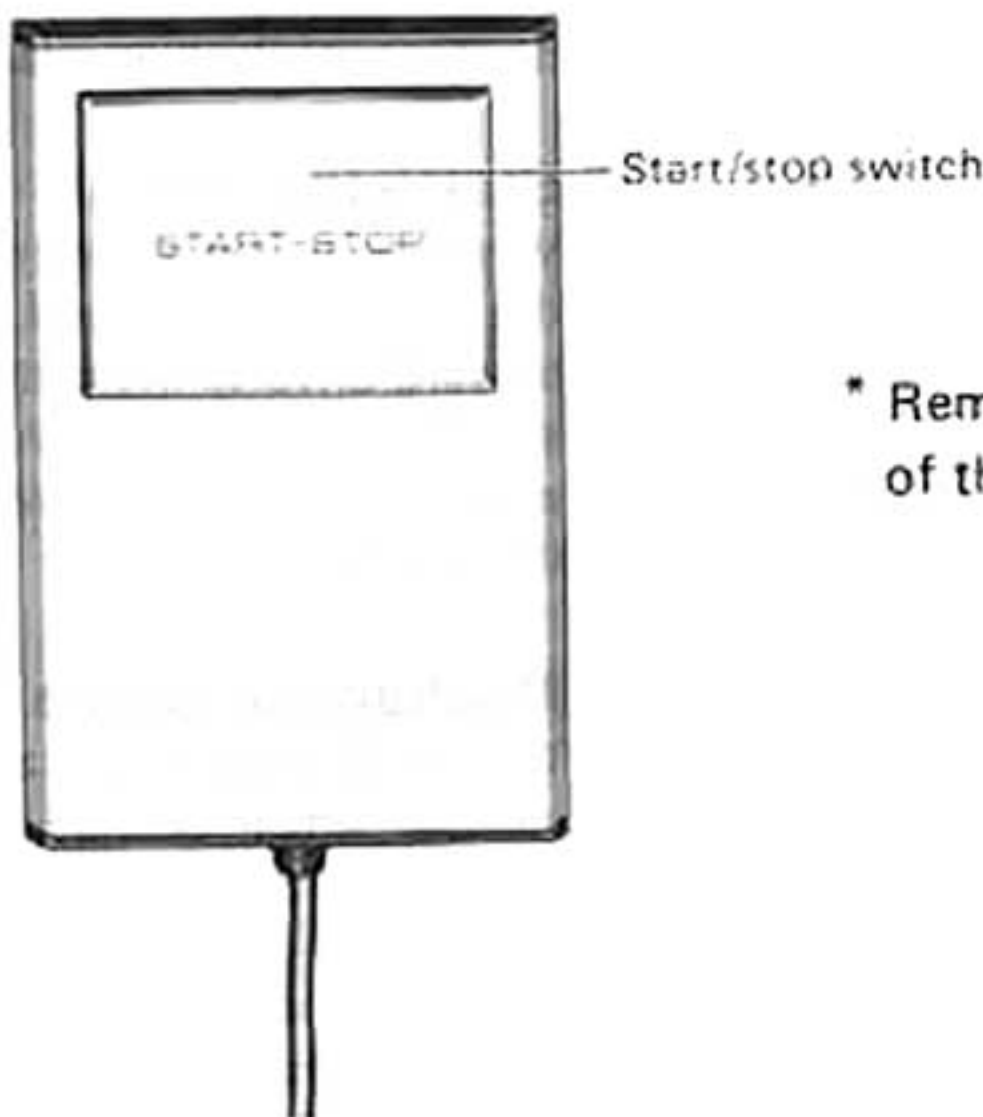
• Main unit



• Power unit (SH-10EA)

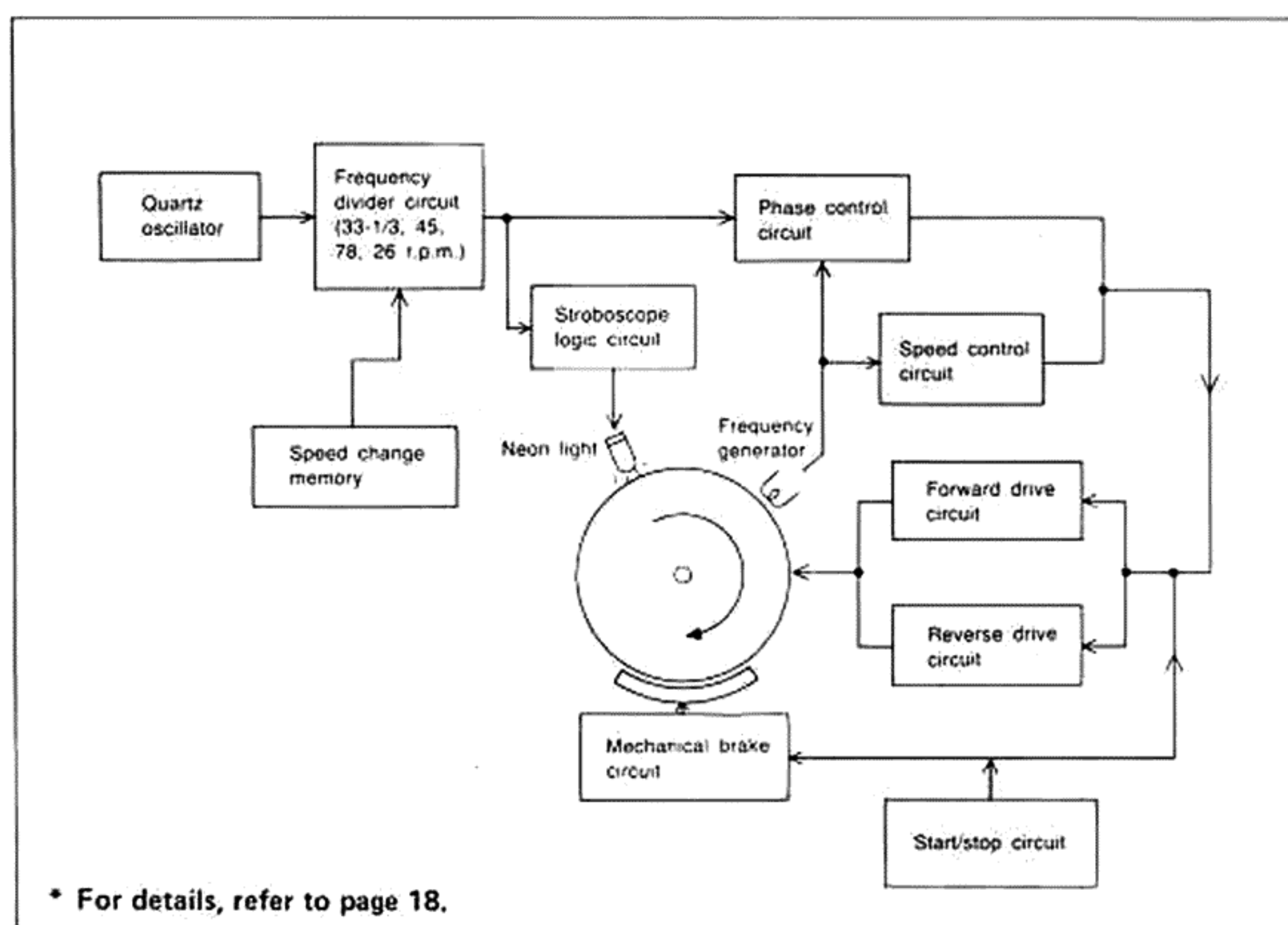


• Remote control unit (SH-10R)



* Remote control unit can be used for start/stop of the unit not for power ON/OFF.

■ OPERATION PRINCIPLES OF SP-10MK2A



■ Quartz generated reference signal

The quartz reference signal generator provides a reference signal which controls the platter speed. The oscillation of a quartz crystal is used to generate a stable, highly accurate reference frequency that is not affected by temperature and other variables. The reference signal is processed by the frequency divider to obtain the appropriate frequency for the speed selected. When one of the speed selectors is pressed, that speed is memorized in the speed selector digital memory to control the frequency divider.

■ Strobe logic circuit

A logic circuit is used to control the rate at which a neon light flashes on and off to illuminate the 190 strobo lines cut into the underside of the platter. This logic circuit digitally processes the reference signal after it has gone through the frequency divider to maintain a bright, clear strobo image that is unaffected by fluctuations in the power supply frequency.

■ Frequency generator

The frequency generator (FG) is built into the platter motor. To assure the utmost precision in converting the platter rotations into a frequency, the FG has a push-pull electromagnetic construction that cancels external inductions. The output of the FG is sent to the speed and phase control circuits.

■ Speed control circuit

This circuit converts the FG output frequency into a voltage. It consists of a sample-hold type frequency-voltage converter which generates a control voltage to maintain the correct platter speed at all times.

■ Phase control circuit

This circuit detects phase differences between the reference signal and frequency generator signal and generates a control voltage to correct those differences. It is this circuit that makes it possible to lock the platter speed onto a reference signal. Compared with previous DD motors having only speed control circuits, the phase control circuit significantly improves speed stability and speed control performance with regard to changes in load.

■ Drive Circuit

A combination of two control signals is applied to the drive circuit in such a way that the motor rotates in the proper direction. The drive circuit supplies full-wave signals with double the current efficiency of half-wave signals. Wave symmetry means that (theoretically) the motor could rotate in either direction. The motor provides very fast build-up time because of its high starting torque.

■ Start/stop circuit

When the unit is started by the switch on the front panel or by the remote control unit, the start/stop circuit activates the forward drive to instantly start the platter. When the unit is switched off, the start/stop circuit activates the reverse drive and the mechanical brake actuating-circuits to quickly stop the platter.

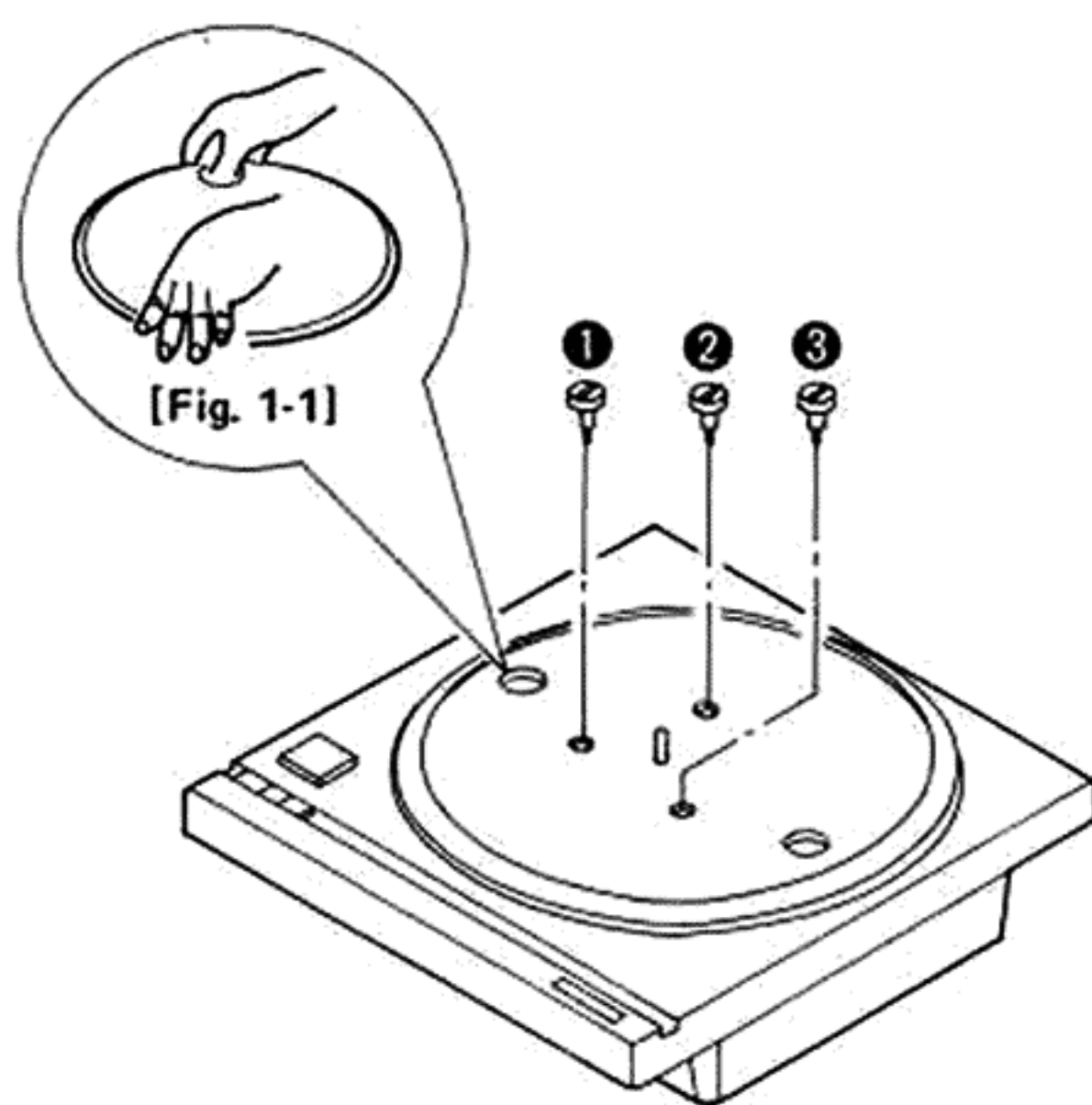
■ Mechanical brake actuating-circuit

The mechanical brake actuating-circuit operates a solenoid plunger which pushes a brake shoe against the platter. Working in conjunction with the reverse drive current, the mechanical brake can bring the platter to a complete stop quickly and smoothly. A half-braking force is maintained after the platter has stopped making it easy to accurately cue a record.

■ DISASSEMBLY INSTRUCTIONS (Main unit)

● How to remove the turntable platter

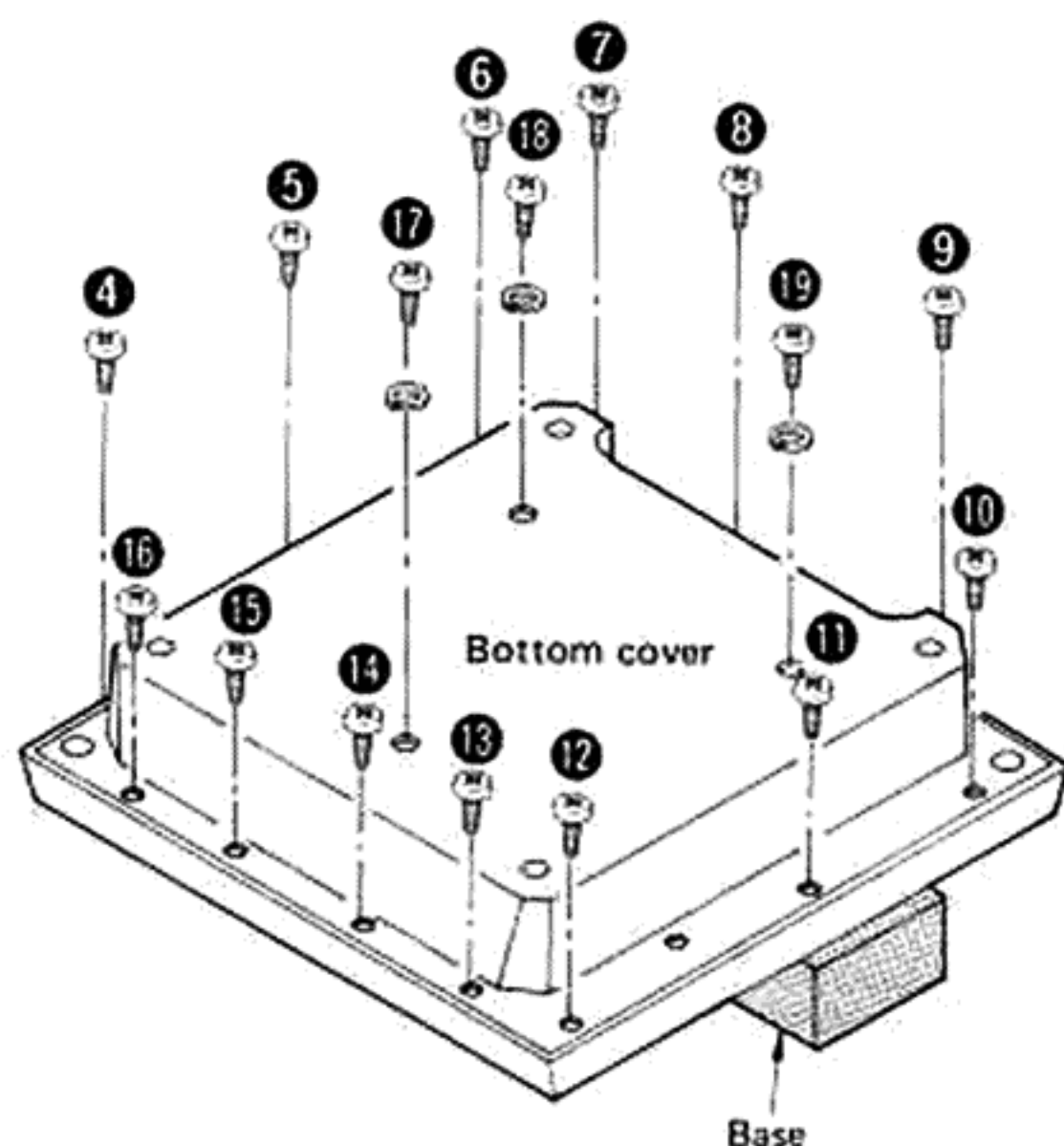
1. Remove the turntable mat.
2. Remove the 3 setscrews (Fig. 1 : ① ~ ③) of the turntable platter.
3. Lift the turntable platter. (Fig. 1-1)



[Fig. 1]

● How to remove the bottom cover

1. Remove the turntable mat.
2. Place a proper base under either side of the panel so that external stresses will not be given to the center spindle. (Fig. 2)
3. Remove the 16 setscrews (Fig. 2 : ④ ~ ⑲) of the bottom cover.



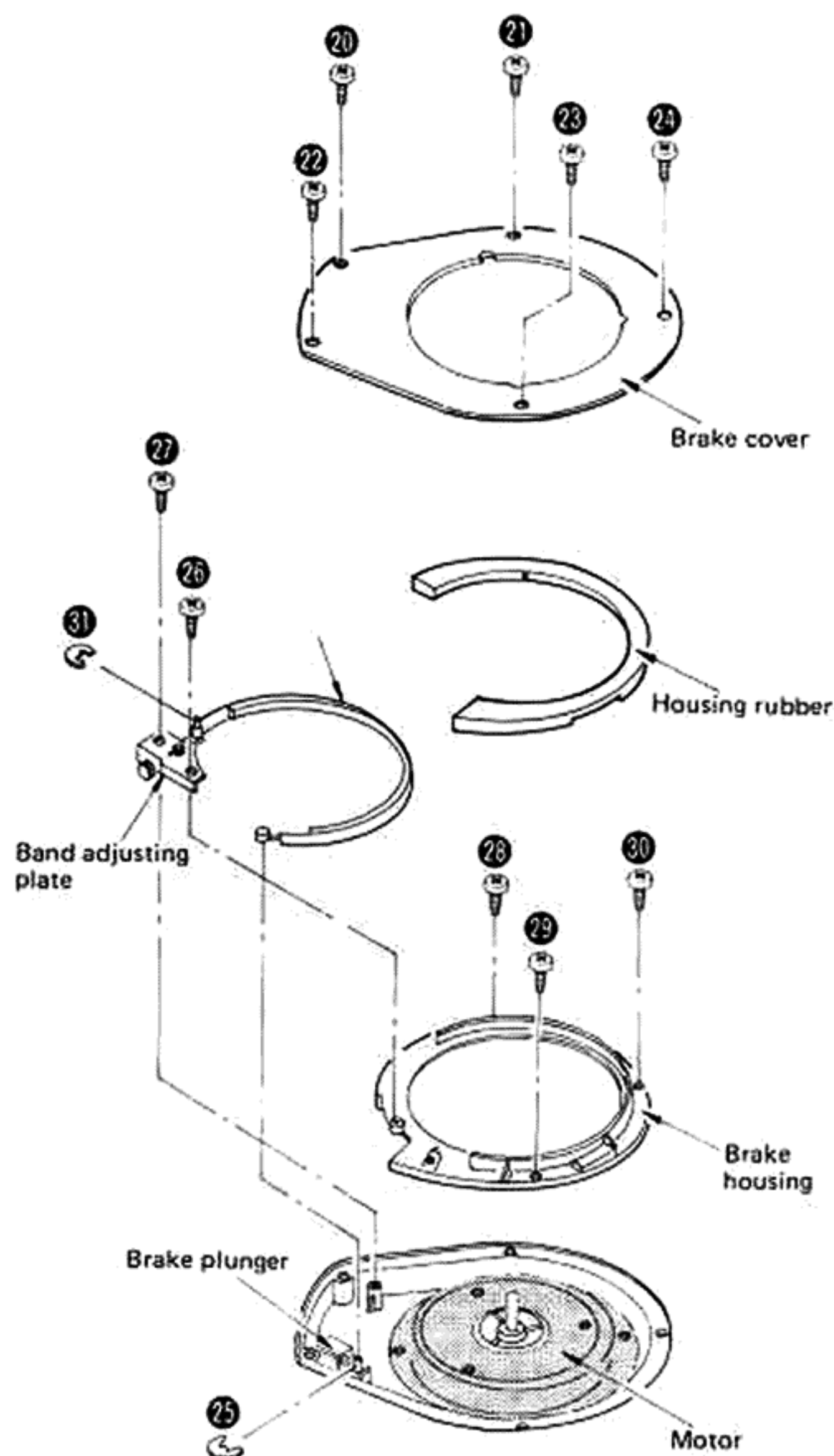
[Fig. 2]

● How to remove the motor

1. Remove the turntable platter. (Refer to "How to remove the turntable platter".)
2. Remove the 5 setscrews (Fig. 3 : ⑳ ~ ㉔) of the brake cover.
3. Remove the housing cover.
4. Remove the brake band retaining washer (Fig. 3 : ㉕).
5. Remove the 2 setscrews (Fig. 3 : ㉖, ㉗) of the band adjusting plate.
6. Remove the 3 setscrews (Fig. 3 : ㉘ ~ ㉚) of the brake housing.
7. Lift the motor and pull out the connector (CN2). Then the motor can be removed.

Note:

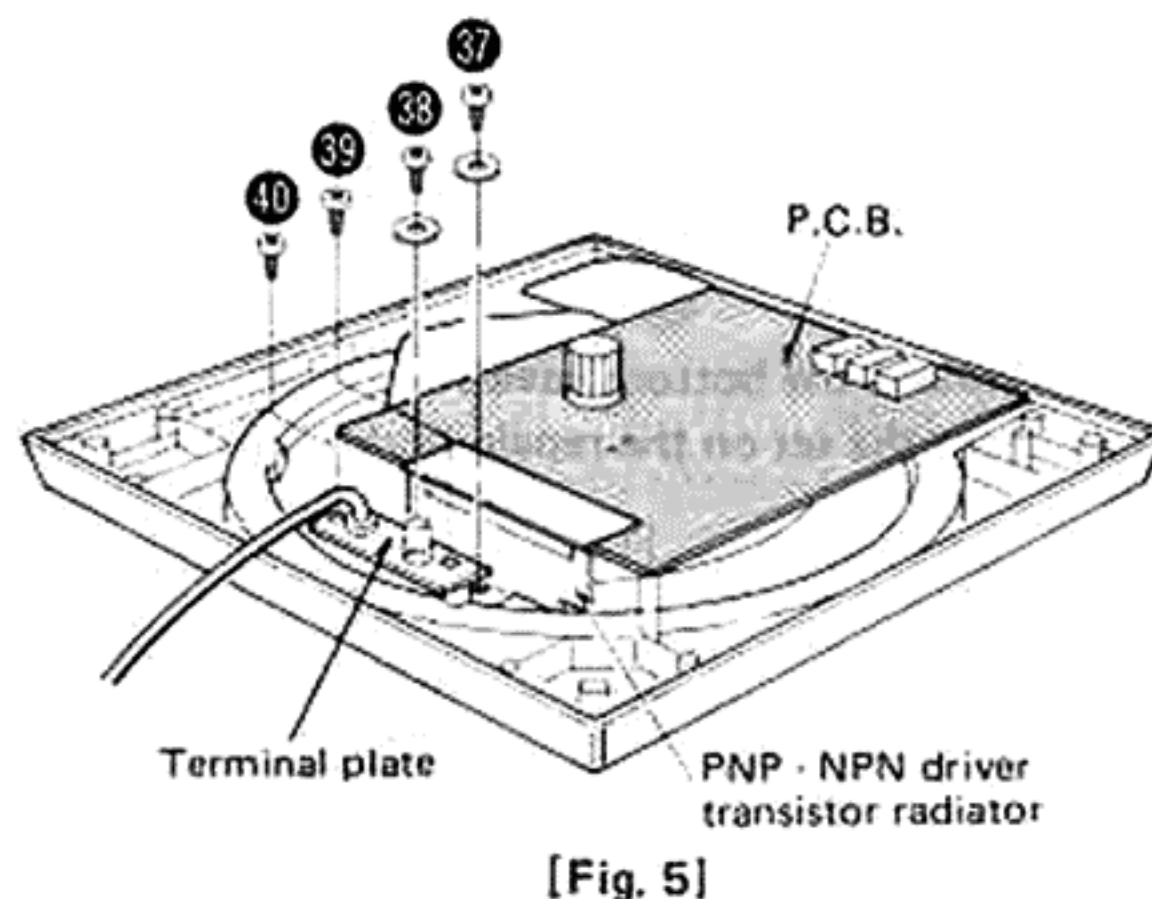
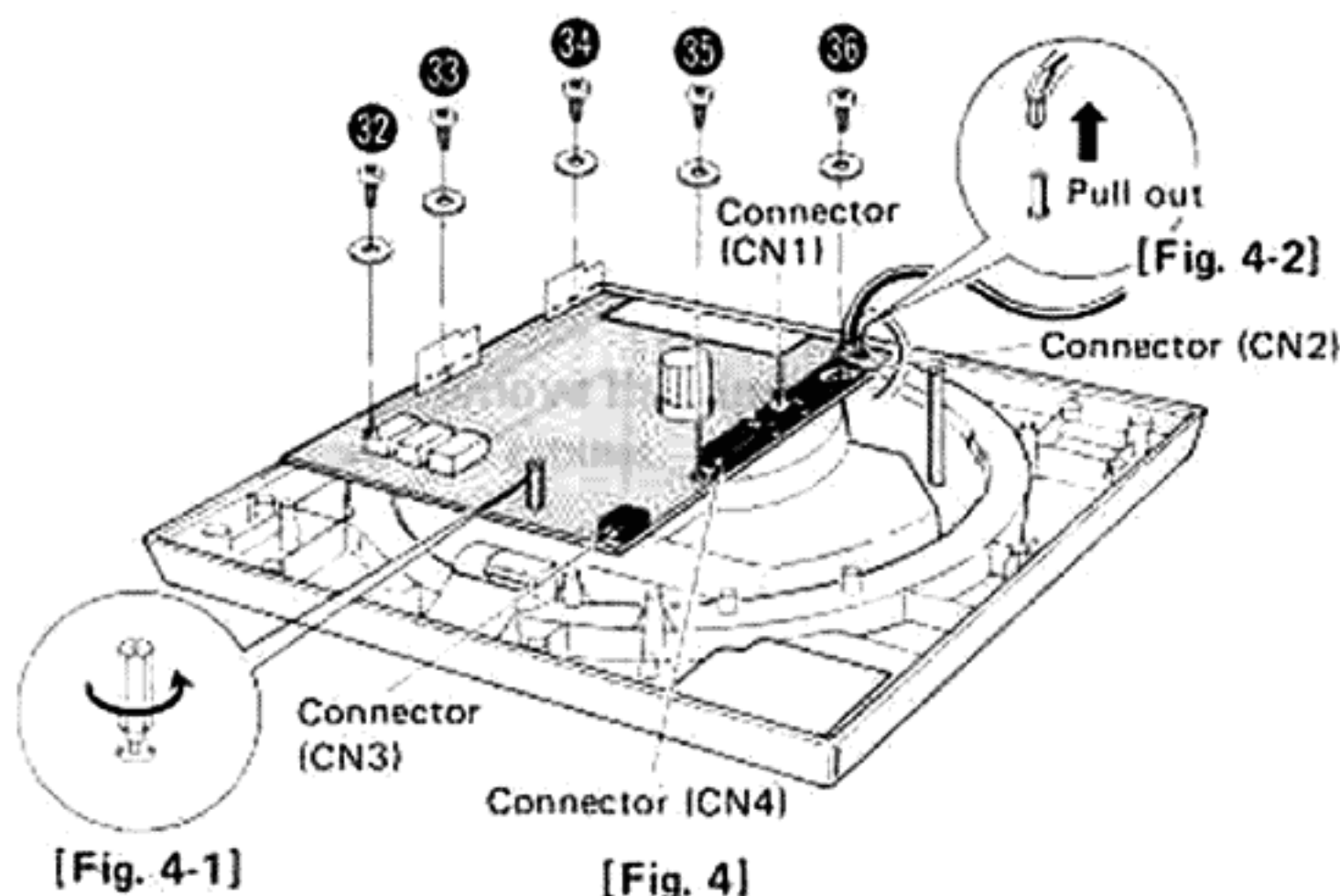
1. When removing the brake band, remove the brake cover and the brake band retaining washer (Fig. 3 : ㉕, ㉚).
2. If the motor and brake band are removed, adjust the brake band.
(Refer to "Adjustment procedure" on page 12.)



[Fig. 3]

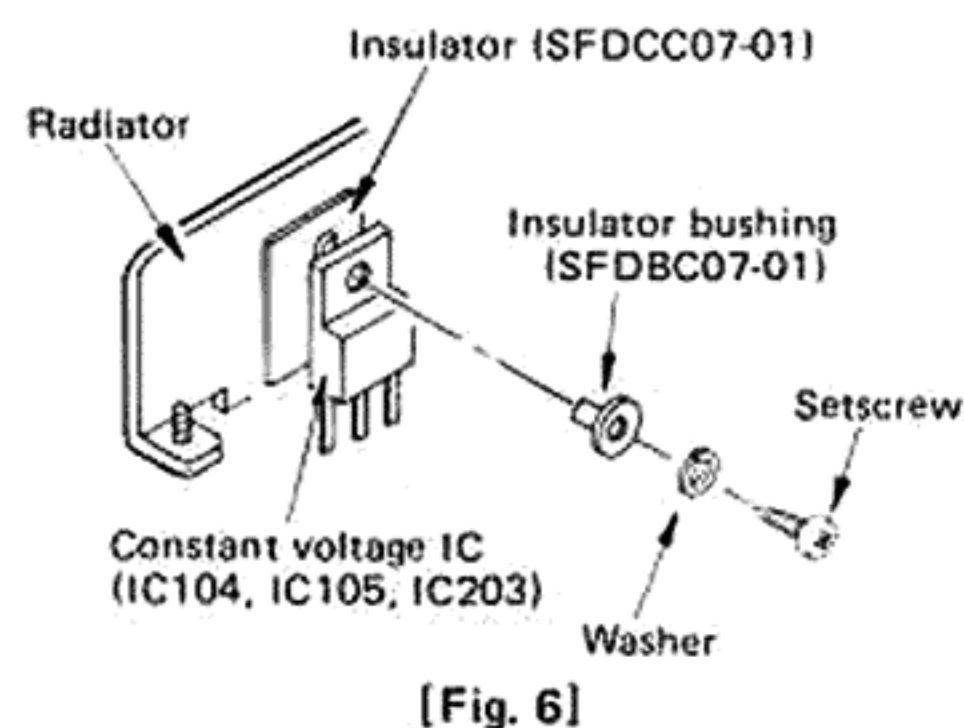
- **How to remove the P.C.B. (Drive circuit, control circuit and Logic circuit)**

1. Remove the bottom cover. (Refer to "How to remove the bottom cover".)
2. Remove the 5 setscrews (Fig. 4 : 32 ~ 36) of P.C.B.
3. Turn the spacer in the direction of the arrow to remove the spacer. (Fig. 4-1)
4. Pull out the ground terminal. (Fig. 4-2)
5. Remove the 2 setscrews (Fig. 5 : 37, 38) of PNP · NPN driver transistor radiator.
6. Pull out the 4 connectors (CN1 ~ CN4) and lift the P.C.B. to remove.
7. To remove the terminal plate, remove the 2 setscrews (Fig. 5 : 39, 40).



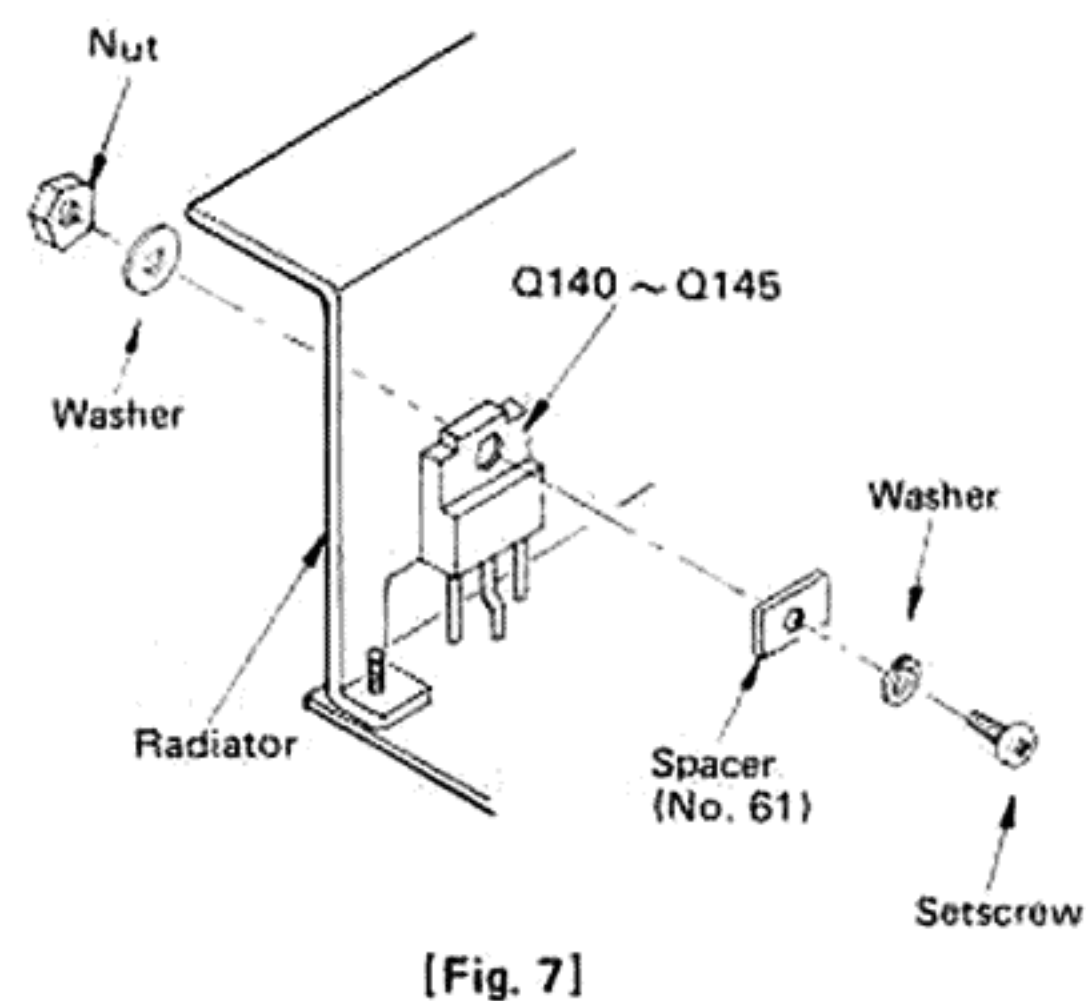
- **How to remove the constant voltage IC (IC104, IC105, IC203)**

1. Remove the bottom cover and P.C.B. (Refer to "How to remove the bottom cover and P.C.B.")
2. Remove solder from IC.
3. Remove IC setscrew. (Fig. 6)
4. To fit IC, be sure to set the insulator and bushing in place. (Fig. 6)



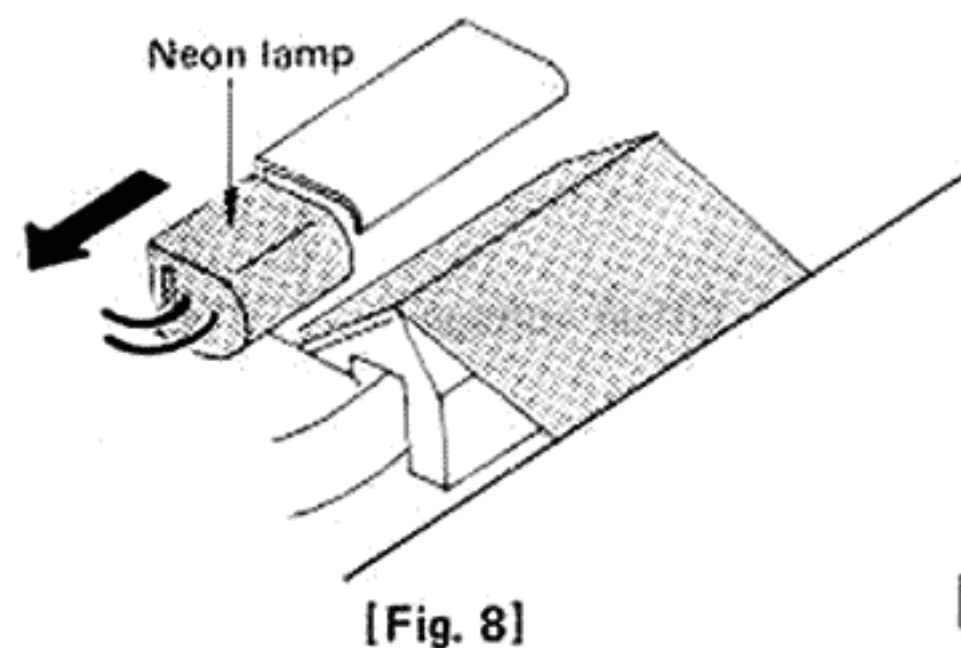
- **How to remove PNP · NPN driver transistors (Q140 ~ Q145)**

1. Remove the bottom cover. (Refer to "How to remove the bottom cover".)
2. Remove the radiator. (Refer to step 5 of "How to remove the P.C.B.")
3. Remove solder from the transistor.
4. Remove the transistor setscrew.
5. To fit the transistor, apply silicone compound (or equivalent heat diffuser) to the back of transistor and reversely follow the procedures 1 ~ 5.



- **How to remove the neon lamp**

1. Remove the bottom cover. (Refer to "How to remove the bottom cover".)
2. Pull out the neon lamp in the direction of the arrow. (Fig. 8)

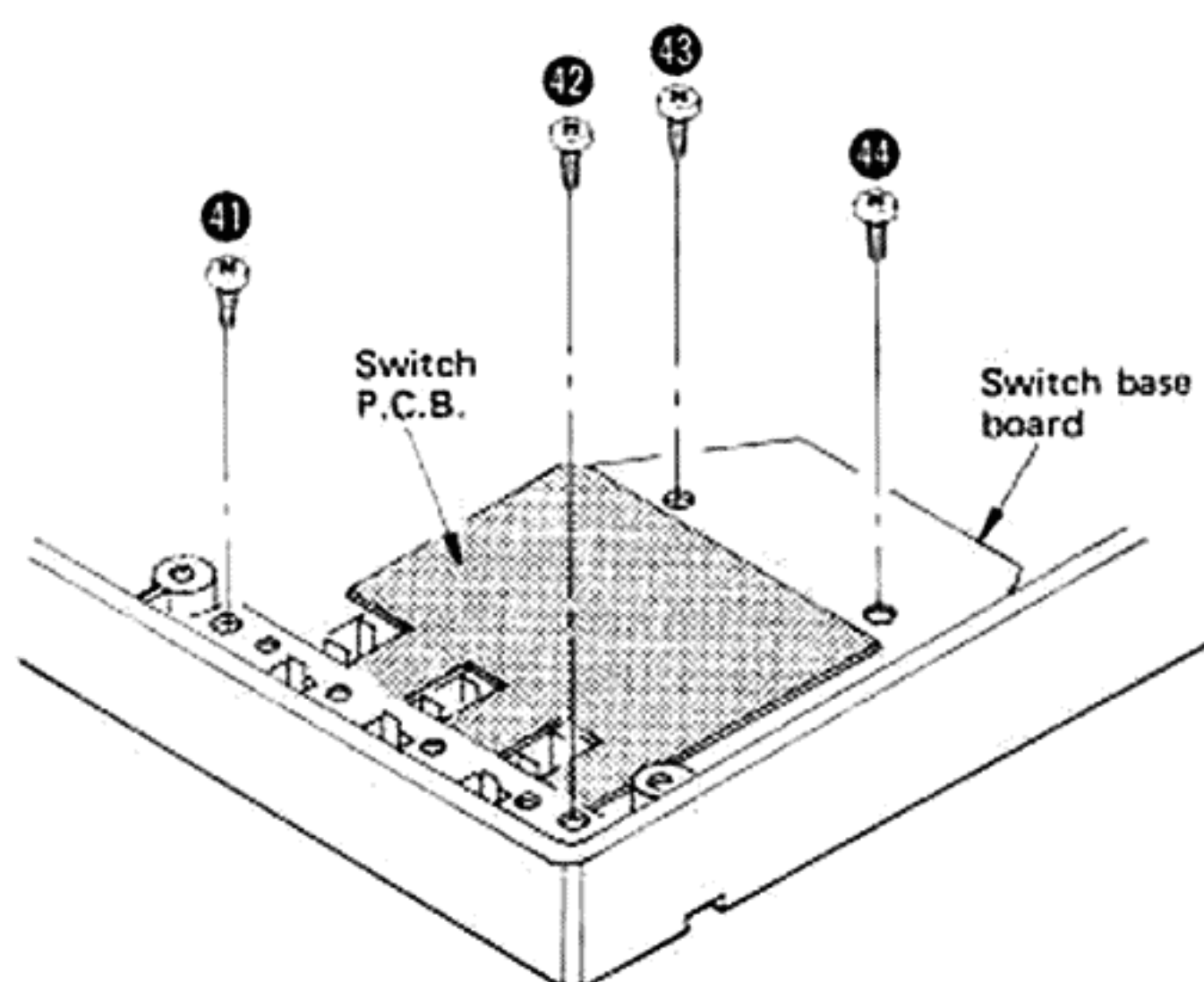


- **How to remove the start/stop button**

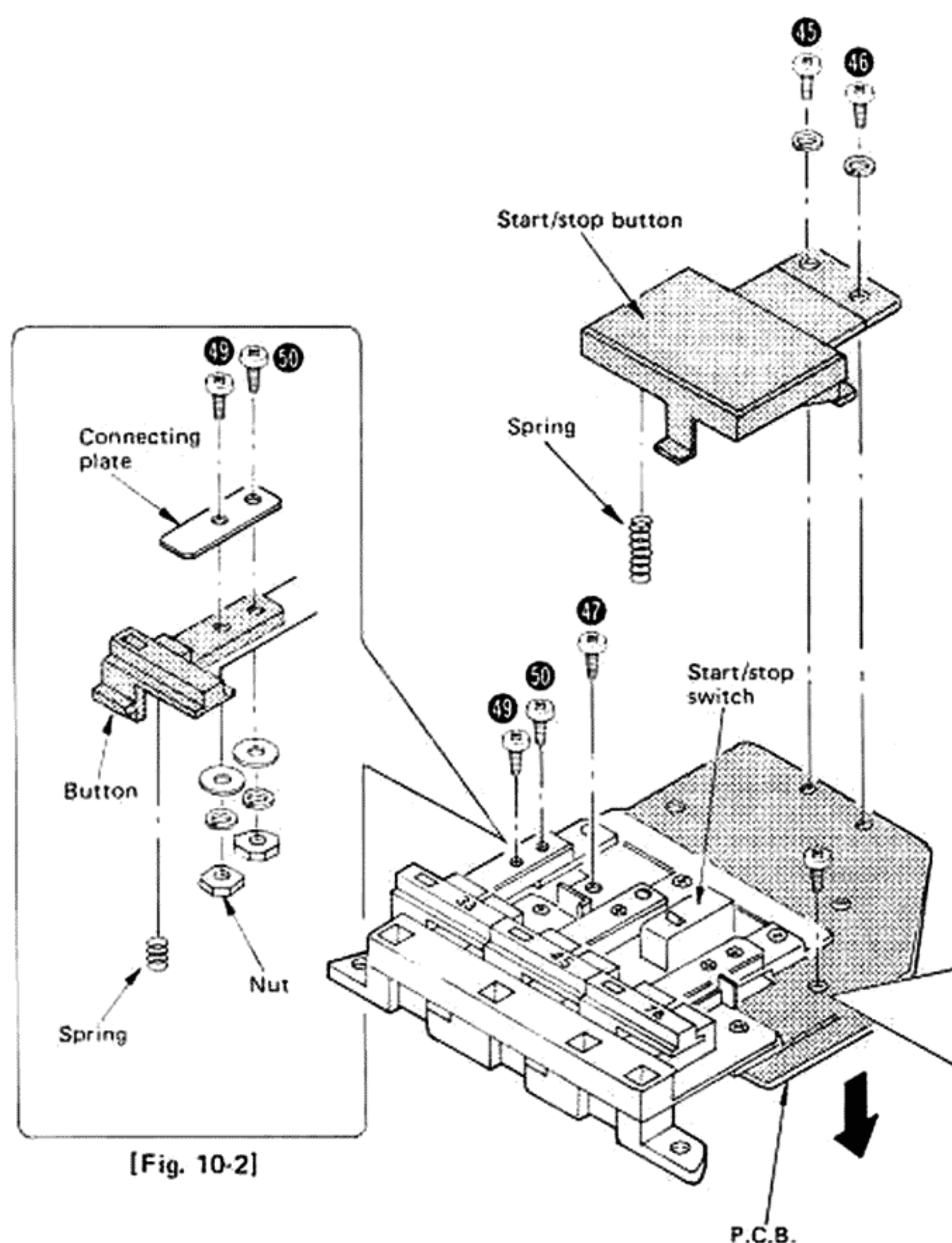
1. Remove the bottom cover. (Refer to "How to remove the bottom cover".)
2. Remove the 4 setscrews (Fig. 9 : ④① ~ ④④) of the switch base board.
3. Turn over the switch base board.
4. Remove the 2 setscrews (Fig. 10 : ④⑤ , ④⑥) of the start/stop button.

- **How to remove the speed selector button**

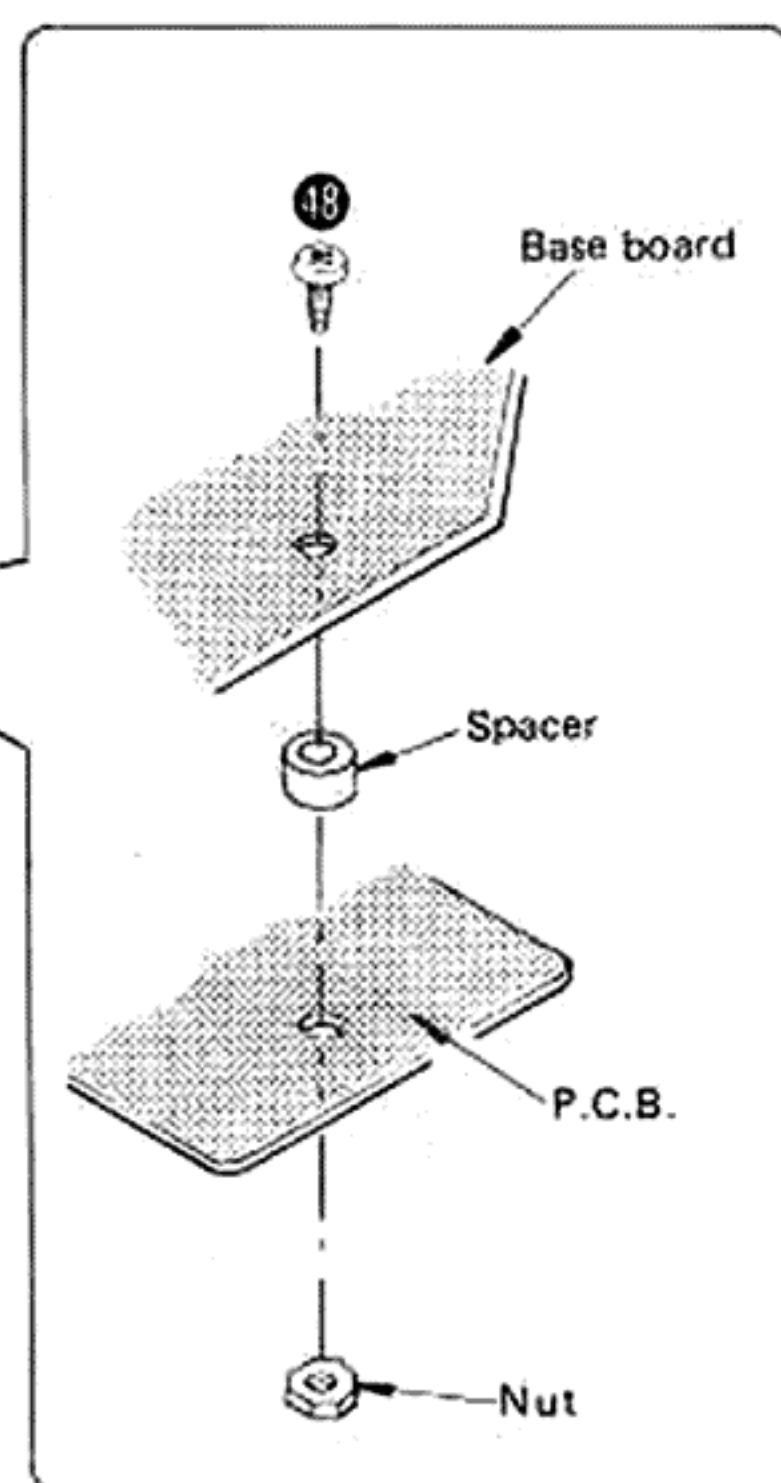
1. Remove the start/stop button. (Refer to "How to remove the start/stop button".)
2. Remove setscrews (Fig. 10 : ④⑦ , ④⑧) to separate the switch base board from P.C.B. (Fig. 10-1)
3. Remove the 2 setscrews (Fig. 10 : ④⑨ , ④⑩) of the selector button. (33-1/3r.p.m. button)
4. For fitting the button, refer to Fig. 10-2.



[Fig. 9]



[Fig. 10]



[Fig. 10-1]

■ DISASSEMBLY INSTRUCTIONS (Power unit)

● How to remove the cabinet

1. Remove the 10 setscrews (Fig. 11 : 51 ~ 60) of the cabinet.
2. Lift the cabinet.

● How to remove the front panel

1. Pull out the power switch knob. (Fig. 11)
2. Remove the 4 setscrews (Fig. 11 : 61 ~ 64) of the front panel.

Note: Use a hexagonal wrench (M3).

● How to remove the fuse P.C.B.

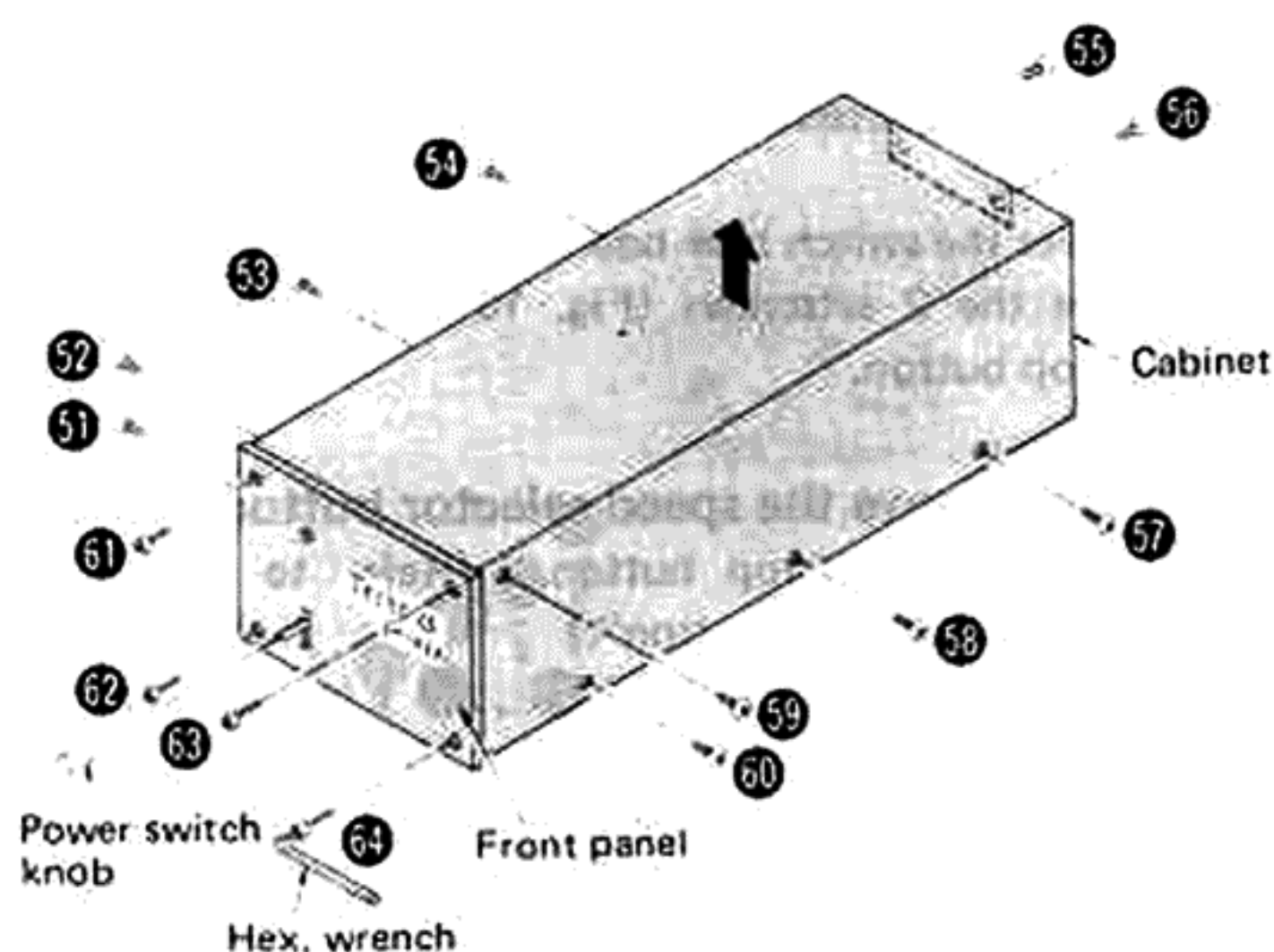
1. Remove the cabinet. (Refer to "How to remove the cabinet".)
2. Remove the 2 setscrews (Fig. 12 : 65, 66) of the P.C.B.
3. Pull out the connector (P1) and remove the P.C.B. in the direction of the arrow. (Fig. 12)

● How to remove constant voltage transistor (TR406)

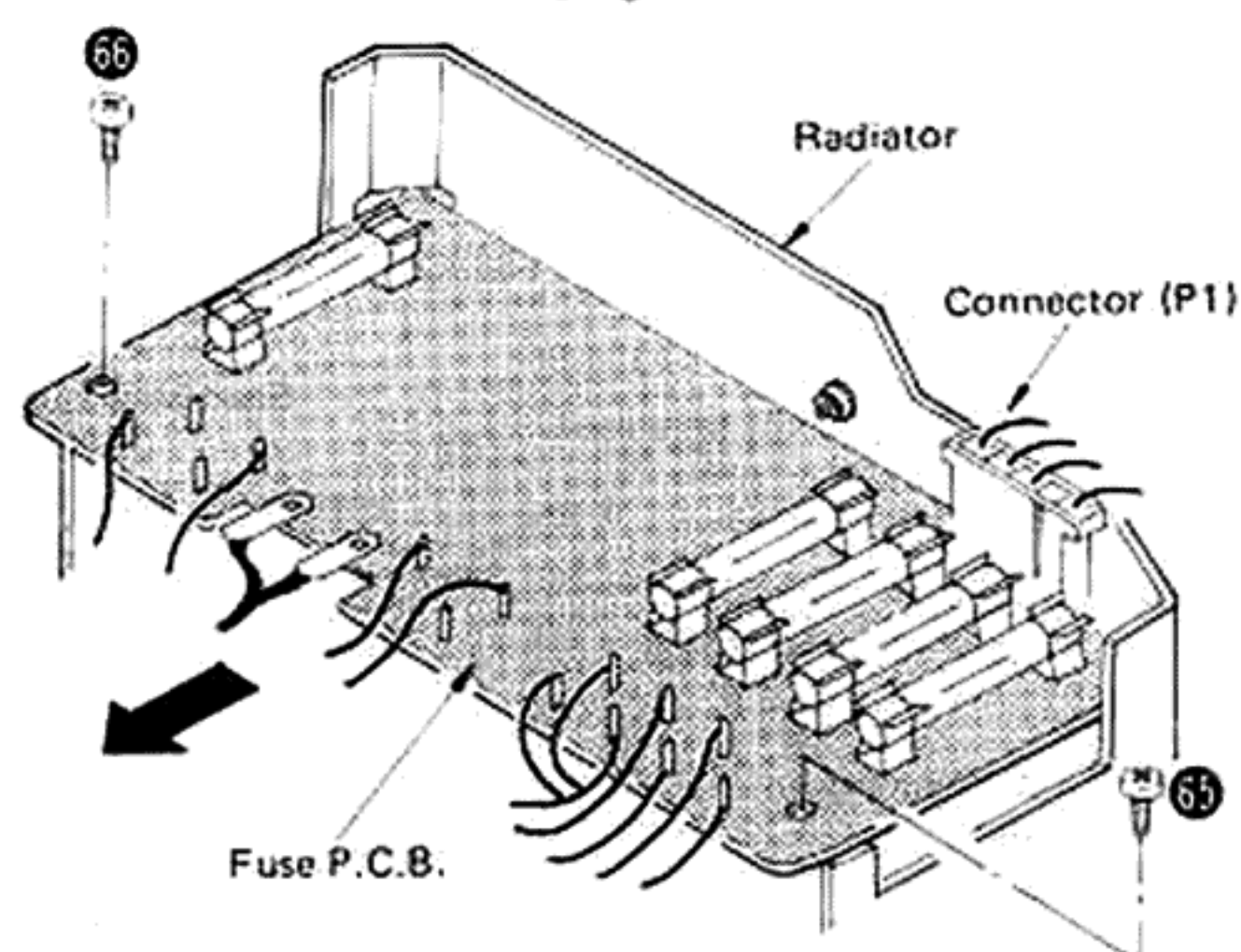
1. Remove the cabinet. (Refer to "How to remove the cabinet".)
2. Remove the fuse P.C.B. (Refer to "How to remove the fuse P.C.B.".)
3. Unsolder the emitter and base terminal leads.
4. Remove the 2 setscrews (Fig. 13 : 67, 68) of the transistor.
5. For fitting the transistor, refer to Fig. 13. Also, be sure to apply silicone compound (or equivalent heat diffuser) to both sides of mica sheet.

● How to remove constant voltage transistor (TR404)

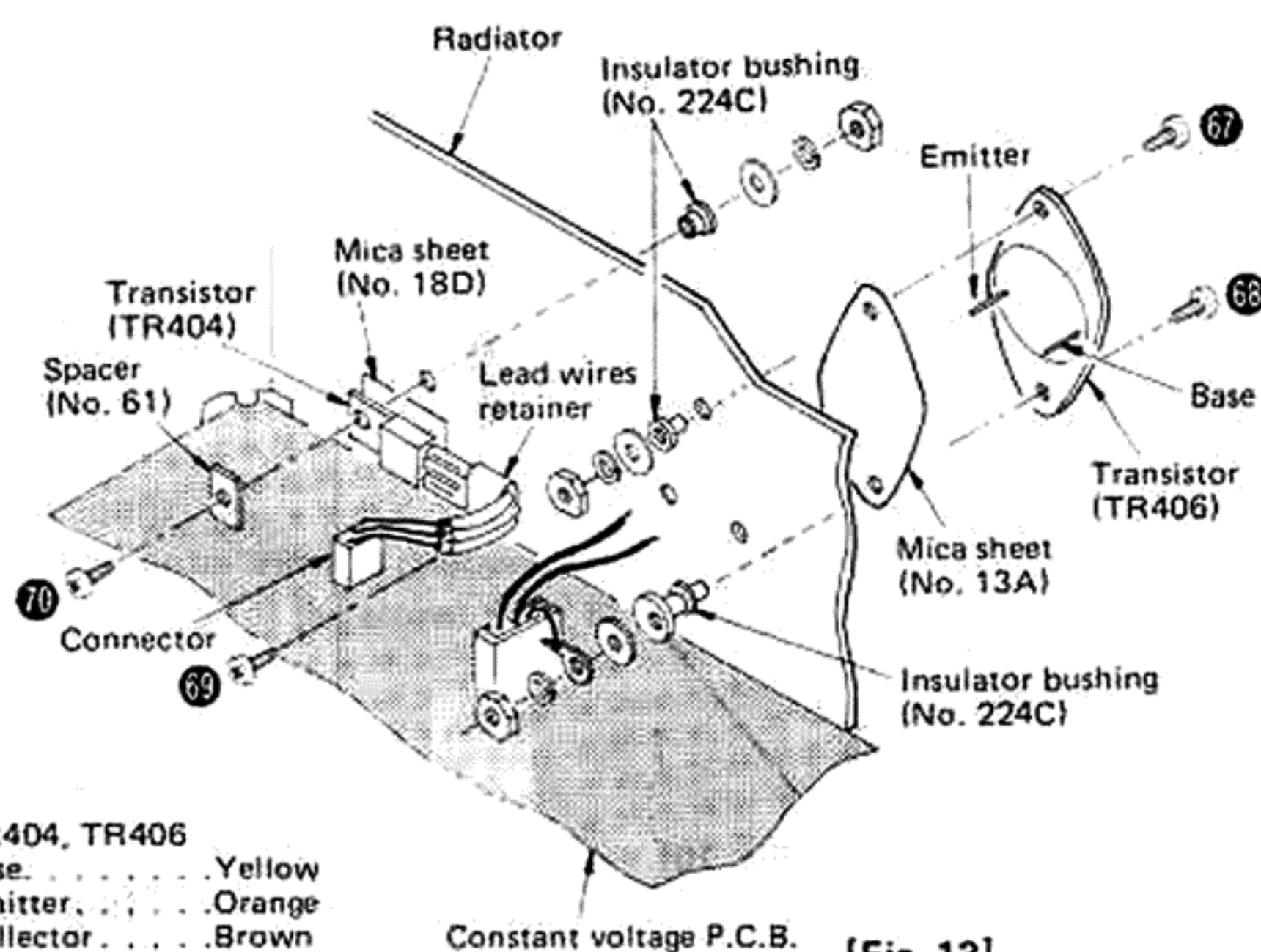
1. Remove the cabinet. (Refer to "How to remove the cabinet".)
2. Remove the fuse P.C.B. (Refer to "How to remove the fuse P.C.B.".)
3. Pull out the connector and remove the lead retaining screw (Fig. 3 : 69).
4. Remove the transistor setscrew (Fig. 13 : 70).
5. For fitting the transistor, refer to Fig. 13. Also, be sure to apply silicone compound (or equivalent heat diffuser) to both sides of mica sheet.



[Fig. 11]



[Fig. 12]



[Fig. 13]

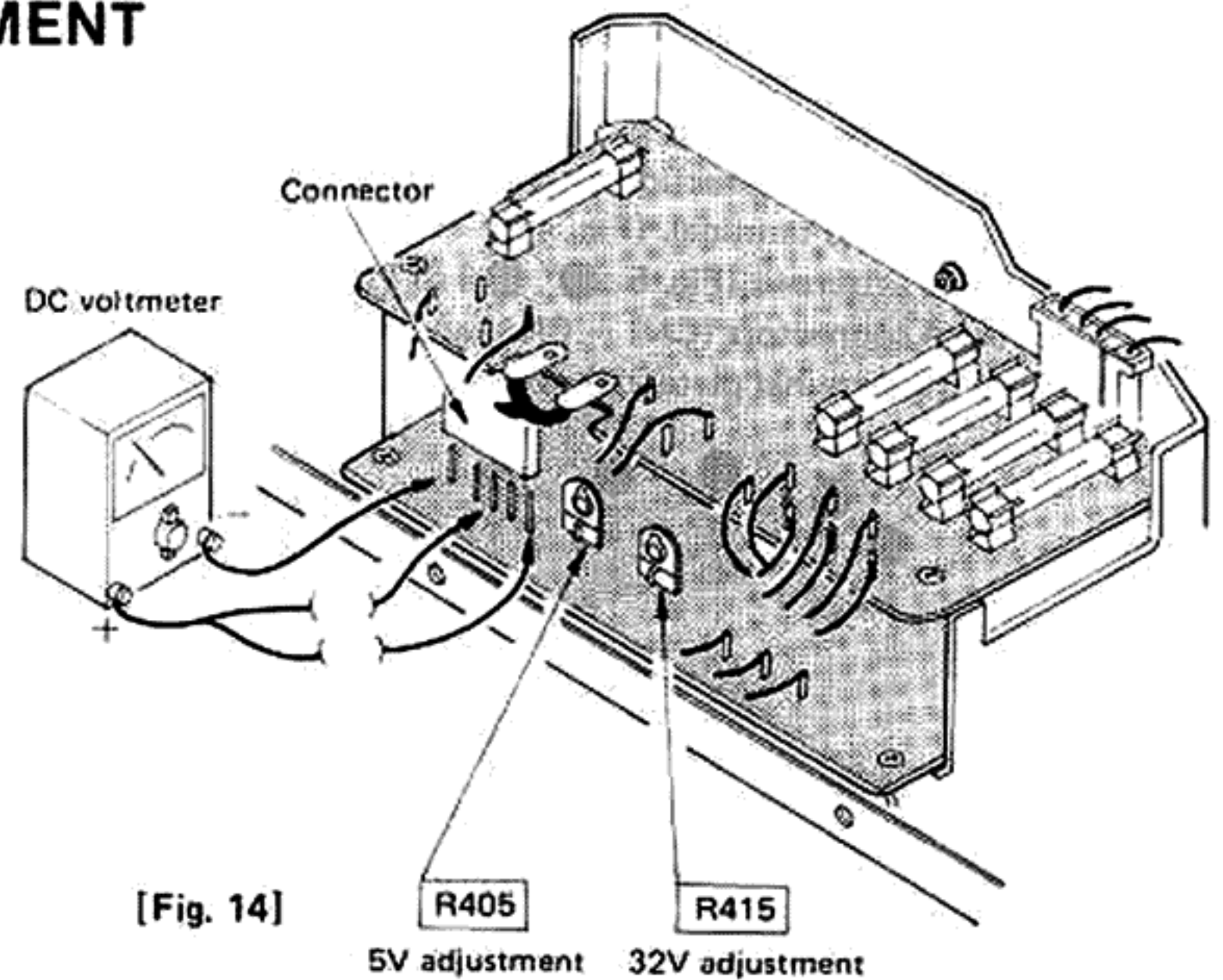
■ MEASUREMENTS AND ADJUSTMENT

● Instruments used

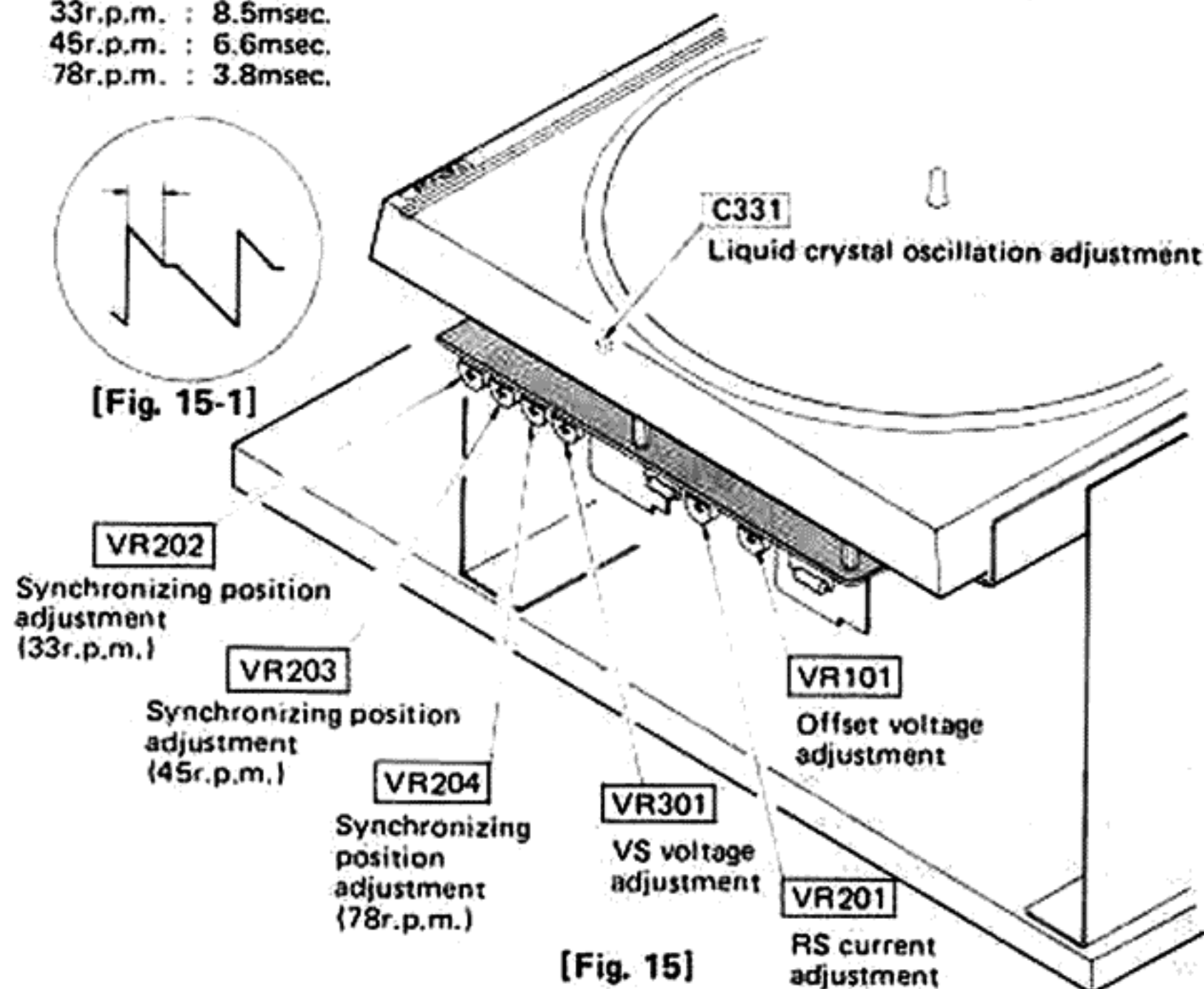
1. DC voltmeter.
2. Oscilloscope.
3. Frequency counter.
4. DC power source.

● Conditions of the set

1. Power unit (during constant voltage power supply adjustment).
 - (a) Remove the cabinet.
 - (b) Pull out the connector. (Fig. 14)
2. Main unit
 - (a) Remove the bottom cover.
 - (b) Place the set on the repair work table. (Fig. 15)



33r.p.m. : 8.5msec.
45r.p.m. : 6.6msec.
78r.p.m. : 3.8msec.

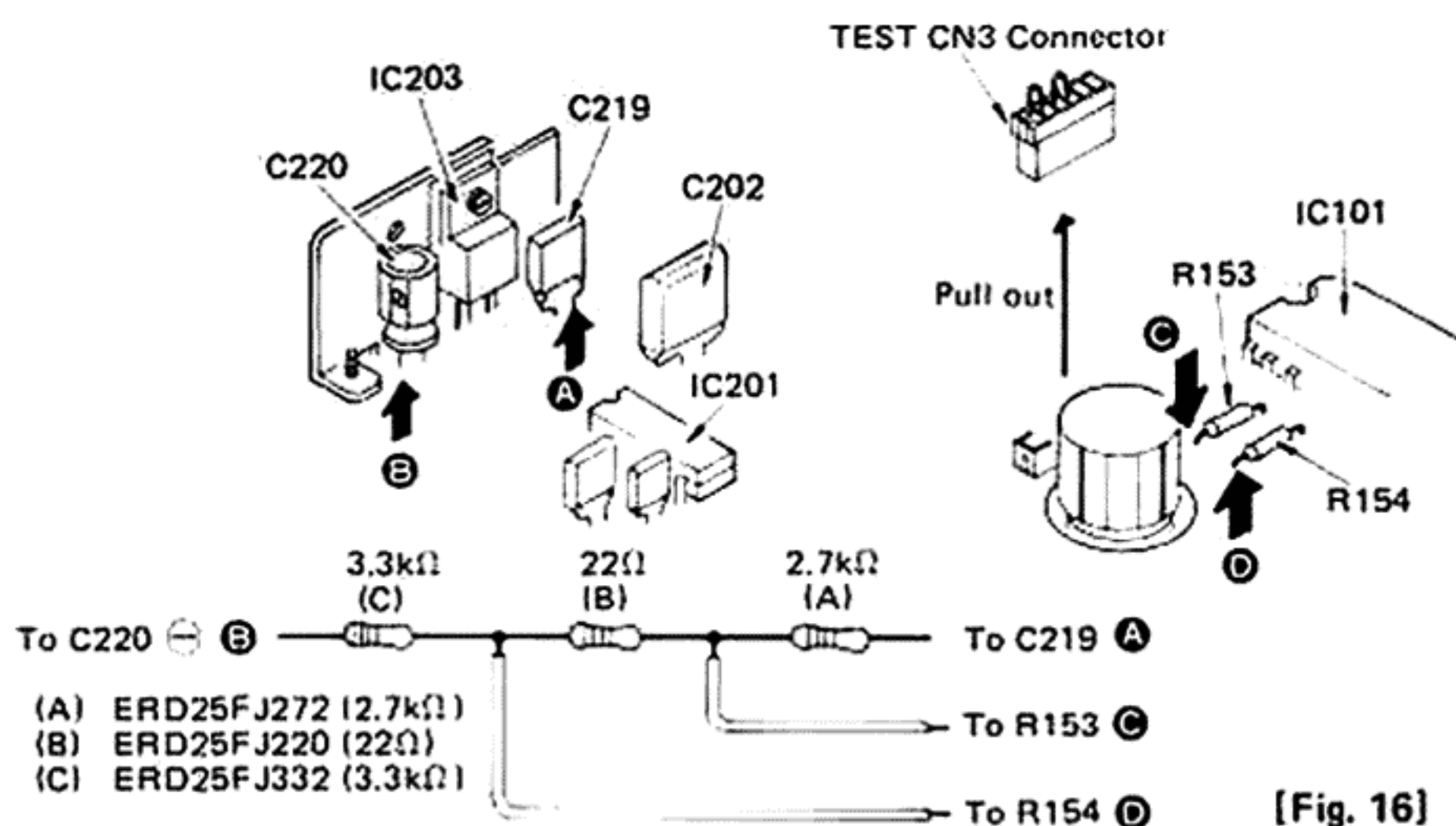


No.	Item	Preparations	Parts adjusted	Procedure
1	Constant voltage power supply	① Set power switch to "off". ② Set up power unit as in Fig. 14. ③ Connect DC voltmeter to 5V terminal (+) or 32V terminal (+) and to earth terminal. ④ Set power switch to "on".	R405 (+5V)	① Adjust R405 so that output voltage is +5V.
			R415 (+32V)	① Adjust R415 so that output voltage is +32V.
2	Offset voltage	① Set power switch to "off". ② Set up turntable platter as in Fig. 15. ③ Pull out TEST CN3 connector. ④ Apply 40 mV between TEST CN3 terminals ⑤ and ③ by use of DC power source. ⑤ Connect DC voltmeter between TEST CN1 terminals ② and ①.	VR101	① Set power switch to "on" and push start button. ② Adjust VR101 so that output voltage is 30 mV. ③ After completion of adjustment, insert TEST CN3 connector.

No.	Item	Preparations	Part adjusted	Procedure
3	Liquid crystal oscillation	① Set power switch to "off". ② Set up turntable platter as in Fig. 15. ③ Connect frequency counter to IC301 terminal ⑥.	C311	① Set power switch to "on". ② Adjust C311 so that frequency is 273.60 kHz.
4	VS voltage	① Set power switch to "off". ② Set up turntable platter as in Fig. 15. ③ Connect DC voltmeter to TEST CN2 terminal ② (or IC201 terminal ⑦) and TEST CN2 terminal ① (-).	VR301	① Set power switch to "on" and push speed selector button "33". ② Adjust VR301 so that output voltage is 2.1V.
5	RS current	① Set power switch to "off". ② Set up turntable platter as in Fig. 15. ③ Connect DC voltmeter across TEST CN2 terminals ② and ④ (or IC201 terminals ⑥ and ⑧).	VR201	① Set power switch to "on" and push start button. (33r.p.m.) ② Adjust VR201 so that output voltage is 0V.
6	Synchronizing position	① Set power switch to "off". ② Set up turntable platter as in Fig. 15. ③ Connect oscilloscope across TEST CN2 terminal ⑤ (or IC201 terminal ②) and TEST CN2 terminal ① (-).	VR202 (33r.p.m.) VR203 (45r.p.m.) VR204 (78r.p.m.)	① Set power switch to "on" and push start button. ② Shift speed selector to "33", "45" and "78". ③ Adjust waveform period (T) of Fig. 15-1. 33r.p.m. 8.5msec 45r.p.m. 6.6msec 78r.p.m. 3.8msec

● Adjusting method without DC power for offset voltage adjustment

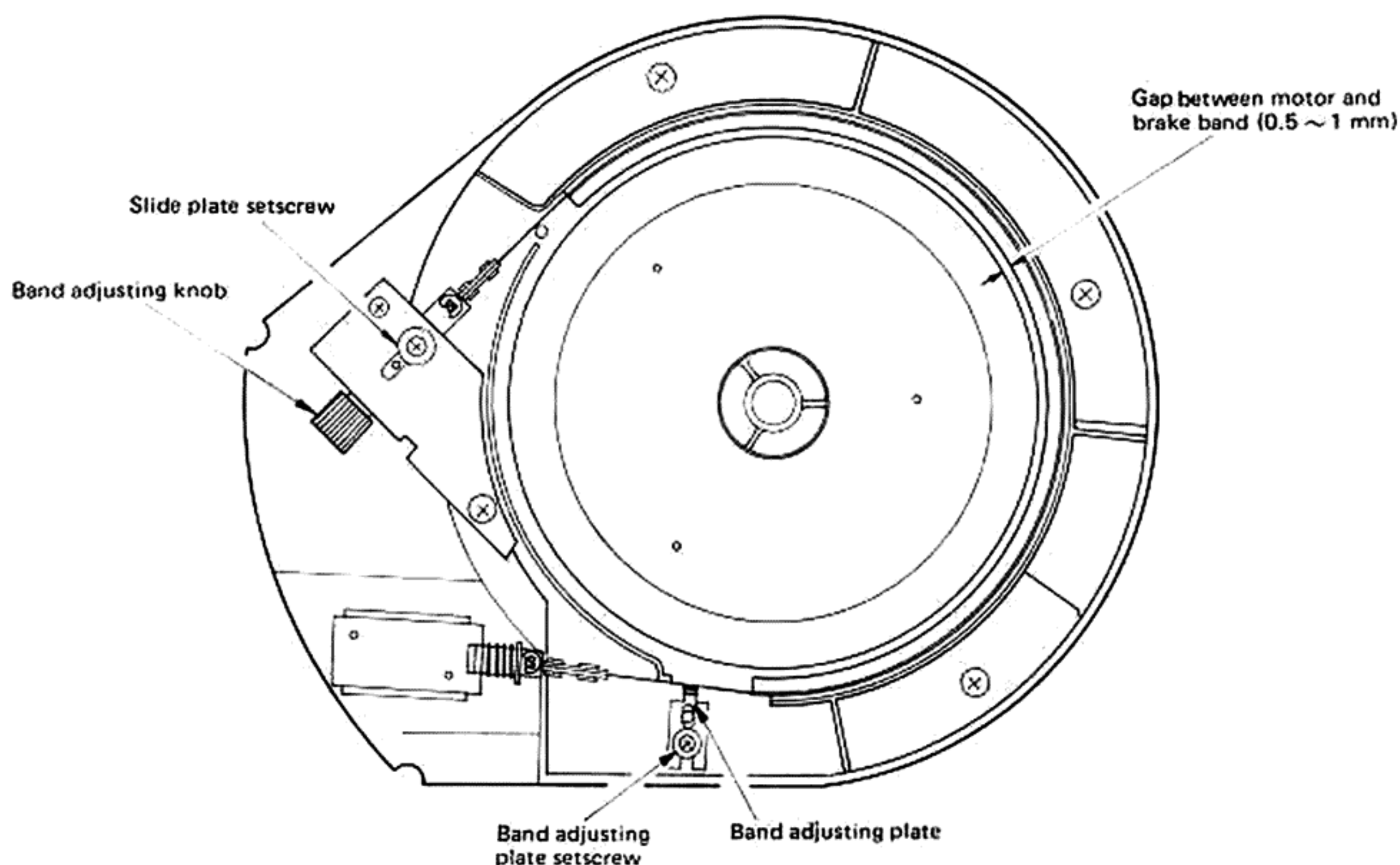
1. Remove the bottom cover.
2. Solder the 3 resistors and connect the lead wire across resistor B. (Fig. 16)
3. Pull out TEST CN3 connector and connect the lead wire from both ends of resistor B to R153 and R154 (or CN3 terminals ⑤, ③).
4. Set up turntable platter as in Fig. 15.
5. Connect DC voltmeter across TEST CN1 terminals ② and ①.
6. Set power switch to "on" and push start button.
7. Adjust VR101 so that output voltage is 30 mV.
8. After completion of adjustment, remove resistor and lead wire, then insert TEST CN3 connector.



[Fig. 16]

- **Mechanical brake adjustment (Fig. 17)**

1. Remove the turntable mat and turntable platter.
2. Remove the brake cover.
3. Loosen the slide plate setscrew and band adjusting plate setscrew.
4. Adjust the band adjusting knob so that the gap between motor and brake band 0.5 ~ 1.0 mm. Next, make the fine adjustment by the band adjusting plate.
5. Tighten the slide setscrew and band adjusting plate setscrew.



[Fig. 17]

■ TROUBLE SHOOTING

Repair and check the set . . .

- **Power unit (SH-10EA)**

1. Remove the cabinet. (See Fig. 14 on page 9.)

- **Main unit (SP-10MK2A)**

1. Remove the bottom cover.
2. Remove the P.C.B. and terminal plate.
(Refer to Fig. 4, 5 on page 6.)
3. Place the set on the repair work table. (See Fig. 18.)

Note: Connect the P.C.B. earth terminal and the terminal plate earth terminal with clip lead.



[Fig. 18]

Turntable platter
does not rotate.

Check constant voltage circuit (power unit)

1. AC voltage (42.0V) across power transformer brown to brown leads.
2. Check DC voltage of TR405 ~ TR410.

NO

1. F2, F5, S1
Power transformer
2. D403 ~ D406
TR405 ~ TR410

YES

DC voltage of CN1 terminal ③ (turntable)
..... 32V

NO

DC connector

YES

Constant voltage circuit (Main unit)

1. DC voltage of IC203
① 21.6V, ② 0V, ③ 12V
2. DC voltage of Q301
① 8.4V, ② 5.6V, ③ 5V
3. DC voltage of IC104
① 24.9V, ② 12V, ③ 17V
4. DC voltage of IC105
① 15V, ② 0V, ③ 12V

NO

1. R221, IC203
C219, C220
2. R316 ~ R318
D302, Q301
3. R113, C114,
C115, IC104
4. R134, C116
C117, IC105

YES

Start/Stop Circuit

1. DC voltage of IC301 pin ④.
It is initially "H" (3.1V), repeating
"H" ↔ "L" (0V) each time S2
(start/stop) is pushed.
2. DC voltage of IC301 pin ⑤.
It is initially "L" (0V), repeating
"L" ↔ "H" (3.6V) each time S2
is pushed.

NO

S2 (start/stop)
IC305, IC306, IC301

YES

Drive circuit

1. Check DC voltage and waveform of IC101.
2. Check conduction of drive coil (0Ω).
3. Check voltage and waveform of Q140 ~ Q145 (drive circuit).
4. Check voltage of IC103 (voltage shift circuit)
⑤ - ⑥ 12V, ⑦ 11.9V

NO

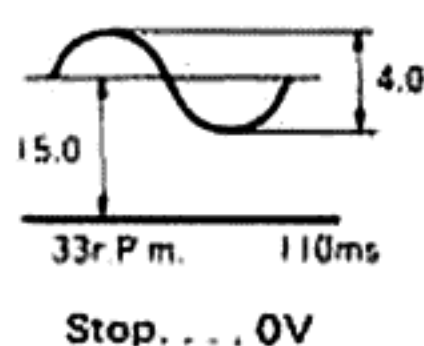
1. IC101
2. Armature coil
(A1 ~ A3)
3. Q140 ~ Q145
Q103 ~ Q105
4. IC103, Q106, Q107
Adjustment of
VR101

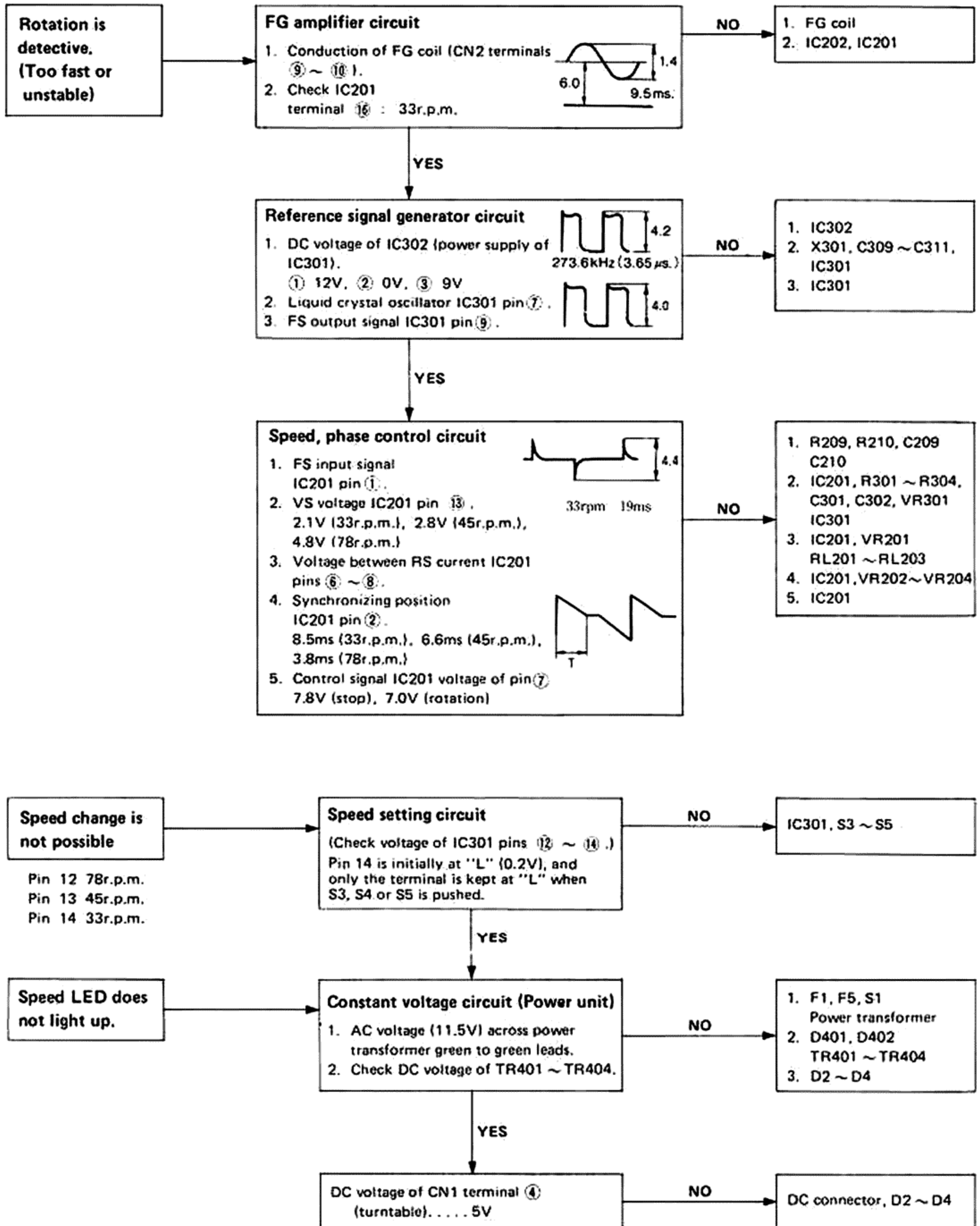
• Drive Circuit

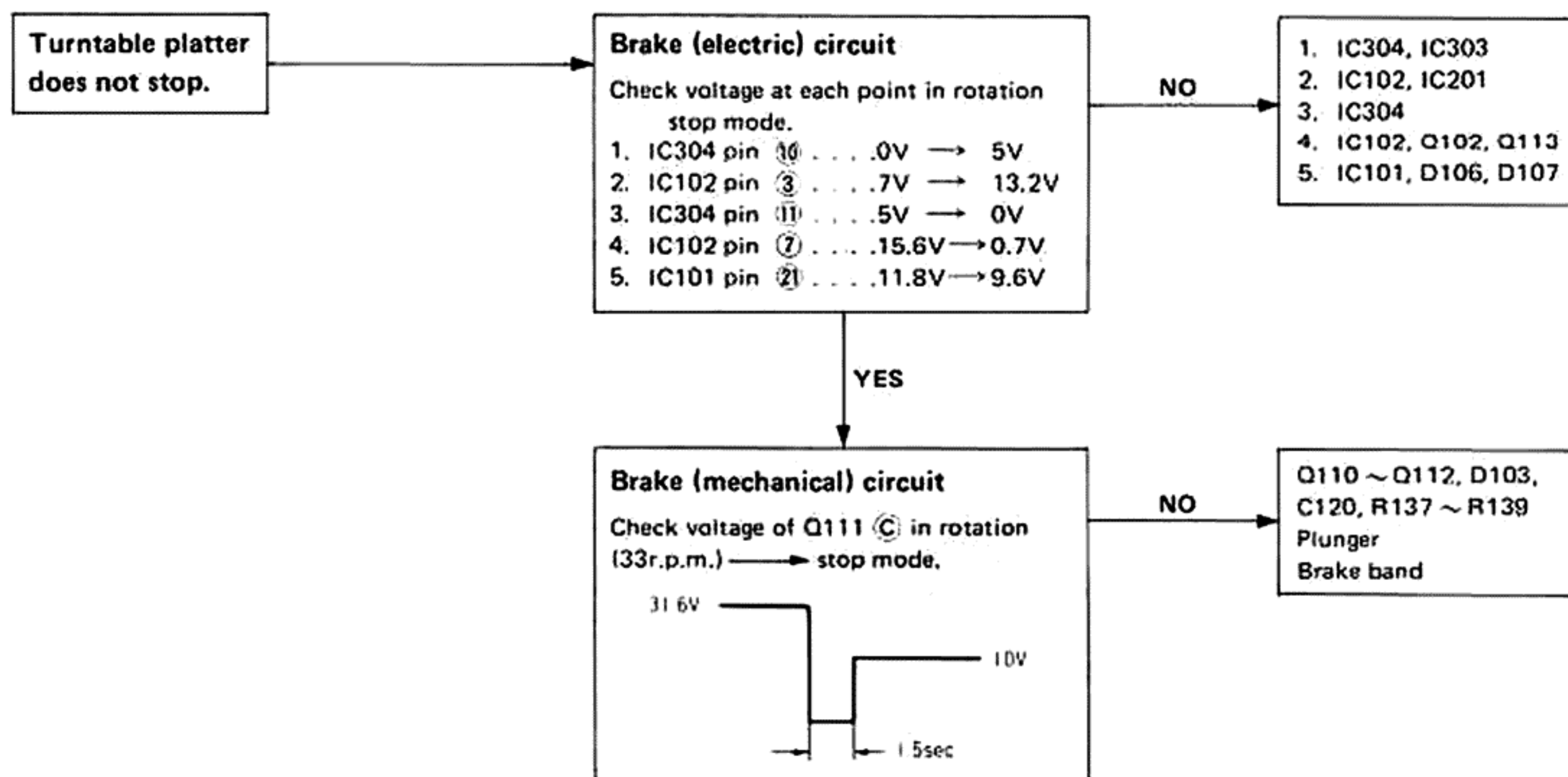
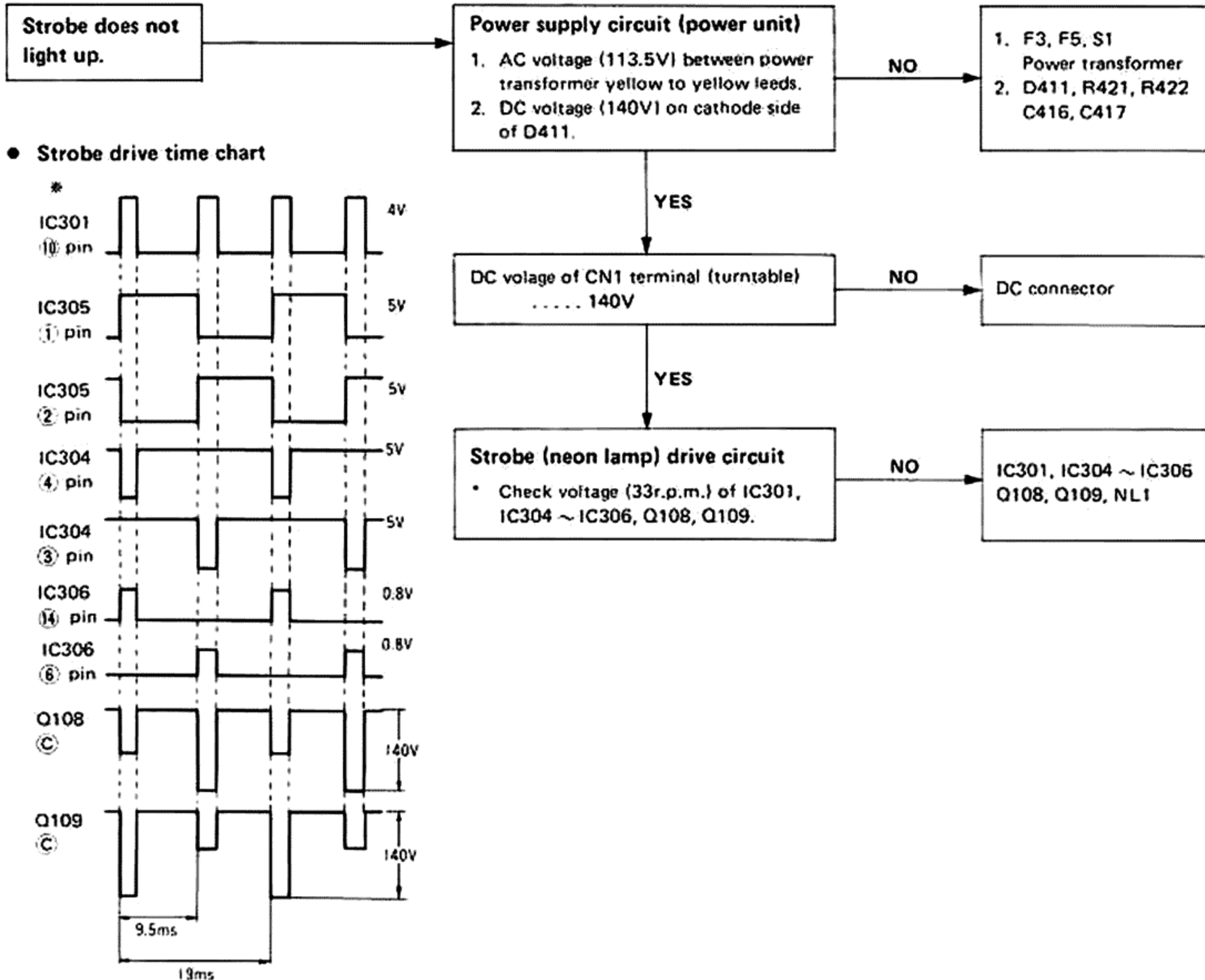
• IC101 AN640G

No.	Stop	Start (33r.p.m.)
1		0.7
2	0	
3		110ms
4	6.9	6.9
5	5.2	7.0
6	0.3	2.7
10		
12	6.7	110ms
14		6.5
11		1.0
		20μs
13		1.4
15		20μs
16	0	
17	6.8	6.8
18		8.0
		20μs
19		12.0
20	0.7	1.7
21	9.6	11.8
22		
23	11.5	11.5
24		

• Collector of Q140, Q141
Collector of Q142, Q143
Collector of Q144, Q145







RESISTORS AND CAPACITORS

- Notes:**
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

3. The "S" mark is service standard parts and may differ from production parts.

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value
ERX	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value

Resistor type	Wattage	Tolerance
ERD: Carbon	25 : 1/4W	F : $\pm 1\%$
ERG: Metal Oxide	50 : 1/2W	J : $\pm 5\%$
ERO: Metal Film	1A: 1W	
ERX: Metal Film	2A: 2W	

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity
ECEA	50	M	R47	R
Type	Voltage	Regularity use	Value	Special use

Capacitor Type	Voltage	Tolerance
ECEA : Electrolytic	0J : 6.3V	J : $\pm 5\%$
ECEB : Electrolytic	1C : 16V	K : $\pm 5\%$
ECEA...N : Non Polar Electrolytic	1E : 25V	M : $\pm 20\%$
ECCD : Ceramic	1V : 35V	Z : $+80\%, -20\%$
ECQM : Polyester	1H : 50V	
ECQP : Polypropylene	ECQP1 : 100V	
ECQU : Polyester	ECQU1A : 125V	
ECKD : Ceramic		

Main Unit Section

Ref. No.	Part No.	Value
RESISTORS		
R101,102	ERD25FJ103	10k Ω
R103,104	ERD25FJ103	10k Ω
R105	ERD25TJ183	18k Ω
R106	ERD25FJ182	1.8k Ω
R107	ERD25TJ473	47k Ω
R108	ERD25FJ103	10k Ω
R109	ERD25FJ472	4.7k Ω
R110	ERD25FJ272	2.7k Ω
R111,112	ERD25FJ562	5.6k Ω
R113	ERD25TJ273	27k Ω
R114	ERD25FJ103	10k Ω
R115	ERD25FJ332	3.3k Ω
R116,117	ERD25FJ151	150 Ω
R118	ERD25FJ151	150 Ω
R119	ERD25FJ562	5.6k Ω
R120,121	ERD25FJ151	150 Ω
R122	ERD25FJ151	150 Ω
R123	ERD25FJ471	470 Ω
R124	ERD25FJ220	22 Ω
R125	ERD25FJ472	4.7k Ω
R126	ERD25TJ123	12k Ω
R127	ERD25FJ102	1k Ω
R128	ERD25FJ471	470 Ω
R129	ERD25TJ183	18k Ω
R130	ERD25FJ150	15 Ω
R131	ERD25TJ153	15k Ω
R132	ERD25FJ332	3.3k Ω
R133	ERD25FJ681	680 Ω
R134	ERG2ANJ331	330 Ω
R135,136	ERG1ANJ472	4.7k Ω
R137	ERD25TJ393	39k Ω
R138	ERD25FJ103	10k Ω
R139	ERG2ANJ121	120 Ω
R140,141	ERD25FJ103	10k Ω
R142,143	ERD25FJ103	10k Ω
R144,145	ERD25FJ103	10k Ω
R146,147	ERG2ANJ150	15 Ω
R148	ERG2ANJ150	15 Ω
R149	ERG2ANJR47	0.47 Ω
R150	ERD25TJ273	27k Ω
R152	ERD25FJ103	10k Ω
R153,154	ERD25FJ222	2.2k Ω
R155	ERD25TJ153	15k Ω

Ref. No.	Part No.	Value
R201	ERD25TJ224	220k Ω
R202	ERD25TJ393	39k Ω
R203	ERD25TJ183	18k Ω
R204	ERD25TJ473	47k Ω
R205	ERD25TJ154	150k Ω
R206	ERD25TJ473	47k Ω
R207	ERD25TJ273	27k Ω
R208	ERD25TJ473	47k Ω
R209	ERD25FJ222	2.2k Ω
R210	ERD25TJ223	22k Ω
R211	ERD25FJ222	2.2k Ω
R212	ERD25FJ272	2.7k Ω
R213	ERD25FJ102	1k Ω
R214,215	ERD25TJ224	220k Ω
R216	ERD25TJ393	39k Ω
R217	ERD25TJ563	56k Ω
R218,219	ERD25FJ103	10k Ω
R220	ERD25FJ221	220 Ω
R221	ERG2ANJ101	100 Ω
R222	ERD2FCG180	18 Ω
R301	ERD25FJ472	4.7k Ω
R302,303	ERD25TJ123	12k Ω
R304	ERD25TJ473	47k Ω
R305	ERD25FJ101	100 Ω
R306	ERD25FJ103	10k Ω
R307	ERD2FCG221	220 Ω
R308,309	ERD25FJ103	10k Ω
R310	ERD25FJ103	10k Ω
R311	ERD25TJ224	220k Ω
R312	ERD25FJ102	1k Ω
R313	ERD25TJ223	22k Ω
R314,315	ERD25FJ682	6.8k Ω
R316	ERD25FJ681	680 Ω
R317	ERD25FJ101	100 Ω
R318	ERG2ANJ101	100 Ω

Power Unit Section

Ref. No.	Part No.	Value
R401	ERD50FJ4R7	4.7 Ω
R402,403	ERD25FJ471	470 Ω
R404	ERD25FJ561	560 Ω
R406	ERD25FJ392	3.9k Ω
R407,408	ERD25FJ102	1k Ω
R409	ERD25FJ661	660 Ω
R410	ERD50FJ102	1k Ω

Ref. No.	Part No.	Value
R411	ERD25TJ512	5.1k Ω
R412	ERD25TJ432	4.3k Ω
R413	ERD50TJ202	2k Ω
R414	ERD25FJ392	3.9k Ω
R416	ERD25FJ682	6.8k Ω
R417	ERD50FJ561	560 Ω
R418	ERD25TJ513	5.1k Ω
R419	ERD25TJ912	9.1k Ω
R420	ERD50TJ112	1.1k Ω
R421	ERD25TJ104	100k Ω
R422	ERD50FJ561	560 Ω

Remote Control Unit Section

Ref. No.	Part No.	Value
R501	ERD25FJ101	100 Ω

Main Unit Section

Ref. No.	Part No.	Value
CAPACITORS		
C101	ECEA5022R2	2.2 μ F
C102	ECEA1HS100	10 μ F
C103,104	ECEA50M1R	1 μ F
C105	ECEA50M1R	1 μ F
C106	ECEA1HS100	10 μ F
C107	ECQM1H104JZ	0.1 μ F
C108	ECQM1H223JZ	0.022 μ F
C109	ECEA1CS331	330 μ F
C110	ECQM1H104JZ	0.1 μ F
C111	ECQM1H223JZ	0.022 μ F
C112	ECEA25N4R7S	4.7 μ F
C113,114	ECQM1H104JZ	0.1 μ F
C115	ECEA1VS330	33 μ F
C116	ECQM1H104JZ	0.1 μ F
C117	ECEA1ES101	100 μ F
C118,119	ECQM2102KZ	0.001 μ F
C120	ECEA1JS220	22 μ F
C121	ECEA1VS330	33 μ F
C122	ECQM1H104JZ	0.1 μ F
C140,141	ECQM1H103JZ	0.01 μ F
C142,143	ECQM1H103JZ	0.01 μ F
C144,145	ECQM1H103JZ	0.01 μ F
C146,147	ECEA1HS470	47 μ F
C148	ECEA1HS470	47 μ F

Ref. No.	Part No.	Value
C201	ECQM1H154KZ	0.15 μ F
C202	ECQP1124JZ	0.12 μ F
C203	ECQM1H562JZ	0.006 μ F
C204,205	ECQM1H103JZ	0.01 μ F
C206	ECQM1H104JZ	0.1 μ F
C207,208	ECQM1H154KZ	0.15 μ F
C209	ECQM1H103JZ	0.01 μ F
C210	ECQM1H222JZ	0.0022 μ F
C211	ECEA50Z1	1 μ F
C212	ECOV05224JZ	0.22 μ F
C213,214	ECQM1H273JZ	0.027 μ F
C215	ECQM1H103JZ	0.01 μ F
C216	ECEA50Z1	1 μ F
C217,218	ECEA1HS330	33 μ F
C219	ECQM1H104JZ	0.1 μ F
C220	ECEA1ES101	100 μ F
C301	ECEA50M1R	1 μ F
C302	ECEA50M2R2	2.2 μ F
C303	ECQM1H822JZ	0.0082 μ F
C304	ECEA1HS100	10 μ F
C305	ECKD1H102KB	0.001 μ F
C306	ECCD1H221K	220 μ F
C307	ECEA1CS330	33 μ F
C308	ECCD1H151K	150 μ F
C309	ECCD1H221K	220 μ F
C310	ECCD1H330K	33 μ F
C312	ECEA1CS330	33 μ F
C313	ECQM1H473JZ	0.047 μ F
C314,315	ECQM1H103JZ	0.01 μ F
C316	ECQM1H103JZ	0.01 μ F

Power Unit Section

Ref. No.	Part No.	Value
C401	ECQU1A473MD	0.047 μ F
C408	ECQM6103MZ	0.01 μ F
C409	ECQM1H822JZ	0.0082 μ F
C410	ECEB1CS102	1.000 μ F
C411,412	ECEA1ES101	100 μ F
C413	ECQM80R1000X	1.000 μ F
C414,415	ECEA1HS101	150 μ F
C416	ECEB2CS101	100 μ F
C417	ECEA160V22	22 μ F

● IC101 AN640G (Motor drive)

No.	Symbol	Description	No.	Symbol	Description	No.	Symbol	Description
1	AN1	Single-phase drive output (lower)	9	EN	Rotating speed output	17	PCOM	Oscillation amplitude adjuster
2	AN2	2-phase drive output (lower)	10	C3	3-phase wave detection condenser	18	OSC	Oscillation coil
3	AN3	3-phase drive output (lower)	11	P3	3-phase position detection coil	19	VCC	Power supply
4	EC	Torque command input	12	C2	2-phase wave detection condenser	20	PC	Phase compensating condenser
5	ECR	Torque command input	13	P2	2-phase position detection coil	21	CS	Current detection
6	AC	Medium point voltage	14	C1	Single-phase wave detection condenser	22	AP1	Single-phase drive output (upper)
7	ED	Rotational direction command	15	P1	Single-phase position detection coil	23	AP2	2-phase drive output (upper)
8	ER	Rotational direction output	16	GND	Ground (earth)	24	AP3	3-phase drive output (upper)

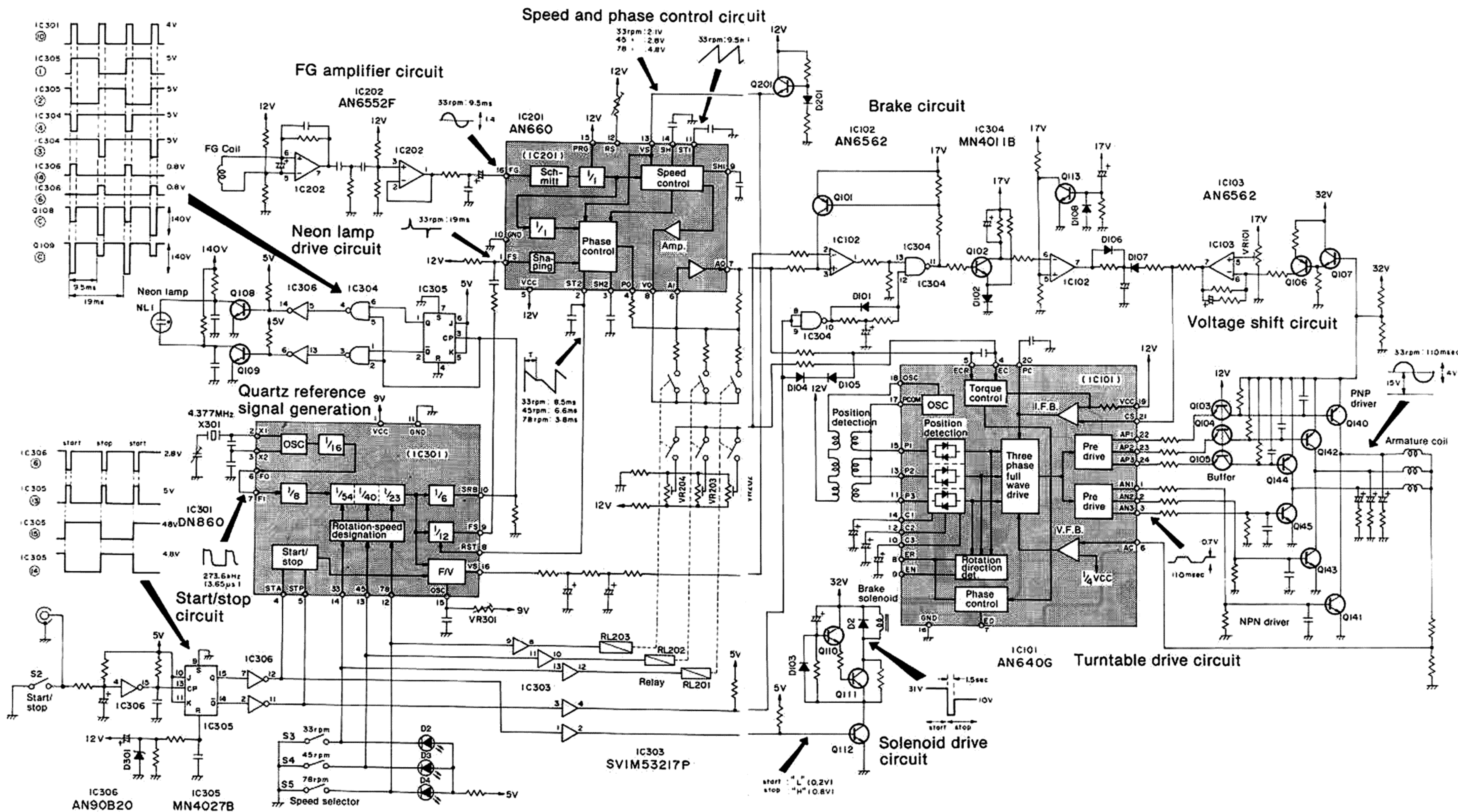
● IC201 AN660 (Motor control)

No.	Symbol	Description	No.	Symbol	Description	No.	Symbol	Description
1	FS	Reference pulse input	A7	AO	Amplifier output	13	VS	Voltage adjustment (amplifier)
2	ST2	Triangular wave generation	A8	VO	Speed output	14	SH	Voltage sample pulse generation
3	SH2	Sample hold (phase control)	9	SH1	Sample hold (speed control)	15	PRG	FG signal frequency division
4	PO	Phase difference output	10	GND	Ground (earth)	16	FG	FG signal input
5	VCC	Power supply	11	ST1	Triangular wave generation			
6	AI	Amplifier input	12	RC	Current adjustment (amplifier)			

● IC301 DN860 (Reference signal generation)

No.	Symbol	Description	No.	Symbol	Description	No.	Symbol	Description
1	VCC	Power supply	7	FI	Frequency dividing input	13	45	45r.p.m. setting
2	OS1	Liquid crystal oscillator	8	RST	Reset input	14	33	33r.p.m. setting
3	OS2		9	FS	Reference frequency output	15	OSC	Oscillation time constant setting
4	STA	Start terminal	10	SRB	Strobe signal output	16	VS	f/v conversion output
5	STP	Stop terminal	11	GND	Ground (earth)			
6	FO	1/16 frequency dividing output	12	78	78r.p.m. setting			

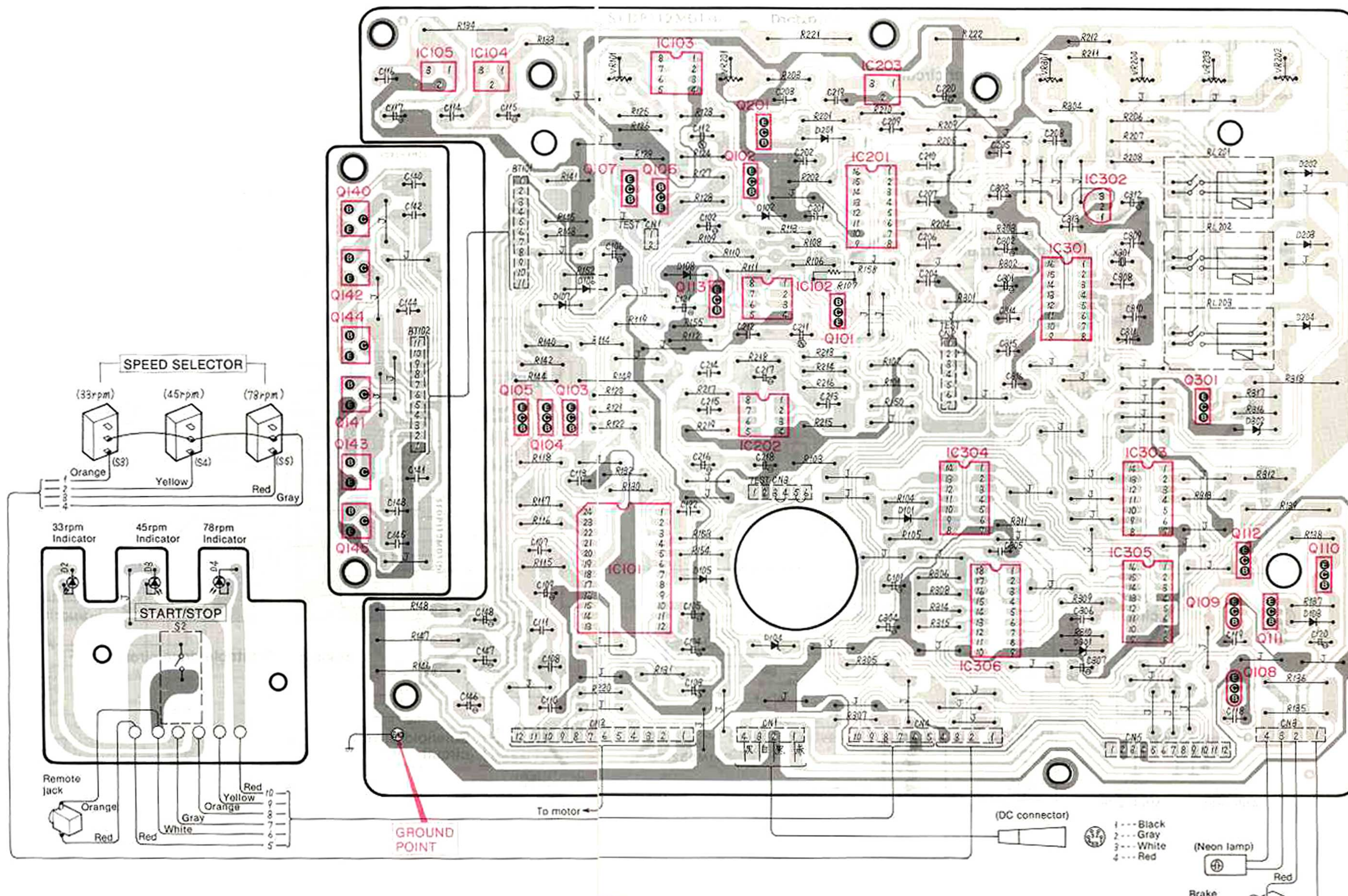
■ BLOCK DIAGRAM



■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

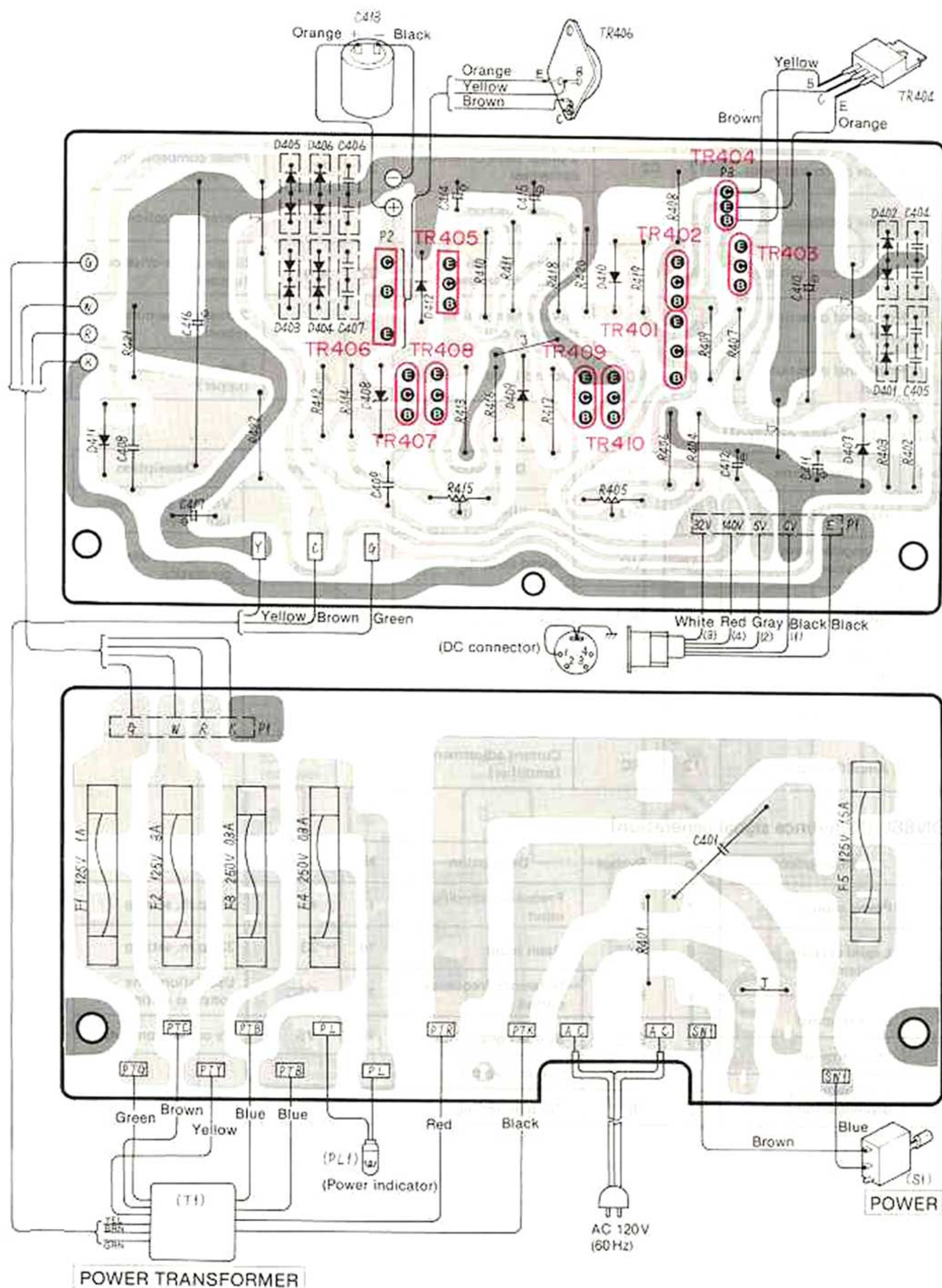
Ground (Earth) line

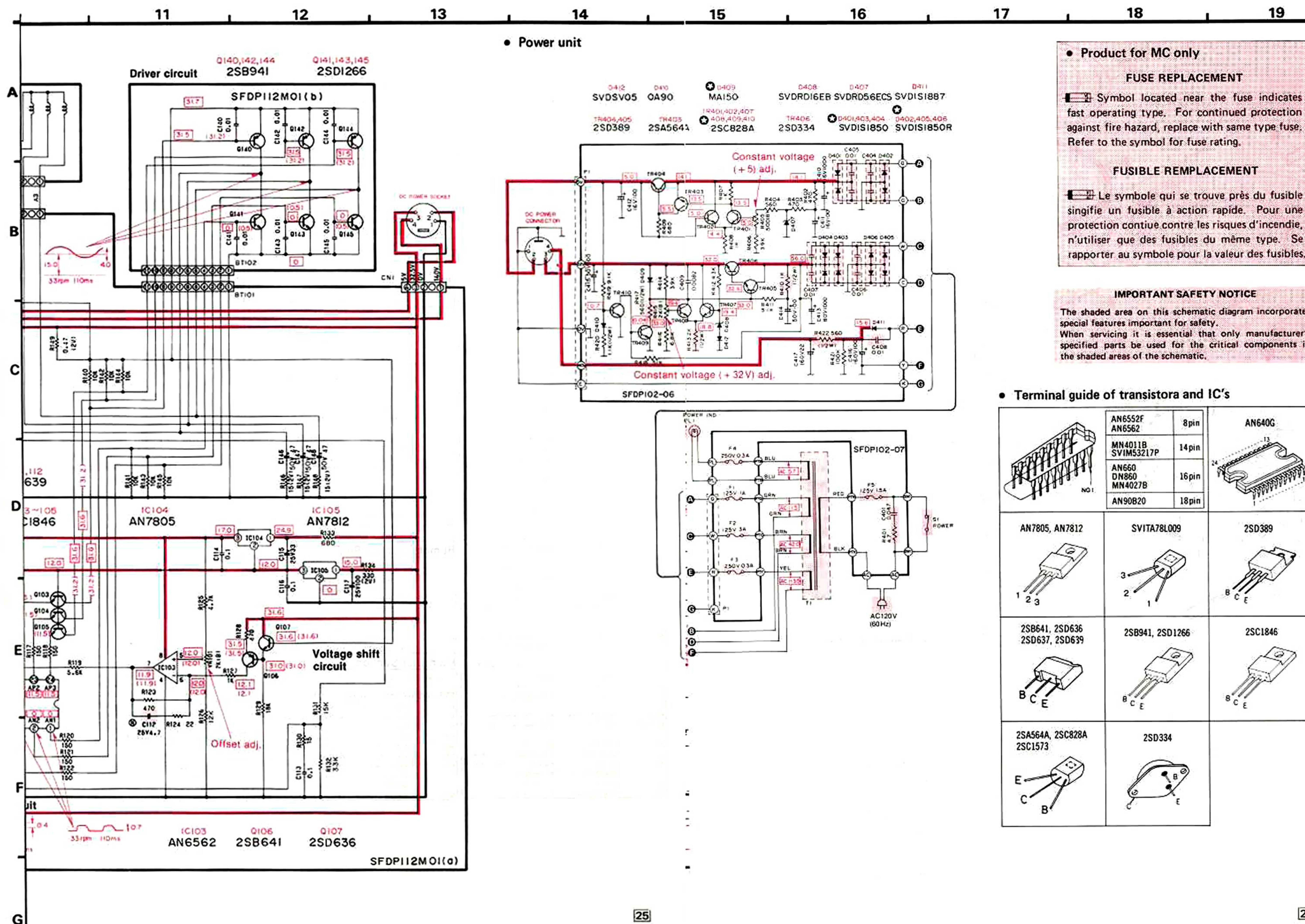
• Main unit



• Power unit

The P.C.B. of power unit is also used for power unit (SH-10E) of SP-10 Mark II. So, transistor is indicated by "TR".





■ SCHEMATIC DIAGRAM

Notes:

1. **S1** : Power switch in "on" position.
2. **S2** : Start/stop switch.
3. **S3** : Speed selector (33r.p.m.) switch.
4. **S4** : Speed selector (45r.p.m.) switch.
5. **S5** : Speed selector (78r.p.m.) switch.
6. **S6** : Start/stop switch. (Remote control unit SH-10R).

7. The value in \square is the reference voltage at stop of turntable, measured by DC electronic tester (high-impedance) on the basis of chassis. Therefore, the measured value may include some error depending on the internal impedance of DC circuit tester and other condition.

* Those \square are voltage in rotation.

8. \oplus B voltage lines.

9. The part No. of transistor, IC and diodes mentioned in

■ REPLACEMENT PARTS LIST

- Notes:**
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
 2. Important safety notice:
Components identified by Δ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
 3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

4. The "S" mark is service standard parts and may differ from production parts.

Areas

- * [M] is available in U.S.A.
- * [MC] is available in Canada.

Main Unit Section

Ref. No.	Part No.	Description
INTERGRATED CIRCUITS		
IC101	AN6400	Motor Drive
IC102,103	AN6567	Brake Circuit
IC104	AN7805	Regulator(5V)
IC105	AN7812	Regulator(12V)
IC201	AN660	Motor Control
IC202	AN6552F	FG Amp.
IC203	AN7812	Regulator(12V)
IC301	DN860	Reference Signal Generation
IC302	SVTA78L009	Regulator(9V)
IC303	SVIM53217P	Relay Drive
IC304	MN4011B	Neon Lamp Drive/Brake Circuit
IC305	MN4027B	Start/Stop & Neon Lamp Drive Circuits
IC306	AN90B20	Start/Stop & Neon Lamp Drive Circuits
TRANSISTORS		
Q101,106	2SB641	Brake & Voltage Shift Circuit
Q102,107,113,201,301	2SD636	Brake/Voltage Shift & Regulator Circuit
Q103~105	2SC1846R	Buffer
Q108,109	2SC1573	Neon Lamp Drive
Q110	2SD637	Brake Timer Circuit
Q111,112	2SD639	Brake Solenoid Drive
Q140,142,144	2SB941	PNP Driver
Q141,143,145	2SD1265	NPN Driver
DIODES		
D1	SVD151887	
D2~4	LN22L	Speed Indicator

Main Unit Section

Ref. No.	Part No.	Description
D101~103,105,108,201~204	MA162A	Switching
D104	MA1047M	4.7V Zener
D301	MA1051M	5.1V Zener
D302	MA1056M	5.6V Zener
CRYSTAL		
X301	SVQ18C4377	4.377MHz
VARIABLE RESISTORS		
VR101	EVMH0GA00B23	Offset Adjustment, 2k Ω B
VR201,301	EVMH0GA00B24	VS Voltage and RS Current Adj. 20k Ω B
VR202~204	EVMH0GA00B14	Synchronizing Position Adj. 10k Ω B
RELAYS		
RL201~203	SFDYC10-01	
TRIMER		
C311	ECV1ZW20X53T	OSC Adj.
LAMP		
NL1	SFDN102-01E	with Connector
MOTOR		
Motor	SFMZ102-01E	
SWITCHES		
S2~5	SFDSSSL1-C	Start/Stop & Speed Select
SOLENOID		
L3	SFDZSD1AC10	Brake

Power Unit Section

Ref. No.	Part No.	Description
TRANSISTORS		
TR401,402	2SC828A-R	Regulator

Power Unit Section

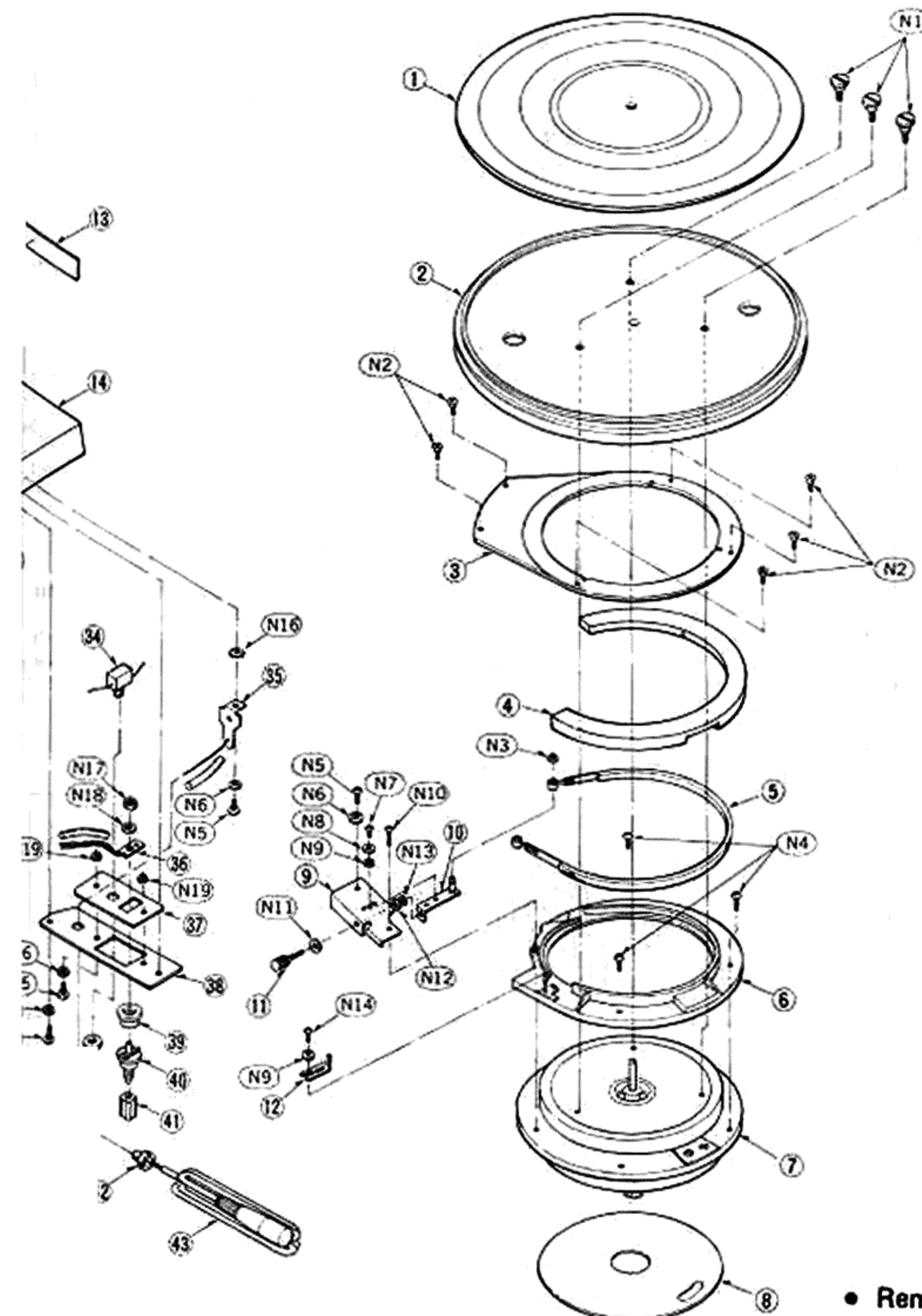
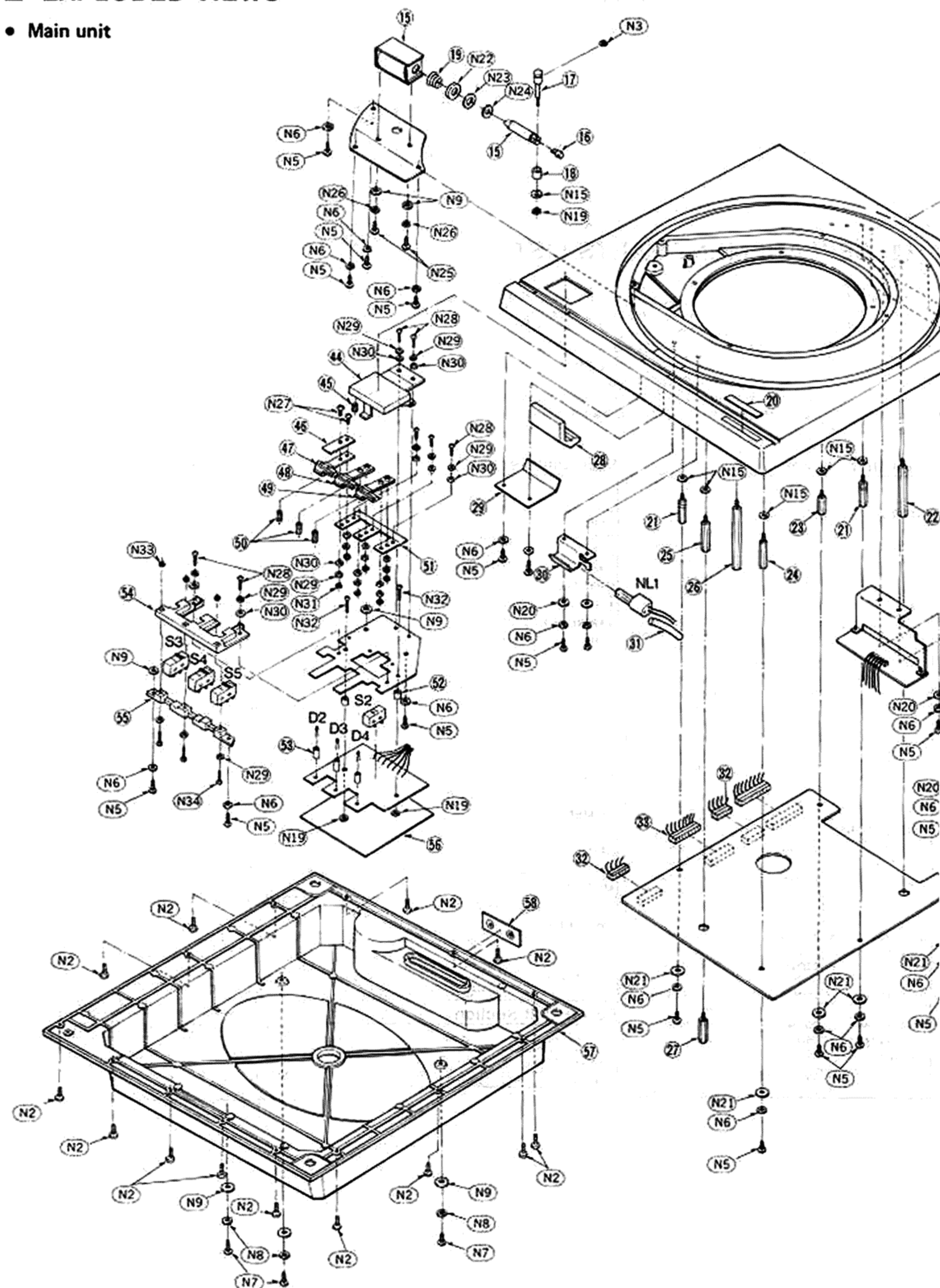
Ref. No.	Part No.	Description
TR403	2SA722-S	Regulator
TR404,405	2SD389A-Q	Regulator
TR406	2SD334	Regulator
TR407~410	2SC828A-R	Regulator
DIODES		
D401,403,404	RVD100C4	Rectifier
D402,405,406	RVD100C4R	Rectifier
D407	SVDRD5.6ECS	5.6V Zener
D408	SVDRD16EB	16V Zener
D409	MA162A	
D410	20A90	
D411	SVD151887	Rectifier
D412	SVDSV05	
SWITCH		
S1	SSLA37S	Power
POWER TRANSFORMER		
T1	ETP76BL1A	
FUSES		
F1	XBA1F10NU100	126V,1A
F2	XBA1F30NU100	125V,3A
F3,4	XBA2F03NU100	250V,0.3A
F5	XBA1F15NU100	125V,1.5A
PILOT LAMP		
PL1	XAM37K250	Power
COMPONENT COMBINATIONS		
C404~407	RXAF103P22HD	0.01 μ F X2
VARIABLE RESISTORS		
R405	EVT50AA00B52	5V A.d.,500 Ω B
R415	EVT50AA00B23	32V A.d.,2k Ω B
BLOCK CAPACITOR		
C413	ECEM80R1000X	80V 1000 μ F

Remote Control Unit Section

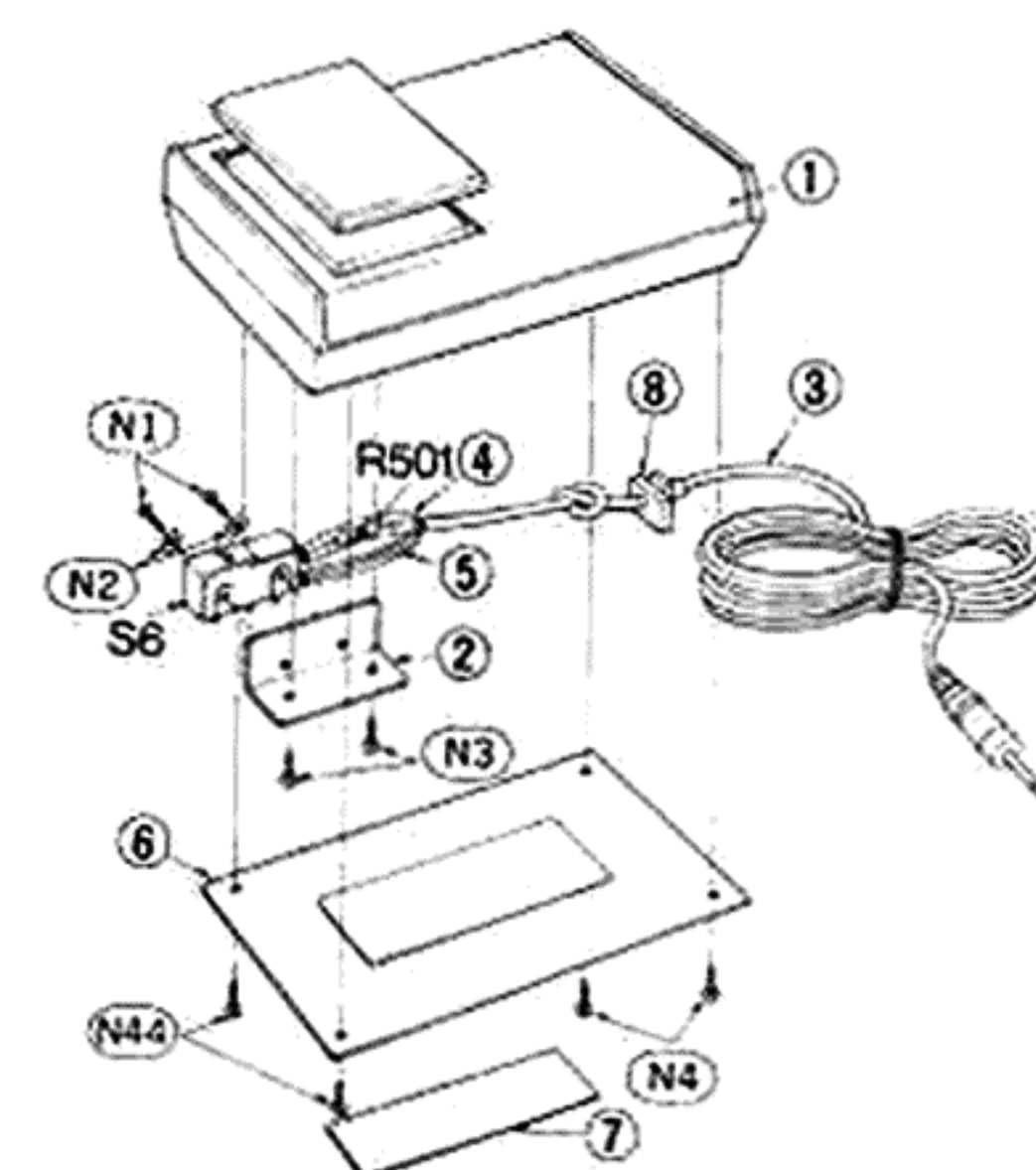
Ref. No.	Part No.	Description
SWITCH		
S6	SFDSSSL1-C	Start/Stop

EXPLODED VIEWS

• Main unit



• Remote control unit



Main Unit Section

Ref. No.	Part No.	Description
CABINET and CHASSIS PARTS		
1	SFTG172-01	Turntable Mat
2	SFTE102-01E	Turntable Platter
3	SFUP102-06	Cover, Brake
4	SFTG102-03	Rubber, Brake
5(M)	SFTG102M02	Belt, Brake
5(MC)	SFTG102-03	Belt, Brake
6	SFUM102-01	Case, Brake Belt
7	SFMZ102-01E	Motor
8	SFUZ102-04	Sheet, Shield
9	SFUP102-07	Adjusting Base, Brake Belt
10	SFUP102-05E	Lever, Slide
11	SFXJ102-02	Knob, Brake Belt Adjustment
12	SFUP102-15	Adjusting Plate, Brake Belt
13(M)	SFNN112M01	Name Plate
13(MC)	SFNN112C01	Name Plate
14	SFAC112N01	Cabinet
15	SFDZSD1AC10	Brake Solenoid
16	SFGH102-01	Cushion Rubber, Brake
17	SFXJ102-03	Shaft, Belt Stopper
18	SFXD102-01	Spacer, Belt Stopper Shaft
19	SFOA102-01	Spring, Brake Solenoid
20	SFKB109N01	Badge
21	SFXJ112N01	Shaft (18.5mm), P.C. Board Fixing
22	SFXJ102-04	Shaft (48.5mm), Bottom Board Fixing
23	SFXJ112N03	Shaft (12.7mm), P.C. Board Fixing
24	SFXJ112N07	Shaft (29.5mm), P.C. Board Fixing
25	SFXJ112N02	Shaft (26mm), P.C. Board Fixing
26	SFXJ102-10	Shaft (61mm), Bottom Board Fixing
27	SFXJ112N04	Shaft (20.9mm), P.C. Board Fixing
28	SFUM102-02	Cover, Strobe
29	SFUP102-02	Holder, Strobe Cover
30	SFUP102-08	Holder, Neon Lamp
31	SFEB3UT75	Tube, Neon Lamp
32	SFDJ12804S	Connector, 4pins
33	SFDJ12810S	Connector, 10pins
34	RJJ10C	Jack, Remote Control
35	SFER1E	Terminal, Ground Wire
36	RJT719	Terminal, G.N.D
37	SFUZ102-05	Plate, Remote Control Jack Fixing
38(M)	SFUP102M03	Plate, DC Cord Fixing
38(MC)	SFUP102-03	Plate, DC Cord Fixing
39	SGE103	Terminal Holder, G.N.D
40	SNE271S	Terminal Screw, G.N.D
41	SNE273-1	Knob, G.N.D
42	SFSR5N4	Bushing, D.C. Cord
43(M)	SFDJ102M01E	D.C. Cord, with Plug
43(MC)	SFDJ102-01E	D.C. Cord, with Plug
44	SFKT102-01R	Button, Start/Stop
45	SFOA102-03	Spring, Start/Stop Button
46	SFUP102-18	Plate, Speed Select Button
47	SFKT102-02E	Button, 33r.p.m
48	SFKT102-03E	Button, 45r.p.m
49	SFKT102-04E	Button, 78r.p.m

Ref. No.	Part No.	Description
50	SFOA102-02	Spring, Speed Select Button
51	SFUM102-05	Hinge, Speed Select Button
52	SFX0102-02	Pipe, P.C. Board Fixing
53	SFUM102-04	Holder, L.E.D
54	SFUM102-06	Upper Cover, Speed Select Switch
55	SFUM102-07	Lower Cover, Speed Select Switch
56	SFUZ102-06	Sheet, Isolation
57	SFAU102-01A	Bottom Board
58	SFNZ102-02	Label, Remote Control

Power Unit Section

Ref. No.	Part No.	Description
1	SFKK10E-02A	Front Panel, with Felt and Panel Light
1-1	SFUZ10E-01	Felt
1-2	SGLA9	
2	SBLA4-3	Knob, Power Switch
3	SFUZ10E-03	Sheet, Power Switch
4	SJS5307	Connector, 3pins (TR400)
5	SFEZ196	Latch, P.C. Board Fixing
6	SFDJ-S3P-SHF	Connector, 3pins (TR404)
7	SFEZNR-3N	Clamper
8	SJT345	Holder, Fuse
9	SMZA6091	Holder, Pilot Lamp
10	SFDJ83PSHF	Terminal, 3pins (TR404)
11	SJS5405	Connector, 4pins
12	SFDJD4F	Socket, D.C
13	SJS5505	Connector, 5pins
14	SFER1C	Terminal, G.N.D and TR404
15	SFUP10E-05	Fixing Plate, A.C. Cord
16	RJA9YA-K	A.C. Cord
17	SFHK0404	Bushing, A.C. Cord
18	SFEB6UT220	Tube, A.C. Cord
19	SFUP10E-01A	Rear Panel
20	SFX010E-10	Spacer
21	SFUP10E-02E	Cabinet
22(M)	SFNN10EM03	Name plate
22(MC)	SFNN10EC03	Name plate

Remote Control Section

Ref. No.	Part No.	Description
1	SFUM10R01R	Case, with Start/Stop Button
2	SFUP10R02	Plate, Micro Switch
3	SFEZ10R-01	Shield Cord
4	SFEB3UT20	Tube, Shield Cord
5	SFEB2UT15	Tube, Shield Cord
6	SFUP10R-01	Cover
7	SFNN10RM01	Name Plate

Main Unit Section

Ref. No.	Part No.	Description
SCREWS WASHERS, NUTS and RINGS		
N1	SFXJ102-08A	Screw, Turntable
N2	XSS3+8BVS	Screw, Brake Cover
N3	XUC3FT	E.Ring, Brake Belt
N4	XYN4+C15FZS	Screw, Motor
N5	XSN3+6BVS	Screw
N6	XWA3BFZ	Washer
N7	XSN3+8BVS	Screw
N8	XWA3BFZ	Washer
N9	SFXW120-01	Washer
N10	XYN4+C18FZS	Screw, Adjustment Board

Main Unit Section

Ref. No.	Part No.	Description
N11	SFXW701-5	Washer, Brake Adjustment
N12	SFPEW12002	Washer, Brake Adjustment Knob
N13	XUC4FT	E.Ring, Brake Adjustment Knob
N14	XTV3+8BFZ	Screw, Brake Belt Adjustment
N15	XWA3B	Washer, P.C. Board Fixing Shaft
N16	XWC3B	Washer, Ground Terminal
N17	XNG4ES	Nut, Ground Terminal
N18	XWA4B	Washer, Ground Terminal
N19	XNG3ES	Nut, Remote Control Fixing Plate
N20	XWG3BFZ	Washer
N21	SFXW102-03	Washer
N22	SFGH102-02	Washer, Brake Solenoid
N23	SFXW880-1	Washer, Brake Solenoid
N24	SFXW102-02	Washer, Brake Solenoid
N25	XSN3+5BVS	Screw, Brake Solenoid
N26	XWA3BFZ	Washer, Brake Solenoid
N27	XSN2+8	Screw, Speed Select Button
N28	XSN2+6	Screw, Speed Select Button
N29	XWA2B	Washer, Speed Select Button
N30	XWE2BW	Washer, Speed Select Button
N31	XNG2EBW	Nut, Speed Select Button
N32	XYN3+C10FZS	Screw
N33	XNG2E	Nut
N34	XSN2+10	Screw
N35	XSS3+8BVS	Screw, Bottom Board

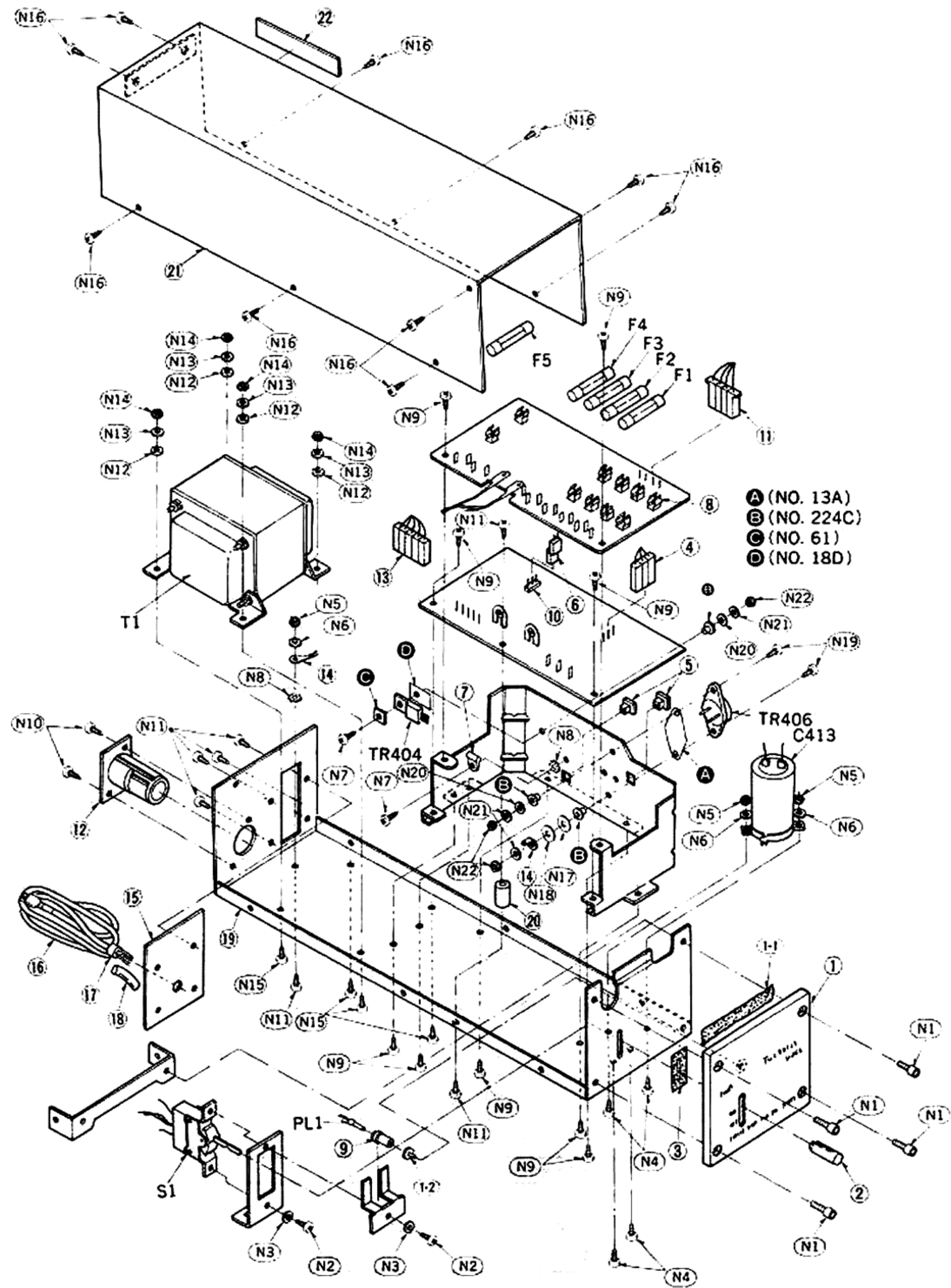
Power Unit Section

Ref. No.	Part No.	Description
N1	XVE3A6FZS	Screw, Front Panel
N2	XSN3+6BVS	Screw, Power Switch
N3	XWA3BFZ	Washer, Power Switch
N4	XSN3+6BVS	Screw, Switch Board
N5	XSN3ES	Nut
N6	XWA3BFZ	Washer
N7	XTV3+8BFN	Screw, TR404 Clamper
N8	XWC3B	Washer, Clamper and Ground Terminal
N9	XTW3+10TFZ	Screw, P.C. Board and Plate
N10	XSS3+10BNS	Screw, D.C. Socket
N11	XSN3+6BVS	Screw, Ground Terminal and A.C. Fixing Plate
N12	XWE4X10FN	Washer, Power Transformer
N13	XWA4B	Washer, Power Transformer
N14	XNG4ES	Nut, Power Transformer
N15	XST4+8VWS	Screw, Power Transformer
N16	XST3+6FZS	Screw, Cabinet
N17	SFXW10E-01	Washer, TR404
N18	XWE3E12	Washer, TR404
N19	XSN3+12S	Screw, TR404
N20	XWE3	Washer, TR404
N21	XWA3B	Washer, TR404
N22	XNG3ES	Nut, TR404

Remote Control Section

Ref. No.	Part No.	Description
N1	XSN2+10	Screw, Micro Switch
N2	XWA2B	Washer, Micro Switch
N3	XTN3+6B	Screw, Switch Board
N4	XTS3+8BFZ	Screw, Cover

● Power unit



Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
PACKING PARTS			P12	SFYF28A55	Polyethylene Bag, Power Unit	A2	SFXJ102-08A	Screw, Turntable Platter
P1(M)	SFHP112M01	Carton Box	P13	SFYF45A50	Polyethylene Bag, Turntable	A3	SFW0010	Oil, Motor
P1(MC)	SFHP112C01	Carton Box	P14	SFYF10A30	Polyethylene Bag, Remote Control Unit/ D.C. Cord/ A.C. Cord	A4	SFWE010	Adaptor, 45r.p.m.
P2	SFHH102-04	Pad, Turntable (Left)	P15	SFYF27A40	Polyethylene Bag, Instruction Bag	A5	SFXW650-2	Washer, Turntable Base
P3	SFHH102-05	Pad, Turntable (Right)	P16	SFYF07A10	Polyethylene Bag, Screw and Adaptor	A6	XSN5+35FZS	Screw, Turntable Base
P4	SFHH102-06	Pad, Turntable (Bottom)	P17	SFYF09B15	Polyethylene Bag, Accessories	A7	XSN5+43FZS	Screw, Turntable Base
P5	SFHH102-07	Pad, Power Unit (Front)				A8(M)	SFNZ102M02	Installation Diagram, Turntable Base
P6	SFHH102-08	Pad, Power Unit (Rear)				A8(MC)	SFNZ102C01	Installation Diagram, Turntable Base
P7	SFHD102-05	Pad, Turntable Mat				A9(M)	SFNU112M01	Instruction Book
P8	SFHD102-06	Case, Power Unit				A9(MC)	SFNU112C01E	Instruction Book
P9	SFUP102-14	Stopper, Motor						
P10	XYN3+C8B	Screw, Motor Stopper						
P11	SFYF60A60	Polyethylene Bag, Turntable Unit						
			ACCESSORIES					
			A1	SFEL028-01E	Ground Wire			

■ PACKING

