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Service Manual

Synthasizer Direct Drive Turntable

SP-15 (M), (MC)



- The model SP-15 (M) is available in America only.
- The model SP-15 (MC) is available in Canada only.

Specifications (Specifications are subject to change without notice.) (Weights and dimensions shown are approximate.)

General

Power supply:

120V, 50 or 60 Hz

Power consumption:

11W

Dimensions:

34.9 x 9.3 x 37.2 cm

 $(W \times H \times D)$

(13-3/4x3-21/32x14-41/64 inches)

Weight:

6.2 kg (13.7 lb)

Turntable section

Type:

Quartz synthesizer pitch control

Direct drive

Drive method:

Direct Drive

Motor:

Brushless DC motor

Drive control method: Quartz-phase-locked control

Turntable platter:

Aluminum die-cast, diameter 33.9 cm (13-11/32 inches) weight 2.7 kg (5.9 lb)

Moment of inertia:

380 kg·cm² (130 lb·in²)

Turntable speeds:

Turntable speed

fine adjustment:

Adjustable up to ±9.9% in 0.1%

33-1/3, 45 and 78.26 rpm

3 kg·cm (2.61 lb·in)

0.4 sec. to 33-1/3 rpm

0.4 sec. from 33-1/3 rpm

increments by digital indication

Starting torque:

Build-up time:

Braking time:

Braking system:

Speed fluctuation due

to load torque:

Speed drift:

Rumble:

0% within 2.5 kg·cm (2.2 lb·in)

Electrical and Mecanical braking

Within ±0.002%

Wow and flutter:

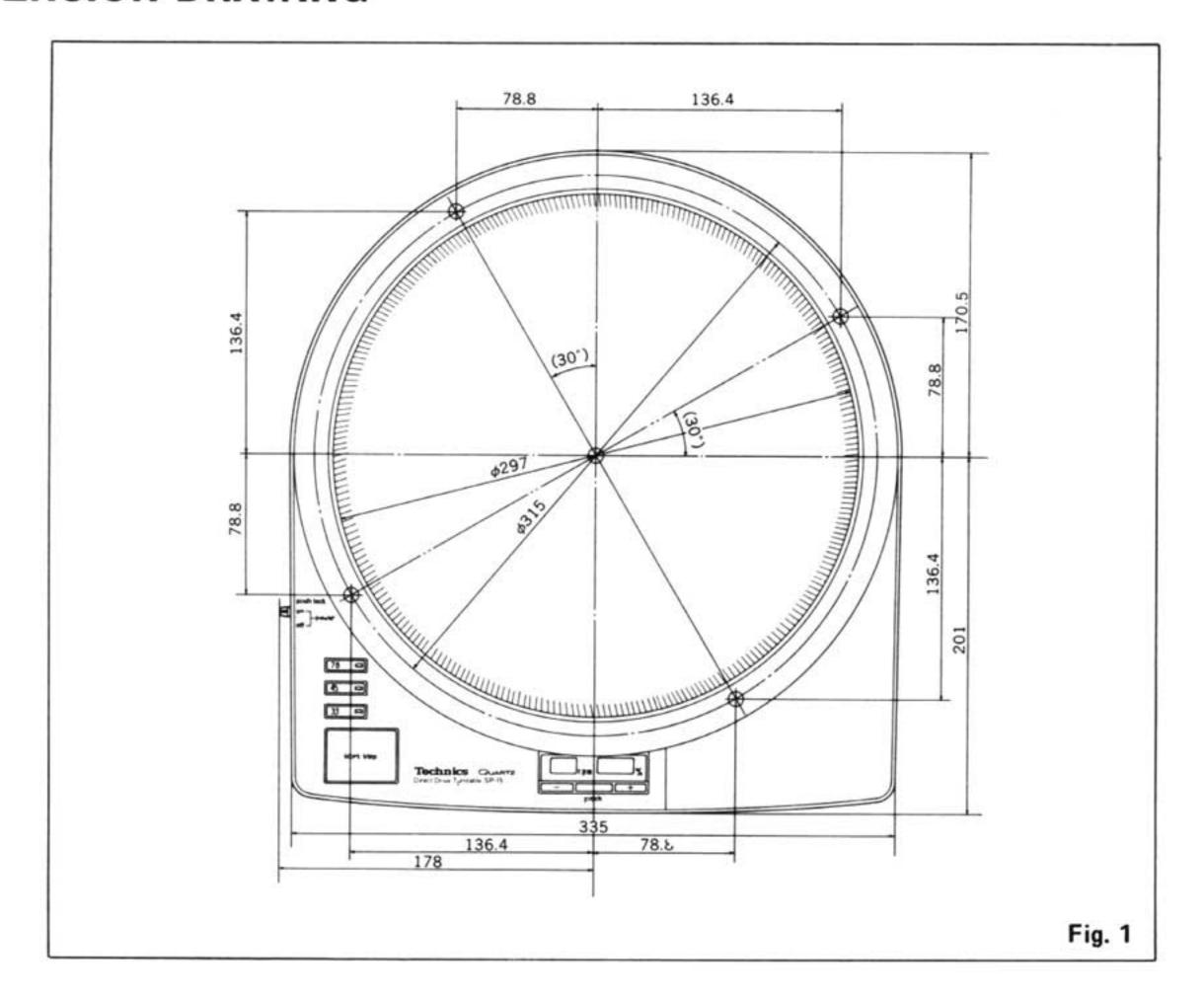
0.025% WRMS (JIS C5521)

±0.035% peak (IEC 98A Weighted)

-56 dB (IEC 98A Unweighted)

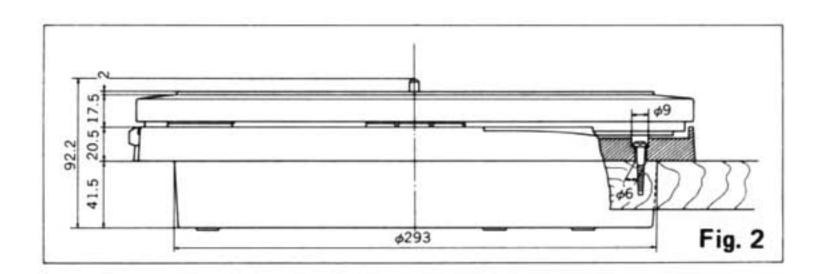
-78 dB (IEC 98A Weighted)

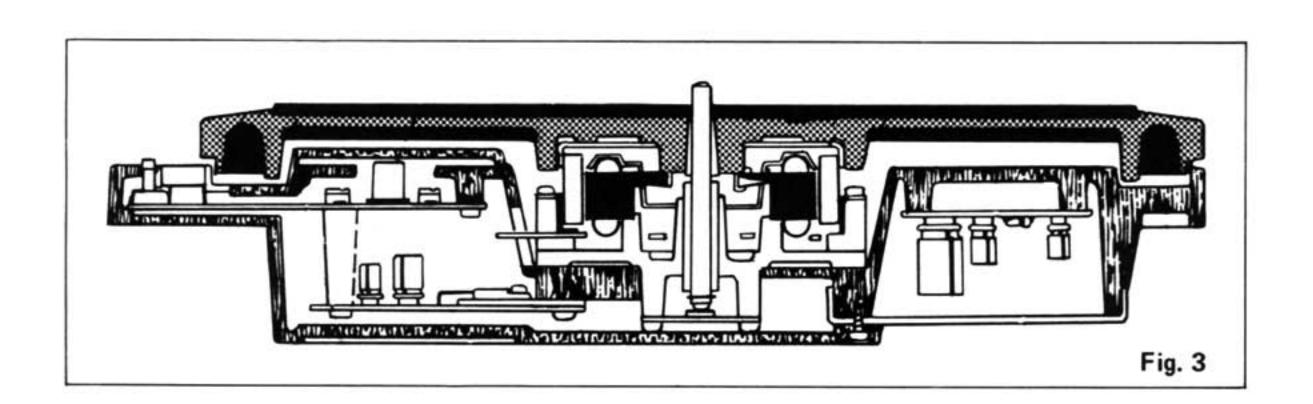
■ DIMENSION DRAWING



NOTE:

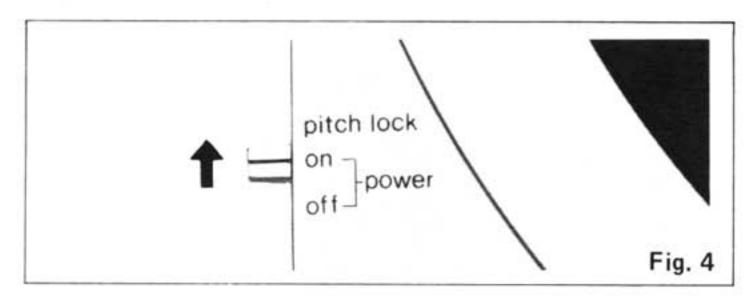
- Secure the main body with the attached 4 setscrews. When other setscrews are used, find suitable ones in accordance with the dimension drawing.
- In order to make the best use of this turntable, employ a sturdy cabinet (turntable base) which sufficiently withstands the load.
- * It is recommended to use the optional turntable (SH-15B1) as the cabinet for SP-15.



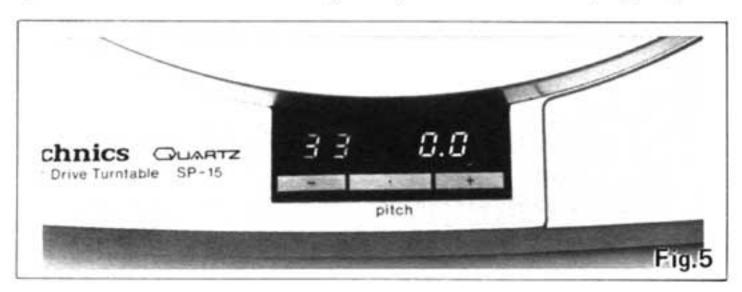


■ HOW TO OPERATE

 Set the Power switch/pitch lock knob to the "on" position. (See Fig. 4.)



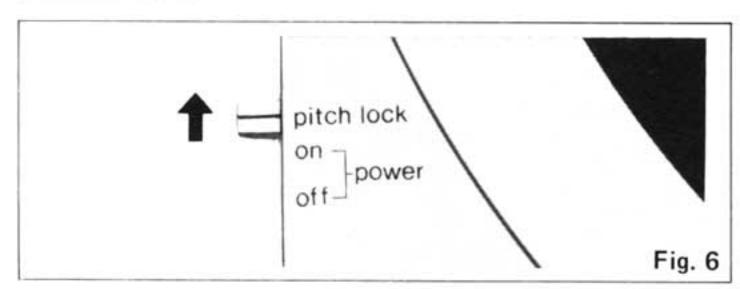
The revolutions are indicated at 33 (33-1/3 rpm.) of the speed selector knob and digital speed indicator. (Fig. 5.)



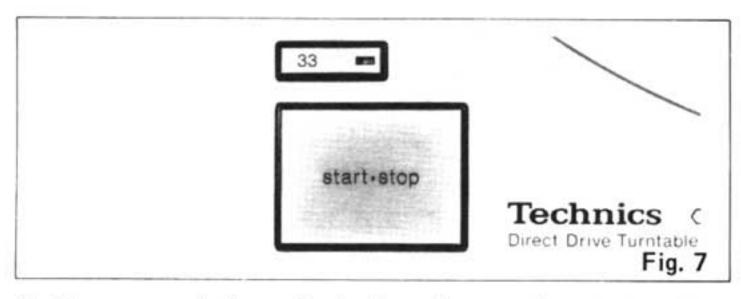
Upon setting the power switch/pitch lock knob to "on", the revolutions are changed over to 33-1/3 rmp. at all times. If the record to be played is other than a 33-1/3 rpm., depress the speed select button to suit the phono disc to be played.

When the power switch/pitch lock knob is set to "pitch lock", the pitch control button and speed select button are locked so as not to be actuated even if the buttons are accidentally touched during playing. (See Fig. 6.)

Therefore, for selecting the speeds or operating the pitch control, first set the power switch/pitch lock knob to the position "on".



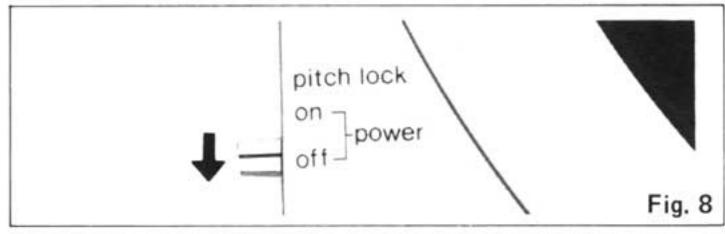
Place a record on the turntable mat.
 Push the start • stop button. (See Fig. 7.)
 The turntable platter will begin to rotate and reach its constant rotation speed 0.4 sec. (33-1/3 rpm.).



Upon completion of playing, depress the start • stop button.

The turntable is instantly (0.4 second) stopped by the double brake system.

4. After that, set the power switch/pitch lock knob to "off". (See Fig. 8.)



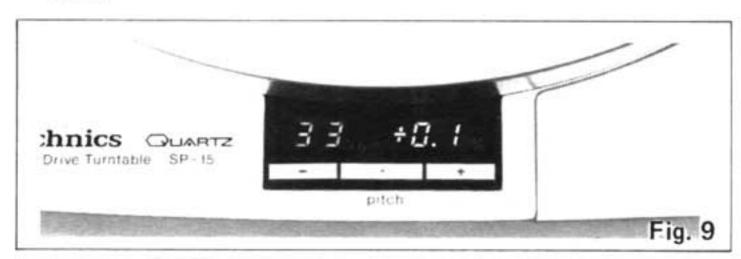
Pitch control (turntable speed fine adjustment).

The Quartz synthesizer system is being employed for the first time in the world. A high degree of pitch control accuracy over a wide range (±9.9%) in 0.1% increments can be obtained with the quartz perfectly locked.

The pitch control is continuously variable up to 9.9%.

The pitch variations which are clearly indicated by the LED digital indicator provide you with accurate and easy selection.

The pitch control can be selected in increments of 0.1% which is below the threshold of human perception. (See Fig. 9.)

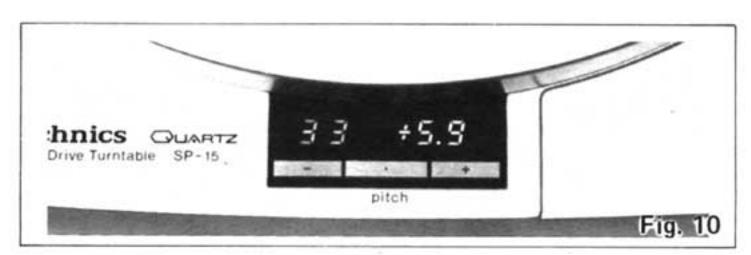


The pitch control also enables you to accurately and precisely tune musical instruments and by varying the pitch slightly, to obtain a different musical note from the record. (See Fig. 10.)

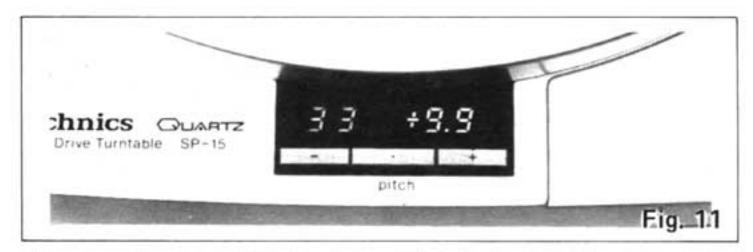
For a half-tone change:

+5.9% (#)

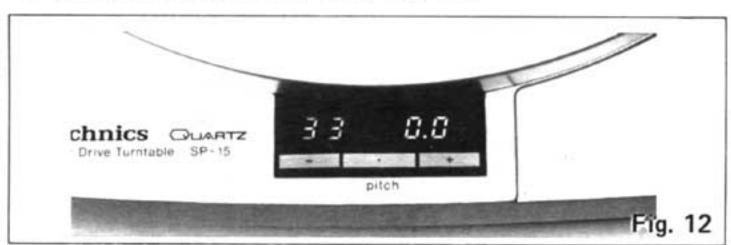
-5.6% (b)



Another feature of the variable pitch control over a wide range of ±9.9% is that it makes singing along with a melody easy for a chorus, or for playing a record for accompaniment only. (See Fig. 11.)



By pressing the clear button which is located between the "+" and "-" pitch buttons, you can quickly return the set to normal palying speed. (See Fig. 12.)



SP-15

■ FEATURES

Quartz synthesizer system that for the first time in the world has made it possible to achieve a digital pitch control of $\pm 9.9\%$ in 0.1% increments

In conventional quartz players the quartz reference was in effect only within strictly limited ranges: whenever vernier speed change was required, the quartz circuit had to be switched off. In the Technics SP-15, we took the lead by locking the quartz, thus making it possible to effect a high degree of pitch control accuracy over a range as wide as ±9.9% in 0.1% increments, which is below the threshold of human perception.

Moreover, the pitch control, coupled with the clear digital indicator, enables you to accurately and precisely tune with musical instruments, vary pitch slightly for obtaining a musical note from a record or alter tones by a half-note.

Oversized turntable that cuts off and absorbs external vibrations.

Based on analyses of the turntable vibration modes and vibrations in the sound range, a special viscoelastic material is applied to the reverse surface of the turntable platter for deadening.

The deadening material is applied to the undersurface and outer periphery of the turntable platter, with the rubber turntable mat on the surface settled into the turntable platter. This design is superior in acoustic characteristics even at high sound levels through elimination of turntable resonance and absorption of external vibration.

Moreover, the oversized aluminum die-cast turntable platter, 33.9 cm (13-11/32") in diameter, is heavy with 2.7 kg (5.9 lb.) of its own weight, with a moment of inertia of 380 kg cm² (130 lb. in²) for large heavy weight class design.

Vibration damping structure by the precision aluminum die-cast cabinet and TNRC.

The acoustical characteristics of the player system are inevitably affected by the turntable platter and cabinet employed. The SP-15 adopts an aluminum die-cast cabinet superior in strength, with high processing accuracy, and the new acoustic material TNRC excellent in acoustical properties. Through cutting-off and absorption of external vibrations, the unit is designed for improved acoustic characteristics, with susceptibility to feedback minimized.

Electronic circuits of more than 3,000 discrete elements concentrated into 4ICs

The 4 kinds of IC, i.e., Synthesizer pitch control CMOS LSI (MN 6042), Frequency dividing IC employing I²L, ECL

■ RUBRICATION

Apply 2 or 3 drops of oil once after every 2000 hours of operation. (See Fig. 13.)

This time interval is much longer than that of conventional type motors (200–500 hours).

Please purchase original brand of oil (Parts number is SFWO 010.)

(DN 860), phase speed control IC (AN 660) and Driving IC (AN 640) into which high density electronic circuits of more than 3,000 discrete elements have been compressed have made it possible to produce this high precision quartz turntable.

Quartz Controlled Rotation Accuracy

The SP-15 utilizes the oscillation of a quartz crystal as a reference signal or source. This oscillation is not affected by temperature change or power fluctuations. By synchronizing the rotation of the turntable platter accurately to the reference signal, speed drift of the unit is held within ±0.002%.

Technics' unique motor construction in which the rotor of the motor is integrally formed with the turntable

High torque motor of 3 kg-cm with starting time of 0.4 second is capable of instant speed change-over (at 33-1/3 rpm.).

With the double braking system of the electronic brake and mechanical brake, the turntable stops instantly (0.4 second) upon depression of the start • stop button (at 33-1/3 rpm.)

High performance with wow and flutter of only 0.025% (JIS C5521) and rumble of -78 dB (IEC 98A Weighted).

Pitch lock mechanism capable of locking the speed selection and pitch control operation

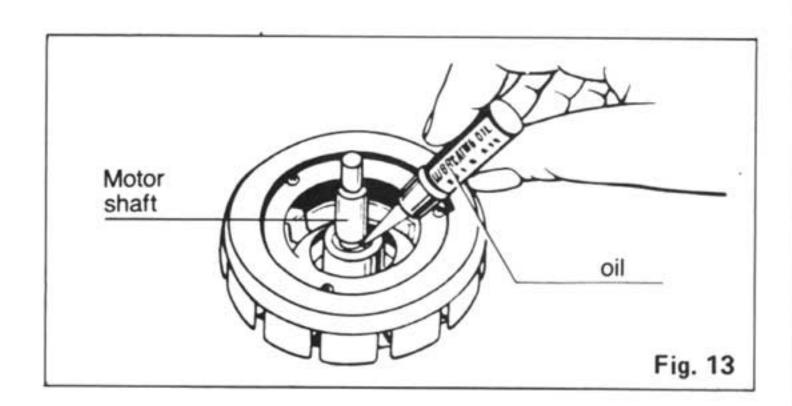
Malfunction caused by accidental touching of the operating portion during playing, can be prevented.

Highly efficient pulse power supply circuit is employed for the DC power source

Since DC voltage is obtained by oscillating high frequency (20 kHz) through direct rectification of AC power supply for voltage conversion at the pulse transformer, there is no leakage of the commercial power source frequency.

Stable and positive mechanism that can stand frequent use for business use, etc. and a switch section with point contacts.

Revolutions at 3 speeds of 33-1/3, 45 and 78.26 rpm. are employed, taking into account business use.



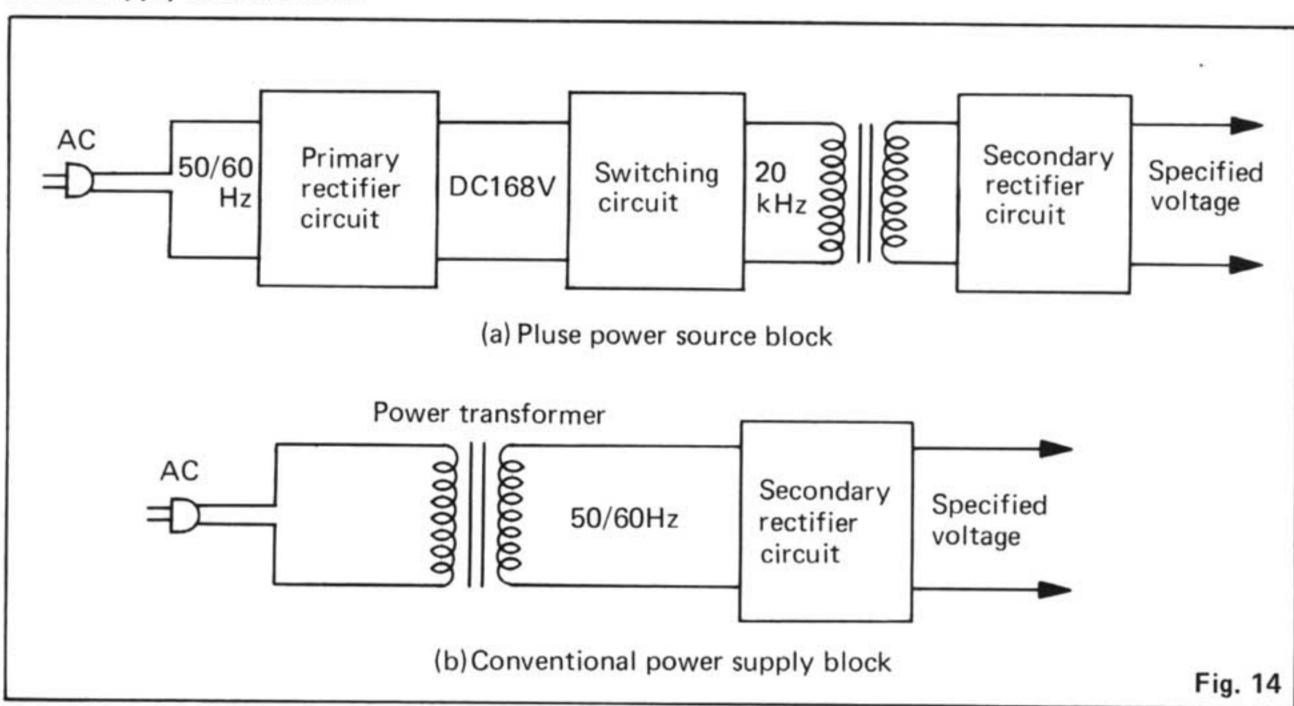
■ TECHNICAL DESCRIPTION

Description of pulse power supply circuit

The pulse power source directly rectifies the commercial power with diode to make DC 168V. And it generates pulses (approx. 20 kHz waves) by switching the DC 168V with the special high-voltage withstanding, high-speed switching transistor. Thus, the circuit serves to drive the power transformer with the switching pulses in order to obtain the specified voltage on the secondary side.

Fig.14 shows a pulse power supply block and a conventional power supply block.

Power supply circuit blocks



Pulse power supply circuit of SP-15

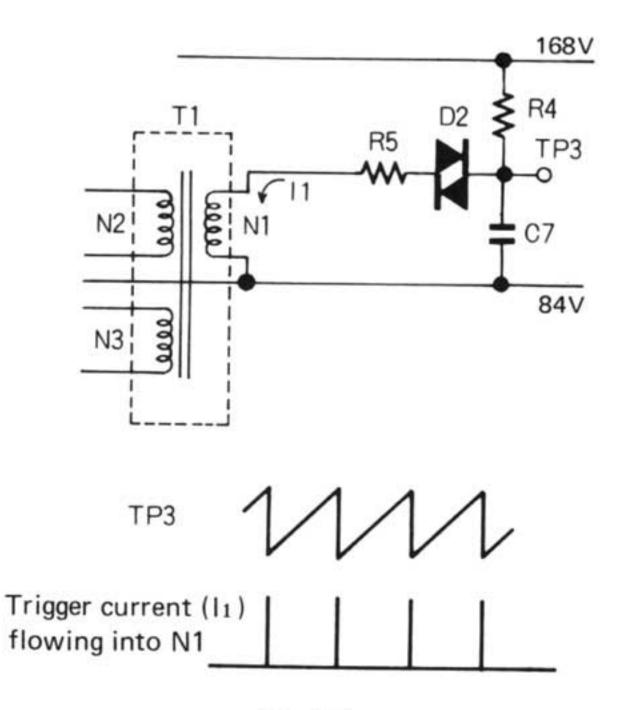
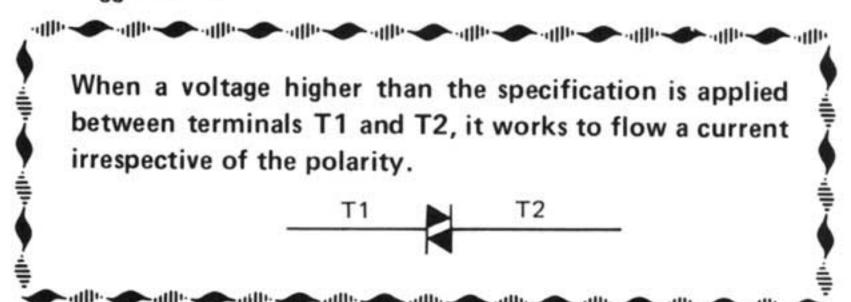


Fig. 15

With power supply turned ON,
 C7 is charged through B4. Wh

C7 is charged through R4. When the charged voltage becomes high enough to turn on trigger diode D2, current (I1) flows through R5. Then, C7 is discharged and, therefore, it is again charged through R4. As the operations are repeated, trigger current flows into N1 as shown in Fig. 15.

Trigger diode



Switching circuit operation

- ① Commercial power (50/60Hz) is rectified by D1 and D4 through line filter L4 to obtain DC 168V. The DC 168V is divided by R2 and R3 so that TP. 0 = 0V, TP. 2 = 84V and TP. 3 = 168V.
- 2 C7 is charged through R4. When trigger diode D2 reaches "on" level, the trigger current flows from D2 to N1 via R5. Since the coils of N2 and N3 are reverse in phase, when a current flows into N1 in the direction of ↓, the base current is generated at N2 and N3 so that Q1 and Q2 are respectively reverse- and forward-biased. Therefore, Q1 turns off and Q2 turns on, and the primary current of T2 flows from N1 → N5 → Q2 (C-E) → TP. 0. At that time, a feedback current is generated at N4 and it flows into N1 through R6. The current flowing into N1 becomes of positive feedback, then Q1 and Q2 keep turning on, and the collector current of Q2 keeps increasing in accordance with the inductance of N5.
- Whowever, N3 is directly connected between base and emitter of Q2, proximately being short-circuited, therefore, the feedback current is saturated at a given value determined by R6. Accordingly, the base current of Q2 decreases in accordance with the inductance of N3. When the base current of Q2 is about to become smaller, the counter electromotive force is generated at N1, causing the feedback current to flow in the reverse direction, and then a positive feedback line is formed for Q1. Consequently, Q1 turns on and Q2 turns off, and the primary current of T2 flows from TP. 1 → Q1 (C-E) → N5 → TP. 2. Similarly, when the current is saturated, a positive feedback line is formed for Q2.
- Through repetition of the above procedure, the oscillation is continued and 20 kHz pulse voltage can be obtained at N6 on the secondary side of T2.

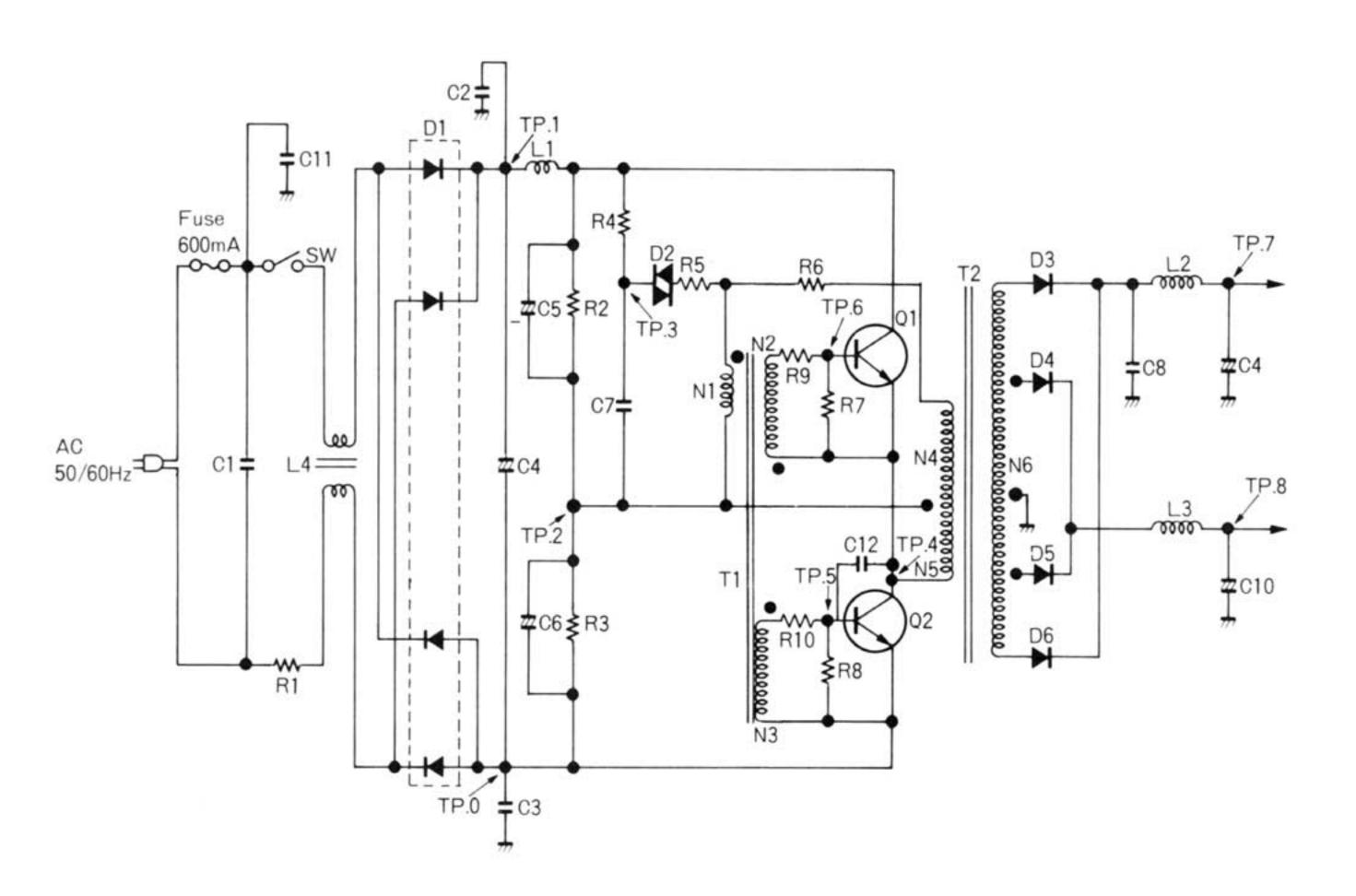


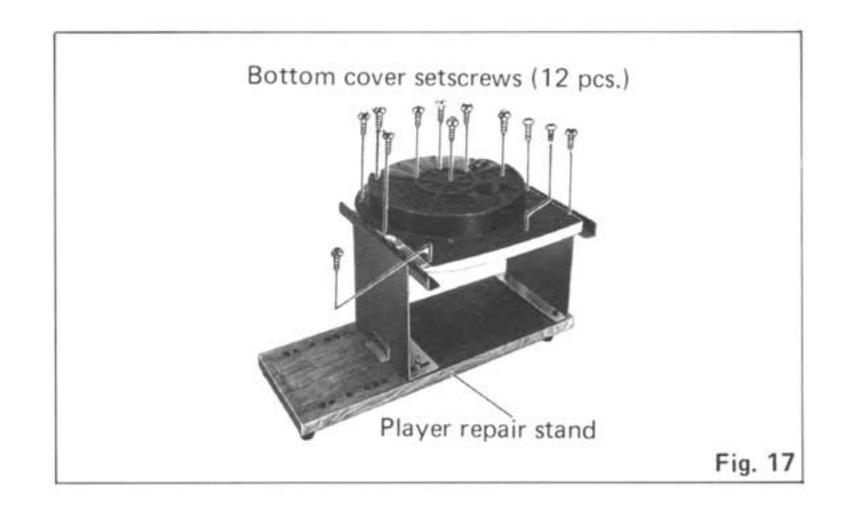
Fig. 16 Switching circuit

(-mark shows the polarity of coil.)

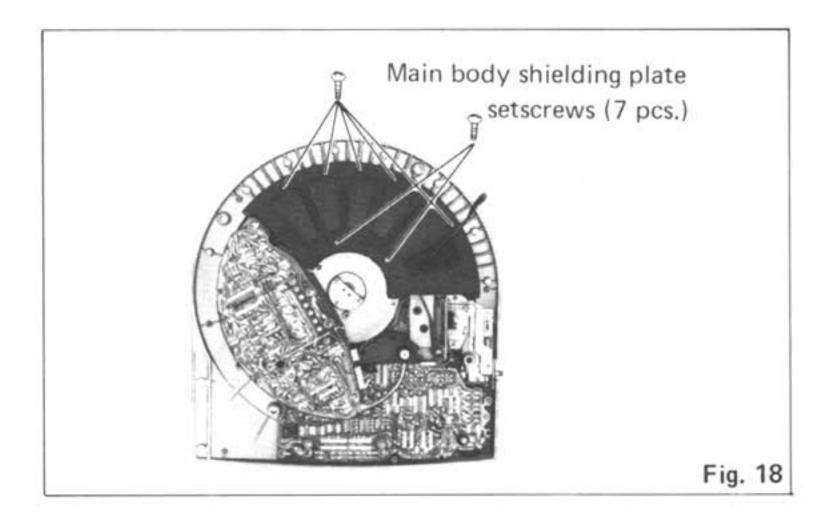
■ DISASSEMBLY PROCEDURE

How to remove bottom cover and shielding plate.

- Remove the turntable rubber and turntable, and then turn the main body upside down.
- Remove 12 setscrews of the bottom cover. (See Fig. 17.)

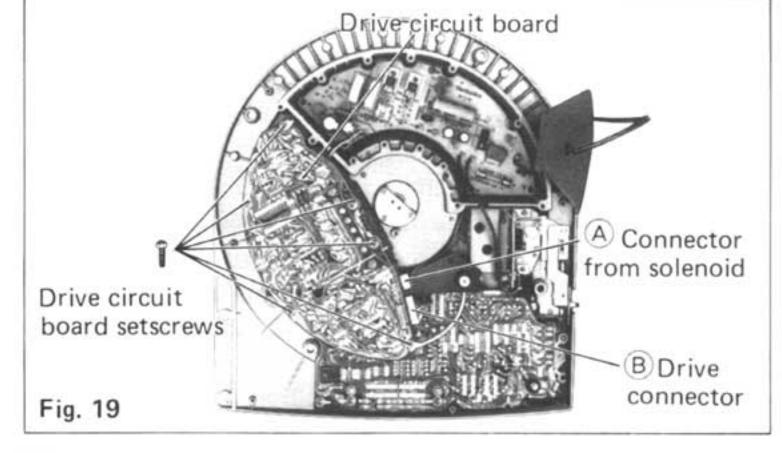


 Remove 7 setscrews of the shielding cover. (See Fig. 18.)



How to remove drive circuit board (See Fig. 19.)

- Detach connector A from the solenoid, and drive connector B from the logical circuit board.
- 2. Remove 6 setscrews of the drive circuit board.
- Remove the drive circuit board, and detach the motor drive connector and the power line connector from the drive circuit board. Thus, the drive circuit board can be removed.

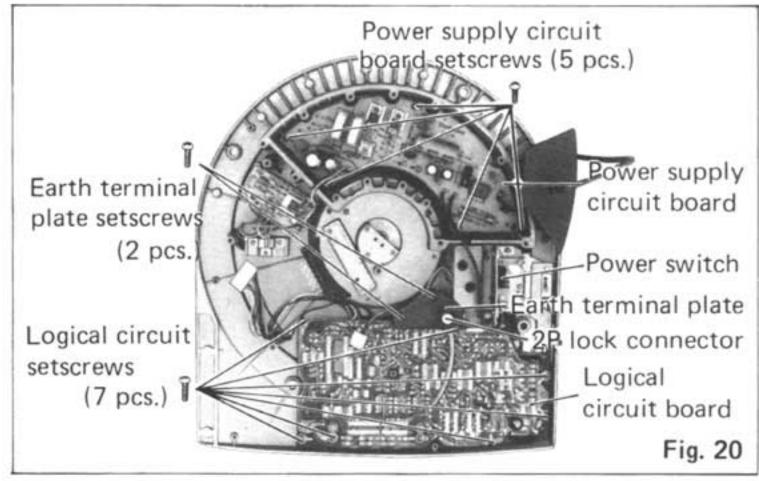


How to remove power supply circuit board and logical circuit board (See Fig.20.)

 Remove 5 setscrews of the power supply circuit board.

Note: Take special care when disassembling the power supply section because the circuit board is supplied with a high voltage.

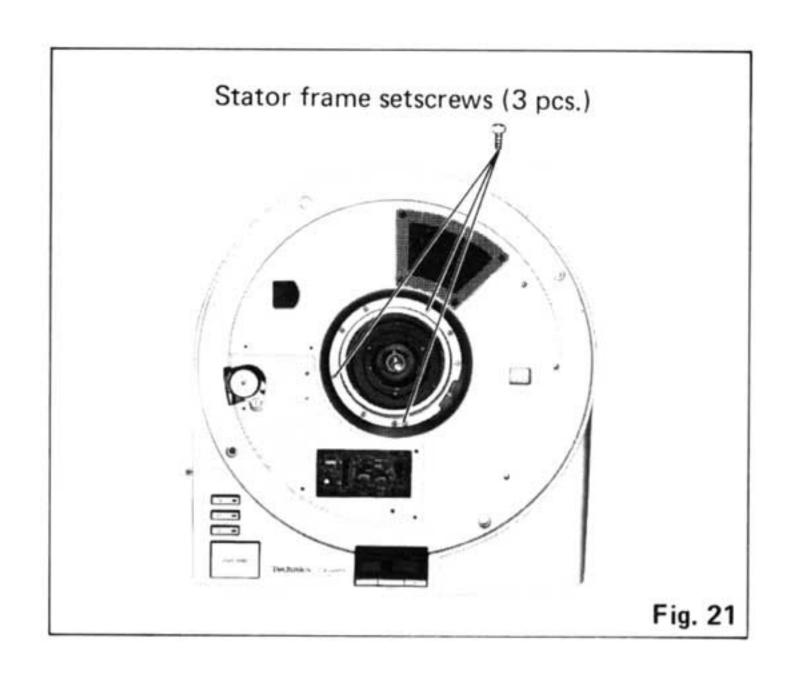
- 2. Remove 2 setscrews of the earth terminal plate.
- 3. Remove 7 setscrews of the logical circuit board.
- Detach the logical circuit board and the 2P lock switch connector.



How to remove stator frame

- Remove the drive circuit board in accordance with the above-mentioned procedure.
- Turn the main body up and remove 3 setscrews of the stator frame. (See Fig.21.)

(marked 3 setscrews)



Remarks:

For the disassembly of mechanical parts other than the above (such as power switch plate, brake operating plate, etc.), refer to the exploded views in this manual.

Repair of drive circuit and logical circuit (Figs. 22 and 23.)

- 1. Detach the bottom cover with reference to the disassembly procedure.
- 2. Put the set on the repair stand with its front up.
- 3. Mount the turntable.

Then, carry out the check of each part in accordance with the Trouble Shooting Chart. Also use a stroboscope when checking the number revolutions.

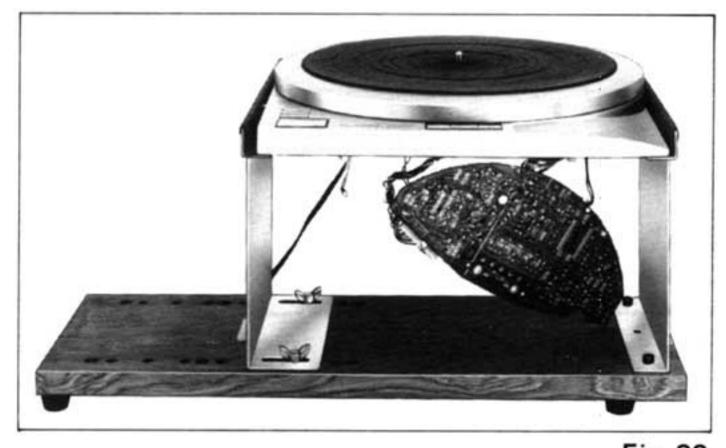


Fig. 22

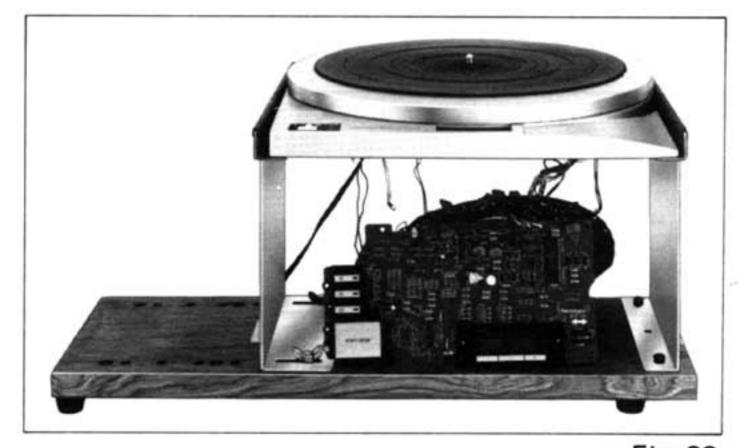


Fig. 23

Repair of power supply circuit

- 1. Remove the bottom cover and the shielding plate with reference to the disassembly procedure.
- 2. Carry out the check of each part according to the Trouble Shooting Chart with reference to the test points printed on the power supply circuit.

■ ADJUSTMENTS

Adjustment Points of Electrical System

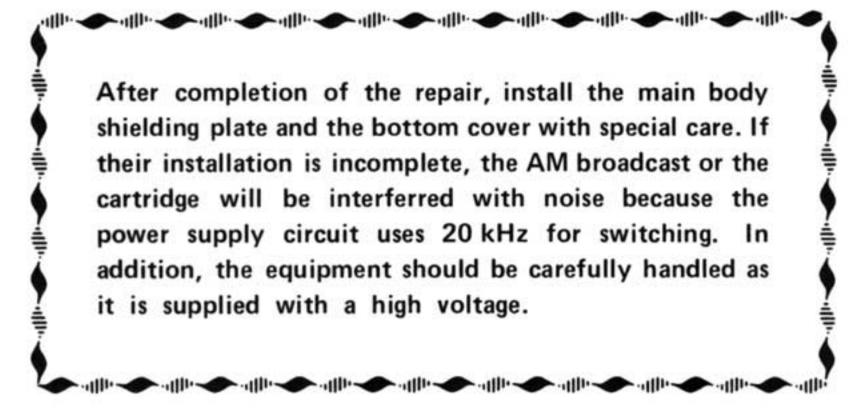
NOTE: Make the following adjustments after replacing parts such as IC's, transistors, diodes, etc.

	Adjustment	Connection Points	Adjustment Point	Adjustment Method			
1	Adjustment of standard voltage (VS)	DC voltmeter or Oscilloscope (+) → TP18 (-) → GROUND	VR301	With the start switch set at ON, adjust VR301 so that the voltage is DC 2.10V ± 0.01 at 33 r.p.m. Confirm that the voltage is 2.835V ± 0.05 V at 45 r.p.m. and 4.9V ± 0.1 V at 78 r.p.m.			
2	Adjustment of current source (IR)	DC voltmeter or Oscilloscope (+) → TP19 (-) → TP21	VR201	Turn start switch on to begin turntable rotation. Adjust VR201 for 0 V potential difference of TP19 and TP21.			
3	Tracking adjustment (TRACKING)	Oscilloscope (+) + TP18 (-) + GROUND	VR101	TP18 waveform With the start switch set at ON, adjust VR101 so that $8 \le T0 \le 8.5$ ms at 33 r.p.m. Confirm that $5.8 \le T0 \le 6.4$ ms at 45 r.p.m. and $3 \le T0 \le 4.5$ ms at 78 r.p.m.			
4	Braking adjustment (BRAKE)		VR202	STOP SIGNAL T.T. Adjust VR202 for complete stop within 90° ~ 270° after stop signal initiated. (Turntable becomes free a few seconds after stop.)			

■ TERMINAL GUIDE OF TRANSISTOR AND IC

2SD636,2SD639 2SD59 2SB641,2SB643 2SC13			2SC1846,2SA886 2SC1847		2SD712A-C 2SC1826	AN640G
E C B	E	C B	E C B		BCE	
SVIUPC4558C		AN660, DN860		SVIMSM4013 SVIM53217P		MN6042
**************************************		9 8			8 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	13 A A A A A A A A A A A A A A A A A A A

After-repair precautions



■ ADJUSTMENT OF MECHANICAL BRAKE

The mechanical brake has been already factory-adjusted before delivery. However, if the brake creates abnormal noise during operation or fails to work as specified, make its adjustment in accordance with the following procedure.

- Remove the turntable and the main body cover. (Refer to the exploded views.)
- 2 Loosen the screw A and put the turntable in place.
- Turn on the power switch and then regulate adjust screw (a) through the hole in the turntable so that the brake shoe is about 1 mm off the turntable being released while turning on and off the start/stop switch. After that, tighten the screw (a) completely.

The above procedure is enough to complete the adjustment of the brake operating position. But if the brake shoe is worn out, loosen the screw

and properly shift the brake shoe.

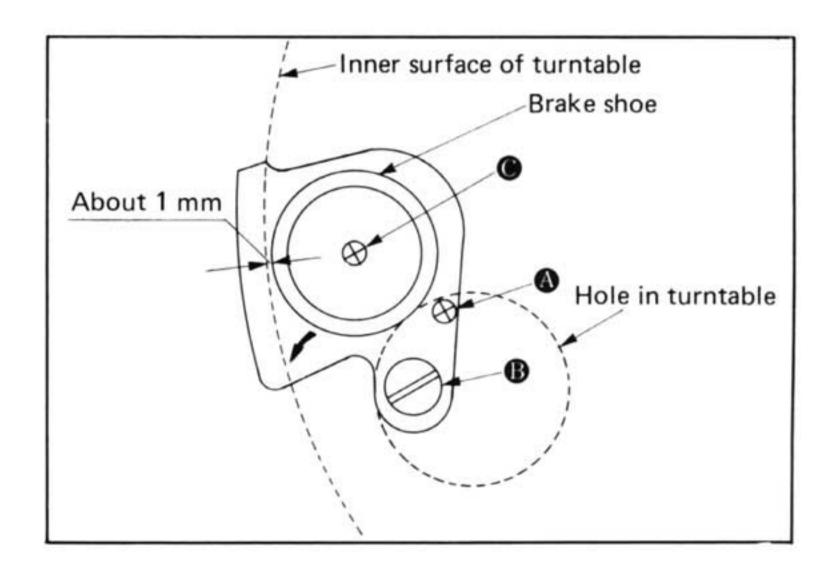
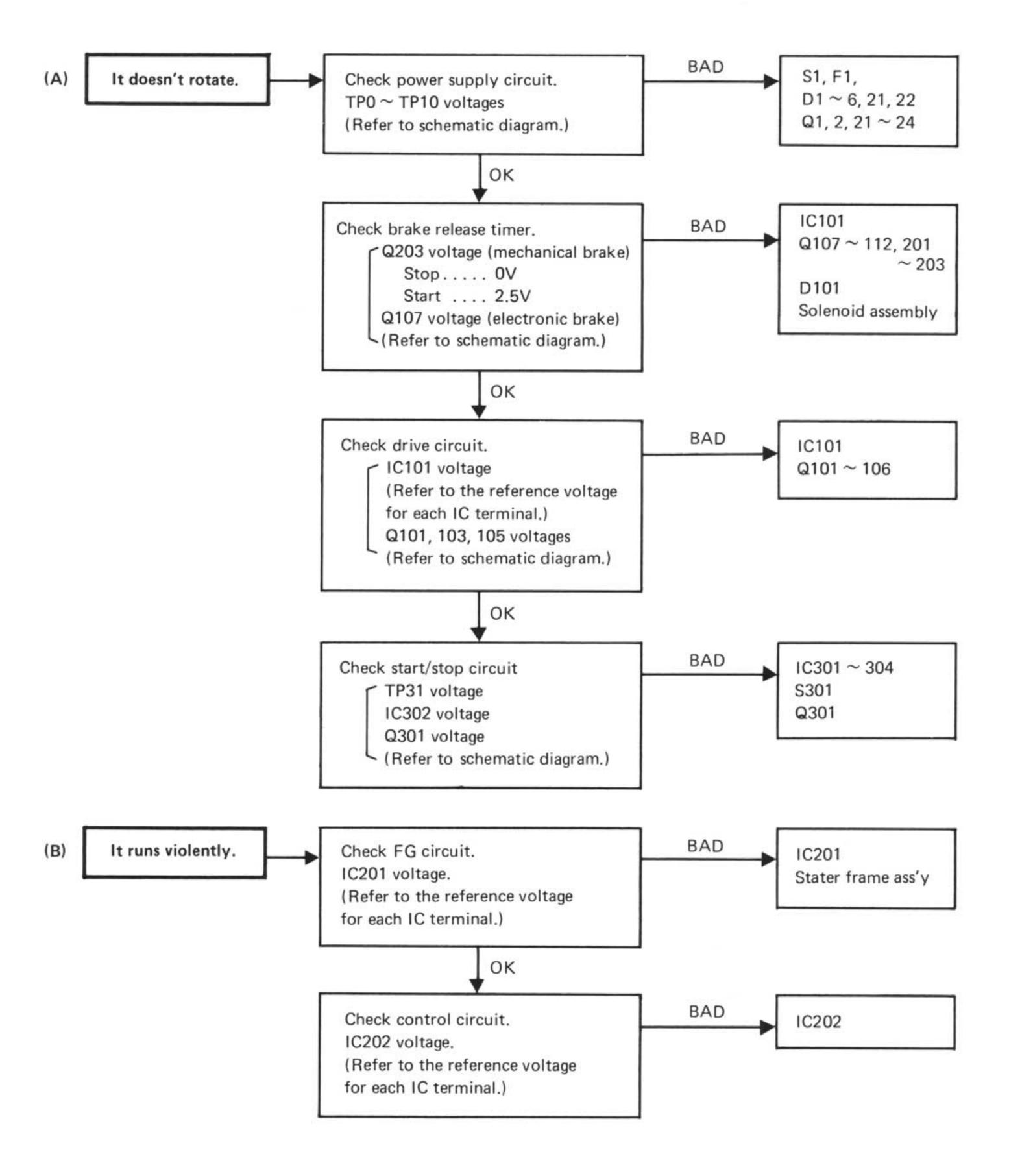
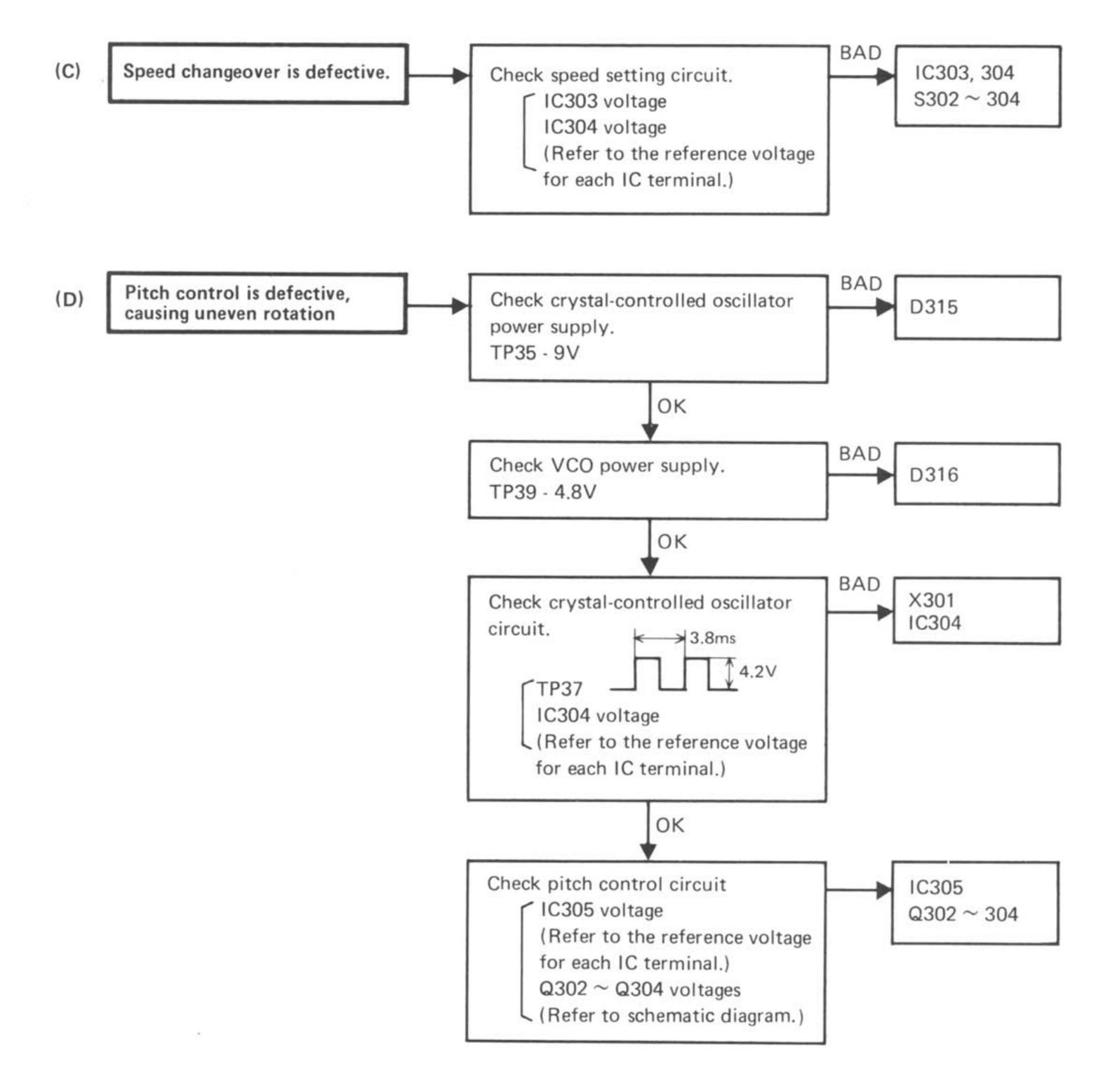


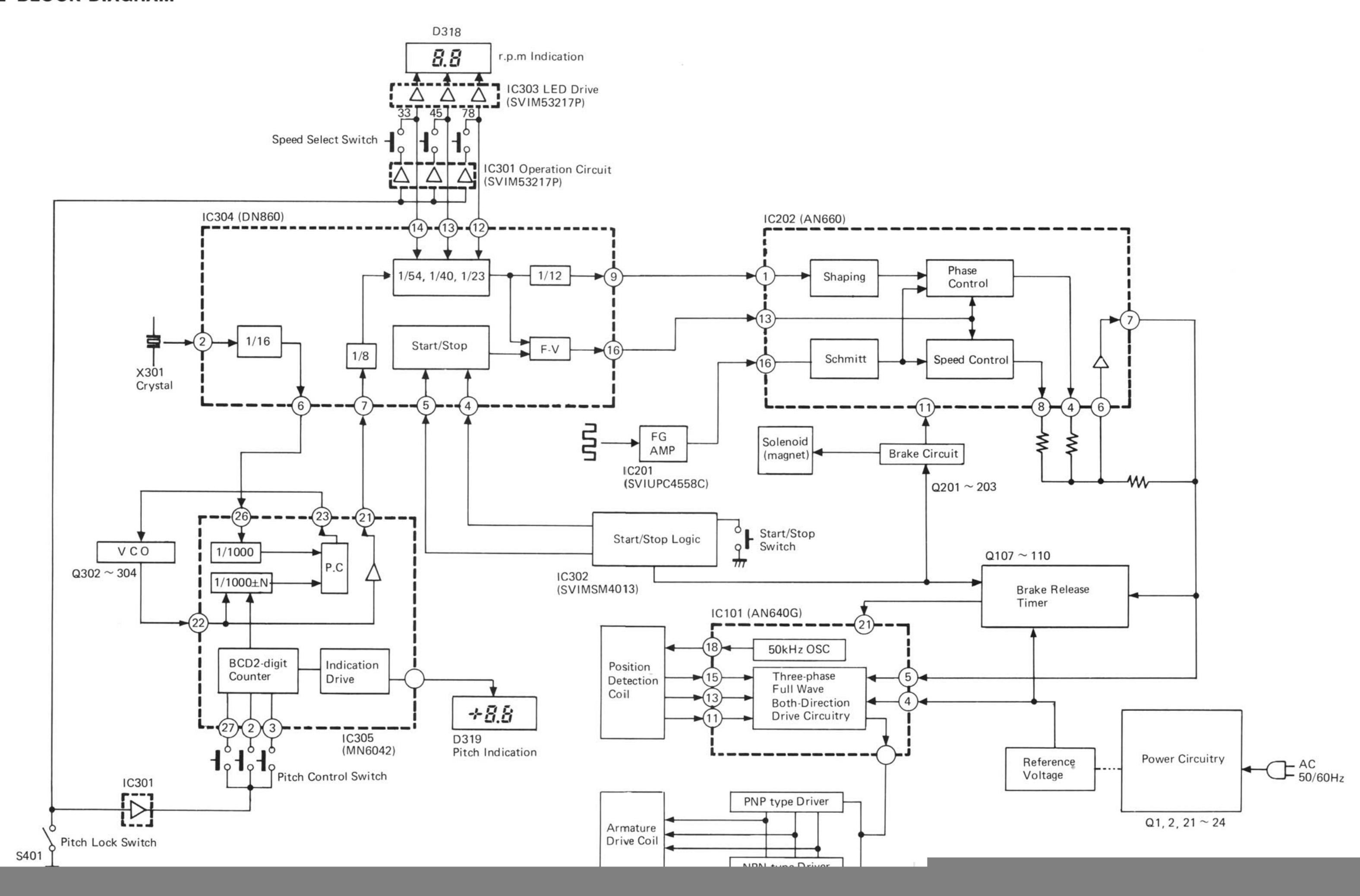
Fig. 24 Mechanical brake system

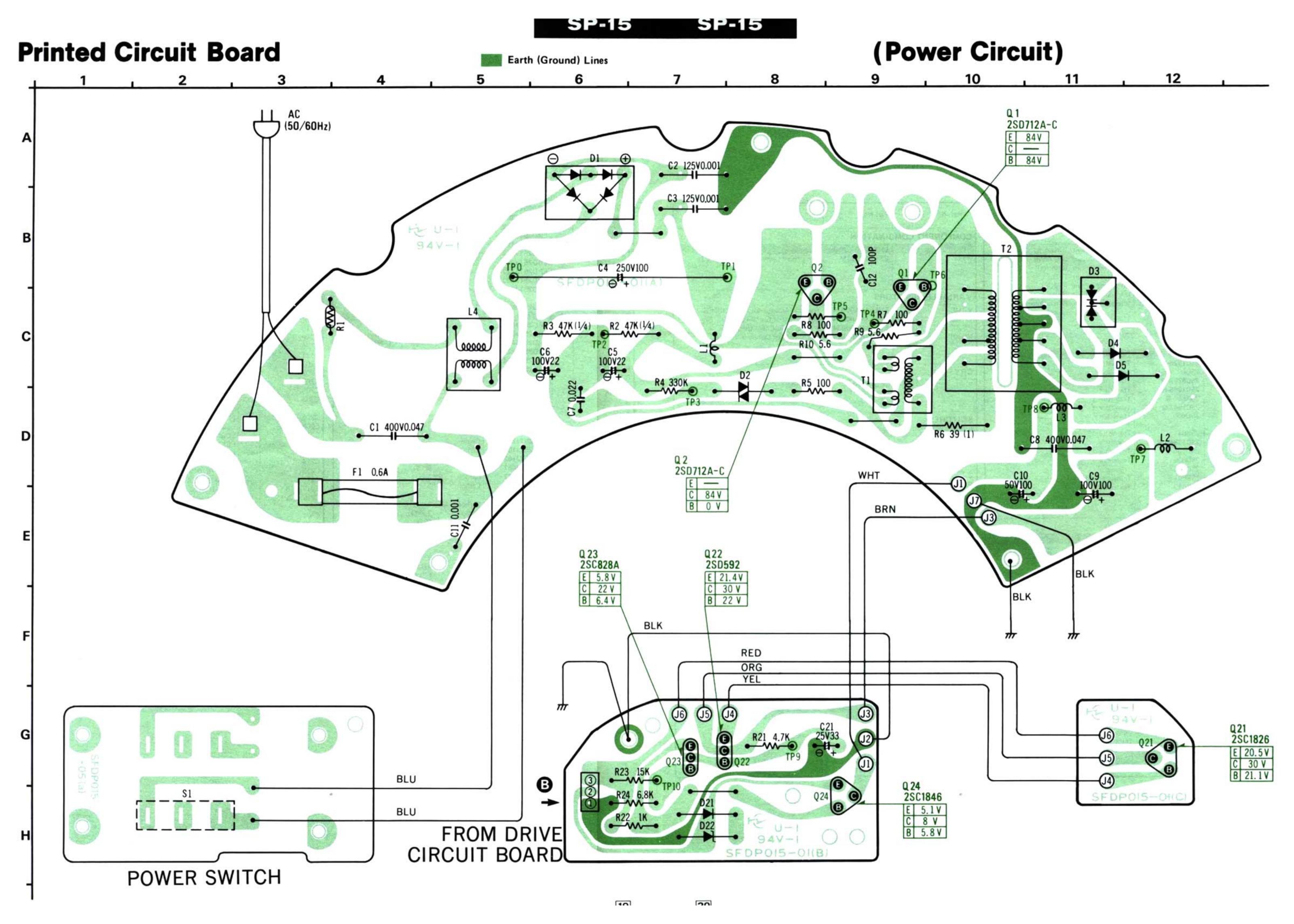
I TROUBLE SHOOTING





BLOCK DIAGRAM





■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Notes: 1. Part numbers are indicated on most mechanical parts.

Please use this part number for parts orders. 2. SP-15 (M) \rightarrow [M], SP-15 (MC) \rightarrow [MC].

Ref. No.	Part No.	Part Name & Description
INTEGRATED O	CIRCUITS	
IC101	AN640G	Integrated Circuit (Drive)
IC201	SVIUPC4558C	Integrated Circuit (FG AMP)
IC202	AN660	Integrated Circuit (Control)
IC301, 303	SVIM53217P	Integrated Circuit (CONTO)
C302	SVIMSM4013	
IC304	DN860	Integrated Circuit (CMOS)
C305	MN6042	Integrated Circuit (Frequency Divider)
C303	101100042	Integrated Circuit (Pitch Control)
TRANSISTORS		
21,2	2SD712A-C	Transistor
221	2SC1826-Y	Transistor
Q22	2SD592AE-R	Transistor
Q23	2SC828A-R	Transistor
224	2SC1846-R	Transistor
2101, 103, 105	2SA886-Q	Transistor)
2102, 104, 106	2SC1847-Q	Transistor Use pair ranks
2107, 110, 112,	2SD636	Transistor
2108, 109, 111	2SB641	Transistor
Q113	2SC1384A-R	Transistor
2201, 202, 205	2SD636	Transistor
a201, 202, 203 a203		100000000000000
	2SD639	Transistor
2301, 304	2SD636	Transistor
2302, 303	2SB641	Transistor
2305, 306, 307	2SB643	Transistor
	0.100.00.40	
01	SVDS1RBA40	Rectifier
01	SVDS1S2093	Diode
D1 D2 D3	SVDS1S2093 SVDCTU22S	Diode Diode
01 02 03 04, 5	SVDS1S2093 SVDCTU22S SVDV19C	Diode Diode Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203	SVDS1S2093 SVDCTU22S SVDV19C MA150	Diode Diode Diode Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS	Diode Diode Diode Diode, Zener 5.1V
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C	Diode Diode Diode Diode Diode Diode Light Emitting Diode
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150	Diode Diode Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS	Diode Diode Diode Diode Diode Diode Light Emitting Diode
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314 0315 0316	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS	Diode Diode Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode
DIODES D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314 0315 0316 0318	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314 0315 0316 0318	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, Tener 5.1V Diode, Tener 5.1V Diode, Pitch Indication
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9, 1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314 0315 0316 0318 0319 0320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887 SEQ1025T-201 SLQ1016D-800 SLQ809D-300	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9, 1EBS SVDRD5, 1EBS SVDRD	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Coil Filter
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887 SLQ1025T-201 SLQ1016D-800 SLQ809D-300 ELF18D305 SLQ0406S102K	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Filter Transformer
01 02 03 04, 5 0201; 101, 201 202, 203 022, 102 0301, 302, 303 0304 ~ 314 0315 0316 0318 0319 0320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9, 1EBS SVDRD5, 1EBS SVDRD	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Coil Filter

Ref. No.	Part No.	Par	t Name & De	scription	
COMPONENT	COMBINATION				
R1	ERTD3FEK8ROS	Thermistor			JE SER 3
R335	EXBRB7121M	Componen	t Combinatio	on (120 Ω	× 7)
VARIABLE RE	SISTORS				
VR101	EVLS3AA00B14	Teaching A	divetment /T	DACKIN	CI
VR201 VR202 VR301	EVLS3AA00B24 EVLS3AA00B54 EVLS3AA00B24	Adjustmen Braking Ad	djustment (T t of Current : ljustment (Bf t of Standard	Source (IF RAKE)	R)
CRYSTAL					
X301	SVQU306115	4 19328MF	dz Oscillator		
	0,4000115		Oscillator		
SWITCHES					
S1	SFDSSS5GL132		wer	DAUGE ST	
S301 ~ 307 S401	SFDSSS5GL13C	Switch Switch, Pite	ch Lock		
FUSE					
F1	XBA2F06NU100	Fuse, 0.6A			
RESISTORS		NAME AND POST OF			
R2, 3	ERD25TJ473	Carbon	471.0	1/414	F. F.W.
R4	ERD25TJ334	Carbon, Carbon,			
R5	ERD25TJ101	Carbon,		0.000	
R6	ERG1ANJ330	Metallic,	The second secon		
R7, 8	ERD25TJ101	Carbon,			manufacture and a school
R9, 10	ERD25TJ5R6	Carbon,	5.6Ω,	1/4W.	± 5%
R21	ERD25TJ472	Carbon,			± 5%
R22	ERD25TJ102	Carbon,		3 7 2 3 3 3 3 3 5 7 5 7 5 5 5 5 5 5 5 5 5 5 5	± 5%
R23	ERD25TJ153	Carbon,		1.0100000000000000000000000000000000000	
R24	ERD25TJ682	Carbon,	6.8kΩ,	1/4W,	± 5%
R101	ERD25TJ103	Carbon,	10kΩ,	1/4W	+ 5%
R102	ERD25TJ150	Carbon,			± 5%
R103	ERD25TJ103	Carbon,			± 5%
R104 ~ 106	ERG1ANJP150		15Ω,		
R107 ~ 109	ERG1ANJP470	Metallic,			± 5%
R110 ~ 115	ERD25TJ103	Carbon,	10kΩ,		± 5%
R116	ERD25TJ562	Carbon,	5.6kΩ,	1/4W,	± 5%
R117	ERD25TJ103	Carbon,	10kΩ.	The second secon	± 5%
R118	ERX1ANJPR47	Metallic,	The state of the s		± 5%
R119	ERD25TJ103	Carbon,	10kΩ.	1/4W,	± 5%
P.120	ERD25TJ682	Carbon,	6.8kΩ,	1/4W,	± 5%
R121	ERD25TJ393	Carbon,	39kΩ.		± 5%
R122	ERD25TJ103	Carbon,	10kΩ,	1/4W,	± 5%
R123	ERD25TJ222	Carbon,	$2.2k\Omega$.	1/4W.	± 5%
R124	ERD25TJ103	Carbon,	10kΩ.	1/4W.	

Ref. No.	Part No.	Par	t Name & Des	cription	
R125	ERD25TJ332	Carbon,	3.3kΩ,	1//1//	4 50
R126	ERD25TJ222	Carbon,			
R127	ERD25TJ473	[15] [15] [15] [15] [15] [15] [15] [15]			
R128		Carbon,			
(0.000000000000000000000000000000000000	ERD25TJ153	Carbon,			
R129	ERD25TJ154	Carbon,		100000000000000000000000000000000000000	
R130 ~ 132	ERD25TJ104	Carbon,	The state of the s		
R133	ERD25TJ102	Carbon,	1kΩ.	1/4W,	± 5%
R134	ERD25TJ103	Carbon,	10kΩ.	1/4W,	± 5%
R135	ERD25TJ153	Carbon,		1/4W.	± 5%
R136	ERD25TJ123	Carbon,			± 5%
R137	ERD25TJ272	Carbon,	2.7kΩ,	1/4W.	± 5%
R138	ERD25TJ392	Carbon,	3.9kΩ,	1/4W.	± 5%
R201	ERD25TJ102		1kΩ,		± 5%
R202, 203	ERD25TJ222		2.2kΩ,		
R206	ERD25TJ472				
			4.7kΩ,		± 5%
R207	ERD25TJ222		2.2kΩ.		± 5%
R208	ERD25TJ393		39kΩ,		
R209	ERD25TJ123		12kΩ,		
R210	ERD25TJ822		8.2kΩ,	1/4W,	± 5%
R211	ERD25TJ223	Carbon,	22kΩ.	1/4W,	± 5%
R212	ERD25TJ563		56kΩ,		
R213 R214	ERG1ANJ101 ERD25TJ681	Metallic, Carbon,			
R215	ERD25TJ683				
0.155,10,55		Carbon,			
R216	ERD25TJ473		47kΩ,		
R217	ERD25TJ221		220Ω,		
R218	ERD25TJ104		100kΩ,		
R220, 221	ERD25TJ222	Carbon,	$2.2k\Omega$.	1/4W,	± 5%
R222, 223	ERD25TJ184	Carbon,	180kΩ,	1/4W,	± 5%
R224	ERD25TJ393	Carbon,			
R301	ERD25TJ101	Carbon.	100Ω,	1/4W.	± 5%
R302	ERD25TJ103		10kΩ,		
R303	ERD25TJ223	Carbon,			
R304	ERD25TJ103	3 3 3 1 3 3 3 5 5 5 1 1 1 m			
			10kΩ,		
R305, 306	ERD25TJ223		22kΩ,		
R307, 308	ERD25TJ103		10kΩ,		
R309	ERD25TJ102	Carbon,	1kΩ,	1/4W,	± 5%
R310	ERD25TJ681	Carbon,	680Ω,	1/4W,	± 5%
R311 ~ 315	ERD25TJ222	Carbon,	2.2kΩ.	1/4W,	± 5%
R316, 317	ERD25TJ333	Carbon,			
R318	ERD25TJ563	Carbon,	56kΩ	1/4W.	± 5%
R319	ERD25TJ222		2.2kΩ.	0.707.07.07.0	
R320	ERD25TJ680	Carbon,			
R321	ERD25TJ101				
5 1 (C) 1 LL			100Ω,		
R322	ERD25TJ680		68Ω,		
R323, 324	ERD25TJ103	F 2. 22-20 CO 1961 N 1974 C	10kΩ,		
R325, 326	ERD25TJ562	Carbon,			
R327, 328	ERD25TJ473	Carbon,	47kΩ,	100000000000000000000000000000000000000	
R329	ERD25TJ472	Carbon,	4.7kΩ.	1/4W,	± 5%
R330	ERD25TJ102	Carbon,	1kΩ,	1/4W,	± 5%
R331	ERD25TJ273	Carbon,	27kΩ.	1/4W,	± 5%
R332	ERD25TJ272	10 20 CO 10	2.7kΩ,		
R333	ERD25TJ332	Carbon,		200 3 C - C - C - C - C - C - C - C - C - C	
R334	ERD25TJ102	Carbon,	1kΩ,		
R336	ERD25TJ222	Carbon,			
R337	ERD25TJ121	Carbon,		1/4W.	± 5%
R338	ERD25TJ680	Carbon,	68Ω,		
R339 ~ 341					
R342	ERD25TJ152	Carbon,			
3.304.7	ERD25TJ680	Carbon,	68Ω.	1/4W.	± 5%
R343	ERD25TJ221	Carbon,	220Ω.	1/4W.	± 5%

Ref. No.	Part No.	Part Name & Description					
CAPACITORS		1					
01 [M]	ECQM4473KZ	Polyester,	0.047µF,	400V.	±10%		
C1 [MC]	ECQU1A473MC	Polyester,		The second secon	±10%		
C2.3	ECQUIA102MD	Polyester.	0.001µF	The second second second	±20%		
C4	ECEB 250V 100U	Electrolytic,	STATE OF THE PARTY		12010		
C5, 6	ECEA2AS200	Electrolytic,			No. of Lot		
C7	ECQM1H223KZ	Polyester,	0.022µF,		±10%		
C8	ECQM4473KZ	Polyester,	STEEDING STREET, STREE	THE RESERVE OF THE PARTY OF THE	TORRI SI SELECTIONI SI PARENTE IN CONTROL PROPERTO DE LA CONTROL PRO		
09	ECEA2AS101	Electrolytic,			±10%		
210	ECEA1HS101			100 miles			
211	ECQUIA102MD	Electrolytic,	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.		LOON		
12	AND AND ADDRESS OF THE PARTY OF	Polyester,	0.001µF,		±20%		
21	ECKD3A101MB2 ECEA1VS330	Ceramic,	100pF,				
107316		Electrolytic,			STREET		
101	ECQM1H104KZ	Polyester,		50V,	±10%		
102 ~ 107	ECQM1H123KZ	Polyester,	10 TO TO THE RESERVE OF THE SECOND		±10%		
108 ~ 110	ECEA1VS330	Electrolytic	33μF,	35V			
111	ECSF25E1ZEN	Tantalum,	1μF,	25V			
112	ECSF25E2R2Z	Tantalum,	2.2µF,	25V			
113	ECS25E1ZEN	Tantalum,	1μF,	25V			
114	ECEA25Z100	Electrolytic,		25V			
115	ECQM1H104KZ	Polyester,			±10%		
116	ECQM1H562KZ	Polyester,	0.0056µF,		±10%		
		0.0000000000000000000000000000000000000		S41832-757/	T-0:		
117	ECQM1H223KZ	Polyester,	0.022uF	50V	±10%		
118	ECQM1H154KZ	Polyester,			±10%		
119	ECEA1HS100	Electrolytic,			11070		
120	ECQM1H823KZ	Polyester,			+ 100/		
121	ECEA1ES470		0.082μF,		±10%		
201		Electrolytic,					
55.53	ECSF35ER33	Tantalum,	0.33µF,				
202	ECQM1H562KZ	Polyester,			±10%		
203	ECQM1H103KZ	Polyester,			±10%		
204	ECQM1H104KZ	Polyester,			±10%		
205	ECQM1H683JZ	Polyester,	$0.068 \mu F$	50V,	± 5%		
206	ECQM1H562KZ	Polyester,	0.0056µF,	50V	±10%		
208 ~ 210	ECQM1H104KZ	Polyester,			±10%		
211	ECQM1H562KZ	Polyester,					
212	ECKD1E104ZFZ		The state of the s		±10%		
213		Ceramic,	Carried Control of the				
804-1840	ECEA1ES470	Electrolytic,					
214	ECEA1HS100	Electrolytic,					
215	ECKD1E104ZFZ	Ceramic,	The Court of the C		(N.S.MESN)		
216	ECQM1H562KZ	Polyester,			±10%		
217, 218	ECEA1ES470	Electrolytic,	Control of the Contro				
219 ~ 221	ECQM1H104KZ	Polyester,	$0.1\mu F$,	50V,	±10%		
301	ECKD1H102MD	Ceramic,	0.001µF,	50V	±20%		
302	ECSF25E1ZEN	Tantalum,					
303, 304	ECEA1HS100	Electrolytic,					
305, 306	ECSF25E1ZEN	Tantalum,	7 h				
307	ECQM1H822KZ	Polyester,			±10%		
308	ECKD1E104ZFZ				110%		
309	ECCD1H330K	Ceramic,	the state of the s				
	ECCDINSSUK	Ceramic,	33pF,	50V			
310	ECCD1H331K	Ceramic,	330pF,	50V			
311	ECCD1H221K	Ceramic,	the Control of the Co				
312	ECEA1HS100	Electrolytic,					
313	ECQM1H102KZ	Polyester,			±10%		
314	ECQM1H103KZ			Control of Section 1			
315		Polyester,					
2.0.72	ECQM1H104KZ	Polyester,					
316	ECQM1H102KZ	Polyester,		Control of the contro	±10%		
317	ECKD1E104ZFZ	Ceramic,					
318	ECEB1AS221	Electrolytic,					
319, 320	ECEA1AS221	Electrolytic,	220µF,	and the second s			

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

IC101 (AN640G)

	Start	Stop		Start	Stop		Start	Stop
1			10	~~_±		19	20.5V	20.5V
2	0.6V	0 V	(12)	15V	15 V	20	15.4V	1.4V
3	/ <u> </u>		14)			21)	20.6V	16.4V
4	6.3V	6.4V	11)	→ 1 20µs	_	22		
(5)	6.3V	7.9V	(13)	15V	Same as at left	23	19.9V	20.5V
6	4.8V	2.2V	(15)			24		
7	5 V	5 V	16	0V	0 V			
8	20.5V	20.5V	17)	15.5V	15.5V	1		
9		0.2V	18)	20µs	Same as at left			

IC201 (SVIUPC4558C)

	Start	Stop		Start	Stop
① ⑤	20ms +	9V	② ③	9 V	9 V
6	9V	<i>y</i> v	4	0 V	0 V
7			8	17.6V	17.6V

IC202 (AN660)

	Start	Stop		Start	Stop		Start	Stop
	, <u>.</u>		(5)	12.6V	Same as	(12)	2.4V	2.1V
1	3.50	0 V	6	6.3V	at left	(13)	2.2V	2.1V
	→ 20ms -		7	6.5V	8 V		—→ 20ms — ↓	
	8ms		8	6.3V	5.1V	14)	7.5V	7.5V
2	7.5V	0 V	9	-20ms 6.2V	7.5V	(15)	12.5V	12.5V
3	20ms + 6V	5.8V	10	0 V	0 V	16	20ms + 5.6V	5.6V
4)	5.8V	6 V	(1)	20ms <u>1</u>	7.5V		-	

10001	101	IBAFOO	1701
IC301		1101532	1721

	Start	Stop
1	0.2V	0.2V
2	0 V	0 V
3	0.2V	0.2V
4	0 V	0 V
(5)	0.2V	0.2V
6 7 8	0 V	0 V
9	0.2V	0.2V
14)	5.1V	5.1V

IC302 (SVIMSM4013) IC303 (SVIM53217P)

		2.00					
	Start	Stop		Start	Stop		
3			1	0.1V	4.2V		
4			3	0 V	4.7V		
(5)	0 V	0 V	4	0.1V	4.2V		
6	0 V	0 V	(5)	4.7V	0 V		
7			6	3.2V	0 V		
8			7	0 V	0 V		
9	0 V	4.7V	8	3.8V	3.8V		
10	0 V	0 V	9	4 V	4 V		
11)	0 V	0 V	10	3.8V	3.8V		
(12)	0 V	4.7V	(1)	4 V	4 V		
13)	4.7V	0 V	12)	0.4V	0.4V		
14)	4.7V	4.7V	13)	0 V	0 V		
			14)	5.1V	5.1V		

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

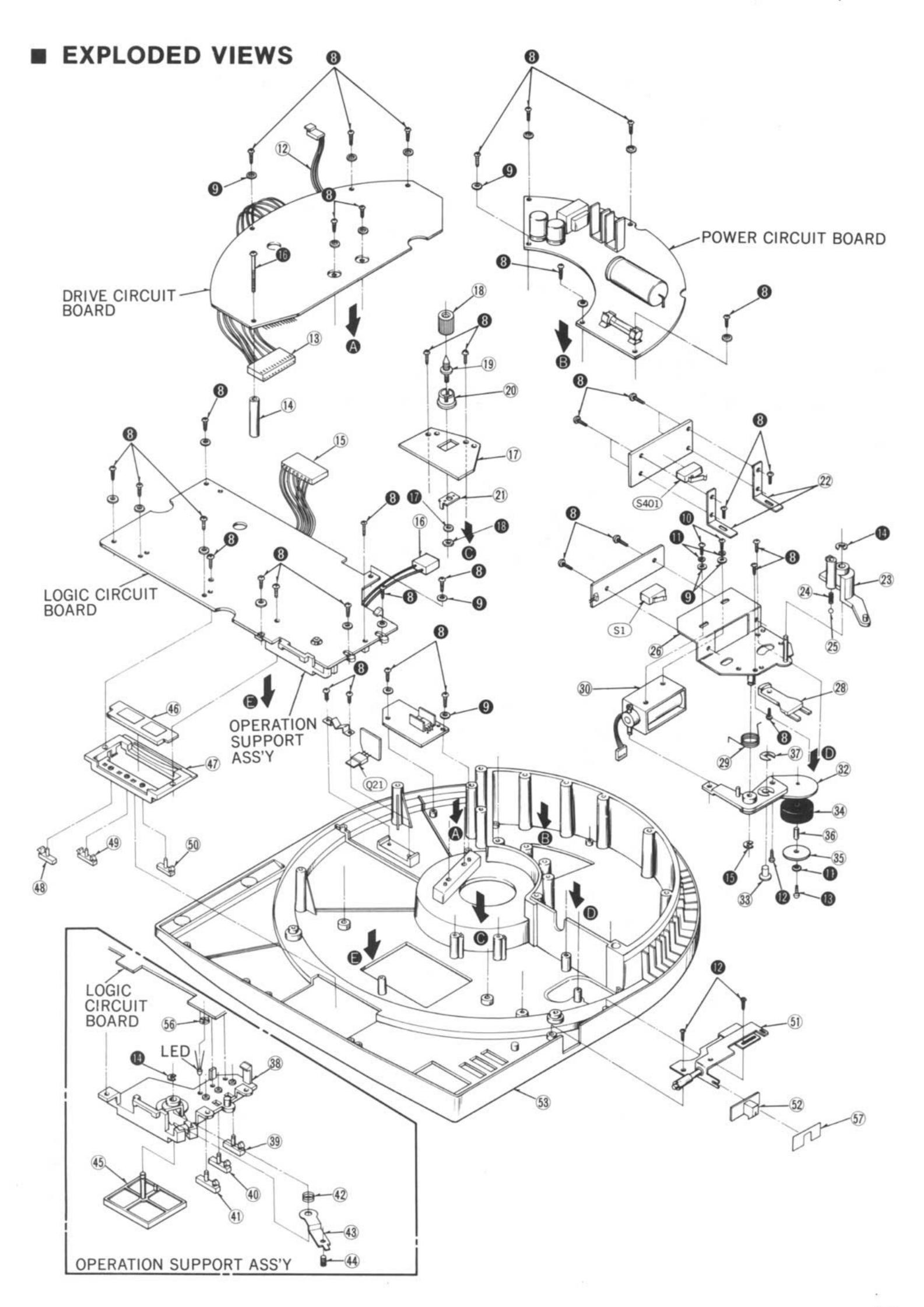
IC304 (DN860)

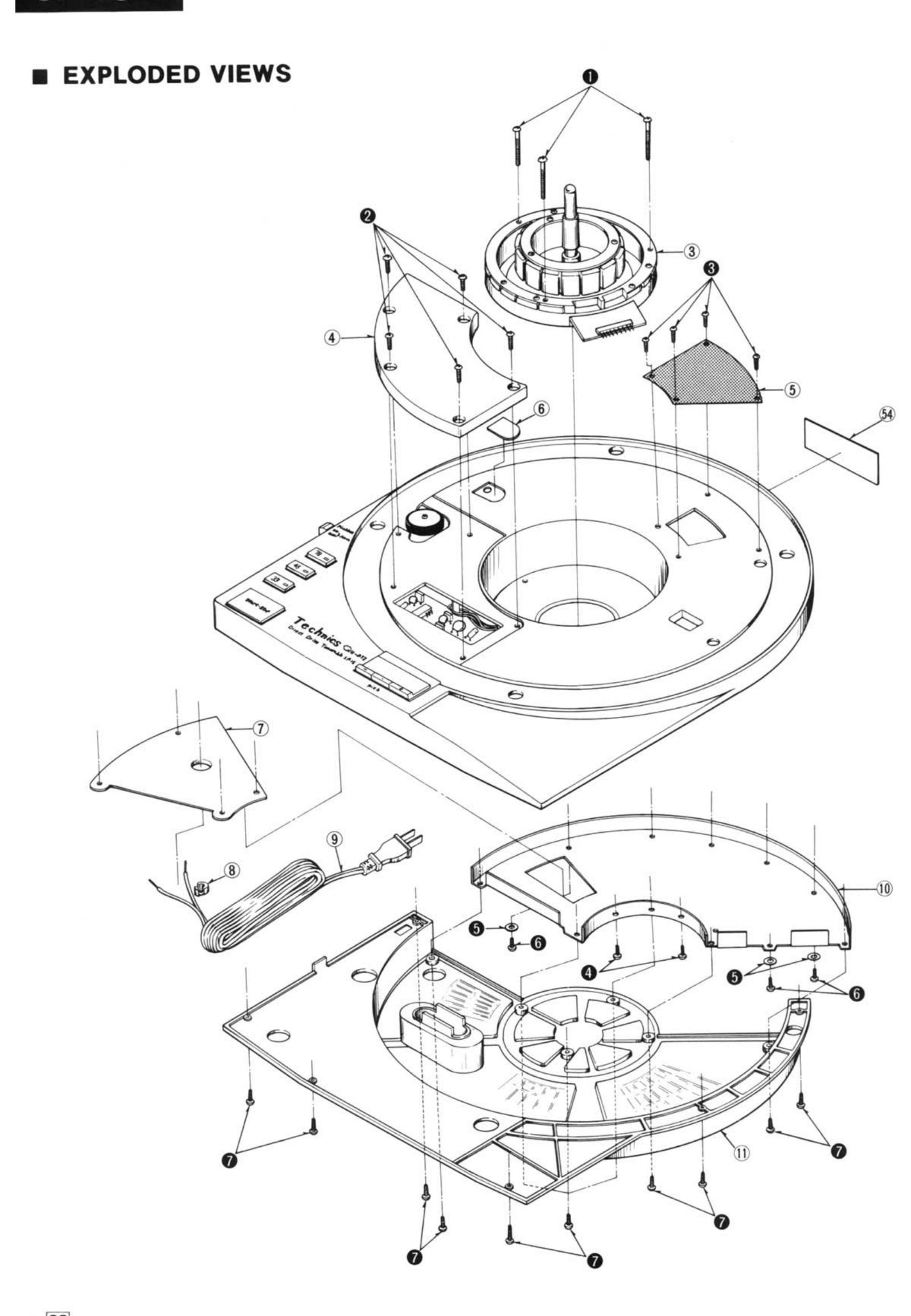
	Start	Stop		Start	Stop		Start	Stop
1	9.3V	9.3V		+-3.8µs	C	(11)	0V	0V
2	0.24μs 1.2V	Same as at left	7	3.8V	Same as at left	(12) (13)	4V	4V
		ation		20ms +		(14)	0V	0V
3	0.24 μs 0.5V	Same as at left	8	7.5V + 20ms +	0V	15)	6.2V	Same as at left
4)5)	0 V 3.2V	3.2V 0 V	9	4V	4V	(16)	20ms 6.5V	0V
6	3.8µs 1 4.2V	Same as at left	10	10ms 1 4.5V	Same as at left			

IC305 (MN6042)

	Start	Stop		Start	Stop		Start	Stop
① ② ③ ②	4.6V	4.6V	16	3.5ms	Same as at left	21)	3.8µs 4.5V	Same as at left
28						22	3.8ms	Same as at left
4 8 5 9	0 V	0 V	17	+-4ms+	Same as	23	1.8V	1.8V
6 19 7		(18)	18)	5.1V	at left	24)	2.2V	Same as
10 11 12 13 14	3.5ms	Same as	20	2ms	Same as		+3.8µs	at left
(13) (14) (15)		at left	5.1V	at left	26	4.24	Same as at left	

— NOTE —





■ REPLACEMENT PARTS LIST

Important Safety Notice

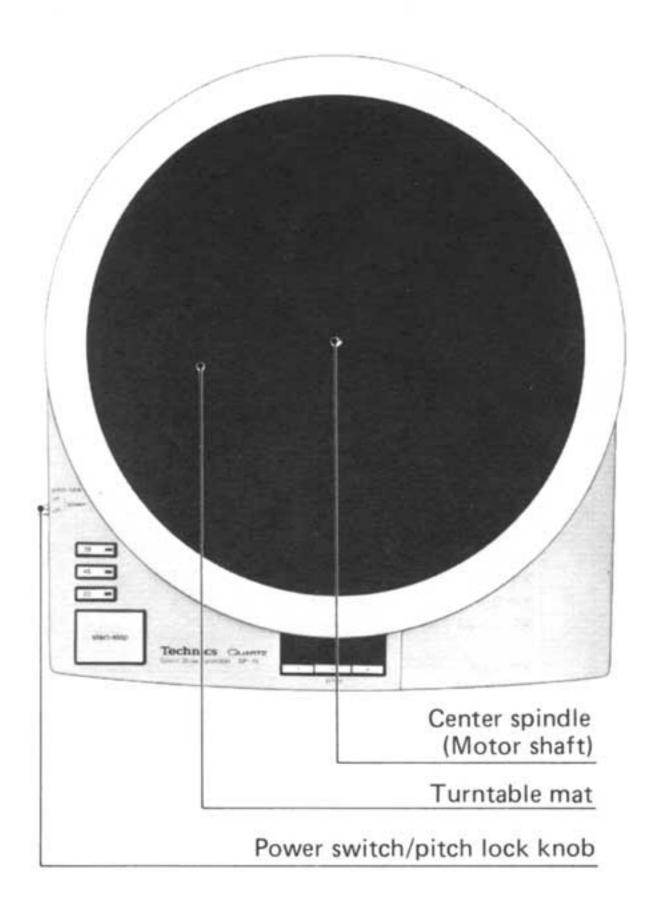
Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

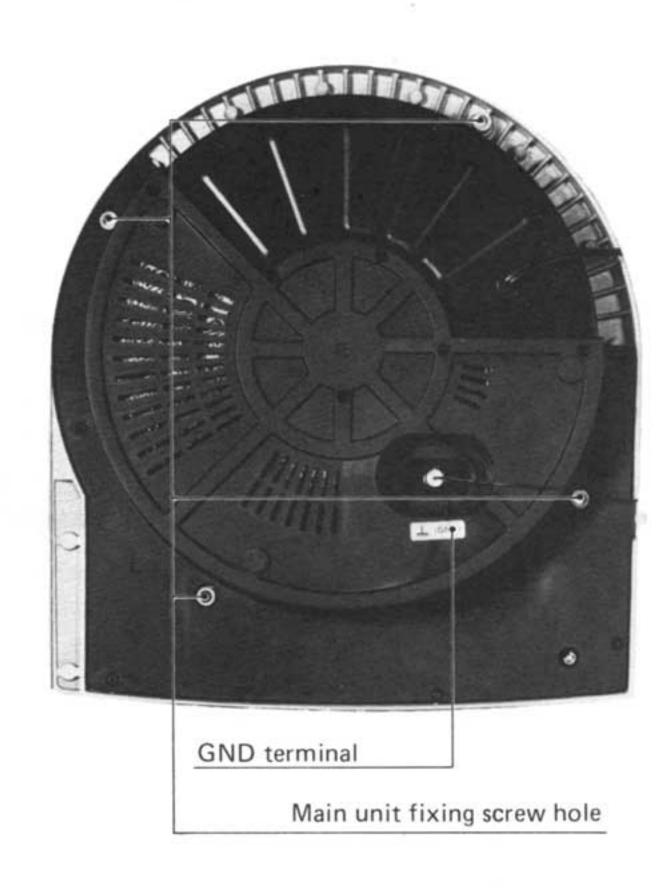
Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. SP-15 (M) → [M], SP-15 (MC) → [MC].

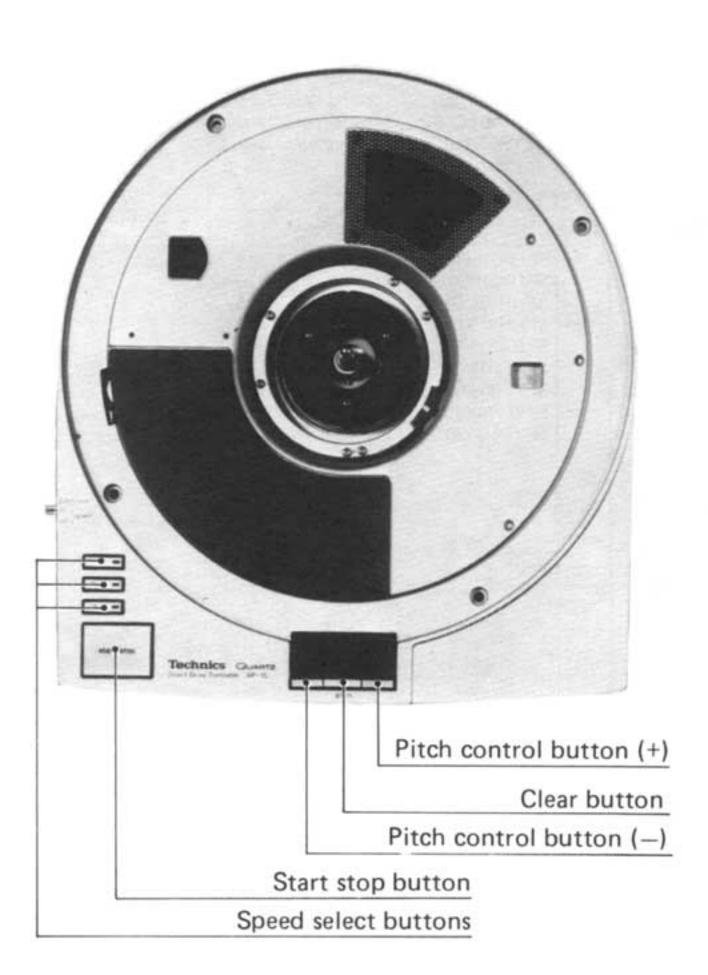
Ref. No.	Part No.	Part Name & Description	
CABINET and (CHASSIS PARTS		
1	SFTG015-01	Turntable Mat	
2	SFTE015-01A	Turntable	
3	SFMZ015-02Z	Stater Frame Ass'y	
4	SFUM015-07	Cover, Turntable	
5	SFUP015-09	Plate, Shield, Turntable	
6	SFUP015-13	Cap, Turntable	
7	SFUP015-11	Plate, AC Cord	
8	SFHK040L	Bushing, AC Cord	
9	QFC1201MA	AC Cord	1
10	SFUP015-12	Plate, Shield, Power Circuit	
11	SFUM015-09	Cover, Bottom	
12	SFDJ015-02E	Connector, Power Circuit	
13	SFDJ134-01E	Connector, Stater Frame Ass'y	
14	SFX0015-01	Pipe, Logic Circuit Screw	
15	SFDJ015-03E	Connector, Drive	
16	SFDJ015-01E	Connector, Pitch Lock Switch	
17	SFUP015-04	Plate, Ground Wire	
18	SNE273-1	Knob, Ground Terminal	
19	SNE271S	Screw, Ground Terminal	
20	SGE401	Ornament, Ground Terminal	
21	SJT719	Spacer, Ground Terminal	
22	SFUP015-10	Bracket, Power Circuit	
23	SFUM015-03	Cam, Power Switch	
24	SFQA015-02	Spring, Power Switch Cam	
25	SFYB-M30	Ball, Power Switch Cam	
26	SFUP015-03E	Bracket, Power Switch	
28	SFUM015-04	Cam, Pitch Lock Switch	
29	SFQS015-01	Spring, Brake	
30	SFDZ015-01E	Solenoid Ass'y	
32	SFUM015-06E	Brake Ass'y	
33	SFXJ015-06	Shaft, Eccentricity	
34	SFUZ015-01	Roller, Brake	
35	SFUP015-14	Spacer, Roller	
36	SFX0015-02	Pipe, Roller	
37	SFXW130-01	Circlip, Roller	
38	SFUM015-01	Plate, Operation	
39	SFKT015-03E	Knob, Speed Select (78 rpm)	
10	SFKT015-02E	Knob, Speed, Select (45 rpm)	
11	SFKT015-01E	Knob, Speed Select (33 rpm)	
12	SFQA015-01	Spring, Supporter	
13	SFUP015-07	Supporter, Switch	
14	SFRTN30060	Screw, Supporter	
15	SFKT015-06	Knob, Start/Stop	
16	SFUM015-05E	Supporter, Logic Circuit	
17	SFUM015-62	Plate, Operation	
18	SFKT015-08	Knob, Operation (C)	
19	SFKT015-04	Knob, Operation (A)	
50	SFKT015-05	Knob, Operation (B)	
51	SFUP015-08Z	Plate, Slider	
52	SFKT015-07	Knob, Power Switch	
3	SFAC015-01	Cabinet, Panel	
4 [M]	SFNN015M01	Name Plate	
4 [MC]	SFNN015C01	Name Plate	
6	SFUM015-11	Spacer, LED	

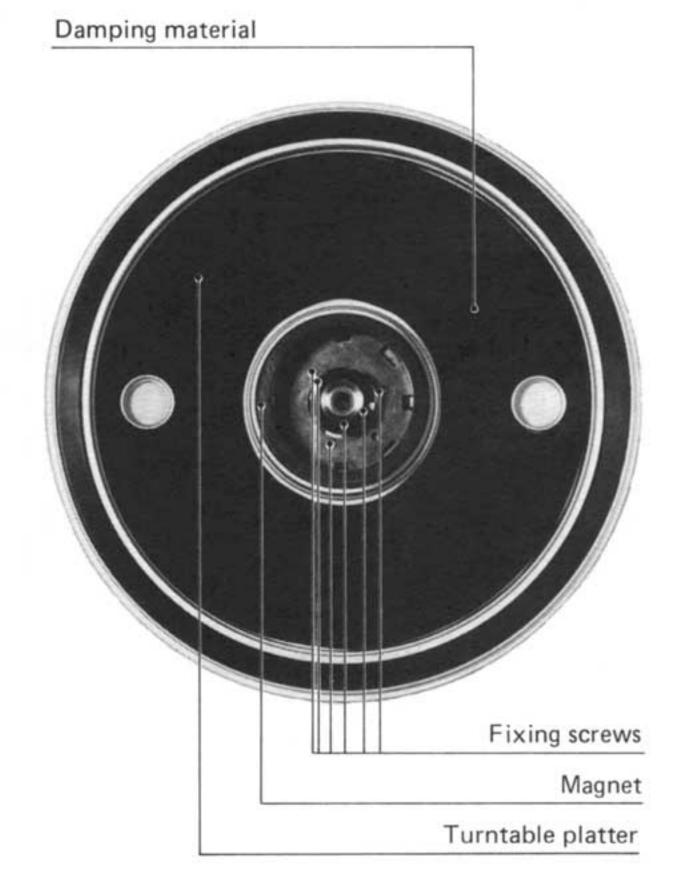
Ref. No.	Part No.	Part Name & Description
57	SFUP015-15	Cover, Power Switch
SCREWS and C	IRCLIPS	
D	XTN3+30B	Screw
D 9	XTN3+8BFZ	Screw
9	XTN3+6BFZ	Screw
9	XTN3+10B	Screw
3 3 3 3	XWG3FZ	Washer
9	XTN3+10BFZ	Washer
2	XTS3+10BFZ XTN3+8B	Washer
9	XWG3	Washer
•	XSN3+6S	Screw
	хwазв	Washer
	XTN3+6B	Screw
	XSN3+12S	Screw
B	XUC3FT	Circlip
•	XUC4FT	Circlip
	XTN3+40B	Screw
•	XWA4B	Washer
	XNG4ES	Nut
ACCESSORIES		
1 [M]	SFNU015M01	Instruction Book
1 [MC]	SFNU015C01	Instruction Book
3	SFWE212-01 SFEL028-01E	Adaptor, 45 r.p.m Ground Wire
4	XMM41+32FU	Screw
5	SFXW028-01	Washer
6 [M]	SFNU015M02	Instruction, Dimension Drawing
6 [MC]	SFNU015C02	Instruction, Dimension Drawing
.7	SFYF07A10	Polyethylene Bag
ACKING PAR	TS	
1 [M]	SFHP015M01	Carton
1 [MC]	SFHP015C01	Carton
2	SFHH015-01	Pad (Left)
3	SFHH015-02	Pad (Right)
5	SFHH015-03 SFHD015-01	Pad Too
6	SFYF60A60	Pad, Top Polyethylene Bag, Unit
7	SFYH40X45	Polyethylene Bag, Ont
B	SFYF10A30	Polyethylene Bag, Cord
-	A STATE OF THE STA	The street of th

■ PARTS IDENTIFICATION









Service Manual

Synthasizer Direct Drive Turntable

SP-15

(M), (MC)



- The model SP-15 (M) is available in America only.
- The model SP-15 (MC) is available in Canada only.

33-1/3, 45 and 78.26 rpm

Adjustable up to ±9.9% in 0.1%

increments by digital indication

Specifications (Specifications are subject to change without notice.) (Weights and dimensions shown are approximate.)

General

Power supply:

120V, 50 or 60 Hz

Power consumption:

11W

Dimensions:

34.9 x 9.3 x 37.2 cm

 $(W \times H \times D)$

(13-3/4x3-21/32x14-41/64 inches)

Weight:

6.2 kg (13.7 lb)

Turntable section

Type:

Motor:

Quartz synthesizer pitch control

Direct drive

Drive method:

Direct Drive

Drive control method: Quartz-phase-locked control

Brushless DC motor

Aluminum die-cast, diameter 33.9 cm

(13-11/32 inches) weight 2.7 kg (5.9 lb)

Moment of inertia:

Turntable platter:

380 kg·cm² (130 lb·in²)

Turntable speeds:

Turntable speed

fine adjustment:

Starting torque:

Build-up time:

Braking time:

Braking system:

Speed fluctuation due

to load torque:

Speed drift:

Rumble:

Wow and flutter:

0% within 2.5 kg-cm (2.2 lb-in)

Electrical and Mecanical braking

Within ±0.002%

3 kg-cm (2.61 lb-in)

0.4 sec. to 33-1/3 rpm

0.4 sec. from 33-1/3 rpm

0.025% WRMS (JIS C5521)

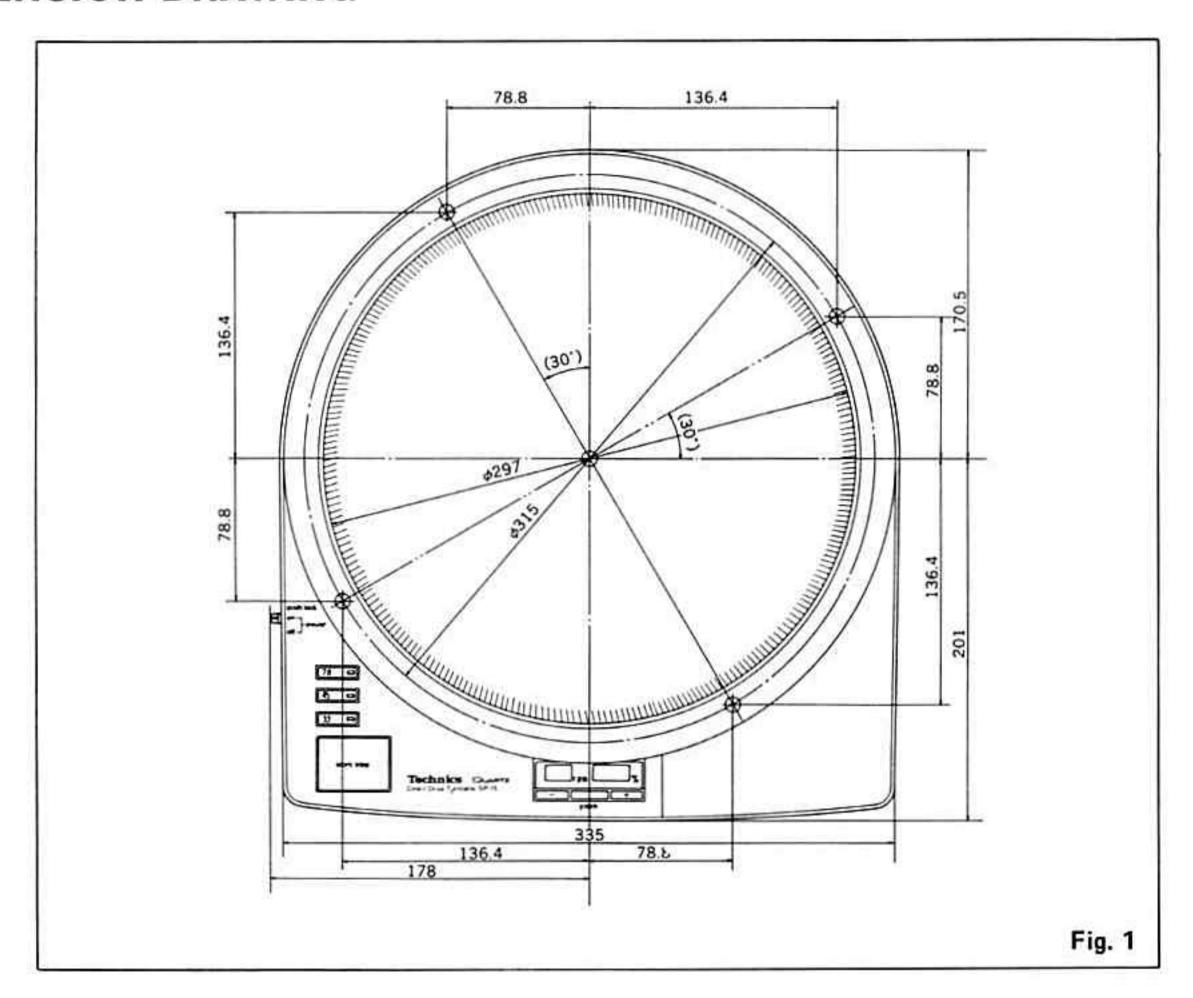
±0.035% peak (IEC 98A Weighted)

-56 dB (IEC 98A Unweighted)

-78 dB (IEC 98A Weighted)

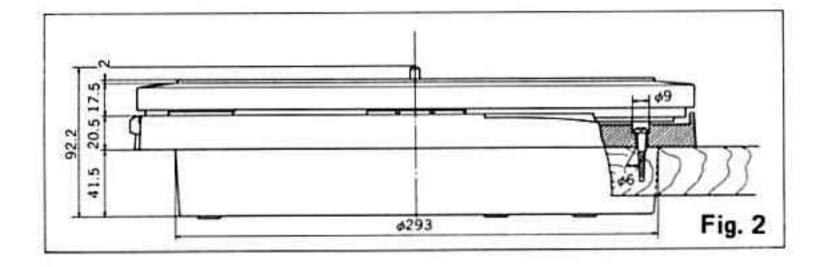
Technics

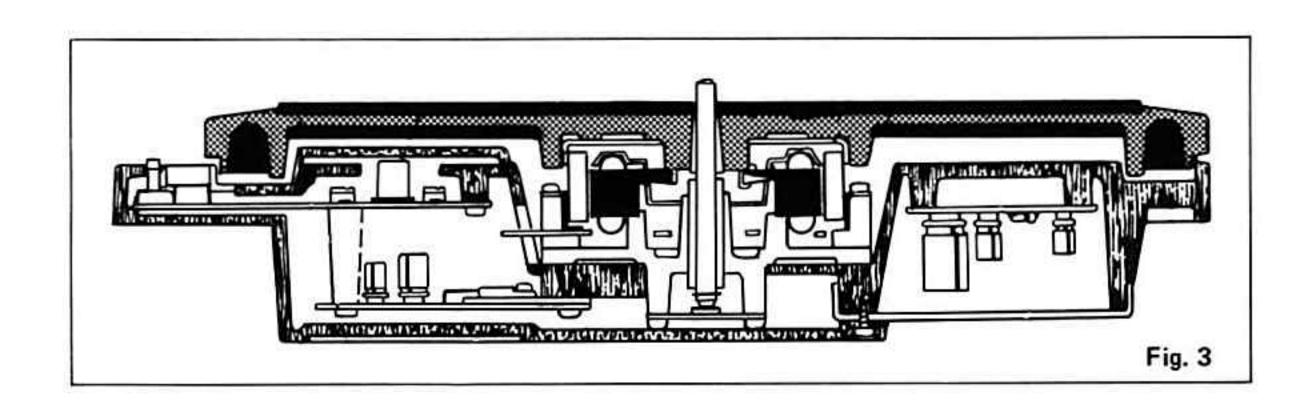
DIMENSION DRAWING



NOTE:

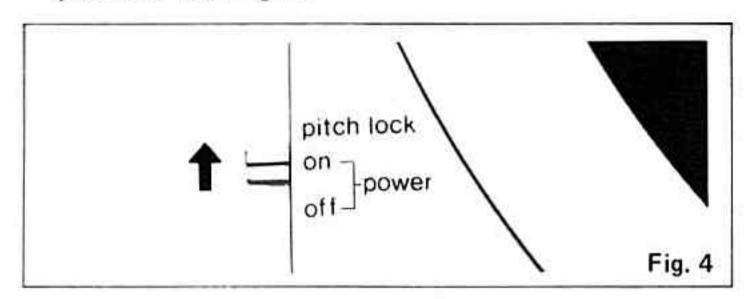
- Secure the main body with the attached 4 setscrews.
 When other setscrews are used, find suitable ones in accordance with the dimension drawing.
- In order to make the best use of this turntable, employ a sturdy cabinet (turntable base) which sufficiently withstands the load.
- * It is recommended to use the optional turntable (SH-15B1) as the cabinet for SP-15.



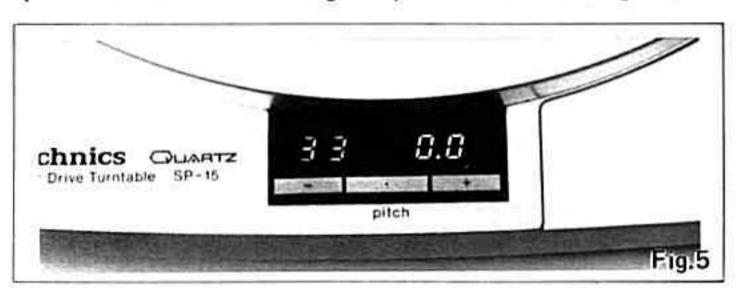


HOW TO OPERATE

 Set the Power switch/pitch lock knob to the "on" position. (See Fig. 4.)



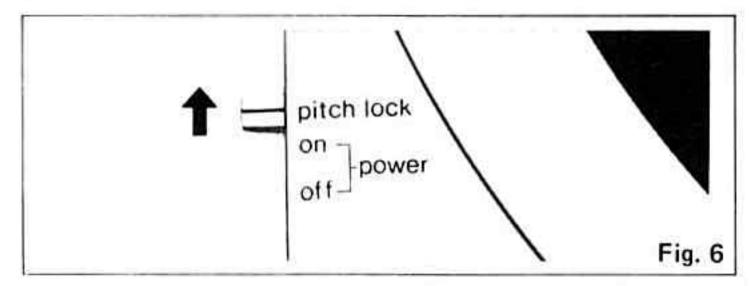
The revolutions are indicated at 33 (33-1/3 rpm.) of the speed selector knob and digital speed indicator. (Fig. 5.)



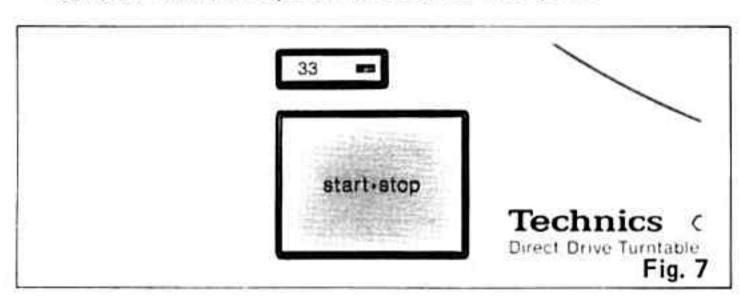
Upon setting the power switch/pitch lock knob to "on", the revolutions are changed over to 33-1/3 rmp. at all times. If the record to be played is other than a 33-1/3 rpm., depress the speed select button to suit the phono disc to be played.

When the power switch/pitch lock knob is set to "pitch lock", the pitch control button and speed select button are locked so as not to be actuated even if the buttons are accidentally touched during playing. (See Fig. 6.)

Therefore, for selecting the speeds or operating the pitch control, first set the power switch/pitch lock knob to the position "on".



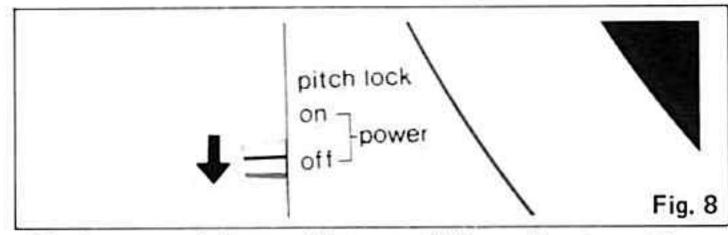
Place a record on the turntable mat.
 Push the start • stop button. (See Fig. 7.)
 The turntable platter will begin to rotate and reach its constant rotation speed 0.4 sec. (33-1/3 rpm.).



Upon completion of playing, depress the start • stop button.

The turntable is instantly (0.4 second) stopped by the double brake system.

4. After that, set the power switch/pitch lock knob to "off". (See Fig. 8.)



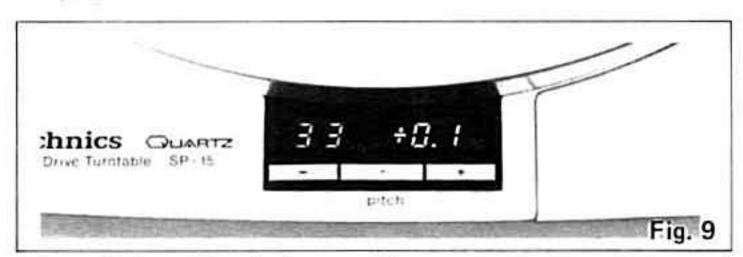
Pitch control (turntable speed fine adjustment).

The Quartz synthesizer system is being employed for the first time in the world. A high degree of pitch control accuracy over a wide range (±9.9%) in 0.1% increments can be obtained with the quartz perfectly locked.

The pitch control is continuously variable up to 9.9%.

The pitch variations which are clearly indicated by the LED digital indicator provide you with accurate and easy selection.

The pitch control can be selected in increments of 0.1% which is below the threshold of human perception. (See Fig. 9.)

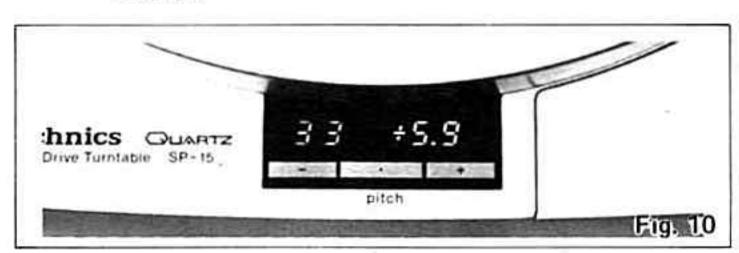


The pitch control also enables you to accurately and precisely tune musical instruments and by varying the pitch slightly, to obtain a different musical note from the record. (See Fig. 10.)

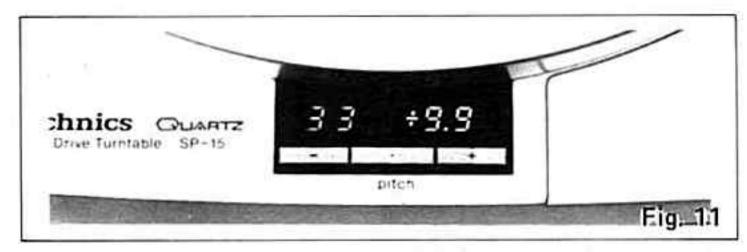
For a half-tone change:

+5.9% (#)

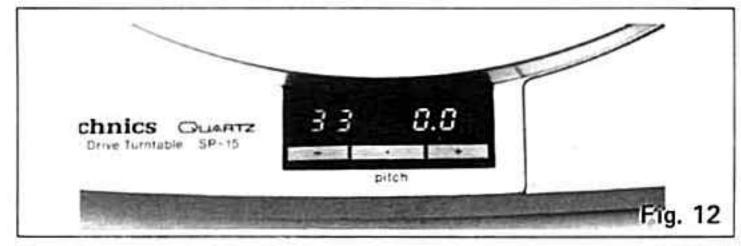
-5.6%(b)



Another feature of the variable pitch control over a wide range of ±9.9% is that it makes singing along with a melody easy for a chorus, or for playing a record for accompaniment only. (See Fig. 11.)



By pressing the clear button which is located between the "+" and "-" pitch buttons, you can quickly return the set to normal palying speed. (See Fig. 12.)



SP-15

■ FEATURES

Quartz synthesizer system that for the first time in the world has made it possible to achieve a digital pitch control of ±9.9% in 0.1% increments

In conventional quartz players the quartz reference was in effect only within strictly limited ranges: whenever vernier speed change was required, the quartz circuit had to be switched off. In the Technics SP-15, we took the lead by locking the quartz, thus making it possible to effect a high degree of pitch control accuracy over a range as wide as ±9.9% in 0.1% increments, which is below the threshold of human perception.

Moreover, the pitch control, coupled with the clear digital indicator, enables you to accurately and precisely tune with musical instruments, vary pitch slightly for obtaining a musical note from a record or alter tones by a half-note.

Oversized turntable that cuts off and absorbs external vibrations.

Based on analyses of the turntable vibration modes and vibrations in the sound range, a special viscoelastic material is applied to the reverse surface of the turntable platter for deadening.

The deadening material is applied to the undersurface and outer periphery of the turntable platter, with the rubber turntable mat on the surface settled into the turntable platter. This design is superior in acoustic characteristics even at high sound levels through elimination of turntable resonance and absorption of external vibration.

Moreover, the oversized aluminum die-cast turntable platter, 33.9 cm (13-11/32'') in diameter, is heavy with 2.7 kg (5.9 lb.) of its own weight, with a moment of inertia of 380 kg cm^2 (130 lb. in^2) for large heavy weight class design.

Vibration damping structure by the precision aluminum die-cast cabinet and TNRC.

The acoustical characteristics of the player system are inevitably affected by the turntable platter and cabinet employed. The SP-15 adopts an aluminum die-cast cabinet superior in strength, with high processing accuracy, and the new acoustic material TNRC excellent in acoustical properties. Through cutting-off and absorption of external vibrations, the unit is designed for improved acoustic characteristics, with susceptibility to feedback minimized.

Electronic circuits of more than 3,000 discrete elements concentrated into 4ICs

The 4 kinds of IC, i.e., Synthesizer pitch control CMOS LSI (MN 6042), Frequency dividing IC employing I²L, ECL

RUBRICATION

Apply 2 or 3 drops of oil once after every 2000 hours of operation. (See Fig. 13.)

This time interval is much longer than that of conventional type motors (200-500 hours).

Please purchase original brand of oil (Parts number is SFWO 010.)

(DN 860), phase speed control IC (AN 660) and Driving IC (AN 640) into which high density electronic circuits of more than 3,000 discrete elements have been compressed have made it possible to produce this high precision quartz turntable.

Quartz Controlled Rotation Accuracy

The SP-15 utilizes the oscillation of a quartz crystal as a reference signal or source. This oscillation is not affected by temperature change or power fluctuations. By synchronizing the rotation of the turntable platter accurately to the reference signal, speed drift of the unit is held within ±0.002%.

Technics' unique motor construction in which the rotor of the motor is integrally formed with the turntable

High torque motor of 3 kg-cm with starting time of 0.4 second is capable of instant speed change-over (at 33-1/3 rpm.).

With the double braking system of the electronic brake and mechanical brake, the turntable stops instantly (0.4 second) upon depression of the start stop button (at 33-1/3 rpm.)

High performance with wow and flutter of only 0.025% (JIS C5521) and rumble of -78 dB (IEC 98A Weighted).

Pitch lock mechanism capable of locking the speed selection and pitch control operation

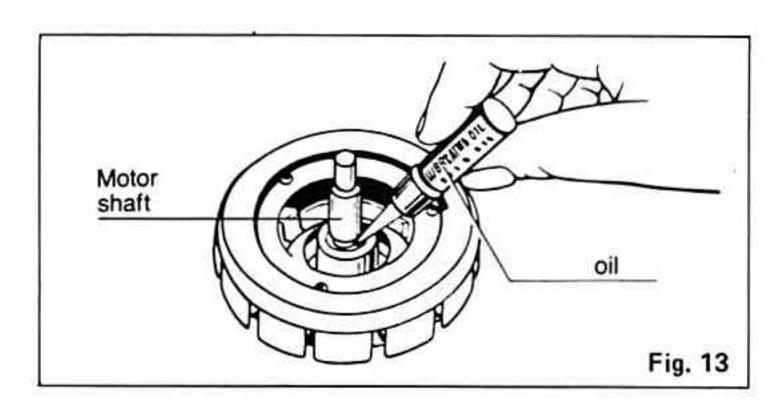
Malfunction caused by accidental touching of the operating portion during playing, can be prevented.

Highly efficient pulse power supply circuit is employed for the DC power source

Since DC voltage is obtained by oscillating high frequency (20 kHz) through direct rectification of AC power supply for voltage conversion at the pulse transformer, there is no leakage of the commercial power source frequency.

Stable and positive mechanism that can stand frequent use for business use, etc. and a switch section with point contacts.

Revolutions at 3 speeds of 33-1/3, 45 and 78.26 rpm. are employed, taking into account business use.



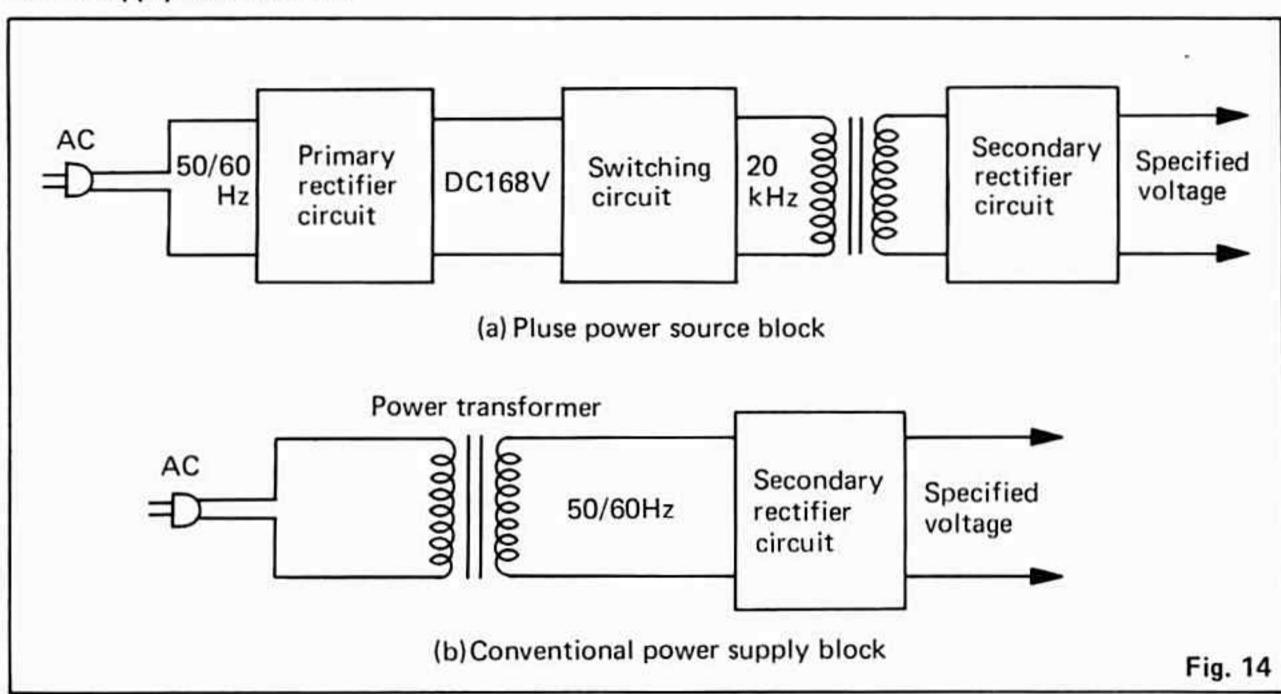
■ TECHNICAL DESCRIPTION

· Description of pulse power supply circuit

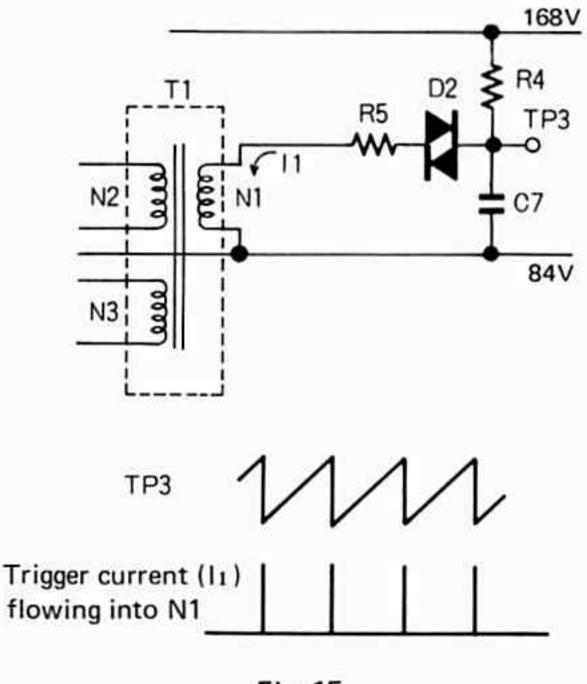
The pulse power source directly rectifies the commercial power with diode to make DC 168V. And it generates pulses (approx. 20 kHz waves) by switching the DC 168V with the special high-voltage withstanding, high-speed switching transistor. Thus, the circuit serves to drive the power transformer with the switching pulses in order to obtain the specified voltage on the secondary side.

Fig.14 shows a pulse power supply block and a conventional power supply block.

Power supply circuit blocks



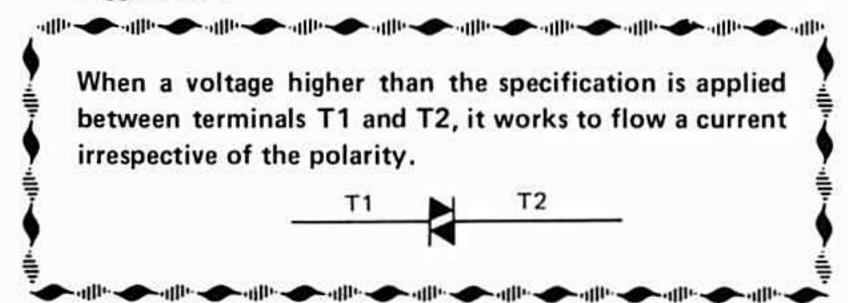
Pulse power supply circuit of SP-15



1. With power supply turned ON,

C7 is charged through R4. When the charged voltage becomes high enough to turn on trigger diode D2, current (I1) flows through R5. Then, C7 is discharged and, therefore, it is again charged through R4. As the operations are repeated, trigger current flows into N1 as shown in Fig. 15.

Trigger diode



Switching circuit operation

- Commercial power (50/60Hz) is rectified by D1 and D4 through line filter L4 to obtain DC 168V. The DC 168V is divided by R2 and R3 so that TP. 0 = 0V, TP. 2 = 84V and TP. 3 = 168V.
- Q C7 is charged through R4. When trigger diode D2 reaches "on" level, the trigger current flows from D2 to N1 via R5. Since the coils of N2 and N3 are reverse in phase, when a current flows into N1 in the direction of + , the base current is generated at N2 and N3 so that Q1 and Q2 are respectively reverse- and forward-biased. Therefore, Q1 turns off and Q2 turns on, and the primary current of T2 flows from N1 → N5 → Q2 (C-E) → TP. 0. At that time, a feedback current is generated at N4 and it flows into N1 through R6. The current flowing into N1 becomes of positive feedback, then Q1 and Q2 keep turning on, and the collector current of Q2 keeps increasing in accordance with the inductance of N5.
- Observer, N3 is directly connected between base and emitter of Q2, proximately being short-circuited, therefore, the feedback current is saturated at a given value determined by R6. Accordingly, the base current of Q2 decreases in accordance with the inductance of N3. When the base current of Q2 is about to become smaller, the counter electromotive force is generated at N1, causing the feedback current to flow in the reverse direction, and then a positive feedback line is formed for Q1. Consequently, Q1 turns on and Q2 turns off, and the primary current of T2 flows from TP. 1 → Q1 (C-E) → N5 → TP. 2. Similarly, when the current is saturated, a positive feedback line is formed for Q2.
- Through repetition of the above procedure, the oscillation is continued and 20 kHz pulse voltage can be obtained at N6 on the secondary side of T2.

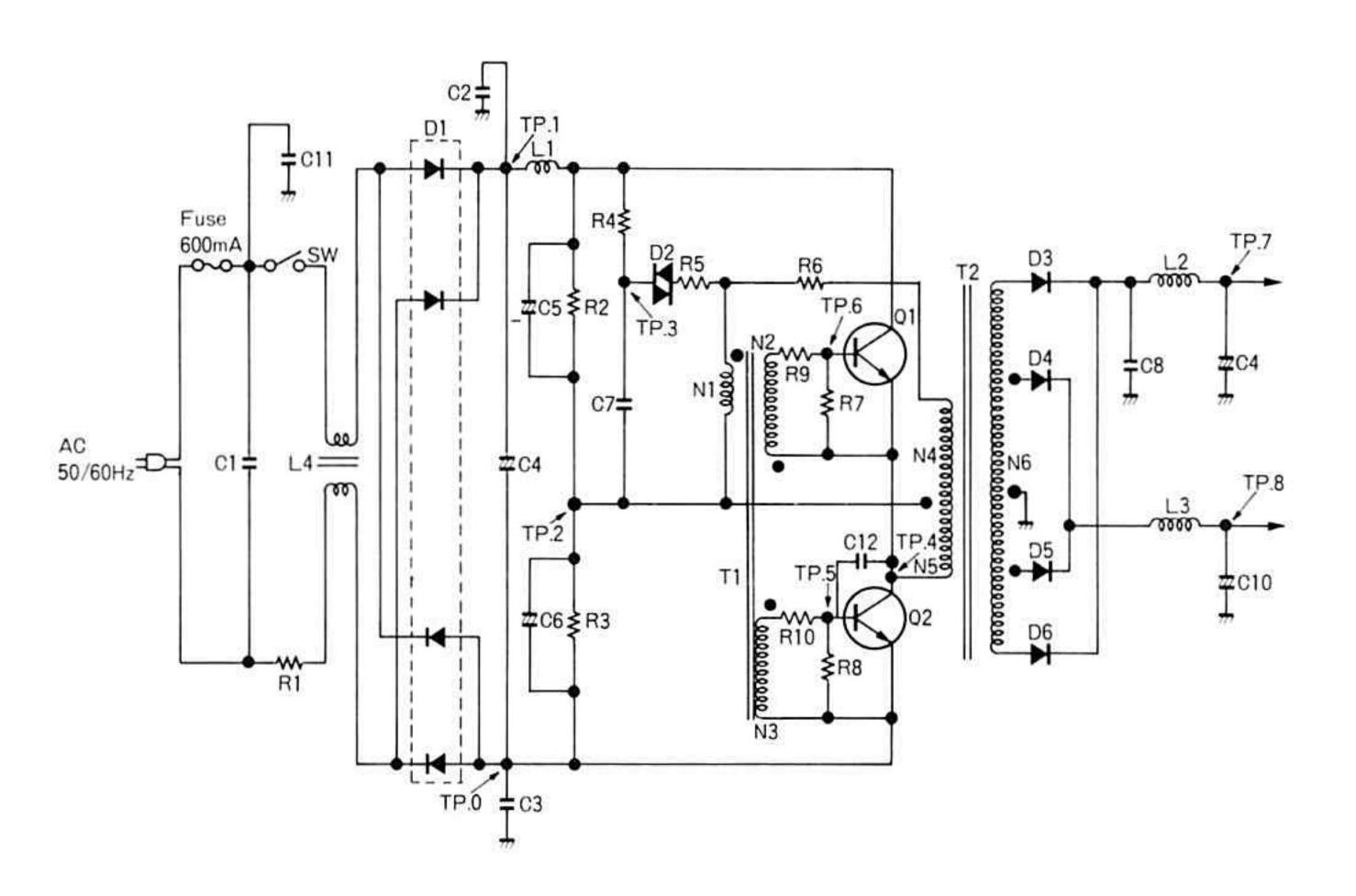
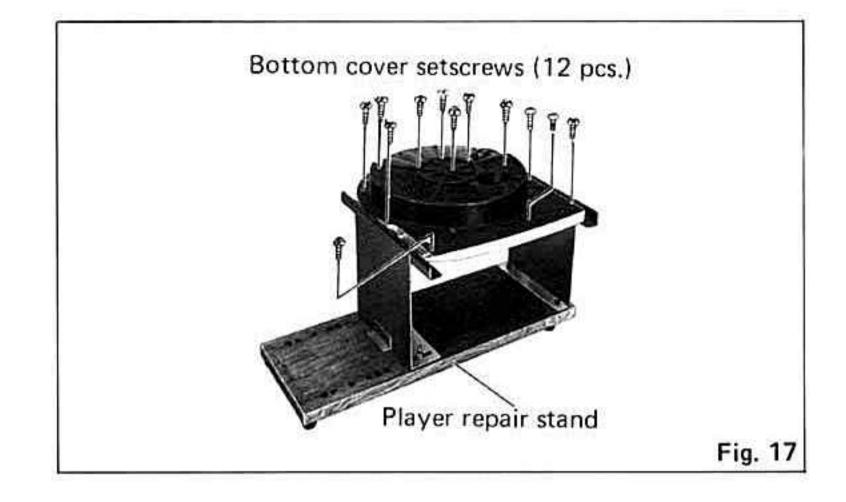


Fig. 16 Switching circuit (-mark shows the polarity of coil.)

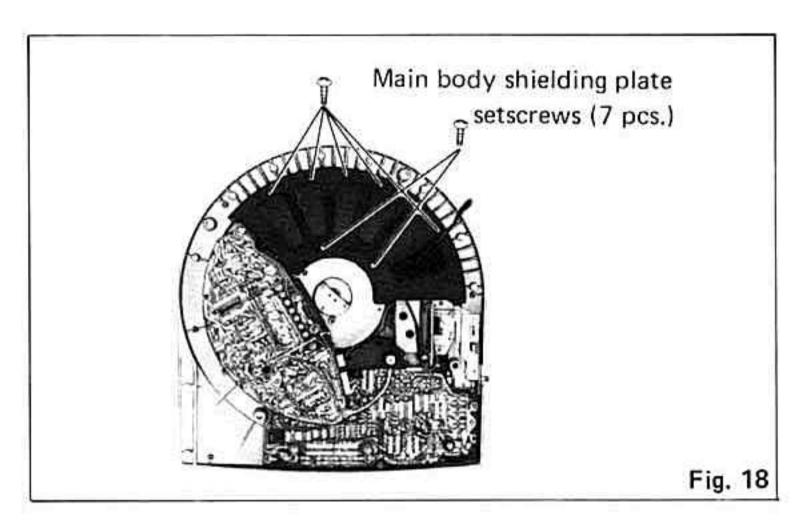
DISASSEMBLY PROCEDURE

How to remove bottom cover and shielding plate.

- Remove the turntable rubber and turntable, and then turn the main body upside down.
- Remove 12 setscrews of the bottom cover. (See Fig. 17.)

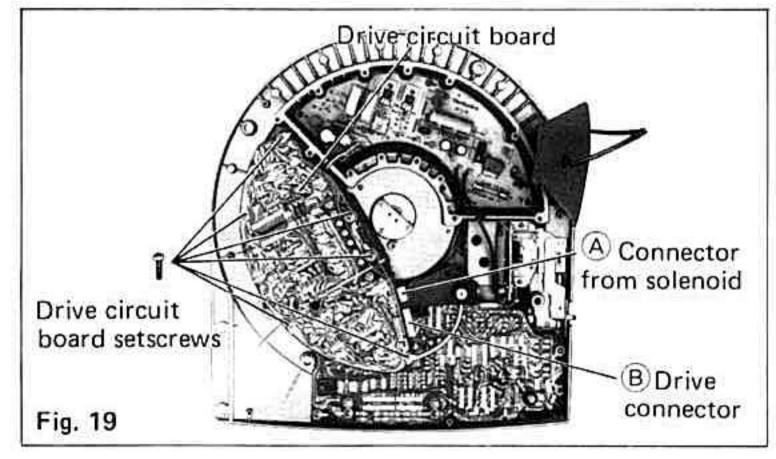


Remove 7 setscrews of the shielding cover. (See Fig. 18.)



How to remove drive circuit board (See Fig. 19.)

- Detach connector A from the solenoid, and drive connector B from the logical circuit board.
- 2. Remove 6 setscrews of the drive circuit board.
- Remove the drive circuit board, and detach the motor drive connector and the power line connector from the drive circuit board. Thus, the drive circuit board can be removed.

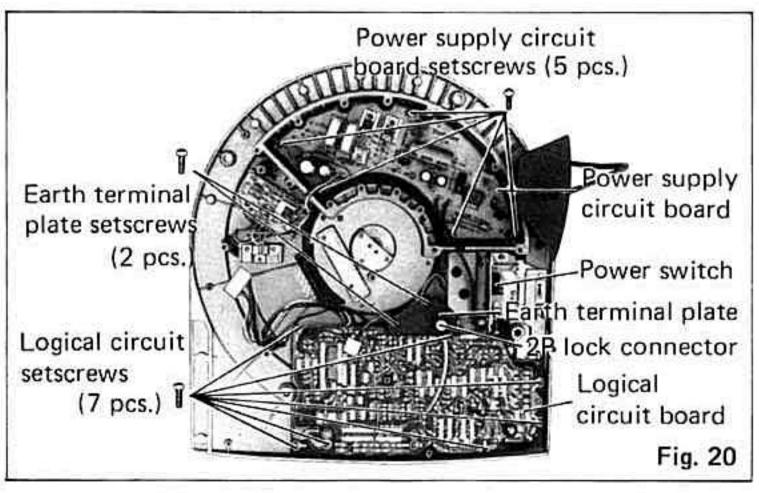


How to remove power supply circuit board and logical circuit board (See Fig.20.)

 Remove 5 setscrews of the power supply circuit board.

Note: Take special care when disassembling the power supply section because the circuit board is supplied with a high voltage.

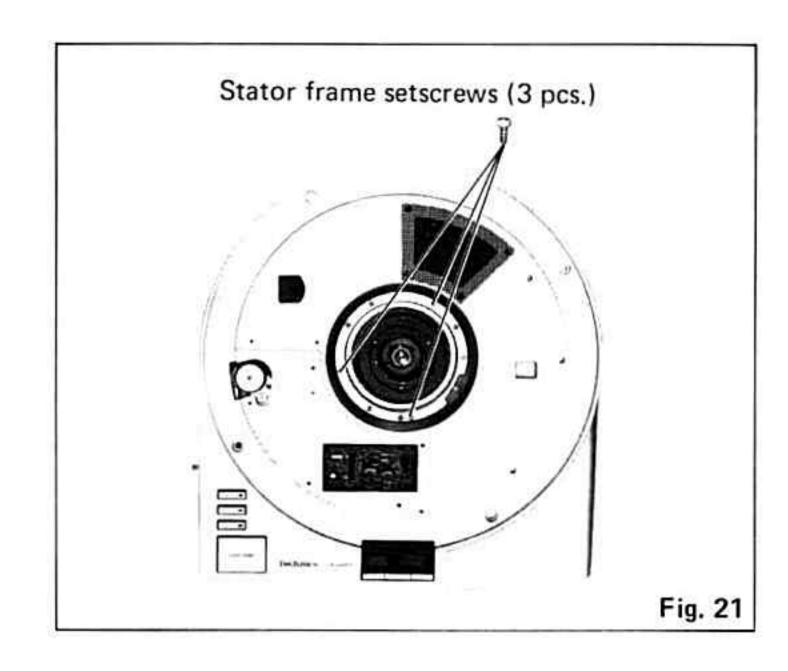
- 2. Remove 2 setscrews of the earth terminal plate.
- 3. Remove 7 setscrews of the logical circuit board.
- Detach the logical circuit board and the 2P lock switch connector.



How to remove stator frame

- Remove the drive circuit board in accordance with the above-mentioned procedure.
- Turn the main body up and remove 3 setscrews of the stator frame. (See Fig.21.)

(marked 3 setscrews)



Remarks:

For the disassembly of mechanical parts other than the above (such as power switch plate, brake operating plate, etc.), refer to the exploded views in this manual.

Repair of drive circuit and logical circuit (Figs. 22 and 23.)

- 1. Detach the bottom cover with reference to the disassembly procedure.
- 2. Put the set on the repair stand with its front up.
- 3. Mount the turntable.

Then, carry out the check of each part in accordance with the Trouble Shooting Chart. Also use a stroboscope when checking the number revolutions.

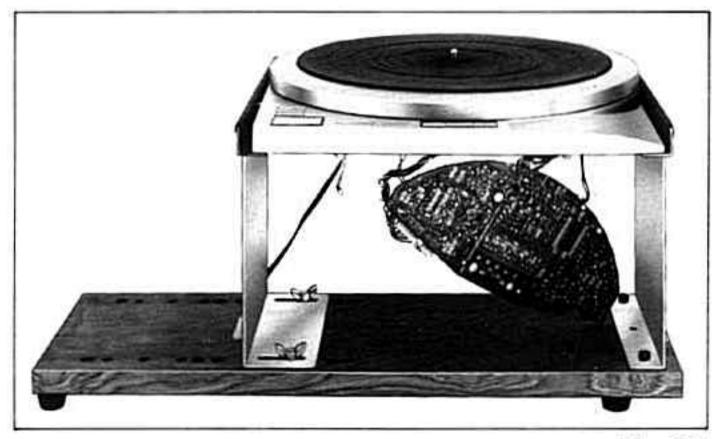


Fig. 22

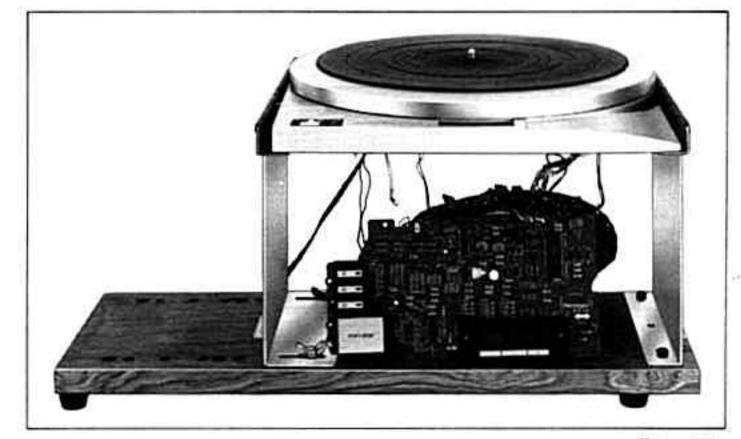


Fig. 23

Repair of power supply circuit

- 1. Remove the bottom cover and the shielding plate with reference to the disassembly procedure.
- 2. Carry out the check of each part according to the Trouble Shooting Chart with reference to the test points printed on the power supply circuit.

ADJUSTMENTS

Adjustment Points of Electrical System

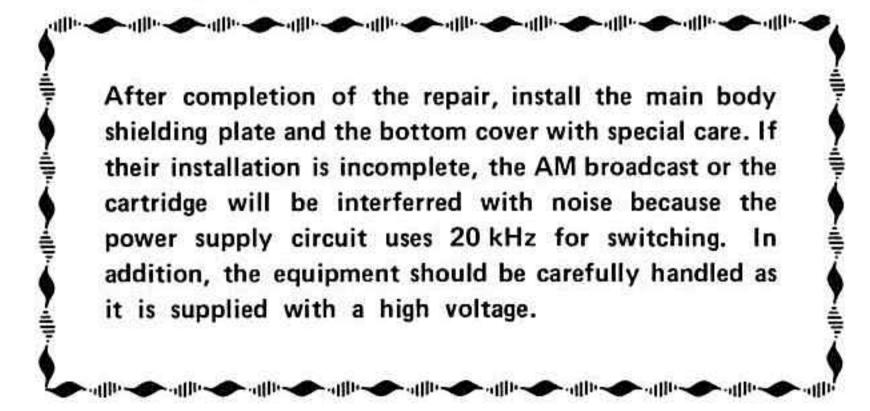
NOTE: Make the following adjustments after replacing parts such as IC's, transistors, diodes, etc.

	Adjustment	Connection Points	Adjustment Point	Adjustme	nt Method		
1	Adjustment of standard voltage (VS)	DC voltmeter or Oscilloscope ⊕ → TP18 ⊕ → GROUND	VR301	With the start switch set at ON, adjust VR301 so that the voltage is DC 2.10V ± 0.01 at 33 r.p.m. Confirm that the voltage is 2.835V ± 0.05 V at 45 r.p.m. and 4.9V ± 0.1 V at 78 r.p.m.			
2	Adjustment of current source (IR)	DC voltmeter or Oscilloscope ⊕ → TP19 — → TP21	VR201	Turn start switch on to be Adjust VR201 for 0 V po TP19 and TP21.	장류의 - '' - '' - '' - '' - '' - '' - '' -		
3	Tracking adjustment (TRACKING)	Oscilloscope (+) → TP18 (-) → GROUND	VR101	TP18 waveform → T0 ←	With the start switch set at ON, adjust VR101 so that $8 \le T0 \le 8.5$ ms at 33 r.p.m. Confirm that $5.8 \le T0 \le 6.4$ ms at 45 r.p.m. and $3 \le T0 \le 4.5$ ms at 78 r.p.m.		
4	Braking adjustment (BRAKE)		VR202	STOP SIGNAL T.T. 270° 90°	Adjust VR202 for complete stop within 90° ~ 270° after stop signal initiated. (Turntable becomes free a few seconds after stop.)		

■ TERMINAL GUIDE OF TRANSISTOR AND IC

2SD636,2SD639 2SD 2SB641,2SB643 2SC			A 2SC1846,2SA886 2SC1847		2SD712A-C 2SC1826	AN640G	
E C B	E	E C B		BCE			
SVIUPC4558C		AN660, DN860			IMSM4013 IM53217P	MN6042	

After-repair precautions



■ ADJUSTMENT OF MECHANICAL BRAKE

The mechanical brake has been already factory-adjusted before delivery. However, if the brake creates abnormal noise during operation or fails to work as specified, make its adjustment in accordance with the following procedure.

- Remove the turntable and the main body cover. (Refer to the exploded views.)
- 2 Loosen the screw A and put the turntable in place.
- Turn on the power switch and then regulate adjust screw (2) through the hole in the turntable so that the brake shoe is about 1 mm off the turntable being released while turning on and off the start/stop switch. After that, tighten the screw (2) completely.

The above procedure is enough to complete the adjustment of the brake operating position. But if the brake shoe is worn out, loosen the screw and properly shift the brake shoe.

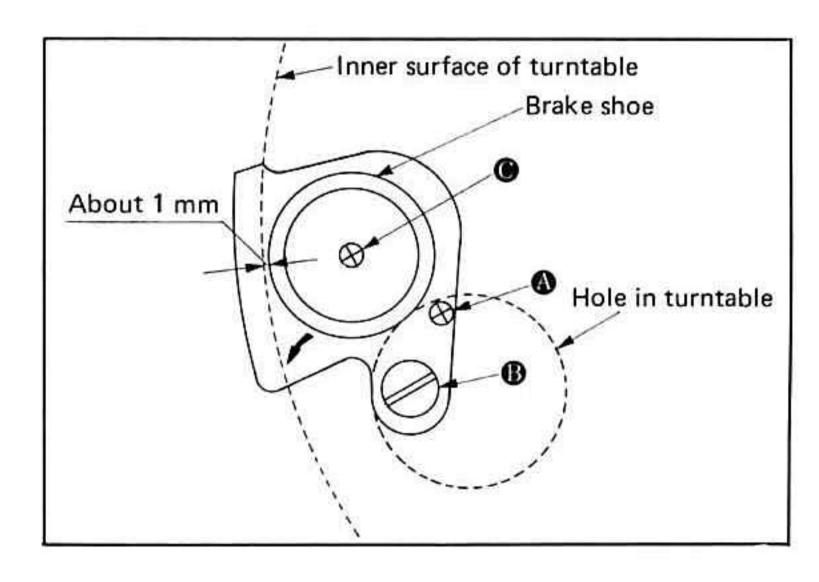
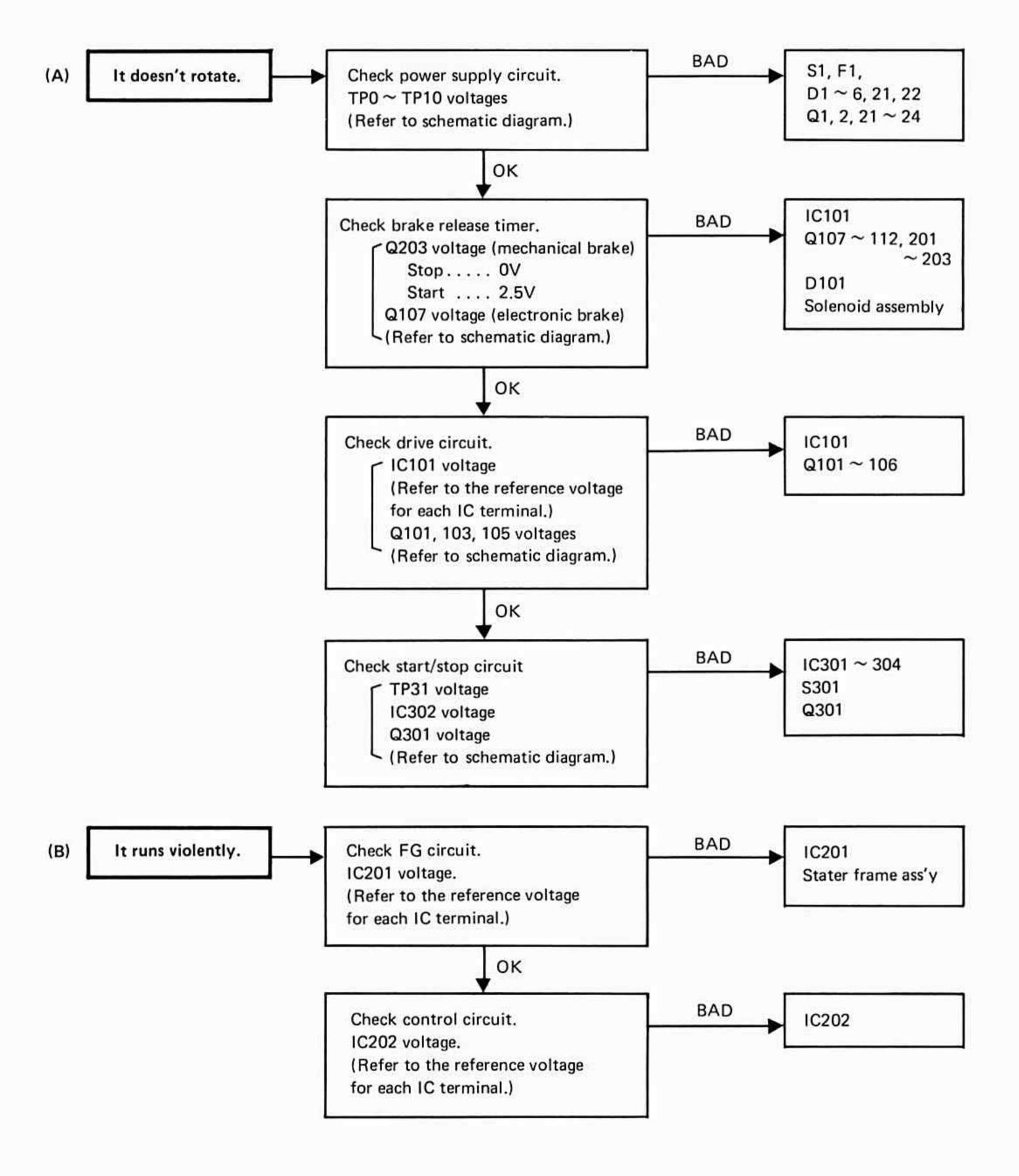
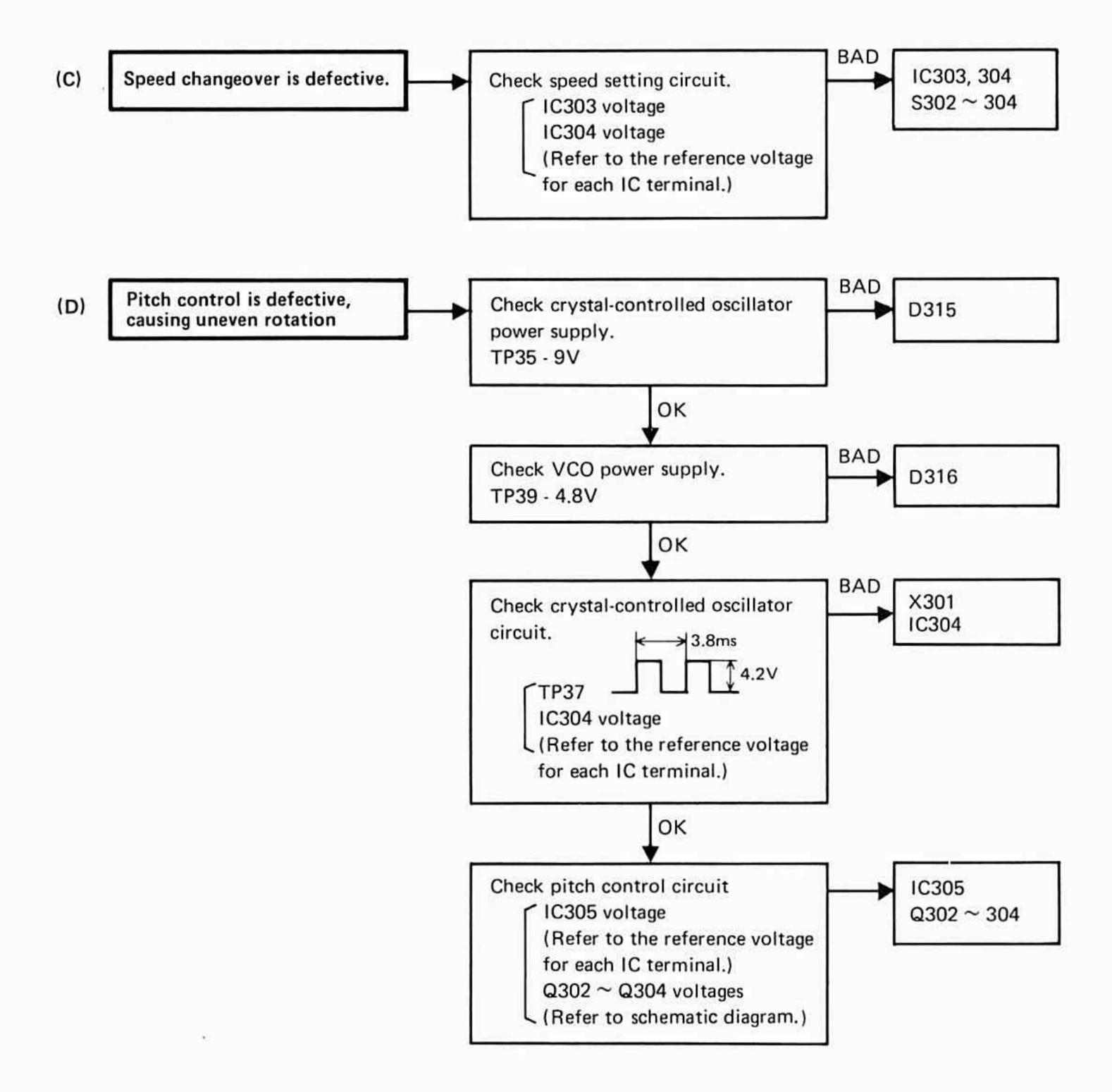


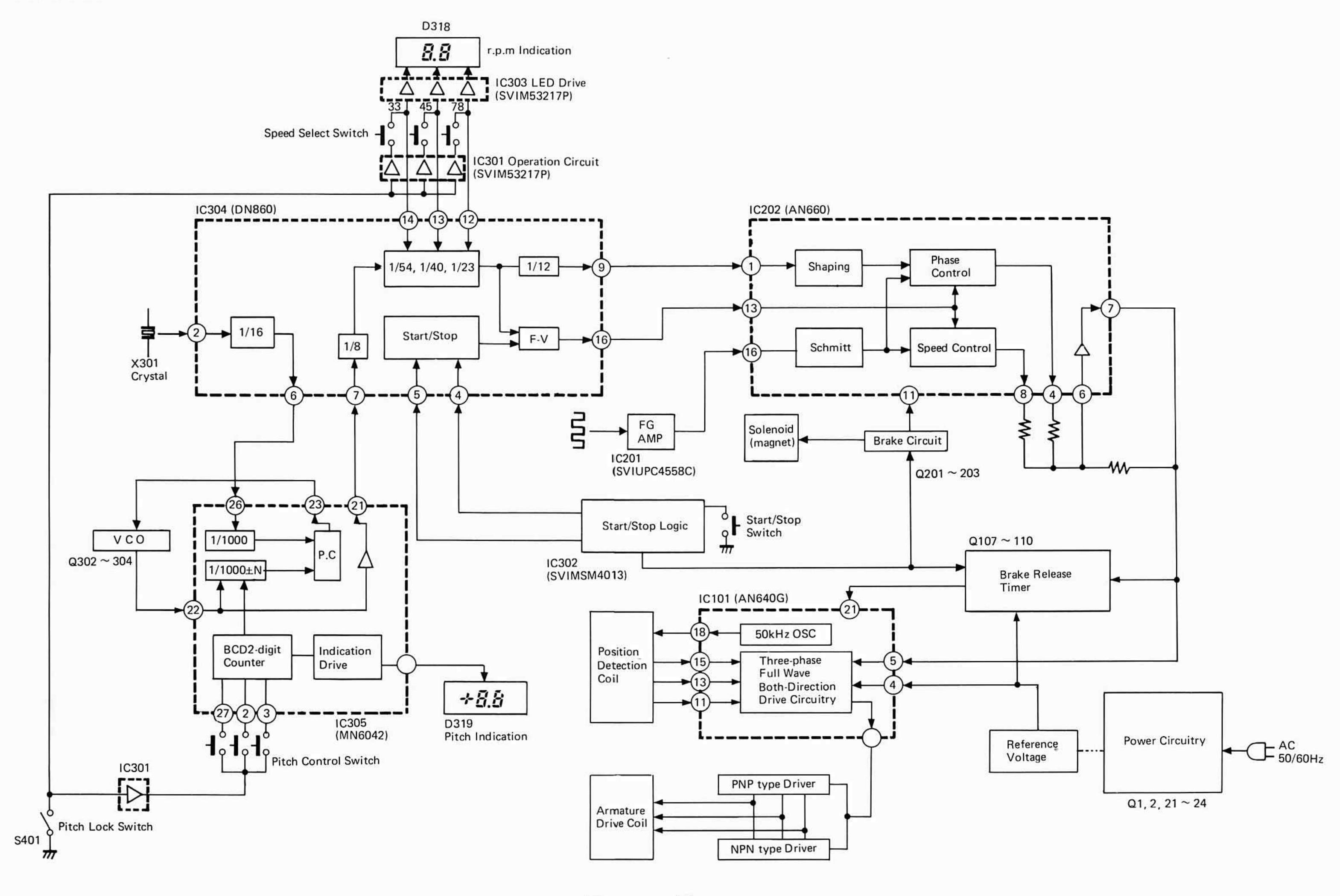
Fig. 24 Mechanical brake system

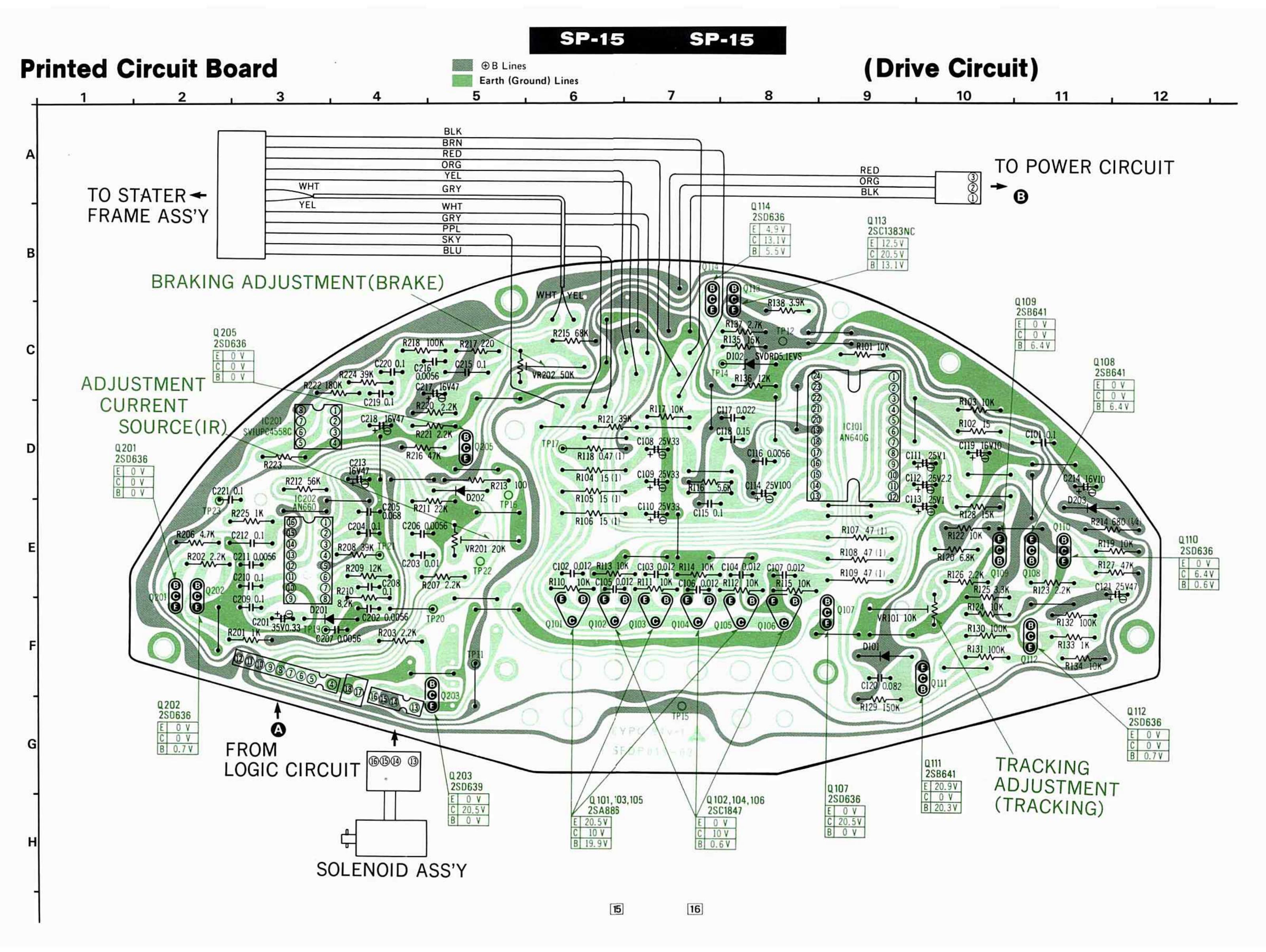
I TROUBLE SHOOTING

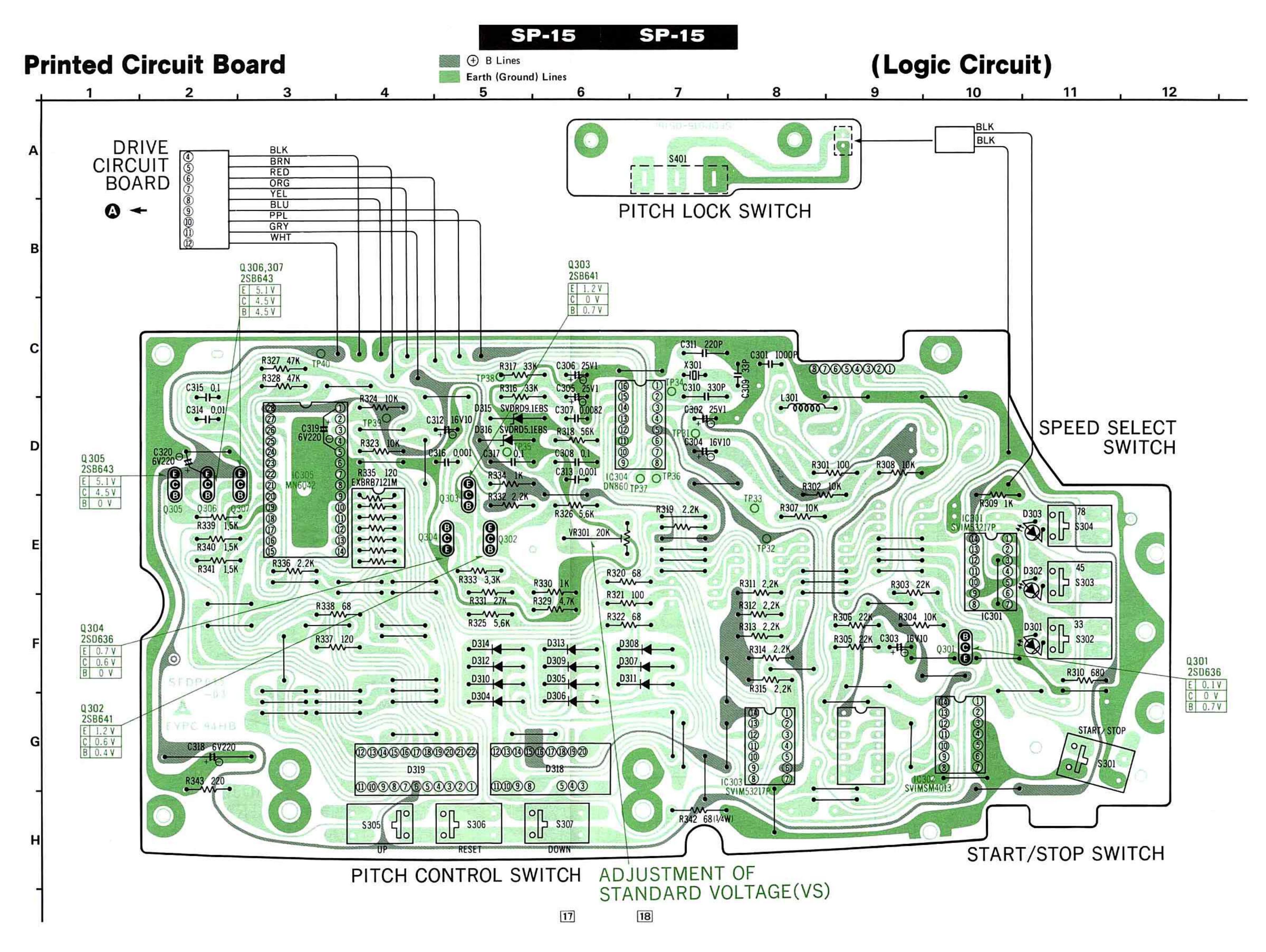


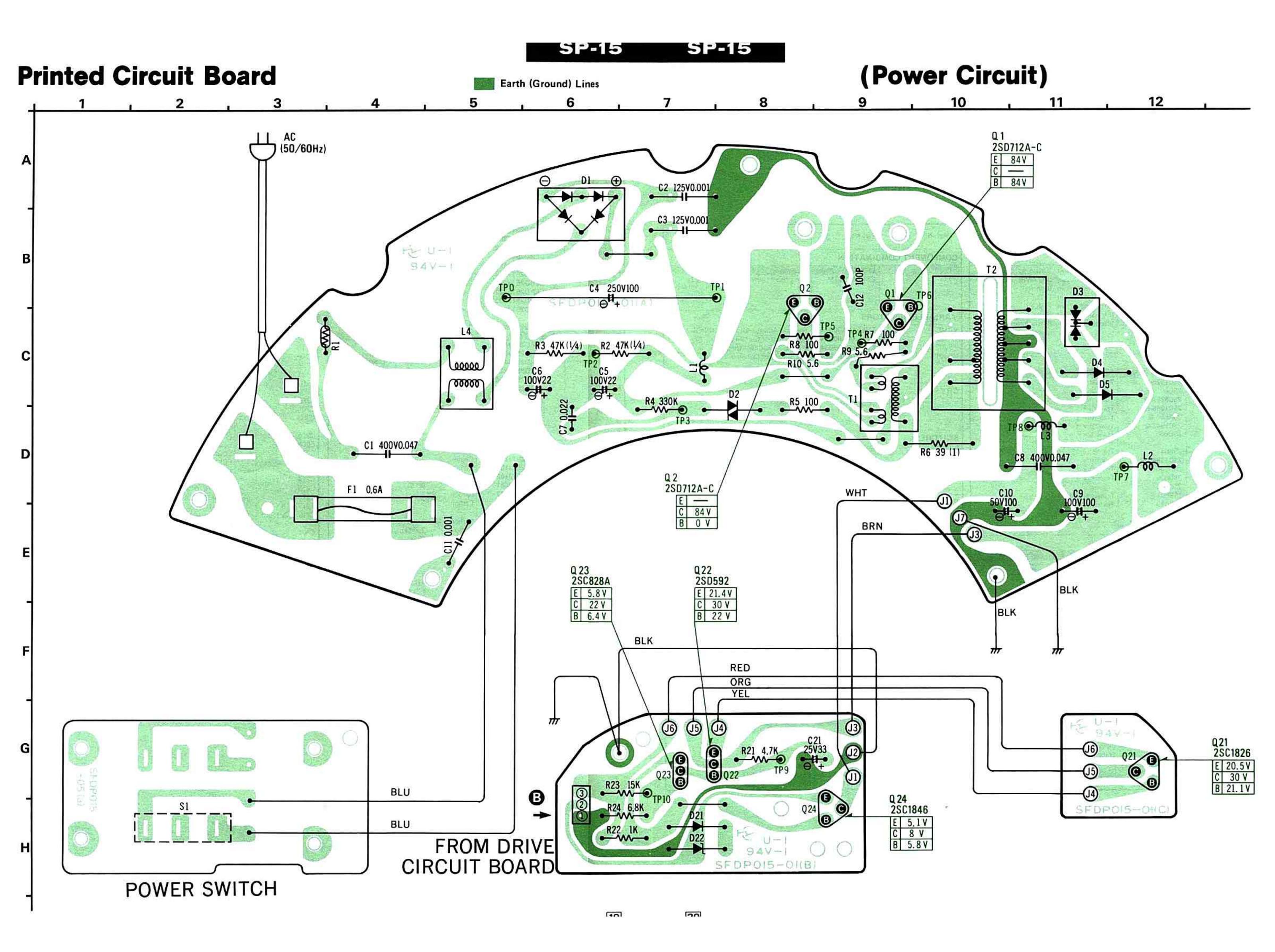


■ BLOCK DIAGRAM









■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Notes: 1. Part numbers are indicated on most mechanical parts.

Please use this part number for parts orders.

2. SP-15 (M) → [M], SP-15 (MC) → [MC].

Ref. No.	Part No.	Part Name & Description
INTEGRATED C	IRCUITS	
IC101	AN640G	Integrated Circuit (Drive)
IC201	SVIUPC4558C	Integrated Circuit (FG AMP)
IC202	AN660	Integrated Circuit (Control)
IC301, 303	SVIM53217P	Integrated Circuit (TTL)
IC302	SVIMSM4013	Integrated Circuit (CMOS)
IC304	DN860	Integrated Circuit (Frequency Divider)
IC305	MN6042	Integrated Circuit (Pitch Control)
TRANSISTORS		
Q1, 2	2SD712A-C	Transistor
Q21	2SC1826-Y	Transistor
Q22	2SD592AE-R	Transistor
Q23	2SC828A-R	Transistor
Q24	2SC1846-R	Transistor
Q101, 103, 105	2SA886-ଭ	Transistor (Use pair realis
Q102, 104, 106	2SC1847-Q	Transistor Suse pair ranks
Q107, 110, 112,	2SD636	Transistor
114	property at a	
Q108, 109, 111	2SB641	Transistor
Q113	2SC1384A-R	Transistor
Q201, 202, 205	2SD636	Transistor
Q203	2SD639	Transistor
Q301, 304	2SD636	Transistor
Q302, 303 Q305, 306, 307	2SB641 2SB643	Transistor
4303, 300, 307	238043	Transistor
DIODES		
DIODES	SVDS1RBA40	Rectifier
DI	SVDS1RBA40 SVDS1S2093	Rectifier Diode
D1 D2		and a second sec
D1 D2 D3	SVDS1S2093	Diode
D1 D2 D3 D4, 5 D201; 101, 201	SVDS1S2093 SVDCTU22S	Diode Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203	SVDS1S2093 SVDCTU22S SVDV19C	Diode Diode Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS	Diode Diode Diode Diode, Zener 5.1V
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C	Diode Diode Diode Diode Diode Diode Light Emitting Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150	Diode Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDRD5,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication
D1 D2 D3 D4, 5 D201; 101, 201	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDRD5,1EBS	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9, 1EBS SVDRD5, 1EBS SVDRD5, 1EBS SVDGL7R204 SVDGL7R203 SVDIS1887	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9, 1EBS SVDRD5, 1EBS	Diode Diode Diode Diode Diode, Zener 5,1V Light Emitting Diode Diode Diode Diode, Zener 9,1V Diode, Zener 5,1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5.1EBS SVDRD5.1EBS SVDGL7R204 SVDGL7R203 SVDIS1887	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 9.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204 SVDGL7R203 SVDIS1887 SEQ1025T-201 SLQ1016D-800 SLQ809D-300	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204 SVDGL7R203 SVDIS1887 SEQ1025T-201 SLQ1016D-800 SLQ809D-300 ELF18D305	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Coil Filter
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204 SVDGL7R204 SVDGL7R203 SVDIS1887 SLQ1025T-201 SLQ1016D-800 SLQ809D-300 ELF18D305 SLQ0406S102K	Diode Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Filter Transformer
D1 D2 D3 D4, 5 D201; 101, 201 202, 203 D22, 102 D301, 302, 303 D304 ~ 314 D315 D316 D318 D319 D320 COILS and TRAN	SVDS1S2093 SVDCTU22S SVDV19C MA150 SVDRD5, 1EBS SVDSR105C MA150 SVDRD9,1EBS SVDRD5,1EBS SVDRD5,1EBS SVDGL7R204 SVDGL7R203 SVDIS1887 SEQ1025T-201 SLQ1016D-800 SLQ809D-300 ELF18D305	Diode Diode Diode Diode Diode, Zener 5.1V Light Emitting Diode Diode Diode Diode, Zener 9.1V Diode, Zener 5.1V Diode, rpm Indication Diode, Pitch Indication Diode, Solenoid Coil Coil Coil Filter

Ref. No.	Part No.	Part	Name & Des	cription		
COMPONENT	COMBINATION					
R1	ERTD3FEK8ROS	Thermistor			E SING	
R335	EXBRB7121M	Componen	t Combination	n (120Ω)	× 7)	
VARIABLE RE	SISTORS					
VR101	EVLS3AA00B14	Tracking A	djustment (T	BACKING	3)	
VR201 VR202 VR301	EVLS3AA00B24 EVLS3AA00B54 EVLS3AA00B24	Adjustmen Braking Ad	t of Current S justment (BR t of Standard	ource (IF	1)	
CRYSTAL						
X301	SVQU306115	4.19328MF	lz Oscillator			
SWITCHES						
S1	SFDSSS5GL132	Switch, Por	wer	DE PERSON	100000	
S301 ~ 307 S401	EVQP1R04K SFDSSS5GL13C	Switch, Pitch Lock				
FUSE		-				
F1	XBA2F06NU100	Fuse, 0.6A				
RESISTORS						
R2, 3	ERD25TJ473	Carbon,	47kΩ.	1/4W,	± 5%	
R4	ERD25TJ334		330kΩ.	N N S C P No. 12 C P	± 5%	
R5	ERD25TJ101	A STATE OF THE PARTY OF THE PAR	100Ω,		± 5%	
R6 R7, 8	ERG1ANJ330 ERD25TJ101	Metallic,	the second district and the se		± 5%	
R9, 10	ERD25TJ5R6	Carbon,	100Ω, 5.6Ω,	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	± 5%	
R21	ERD25TJ472		4.7kΩ.	The second secon	± 5%	
R22	ERD25TJ102	Carbon,	1kΩ.	9000000 PDC 100 TO	± 5%	
R23	ERD25TJ153	Carbon,	15kΩ,	2012 DE 1000 DE	± 5%	
R24	ERD25TJ682	Carbon,	6.8kΩ,		± 5%	
R101	ERD25TJ103	Carbon,	lOkΩ.	1/4W	± 5%	
R102	ERD25TJ150	Carbon,	15Ω,	Part Control Control	± 5%	
R103	ERD25TJ103	Carbon,	tokΩ.		± 5%	
R104 ~ 106	ERG1ANJP150	and the same of th	15Ω,			
R107 ~ 109	ERG1ANJP470	Metallic,	47Ω.	The state of the s	± 5%	
R110~115	ERD25TJ103	Carbon,	10kΩ,		± 5%	
R116	ERD25TJ562	Carbon,	5.6kΩ.	1/4W.	± 5%	
R117	ERD25TJ103	Carbon,	10kΩ.	1/4W.	± 5%	
R118	ERX1ANJPR47	Metallic,	0.47Ω.		± 5%	
R119	ERD25TJ103	Carbon,	lokΩ.	1/4W.	± 5%	
P.120	ERD25TJ682	Carbon,	6.8kΩ,	1/4W.	± 5%	
R121	ERD25TJ393	Carbon,	39kΩ.	1/4W.		
R122	ERD25TJ103	Carbon,	10kΩ.	1/4W.		
0100	EDDSET 1999	Carbon,	2.2kΩ,		± 5%	
R123	ERD25TJ222	Carbon,	E. C. C. C.	100	A 100 11 11 11 11 11 11 11 11 11 11 11 11	

SP-15

Ref. No.	Part No.	Part Name & Description						
R125	ERD25TJ332	Carbon,	3.3kΩ,	1780	± 5%			
R126	ERD25TJ222	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		110100533010531751				
(H11922965)).		Carbon,			± 5%			
R127	ERD25TJ473	Carbon,	12.50		± 5%			
R128	ERD25TJ153	Carbon,	15kΩ.		± 5%			
R129	ERD25TJ154	Carbon,		CARD COLUMN -	± 5%			
R130 ~ 132	ERD25TJ104	Carbon,	100kΩ.	1/4W.	± 5%			
R133	ERD25TJ102	Carbon,	īkΩ,	1/4W.	± 5%			
R134	ERD25TJ103	Carbon,	10kΩ.	1/4W.	± 5%			
R135	ERD25TJ153	Carbon,		5255574 55555				
R136	ERD25TJ123	Carbon.	10. 10. Cal. (10. Cal. (10	100 Car 20 Car 2	± 5%			
R137	ERD25TJ272	Carbon,	2.7kΩ,	1/4W.	± 5%			
R138	ERD25TJ392	Carbon,		Charles of Charles and Charles	± 5%			
R201	ERD25TJ102	Carbon,		2000 U.S. S. S. S. S. S. S. S.	± 5%			
R202, 203	ERD25TJ222	Carbon,	2.2kΩ,		± 5%			
R206	ERD25TJ472	The second of th		7000 N (2004) JOH				
R207			4.7kΩ.		± 5%			
C 1 - C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C	ERD25TJ222		2.2kΩ,		± 5%			
R208	ERD25TJ393	Carbon,	39kΩ,	100000000000000000000000000000000000000	± 5%			
R209	ERD25TJ123	Carbon.			± 5%			
R210	ERD25TJ822	Carbon,			± 5%			
R211	ERD25TJ223	Carbon,	22kΩ.	1/4W,	± 5%			
R212	ERD25TJ563	Company of the Section of the Sectio	56kΩ.	The second secon	Commence and commence and commence and com-			
R213 R214	ERG1ANJ101 ERD25TJ681	Metallic, Carbon,			± 5%			
R215								
0.62011.024	ERD25TJ683	Carbon.						
R216	ERD25TJ473		47kΩ.					
R217	ERD25TJ221	Carbon,			± 5%			
R218	ERD25TJ104		100kΩ.					
R220, 221	ERD25TJ222		$2.2k\Omega$.	1/4W.	± 5%			
R222, 223	ERD25TJ184	Carbon,	180kΩ.	1/4W,	± 5%			
R224	ERD25TJ393	Carbon,		1/4W.				
R301	ERD25TJ101	Carbon,	100Ω.	1/4W.	± 5%			
R302	ERD25TJ103	Carbon,		F 10 2 TO 0 TO 1 CONT. TO 1				
R303	ERD25TJ223	Carbon,		The State of State of the State of Stat	The second second			
304	ERD25TJ103	Color of the color	10kΩ.		The second secon			
R305, 306	ERD25TJ223		22kΩ.					
R307, 308		11 Part Co. Jonatory Charles Specifical	A COUNTY OF THE PARTY OF THE PA					
A DOMESTIC AND SECURITION OF THE PROPERTY OF T	ERD25TJ103	Carbon,	The second secon	St. 10 10 10 10 10 10 10 10 10 10 10 10 10				
R309	ERD25TJ102	11 DOMES 1 10 DOMES 1	1kΩ,	The second secon	To reason has been			
R310	ERD25TJ681	1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C 1 C	680Ω,	The second secon	The second secon			
R311 ~ 315	ERD25TJ222	Carbon,	2.2kΩ.	1/4W,	± 5%			
316, 317	ERD25TJ333	Carbon,	33kΩ,	1/4W,	± 5%			
3318	ERD25TJ563	Carbon,	$56k\Omega$	1/4W,	± 5%			
319	ERD25TJ222	The state of the s		1/4W.	The second secon			
320	ERD25TJ680	Carbon,	68Ω.	1/4W.	The second of the second of the second			
3321	ERD25TJ101	Carbon,		1/4W.				
3322	ERD25TJ680	Carbon,	68Ω.	PER UNITED TO STATE OF				
3323, 324	ERD25TJ103							
325, 324		Carbon,		1/4W,	± 5%			
	ERD25TJ562	Carbon,						
3327, 328	ERD25TJ473	Carbon,	47kΩ,	1/4W,	± 5%			
R329	ERD25TJ472	Carbon,	4.7kΩ.	1/4W,	± 5%			
R330	ERD25TJ102	Carbon,	1kΩ,	1/4W.	± 5%			
331	ERD25TJ273	Carbon,	27kΩ.	1/4W.	± 5%			
R332	ERD25TJ272	Carbon,	$2.7k\Omega$.	1/4W,	± 5%			
3333	ERD25TJ332	Carbon,	3.3kΩ.	1/4W.	± 5%			
1334	ERD25TJ102	Carbon,	1kΩ.	1/4W.	± 5%			
R336	ERD25TJ222	Carbon,	2.2kΩ.	1/4W.	± 5%			
1337	ERD25TJ121	Carbon,	120Ω,	1/4W,	± 5%			
R338	ERD25TJ680	Carbon,	68Ω.	1/4W.	± 5%			
3339 ~ 341	ERD25TJ152	Carbon,	1.5kΩ,	1/4W.	± 5%			
342	ERD25TJ680	Carbon,	68Ω.	1/4W.	± 5%			
3343	ERD25TJ221	Carbon,	220Ω.	1/4W.	± 5%			
				The second secon	The second secon			

Ref. No.	Part No.	Part N	Name & Desc	ription	
CAPACITORS					
C1 [M]	ECQM4473KZ	Polyester,	0.047µF,	400V.	±10%
C1 [MC]	ECQU1A473MC	Polyester,	0.047µF,	400V,	THE RESIDENCE OF THE PARTY OF T
C2. 3	ECQUIA102MD		0.001µF,	THE RESERVE OF THE PARTY OF THE	±20%
C4 C5, 6	ECEB 250V 100U	Electrolytic,	THE REAL PROPERTY AND ADDRESS OF THE PERSON NAMED IN COLUMN TWO IN COLUM	THE RESERVE OF THE PERSON NAMED IN	200
C5, 6	ECEA2AS200 ECQM1H223KZ	Electrolytic,			+ 100/
C8	ECQM4473KZ	Polyester,	BETTER BETTER STATE OF THE STAT	minimum and the first profession for feedings.	and the second s
C9	ECEA2AS101	Electrolytic,	THE RESERVE THE PERSON NAMED IN COLUMN 2 I		
C10	ECEA1HS101	Electrolytic,	21,000 000000000000000000000000000000000	23/22/23/13	
C11	ECQUIA102MD	Polyester,	0.001µF.	THE PROPERTY OF THE PARTY OF TH	±20%
C12	ECKD3A101MB2	Ceramic,	100pF,	10V	
C21	ECEA1VS330	Electrolytic,		35V	ET STEWN
C101	ECQM1H104KZ	Polyester.	0.1μF,	50V.	±10%
C102 ~ 107 C108 ~ 110	ECQM1H123KZ	Polyester,	0.012μF,	50V,	±10%
C111	ECEA1VS330 ECSF25E1ZEN	Electrolytic Tantalum,	and the second second	35V 25V	
C112	ECSF25E2R2Z	Tantalum,	1μF, 2.2μF,	25V	
C113	ECS25E1ZEN	Tantalum,	1μF.	25V	
C114	ECEA25Z100	Electrolytic,	All the second of the formation	25V	
C115	ECQM1H104KZ	Polyester,	0.1µF.		±10%
C116	ECQM1H562KZ	Polyester,	0.0056µF,		±10%
	- 35	The Annabour December	Total Section (Contract)		
C117	ECQM1H223KZ	Polyester.	0.022µF,		
C118	ECQM1H154KZ	Polyester,	0.15µF,	50V.	±10%
C119 C120	ECEA1HS100	Electrolytic,	LESSON CONTROL		
C121	ECQM1H823KZ ECEA1ES470	Polyester.	0.082µF,		±10%
2201	ECSF35ER33	Electrolytic, Tantalum,	47μF, 0.33μF,	25V 35V	
202	ECQM1H562KZ	Polyester,	0.0056 F.		±10%
203	ECQM1H103KZ	Polyester,	0.01µF,	50V.	±10%
204	ECQM1H104KZ	Polyester,	0.1µF.	Track (1996) 1 2 2	
205	ECQM1H683JZ	Polyester,	0.068µF,	50V.	± 5%
2206	ECQM1H562KZ	Polyester,	0.0056uF,	50W	±10%
208 ~ 210	ECQM1H104KZ		0.0050μr, 0.1μF,	50V.	
2211	ECQM1H562KZ	Polyester,	AND AND RESIDENCE OF THE PARTY	STEEL STORY 1	±10%
212	ECKD1E104ZFZ	Ceramic,		25V	
213	ECEA1ES470	Electrolytic,	99500176169		
214	ECEA1HS100	Electrolytic,			
2215	ECKD1E104ZFZ	Ceramic,	[전에 마이어 HON] : 프라틴 HON (LOTE) (See LO		0000000
2216	ECQM1H562KZ	Polyester,			±10%
217, 218 2219 ~ 221	ECEA1ES470	A STATE OF THE STA		25V	
219 - 221	ECQM1H104KZ	Polyester,	0.1μF.	50V.	±10%
301	ECKD1H102MD	Ceramic,	0.001µF,	50V.	±20%
302	ECSF25E1ZEN	Tantalum,	1μF.	25V	
2303, 304	ECEA1HS100	Electrolytic,	100µF.	50V	
305, 306	ECSF25E1ZEN	Tantalum,		25V	
307	ECQM1H822KZ	Polyester,	0.0082µF,		±10%
308	ECKD1E104ZFZ	Ceramic,	0.1μF,	25V	
309	ECCD1H330K	Ceramic,	33pF.	50V	
310	ECCD1H331K	Ceramic,	330pF.	50V	
311	ECCD1H221K	Ceramic,	220pF.	50V	
312	ECEA1HS100	Electrolytic,	10μF.	50V	
313	ECQM1H102KZ	Polyester,	0.001µF	50V.	±10%
314	ECQM1H103KZ	Polyester.	0.01µF.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	±10%
315	ECQM1H104KZ	Polyester,	0.1μF.	- Contract of the Contract of	±10%
316	ECQM1H102KZ	Polyester,	0.001µF,	(Calculation 11)	±10°0
317	ECKD1E104ZFZ	Ceramic.	0.1μF,	25V	
318	ECEB1AS221	Electrolytic,	220μF.	100	
319, 320	ECEA1AS221	Electrolytic,	220µF.	10V	

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

IC101 (AN640G)

	Start	Stop		Start	Stop		Start	Stop
1			(10)	~~_±		(19)	20.5V	20.5V
2	0.60	0 V	(12)	15V	15 V	20	15.4V	1.4V
3			(14)			21)	20.6V	16.4V
4	6.3V	6.4V	(<u>1</u>)	+ 1-20µs		(22)		
(5)	6.3V	7.9V	(13)	15V	Same as at left	23)	19.9V	20.5V
6	4.8V	2.2V	15)	-	attert	24)		
7	5 V	5 V	16	0V	0 V			
8	20.5V	20.5V	(17)	15.5V	15.5V			
9		0.2V	18)	20µs	Same as at left			

IC201 (SVIUPC4558C)

	Start	Stop		Start	Stop
① ⑤	20ms	03/	② ③	9 V	9 V
6	9V	9V	4	0 V	0 V
7			8	17.6V	17.6V

IC202 (AN660)

	Start	Stop		Start	Stop		Start	Stop
	, <u>,</u> <u>,</u>		(5)	12.6V	Same as	(12)	2.4V	2.1V
1	3.50	0 V	6	6.3V	at left	(13)	2.2V	2.1V
	→ 20ms +—		7	6.5V	8 V		→ 20ms	
	₩ 8ms → ↓		8	6.3V	5.1V	110	7.50	7.5V
2	7.5V	0 V	9	-20ms 1 6.2V	7.5V	(15)	12.5V	12.5V
3	20ms 1	5.8V	(10)	0 V	0 V	16	20ms 1 5.6V	5.6V
4	5.8V	6 V	(1)	-20ms <u>1</u>	7.5V			

	Start	Stop
1	0.2V	0.2V
2	0 V	0 V
3	0.2V	0.2V
4	0 V	0 V
(5)	0.2V	0.2V
6 7 8	0 V	0 V
9	0.2V	0.2V
03)	5.1V	5.1V

IC302	(SVIMSM4013)		IC303	(SVIM53217P)	
	Start	Stop		Start	Stop
3			1)	0.1V	4.2V
④			3	0 V	4.7V
(5)	0 V	0 V	4	0.1 V	4.2V
6		0 V	(5)	4.7V	0 V
7			6	3.2V	0 V
8			7	0 V	0 V
9	0 V	4.7V	8	3.8V	3.8V
10	0 V	0 V	9	4 V	4 V
(I)	0 4	U V	10	3.8V	3.8V
12)	0 V	4.7V	00	4 V	4 V
13)	4.7V	0 V	12)	0.4V	0.4V
14)	4.7V	4.7V	(13)	0 V	0 V
			13)	5.1V	5.1V

■ REFERENCE VOLTAGE AND WAVEFORM AT EACH IC PIN

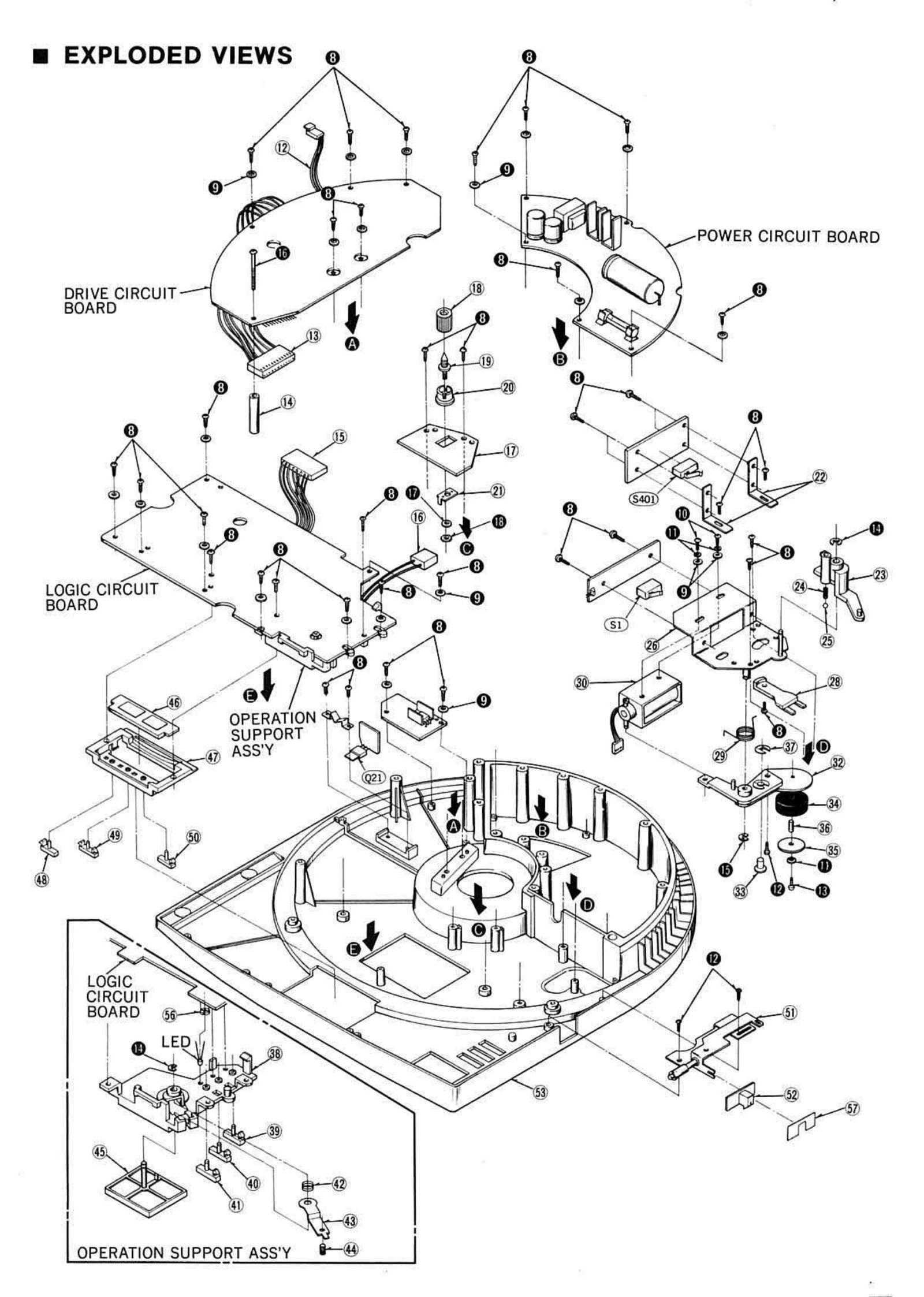
IC304 (DN860)

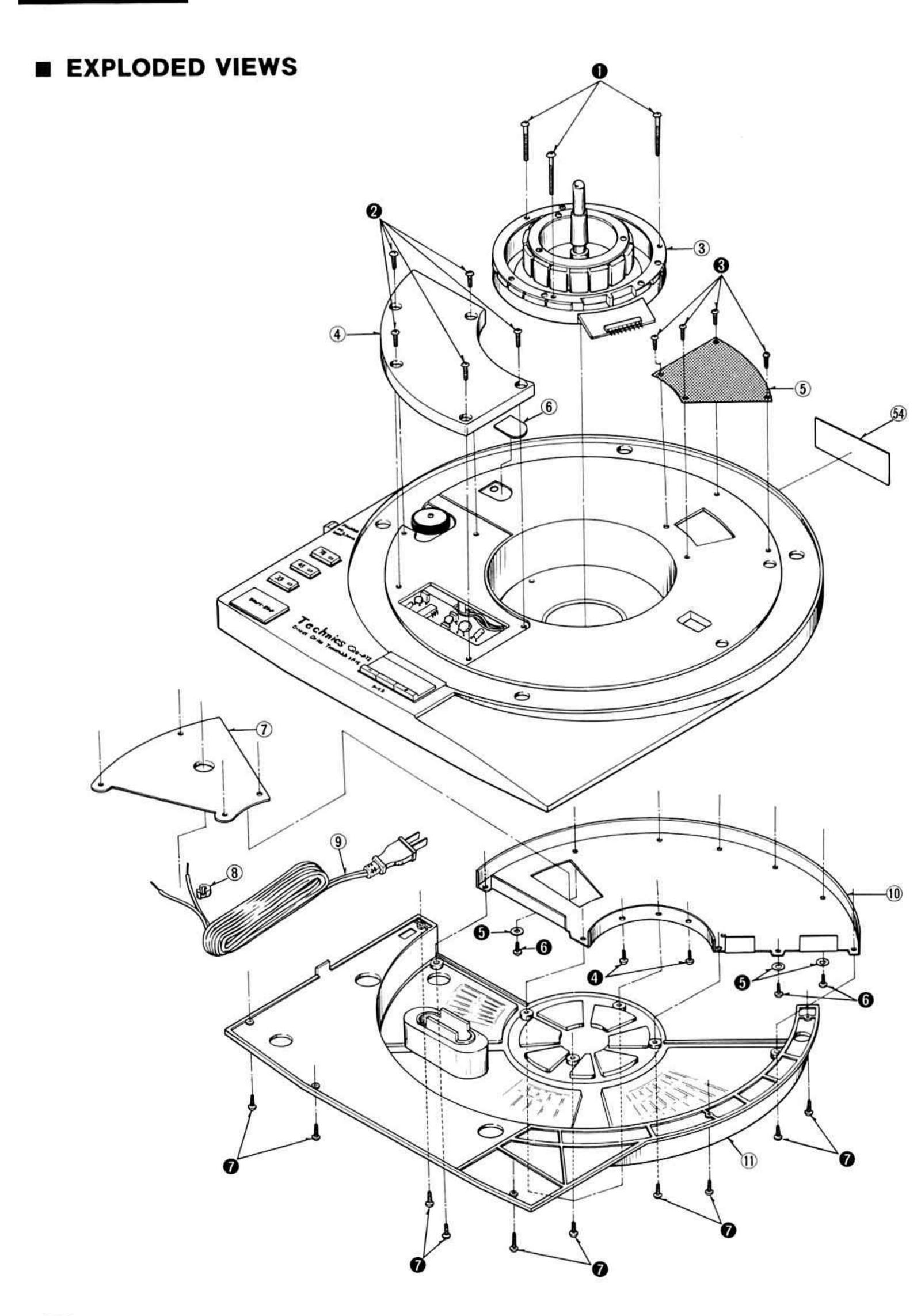
Start	Stop		Start	Stop		Start	Stop
9.3V	9.3V			0	(1)	0V	0V
1.24μs	Same as	7	3.8V	at left	(12) (13)	4V	4V
1.24	at left		20ms -		14)	0V	0V
0.24 µs	Same as at left	8	7.5V	0V	15)	6.2V	Same as at left
0 V	3.2V	9	J AV	4V	16	20ms + 6.5V	0V
3.2 V	Same as	(10)	10ms 1 4.5V	Same as at left			
	9.3V 1.2V 1.2V 1.2V 0.5V 3.2V	9.3V 9.3V 9.3V Same as at left 0 V 3.2V 3.2V 3.2V Same as at left 0 V 3.2V Same as	9.3V 9.3V +0.24μs Same as at left -0.24 μs Same as at left -0.5ν Same as at left -0.5ν 3.2V -0.5ν 3.2V -0.5ν Same as at left -0.5ν Same as at left	9.3V 9.3V +0.24μs Same as at left 20ms 1.2V 0.5V 3.2V 9 4ν 3.8μs Same as at left 1.20ms 1.	9.3V 9.3V 1.2V Same as at left Same as at left Same as at left O V	9.3V 9.3V 1.2V Same as at left 1.2V 1.5V OV 1.5V 3.2V 0 V 1.5V Same as at left 1.2V 1.5V 1.5V	9.3V 9.3V 1.2V Same as at left Same as at left 0.5V Same as at left 0.5V 3.2V 3.2V 3.2V 9 4V 4V 4V 4V 16 Same as at left 10 0V 4V 15 6.5V 16 Same as at left 10 10 10 10 10 10 10 10 10 1

IC305 (MN6042)

	Start	Stop		Start	Stop		Start	Stop
① ② ③	4.6V	4.6V	16	3.5ms	Same as	21)	3.8µs 1 4.5V	Same as at left
27 28 4 8				- T		22	3.8ms	Same as at left
5 9 6 19	0 V	0 V	(17) (18)	4ms — + 1 5.1V	Same as at left	23 24	1.8V 2.2V	1.8V 2.2V
7						25	4ms 4.6v	Same as at left
(1) (1) (1) (1) (1) (1) (1)	3.5ms + 1 1 4v	Same as at left	20	2ms	Same as at left	26	+3.8µs+ 4.2V	Same as at left

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■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Notes: 1. Part numbers are indicated on most mechanical parts.

Please use this part number for parts orders.

2. SP-15 (M) → [M], SP-15 (MC) → [MC].

Ref. No.	Part No.	Part Name & Description
CABINET and C	CHASSIS PARTS	
1	SFTG015-01	Turntable Mat
2	SFTE015-01A	Turntable
2 3 4 5 6	SFMZ015-02Z	Stater Frame Ass'y
4	SFUM015-07	Cover, Turntable
5	SFUP015-09	Plate, Shield, Turntable
6	SFUP015-13	Cap, Turntable
7	SFUP015-11	Plate, AC Cord
8	SFHK040L	The State of the S
	The second secon	Bushing, AC Cord
10	QFC1201MA SFUP015-12	Plate, Shield, Power Circuit
11	SFUM015-09	Cover, Bottom
12	SFDJ015-02E	Connector, Power Circuit
13	SFDJ134-01E	
11 (2)		Connector, Stater Frame Ass'y
14 15	SFX0015-01	Pipe, Logic Circuit Screw
	SFDJ015-03E	Connector, Drive
16	SFDJ015-01E	Connector, Pitch Lock Switch
17	SFUP015-04	Plate, Ground Wire
18	SNE273-1	Knob, Ground Terminal
19	SNE271S	Screw, Ground Terminal
20	SGE401	Ornament, Ground Terminal
21	SJT719	Spacer, Ground Terminal
22	SFUP015-10	Bracket, Power Circuit
23	SFUM015-03	Cam, Power Switch
24	SFQA015-02	Spring, Power Switch Cam
25	SFYB-M30	Ball, Power Switch Cam
26	SFUP015-03E	Bracket, Power Switch
28	SFUM015-04	Cam, Pitch Lock Switch
29	SFQS015-01	Spring, Brake
30	SFDZ015-01E	Solenoid Ass'y
32	SFUM015-06E	Brake Ass'y
33	SFXJ015-06	Shaft, Eccentricity
34	SFUZ015-01	Roller, Brake
35	SFUP015-14	Spacer, Roller
36	SFX0015-02	Pipe, Roller
37	SFXW130-01	[[[]] [] [] [] [] [] [] [] [
38	SFUM015-01	Circlip, Roller
14.23/4		Plate, Operation
39	SFKT015-03E	Knob, Speed Select (78 rpm)
40	SFKT015-02E	Knob, Speed, Select (45 rpm)
41 42	SFKT015-01E SFQA015-01	Knob, Speed Select (33 rpm) Spring, Supporter
13	SFUP015-07	Supporter, Switch
14	SFRTN30060	Screw, Supporter
15	SFKT015-06	Knob, Start/Stop
16	SFUM015-05E	Supporter, Logic Circuit
17	SFUM015-62	Plate, Operation
18	SFKT015-08	Knob, Operation (C)
19	SFKT015-04	Knob, Operation (A)
50	SFKT015-05	Knob, Operation (B)
51	SFUP015-08Z	Plate, Slider
52	SFKT015-07	Knob, Power Switch
53	SFAC015-01	Cabinet, Panel
54 [M]	SFNN015M01	Name Plate
4 [MC]	SFNN015C01	Name Plate
56	SFUM015-11	Spacer, LED

Ref. No.	Part No.	Part Name & Description
57	SFUP015-15	Cover, Power Switch
SCREWS and C	IRCLIPS	
0	XTN3+30B	Screw
0	XTN3+8BFZ	Screw
0	XTN3+6BFZ	Screw
0	XTN3+10B	Screw
0	XWG3FZ	Washer
0	XTN3+10BFZ	Washer
0	XTS3+10BFZ	Washer
8	XTN3+8B	Washer
0	XWG3	Washer
•	XSN3+6S	Screw
<u> </u>	хwазв	Washer
0 0 0 0 0	XTN3+6B	Screw
<u> </u>	XSN3+12S	Screw
•	XUC3FT	Circlip
~	XUC4FT	Circlip
<u> </u>	XTN3+40B	Screw
<u> </u>	XWA4B	Washer
ŏ	XNG4ES	Nut
	NVAPAREE	1101
ACCESSORIES	3	
A1 [M]	SFNU015M01	Instruction Book
A1 [MC]	SFNU015C01	Instruction Book
A2	SFWE212-01	Adaptor, 45 r.p.m
A3	SFEL028-01E	Ground Wire
A4	XMM41+32FU	Screw
A5	SFXW028-01	Washer
A6 [M]	SFNU015M02	Instruction, Dimension Drawing
A6 [MC]	SFNU015C02	Instruction, Dimension Drawing
A7	SFYF07A10	Polyethylene Bag
PACKING PAR	TS.	
P1 [M]	SFHP015M01	Carton
P1 [MC]	SFHP015C01	Carton
P2	SFHH015-01	Pad (Left)
P3	SFHH015-02	Pad (Right)
P4	SFHH015-03	Pad
P5	SFHD015-01	Pad, Top
P6	SFYF60A60	Polyethylene Bag, Unit
P7	SFYH40X45	Polyethylene Bag, Turntable
8	SFYF10A30	Polyethylene Bag, Cord
		1/4

SP-15

■ PARTS IDENTIFICATION

