

Service Manual

Direct Drive Turntable with Quartz
Phase Locked Control

SL-1000MK2

(X, XGE, E, XGF)

Original

For additional information, please refer to the service manual Model No. SP-10 MK2 and SH-10B3 + 1643

Notes: * This manual should be filed with the service manual for model SP-10 MK2 (X) (ORDER NO. SD7604-1071) or SP-10MK2 (XGE, E) (ORDER NO. SD7609-1151) and SH-10B3 (X) (ORDER NO. 7609-1150)

* When servicing model SL-1000MK2 (X, XGE, E, XGF), this service manual and the model SP-10MK2 (X) (ORDER NO. SD7604-1071) or SP-10MK2 (XGE, E) (ORDER NO. SD7609-1151) and SH-10B3 (X) (ORDER NO. 7609-1150) service manual should be used together.

Notes: * The model SL-1000MK2 (X) is available in European, Asia, Latin America, Oceania, Middle East and Africa.

* The model SL-1000MK2 (XGE) is available in England only.

* The model SL-1000MK2 (E) is available in Scandinavia only.

* SL-1000MK2 (XGF) is available in France only.



SPECIFICATIONS Specifications are subject to change without notice for further improvement.

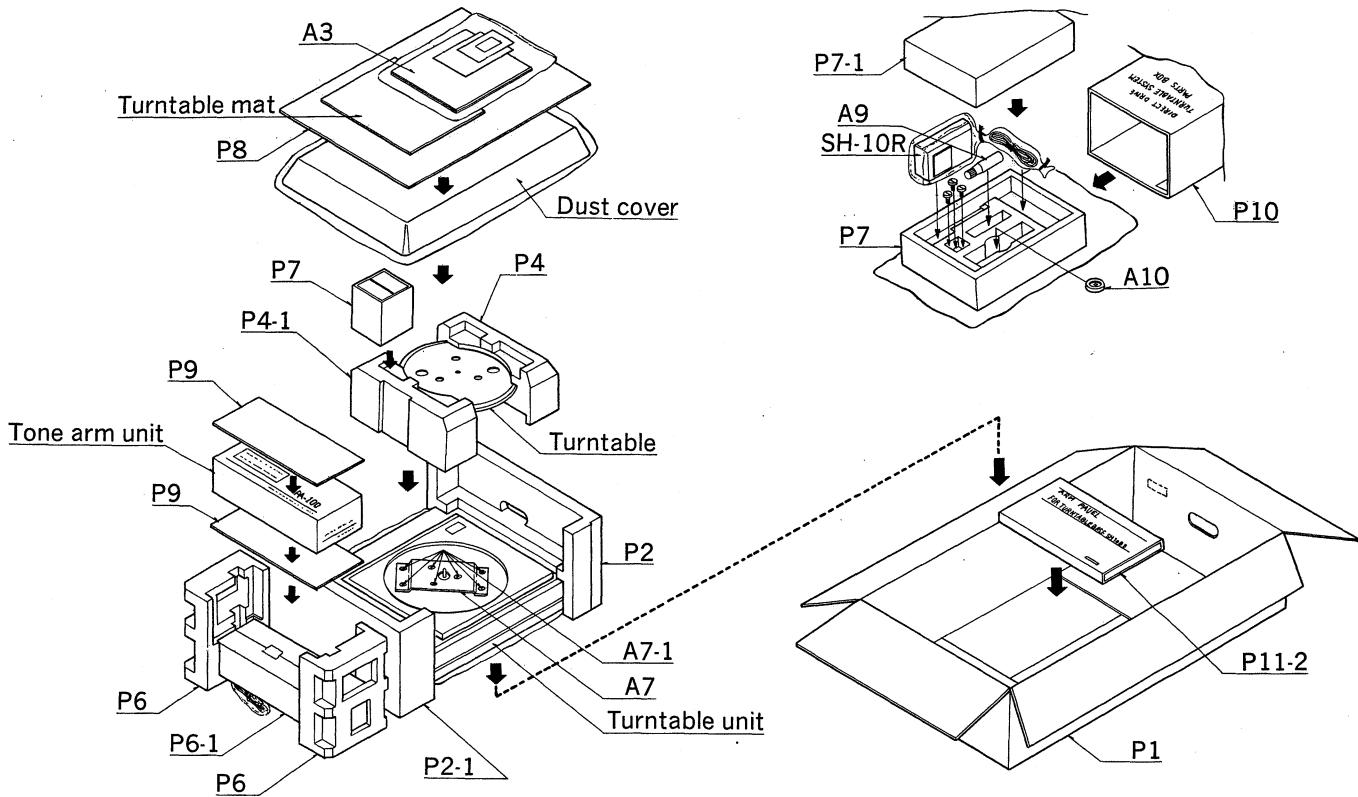
Dimensions 56 x 46.5 x 17 cm (W x D x H)
(22-1/16 x 18-5/16 x 6-11/16" inches)

Weight 26.2 kg (57.8 lbs)

 **Technics**

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

PACKING PARTS



REPLACEMENT PARTS LIST

Notes: [X] is available in European, Asia, Latin America, Oceania, Middle East and Africa.
 [XGE] is available in England only.
 [E] is available in Scandinavia only.
 [XGF] is available in France only.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks	Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
CABINET and CHASSIS PARTS					P1-1 [X]	SFHP101X02	Carton, Outside	1	○
1	SFNN101X01	Name Plate	1	*○	P2	SFHH101-08	Pad, Left	1	○
ACCESSORY PARTS					P2-1	SFHH103-02	Pad, Right	1	○
A1	SFAZ103-01	Base, Arm Panel	1		P4	SFHH101-01	Pad, Turntable (Left)	1	○
A1-1	SFAZ103-02	Arm Panel	1		P4-1	SFHH101-02	Pad, Turntable, (Right)	1	○
A1-2	XMC27+16FV	Screw	4		P6	SFHH101-03	Pad, Power Unit	2	○
A2	SFAZ103-01	Base, Arm Panel	1		P6-1	SFHD102-06	Case, Power Unit	1	○
A2-1	SFAZ103-03	Arm Panel	1		P7	SFHH101-04	Parts Box	1	○
A2-2	XMC27+16FV	Screw	4		P7-1	SFHH101-05	Top, Parts Box	1	○
A3 [X,E,XGF]	SFNU101X01	Instruction Book	1	○	P8	SFHD103-01	Pad, Top	1	○
A3	SFNU101G01	Instruction Book	1	○	P9	SFHD101-01	Pad, Tone Arm	2	○
A7	SFUP102M14E	Mounting Plate, Motor	1		P10	SFHD101-02	Case, Parts Box	1	○
A7-1	XYN3+C6BS	Screw	7		P11	SFHH103-03	Pad, Arm Panel	1	
A8	SFXZ103-01	Allen Wrench	1		P11-1	SFHD103-02	Spacer, Arm Panel	1	
A9	SFW0010	Oil	1		P11-2	SFHD103-03	Case, Arm Panel	1	
A10	SFWE010	45 r.p.m Adaptor	1		P12	SFDK100G	DIN-PIN Plug	1	
PACKING MATERIALS					P12-1	SFDK119118	2PIN. Plug	1	
P1 [X,XGE,E]	SFHP101X01	Carton, Inside	1	○	[X,XGF]	RJP17AS	Adaptor Plug	1	
P1 [XGF]	SFHP101J01	Carton, Inside	1	○					

Service Manual

TURNTABLE BASE/DUST COVER

SH-10B3- (X)



SP-10MK II
(Separately available)

■ SPECIFICATIONS

External dimensions. 56 x 46.5 x 17 cm (W x D x H)
Weight. 12 kg (including dust cover)
(26.5 lbs.)

■ PARTS IDENTIFICATION

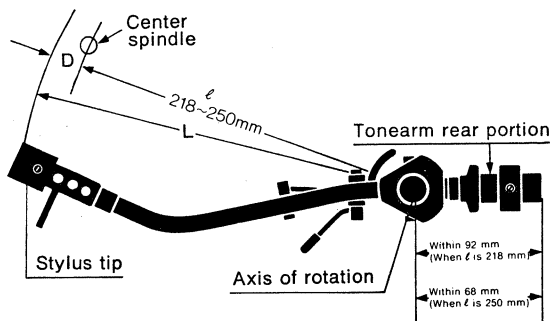


■ TONEARMS ATTACHABLE TO THE UNIT

Since tonearms attachable to this unit are limited in their dimensions and configurations, select a suitable tonearm based on the following dimensions.

Note:

- 1) A tonearm having its rear portion longer than that shown in the figure can not be used due to contact with the dust cover.
- 2) A tonearm whose arm rest is formed to be a separate component can not be employed, either.
(This is because of the difficulty in drilling a hole for the arm rest in the turntable base.)



When the length (ℓ) = $L - D$ is between 218 and 250 mm, the tonearm can be used.

L...Arm effective length
Length between the stylus tip and axis of rotation
D...Overhang
 ℓ ...Tonearm setting length
Length between the center spindle and axis of rotation

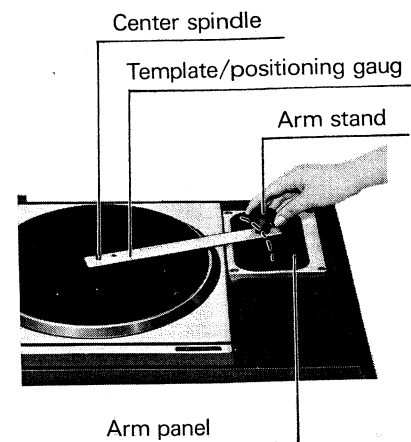
■ INSTALLATION OF THE TONEARM

The procedures described below relate to one example for installing a tonearm. When actually attaching, mount correctly according to the instructions for the tonearm you are now using.

1. Align the screw hole of the arm panel with that of the turntable base as shown.
2. Fit the template (positioning gauge for the tonearm installation) furnished with the tonearm into the center spindle of the turntable. Determine the tonearm mounting position while moving along the dotted line and mark the set position with a pencil or the like.

Note:

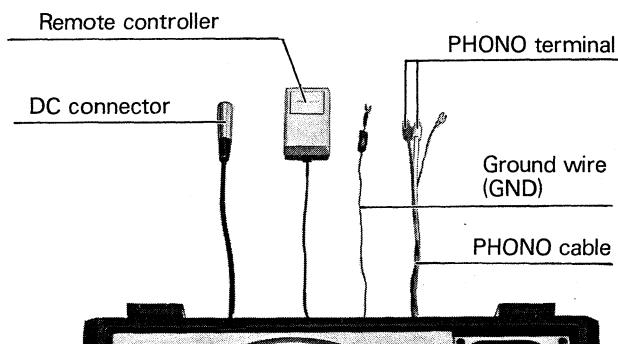
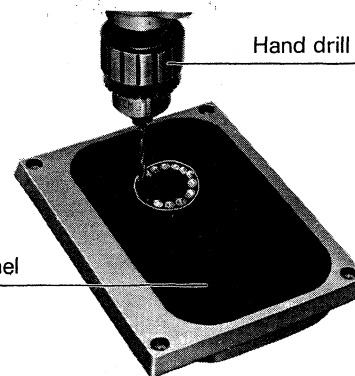
In the above position setting, ensure that the rear portion of the tonearm does not contact the dust cover during playing.



3. Drill holes in the arm panel.

Drill holes with a hand drill or the like as shown along the circumference marked in the previous item. Next cut off unnecessary portions and finish with a round file.

4. Mount the tonearm on the arm panel, and pass the PHONO terminal side of the arm output cord through the surface of the turntable base. At the side pull it out from under the base.



5. Secure the arm panel with screws.

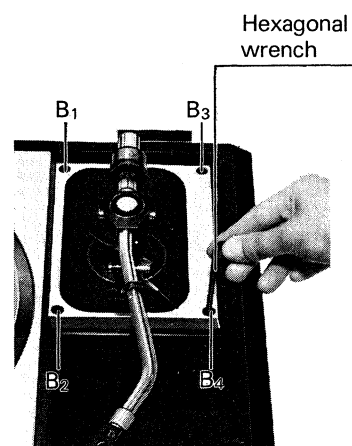
Tightly secure 4 positions B₁ to B₄ with screws, using the furnished hexagonal wrench.

After the above procedure, the mounting of the tonearm has been completed.

For adjustments of the height and range of rotation of the tonearm, follow the instructions furnished with the tonearm you are using.

Note.

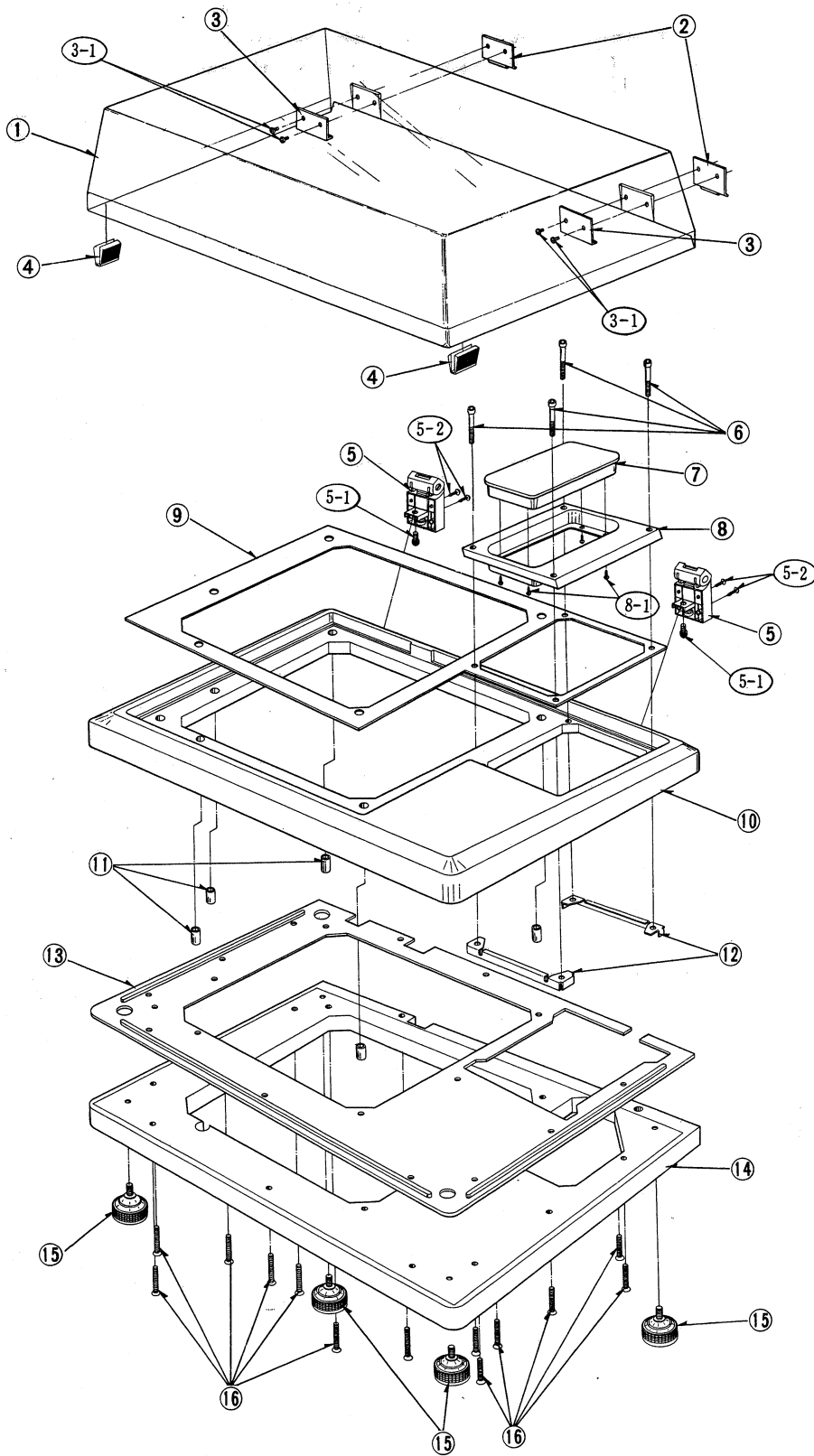
Should no template/positioning gauge or the like be furnished with the tonearm you are using, calculate the length from the center spindle to the tonearm installing position by subtracting the overhang length from the effective length of the tonearm. Set the tonearm according to this calculated length.



■ PARTS LIST

Ref. No.	Part No.	Description	Per Set	Remarks	Ref. No.	Part No.	Description	Per Set	Remarks
1	SFAD103-01	Dust cover	1	○	ACCESSORY PARTS				
2	SFUP103-02	Hinge (A)	2	○	A1	SFNU103X01	Instruction Book	1	○
3	SFUP103-03	Bracket, Hinge	2	○	A2	SFAZ103-02	Arm Panel	1	○
3-1	XST4+10FZS	Screw	4	○	A3	SFAZ103-01	Base, Arm Panel	1	○
4	SFGZ103-03	Cussion, Dust cover	2	○	A4	XMC27+16FV	Screw	4	○
5	SFAT103-01A	Hinge ass'y	2	○	A5	SFXZ103-01	Allen Wrench	1	○
5-1	XYN5+C8FZS	Screw	2	○	PACKING MATERIALS				
5-2	XMC38+32FZ	Screw	4	○	P1	SFHP103M01	Packing case (Outer)	1	○
6	SFXG103-01	Screw, Arm Panel	4	○	P2	SFHP103X02	Packing case (Inner)	1	○
7	SFAZ103-02	Arm Panel	1	○	P3	SFHH103-01	Side Pad (Left)	1	○
8	SFAZ103-01	Base, Arm Panel	1	○	P4	SFHH103-02	Side Pad (Right)	1	○
8-1	XMC27+16FV	Screw	4	○	P5	SFHD103-01	Pad, Top	1	○
9	SFGZ103-01	Spacer Rubber, Turntable	1	○	P6	SFHH103-03	Pad, Arm Panel	1	○
10	SFAC103-01	Cabinet	1	○	P7	SFHD103-02	Arm Panel Pad	1	○
11	SFGZ103-04	Tube	5	○	P8	SFHD103-03	Case, Arm Panel	1	○
12	SFUP103-01	Bracket, Arm Panel	2	○	P9	SFHD103-04	Pad, Arm Panel Case	1	○
13	SFGZ103-02	Spacer Rubber, Cabinet	1	○	P10-1	SFYF60A80	Polyethylene Pack	2	○
14	SFAU103-01	Bottom case	1	○	P10-2	SFYF17A25	Polyethylene Pack	2	○
15	SFGA103-01A	Audio insulator ass'y	4	○	P10-3	SFYF09B15	Polyethylene Pack	1	○
16	XMC38+32FZ	Screw	4	○					
17	SFNN103X01	Name Plate	1	○					

CABINET PARTS LOCATION

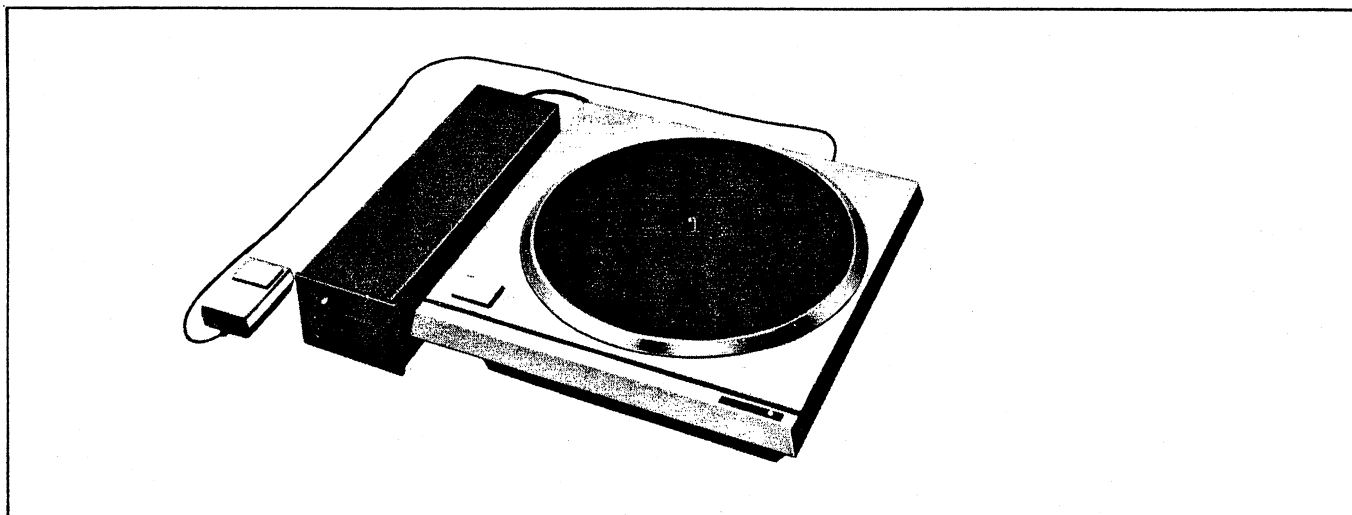


Service Manual

Player
SP-10MKII
 [EG], [XGF]

Areas

- * [EG] is available in F.R. Germany.
- * [XGF] is available in France.



■ SPECIFICATIONS

Type:	Direct-drive turntable	Wow & Flutter:	0.025% (JIS C5521) W.R.M.S. ±0.035% (DIN 45507), weighted, zero-to-peak
Turntable paltter:	Aluminum diecast, diameter 32 cm (12-19/32 inches), weight 2.9 kg (6.4 lbs.), moment of inertia 380kg. cm ² (130 lbs. in ²)	Rumble:	60 dB (IEC 179B) - 50 dB (DIN 45539A) - 70 dB (DIN 45539B)
Motor:	Brushless DC motor, electronic rectification, quartz-controlled phase-locked servo circuit	Power Supply:	AC110/120/220/240V 50/60Hz
Platter speeds:	33-1/3, 45 and 78.26r.p.m.	Power Consumption:	20 W
Starting torque:	6 kg. cm (5.2 lbs. in)	Dimensions:	Turntable Only 36.85 (W) x 10.25 (H) x 36.85 (D) cm (14-31/64 x 4-1/64 x 14-31/64 inches)
Build-up time	0.25 sec. (25° rotation) to 33-1/3r.p.m.	Power Unit	110 (W) x 8.35 (H) x 37.0 (D) cm
Braking time:	0.3 sec. (30° rotation) from 33-1/3r.p.m. to standstill	Weight:	Turntable Only 9.5 kg (20.9 lbs.) Power Unit 3.8 kg
Speed fluctuation by load changes:	0% within 5 kg. cm (4.3 lbs. in)		
Speed drift:	Within ± 0.002%		

Specifications are subject to change without notice for further improvement.

Technics

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 P.O. Box 288, Central Osaka Japan

■ PARTS IDENTIFICATION

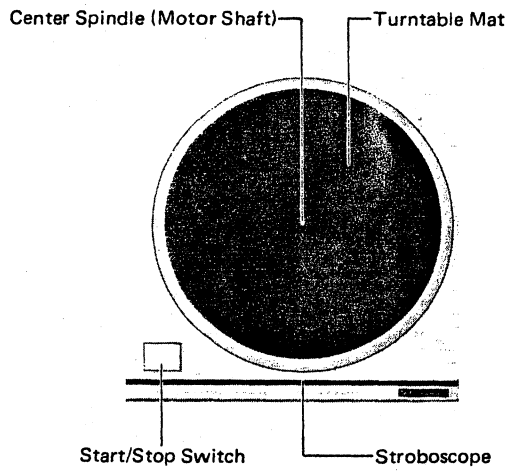


Fig. 1

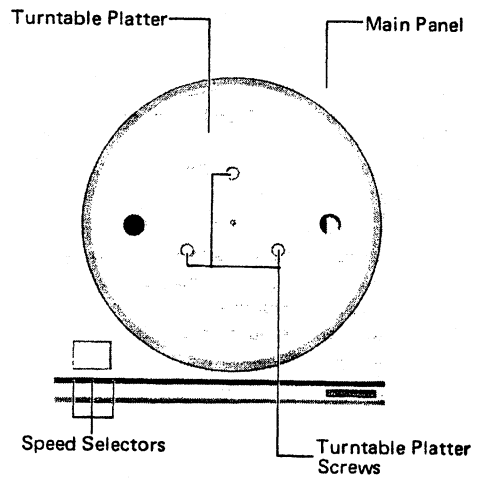


Fig. 2

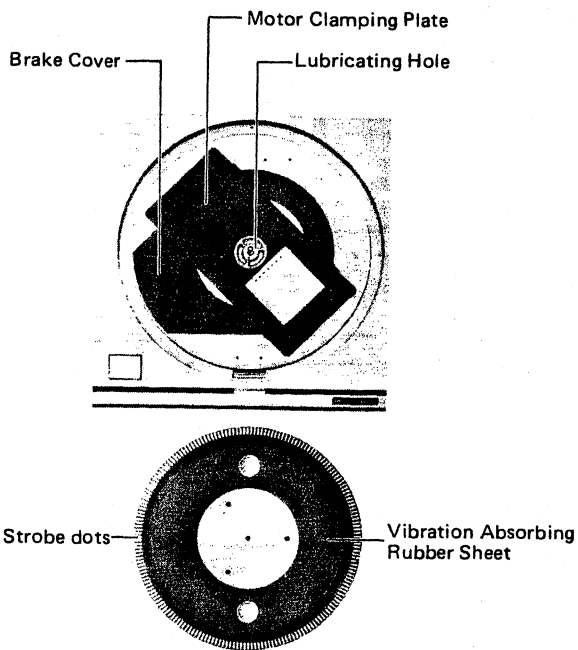


Fig. 3

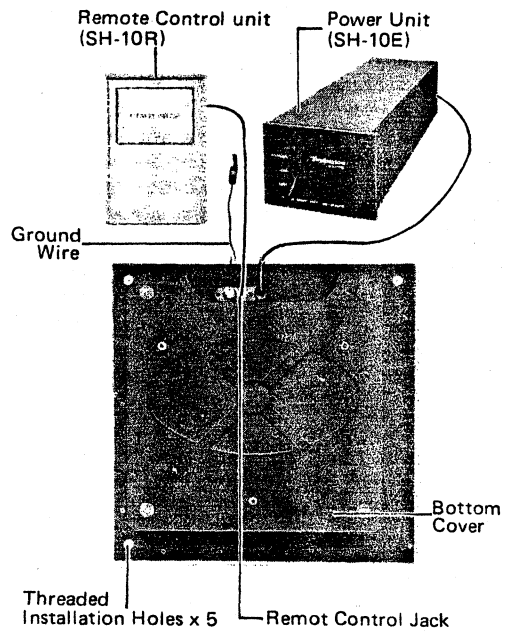


Fig. 4

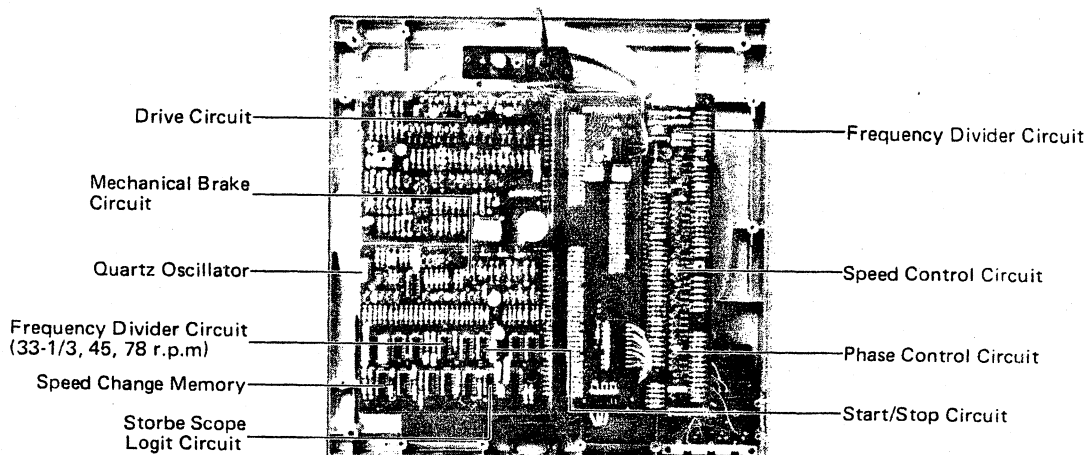


Fig. 5

■ ASSEMBLY AND SET-UP

1. Building a base or cabinet for this model

The starting torque of this model is 6Kg. cm. (5.2 lbs. in). Thus the turntable platter which is heavy (2.9kg, 6.4 lbs.) and large (32cm, 12-19/32 inches) can be started and stopped quickly. For this reason we recommend that you use durable and heavy material. The thickness of the base should be 3cm. (1-11/64 inch) or more in order to bring out the best performance of model.

Note: Use durable and stable insulators (legs) Fig. 6 shows an example of cabinet construction.

2. Drill and cutout the base according to the installation diagram.

As paper has a tendency to stretch we suggest that you check the diagram before using it as a template. Also check dimensions for printing errors. Check the tone arm mounting position for proper alignment (follow the tonearm manufacturers specifications). Also make sure to allow sufficient clearance for power connector and output terminals of the tone arm.

3. Install the unit in the cabinet

Two kinds of screws are included in the carton. Use the proper length of screw according to the thickness of the cabinet which you use. When you install the unit in the cabinet place protective material, on top of the unit to protect the center spindle from external damage. A soft cloth placed on the panel surface will protect it from scratches.

4. Remove the motor clamping plate and screws (Fig. 8)

After installation of the unit in the cabinet remove the seven blue screws and motor clamping plate.

NOTE: To protect the very delicate and important parts of the motor (spindle, motorshaft etc.) from external damage during transportation protective fittings have been installed. Be sure to remove these fittings carefully and save them for future use in case you again need to transport the unit.

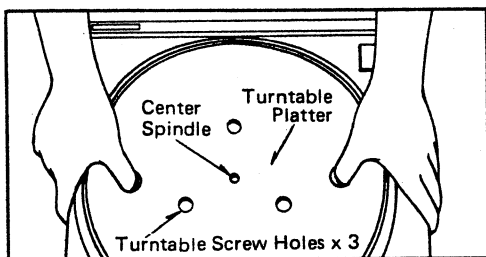


Fig. 9

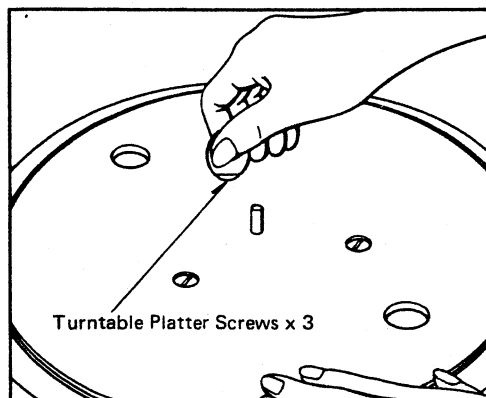


Fig. 10

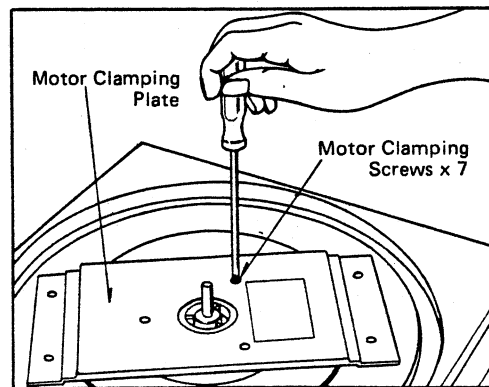


Fig. 8

NOTE: Dimensions are marked in millimeters. (25.4 mm are equal to inch.)

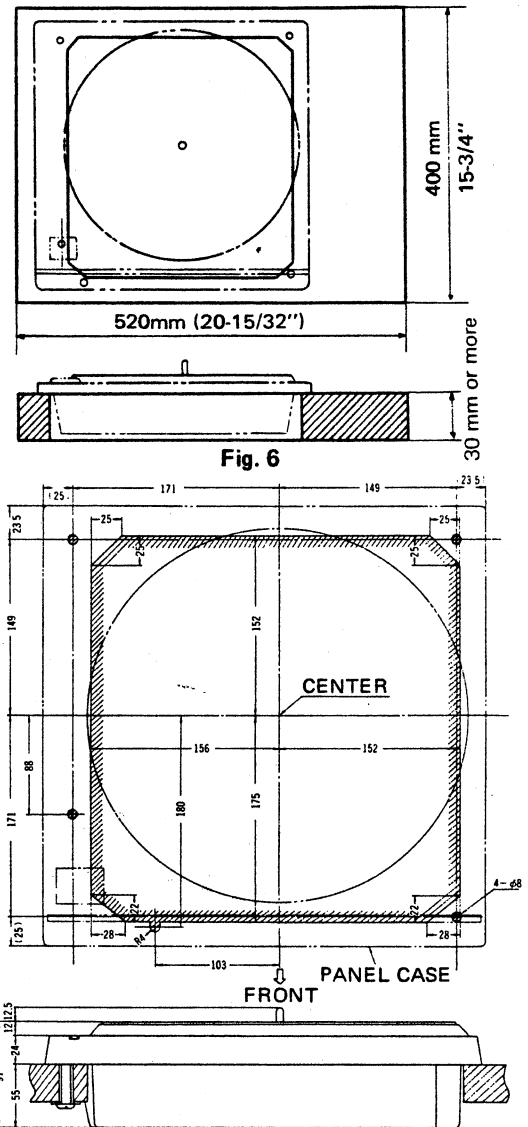


Fig. 7

5. Securing the turntable platter (Fig. 9 & 10)

Place the turntable platter on the spindle aligning holes in the platter with the rotor screw holes by eye.

Slightly lifting the turntable platter will make it easier to align the holes. Using the three screws supplied, firmly tighten the turntable platter and put the turntable mat on it.

NOTE: The turntable platter must be tightened at all three points. To assure proper operation.

■ OPERATION PRINCIPLES OF THE SP-10MKII

1. Quartz Generated Reference Signal

The quartz reference signal generator provides a reference signal which controls the action of the SP-10MKII. The oscillation of a quartz crystal is used. This oscillation is stable, highly accurate and not effected by temperature and other changes. The signal generated by the reference signal generator is split by the frequency divider into the appropriate frequency according to the speed selected. The frequency divider is controlled by pushing the speed selector on the front panel of the unit. The selected speed information is stored in the speed change digital memory.

2. Stroboscopy Logic Circuit

The stroboscope lights up the 190 stripes engraved on the platter rim. A neon lamp flashes according to instructive pulses from the stroboscope logic circuit. The circuit shapes digitally the signals from the frequency divider. This provides a sharp strobe image which is independent of external power source frequency.

3. Frequency Generator

A frequency generator is integrated with the platter drive motor. It is electromagnetic structure using a push-pull design cancels external induction. It converts accurately the platter rotation speed into a frequency. The output of the frequency generator is fed to the speed and the phase control circuits.

4. Phase Control Circuit

The phase control circuit detects a phase difference between a reference signal and a frequency generator signal and generates a control voltage. This circuit makes it possible to lock the rotation of the turntable platter to a reference signal. It improves considerably speed stability and speed control characteristics for load conditions when compared with the conventional direct-drive motor having only speed control as shown in Fig. 11 & 12.

5. Speed Control Circuit

The speed control circuit includes a sample-and-hold circuit, which converts the output of the frequency generator into an electrical voltage. This is the control voltage which maintains the platter rotation speed.

6. Drive Circuit

Two control signals are composed and applied to the drive circuit to maintain a forward motor-rotation. The drive circuit supplies fullwave drive current doubling current efficiency. It supplies drive current in both directions for a symmetrical rotation in either a forward or reverse direction.

The drive circuit rotates the turntable platter with quick response and large starting torque.

7. Start/stop Circuit

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

3. 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 accomplish accurate cueing of a record.

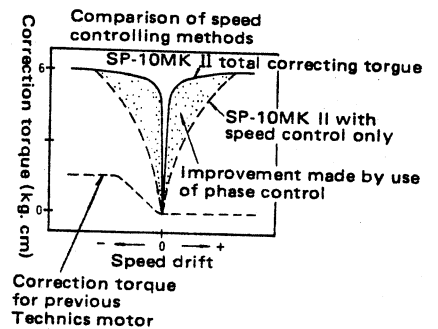


Fig. 11

Comparison of stability against load variations.

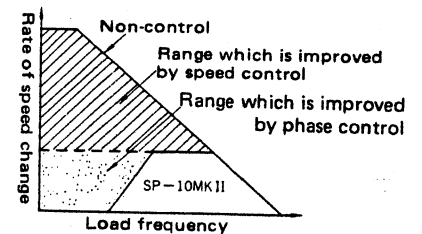


Fig. 12

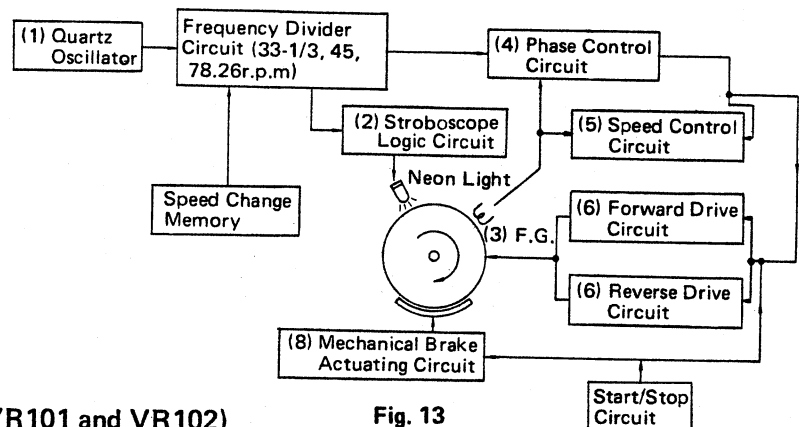


Fig. 13

■ THE PERIOD ADJUSTMENT METHOD (VR101 and VR102)

Note: If you repair the Control circuit board or the Drive Circuit board, you have to adjust VR101 and VR102.

1. Connect a dual-channel oscilloscope to points T and S on the circuit board. Point O is for the ground wire of the Control Circuit board.
2. Please refer to fig. 14 for the phase relation of the 2 waves for the adjustment of VR101 and VR102.
3. Please adjust in the order: 33-1/3r.p.m. 45r.p.m. 78r.p.m.

Speed Selector	Time	Adjustment Point
33-1/3 r.p.m.	$6.3 \pm 0.2\text{ms}$	VR101
45 r.p.m.	$4.7 \pm 1.3\text{ms}$	Confirm
78 r.p.m.	$2.7 \pm 0.1\text{ms}$	VR102

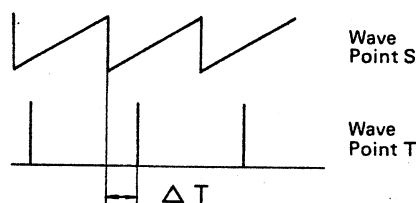


Fig. 14

■ BLOCK DIAGRAM

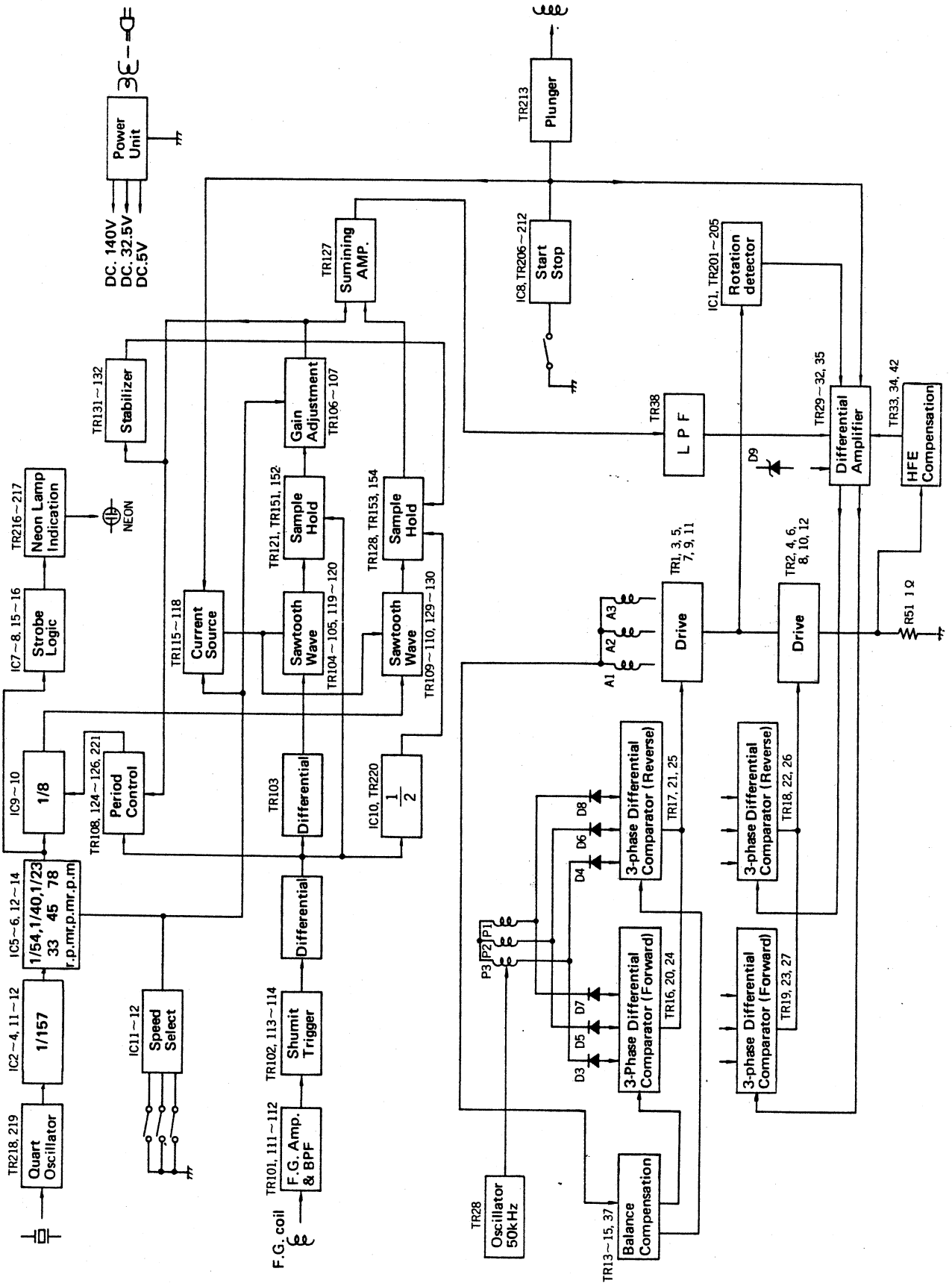
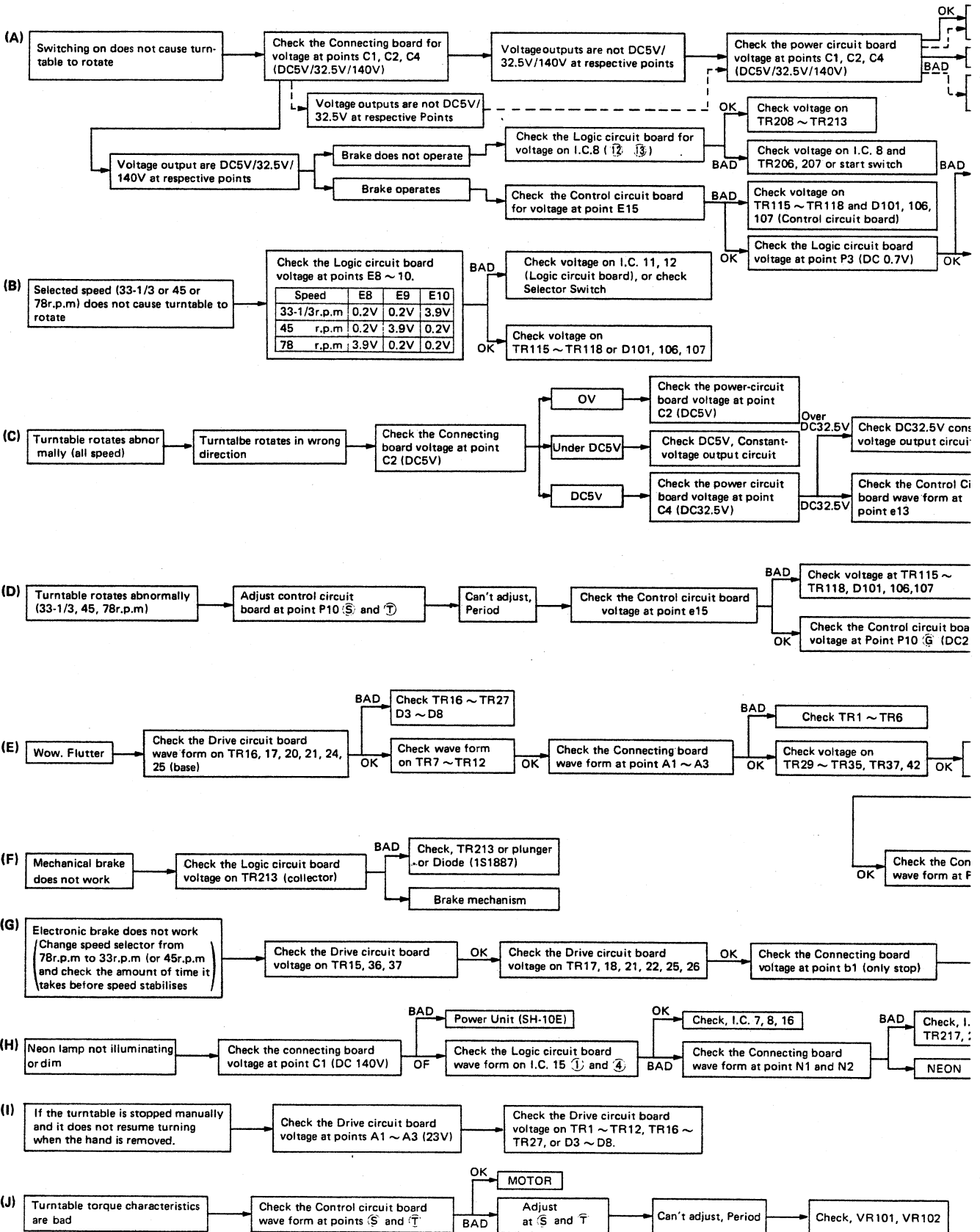
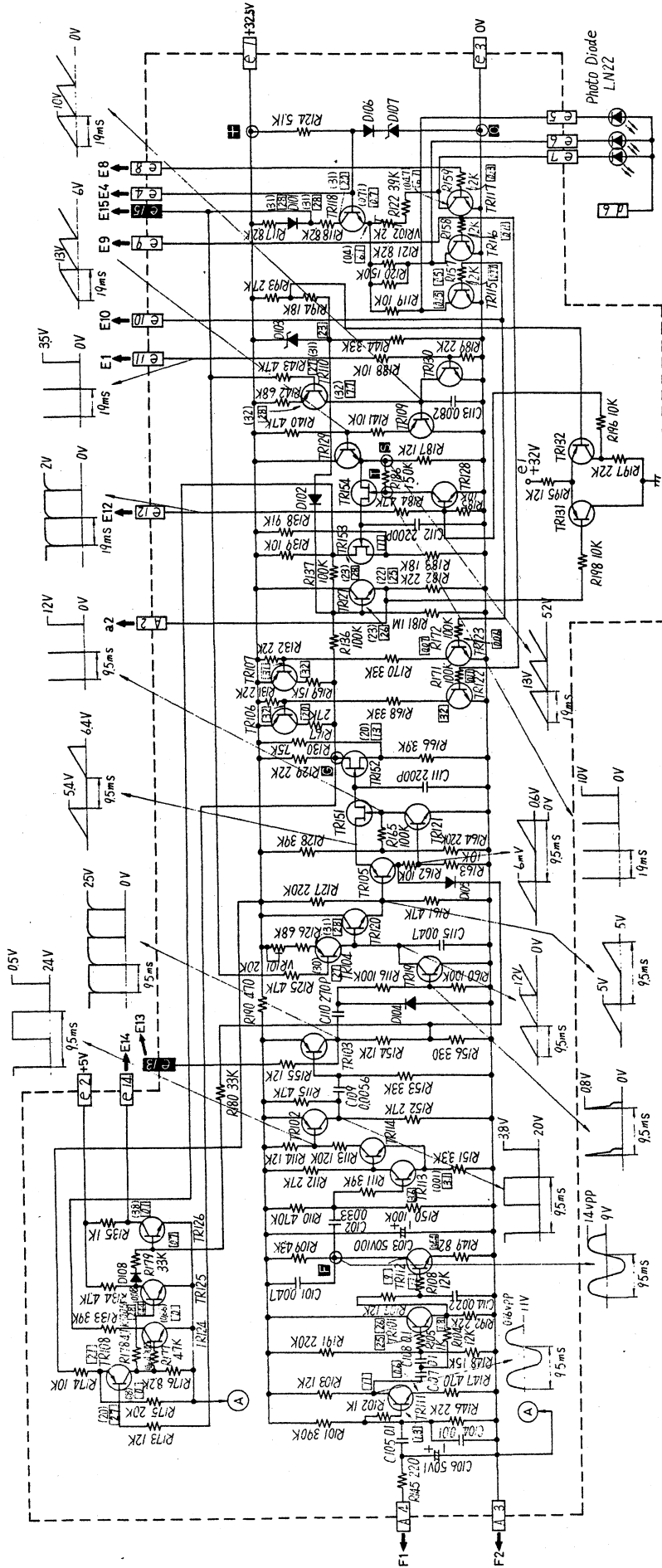


Fig. 15

■ SERVICE CHECK POINTS

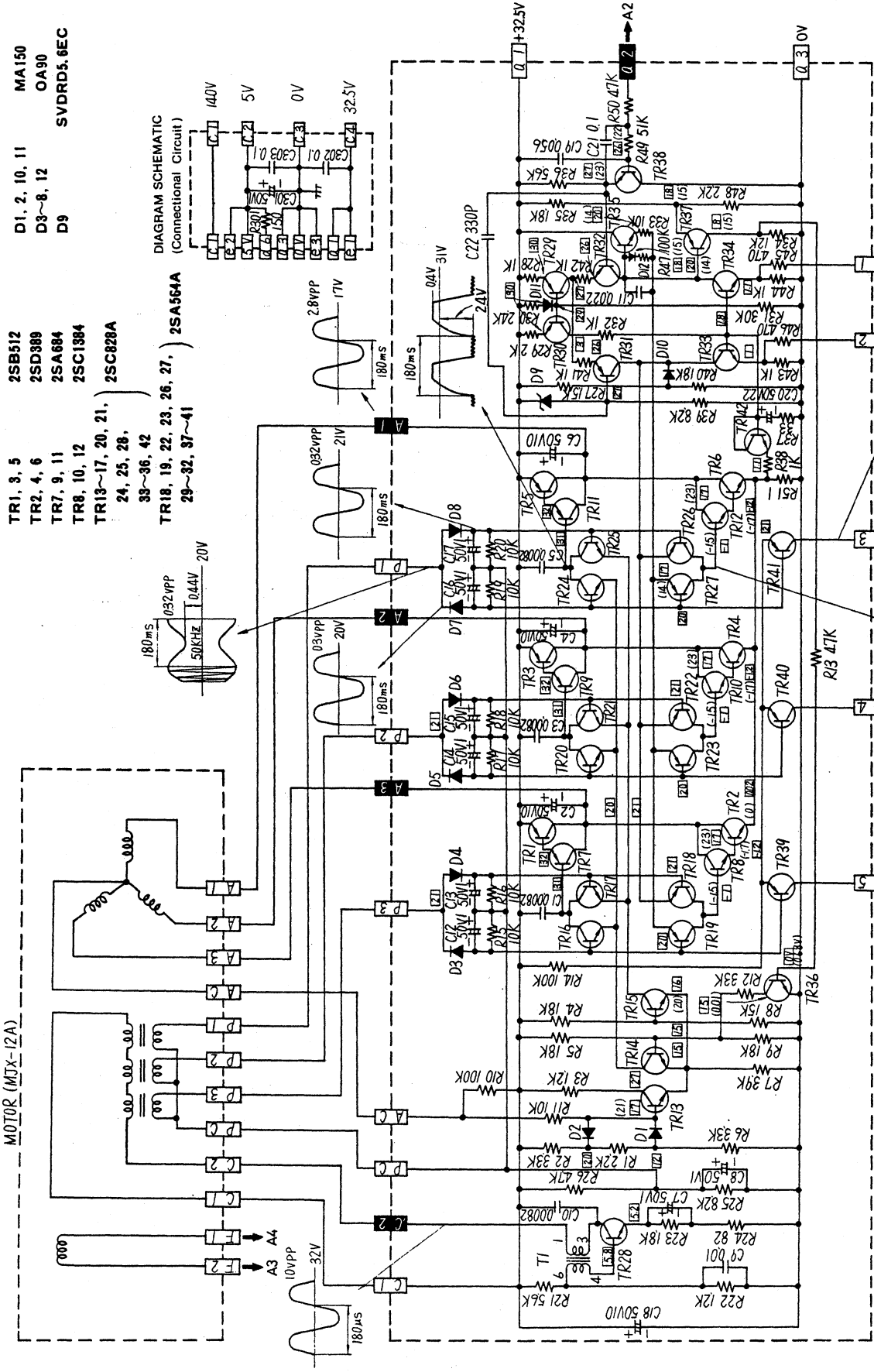


Schematic Diagram (Control Circuit) Model SP-10MKII



- Notes:**
- 1. Values shown are with reference to the chassis, measured by DC voltmeter.
 - voltage during 33-1/3 rpm.
 - () voltage when stopped.
 - Waveforms are during 33-1/3 rpm.
- | | |
|-------------------------------|-------------|
| TR102~110, 131, 132 | 2SA564A |
| TR101, 111~130 | 2SC828A |
| TR151~154 | 2SK30A |
| D101, 102, 104, 105, 106, 108 | MA150 |
| D103 | SVDRD9.1EBS |
| D107 | SVDRD5.6ECS |
- This schematic diagram may be modified at any time with the development of new technology.

Schematic Diagram (Drive Circuit) Model SP-10MKII



- TR1, 3, 5 2SB512
- TR2, 4, 6 2SD389
- TR7, 9, 11 2SA684
- TR8, 10, 12 2SC1384
- TR13~17, 20, 21, 25C828A
- 24, 25, 28, 33~36, 42
- TR18, 19, 22, 23, 26, 27, 29~32, 37~41 2SA564A

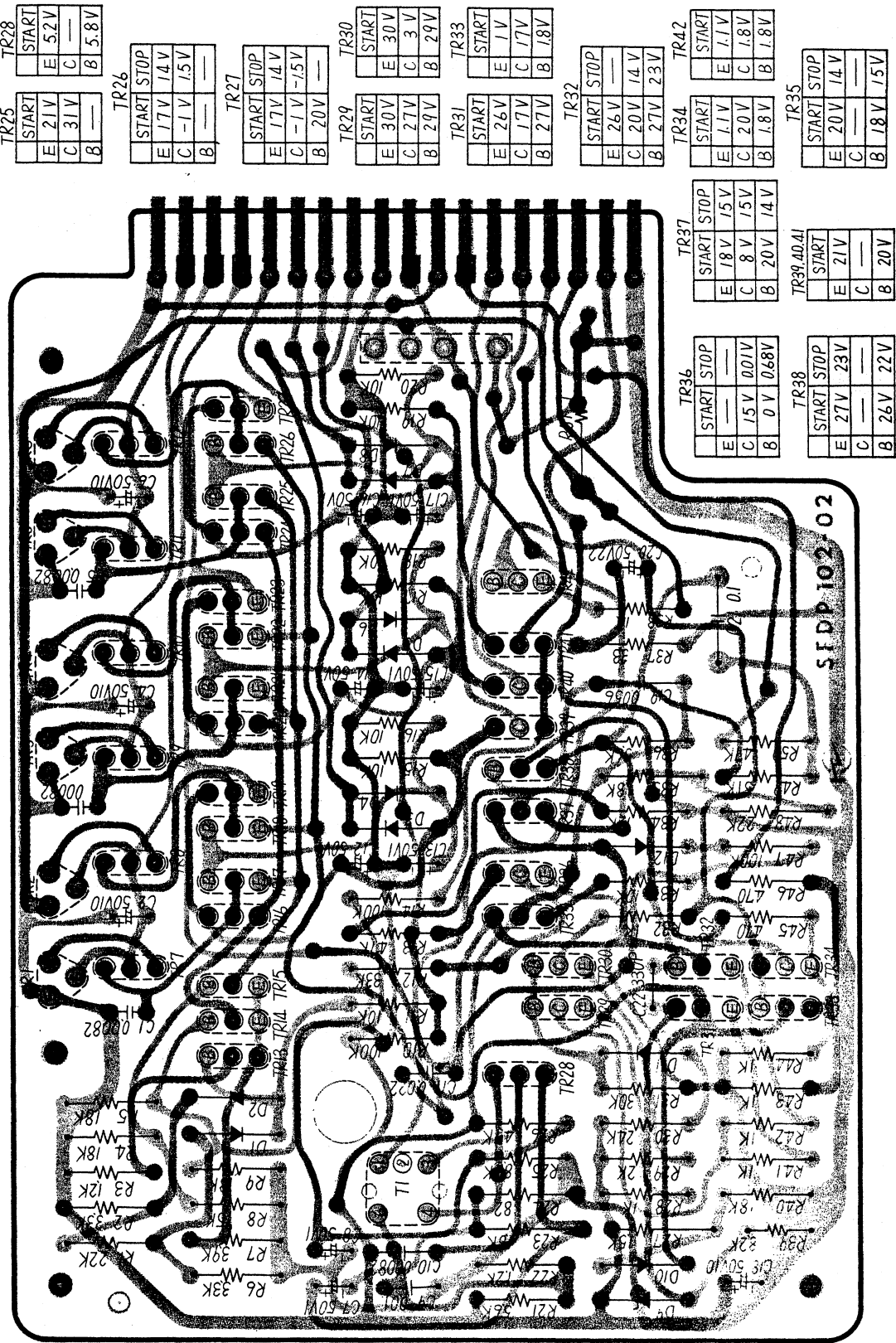
- D1, 2, 10, 11 MA150
- D3~8, 12 OA90
- D9 SVDRD5.6EC

Notes: 1. Values shown are with reference to the chassis, measured by DC voltmeter.
 □ voltage during 33-1/3 rpm.
 () voltage when stopped.
 Waveforms are during 33-1/3 rpm.

This schematic diagram maybe modified at any time with the development of new technology.

Printed circuit board pattern seen from above.

Circuit Board Wiring View (Drive Circuit) Model SP-10MKII



TR1.3.5	START	—
	E	32V
	C	17V
	B	31V

TR2.4.6	START	STOP
	E	0.02V
	C	17V 23V
	B	-1.2V -17V

TR8.10.12	START	STOP
	E	-12V -17V
	C	17V 23V
	B	-1V -15V

TR13	START	—
	E	16V
	C	27V
	B	17V

TR15	START	—
	E	16V
	C	21V
	B	15V

TR17.21	START	—
	E	21V
	C	31V
	B	21V

TR18.22	START	STOP
	E	17V 14V
	C	-1V -15V
	B	21V

TR19.23	START	STOP
	E	17V 14V
	C	-1V -15V
	B	20V

TR25	START	—
	E	21V
	C	31V
	B	—

TR26	START	STOP
	E	17V 14V
	C	-1V 15V
	B	—

TR27	START	STOP
	E	17V 14V
	C	-1V -15V
	B	20V

TR29	START	—
	E	30V
	C	27V
	B	29V

TR30	START	—
	E	30V
	C	3V
	B	29V

TR31	START	—
	E	26V
	C	17V
	B	27V

TR32	START	STOP
	E	26V
	C	20V 14V
	B	27V 23V

TR33	START	—
	E	1V
	C	17V
	B	18V

TR34	START	STOP
	E	11V
	C	20V
	B	18V

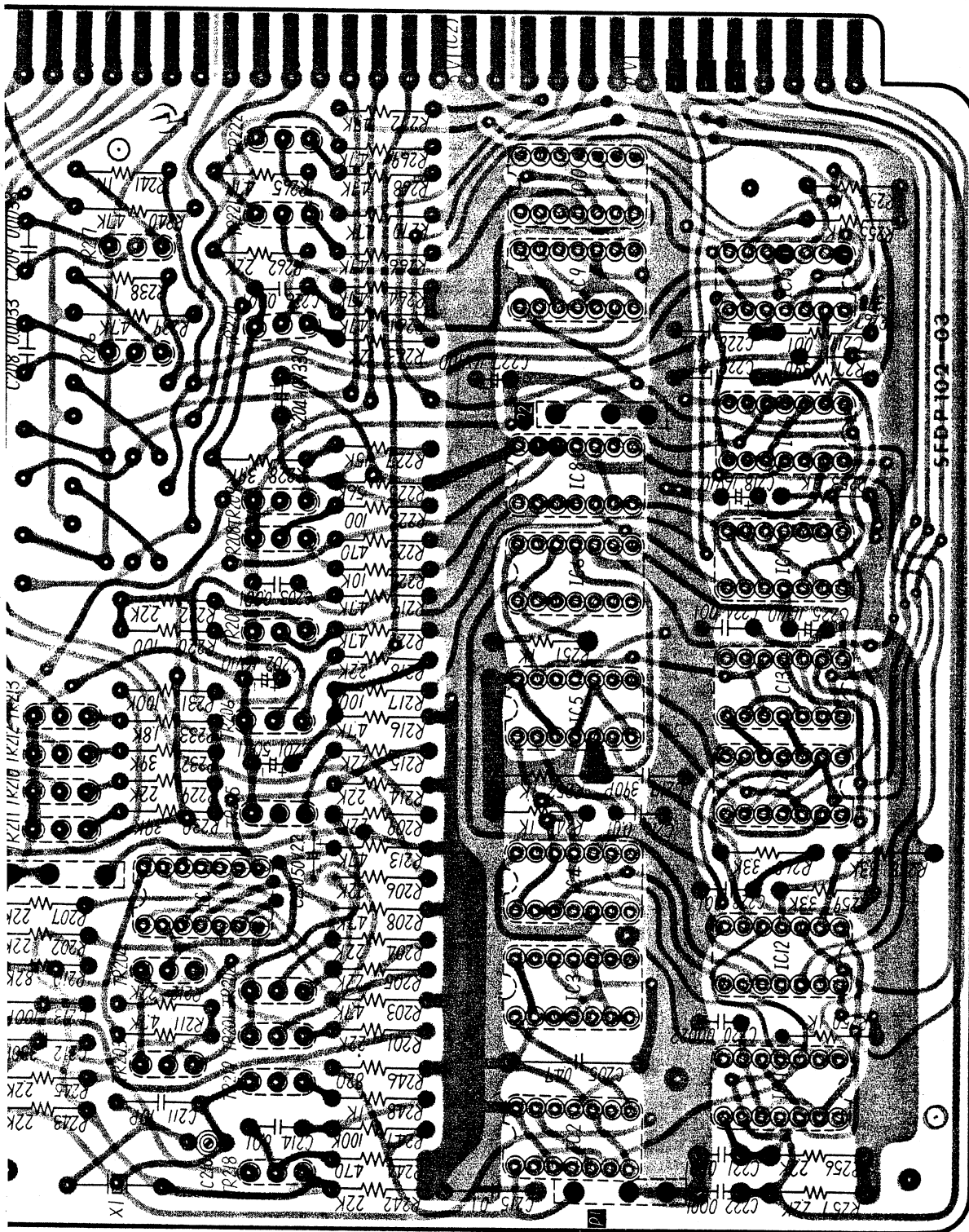
TR35	START	STOP
	E	20V 14V
	C	—
	B	18V 15V

TR36	START	STOP
	E	15V 0.01V
	C	0V 10.68V
	B	—

TR37	START	STOP
	E	18V 15V
	C	8V 15V
	B	20V 14V

TR38	START	STOP
	E	27V 23V
	C	—
	B	26V 22V

TR39.40.41	START	STOP
	E	21V
	C	—
	B	20V



5FD-P102-03

E	C 0.03V
B	B 0.71V

START	TR207
2	3.9V
4	0.1V
6	0.14V

START	STOP
I2	3.5V 0.1V
I3	0.21V 3.9V

START	STOP
E	C 1.2V 0.12V
B	0.03V 0.7V

START	STOP
E	C 1.2V 0.08V
B	0.21V 0.72V

START	STOP
E	C 2.6V 0.04V
B	0.21V 0.66V

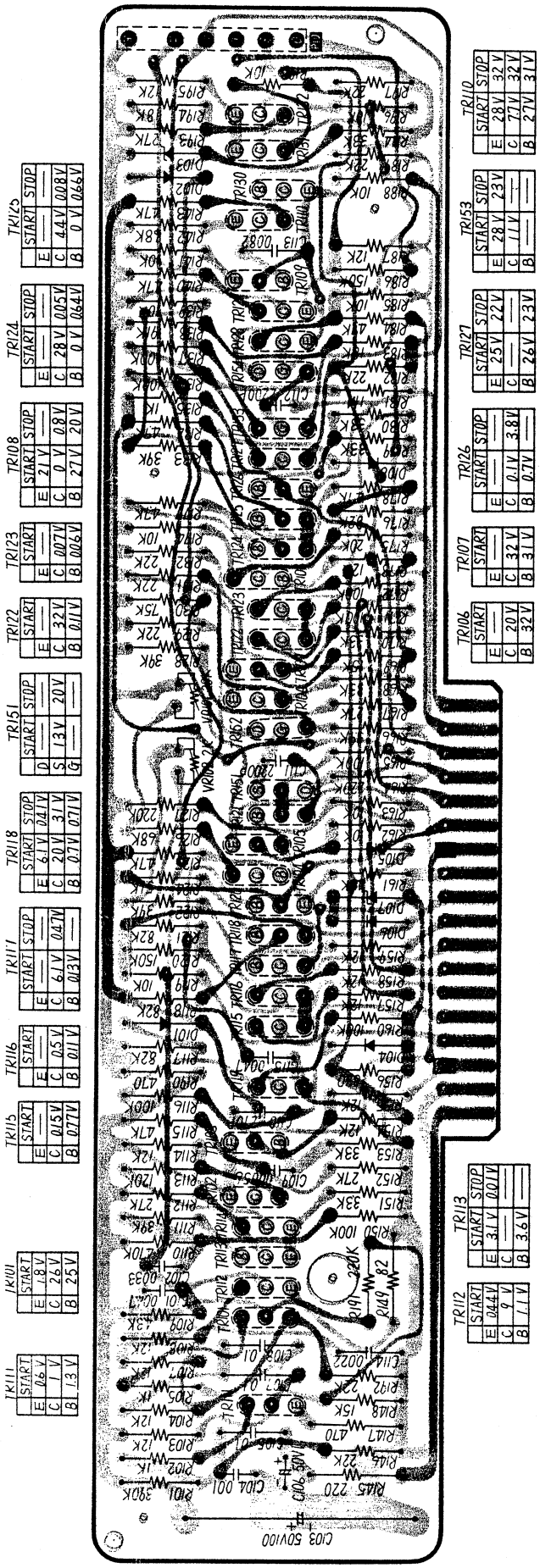
START	STOP
E	C 6.7V 0.17V
B	0.21V 0.73V

START	STOP
E	C 3.2V 0.16V
B	0.21V 0.76V

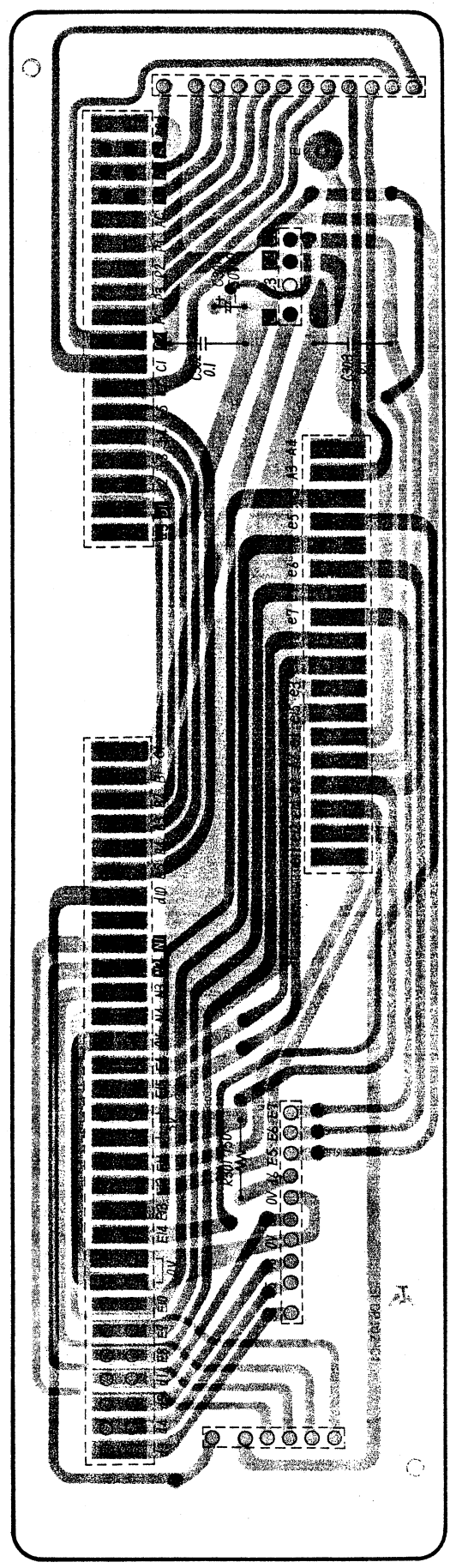
START	IC11
1	4.9V
2	4.8V
3	0.12V
4	4.8V
5	4.9V
6	0.12V

START	TR218
E	2.2V
C	4.4V
B	2.4V

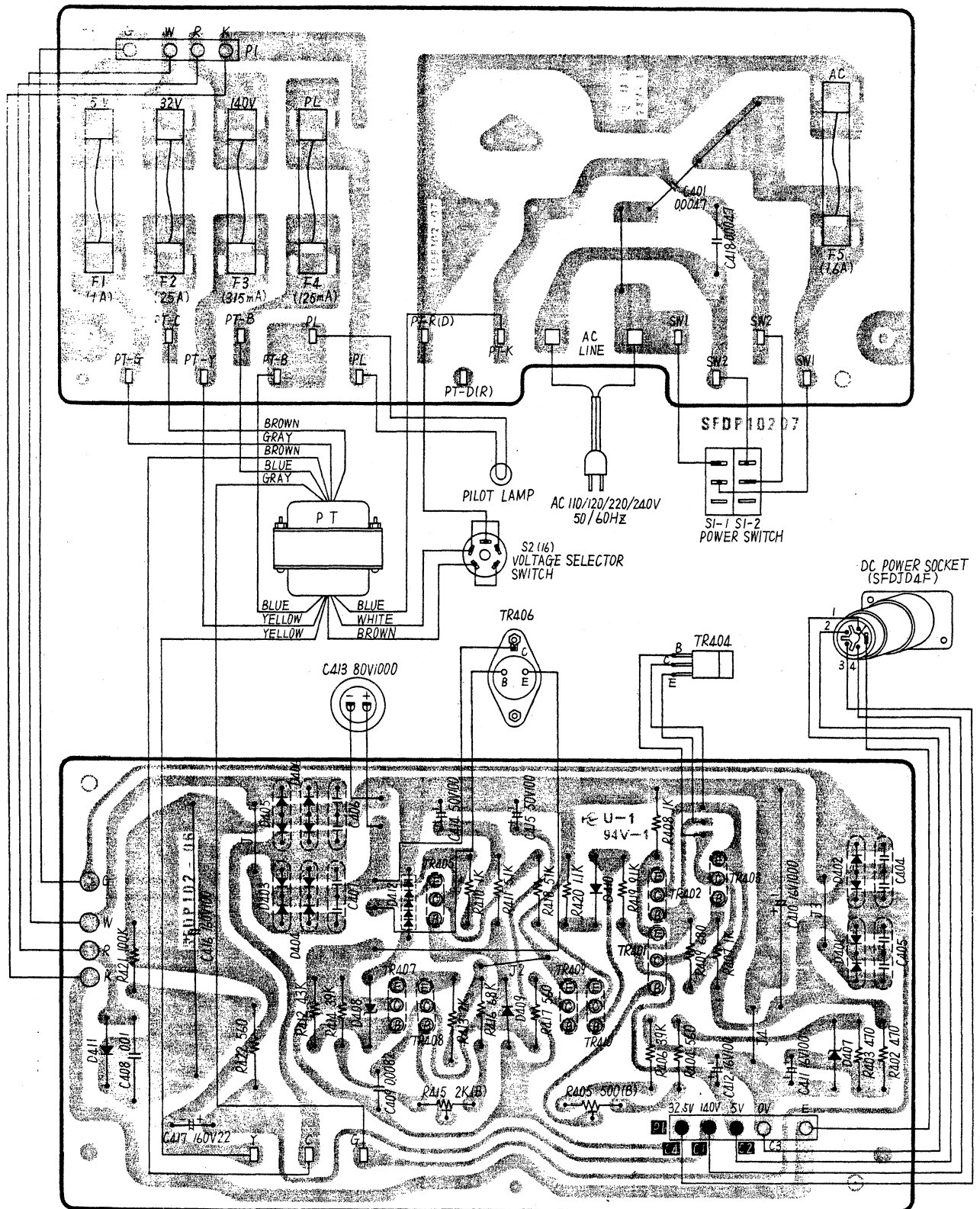
Circuit Board Wiring View (Control Circuit) Model SP-10MKII



Circuit Board Wiring View (Connectional Circuit) Model SP-10MKII



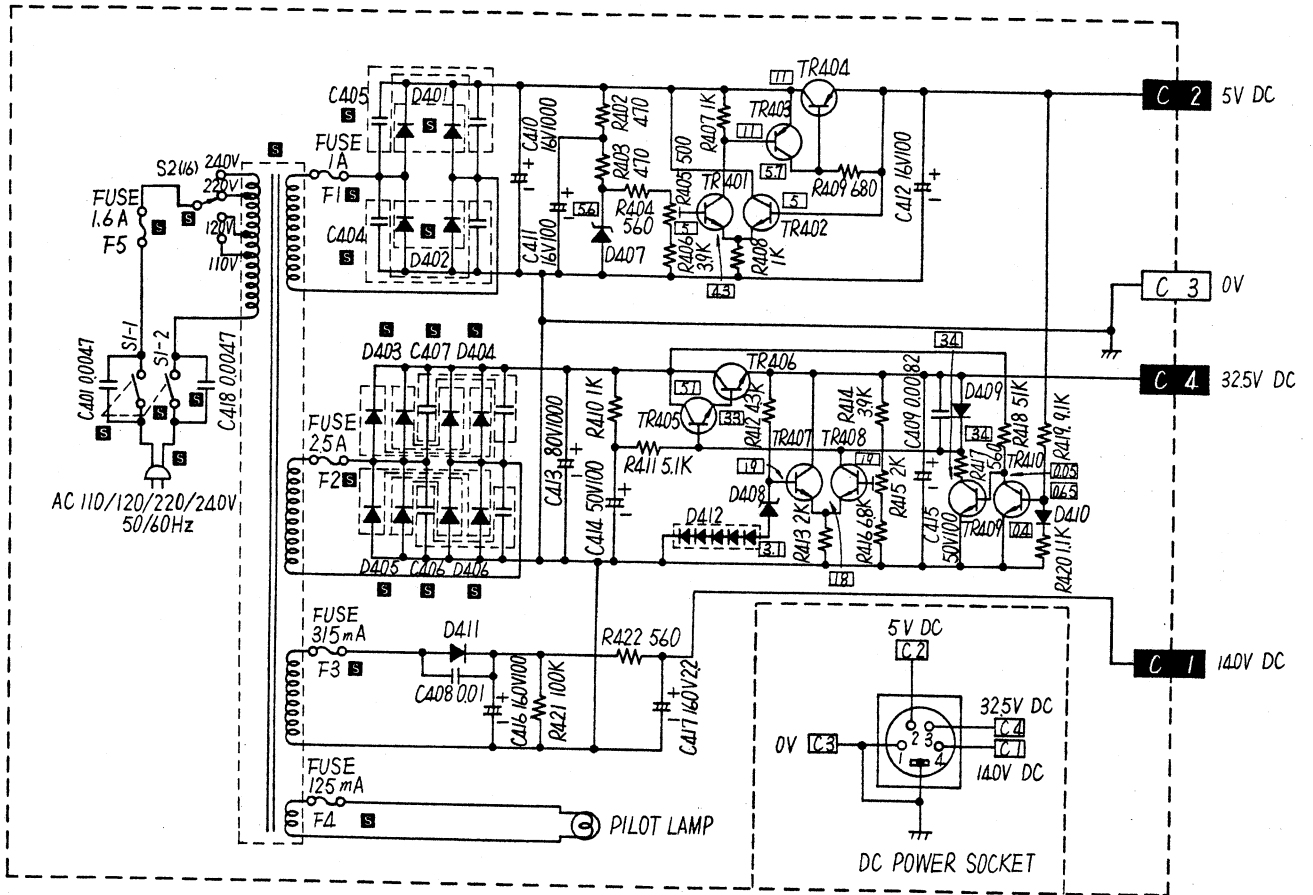
Circuit Board Wiring View Power Unit [SH-10E]



TR401 402	TR403	TR404	TR405	TR406	TR407	TR408	TR409	TR410
START	START	START	START	START	START	START	START	START
E 4.3V	E 11V	E 5V	E 33V	E 325V	E 18V	E 18V	E 3.1V	E 3.1V
C 1V	C 5.7V	C 11V	C 51V	C 48V	C 325V	C 34V	C 34V	C 0.05V
B 5V	B 11V	B 5.7V	B 34V	B 33V	B 19V	B 19V	B 0.05V	B 0.65V

Schematic Diagram Power Unit (SH-10E)

Notes: **S** indicates that only parts specified by the manufacturer be used for replacement in critical circuits.



PACKING PARTS

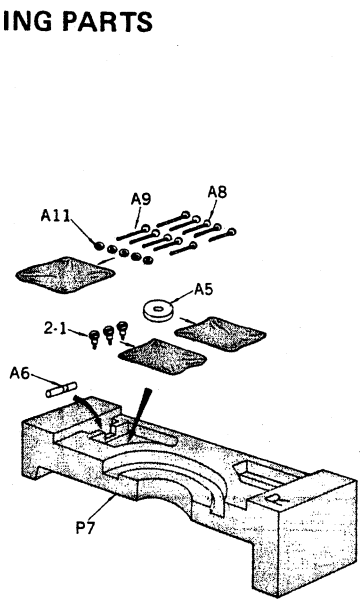


Fig. 16

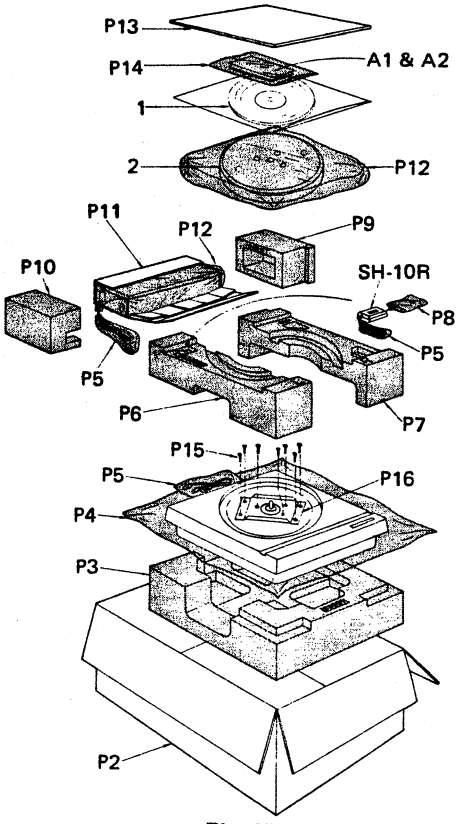


Fig. 17

Exploded View of Turntable Model SP-10MKII

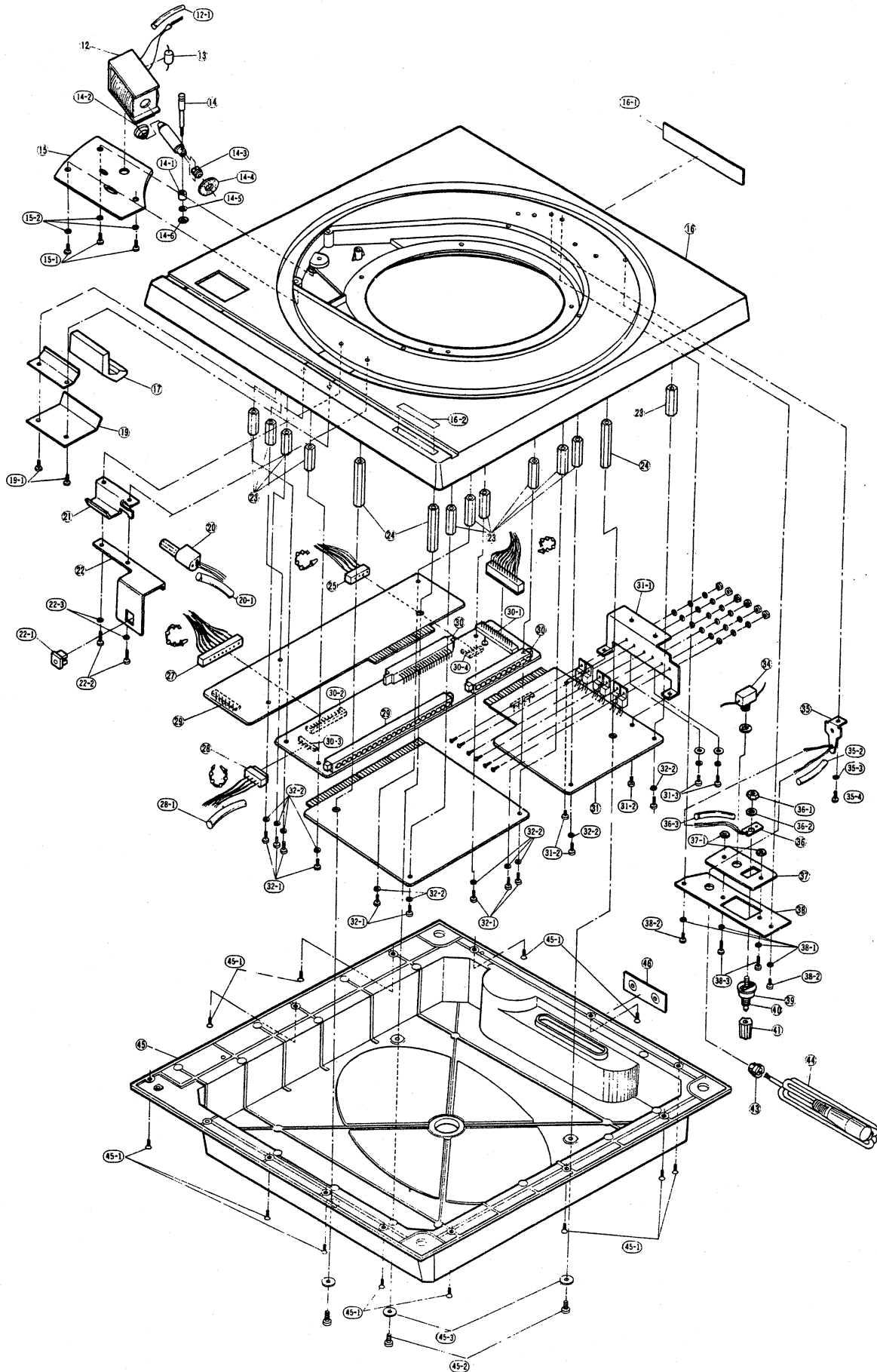


Fig. 18

Exploded View of Turntable Model SP-10MKII

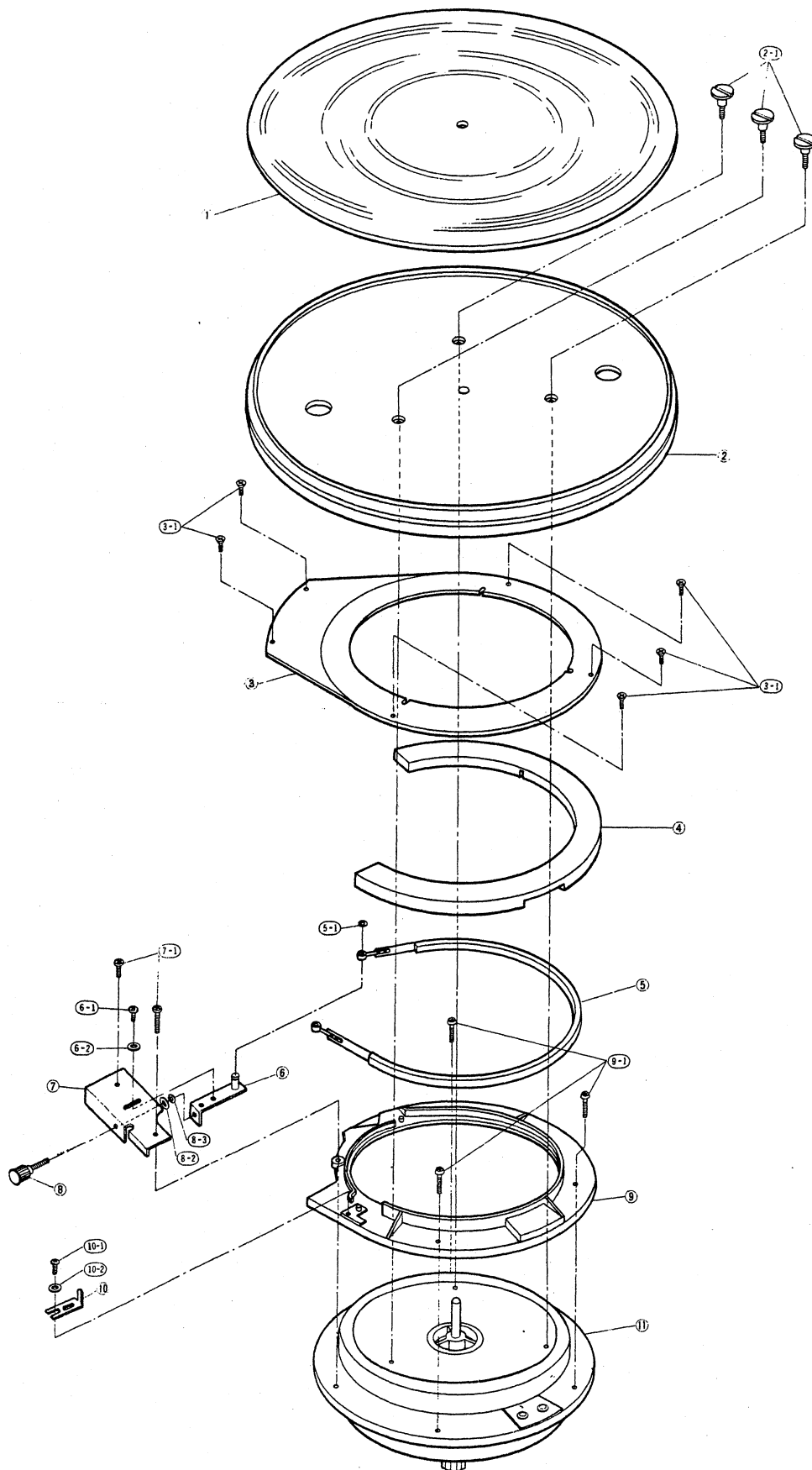


Fig. 19

Exploded View of Power Unit Model SH-10E

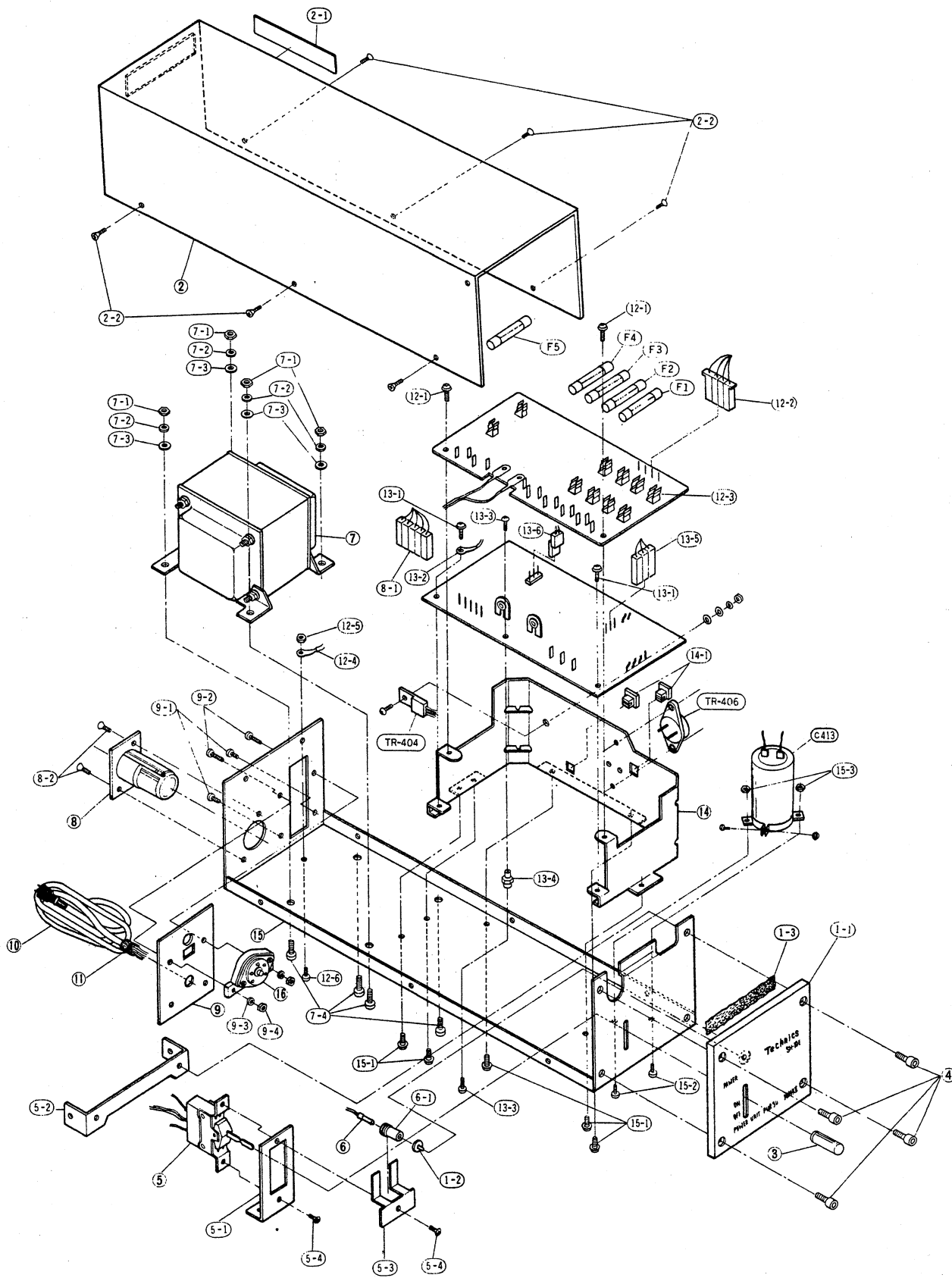


Fig. 20

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.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
DRIVE CIRCUIT BOARD				
Transistors				
TR1, 3, 5	25B512A-P	Transistor	3	
TR2, 4, 6	25D390AQ	Transistor	3	FTD
TR7, 9, 11	25A684-QNC	Transistor	3	
TR13 ~ 17, 20, 21, 24, 25, 28, 33 ~ 36, 42	25C1328-T	Transistor	15	
TR18, 19, 22, 23, 27, 29 ~ 32, 37 ~ 41	25A722-S	Transistor	15	
Diodes				
D1, 2, 10, 11	MA162A	Diode	4	
D3 ~ 8, 12	20A90	Diode	7	ARD
D9	SVDJRD5.6ECS	Diode	1	
Transformer				
T1	ELM10S123	Oscillator	1	
Resistors				
R28, 38, 43, 44	ERO50CKF1001	Metallic, 1/2W, 1kΩ, ± 1%	4	
R29	ERO50CKF2001	Metallic, 1/2W, 1kΩ, ± 1%	1	
R51	ERX2ANJ1R0	Metallic, 2W, 1Ω, ± 5%	1	
R37	ERX2ANJ3R3	Metallic, 1/2W, 3.3Ω, ± 5%	1	
R24	ERD50FJ820	Carbon, 1/2W, 82Ω, ± 5%	1	
R3, 22	ERD50FJ122	Carbon, 1/2W, 1.2kΩ, ± 5%	2	
R27	ERD50FJ152	Carbon, 1/2W, 1.5kΩ, ± 5%	1	
R23, 35, 40	ERD50FJ182	Carbon, 1/2W, 1.8kΩ, ± 5%	3	
R48	ERD50FJ222	Carbon, 1/2W, 2.2kΩ, ± 5%	1	
R1	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ± 5%	1	
R30	ERD25FJ242	Carbon, 1/4W, 2.4kΩ, ± 5%	1	
R2, 6	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ± 5%	2	
R7	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R26	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ± 5%	1	
R21, 36	ERD25FJ562	Carbon, 1/4W, 5.6kΩ, ± 5%	2	
R45, 46	ERD25FJ471	Carbon, 1/4W, 470Ω, ± 5%	2	
R32, 41, 42	ERD25FJ102	Carbon, 1/4W, 1kΩ, ± 5%	3	
R25, 39	ERD25FJ822	Carbon, 1/4W, 8.2kΩ, ± 5%	2	
R11, 15, 16, 17, 18, 19, 20, 33	ERD25FJ103	Carbon, 1/4W, 10kΩ, ± 5%	8	
R34	ERD25TJ123	Carbon, 1/4W, 12kΩ, ± 5%	1	
R8	ERD25TJ153	Carbon, 1/4W, 15kΩ, ± 5%	1	
R4, 5, 9	ERD25TJ183	Carbon, 1/4W, 18kΩ, ± 5%	1	
R31	ERD25TJ303	Carbon, 1/4W, 30kΩ, ± 5%	1	
R12	ERD25TJ333	Carbon, 1/4W, 33kΩ, ± 5%	1	
R13, 50	ERD25TJ473	Carbon, 1/4W, 47kΩ, ± 5%	2	
R49	ERD25TJ513	Carbon, 1/4W, 51kΩ, ± 5%	1	
R10, 14, 47	ERD25TJ104	Carbon, 1/4W, 100kΩ, ± 5%	3	
Capacitors				
C22	EGCS1331JZ	Styrol, 125V, 330pF, ± 5%	1	ARD
C1, 3, 5, 10	ECCM1H822JZ	Polyester, 50V, 0.0082μF, ± 5%	1	ARD

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
C9	ECCM1H103JZ	Polyester, 50V, 0.01μF, ± 5%	1	ARD
C11	ECCM1H223JZ	Polyester, 50V, 0.022μF, ± 5%	1	ARD
C19	ECCM1H633JZ	Polyester, 50V, 0.056μF, ± 5%	1	ARD
C21	ECCM1H104JZ	Polyester, 50V, 0.1μF, ± 5%	1	ARD
C7, 8, 12, 13, 14, 15, 16, 17	ECEA50Z1	Electrolytic, 50V, 1μF	8	
C20	ECEA50Z2R2	Electrolytic, 50V, 2.2μF	1	
C2, 4, 6, 18	ECEA1H5100	Electrolytic, 50V, 10μF	4	
LOGIC CIRCUIT BOARD				
Integrated Circuits				
IC1, 14, 15	SVIM53200P	Integrated Circuit	1	
IC2, 3, 5, 7, 8, 9, 10	SVIM53273P	Integrated Circuit	7	
IC4, 6	SVIM53293P	Integrated Circuit	2	
IC11	SVIM5946P	Integrated Circuit	1	
IC12	SVIM53204P	Integrated Circuit	1	
IC13, 16	SVIM53210P	Integrated Circuit	2	
Transistors				
TR201 ~ 212, 218 ~ 222	25C1328-T	Transistors	17	
TR213	25C1384AR	Transistors	1	FTD
TR216, 217	25C1573-Q	Transistors	2	MTD
Resistors				
R210, 220, 226	ERD25FJ101	Carbon, 1/4W, 100Ω, ± 5%	3	
R267, 271	ERD25FJ391	Carbon, 1/4W, 390Ω, ± 5%	2	
R223, 224	ERD25FJ471	Carbon, 1/4W, 470Ω, ± 5%	2	
R246	ERD25FJ821	Carbon, 1/4W, 820Ω, ± 5%	1	
R238, 241, 248, 249 ~ 255	ERD25FJ102	Carbon, 1/4W, 1kΩ, ± 5%	10	
R233	ERD25FJ182	Carbon, 1/4W, 1.8kΩ, ± 5%	1	
R214, 218, 222, 246, 256, 257, 262	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ± 5%	7	
R258, 259, 260	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ± 5%	3	
R228	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R203, 208, 211, 213, 216, 219, 221, 261, 264, 265, 266, 268, 269, 270, 272	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ± 5%	15	
R225	ERD25FJ562	Carbon, 1/4W, 5.6kΩ, ± 5%	1	
R210	ERD25FJ822	Carbon, 1/4W, 8.2kΩ, ± 5%	1	
R224	ERD25FJ103	Carbon, 1/4W, 10kΩ, ± 5%	1	
R263	ERD25TJ123	Carbon, 1/4W, 12kΩ, ± 5%	1	
R227	ERD25TJ153	Carbon, 1/4W, 15kΩ, ± 5%	1	
R201, 202, 204 ~ 207, 209, 212, 215, 229, 242, 243	ERD25TJ223	Carbon, 1/4W, 22kΩ, ± 5%	12	
R230, 232	ERD25TJ393	Carbon, 1/4W, 39kΩ, ± 5%	2	
R231, 247	ERD25TJ104	Carbon, 1/4W, 100kΩ, ± 5%	2	
R239, 240	ERGIANJ472	Metallic, 1W, 4.7kΩ, ± 5%	2	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
R115	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ± 5%	1	
R124	ERD25FJ512	Carbon, 1/4W, 5.1kΩ, ± 5%	1	
R130	ERD25FJ752	Carbon, 1/4W, 7.5kΩ, ± 5%	1	
R190	ERD25FJ471	Carbon, 1/4W, 470Ω, ± 5%	3	
R102, 105, 135	ERD25FJ102	Carbon, 1/4W, 1kΩ, ± 5%	2	
R131, 132	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ± 5%	1	
R151	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ± 5%	1	
R134, 177, 178, 184	ERD25FJ472	Carbon, 1/4W, 4.7kΩ, ± 5%	4	
R117, 118, 176	ERD25FJ822	Carbon, 1/4W, 8.2kΩ, ± 5%	3	
R139, 141, 162, 163, 165, 188, 196, 198	ERD25FJ103	Carbon, 1/4W, 10kΩ, ± 5%	8	
R103, 104, 107, 108, 114, 154, 155, 157, 158, 159, 173, 187, 195	ERD25TJ123	Carbon, 1/4W, 12kΩ, ± 5%	13	
R148, 169	ERD25TJ153	Carbon, 1/4W, 15kΩ, ± 5%	2	
R183, 194	ERD25TJ183	Carbon, 1/4W, 18kΩ, ± 5%	2	
R129, 146, 182, 189, 197	ERD25TJ223	Carbon, 1/4W, 22kΩ, ± 5%	5	
R112, 152, 167, 193	ERD25TJ273	Carbon, 1/4W, 27kΩ, ± 5%	4	
R153, 168, 170, 179, 180	ERD25TJ333	Carbon, 1/4W, 33kΩ, ± 5%	5	
R111, 128, 133	ERD25TJ393	Carbon, 1/4W, 39kΩ, ± 5%	3	
R125, 140, 143, 161	ERD25TJ473	Carbon, 1/4W, 47kΩ, ± 5%	4	
R126, 142	ERD25TJ683	Carbon, 1/4W, 68kΩ, ± 5%	2	
R109	ERD25FJ432	Carbon, 1/4W, 4.3kΩ, ± 5%	1	
R138	ERD25TJ913	Carbon, 1/4W, 91kΩ, ± 5%	1	
R116, 136, 137, 150, 160, 165, 171, 172	ERD25TJ104	Carbon, 1/4W, 100kΩ, ± 5%	8	
R113	ERD25TJ124	Carbon, 1/4W, 120kΩ, ± 5%	1	
R120, 186	ERD25TJ164	Carbon, 1/4W, 150kΩ, ± 5%	2	
R127, 164, 191	ERD25TJ24	Carbon, 1/4W, 220kΩ, ± 5%	3	
R101	ERD25TJ394	Carbon, 1/4W, 390kΩ, ± 5%	1	
R110	ERD25TJ474	Carbon, 1/4W, 470kΩ, ± 5%	1	
R181	ERD25TJ105	Carbon, 1/4W, 1MΩ, ± 5%	1	
Variable Resistors				
VR101	EVSP1AA00E24	Variable Resistors 20kΩ	1	
VR102	EVSP1AA00E23	Variable Resistors 2kΩ	1	
Capacitor				
C110	ECQS1271JZ	Styrol, 125V, 270pF, ± 5%	1	ARD
C111, 112	ECQS1222JZ	Styrol, 125V, 2200pF, ± 5%	2	ARD
C109	ECQM1H562JZ	Polyester, 50V, 0.0056μF, ± 5%	1	ARD
C104	ECQM1H103JZ	Polyester, 50V, 0.01μF, ± 5%	1	ARD
C114	ECQM1H223JZ	Polyester, 50V, 0.022μF, ± 5%	1	ARD
C102	ECQM1H333JZ	Polyester, 50V, 0.033μF, ± 5%	1	ARD
C110, 115	ECQM1H473JZ	Polyester, 50V, 0.047μF, ± 5%	2	ARD
C113	ECQM1H823JZ	Polyester, 50V, 0.082μF, ± 5%	1	ARD
C105, 107, 108	ECQM1H104JZ	Polyester, 50V, 0.1μF, ± 5%	3	ARD
C106	ECEA5021	Electrolytic, 50V, 1μF	1	
C103	ECEB1S100	Electrolytic, 63V, 100μF	1	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
Capacitors				
C203, 221, 222, 226	ECQM1H102JZ	Polyester, 50V, 0.001μF, ± 5%	4	ARD
C220	ECQM1H222JZ	Polyester, 50V, 0.0022μF, ± 5%	1	ARD
C214, 216, 219, 223, 224	ECQM1H103JZ	Polyester, 50V, 0.01μF, ± 5%	5	ARD
C215, 229	ECQM1H104JZ	Polyester, 50V, 0.1μF, ± 5%	2	ARD
C228	ECQM1H224JZ	Polyester, 50V, 0.22μF, ± 5%	1	ARD
C205	ECM05474KZ	Polyester, 50V, 0.47μF, ± 10%	1	
C208, 209	ECQM2332KZ	Polyester, 50V, 0.0033μF, ± 10%	2	
C211	ECQS5100K	Styrol, 100V, 10μF, ± 10%	1	
C213	ECQS1331JZ	Styrol, 125V, 330pF, ± 5%	1	ARD
C212	ECQS1331JZ	Styrol, 125V, 330pF, ± 5%	1	ARD
C217	ECQS1391JZ	Styrol, 125V, 390pF, ± 5%	1	ARD
C201	ECEA5021	Electrolytic, 50V, 1μF	1	
C230	ECEA5022R2	Electrolytic, 50V, 2.2μF	1	
C202, 218, 225	ECEA1HS100	Electrolytic, 50V, 100μF	3	
C227	ECEA1ES101	Electrolytic, 25V, 100μF	1	
C204	ECEA1AS331	Electrolytic, 10V, 330μF	1	
Variable Capacitor				
C210	ECV1ZM10X53	Ceramic Trimmer, 10pF	1	
Crystal				
X1	T5S616-1K	Oscillator, 3.5796MHz	1	
CONTROL CIRCUIT BOARD				
Transistors				
TR101, 113 ~ 130	2SC1328-T	Transistor	18	
TR102 ~ 108, 110, 131, 132,	2SA722-S	Transistor	10	
TR109	2SA722-S	Transistor	1	
TR111, 112, 120,	2SC1328-T	Transistor	3	
TR151 ~ 154	2SK30A-Y	Transistor	4	
Diodes				
D101, 102, 104, 105, 106, 108	MA162A	Diode	6	
D103	RVDRD9R1FB	Diode	1	RD
D107	SVDRD5.6ECS	Diode	1	
Resistors				
R121	ERO25CKF8201	Metallic, 1/4W, 8.2kΩ, ± 1%	1	
R119	ERO25CKF1002	Metallic, 1/4W, 10kΩ, ± 1%	1	
R174	ERO25CKF1002	Metallic, 1/4W, 10kΩ, ± 1%	1	
R175	ERO25CKF2002	Metallic, 1/4W, 20kΩ, ± 1%	1	
R149	ERD12FJ820	Carbon, 1/2W, 82Ω, ± 5%	1	
R145	ERD12FJ221	Carbon, 1/2W, 220Ω, ± 5%	1	
R156	ERD12FJ331	Carbon, 1/2W, 330Ω, ± 5%	1	
R147	ERD12FJ471	Carbon, 1/2W, 470Ω, ± 5%	1	
R192	ERD25FJ222	Carbon, 1/4W, 2.2kΩ, ± 5%	1	
R144	ERD25FJ332	Carbon, 1/4W, 3.3kΩ, ± 5%	1	
R122, 166	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ± 5%	2	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
CONNECTIONAL BOARD				
Resistors				
R301	ERD25FJ151	Carbon, 1/4W, 150Ω, ± 5%	1	
Capacitors				
C301	ECEA1HS100	Electrolytic, 50V, 10μF	1	
C302, 303	ECCMTH104JZ	Polyester, 50V, 0.1μF, ± 5%	2	ARD
CABINET AND CHASSIS PARTS				
1	SFTG102-01	Turntable Mat	1	
2	SFTE102-01E	Turntable	1	
2-1	SFXJ102-08E	Screw, Turntable	3	
3	SFUP102-06	Cover, Brake	1	
3-1	XSS3+BBVS	Screw, Cover	5	WDD
4	SFTG102-03	Rubber, Brake Cover	1	
5	SFUP102-09A	Brake Band	1	
5-1	XUC3FT	Circlip, Brake Band	1	WDD
6	SFUP102-05E	Plate, Brake	1	
6-1	XYN3+C8FZS	Screw, Plate	1	
6-2	SFXW120-01	Washer, Plate	1	
7	SFUP102-07	Plate, Adjustment	1	
7-1	XYN3+C6FZS	Screw, Plate	2	
8	SFXJ102-02	Screw, Adjustment	1	
8-2	SFPEW12002	Washer	1	
8-3	XUC4FT	Circlip	1	
9	SFUM102-01	Brake Housing	1	WDD
9-1	XYN4+C15FZS	Screw	1	
10	SFUP102-15	Plate, Brake Adjustment	3	
10-1	XTV3+8BFZ	Screw, Adjustment Plate	1	
10-2	SFXW120-01	Washer, Adjustment Plate	1	WDD
11	SFMZ102-01E	Motor Ass'y	1	
12	SFDZSD1AC10	Plunger	1	
12-1	SFEB3UT	Tube	1	
13	SVDIS1887	Diode	1	
14	SFXJ102-03	Lever, Plunger	1	
14-1	SFXO102-01	Spacer, Plunger	1	
14-2	SFGA102-01	Spring, Brake	1	
14-3	SFGH102-01	Rubber, Plunger	1	
14-4	SFGH102-02	Rubber, Washer	1	
14-5	XWA3B	Washer	1	WDD
14-6	XNG3ES	Nut	1	WDD
15	SFUP102-12	Mounting Plate, Plunger	1	
15-1	XYN3+C5FZS	Screw, Mounting Plate	1	
15-2	SFXW120-01	Washer, Mounting Plate	3	
16	SFAC102-01	Panel Case	1	
16-1	SFNN102M01	Name Plate	1	
16-2	SFKB102-01	Badge	1	
17	SFUM102-02	Neon Lamp Base, A	1	
19	SFUP102-02	Neon Lamp Base, C	1	
19-1	XYN3+C6FZS	Screw, Neon Lamp Base	2	
20	SFDN1L78MM	Neon Lamp	1	
20-1	SFEB3UT	Tube	1	
21	SFUP102-08	Holder, Neon Lamp	1	
22	SFUP102-17	Holder, P.C.B.	1	
22-1	SFEZ196	Spacer, P.C.B.	1	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
22-2	XYN3+C8FZS	Screw	2	WDD
22-3	XWA3B	Washer	2	
23	SFXJ102-05	Spacer, P.C.B.	11	
24	SFXJ102-04	Spacer, Bottom Case	3	
25	SFDJ12804S	Connector, 4P	1	
27	SFDJ12810S	Connector, 10P	1	
28	SFDJ12804S	Connector, 4P	1	
28-1	SFEB2UT	Tube	1	
29	SFDJ153250	Connector	1	
30	SFDJ153241	Connector	2	
30-1	SFDJ12812P	Connector, 12P	1	
30-2	SFDJ12910P	Connector, 10P	1	
30-3	SFDJ12906P	Connector, 6P	1	
30-4	SFDJ12904P	Connector, 4P	1	
31-1	SFUP102-11	Plate, Heat Sink	1	
31-2	XYN3+C6FZS	Screw	4	WDD
31-3	XSN3+H6S	Screw	2	WDD
32-1	XYN3+C6FZS	Screw	9	WDD
32-2	XWA3B	Washer	13	WDD
34	RJ110C	Jack	1	
35	SFER1E	Mounting, Ground Wire	1	
35-2	SFEB3UT	Tube	1	
35-3	XWC3B	Washer	1	WDD
35-4	XYN3+C6FZS	Screw	1	
36	SJT719	Mounting Plate	1	
36-1	XNG4ES	Nut	1	WDD
36-2	XWA4B	Washer	1	WDD
36-3	SFEB3UT	Tube	1	
37	SFUZ102-05	Mounting Plate, Socket	1	
37-1	XNG3ES	Nut	2	WDD
38	SFUP102-03	Mounting Plate, Cord	1	
38-1	XWC3B	Washer	4	WDD
38-2	XYN3+C8FZS	Screw	2	
38-3	XYN3+C6FZS	Screw	2	
39	SGE103	Terminal	1	
40	SNE281-1S	Terminal Screw	1	
41	SNE273-1	Knob	1	
43	SFSR5N4	Bushing, Cord	1	
44	SFAU102-01E	Plug	1	
45	SFAU102-01	Bottom Case	1	
45-1	XSS3+BBVS	Screw	12	WDD
45-2	XYN3+C8FZS	Screw	2	
45-3	SFXW120-01	Washer	2	
45-4	SFGK102-01	Rubber Cap	1	
45-5	SFUZ102-03	Felt	4	
46	SFNZ102-02	Label Remort	1	
47	SFKT102-01	Plate, Start Stop Switch	1	
47-1	SFKK102-01	Ornament, Start Stop Switch	1	
47-2	SFGA102-03	Spring, Start Stop Switch	1	
47-3	SFXJ102-06	Adjustment Screw, Start Stop Switch	1	
47-4	XWA2B	Washer	1	WDD
47-5	XSN2+H6	Screw	11	WDD
47-6	XWE2BW	Washer	11	WDD
48	SFKT102-02E	Plate, Select 33	1	
49	SFKT102-03E	Plate, Select 45	1	
50	SFKT102-04E	Plate, Select 78	1	
51	SFGA102-02	Spring, Select	3	
52	SFUM102-05	Mounting Plate, Switch	1	WDD
52-1	XWA2B	Washer	3	WDD
52-2	XNG2EBW	Nut	6	WDD

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
Resistors				
R401	ERD50FJ4R7	Carbon, 1/2W, 4.7Ω, ± 5%	1	
R402, 403	ERD25FJ471	Carbon, 1/4W, 470Ω, ± 5%	2	
R404	ERD25FJ561	Carbon, 1/4W, 560Ω, ± 5%	1	
R406	ERD25FJ392	Carbon, 1/4W, 39kΩ, ± 5%	2	
R407, 408	ERD25FJ102	Carbon, 1/4W, 1kΩ, ± 5%	2	
R409	ERD12FJ102	Carbon, 1/2W, 1kΩ, ± 5%	1	
R410	ERD25FJ512	Carbon, 1/4W, 5.1kΩ, ± 5%	1	
R411	ERD50FJ432	Carbon, 1/2W, 4.3kΩ, ± 5%	1	
R412	ERD50FJ202	Carbon, 1/2W, 2kΩ, ± 5%	1	
R413	ERD25FJ392	Carbon, 1/4W, 3.9kΩ, ± 5%	1	
R414	ERD25FJ682	Carbon, 1/4W, 6.8kΩ, ± 5%	1	
R416	ERD25FJ561	Carbon, 1/4W, 560Ω, ± 5%	2	
R417, 422	ERD25TJ513	Carbon, 1/4W, 51kΩ, ± 5%	1	
R418	ERD25FJ912	Carbon, 1/4W, 9.1kΩ, ± 5%	1	
R419	ERD25FJ112	Carbon, 1/4W, 1.1kΩ, ± 5%	1	
R420	ERD25TJ104	Carbon, 1/4W, 1.1kΩ, ± 5%	1	
R421	ERD25TJ104	Carbon, 1/4W, 100kΩ, ± 5%	1	
Capacitors				
C401, 402	ECKDSD472ME	Polyester, 125VAC, 0.0047μF, ± 20%	2	
C404, 405, 406, 407	RXAF103P22HD	Ceramic, 500V, 0.01μF x 2,	4	
C408	ECQM6103MZ	Polyester, 600V, 0.01μF, ± 20%	1	ARD
C409	ECQM1822ZJ	Polyester, 50V, 0.0082μF, ± 5%	1	
C410	ECEB1C102	Electrolytic, 16V, 100μF,	1	
C411, 412	ECEA1ES101	Electrolytic, 25V, 100μF,	2	
C413	ECEM80R1000X	Electrolytic, 80V, 100μF	1	
C414, 415	ECEA1J5101	Electrolytic, 63V, 100μF	2	
C416	ECEB160V100	Electrolytic, 160V, 100μF	1	
C417	ECEA160V22	Electrolytic, 160V, 22μF	1	
CABINET and CHASSIS PARTS				
1-1	SFKK10E-01A	Panel Assy Front	1	
1-2	SGLA9	Lamp, Indicate	1	
1-3	SFUPT0E01	Felt	1	
2	SFUPT0E-02E	Case	1	
2-1	SFNN10EX01	Name Plate	1	
2-2	XSN3+6BVS	Screw	10	WDD
3	SBLA4-3	Knob, Power Switch	1	
4	XVE3A8FZS	Power Switch	4	
5	SFDS10EX01	Mounting Plate, Power Switch	1	
5-1	SFUPT0E-03	Mounting Plate, Power Switch	1	
5-2	SFUPT0E-09	Holder, Lamp	1	
5-3	SFUPT0E-04	Holder, Lamp	1	
5-4	XYN3+C6FZS	Screw	2	
6	XAM37T500	Lamp	1	ARD
6-1	SMZA6091	Rubber, Lamp	1	
7	ETP85Q3E	Power, Transformer	1	
7-1	XNG4ES	Nut	4	WDD
7-2	XWAA4B	Washer	4	WDD
7-3	XWGA4	Washer	4	WDD
7-4	XSN4+8BVS	Screw	4	WDD
8	SFDJD4F	Socket, DC	1	
8-1	SJSS505	Connector, 5P	1	
8-2	XSS3+10BNS	Screw	2	WDD
9	SFUPT0EX01	Mounting Plate, AC Cord	1	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
POWER UNIT (Model SH-10E)				
Transistors				
TR401, 402, 407, 408, 409, 410	25C1328-T	Transistor	6	
TR403	25A722-S	Transistor	1	MTD
TR404	25D389A-Q	Transistor	1	MTD
TR405	25D389A-Q	Transistor	1	
TR406	25D3324	Transistor	1	
Diodes				
D401, 403, 404	RVD10DC4	Diode	3	RD
D402, 405, 406	RVD10DC4R	Diode	3	RD
D407	SVDRD5.6ECS	Diode	1	
D408	SVDRD16EB	Diode	1	
D409	MA162A	Diode	1	ARD
D410	20A90	Diode	1	
D411	SVD1S1887	Diode	1	
D412	SVDSV05	Diode	1	
Variable Resistors				
R405	EVTS0AA00B52	Variable Resistor, 500Ω (B)	1	ARD
R445	EVTS0AA00B23	Variable Resistor, 2kΩ (B)	1	ARD
Fuses				
F1	XBA2C10T1R0	Fuse, T1A, 250V	1	
F2	XBA2C25T1R0	Fuse, T2.5A, 250V	1	
F3	XBA2C03T1R0	Fuse, T3.15mA, 250V	1	
F4	XBA2C0125S0	Fuse, T25mA, 250V	1	
F5	XBA2C16T1R0	Fuse, T1.6A, 250V	1	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
9-1	XSN3+6BVS	Screw	2	WDD
9-2	XSN3+12BVS	Screw	2	WDD
9-3	XWA3B	Washer	2	WDD
9-4	XNG3ES	Nut	2	WDD
10	SJA88	AC Cord	1	TSD
11	SFSR4N-4	Bushing, Cord	1	
12-1	XTW3+10HFZ	Screw	2	
12-2	SJS5405	Connector, 4P	1	
12-3	SFDZ023X01	Holder, Fuse	10	
12-4	SFER1C	Terminal	1	
12-5	XNG3ES	Nut	1	WDD
12-6	XSN3+6BVS	Screw	1	WDD
13-1	XTW3+10HFZ	Screw	2	
13-2	SHE36	Clamper, Wire	1	
13-3	XSN3+6BVS	Screw	2	WDD
13-4	SFXO10E-01	Spacer	1	
13-5	SJS5307	Connector, 3P	1	
13-6	SFDJ53PSHF	Connector, 3P	1	
14	SFUP10E-08	Mounting Plate	1	
14-1	SFEZ196	Sporting, P.C.B.	2	
15	SFUP10E-01	Case, Bottom	1	
15-1	XTW3+10HFZ	Screw	4	
15-2	XSN3+6BVS	Screw	2	WDD
15-3	XNG3ES	Nut, Capacitor	2	WDD
16	SFDSHXW0103	Selector, Switch	1	
16-1	SFUM130G01	Base, Selector Switch	1	
REMOTE CONTROL (Model SH-10R)				
1	SFKK102-01	Ornament Plate, Start Stop	1	
1-1	SFXJ102-06	Screw	1	
2	SFUM10R01E	Case	1	
3	SFDSSSL1-C	Micro Switch	1	
3-1	XTN2+10B	Screw	1	
4	SFUP10R02	Mounting Plate, Micro Switch	1	
4-1	XTN2+6B	Screw	2	WDD
5	ERD25FJ101	Carbon, 1/8W, 100Ω, ± 5%	1	
5-1	SFEB3UT	Tube	1	
5-2	SFEB2UT	Tube	1	
6	SFGP10R-01	Rubber, Bushing	1	
7	SFEZ10R-01	Cord, Jack	1	
8	SFUP10R-01	Bottom Cover	1	
8-1	XTS3+8BFZ	Screw	4	WDD
9	SFNN10RM01	Name Plate	1	
ACCESSORY PARTS				
A1	SFNU102X01	Operating Instructions	1	
A2	SQXA2004	Product Service Guide	1	
A5	SFWE010	45 Adaptor	1	
A6	SFW0010	Oil	1	WDD
A8	XSN5+35S	Screw A	5	WDD
A9	XSN5+45S	Screw B	5	WDD
A10	SFXW650-2	Washer	5	

PACKING PARTS

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
P2 [EG]	SFHP102X01	Carton Box	1	
P2 [XGF]	SFHP102C01	Carton Box	1	
P3	SFHH102-06	Bottom Pad	1	
P4	SFYF60A60	Polyethylene Bag	1	
P5	SFYF10A30	Polyethylene Bag	3	
P6	SFHH102-04	Side Pad (L)	1	
P7	SFHH102-05	Side Pad (R)	1	
P8	SFYF15A20	Polyethylene Bag	1	
P9	SFHH102-07	Side Pad, Power Unit	1	
P10	SFHH102-08	Side Pad, Power Unit	1	
P11	SFHD102-06	Case, Power Unit	1	
P12	SFYF45A50	Polyethylene Bag	2	
P13	SFHD102-05	Top Pad, Turntable	1	
P14	SFYF27A40	Polyethylene Bag	1	
P15	XYN3+C6BS	Screw, Clamper	7	
P16	SFUP102M14E	Mounting Plate, Motor	1	

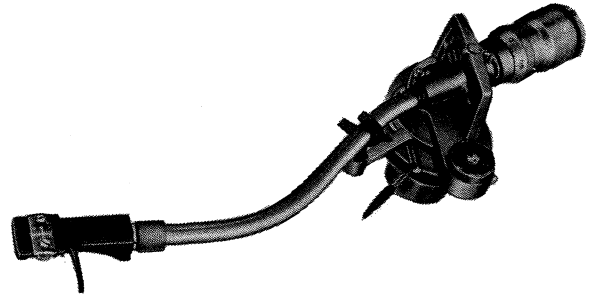
Service Manual

Universal Tonearm

EPA-100 (X)

Note:

The model EPA-100(X) is available in European, Scandinavia, Asia, Latin America, Oceania, Middle East and Africa.

**Specifications**

(Specifications are subject to change without notice for further improvement)

Type	Universal Tonearm with Variable Dynamic Damping system
Bearings	Gimbal-suspension system with shock-resistant pivot and coil spring, and highly precise ruby ball bearings (20)
Tubular tonearm	High-strength titanium tubular tonearm with special nitridation finish
Effective length	250 mm
Overall range	322—350 mm
Arm rear range	66—94 mm
Height adjustment range	42—90 mm (helicoid part: 6 mm)
Overhang	15 mm
Horizontal tracking error angle	+ 1.1° (internal perimeter of 30 cm record) + 2.1° (external perimeter of 30 cm record)
Friction	5 mg (horizontally and vertically)
Effective mass	22 g (at 6.5 g cartridge weight, 1.25 g stylus pressure)

Resonance frequency	9.8 Hz (at 6.5 g cartridge weight, 1.25 g stylus pressure, 12×10^{-6} cm/dyne compliance)
Resonance acute angle (Q)	6 dB or less (at optimum adjustment)
Damping adjustment range	

Damping selector calibrations	Cartridge compliance (100 Hz dynamic)
4~5	more than 15×10^{-6} cm/dyne
2~4	$10 \sim 15 \times 10^{-6}$ cm/dyne
1~2	$5 \sim 10 \times 10^{-6}$ cm/dyne

Stylus pressure adjustment range	0—3 g
Head shell weight	9.5 g
Cartridge mounting dimensions	12.7 mm (1/2 inch) mounting space
Head shell terminal lug	1.2ø, for 4-pin terminal
Cartridge weight range	5—10 g
Arm installation opening	38 mmø

■ Parts identifications

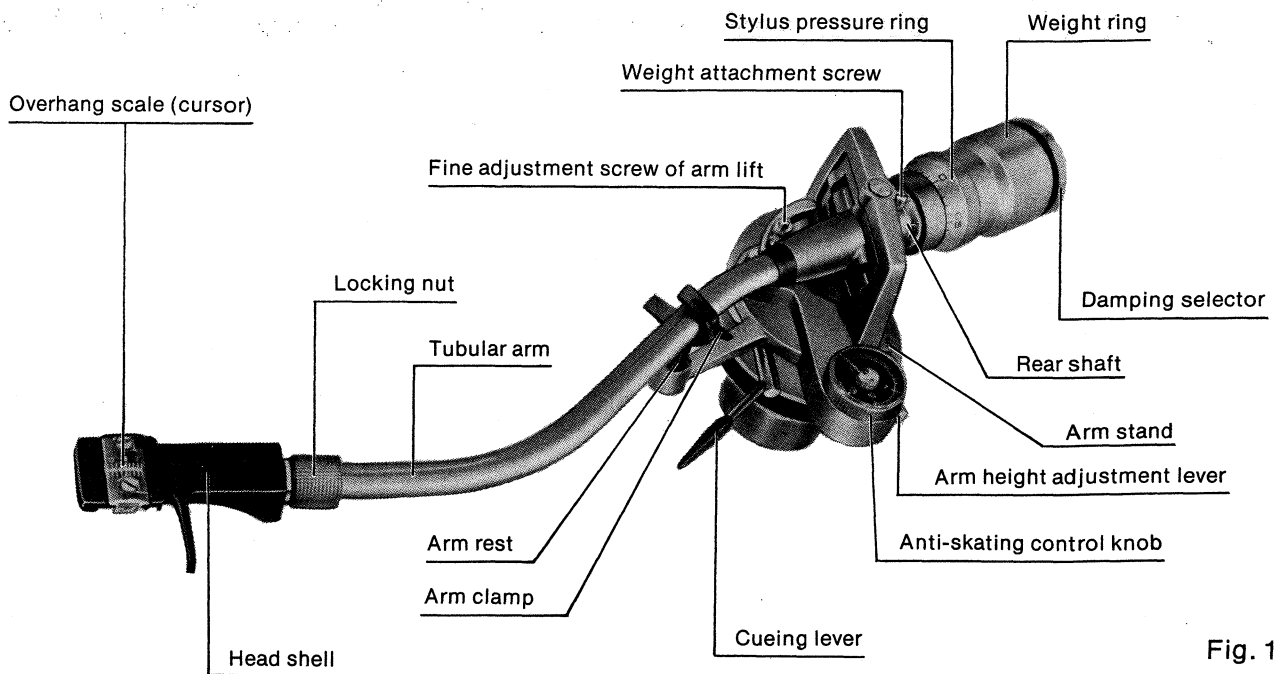


Fig. 1

■ Assembly and set-up

Installation of the balance weight

Place the balance weight onto the rear shaft of the tonearm, align the hole for the screw, and tighten the screw completely (Fig. 2).

Adjustment of the damping selector

This tonearm includes a unique magnetic damping selector which can be used to assure that the tonearm is perfectly matched to the compliance of the cartridge to be used.

The damping selector is calibrated in five positions, (1—5), and the position which corresponds to the compliance and weight of the cartridge should be aligned with the index mark on the balance weight. (Refer to the chart of Fig. 3 and see Fig. 4.)

The following are the standards of applicable calibrations depending upon the compliance of the cartridge to be used.

For precision, also refer to feature (1).

Damping selector calibrations	Cartridge compliance (100 Hz dynamic)
4~5	more than 15×10^{-6} cm/dyne
2~4	$10 \sim 15 \times 10^{-6}$ cm/dyne
1~2	$5 \sim 10 \times 10^{-6}$ cm/dyne

Fig. 3

Note that the damping selector position is continuously variable, and any position between the calibrations can therefore also be selected.

Note:

If the damping selector is rotated completely in the direction of the [1] mark, the movable weight inside the balance weight will become locked, and the tonearm can be used as an ordinary high-sensitivity tonearm, without dynamic damping.

When the unit is moved, be sure to rotate the damping selector completely to the [1] mark in order to lock and protect the internal structure of the balance weight.

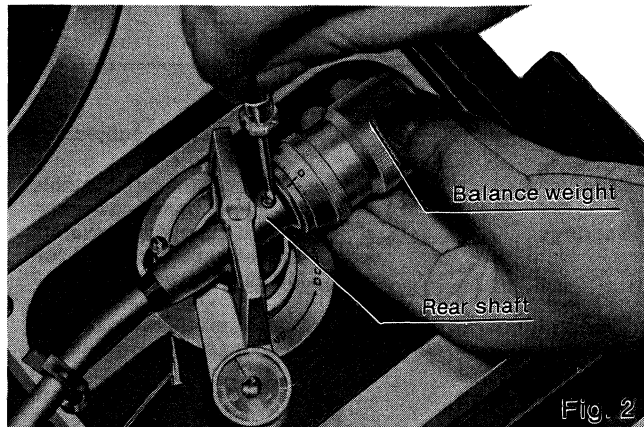


Fig. 2

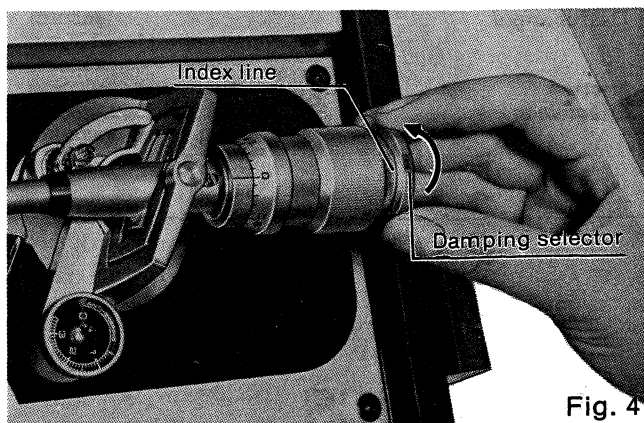


Fig. 4

■ Adjustment of parts

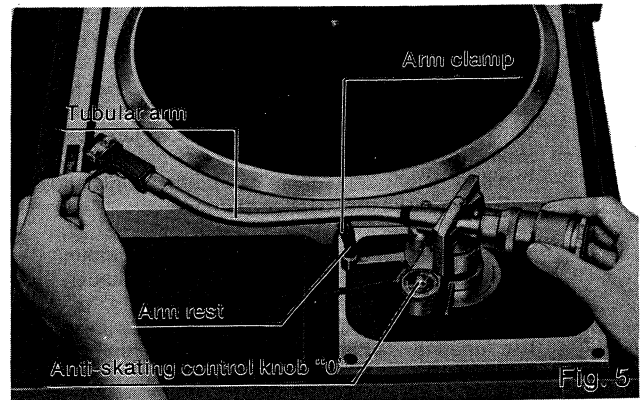
1. Adjustment of the "0" balance

Before making the adjustment of horizontal balance, check the following points:

1. Check whether the cueing lever is in the down position or not.
2. Check whether the anti-skating control is set to the "0" position or not.

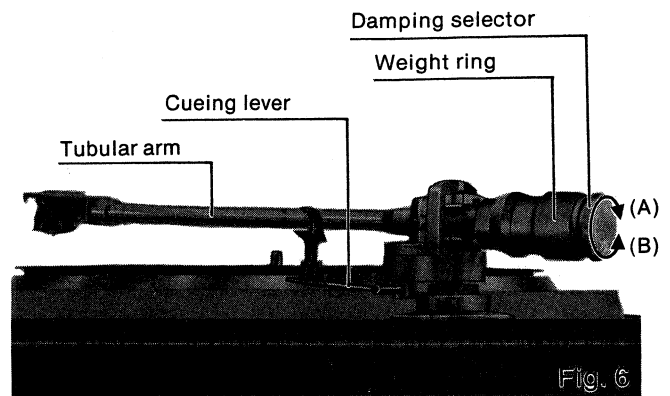
Although the tonearm may move very slightly to the left and right when the anti-skating control is set to the "0" position, this is because of the high sensitivity of the rotating part of the tonearm, and is no problem, because the lateral force is very small.

3. If the cartridge to be used has a removal cover, remove it.



2) Adjustment of horizontal (zero) balance and of stylus pressure

1. Remove the arm clamp, and move the tonearm away from the arm rest so that it is freely suspended (Fig. 5).
2. While turning the weight ring in direction "A" or "B" (as indicated by the arrows), adjust so that the tonearm is as horizontal as possible (Fig. 6). Do not touch the damping selector while making this adjustment.
3. After finishing the adjustment of the horizontal balance, return the tonearm to the arm rest, and secure it with the arm clamp.

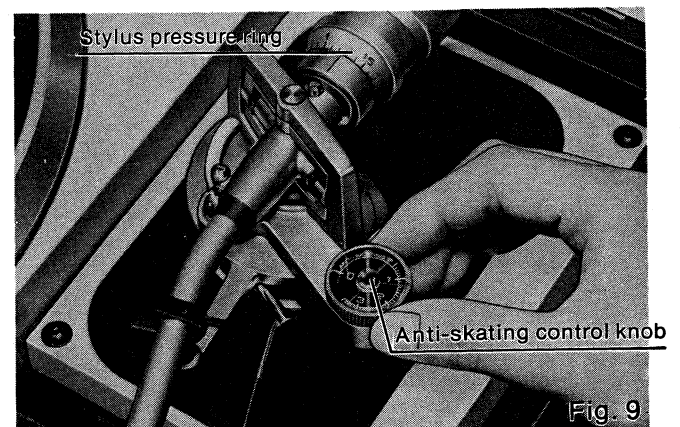
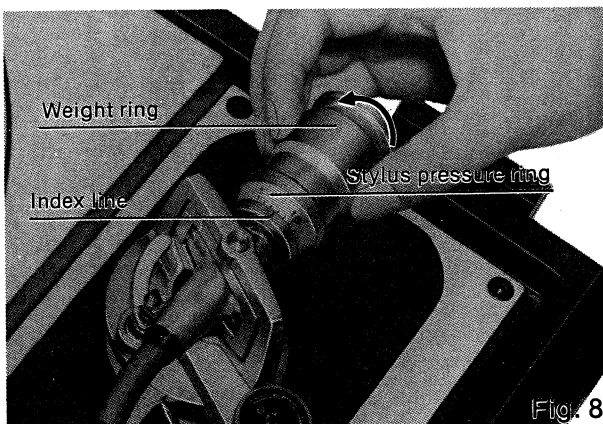
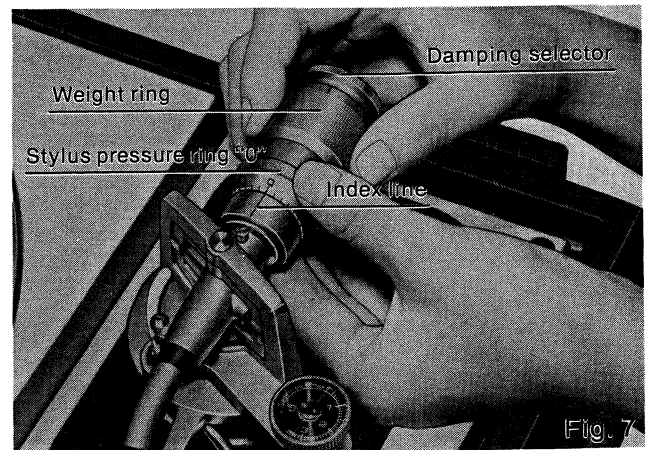


4. As shown in the figure, hold the weight ring with a finger so that it does not move, and turn only the stylus pressure ring so that the "0" indication of the ring is aligned with the index mark on the weight (Fig. 7).

Note:

When the horizontal balance is adjusted, be careful that the stylus tip of the cartridge does not touch the turntable mat or the turntable base.

5. Next turn the weight ring, and set it to the numerical value corresponding to the rated stylus pressure of the cartridge to be used (Fig. 8). Because the stylus pressure ring also moves when the weight ring is turned, the calibration can be read directly, thus making it easy to correctly adjust the stylus pressure.
6. Turn the anti-skating control, and set it to the same numerical value as the stylus pressure (Fig. 9).



3) Adjustment of arm height and confirmation of arm movement range

1. Place a record on the turntable, and, without rotating the turntable, gently place the stylus tip on the record.
2. While turning the arm height adjustment lever to the "DOWN" position, adjust the tubular arm until it is nearly parallel with the record surface. (See Fig. 10).

The arm height adjustment can be fine adjusted in 0.5 mm steps over a range of 6 mm.

Note:

If the fine adjustment of the correct height within the range can not be made, turn the fine adjustment height lever in the "UP" direction to "6," loosen the securing screws, and slightly raise the tonearm. Afterward, re-adjust the fine adjustment.

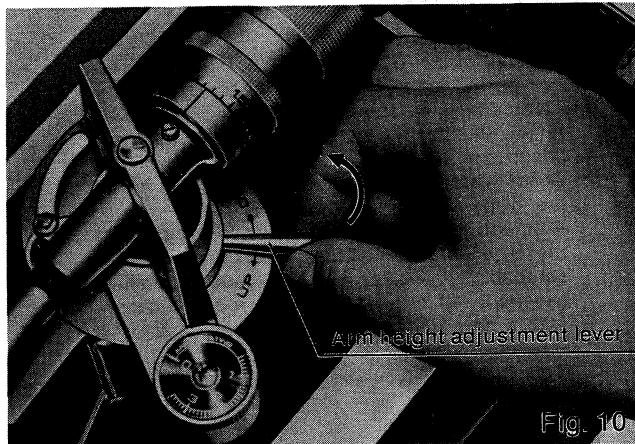


Fig. 10

4) Adjustment of arm lift distance

The arm lift distance (the space between the stylus tip and the record surface when the cueing lever is raised as shown in the figure) is most suitable at about 5~10mm. Adjust, if necessary, so that the distance will be within this range (Fig. 11).

1. Raise the cueing lever.
2. To make the adjustment, first loosen the lock nut and then turn the screw for fine adjustment of the arm lift (Fig. 12).

After adjustment, re-tighten the lock nut.

Clockwise

The distance between the stylus tip and the record surface will increase.

Counterclockwise

The distance between the stylus tip and the record surface will decrease.

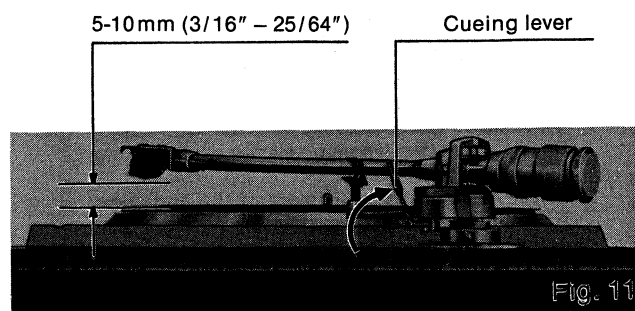


Fig. 11

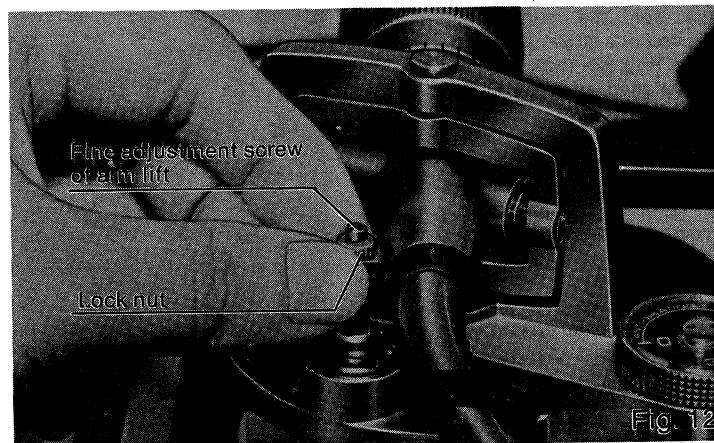


Fig. 12

■ REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
MECHANICAL PARTS				
1	SFPCC10001K	Head Shell	1	○
1-1	SFPKS10001	Cursor	1	○
1-2	SFPEV10005	Screw	2	○
1-3	SFPEV7805	Screw	2	
1-4	SFPEW9601	Washer	4	
1-5	SFPEN9200	Nut	4	
2	SFPAM10001K	Tone Arm	1	○
3	SFPRT10001	Arm Lift	1	
3-1	XSS17-4BN	Screw	1	○
4	SFPRT10003K	Arm Rest	1	○
4-1	SFYBM30	Steel Ball	1	*○
4-2	SFPSP10006	Spring, Arm Rest	1	○
4-3	XWA4BFM	Washer	1	○
4-4	SFPRT10004	Screw	1	○
5	SFPRT10001K	Lift Ass'y	1	○
6	SFPWG10001K	Balance Weight Ass'y	1	○
6-1	SFPEV10001	Screw	1	○
8	SFPKD10003K	Arm Stand	1	○
8-1	SFPEV10008K	Screw	2	○
8-2	SFPGM10002	Rubber, Arm Stand	2	○
8-3	SFPEW1001	Washer	1	○
8-4	SFPEN10003	Nut	1	○
9	SFPZB10106	Phono Cord	1	
ACCESSORY PARTS				
A1	SFPZB10005	Template	1	○
A2	SFPZB10004	Wrench	1	○
A3	SFPZB10006	Screwdriver	1	○
A4	SFPZB4500	Spacer	1	○
A5	SFPZB3501	Spacer	1	○
A6	SFPDS10002	Instruction Book	1	○
PACKING MATERIALS				
P1	SFPHH10002	Packing Case	1	○
P2	SFHH101-07	Pad, Top	1	○
P3	SFHH101-06	Pad, Bottom	1	○
P4	SFYF15A20	Polyethylene Cover	1	
P5	SFYF10A30	Polyethylene Cover	1	
P6	SFYF09B15	Polyethylene Cover	1	

■ EXPLODED VIEW OF UNIVERSAL TONEARM

