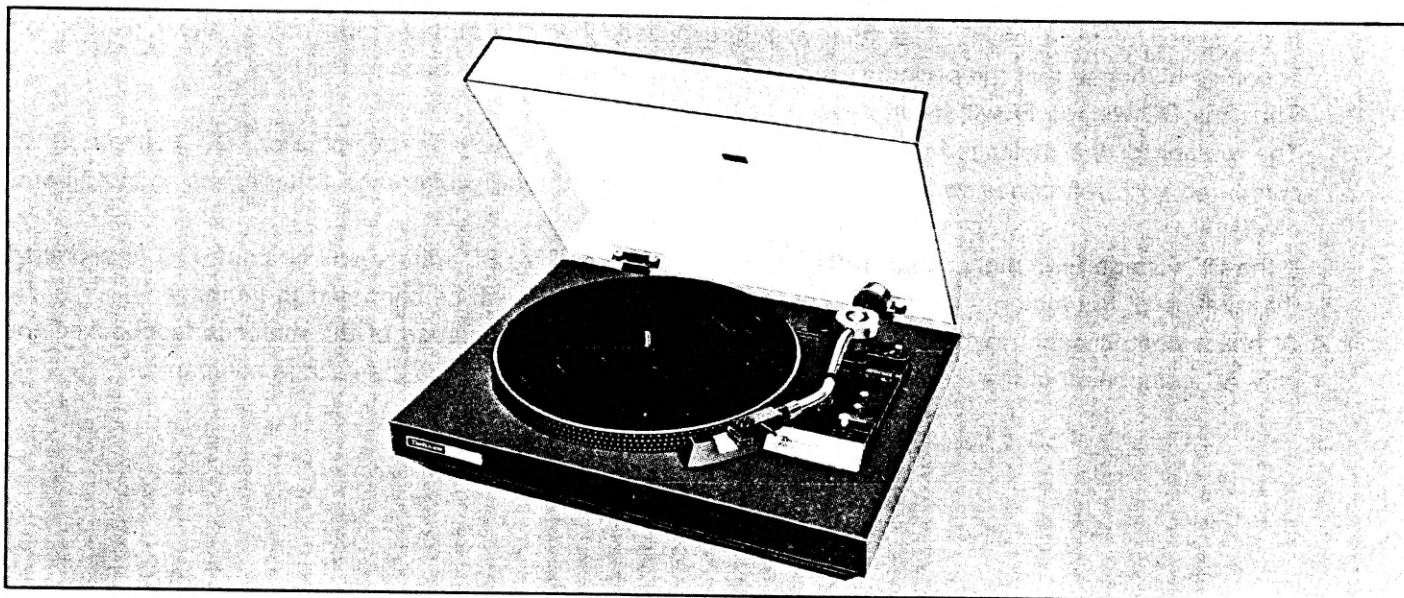


# Service Manual

Player

SL-23-(X)



## Specifications

### TURNTABLE SECTION

Type: F. G. SERVO PLAYER, Auto return  
 Driving method: Belt drive  
 Motor: Dc motor with F. G. SERVO  
 Turntable platter: Aluminium die-cast, 30cm (12") diameter (with Strobe)  
 Turntable speeds: 33-1/3 and 45 r.p.m.  
 Wow and flutter: 0.05% W.R.M.S (JIS C5521)  
 0.08% W. zero to peak (DIN 45507)  
 Rumble: -40 dB (DIN-A), -65 dB (DIN-B)  
 Speeds change method: Electronic change

### TO NEARM SECTION

Type: Universal "S" shaped tubular arm, Static-balanced type, Direct reading tracking force adjustment, Anti-skating force control and Viscous damped cueing lever  
 Effective length: 220mm (8-21/32")  
 Overhang: 14mm (35/64")  
 Tracking error angle: Within +3° (at the point 150mm or 5-1/8" from the center)  
 Within -0.2° (at the point 55mm or 2-3/16" from the center)

Offset angle: 22°  
 Adjustable tracking force range: 0 to 4g  
 Cartridge weight range: 13 to 17g (included head shell weight)

### CARTRIDGE SECTION

Type: Moving magnetic stereo cartridge  
 Frequency response: 20 to 25,000 Hz  
 Output voltage: 3.2mV (50mm/sec. 1 kHz, lateral)  
 4.5mV (50mm/sec. 1 kHz, 45°)  
 Channel separation: 25 dB at 1 kHz  
 Channel balance: Within 2 dB at 1 kHz  
 Load impedance: 50 to 100k $\Omega$   
 Tracking force: 1.75  $\pm$  0.25g  
 Replacement stylus: EPS-270ED

### GENERAL SECTION

Power supply: ~110/120/220/240V, 50 and 60 Hz  
 Power consumption: 3W  
 Dimensions (W x D x H): 42.8 x 34.8 x 13.5 cm  
 Weight: 16.55/64 x 13.45/64 x 5.5/16 inches  
 6.5kg (14.3 lb.)

\* Specifications are subject to change without notice for further improvement.

 **Technics**

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

# BLOCK DIAGRAM OF THE F·G·SERVO

- \* The output frequency which occurs at the F·G·section is in proportion to the rotation of the motor. And this output frequency is amplified and converted to rectangular wave at pulse shaping circuit.
- \* This wave is converted to trigger pulse and converted to rectangular having constant amplitude and constant time base of  $T_s$ .
- \* This rectangular wave is in proportion to the rotation of the motor, too.
- \* At next integrating circuit, this wave is converted to DC voltage  $E_i$ . This circuit controls the rotation of the motor by changing the voltage.

If the speed of the motor is fast than standard speed, then the output frequency of the F·G·section becomes higher so that the periodic time  $T$  of the constant time base becomes narrow, too.

Thus the DC voltage  $E_i$  will be increased.

The rotation of the motor is in proportion to DC voltage  $E_i$ . At voltage comparator, DC voltage  $E_i$  is compared with reference voltage  $E_s/n$  which is supplied through reference voltage raising circuit and divider.

If the DC voltage  $E_i$  is higher than reference voltage  $E_s/n$ . This DC voltage will be controlled to decrease the rotation of the motor, and if lower than  $E_s/n$ , DC voltage  $E_i$  will be controlled to increase.

- \* At phase compensating circuit, to get more stable and accuracy rotation of the motor is feedbacked the only AC component of the output signal from the motor driving circuit to the voltage comparator.

## BLOCK DIAGRAM OF THE F.G. SERVO

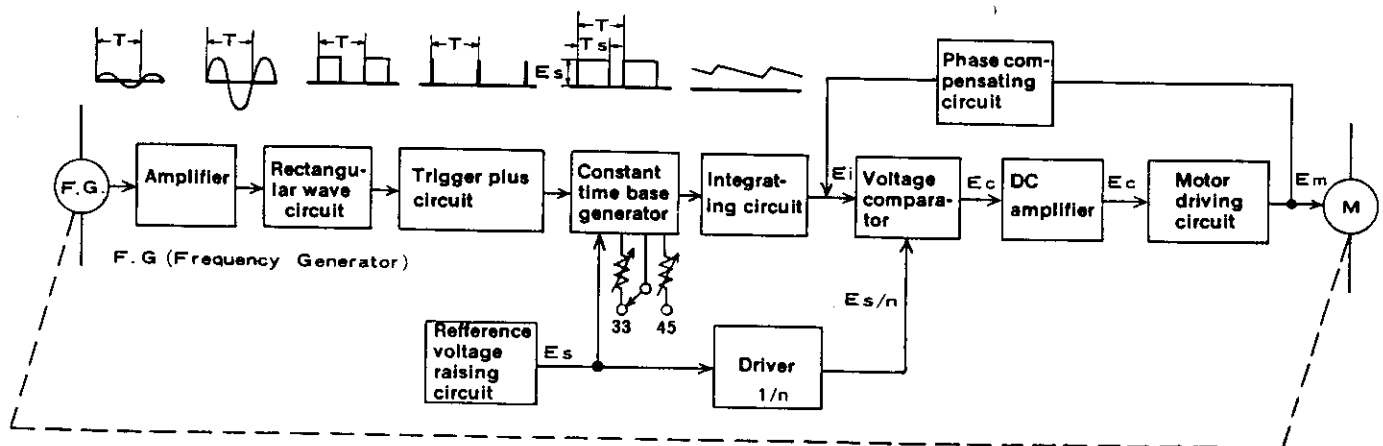


Fig. 1

# ADJUSTMENT INSTRUCTION

## 1. ADJUSTMENT OF THE ARM LIFT HEIGHT

- \* The interval (the space between the stylus tip and record surface when the cueing lever is raised) of this tonearm has been adjusted from 5 to 10mm (3/16" to 25/64").
- \* If, for any reason, the space is too narrow or wide, turn the adjustment screw clockwise or counterclockwise pushing the arm lift.

### NOTE :

- \* This screw has hexagonal head shape, so be sure to push the arm lift when you turn this screw.  
Clockwise ..... The space will be narrow.  
Counterclockwise ..... The space will be wide.

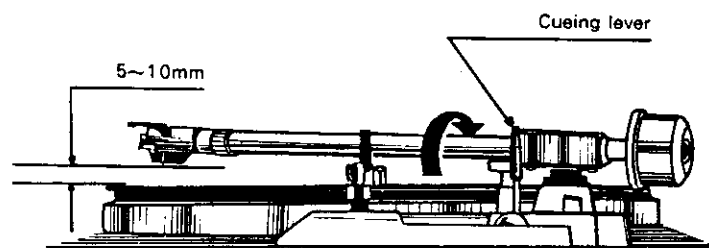


Fig. 2

## 2. SPEED ADJUSTMENT

- \* This unit is built-in F·G·SERVO circuit and the speed has been adjusted accurately in the factory.
- \* If, for any reason, when you change the speed, turn these volumes with the screwdriver to the "+" direction or "-" direction.  
"+" direction ..... This increases the speed.  
"-" direction ..... This decreases the speed.

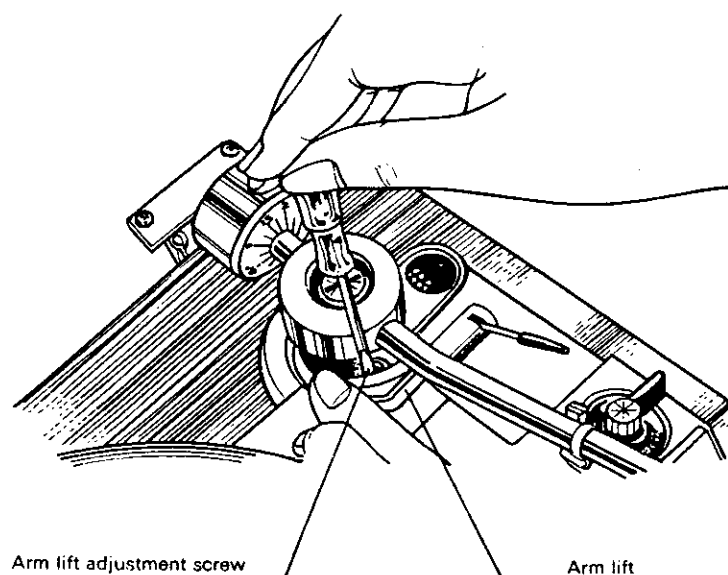


Fig. 3

## TURNTABLE SPEEDS (PITCH CONTROLS)

If you wish to adjust the turntable speeds, turn these control knobs to the "+" (increase) or "-" (decrease) direction. (See Fig. 4)

"+" direction..... This increases the speed of the turntable platter.

Turn the knob to "+" direction if the strobo dots seem to be "falling back", i.e., seem to be moving counterclockwise.

When the strobe dots appear to be stationary, the speed is accurate.

"-" direction..... This decreases the speed of the turntable platter.

Turn the knob to "-" direction if the strobe dots seem to be "running ahead"; i.e., seem to be moving clockwise, until they appear stationary.

\*Each of the two turntable speeds (33-1/3 and 45 r.p.m.) can be adjusted within a range of 6%.

### NOTE:

Any change in powerline frequency will cause a change of the fluctuation rate of the neon or fluorescent lamp used for the illumination of the strobe dots. In such case the strobe dots will start to move very slightly. Under normal conditions the powerline frequency from Electric Utility Companies is extremely stable. Under certain abnormal conditions, however, changes in line frequency have been observed, averaging to about 0.2 % when measured over a period of time.

Such change in line frequency will in no way affect the quality of the sound reproduction, as a change of line frequency does not change the rotational speed of the turntable.

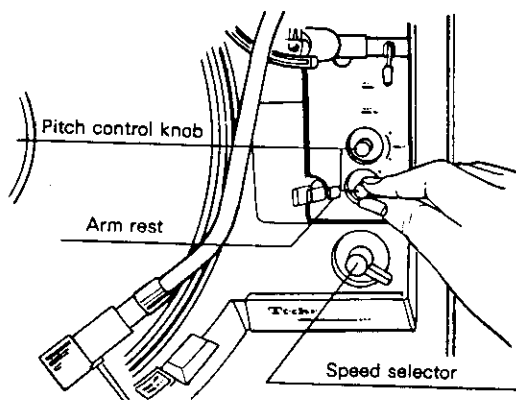


Fig. 4

## ONEARM RETURN POINT

In some cases, the tonearm will tend to return to its rest position before playing has finished. In other cases, it may fail to return to the rest position even after playing the last groove of the record.

Rotate this screw to correct for either condition. If the tonearm returns its rest too soon. —Turn this screw counterclockwise.

If the tonearm does not return its rest even after playing the last groove. —Turn this screw clockwise.

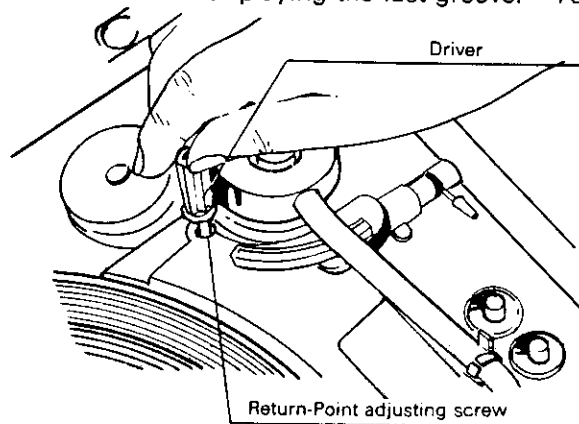
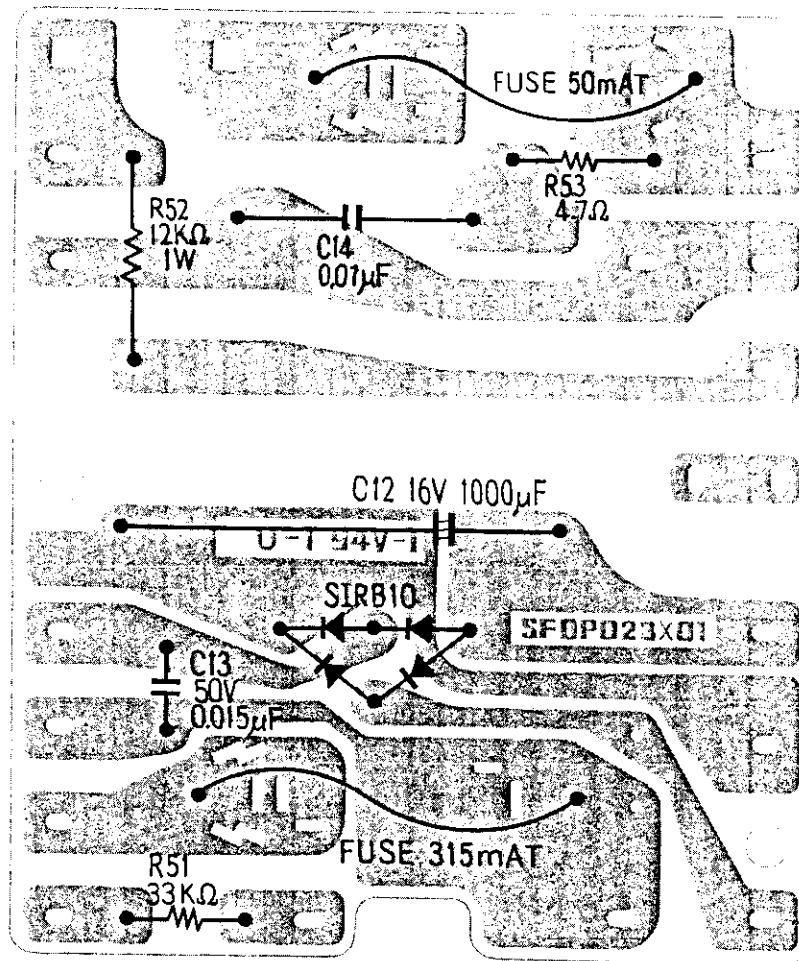
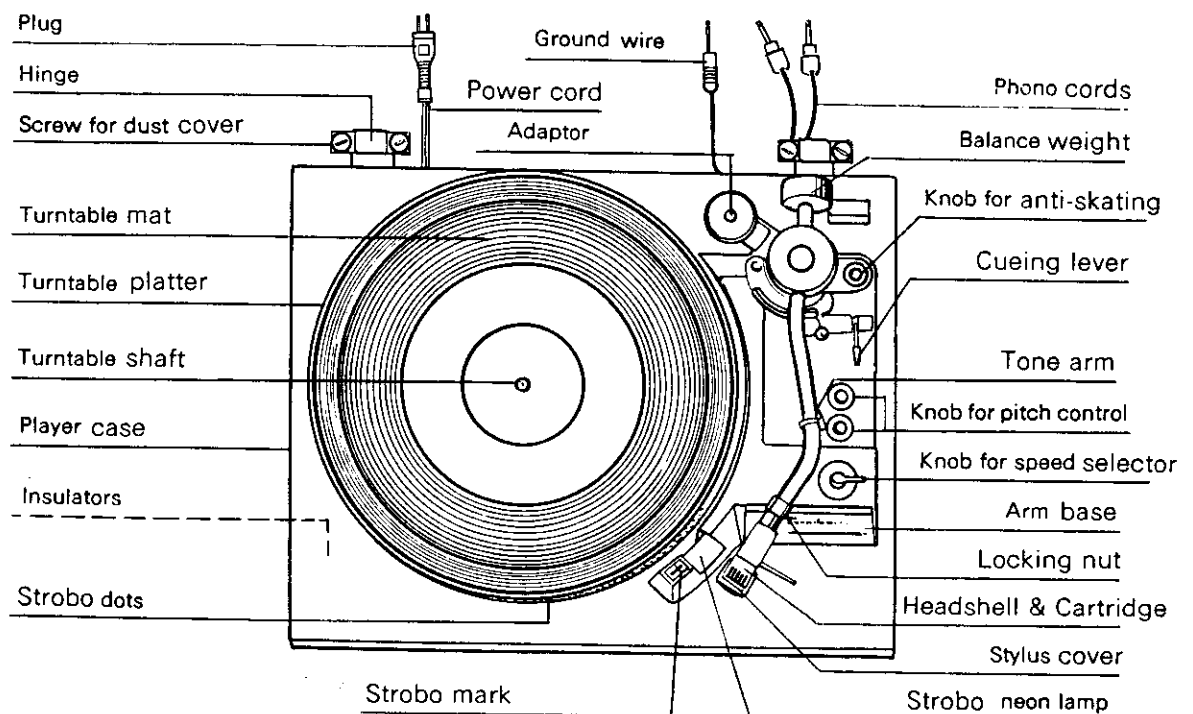


Fig. 5

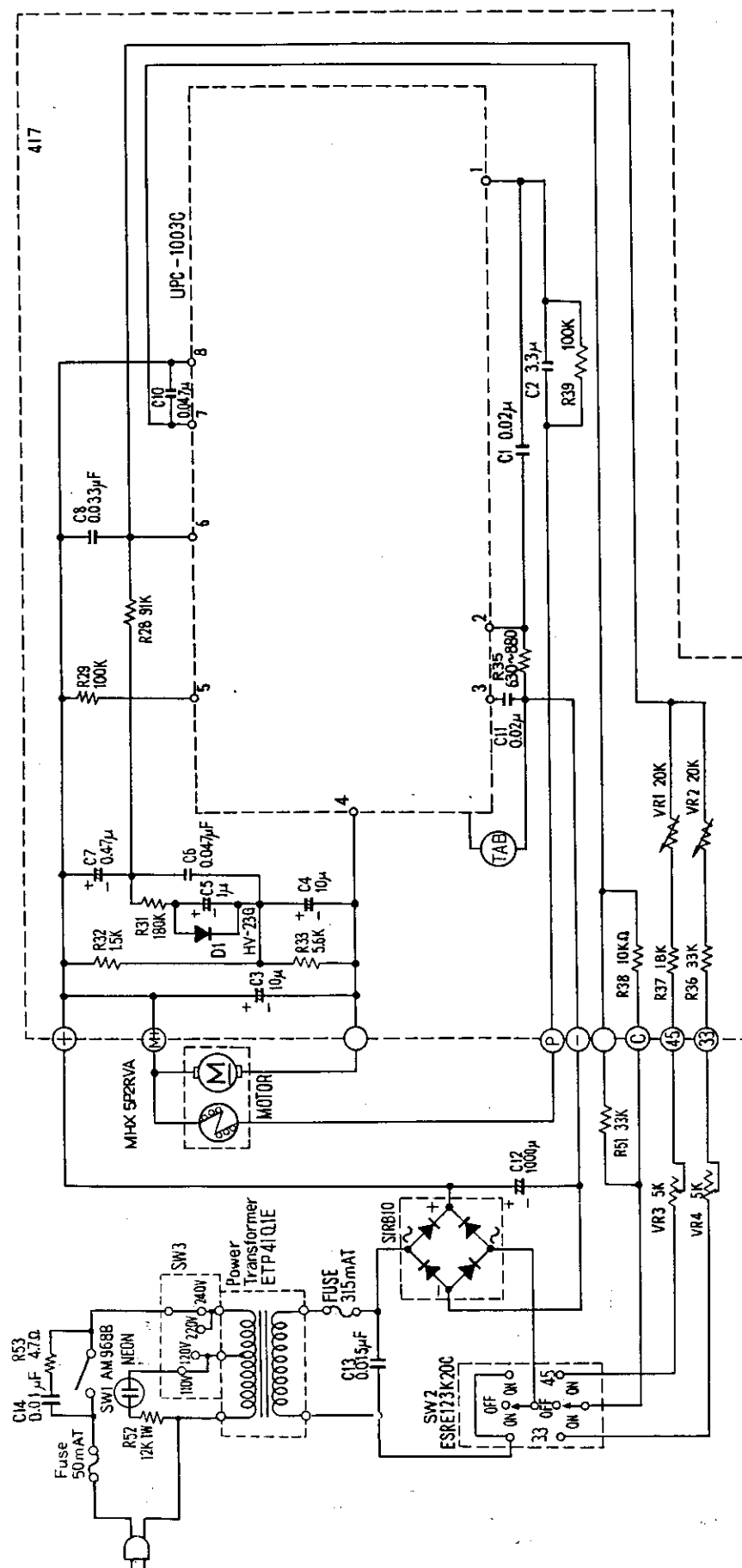
## CIRCUIT BOARD SL-23-(X)



## LOCATION OF PARTS



## SCHEMATIC DIAGRAM SL-23-(X)



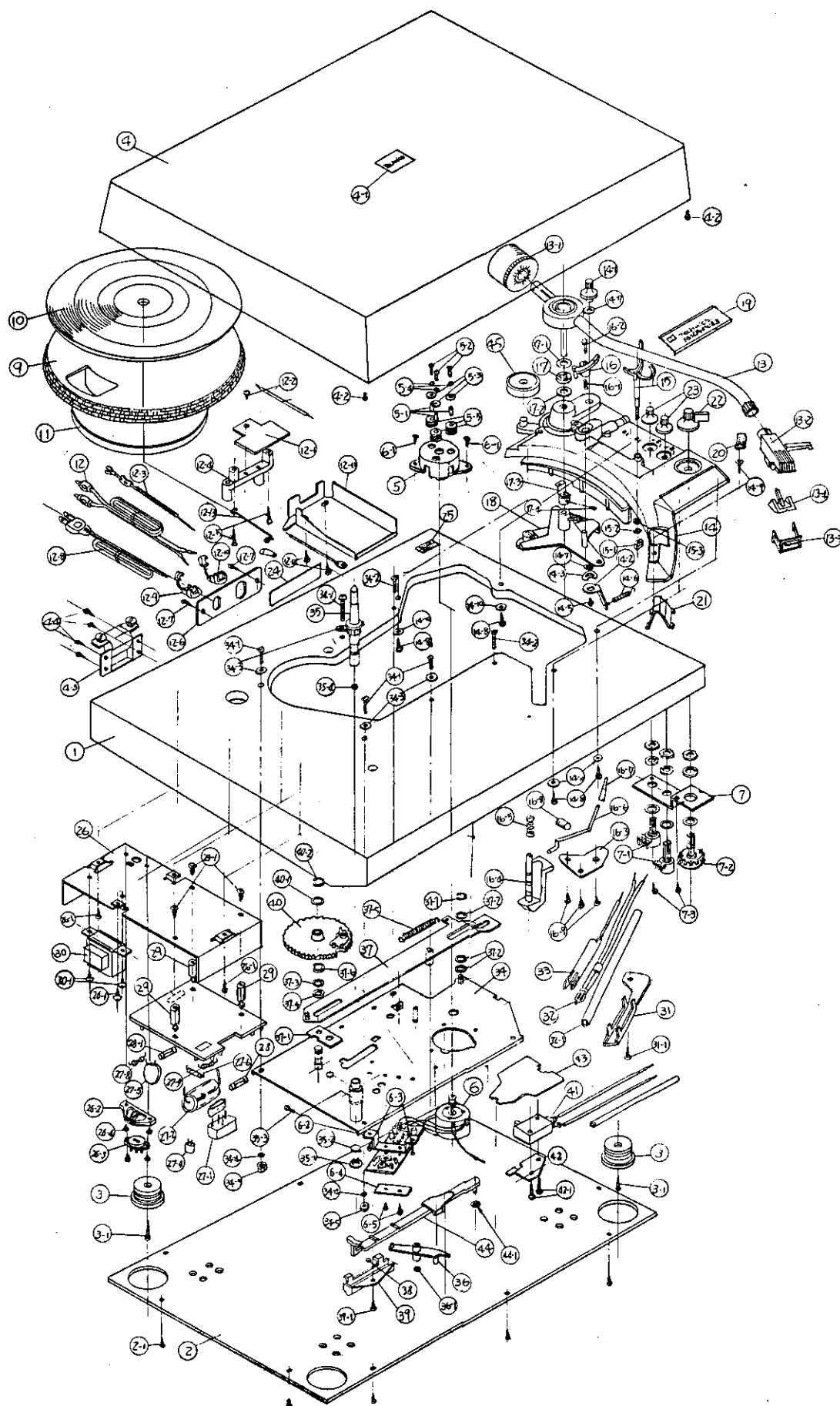
# PARTS LIST

NO.	PART NO.	DESCRIPTION	Q'TY	NO.	PART NO.	DESCRIPTION	Q'TY
1	SFAC023X01	Player case	1	13-1	SFPWG22001K	Balance weight	1
2	SFAU023L01	Bottom board	1	13-2	EPC271CES-X	Cartridge with shell	1
2-1	XMS27+13FVC	Screws for bottom board	10	13-3	SFCNC27102K	Stylus cover	1
3	SFGA020L01E	Audio insulators	4	13-4	EPS270ED	Stylus	1
3-1	XMM31+16	Screws	4	14	SFPKD22006	Arm base	1
4	SFAD020-01	Dust cover ass'y	1	14-1	SFPJK22003K	Anti-skating force control knob	1
4-1	SFKK020X01	Badge for dust cover	1	14-2	SFPSH22001	Suspension for the anti-skating force control spring	1
4-2	SFGC040L1	Cushions for dust cover	2	14-3	SFPEW12002	Teflon washer	1
4-3	SFAT023L01A	Hinges	2	14-5	XTW26+5D	Screw	1
4-4	XMM31+10FZ	Screws	8	14-6	SFPSP12002	Spring for anti-skating	1
5	SFUM023L01	Case for motor	1	14-7	SFXW303-1	Washer	2
5-1	SFX0020L01	Pipe for installation of the motor	3	14-8	XTN3+16B	Screw	4
5-2	XSN26+9	Screws	3	14-9	XMS31+25	Screw	1
5-3	XWE26D75BW	Washer	3	14-10	XWE3E10	Washers	4
5-4	XWA26B	Spring	3	15	SFPRT22001K	Arm rest	1
5-5	SFGC020L01	Cushions	3	15-1	XNG26HBN	Nut	1
6	SFMC023L01E	Motor ass'y (w/capstan & PCB)	1	15-2	XWA26B	Spring-washer	1
6-1	XTN3+8B	Screws	2	15-3	XWE26E 75BW	Washer	1
6-2	SFUP026L01	P base holder	1	16	SFPRT22003K	Arm lift	1
6-3	XTN3+8B	Screws	2	16-1	SFOA829-3	Spring for the arm lift	1
6-4	SFUZ825H01	Insulating plate	1	16-2	SFXG829-1	Screw (height adjustment)	1
6-5	XTN3+8B	Screws	2	16-3	SFPAB22006	Lift base	1
7	SFUP023L03	Mounting plate for variable resistor	1	16-4	SFPJL22002K	Lift bar	1
7-1	EVHBOAK15B53	Variable resistor	2	16-5	SFPSP3500	Spring for lift	1
7-2	ESRE123K20C	Speed selector switch	1	16-6	SFPJL22003	Cueing lever	1
7-3	XTN3+8B	Screws	2	16-7	SFPAB12002	Knob for cueing lever	1
9	SFTE023L01	Turntable platter	1	16-8	SFPGM22001	Gum for cueing lever	1
10	SFTG120-01	Turntable mat	1	16-9	XTN3+5B	Screws	3
11	SFGB029-1	Belt	1	17	SFUP890B01E	PU bearing	1
12	SFDH020L01	Phono cords	1	17-1	SFPEW3500	PU thrust washer	1
12-1	SFDP020L02	PU Print base	1	17-2	SFPEW22001	PU thrust washer	1
12-2	XTW3+8BFY	Screw	1	17-3	SFPJD22003K	PU stopper	1
12-3	SFEL028-01E	Ground wire	1	17-4	XXE3D3FNS	Screws	1
12-4	SFUM020L01	Board for installation of the phono cords	1	18	SFPAB22007K	Plate for PU	1
12-5	XMM31+25	Screws	2	19	SFKK023X01	Plate for arm base	1
12-6	SFUP20L03	Fixing plate for power & PU cord	1	20	SFKK023L02	Strobe mark	1
12-7	XMM31+13FY	Screws	2	21	SFUM023L05	Cover for neon lamp	1
12-8	SJAA3-1	Power cord	1	22	SFKT020L01E	Knob for speed select	1
12-9	SFHK040L	Bushing for fixing the power cord	1	23	SFKT130-01A	Knob for speed adjustment	2
12-10	SFSR4N-4	Bushing for fixing the phono cord	1	24	SFNN023X01	Name plate	1
12-11	SFUP023L04	Shield case	1	25	SFNN020X01	Label for stylus	1
12-12	XTN3+8B	Screws	2	26	SFUK023L02	Electro base	1
12-13	SFQS023L01	Spring	1	26-1	XMM31+8	Screw	4
13	SFPAM22005K	Tonearm unit	1				

NO.	PART NO.	DESCRIPTION	Q'TY	NO.	PART NO.	DESCRIPTION	Q'TY
26-2	SFUM130G01	Plate for power	1	37-4	SFXW623-2	Washer	1
26-3	SSRA1	Power selector switch	1	37-5	SFQH623-1	Spring for supporting	1
26-4	XTN3+8B	Screws	4	37-6	XUC5FY	E-Shaped	1
			1	37-7	XUC4FY	E-Shaped	1
27-1	SVDS1RB10	Rectifier	1	38	SFYB7-32	Ball	1
27-2	ECEB16V1000L	Capacitor	1	39	SFUM023L04	Supporting plate for ball	1
			1	39-1	XTN3+8B	Screw	1
27-4	ECQM05153KZ	Capacitor	1	40	SFUG825C01A	Main gear	1
27-5	ECQE10103MZ	Capacitor	1	40-1	SFXW702-3	Washer	1
27-6	ERG1ANJ123	Resistor	1	40-2	XUC5FT	E-Shaped	1
			1	41	AM9688	Micro switch	1
27-8	ERD12TJ4R7	Resistor	1	42	SFUP623-5	Cover for micro switch	1
27-9	ERD14TJ333	Resistor	1	42-1	XTN3+20B	Screws	2
28	XBA2C03TR0	Fuse	1	43	SFUP023L01	Insulating plate	1
28-1	XBA2C005TR0	Fuse	1	44	SFUC023L01E	Actuating plate ass'y	1
29	SFHZ055-01	Holder for print base	3	44-1	CSTW3	Stop ring	1
29-1	XTN35+8B	Screws	3	45	SFWE154A1	45 r.p.m. adaptor	1
30	ETP41Q1E	Power transformer	1		SFCNC8600	Cover for stylus	1
30-1	XTN4+6B	Screws	2	<b>ACCESSORY PARTS</b>			
31	SFUP023L02	Radiant plate	1	A1	SFNU023X01	Operating instructions	1
31-1	XTN3+8B	Screw	1	A2	SQXA2004	Product service guide	1
32	SFDNE2HUWMA2	Neon lamp	1	A3	SFWE154A1	45 r.p.m. adaptor	1
32-1	SFE88UT	Tube for neon lamp	1	A4	SFDK100G	DIN-PIN adaptor	1
33	SFUP023L05	Shield plate	1	A5	SFDK119118	2-PIN plug	1
34	SFUK023L01E	Mechanism base	1	A6	RJP17AS	Adaptor	1
34-1	XSN3+30FZS	Screws	4	<b>PACKING MATERIALS</b>			
34-2	XSS3+30FZS	Screws	2	P1	SFHP023 X02	Outside packing case	1
34-3	SFXW120-01	Washers	4	P2	SFHP023 X01	Inside packing case	1
34-4	XWA3B	Spring-washers	6	P3	SFHD020L01	Upper board	1
34-5	XNG3H	Nuts	6	P4	SF Z055-01	Side pad	1
35	SFTJ023L01E	Turntable shaft ass'y	1	P5	SFHH020L01	Corner pad A	2
35-1	RTW10	C-shaped	1	P6	SFHH020L02	Corner pad B	
35-2	SFXW829T03	Thrust washer	1	P7	SFHD020 X01	Parts box B	1
35-3	SFXG829T01	Screw	1	P8	SFHH020L03	Parts box A	1
35-4	SFYB5-32	Ball for turntable shaft	1	P9	SFYC100A130	Polyethylene sheet for unit	1
36	SFUM023L02	ON-OFF plate for micro switch	1	P10	SFYF15A20	Polyethylene bag for power cord and phono cords	1
36-1	XUC3FT	E-shaped	1	P11	SNE2001	Turntable platter clamping screws	2
37	SFUB023L01E	Operating plate ass'y	1	P12	SFHS327S	Spacers	2
37-1	SFUP827-1	Washer	1	P13	SFHD020L02	Top lid for parts box A	1
37-2	SFXW028-01	Washers	3				
37-3	SFXW702-3	Washer	1				



# EXPLODED VIEW OF CHANGER SL-23-(X)



# TROUBLE SHOOTING GUIDE

\* Except when checking voltage, disconnect the power cord before repair without fail.

TROUBLE	CAUSE	REMEDY
Turntable speed A. Switching on does not cause turntable to rotate.	<ol style="list-style-type: none"> <li>Come off belt from capstan (Remove bottom cover and, using DC voltmeter, check printed base voltage)</li> <li>No output of constant-voltage circuit (1) No output on secondary of transformer. <ul style="list-style-type: none"> <li>* Cord disconnected.</li> <li>* Soldered improperly.</li> <li>* Fuse disconnected.</li> <li>* Power transformer defective.</li> </ul> </li> <li>Output of constant-voltage circuit is 9.6~14.4V. <ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> </ul> </li> <li>Speed selector switch defective <ul style="list-style-type: none"> <li>* Contact faulty.</li> <li>* Soldered improperly.</li> </ul> </li> </ol>	<p>Install the belt to capstan.</p> <ul style="list-style-type: none"> <li>* Replace cord.</li> <li>* Solder securely.</li> <li>* Replace fuse.</li> <li>* Replace power transformer.</li> <li>* Replace motor ass'y.</li> <li>* Replace speed selector switch.</li> <li>* Solder securely.</li> </ul>
B. Turntable speed too slow.	<ol style="list-style-type: none"> <li>Constant-voltage output is not 9.6V~14.4V. <ul style="list-style-type: none"> <li>* Power transformer defective.</li> </ul> </li> <li>Constant voltage output is 9.6V~14.4V. <ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> <li>* Speed unadjusted.</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>* Replace power trans.</li> <li>* Replace motor ass'y.</li> <li>* Adjust semi-fixed resistor VR1 &amp; VR2.</li> </ul>
C. Turntable speed too fast.	<ol style="list-style-type: none"> <li>Constant-voltage output is not 9.6V~14.4V. <ul style="list-style-type: none"> <li>* Power transformer defective.</li> </ul> </li> <li>Constant-voltage output is 9.6V~14.4V. <ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> <li>* Speed unadjusted.</li> </ul> </li> </ol>	<ul style="list-style-type: none"> <li>* Replace power transformer.</li> <li>* Replace motor ass'y.</li> <li>* Adjust semi-fixed resistor VR1 &amp; VR2.</li> </ul>
D. Turntable speed varies too much.	<ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> <li>* Belt defective.</li> </ul>	<ul style="list-style-type: none"> <li>* Replace motor ass'y.</li> <li>* Replace belt.</li> </ul>
E. Turntable, after stopped by hand, will not turn or starts turning but will stop soon.	<ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> </ul>	<ul style="list-style-type: none"> <li>* Replace motor ass'y.</li> </ul>
F. Operative at only one of two speeds. (33-1/3 r.p.m or 45 r.p.m)	<ul style="list-style-type: none"> <li>* Speed selector switch defective.</li> <li>* Leadwire disconnected or unsoldered.</li> <li>* Contact of VR1, VR2 insufficient.</li> </ul>	<ul style="list-style-type: none"> <li>* Replace speed selector switch.</li> <li>* Replace leadwire, or solder securely.</li> <li>* Replace printed base ass'y.</li> </ul>
G. When actuating, turntable speed is unsteady for a long time.	<ul style="list-style-type: none"> <li>* Motor ass'y defective.</li> </ul>	<ul style="list-style-type: none"> <li>* Replace motor ass'y.</li> </ul>
Noise Offensive noise is heard.	<ul style="list-style-type: none"> <li>* Power transformer makes loud noise of vibration.</li> </ul>	<ul style="list-style-type: none"> <li>* Replace power transformer.</li> </ul>

# COMPONENT PACKING PROCEDURE

