SERVICE MANUAL

DC Servo Stereo Turntable

SANYO

TP 728

(GENERAL)

SPECIFICATIONS (Nominal)

MOTOR & TURNTABLE SECTION

Motor	DC Servo
Drive	Belt
Wow and Flutter (WRMS)	0.05 %
Rumble	−60 dB
Speed Variation	±0.8 %
Speed Control Range	±3 %
Tracking Force Range	0.7 - 3.5 grams
Platter Diameter	12 - 1/8"
Platter Weight	2 lbs.
Strobe Light	Yes
Record Speed Selector	33/45 rpm
Auto Function	
Stop	Yes
Reject	Yes
Manual Function	
Start	Yes
Stop	Yes

TONE ARM SECTION

Tone Arm Data	
Resonance	10 Hz
Balance Adjustment	Counter-Weight
Effective Length	222 mm
Shape	S-Form
Bearing-Type	
Horizontal	Thrust
Friction Sensitivity	0.25 gram
Vertical	Pivot
Friction Sensitivity	0.3 gram
Max. Tracking Error	+3° −1°
Anti Skate Control	Adjustable
Cueing	Viscous Damped

GENERAL SECTION

Power Requirements	110~120/220~240V 50/60 Hz
Dimensions	17-3/4" x 5-1/8" x 14-1/4"
Weight	13.25 lbs.

* Specifications are subject to change without notice.

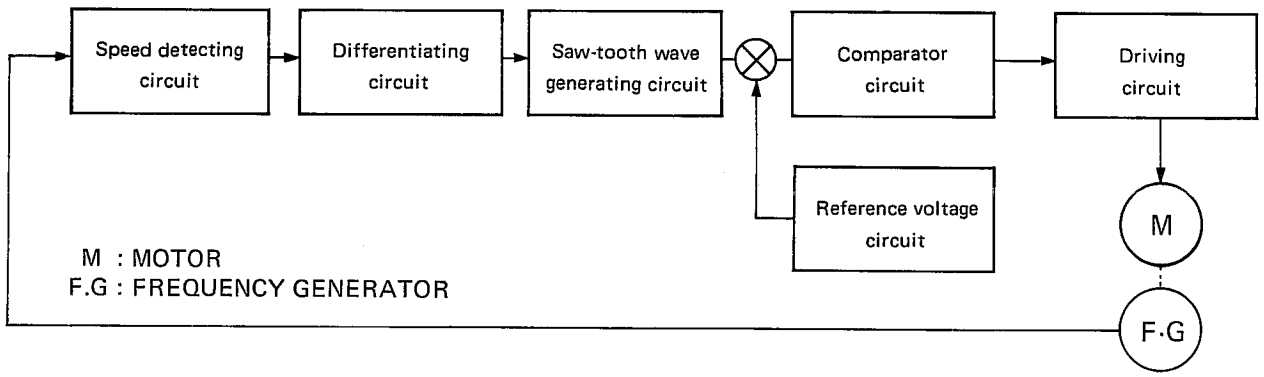
BLOCK DIAGRAM OF THE DC SERVO

Principle of Operation

The frequency generator is placed coaxially with the motor shaft. The output signal from the frequency generator is converted into a rectangular wave in the speed detecting circuit, which is then supplied to the differentiating circuit to obtain a differentiated wave from synchronized to the frequency of rotation.
The leading edge of the differentiated wave form is used for switching a transistor ON or OFF to obtain a saw-tooth wave whose wave peak is proportional to the frequency.
The saw-tooth wave thus generated is compared with a reference voltage obtained from a reference voltage circuit separately composed, and the portion of the saw-tooth wave exceeding the reference voltage is taken out as the control signal.
The driving signal for the motor is obtained by integrating the control signal (rectangular pulse).
Motor speed can be adjusted by changing the reference voltage.

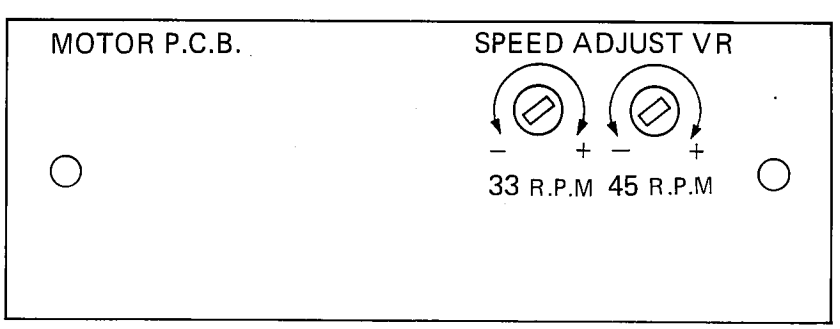
Control frequency:

EP disk motor speed 1520 rpm ..... 304 Hz
LP disk motor speed 1130 rpm ..... 226 Hz



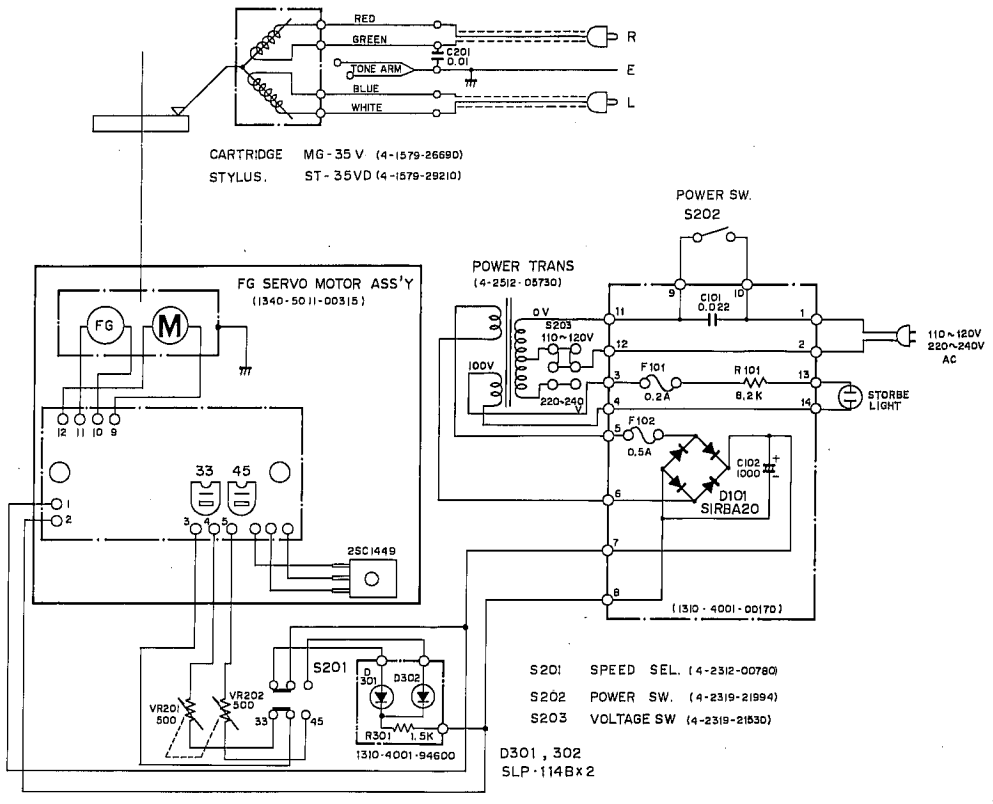
SPEED ADJUSTMENT

- 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.

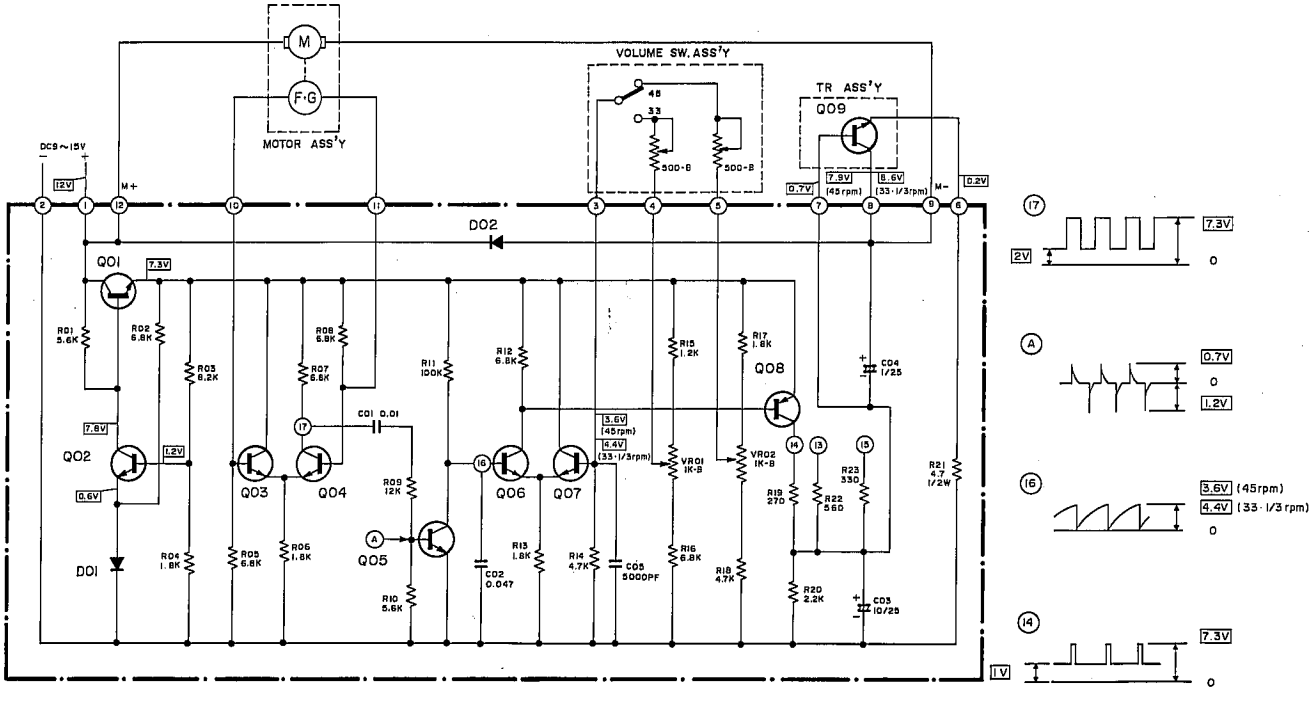


BOTTOM VIEW

SCHEMATIC DIAGRAM



F.G.SERVO MOTOR CONTROL SCHEMATIC DIAGRAM



D01	VD112
D02	IS953
Q01~Q07	2SC945
Q08	2SA641

Q09	2SC1449	TERMINAL SHORT	R23
RANK	L	13 - 14	220 ohm
	K	–	270 ohm

* Short the circuits between Pins 13 and 14, Pins 14 and 15.

DISASSEMBLY INSTRUCTIONS

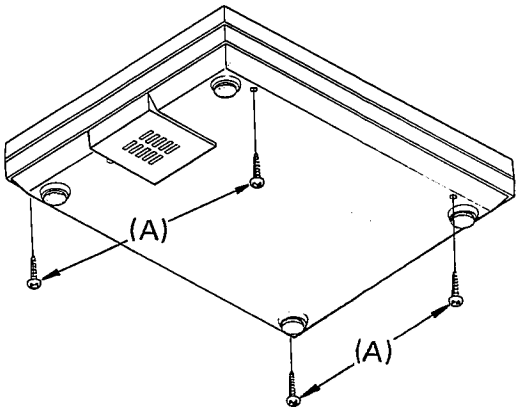
1. Remove the four screws (A) from the bottom of the cabinet.
2. Remove the three screws (B) from the top of the cabinet.
3. Remove the screw (C) from the tone armrest.
4. Remove the tone armrest.
   a. Move the tone arm over the turntable spindle.
   b. Set the tone armlifter to the UP mode.
5. Carefully lift the top cabinet.

NOTE:
(Pay due caution not to contact the cabinet with other mechanical parts.)

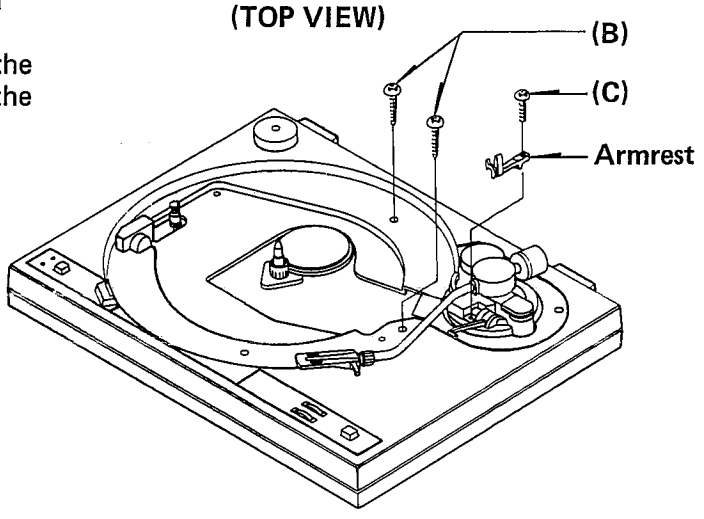
CAUTION ON REMOVAL OF THE TOP CABINET

To prevent the parts from falling, do not turn over the set because the mechanical parts are just placed on the set.

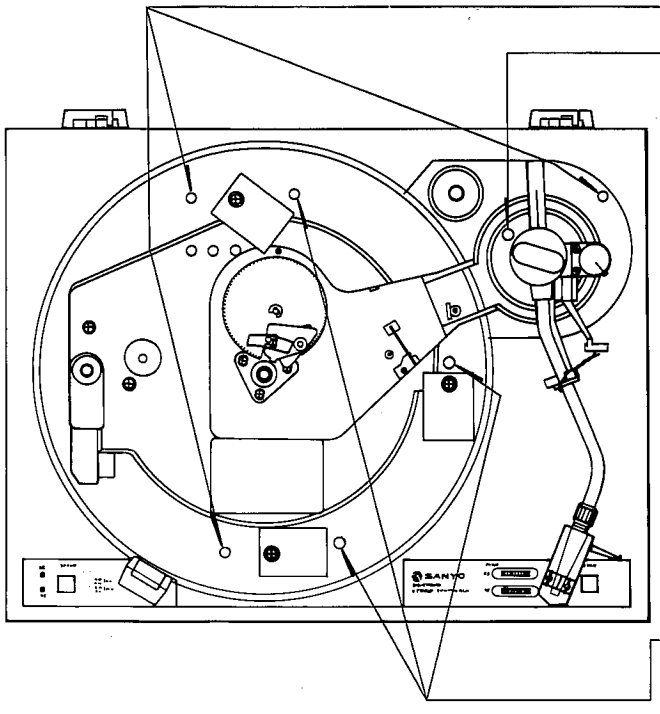
(BOTTOM VIEW)



(TOP VIEW)



ADJUSTING AND MOUNTING SCREW POSITIONS



(D) Adjusting screws to keep the chassis balanced.

(E) Adjusting the screw for proper return of the tone arm after a disk play has been completed.

(B) Mounting screws of the top and bottom cabinets
Three screws for the top cabinet
Four screws for the bottom cabinet
Remove the screws to observe the inside of the set.

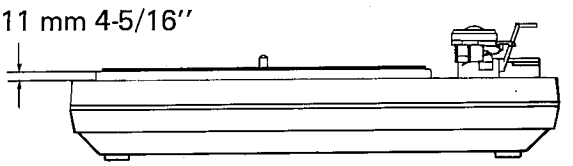
ADJUSTMENT OF THE CHASSIS BALANCE

Adjust three screws (D) to obtain the distance of 11 mm (4-5/16") from the cabinet to the surface of the turntable as illustrated. (Refer to the adjusting and mounting screw positions.)

NOTE:

Do not remove the turntable

Remove the rubber mat which is on the turntable. Then, turn the turntable until the two cut-out holes of the turntable platter are positioned to enable easy turning of the two screws.



PICK-UP ARM HEIGHT ADJUSTMENT

Loosen the pick-up arm height adjusting screw (52) and adjust the height by sliding the support arm (S) and secure the screw.

PICK-UP RAISING POSITION ADJUSTMENT (Return point)

Turn screw (E) clockwise to move outwards, and counterclockwise to move inwards.

MOUNTING THE CARTRIDGE

1. Carefully mount cartridge according to instructions given by the cartridge manufacturer. Do not tighten mounting screws as yet.
2. Connect the four colored wires of the cartridge shell to the cartridge terminals. It is important that connections are made correctly. That is, colors of wires and cartridge terminals must be matched.
   Red = Right output
   Green = Right ground
   White = Left output
   Blue = Left ground
3. Plug cartridge shell into tone arm and tighten cartridge shell ring by turning it counterclockwise (as seen from shell side). (Fig. 1)
4. Overhang Adjustment: Move the tone arm over the turntable shaft and move the cartridge back or forth to obtain a space of 21/32" between turntable shaft and stylus tip. (Fig. 2)
   Fix cartridge in this location by tightening mounting screws.

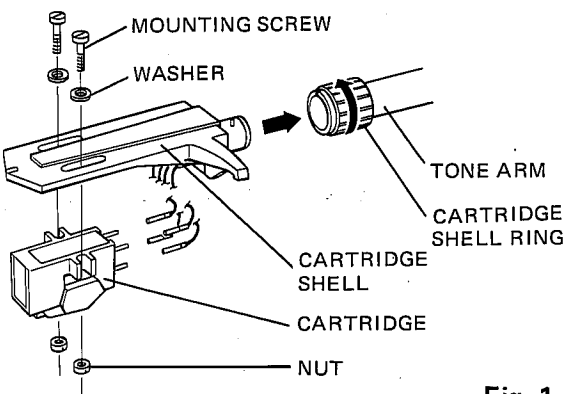


Fig. 1

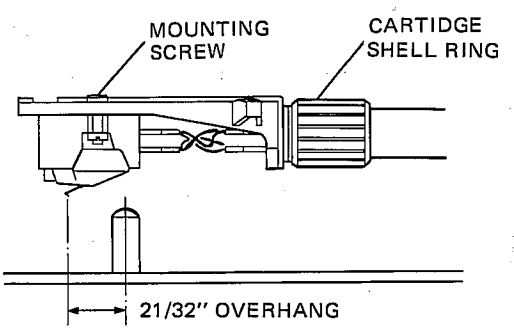
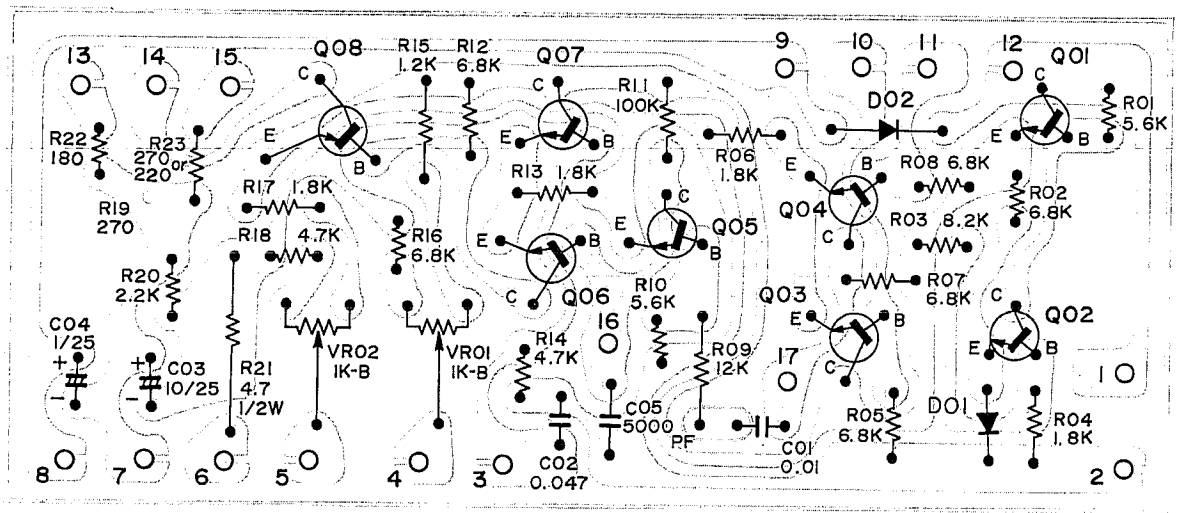


Fig. 2

F.G.SERVO MOTOR CONTROL CIRCUIT BOARD

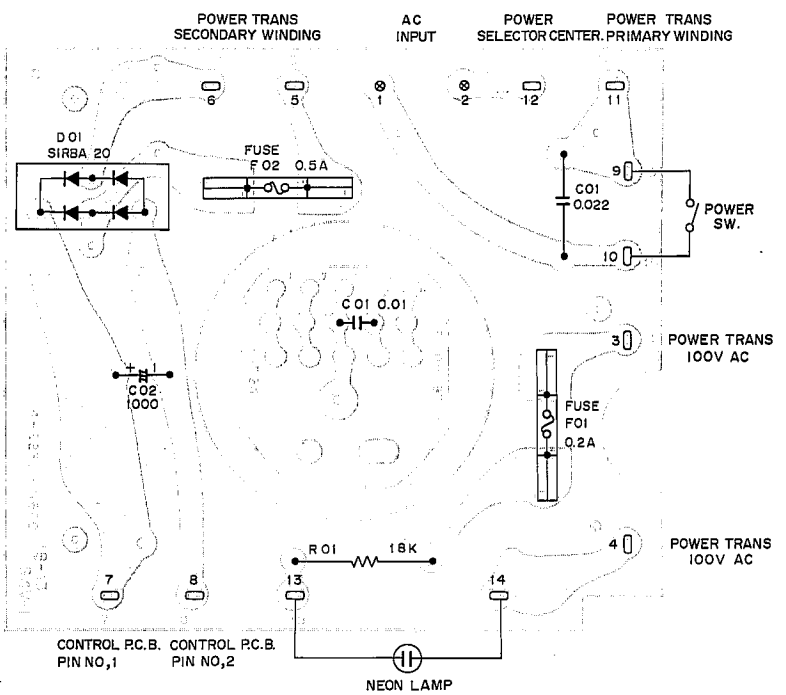
(BOTTOM VIEW)



Note: The F.G. Servo Block Circuit and The Motor P.C.B. are fundamental diagrams which are to be used as references when necessary and are subject to change without notice for the improvement of performance.

POWER SUPPLY & TERMINAL CIRCUIT BOARD

(BOTTOM VIEW)



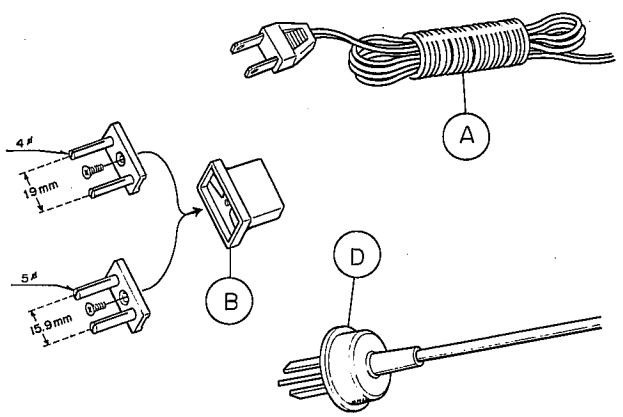
PARTS LIST

Ref.No.	Parts No.	Description
*		F.G. SERVO P.C.B. Assy
	CAPACITORS	
C01	C1HFAK103A	Mylar 0.01 μF ±10%
C02	C1HFAK473A	Mylar 0.047 μF ±10%
C03	C1ERB-106A	Electrolytic 10 μF 25WV
C04	C1ERB-105A	Electrolytic 1 μF 25WV
C05	C1HYSZ502A	Ceramic 5000P 50V
	RESISTORS	
R01	R2EDUJ562A	Carbon 5.6k 1/4W ±5%
R02	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R03	R2EDUJ822A	Carbon 8.2k 1/4W ±5%
R04	R2EDUJ182A	Carbon 1.8k 1/4W ±5%
R05	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R06	R2EDUJ182A	Carbon 1.8k 1/4W ±5%
R07	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R08	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R09	R2EDUJ123A	Carbon 12k 1/4W ±5%
R10	R2EDUJ562A	Carbon 5.6k 1/4W ±5%
R11	R2EDUJ104A	Carbon 100k 1/4W ±5%
R12	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R13	R2EDUJ182A	Carbon 1.8k 1/4W ±5%
R14	R2EDUJ472A	Carbon 4.7k 1/4W ±5%
R15	R2EDUJ122A	Carbon 1.2k 1/4W ±5%
R16	R2EDUJ682A	Carbon 6.8k 1/4W ±5%
R17	R2EDUJ182A	Carbon 1.8k 1/4W ±5%
R18	R2EDUJ472A	Carbon 4.7k 1/4W ±5%
R20	R2EDUJ222A	Carbon 2.2k 1/4W ±5%
R21	R2HDPJ4R7A	Carbon 4.7 1/2W ±5%
R22	R2EDUJ181A	Carbon 180 1/4W ±5%
R23	R2EDUJ271A	Carbon 270 1/4W ±5%
or	R2EDUJ221A	Carbon 220 1/4W ±5%
VR01		Semi Fixed 1K - B
VR02		Semi Fixed 1K - B
	SEMICONDUCTORS	
Q01,02 03,04 05,06 07	TNN-2SC945K	TR 2SC945
Q08	TNN-2SA641H	TR 2SA641
Q09	TNN-2SC1449L	TR 2SC1449 Lork
D01	DNN-VD1122	Diode VD1122
D02	DNN-1S953	Diode 1S953
*	131 0 4001 00170	Power Supply P.C.B. Assy
	4 2349 20310	Fuse 0.5A
	4 2349 20960	Fuse 200mA
	4 2359 23080	Socket
C01	C2EHRM223A	Polypropilene 0.022 μF 250V
C02	C1CRB-108A	Electrolytic 1000 μF 16V
D01	DDD-SIRBA20	Diode Bridge SIRBA20
R01	R3AXBJ822A	Oxide Metal Film 18k 1W ±5%
*	131 0 4001 92900	Terminal P.C.B. Assy
C01	C1HYDZ103A	Ceramic 0.01 μF 50V +80,–20%

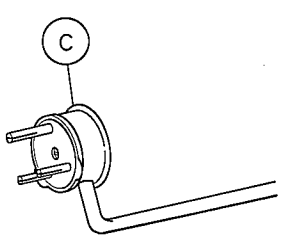
NOTE: * Asterisk indicates not a service part.

POWER CORD AND PLUG COMBINATION

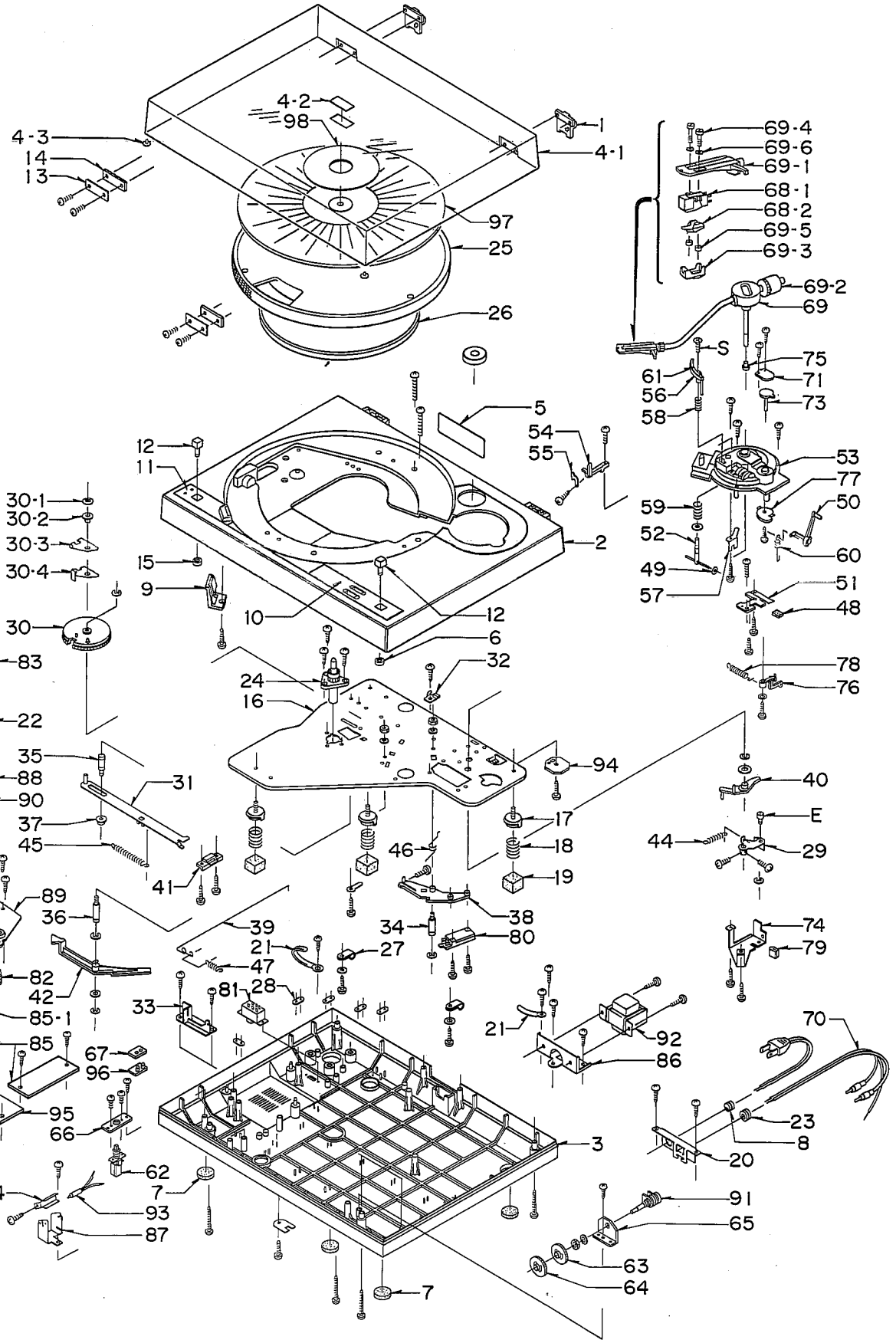
1. A ONLY (U2) , 2. A+B (UCS) , 3. C ONLY (E3) , 4. D ONLY (A3)



(A) POWER CORD ASS'Y U2
(B) PLUG CONVERSION 4-2362-00010
(C) POWER CORD ASS'Y ENGLAND TYPE 3P
(D) POWER CORD ASS'Y AUSTRALIA TYPE 3P



EXPLODED VIEW OF CABINET & TURNTABLE



PARTS LIST

Ref.No.	Parts No.	Description
	PACKING	
	131 6 1139 68009	Box Corrugate-EXP
	131 6 2119 01331	Bag Polyethylene-EXP (Lid)
	131 6 2119 01362	Bag Polyethylene-EXP (Set)
	131 6 2519 01300	Bag Polyethylene Ind (Weight)
	131 6 3009 25641	Pad (Front)
	131 6 3009 25651	Pad (Rear)
	ACCESSORIES	
	131 6 4119 69302	Explanatory Booklet
	131 6 4159 14700	Notes (Line Cord)
	134 2 2901 10502	Adapter EP (Bag Fan)
	CABINET	
1	131 0 2002 15000	Hinge Assy
2	131 2 1101 37600	Cabinet (Top)
3	131 2 1101 37700	Cabinet (Bottom)
→4	131 0 2202 90121	Lid Assy
4-1	131 2 1107 20100	Lid
4-2	131 2 1310 22101	Name Plate (SANYO)
4-3	131 2 2904 12300	Pad Lid (Lid)
5	131 2 1310 34605	Name Plate (Top Cabinet)
6	131 2 4220 10506	Ring Snap (Reject Knob)
7	131 2 5205 18200	Cushion (Bottom Cabinet)
8	131 2 6111 14200	Bushing (U2, UCS) — Line Cord
	131 2 6111 14700	Bushing (E3) — Line Cord
	131 2 6111 14801	Bushing (A3) — Line Cord
9	131 2 6308 17500	Strobo Filter
10	134 2 1404 11800	Housing (Reject Housing)
11	134 2 1404 11900	Housing (Speed Housing)
12	134 2 1601 15800	Knob (Speed Select & Reject)
13	134 2 4108 20900	Plate (Lid, Hinge)
14	134 2 5205 12200	Cushion (Lid, Hinge)
15	134 2 5205 12700	Cushion (Speed Select Knob)
*	131 2 4201 21500	Screw, Pan Head Tapping 3.5x25 2 – 2, 3 – 4
*	101 3 1504 01002	Screw, Truss Head 4.0x10 1 – 4
*	131 2 4201 19501	Screw (Screw, Button Head Tapping B-TITE 3) 9 – 1
	TURNTABLE	
16	134 2 2101 12801	Unit Plate
17	134 2 2106 11000	Holder (Spring Holder)
18	134 2 5102 13500	Spring Mounting (PL Unit Float)
19	134 2 5205 10001	Cushion (Spring Mounting)
20	131 2 3101 50801	Metal Mount
21*	131 2 3608 10200	Cramp Wire (Trans Lead)
22*	131 2 3610 10401	Lug Egg Like (Earth Lug)
23	131 2 6111 15800	Bushing (Phono Cord)
24	134 0 9902 11701	Assembly Plan (Spindle T.T. Assy)
25	134 2 6101 11800	Turntable
26	134 2 6302 10800	Belt
27*	131 2 3608 11000	Cramp Wire (Power & Phono Cord)
28*	131 2 3608 12000	Cramp Wire (Phono & Line Cord)
*	131 2 4201 13502	Screw (Taptite) 3x8 24 – 3

Ref.No.	Parts No.	Description
	TURNTABLE	
*	102 3 1203 00603	Screw, Pan Head Tapping 3.0x6 22 – 1
*	102 3 1203 01204	Screw, Pan Head Tapping 3.0x12 28 – 2
*	131 2 4201 19502	Screw (Screw, Button Head Tapping B-TIPE 3) 20 – 2
*	131 2 4203 83202	Washer, Plain 3.2x10x1.0 27 – 2
29	134 0 6022 12200	Plate PU Fix Assy
→30	134 0 6030 11300	Gear Cycling Assy
30-1	131 2 4220 10502	Ring Snap
30-2	134 2 4107 00400	Collar
30-3	134 2 4122 11700	Trip
30-4	134 2 4122 11800	Trip
31	134 0 6035 11200	Arm Return Assy
32	134 2 2106 11100	Holder (Rod Holder)
33*	134 2 2403 18200	Angle Mount (Reject Angle)
34	134 2 4106 16200	Shaft (Switch Plate Shaft)
35	134 2 4106 19900	Shaft (Gear Shaft)
36	134 2 4106 20000	Shaft (Return Arm Shaft)
37	134 2 4107 00500	Collar (Gear Shaft)
38	134 2 4108 21000	Plate (Switch Plate)
39	134 2 4112 00200	Rod (Rejector Rod)
40	134 2 4120 17100	Lever
41*	134 2 4121 11500	Guide (Arm Return Guide)
42	134 2 4123 16100	Arm (Return Arm)
E	134 2 4124 11300	Cam (Return Adjust)
44	134 2 5101 20500	Spring
45	134 2 5101 24600	Spring (Arm Return Spring)
46	134 2 5101 26400	Spring (Switch Plate Spring)
47	134 2 5101 28000	Spring (Reject Spring)
*	104 3 1203 00002	Nut, Hex Head 3.0 36 – 1, 34 – 1, 35 – 1
*	108 3 1103 00000	Ring E 3.0 36 – 2, 34 – 1
*	108 3 1104 00000	Ring E 4.0 35 – 1
*	131 2 4220 10401	Ring Snap 3.0 40 – 1
*	102 3 1203 00603	Screw, Pan Head Tapping 3.0x6 41 – 2, 32 – 1
*	101 3 1103 00603	Screw, Pan Head 3.0x6 40 – 2
*	131 2 4201 19501	Screw (Screw, Button Head Tapping B-TITE 3) 33 – 2
*	105 3 1203 00002	Washer, Spring 3.0 36 – 1, 34 – 1, 35 – 1
*	131 2 4203 84700	Washer 36 – 1
*	131 2 4203 83200	Washer, Plain 3.2x8x0.5 35 – 1
*	131 2 4203 83202	Washer, Plain 3.2x10x1.0 35 – 1
48	131 2 2904 12600	Pad (Friction Pad)
49	131 2 4220 10500	Ring Snap (Spring Pin)
50	134 0 6009 12800	Lifter Assy (Cueing Lever)
51	134 0 6026 12700	Angle Elevate Assy (Friction Plate)

NOTE: * Asterisk indicates not a service part.

PARTS LIST

Note: * Asterisk indicates not a service part.

Ref.No.	Parts No.	Description
	TURNTABLE	
52	134 0 6027 11600	Shaft Elevate Assy (Spindle Lifting)
53	134 2 3201 11700	Base Pick-up
54	134 2 3301 12800	Arm Rest
55	134 2 3308 10501	Holder Pick-up (Lock Lever)
56	134 2 3310 11200	Support Arm
57*	134 2 4108 21800	Plate (Cueing Plate)
58	134 2 5101 28200	Spring (Spindle Lifting)
59	134 2 5101 28300	Spring (Spindle Lifting)
60	134 2 5101 29300	Spring (Cueing Spring)
61	134 2 5205 12100	Cushion (Support Arm)
S*	101 3 1203 01002	Screw, Flat Head 3.0x10 56 – 1
*	102 3 1203 02004	Screw, Pan Head Tapping 3.0x20 53 – 3
*	102 3 1202 60601	Screw, Pan Head Tapping 2.6x6 55 – 1, 57 – 1
*	131 2 4201 19500	Screw (Screw, Button Head Tapping B-TITE 3) 51 – 2
*	131 2 4201 13509	Screw (Taptite) 54 – 1
*	131 2 4201 13510	Screw (Taptite) 51 – 1
*	131 2 4201 19501	Screw (Screw, Button Head Tapping B-TITE 3) 76 – 1
*	131 2 4203 84503	Washer, Plain 4.5x8x0.3 52 – 1
*	131 2 4203 83202	Washer, Plain 3.2x10x1.0 76 – 1
62	4 2312 00780	Push Switch (Speed Selector)
63	134 2 1601 15900	Knob (Speed Adjust Knob, 33 rpm)
64	134 2 1601 16000	Knob (Speed Adjust Knob, 45 rpm)
65*	134 2 2403 19100	Angle Mount
66*	134 2 4108 21900	Plate
67	134 2 5205 12400	Cushion (LED Cushion)
*	131 2 4201 19502	Screw (Screw, Button Head Tapping B-TIPE 3) 65 – 2, 66 – 2
*	101 3 1103 00401	Screw, Pan Head 3.0x4 65 – 2
68	4 1579 21071	Pick-up
68-1	4 1579 26690	Cartridge (MG-35V)
68-2	4 1579 29210	Pick-up Stylus (ST-35VD)
69	134 0 4001 06101	Tone Arm Assy
69-1	134 0 4002 11200	Arm Head Assy
69-2	134 0 4003 00900	PU Weight Assy
69-3*	134 2 1402 11500	Retainer Needle
69-4*	134 2 4201 11310	Screw (–) 2.6x9
69-5*	134 2 4202 11301	Nut
69-6*	134 2 4203 01800	Washer
70	131 0 4004 14402	Wire Shield Assy
71	131 2 1401 18700	Cover (IFC Cover)
73	134 2 1601 16100	Knob (IFC Knob)
74*	134 2 2403 18100	Angle Mount
75	134 2 4117 10600	Support Shaft

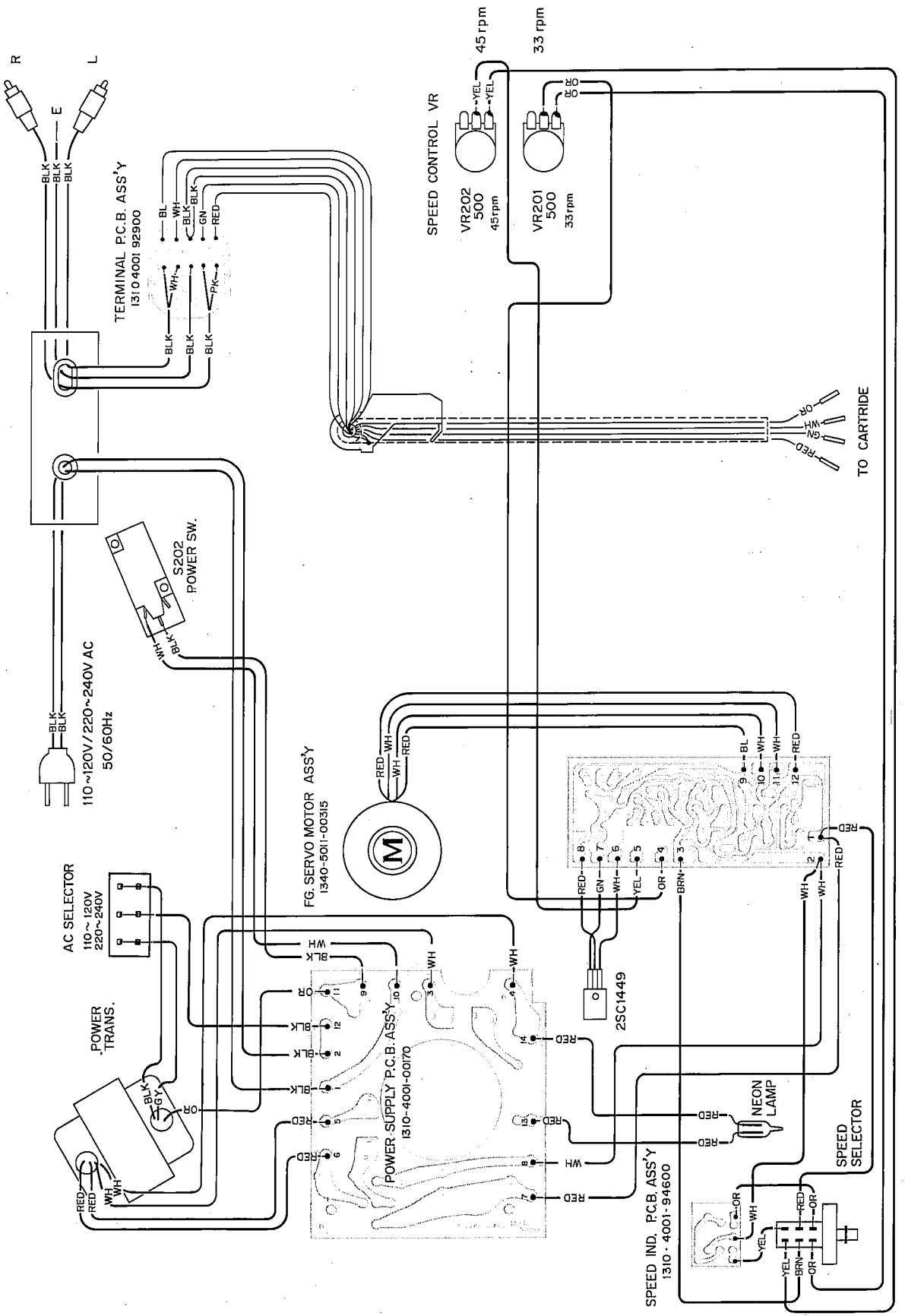
Ref.No.	Parts No.	Description
	TURNTABLE	
76	134 2 4123 16700	Arm (IFC Arm)
77	134 2 4124 11700	Cam (IFC Cam)
78	134 2 5101 29400	Spring (IFC Spring)
79	134 2 5205 12000	Cushion (Pick-up Wire Cramp)
*	131 2 4220 10700	Ring Snap 4.9x0.6 75 – 1
*	102 3 1202 60601	Screw, Pan Head Tapping 2.6x6 73 – 1
*	102 3 1203 00603	Screw, Pan Head Tapping 3.0x6 74 – 2
*	102 3 1702 60606	Screw, Truss Head Tapping 2.6x6 71 – 2
*	131 2 4203 17100	Washer 75 –2
80	4 2319 21994	Switch Micro (Power Switch)
81	4 2312 01020	Switch Slide
82	131 2 3614 19200	Mount P.C.B.
83	131 2 4108 10300	Spindle Pulley (Mount Motor)
84	131 2 6110 27401	Shelter Light (Strobo Reflector)
85	134 0 5011 00315	Motor Assy (DC Servo)
85-1	134 2 6401 12600	Pulley Motor
86	134 2 2403 18400	Angle Mount (Mount Trans)
87	134 2 2403 20101	Angle Mount (Strobo Angle)
88	134 2 4108 20800	Plate (Mount Motor)
89	134 2 4108 21401	Plate (Mount Motor)
90	134 2 5202 11800	Rubber Cushion (Mount Motor)
*	131 2 4201 19700	Screw, Pan Head 2.6x4 88 – 3
*	131 2 4201 19501	Screw (Screw, Button Head Tapping B-TITE 3) 82 – 2
*	131 2 4201 19502	Screw (Screw, Button Head Tapping B-TIPE 3) 86 – 3, 89 – 1, 87 –1
*	131 2 4201 19504	Screw (Screw, Button Head Tapping B-TITE 3) 80 – 2
*	102 3 1203 00603	Screw, Pan Head Tapping 3.0x6 86 – 2, 84 – 1
*	102 3 1203 00803	Screw, Pan Head Tapping 3.0x8 85 – 1
*	131 2 4203 17800	Washer 4.2x10x0.5t 88 – 3
91	4 2222 00180	VR 500Bx2
92	4 2512 05730	Power Transformer
93	4 6129 20793	Neon Lamp
94*	131 0 4001 92900	Terminal P.C.B. Assy
95*	131 0 4001 00170	Power Supply P.C.B. Assy
96*	131 0 4001 94600	Speed Ind P.C.B. Assy
D01	DOO-SLP-114B	Diode, SLP-114B Ind Lamp 33 rpm
D02	DOO-SLP-114B	Diode, SLP-114B Ind Lamp 45 rpm
R01	R2EDSJ152A	Carbon 1.5k 1/4W ±5%
97	134 2 6102 14301	Mat Turntable
98	134 2 6103 10000	Plate Decorate T.T.
A	4 2439 20394	Line Cord (U2, UC, UCS)
B	4 2362 00010	Plug Conversion
C	131 0 4006 00210	Line Cord Assy (E3)
D	4 2439 20650	Line Cord (A3)

The numbers for screws, nuts, and washers, shown in Description, parts using these screws, nuts and washers correspond with Ref. Nos. of the washers.

Example: 3 – 2

3 means **Ref. No.**
2 means **Q'ty.**

POINT TO POINT WIRING DIAGRAM



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