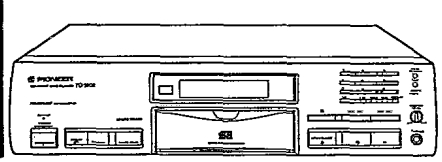
PIONEER®
The Art of Entertainment

Service Manual



ORDER NO.
ARP2684

COMPACT DISC PLAYER

PD-S502

PD-S502 HAS THE FOLLOWING:

Type	Power Requirement	Remarks
WEMXK	AC220 – 240V	
WBXK	AC220 – 240V	
WPW	AC220 – 240V	
RD	AC100 – 127V, 220 – 240V (Switchable)	
WL	AC220 – 240V	

- **This manual is applicable to PD-S502/WEMXK, WBXK, RD, WPW and WL.**
- **For WBXK, RD, WPW and WL types, refer to page 36.**

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PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 300 Allstate Parkway Markham, Ontario L3R 0P2 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

SJ MAR. 1993 Printed in Japan

1. SAFETY INFORMATION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5).
When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

NOTICE
(FOR CANADIAN MODEL ONLY)
Fuse symbols -▮▭▭- (fast operating fuse) and/or -▮▭▭- (slow operating fuse) on PCB indicate that replacement parts must be of identical designation.

REMARQUE
(POUR MODÈLE CANADIEN SEULEMENT)
Les symboles de fusible -▮▭▭- (fusible de type rapide) et/ou -▮▭▭- (fusible de type lent) sur CCI indiquent que les pièces de remplacement doivent avoir la même désignation.

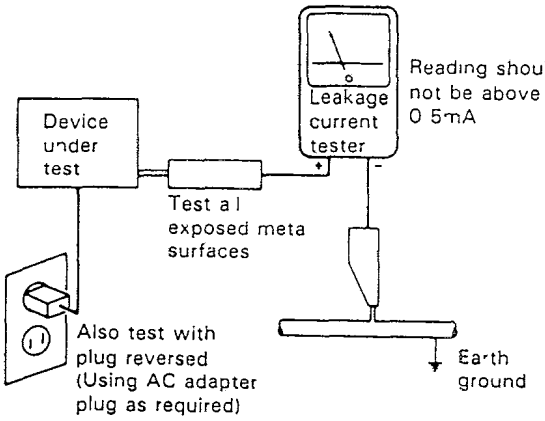
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.
The use of a substitute replacement component which dose not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

(FOR EUROPEAN MODEL ONLY)

VARO!
AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

ADVERSEL:
USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSAETTELSE FOR STRÅLING.

VARNING!
OSYNLIG LASERSTRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRAKTA EJ STRÅLEN.

LASER
Kuva 1
Lasersateilyn varoitusmerkki

WARNING!
DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.

IMPORTANT
THIS PIONEER APPARATUS CONTAINS LASER OF CLASS 1.
SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

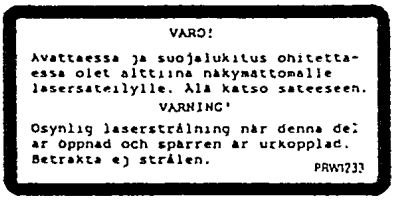
LASER DIODE CHARACTERISTICS
MAXIMUM OUTPUT POWER: 5 mw
WAVELENGTH: 780-785 nm

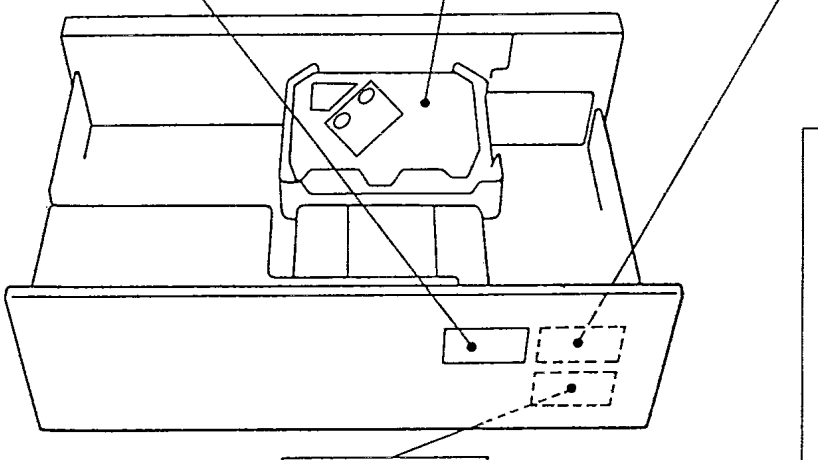
LASER
Picture 1
Warning sign for laser radiation

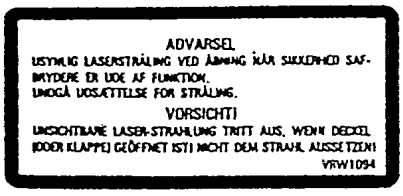
LABEL CHECK

WBXK and WEMXK types

WEMXK type







WEMXK type

WBXK type

Additional Laser Caution

1. Laser Interlock Mechanism
   The position of the switch (S601) for detecting loading completion is detected by the system microprocessor, and the design prevents laser diode oscillation when the switch (S601) is not in $\overline{\text{CLMP}}$ terminal side (when the mechanism is not clamped and $\overline{\text{CLMP}}$ signal is high level). Thus, the interlock will no longer function if the switch (S601) is deliberately set to $\overline{\text{CLMP}}$ terminal side (if $\overline{\text{CLMP}}$ signal is low level).
   In the test mode * the interlock mechanism will not function.
   Laser diode oscillation will continue, if pin 1 of M51593FP (IC101) on the preamplifier board loaded on pickup assembly are connected to GND, or pin 19 is connected to low level (ON), or else the terminals of Q101 are shorted to each other (fault condition).
2. When the cover is opened, close viewing of the objective lens with the naked eye will cause exposure to a Class 1 laser beam.

* Refer to page 28.

2. EXPLODED VIEWS, PACKING AND PARTS LIST

2.1 EXTERIOR

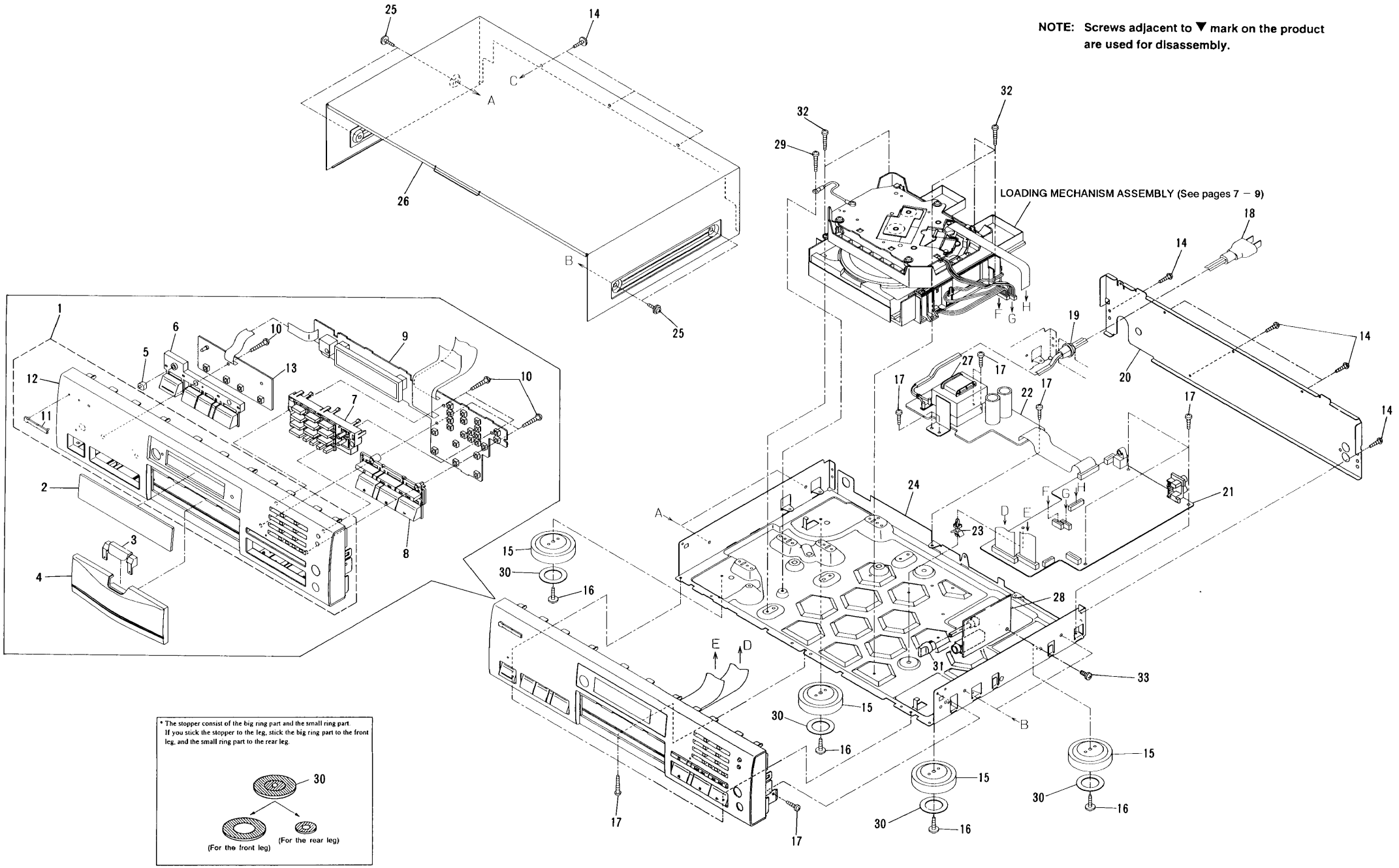
NOTES:

- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

Parts List

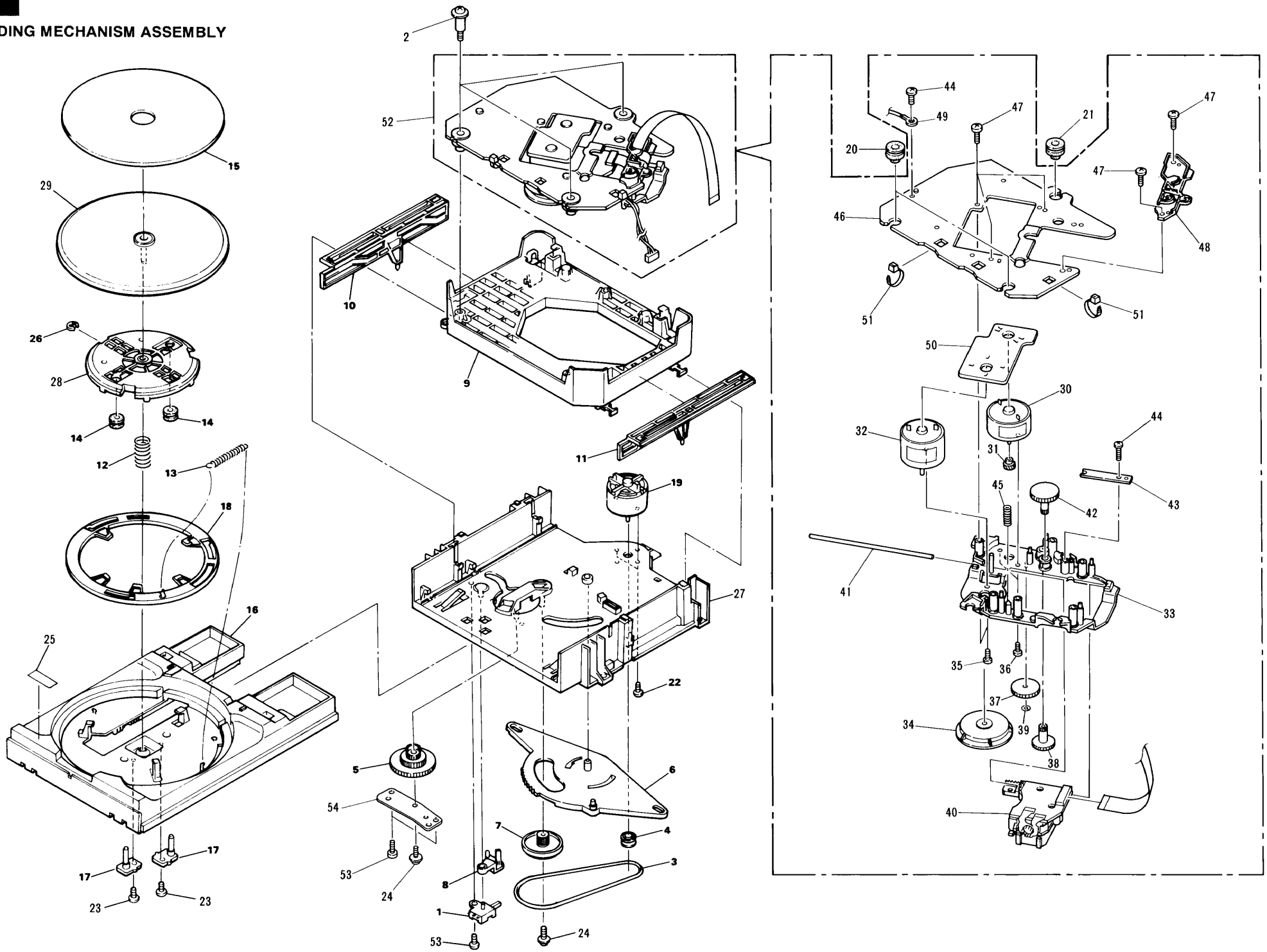
Mark	No.	Description	Part No.
	1	Function panel assembly	PEA1261
	2	Display window	PAM1612
	3	Tray lens	PNW2242
	4	Tray name plate	PNW2244
	5	LED lens	PNW2019
	6	Power button	PAC1712
	7	10key	PAC1714
	8	Function button	PAC1713
	9	FUNCTION board assembly	PWZ2614
	10	Screw	PPZ30P150FMC
	11	PIONEER badge	PAM1608
	12	Function panel	PNW2243
NSP	13	SW board assembly	PWZ2615
	14	Screw	BBZ30P080FCC
	15	Insulator	PNW1263
	16	Screw	IBZ30P100FCC
	17	Screw	BBZ30P060FCC
⚠	18	AC power cord	PDG1003
⚠	19	Strain relief	CM – 22B
NSP	20	Rear base	PNA1962
	21	MAIN board assembly	PWZ2479
	22	SERVO TRANS board assembly	PWZ2487
NSP	23	PCB holder	PNW2100
NSP	24	Under base	PNA1912
	25	Screw	FBT40P080FZK
	26	Bonnet	PYY1162
⚠	27	Power transformer	PTT1236
NSP	28	HEADPHONE board assembly	PWZ2616
	29	Screw	PDZ30P050FMC
	30	Stopper	PNM1070
	31	Headphone knob	PAC1600
	32	Screw	BSZ30P070FMC
	33	Screw	IBZ30P060FCC

NOTE: Screws adjacent to ▼ mark on the product are used for disassembly.



* The stopper consist of the big ring part and the small ring part. If you stick the stopper to the leg, stick the big ring part to the front leg, and the small ring part to the rear leg.

2.2 LOADING MECHANISM ASSEMBLY



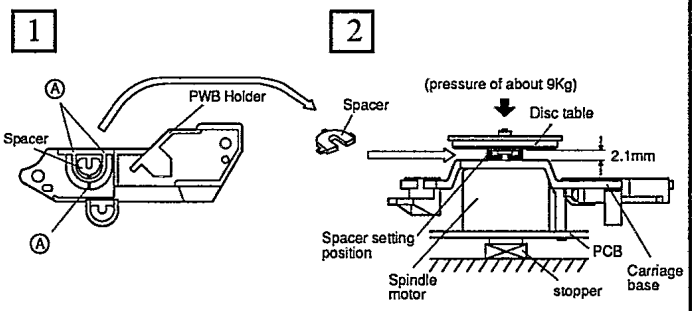
Parts List

Mark	No.	Description	Part No.
	1	Lever switch (S601)	DSK1003
	2	Screw (steel)	PBA1027
	3	Rubber belt	PEB1186
	4	Motror pulley	PNW1634
	5	Drive gear	PNW1996
	6	Synchro lever	PNW2168
	7	Gear pulley	PNW1998
	8	SW head	PNW1999
	9	Float base	PNW2000
	10	Left cam	PNW2001
	11	Right cam	PNW2002
	12	Compression spring	PBH1120
	13	Tention spring	PBH1121
	14	Float (rubber)	PEB1014
	15	Table rubber sheet	PEB1181
	16	Tray	PNW2003
	17	Table guide	PNW2004
	18	Lock plate	PNW2005
	19	DC motor (0.75W, LOADING)	PXM1010
	20	Rubber bush	PEB1031
	21	Rubber bush	PEB1170
	22	Screw	BMZ26P040FMC
	23	Screw	IPZ26P060FCU
	24	Screw	IPZ20P080FMC
	25	Caution label	PRW1244
	26	Washer	Z39 – 017
NSP	27	Loading base	PNW1995
NSP	28	Table bearing assembly	PXA1383
NSP	29	Turn table (AL)	PNR1044
	30	DC motor (CARRIAGE)	PXM1027
	31	Pinion gear	PNW2055
	32	DC motor assembly (SPINDLE, with oil)	PEA1236
NSP	33	Carriage base	PNW2058
	34	Disc table	PNW1067
	35	Screw	JFZ20P030FNI
	36	Screw	JFZ17P025FZK
	37	Gear 3	PNW2054
	38	Gear 2	PNW2053
	39	Washer	WT12D032D025
	40	Pickup assembly	PEA1179
	41	Guide bar	PLA1094
	42	Gear 1	PNW2052
NSP	43	Gear stopper	PNB1303
	44	Screw	BPZ20P060FMC
	45	Spring	PBH1132
NSP	46	Mechanism base	PNB1431
	47	Screw	BPZ20P100FMC
	48	PWB holder	PNW2057
NSP	49	Earth lead unit	PDF1104
NSP	50	Mechanism board assembly	PWX1192
	51	Cord clamper	REC – 371
NSP	52	Servo mechanism assembly	PXA1479
	53	Screw	BPZ26P060FMC
	54	Shaft holder	PNB1382

• How to install the disc table

1 Use nipper or other tool to cut the three sections marked Ⓐ figure 1. Then remove the spacer.

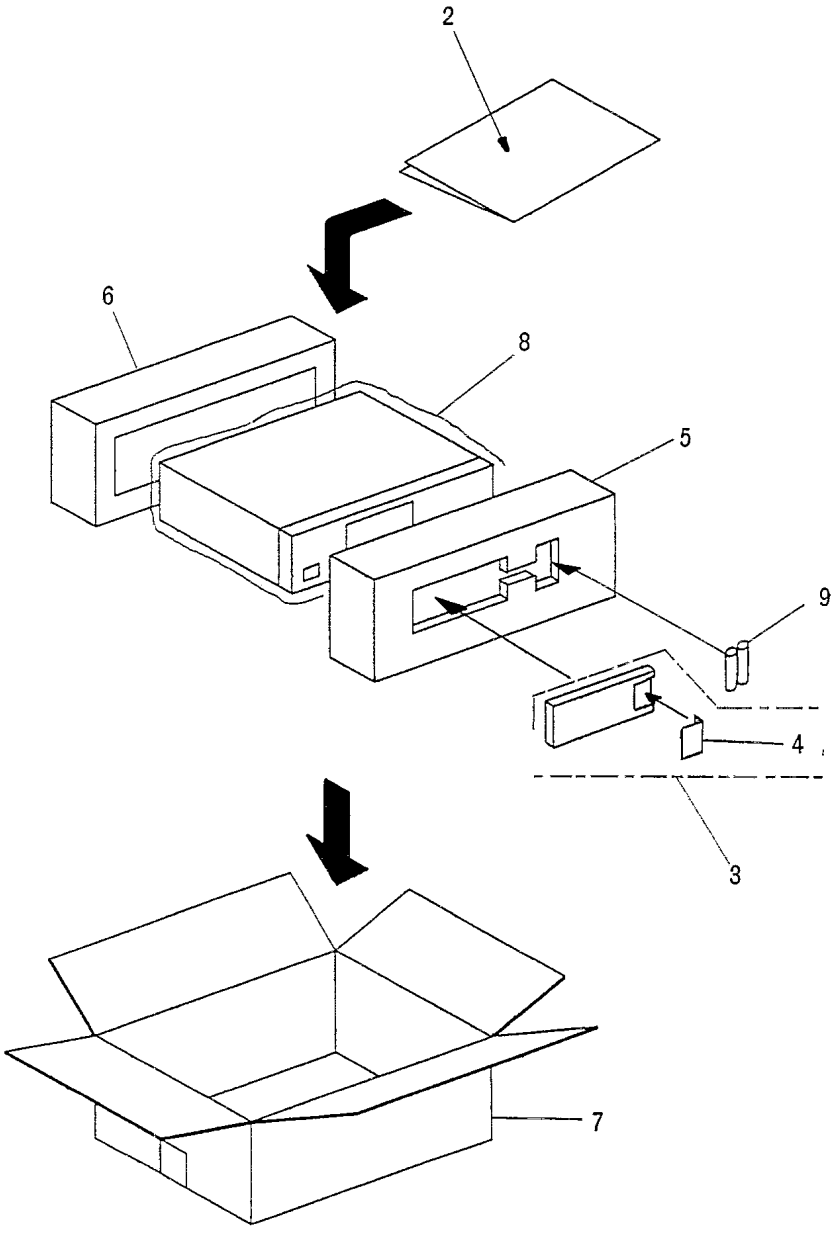
2 While supporting the spindle motor shaft with the stopper, put spacer on top of the motor base and stick the disc table on top (takes about 9Kg pressure). Take off the spacer.



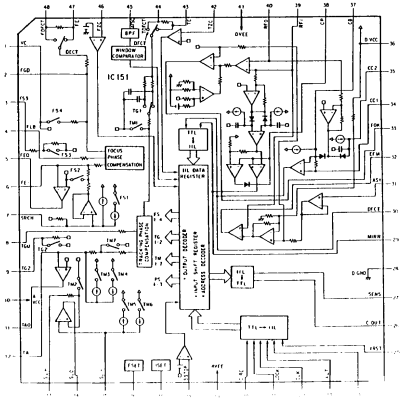
2.3 PACKING

Parts List

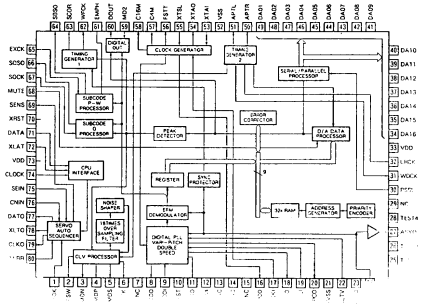
Mark	No.	Description	Part No.
	1	Cord with pin plug	PDE1109
	2	Operating instructions (English/French/German/Italian /Dutch/Swedish/Spanish/Portuguese)	PRE1173
	3	Remote control unit	PWW1061
	4	Battery lid	PZN1010
	5	Protector F	PHA1237
	6	Protector R	PHA1261
	7	CD packing case	PHG1902
	8	Sheet	Z23 – 007
NSP	9	Battery (R03, AAA)	VEM – 022



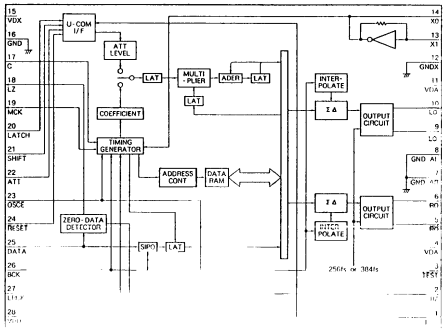
IC151: CXA1372Q



IC301: CXD2500BQ



IC401: PD2026B



Note: (Type 4)

1. **When ordering service parts, be sure to refer to "PARTS LIST of EXPLODED VIEWS" or "PCB PARTS LIST".**
2. **Since these are basic circuits, some parts of them or the values of some components may be changed for improvement.**
3. **RESISTORS:**
   Unit: k:kΩ, M:MΩ, or Ω unless otherwise noted.
   Rated power: 1/4W, 1/6W, 1/8W, 1/10W unless otherwise noted.
   Tolerance: (F): ±1%, (G): ±2%, (K): ±10%, (M): ±20% or ±5% unless otherwise noted.
4. **CAPACITORS:**
   Unit: p:pF or μF unless otherwise noted.
   Ratings: capacitor (μF)/ voltage (V) unless otherwise noted.
   Rated voltage: 50V except for electrolytic capacitors.
5. **COILS:**
   Unit: m:mH or μH unless otherwise noted.
6. **VOLTAGE AND CURRENT:**
   ▭ : DC voltage (V) in PLAY mode unless otherwise noted.
   ⇨ mA or ← mA: DC current in PLAY mode unless otherwise noted.
   Value in ( ) is DC current in STOP mode.
7. **OTHERS:**
   - ● ➡ : Signal route.
   - ● ⌀ : Adjusting point.
   - ● ▼ (Red) : Measurement point.
   - The Δ mark found on some component parts indicates the importance of the safety factor of the parts. Therefore, when replacing, be sure to use parts of identical designation.
8. **SWITCHES** (Underline indicates switch position):

FUNCTION BOARD ASSEMBLY

S701	:	O/C
S702	:	STOP
S703	:	PAUSE
S704	:	PLAY
S706	:	PEAK
S708	:	TIME
S709	:	PGM
S712	:	REP
S713	:	EDIT
S714	:	5
S715	:	10
S716	:	1
S717	:	2
S718	:	3
S719	:	4
S720	:	6
S721	:	7
S722	:	8
S723	:	9
S724	:	⏮
S725	:	⏭
S726	:	>10

SW BOARD ASSEMBLY

S751	:	RND
S752	:	HI – LITE
S753	:	POWER
S754	:	D. OFF

3. DISASSEMBLY

REMOVE THE TRAY NAME PLATE AND THE TRAY LENS

Hold the tray panel with your hands as the figure shouwn right, and grasp the tray with your thumbs and then lift the tray name plate up while pulling it foward you with the other fingers. (Figs. 1 and 2)

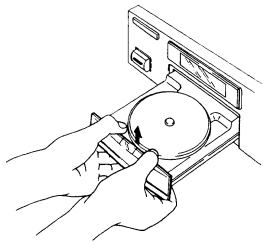


Fig. 1

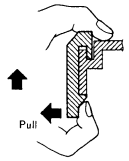


Fig. 2

INSTALL THE TRAY NAME PLATE AND THE TRAY LENS

Align the tray panel with the grooves located at both edges of the tray while holding the tray lens with you fingers, and then press it down till it stops. (Fig. 3)

Hold the tray name plate and the tray as shown in Fig. 4 and slide them down till you hear a click sound while pressing stongly with your thumbs. (Figs. 4 and 5)

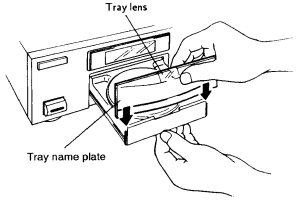


Fig. 3

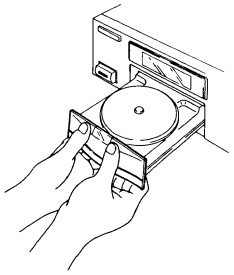


Fig. 4

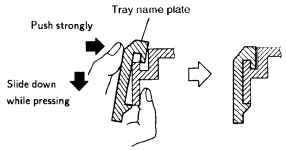


Fig. 5

4. SCHEMATIC DIAGRAM

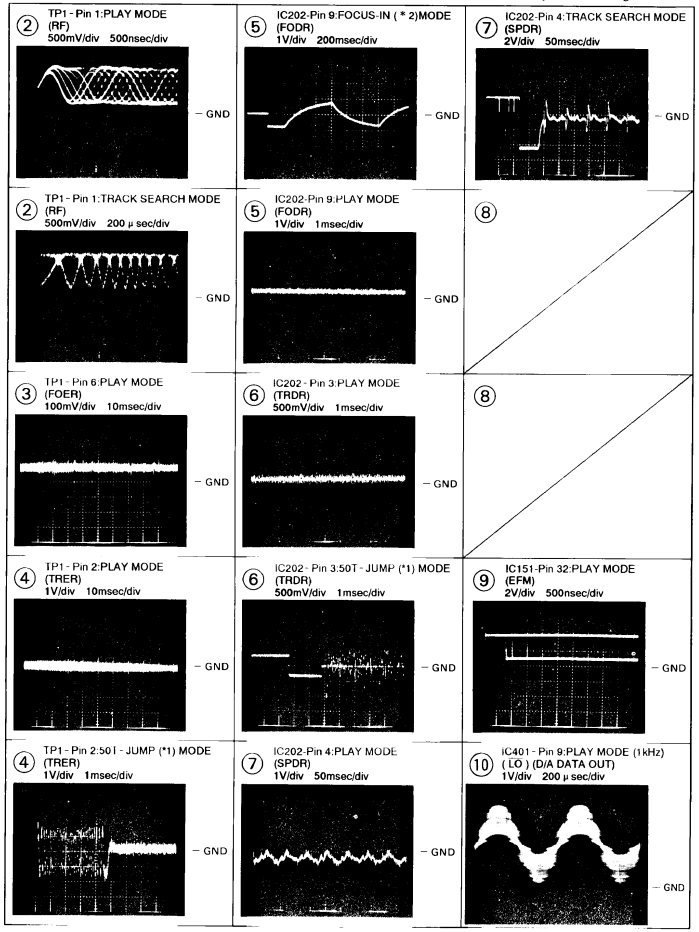
PD-S502

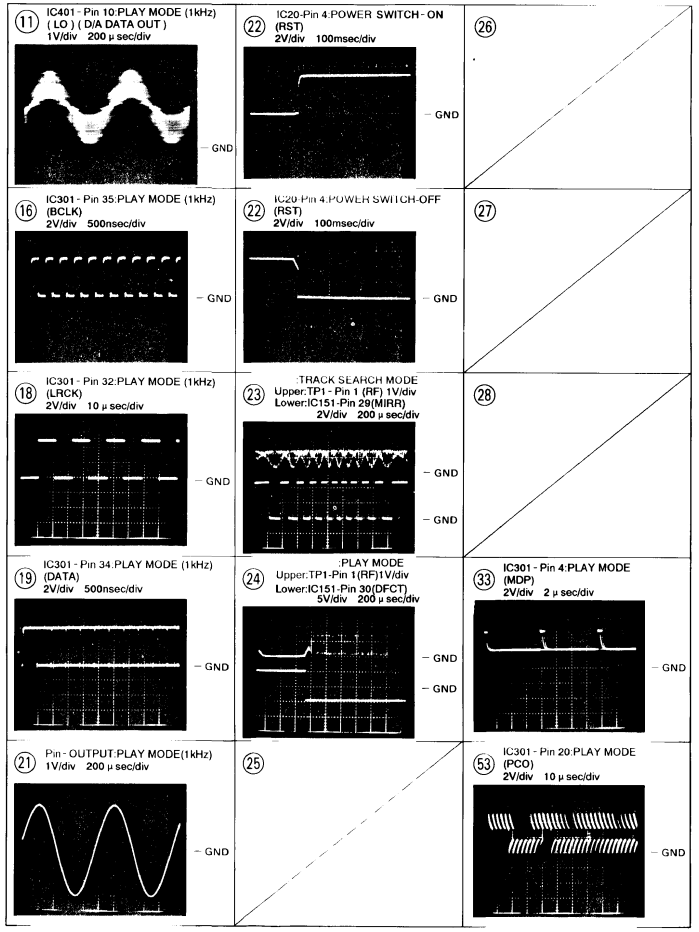
WAVEFORMS

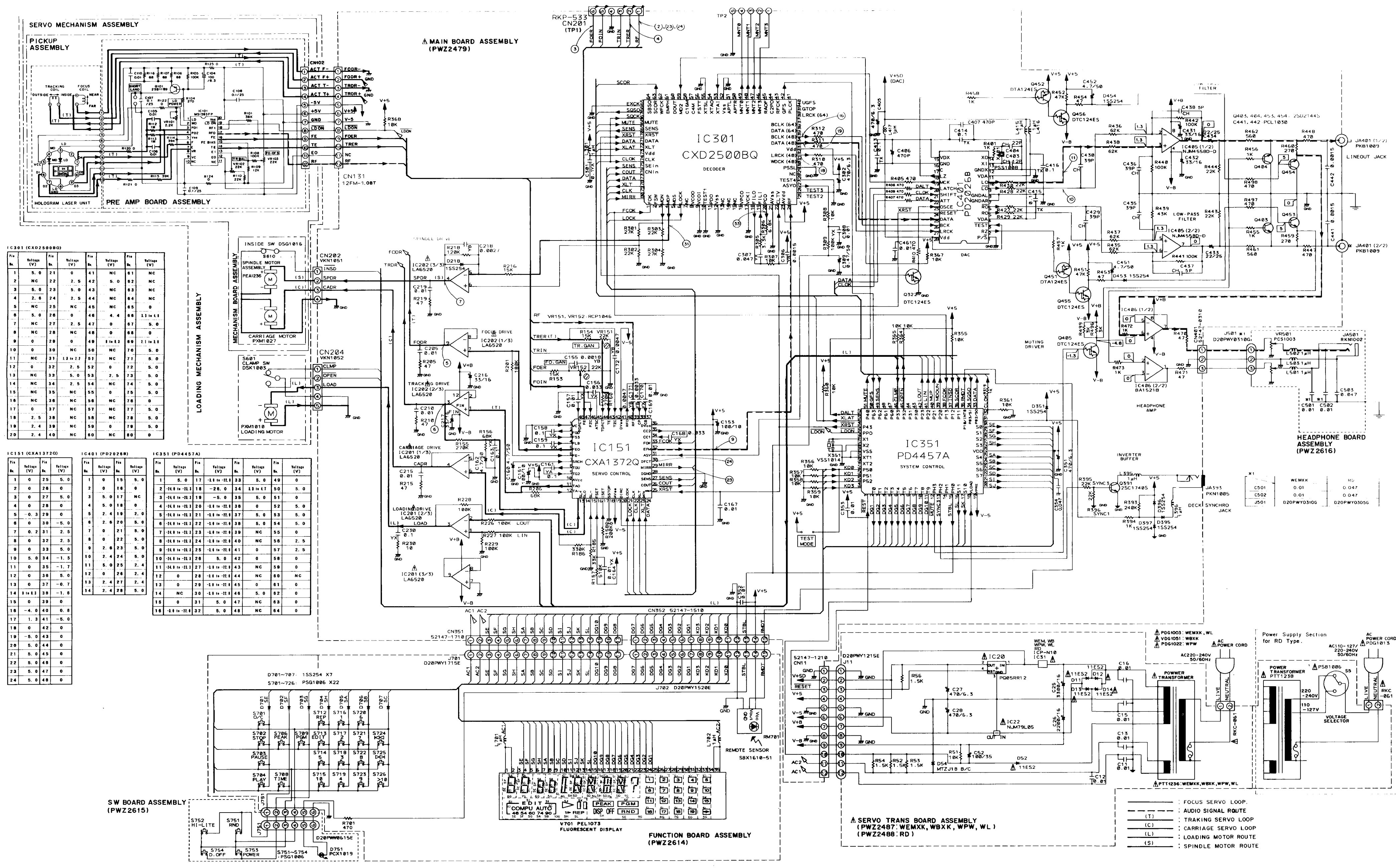
Note: The encircled numbers denote measuring points in the schematic diagram.

*1 50T – JUMP: After switching to the pause mode, press the manual search key.

*2 FOCUS – IN: Press the key without loading a disc.







IC301 (CXD2500BQ)

Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	5.0	21	0	41	NC	61	NC
2	NC	22	2.5	42	5.0	62	NC
3	5.0	23	5.0	43	NC	63	NC
4	2.6	24	2.5	44	NC	64	NC
5	NC	25	NC	45	NC	65	0
6	5.0	26	0	46	4.4	66	3.3 to 4.6
7	NC	27	2.5	47	0	67	5.0
8	NC	28	NC	48	0	68	0
9	0	29	0	49	0 to 0.3	69	2.1 to 3.0
10	0	30	NC	50	NC	70	5.0
11	NC	31	1.3 to 2.2	51	NC	71	5.0
12	0	32	2.5	52	0	72	5.0
13	NC	33	5.0	53	2.5	73	5.0
14	NC	34	2.5	54	NC	74	5.0
15	NC	35	NC	55	0	75	5.0
16	NC	36	NC	56	NC	76	0
17	0	37	NC	57	NC	77	5.0
18	2.5	38	NC	58	NC	78	5.0
19	2.4	39	NC	59	0	79	5.0
20	2.4	40	NC	60	NC	80	0

IC151 (CXA1372Q)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0	25	5.0
2	0	26	0
3	0	27	5.0
4	0	28	0
5	-0.3	29	0
6	0	30	-5.0
7	0.2	31	2.5
8	0	32	2.5
9	0	33	5.0
10	5.0	34	-1.5
11	0	35	-1.7
12	0	36	5.0
13	0	37	-0.7
14	0 to 0.3	38	-1.6
15	0	39	0
16	-4.0	40	0.8
17	1.3	41	-5.0
18	0	42	0
19	-5.0	43	0
20	5.0	44	0
21	5.0	45	0
22	5.0	46	0
23	5.0	47	0
24	5.0	48	0

IC401 (PD2026B)

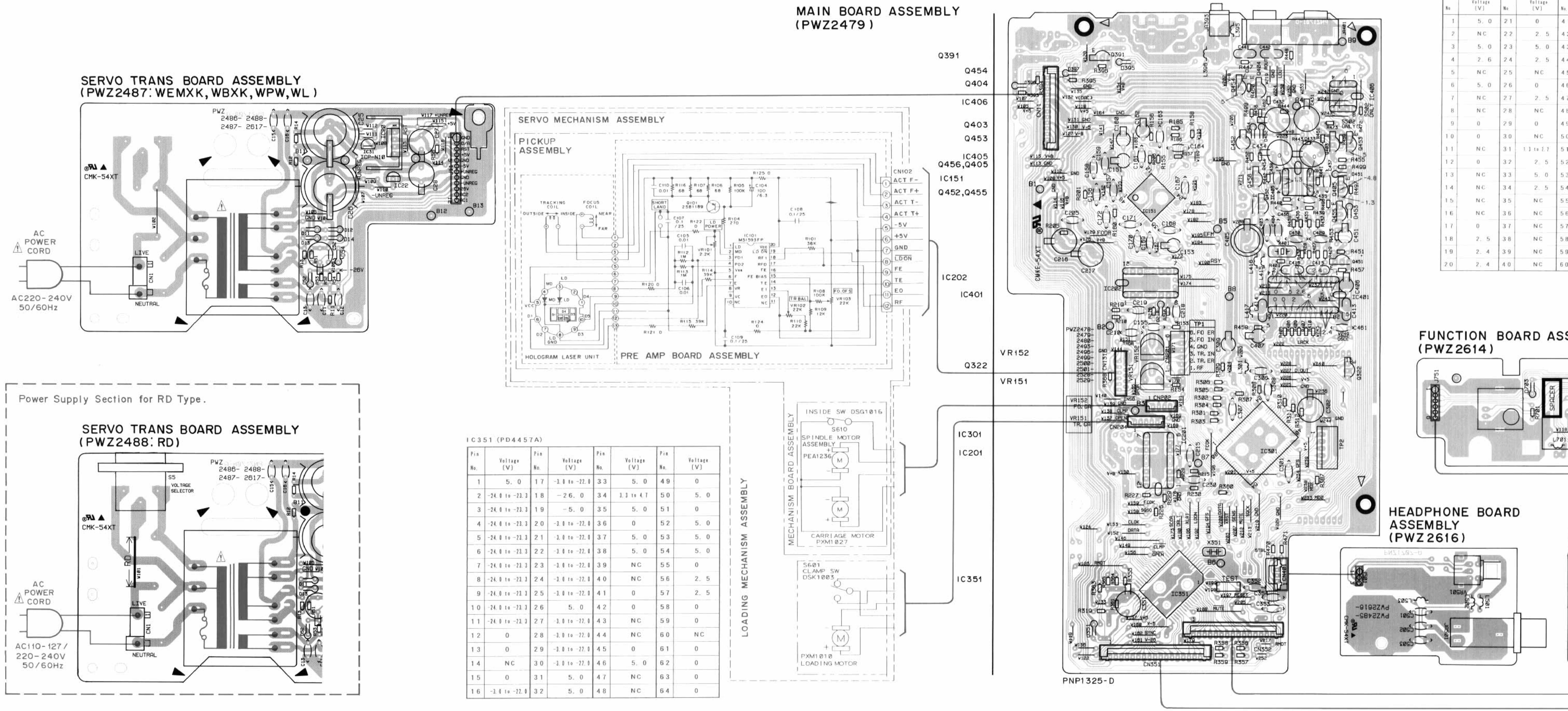
Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0	15	5.0
2	0	16	0
3	5.0	17	NC
4	5.0	18	0
5	2.4	19	2.0
6	2.6	20	5.0
7	0	21	5.0
8	0	22	5.0
9	2.6	23	5.0
10	2.4	24	5.0
11	5.0	25	2.4
12	0	26	2.4
13	2.4	27	2.4
14	2.4	28	5.0

IC351 (PD4457A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	5.0	17	-3.0 to -22.0	33	5.0	49	0
2	-24.0 to -23.3	18	-26.0	34	3.3 to 4.7	50	5.0
3	-24.0 to -23.3	19	-5.0	35	5.0	51	0
4	-24.0 to -23.3	20	-3.0 to -22.0	36	0	52	5.0
5	-24.0 to -23.3	21	-3.0 to -22.0	37	5.0	53	5.0
6	-24.0 to -23.3	22	-3.0 to -22.0	38	5.0	54	5.0
7	-24.0 to -23.3	23	-3.0 to -22.0	39	NC	55	0
8	-24.0 to -23.3	24	-3.0 to -22.0	40	NC	56	2.5
9	-24.0 to -23.3	25	-3.0 to -22.0	41	0	57	2.5
10	-24.0 to -23.3	26	5.0	42	0	58	0
11	-24.0 to -23.3	27	-3.0 to -22.0	43	NC	59	0
12	0	28	-3.0 to -22.0	44	NC	60	NC
13	0	29	-3.0 to -22.0	45	0	61	0
14	NC	30	-3.0 to -22.0	46	5.0	62	0
15	0	31	5.0	47	NC	63	0
16	-3.0 to -22.0	32	5.0	48	NC	64	0

5. PCB CONNECTION DIAGRAM

- View from component side



IC301 (CXD2500BQ)

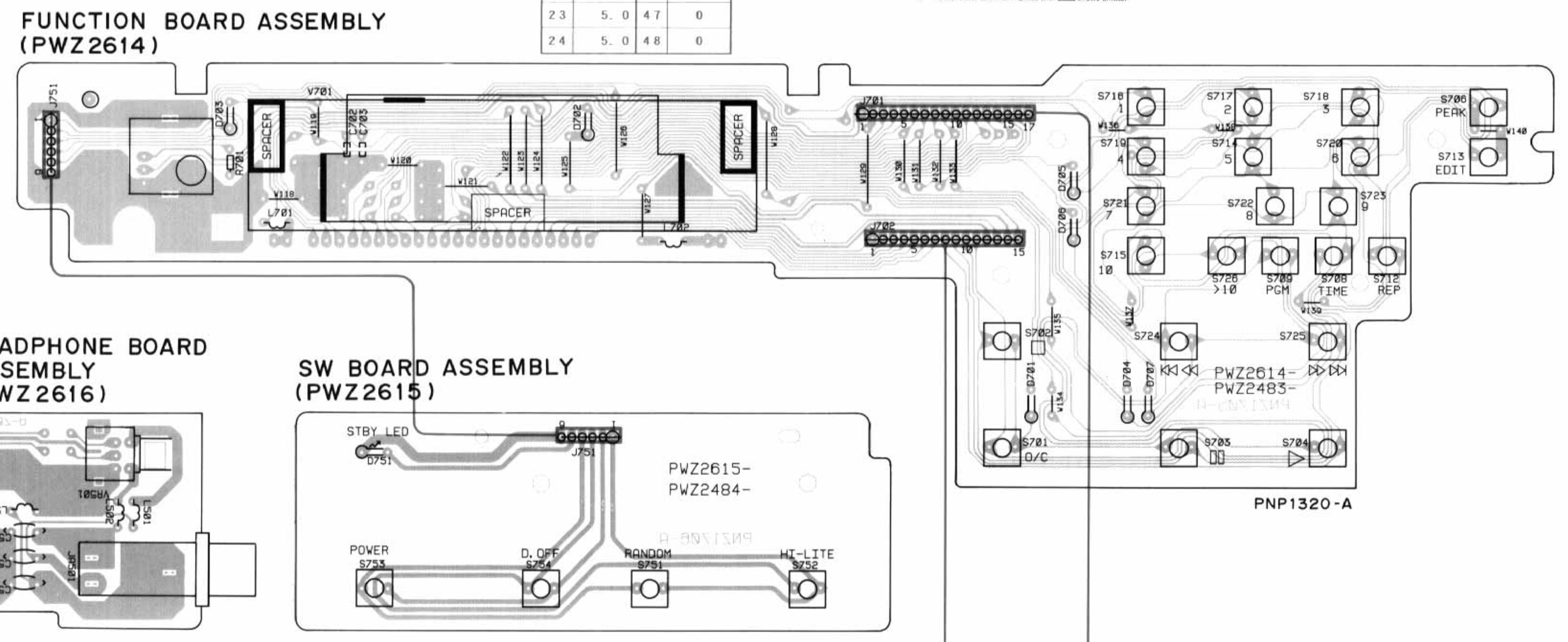
Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	5.0	21	0	41	NC	61	NC
2	NC	22	2.5	42	5.0	62	NC
3	5.0	23	5.0	43	NC	63	NC
4	2.6	24	2.5	44	NC	64	NC
5	NC	25	NC	45	NC	65	0
6	5.0	26	0	46	4.4	66	1.3 to 4.6
7	NC	27	2.5	47	0	67	5.0
8	NC	28	NC	48	0	68	0
9	0	29	0	49	0 to 0.3	69	2.1 to 3.4
10	0	30	NC	50	NC	70	5.0
11	NC	31	1.3 to 2.7	51	NC	71	5.0
12	0	32	2.5	52	0	72	5.0
13	NC	33	5.0	53	2.5	73	5.0
14	NC	34	2.5	54	NC	74	5.0
15	NC	35	NC	55	0	75	5.0
16	NC	36	NC	56	NC	76	0
17	0	37	NC	57	NC	77	5.0
18	2.5	38	NC	58	NC	78	5.0
19	2.4	39	NC	59	0	79	5.0
20	2.4	40	NC	60	NC	80	0

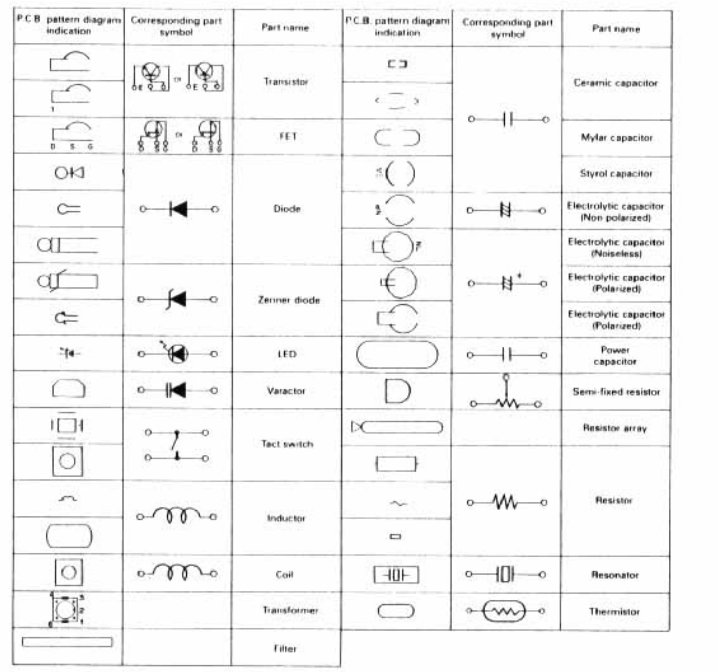
IC151 (CXA1372Q)

Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	0	25	5.0
2	0	26	0
3	0	27	5.0
4	0	28	0
5	−0.3	29	0
6	0	30	−5.0
7	0.2	31	2.5
8	0	32	2.5
9	0	33	5.0
10	5.0	34	−1.5
11	0	35	−1.7
12	0	36	5.0
13	0	37	−0.7
14	0 to 0.3	38	−1.6
15	0	39	0
16	−4.0	40	0.8
17	1.3	41	−5.0
18	0	42	0
19	−5.0	43	0
20	5.0	44	0
21	5.0	45	0
22	5.0	46	0
23	5.0	47	0
24	5.0	48	0

IC351 (PD4457A)

Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)	Pin No.	Voltage (V)
1	5.0	17	-3.0 to -22.0	33	5.0	49	0
2	-24.0 to -23.3	18	−26.0	34	3.3 to 4.7	50	5.0
3	-24.0 to -23.3	19	−5.0	35	5.0	51	0
4	-24.0 to -23.3	20	-3.0 to -22.0	36	0	52	5.0
5	-24.0 to -23.3	21	-3.0 to -22.0	37	5.0	53	5.0
6	-24.0 to -23.3	22	-3.0 to -22.0	38	5.0	54	5.0
7	-24.0 to -23.3	23	-3.0 to -22.0	39	NC	55	0
8	-24.0 to -23.3	24	-3.0 to -22.0	40	NC	56	2.5
9	-24.0 to -23.3	25	-3.0 to -22.0	41	0	57	2.5
10	-24.0 to -23.3	26	5.0	42	0	58	0
11	-24.0 to -23.3	27	-3.0 to -22.0	43	NC	59	0
12	0	28	-3.0 to -22.0	44	NC	60	NC
13	0	29	-3.0 to -22.0	45	0	61	0
14	NC	30	-3.0 to -22.0	46	5.0	62	0
15	0	31	5.0	47	NC	63	0
16	-3.0 to -22.0	32	5.0	48	NC	64	0





1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with ○ shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.

5. PCB CONNECTION DIAGRAM

- View from soldering side

6. PCB PARTS LIST

NOTES:

- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex.1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560 Ω → 56 × 10^1 → 561 ····· RD1/8PM[5][6][1]J
47k Ω → 47 × 10^3 → 473 ····· RD1/4PS[4][7][3]J
0.5 Ω → 0R5 ····· RN2H[0][R][5]K
1 Ω → 010 ····· RS1P[0][1][0]K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62k Ω → 562 × 10^1 → 5621 ····· RN1/4PC[5][6][2][1]F

Mark	No.	Description	Part No.

LIST OF ASSEMBLIES

NSP		MOTHER BOARD ASSEMBLY	PWM1760
		└MAIN BOARD ASSEMBLY	PWZ2479
NSP		SUB BOARD ASSEMBLY	PWX1273
		├FUNCTION BOARD ASSEMBLY	PWZ2614
NSP		├SW BOARD ASSEMBLY	PWZ2615
NSP		├HEADPHONE BOARD ASSEMBLY	PWZ2616
		└SERVO TRANS BOARD ASSEMBLY	PWZ2487
NSP		MECHANISM BOARD ASSEMBLY	PWX1192

MAIN BOARD ASSEMBLY

SEMICONDUCTORS

		IC406	BA15218
		IC151	CXA1372Q
		IC301	CXD2500BQ
⚠		IC201, IC202	LA6520
		IC405	NJM4558D-D
		IC401	PD2026B
		IC351	PD4457A
		Q391	2SC1740S
		Q403, Q404, Q453, Q454	2SD2144S
		Q451, Q452	DTA124ES
		Q322, Q405, Q455, Q456	DTC124ES
		D218, D351, D395-D397, D451-D454	1SS254

COILS

		L301, L395, L396, L415-L417	LAU010K

CAPACITORS

		C435-C438	CCCCH050C50
		C403	CCCCH120J50
		C404	CCCCH220J50
		C429, C430	CCCCH390J50
		C151, C153	CEAS101M10
		C433, C434	CEAS220M25
		C216, C217, C431, C432	CEAS330M16
		C302, C351, C405	CEAS471M6R3
		C160, C162, C451, C452	CEAS4R7M50
		C309	CEASR47M50
		C413-C416	CFTXA104J50
		C406, C407	CFTXA471J50
		C161	CFTYA104J50
		C157, C164, C169, C308	CGCYX103K25
		C158, C159, C163, C230, C301	CGCYX104K25
		C156, C168	CGCYX333K25
		C307, C354	CGCYX473K25
		C306	CKCYB152K50
		C155	CKCYB182K50
		C218	CKCYB272K50
		C170	CKCYB332K50
		C171, C172	CKCYB472K50
		C167, C205, C210, C215, C219, C352, C353, C461	CKCYF103Z50
		C441, C442 (C=0.0015 μ, V(AC)=50V)	PCL1030

RESISTORS

		VR151, VR152 (22k)	RCP1046
		OTHER RESISTORS	RD1/6PM□□□J

OTHERS

		CN131 CONNECTOR(12P)	12FM-1.0BT
		JA401 PIN JACK(2P)	PKB1009
		JA393 MINI JACK	PKN1005
		X401 CRYSTAL RESONATOR(16.9344MHz)	PSS1008
		X351 CERAMIC RESONATOR(4.19MHz)	VSS1014

FUNCTION BOARD ASSEMBLY

SEMICONDUCTORS

		D701-D707	1SS254

SWITCHES

		S701-S704, S706, S708, S709, S712-S726	PSG1006

COILS

		L701, L702	LAU010K

RESISTORS

		ALL RESISTORS	RD1/6PM□□□J

Mark	No.	Description	Part No.
		OTHERS	
		V701 FL INDICATOR TUBE	PEL1073
		REMOTE CONTROL SENSOR	SBX1610

SW BOARD ASSEMBLY

		SEMICONDUCTORS	
		D751	PCX1019
		SWITCHES	
		S751-S754	PSG1006

HEADPHONE BOARD ASSEMBLY

		COILS	
		L501-L503	LAU010K
		CAPACITORS	
		C501-C503	CKCYF473Z50
		RESISTORS	
		VR501(kB)	PCS1003
		OTHERS	
		JA501 HEADPHONE JACK	RKN1002

SERVO TRANS BOARD ASSEMBLY

		SEMICONDUCTORS	
⚠		IC31	ICP-N10
⚠		IC22	NJM79L05A
⚠		IC20	PQ05RR12
⚠		D11-D14, D52	11ES2
		D54	MTZJ18B
		CAPACITORS	
		C52	CEAS101M35
		C26	CEAS222M16
		C25	CEAS332M16
		C27, C28	CEAS471M6R3
		C11-C13, C15, C16	CKCYF103Z50
		RESISTORS	
		ALL RESISTORS	RD1/6PM□□□J
		OTHERS	
⚠		TERMINAL	RKC-061

MECHANISM BOARD ASSEMBLY

		SWITCHES	
		S610	DSG1016

7. ADJUSTMENTS

7.1 Adjustment Methods

If a disc player is adjusted incorrectly or inadequately, it may malfunction or not work at all even though there is nothing at all wrong with the pickup or the circuitry. Adjust correctly following the adjustment procedure.

● Adjustment Items/Verification Items and Order

If the specified values cannot be obtained or no adjustment is possible by performing the verifications or adjustments described in steps 1 − 4, the pickup block may be defective.

Step	Item	Test Point	Adjustment Location
1	Focus offset verification	TP1, Pin 6 (FCS. ERR)	None
2	Tracking error balance verification	TP1, Pin 2 (TRK. ERR)	None
3	Pickup radial/tangential direction tilt adjustment	TP1, Pin 1 (RF)	Radial tilt adjustment screw, Tangential tilt adjustment screw
4	RF level verification	TP1, Pin 1 (RF)	None
5	Focus servo loop gain adjustment	TP1, Pin 5 (FCS. IN) TP1, Pin 6 (FCS. ERR)	VR152 (FCS. GAN)
6	Tracking servo loop gain adjustment	TP1, Pin 3 (TRK. IN) TP1, Pin 2 (TRK. ERR)	VR151 (TRK. GAN)

● **Abbreviation table**

FCS. ERR :Focus Error
TRK. ERR :Tracking Error
FCS GAN :Focus Gain
TRK GAN :Tracking Gain
FCS. IN :Focus In
TRK. IN :Tracking In

● Measuring Instruments and Tools

1. Dual trace oscilloscope (10:1 probe)
2. Low-frequency oscillator
3. Test disc (YEDS-7)
4. Low pass filter (39kΩ +0.001 μF)
5. Resistor (100 kΩ)
6. Standard tools

● Test Point and Adjustment Variable Resistor Positions

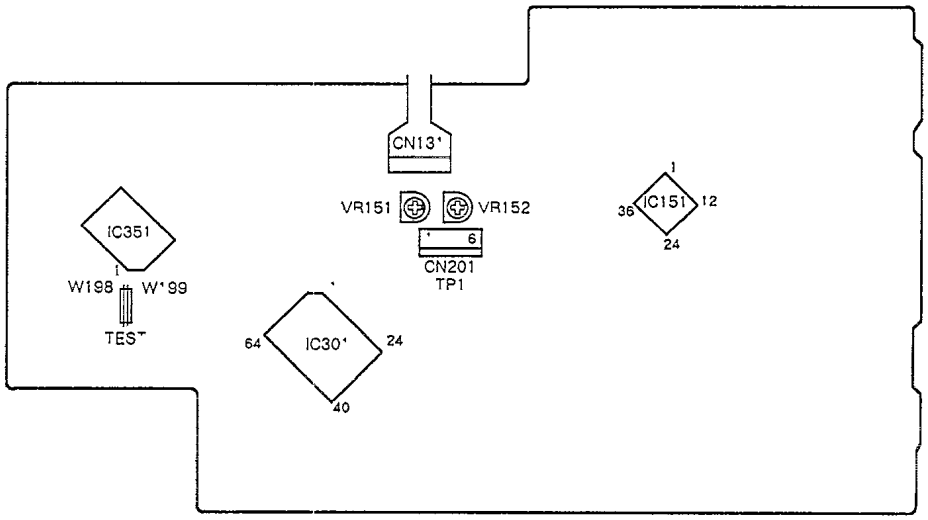


Figure 1. Adjustment Locations

● Notes

1. Use a 10:1 probe for the oscilloscope.
2. All the knob positions (settings) for the oscilloscope in the adjustment procedures are for when a 10:1 probe is used.

● Test Mode

These models have a test mode so that the adjustments and checks required for service can be carried out easily. When these models are in test mode, the keys on the front panel work differently from normal. Adjustments and checks can be carried out by operating these keys with the correct procedure. For these models, all adjustments are carried out in test mode.

[Setting these models to test mode]

How to set this model into test mode.
1. Turn off the power switch.
2. Press the TEST mode switch (S351). (See Figure 1.)
3. Turn on the power switch.

When the test mode is set correctly, the display is different from what it usually is when the power is turned on. If the display is still the same as usual, test mode has not been set correctly, so repeat Steps 1 – 3.

[Release from test mode]

Here is the procedure for releasing the test mode:

1. Press the STOP key and stop all operations.
2. Turn off the power switch on the front panel.

[Operations of the keys in test mode]

Code	Key Name	Function In Test Mode	Explanation
	PGM (PROGRAM)	Focus servo close	The laser diode is lit up and the focus actuator is lifted up, then lowered slowly and the focus servo is closed at the point where the objective lens is focused on the disc. With the player in this state, if you lightly rotate the stopped disc by hand, you can hear the sound the focus servo. If you can hear this sound, the focus servo is operating correctly. If you press this key with no disc mounted, the laser diode lights up, the focus actuator is pulled up, then the actuator is lowered and raised three times and returned to its original position.
▷	PLAY	Spindle servo ON	Starts the spindle motor in the clockwise direction and when the disc rotation reaches the prescribed speed (about 500 rpm at the inner periphery), sets the spindle servo in a closed loop. Be careful. Pressing this key when there is no disc mounted makes the spindle motor run at the maximum speed. If the focus servo does not go correctly into a closed loop or the laser light shines on the mirror section at the outermost periphery of the disc, the same symptom is occurred.
▯▯	PAUSE	Tracking servo close/open	Pressing this key when the focus servo and spindle servo are operating correctly in closed loops puts the tracking servo into a closed loop, displays the track number being played back and the elapsed time on the front panel, and outputs the playback signal. If the elapsed time is not displayed or not counted correctly or the audio is not played back correctly, it may be that the laser is shining on the section with no sound recorded at the outer edge of the disc, that something is out of adjustment, or that there is some other problem. This key is a toggle key and open/close the tracking servo alternately. This key has no effect if no disc is mounted.

Code	Key Name	Function in Test Mode	Explanation
⏮ / ◁◁	TRACK / MANUAL SEARCH REV	Carriage reverse (inwards)	Moves the pickup position toward the inner diameter of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the motor does not automatically stop at the mechanical end point in test mode, be careful with this operation.
▷▷ / ⏭	TRACK / MANUAL SEARCH FWD	Carriage forward (outwards)	Moves the pickup position toward the outer diameter of the disc. When this key is pressed with the tracking servo in a closed loop, the tracking servo automatically goes into an open loop. Since the motor does not automatically stop at the mechanical end point in test mode, be careful with this operation.
□	STOP	Stop	Initializes and the disc rotation stops. The pickup and disc remain where they are when this key is pressed.
⏏	OPEN/CLOSE	Disc tray open/close	Open/close the disc tray. This key is a toggle key and open/close tray altenately. Pressing this key when the disc is turning stops the disc, then opens the tray. This key operation does not affect the position of the pickup.

[How to play back a disc in test mode]

In test mode, since the servos operate independently, playing back a disc requires that you operate the keys in the correct order to close the servos.
Here is the key operation sequence for playing back a disc in test mode.

PGM(PROGRAM)	Lights up the laser diode and closes the focus servo.
⇩	
PLAY ▷	Starts the spindle motor and closes the spindle servo.
⇩	
PAUSE ▯▯	Closes the tracking servo.

Wait at least 2-3 seconds between each of these operations.

1. Focus Offset Verification

● Objective ● Symptom when out of adjustment	Verify the DC offset for the focus error amp. The model does not focus in and the RF signal is dirty.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 6 (FCS. ERR) [Settings] 5 mV/division 10 ms/division DC mode	● Player state ● Adjustment location ● Disc	Test mode, stopped (just the Power switch on) None None needed

[Procedure]

Verify the DC voltage at TP1, Pin 6 (FCS. ERR) is 0 ± 50 mV.

Note : If the specified values cannot be obtained or no adjustment is possible by performing the verifications or adjustments described in adjustment items 1 – 4, the pickup block may be defective.

2. Tracking Error Balance Verification

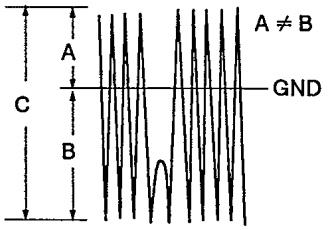
● Objective ● Symptom when out of adjustment	To verify that there is no variation in the sensitivity of the tracking photo diode. Play does not start or track search is impossible.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK. ERR). This connection may be via a low pass filter. [Settings] 50 mV/division 5 ms/division DC mode	● Player state ● Adjustment location. ● Disc	Test mode, focus and spindle servos closed and tracking servo open None YEDS-7

[Procedure]

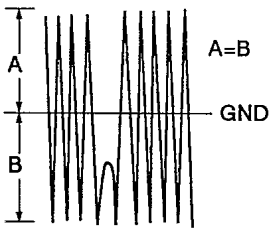
1. Move the pickup to midway across the disc (R=35 mm) with the TRACK/MANUAL SEARCH FWD ▷▷ • ▷▷| or REV |◁◁ • ◁◁ key.
2. Press the PGM (PROGRAM) key, then the PLAY ▷ key in that order to close the focus servo then the spindle servo.
3. Line up the bright line (ground) at the center of the oscilloscope screen and put the oscilloscope into DC mode.
4. Supposing that the positive amplitude of the tracking error signal at TP1, pin 2 (TRK ERR) is (A) and the negative amplitude is (B), the following expression is satisfied.

When $A \geqq B$, $\frac{A-B}{C} \times \frac{1}{2} \leqq 0.1$

When $A < B$, $\frac{B-A}{C} \times \frac{1}{2} \leqq 0.1$



When there is a DC component



When there is no DC component

3. Pickup Radial/Tangential Tilt Adjustment

● Objective	To adjust the angle of the pickup relative to the disc so that the laser beams are shone straight down into the disc for the best read out of the RF signals.		
● Symptom when out of adjustment	Sound broken;some discs can be played but not others.		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 20 mV/division 200 ns/division AC mode	● Player state ● Adjustment location ● Disc	Test mode, play Pickup radial tilt adjustment screw and tangential tilt adjustment screw YEDS-7

[Procedure]

1. Press the TRACK/MANUAL SEARCH FWD ▷▷ • ▷▷| or REV |◁◁ • ◁◁ key to move the pickup to halfway across the disc (R=35mm).
   Press the PGM (PROGRAM) key, the PLAY ▷ key and PAUSE ▯▯ key in that order to close the respective servos and put the player into play mode.
2. First, adjust the radial tilt adjustment screw with a Phillips screwdriver so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly.
3. Next, adjust the tangential tilt adjustment screw with a Phillips screwdriver so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly (Figure 3).
4. Adjust the radial tilt adjustment screw and the tangential tilt adjustment screw again so that the eye pattern can be seen the most clearly. As necessary, adjust the two screws alternately so that the eye pattern can be seen the most clearly.
5. When the adjustment is completed, lock the radial and tangential adjustment screw.
   Note:Radial and tangential mean the directions relative to the disc shown in Figure 2.

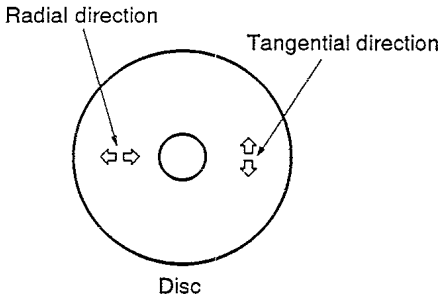
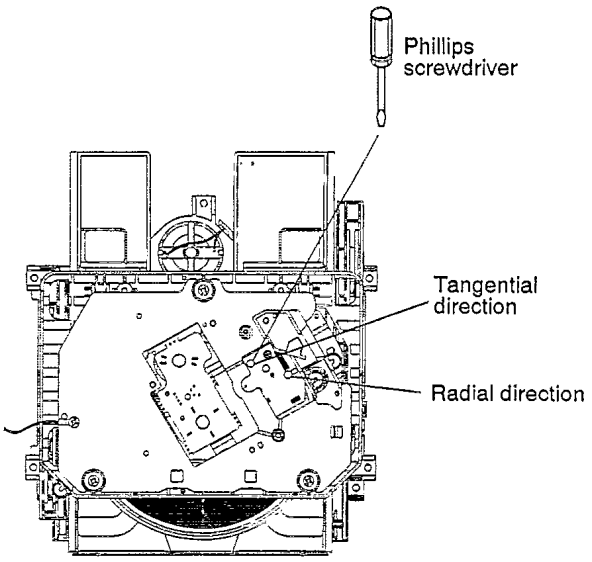


Figure 2



Adjustment locations

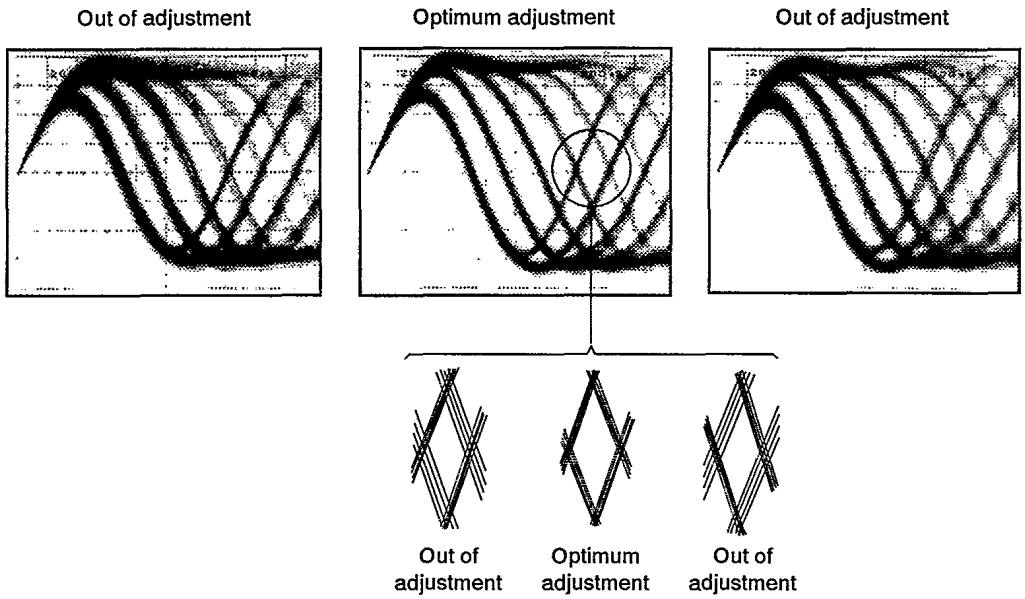


Figure 3. Eye pattern

4. RF Level Verification

● Objective ● Symptom when out of adjustment	To verify the playback RF signal amplitude No play or no search		
● Measurement instrument connections	Connect the oscilloscope to TP1, Pin 1 (RF). [Settings] 50 mV/division 10 ms/division AC mode	● Player state ● Adjustment location ● Disc	Test mode, play None YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R=35 mm) with the TRACK/MANUAL SEARCH FWD ▷▷ • ▷▷| or REV |◁◁ • ◁◁ key, then press the PGM (PROGRAM) key, the PLAY ▷ key and PAUSE ▯▯ key in that order to close the respective servos and put the player into play mode.
2. Verify the RF signal amplitude is 1.2 Vp-p ± 0.2 V.

5. Focus Servo Loop Gain Adjustment

● Objective ● Symptom when out of adjustment	To optimize the focus servo loop gain. Playback does not start or focus actuator noisy.		
● Measurement instrument connections	See figure 4. [Settings] CH1 CH2 20 mV/division 5 mV/division X-Y mode	● Player state - ● Adjustment location ● Disc	Test mode, play VR152 (FCS. GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 1 Vp-p.
2. Press the TRACK / MANUAL SEARCH FWD ▷▷ • ▷▷| or REV |◁◁ • ◁◁ key to move the pickup to halfway across the disc (R=35 mm), then press the PGM (PROGRAM) key, the PLAY ▷ key and the PAUSE ▯▯ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR152 (FCS. GAN) so that the Lissajous waveform is symmetrical about the X axis and the Y axis.

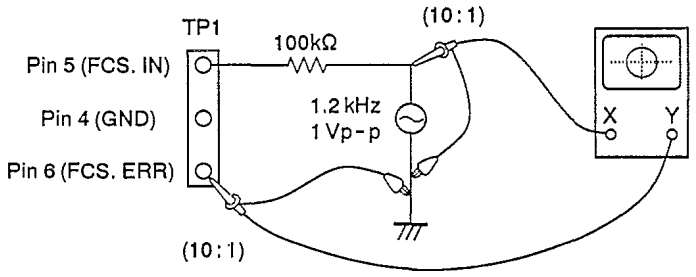
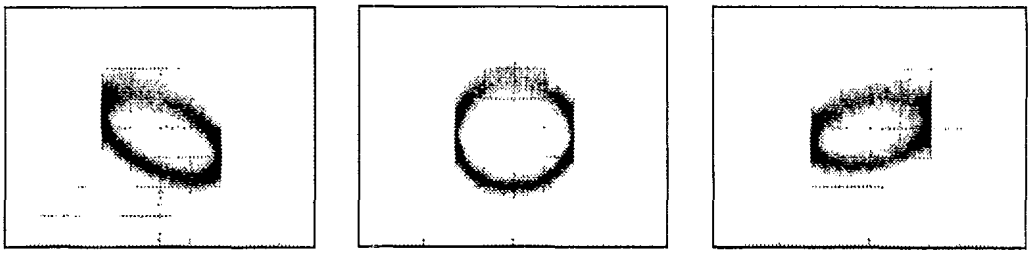


Figure 4

Focus Gain Adjustment



Higher gain | Optimum gain | Lower gain

6. Tracking Servo Loop Gain Adjustment

● Objective	To optimize the tracking servo loop gain.		
● Symptom when out of adjustment	Playback does not start, during searches the actuator is noisy, or tracks are skipped.		
● Measurement instrument connections	See Figure 5. [Settings] CH1 CH2 50 mV/division 20 mV/division X-Y mode	● Player state ● Adjustment location ● Disc	Test mode, play VR151 (TRK. GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 2 Vp-p.
2. Press the TRACK/MANUAL SEARCH FWD ▷▷ • ▷▷| or REV |◁◁ • ◁◁ key to move the pickup to halfway across the disc (R=35 mm), then press the PGM (PROGRAM)key, the PLAY ▷ key and the PAUSE ▯▯ key in that order to close the corresponding servos and put the player into play mode.
3. Adjust VR151 (TRK. GAN) so that the Lissajous waveform is symmetrical about the X axis and the Y axis.

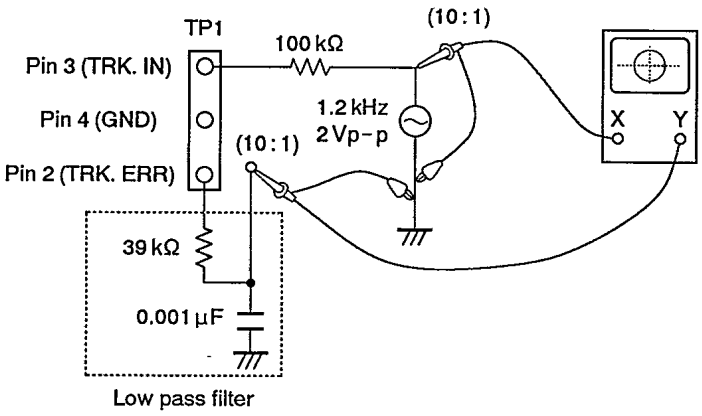
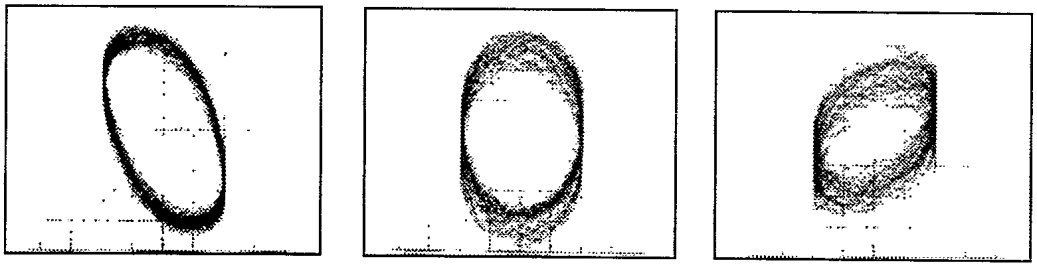


Figure 5

Tracking Gain Adjustment



Higher gain | Optimum gain | Lower gain

8. FOR WBXK, RD, WL AND WPW TYPES

CONTRAST OF MISCELLANEOUS PARTS

NOTES:

- Parts marked by "NSP" are generally unavailable because they are not in our Master Spare Parts List.
- The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.

PD-S502/WBXK, RD, WL, WPW and WEMXK have the same construction except for the following :

Mark	Symbol & Description	Part No.					Remarks
		WEMXK type	WBXK type	RD type	WL type	WPW type	
NSP	SUB board assembly	PWX1273	PWX1273	PWX1274	PWX1273	PWX1273	
	SERVO TRANS board assembly	PWZ2487	PWZ2487	PWZ2488	PWZ2487	PWZ2487	
⚠	AC power cord	PDG1003	VDG1051	PDG1013	PDG1003	RDG1022	
⚠	Power transformer (AC220 – 240V)	PTT1236	PTT1236	.....	PTT1236	PTT1236	
⚠	Power transformer (AC100 – 127/220 – 240V)	.....	.....	PTT1238	.....	.....	
	Display window	PAM1612	PAM1612	PAM1597	PAM1597	PAM1597	
	Function panel assembly	PEA1261	PEA1261	.....	.....	.....	
	Protector R	PHA1261	PHA1259	PHA1238	PHA1238	PHA1238	
NSP	Rear base	PNA1962	PNA1963	PNA1964	PNA2033	PNA1965	
	CD packing case	PHG1902	PHG1903	PHG1905	PHG1905	PHG1905	
	Operating instructions (English/French/German/Italian/ Dutch/Swedish/Spanish/Portuguese)	PRE1173	.....	.....	.....	.....	
	Operating instructions (English)	.....	PRB1191	PRB1183	PRB1183	PRB1183	
	Operating instructions (Spanish)	.....	.....	PRC1057	.....	.....	

SERVO TRANS BOARD ASSEMBLY

PWZ2488 and PWZ2487 have the same construction except for the following:

Mark	Symbol & Description	Part No.		Remarks
		PWZ2487	PWZ2488	
	S5 (Voltage selector)	.....	PSB1006	

9. SPECIFICATIONS AND PANEL FACILITIES

SPECIFICATIONS

1. General

Type ..... Compact disc digital audio system
Power requirements
European and Singapore models .....AC 220 - 240 V, 50/60 Hz
U.K. and Australian models .....AC 220 - 240 V, 60 Hz
Other models .....AC 110 - 127/220 - 240 V (Switchable), 50/60 Hz
Power consumption .....15 W
Operating temperature .....+5°C - +35°C
+41°F - +95°F
Weight .....3.8 kg (8 lb, 6 oz)
External dimensions .....420(W) X 286(D) X 116(H) mm
16-9/16(W) X 11-1/4(D) X 4-9/16(H) in

2. Audio section

Frequency response ..... 2 Hz - 20 kHz
S/N ratio .....106 dB or more (EIAJ)
Dynamic range ..... 96 dB or more (EIAJ)
Harmonic distortion ..... 0.003% or less (EIAJ)
Output voltage .....2.0 V
Wow and flutter ..... Limit of measurement (±0.001% W.PEAK) or less (EIAJ)
Channels ..... 2-channel (stereo)

3. Output terminal

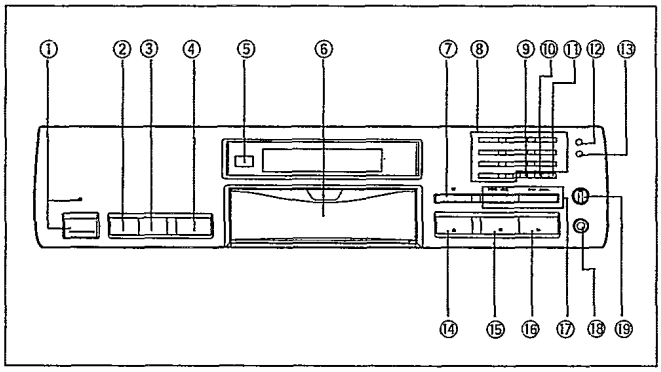
Audio line output jacks
CD-DECK SYNCHRO jack
Headphone jack (with volume control)

4. Accessories

- Remote control unit 1
- Size AAA/R03/dry batteries 2
- Output cable 1
- Operating instructions 1

NOTE:
Specifications and design subject to possible modification without notice, due to improvements.

PANEL FACILITIES



FRONT PANEL

① POWER STANDBY/ON switch and STANDBY indicator
② DISPLAY OFF button
③ RANDOM button
④ HI-LITE SCAN button
⑤ Remote sensor
Receives the signal from the remote control unit.
⑥ Disc tray
⑦ Stop button (■)
⑧ Track number/Digit buttons (1 - 10, >10)
⑨ PGM (Program) button
⑩ TIME button
⑪ REPEAT button
⑫ PEAK SEARCH button
⑬ COMPU/AUTO EDIT button (• COMPU/ •• AUTO)
⑭ OPEN/CLOSE button (⏏)
⑮ Pause button (II)
⑯ Play button (►)
⑰ Track/Manual search buttons (I◄◄ ◄◄ / ►► ►►I)
⑱ Headphones jack (PHONES)
⑲ Headphones volume control (PHONES LEVEL)