



PIONEER®
The future of sound and vision.

Service Manual

ORDER NO.
ARP1990

COMPACT DISC PLAYER

PD-4550

HPW, SD

PD-4500

HPW, SD

- Refer to the service manual ARP1948, PD-4550/KU, and PD-4500/KU types.
- This manual is applicable to the PD-4550/HPW, SD, PD-4500/HPW and SD types.

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1. CONTRAST OF MISCELLANEOUS PARTS

NOTES :

- Parts without part number cannot be supplied.
- Parts marked by "⊙" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- 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.

1.1 FOR PD-4550/HPW AND SD TYPES

The PD-4550/HPW and SD types are the same as the PD-4550/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PD-4550 / KU type	PD-4550 / HPW type	PD-4550 / SD type	
△	Strain relief	CM-22C	CM-22B	CM-22B	
△	Connection cord with mini plug	PDE-319	• • • • •	• • • • •	
△	AC power cord	PDG1002	PDG1006	PDG1013	
△	Power transformer (AC120V)	PTT1124	• • • • •	• • • • •	
△	Power transformer (AC220V, 240V)	• • • • •	PTT1125	• • • • •	
△	Power transformer (AC110V, 120-127V, 220V, 240V)	• • • • •	• • • • •	PTT1126	
⊙	Mother board assembly	PWM1269	PWM1271	PWM1270	
	Cord holder	RNH-184	• • • • •	• • • • •	
	Operating instructions (Spanish)	• • • • •	• • • • •	PRC1027	
△	Line voltage selector (AC110V, 120-127V, 220V, 240V)	• • • • •	• • • • •	PSB1002	

MOTHER BOARD ASSEMBLY (PWM1271 AND PWM1270)

The mother board assembly (PWM1271:PD-4550/HPW type) and (PWM1270:PD-4550/SD type) are the same as the mother board assembly (PWM1269:PD-4550/KU type) with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PWM1269	PWM1271	PWM1270	
△	D11 - D14	11ES2	• • • • •	11ES2	
△	D25	• • • • •	2W02-5008-L	• • • • •	
	D391 - D394	1SS254	• • • • •	• • • • •	
△	IC30	• • • • •	ICP-N10	• • • • •	
	JA391,JA392 Jack (CONTROL IN/OUT)	PKN1004	• • • • •	• • • • •	
	R391	RD1/6PM244J	• • • • •	• • • • •	
	R392	RD1/6PM102J	• • • • •	• • • • •	

1.2 FOR PD-4500/HPW AND SD TYPES

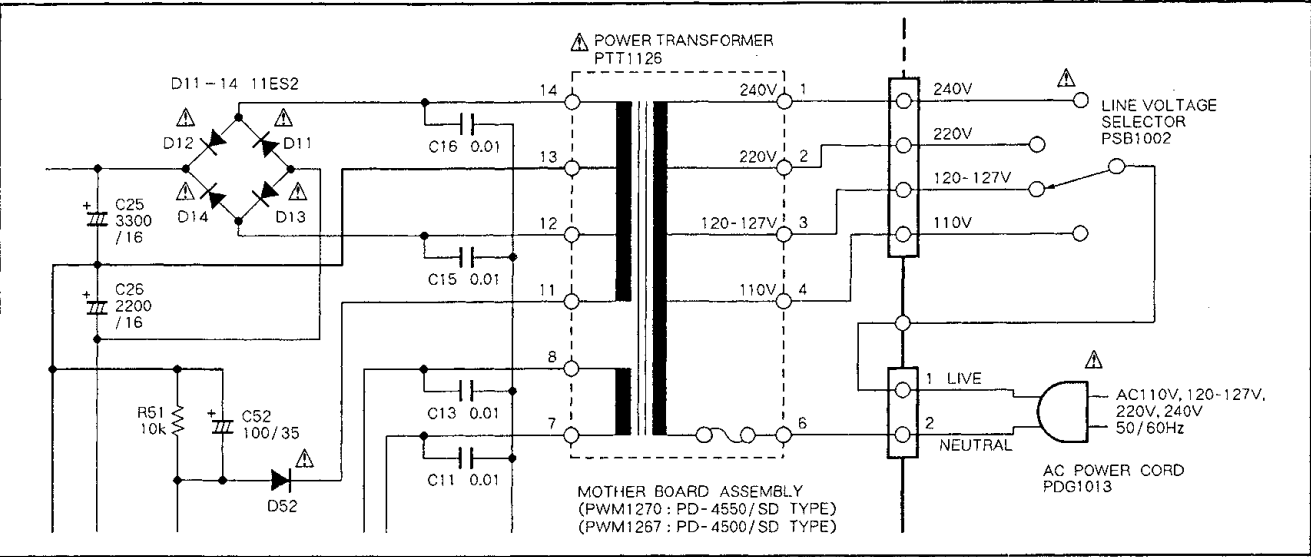
The PD-4500/HPW and SD types are the same as the PD-4550/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.			Remarks
		PD-4500 /KU type	PD-4500 /HPW type	PD-4500 /SD type	
⚠	Strain relief	CM-22C	CM-22B	CM-22B	
⚠	AC power cord	PDG1002	PDG1006	PDG1013	
⚠	Power transformer (AC120V)	PTT1124	•••••	•••••	
⚠	Power transformer (AC220V, 240V)	•••••	PTT1125	•••••	
⚠	Power transformer (AC110V, 120 – 127V, 220V, 240V)	•••••	•••••	PTT1126	
⚠	Cord holder	RNH-184	•••••	•••••	
⚠	Operating instructions (Spanish)	•••••	•••••	PRC1027	
⚠	Line voltage selector (AC 110V, 120 – 127V, 220V, 240V)	•••••	•••••	PSB1002	
●	Mother board assembly	PWM1266	PWM1266	PWM1267	

MOTHER BOARD ASSEMBLY (PWM1267)

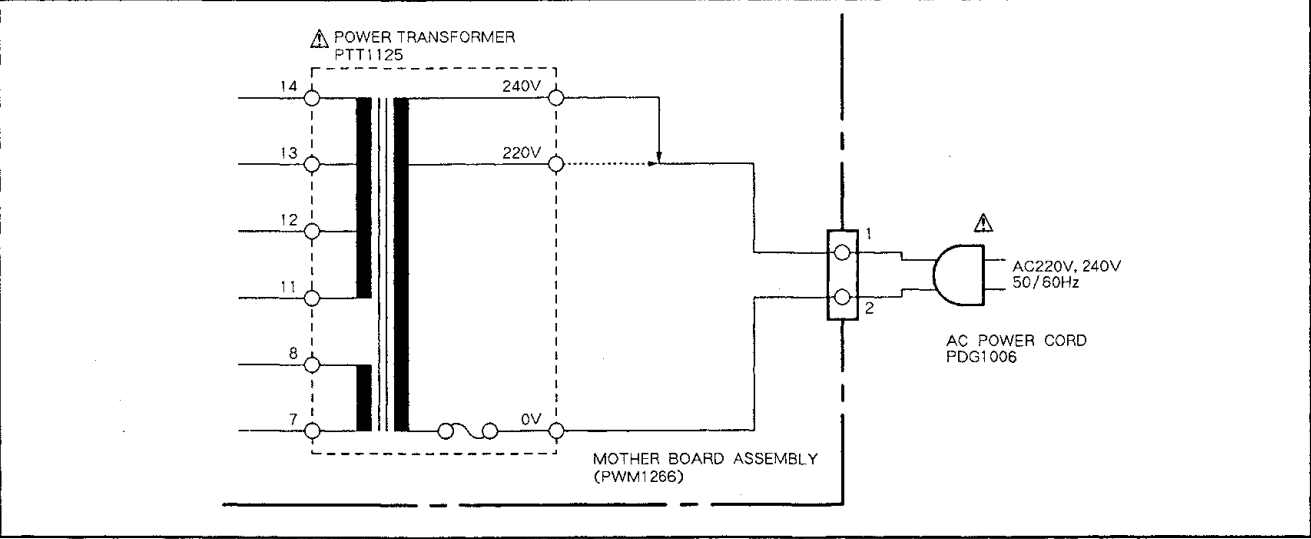
- The mother board assembly (PWM1267 : PD-4500/SD type) is the same as the mother board assembly (PWM1266 : PD-4500/KU and HPW types) for the service supply parts.
- The wiring of between the mother board assembly (PWM1267) and the line voltage selector of the PD-4500/SD type is the same as that of the PD-4550/SD type. (Refer to pages 4 and 13.)

2. SCHEMATIC DIAGRAM OF POWER SUPPLY SECTION FOR PD-4550/SD AND PD-4500/SD TYPES



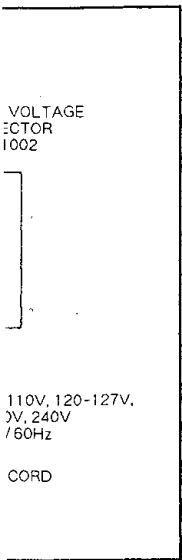
- Note :
- As to the schematic diagram for PD-4550/SD type with the exception of the power supply section, refer to pages 7 to 10.
 - As to the schematic diagram for PD-4500/SD type with the exception of the power supply section, refer to the schematic diagram for PD-4500/KU type.

3. SCHEMATIC DIAGRAM OF POWER SUPPLY SECTION FOR PD-4500/HPW TYPE



- Note : As to the schematic diagram for PD-4500/HPW type with the exception of the power supply section, refer to the schematic diagram for PD-4500/KU type.

ON



✓ section, refer

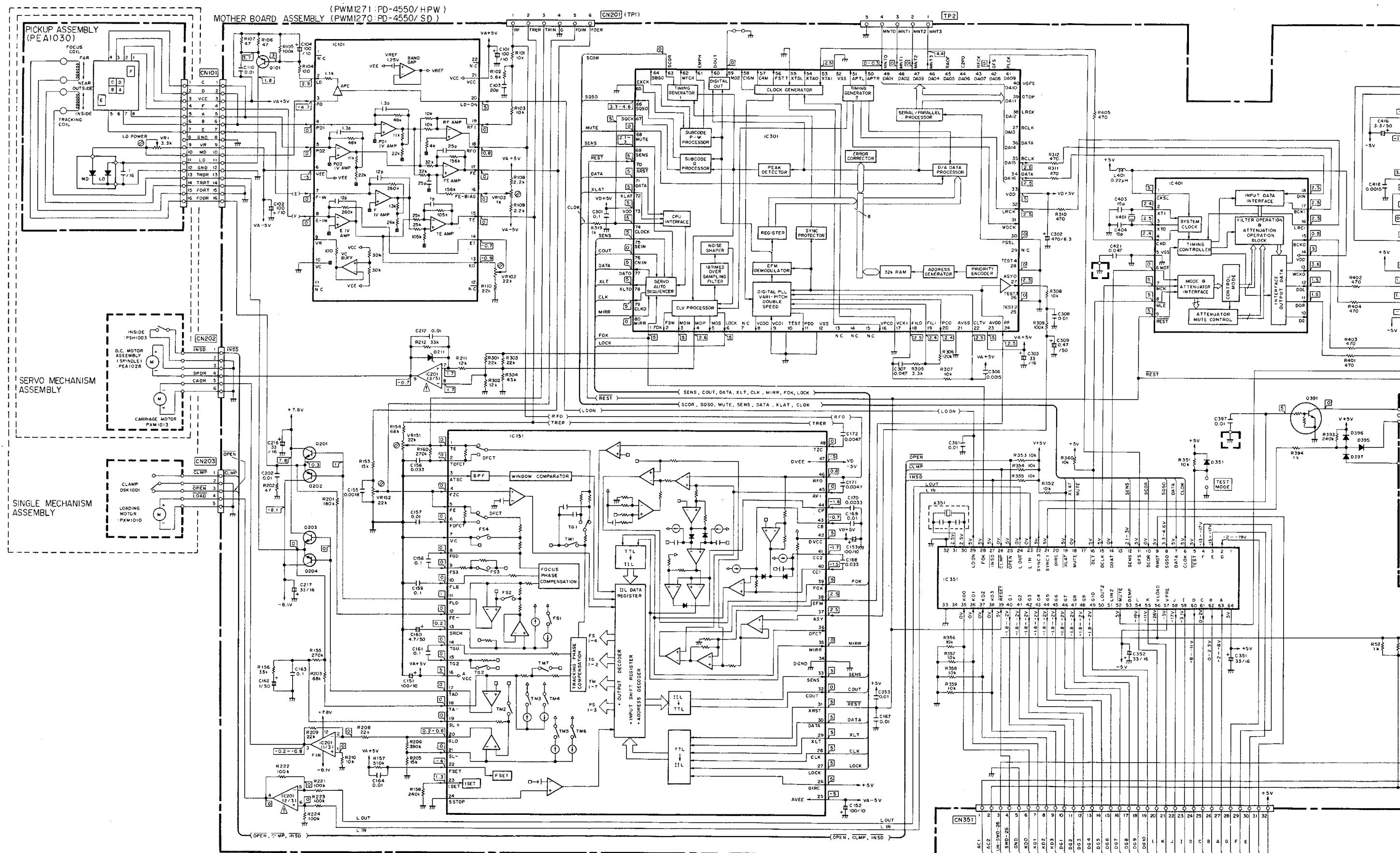
✓ section, refer

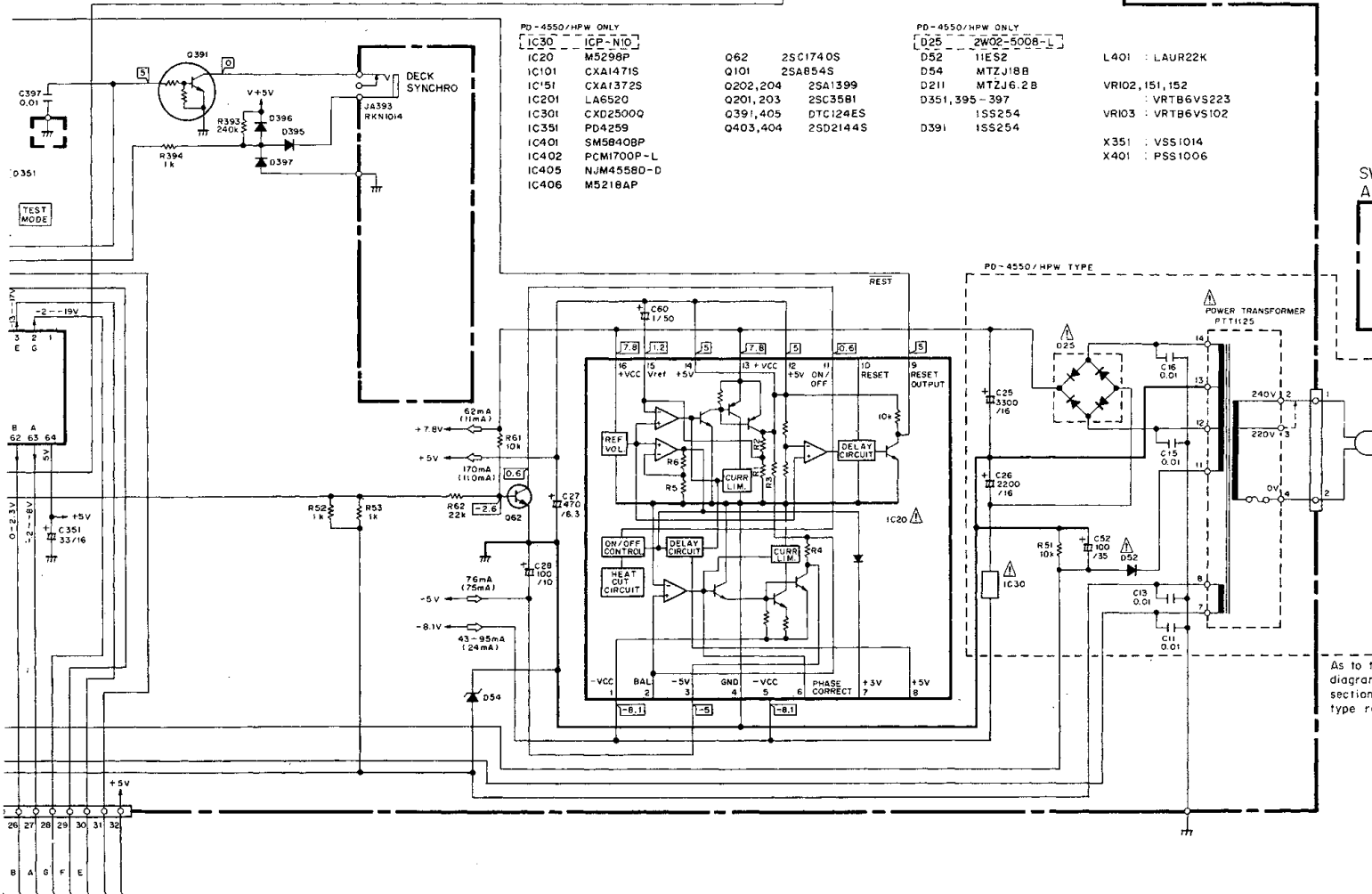
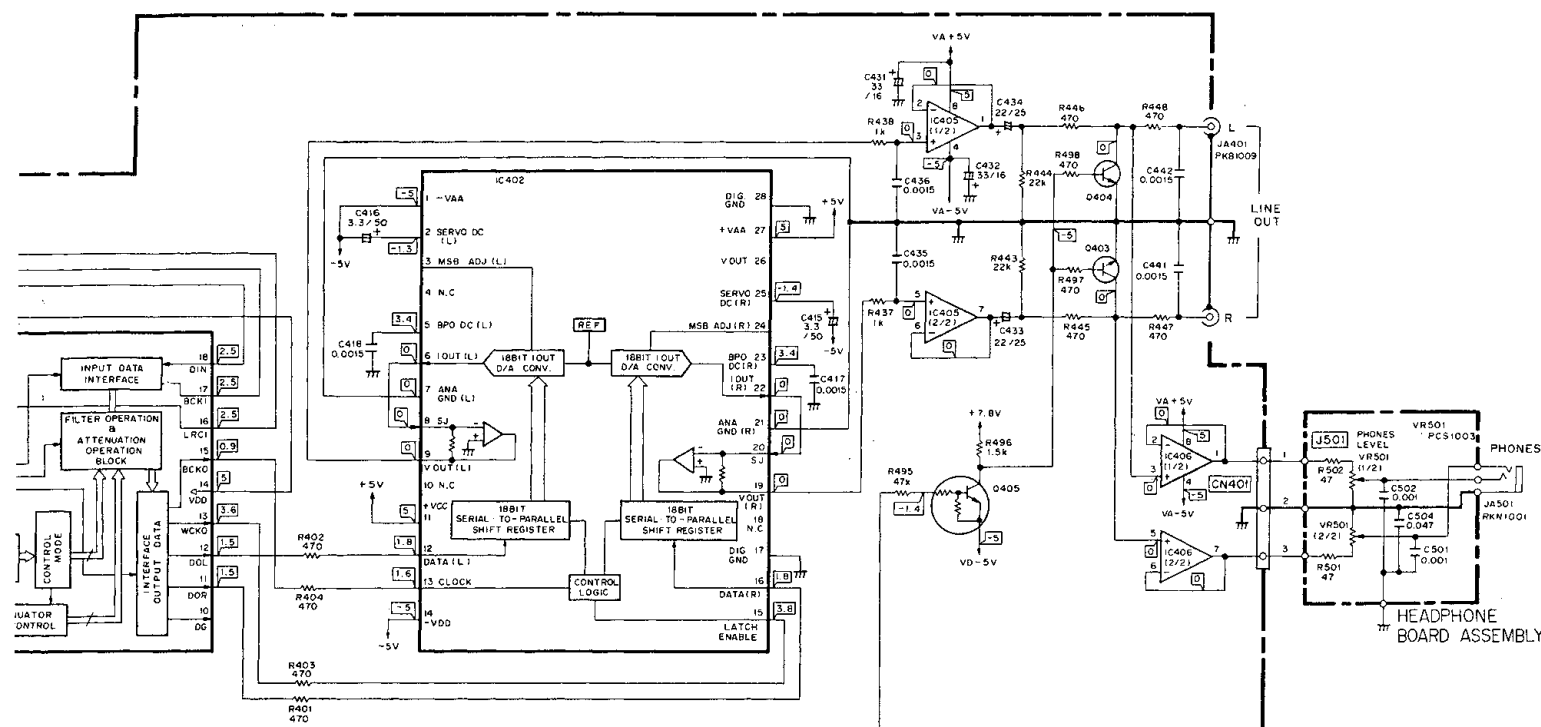
ON



supply section,

4. SCHEMATIC DIAGRAM FOR PD-4550/HPW AND SD TYPES





1. RESISTORS:
Indicated in Ω , 1/4W, 1/6W and 1/8W, $\pm 5\%$ tolerance unless otherwise noted k; k Ω , M; M Ω , (F); $\pm 1\%$, (G); $\pm 2\%$, (K); $\pm 10\%$, (M); $\pm 20\%$ tolerance.

2. CAPACITORS:
Indicated in capacity (μ F)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT:
□; DC voltage (V) at play state.
mA; DC current at play state.
Value in () is DC current at stop state.

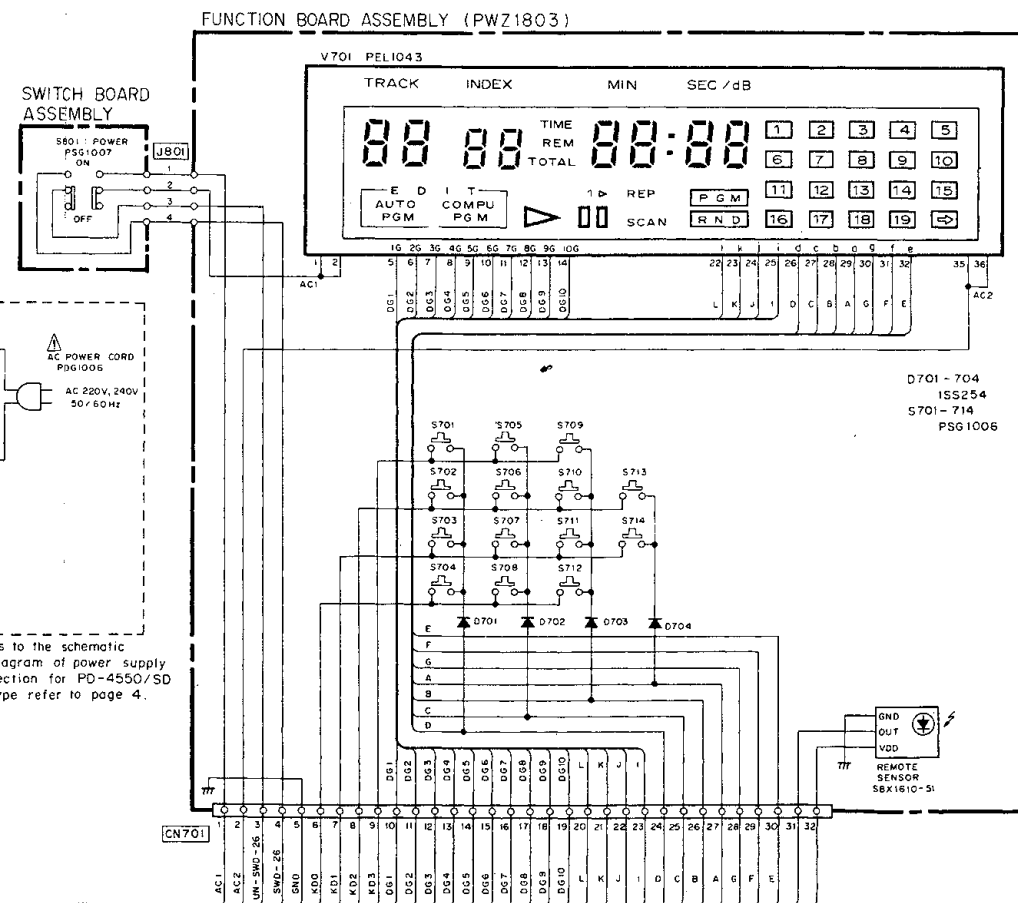
4. OTHERS:
→; Signal route.
⊗; Adjusting point.
The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
* marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES: (The underlined indicates the switch position)
SWITCH BOARD ASSEMBLY
S801: POWER ON—OFF
FUNCTION BOARD ASSEMBLY

S701: TIME
S702: REPEAT
S703: HI-LITE SCAN
S704: OPEN/CLOSE (Δ)
S705: STOP ($\square$)
S706: $\ll$] MANUAL SEARCH
S707: $\gg$]
S708: RANDOM PLAY
S709: PAUSE ($\square$)
S710: $\ll$] TRACK SEARCH
S711: $\gg$]
S712: PLAY ($\triangleright$)
S713: EDIT
S714: PGM
S715: CHECK
S716: CLEAR
S717: 7
S718: 8
S719: 9
S720: 10
S721: 4
S722: 5
S723: 6
S724: ≥ 20
S725: 1
S726: 2
S727: 3
S728: +10

TRACK NUMBER



5. P. C. BOARDS PATTERN FOR PD-4550/HPW AND SD TYPES

A

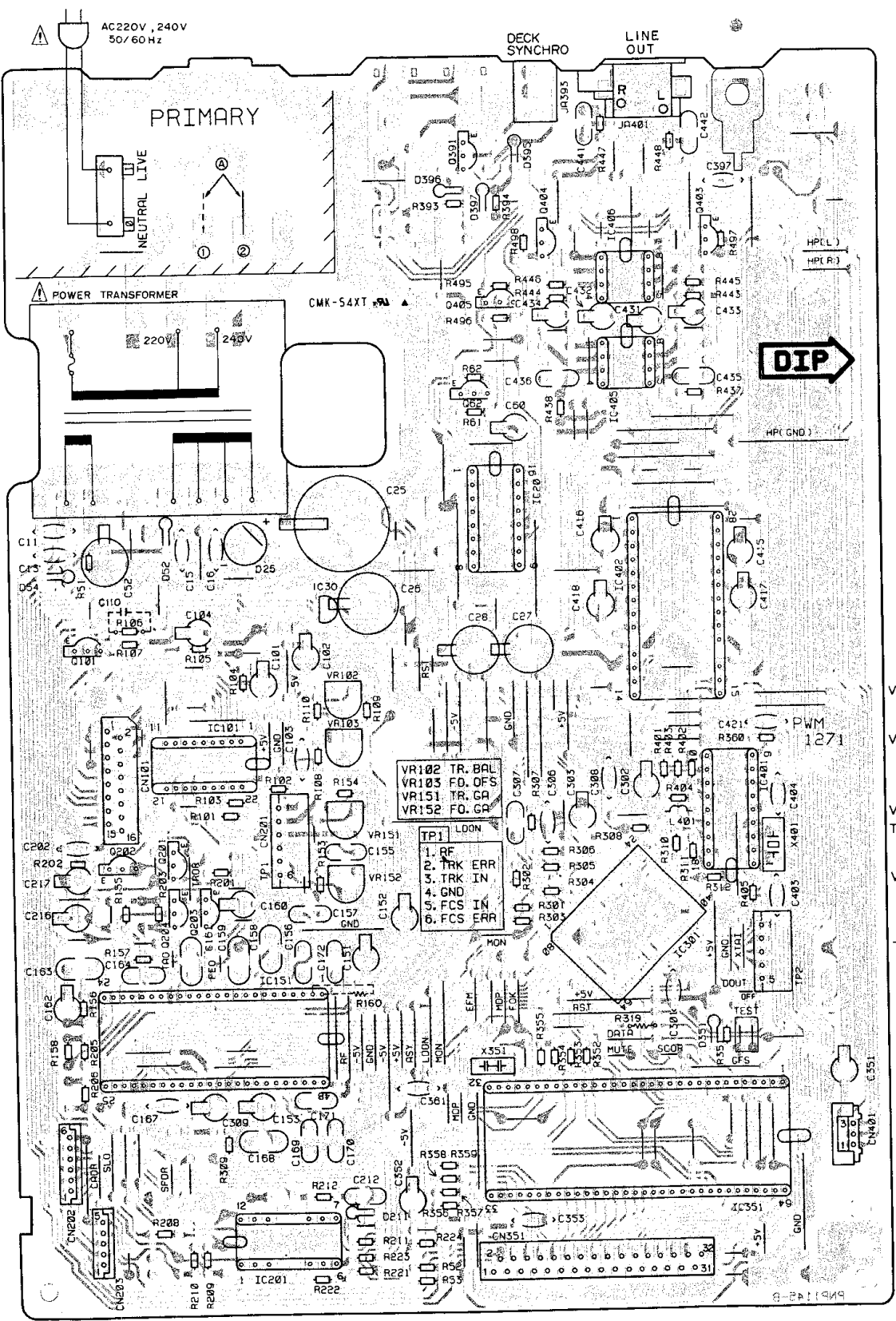
B

C

D

P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
		FET			Mylar capacitor
		Diode			Styrol capacitor
		Zenner diode			Electrolytic capacitor (Non polarized)
		LED			Electrolytic capacitor (Noiseless)
		Varactor			Electrolytic capacitor (Polarized)
		Tact switch			Power capacitor
		Resistor array			Semi-fixed resistor
		Resistor			Resistor array
		Inductor			Resistor
		Coil			Resonator
		Transformer			Thermistor
		Filter			

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.



MOTHER BOARD ASSEMBLY (PWM1271 : HPW TYPE)

Q391

Q403
Q404
IC406
Q405

IC405
Q62

IC20

IC402
IC30
Q101

VR102

VR103

VR151

TP1

VR152

Q201
Q202
Q203
Q204

IC301

TP2

IC151

IC351

IC201

Q391

Q403
Q404
IC406
Q405

IC405
Q62

IC20

IC402
IC30
Q101

VR102

VR103

IC101

IC401

Q201
Q202

Q203
Q204

IC301

TP2

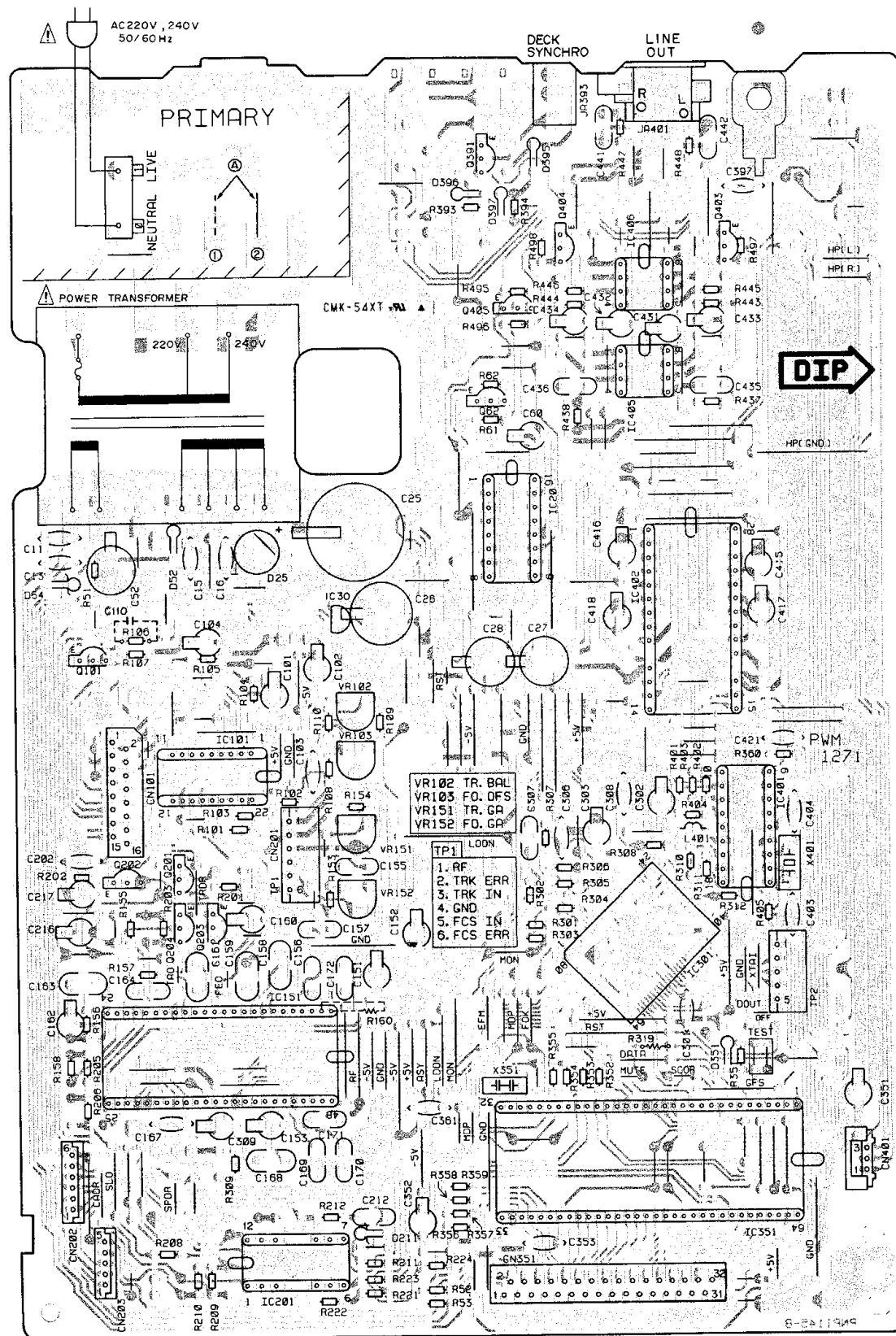
IC151

IC351

IC201

AC110V, 12
220V,
50/6

TYPES



Q391
Q403
Q404
IC406
Q405

IC405
Q62

IC20

IC402
IC30
Q101

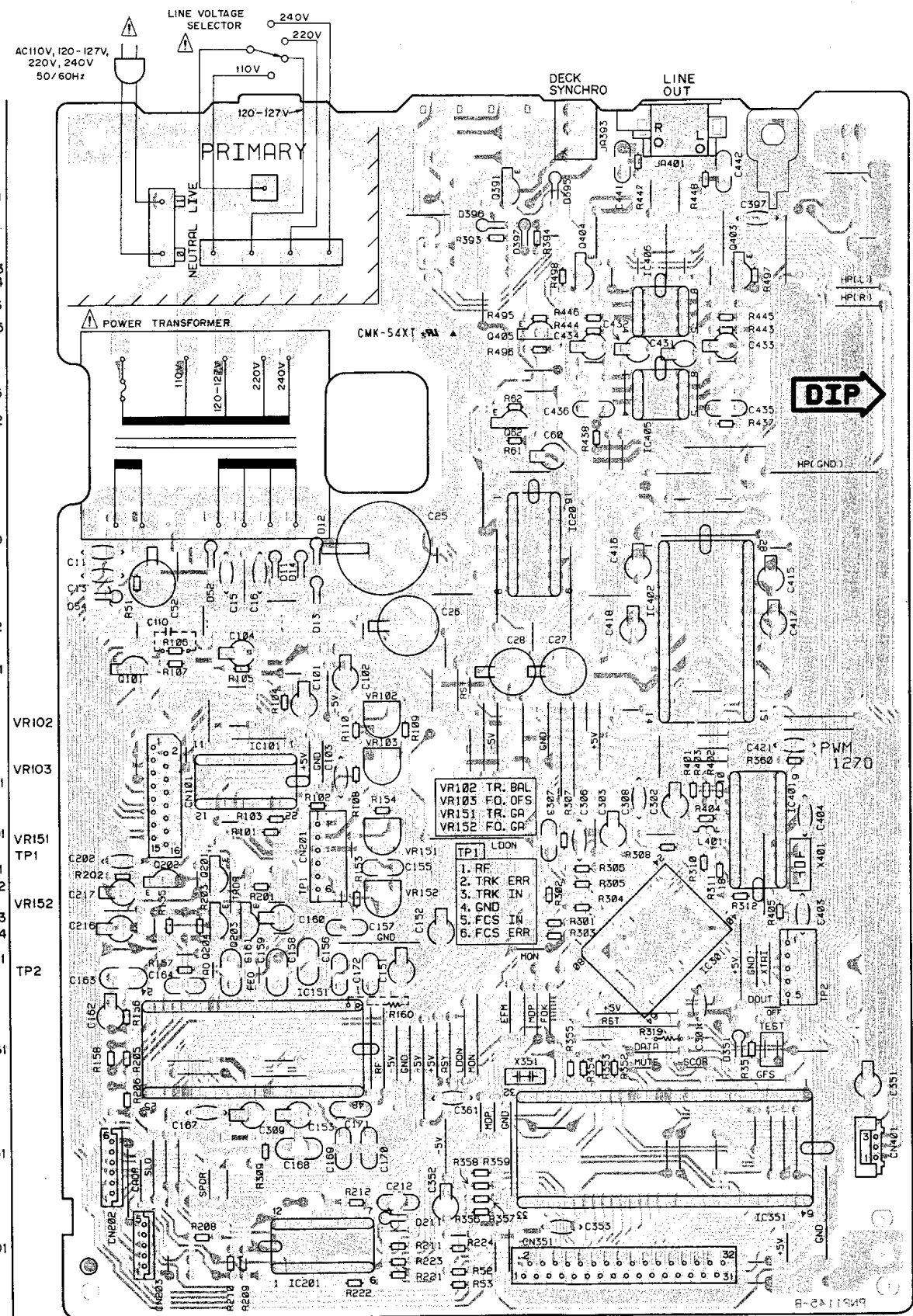
VR102
VR103
IC101
VR151
TP1
VR152
TP2

IC151

IC351

IC201

MOTHER BOARD ASSEMBLY (PWM1271 : HPW TYPE)



Q391
Q403
Q404
IC406
Q405

IC405
Q62

IC20

IC402
Q101

VR102
VR103
IC101
VR151
TP1
VR152
TP2

IC151

IC351

IC201

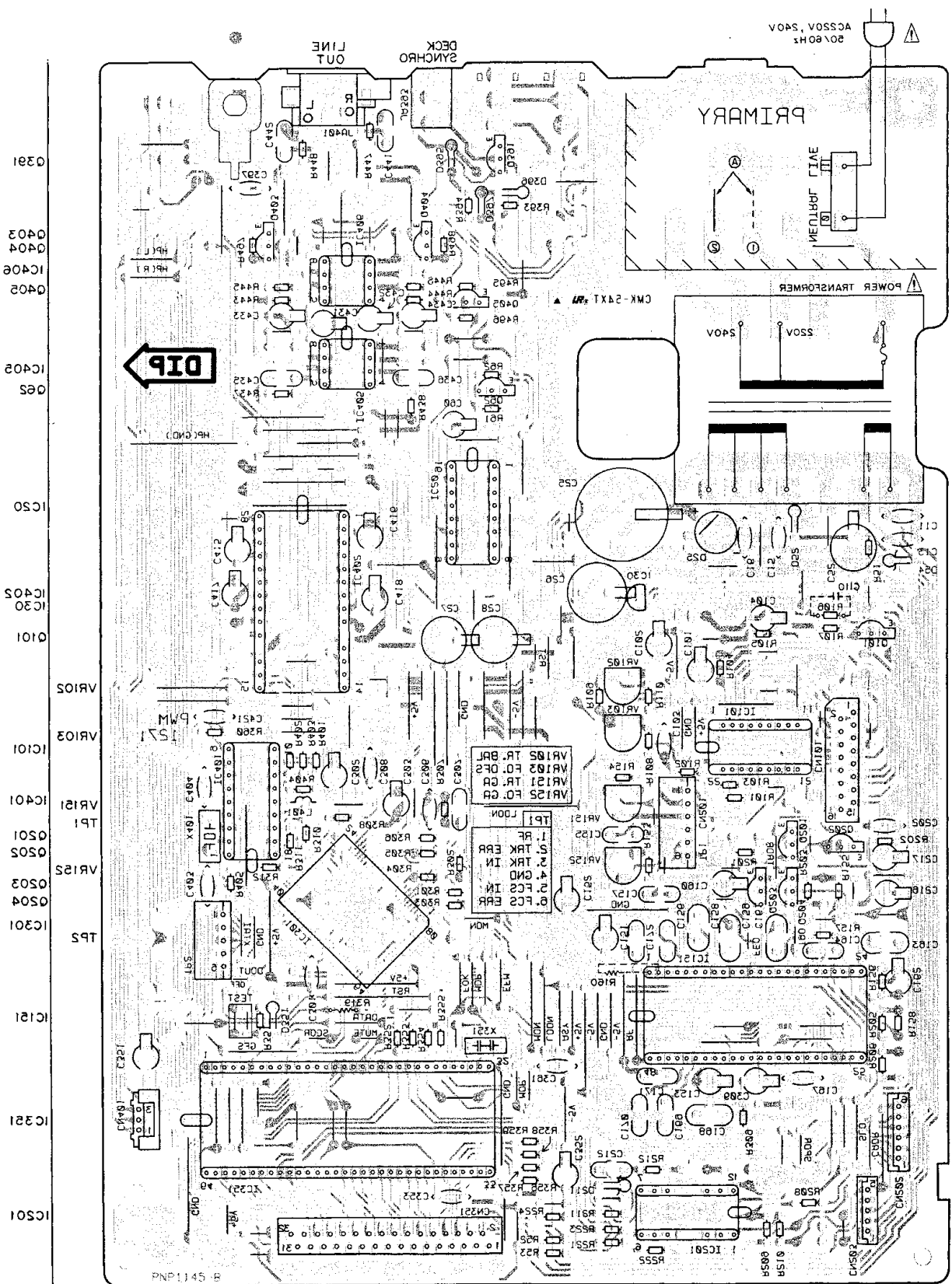
MOTHER BOARD ASSEMBLY (PWM1270 : SD TYPE)

A

B

C

D



MOTHER BOARD ASSEMBLY (PBM1511: HPW TYPE)

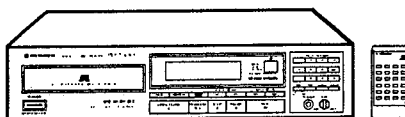
This P.C.B. connection diagram is viewed from the foil side.

12325

275'

PIONEER®
The future of sound and vision.

Service Manual



ORDER NO.
ARP1948

COMPACT DISC PLAYER

PD-5500

PD-5500-S

PD-4550

PD-4550-S

PD-4500

PD-4500-S

+ Adjustment, ARP 2000, 2783, 1/32/13/5

PD-5500, PD-5500-S, PD-4550, PD-4550-S, PD-4500 AND PD-4500-S HAVE
FOLLOWING VERSIONS :

Type	Applicable model				Power requirement	Export destination
	PD-5500	PD-5500-S PD-4550-S	PD-4550 PD-4500	PD-4500-S		
KU	○	—	○	—	AC 120V only	U.S.A
KC	○	—	○	—	AC 120V only	Canada
KUXJ	○	—	○	—	AC 120V only	U.S.A
KCXJ	○	—	○	—	AC 120V only	Canada
HEMXJ	○	—	○	—	AC 220V, 240V (switchable) *	European continent
HBXJ	○	—	○	○	AC 220V, 240V (switchable) *	United Kingdom
HEWMXJ	—	○	—	○	AC 220V, 240V (switchable) *	European continent
SD	—	—	○	—	AC 110V, 120V-127V, 220V, 240V (switchable)	Kingdom of Saudi Arabia and General market
HPW	—	—	○	—	AC 220V, 240V (switchable) *	Australia

* Change the primary wiring of the power transformer.

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IFO MAR. 1990 Printed in Japan 27

- This manual is applicable to the PD-5500/KU, KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-5500-S/HEWMXJ, PD-4550/KU, KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4550-S/HEWMXJ, PD-4500/KU, KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4500-S/HBXJ and HEWMXJ types.
- As to the PD-5500/KC, KUXJ, KCXJ, HEMXJ, HBXJ and PD-5500-S/HEWMXJ types, refer to pages 61 – 63.
- As to the PD-4550/KC, KUXJ, KCXJ, HEMXJ, HBXJ and PD-4550-S/HEWMXJ types, refer to pages 63 – 66.
- As to the PD-4500/KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4500-S/HBXJ and HEWMXJ types, refer to pages 65 – 67.
- As to the other types, refer to applicable service manuals.
- As to the adjustments, refer to the single CD model (PD-5500) section of the ADJUSTMENT FOR CD PLAYERS. VOL.1 (ORDER NO. ARP2000).

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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.

1. SAFETY INFORMATION

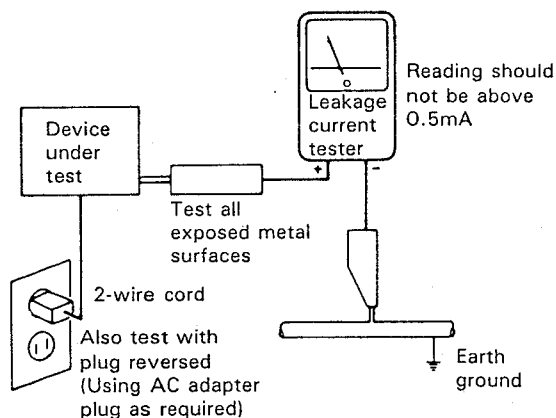
(FOR USA MODEL ONLY)

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 Δ on the schematics and on the parts list in this Service Manual. The use of a substitute replacement component which does 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 UNDGA UDSAETTELSE FOR
STRÅLING.

VARNING!

OSYNLIG LASERSTRÅLNING NÅR DENNA
DEL ÄR ÖPPNAD OCH SPÄRREN
ÄR URKOPPLAD. BETRakta EJ STRÅLEN.



LASER
Kuva 1
Lasersäteilyn
varoituserkki

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.



LASER
Picture 1
Warning sign for
laser radiation

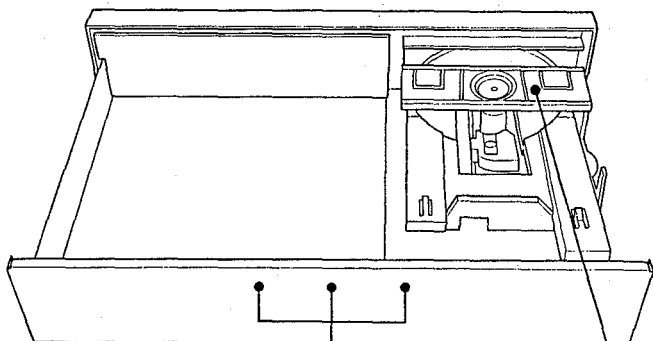
IMPORTANT

THIS PIONEER APPARATUS CONTAINS
LASER OF HIGHER CLASS THAN 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

LABEL CHECK (SINGLE type)



HEMXJ and HBXJ types

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 CLMP
terminal side (when the mechanism is not clamped
and CLMP signal is high level).

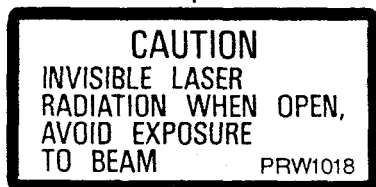
Thus, the interlock will no longer function if the
switch (S601) is deliberately set to CLMP terminal
side (if CLMP signal is low level).

In the test mode,* the interlock mechanism will not
function.

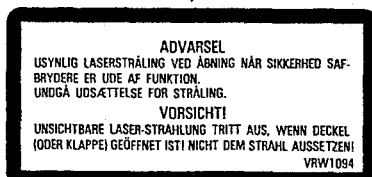
Laser diode oscillation will continue if pins 2 and 3
of CXA1471S (IC101) are connected to ground or pin
20 is connected to high level (ON) or the terminals
of Q101 are shorted to each other (fault condition).

2. When the cover is opened, close viewing of the
objective lens with the naked eye will cause exposure
to a Class 1 or higher laser beam.

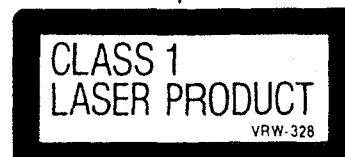
* Refer to Service manual ARP2000, FOR CD PLAYERS
ADJUSTMENT VOL.1.



HBXJ type



HEMXJ type



HEMXJ and HBXJ types

2. DISASSEMBLY

● REMOVING THE BONNET

- ① Remove six screws to the bonnet.
- ② Remove the bonnet by pulling up it in the vertically direction of arrow (Fig. 2-1).

Note: If you pull up the rear base of the bonnet to remove it as in the conventional manner, the hooks shown in Fig. 2-1 may be caught and the hooks on the front panel side may be deformed.

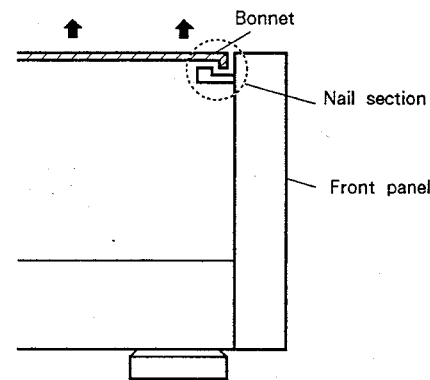


Fig. 2-1

● REMOVING THE TRAY

- ① Turn the POWER switch ON, and open the tray by the OPEN/CLOSE key. (Refer to the Note 1 when opening the tray by hand-operated.)
- ② Pull out the tray slowly by pushing the nail of the tray section from two holes (C) and (D) of the clamp holder (Fig. 2-2). (It is necessary to push the nail of the tray section at the front panel portion.)

Note 1: How to open the tray by hand-operated

● REMOVING THE FRONT PANEL

- ① Remove five screws (A) (Upper side is two screws and under side is three screws.) to the front panel.
- ② Remove a screw (B) to the Headphone board assembly (Fig. 2-2).
- ③ Disconnect two connectors CN351 and CN401 from the Mother board assembly (Fig. 2-2).
- ④ Remove the front panel and the Headphone board assembly together.

CAUTION: When CN351 is connected and disconnected, be sure to disconnect the AC power cord from the AC outlet. If not, microcomputer (IC351) may be destroyed.

- ① Turn the gear B slowly in the direction of arrow by ⊖ screwdriver with care not to damage the gear B (Fig. 2-2).
- ② Turn gear B until the tray starts to move in the direction of the OPEN position.
- ③ Move the tray to the OPEN position by hand.

Note: When attaching the tray, be sure attach it when the servo mechanism assembly is in the completely lowered position (when the rack has been moved all the way back). Otherwise, the upward and downward movements of the servo mechanism assembly may not synchronize with the movements of the tray. If the tray has been incorrectly attached, re-attach it as follows.

- ① Remove the tray following Step 2 of "REMOVING THE TRAY".
- ② Move the rack all the way back by hand
- ③ Install the tray.

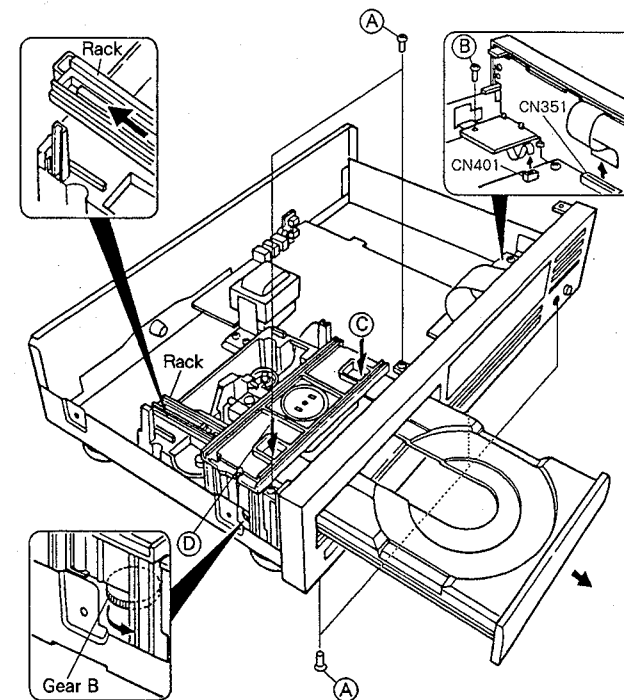


Fig. 2-2

● REMOVING THE SERVO MECHANISM ASSEMBLY

- ① Remove the tray. (Refer to the "REMOVING THE TRAY".)
- ② Remove the four screws (E) and one screw (F) with the servo mechanism assembly lowered (to the tray-open position). (Fig. 2-3)
- ③ To move the rack by hand, gear A and the gear section of the rack must be engaged at section (G) (see Fig. 2-3). Otherwise, the rack may not move. In this case, move gear B with a ⊖ screwdriver from the side and fit gear B and the gear section of the rack at the engaging section (G).

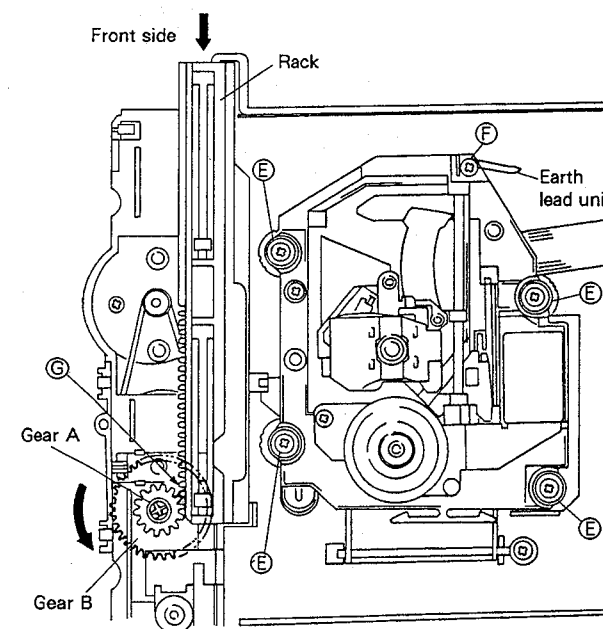


Fig. 2-3

- ④ Push the slide bushing at the front left with a thin implement such as a ⊖ screwdriver (Fig. 2-4).
- ⑤ Pull up the rear side (H) of the servo mechanism assembly. (Arrow ① in Fig. 2-4)
- ⑥ To release the engagement at section (J) of the servo mechanism assembly, turn the assembly counterclockwise on the slide bushing (I) (Arrow ② in Fig. 2-4)

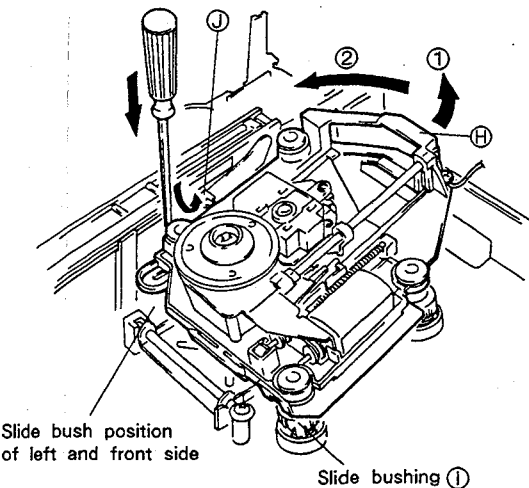


Fig. 2-4

● REMOVING THE SWING LEVER

- ① Move the rack manually so that section (K) of the swing lever reaches the inclined part (L) of a groove on the rack. (see Fig. 2-5)
- ② Remove screw (M) which holds the shaft.
- ③ Slightly pull up the right side of the shaft (the side of screw (M)) and pull the shaft outward in the direction of arrow ③.

● REMOVING THE SLIDE BUSHING

- ① Compress the slide bushing from three directions as shown in Fig. 2-5.
- ② Remove the bushing by turning it in the direction of the arrow ④.

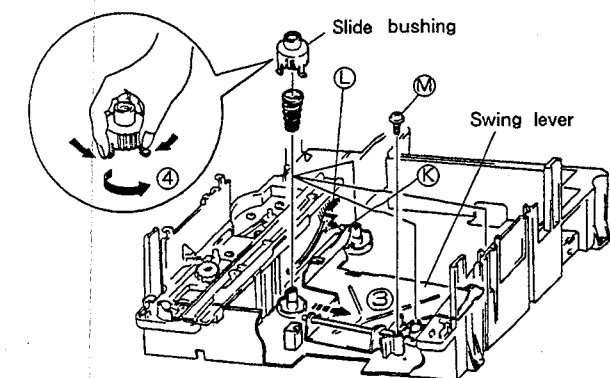
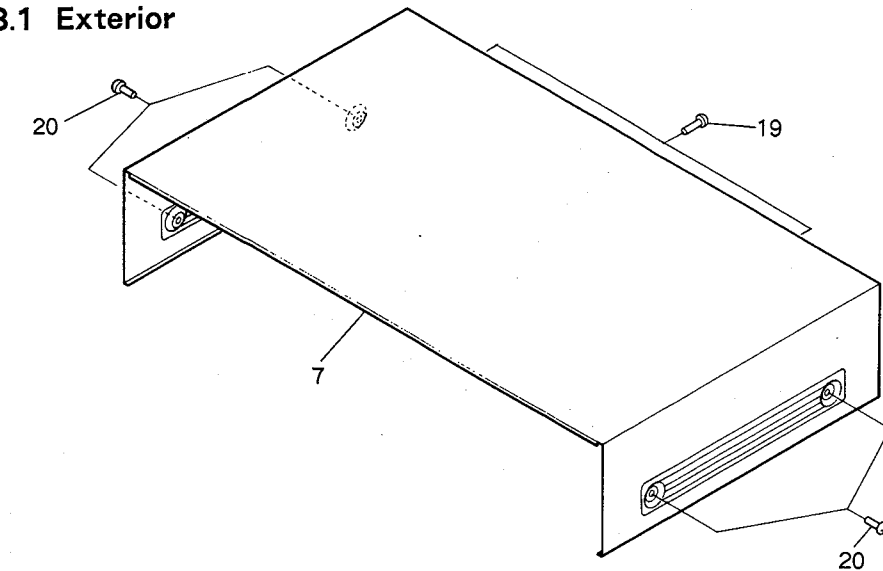


Fig. 2-5

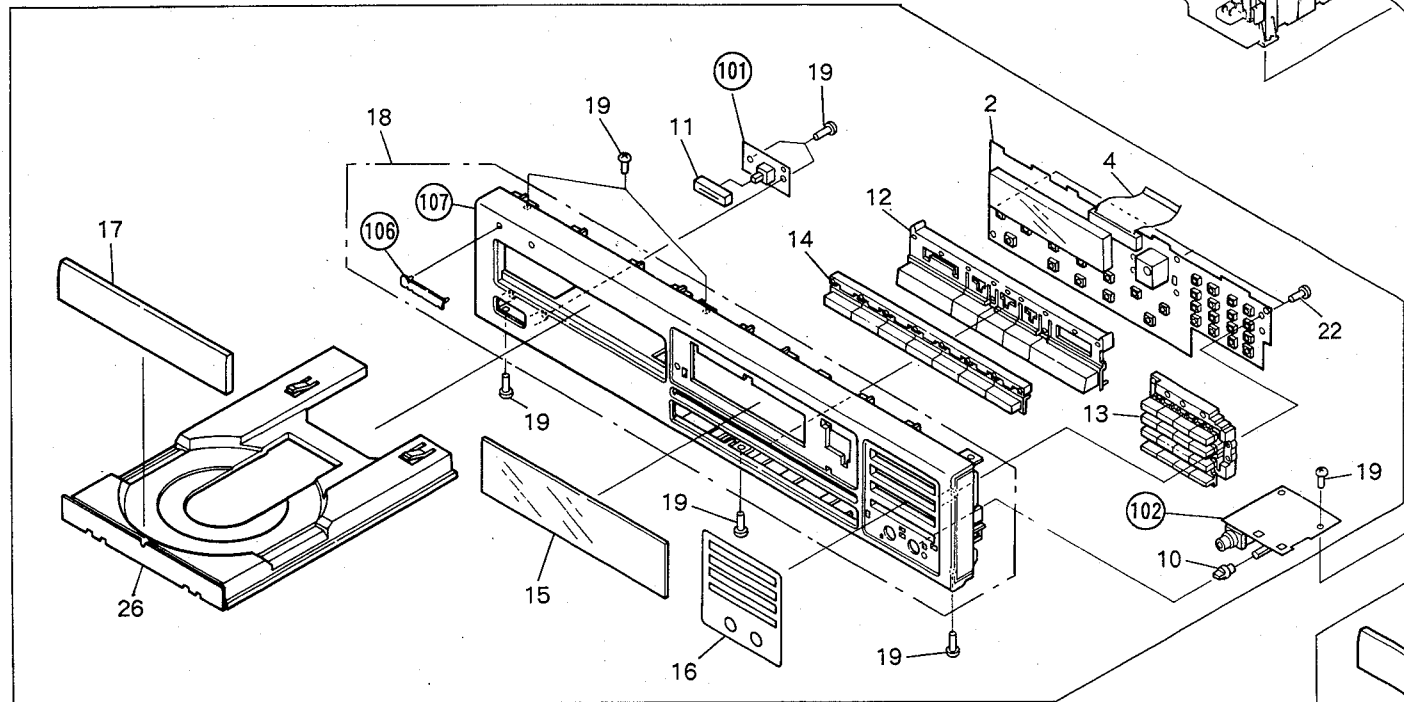
3. EXPLODED VIEWS AND PARTS LIST

3.1 Exterior

A

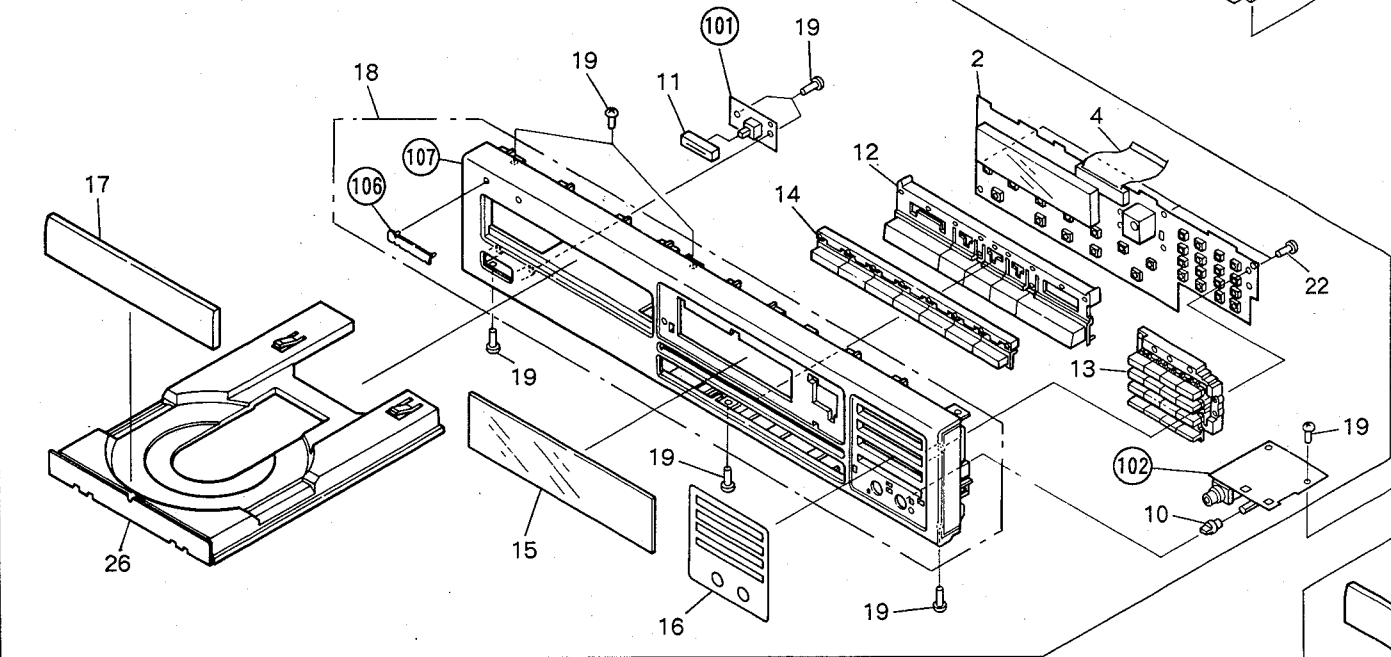


B



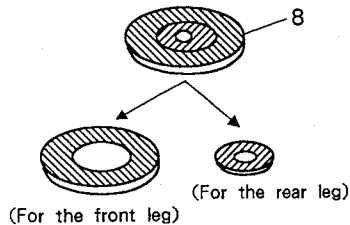
(FOR PD-5500/KU TYPE)

C



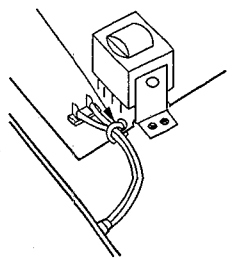
D

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



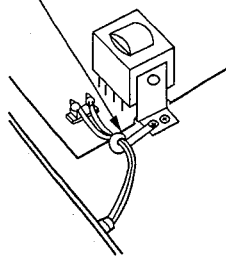
Note : When the model is KU or KUXJ types, fix the AC power cord by using a binder or a UL cord holder.

Fix the AC power cord by passing a binder through a hole of the Mother board assembly.



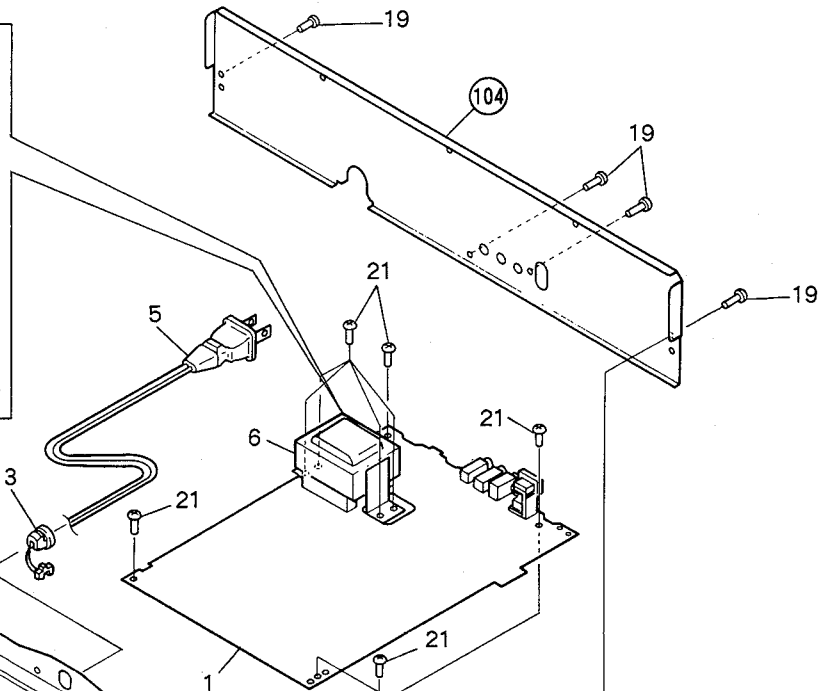
When using the binder

Wind a UL cord holder over one time.

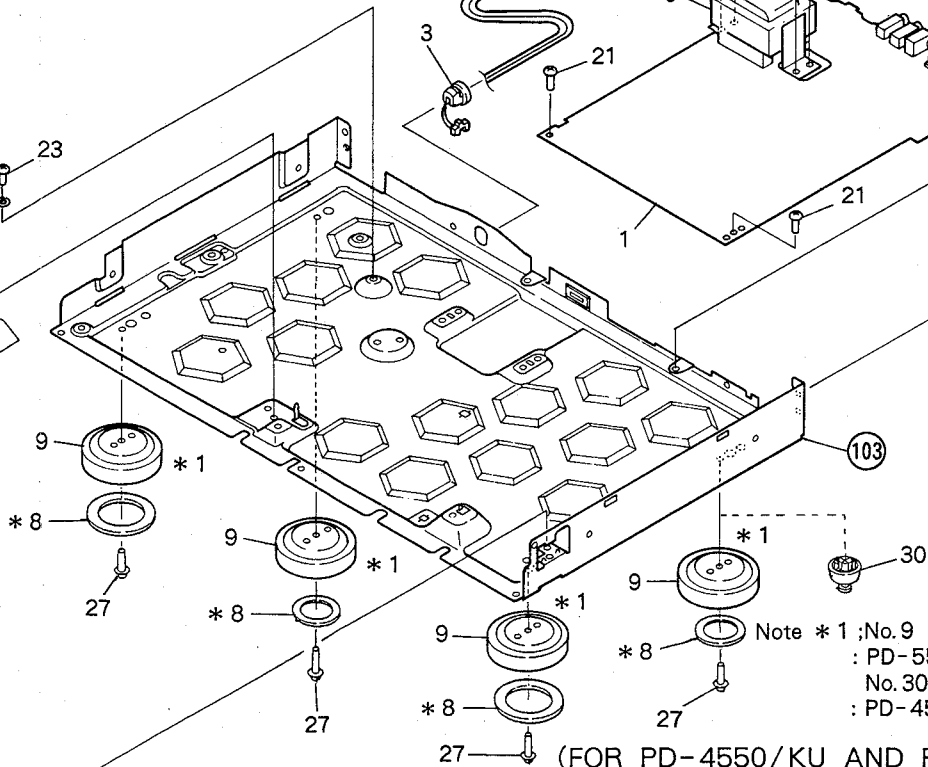


When using the UL cord holder

5

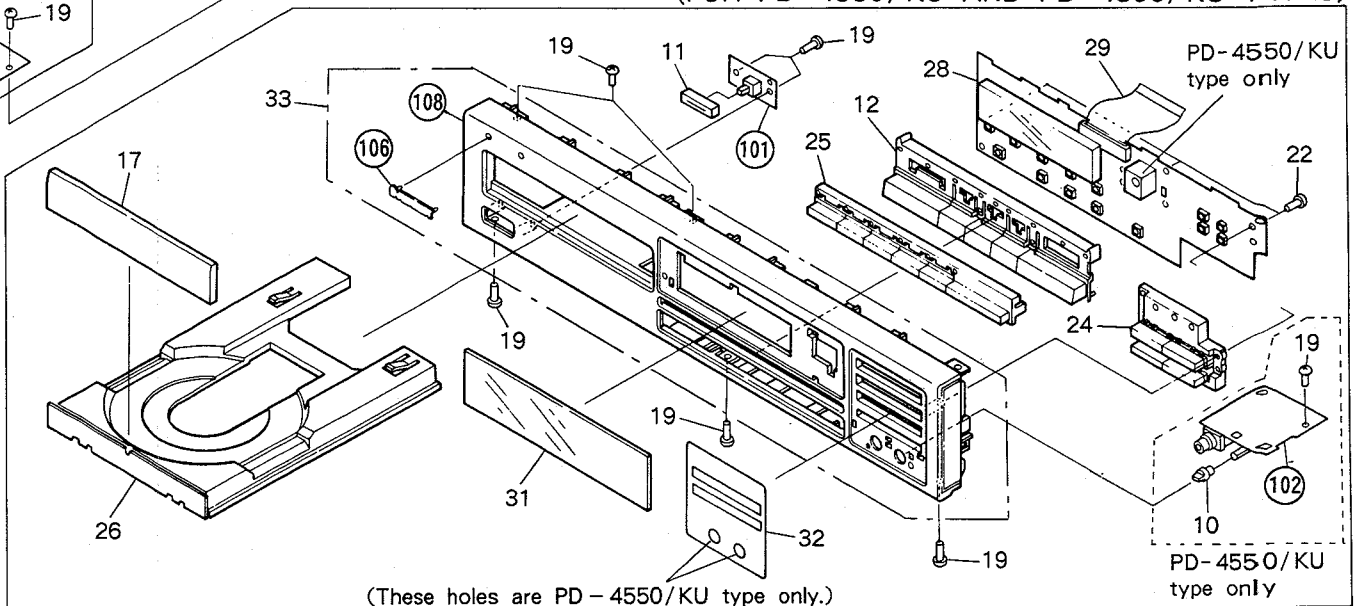


6



Note * 1 ; No.9 insulator(VNK1095)
: PD-5500/KU type
No.30 leg assembly(PXA1201)
: PD-4550/KU and PD-4500/KU types

(FOR PD-4550/KU AND PD-4500/KU TYPES)



(These holes are PD-4550/KU type only.)

PD-4550/KU type only

A

B

C

D

NOTES :

- Parts without part number cannot be supplied.
- The Δ 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 of Exterior Section

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
◎	1	PWM1269	Mother board assembly (PD-5500/KU and PD-4550/KU types)	◎	28	PWZ1802	Function board assembly (PD-4500/KU type)
◎	1	PWM1266	Mother board assembly (PD-4500/KU type)		29	PDD1041	Flexible cable (32P) (PD-4550/KU type)
◎	2	PWZ1804	Function board assembly (PD-5500/KU type)		29	PDD1049	Flexible cable (30P) (PD-4500/KU type)
Δ	3	CM-22C	Strain relief		30	PXA1201	Leg assembly (PD-4550/KU and PD-4500/KU types)
Δ	4	PDD1041	Flexible cable (32P)		31	PAM1362	Display window B (PD-4550/KU type)
Δ	5	PDG1002	AC power cord		31	PAM1357	Display window A (PD-4500/KU type)
Δ	6	PTT1124	Power transformer (AC120V)		32	PAM1364	Headphone name plate B (PD-4550/KU type)
	7	PYY1129	Bonnet		32	PAM1356	Headphone name plate A (PD-4500/KU type)
	8	PNM1070	Skid (PD-5500/KU type)		33	PEA1038	Function panel assembly (PD-4550/KU type)
	9	VNK1095	Insulator (PD-5500/KU type)		33	PEA1037	Function panel assembly (PD-4500/KU type)
	10	PAC1370	Headphone knob		101		Switch board assembly
	11	PAC1438	Power button		102		Headphone board assembly
	12	PAC1439	Play button		103		Under base
	13	PAC1440	Select button		104		Rear base (PD-5500/KU type)
	14	PAC1441	Time button A		104		Rear base (PD-4550/KU type)
	15	PAM1362	Display window B		104		Rear base (PD-4500/KU type)
	16	PAM1365	Headphone name plate C		105		Single mechanism assembly
	17	PNW1625	Tray name plate		106		PIONEER badge
	18	PEA1039	Function panel assembly		107		Function panel C
	19	BBZ30P080FZK	Screw		108		Function panel B (PD-4550/KU type)
	20	FBT40P080FZK	Screw		108		Function panel A (PD-4500/KU type)
	21	BBZ30P060FMC	Screw				
	22	BBZ30P120FMC	Screw				
	23	PDZ30P050FMC	Screw				
	24	PAC1446	Program button (PD-4550/KU and PD-4500/KU types)				
	25	PAC1447	Time button B				
	26	PNW1672	Tray				
	27	IBZ30P080FCC	Screw				
◎	28	PWZ1803	Function board assembly (PD-4550/KU type)				

3.2 MECHANISM SECTION

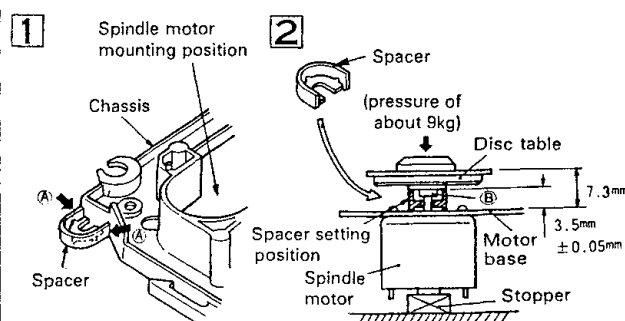
Parts List of Mechanism Section

Mark	No.	Part No.	Description
	1	DSK1001	Lever switch (CLAMP)
	2	PBA1042	Screw
	3	PBH1085	Coil spring
	4	PEB1127	Rubber belt
	5	PNW1634	Motor pulley
	6	PNW1673	Clamper base
	7	PNW1674	Rack
	8	PNW1675	Synchronized plate
	9	PNW1676	Gear A
	10	PNW1677	Gear B
	11	PNW1678	Gear Pulley
	12	PNW1679	Sensor head
	13	PNW1680	Slide bush
	14	PXM1010	D. C. motor (0.75W) (LOADING)
	15	PEB1014	Floating rubber
	16	PEB1132	Floating rubber
	17	BPZ26P080FMC	Screw
	18	IPZ30P080FMC	Screw
	19	PMZ26P040FMC	Screw
	20	WT26D047D050	Washer
	21	PBH1009	Earth spring
	22	PBH1084	Drive spring
	23	PBK1057	Plate spring
	24	PEB1072	Belt
	25	PLA1003	Drive screw
	26	PLA1071	Guide bar
	27	PNW1066	Pulley
	28	PNW1605	Harf nut
	29	PNW1608	Disc table
	30	PNW1634	Motor pulley
	31	PSH1003	Slide switch (INSIDE)
	32	PBZ30P080FMC	Screw
	33	PXM1013	D. C. motor (1.7W) (CARRIAGE)
	34	BPZ20P080FMC	Screw
	35	JFZ20P025FMC	Screw
	36	PMZ20P030FMC	Screw
	37	PEA1028	D. C. motor assembly (SPINDLE)
	38	PEA1030	Pickup assembly
	39	PCP1008	Variable resistor (VR1)
	40	CKSYF105Z16	Chip capasitor (C1001)
	41	WA62D095D013	Washer

Mark	No.	Part No.	Description
	101		2mm pitch connector assembly (5P)
	102		Shaft
	103		Magnet
	104		Yoke
	105		Swing lever
	106		Clamper S
	107		Loading base
	108		Servo mechanism assembly
	109		2mm pitch connector assembly (6P)
	110		Motor base
	111		Earth lead unit (300V)
	112		Mechanism base
	113		Mechanism shassis

• How to install the disc table

- 1 Use nippers or other tool to cut the two sections marked (A) in figure 1. Then remove the spacer.
- 2 While supporting the spindle motor shaft with the stopper, put spacer on top of the motor base (angled so it doesn't touch section (B)), and stick the disc table on top (takes about 9kg pressure). Take off the spacer.



1

2

3

4

5

6

4.

Part:
Mark

A

B

C

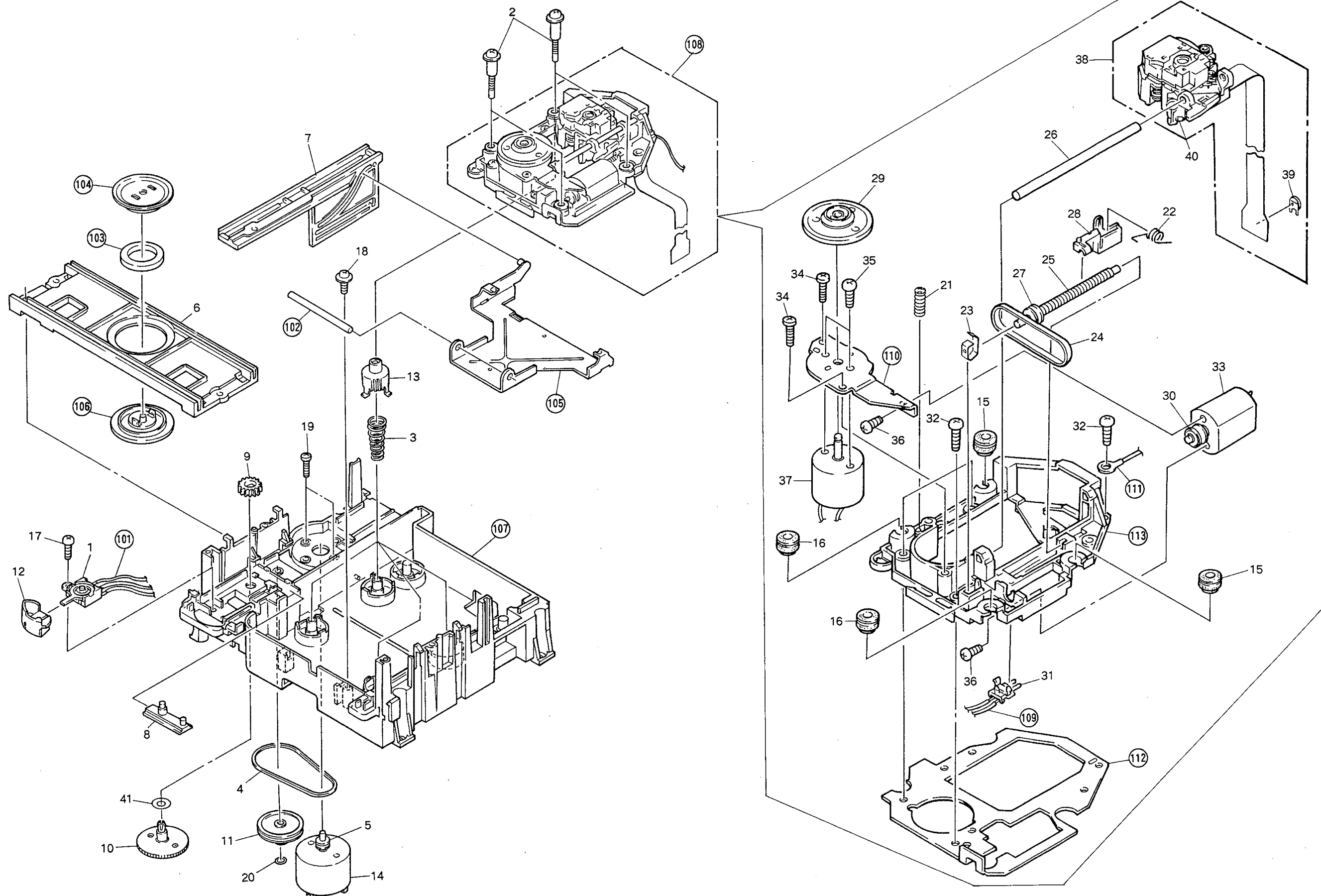
D

A

B

C

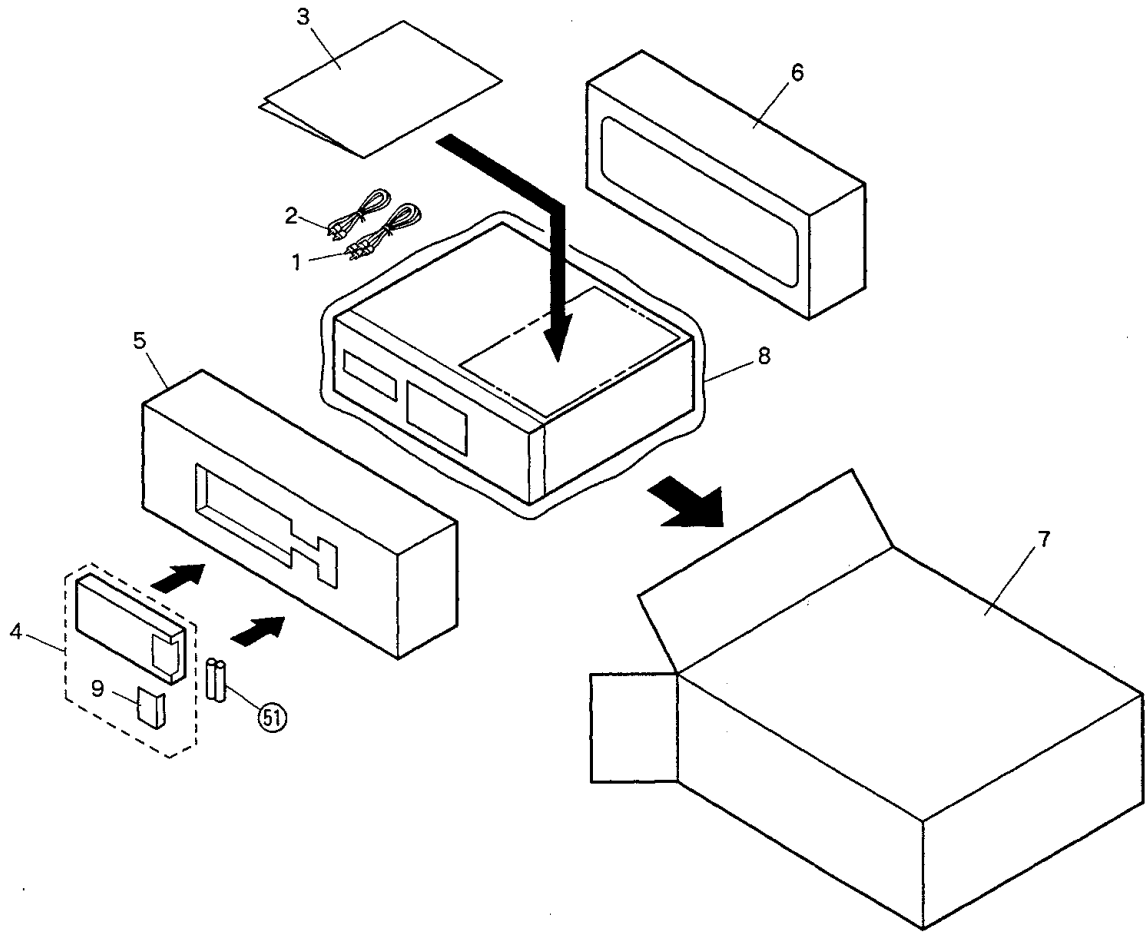
D



4. PACKING

Parts List

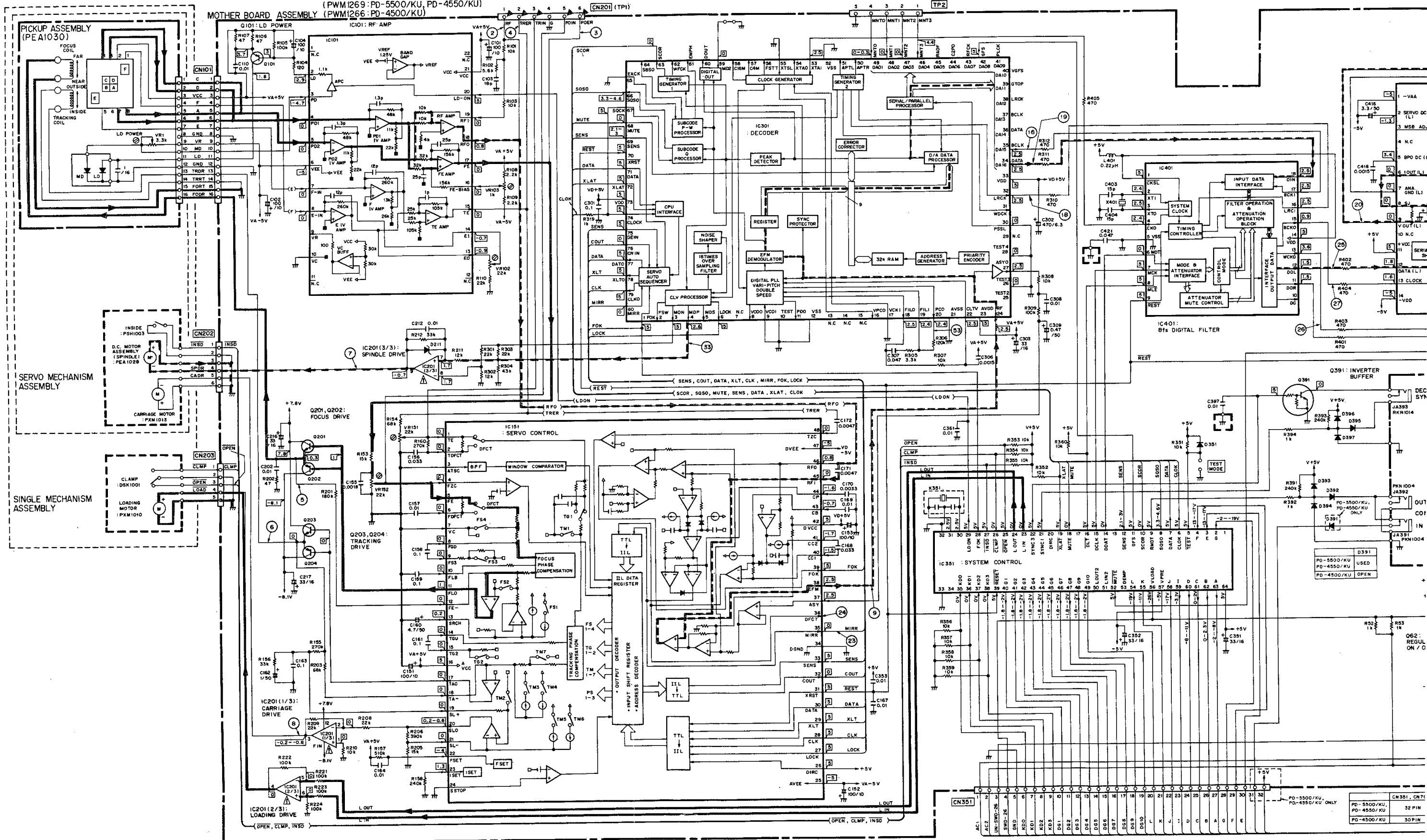
Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1	PDE-319	Connection cord with mini plug		7	PHG1506	CD packing case (PD-5500/KU type)
	2	PDE1001	Connection cord with pin plug		7	PHG1496	CD packing case (PD-4550/KU type)
	3	PRB1114	Operating instructions (English)		7	PHG1396	CD packing case (PD-4500/KU type)
	4	PWW1047	Remote control unit (PD-5500/KU and PD-4550/KU types)		8	Z23-007	Mirror mat sheet
	5	PHA1116	Protector F		9	VNK-634	Case (C) (PD-5500/KU and PD-4550/KU types)
	6	PHA1117	Protector R				
				51			Battery (UM-4)

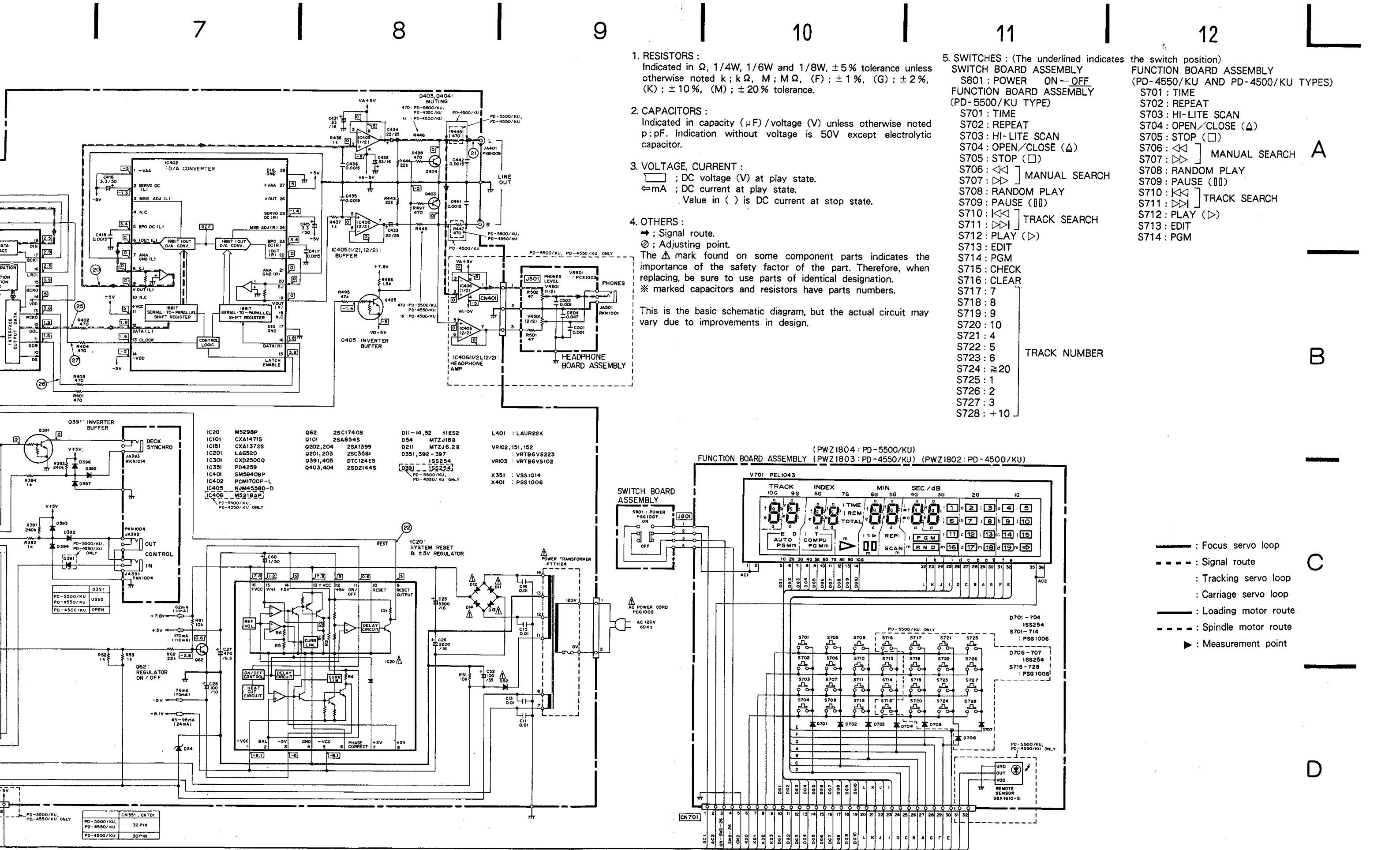


5. SCHEMATIC DIAGRAM

(PWM1269: PD-5500/KU, PD-4550/KU)
(PWM1266: PD-4500/KU)

MOTHER BOARD ASSEMBLY (PWM1266: PD-4500/KU)





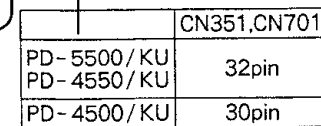
1. RESISTORS :
Indicated in Ω , 1/4W, 1/6W and 1/8W, $\pm 5\%$ tolerance unless otherwise noted k ; k Ω , M ; M Ω , (F) ; $\pm 1\%$, (G) ; $\pm 2\%$, (K) ; $\pm 10\%$, (M) ; $\pm 20\%$ tolerance.
2. CAPACITORS :
Indicated in capacity (μ F) /voltage (V) unless otherwise noted p ; pF. Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE, CURRENT :
□ ; DC voltage (V) at play state.
◁ mA ; DC current at play state.
Value in () is DC current at stop state.

4. OTHERS :
→ ; Signal route.
⊙ ; Adjusting point.
The Δ 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.
* marked capacitors and resistors have parts numbers.
- This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

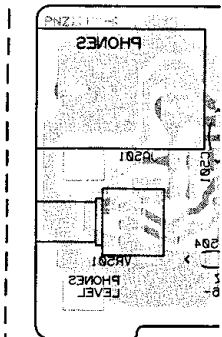
5. SWITCHES : (The underlined indicates the switch position)
- SWITCH BOARD ASSEMBLY
S801 : POWER ON—OFF
FUNCTION BOARD ASSEMBLY (PD-5500/KU TYPE)
S701 : TIME
S702 : REPEAT
S703 : HI-LITE SCAN
S704 : OPEN/CLOSE (Δ)
S705 : STOP ($\square$)
S706 : $\ll$] MANUAL SEARCH
S707 : $\gg$] MANUAL SEARCH
S708 : RANDOM PLAY
S709 : PAUSE ($\square$)
S710 : $\ll$] TRACK SEARCH
S711 : $\gg$] TRACK SEARCH
S712 : PLAY ($\triangleright$)
S713 : EDIT
S714 : PGM
S715 : CHECK
S716 : CLEAR
S717 : 7
S718 : 8
S719 : 9
S720 : 10
S721 : 4
S722 : 5
S723 : 6
S724 : ≥ 20
S725 : 1
S726 : 2
S727 : 3
S728 : +10]
- FUNCTION BOARD ASSEMBLY (PD-4550/KU AND PD-4500/KU TYPES)
S701 : TIME
S702 : REPEAT
S703 : HI-LITE SCAN
S704 : OPEN/CLOSE (Δ)
S705 : STOP ($\square$)
S706 : $\ll$] MANUAL SEARCH
S707 : $\gg$] MANUAL SEARCH
S708 : RANDOM PLAY
S709 : PAUSE ($\square$)
S710 : $\ll$] TRACK SEARCH
S711 : $\gg$] TRACK SEARCH
S712 : PLAY ($\triangleright$)
S713 : EDIT
S714 : PGM
S715 : CHECK
S716 : CLEAR
S717 : 7
S718 : 8
S719 : 9
S720 : 10
S721 : 4
S722 : 5
S723 : 6
S724 : ≥ 20
S725 : 1
S726 : 2
S727 : 3
S728 : +10]

- : Focus servo loop
- - - : Signal route
— : Tracking servo loop
— : Carriage servo loop
— : Loading motor route
- - - : Spindle motor route
▶ : Measurement point

6. P.C.BOARDS CONNECTION DIAGRAM



22



IE BOARD
TYPES ONLY

IE BOARD
_ _ _ _
TYPES ONLY

IE BOARD
_ _ _ _
TYPES ONLY

IE BOARD
TYPES ONLY

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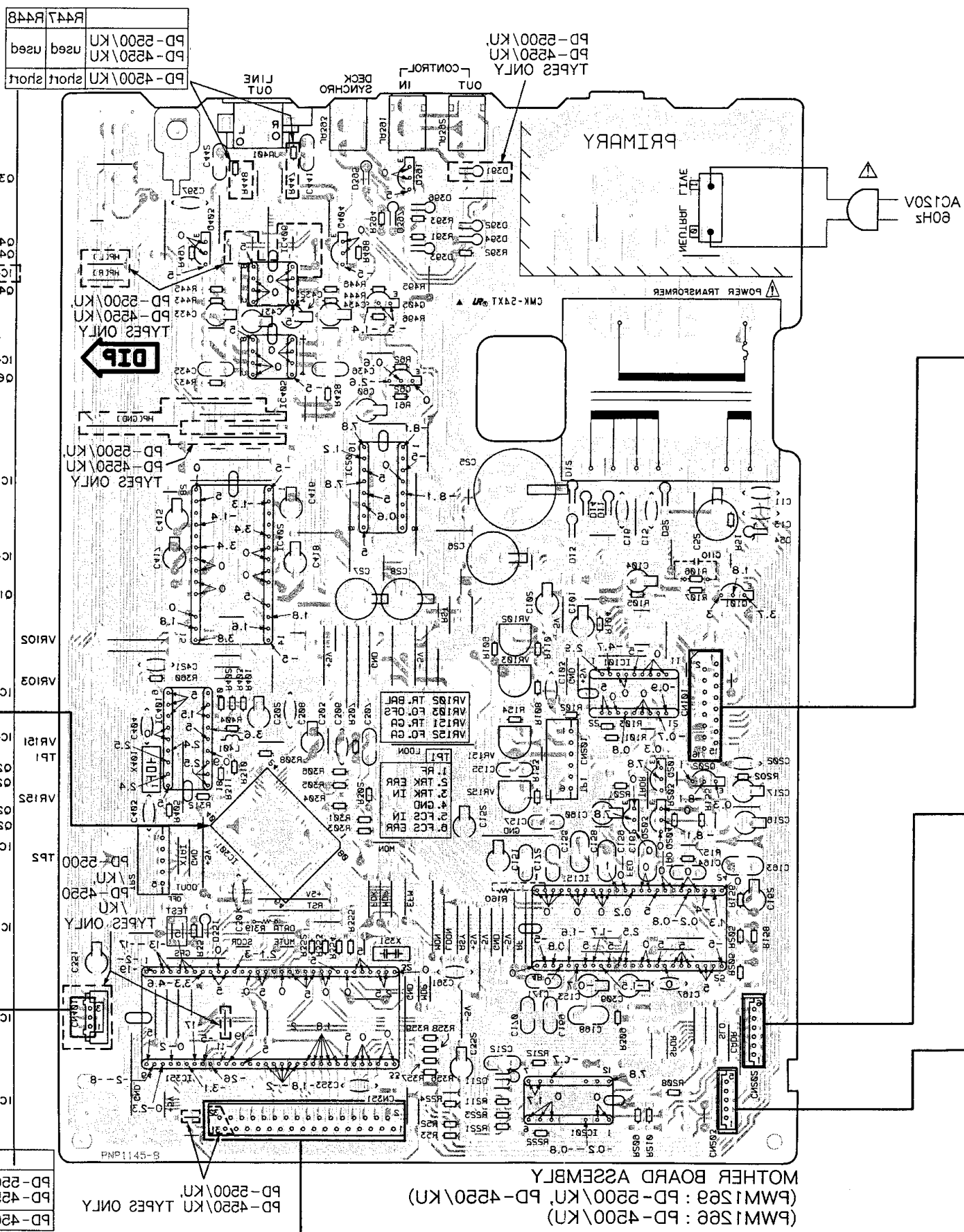
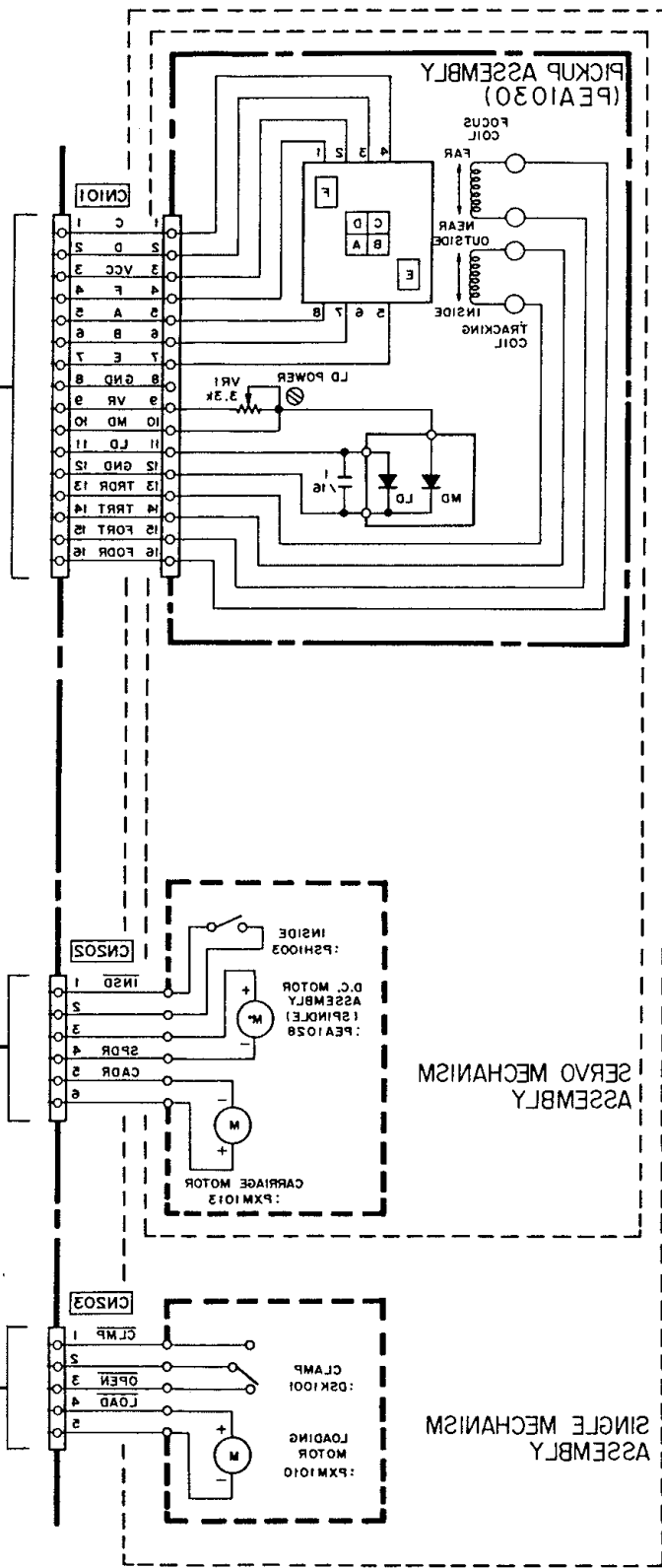
IE BOARD
TYPES ONLY

IE BOARD
_ _ _ _
TYPES ONLY

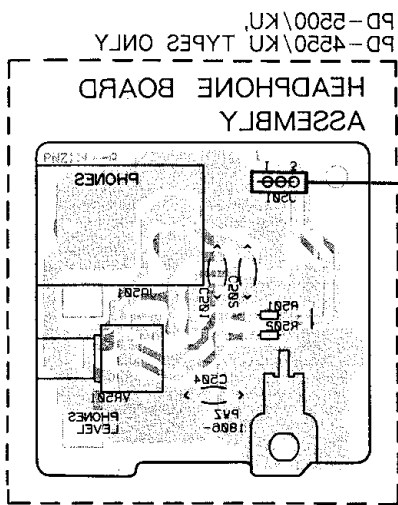
IE BOARD
_ _ _ _
TYPES ONLY

IE BOARD
TYPES ONLY

E. P.C. BOARDS CONNECTION DIAGRAM



NO	PRO	Voltage	PRO	Voltage
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
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60	0	0	0	0
61	0	0	0	0
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65	0	0	0	0
66	0	0	0	0
67	0	0	0	0
68	0	0	0	0
69	0	0	0	0
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73	0	0	0	0
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76	0	0	0	0
77	0	0	0	0
78	0	0	0	0
79	0	0	0	0
80	0	0	0	0
81	0	0	0	0
82	0	0	0	0
83	0	0	0	0
84	0	0	0	0
85	0	0	0	0
86	0	0	0	0
87	0	0	0	0
88	0	0	0	0
89	0	0	0	0
90	0	0	0	0
91	0	0	0	0
92	0	0	0	0
93	0	0	0	0
94	0	0	0	0
95	0	0	0	0
96	0	0	0	0
97	0	0	0	0
98	0	0	0	0
99	0	0	0	0
100	0	0	0	0



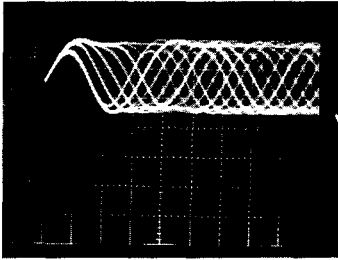
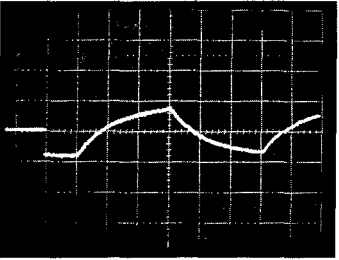
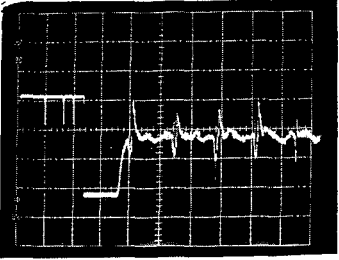
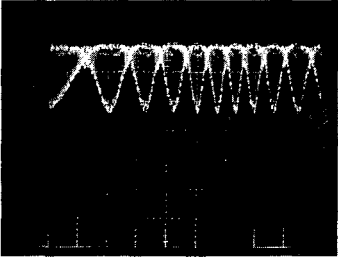
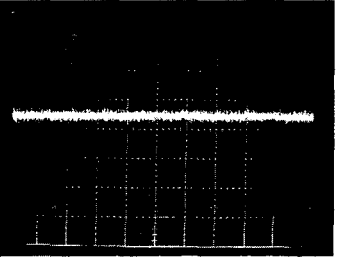
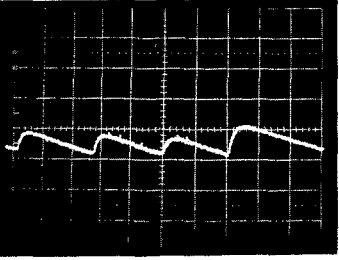
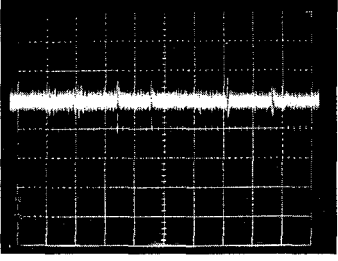
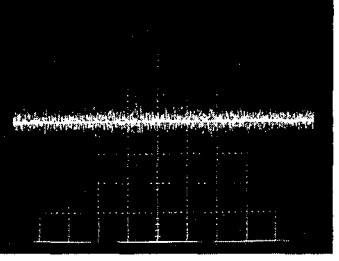
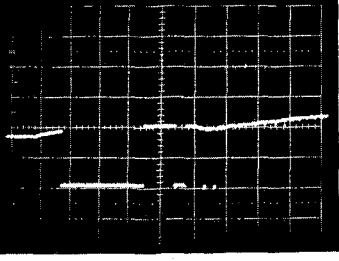
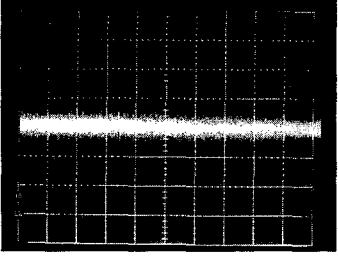
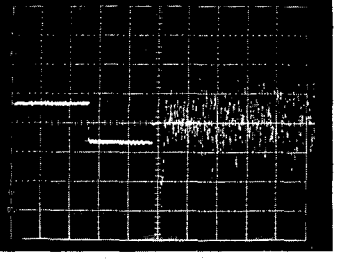
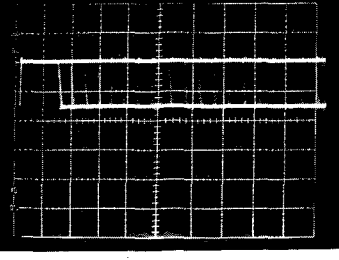
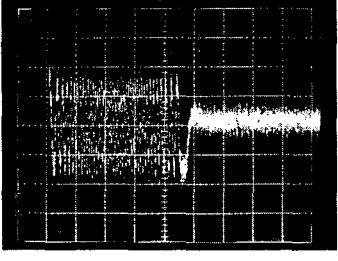
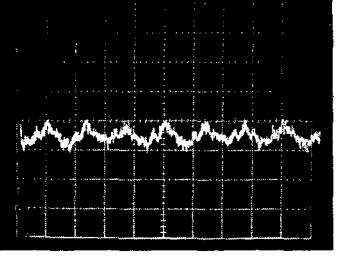
30qin	PD-4500\KU
30qin	PD-4550\KU
30qin	PD-5500\KU

Wave Forms

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

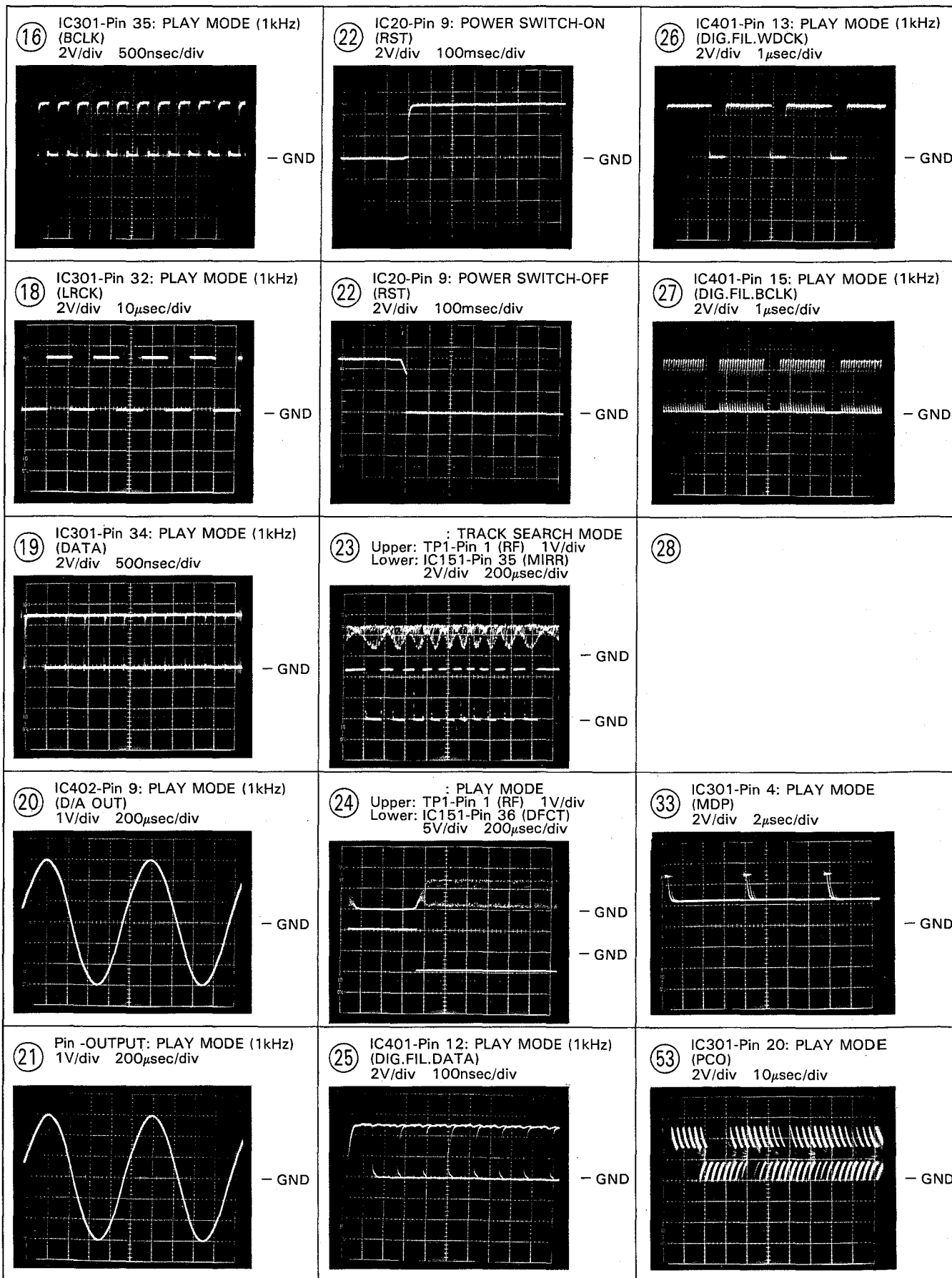
*1 50T-JUMP: After switching to the pause mode, press the manual search key.

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

② TP1-Pin 1: PLAY MODE (RF) 500mV/div 500nsec/div 	⑤ Q201 Emitter: FOCUS-IN (*2) MODE (FODR) 1V/div 200msec/div 	⑦ IC201-Pin 9: TRACK SEARCH MODE (SPDR) 2V/div 50msec/div 
② TP1-Pin 1: TRACK SEARCH MODE (RF) 500mV/div 200μsec/div 	⑤ Q201 Emitter: PLAY MODE (FODR) 1V/div 1msec/div 	⑧ IC201-Pin 3: PLAY MODE (CADR) 1V/div 2S/div 
③ TP1-Pin 6: PLAY MODE (FOER) 100mV/div 10msec/div 	⑥ Q203 Emitter: PLAY MODE (TRDR) 500mV/div 1msec/div 	⑧ IC201-Pin 3: TRACK SEARCH MODE (CADR) 2V/div 200msec/div 
④ TP1-Pin 2: PLAY MODE (TRER) 1V/div 10msec/div 	⑥ Q203 Emitter: 50T-JUMP (*1) MODE (TRDR) 500mV/div 1msec/div 	⑨ IC151-Pin 38: PLAY MODE (EFM) 2V/div 500nsec/div 
④ TP1-Pin 2: 50T-JUMP (*1) MODE (TRER) 1V/div 1msec/div 	⑦ IC201-Pin 9: PLAY MODE (SPDR) 1V/div 50msec/div 	

*3 POWER ON : Plug AC cord into AC wall socket.

*4 POWER OFF: Unplug AC cord from AC wall socket.



Mark	NO	Description	Part NO.
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◎ Mother Board Assembly
(PWM1266 : PD-4500/KU)

SEMICONDUCTORS

	IC101	PRE AMP IC	CXA1471S
	IC151	SERVO IC	CXA1372S
△	IC20	REGULATOR IC	M5298P
△	IC201	POWER OP-AMP	LA6520
	IC301	EFM DEMODULATION IC	CXD2500Q
	IC351	MICROCOMPUTER	PD4259
	IC401	DIGITAL FILTER, IC	SM5840BP
	IC402	DA CONVERTER, IC	PCM1700P-L
	IC405	OP-AMP IC	NJM4558D-D
	Q101	TRANSISTOR	2SA854S
	Q201	TRANSISTOR	2SC3581
	Q202	TRANSISTOR	2SA1399
	Q203	TRANSISTOR	2SC3581
	Q204	TRANSISTOR	2SA1399
	Q391	TRANSISTOR	DTC124ES
	Q403, 404	TRANSISTOR	2SD2144S
	Q405	TRANSISTOR	DTC124ES
	Q62	TRANSISTOR	2SC1740S
△	D11-14	DIODE	11ES2
	D211	ZENNER DIODE	MTZJ6. 2B
	D351	DIODE	1SS254
	D392-397	DIODE	1SS254
△	D52	DIODE	11ES2
	D54	ZENNER DIODE	MTZJ18B

COIL

L401(0. 22 μ H)	LAUR22K
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CAPACITORS

C101, 102	ELECTR. CAPACITOR	CEAS101M10
C103	CERAMIC CAPACITOR	CCCCH180J50
C104	ELECTR. CAPACITOR	CEAS101M10
C109	CERAMIC CAPACITOR	CKCYB152K50
C11, 13	CERAMIC CAPACITOR	CKCYF103Z50
C110	CERAMIC CAPACITOR	CKDYF103Z50
C15	CERAMIC CAPACITOR	CKCYF103Z50
C151-153	ELECTR. CAPACITOR	CEAS101M10
C155	MYLOR FILM CAPACITOR	CQMA182J50
C156	MYLOR FILM CAPACITOR	CQMA333K50
C157	MYLOR FILM CAPACITOR	CQMA103K50
C158, 159	MYLOR FILM CAPACITOR	CQMA104K50
C16	CERAMIC CAPACITOR	CKCYF103Z50
C160	ELECTR. CAPACITOR	CEAS47M50
C161	MYLOR FILM CAPACITOR	CQMA104K50
C162	ELECTR. CAPACITOR	CEAS010M50
C163	MYLOR FILM CAPACITOR	CQMA104K50
C164	MYLOR FILM CAPACITOR	CQMA103K50
C167	CERAMIC CAPACITOR	CKCYF103Z50
C168	MYLOR FILM CAPACITOR	CQMA333K50

Mark	NO	Description	Part NO.
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C169	MYLOR FILM CAPACITOR	CQMA103K50
C170	MYLOR FILM CAPACITOR	CQMA332J50
C171	MYLOR FILM CAPACITOR	CQMA472J50
C172	MYLOR FILM CAPACITOR	CQMA472K50
C202	CERAMIC CAPACITOR	CKCYF103Z50
C212	MYLOR FILM CAPACITOR	CQMA103K50
C216, 217	ELECTR. CAPACITOR	CEAS330M16
C25	ELECTR. CAPACITOR	CEAS332M16
C26	ELECTR. CAPACITOR	CEAS222M16
C27	ELECTROLYTIC CAPACIT	CEAS471M6R3
C28	ELECTR. CAPACITOR	CEAS101M10
C301	MYLOR FILM CAPACITOR	CQMA104K50
C302	ELECTROLYTIC CAPACIT	CEAS471M6R3
C303	ELECTR. CAPACITOR	CEAS330M16
C306	CERAMIC CAPACITOR	CKCYB152K50
C307	MYLOR FILM CAPACITOR	CQMA473J50
C308	MYLOR FILM CAPACITOR	CQMA103K50
C309	ELECTR. CAPACITOR	CEAS47M50
C351	ELECTROLYTIC CAPACIT	CEAS471M6R3
C352	ELECTR. CAPACITOR	CEAS330M16
C353, 361	CERAMIC CAPACITOR	CKCYF103Z50
C397	CERAMIC CAPACITOR	CKCYF103Z50
C403, 404	CERAMIC CAPACITOR	CCCCH150J50
C415, 416	ELECTR. CAPACITOR	CEAS3R3M50
C417, 418	CERAMIC CAPACITOR	CKCYB152K50
C421	CERAMIC CAPACITOR	CKCYF473Z50
C431, 432	ELECTR. CAPACITOR	CEAS330M16
C433, 434	ELECTR. CAPACITOR	CEAS220M25
C435, 436	MYLOR FILM CAPACITOR	CQMA152J50
C441, 442	MYLOR FILM CAPACITOR	CQMA152J50
C52	ELECTR. CAPACITOR	CEAS101M35
C60	ELECTR. CAPACITOR	CEAS010M50

RESISTORS

VR102	Semi fixed(22k Ω)	VRTB6VS223
VR103	Semi fixed(1k Ω)	VRTB6VS102
VR151, 152	Semi fixed(22k Ω)	VRTB6VS223
Other resistors		RD1/6PM□□□J

OTHERS

X351	CERAMIC RESONATOR(4. 19MHz)	VSS1014
X401	XTAL RES(OSC)(16. 9344MHz)	PSS1006
CN101	CONNECTOR	52045-1610
CN351	CONNECTOR	HLEM30S-1
JA391, 392	JACK/12V (CONTROL IN/OUT)	PKN1004
JA393	Mini jack(DECK SYNCHRO)	RKN1014
JA401	2P pinjack(LINE OUT)	PKB1009

8. IC INFORMATION

■ CXD2500Q

● Pin functions

No.	Pin name	I/O	Function
1	FOK	I	Focus OK input. Use for SENS output and servo auto sequence.
2	FSW	O	Switching output of output filter of spindle motor
3	MON		ON - OFF control output of spindle motor
4	MDP		Servo control of spindle motor
5	MDS		Servo control of spindle motor
6	LOCK		Perform sampling with 460Hz of GFS signal and if it is "H", outputs "H". If it is "L" consecutively 8 times, outputs "L".
7	NC	—	
8	VCOO	O	VCO output for analog EFM PLL
9	VCOI	I	VCO input for analog EFM PLL ($f_{\text{LOCK}} = 8.6436\text{MHz}$)
10	TEST		TEST terminal (Connect to GND)
11	PDO	O	Charge pump output for analog EFM PLL
12	Vss		GND
13	NC	—	
14	NC	—	
15	NC	—	
16	VPCO	O	PLL charge pump output for variable pitch
17	VCKI		Clock input from VCO for variable pitch ($f_{\text{center}} = 16.9344\text{MHz}$)
18	FILO		Filter output for master PLL (Slave = digital PLL)
19	FILI	I	Filter input for master PLL
20	PCO	O	Charge pump output for master PLL
21	AVss		Analog GND
22	CLTV	I	VCO control voltage input for master
23	AVDD		Analog power supply voltage (+5V)
24	RF	I	EFM signal input
25	TEST2		TEST terminal
26	TEST3		TEST terminal (Connect to GND)
27	ASYO	O	EFM full-swing output (L = Vss, H = VDD)
28	TEST4	I	TEST terminal (Connect to GND)
29	NC	—	
30	PSSL	I	Mode switching input of audio data output (L : serial output, H : parallel output)
31	WDCK	O	D/A interface for 48 bit slot. Word clock $f = 2F_s$
32	LRCK		D/A interface for 48 bit slot. LR clock $f = F_s$
33	VDD	—	Power supply voltage (+5V)
34	DA16	O	DA16 (MSB) output at PSSL = 1. Serial data of 48 bit slot at PSSL = 0 (2's COMP, MSB first)
35	DA15		DA15 output at PSSL = 1. Bit clock of 48 bit slot at PSSL = 0
36	DA14		DA14 output at PSSL = 1. Serial data of 64 bit slot at PSSL = 0 (2's COMP, LSB first)
37	DA13		DA13 output at PSSL = 1. Bit clock of 64 bit slot at PSSL = 0
38	DA12		DA12 output at PSSL = 1. LR clock of 64 bit slot at PSSL = 0
39	DA11		DA11 output at PSSL = 1. GTP output at PSSL = 0
40	DA10		DA10 output at PSSL = 1. XUGF output at PSSL = 0

No.	Pin name	I/O	Function
41	DA09	O	DA09 output at PSSL = 1. XPLCK output at PSSL = 0.
42	DA08		DA08 output at PSSL = 1. GFS output at PSSL = 0.
43	DA07		DA07 output at PSSL = 1. RFCK output at PSSL = 0.
44	DA06		DA06 output at PSSL = 1. C2P0 output at PSSL = 0.
45	DA05		DA05 output at PSSL = 1. XRAOF output at PSSL = 0.
46	DA04		DA04 output at PSSL = 1. MNT3 output at PSSL = 0.
47	DA03		DA03 output at PSSL = 1. MNT2 output at PSSL = 0.
48	DA02		DA02 output at PSSL = 1. MNT1 output at PSSL = 0.
49	DA01		DA01 output at PSSL = 1. MNT0 output at PSSL = 0.
50	APTR		Control output for aperture correction. "H" at R ch.
51	APTL		Control output for aperture correction. "H" at L ch.
52	Vss		GND
53	XTAI	I	Crystal oscillating circuit input. f = 16.9344MHz or f = 33.8688MHz
54	XTAO	O	Crystal oscillating circuit output. f = 16.9344MHz
55	XTSL	I	Crystal selection input. "L" at f = 16.9344MHz, "H" at f = 33.8688MHz.
56	FSTT	O	2/3 demultiplier output of pins 53 and 54.
57	C4M		4.2336MHz output
58	C16M		16.9344MHz output
59	MD2	I	ON/OFF control of Digital-out. "H" = ON, "L" = OFF
60	DOUT	O	Digital-out output
61	EMPH		When the emphasis is existed in playback disc, "H" outputs. It is not existed, "L" outputs.
62	WFCK		WFCK (Write Frame Clock) output
63	SCOR		"H" output when detecting the subcode Sync. signal S0 or S1.
64	SBSO		Serial output of Sub P through W.
65	EXCK	I	Clock input for SBSO read out.
66	SQSO	O	SubQ 80 bit output and level data 16 bit output of PCM peak.
67	SQCK	I	Clock input for SQSO read out.
68	MUTE		Mute at "H" and release at "L".
69	SENS	—	SENS output to CPU.
70	XRST	I	System reset. Reset at "L".
71	DATA		Serial data input from CPU.
72	XLAT		Latch input from CPU. Latches the serial data at fall edge of clock.
73	VDD		+ 5V power supply
74	CLOCK	I	Serial data transfer clock input from the CPU.
75	SEIN		Sense input from SSP.
76	CNIN		Track jump count pulse input
77	DATO	O	Serial data output to the SSP.
78	XLTO		Serial data output to the SSP. Latches the serial data at fall edge of clock.
79	CLKO		Serial data transfer clock output to the SSP.
80	MIRR	I	Mirror signal input. Auto sequence control so that it uses to jump over 128 tracks.

■ CXA1471S

● Pin functions

No.	Pin name	I/O	Function	No.	Pin name	I/O	Function
1	—		Not used	12	—		Not used
2	LD	O	APC amplifier output	13	EO	O	Output for monitor of I-V amplifier E.
3	PD		APC amplifier input	14	EI	—	Pin for gain adjustment of I-V amplifier E.
4	PD1	I	Inversion input of RF I-V amplifier. Connect to A + C and B + D of the photo diode, and current input.	15	TE	O	Output of tracking error amplifier
5	PD2			16	FE-BIAS	I	Pin for bias adjustment of non-inverting side of the focus error amplifier.
6	VEE		-5V power supply	17	FE		Output of focus error amplifier.
7	F-IN		Inversion input of F and E I-V amplifier. Connect to F and E of the photo diode, and current input.	18	RFO	O	Output of RF amplifier
8	E-IN	I		19	RFI	I	Input of inverting side of the RF amplifier. RF amplifier's gain is decided by resistor which connecting between RFI (pin 19) and RFO (pin 18).
9	VR	O	DC voltage output of $(V_{CC} + V_{EE}) / 2$.	20	LD-ON		
10	VC	I	Centering voltage of VC input. When using the +5V and -5V power supply, connect to GND. When using the +5V power supply, connect to VR (pin 9) pin.	21	Vcc		+5V power supply
11	—		Not used				

■ SM5840BP

● Pin functions

No.	Pin name	I/O	Function	No.	Pin name	I/O	Function
1	CKSL	ip **	Selection of oscillation and input frequency. (384fs at CKSL = "H") * (256fs at CKSL = "L") *	10	DG		Deglitch output at 8fs LR parallel output mode.* Deglitch output at 4fs LR alternate output mode.*
2	XTI	I	Oscillating circuit input (Frequency is selected by CKSL).	11	DOR	O	R ch data output at 8fs LR parallel output mode.* LR clock output at 4fs LR alternate output mode.*
3	XTO		Oscillating circuit output	12	DOL		L ch data output at 8fs LR parallel output mode.* L ch / R ch data output at 4fs LR alternate output mode.*
4	CKO	O	Oscillating circuit output clock (Frequency is same as XTI pin).	13	WCKO		Word clock output
5	VSS	—	GND	14	VDD	—	+5V power supply
6	MDT		Mode set data	15	BCKO	O	Bit clock output
7	MCK		Mode set clock	16	LRCI		Sample rate (fs) clock of input data. *
8	MLE	ip **	Mode set latch enable	17	BCKI	ip **	Bit clock input
9	RST		System reset (initialize)	18	DIN		Data input

* : fs means sample frequency of the input data.

** : ip is input pins with pull-up resistor. Therefore, don't mind that pins are opened at setting the H level.

■ CXA1372S

● Pin functions

No.	Pin name	I/O	Function	No.	Pin name	I/O	Function
1	TE		Tracking error input	27	LOCK		Sled protection circuit is worked at "L". (with 47kohms pull-up resistor)
2	TDFCT		Capacitor connect pin for time constant at the defect.	28	CLK		Serial data transfer clock input from the CPU. (Pull-up resistor is nothing.)
3	ATSC		Window comparator input for ATSC detection.	29	XLT	I	Latch input from the CPU. (Pull-up resistor is nothing.)
4	FZC		Focus and zerocross comparator input.	30	DATA		Serial data input from the CPU. (Pull-up resistor is nothing.)
5	FE		Focus error input.	31	XRST		Reset input (reset at "L"). (Pull-up resistor is nothing.)
6	FDFCT		Capacitor connect pin for time-constant at the defect.	32	C.OUT		Signal output for count the track
7	VC	I	Center voltage input. (GND at two power supply, (Vcc+GND) / 2 at single power supply)	33	SENS	O	FZC, AS, TZC and SSTOP outputs from the CPU.
8	FGD		Connect a capacitor between FGD (pin 8) and ATSC (pin 3) when high-pass gain of focus servo is dropped.	34	D GND	—	Digital GND
9	FS3		Switching the high-frequency gain of the focus servo by ON/OFF of FS3.	35	MIRR	O	MIRR comparator output. (DC voltage : connect 10kohms load resistor)
10	FLB		Time constant connect pin for boosts low of focus servo.	36	DFCT		DEFECT comparator output. (DC voltage : connect 10kohms load resistor)
11	FEO	O	Focus drive output	37	ASY	I	Auto asymmetrical control input
12	FE-		Inverting input of focus amplifier	38	EFM	O	EFM comparator output. (DC voltage : connect 10kohms load resistor)
13	SRCH	I	Time constant connect pin for making the focus search waveform.	39	FOK		Focus OK comparator output. (DC voltage : connect 10kohms load resistor)
14	TGU		Time constant connect pin for switching the tracking high-frequency gain.	40	CC1	I	DEFECT bottom hold output
15	TG2			41	CC2	O	Input pin so that DEFECT bottom hold output signal is input by coupling capacitor.
16	AVCC	—	Analog +5V power supply	42	DVCC	—	Digital +5V power supply
17	TAO	O	Tracking drive output	43	CB		Capacitor connect pin for the DEFECT bottom hold.
18	TA -	I	Inverting input of tracking amplifier.	44	CP	I	Capacitor connect pin for the MIRR hold. Non-inverting input of the MIRR comparator.
19	SL +		Non-inverting input of sled amplifier.	45	RFI		Input terminal so that RF summing amplifier output signal is input by coupling capacitor.
20	SLO	O	Sled drive output	46	RFO	O	RF summing amplifier output. Check point of the eye pattern.
21	SL-		Inverting input of sled amplifier	47	DVEE	—	Digital -5V power supply
22	FSET		Pin for peak setting of phase compensation of the focus tracking.	48	TZC	I	Tracking zerocross comparator input.
23	ISET	I	Current flows for set the height of focus search, track jump and sled kick.				
24	SSTOP		Pin for detect ON/OFF signal of the limit switch for detecting inner side of the disc.				
25	AVEE	—	Analog -5V power supply				
26	DIRC	I	Use at one track jump. (With 47kohms pull-up resistor)				

9. OPTICAL PATH IN THE PICKUP

9.1 OPTICAL SYSTEM OF PICKUP MODEL THE '90

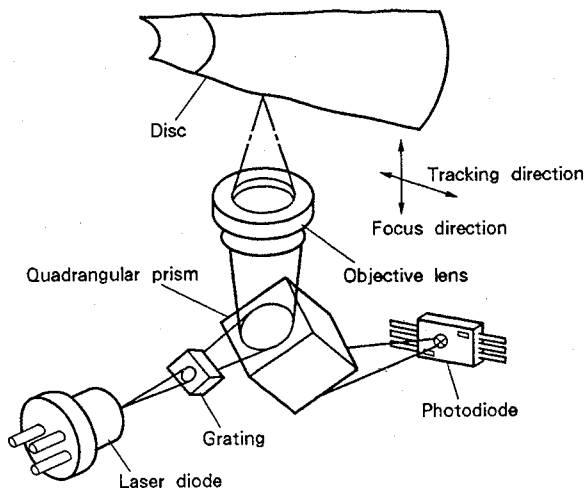


Fig. 9-1 Optical path and parts

Fig. 9-1 shows the configuration of this pickup's optical parts.

The wavelength of the light emitted from the laser diode is between 780 and 790nm. The light is barely visible. This light source is spread into an ellipse from an ultra-small emission point. The light expands at a set angle. The emitted light goes through a grating and is divided into three beams of 0 step and ± 1 step.

The other beams of ± 2 , 3 and n steps are also present, but are lost and not used. When the light reaches the quadrangular prism, 50% is reflected. The remaining light permeates the quadrangular prism and is lost. The light then goes to the objective lens (finite type). Since this pickup's objective lens uses a finite system (finite because the convergence distance for the LD to objective lens pass-way is finite), a collimator lens is unnecessary. The light that is converged on an ultra-small diameter spot by these objective lenses is reflected by the disc and returns to the objective lens. Then it goes through the quadrangular prism where 50% of it returns to the laser diode. The remaining 50% of light goes through the quadrangular prism and reaches the photodiode.

This has been a general outline of the optical path. The feature of each part are explained in the following section.

9.2 FEATURE OF EACH SECTION

(1) Laser diode (LD)

The size of previously-used LDs is 5.6mm ϕ . This has resulted in a compact and lightweight optical path.

(2) Objective lens

The collimator lens has been superseded by the finite objective lens which has a finite convergence distance for the LD to objective lens pass-way. A much brighter low-magnification finite objective lens preserving high performance is newly employed for this player in place of the finite lens used in our previous models.

(3) Simple optical path mad possible by the newly-developed quadrangular prism (Fig. 9-1)

The above-mentioned objective lens and the newly developed optical path permit the number of optical parts to be decreased. This results in yielding a higher reliability.

As the first model to employ the bright finite objective lens, this CD player succeeded in eliminating the necessity of the conventional photo IC (photo diode with an output amplifier). Therefore, this photo IC is replaced a photodiode, high performance can be obtained at low cost. This replacement is accompanied by a change in the output format of the pickup block to the electric current-output type.

(4) Actuator of the wire-suspension system

(Fig. 9-2)

There are generally two types of actuators for pickup; axis-sliding type and wire-suspension type. The '90 pickup models have employed the latter type.

This realizes an actuator with stable and invariable characteristics.

(5) Super engineering-plastic body

By further developing the computer-simulated body resinification technology cultivated with the '87 and '88 models, a more reliable body has been produced.

(6) Clean playback by skew adjustment in both tangential and radial directions (Fig. 9-2)

The beam converging on pits has an uneven factor (aberration) of intensity distribution depending on the aberration of the optical path, which may cause signal degradation and affect performance. A factor in the aberration depending on the inclination of the optical axis is called "coma". As is broadly known, it can be canceled by adjusting the inclination of the objective lens. While this adjustment has been conventionally performed only in the tangential direction, this CD player has employed a system to adjust it in both the tangential and radial directions. This results in a ideal form for the converging beam with very little aberration, and stable reproduction with a minimum of jitter is enabled with any compact disc.

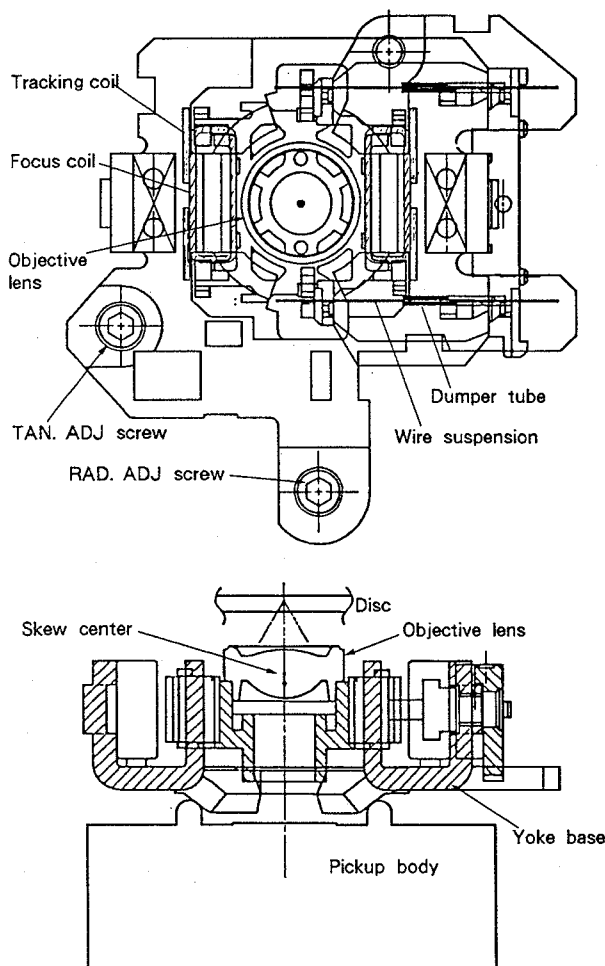


Fig. 9-2 Structure of actuator

(7) RF and servo signal

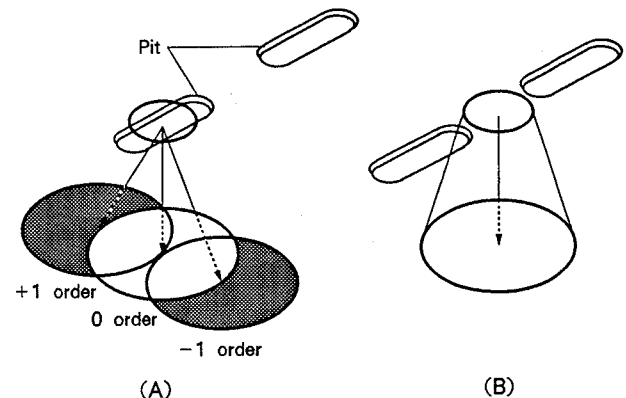


Fig. 9-3
Axis beam reflection at the disc surface

The beam, which has been reduced to an extremely small spot by the objective lens, now strikes the disc side on which the signal is located. Part of the beam is then reflected back to the objective lens and photo diode. A diagram showing how this beam is reflected off the disc is shown in Fig. 9-3.

(A) shows what happens when the concentrated beam is directed at a pit and (B) shows the same beam when reflected from a space between pits.

In case (A), the beam is diffracted, so the dark part of the beam does not return to the objective lens. Instead, only the center of the beam passes through the objective lens and reaches the photodiode.

In case (B), there is no diffraction because the beam does not strike a pit. Therefore, the entire beam is reflected back to the photodiode, producing brighter beam than case (A).

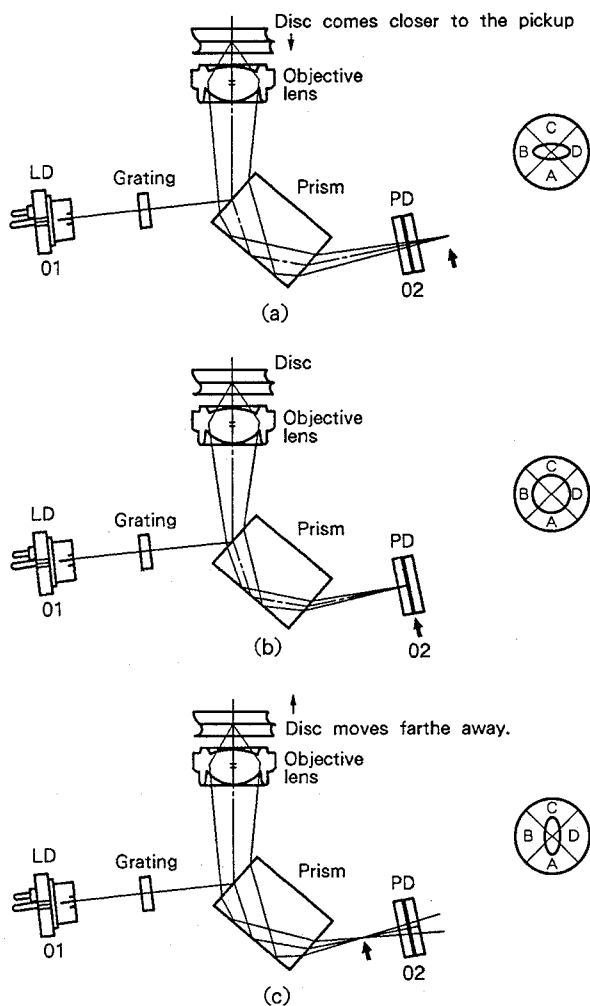


Fig. 9-4

Focuses (indicated by arrows in the figures) and beam forms on the photo diode depending on the disc positions.

In this system, the data on the disc, which is represented by pits, is converted into an electrical signal at the photodiode according to the intensity (brightness) of the reflected beam. The RF signal is then produced from this electrical signal by the arithmetic-logic circuit. Fig. 9-4 shows how the focus signal is detected.

(b) is when the beam from the laser diode is accurately focused on the disc by the objective lens.

(a) shows what happens when the disc comes closer to the pickup and (c) shows what happens when the disc moves farther away.

In case (b), the beam emanating from point 01 is reflected and diffracted on the disc surface to produce a convergence in point 02. In case (a), the beam is directed at a point farther than point 02.

In case (c), the beam is directed at a point nearer than point 02.

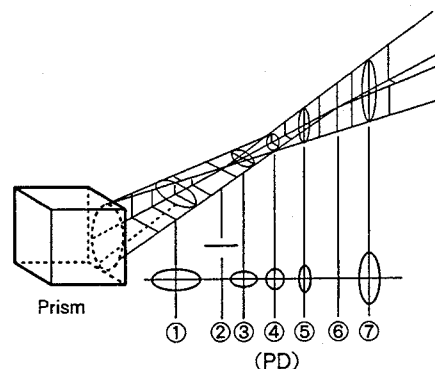


Fig. 9-5 Quadrangular prism

Fig. 9-5 shows the characteristics of the quadrangular prism.

It functions as a lens in the vertical direction in the figure, but not in the horizontal direction.

① through ⑦ shows the shape of the beam at each point. Between points ② and ⑥, which are in a straight line, the beam is circular at point ④. If we assume that Fig. 9-5 shows mode (b) of Fig. 9-4, that means the beam is circular because the photo diode is located at point ④.

In mode (a) of Fig. 9-4, the location of the photo diode is closer to the quadrangular prism than it was in Fig. 9-5. That means the shape of the beam is the same as that of point ③ (an ellipse that has a longer width than height). In mode (c) of Fig. 9-4, the shape of the beam is that of point ⑤, an ellipse that has a longer height than width.

10. CIRCUIT DESCRIPTIONS

10.1 PRE-AMP

Pre-amp section processes the output signal received from the pickup and then sends signals to the servo section.

Its primary component is an IC CXA1471S (IC101). A description of each section follows.

The internal configuration of CXA1471S is shown in Fig.10-1.

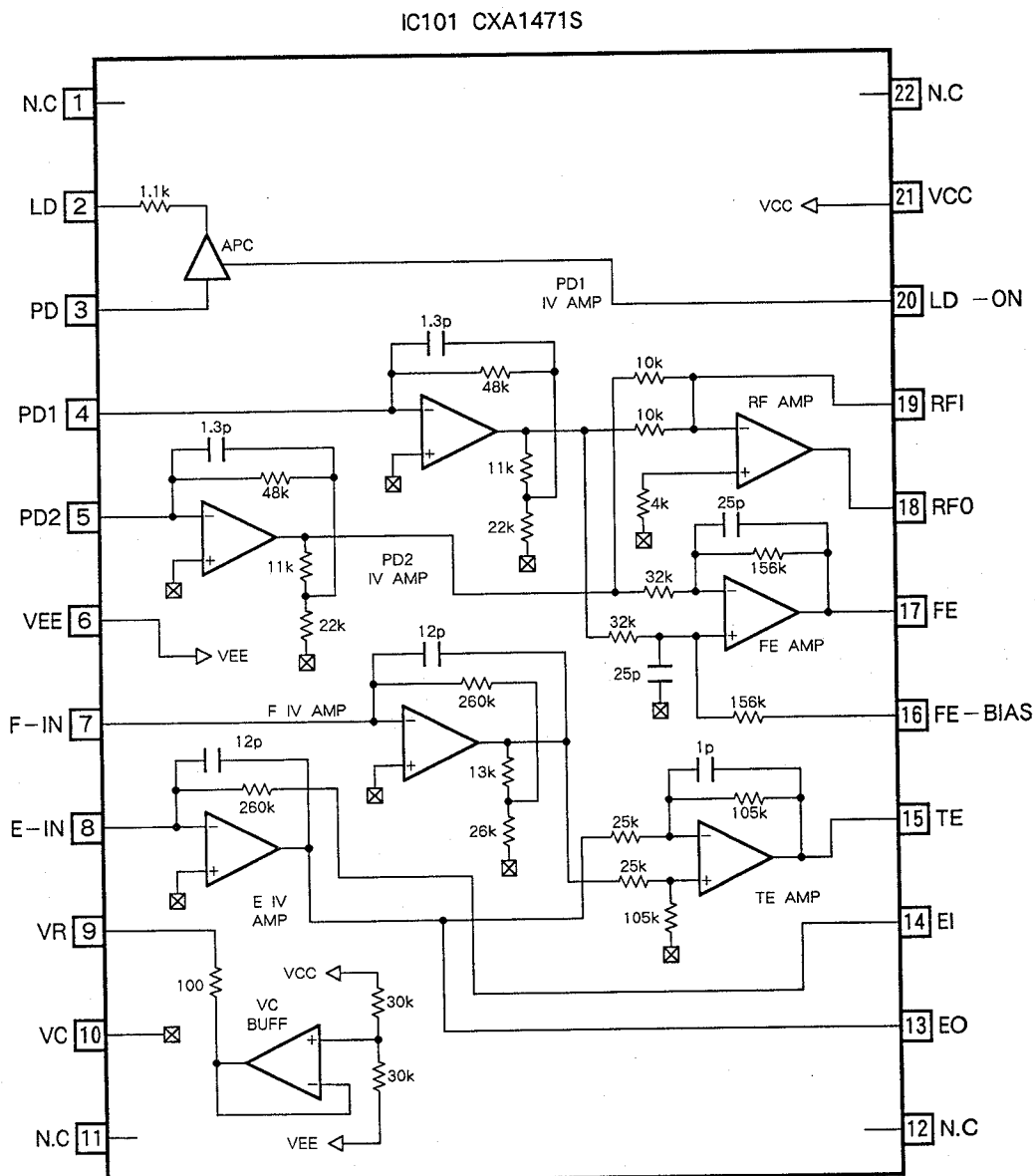


Fig. 10-1

10.1.1 RF amp

The output of the photodiode that is input to the input pins (PD1 and PD2) is respectively subjected to I-V conversion into a $83k\Omega$ equivalent resistor at the RF I-V amps (1) and (2). Furthermore, addition is performed at the RF summing amp so that the output voltage which has been converted from the currents of the photodiodes ($A + B + C + D$) is output from Pin RFO. An eye pattern check can be performed at this pin.

C103 and R101 through R103 raise the high-range gain characteristics (above 1MHz) of the RF amp inside the IC. As a result, the amplitude of high range signals such as 3T of RF is raised.

So, signal is detected more accurately.

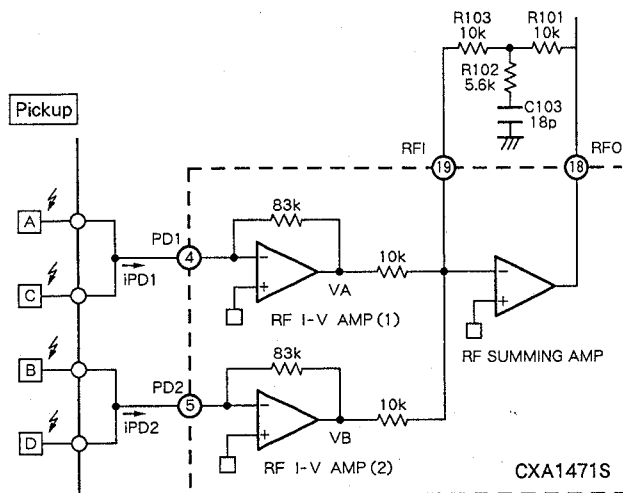


Fig. 10-2

The low-frequency component of the RFO output voltage V_{RFO} is as follows:

$$V_{RFO} = 2.0 \times (V_A + V_B) \\ = 166k \times (i_{PD1} + i_{PD2})$$

10.1.2 Focus Error Amp

This amp obtains the difference between the output (V_A) of the RF I-V Amp (1) and the output (V_B) of the RF I-V Amp (2), then outputs the voltage which has been converted from the currents of the photodiodes $[A + C - (B + D)]$.

The FE output voltage (low frequency) is as follows:

$$V_{FE} = 4.9 \times (V_A - V_B) \\ = 400k \times (i_{PD1} - i_{PD2})$$

This output corresponds to the sum and difference of the opposite angles of the 4-division detector which cause a focus error (what is called S curve).

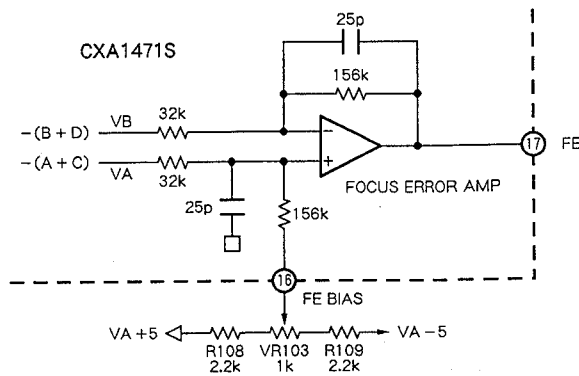


Fig. 10-3

10.1.3 Tracking Error Amp

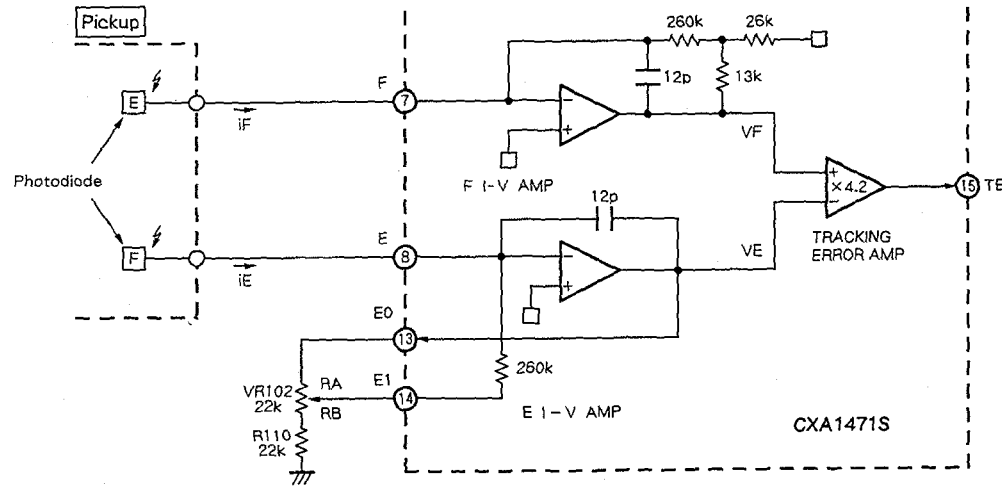


Fig. 10-4

The output of photodiodes for the side spots input to pins E and F are respectively subjected to I-V conversion at the E I-V and F I-V amps. That is:

$$V_F = 403k\Omega \times i_F$$

$$V_E = [260k\Omega \times RA / (RB + 22k\Omega) + (RA + 260k\Omega)] \times i_E$$

Furthermore, the output difference between the E I-V amp and F I-V amp is obtained at the Tracking Error Amp. The output voltage V_{TE} that has been converted from currents of the photodiodes (E-F) as follows:

$$V_{TE} = (V_E - V_F) \times 4.2$$

$$= (i_E - i_F) \times 403k\Omega \times 4.2$$

10.1.4 APC Circuit (Automatic Power Control)

The laser diode (LD) has negative thermal characteristics to increase the optical output when driven with a fixed current. It is necessary to control the current at the monitor photodiode (MD) so that a fixed output is obtained. The APC circuit is provided for this purpose.

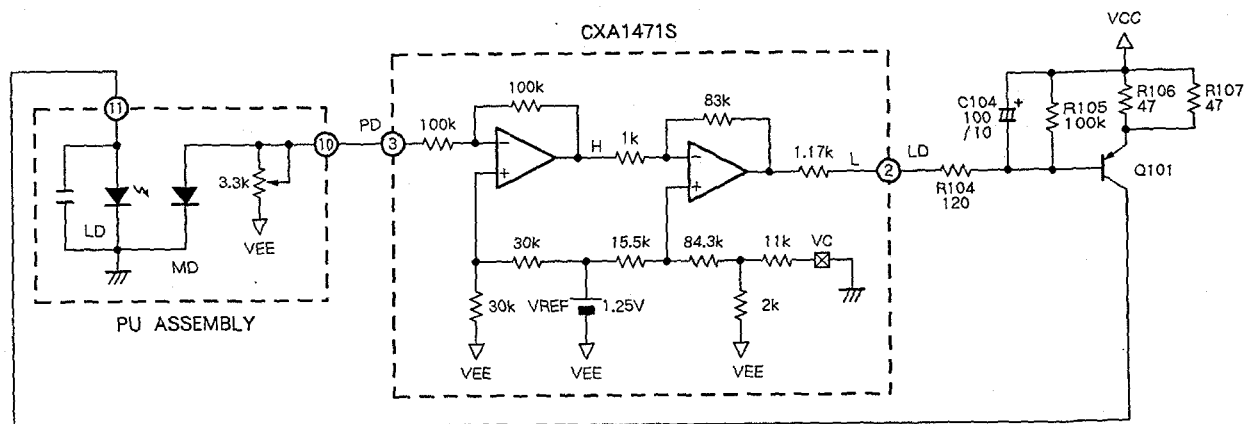


Fig. 10-5

10.2 SERVO SECTION

All servo control is performed using the system control signal. The primary servo control systems of the CD player are listed below.

1. Focus servo
2. Tracking servo
3. Carriage servo
4. Spindle servo
5. EFM-PLL servo
6. Focus in
7. Track jump

In this system, the servo section includes FOK, MIRR and DFCT circuits which have been conventionally used in the RF amplifier.

Its primary component are two ICs CXA1372S (IC151) and CXD2500Q (IC301). A description of each section follows.

The internal configuration of CXA1372S is shown in Fig. 10-6.

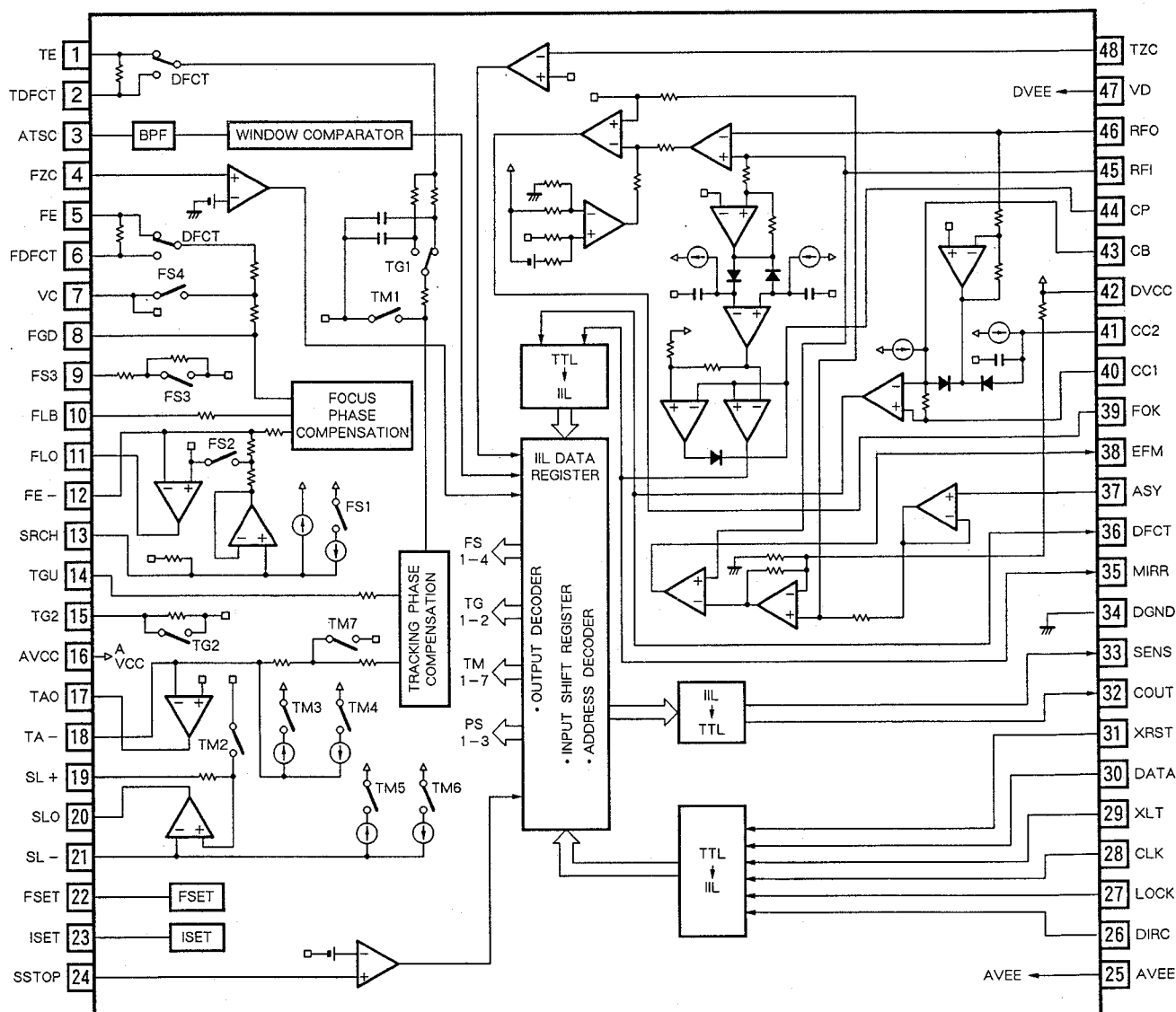


Fig. 10-6 IC151 CXA1372S

10.2.1 Focus OK Circuit

The Focus OK circuit functions to create the window for the timing of switching ON the Focus Servo from Focus Search status.

RF signal is input to pin 46 and the signal which passes through the HPF is input to pin 45. These signals pass through the Focus OK Amp and the Focus OK Comparator, and are output as the Focus OK signal from pin 39.

The Focus OK output is inverted in the case below:

$$V_{RFI} - V_{RFO} \approx -0.37V$$

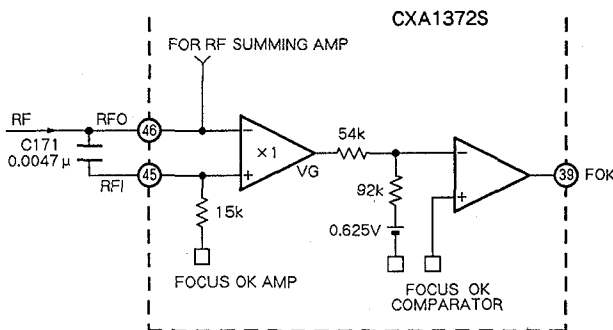


Fig. 10-7

10.2.2 EFM Comparator

The EFM comparator functions to convert the RF signals into binary signals. The asymmetry caused by variance during disc manufacture cannot be eliminated merely by AC coupling. Consequently, the reference voltage of the EFM comparator is controlled by exploiting the respective 50% probability of a 1 or 0 occurring as the value of a binary-coded EFM signal. Note that since this EFM comparator is of power-current SW type, its H and L levels will not equal the supply voltage, feedback is applied through the decoder C-MOS (CXD2500Q) buffer.

R308, R309, C308 and C309 serve as a LPF for obtaining the DC component of the EFM signal.

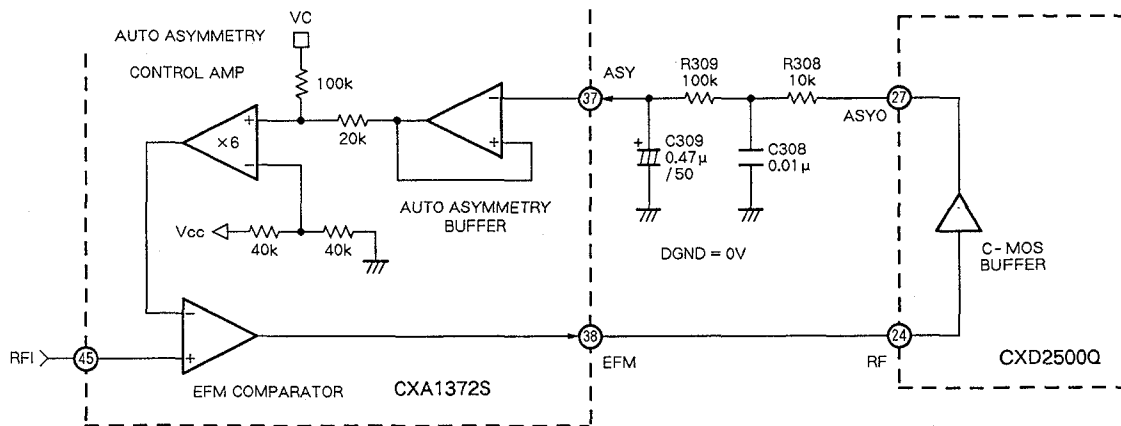


Fig. 10-8

10.2.3 Mirror Circuit

After amplifying the RFI signal (This signal is for detecting ON Track or OFF Track of the pickup's beam. Output of pin 35 is "H" at OFF Track), the Mirror circuit performs Peak Hold and Bottom Hold. Peak Hold will hold the peak value at a time constant that is capable of tracking even a 30kHz Traverse signal, whereas Bottom Hold will hold the bottom value at a time constant that is capable of tracking even the envelope fluctuations of revolving cycles.

The DC-replayed Envelope signal J is obtained from the differential amplitude of these Peak and Bottom Hold signals, H and I. The Mirror output is obtained by comparing this signal J with the signal K which has been held at level that is two-thirds that of the peak value, using large time constant. In other words, the Mirror output is "L" upon a disc track or "H" between disc tracks (the mirror section). Moreover, the Mirror output is also "H" when a defect has been detected.

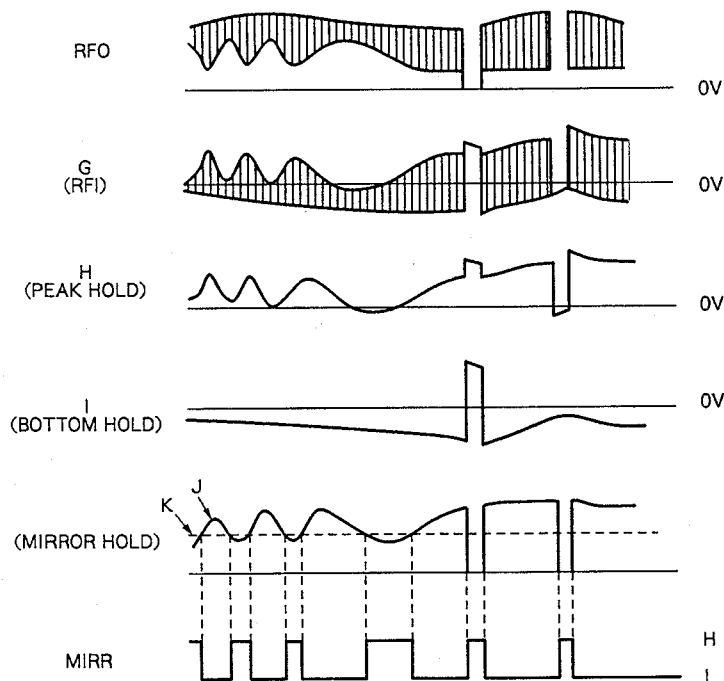
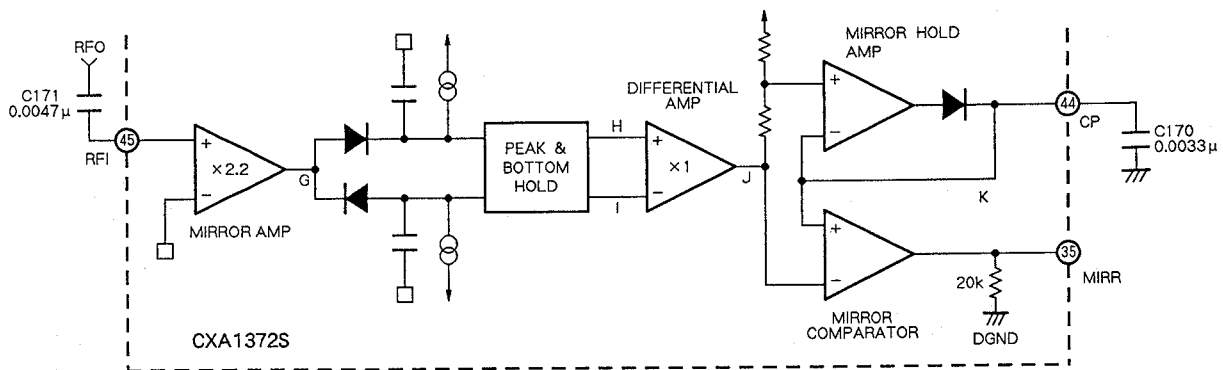


Fig. 10-9

10.2.4 Defect Circuit

After inverting the RFI signal, the defect circuit performs bottom hold using two time constants, one long and one short. The bottom hold performed by the short time constant sends a response at a mirror-surface defect on the disc that is 0.1ms or longer. The bottom hold performed using the longer time constant continues holding the mirror surface at the level preceding the defect. These signals are respectively differentiated by use of C coupling and their level are shifted. Then, the signal which might result from a possible defect in the disc's mirror surface is generated by comparing the aforementioned signals. This signal is used to control the tracking and focus servo loops when the DEFECT output is "H" to improve the playability.

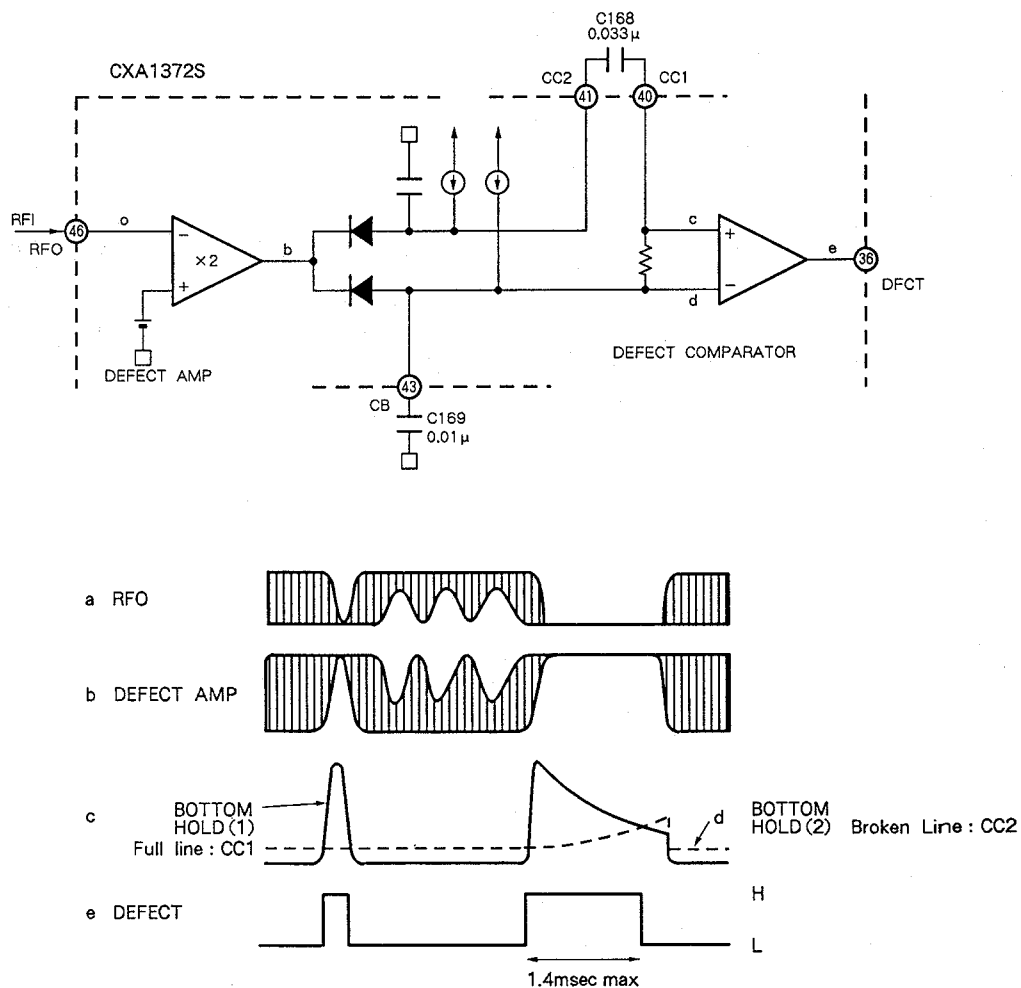


Fig. 10-10

10.2.5 CPU INTERFACE

Servo control in this CD player is performed transferring the serial data from the CPU (system control micro-computer) PD4259 (IC351) to the DSP CXD2500Q (IC301).

The serial data is transferred to the SSP CXA1372S (IC151) via CXD2500Q. The connections of serial interface is shown in Fig. 10-11.

The serial data consists of 4-through 16-bit data and 4-bit address and is transferred in sequence from the LSB of data, sending DATA, CLK and XLAT signals. Also, a SENS signal is supplied to CPU PD4259 from SSP and DSP, showing the various servo statuses. The timing chart of serial interface is shown in Fig. 11-12. The command instruction of the system control data and SENS output correspond to it address are shown in Table 10-1.

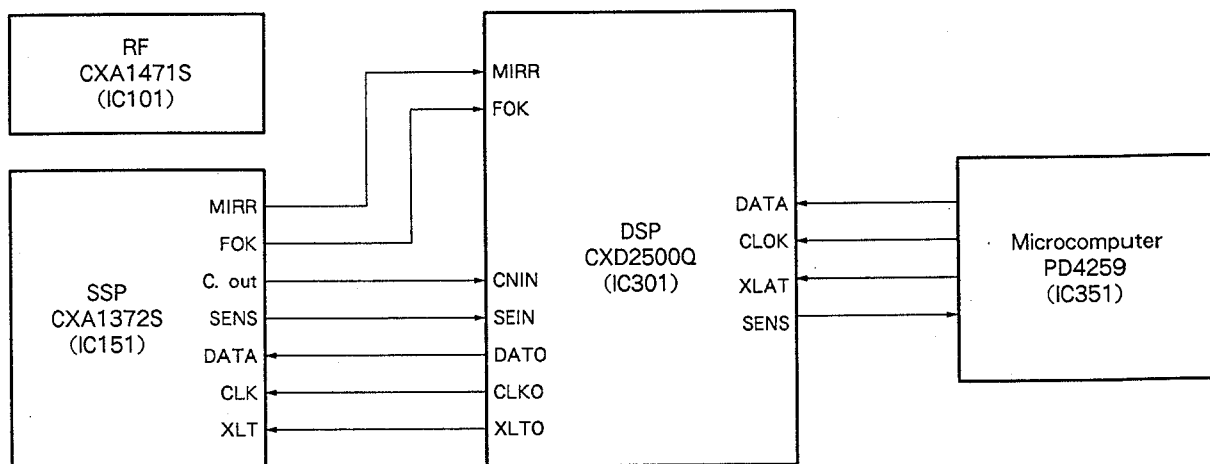


Fig. 10-11

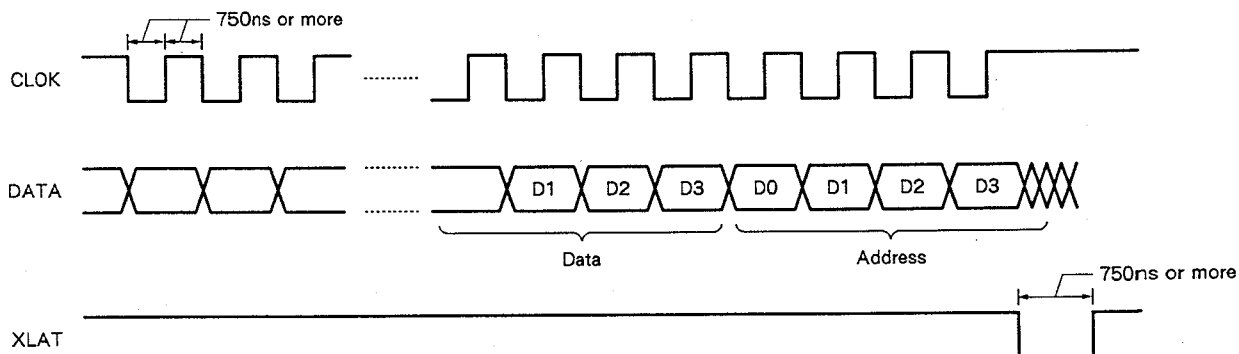


Fig. 10-12

—: Don't Care

Command	Address				Data 1				Data 2				Data 3				Data 4				SENS
	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	
\$0 Focus Control	0	0	0	0	FS4 Focus ON	FS3 Gain Down	FS2 Search ON	FS1 Search Up													FZC
\$1 Tracking Control	0	0	0	1	Anti Shock	Brake ON	TG2 Gain Set	TG1													A.S
\$2 Tracking Mode	0	0	1	0	Tracking Mode				Carriage Mode												TZC
\$4 Auto-sequence	0	1	0	0	AS3	AS2	AS1	AS0													XBUSY
\$5 Blind (A,E), Overflow (C) Brake (B)	0	1	0	1	0.18ms	0.09ms	0.045ms	0.022ms													FOK
					0.36ms	0.18ms	0.09ms	0.045ms													
\$6 KICK (D)	0	1	1	0	11.6ms	5.8ms	2.9ms	1.45ms													Hi-Z
\$7 Auto-sequencer (N) setting track jumps.	0	1	1	1	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2	1	"L"
\$8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
\$9 Func setting	1	0	0	1	D CLV 011-OFF	0	A SEQ ON-OFF	D PLL ON-OFF	0	0	0	—	—	—	—	—	—	—	—	—	"L"
\$A Audio CTRL	1	0	1	0	0	0	Mute	ATT	0	0	—	—	—	—	—	—	—	—	—	—	GFS
\$B Traverse monitor counter setting	1	0	1	1	32,768	16,384	8,192	4,096	2,048	1,024	512	256	278	64	32	16	8	4	2	1	COMP
\$C Servo coefficient setting	1	1	0	0	Gain MDP1	Gain MDP0	Gain MDS1	Gain MDS0	—	—	—	—	—	—	—	—	—	—	—	—	COUT
\$D CLV CTRL	1	1	0	1	DCLV PWM MD	1	0	CLVS Gain	—	—	—	—	—	—	—	—	—	—	—	—	"L"
\$E CLV Mode	1	1	1	0	CM3	CM2	CM1	CM0	—	—	—	—	—	—	—	—	—	—	—	—	OV64

Table. 10-1 Command instruction

10.2.6 The meaning of SENS signal

The meaning of SENS signal is shown in the table below.

Description of the SENS signal

SENS output	Meaning
FZC	When focus error is more than 0V, outputs "H", and when it is less than 0V, outputs "L" at Focus IN. This signal shows the timing of servo ON at Focus IN.
ATSC	Outputs "H" when detecting anti-shocked. This CD player is fixed "L".
T.Z.C	When tracking error is more than 0V, outputs "H", and when it is less than 0V, outputs "L".
$\overline{\text{XBUSY}}$	When auto sequencer during operation, outputs "L", and when it completes operation, outputs "H".
FOK	Output the input signal of FOK terminal. Output "H" when Focus OK.
GFS	Outputs "H" when the reproduced frame sync is obtained with proper timing.
COMP	Counts the number of tracks defined by \$B and outputs "H" when latched to \$B or \$C and outputs "L" when CNIN is input up to the number of \$B.
COUT	Counts the number of tracks defined by \$B and outputs "H" when latched to \$B or \$C and toggles each time when CNIN is input up to the number of \$B.
$\overline{\text{OV64}}$	Outputs "L" when the EFM signal has been prolonged over sixty-four channel clocks after passing the sync detection filter.

10.2.7 Meaning of the instruction code

Meaning of the instruction code is described in the below.

\$ 2 Tracking Mode

	D3	D2
OFF	0	0
Servo ON	0	1
FWD JUMP	1	0
REV JUMP	1	1

Carriage Mode

	D1	D0
OFF	0	0
Servo ON	0	1
FWD MOVE	1	0
REV MOVE	1	1

\$ 4 Auto sequence

Command	AS3	AS2	AS1	AS0
CANCEL	0	0	0	0
FOCUS - ON	0	1	1	1
1 TRACK JUMP	1	0	0	RXF
10 TRACK JUMP	1	0	1	RXF
2N TRACK JUMP	1	1	0	RXF
N TRACK MOVE	1	1	1	RXF

RXF = 0 FORWARD
RXF = 1 REVERSE

When the CXD2500Q receives this command, a series of operations including auto focus and track jump is automatically performed without commands from the system microcomputer.

A description of each operation follows. Registers \$5 through \$7 define the conditions for this automatic sequence.

\$ 9 FUNC setting

Command	Data 1			
	D3	D2	D1	D0
Func setting	DCLV ON - OFF	0	A. SEQ ON - OFF	D. PLL ON - OFF

D3

Command bit	CLV mode	Contents	
DCLV ON-OFF=0 (D3 = 0)	Usual CLV servo	—	
DCLV ON-OFF=1 (D3 = 1)	Digital CLV servo	D3 DCLV of \$D PWM MD	MDS = PWM Polarity signal MDP = PWM Absolute signal (Two values)
		0	MDS = Z (*) MDP = Three value PWM output

D1 Auto sequence ON when D1 (A.SEQ) = 1.

* : Use this setting for this CD player.

D0

Command bit	Meaning
DPLL = 0	RFPLL becomes analog. Use PDO, VCOI and VCOO.
DPLL = 1	RFPLL becomes digital. PDO becomes Z. (*)

* : Use this setting for this CD player.

\$ A

Command	Data 1			
	D3	D2	D1	D0
Audio CTRL	0	0	Mute	ATT

D1

Command bit	Meaning
Mute = 0	Set Mute OFF if other muting conditions are not defined.
Mute = 1	Mute ON

DO

Command bit	Meaning
ATT = 0	Attenuation OFF
ATT = 1	- 12dB

\$ C Spindle servo coefficient setting

Command	D3	D2	D1	D0
Servo coefficient setting	Gain MDP1	Gain MDP0	Gain MDS1	Gain MDS0
CLV CTRL (\$DX)	—————			Gain CLVS

Perform the external setting of the spindle servo gain when DCLV = 1. (\$9D3)

- Gain setting of the CLVS mode : GCLVS

Gain MDS1	Gain MDS0	Gain CLVS	GCLVS
0	0	0	-18dB
0	0	1	-6dB
0	1	0	-12dB
0	1	1	0dB
1	0	0	-6dB
1	0	1	+6dB

- Gain setting of the CLVP mode : GMDP : GMDS

Gain MDP1	Gain MDP0	GMDP
0	0	- 6dB
0	1	0dB
1	0	+ 6dB

Gain MDS1	Gain MDS0	GMDS
0	0	- 6dB
0	1	0dB
1	0	+ 6dB

* : Use this setting for this CD player.

\$ D

Command	D3	D2	D1	D0
CLV CTRL	DCLV PWM MD	1	0	CLVS Gain

Refer to \$9

Refer to \$C

\$ E Spindle servo control

Command	D3	D2	D1	D0
CLV mode	CM3	CM2	CM1	CM0

CM3	CM2	CM1	CM0	Mode
0	0	0	0	STOP
1	0	0	0	KICK
1	0	1	0	BRAKE
1	1	1	0	CLVS
1	1	0	0	CLVH
1	1	1	1	CLVP
0	1	1	0	CLVA

STOP : This mode is stopped to the spindle motor.

KICK : This mode is forward rotated to the spindle motor.

BRAKE : This mode is reverse rotated to the spindle motor.

CLVS : Rough servo mode. Used to pull disc rotation into the capture range of RF-PLL when RF-PLL is unlocked.

CLVP : PLL servo mode.

CLVA : Automatic exchange of the CLVS and CLVP modes.
The player is set in this mode during normal
playback.

10.2.8 Focus servo system

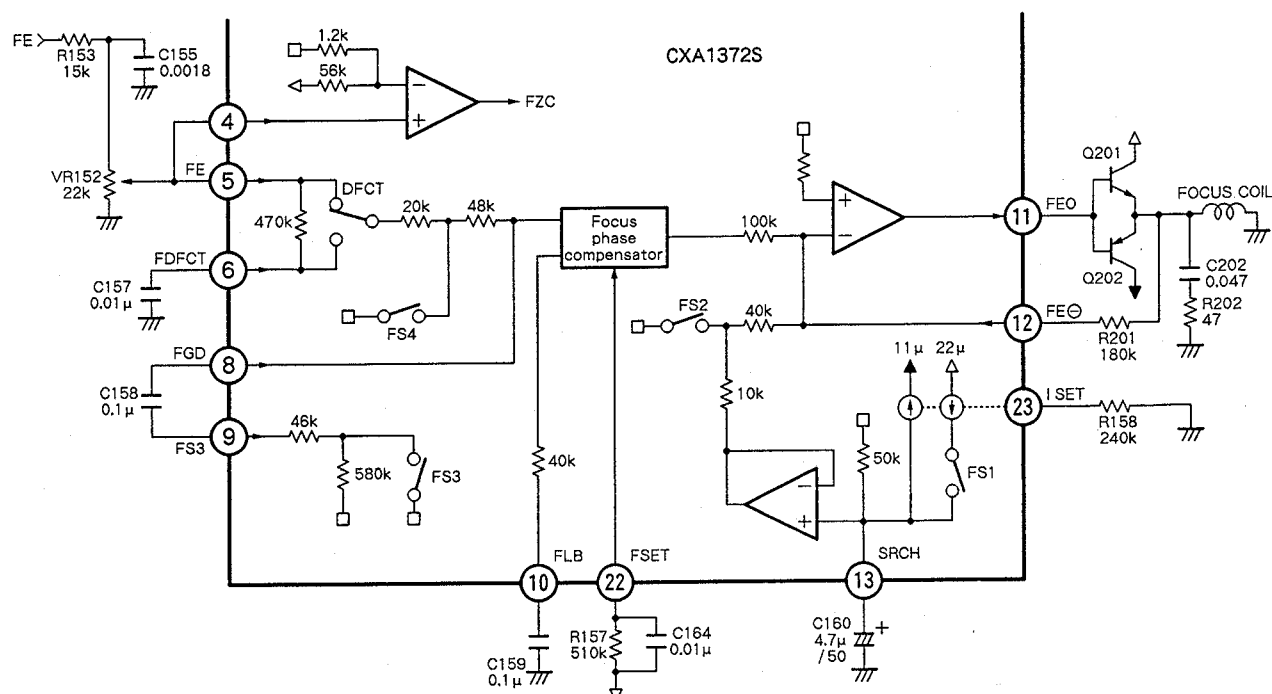


Fig. 10-13

Fig. 10-13 is a block diagram of the Focus Servo System.

The FE signal is normally input to the focus phase compensator circuit through resistors of 20 and 48 k Ω . When DFCT is detected, it is switched to the route passing through a low-pass filter formed by capacitor (C157) connected to a built-in 470k Ω resistor and pin 6.

FS3 is ON at normal play, the high-cut filter that formed the low-range time constant by the operation of the capacitor connected between pins 8 and 9 and the internal resistor drops the high-range gain.

The capacitor C159 (0.1 μ F) is a time constant that boost the low-range frequency during normal play mode.

The peak frequency of the Focus Phase Compensator is in proportion to the value of the resistor connected to pin 22, and its peak value is approximately 1.2kHz in case of 510k Ω resistance value.

The height of the focus search is approximately $\pm 0.9V$ in case of the time constants shown in the Fig. 10-13. This height is inverse proportion to the value of the resistor connected between pin 22 (ISET) and GND. When the value of the resistor connected to pin 22 is changed, the track jump and the height of the sled kick will also concurrently changed.

The inverted input level of the FZC comparator is set to a value that is 2% (approx.100mV) of difference between Vcc and GND (pin 7).

(a) Focus-in sequence

In the focus-in sequence, the lens is driven close to the focal point on the disc surface and the servo loop is closed at the center of Focus S-curve. This sequence uses the automatic sequence function built into the CXD2500Q (auto focus, Fig. 10-15) as shown in Fig. 10-14. When focus-in is not possible at one time, the lens will be lowered again after its upward movement is completed, and the sequence will be repeated.

Auto focus (Auto sequence of CXD2500Q and CXA1372S)

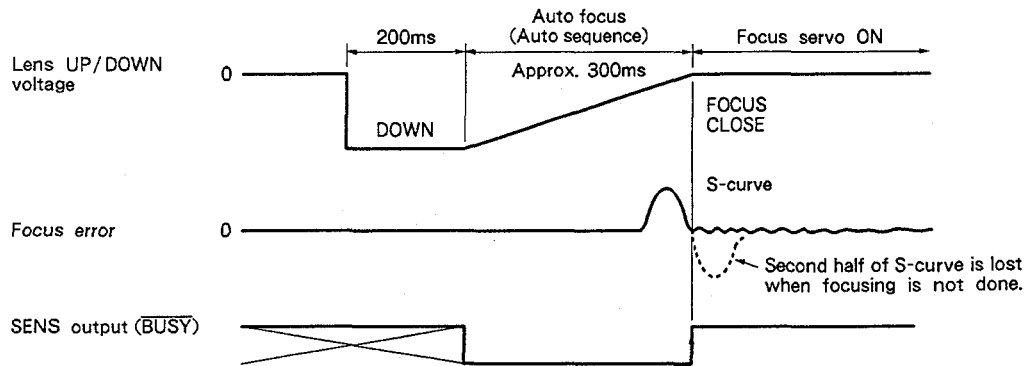
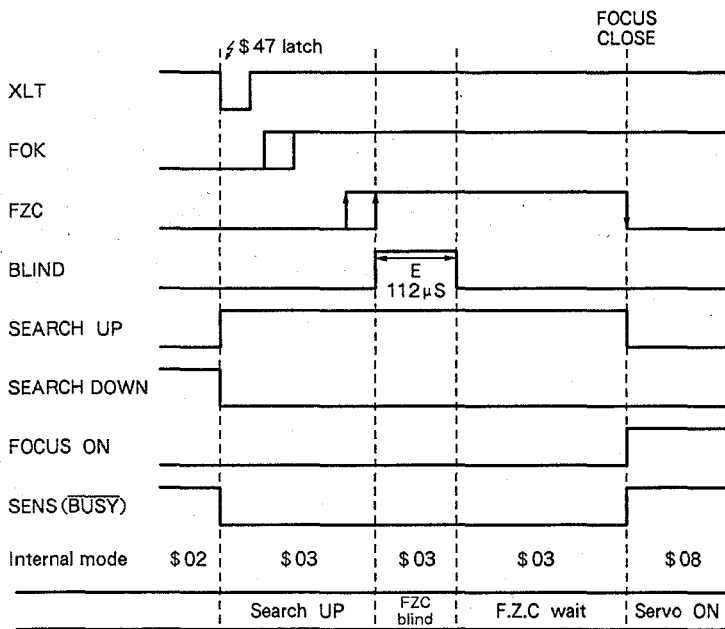


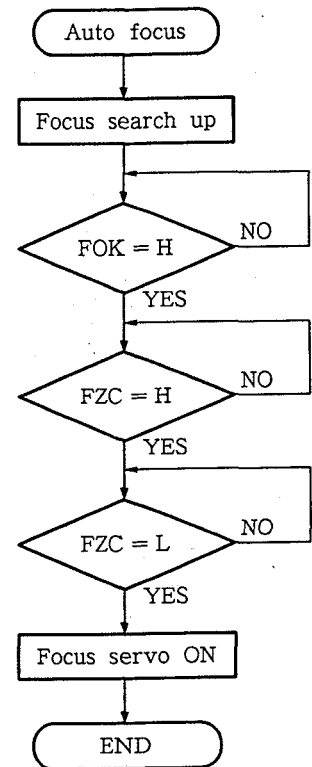
Fig. 10-14

Timing chart



Note: Time control E is made by the system control microcomputer setting \$5.

Fig. 10-15



Flow chart of Auto focus.

10.2.9 Tracking and carriage servo system

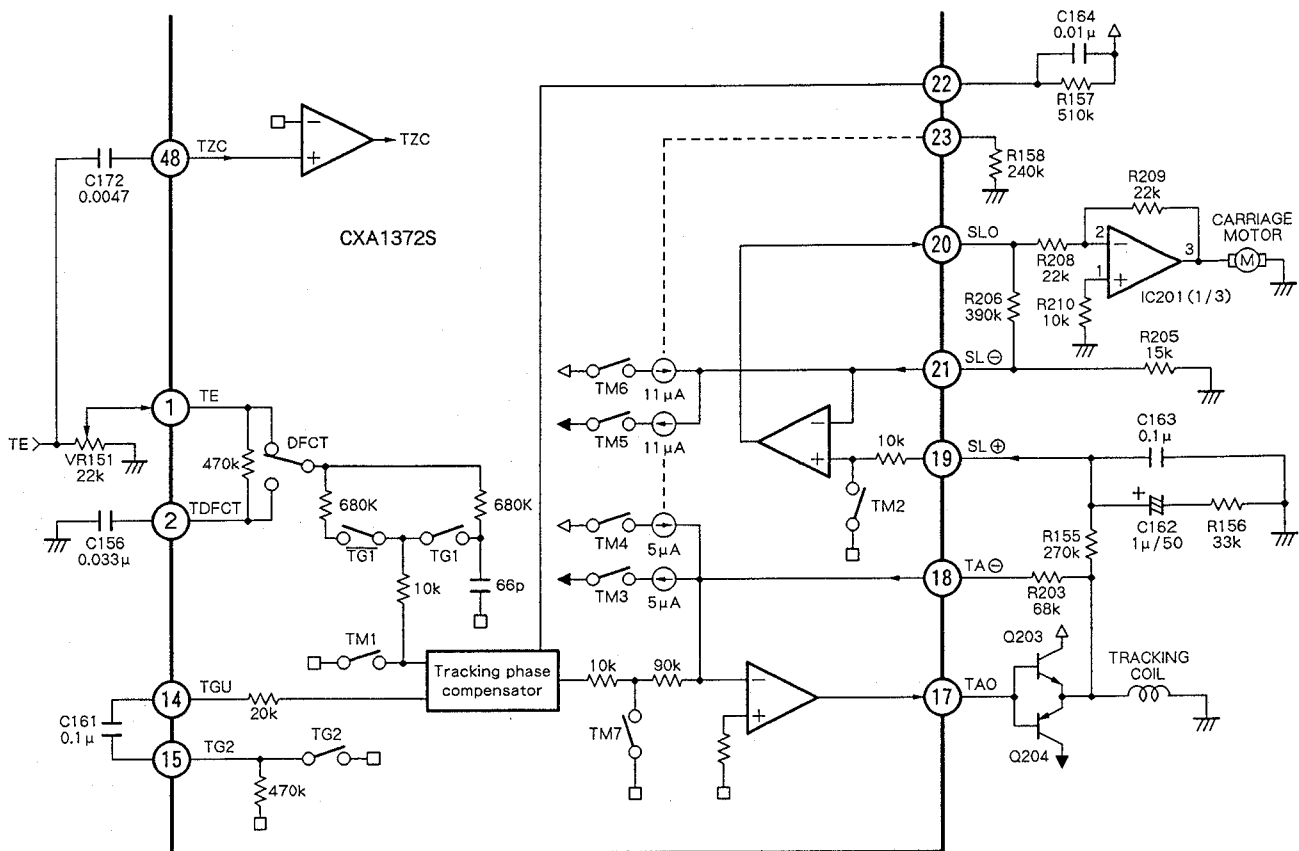


Fig. 10-16

Fig. 10-16 is a block diagram of the tracking and carriage servo system.

The capacitor (C161) connected between pins 14 and 15 is a time constant that functions to drop the high-range gain at normal play. The peak frequency of the Tracking phase compensator is fixed the resistor R157 (510k Ω) connected to pin 22, and its peak value is approximately 1.2kHz.

TM3 or TM4 is switched ON in order to make a tracking jump in the FWD (forward) or REV (reverse) direction, respectively. The peak voltage to be applied to the tracking coil at this time is determined by the current value of TM3 or TM4 and the feedback resistor from pin 18; that is:

$$\text{Track Jump Peak Voltage} = \text{TM3 (TM4) current value} \times \text{feedback resistance value} \approx 400\text{mV}$$

A FWD or REV carriage kick is performed by switching TM5 or TM6 to ON, respectively. The peak voltage to be applied to the carriage motor at this time is determined by the current value of TM5 or TM6 and the feedback resistor from pin 21; that is:

$$\text{Carriage Jump Peak Voltage} = \text{TM5 (TM6) current value} \times \text{feedback resistance value} \approx 4\text{V}$$

The current value at each SW is determined by the value of the resistor (R158) connected to pin 23 and GND. When its resistance value is 240k Ω , the respective current values will be as follows:

$$\text{TM3, TM4} = \pm 5.5\mu\text{A} \quad \text{TM5, TM6} = \pm 11\mu\text{A}$$

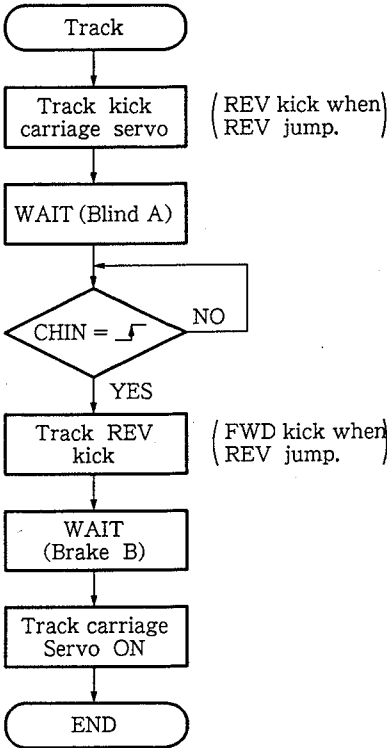
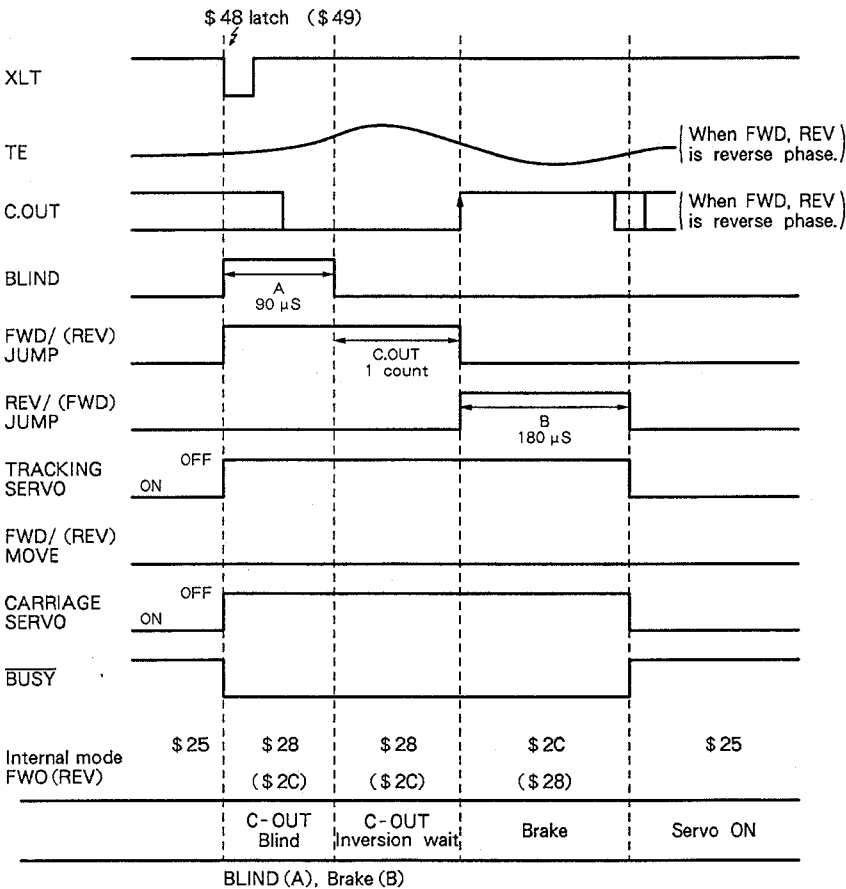
Similar to the FE signal, the TE signal is switched for DFCT to the route passing through a low-pass filter formed by capacitor (C156) connected to pin 2 and a built-in resistor (470k Ω).

(a) Track jump

An access operation, such as track search, is performed with a track count jump to roughly move the carriage and a track jump to kick the tracking carriage by using TM3 through TM5 as described above. The track jump uses 1-track jump, 10-track jump and 2N (N = 24 or 48) track jump functions of the automatic sequence in the CXD2500Q. (Fig. 10-17, -18, -19)

Auto sequence timing chart

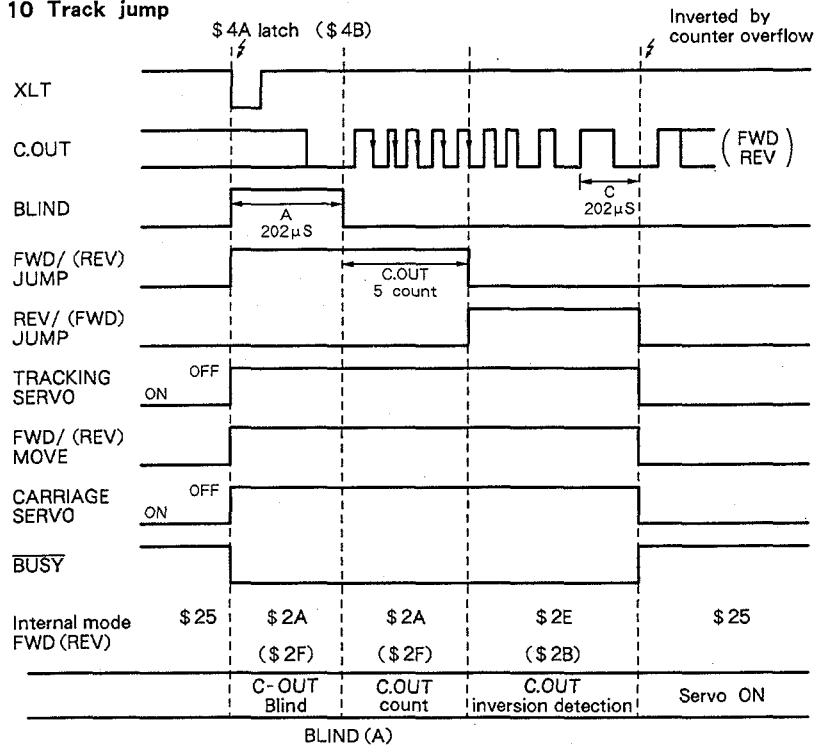
1 Track jump



Note: Time control of A and B are made by system control microcomputer setting \$5.

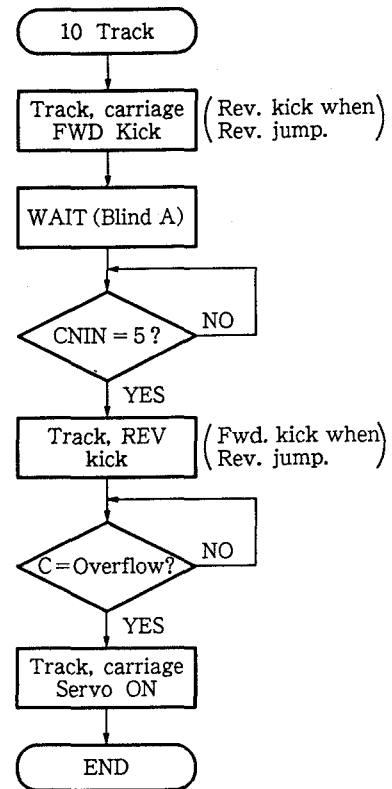
Fig. 10-17

10 Track jump



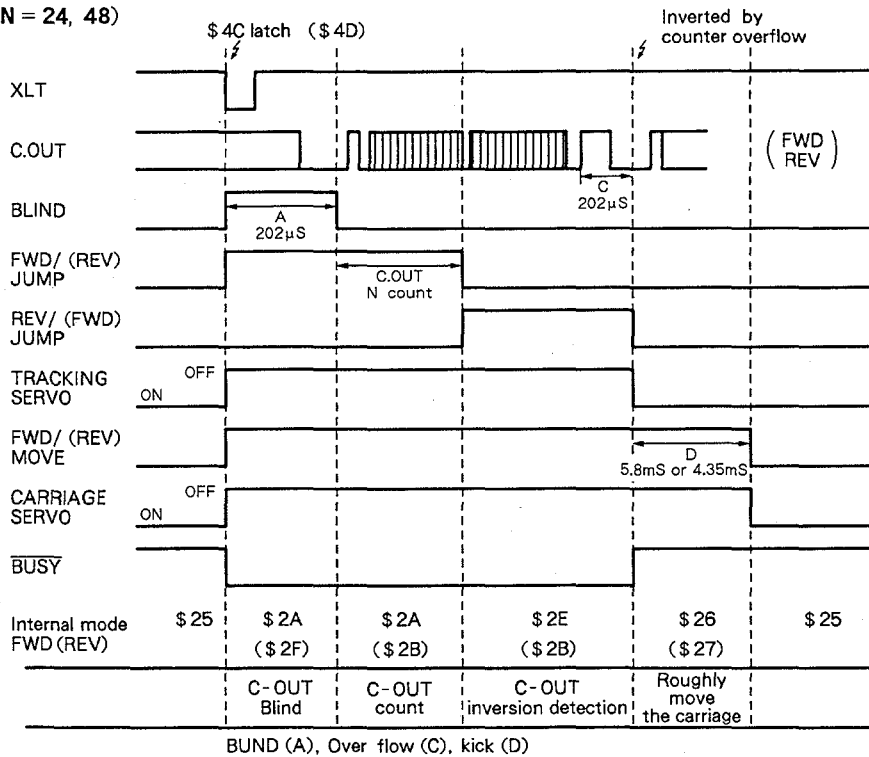
Note : Time control of A and C are made by system control microcomputer setting \$5.

Fig. 10-18



Flow chart of 10 track jump

2N Track jump (N = 24, 48)



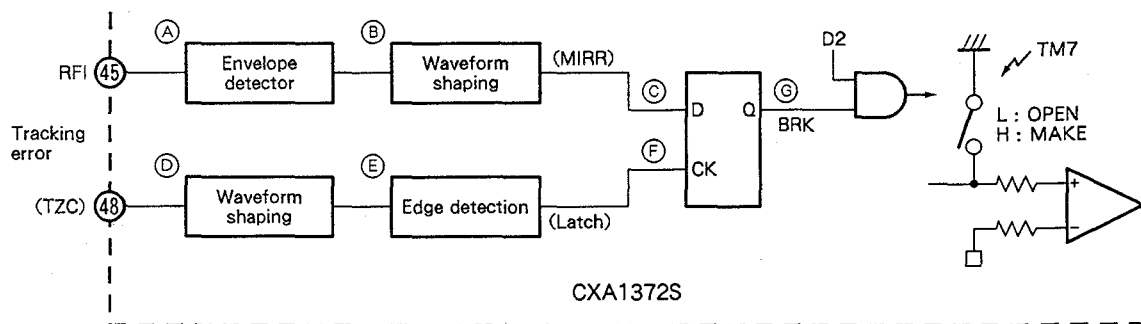
Note: Time control of A and C are made by system control microcomputer setting \$5, and that of D and N are respectively made by its \$6 and \$7.

Fig. 10-19

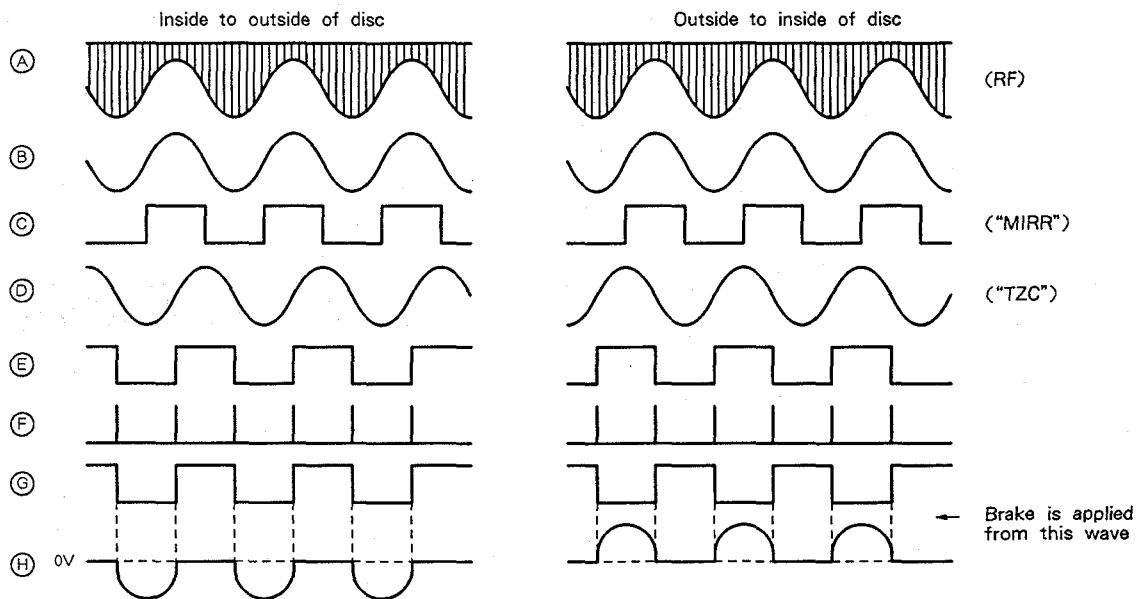
(b) Brake mode circuit

The brake mode circuit is provided to make possible the smooth closing of tracking when the lens (pickup) and track (disc) are moving in relation to each other after performing the track jump, etc.

The directions of lens and track movement are detected using the phase relationship between the envelope of RF signal and tracking error. Switching is conducted in such a way that the accelerating side of the tracking error is cut. Consequently, only the decelerating side is used. This, operation, called the brake mode. A block diagram and waveforms are shown in Fig. 10-20.



TM7 Operation (Brake circuit)



Each waveforms

Fig. 10-20

10.2.10 Demodulator section

The demodulator section is composed primary of LSI CXD2500Q (IC301); is also includes a small amount of added-on circuits. A block diagram is shown in Fig. 10-21. Its functions are :

1. Built-in 32k RAM is included.
2. Bit clock regeneration using the digital PLL for the EFM signal is strobed.
3. Demodulation of the EFM data.
4. Detection, protection and internal extension of the EFM frame sync signal.
5. Thorough error detection and correction.

C1 : double correction C2 : fourth correction

6. Reduce the noise generation when track is jumped.
7. Mute of the audio data.
8. Demodulation of the sub-code and error detection for sub-code Q.
9. Digital spindle servo (built-in over-sampling filter).
10. 16-bit tracking counter.
11. CPU interface using the serial bus.
12. Built-in servo auto-sequencer.
13. Output for the digital audio interface. (This CD player is not output.)

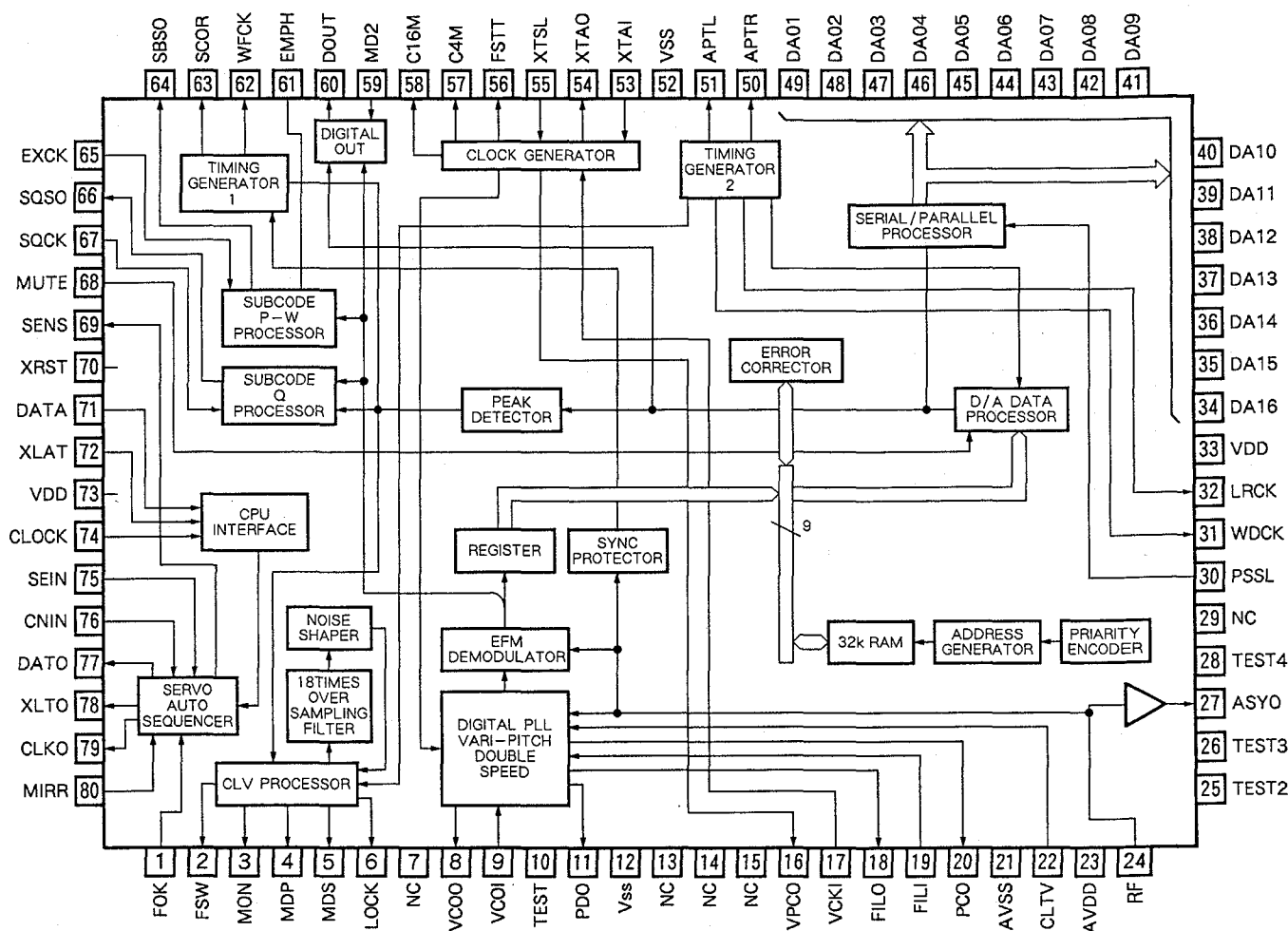


Fig. 10-21 Block diagram of CXD2500Q

10.2.11 Spindle servo system (CLV servo)

The CLV servo controls the rotation of the spindle for the frame sync signals in the EFM signal. Of this CLV servo, three types are available; rough servo CLV-S for tracking opening, etc., CLV-H for accessing and CLV-P for lock. In addition, there is CLV-A for automatic switching between CLV-S and CLV-P. According to the condition, the appropriate servo is activated by system control (serial).

The operations are described here taking CLV-A as an example. With CLV-S, CLV servo is activated so that the pulse width of the frame sync signal becomes 22T (when defining a cycle of 8.4672MHz as T) and the disc speed becomes almost equal to that at the PLL lock. When the clock for EFM signals on the disc reaches the specified frequency, permitting the frame sync signal to be obtained, the servo is automatically switched from CLV-S to CLV-P inside IC CXD2500Q. With CLV-P, the servo functions so that WFCCK which generated by VCO to synchronize with EFM signals is compared and equalized with RFCK from a crystal oscillator. If CLV-P lock is released during playback, the servo is immediately switched to CLV-S and follows the above-mentioned sequence.

This CD player has employed a digital servo in place of the conventional external analog servo as its spindle servo. The circuit is designed so that the CXD2500Q converts a digital servo signal to an analog signal with PWM conversion and outputs it from the MDP terminal. This output and that from the MON terminal which shows the motor ON/OFF status are processed at the power OP amplifier LA6520 (IC201) for amplification, level shift and carrier cancellation, and then output to the spindle motor. The circuit diagram is shown in Fig. 10-22.

The internal blocks of the CXD2500Q are shown in Fig. 10-23. The basic configuration and characteristics are the same as those of the conventional ones. The only difference is that a fourth over-sampling digital filter has been inserted in the MDP error loop and an 18th over-sampling filter has been inserted after the MDP error loop is mixed with the MDS error loop, increasing the carrier frequency to 132.3kHz. The MDP output will be one of three values "H", "L" or "Hi-Z". The speed is accelerated at "H" and decelerated at "L". The MON and MDP outputs for each operation mode are shown in Fig. 10-24.

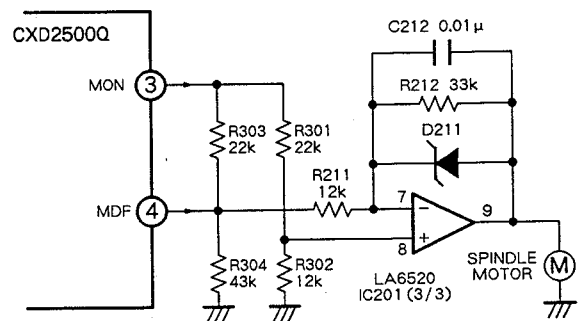


Fig. 10-22

Digital CLV

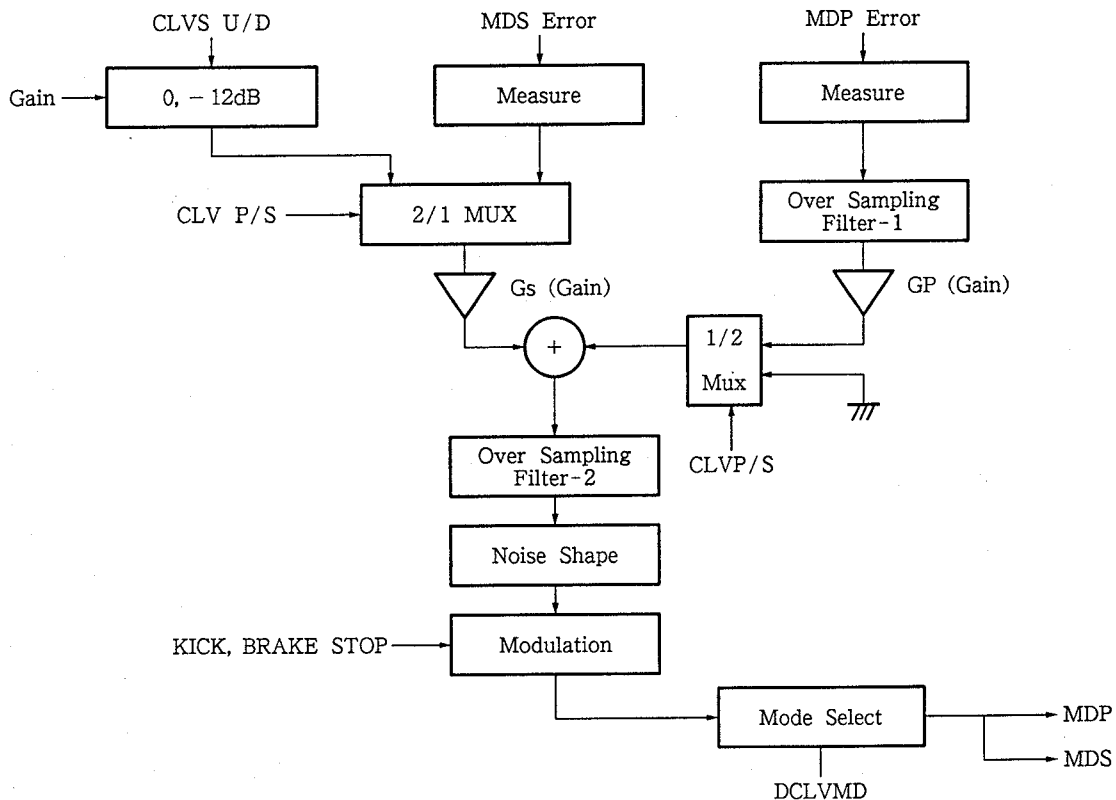


Fig. 10-23 Block diagram

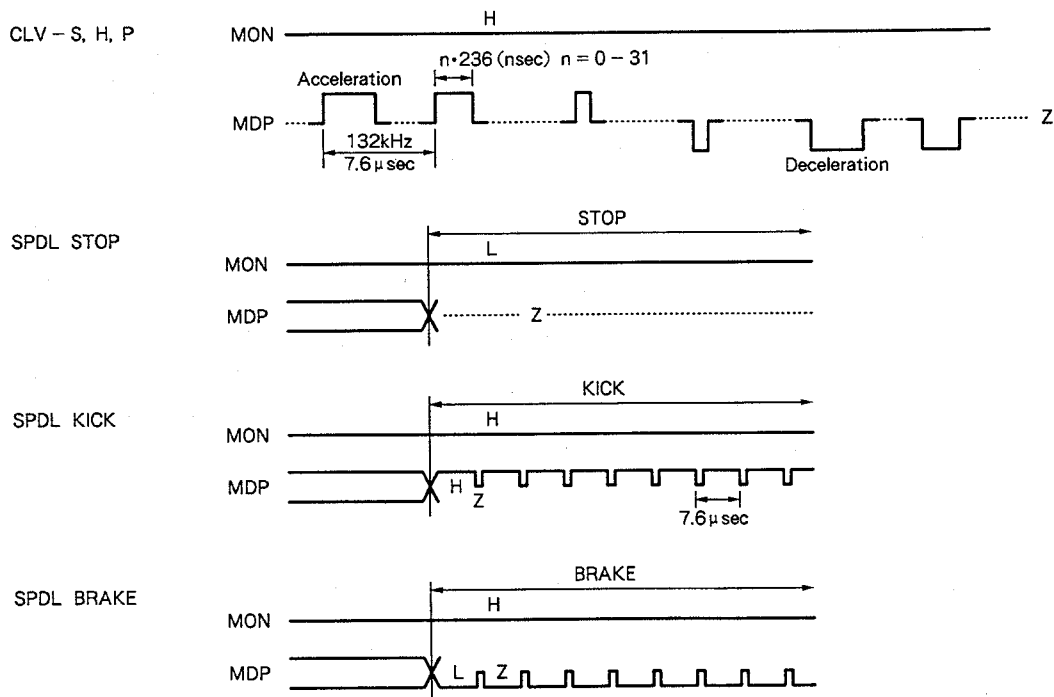


Fig. 10-24 MON and MDP outputs for each operation

10.2.12 Channel clock reproduction by the digital PLL circuit

To demodulate the EFM signal reproduced by the optical system, a channel clock is required. Defining the channel clock frequency as T , EFM signals are modulated to $3T$ through $11T$ (integral multiples of T). To read the information of EFM signals, these integral values must be correctly read out. For this, " T " or a channel clock is required.

In actual CD players, as the rotation irregularity of the spindle changes the pulse width of EFM signals, a PLL circuit is required to activate the channel clock. The block diagram of this PLL circuit is shown in Fig. 10-25. The CXD2500Q has PLL in two stages as shown in the block diagram.

- PLL in the first stage generates a high-frequency clock required for the digital PLL in the second stage.
- The digital PLL in the second stage reproduces the actual channel clock and has a capture range of more than $\pm 150\text{kHz}$ (under normal conditions.)

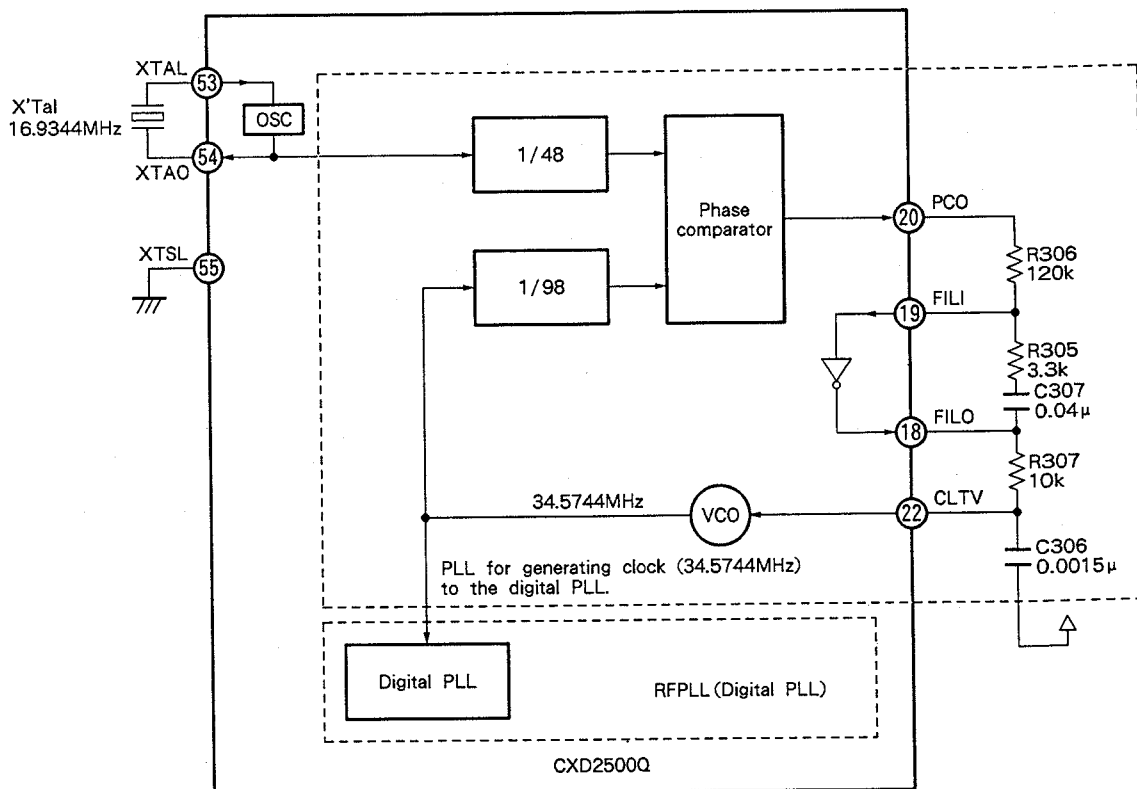


Fig. 10-25

11. FOR PD-5500/KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-5500-S/HEWMXJ,
PD-4550/KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4550-S/HEWMXJ,
PD-4500/KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4500-S/HBXJ AND HEWMXJ TYPES

NOTES :

- Parts without part number cannot be supplied.
- The Δ 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.

11.1 FOR PD-5500/KC, KUXJ, KCXJ HEMXJ, HBXJ
AND PD-5500-S/HEWMXJ TYPES

CONTRAST OF MISCELLANEOUS PARTS

The PD-5500/KC, KUXJ, KCXJ, HEMXJ, HBXJ and PD-5500-S/HEWMXJ types are the same as the PD-5500/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.							Remarks
		PD-5500 /KU type	PD-5500 /KC type	PD-5500 /KUXJ type	PD-5500 /KCXJ type	PD-5500 /HEMXJ type	PD-5500 /HBXJ type	PD-5500-S /HEWMXJ type	
⊙	Mother board assembly	PWM1269	PWM1269	PWM1269	PWM1269	PWM1289	PWM1289	PWM1289	For packing
Δ	Strain relief	CM-22C	CM-22C	CM-22C	CM-22C	CM-22B	CM-22B	CM-22B	
Δ	AC powr cord	PDG1002	PDG1002	PDG1002	PDG1002	PDG1008	PDG1009	PDG1008	
Δ	Power transformer (AC120V)	PTT1124	PTT1124	PTT1124	PTT1124	.....	.....	.....	
Δ	Power transformer (AC220, 240V)	.....	.....	.....	.....	PTT1125	PTT1125	PTT1125	
	Display window B	PAM1362	PAM1362	PAM1362	PAM1362	.....	.....	.....	
	Display window D	.....	.....	.....	.....	PAM1405	PAM1405	PAM1405	
	CD packing case	PHG1506	PHG1506	PHG1468	PHG1468	PHG1468	PHG1468	PHG1472	
	Connection cord with mini plug	PDE-319	PDE-319	PDE-319	PDE-319	.....	.....	.....	
	Headphone knob	PAC1370	PAC1370	PAC1370	PAC1370	PAC1370	PAC1370	PAC1402	
	Power button	PAC1438	PAC1438	PAC1438	PAC1438	PAC1438	PAC1438	PAC1481	
	Play button	PAC1439	PAC1439	PAC1439	PAC1439	PAM1439	PAM1439	PAC1472	
	Select button	PAC1440	PAC1440	PAC1440	PAC1440	PAC1440	PAC1440	PAC1473	
	Time button A	PAC1441	PAC1441	PAC1441	PAC1441	PAC1441	PAC1441	PAC1474	
	Headphone name plate C	PAM1365	PAM1365	PAM1365	PAM1365	PAM1365	PAM1365	PAM1413	
	Skid	PNM1070	PNM1070	PNM1098	PNM1098	PNM1098	PNM1098	PNM1098	
	Function panel assembly	PEA1039	PEA1039	PEA1039	PEA1039	PEA1039	PEA1039	PEA1041	
	Tray name plate	PNW1625	PNW1625	PNW1625	PNW1625	PNW1625	PNW1625	PNW1720	
	Bonnet	PYY1129	PYY1129	PYY1129	PYY1129	PYY1129	PYY1129	PYY1130	
	Single mechanism assembly	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	Non supply	
	Operating instructions (English)	PRB1114	.....	PRB1114	.....	.....	PRB1114	.....	
	Operating instrucionts (English/French)	.....	PRE1112	.....	PRE1112	PRE1112	.....	.....	
	Operating instructions (German/Italian/Dutch/Swedish /Spanish/Portuguese)	.....	.....	.....	.....	PRF1030	.....	PRF1030	

MOTHER BOARD ASSEMBLY (PWM1289)
 The mother board assembly (PWM1289) is the same as the mother board assembly (PWM1269) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PWM1269	PWM1289	
△ △ △	IC30 D11 - D14 D25 D391 - D394 C321 C323 C324 R321 R391 R392 JA301 (DIGITAL OUT) JA391,JA392 (CONTROOL IN/OUT)	 11ES2 1SS254 RD1/6PM244J RD1/6PM102J PKN1004	ICP-N10 2W02-5008-L CGCYX104K25 CKCYF473Z50 CCCCH100D50 RD1/6PM102J TOTX178	

11.2 FOR PD-4550/KC, KUXJ, KCXJ HEMXJ, HBXJ
 AND PD-4550-S/HEWMXJ TYPES

CONTRAST OF MISCELLANEOUS PARTS
 The PD-4550/KC, KUXJ, KCXJ, HEMXJ, HBXJ and PD-4550-S/HEWMXJ types are the same as the PD-4550/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.							Remarks
		PD-4550 /KU type	PD-4550 /KC type	PD-4550 /KUXJ type	PD-4550 /KCXJ type	PD-4550 /HEMXJ type	PD-4550 /HBXJ type	PD-4550-S /HEWMXJ type	
● △ △ △ △	Mother board assembly Power transformer (AC120V) Power transformer (AC220, 240V) AC power cord Strain relief	PWM1269 PTT1124 PDG1002 CM-22C	PWM1269 PTT1124 PDG1002 CM-22C	PWM1269 PTT1124 PDG1002 CM-22C	PWM1269 PTT1124 PDG1002 CM-22C	PWM1271 PTT1125 PDG1008 CM-22B	PWM1271 PTT1125 PDG1009 CM-22B	PWM1271 PTT1125 PDG1008 CM-22B	
	Connection cord with mini plug CD packing case Skid Leg assembly Insulator	PDE-319 PHG1496 PXA1201	PDE-319 PHG1496 PXA1201	PDE-319 PHG1504 PXA1201	PDE-319 PHG1504 PXA1201	 PHG1504 PNM1098 VNK1095	 PHG1504 PNM1098 VNK1095	 PHG1426 PNM1098 VNK1095	For packing
	Display window B Display window D Headphone knob Power button Play button	PAM1362 PAC1370 PAC1438 PAC1439	PAM1362 PAC1370 PAC1438 PAC1439	PAM1362 PAC1370 PAC1438 PAC1439	PAM1362 PAC1370 PAC1438 PAC1439	 PAM1405 PAC1370 PAC1438 PAC1439	 PAM1405 PAC1370 PAC1438 PAC1439	 PAM1405 PAC1402 PAC1481 PAC1472	
	Program button Time button B Headphone name plate B Function panel assembly Tray name plate	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1446 PAC1447 PAM1364 PEA1038 PNW1625	PAC1476 PAC1475 PAM1412 PEA1040 PNW1720	
	Bonnet Single mechanism assembly Operating instructions (English) Operating instructions (English/French) Operating instructions (German/Italian/Dutch/Swedish /Spanish/Portuguese)	PYY1129 Non supply PRB1114 PRE1112	PYY1129 Non supply PRE1112	PYY1129 Non supply PRB1114 PRE1112	PYY1129 Non supply PRE1112	PYY1129 Non supply PRE1112 PRF1030	PYY1129 Non supply PRB1114 PRF1030	PYY1130 Non supply PRF1030	

MOTHER BOARD ASSEMBLY (PWM1271)

The mother board assembly (PWM1271) is the same as the mother board assembly (PWM1269) with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PWM1269	PWM1271	
△ △ △	IC30 D11 - D14 D25 D391 - D394 R391	 11ES2 1SS254 RD1/6PM244J	ICP-N10 2W02-5008-L	
	R392 JA391,JA392 (CONTROL IN/OUT)	RD1/6PM102J PKN1004		

11.3 FOR PD-4500/KC, KUXJ, KCXJ HEMXJ, HBXJ
PD-4500-S/HBXJ AND HEWMXJ TYPES

CONTRAST OF MISCELLANEOUS PARTS

The PD-4500/KC, KUXJ, KCXJ, HEMXJ, HBXJ, PD-4550-S/HBXJ, HEWMXJ types are the same as the PD-4500/KU type with the exception of the following sections.

Mark	Symbol & Description	Part No.								Remarks
		PD-4500 /KU type	PD-4500 /KC type	PD-4500 /KUXJ type	PD-4500 /KCXJ type	PD-4500 /HEMXJ type	PD-4500 /HBXJ type	PD-4500-S /HBXJ type	PD-4500-S /HEWMXJ type	
●	Mother board assembly	PWM1266	PWM1266	PWM1266	PWM1266	PWM1268	PWM1268	PWM1268	PWM1268	
△	Headphone board assembly					Non supply	Non supply	Non supply	Non supply	
△	AC power cord	PDG1002	PDG1002	PDG1002	PDG1002	PDG1008	PDG1009	PDG1009	PDG1008	
△	Power transformer (AC120V)	PTT1124	PTT1124	PTT1124	PTT1124					
△	Power transformer (AC220, 240V)					PTT1125	PTT1125	PTT1125	PTT1125	
△	Strain relief	CM-22C	CM-22C	CM-22C	CM-22C	CM-22B	CM-22B	CM-22B	CM-22B	
	CD packing case	PHG1396	PHG1396	PHG1460	PHG1460	PHG1460	PHG1460	PHG1464	PHG1464	
	Skid					PNM1098	PNM1098	PNM1098	PNM1098	
	Leg assembly	PXA1201	PXA1201	PXA1201	PXA1201					
	Insulator					VNK1095	VNK1095	VNK1095	VNK1095	
	Bonnet	PYY1129	PYY1129	PYY1129	PYY1129	PYY1129	PYY1129	PYY1130	PYY1130	
	Headphone knob					PAC1370	PAC1370	PAC1402	PAC1402	
	Headphone name plate A	PAM1356	PAM1356	PAM1356	PAM1356					
	Headphone name plate B					PAM1364	PAM1364	PAM1412	PAM1412	
	Display window A	PAM1357	PAM1357	PAM1357	PAM1357					
	Display window C					PAM1404	PAM1404	PAM1404	PAM1404	
	Function panel assembly	PEA1037	PEA1037	PEA1037	PEA1037	PEA1037	PEA1037	PEA1045	PEA1045	
	Tray name plate	PNW1625	PNW1625	PNW1625	PNW1625	PNW1625	PNW1625	PNW1720	PNW1720	
	Power button	PAC1438	PAC1438	PAC1438	PAC1438	PAC1438	PAC1438	PAC1481	PAC1481	
	Play button	PAC1439	PAC1439	PAC1439	PAC1439	PAC1439	PAC1439	PAC1472	PAC1472	
	Program button	PAC1446	PAC1446	PAC1446	PAC1446	PAC1446	PAC1446	PAC1476	PAC1476	
	Time button B	PAC1447	PAC1447	PAC1447	PAC1447	PAC1447	PAC1447	PAC1475	PAC1475	
	Operating instructions (English)	PRB1114		PRB1114			PRB1114	PRB1114		
	Operating instructions (English/French)		PRE1112		PRE1112	PRE1112				
	Operating instructions (German/Italian/Dutch/Swedish /Spanish/Portuguese)					PRF1030			PRF1030	

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MOTHER BOARD ASSEMBLY (PWM1268)
The mother board assembly (PWM1268) is the same as the mother board assembly (PWM1266) with the exception of the following sections.

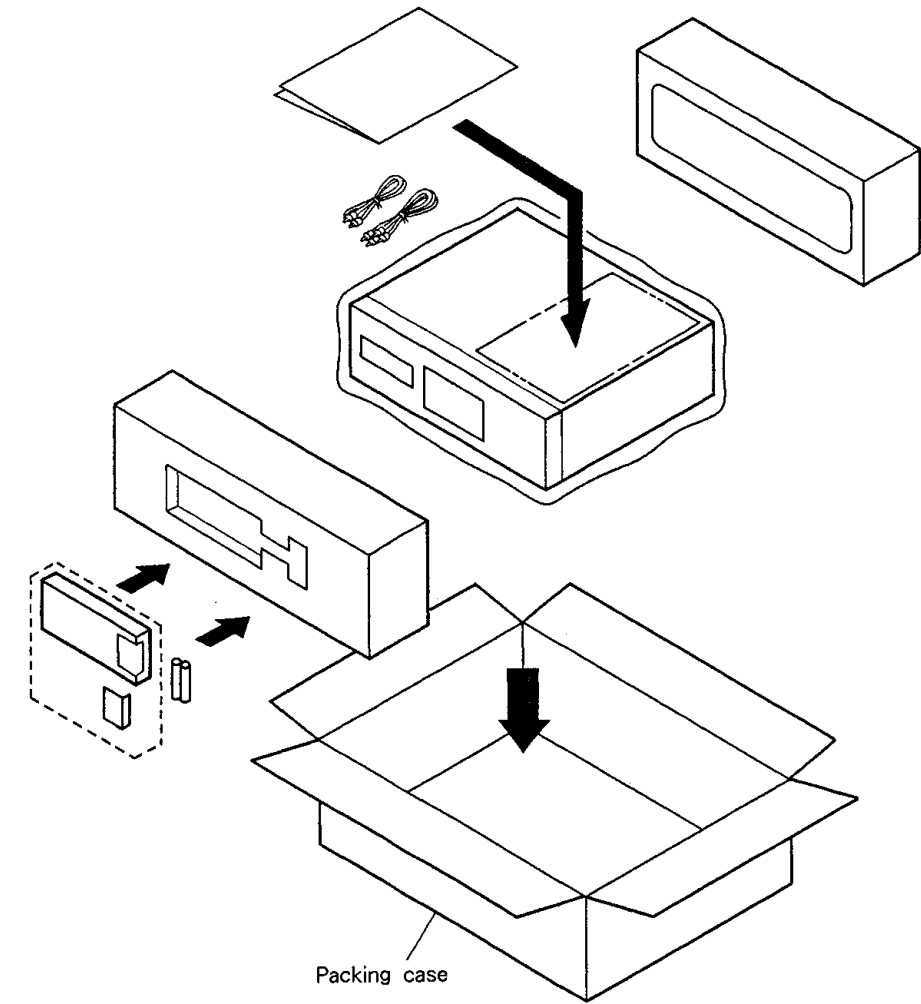
Mark	Symbol & Description	Part No.		Remarks
		PWM1266	PWM1268	
△ △ △	IC30 D11 - D14 D25 IC406 R445,R446 R447,R448	 11ES2 RD1/6PM102J	ICP-N10 2W02-5008-L M5218AP RD1/6PM471J RD1/6PM471J	

HEADPHONE BOARD ASSEMBLY
The Headphone board assemblies of PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ and HEWMXJ types are the same as that of PD-5500/KU and PD-4500/KU types.
(See page 29.)

11.4 PACKING FOR XJ TYPE

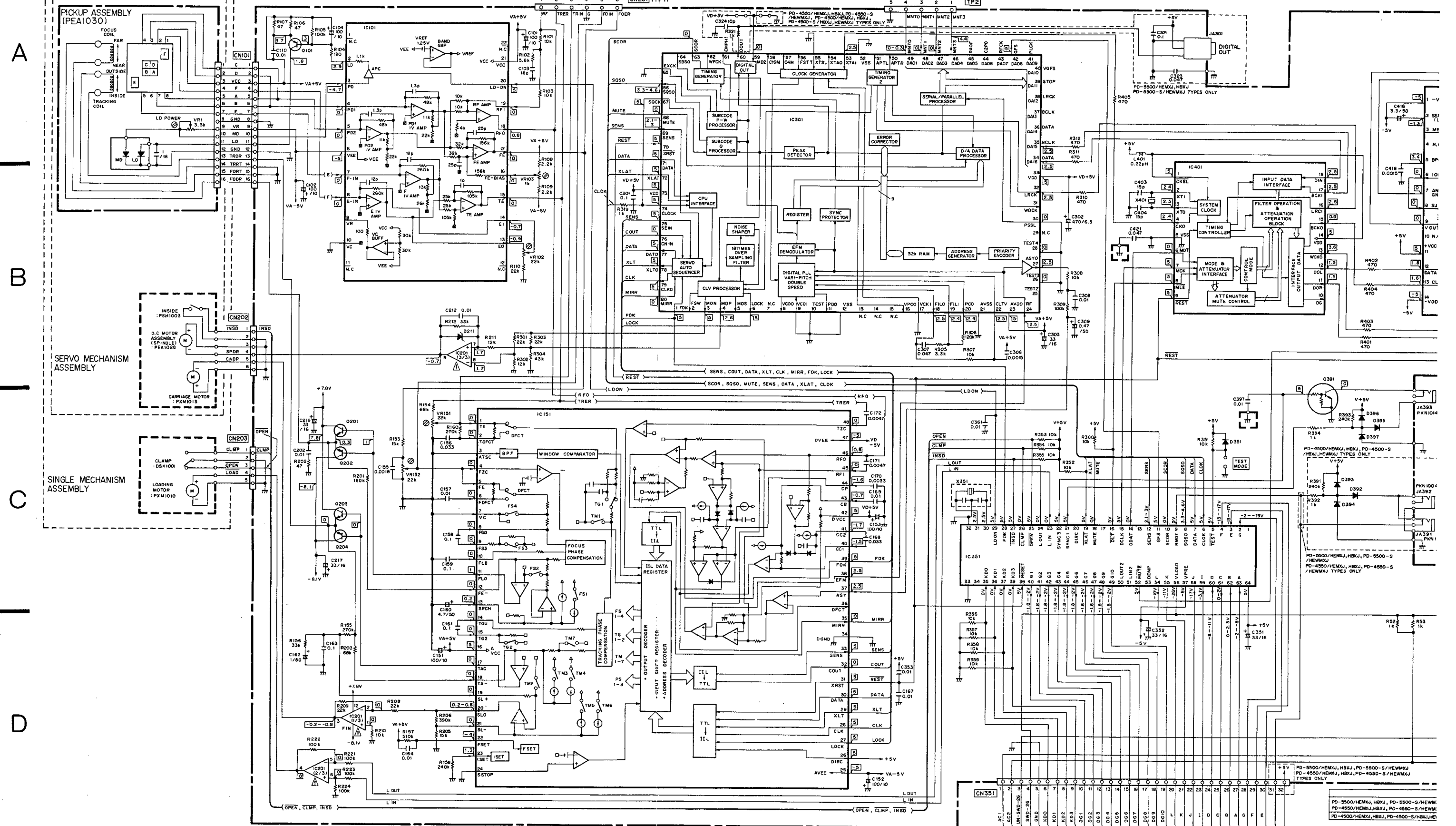
XJ type is the same as the other types with the exception of the packing case's style.

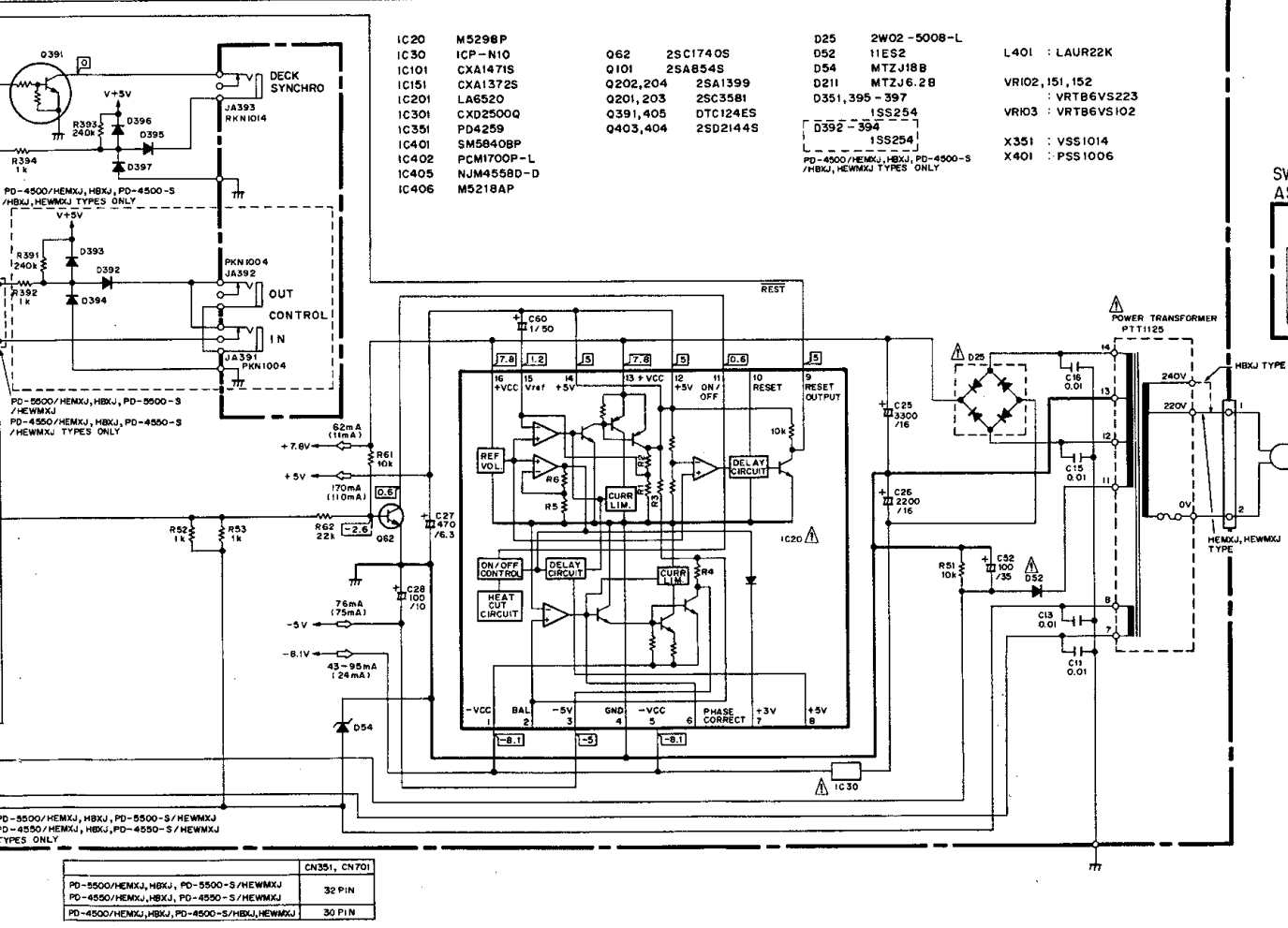
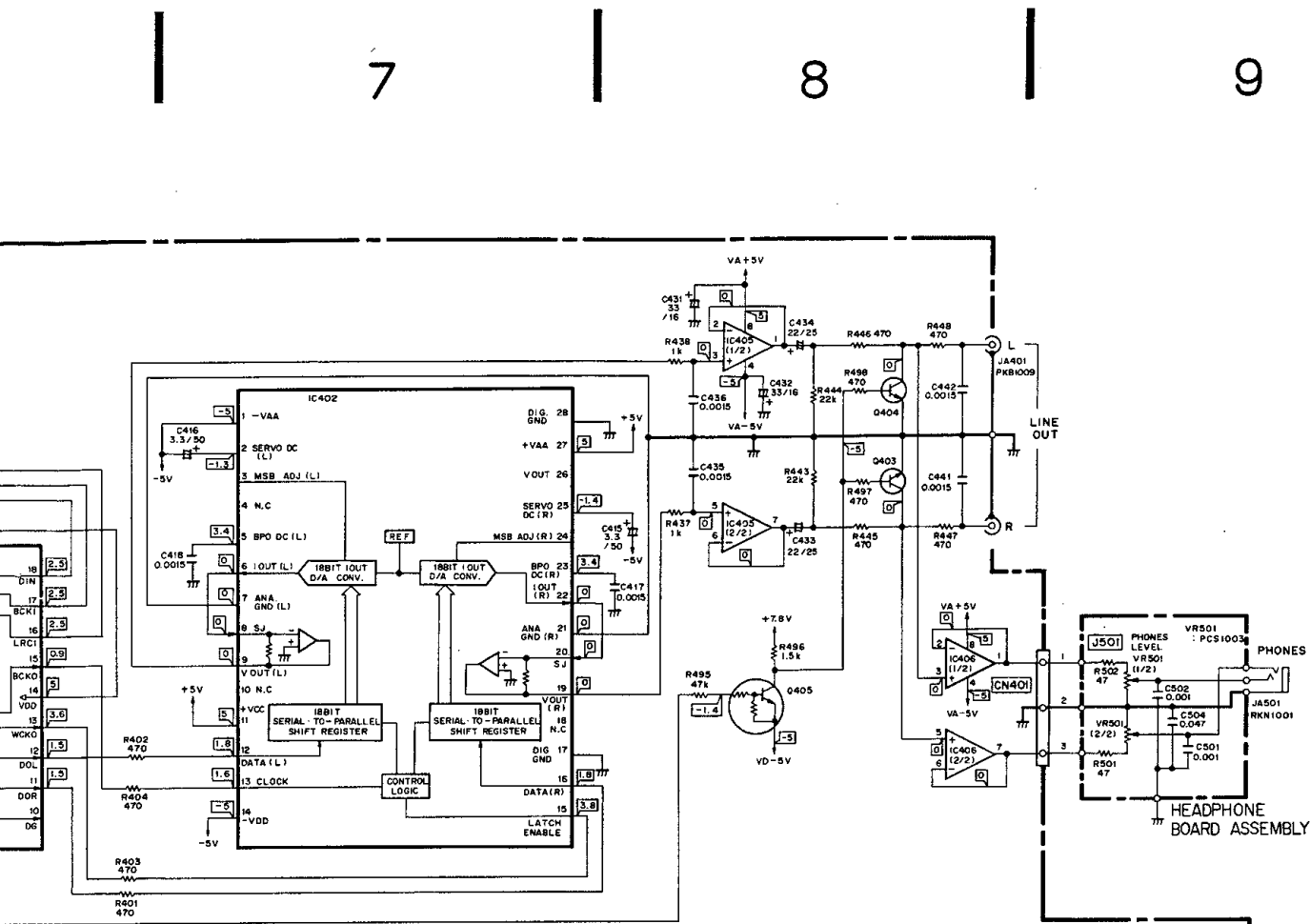
Type	Part No.	Type	Part No.	Type	Part No.
PD-5500/KUXJ	PHG1468	PD-4550/KUXJ	PHG1504	PD-4500/KUXJ	PHG1460
PD-5500/KCXJ	PHG1468	PD-4550/KCXJ	PHG1504	PD-4500/KCXJ	PHG1460
PD-5500/HEMXJ	PHG1468	PD-4550/HEMXJ	PHG1504	PD-4500/HEMXJ	PHG1460
PD-5500/HBXJ	PHG1468	PD-4550/HBXJ	PHG1504	PD-4500/HBXJ	PHG1460
PD-5500-S/HEWMXJ	PHG1472	PD-4550-S/HEWMXJ	PHG1426	PD-4500-S/HBXJ	PHG1464
				PD-4500-S/HEWMXJ	PHG1464



11.5 SCHEMATIC DIAGRAM OF HBXJ, HBXJ AND HEWMXJ TYPES

MOTHER BOARD ASSEMBLY
 (PWM1289 : PD-5500/HEMXJ, HBXJ, PD-5500-S/HEWMXJ)
 (PWM1271 : PD-4550/HEMXJ, HBXJ, PD-4550-S/HEWMXJ)
 (PWM1268 : PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ, HEWMXJ)





1. RESISTORS :
Indicated in Ω , 1/4W, 1/6W and 1/8W, $\pm 5\%$ tolerance unless otherwise noted k; k Ω , M; M Ω , (F); $\pm 1\%$, (G); $\pm 2\%$, (K); $\pm 10\%$, (M); $\pm 20\%$ tolerance.

2. CAPACITORS :
Indicated in capacity (μ F)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

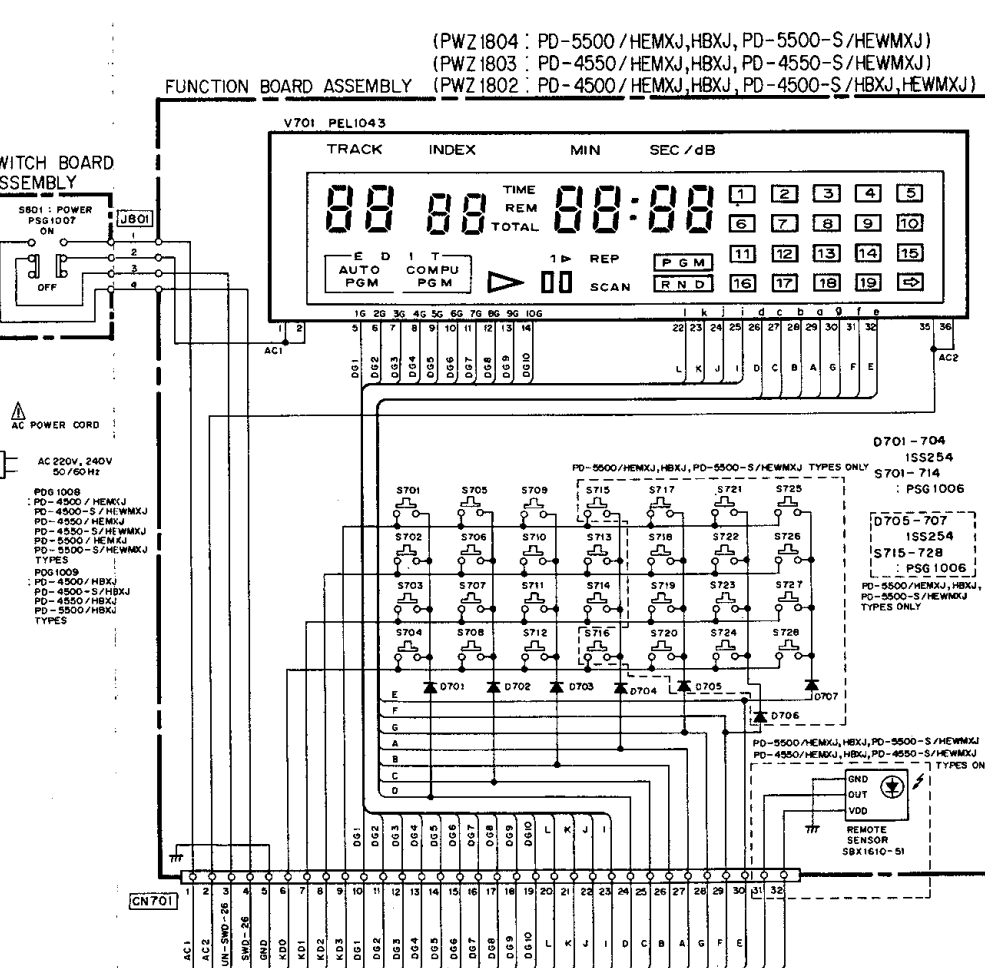
3. VOLTAGE, CURRENT :
□ : DC voltage (V) at play state.
mA : DC current at play state.
Value in () is DC current at stop state.

4. OTHERS :
→ : Signal route.
⊗ : Adjusting point.
The Δ 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.
※ marked capacitors and resistors have parts numbers.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES : (The underlined indicates the switch position)
SWITCH BOARD ASSEMBLY
S801 : POWER ON—OFF
FUNCTION BOARD ASSEMBLY
(PD-5500/HEMXJ, HBXJ AND PD-5500-S/HEWMXJ TYPES)

S701 : TIME
S702 : REPEAT
S703 : HI-LITE SCAN
S704 : OPEN/CLOSE (Δ)
S705 : STOP ($\square$)
S706 : $\ll$] MANUAL SEARCH
S707 : $\gg$] MANUAL SEARCH
S708 : RANDOM PLAY
S709 : PAUSE ($\square\square$)
S710 : $\ll$] TRACK SEARCH
S711 : $\gg$] TRACK SEARCH
S712 : PLAY ($\triangleright$)
S713 : EDIT
S714 : PGM
S715 : CHECK
S716 : CLEAR
S717 : 7
S718 : 8
S719 : 9
S720 : 10
S721 : 4
S722 : 5
S723 : 6
S724 : ≥ 20
S725 : 1
S726 : 2
S727 : 3
S728 : +10]



A

B

C

D

11.6 P.C.BOARD PATTERN OF HEMXJ, HBXJ AND HEWMXJ TYPES

PD-5500/HEMXJ, HBXJ, PD-5500-S/HEWMXJ
PD-4550/HEMXJ, HBXJ, PD-4550-S/HEWMXJ
PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ, HEWMXJ

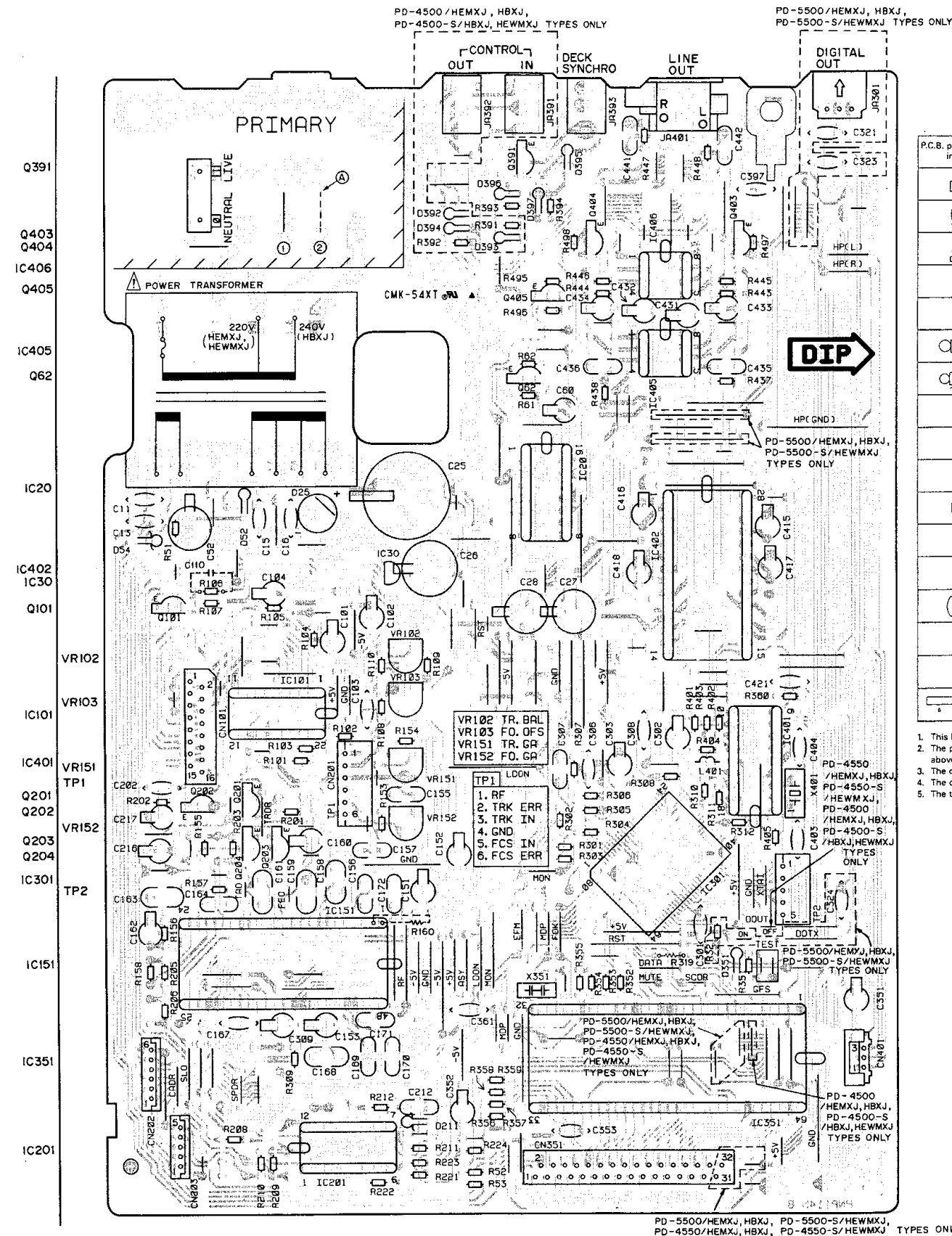
LINE VOLTAGE SELECTION

- Line voltage can be changed with the following steps.
1. Disconnect the AC power cord.
 2. Remove the bonnet.
 3. Change the position of the jumper ① as follows.
(Refer to the Mother board assembly.)

Voltage	Jumper ① position
220V	①
240V	②

4. Stick the line voltage label on the rear panel.

Part No.	Description
AAX-193	220V label
AAX-192	240V label



P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
		FET			Mylar capacitor
		Diode			Styro capacitor
		Zener diode			Electrolytic capacitor (Non polarized)
		LED			Electrolytic capacitor (Noiseless)
		Varactor			Electrolytic capacitor (Polarized)
		Tact switch			Electrolytic capacitor (Polarized)
		Inductor			Power capacitor
		Coil			Semi-fixed resistor
		Transformer			Resistor array
		Filter			Resistor
					Resonator
					Thermistor

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.

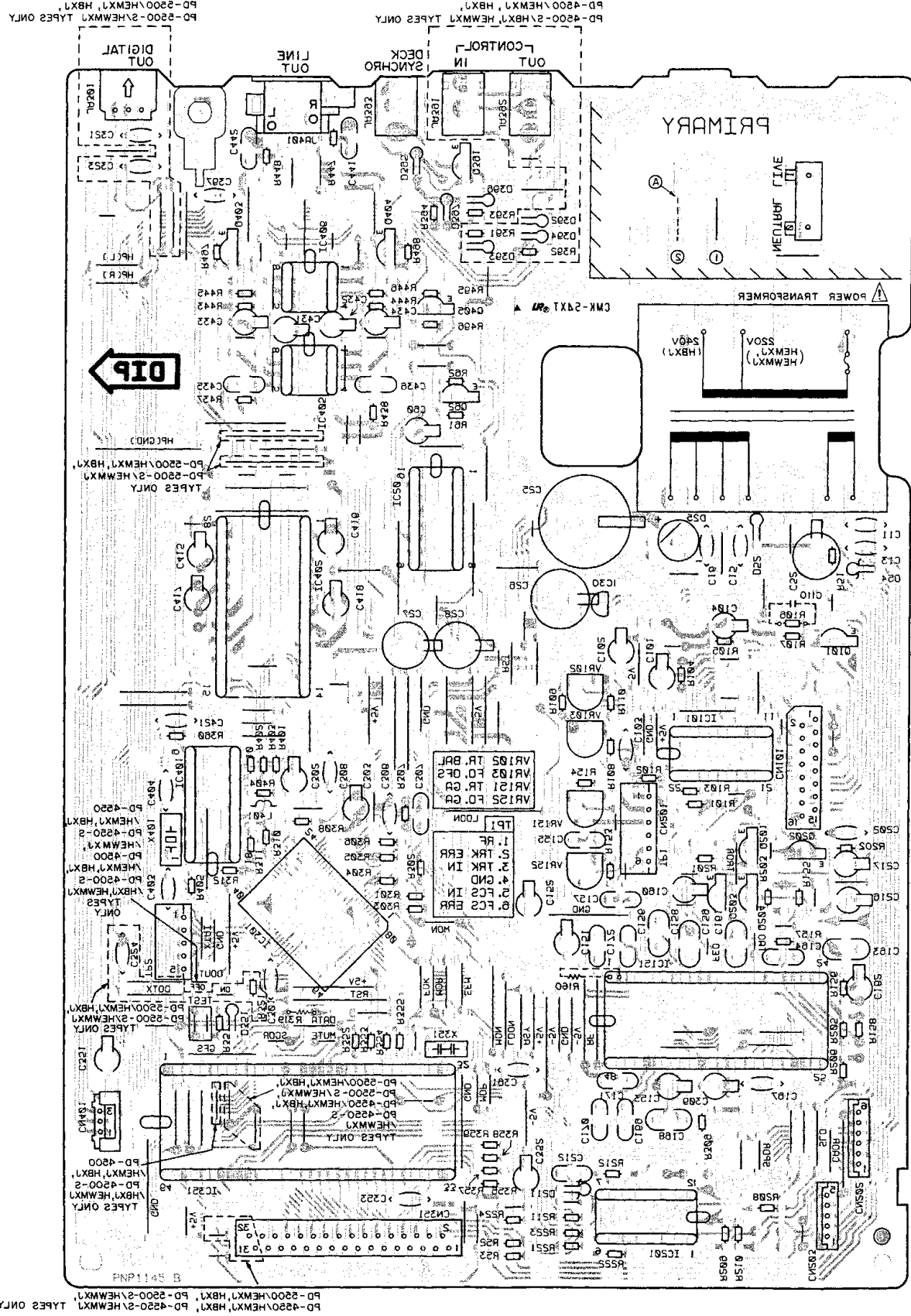
PD-5500/HEMXJ, HBXJ, PD-5500-S/HEWMXJ PD-4550/HEMXJ, HBXJ, PD-4550-S/HEWMXJ	CN351
PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ, HEWMXJ	32pin
PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ, HEWMXJ	30pin

MOTHER BOARD ASSEMBLY
(PWM1289 : PD-5500/HEMXJ, HBXJ, PD-5500-S/HEWMXJ TYPES)
(PWM1271 : PD-4550/HEMXJ, HBXJ, PD-4550-S/HEWMXJ TYPES)
(PWM1268 : PD-4500/HEMXJ, HBXJ, PD-4500-S/HBXJ, HEWMXJ TYPES)

MOTHER BOARD ASSEMBLY
 (PBM1588 : PD-4500\HEMWX1, HBX1, PD-4500-2\HEMWX1 TYPES)
 (PBM1571 : PD-4520\HEMWX1, HBX1, PD-4520-2\HEMWX1 TYPES)
 (PBM1589 : PD-2500\HEMWX1, HBX1, PD-2500-2\HEMWX1 TYPES)

PD-4500\HEMWX1,HBX1,PD-4500-2\HEMWX1	30pin
PD-4520\HEMWX1,HBX1,PD-4520-2\HEMWX1	35pin
PD-2500\HEMWX1,HBX1,PD-2500-2\HEMWX1	CN321

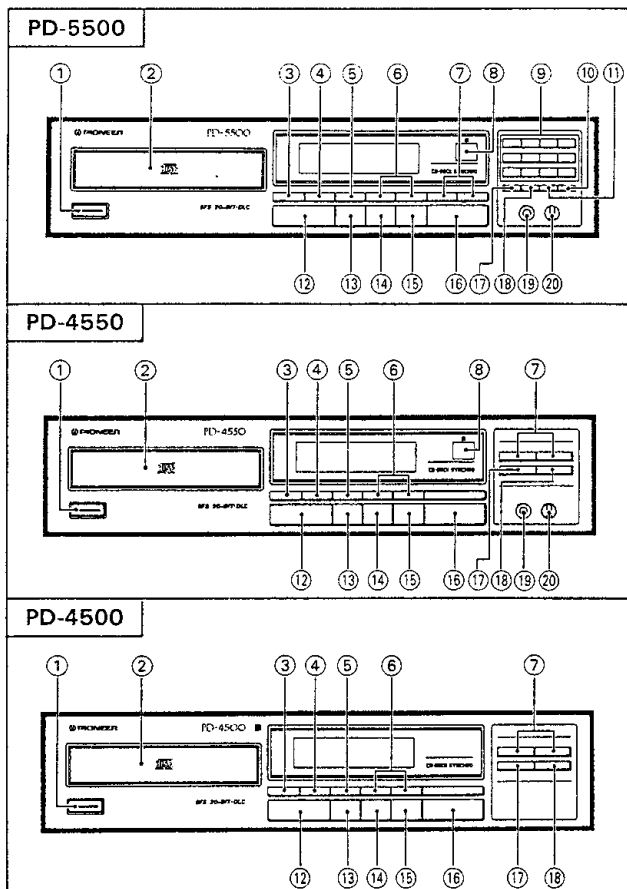
This P.C.B. connection diagram is viewed from the foil side.



11.6 P.C.B. BOARD PATTERN OF HEWX1, HBX1 AND HEWMX1 TYPES

PD-4500\HEMWX1,HBX1,PD-4500-2\HEMWX1
 PD-4520\HEMWX1,HBX1,PD-4520-2\HEMWX1
 PD-2500\HEMWX1,HBX1,PD-2500-2\HEMWX1

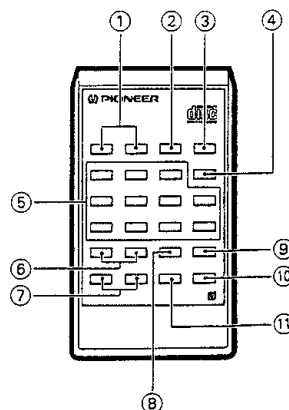
12. PANEL FACILITIES



FRONT PANEL

- ① **POWER STANDBY/ON switch**
Press to turn power ON and STANDBY. If the power is turned ON when a disc is already loaded, the player will automatically enter the play mode (timer start function).
- ② **Disc tray**
- ③ **TIME button**
- ④ **REPEAT button**
- ⑤ **HI-LITE SCAN button**
- ⑥ **MANUAL SEARCH button**
- ⑦ **TRACK SEARCH button**
- ⑧ **Remote sensor**
- ⑨ **TRACK NUMBER buttons (1-10, +10, ≥ 20)**
- ⑩ **CLEAR button**
- ⑪ **CHECK button**
- ⑫ **OPEN/CLOSE button**
- ⑬ **RANDOM PLAY button**
- ⑭ **STOP button (■)**
- ⑮ **PAUSE button (■ ■)**
- ⑯ **PLAY button (▶)**
- ⑰ **Program edit button (EDIT) (■ AUTO PGM/■ ■ COMPU PGM)**
- ⑱ **Program button (PGM)**
- ⑲ **Headphones jack (PHONES)**
- ⑳ **Headphones volume control (PHONES LEVEL)**

PD-5500, PD-4550 only



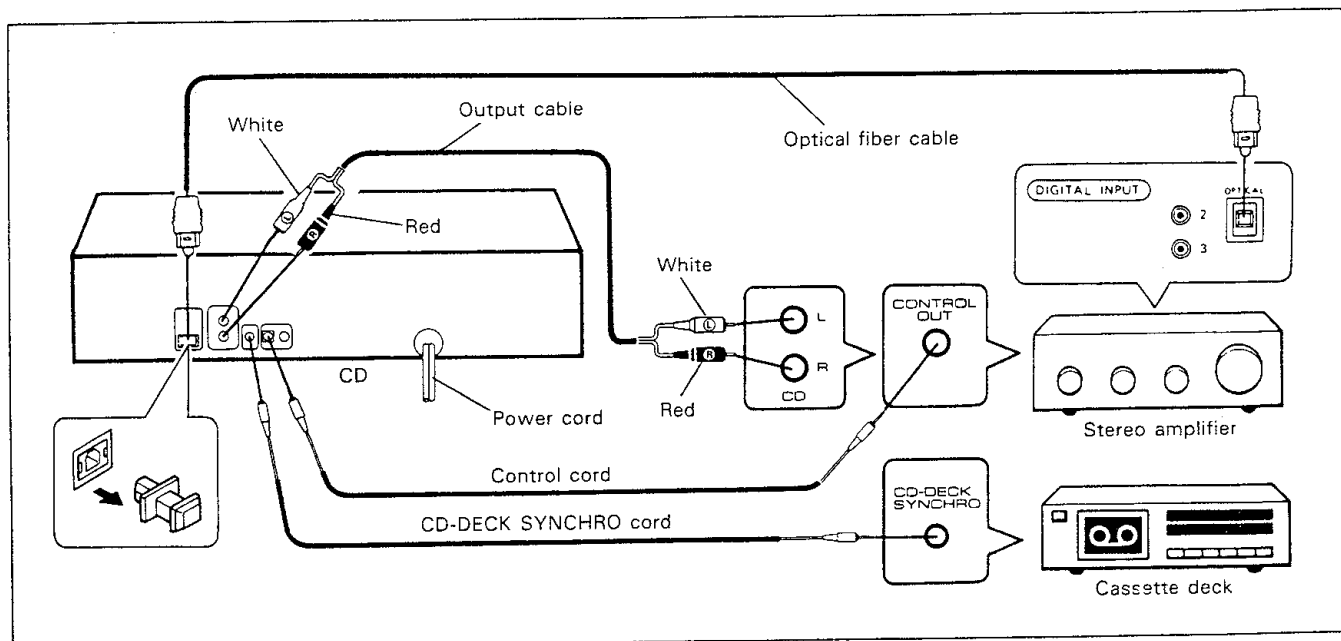
REMOTE CONTROL UNIT

Buttons listed here but not accompanied with explanations have the same functions as the corresponding front-panel buttons.

- ① **OUTPUT LEVEL button**
- ② **Hi-lite scan button (HI-LITE SCAN)**
- ③ **Program edit button (EDIT) (■ AUTO/■ ■ COMPU)**
- ④ **Program button (PGM)**
- ⑤ **Track number buttons (1-10, >10)**
- ⑥ **Track search buttons (TRACK ◀◀, ▶▶)**
- ⑦ **Manual search buttons (MANUAL ◀◀, ▶▶)**
- ⑧ **RANDOM PLAY button**
- ⑨ **PLAY button (▶)**
- ⑩ **STOP/CLEAR button (■)**
- ⑪ **PAUSE button (■ ■)**

NOTE:

Items ⑲ and ⑳ are included on the U.K. and European models of the PD-4500.



CONNECTING THE OUTPUT CABLE:

Connect the plugs on one end of the cable to your amplifier's input terminals (CD or AUX), and those on the other end to the output terminals on this CD player.

- When connecting the cord, insert the white plugs into the left (L) channel, and the red plugs to the right (R) channel.
- Be sure to connect all plugs fully into their terminals.
- Never connect the CD player to your amplifier's turntable (PHONO) terminals, since sound will be distorted and proper playback will not be possible.

CONNECTING THE POWER CORD:

Insert the power cord's plug into an accessory AC outlet on your amplifier, or into a normal household outlet.

CONNECTING THE OPTICAL FIBER CABLE:

Applicable models: PD-5500 (U.K. and European models)

NOTE:

- The sound volume control cannot be done through the digital output terminal.

Handling precautions for the optical fiber cable (sold separately)

- Do not bend the cable at sharp angles. Doing so may damage the cable. When installing in a rack, take special care. When storing the cable for storage, coil with 5-15/16 in (15 cm) diameter or larger.
- When connecting, insert the plug fully. Avoid an incomplete connection.
- Use an optical fiber cable 10 feet (3 m) or less.
- Avoid the optical fiber cable plug being scratched or exposed to dust. If there is dust, wipe off with a soft cloth.
- When an optical fiber cable is not connected, place the dust cap on the optical terminal (OPTICAL).

REMOTE CONTROL AMPLIFIER OPERATION:

Applicable models: PD-4500

PD-4550 (U.S. and Canadian models),

PD-5500 (U.S. and Canadian models).

If your amplifier features the **SR** mark, connect the accessory control cord between the Amplifier's CONTROL OUT terminal and the CD player's CONTROL IN terminal.

- You can then use the remote control unit furnished with your amplifier to perform PLAY, PAUSE, STOP and TRACK operations on the CD player.
- For details regarding connection and operation, consult the Operating Instructions accompanying your stereo amplifier.
- These terminals do not need to be connected if you do not intend to use this function.

NOTE:

- When the control cord is connected to the CONTROL IN terminal, the remote control unit cannot be used to control the player directly. The remote control unit must be pointed at the amplifier's remote sensor.
- Be sure to connect both of the control cord's plugs securely to the CONTROL IN and CONTROL OUT terminals. Do not connect only one end of the cable.

About the CD-DECK SYNCHRO recording function:

- This function facilitates edit recording from CD to cassette tape when the CD player is connected to a Pioneer cassette deck equipped with a CD-DECK SYNCHRO terminal. For details, consult the Operating Instructions accompanying the cassette deck featuring the CD-DECK SYNCHRO mark.

13. SPECIFICATIONS

1. General

Type	Compact disc digital audio system
Usable discs	Compact Disc
Power requirements	
U.K. and Australian models	AC 240V, 50/60Hz
European model	AC 220V, 50/60Hz
U.S. and Canadian models	AC 120V, 60Hz
Power consumption	10W
Operating temperature	+5°C—+35°C (+41°F—+95°F)
Weight	3.6kg (7lb, 15oz)
External dimensions	
PD-4500: U.K. and European models,	
PD-4550: U.K. and European models,	
PD-5500: All models	420(W) × 276(D) × 101(H)mm 16-9/16(W) × 10-7/8(D) × 3-31/32(H) in.
Other models	420(W) × 276(D) × 96(H)mm 16-9/16(W) × 10-7/8(D) × 3-25/32(H) in.

2. Audio section

Frequency response	2Hz—20kHz
S/N	106dB or more (EIAJ)
Dynamic range	96dB or more (EIAJ)
Channel separation	98dB or more (EIAJ)
Total harmonic distortion	0.004% or less (EIAJ)
Output voltage	2.0V
Wow and flutter	Limit of measurement (±0.001% W.PEAK) or less (EIAJ)
Number of channels	2 channels (stereo)

3. Output terminal

- Audio line output terminals
- CD-DECK SYNCHRO terminal
- Control input/output terminals
(PD-4500: All models,
PD-4550: U.S. and Canadian models only,
PD-5500: U.S. and Canadian models only)
- Headphone jack (with volume control)
(PD-4500: U.K. and European models only,
PD-4550: All models,
PD-5500: All models)
- Optical digital output terminal
(PD-5500: U.K. and European models only)

4. Functions

- Play
- Pause
- Stop
- Manual search
- Track search
- Hi-lite scan
- Direct selection
(PD-5500: Main unit control and remote control
PD-4550: Remote control only)
- Single track repeat
- All track repeat
- Programmed repeat
- Random play repeat
- Programmed random play repeat
- Programmed playback (up to 24 tracks)
- Pause program
- Program check (PD-5500)
- Program correction (PD-5500)
- Program clear (PD-5500)
- Auto program edit
- Compu program edit
- Digital level control (PD-5500/PD-4550: Remote control only)
- Random play
- Programmed random play
- Timer start
- CD-deck synchro

5. Accessories

- Remote control unit (PD-5500, PD-4550) 1
- Size AAA/R03 dry cell batteries (PD-5500, PD-4550) 2
- Output cable 1
- Control cord
(PD-5500: U.S. and Canadian models)
(PD-4550: U.S. and Canadian models)
(PD-4500: All models) 1
- Operating instructions 1

NOTE:

The specifications and design of this product are subject to change without notice, due to improvements.



PIONEER®
The future of sound and vision.

Service Manual

ORDER NO.
ARP2000

ADJUSTMENT FOR CD PLAYERS VOL. 1

- This service manual explains compact disc player adjustment methods. The compact disc (CD) players covered by this service manual can be divided into three types: Single CD type, Twin-tray CD type, and Multi-play CD type. Typical models are:

Single CD type	Model PD-5500
Twin-tray CD type	Model PD-T505
Multi-play CD type	Model PD-M530

- For details on items other than adjustment methods, see the respective service manual.
- These adjustment methods can sometimes be used for models other than the typical models listed above. In such a case, follow the instructions in the respective service manual.
- Ce manuel pour le service comprend les explications de réglage en français (voir page 20).
- Este manual de servicio trata del método ajuste escrito en español (consulte la página 38).

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FO MAR. 1990 Printed in Japan

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 pick up or the circuitry. Adjust correctly following the adjustment procedure.

1-1 Adjustment items/verification items and order

Step	Item	Test point	Adjustment location
1	Focus offset adjustment	TP 1, Pin 6 (FCS. ERR)	VR103 (FCS. OFS)
2	Grating adjustment	TP 1, Pin 2 (TRK. ERR)	Grating adjustment slit
3	Tracking error balance adjustment	TP 1, Pin 2 (TRK. ERR)	VR102 (TRK. BAL)
4	Pick up radial/ tangential direction tilt adjustment	TP 1, Pin 1 (RF)	Radial tilt adjustment screw, Tan- gential tilt adjustment screw
5	RF level adjustment	TP 1, Pin 1 (RF)	VR1 (RF level)
6	Focus servo loop gain adjustment	TP 1, Pin 5 (FCS. IN) TP 1, Pin 6 (FCS. ERR)	VR152 (FCS. GAN)
7	Tracking servo loop gain adjust- ment	TP 1, Pin 3 (TRK. IN) TP 1, Pin 2 (TRK. ERR)	VR151 (TRK. GAN)
8	Focus error signal verification	TP 1, Pin 6 (FCS. ERR)	—

• Abbreviation table

FCS. ERR : Focus Error
 FCS. OFS : Focus Offset
 TRK. ERR : Tracking Error
 TRK. BAL : Tracking Balance
 FCS. IN : Focus In
 TRK. IN : Tracking In

1-2 Measuring instruments and tools

1. Dual trace oscilloscope (10:1 probe)
2. Low-frequency oscillator
3. Test disc (YEDS-7)
4. 12-cm disc (with at least about 70 minutes of recording)
For Twin-tray CD type, an 8-cm disc (with at least about 20 minutes of recording) can also be used.
For Multi-play CD type, use only the YEDS-7 test disc.
5. Low-pass filter (39 k Ω + 0.001 μ F)
6. Resistor (100 k Ω)
7. Hexagonal wrench (M3 mm) (not used for Multi-play CD type)
8. Standard tools

1-3 Test point and adjustment variable resistor positions

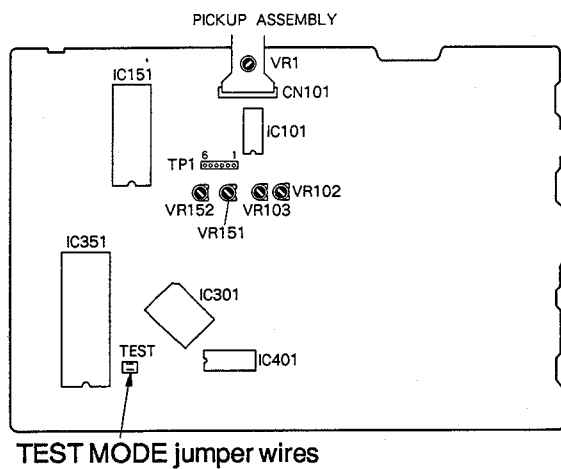


Figure 1 Single CD type Adjustment Locations

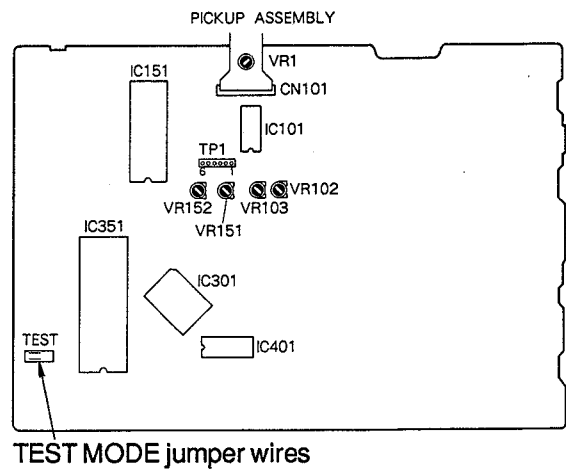


Figure 1 Multi-play CD type Adjustment Locations

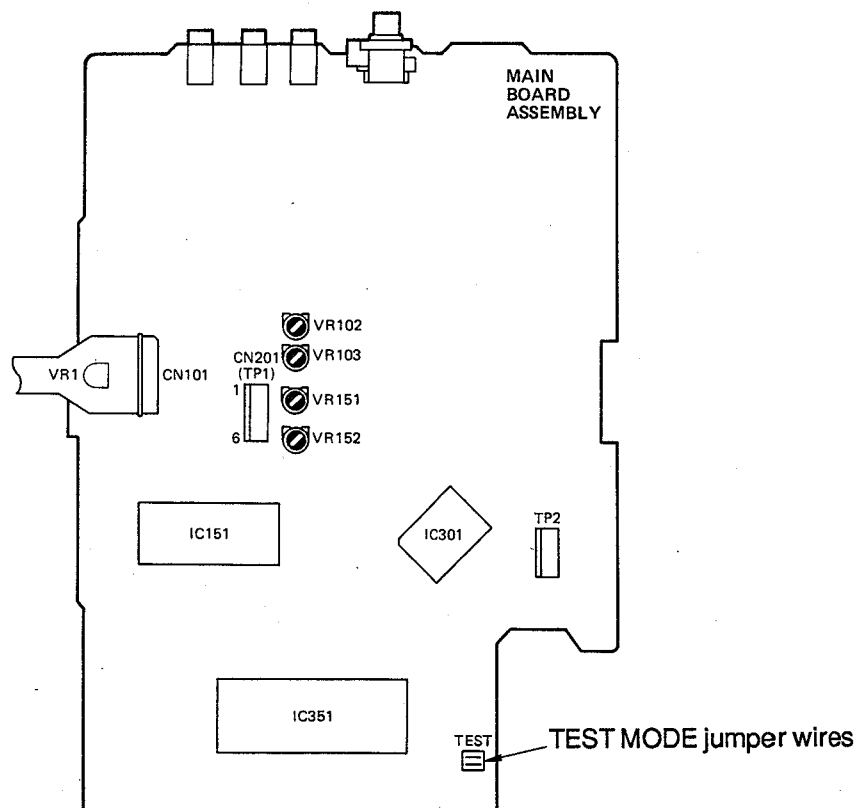


Figure 1 Twin-tray CD type Adjustment Locations

1-4 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.

1-5 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. For Multi-play CD type, unplug the power cord from the AC socket.
2. Short the test mode jumper wires. (See Figure 1.)
3. Turn on the power switch. For Multi-play CD type, plug the power cord back into the AC socket.

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.
For Multi-play CD type, unplug the power cord from the AC socket.

[Operations of the keys in test mode]

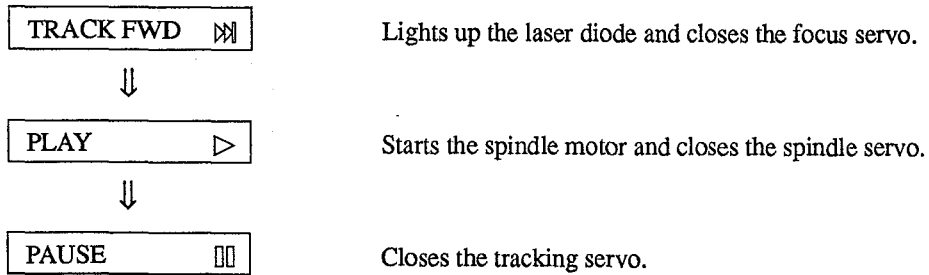
Code	Key name	Function in test mode	Explanation
▷▷	TRACK FWD	Focus servo close	For Twin-tray CD type only, if Disc Tray 1 is closed, Disc Tray 1 is moved to the play position. For Multi-play CD type only, Disc 1 is pulled out of the CD magazine and loaded. Then, no matter what the type, the laser diode is lit up and the focus actuator is lowered (*1), then raised slowly (*2) 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 makes when it operates. 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 down (*3), then the actuator is raised and lowered twice (*4) and returned to its original position. Note : For Multi-play CD type, the operations are reversed this way. *1: The focus actuator is lifted up. *2: Lowered slowly *3: Pulled up *4: Lowered and raised twice
▷	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 wild. 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 displayed.

Code	Key name	Function in test mode	Explanation
□□	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. Pressing this key when the tracking servo is closed opens it and pressing this key when the tracking servo is open closes it. This key has no effect if no disc is mounted.
◀◀	MANUAL SEARCH REV	Carriage reverse (inwards)	Moves the pickup position toward the inner periphery 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 pickup does not automatically stop at the mechanical end point in test mode, be careful with this operation.
▶▶	MANUAL SEARCH FWD	Carriage forward (outwards)	Moves the pickup position toward the outer periphery 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 pickup does not automatically stop at the mechanical end point in test mode, be careful with this operation.
□	STOP	Stop	Switches off all the servos and initializes. For Multi-play CD type, Disc 1 is stored into the magazine, then the player stops. The pickup remains where it was when this key was pressed.
⏏	OPEN/CLOSE DISC 1	Disc tray open/close	Opens/closes the disc tray. This key is a toggle key. Pressing this key when the tray is closed opens it and pressing this key when the tray is open closes it. 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.
..... For Multi-play CD type			
	EJECT	CD magazine eject	Stores Disc 1 in the CD magazine, then ejects the CD magazine. However, even though the CD magazine is ejected, the pickup does not return to the park position. Even if the CD magazine is mounted again, the pickup remains where it is.

[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 in order.

Here is the key operation sequence for playing back a disc in test mode.



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

1. Focus offset adjustment

• Objective • Symptom when out of adjustment	Sets the DC offset for the focus error amp to 0 V. The player 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) VR103 (FCS OFS) None needed

[Procedure]

Adjust VR103 (FCS OFS) so that the DC voltage at TP1, Pin 6 (FCS ERR) is 0 ± 50 mV.

2. Grating adjustment

• Objective • Symptom when out of adjustment	To align the tracking error generation laser beam spots to the optimum angle on the track Play does not start, track search is impossible, tracks are skipped.		
• Measurement instrument connections	Connect the oscilloscope to TP1, Pin 2 (TRK ERR) via a low pass filter. (See Figure 2) [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 Pickup grating adjustment slit 12-cm disc. For Twin-tray CD type, an 8-cm disc can also be used. (YEDS-7 can not be used.) For Multi-play CD type, use the YEDS-7 test disc.

[Procedure]

- When adjusting Twin-tray CD type using a 12-cm disc, always remove the disc tray1. (*)
1. Move the pickup to the outer edge of the disc with the MANUAL SEARCH FWD $\Rightarrow$ or $\Leftarrow$ key so that the grating adjustment slit is at the outer edge of the disc where it can be adjusted.
 Note : For Multi-play CD type, use the MANUAL SEARCH FWD $\Rightarrow$ or $\Leftarrow$ key to move the pickup to half-way across the disc (R = 35 mm).
 2. Press the TRACK FWD $\Rightarrow$ key, then the PLAY $\triangleright$ key in that order to close the focus servo then the spindle servo.
 3. Insert an ordinary screwdriver into the grating adjustment slit and adjust the grating to find the null point. For more details, see the next page.
 4. If you slowly turn the screwdriver counterclockwise (clockwise for Multi-play CD type) from the null point, the amplitude of the wave gradually increases, then if you continue turning the screwdriver, the amplitude of the wave becomes smaller again. Turn the screwdriver counterclockwise (clockwise for Multi-play CD type) from the null point and set the grating to the first point where the wave amplitude reaches its maximum.

Reference : Figure 3 shows the relation between the angle of the tracking beam with the track and the waveform.

Note : The amplitude of the tracking error signal is about 3 Vp-p (when a $39\text{ k}\Omega + 0.001\text{ }\mu\text{F}$ low pass filter is used). If this amplitude is extremely small (2 Vp-p), then the objective lens may be dirty or the pickup malfunctioning. If the difference between the amplitude of the error signal at the innermost edge and outermost edge of the disc is more than 10%, the grating is not adjusted to the optimum point, so adjust it again.

5. Return the pickup to more or less midway across the disc with the MANUAL SEARCH REV $\Leftarrow$ key, press the PAUSE $\square\square$ key and check that the track number and elapsed time are displayed on the front panel. If they are not displayed at this time or the elapsed time changes irregularly, check the null point and adjust the grating again.

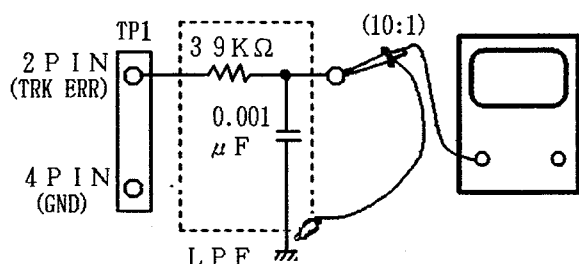
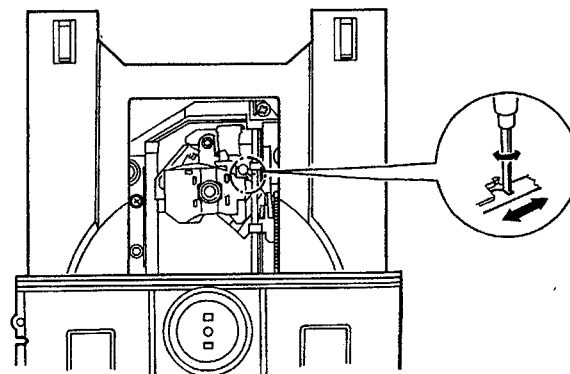
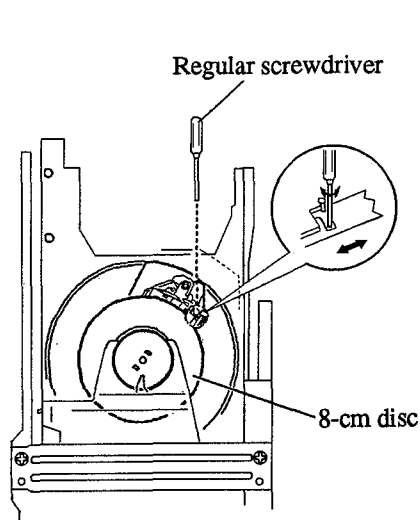


Figure 2

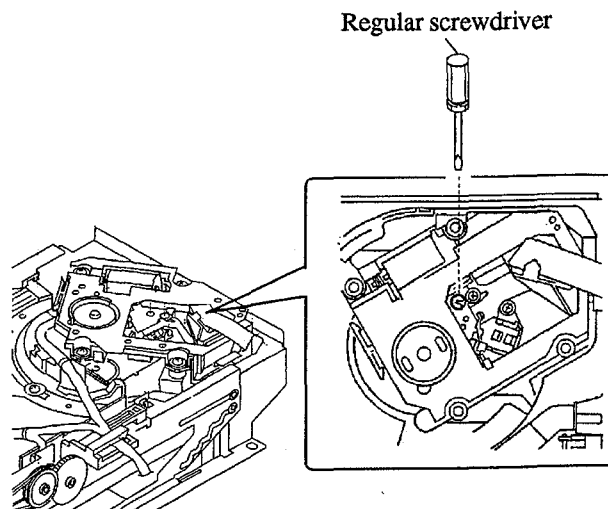


Single CD type adjustment locations

* : See Page 18.



Twin-tray CD type adjustment locations



Multi-play CD type adjustment locations

[How to find the null point]

When you insert the regular screwdriver into the slit for the grating adjustment and change the grating angle, the amplitude of the tracking error signal at TP1 Pin 2 changes. Within the range for the grating, there are five or six locations where the amplitude of the wave reaches a minimum. Of these five or six locations, there is only one at which the envelope of the wave form is smooth. This location is where the three laser beams divided by the grating are all right above the same track. (See Figure 3.)

This point is called the null point. When adjusting the grating, this null point is found and used as the reference position.

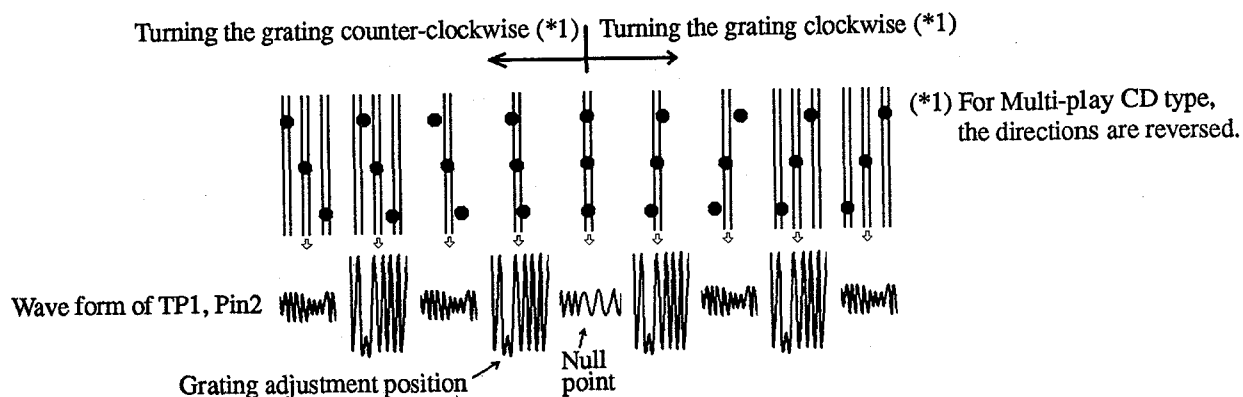
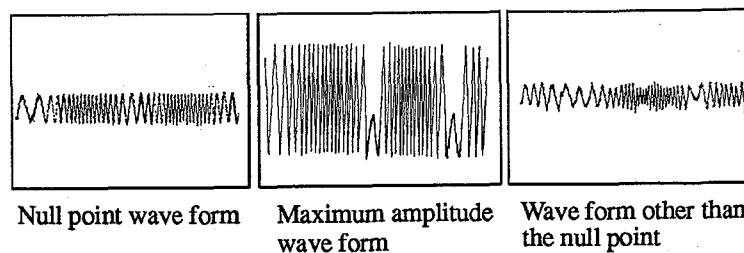


Figure 3

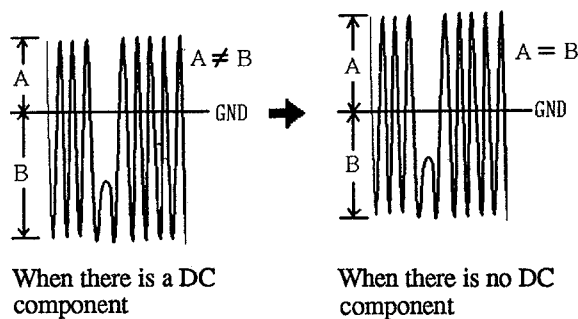


3. Tracking error balance adjustment

• Objective	To correct for the variation in the sensitivity of the tracking photodiode		
• Symptom when out of adjustment	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	Test mode, focus and spindle servos closed and tracking servo open
		• Adjustment location	VR102 (TRK BAL)
		• Disc	YEDS-7

[Procedure]

1. Move the pickup to midway across the disc (R = 35 mm) with the MANUAL SEARCH FWD $\gg$ or $\ll$ key.
2. Press the TRACK FWD $\gg$ key, then the PLAY $\triangleright$ 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. Adjust VR102 (TRK BAL) so that the positive amplitude and negative amplitude of the tracking error signal at TP1 Pin 2 (TRK ERR) are the same (in other words, so that there is no DC component).

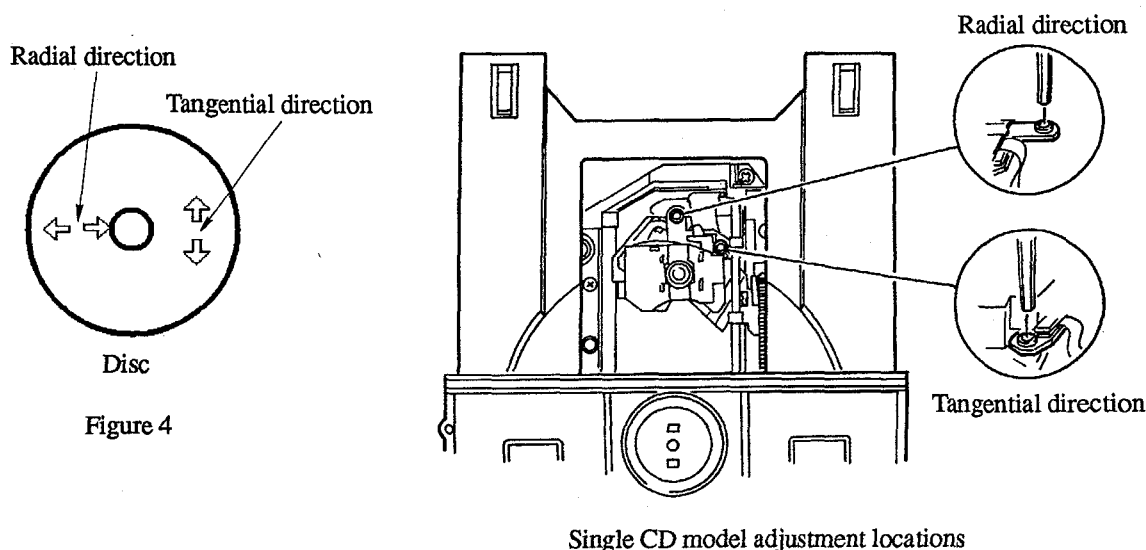


4. Pickup radial/tangential tilt adjustment

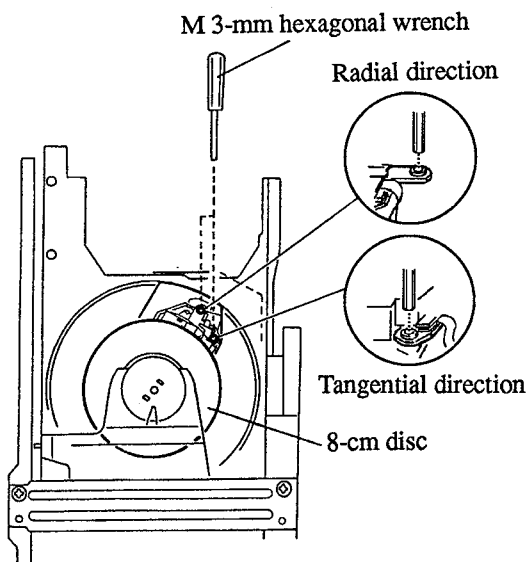
• Objective	To adjust the angle of the pickup relative to the disc so that the laser beams are shone straight down into the disc for the best read out of the RF signals.		
• Symptom when out of adjustment	Sound broken; some discs can be played but not others.		
• Measurement instrument connections	Connect 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 12-cm disc. For Twin-tray CD type, an 8-cm disc can also be used. (YEDS-7 can not be used.) For Multi-play CD type, use the YEDS-7 test disc.

[Procedure]

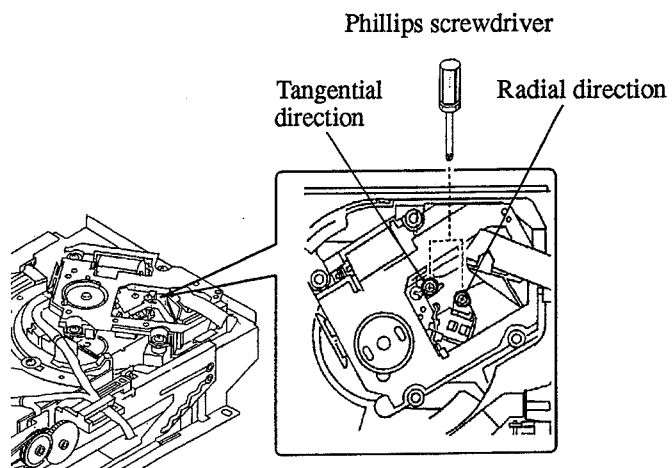
- When adjusting Twin-tray CD type using a 12-cm disc, always remove the disc tray. (*)
1. Move the pickup to the outer edge of the disc with the MANUAL SEARCH FWD $\gg$ or $\ll$ key so that the radial/tangential tilt screws can be adjusted.
 Note : For Multi-play CD type, use the MANUAL SEARCH FWD $\gg$ or $\ll$ key to move the pickup to half-way across the disc (R = 35 mm).
 Press the TRACK FWD $\gg$ key, the PLAY key, then the PAUSE $\triangleright$ key in that order to close the focus servo then the spindle servo and put the player into play mode.
 2. First, adjust the radial tilt adjustment screw with an M 3-mm hexagonal wrench so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly. For Multi-play CD type, use a Phillips screwdriver.
 3. Next, adjust the tangential tilt adjustment screw with an M 3-mm hexagonal wrench so that the eye pattern (the diamond shape at the center of the RF signal) can be seen the most clearly (Figure 5). For Multi-play CD type, use a Phillips screwdriver.
 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.
 Note : Radial and tangential mean the directions relative to the disc shown in Figure 4.



* : See Page 18.



Twin-tray CD type adjustment locations



Multi-play CD type adjustment locations

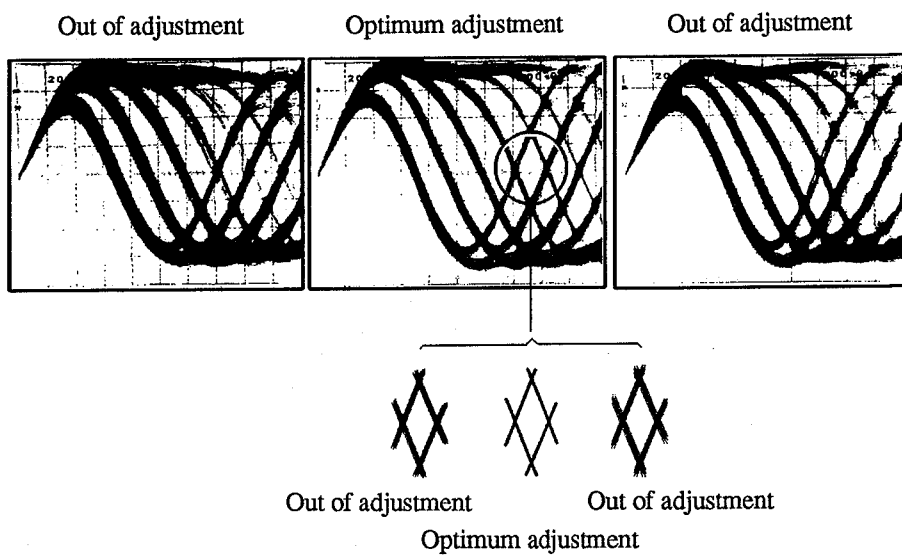


Figure 5 Eye pattern

5. RF level adjustment

• Objective	To optimize the playback RF signal amplitude		
• Symptom when out of adjustment	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	Test mode, play
		• Adjustment location	VR1 (laser power)
		• Disc	YEDS-7

[Procedure]

1. Move the pickup to midway across the disc ($R = 35 \text{ mm}$) with the MANUAL SEARCH FWD $\gg$ or $\ll$ key, then press the TRACK FWD $\gg$ key, then the PLAY $\triangleright$ key in that order to close the respective servos and put the player into play mode.
2. Adjust VR1 (laser power) so that the RF signal amplitude is $1.2 \text{ V}_{p-p} \pm 0.1 \text{ V}$.

6. Focus servo loop gain adjustment

• Objective	To optimize the focus servo loop gain		
• Symptom when out of adjustment	Playback does not start or focus actuator noisy		
• Measurement instrument connections	See Figure 6.	• Player state	Test mode, play
	[Settings] CH1 CH2 20 mV/division 5 mV/division X-Y mode	• Adjustment location • Disc	VR152 (FCS GAN) YEDS-7

[Procedure]

1. Set the AF generator output to 1.2 kHz and 1 Vp-p.
2. Press the MANUAL SEARCH FWD $\gg$ or $\ll$ key to move the pickup to halfway across the disc (R = 35 mm), then press the TRACK FWD $\gg$ key, the PLAY $\triangleright$ key, then the PAUSE $\square\square$ 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 wave form is symmetrical about the X axis and the Y axis.

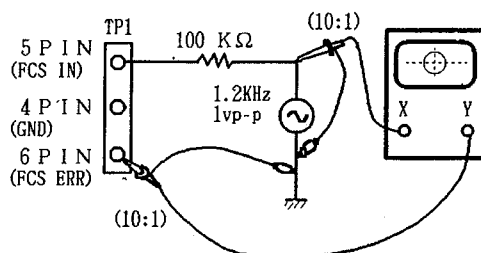
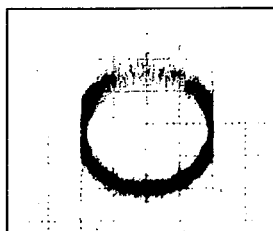


Figure 6

Focus Gain Adjustment



Large gain



Optimum gain



Minimum gain

7. 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 7.	• Player state	Normal mode, play
	[Settings] CH1 CH2 50 mV/division 5 mV/division X-Y mode	• Adjustment location VR151 (TRK GAN) • Disc YEDS-7	

[Procedure]

1. Set the AF generator output to 1.2 kHz and 2 V_{p-p}.
2. Press the MANUAL SEARCH FWD $\Rightarrow$ or $\Leftarrow$ key to move the pickup to halfway across the disc (R = 35 mm), then press the TRACK FWD $\Rightarrow$ key, the PLAY $\triangleright$ key, then the PAUSE $\square\square$ 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 wave form is symmetrical about the X axis and the Y axis.

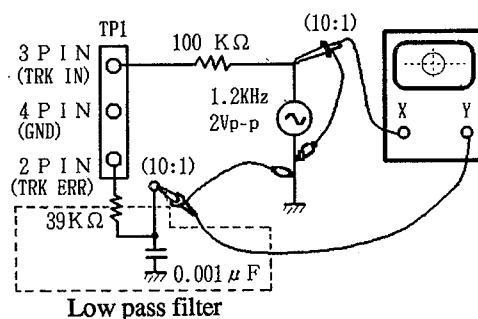
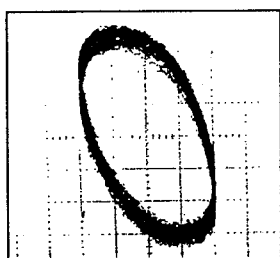
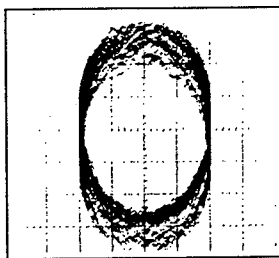


Figure 7

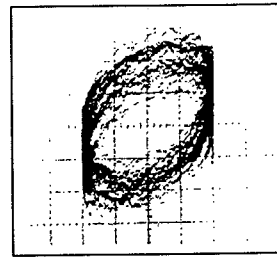
Tracking Gain Adjustment



Large gain



Optimum gain



Minimum gain

8. Focus error signal (focus S curve) verification

• Objective	To judge whether the pickup is ok or not by observing the focus error signal. The pickup is judged from the amplitude of the tracking error signal (as discussed in the section on adjusting the tracking error balance) and the wave form for the focus error signal.		
• Symptom when out of adjustment			
• Measurement instrument connections	Connect the oscilloscope to TP1, Pin 6 (FOCS ERR).	• Player state	Test mode, stop
	[Settings] 100 mV/division 5 ms/division DC mode	• Adjustment location	None
		• Disc	YEDS-7

[Procedure]

1. Connect TP1 Pin 5 to ground.
2. Mount the disc.
3. While watching the oscilloscope screen, press the TRACK FWD key and observe the wave form in Figure 8 for a moment. Verify that the amplitude is at least 2.5 Vp-p and that the positive and negative amplitude are about equal. Since the wave form is only output for a moment when the TRACK FWD key is pressed, press this key over and over until you have checked the wave form.

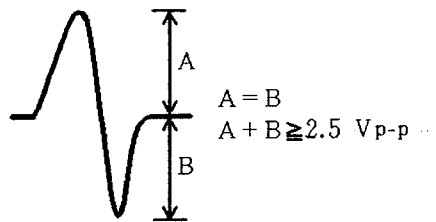


Figure 8

[Judging the pickup]

Do not judge the pickup until all the adjustments have been made correctly. In the following cases, there may be something wrong with the pickup.

1. The tracking error signal amplitude is extremely small (less than 2 Vp-p).
2. The focus error signal amplitude is extremely small (less than 2.5 Vp-p).
3. The positive and negative amplitudes of the focus error signal are extremely asymmetrical (2:1 ratio or more).
4. The RF signal is too small (less than 0.8 Vp-p) and even if VR1 is adjusted (laser power), the RF signal can not be brought up to the standard level.

[How to remove Tray 1 for Twin-tray CD type]

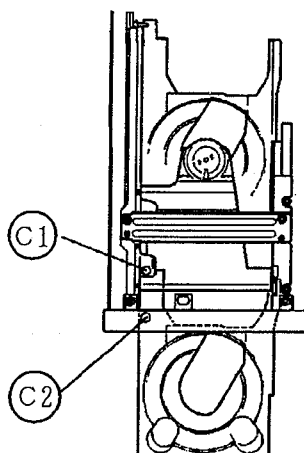


Figure 9

1. Put Tray 1 in the Open position.
2. Remove screws C1 and C2 holding Tray 1. (See Figure 9.)
3. Move Tray 1 in the direction of the arrow in Figure 10 and while removing the protruding section B of Tray 1, remove the A section where Tray 1 and the Slide angle U unit catch.
4. Lift up the Tray 1 Slide angle U unit side slightly and remove it.

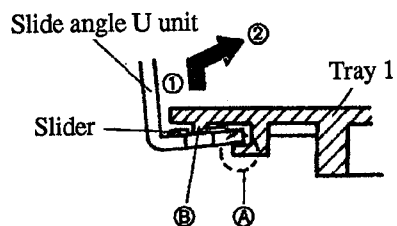


Figure 10

[How to install Tray 1 for Twin-tray CD player]

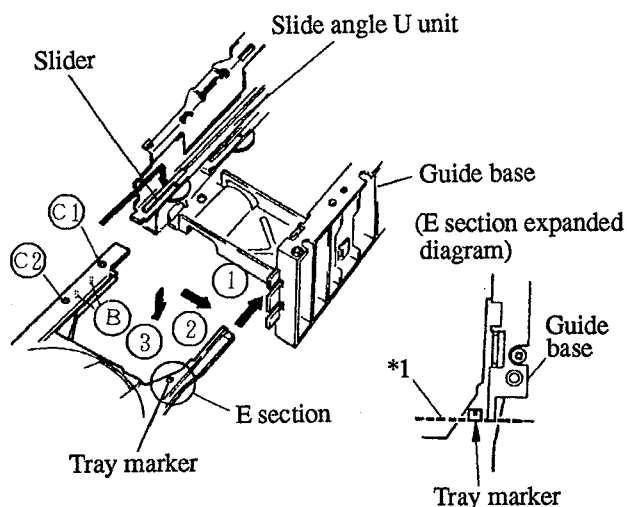


Figure 11

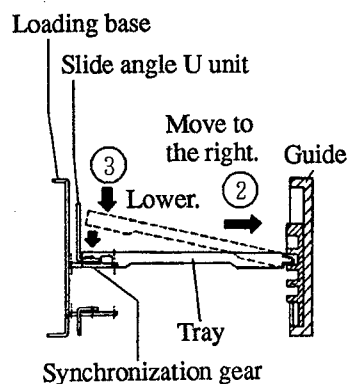


Figure 12

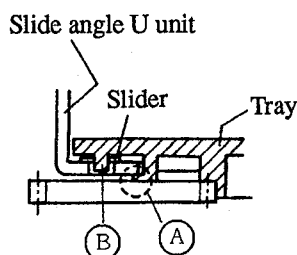


Figure 13

When installing Tray 1, first remove the front panel to make the work easier.

1. Put the slide angle U unit to the very front (the position when Tray 1 is completely open).
2. Put the slider in the very front as shown in Figure 11.
3. With Tray 1 at a slight angle as indicated by the dotted lines in Figure 12, insert Tray 1 until the slider and Tray 1 screw holes are lined up, being careful that the slider does not move to the rear.
4. While moving Tray 1 to the right (the guide side), lower it. Support the slider from below by hand.
5. Setting the catch section A of Tray 1 so that it catches on the Slide angle U unit as shown in Figure 13, insert the protruding section B of Tray 1 into the hole of the slider. At the same time, mesh the synchronization gear and the gear section of Tray 1.
6. After double checking that the screw hole of the slider is positioned at the center of the screw hole of Tray 1 as shown in Figure 14, fasten with Screws C1 and C2 in that order.
7. After installing Tray 1, double check that when Tray 1 is completely open, the position relations are as shown in the E section expanded diagram. If they are not, repeat the installation of Tray 1 from the start.

*1 : The tip of the guide base and the tray marker are lined up. When Tray 1 is installed poorly, they are about 2 mm apart.

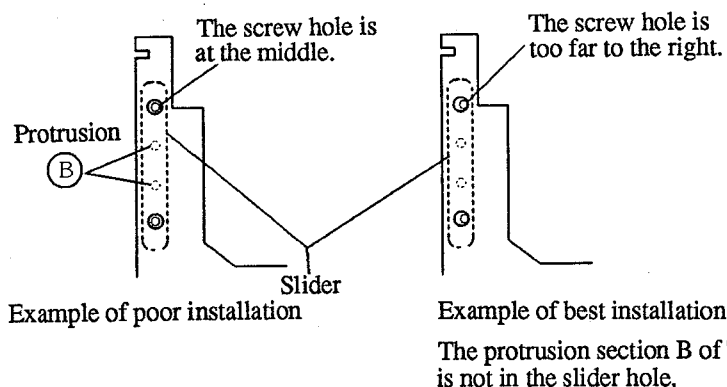


Figure 14

1. Méthodes de réglage

Si le lecteur CD est mal réglé, il risque de ne plus fonctionner normalement, voire ne plus fonctionner du tout, même si le capteur et la circuiterie en présentent aucune anomalie. Par conséquent, ajuster le lecteur correctement en suivant les démarches de réglage.

1-1 Points de réglage/Point et ordre de vérification

Etape	Point	Point d'essai	Emplacement du réglage
1	Réglage du décalage de la mise au point	TP 1, Broche 6 (FCS. ERR)	VR103 (FCS. OFS)
2	Réglage du réseau de diffraction	TP 1, Broche 2 (TRK. ERR)	Fente de réglage du réseau de diffraction
3	Réglage d'équilibrage d'erreur d'alignement	TP 1, Broche 2 (TRK. ERR)	VR102 (TRK. BAL)
4	Réglage d'inclinaison radiale/tangentielle du capteur	TP 1, Broche 1 (RF)	Vis de réglage d'inclinaison radiale, Vis de réglage d'inclinaison tangentielle
5	Réglage du niveau RF	TP 1, Broche 1 (RF)	VR1 (niveau RF)
6	Réglage de gain de boucle asservie de la mise au point	TP 1, Broche 5 (FCS. IN) TP 1, Broche 6 (FCS. ERR)	VR152 (FCS. GAN)
7	Réglage de gain de boucle asservie de l'alignement	TP 1, Broche 3 (TRK. IN) TP 1, Broche 2 (TRK. ERR)	VR151 (TRK. GAN)
8	Vérification du signal d'erreur de la mise au point	TP 1, Broche 6 (FCS. ERR)	—

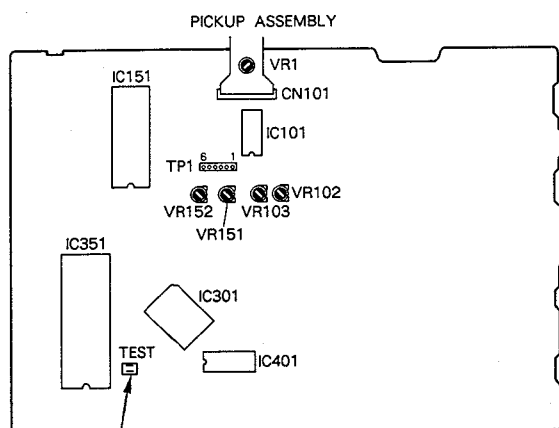
• Tableau des abréviations

FCS. ERR	: erreur de mise au point
FCS. OFS	: décalage de mise au point
TRK. ERR	: erreur d'alignement
TRK. BAL	: équilibrage d'erreur d'alignement
FCS. IN	: mise au point correcte
TRK. IN	: alignement correct

1-2 Instruments de mesure et outils

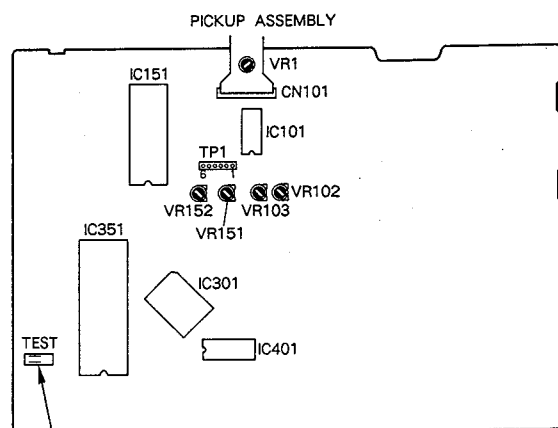
1. Oscilloscope cathodique à deux faisceaux (sonde 10:1)
2. Oscillateur de basse fréquence
3. Disque d'essai (YEDS-7)
4. Disque de 12 cm (avec au moins 70 minutes d'enregistrement)
Dans le cas d'un lecteur à double plateau, on peut également utiliser un disque de 8 cm (avec au moins 20 minutes d'enregistrement)
Dans le cas d'un lecteur multidisques, utiliser le disque d'essai YEDS-7 uniquement.
5. Filtre passe-bas (39 k Ω + 0,001 μ F)
6. Résistance (100 k Ω)
7. Clé hexagonale (M3 mm) (inutile pour le lecteur multidisques)
8. Outils conventionnels

1-3 Point d'essai et positions de réglage de la résistance variable



Fils de liaison TEST MODE

Figure 1 Emplacement des réglages du lecteur à un seul disque



Fils de liaison TEST MODE

Figure 1 Emplacement des réglages du lecteur multidisques

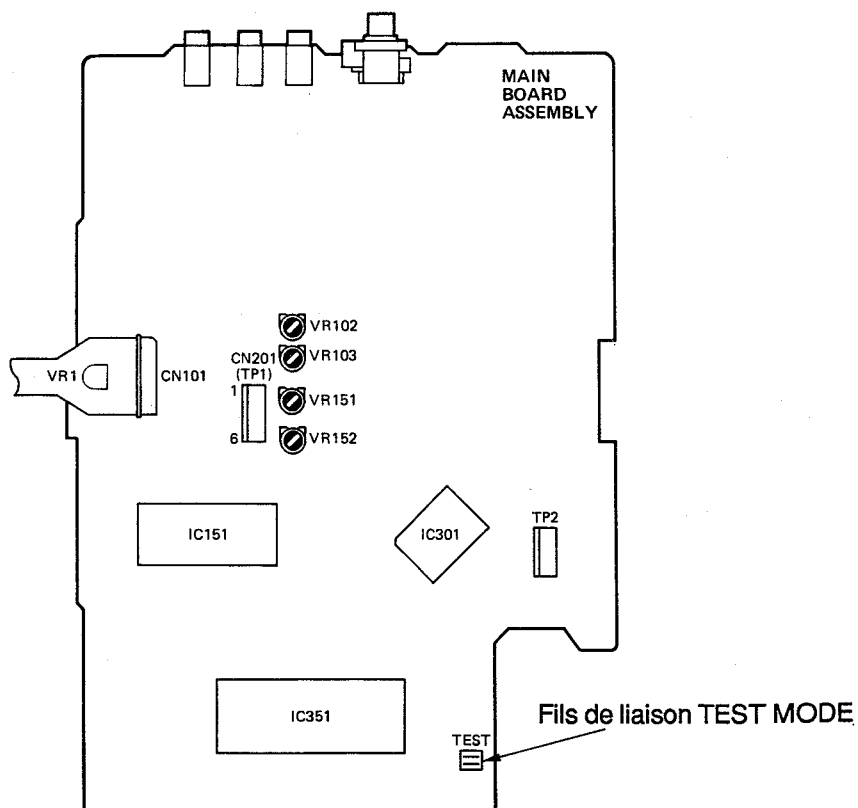


Figure 1 Emplacement des réglages du lecteur à double plateau

1-4 Remarques

1. Utiliser une sonde 10:1 pour l'oscilloscope.
2. Toutes les positions (réglages) des boutons de l'oscilloscope, dans les démarches de réglage, sont conçues pour l'usage d'une sonde 10:1.

1-5 Mode d'essai

Ces modèles sont munis d'un mode d'essai, de façon que les réglages requis à la réparation puissent être effectués aisément. Quand ces modèles sont en mode d'essai, les touches du panneau avant ne fonctionnent pas comme à l'ordinaire. Les réglages et les vérifications peuvent s'effectuer par l'enclenchement de ces touches, à conditions de suivre les démarches requises. Dans le cas de ces modèles, tous les réglages sont réalisés en mode d'essai.

[Mise en mode d'essai]

Voici la manière de mettre le modèle en mode d'essai.

1. Commuter l'interrupteur d'alimentation sur arrêt. Dans le cas d'un lecteur multidisque, débrancher le cordon d'alimentation de la prise secteur.
2. Court-circuiter les fils de liaison du mode d'essai. (voir Figure 1).
3. Commuter l'interrupteur d'alimentation sur marche. Dans le cas d'un lecteur multidisque, rebrancher le cordon d'alimentation dans la prise secteur.

Quand le mode d'essai est correctement réglé, l'affichage est différent de celui qui apparaît généralement à la mise sous tension. Si l'affichage reste le même, le mode d'essai n'a pas été réglé correctement. Dans ce cas, répéter les étapes 1 à 3.

[Pour sortir du mode d'essai]

Voici la procédure pour sortir du mode d'essai.

1. Appuyer sur la touche STOP pour arrêter toutes les opérations.
2. Sur le panneau avant, commuter l'interrupteur d'alimentation sur arrêt. Dans le cas d'un lecteur multidisque, débrancher le cordon d'alimentation de la prise secteur.

[Fonctionnement des touches en mode d'essai]

Code	Nom de la touche	Fonction en mode d'essai	Explications
⏮	TRACK FWD	Fermeture du circuit asservi de la mise au point	Dans le cas d'un lecteur à double plateau, si le plateau n°1 est fermé, il se place en mode de lecture. Dans le cas d'un lecteur multidisque uniquement, le disque n°1 est extrait du magasin et chargé. Ensuite, quel que soit le type, la diode laser s'allume et l'actuateur de la mise au point s'abaisse (*1), puis se relève lentement (*2) et le circuit servo de la mise au point se ferme au point où la lentille de l'objectif se focalise sur le disque. Quand l'appareil est dans cet état, si l'on fait légèrement tourner à la main le disque arrêté, le bruit produit par la mise en service du circuit servo de la mise au point sera audible. Si ce bruit est perçu, le circuit servo de la mise au point fonctionne correctement. Si cette touche est enclenchée et qu'aucun disque n'est installé, la diode laser s'allume, l'actuateur de la mise au point s'abaisse (*3), se relève, puis s'abaisse une deuxième fois (*4) et enfin, revient à sa position de départ. Remarque : Dans le cas d'un lecteur multidisque, les opérations sont inversées de cette manière. *1: L'actuateur de la mise au point se relève. *2: S'abaisse lentement. *3: Se soulève. *4: S'abaisse et se soulève une deuxième fois.
▶	PLAY	Asservissement de rotation en service	Démarre le moteur de rotation dans le sens des aiguilles d'une montre, quand la rotation du disque atteint la vitesse prescrite (environ 500 tours/min à la circonférence interne) et place le circuit servo de rotation dans une boucle fermée. Attention. Si cette touche est enfoncée et qu'un disque n'est pas installé, le moteur de rotation va tourner fou. Si le circuit servo de la mise au point ne passe pas comme prévu dans une boucle fermée ou que la diode laser brille dans le miroir à la périphérie externe du disque, le même symptôme apparaît.

Code	Nom de la touche	Fonction en mode d'essai	Explications
□□	PAUSE	Ouverture/Fermeture du circuit servo de l'alignement	Le fait d'appuyer sur cette touche quand le circuit servo de la mise au point et de la rotation fonctionnent correctement en boucles fermées, place le circuit servo de l'alignement dans une boucle fermée, fait apparaître, sur le panneau avant, le numéro de la piste en cours de lecture et la durée écoulée, puis sort le signal de lecture. Si la durée écoulée n'est pas affichée ou n'est pas correctement calculée, ou si la reproduction sonore est anormale, il se peut que la diode laser s'active dans la section dépourvue de signaux enregistrés, au bord externe du disque, qu'un ajustement quelconque soit déréglé, ou qu'un autre problème se manifeste. Cette touche est de type à bascule. Le fait d'enfoncer cette touche quand le circuit servo de l'alignement est ouvert le ferme et vice versa. Cette touche est inopérante si un disque n'est pas installé.
◀◀	MANUAL SEARCH REV	Inversion du chariot (vers l'intérieur)	Déplace le capteur vers la périphérie interne du disque. Quand cette touche est enclenchée et que le circuit servo de l'alignement travaille en boucle fermée, celui-ci change automatiquement dans une boucle ouverte. Comme le capteur ne s'arrête pas automatiquement au point de fin mécanique du mode d'essai, effectuer cette démarche avec précaution.
▶▶	MANUAL SEARCH FWD	Inversion du chariot (vers l'extérieur)	Déplace le capteur vers la périphérie externe du disque. Quand cette touche est enclenchée et que le circuit servo de l'alignement travaille en boucle fermée, celui-ci change automatiquement dans une boucle ouverte. Comme le capteur ne s'arrête pas automatiquement au point de fin mécanique du mode d'essai, effectuer cette démarche avec précaution.
□	STOP	Arrêt	Met tous les circuits servo hors service et les initialise. Dans le cas d'un lecteur multidisque, le disque n°1 est remis dans le magasin, puis le lecteur s'arrête. Le capteur reste là où il était quand cette touche a été enclenchée.
≡	OPEN/CLOSE DISC 1	Ouverture/Fermeture du plateau à disque	Ouvre/Ferme le plateau à disque. Cette touche est de type à bascule. Le fait d'enfoncer cette touche quand le plateau est ouvert le ferme et vice versa. Le fait d'appuyer sur cette touche quand le disque tourne arrête la rotation et ouvre le plateau. La fonction de cette touche n'a aucun effet sur la position du capteur.
..... Pour les lecteurs multidisques			
	EJECT	Ejection du magasin à disques	Range le disque n°1 dans le magasin à disques, puis éjecte celui-ci. Cependant, bien que le magasin soit éjecté, le capteur ne revient pas sur sa position de départ. Même si le magasin à disques est réinstallé, la position du capteur reste inchangée.

[Lecture de disque en mode d'essai]

En mode d'essai, comme les circuits servo fonctionnent de manière indépendante, la lecture d'un disque exige que les touches soient enclenchées dans l'ordre prescrit, afin de fermer les circuits servo dans le bon ordre.

Voici l'ordre d'enclenchement des touches pour reproduire un disque en mode d'essai.

TRACK FWD 

Allume la diode laser et ferme le circuit servo de la mise au point.



PLAY 

Démarre le moteur de rotation et ferme le circuit servo de la rotation.



PAUSE 

Ferme le circuit servo de l'alignement.

Attendre 2 à 3 secondes entre chaque opération.

1. Réglage du décalage de la mise au point

• Objectif	Règle le décalage CC de l'amplificateur d'erreur de mise au point sur 0V.		
• Symptôme quand déréglé	Le lecteur ne procède plus à la mise au point et le signal RF n'est pas clair.		
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 6 (FSC ERR).	• Etat du lecteur	Mode d'essai, arrêté (juste l'interrupteur d'alimentation commuté sur marche)
	[Réglages] 5 mV/division 10 ms/division mode CC	• Emplacement du réglage	VR103 (FCS OFS)
		• Disque	Aucun requis

[Marche à suivre]

Ajuster VR103 (FCS OFS) de façon que la tension à TP1 broche 6 (FSC ERR) soit 0 ± 50 mV.

2. Réglage du réseau de diffraction

• Objectif	Pour aligner les points du rayon laser producteur d'erreur d'alignement sur l'angle optimum de la piste		
• Symptôme quand déréglé	La lecture ne commence pas, la recherche de piste est impossible, les pistes sont sautées.		
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 2 (TRK ERR) via un filtre passe-bas. (Voir Figure 2)	• Etat du lecteur	Mode d'essai, circuits servo de la mise au point et de la rotation fermés, circuit servo de l'alignement ouvert
	[Réglages] 50 mV/division 5 ms/division mode CC	• Emplacement du réglage	Fente de réglage du réseau de diffraction du capteur
		• Disque	Disque de 12 cm. Dans le cas d'un lecteur à double plateau, il est aussi possible d'utiliser un disque de 8 cm (il est impossible d'employer le disque YEDS-7). Pour un lecteur multidisques, utiliser le disque d'essai YEDS-7.

[Marche à suivre]

- Lors du réglage d'un modèle à double plateau à l'aide d'un disque de 12 cm, toujours enlever le plateau à disque 1. (*)
1. Déplacer le capteur sur le bord externe du disque par la touche MANUAL SEARCH FWD $\Rightarrow$ ou la touche $\Leftarrow$, de façon que la fente de réglage du réseau de diffraction se situe sur bord extérieur du disque, où elle peut être réglée.
Remarque : Dans le cas d'un lecteur multidisque, utiliser la touche MANUAL SEARCH FWD $\Rightarrow$ ou la touche $\Leftarrow$ pour déplacer le capteur à mi-chemin sur le disque ($R = 35$ mm).
 2. Appuyer sur la touche TRACK FWD $\Rightarrow$, puis sur la touche PLAY $\triangleright$, dans cet ordre, pour fermer le circuit servo de la mise au point, puis celui de la rotation.
 3. Insérer un tournevis ordinaire dans le réseau de diffraction pour trouver le point zéro. Pour plus de détails, voir page suivante.
 4. Si l'on tourne lentement le tournevis dans le sens contraire des aiguilles d'une montre (dans le sens des aiguilles d'une montre pour un lecteur multidisque) à partir du point zéro, l'amplitude de l'onde augmente graduellement et si l'on continue à tourner le tournevis, l'amplitude de l'onde diminue de nouveau. Tourner le tournevis dans le sens contraire des aiguilles d'une montre (sens des aiguilles d'une montre pour un lecteur multidisque) à partir du point zéro et régler le réseau de diffraction au premier point où l'amplitude de l'onde atteint son maximum.
Référence : La Figure 3 illustre la relation entre l'angle du faisceau de l'alignement et la piste et la forme d'onde.
- Remarque : L'amplitude du signal d'erreur d'alignement se situe aux environs de 3 Vc-c (quand un filtre passe-bas de $39\text{ k}\Omega + 0,001\text{ }\mu\text{F}$ est utilisé). Si cette amplitude est extrêmement petite (2 Vc-c), la lentille de l'objectif risque alors de s'encrasser ou le capteur risque de mal fonctionner. Si la différence entre l'amplitude du signal d'erreur au bord le plus intérieur et au bord le plus extérieur du disque est supérieure à 10 %, ceci signifie que le réseau de diffraction n'est pas réglé à son point optimum. Dans ce cas, recommencer le réglage.
5. Replacer le capteur plus ou moins à mi-chemin sur le disque par la touche MANUAL SEARCH REV $\Leftarrow$, appuyer sur la touche PAUSE $\square$ et vérifier que le numéro de piste et la durée écoulée sont affichés sur le panneau avant. Si ces paramètres n'apparaissent pas ce moment, ou que la durée écoulée change de manière irrégulière, vérifier le point zéro et recommencer le réglage du réseau de diffraction.

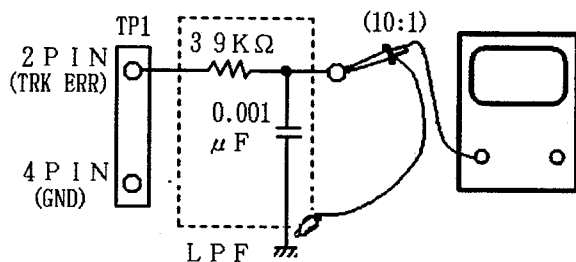
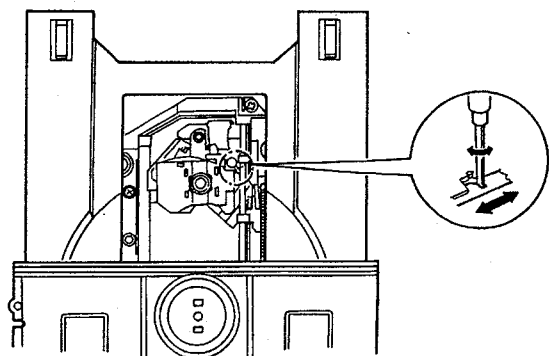
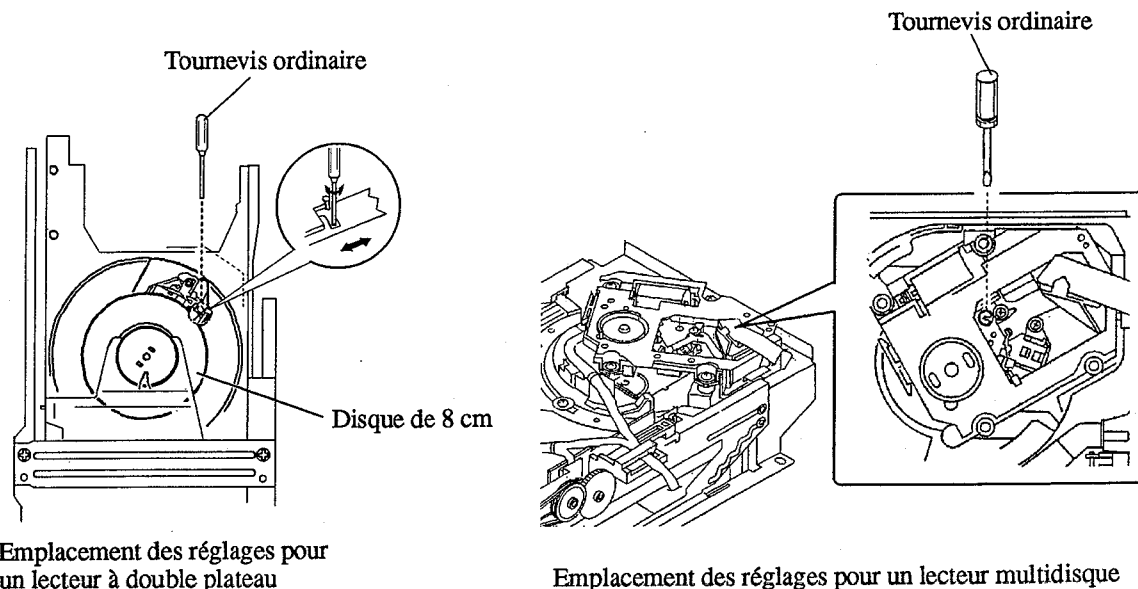


Figure 2



Emplacement des réglages pour un lecteur à un seul disque

*: Voir page 36



[Repérage du point zéro]

Quand le tournevis est introduit dans la fente de réglage du réseau de diffraction et que l'angle du réseau de diffraction est modifié, l'amplitude du signal d'erreur d'alignement à TP1, broche 2, change. Dans les limites de la plage du réseau de diffraction, il existe six emplacements où l'amplitude de l'onde atteint le minimum. Mais l'enveloppe de la forme d'onde n'est régulière qu'à un seul de ces emplacements. Ce point se situe à l'endroit où les trois rayons laser, divisés par le réseau de diffraction, se situent exactement sur la même piste (voir Figure 3).

Ce point s'appelle le point zéro. Lors du réglage du réseau de diffraction, ce point zéro est repéré et utilisé comme position de référence.

Tourner le réseau de diffraction dans le sens contraire des aiguilles d'une montre (*1) Tourner le réseau de diffraction dans le sens des aiguilles d'une montre (*1)

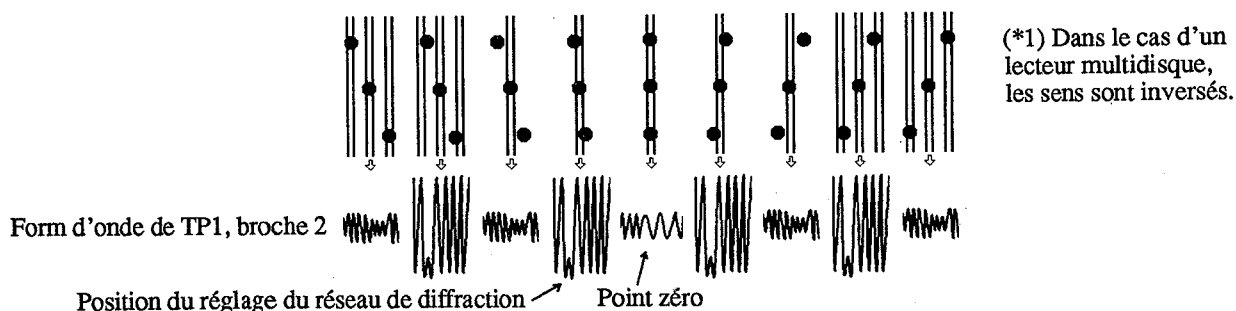
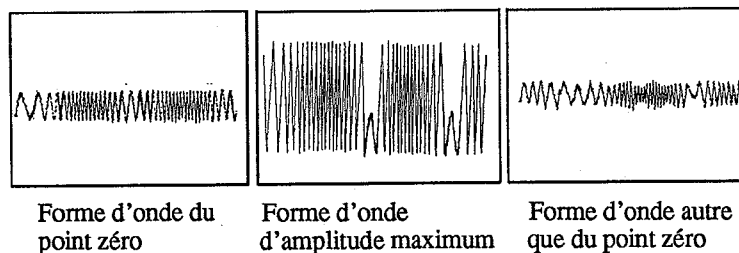


Figure 3

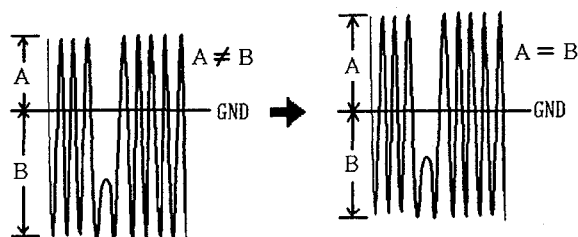


3. Réglage d'équilibrage d'erreur d'alignement

• Objectif	Pour corriger la variation de sensibilité de la photodiode d'alignement		
• Symptôme quand déréglé	La lecture ne commence pas, la recherche de piste est impossible.		
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 2 (TRK ERR).	• Etat du lecteur	Mode d'essai, circuits servo de la mise au point et de la rotation fermés, circuit servo de l'alignement ouvert
	[Réglages] 50 mV/division 5 ms/division mode CC	• Emplacement du réglage • Disque	VR102 (TRK BAL) YEDS-7

[Marche à suivre]

1. Déplacer le capteur à mi-chemin sur le disque ($R = 35 \text{ mm}$) par la touche MANUAL SEARCH FWD $\gg$ ou $\ll$.
2. Appuyer sur la touche TRACK FWD $\gg$, puis sur la touche PLAY $\triangleright$, dans cet ordre, pour fermer le circuit servo de la mise au point, puis celui de la rotation.
3. Aligner la ligne lumineuse (masse) au centre de l'écran de l'oscilloscope et placer celui-ci en mode CC.
4. Ajuster VR102 (TRK BAL) de façon que l'amplitude positive et l'amplitude négative du signal d'erreur d'alignement à TP1, broche 2 (TRK ERR) soient identiques (c'est-à-dire, qu'il n'y ait aucun composant CC).



S'il y a un composant CC

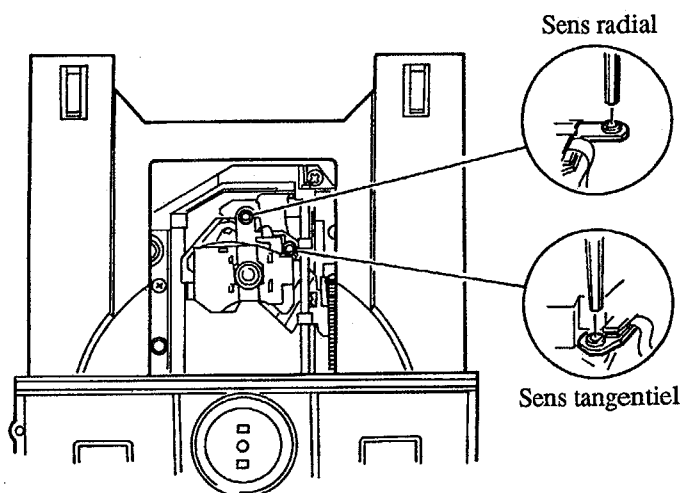
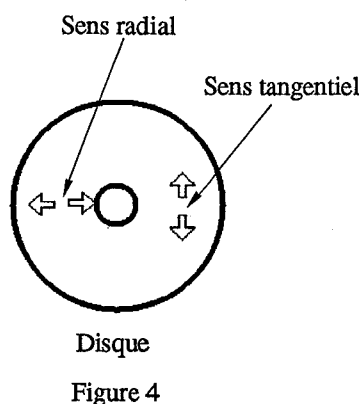
S'il n'y a pas de composant CC

4. Réglage d'inclinaison radiale/tangentielle du capteur

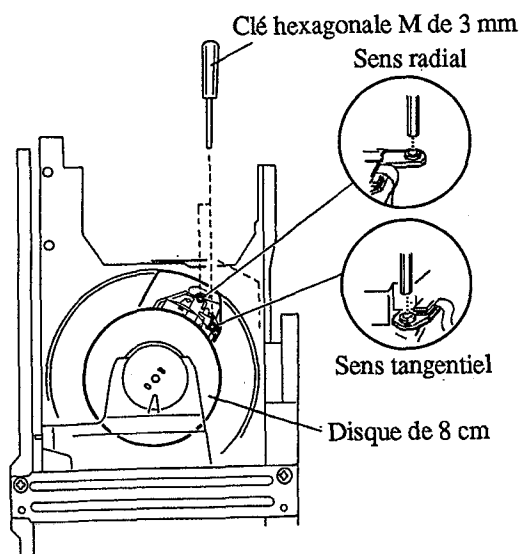
• Objectif	Pour régler l'angle du capteur par rapport au disque, de façon que les rayons laser frappent verticalement le disque et permettre ainsi la lecture optimum des signaux RF.		
• Symptôme quand déréglé	Son interrompu; certains disques peuvent être lus et pas d'autres.		
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 1 (RF).	• Etat du lecteur	Mode d'essai, lecture
	[Réglages] 20 mV/division 200 ns/division mode CA	• Emplacement du réglage • Disque	Vis de réglage d'inclinaison radiale Vis de réglage d'inclinaison tangentielle Disque de 12 cm. Dans le cas d'un lecteur à double plateau, il est aussi possible d'utiliser un disque de 8 cm (il est impossible d'employer le disque YEDS-7). Dans le cas d'un lecteur multidisque, utiliser le disque d'essai YEDS-7.

[Marche à suivre]

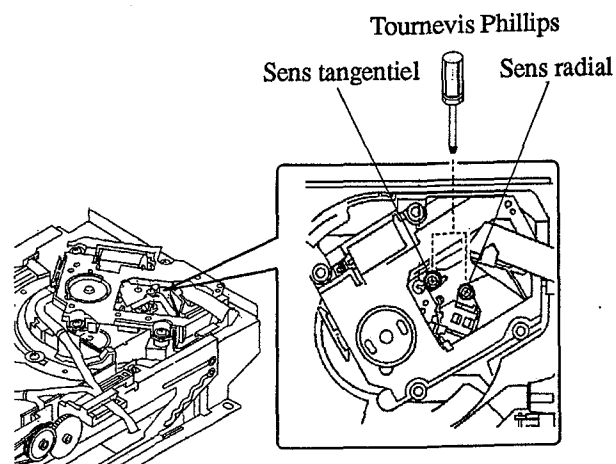
- Lors du réglage d'un modèle à double plateau à l'aide d'un disque de 12 cm, toujours enlever le plateau à disque. (*)
1. Déplacer le capteur sur le bord externe du disque par la touche MANUAL SEARCH FWD $\Rightarrow$ ou $\Leftarrow$, de façon que les vis de réglage d'inclinaison radiale et tangentielle puissent être réglées.
Remarque : Dans le cas d'un lecteur multidisque, utiliser la touche MANUAL SEARCH FWD $\Rightarrow$ ou la touche $\Leftarrow$ pour déplacer le capteur à mi-chemin sur le disque (R = 35 mm).
Appuyer sur la touche TRACK FWD $\Rightarrow$, PLAY $\triangleright$ et PAUSE $\square\square$ dans cet ordre, afin de fermer le circuit servo de la mise au point, puis celui de la rotation et placer le lecteur en mode de lecture.
 2. D'abord, ajuster la vis d'inclinaison radiale à l'aide d'une clé hexagonale M de 3 mm, de façon que le motif en oeil (c'est-à-dire, le diamant au centre du signal RF) soit le plus clairement visible. Dans le cas d'un lecteur multidisque, utiliser un tournevis Phillips.
 3. Ensuite, ajuster la vis d'inclinaison tangentielle à l'aide d'une clé hexagonale M de 3 mm, de façon que le motif en oeil (c'est-à-dire, le diamant au centre du signal RF) soit le plus clairement visible (Figure 5). Dans le cas d'un lecteur multidisque, utiliser un tournevis Phillips.
 4. Ajuster de nouveau la vis d'inclinaison radiale et la vis d'inclinaison tangentielle de façon que le motif en oeil soit le plus clairement visible. Le cas échéant, régler les deux vis de façon que le motif en oeil soit le plus clairement visible.
Remarque : "Radial" et "tangentiel" se rapportent aux sens par rapport au disque illustré à la Figure 4.



Emplacements des réglages pour un lecteur à un seul disque



Emplacements des réglages pour un lecteur à double plateau



Emplacements des réglages pour un lecteur multidisque

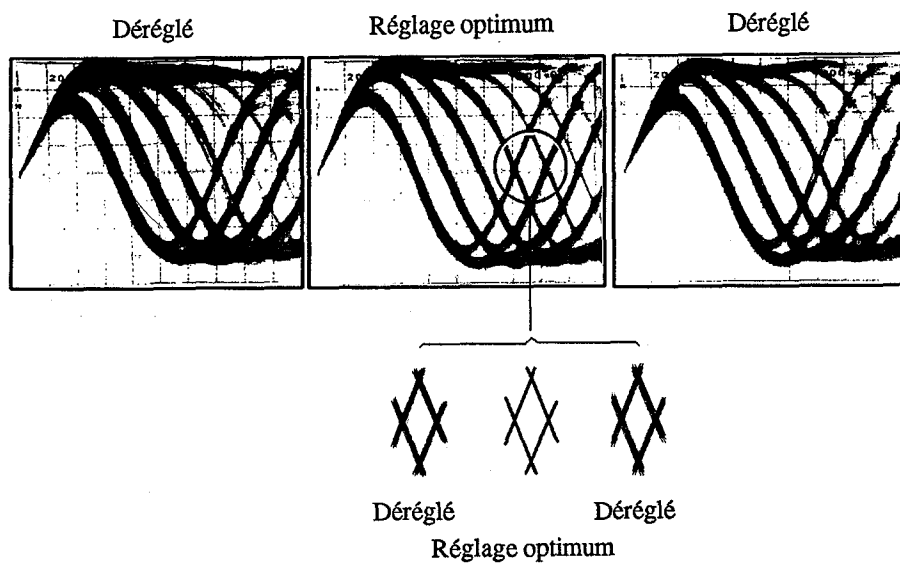


Figure 5 Motif en oeil

5. Réglage du niveau RF (niveau RF)

• Objectif	Pour optimiser l'amplitude du signal RF de lecture		
• Symptôme quand déréglé	Pas de lecture ni de recherche		
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 1 (RF).	• Etat du lecteur	Mode d'essai, lecture
	[Réglages] 50 mV/division 10 ms/division mode CA	• Emplacement du réglage	VR1 (alimentation du laser)
		• Disque	YEDS-7
[Marche à suivre] - Placer le capteur à mi-chemin sur le disque ($R = 35 \text{ mm}$) à l'aide de la touche MANUAL SEARCH FWD $\gg$ ou $\ll$. Ensuite, appuyer sur la touche TRACK FWD $\gg$ puis sur la touche PLAY $\triangleright$, dans cet ordre, pour fermer les circuits servo respectifs et mettre le lecteur en mode de lecteur. - Ajuster VR1 (alimentation du laser) de façon que l'amplitude du signal RF atteigne $1,2 V_{c-c} \pm 0,1 \text{ V}$.			

6. Réglage de gain de boucle asservie de la mise au point

• Objectif	Pour optimiser le gain de la boucle d'asservissement de la mise au point.		
• Symptôme quand déréglé	La lecture ne commence pas ou l'actuateur de la mise au point est parasité.		
• Raccordement des instruments de mesure	Voir Figure 6.	• Etat du lecteur	Mode d'essai, lecture
	[Réglages] CAN.1 CAN.2 20 mV/division 5 mV/division Mode X-Y	• Emplacement du réglage • Disque	VR152 (FSC GAN) YEDS-7

[Marche à suivre]

1. Régler la sortie du générateur AF sur 1,2 kHz et 1 V_{c-c}.
2. Appuyer sur la touche MANUAL SEARCH FWD $\gg$ ou la touche $\ll$ pour placer le capteur à mi-chemin sur le disque (R = 35 mm). Ensuite, appuyer sur la touche TRACK FWD $\gg$, la touche PLAY $\triangleright$, puis sur la touche PLAY $\square$, dans cet ordre, pour fermer les circuits servo respectifs et placer le lecteur en mode de lecture.
3. Ajuster VR152 (FSC GAN) de façon que la forme d'onde de Lissajous soit symétrique aux alentours de l'axe X et l'axe Y.

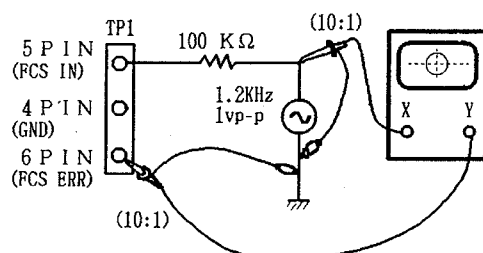
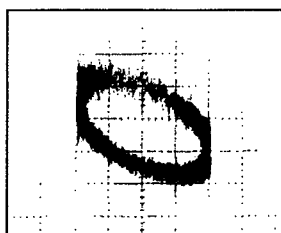
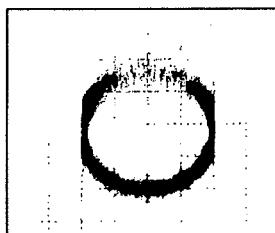


Figure 6

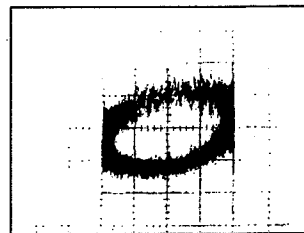
Adjustment de gain de mise au point



Gain important



Gain optimum



Gain minimum

7. Réglage de gain de boucle asservie de l'alignement

• Objectif	Pour optimiser le gain de la boucle d'asservissement de l'alignement.		
• Symptôme quand déréglé	La lecture ne commence pas, l'actuateur est parasité pendant la recherche, ou des pistes sont sautées.		
• Raccordement des instruments de mesure	Voir Figure 7.	• Etat du lecteur	Mode normal, lecture
	[Réglages] CAN.1 CAN.2 50 mV/division 5 mV/division Mode X-Y	• Emplacement du réglage • Disque	VR151 (TRK GAN) YEDS-7

[Marche à suivre]

1. Régler la sortie du générateur AF sur 1,2 kHz et 1 Vc-c.
2. Appuyer sur la touche MANUAL SEARCH FWD $\Rightarrow$ ou la touche $\Leftarrow$ pour placer le capteur à mi-chemin sur le disque (R = 35 mm). Ensuite, appuyer sur la touche TRACK FWD $\Rightarrow$, la touche PLAY $\triangleright$, puis sur la touche PAUSE $\square$, dans cet ordre, pour fermer les circuits servo respectifs et placer le lecteur en mode de lecture.
3. Ajuster VR151 (TRK GAN) de façon que la forme d'onde de Lissajous soit symétrique aux alentours de l'axe X et l'axe Y.

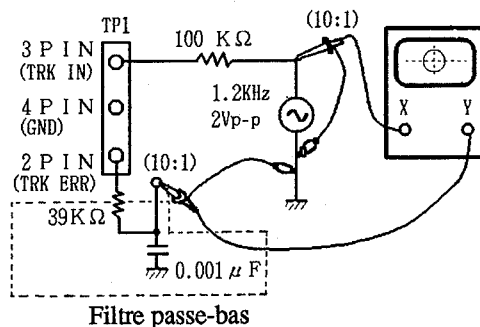
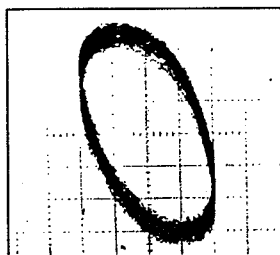
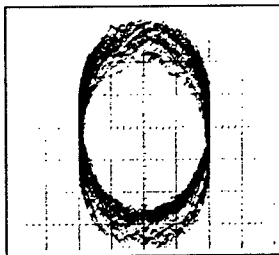


Figure 7

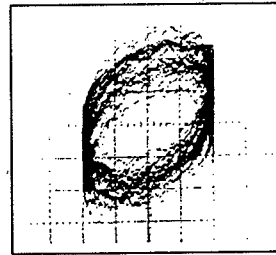
Adjustment de gain d'alignement



Gain important



Gain optimum



Gain minimum

8. Vérification du signal d'erreur de la mise au point

• Objectif	Pour juger si le capteur est bon ou pas, en observant le signal d'erreur de la mise au point. L'état du capteur s'évalue à partir de l'amplitude du signal d'erreur d'alignement (comme décrit dans le paragraphe relatif à l'équilibrage d'erreur d'alignement), ainsi qu'à partir de la forme d'onde du signal d'erreur de mise au point.		
• Symptôme quand déréglé			
• Raccordement des instruments de mesure	Raccorder l'oscilloscope à TP1, broche 6 (FCS ERR).	• Etat du lecteur	Mode de test, arrêt
	[Réglages] 100 mV/division 5 ms/division mode CC	• Emplacement du réglage	Aucun
		• Disque	YEDS-7

[Marche à suivre]

1. Raccorder TP1, broche 5 à la masse.
2. Installer le disque.
3. Tout en regardant l'écran de l'oscilloscope, appuyer sur la touche TRACK FWD  et observer la forme d'onde de la Figure 8, pendant quelques instants. Vérifier que l'amplitude atteint au moins 2,5 Vc-c et que les amplitudes positive et négatives soient égales. Comme la forme ne sort que pour un moment, quand la touche TRACK FWD  est enclenchée, appuyer sur à plusieurs reprises sur cette touche, jusqu'à ce que la forme d'onde ait été vérifiée.

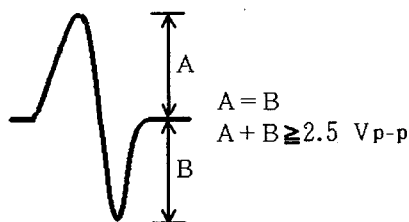


Figure 8

[Evaluation du capteur]

Ne pas tenter d'évaluer l'état du capteur tant que tous les réglages ne sont pas corrects. Les cas suivants témoignent de l'anomalie du capteur.

1. L'amplitude du signal d'erreur d'alignement est extrêmement petite (inférieure à 2 Vc-c).
2. L'amplitude du signal d'erreur de mise au point est extrêmement petite (inférieure à 2,5 Vc-c).
3. Les amplitudes positive et négative du signal d'erreur de mise au point sont extrêmement asymétriques (taux 2:1 ou plus).
4. Le signal RF est trop petit (inférieur à 0,8 Vc-c) et même si VR1 (alimentation du laser) est ajustée, le signal RF ne peut être élevé au niveau standard.

[Retrait du premier plateau à disque dans le cas d'un lecteur à double plateau]

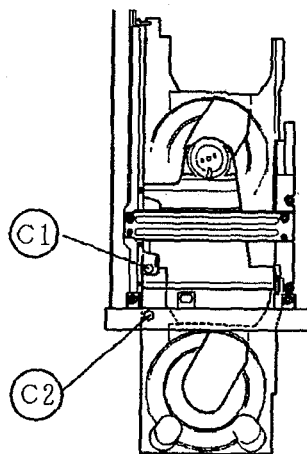


Figure 9

1. Ouvrir le premier plateau à disque.
2. Déposer les vis C1 et C2 qui soutiennent le premier plateau (voir Figure 9).
3. Déplacer le premier plateau dans le sens de la flèche, illustrée sur la Figure 10, et tout en enlevant la partie saillante du plateau, déposer la section A où le premier plateau et l'unité en U d'angle de glissière s'emboîtent.
4. Soulever légèrement l'unité en U d'angle de glissière du premier plateau, puis l'enlever.

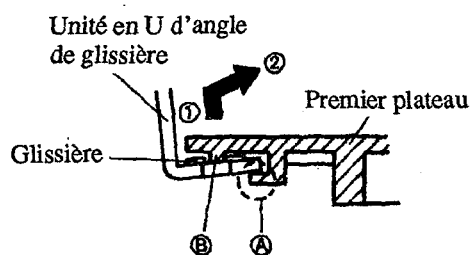


Figure 10

[Mise en place du premier plateau à disque dans le cas d'un lecteur à double plateau]

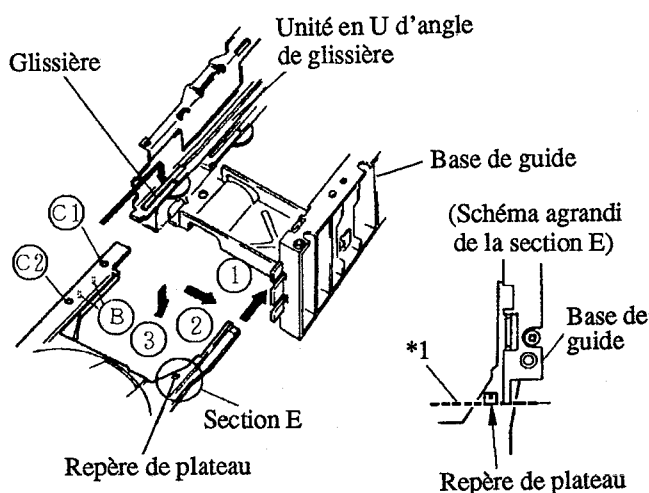


Figure 11

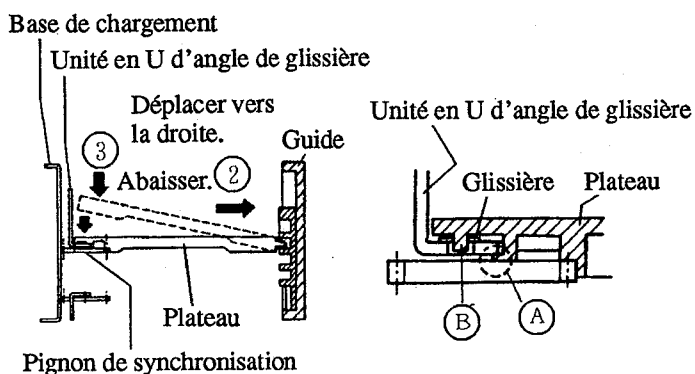


Figure 12

Figure 13

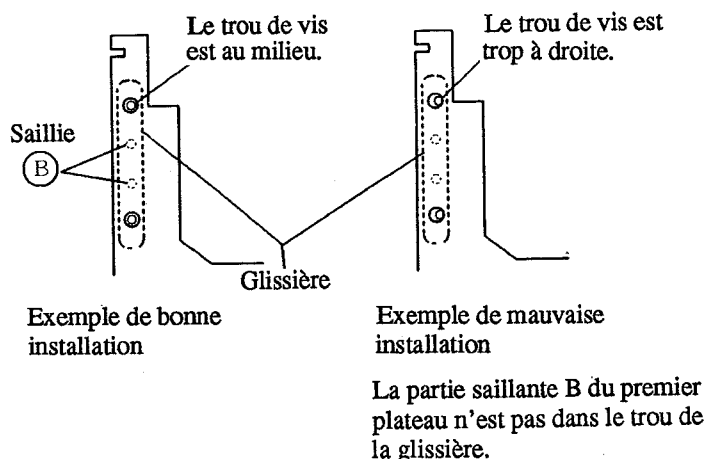


Figure 14

Lors de l'installation du premier plateau, enlever d'abord le panneau avant, afin de faciliter l'opération.

1. Placer l'unité en U d'angle de glissière au tout premier plan (la position quand le premier plateau est complètement ouvert).
2. Placer la glissière au tout premier plan, comme illustré à la Figure 11.
3. En inclinant légèrement le premier plateau (l'angle est indiqué par les lignes en pointillé sur la Figure 12), insérer le premier logement jusqu'à ce que la glissière et les trous des vis du plateau soit alignés. Faire attention à ce que la glissière ne recule pas vers l'arrière.
4. Tout en poussant le plateau vers la droite (le côté du guide), l'abaisser. Soutenir la glissière par le fond, de la main.
5. Installer la section d'emboîtement du plateau, de façon qu'elle s'emboîte sur l'unité en U d'angle de glissière, comme illustré à la Figure 13, et insérer la partie saillante B du plateau dans le trou de la glissière. En même temps, engrener le pignon de synchronisation avec la section d'engrenage du plateau.
6. Après avoir vérifié que le trou de vis de la glissière est aligné sur le trou de vis du plateau, comme illustré sur la Figure 14, serrer les vis C1 et C2, dans cet ordre.
7. Après avoir installé le premier plateau, vérifier une fois de plus que lorsque le premier plateau est complètement ouvert, les positions pièces correspondent à celle illustrées sur le schéma de la section E. Dans la négative, recommencer les démarches d'installation de premier plateau à partir du début.

*1 : La pointe de la base de guide et le repère du plateau sont alignés. Si le premier plateau est mal installé, ils sont à 2 mm environ l'un de l'autre.

1. Métodos de ajuste

Si un reproductor de discos compactos se ajusta incorrecta o inadecuadamente, puede funcionar mal o no trabajar incluso aunque no exista ningún problema en el captor ni en los circuitos. Ajuste correctamente siguiendo el procedimiento de ajuste.

1-1 Ítemes de ajuste/verificación y orden

Paso	Ítem	Punto de prueba	Lugar de ajuste
1	Ajuste del descentramiento de enfoque	TP 1, Patilla 6 (FCS. ERR)	VR103 (FCS. OFS)
2	Ajuste de retícula	TP 1, Patilla 2 (TRK. ERR)	Ranura de ajuste de retícula
3	Ajuste del equilibrio de ajuste de seguimiento	TP 1, Patilla 2 (TRK. ERR)	VR102 (TRK. BAL)
4	Ajuste de la inclinación en sentido radial/ tangencial del captor	TP 1, Patilla 1 (RF)	Tornillo de ajuste de la inclinación radial Tornillo de ajuste de la inclinación tangencial
5	Ajuste del nivel de RF	TP 1, Patilla 1 (RF)	VR1 (Nivel de RF)
6	Ajuste de la ganancia del bucle del servo de enfoque	TP 1, Patilla 5 (FCS. IN) TP 1, Patilla 6 (FCS. ERR)	VR152 (FCS. GAN)
7	Ajuste de la ganancia del bucle del servo de seguimiento	TP 1, Patilla 3 (TRK. IN) TP 1, Patilla 2 (TRK. ERR)	VR151 (TRK. GAN)
8	Verificación de la señal de error de enfoque	TP 1, Patilla 6 (FCS. ERR)	—

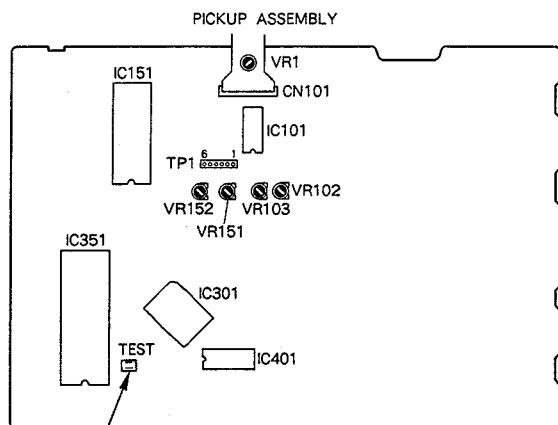
• Tabla de abreviaturas

FCS. ERR : Error de enfoque
FCS. OFS : Descentramiento de enfoque
TRK.ERR : Error de seguimiento
TRK. BAL : Equilibrio de seguimiento
FCS.IN : Entrada de enfoque
TRK. IN : Entrada de seguimiento

1-2 Instrumentos y herramientas de medición

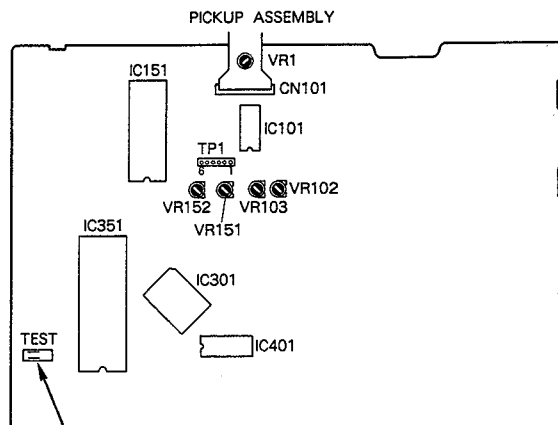
1. Osciloscopio de doble traza (Sonda de 10:1)
2. Oscilador de baja frecuencia
3. Disco de prueba (YEDS-7)
4. Disco de 12 cm (con 70 minutos de grabación por lo menos)
Para el tipo de doble bandeja de disco compacto, también puede emplearse un disco de 8 cm (con 20 minutos de grabación por lo menos)
Para el tipo de reproducción múltiple de disco compacto, emplee solamente el disco de prueba YEDS-7.
5. Filtro de paso bajo (39 k Ω , 0,001 μ F)
6. Resistor (100 k Ω)
7. Llave hexagonal (M 3 mm) (no se emplea para el tipo de reproducción múltiple de disco compacto)
8. Herramientas estándar

1-3 Ubicación de los puntos de prueba y los resistores variables de ajuste



Hilos de puenteado de modo de prueba

Figura 1 Lugares de ajuste para el tipo de disco compacto sencillo



Hilos de puenteado de modo de prueba

Figura 1 Lugares de ajuste para el tipo de reproducción múltiple de disco compacto.

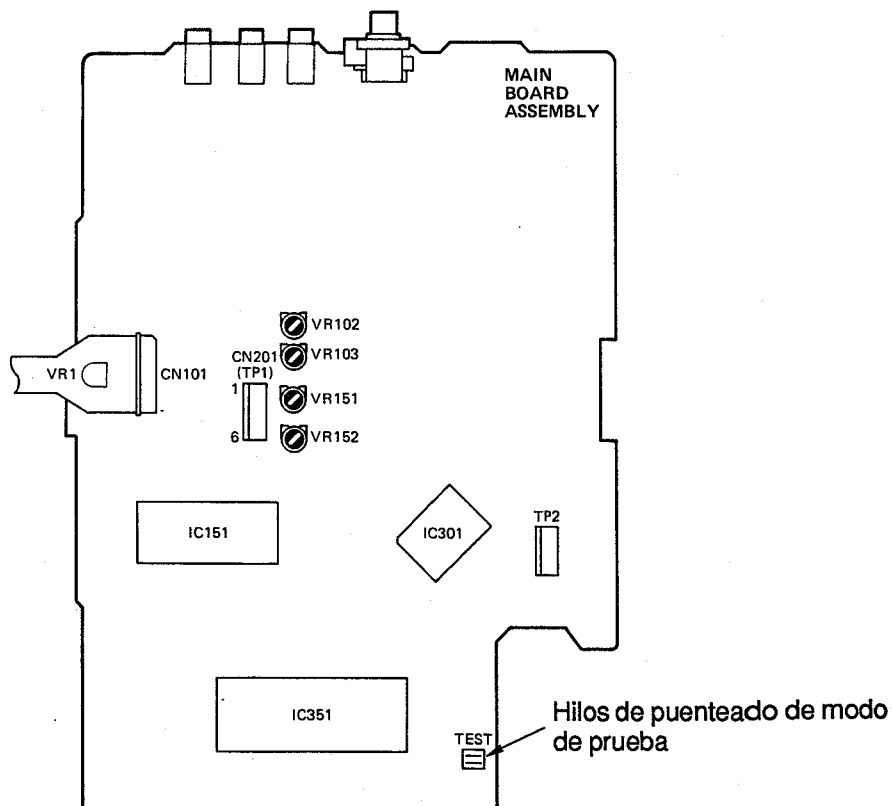


Figura 1 Lugares de ajuste para el tipo de doble bandeja de disco compacto

1-4 Notas

1. Emplee una sonda de 10:1 para el osciloscopio.
2. Todas las posiciones de los mandos (ajustes) para el osciloscopio de los procedimientos de ajuste son para cuando se emplee la sonda de 10:1.

1-5 Modo de prueba

Estos modelos poseen un modo de prueba que permite realizar fácilmente los ajustes y las comprobaciones requeridos para el servicio. Cuando estos modelos estén en el modo de prueba, las teclas del panel frontal trabajarán de forma diferente a la normal. Los ajustes y las comprobaciones podrán realizarse accionando estas teclas de acuerdo con el procedimiento correcto. Para estos modelos, todos los ajustes se realizarán en el modo de prueba.

[Puesta de estos modelos en el modo de prueba]

A continuación se indica cómo poner estos modelos en el modo de prueba.

1. Ponga en OFF el interruptor de alimentación. Para un tipo de reproducción múltiple de disco compacto, desenchufe el cable de alimentación de la toma de CA.
2. Cortocircuite los hilos de puenteado de modo de prueba. (Consulte la figura 1.)
3. Ponga en ON el interruptor de alimentación. Para un tipo de reproducción múltiple de disco compacto, enchufe el cable de alimentación de la toma de CA.

Cuando haya ajustado correctamente el modo de prueba, la visualización será diferente a la obtenida normalmente al conectar la alimentación. Si la visualización sigue siendo la normal, el modo de prueba no se habrá ajustado normalmente, por lo que tendrá que repetir los pasos 1 a 3.

[Desactivación del modo de prueba]

A continuación se indica el procedimiento para desactivar el modo de prueba.

1. Presione la tecla STOP y cese todas las operaciones.
2. Ponga en OFF el interruptor de alimentación del panel frontal.

Para un tipo de reproducción múltiple de disco compacto, desenchufe el cable de alimentación de la toma de CA.

[Operaciones de teclas en el modo de prueba]

Código	Nombre de la tecla	Función en el modo de prueba	Explicación
▷▷	TRACK FWD	Cierre del servo de enfoque	Para un tipo de doble bandeja de disco compacto solamente, si la bandeja de disco 1 está cerrada, ésta se moverá hasta la posición de reproducción. Para un tipo de reproducción múltiple de disco compacto solamente, el disco 1 saldrá del cargador de discos compactos y se cargará. Después, independientemente del tipo, el diodo láser se encenderá y el actuador de enfoque descenderá (*1), después se elevará lentamente (*2), y el servo de enfoque se cerrará en el punto en el que el objetivo se enfoca sobre el disco. Con el reproductor en este estado, si gira ligeramente con la mano el disco parado, podrá oír el sonido que hace el servo de enfoque al funcionar. Si puede oír este sonido, el servo de enfoque estará funcionando correctamente. Si presiona esta tecla sin disco montado, el diodo láser se encenderá, el actuador de enfoque se verá empujado hacia abajo (*3), y después se levantará y descenderá dos veces (*4), y volverá a su posición original. Nota : Para un tipo de reproducción múltiple de disco compacto, las operaciones serán inversas a éstas. *1: El actuador de enfoque se eleva *2: Desciende lentamente *3: Se ve empujado hacia arriba *4: Desciende y se eleva dos veces
▷	PLAY	Activación del servo del eje	Pondrá en marcha el motor del eje haciéndolo girar hacia la derecha y después la rotación del disco alcanzará la velocidad prescrita (unas 500 rpm en la periferia interior), y pondrá el servo del eje en un bucle cerrado. Tenga cuidado. Si presiona esta tecla cuando no haya disco montado, el motor del eje girará desenfrenadamente. Si el servo de enfoque no pasa correctamente a un bucle cerrado, o si el haz láser incide en la sección del espejo en el la periferia del disco, se visualizará el mismo síntoma.

Código	Nombre de la tecla	Función en el modo de prueba	Explicación
□□	PAUSE	Apertura/cierre del servo de seguimiento	Si presiona esta tecla cuando el servo de enfoque y el servo del eje están funcionando correctamente en bucles cerrados, el servo de seguimiento se pondrá en bucle cerrado, en el panel frontal se visualizarán el número de canción que esté reproduciéndose y el tiempo transcurrido, y se producirá la salida de la señal de reproducción. Si el tiempo transcurrido no se visualiza o no se cuenta correctamente, o si el sonido no se reproduce correctamente, es posible que el rayo láserico esté incidiendo en la sección sin sonido grabado en el borde exterior del disco, o que exista algún otro problema. Esta tecla es de acción alternativa. Si la presiona cuando el servo de seguimiento esté cerrado, lo abrirá, y si la presiona cuando esté abierto, lo cerrará. Esta tecla no funcionará cuando no haya disco montado.
◀◀	MANUAL SEARCH REV	Retroceso del carro (hacia adentro)	Moverá la posición del captor hacia el diámetro interior del disco. Si presiona esta tecla con el servo de seguimiento en bucle cerrado, dicho bucle pasará automáticamente a bucle abierto. Como el captor no se para automáticamente en el punto final mecánico en el modo de prueba, tenga cuidado cuando realice esta operación.
▶▶	MANUAL SEARCH FWD	Avance del carro (hacia afuera)	Moverá la posición del captor hacia la periferia del disco. Si presiona esta tecla con el servo de seguimiento en bucle cerrado, dicho bucle pasará automáticamente a bucle abierto. Como el captor no se para automáticamente en el punto final mecánico en el modo de prueba, tenga cuidado cuando realice esta operación.
□	STOP	Parada	Desactivará todos los servos e inicializará la unidad. Para un tipo de reproducción múltiple de disco compacto, el disco 1 se almacenará en el cargador, y después el reproductor se parará. El captor permanecerá donde estaba cuando se presionó esta tecla.
⏏	OPEN/CLOSE DISC 1	Apertura/cierre de la bandeja del disco	Abrirá/cerrará la bandeja del disco. Esta tecla es de acción alternativa. Si la presiona cuando la bandeja esté cerrada, la abrirá, y si la presiona cuando esté abierta, la cerrará. Si presiona esta tecla cuando el disco esté girando, lo parará, y abrirá la bandeja. Esta operación de la tecla no afectará la posición del captor.
..... Para un tipo de reproducción múltiple de disco compacto			
	EJECT	Expulsión del cargador de discos compactos	Almacenará el disco 1 en el cargador de discos compactos, y después expulsará dicho cargador. Sin embargo, aunque el cargador de discos compactos sea expulsado, el captor no volverá a su posición de reposo. Aunque vuelva a montar el cargador de discos compactos, el captor permanecerá donde estaba.

[Cómo reproducir un disco en el modo de prueba]

En el modo de prueba, como los servos funcionan independientemente, la reproducción de un disco requiere el que usted emplee las teclas en el orden correcto para cerrar los servos por orden.

A continuación se indica la secuencia de operación de teclas para reproducir un disco en el modo de prueba.

TRACK FWD 

Hará que se encienda el diodo láser y cerrará el servo de enfoque.



PLAY 

Pondrá en marcha el motor del eje y hará que se cierre el servo del eje.



PAUSE 

Cerrará el servo de seguimiento.

Espere de 2 a 3 segundos por lo menos entre cada una de estas operaciones.

1. Ajuste del descentramiento del enfoque

• Objetivo • Síntomas en caso de desajuste	Ajuste de la tensión de CC para el amplificador de error de enfoque a 0V. El reproductor no enfoca y la señal de RF contiene perturbaciones.		
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 6, (FCS ERR). [Ajustes] 5 mV/división 10 ms/división modo de CC	• Estado del reproductor • Lugar de ajuste • Disco	Modo de prueba, parado (con el interruptor de alimentación en ON) VR103 (FCS OFS) No es necesario

[Procedimiento]

Ajuste VR103 (FCS OFS) de forma que la tensión de CC de TP1, patilla 6, (FCS ERR) sea de 0 ± 50 mV.

2. Ajuste de retícula

• Objetivo	Alineación de los puntos del haz láserico de generación de error de seguimiento al ángulo óptimo en la pista		
• Síntomas en caso de desajuste	La reproducción no se inicia, la búsqueda de canciones es imposible, las pistas se saltan.		
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 2, (TRK ERR) a través de un filtro de paso bajo. (Consulte la figura 2)	• Estado del reproductor	Modo de prueba, servos de enfoque y del eje cerrados, y servo de seguimiento abierto
	[Ajustes] 50 mV/división 5 ms/división modo de CC	• Lugar de ajuste • Disco	Ranura de ajuste de retícula del captor Disco de 12 cm. Para un tipo de doble bandeja de disco compacto, podrá emplearse también un disco de 8 cm. (El disco YEDS-7 no podrá emplearse.) Para un tipo de reproducción múltiple de disco compacto, emplee el disco de prueba YEDS-7.

[Procedimiento]

- Para ajustar un tipo de doble bandeja de disco compacto empleando un disco de 12 cm, extraiga siempre la bandeja del disco 1. (*)
1. Mueva el captor hasta el borde exterior del disco con la tecla **MANUAL SEARCH FWD** $\gg$ o $\ll$ de forma que la ranura de ajuste de la retícula quede en el borde exterior del disco, donde puede ajustarse.
Nota : Para un reproductor de reproducción múltiple de disco compacto, emplee la tecla **MANUAL SEARCH FWD** $\gg$ o $\ll$ a fin de mover el captor hasta la mitad del disco ($R = 35 \text{ mm}$).
 2. Presione la tecla **TRACK FWD** $\gg$, y después la tecla **PLAY** $\triangleright$, por este orden, a fin de cerrar el servo de enfoque y después el servo del eje.
 3. Inserte un destornillador normal en la ranura de ajuste de la retícula y ajuste la retícula hasta encontrar el punto nulo. Para más detalles, consulte la página siguiente.
 4. Si gira lentamente el destornillador hacia la izquierda (hacia la derecha para un tipo de reproducción múltiple de disco compacto) desde el punto nulo, la amplitud de la onda aumentará gradualmente. Después, si continúa girando el destornillador, la amplitud de la onda se volverá otra vez más pequeña. Gire el destornillador hacia la izquierda (hacia la derecha para un tipo de reproducción múltiple de disco compacto) desde el punto nulo y ajuste la retícula al primer punto en el que la amplitud de la onda alcance su valor máximo.
Referencia : En la figura 3 se muestra la relación entre el ángulo del haz de seguimiento con la pista y la forma de onda.
Nota : La amplitud de la señal de error de seguimiento será de aproximadamente 3 Vp-p (cuando se emplee un filtro de paso bajo de $38 \text{ k}\Omega$, $0,001 \mu\text{F}$). Si esta amplitud es extremadamente pequeña (2 Vp-p), es posible que el objetivo esté sucio o que el captor esté funcionando mal. Si la diferencia entre la amplitud de la señal de error en el borde interior y exterior del disco es superior al 10%, la retícula no estará ajustada al punto óptimo, por lo que tendrá que volver a ajustarla.
 5. Devuelva el captor hasta la mitad más o menos del disco con la tecla **MANUAL SEARCH REV** $\ll$, presione la tecla **PAUSE** $\square\square$, y vuelva a comprobar si en el panel frontal se visualizan el número de canción y el tiempo transcurrido. Si no se visualizan esta vez, o si el tiempo transcurrido cambia irregularmente, vuelva a comprobar el punto nulo y ajuste otra vez la retícula.

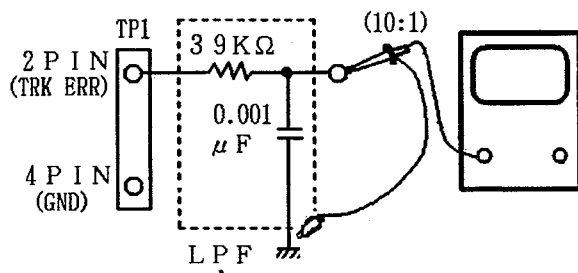
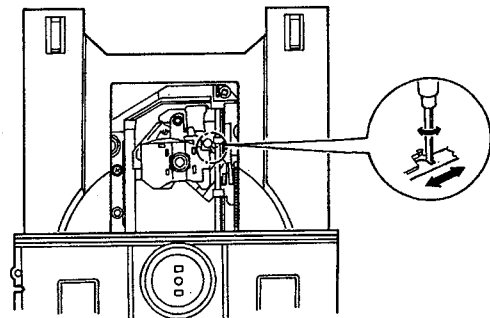
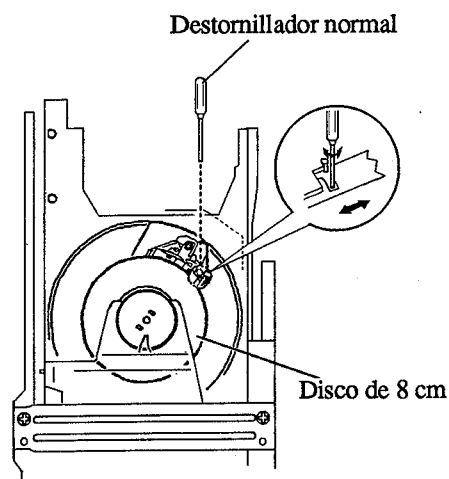


Figura 2

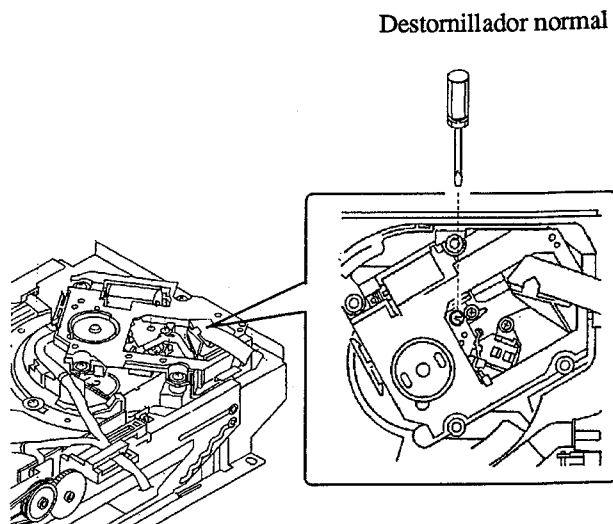


Lugares de ajuste para un tipo de disco compacto sencillo

*: Consulte la página 54



Lugares de ajuste para un tipo de doble bandeja de disco compacto



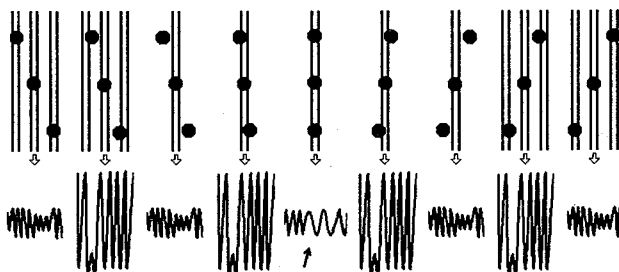
Lugares de ajuste para un tipo de reproducción múltiple de disco compacto

[Cómo encontrar el punto nulo]

Cuando inserte el destornillador normal en la ranura para el ajuste de la retícula y cambie el ángulo de la misma. La amplitud de la señal de error de seguimiento de TP1, patilla 2, cambiará. Dentro del margen para la retícula existen cinco o seis lugares en los que la amplitud alcanza el valor mínimo. De estos cinco o seis lugares, solamente hay uno en el que la envolvente de la forma de onda es uniforme. Este lugar es donde los tres haces lásericos divididos por la retícula se encuentran exactamente sobre la misma pista. (Consulte la figura 3.)

Este punto se denomina punto nulo. Cuando ajuste la retícula, este punto se encontrará y empleará como posición de referencia.

Giro de la retícula hacia la izquierda (*1) Giro de la retícula hacia la derecha (*1)



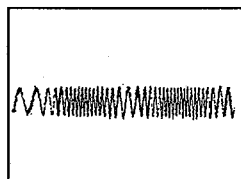
(*1) Para el tipo de reproducción múltiple de disco compacto, el sentido es el contrario.

Forma de onda de TP1, patilla 2

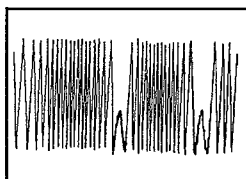
Posición de ajuste de la retícula

Punto nulo

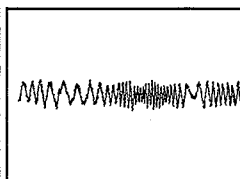
Figura 3



Forma de onda del punto nulo



Forma de onda de amplitud máxima



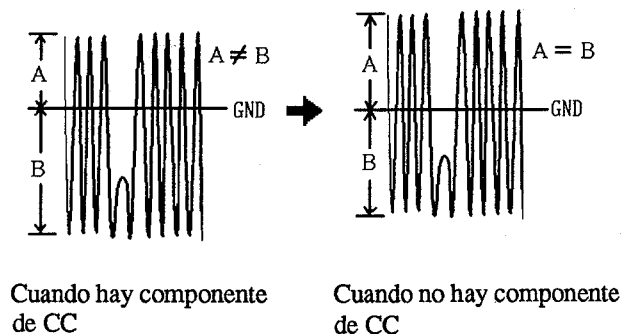
Forma de onda que no es el punto nulo

3. Ajuste del equilibrio de error de seguimiento

• Objetivo	Corrección de la variación de la sensibilidad del fotodiodo de seguimiento		
• Síntomas en caso de desajuste	La reproducción no se inicia o la búsqueda de canciones es imposible.		
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 2, (TRK ERR). Esta conexión puede realizarse a través de un filtro de paso bajo. [Ajustes] 50 mV/división 5 ms/división modo de CC	• Estado del reproductor • Lugar de ajuste • Disco	Modo de prueba, servos de enfoque y del eje cerrados, y servo de seguimiento abierto VR102 (TRK BAL) YEDS-7

[Procedimiento]

1. Mueva el captor hasta la mitad del disco (R = 35 mm) con la tecla MANUAL SEARCH FWD $\gg$ o $\ll$.
2. Presione la tecla TRACK FWD $\gg$, y después la tecla PLAY $\triangleright$, por este orden, a fin de cerrar el servo de enfoque y después el servo del eje.
3. Haga coincidir la línea brillante (masa) del centro de la pantalla del osciloscopio y ponga éste en el modo de CC.
4. Ajuste VR102 (TRK BAL) de forma que la amplitud positiva y la negativa de la señal de error de seguimiento de TP1, patilla 2, (TRK ERR) sean iguales (en otras palabras, de forma que no haya componente de CC).



4. Ajuste de la inclinación en sentido radial/tangencial del captor

• Objetivo	Ajustar el ángulo del captor en relación con el disco de forma que los haces lásericos incidan perpendicularmente sobre el mismo a fin de poder leer con la mayor exactitud las señales de RF.		
• Síntomas en caso de desajuste	Sonido quebrado, algunos discos pueden reproducirse pero otros no.		
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 1, (RF). [Ajustes] 20 mV/división 200 ns/división modo de CA	• Estado del reproductor • Lugar de ajuste • Disco	Modo de prueba, reproducción Tornillo de ajuste de la inclinación radial y tornillo de ajuste de la inclinación tangencial Disco de 12 cm. Para un tipo de doble bandeja de disco compacto, podrá emplearse también un disco de 8 cm. (El disco YEDS-7 no podrá emplearse.) Para un tipo de reproducción múltiple de disco compacto, emplee el disco de prueba YEDS-7.

[Procedimiento]

- Para ajustar un tipo de doble bandeja de disco compacto empleando un disco de 12 cm, extraiga siempre la bandeja del disco. (*)
1. Mueva el captor hasta el borde exterior del disco con la tecla MANUAL SEARCH FWD $\gg$ o $\ll$ de forma que puedan ajustarse los tornillos de inclinación radial/tangencial.
 Nota : Para un tipo de reproducción múltiple de disco compacto, emplee la tecla MANUAL SEARCH FWD $\gg$ o $\ll$ a fin de mover el captor hasta la mitad del disco ($R = 35$ mm).
 Presione la tecla TRACK FWD $\gg$, la tecla PLAY $\triangleright$, y después la tecla PAUSE $\square\square$, por este orden, a fin de cerrar el servo de enfoque, después el servo del eje, y por último para poner el reproductor en el modo de reproducción.
 2. En primer lugar, gire el tornillo de ajuste de inclinación radial con una llave hexagonal M 3 mm hasta que el patrón ocular (la forma de diamante del centro de la señal de RF) pueda verse con la mayor claridad. Para un tipo de reproducción múltiple de disco compacto, emplee un destornillador Phillips.
 3. A continuación, ajuste el tornillo de ajuste de inclinación tangencial con una llave hexagonal M 3 mm hasta que el patrón ocular (la forma de diamante del centro de la señal de RF) pueda verse con la mayor claridad (figura 5). Para un tipo de reproducción múltiple de disco compacto, emplee un destornillador Phillips.
 4. Vuelva a girar el tornillo de ajuste de inclinación radial y el tornillo de inclinación tangencial hasta que el patrón ocular pueda verse con la mayor claridad. Si es necesario, ajuste alternativamente los dos tornillos hasta que el patrón ocular pueda verse con la mayor claridad.
 Nota : Radial y tangencial significan las direcciones en relación con el disco mostrado en la figura 4.

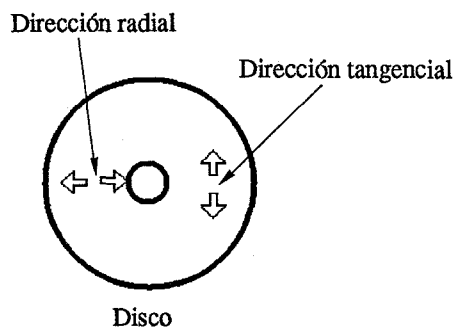
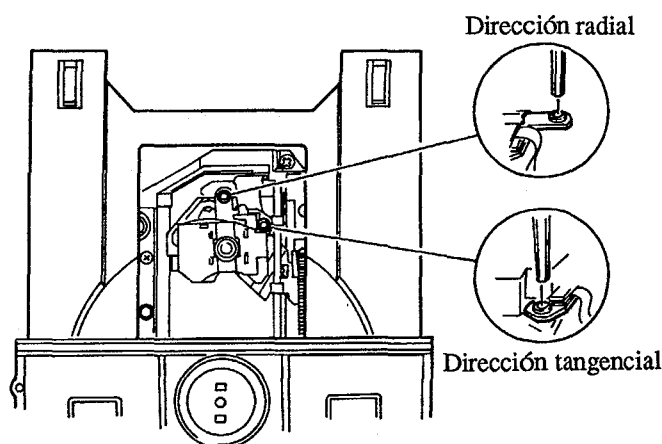
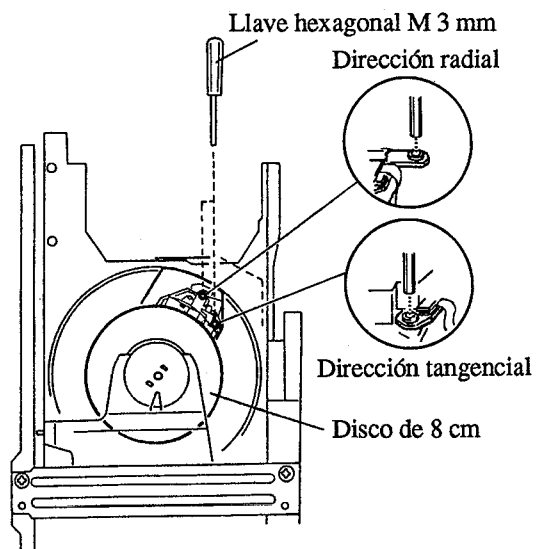


Figura 4

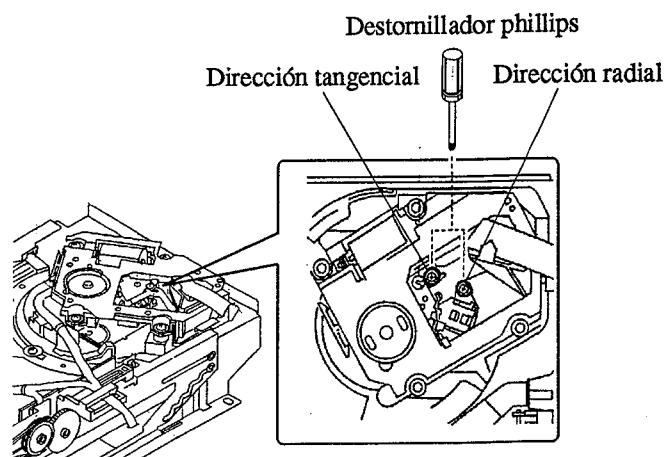


Lugares de ajuste del tipo de disco compacto sencillo

*: Consulte la página 54



Lugares de ajuste para el tipo de doble bandeja de disco compacto



Lugares de ajuste para el tipo de reproducción múltiple de disco compacto

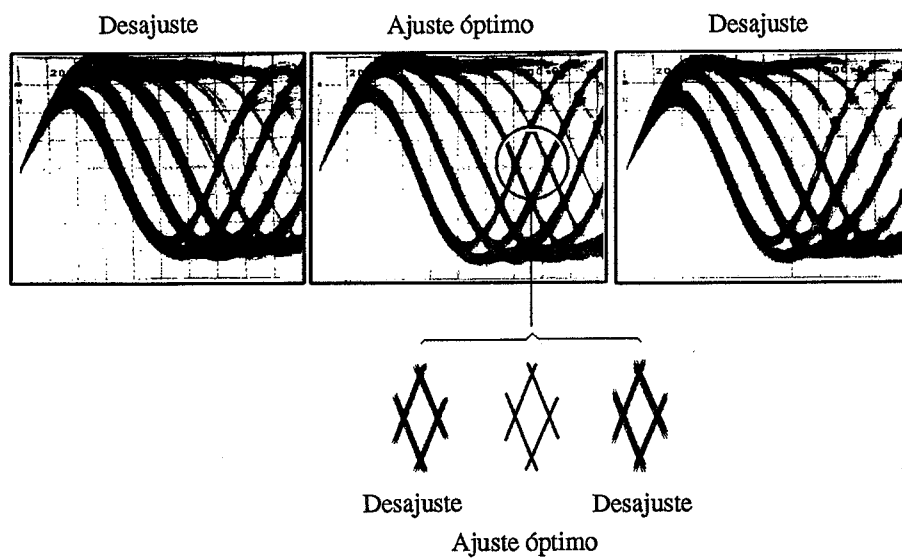


Figura 5 Patron optico

5. Ajuste del nivel de RF

• Objetivo	Optimización de la amplitud de la señal de RF de reproducción		
• Síntomas en caso de desajuste	La reproducción no se inicia o la búsqueda de canciones es imposible.		
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 1, (RF).	• Estado del reproductor	Modo de prueba, reproducción
	[Ajustes] 50 mV/división 10ms/división modo de CA	• Lugar de ajuste • Disco	VR1 (potencia de láser) YEDS-7
[Procedimiento] 1. Mueva el captor hasta la mitad del disco ($R = 35 \text{ mm}$) con la tecla MANUAL SEARCH FWD $\gg$ o $\ll$, presione la tecla TRACK FWD $\gg$, después la tecla PLAY $\triangleright$, por este orden a fin de cerrar los servos respectivos, y ponga el reproductor en el mode de reproducción. 2. Ajuste VR1 (potencia de láser) de forma que la amplitud de la señal de RF sea de $1,2 \text{ Vp-p} \pm 0,1 \text{ V}$.			

6. Ajuste de la ganancia del bucle del servo de enfoque

• Objetivo	Optimización de la ganancia del bucle del servo de enfoque		
• Síntomas en caso de desajuste	La reproducción no se inicia o el actuador de enfoque produce ruido.		
• Conexión de los instrumentos de medición	Consulte la figura 6.	• Estado del reproductor	Modo de prueba, reproducción
	[Ajustes] CH1 CH2 20 mV/división 5 mV/división Modo X - Y	• Lugar de ajuste • Disco	VR152 (FCS GAN) YEDS-7

[Procedimiento]

1. Ajuste la salida del generador de AF a 1,2 kHz y 1 Vp-p.
2. Presione la tecla MANUAL SEARCH FWD $\gg$ o $\ll$ para mover el captor hasta la mitad del disco (R = 35 mm), y después presione la tecla TRACK FWD $\gg$, la tecla PLAY $\triangleright$, y después la tecla PAUSE $\square\square$, por este orden, a fin de cerrar los servos correspondientes y poner el reproductor en el modo de reproducción.
3. Ajuste VR152 (FCS GAN) hasta que la forma de onda de Lissajous sea simétrica alrededor del eje X y el eje Y.

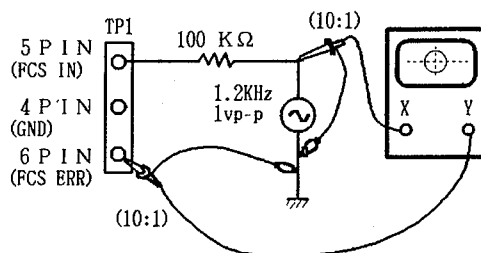
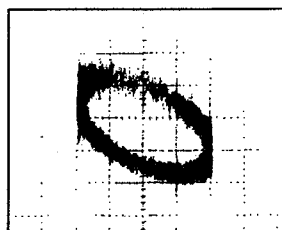
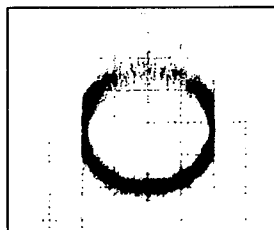


Figura 6

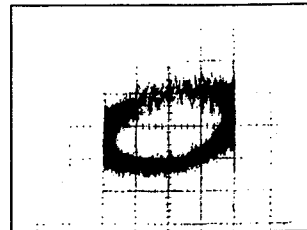
Ajuste de la ganancia de enfoque



Ganancia grande



Ganancia óptima



Ganancia mínima

7. Ajuste de la ganancia del bucle del servo de seguimiento

• Objetivo	Optimización de la ganancia del bucle del servo de seguimiento		
• Síntomas en caso de desajuste	La reproducción no se inicia, el actuador de enfoque produce ruido, o se saltan pistas.		
• Conexión de los instrumentos de medición	Consulte la figura 7.	• Estado del reproductor	Modo normal, reproducción
	[Ajustes] CH1 CH2 50 mV/división 5 mV/división Modo X - Y	• Lugar de ajuste	VR151 (TRK GAN)
		• Disco	YEDS-7

- [Procedimiento]
1. Ajuste la salida del generador de AF a 1,2 kHz y 1 Vp-p.
 2. Presione la tecla MANUAL SEARCH FWD $\gg$ o $\ll$ para mover el captor hasta la mitad del disco (R = 35 mm), y después presione la tecla TRACK FWD $\gg$, la tecla PLAY $\triangleright$, y la tecla PAUSE $\square\square$, por este orden, a fin de cerrar los servos respectivos y poner el reproductor en el modo de reproducción.
 3. Ajuste VR151 (TRK GAN) hasta que la forma de onda de Lissajous sea simétrica alrededor del eje X y el eje Y.

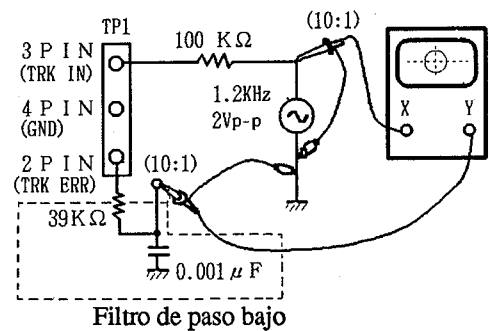
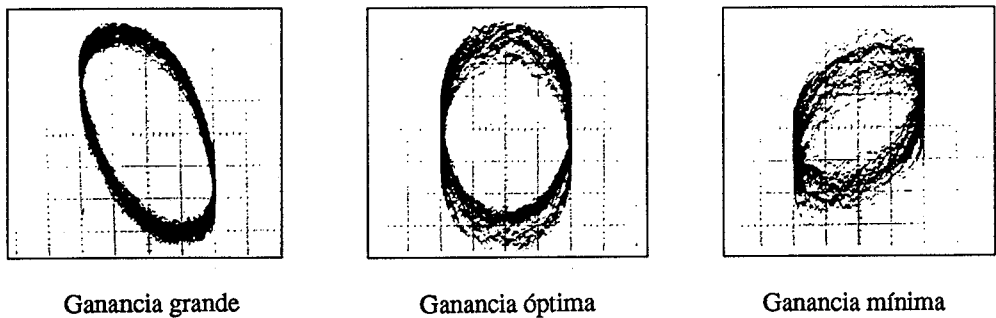


Figura 7

Ajuste de la ganancia de seguimiento



8. Verificación de la señal de error de enfoque (curva S de enfoque)

• Objetivo	Juzgar si el captor está bien o no observando la señal de error de enfoque. El captor se juzga por la amplitud de la señal de error de seguimiento (como se ha indicado en la sección sobre el ajuste del equilibrio de error de seguimiento) y la forma de onda de la señal de error de enfoque.		
• Síntomas en caso de desajuste			
• Conexión de los instrumentos de medición	Conecte el osciloscopio a TP1, patilla 6, (FCS ERR).	• Estado del reproductor	Modo de prueba, parada
	[Ajustes] 100 mV/división 5 ms/división modo de CC	• Lugar de ajuste	Ninguno
		• Disco	YEDS-7

[Procedimiento]

1. Conecte TP1, patilla 5, a masa.
2. Coloque el disco.
3. Contemplando la pantalla del osciloscopio, presione la tecla **TRACK FWD** y observe durante un momento la forma de onda de la figura 8. Verifique si la amplitud es de 2,5 Vp-p por lo menos y si la amplitud de las partes positiva y negativa son iguales. Como la forma de onda solamente sale durante un momento cuando se presiona la tecla **TRACK FWD**, presione una y otra vez esta tecla hasta que logre comprobar la forma de onda.

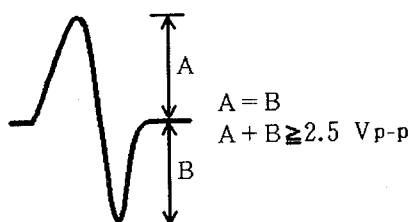


Figura 8

[Juicio sobre el captor]

No juzgue el captor hasta haber finalizado correctamente todos los ajustes. En los casos siguientes es posible que haya algo erróneo en el captor.

1. La amplitud de la señal de error de seguimiento es extremadamente pequeña (menos de 2 Vp-p).
2. La amplitud de la señal de error de enfoque es extremadamente pequeña (menos de 2,5 Vp-p).
3. Las amplitudes de las partes positiva y negativa de la señal de error de enfoque son extremadamente asimétricas (relación de 2:1 o superior).
4. La señal de RF es demasiado pequeña (menos de 0,8 Vp-p) y aunque se ajuste VR1 (potencia de láser), la señal de RF no puede aumentarse hasta el nivel estándar.

[Cómo extraer la bandeja 1 para un tipo de reproductor de doble bandeja de disco compacto]

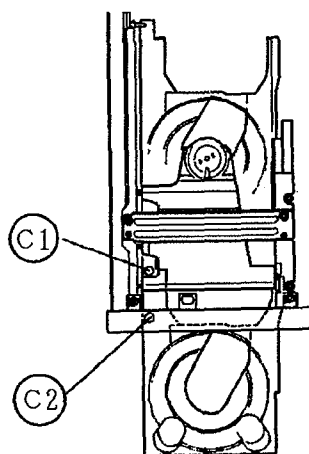


Figura 9

1. Ponga la bandeja 1 en posición de abierta.
2. Quite los tornillos C1 y C2 que sujetan la bandeja 1. (Consulte la figura 9.)
3. Mueva la bandeja 1 en el sentido de la flecha de la figura 10 y, extrayendo la sección saliente B de la bandeja 1, extraiga la sección A donde se enganchan la bandeja 1 y la unidad en U de ángulo de deslizamiento.
4. Levante ligeramente el lado de la unidad en U de ángulo de deslizamiento y extráigala.

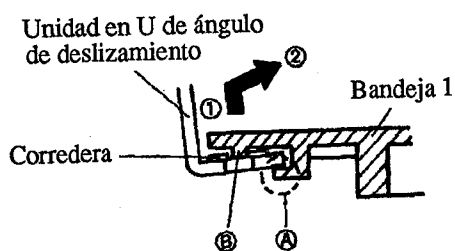


Figura 10

[Cómo instalar la bandeja 1 para un tipo de reproductor de doble bandeja de disco compacto]

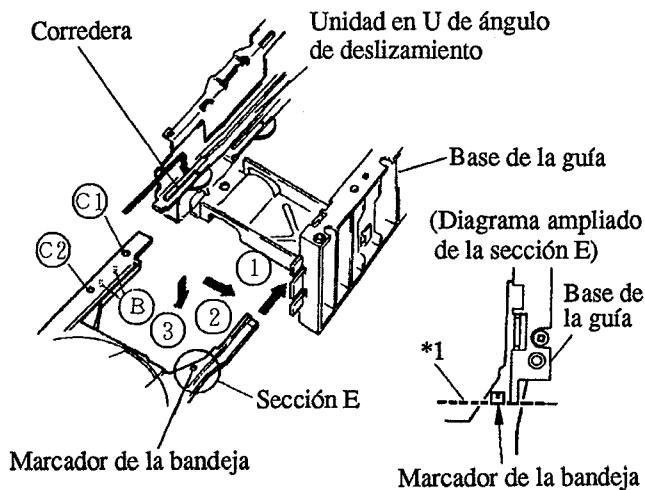


Figura 11

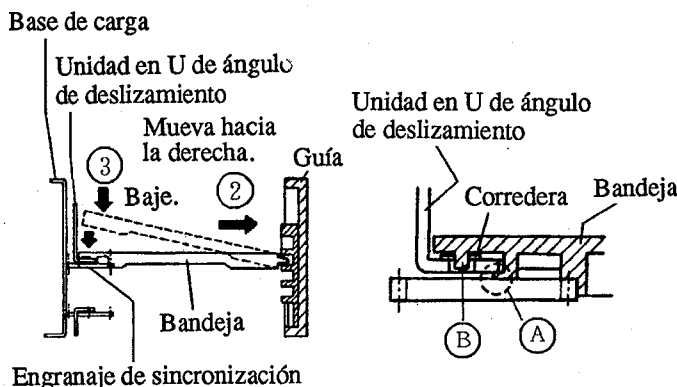


Figura 12

Figura 13

Para instalar la bandeja 1, extraiga en primer lugar el panel frontal a fin de facilitar el trabajo.

1. Coloque la unidad en U de ángulo de deslizamiento al comienzo de la parte frontal (la posición en la que la bandeja 1 se encuentra completamente abierta).
2. Coloque la corredera al comienzo de la parte frontal como se muestra en la figura 11.
3. Con la bandeja 1 ligeramente inclinada, como se indica mediante las líneas discontinuas de la figura 12, insértela hasta que la corredera y los orificios roscados de la bandeja 1 queden alineados, teniendo cuidado de que la corredera no se mueva hacia la parte posterior.
4. Moviéndola hacia la derecha (el lado de la guía), bájela. Sujete la corredera desde la parte inferior con la mano.
5. Colocando la sección A de enganche de la bandeja 1 de forma que encaje en la unidad en U de ángulo de deslizamiento, como se muestra en la figura 13, inserte la sección saliente B de la bandeja 1 en el orificio de la corredera. Al mismo tiempo, acople el engranaje de sincronización y la sección del engranaje de la bandeja 1.
6. Después de volver a comprobar si el orificio roscado de la corredera está colocado en el centro del orificio roscado de la bandeja 1, como se muestra en la figura 14, apriete con los tornillos C1 y C2, por este orden.
7. Después de haber instalado la bandeja 1, vuelva a comprobar si ésta se encuentra completamente abierta, y si las relaciones de ubicación son como se muestra en el diagrama ampliado de la sección E. Si no lo son, repita el procedimiento de instalación de la bandeja 1 desde el principio.

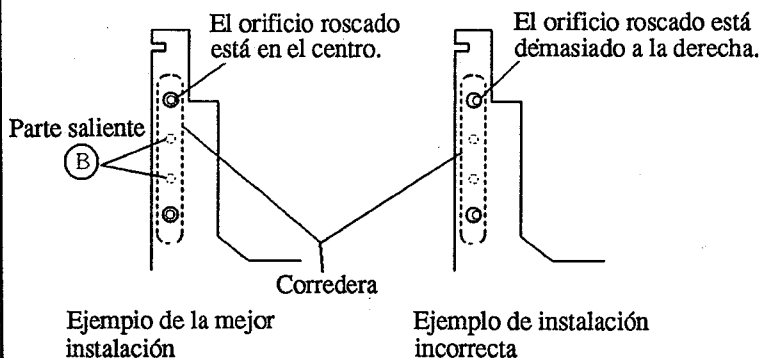


Figura 14

La sección saliente B de la bandeja 1 no está en el orificio de la corredera.

*1 : La punta de la base de la guía y el marcador de la bandeja están alineados. Cuando la bandeja 1 esté mal instalada, se encontrarán 2 mm separados.