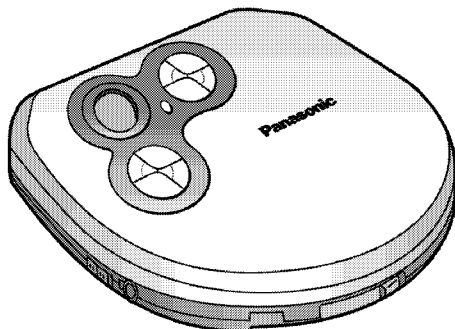


Service Manual

Portable CD Player



SL-SX228

SL-SX230

Traverse Deck: RAE0145Z Mechanism Series

Colours

(S).....Silver Type

(A).....Blue Type [Only (EG) area]

Areas

E.....Europe and Russia. [For SL-SX228]

EG.....Europe and Russia. [For SL-SX230]

Specifications

IAudio

No. of channels: 2 channels (left and right, stereo)
Frequency response: 20 ~ 20,000 Hz (+0dB ~ -7dB)
DA converter: 1 bit, MASH
Headphones output level: RMS Max. 8mW+8mW/ 16Ω (adjustable)

4.0W (When recharging)

IPickup

Light source: Semiconductor laser
Wavelength: 780 nm

IGeneral

Operational temperature range: 0°C-40°C
Rechargeable temperature range: 5°C-40°C
Power supply DC 4.5V

IPlay time

[When used in hold mode with EQ canceled, at 25°C (77°F) temperature and on flat and stable surface]

Batteries used

2 "AA" (LR6) alkaline batteries 24h

Rechargeable batteries 10h

Recharging time: 5h (Only SL-SX230) batteries

The play time may be less depending on the operating conditions.

Dimensions (WxHxD) 128x25.9x131.5mm

Mass: 235g (with batteries)

187g (without batteries)

IPower consumption (Only SL-SX230)

3.2W (When using AC adaptor)

Note:

Specifications are subject to change without notice.

Weight and dimensions are approximate.

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic®

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1 Precaution of Laser Diode

CAUTION:

This product utilizes a laser diode with the unit turned "on", invisible laser radiation is emitted from the pickup lens.

Wave length: 780nm

Maximum output radiation power from pickup: 100 μ W/VDE

Laser radiation from the pickup lens is safety level, but be sure the followings:

1. Do not disassemble the optical pickup unit, since radiation from exposed laser diode is dangerous.
2. Do not adjust the variable resistor on the pickup unit. It was already adjusted.
3. Do not look at the focus lens using optical instruments.
4. Recommend not to look at pickup lens for a long time.

ACHTUNG:

Dieses Produkt enthält eine Laserdiode. Im eingeschalteten Zustand Wird unsichtbare Laserstrahlung von der Lasereinheit abgestrahlt.

Wellenlänge: 780nm

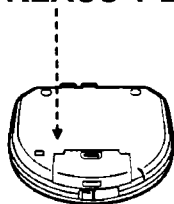
Maximale Strahlungsleistung der Lasereinheit: 100 μ W/VDE

Die Strahlung aus der Lasereinheit ist ungefährlich, wenn folgende Punkte beachtet werden:

1. Die Lasereinheit nicht zerlegen, da die Strahlung an der freigelegten Laserdiode gefährlich ist.
2. Denwerkseitig Justierten Einstellregler der Lasereinheit nicht verstellen.
3. Nicht mit optischen Instrumenten in die Fokussierlines blicken.
4. Nicht über längere Zeit in die Fokussierlines blicken.



LUOKAN 1 LASERLAITE
KLASS 1 LASER APPARAT



DANGER	INVISIBLE LASER RADIATION WHEN OPEN. AVOID DIRECT EXPOSURE TO BEAM.
ADVARSEL	USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION. UNDGÅ UDSÆTTELSE FOR STRÅLING.
VARO!	AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTHIN NÄKYMÄTÖNÄ LASERSÄTELYLLE. ÄLÄ KATSO SÄTEESEEN.
VARNING	OSYNLIG LASERSTRÅLING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRÄKTA EJ STRÅLEN.
ADVARSEL	USYNLIG LASERSTRÅLING NÄR DEKSEL ÅPNES OG SIKKERHEDSLÅS BRYTES. UNNGÅ EKSPONERING FOR STRÅLEN.
VORSICHT	UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET. NICHT DEM STRAHL AUSSETZEN.

2 Accessories

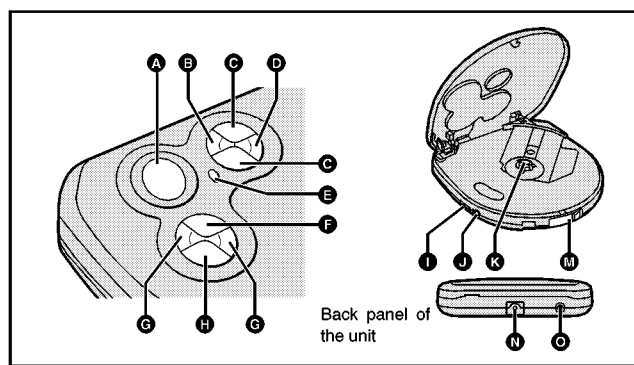
For SL-SX228

- Stereo earphones.....1 pc.
(L0BAB0000123)

For SL-SX230

- AC adaptor.....1 pc.
(RFEA419E-M)

3 Operating Instructions



- | | |
|--|-------------------------------------|
| A Display | I Hold switch (HOLD) |
| B Memory/recall button (MEMORY/RECALL) | J Headphone jack (○) |
| C Headphone volume control buttons (VOL +, -) | K CD release button (PUSH) |
| D EQ button (EQ) | L Open switch (OPEN ►) |
| E Mode button (MODE) | M Hole for car mounting base |
| F Play/pause button (►) | N DC IN jack |
| G Skip/search buttons (◀◀, ▶▶, ◀◀, ▶▶) | (DC IN 4.5 V ◊—C—◊) |
| H Stop/operation off button (■, OPR OFF) | |

4 Handling Precautions for Traverse Deck

The laser diode in the traverse deck (optical pickup) may break down due to potential difference caused by static electricity of clothes or human body.

So, be careful of electrostatic breakdown during repair of the traverse deck (optical pickup).

4.1. Handling the traverse deck (optical pickup)

1. The traverse deck (optical pickup) is an extremely high-precision construction and must not be subjected to impact, excessive vibration, or other types of rough handling.
2. In order to prevent static electricity damage to the laser diode, use a short pin or similar tool to short the optical pickup's flexible circuit boards after they have been disconnected from the main circuit board. (as shown in **Fig. 1**)
3. Handle the flexible circuit boards with care; excessive force could cause them to be broken.
4. Do not turn the pre-set variable resistor (for adjustment of the laser power); it has been adjusted at the factory. (as shown in **Fig. 2**)



Clip or short-pin

Fig. 1

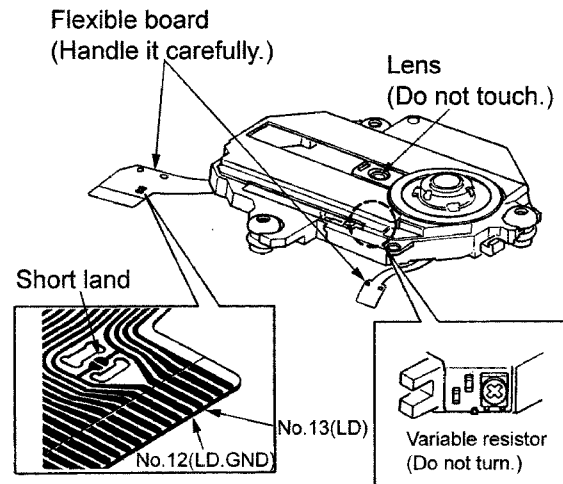


Fig. 2

4.2. Grounding for electrostatic breakdown prevention

1. Human body grounding

Use the anti-static wrist strap to discharge the static electricity from your body. (as shown in **Fig. 3**)

2. Work table grounding

Put a conductive material (sheet) or steel sheet on the area where the optical pickup is placed, and ground the sheet. (as shown in **Fig. 4**)

Caution

The static electricity of your clothes will not be grounded through the wrist strap.

So, take care not to let your clothes touch the traverse deck (optical pickup).

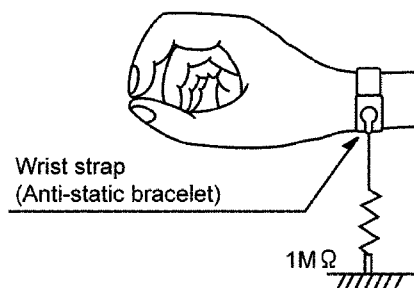


Fig. 3

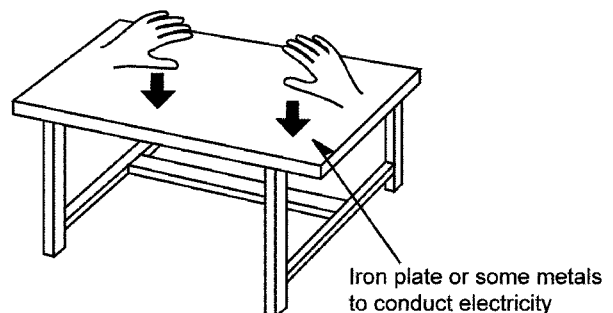


Fig. 4

5 Operation Checks and Component Replacement Procedures

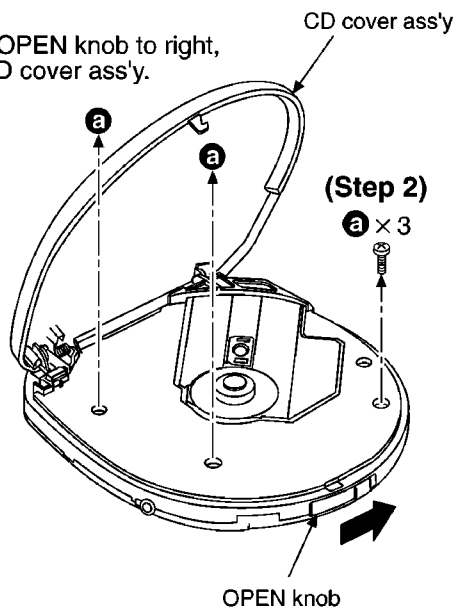
- This section describes procedures for checking the operation of the major printed circuit boards and replacing the main components.
- For reassembly after operation checks or replacement, reverse the respective procedures. Special reassembly procedures are described only when required.

5.1. Checking for the main P.C.B.

5.1.1. Checking for the main P.C.B. (A side)

(Step 1)

Sliding the OPEN knob to right, open the CD cover ass'y.

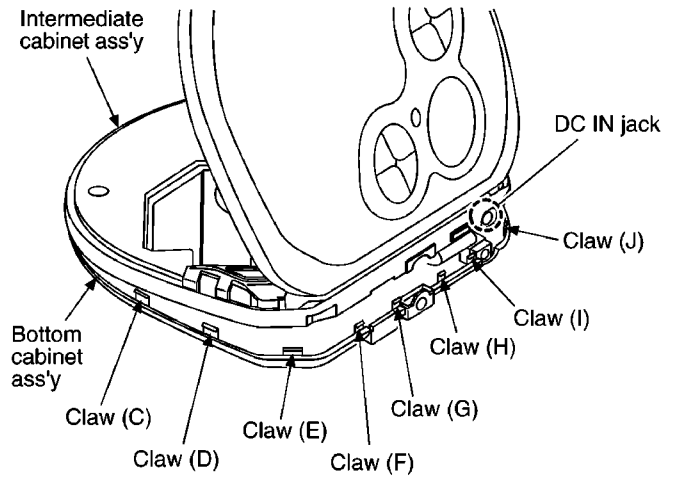
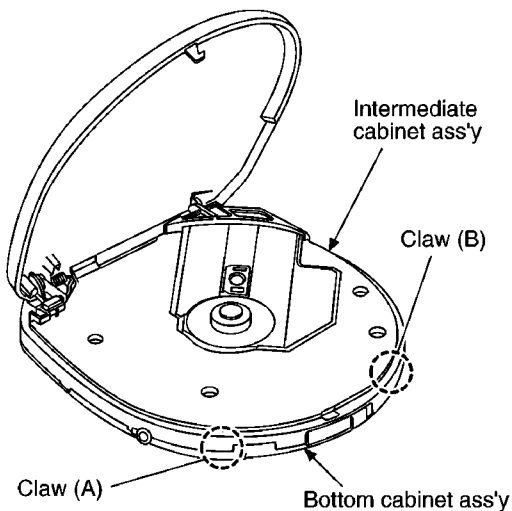


(Step 2)

$a \times 3$

(Step 3)

Spread the clearance between the bottom cabinet ass'y and intermediate cabinet ass'y manually.

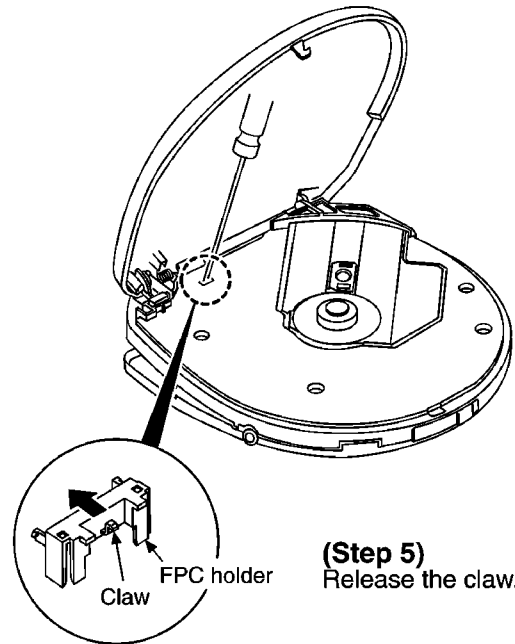


(Step 4)

Open the clearance between the bottom cabinet ass'y and intermediate cabinet ass'y, and then release the claw (C) to claw (J) in turn.

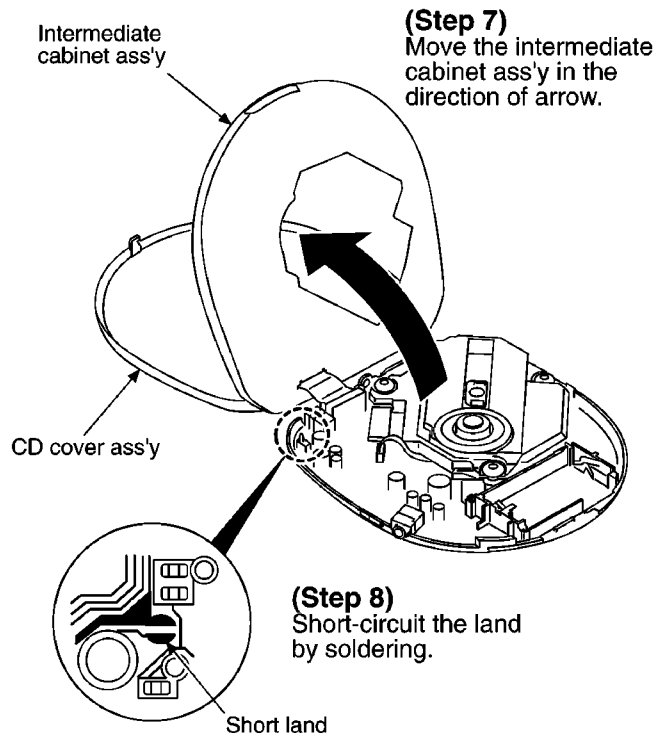
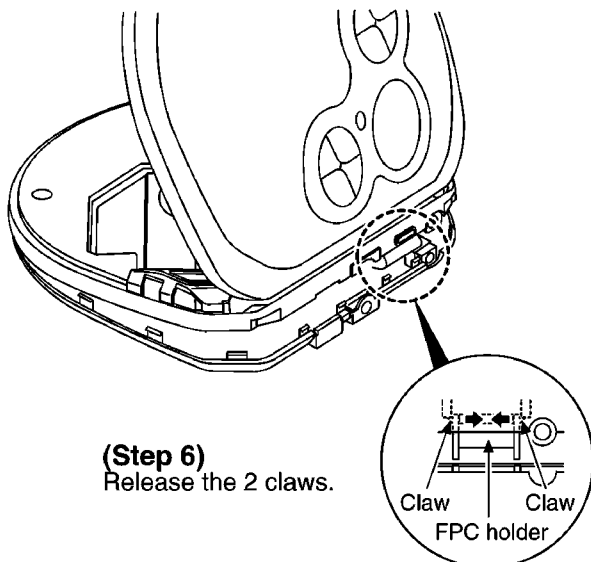
NOTE:

Take care not to break the DC IN Jack provided with intermediate cabinet.



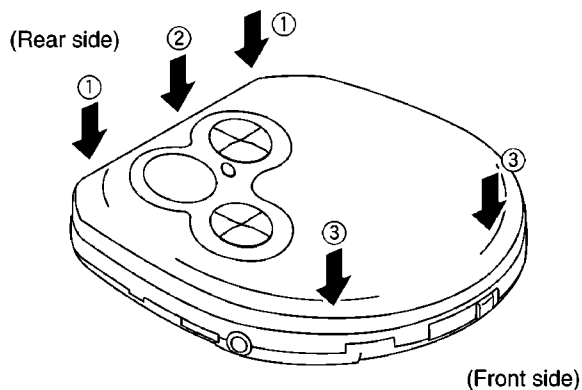
(Step 5)

Release the claw.

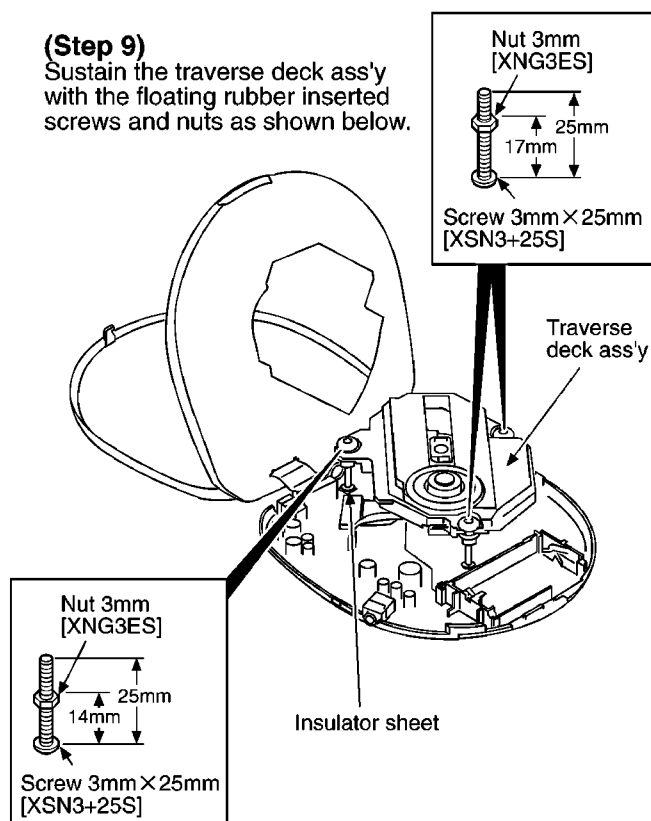


■ CD cover ass'y and intermediate reassembly procedure

- ① Fit together right side and left side of rear part.
(Either right or left side)
- ② Fit together the center of rear part.
- ③ Fit together the right and left of front part.
(Either right or left side)



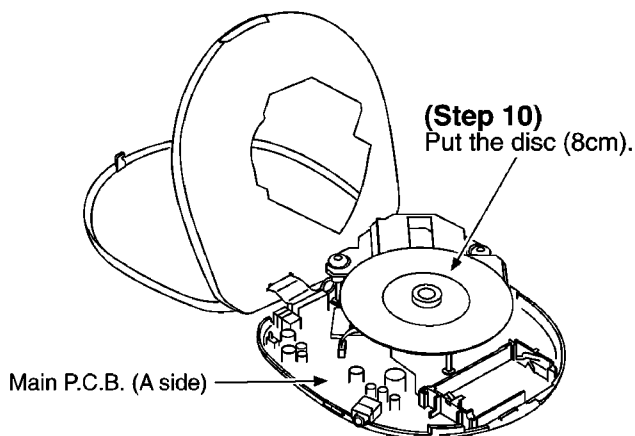
- (Step 9)**
Sustain the traverse deck ass'y with the floating rubber inserted screws and nuts as shown below.



NOTE:

- The tip of screw must not protrude above the floating rubber.
- To keep insulation, place the insulator sheet (paper etc.) between the P.C.B. and the head of screws.

- Check the main P.C.B. (A side) as shown below.

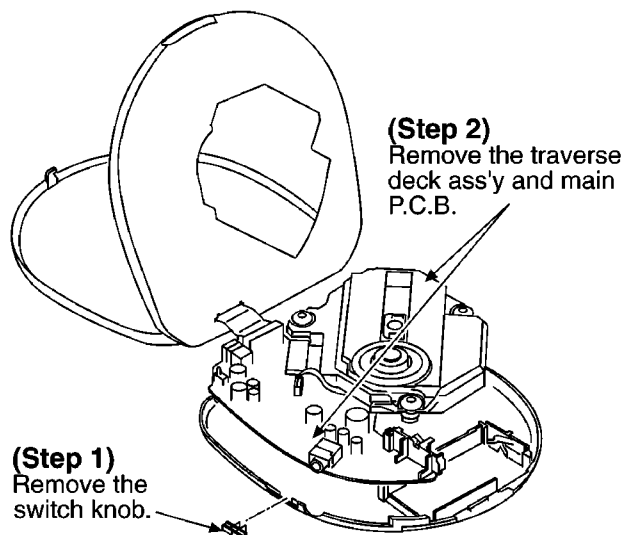


NOTE:

After checking, unsolder the short land to open circuit.

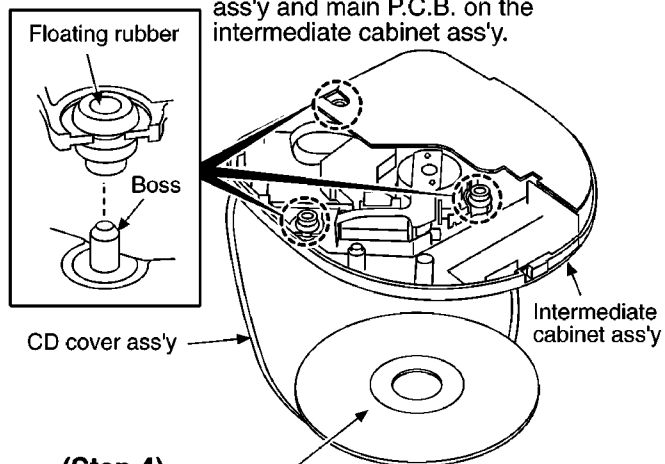
5.1.2. Checking for the main P.C.B. (B side)

- Follow the (Step 1) - (Step 8) of item 5.1.1.



(Step 3)

Align the floating rubbers with bosses, and then locate the traverse deck ass'y and main P.C.B. on the intermediate cabinet ass'y.



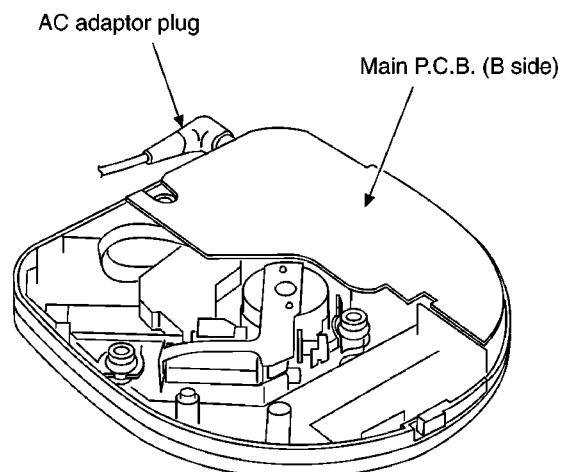
(Step 4)

Put the test disc, and then close the CD cover ass'y.

- Check the main P.C.B. (B side) as shown below.

(Step 5)

Insert the AC adaptor plug into the DC IN jack, and then apply the power.

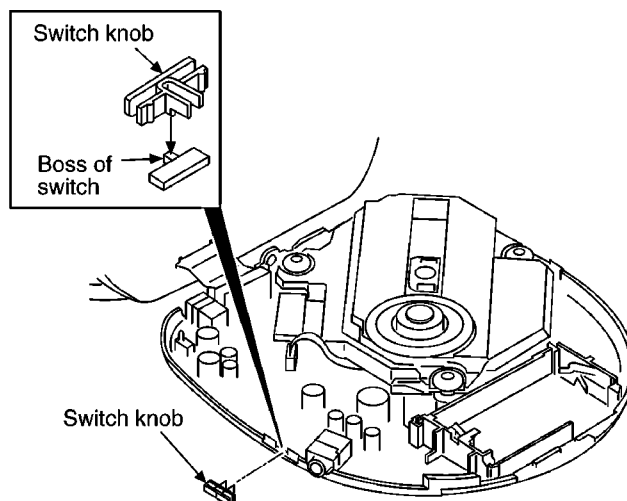


NOTE:

After checking, unsolder the short land to open circuit.

Notice for installation of switch knobs

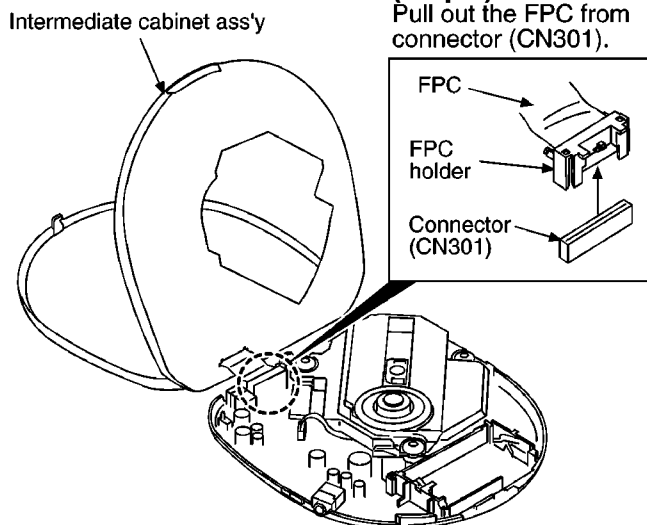
- Make sure the bosses of switch are fit in the switch knob.



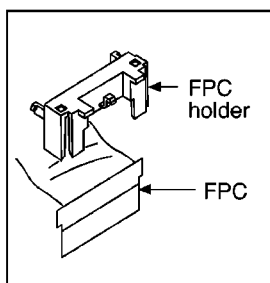
5.2. Replacement for the CD cover ass'y and LCD

• Follow the (Step 1) - (Step 7) of item 5.1.1.

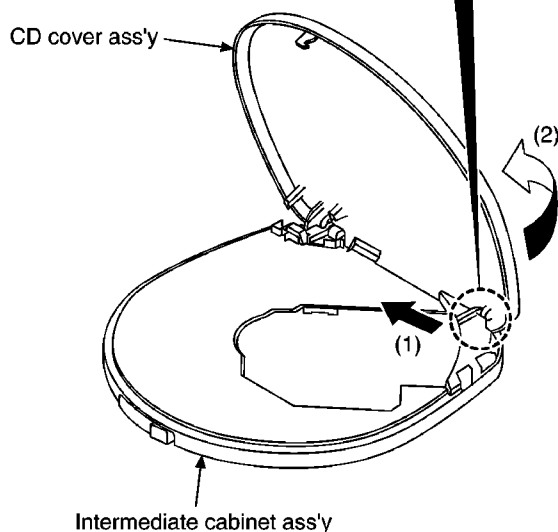
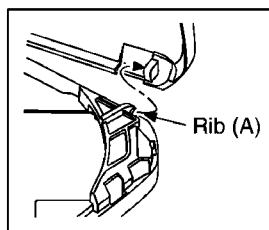
(Step 1)
Pull out the FPC from connector (CN301).



(Step 2)
Remove the FPC holder from FPC.

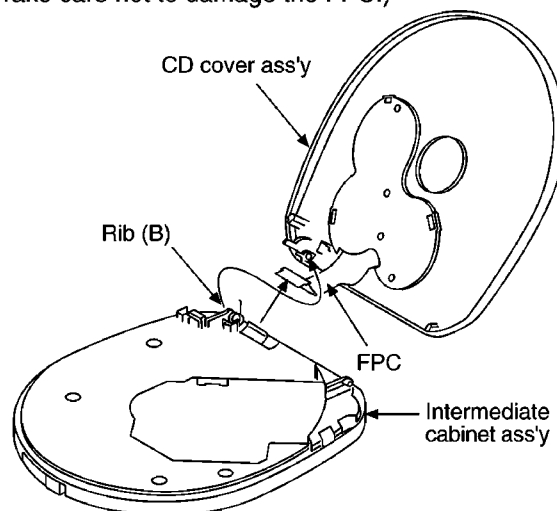


(Step 3)
Bend the intermediate cabinet ass'y in the direction of arrow (1), and then release the CD cover ass'y from the rib (A).

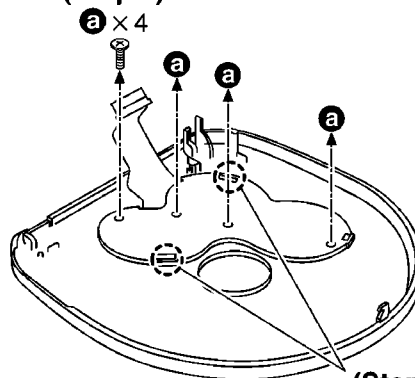


(Step 4)
Remove the CD cover ass'y from the rib (B).

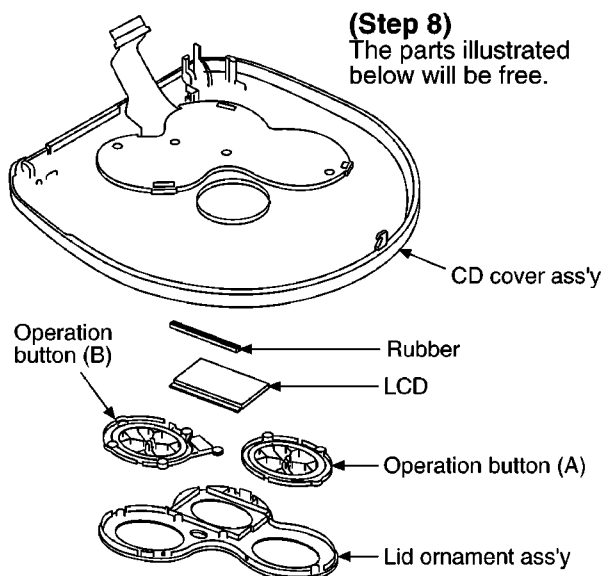
(Step 5)
Draw the FPC from the intermediate cabinet ass'y. (Take care not to damage the FPC.)



(Step 6)



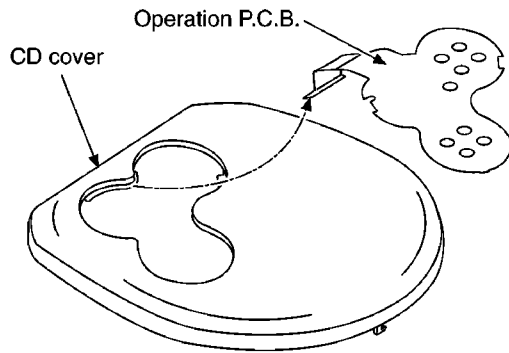
(Step 7)
Release the 2 claws.



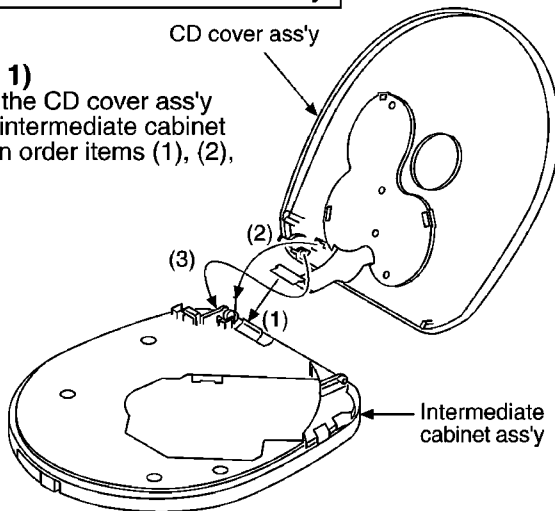
NOTE:
Be careful not to be applied the dust or smudge on the surface rubber.

(Step 9)

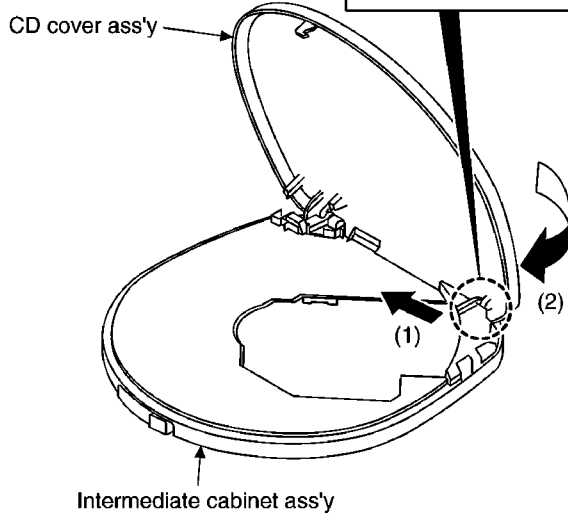
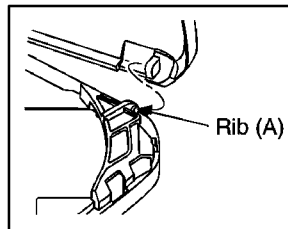
Remove the operation P.C.B. from CD cover.

**Installation of CD cover ass'y****(Step 1)**

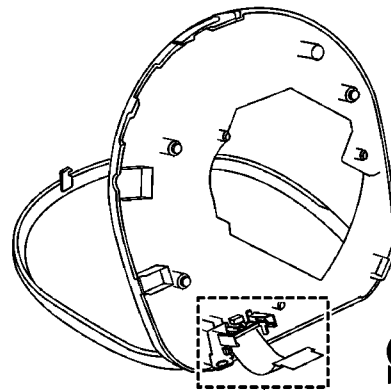
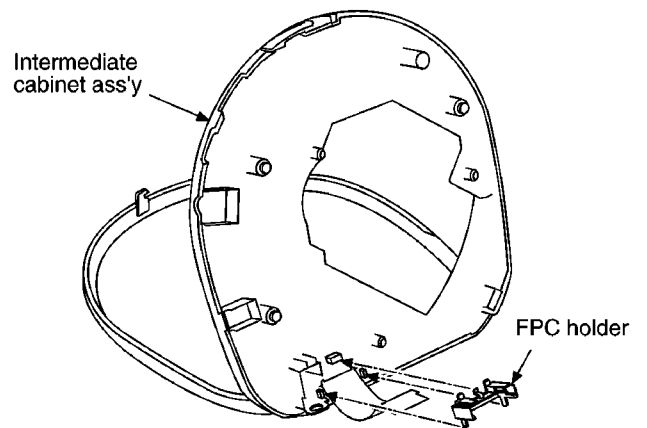
Install the CD cover ass'y to the intermediate cabinet ass'y in order items (1), (2), (3).

**(Step 2)**

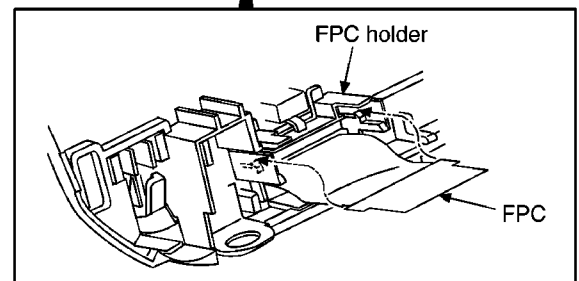
Bend the intermediate cabinet ass'y in the direction of arrow (1), and then align the CD cover ass'y with the rib (A).

**Installation of intermediate cabinet ass'y****(Step 1)**

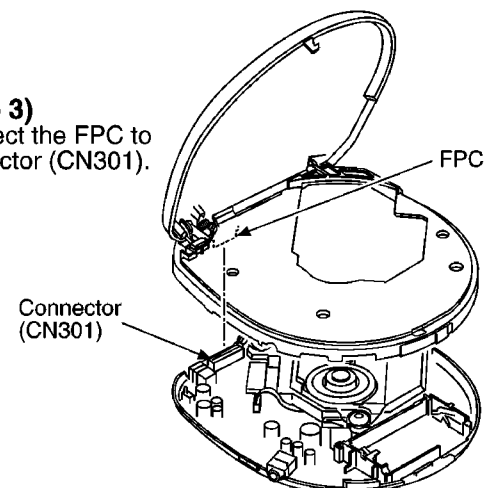
Install the FPC holder to intermediate cabinet ass'y.

**(Step 2)**

Install the FPC to FPC holder.

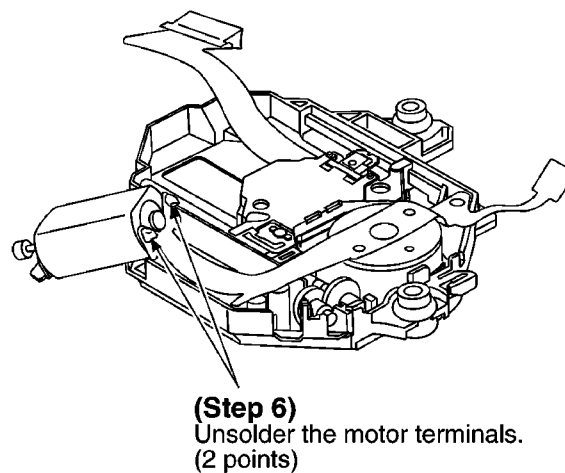
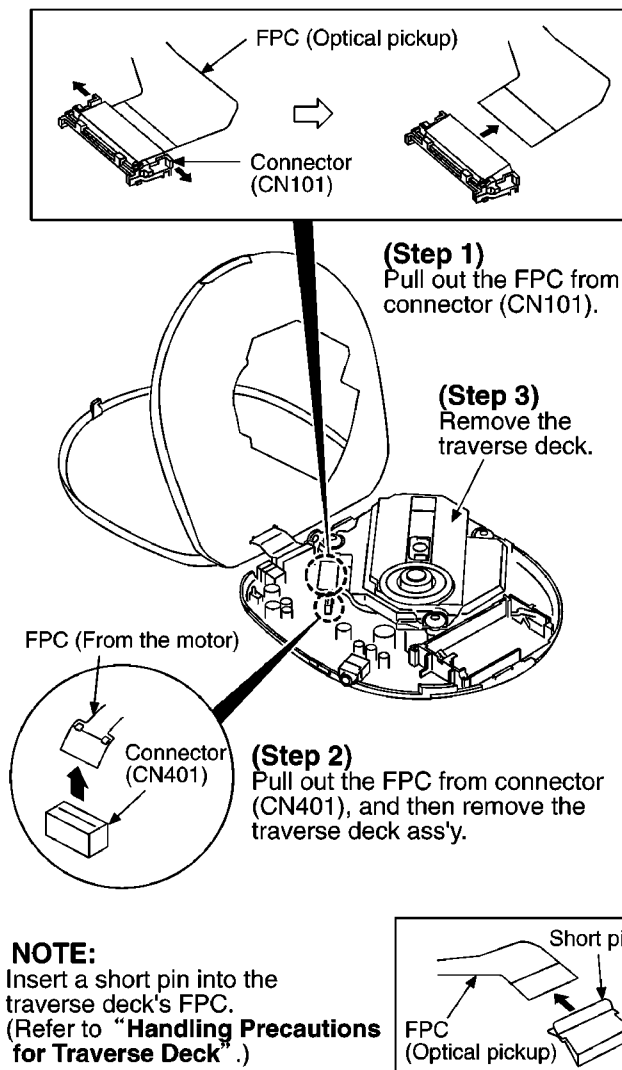
**(Step 3)**

Connect the FPC to connector (CN301).



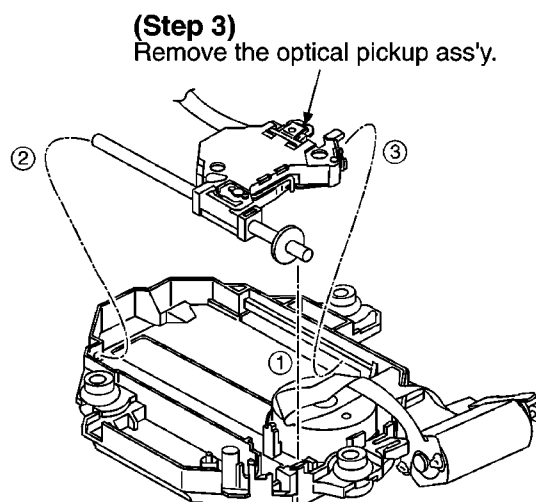
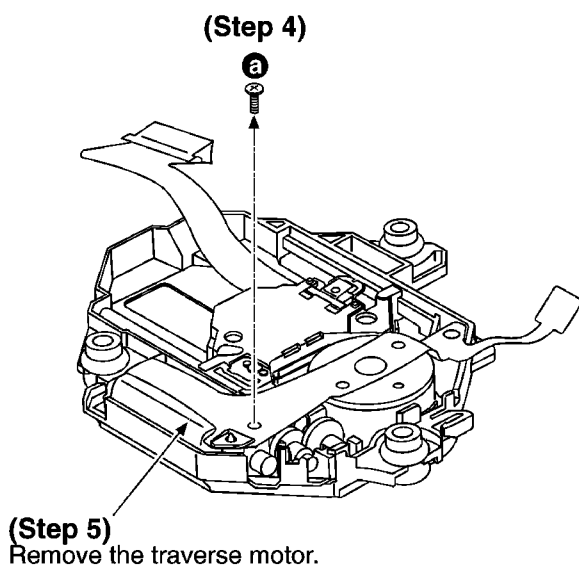
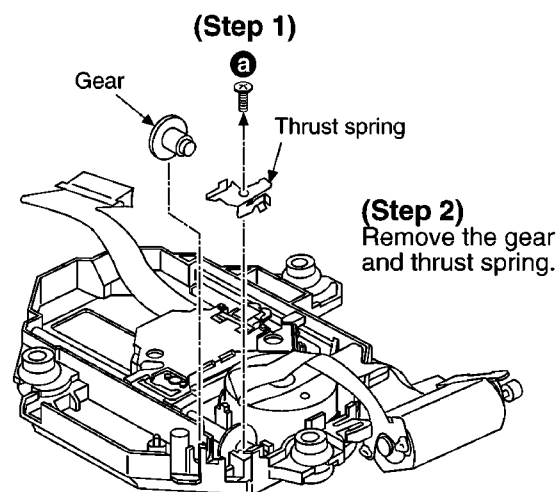
5.3. Replacement for the traverse motor

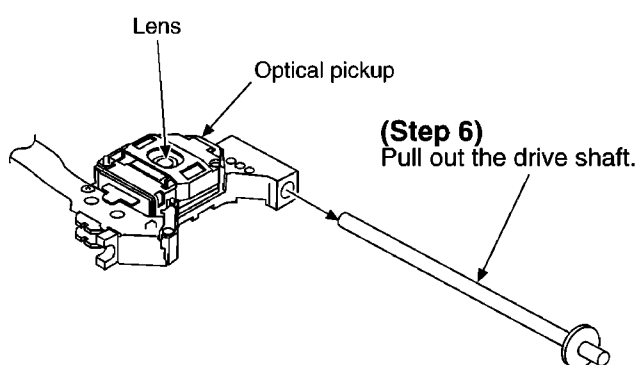
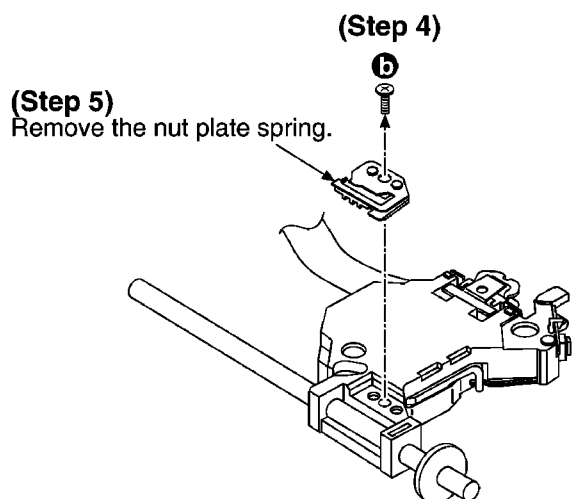
- Follow the (Step 1) - (Step 7) of item 5.1.1.



5.4. Replacement for the optical pickup

- Follow the (Step 1) - (Step 7) of item 5.1.1.
- Follow the (Step 1) - (Step 5) of item 5.3.



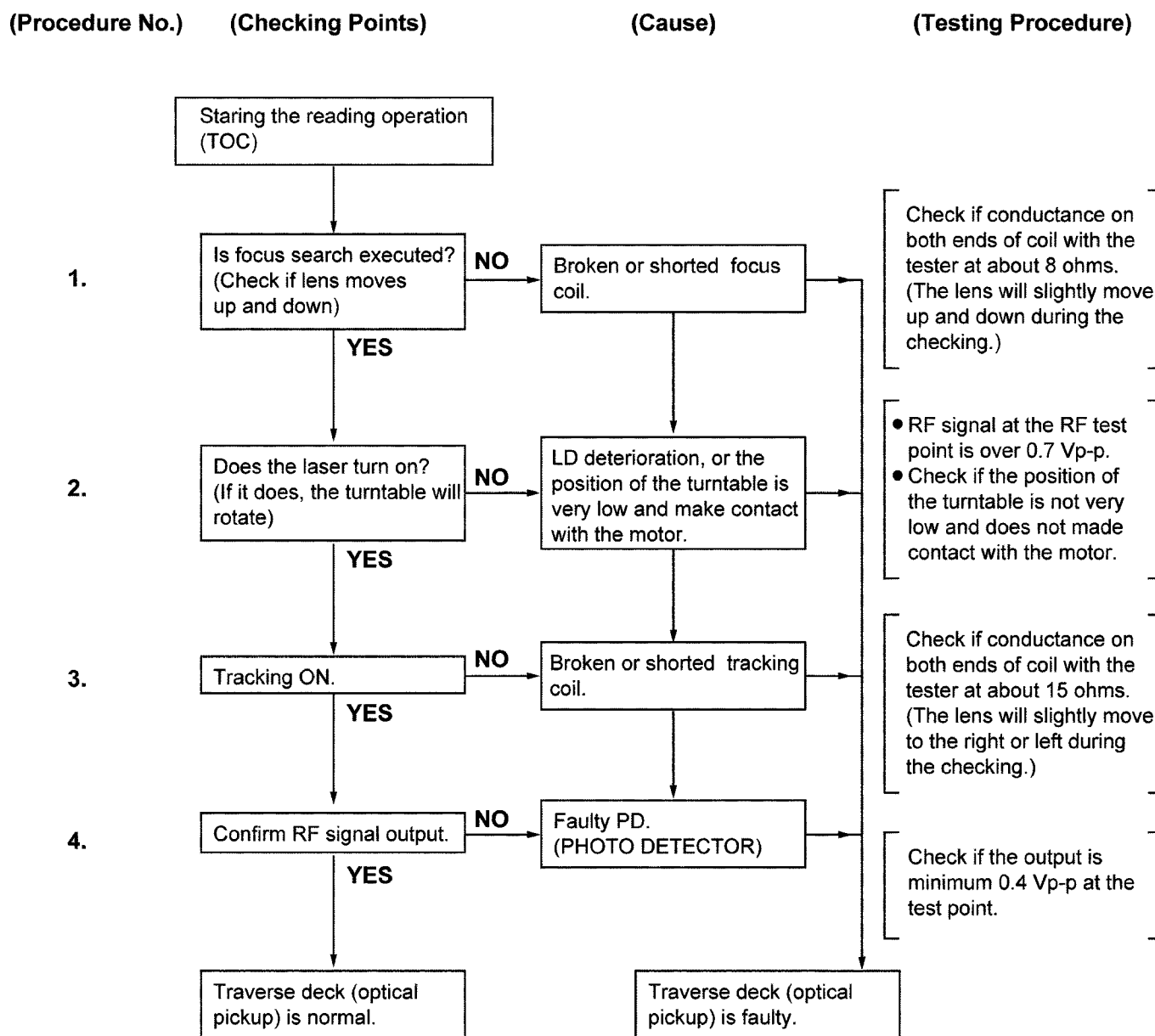
**NOTE:**

1. Use care to prevent damage the optical pickup, due to the precision construction.
2. Do not apply the grease on the lens of optical pickup.
3. Do not touch the lens of the optical pickup.

6 Checking the Operation Problems on the Traverse Deck (Optical Pickup)

Make sure to follow the procedures below to check the operation problems of the traverse deck (optical pickup) before replacing it.

Replace the traverse deck only after the problem is identified.



※ Replace the traverse deck.

- Check electrical circuit.
- Check for flaws on disc or if it is warped or not centered.

Check the operations described below on the traverse deck after replacing it.

*Checking Skip Search

1. Play an ordinary musical program disc.
2. Press the skip button to check for normal skip search operation (in both the forward and reverse directions).

*Checking Manual Search

1. Play an ordinary musical program disc.
2. Press the manual search button to check for smooth manual search operations at either low or high speed (in both the forward and reverse directions).

*Checking Playability

1. Play the 0.7 mm black dot and the 0.7 mm wedge on the playability test disc (SZZP1054C) and verify that no sound skip or noise occurs.
2. Play the middle tracks of the uneven test disc (SZZP1056C) and verify that no sound skip or noise occurs.

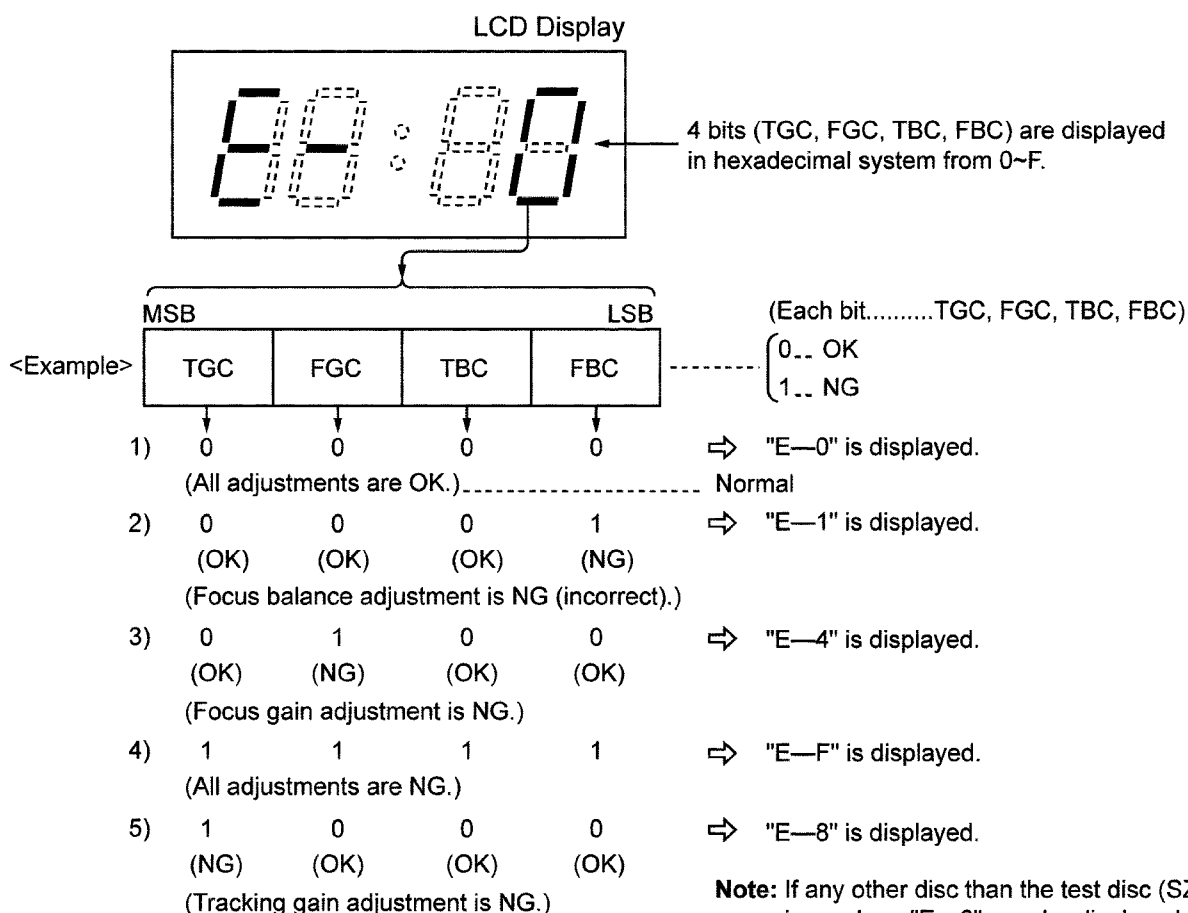
7 Automatic Adjustment Results Display Function (Self-check Function)

On this unit (SL-SX228,SL-SX230), each automatic adjustment results are displayed on the LCD. This function is convenient to check or identify which automatic adjustment circuit is incorrect. The followings are the contents of the automatic adjustment result displays (self-check function).

7.1. How to display automatic adjustment results

1. Load the test disc (SZZP1054C).
2. Press the ◀◀ (SKIP/SEARCH) and ▶▶ (SKIP/SEARCH) Buttons simultaneously and hold them, and additionally press the ▶|| (PLAY/PAUSE) Button.
3. Press the ■ (OPR OFF) Button once.
4. An automatic adjustment result is displayed on the LCD.

7.2. Display of automatic adjustment results (self-check function)



Note: If any other disc than the test disc (SZZP1054C) is used, an "E—8" may be displayed.

<Example>

Follow the below steps when "E-1" is displayed.

(Cause: Focus balance (FBC) is set beyond the limit.)

1 Check if

1. the waveform or voltage of the focus servo circuit is correct. (check the waveform or voltage.)
2. the optical pickup returns to the normal state by exchanging the traverse deck.

Follow the below steps when "E-4" is displayed.

(Cause: Focus gain (FGC) is set beyond the limit.)

1 Check if

1. the waveform or voltage of the focus servo circuit is

correct. (check the waveform or voltage.)

2. the focus coil of the optical pickup is correct (around 15 ohms).
3. the optical pickup returns to the normal state by exchanging the traverse deck.

Follow the below steps when "E-F" is displayed.

(Cause: All adjustments (TGC, FGC, TBC, FBC) are set beyond the limit.)

1 Check if

1. the optical pickup returns to the normal state by exchanging the traverse deck.
2. the waveform or voltage of the servo IC's are correct.

(check the waveform or voltage.)

Note:

It is not always necessary to exchange the traverse deck when an error message is displayed.

Be sure to check if the circuit is defective or not before

exchanging the traverse deck.

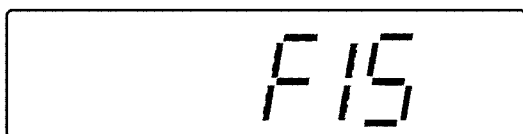
Note:

If any other disc than the test disc (SZZP1054C) is used, an error message may be displayed. This is not a malfunction.

8 Display of Self-Diagnostic Function

This model is equipped with a self-diagnosis function and shows, when necessary, the following indication in the LCD section of the set.

LCD display



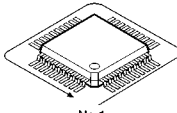
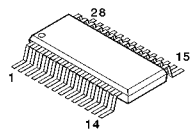
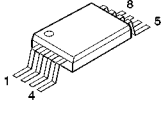
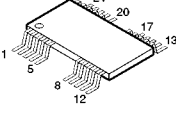
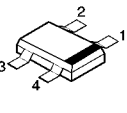
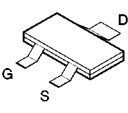
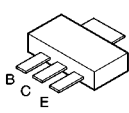
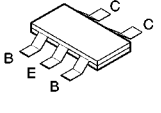
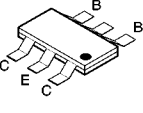
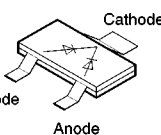
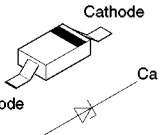
(Press PLAY and STOP button. After 15 seconds, it is displayed for 2 seconds.)

"F15"---This indication appears when the Down switch fails to turn ON since the magnetic head fails to move up/down normally (Due to trouble of the magnetic head or trouble of the magnetic head up/down motor) or the magnetic head P.C.B. is out of position or a foreign matter has mixed in or for some other reason.

In such a case, check the peripheral parts of the magnetic head, repair or replace defective parts with normal ones.

9 Schematic Diagram Notes

9.1. Type Illustration of IC's, Transistors and Diodes

 MN662786SB 80PIN C2BBFD000279 80PIN C0DBFFB00002 48PIN				
2SK1958T1 B1CDGD000001 	2SB1132T100 B1ABMD000004 	FMG6AT148 	XN0F26200L 	2SB709ATX DTA114YUA106 DTC143EUA106 DTC143ZUA106 UN5214TX
DAN202UT106 	MA8056MTX 			

9.2. Schematic Diagram Notes

Notes:

- IS201: Laser ON/OFF switch in "OFF" position.
(It turns "ON" with disc holder closed.)
- IS202: Rest detector in "OFF" position.
(It turns "ON" when optical pickup comes to innermost periphery.)
- IS310: Hold (HOLD) switch in "OFF" position.
- IS801: Stop/operation off (■ /OPR OFF) button.
- IS802,809: Skip/search (►► / ►► ,
◄◄ / ◄◄) buttons.
- IS803: Play/pause (►■) button.
- IS804: EQ (EQ) button in "OFF" position.
- IS805, 807: Headphone volume control (VOL +, -) buttons.
- IS806: Memory/recall (MEMORY/RECALL) button.
- IS808: Mode (MODE) button.

- Components identified by  mark have special characteristics important for safety.
- When replacing any of components, be sure to use only manufacture's specified parts shown in the parts list.
- The supply part number is described alone in the replacement parts.

• Signal line

-  : Positive voltage line.
-  : Playback signal line.

- The voltage value and waveforms are the reference

voltage of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of GND terminal (DC IN Jack). Accordingly, there may arise some errors in the voltage values and waveforms depending upon the internal impedance of the tester or measuring unit.

Measurement conditions:

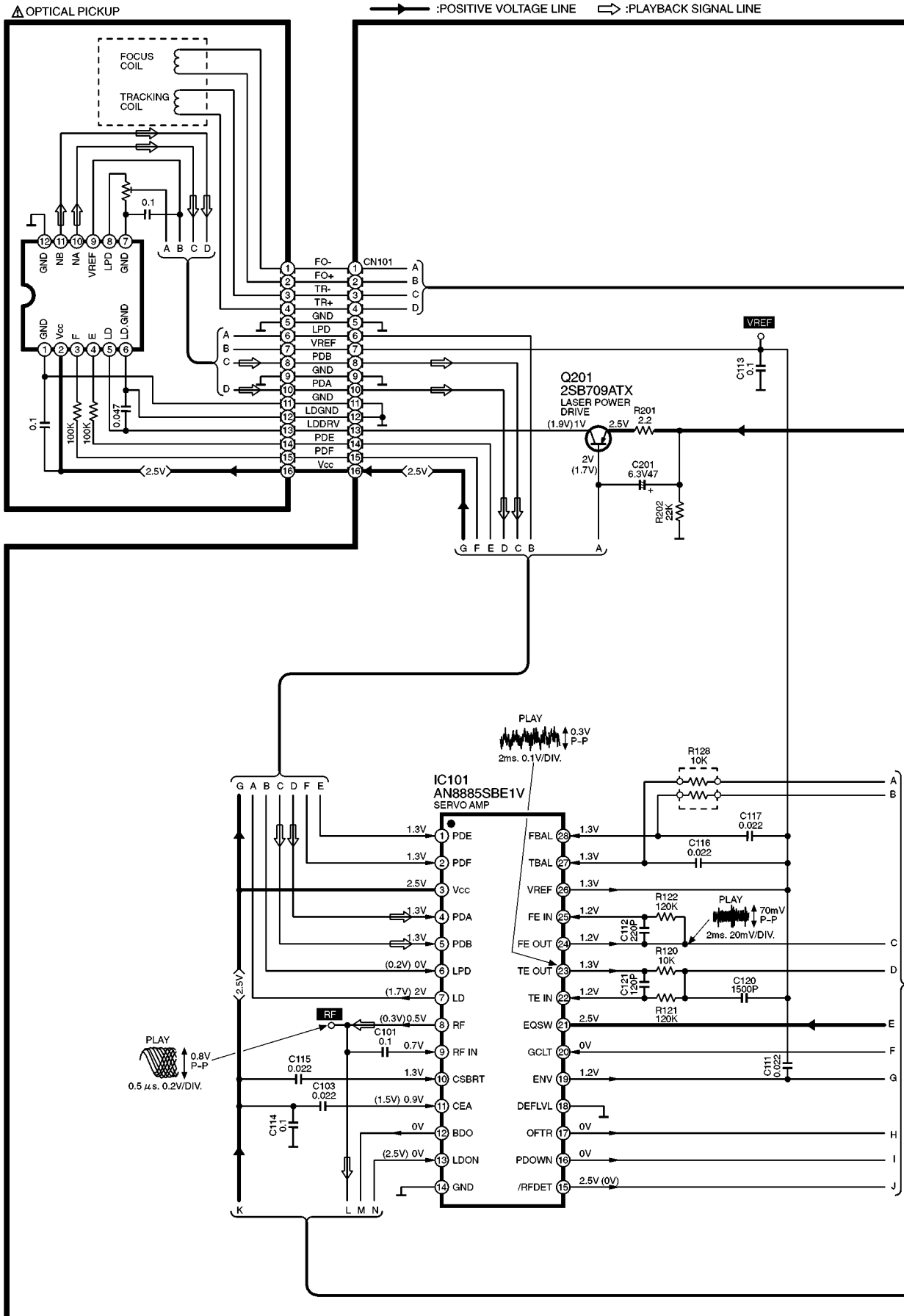
*().....CD playback mode (Test disc 1kHz, L+R, 0dB)

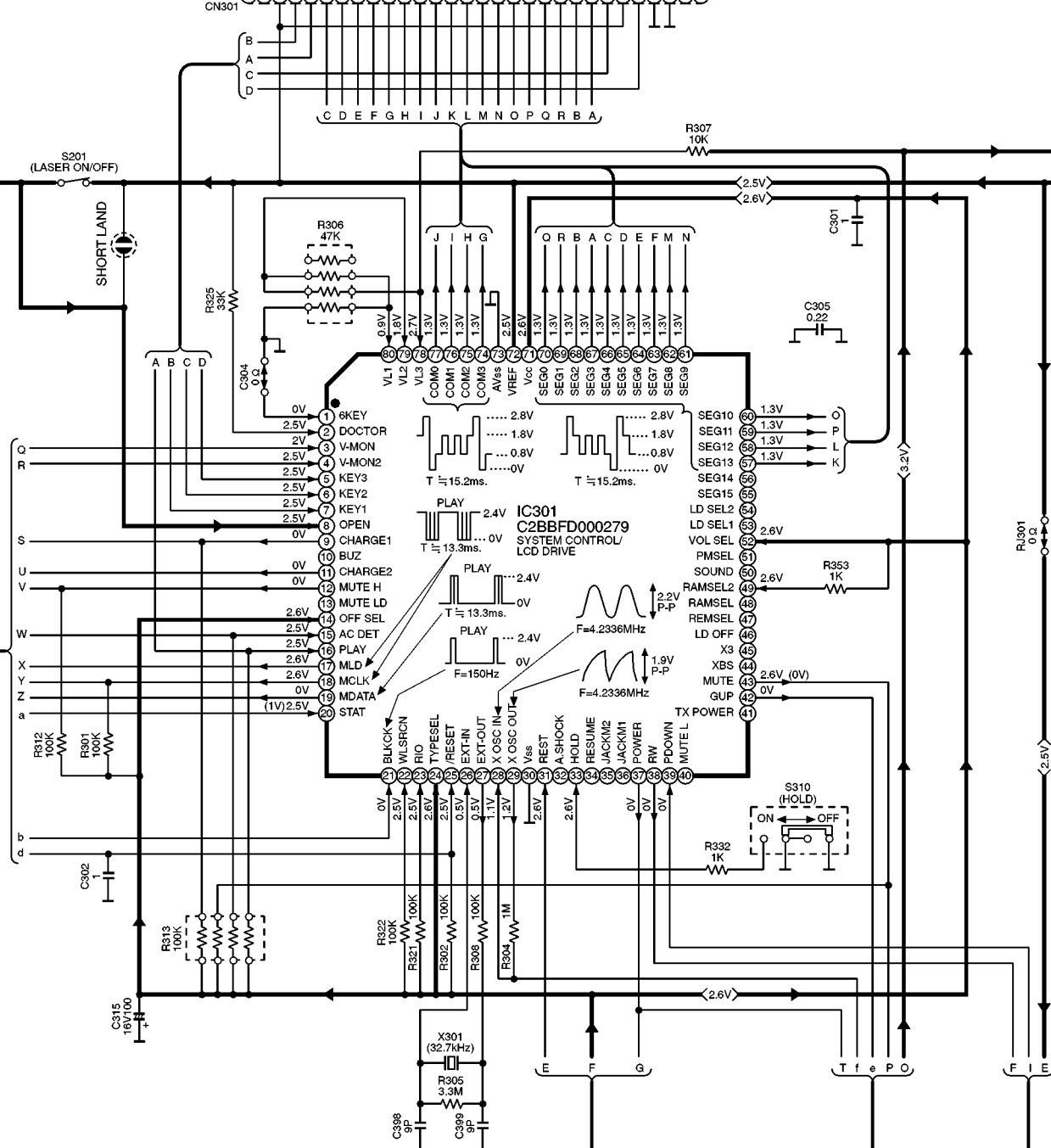
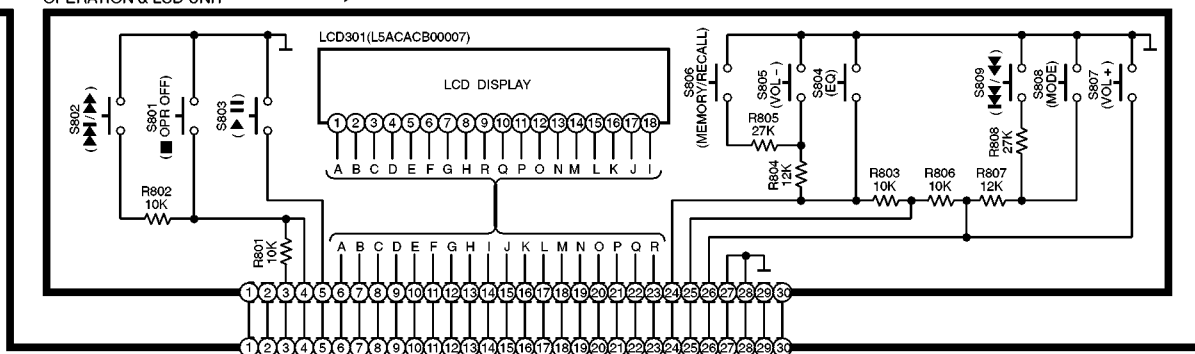
*No mark.....CD stop mode

Caution!!

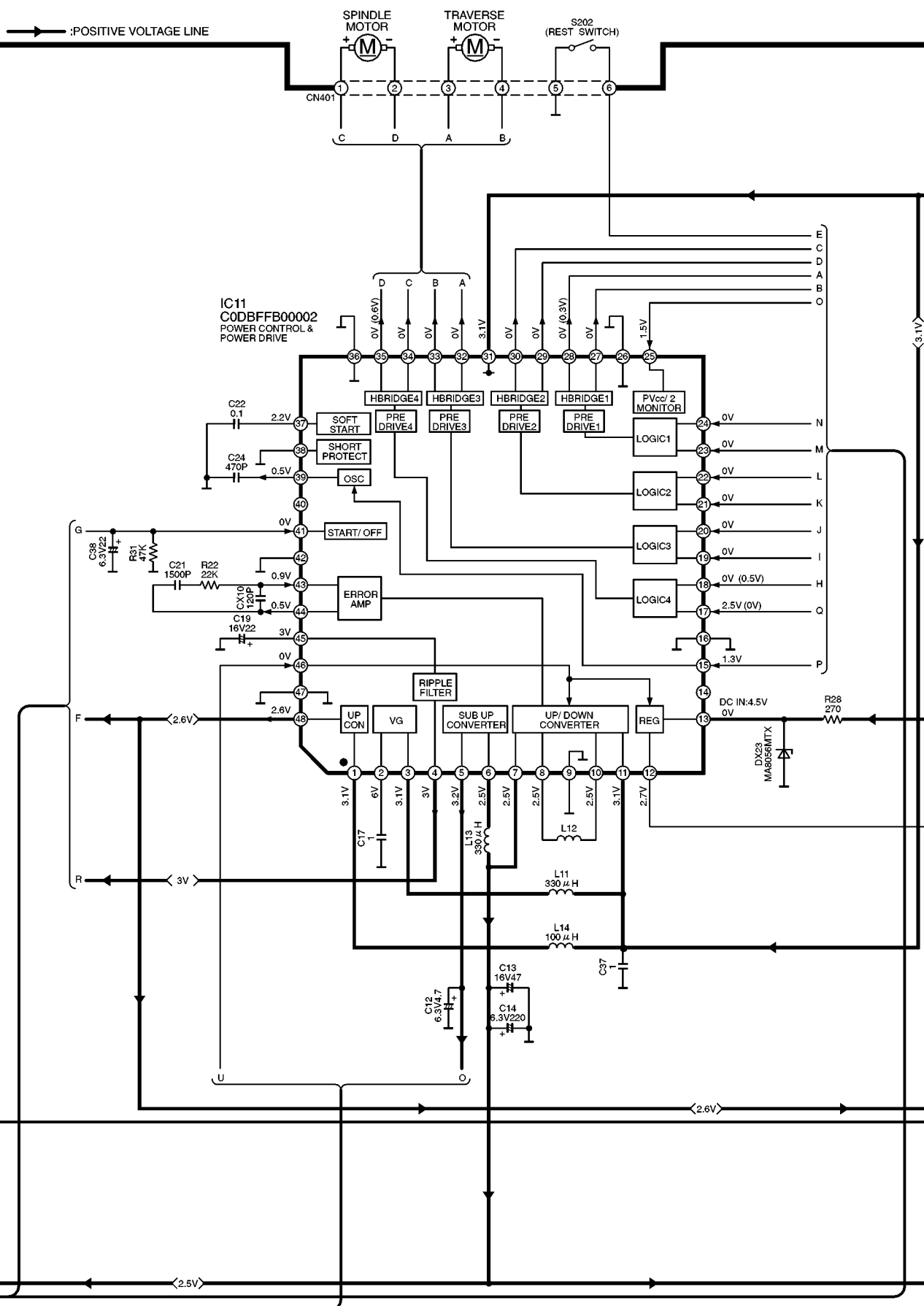
- IC and LSI are sensitive to static electricity.
- Secondary trouble can be prevented by taking care during repair.
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the pins of IC or LSI with fingers directly.

10 Schematic Diagram

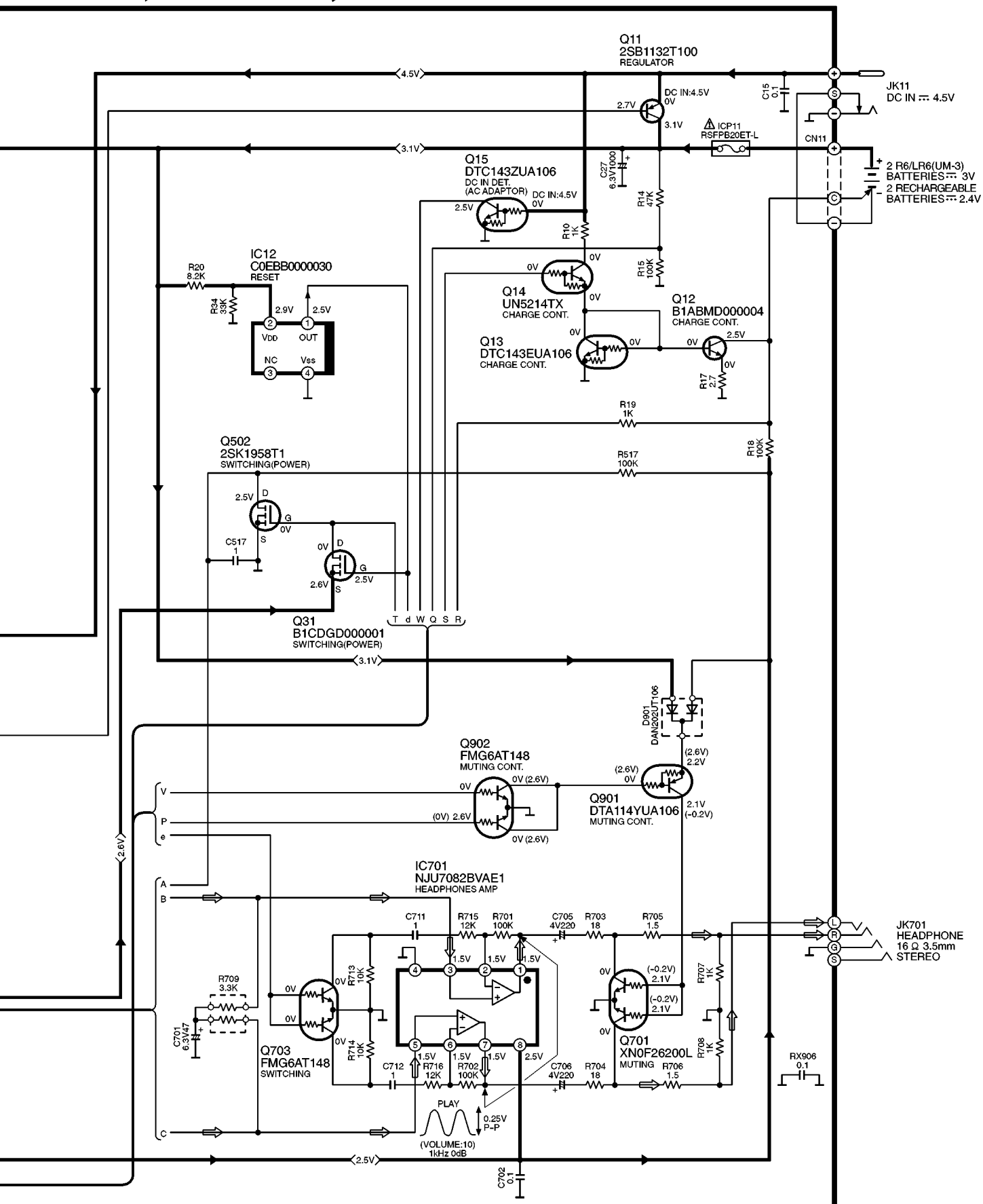




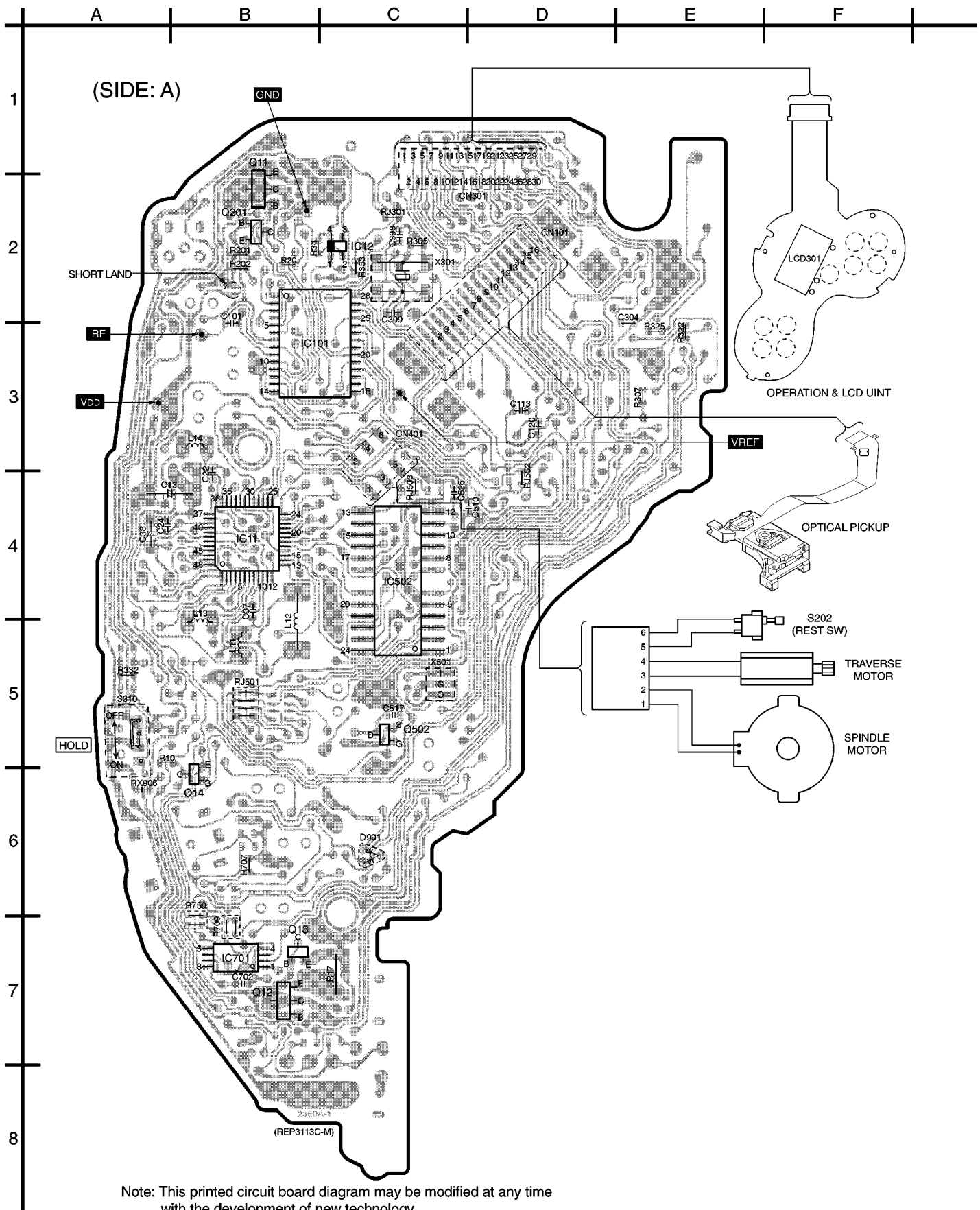




→ : POSITIVE VOLTAGE LINE ⇨ : PLAYBACK SIGNAL LINE



11 Printed Circuit Board and Wiring Connection Diagram



G

H

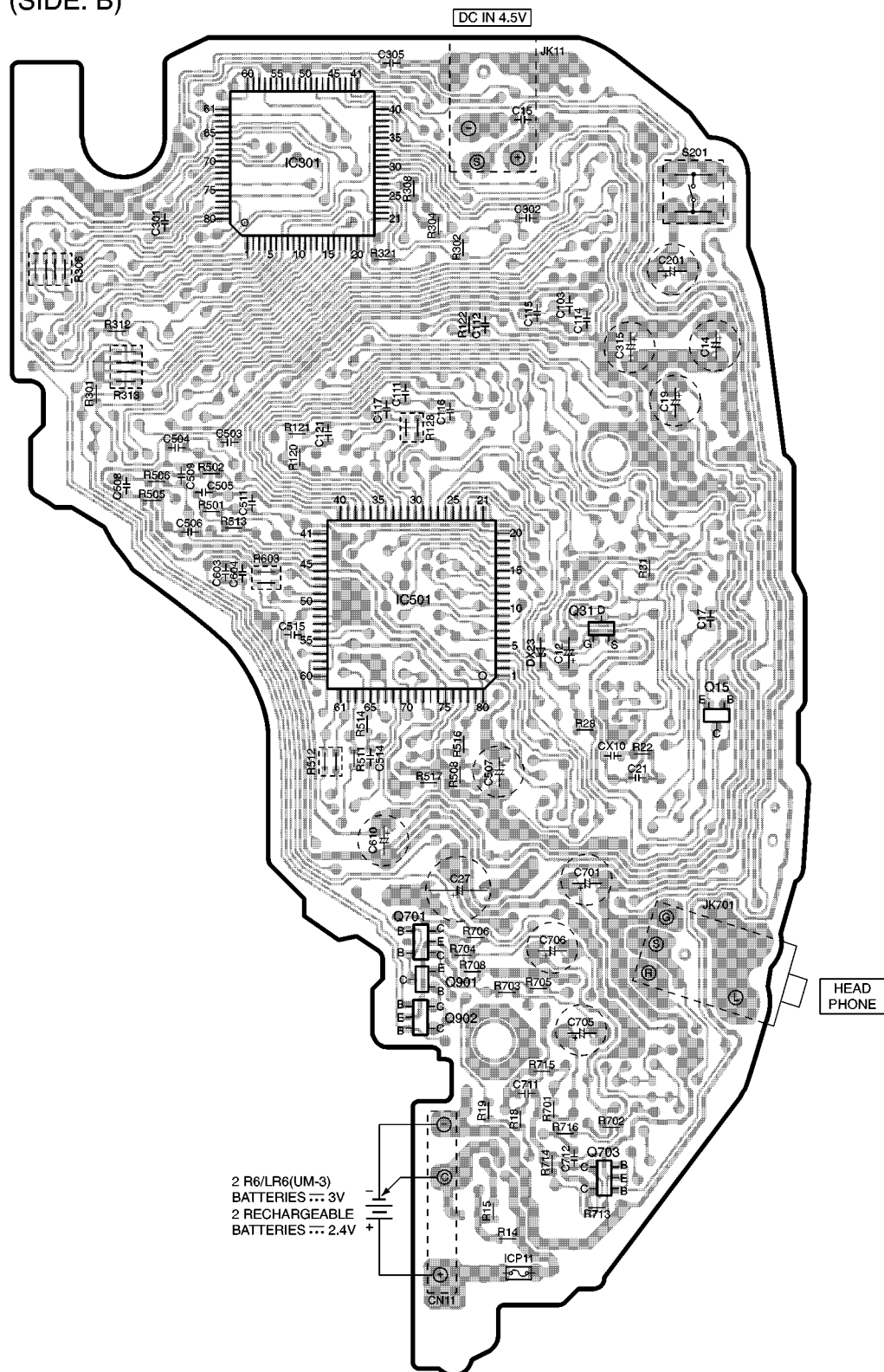
I

J

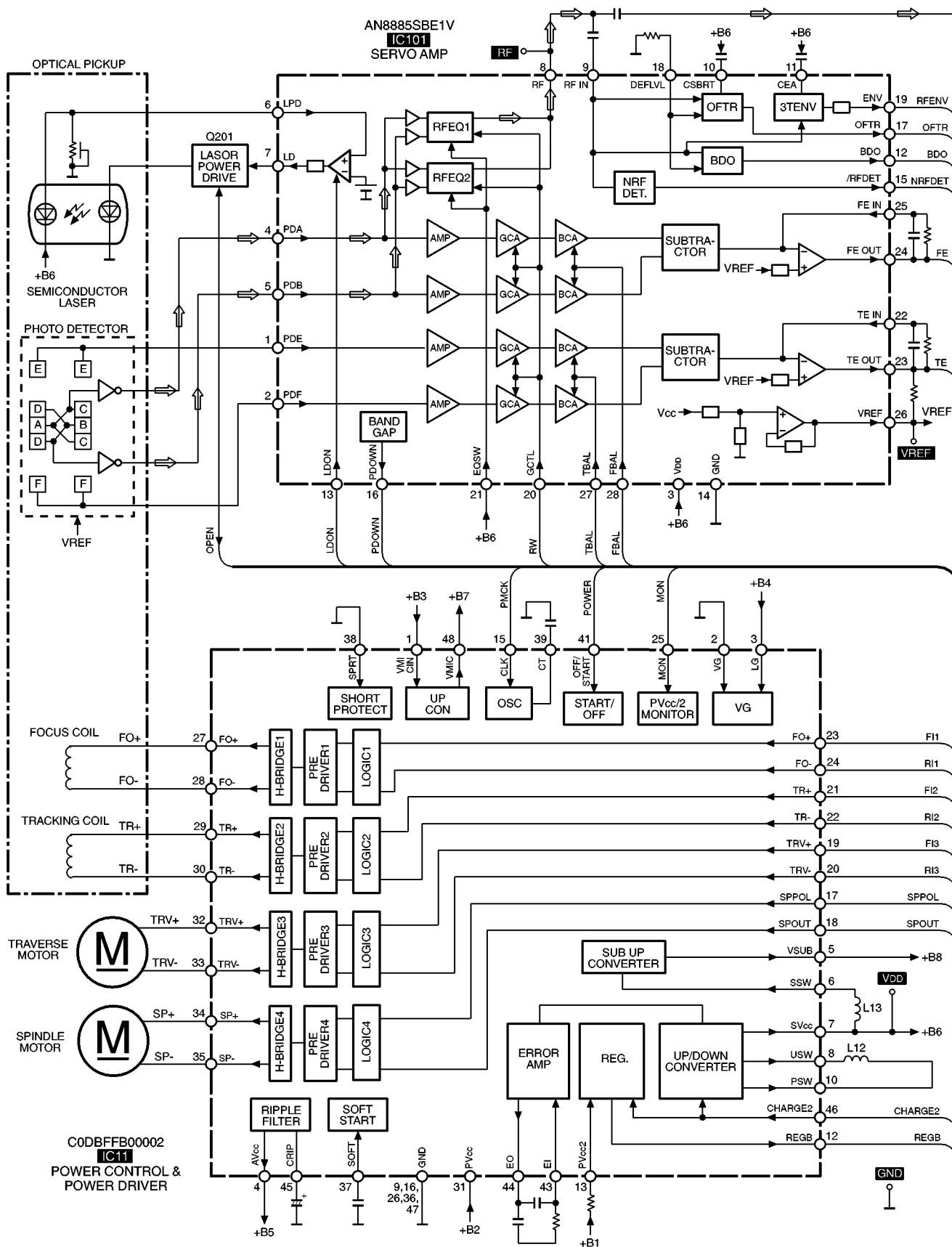
K

L

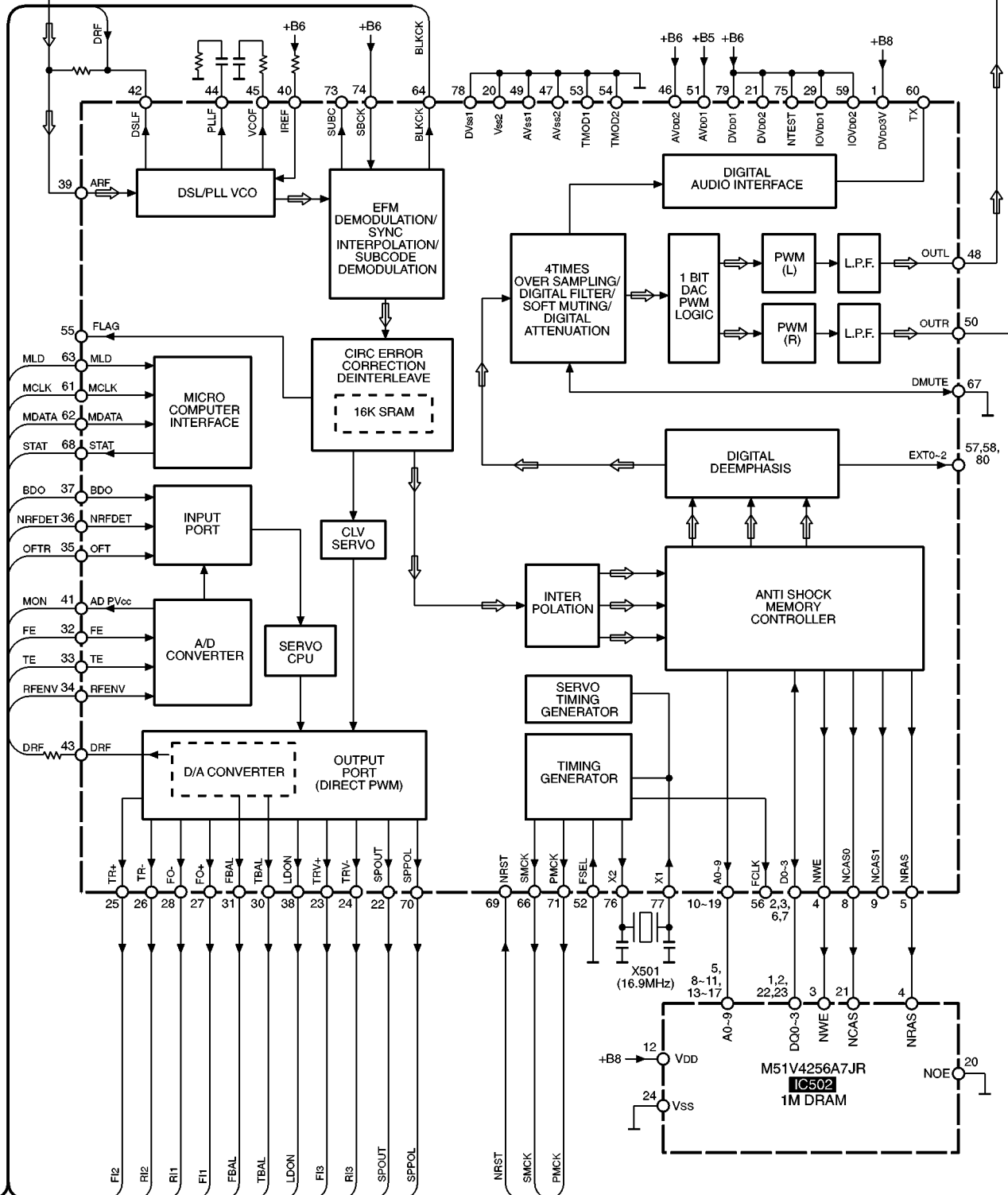
(SIDE: B)

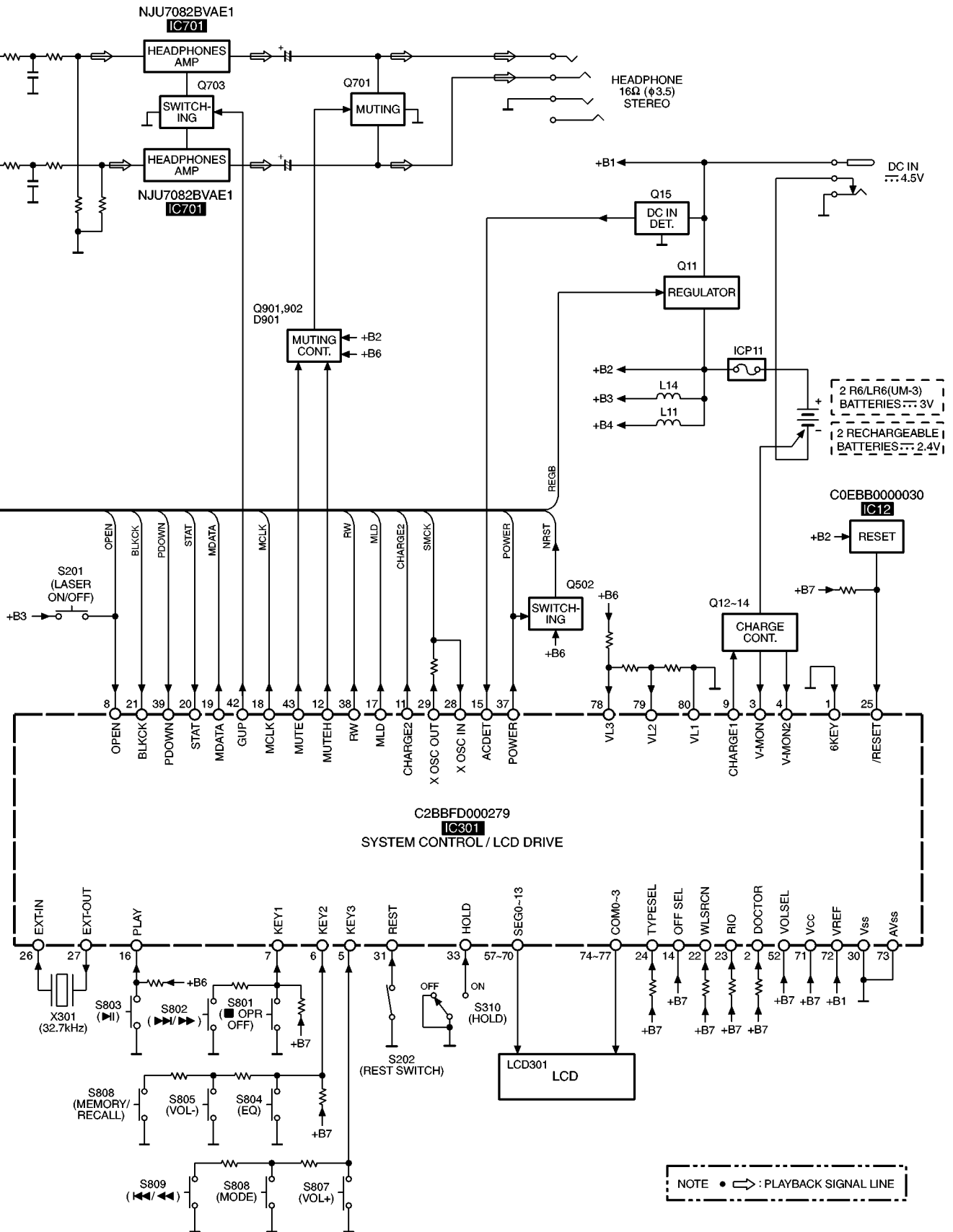


12 Block Diagram



MN662786SB
IC501
 SERVO PROCESSOR / DIGITAL SIGNAL PROCESSOR
 DIGITAL FILTER & D/A CONVERTER





13 Terminal Function of IC's

13.1. IC101(AN8885SBE1V): Servo Amplifier

Pin No.	Mark	I/O Division	Function
1	PDE	I	Tracking signal input (1) terminal
2	PDF	I	Tracking signal input (2) terminal
3	V _{CC}	O	Power supply output terminal
4	PDA	I	Focus signal input (1) terminal
5	PDB	I	Focus signal input (2) terminal
6	LPD	I	APC amplifier input terminal
7	LD	O	APC amplifier output terminal
8	RF	O	RF addition output terminal
9	RF IN	I	RF detection signal input terminal
10	CSBRT	I	Capacitor connection terminal for detection of RF envelope signal
11	CEA	I	Capacitor connection terminal for H.P.F. amplifier
12	BD0	O	BD0 output terminal
13	LDON	I	APC control terminal
14	GND	—	Connected to GND
15	/RFDET	O	NRFDET output terminal
16	PDOWN	O	Power down mode control terminal
17	OFTR	O	Off-track signal output terminal (H:off-track)
18	DEFLVL	—	OFTR/BD0 detection level control terminal
19	ENV	O	3TENV output terminal
20	GCTL	I	RF/FE/TE gain control terminal
21	EQSW	I	EQ characteristic control terminal
22	TE IN	I	TE amplifier reverse input terminal
23	TE OUT	O	TE amplifier output terminal
24	FE OUT	O	FE amplifier output terminal
25	FE IN	I	FE amplifier reverse input terminal
26	VREF	O	VREF output terminal
27	TBAL	I	TBAL control terminal
28	FBAL	I	FBAL control terminal

13.2. IC301(C2BBFD000279): System Control/LCD Drive

Pin No.	Mark	I/O Division	Function
1	6KEY	I	A/D key signal input
2	DOCTOR	I	Doctor mode input terminal (Connected to power supply through resistor)
3	V-MON	I	Rechargeable battery voltage measurement decline voltage judgment signal input
4	V-MON2	I	Battery remaining measurement signal
5	KEY3	I	Operation key signal input
6	KEY2		
7	KEY1		
8	OPEN	I	CD cover open detect signal input
9	CHARGE	O	Charging ON signal output
10	BUZ	O	Buzzer control output terminal
11	CHARGE2	O	Charging ON signal output(2)
12	MUTEH	O	Headphone muting signal output
13	MUTELD	—	Not used, open
14	OFFSEL	I	For selection of power management input terminal
15	AC DET	I	AC detect signal input
16	PLAY	I	PLAY key signal input
17	MLD	O	Serial command latch output
18	MCLK	O	Serial command clock output

Pin No.	Mark	I/O Division	Function
19	MDATA	O	Serial command data output
20	STAT	I	Status signal input
21	BLKCK	I	Sub code block clock signal input
22	WLSRCN	I	Wire-less remote control signal input
23	RIO	I	Remote control LCD communication signal input
24	TYPESEL	I	Model select input terminal (H: SX280)
25	/RESET	I	Reset detect signal input
26	EXT-IN	I	Oscillator connected terminal (F=32.7kHz)
27	EXT-OUT	O	System clock signal
28	XOSCIN	I	
29	XOSCOU	O	GND
30	V _{SS}	—	
31	REST	I	Rest detect switch signal input
32	ASHOCK	—	Not used, open
33	HOLD	I	HOLD switch signal input
34	RESUME	—	Not used, open
35	JACKM2	I	Line out connection detect signal input
36	JACKM1	I	Line out connection detect signal input
37	POWER	O	Power supply detect signal output
38	RW	O	RF/FE/TE gain control signal output
39	PDOWN	I	Headphone power OFF signal input
40	MUTEL	O	Line out muting signal output
41	TXPOWER	O	Optical output ON signal output
42	GUP	O	Gain control output terminal for during XBS/TRAIN/LIVE operation (When ON: increased 6dB)
43	MUTE	O	Muting signal output
44	XBS	—	Not used, open
45	X3	O	RF equalizer triple speed signal output
46	LD-OFF	—	Not used, open
47	REMSEL	—	Not used, open
48	RAMSEL	I	DRAM select signal input
49	RAMSEL2	I	DRAM select signal input
50	SOUND	—	Not used, open
51	PMSEL	—	Not used, open
52	VOLSEL	I	Voice out (+4dB) up signal input
53	LDSEL2	—	Not used, open
54	LDSEL1	—	Not used, open
55~70	SEG15 ~SEG0	O	LCD segment signal output
71	V _{CC}	I	Power supply terminal
72	VREF	I	Reference voltage input terminal
73	AV _{SS}	—	GND
74~77	COM3 ~COM0	O	LCD common signal output
78	VL3	I	Power supply terminal
79	VL2	I	Power supply terminal (LCD drive bias)
80	VL1	I	

13.3. IC11(C0DBFFB00002): Power Control and Power Drive

Pin No.	Mark	I/O Division	Function
1	LMC	I	Coil drive input terminal for micon power supply voltage increase
2	VG	—	Power Mos drive circuit power supply terminal
3	LG	I	Coil drive input terminal for VG voltage increase
4	AV _{CC}	O	Ripple filter output terminal
5	VSUB	O	Sub power supply terminal
6	SSW	O	Coil drive output terminal for sub voltage increase
7	SV _{CC}	O	Power supply output terminal for control circuits

Pin No.	Mark	I/O Division	Function
8	USW	—	Coil drive input terminal (2) for main voltage increase/decrease
9	PGND1	—	GND (1) terminal (power)
10	DSW	—	Coil drive input terminal (1) for main voltage increase/decrease
11	PV _{CC} 1	I	Battery power supply input terminal
12	REGB	I	Tr drive input terminal for regulator
13	PV _{CC} 2	I	AC adaptor power supply input terminal
14	TEST	—	Test terminal
15	CLK	I	DC/DC converter external clock input terminal
16	GND	—	GND terminal (pre-driver)
17	IN4P	I	IN4 input terminal (polarity)
18	IN4S	I	CH4 input terminal (signal)
19	IN3F	I	CH3 forward input terminal
20	IN3R	I	CH3 reverse input terminal
21	IN2F	I	CH2 forward input terminal
22	IN2R	I	CH2 reverse input terminal
23	IN1F	I	CH1 forward input terminal
24	IN1R	I	CH1 reverse input terminal
25	VMON	I	PV _{CC} 2 monitor terminal
26	PGND2	—	GND (2) terminal (power)
27	OUT 1F	O	CH1 forward output terminal
28	OUT 1R	O	CH1 reverse output terminal
29	OUT 2F	O	CH2 forward output terminal
30	OUT 2R	O	CH2 reverse output terminal
31	PV _{CC}	I	Power supply terminal (power)
32	OUT 3F	O	CH3 forward output terminal
33	OUT 3R	O	CH3 reverse output terminal
34	OUT 4F	O	CH4 forward output terminal
35	OUT 4R	O	CH4 reverse output terminal
36	PGND3	—	GND (3) terminal (power)
37	SOFT	O	Soft start setting output terminal
38	SPRT	O	Output terminal setting of constants anti-power OFF
39	CT	O	Triangular wave output terminal
40	TEST	—	Test terminal
41	START	I	DC/DC converter start/OFF terminal
42	TEST	—	Test terminal
43	EI	I	Increase/decrease voltage DC/DC converter error amp input terminal
44	EO	O	Increase/decrease voltage DC/DC converter error amp output terminal
45	CRP	—	Ripple filter smoothing capacitor connection terminal
46	VCNT	I	Regulator voltage select input terminal (increase/decrease voltage)
47	PGND4	—	GND (4) terminal (power)
48	VMC	O	Power supply terminal (Micon)

13.4. IC501(MN662786SB): Servo processor, Digital Signal Processing, Digital Filter, and D/A Converter

Pin No.	Mark	I/O Division	Function
1	DV _{DD} 3V	I	Power supply input terminal for DRAM interface (Pin No. 2~19,80)
2	D0	I/O	Data input/output terminal for DRAM
3	D1		
4	NWE	O	Write enable output terminal for DRAM
5	NRAS	O	RAS control signal output terminal for DRAM

Pin No.	Mark	I/O Division	Function
6	D2	I/O	Data 2/3 input /output terminal for DRAM
7	D3		
8	NCAS0	O	CAS control 0 signal output terminal for DRAM
9	NCAS1	O	CAS control 1 signal output terminal for DRAM
10~14	A8~A4	O	Addresses 8~4 output terminal for DRAM
15	A9	O	Address 9 output terminal for DRAM
16~19	A0~A3	O	Addresses 0~3 output terminal for DRAM
20	DV _{SS} 2	I	Connected to GND
21	DV _{DD} 2	I	Power supply input terminal for digital circuit
22	SPOUT	O	Spindle motor drive output terminal (absolute value)
23	TRV+	O	Traverse motor drive (+) output terminal
24	TRV-	O	Traverse motor drive (-) output terminal
25	TR+	O	Tracking motor drive (+) output terminal
26	TR-	O	Tracking motor drive (-) output terminal
27	FO+	O	Focus motor drive (+) output terminal
28	FO-	O	Focus motor drive (-) output terminal
29	IOVDD1	I/O	Power supply for IN/OUT
30	TBAL	O	Tracking balance adjustment output terminal
31	FBAL	O	Focus balance adjustment output terminal
32	FE	I	Focus error signal input terminal (Analog input)
33	TE	I	Tracking error signal input terminal (Analog input)
34	RFENV	I	RF envelope signal input terminal (Analog input)
35	OFT	I	Off-track signal input terminal (H:off-track)
36	NRFDET	I	RF detection signal input terminal (L:detection)
37	BD0	I	Dropout signal input terminal (H:dropout)
38	LDON	O	Laser ON signal output terminal (H:ON)
39	ARF	I	RF signal input terminal
40	IREF	I	Reference current input terminal
41	ADPV _{CC}	O	A/D reference voltage output terminal (Analog input)
42	DSL	O	Loop filter output terminal for DSL
43	DRF	I	Bias input terminal for DSL
44	PLL	O	Loop filter output terminal for PLL
45	VCOF	O	Loop filter output terminal for jitter-free VCO
46	AV _{DD} 2	I	Power supply input terminal for analog circuit (DSL,PLL,VCOF,AD,DA)
47	AV _{SS} 2	I	GND for analog circuit (DSL,PLL,VCOF,AD,DA)
48	OUTL	O	Left channel audio signal output terminal
49	AV _{SS} 1	—	Connected to GND
50	OUTR	O	Right channel audio signal output terminal
51	AV _{DD} 1	I	Power supply input terminal for analog circuit
52	FSEL	I	Noise filter ON/OFF switching input terminal (L:ON/H:OFF) (Connected to GND)
53	TMOD1	—	Test terminal (L:normal) (Connected to GND)
54	TMOD2		

Pin No.	Mark	I/O Division	Function
55	FLAG	O	Flag signal output terminal (Not used, open)
56	IPFLAG	O	Interpolation flag output terminal (H:interpolation)(Not used, open)
57	EXT0	I/O	Extension IN/OUT port (0) (Not used, open)
58	EXT1	I/O	Extension IN/OUT port (1) (Not used, open)
59	IOV _{DD2}	I	Power supply for IN/OUT
60	TX	O	Digital audio interface signal output terminal (Not used, open)
61	MCLK	I	Microprocessor command clock signal input terminal
62	MDATA	I	Microprocessor command data signal input terminal
63	MLD	I	Microprocessor command load signal input terminal (L:load)
64	BLKCK	O	Sub-code block clock signal output terminal (f=75Hz:during normal speed playback)
65	PWMSEL	I/O	PWM output mode select input terminal (L:direct, H:3 value) (Connected to GND)
66	SMCK	O	System clock signal output terminal (f=4.236/8.4672MHz)
67	DMUTE	I/O	Mute input terminal (H:mute) (Connected to GND)
68	STAT	O	Status signal output terminal
69	NRST	I	Reset signal input terminal (H:reset)
70	SPPOL	O	Spindle motor drive signal output terminal (polarity output)
71	PMCK	O	Clock signal output terminal (f=88.2KHz)
72	NCLDCK	O	Frame clock signal output terminal (f=7.35KHz:during normal speed playback)(Not used, open)
73	SUBC	O	Sub-code serial output terminal (Not used, open)
74	SBCK	I	Clock input terminal for sub-code output terminal
75	NTEST	I	Test input terminal (H:normal)
76	X2	O	Crystal oscillator circuit output terminal (f=16.9344MHz)
77	X1	I	Crystal oscillator circuit input terminal (f=16.9344MHz)
78	DV _{SS1}	—	Connected to GND
79	DV _{DD1}	I	Power supply input terminal for digital circuits
80	EXT2	I	Extension IN/OUT port (2) (Not used, open)

14 Replacement Parts List

Notes:

*Important safety notice:

Components identified by Δ mark have special characteristics important for safety.

*Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.

*When replacing any of components, be sure to use only manufactures specified parts shown in the parts list.

*The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)

Parts without these indications can be used for all areas.

*The parenthesized indications in the Remarks columns specify the colours. (Refer to the cover page for colour.)

Parts without these indications can be used for all colours.

*Warning: This product uses a laser diode. Refer to caution statements.

*Capacity values are in microfarads (μ F) unless specified otherwise, P=Pico-farads (pF), F=Farads (F).

*Resistance values are in ohms, unless specified otherwise, 1K=1,000 (OHM), 1M=1,000k (OHM).

*The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.

**<IA>, <IB>, <IC>” marks in Remarks indicate languages of instruction manuals.

[<IA>: English/Portuguese/Spanish/Swedish/German/Italian/French/Netherlands/Danish/Russian/Czech/Polish, <IB>: English/Spanish/Swedish/German/Italian/French, <IC>: Netherlands/Danish/Russian/Polish/Czech/Portuguese]

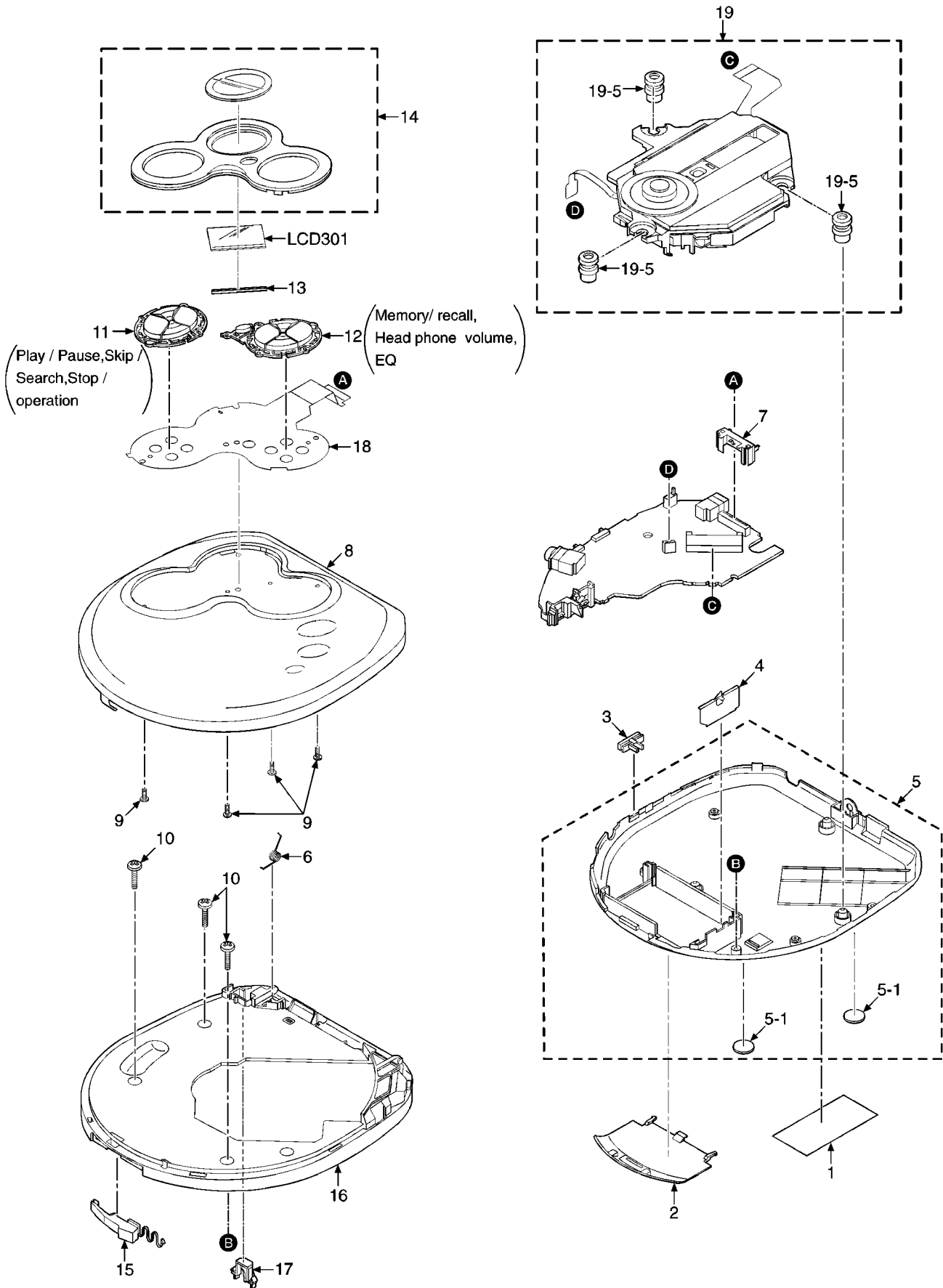
Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
1	RGN2048-K	NAME PLATE	1	SL-SX228
1	RGN2047-K	NAME PLATE	1	SL-SX230
2	RKK0135-H	BATTERY COVER	1	
3	RGV0200-K	SWITCH KNOB	1	
4	RJC93020-1	BATTERY TERMINAL	1	
5	RFKJLSX280EG	BOTTOM CABINET ASS'Y	1	
5-1	RKA0112-K	FOOT	2	
6	RME0308	OPEN SPRING	1	
7	RML0578	FPC HOLDER	1	
8	RGD0073E-S	CD COVER	1	SL-SX228
8	RGD0073D-A	CD COVER	1	SL-SX230 (A)
8	RGD0073D-S	CD COVER	1	SL-SX230 (S)
9	RHE5119YA	SCREW	4	
10	XTN17+6GFZ	SCREW	3	
11	RGU1964-H	OPERATION BUTTON(A)	1	
12	RGU1965-H	OPERATION BUTTON(B)	1	
13	RSQ0070	RUBBER	1	
14	RYF0575C-A	LID ORNAMENT ASS'Y	1	
15	RGU1838-H	OPEN KNOB	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
16	RKM0411A-H	INTERMEDIATE CABINET	1	
17	RML0580	STOPPER	1	
18	KORE00900004	OPERATION P.C.B.	1	
19	RAE0145Z	TRAVERSE DECK	1	Δ
19-1	RAF0142A	OPTICAL PICKUP	1	Δ
19-2	RDG0305	GEAR	1	
19-3	RDG0306	GEAR	1	
19-4	RJB2106A	TRAVERSE FPC	1	
19-5	RMG0449-H	FLOATING RUBBER	3	
19-6	RMC0264	THRUST SPRING	1	
19-7	RXQ0482	NUT PLATE SPRING	1	
19-8	RXQ0525	TRAVERSE MOTOR	1	
19-9	SNSD38	SCREW	1	
19-10	XQN17+BG45	SCREW	1	
19-11	XQN17+CG45	SCREW	1	
19-12	XQN2+BG55	SCREW	1	
A1	L0BAB0000123	STEREO EARPHONES	1	SL-SX228
A2	RQT5907-E	INSTRUCTION MANUAL	1	SL-SX228<IA>
A3	RQCB0169	SERVICE CENTER LIST	1	SL-SX228
A11	L0BAB0000123	STEREO EARPHONES	1	SL-SX230
A12	RFEA419E-M	AC ADAPTOR	1	SL-SX230 Δ
A13	RQT5790-E	INSTRUCTION MANUAL	1	SL-SX230<IB>
A13	RQT5791-H	INSTRUCTION MANUAL	1	SL-SX230<IC>
A14	RQCB0169	SERVICE CENTER LIST	1	SL-SX230
C12	ECST0JY475RR	6.3V 4.7U	1	ECST0JY475R
C13	RCST1CC476RC	16V 47U	1	F3H1A476A001
C14	RCE0JKA221TG	6.3V 220U	1	F2A0J2210012
C15	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
C17	ECUVNA105ZFV	10V 1U	1	F1H1A105A030
C19	ECA1CAK220XH	16V 22U	1	
C21	ECUV1H152KBV	50V 1500P	1	F1H1H152A013
C22	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
C24	ECUV1H471KBV	50V 470P	1	F1H1H471A013
C27	RCE0JRS102BJ	6.3V 1000U	1	
C37	ECUVNA105ZFV	10V 1U	1	F1H1A105A030
C38	RCST0JY226RG	6.3V 22U	1	F3F0J2260002
C101	ECUVNC104KBV	16V 0.1U	1	
C103	ECUVNE223KBV	25V 0.022U	1	F1H1E223A050
C111	ECUVNE223KBV	25V 0.022U	1	F1H1E223A050
C112	ECUV1H221KBV	50V 220P	1	F1H1H2210001
C113,14	ECUZNC104ZFV	16V 0.1U	2	F1H1C1040008
C115-17	ECUVNE223KBV	25V 0.022U	3	F1H1E223A050
C120	ECUV1H152KBV	50V 1500P	1	F1H1H152A013
C121	ECUV1H121KCV	50V 120P	1	
C201	ECA0JAK470XH	6.3V 47U	1	
C301,02	ECUVNA105ZFV	10V 1U	2	F1H1A105A030
C304	ERJ3GEY0R00V	1/16W 0	1	
C305	ECUVNA224KBV	10V 0.22U	1	F1H1A224A028
C315	ECEA1CKS101	16V 100U	1	
C398,99	ECUV1H090DCV	50V 9P	2	F1H1H9R0A244
C503	ECUV1H561KBV	50V 560P	1	F1H1H561A013
C504	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
C505	ECUVNE223KBV	25V 0.022U	1	F1H1E223A050
C506	ECUVNJ474KBV	63V 0.47U	1	F1H0J474A002
C507	ECEA0JKS331	6.3V 330U	1	
C508	ECUVNJ474KBV	63V 0.47U	1	F1H0J474A002
C509	ECUVNH103KBV	50V 0.01U	1	F1H1H103A748
C510,11	ECUZNC104ZFV	16V 0.1U	2	F1H1C1040008
C514	ECUV1H102KBV	50V 1000P	1	
C515	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
C517	ECUVNA105ZFV	10V 1U	1	F1H1A105A030
C525	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
C603,04	ECUV1H272KBV	50V 2700P	2	
C610	ECA0JAK470XH	6.3V 47U	1	
C701	ECEA0JPD470I	6.3V 47U	1	
C702	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008

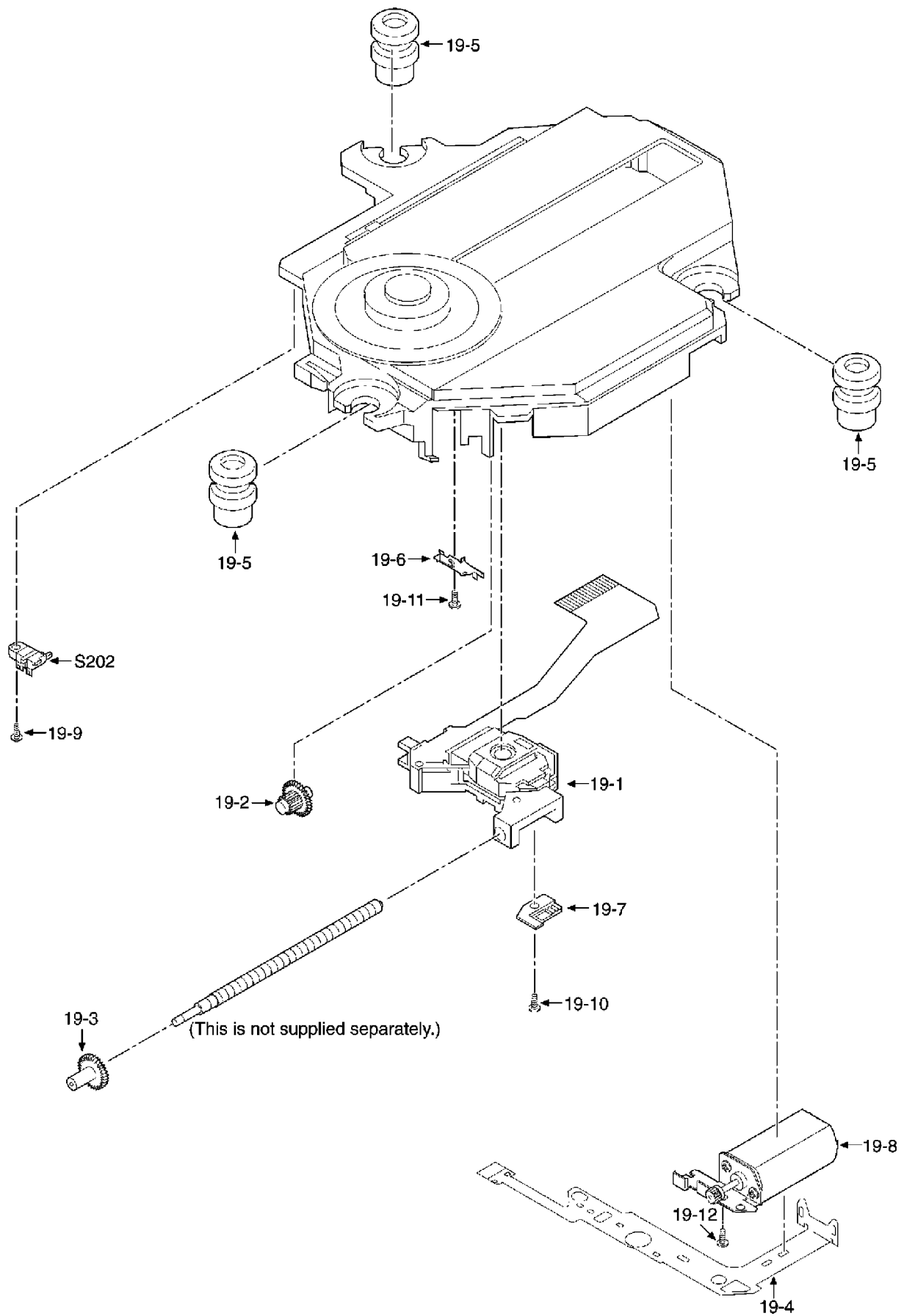
Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
C705,06	ECEA0GKS221	4V 220U	2	
C711,12	ECUVNA105KEV	10V 1U	2	F1H1A105A028
CN11	RJH8303-3	BATTERY TERMINAL	1	
CN101	RJS2A6216T	CONNECTOR (16P)	1	K1MN16B00027
CN301	RJS2A6130T	CONNECTOR (30P)	1	K1MN30A00023
CN401	RJS2A5106T1	CONNECTOR (6P)	1	K1MN06A00021
CX10	ECUV1H121KCV	50V 120P	1	
D901	DAN202UT106	DIODE	1	B0ADCJ000012
DX23	MA8056M	DIODE	1	MAZ80560M
IC11	C0DBFFB00002	IC	1	
IC12	C0EBB0000030	IC	1	
IC101	AN8885SBE1V	IC	1	
IC301	C2BBFD000279	IC	1	
IC501	MN662786SB	IC	1	
IC502	M51V4256A7JR	IC	1	
IC701	NJU7082BVAE1	IC	1	
ICP11	RSFPB20ET-L	IC PROTECTOR	1	K5H102Z00002 △
JK11	RJJ43K09-C	JACK,DC IN	1	K2EB2B000006
JK701	K2HC104B0013	JACK,HEADPHONE	1	
L11	RLQU331KT-W	COIL	1	G1C331K00004
L12	RLQS101KT1-D	COIL	1	G1A101C00001
L13	RLQU331KT-W	COIL	1	G1C331K00004
L14	RLQU101KT-W	COIL	1	G1C101K00008
LCD301	L5ACACB00007	LCD	1	
P1	RPN1436	TRAY	1	SL-SX228
P2	RPN1437	LID	1	SL-SX228
P3	RPQ1200	PAD	1	SL-SX228
P4	RPF0111	PROTECTION BAG (UNIT)	1	SL-SX228
P11	RPK1534	PACKING CASE	1	SL-SX230 (A)
P11	RPK1533	PACKING CASE	1	SL-SX230 (S)
P12	RPQ0836-1	PAD	1	SL-SX230
P13	RPQ0924	PAD	1	
P14	RPQ0966	PAD	1	SL-SX230
P15	RPF0046	PROTECTION BAG (F.B.)	1	SL-SX230
P16	RPF0111	PROTECTION BAG (UNIT)	1	SL-SX230
PCB1	REP3113C-M	MAIN P.C.B.ASS'Y	1	(RTL)
Q11	2SB1132T100	TRANSISTOR	1	B1ADMD000007
Q12	B1ABMD000004	TRANSISTOR	1	
Q13	DTC143EUA106	TRANSISTOR	1	B1GBCFGG0011
Q14	UN5214TX	TRANSISTOR	1	UNR521400L
Q15	DTC143ZUA106	TRANSISTOR	1	B1GBCFGN0004
Q31	B1CDGD000001	TRANSISTOR	1	
Q201	2SB709ASTX	TRANSISTOR	1	2SB0709ASL
Q502	2SK1958T1	TRANSISTOR	1	B1CFHA000001
Q701	XN0F26200L	TRANSISTOR	1	
Q703	FMG6AT148	TRANSISTOR	1	B1GBCEJA0001
Q901	DTA114YUA106	TRANSISTOR	1	B1GDCFN00011
Q902	FMG6AT148	TRANSISTOR	1	B1GBCEJA0001
R10	ERJ3GEYJ102V	1/16W 1K	1	ERJ3GEYJ102Z
R14	ERJ3GEYJ473V	1/16W 47K	1	D0GB473JA002
R15	ERJ3GEYJ104Z	1/16W 100K	1	
R17	ERJ12YJ2R7H	1/2W 2.7	1	
R18	ERJ3GEYJ104Z	1/16W 100K	1	
R19	ERJ3GEYJ102V	1/16W 1K	1	ERJ3GEYJ102Z
R20	ERJ3GEYJ822V	1/16W 8.2K	1	D0GB822JA002
R22	ERJ3GEYJ223V	1/16W 22K	1	D0GB223JA002
R28	ERJ3GEYJ271V	1/16W 270	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
R31	ERJ3GEYJ473V	1/16W 47K	1	D0GB473JA002
R34	ERJ3GEYJ333V	1/16W 33K	1	D0GB333JA002
R120	ERJ3GEYJ103Z	1/16W 10K	1	
R121,22	ERJ3GEYJ124V	1/16W 120K	2	D0GB124JA002
R128	EXBV4V103JV	1/32W 10K	1	
R201	ERJ3GEYJ2R2V	1/16W 2.2	1	D0GB2R2JA002
R202	ERJ3GEYJ223V	1/16W 22K	1	D0GB223JA002
R301,02	ERJ3GEYJ104Z	1/16W 100K	2	
R304	ERJ3GEYJ105V	1/16W 1M	1	
R305	ERJ3GEYJ335V	1/16W 3.3M	1	
R306	EXBV8V473JV	1/16W 47K	1	
R307	ERJ3GEYJ103Z	1/16W 10K	1	
R308	ERJ3GEYJ104Z	1/16W 100K	1	
R312	ERJ3GEYJ104Z	1/16W 100K	1	
R313	EXBV8V104JV	1/16W 100K	1	
R321,22	ERJ3GEYJ104Z	1/16W 100K	2	
R325	ERJ3GEYJ333V	1/16W 33K	1	D0GB333JA002
R332	ERJ3GEYJ102V	1/16W 1K	1	ERJ3GEYJ102Z
R353	ERJ3GEYJ102V	1/16W 1K	1	ERJ3GEYJ102Z
R501	ERJ3GEYJ683V	1/16W 68K	1	D0GB683JA002
R502	ERJ3GEYJ563V	1/16W 56K	1	
R505	ERJ3GEYJ151V	1/16W 150	1	
R506	ERJ3GEYJ222V	1/16W 2.2K	1	
R508	ERJ3GEYJ1R0V	1/16W 1	1	
R511	ERJ3GEYJ222V	1/16W 2.2K	1	
R512	EXBV4V222JV	1/32W 2.2K	1	
R513	ERJ3GEYJ104Z	1/16W 100K	1	
R514	ERJ3GEYJ331V	1/16W 330	1	
R516	ERJ3GEYJ181V	1/16W 180	1	
R517	ERJ3GEYJ104Z	1/16W 100K	1	
R603	EXBV4V561JV	1/32W 560	1	
R701,02	ERJ3GEYJ104Z	1/16W 100K	2	
R703,04	ERJ3GEYJ180V	1/16W 18	2	
R705,06	ERJ3GEYJ1R5V	1/16W 1.5	2	
R707,08	ERJ3GEYJ102V	1/16W 1K	2	ERJ3GEYJ102Z
R709	EXBV4V332JV	1/32W 3.3K	1	
R713,14	ERJ3GEYJ103Z	1/16W 10K	2	
R715,16	ERJ3GEYJ123V	1/16W 12K	2	
R750	EXBV4V123J	1/32W 12K	1	D1H412320001
RJ301	ERJ3GEY0R00V	1/16W 0	1	
RJ501	EXBV8VR000V	1/8W 0	1	
RJ503	ERJ3GEY0R00V	1/16W 0	1	
RJ552	ERJ3GEY0R00V	1/16W 0	1	
RX906	ECUZNC104ZFV	16V 0.1U	1	F1H1C1040008
S201	ESE11SV6	SW,LASER ON/OFF	1	
S202	ESE11HS4	SW,REST DET.	1	
S310	RSS2A010-1A	SW,HOLD	1	K0D112B00071
X301	RSXC32K7L01T	OSCILLATOR	1	
X501	H2D169500011	OSCILLATOR	1	

15 Cabinet Parts Location

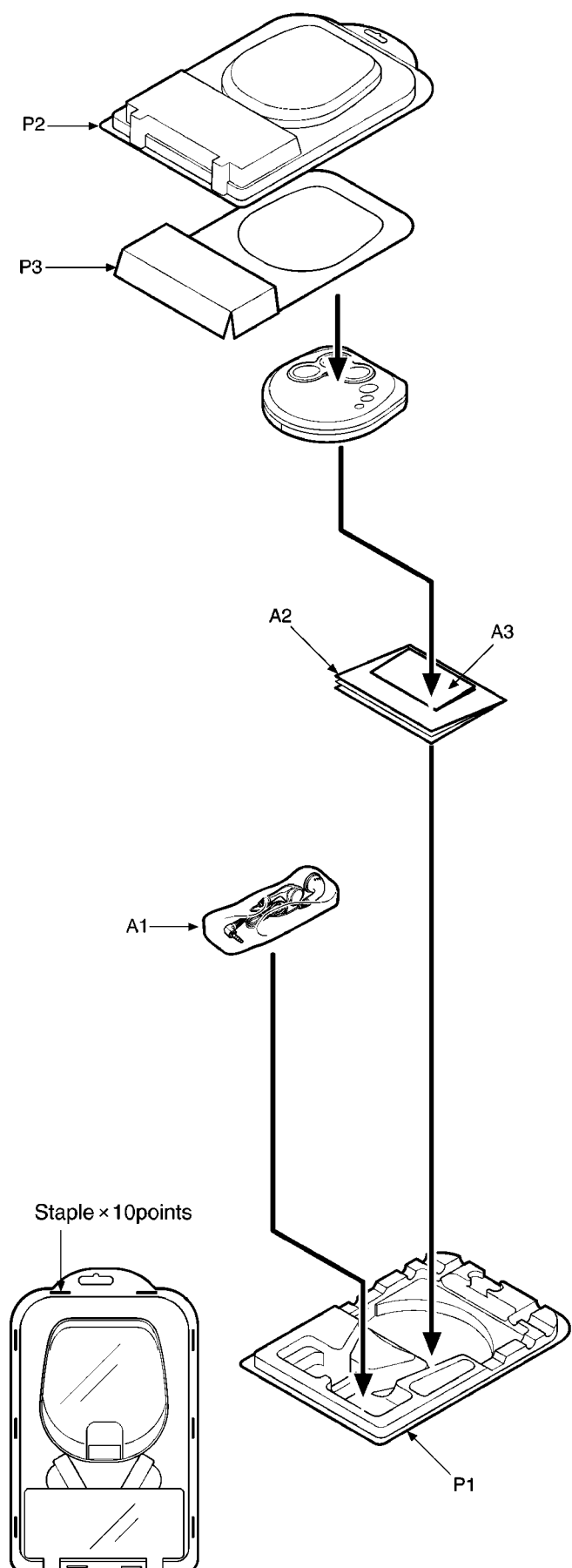


16 Traverse Parts Location



17 Packaging

SL-SX228(E)



SL-SX230(EG)

