

MDS-SD1

SERVICE MANUAL

Self Diagnosis
Supported model

AEP Model
UK Model
E Model



MDS-SD1 is the minidisc deck that can be used only with section CMT-SD1/SD3.

US and foreign patents licensed from Dolby Laboratories Licensing Corporation.

Model Name Using Similar Mechanism	MDS-JE520
MD Mechanism Type	MDM-5A
Base Unit Type	MBU-5A
Optical Pick-up Type	KMS-260A/J1N

SPECIFICATIONS

System	MiniDisc digital audio system
Laser	Semiconductor laser ($\lambda=780$ nm) Emission duration: continuous
Laser output	Max. 44.6 μ W* *This output is the value measured at a distance of 200 mm from the objective lens surface on the Optical Pick-up Block with a 7 mm aperture.
Recording time	74 minutes max. (using MDW-74, stereo) 148 minutes max. (using MDW-74, monaural)
Sampling frequency	44.1 kHz
Frequency response	20 - 20,000 Hz
Input	CD IN: Optical DIGITAL OPTICAL IN: Optical MD WM LINK CONTROL I
Output	DIGITAL OUT: Optical

General

Power requirements	
European model:	230 V AC, 50/60 Hz
Other models:	220 - 240 V AC, 50/60 Hz
Power consumption	10 W (Normal)
Dimensions	190 x 91 x 315 mm (w/h/d, incl. projecting parts and controls)
Mass	Approx. 2.4 kg
Supplied accessories	Optical digital cord (1) Audio cords (2) System cable (1) MD Walkman cable (1)
Designs and specifications are subject to change without notice	

MINIDISC DECK

SONY[®]

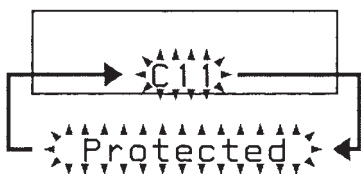


SELF-DIAGNOSIS FUNCTION

The self-diagnosis function consists of error codes for customers which are displayed automatically when errors occur, and error codes which show the error history in the test mode during servicing. For details on how to view error codes for the customer, refer to the following box in the instruction manual. For details on how to check error codes during servicing, refer to the following "Procedure for using the Self-Diagnosis Function (Error History Display Mode)".

Self-diagnosis Display

This system has the Self-diagnosis display function to let you know if there is a system malfunction. The display shows a code made up of three letters and a message alternately to show you the problem. To solve the problem refer to the following list. If any problem persists, consult your nearest Sony dealer.



C11 / Protected

The MD is protected against erasure.
→Remove the MD and slide the tab to close the slot (page 16).

C12 / Cannot Copy

The MD is an incompatible format type.
→Change the MD with another one.

C13 / REC Error

Recording is not possible.
→Move the system to a stable place and start recording over from the beginning.
The MD is dirty or is scratched or the MD does not meet the standards.
→Change the MD with another one and start recording over from the beginning.

C13 / Read Error

The MDS-SD1 cannot read the disc information correctly.
→Eject the MD once, then insert it again.

C14 / Toc Error

The MDS-SD1 cannot read the disc information correctly.
→Change the MD with another one.
→Erase all the recorded contents of the MD using the Erase function on page 29.

C41 / Cannot Copy

This unit complies with the Serial Copy Management System (SCMS) which limits the number of digital copies that can be made of any given digital audio source (page 44).

C71 / Check OPT-IN

You tried to record from the digital component when no component is connected to AUX IN 2 jack or the digital component is not connected correctly.
→Connect the digital component correctly to AUX IN 2 jack with a digital optical cable.
The power of the connected digital component is off.
→Turn on the digital component.

Procedure for using the Self-Diagnosis Function (Error History Display Mode).

Note: Perform the self-diagnosis function in the "error history display mode" in the test mode. The following describes the least required procedure. Be careful not to enter other modes by mistake. If you set other modes accidentally, press the **[MENU/NO]** button to exit the mode.

1. While pressing the **[ENTER/YES]** button and **[]** button, connect the power plug to the outlet, and release the **[ENTER/YES]** button and **[]** button.
2. "TEMP CHECK" will be displayed. Press the **[MENU/NO]** button to display "Check".
3. Rotate the **[←↔→+]** knob and when "[Service]" is displayed, press the **[ENTER/YES]** button.
4. Rotate the **[←↔→+]** knob and display "ERR DP MODE".
5. Pressing the **[ENTER/YES]** button sets the error history mode and displays "total rec".
6. Select the contents to be displayed or executed using the **[←↔→+]** knob.
7. Pressing the **[CD SYNC/MD WM SYNC]** button will display or execute the contents selected.
8. Pressing the **[CD SYNC/MD WM SYNC]** button another time returns to step 5.
9. Pressing the **[MENU/NO]** button displays "ERROR DP MODE" and exits the error history mode.
10. To exit the test mode, press the **[I/⏻]** button. The unit sets into the STANDBY state, the disc is ejected, and the test mode ends.

ITEMS OF ERROR HISTORY MODE ITEMS AND CONTENTS

Selecting the Test Mode

Display	Details of History
total rec	Displays the recording time. Displayed as "r□□□□□h". The displayed time is the total time the laser is set to the high power state. This is about 1/4 of the actual recording time. The time is displayed in decimal digits from 0h to 65535h.
total play	Displays the play time. Displayed as "p□□□□□h". The time displayed is the total actual play time. Pauses are not counted. The time is displayed in decimal digits from 0h to 65535h.
retry err	Displays the total number of retries during recording and number of retry errors during play. Displayed as "r□□ p□□". "r" indicates the retries during recording while "p" indicates the retry errors during play. The number of retries and retry errors are displayed in hexadecimal digits from 00 to FF.
total err	Displays the total number of errors. Displayed as "total □□". The number of errors is displayed in hexadecimal digits from 00 to FF.
err history	Displays the 10 latest errors. Displayed as "0□ E@@". □ indicates the history number. The smaller the number, the more recent is the error. (00 is the latest). @@ indicates the error code. Refer to the following table for the details. The error history can be switched by rotating the <input type="text" value="- ← → +"/> knob.
er refresh	Mode which erases the "retry err", "total err", and "err history" histories. When returning the unit to the customer after completing repairs, perform this to erase the past error history. After pressing the <input type="text" value="CD SYNC/MD WM SYNC"/> button and "er refresh?" is displayed, press the <input type="text" value="ENTER/YES"/> button to erase the history. "Complete!" will be displayed momentarily. Be sure to check the following when this mode has been executed. <ul style="list-style-type: none"> • The data has been erased. • The mechanism operates normally when recording and play are performed.
tm refresh	Mode which erases the "total rec" and "total play" histories. These histories serve as approximate indications of when to replace the optical pickup. If the optical pickup has been replaced, perform this operation and erase the history. After pressing the <input type="text" value="CD SYNC/MD WM SYNC"/> button and "tm refresh?" is displayed, press the <input type="text" value="ENTER/YES"/> button to erase the history. "Complete!" will be displayed momentarily. Be sure to check the following when this mode has been executed. <ul style="list-style-type: none"> • The data has been erased. • The mechanism operates normally when recording and play are performed.

Table of Error Codes

Error Code	Details of Error	Error Code	Details of Error
E00	No error	E05	FOK has deviated
E01	Disc error. PTOC cannot be read (DISC ejected)	E06	Cannot focus (Servo has deviated)
		E07	Recording retry
E02	Disc error. UTOC error (DISC not ejected)	E08	Recording retry error
		E09	Playback retry error (Access error)
E03	Loading error		
E04	Address cannot be read (Servo has deviated)	E0A	Play retry error (C2 error)

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the equipment manufacturer.
Discard used batteries according to manufacture's instructions.

ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

ADVARSEL

Eksplosjonsfare ved feilaktig skifte av batteri.
Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
Brukte batterier katterier kasseres i henhold til fabrikantens

VARNIG

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

VAROITUS

Parist voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitätä käytetty paristo valmistajan ohjeiden mukaisesti.

Laser component in this product is capable of emitting radiation exceeding the limit for Class 1.

CLASS 1 LASER PRODUCT
LUOKAN 1 LASERLAITE
KLASS 1 LASERAPPARAT

This appliance is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT MARKING is located on the rear exterior.

CAUTION : INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.
ADVARSEL : USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSafbrydere er ude af funktion. Undgå udsættelse for stråling.
VORSICHT : UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEÖFFNET UND SICHERHEITSVERRIEGELUNG ÜBERBRÜCKT. NICHT DEM STRAHL AUSSETZEN.
VARO! : AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.
WARNING : OSYNLIG LASERSTRÅLING NÅR DENNA DEL ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD. BETRÄKTA EJ STRÅLEN.
ADVERSEL : USYNLIG LASERSTRÅLING NÅR DEKSEL ÅPNES OG SIKKERHEDSLÅS BRYTES. UNNGÅ EKSPONERING FOR STRÅLEN.
VIGYAZAT! : A BURKOLAT NYITÁSÁKOR LÁTHATATLAN LÉZERSUGÁRVESZÉLY! KERÜLJE A BESUGÁRZÁST!

This caution label is located inside the unit.

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Notes on chip component replacement

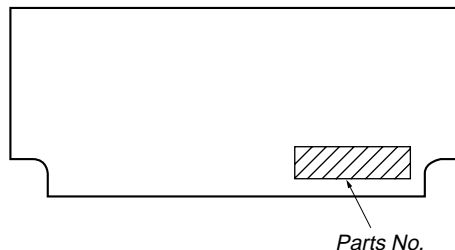
- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

Flexible Circuit Board Repairing

- Keep the temperature of soldering iron around 270°C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

MODEL IDENTIFICATION

– Specification Label –



MODEL	PARTS No.
AEP, UK model	4-212-572-1□
SP, HK model	4-212-572-2□

- Abbreviation
HK : Hong Kong model
SP : Singapore model

SAFETY-RELATED COMPONENT WARNING !!

COMPONENTS IDENTIFIED BY MARK \triangle OR DOTTED LINE WITH MARK \triangle ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

TABLE OF CONTENTS

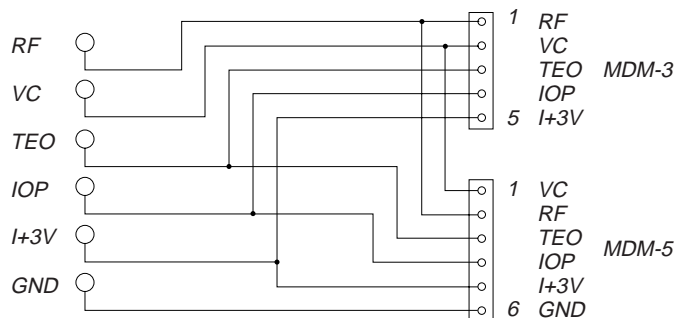
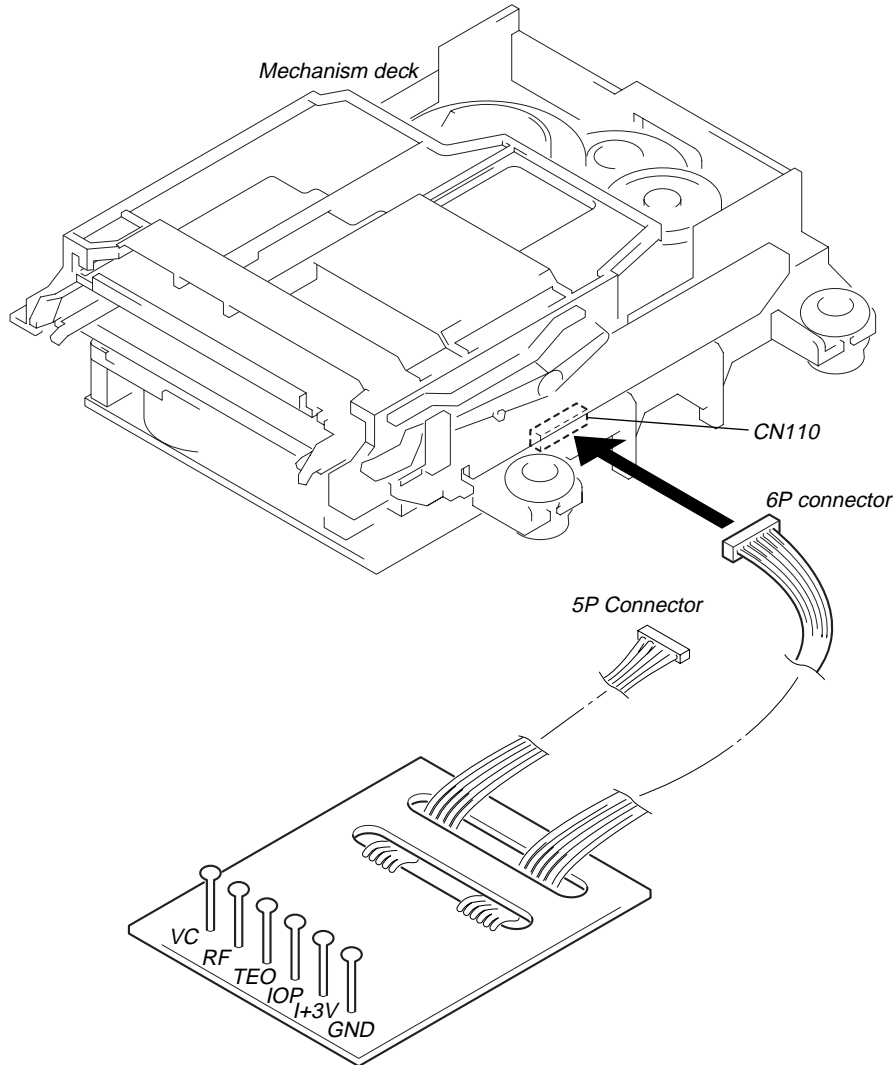
1. SERVICING NOTE	6
2. GENERAL	15
3. DISASSEMBLY	
3-1. Glass ASSY	16
3-2. Front Panel	16
3-3. Slider (CAM)	17
3-4. Base Unit and BD Board	17
3-5. SW Board and Loading Motor (M103)	18
4. TEST MODE	19
5. ELECTRICAL ADJUSTMENTS	23
6. DIAGRAMS	
6-1. Circuit Boards Location	32
6-2. Block Diagrams	
• BD Section	33
• Main Section	35
6-3. Printed Wiring Board – BD Section –	39
6-4. Schematic Diagram – BD (1/2) Section –	41
6-5. Schematic Diagram – BD (2/2) Section –	43
6-6. Schematic Diagram – Main (1/2) Section –	45
6-7. Schematic Diagram – Main (2/2) Section –	47
6-8. Printed Wiring Board – Main Section –	49
6-9. Schematic Diagram – Panel Section –	51
6-10. Printed Wiring Board – Panel Section –	53
6-11. Schematic Diagram – Connector Section –	55
6-12. Printed Wiring Board – Connector Section –	57
6-13. Schematic Diagram – BD Switch Section –	59
6-14. Printed Wiring Board – BD Switch Section –	59
6-15. Schematic Diagram – Encoder Section –	60
6-16. Printed Wiring Board – Encoder Section –	60
6-17. IC Block Diagrams	61
6-18. IC Pin Functions	64
7. EXPLODED VIEWS	
7-1. Case and Back Panel Section	67
7-2. Front Panel Section	68
7-3. Mechanism Section (MDM-5A)	69
7-4. Base Unit Section (MBU-5A)	70
8. ELECTRICAL PARTS LIST	71

SECTION 1 SERVICING NOTE

JIG FOR CHECKING BD BOARD WAVEFORM

The special jig (J-2501-149-A) is useful for checking the waveform of the BD board. The names of terminals and the checking items to be performed are shown as follows.

- GND : Ground
- I+3V : For measuring IOP (Check the deterioration of the optical pick-up laser)
- IOP : For measuring IOP (Check the deterioration of the optical pick-up laser)
- TEO : TRK error signal (Traverse adjustment)
- RF : RF signal (Check jitter)
- VC : Reference level for checking the signal



IOP DATA RECORDING AND DISPLAY WHEN PICKUP AND NON-VOLATILE MEMORY (IC171 OF BD BOARD) ARE REPLACED

The IOP value labeled on the pick-up can be recorded in the non-volatile memory. By recording the value, it will eliminate the need to look at the value on the label of the optical pick-up. When replacing the pick-up or non-volatile memory (IC171 of BD board), record the IOP value on the pick-up according to the following procedure.

Record Procedure:

1. While pressing the **ENTER/YES** button and **[]** button, connect the power plug to the outlet, and release the **ENTER/YES** button and **[]** button.
2. "TEMP CHECK" will be displayed. Press the **MENU/NO** button to display "Check".
3. Rotate the **[- ↔ +]** knob to display "[Service]", and press the **ENTER/YES** button.
4. Rotate the **[- ↔ +]** knob to display "Iop.Write", and press the **ENTER/YES** button.
5. The display becomes "Ref=@@.@." (@ is an arbitrary number) and the numbers which can be changed will blink.
6. Input the IOP value written on the optical pick-up.
To select the number : Rotate the **[- ↔ +]** knob.
To select the digit : Press the **CD SYNC/MD WM SYNC** button.
7. When the **ENTER/YES** button is pressed, the display becomes "Measu=@@.@." (@ is an arbitrary number).
8. As the adjustment results are recorded for the step 6 value. Leave it as it is and press the **ENTER/YES** button.
9. "Complete!" will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become "Iop Write".
10. Press the **I/O** button to complete. "Standby" will be displayed.

Display Procedure:

1. While pressing the **ENTER/YES** button and **[]** button, connect the power plug to the outlet, and release the **ENTER/YES** button and **[]** button.
2. "TEMP CHECK" will be displayed. Press the **MENU/NO** button to display "Check".
3. Rotate the **[- ↔ +]** knob to display "[Service]", and press the **ENTER/YES** button.
4. Rotate the **[- ↔ +]** knob to display "Iop.Read".
5. "@@.@/##.#" is displayed and the recorded contents are displayed.
@@.@ : indicates the Iop value labeled on the pick-up.
##.# : indicates the Iop value after adjustment
6. To end, press the **CD SYNC/MD WM SYNC** button or **MENU/NO** button to display "Iop Read". Then press the **I/O** button to display "Standby".

CHECKS PRIOR TO PARTS REPLACEMENT AND ADJUSTMENTS

Before performing repairs, perform the following checks to determine the faulty locations up to a certain extent. Details of the procedures are described in “5 Electrical Adjustments”.

	Criteria for Determination (Unsatisfactory if specified value is not satisfied)	Measure if unsatisfactory:
Laser power check (5-6-2 : See page 25)	<ul style="list-style-type: none"> 0.9 mW power Specified value : 0.84 to 0.92 mW 7.0 mW power Specified value : 6.8 to 7.2 mW 	<ul style="list-style-type: none"> Clean the optical pick-up Adjust again Replace the optical pick-up
	<ul style="list-style-type: none"> Iop (at 7mW) Labeled on the optical pickup Iop value \pm 10mA 	<ul style="list-style-type: none"> Replace the optical pick-up
Traverse check (5-6-3 : See page 25)	<ul style="list-style-type: none"> Traverse waveform Specified value : Below 10% offset 	<ul style="list-style-type: none"> Replace the optical pick-up
Focus bias check (5-6-4 : See page 26)	<ul style="list-style-type: none"> Error rate check Specified value : For points a, b, and c C1 error : Below 220 AD error : Below 2 	<ul style="list-style-type: none"> Replace the optical pick-up
C PLAY check (5-6-5 : See page 26)	<ul style="list-style-type: none"> Error rate check Specified value: a. When using test disc (MDW-74/AU-1) C1 error : Below 80 AD error : Below 2 b. When using check disc (TDYS-1) C1 error : Below 50 	<ul style="list-style-type: none"> Replace the optical pick-up
Self-recording/playback check (REC/PLAY) (5-6-6 : See page 26)	<ul style="list-style-type: none"> CPLAY error rate check Specified value: C1 error : Below 80 AD error : Below 2 	If always unsatisfactory: <ul style="list-style-type: none"> Replace the overwrite head Check for disconnection of the circuits around the overwrite head
		If occasionally unsatisfactory: <ul style="list-style-type: none"> Check if the overwrite head is distorted Check the mechanism around the sled
TEMP check (Temperature compensation offset check) (5-6-1 : See page 25)	<ul style="list-style-type: none"> Unsatisfactory if displayed as T=@@ (##) [NG]” NG (@@, ## are both arbitrary numbers) 	<ul style="list-style-type: none"> Check for disconnection of the circuits around D101 (BD board) Check the signals around IC101, IC121, CN102, CN103 (BD board)

Note:

The criteria for determination above is intended merely to determine if satisfactory or not, and does not serve as the specified value for adjustments.

When performing adjustments, use the specified values for adjustments.

FORCED RESET

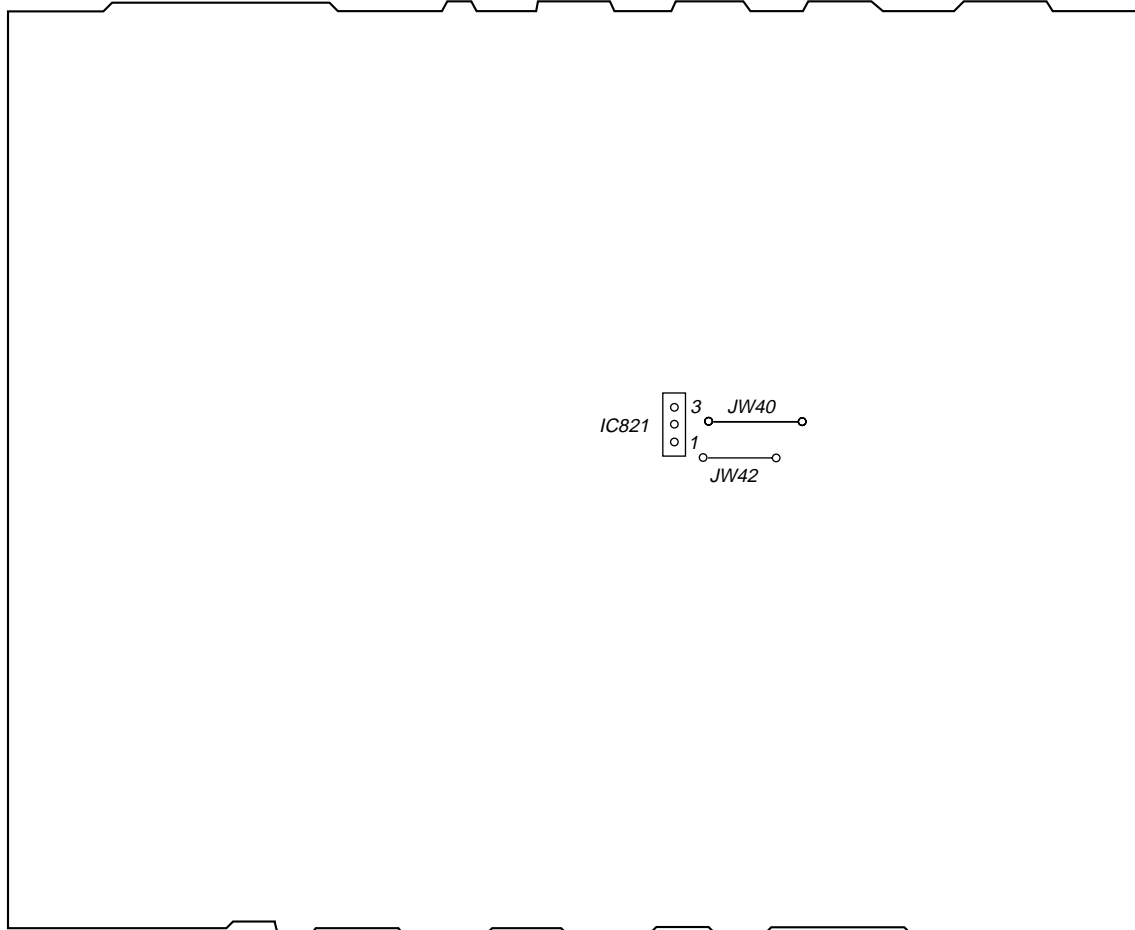
The system microprocessor can be reset in the following procedure.

Use these procedure when the unit cannot be operated normally due to the overrunning of the microprocessor, etc.

Procedure :

Short-circuit jumper wire of JW40 and JW41 (RESET).

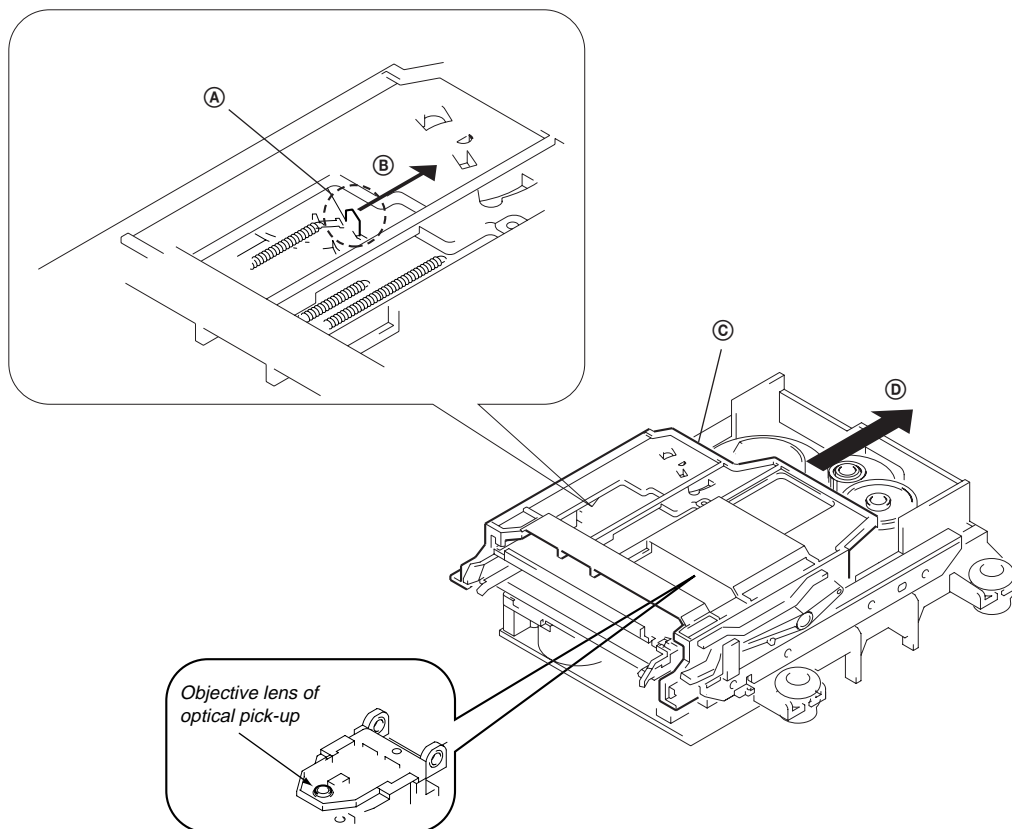
[MAIN BOARD] (Component Side)



CLEANING OF OBJECTIVE LENS OF OPTICAL PICKUP

- When cleaning the objective lens of the optical pickup, move the mechanism deck using the following method.

- ① If a disc is inside, eject it out.
- ② Disconnect the power cord from the outlet, and set the non-conducted state.
- ③ Using a pair of tweezers, while pulling the claw at **(A)** towards **(B)**, move part **(C)** in direction **(D)**.
- ④ Move part **(C)** to a position which allows it to be cleaned easily, and clean.

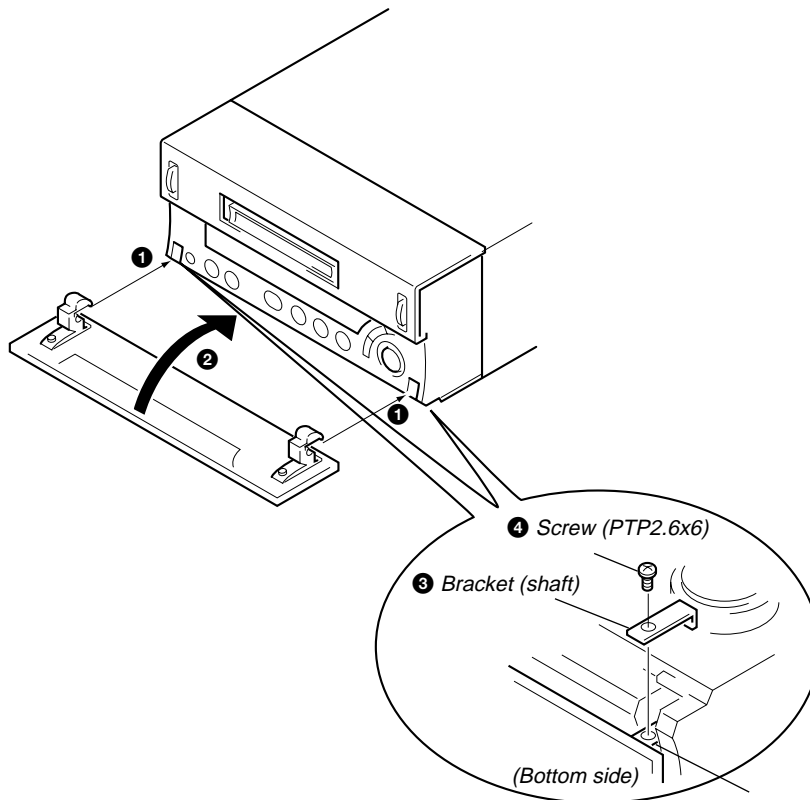


FLUORESCENT INDICATOR TUBE AND MECHANISM DECK

- The fluorescent indicator tube will not display anything if the mechanism deck is not connected to the MAIN board. Before servicing, check the connection of the cables connecting these parts first.

ATTACHING THE GLASS ASSEMBLY

- Attach according to steps ① to ④.



When fixing this part, secure at the center to allow for some play. Open and close the glass window several times, and check that the parts do not touch each other.

FLUORESCENT INDICATOR TUBE, LED COMPLETE LIGHTING CHECK

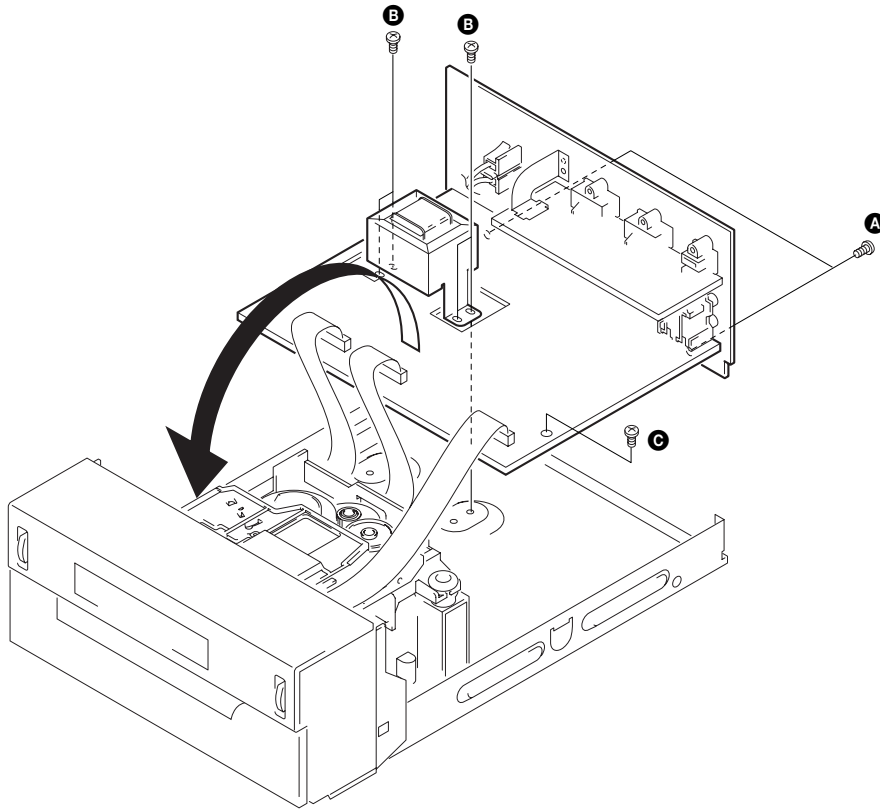
- The fluorescent indicator tube and LED complete lighting and key check mode of this unit can be performed as follows.

Procedure:

1. While pressing the **ENTER/YES** and **●REC** buttons, insert the power plug into the outlet, and turn ON the power.
2. "FL All On Key" will be displayed momentarily, after which immediately the fluorescent indicator tube and LED will light up completely.
3. The fluorescent display tube will go off part by part each time a button is pressed. When all buttons have been pressed, "Push Yen" will be displayed.
4. When the **ENTER/YES** button is pressed next, "Seg Chk" will be displayed momentarily.
5. Checkered pattern will be displayed on the fluorescent display tube.
6. When the **ENTER/YES** button is pressed next, "Jog & LED Chk" will be displayed.
7. The LED lighting state changes each time the **- ↔ +** knob is rotated.
(The LED will stop reacting after the knob has been rotated to some extent. This is not a fault.)
8. When the **ENTER/YES** button is pressed, "Check End" will be displayed on the fluorescent indicator tube, and the check mode ends.

SERVICING POSITION

- 1 Remove the four screws securing the upper cover, and remove the upper cover.
- 2 Undo the bound cables.
- 3 Remove the two screws **A** securing the rear panel.
- 4 Remove the four screws **B** securing the transformer.
- 5 Remove the screw **C** securing the MAIN board.
- 6 Remove the MAIN board with the rear panel.



RETRY CAUSE DISPLAY MODE

- In this test mode, the causes for retry of the unit during recording can be displayed on the fluorescent indicator tube. During playback, the “track mode” for obtaining track information will be set. This is useful for locating the faulty part of the unit.
- The following will be displayed :
 - During recording and stop : Retry cause, number of retries, and number of retry errors.
 - During playback : Information such as type of disc played, part played, copyright.
 These are displayed in hexadecimal.

Precedure:

- Load a recordable disc whose contents can be erased into the unit.
- Press the **MENU/NO** button. When “Edit/Menu” is displayed on the fluorescent indicator tube, rotate the **← ↔ +** knob to display “All Erase?”.
- Press the **ENTER/YES** button.
- When “All Erase??” is displayed on the fluorescent indicator tube.
- Press the **ENTER/YES** button to display “Complete!!”, and press the **□** button immediately. Wait for about 15 seconds while pressing the button.
- When the “TOC” displayed on the fluorescent indicator tube goes off, release the **□** button.
- Press the **● REC** button to start recording. Then press the **▶|||** button and start recording.
- To check the “track mode”, press the **▶|||** button to start play.
- To exit the test mode, press the **I/O** button, and turn OFF the power. When “TOC” disappears, disconnect the power plug from the outlet. If the test mode cannot be exited, refer to “Forced Reset” on page 8.

Fig. 1 Reading the Test Mode Display (During recording and stop)

RTs@@c##c**
Fluorescent display tube display

@@ : Cause of retry
: Number of retries
** : Number of retry errors

Fig. 2 Reading the Test Mode Display (During playback)

@ @####\$\$**
Fluorescent display tube display

@@ : Parts No. (name of area named on TOC)
: Cluster } Address (Physical address on disc)
** : Sector }
\$\$: Track mode (Track information such as copyright information of each part)

Reading the Retry Cause Display

Hexadecimal	Higher Bits				Lower Bits				Hexadecimal	Cause of Retry	Occurring conditions
	8	4	2	1	8	4	2	1			
Bit	b7	b6	b5	b4	b3	b2	b1	b0			
Binary	0	0	0	0	0	0	0	1	01	shock	When track jump (shock) is detected
	0	0	0	0	0	0	1	0	02	ader5	When ADER was counted more than five times continuously
	0	0	0	0	0	1	0	0	04	Discontinuous address	When ADIP address is not continuous
	0	0	0	0	1	0	0	0	08	DIN unlock	When DIN unlock is detected
	0	0	0	1	0	0	0	0	10	FCS incorrect	When not in focus
	0	0	1	0	0	0	0	0	20	IVR rec error	When ABCD signal level exceeds the specified range
	0	1	0	0	0	0	0	0	40	CLV unlock	When CLV is unlocked
	1	0	0	0	0	0	0	0	80	Access fault	When access operation is not performed normally

Reading the Display:

Convert the hexadecimal display into binary display. If more than two causes, they will be added.

Example

When 42 is displayed:
Higher bit : 4 = 0100 → b6
Lower bit : 2 = 0010 → b1
In this case, the retry cause is combined of “CLV unlock” and “ader5”.

When A2 is displayed:
Higher bit : A = 1010 → b7+b5
Lower bit : 2 = 0010 → b2
The retry cause in this case is combined of “access fault”, “IVR rec error”, and “ader5”.

Reading the Track Mode Display

Hexadecimal	Higher Bits				Lower Bits				Hexa- decimal	Details	
	8	4	2	1	8	4	2	1		When 0	When 1
Bit	b7	b6	b5	b4	b3	b2	b1	b0			
Binary	0	0	0	0	0	0	0	1	01	Emphasis OFF	Emphasis ON
	0	0	0	0	0	0	1	0	02	Monaural	Stereo
	0	0	0	0	0	1	0	0	04	This is 2-bit display. Normally 01.	
	0	0	0	0	1	0	0	0	08	01:Normal audio. Others:Invalid	
	0	0	0	1	0	0	0	0	10	Audio (Normal)	Invalid
	0	0	1	0	0	0	0	0	20	Original	Digital copy
	0	1	0	0	0	0	0	0	40	Copyright	No copyright
	1	0	0	0	0	0	0	0	80	Write prohibited	Write allowed

Reading the Display:

Convert the hexadecimal display into binary display. If more than two causes, they will be added.

Example When 84 is displayed:

Higher bit : 8 = 1000 → b7

Lower bit : 4 = 0100 → b2

In this case, as b2 and b7 are 1 and others are 0, it can be determined that the retry cause is combined of “emphasis OFF”, “monaural”, “original”, “copyright exists”, and “write allowed”.

Example When 07 is displayed:

Higher bit : 0 = 1000 → All 0

Lower bit : 7 = 0111 → b0+b1+b2

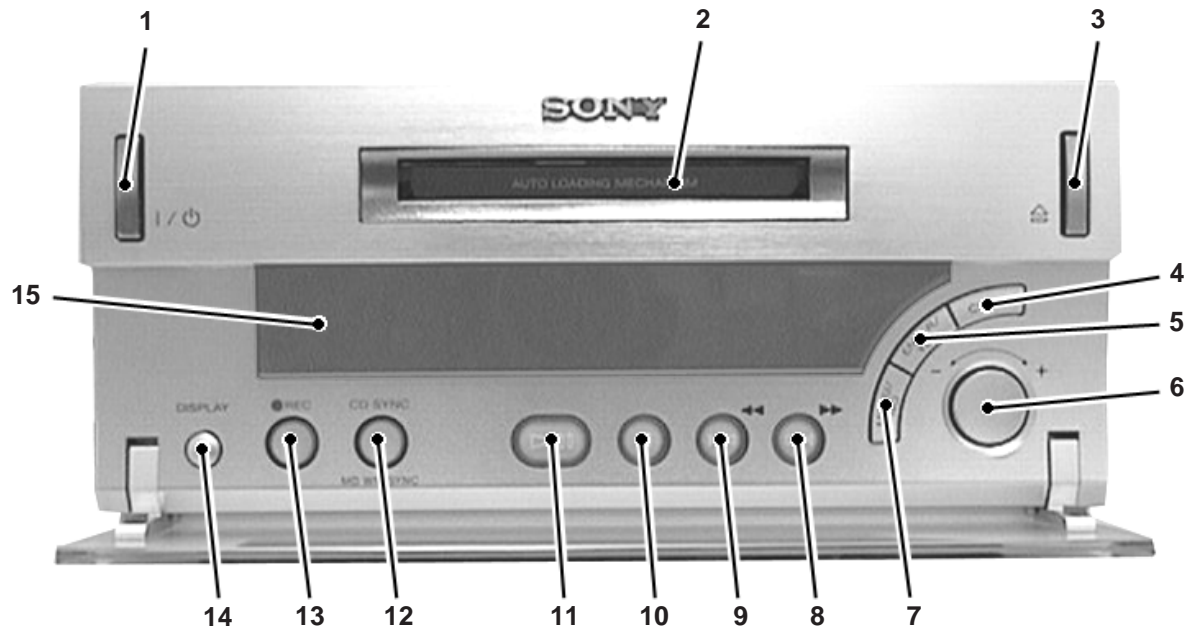
In this case, as b0, b1, and b2 are 1 and others are 0, it can be determined that the retry cause is combined of “emphasis ON”, “stereo”, “original”, “copyright exists”, and “write prohibited”.

Hexadecimal → Binary Conversion Table

Hexadecimal	Binary	Hexadecimal	Binary
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

SECTION 2 GENERAL

Front Panel



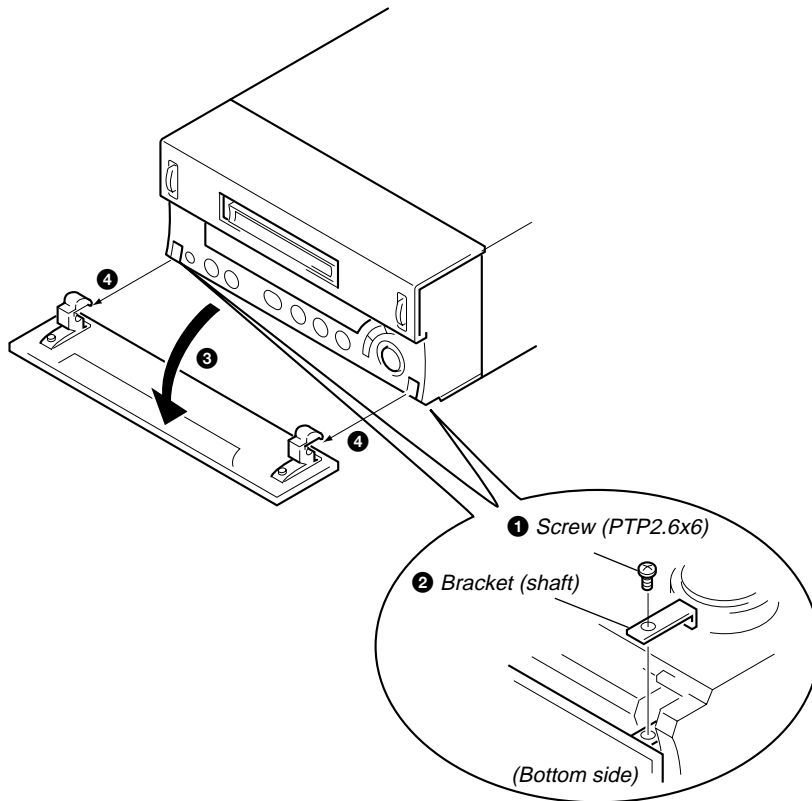
Location of Parts and Controls

- | | | | |
|---|---------------------|----|---------------------------|
| 1 | I/⏻ (Power) button | 9 | ⏮/⏪ button |
| 2 | MD disk compartment | 10 | □ button |
| 3 | ⏻ button | 11 | ⏩ button |
| 4 | CLEAR button | 12 | CD SYNC/MD WM SYNC button |
| 5 | ENTER/YES button | 13 | ● REC button |
| 6 | VOLUME knob | 14 | DISPLAY button |
| 7 | MENU/NO button | 15 | Display window |
| 8 | ⏩/⏭ button | | |

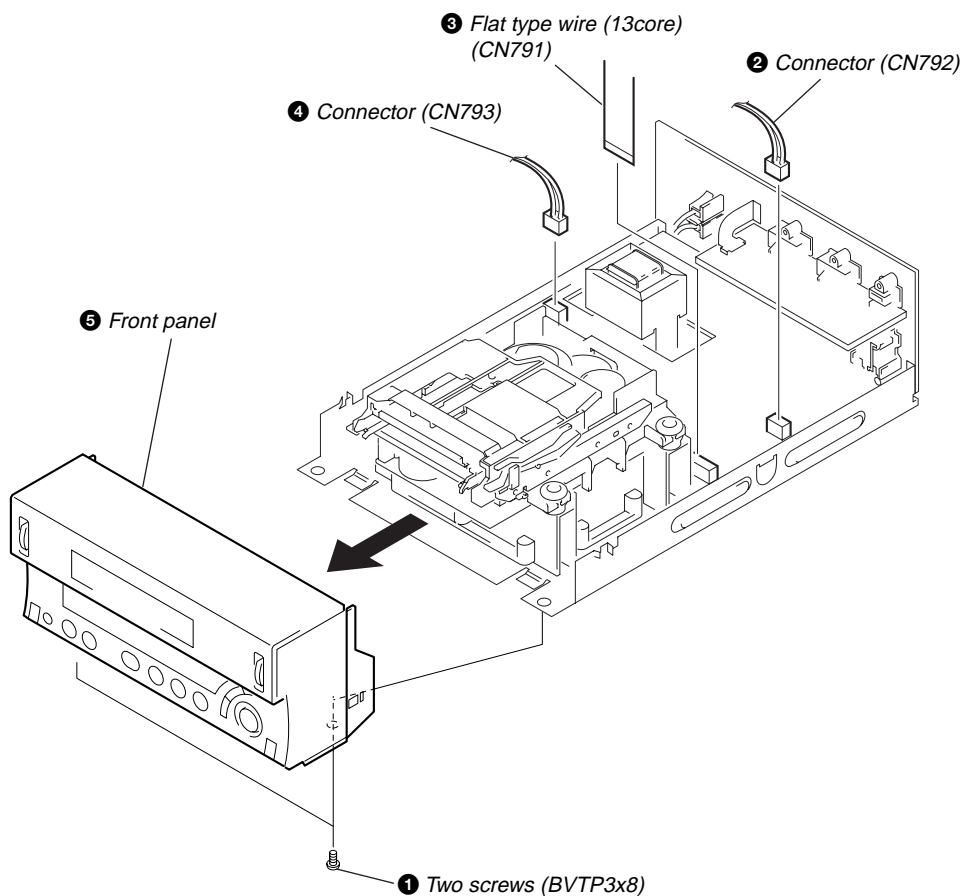
SECTION 3 DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

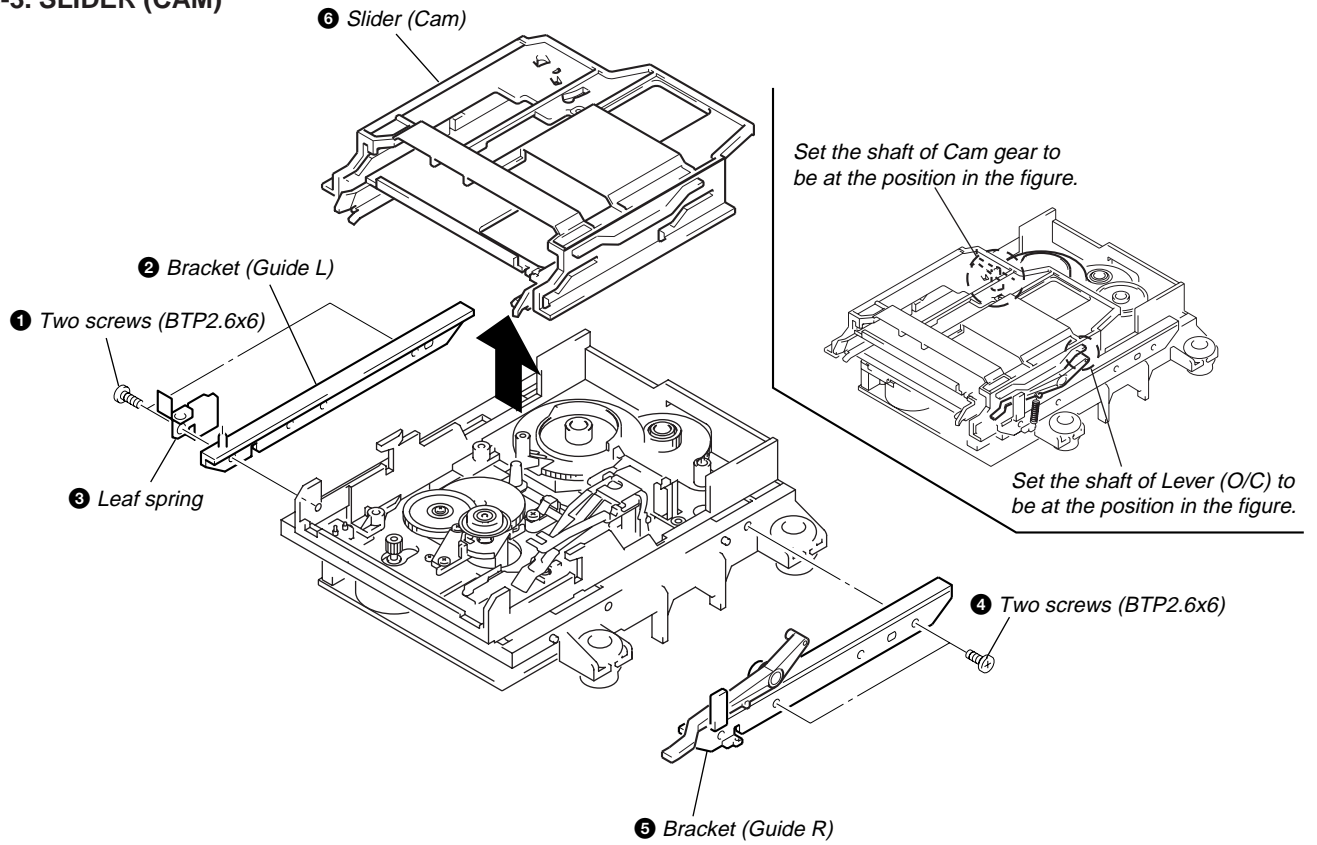
3-1. GLASS ASSY



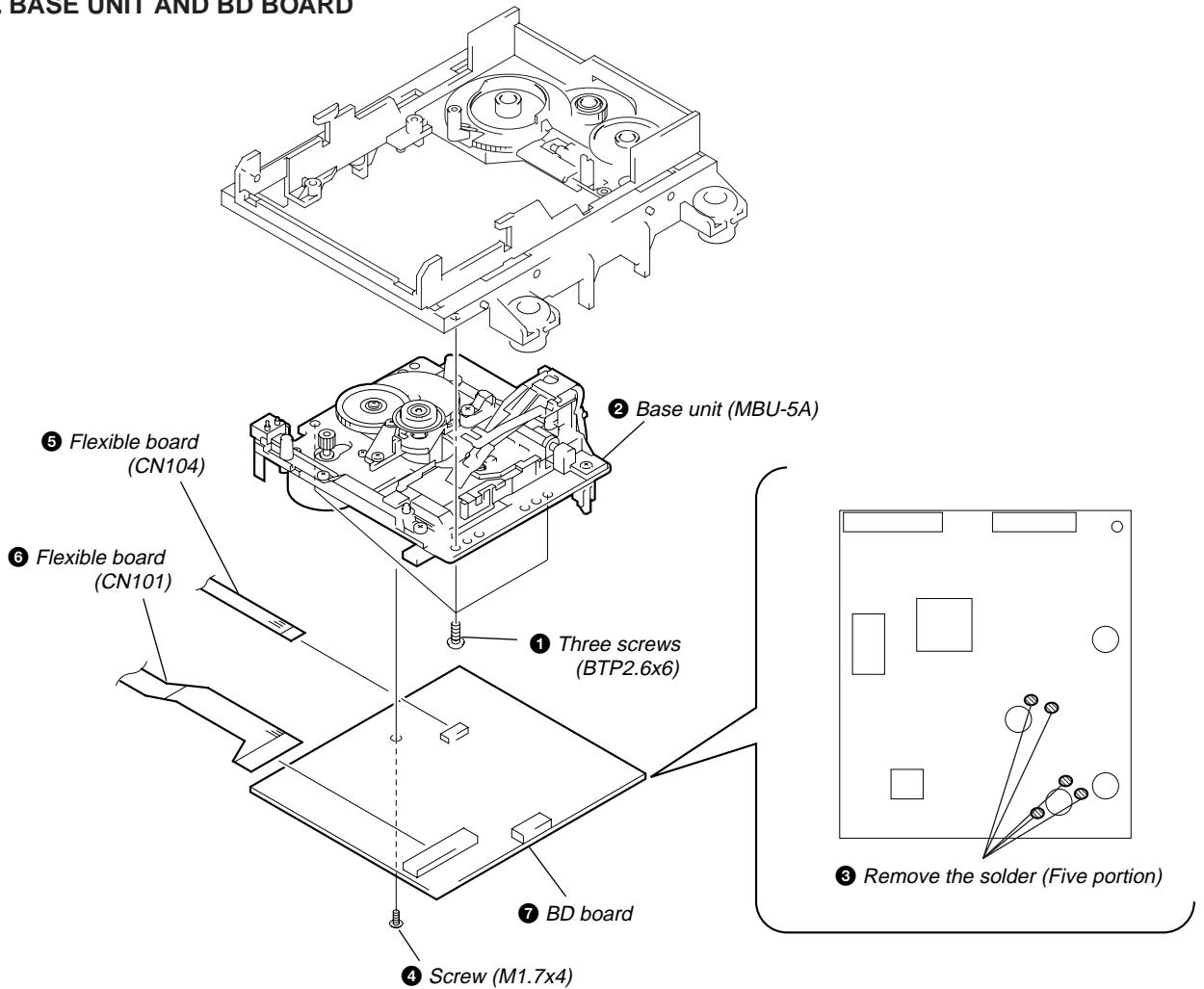
3-2. FRONT PANEL



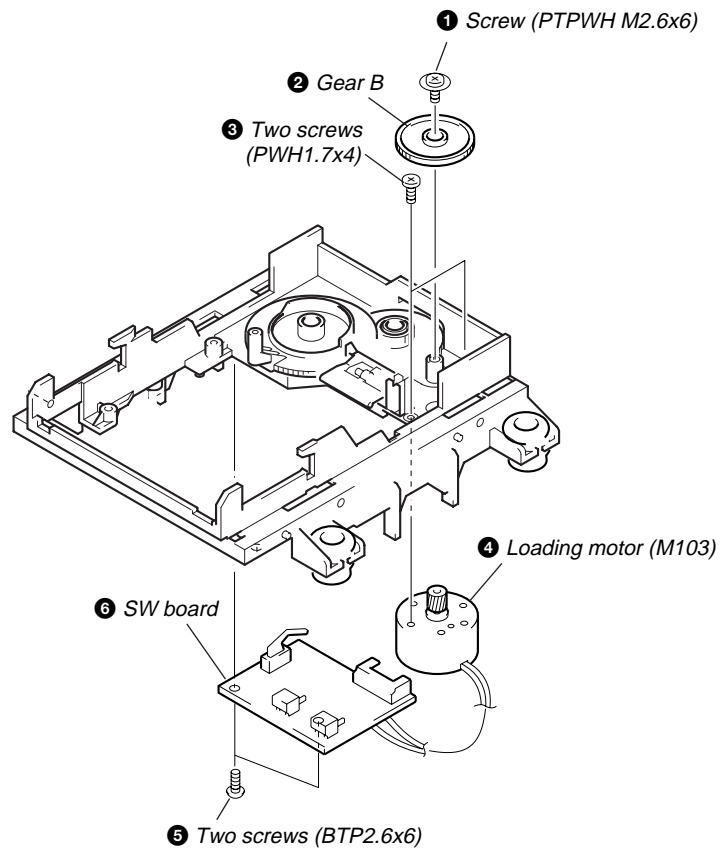
3-3. SLIDER (CAM)



3-4. BASE UNIT AND BD BOARD






3-5. SW BOARD AND LOADING MOTOR (M103)




SECTION 4 TEST MODE

4-1. PRECAUTIONS FOR USE OF TEST MODE





- As loading related operations will be performed regardless of the test mode operations being performed, be sure to check that the disc is stopped before setting and removing it.
Even if the  button is pressed while the disc is rotating during continuous playback, continuous recording, etc., the disc will not stop rotating.
Therefore, it will be ejected while rotating.
Be sure to press the  button after pressing the  button and the rotation of disc is stopped.

4-1-1. Recording laser emission mode and operating buttons







- Continuous recording mode (CREC MODE)
- Laser power check mode (LDPWR CHECK)
- Laser power adjustment mode (LDPWR ADJUST)
- Traverse (MO) check (EF MO CHECK)
- Traverse (MO) adjustment (EF MO ADJUST)
- When pressing the  button.


4-2. SETTING THE TEST MODE

The following are two methods of entering the test mode.

Procedure 1: While pressing the  button and  button, connect the power plug to an outlet, and release the  button and  button.


When the test mode is set “TEMP CHECK” will be displayed. Press the  button to display “Check”.

“[Check]” will be displayed. Rotating the  knob switches between the following four groups; ... Check  Adjust  Service  Develop  ...


Procedure 2: While pressing the  button, connect the power plug to the outlet and release the  button.

When the test mode is set, “TEMP CHECK” will be displayed. By setting the test mode using this method, only the “Check” group of method 1 can be executed.




4-3. EXITING THE TEST MODE

Press the  button in the mode other than “TEMP CHECK”. The disc is ejected when loaded, and “Standby” display blinks, and the STANDBY state is set.

4-4. BASIC OPERATIONS OF THE TEST MODE

All operations are performed using the  knob,  button, and  button.

The functions of these buttons are as follows.

Function name	Function
 knob	Changes parameters and modes
 button	Proceeds onto the next step. Finalizes input.
 button	Returns to previous step. Stops operations.

4-5. SELECTING THE TEST MODE

There are 31 types of test modes as shown below. The groups can be switched by rotating the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob. After selecting the group to be used, press the $\left[\text{ENTER/YES} \right]$ button. After setting a certain group, rotating the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob switches between these modes. Refer to “Group” in the table for details selected.

All items used for servicing can be treated using group S. So be carefully not to enter other groups by mistake.

Display	Contents	Mark	Group (*)
TEMP CHECK	Temperature compensation offset check		C S
LDPWR CHECK	Laser power check		C S
EF MO CHECK	Traverse (MO) check		C S
EF CD CHECK	Traverse (CD) check		C S
FBIAS CHECK	Focus bias check		C S
S curve CHECK	S letter check	(X)	C
VERIFY MODE	Non-volatile memory check	(X)	C
DETRK CHECK	Detrack check	(X)	C
TEMP ADJUST	Temperature compensation offset adjustment		A S
LDPWR ADJUST	Laser power adjustment		A S
EF MO ADJUST	Traverse (MO) adjustment		A S
EF CD ADJUST	Traverse (CD) adjustment		A S
FBIAS ADJUST	Focus bias adjustment		A S
EEP MODE	Non-volatile memory control	(X) (!)	D
MANUAL CMD	Command transmission	(X)	D
SVDATA READ	Status display	(X)	D
ERR DP MODE	Error history display, clear		S
SLES MOVE	Sled check	(X)	D
ACCESS MODE	Access check	(X)	D
0920 CHECK	Outermost circumference check	(X)	D
HEAD ADJUST	Head position check	(X)	D
CPLAY2 MODE	Same functions as CPLAY MODE	(X)	D
CREC2 MODE	Same functions as CREC MODE	(X)	D
ADJ CLEAR	Initialization of non-volatile memory of adjustment value		A S
AG Set (MO)	Auto gain output level adjustment (MO)		A S
AG Set (CD)	Auto gain output level adjustment (CD)		A S
Iop Read	IOP data display		C S
Iop Write	IOP data write		A S
INFOMATION	Microprocessing version display		C S
CPLAY MODE	Continuous play mode		C A S D
CREC MODE	Continuous recording mode		C A S D

Group (*)

C: Check

S: Service

A: Adjust

D: Develop

- For details of each adjustment mode, refer to “5. Electrical Adjustments”.
- For details of “ERR DP MODE”, refer to “Self-Diagnosis Function” on page 2.
- If a different mode has been selected by mistake, press the $\left[\text{MENU/NO} \right]$ button to exit that mode.
- Modes with (X) in the Mark column are not used for servicing and therefore are not described in detail. If these modes are set accidentally, press the $\left[\text{MENU/NO} \right]$ button to exit the mode immediately. Be especially careful not to set the modes with (!) as they will overwrite the non-volatile memory and reset it, and as a result, the unit will not operate normally.

4-5-1. Operating the Continuous Playback Mode

- Entering the continuous playback mode
 - Set the disc in the unit. (Whichever recordable discs or discs for playback only are available.)
 - Rotate the knob and display "CPLAY MODE".
 - Press the button to change the display to "CPLAY MID".
 - When access completes, the display changes to "C1 = 0000 AD = 00".

Note : The numbers "00" displayed show you error rates and ADER.
- Changing the parts to be played back
 - Press the button during continuous playback to change the display as below.
 "CPLAY MID" → "CPLAY OUT" → "CPLAY IN"
 - When pressed another time, the parts to be played back can be moved.
 - When access completes, the display changes to "C1 = 0000 AD = 00".

Note : The numbers "00" displayed show you error rates and ADER.
- Ending the continuous playback mode
 - Press the button. The display will change to "CPLAY MODE".
 - Press the button to remove the disc.

Note : The playback start addresses for IN, MID, and OUT are as follows.

IN	40h cluster
MID	300h cluster
OUT	700h cluster

4-5-2. Operating the Continuous Recording Mode (Use only when performing self-recording/palyback check.)

- Entering the continuous recording mode
 - Set a recordable disc in the unit.
 - Rotate the knob and display "CREC MODE".
 - Press the button to change the display to "CREC MID".
 - When access completes, the display changes to "CREC (0000)" and **REC** lights up.

Note : The numbers "00" displayed shows you the recording position addresses.
- Changing the parts to be recorded
 - When the button is pressed during continuous recording, the display changes as below.
 "CPLAY MID" → "CPLAY OUT" → "CPLAY IN"
 - When pressed another time, the parts to be recorded can be changed. **REC** goes off.
 - When access completes, the display changes to "CREC (0000)" and **REC** lights up.

Note : The numbers "00" displayed shows you the recording position addresses.
- Ending the continuous recording mode
 - Press the button. The display changes to "CREC MODE" and **REC** goes off.
 - Press the button to remove the disc.

Note 1 : The recording start addresses for IN, MID, and OUT are as follows.

IN	40h cluster
MID	300h cluster
OUT	700h cluster

Note 2 : The button can be used to stop recording anytime.

Note 3 : Do not perform continuous recording for long periods of time above 5 minutes.

Note 4 : During continuous recording, be careful not to apply vibration.

4-5-3. Non-Volatile Memory Mode (EEP MODE)

This mode reads and writes the contents of the non-volatile memory.

It is not used in servicing. If set accidentally, press the button immediately to exit it.

4-6. FUNCTIONS OF OTHER BUTTONS

Function	Contents
	Sets continuous playback when pressed in the STOP state. When pressed during continuous playback, the tracking servo turns ON/OFF.
	Stops continuous playback and continuous recording.
	The sled moves to the outer circumference only when this is pressed.
	The sled moves to the inner circumference only when this is pressed.
SCROLL	Switches between the pit and groove modes when pressed.
DISPLAY	Switches the displayed contents each time the button is pressed
	Ejects the disc
	Exits the test mode

4-7. TEST MODE DISPLAYS

Each time the [DISPLAY] button is pressed, the display changes in the following order.

1. Mode display

Displays “TEMP ADJUST”, “CPLAYMODE”, etc.

2. Error rate display

Displays the error rate in the following way.

C1 = □□□□ AD = □□

C1 = Indicates the C1 error.

AD = Indicates ADER.

3. Address display

The address is displayed as follows. (MO:recordable disc, CD:playback only disc)

Pressing the [CLEAR] button switches between the group display and bit display.

h = □□□□ s = □□□□ (MO pit and CD)

h = □□□□ a = □□□□ (MO groove)

h = Indicates the header address.

s = Indicates the SUBQ address.

a = Indicates the ADIP address.

Note: “-” is displayed when servo is not imposed.

4. Auto gain display (Not used in servicing)

The auto gain is displayed as follows.

AG = □□/□□ [□□]

5. Detrack check display (Not used in servicing)

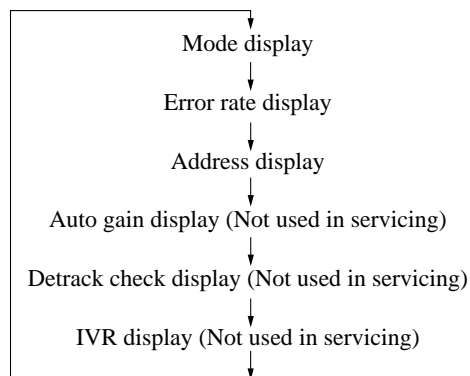
The detrack is displayed as follows.

ADR = □□□□□□

6. IVR display (Not used in servicing)

The IVR is displayed as follows.

[□□][□□][□□]



MEANINGS OF OTHER DISPLAYS

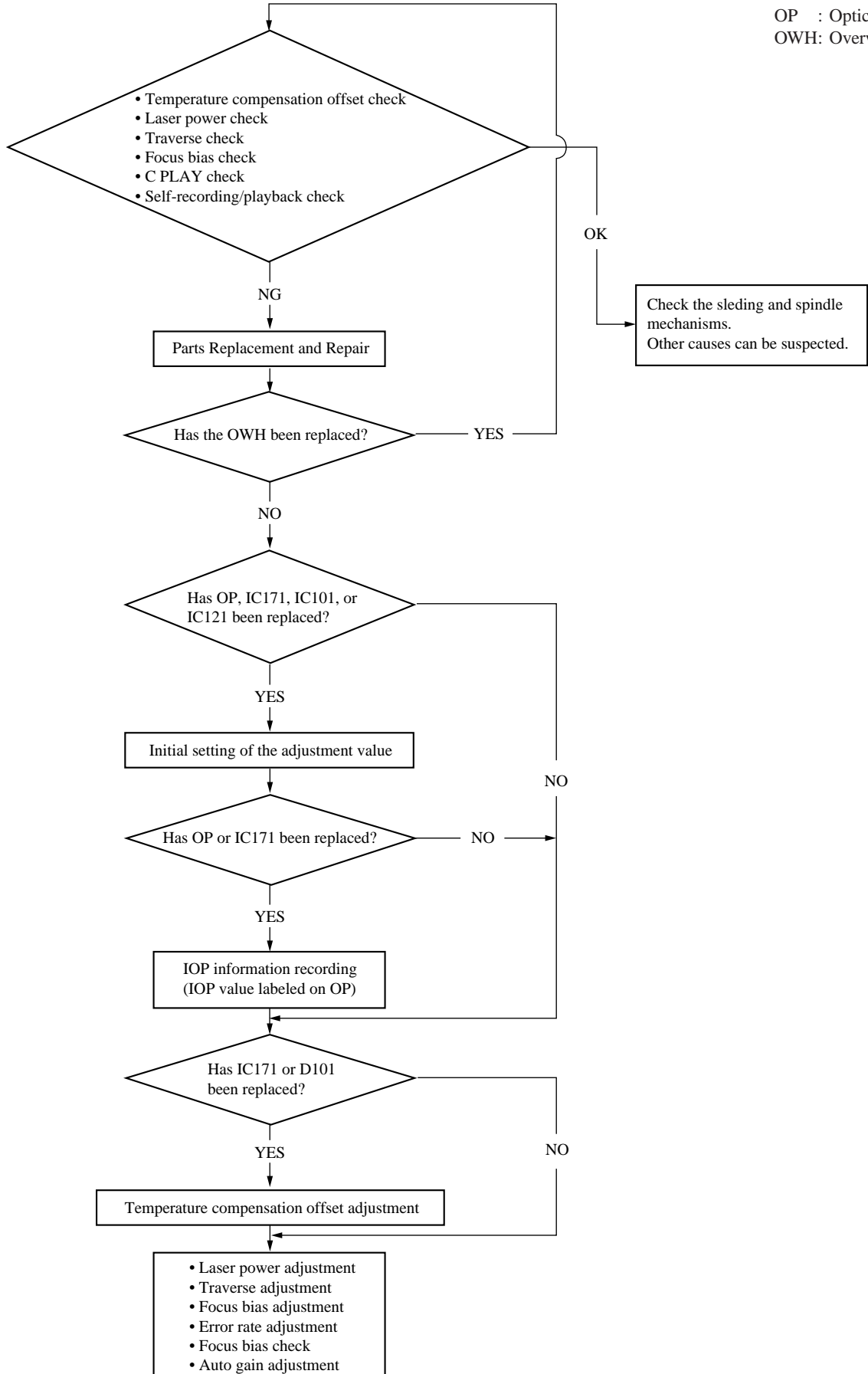
Display	Contents	
	When Lit	When Off
▷	During continuous playback (CLV: ON)	STOP (CLV: OFF)
	Tracking servo OFF	Tracking servo ON
SYNC	CLV low speed mode	CLV normal mode
LEVEL-SYNC	ABCD adjustment completed	
OVER	Tracking offset cancel ON	Tracking offset cancel OFF
REPEAT	Tracking auto gain OK	
1	Focus auto gain OK	
TRACK	Pit	Groove
DISC	High reflection	Low reflection
DATE	CLV-S	CLV-A
MONO	CLV LOCK	CLV UNLOCK

SECTION 5 ELECTRICAL ADJUSTMENTS

5-1. PARTS REPLACEMENT AND ADJUSTMENT

- Check and adjust the MDM and MBU as follows.
The procedure changes according to the part replaced

- Abbreviation
OP : Optical pick-up
OWH: Overwrite head

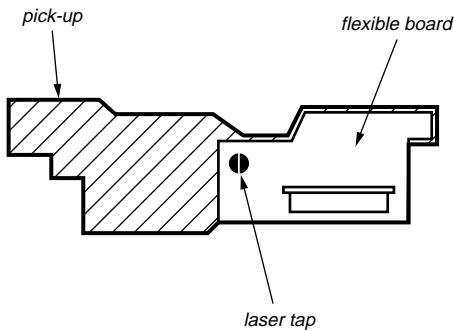


5-2. PRECAUTIONS FOR CHECKING LASER DIODE EMISSION

To check the emission of the laser diode during adjustments, never view directly from the top as this may lose your eye-sight.

5-3. PRECAUTIONS FOR USE OF OPTICAL PICK-UP (KMS-260A)

As the laser diode in the optical pick-up is easily damaged by static electricity, solder the laser tap of the flexible board when using it. Before disconnecting the connector, desolder first. Before connecting the connector, be careful not to remove the solder. Also take adequate measures to prevent damage by static electricity. Handle the flexible board with care as it breaks easily.



Optical pick-up flexible board

5-4. PRECAUTIONS FOR ADJUSTMENTS

1) When replacing the following parts, perform the adjustments and checks with ○ in the order shown in the following table.

	Optical Pick-up	BD Board			
		IC171	D101	IC101, IC121	IC192
1. Initial setting of adjustment value	○	○	×	○	×
2. Recording of IOP information (Value written in the pick-up)	○	○	×	×	×
3. Temperature compensation offset adjustment	×	○	○	×	×
4. Laser power adjustment	○	○	×	○	○
5. Traverse adjustment	○	○	×	○	×
6. Focus bias adjustment	○	○	×	○	×
7. Error rate check	○	○	×	○	×
8. Auto gain output level adjustment	○	○	×	○	×

- 2) Set the test mode when performing adjustments.
After completing the adjustments, exit the test mode.
Perform the adjustments and checks in "group S" of the test mode.
- 3) Perform the adjustments to be needed in the order shown.

- 4) Use the following tools and measuring devices.
 - Check Disc (MD) TDYS-1 (Parts No. 4-963-646-01)
 - Test Disk (MDW-74/AU-1) (Parts No. 8-892-341-41)
 - Laser power meter LPM-8001 (Parts No. J-2501-046-A)
or
MD Laser power meter 8010S (Parts No. J-2501-145-A)
(NOTE:)
 - Oscilloscope (Measure after performing CAL of prove.)
 - Digital voltmeter
 - Thermometer
 - Jig for checking BD board waveform (Parts No. : J-2501-149-A)
- 5) When observing several signals on the oscilloscope, etc., make sure that VC and ground do not connect inside the oscilloscope.
(VC and ground will become short-circuited.)
- 6) Using the above jig enables the waveform to be checked without the need to solder.
(Refer to Servicing Note on page 6.)
- 7) As the disc used will affect the adjustment results, make sure that no dusts nor fingerprints are attached to it.

Note:

When performing laser power checks and adjustment (electrical adjustment), use of the new MD laser power meter 8010S (J-2501-145-A) instead of the conventional laser power meter is convenient. It sharply reduces the time and trouble to set the laser power meter sensor onto the objective lens of the pick-up.

5-5. CREATING CONTINUOUSLY RECORDED DISC

* This disc is used in focus bias adjustment and error rate check.

The following describes how to create a continuous recording disc.

1. Insert a disc (blank disc) commercially available.
2. Rotate the $\left[\begin{array}{c} - \\ \leftrightarrow \\ + \end{array} \right]$ knob and display "CREC MODE".
3. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \end{array} \right]$ button again to display "CREC MID".
Display "CREC (0300)" and start to recording.
4. Complete recording within 5 minutes.
5. Press the $\left[\begin{array}{c} \text{MENU/NO} \\ \text{---} \end{array} \right]$ button and stop recording .
6. Press the $\left[\begin{array}{c} \text{---} \\ \text{---} \end{array} \right]$ button and remove the disc.

The above has been how to create a continuous recorded data for the focus bias adjustment and error rate check.

Note :

- Be careful not to apply vibration during continuous recording.

5-6. CHECKS PRIOR TO REPAIRS

These checks are performed before replacing parts according to “approximate specifications” to determine the faulty locations. For details, refer to “Checks Prior to Parts Replacement and Adjustments” (See page 8).

5-6-1. Temperature Compensation Offset Check

When performing adjustments, set the internal temperature and room temperature to 22 to 28 C.

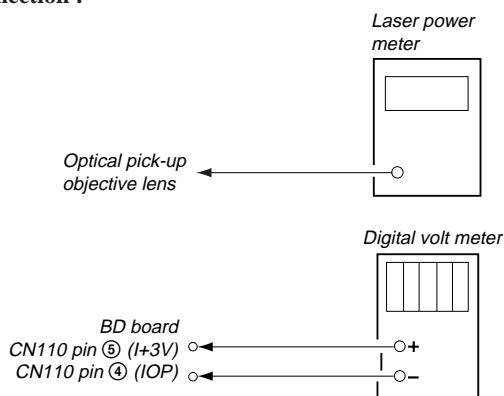
Checking Procedure:

1. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display “TEMP CHECK”.
2. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button.
3. “T=@@ (##) [OK]” should be displayed. If “T=@@ (##) [NG]” is displayed, it means that the results are bad.
(@@ indicates the current value set, and ## indicates the value written in the non-volatile memory.)

5-6-2. Laser Power Check

Before checking, check the IOP value of the optical pick-up.
(Refer to 5-8. Recording and Displaying IOP Information.)

Connection :



Checking Procedure:

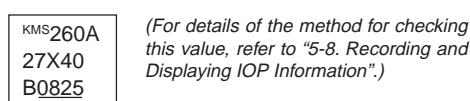
1. Set the laser power meter on the objective lens of the optical pick-up. (When it cannot be set properly, press the $\left[\begin{array}{c} \lll \\ \text{---} \\ \lll \end{array} \right]$ button or $\left[\begin{array}{c} \ggg \\ \text{---} \\ \ggg \end{array} \right]$ button to move the optical pick-up.)
Connect the digital volt meter to CN110 pin 5 (I+3V) and CN110 pin 4 (IOP).
2. Then, rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display “LDPWR CHECK”.
3. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button once and display “LD 0.9 mW \$ $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ ”. Check that the reading of the laser power meter become 0.84 to 0.92 mW.
4. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button once more and display “LD 7.0 mW \$ $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ ”. Check that the reading the laser power meter and digital volt meter satisfy the specified value.

Specified Value :

Laser power meter reading : 7.0 ± 0.2 mW

Digital voltmeter reading : Optical pick-up displayed value $\pm 10\%$

(Optical pick-up label)



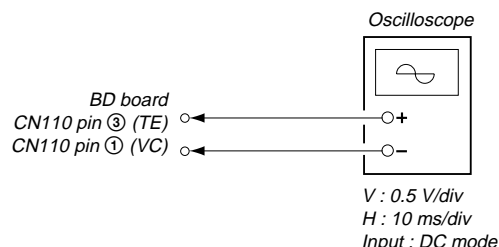
$I_{op} = 82.5$ mA in this case
 I_{op} (mA) = Digital voltmeter reading (mV)/1 (Ω)

5. Press the $\left[\begin{array}{c} \text{MENU/NO} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and display “LDPWR CHECK” and stop the laser emission.
(The $\left[\begin{array}{c} \text{MENU/NO} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button is effective at all times to stop the laser emission.)

Note 1: After step 4, each time the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button is pressed, the display will be switched between “LD 0.7 mW \$ $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ ”, “LD 6.2 mW \$ $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ ”, and “LD Wp ホセイ \$ $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ ”. Nothing needs to be performed here.

5-6-3. Traverse Check

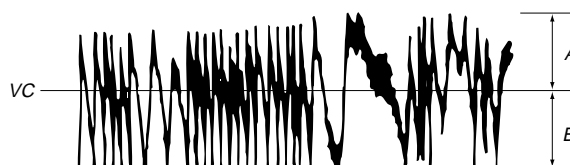
Connection :



Checking Procedure:

1. Connect an oscilloscope to CN110 pin 3 (TE) and CN110 pin 1 (VC) of the BD board.
2. Load a disc (any available on the market). (Refer to Note 1.)
3. Press the $\left[\begin{array}{c} \ggg \\ \text{---} \\ \ggg \end{array} \right]$ button and move the optical pick-up outside the pit.
4. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display “EF MO CHECK”.
5. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and display “EFB = $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ MO-R”.
(Laser power READ power/Focus servo ON/tracking servo OFF/spindle (S) servo ON)
6. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob. (Read power traverse checking)

(Traverse Waveform)

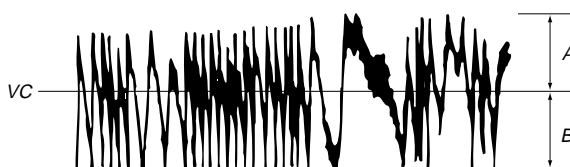


Specified value : Below 10% offset value

$$\text{Offset value (\%)} = \frac{IA - BI}{2(A + B)} \times 100$$

7. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and display “EFB = $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ MO-W”.
8. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob. (Write power traverse checking)

(Traverse Waveform)



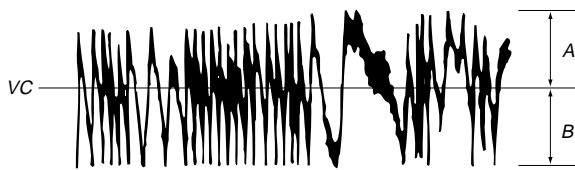
Specified value : Below 10% offset value

$$\text{Offset value (\%)} = \frac{IA - BI}{2(A + B)} \times 100$$

9. Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button display “EFB = $\left[\begin{array}{c} \square \\ \square \\ \square \end{array} \right]$ MO-P”.
Then, the optical pick-up moves to the pit area automatically and servo is imposed.

10. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob.

(Traverse Waveform)

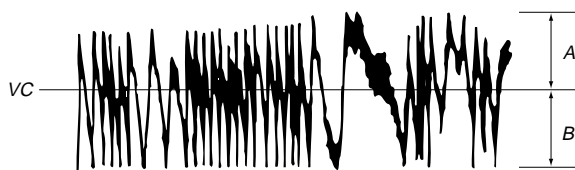


Specified value : Below 10% offset value

$$\text{Offset value (\%)} = \frac{|A - B|}{2(A + B)} \times 100$$

11. Press the $\left[\text{ENTER/YES} \right]$ button display “EF MO CHECK”
The disc stops rotating automatically.
12. Press the $\left[\text{STOP} \right]$ button and remove the disc.
13. Load the check disc (MD) TDYS-1.
14. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob and display “EF CD CHECK”.
15. Press the $\left[\text{ENTER/YES} \right]$ button and display “EFB = $\square\square\square$ CD”.
Servo is imposed automatically.
16. Observe the waveform of the oscilloscope, and check that the specified value is satisfied. Do not rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob.

(Traverse Waveform)



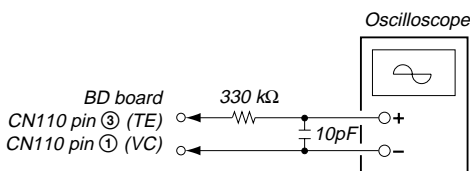
Specified value : Below 10% offset value

$$\text{Offset value (\%)} = \frac{|A - B|}{2(A + B)} \times 100$$

17. Press the $\left[\text{ENTER/YES} \right]$ button and display “EF CD CHECK”.
18. Press the $\left[\text{STOP} \right]$ button and remove the check disc (MD) TDYS-1.

Note 1 : MO reading data will be erased during if a recorded disc is used in this adjustment.

Note 2 : If the traverse waveform is not clear, connect the oscilloscope as shown in the following figure so that it can be seen more clearly.



5-6-4. Focus Bias Check

Change the focus bias and check the focus tolerance amount.

Checking Procedure :

1. Load a test disk (MDW-74/AU-1).
2. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob and display “CPLAY MODE”.
3. Press the $\left[\text{ENTER/YES} \right]$ button twice and display “CPLAY MID”.
4. Press the $\left[\text{MENU/NO} \right]$ button when “C1 = $\square\square\square\square$ AD = $\square\square$ ” is displayed.
5. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob and display “FBIAS CHECK”.
6. Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ c = $\square\square$ ”.
The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [c =] indicate the focus bias value.
Check that the C1 error is below 220 and ADER is below 2.
7. Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ b = $\square\square$ ”.
Check that the C1 error is below 220 and ADER is below 2.
8. Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ a = $\square\square$ ”.
Check that the C1 error is below 220 and ADER is below 2.
9. Press the $\left[\text{MENU/NO} \right]$ button, next press the $\left[\text{STOP} \right]$ button, and remove the test disc.

5-6-5. C PLAY Checking

MO Error Rate Check

Checking Procedure :

1. Load a test disk (MDW-74/AU-1).
2. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob and display “CPLAY MODE”.
3. Press the $\left[\text{ENTER/YES} \right]$ button and display “CPLAY MID”.
4. The display changes to “C1 = $\square\square\square\square$ AD = $\square\square$ ”.
5. If the C1 error rate is below 80, check that ADER is below 2.
6. Press the $\left[\text{MENU/NO} \right]$ button, stop playback, press the $\left[\text{STOP} \right]$ button, and test disc.

CD Error Rate Check

Checking Procedure :

1. Load a check disc (MD) TDYS-1.
2. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob and display “CPLAY MODE”.
3. Press the $\left[\text{ENTER/YES} \right]$ button twice and display “CPLAY MID”.
4. The display changes to “C1 = $\square\square\square\square$ AD = $\square\square$ ”.
5. Check that the C1 error rate is below 50.
6. Press the $\left[\text{MENU/NO} \right]$ button, stop playback, press the $\left[\text{STOP} \right]$ button, and the test disc.

5-6-6. Self-Recording/playback Check

Prepare a continuous recording disc using the unit to be repaired and check the error rate.

Checking Procedure :

1. Insert a recordable disc (blank disc) into the unit.
2. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob to display “CREC MODE”.
3. Press the $\left[\text{ENTER/YES} \right]$ button to display the “CREC MID”.
4. When recording starts, “**REC**” is displayed, this becomes “CREC @@@@” (@@@@ is the address), and recording starts.
5. About 1 minute later, press the $\left[\text{MENU/NO} \right]$ button to stop continuous recording.
6. Rotate the $\left[\leftarrow \leftrightarrow \rightarrow \right]$ knob to display “C PLAY MODE”.
7. Press the $\left[\text{ENTER/YES} \right]$ button to display “C PLAY MID”.
8. “C1 = $\square\square\square\square$ AD = $\square\square$ ” will be displayed.
9. Check that the C1 error becomes below 80 and the AD error below 2.
10. Press the $\left[\text{MENU/NO} \right]$ button to stop playback, and press the $\left[\text{STOP} \right]$ button and remove the disc.

5-7. INITIAL SETTING OF ADJUSTMENT VALUE

Note:

Mode which sets the adjustment results recorded in the non-volatile memory to the initial setting value. However the results of the temperature compensation offset adjustment will not change to the initial setting value.

If initial setting is performed, perform all adjustments again excluding the temperature compensation offset adjustment.

For details of the initial setting, refer to "5-4. Precautions on Adjustments" and execute the initial setting before the adjustment as required.

Setting Procedure :

1. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display "ADJ CLEAR".
2. Press the $\left[\text{ENTER/YES} \right]$ button. "Complete!" will be displayed momentarily and initial setting will be executed, after which "ADJ CLEAR" will be displayed.

5-8. RECORDING AND DISPLAYING THE IOP INFORMATION

The IOP data can be recorded in the non-volatile memory. The IOP value on the label of the optical pickup and the IOP value after the adjustment will be recorded. Recording these data eliminates the need to read the label on the optical pick-up.

Recording Procedure :

1. While pressing the $\left[\text{ENTER/YES} \right]$ button and $\left[\square \right]$ button, connect the power plug to the outlet, and release the $\left[\text{ENTER/YES} \right]$ button and $\left[\square \right]$ button.
2. "TEMP CHECK" will be displayed. Press the $\left[\text{MENU/NO} \right]$ button to display "Check".
3. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display "[Service]", and press the $\left[\text{ENTER/YES} \right]$ button.
4. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display "Iop.Write", and press the $\left[\text{ENTER/YES} \right]$ button.
5. The display becomes Ref=@@.@ (@ is an arbitrary number) and the numbers which can be changed will blink.
6. Input the IOP value written on the optical pick-up.
To select the number : Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob.
To select the digit : Press the $\left[\text{CD SYNC/MD WM SYNC} \right]$ button.
7. When the $\left[\text{ENTER/YES} \right]$ button is pressed, the display becomes "Measu=@@.@." (@ is an arbitrary number).
8. As the adjustment results are recorded for the step 7 value. Leave it as it is and press the $\left[\text{ENTER/YES} \right]$ button.
9. "Complete!" will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become "Iop Write".

Display Procedure :

1. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display "Iop.Read".
2. "@@.@/##.#" is displayed and the recorded contents are displayed.
@@.@ indicates the Iop value labeled on the pick-up.
##.# indicates the Iop value after adjustment
3. To end, press the $\left[\text{CD SYNC/MD WM SYNC} \right]$ button. or $\left[\text{MENU/NO} \right]$ button to display "Iop Read".

5-9. TEMPERATURE COMPENSATION OFFSET ADJUSTMENT

Save the temperature data at that time in the non-volatile memory as 25 °C reference data.

Note :

1. Usually, do not perform this adjustment.
2. Perform this adjustment in an ambient temperature of 22 °C to 28 °C. Perform it immediately after the power is turned on when the internal temperature of the unit is the same as the ambient temperature of 22 °C to 28 °C.
3. When D101 has been replaced, perform this adjustment after the temperature of this part has become the ambient temperature.

Adjusting Procedure :

1. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display "TEMP ADJUST".
2. Press the $\left[\text{ENTER/YES} \right]$ button and select the "TEMP ADJUST" mode.
3. "TEMP = [] [OK]" and the current temperature data will be displayed.
4. To save the data, press the $\left[\text{ENTER/YES} \right]$ button.
When not saving the data, press the $\left[\text{MENU/NO} \right]$ button.
5. When the $\left[\text{ENTER/YES} \right]$ button is pressed, "TEMP = [] SAVE" will be displayed and turned back to "TEMP ADJUST" display then. When the $\left[\text{MENU/NO} \right]$ button is pressed, "TEMP ADJUST" will be displayed immediately.

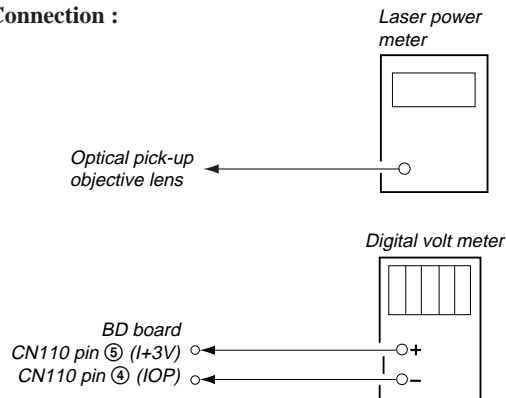
Specified Value :

The "TEMP = []" should be within "E0 - EF", "F0 - FF", "00 - 0F", "10 - 1F" and "20 - 2F".

5-10. LASER POWER ADJUSTMENT

Check the IOP value of the optical pick-up before adjustments. (Refer to 5-8. Recording and Displaying IOP Information.)

Connection :



Adjusting Procedure :

1. Set the laser power meter on the objective lens of the optical pick-up. (When it cannot be set properly, press the $\left[\leftarrow \right]$ button or $\left[\rightarrow \right]$ button to move the optical pick-up.)
Connect the digital volt meter to CN110 pin 5 (I+3V) and CN110 pin 4 (IOP).
2. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display "LDPWR ADJUST". (Laser power : For adjustment)
3. Press the $\left[\text{ENTER/YES} \right]$ button once and display "LD 0.9 mW \$ []".
4. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob so that the reading of the laser power meter becomes 0.85 to 0.91 mW. Press the $\left[\text{ENTER/YES} \right]$ button after setting the range knob of the laser power meter, and save the adjustment results. ("LD SAVE \$ []" will be displayed for a moment.)
5. Then "LD 7.0 mW \$ []" will be displayed.
6. Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob so that the reading of the laser power meter becomes 6.9 to 7.1 mW, press the $\left[\text{ENTER/YES} \right]$ button and save it.

Note : Do not perform the emission with 7.0 mW more than 15 seconds continuously.

- Then, rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display "LDPWR CHECK".
- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button once and display "LD 0.9 mW \$ --- ". Check that the reading of the laser power meter become 0.85 to 0.91 mW.
- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button once more and display "LD 7.0 mW \$ --- ". Check that the reading the laser power meter and digital volt meter satisfy the specified value.
Note down the digital voltmeter reading value.

Specified Value :

Laser power meter reading : $7.0 \pm 0.1 \text{ mW}$

Digital voltmeter reading : Optical pick-up displayed value $\pm 10\%$

(Optical pick-up label)

KMS260A
27X40
B0825

(For details of the method for checking this value, refer to "5-8. Recording and Displaying IOP Information".)

$I_{op} = 82.5 \text{ mA}$ in this case

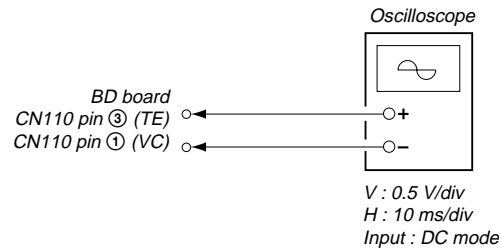
$I_{op} (\text{mA}) = \text{Digital voltmeter reading (mV)} / 1 (\Omega)$

- Press the $\left[\begin{array}{c} \text{MENU/NO} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and display "LDPWR CHECK" and stop the laser emission.
(The $\left[\begin{array}{c} \text{MENU/NO} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button is effective at all times to stop the laser emission.)
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob to display "Iop.Write".
- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button. When the display becomes Ref=@@.@.@ (@ is an arbitrary number), press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button to display "Measu=@@.@.@" (@ is an arbitrary number).
- The numbers which can be changed will blink. Input the I_{op} value noted down at step 9.
To select the number : Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob.
To select the digit : Press the $\left[\begin{array}{c} \text{CD SYNC/MD WM SYNC} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button.
- When the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button is pressed, "Complete!" will be displayed momentarily. The value will be recorded in the non-volatile memory and the display will become "Iop Write".

Note 1: After step 4, each time the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button is pressed, the display will be switched between "LD 0.7 mW \$ --- ", "LD 6.2 mW \$ --- ", and "LD Wp ホセイ \$ --- ". Nothing needs to be performed here.

5-11. TRAVERSE ADJUSTMENT

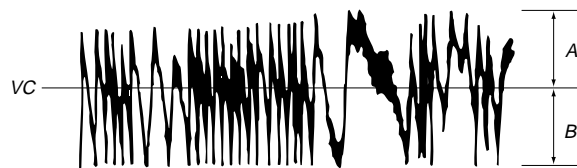
Connection :



Adjusting Procedure :

- Connect an oscilloscope to CN110 pin ③ (TE) and CN110 pin ① (VC) of the BD board.
- Load a disc (any available on the market). (Refer to Note 1.)
- Press the $\left[\begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and move the optical pick-up outside the pit.
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display "EF MO ADJUST".
- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and display "EFB = --- MO-R". (Laser power READ power/Focus servo ON/tracking servo OFF/spindle (S) servo ON)
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob so that the waveform of the oscilloscope becomes the specified value.
(When the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob is rotated, the --- of "EFB = --- " changes and the waveform changes.) In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.
(Read power traverse adjustment)

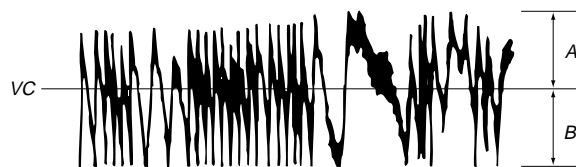
(Traverse Waveform)



Specification A = B

- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button and save the result of adjustment to the non-volatile memory ("EFB = --- SAVE" will be displayed for a moment. Then "EFB = --- MO-W" will be displayed).
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob so that the waveform of the oscilloscope becomes the specified value.
(When the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob is rotated, the --- of "EFB = --- " changes and the waveform changes.) In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.
(Write power traverse adjustment)

(Traverse Waveform)

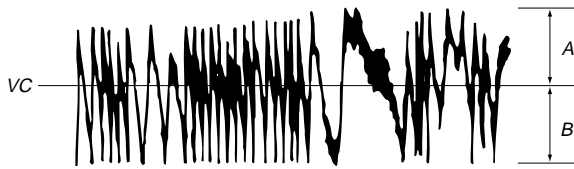


Specification A = B

- Press the $\left[\begin{array}{c} \text{ENTER/YES} \\ \text{---} \\ \text{---} \\ \text{---} \end{array} \right]$ button, and save the adjustment results in the non-volatile memory. ("EFB = --- SAVE" will be displayed for a moment.)
- "EFB = --- MO-P". will be displayed.
The optical pick-up moves to the pit area automatically and servo is imposed.

- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob until the waveform of the oscilloscope moves closer to the specified value.
In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.

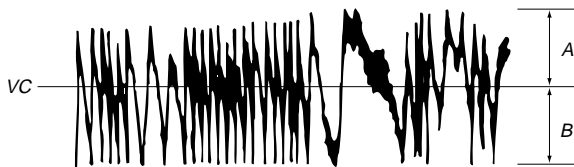
(Traverse Waveform)



Specification $A = B$

- Press the $\left[\text{ENTER/YES} \right]$ button, and save the adjustment results in the non-volatile memory. (“EFB = $\square\square\square$ SAVE” will be displayed for a moment.)
Next “EF MO ADJUST” is displayed. The disc stops rotating automatically.
- Press the $\left[\text{HOME} \right]$ button and remove the disc.
- Load the check disc (MD) TDYS-1.
- Rotate $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display “EF CD ADJUST”.
- Press the $\left[\text{ENTER/YES} \right]$ button and display “EFB = $\square\square$ CD”.
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob so that the waveform of the oscilloscope moves closer to the specified value.
In this adjustment, waveform varies at intervals of approx. 2%. Adjust the waveform so that the specified value is satisfied as much as possible.

(Traverse Waveform)

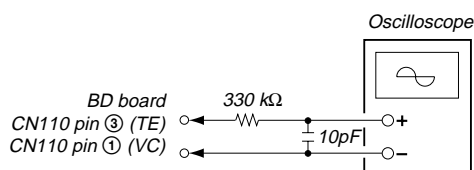


Specification $A = B$

- Press the $\left[\text{ENTER/YES} \right]$ button, display “EFB = $\square\square\square$ SAVE” for a moment and save the adjustment results in the non-volatile memory.
Next “EF CD ADJUST” will be displayed.
- Press the $\left[\text{HOME} \right]$ button and remove the check disc (MD) TDYS-1.

Note 1 : MO reading data will be erased during if a recorded disc is used in this adjustment.

Note 2 : If the traverse waveform is not clear, connect the oscilloscope as shown in the following figure so that it can be seen more clearly.



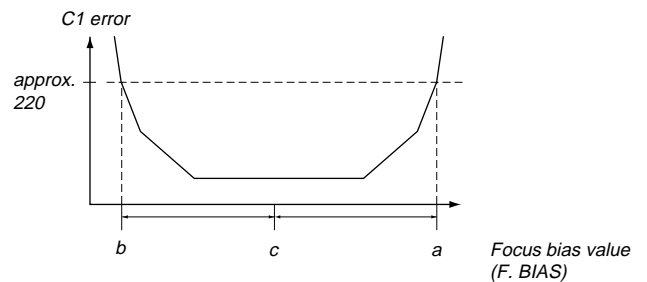
5-12. FOCUS BIAS ADJUSTMENT

Adjusting Procedure :

- Load a test disk (MDW-74/AU-1).
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display “CPLAY MODE”.
- Press the $\left[\text{ENTER/YES} \right]$ button and display “CPLAY MID”.
- Press the $\left[\text{MENU/NO} \right]$ button when “C1 = $\square\square\square\square$ AD = $\square\square$ ” is displayed.
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob and display “FBIAS ADJUST”.
- Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ a = $\square\square$ ”.
The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [a =] indicate the focus bias value.
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob in the clockwise direction and find the focus bias value at which the C1 error rate becomes 220 (Refer to Note 2).
- Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ b = $\square\square$ ”.
- Rotate the $\left[\begin{array}{c} - \\ \longleftrightarrow \\ + \end{array} \right]$ knob in the counterclockwise direction and find the focus bias value at which the C1 error rate becomes approximately 220.
At this time, set the C1 error rate to about the same value set at step 7.
- Press the $\left[\text{ENTER/YES} \right]$ button and display “ $\square\square\square\square/\square\square$ c = $\square\square$ ”.
- Check that the C1 error rate is below 50 and ADER is 00. Then press the $\left[\text{ENTER/YES} \right]$ button.
- If the “()” in “ $\square\square - \square\square - \square\square$ ()” is above 20, press the $\left[\text{ENTER/YES} \right]$ button.
If below 20, press the $\left[\text{MENU/NO} \right]$ button and repeat the adjustment from step 2.
- Press the $\left[\text{HOME} \right]$ button to remove the test disc.

Note 1 : The relation between the C1 error and focus bias is as shown in the following figure. Find points a and b in the following figure using the above adjustment. The focal point position C is automatically calculated from points a and b.

Note 2 : As the C1 error rate changes, perform the adjustment using the average value.



5-13. ERROR RATE CHECK

5-13-1. CD Error Rate Check

Checking Procedure :

1. Load a check disc (MD) TDYS-1.
2. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob and display "CPLAY MODE".
3. Press the $\left[\text{ENTER/YES} \right]$ button twice and display "CPLAY MID".
4. The display changes to "C1 = $\square\square\square\square$ AD = $\square\square$ ".
5. Check that the C1 error rate is below 20.
6. Press the $\left[\text{MENU/NO} \right]$ button, stop playback, press the $\left[\text{HOME} \right]$ button, and remove the test disc.

5-13-2. MO Error Rate Check

Checking Procedure :

1. Load a test disc (MDW-74/AU-1).
2. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob and display "CPLAY MODE".
3. Press the $\left[\text{ENTER/YES} \right]$ button and display "CPLAY MID".
4. The display changes to "C1 = $\square\square\square\square$ AD = $\square\square$ ".
5. If the C1 error rate is below 50, check that ADER is 00.
6. Press the $\left[\text{MENU/NO} \right]$ button, stop playback, press the $\left[\text{HOME} \right]$ button, and remove the test disc.

5-14. FOCUS BIAS CHECK

Change the focus bias and check the focus tolerance amount.

Checking Procedure :

1. Load a test disc (MDW-74/AU-1).
2. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob and display "CPLAY MODE".
3. Press the $\left[\text{ENTER/YES} \right]$ button twice and display "CPLAY MID".
4. Press the $\left[\text{MENU/NO} \right]$ button when "C1 = $\square\square\square\square$ AD = $\square\square$ " is displayed.
5. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob and display "FBIAS CHECK".
6. Press the $\left[\text{ENTER/YES} \right]$ button and display " $\square\square\square\square/\square\square$ c = $\square\square$ ".
The first four digits indicate the C1 error rate, the two digits after [/] indicate ADER, and the 2 digits after [c =] indicate the focus bias value.
Check that the C1 error is below 50 and ADER is below 2.
7. Press the $\left[\text{ENTER/YES} \right]$ button and display " $\square\square\square\square/\square\square$ b = $\square\square$ ".
Check that the C1 error is below 220 and ADER is below 2.
8. Press the $\left[\text{ENTER/YES} \right]$ button and display " $\square\square\square\square/\square\square$ a = $\square\square$ ".
Check that the C1 error is below 220 and ADER is below 2.
9. Press the $\left[\text{MENU/NO} \right]$ button, next press the $\left[\text{HOME} \right]$ button, and remove the continuously recorded disc.

Note 1 : If the C1 error and ADER are above other than the specified value at points a (step 8. in the above) or b (step 7. in the above), the focus bias adjustment may not have been carried out properly. Adjust perform the beginning again.

5-15. AUTO GAIN CONTROL OUTPUT LEVEL ADJUSTMENT

Be sure to perform this adjustment when the pickup is replaced. If the adjustment results becomes "Adjust NG!", the pickup may be faulty or the servo system circuits may be abnormal.

5-15-1. CD Auto Gain Control Output Level Adjustment

Adjusting Procedure :

1. Insert the check disc (MD) TDYS-1.
2. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob to display "AG Set (CD)".
3. When the $\left[\text{ENTER/YES} \right]$ button is pressed, the adjustment will be performed automatically.
"Complete!!" will then be displayed momentarily when the value is recorded in the non-volatile memory, after which the display changes to "AG Set (CD)".
4. Press the $\left[\text{HOME} \right]$ button to remove the disc.

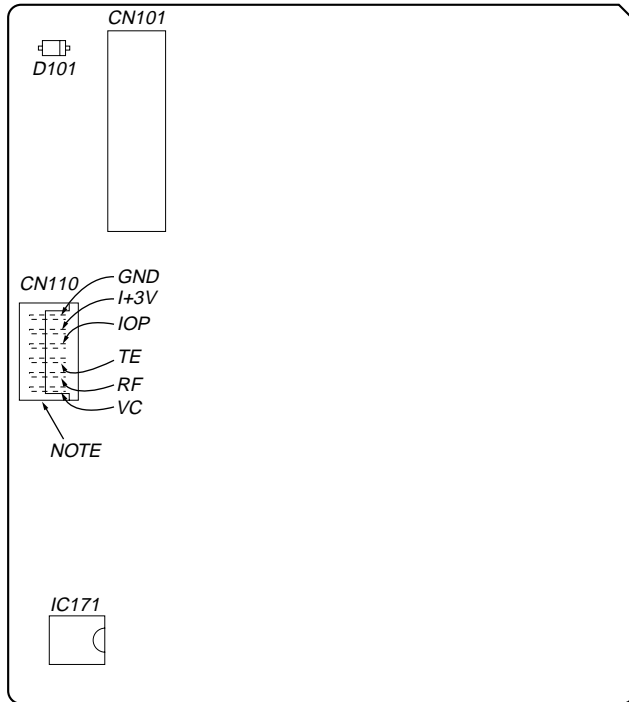
5-15-2. MO Auto Gain Control Output Level Adjustment

Adjusting Procedure :

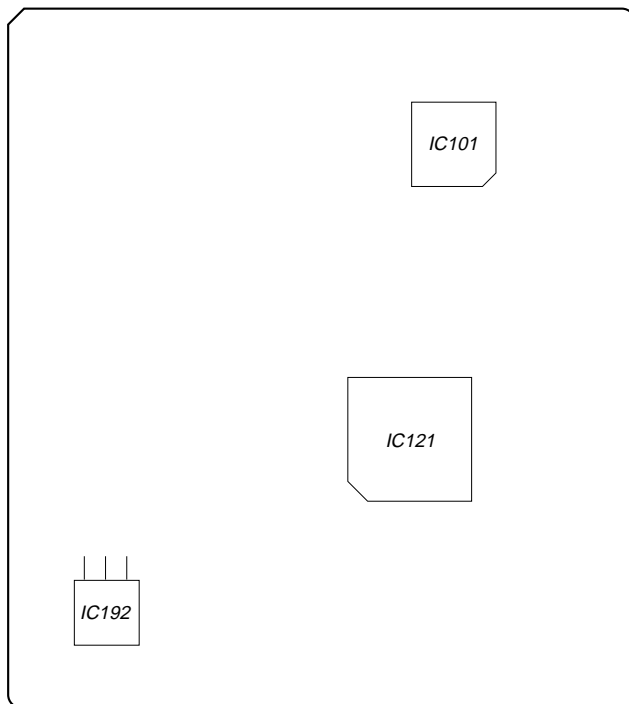
1. Insert the reference disc (MDW-74/AU-1) for recording.
2. Rotate the $\left[\leftarrow \leftrightarrow + \right]$ knob to display "AG Set (MO)".
3. When the $\left[\text{ENTER/YES} \right]$ button is pressed, the adjustment will be performed automatically.
"Complete!!" will then be displayed momentarily when the value is recorded in the non-volatile memory, after which the display changes to "AG Set (MO)".
4. Press the $\left[\text{HOME} \right]$ button to remove the disc.

5-15. ADJUSTING POINTS AND CONNECTING POINTS

[BD BOARD] (SIDE A)



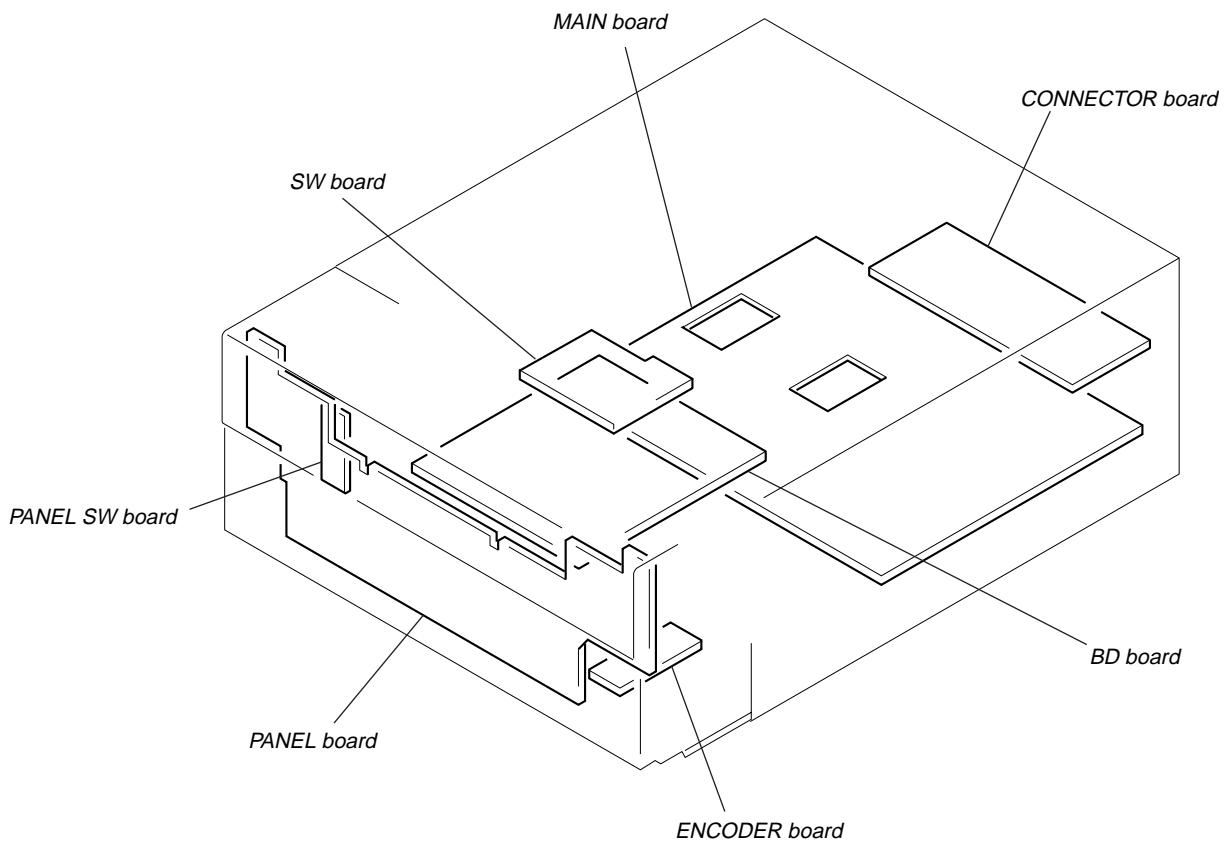
[BD BOARD] (SIDE B)



NOTE: It is useful to use the jig. for checking the waveform.
(Refer to Servicing Note on page 6.)

SECTION 6 DIAGRAMS

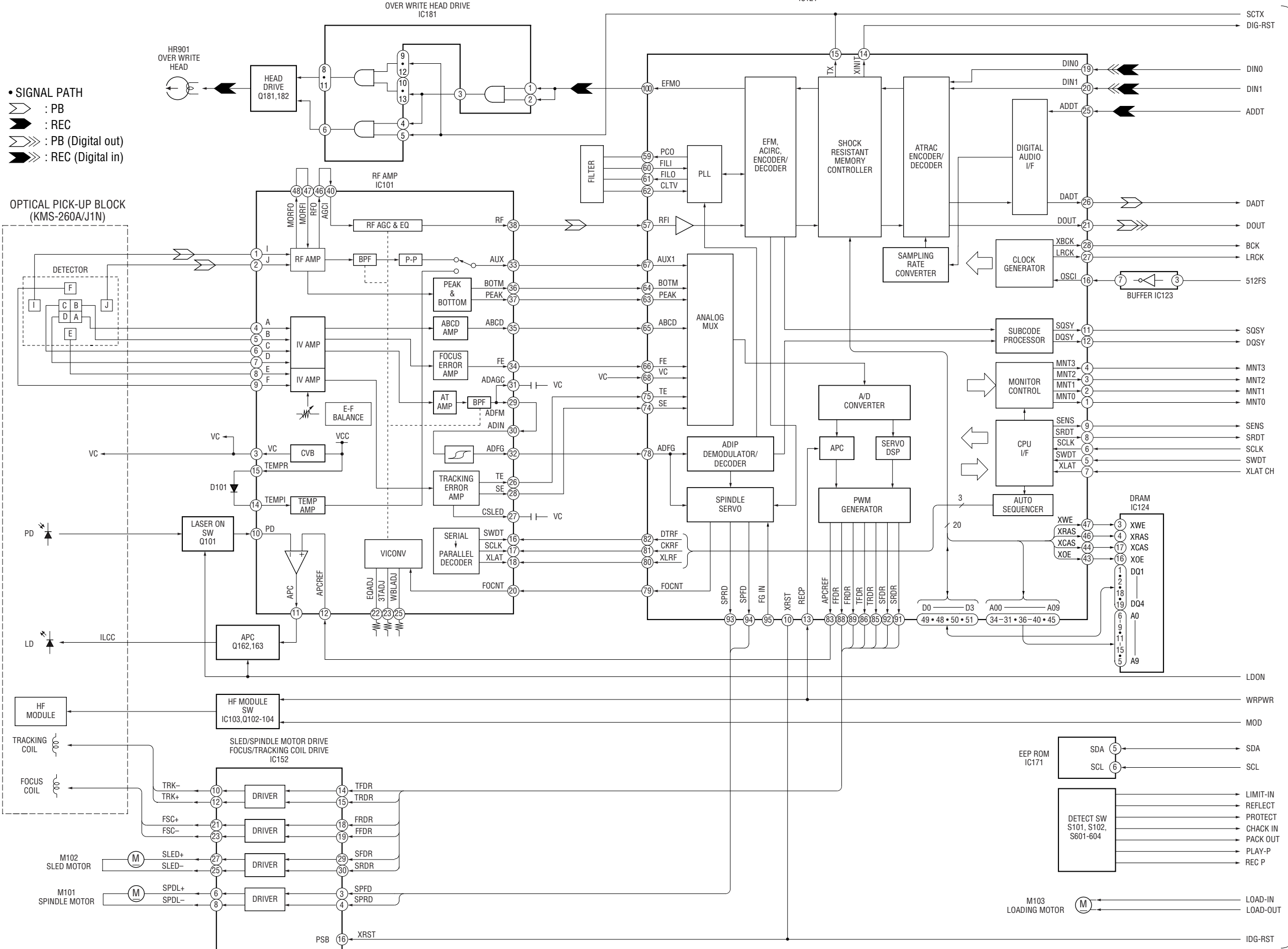
6-1. CIRCUIT BOARDS LOCATION



6-2. BLOCK DIAGRAMS
- BD SECTION -

DIGITAL SERVO SIGNAL PROCESSOR, DIGITAL SIGNAL PROCESSOR,
EFM/ACIRC ENCODER/DECODER, SHOCK-PROOF MEMORY CONTROLLER,
ATRAAC ENCODER/DECODER
IC121

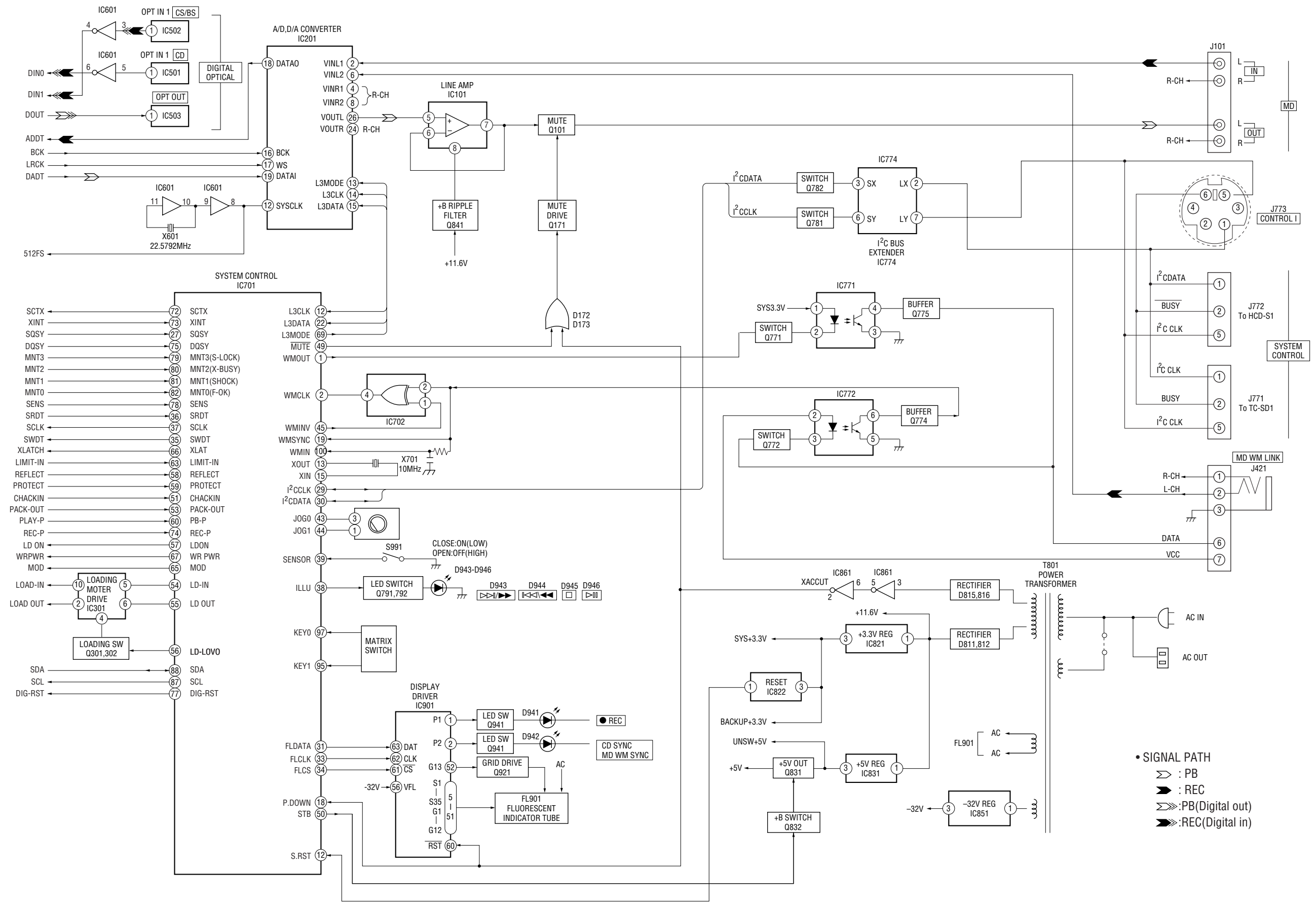
- SIGNAL PATH
- ▬ : PB
- ▬ : REC
- ▬▬▬ : PB (Digital out)
- ▬▬▬ : REC (Digital in)



MAIN SECTION
(Page 35)

- MAIN SECTION -

BD SECTION
(Page 34)



- SIGNAL PATH
- : PB
- : REC
- : PB(Digital out)
- : REC(Digital in)

THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

For schematic diagrams.

Note:

- All capacitors are in μF unless otherwise noted. pF: μF 50 WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $1/4\text{W}$ or less unless otherwise specified.
- Δ : internal component.
- \square : panel designation.

Note: The components identified by mark Δ or dotted line with mark Δ are critical for safety.
 Replace only with part number specified.

- B+ : B+ Line.
- B- : B- Line.
- \square : adjustment for repair.
- no mark : STOP
- () : Play the test disc (TDYS-1)
- < > : REC
- * : Can not be measured.
- Voltages are taken with a VOM (Input impedance 10 M Ω). Voltage variations may be noted due to normal production tolerances.
- Waveforms are taken with an oscilloscope. Voltage variations may be noted due to normal production tolerances.
- Circled numbers refer to waveforms.
- Signal path.
 - \rightarrow : PB
 - \rightarrow : REC
 - \rightarrow : PB (DIGITAL OUT)
 - \rightarrow : REC (DIGITAL IN)
- Abbreviation
 - HK : Hong Kong model.
 - SP : Singapore model.

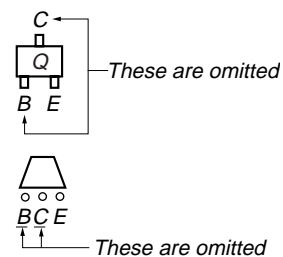
For printed wiring boards.

Note:

- \circ : parts extracted from the component side.
- \square : parts extracted from the conductor side.
- \blacksquare : parts mounted on the conductor side.
- \circ : Through hole.
- \square : Pattern from the side which enables seeing. (The other layers' patterns are not indicated.)

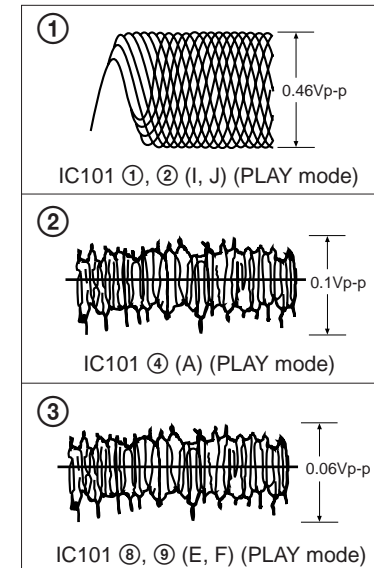
Caution:
 Pattern face side: Parts on the pattern face side seen from the (Side B) pattern face are indicated.
 Parts face side: Parts on the parts face side seen from the (Side A) parts face are indicated.

• Indication of transistor

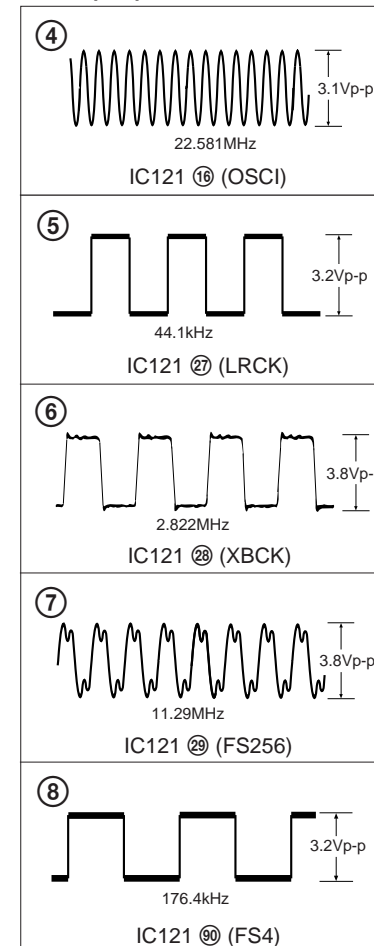


WAVEFORMS

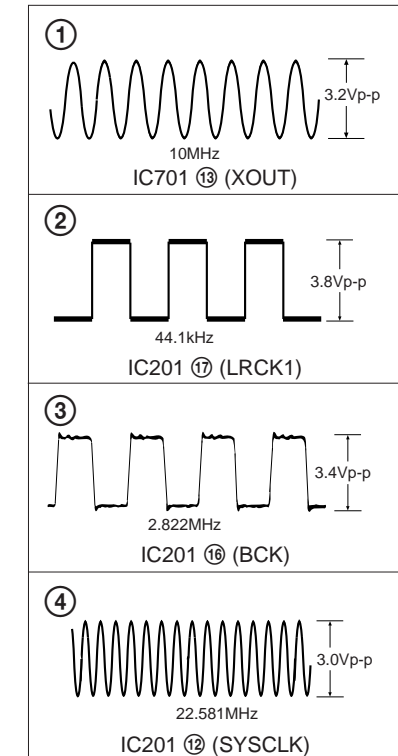
- BD (1/2) SECTION -



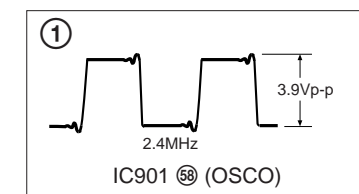
- BD (1/2) SECTION -



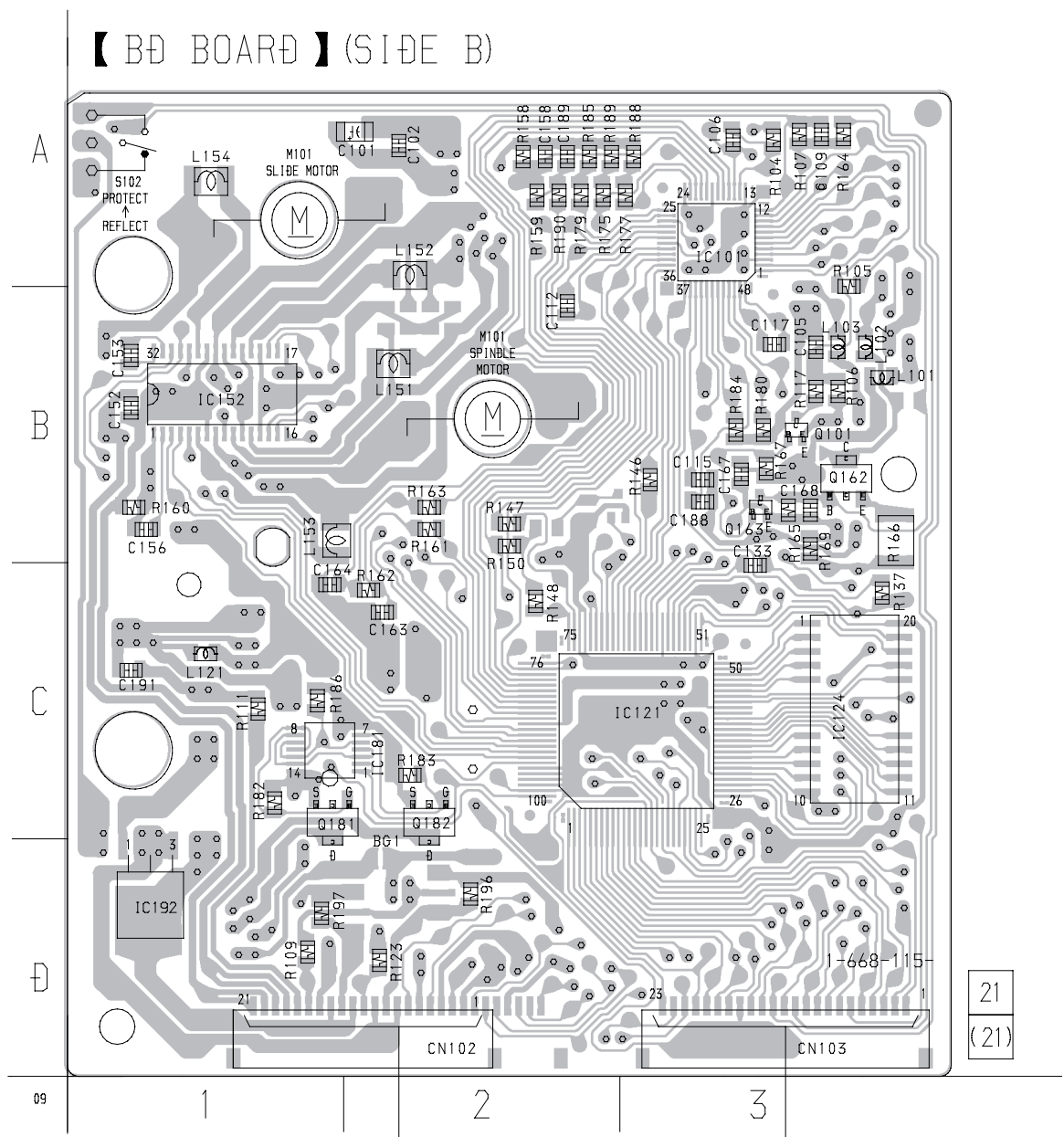
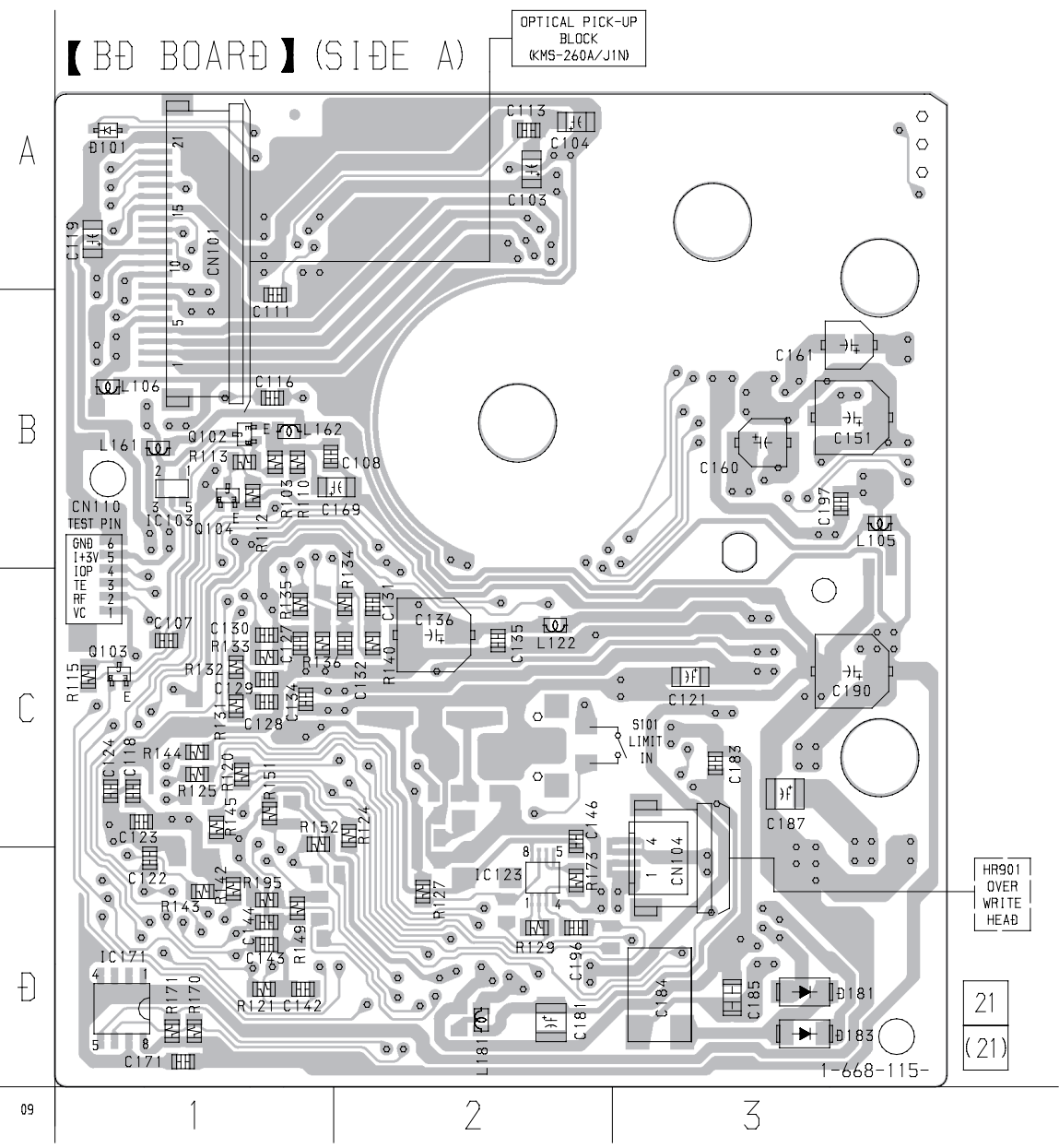
- MAIN SECTION -



- DISPLAY SECTION -



6-3. PRINTED WIRING BOARD – BD SECTION –
 • See page 32 for Circuit Boards Location.



(Page 49) **A**

(Page 49) **B**

• Semiconductor Location

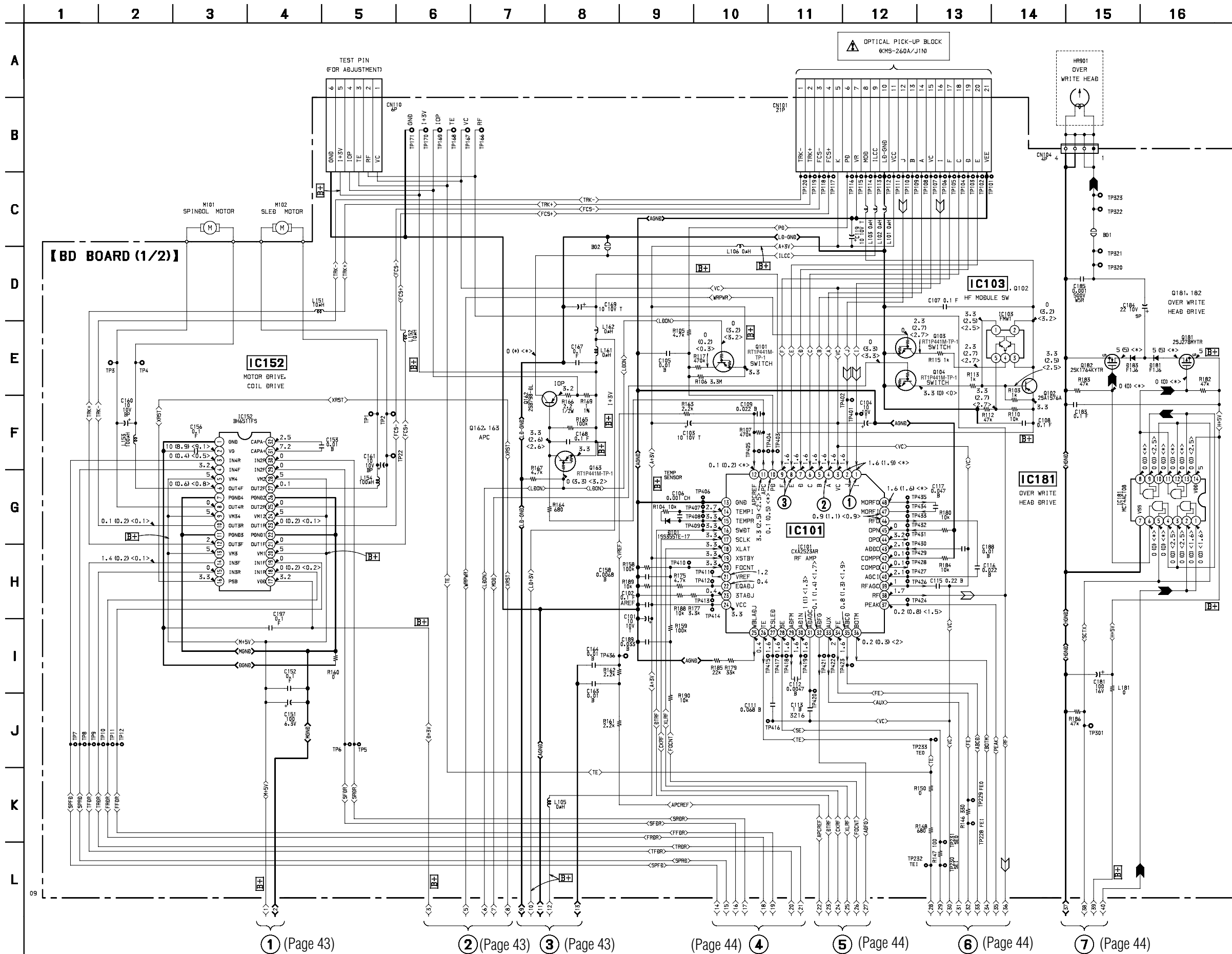
Ref. No.	Location
D101	A-1
D181	D-3
D183	D-3
IC103	B-1
IC123	D-2
IC171	D-1
Q102	B-1
Q103	B-1
Q104	B-1

• Semiconductor Location

Ref. No.	Location
IC101	A-3
IC121	C-3
IC124	C-3
IC152	B-1
IC181	C-1
IC192	D-1
Q101	B-3
Q162	B-3
Q163	B-3
Q181	C-1
Q182	C-2

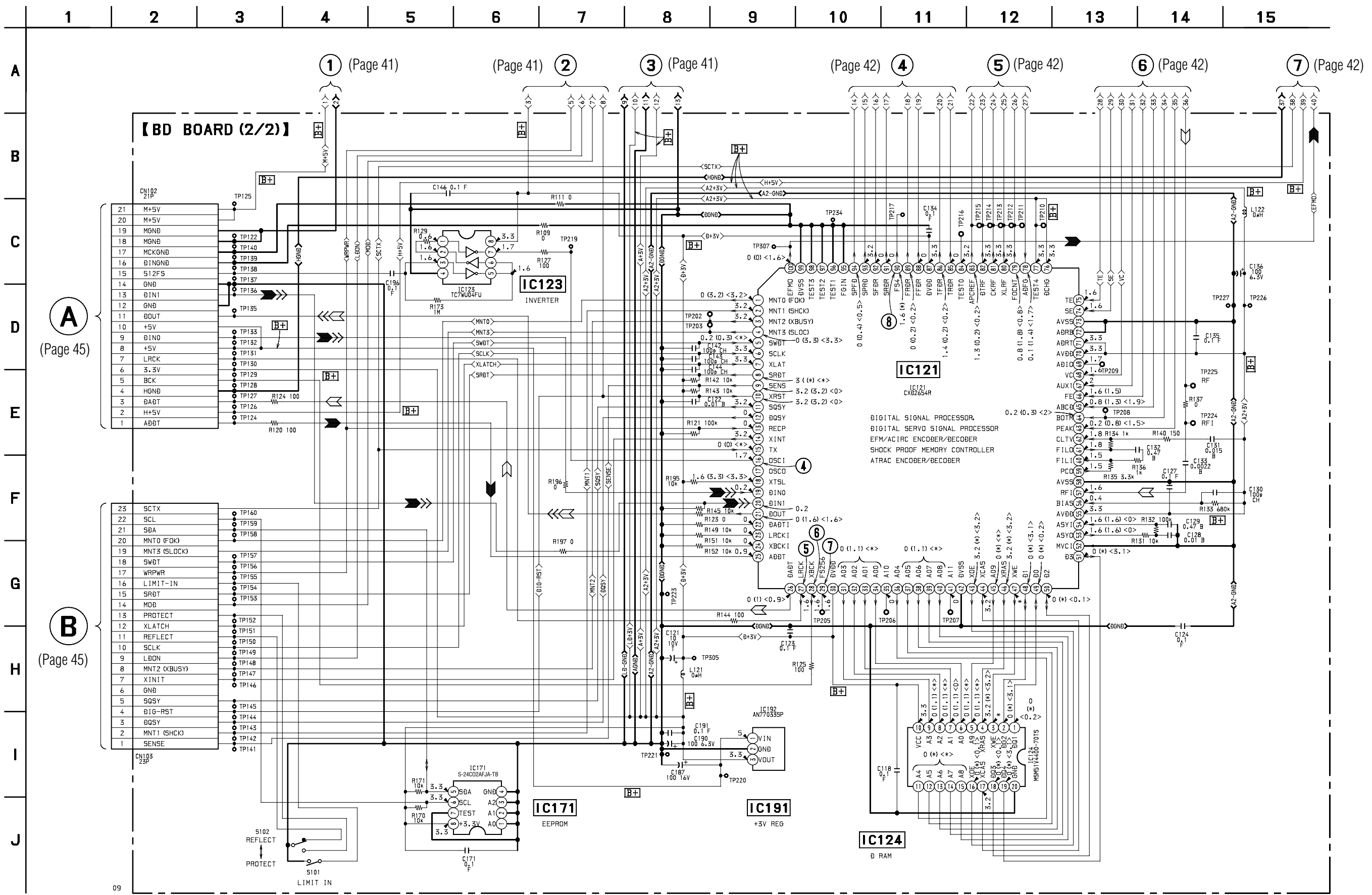
6-4. SCHEMATIC DIAGRAM - BD (1/2) SECTION -

- See page 38 for Waveforms.
- See page 61 for IC Block Diagrams.
- See page 64 for IC Pin Functions.



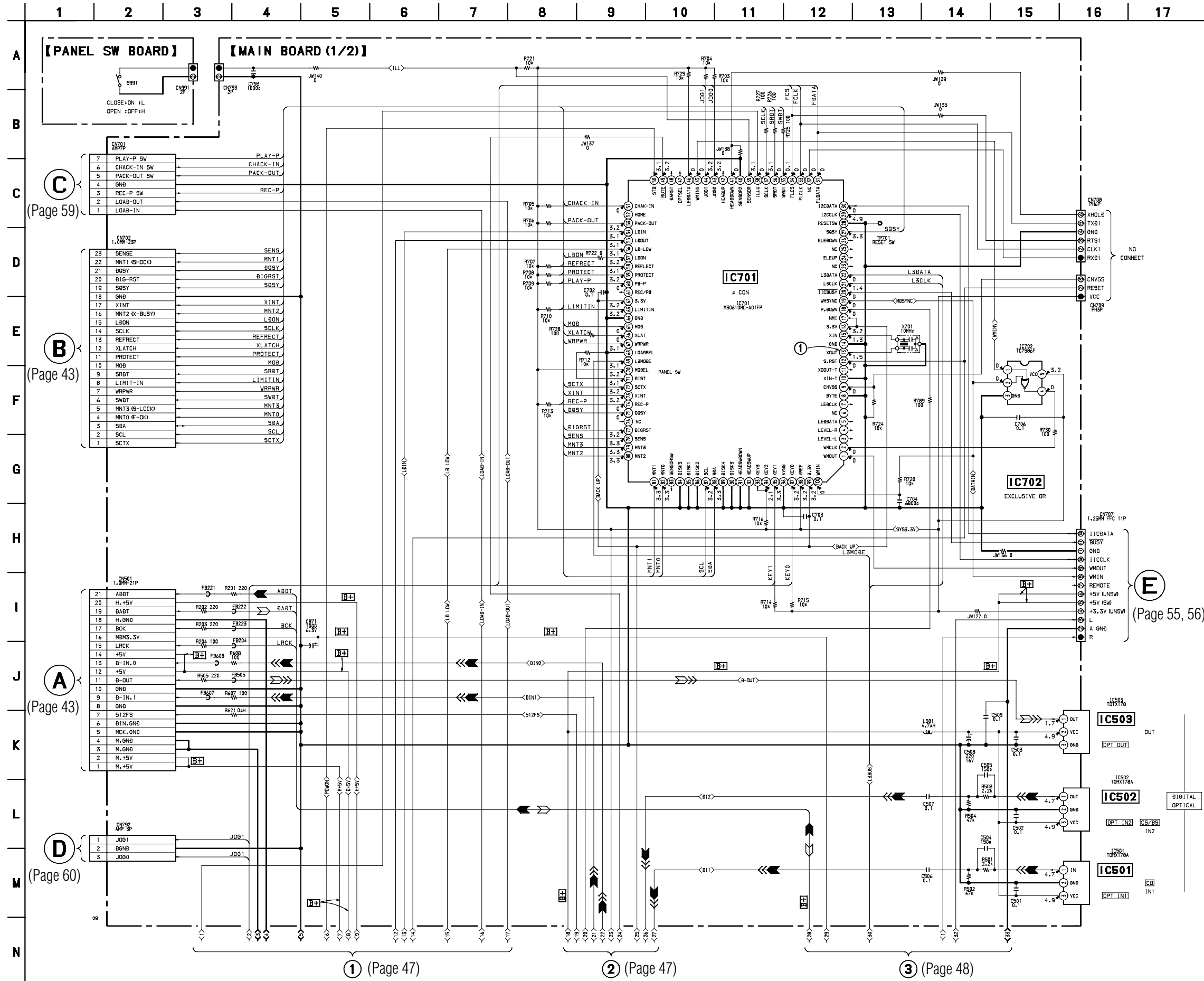
6-5. SCHEMATIC DIAGRAM – BD (2/2) SECTION –

- See page 38 for Waveforms.
- See page 39 for Printed Wiring Board.



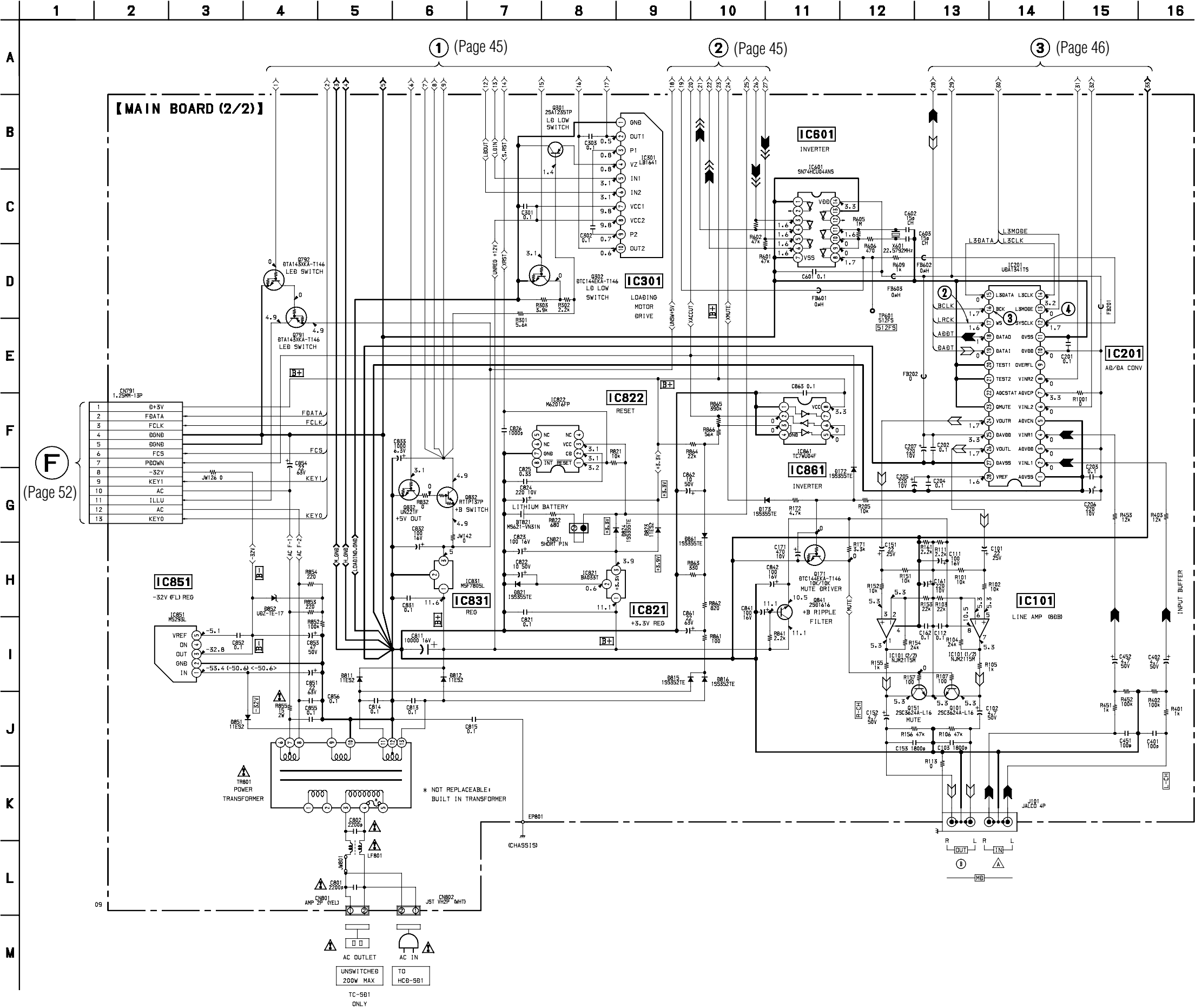
6-6. SCHEMATIC DIAGRAM – MAIN (1/2) SECTION –

- See page 38 for Waveforms.
- See page 49 for Printed Wiring Board.
- See page 65 for IC Pin Functions.



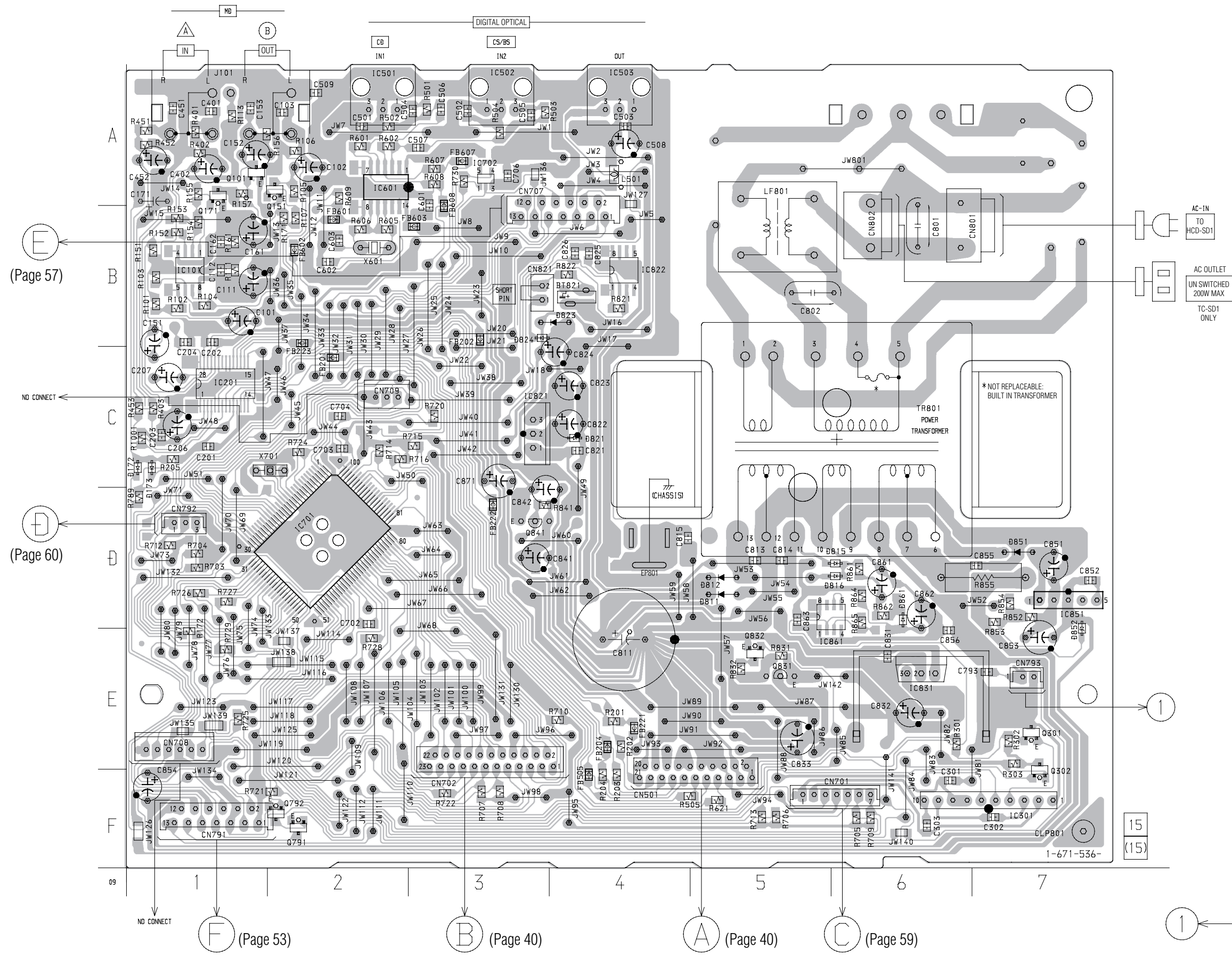
6-7. SCHEMATIC DIAGRAM – MAIN (2/2) SECTION –

- See page 38 for Waveforms.
- See page 62 for IC Block Diagrams.



6-8. PRINTED WIRING BOARD – MAIN SECTION –
 • See page 32 for Circuit Boards Location.

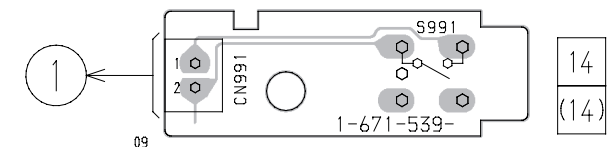
【MAIN BOARD】



• Semiconductor Location

Ref. No.	Location
D172	C-1
D173	C-1
D811	D-5
D812	D-5
D815	D-6
D816	D-6
D821	C-4
D823	B-4
D824	B-3
D831	E-6
D832	E-5
D833	E-6
D851	D-7
D852	D-7
D861	D-6
IC101	B-1
IC201	C-1
IC301	F-7
IC501	A-2
IC502	A-3
IC503	A-4
IC601	A-2
IC701	D-2
IC702	A-3
IC821	C-3
IC822	B-4
IC831	E-6
IC851	D-7
IC861	E-6
Q101	A-1
Q151	A-2
Q171	A-1
Q301	E-7
Q302	E-7
Q791	F-2
Q792	F-2
Q831	E-5
Q832	E-5
Q841	D-3

【PANEL SW BOARD】



(Page 57)

(Page 60)

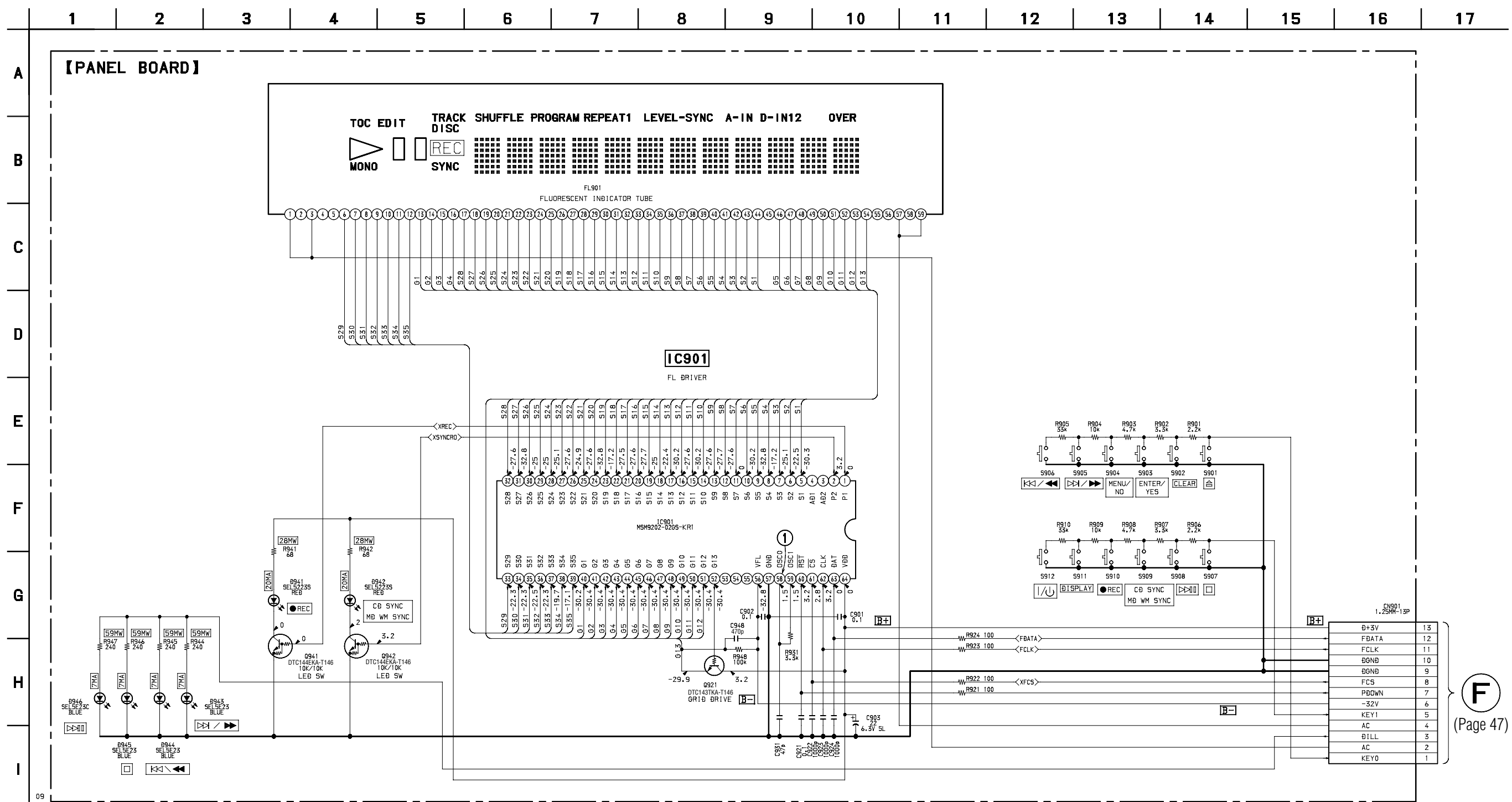
(Page 53)

(Page 40)

(Page 40)

(Page 59)

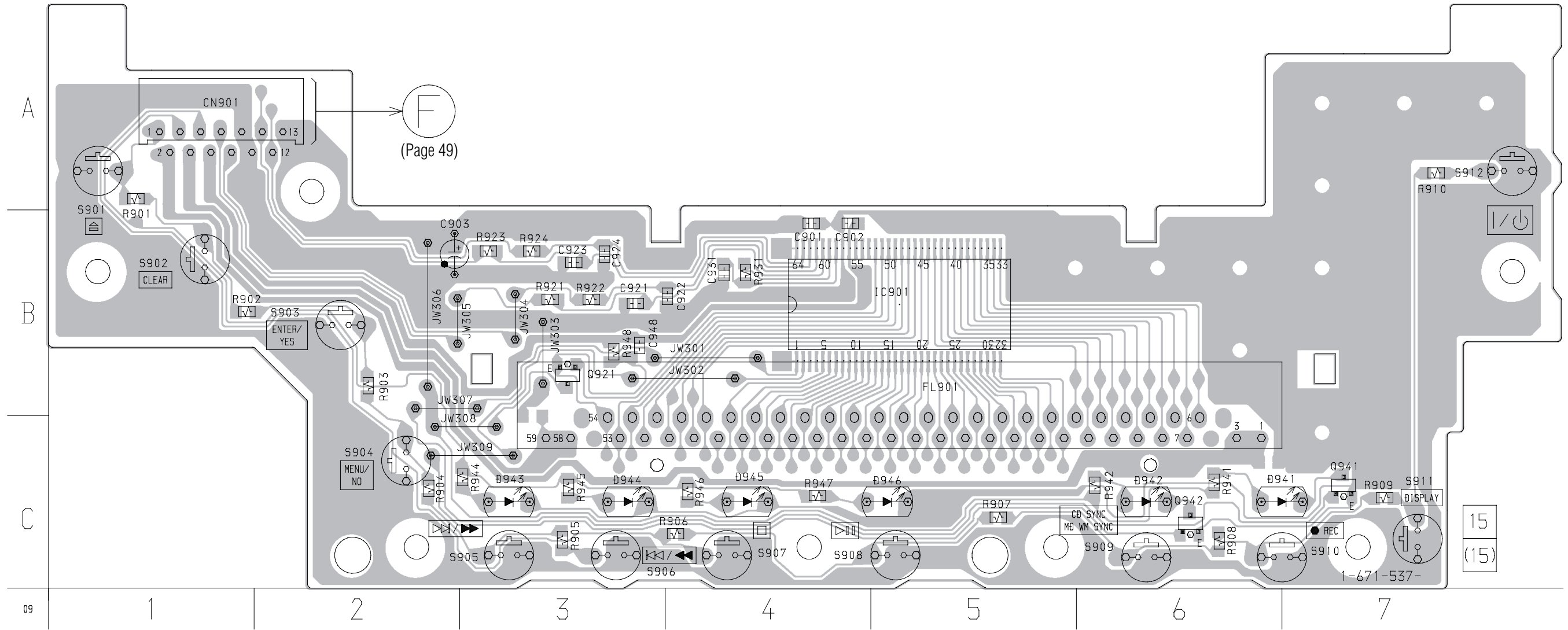
6-9. SCHEMATIC DIAGRAM – PANEL SECTION –
• See page 38 for Waveforms.



F
(Page 47)

6-10. PRINTED WIRING BOARD – PANEL SECTION –
 • See page 32 for Circuit Boards Location.

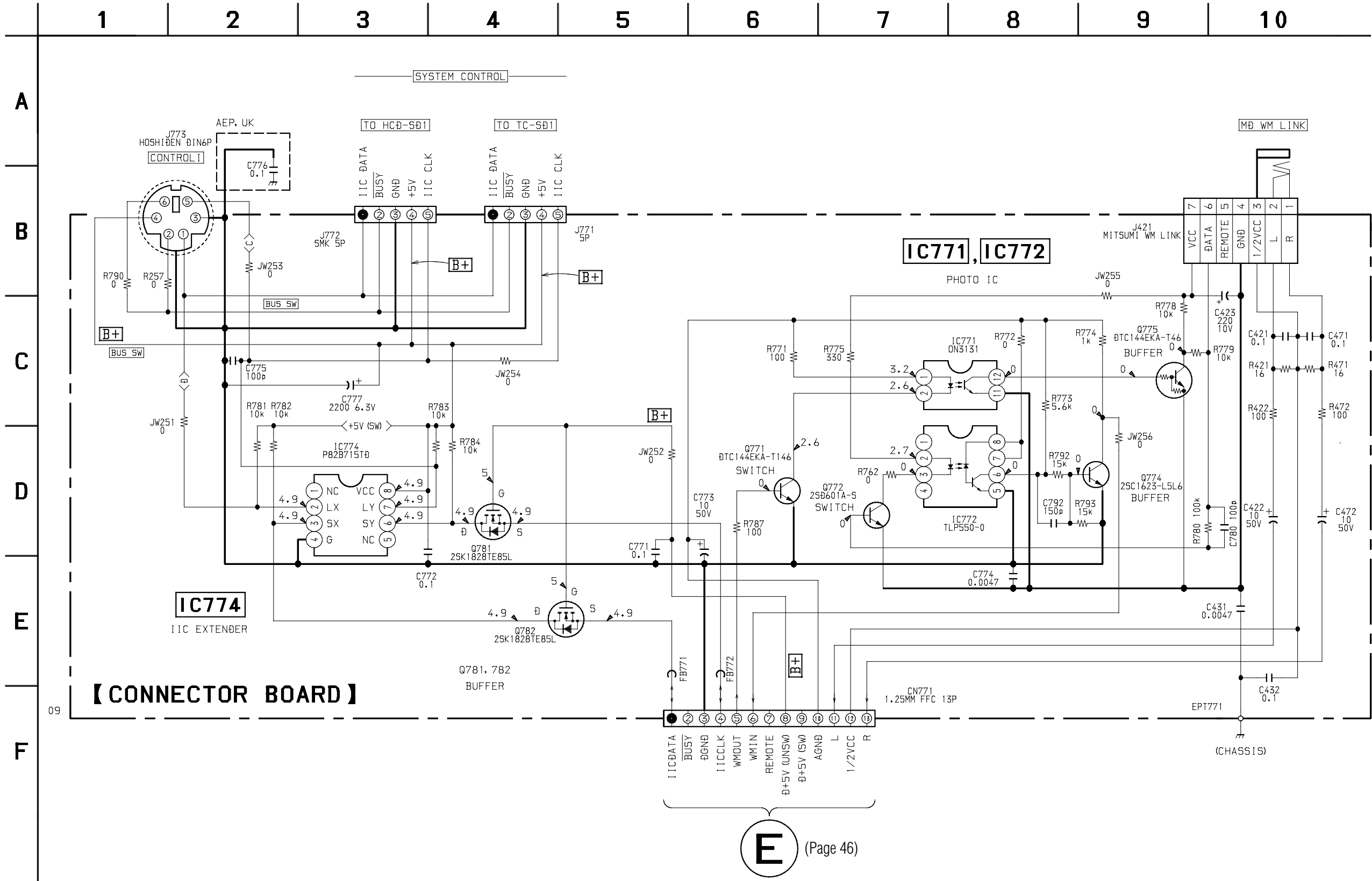
【PANEL BOARD】



• Semiconductor Location

Ref. No.	Location
D941	C-7
D942	C-6
D943	C-3
D944	C-3
D945	C-4
D946	C-5
IC901	B-5
Q921	B-3
Q941	C-7
Q942	C-6

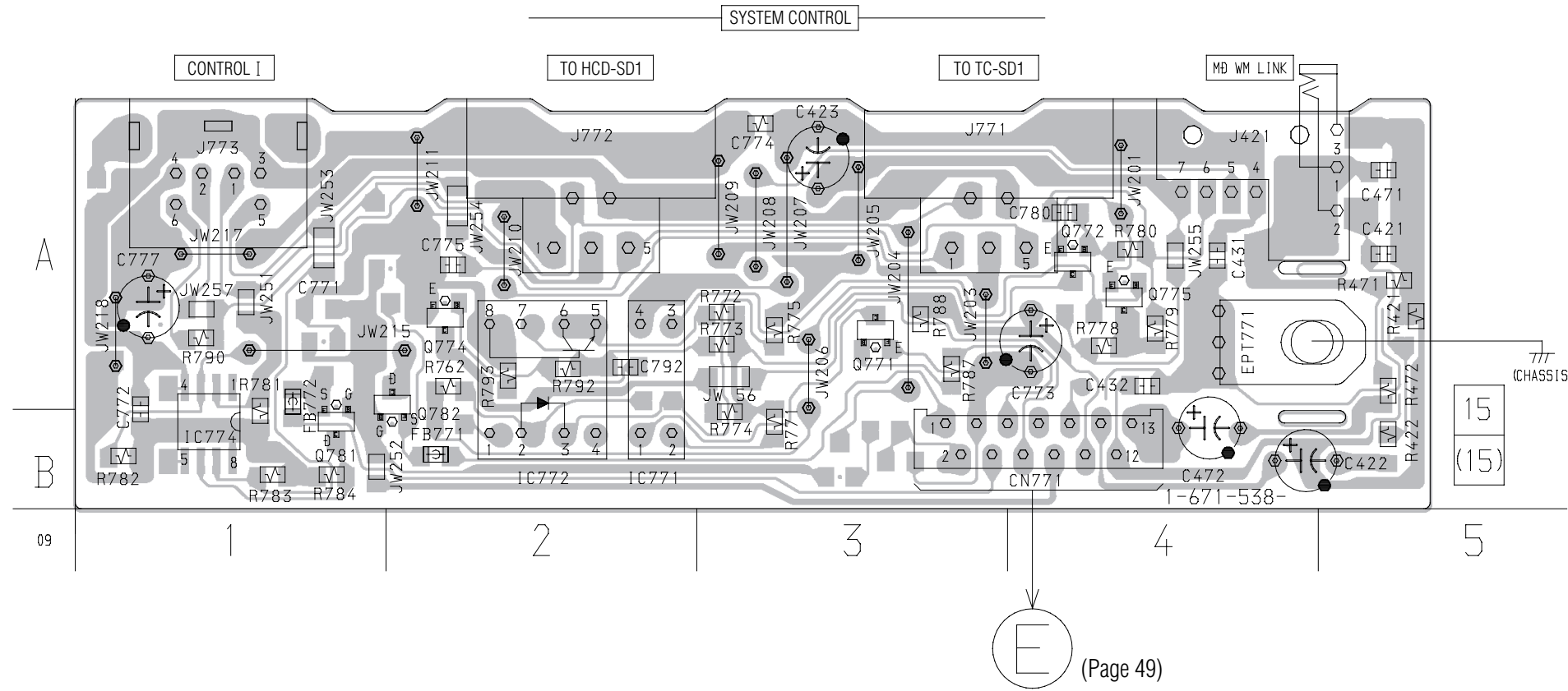
6-11. SCHEMATIC DIAGRAM – CONNECTOR SECTION –
• See page 63 for IC Block Diagrams.



E (Page 46)

6-12. PRINTED WIRING BOARD – CONNECTOR SECTION –
 • See page 32 for Circuit Boards Location.

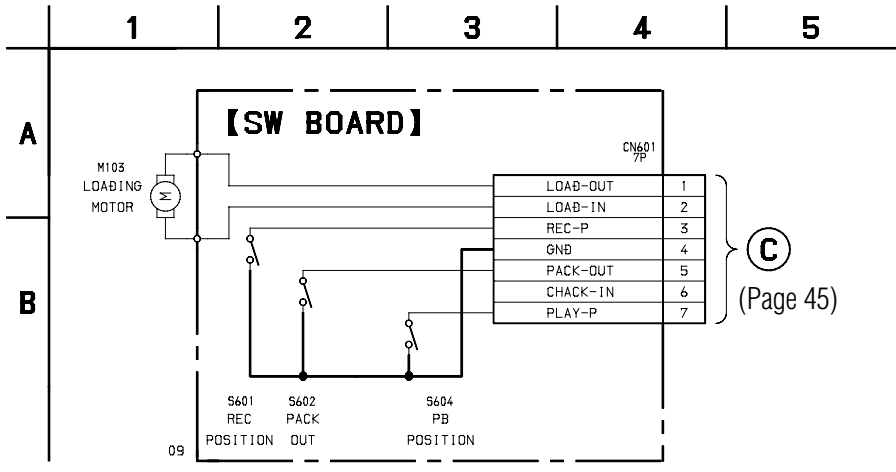
【CONNECTOR BOARD】



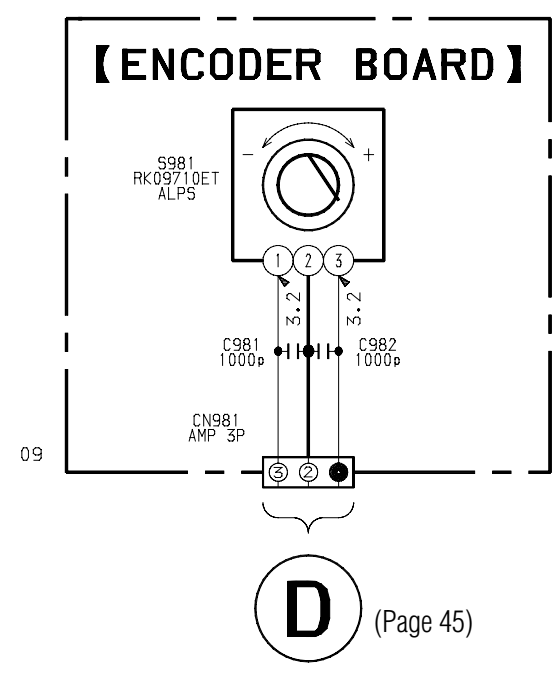
• Semiconductor Location

Ref. No.	Location
D781	A-1
D782	A-2
IC771	B-2
IC772	B-2
IC774	B-1
Q771	A-3
Q772	A-4
Q774	A-2
Q775	A-4
Q781	B-1
Q782	A-2
Q783	B-3

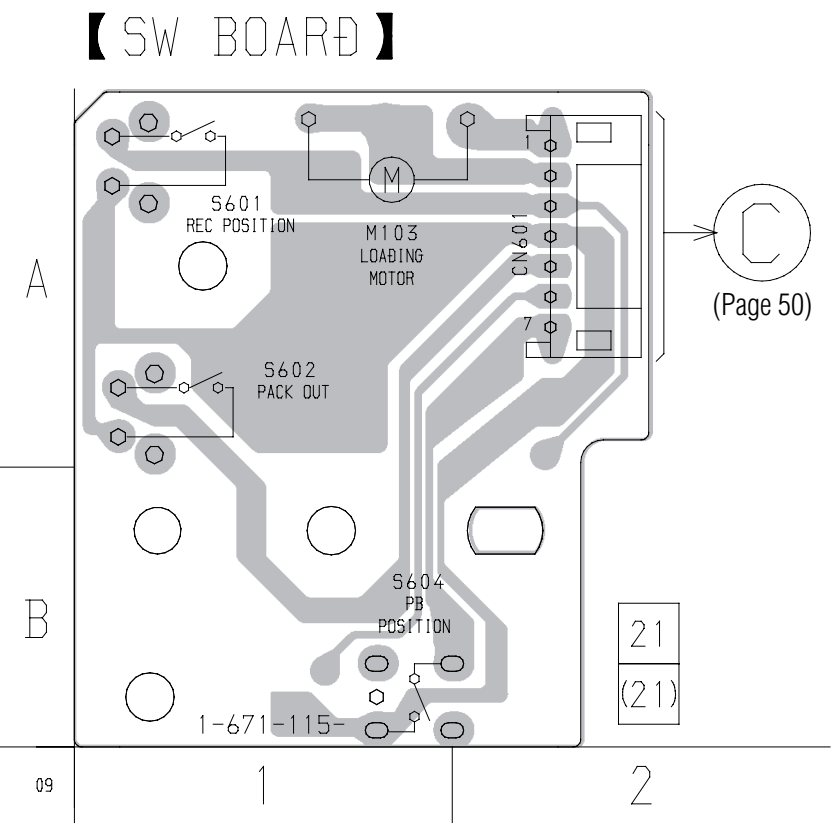
6-13. SCHEMATIC DIAGRAM – BD SWITCH SECTION –



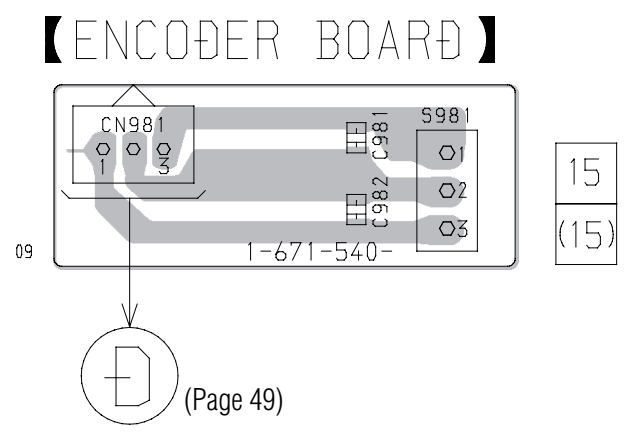
6-15. SCHEMATIC DIAGRAM – ENCODER SECTION –



6-14. PRINTED WIRING BOARD – BD SWITCH SECTION –
• See page 32 for Circuit Boards Location.



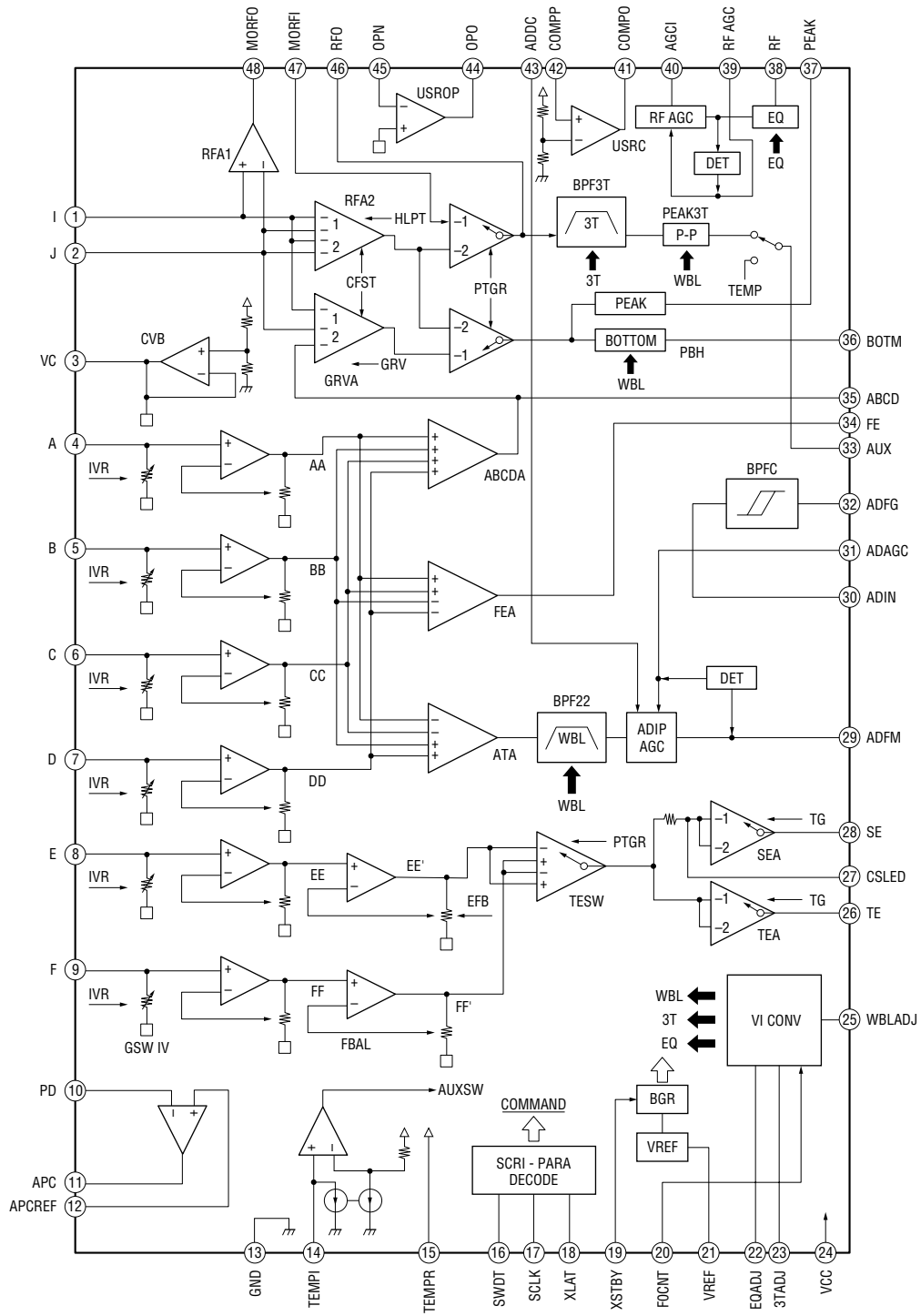
6-16. PRINTED WIRING BOARD – ENCODER SECTION –
• See page 32 for Circuit Boards Location.



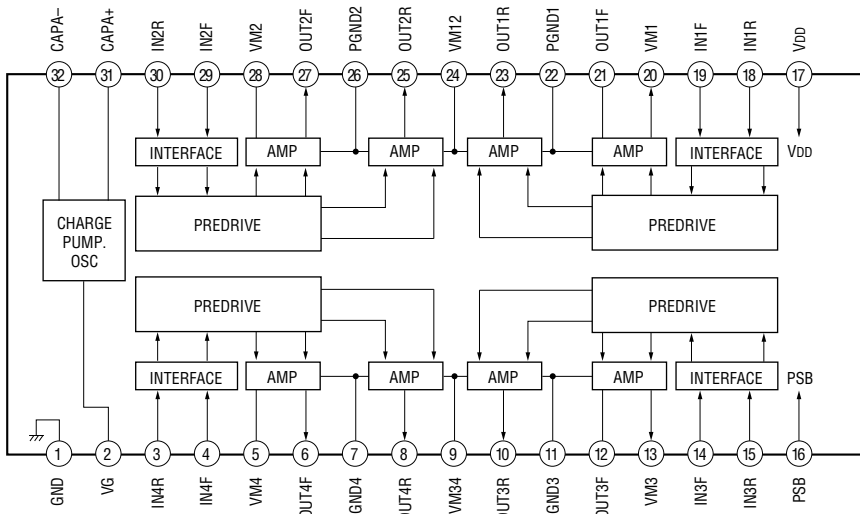
6-17. IC BLOCK DIAGRAMS

– BD Section –

IC101 CXA2523AR

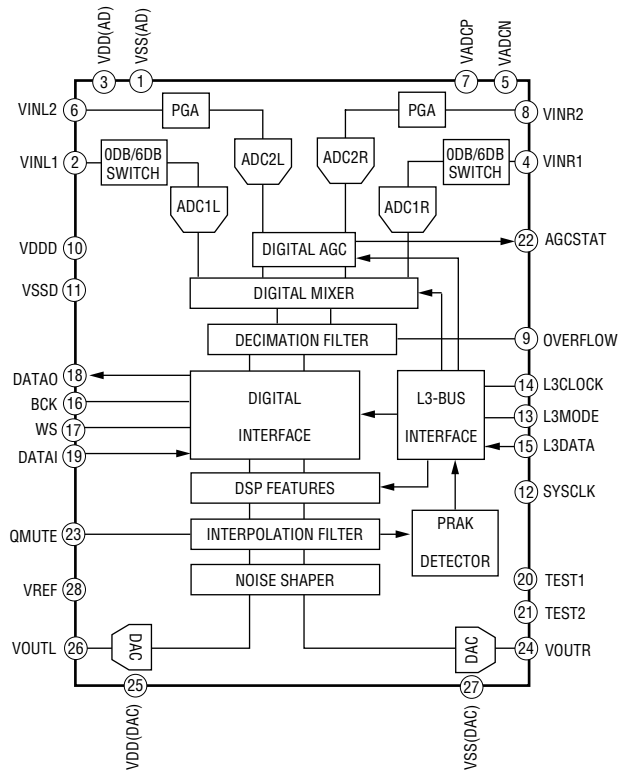


IC152 BH6511FS-E2

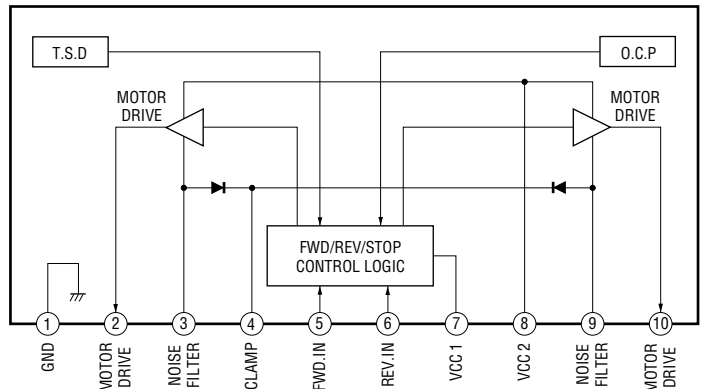


- MAIN Section -

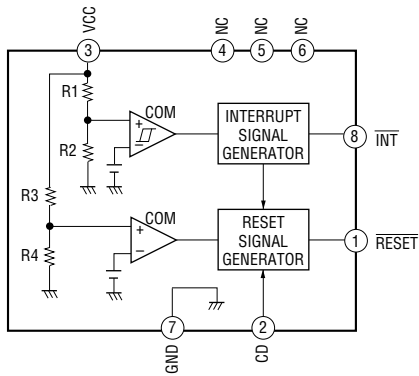
IC201 UDA1341TS/N2



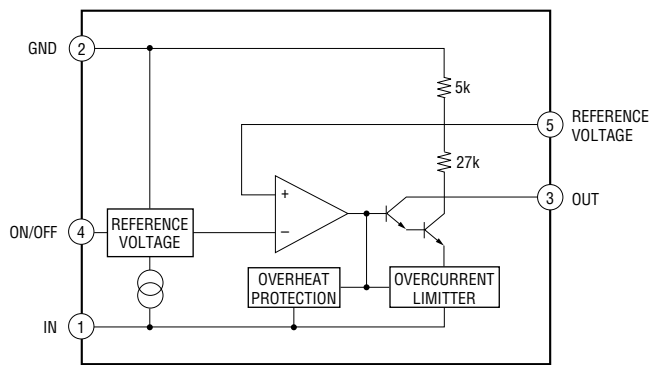
IC301 LB1641



IC822 M62016FP-E1

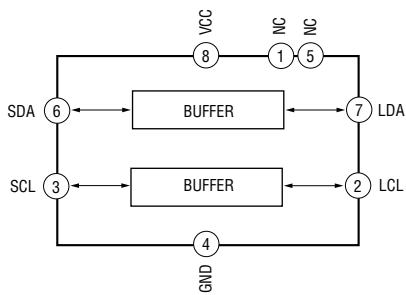


IC851 M5293L



– CONNECTOR Section –

IC774 P82B715TD.118



6-18. IC PIN FUNCTIONS

• IC101 CXA2523AR (RF Amplifier) (BD Board)

Pin No.	Pin Name	I/O	Function
1	I	I	I-V converted RF signal I input from the optical pick-up block detector
2	J	I	I-V converted RF signal J input from the optical pick-up block detector
3	VC	O	Middle point voltage (+1.65V) generation output terminal
4 to 9	A to F	I	Signal input from the optical pick-up detector
10	PD	I	Light amount monitor input terminal
11	APC	O	Laser amplifier output terminal to the automatic power control circuit
12	APCREF	I	Reference voltage input terminal for setting laser power
13	GND	—	Ground terminal
14	TEMPI	I	Connected to the temperature sensor
15	TEMPR	O	Output terminal for a temperature sensor reference voltage
16	SWDT	I	Writing serial data input from the CXD2652AR (IC121)
17	SCLK	I	Serial clock signal input from the CXD2652AR (IC121)
18	XLAT	I	Serial latch signal input from the CXD2652AR (IC121)
19	XSTBY	I	Standby signal input terminal "L": standby (fixed at "H" in this set)
20	FOCNT	I	Center frequency control voltage input terminal of internal circuit (BPF22, BPF3T, EQ) input from the CXD2652AR (IC121)
21	VREF	O	Reference voltage output terminal Not used (open)
22	EQADJ	I	Center frequency setting terminal for the internal circuit (EQ)
23	3TADJ	I	Center frequency setting terminal for the internal circuit (BPF3T)
24	VCC	—	Power supply terminal (+3.3V)
25	WBLADJ	I	Center frequency setting terminal for the internal circuit (BPF22)
26	TE	O	Tracking error signal output to the CXD2652AR (IC121)
27	CSLED	I	Connected to the external capacitor for low-pass filter of the sled error signal
28	SE	O	Sled error signal output to the CXD2652AR (IC121)
29	ADFM	O	FM signal output of the ADIP
30	ADIN	I	Receives a ADIP FM signal in AC coupling
31	ADAGC	I	Connected to the external capacitor for ADIP AGC
32	ADFG	O	ADIP duplex signal (22.05 kHz \pm 1 kHz) output to the CXD2652AR (IC121)
33	AUX	O	Auxiliary signal (I3 signal/temperature signal) output to the CXD2652AR (IC121)
34	FE	O	Focus error signal output to the CXD2652AR (IC121)
35	ABCD	O	Light amount signal (ABCD) output to the CXD2652AR (IC121)
36	BOTM	O	Light amount signal (RF/ABCD) bottom hold output to the CXD2652AR (IC121)
37	PEAK	O	Light amount signal (RF/ABCD) peak hold output to the CXD2652AR (IC121)
38	RF	O	Playback EFM RF signal output to the CXD2652AR (IC121)
39	RFAGC	I	Connected to the external capacitor for RF auto gain control circuit
40	AGCI	I	Receives a RF signal in AC coupling
41	COMPO	O	User comparator output terminal Not used (open)
42	COMPP	I	User comparator input terminal Not used (fixed at "L")
43	ADDC	I	Connected to the external capacitor for cutting the low band of the ADIP amplifier
44	OPO	O	User operational amplifier output terminal Not used (open)
45	OPN	I	User operational amplifier inversion input terminal Not used (fixed at "L")
46	RFO	O	RF signal output terminal
47	MORFI	I	Receives a MO RF signal in AC coupling
48	MORFO	O	MO RF signal output terminal

• IC701 M30610MC-A01FP (SYSTEM CONTROL μ CON) (MAIN BOARD)

Pin No.	Pin Name	I/O	Function
1	WMOUT	O	MD WM LINK data out
2	WMCLK	I	MD WM LINK clock in
3	LEVEL-L	O	LEVEL-L DA output (Not used)
4	LEVEL-R	O	LEVEL-R DA output (Not used)
5	LEDDATA	O	LED DRIVER DATA output (Not used)
6	NC	O	Not used
7	LEDCLK	O	LED DRIVER CLOCK output (Not used)
8	BYTE	I	Data bus switching (Fixed at "L")
9	CNVSS	I	Pulled down to "L"
10	XIN-T	I	Not used
11	XOUT-T	O	
12	S.RST	I	System reset
13	XOUT	O	Main clock output (10 MHz)
14	GND	–	Ground pin
15	XIN	I	Main clock output (10 MHz)
16	3.3V	–	Power supply 3.3V
17	NMI	I	Not used (Fixed at "H")
18	P.DOWN	I	Power down detection
19	WMSYNC	I	MD WM LINK SYNC input
20	IICBUSY	O	I ² C BUSY output (Not used)
21	L3CLK	O	AD/DA clock out
22	L3DATA	O	AD/DA data out
23	NC	O	Not used
24	ELEUP	O	Elevator control up output (Not used)
25	NC	O	Not used
26	ELEDOWN	O	Elevator control down output (Not used)
27	SQSY	I	SUBQ, ADIP sync input
28	RESETSW	I	Reset switch detection signal (Not used)
29	IICCLK	I/O	I ² C clock
30	IICDATA	I/O	I ² C data
31	FLDATA	O	FLD transmission data out
32	NC	O	Not used
33	FLCLK	O	FLD transmission data clock out
34	FLCS	O	FLD transmission data chip select out
35	SWDT	O	Serial data out
36	SRDT	I	Serial data in
37	SCLK	O	Serial clock out
38	ILLU	O	Illumination output ("H":Light up)
39	SESOR	I	Main sensor detection signal (Front panel open detection "H":OPEN)
40	SENSOR2	I	Sub sensor detection signal (Not used)
41	HEADDOWN	O	Recording head control down output (Not used)
42	HEADUP	O	Recording head control up output (Not used)
43	JOG0	I	Jog 0 input
44	JOG1	I	Jog 1 input
45	WMINV	O	MD WM LINK clock inverse signal output
46	LEDLATCH	O	LED driver latch output (Not used)
47	OPTSEL1	O	Optical input selection signal output (Not used)
48	DARST	O	A/D, D/A reset signal output (Not used)
49	MUTE	O	Line mute ("L":MUTE)
50	STB	O	Power on/off output ("H":POW ON)

Pin No.	Pin Name	I/O	Function
51	CHAK-IN	I	Detection signal from IN switch
52	HOME	I	Detection signal form HOME switch
53	PACK-OUT	I	Detection signal from OUT switch
54	LDIN	O	Loading motor in control
55	LDOUT	O	Loading motor out control
56	LD-LOW	O	Loading motor voltage control output
57	LDON	O	Laser power ON/OFF
58	REFLECT	I	Disc reflection rate detection
59	PROTECT	I	Disc hole detection
60	PB-P	I	Detection signal from playback position detection switch
61	REC/PB	O	Not used
62	3.3V	–	Power supply 3.3V
63	LIMITIN	I	Detection signal from limit switch
64	GND	–	Ground pin
65	MOD	O	High frequency superimposing ON/OFF output
66	XLAT	O	Latch signal output to serial pulse
67	WRPWR	O	BD light power ON/OFF output
68	LOADINGSEL	I	LOADING SELECT input (Fixed at “L”)
69	L3MODE	I	AD/DA MODE signal output
70	MODEL	I	Model selection (Fixed at “H”)
71	DIST	I	Destination selection (Fixed at “H”)
72	SCTX	O	Timing for sending write data to CXD2654
73	XINT	I	CXD2654 interrupt status input
74	REC-P	I	Not used
75	DQSY	I	Digital in sync input
76	NC	O	Not used
77	DIGRST	O	CXD2654, motor driver reset signal
78	SENS	I	Internal status
79	MNT3	I	Spindle servo lock status monitor
80	MNT2	I	Command execution status monitor
81	MNT1	I	Track jump signal
82	MNT0	I	Focus OK signal
83	SENSORSW	O	MAIN SENSOR waveform switching output (Not used)
84	DISK5	I	DISC5 IN SW (Not used)
85	DISK1	I	DISC1 IN SW (Not used)
86	DISK2	I	DISC2 IN SW (Not used)
87	SCL	O	Clock signal to backup memory
88	SDA	I/O	Data signal to backup memory
89	DISK4	I	DISC4 IN SW (Not used)
90	DISK3	I	DISC3 IN SW (Not used)
91	HEADSWDWN	I	Recording head down detection signal (Not used)
92	HEADSWUP	I	Recording head up detection signal (Not used)
93	KEY3	I	Key 3 (A/D) (Not used)
94	KEY2	I	Key 2 (A/D) (Not used)
95	KEY1	I	Key 1 (A/D)
96	AVSS	–	Ground pin
97	KEY0	I	Key 0 (A/D)
98	VREF	–	A/D reference voltage 3.3V
99	3.3V	–	Power supply 3.3V
100	WMCLK	I	MD WM LINK data input

SECTION 7 EXPLODED VIEWS

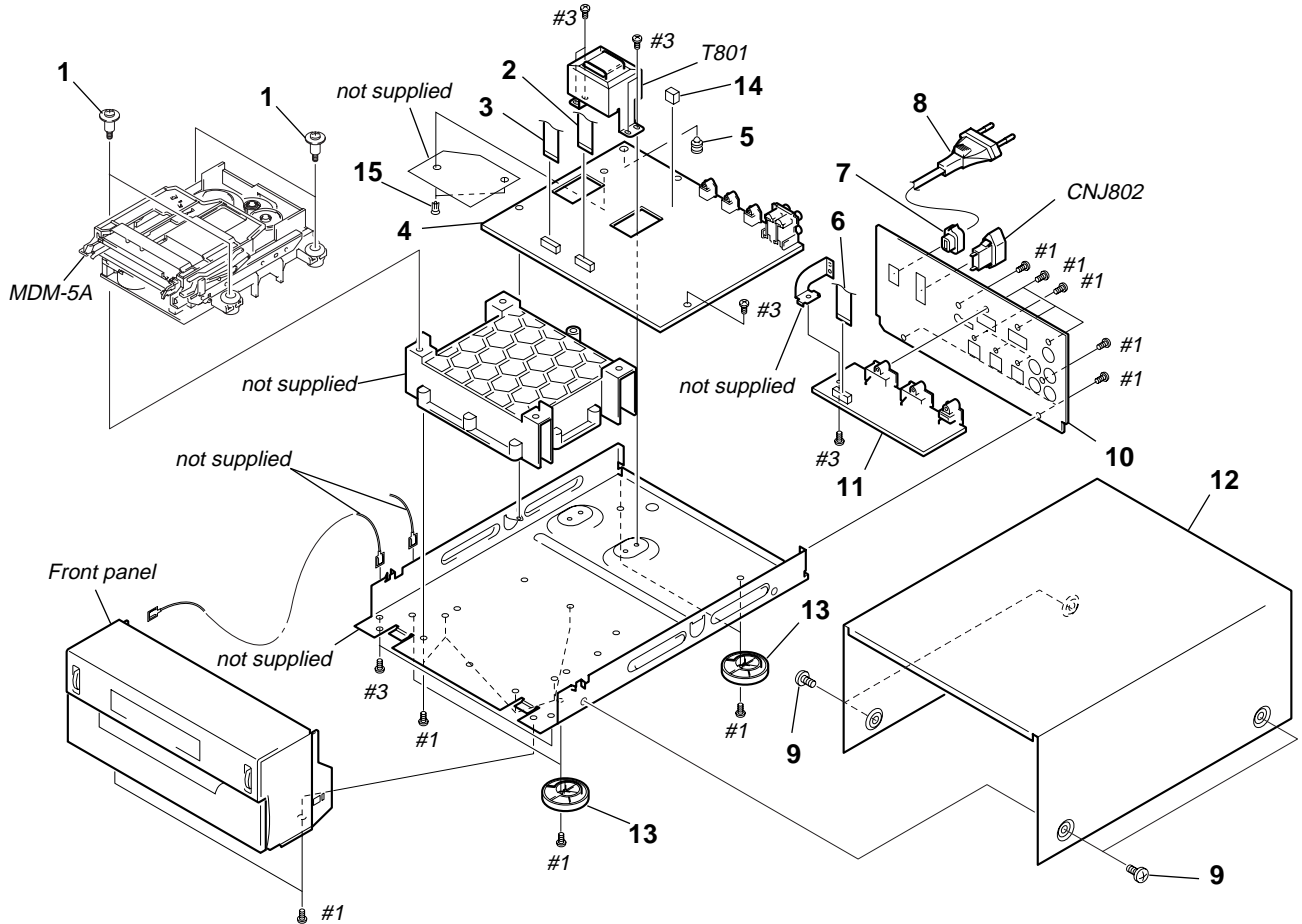
NOTE:

- Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

- Hardware (# mark) list and accessories and packing materials are given in the last of this parts list.
- Abbreviation
 HK : Hong Kong model
 SP : Singapore model

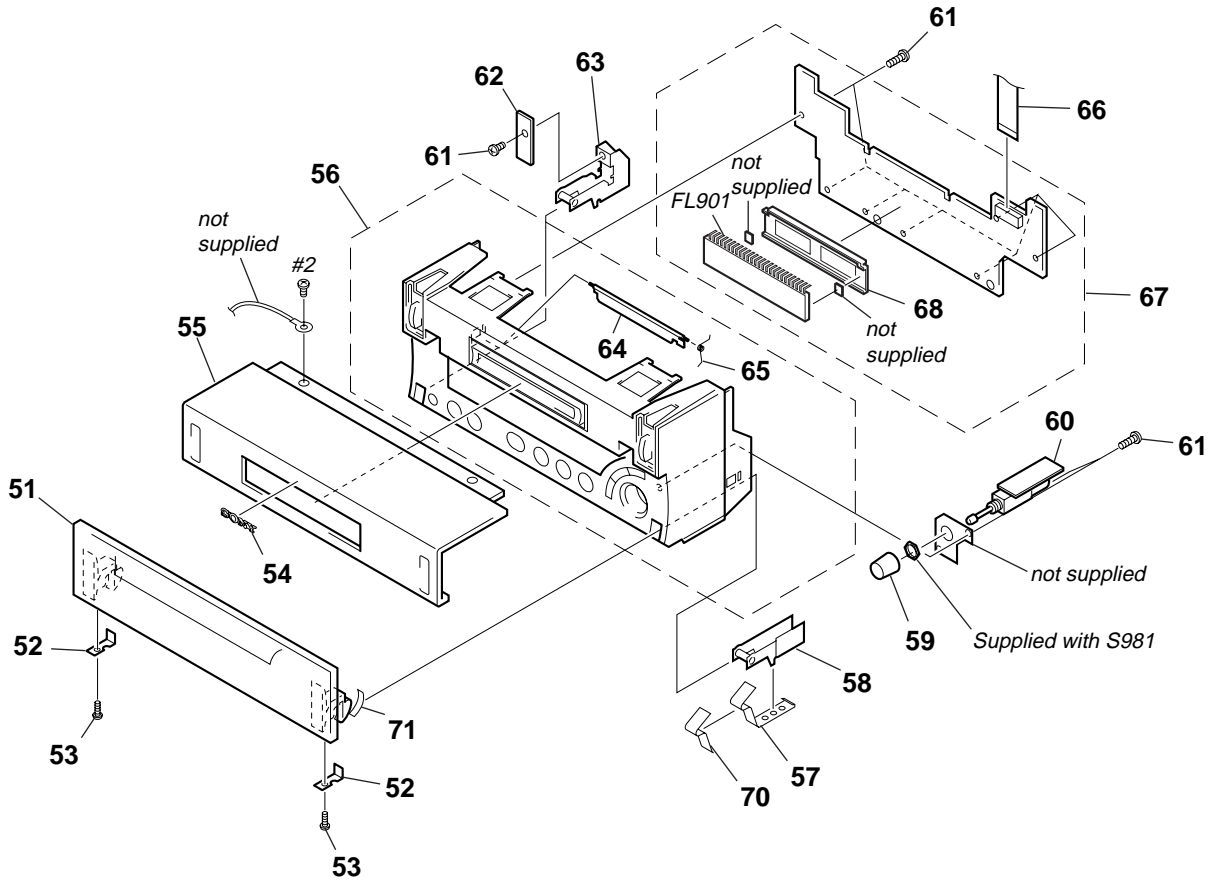
The components identified by mark \triangle or dotted line with mark \triangle are critical for safety. Replace only with part number specified.

7-1. CASE AND BACK PANEL SECTION



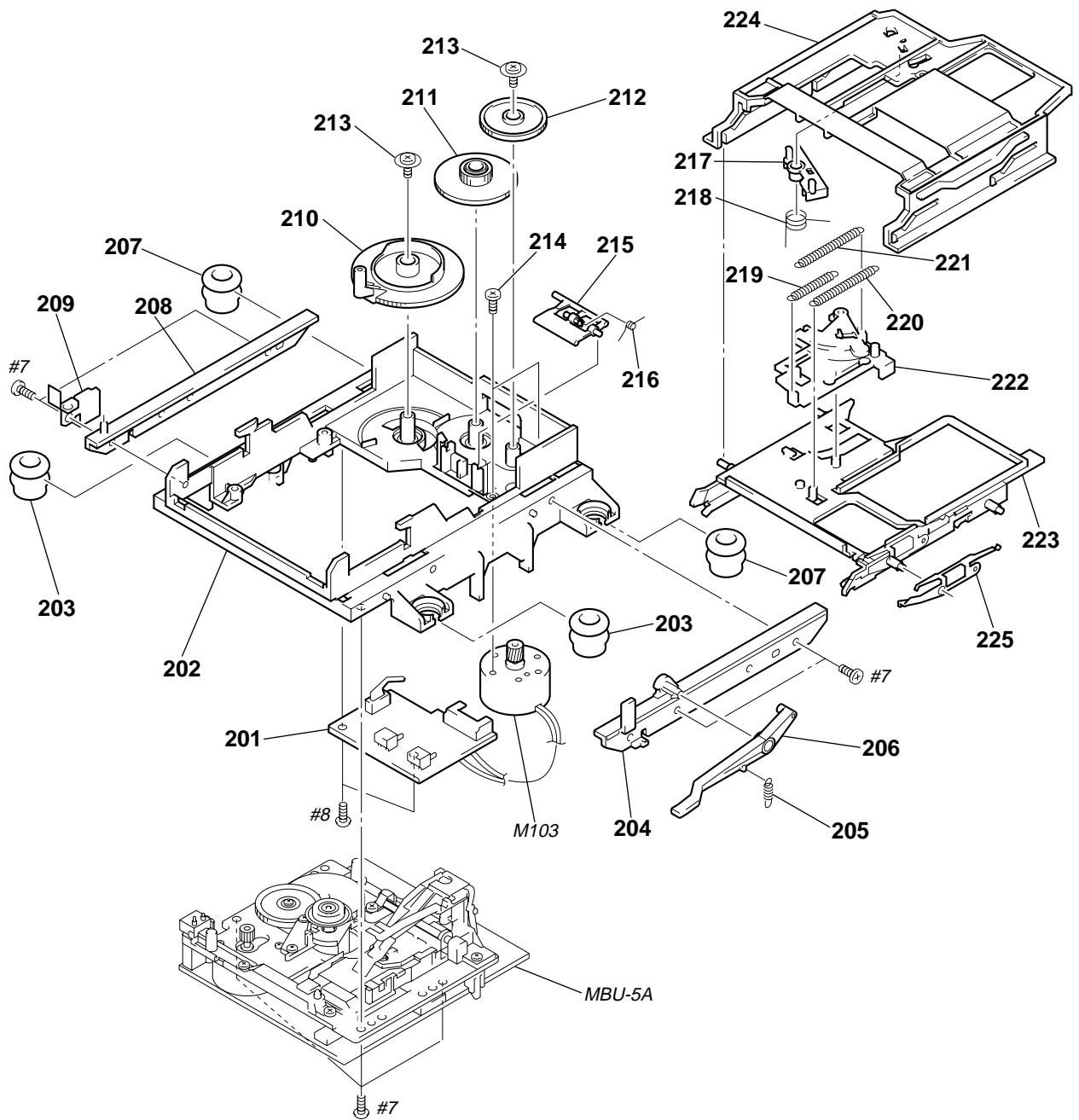
Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
1	4-212-589-01	SCREW (+BVTPWH M3), STEP		* 10	4-212-572-11	PANEL (MD), BACK (AEP,UK)	
2	1-783-140-11	WIRE (FLAT TYPE) (23 CORE)		* 10	4-212-572-21	PANEL (MD), BACK (SP,HK)	
3	1-783-139-11	WIRE (FLAT TYPE) (21 CORE)		* 11	1-671-538-11	CONNECTOR BOARD	
* 4	A-4724-618-A	MAIN BOARD, COMPLETE (AEP,UK)		* 12	4-212-561-31	CASE	
* 4	A-4724-626-A	MAIN BOARD, COMPLETE (SP,HK)		13	X-4950-994-1	FOOT ASSY	
* 5	4-944-316-01	HOLDER, PC BOARD		14	1-569-972-21	SOCKET, SHORT 2P	
6	1-769-969-11	WIRE (FLAT TYPE) (13 CORE)		15	3-531-576-01	RIVET	
* 7	3-703-244-00	BUSHING (2104), CORD		\triangle CNJ802	1-526-794-11	OUTLET, AC	
\triangle 8	1-783-499-11	CORD, POWER		\triangle T801	1-431-685-31	TRANSFORMER, POWER	
9	3-363-099-51	SCREW (CASE 3 TP2)					

7-2. FRONT PANEL SECTION



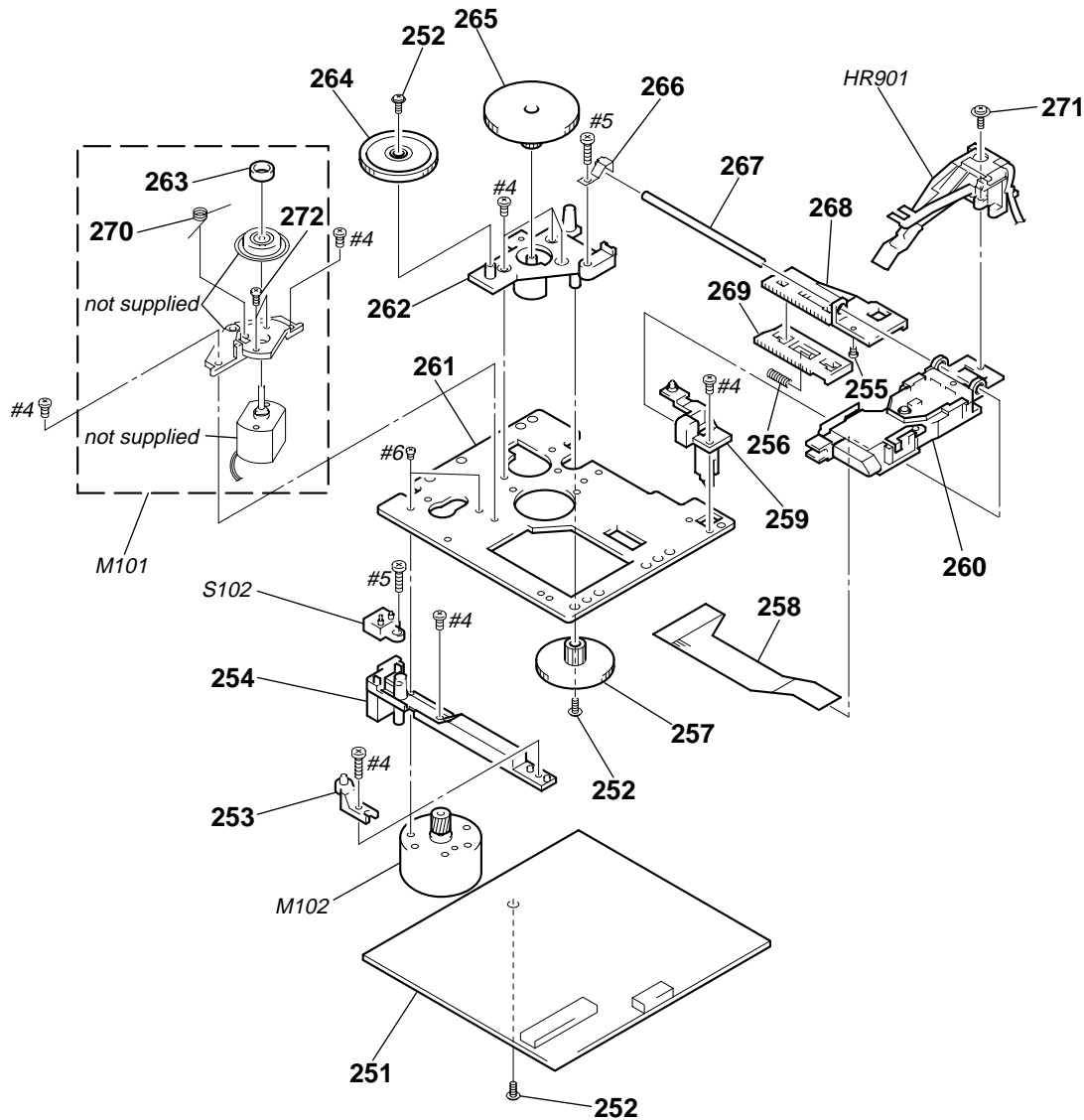
Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
51	X-4950-581-1	GLASS (MD) ASSY		61	4-951-620-01	SCREW (2.6X8), +BVTP	
52	4-212-584-01	BRACKET (SHAFT)		* 62	1-671-539-11	PANEL SW BOARD	
53	4-993-007-01	SCREW (M2.6X6), +P TAPPING		63	X-4950-998-1	BRACKET (L) ASSY	
54	4-942-636-21	EMBLEM (NO.3.5), SONY		64	4-996-690-91	LID (CARTRIDGE)	
55	4-212-551-11	PANEL (AL-MD), FRONT		65	4-976-593-01	SPRING (LID), TORSION	
56	X-4950-996-1	PANEL (MD) ASSY , FRONT		66	1-751-086-11	WIRE (FLAT TYPE) (13 CORE)	
57	4-212-580-11	SPRING (GLASS)		* 67	A-4724-619-A	PANEL BOARD, COMPLETE	
58	X-4950-999-1	BRACKET (R) ASSY		* 68	4-212-590-11	HOLDER (FL)	
59	4-212-553-11	KNOB (JOG)		70	4-213-692-02	TAPE (SPRING)	
* 60	1-671-540-11	ENCODER BOARD		71	4-214-458-01	TAPE	
				FL901	1-517-804-11	INDICATOR TUBE, FLUORESCENT	

7-3. MECHANISM DECK SECTION (MDM-5A)



Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
* 201	1-671-115-21	SW BOARD		215	4-996-227-01	LEVER (HEAD)	
* 202	4-996-217-01	CHASSIS		216	4-996-229-01	SPRING (HEAD LEVER), TORSION	
203	4-996-223-11	INSULATOR (F)		217	4-996-212-01	LEVER (LIMITTER)	
* 204	4-996-218-01	BRACKET (GUIDE R)		218	4-996-213-01	SPRING (LIMITTER), TORSION	
205	4-996-277-01	SPRING (O/C), TENSION		219	4-996-214-01	SPRING (SLIDER), TENSION	
206	4-996-226-01	LEVER (O/C)		220	4-996-216-01	SPRING (HOLDER), TENSION	
207	4-999-347-01	INSULATOR (R)		221	4-210-396-01	SPRING (LOCK LEVER), TENSION	
* 208	4-996-225-01	BRACKET (GUIDE L)		222	X-4949-246-1	SLIDER ASSY	
209	4-988-466-21	SPRING (ELECTROSTATIC), LEAF		223	X-4949-245-1	HOLDER ASSY	
210	4-996-219-01	GEAR (CAM GEAR)		* 224	4-996-211-01	SLIDER (CAM)	
211	4-996-220-01	GEAR (A)		225	4-998-763-24	SPRING (SHUTTER), LEAF	
212	4-996-221-01	GEAR (B)		M103	X-4949-264-1	MOTOR ASSY, LOADING	
213	4-933-134-01	SCREW (+PTPWH M2.6X6)					
214	4-996-224-11	SCREW (1.7X3), +PWH					

7-4. BASE UNIT SECTION (MBU-5A)



The components identified by mark \triangle or dotted line with mark \triangle are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
* 251	A-4699-893-A	BD BOARD, COMPLETE		265	4-996-261-01	GEAR (SL-B)	
252	3-372-761-01	SCREW (M1.7), TAPPING		266	4-996-264-01	SPRING (SHAFT), LEAF	
* 253	4-996-267-01	BASE (BU-D)		267	4-996-265-01	SHAFT, MAIN	
* 254	4-996-255-01	BASE (BU-C)		268	4-996-256-11	SL (BASE)	
255	4-900-590-01	SCREW, PRECISION SMALL		269	4-996-257-01	RACK (SL)	
256	4-996-258-01	SPRING, COMPRESSION		270	4-996-263-01	SPRING (CLV), TORSION	
257	4-996-262-01	GEAR (SL-C)		271	4-988-560-01	SCREW (+P 1.7X6)	
* 258	1-667-954-11	FLEXIBLE BOARD		272	4-211-036-01	SCREW (1.7X2.5), +PWH	
* 259	4-996-253-12	BASE (BU-A)		HR901	1-500-502-11	HEAD, OVER LIGHT	
\triangle 260	8-583-028-02	OPTICAL PICK-UP KMS-260A/J1NP		M101	A-4672-475-A	MOTOR ASSY, SPINDLE	
* 261	4-996-252-01	CHASSIS, BU		M102	A-4672-474-A	MOTOR ASSY, SLED	
* 262	4-996-254-01	BASE (BU-B)		S102	1-762-148-21	SWITCH, PUSH (2 KEY)	
263	4-967-688-11	MAGNET, ABSORPTION					
264	4-996-260-01	GEAR (SL-A)					

SECTION 8 ELECTRICAL PARTS LIST

BD

Note:

The components identified by mark Δ or dotted line with mark Δ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board name.

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- RESISTORS
All resistors are in ohms
METAL: Metal-film resistor
METAL OXIDE: Metal Oxide-film resistor
F : nonflammable
- SEMICONDUCTORS
In each case, u: μ , for example:
uA...: μ A..., uPA...: μ PA..., uPB...: μ PB..., uPC...: μ PC..., uPD...: μ PD...
- CAPACITORS
uF : μ F
- COILS
uH : μ H
- Abbreviation
HK : Hong Kong model
SP : Singapore model

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
*	A-4699-893-A	BD BOARD, COMPLETE *****		C164	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V
		< CAPACITOR >		C167	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C101	1-125-822-11	TANTALUM 10uF	20% 10V	C168	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C102	1-163-038-91	CERAMIC CHIP 0.1uF	25V	C169	1-125-822-11	TANTALUM 10uF	20% 10V
C103	1-125-822-11	TANTALUM 10uF	20% 10V	C171	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C104	1-125-822-11	TANTALUM 10uF	20% 10V	C181	1-104-913-11	TANTAL. CHIP 10uF	20% 16V
C105	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V	C183	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C106	1-163-275-11	CERAMIC CHIP 0.001uF	5% 50V	C184	1-117-970-11	ELECT CHIP 22uF	20% 10V
C107	1-163-038-91	CERAMIC CHIP 0.1uF	25V	C185	1-164-611-11	CERAMIC CHIP 0.001uF	10% 500V
C108	1-163-038-91	CERAMIC CHIP 0.1uF	25V	C187	1-104-913-11	TANTAL. CHIP 10uF	20% 16V
C109	1-163-037-11	CERAMIC CHIP 0.022uF	10% 25V	C188	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V
C111	1-164-344-11	CERAMIC CHIP 0.068uF	10% 25V	C189	1-163-989-11	CERAMIC CHIP 0.033uF	10% 25V
C112	1-163-017-00	CERAMIC CHIP 0.0047uF	5% 50V	C190	1-126-206-11	ELECT CHIP 100uF	20% 6.3V
C113	1-109-982-11	CERAMIC CHIP 1uF	10% 10V	C191	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C115	1-164-489-11	CERAMIC CHIP 0.22uF	10% 16V	C196	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C116	1-163-037-11	CERAMIC CHIP 0.022uF	10% 25V	C197	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C117	1-163-809-11	CERAMIC CHIP 0.047uF	10% 25V			< CONNECTOR >	
C118	1-163-038-91	CERAMIC CHIP 0.1uF	25V	CN101	1-569-479-21	CONNECTOR, FPC 21P	
C119	1-125-822-11	TANTALUM 10uF	20% 10V	CN102	1-784-833-21	CONNECTOR, FFC(LIF(NON-ZIF))21P	
C121	1-125-822-11	TANTALUM 10uF	20% 10V	CN103	1-784-834-21	CONNECTOR, FFC(LIF(NON-ZIF))23P	
C122	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V	CN104	1-770-687-11	CONNECTOR, FFC/FPC 4P	
C123	1-163-038-91	CERAMIC CHIP 0.1uF	25V	CN110	1-695-440-21	PIN, CONNECTOR (PC BOARD) 6P	
C124	1-163-038-91	CERAMIC CHIP 0.1uF	25V			< DIODE >	
C127	1-163-038-91	CERAMIC CHIP 0.1uF	25V	D101	8-719-988-61	DIODE 1SS355	
C128	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V	D181	8-719-046-86	DIODE F1J6TP	
C129	1-107-823-11	CERAMIC CHIP 0.47uF	10% 16V	D183	8-719-046-86	DIODE F1J6TP	
C130	1-163-251-11	CERAMIC CHIP 100PF	5% 50V			< IC >	
C131	1-163-023-00	CERAMIC CHIP 0.015uF	5% 50V	IC101	8-752-080-95	IC CXA2523AR	
C132	1-107-823-11	CERAMIC CHIP 0.47uF	10% 16V	IC103	8-729-903-10	IC TRANSISTOR FMW1	
C133	1-163-017-00	CERAMIC CHIP 0.0047uF	5% 50V	IC121	8-752-389-44	IC CXD2654R	
C134	1-163-038-91	CERAMIC CHIP 0.1uF	25V	IC123	8-759-096-87	IC TC7WU04FU(TE12R)	
C135	1-163-038-91	CERAMIC CHIP 0.1uF	25V	IC124	8-759-498-44	IC MSM51V4400-70TS-K	
C136	1-126-206-11	ELECT CHIP 100uF	20% 6.3V	IC152	8-759-430-25	IC BH6511FS-E2	
C142	1-163-251-11	CERAMIC CHIP 100PF	5% 50V	IC171	8-759-487-04	IC S-24C02AFJA-TB	
C143	1-163-251-11	CERAMIC CHIP 100PF	5% 50V	IC181	8-759-481-17	IC MC74ACT08DTR2	
C144	1-163-251-11	CERAMIC CHIP 100PF	5% 50V	IC192	8-759-460-72	IC BA033FP-E2	
C146	1-163-038-91	CERAMIC CHIP 0.1uF	25V			< COIL >	
C151	1-126-206-11	ELECT CHIP 100uF	20% 6.3V	L101	1-414-813-11	FERRITE 0uH	
C152	1-163-038-91	CERAMIC CHIP 0.1uF	25V	L102	1-414-813-11	FERRITE 0uH	
C153	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V	L103	1-414-813-11	FERRITE 0uH	
C156	1-163-038-91	CERAMIC CHIP 0.1uF	25V	L105	1-414-813-11	FERRITE 0uH	
C158	1-163-019-00	CERAMIC CHIP 0.0068uF	10% 50V	L106	1-414-813-11	FERRITE 0uH	
C160	1-104-601-11	ELECT CHIP 10uF	20% 10V	L121	1-414-813-11	FERRITE 0uH	
C161	1-104-601-11	ELECT CHIP 10uF	20% 10V				
C163	1-163-021-91	CERAMIC CHIP 0.01uF	10% 50V				

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
L122	1-414-813-11	FERRITE	0uH	R152	1-216-073-00	METAL CHIP	10K 5% 1/10W
L151	1-412-029-11	INDUCTOR CHIP	10uH	R158	1-216-097-91	RES,CHIP	100K 5% 1/10W
L152	1-412-029-11	INDUCTOR CHIP	10uH	R159	1-216-097-91	RES,CHIP	100K 5% 1/10W
L153	1-412-032-11	INDUCTOR CHIP	100uH	R160	1-216-295-91	SHORT	0
L154	1-412-032-11	INDUCTOR CHIP	100uH	R161	1-216-057-00	METAL CHIP	2.2K 5% 1/10W
L161	1-414-813-11	FERRITE	0uH	R162	1-216-057-00	METAL CHIP	2.2K 5% 1/10W
L162	1-414-813-11	FERRITE	0uH	R163	1-216-057-00	METAL CHIP	2.2K 5% 1/10W
L181	1-216-295-91	SHORT	0	R164	1-216-045-00	METAL CHIP	680 5% 1/10W
< TRANSISTOR >				R165	1-216-097-91	RES,CHIP	100K 5% 1/10W
Q101	8-729-028-91	TRANSISTOR	RT1P441M-TP-1	R166	1-220-149-11	REGISTER	2.2 10% 1/2W
Q102	8-729-026-53	TRANSISTOR	2SA1576A-T106-QR	R167	1-216-065-91	RES,CHIP	4.7K 5% 1/10W
Q103	8-729-028-99	TRANSISTOR	RT1P441M-TP-1	R169	1-219-724-11	METAL CHIP	1 1% 1/4W
Q104	8-729-028-99	TRANSISTOR	RT1P441M-TP-1	R170	1-216-073-00	METAL CHIP	10K 5% 1/10W
Q162	8-729-101-07	TRANSISTOR	2SB798-DL	R171	1-216-073-00	METAL CHIP	10K 5% 1/10W
Q163	8-729-028-91	TRANSISTOR	RT1P441M-TP-1	R173	1-216-121-91	RES,CHIP	1M 5% 1/10W
Q181	8-729-018-75	TRANSISTOR	2SJ278MY	R175	1-216-065-91	RES,CHIP	4.7K 5% 1/10W
Q182	8-729-017-65	TRANSISTOR	2SK1764KY	R177	1-216-061-00	METAL CHIP	3.3K 5% 1/10W
< RESISTOR >				R179	1-216-085-00	METAL CHIP	33K 5% 1/10W
R103	1-216-049-91	RES,CHIP	1K 5% 1/10W	R180	1-216-073-00	METAL CHIP	10K 5% 1/10W
R104	1-216-073-00	METAL CHIP	10K 5% 1/10W	R182	1-216-089-91	RES,CHIP	47K 5% 1/10W
R105	1-216-065-91	RES,CHIP	4.7K 5% 1/10W	R183	1-216-089-91	RES,CHIP	47K 5% 1/10W
R106	1-216-133-00	METAL CHIP	3.3M 5% 1/10W	R184	1-216-073-00	METAL CHIP	10K 5% 1/10W
R107	1-216-113-00	METAL CHIP	470K 5% 1/10W	R185	1-216-081-00	METAL CHIP	22K 5% 1/10W
R109	1-216-295-91	SHORT	0	R186	1-216-089-91	RES,CHIP	47K 5% 1/10W
R110	1-216-073-00	METAL CHIP	10K 5% 1/10W	R188	1-216-073-00	METAL CHIP	10K 5% 1/10W
R111	1-216-295-91	SHORT	0	R189	1-216-073-00	METAL CHIP	10K 5% 1/10W
R112	1-216-089-91	RES,CHIP	47K 5% 1/10W	R190	1-216-073-00	METAL CHIP	10K 5% 1/10W
R113	1-216-049-91	RES,CHIP	1K 5% 1/10W	R195	1-216-073-00	METAL CHIP	10K 5% 1/10W
R115	1-216-049-91	RES,CHIP	1K 5% 1/10W	R196	1-216-295-91	SHORT	0
R117	1-216-113-00	METAL CHIP	470K 5% 1/10W	R197	1-216-295-91	SHORT	0
R120	1-216-025-91	RES,CHIP	100 5% 1/10W	< SWITCH >			
R121	1-216-097-91	RES,CHIP	100K 5% 1/10W	S101	1-762-596-21	SWITCH, PUSH (1 KEY)(LIMIT IN)	
R123	1-216-295-91	SHORT	0	S102	1-762-148-21	SWITCH, PUSH (2 KEY)	
R124	1-216-025-91	RES,CHIP	100 5% 1/10W	*****			
R125	1-216-025-91	RES,CHIP	100 5% 1/10W	*	1-671-538-11	CONNECTOR BOARD	
R127	1-216-025-91	RES,CHIP	100 5% 1/10W	*****			
R129	1-216-295-91	SHORT	0	< CAPACITOR >			
R131	1-216-073-00	METAL CHIP	10K 5% 1/10W	C421	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R132	1-216-097-91	RES,CHIP	100K 5% 1/10W	C422	1-126-964-11	ELECT	10uF 20% 50V
R133	1-216-117-00	METAL CHIP	680K 5% 1/10W	C423	1-126-934-11	ELECT	220uF 20% 10V
R134	1-216-049-91	RES,CHIP	1K 5% 1/10W	C431	1-163-017-00	CERAMIC CHIP	0.0047uF 5% 50V
R135	1-216-061-00	METAL CHIP	3.3K 5% 1/10W	C432	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R136	1-216-049-91	RES,CHIP	1K 5% 1/10W	C471	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R137	1-216-295-91	SHORT	0	C472	1-126-964-11	ELECT	10uF 20% 50V
R140	1-216-029-00	METAL CHIP	150 5% 1/10W	C771	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R142	1-216-073-00	METAL CHIP	10K 5% 1/10W	C772	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R143	1-216-073-00	METAL CHIP	10K 5% 1/10W	C773	1-126-964-11	ELECT	10uF 20% 50V
R144	1-216-025-91	RES,CHIP	100 5% 1/10W	C774	1-163-017-00	CERAMIC CHIP	0.0047uF 5% 50V
R145	1-216-073-00	METAL CHIP	10K 5% 1/10W	C775	1-163-251-11	CERAMIC CHIP	100PF 5% 50V
R146	1-216-037-00	METAL CHIP	330 5% 1/10W	C776	1-163-038-91	CERAMIC CHIP	0.1uF 25V
R147	1-216-025-91	RES,CHIP	100 5% 1/10W	(AEP,UK)			
R148	1-216-045-00	METAL CHIP	680 5% 1/10W	C777	1-104-656-11	ELECT	2200uF 20% 6.3V
R149	1-216-073-00	METAL CHIP	10K 5% 1/10W	C778	1-163-251-11	CERAMIC CHIP	100PF 5% 50V
R150	1-216-295-91	SHORT	0	C780	1-163-251-11	CERAMIC CHIP	100PF 5% 50V
R151	1-216-073-00	METAL CHIP	10K 5% 1/10W				

CONNECTOR

ENCODER

MAIN

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
C792	1-163-121-00	CERAMIC CHIP 150PF 5%	50V	R781	1-216-073-00	METAL CHIP 10K 5%	1/10W
		< CONNECTOR >		R782	1-216-073-00	METAL CHIP 10K 5%	1/10W
* CN771	1-568-832-11	SOCKET, CONNECTOR 13P		R783	1-216-073-00	METAL CHIP 10K 5%	1/10W
		< GROUND TERMINAL >		R784	1-216-073-00	METAL CHIP 10K 5%	1/10W
* EPT771	1-537-738-21	TERMINAL, EARTH		R787	1-216-025-91	RES,CHIP 100 5%	1/10W
		< FERRITE BEAD >		R790	1-216-295-91	SHORT 0	
FB771	1-500-445-21	FERRITE OUH		R792	1-216-077-00	RES,CHIP 15K 5%	1/10W
FB772	1-500-445-21	FERRITE OUH		R793	1-216-077-00	RES,CHIP 15K 5%	1/10W
		< IC >		*****			
IC771	8-749-015-19	IC PHOTO COUPLER ON3131-SA.S0		* 1-671-540-11	ENCODER BOARD		
IC772	8-719-802-25	IC PHOTO TRANSISTOR TLP550-0			*****		
IC774	8-759-549-80	IC P82B715TD.118			< CAPACITOR >		
		< JACK >		C981	1-163-009-11	CERAMIC CHIP 0.001uF 10%	50V
J421	1-785-382-21	JACK, MINIATURE(+ CONNECTOR)4P (MD WM LINK)		C982	1-163-009-11	CERAMIC CHIP 0.001uF 10%	50V
* J771	1-566-856-11	SOCKET, CONNECTOR 5P (TC-SD1)			< SWITCH >		
* J772	1-566-856-11	SOCKET, CONNECTOR 5P (HCD-SD1)		S981	1-418-000-11	ENCODER,ROTARY(WITH PUSH ROCK)	
J773	1-580-394-11	CONNECTOR DIN 6P (AEP,UK)		*****			
J773	1-774-136-11	CONNECTOR 6P (CONTROL) (SP,HK)		* A-4724-618-A	MAIN BOARD, COMPLETE (AEP,UK)		
		< JUMPER RESISTOR >			*****		
JW251	1-216-295-91	SHORT 0		* A-4724-626-A	MAIN BOARD, COMPLETE (SP,HK)		
JW252	1-216-295-91	SHORT 0			*****		
JW253	1-216-296-91	SHORT 0		* 4-212-590-11	HOLDER (FL)		
JW254	1-216-296-91	SHORT 0		7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S		
JW255	1-216-295-91	SHORT 0			< CAPACITOR >		
JW256	1-216-296-91	SHORT 0		C101	1-128-551-11	ELECT 22uF 20%	25V
JW257	1-216-296-91	SHORT 0		C102	1-126-963-11	ELECT 4.7uF 20%	50V
		< TRANSISTOR >		C103	1-163-012-00	CERAMIC CHIP 0.0018uF 5%	50V
Q771	8-729-027-59	TRANSISTOR DTC144EKA-T146		C111	1-126-933-11	ELECT 100uF 20%	16V
Q772	8-729-422-29	TRANSISTOR 2SD601A-S		C112	1-163-038-91	CERAMIC CHIP 0.1uF	25V
Q774	8-729-120-28	TRANSISTOR 2SC1623-L5L6		C151	1-128-551-11	ELECT 22uF 20%	25V
Q775	8-729-027-59	TRANSISTOR DTC144EKA-T146		C152	1-126-963-11	ELECT 4.7uF 20%	50V
Q781	8-729-025-28	TRANSISTOR 2SK1828		C153	1-163-012-00	CERAMIC CHIP 0.0018uF 5%	50V
Q782	8-729-025-28	TRANSISTOR 2SK1828		C161	1-126-934-11	ELECT 220uF 20%	10V
		< RESISTOR >		C162	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R421	1-216-608-11	METAL CHIP 16 0.5%	1/10W	C171	1-126-925-11	ELECT 470uF 20%	10V
R422	1-216-025-91	RES,CHIP 100 5%	1/10W	C201	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R471	1-216-608-11	METAL CHIP 16 0.5%	1/10W	C202	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R472	1-216-025-91	RES,CHIP 100 5%	1/10W	C203	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R762	1-216-295-91	SHORT 0		C204	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R771	1-216-025-91	RES,CHIP 100 5%	1/10W	C206	1-126-934-11	ELECT 220uF 20%	10V
R772	1-216-295-91	SHORT 0		C207	1-126-934-11	ELECT 220uF 20%	10V
R773	1-216-067-00	METAL CHIP 5.6K 5%	1/10W	C301	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R774	1-216-049-91	METAL CHIP 1K 5%	1/10W	C302	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R775	1-216-037-91	METAL CHIP 330 5%	1/10W	C303	1-163-038-91	CERAMIC CHIP 0.1uF	25V
R777	1-216-031-00	METAL CHIP 180 5%	1/10W	C401	1-163-251-11	CERAMIC CHIP 100PF 5%	50V
R778	1-216-073-00	METAL CHIP 10K 5%	1/10W	C402	1-126-963-11	ELECT 4.7uF 20%	50V
R779	1-216-073-00	METAL CHIP 10K 5%	1/10W	C451	1-163-251-11	CERAMIC CHIP 100PF 5%	50V
R780	1-216-097-91	RES,CHIP 100K 5%	1/10W	C452	1-126-963-11	ELECT 4.7uF 20%	50V
				C501	1-163-038-91	CERAMIC CHIP 0.1uF	25V
				C502	1-163-038-91	CERAMIC CHIP 0.1uF	25V

MAIN

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark	
C503	1-163-038-91	CERAMIC CHIP	0.1uF	25V	D812	8-719-200-82	DIODE 11ES2	
C504	1-163-121-00	CERAMIC CHIP	150PF	5%	50V	D815	8-719-016-74	DIODE 1SS352
C505	1-163-121-00	CERAMIC CHIP	150PF	5%	50V			
C506	1-163-038-91	CERAMIC CHIP	0.1uF	25V				
C507	1-163-038-91	CERAMIC CHIP	0.1uF	25V	D816	8-719-016-74	DIODE 1SS352	
C508	1-126-934-11	ELECT	220uF	20%	10V	D821	8-719-988-61	DIODE 1SS355TE-17
C509	1-163-038-91	CERAMIC CHIP	0.1uF	25V	D823	8-719-200-82	DIODE 11ES2	
C601	1-163-038-91	CERAMIC CHIP	0.1uF	25V	D824	8-719-988-61	DIODE 1SS355TE-17	
C602	1-163-231-11	CERAMIC CHIP	15PF	5%	50V	D851	8-719-200-82	DIODE 11ES2
C603	1-163-231-11	CERAMIC CHIP	15PF	5%	50V	D852	8-719-976-96	DIODE DTZ4.7C
C702	1-163-038-91	CERAMIC CHIP	0.1uF	25V	D861	8-719-988-61	DIODE 1SS355TE-17	
C703	1-163-038-91	CERAMIC CHIP	0.1uF	25V			< GROUND PLATE >	
C704	1-163-019-00	CERAMIC CHIP	0.0068uF	10%	50V	* EP801	4-962-200-11	PLATE (TR), GROUND
C706	1-163-038-91	CERAMIC CHIP	0.1uF	25V			< FERRITE BEAD >	
C793	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V	FB201	1-500-445-21	FERRITE OUH
△C801	1-113-920-11	CERAMIC	0.0022uF	20%	250V	FB202	1-216-295-91	SHORT 0
△C802	1-113-920-11	CERAMIC	0.0022uF	20%	250V	FB204	1-216-295-91	SHORT 0
C811	1-126-939-11	ELECT	10000uF	20%	16V	FB221	1-216-295-91	SHORT 0
C813	1-163-038-91	CERAMIC CHIP	0.1uF	25V	FB222	1-216-295-91	SHORT 0	
C814	1-163-038-91	CERAMIC CHIP	0.1uF	25V	FB223	1-216-295-91	SHORT 0	
C815	1-163-038-91	CERAMIC CHIP	0.1uF	25V	FB505	1-216-295-91	SHORT 0	
C821	1-163-038-91	CERAMIC CHIP	0.1uF	25V	FB601	1-500-445-21	FERRITE OUH	
C822	1-126-964-11	ELECT	10uF	20%	50V	FB602	1-500-445-21	FERRITE OUH
C823	1-126-933-11	ELECT	100uF	20%	16V	FB603	1-500-445-21	FERRITE 0uH
C824	1-126-934-11	ELECT	220uF	20%	10V	FB607	1-216-295-91	SHORT 0
C825	1-110-501-11	CERAMIC CHIP	0.33uF	10%	16V	FB608	1-216-295-91	SHORT 0
C826	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V			< IC >
C831	1-163-038-91	CERAMIC CHIP	0.1uF	25V	IC101	8-759-357-68	IC NJM2115M-TE2	
C832	1-126-933-11	ELECT	100uF	20%	16V	IC201	8-759-553-65	IC UDA1341TS/N2
C833	1-126-916-11	ELECT	1000uF	20%	6.3V	IC301	8-759-822-09	IC LB1641
C841	1-126-933-11	ELECT	100uF	20%	16V	IC501	8-749-923-05	IC TORX178A (DIGITAL OPTICAL IN1 CD)
C842	1-126-933-11	ELECT	100uF	20%	16V	IC502	8-749-923-05	IC TORX178A (DIGITAL OPTICAL IN2 CS/BS)
C851	1-128-551-11	ELECT	22uF	20%	63V	IC503	8-749-923-04	IC TOTX178 (DIGITAL OPTICAL OUT)
C852	1-165-319-11	CERAMIC CHIP	0.1uF	50V	IC601	8-759-269-92	IC SN74HCU04ANS-E20	
C853	1-126-967-11	ELECT	47uF	20%	50V	IC701	8-759-585-60	IC M30624MG-A01FP
C854	1-126-965-11	ELECT	22uF	20%	35V	IC702	8-759-195-02	IC TC7S86F-TE85L
C855	1-165-319-11	CERAMIC CHIP	0.1uF	50V	IC821	8-759-445-59	IC BA033T	
C856	1-165-319-11	CERAMIC CHIP	0.1uF	50V	IC822	8-759-565-74	IC M62016FP-E1	
C861	1-128-551-11	ELECT	22uF	20%	25V	IC831	8-759-231-53	IC TA7805S
C862	1-126-964-11	ELECT	10uF	20%	50V	IC851	8-759-633-42	IC M5293L
C863	1-163-038-91	CERAMIC CHIP	0.1uF	25V	IC861	8-759-242-70	IC TC7WU04F	
C871	1-126-916-11	ELECT	1000uF	20%	6.3V			< JACK >
		< CONNECTOR >			J101	1-695-188-31	JACK, PIN 4P (MD IN/OUT)	
CN501	1-784-418-11	CONNECTOR, FFC(LIF(NON-ZIF)21P					< JUMPER RESISTOR >	
* CN701	1-568-934-11	PIN, CONNECTOR 7P			JW126	1-216-296-91	SHORT 0	
CN702	1-784-417-11	CONNECTOR, FFC(LIF(NON-ZIF)23P			JW127	1-216-295-91	SHORT 0	
* CN791	1-568-832-11	SOCKET, CONNECTOR 13P			JW135	1-216-295-91	SHORT 0	
CN792	1-506-468-11	PIN, CONNECTOR 3P			JW136	1-216-295-91	SHORT 0	
* CN793	1-568-951-11	PIN, CONNECTOR 2P			JW137	1-216-295-91	SHORT 0	
* CN801	1-580-230-11	PIN, CONNECTOR (PC BOARD) 2P			JW138	1-216-296-91	SHORT 0	
CN802	1-564-321-00	PIN, CONNECTOR 2P			JW139	1-216-296-91	SHORT 0	
CN821	1-568-683-11	PIN, CONNECTOR (PC BOARD) 2P			JW140	1-216-295-91	SHORT 0	
		< DIODE >						
D172	8-719-988-61	DIODE 1SS355TE-17						
D173	8-719-988-61	DIODE 1SS355TE-17						
D811	8-719-200-82	DIODE 11ES2						

The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
		< COIL >		R601	1-216-089-91	RES,CHIP 47K 5%	1/10W
L501	1-414-396-21	INDUCTOR 4.7uH		R602	1-216-089-91	RES,CHIP 47K 5%	1/10W
		< LINE FILTER >		R605	1-216-121-91	RES,CHIP 1M 5%	1/10W
LF801	1-424-485-11	FILTER, LINE		R606	1-216-025-91	RES,CHIP 100 5%	1/10W
		< TRANSISTOR >		R607	1-216-025-91	RES,CHIP 100 5%	1/10W
Q101	8-729-107-45	TRANSISTOR 2SC3624A-L16		R608	1-216-025-91	RES,CHIP 100 5%	1/10W
Q151	8-729-107-45	TRANSISTOR 2SC3624A-L16		R609	1-216-049-91	RES,CHIP 1K 5%	1/10W
Q171	8-729-027-59	TRANSISTOR DTC144EKA-T146		R621	1-500-445-21	FERITE 0uH	
Q301	8-729-600-22	TRANSISTOR 2SA1235-F		R703	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q302	8-729-027-59	TRANSISTOR DTC144EKA-T146		R704	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q791	8-729-027-36	TRANSISTOR DTA143XKA-T146		R705	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q792	8-729-027-57	TRANSISTOR DTC143XKA-T146		R706	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q831	8-729-040-20	TRANSISTOR RT1P137L-TP		R707	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q832	8-729-027-57	TRANSISTOR DTC143XKA-T146		R708	1-216-073-00	METAL CHIP 10K 5%	1/10W
Q841	8-729-281-53	TRANSISTOR 2SC1815-GR		R709	1-216-073-00	METAL CHIP 10K 5%	1/10W
		< RESISTOR >		R710	1-216-073-00	METAL CHIP 10K 5%	1/10W
R101	1-216-073-00	METAL CHIP 10K 5%	1/10W	R712	1-216-073-00	METAL CHIP 10K 5%	1/10W
R102	1-216-073-00	METAL CHIP 10K 5%	1/10W	R713	1-216-073-00	METAL CHIP 10K 5%	1/10W
R103	1-216-081-00	METAL CHIP 22K 5%	1/10W	R714	1-216-073-00	METAL CHIP 10K 5%	1/10W
R104	1-216-082-00	RES,CHIP 24K 5%	1/10W	R715	1-216-073-00	METAL CHIP 10K 5%	1/10W
R105	1-216-049-91	RES,CHIP 1K 5%	1/10W	R716	1-216-073-00	METAL CHIP 10K 5%	1/10W
R106	1-216-089-91	RES,CHIP 47K 5%	1/10W	R720	1-216-073-00	METAL CHIP 10K 5%	1/10W
R107	1-216-025-91	RES,CHIP 100 5%	1/10W	R721	1-216-073-00	METAL CHIP 10K 5%	1/10W
R111	1-216-057-00	METAL CHIP 2.2K 5%	1/10W	R722	1-216-295-91	SHORT 0	
R113	1-500-445-21	FERRITE 0uH		R724	1-216-073-00	METAL CHIP 10K 5%	1/10W
R151	1-216-073-00	METAL CHIP 10K 5%	1/10W	R725	1-216-025-91	RES,CHIP 100 5%	1/10W
R152	1-216-073-00	METAL CHIP 10K 5%	1/10W	R726	1-216-025-91	RES,CHIP 100 5%	1/10W
R153	1-216-081-00	METAL CHIP 22K 5%	1/10W	R727	1-216-025-91	RES,CHIP 100 5%	1/10W
R154	1-216-082-00	RES,CHIP 24K 5%	1/10W	R728	1-216-025-91	RES,CHIP 100 5%	1/10W
R155	1-216-049-91	RES,CHIP 1K 5%	1/10W	R729	1-216-073-00	METAL CHIP 10K 5%	1/10W
R156	1-216-089-91	RES,CHIP 47K 5%	1/10W	R730	1-216-025-91	RES,CHIP 100 5%	1/10W
R157	1-216-025-91	RES,CHIP 100 5%	1/10W	R789	1-216-025-91	RES,CHIP 100 5%	1/10W
R161	1-216-057-00	METAL CHIP 2.2K 5%	1/10W	R821	1-216-073-00	METAL CHIP 10K 5%	1/10W
R171	1-216-061-00	METAL CHIP 3.3K 5%	1/10W	R822	1-216-045-00	METAL CHIP 680 5%	1/10W
R172	1-216-057-00	METAL CHIP 2.2K 5%	1/10W	R832	1-216-295-91	SHORT 0	
R201	1-216-033-00	METAL CHIP 220 5%	1/10W	R841	1-216-057-00	METAL CHIP 2.2K 5%	1/10W
R202	1-216-033-00	METAL CHIP 220 5%	1/10W	R852	1-216-097-91	RES,CHIP 100K 5%	1/10W
R203	1-216-033-00	METAL CHIP 220 5%	1/10W	△ R853	1-216-033-00	METAL CHIP 220 5%	1/10W
R204	1-216-025-91	RES,CHIP 100 5%	1/10W	R854	1-216-033-00	METAL CHIP 220 5%	1/10W
R205	1-216-073-00	METAL CHIP 10K 5%	1/10W	R855	1-215-881-11	METAL OXIDE 15 5%	2W F
R301	1-216-067-00	METAL CHIP 5.6K 5%	1/10W	R861	1-216-033-00	METAL CHIP 220 5%	1/10W
R302	1-216-057-00	METAL CHIP 2.2K 5%	1/10W	R862	1-216-047-91	RES,CHIP 820 5%	1/10W
R303	1-216-063-91	RES,CHIP 3.9K 5%	1/10W	R863	1-216-037-00	METAL CHIP 330 5%	1/10W
R401	1-216-049-91	RES,CHIP 1K 5%	1/10W	R864	1-216-081-00	METAL CHIP 22K 5%	1/10W
R402	1-216-097-91	RES,CHIP 100K 5%	1/10W	R865	1-216-111-00	METAL CHIP 390K 5%	1/10W
R403	1-216-075-00	METAL CHIP 12K 5%	1/10W	R866	1-216-091-00	METAL CHIP 56K 5%	1/10W
R451	1-216-049-91	RES,CHIP 1K 5%	1/10W	R1001	1-216-295-91	SHORT 0	
R452	1-216-097-91	RES,CHIP 100K 5%	1/10W			< VIBRATOR >	
R453	1-216-075-00	METAL CHIP 12K 5%	1/10W	X601	1-579-314-11	VIBRATOR, CRYSTAL (22.5792MHz)	
R501	1-216-057-00	METAL CHIP 2.2K 5%	1/10W	X701	1-579-175-11	VIBRATOR, CERAMIC (10MHz)	
R502	1-216-089-91	RES,CHIP 47K 5%	1/10W				
R503	1-216-057-00	METAL CHIP 2.2K 5%	1/10W				
R504	1-216-089-91	RES,CHIP 47K 5%	1/10W				
R505	1-216-033-00	METAL CHIP 220 5%	1/10W				

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PANEL

PANEL SW

SW

Ref. No.	Part No.	Description	Remark
*	A-4724-619-A	PANEL BOARD, COMPLETE *****	
		< CAPACITOR >	
C901	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C902	1-165-319-11	CERAMIC CHIP 0.1uF	50V
C903	1-123-618-11	ELECT 22uF	20% 6.3V
C921	1-163-038-91	CERAMIC CHIP 0.1uF	25V
C922	1-163-009-11	CERAMIC CHIP 0.001uF	10% 50V
C923	1-163-009-11	CERAMIC CHIP 0.001uF	10% 50V
C924	1-163-009-11	CERAMIC CHIP 0.001uF	10% 50V
C931	1-163-243-11	CERAMIC CHIP 47PF	5% 50V
C948	1-163-133-00	CERAMIC CHIP 470PF	5% 50V
		< CONNECTOR >	
* CN901	1-568-856-21	SOCKET, CONNECTOR 13P	
		< DIODE >	
D941	8-719-058-04	DIODE SEL5223S-TP15 (● REC)	
D942	8-719-058-04	DIODE SEL5223S-TP15 (CD SYNC/MD WM SYNC)	
D943	8-719-072-76	DIODE SEL5E23C-TP15 (▷▷I/▶▶)	
D944	8-719-072-76	DIODE SEL5E23C-TP15 (◀◀I/◀◀)	
D945	8-719-072-76	DIODE SEL5E23C-TP15 (□)	
D946	8-719-072-76	DIODE SEL5E23C-TP15 (▷◻)	
		< FLUORESCENT INDICATOR >	
FL901	1-517-804-11	INDICATOR TUBE, FLUORESCENT	
		< IC >	
IC901	8-759-572-22	IC MSM9202-02GS-KR1	
		< TRANSISTOR >	
Q921	8-729-027-56	TRANSISTOR DTC143TKA-T146	
Q941	8-729-027-59	TRANSISTOR DTC144EKA-T146	
Q942	8-729-027-59	TRANSISTOR DTC144EKA-T146	
		< RESISTOR >	
R901	1-216-057-00	METAL CHIP 2.2K	5% 1/10W
R902	1-216-061-00	METAL CHIP 3.3K	5% 1/10W
R903	1-216-065-91	RES,CHIP 4.7K	5% 1/10W
R904	1-216-073-00	METAL CHIP 10K	5% 1/10W
R905	1-216-085-00	METAL CHIP 33K	5% 1/10W
R906	1-216-057-00	METAL CHIP 2.2K	5% 1/10W
R907	1-216-061-00	METAL CHIP 3.3K	5% 1/10W
R908	1-216-065-91	RES,CHIP 4.7K	5% 1/10W
R909	1-216-073-00	METAL CHIP 10K	5% 1/10W
R910	1-216-085-00	METAL CHIP 33K	5% 1/10W
R921	1-216-025-91	RES,CHIP 100	5% 1/10W
R922	1-216-025-91	RES,CHIP 100	5% 1/10W
R923	1-216-025-91	RES,CHIP 100	5% 1/10W
R924	1-216-025-91	RES,CHIP 100	5% 1/10W
R931	1-216-061-00	METAL CHIP 3.3K	5% 1/10W
R941	1-216-021-00	METAL CHIP 68	5% 1/10W
R942	1-216-021-00	METAL CHIP 68	5% 1/10W
R944	1-216-034-00	METAL CHIP 240	5% 1/10W
R945	1-216-034-00	METAL CHIP 240	5% 1/10W

Ref. No.	Part No.	Description	Remark
R946	1-216-034-00	METAL CHIP 240	5% 1/10W
R947	1-216-034-00	METAL CHIP 240	5% 1/10W
R948	1-216-089-91	RES,CHIP 47K	5% 1/10W
		< SWITCH >	
S901	1-762-875-21	SWITCH, KEYBOARD (△)	
S902	1-762-875-21	SWITCH, KEYBOARD (CLEAR)	
S903	1-762-875-21	SWITCH, KEYBOARD (ENTER/YES)	
S904	1-762-875-21	SWITCH, KEYBOARD (MENU/NO)	
S905	1-762-875-21	SWITCH, KEYBOARD (▷▷I/▶▶)	
S906	1-762-875-21	SWITCH, KEYBOARD (◀◀I/◀◀)	
S907	1-762-875-21	SWITCH, KEYBOARD (□)	
S908	1-762-875-21	SWITCH, KEYBOARD (▷◻)	
S909	1-762-875-21	SWITCH, KEYBOARD (CD SYNC/MD WM SYNC)	
S910	1-762-875-21	SWITCH, KEYBOARD (● REC)	
S911	1-762-875-21	SWITCH, KEYBOARD (DISPLAY)	
S912	1-762-875-21	SWITCH, KEYBOARD (I/⏻)	

*	1-671-539-11	PANEL SW BOARD *****	
		< SWITCH >	
S991	1-771-516-11	SWITCH, PUSH(DETECTION)(1 KEY)	

*	1-671-115-21	SW BOARD *****	
		< CONNECTOR >	
CN601	1-506-486-11	PIN, CONNECTOR 7P	
		< SWITCH >	
S601	1-572-126-21	SWITCH, PUSH (1 KEY)(REC POSITION)	
S602	1-572-126-21	SWITCH, PUSH (1 KEY)(PACK OUT)	
S604	1-771-264-11	SWITCH, PUSH(DETECTION)(1 KEY) (PB POSITION)	

		MISCELLANEOUS *****	
2	1-783-140-11	WIRE (FLAT TYPE) (23 CORE)	
3	1-783-139-11	WIRE (FLAT TYPE) (21 CORE)	
6	1-769-969-11	WIRE (FLAT TYPE) (13 CORE)	
△ 8	1-783-499-11	CORD, POWER	
14	1-569-972-21	SOCKET, SHORT 2P	
66	1-751-086-11	WIRE (FLAT TYPE) (13 CORE)	
△ 260	8-583-028-02	OPTICAL PICK-UP KMS-260AJ1NP	
△ CNJ802	1-526-794-11	OUTLET, AC	
FL901	1-517-804-11	INDICATOR TUBE, FLUORESCENT	
HR901	1-500-502-11	HEAD, OVER LIGHT	
M101	A-4672-475-A	MOTOR ASSY, SPINDLE	
M102	A-4672-474-A	MOTOR ASSY, SLED	
M103	X-4949-264-1	MOTOR ASSY, LOADING	
S102	1-762-148-21	SWITCH, PUSH (2 KEY)	
△ T801	1-431-685-31	TRANSFORMER, POWER	

The components identified by mark △ or dotted line with mark △ are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
ACCESSORIES & PACKING MATERIALS			

	1-543-793-11	FILTER, CLAMP (FERRITE CORE)	
	1-558-271-11	CORD, CONNECTION (AUDIO, 108cm)	
	1-574-264-11	CORD, OPTICAL PLUG (OPTICAL PLUG, 60cm)	(AEP,UK)
	1-790-034-11	CORD (WITH CONNECTOR) (5 CORE)	(SYSTEM CABLE, 50cm)
	1-790-137-11	CORD (WITH CONNECTOR)	(WALKMAN-LINK, 80cm)
	3-864-771-11	MANUAL, INSTRUCTION (ENGLISH)	
	3-864-771-21	MANUAL, INSTRUCTION	(FRENCH,SPANISH)(AEP,UK)
	3-864-771-31	MANUAL, INSTRUCTION	(ITALIAN,PORTUGUESE)(AEP,UK)
	3-864-771-41	MANUAL, INSTRUCTION	(GERMAN,DUTCH,SWEDISH)(AEP,UK)
	3-864-771-51	MANUAL, INSTRUCTION (CHINESE)	(SP,HK)

HARDWARE LIST

#1	7-685-646-79	SCREW +BVTP 3X8 TYPE2 N-S
#2	7-685-532-14	SCREW +BTP 2.6X5 TYPE2 N-S
#3	7-685-871-01	SCREW +BVTT 3X6 (S)
#4	7-621-772-20	SCREW +B 2X5
#5	7-621-772-40	SCREW +B 2X8
#6	7-627-852-08	SCREW,PRECISION +P 1.7X2.5
#7	7-685-133-19	SCREW (DIA. 2.6) (IT3B)
#8	7-685-533-19	SCREW +BTP 2.6X6 TYPE2 N-S

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