

## Service Manual

ORDER NO.  
**CRT5651**

DVD MECHANISM MODULE (LS2.5)

# CX-3311

- This service manual describes the operation of the DVD mechanism module incorporated in models listed in the table below.
- When performing repairs use this manual together with the specific manual for model under repair.

| Model   | Service manual | DVD Mechanism Module |
|---|----------------|----------------------|
| AVH-X5700BHS/XNUC, AVH-X4700BS/XNUC   | CRT5614        | CXK8100              |
| AVH-X4700DVD/XNUW5, AVH-X4750DVD/XNRC, AVH-X4750DVD/XNRD, AVH-X4750DVD/XNRI, AVH-X4790DVD/XNID                                  | CRT5615        | CXK8100              |
| AVH-X5700DAB/XNEW5, AVH-X5700BT/XNUW5, AVH-X5750BT/XNRC, AVH-X5750BT/XNRD, AVH-X5750TV/XNRD, AVH-X5750BT/XNRI, AVH-X5790BT/XNID | CRT5616        | CXK8100              |
| AVH-X1700S/XNUC, AVH-X1700DVD/XNUW5, AVH-X1750DVD/XNRC, AVH-X1750DVD/XNRD, AVH-X1750DVD/XNRI, AVH-X1790DVD/XNID                 | CRT5617        | CXK8100              |
| AVH-X2700BS/XNUC, AVH-X2700BT/XNEW5, AVH-X2700BT/XNUW5, AVH-X2750BT/XNRC, AVH-X2750BT/XNRD, AVH-X2750BT/XNRI, AVH-X2790BT/XNID  | CRT5618        | CXK8100              |
| AVH-X3700BHS/XNUC, AVH-X3700DAB/XNEW5   | CRT5619        | CXK8100              |

## CONTENTS

|                                     |    |
|-------------------------------------|----|
| 1. CIRCUIT DESCRIPTION.....         | 2  |
| 2. MECHANISM DESCRIPTION .....      | 15 |
| 3. DISASSEMBLY .....                | 21 |
| 4. DIAGNOSIS.....                   | 32 |
| 5. EACH SETTING AND ADJUSTMENT..... | 51 |

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# 1. CIRCUIT DESCRIPTION

## FRONT END SECTION (MN2DS0018MA : IC1501)

MN2DS0018MA is a one-chip LSI for a DVD Player. By connecting the LSI with a driver IC, SDRAM, Flash-ROM, Audio-DAC and so on, a DVD Player system can be established.

The LSI incorporates the Front End (SODC / FE) to process RF signals / servo / decode, AV decoder (Back End / BE) to process video decode such as MPEG1 / MPEG2 / JPEG and audio decode such as Dolby Digital<sup>2</sup> / MP3, and a system controller to control the system.

The Front End part processes the optical head signal computing and RF signals, the digital signals to play DVD-ROM compliant with the DVD format (16 - 8 demodulation, error correction), and the digital signals (error correction) for CD-DA / CD-ROM, as well as conducts AV decoder forwarding, servo control, spindle motor control and seek control.

Please note that in this MN2DS0018MA, the servo-related waveforms in the Front End, such as the waveforms in the FE, TE, and AS, cannot be observed, as in the case of a DVD mechanism module (LS1) CX-3250.

### 1.1 ANALOG BLOCK (MN2DS0018MA : IC1501)

The functions of the analog block are:

1. Reference supply circuit
2. Signal processing circuit for the SERVO system / DPD system  
Gain switching amplifier and Low Pass Filter (LPF)
3. RF signal processing circuit  
RF addition circuit, Inline circuit, Variable Gain Amplifier (VGA) circuit
4. Laser Power Control (LPC) circuit
5. A/D converter for SERVO (10 bit), DPD system comparator, PWM

#### 1.1.1 APC Circuit

The optical output of a Laser Diode (LD) has large negative temperature characteristics.

Therefore, driving LD with constant current will not get you constant optical output.

The APC circuit controls the current so that the output will be constant using a Monitor Diode (MD).

The MN2DS0018MA incorporates two types of APC circuits; one is for DVD and the other is for CD.

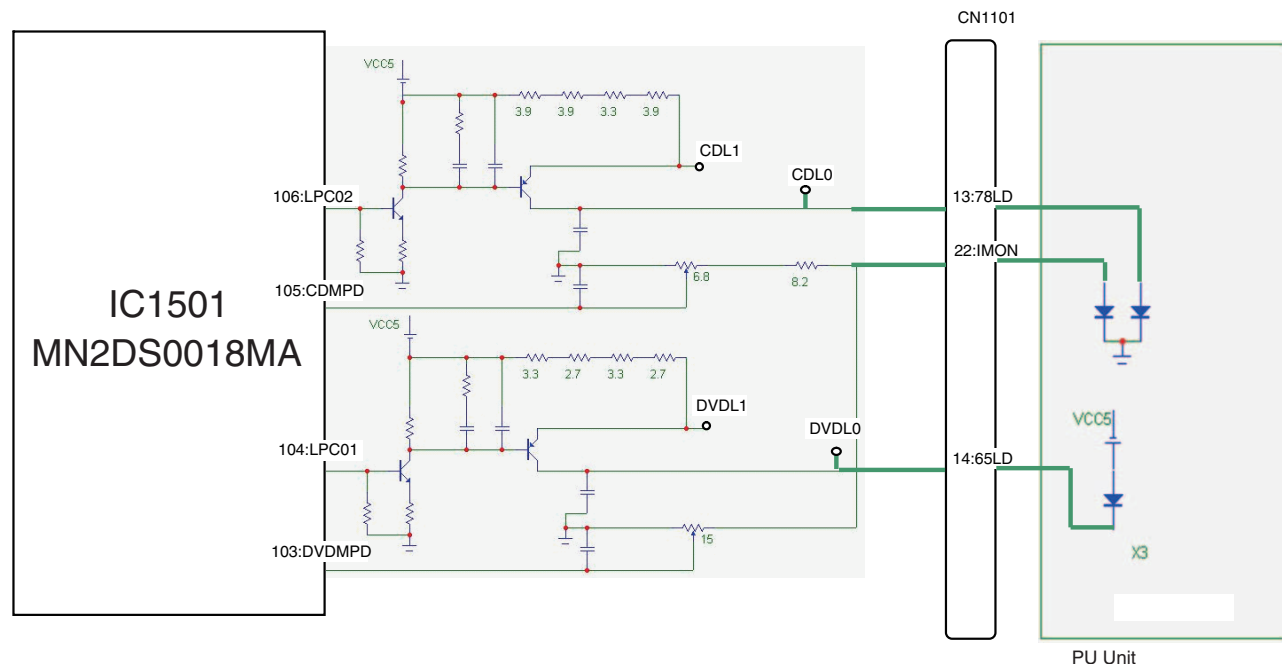
The LD current for a CD is calculated by dividing the measured voltage between CDL1 and 5V by 15 ohm ( $3.9 \text{ ohm} \times 3 + 3.3 \text{ ohm} = 15 \text{ ohm}$ ).

For a DVD, the current is calculated by dividing the measured voltage between DVDL1 and 5V by 12 ohm ( $3.3 \text{ ohm} \times 2 + 2.7 \text{ ohm} \times 2 = 12 \text{ ohm}$ ).

The result will be about 50 mA (45 mA) for DVD (CD).

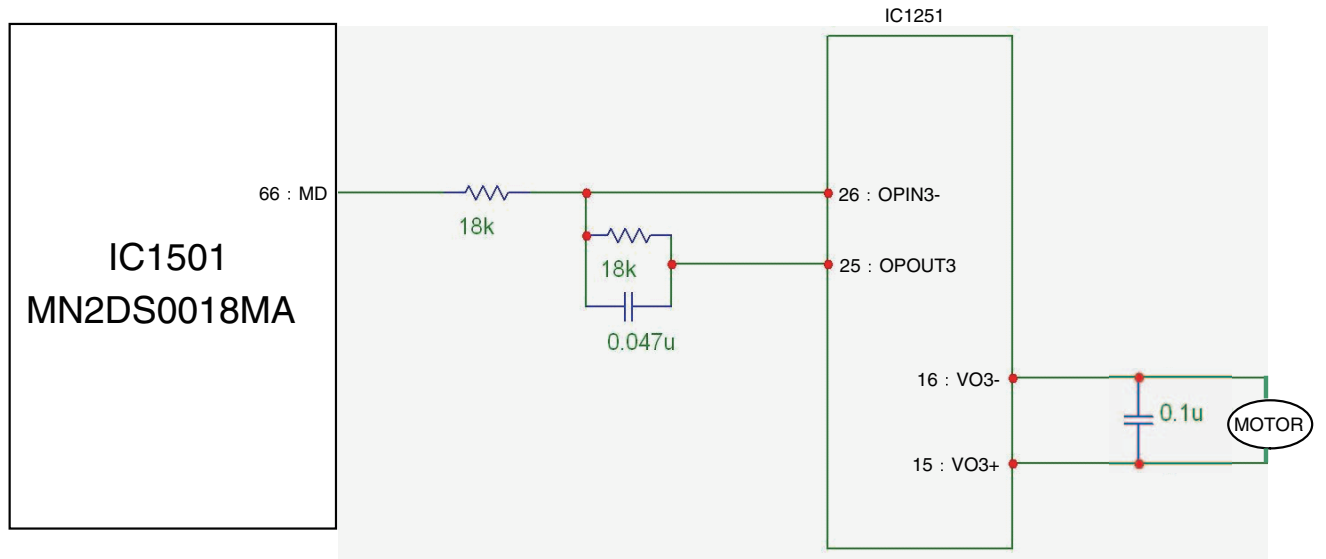
On this or later version of the DVD mechanism module, the Power adjustment circuit (which is the circuit from IMON to CDMF and DVDMP) that adjusts the optical output of the LD is mounted on the mechanism module board. Therefore, it is required to adjust power when the CRG mechanism (equipped with the PU unit) or the mechanism module board is replaced.

For details, refer to the Power Adjustment Specifications.



### 1.1.2 SPDL Circuit

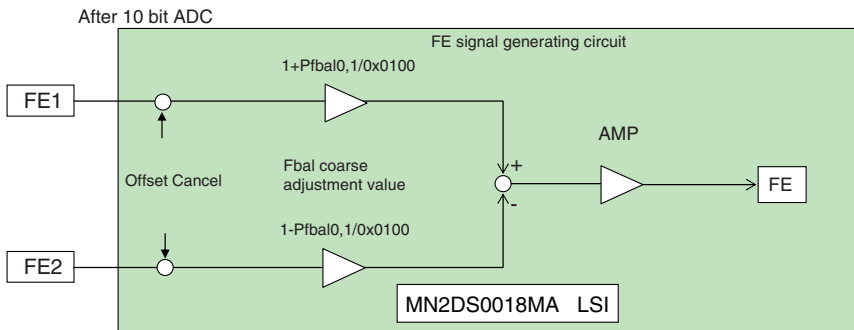
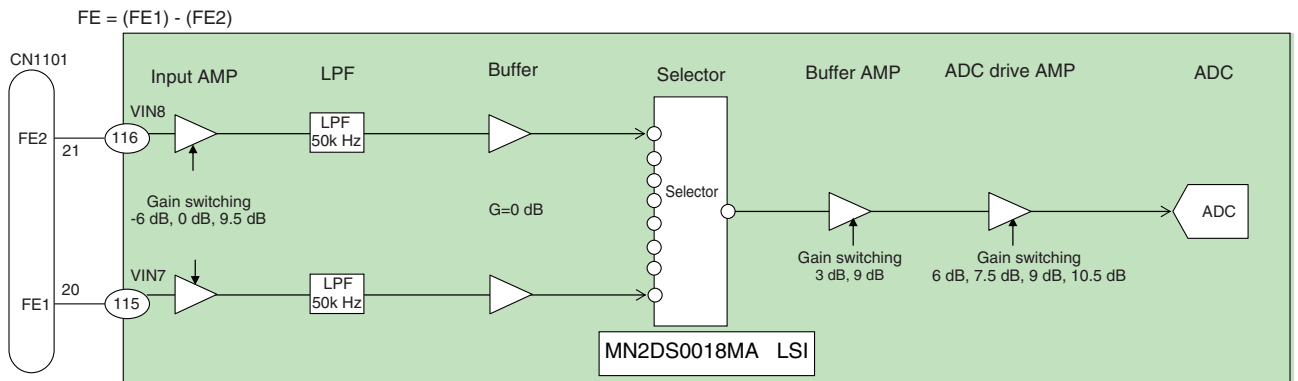
For the SPDL motor for the DVD mechanism module, a brush motor which is used for the CD mechanism module is adopted instead of a brushless motor which is used for the conventional DVD mechanism module. The SPDL circuit to drive the brush motor is as shown below.



### 1.1.3 FE Generating Circuit

Focus Error (FE) Generating Circuit

Signals FE1 and FE2 from PU will be AD converted and imported to IC1501. Then, taking the offset cancel into consideration and taking the differential, FE is generated.

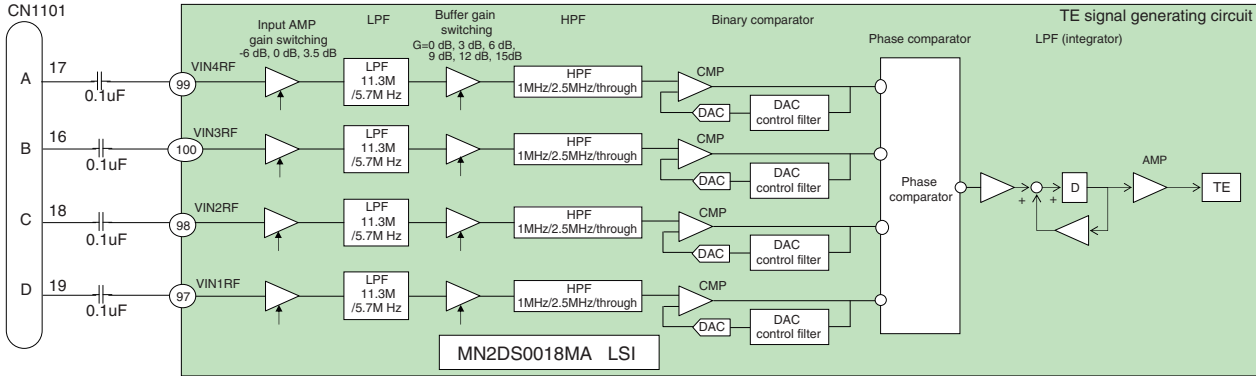


### 1.1.4 TE Generating Circuit

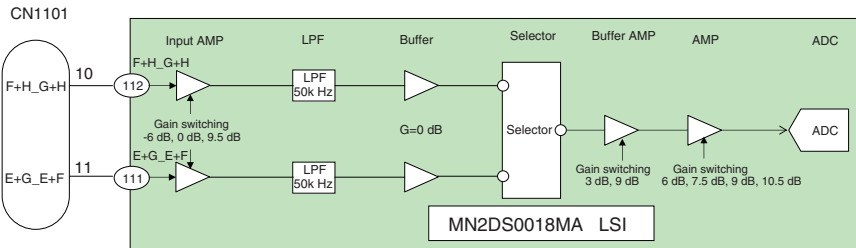
#### Tracking Error (TE) Generating Circuit

A For DVD, using a phase difference method, TE is generated based on a phase difference between (A+C) and (B+D). For CD, using a three-beam method, TE is generated based on the equation  $TE = (F+H\_G+H) - (E+G\_E+F)$  after going into the variable amplifier and AD converted.

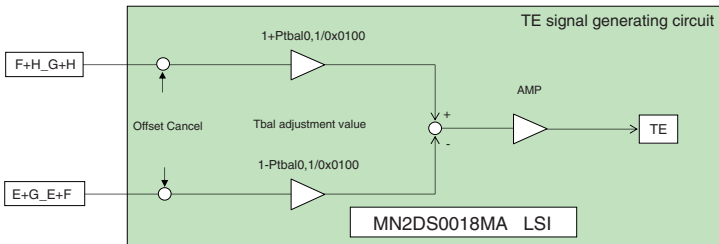
B • DVD (TE based on phase difference)



C • CD(TE based on the three-beam method)



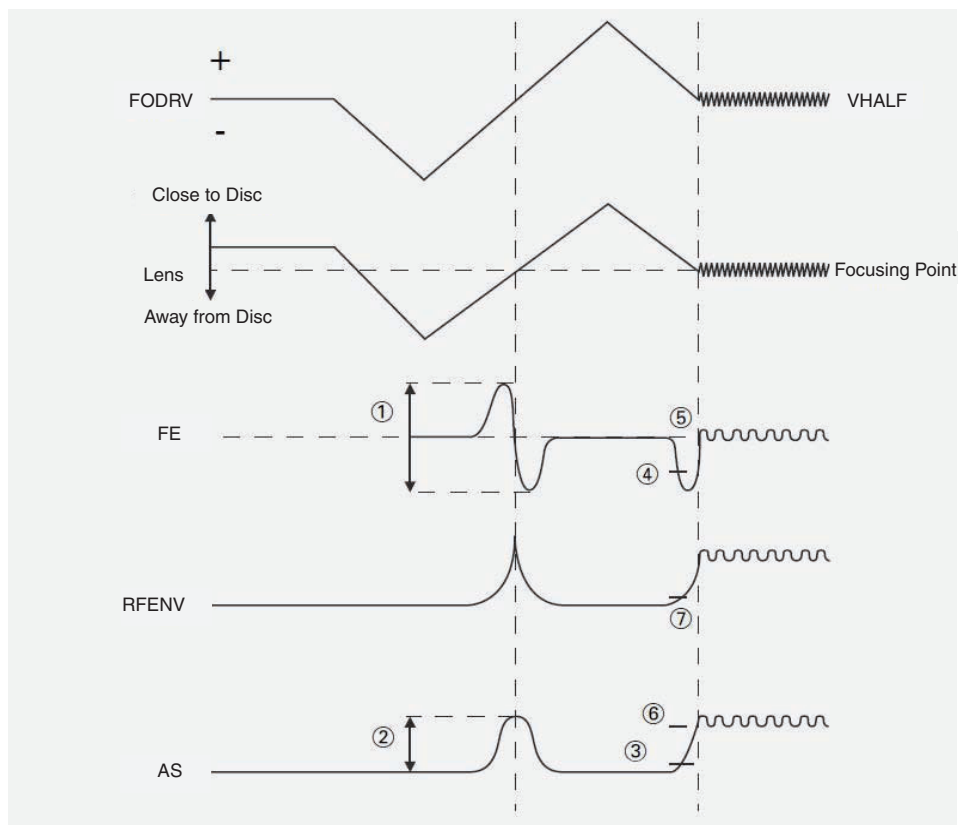
D • After 10 bit ADC



## 1.2 SERVO BLOCK (MN2DS0018MA : IC1501)

The servo block performs servo control for focus, tracking, and traverse, spindle motor control and seek control.

### 1.2.1 Focus Close



For both DVD and CD, the processing sequence after issuing a focus close command will be:

1. Measurement and optimization of a signal level

Drive the PU lens in the direction to get away from the disc first, and then drive it in the direction to get closer to the disc. During the process, measure the signal levels of FE, AS, and RFENV when it passes the focusing point. Optimize the signal levels for FE and AS (See ① and ② in the figure).

2. Focus pulling-in

Next, drive the lens in the direction to get away from the disc and detect pulling-in level of FE and AS. Then, activate the Focus Loop Filter to pull in the focus (See ③ - ⑥ in the figure).

3. Pulling-in check

Check the focusing with the signal levels of AS and RFENV (See ⑥ and ⑦ in the figure).

Using a focus search of test mode, you can check the signal levels of FE, AS, and RFENV as well as focus driving voltage.

### 1.2.2 Tracking Close

For both DVD and CD, the processing sequence after issuing a tracking close command will be:

1. Tracking brake

Measuring a 1/2 cycle of track cross, output a brake pulse if the cycle is within the specified range. In which direction the brake pulse should be output is determined from the phase relation between OFTR and TKC signals (binarized signal of TE). Once it is confirmed that the swinging of the lens against the disc has been successfully controlled, stop braking and start pulling in. If the pulling-in conditions are not fulfilled within 10 msec after brake is output, stop braking and start pulling in.

2. Tracking pulling-in

Process the tracking drive hold with an OFTR signal.

3. Pulling-in check

Check that track jump is less than the specified number within the specified period. The pulling-in check will time out in 8.4 msec and be retried upon receiving a command from the microprocessor.

### 1.2.3 Track Jump

The system selects a track jump method according to the target move number of tracks from the following three schemes: Interval Jump, Multi Jump, and Traverse Seek.

#### 1. Interval Jump

Detailed seek is possible because this scheme repeatedly performs track jump by 1 track. This scheme is selected when it is close to the target track or it conducts a seek operation to an adjacent track.

#### 2. Multi Jump

It counts the both edges of a Track Cross Signal TKC and moves by the specified number of track count. It also drives the CRG motor according to the number of jump.

#### 3. Traverse Seek

By counting the track according to the Track Cross Signal TKC and measuring the time of TKC, it controls the movement speed and performs the seek operation. At the same time, it minimizes the vibration in the pick-up that will occur during movement.

Here is the common jump switching setting between DVD and CD.

Types of jump according to target move number of tracks

DVD

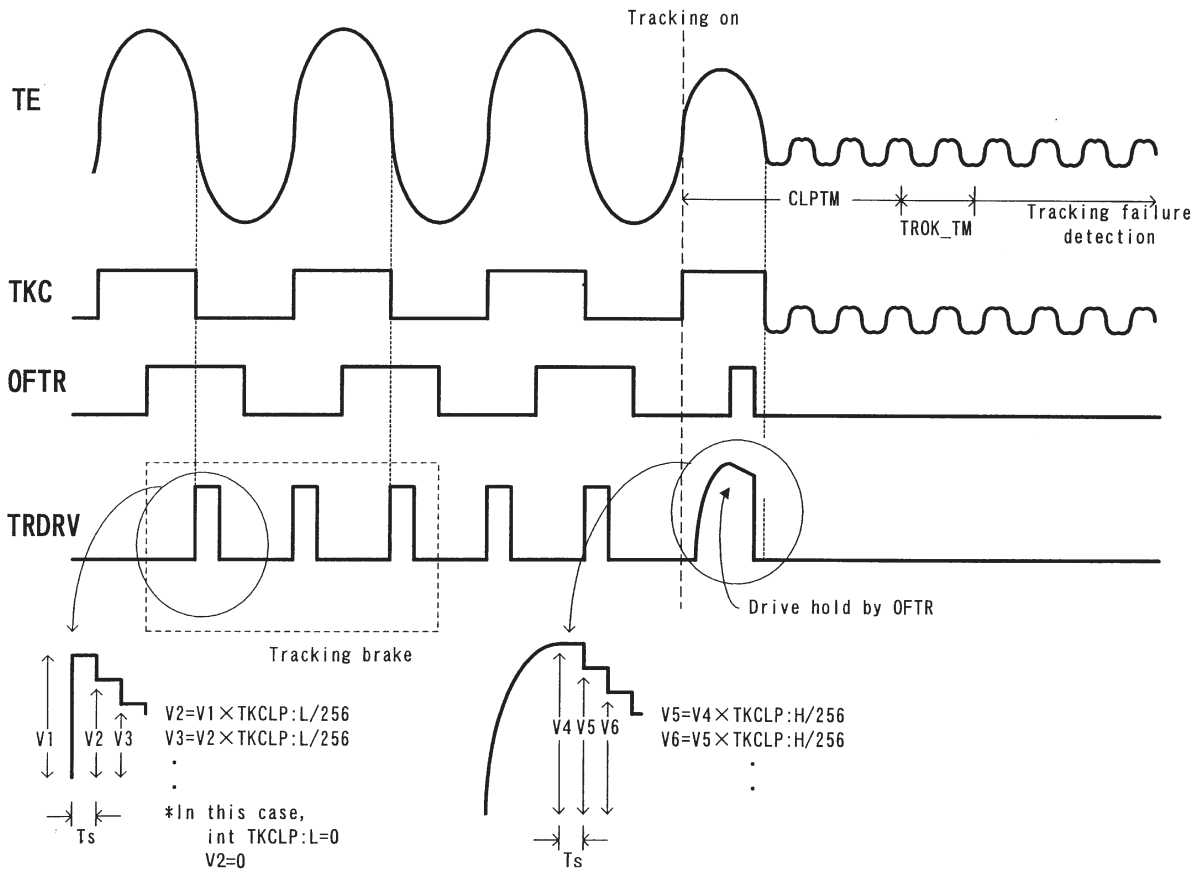
- 1-10 Interval Jump
- 11-500 Multi Jump
- 501-1000 Combination of Multi Jump and Interval Jump
- 1001-Traverse Seek

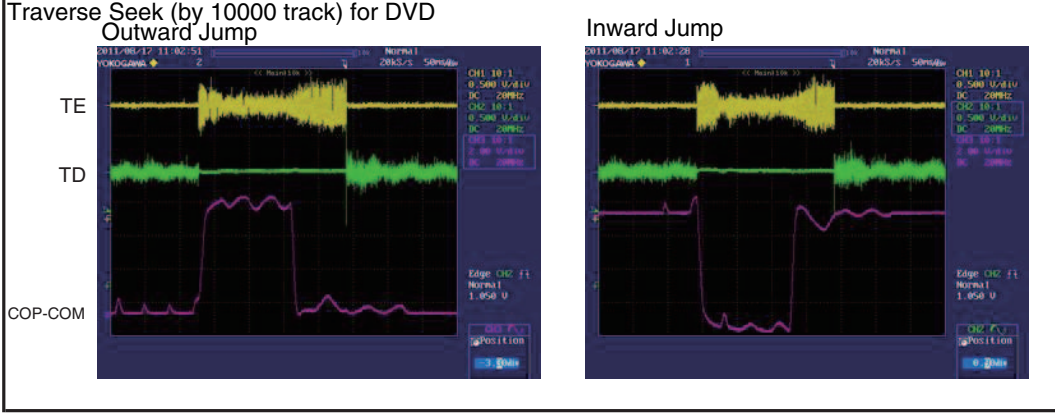
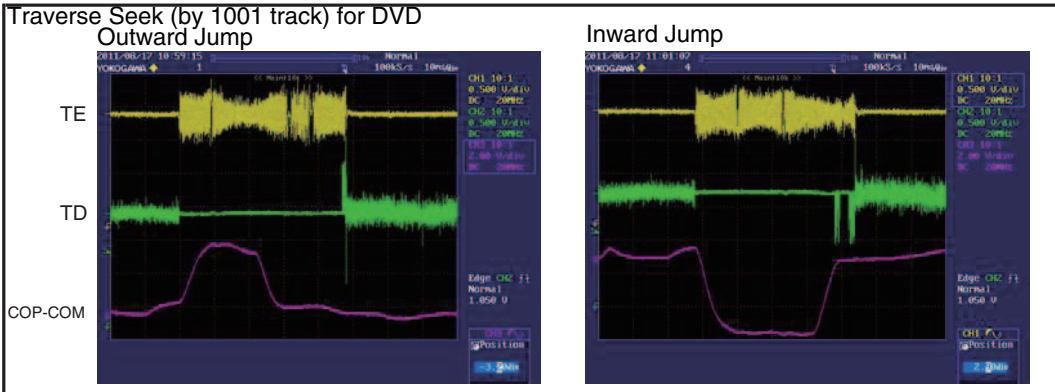
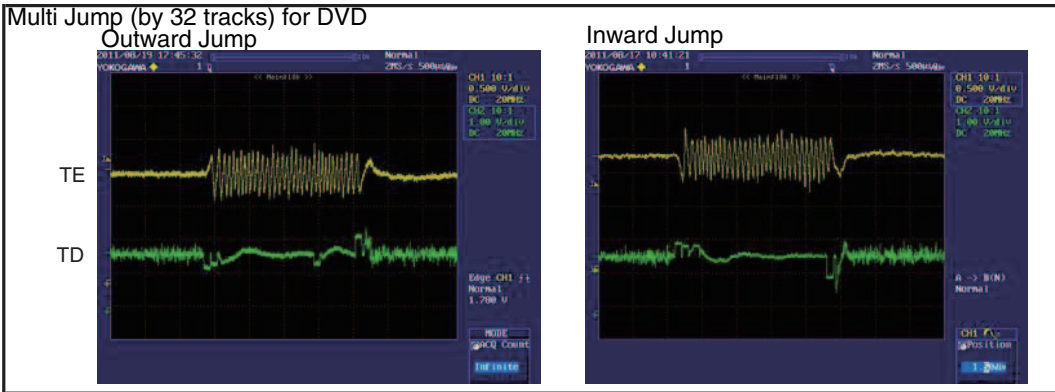
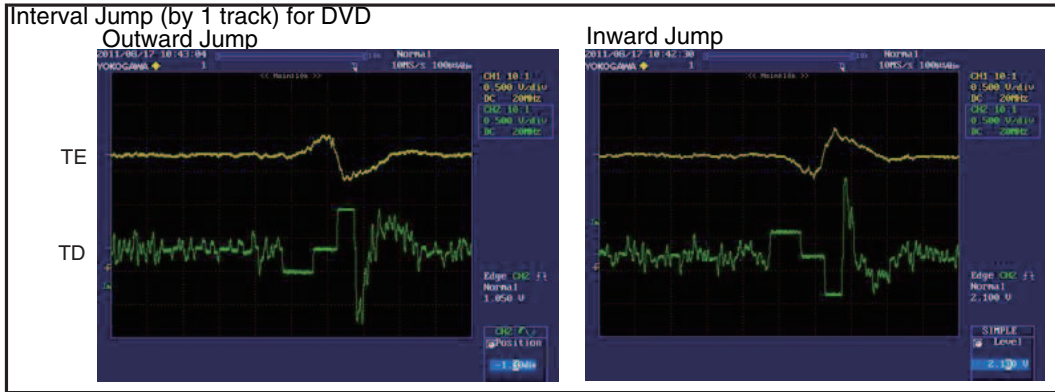
Here are the waveforms of Track Jump.

CD

- 1-10 Interval Jump
- 11-100 Multi Jump
- 101-500 Combination of Multi Jump and Interval Jump
- 501-Traverse Seek

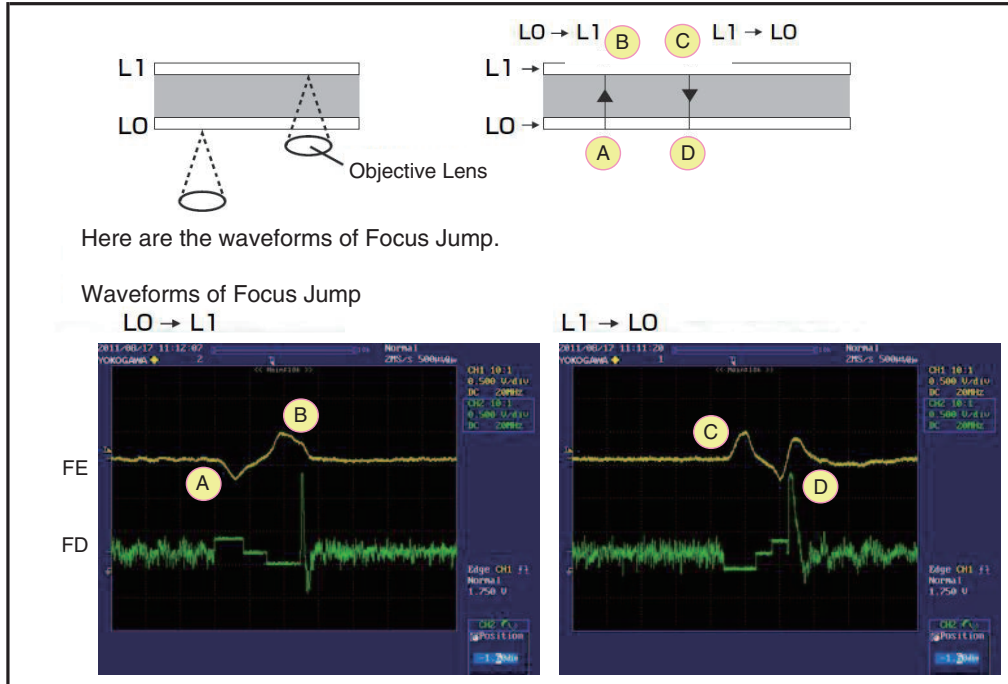
### Tracking-on process





### 1.2.4 Focus Jump

The function of Focus Jump is for single-sided or double-sided dual layers. The nearer layer from the Objective Lens is called Layer 0 (L0) and the farther layer called Layer 1 (L1).



Focus Jump is conducted as follows:

1. Open the tracking in the layer currently played.
2. Issue a command to execute jump to the target layer.
3. Close the tracking in the layer after the jump and restart the play.

When a jump command is issued, the processing will be:

1. Accelerate the lens toward a target layer until an FE signal detects the Focus Jump Acceleration End Level. If the acceleration time-out time is reached before detecting the Acceleration End Level, however, it will forcibly end the acceleration.
2. Move the lens through inertia until an FE signal detects the Deceleration Start Level without outputting drive voltage.
3. Decelerate the lens once the Deceleration Start Level is detected until it detects the Deceleration End Level. If the deceleration time-out time is reached before detecting the Deceleration End Level, however, it will forcibly end the deceleration.

## 1.3 AUTOMATIC ADJUSTMENT FUNCTION

The system automates all kinds of circuit adjustment. The section describes how each automatic adjustment works.

### 1.3.1 Offset Cancel of VIN7, VIN8, VIN9, and VIN10

Each signal of VIN7 - 9, and 10 from PU will be converted to a digital signal by the AD converter in the servo block. The Offset Cancel function cancels the input offset of the AD converter when turning the power on.

### 1.3.2 VCO Gain Adjustment (VARI Adjustment)

The system has the function to automatically adjust VCO gain so that it will be constant by absorbing the variations from part to part through learning.

To do that, VCO is locked against the reference frequency for learning.

Then, it reads a Frequency Control Value (FCNT) and adjusts the VARI register so that the value will be equal to the target FCNT value.

### 1.3.3 FE Normalization Adjustment

The function is to adjust the FE signal level so that the level measured during Focus Close will be 190LSB at the digital equalizer input stage.



### 1.3.4 Focus Balance (FBAL) Adjustment

The function is to adjust a focus position so that RFENV will be maximized during Focus Close, Tracking Open and Tracking Close.

### 1.3.5 DPD Amplitude Adjustment

The function is to adjust the gain at the analog stage so that the input signal of the DPD comparator of the TE generating circuit of DVD will be constant.

### 1.3.6 Tracking Error Amplitude Learning

The function is to vibrate the lens in the direction of track and adjust the TE amplitude level so that it will be 190LSB at the digital equalizer input stage during Focus Close and Tracking Open.

### 1.3.7 Tracking Balance (TBAL) Adjustment

The function is to vibrate the lens in the direction of track, and using the Newton-Raphson method, search for the balancing point where DC offset will be zero and adjust it during Focus Close and Tracking Open.

### 1.3.8 OFTR Adjustment

The function is to adjust the binarization threshold level to binarize an OFTR signal.

### 1.3.9 AS Normalization Adjustment

The function is to fine-tune the AS signal level so that it will be 64 LSB at the digital equalizer input stage after measuring the AS signal level by the specified number of sampling and A/D converting it at ADSC during Tracking Close.

### 1.3.10 Focus Gain Adjustment / Tracking Gain Adjustment

The function is to adjust to the target gain intersection point by injecting disturbance into a Servo Loop during Tracking Close.

All the automatic adjustment results can be checked on the display in a test mode.

List of Automatic Adjustment Coefficients

| State                       | Coefficient                 | DVD           | CD          |
|-----------------------------|-----------------------------|---------------|-------------|
| Power On                    | VIN7 Offset                 | 05FB – 0A17   | ←           |
|                             | VIN8 Offset                 | 05FB – 0A17   | ←           |
|                             | VIN9 Offset                 | -             | 06B1 – 08D3 |
|                             | VIN10 Offset                | -             | 06B1 – 08D3 |
| Focus close                 | FEPP(FEMAX-FEMIN)           | 1D84 – 6C08   | 2E18 – A8CF |
|                             | AS MAX                      | Not specified | ←           |
|                             | FE Normalization Adjustment | Not specified | ←           |
| Focus close<br>(after TBAL) | TEPP(TEMAX-TEMIN)           | 36B0 – 80E8   | 1235 – 5B07 |
|                             | TE Normalization Adjustment | Not specified | ←           |
| Tracking close              | Focus Gain                  | 0100 – 0400   | ←           |
|                             | Tracking Gain               | 0100 – 0400   | ←           |
|                             | AS Normalization Adjustment | Not specified | ←           |

Caution: •All coefficients are expressed in hexadecimal. The specification values for all production lines (during TP production) are used.  
•As for a disc used, it is TDV-582 for DVD and TCD-792 for CD.

## 1.4 CIRC BLOCK (MN2DS0018MA : IC1501)

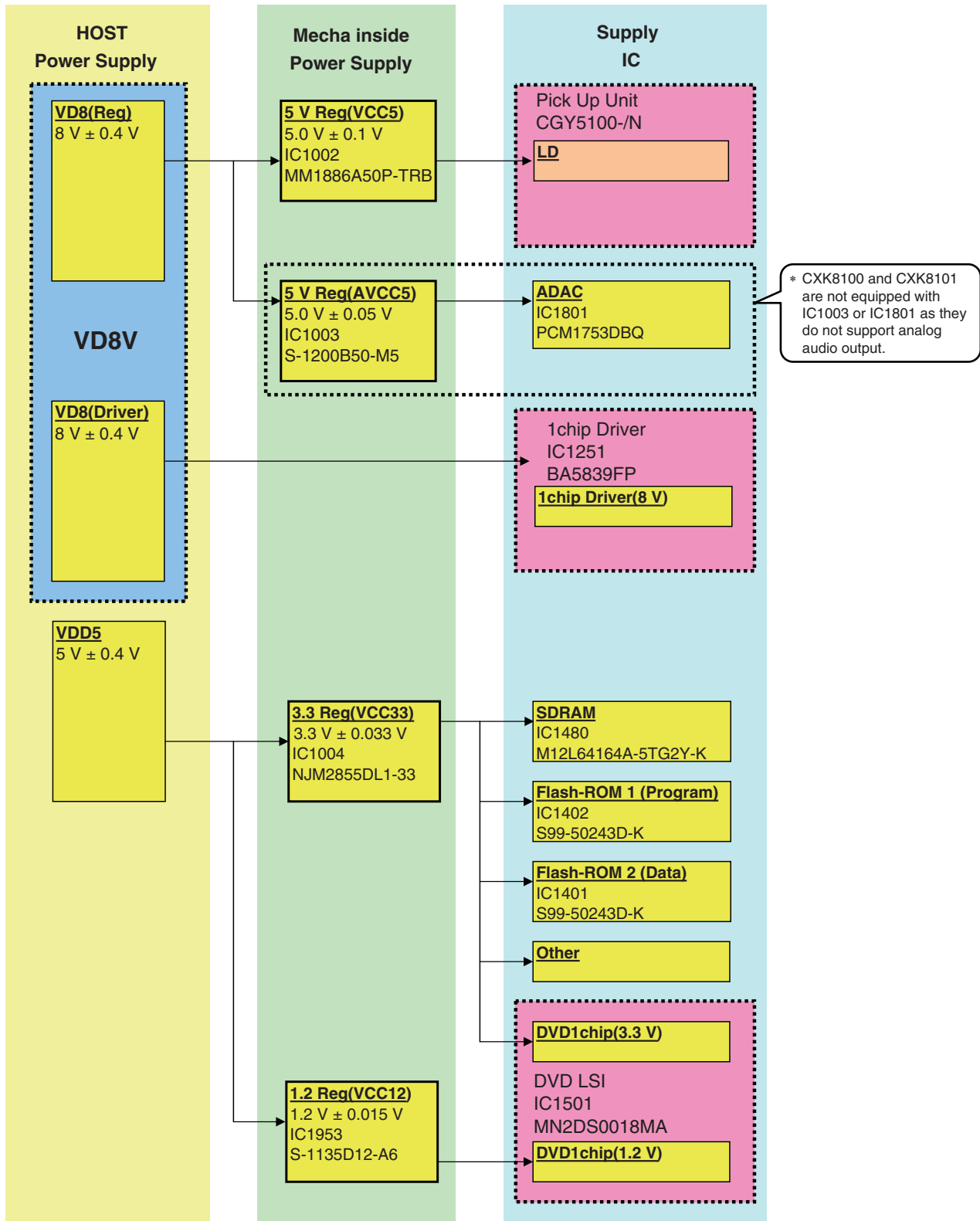
The CIRC block incorporates the digital signal processing function for CD-DA and CD-ROM (EFM demodulation and error correction) and the digital servo processing function for a Spindle Motor.

## 1.5 DRC BLOCK (MN2DS0018MA : IC1501)

The Digital Read Channel (DRC) is equipped with A/D converter, Digital Equalizer (DEQ), Adaptive equalizer, Viterbi detector, Digital PLL circuit, RISC interface, and peripheral circuits to read signals of an optical disc.

# 1.6 POWER SUPPLY MAP

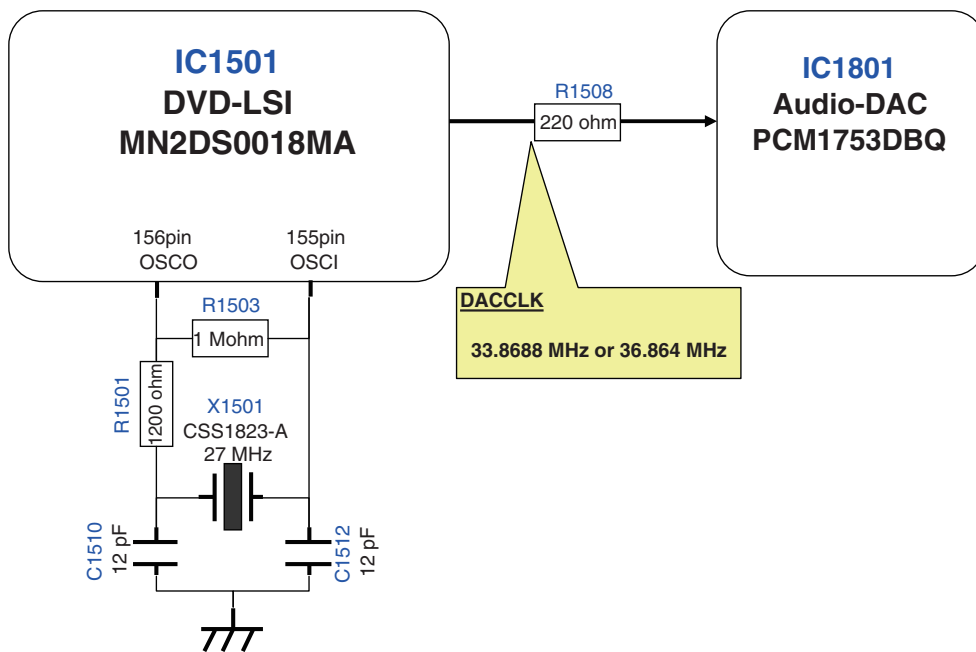
A  
B  
C  
D  
E  
F



# 1.7 CLOCK CIRCUIT

[Outline]

By connecting a 27 MHz crystal oscillator with DVD-LSI (IC1501), it generates and supplies DACCLK for externally connected Audio-DAC in addition to the clock to be used in the LSI with the clock generator in DVD-LSI.  
\* CXK8100 and CXK8101 are not equipped with R1508 or IC1801 as they do not support analog audio output.



# 1.8 AUDIO CIRCUIT

[Outline]

(1) Analog Audio Signal

It converts the serial 3-wire digital output +DACCLK (audio clock) coming from DVD-LSI (IC1501) to an Analog Audio Signal at Audio-DAC (IC1801) and output it from HOST IF connector (CN1901).

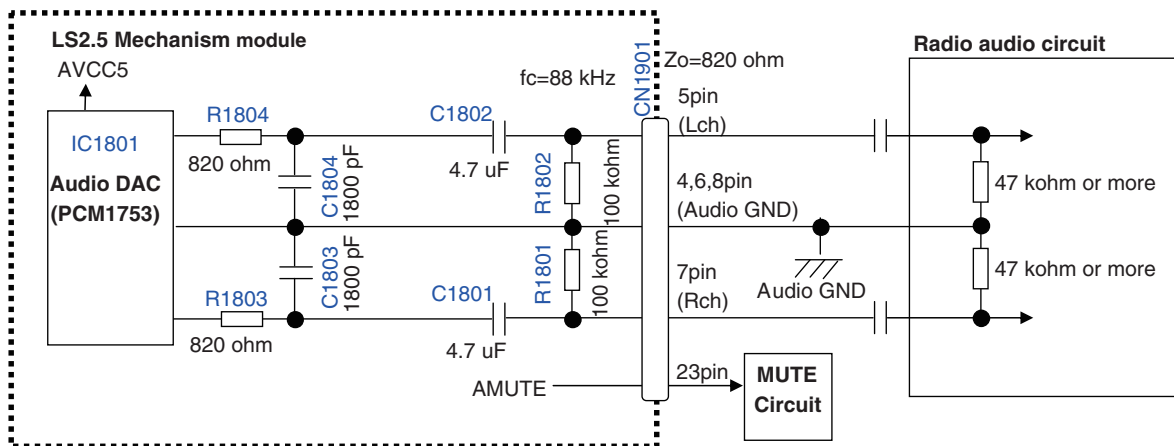
At the same time, it outputs an Analog MUTE Signal from DVD-LSI (IC1501) through HOST IF connector (CN1901).

\* CXK8100 and CXK8101 are not equipped with IC1801, R1801 ~ R1804 or C1801 ~ C1804 as they do not support analog audio output.

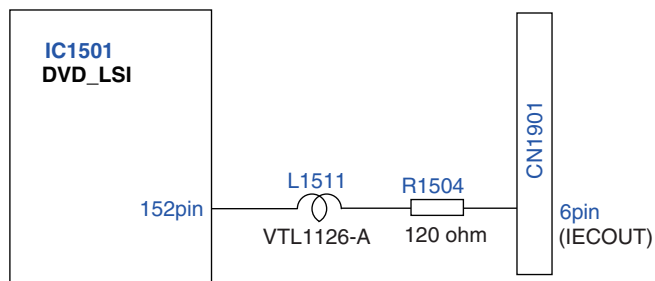
(2) Digital Audio Signal (IEC60958/IEC61937)

It outputs the Digital Audio Signal (IEC60958/IEC61937) coming from DVD-LSI (IC1501) through the HOST IF connector (CN1901).

[Analog Audio Signal]

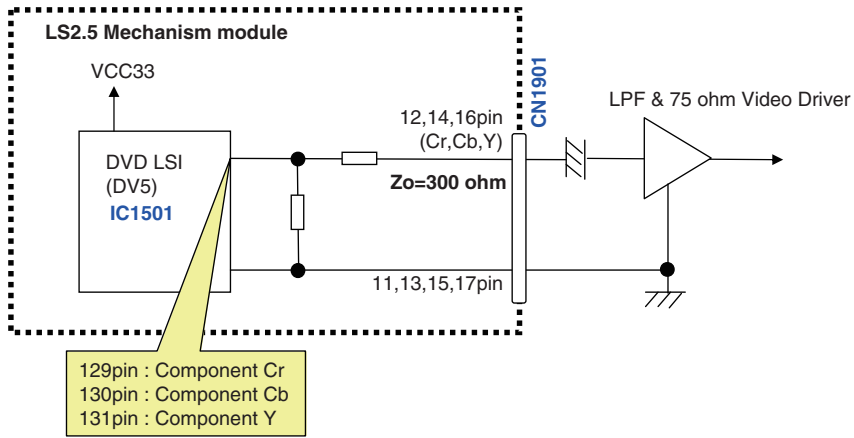
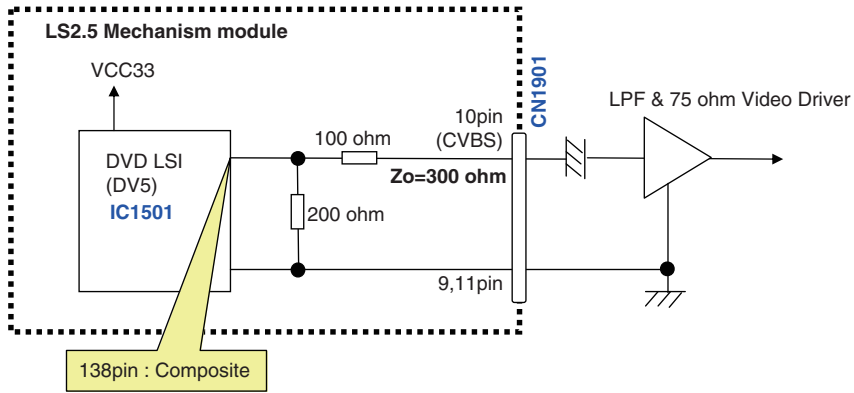


[Digital Audio Signal]



# 1.9 VIDEO CIRCUIT

[Outline]  
 It outputs a Composite Signal and Component Signal from DVD-LSI (IC1501) and finally outputs it from HOST IF connector (CN1901).



# 1.10 SDRAM I/F

## [Outline]

This is the memory for implementing the AV decoding function of DVD-LSI (IC1501). It can be used in various ways from buffering the stream data before decoding and serving as a work area during decoding, to storing the AV and output data after decoding.

### SDRAM Interface

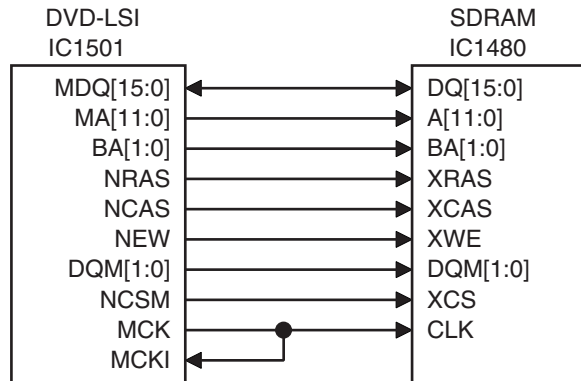
\* ↓ Looking from DVD-LSI

| Signal Name | Bits | I/O | Description                           |
|-------------|------|-----|---------------------------------------|
| MDQ[15:0]   | 16   | I/O | Data bus for external SDRAM           |
| MA[11:0]    | 12   | O   | SDRAM address                         |
| BA[1:0]     | 2    | O   | SDRAM bank address                    |
| NRAS        | 1    | O   | RAS signal of SDRAM                   |
| NCAS        | 1    | O   | CAS signal of SDRAM                   |
| NEW         | 1    | O   | Write enable signal of SDRAM          |
| NCS         | 1    | O   | Chip select signal of SDRAM           |
| DQM[0]      | 1    | O   | Data mask 0 of SDRAM                  |
| DQM[1]      | 1    | O   | Data mask 1 of SDRAM                  |
| MCK         | 1    | O   | Clock input to SDRAM                  |
| MCKI        | 1    | I   | Clock input for data input from SDRAM |

### SDRAM Design

- Data bus range : 16 bit
- Operating frequency : 121.5 MHz
- CAS latency = 3
- 8 word burst forwarding
- Manual precharge
- CAS before RAS refresh (Auto refresh)

### Connection Structure of SDRAM

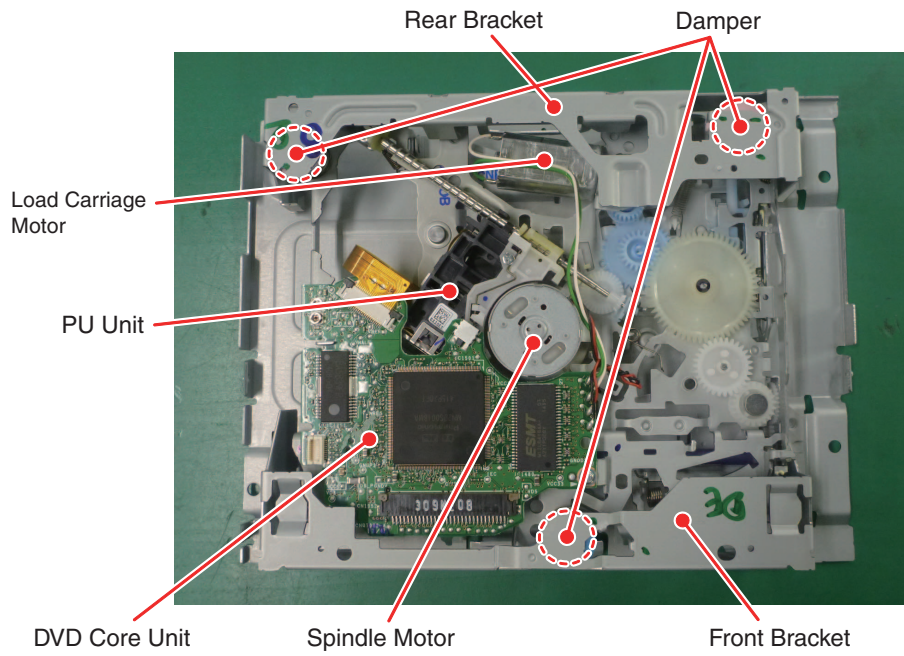
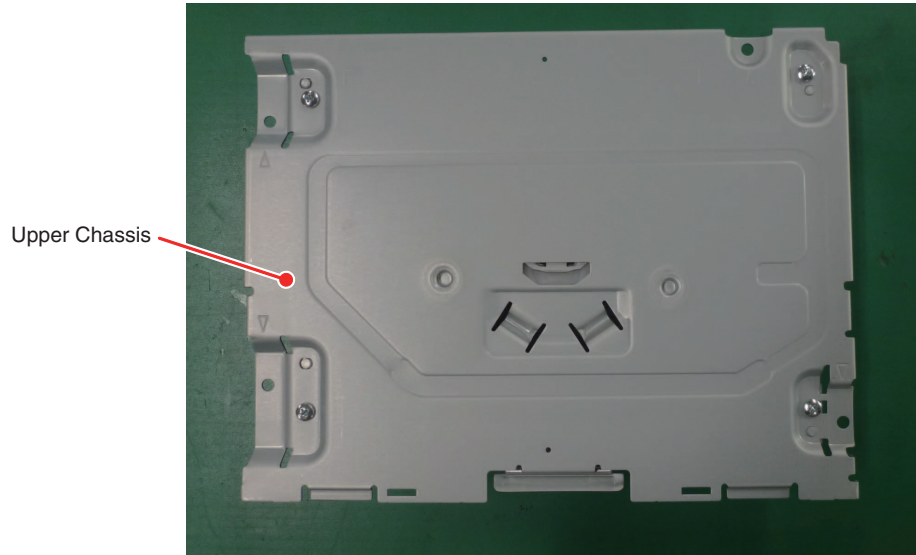


5 6 7 8

# 2. MECHANISM DESCRIPTION

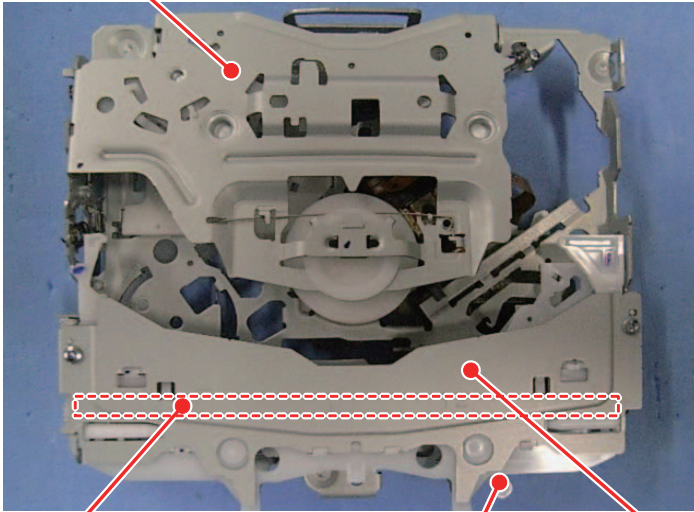
## 2.1 OUTLINE

### ●Mechanism Module



### ●CRG Mechanism

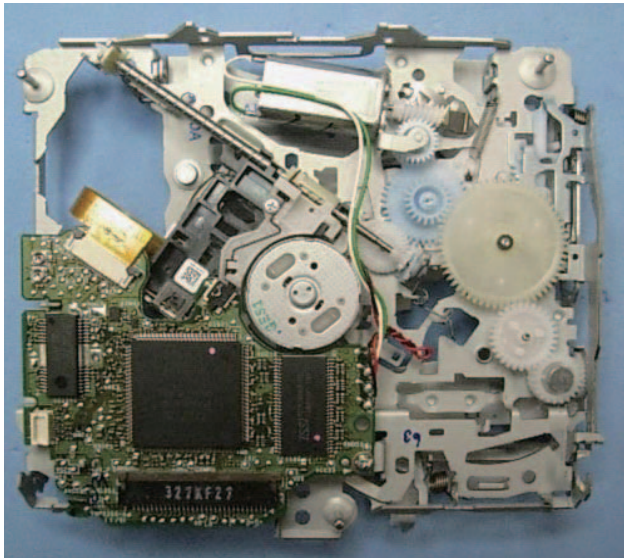
Clamp Arm ASSY



Roller Arm ASSY

SW Arm

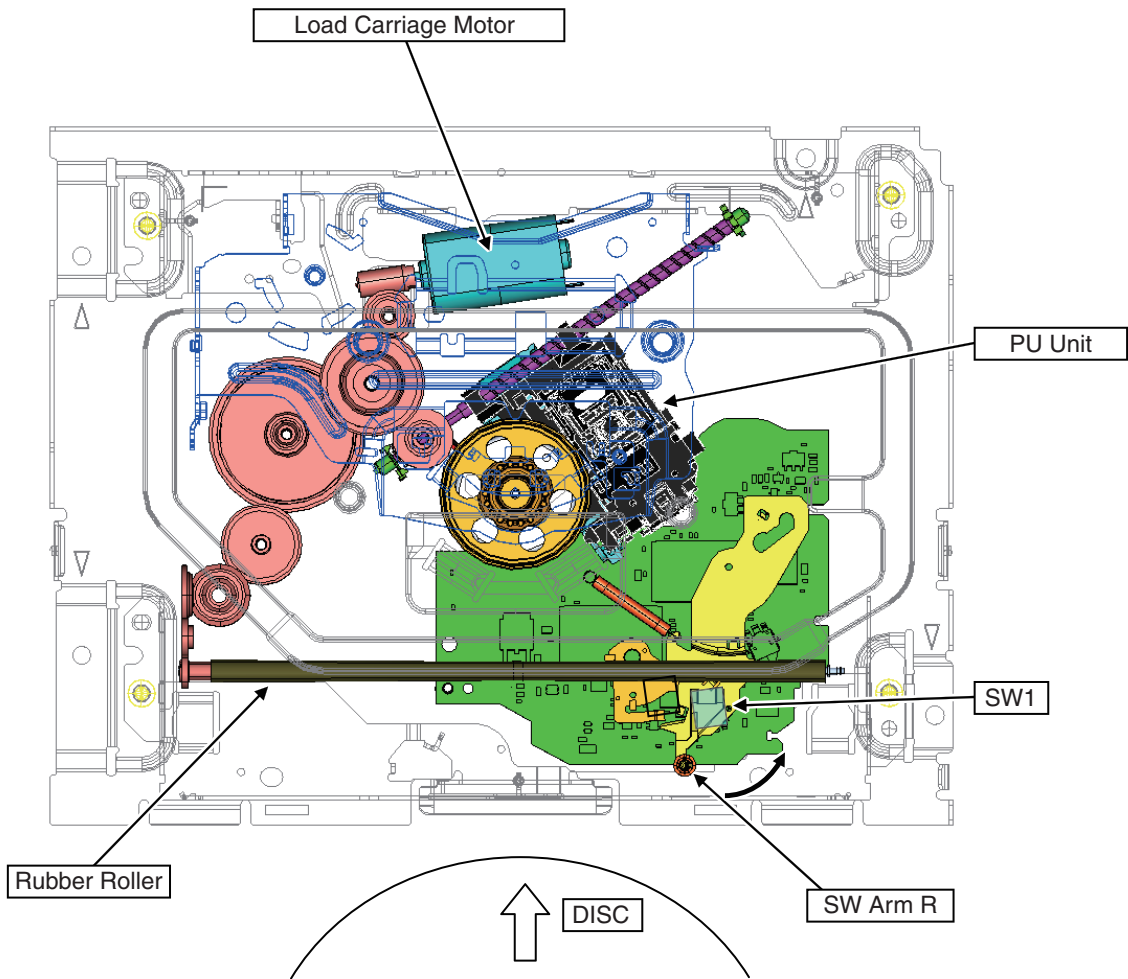
Disc Guide ASSY





## 2.2 DISC LOADING OPERATION

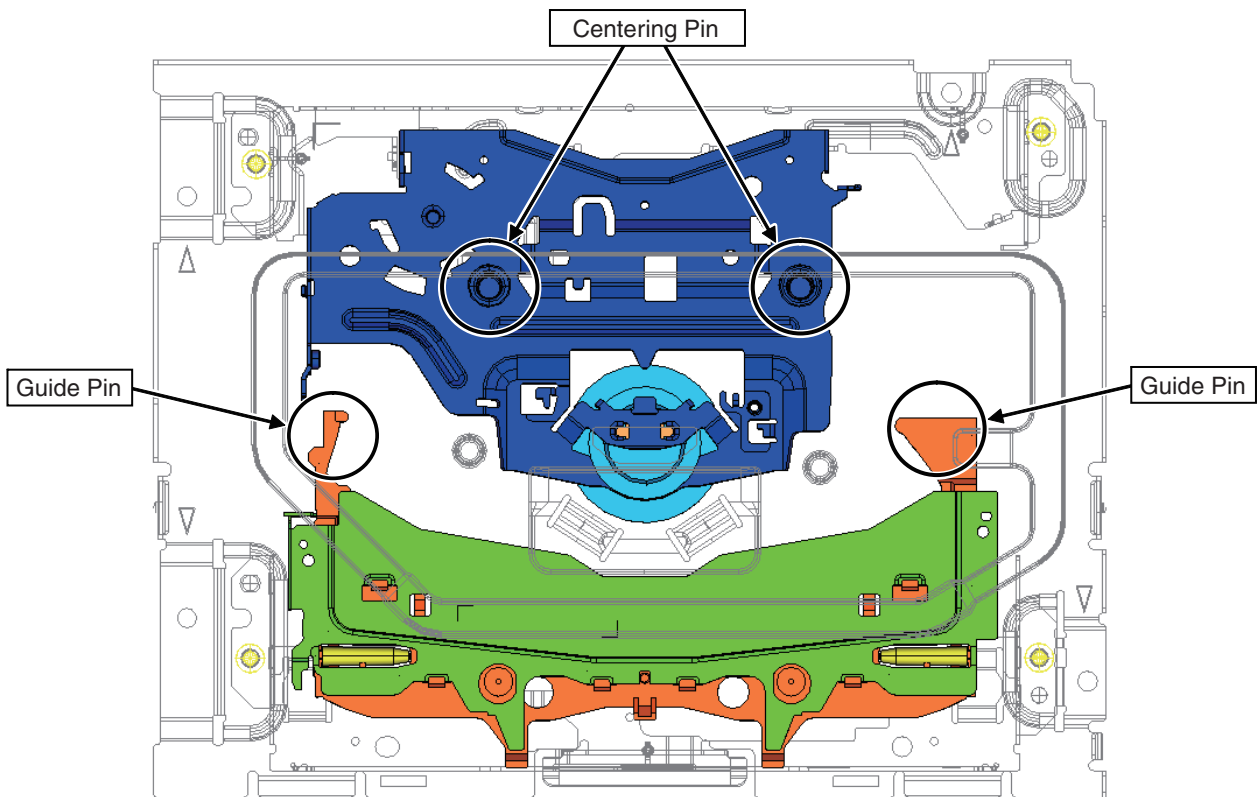
1. When the disc is inserted, SW Arm R turns and SW1 switches from OFF to ON.  
When SW1 switched from OFF to ON, the Load Carriage Motor starts and the Rubber Roller rotates.
2. In the case of 12 cm disc, as SW Arm R spreads widely, SW1 switches from ON to OFF, and the microcomputer judges that it is 12 cm disc.



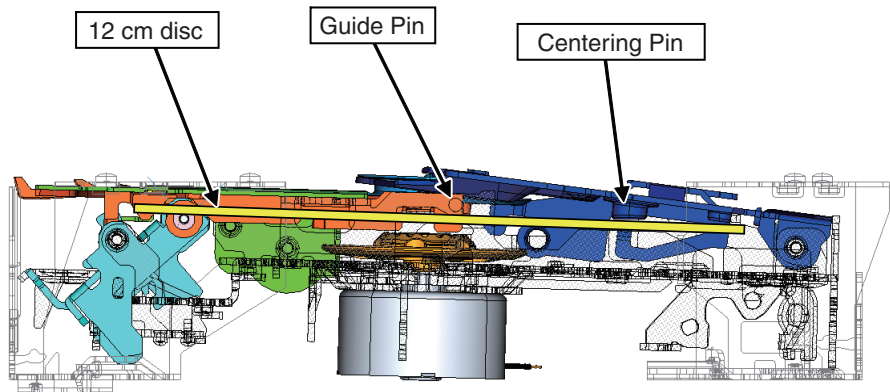
### 2.3 DISC CENTERING MECHANISM

1. The 12 cm disc passes under the Guide Pin and the Centering Pin, and is centered at the back position of mechanism.

A

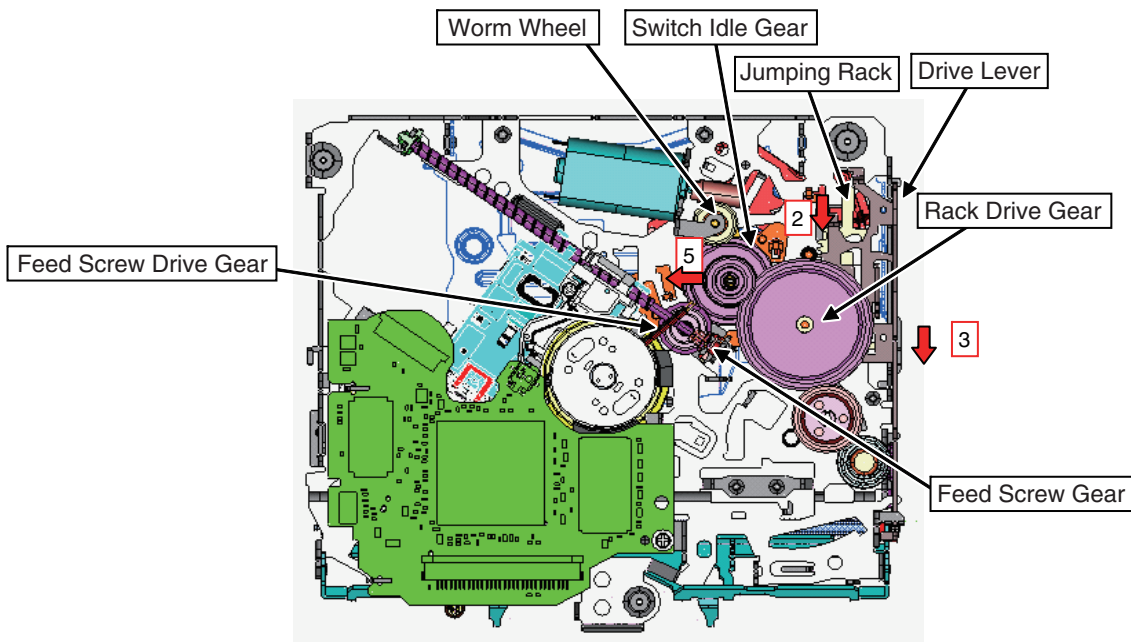
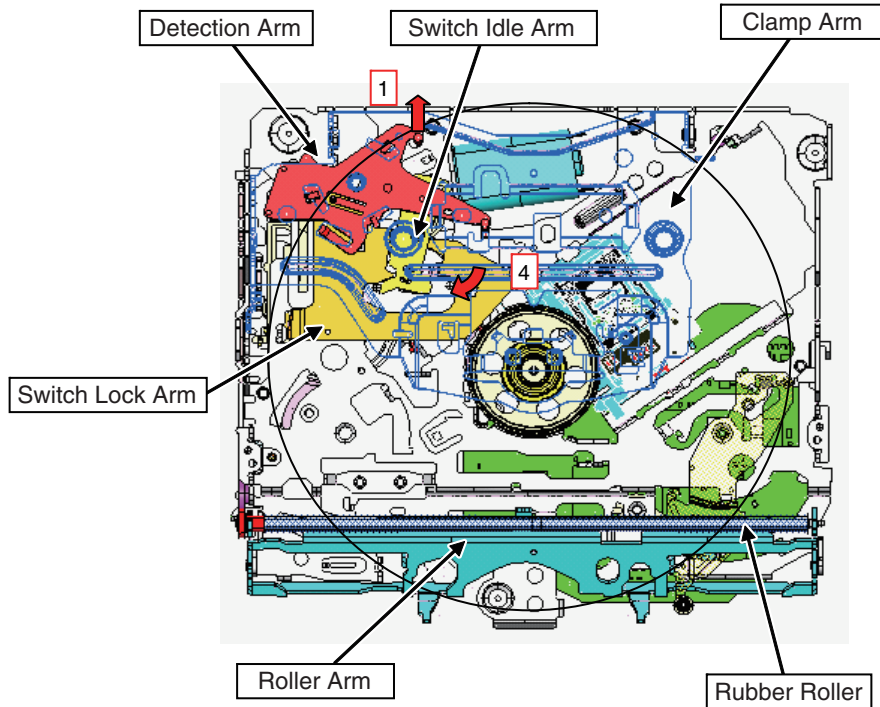


D



## 2.4 CLAMP MECHANISM

1. When the 12 cm disc is centered on the spindle, the Detection Arm drive.
2. The Detection Arm engages the Jumping Rack with the Rack Drive Gear.
3. The Drive Lever which is joined to the Jumping Rack slides and moves the Clamp Arm down. (The disc is clamped.)  
Simultaneously, the Roller Arm turns and the Rubber Roller is disconnected from the disc.
- And when the Roller Arm turns, the upper and bottom mechanism locks are released and clamp operation is completed.
4. When the clamp operation is completed, the control by the Cam on the Drive Lever is removed and the Switch Lock Arm turns.
5. When the Switch Lock Arm turns, the Switch Idle Gear moves away from the Rack Drive Gear, engages with the Feed Screw Drive Gear and the carriage operation starts.



■

1

■

2

■

3

■

4

■

## 2.5 EJECT OPERATION

1. When the Load Carriage Motor reverses and the PU moves SW2 to the inner circumference (beyond ON), the eject operation starts in the inverse process of the above description.
2. Eject completion of 12 cm disc: SW1 ON→OFF→ON→OFF→ON

A

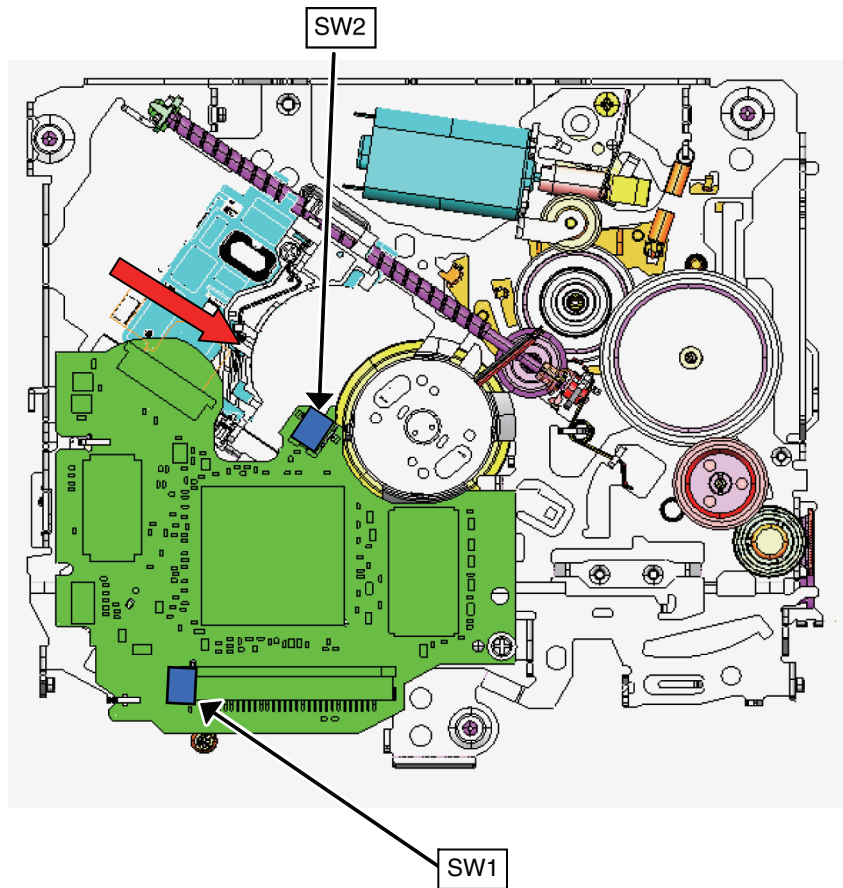
B

C

D

E

F



■

1

■

2

■

3

■

4

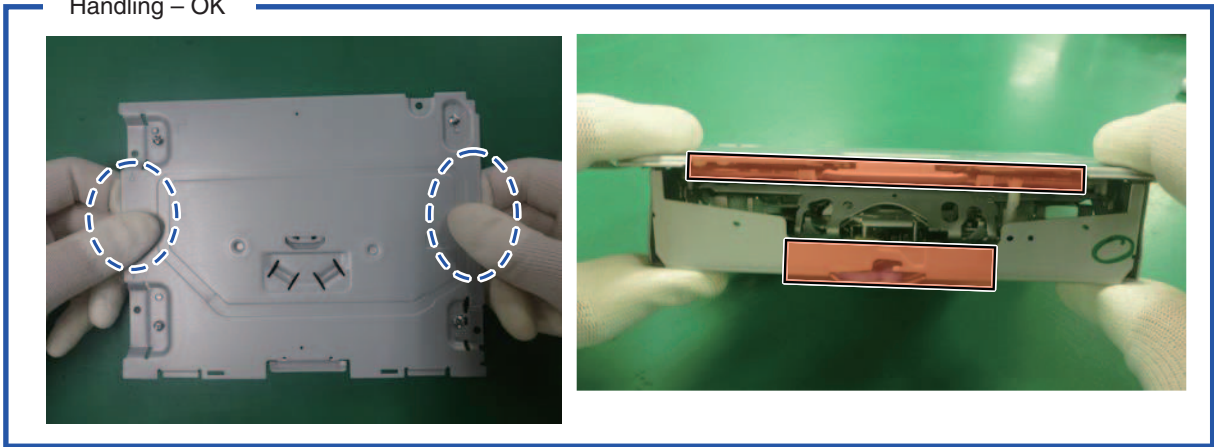
■

# 3. DISASSEMBLY

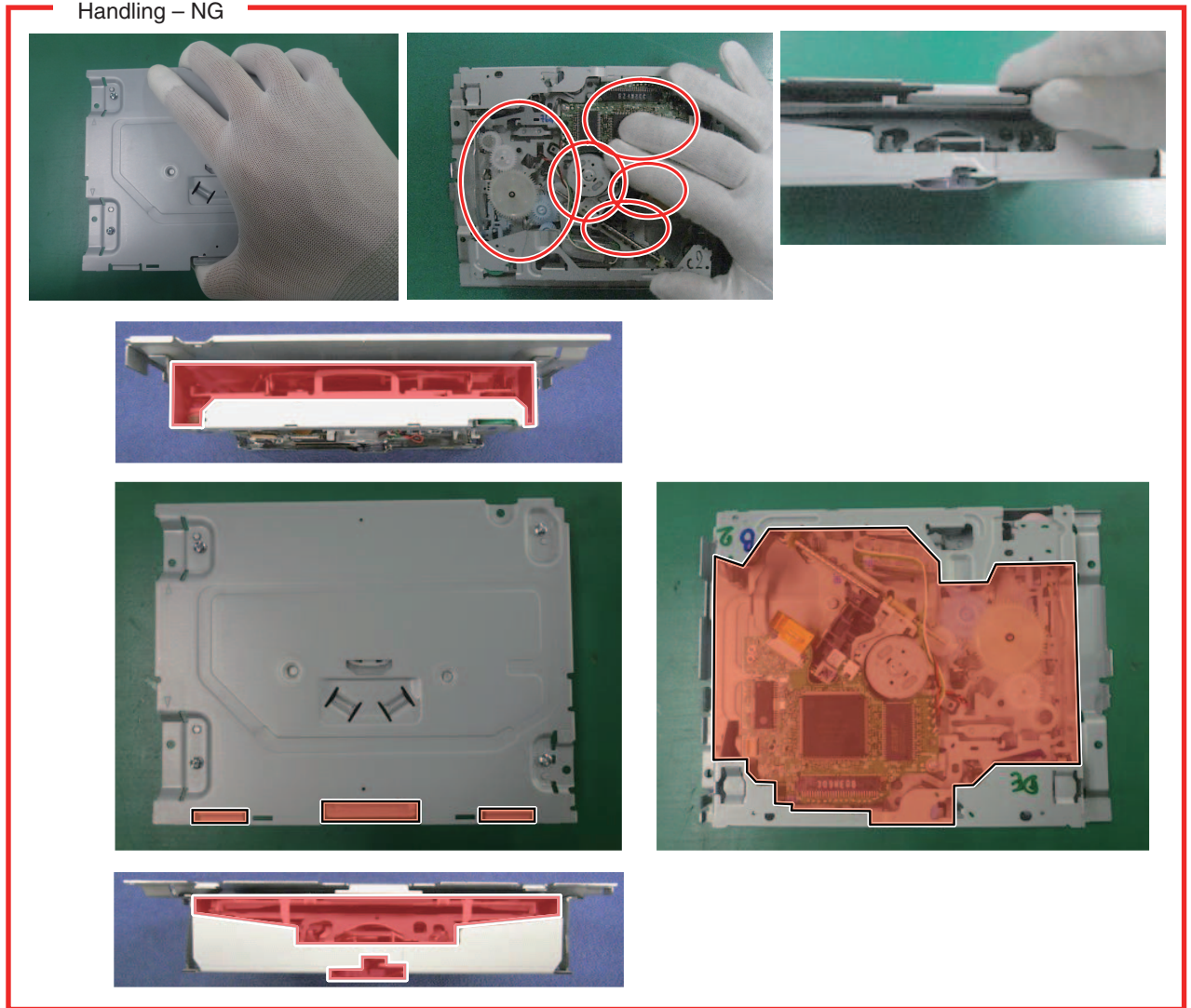
## 3.1 HOW TO HOLD MECHANISM

1. Hold the designated parts (areas surrounded by blue dashed lines) of Upper Chassis, Front and Rear Bracket.
2. Do not hold in the red areas or the CRG Mechanism Section or insert a foreign object. Doing so may cause deformation.

Handling – OK

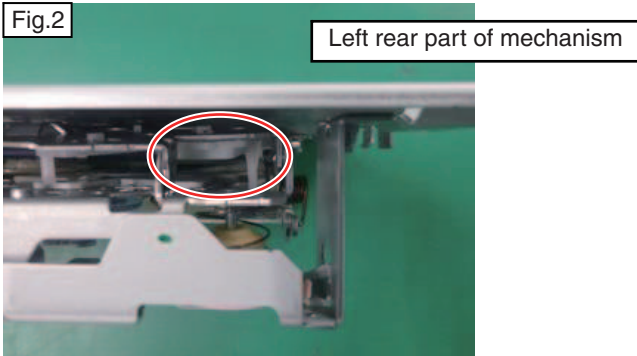
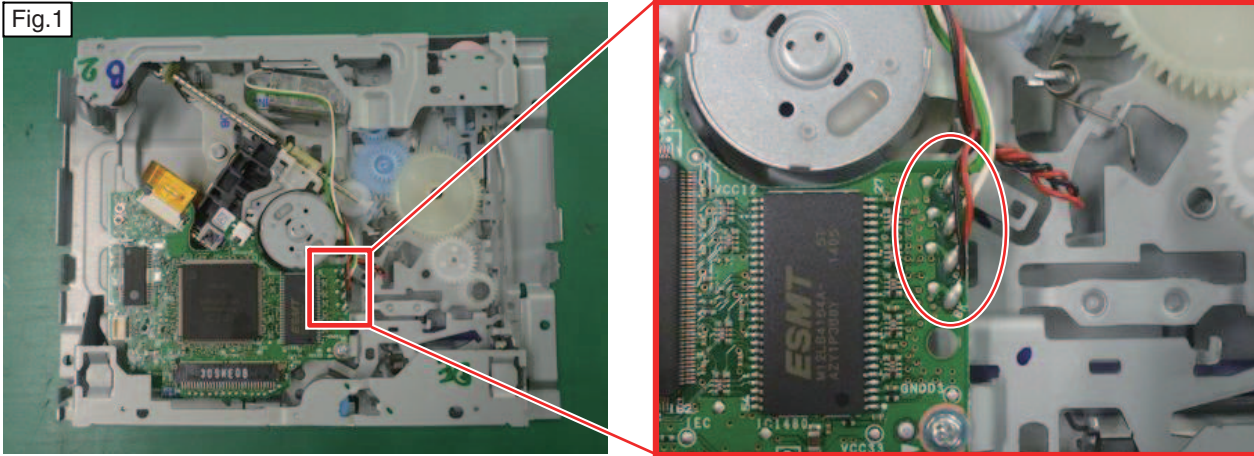


Handling – NG



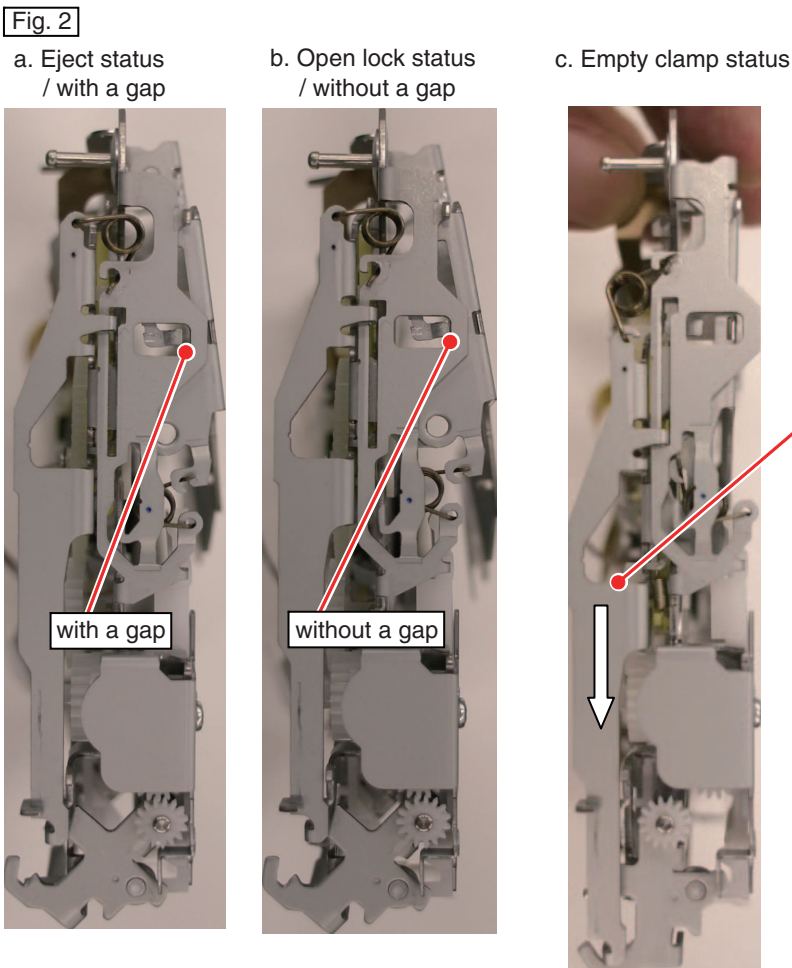
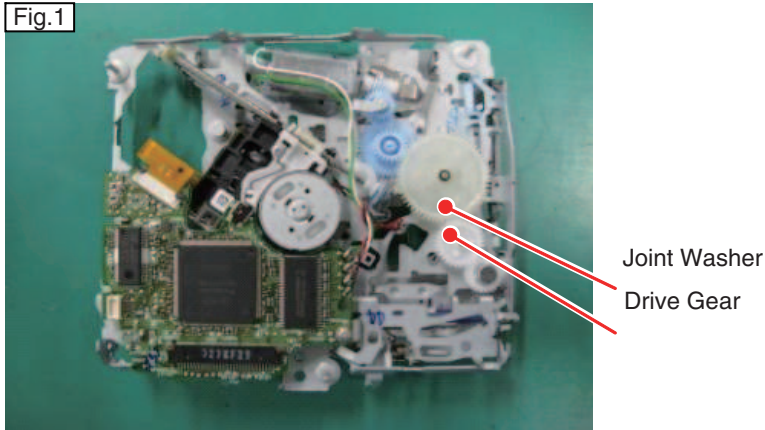
### 3.2 HOW TO CREATE EMPTY CLAMP STATUS (MECHANISM MODULE)(MOTOR-DRIVEN)

- A
  1. Remove soldering of the CRG Motor Lead Wire (Fig.1).
  2. Tuck the Disc Detection Arm while applying 4 V to the CRG Motor (Fig. 2).  
(green wire – 4 V, white wire – GND)  
The mechanism is clamped, and the PU moves to the outer circumference.  
(Note) Do not apply the current when soldering of the CRG Motor Lead Wire is not removed.  
IC and the PU may be damaged.
  3. Stop the motor when the PU reaches the intermediate circumference.  
(Note) If the PU moves to the outermost circumference, tooth jumping occurs.  
There is no problem, but prevent tooth jumping as much as possible.



### 3.3 HOW TO CREATE EMPTY CLAMP STATUS (CRG MECHANISM)(MANUAL)

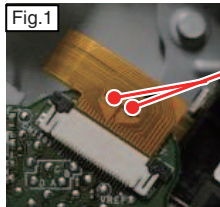
1. According to “3.6 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (mechanism – Eject status)
2. Remove the Joint Washer of Drive Gear, and remove the Drive Gear (Fig.1).  
(Note) Do not reuse the Joint Washer.
3. Move the Clamp Arm ASSY up to the status of Fig.2-b (Open lock status).
4. Put a finger on A part of Fig.2-c and slide it in the direction of arrow (Direction of play state).
5. Push the Clamp Arm down.  
(Note) When the CRG Mechanism is returned to eject status, install the Drive Gear after it is put to eject status by sliding the Drive Lever to prevent tooth break of the pinion of Drive Gear in the installation.



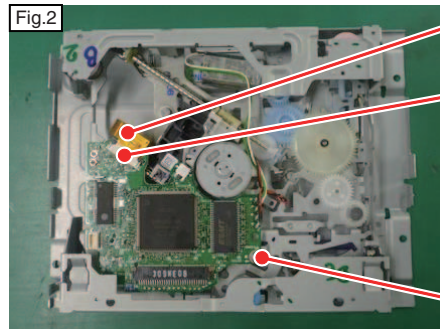
### 3.4 HOW TO REMOVE AND INSTALL THE DVD CORE UNIT

How to remove:

1. Short-circuit two points of land of the FPC (Fig.1).
2. Remove the FPC from the connector (Fig.2).
3. Remove soldering of the lead wire (Fig.3).
4. Remove the Fixing Screw of DVD CORE UNIT (Fig.3).
5. Slide the DVD CORE UNIT in the direction of arrow and remove the UNIT from A-hook and B-hook (Fig.3).
6. Temporarily joint the FPC for PU to prevent disconnection of it (Fig.4).



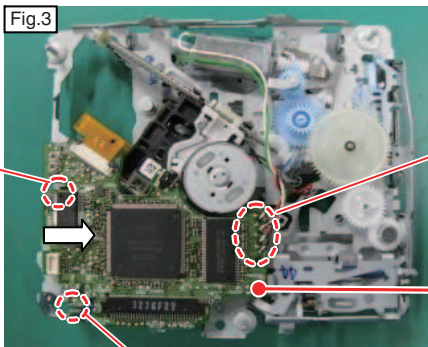
Two areas of land



FPC

Connector

Fixing Screw of DVD CORE UNIT



A-hook

Soldered part of lead wire

Fixing Screw of DVD CORE UNIT

B-hook

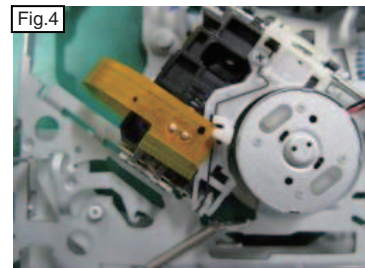
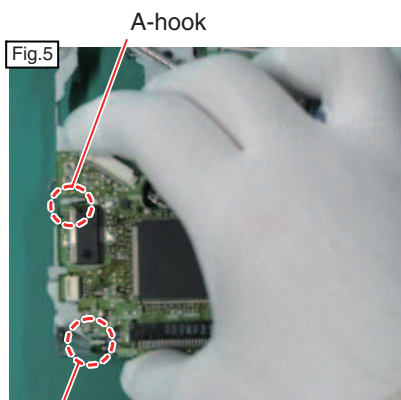


Fig.4

How to install:

1. Check that the status of mechanism is eject (disc load standby status).  
If it is not eject status, apply 4 V to the CRG Motor Lead Wire to make it eject status.  
(white wire – 4 V green wire – GND)
2. Hold the DVD CORE UNIT as shown in Fig.5. Be careful not to touch the SW Knob.
3. Insert the DVD CORE UNIT into A-hook and B-hook simultaneously (Fig.5).
4. Push the DVD CORE UNIT down lightly and set it to the positioning dowel.
5. Fix the DVD CORE UNIT with a screw while supporting C-part with a finger as shown in the Fig.6.
6. Solder the lead wires.
7. Bring the lead wires together according to "3.5 HOW TO TREAT LEAD WIRES".
8. Connect the FPC with the connector.
9. Remove the soldering that has shorted the land for the FPC.



A-hook

B-hook

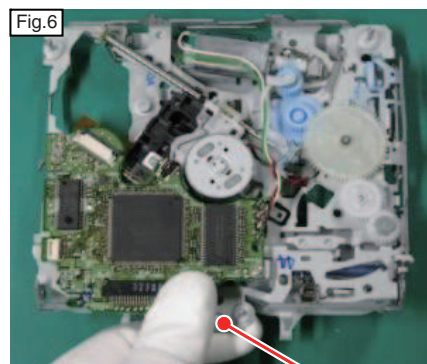


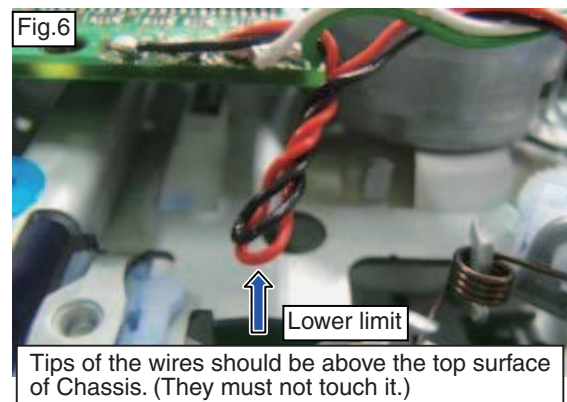
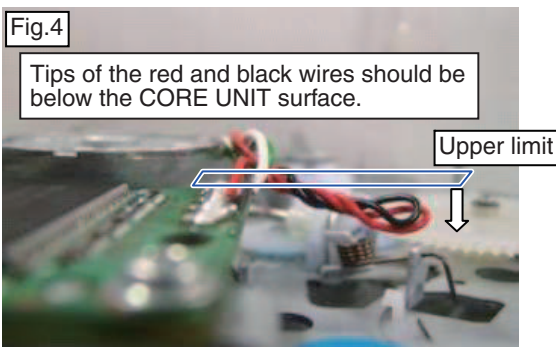
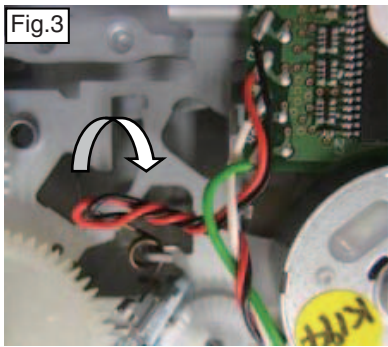
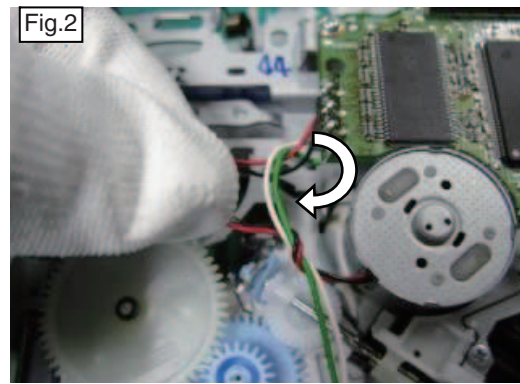
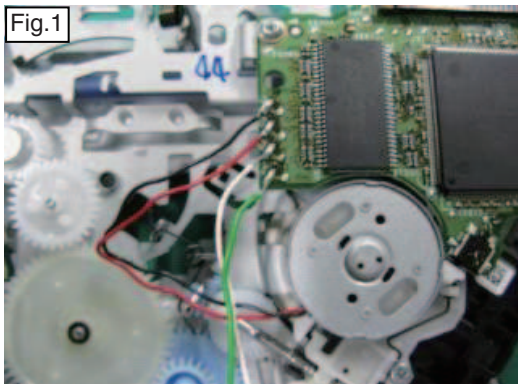
Fig.6

C



### 3.5 HOW TO TREAT LEAD WIRES

1. Solder the lead wires so that the green and white wires pass above the red and black wires (Fig. 1).
2. Wrap the red and black wires around the green and white wires one time (Fig. 2).
3. Twist the red and black wires two and half turns (Fig. 3).
4. Make sure that the wound red and black wires are located in the positions shown in Fig. 4 and Fig. 5.



### 3.6 HOW TO REMOVE THE CRG MECHANISM ASSY

1. Remove the four Fixing Screws of Upper Chassis and remove the Upper Chassis. (Fig.1 and Fig.2)  
(The same applies to the mechanism of different type of the Upper Case)

2. Remove it from the three Dampers while moving the Carriage Mechanism part up (Fig.2).

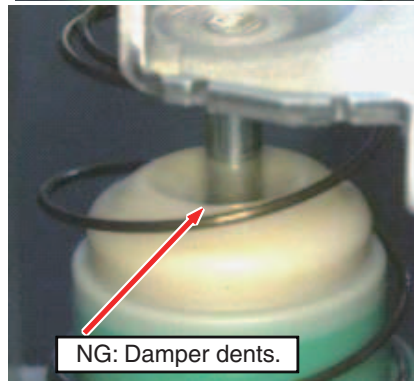
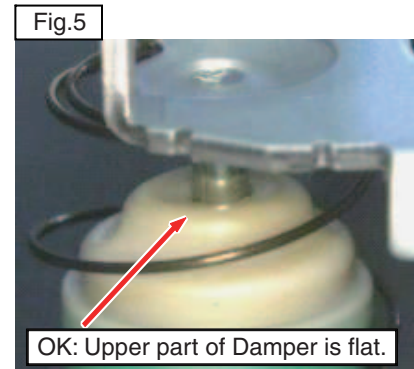
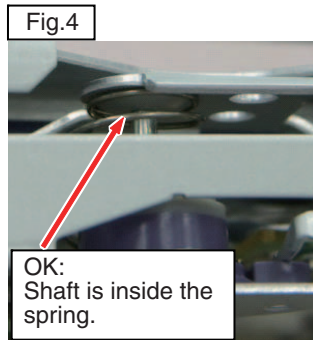
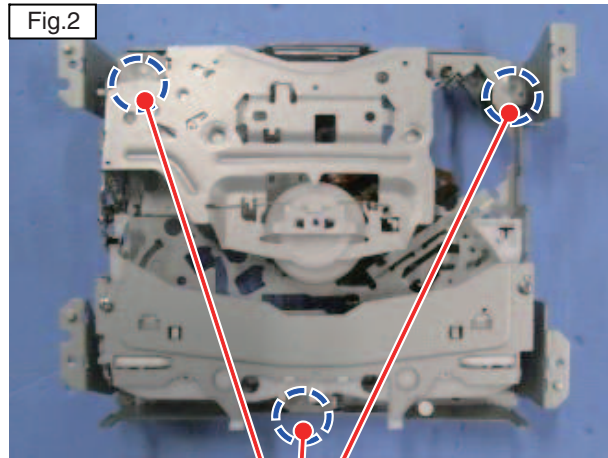
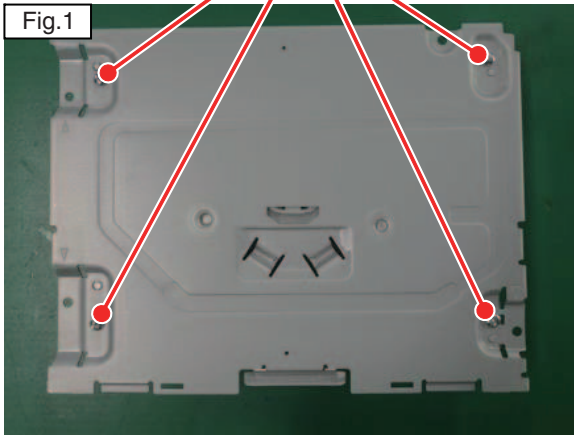
(Note) When the CRG Mechanism ASSY is installed, apply the ethanol to the Dampers.

Check that the tip of Centering Front Spring is located within inside the bend (Fig.3).

Check that the Damper Shaft is located within the Centering Spring (Fig. 4).

When assembling the CRG Mechanism, create an empty clamp state according to "3.2 HOW TO CREATE EMPTY CLAMP STATUS (MECHANISM MODULE)(MOTOR-DRIVEN)" and press down the upper part of Damper of the CRG Mechanism so that the Damper and the CRG Mechanism ASSY are firmly in engagement with each other (Fig. 5).

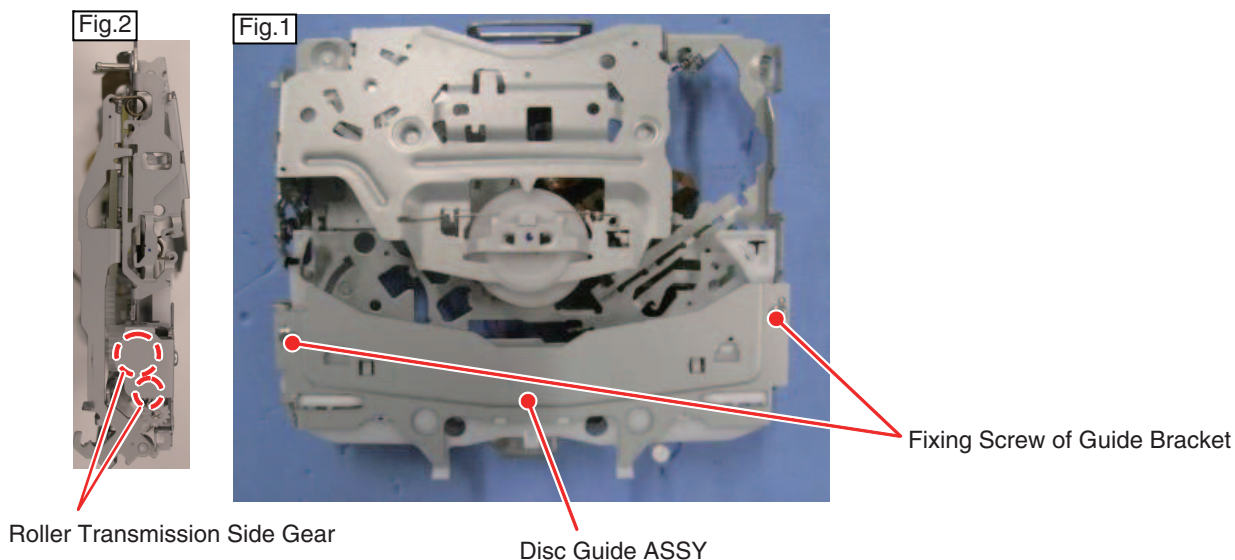
Fixing Screw of Upper Chassis



### 3.7 HOW TO REMOVE THE DISC GUIDE ASSY

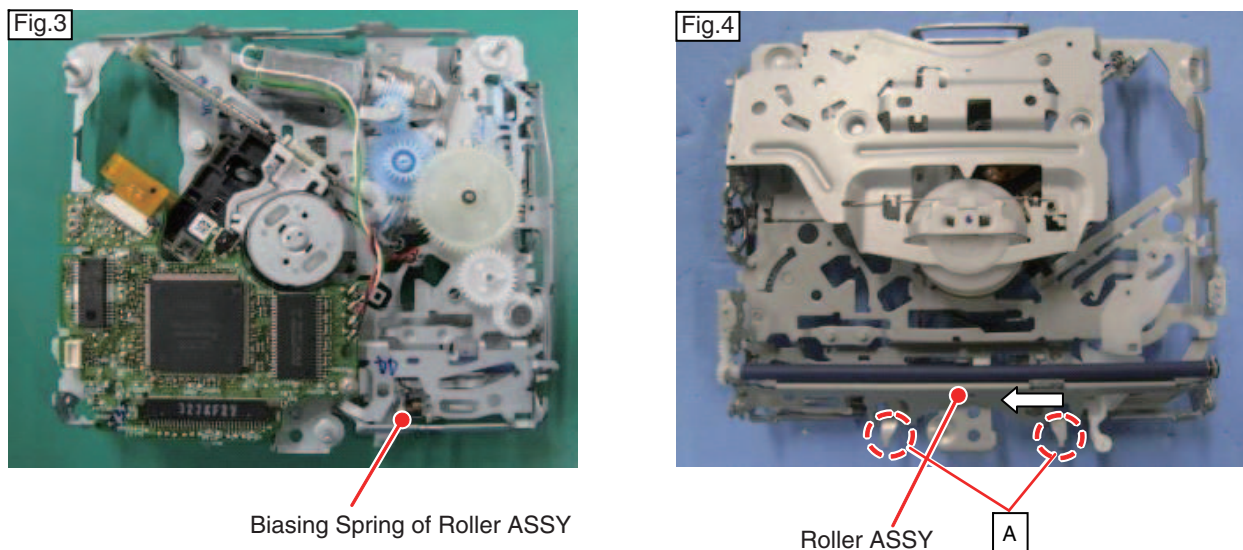
How to remove the Roller Transmission Side Gear:

1. According to “3.6 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
  2. Remove the two Fixing Screws of Guide Bracket, and remove the Disc Guide ASSY. (Fig. 1)
  3. Remove the two Roller Transmission Side Gears. (Fig. 2)
- (Note) When the Disc Guide ASSY is installed, make sure to install the two Side Gears.



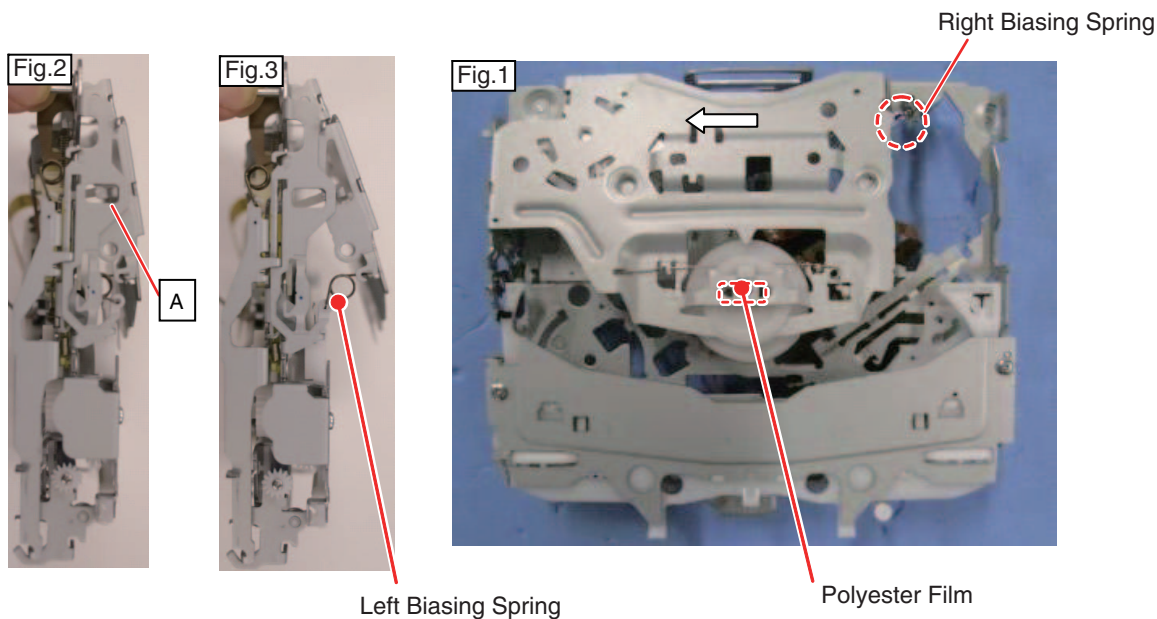
### 3.8 HOW TO REMOVE THE ROLLER ASSY

1. According to “3.6 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
  2. According to “3.9 HOW TO REMOVE AND INSTALL THE CLAMP ARM ASSY”, remove the Clamp Arm ASSY.
  3. According to “3.11 HOW TO REMOVE THE DRIVE LEVER ASSY”, remove the Drive Lever ASSY.
  4. Remove the Biasing Spring of Roller ASSY. (Fig. 3)
  5. According to the items after Item 2 of “3.7 HOW TO REMOVE THE DISC GUIDE ASSY”, remove the Disc Guide ASSY.
  6. Hold A-parts of Roller ASSY, turn in PLAY direction and then slide it to the left and remove it (Fig. 4)
- (Note) When the Disc Guide ASSY is installed, make sure to install the two Side Gears.



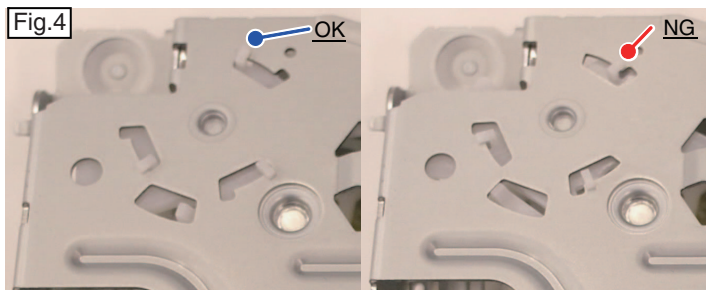
### 3.9 HOW TO REMOVE AND INSTALL THE CLAMP ARM ASSY

1. According to “3.6 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY.  
(Mechanism – Eject status)
2. According to “3.3 HOW TO CREATE EMPTY CLAMP STATUS (CRG MECHANISM)(MANUAL)”, create empty clamp status.
3. Remove the Right Biasing Spring of Clamp Arm. (Only the spring of Clamp Arm side. Do not remove that of Chassis side.)
4. Hold the Clamp Arm ASSY up to the state of Fig.2 (open lock status).
5. Furthermore, hold the Clamp Arm ASSY up to the state of Fig.3 while lightly pushing A-part.
6. Remove the Left Biasing Spring of Clamp Arm.
7. Furthermore, hold the Clamp Arm ASSY up to 45 ~ 60 °, and slide to the left then remove it (Fig.1).



How to install:

1. Slide the Clamp Arm ASSY from the left and install to the support with it tipped (45 ~ 60 °).
  2. Tip the Clamp Arm ASSY to the position of Fig.3 (position where it stops by contacting with the Chassis.)
  3. Install the Left Biasing Spring of Clamp Arm.
  4. Turn the Detection Arm completely to the position of OK in Fig.4, and tuck the Clamp Arm ASSY.
  5. Install the Right Biasing Spring of Clamp Arm.
- (Note) When the Clamp Arm ASSY is replaced, replace the Polyester Film with a new one.



### 3.10 HOW TO REMOVE THE CRG MOTOR ASSY

How to remove the Drive Gear:

1. According to "3.6 HOW TO REMOVE THE CRG MECHANISM ASSY", remove the CRG Mechanism ASSY. (Mechanism – Eject status)
  2. According to "3.9 HOW TO REMOVE AND INSTALL THE CLAMP ARM ASSY", remove the Clamp Arm ASSY.
  3. Remove soldering of the CRG Motor Lead Wires (Fig.1).
  4. Remove the Joint Washer with the tweezers, etc. and remove the Drive Gear (Fig.1).
  5. Narrow the Gear Hook part of Switch Idle Arm with the fingertips, and tuck it from the upper surface of Gear (Fig.2a→ Fig.2b)
  6. Warp the hook part (Chassis side) of Switch Idle Arm in the direction of arrow with the tweezers, etc. and remove the joint with the Chassis (Fig.3).
  7. Draw out the Switch Idle Arm from the upper surface side of mechanism (Fig.4), and remove the Worm Wheel and the Idle Gear (Fig.3).
  8. Remove the Biasing Spring of Switch Idle Lock Arm (Fig.3).
  9. Remove the two Fixing Screws of CRG Motor and remove the CRG Motor (Fig.3).
- (Note)
- When the Switch Idle Arm is installed, put the Idle Gear and Worm Wheel temporarily as shown in Fig.5, push the Idle Gear with the fingers and install it from the opposite side of Chassis according to the procedure of Fig.6. Make sure to install the Biasing Spring of Switch Idle Arm.
  - Do not reuse the Joint Washer of Drive Gear and Idle Arm (due to snap-fit structure).
  - When the CRG Motor is installed, move to the center of mechanism to completely engage the gear.

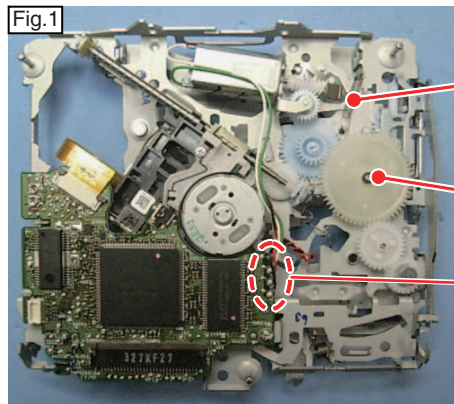
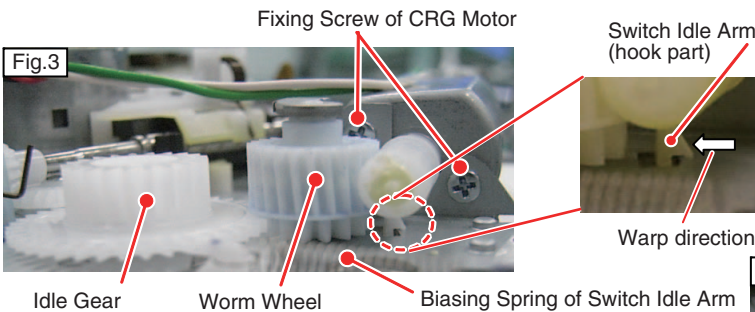
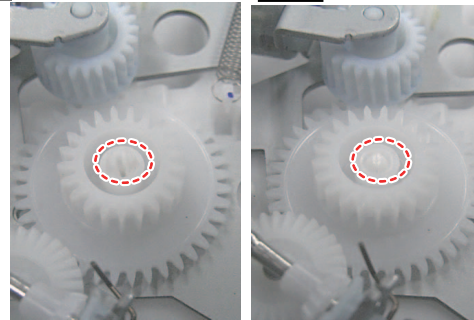


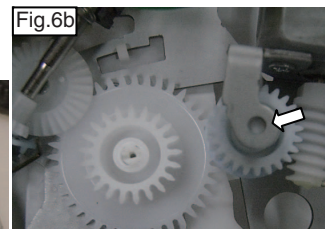
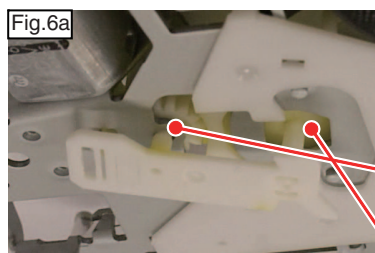
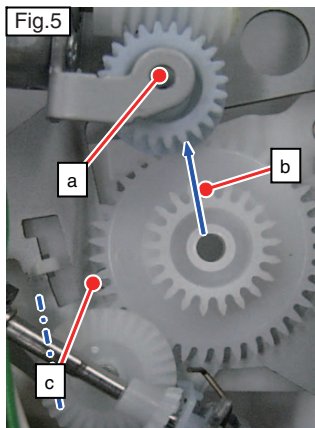
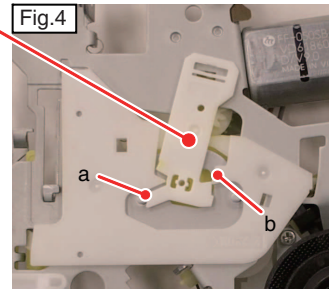
Fig.2a Normal installation state

Fig.2b State where the joint is removed

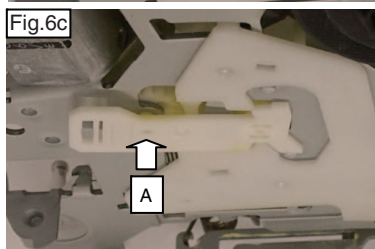


Switch Idle Arm (Draw upward)

Fig.4



- Step 1: Insert the Arm Support Boss to the Worm Wheel through the Chassis hole. Insert only the tip of boss as shown in the figure.
- Step 2: Insert the Gear Support Boss to the Gear while pressing the Idle Gear from the opposite side, and join it (normal installation state shown in Fig.2a). If the normal state can not be reached, the interference at a-part and b-part (Fig.4) may be the cause of it. Conduct fine adjustment (move to right and left).
- Step 3: Tuck A-part of Fig.6c while aligning the tip of Support Boss with the plate hole with the fingers (Fig.6b) and install the Idle Arm.



- a: Align the support hole of Worm Wheel with the plate hole.
- b: Engage the Idle Gear with the Worm Wheel.
- c: Adjust the positioning while checking the external form of plate □.

## 3.11 HOW TO REMOVE THE DRIVE LEVER ASSY

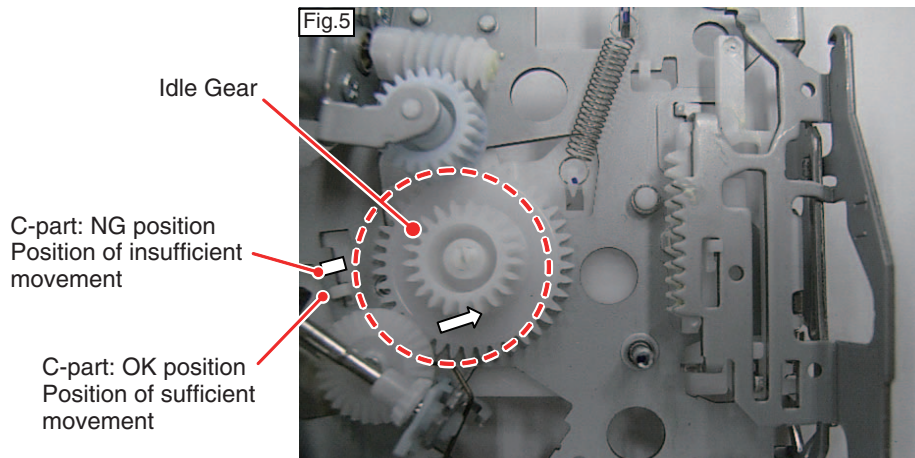
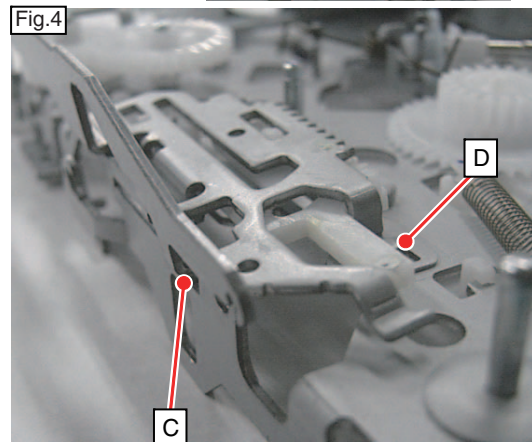
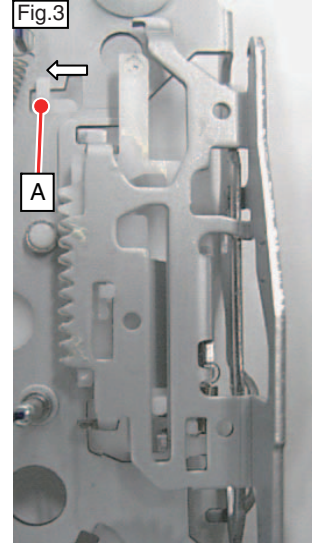
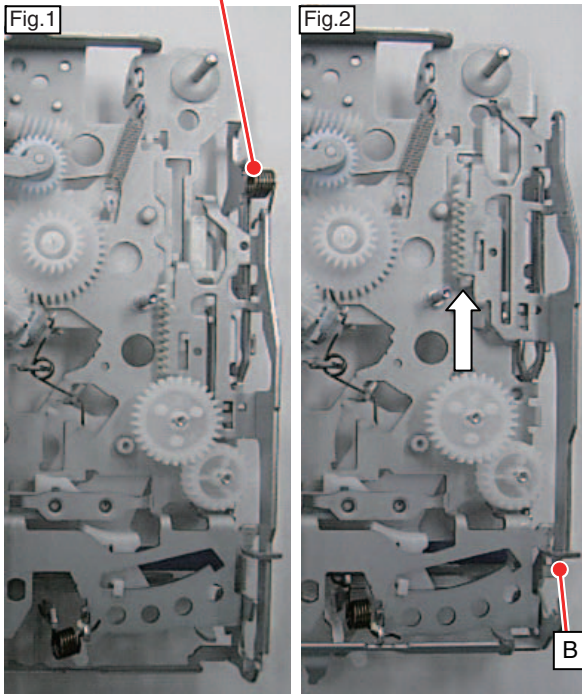
1. According to "3.6 HOW TO REMOVE THE CRG MECHANISM ASSY", remove the CRG Mechanism ASSY.  
(Mechanism – Eject status)
2. According to "3.9 HOW TO REMOVE AND INSTALL THE CLAMP ARM ASSY", remove the Clamp Arm ASSY.
3. Remove the Biasing Spring of Drive Lever (Fig.1).
4. Slide the Drive Lever in the direction of arrow (eject direction), hold it up in the direction of upper right and remove it (Fig.2).

(Note) When the Drive Lever ASSY is installed, in the state where A-part of Fig.3 is completely moved to the direction of arrow (\*1), first install B-part (Fig.2), install C-part of the Drive Lever (Fig.4) in the groove of Chassis side bend, and finally install D-part (Fig.4) in the L-shaped groove of Chassis. And then slide the Drive Lever to the state of Fig.1

\*1: If A-part (Fig.3) is not moved sufficiently, the Drive Lever cannot be engaged suitably.

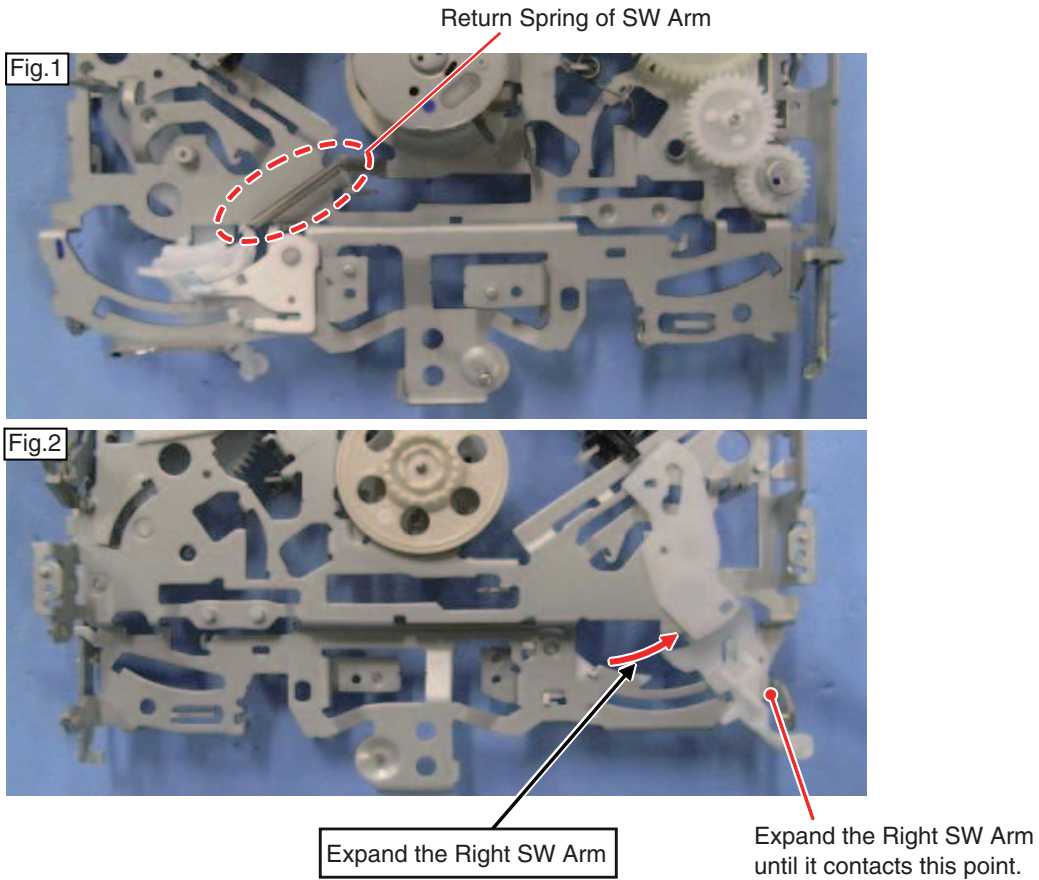
In this case, the Idle Gear may be on the position of red dashed line (Fig.5), so move A-part (Fig.3) to the direction of arrow while moving the Idle Gear to the direction of arrow (Fig.5)  
Judge sufficient movement of A-part based on the position of C-part of Fig.5.

Biasing Spring of Drive Lever



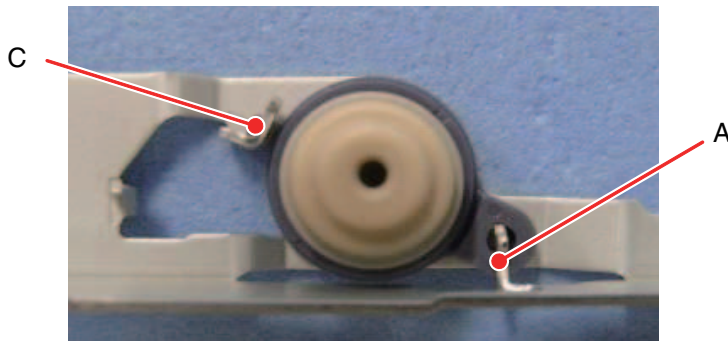
### 3.12 HOW TO REMOVE THE SW ARM

1. According to "3.8 HOW TO REMOVE THE ROLLER ASSY", remove the Roller Arm ASSY.
2. Remove the Return Spring of SW Arm (Fig.1).
3. Expand the Right SW Arm until the end contacts the Chassis (Fig.2).
4. Hold the SW Arm up while expanding it and remove it.



### 3.13 HOW TO REMOVE THE DAMPER

1. According to "3.9 HOW TO REMOVE THE CRG MECHANISM ASSY", remove the CRG Mechanism ASSY.
2. Insert the flathead screwdriver under A-part of plate which is joined with the Damper, raise the plate and release the clinch.
3. Similarly, insert the flathead screwdriver under C-part, raise the plate, release the clinch and remove the Damper.

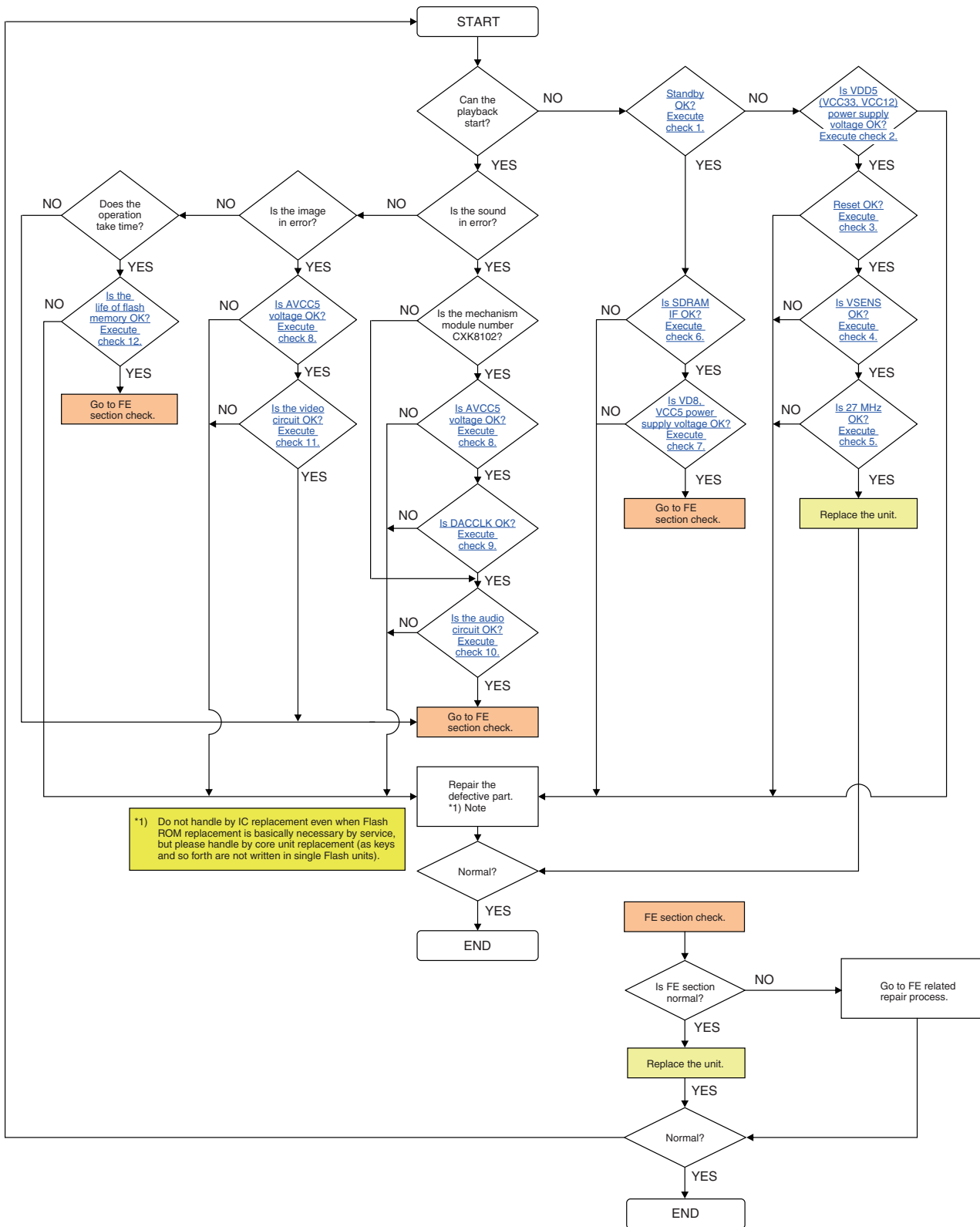


**Caution: Make sure to reinstall the clinch after repair.**

# 4. DIAGNOSIS

## 4.1 DIAGNOSIS FLOWCHART FOR DVD CORE UNIT

### LS2.5 BACK END SECTION FLOW





# Check 1: Standby OK?

<Check> Check the voltage at the "STANBY" test point while the power is on.  
Check the "DGND1" test point at the reference.

| No. | Check point    | Module No. | Specification value | Unit |
|-----|----------------|------------|---------------------|------|
| 1   | STANBY - DGND1 | ALL        | VCC33 - 0.6 or more | V    |

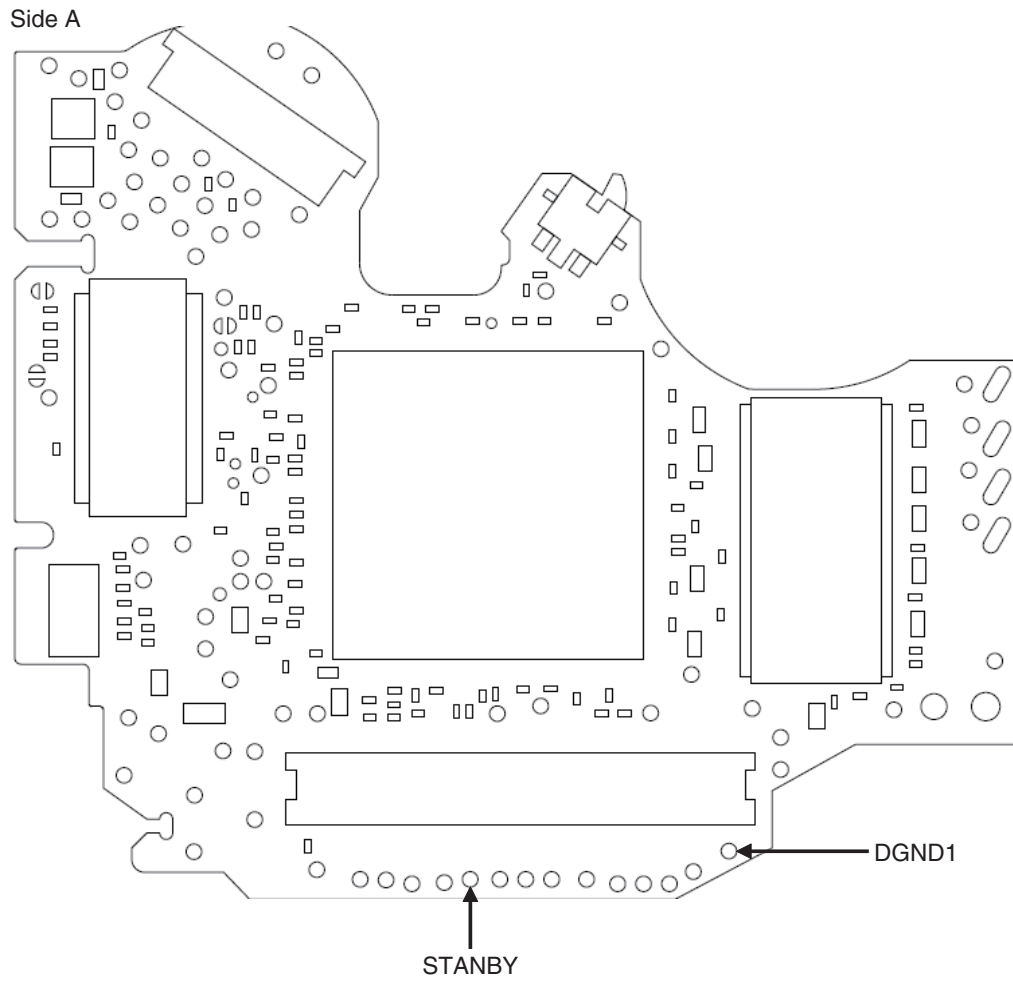
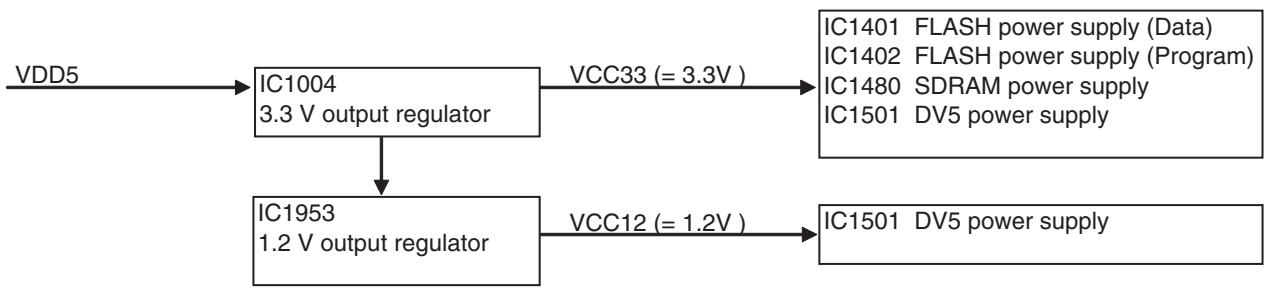


Fig 1.1: STANBY check point

### Check 2: Is VDD5 (VCC33, VCC12) power supply voltage OK?

A



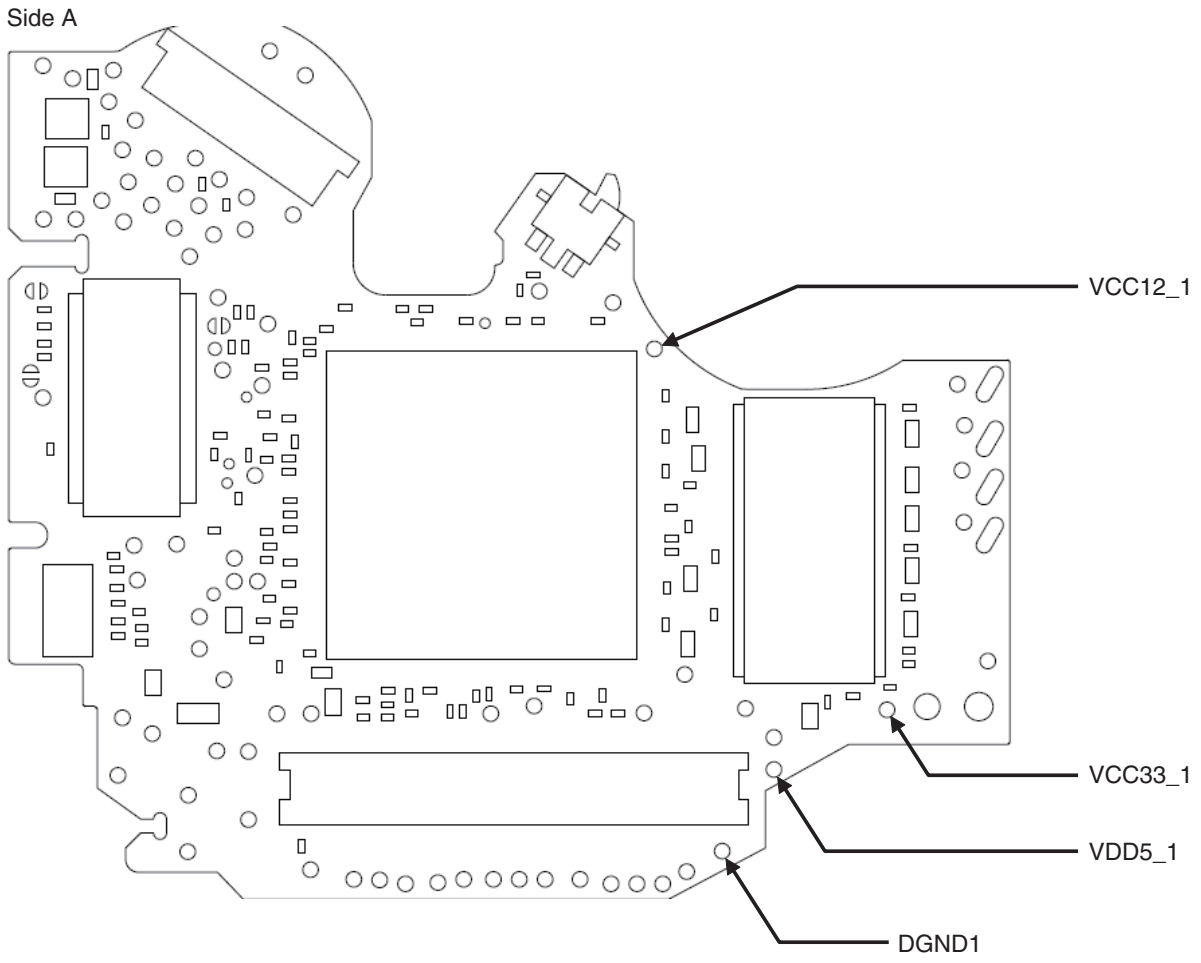
B

Fig 2.1: Power supply configuration

<Check> Check the voltage at the “VDD5\_1, VCC33\_1 and VCC12\_1” test point while the power is on.  
 Check the “DGND1” test point at the reference.

| No. | Check point     | Module No. | Specification value | Unit |
|-----|-----------------|------------|---------------------|------|
| 1   | VDD5_1 - DGND1  | ALL        | 5.0 ± 0.4           | V    |
| 2   | VCC33_1 - DGND1 | ALL        | 3.3 ± 0.033         | V    |
| 3   | VCC12_1 - DGND1 | ALL        | 1.2 ± 0.015         | V    |

C



D

E

Fig 2.2: VDD5, VCC33, VCC12 voltage check points

F

### Check 3: Reset OK?

<Check> Check the voltage at the “NRES” test point while the power is on.  
Check the “DGND1” test point at the reference.

| No. | Check point  | Module No. | Specification value | Unit |
|-----|--------------|------------|---------------------|------|
| 1   | NRES - DGND1 | ALL        | VCC33 - 0.7 or more | V    |

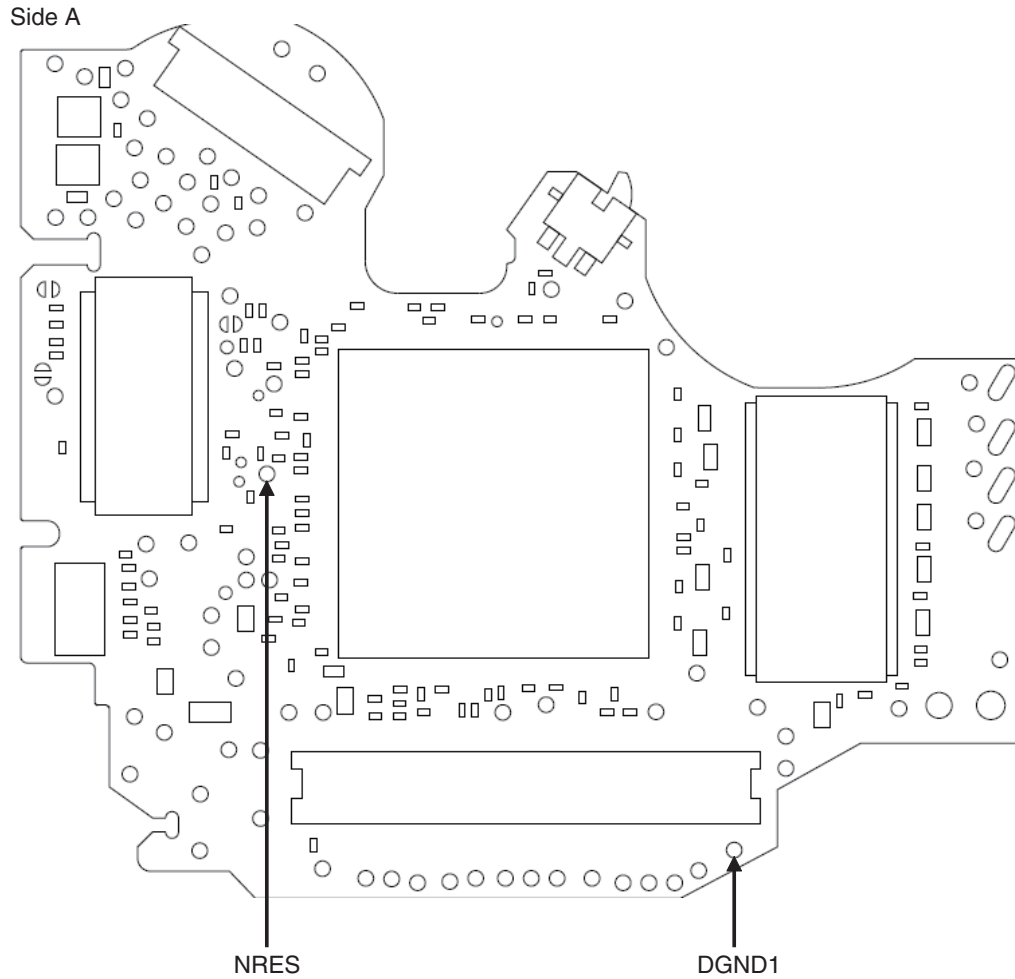


Fig 3.1: Reset check point

### Check 4: Is VSENS OK?

A

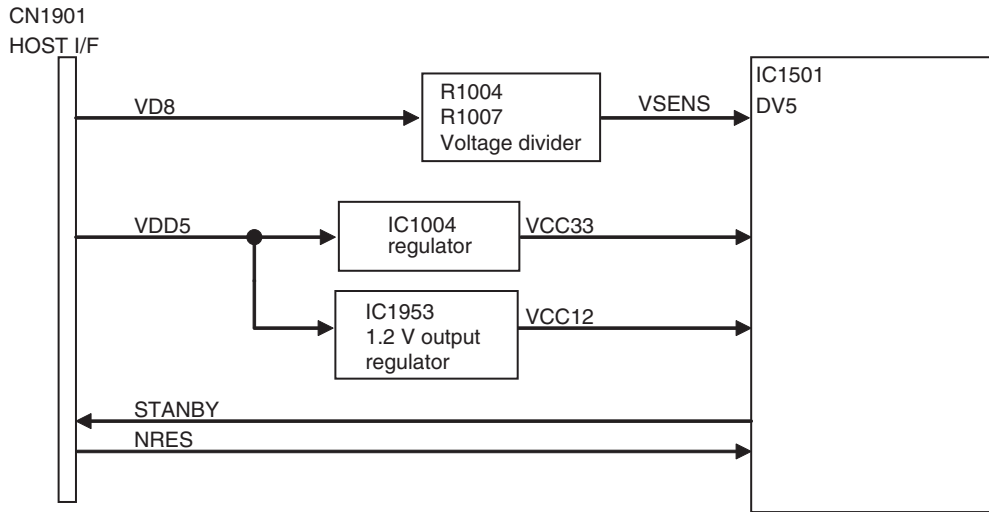


Fig 4.1: Power supply configuration and VSENS

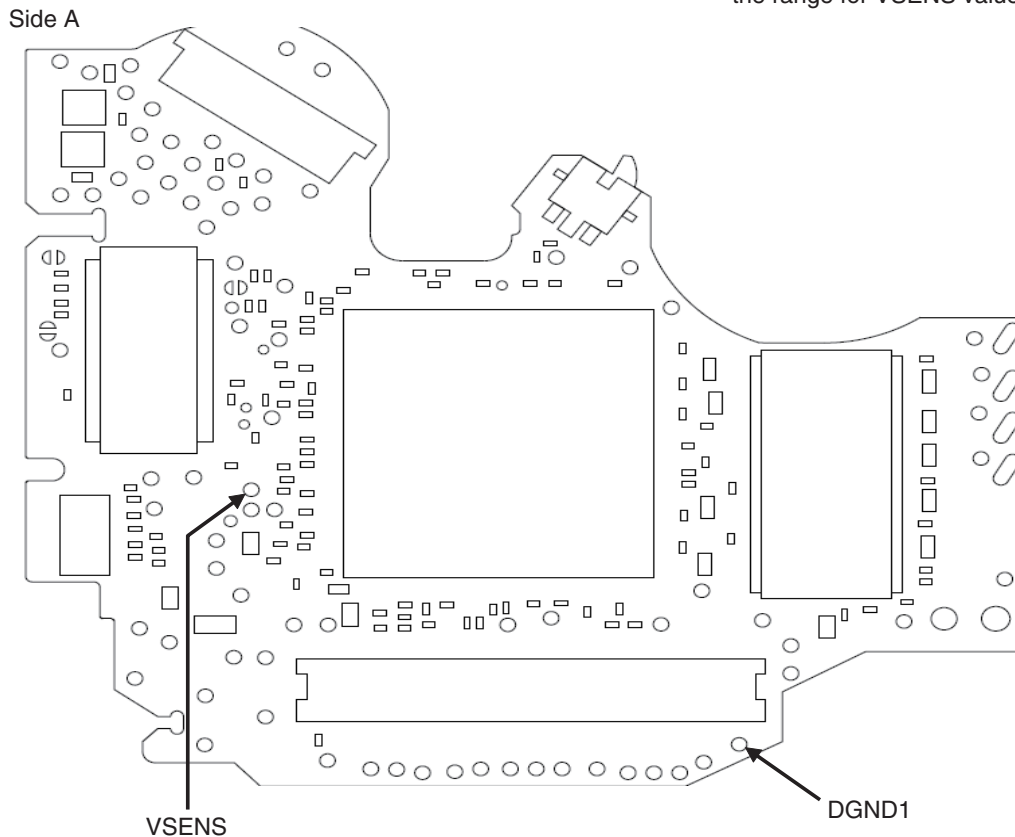
C

<Check> Check the voltage at the “VSENS” test point while the power is on.  
 Check the “DGND1” test point at the reference.

| No. | Check point   | Module No. | Specification value | Unit |
|-----|---------------|------------|---------------------|------|
| 1   | VSENS - DGND1 | ALL        | 0.95 - 1.07         | V    |

\* When VD8 = 8.0 ± 0.4 V,  
 the range for VSENS value

D



E

F

Fig 4.2: VSENS check point

### Check 5: Is 27 MHz OK?

<Outline> Each clock is created inside the IC1501 using the 27 MHz master crystal oscillator (X1501).

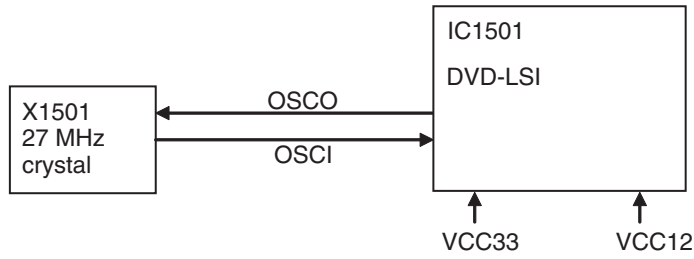
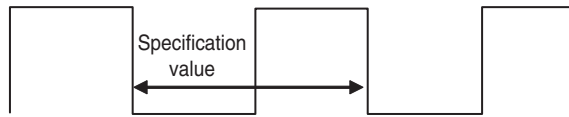


Fig 5.1: Clock configuration

<Check method> Check the “DGND1” test point at the reference while the power is on.  
 In case of NG, check the applicable line, periphery of IC1501,  
 soldering of the peripheral components and defective components.

| No. | Check point           | Module No. | Specification value | Unit |
|-----|-----------------------|------------|---------------------|------|
| 2   | IC1501 156pin - DGND1 | ALL        | 27 MHz ± 50         | ppm  |



GND

Fig 5.2: Clock specification value

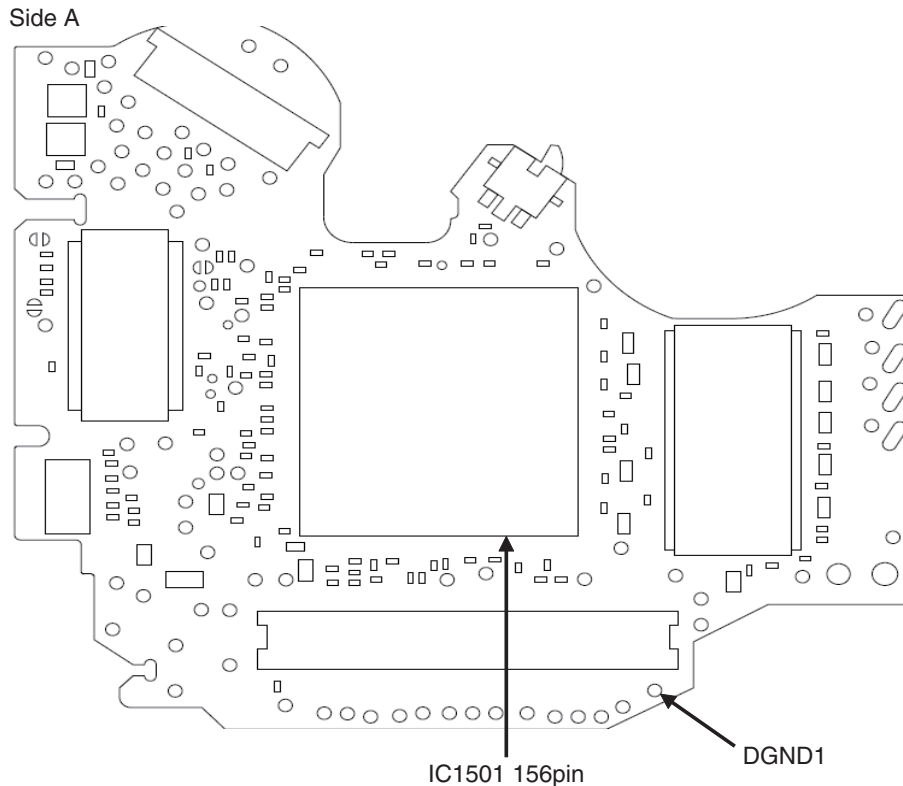


Fig 5.3: 27 MHz check point

## Check 6: Is SDRAM I/F OK?

<Outline> In order to secure the MPEG stream data as the buffer, the capacity of communication I/F SDRAM between the LSI and the memory is 64Mbit. Be careful as XCSM, XWE, XCAS and XRAS of IC1480 are called differently in IC1501, namely NCSM, NWE, NCAS, NRAS.

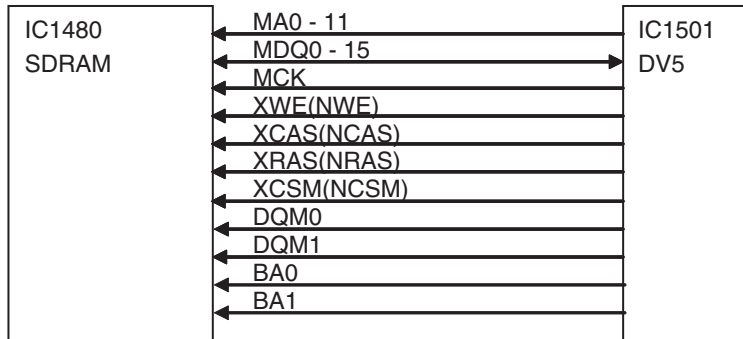


Fig 6.1: SDRAM I/F

<Check> Check the conductivity at “check point 1” and “check point 2” without the power is on. In case of NG, check the soldering and defective components throughout the “output → input” of the applicable section.

| No. | Signal name | Check point 1 | Check point 2 | Specification value |
|-----|-------------|---------------|---------------|---------------------|
| 1   | MA0         | IC1480 23pin  | IC1501 201pin | 56 ohm ± 5%         |
| 2   | MA1         | IC1480 24pin  | IC1501 203pin | 56 ohm ± 5%         |
| 3   | MA2         | IC1480 25pin  | IC1501 207pin | 56 ohm ± 5%         |
| 4   | MA3         | IC1480 26pin  | IC1501 209pin | 56 ohm ± 5%         |
| 5   | MA4         | IC1480 29pin  | IC1501 208pin | 56 ohm ± 5%         |
| 6   | MA5         | IC1480 30pin  | IC1501 206pin | 56 ohm ± 5%         |
| 7   | MA6         | IC1480 31pin  | IC1501 202pin | 56 ohm ± 5%         |
| 8   | MA7         | IC1480 32pin  | IC1501 200pin | 56 ohm ± 5%         |
| 9   | MA8         | IC1480 33pin  | IC1501 198pin | 56 ohm ± 5%         |
| 10  | MA9         | IC1480 34pin  | IC1501 194pin | 56 ohm ± 5%         |
| 11  | MA10        | IC1480 22pin  | IC1501 199pin | 56 ohm ± 5%         |
| 12  | MA11        | IC1480 35pin  | IC1501 192pin | 56 ohm ± 5%         |
| 13  | MDQ0        | IC1480 2pin   | IC1501 160pin | 56 ohm ± 5%         |
| 14  | MDQ1        | IC1480 4pin   | IC1501 162pin | 56 ohm ± 5%         |
| 15  | MDQ2        | IC1480 5pin   | IC1501 164pin | 56 ohm ± 5%         |
| 16  | MDQ3        | IC1480 7pin   | IC1501 168pin | 56 ohm ± 5%         |
| 17  | MDQ4        | IC1480 8pin   | IC1501 170pin | 56 ohm ± 5%         |
| 18  | MDQ5        | IC1480 10pin  | IC1501 172pin | 56 ohm ± 5%         |
| 19  | MDQ6        | IC1480 11pin  | IC1501 176pin | 56 ohm ± 5%         |
| 20  | MDQ7        | IC1480 13pin  | IC1501 178pin | 56 ohm ± 5%         |
| 21  | MDQ8        | IC1480 42pin  | IC1501 177pin | 56 ohm ± 5%         |
| 22  | MDQ9        | IC1480 44pin  | IC1501 175pin | 56 ohm ± 5%         |
| 23  | MDQ10       | IC1480 45pin  | IC1501 171pin | 56 ohm ± 5%         |
| 24  | MDQ11       | IC1480 47pin  | IC1501 169pin | 56 ohm ± 5%         |
| 25  | MDQ12       | IC1480 48pin  | IC1501 167pin | 56 ohm ± 5%         |
| 26  | MDQ13       | IC1480 50pin  | IC1501 163pin | 56 ohm ± 5%         |
| 27  | MDQ14       | IC1480 51pin  | IC1501 161pin | 56 ohm ± 5%         |
| 28  | MDQ15       | IC1480 53pin  | IC1501 159pin | 56 ohm ± 5%         |
| 29  | MCK         | IC1480 38pin  | IC1501 183pin | 47 ohm ± 5%         |
| 30  | XWE         | IC1480 16pin  | IC1501 181pin | 56 ohm ± 5%         |
| 31  | XCAS        | IC1480 17pin  | IC1501 188pin | 56 ohm ± 5%         |
| 32  | XRAS        | IC1480 18pin  | IC1501 189pin | 56 ohm ± 5%         |
| 33  | XCSM        | IC1480 19pin  | IC1501 190pin | 56 ohm ± 5%         |
| 34  | DQM0        | IC1480 15pin  | IC1501 179pin | 56 ohm ± 5%         |
| 35  | DQM1        | IC1480 39pin  | IC1501 180pin | 56 ohm ± 5%         |
| 36  | BA0         | IC1480 20pin  | IC1501 193pin | 56 ohm ± 5%         |
| 37  | BA1         | IC1480 21pin  | IC1501 197pin | 56 ohm ± 5%         |

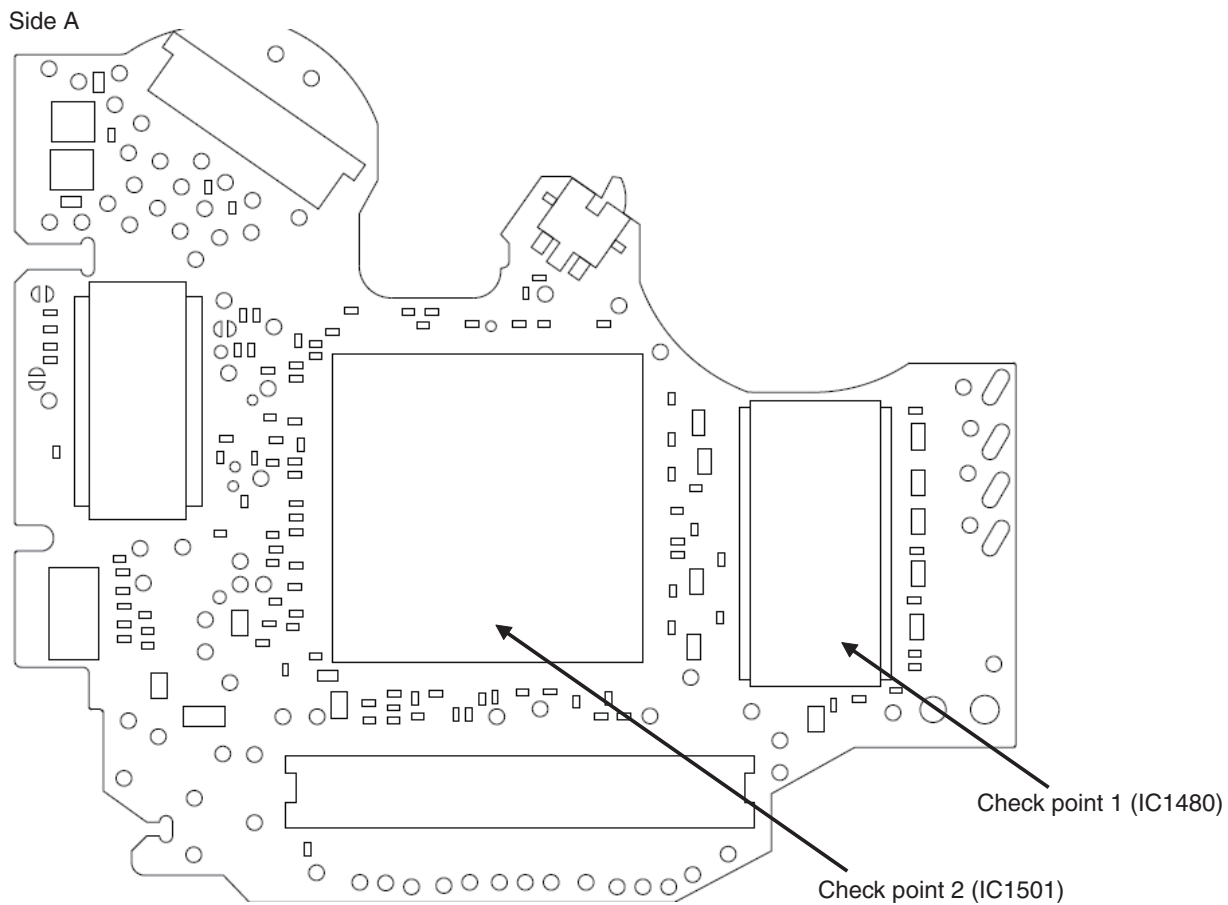


Fig 6.2: SDRAM I/F check point

### Check 7: Is VD8, VCC5 power supply voltage OK?

A

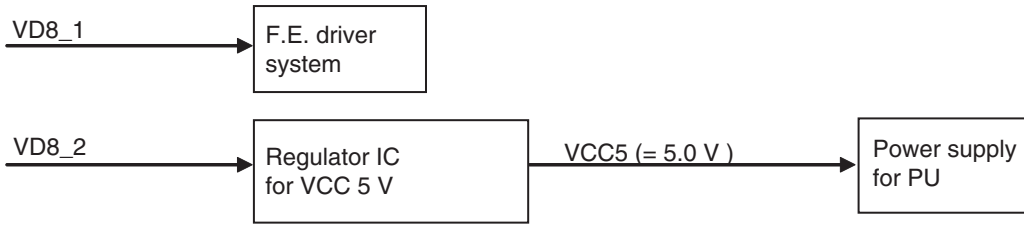


Fig 7.1: Power supply configuration

B

<Check> Check the voltage at the “VD8\_P, VD8\_A and VCC5\_1” test point while the power is on.  
 Check the “PGND1 and AGND1” test point at the reference.

| No. | Check point    | Module No. | Specification value | Unit |
|-----|----------------|------------|---------------------|------|
| 1   | VD8_P - PGND1  | ALL        | 8.0 ± 0.4           | V    |
| 2   | VD8_A - AGND1  | ALL        | 8.0 ± 0.4           | V    |
| 3   | VCC5_1 - AGND1 | ALL        | 5.0 ± 0.05          | V    |

C

Side A

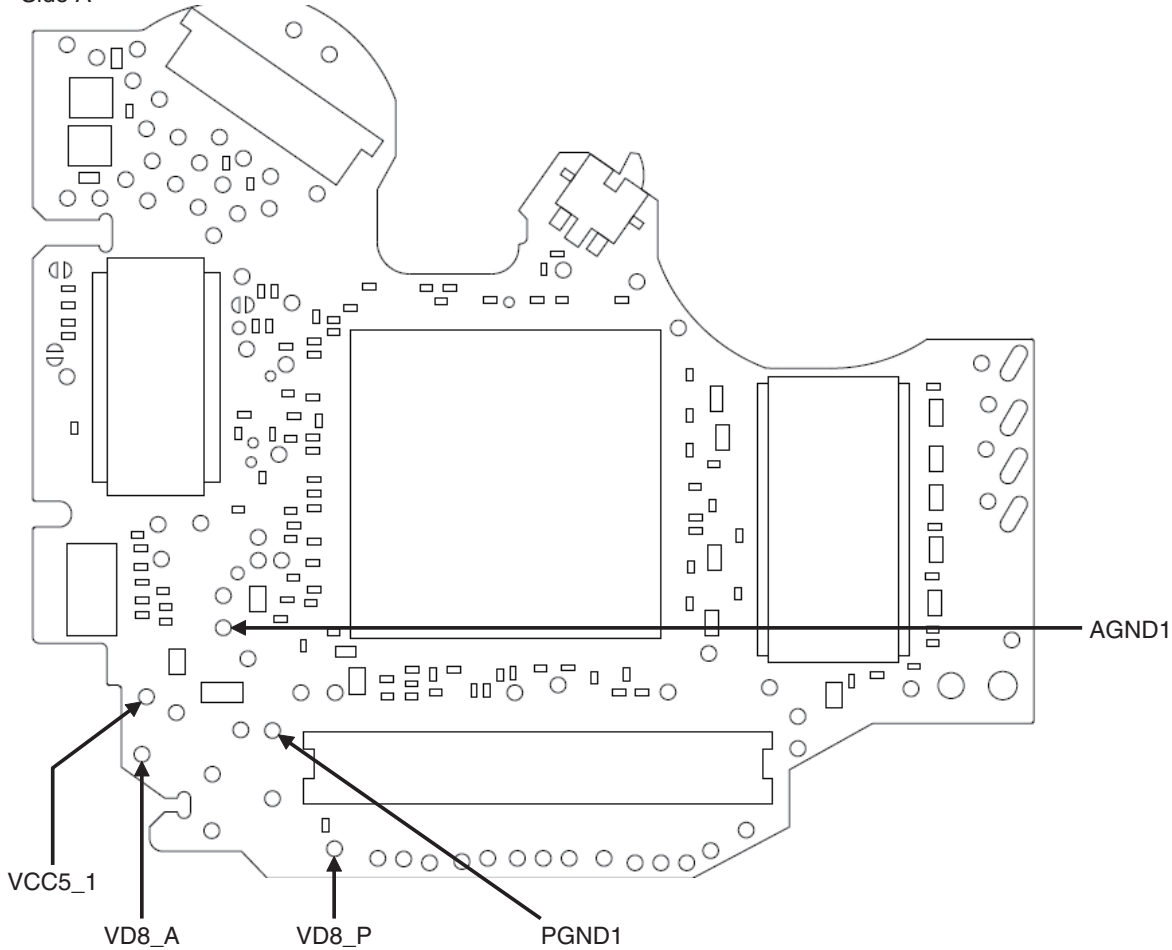


Fig 7.2: VD8, VCC5 voltage check points

F



### Check 8: Is AVCC5 voltage OK?

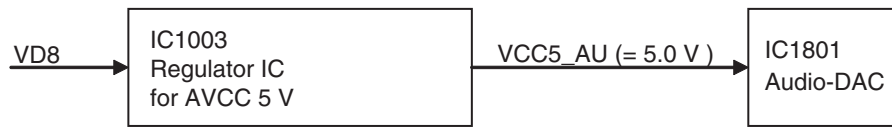


Fig 8.1: Power supply configuration

<Check> Playback DVD-REF-A1 TITLE 1 and check the voltage at the stylus.  
Check the "PGND\_3 and GNDAU1" test point at the reference.

| No. | Check point      | Module No. | Specification value | Unit |
|-----|------------------|------------|---------------------|------|
| 1   | VD8_A - PGND_3   | ALL        | 8.0 ± 0.4           | V    |
| 2   | VCC5_AU - GNDAU1 | ALL        | 5.0 ± 0.05          | V    |

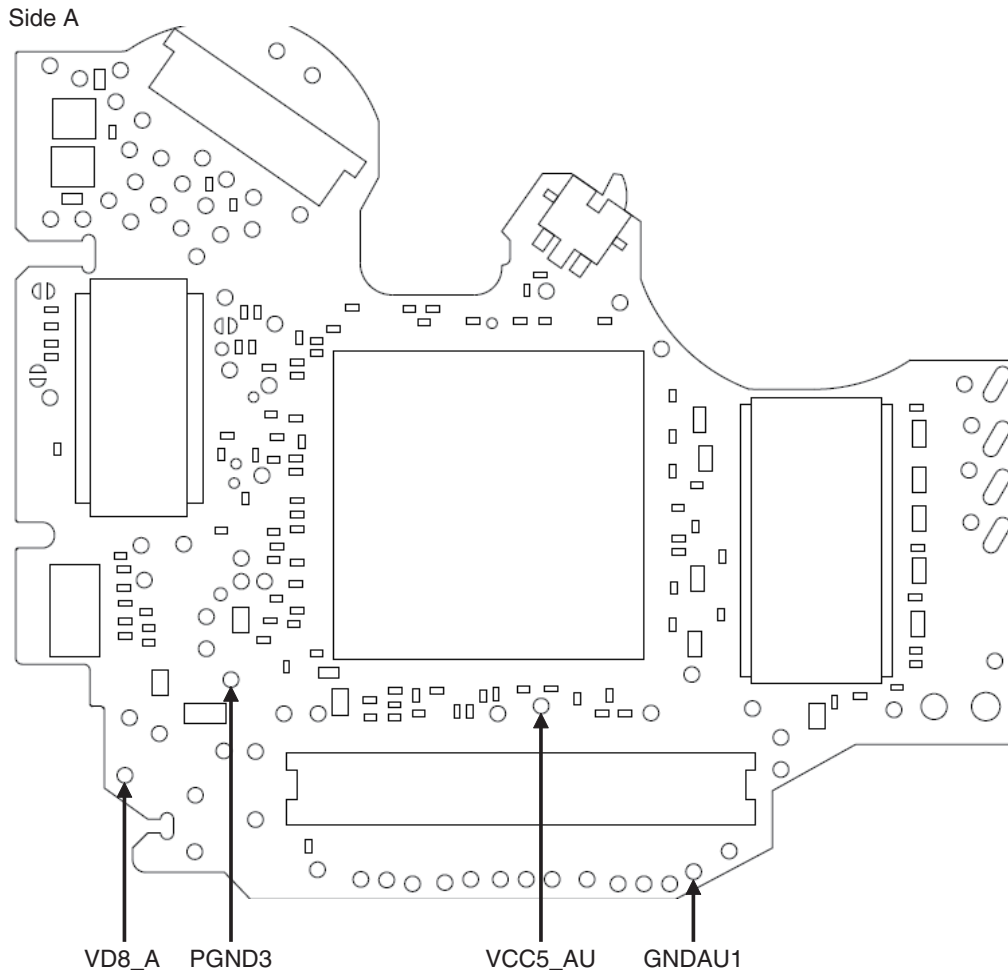


Fig 8.2: VD8, AVCC5 voltage check points

### Check 9: Is DACCLK OK?

A <Outline> DACCLK for Audio-DAC is created by IC1501 using the 27 MHz master crystal oscillator (X1501).

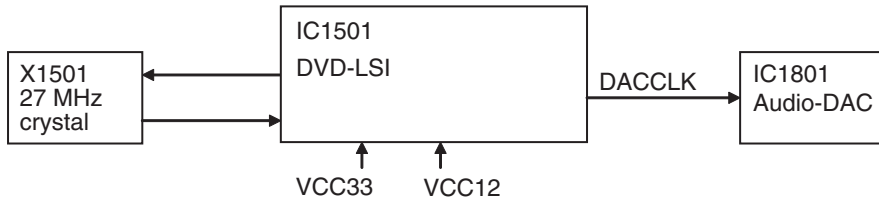


Fig 9.1: Clock configuration

<Check method>

DVD: DVD-REF-A1 TITLE 1

CD: Playback a normal CDDA.

Common to all DVD-V compatible modules.

Check the "DGND4" test point at the reference.

In case of NG, check the applicable line, periphery of IC1501, soldering of the peripheral components and defective components.

| No. | Check point 1 (stylus) | Media | Specification value 1 | Specification value 2 | Specification value 3 |
|-----|------------------------|-------|-----------------------|-----------------------|-----------------------|
| 1   | DACCLK                 | DVD   | 2.0 V - VCC33V        | DGND - 0.8 V          | 36.8640 MHz ± 300 ppm |
| 2   | DACCLK                 | CD    | 2.0 V - VCC33V        | DGND - 0.8 V          | 33.8688 MHz ± 300 ppm |

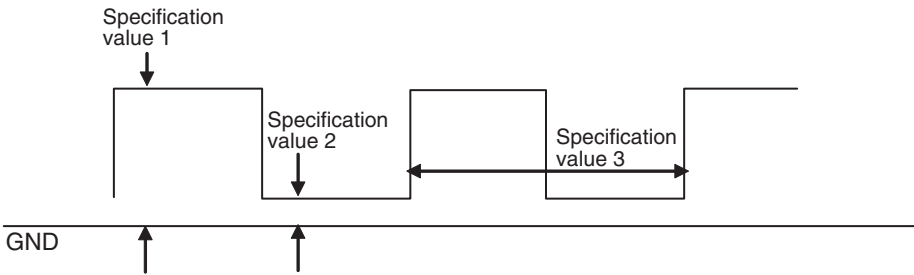


Fig 9.2: Clock specification value

Side A

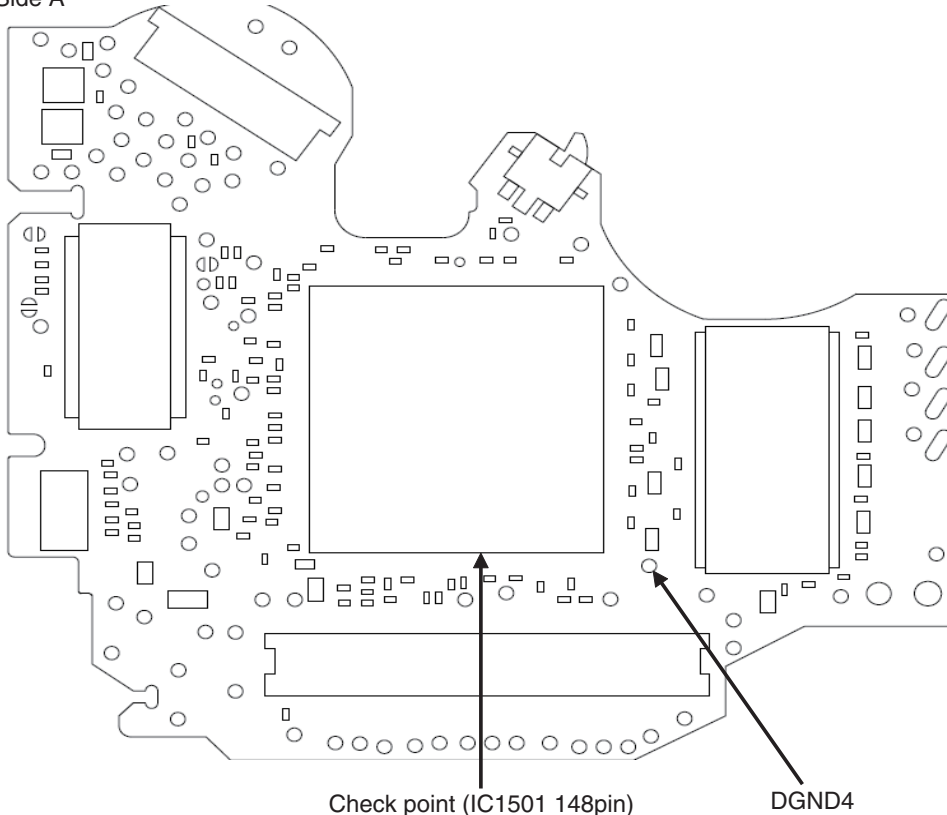


Fig 9.3: DACCLK check point

### Check 10: Is the audio circuit OK?

<Outline> The serial 3 lines digital output + DACCLK, output from DVD-LSI (IC1501), are converted to analog audio signal at Audio-DAC (IC1801) and are output from the HOST I/F connector (CN1901). Simultaneously, the analog MUTE signal is also output from DVD-LSI (IC1501) via the HOST I/F connector. The digital audio signal (IECOUT) is also output from DVD-LSI (IC1501) via the HOST I/F connector.

- Please implement IEC check in Check No.6 for CXK8100 and CXK8101.  
Check No.1 – 5 are not necessary as analog audio output is not supported.
- Please implement 3-wire digital output, LO and RO check in Check No.1 – 5 for CXK8102.  
Check No.6 is not necessary as IEC is not supported.

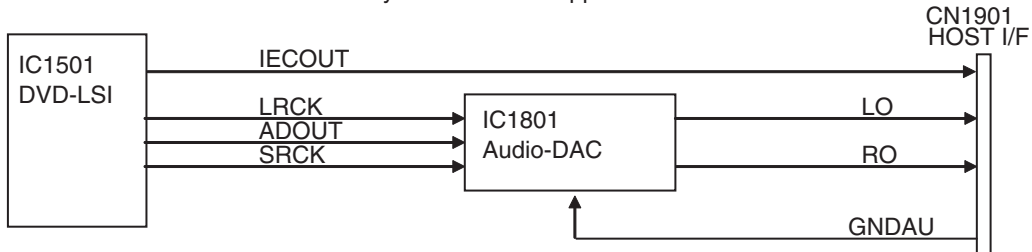


Fig 10.1: Audio circuit

<Check method> Playback DVD-REF-A1 TITLE 2 CHAPTER 1 (48 k/16 bit 1 kHz 0 dB), and check the “DGND1” test point at the reference. In case of NG, check the applicable line, periphery of major components in the above drawing, soldering of the peripheral components and defective components.

| No. | Check point 1 (stylus) | Specification value 1  | Specification value 2 | Reference waveform |
|-----|------------------------|------------------------|-----------------------|--------------------|
| 1   | ADOUT                  | VCC33V - 0.6 V or more | 0.4 V or less         | Waveform 1         |
| 2   | SRCK                   | VCC33V - 0.6 V or more | 0.4 V or less         | Waveform 2         |
| 3   | LRCK                   | VCC33V - 0.6 V or more | 0.4 V or less         | Waveform 3         |

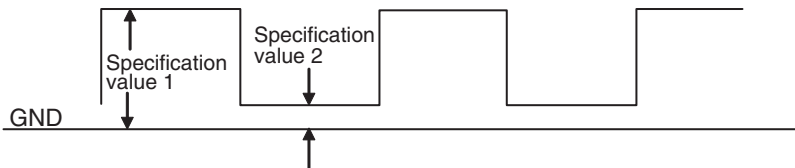


Fig 10.2: Serial 3 lines specification value

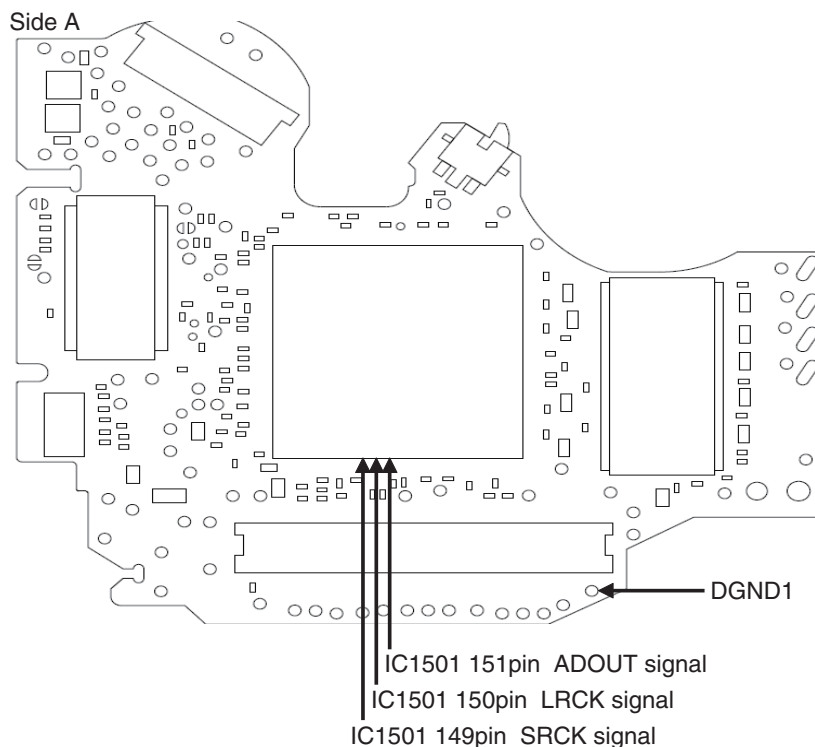
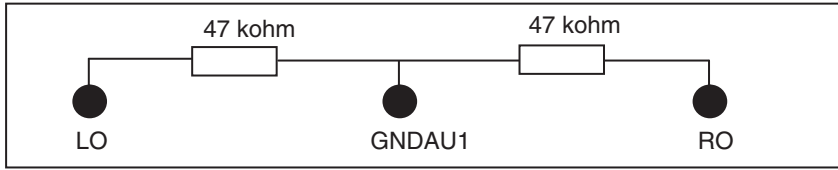


Fig 10.3: Serial 3 lines check points

A

The following checks shall be conducted using the following measurement circuits with "GNDAU1" at the reference.



B

| No. | Check point 1 (stylus) | Specification value (rms) | Reference waveform |
|-----|------------------------|---------------------------|--------------------|
| 4   | LO                     | 1400 ± 150 mV             | Waveform 4         |
| 5   | RO                     | 1400 ± 150 mV             | Waveform 4         |

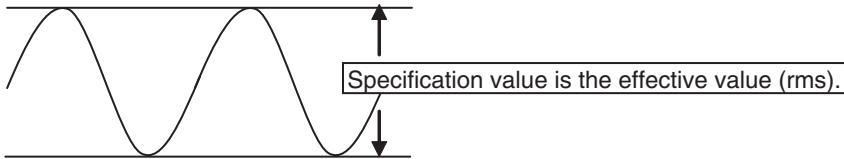


Fig 10.4: Analog audio out (LO, RO) specification value.

C

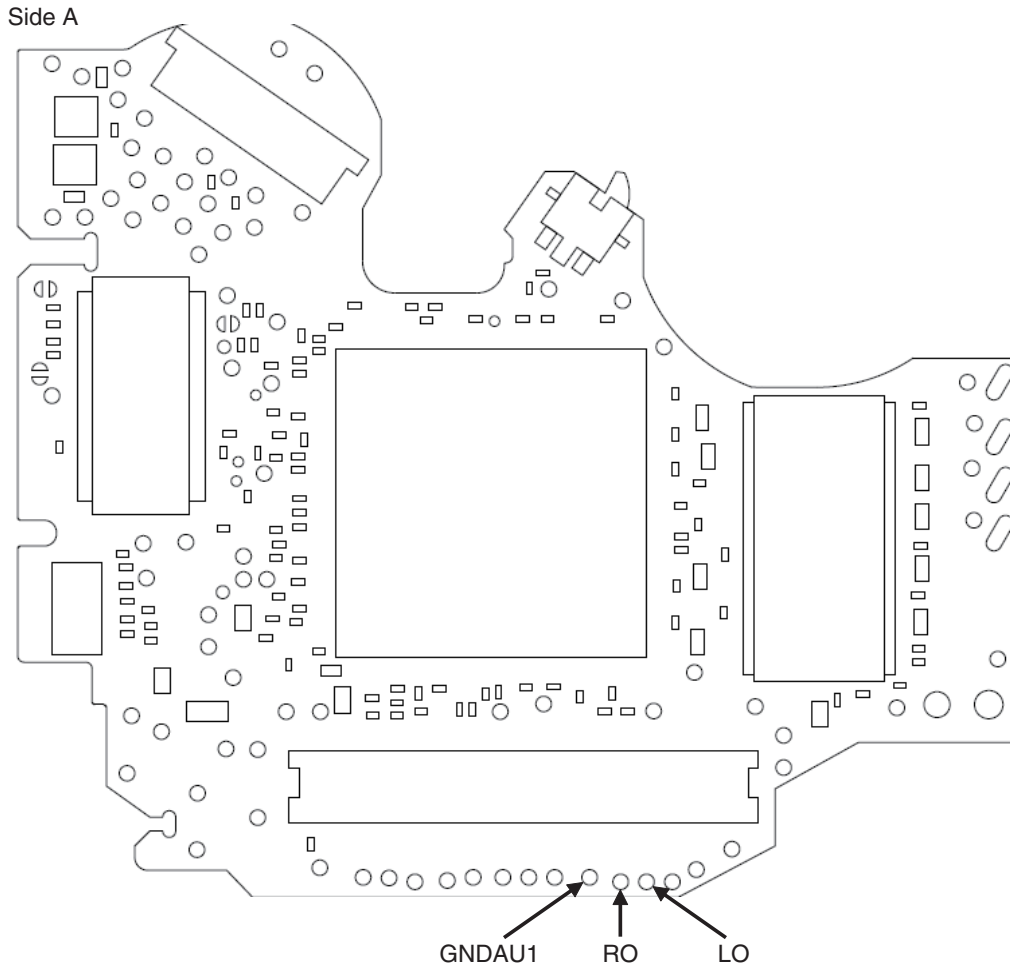


Fig 10.5: Analog audio out check points

F

Check the "DGND1" test point at the reference.

| No. | Check point 1 (stylus) | Specification value 1  | Specification value 2 | Reference waveform |
|-----|------------------------|------------------------|-----------------------|--------------------|
| 6   | IEC                    | VCC33V - 0.6 V or more | 0.4 V or less         | Waveform 5         |

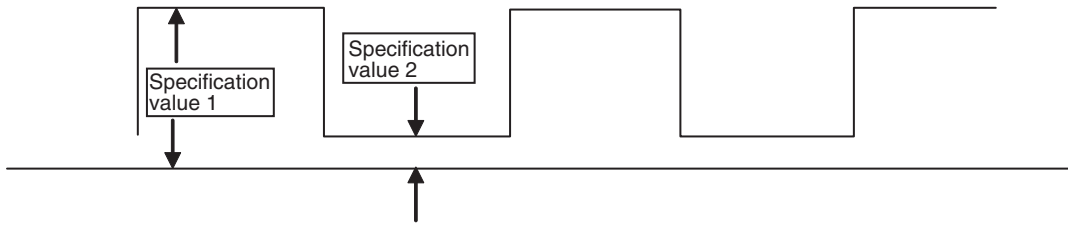


Fig 10.6: Digital audio signal (IECOUT) specification value

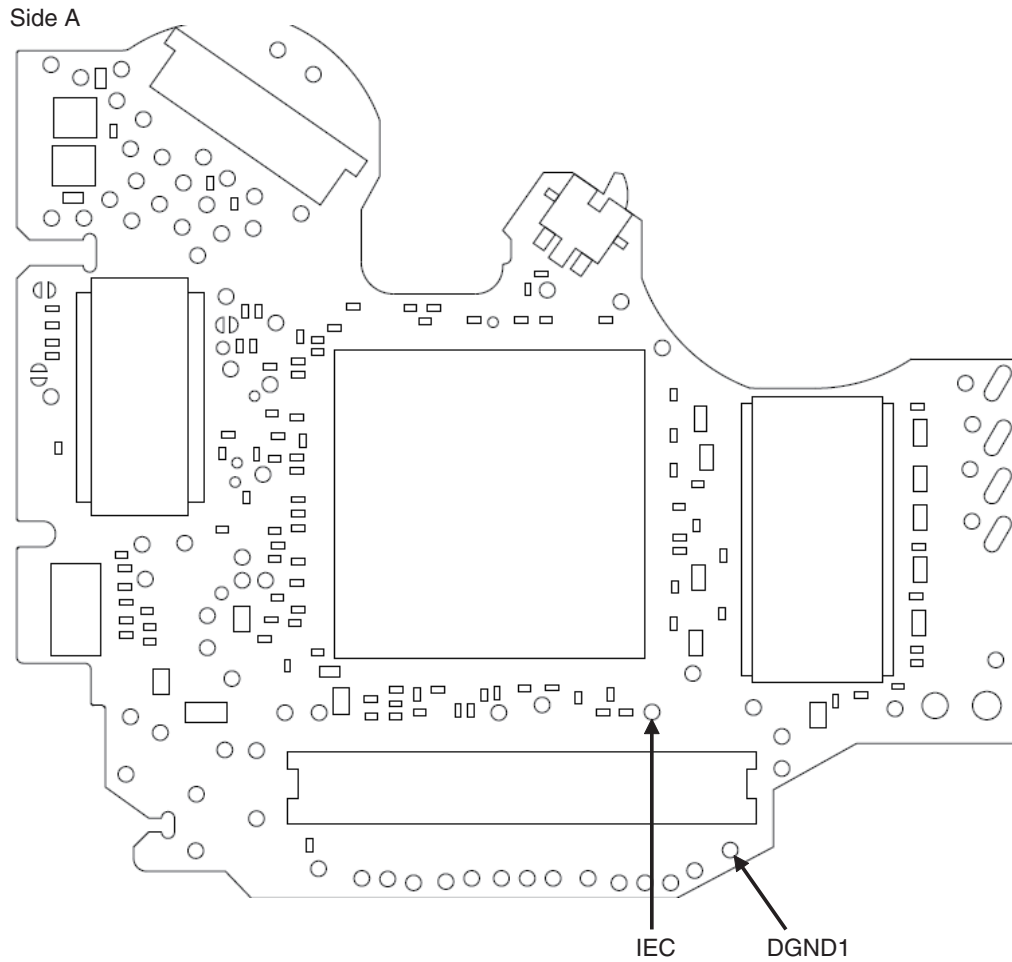
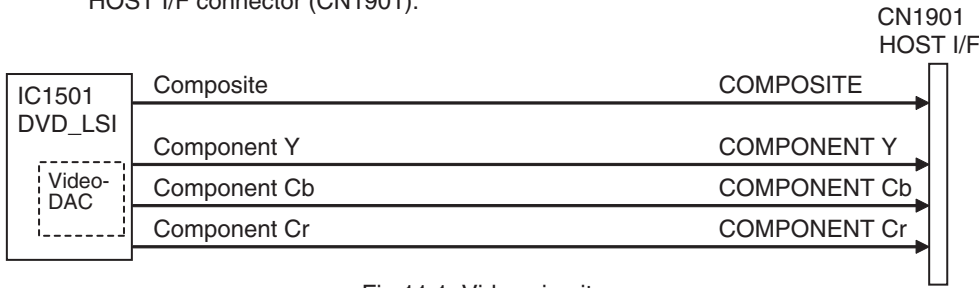


Fig 10.7: Digital audio signal (IECOUT) check point

### Check 11: Is the video circuit OK?

A

<Outline> Composite and component signal are output from DVD-LSI (IC1501), and are output from the HOST I/F connector (CN1901).



B

Fig 11.1: Video circuit

#### <Composite checking method>

Playback DVD-REF-A1 TITLE2 CHAPTER5 (WHITE 100 %), and monitor COMPOSITE signal with an oscilloscope with "GNDV2" test point (stylus) at the reference. Set the trigger mode to "TV trigger" and the trigger line to "150 line".

| No. | Check point 1 (stylus) | Specification value | Reference waveform |
|-----|------------------------|---------------------|--------------------|
| 1   | COMPOSITE              | 1000 mVpp ± 5 %     | Waveform 6         |

In case of NG, check the applicable line, periphery of major components in the above drawing, soldering of the peripheral components and defective components.

C

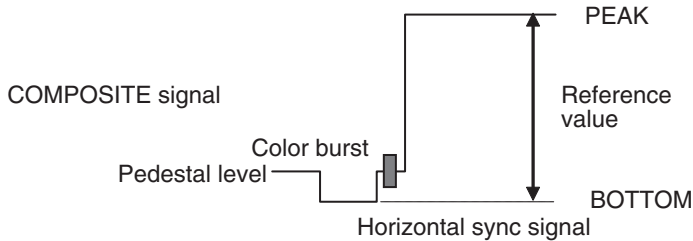


Fig 11.2: Waveform for the case of composite white 100 % output

D

#### <Component checking method>

Playback DVD-REF-A1 TITLE2 CHAPTER19 (100 % COLORBAR), and monitor COMPONENT (Y, Cb, Cr) signal with an oscilloscope with "GNDV2" test point (stylus) at the reference. Set the trigger mode to "TV trigger" and the trigger line to "150 line".

| No. | Check point 1 (stylus) | Specification value | Reference waveform |
|-----|------------------------|---------------------|--------------------|
| 2   | Y                      | 1000 mVpp ± 5 %     | Waveform 7         |
| 3   | Cb                     | 700 mVpp ± 5 %      | Waveform 8         |
| 4   | Cr                     | 700 mVpp ± 5 %      | Waveform 9         |

In case of NG, check the applicable line, periphery of major components in the above drawing, soldering of the peripheral components and defective components.

E

F

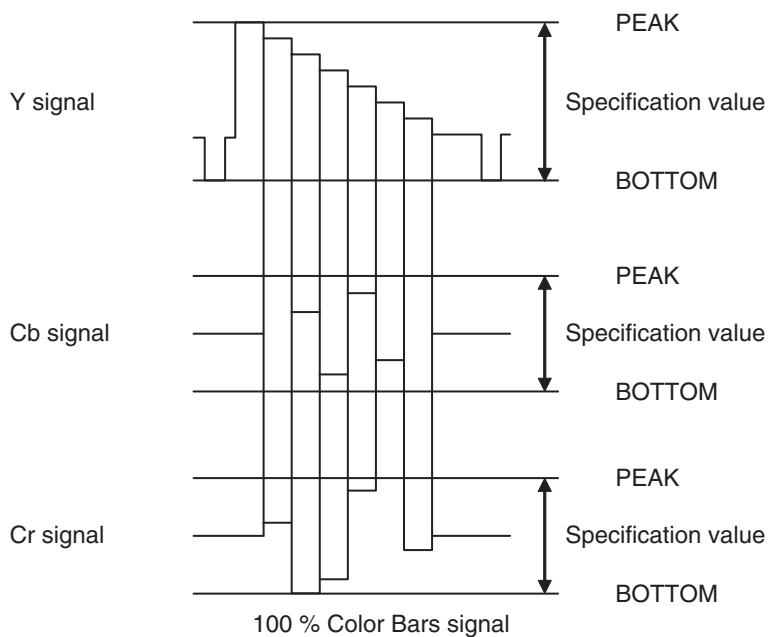


Fig 11.3: Waveform for the case of component 100 % color bar output

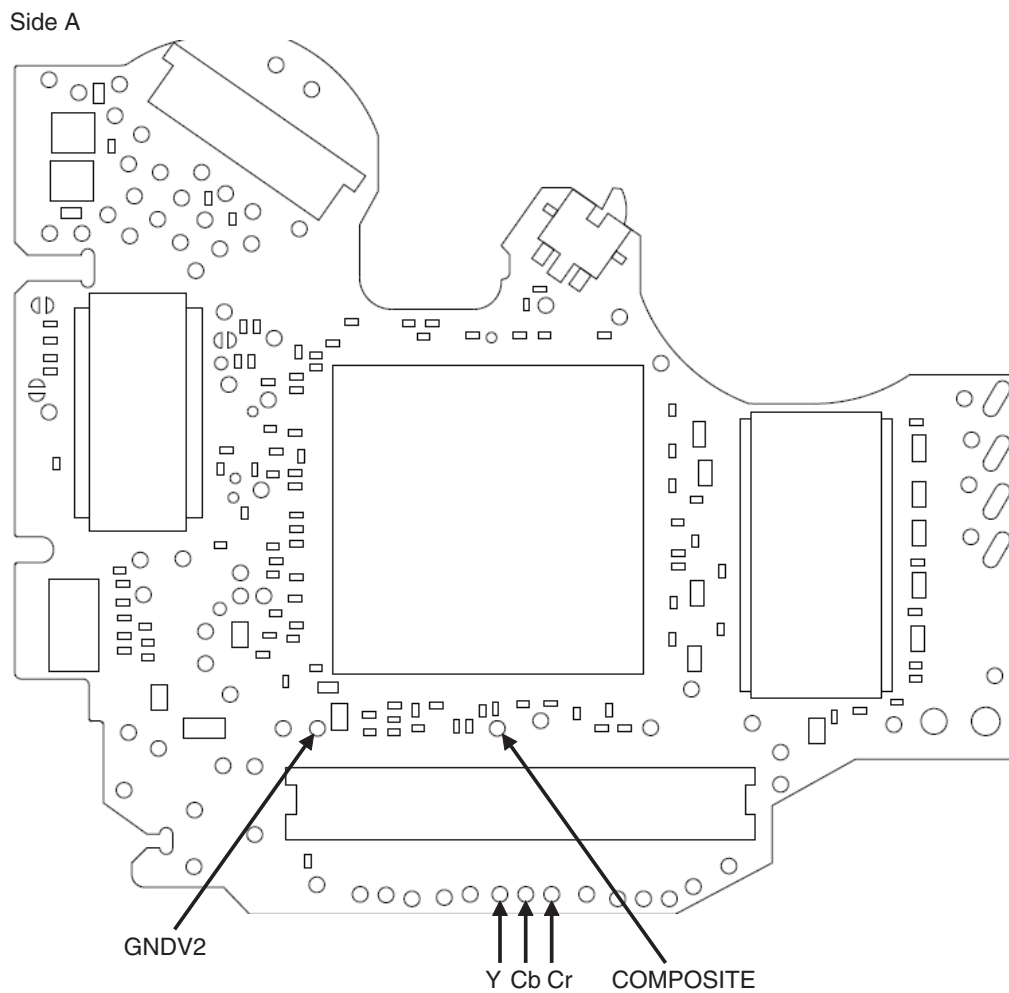


Fig 11.4: VIDEO signal check points

## Check 12: How to judge whether the flash memory has reached its life or not.

A

If the reaction to user operation is slow or operation is slow in general, there is a possibility that the flash memory has reached its life.

Make judgment regarding the flash memory life by looking at the display of the LD energizing time.

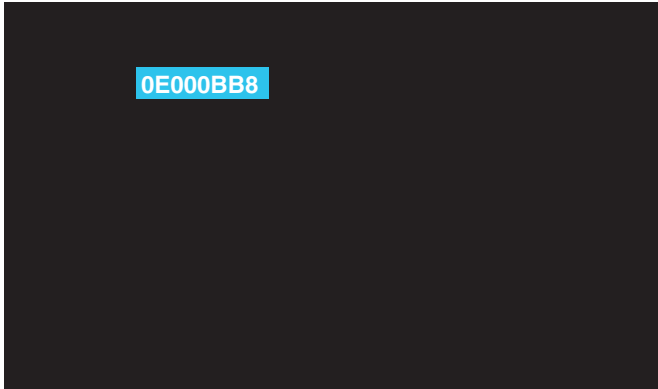
1. Displaying the LD energizing time.

(Refer to the FE test mode for the method of displaying the LD energizing time.)

2. If the second digit from the left of the energizing time display is showing E, it means that the flash memory has reached its life.

B

Example:



C

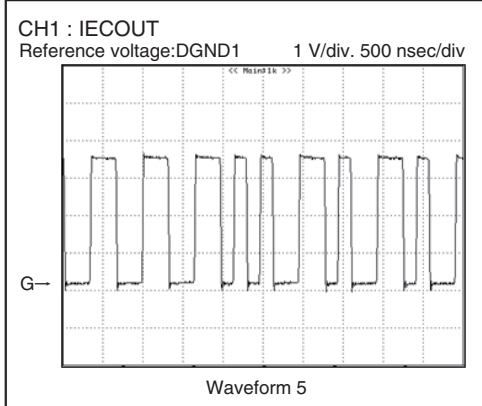
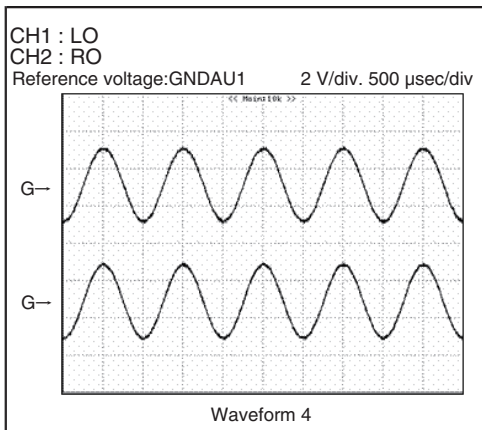
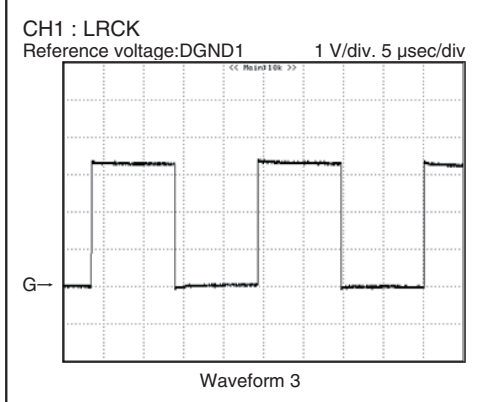
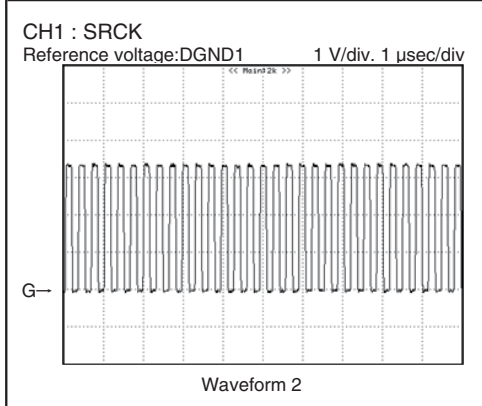
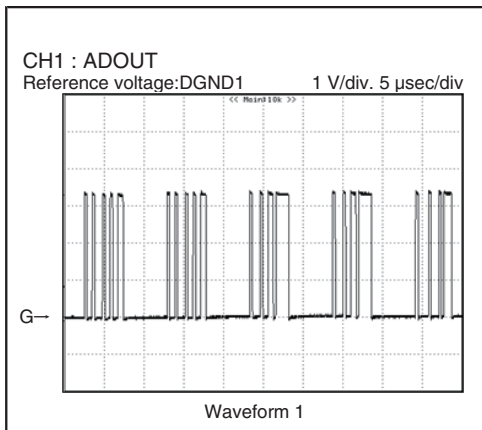
D

E

F



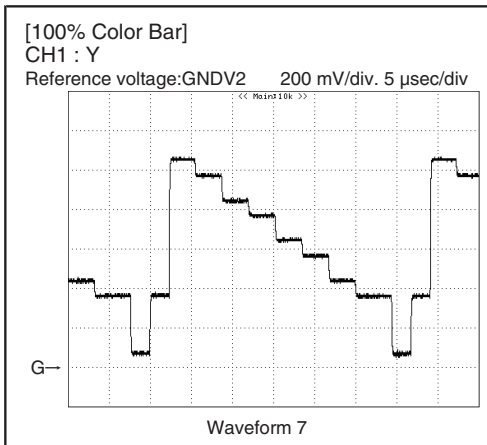
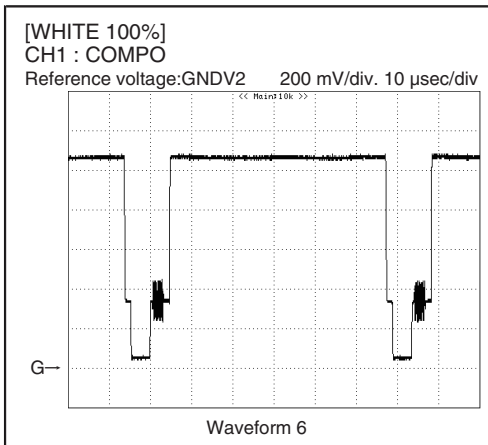
AUDIO



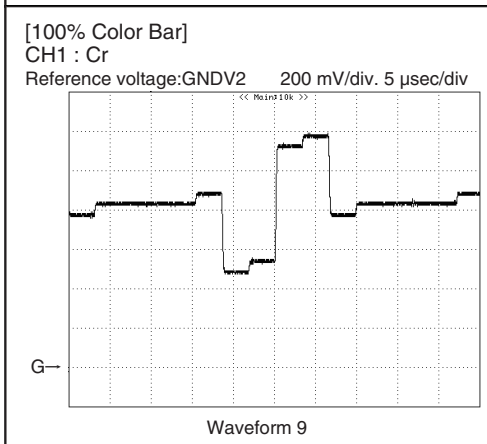
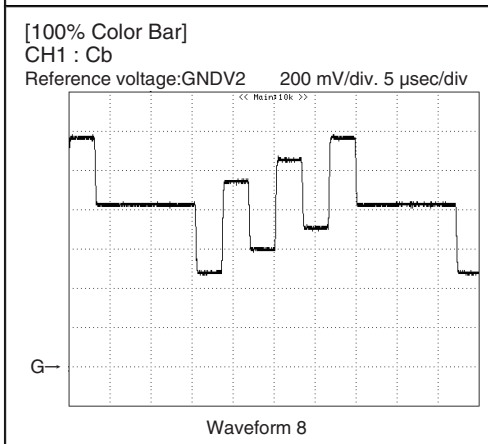
A  
B  
C  
D  
E  
F

VIDEO

A



B



C

D

E

F

## 5. EACH SETTING AND ADJUSTMENT

### 5.1 DVD ADJUSTMENT



This product uses 5 V and 3.3 V as standard voltages.

The electrical potential that is the reference for signals, is not GND, but VREF (approximately 2.2 V) and VHALF (approximately 1.65 V) .

During product adjustments, if the reference voltage is mistakenly taken as GND, and a grounding contact is made, not only would it be impossible to measure the accurate electrical potential, but also the servo motor would malfunction, resulting in the application of a strong impact on the pick up.

The following precautionary measures should be strictly adhered to, in order to avoid such problems.

The reference voltage and GND should not be confused when using the minus probe of a measurement device.

When an oscilloscope is being used special care should be taken to make sure that the reference voltage is not connected to the probe of ch1 (on the minus side), while the probe of ch2 (on the minus side), is connected to GND.

Further, since the body frame of most measurement devices have the same electrical potential as the minus side of the probe, the body frame of the measurement device should be set to floating ground.

If the reference voltage is connected to GND by mistake, turn the regulator OFF immediately, or turn the power OFF.

- Remove the wires used for measurements only after the regulator has been turned OFF.
- After the power supply is turned on, regulator ON the following adjustment and measurement are promptly done.
- Whenever the product is in the test mode, the software will not take any protective action. For this reason, special care should be taken to make sure that no mechanical or electrical shock could be applied to the product when taking measurements in the test mode.
- Whenever the EJECT key is pressed to eject the disk, no other keys, other than the EJECT key, should be pressed until the disk eject action has been completed.
- Press the EJECT key only after the disk has stopped completely.
- If the product hangs up turn the power OFF immediately.
- Don't touch the volume for laser power adjustment other than the time of POWER adjustment. (Laser diode may be damaged.)

# ● Power Adjustment

## A ■ Power Adjustment

To turn VR of the circuit for Power adjustment and adjust the optical output level of PU laser diode to make the level of signal (RF signal) read from the media appropriate level during the reproduction of media, CD and DVD.  
 It has been decided that Power adjustment circuit (circuit from IMON to CDMP, DVDMP) which adjusts the optical output level of PU laser diode should be installed on DVD Core Unit in the DVD mecha module.

Therefore, in the replacement of DVD Core Unit, Power adjustment should be implemented.

The Power adjustment method of mecha module is shown below.

## ■ Items to be Prepared

Measuring instrument: Oscilloscope (digital or analog)

Frequency band of oscilloscope in DVD whose frequency is higher than CD Adjustable 10 MHz and higher (enough to check the level)

(In LS2, DVD (x 1.5CLV) MAX RF 6.55 MHz / DVD (x 1.5CLV) MIN RF 1.40 MHz)

DISC: DVD TEST DISC (GGV1025) Pioneer

CD TEST DISC (TCD-782) Almedio

Adjustment screwdriver : crosshead, No.0, nonmetal (ceramic screwdriver for adjustment)

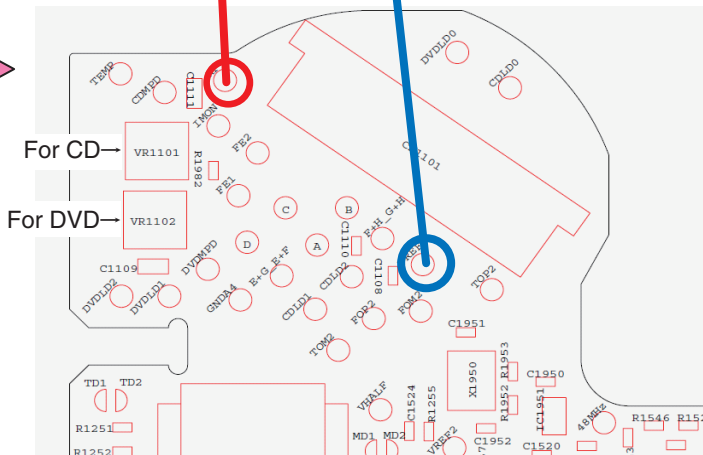
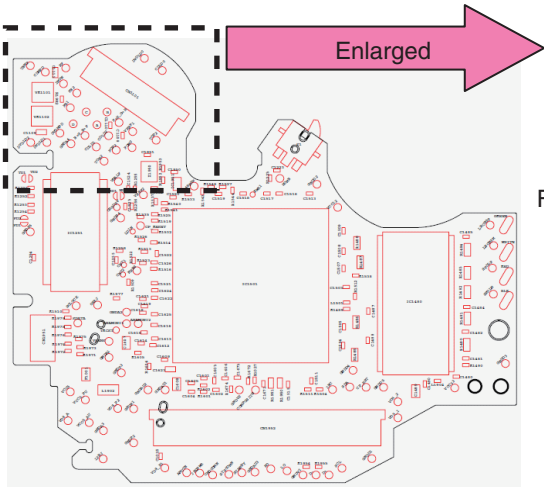
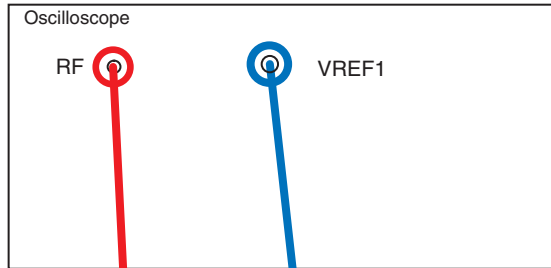
## ■ Line Locating

The following line locating is required.

|   |       |                  |
|---|-------|------------------|
| 1 | RF    | Power adjustment |
| 2 | VREF1 | Power adjustment |

## ■ Connection Diagram

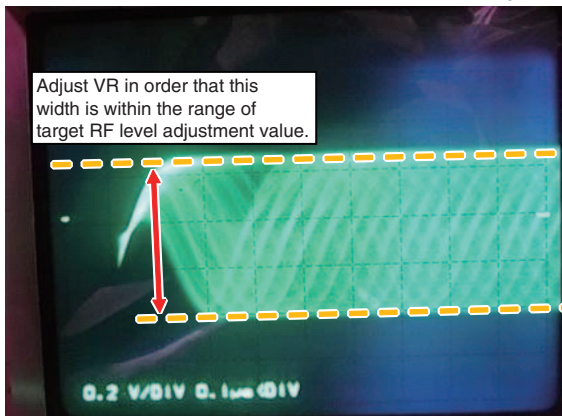
○ : Checking terminal for oscilloscope



## Method of Power Adjustment

1. Monitor RF by using the analog oscilloscope. (line locating of RF and VREF1)
2. Turn VR1101 and VR1102 to set the PP value of RF at the value shown in the right lower table.

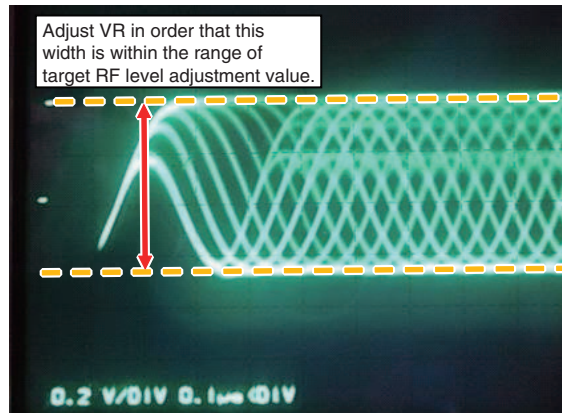
### RF waveform after Focus Close / Tracking Open (waveform measured by analog oscilloscope)



Power adjustment standard  
RF level adjustment value  
(Focus Close STEP 10, 24)

|     |                   |
|-----|-------------------|
| DVD | 200 mV to 1200 mV |
| CD  | 200 mV to 1200 mV |

### RF waveform after the completion of all adjustment (waveform measured by analog oscilloscope)



Power adjustment standard  
RF level adjustment value  
(The setup is completed. STEP 12, 26)

|     |                  |
|-----|------------------|
| DVD | 848 mV to 892 mV |
| CD  | 658 mV to 702 mV |

## ■ Procedure of Power Adjustment

### ■ Flow

1. DVD Power adjustment in the state where Focus is Closed.
2. DVD Power adjustment in the state where the setup is completed
3. CD Power adjustment in the state where Focus is Closed.
4. CD Power adjustment in the state where the setup is completed

## ■ Procedure of Adjustment

STEP No.

1. Set the mecha.
2. Turn on power.
3. Test Mode In.
4. Insert DVD GGV1025.
5. Set the mecha upside down.

[Refer to FE test mode function flow.](#)

6. Adjustment of the initial position of VR for Power adjustment.

Adjust the angle at the D cut position to the initial position (initial position shown in Fig.1).

|              | 1st  | 2nd  | 3rd  |
|--------------|------|------|------|
| CD (VR1101)  |      | -30° |      |
| DVD (VR1102) | -30° | -45° | -90° |

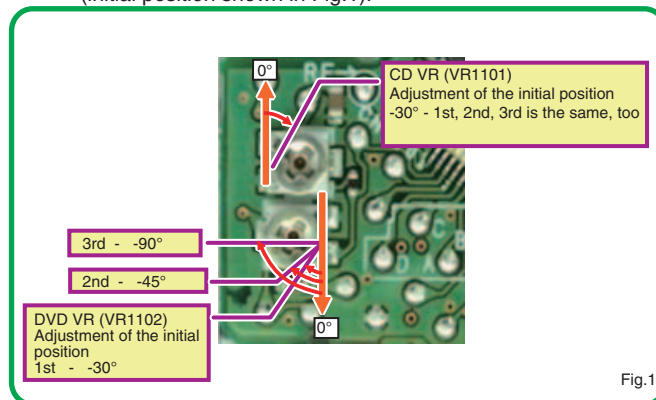


Fig.1

7. Set DISC TYPE to DVD single layer.

8. Power on.

[Refer to FE test mode function flow.](#)

9. LD-ON

[Refer to FE test mode function flow.](#)

10. Execute until Focus close state is reached.

▼ If the waveform is similar to RF waveform after Focus Close and Tracking Open (waveform measured by analog oscilloscope), Focus Close is reached. Go to STEP 9.

If the RF waveform does not appear, Focus Close is not reached.

Return to STEP 7 and change the angle of initial position of DVD VR (VR 1102). If Focus Close is not reached after the 3rd VR adjustment, replace the Mechanism Unit (Service).

|     |                   |
|-----|-------------------|
| DVD | 200 mV to 1200 mV |
|-----|-------------------|

11. Conduct Power adjustment. (Conduct the adjustment in the state of Focus Close.)

|     |                  |
|-----|------------------|
| DVD | 848 mV to 892 mV |
|-----|------------------|

12. Execute until Tracking Close is reached.

13. Conduct Power adjustment. (Conduct the adjustment in the state of Tracking Close.)

|     |                    |
|-----|--------------------|
| DVD | 2.0E – 4 and under |
|-----|--------------------|

14. Check the ERR rate after Power adjustment.

|     |                    |
|-----|--------------------|
| DVD | 820 mV to 917 mV   |
| DVD | 2.0E – 4 and under |

15. Power off.

16. Return to the original position.

17. Set up again (setting of DVD single layer) and conduct the final check of RF level and ERR rate. (Check in the state of Tracking Close)

18. Eject.

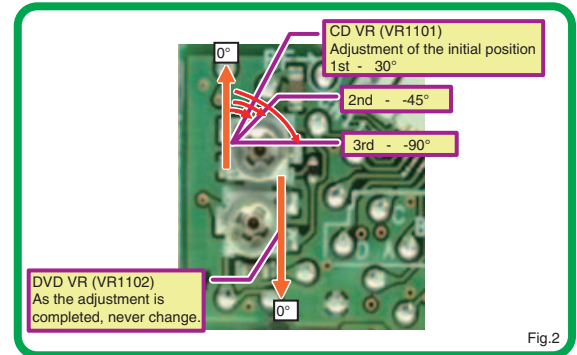
19. Take out DVD GGV1025.  
Insert CD TCD-782.

20. Set the mecha.

21. Adjustment of the initial position of VR for Power adjustment

|              | 1st   | 2nd  | 3rd  |
|--------------|---|------|------|
| CD (VR1101)  | -30°  | -45° | -90° |
| DVD (VR1102) | As the adjustment is completed, never change. |      |      |

Adjust the angle at the D cut position to the initial position (initial position shown in Fig.2).



22. Set DISC TYPE to CD.

[Refer to FE test mode function flow.](#)

23. Power on.

[Refer to FE test mode function flow.](#)

24. Execute until Focus Close 1 is reached.

[Refer to FE test mode function flow.](#)

- ▼ If the waveform is similar to RF waveform after Focus Close and Tracking Open (waveform measured by analog oscilloscope), Focus Close is reached. Go to STEP 20.  
If the RF waveform does not appear, Focus Close is not reached. Return to STEP 21 and change the angle of initial position of CD VR (VR1101).  
If Focus Close is not reached after the 3rd VR adjustment, replace the Mechanism Unit (Service).

25. Conduct Power adjustment. (Conduct the adjustment in the state of Focus Close.)

|    |                   |
|----|-------------------|
| CD | 200 mV to 1200 mV |
|----|-------------------|

26. Execute until Tracking Close is reached.

[Refer to FE test mode function flow.](#)

27. Conduct Power adjustment. (Conduct the adjustment in the state of Focus Close.)

|    |                  |
|----|------------------|
| CD | 658 mV to 702 mV |
|----|------------------|

28. Check ERR rate.

|    |                    |
|----|--------------------|
| CD | 1.0E - 2 and under |
|----|--------------------|

[Refer to FE test mode function flow.](#)

29. Power off.

[Refer to FE test mode function flow.](#)

30. Return to the original position.

31. Set up again (setting of CD layer), and conduct the final check of RF level and ERR rate. (Check in the state of Tracking Close)

|    |                    |
|----|--------------------|
| CD | 528 mV to 832 mV   |
| CD | 1.0E - 2 and under |

[Refer to FE test mode function flow.](#)

32. Eject.

[Refer to FE test mode function flow.](#)

33. Take out CD TCD-782.

34. Power off.