Pioneer

Service Manual

ORDER NO.
CRT4843

DVD MECHANISM MODULE (LS2)

CX-3283

- **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-2400BT/XUEW5, AVH-2400BT/XUUW5, AVH-1400DVD/XUEW5 AVH-1400DVD/XUUW5	CRT4836	CXK8003
AVH-P1400DVD/XUUC, AVH-1450DVD/XMRC, AVH-1450DVD/XURD AVH-1450DVD/XMRI, AVH-1490DVD/XMID	CRT4837	CXK8003
AVH-P3400BH/XUUC, AVH-P2400BT/XUUC, AVH-2450BT/XMRC AVH-2450BT/XURD, AVH-2450BT/XMRI, AVH-2490BT/XMID	CRT4838	CXK8003
AVH-3400DVD/XUEW5, AVH-P3400DVD/XUUW5, AVH-P3450DVD/XURC AVH-P3450DVD/XURD, AVH-P3450DVD/XURI, AVH-P3490DVD/XUID, AVH-P3450DVD/XMRC, AVH-P3450DVD/XMRI, AVH-P3490DVD/XMID	CRT4839	CXK8002
AVH-P4400BH/XUUC, AVH-4400BT/XUEW5, AVH-P4450BT/XURC AVH-P4450BT/XURD, AVH-P4450BT/XURI, AVH-P4490BT/XUID	CRT4840	CXK8002
DVH-340UB/XMEW5, DVH-340UB/XMUW5, DVH-345UB/XMRC DVH-345UB/XMRD, DVH-345UB/XMRI, DVH-3490UB/XMID	CRT4842	CXK8001

CONTENTS

PIONEER CORPORATION 1-1, Shin-ogura, Saiwai-ku, Kawasaki-shi, Kanagawa 212-0031, Japan
PIONEER ELECTRONICS (USA) INC. P.O. Box 1760, Long Beach, CA 90801-1760, U.S.A.
PIONEER EUROPE NV Haven 1087, Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS ASIACENTRE PTE. LTD. 253 Alexandra Road, #04-01, Singapore 159936

K-ZZZ DEC. 2011 Printed in Japan

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 / DTS / 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 MN2DS0016AAUB, the servo-related waveforms in the Front End, such as FE, TE, and AS, cannot be observed, as in the case of a DVD mechanism module (LS1) CX-3250.

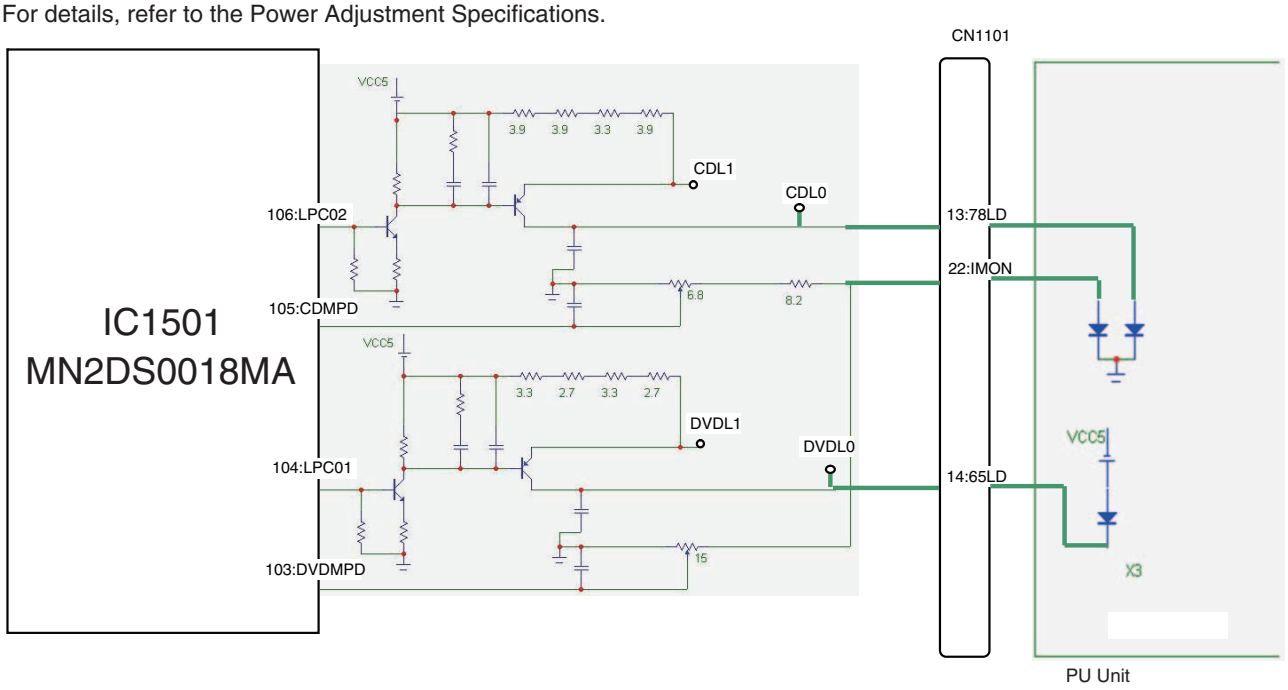
1.1 ANALOG BLOCK (MN2DS0018MA : IC1501)

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

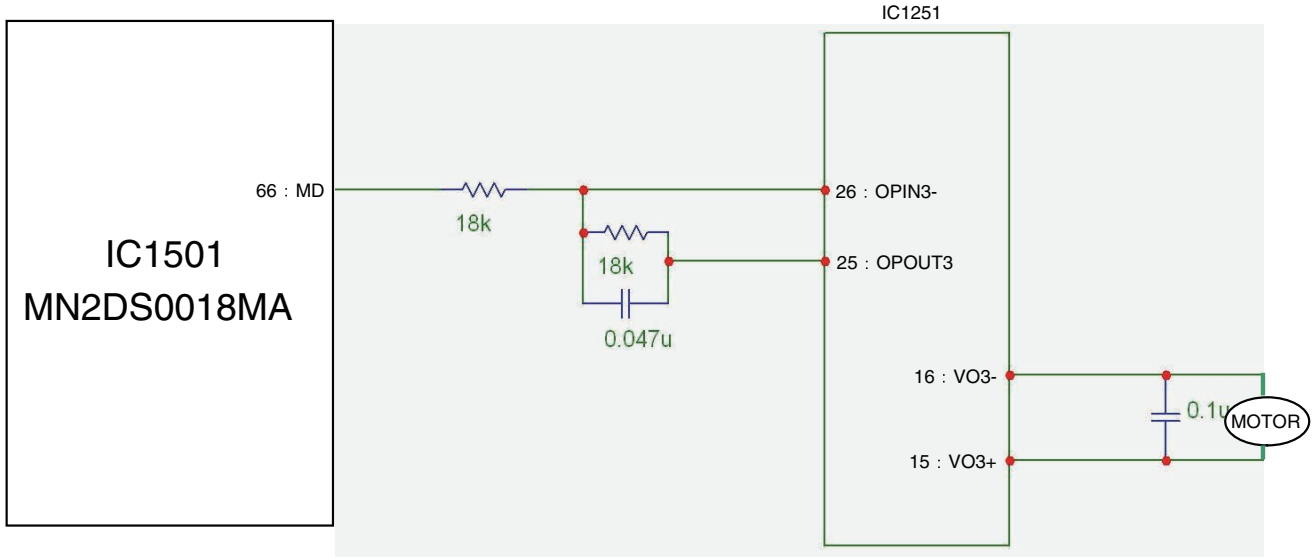
The optical output of a Laser Diode (LD) has large negative temperature characteristics.
Therefore, driving LD with constant current will not get you constant optical output.
The APC circuit controls the current so that the output will be constant using a Monitor Diode (MD).
The MN2DS0018MA incorporates 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 CDLD1 and 5V by 15 ohm (3.9 ohm × 3 + 3.3 ohm = 15 ohm).
For a DVD, the current is calculated by dividing the measured voltage between DVDLD1 and 5V by 12 ohm (3.3 ohm × 2 + 2.7 ohm × 2 = 12 ohm).
The result will be about 50 mA (45 mA) for DVD (CD).
The potential difference between DVDLD1(CDLD1) and 5 V is set to approx. 600 mV(675 mV).

On this or later version of the DVD mechanism module, the Power adjustment circuit (which is the circuit from IMON to CDMP 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

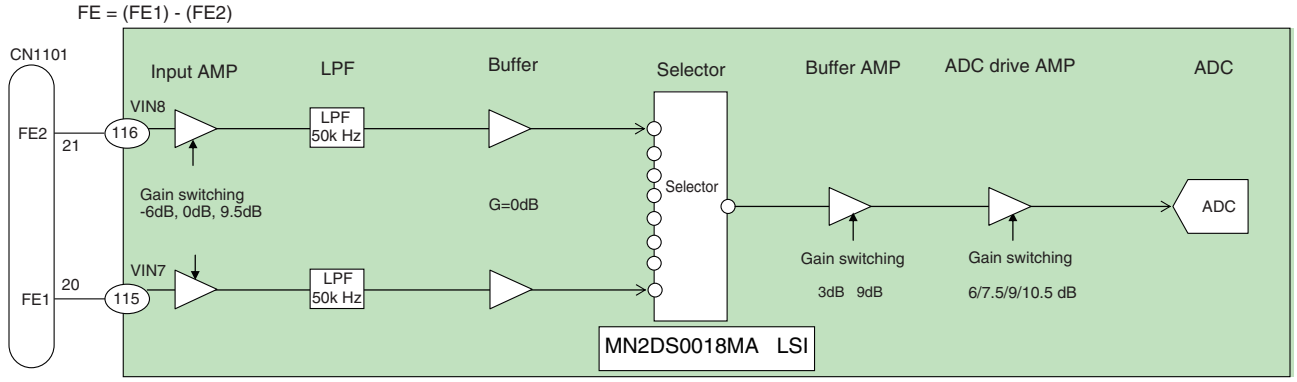
For the SPDL motor for the DVD mechanism module, a brush motor which is used for the CD mechanism module is adopted instead of a brushless motor which is used for the conventional DVD mechanism module.
The SPDL circuit to drive the brush motor is as shown below.

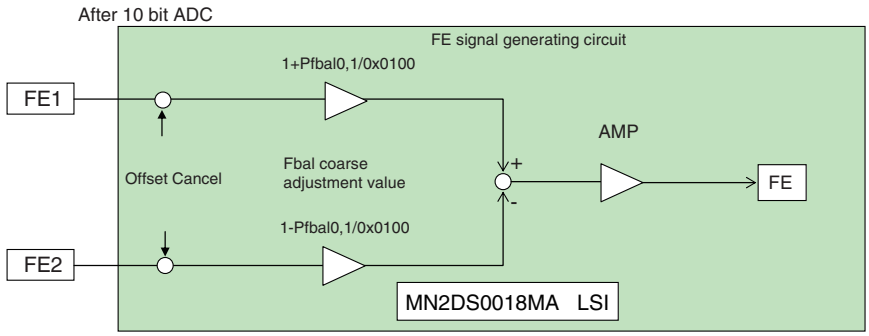


1.1.3 FE Generating Circuit

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.



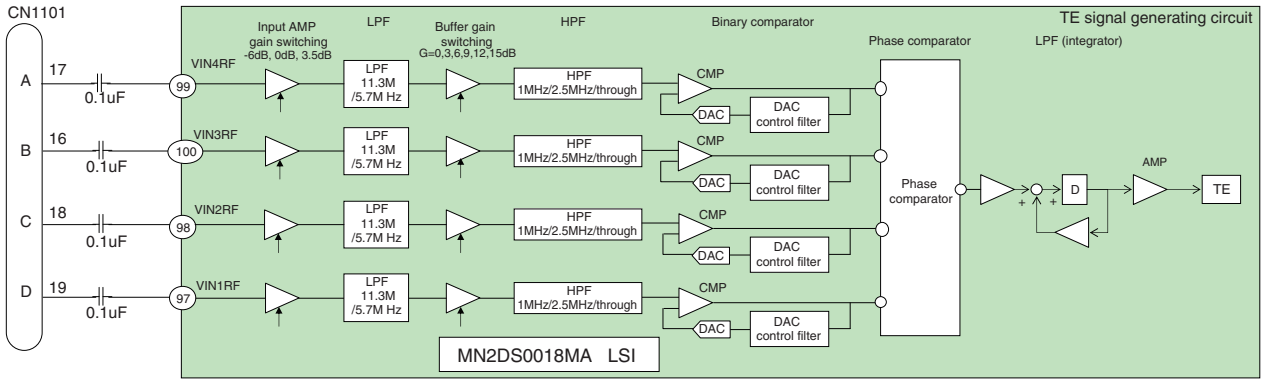


1.1.4 TE Generating Circuit

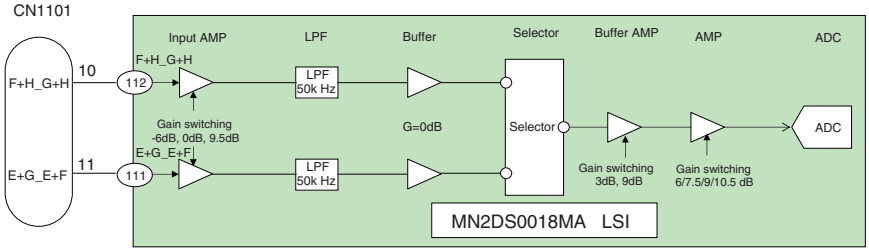
Tracking Error (TE) Generating Circuit

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.

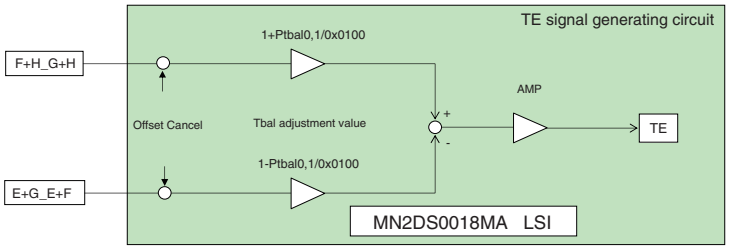
- DVD (TE based on phase difference)



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



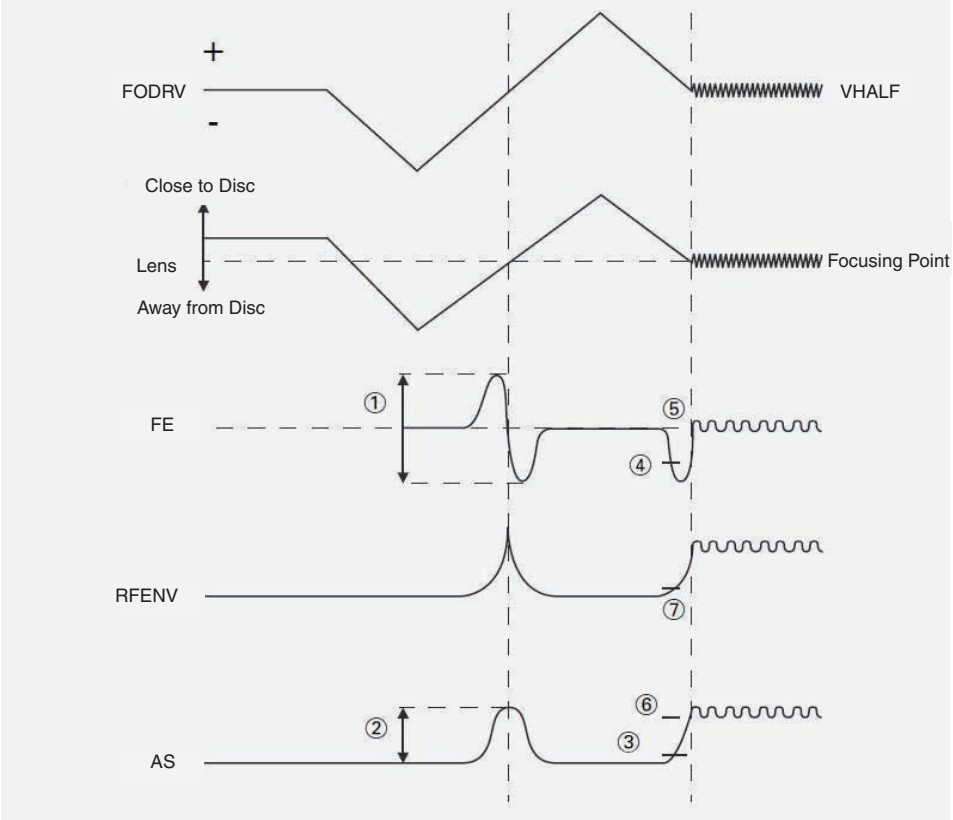
- After 10 bit ADC



1.2 SERVO BLOCK (MN2DS0018MA : IC1501)

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

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 (③ - ⑥).
3. Pulling-in check
   Check the focusing with the signal levels of AS and RFENV (⑥ and ⑦). Using a test mode focus search, 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 number of tracks to move from the following three schemes: Interval Jump, Multi Jump, and Traverse Seek.

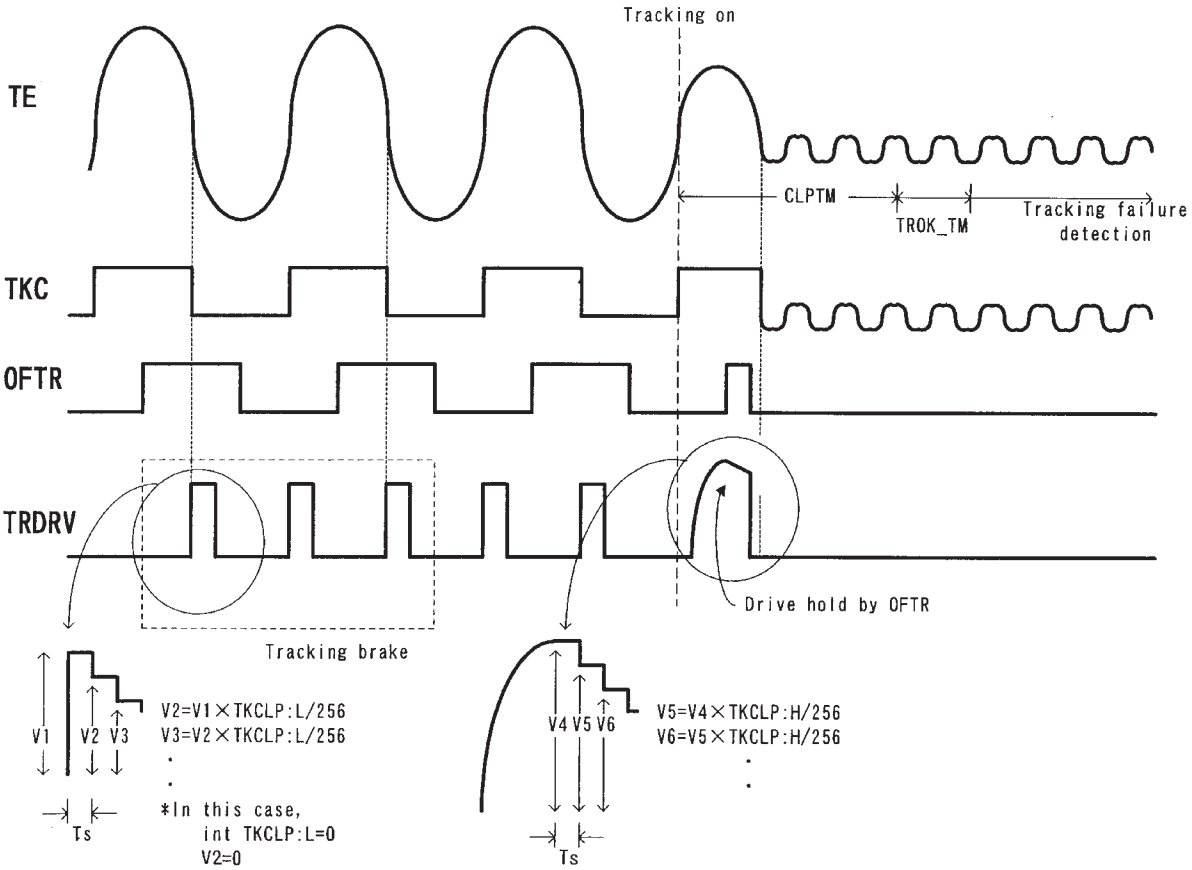
1. Interval Jump
   Detailed seek is possible because this scheme repeatedly performs track jump by 1 track. This scheme is selected when it is close to the target track or it conducts a seek operation to an adjacent track.
2. Multi Jump
   It counts the both edges of a Track Cross Signal TKC and moves 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 number of tracks to move

DVD	CD
1-10 Interval Jump	1-10 Interval Jump
11-500 Multi Jump	11-100 Multi Jump
501-1000 Combination of Multi Jump and Interval Jump	101-500 Combination of Multi Jump and Interval Jump
1001-Traverse Seek	501-Traverse Seek

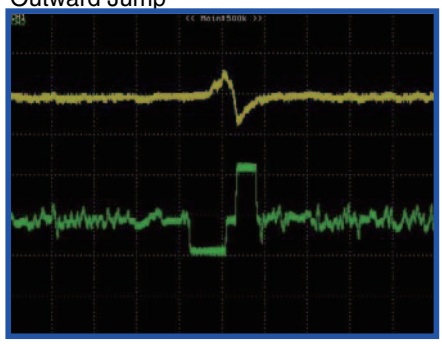
Here are the wavefoms of Track Jump.

Tracking-on process

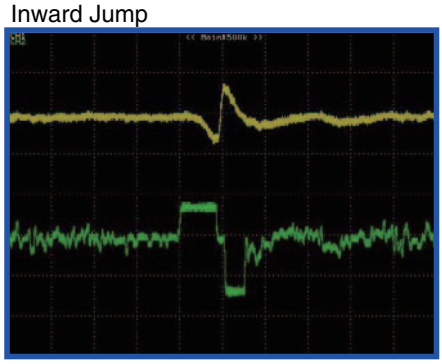


Interval Jump (by 1 track) for DVD

Outward Jump

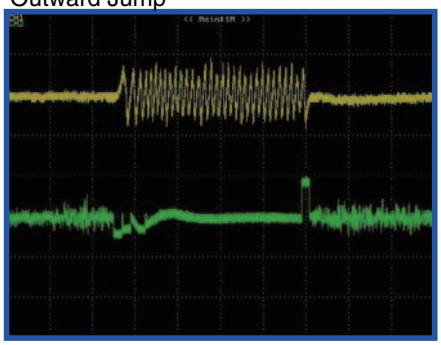


Inward Jump



Multi Jump (by 32 tracks) for DVD

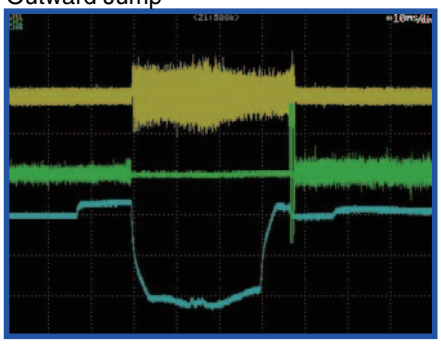
Outward Jump



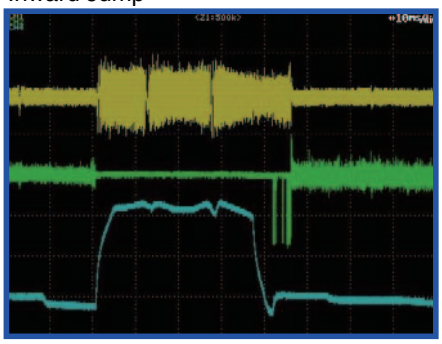
Inward Jump

Traverse Seek (by 1001 track) for DVD

Outward Jump

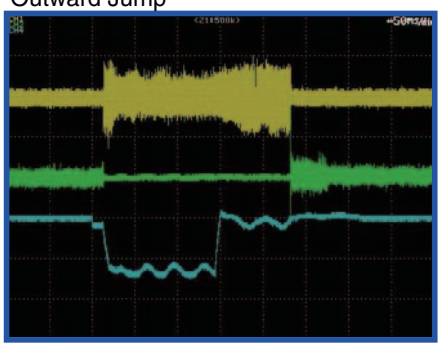


Inward Jump



Traverse Seek (by 10000 track) for DVD

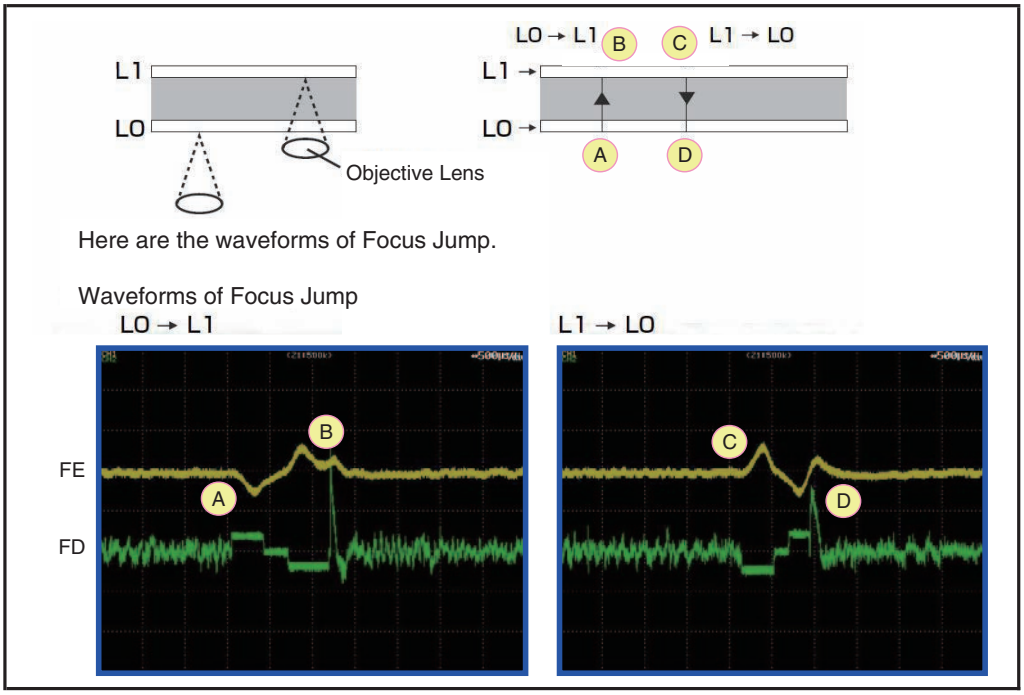
Outward Jump



Inward Jump

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
F close	FEPP(FEMAX-FEMIN)	1D84 – 6C08	2E18 – A8CF
	AS MAX	Not specified	←
	FE Normalization Adjustment	Not specified	←
F close (after TBAL)	TEPP(TEMAX-TEMIN)	36B0 – 80E8	1235 – 5B07
	TE Normalization Adjustment	Not specified	←
T close	F Gain	0100 – 0400	←
	T 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.

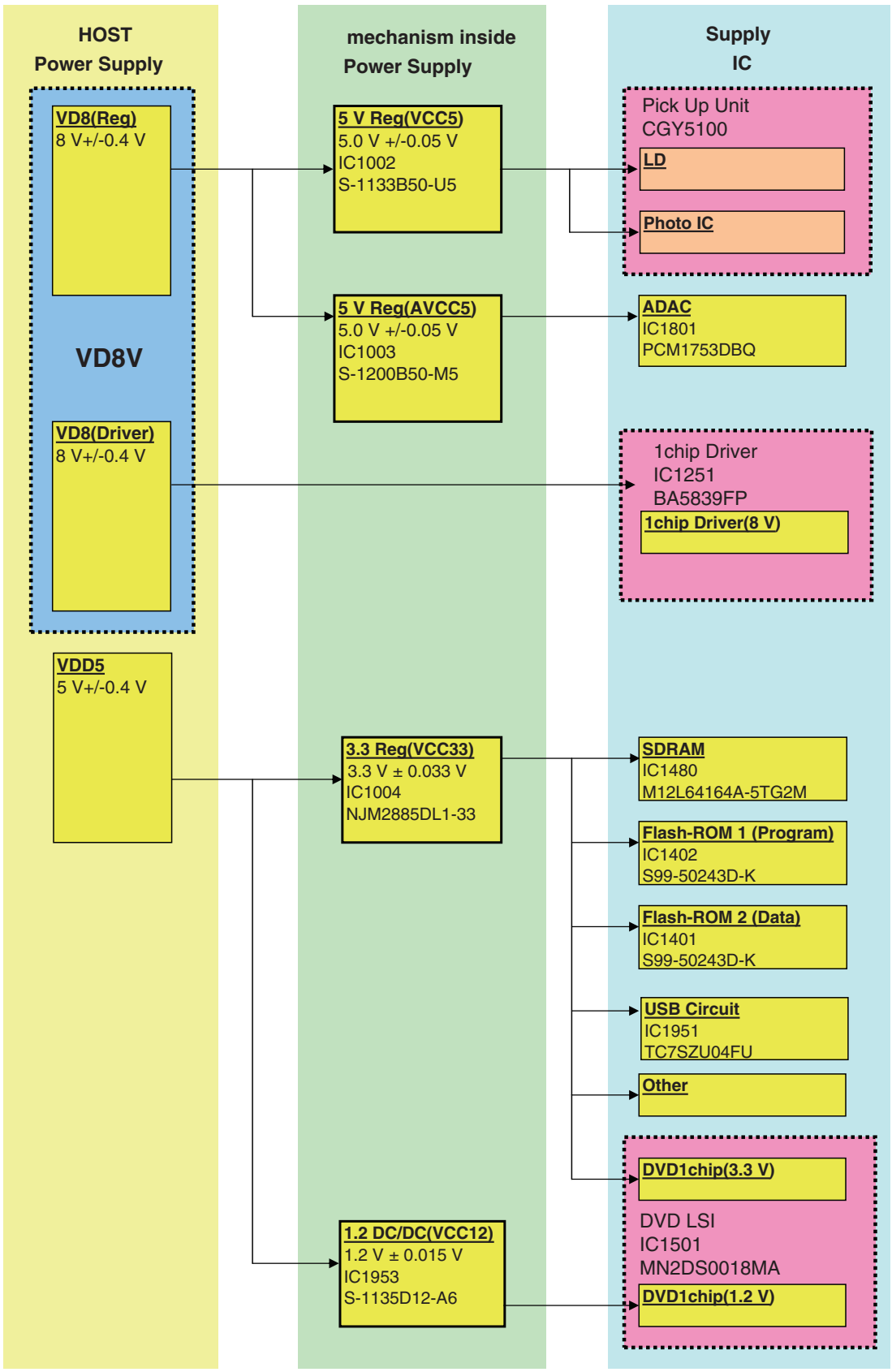
1.4 CIRC BLOCK (MN2DS0018MA : IC1501)

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)

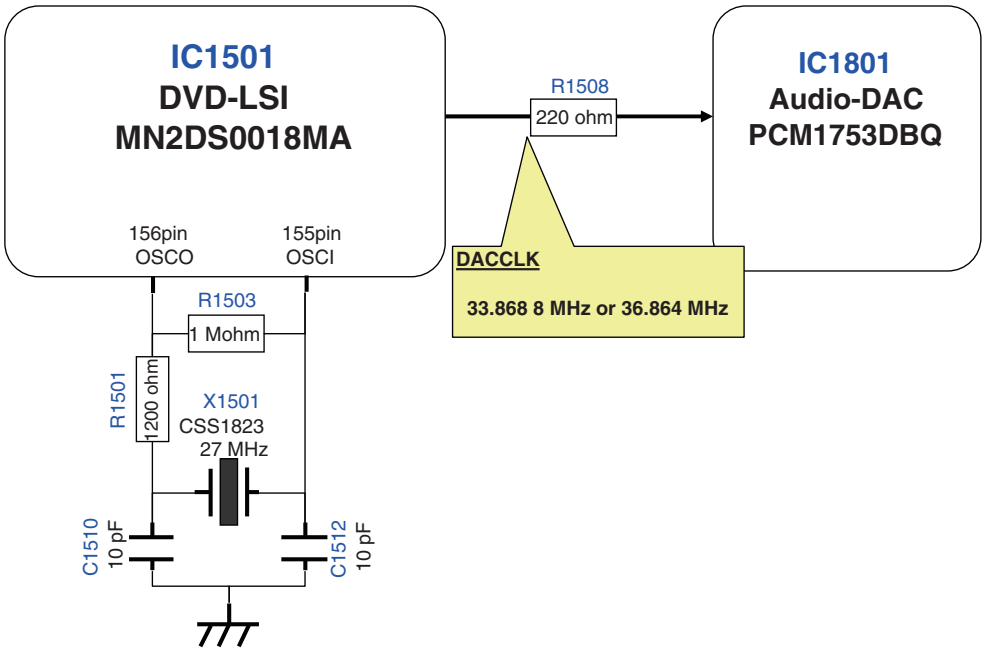
The Digital Read Channel (DRC) is equipped with A/D converter, Digital Equalizer (DEQ), Adaptive equalizer, Viterbi detector, Digital PLL circuit, RISC interface, and peripheral circuits to read signals of an optical disc.

1.6 POWER SUPPLY MAP

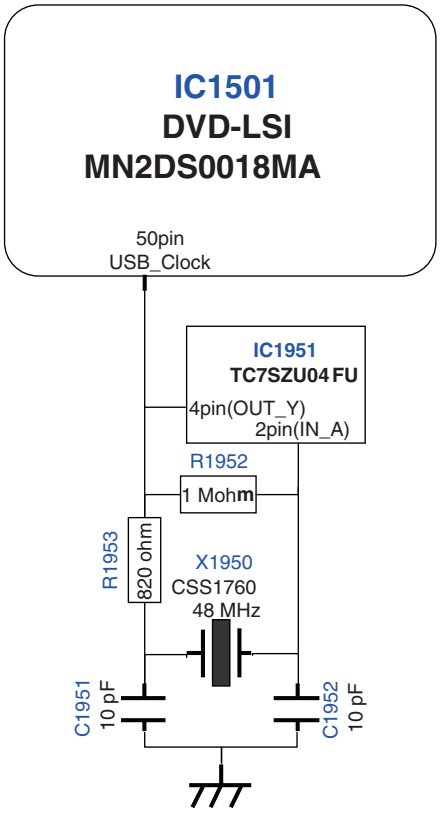


1.7 CLOCK CIRCUIT

[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.



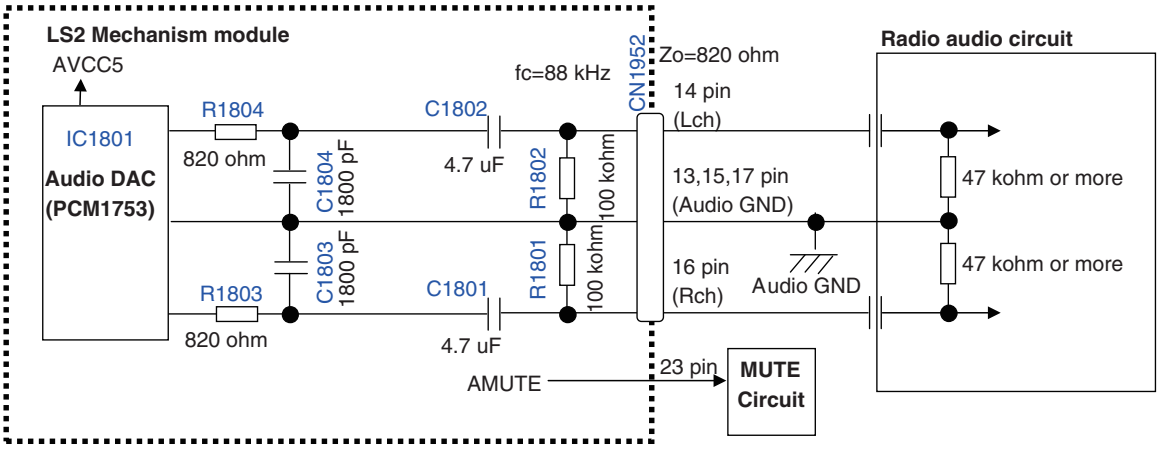
[Outline of USB_Clock]
By connecting a 48 MHz crystal oscillator with DVD-LSI (IC1501), it generates and supplies the clock to be used in the USB circuit with the clock generator in DVD-LSI (USB interface section).



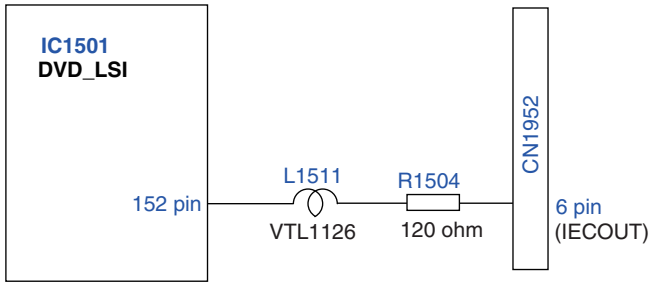
1.8 AUDIO CIRCUIT

[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).
(2) Digital Audio Signal (IEC60958/IEC61937)
It outputs the Digital Audio Signal (IEC60958/IEC61937) coming from DVD-LSI (IC1501) through the HOST IF connector (CN1952).

[Analog Audio Signal]

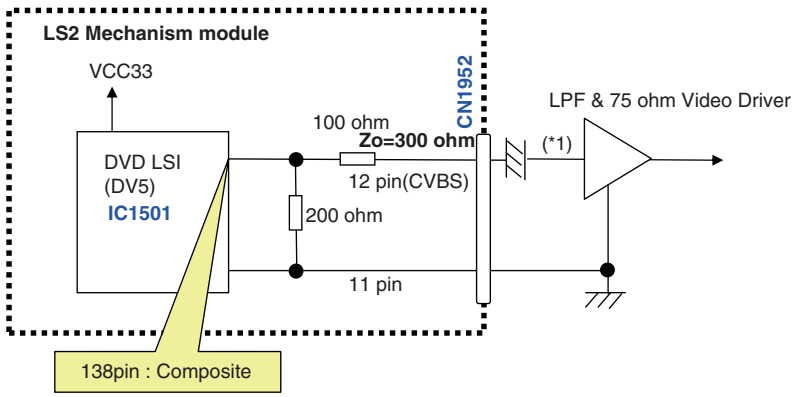


[Digital Audio Signal]



1.9 VIDEO CIRCUIT

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

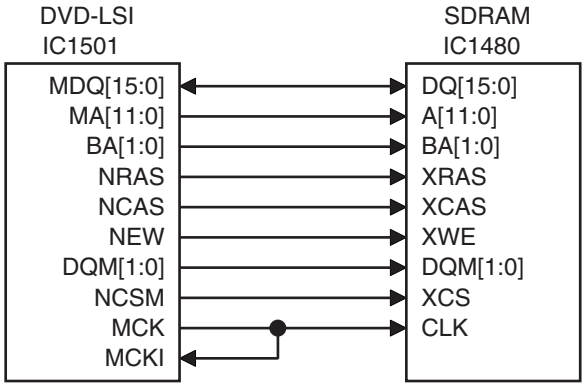
* ⬇ Looking from DVD-LSI

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

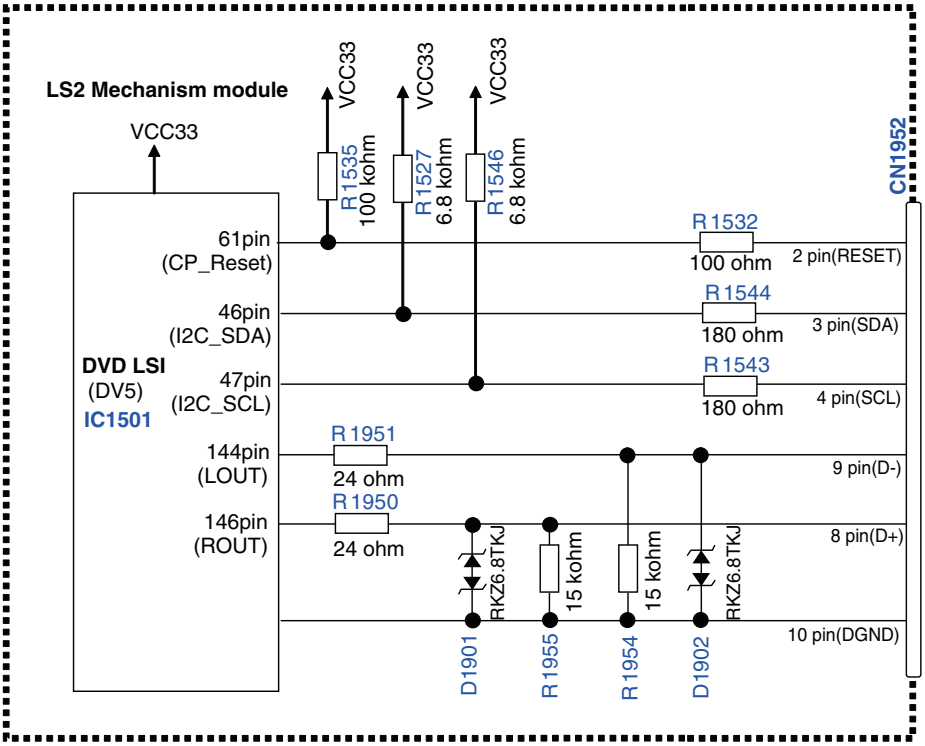
- Data bus range : 16 bit
- Operating frequency : 121.5 MHz
- CAS latency = 3
- 8 word burst forwarding
- Manual precharge
- CAS before RAS refresh (Auto refresh)

■ Connection Structure of SDRAM



1.11 USB CIRCUIT

[Outline]
It inputs the D-/D+ signals from HOST IF (CN1952) to DVD-LSI (IC1501).
For iPod, CP_RESET, SDA and SCL are also used for the iPod authentication.

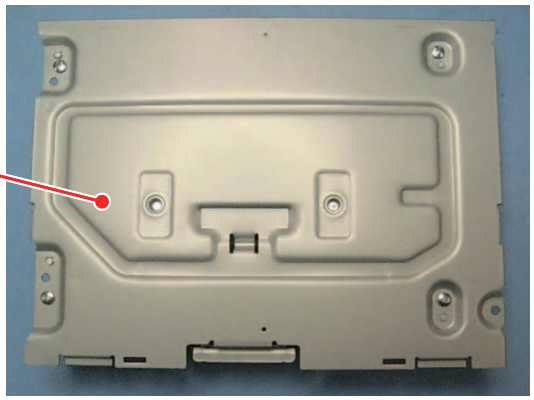


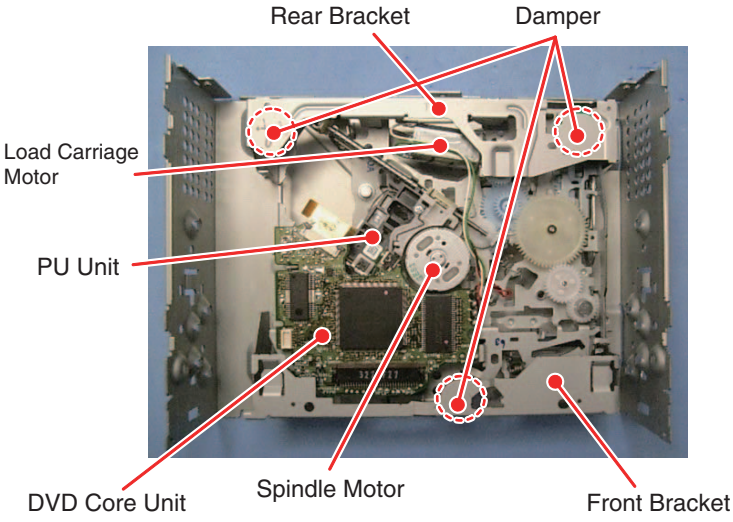
2. MECHANISM DESCRIPTION
2.1 OUTLINE

●mechanism module

Model for DVH

Model for AVN/AVH
(One of four types of the upper case is shown below as an example)

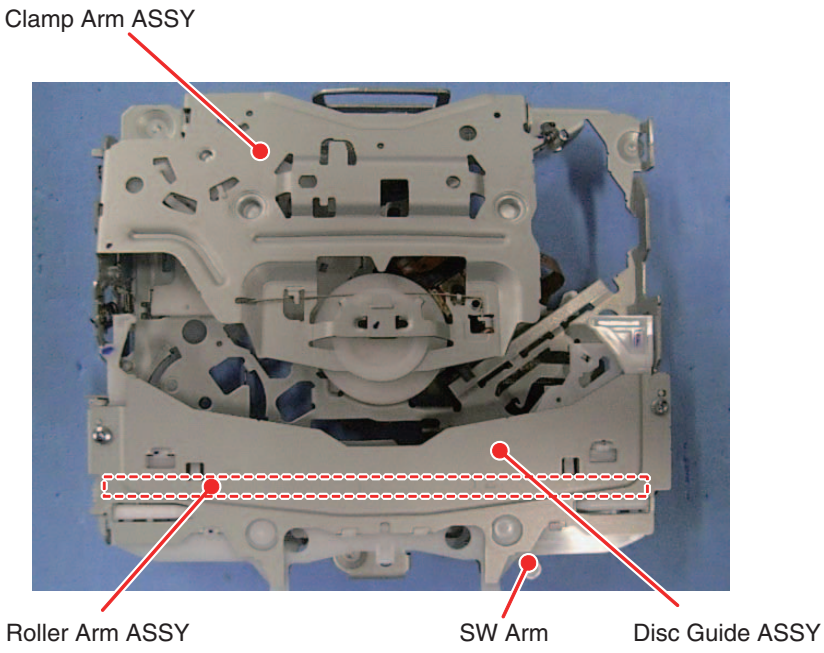


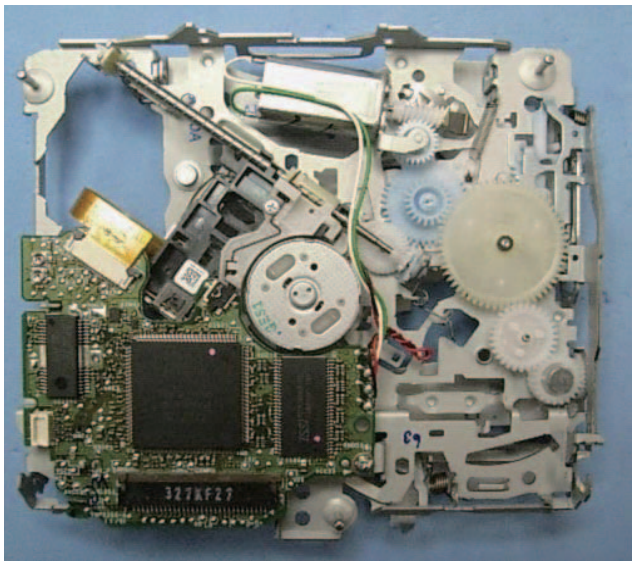


The structure is as same as that of the model for DVH

●CRG mechanism

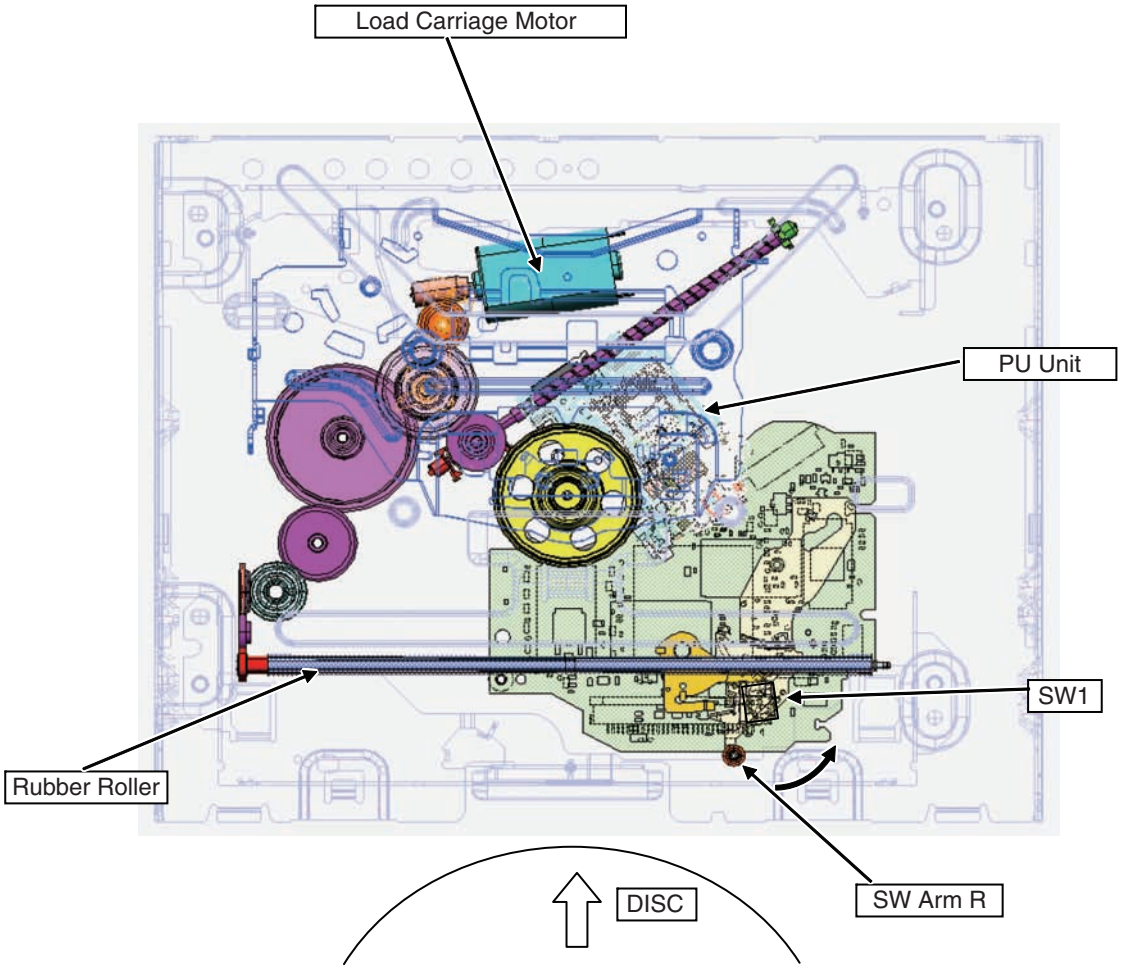
The structure of the CRG mechanism is common regardless of the type of the Upper Case.





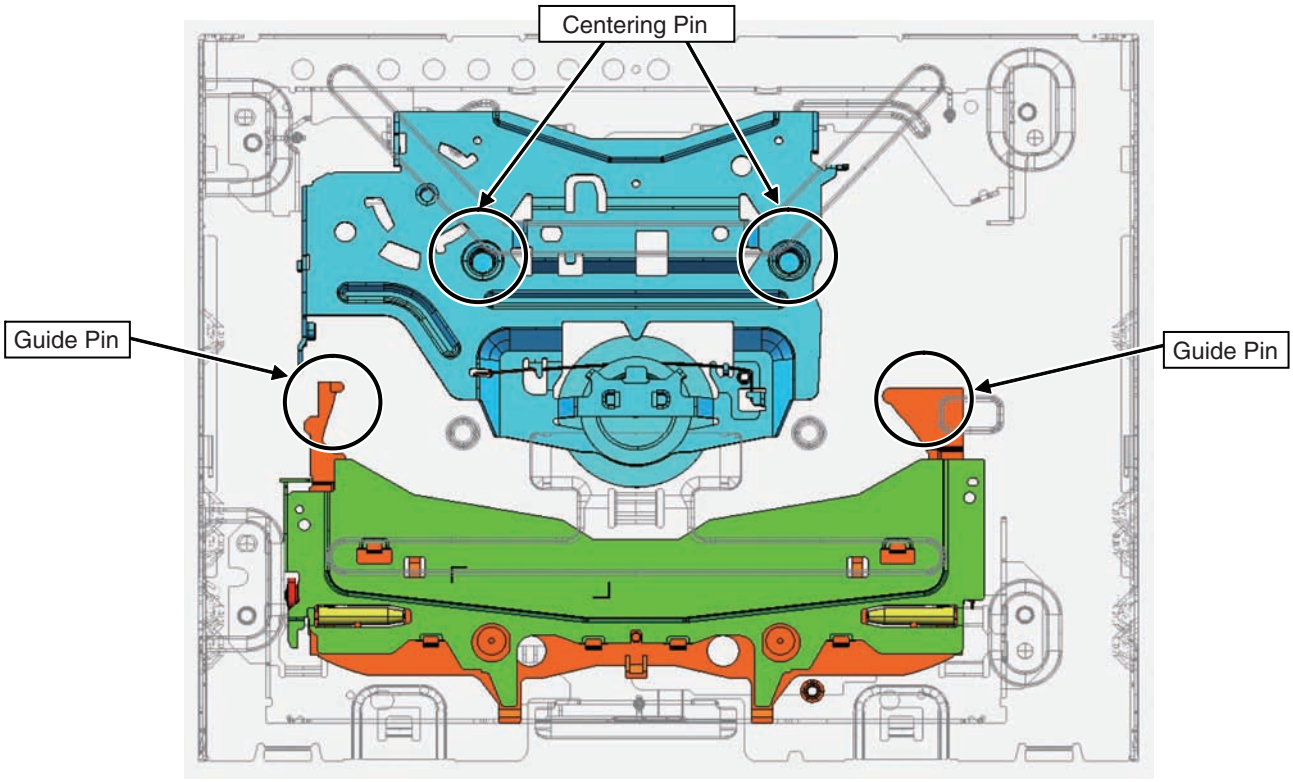
2.2 DISC LOADING OPERATION

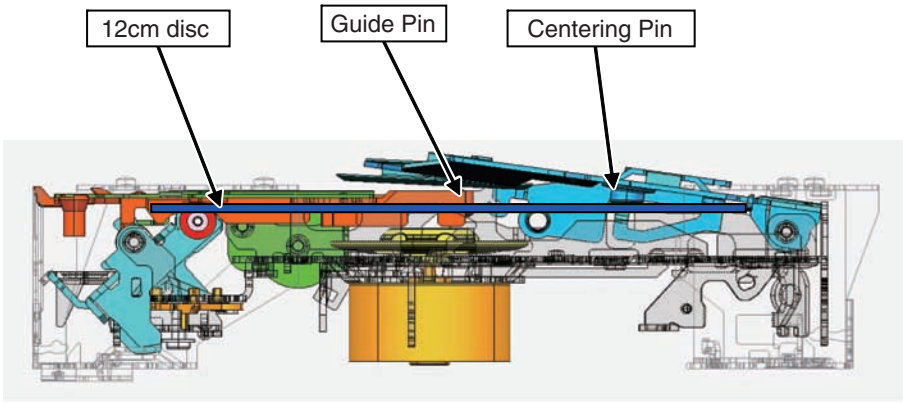
1. When the disc is inserted, SW Arm R turns and SW1 switches from OFF to ON.
   When SW1 switched from OFF to ON, the Load Carriage Motor starts and the Rubber Roller rotates.
2. In the case of 12cm disc, as SW Arm spreads widely, SW1 switches from ON to OFF, and the microcomputer judges that it is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



2.3 DISC CENTERING MECHANISM

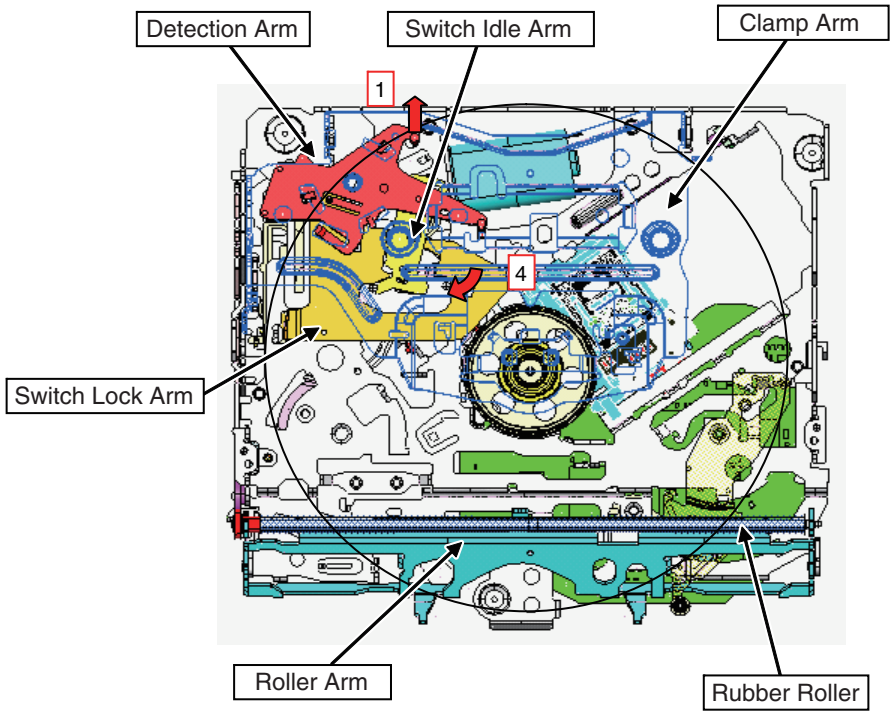
1. The 12cm disc passes under the Guide Pin and the Centering Pin, and is centered at the back position of mechanism.

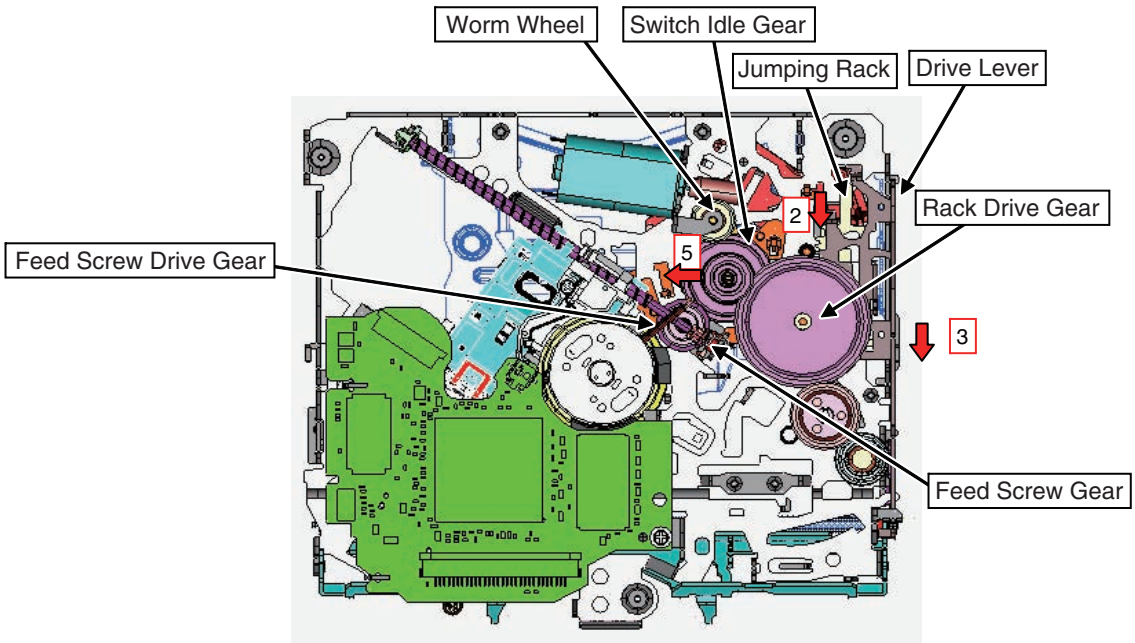




2.4 CLAMP MECHANISM

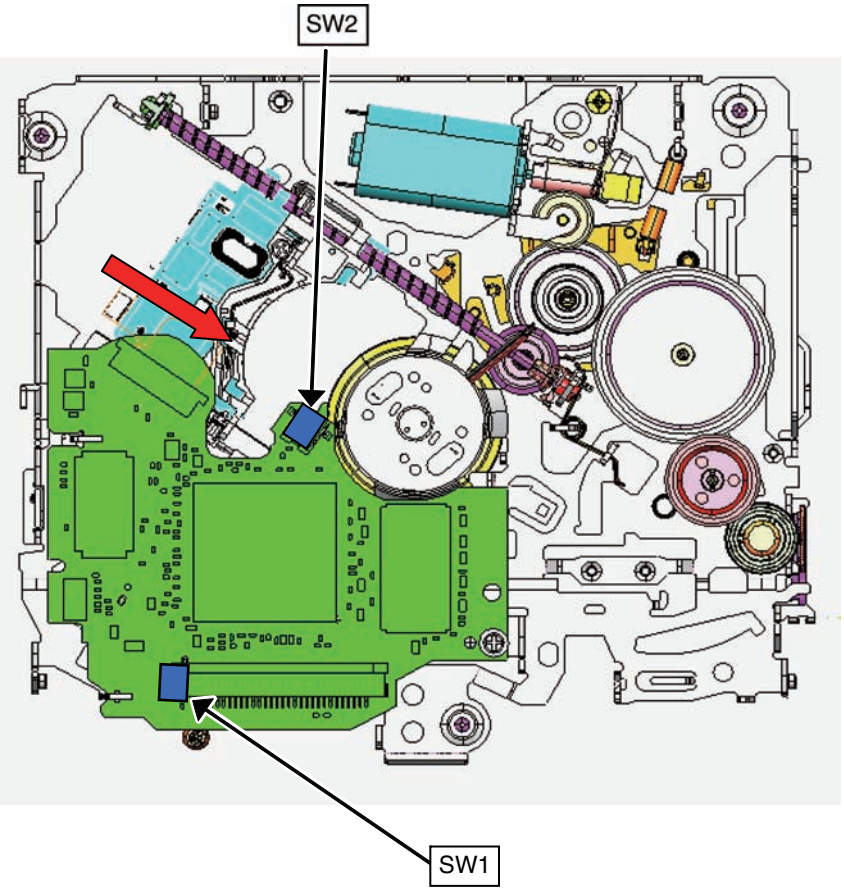
1. When the 12cm disc is centered on the spindle, the Detection Arm drive.
2. The Detection Arm engages the Jumping Rack with the Rack Drive Gear.
3. The Drive Lever which is joined to the Jumping Rack slides and moves the Clamp Arm down. (The disc is clamped.)
   Simultaneously, the Roller Arm turns 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 competed, the control by the Cam on the Drive Lever is removed and the Switch Lock Arm turns.
   When the 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.





2.5 EJECT OPERATION

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

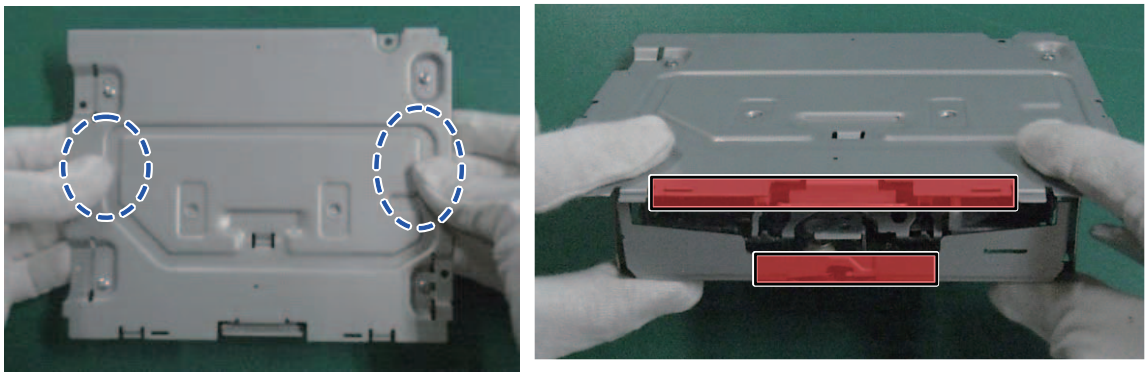


3. DISASSEMBLY

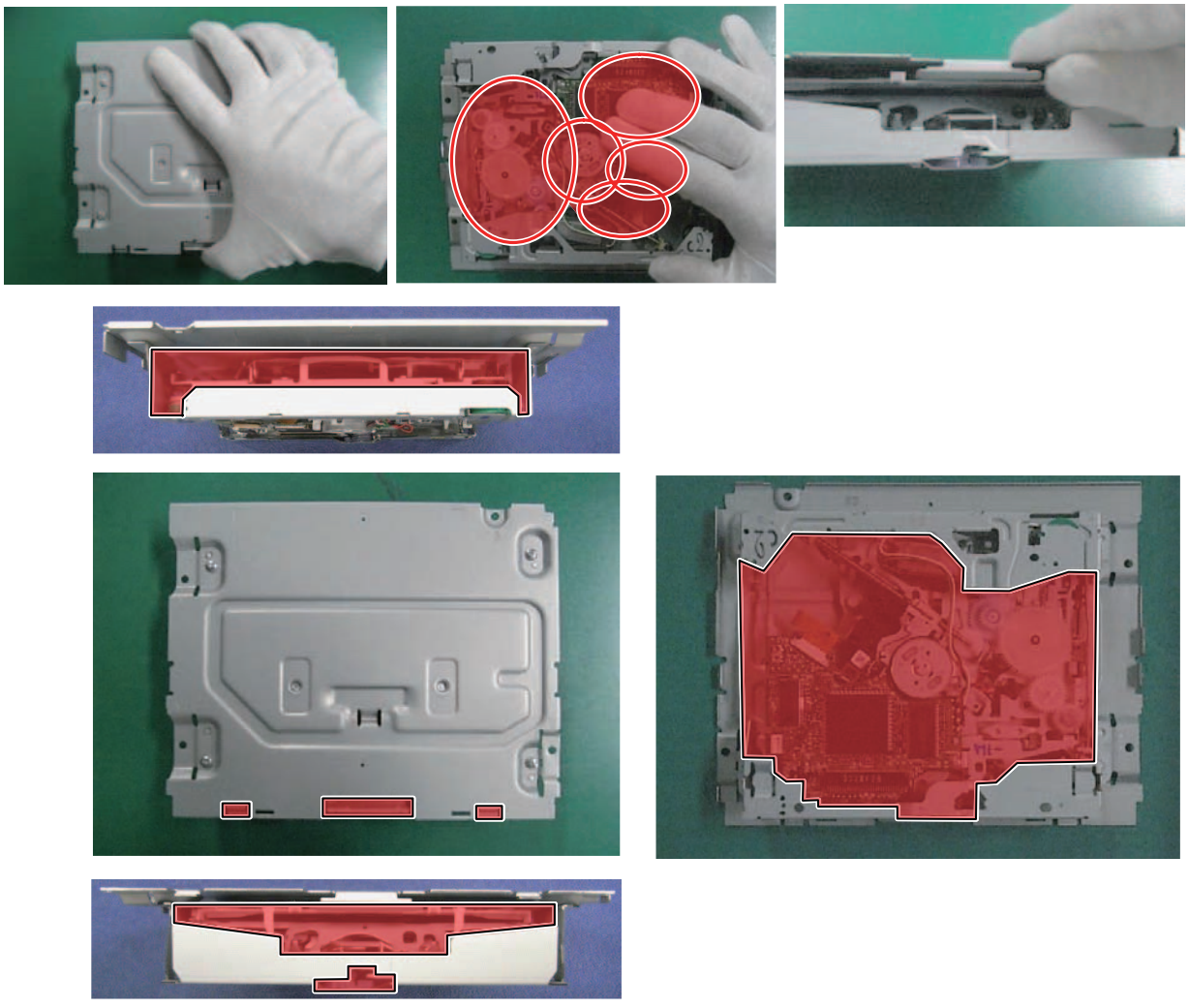
3.1 HOW TO HOLD MECHANISM (For AVN, AVH)

1. Hold the designated parts (within the dashed line) of Upper Chassis and Front and Rear Bracket.
2. Do not hold the areas within the solid line or the CRG mechanism Section or insert a foreign object. Doing so may cause deformation.

Handling – OK



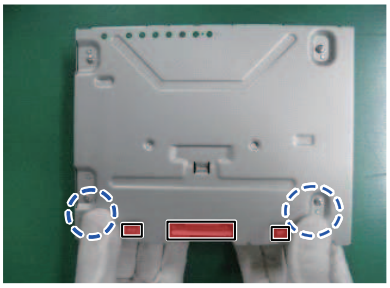
Handling – NG

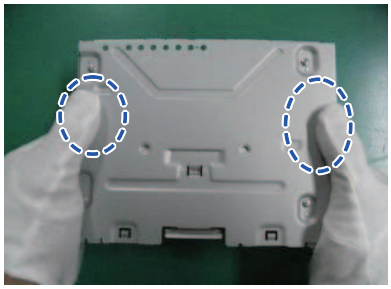


3.2 HOW TO HOLD MECHANISM (For DVH)

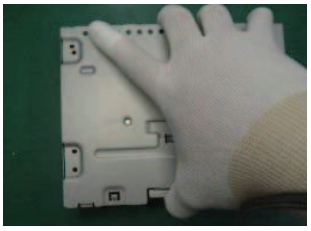
1. Hold the designated parts (within the dashed line) of Upper Chassis and Front and Rear Bracket.
2. Do not hold the areas within the solid line or the CRG mechanism Section or insert a foreign object. Doing so may cause deformation.
3. Holding the lateral face of Upper Chassis may result in deformation. So do not apply excessive force. (approximately 8 newtons and under)

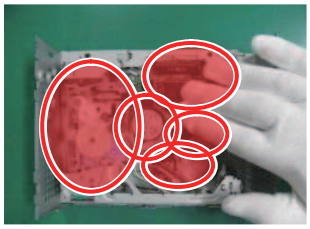
Handling – OK

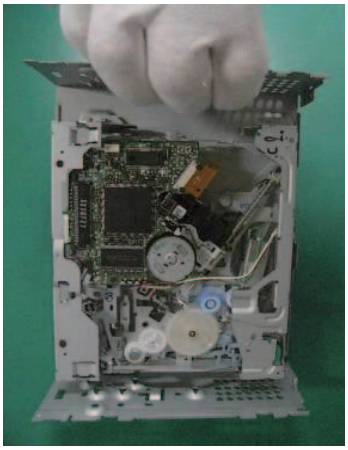


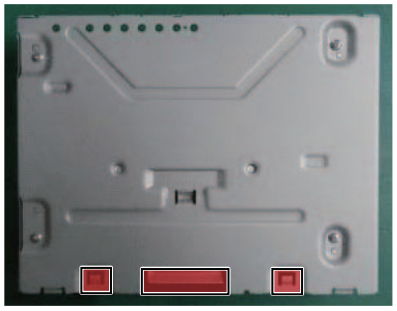


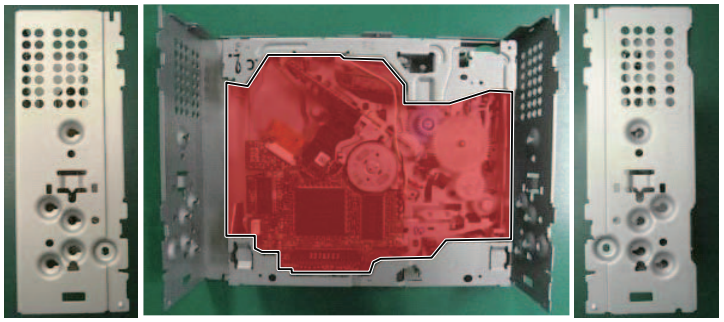
Handling – NG











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

1. Remove soldering of the CRG Motor Lead Wire (Fig.1).
2. Tuck the Disc Detection Arm while applying 4V to the CRG Motor (Fig. 2).
   (green wire – 4V, 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.

Fig.1

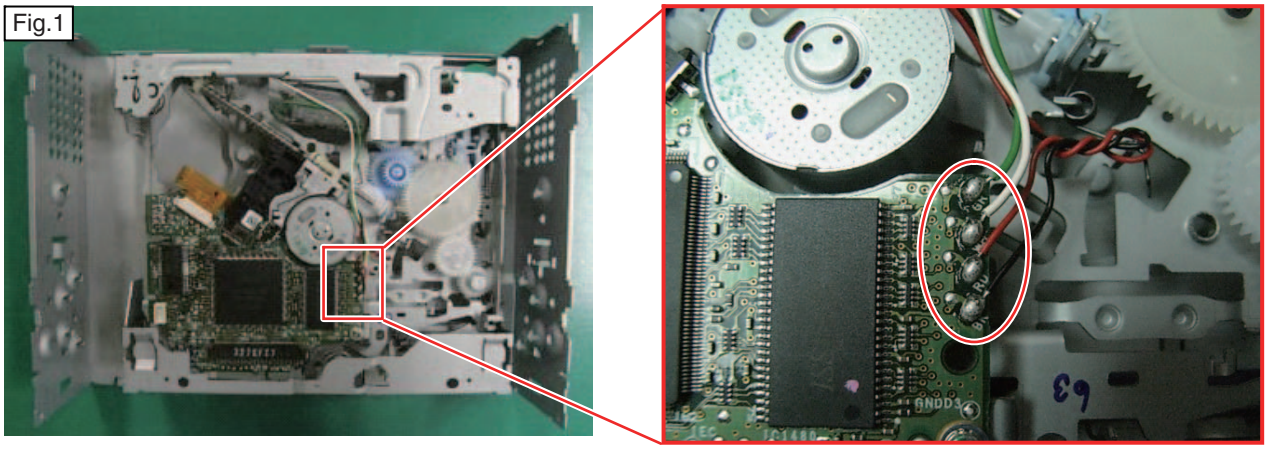
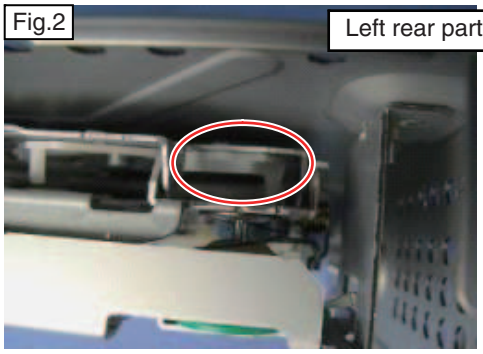


Fig.2 Left rear part of mechanism



3.4 HOW TO CREATE EMPTY CLAMP STATUS (CRG MECHANISM)(MANUAL)

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG mechanism ASSY. (mechanism – Eject status)
2. Remove the Joint Washer of the 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.

Fig.1

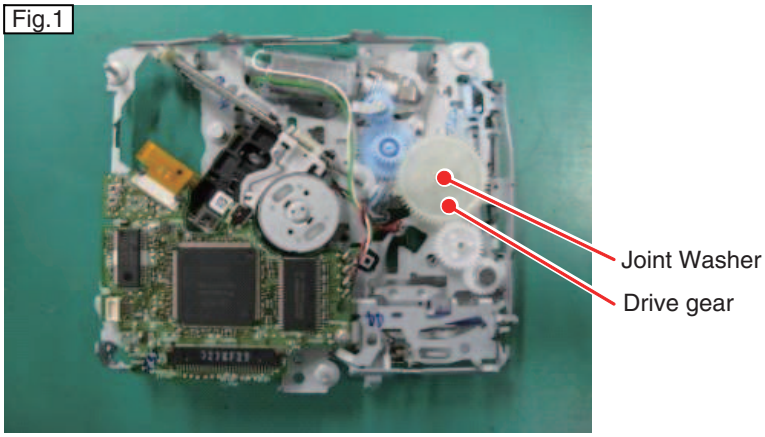
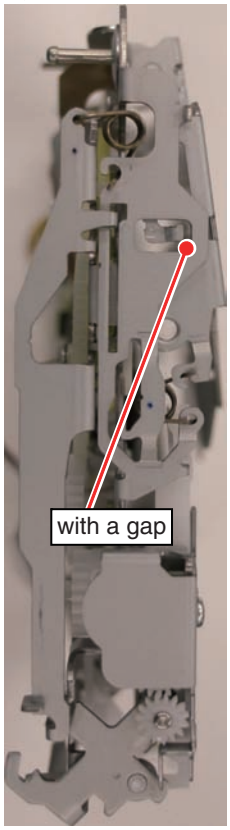
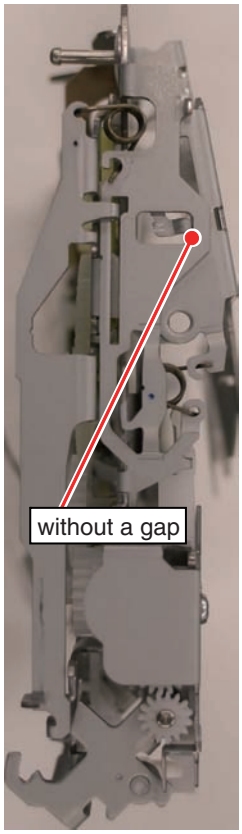


Fig. 2

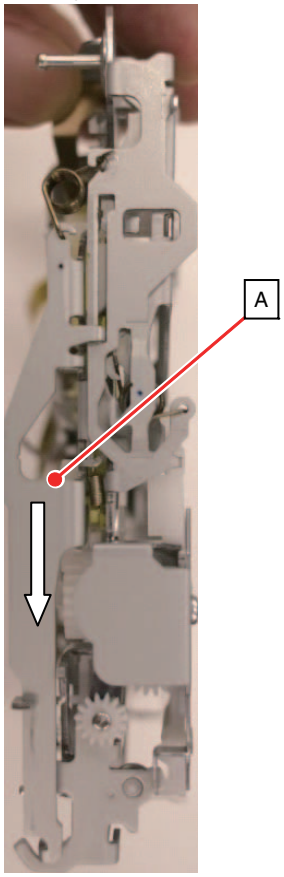
a. Eject status / Aperture



b. Open lock status /No Aperture



c. Empty clamp status



3.5 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 the 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 pick-up to prevent disconnection of it (Fig.4).

Fig.1

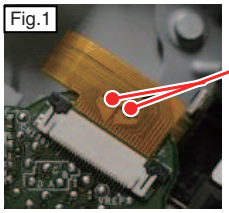


Fig.2

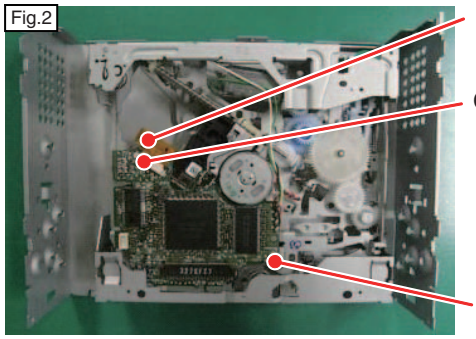


Fig.3

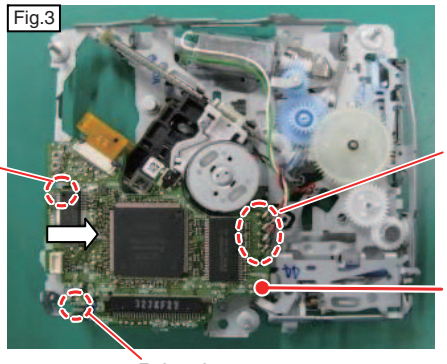
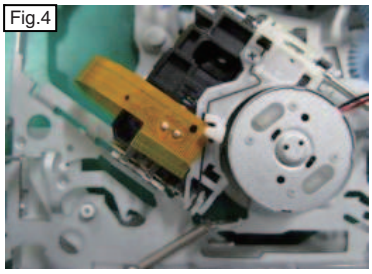


Fig.4



How to install:

1. Check that the status of mechanism is eject (disc load standby status).
   If it is not eject status, apply 4V to the CRG Motor Lead Wire to make it eject status.
   (white wire – 4V 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 "HOW TO TREAT LEAD WIRES".
8. Connect the FPC with the connector.
9. Remove the soldering that has shorted the land for the FPC.

Fig.5

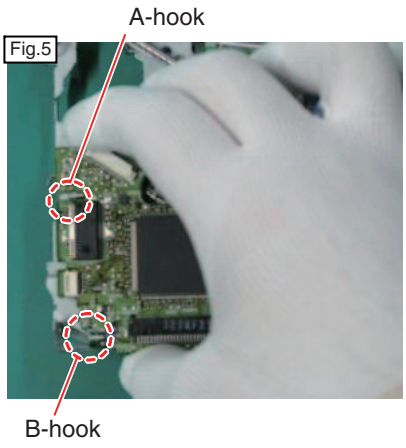
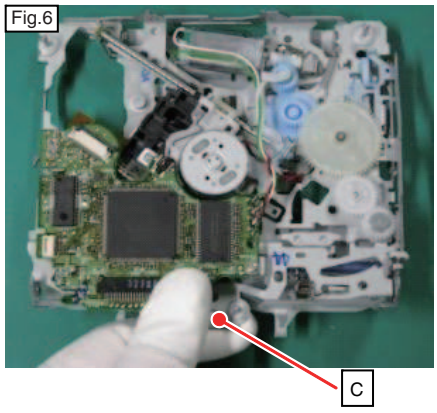


Fig.6



3.6 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 wire and the black wire around the green wire and the white wire 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 lead wires are located in the positions shown in Fig. 4 and Fig. 5.

Fig.1

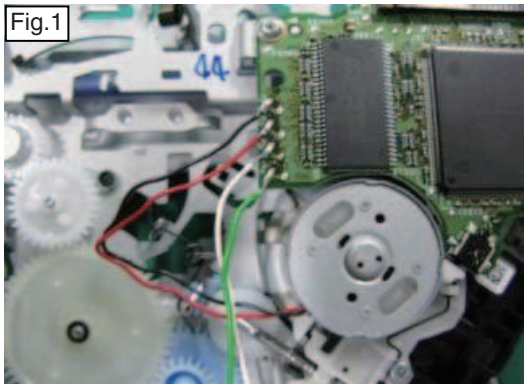


Fig.2

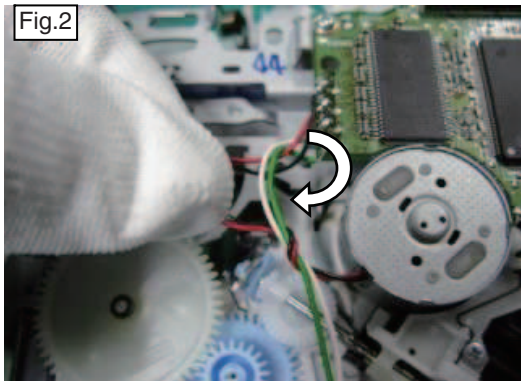


Fig.3

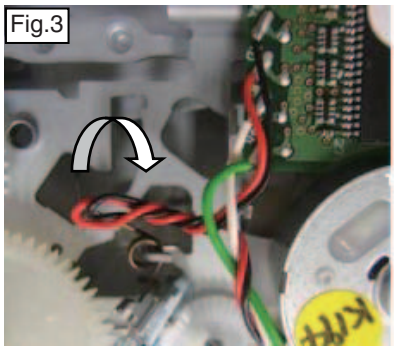


Fig.4

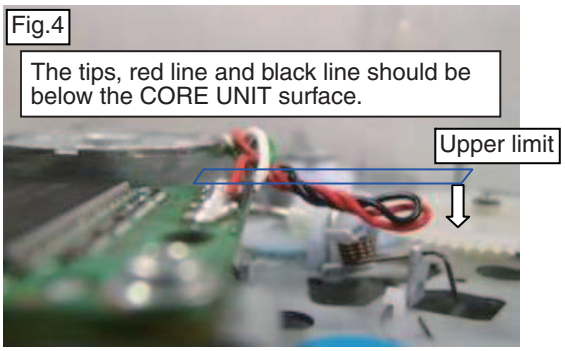
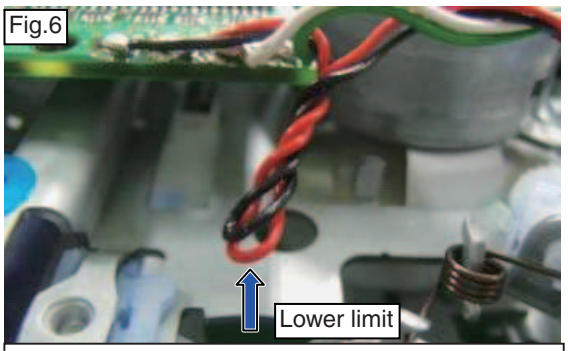


Fig.6



The tips of wires should be above the top surface of Chassis. (They must not contact it.)

3.7 HOW TO REMOVE THE CRG MECHANISM ASSY

1. Remove four Fixing Screws of Upper Chassis and remove the Upper Chassis. (Fig.1 and 2)
   (The same applies to the mechanism of the different type of the Upper Case)
2. Remove it from three Dampers while moving the Carriage Mechanism part up (Fig.2).
   (Note) When the CRG Mechanism ASSY is reinstalled, apply ethanol to the Dampers.
   Check that the tip of Centering Front Spring is 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 “3.3 HOW TO CREATE EMPTY CLAMP STATUS (MECHANISM MODULE)(MOTOR-DRIVEN)" and press down the upper part of the Damper of the CRG Mechanism so that the Damper and the CRG Mechanism are firmly in engagement with each other (Fig. 5).

Fig.1

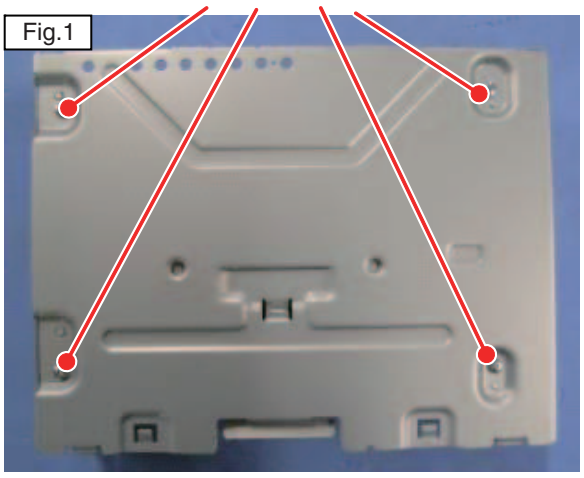


Fig.2

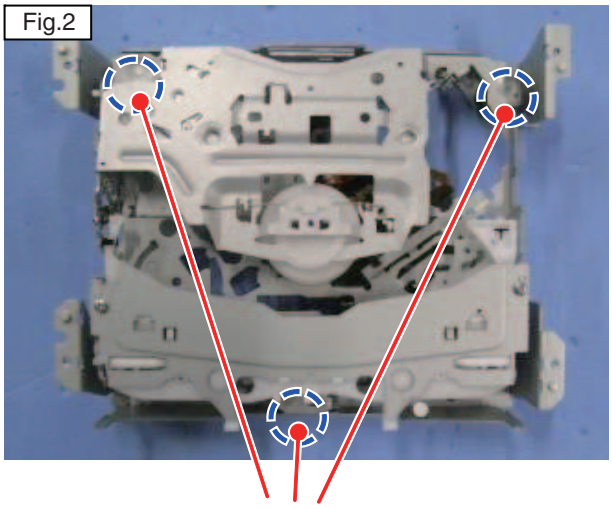


Fig.3

The tip of spring should be within the red circle.

Fig.4

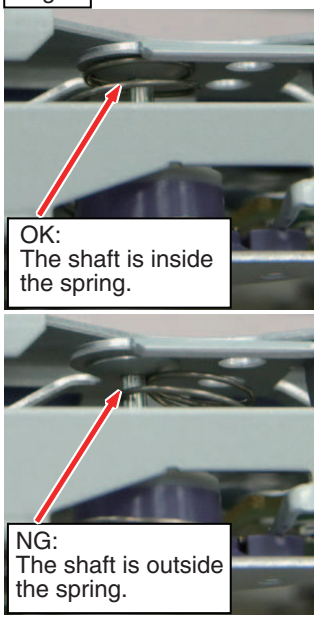
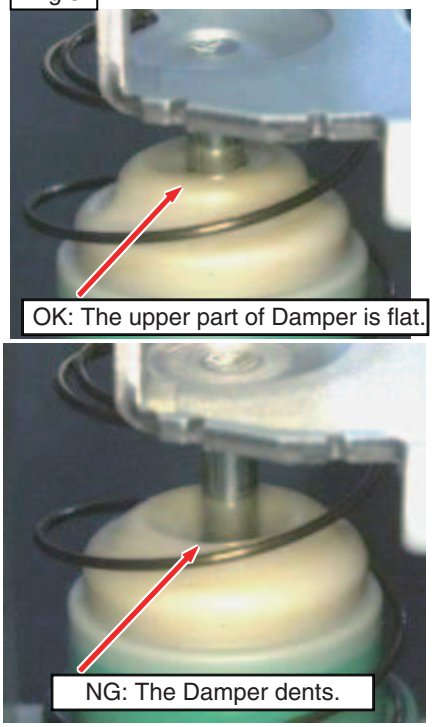


Fig.5



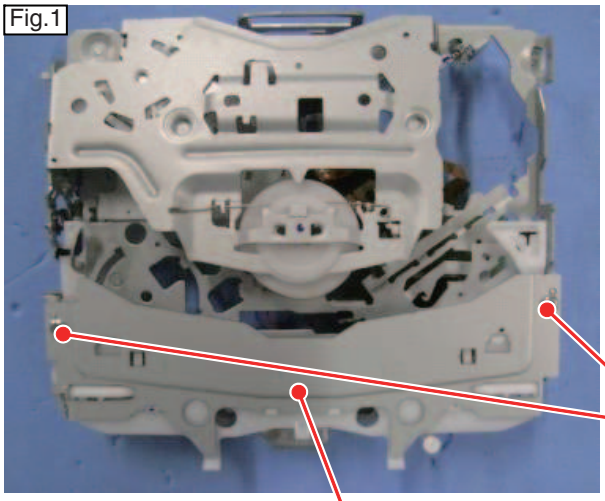
3.8 HOW TO REMOVE THE DISC GUIDE ASSY

How to remove the Roller Transmission Side Gear:

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
2. Remove two Fixing Screws of Guide Bracket, and remove the Disc Guide ASSY. (Fig. 1)
3. Remove two Roller Transmission Side Gears. (Fig. 2)
   (Note) When the Disc Guide ASSY is reinstalled, make sure to install two Side Gears.

Fig.2

Fig.1



3.9 HOW TO REMOVE THE ROLLER ASSY

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
2. Remove the Biasing Spring of Roller ASSY. (Fig. 3)
3. According to the items after Item 2 of “3.11 HOW TO REMOVE THE DISC GUIDE ASSY”, remove the Disc Guide ASSY.
4. Hold A-parts of Roller ASSY and slide them to the left to remove. (Fig. 4)
   (Note) When the Disc Guide ASSY is reinstalled, make sure to install two Side Gears.

Fig.3

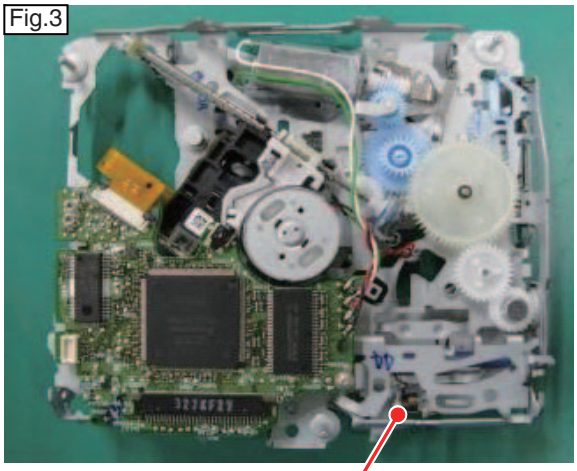
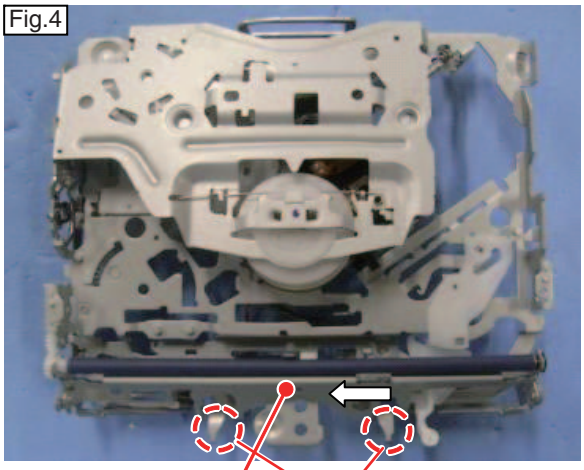


Fig.4



3.10 HOW TO REMOVE AND INSTALL THE CLAMP ARM ASSY

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
2. According to “3.4 HOW TO CREATE EMPTY CLAMP STATUS (CRG MECHANISM)(MANUAL)”, create empty clamp stat
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 it to remove (Fig.1).

Fig.2

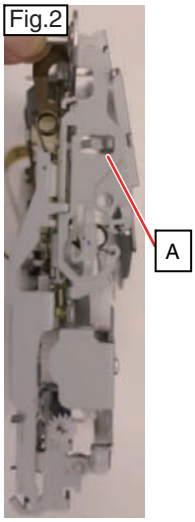


Fig.3

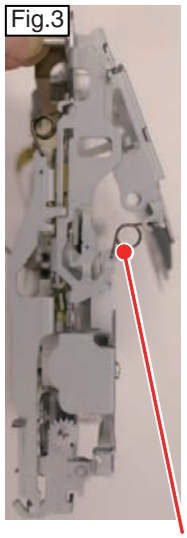
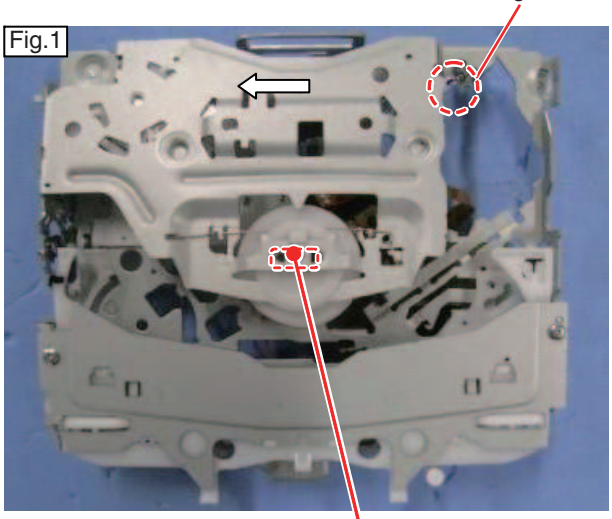


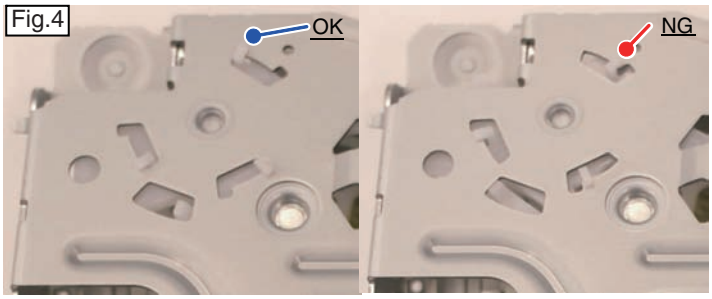
Fig.1



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.

Fig.4



3.11 HOW TO REMOVE THE CRG MOTOR ASSY

How to remove the Drive Gear:

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
2. According to “3.13 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 tweezers and others, and remove the Drive Gear (Fig.1).
5. Narrow the Gear Hook part of Switch Idle Arm with 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 tweezers and others and remove the joint with Chassis (Fig.3).
7. Draw out the Switch Idle Arm from the upper surface side of the 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 two Fixing Screws of CRG Motor and remove the CRG Motor (Fig.3).

(Note) •When the Switch Idle Arm is reinstalled, put the Idle Gear and Worm Wheel temporarily as shown in Fig.5, push the Idle Gear with fingers and install it from the opposite side of the 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.1

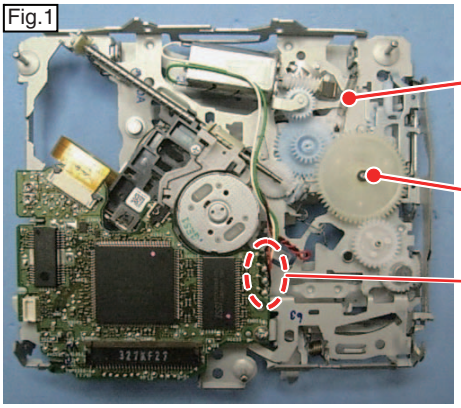
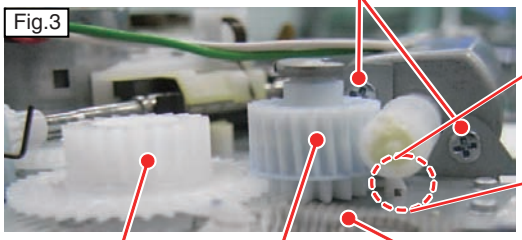


Fig.2a Normal installation state

Fig.2b State where the joint is removed

Fig.3



Switch Idle Arm (Draw upward)

Switch Idle Arm (hook part)

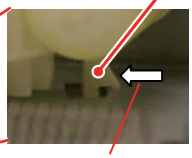


Fig.4

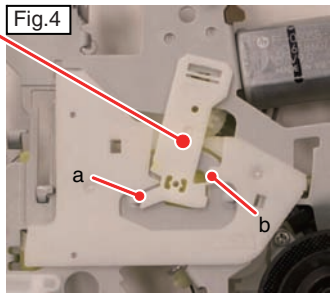
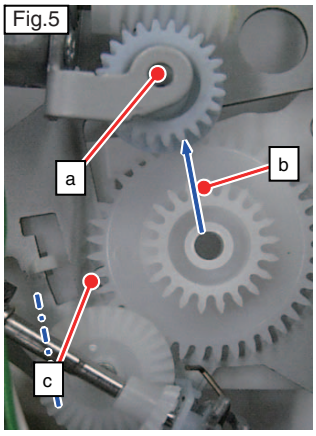


Fig.5



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 ⊔.

Fig.6a

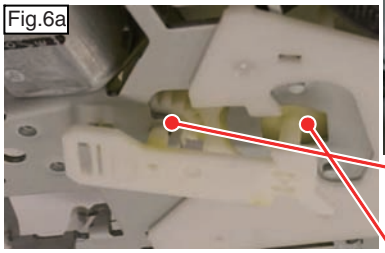


Fig.6b

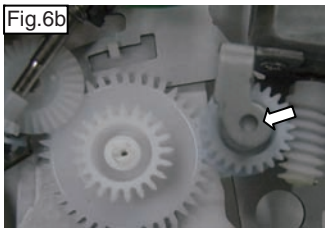
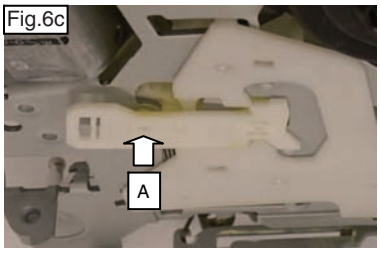


Fig.6c



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 fingers (Fig.6b) and install the Idle Arm.

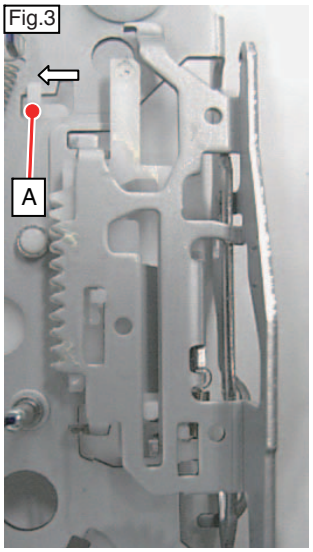
3.12 HOW TO REMOVE THE DRIVE LEVER ASSY

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism ASSY. (Mechanism – Eject status)
2. According to “3.13 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 reinstalled, 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 broken 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.

Fig.3



Biasing Spring of Drive Lever

Fig.1

Fig.2

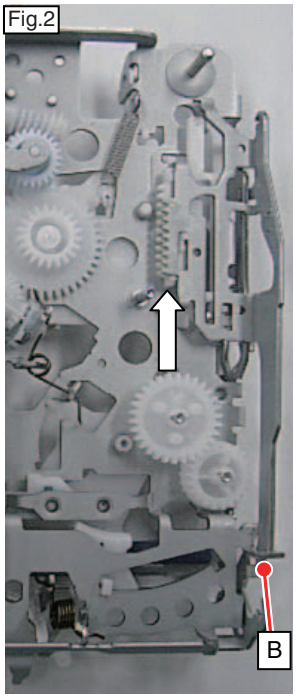


Fig.4

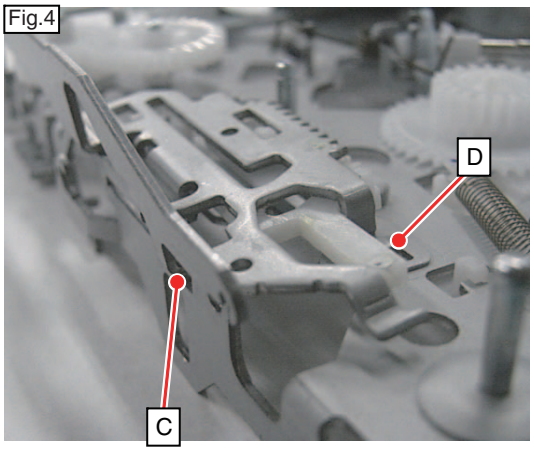
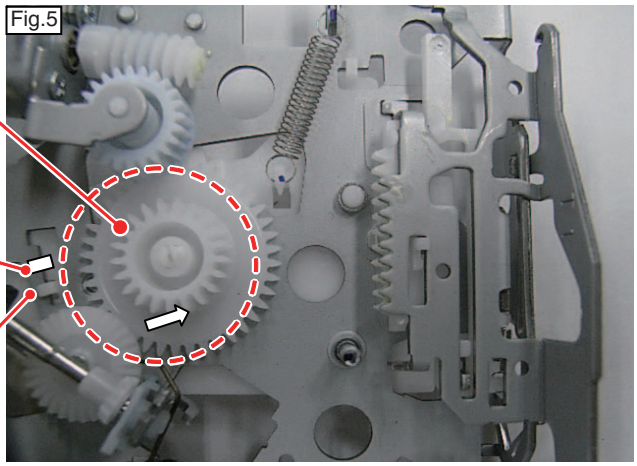


Fig.5



3.13 HOW TO REMOVE THE SW ARM

1. According to “3.12 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.

Return Spring of SW Arm

Fig.1

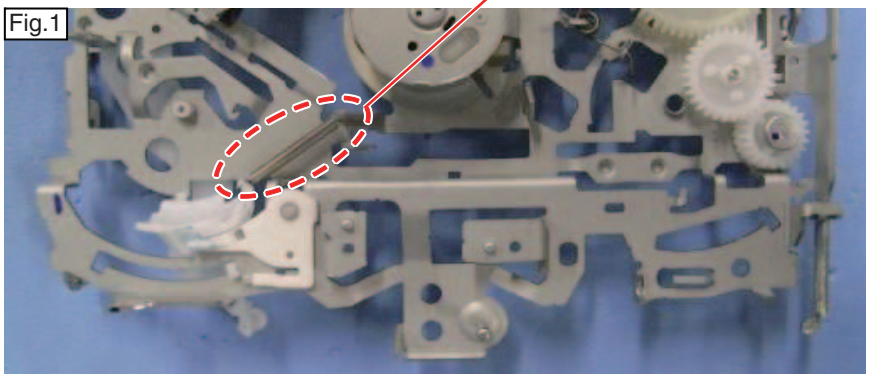
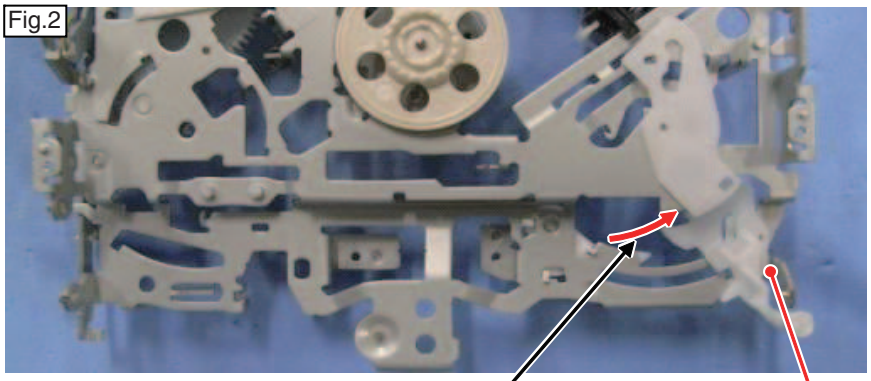


Fig.2

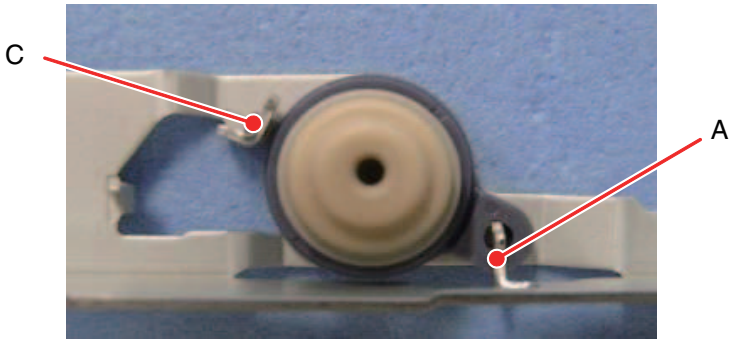


Expand the Right SW Arm

Expand the Right SW Arm until it contacts this point.

3.14 HOW TO REMOVE THE DAMPER

1. According to “3.10 HOW TO REMOVE THE CRG MECHANISM ASSY”, remove the CRG Mechanism.
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.