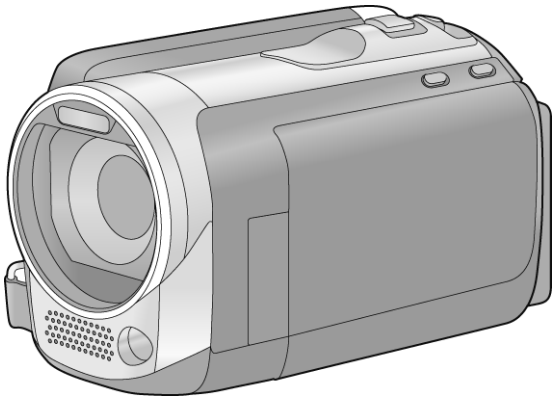
ORDER NO. VM1002005CE
B27

Service Manual

High Definition Video Camera

Model No. **HDC-HS60P**
HDC-HS60PC
HDC-HS60PU
HDC-HS60EB
HDC-HS60EC
HDC-HS60EE
HDC-HS60EF
HDC-HS60EG
HDC-HS60EP
HDC-HS60GC
HDC-HS60GK
HDC-HS60GN
HDC-HS60GT
HDC-HS60SG



Vol. 1
Colour
(K).....Black Type

⚠ WARNING

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

Panasonic®

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1 Safety Precautions

1.1. General Guidelines

1. **IMPORTANT SAFETY NOTICE**
   There are special components used in this equipment which are important for safety. These parts are marked by

   ⚠ in the Schematic Diagrams, Circuit Board Layout, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design without permission of manufacturer.
2. An Isolation Transformer should always be used during the servicing of AC Adaptor whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect AC Adaptor from being damaged by accidental shorting that may occur during servicing.
3. When servicing, observe the original lead dress. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
4. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers shields are properly installed.
5. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

1.2. Leakage Current Cold Check

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the equipment such as screwheads, connectors, control shafts, etc. When the exposed metallic part has a return path to the chassis, the reading should be between 1 MΩ and 5.2 MΩ. When the exposed metal does not have a return path to the chassis, the reading must be infinity.

1.3. Leakage Current Hot Check (See Figure 1.)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5 kΩ, 10 W resistor, in parallel with a 0.15 μF capacitor, between each exposed metallic part on the set and a good earth ground, as shown in Figure 1.
3. Use an AC voltmeter, with 1 kΩ/V or more sensitivity, to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. Reverse the AC plug in the AC outlet and repeat each of the above measurements.
6. The potential at any point should not exceed 0.75 V RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 1/2 mA. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the equipment should be repaired and rechecked before it is returned to the customer.

Hot-Check Circuit

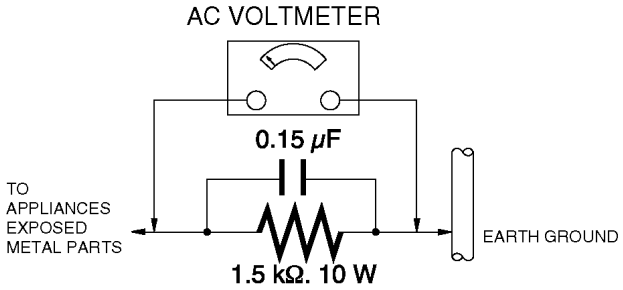


Figure. 1

1.4. How to Discharge the Capacitor on Flash P.C.B.

• This unit equipped with two pieces of capacitors as flash charging capacitors.
"Either one of the capacitor discharging operation" makes discharging for others as well.

CAUTION:

1. **Be sure to discharge the capacitor on FLASH P.C.B..**
2. **Be careful of the high voltage circuit on FLASH P.C.B. when servicing.**

[Discharging Procedure]

1. Refer to the disassemble procedure and Remove the necessary parts/unit.
2. Put the insulation tube onto the lead part of Resistor (ERG5SJ102:1kΩ /5W).
   (an equivalent type of resistor may be used.)
3. Put the resistor between both terminals of capacitor on FLASH P.C.B. for approx. 5 seconds.
4. After discharging confirm that the capacitor voltage is lower than 10V using a voltmeter.

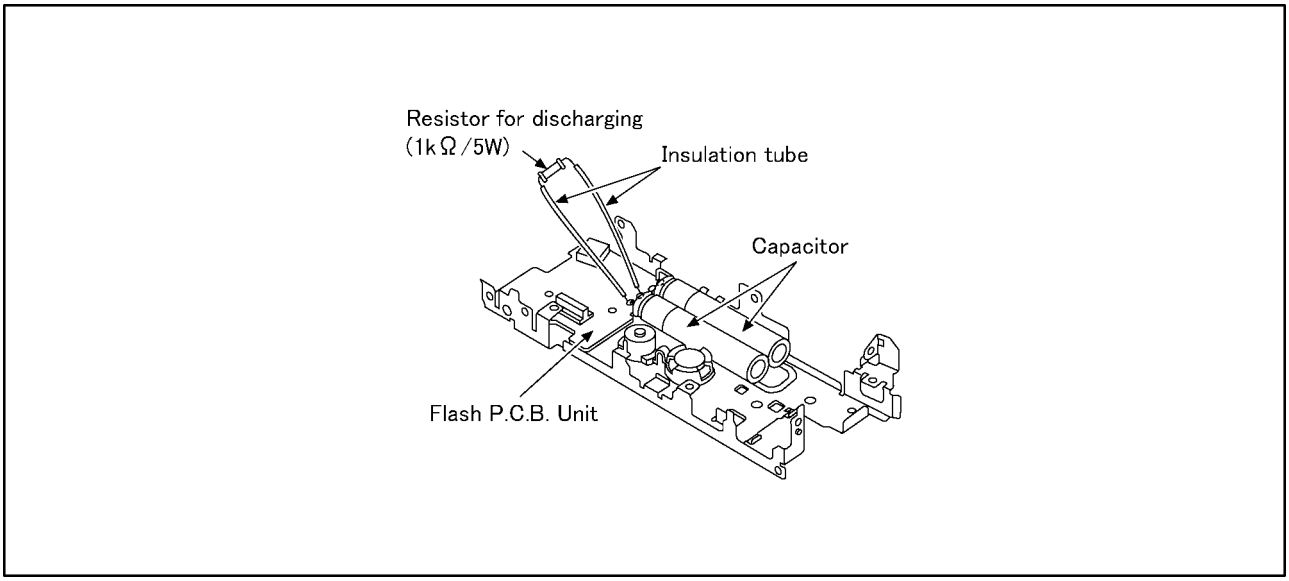


Fig. F1

2 Warning

2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by electrostatic discharge (ESD).

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any ESD on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging ESD wrist strap, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an antistatic solder removal device. Some solder removal devices not classified as "antistatic (ESD protected)" can generate electrical charge sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION :
   Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity (ESD) sufficient to damage an ES device).

2.2. How to Recycle the Lithium Ion Battery (U.S. Only)

ENGLISH

A lithium ion/polymer battery that is recyclable powers the product you have purchased. Please call 1-800-8-BATTERY for information on how to recycle this battery.

FRANÇAIS

L'appareil que vous vous êtes procuré est alimenté par une batterie au lithium-ion/lithium-polymère. Pour des renseignements sur le recyclage de la batterie, veuillez composer le 1-800-8-BATTERY.

2.3. Caution for AC Cord (For EB/GC)

2.3.1. Information for Your Safety

IMPORTANT

Your attention is drawn to the fact that recording of pre-recorded tapes or discs or other published or broadcast material may infringe copyright laws.

WARNING

To reduce the risk of fire or shock hazard, do not expose this equipment to rain or moisture.

CAUTION

To reduce the risk of fire or shock hazard and annoying interference, use the recommended accessories only.

FOR YOUR SAFETY

DO NOT REMOVE THE OUTER COVER

To prevent electric shock, do not remove the cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

2.3.2. Caution for AC Mains Lead

For your safety, please read the following text carefully.

This appliance is supplied with a moulded three-pin mains plug for your safety and convenience.
A 5-ampere fuse is fitted in this plug.
Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 5 amperes and it is approved by ASTA or BSI to BS1362
Check for the ASTA mark or the BSI mark on the body of the fuse.

ASTA mark	BSI mark

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.
If you lose the fuse cover, the plug must not be used until a replacement cover is obtained.
A replacement fuse cover can be purchased from your local Panasonic Dealer.

If the fitted moulded plug is unsuitable for the socket outlet in your home then the fuse should be removed and the plug cut off and disposed of safety.
There is a danger of severe electrical shock if the cut off plug is inserted into any 13-ampere socket.

If a new plug is to be fitted please observe the wiring code as shown below.
If in any doubt, please consult a qualified electrician.

2.3.2.1. Important

The wires in this mains lead are coloured in accordance with the following code:

Blue	Neutral
Brown	Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.

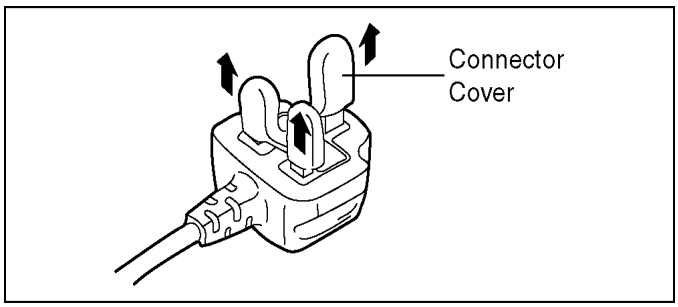
The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

Under no circumstances should either of these wires be connected to the earth terminal of the three pin plug, marked with the letter E or the Earth Symbol.

Earth Symbol	⏚

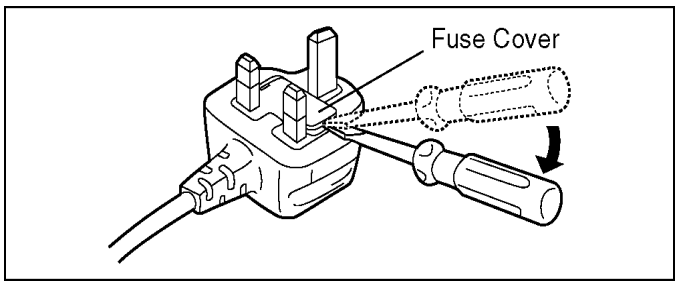
2.3.2.2. Before Use

Remove the Connector Cover as follows.

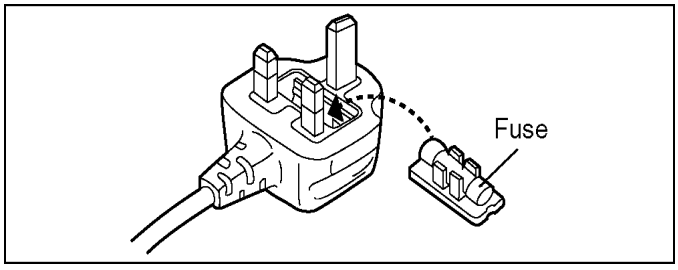


2.3.2.3. How to Replace the Fuse

1. Remove the Fuse Cover with a screwdriver.



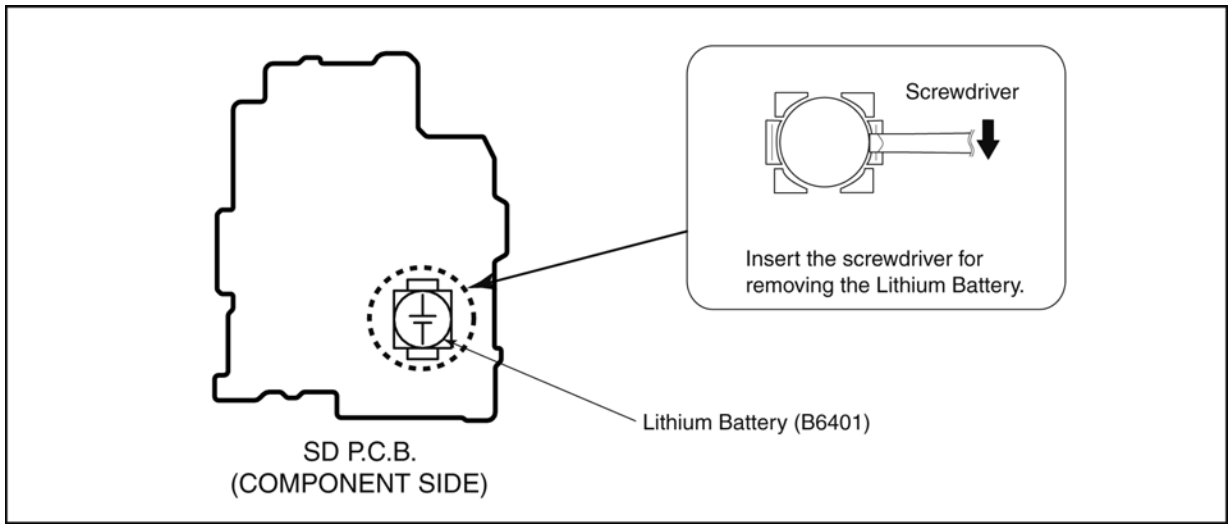
2. Replace the fuse and attach the Fuse cover.



2.4. How to Replace the Lithium Battery

2.4.1. Replacement Procedure

1. Remove the SD P.C.B.. (Refer to Disassembly Procedures.)
2. Remove the Lithium battery (Ref. No. “B6401” at component side of SD P.C.B.) and then replace it into new one.



NOTE:

This Lithium battery is a critical component.
(Type No.: ML-614S/ZTK **Manufactured by Energy Company, Panasonic Corporation**)
It must never be subjected to excessive heat or discharge.
It must therefore only be fitted in requirement designed specifically for its use.
Replacement batteries must be of same type and manufacture.
They must be fitted in the same manner and location as the original battery, with the correct polarity contacts observed.
Do not attempt to re-charge the old battery or re-use it for any other purpose.
It should be disposed of in waste products destined for burial rather than incineration.

(For English)

CAUTION

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

(For German)

ACHTUNG

Explosionsgefahr bei falschem Anbringen der Batterie. Ersetzen Sie nur mit einem äquivalentem vom Hersteller empfohlenem Typ.
Behandeln Sie gebrauchte Batterien nach den Anweisungen des Herstellers.

(For French)

MISE EN GARDE

Une batterie de remplacement inappropriée peut exploser. Ne remplacez qu’avec une batterie identique ou d’un type recommandé par le fabricant. L’élimination des batteries usées doit être faite conformément aux instructions du manufacturier.

NOTE:

Above caution is applicable for a battery pack which is for HDC-HS60 series, as well.

3 Service Navigation

3.1. Introduction

This service manual contains technical information, which allow service personnel's to understand and service this model.
Please place orders using the parts list and not the drawing reference numbers.
If the circuit is changed or modified, the information will be followed by service manual to be controlled with original service manual.

3.2. General Description About Lead Free Solder (PbF)

The lead free solder has been used in the mounting process of all electrical components on the printed circuit boards used for this equipment in considering the globally environmental conservation.
The normal solder is the alloy of tin (Sn) and lead (Pb). On the other hand, the lead free solder is the alloy mainly consists of tin (Sn), silver (Ag) and Copper (Cu), and the melting point of the lead free solder is higher approx.30°C (86°F) more than that of the normal solder.

Distinction of P.C.B. Lead Free Solder being used

The letter of "PbF" is printed either foil side or components side on the P.C.B. using the lead free solder.(See right figure)	PbF

Service caution for repair work using Lead Free Solder (PbF)

- The lead free solder has to be used when repairing the equipment for which the lead free solder is used.
  (Definition: The letter of "PbF" is printed on the P.C.B. using the lead free solder.)
- To put lead free solder, it should be well molten and mixed with the original lead free solder.
- Remove the remaining lead free solder on the P.C.B. cleanly for soldering of the new IC.
- Since the melting point of the lead free solder is higher than that of the normal lead solder, it takes the longer time to melt the lead free solder.
- Use the soldering iron (more than 70W) equipped with the temperature control after setting the temperature at 350±30°C (662±86°F).

Recommended Lead Free Solder (Service Parts Route.)

- The following 3 types of lead free solder are available through the service parts route.
  RFKZ03D01KS----------(0.3mm 100g Reel)
  RFKZ06D01KS----------(0.6mm 100g Reel)
  RFKZ10D01KS----------(1.0mm 100g Reel)

Note

* Ingredient: tin (Sn) 96.5%, silver (Ag) 3.0%, Copper (Cu) 0.5%, Cobalt (Co) / Germanium (Ge) 0.1 to 0.3%

3.3. Important Notice 1

1. The service manual does not contain the following information, because of the impossibility of servicing at component level without concerned equipment/facilities.
   a. Schematic diagram, Block Diagram and P.C.B. layout of MAIN P.C.B..
   b. Parts list for individual parts for MAIN P.C.B..
   When a part replacement is required for repairing MAIN P.C.B., replace as an assembled parts. (Main P.C.B.)
2. The following category is /are recycle module part. Please send it/them to Central Repair Center.
   - MAIN P.C.B. (VEP03H84AN: HDC-HS60P/PC/PU/GT)
   - MAIN P.C.B. (VEP03H84AP: HDC-HS60EB/EC/EF/EG/EP)
   - MAIN P.C.B. (VEP03H84AQ: HDC-HS60EE/GC/GKGN/SG)

3.4. How to Define the Model Suffix (NTSC or PAL model)

There are seven kinds of HDC-HS60.

- a) HDC-HS60P
- b) HDC-HS60PC
- c) HDC-HS60EB/EC/EF/EG/EP/GN
- d) HDC-HS60EE
- e) HDC-HS60GK
- f) HDC-HS60GT
- g) HDC-HS60PU/GC/SG

What is the difference is that the “INITIAL SETTING” data which is stored in Flash ROM mounted on Main P.C.B..

3.4.1. Defining methods:

To define the model suffix to be serviced, refer to the rating label which is putted on the Unit.

a) HDC-HS60P

The nameplate for this model show the following Safety registration mark.

b) HDC-HS60PC

The nameplate for this model show the following Safety registration mark.

c) HDC-HS60EB/EC/EF/EG/EP/GN

The nameplate for these models show the following Safety registration mark.

d) HDC-HS60EE

The nameplate for this model show the following Safety registration mark.

e) HDC-HS60GK

The nameplate for this model show the following Safety registration mark.

f) HDC-HS60GT

The nameplate for this model show the following Safety registration mark.

g) HDC-HS60PU/GC/SG

The nameplate for these models do not show any above Safety registration mark.

NOTE:

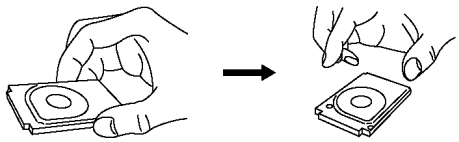
After replacing the MAIN P.C.B., be sure to achieve adjustment.

The adjustment instruction is available at “software download” on the “Support Information from NWBG/VDBG-AVC” web-site in “TSN system”, together with Maintenance software.

3.5. Precautions for Handling HDD

1. Handle HDD very carefully to prevent the static electricity and shock.
2. Set the HDD quickly after taking it out from the package. Make sure to put the HDD on buffer materials, etc.

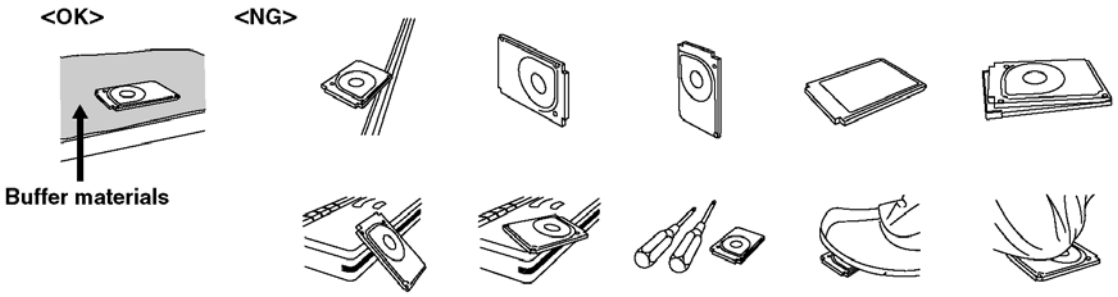
3.5.1. Precautions at incoming process and for opening packages

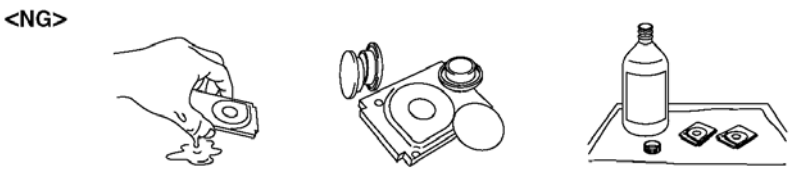
Preventing shock	▪ Do not throw down HDD from luggage carrier or avoid dropping accidentally when unloading. The HDD may not be reliable when impacts of dropping, throwing or rolling occur. ▪ Avoid HDD hitting other equipment or other HDD. Hold HDD firmly but do not apply excessive force when taking out from the package because it is particulars slippery. ▪ When taking out HDD from the package, make sure to put buffer materials such as conductive urethane materials on a work table. Also, a stable place is recommended to avoid impacts or vibration.
Preventing condensation	▪ To prevent dew condensation on HDD due to sharp temperature change, keep it indoors without unpacking, and adjust the package of HDD to room temperature completely before unpacking. ▪ Avoid entrance or window areas where temperature changes easily for storage.
Holding example	▪ Take out HDD holding both sides, not to press the top cover and the center of the device label. <OK>  Don't drop! <NG> 
Preventing static electricity	▪ After opening package, HDD must be handled only by a specified worker in E.S.D.* free environment on a conductive mat. It may cause damage on HDD components due to overvoltage such as electrostatic discharge, etc.

*E.S.D. = Electrostatically Sensitive Devices

3.5.2. Precautions for installing HDD

<table>
<tr><td>Preventing static electricity</td><td>
• HDD may be destroyed by static electricity charged to clothes or human body. Place a conductive mat with removed earthing and use the wrist strap to prevent static charge.

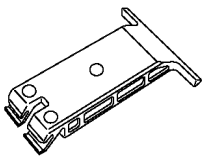

</td></tr>
<tr><td>Preventing shock</td><td>
• Place HDD with its face upward (the device label upward) on the flat and stable surface using buffer materials, etc.
• Do not stand HDD. If it falls down, the excessive impacts may damage HDD.
• Do not store or carry HDD close to other HDD or other components. The components may be distorted due to impacts or weight, which may result in the performance deterioration of the HDD.
• Do not put HDD in the working area. Do not put HDD close to industrial tools in particular or temporarily put it on the floor.
• Be extremely careful not to drop HDD when working on it because even dropping HDD down on the work table with a mat on it may cause damage to HDD.


</td></tr>
<tr><td>No water / solvent</td><td>
• Do not hold HDD with a wet hand or put magnets, solvent, tea, coffee, etc, close to HDD.
This affects internal components and outside of HDD


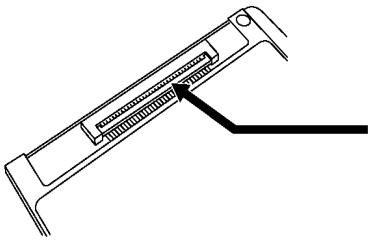
</td></tr>
<tr><td>Connector</td><td>
• The interface connector pin is easily damaged. Push it lightly and firmly to the end along the connector guide.
• For further details, refer to "Precautions for inserting and removing HDD FPC".
</td></tr>
</table>

3.5.3. Precautions for inserting and removing HDD FPC

Make sure to use the tool (LSVQ0112) when locking and unlocking the lock lever of HDD FPC connector.
Do not lock the lock lever without inserting HDD FPC. Otherwise, the connector may be damaged.



(LSVQ0112)

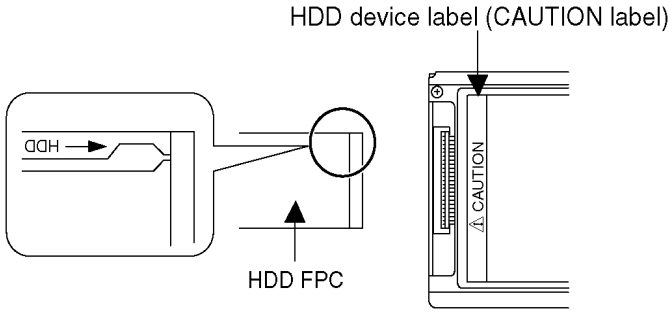


*The lock lever is open on initial condition.

Insert HDD FPC

① Place HDD so that HDD device label (CAUTION label) faces up.
Caution: Do not set the HDD cushion when installing HDD FPC.

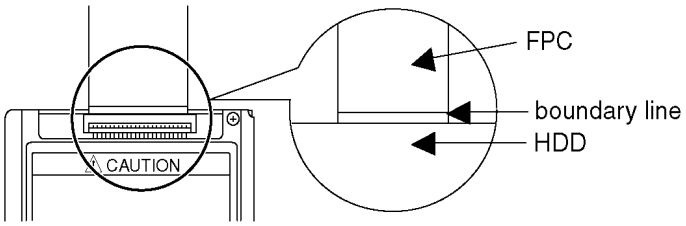
② Insert HDD FPC straight to the connector, and make sure if HDD FPC has been inserted to the end.
Caution: The connector surface of HDD FPC must face down and the letter "HDD" and the arrow must be seen as shown.



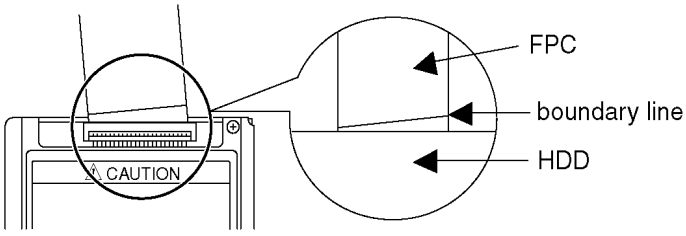
Check HDD FPC

Make sure if HDD FPC has been correctly inserted by confirming the FPC pattern boundary line.

<OK>

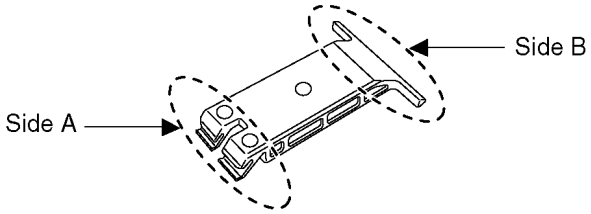


<NG>



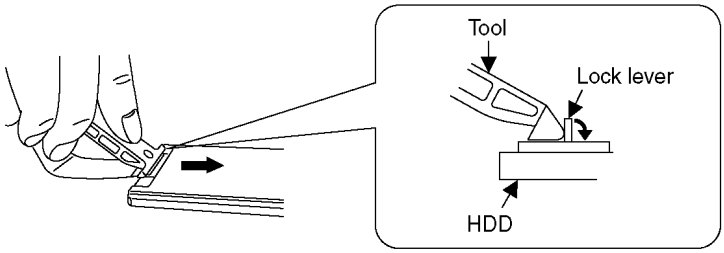
Tool operation

Lock using the tool after inserting HDD FPC.



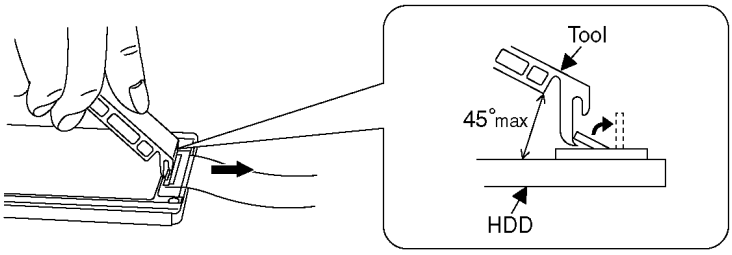
<How to lock>

After inserting HDD FPC, put the tool (Side B) on the connector and slide it slightly to the direction as shown to lock the lock lever.



<How to unlock>

Hook up the tip of the tool (Side A) and unlock the lock lever.
The angle of the tool must be less than 45 degree.



Make sure to use the tool (LSVQ0112) when opening and closing the lock lever.
When install the HDD to main unit, necessary install the HDD FPC and HDD cushion.

3.6. Formatting

[FORMAT MEDIA]

Please be aware that if a medium is formatted, then all the data recorded on the medium will be erased and cannot be restored. Back up important data on a PC, DVD disc etc.

1 Touch [FORMAT MEDIA].

2 Touch [SD CARD] or [HDD].

- When formatting is complete, touch [EXIT] to exit the message screen.
- Perform a physical formatting of the SD card when the SD card is to be disposed/ transferred.
- Perform a physical formatting of the built-in memory/HDD when this unit is to be disposed/ transferred.

- Do not turn this unit off or remove the SD card, while formatting. Do not expose the unit to vibrations or shock.

Use this unit to format media.
Formatting HDD is only available with this unit.
Do not format an SD card using any other equipment such as a PC. The card may not be used on this unit.

When disposing of or giving away this unit, note that:

- Formatting and deletion simply change the file management information and cannot be used to completely erase the data in built-in memory of this unit. The data can be recovered using commercially available software or the like.
- We recommend that you physically format the built-in memory before disposing of or giving away this unit.
- To physically format the HDD, connect the unit via the AC adaptor, select [FORMAT MEDIA] → [HDD] from the menu, and then press and hold the delete button on the screen below for about 3 seconds. When the HDD data deletion screen appears, select [YES], and then follow the on-screen instructions.

- Please look after the data in your built-in memory or HDD carefully. Panasonic will not be held responsible in the unlikely case that private data is divulged.

When disposing of or giving away the SD card, note that:

- Formatting and deletion of this unit or computer only changes the file management information and does not completely delete the data in the SD card.
- It is recommended that the SD card is physically destroyed or the SD card is physically formatted using this unit when disposing of or giving away the SD card.
- To physically format the SD card, connect the unit via the AC adaptor, select [FORMAT MEDIA] → [SD CARD] from the menu, and then press and hold the delete button on the screen below for about 3 seconds. When the SD card data deletion screen appears, select [YES], and then follow the on-screen instructions.

- The customer is responsible for the management of the data in the SD card.

4 Specifications

High Definition Video Camera
Information for your safety

Power source:	DC 5.0 V (When using AC adaptor) DC 3.6 V (When using battery)
Power consumption:	Recording: 4.7 W Charging: 7.7 W

Signal system	1080/60i (NTSC areas), 1080/50i (PAL areas)
Recording format	AVCHD format compliant
Image sensor	1/4.1″ 1MOS image sensor Total: 3320 K Effective pixels: Motion picture: 2110 K (16:9) Still picture: 2320 K (4:3), 2280 K (3:2), 2110 K (16:9)
Lens	Auto Iris, F1.8 to F3.3 Focal length: 3.02 mm to 75.5 mm Macro (Full range AF) 35 mm equivalent: Motion picture: 35.7 mm to 893 mm (16:9) Still picture: 36 mm to 900 mm (4:3) 35.7 mm to 893 mm (3:2) 35.7 mm to 893 mm (16:9) Minimum focus distance: Normal: approx. 4 cm (1.6″) (Wide)/ approx. 1.5 m (4.9 feet) (Tele) Tele macro: approx. 70 cm (28″) (Tele) Intelligent auto Macro: approx. 1 cm (0.4″) (Wide)/ approx. 70 cm (28″) (Tele)
Zoom	25× Optical Zoom, 35× i.Zoom, 60×/1500× Digital Zoom
Monitor	2.7″ wide LCD monitor (approx. 230 K dots)

Microphone		Stereo (with a zoom microphone function)
Speaker		1 round speaker, dynamic type
White balance adjustment		Auto tracking white balance system
Standard illumination		1,400 lx
Minimum required illumination		Approx. 4 lx (1/30 in Low light mode) (NTSC areas) Approx. 1 lx with the Color Night Rec function (NTSC areas) Approx. 4 lx (1/25 in Low light mode) (PAL areas) Approx. 1 lx with the colour night view function (PAL areas)
AV multi connector video output level		AV video output level: 1.0 Vp-p, 75 Ω, NTSC system (NTSC areas) 1.0 Vp-p, 75 Ω, PAL system (PAL areas) Component video output level: Y: 1.0 Vp-p, 75 Ω Pb: 0.7 Vp-p, 75 Ω Pr: 0.7 Vp-p, 75 Ω
HDMI mini connector video output level		HDMI™ (x.v.Color™) 1080i/480p (NTSC areas) HDMI™ (x.v.Color™) 1080i/576p (PAL areas)
AV multi connector audio output level (Line)		316 mV, 600 Ω, 2 ch
HDMI mini connector audio output level		Dolby Digital/Linear PCM
USB	**SD card**	Read only (No copyright protection support) (EB/EC/EF/EG/EP areas) Read/Write (No copyright protection support) (Other areas)
	HDD	Read only
		Hi-Speed USB (USB 2.0), USB terminal Type Mini AB USB host function (for DVD burner)
Flash		Available range: Approx. 1.0 m to 2.5 m (3.3 feet to 8.2 feet)
Dimensions		54.5 mm (W)×65.5 mm (H)×112 mm (D) [2.15 ″ (W)×2.58 ″ (H)×4.37 ″ (D)] (excluding projecting parts)
Mass (Weight)		Approx. 327 g (Approx. 0.72 lbs.) [without battery (supplied)]

Mass (Weight) in operation	Approx. 369 g (Approx. 0.81 lbs.) [with battery (supplied)]
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Operating humidity	10% to 80%
Battery operation time	Refer to “Charging and recording time”

Motion pictures

Recording media	**SD card**	SD Memory Card (FAT12 and FAT16 system compliant) SDHC Memory Card (FAT32 system compliant) SDXC Memory Card (exFAT system compliant) Refer to “Card that you can use with this unit”
	HDD	120 GB
Compression		MPEG-4 AVC/H.264
Recording mode and transfer rate		HA: Approx. 17 Mbps (VBR) HG: Approx. 13 Mbps (VBR) HX: Approx. 9 Mbps (VBR) HE: Approx. 5 Mbps (VBR) Refer to “Recording models/approximate recordable time”
Picture size		HA/HG/HX/HE: 1920×1080/60i (NTSC areas) HA/HG/HX/HE: 1920×1080/50i (PAL areas)
Audio compression		Dolby Digital

Still pictures

Recording media	**SD card**	SD Memory Card (FAT12 and FAT16 system compliant) SDHC Memory Card (FAT32 system compliant) SDXC Memory Card (exFAT system compliant) Refer to “Card that you can use with this unit”
	HDD	120 GB
Compression		JPEG (Design rule for Camera File system, based on Exif 2.2 standard), DPOF corresponding
Picture size		Picture aspect [4:3]: 2592×1944/1600×1200/640×480 Picture aspect [3:2]: 2688×1792/1680×1120 Picture aspect [16:9]: 2816×1584/1920×1080 Refer to “Number of recordable pictures”

AC adaptor
Information for your safety

Power source:	AC 110 V to 240 V, 50/60 Hz
Power consumption:	12 W
DC output:	DC 5.0 V, 1.6 A

Dimensions	46 mm (W)×25 mm (H)×75.5 mm (D) [1.8 ″ (W)×1.0 ″ (H)×3.0 ″ (D)]
Mass (Weight)	Approx. 115 g (Approx. 0.25 lbs.)

Specifications may change without prior notice.

Charging and recording time

■ **Charging/Recording time**

● Temperature: 25 °C (77 °F)/humidity: 60%

NTSC areas					
Battery model number [Voltage/Capacity (minimum)]	**Charging time**	**Recording destination**	**Recording mode**	**Maximum continuous recordable time**	**Actual recordable time**
Supplied battery/ VW-VBK180 (optional) [3.6 V/1790 mAh]	2 h 50 min	HDD	HA/HG/ HX/HE	1 h 35 min	50 min
		SD	HA/HG	1 h 35 min	50 min
			HX/HE	1 h 40 min	
VW-VBK360 (optional) [3.6 V/3580 mAh]	4 h 50 min	HDD	HA/HG/ HX/HE	3 h 15 min	1 h 40 min
		SD	HA	3 h 20 min	1 h 40 min
			HG/HX/ HE	3 h 20 min	1 h 45 min

PAL areas					
Battery model number [Voltage/ Capacity (minimum)]	**Charging time**	**Recording destination**	**Recording mode**	**Maximum continuously recordable time**	**Actual recordable time**
Supplied battery/ VW-VBK180 (optional) [3.6 V/ 1790 mAh]	2 h 50 min	HDD	HA/HG/HX/ HE	1 h 40 min	50 min
		SD	HA	1 h 45 min	50 min
			HG/HX/HE	1 h 45 min	55 min
VW-VBK360 (optional) [3.6 V/ 3580 mAh]	4 h 50 min	HDD	HA	3 h 25 min	1 h 45 min
			HG	3 h 30 min	1 h 45 min
			HX/HE	3 h 30 min	1 h 50 min
		SD	HA/HG/HX/ HE	3 h 35 min	1 h 50 min

● These times are approximations.

● **The indicated charging time is for when the battery has been discharged completely. Charging time and recordable time vary depending on the usage conditions such as high/low temperature.**

● The actual recordable time refers to the recordable time when repeatedly starting/stopping recording, turning the unit on/off, moving the zoom lever etc.

● The batteries heat up after use or charging. This is not a malfunction.

Cards that you can use with this unit

Use SD cards conforming to Class 4 or higher of the SD Speed Class Rating* for motion picture recording.

Card type	Capacity	Motion picture recording	Still picture recording
SD Memory Card	8 MB/16 MB	Cannot be used.	Can be used.
	32 MB/64 MB/ 128 MB/256 MB	Cannot be guaranteed in operation. The recording may suddenly stop during motion picture recording depending on the SD card you use.	
	512 MB/1 GB/ 2 GB	Can be used.	
SDHC Memory Card	4 GB/6 GB/8 GB/ 12 GB/16 GB/ 24 GB/32 GB		
SDXC Memory Card	48 GB/64 GB		

* The SD Speed Class Rating is the speed standard for successive writes.

Recording modes/approximate recordable time

● SD cards are only mentioned with their main memory size.

Recording mode		**HA**	**HG**	**HX**	**HE**
Picture size		**1920×1080**	**1920×1080**	**1920×1080**	**1920×1080**
SD card	**4 GB**	30 min	40 min	1 h	1 h 30 min
	8 GB	1 h	1 h 20 min	2 h	3 h 20 min
	16 GB	2 h	2 h 40 min	4 h 10 min	6 h 40 min
	32 GB	4 h 10 min	5 h 30 min	8 h 20 min	13 h 40 min
	48 GB	6 h 20 min	8 h 10 min	12 h 30 min	20 h 20 min
	64 GB	8 h 30 min	11 h	16 h 50 min	27 h 30 min
HDD	**120 GB**	15 h 50 min	20 h 30 min	31 h 20 min	51 h

Ⓐ Favors image quality

Ⓑ Favors recording time

● The default setting is HG mode.

● Maximum continuously recordable time for one scene: 12 hours

● The recording is paused once when the recording time for one scene exceeds 12 hours, and the recording will automatically resume after a few seconds.

● If a recording with a lot of action is recorded, the recording time is reduced.

● The recordable time may be reduced if recording of short scene is repeated.

● Use time in the row of 4 GB in above table as a guideline for the time that can be copied onto one DVD disc (4.7 GB).

Number of recordable pictures

● SD cards are only mentioned with their main memory size.

Aspect ratio		4:3					
Picture size		5M 2592×1944		1.9M 1600×1200		0.3M 640×480	
Picture quality							
SD card	512 MB	180	280	470	750	3600	6100
	1 GB	370	580	970	1500	7400	12000
	2 GB	750	1100	1990	3100	15000	25000
	4 GB	1400	2350	3900	6100	30000	50000
	8 GB	3000	4700	7900	12000	60500	102000
	16 GB	6000	9500	15900	25000	122000	205000
	24 GB	8900	14000	23000	36000	179000	301000
	32 GB	12000	19000	32000	50000	246000	414000
	48 GB	18000	28000	47000	74000	364000	613000
	64 GB	24000	38000	64000	101000	492000	829000
HDD	120 GB	45000	71000	119000	188000	899100	899100

Aspect ratio		3:2			
Picture size		4.8M 2688×1792		1.9M 1680×1120	
Picture quality					
SD card	512 MB	180	290	490	760
	1 GB	380	600	1000	1500
	2 GB	790	1200	2000	3100
	4 GB	1500	2400	4000	6300
	8 GB	3100	4900	8000	12000
	16 GB	6300	10000	16000	25000
	24 GB	9300	14500	24000	37500
	32 GB	12000	20000	33000	51000
	48 GB	19000	29800	49000	76000
	64 GB	25000	40000	66000	103000
HDD	120 GB	47000	75000	123000	192000

Aspect ratio		16:9			
Picture size		4.5M 2816×1584		2.1M 1920×1080	
Picture quality					
SD card	512 MB	200	320	440	690
	1 GB	410	650	900	1400
	2 GB	850	1300	1800	2800
	4 GB	1680	2600	3600	5600
	8 GB	3400	5300	7300	11000
	16 GB	6800	10000	14000	23000
	24 GB	10000	15800	21000	34000
	32 GB	13000	21000	29000	46000
	48 GB	20000	32000	44000	69000
	64 GB	27000	43000	59000	93000
HDD	120 GB	51000	81000	110000	174000

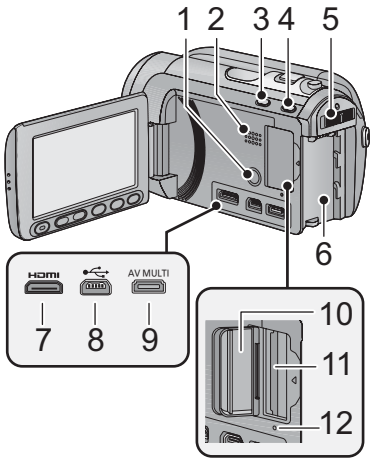
● The numbers shown in the table are approximations.

● **The number of recordable pictures depends on whether and are used together and on the subject being recorded.**

● Maximum number of recordable pictures that can be displayed is 99999.
If the number of recordable pictures exceeds 99999, the number will not change when the picture is taken until the number of recordable pictures gets less than 99999.

● The memory capacity indicated on the label of an SD card is the total of the capacity for opyright protection and management and the capacity which can be used on the unit, a PC etc.

5 Location of Controls and Components

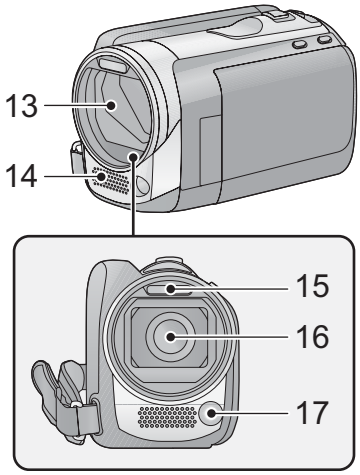


1 Power button [⏻/I]
2 Speaker
3 Intelligent auto/Manual button [iA/MANUAL]
4 Optical image stabilizer button [((✋))/O.I.S.]
5 Mode switch
6 Battery holder
7 HDMI mini connector [HDMI]

8 USB terminal [⇐]
9 AV multi connector [AV MULTI]

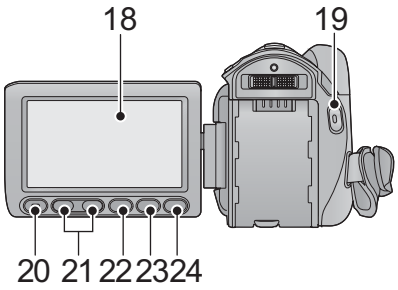
- Use the AV multi cable (only the supplied cable).

10 SD card cover
11 Card slot
12 Access lamp [ACCESS]

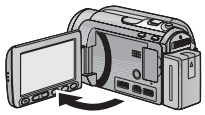


13 Lens cover
- The lens cover opens in 🎥 Motion Picture Recording Mode or 📷 Still Picture Recording Mode.

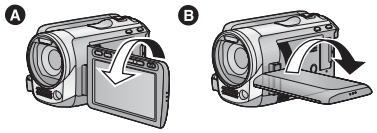
14 Internal stereo microphones
15 Built-in flash
16 Lens
17 Video light



18 LCD monitor (Touch screen)



- It can open up to 90°.

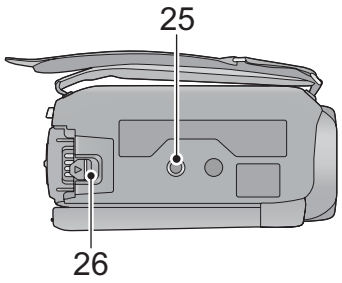


- It can rotate up to 180° Ⓐ towards the lens or 90° Ⓑ towards the opposite direction.

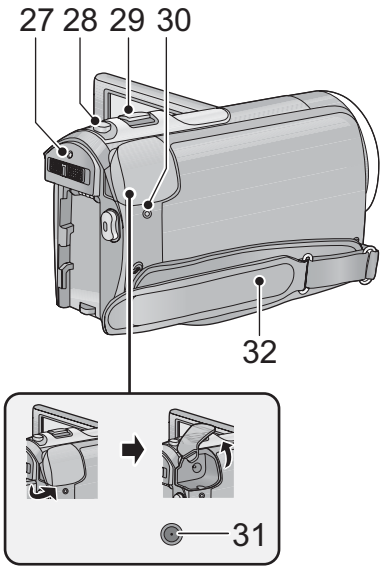
> Due to limitations in LCD production technology, there may be some tiny bright or dark spots on the LCD monitor screen. However, this is not a malfunction and does not affect the recorded picture.

19 Recording start/stop button
20 Sub recording start/stop button
- This button functions in the same manner as the recording start/stop button.

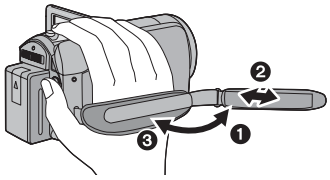
21 Adjust zoom buttons
22 Menu button [MENU]
23 Video light button [LIGHT]
24 Delete button [🗑]



25 Tripod receptacle
26 Battery release lever [BATTERY]



27 Status indicator
28 Photoshot button [ ]
29 Zoom lever [W/T] (In Motion Picture Recording Mode or Still Picture Recording Mode)
Thumbnail display switch [/]/ Volume lever [−VOL+] (In Playback Mode)
30 HDD access lamp [ACCESS HDD]
31 DC input terminal
● Do not use any other AC adaptors except the supplied one.
32 Grip belt

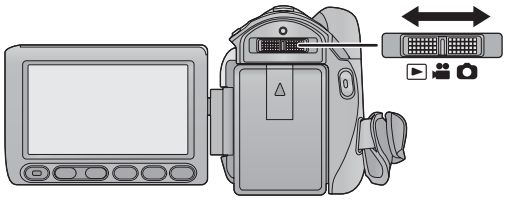


❶ Flip the belt.
❷ Adjust the length.
❸ Replace the belt.

Selecting a mode

Change the mode to recording or playback.

Operate the mode switch to change the mode to , or .



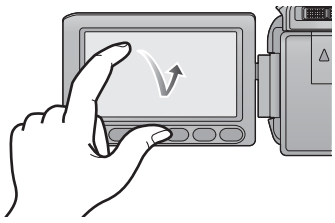
	Motion Picture Recording Mode
	Still Picture Recording Mode
	Playback Mode

How to use the touch screen

You can operate by directly touching the LCD monitor (touch screen) with your finger. It is easier to use the stylus pen (supplied) for detailed operation or if it is hard to operate with your fingers.

■ Touch

Touch and release the touch screen to select icon or picture.



- Touch the center of the icon.
- Touching the touch screen will not operate while you are touching another part of the touch screen.

■ About the operation icons

/ / / :

These icons are used to switch the menu and thumbnail display page, for item selection and setting etc.

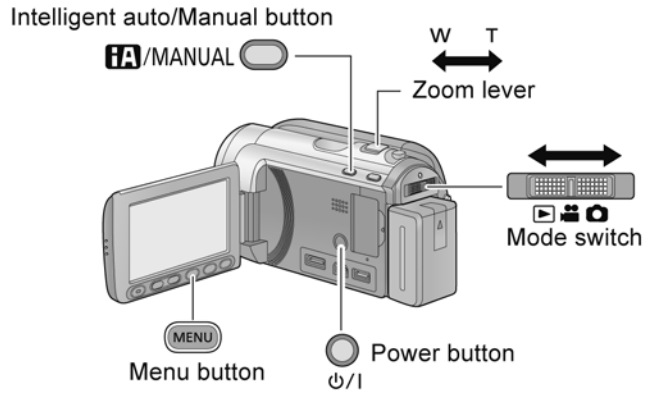
:

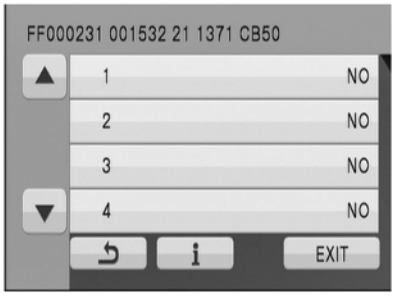
Touch to return to the previous screen such as when setting menus

- Do not touch on the LCD monitor with hard pointed tips, such as ball point pens.
- Perform the touch screen calibration when the touch is not recognized or wrong location is recognized.

6 Service Mode

1. **Indication method of the service menu**
   Set the mode dial “Motion Picture Recording” mode.
2. Turn the power on, and then while keep pressing the "Zoom lever" to W side, "Intelligent auto/Manual" button and "Menu" button for more than 3 seconds until the top screen of the Service Mode Menu being displayed.





Top Screen of the service mode menu

Service mode menu

Screen display	Contents	Function
1	Factory settings	Function to throw a product up in a factory shipment state (When recorded data in HDD, “error display” is done)
2	Drive information display	Fall detection frequency of HDD, Frequency that exceeds highest/lowest operation guarantee temperature and serial number display
3	HDD self check execution	Function to check self as for the state of HDD
4	Lock search history indication	Display an error cord for three histories saved in EEPROM
5	Power ON self check result display	Power ON self check (function to diagnose correct function of the device and interface between devices) result display
6	HDD hardware test	Function to confirm state of HDD hardware

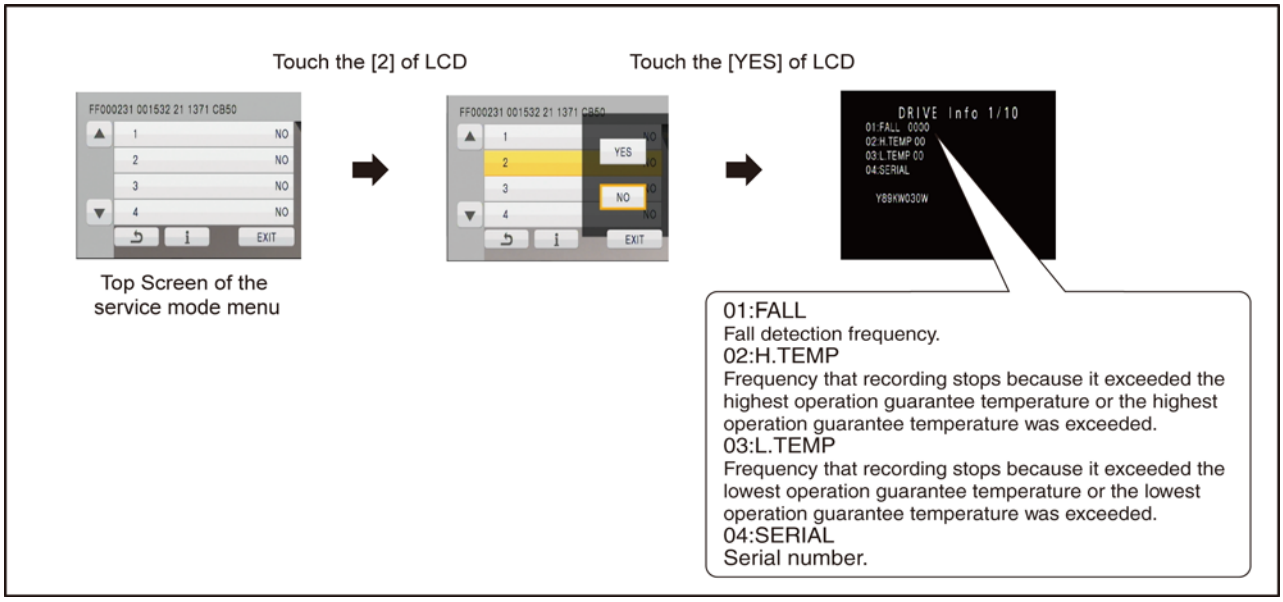
NOTE:
Do not using service mode except above table of Service Menu.

3. End method of the top screen of the service menu
   Push the menu button to end the service mode, and then POWER OFF.

6.1. Drive Information Display

Touch the [2] of LCD, select Drive Information display.

Operation specifications



Indication contents

- Drive Information display

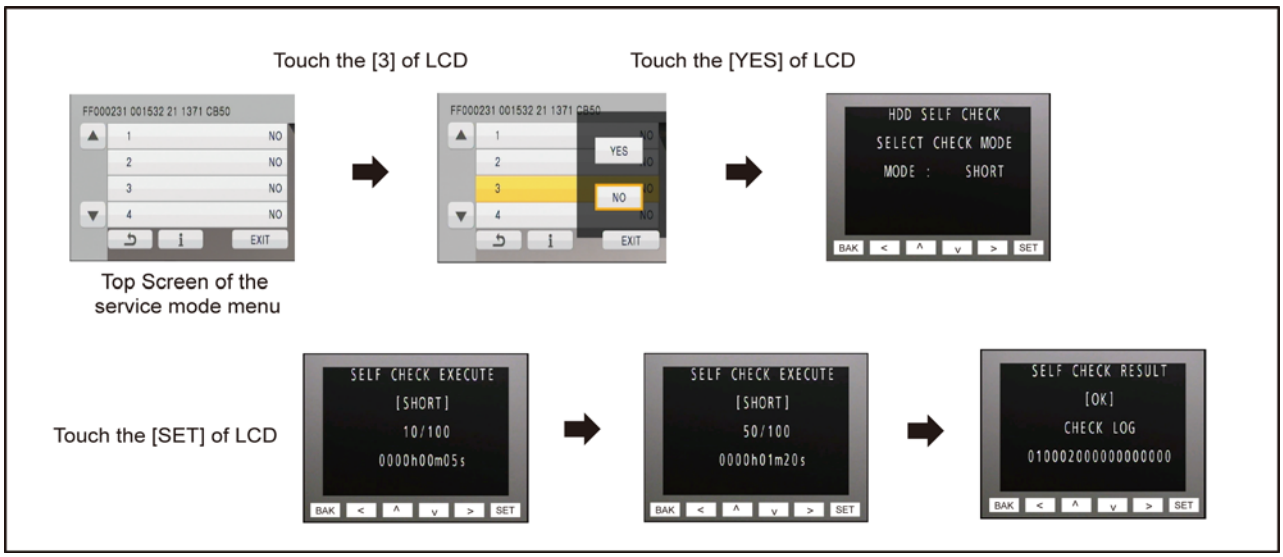
  Display the fall detection frequency of HDD, Frequency that exceeds highest/lowest operation guarantee temperature and serial number.

  Push the menu button to end the service mode, and then POWER OFF.

6.2. HDD Self Check Execution

Touch the [3] of LCD, select HDD self check execution.

Operation specifications



Indication contents

- HDD self check execution

  Display the HDD self check result information.

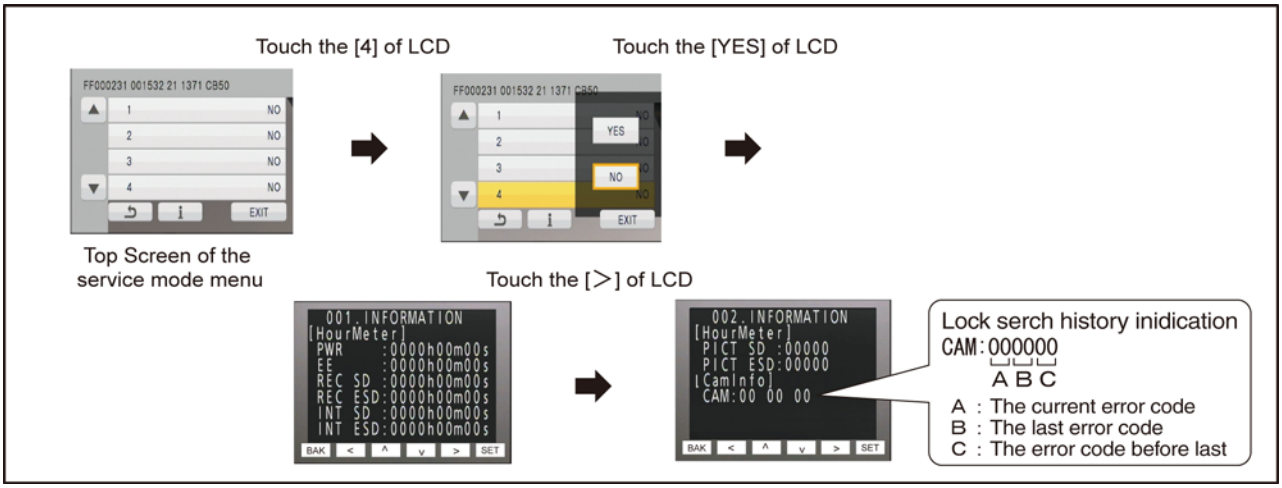
  Displays other than “OK” are abnormalities of HDD.

  Push the menu button to end the service mode, and then POWER OFF.

6.3. Lock Search History Indication

Touch the [4] of LCD, select Lock search history indication.

Operation specifications



Indication contents

- Lock search history indication
  Display the camera system error cord for three histories saved in EEPROM.
- The error cord contents which are displayed

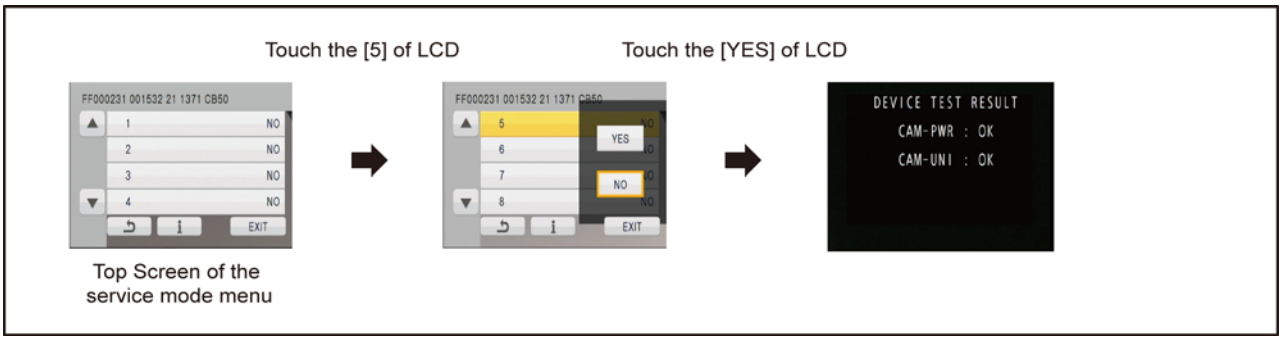
Error code	Function
51	Focus control is abnormal
52	Zoom control is abnormal
53	OIS lens control is abnormal
71	Lens cover open/close is abnormal
72	Cooling fan is abnormal
73	High temperature is abnormal
33	Communication between camera to ARM is abnormal

Lock search history indication is finished by POWER OFF.

6.4. Power ON Self Check Result Display

Touch the [5] of LCD, select Power ON self check result display.

Operation specifications



Indication contents

- Power ON self check result display
  Function to diagnose correct function of the device and interface between devices result display.

  Display the following commnucation test result.
  - CAM-PWR : Commnucation test between IC2006 to IC301
  - CAM-UNI : Commnucation test between IC3401 to IC301

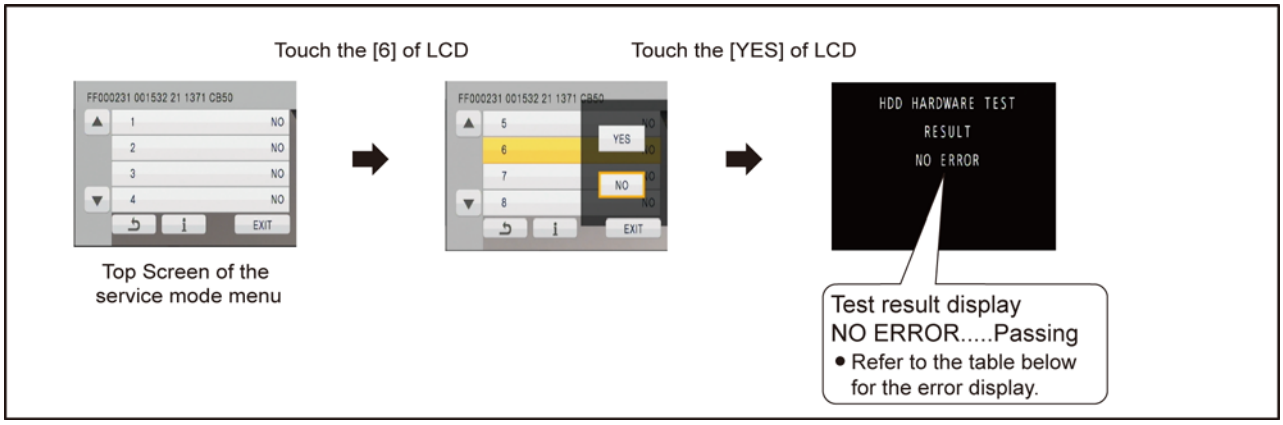
  Display other than “OK” are abnomalities of each lines.

Cutting of battery connection or AC power supply connection to end the service mode.

6.5. HDD Hardware Test

Touch the [6] of LCD, select HDD hardware test.

Operation specifications



Indication contents

- HDD hardware test
  Display the HDD hardware test result information.
- The error cord contents which are displayed

Error code	Function
NO ERROR	It is normal without the error
CTR ERROR	Controller Resistor Error
BUFF RAM ERROR	Buffer RAM Error
ECC DEV ERROR	ECC device Error
CPU ERROR	CPU RAM/ROM Error
COMMAND ERROR	Reserved

In the above table, displays other than “NO ERROR” are abnormalities of HDD.
Push the menu button to end the service mode, and then POWER OFF.

7 Service Fixture & Tools

7.1. When Replacing the Main P.C.B.

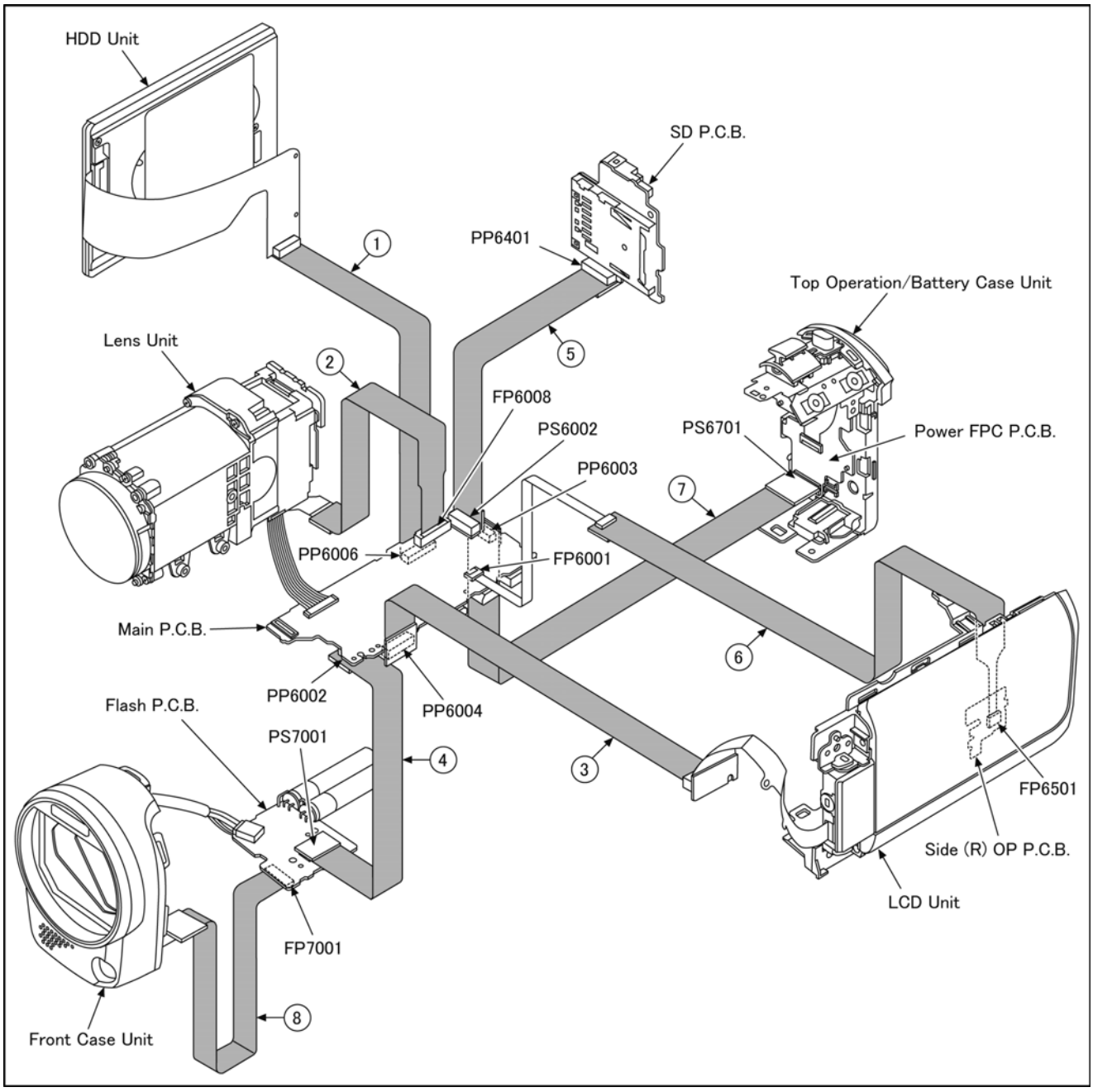
After replacing the MAIN P.C.B., be sure to achieve adjustment.
The adjustment instruction is available at “software download” on the “Support Information from NWBG/VDBG-AVC” web-site in “TSN system”, together with Maintenance software.

7.2. Service Position

This Service Position is used for checking and replacing parts. Use the following Extension cables for servicing.

Table S1 Extension Cable List

No.	Parts No.	Connection	Form
1	RFKZ0379	PP6006(MAIN) - HDD FPC	40PIN 0.5 B to B
2	RFKZ0448	FP6008(MAIN) - LENS UNIT	33PIN 0.3 FPC
3	VFK1933	PP6004(MAIN) - MONITOR FPC	34PIN 0.5 B to B
4	RFKZ0343	PP6002(MAIN) - PS7001(FLASH)	30PIN 0.5 B to B
5	RFKZ0379	PS6002(MAIN) - PP6401(SD)	40PIN 0.5 B to B
6	VFK1480	FP6001(MAIN) - FP6501(SIDE (R) OP)	6PIN 0.5 FFC
7	VFK1933	PP6003(MAIN) - PS6701(POWER FPC)	34PIN 0.5 B to B
8	VFK1286	FP7001(FLASH) - FRONT CASE UNIT	16PIN 0.5 FFC



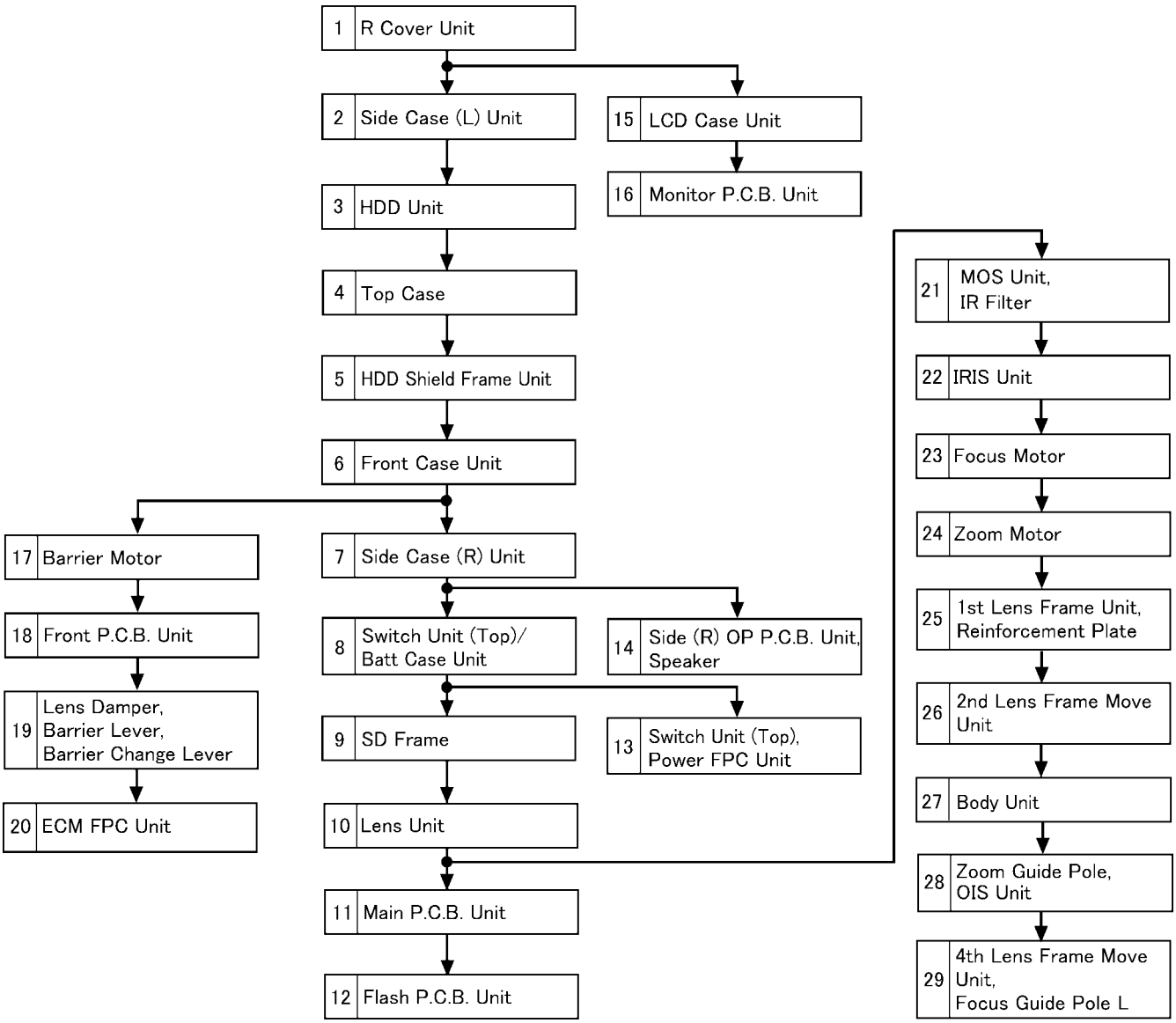
CAUTION-1. (When servicing FLASH P.C.B.)

1. Be sure to discharge the capacitor on FLASH P.C.B..
   Refer to “HOW TO DISCHARGE THE CAPACITOR ON FLASH P.C.B.”.
   The capacitor voltage is not lowered soon even if the AC Cord is unplugged or the battery is removed.
2. Be careful of the high voltage circuit on FLASH P.C.B..
3. DO NOT allow other parts to touch the high voltage circuit on FLASH P.C.B..

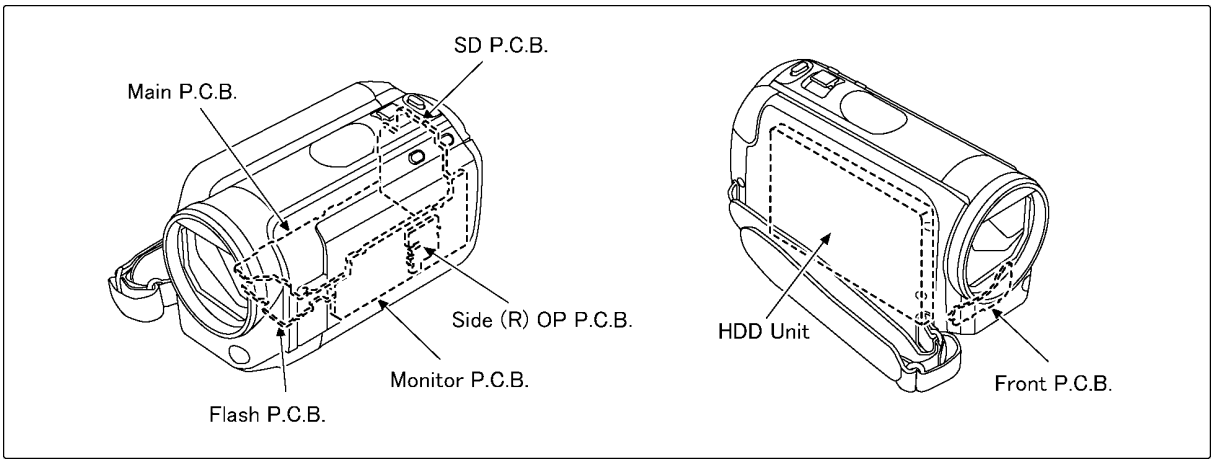
8 Disassembly and Assembly Instructions

8.1. Disassembly Flow Chart

This is a disassembling chart.
When assembling, perform this chart conversely.



8.2. PCB Location



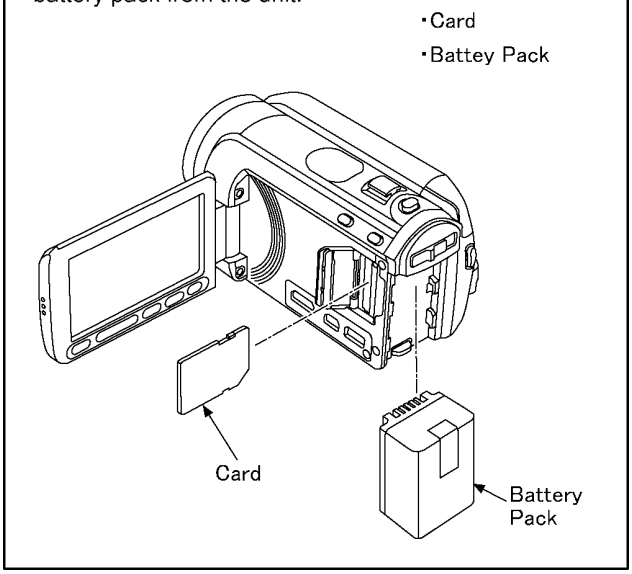
8.3. Disassembly Procedure

No.	Item	Fig	Removal
1	R Cover Unit	Fig.D1	2 Screws (A)
			1 Screw (B)
		Fig.D2	3 Locking tabs
			R Cover Unit
2	Side Case (L) Unit	Fig.D3	6 Screws (C)
		Fig.D4	5 Locking tabs
			Side Case (L) Unit
3	HDD Unit	Fig.D5	PP6006 (Connector)
		Fig.D6	2 HDD Cushions
			HDD Unit
4	Top Case	Fig.D7	1 Screw (D)
			2 Screws (E)
			2 Ribs
		Fig.D8	Top Case
5	HDD Shield Frame Unit	Fig.D9	2 Screws (F)
			HDD Shield Frame Unit
6	Front Case Unit	Fig.D10	1 Screw (G)
			1 Screw (H)
			Front Under Cover
			1 Locking tab
			2 Ribs
			P7001 (Connector)
			P7002 (Connector)
			FP7001 (Flex)
			Front Case Unit
7	Side Case (R) Unit	Fig.D11	1 Screw (I)
			1 Screw (J)
			1 Screw (K)
			2 Screws (L)
			1 Rib
			2 Locking tabs
			FP6501 (Flex)
			PP6004 (Connector)
			Side Case (R) Unit
8	Switch Unit (Top)/ Batt Case Unit	Fig.D12	1 Screw (M)
			2 Locking tabs
			Switch Unit (Top)/ Batt Case Unit
9	SD Frame	Fig.D13	2 Screws (N)
			PP6401 (Connector)
			SD Frame
10	Lens Unit	Fig.D14	1 Screw (O)
			1 Rib
			P6001 (Connector)
			FP6008 (Flex)
			1 Screw (P)
			1 Screw (Q)
			Lens Frame R Unit
			Radiation Plate Unit
			Lens Unit
11	Main P.C.B. Unit	Fig.D15	3 Screws (R)
			PP6002 (Connector)
			Main P.C.B. Unit
12	Flash P.C.B. Unit	Fig.D16	2 Screws (S)
			Flash P.C.B. Unit
		Fig.D17	Discharge of the Capacitor
13	Switch Unit (Top) Power FPC Unit	Fig.D18	FP6701 (Flex)
			2 Screws (T)
			6 Ribs
			Switch Unit (Top)
			Power FPC Unit

No.	Item	Fig	Removal
14	Side (R) OP P.C.B. Unit Speaker	Fig.D19	2 Screws (U)
			1 Screw (V)
			P6501 (Connector)
			SP Angle
			Side (R) OP P.C.B. Unit
			Speaker
15	LCD Case Unit	Fig.D20	2 Screws (W)
			Switch Unit
			Light Guide Plate
			Earth Plate
			3 Ribs
			LCD Case Unit
16	Monitor P.C.B. Unit	Fig.D21	FP904 (Flex)
			FP905 (Flex)
			2 Ribs
			LCD Frame
		Fig.D22	FP903 (Flex)
			4 Locking tabs
			Monitor P.C.B. Unit
		Fig.D23	1 Locking tab
			Reflection Sheet
			Light Guide Plate
			Diffusion Sheet
			Prism Sheet B
			Prism Sheet A
			Lens Holder
			Monitor P.C.B. Unit
17	Barrier Motor	Fig.D24	1 Screw (Z)
			4 Screws (a)
			Front Frame
			FP6600 (Flex)
			Barrier Motor
18	Front P.C.B. Unit	Fig.D25	1 Screw (b)
			FP6601 (Flex)
			Front P.C.B. Unit
19	Lens Damper Barrier Lever Barrier Change Lever	Fig.D26	2 Barrier Springs
			LED Light Lens
			2 Locking tabs
			Lens Damper
			Barrier Lever
			Barrier Change Lever
20	ECM FPC Unit	Fig.D27	1 Screw (c)
			2 Locking tabs
			Front Base
			ECM FPC Unit
21	MOS Unit IR Filter	Fig.D28	2 Screws (d)
			MOS Cushion
			MOS Unit
			IR Filter
22	IRIS Unit	Fig.D29	20 Points Solder
			3 Screws (e)
			2 Ribs
		Fig.D30	IRIS Unit
23	Focus Motor	Fig.D31	1 Screw (f)
			Focus Motor
24	Zoom Motor	Fig.D32	2 Screws (g)
			Zoom Motor
25	1st Lens Frame Unit Reinforcement Plate	Fig.D33	3 Screws (h)
			2 1st Lens Frame Springs
			3 Screws (i)
			1st Lens Frame Unit
			Reinforcement Plate
26	2nd Lens Frame Move Unit	Fig.D34	2nd Lens Frame Move Unit

No.	Item	Fig	Removal
27	Body Unit	Fig.D35	3 Screws (j)
			Body Unit
28	Zoom Guide Pole OIS Unit	Fig.D36	2 Zoom Guide Poles
			OIS Unit
29	4th Lens Frame Move Unit Focus Guide Pole L	Fig.D37	4th Lens Frame Move Unit
			2 Focus Guide Poles L

NOTE:
When servicing and reassembling, remove the card and battery pack from the unit.



8.3.1. Removal of the R Cover Unit

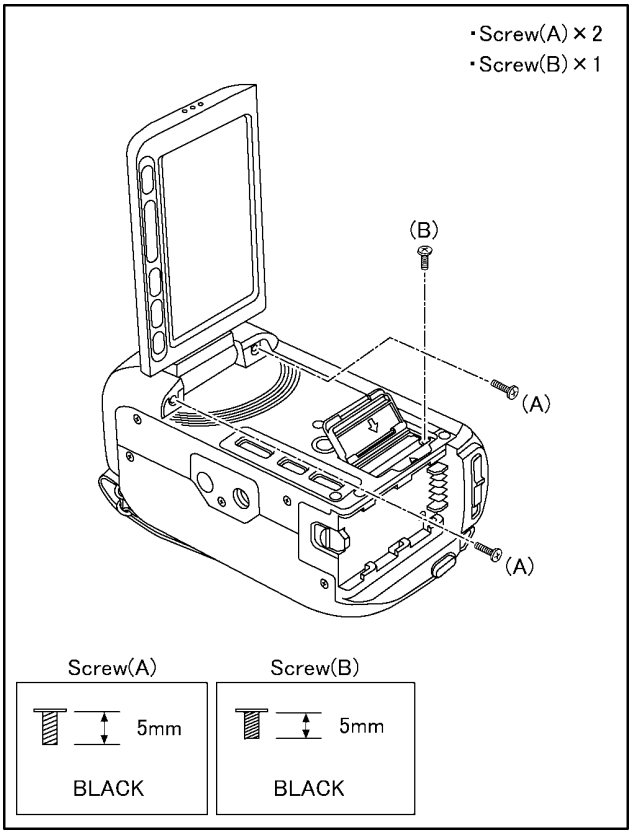


Fig.D1

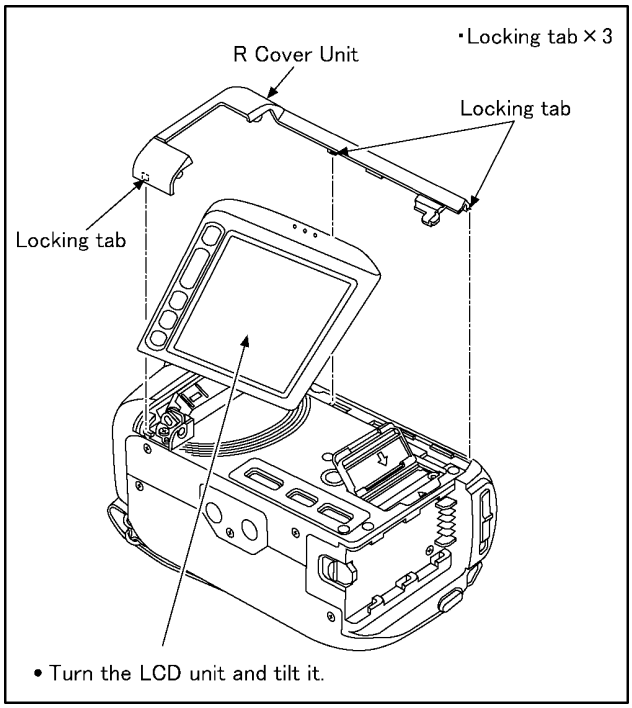


Fig.D2

8.3.2. Removal of the Side Case (L) Unit

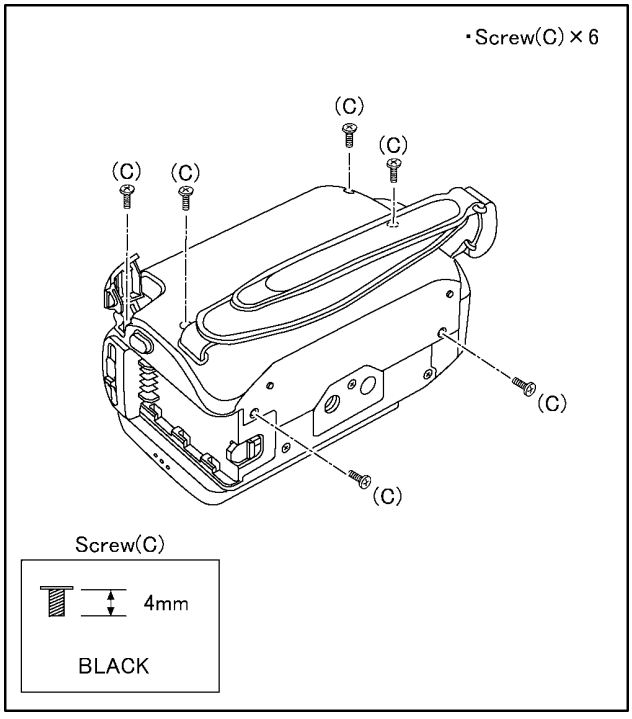


Fig.D3

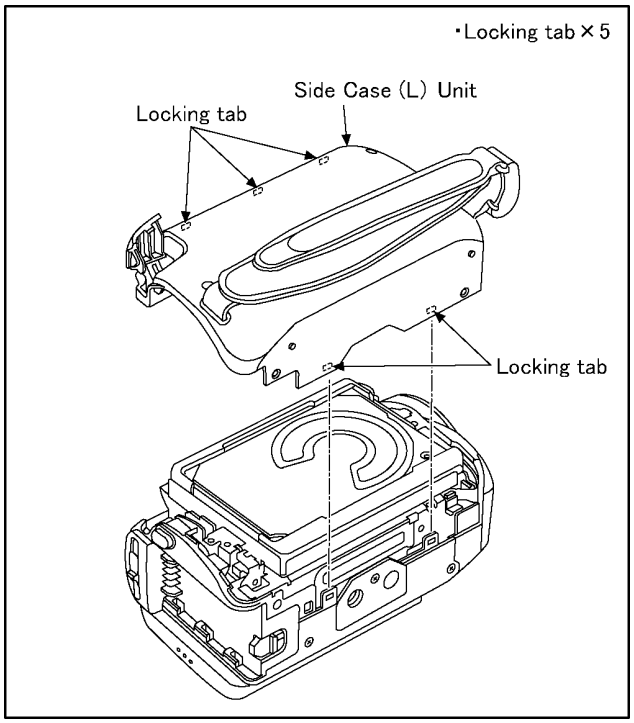


Fig.D4

8.3.3. Removal of the HDD Unit

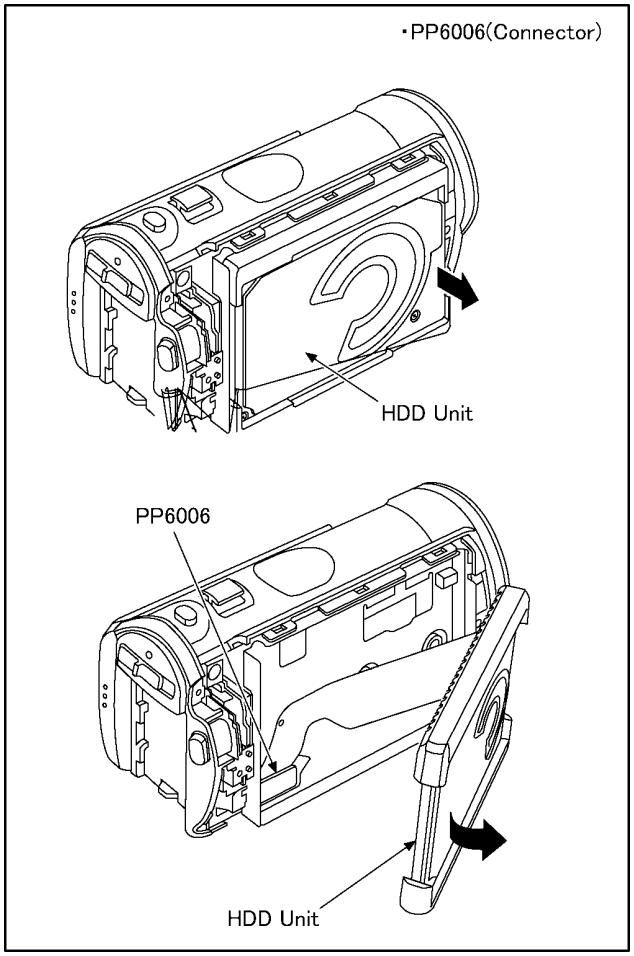


Fig.D5

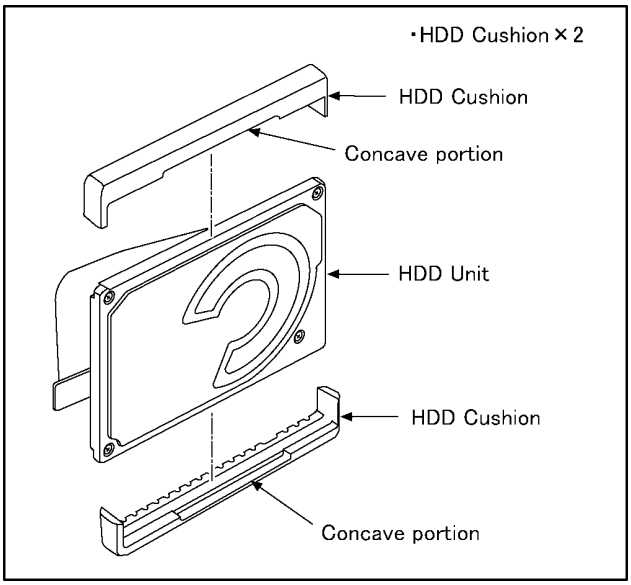


Fig.D6

8.3.4. Removal of the Top Case

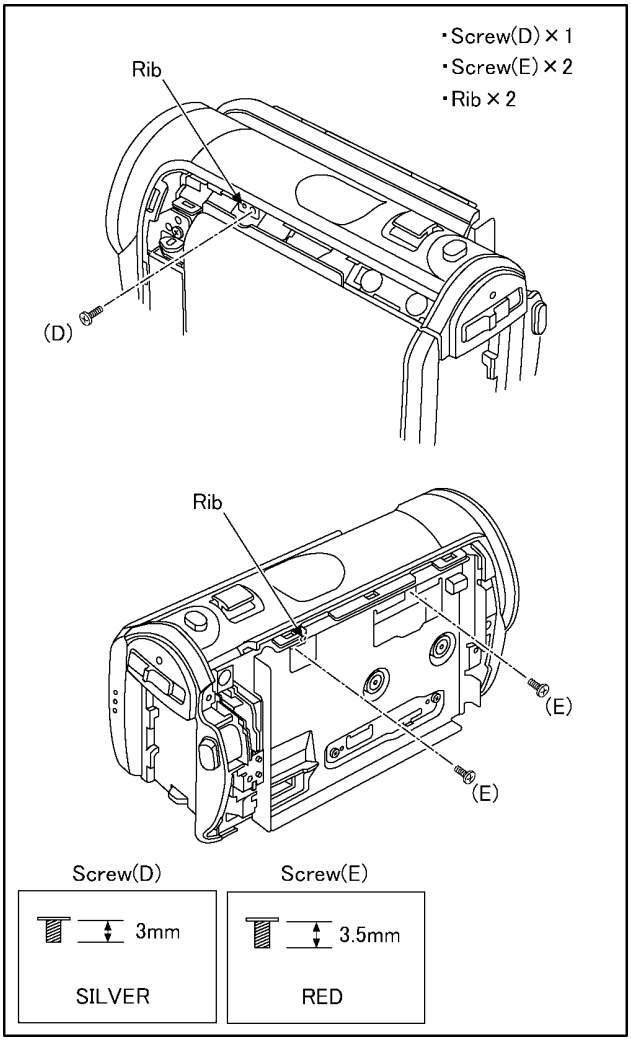


Fig.D7

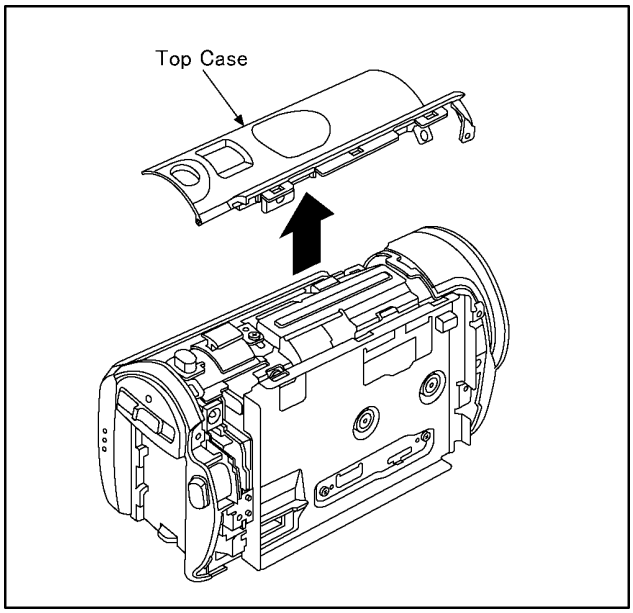


Fig.D8

8.3.5. Removal of the HDD Shield Frame Unit

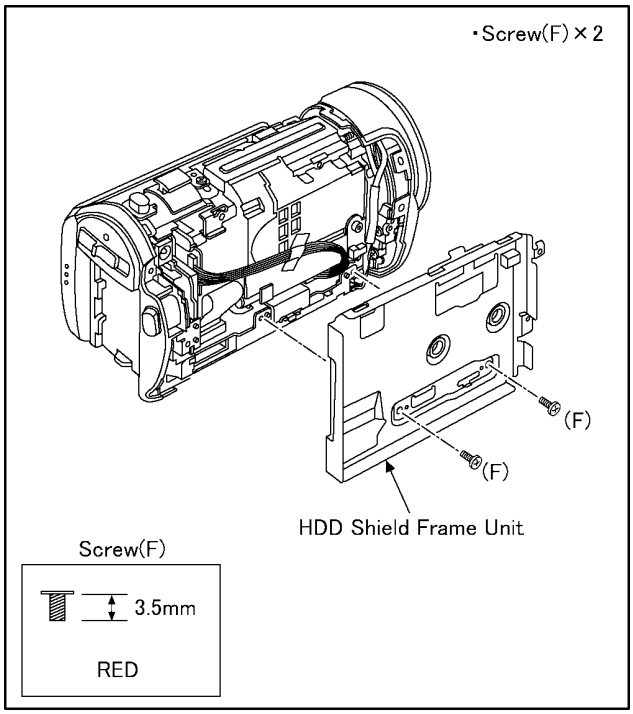


Fig.D9

8.3.6. Removal of the Front Case Unit

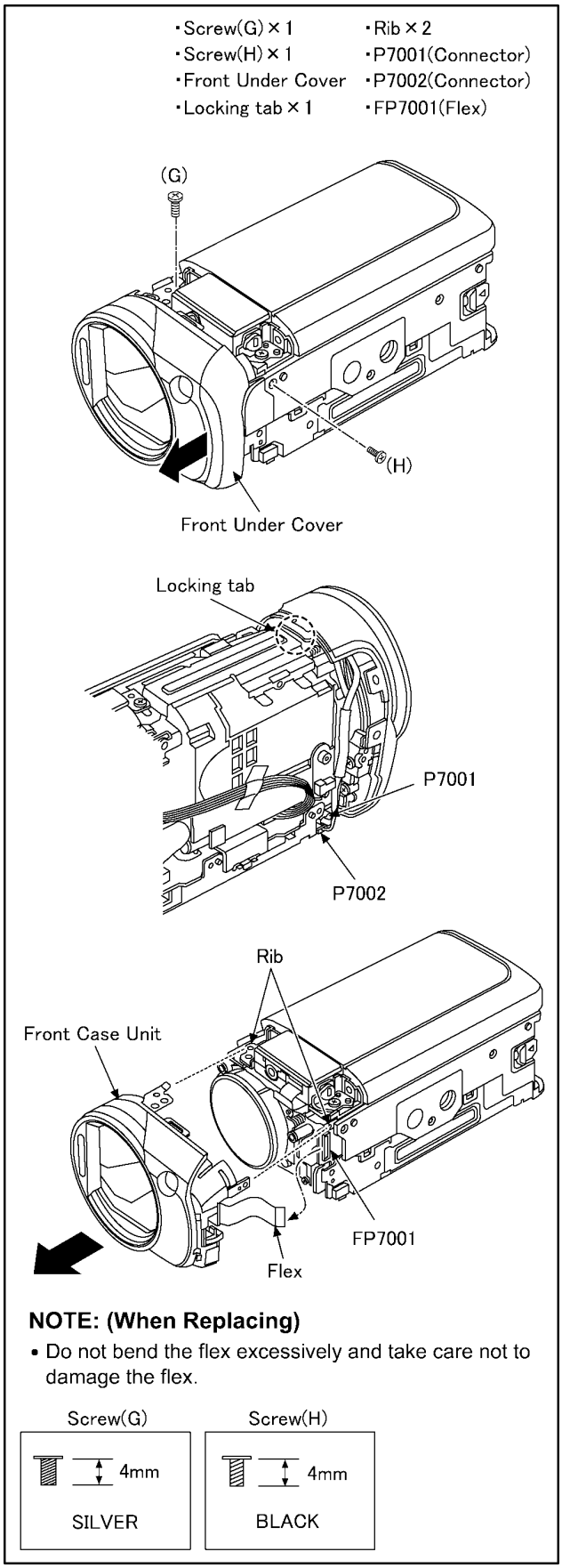


Fig.D10

8.3.7. Removal of the Side Case (R) Unit

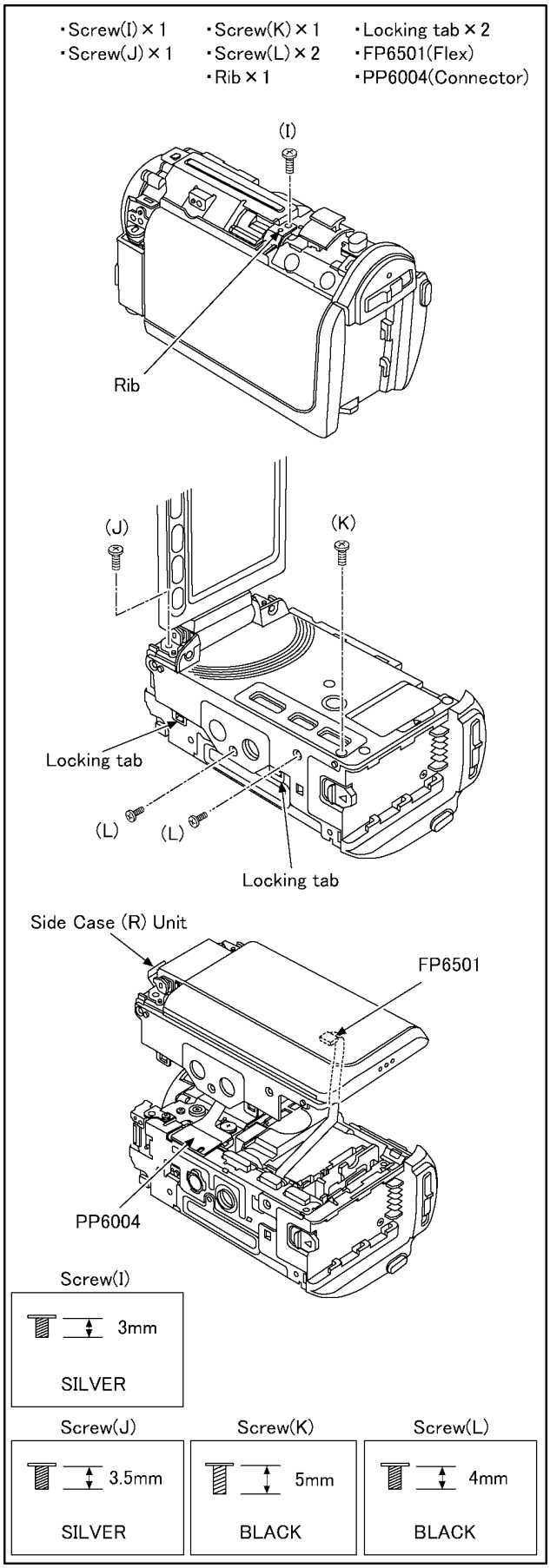


Fig.D11

8.3.8. Removal of the Switch Unit (Top)/ Batt Case Unit

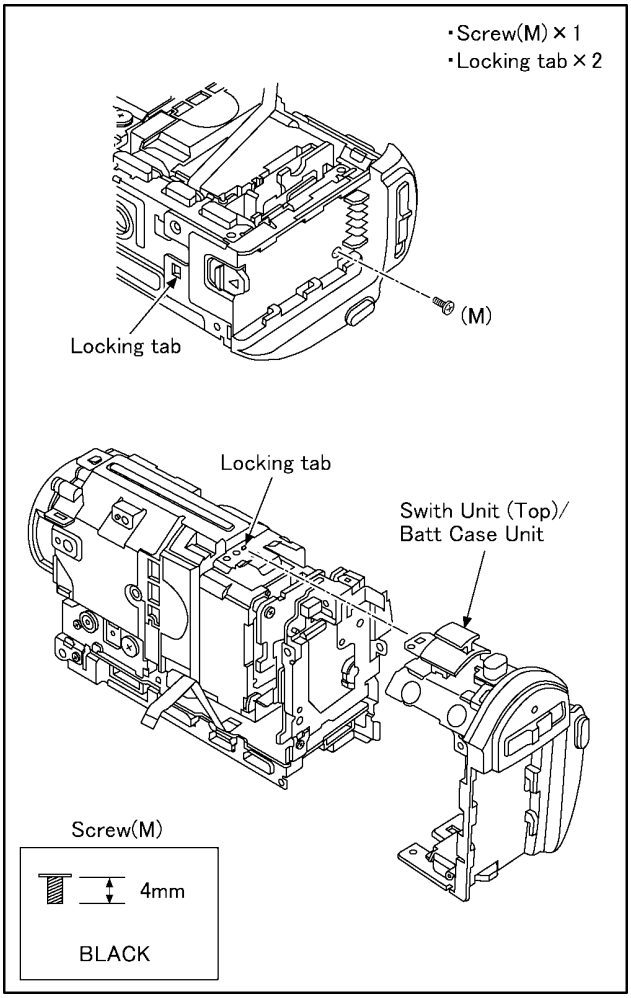


Fig.D12

8.3.9. Removal of the SD Frame

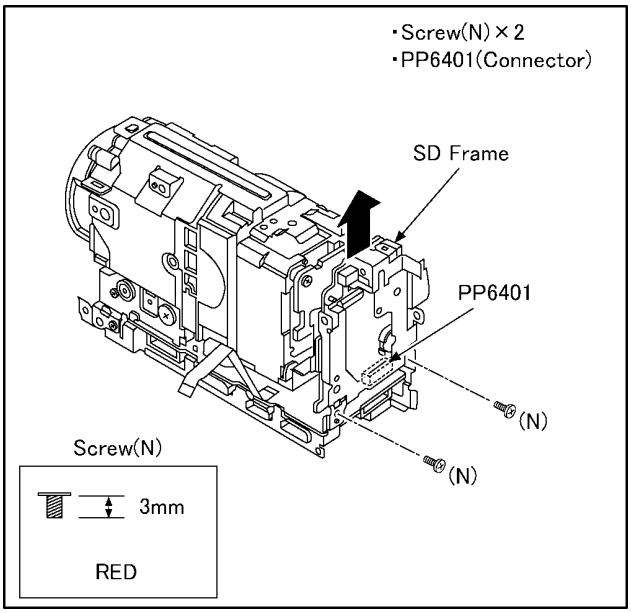


Fig.D13

8.3.10. Removal of the Lens Unit

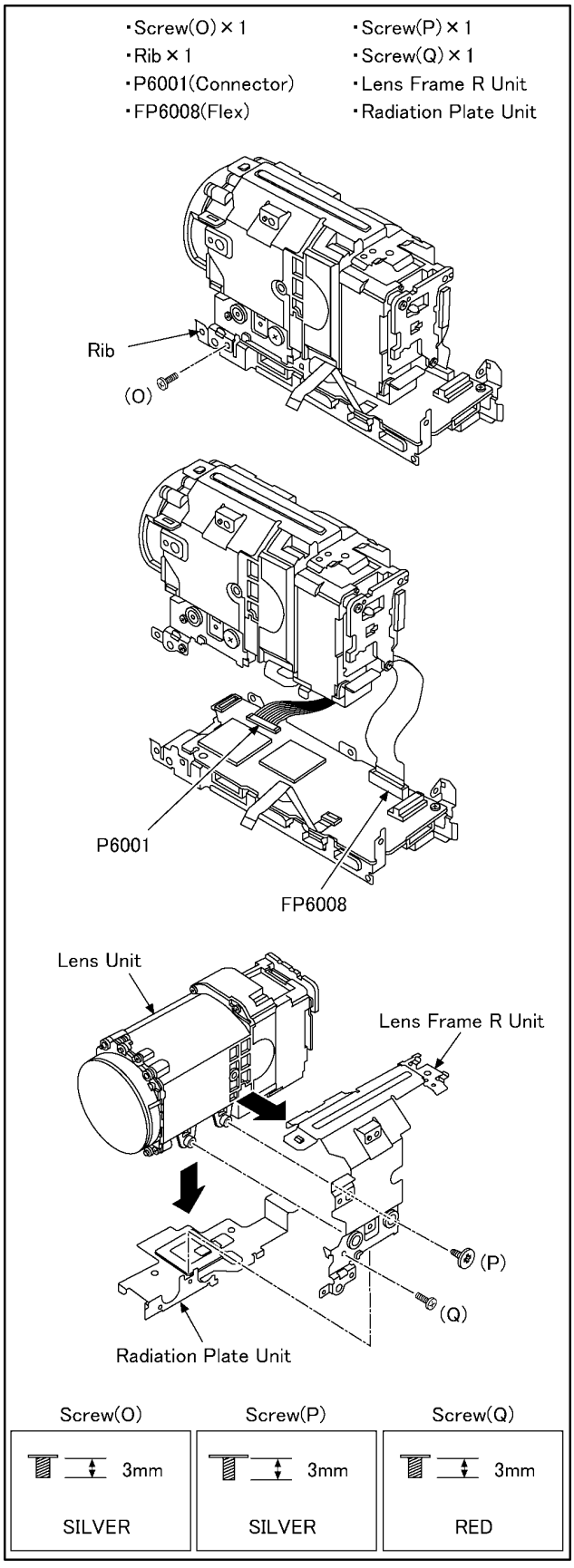


Fig.D14

8.3.11. Removal of the Main P.C.B. Unit

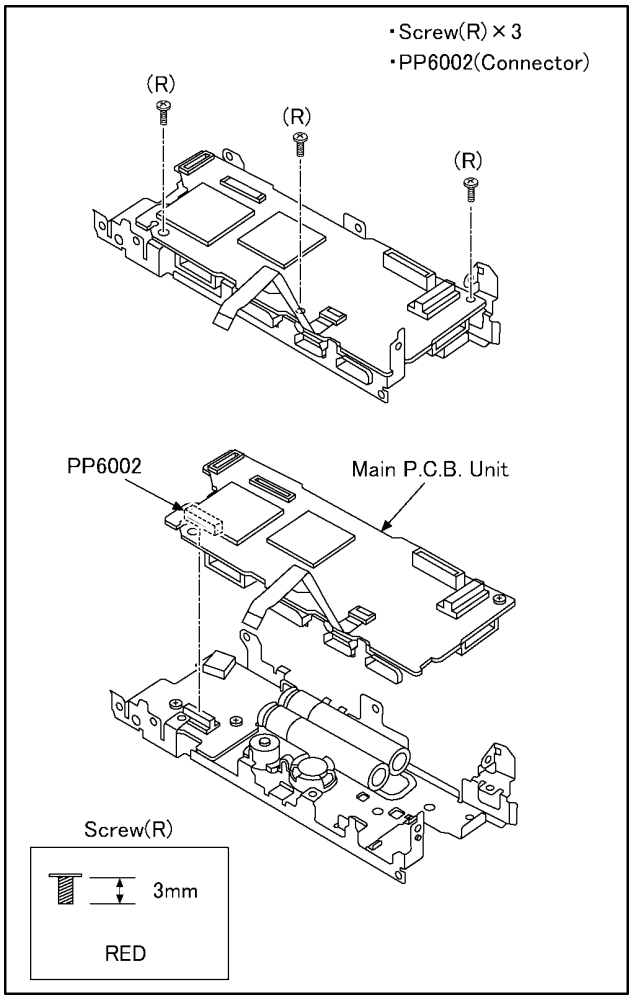


Fig.D15

8.3.12. Removal of the Flash P.C.B. Unit

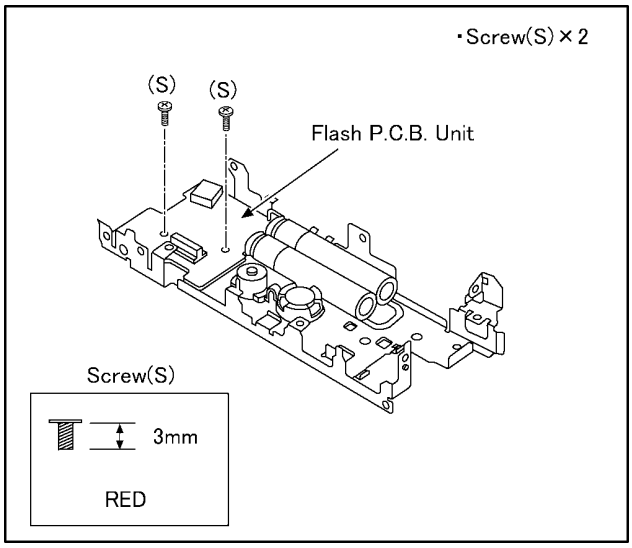
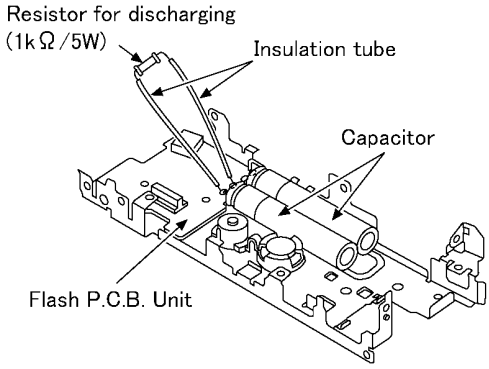


Fig.D16



⚠ CAUTION

Be sure to discharge the capacitor on Flash P.C.B. Unit before disassembling.

1. Put the insulation tube on the lead part of resistor (ERG5SJ102:1kΩ/5W).
2. Put the resistor between both terminals of capacitor unit for approx. 5 seconds.

Fig.D17

8.3.13. Removal of the Switch Unit (Top) and Power FPC Unit

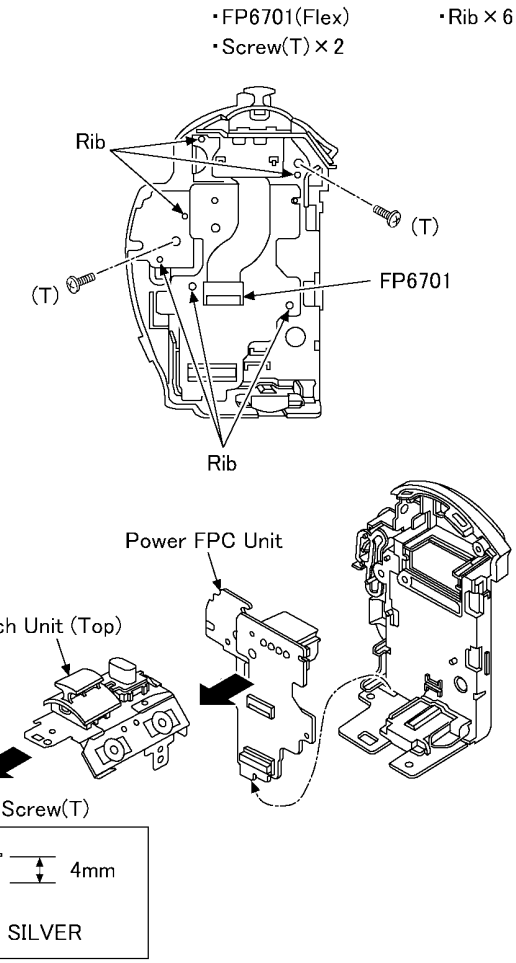


Fig.D18

8.3.14. Removal of the Side (R) OP P.C.B. Unit and Speaker

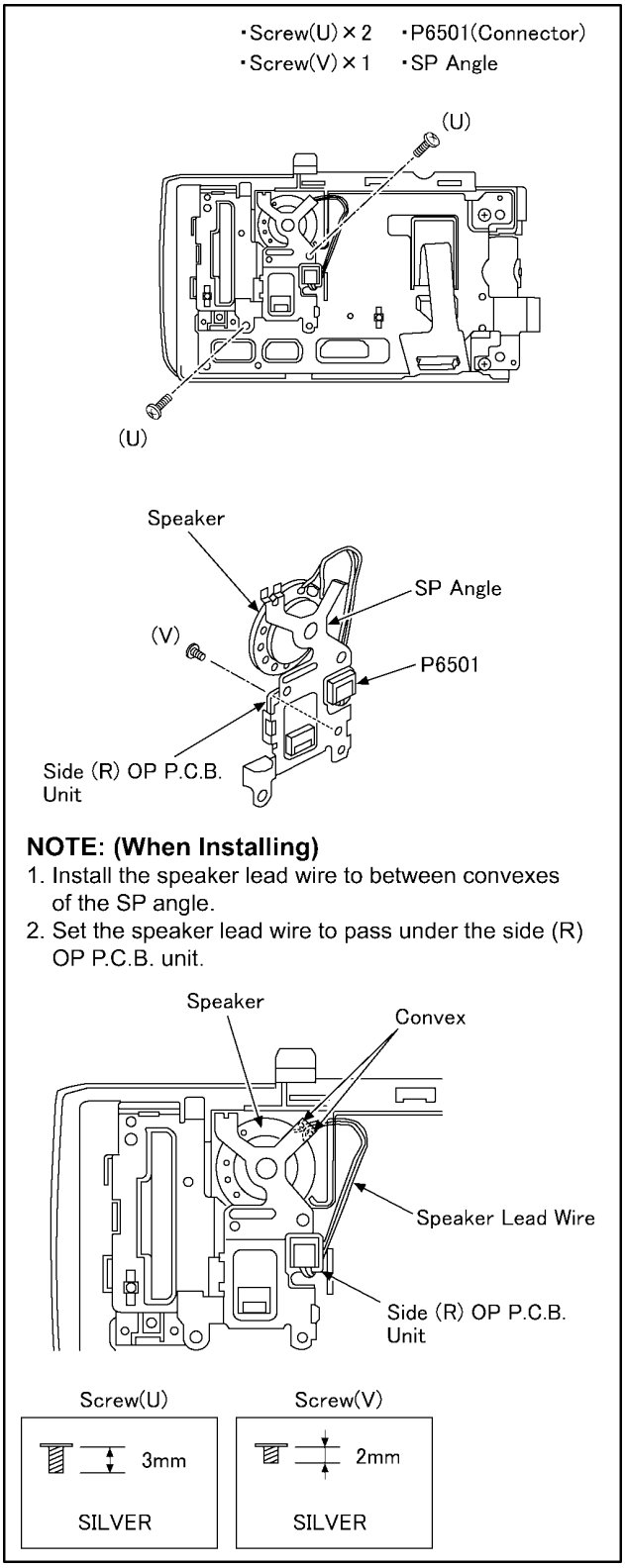


Fig.D19

8.3.15. Removal of the LCD Case Unit

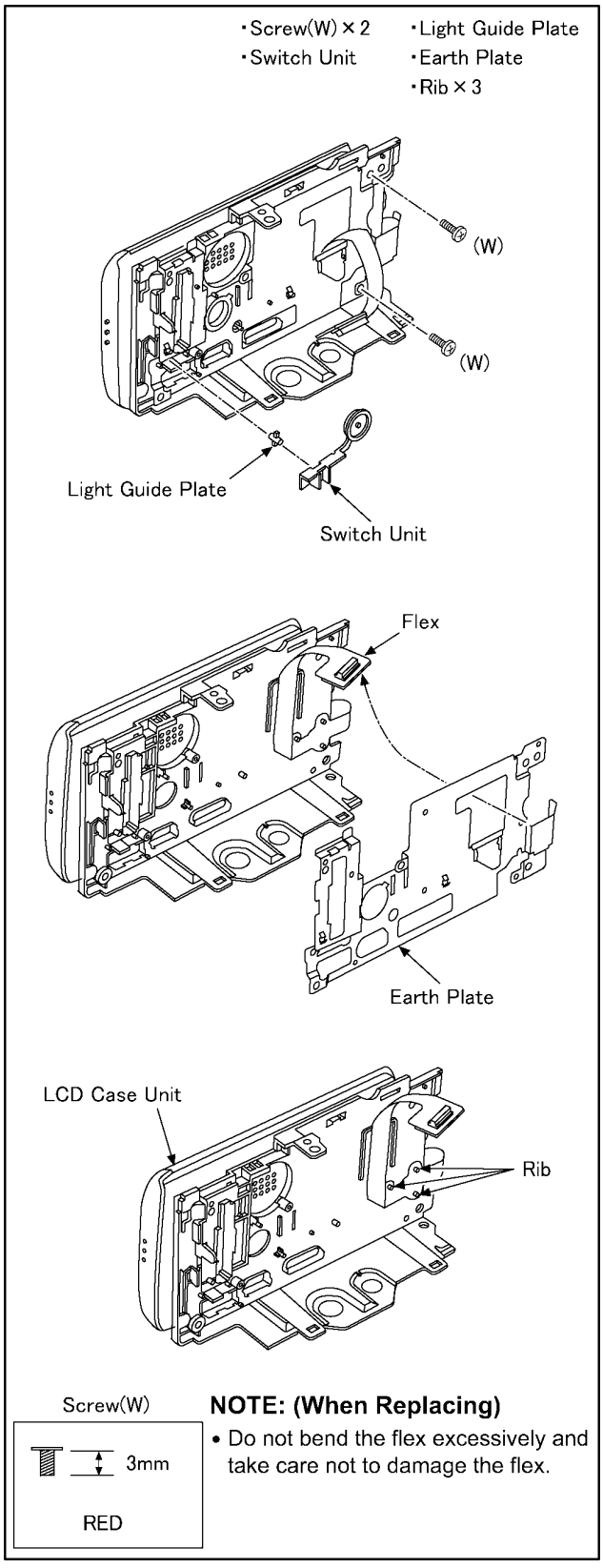


Fig.D20

8.3.16. Removal of the Monitor P.C.B. Unit

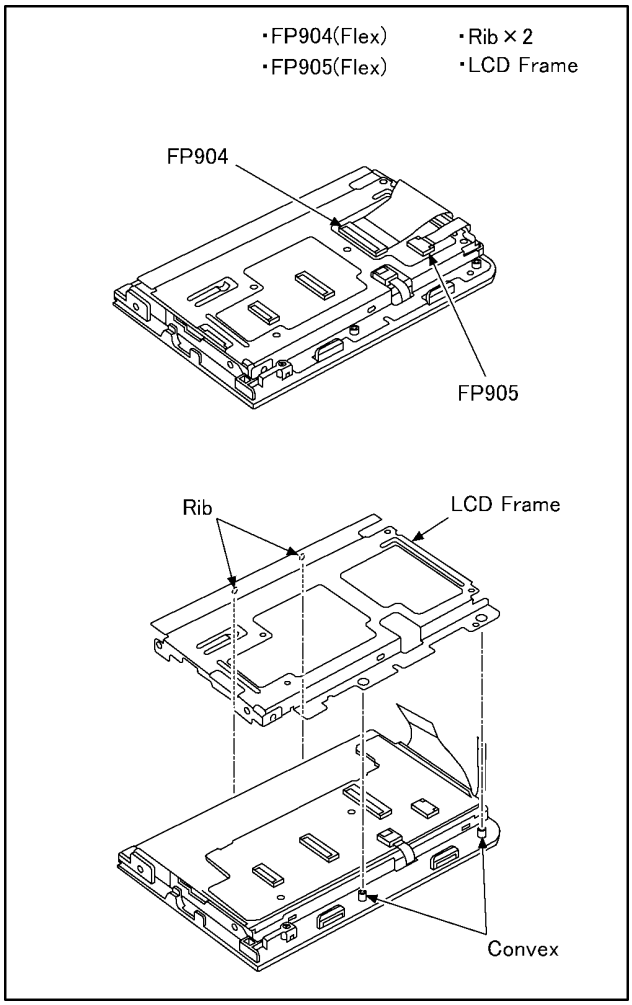


Fig.D21

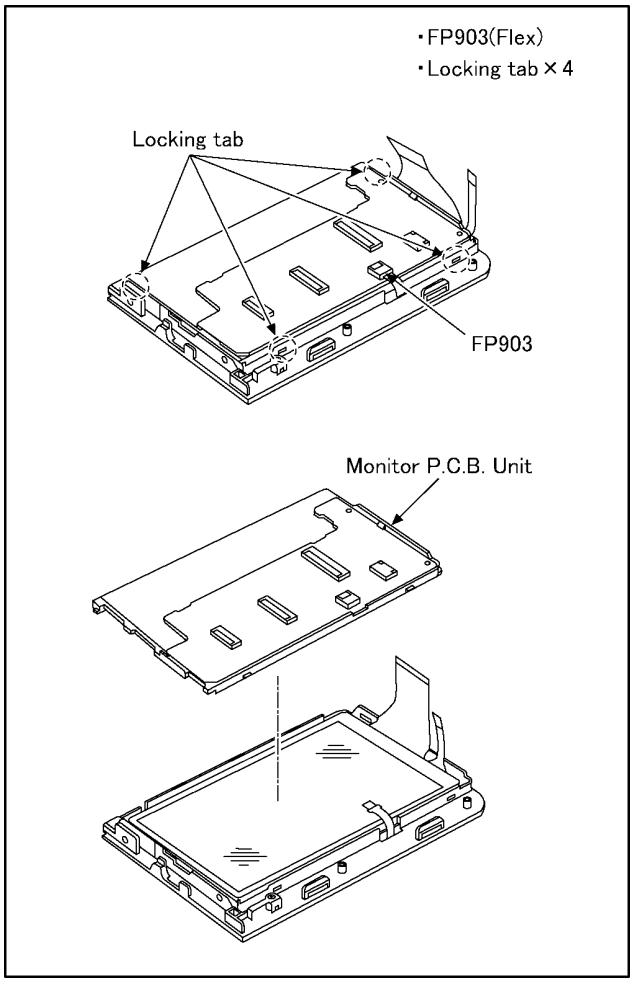


Fig.D22

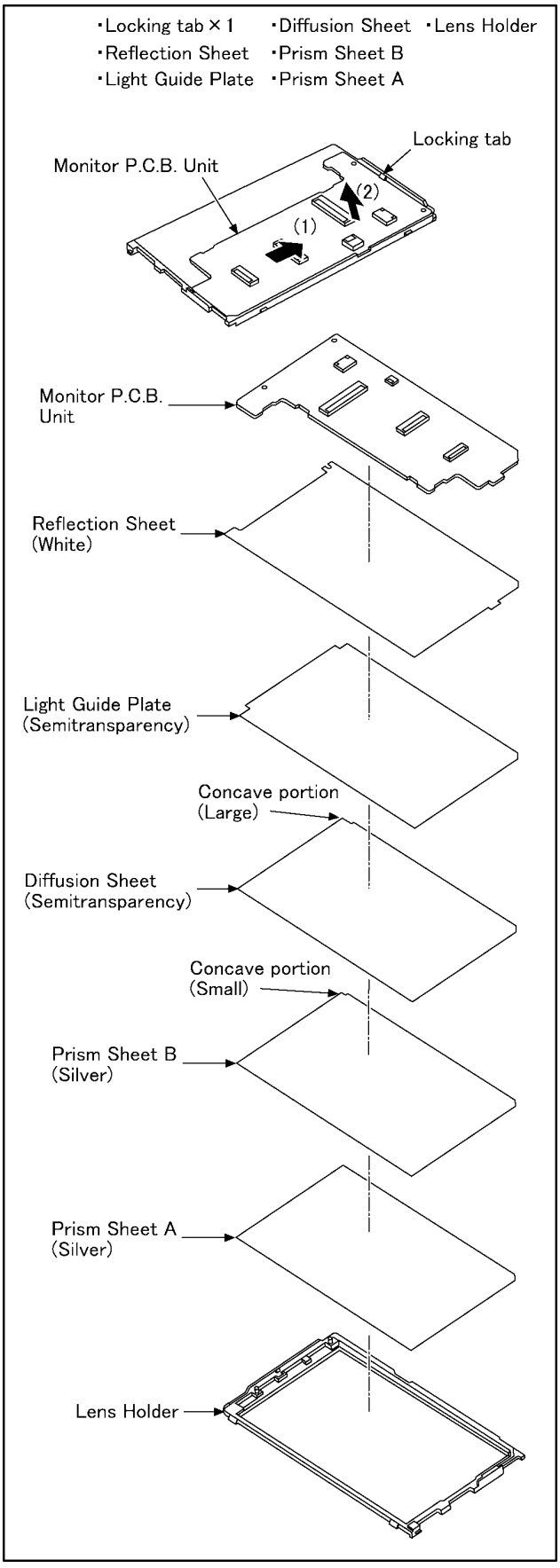


Fig.D23

8.3.17. Removal of the Barrier Motor

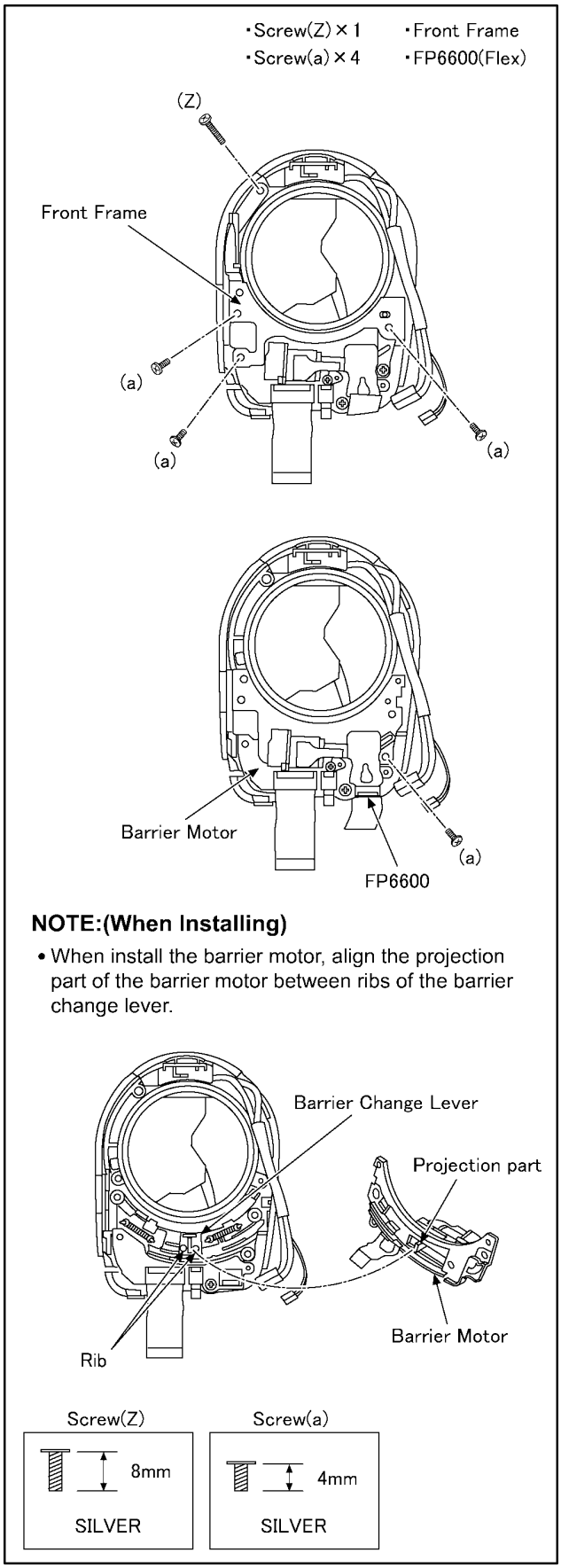


Fig.D24

8.3.18. Removal of the Front P.C.B. Unit

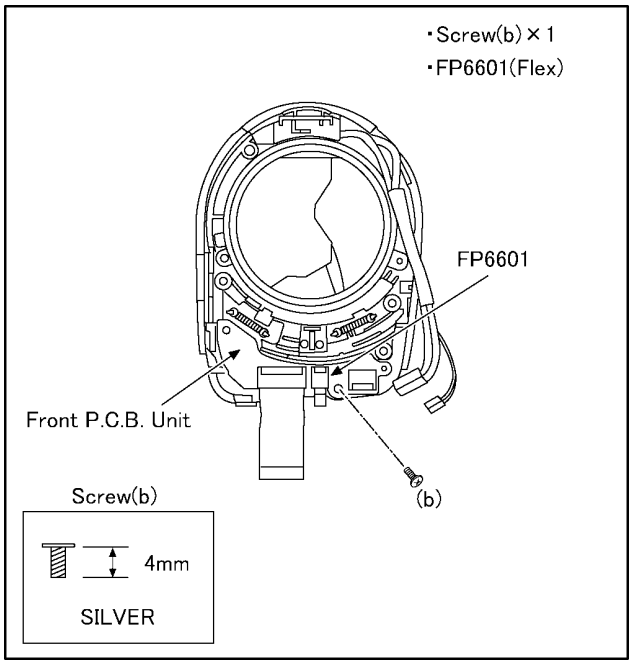


Fig.D25

8.3.19. Removal of the Lens Damper, Barrier Lever and Barrier Change Lever

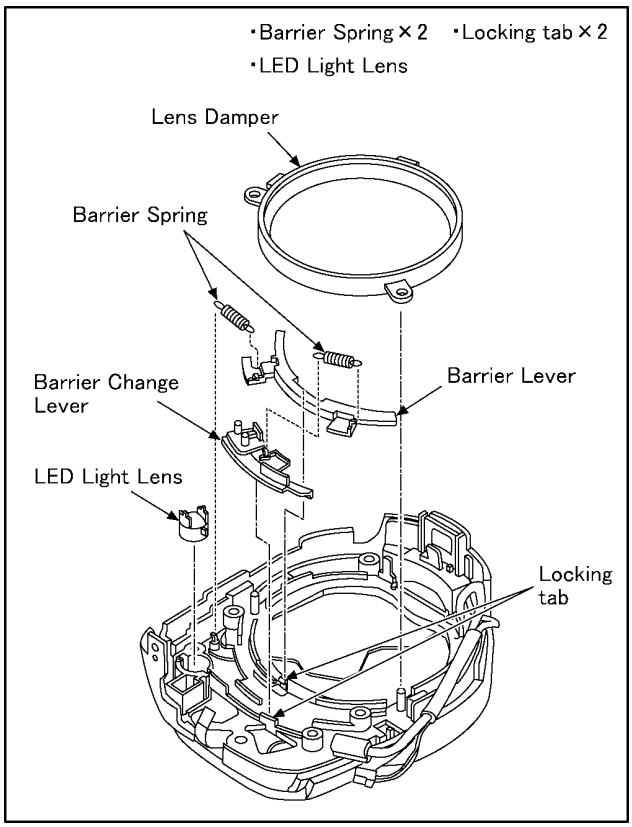
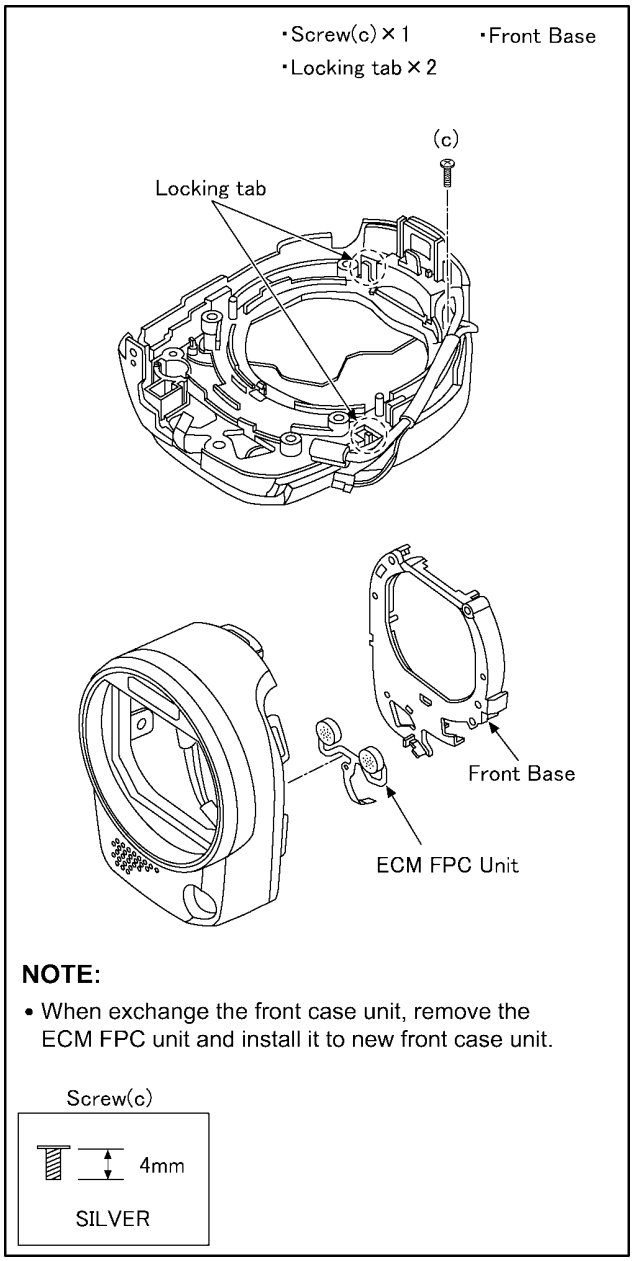


Fig.D26

8.3.20. Removal of the ECM FPC Unit



NOTE:

- When exchange the front case unit, remove the ECM FPC unit and install it to new front case unit.

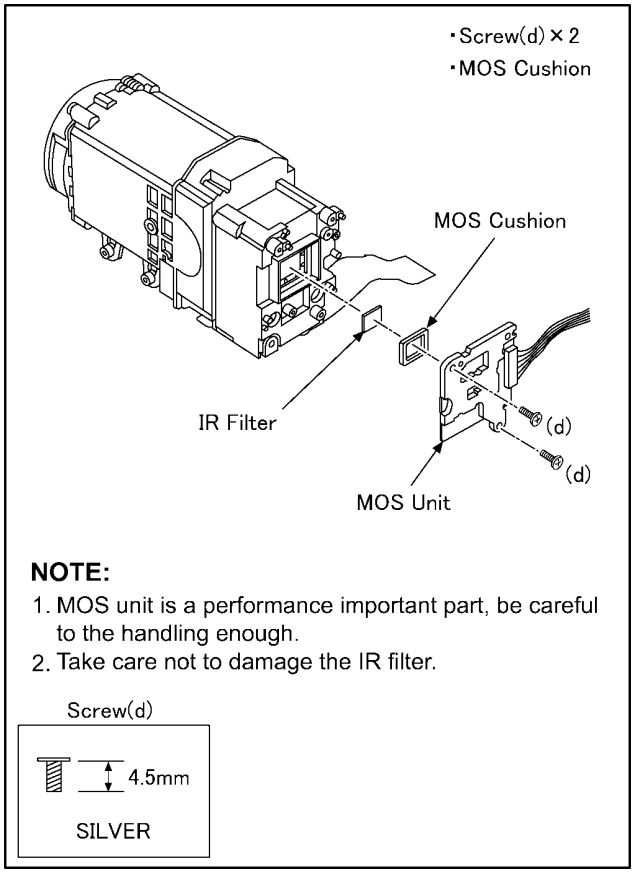
Screw(c)

4mm

SILVER

Fig.D27

8.3.21. Removal of the MOS Unit and IR Filter



NOTE:

1. MOS unit is a performance important part, be careful to the handling enough.
2. Take care not to damage the IR filter.

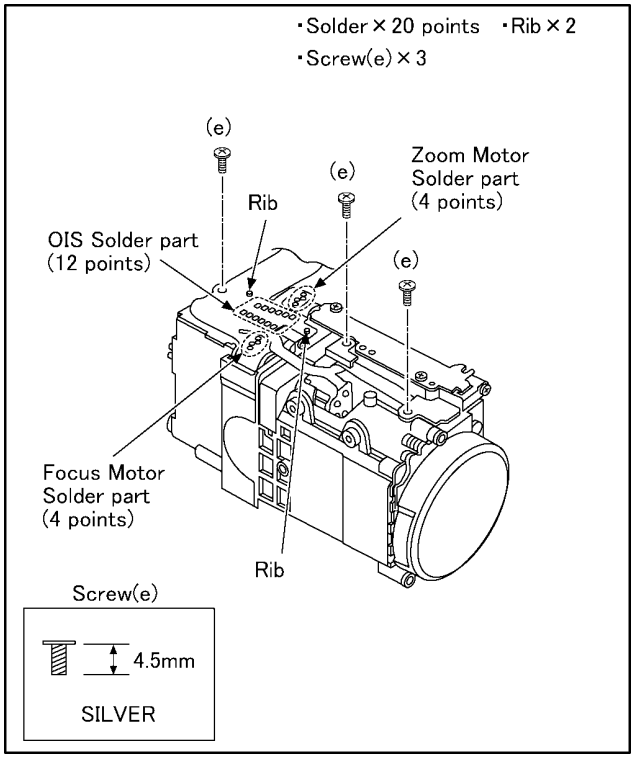
Screw(d)

4.5mm

SILVER

Fig.D28

8.3.22. Removal of the IRIS Unit



Screw(e)

4.5mm

SILVER

Fig.D29

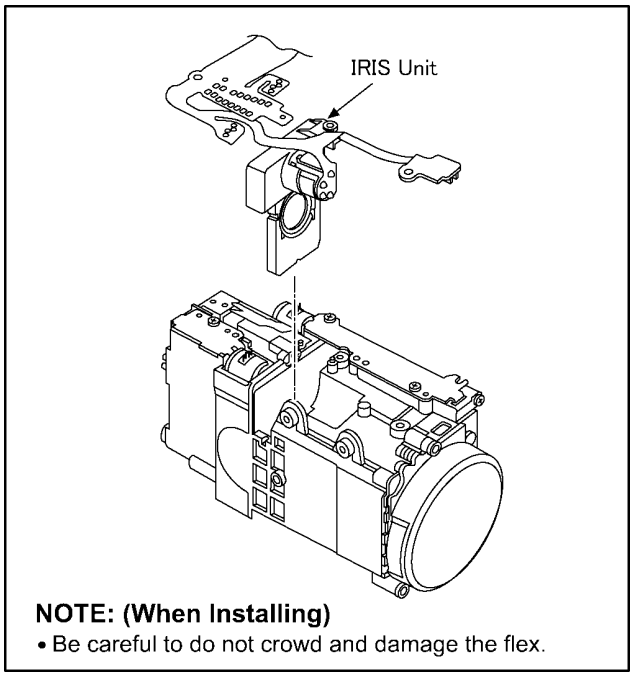


Fig.D30

8.3.23. Removal of the Focus Motor

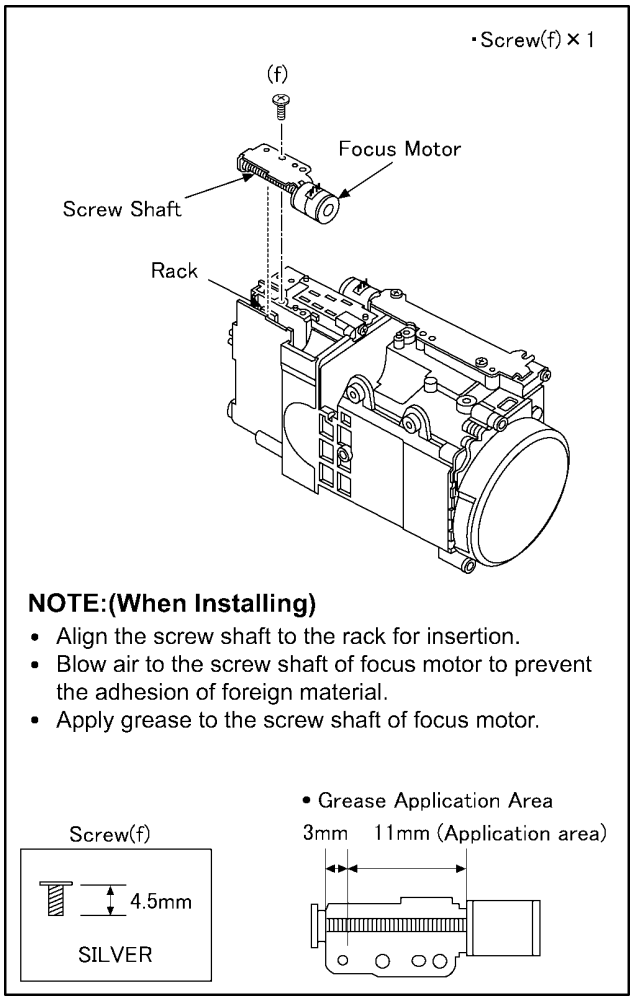


Fig.D31

8.3.24. Removal of the Zoom Motor

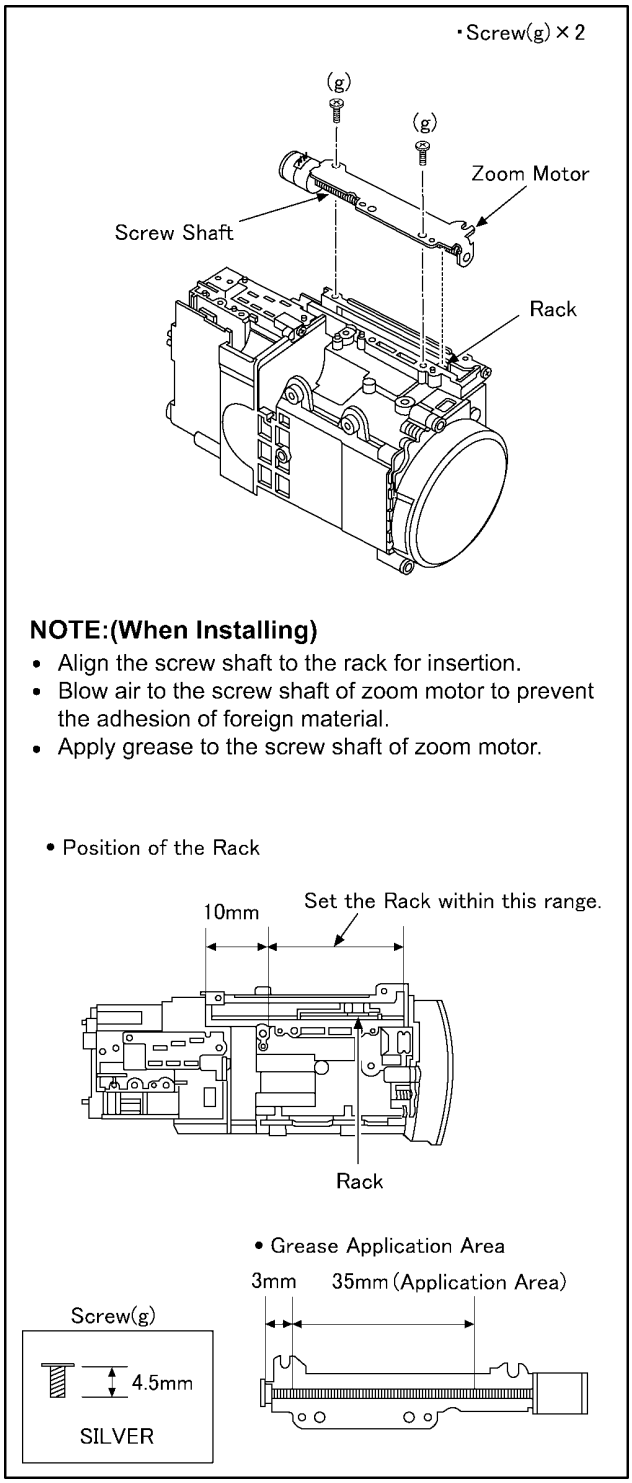


Fig.D32

8.3.25. Removal of the 1st Lens Frame Unit and Reinforcement Plate

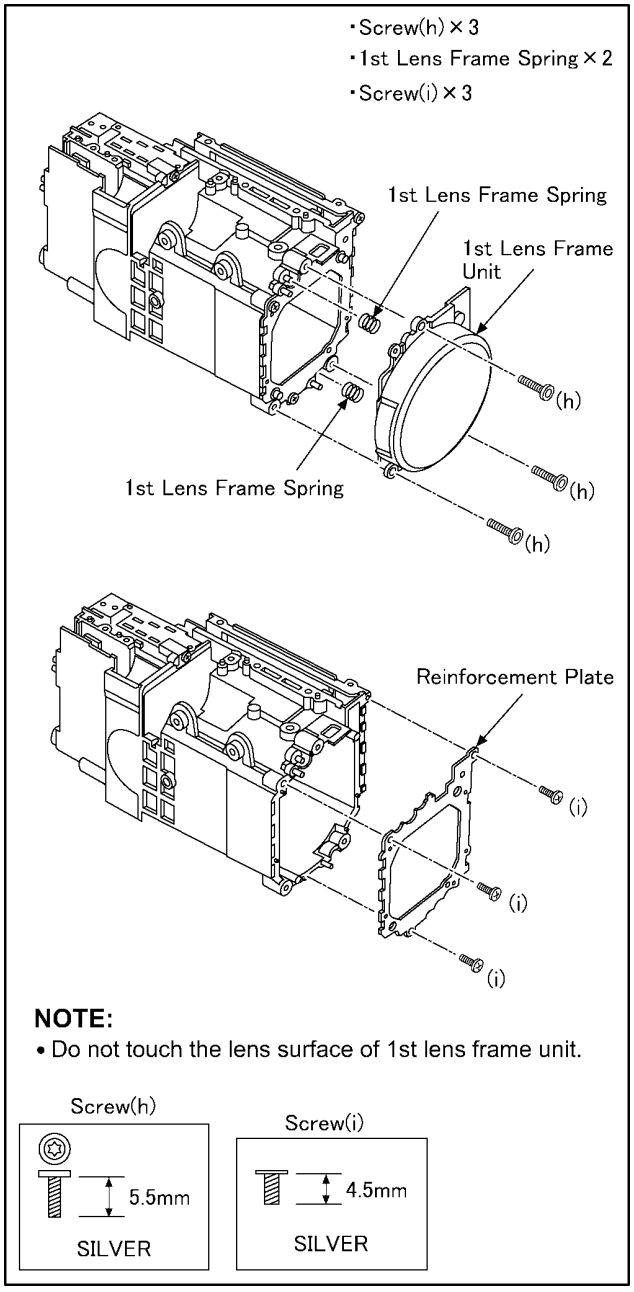


Fig.D33

8.3.26. Removal of the 2nd Lens Frame Move Unit

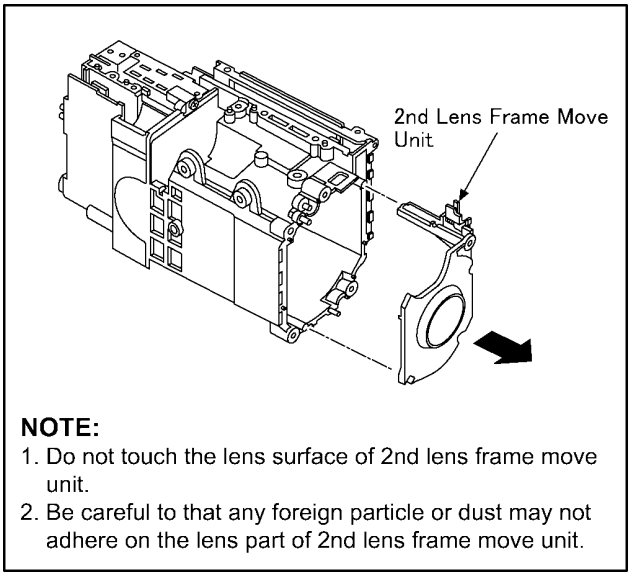


Fig.D34

8.3.27. Removal of the Body Unit

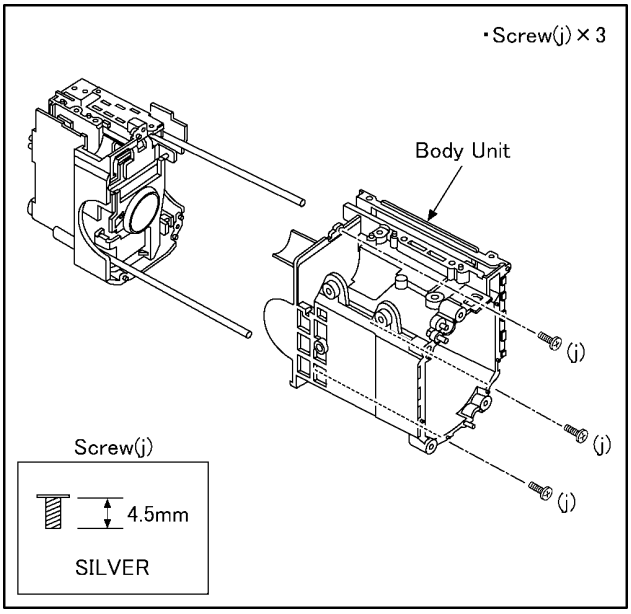
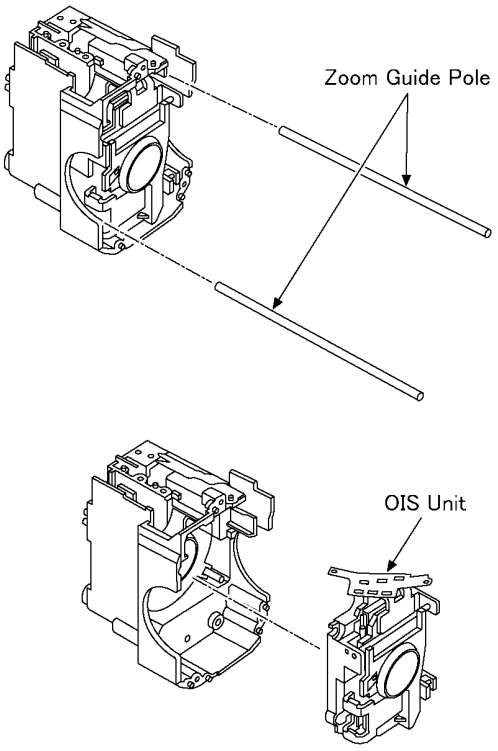


Fig.D35

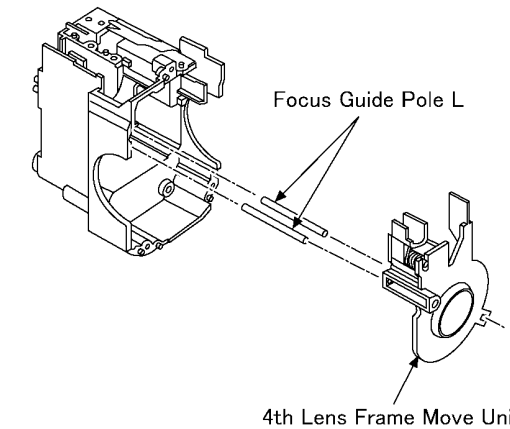
8.3.28. Removal of the Zoom Guide Pole and OIS Unit



NOTE: (When Installing)
1. Apply grease to the zoom guide pole.
2. Be careful to that any foreign particle or dust may not adhere on the lens part of OIS unit.

Fig.D36

8.3.29. Removal of the 4th Lens Frame Move Unit and Focus Guide Pole L



NOTE: (When Installing)
1. Apply grease to the focus guide pole L.
2. Be careful to that any foreign particle or dust may not adhere on the lens part of 4th lens frame move unit.

Fig.D37

9 Measurements and Adjustments

9.1. Electric Adjustment

- Adjustment method is different from a conventional High definition video camera.
- An exclusive jig and PC (including software for adjustment “Tatsujin”) are necessary for electric adjustment.
- A USB driver for service is necessary to communication with PC.
- Connection method of the main unit and an exclusive adjustment jig as follows

9.1.1. Adjustment Procedure

- Connect the main unit to PC with USB.
  The adjustment instruction is available at "Software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN System".

Figure of connection

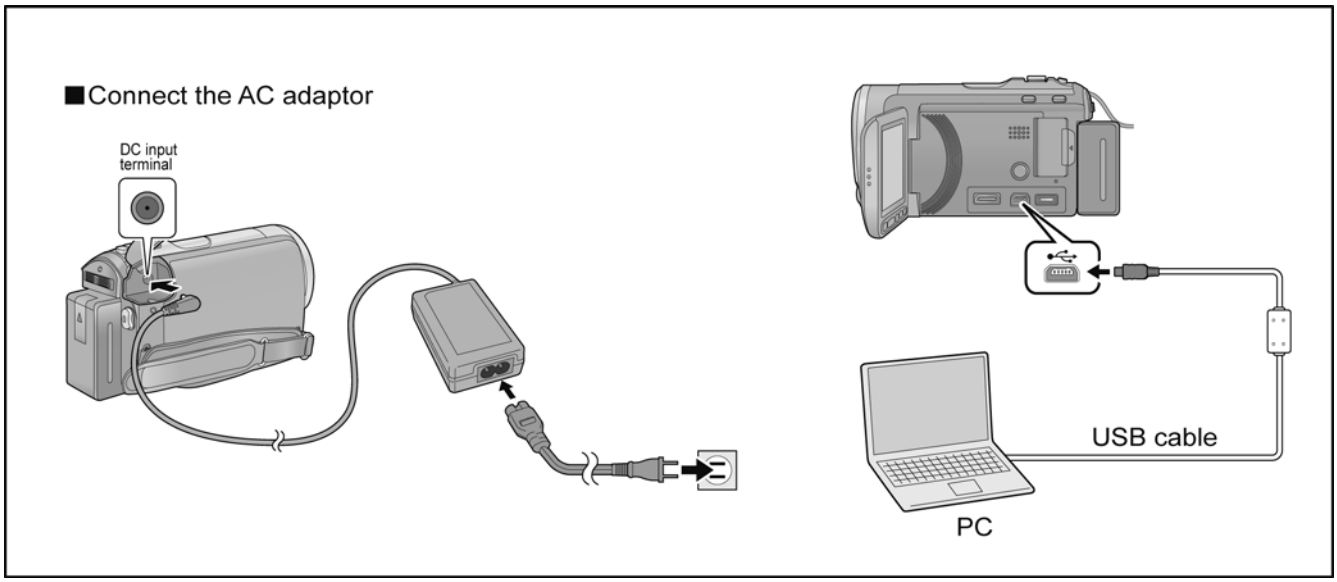
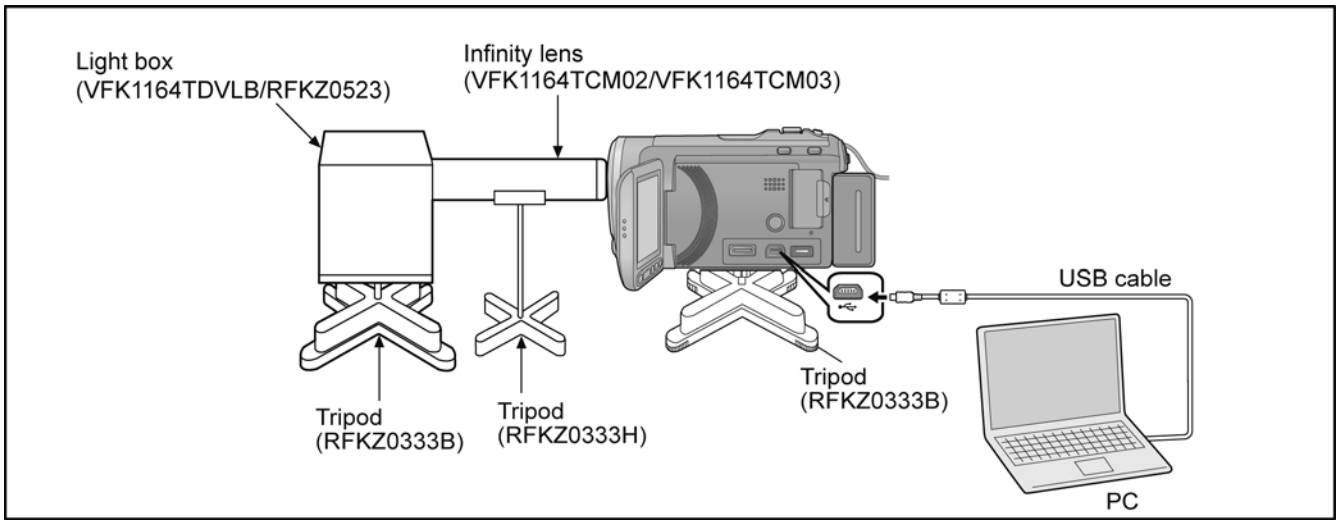


Figure of image when adjustment



Part Number of jig

- Only a necessary jig mentions it in setup of electric adjustment.

No.	Part Name	Part Number	Remarks
1	PC	------	
2	AC Adaptor	------	
3	USB Cable	------	
4	Adjustment Software (Tatsujin)	------	

Adjustment Items

• Adjustment item as follows.

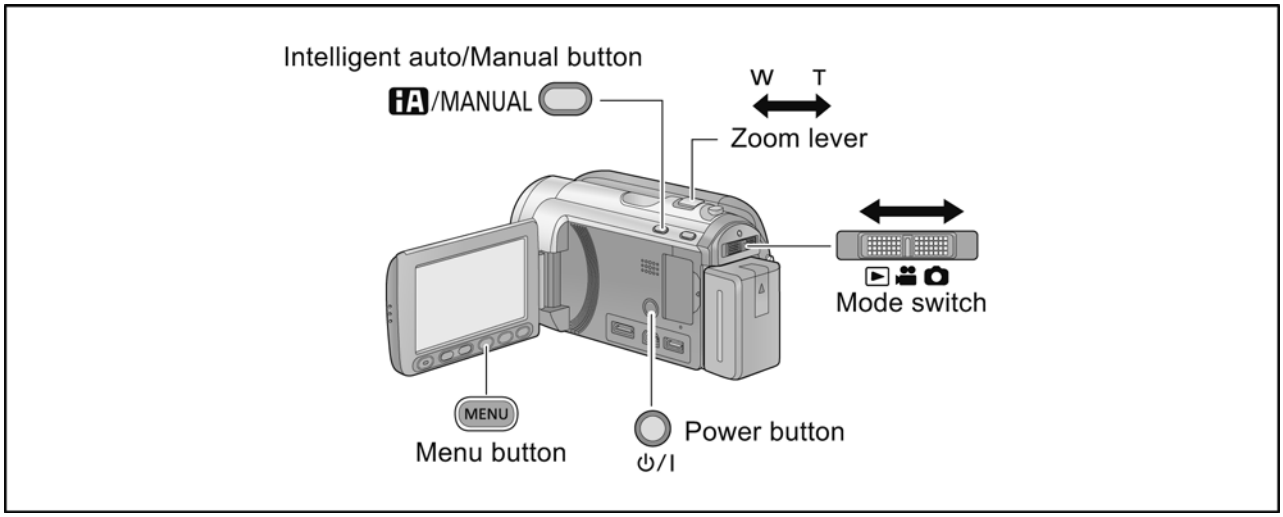
The adjustment instruction is available at "Software download" on the "Support Information from NWBG/VDBG-AVC" web-site in "TSN System".

	Replacement part / Adjustment item	Main P.C.B.	IC2002(EEPROM)	Lens Unit	Prism Unit	IRIS	4th lens frame move unit	IC3701	IC301	OIS sensor	G sensor
Camera Part	● Hall amplifire/PWM bias (automatic)	○	○	○	○	○					
	● OIS Hall amplifire adjustment	○	○	○	○	○					
	● OIS Sensor Offset adjustment	○	○							○	
	● Zoom tracking adjustment (automatic)	○	○	○	○	○	○				
	● Address wound revision	○	○		○						
	● White balance adjustment	○	○		○						
	● Gain adjustment between channels	○			○				○		
Video Part	● DDR revision	○	○					○			
	● G Sensor Offset adjustment	○	○								○

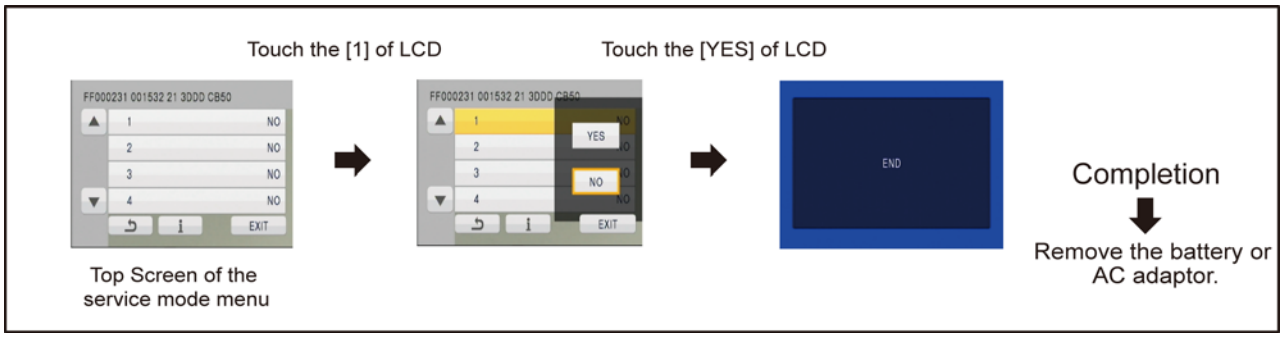
10 Factory Setting

10.1. How To Turn On The Factory Settings?

1. Set the mode switch “Motion Picture Recording” mode.
2. Turn the power on, and then while keep pressing the “Zoom lever” to W side, “Intelligent auto/Manual” button and “Menu” button for more than 3 seconds until the top screen of the Service Mode Menu being displayed.



3. Touch the [1] of LCD.
4. Touch the [YES] of LCD.
5. After few seconds “END” is displayed on LCD monitor. Cutting of battery connection or AC power supply connection as a completion of the “FACTORY SETTINGS”.



10.2. What Is The Factory Settings?

The factory settings clean up and/or refresh the following settings.

1. MENU, MODE, ADJUSTMENT VALUE.
2. SD card format.
3. Reset the folder number and file number of still pictures.
   (Setting the folder number is 100, and file number is 0.)
4. Clear the mechanism lock information.
5. Clear the service mode information contents.
6. Close the lens cover
7. Initialize the VIERA Link Physical Address.
8. Confirm the data area of HDD is cleared.
   (When recorded data in HDD, "error display" is done)
   If "error display" is done, execute physical format according to the following procedure.

- To physically format the HDD, connect the unit via the AC adaptor, select [FORMAT MEDIA] → [HDD] from the menu, and then press and hold the delete button on the screen below for about 3 seconds. When the HDD data deletion screen appears, select [YES], and then follow the on-screen instructions.

The setting position of factory settings:

Name	Setting position
Mode switch	Motion picture recording mode

VM1002005CE

Service Manual

Diagrams and Replacement Parts List

High Definition Video Camera

Model No.

HDC-HS60P	HDC-HS60EG
HDC-HS60PC	HDC-HS60EP
HDC-HS60PU	HDC-HS60GC
HDC-HS60EB	HDC-HS60GK
HDC-HS60EC	HDC-HS60GN
HDC-HS60EE	HDC-HS60GT
HDC-HS60EF	HDC-HS60SG

Vol. 1
Colour
(K).....Black Type

Table of contents

S1. About Indication of The Schematic Diagram

S1.1. Important Safety Notice

COMPONENTS IDENTIFIED WITH THE MARK ⚠ HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN REPLACING ANY OF THESE COMPONENTS USE ONLY THE SAME TYPE.

1.Although reference number of the parts is indicated on the P.C.B. drawing and/or schematic diagrams, it is NOT mounted on the P.C.B. when it is displayed with "$" mark.

2.It is only the "Test Round" and no terminal (Pin) is available on the P.C.B. when the TP (Test Point) indicated as "●" mark.

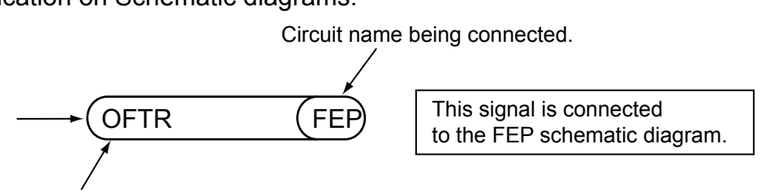
3.The voltage being indicated on the schematic diagram is measured in "Standard-Playback" mode when there is no specify mode is mentioned.

4.Although the voltage and waveform available on here is measured with standard frame, it may be differ from actual measurement due to modification of circuit and so on.

5.The voltage being indicated here may be include observational-error (deviation) due to internal-resistance and/or reactance of equipment. Therefore, handle the value indicated on here as reference.

6.Use the parts number indicated on the Replacement Parts List .

7.Indication on Schematic diagrams:



S2. Voltage Chart

Note) Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard.
Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.

S2.1. Strobe P.C.B.

REF No.	PIN No.	POWER ON
IC4801	1	2.6
IC4801	2	2.6
IC4801	3	2.6
IC4801	4	0
IC4801	5	2.6
IC4801	6	2.6
IC4801	7	2.6
IC4801	8	5
IC7001	1	0
IC7001	2	0
IC7001	3	0
IC7001	4	0
IC7001	5	3.2
IC7001	6	0
IC7001	7	0
IC7001	8	0
IC7001	9	2.9
IC7001	10	4.6
Q4801	E	4.3
Q4801	C	5
Q4801	B	5

S2.2. Front P.C.B.

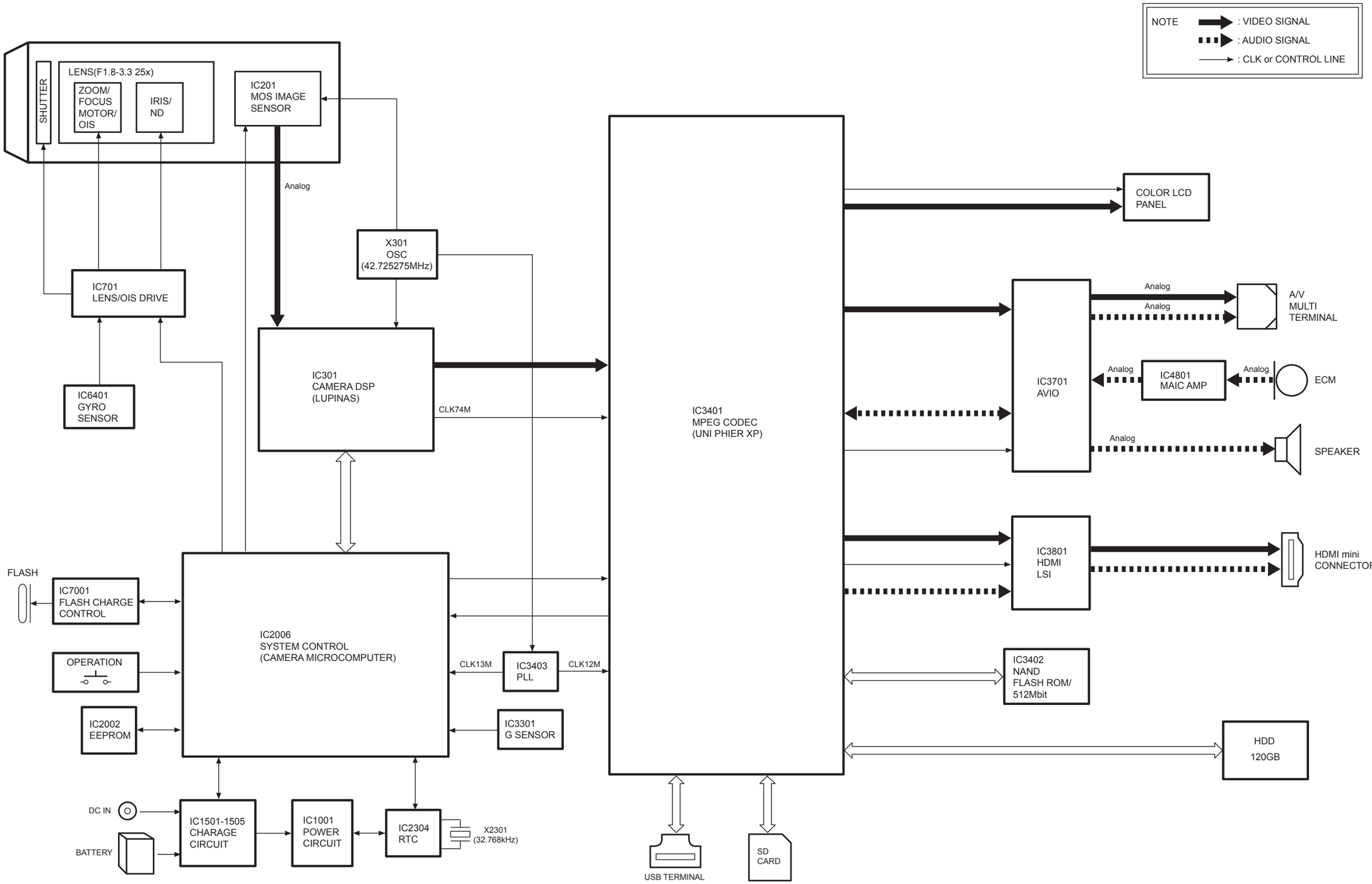
REF No.	PIN No.	POWER ON
Q6622	E	0
Q6622	C	2.9
Q6622	B	0
Q6623	E	0
Q6623	C	0
Q6623	B	0

S2.3. SD P.C.B.

REF No.	PIN No.	POWER ON
IC6402	1	3.2
IC6402	2	0
IC6402	3	0
IC6402	4	2.9
IC6402	5	3.2
Q3901	E	3.2
Q3901	C	3.2
Q3901	B	3.2
QR6402	E	2.9
QR6402	C	-0.5
QR6402	B	2.9

S3. Block Diagram

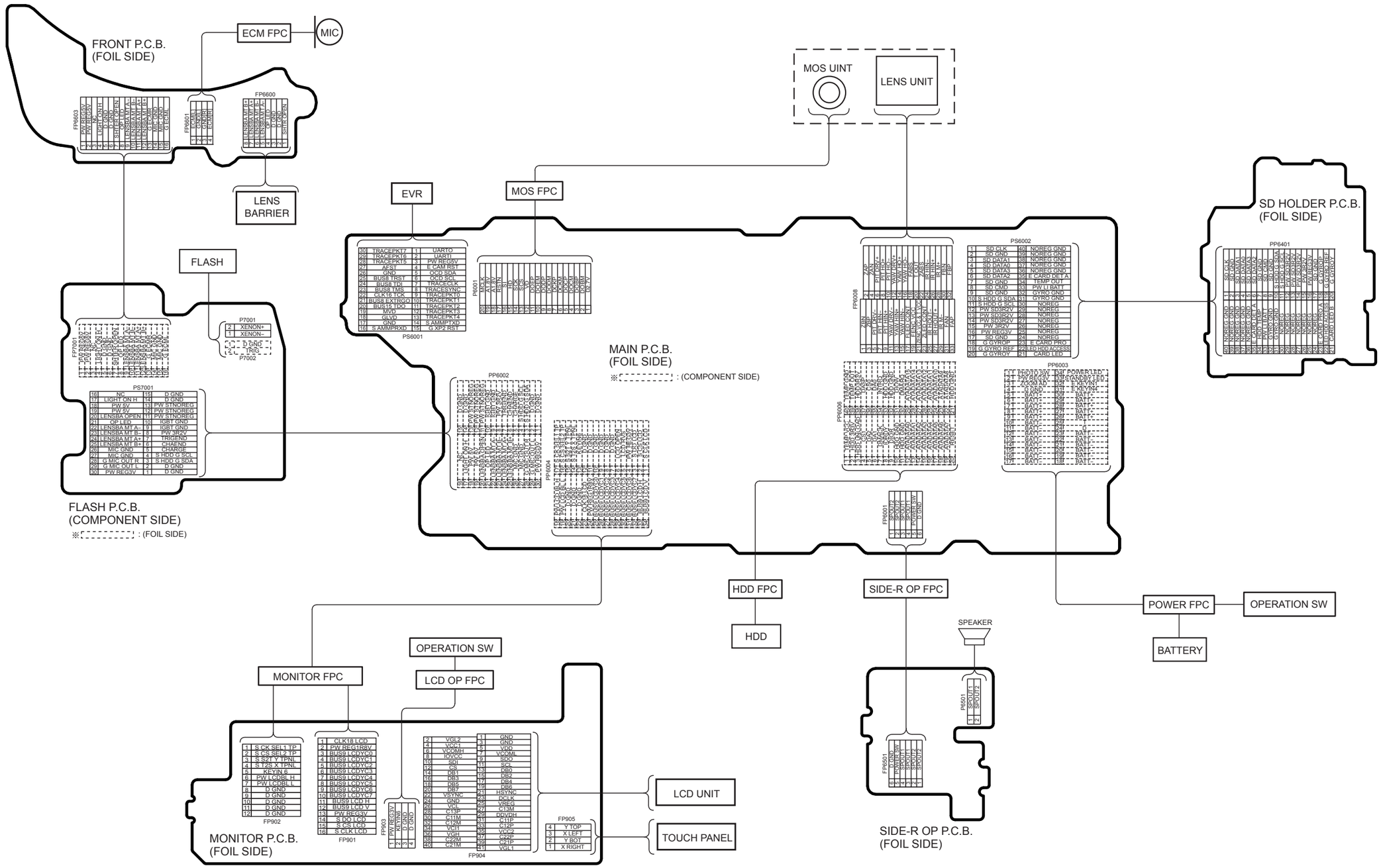
S3.1. Overall Block Diagram



HDC-HS60 OVERALL BLOCK DIAGRAM

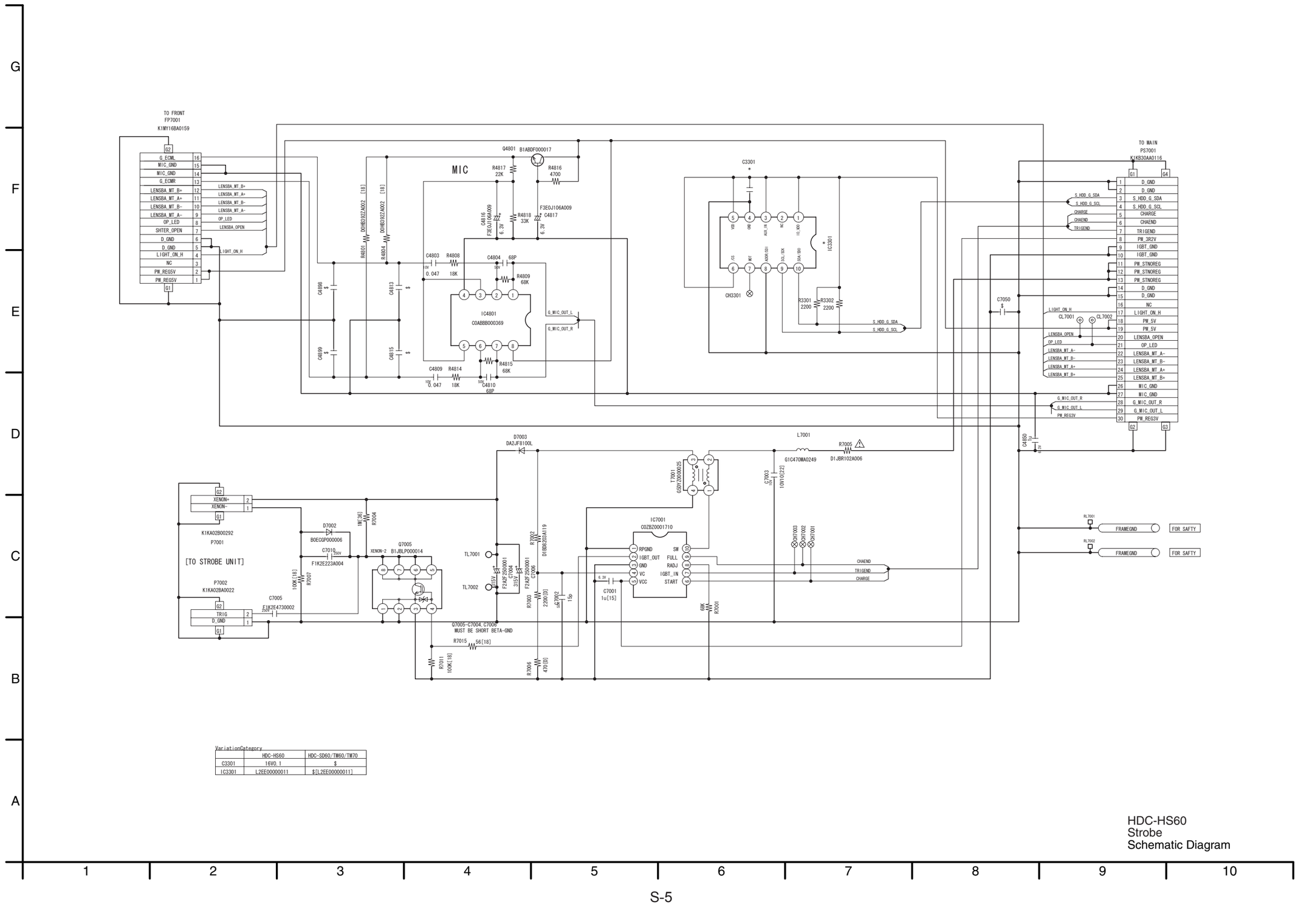
S4. Schematic Diagram

S4.1. Interconnection Diagram



HDC-HS60 INTERCONNECTION DIAGRAM

S4.2. Strobe Schematic Diagram

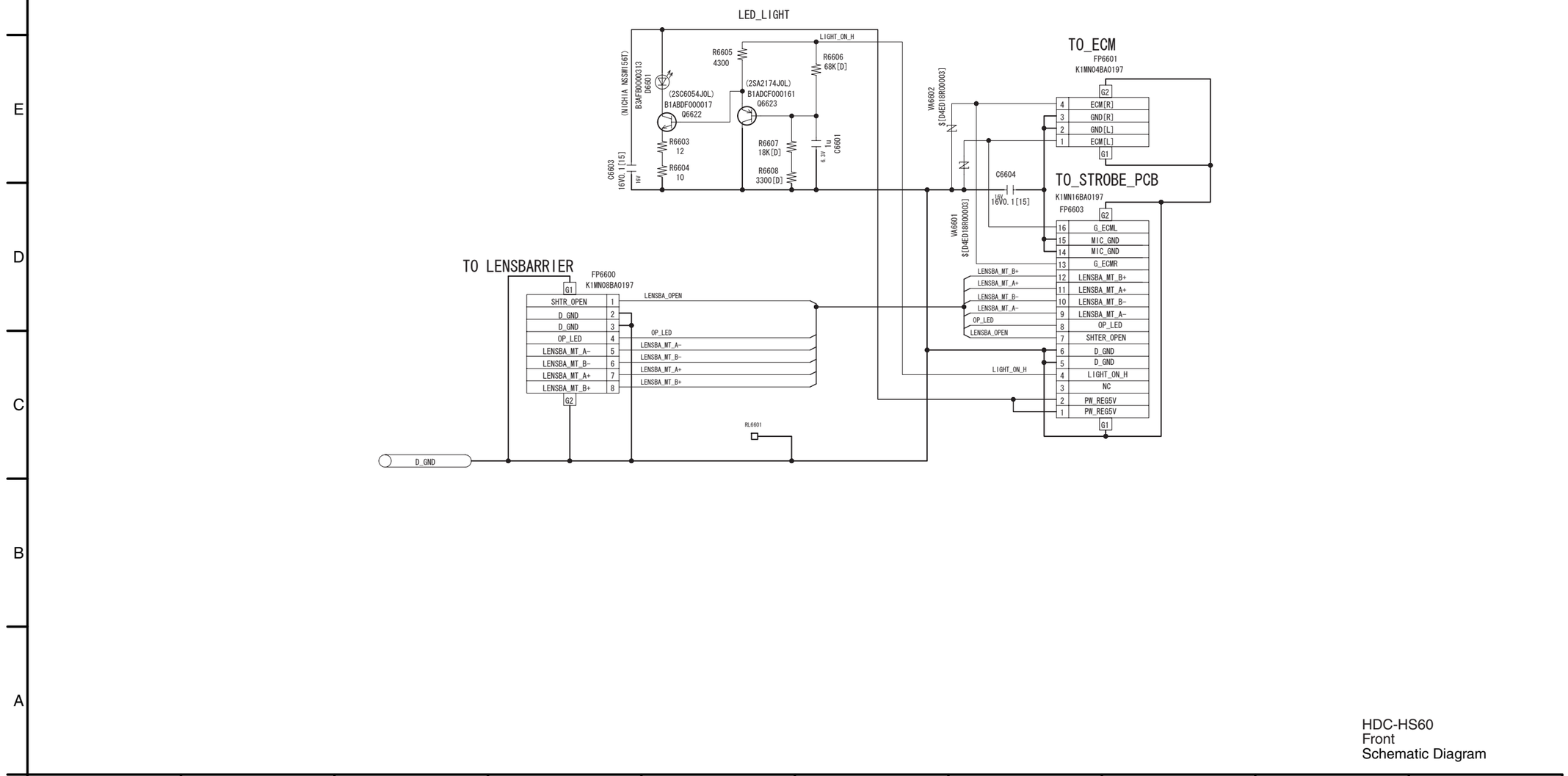


VariationCategory

	HDC-HS60	HDC-SD60/TM60/TM70
C3301	16V0.1	$
IC3301	L2EE00000011	$[L2EE00000011]

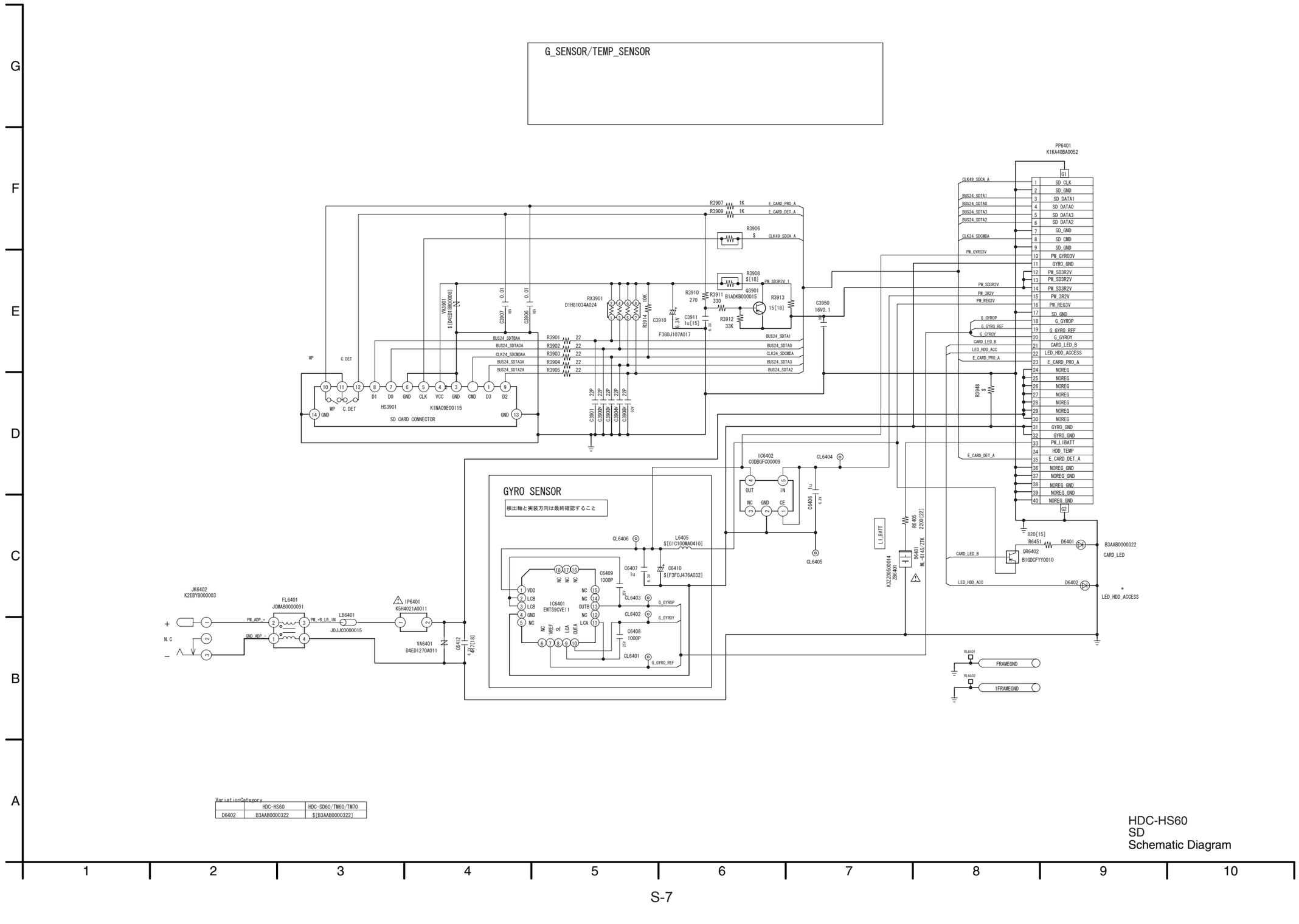
HDC-HS60
Strobe
Schematic Diagram

S4.3. Front Schematic Diagram



HDC-HS60
Front
Schematic Diagram

S4.4. SD Schematic Diagram

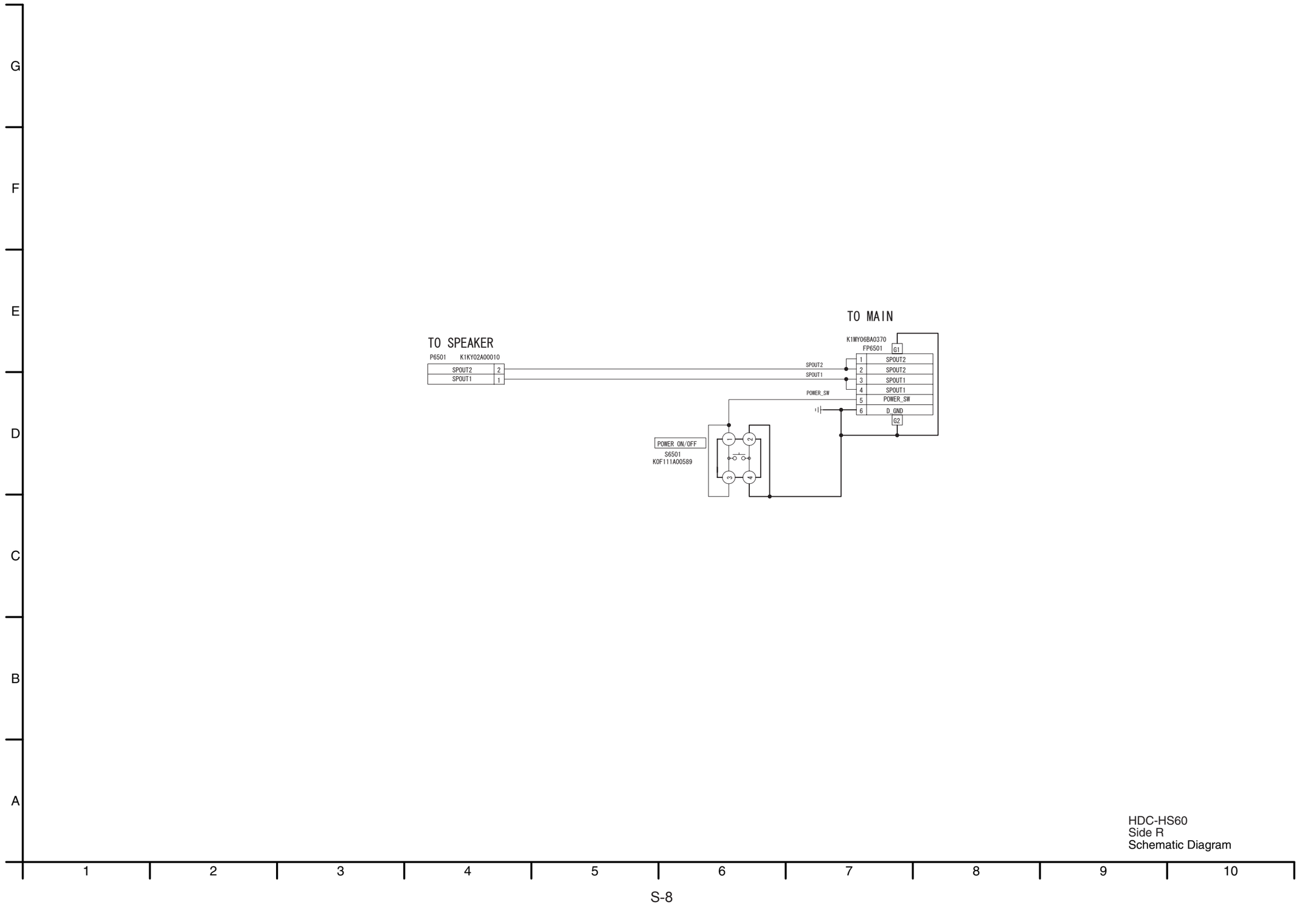


VariationCategory

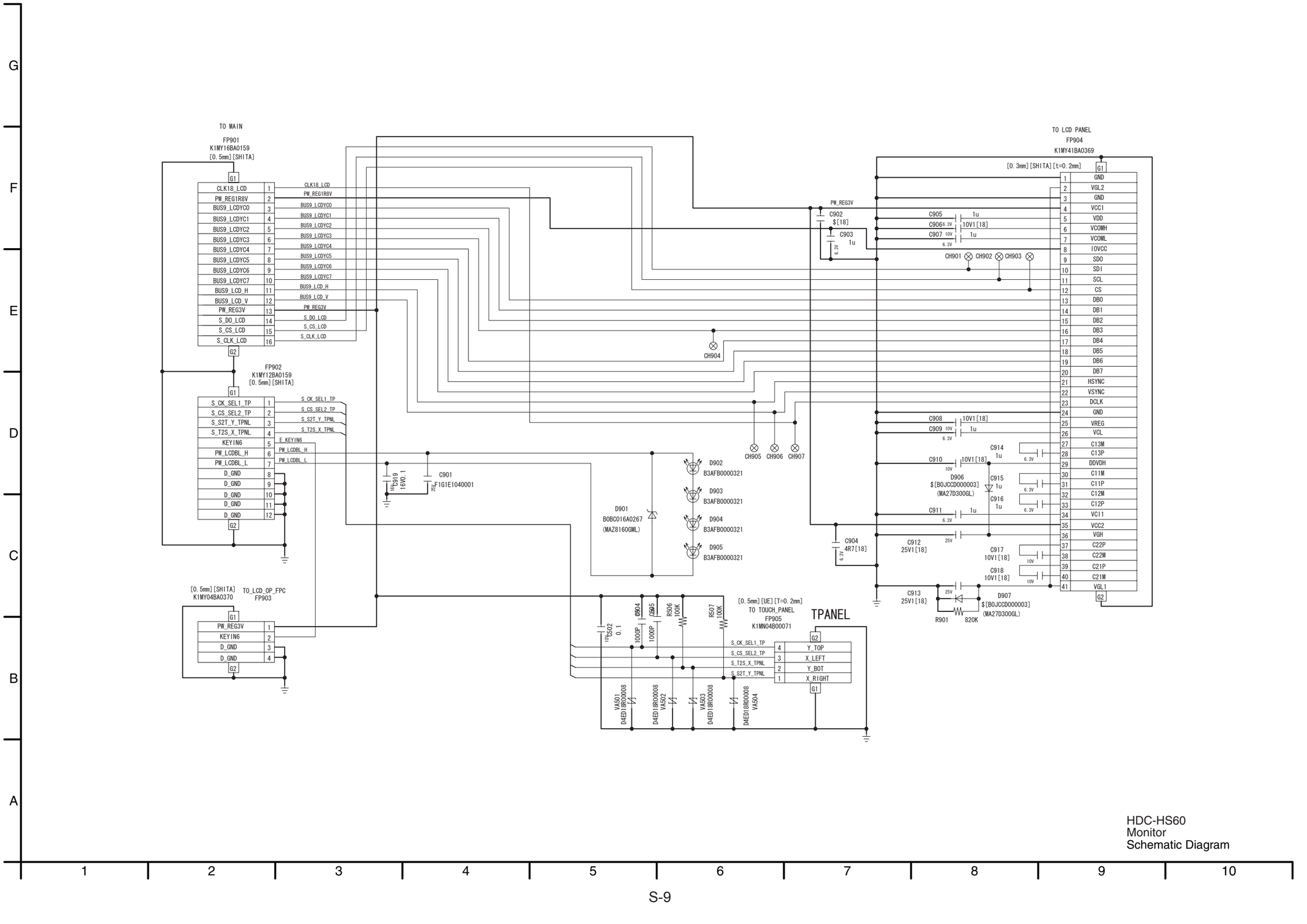
	HDC-HS60	HDC-SD60/TM60/TM70
D6402	B3AAB0000322	$[B3AAB0000322]

HDC-HS60
SD
Schematic Diagram

S4.5. Side R Schematic Diagram

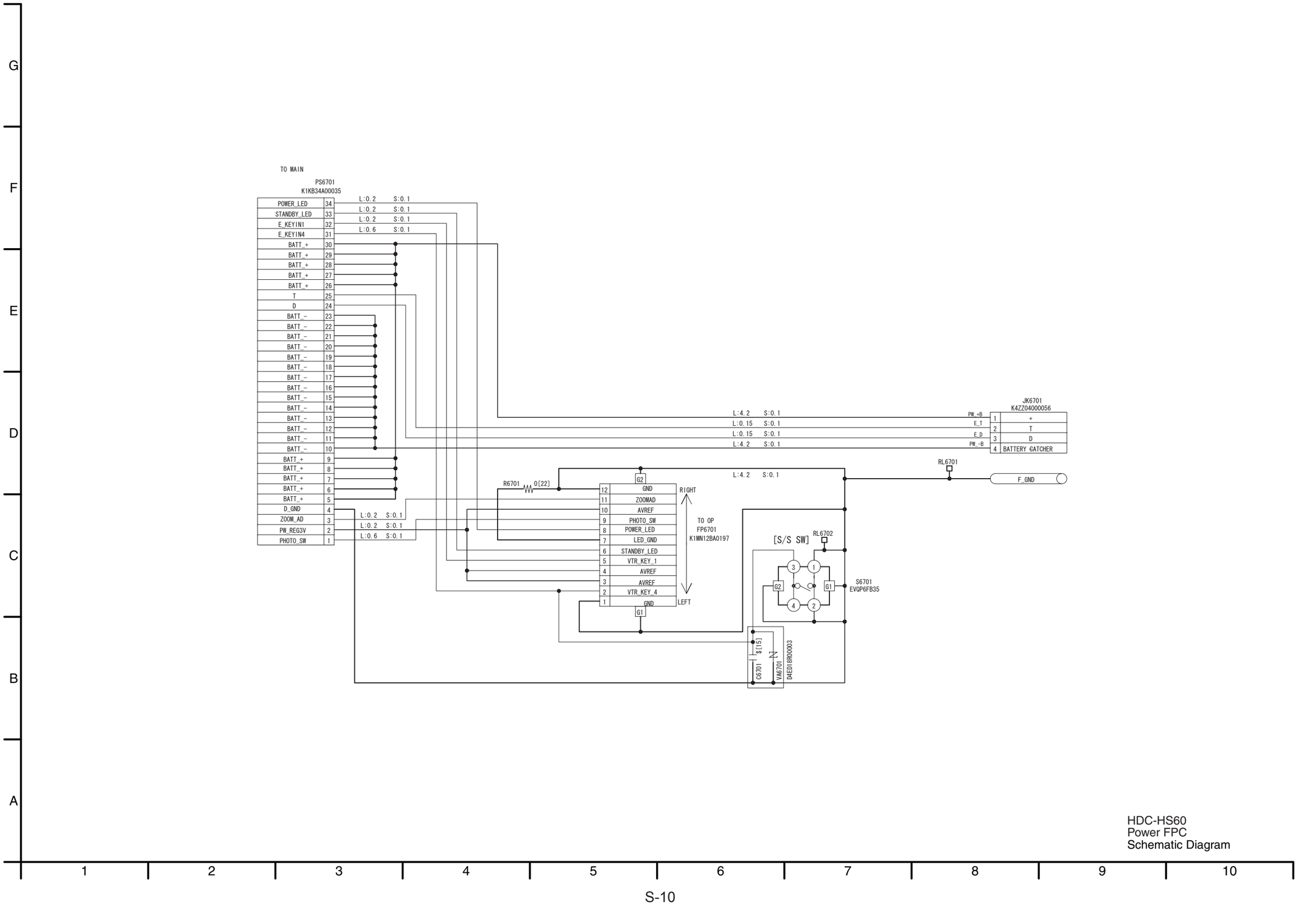


S4.6. Monitor Schematic Diagram



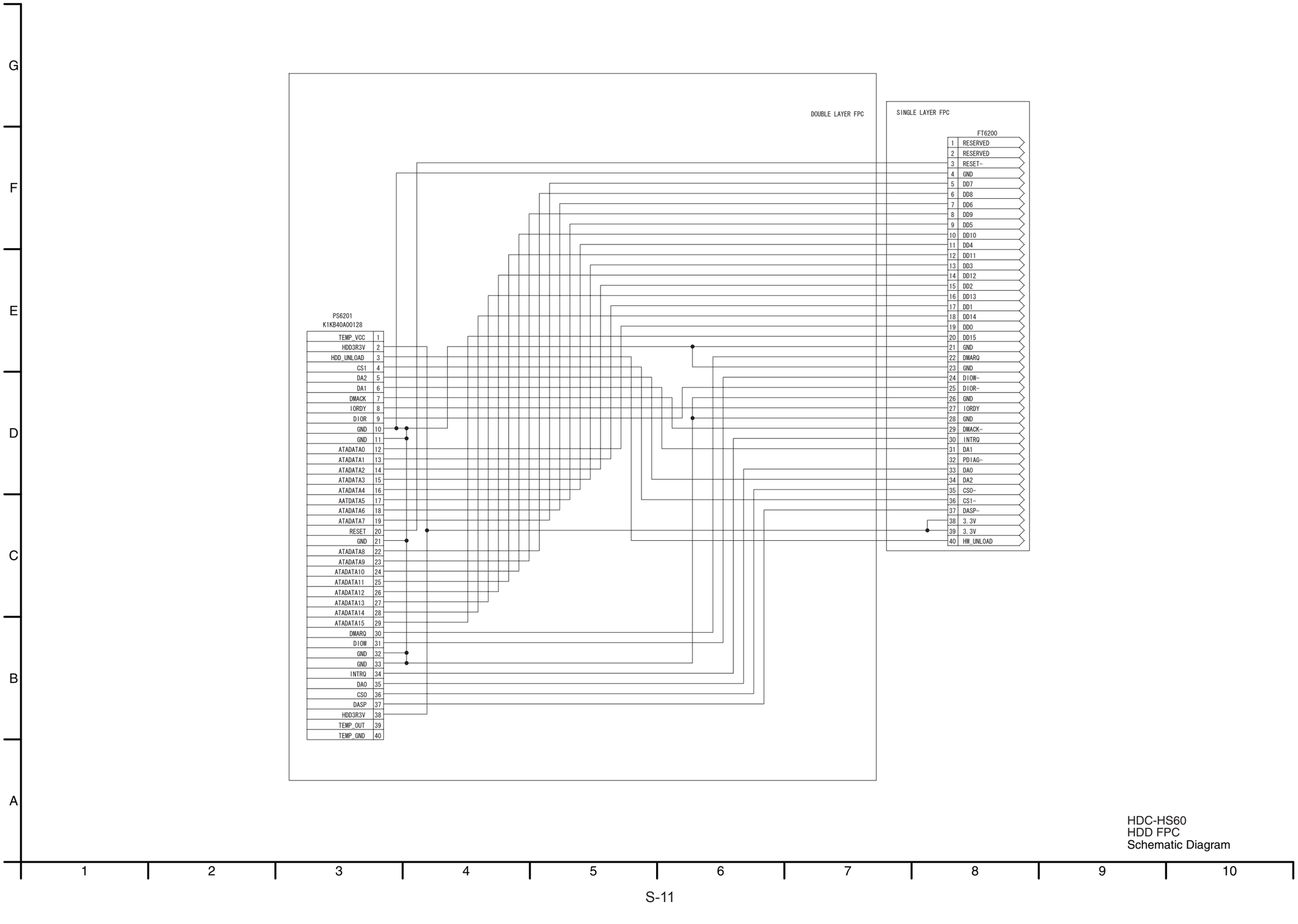
HDC-HS60
Monitor
Schematic Diagram

S4.7. Power FPC Schematic Diagram



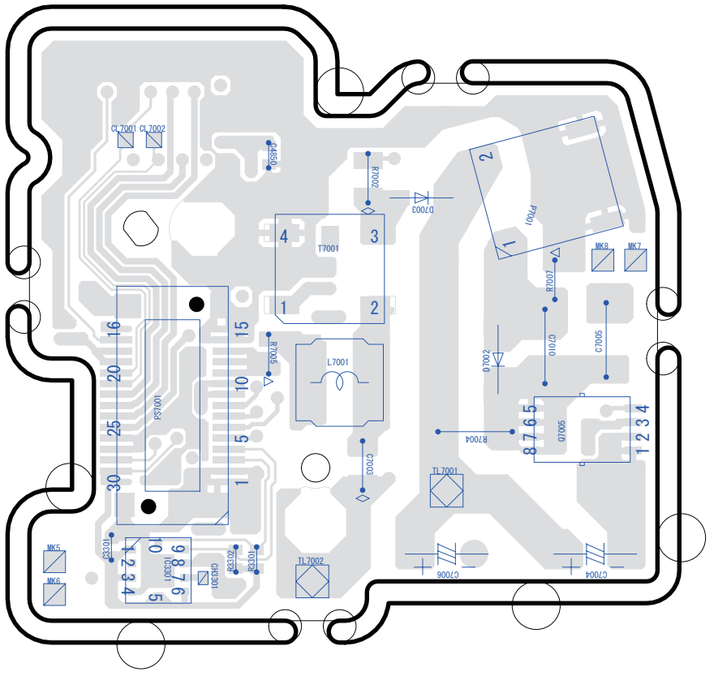
HDC-HS60
Power FPC
Schematic Diagram

S4.8. HDD FPC Schematic Diagram

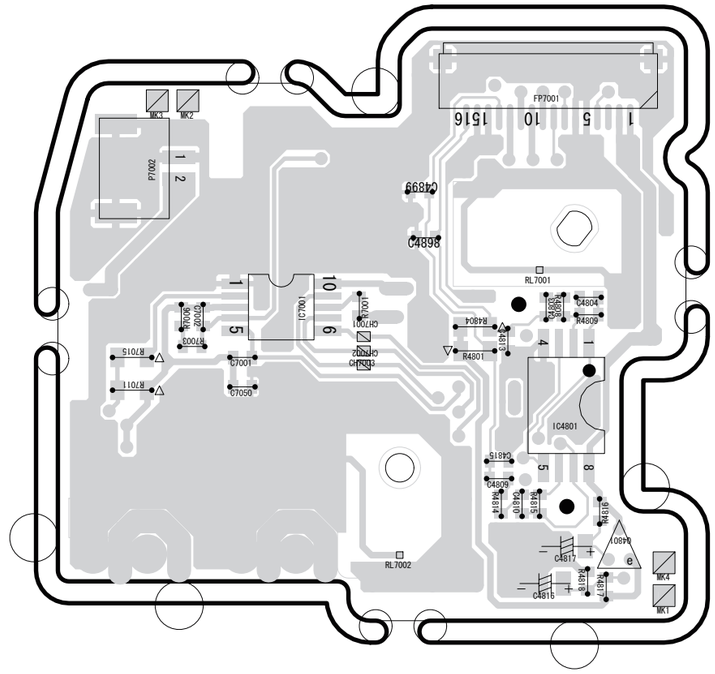


S5. Print Circuit Board

S5.1. Strobe P.C.B.



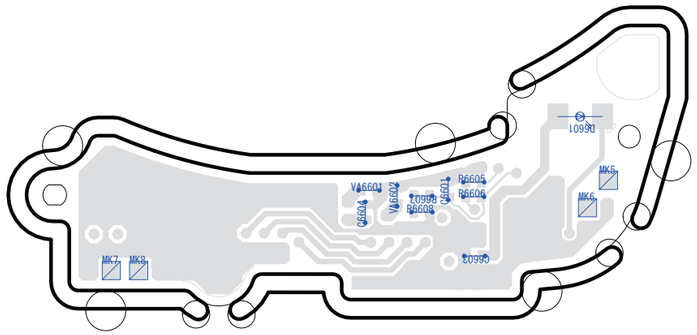
(Component Side)



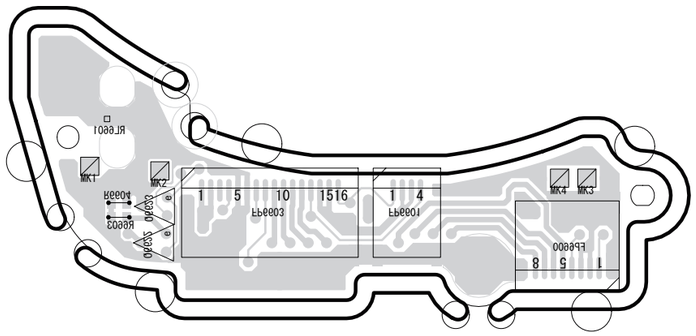
(Foil Side)

HDC-HS60
Strobe P.C.B.

S5.2. Front P.C.B.



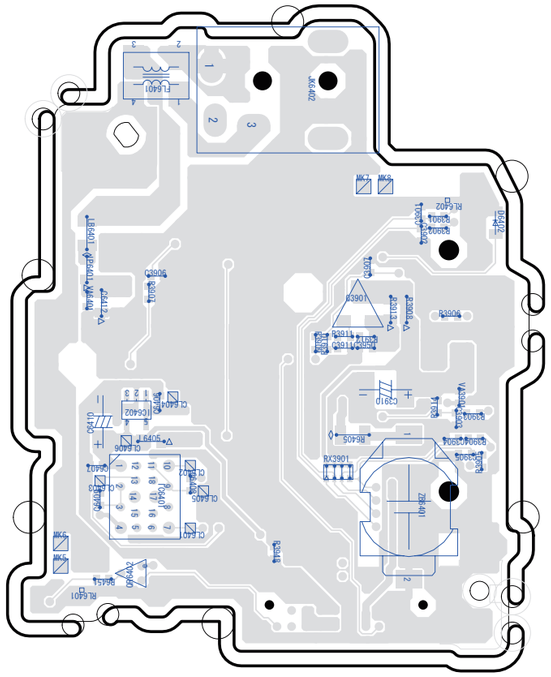
(Component Side)



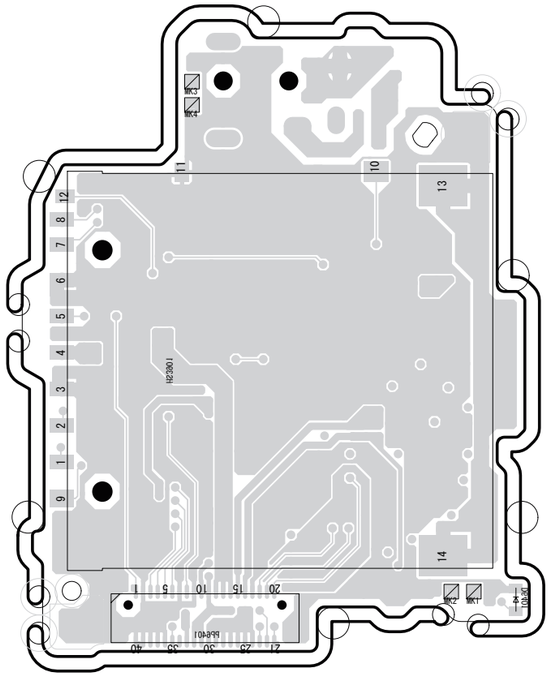
(Foil Side)

HDC-HS60
Front P.C.B.

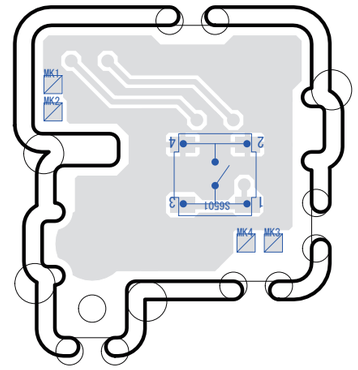
S5.3. SD P.C.B. / S5.4. Side R P.C.B.



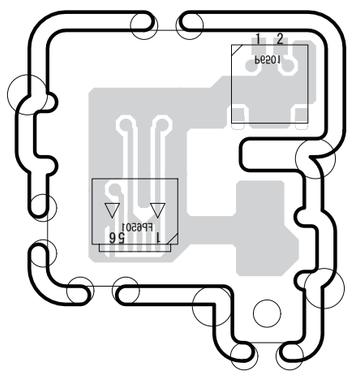
(Component Side)



(Foil Side)



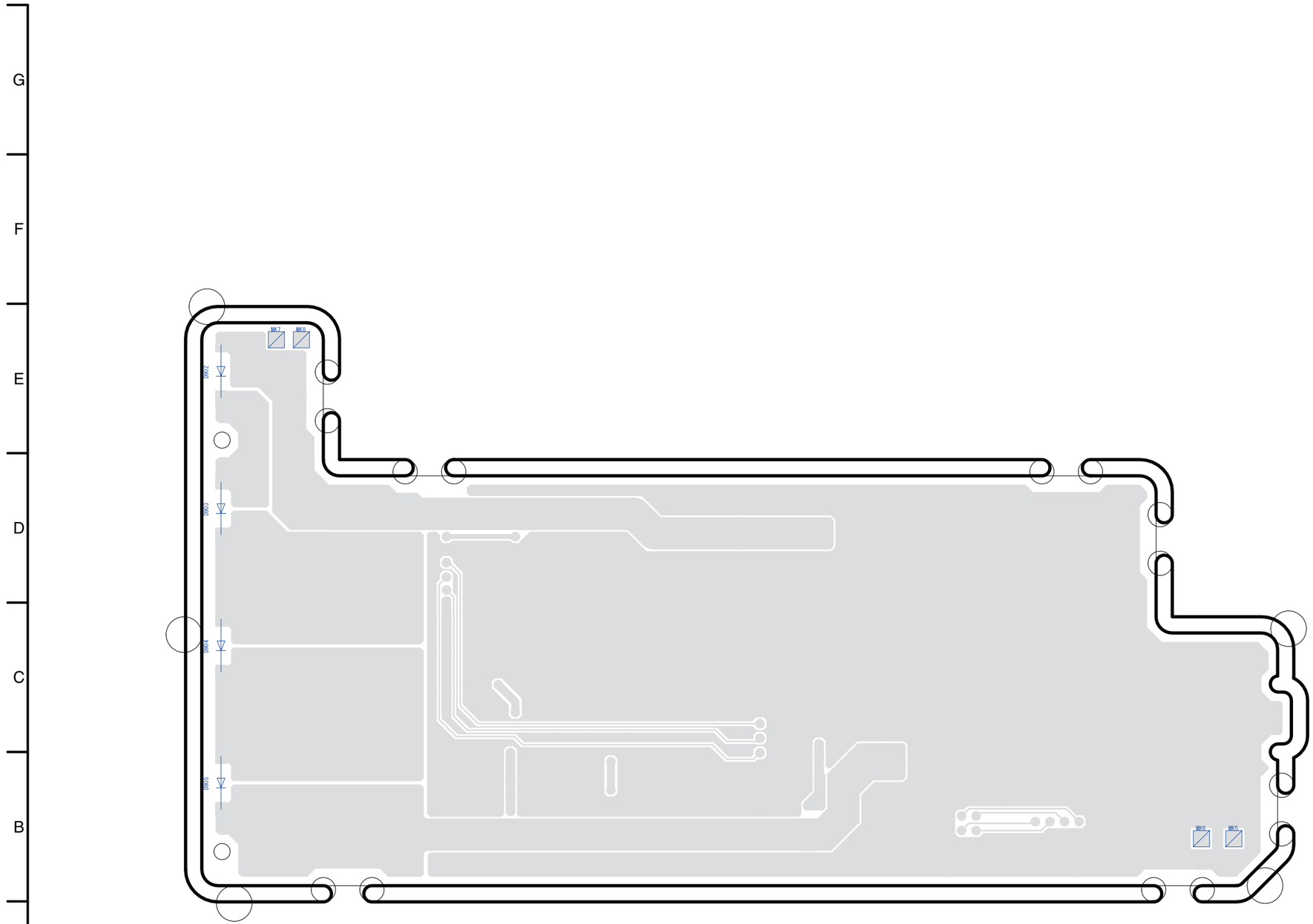
(Component Side)



(Foil Side)

S5.5. Monitor P.C.B.

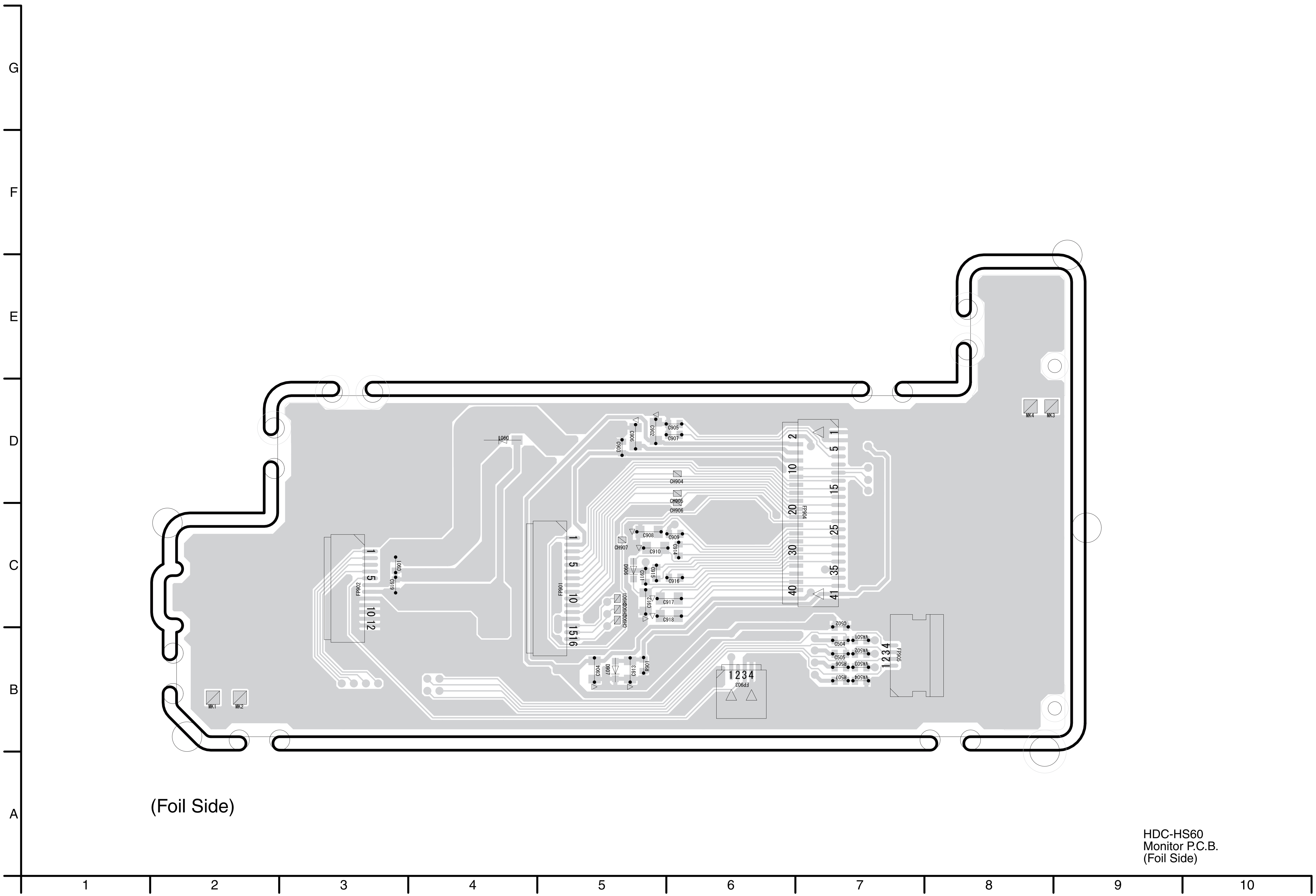
S5.5.1. Monitor P.C.B. (Component Side)



(Component Side)

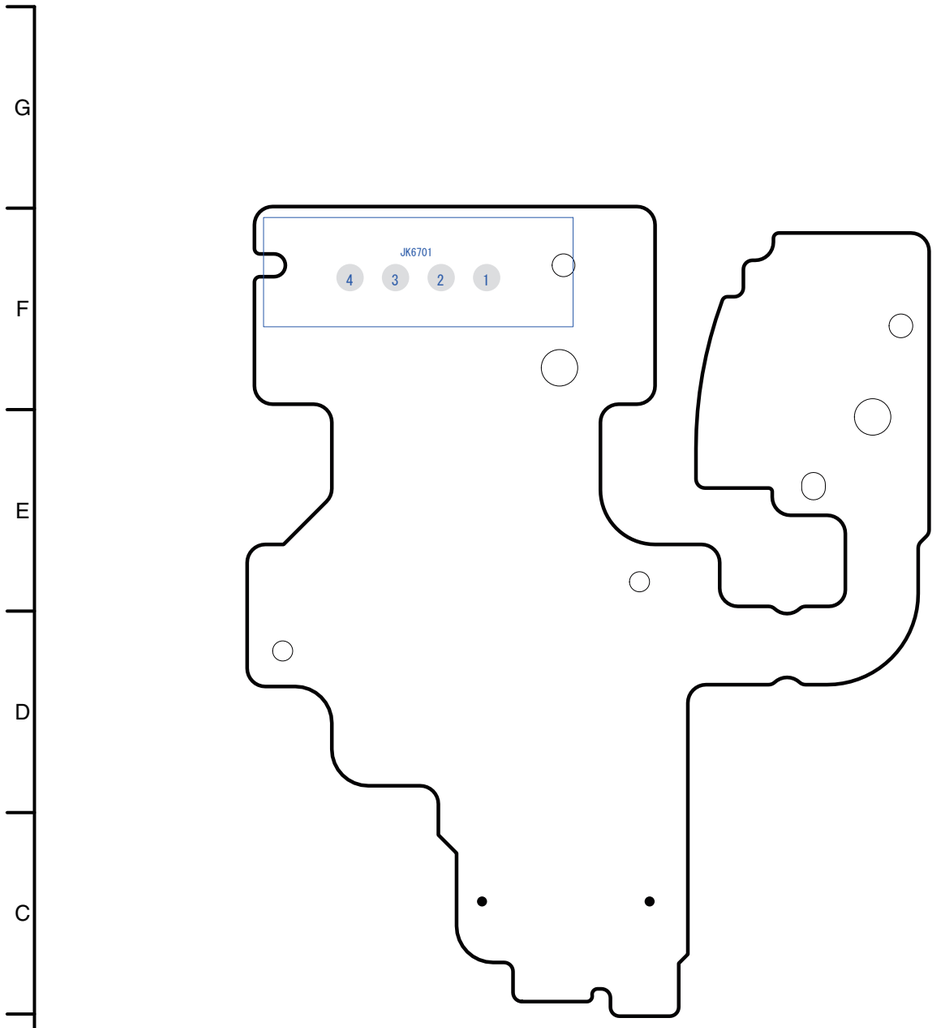
HDC-HS60
Monitor P.C.B.
(Component Side)

S5.5.2. Monitor P.C.B. (Foil Side)

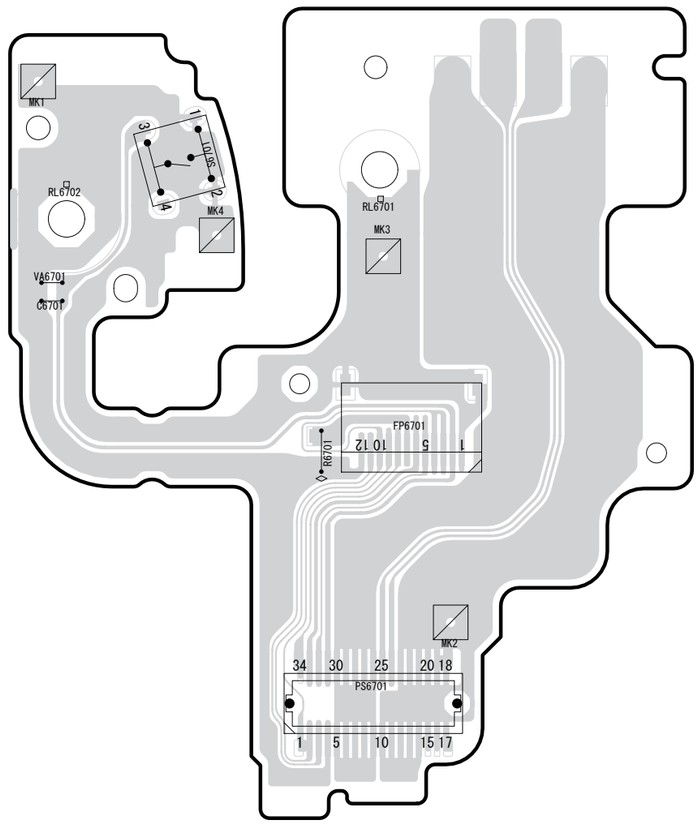


HDC-HS60
Monitor P.C.B.
(Foil Side)

S5.6. Power FPC P.C.B.



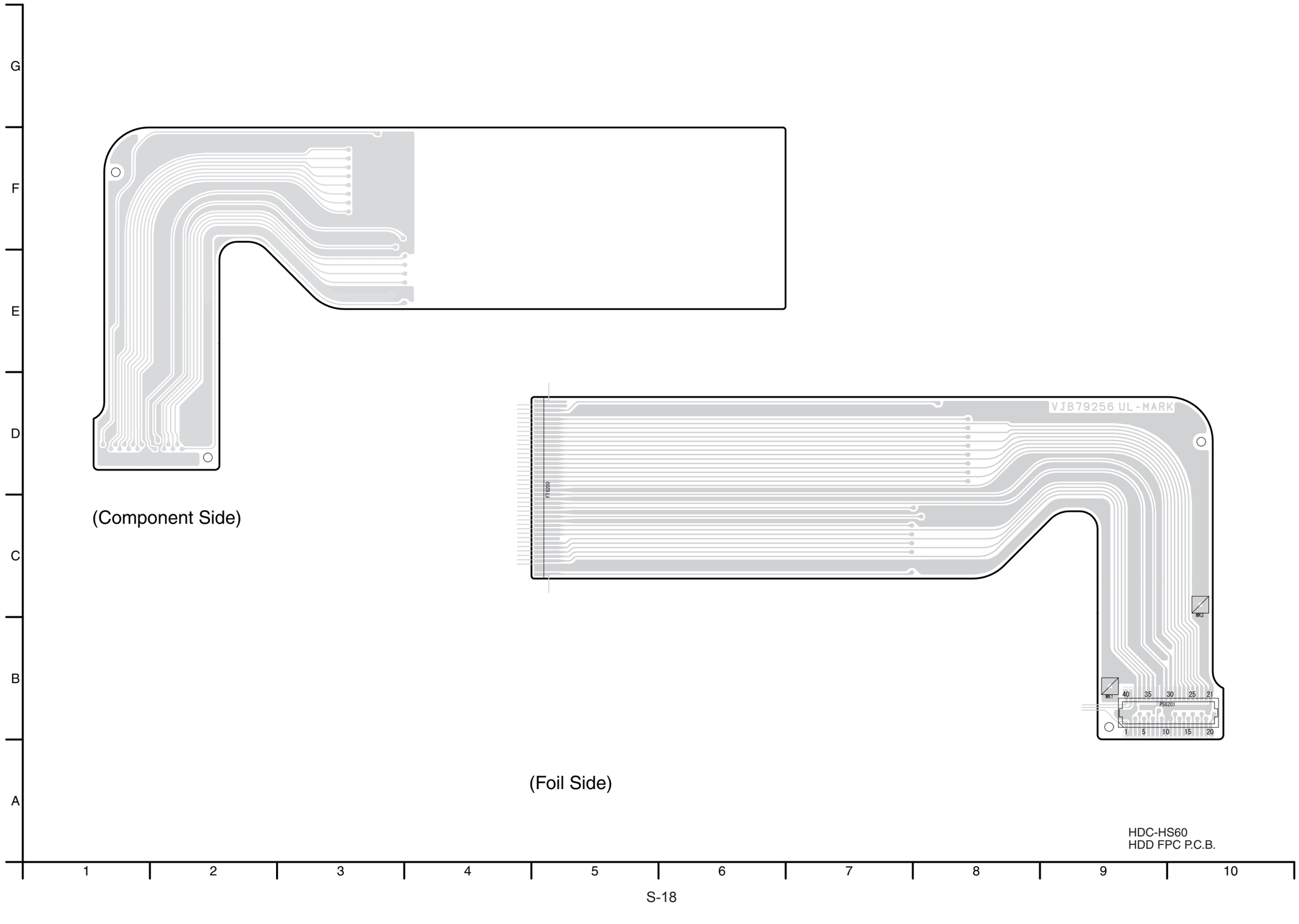
(Component Side)



(Foil Side)

HDC-HS60
Power FPC P.C.B.

S5.7. HDD FPC P.C.B.



(Component Side)

(Foil Side)

HDC-HS60
HDD FPC P.C.B.

S6. Replacement Parts List

Note: 1.* Be sure to make your orders of replacement parts according to this list.

2. IMPORTANT SAFETY NOTICE
   Components identified with the mark ⚠ have the special characteristics for safety.
   When replacing any of these components, use only the same type.

3. Unless otherwise specified,
   All resistors are in OHMS, K=1,000 OHMS. All capacitors are in MICRO-FARADS (uf), P=uuF.

4. The marking (RTL) indicates the retention time is limited for this item. After the discontinuation of this assembly in production, it will no longer be available.

E.S.D. standards for Electrostatically Sensitive Devices, refer to "PREVENTION OF ELECTROSTATIC DISCHARGE (ESD) TO ELECTROSTATICALLY SENSITIVE (ES) DEVICES" section.

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
##	VEP03H84AP	MAIN PCB UNIT	1	EG,EP,EF,EB,EC
				(RTL) E.S.D.
##	VEP03H84AQ	MAIN PCB UNIT	1	EE,GC,GK,GN,SG
				(RTL) E.S.D.
##	VEP03H84AN	MAIN PCB UNIT	1	P,PC,PU,GT (RTL) E.S.D.
##	VEP26327A	FLASH PCB UNIT	1	(RTL) E.S.D.
##	VEP20C81A	FRONT PCB UNIT	1	(RTL) E.S.D.
##	VEP03H86A	SD PCB UNIT	1	(RTL) E.S.D.
##	VEP26329A	MONITOR PCB UNIT	1	(RTL) E.S.D.
##	VEP21309A	POWER FPC UNIT	1	(RTL) E.S.D.
##	VEP06G49A	SIDE R OP PCB UNIT	1	(RTL) E.S.D.
##	VEP26327A	FLASH PCB UNIT		(RTL) E.S.D.
C3301	F1G1C104A080	C.CAPACITOR CH 16V 0.1U	1	
C4803	ECJ0EB1A473K	C.CAPACITOR CH 10V 0.047U	1	
C4804	ECJ0EC1H680J	C.CAPACITOR CH 50V 68P	1	
C4809	ECJ0EB1A473K	C.CAPACITOR CH 10V 0.047U	1	
C4810	ECJ0EC1H680J	C.CAPACITOR CH 50V 68P	1	
C4816	F3E0J106A009	E.CAPACITOR CH 6.3V 22U	1	
C4817	F3E0J106A009	E.CAPACITOR CH 6.3V 22U	1	
C4898	F1G1H4710004	C.CAPACITOR CH 50V 470U	1	
C4899	F1G1H4710004	C.CAPACITOR CH 50V 470U	1	
C7001	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C7002	ECJ0EC1H150J	C.CAPACITOR CH 50V 15P	1	
C7003	F1J1A106A043	C.CAPACITOR CH 10V 10U	1	
C7004	F2A2F2500001	ALUMINUM NON-SOLID ELECTR	1	
C7005	F1K2E4730005	C.CAPACITOR 250V 0.047U	1	
C7006	F2A2F2500001	ALUMINUM NON-SOLID ELECTR	1	
C7010	F1K2E223A004	C.CAPACITOR 250V 0.022U	1	
D7002	B0ECGP000006	DIODE	1	E.S.D.
D7003	DA2JF8100L	DIODE	1	E.S.D.
FP7001	K1MY16BA0159	CONNECTOR 16P	1	
IC3301	L2EE00000011	IC	1	E.S.D.
IC4801	C0ABBB000369	IC	1	E.S.D.
IC7001	C0ZBZ0001710	IC	1	E.S.D.
L7001	G1C470MA0249	CHIP INDUCTOR 47UH	1	
P7001	K1KA02B00292	CONNECTOR 2P	1	
P7002	K1KA02BA0022	CONNECTOR 2P	1	
PS7001	K1KB30AA0116	CONNECTOR 30P	1	
Q4801	B1ABDF000017	TRANSISTOR	1	E.S.D.
Q7005	B1JBLP000014	TRANSISTOR	1	E.S.D.
R3301	ERJ2GEJ222	M.RESISTOR CH 1/10W 2.2K	1	
R3302	ERJ2GEJ222	M.RESISTOR CH 1/10W 2.2K	1	
R4801	VRE0071E392	M.RESISTOR CH 1/10W 3.9K	1	
R4804	VRE0071E392	M.RESISTOR CH 1/10W 3.9K	1	
R4808	ERJ2GEJ183	M.RESISTOR CH 1/10W 18K	1	
R4809	ERJ2GEJ683	M.RESISTOR CH 1/16W 68K	1	
R4814	ERJ2GEJ183	M.RESISTOR CH 1/10W 18K	1	
R4815	ERJ2GEJ683	M.RESISTOR CH 1/16W 68K	1	
R4816	ERJ2GEJ472	M.RESISTOR CH 1/10W 4.7K	1	
R4817	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
R4818	ERJ2GEJ333	M.RESISTOR CH 1/16W 33K	1	
R7001	ERJ2GEJ683	M.RESISTOR CH 1/16W 68K	1	
R7002	D1BD8203A119	RESISTOR	1	
R7003	ERJ2RHD222	M.RESISTOR CH 1/16W 2.2K	1	
R7004	ERJ8GEYJ105V	M.RESISTOR CH 1/4W 1M	1	
⚠ R7005	D1JBR102A006	M.RESISTOR CH 1/16W 1K	1	
R7006	ERJ2RHD471X	M.RESISTOR CH 1/16W 470	1	
R7007	ERJ3GEYJ104	M.RESISTOR CH 1/10W 100K	1	
R7011	ERJ3GEYJ104	M.RESISTOR CH 1/10W 100K	1	
R7015	ERJ3GEYJ560	M.RESISTOR CH 1/10W 56	1	
T7001	G5DYZ0000025	TRANSFOMER	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
##	VEP20C81A	FRONT PCB UNIT		(RTL) E.S.D.
C6601	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C6603	F1G1C104A080	C.CAPACITOR CH 16V 0.1U	1	
C6604	F1G1C104A080	C.CAPACITOR CH 16V 0.1U	1	
D6601	B3AFB0000313	DIODE	1	E.S.D.
FP6600	K1MN08BA0197	CONNECTOR 8P	1	
FP6601	K1MN04BA0197	CONNECTOR 4P	1	
FP6603	K1MN16BA0197	CONNECTOR 16P	1	
Q6622	B1ABDF000017	TRANSISTOR	1	E.S.D.
Q6623	B1ADCF000161	TRANSISTOR	1	E.S.D.
R6603	D0GA120JA021	M.RESISTOR CH 1/16W 20	1	
R6604	ERJ2GEJ100	M.RESISTOR CH 1/10W 10	1	
R6605	ERJ2GEJ432	M.RESISTOR CH 1/10W 4.3K	1	
R6606	ERJ2RHD683	M.RESISTOR CH 1/16W 68K	1	
R6607	ERJ2RHD183	M.RESISTOR CH 1/16W 18K	1	
R6608	ERJ2RHD332X	M.RESISTOR CH 1/16W 3.3K	1	
##	VEP03H86A	SD PCB UNIT		(RTL) E.S.D.
⚠ B6401	ML-614S/ZTK	BATTERY	1	[ENERGY]
C3901	ECJ0EC1H220J	C.CAPACITOR CH 50V 22P	1	
C3902	ECJ0EC1H220J	C.CAPACITOR CH 50V 22P	1	
C3903	ECJ0EC1H220J	C.CAPACITOR CH 50V 22P	1	
C3904	ECJ0EC1H220J	C.CAPACITOR CH 50V 22P	1	
C3905	ECJ0EC1H220J	C.CAPACITOR CH 50V 22P	1	
C3906	ECJ0EB1C103K	C.CAPACITOR CH 16V 0.01U	1	
C3907	ECJ0EB1C103K	C.CAPACITOR CH 16V 0.01U	1	
C3910	F3G0J107A017	C.CAPACITOR CH 6.3V 100U	1	
C3911	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C3950	F1G1C104A080	C.CAPACITOR CH 16V 0.1U	1	
C6406	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C6407	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C6408	F1G1H1020008	C.CAPACITOR CH 50V 1000P	1	
C6409	F1G1H1020008	C.CAPACITOR CH 50V 1000P	1	
C6412	F1H0J475A010	C.CAPACITOR CH 6.3V 4.7U	1	
D6401	B3AAB0000322	LED	1	E.S.D.
D6402	B3AAB0000322	LED	1	E.S.D.
FL6401	J0MAB0000091	FILTER	1	
HS3901	K1NA09E00115	SD CARD SLOT	1	
IC6401	EWTS9CVE11	IC	1	E.S.D.
IC6402	C0DBGFC00009	IC	1	E.S.D.
⚠ IP6401	K5H4021A0011	IC PROTECTOR	1	
JK6402	K2EBYB000003	JACK, DC IN	1	
LB6401	J0JJC0000015	FILTER	1	
PP6401	K1KA40BA0052	CONNECTOR 40P	1	
Q3901	B1ADKB000015	TRANSISTOR	1	E.S.D.
QR6402	B1GDCFYY0010	TRANSISTOR	1	E.S.D.
R3901	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R3902	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R3903	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R3904	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R3905	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R3907	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
R3909	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	
R3910	ERJ2GEJ271	M.RESISTOR CH 1/10W 270	1	
R3911	ERJ2GEJ331	M.RESISTOR CH 1/16W 330	1	
R3912	ERJ2GEJ333	M.RESISTOR CH 1/16W 33K	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
R3913	D0GB150JA057	M.RESISTOR CH 1/10W 15	1	
R3914	ERJ2GEJ103	M.RESISTOR CH 1/10W 10K	1	
R6405	ERJ6GEYJ222V	M.RESISTOR CH 1/8W 2.2K	1	
R6451	ERJ2GEJ821	M.RESISTOR CH 1/10W 820	1	
RX3901	EXB28V103JX	RESISTOR NETWORKS	1	
VA6401	D4ED1270A011	VARISTOR	1	
ZB6401	K3ZZ00500014	BATTERY HOLDER	1	
##	VEP26329A	MONITOR PCB UNIT		(RTL) E.S.D.
C502	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
C901	F1G1E1040001	C.CAPACITOR CH 25V 0.1U	1	
C903	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C904	F1H0J475A010	C.CAPACITOR CH 6.3V 4.7U	1	
C905	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C906	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C907	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C908	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C909	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C910	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C911	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C912	F1H1E105A116	C.CAPACITOR CH 25V 1U	1	
C913	F1H1E105A116	C.CAPACITOR CH 25V 1U	1	
C914	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C915	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C916	F1G0J1050007	C.CAPACITOR CH 6.3V 1U	1	
C917	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C918	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C919	F1G1C104A080	C.CAPACITOR CH 16V 0.1U	1	
D901	B0BC016A0267	DIODE	1	E.S.D.
D902	B3AFB0000321	DIODE	1	E.S.D.
D903	B3AFB0000321	DIODE	1	E.S.D.
D904	B3AFB0000321	DIODE	1	E.S.D.
D905	B3AFB0000321	DIODE	1	E.S.D.
FP901	K1MY16BA0159	CONNECTOR 16P	1	
FP902	K1MY12BA0159	CONNECTOR 12P	1	
FP903	K1MY04BA0370	CONNECTOR 4P	1	
FP904	K1MY41BA0369	CONNECTOR 41P	1	
FP905	K1MN04B00071	CONNECTOR 4P	1	
R506	ERJ2GEJ104	M.RESISTOR CH 1/10W 100K	1	
R507	ERJ2GEJ104	M.RESISTOR CH 1/10W 100K	1	
R901	ERJ2GEJ824	M.RESISTOR CH 1/16W 820K	1	
VA501	D4ED18R00008	VARISTOR	1	
VA502	D4ED18R00008	VARISTOR	1	
VA503	D4ED18R00008	VARISTOR	1	
VA504	D4ED18R00008	VARISTOR	1	
##	VEP21309A	POWER FPC UNIT		(RTL) E.S.D.
FP6701	K1MN12BA0197	CONNECTOR 12P	1	
JK6701	K4ZZ04000056	JACK, BATTERY CATCH	1	
PS6701	K1KB34A00035	CONNECTOR 34P	1	
R6701	ERJ6GEY0R00V	M.RESISTOR CH 1/8W 0	1	
S6701	EVQP6FB35	SWITCH	1	
VA6701	D4ED18R00003	VARISTORS	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
##	VEP06G49A	SIDE R OP PCB UNIT		(RTL) E.S.D.
FP6501	K1MY06BA0370	CONNECTOR 6P	1	
P6501	K1KY02A00010	CONNECTOR 2P	1	
S6501	K0F111A00589	SWITCH	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
4	VWJ2128	SIDE R OP FPC	1	
31	VYK3V24	FRONT CASE UNIT	1	
32	VEP04954A	ECM FPC UNIT	1	
33	VMG1927	LENS DAMPER	1	
34	VGQ0K82	BARRIER LEVER	1	
35	VGQ0K83	BARRIER CHANGE LEVER	1	
36	VGQ0K84	SHEET	1	
37	VMB4357	BARRIER SPRING	1	
38	VMB4357	BARRIER SPRING	1	
39	N9ZZ00000414	BARRIER MOTOR	1	
40	VEP20C81A	FRONT PCB UNIT	1	(RTL) E.S.D.
41	VWJ2137	FRONT FPC	1	
42	VDL2468	LED LIGHT LENS	1	
43	VMP9614	FRONT FRAME	1	
45	VYK3Q93	SIDE CASE (L) UNIT	1	
46	VYK3V25	R COVER UNIT	1	
47	VKM8411	TOP CASE	1	
48	VKM8318	FRONT UNDER COVER	1	
50	VKM8374	TOP PIECE	1	
51	VMG1922	HDD CUSHION	1	
52	VMG1922	HDD CUSHION	1	
53	VGQ9672	GASKET	1	
54	VYK3R05	HDD SIELD FRAME UNIT	1	
55	RFKV0220HDKT	HDD UNIT	1	
56	VEP79256A	HDD FPC UNIT	1	
B14	XQN16+BJ4FN	SCREW	1	
B15	XQN16+BJ4FN	SCREW	1	
B16	XQN16+BJ4FN	SCREW	1	
B17	XQN16+BJ4FN	SCREW	1	
B18	XQN16+BJ4FN	SCREW	1	
B19	XQN16+BJ4FN	SCREW	1	
B20	XQN16+BJ8FN	SCREW	1	
B33	VHD1411	SCREW	1	
B34	XQN16+B3FN	SCREW	1	
B45	XQN16+B4FJK	SCREW	1	
B46	XQN16+B4FJK	SCREW	1	
B50	XQN16+B4FJK	SCREW	1	
B51	XQN16+B4FJK	SCREW	1	
B52	XQN16+B4FJK	SCREW	1	
B53	XQN16+B4FJK	SCREW	1	
B54	XQN16+B4FJK	SCREW	1	
B59	VHD1907	SCREW	1	
B60	VHD1907	SCREW	1	
B61	VHD1907	SCREW	1	
B62	VHD1907	SCREW	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
1	VEP03H84AP	MAIN PCB UNIT	1	EG,EP,EF,EB,EC
				(RTL) E.S.D.
1	VEP03H84AQ	MAIN PCB UNIT	1	EE,GC,GK,GN,SG
				(RTL) E.S.D.
1	VEP03H84AN	MAIN PCB UNIT	1	P,PC,PU,GT (RTL) E.S.D.
2	VEP26327A	FLASH PCB UNIT	1	(RTL) E.S.D.
3	VMB4356	CAPACITOR GND SPRING	1	
8	VYK3Q75	BOTTOM FRAME UNIT	1	
9	VYK3Q78	RADIATION PLATE UNIT	1	
10	VYK3Q76	LENS FRAME R UNIT	1	
11	VEP03H86A	SD PCB UNIT	1	(RTL) E.S.D.
12	VMP9606	SD FRAME	1	
13	VYK3Q81	BATT CASE UNIT	1	
14	VEP21309A	POWER FPC UNIT	1	(RTL) E.S.D.
15	K0RE00800010	SWITCH UNIT(TOP)	1	
16	VYK3V29	SIDE CASE (R) UNIT	1	
17	K0RE00600005	SWITCH UNIT	1	
20	L0AA01A00051	SPEAKER	1	
21	VEP06G49A	SIDE R OP PCB UNIT	1	(RTL) E.S.D.
23	VMP9612	SP ANGLE	1	
B1	VHD1919	SCREW	1	
B3	XQN16+BJ4FN	SCREW	1	
B4	XQN16+BJ4FN	SCREW	1	
B9	VHD1630	SCREW	1	
B10	VHD1630	SCREW	1	
B11	XQN16+B2FN	SCREW	1	
B23	VHD1919	SCREW	1	
B24	VHD1919	SCREW	1	
B25	VHD1919	SCREW	1	
B26	VHD1919	SCREW	1	
B27	VHD1919	SCREW	1	
B28	VHD1919	SCREW	1	
B29	VHD1919	SCREW	1	
B30	VHD1919	SCREW	1	
B31	VHD2189	SCREW	1	
B32	VHD1411	SCREW	1	
B35	XQN16+B3FN	SCREW	1	
B36	XQN16+B3FN	SCREW	1	
B47	XQN16+B4FJK	SCREW	1	
B48	XQN16+B4FJK	SCREW	1	
B49	XQN16+B4FJK	SCREW	1	
B55	XQN16+B4FJK	SCREW	1	
B56	XQN16+BJ5FJK	SCREW	1	
B57	XQN16+BJ5FJK	SCREW	1	
B58	XQN16+BJ5FJK	SCREW	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
18	VYK3V37	LCD CASE (T) UNIT	1	
19	VYK3Q88	PANEL UNIT	1	
22	VEP26329A	MONITOR PCB UNIT	1	(RTL) E.S.D.
24	VGQ0K73	LENS HOLDER	1	
25	VGL1330	PRISM SHEET A	1	
26	VGL1331	PRISM SHEET B	1	
27	VGL1296	DIFFUSION SHEET	1	
28	LSGL1526	LIGHT GUIDE PLATE	1	
29	VGL1333	REFLECTION SHEET	1	
30	VMP9613	LCD FRAME	1	
B7	VHD1688	SCREW	1	
B8	VHD1688	SCREW	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks

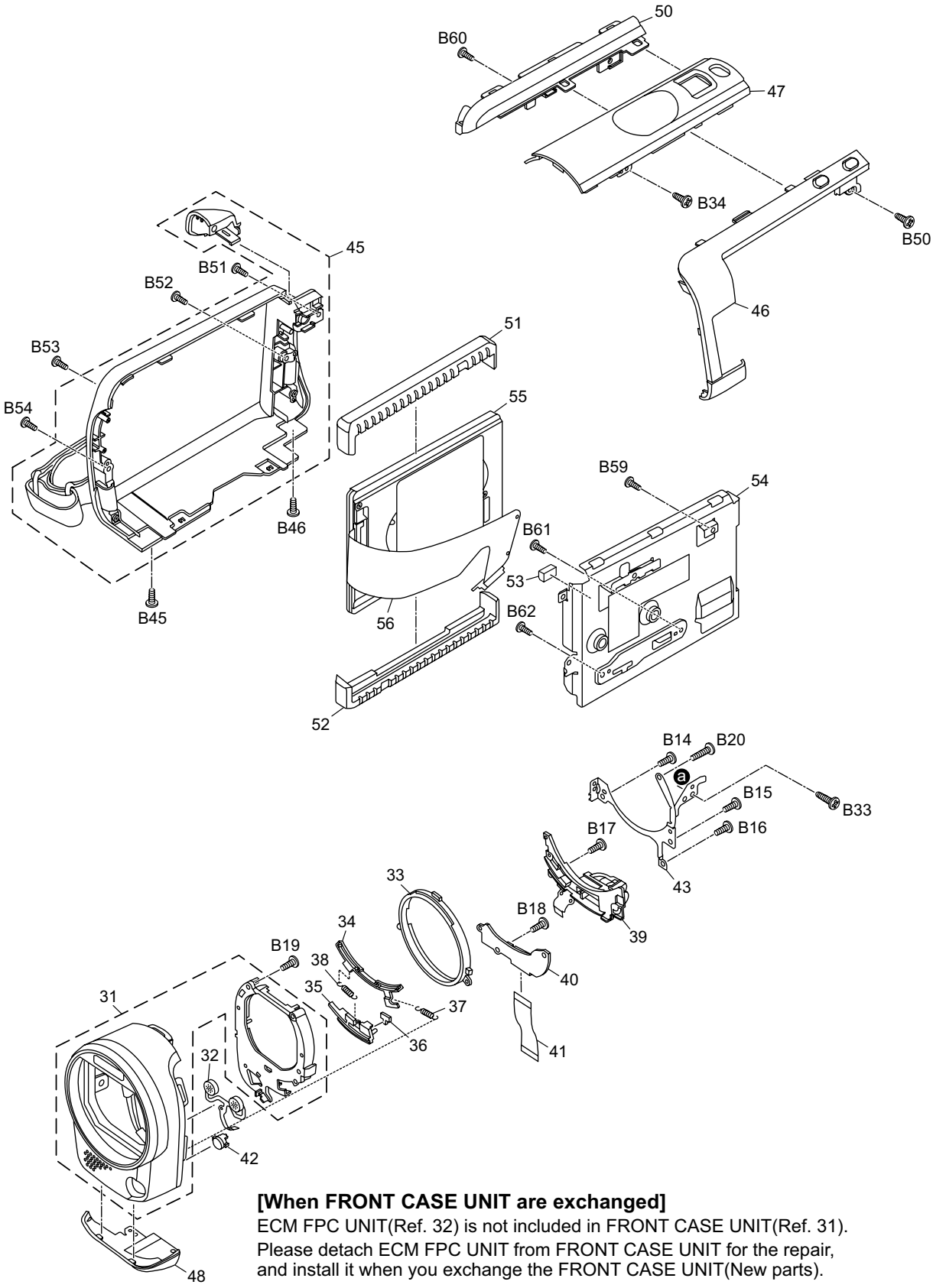
Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
201	VXQ1848	MOS UNIT	1	
203	VXW1109	LENS UNIT	1	
204	VXQ1849	1ST LENS FRAME UNIT	1	
205	VMB4361	1ST LENS FRAME SPRING	1	
206	VMB4361	1ST LENS FRAME SPRING	1	
207	VXP3387	2ND LENS FRAME MOVE UNIT	1	
208	VDW1986	BODY UNIT	1	
209	VMA0X19	REINFORCEMENT PLATE	1	
210	VXQ1852	OIS UNIT	1	
211	L6HA66NC0020	ZOOM MOTOR	1	
212	L6HA66NC0019	FOCUS MOTOR	1	
213	VMS8066	ZOOM GUIDE POLE	1	
214	VMS8066	ZOOM GUIDE POLE	1	
215	VMS8067	FOCUS GUIDE POLE L	1	
216	VMS8067	FOCUS GUIDE POLE L	1	
217	VDW1987	MASTER FLANGE	1	
218	VXP3373	IRIS UNIT	1	
219	VDL2467	IR FILTER	1	
220	VMX3811	MOS CUSHION	1	
221	VXP3390	4TH LENS FRAME MOVE UNIT	1	
B201	VHD2196	SCREW	1	
B202	VHD2196	SCREW	1	
B203	VHD2196	SCREW	1	
B204	VHD2072	SCREW	1	
B205	VHD2196	SCREW	1	
B206	VHD2196	SCREW	1	
B207	VHD2196	SCREW	1	
B208	VHD2196	SCREW	1	
B209	VHD2196	SCREW	1	
B210	VHD2196	SCREW	1	
B211	VHD2196	SCREW	1	
B212	VHD2196	SCREW	1	
B213	VHD2196	SCREW	1	
B214	VHD2196	SCREW	1	
B215	VHD2196	SCREW	1	
B216	VHD2072	SCREW	1	
B217	VHD2072	SCREW	1	

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks

Ref.No.	Part No.	Part Name & Description	Pcs	Remarks
301	K1HY12YY0004	AV MULTI CABLE	1	
302	K1HY04YY0032	USB CABLE	1	
⚠ 303	K2CQ29A00002	AC CABLE	1	EG,EP,EF,EC,EE,GC,SG
⚠ 304	K2CT39A00002	AC CABLE	1	EB,GC,SG
⚠ 305	K2CA2CA00025	AC CABLE	1	P,PC,PU
⚠ 305	K2CA29A00021	AC CABLE	1	GT
⚠ 305	K2CA2YY00070	AC CABLE	1	GK
306	VFF0610	CD-ROM (O/I)	1	EG,EP,EC
306	VFF0611	CD-ROM (O/I)	1	GC,SG
⚠ 308	K2CJ29A00002	AC CABLE	1	GN
⚠ 309	VSK0712	AC ADAPTOR	1	EG,EP,EF,EB,EC,EE,PU,
				GC,GN,SG
⚠ 309	VSK0711	AC ADAPTOR	1	P,PC
⚠ 309	VSK0714	AC ADAPTOR	1	GT
⚠ 309	VSK0713	AC ADAPTOR	1	GK
310	VGQ0C14	STYLUS PEN	1	
311	VPF1294	BAG, POLYETHYLENE	1	
⚠ 312	VQT2M57	OPERATING INSTRUCTIONS	1	EG
⚠ 312	VQT2M58	OPERATING INSTRUCTIONS	1	EG
⚠ 312	VQT2M59	OPERATING INSTRUCTIONS	1	EG
⚠ 312	VQT2M64	OPERATING INSTRUCTIONS	1	EP
⚠ 312	VQT2M65	OPERATING INSTRUCTIONS	1	EP
⚠ 312	VQT2M60	OPERATING INSTRUCTIONS	1	EF
		(FRENCH)		
⚠ 312	VQT2M66	OPERATING INSTRUCTIONS	1	EB
		(ENGLISH)		
⚠ 312	VQT2M61	OPERATING INSTRUCTIONS	1	EC
⚠ 312	VQT2M62	OPERATING INSTRUCTIONS	1	EC
⚠ 312	VQT2M63	OPERATING INSTRUCTIONS	1	EC
⚠ 312	VQT2M70	OPERATING INSTRUCTIONS	1	EE
		(RUSSIAN)		
⚠ 312	VQT2M71	OPERATING INSTRUCTIONS	1	EE
		(UKRAINIAN)		
⚠ 312	VQT2M51	OPERATING INSTRUCTIONS	1	P,PC
		(ENGLISH)		
⚠ 312	VQT2M52	OPERATING INSTRUCTIONS	1	PC
		(CANADIAN FRENCH)		
⚠ 312	VQT2M53	OPERATING INSTRUCTIONS	1	PU
		(ENGLISH)		
⚠ 312	VQT2M54	OPERATING INSTRUCTIONS	1	PU
⚠ 312	VQT2M67	OPERATING INSTRUCTIONS	1	GC,SG
⚠ 312	VQT2M68	OPERATING INSTRUCTIONS	1	GC,SG
⚠ 312	VQT2M69	OPERATING INSTRUCTIONS	1	GC,SG
⚠ 312	VQT2M55	OPERATING INSTRUCTIONS	1	GT
		(CHINESE(SIMPLFIED))		
⚠ 312	VQT2M73	OPERATING INSTRUCTIONS	1	GK
		(CHINESE(TRADITIONAL))		
⚠ 312	VQT2M72	OPERATING INSTRUCTIONS	1	GN
		(ENGLISH)		
313	VPG2D57	PAKCING CASE	1	EG,EP,EF,EB,EC,EE,PU,
				GC,GT,GN
313	VPG2D56	PAKCING CASE	1	P,PC
313	VYQ5241	PACKING CASE U	1	GK
313	VYQ5240	PACKING CASE U	1	SG
314	VPN6970	PAD	1	
315	VPF1376	PROTECT BAG	1	
316		CD-ROM	1	EG,EP,EF,EB,EC,EE,P,PC,
				PU,GC,GT,GN,SG
316		CD-ROM	1	GK
317	---	BATTERY PACK	1	

S7. Exploded View

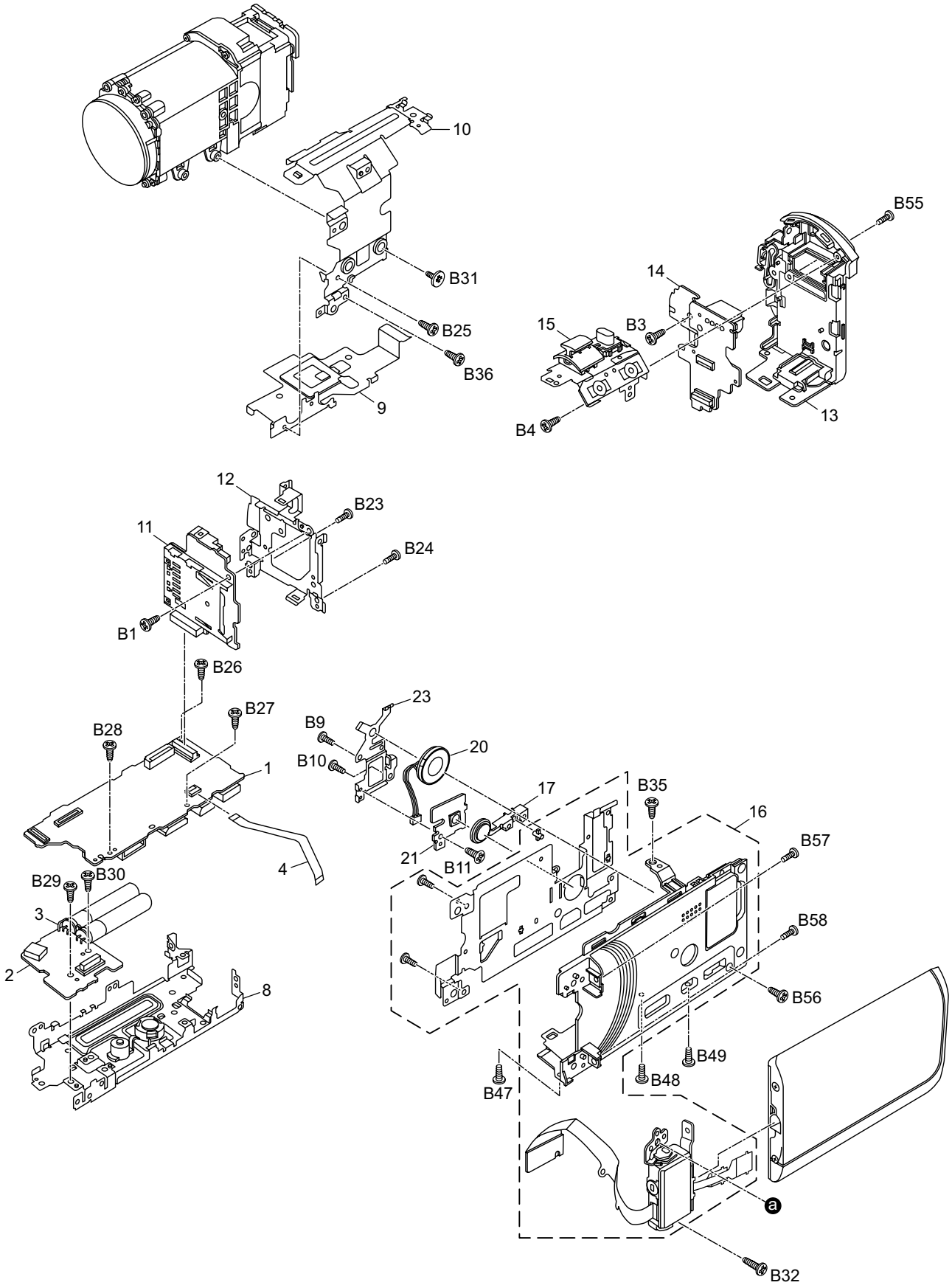
S7.1. Frame and Casing Section (1)



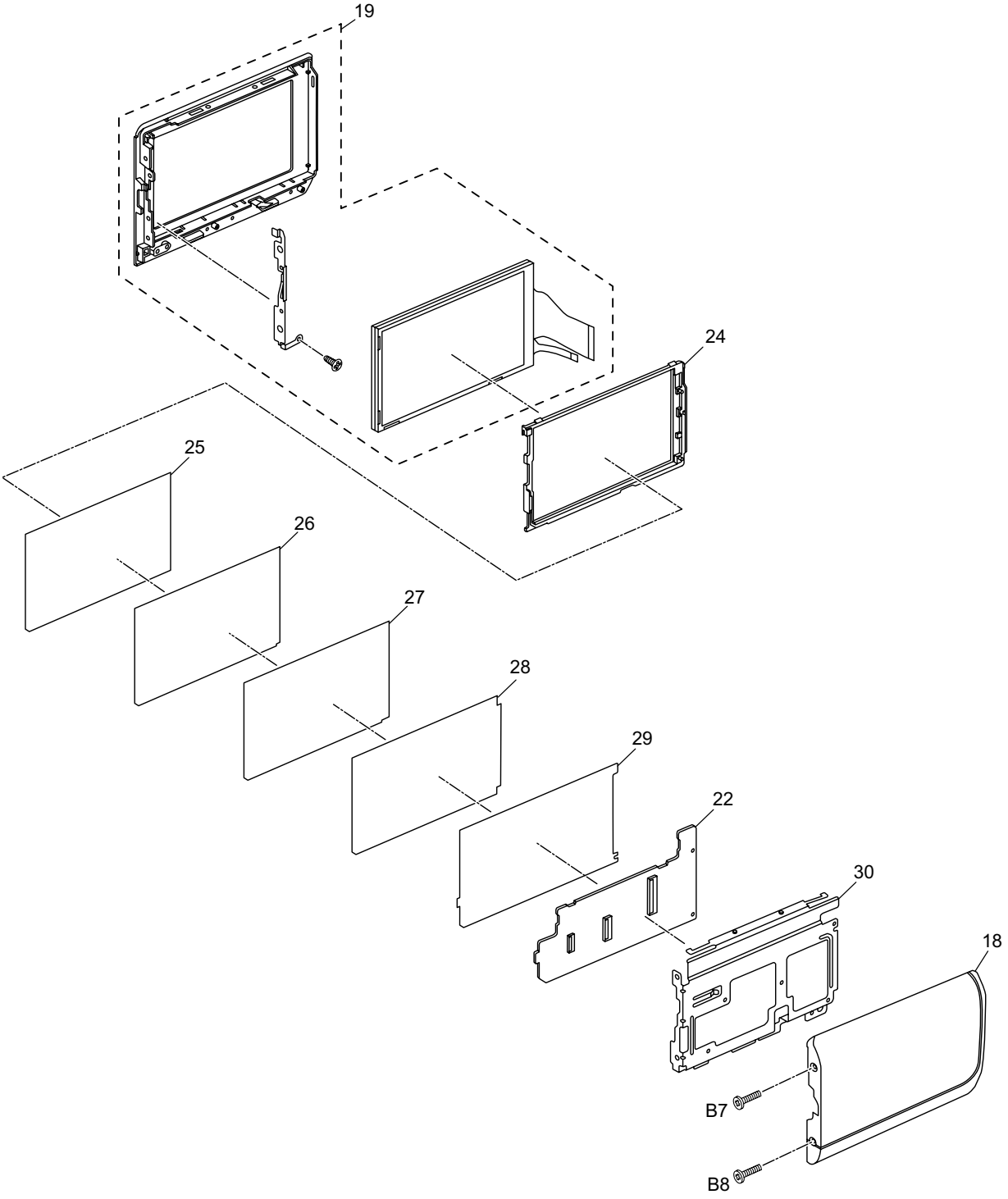
[When FRONT CASE UNIT are exchanged]

ECM FPC UNIT(Ref. 32) is not included in FRONT CASE UNIT(Ref. 31).
Please detach ECM FPC UNIT from FRONT CASE UNIT for the repair, and install it when you exchange the FRONT CASE UNIT(New parts).

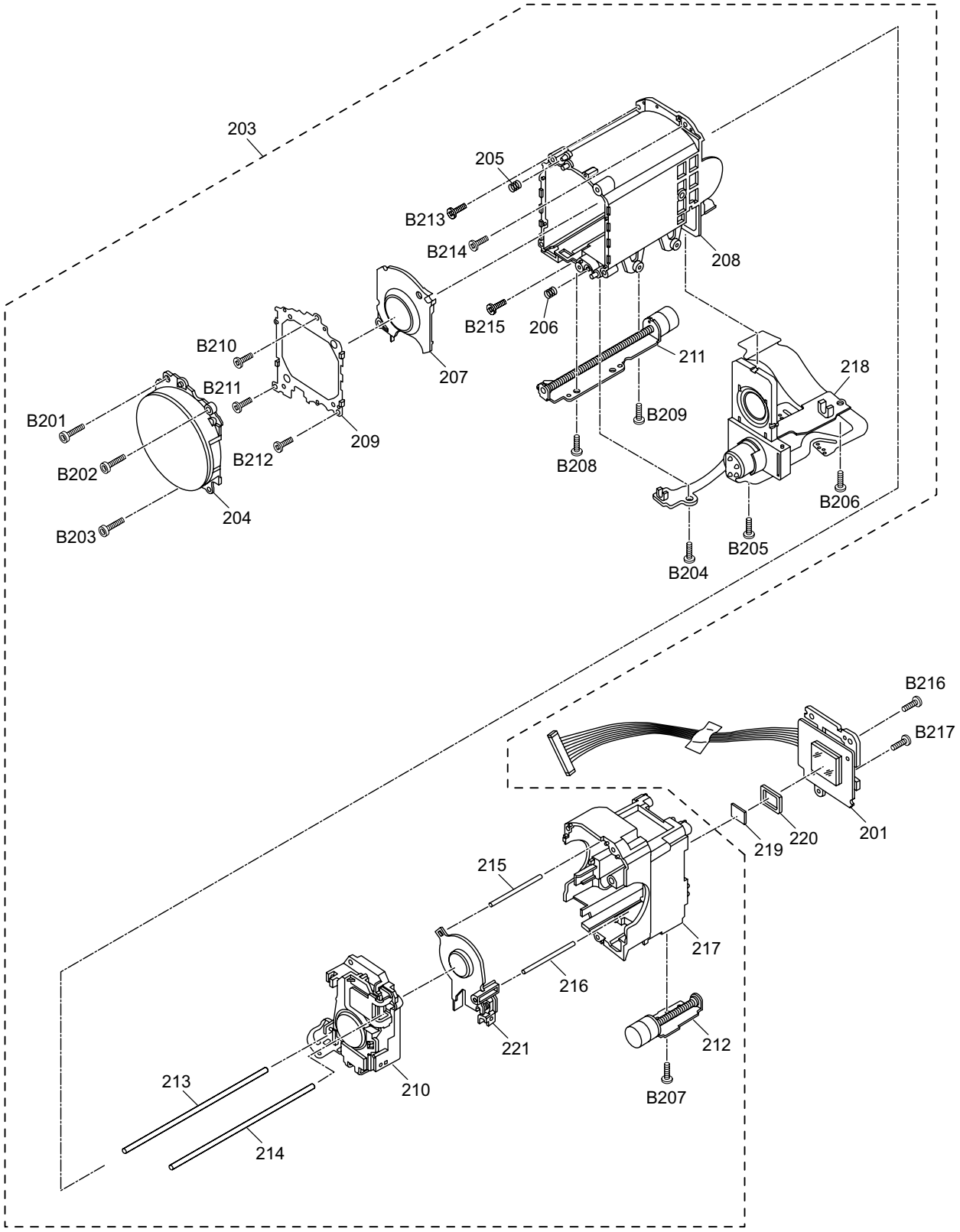
S7.2. Frame and Casing Section (2)



S7.3. LCD Section



S7.4. Camera Lens Section



S7.5. Packing Parts and Accessories Section