

Service Manual

Digital Camera

LUMIX

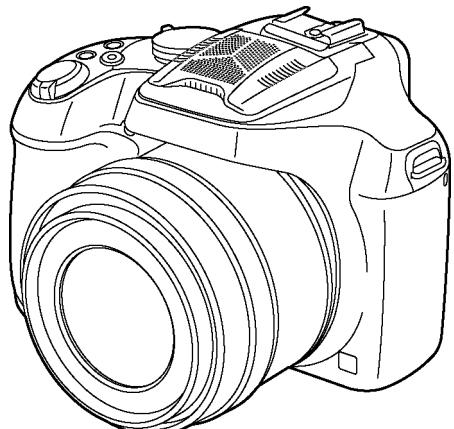


DOLBY
DIGITAL

AVCHD™

HDMI

3D



Model No. **DMC-FZ70P**

DMC-FZ70PC

DMC-FZ70PU

DMC-FZ70GC

DMC-FZ70GK

DMC-FZ70GN

DMC-FZ72EB

DMC-FZ72EE

DMC-FZ72EF

DMC-FZ72EG

DMC-FZ72EP

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.

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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 \triangle 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 $1M\Omega$ and $5.2M\Omega$. 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 $1.5k\Omega$, 10 W resistor, in parallel with a $0.15\mu F$ 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 $1 k\Omega/V$ 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

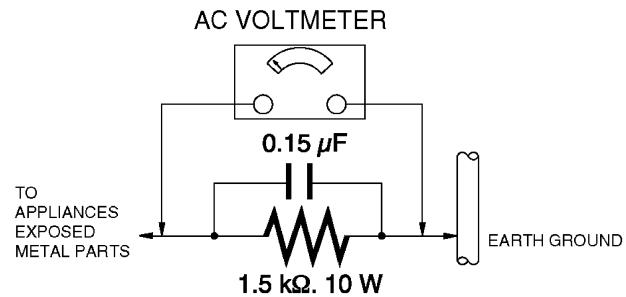


Figure 1

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

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. Install the insulation tube onto the lead part of Resistor (ERG5SJ102:1kΩ /5W).
(an equivalent type of resistor may be used.)
3. Place a resistor between both terminals of capacitor on the Flash P.C.B. for approx. 5 seconds.
4. After discharging, confirm that the capacitor voltage is lower than 10V using a voltmeter.

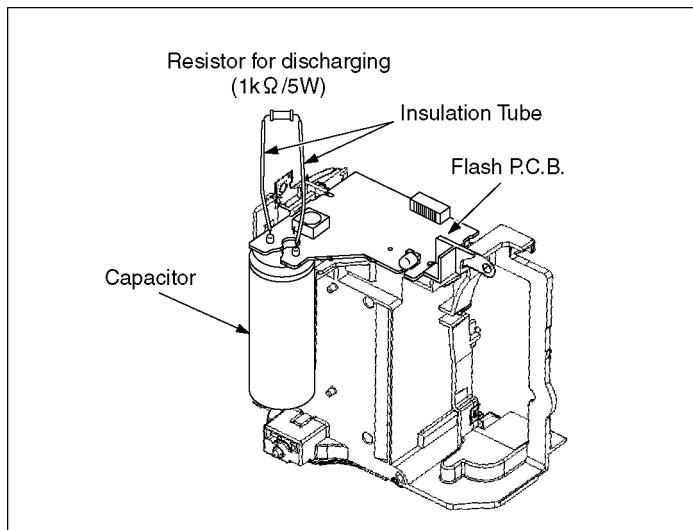


Fig. F1

2 Warning

2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatic 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 MOS image sensor, IC (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 avez acheté est alimenté par une batterie au lithium-ion/polymère recyclable. 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.



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 safely.

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:

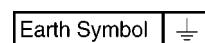
Blue	Neutral
Brown	Live

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.

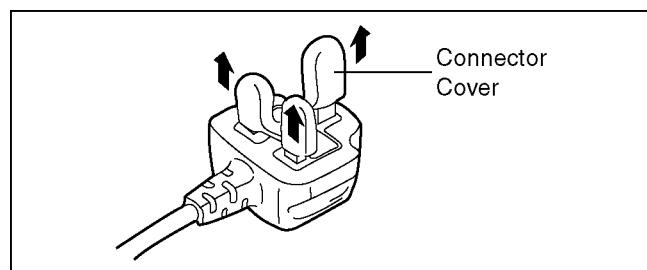
The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

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.



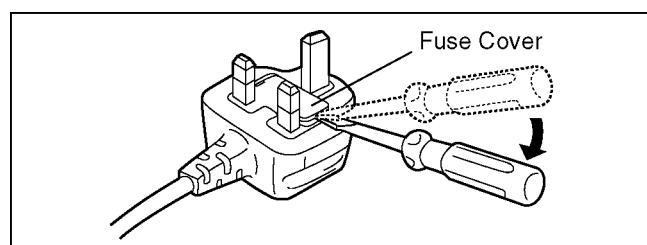
2.3.2.2. Before Use

remove the Connector Cover as follows.

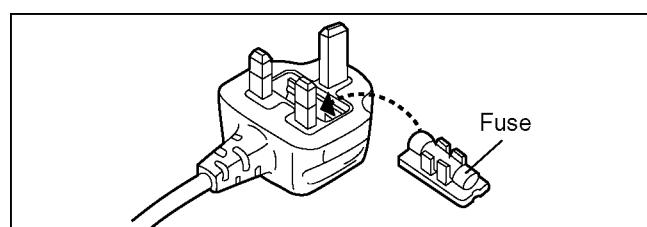


2.3.2.3. How to Replace the Fuse

1. Remove the Fuse Cover with a screwdriver.



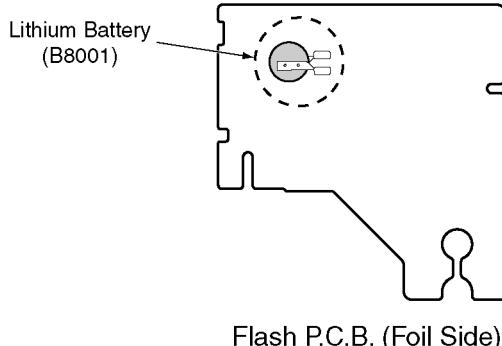
2. Replace the fuse and attach the Fuse cover.



2.4. How to Replace the Lithium Battery

2.4.1. Replacement Procedure

1. Remove the Flash P.C.B. (Refer to Disassembly Procedures.)
2. Unsolder the Lithium battery (Ref. No. B8001 at foil side of Flash P.C.B.) and then replace it into new one.



CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type.

CAUTION

The battery used in this device may present a risk of fire or chemical burn if mistreated.
Do not recharge, disassemble, heat above 100°C (212°F), or incinerate.
Replace battery with Panasonic part number N4ECY25Y0002 only.
Use of another battery may present a risk of fire or explosion.
Dispose of used battery promptly.
Keep away from children.
Do not disassemble and do not dispose of in fire.

Note:

The lithium battery is a critical component.
It must never be subjected to excessive heat or discharge.
It must therefore only be fitted in equipment designed specifically for its use.
Replacement batteries must be of the 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 DMC-FZ70/FZ72 series, as well.

3 Service Navigation

3.1. Introduction

This service manual contains technical information, which will 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. Service Navigation

3.2.1. About lens block

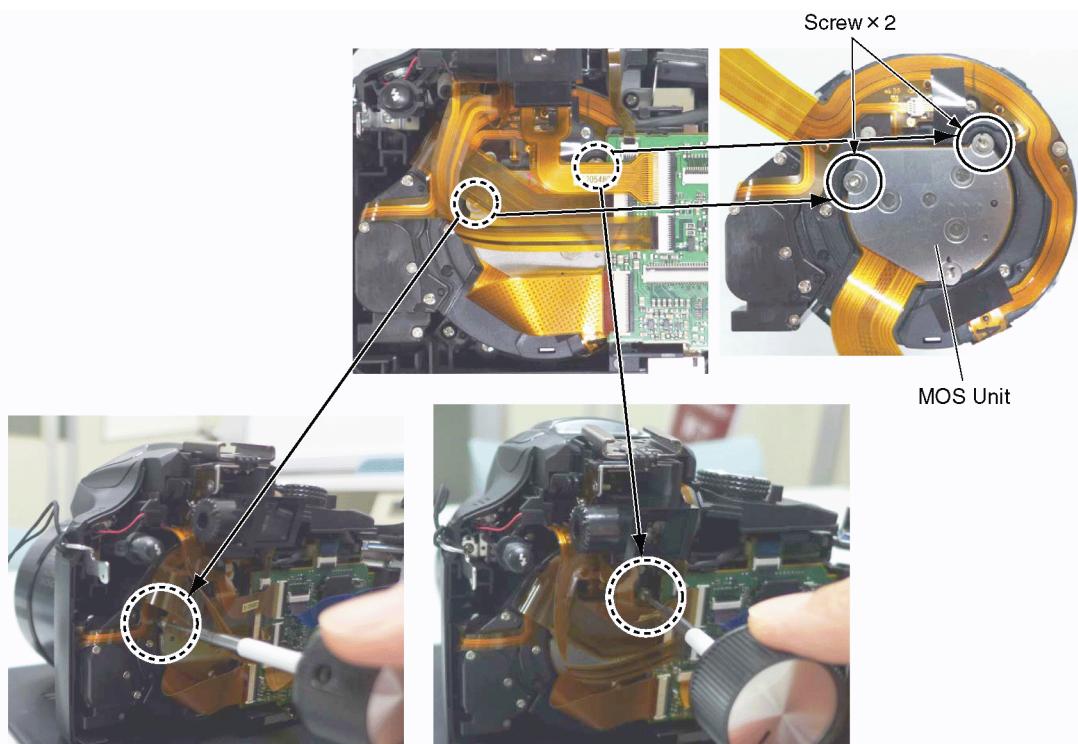
The image sensor (MOS) unit which are connected to the lens unit with 3 screws. 2 of these 3 screws are locked, after performing the Optical tilt adjustment. During servicing, if one of MOS fixing screws are loosened, the Optical tilt adjustment must be performed. (About the Optical tilt adjustment, refer to the "9.3.2 Adjustment Specifications" for details.)

The Optical tilt adjustment can be performed with the Rear Case opened.

NOTE:

It is necessary to use the "DSC_Tilt" software to allow the "Optical tilt adjustment".

The Adjustment software "DSC_Tilt" is available at "TSN Website".



- Insert the Driver (for optical axis adjustment) in the opening of Lens Flex and adjust.

- Slightly turn over the upper part of EVF Flex. Insert the Driver (for optical axis adjustment) and adjust.

※ Take care not to damage the flex.

3.3. 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.

Definition of PCB 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 degrees 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%

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

There are seven kinds of DMC-FZ70/FZ72, regardless of the colours.

- a) DMC-FZ70 (Japan domestic model.)
- b) DMC-FZ70P/PC
- c) DMC-FZ72EB/EF/EG/EP
- d) DMC-FZ72EE
- e) DMC-FZ70GN
- f) DMC-FZ70GK
- g) DMC-FZ70PU/GC

What is the difference is that the "INITIAL SETTINGS" 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 nameplate which is putted on the bottom side of the Unit.

a) DMC-FZ70 (Japan domestic model)

The nameplate for this model shows the following

Safety registration mark.



b) DMC-FZ70P/PC

The nameplate for these models show the following

Safety registration mark.



c) DMC-FZ72EB/EF/EG/EP

The nameplate for these models show the following

Safety registration mark.



d) DMC-FZ72EE

The nameplate for this model show the following

Safety registration mark.



e) DMC-FZ70GN

The nameplate for this model show the following

Safety registration mark.



f) DMC-FZ70GK

The nameplate for these models show the following

Safety registration mark.



g) DMC-FZ70PU/GC

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.

3.4.2. INITIAL SETTINGS:

After replacing the Main P.C.B., make sure to perform the initial settings after achieving the adjustment by ordering the following procedure in accordance with model suffix of the unit.

1. IMPORTANT NOTICE:

Before proceeding Initial settings, be sure to read the following CAUTIONS.

CAUTION 1:(INITIAL SETTINGS)

--- AFTER REPLACING THE MAIN P.C.B. and/or FLASH ROM ---

[Except "EG, EF, EB and EP" models]

*.The model suffix can be chosen **JUST ONE TIME**.

(Effective model suffix : DMC-FZ72 "EE",

DMC-FZ70 "P/PC/P/PU/GC/GK and GN")

*.Once one of the model suffix has been chosen, the model suffix lists will not be displayed, thus, it can not be changed.

CAUTION 2:(Stored picture image data in the unit)

This unit employs "Built-in Memory" for picture image data recording.(Approx.200MB)

After proceeding "INITIAL SETTINGS", the picture image data stored in the unit is erased.

2. PROCEDURES:

• Precautions: Read the above "CAUTION 1" and "CAUTION 2", carefully.

• Preparation:

1. Attach the Battery to the unit.

2. Set the mode dial to the PROGRAM AE mode.

Note: If the mode dial position is other than PROGRAM AE mode, it does not display the initial settings menu.

• **Step 1. The temporary cancellation of "INITIAL SETTINGS":**

While keep pressing "UP of Cursor button" and MOTION PICTURE button simultaneously, turn the Power on.

• **Step 2. The cancellation of "INITIAL SETTINGS":**

Press the PLAYBACK button.

Press "UP of Cursor button" and MOTION PICTURE button simultaneously, then turn the Power off.

• **Step 3. Turn the Power on:**

Turn the Power on.

• **Step 4. Display the "INITIAL SETTINGS" menu:**

Note: If the unit is other than PROGRAM AE mode, it does not display the initial settings menu.

While keep pressing MENU/SET and "RIGHT of Cursor button" simultaneously, turn the Power off.

The "INITIAL SETTINGS" menu is displayed.

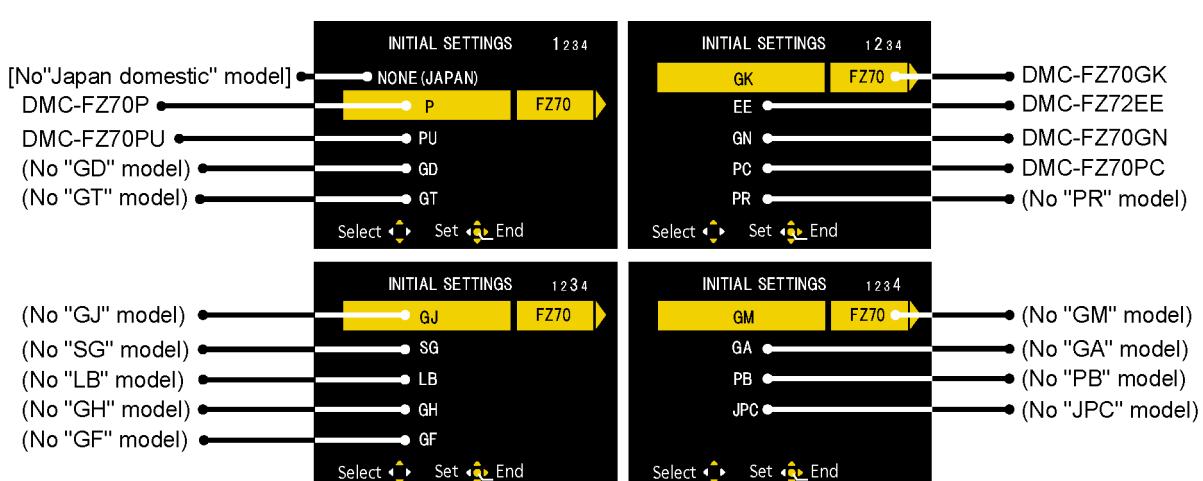
There are two kinds of "INITIAL SETTINGS" menu form as follows:

[CASE 1. After replacing MAIN P.C.B.]

There are two kinds of menu from as follows.

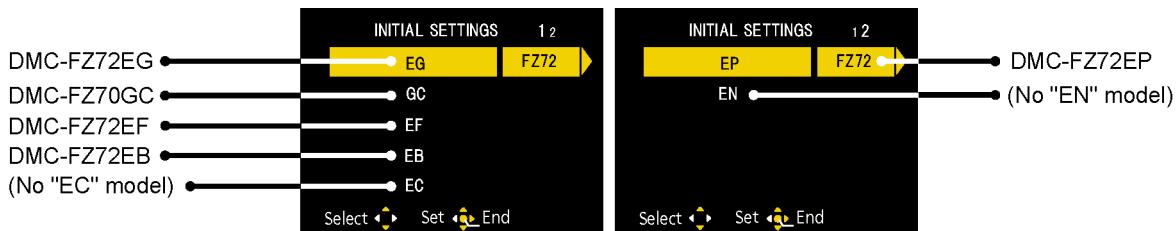
[Except for "DMC-FZ72EG, EF, EB, EP and FZ70GC" models : (VEP56187A is used as a Main P.C.B.)]

When Main P.C.B. has just been replaced, all of the model suffix are displayed as follows. (Four pages in total)



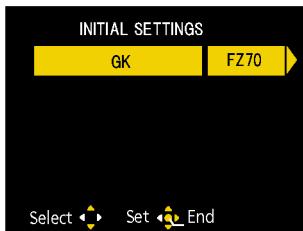
[Only for "DMC-FZ72EG, EF, EB, EP and FZ70GC" models : (VEP56187B is used as a Main P.C.B.)]

When Main P.C.B. has just been replaced, only model suffix are displayed as follows. (Two pages in total)

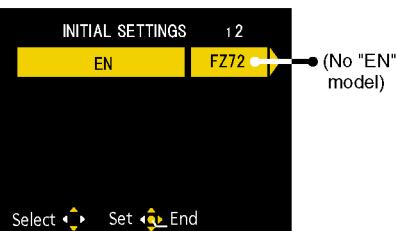
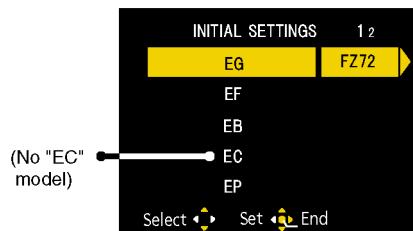


[CASE 2. Other than "After replacing Main P.C.B."]

<Other than "EG/EF/EB/EP" models>



<Only "EG/EF/EB/EP" models>



• **Step 5. Chose the model suffix in "INITIAL SETTINGS": (Refer to "CAUTION 1")**

[Caution: After replacing Main P.C.B.]

(Especially, other than "EG, EF, EB and EP" models)

The model suffix can be chosen, JUST ONE TIME.

Once one of the model suffix have been chosen, the model suffix lists will not be displayed, thus, it can not be changed.

Therefore, select the area carefully.

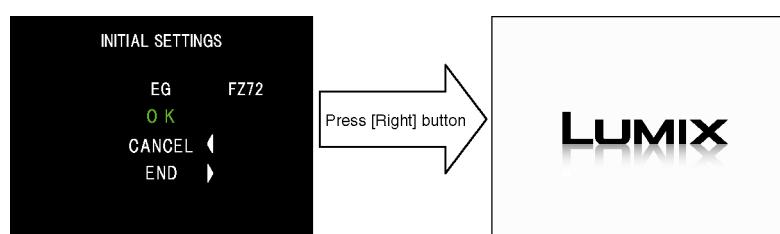
Select the area with pressing "UP / DOWN of Cursor buttons".

• **Step 6. Set the model suffix at "INITIAL SETTINGS":**

Press the "RIGHT of Cursor buttons".

The only set area is displayed. Press the "RIGHT of Cursor buttons" after confirmation.

(The unit is powered off automatically.)



• **Step 7. CONFIRMATION:**

Confirm the display of "PLEASE SET THE CLOCK" in concerned language when the unit is turned on again.

When the unit is connected to PC with USB cable, it is detected as removable media.

1) As for your reference, major default setting condition is as shown in the following table.

• **Default setting (After "INITIAL SETTINGS")**

	MODEL	VIDEO OUTPUT	LANGUAGE	DATE	REMARKS
a)	DMC-FZ70 (Japan domestic model)	NTSC	Japanese	Year/Month/Date	
b)	DMC-FZ72EB	PAL	English	Date/Month/Year	
c)	DMC-FZ72EE	PAL	Russian	Date/Month/Year	
d)	DMC-FZ72EF	PAL	French	Date/Month/Year	
e)	DMC-FZ72EG	PAL	English	Date/Month/Year	
f)	DMC-FZ72EP	PAL	English	Date/Month/Year	
g)	DMC-FZ70GC	PAL	English	Date/Month/Year	
h)	DMC-FZ70GN	PAL	English	Date/Month/Year	
i)	DMC-FZ70GK	PAL	Chinese (simplified)	Year/Month/Date	No Underwater mode.
j)	DMC-FZ70P	NTSC	English	Month/Date/Year	
k)	DMC-FZ70PC	NTSC	English	Month/Date/Year	
l)	DMC-FZ70PU	NTSC	Spanish	Month/Date/Year	

4 Specifications

The following specification is for DMC-FZ70PC.
Some specifications may differ depending on model suffix.

Digital Camera: Information for your safety

Power Source	DC 8.4 V
Power Consumption	When recording with LCD Monitor: 1.6 W When recording with Viewfinder: 1.5 W When playing back with LCD Monitor: 1.0 W When playing back with Viewfinder: 0.7 W
Camera effective pixels	16,100,000 pixels
Image sensor	1/2.3" MOS sensor, total pixel number 16,800,000 pixels Primary color filter
Lens	Optical 60 x zoom f=3.58 mm to 215 mm (35 mm film camera equivalent: 20 mm to 1200 mm)/ Max. Wide: F2.8 to F8.0 Max. Tele: F5.9 to F8.0
Image Stabilizer	Optical method
Focus range	
AF	30 cm (0.98 feet) (Max. Wide) / 1.5 m (4.9 feet) (Max. Tele) to ∞
AF Macro / MF / Intelligent Auto / Motion picture	1 cm (0.033 feet) (Max. Wide) / 1.5 m (4.9 feet) (Max. Tele) to ∞
Scene Mode	The focus ranges listed above may vary depending on the selected Scene Mode.
Shutter system	Electronic shutter + Mechanical shutter
Minimum Illumination	Approx. 9 lx (when i-Low light is used, the shutter speed is 1/30th of a second)
Shutter speed	8 seconds to 1/2000th of a second [Starry Sky] Mode: 15 seconds, 30 seconds, 60 seconds

Mass (Weight)	With card and battery: Approx. 606 g (1.34 lb) Excluding card and battery: Approx. 562 g (1.24 lb)
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Operating humidity	10%RH to 80%RH

Battery Charger (Panasonic DE-A83B): Information for your safety

Input	~ 110 V to 240 V, 50/60 Hz, 0.15 A
Output	--- 8.4 V, 0.43 A

Equipment mobility: Movable

Battery pack (lithium-ion) (Panasonic DMW-BMB9PP): Information for your safety

Voltage / capacity	7.2 V / 895 mAh
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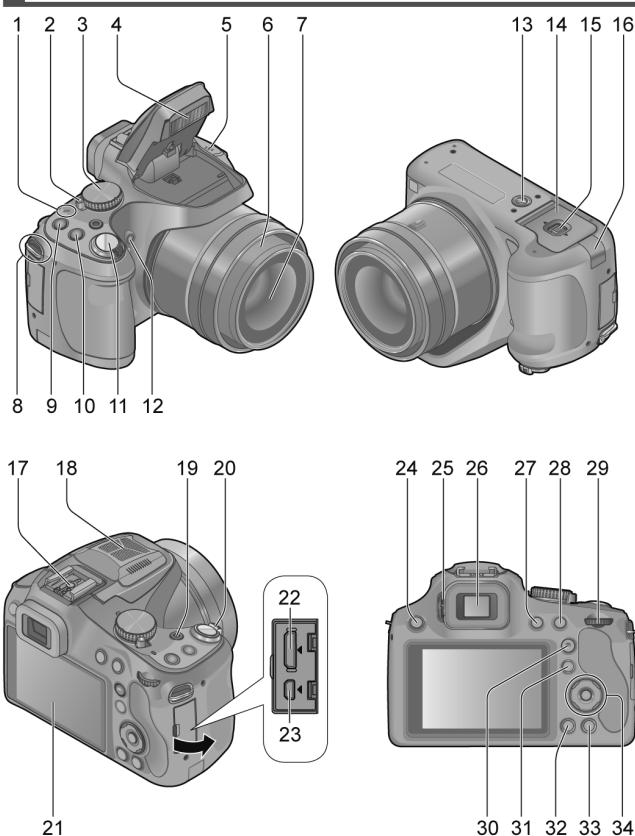
Exposure (AE)	Program AE (P) / Aperture-Priority AE (A) / Shutter-Priority AE (S) / Manual Exposure (M)
Metering Mode	[Multi Metering] / [Center Weighted] / [Spot]
LCD monitor	3.0" TFT LCD (3:2) (Approx. 460,800 dots) (field of view ratio about 100%)
Viewfinder	Color LCD Viewfinder (Approx. 201,600 dots) (field of view ratio about 100%) (with diopter adjustment -4 to +4 diopter)
Flash	Built-in pop up flash
Microphone	Stereo
Speaker	Monaural
Recording media	Built-in Memory (Approx. 200 MB) / SD Memory Card / SDHC Memory Card / SDXC Memory Card
Recording file format	
Still picture	RAW / JPEG (based on Design rule for Camera File system, based on Exif 2.3 standard / DPOF corresponding) / MPO
Motion pictures	AVCHD / MP4
Audio compression format	AVCHD: Dolby® Digital (2 ch) MP4: AAC (2 ch)
Interface	
Digital	USB 2.0 (High Speed)
Analog video	NTSC Composite
Audio	Audio line output (Monaural)
Terminal	HDMI: MiniHDMI Type C AV OUT/DIGITAL: Dedicated jack (8 pin)
Dimensions	Approx. 130.2 mm (W) x 97.0 mm (H) x 118.2 mm (D) [5.13" (W) x 3.82" (H) x 4.65" (D)] (excluding the projection part)

5 Location of Controls and Components

The following description is for DMC-FZ70PC.

Some description may differ depending on model suffix.

Names and Functions of Main Parts



Names and Functions of Main Parts

1 Power lamp	17 Hot shoe
2 Camera [ON/OFF] switch	• Do not attach other than the external flash on the hot shoe.
3 Mode dial	18 Stereo microphone
4 Flash	19 Motion picture button
5 Speaker	20 Zoom lever
• Be careful not to cover the speaker with your finger. Doing so may make sound difficult to hear.	21 LCD monitor
6 Lens barrel	22 [HDMI] socket
7 Lens	23 [AV OUT/DIGITAL] socket
8 Shoulder strap eyelet	24 [Flash open] button
9 [FOCUS] button	25 Diopter adjustment dial
10 [Burst Mode] button	26 Viewfinder ([LVF]) • In this manual, "viewfinder" is used to indicate the LVF.
11 Shutter button	27 [LVF] button
12 Self-timer indicator/AF Assist Lamp	28 [AF/AE LOCK (Fn1)] button
13 Tripod mount	29 Rear dial
• Do not attach to a tripod with a 5.5 mm (0.22 inch) or longer screw. Doing so may damage this unit.	30 [AF/AF LOCK /MF] button
14 Card/Battery door	31 [Playback] button • Use this to select the recording mode or playback mode.
15 Release lever	32 [DISP.] button
16 DC coupler cover	33 [Delete/Cancel/Quick menu] button
• When using an AC adaptor, ensure that the Panasonic DC coupler (DMW-DCC6: optional) and AC adaptor (DMW-AC8PP: optional) are used.	34 Cursor button / [MENU/SET] button • In this manual, the button that is to be used is indicated by ▲▼◀▶.

6 Service Mode

6.1. Error Code Memory Function

1. General description

This unit is equipped with history of error code memory function, and can be memorized 16 error codes in sequence from the latest. When the error is occurred more than 16, the oldest error is overwritten in sequence.

The error code is not memorized when the power supply is shut down forcibly (i.e., when the unit is powered on by the battery, the battery is pulled out). The error code is memorized to Flash ROM when the unit has just before powered off.

2. How to display

The error code can be displayed by ordering the following procedure:

- **Preparation:**

1. Attach the Battery to the unit.
2. Set the mode dial to the PROGRAM AE mode.

Note:

*Since this unit has built-in memory, it can be performed without inserting Memory Card.

• Step 1. The temporary cancellation of "INITIAL SETTINGS":

While keep pressing "UP of Cursor button" and **MOTION PICTURE** button simultaneously, turn the Power on.

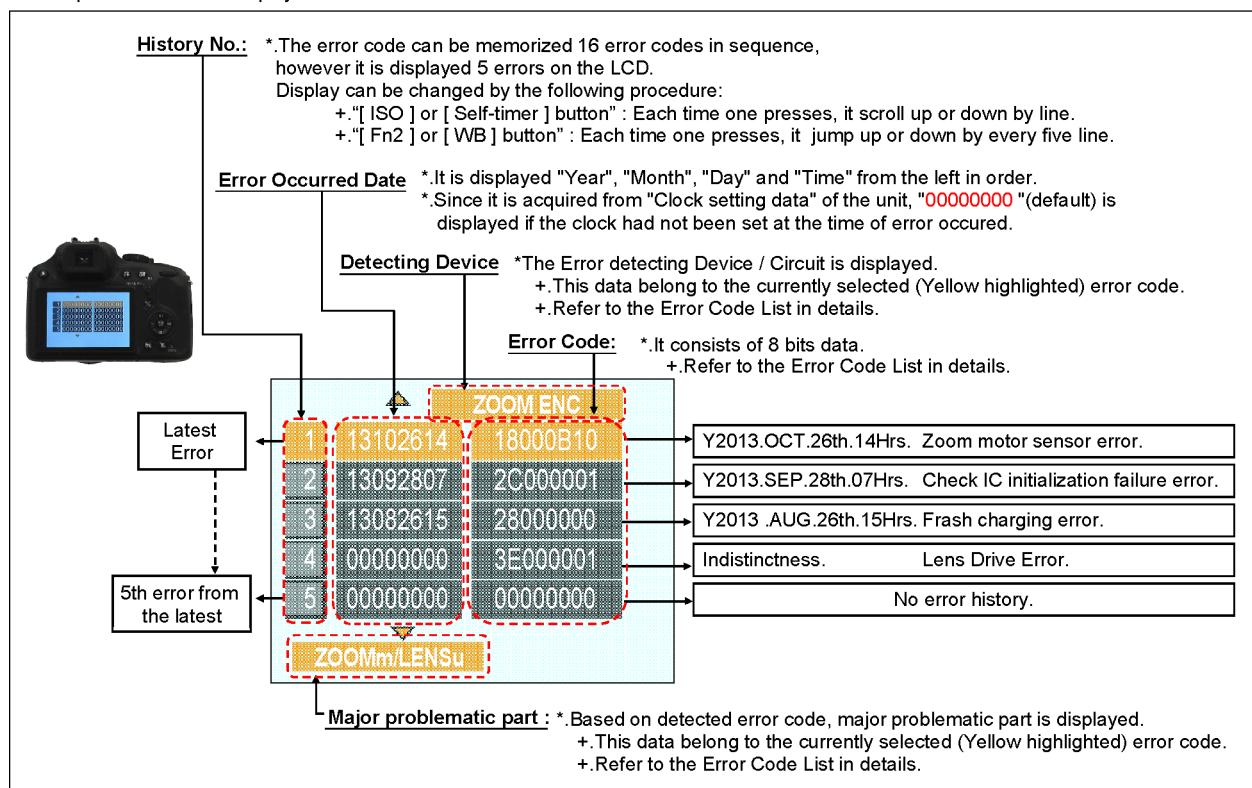
• Step 2. Execute the error code display mode:

Press the "LEFT of Cursor button", **MENU/SET** button and **MOTION PICTURE** button simultaneously.

The display is changed as shown below when the above buttons are pressed simultaneously.

Normal display → Error code display → CAMERA INFO → Normal display → ...

Example of Error Code Display



3. Error Code List

The error code consists of 8 bits data and it shows the following information.

Attribute	Main item	Sub item	Error code		Contents (Upper)	Error Indication		
			High 4bits	Low 4bits		Check point (Lower)	Detecting device	Part/Circuit
LENS	Lens drive	Focus	18*0	0?01	HP Low detect error (Focus encoder always detects High, and not becomes Low)	FOCUS L	LENS FPC/ DSP	
					Mechanical lock, FP9004-(35) signal line or IC6001 (VENUS ENGINE)			
			0?02	0?02	HP High detect error (Focus encoder always detects Low, and not becomes High)	FOCUS H		
					Mechanical lock, FP9004-(35) signal line or IC6001 (VENUS ENGINE)			
			0?10	0?10	Collapsible barrel Low detect error (Collapsible barrel encoder always detects Low.)	ZOOM L	ZOOMm/ LENSu	
					Mechanical lock, FP9004-(24) signal line or IC6001 (VENUS ENGINE)			
			0?20	0?20	Collapsible barrel High detect error (Collapsible barrel encoder always detects High.)	ZOOM H		
					Mechanical lock, FP9004-(24) signal line or IC6001 (VENUS ENGINE)			
			0?30	0?30	Zoom motor sensor error (Initialized or Terminated)	ZOOM ENC		
					Mechanical lock, FP9004-(38), (40) signal line or IC6001 (VENUS ENGINE)			
			0?40	0?40	Zoom motor sensor error (During monitor mode.)	ZOOM ENC		
					Mechanical lock, FP9004-(38), (40) signal line or IC6001 (VENUS ENGINE)			
			0?50	0?50	Zoom motor sensor error (During monitor mode with slow speed.)	ZOOM ENC		
					Mechanical lock, FP9004-(38), (40) signal line or IC6001 (VENUS ENGINE)			
			0?60	0?60	Detection of zoom misregistration by impact such as fails	(No indication)	(No indication)	
					Lens Unit			
	OIS	OIS	1000	1000	PSD (X) error. Hall element (X axis) position detect error in OIS unit	OIS X	LENSu NG	
					OIS Unit			
			2000	2000	PSD (Y) error. Hall element (Y axis) position detect error in OIS unit	OIS Y		
					OIS Unit			
			3000	3000	GYRO (X) error. Gyro (IC7101: X axis) detect error on Main P.C.B.	GYRO X	GYRO NG	
					IC7101 (Gyro element) or IC6001 (VENUS ENGINE)			
			4000	4000	GYRO (Y) error. Gyro (IC7101: Y axis) detect error on Main P.C.B.	GYRO Y		
					IC7101 (Gyro element) or IC6001 (VENUS ENGINE)			
			5000	5000	GYRO (R) error. Gyro (IC7101: R axis) detect error on Main P.C.B.	GYRO R		
					IC7101 (Gyro element) or IC6001 (VENUS ENGINE)			
			6000	6000	Drive voltage (X) error	OISX REF	LENSu/LENS FPC	
					LENS Unit, LENS flex breaks, IC6001(VENUS ENGINE) AD value error, etc.			
			7000	7000	Drive voltage (Y) error	OISY REF		
					LENS Unit, LENS flex breaks, IC6001(VENUS ENGINE) AD value error, etc.			
			8000	8000	OIS GYRO - Digital communication error	(No indication)	LENSu	
					IC7101 (Gyro element) or IC6001 (VENUS ENGINE)			
	Lens	Lens	10*3	0000	Lens cap error	(No indication)		
					Zoom motor, Zoom pulse encoder 1, 2			
			10*4	0000	Lens cap error (During monitor mode)	LENS DRV	LENSu	
					Zoom motor, Zoom pulse encoder 1, 2			
			10*8	0000	Lens cap error (During monitor mode with slow speed)	LENS DRV		
					Zoom motor, Zoom pulse encoder 1, 2			
			18*1	0000	Power ON time out error	LENS DRV	LENSu	
					Lens drive system			
			18*2	0000	Power OFF time out error	LENS DRV		
					Lens drive system			

Attribute	Main item	Sub item	Error code		Contents (Upper)		Error Indication	
			High 4bits	Low 4bits	Check point (Lower)		Detecting device	Part/Circuit
Adj.History	OIS	19*0	2000		OIS adj. Yaw direction amplitude error (small)		OIS ADJ	OIS ADJ
			3000		OIS adj. Pitch direction amplitude error (small)			
			4000		OIS adj. Yaw direction amplitude error (large)			
			5000		OIS adj. Pitch direction amplitude error (large)			
			8000		OIS adj. Yaw direction off set error			
			9000		OIS adj. Pitch direction off set error			
			A000		OIS adj. Yaw direction gain error			
			B000		OIS adj. Pitch direction gain error			
			C000		OIS adj. Yaw direction position sensor error			
			D000		OIS adj. Pitch direction position sensor error			
			E000		OIS adj. other error			
HARD	FLASH	Flash	28*0	0000	Flash charging error		STRB CHG	FLASH P.C.B./ FPC
					IC6001-(AA23) signal line or Flash charging circuit			
	FLASH ROM (EEPROM Area)	FLASH ROM (EEPROM Area)	2B*0	0001	EEPROM read error		FROM RE	FROM
					IC6002 (Flash ROM)			
				0002	EEPROM write error		FROM WR	FROM
					IC6002 (Flash ROM)			
				0005	Firmware version up error		(No indication)	(No indication)
					Replace the firmware file in the Memory Card			
	SYSTEM	RTC	2C*0	0001	SYSTEM IC initialize failure error		SYS INIT	MAIN P.C.B.
					Communication between IC6001 (VENUS ENGINE) and IC9101 (SYSTEM)			
SOFT	CPU	Reset	30*0	0001 0007	NMI reset Non Mask-able Interrupt (30000001-30000007 are caused by factors)		NMI RST	MAIN P.C.B.
	CPU, ASIC hard	Stop	38*0	0001	Camera task finish process time out			
					Communication between Lens system and IC6001 (VENUS ENGINE)		LENS COM	LENSu/DSP
				0002	Camera task invalid code error			
					IC6001 (VENUS ENGINE)		DSP	DSP
				0100	File time out error in recording motion image			
					IC6001 (VENUS ENGINE)			
				0200	File data cue send error in recording motion image			
					IC6001 (VENUS ENGINE)			
				0300	Single or burst recording brake time out			
	Memory area	3A*0	0008		work area partitioning failure		(No indication)	(No indication)
					USB dynamic memory securing failure when connecting			
Operation	Power on	3B*0	0000		Flash ROM processing early period of camera during movement		INIT	(No indication)
Zoom	Zoom	3C*0	0000		Imperfect zoom lens processing		ZOOM	ZOOMm/ LENSu
					Zoom lens			
			35*0	0000 FFFF	Change to the dummy processing (=Illegal command) (0-7bit : command, 8-15bit : status)		DSP	DSP
			35*1	0000	Though record preprocessing is necessary, it is not called			
			35*2	0000	Though record preprocessing is necessary, it is not completed		(No indication)	(No indication)

Important notice about "Error Code List"

1) About "*" indication:

The third digit from the left is different as follows.

+.In case of 0 (example: 18 0 01000)

When the third digit from the left shows "0", this error occurred under the condition of INITIAL SETTINGS has been completed.

It means that this error is occurred basically at user side.

+.In case of 8 (example: 18 8 01000)

When the third digit from the left shows "8", this error occurred under the condition of INITIAL SETTINGS has been released.

(Example; Factory assembling-line before unit shipment, Service mode etc.)

It means that this error is occurred at service side.

2) About "?" indication: ("18*0 0?01" to "18*0 0?50"):

The third digit from the right shows one of the hexadecimal ("0" to "F") character.

4. How to exit from Error Code display mode:

Simply, turn the power off. (Since Error code display mode is executed under the condition of temporary cancellation of "INITIAL SETTINGS", it wake up with normal condition when turn off the power.)

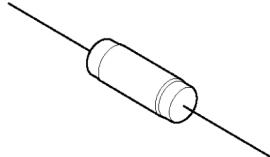
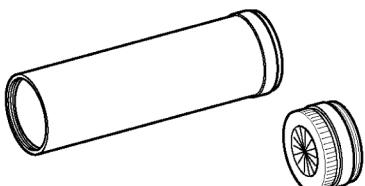
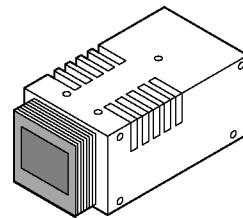
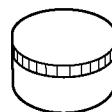
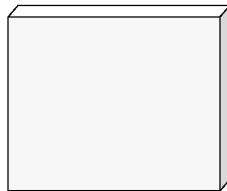
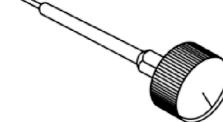
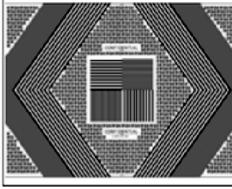
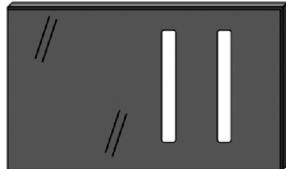
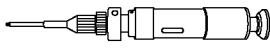
Note:

The error code can not be initialized.

7 Service Fixture & Tools

7.1. Service Fixture and Tools

The following Service Fixture and tools are used for checking and servicing this unit.

Resistor for Discharging ERG5SJ102	COLLIMATOR (with Focus Chart) RFKZ0422	LIGHT BOX (with DC Cable) RFKZ0523
 An equivalent type of Resistor may be used.		 ※ VFK1164TDVLC may be used.
ND Filter RFKZ0513(ND0.3)	Lens Cleaning Kit (BK) VFK1900BK	Grease (for Lens) (for focus motor) RFKZ0472
	 * Only supplied as 10 set/box.	
Diffuser RFKZ0591	Driver (for optical axis adjustment) RFKZ0569	Optical axis adjustment chart RFKZ0570
	 *T4 Torx type	
Camera stand RFKZ0333J	Torque Driver RFKZ0542	
		

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

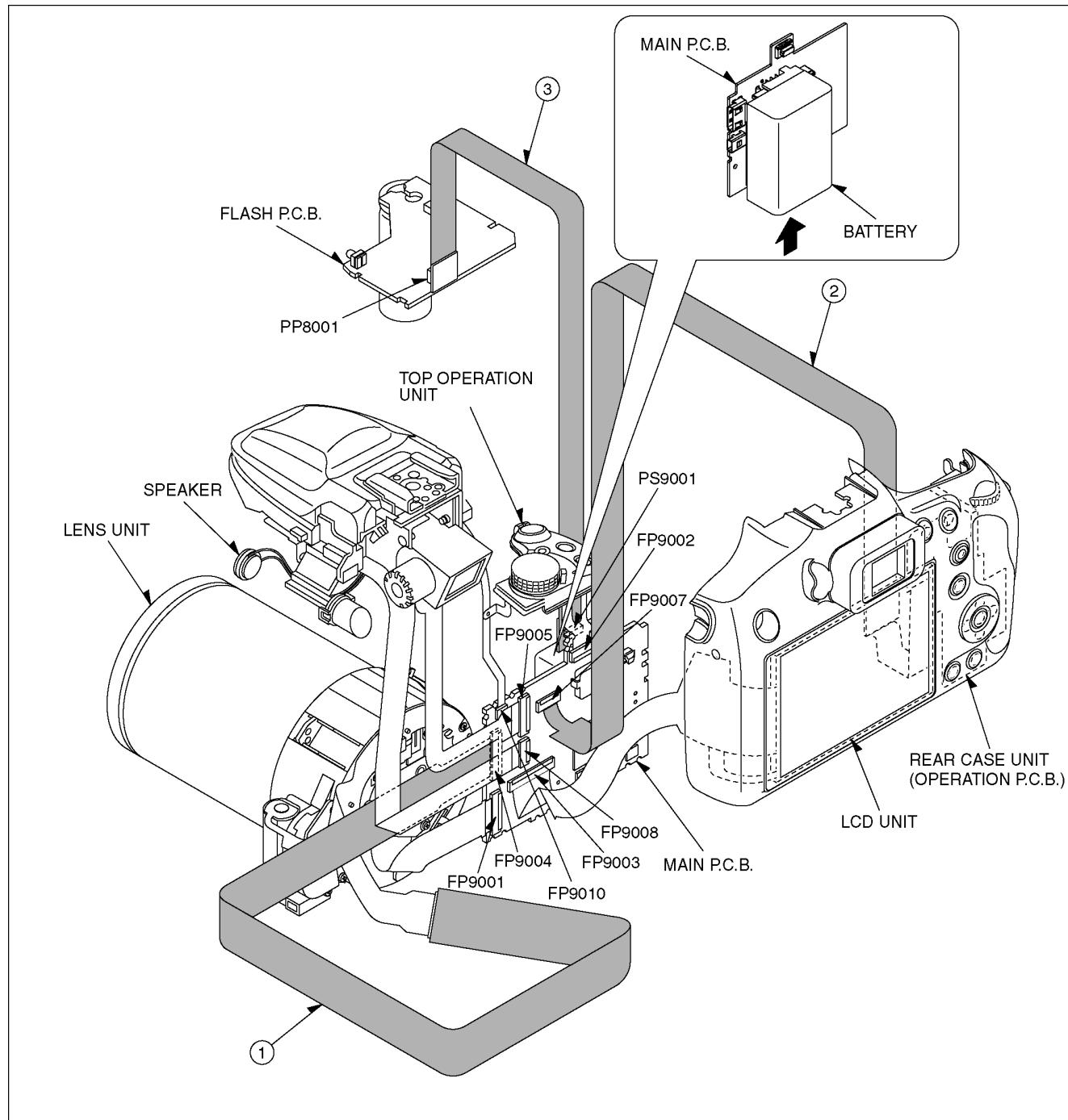
After replacing the Main P.C.B., be sure to achieve adjustment.

7.3. Service Position

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

No.	Parts No.	Connection	Form
1	RFKZ0477	FP9004 (MAIN P.C.B.) - LENS Unit	45PIN 0.5 FFC
2	VFK1175	FP9007 (MAIN P.C.B.) - Rear Case Unit (Operation P.C.B.)	16PIN 0.5 FFC
3	VFK1906	PP8001 (FLASH P.C.B.) - PS9001 (MAIN P.C.B.)	20PIN B to B

7.3.1. Extension Cable Connections



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.".

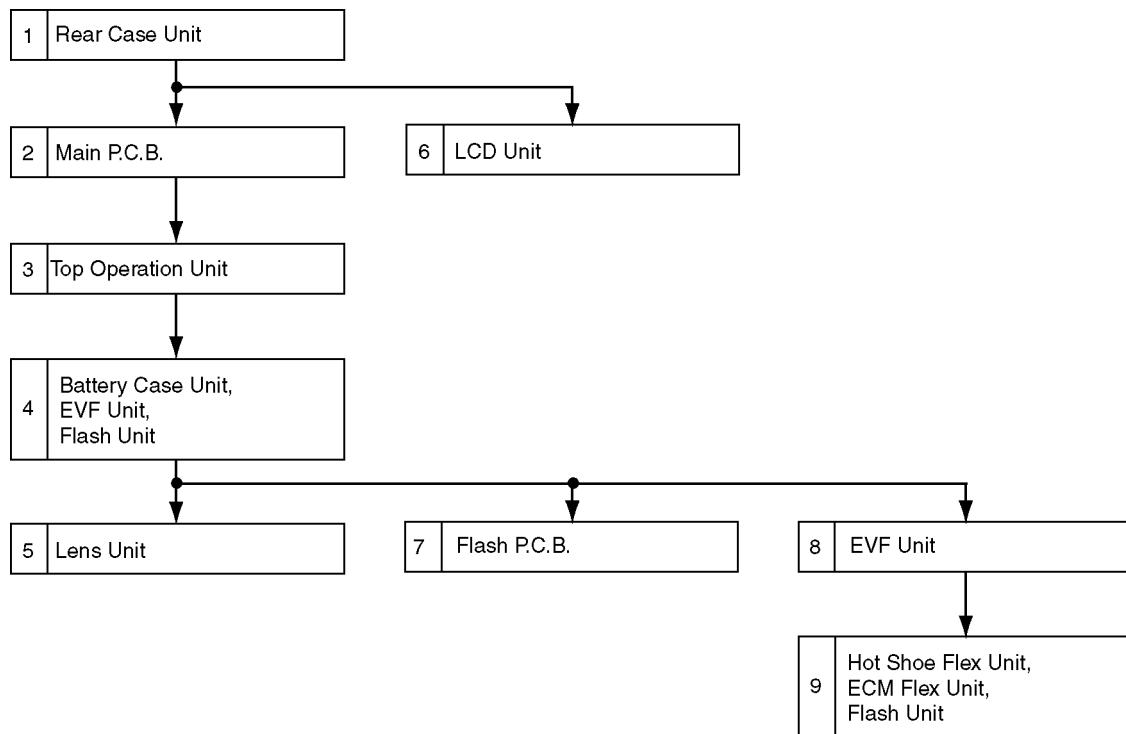
The capacitor voltage is not lowered soon even if the AC Cord is unplugged or the battery is removed.

2. Be careful of the high voltage circuit on Flash P.C.B.

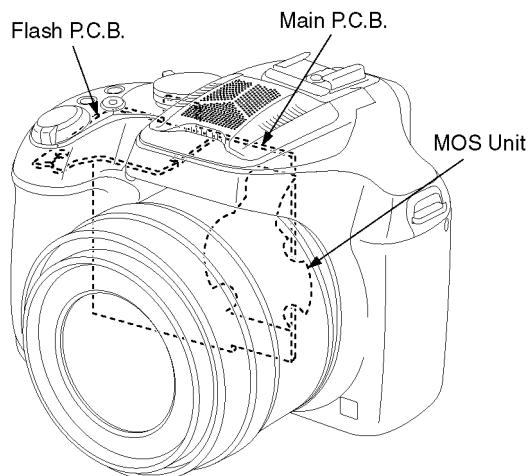
3. DO NOT allow other parts to touch the high voltage circuit on Flash P.C.B.

8 Disassembly and Assembly Instructions

8.1. Disassembly Flow Chart



8.2. P.C.B. Location



8.3. Disassembly Procedure

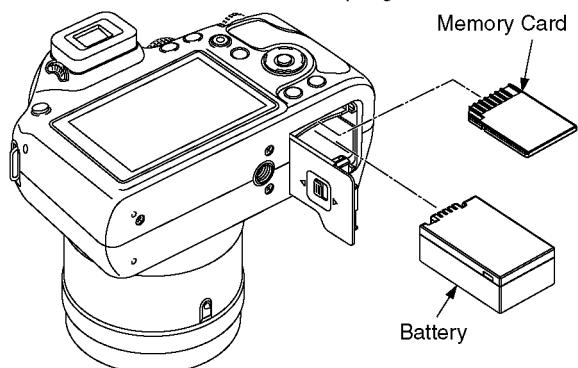
No.	Item	Fig.	Removal
1	Rear Case Unit	Fig. D1	Memory Card
			Battery
			Shoe Spring
			5 Screws (A)
			2 Screws (B)
		Fig. D2	FP9003 (Flex)
			FP9007 (Flex)
			Rear Case Unit
2	Main P.C.B.	Fig. D3	FP9001 (Flex)
			FP9002 (Flex)
			FP9004 (Flex)
			FP9005 (Flex)
			FP9008 (Flex)
			FP9010 (Flex)
3	Top Operation Unit	Fig. D4	2 Screws (C)
			PP8001 (Connector)
			Main P.C.B.
4	Battery Case Unit, EVF Unit, Flash Unit	Fig. D6	1 Screw (D)
			Top Operation Unit
			1 Screw (E)
			1 Screw (F)
			Battery Case Unit
5	Lens Unit	Fig. D7	EVF Unit
			Flash Unit
			3 Screws (G)
			Lens Unit
6	LCD Unit	Fig. D8	5 Screws (H)
			2 Locking tabs
			Strap Holder L
			LCD Holder
			LCD Unit
7	Flash P.C.B.	Fig. D9	2 Locking tabs (A)
			1 Locking tab (B)
			Condenser Cover
		Fig. D10	1 Screw (I)
8	EVF Unit	Fig. D11	1 Locking tab
			4 Solder
			Flash P.C.B.
9	Hot Shoe Flex Unit, ECM Flex Unit, Flash Unit	Fig. D12	2 Locking tabs
			EVF Unit
			2 Screws (J)
		Fig. D13	2 Screws (K)
			Hot Shoe Flex Unit
			2 Screws (L)
			4 Locking tabs
			Flash Case Top Unit
			Flash Shaft
10	Hot Shoe Flex Unit, ECM Flex Unit, Flash Unit	Fig. D14	Flash Pop Up Spring
			MIC Damper
			MIC Cushion
			ECM Flex Unit

8.3.1. Removal of the Rear Case Unit

NOTE:

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

- Memory Card
- Battery
- Shoe Spring
- Screw (A) x 5
- Screw (B) x 2



Insert the thin Minus screwdriver between Hot Shoe and Shoe Spring. Unlock 1 hook (A) turn.

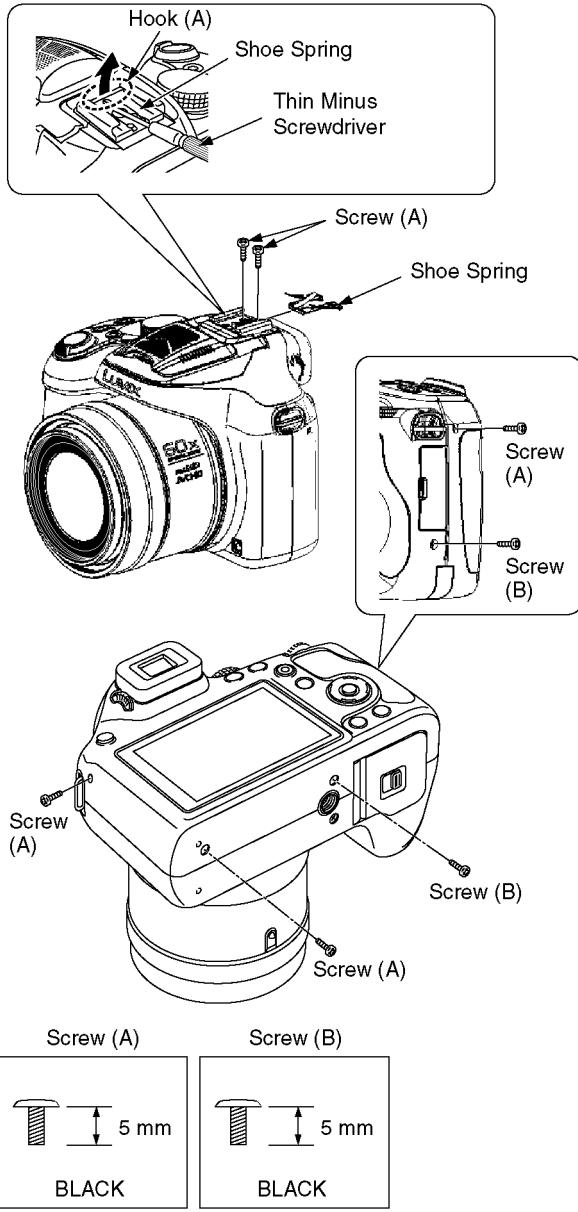


Fig. D1

8.3.2. Removal of the Main P.C.B.

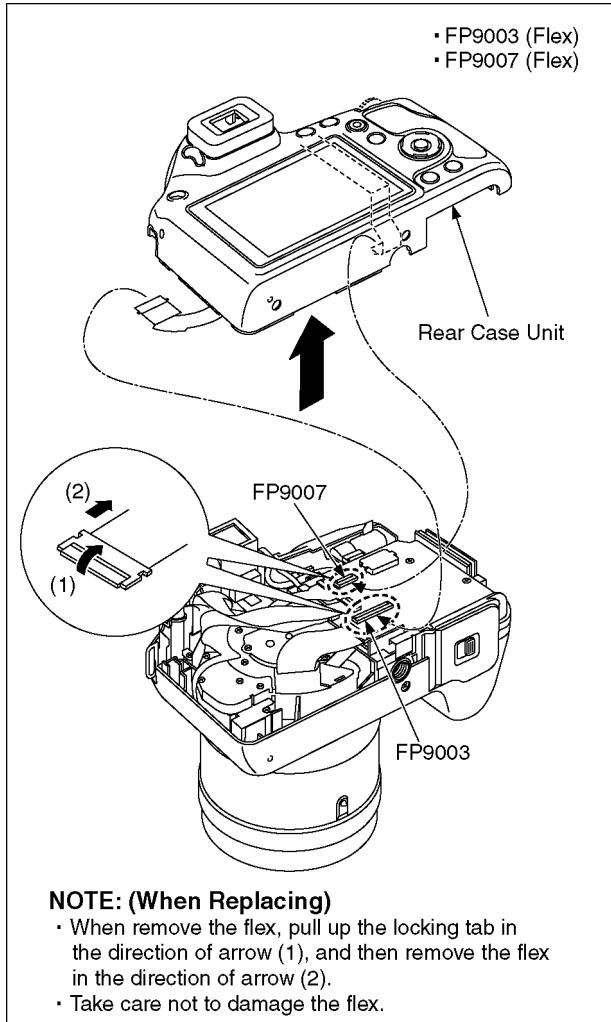


Fig. D2

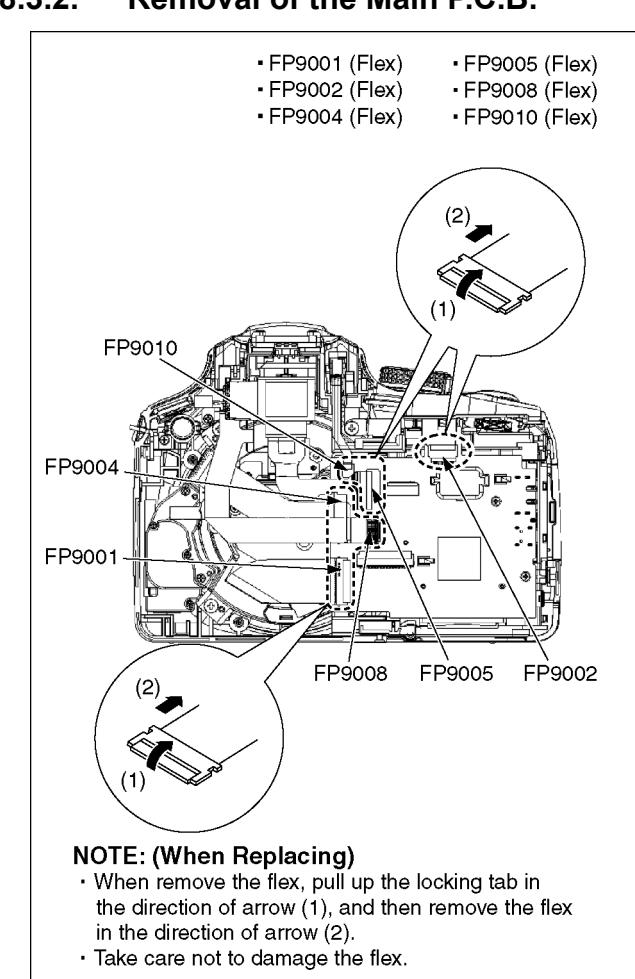


Fig. D3

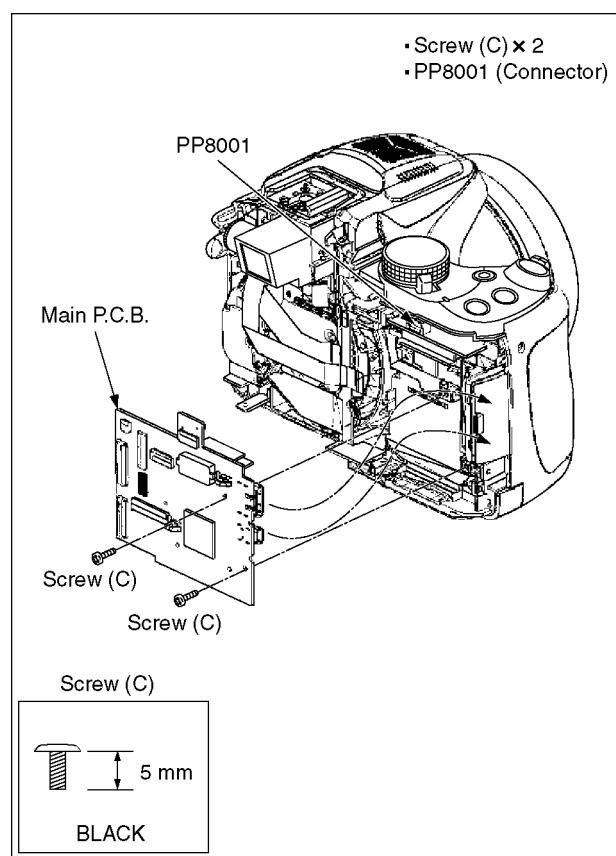


Fig. D4

8.3.3. Removal of the Top Operation Unit

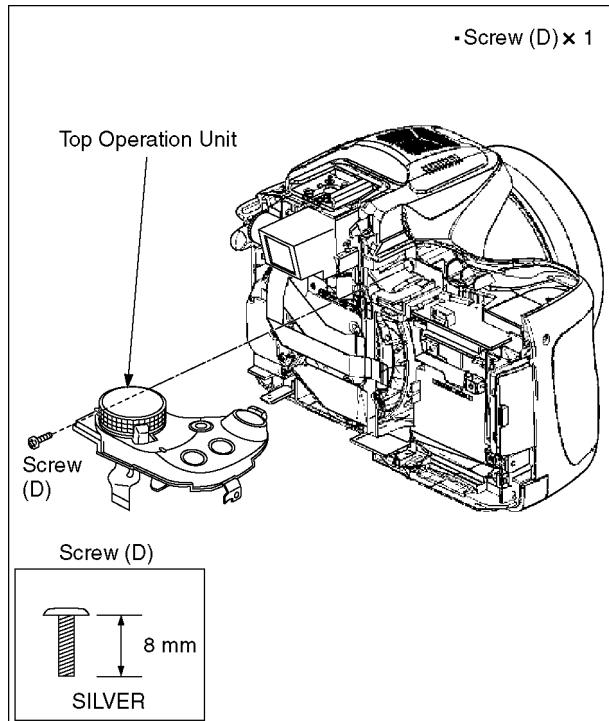
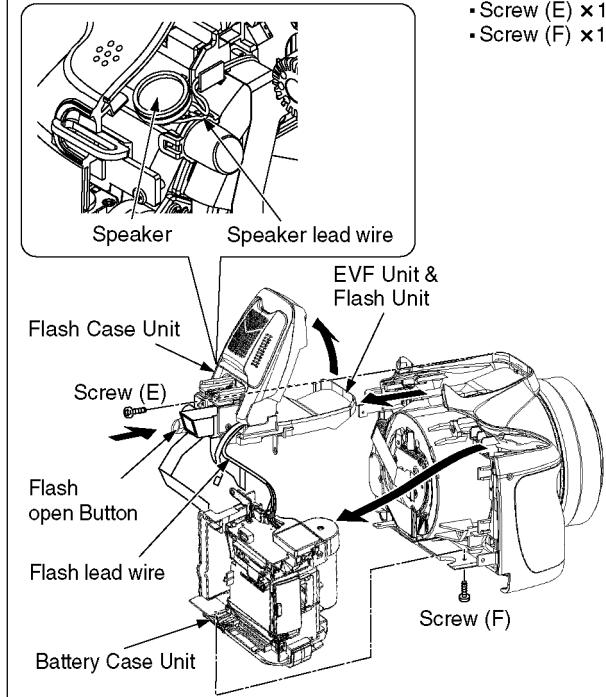


Fig. D5

8.3.4. Removal of the Battey Case Unit, EVF Unit, Flash Unit

IMPORTANT NOTICE:

Take care not apply any bending load to the charging capacitor. It brings about the possibility of P.C.B. and/or component damage on the Flash P.C.B.



NOTE: (When Replacing)

- Push the flash open button in the direction of arrow to open the flash case unit.
- Attach the speaker while processing the lead wire of the speaker as shown below.
- When attaching the Flash Case Unit, make sure the Flash lead wire is routed as following figure.

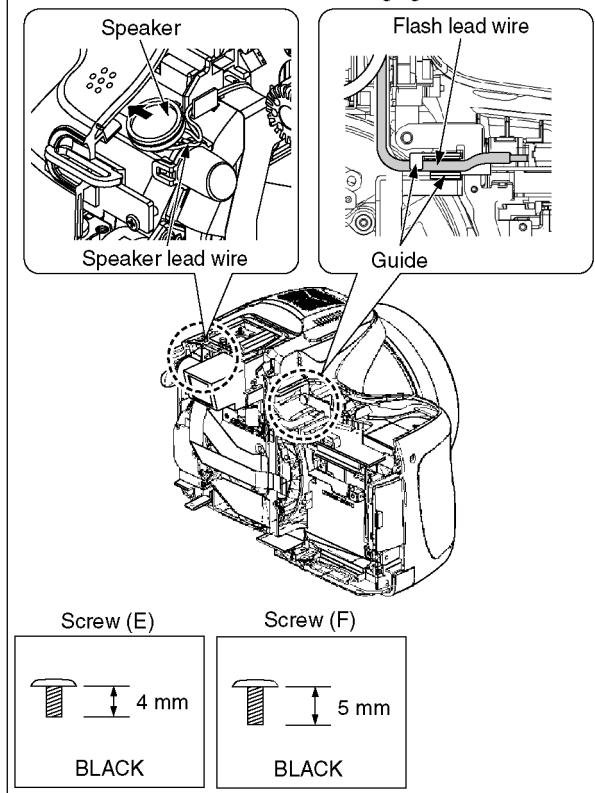


Fig. D6

8.3.5. Removal of the Lens Unit

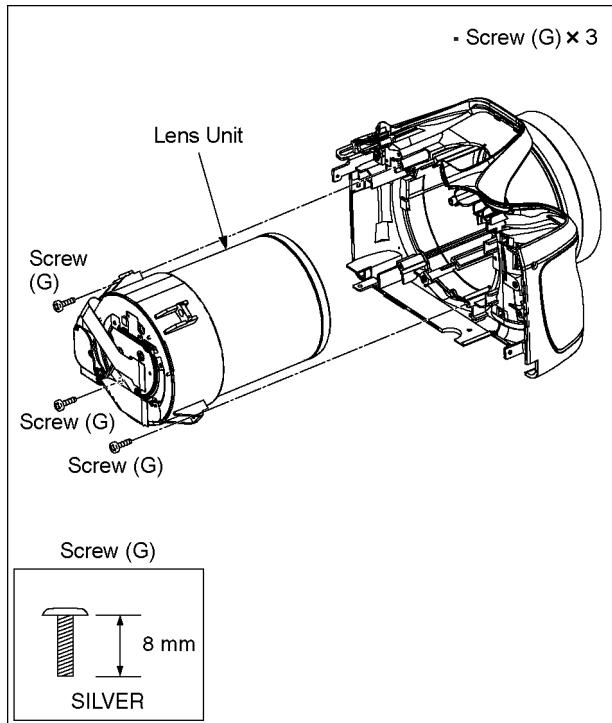
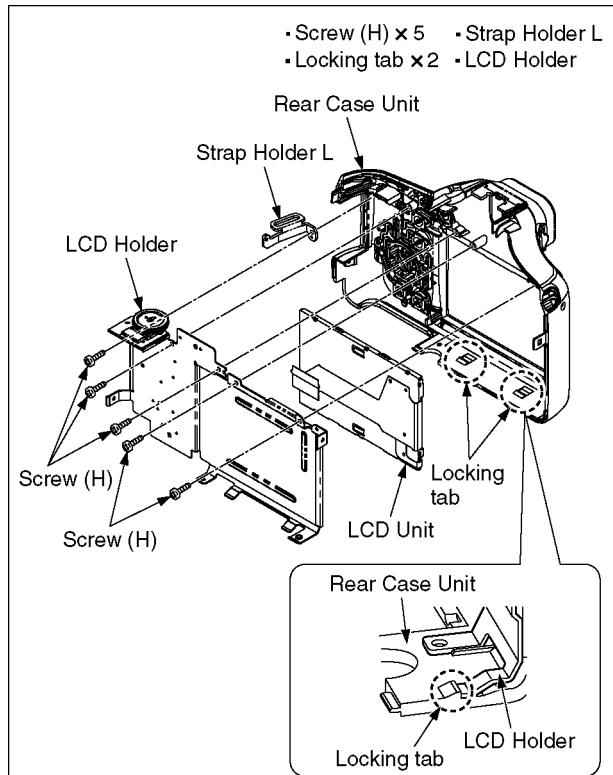


Fig. D7

8.3.6. Removal of the LCD Unit



NOTE: (When Replacing)

- Fold the LCD Flex along the notch of the flex.

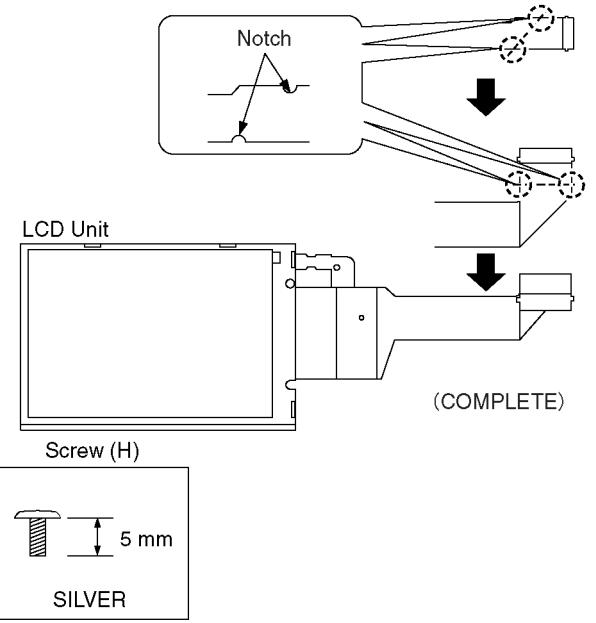


Fig. D8

8.3.7. Removal of the Flash P.C.B.

IMPORTANT NOTICE:

Take care not apply any bending load to the charging capacitor. It brings about the possibility of P.C.B. and/or component damage on the Flash P.C.B.

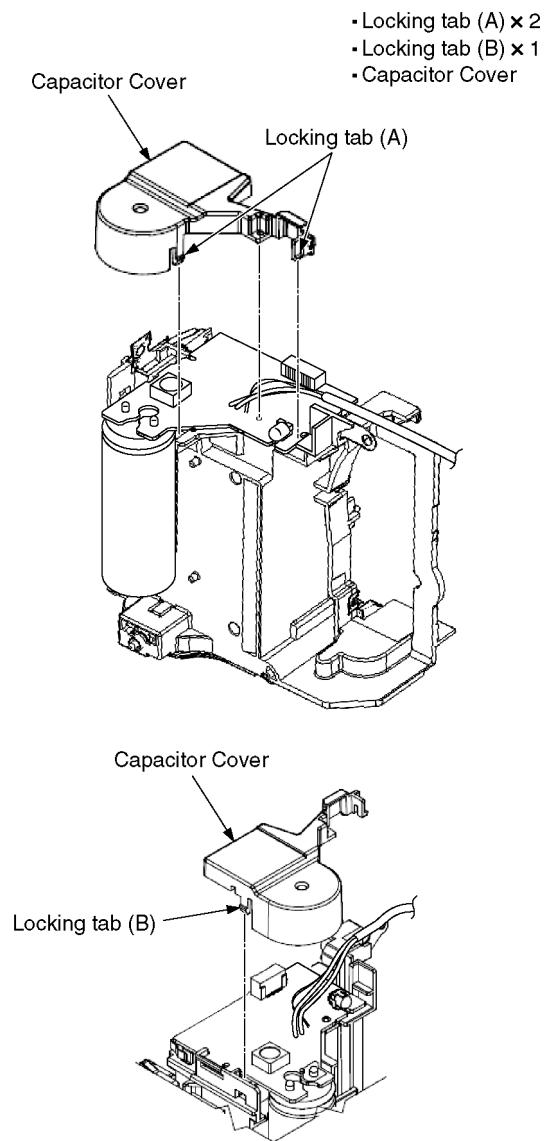
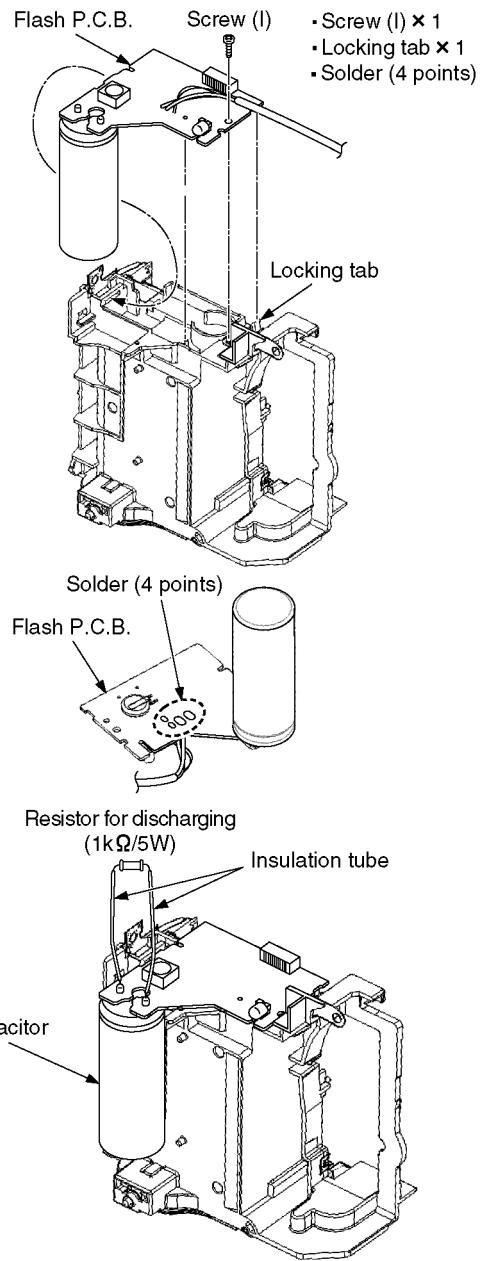


Fig. D9

IMPORTANT NOTICE:

Take care not apply any bending load to the charging capacitor. It brings about the possibility of P.C.B. and/or component damage on the Flash P.C.B.



CAUTION

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

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

Screw (1)

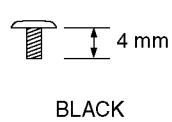


Fig. D10

8.3.8. Removal of the EVF Unit

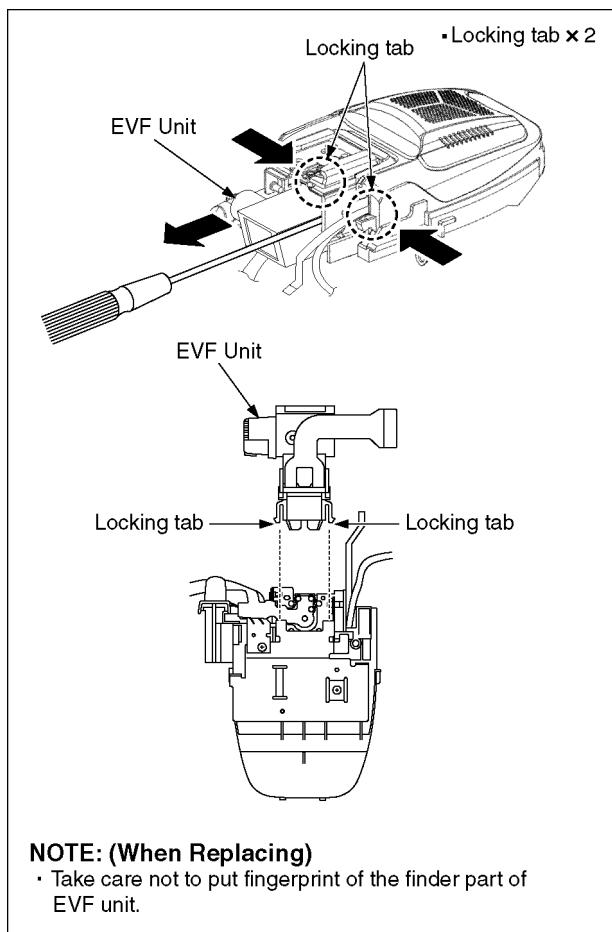


Fig. D11

8.3.9. Removal of the Hot Shoe Flex, ECM Flex Unit, Flash Unit

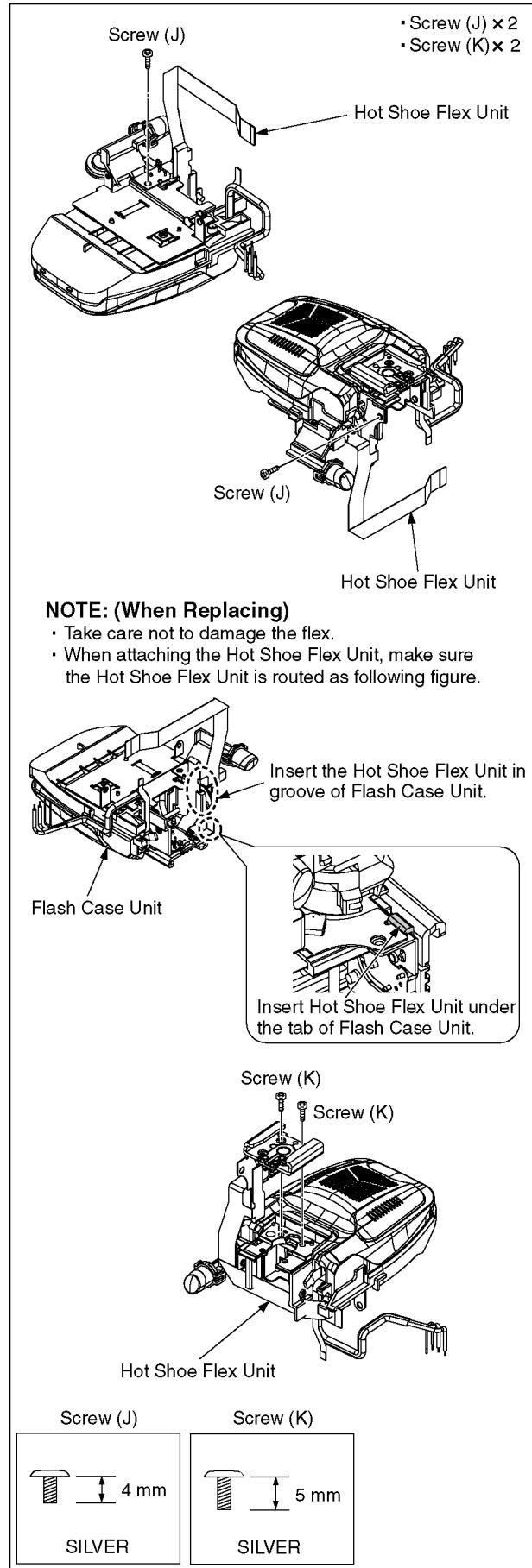


Fig. D12

- Screw (L) × 2
- Locking tab × 4
- Flash Case Top
- Flash Shaft
- Flash Pop Up Spring

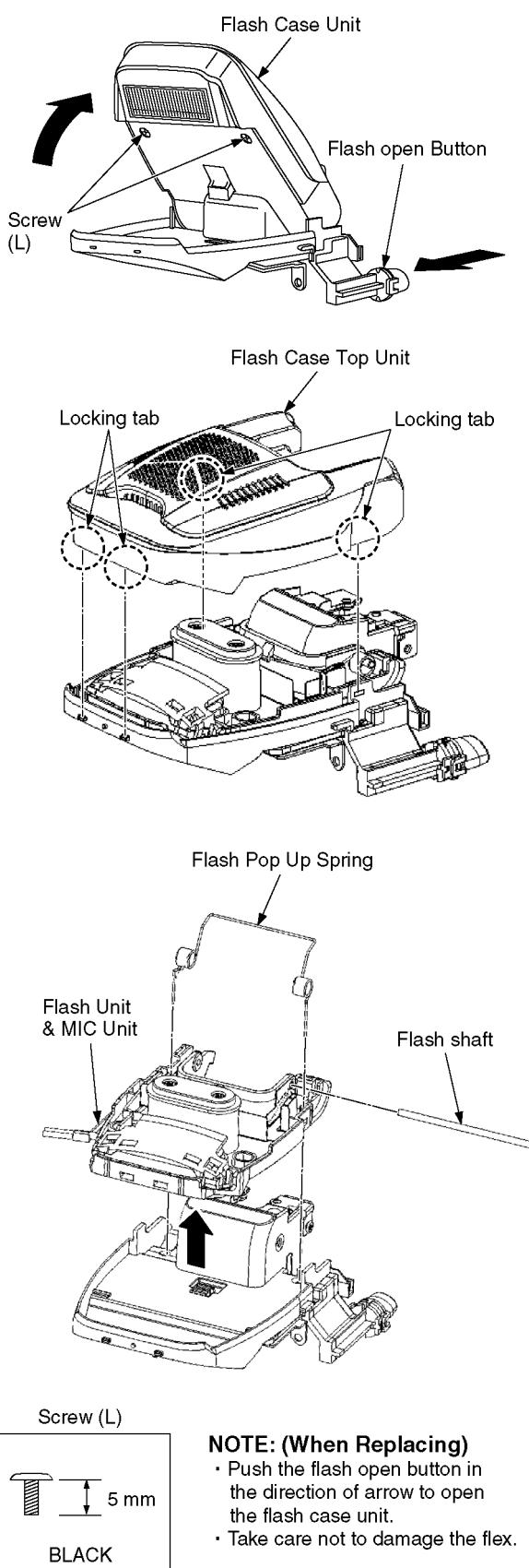
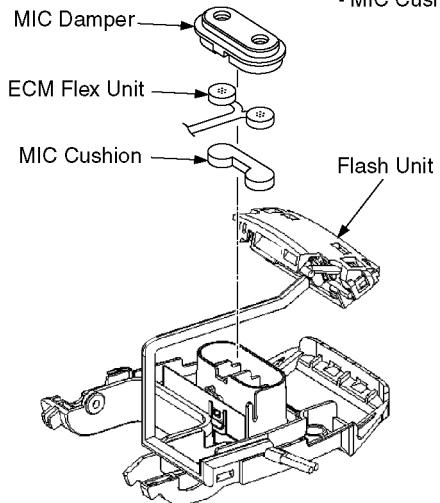


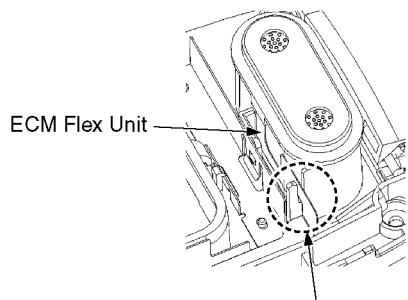
Fig. D13

- MIC Damper
- MIC Cushion



NOTE: (When Replacing)

- Take care not to damage the flex.
- Process the ECM Flex Unit as shown below.



Pass the ECM Flex Unit through the gap.

Fig. D14

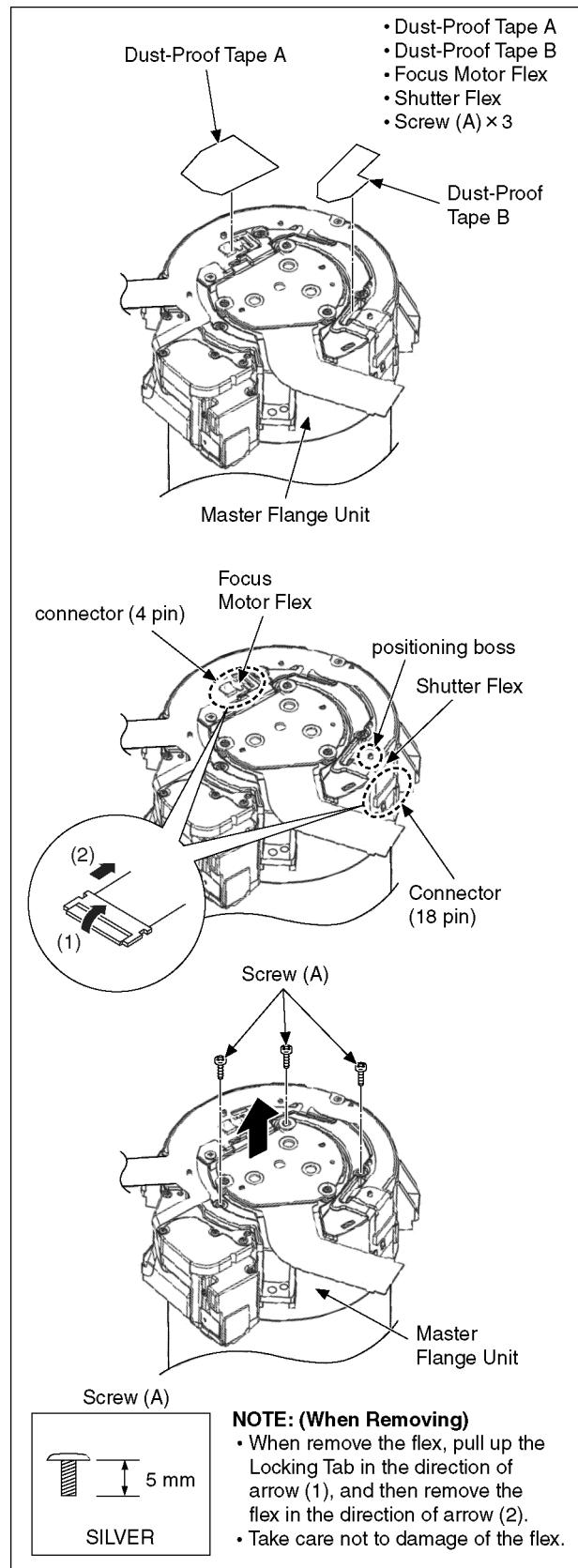
8.4. Lens Disassembly Procedure

Precaution:

1. Do not remove the MOS when disassembling or re-assembling the lens in order to maintain it clean. When remove it, refer to item "8.5.".
2. Keep dust or dirt away from the lens.
3. Do not touch the lens surface.
4. Use lens cleaning KIT (BK)(VFK1900BK).
5. Apply grease as shown on item "8.4.6." and "8.4.7." in the figure.

8.4.1. Removal of the Master Flange Unit

1. Remove the Dust-Proof Tape A and the Dust-Proof Tape B.
2. Disconnect the connector (4 pin) of Focus Motor Flex.
3. Disconnect the connector (18 pin) of Shutter Flex.
4. Remove the Shutter Flex from the positioning boss.
5. Remove the 3 Screws (A) to remove the Master Flange Unit.

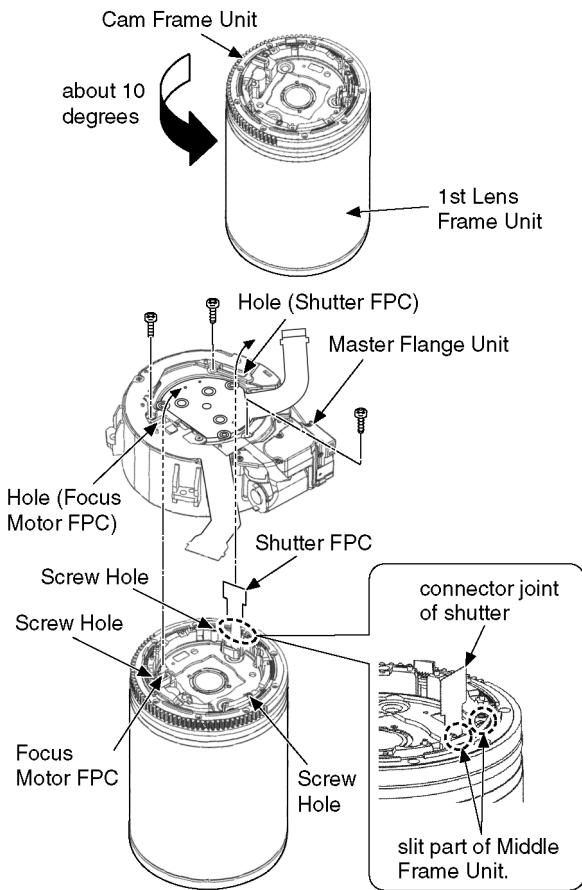


NOTE: (When Removing)

- When remove the flex, pull up the Locking Tab in the direction of arrow (1), and then remove the flex in the direction of arrow (2).
- Take care not to damage of the flex.

NOTE: (When Replacing)

1. Turn the Cam Frame Unit from the collapsible barrel position with 10 degrees toward the 1st Lens Frame Unit.
2. Insert the connector joint of shutter in slit part of Middle Frame Unit.
3. Pass the Shutter Flex and the Focus Motor Flex through the hole of master flange unit.
4. Align the screw hole, hold the Master Flange Unit evenly and screw down it.



5. When attaching the Dust-Proof Tape A and B, confirm the reference line to attach.

※ Avoid contact of Dust-Proof Tape A and B with MOS Unit.

Cover the opening of the Master Flange completely.

Dust-Proof Tape A

Reference Line

Master Flange Unit

MOS Unit

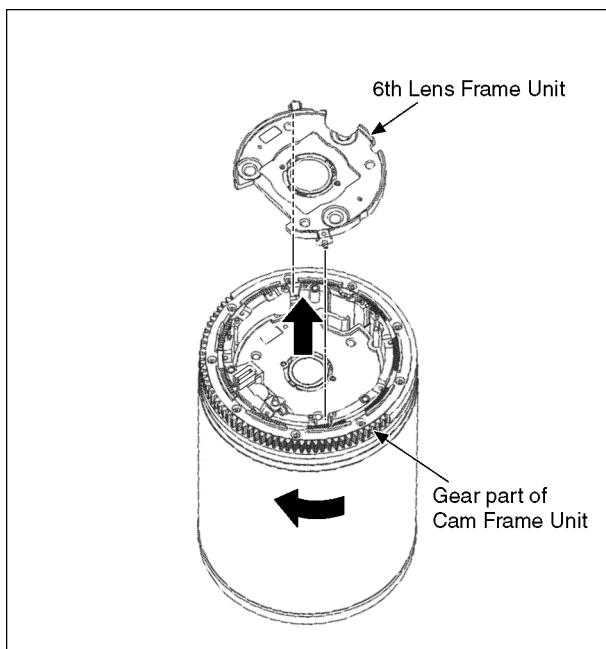
Reference Line

Dust-Proof Tape B

Cover the opening of the Master Flange completely.

8.4.2. Removal of the 6th Lens Frame Unit

1. Turn the gear part of Cam Frame Unit in the direction of arrow fully.
2. Pull out the 6th Lens Frame Unit using tweezers, etc.

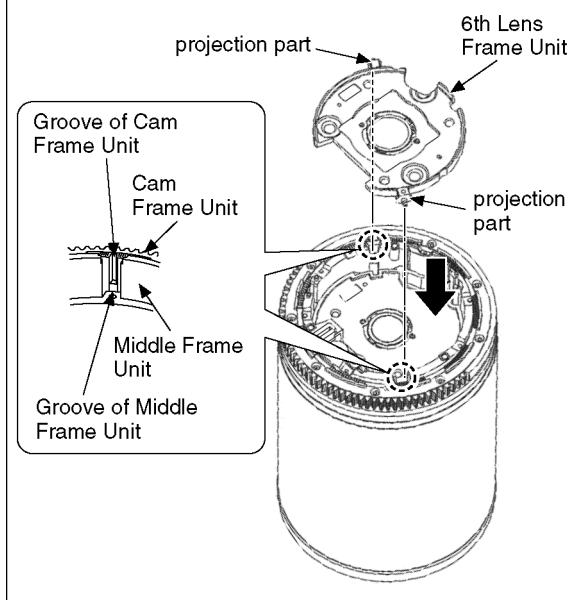


NOTE: (When Replacing)

- When lift the 6th Lens Frame Unit, take care not to put fingerprint of the lens.

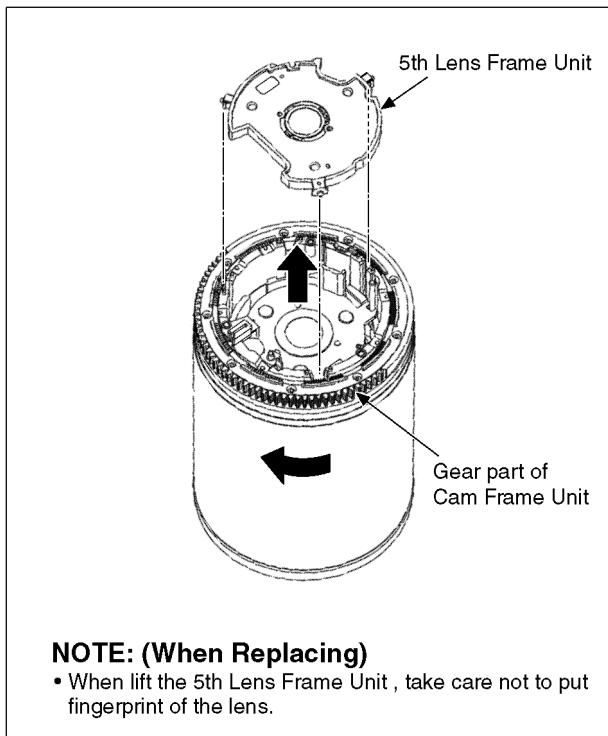
NOTE: (When Replacing)

1. Align the phase of the groove of Middle Frame Unit and the groove of Cam Frame Unit (2 points).
2. Align the projection part of 6th Lens Frame Unit and the groove of Middle Frame Unit, and then install them.



8.4.3. Removal of the 5th Lens Frame Unit

1. Turn the gear part of Cam Frame Unit in the direction of arrow fully.
2. Pull out the 5th Lens Frame Unit using tweezers, etc.

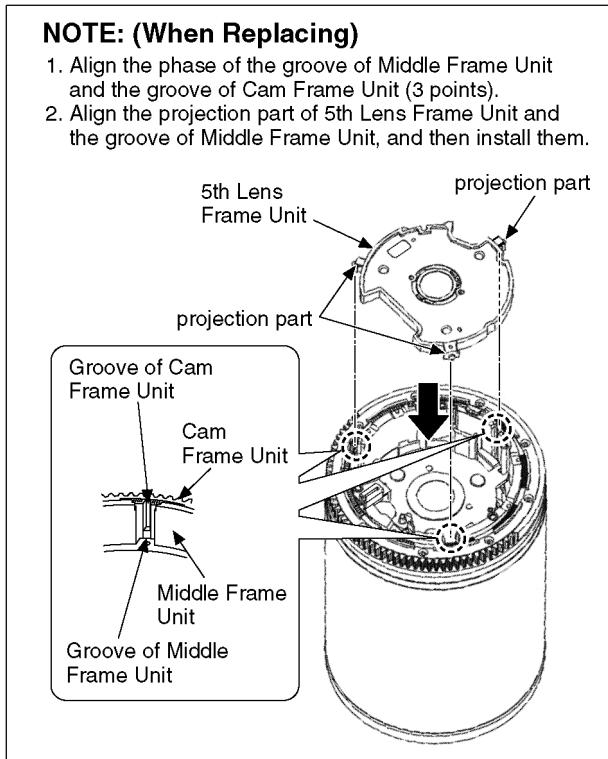
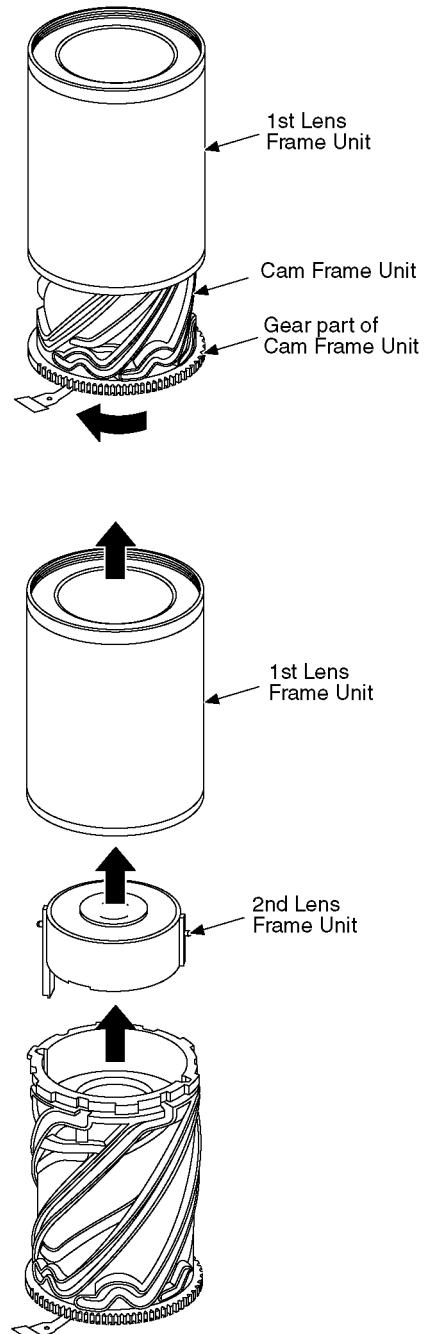


8.4.4. Removal of the 1st Lens Frame Unit and 2nd Lens Frame Unit

1. Turn the gear part of Cam Frame Unit in the direction of arrow fully.
2. Remove the 1st Lens Frame Unit and 2nd Lens Frame Unit.

■ CAUTION

- When remove and install, set the 1st Lens Frame Unit at the upper side at all times, or there is the danger that the 2nd Lens Frame Unit falls and be damaged.

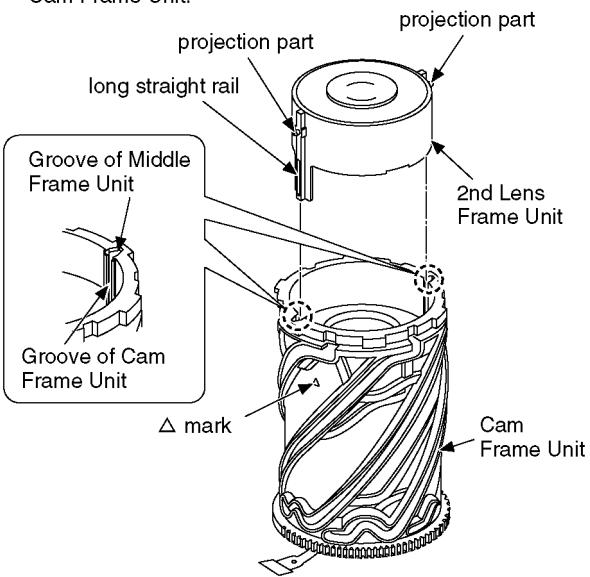


NOTE: (When Replacing)

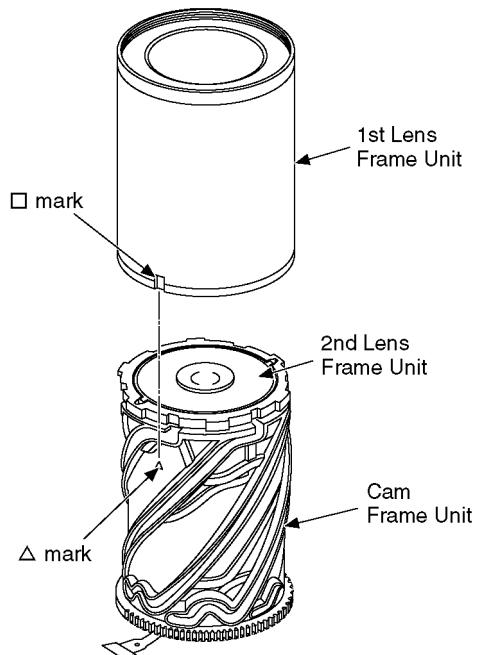
- When lift the 1st Lens Frame Unit and the 2nd Lens Frame Unit, take care not to put fingerprint of the lens.

NOTE: (When Replacing)

1. Align the phase of the groove of Middle Frame Unit and the groove of Cam Frame Unit (2 points).
2. Arrange the 2nd Lens Frame Unit, long straight rail on the triangle Δ mark side of the Cam Frame Unit, and insert the protrusion of the 2nd Lens Frame Unit into the groove between the Middle Frame Unit and Cam Frame Unit.

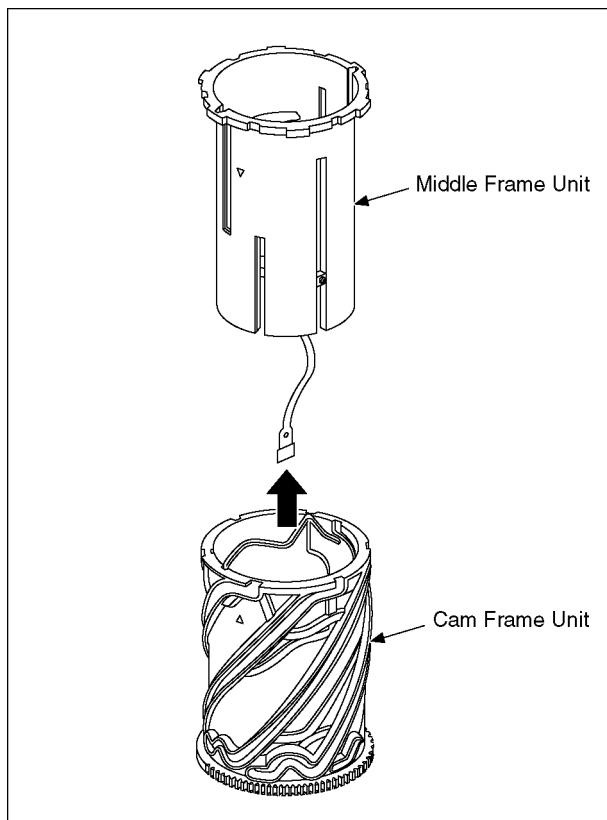


3. Align the \square mark of 1st Lens Frame Unit and the Δ mark of Cam Frame Unit, and then install them.



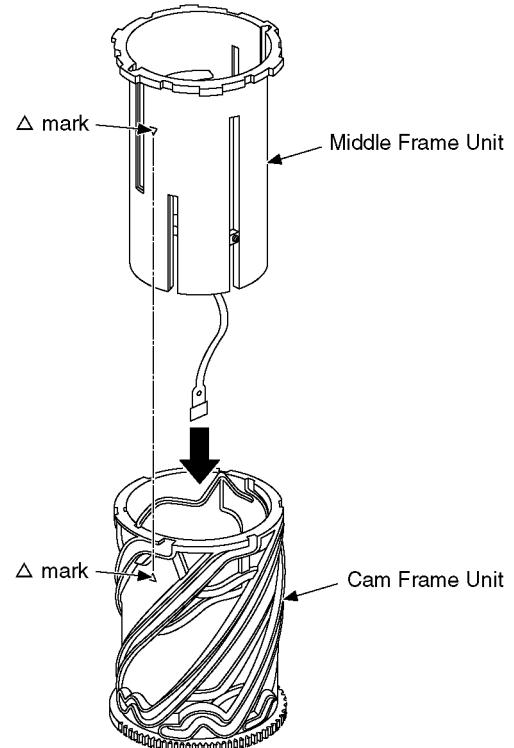
8.4.5. Removal of the Middle Frame Unit

1. Remove the Middle Frame Unit in the direction of arrow.



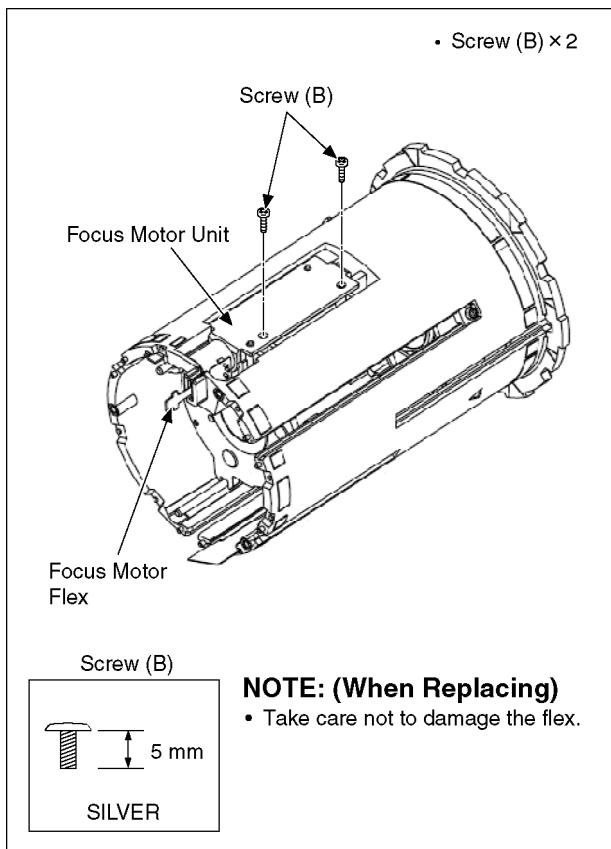
NOTE: (When Replacing)

- Align the Δ mark of Middle Frame Unit and the Δ mark of Cam Frame Unit, and then install them.



8.4.6. Removal of the Focus Motor Unit

1. Remove the 2 Screws (B) to remove the Focus Motor Unit.



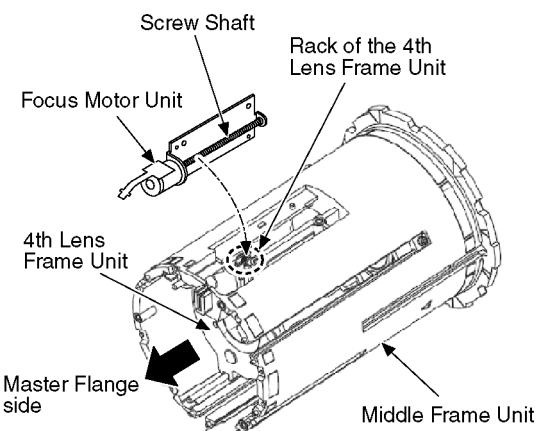
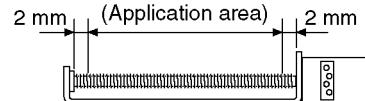
NOTE: (When Installing)

1. Blow air to the screw shaft of Focus Motor Unit to prevent the adhesion of foreign material.
2. Apply grease to the screw shaft of Focus Motor Unit.
3. Align the screw shaft to the rack of 4th Lens Frame Unit for insertion.
(Set the 4th Lens Frame Unit at the Master Flange side)

• Grease Application Area

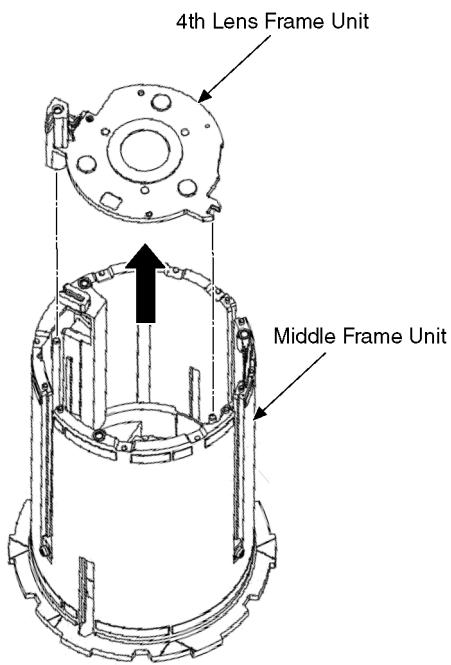
Grease: RFKZ0472

Amount of application: $4.5 \pm 0.3\text{mg}$



8.4.7. Removal of the 4th Lens Frame Unit

1. Remove the 4th Lens Frame Unit in the direction of arrow.

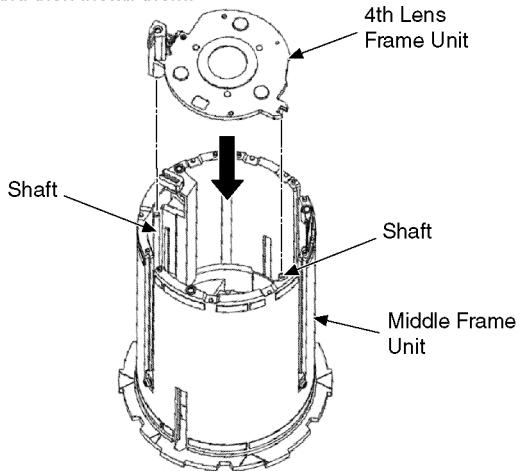


NOTE: (When Replacing)

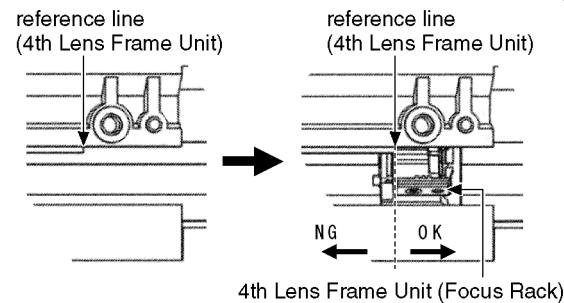
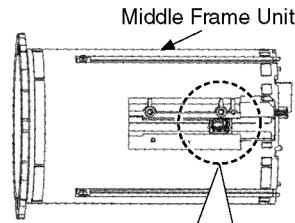
- When lift the 4th Lens Frame Unit, take care not to put fingerprint of the lens.

NOTE: (When Installing)

1. Align the 4th Lens Frame Unit and both the shaft, and then install them.



2. When attaching the 4th Lens Frame Unit, confirm the reference line to attach.



• Grease Application Area

(Shaft x 2)

Grease: RFKZ0472

Amount of application:

$3 \pm 0.3\text{mg}$

• Grease Application Area

(4th Lens Frame Unit x 2)

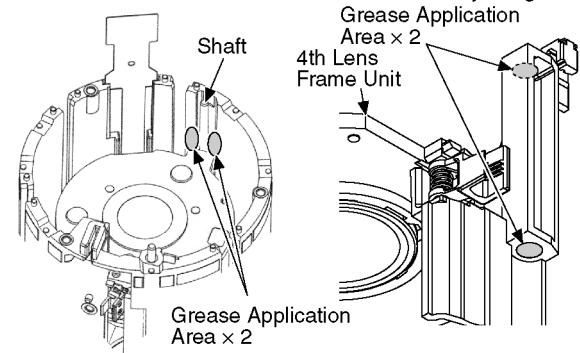
Grease: RFKZ0472

Amount of application:

$10 \pm 1\text{mg}$

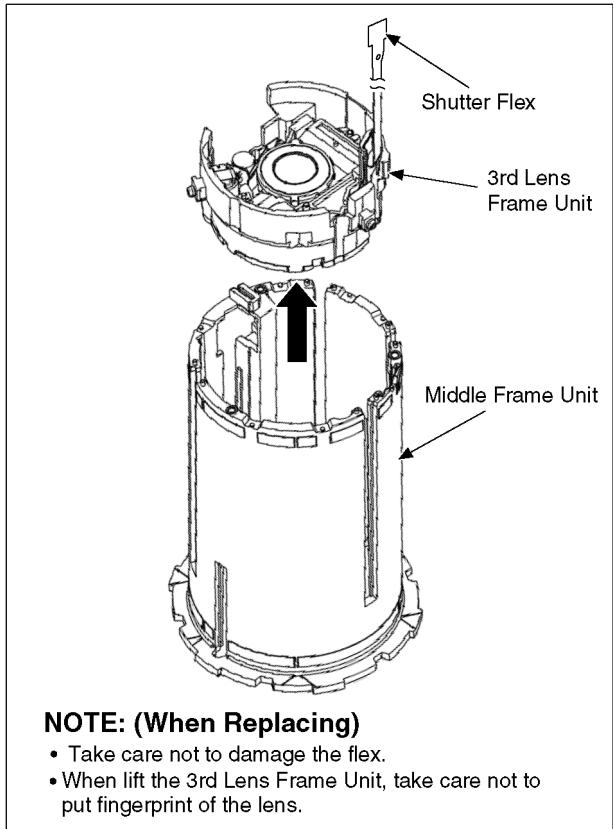
※ Apply the grease over the hole of the 4th Lens Frame Unit so the hole is hidden by the grease.

Grease Application Area x 2



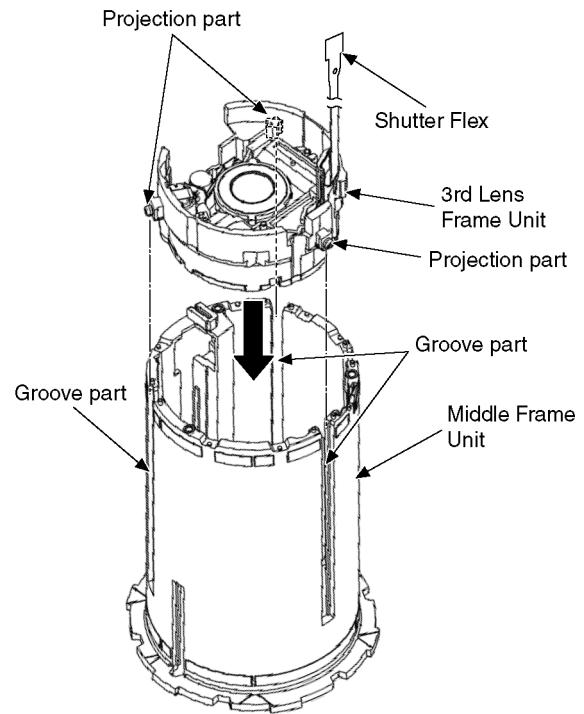
8.4.8. Removal of the 3rd Lens Frame Unit

1. Remove the 3rd Lens Frame Unit in the direction of arrow.

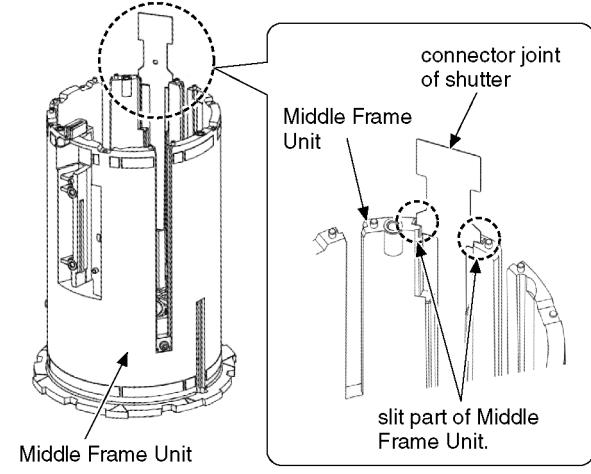


NOTE: (When Installing)

1. Align the projection part of 3rd Lens Frame Unit and the groove part of Middle Frame Unit, and then install them.

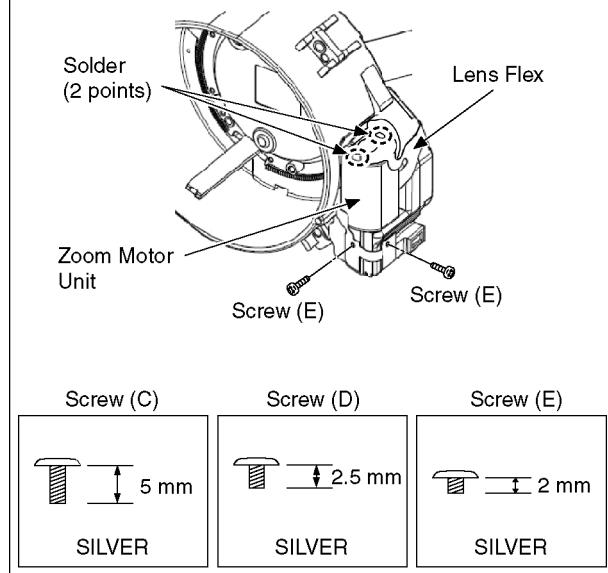
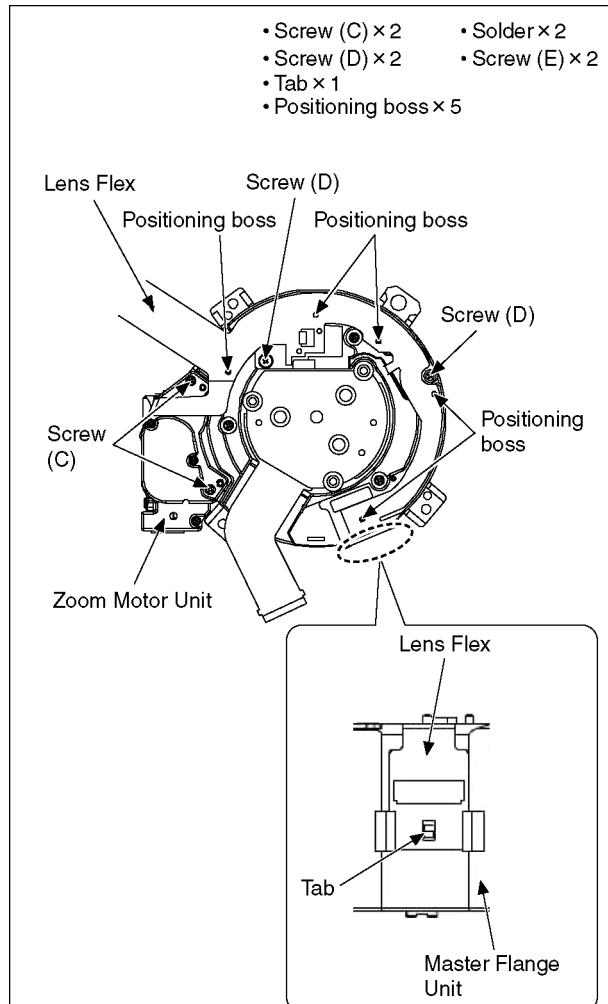


2. Pass the Shutter Flex and the Focus Motor Flex through the hole of master flange unit.



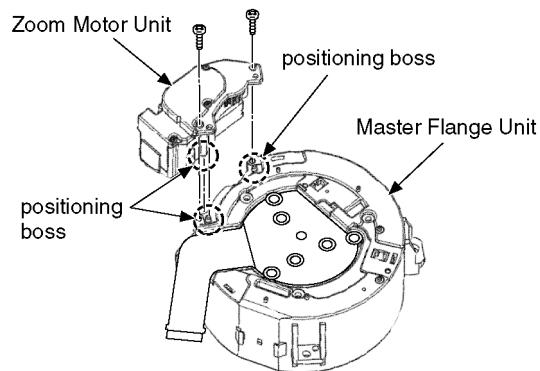
8.4.9. Removal of the Zoom Motor Unit and Lens Flex

1. Remove the 2 Screws (C).
2. Remove the 2 Screws (D).
3. Remove the 1 tab turn.
4. Remove the Lens Flex from positioning boss to remove the Zoom Motor Unit and Lens Flex.
5. Unsolder 2 position.
6. Remove the 2 Screws (E) to remove the zoom Motor Unit.

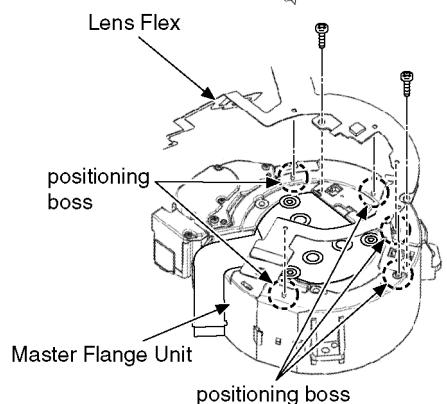
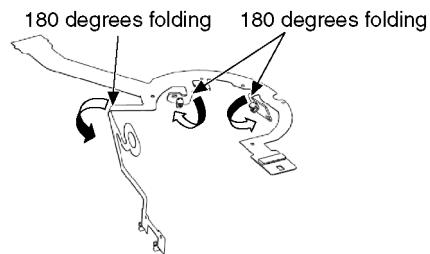


NOTE: (When Installing)

1. Align the Zoom Motor Unit and positioning boss, and then screw down it.

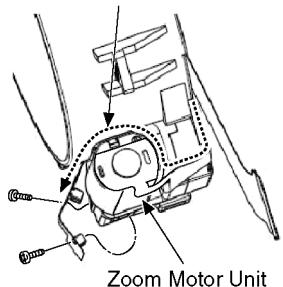


2. Fold the Lens Flex at the designated position. (3 locations)
3. Align the Lens Flex and positioning boss, and then screw down it.



4. Twine the Lens Flex around Zoom Motor Unit, and then screw down it.

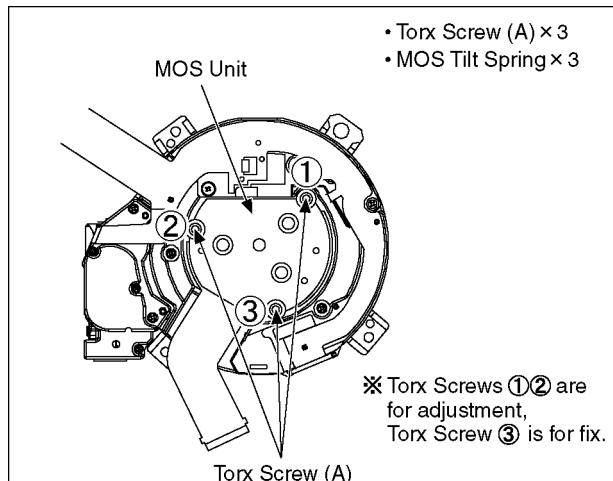
Twine the Lens Flex around Zoom Motor Unit.



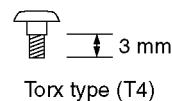
8.5. Removal of the MOS Unit

When remove the MOS Unit once (the Torx screw (A) is loosened even a little), the optical tilt adjustment is required. When loosen the Torx screw (A), necessary the optical tilt adjustment at the end of assembling. (Refer to item "9.3.2.") To prevent the MOS Unit from catching the dust and dirt, do not remove the MOS Unit except for replacing.

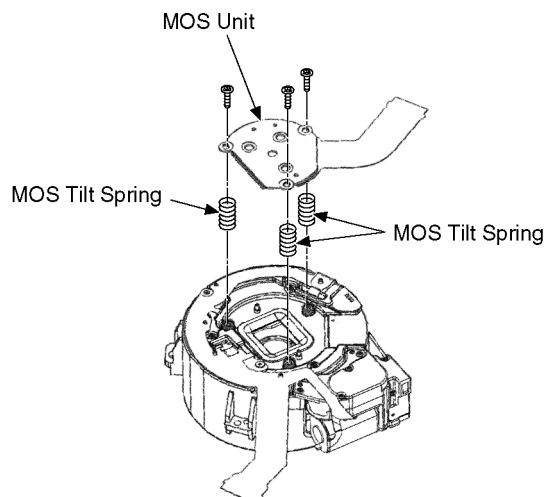
1. Remove the Torx screw (A) to remove the MOS Unit and the 3 Tilt Spring.



Torx Screw (A)



Torx type (T4)
SILVER



NOTE: (When Replacing)

- When attaching screw (A), tighten it according to the following order and torque.
- Set the bit of adjustment driver (VFKZ0569) to the torque driver (VFKZ0542).
- Be sure to execute the optical tilt adjustment with the Torx screw ① and ②.
- Tighten the 3 Torx screws in order ①→②→③.
- Screw torque: $10 \pm 1 \text{ N} \cdot \text{cm}$

9 Measurements and Adjustments

9.1. Introduction

When servicing this unit, make sure to perform the adjustments necessary based on the part(s) replaced.

When trouble occurs, it is recommended to backup the Flash-rom data before disassembling the unit.

NOTE: (When replacing the Lens unit, Master flange unit and MOS unit)

- When the MOS unit is unavoidably removed for Lens unit, Master flange unit and MOS unit replaced, an optical adjustment is necessary after parts are exchanged.
- It is necessary to use the "DSC_Tilt" software to allow the "Optical tilt adjustment".
- The Adjustment software "DSC_Tilt" is available at "TSN Website".

NOTICE (When Main P.C.B. is exchanged)

Number of necessary adjustment items decreases by copying the backup data to new Main P.C.B. when adjustment data in old Main P.C.B. can be read by ROM_BACKUP "DSC→SD" in "9.2.2. Flash-Rom Data Backup".

For more details, please refer an item "MAIN PCB (to which the backup data was copied)" in the table of "9.3.2. Adjustment Specifications".

IMPORTANT NOTICE (After replacing the Main P.C.B.)

After replacing the Main P.C.B., it is necessary to achieve adjustment.

9.2. Before Disassembling the unit

9.2.1. Initial Setting Release

The cameras specification are initially set in accordance with model suffix (such as EB, EG, GK, GC, and so on.).

Unless the initial setting is not released, an automatic alignment software in the camera is not able to be executed when the alignment is carried out.

Note:

The initial setting should be again done after completing the alignment. Otherwise, the camera may not work properly.

Therefore as a warning, the camera display a warning symbol "!" on the LCD monitor every time the camera is turned off.

Refer to the procedure described in "3.4.2. INITIAL SETTINGS" for details.

[How to Release the camera initial setting]

Preparation:

Attach the Battery to the unit.

Set the recording mode dial to PROGRAM AE mode.

Step 1. Temporary cancellation of "INITIAL SETTINGS":

While pressing the UP of Cursor button and MOTION PICTURE button simultaneously, turn the Power on.

Step 2. Cancellation of "INITIAL SETTINGS":

Press the PLAYBACK button.

While pressing UP of Cursor button and MOTION PICTURE button simultaneously. (The camera will beep after this.)

Turn the Power off. (The warning symbol "!" is displayed on the LCD monitor.)

9.2.2. Flash-Rom Data Backup

Number of necessary adjustment items decreases by copying the backup data to new Main P.C.B. when adjustment data in old Main P.C.B. can be read by ROM_BACKUP "DSC→SD".

It is recommended to backup the Flash-rom data as the way of return when trouble occurs before disassembling the unit depending on each case.

[ROM_BACKUP (Method of Non-PC backup)]

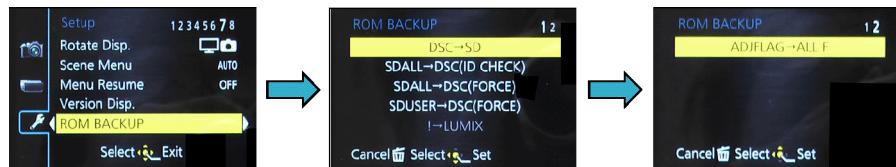
1. Insert the Memory Card into the camera.
2. Set the camera to "Temporary cancellation of the initial settings".
3. Select the "SETUP" menu.

From the "SETUP" menu, select "ROM BACKUP".

Note:

This item is not listed on the customer's "SET UP" menu.

4. When this "ROM_BACKUP" item is selected, the following submenus are displayed.



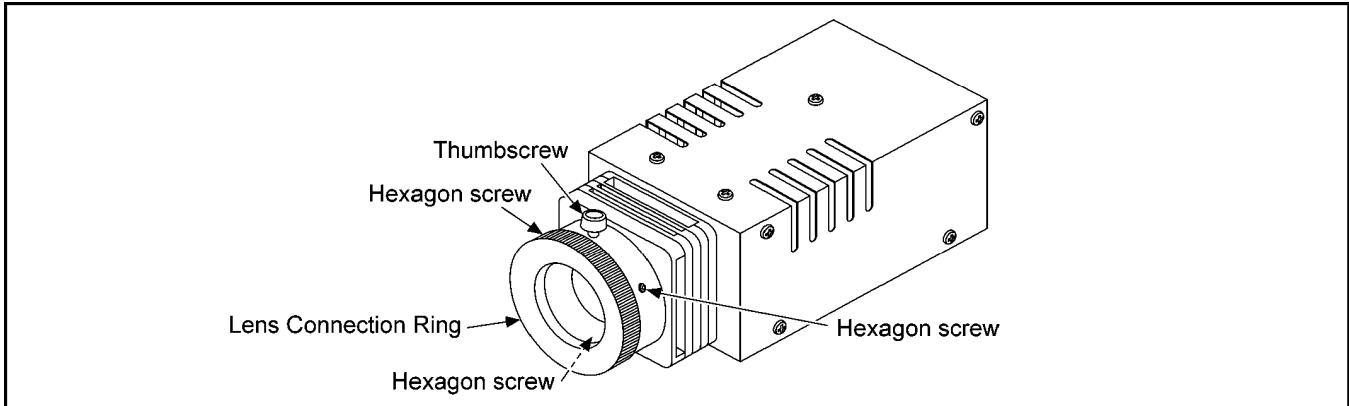
Item	Function	Details
DSC → SD	Save all the DSC's Flash-rom data to Memory Card	<ul style="list-style-type: none"> DSC's Flash-rom data is saved to the Memory Card as a data file. (DATA BACKUP) -File location: ROOT DIRECTORY in Memory Card. -File Name: <ul style="list-style-type: none"> 1) User Setup Information data: <Model No.>U.txt [Depending on the model, more than one file may be generated (e.g. <Model No.>U.TXT and <Model No.>U3.TXT).] 2) Electrical Adjustment data: <Model No.>F.txt [Depending on the model, more than one file may be generated (e.g. <Model No.>F.TXT and <Model No.>F3.TXT).] If the concerned file already exists, "OVERWRITE?" message is displayed.
SDALL→ DSC (ID CHECK)	Write the all data to DSC's Flash-rom from Memory Card	<ul style="list-style-type: none"> The backup data stored in the Memory Card is transferred to DSC unit. ID CHECK: When the model ID is different, data is not transferred.
SDALL → DSC (FORCE)	Write the all data to DSC's Flash-rom from Memory Card	<ul style="list-style-type: none"> FORCE: Even if the model ID is different, data is transferred. * If the main PCB is replaced, select "SDALL→DSC(FORCE)".
SDUSER → DSC (FORCE)	Only "User setup information" is written from the saved file in the Memory Card to DSC's Flash-rom.	<ul style="list-style-type: none"> Only the user's "setup" setting condition is transferred to DSC unit. FORCE: Even if the model ID is different, the data is transferred.
! → LUMIX	Shipping set without initializing "User setup information"	<ul style="list-style-type: none"> Initial setting is executed without initializing the user's set up setting condition. * The initial setting must be performed while the Self-timer LED is blinking. * The picture data stored in the built-in memory of the DSC is not erased, with this operation.
ADJFLAG → ALL F	Set all adjustment flags completion	<ul style="list-style-type: none"> Status of the all adjustment flags are changed to "F"(completion).

9.2.3. About Light Box

When using VFK1164TDVLB Light Box

If using VFK1164TDVLB Light Box, remove the lens connection ring by loosing thumbscrew and three hexagon screws.

* RFKZ0523 Light Box has no lens connection ring.

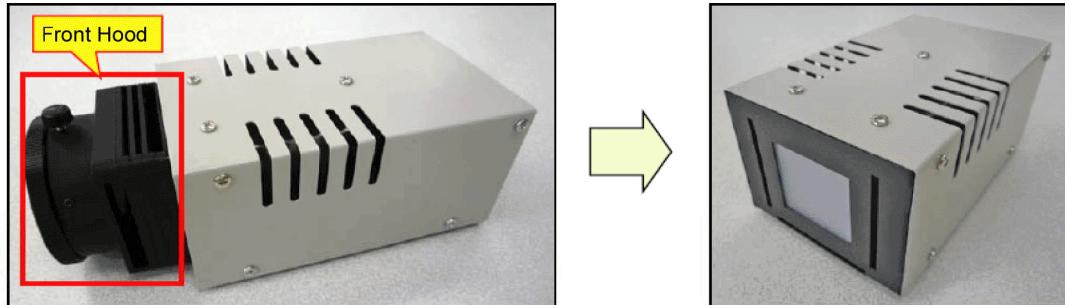


How to remove the Front Hood

In order to utilize maximum of the diffusing surface of light box, some adjustment items need the distance between diffusing surface of light box and camera body becomes several cent-meters.

Before the adjustments, remove the front hood of light box following steps below.

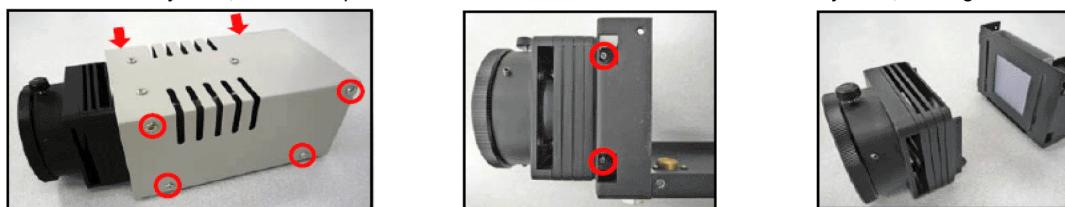
[For VFK1164TDVLB Light Box]



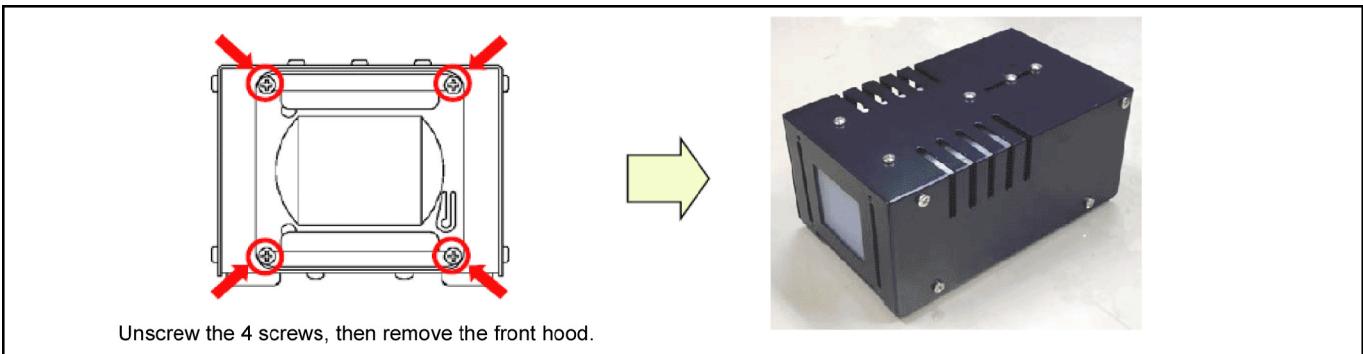
(1) Unscrew the 8 screws.
Slide the body case, then lift it up.

(2) Unscrew the 4 screws.

(3) Remove the front hood. Install the body case, then tighten the 8 screws.



[For RFKZ0523 Light Box]



Unscrew the 4 screws, then remove the front hood.

9.3. Details of Electrical Adjustment

9.3.1. How to execute the Electrical Adjustment

It is not necessary to connect the camera to a PC to perform adjustments.

"Flag reset operation" and "Initial setting operation" are required when carrying out the alignment, follow the procedure below.

9.3.1.1. Startup Electrical Adjustment mode

1. Release the initial settings.
2. Insert a recordable Memory Card.
(Without a Memory Card, the automatic adjustment can not executed.)
3. Procedure to set the camera into adjustment mode:
 - a. Set the mode into PROGRAM AE mode.
 - b. Turn the Power off.
 - c. Turn the Power on pressing MOTION PICTURE and MENU/SET simultaneously.
LCD monitor displays "SERVICE MODE".
(Refer to Fig.F3-1)

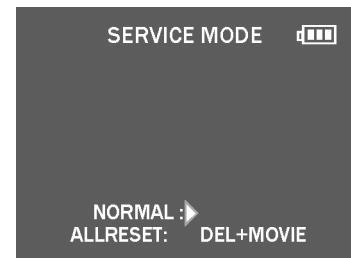


Fig. 3-1

9.3.1.2. Status Adjustment Flag Setting

Reset (Not yet adjusted) the status flag condition.

1. After pressing the DISPLAY button, the LCD monitor displays the Flag status screen (Refer to Fig.3-2.)
2. Select item by pressing the cross keys. (Gray cursor is moved accordingly.)
3. Press the DELETE button.

Note:

The selected item's flag has been changed from "F (green)" to "0 (yellow)".

*(Refer to Fig. 3-3)

*Flag conditions:

F (green)

means that the alignment has been completed and the status flag condition is set. In this case, the flag condition should be reset, if you try to carry out the automatic alignment.

0 (yellow)

means that the alignment has been not "completed" and the status flag condition is "reset". In this case, automatic alignment is available.

MVR F	SHD F	BKI F	FOC F
KEY F	ISO F	DUT F	RS2 F
MVP F	LIN F	COL F	PWK F
PZM F	WBLF	OLN F	BK2 F
OIS F	CLK F	RES F	---
BF F	STB F	ZOM F	---
IRS F	LED F	CEC F	---
SHT F	WKI F	EST F	RESET

Fig. 3-2

MVR F	SHD F	BKI F	FOC F
KEY F	ISO F	DUT F	RS2 F
MVP F	LIN F	COL F	PWK F
PZM F	WBLF	OLN F	BK2 F
OIS O	CLK F	RES F	---
BF F	STB F	ZOM F	---
IRS F	LED F	CEC F	---
SHT F	WKI F	EST F	RESET

Fig. 3-3

- In case of setting the status flag into set condition again without completion of the alignment, the status flag should be SET by using PC, or UNDO by using ROM BACKUP function.

9.3.1.3. Execute Adjustment

1. Perform step "9.3.1.1." to "9.3.1.2.", to reset the OIS flag status "F" (Set) to "0" (Reset).
2. Press DISPLAY button after Flag reset.
OIS Adjustment screen is displayed on the LCD panel.
(Refer to Fig.3-4)
3. Press the shutter button. The adjustment will start automatically.
4. When the adjustment is completed successfully, adjustment report menu appears with Green OK on the LCD monitor. (Refer to Fig.3-5)



Fig. 3-4

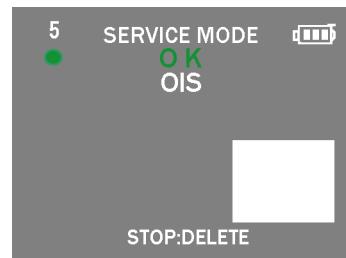


Fig. 3-5

9.3.1.4. Attention point during Adjustment

1. Step "9.3.1.3." procedure shows OIS adjustment as an example. To perform the adjustment, refer to the "9.3.2. Adjustment Specifications" table which shows key point for each adjustment.
2. Do not move the light box, the camera or the chart while adjusting. If one of these is moved accidentally, start the adjustment again.
3. Do not press any buttons/keys until the default menu (Fig.3-6) is displayed on the LCD monitor. Otherwise, adjustment data may not be stored properly.
4. If the adjustment is interrupted accidentally, the alignment data may not be properly saved in the Flash-rom.

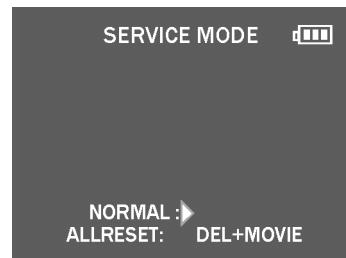


Fig. 3-6

9.3.1.5. Finalizing the Adjustment

1. Several adjustment flags can be reset ("F" into "0") at the same time. In this case, when the adjustment has been completed, the screen will change showing the adjustment for the next item until all reset items are completed.
Also, when the shutter button is pressed, the screen jump to the next adjustment item.
2. To cancel the adjustment mode while in the process of performing the adjustment, follow this procedures.
(1) Press "Right of cross key" button.

Note:

*.If adjustment is cancelled with above procedure, adjustment is not completed. Make sure to adjust it later.

9.3.2. Adjustment Specifications

The following matrix table shows the relation between the replaced part and the Necessary Adjustment.

When a part is replaced, make sure to perform the necessary adjustment(s) in the order indicated.

The table below shows all the information necessary to perform each adjustment.

Adjustment order	Adjustment Item	FLAG	Purpose	Replacing Parts						JIG/TOOLS	SET UP	How to Operate	
				MAIN P.C.B./ VENUS ENGINE (IC6001) MCP (IC6002)	MAIN P.C.B. (to which the backup data was copied)	Lens Parts (except MOS UNIT)	MOS UNIT	MIC UNIT	FLASH UNIT				
1	Optical Tilt	—	Align the image sensor installation angle to the Lens	—	—	○	○	—	—	•OPTICAL AXIS ADJUSTMENT CHART (RFKZ0570) •DRIVER (for OPTICAL AXIS ADJUSTMENT (RFKZ0569 (T4 TORX TYPE)) •CAMERA STAND (RFKZ0333J) •TORQUE DRIVER (RFKZ0542)	Note: • When the Lens Part (except MOS Unit) or MOS Unit is replaced, make sure to perform the "Optical tilt adjustment" before another "Optical Adjustment". • The "DSC Tilt" software (include the "Optical tilt adjustment process document") for the "Optical tilt adjustment" is specially uploaded on the Web-site.		
2	Venus Zoom $\times 4$	PZM	Venus Zoom Inspection	○	○	—	—	—	—	NONE	NONE	1)Press Shutter Button. 2)After completed, the "OK" menu appears.	
3	OIS sensor	OIS	OIS sensor output level adjustment	○	—	○	○	—	—	NONE	NONE	1)Press Shutter Button. (Do not apply any shock and vibration for the camera while adjusting) 2)After completed, the "OK" menu appears.	
4	Back focus / GYRO $\times 4$	BF	To have the focus tracking curve be appropriate shape and GYRO sensor adjustment	○	○	○	○	$\times 1$	—	•COLLIMATOR (RFKZ0422)	1)Set the camera in front of collimator so that the distance between collimator and camera becomes about 4.5 cm as shown in Fig. A. 2)Set the camera angle so that the center of the star chart comes to the center of the LCD monitor. 【IMPORTANT】 The adjustment "NG" might be happened with the following conditions: - Do not put the black colored stuff at the back side of collimator near hunching chart. It needs to get some certain brightness. - Make sure the hunching chart has no dust and dirty condition.	1)Press Shutter Button. 2)The green ● mark is displayed on LCD. 3)Set the camera in front of collimator so that the distance between collimator and camera becomes about 8.0 cm as shown in Fig. A. 4)Press Shutter Button. 5)After completed, the "OK" menu appears. (Do not apply any shock and vibration for the camera while adjusting.)	
5	Iris	IRS	Iris adjustment	○	—	○	○	—	—	•LIGHT BOX (RFKZ0523 or VFK1164TDVLB)	1)Set the camera in front of LIGHT BOX so that the distance between Light box and camera becomes about 5.0 cm as shown in Fig. B. 2)Aim the LIGHT BOX so that the entire LCD screen becomes fully "bright". (No dark area.)	1)Press Shutter Button. 2)After completed, the "OK" menu appears.	
6	Shutter	SHT	Shutter speed adjustment	○	—	○	○	—	—	•LIGHT BOX (RFKZ0523 or VFK1164TDVLB) •ND FILTER (RFKZ0513 (ND0.3))	1)Set the ND FILTER to the LIGHT BOX. (The LIGHT BOX "VFK1164TDVLB" can be used if the front hood of VFK1164TDVLB is removed.) 2)Set the camera in front of LIGHT BOX so that the distance between Light box and camera becomes about 5.0 mm as shown in Fig. B. 3)Aim the LIGHT BOX so that the entire LCD screen becomes fully "bright". (No dark area.)	1)Press Shutter Button. 2)After completed, the "OK" menu appears.	
8	Flash $\times 4$	STB	Flash Inspection	○	○	—	—	—	○	NONE	NONE	1)Press Shutter Button and check that Flash is emitted. (The number of emissions differs depending on the model.) If Flash is not emitted, Flash Unit may be damaged. 2)If the inspection result shows "NG", use "ROM_BACKUP" and rewrite STB to confirm it is adjusted. The result may show "NG" if the inspection is performed at sites other than the specific environment (factory). However, if the flash emission is visible, there is no problem. 3)After completed, the "OK" menu appears.	
9	MOS Missing Pixels (White) $\times 2$	WKI	Compensation of MOS Missing Pixels (White)	○	—	○	○	$\times 1$	—	NONE	NONE	1)Press Shutter Button. 2)After completed, the "OK" menu appears. ※ After adjustment is complete, the lens automatically moves out. Do not place anything in front of the camera.	

Adjustment order	Adjustment Item	FLAG	Purpose	Replacing Parts						JIG/TOOLS	SET UP	How to Operate
				MAIN P.C.B./ VENUS ENGINE (IC601Y)	MAIN P.C.B. (to which the backup data was copied)	Lens Parts (except MOS UNIT)	MOS UNIT	MIC UNIT	FLASH UNIT			
10	Color reproduction inspection and Microphone check	COL	Color reproduction inspection and Microphone check	○	—	○	○	○	—	NONE	NONE	1)Press Shutter Button. Right after pressing the shutter button, make a continuous sound (voice) to the microphone until lens unit starting the zooming. 2)After completed, the "OK" menu appears. ※ After adjustment is complete, the lens automatically moves out. Do not place anything in front of the camera.
11	MOS Missing Pixels (Black) × 3	BK2	Compensation of MOS Missing Pixels (Black)	○	—	○	○	—	—	• LIGHT BOX (RFKZ0523 or VFK1164TDVBLB) • DIFFUSER (RFKZ0591)	1) Prepare the LIGHTBOX (RFKZ0523). (The LIGHTBOX "VFK1164TDVBLB" can be used if the front hood of VFK1164TDVBLB is removed.) 2) Set the Diffuser (RFKZ0591) to the LIGHTBOX. NOTE: Do not use "BK1" adjustment flag for this unit. Use "BK2" adjustment flag, instead.	1)Aim the LIGHTBOX so that the entire LCD screen becomes fully "bright". (No dark area.) 2)Display of "BK2" is checked, press the Shutter Button. (The green ● mark is displayed on LCD.) 3)Bring the lens tip into contact with the Diffuser surface and place the camera so that the diffused light evenly appears on the LCD screen. Note: When setting the camera, make fine adjustment to prevent the 4 corners of the LCD screen from darkening. 4)Press Shutter Button. (The 1st adjustment is executed, and then green ● mark is displayed on LCD.) 5)Set the camera in front of LIGHT BOX so that the distance between Light box and camera becomes about 4.5 mm as shown in Fig. B. 6)Press Shutter Button. (The green ● mark is displayed on LCD.) 7)Press Shutter Button. (The 2nd adjustment is executed, and then green ● mark is displayed on LCD.) 8)Set the camera in front of LIGHT BOX so that the distance between Light box and camera becomes about 7.5 mm as shown in Fig. B. 9)Press Shutter Button. (The green ● mark is displayed on LCD.) 10)Press Shutter Button. (The 3rd adjustment is executed, and then "OK" mark is displayed on LCD when the adjustment has been completed successfully.)

※1: This adjustment must be performed not only replacing the MOS unit, but also simply removing the MOS unit.

※2: The pixel that always lights while shaded is called a white wound.

※3: The pixel that does not light while complete exposed is called a black wound. This unit does not have the LCD adjustment of the camera (LCD flicker adjustment etc.).

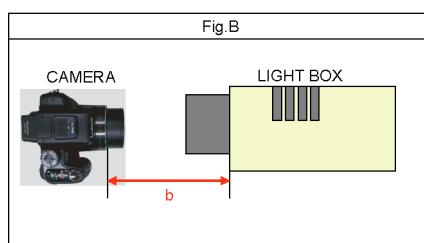
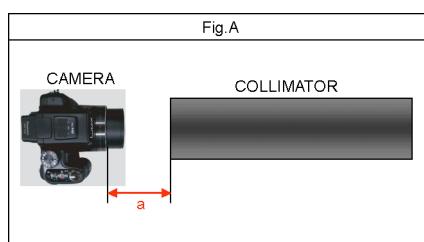
※4: If the adjusted data is backed up from the main board before replacement or repair, write the data to the new main board. If parts other than the main board are not replaced, adjustment is not necessary for items other than "Venus Zoom(PZM)/Back focus/GYRO(BF)/Flash(STB)".

■ IMPORTANT NOTICE (After replacing the Main P.C.B.)

After replacing the Main P.C.B., make sure to perform the "INITIAL SETTINGS" first, then release the "INITIAL SETTINGS" in order to proceed the electrical adjustment.

Note:

1. If electrical adjustment or data re-writing is executed before "INITIAL SETTINGS", suffix code list is never displayed, and it cannot be chosen suitable suffix code.
2. Never remove the battery during initial setting in process.



9.4. After Adjustment

9.4.1. Initial Setting

Since the initial setting has been released to execute the built-in adjustment software, it should be set up again before shipping the camera to the customer.

Refer to the procedure described in "3.4.2. INITIAL SETTINGS" for details.

[IMPORTANT]

1. The initial setting should be done again after completing the alignment. Otherwise, the camera will not work properly.
Therefore as a warning, the camera display a warning symbol "!" on the LCD monitor every time the camera is turned off.
2. Confirm that status of all adjustment flag show "F". Even if one of the adjustment flag shows "0", initial setting programmed is never executed.

10 Maintenance

10.1. Cleaning Lens, Viewfinder and LCD Panel

Do not touch the surface of lens, Viewfinder and LCD Panel with your hand.

When cleaning the lens, use air-Blower to blow off the dust.

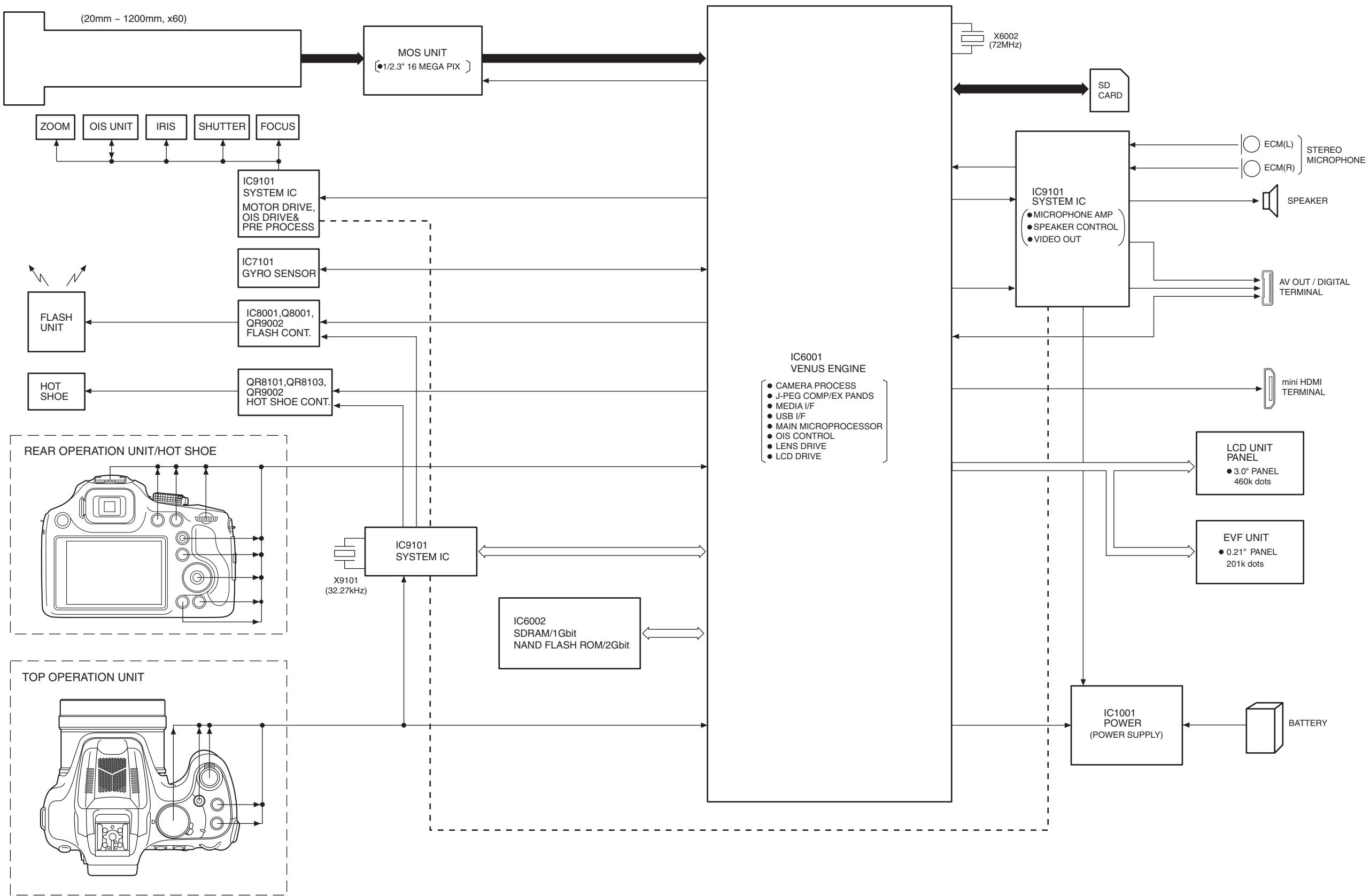
When cleaning the LCD Panel, dampen the lens cleaning paper with lens cleaner, and the gently wipe the their surface.

Note:

The Lens Cleaning KIT; VFK1900BK(Only supplied as 10 set/Box) is available as Service Aid.

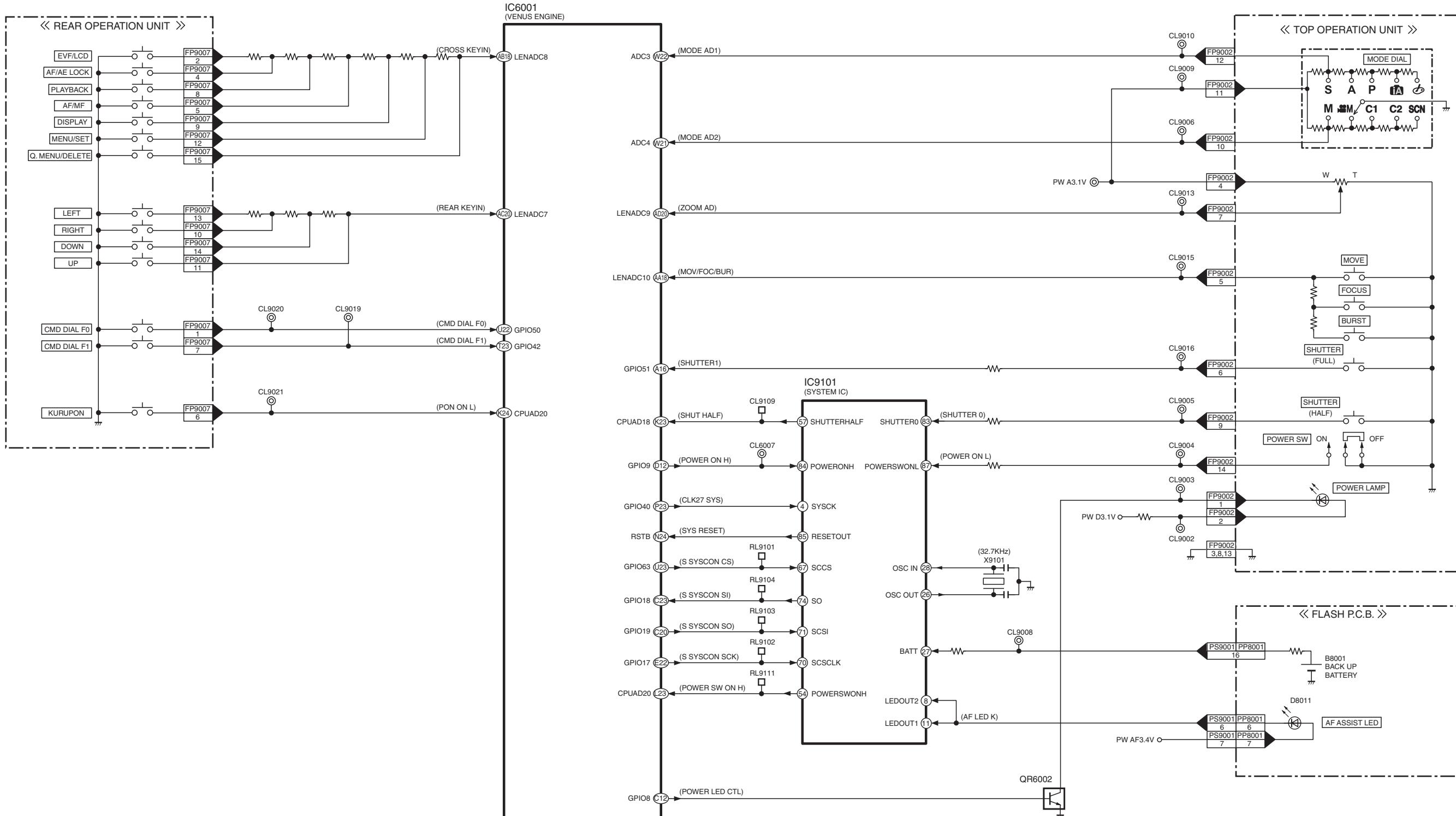
11 Block Diagram

11.1. Overall Block Diagram



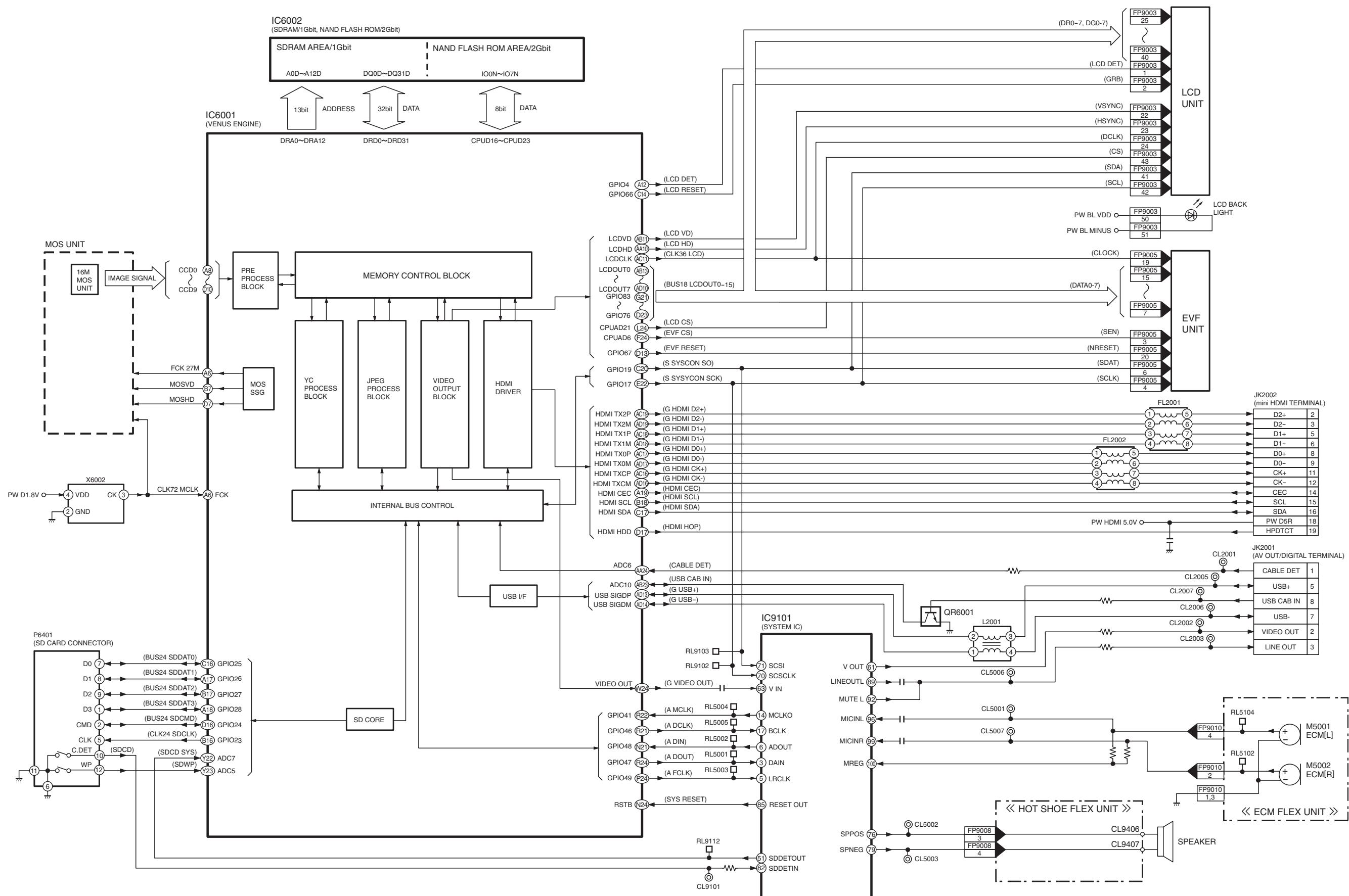
DMC-FZ70/FZ72 OVERALL BLOCK DIAGRAM

11.2. System Control Block Diagram

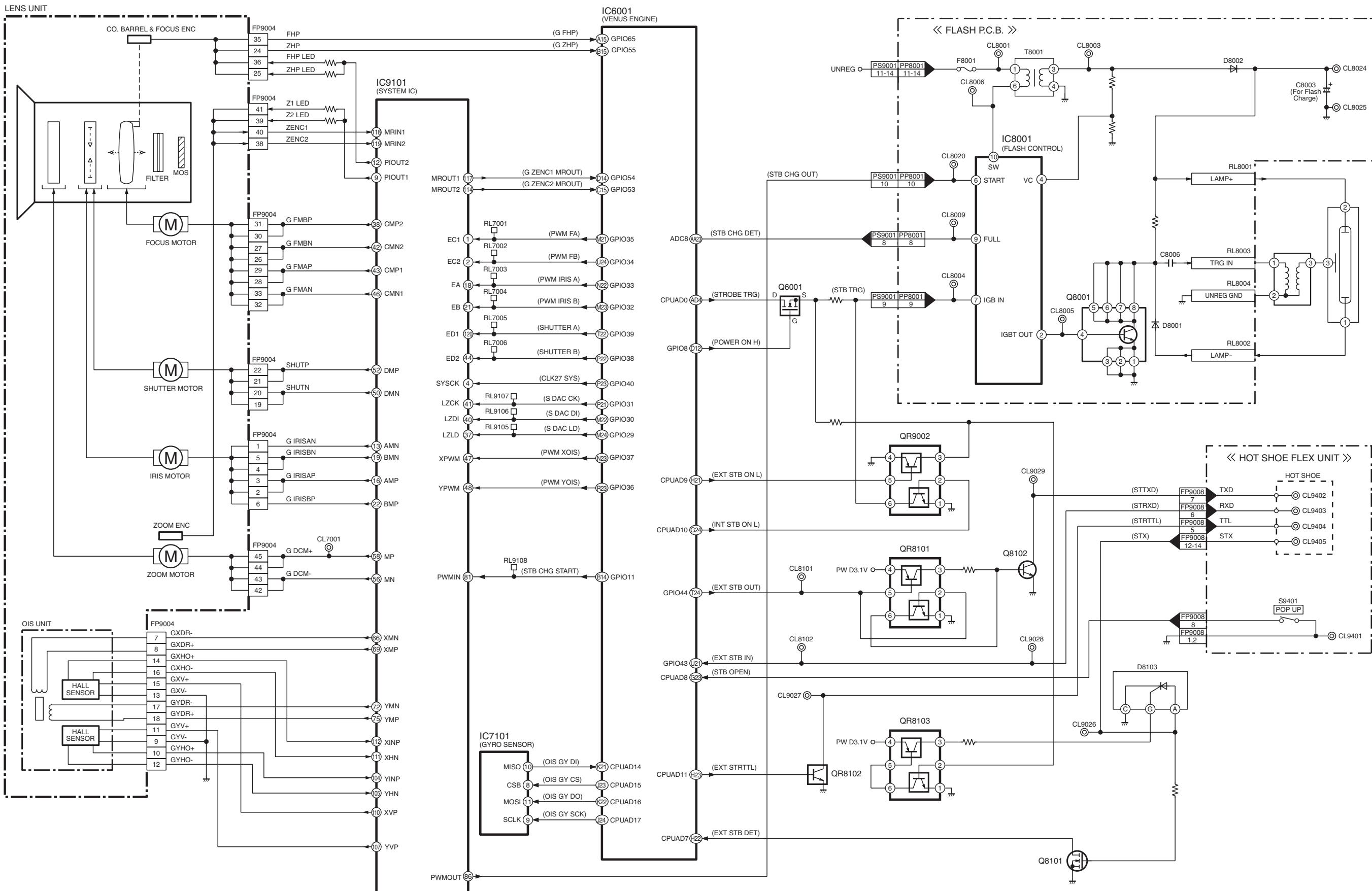


DMC-FZ70/FZ72 SYSTEM CONTROL BLOCK DIAGRAM

11.3. Audio/Video Process/ HDMI Block Diagram

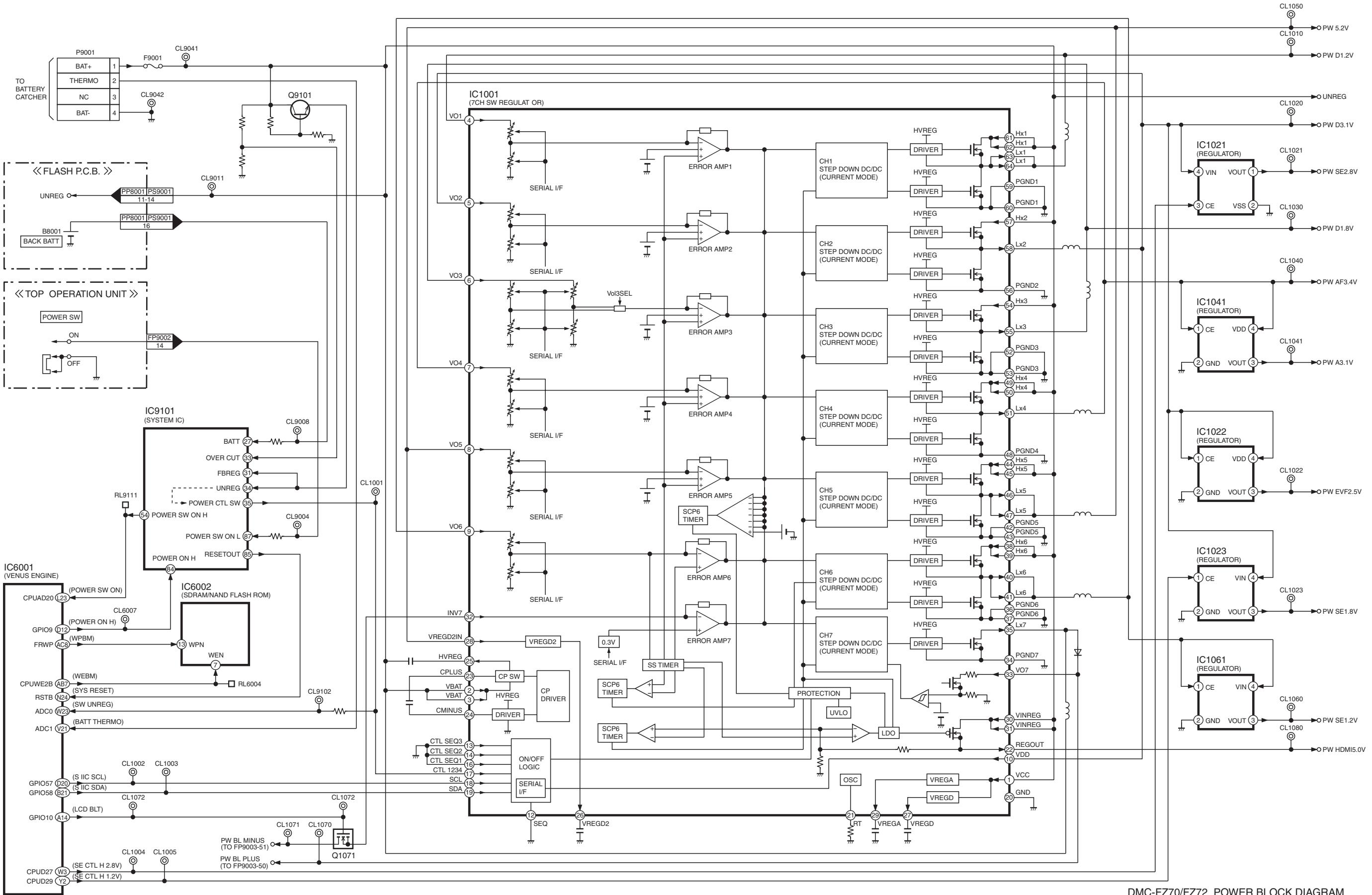


11.4. Lens Drive Block Diagram



DMC-FZ70/FZ72 LENS DRIVE BLOCK DIAGRAM

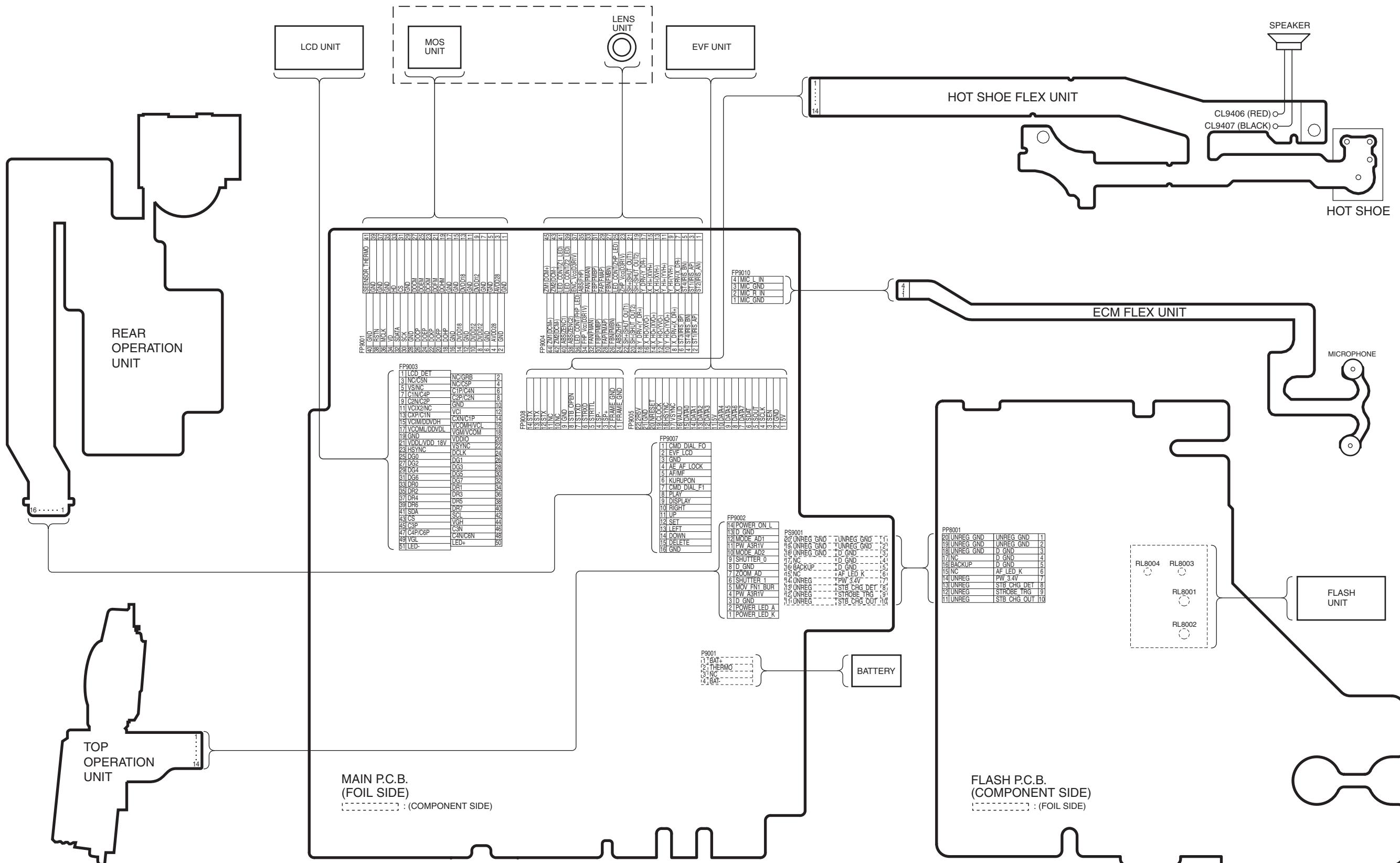
11.5. Power Block Diagram



DMC-FZ70/FZ72 POWER BLOCK DIAGRAM

12 Wiring Connection Diagram

12.1. Interconnection Schematic Diagram



DMC-FZ70/FZ72 INTERCONNECTION SCHEMATIC DIAGRAM