

# Service Manual

4K Video Camera / High Definition Video Camera



Model No. **HC-VX870PP**

**HC-VX870PU**

**HC-VX870EB**

**HC-VX870EE**

**HC-VX870EF**

**HC-VX870EG**

**HC-VX870EP**

**HC-VX870GC**

**HC-VX870GK**

**HC-VX870GW**

**HC-VX878EG**

**HC-V770PP**

**HC-V770EB**

**HC-V770EC**

**HC-V770EE**

**HC-V770EF**

**HC-V770EG**

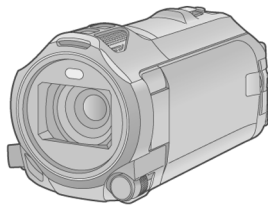
**HC-V770EP**

**HC-V770GC**

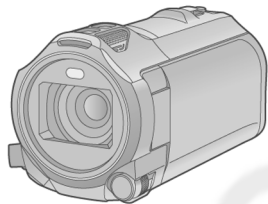
**HC-V770GK**

**HC-V770GW**

**HC-V777EG**



HC-WX970/WX979/WX970M



HC-VX870/VX878/VX870M  
HC-V770/V777/V770M/V760

# HC-V760EE

HC-WX970PP

HC-WX970PU

HC-WX970EB

HC-WX970EE

HC-WX970EF

HC-WX970EG

HC-WX970EP

HC-WX970GC

HC-WX970GK

HC-WX970GW

HC-WX979EG

HC-WX970MGH

HC-WX970MGK

HC-WX970MGN

HC-VX870MGH

HC-VX870MGK

HC-VX870MGN

HC-V770MGK

HC-V770MGN

Colour

(K).....Black Type

(W).....White Type

(only HC-V770EB/EP,V777EG,V760EE)

## 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.

## TABLE OF CONTENTS


	PAGE		PAGE
<b>1 Safety Precautions</b> .....	<b>3</b>	7.1. When Replacing the Main P.C.B. ....	22
1.1. General Guidelines .....	3	7.2. Service Position .....	22
1.2. Leakage Current Cold Check .....	3	<b>8 Disassembly and Assembly Instructions</b> .....	<b>23</b>
1.3. Leakage Current Hot Check (See Figure. 1) .....	3	8.1. Disassembly Flow Chart for the Unit .....	23
<b>2 Warning</b> .....	<b>4</b>	8.2. PCB Location .....	24
2.1. Prevention of Electrostatic Discharge (ESD) to Electrostatically Sensitive (ES) Devices .....	4	8.3. Disassembly Procedure for the Unit .....	25
2.2. How to Recycle the Lithium Ion Battery (U.S. Only) .....	4	<b>9 Measurements and Adjustments</b> .....	<b>47</b>
2.3. How to Replace the Lithium Battery .....	5	9.1. Electric Adjustment .....	47
<b>3 Service Navigation</b> .....	<b>6</b>	<b>10 Factory Setting</b> .....	<b>61</b>
3.1. Introduction .....	6	10.1. How To Turn On The Factory Settings? .....	61
3.2. General Description About Lead Free Solder (PbF) .....	6	10.2. What Is The Factory Settings? .....	62
3.3. How to Define the Model Suffix (NTSC or PAL model) .....	7	<b>11 Block Diagram</b> .....	<b>63</b>
3.4. Baking of replacement IC and defective P.C.B. .....	8	11.1. Overall Block Diagram .....	63
<b>4 Specifications</b> .....	<b>9</b>	11.2. Camera Circuit Block Diagram .....	64
<b>5 Location of Controls and Components</b> .....	<b>12</b>	11.3. System Control Circuit Block Diagram .....	65
<b>6 Service Mode</b> .....	<b>15</b>	11.4. Video/Audio Signal Process(1) Circuit Block Diagram .....	66
6.1. Model/Destination Settings .....	16	11.5. Video/Audio Signal Process(2) Circuit Block Diagram .....	67
6.2. Lock Search and Error History Indication .....	17	11.6. Lens Drive Circuit Block Diagram .....	68
6.3. Power ON Self Check Result Display .....	18	11.7. Power Supply Circuit Block Diagram .....	69
6.4. Adjustment function for the Service .....	19	<b>12 Wiring Connection Diagram</b> .....	<b>70</b>
6.5. Restore the backed up adjustment data .....	20	12.1. Interconnection Diagram .....	70
6.6. Touch Panel Calibration .....	21		
6.7. NFC Initialization (except HC-V760) .....	21		
<b>7 Service Fixture &amp; Tools</b> .....	<b>22</b>		

# 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 M $\Omega$  and 5.2 M $\Omega$ . 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 1.5 k $\Omega$ , 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

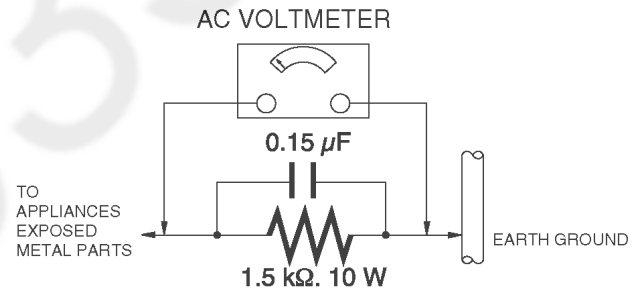


Figure. 1

## 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 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 recyclable. Pour des renseignements sur le recyclage de la batterie, veuillez composer le 1-800-8-BATTERY.

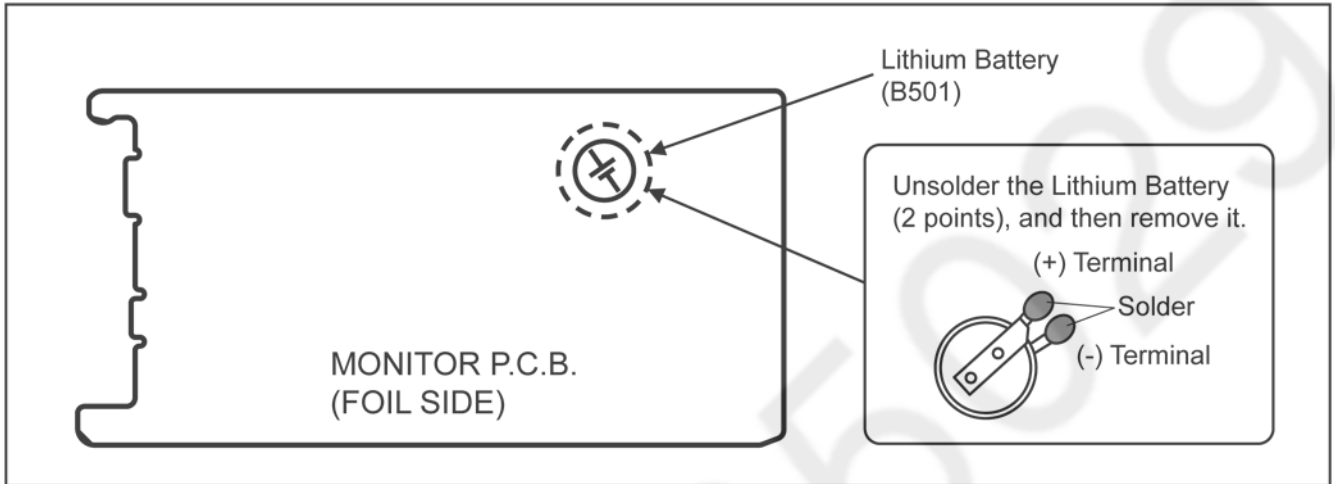
## 2.3. How to Replace the Lithium Battery

### 2.3.1. Replacement Procedure

1. Remove the MONITOR P.C.B.. (Refer to Disassembly Procedures.)
2. Unsolder the each soldering point of electric lead terminal for Lithium battery (Ref. No. "B501" at foil side of MONITOR P.C.B.) and remove the Lithium battery together with electric lead terminal. Then replace it into new one.

**NOTE:**

The Lithium battery includes electric lead terminals.



**NOTE:**

This Lithium battery is a critical component.

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 HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 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.

SVKZ000001-----(0.3mm 100g Reel)

SVKZ000002-----(0.6mm 100g Reel)

SVKZ000003-----(1.0mm 100g Reel)

#### Note

\* Ingredient: Tin (Sn) 96.5%, Silver (Ag) 3.0%, Copper (Cu) 0.5%. (Flux cored)

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

There are eight kinds of HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760.


- a) HC-WX970M, W870M (Japan domestic model)
- b) HC-WX970PP, VX870PP, V770PP
- c) HC-WX970EB/EF/EG/EP, WX979EG, VX870EB/EF/EG/EP, VX878EG, V770EB/EC/EF/EG/EP, V777EG
- d) HC-WX970EE, VX870EE, V770EE
- e) HC-V760EE
- f) HC-WX970GK, WX970MGK, VX870GK, VX870MGK, V770GK, V770MGK
- g) HC-WX970MGN, VX870MGN, V770MGN
- h) HC-WX970PU/GC/GW, WX970MGH, VX870PU/GC/GW, VX870MGH, V770GC/GW

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


#### 3.3.1. Defining methods:

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


**a) HC-WX970M, W870M (Japan domestic model)**  
The nameplate for these models show the following Safety registration mark.



**b) HC-WX970PP, VX870PP, V770PP**  
The nameplate for these models show the following Safety registration mark.




**c) HC-WX970EB/EF/EG/EP, WX979EG, VX870EB/EF/EG/EP, VX878EG, V770EB/EC/EF/EG/EP, V777EG**  
The nameplate for these models show the following Safety registration mark.



**d) HC-WX970EE, VX870EE, V770EE**  
The nameplate for these models show the following Safety registration mark.




**e) HC-V760EE**  
The nameplate for this model shows the following Safety registration mark.



**f) HC-WX970GK, WX970MGK, VX870GK, VX870MGK, V770GK, V770MGK**  
The nameplate for these models show the following Safety registration mark.



**g) HC-WX970MGN, VX870MGN, V770MGN**  
The nameplate for these models show the following Safety registration mark.



**h) HC-WX970PU/GC/GW, WX970MGH, VX870PU/GC/GW, VX870MGH, V770GC/GW**  
The nameplate for these models does not show any above Safety registration mark.

**NOTE:**

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

### 3.4. Baking of replacement IC and defective P.C.B.

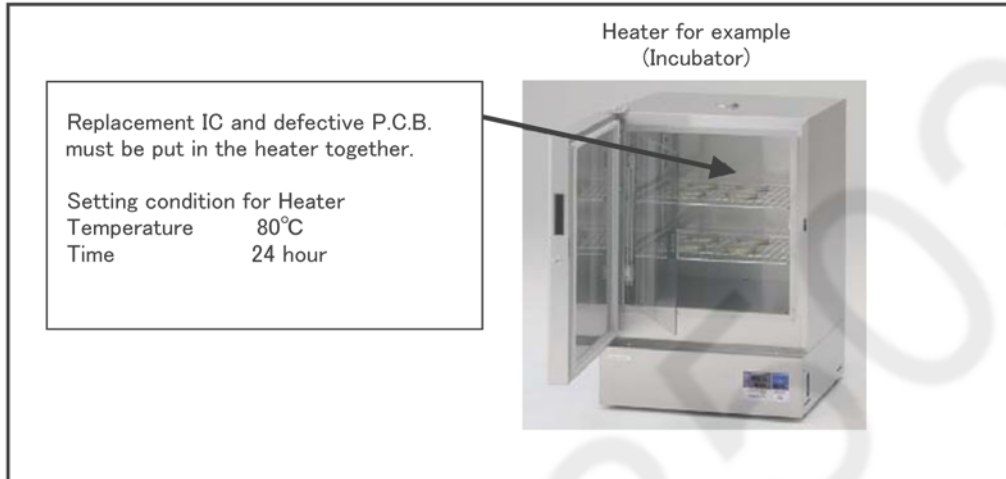
When replacing the CSP/BGA/QFN type IC mounted on the P.C.B., the problem of IC crack or foil pattern breaking in the P.C.B. might sometimes occur by rapid heating.

In order to improve the success rate of IC replacement for repair, it would be required to work out baking of replacement IC and defective P.C.B. before replacing IC.

Please refer the way of baking as follows.

Replacement IC and defective P.C.B. must be put in the heater together.

- Baking temperature and time (Hour)  
80°C / 24 hour





## 4 Specifications

The following specification is for HC-WX970 series, VX870 series, V770 series, V760 series (EB/EP). Some specifications may differ depending on model suffix.

The page number in this chapter does not show the page number of this service manual.

### 4K Video Camera/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;  
WX970 series  
7.6 W  
VX870 series  
7.1 W  
V770 series/V760  
6.7 W  
Charging; 7.7 W

#### Motion picture recording format:

[AVCHD];  
AVCHD format version 2.0 compliant (AVCHD Progressive)  
[MP4/iFrame];  
MPEG-4 AVC file format compliant (.MP4)  
WX970 series/VX870 series  
[4K MP4];  
MPEG-4 AVC file format compliant (.MP4)

**Motion picture compression:**  
MPEG-4 AVC/H.264

#### Audio compression:

[AVCHD];  
Dolby® Digital/5.1 ch (built-in microphone),  
2 ch (built-in microphone/external microphone)  
[MP4/iFrame];  
AAC/2 ch  
WX970 series/VX870 series  
[4K MP4];  
AAC/2 ch

#### Recording mode and transfer rate:

**[AVCHD]**  
[1080/50p];  
Maximum 28 Mbps (VBR)  
[PH];  
Maximum 24 Mbps (VBR)  
[HA];  
Average 17 Mbps (VBR)  
[HG];  
Average 13 Mbps (VBR)  
[HE];  
Average 5 Mbps (VBR)

**[MP4/iFrame]**  
[1080/50M];  
Maximum 50 Mbps (VBR)  
[1080/28M];  
Maximum 28 Mbps (VBR)  
[720];  
Average 9 Mbps (VBR)  
[iFrame];  
Maximum 28 Mbps (VBR)  
WX970 series/VX870 series

**[4K MP4];**  
[2160];  
Maximum 72 Mbps (VBR)

Refer to the operating instructions (PDF format) for the picture size and recordable time of a motion picture.

#### Still picture recording format:

JPEG (Design rule for Camera File system, based on Exif 2.2 standard)  
Refer to the operating instructions (PDF format) for picture size of a still picture and number of recordable pictures.

#### Recording media:

SD Memory Card  
SDHC Memory Card  
SDXC Memory Card  
Refer to page 13 for details on SD cards usable in this unit.

WX970M/VX870M/V770M  
Built-in memory; 16 GB

**Image sensor:**

**WX970** series/**VX870** series  
1/2.3 type (1/2.3") 1MOS image sensor  
Total; 18910 K

**Effective pixels;**

Motion picture; 8290 K (16:9)<sup>\*2</sup>,  
6100 K (16:9)<sup>\*3, 4</sup>  
Still picture; 8290 K (16:9), 6220 K (4:3),  
7000 K (3:2)

**V770** series/**V760**

1/2.3 type (1/2.3") 1MOS image sensor  
Total; 12760 K

**Effective pixels;**

Motion picture; 6030 K (16:9)<sup>\*4</sup>  
Still picture; 6030 K (16:9), 4720 K (4:3),  
5210 K (3:2)

**Lens:**

Auto Iris, 20× optical zoom, F1.8 to F3.6

**Focal length;**

4.08 mm to 81.6 mm

(Full range AF)

35 mm equivalent;

**WX970** series/**VX870** series

Motion picture;  
30.8 mm to 626 mm (16:9)<sup>\*1, 2</sup>,  
37.0 mm to 752 mm (16:9)<sup>\*3, 4</sup>  
Still picture;  
30.8 mm to 626 mm (16:9),  
37.6 mm to 752.8 mm (4:3),  
34.5 mm to 690.3 mm (3:2)

**V770** series/**V760**

Motion picture;  
29.5 mm to 612 mm (16:9)<sup>\*4</sup>  
Still picture;  
29.5 mm to 612 mm (16:9),  
36.2 mm to 724.6 mm (4:3),  
33.5 mm to 669.9 mm (3:2)

**Minimum focus distance;**

Normal; Approx. 3 cm (Wide)/

Approx. 1.5 m (Tele)

Intelligent Auto Macro;

Approx. 1 cm (Wide)

**Filter diameter:**

49 mm

**Zoom:****WX970** / **WX970M** / **VX870** / **VX870M**

20× optical zoom, 25×<sup>\*2</sup>/40×<sup>\*3</sup> i.Zoom,  
60×/1500× digital zoom

**WX979** / **VX878**

20× optical zoom, 25×<sup>\*2</sup>/40×<sup>\*3</sup> i.Zoom,  
60×/250× digital zoom

**V770** / **V770M** / **V760**

20× optical zoom, 50× i.Zoom, 60×/1500×  
digital zoom

**V777**

20× optical zoom, 50× i.Zoom, 60×/250×  
digital zoom

**Image stabilizer function:**

Optical (Hybrid Optical Image Stabilizer, Active  
Mode (Rotation correction), Optical Image  
Stabilizer Lock function)

**Level Shot Function:**

Off/Normal/Strong

**Creative Control:**

[Miniature Effect]/[Silent movie]/[8mm movie]/  
[Time Lapse Rec]

**HDR movie:**

Low/High

**Monitor:**

7.5 cm (3.0") wide LCD monitor (Approx. 460 K  
dots)

**Microphone:**

5.1 channel surround microphone/  
Zoom microphone/Focus microphone/  
Stereo microphone

**Minimum required illumination:**

Approx. 2 lx (1/25 with Low Light Mode in the  
Scene Mode)

**WX970** series/**VX870** series

Approx. 1 lx with the Night Mode ([COLOUR])  
function

0 lx with the Night Mode ([Infrared]) function

**V770** series/**V760**

Approx. 1 lx with the Night Mode function

\*1 When Level Shot Function is set to off

\*2 When [REC FORMAT] is set to [4K MP4].

\*3 When [REC FORMAT] is set to [AVCHD]  
or [MP4/iFrame].

\*4 When Level Shot Function is set to normal  
or off

**AV connector video output level:**1.0 V<sub>p-p</sub>, 75 Ω, PAL system**HDMI micro connector video output level:****WX970** series/**VX870** series

HDMI™ (x.v.Colour™) 2160p/1080p/1080i/576p

**V770** series/**V760**

HDMI™ (x.v.Colour™) 1080p/1080i/576p

**AV connector audio output level (Line):**

251 mV, 600 Ω, 2 ch

**Headphone output:**

85 mV, 32 Ω (Stereo mini jack)

**HDMI micro connector audio output level:**

[AVCHD];

Dolby Digital/Linear PCM

[iFrame], [MP4];

Linear PCM

**WX970** series/**VX870** series

[4K MP4];

Linear PCM

**MIC input:**

-60 dBV (Mic sensitivity -40 dB equivalent,

0 dB=1 V/Pa, 1 kHz)

(Stereo mini jack)

**USB:**

Reader function

SD card; Read only (No copyright protection support)

**WX970M**/**VX870M**/**V770M**

Built-in memory; Read only

Hi-Speed USB (USB 2.0), USB terminal Type micro AB

USB host function (for USB HDD)

Battery charging function (Charges from USB terminal when the main unit is off)

**Dimensions:**

65.0 mm (W)×73 mm (H)×139 mm (D)

(including projecting parts)

**Mass:****WX970**/**WX979**

Approx. 360 g

[without battery (supplied) and an SD card (optional)]

**WX970M**

Approx. 361 g

[without battery (supplied)]

**VX870**/**VX878**

Approx. 353 g

[without battery (supplied) and an SD card (optional)]

**WX970** series/**VX870** series/**V770** series**Wireless transmitter:**

Compliance standard; IEEE802.11b/g/n

Frequency range used;

Central frequency 2412 MHz to 2462 MHz [11ch]

Encryption method; Wi-Fi compliant WPA™/

WPA2™/WEP

Access method; Infrastructure mode

**NFC:**

Compliance standard; ISO/IEC 18092 NFC-F (Passive Mode)

**WX970** series**Sub Camera****Image sensor:**

1/4 type (1/4") 1MOS image sensor

Total; 5270 K

**Lens:**

F2.2

Focal length;

3.54 mm

35 mm equivalent (Motion picture);

37.2 mm

Minimum focus distance;

Approx. 30 cm

**VX870M**

Approx. 354 g

[without battery (supplied)]

**V770** / **V777**

Approx. 353 g

[without battery (supplied) and an SD card (optional)]

**V770M**

Approx. 354 g

[without battery (supplied)]

**V760**

Approx. 350 g

[without battery (supplied) and an SD card (optional)]

**Mass in operation:****WX970**/**WX979**

Approx. 405 g

[with battery (supplied) and an SD card (optional)]

**WX970M**

Approx. 404 g

[with battery (supplied)]

**VX870**/**VX878**

Approx. 398 g

[with battery (supplied) and an SD card (optional)]

**VX870M**

Approx. 397 g

[with battery (supplied)]

**V770** / **V777**

Approx. 398 g

[with battery (supplied) and an SD card (optional)]

**V770M**

Approx. 397 g

[with battery (supplied)]

**V760**

Approx. 395 g

[with battery (supplied) and an SD card (optional)]

**Operating temperature:**

0 °C to 40 °C

**Operating humidity:**

10%RH to 80%RH

**Battery operation time:**

See page 12

**AC adaptor**

Information for your safety

**Power source:**

AC 110 V to 240 V, 50/60 Hz

**AC input:**

0.25 A

**DC output:**

DC 5.0 V, 1.8 A

**Dimensions:****(VSK0815L)**

66.4 mm (W)×72 mm (H)×46.3 mm (D)

**(VSK0815K)**

66.4 mm (W)×78.8 mm (H)×31 mm (D)

**Mass:****(VSK0815L)**

Approx. 70 g

**(VSK0815K)**

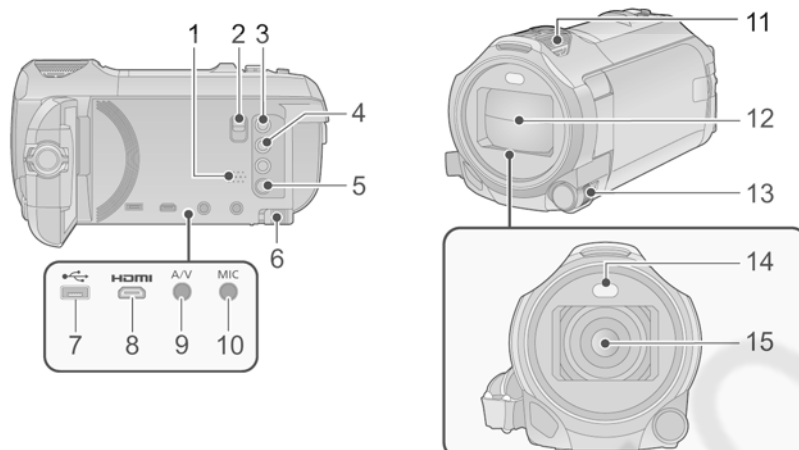
Approx. 65 g

## 5 Location of Controls and Components

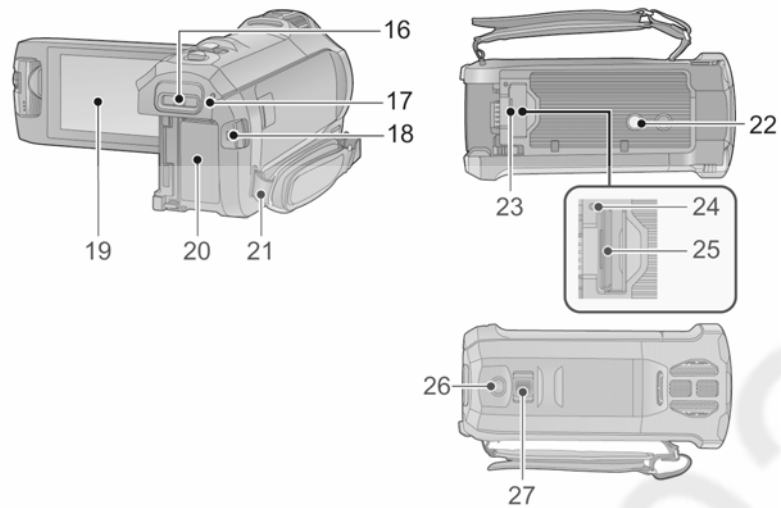
The following description is for HC-WX970 series, VX870 series, V770 series, V760 series (EB/EP).



Some descriptions may differ depending on model suffix.

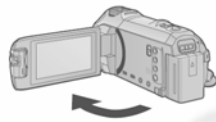
The page number in this chapter does not show the page number of this service manual.



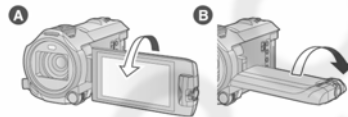
- 1 **Speaker**
- 2 **Shoe adaptor release lever**  
[SHOE ADAPTOR RELEASE] (→ 247)
- 3 **Recording/playback button** [ ] / [ ]  
(→ 18)
- 4 **Level Shot Function button** [ ]  
(→ 45)
- 5 **Power button** [ ] / [ ] (→ 17)
- 6 **Battery release lever** [BATT] (→ 11)
- 7 **USB terminal** [ ] (→ 137, 144, 219)
- 8 **Micro HDMI connector** [HDMI]  
(→ 129)
- 9 **A/V connector** [A/V] (→ 129, 146)
- 10 **Microphone terminal** [MIC]
  - A compatible plug-in powered microphone can be used as an external microphone.
  - If you connect an external microphone when a setting other than [AUTO] is selected for [MIC LEVEL] (→ 90), [2ch] (Microphone input level meter) will be displayed.
  - When the unit is connected with the AC adaptor, sometimes noise may be heard depending on the microphone type. In this case, please switch to the battery for the power supply and the noise will stop.
- 11 **Internal microphones**
- 12 **Lens cover**
  - The lens cover opens in Motion Picture Recording Mode or Still Picture Recording Mode. (→ 18)
- 13 **Multi Manual Dial** [CAMERA FUNCTION]  
(→ 65, 91)
- 14 **Video light** (→ 78, 94)
- 15 **WX970 series/VX870 series Lens (LEICA DICOMAR)**
  - For information on how to attach the supplied lens hood, refer to page 23.



- 16 Shoe adaptor mounting part [SHOE ADAPTOR] (→ 247)
- 17 **VX970** series/**VX870** series/**V770** series  
Status indicator (→ 17, 182)  
**V760**  
Status indicator (→ 17)
- 18 Recording start/stop button (→ 25)
- 19 LCD monitor (Touch screen) (→ 19)
- 22 Tripod receptacle  
• Attaching a tripod with a screw length of 5.5 mm or more may damage the unit.
- 23 SD card cover (→ 16)
- 24 Access lamp [ACCESS] (→ 16)
- 25 Card slot (→ 16)
- 26 Photoshot button [  ] (→ 27)
- 27 Zoom lever [W/T] (In Motion Picture Recording Mode or Still Picture Recording Mode) (→ 44)/  
Thumbnail display switch [  /Q ]/  
Volume lever [-VOL+] (In Playback Mode) (→ 31)

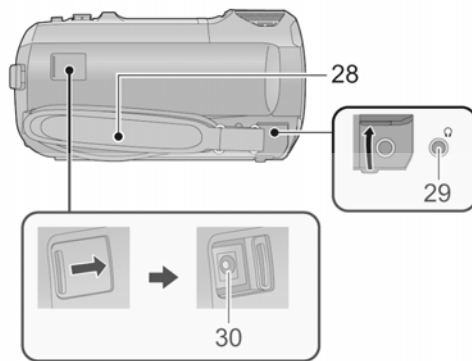


- It can open up to 90°.



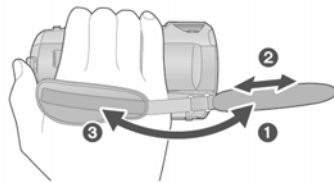
- It can rotate up to 180° **A** towards the lens or 90° **B** towards the opposite direction.

- 20 Battery holder (→ 11)
- 21 Shoulder strap fixture



**28 Grip belt**

Adjust the length of the grip belt so that it fits your hand.



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

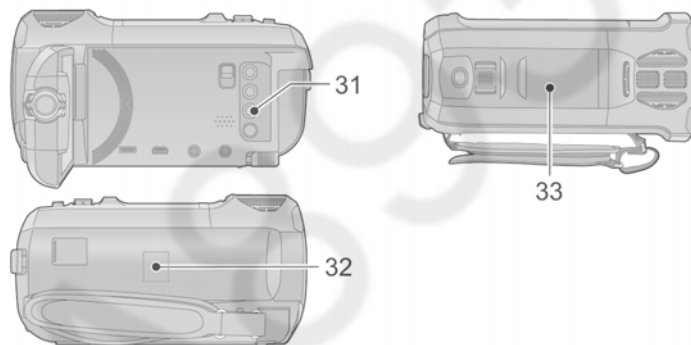
**29 Headphone terminal [🎧] (→ 79)**

- Excessive sound pressure from earphones and headphones can cause hearing loss.
- Listening at full volume for long periods may damage the user's ears.

**30 DC input terminal [DC IN] (→ 12)**

- Do not use any other AC adaptors except the supplied one.

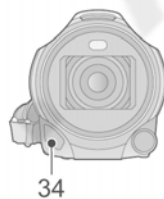
**WX970 series/VX870 series/V770 series**



- 31 Wi-Fi button [Wi-Fi]**  
(→ 152, 159, 162, 169, 171, 175, 190, 193)
- 32 Wi-Fi Transmitter (→ 151)**

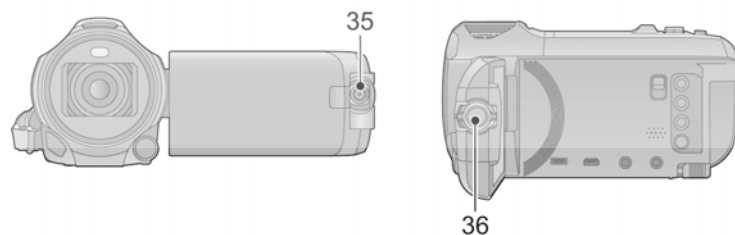
- 33 NFC touch area [📶] (→ 154, 163, 202)**

**WX970 series/VX870 series**



- 34 Infrared light (→ 78)**

**WX970 series**



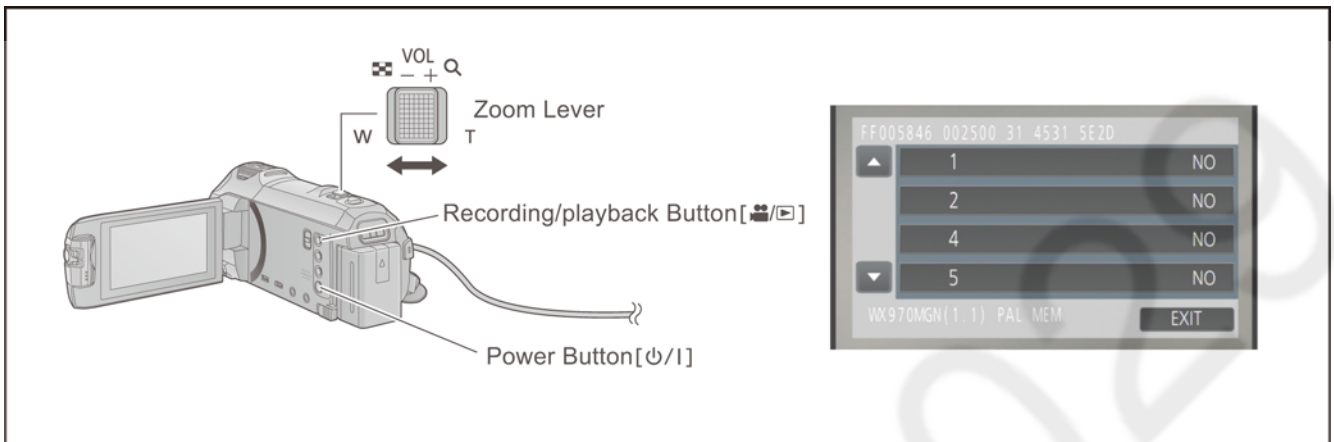
- 35 Sub Camera (→ 46)**

- 36 Sub Camera dial (→ 47)**

## 6 Service Mode

### Indication method of the service menu

1. Keep pressing the “Power” button, “Zoom Lever” to W side and “Recording/Playback” button for more than 3 seconds until the top screen of the Service Mode Menu being displayed.



### Service mode menu

Screen display	Contents	Function
1	Factory settings	Function to throw a product up in a factory shipment state.
2	Model/Destination settings	Change the Model/Destination. (Selectable models and destinations are displayed.)
4	Lock search history indication	Display the main and sub <sup>(*)</sup> camera system error cord for each 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.
14	Adjutment function for the service	The service adjutment do setup and adjustment of the following items required in the field service.
15	Restore the backed up adjustment data	Restore the adjustment data to new or repaired Main P.C.B. from SD card that the data backed up from original Main P.C.B. before repairs or replacement.
16	Touch panel calibration	Calibrate the touch positions of the touch panel.
17	NFC initialization (except HC-V760)	Performs the Initialization of the NFC chip and erase the settings like as Wi-Fi connection etc..

(\*) HC-WX970/WX979/WX970M only

#### NOTE:

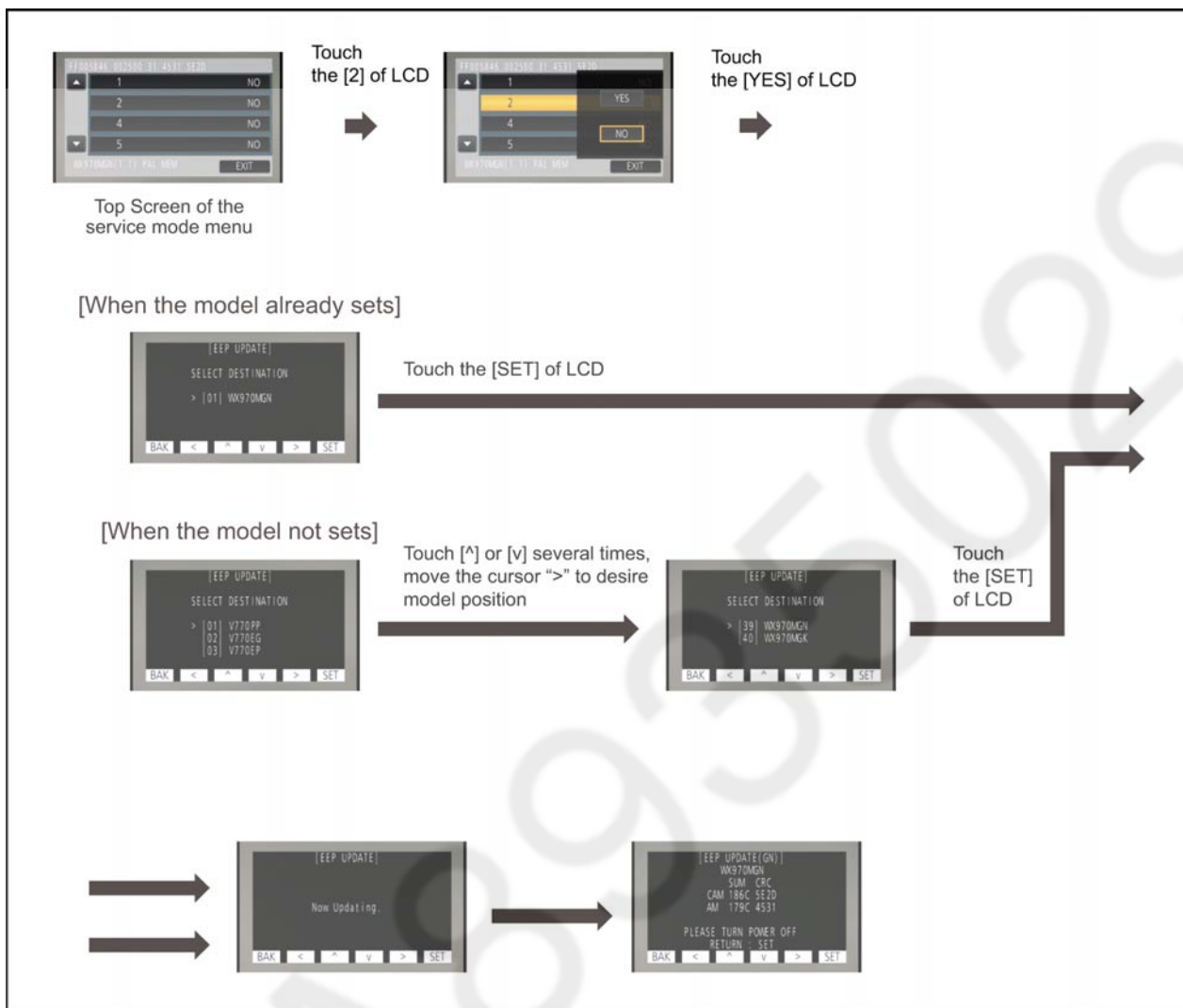
Do not using service mode except above table of Service mode menu.

2. End method of the top screen of the service mode menu  
Touch the [ EXIT ] of LCD to end the service mode, and then POWER OFF.

## 6.1. Model/Destination Settings

Touch the [ 2 ] of LCD, select model/destination settings.

### Operation specifications



### Function description

- Change the Model/Destination

Display the lists of model/destination which the unit can be changed, if a shipment setup is finished. Therefore in some cases, the model/destination that is currently set is only displayed.

### End method of operation

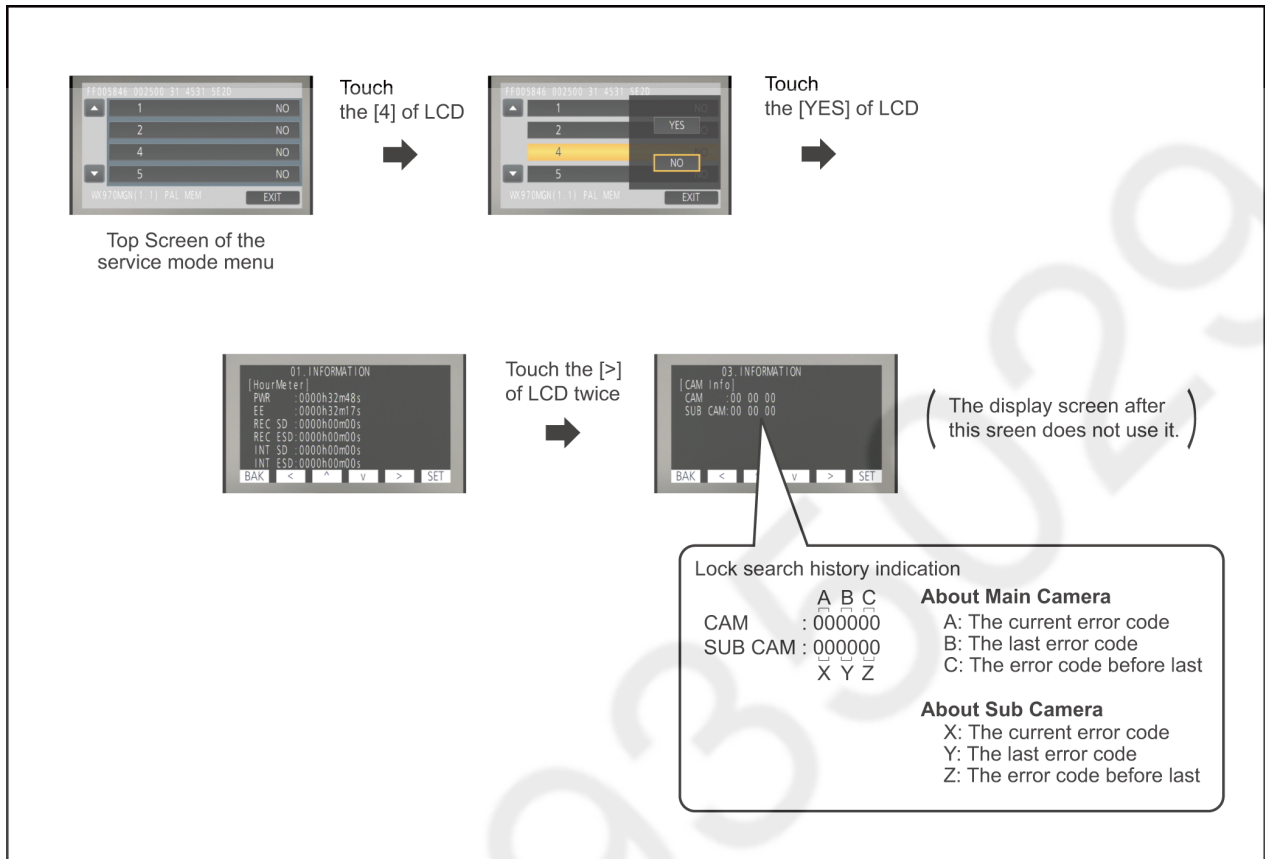
- Touch the [ SET ] of LCD to exit the mode/destination settings, and then POWER OFF.



## 6.2. Lock Search and Error History Indication

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

### Operation specifications



### Indication contents

#### 1. Main Camera

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

Error code	Description	Problematic Parts
51	Focus control is abnormal	LENS UNIT
52	Zoom control is abnormal	2ND STEPPING MOTOR / LENS UNIT
53	OIS lens control is abnormal	LENS UNIT
54	Zoom control is abnormal (2)	3RD STEPPING MOTOR / LENS UNIT
55	Zoom control is abnormal (3)	4TH STEPPING MOTOR / LENS UNIT
71	Lens barrier open/close is abnormal	BARRIER MOTOR UNIT / LENS FRAME UNIT

#### 2. Sub Camera (HC-WX970/WX979/WX970M only)

- Lock search history indication of sub camera  
Display the sub camera system error code for three histories saved in EEPROM.  
(Display always "--" for no sub camera models.)
- The error code contents which are displayed

Error code	Description	Problematic Parts
91	Sub camera error	SUB CAMERA UNIT

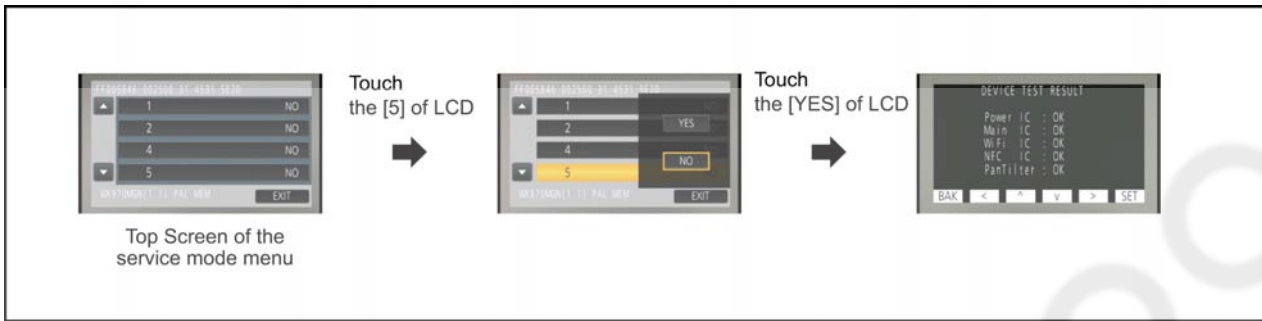
### End method of operation

- Touch the [ BAK ] of LCD to exit the lock search and error history indication, and then POWER OFF.

### 6.3. 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 communication test result.

- Power IC : Communication test between IC3401 and IC1503.
- Main IC : DDR. Communication test inside IC3401.
- WiFi IC : Communication test between IC3401 and Wi-Fi P.C.B..
- NFC IC : Communication test between IC3401 and NFC P.C.B. unit.

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

- PanTilter : Error display of the Remote Pan Tilt Cradle (VW-CTR1)  
(When not connected the remote pan tilt cradle, display “--”.)  
When error is occurred, display “NG” with the error code.

Error Code	Description
NG 01	Battery undercut
NG 04	The start-up state of the update error factor
NG 10	The failure of Tilt motor
NG 80	USB Communication Error

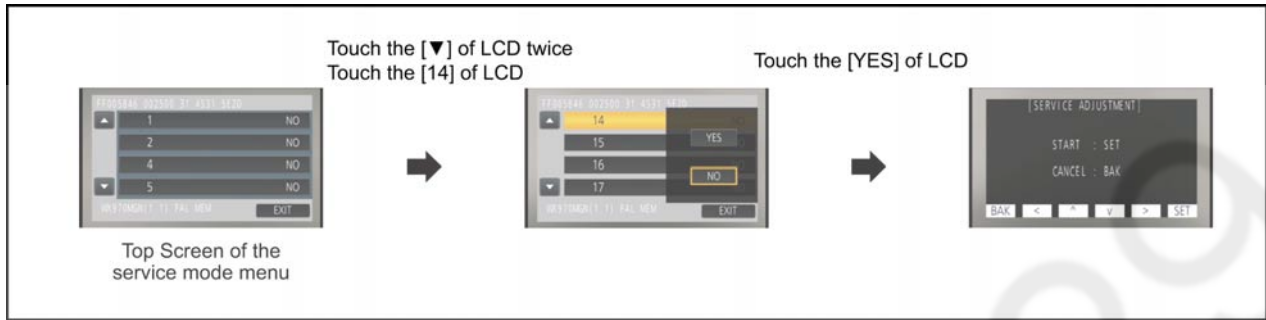
#### End method of operation

- Touch the [ BAK ] of LCD to exit the power on self check result display, and the POWER OFF.

## 6.4. Adjustment function for the Service

Touch the [14] of LCD, select the adjustment function for the service.

**Operation Specifications (until before the start of the adjustment)**



### Function description

The service adjustment do setup and adjustment of the following items required in the field service.

For a detailed content, such as the adjustment procedure, refer to “9 Measurements and Adjustments”.

- Model setting
- Setting of the file name for adjustment data backup to SD card.
- Execution of adjustment data backup to SD card
- Checking of Switches
- Camera adjustment
- Zoom Tracking adjustments
- Indoor White Balance Adjustment
- Outdoor White Balance Adjustment
- Level shot adjustment

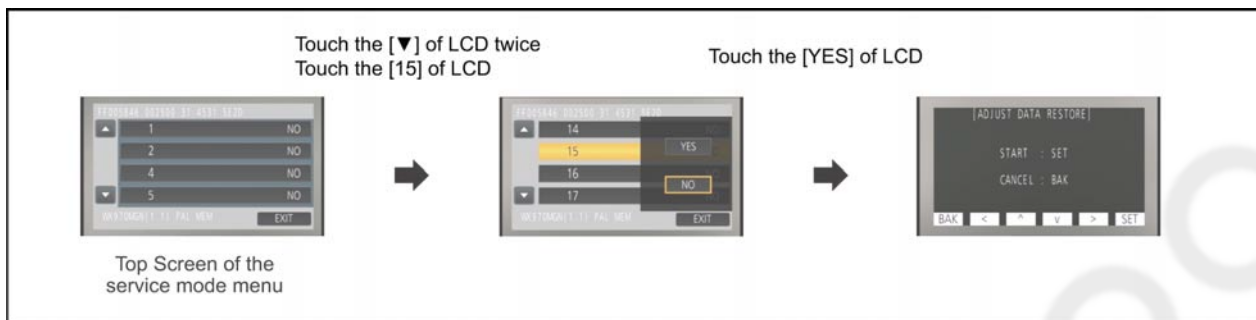
### End method of operation

- Press the power button to turn the unit off.

## 6.5. Restore the backed up adjustment data

Touch the [15] of LCD, select restoring the backed up adjustment data from SD card to the unit.

### Operation Specifications

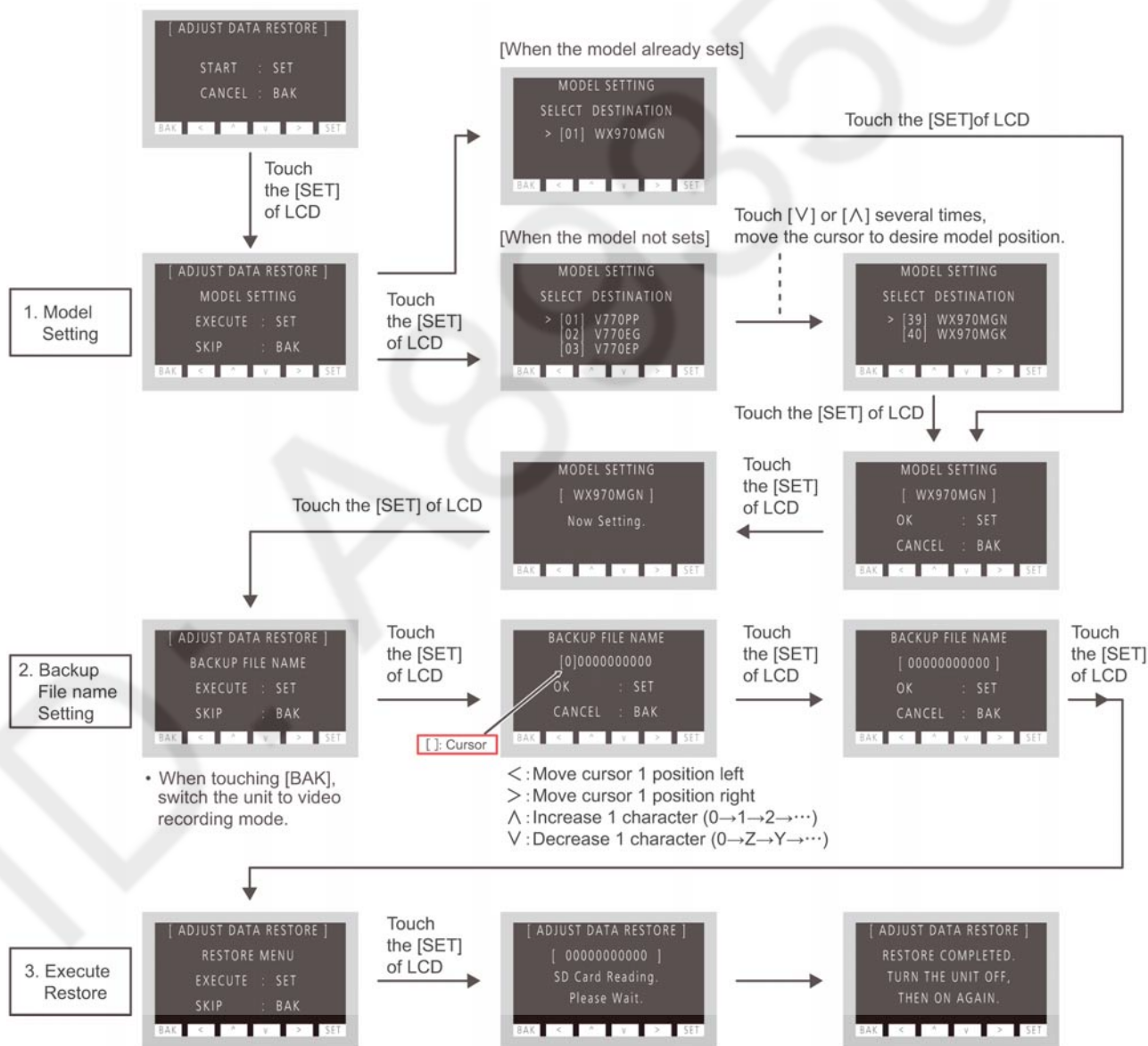


### Function description

Restore the adjustment data to new or repaired Main P.C.B. from SD card that the data backed up from original Main P.C.B. before repairs or replacement.

To backup the adjustment data, use “6.4. Adjustment function for the Service”.

### Restoring procedure



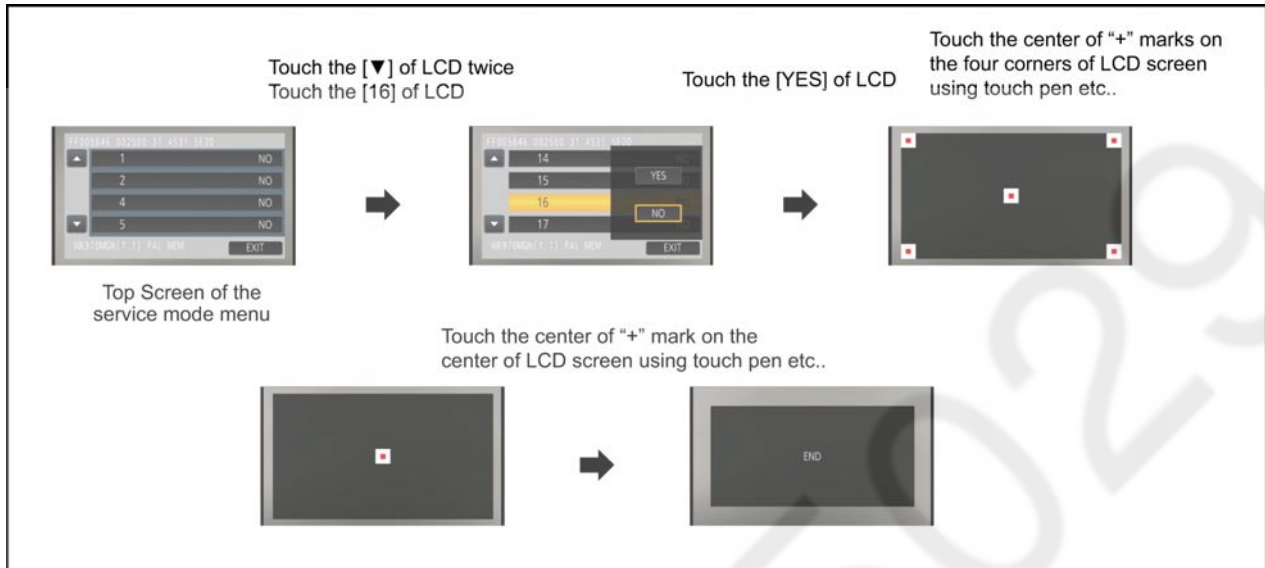
### End method of operation

- Press the power button to turn the unit off.

## 6.6. Touch Panel Calibration

Touch the [16] of LCD, select the calibration of touch panel.

### Operation Specifications



### Function description

Calibrate the touch positions of the touch panel.

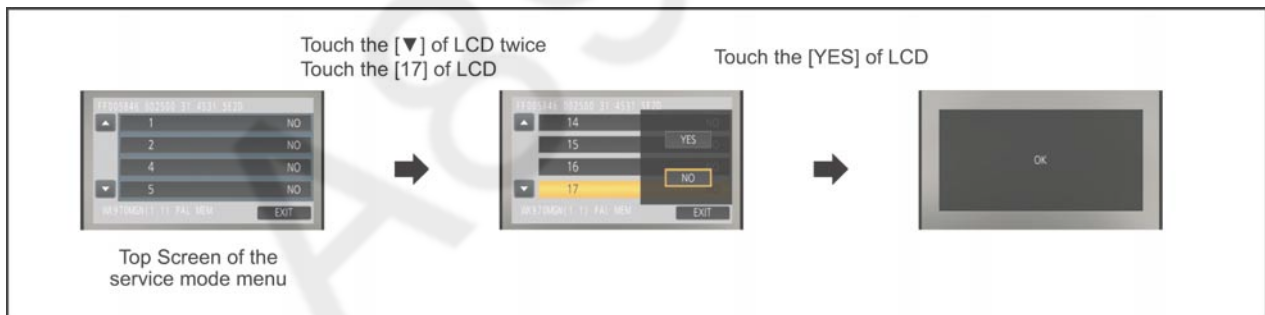
### End method of operation

- Press the power button to turn the unit off.

## 6.7. NFC Initialization (except HC-V760)

Touch the [17] of LCD, select initialization of NFC (Near Field Communication) function.

### Operation Specifications



### Function description

This function performs the Initialization of the NFC chip and erase the settings like as Wi-Fi connection etc..

### End method of operation

- Remove the battery or AC adapter to turn the unit off.

## 7 Service Fixture & Tools

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

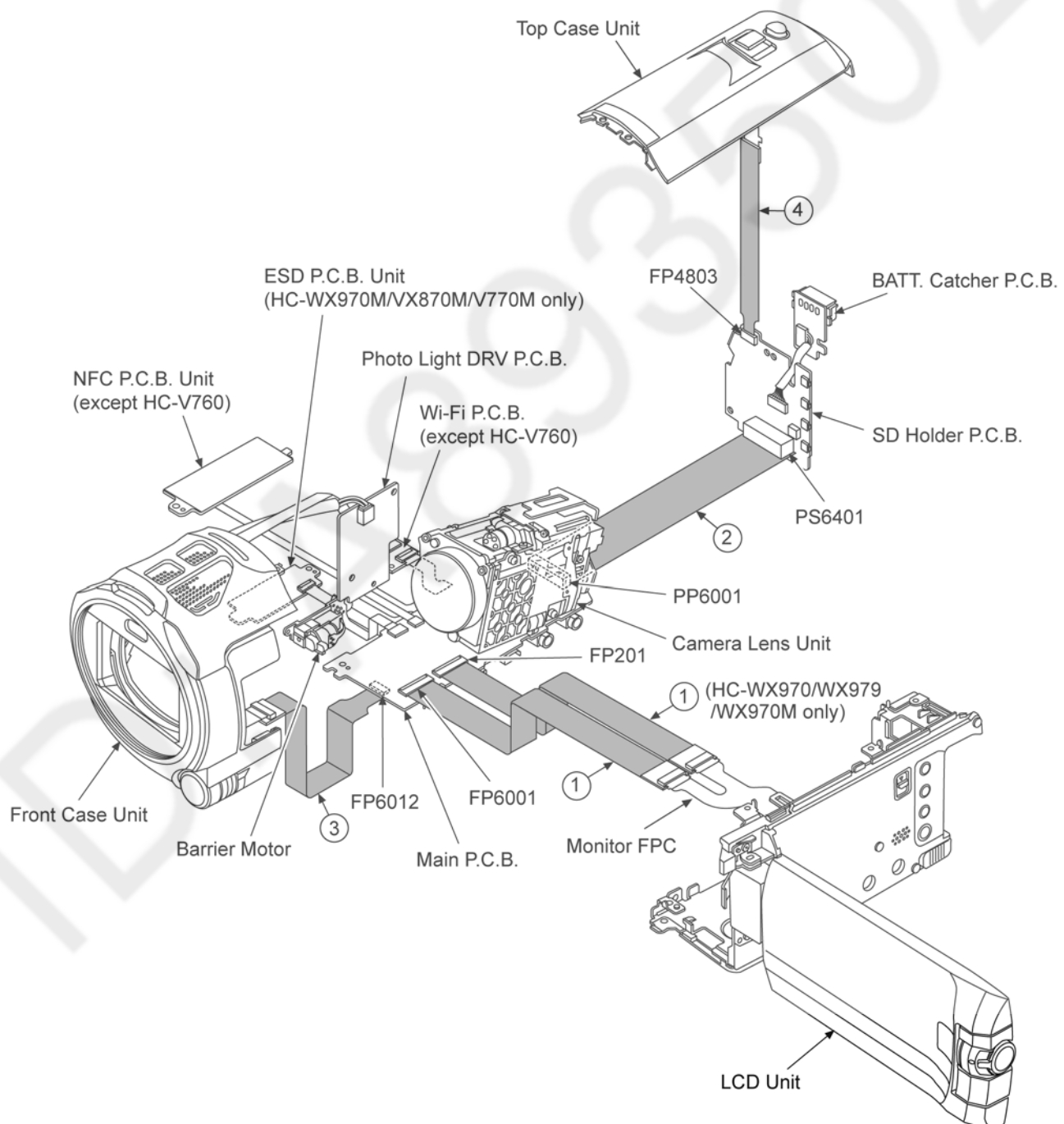
After replacing the MAIN P.C.B., be sure to achieve adjustment.

### 7.2. 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	RFKZ0354	FP6001(MAIN) - MONITOR FPC	37PIN 0.3 FFC
1	RFKZ0354	FP201(MAIN) - MONITOR FPC (HC-WX970/WX979/WX970M only)	37PIN 0.3 FFC
2	VFK1581A6025	PP6001(MAIN) - PS6401(SD HOLDER)	60PIN 0.5 B to B
3	VFK1388	FP6012(MAIN) - FRONT FFC	12PIN 0.5 FFC
4	VFK1440	FP4803(SD HOLDER) - TOP CASE UNIT	10PIN 0.5 FFC

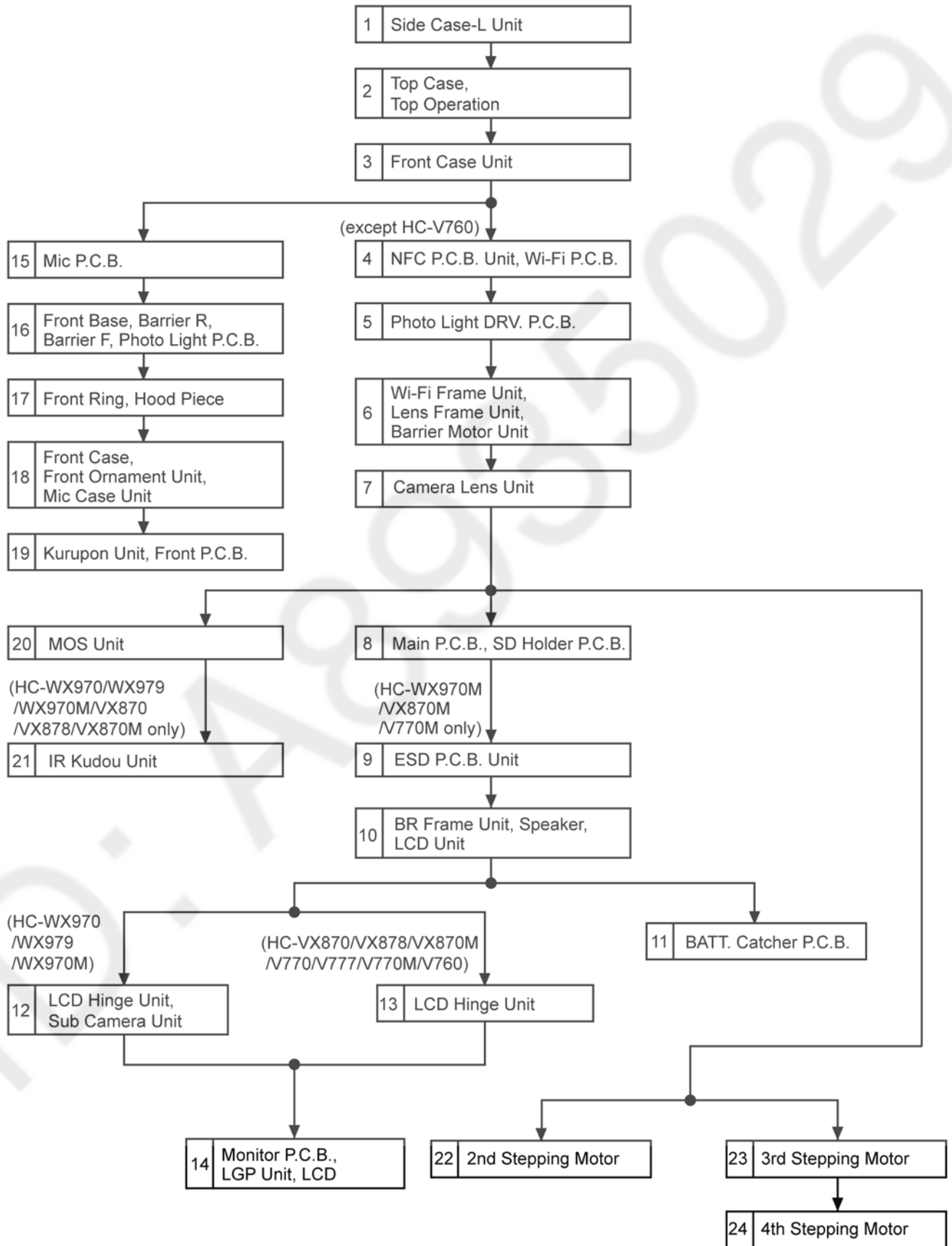
#### 7.2.1. Extention Cable Connection



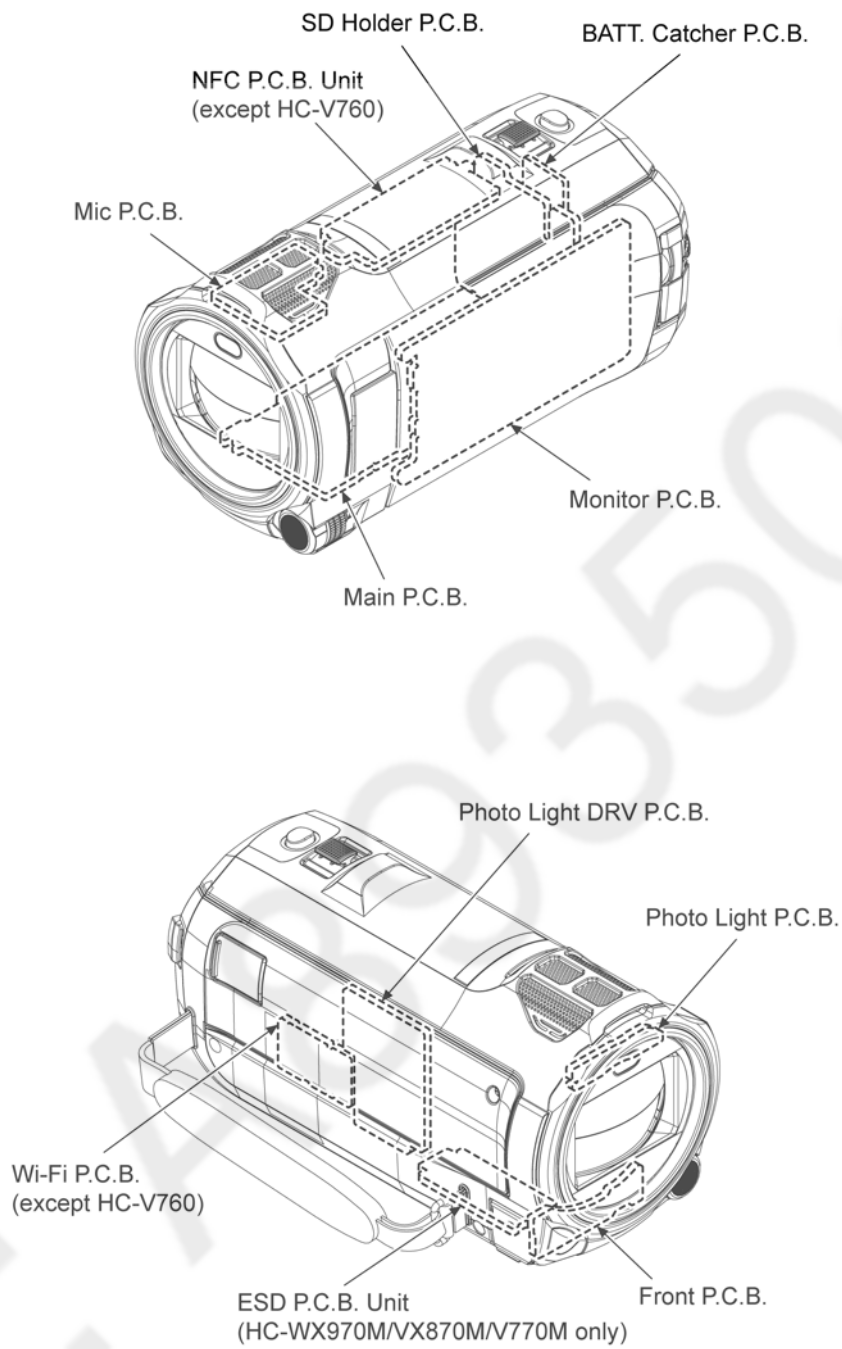
# 8 Disassembly and Assembly Instructions

## 8.1. Disassembly Flow Chart for the Unit

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



## 8.2. PCB Location





### 8.3. Disassembly Procedure for the Unit

No.	Item	Fig.	Removal
1	Side Case-L Unit	(Fig. D1)	Screw (A) x 2
			Screw (B) x 2
		(Fig. D2)	Screw (C) x 3
			Locking tab x3
			Side Case-L Unit
		(Fig. D3)	Screw (D) x 1
			Locking tab x1
			SS Button
			Jack Cover Piece
			SS Lever
			Jack Door Spring
			DC Jack Cover Unit
			Screw (E) x 2
			HP Jack Cover Piece
			HP Jack Cover
			Locking tab x2 (HC-WX970/WX979 /WX970M/VX870 /VX878/VX870M only)
			IR Piece (HC-WX970/WX979 /WX970M/VX870 /VX878/VX870M only)
		(Fig. D4)	Screw (F) x 1
			Screw (G) x 1
		(Fig. D5)	Screw (H) x 1
Locking tab x1			
Projecting part x 2 FP4803 (Flex)			
(Fig. D6)	Screw (I) x 4		
	Convex x 2		
	Top Shoe Angle		
	Screw (J) x 3		
	Top Operation		
	Power Panel Light		
	Shoe Cover		
	Cover Open Spring		
	Locking tab x1		
	Top Ornament		
(Fig. D7)	(When Installing)		
(Fig. D8)	Screw (K) x 1		
	Screw (L) x 2		
(Fig. D9)	Flex A		
	Lead wire A		
	Screw (M) x 1		
	Locking tab x1		
	Convex x 1		
	FP6012 (Flex)		
(Fig. D10)	FP6007 (Flex)		
	Screw (N) x 1		
(Fig. D11)	Hooking part x 1		
	NFC P.C.B. Unit		
	Flex B		
	Screw (N) x 1		
	Hooking part x 1		
	Wi-Fi P.C.B.		
5	Photo Light DRV P.C.B.	(Fig. D11)	Screw (O) x 2
			Flex C
			Photo Light DRV P.C.B.

No.	Item	Fig.	Removal
6	Wi-Fi Frame Unit, Lens Frame Unit, Barrier Motor Unit,	(Fig. D12)	Screw (P) x 2
			Convex x 3
			Hooking part x 2
		(Fig. D13)	Wi-Fi Frame Unit
			Screw (Q) x 1
		(Fig. D14)	Hooking part x 3 FP6005 (Flex)
7	Camera Lens Unit	(Fig. D15)	Screw (R) x 2
			Barrier Motor Unit
			Lens Frame Unit
			FP6001 (Flex)
8	Main P.C.B., SD Holder P.C.B.	(Fig. D16)	FP301 (Flex)
			Convex x 2
			Camera Lens Unit
9	(HC-WX970M/VX870M /V770M only) ESD P.C.B. Unit	(Fig. D17)	Screw (S) x 5
			Hooking part x 3
			Heat Radiation Plate Unit
		(Fig. D18)	P6003 (Connector)
			P6401 (Connector)
			FP201 (Flex) (HC-WX970/WX979 /WX970M only)
			FP6001 (Flex)
		(Fig. D19)	Hooking part x 1
			FP6011 (Flex) (HC-WX970M/VX870M /V770M only)
			Main P.C.B.
10	BR Frame Unit, Speaker, LCD Unit	(Fig. D20)	SD Holder P.C.B.
			Screw (T) x 1
			ESD P.C.B. Unit
			Screw (V) x 2
		(Fig. D21)	Screw (W) x 2
			Screw (X) x 2
			Locking tab x2
			Convex x 4
			BR Frame Unit
			Shoe Lock Knob
			Shoe Lock Spring
(Fig. D22)	Speaker		
	LCD Lever		
	Convex x 3		
11	Batt. Catcher P.C.B.	(Fig. D23)	Convex x 2
			LCD Unit
12	(HC-WX970/WX979 /WX970M) LCD Hinge Unit, Sub Camera Unit	(Fig. D24)	SD Door Unit
			SR OP Button
			Hooking part x 2
		(Fig. D25)	BATT. Frame
			Batt. Catcher P.C.B.
			Screw (Y) x 2
(Fig. D26)	Screw (Z) x 2		
	Locking tab x8		
	LCD Case (T) Unit		
	FP251 (Flex)		
	FP901 (Flex)		
	LCD Hinge Unit		
	Screw (a) x 1		
	FP252 (Flex)		
	Convex x 3		
	LCD Frame A		
Convex x 1			
Sub Camera Unit			

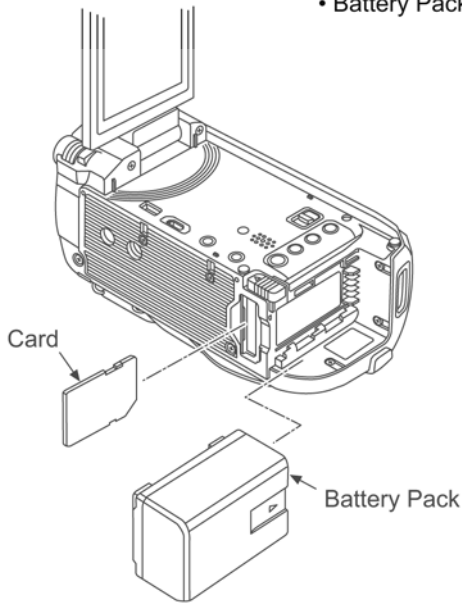
No.	Item	Fig.	Removal
13	(HC-VX870/VX878 /VX870M/V770 /V777/V770M/V760) LCD Hinge Unit	(Fig. D27)	Screw (Y) × 2
			Screw (Z) × 2
			Locking tab × 9
			LCD Case (T) Unit
			FP901(Flex)
		(Fig. D28)	LCD Hinge Unit
			Screw (a) × 1
			Convex × 3
			LCD Frame A
14	Monitor P.C.B., LGP Unit, LCD	(Fig. D29)	FP904(Flex)
			FP905(Flex)
			Locking tab × 1
			Hooking part × 1
			Monitor P.C.B.
			Locking tab × 4
			LGP Unit
			LCD
			TP tape
			LCD Frame B
			LCD Case (B) Unit
			(Fig. D30)
		Light Guide Plate	
		Diffusion Sheet	
		Prism Sheet B	
		Prism Sheet A	
		LGP Holder	
		15	Mic P.C.B.
FP4802 (Flex)			
Mic P.C.B.			
16	Front Base, Barrier R, Barrier F, Photo Light P.C.B.	(Fig. D32)	Projecting part × 3
			Lens Damper Rubber
			Screw (c) × 5
		(Fig. D33)	Front Base
			Barrier R
			Barrier F
			Hooking part × 1
			Convex × 2
			Photo Light P.C.B.
17	Front Ring, Hood Piece	(Fig. D34)	Screw (d) × 2
			Front Ring
			Convex × 2
			Locking tab × 6
			Hood Piece
			LED Light Cover
			Hood Mask
			LED Light Lens
18	Front Case, Front Ornament Unit, Mic Case Unit	(Fig. D35)	Screw (e) × 1
			Screw (f) × 1
			Convex × 1
			Locking tab × 1
			Convex × 2
			Locking tab × 1
			Front Case
			Locking tab × 2
			MF Ornament
			Front Ornament Unit
			(Fig. D36)
		Mic Earth Plate	
		Mic Case Unit	
			Mic Net Cover

No.	Item	Fig.	Removal
19	Kurupon Unit, Front P.C.B.	(Fig. D37)	Screw (h) × 2
			Locking tab × 2
			Convex × 2
			FR Earth Angle
			FP6501 (Flex)
			Kurupon Unit
			Locking tab × 1
20	MOS Unit	(Fig. D38)	Convex × 2
			MOS Unit
			MOS Cushion
21	(HC-WX970/WX979 /WX970M/VX870 /VX878/VX870M only) IR Kudou Unit	(Fig. D39)	Solder × 2 points
			Screw (j) × 1
			Convex × 2
22	2nd Stepping Motor	(Fig. D40)	IR Kudou Unit
			Solder × 4 points
			Screw (k) × 2
23	3rd Stepping Motor	(Fig. D41)	2nd Stepping Motor
			Solder × 4 points
			Screw (m) × 3
			Convex × 1
24	4th Stepping Motor	(Fig. D42)	3rd Stepping Motor
			Solder × 4 points
			Screw (n) × 2
			Convex × 2
	4th Stepping Motor		

**NOTE:**

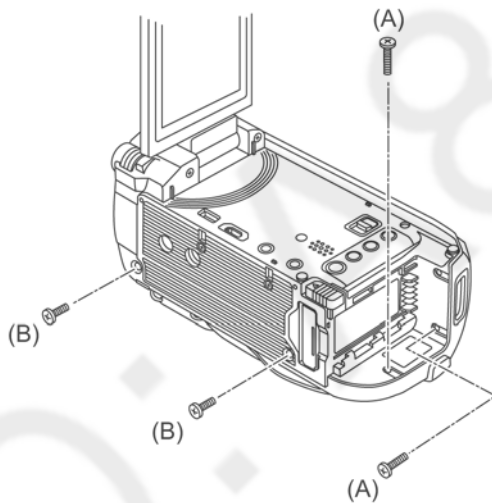
When servicing and reassembling, remove the Card and battery pack from the unit.

- Card
- Battery Pack



### 8.3.1. Removal of the Side Case-L Unit

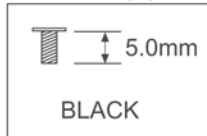
- Screw (A) × 2
- Screw (B) × 2



Screw (A)



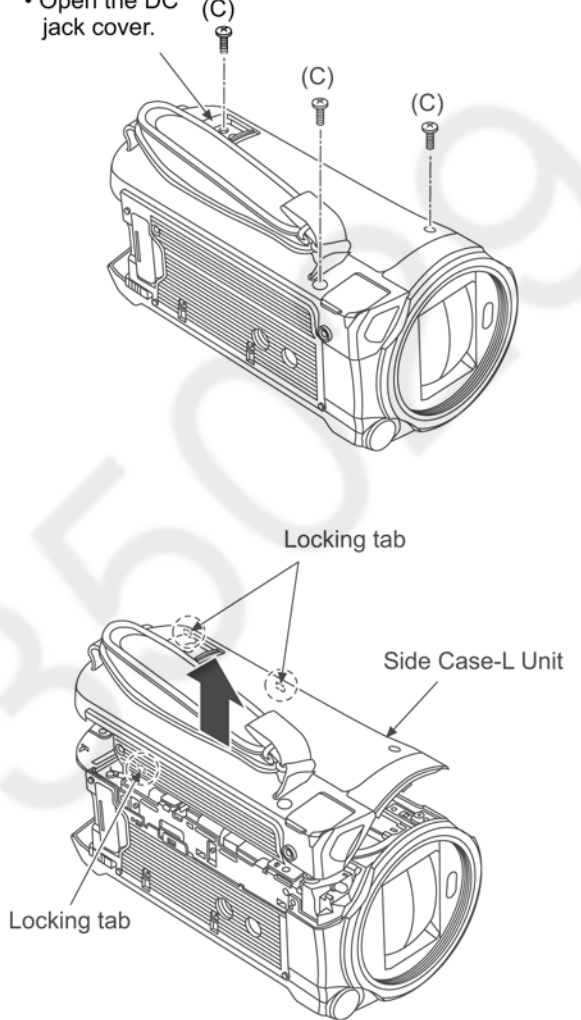
Screw (B)



(Fig. D1)

- Screw (C) × 3
- Locking tab × 3

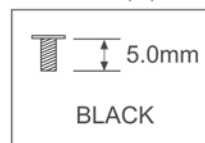
• Open the DC jack cover.



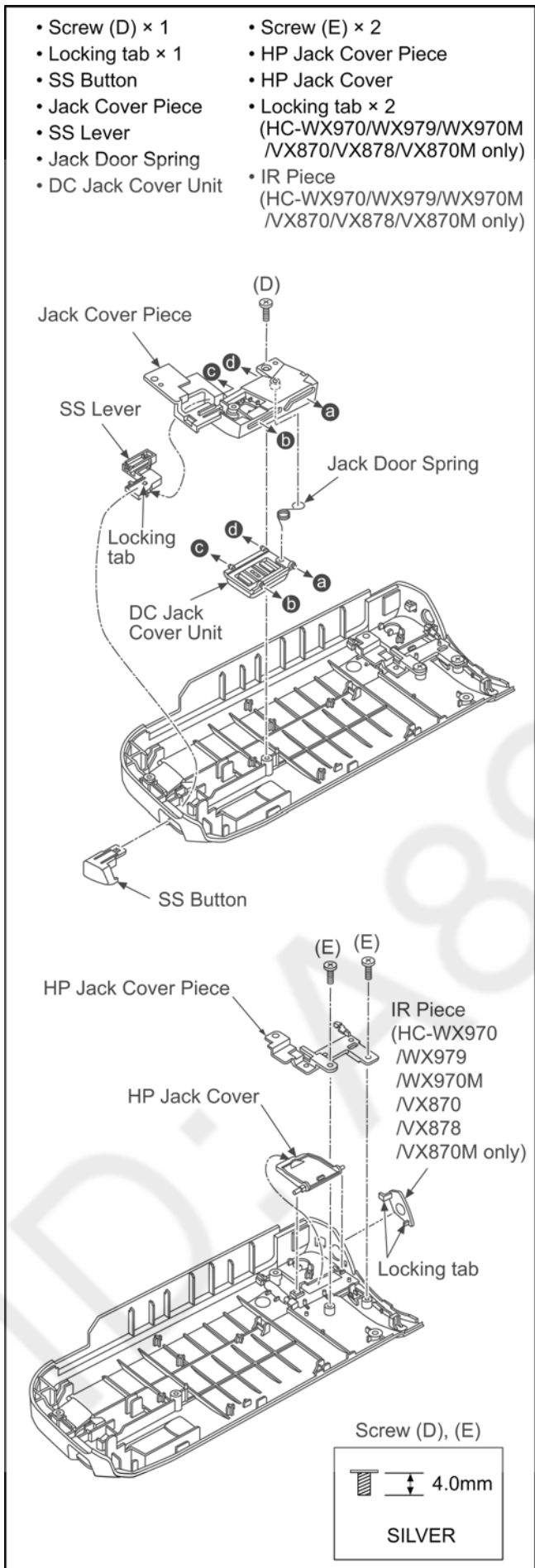
**NOTE: (When Installing)**

- When installing the side case-L unit, be careful not to strike the flex and not to cut the flex by sandwiching.

Screw (C)

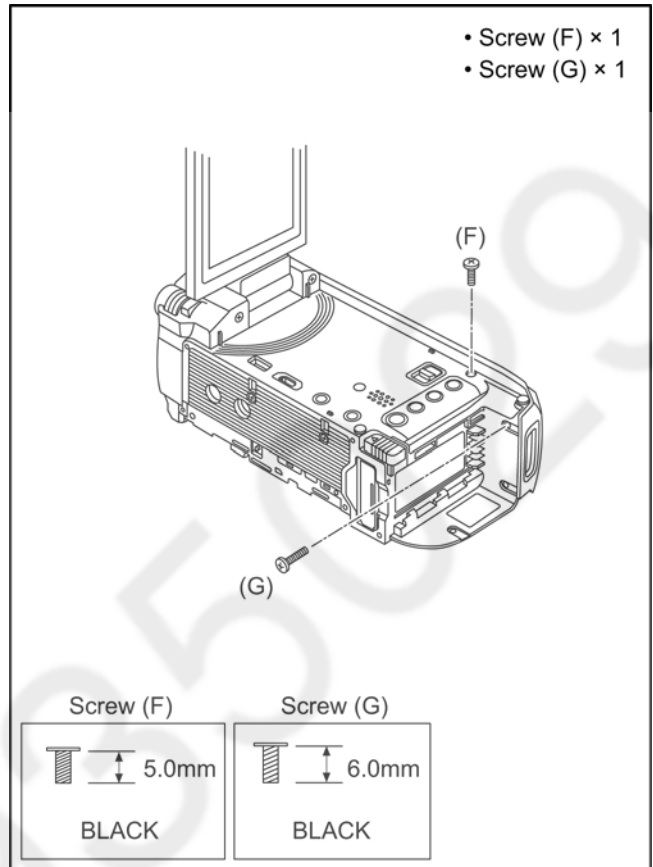


(Fig. D2)

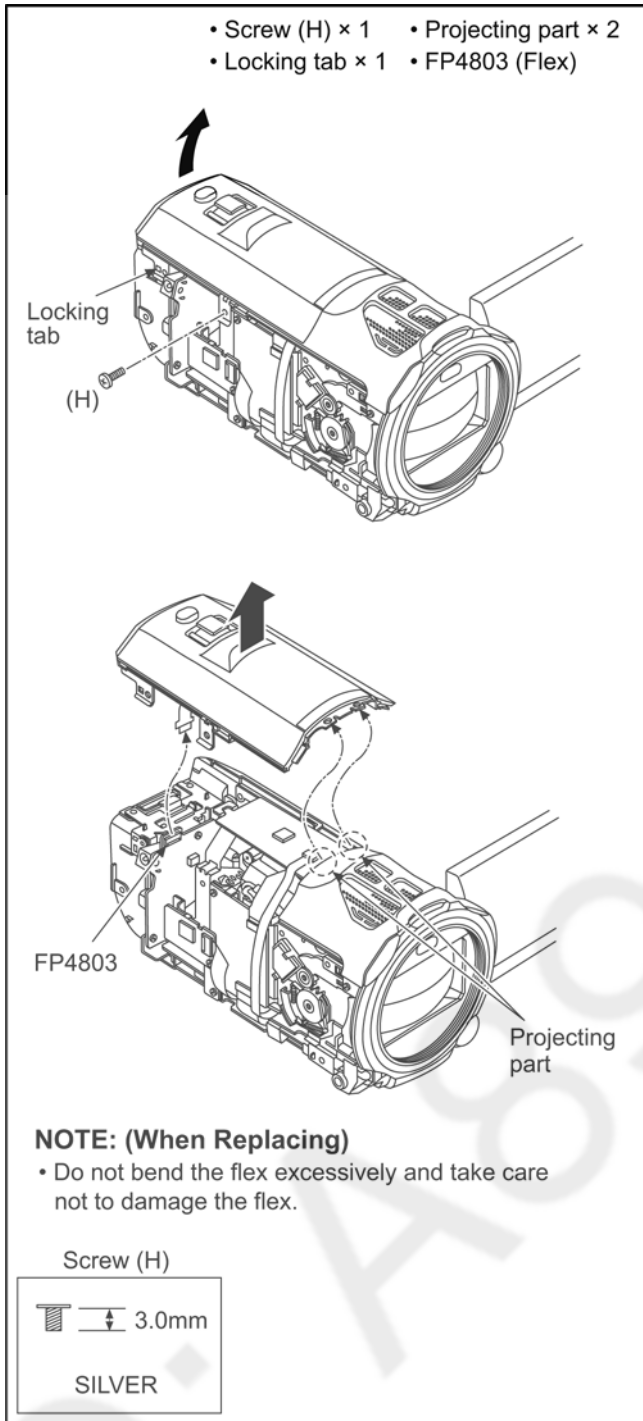


(Fig. D3)

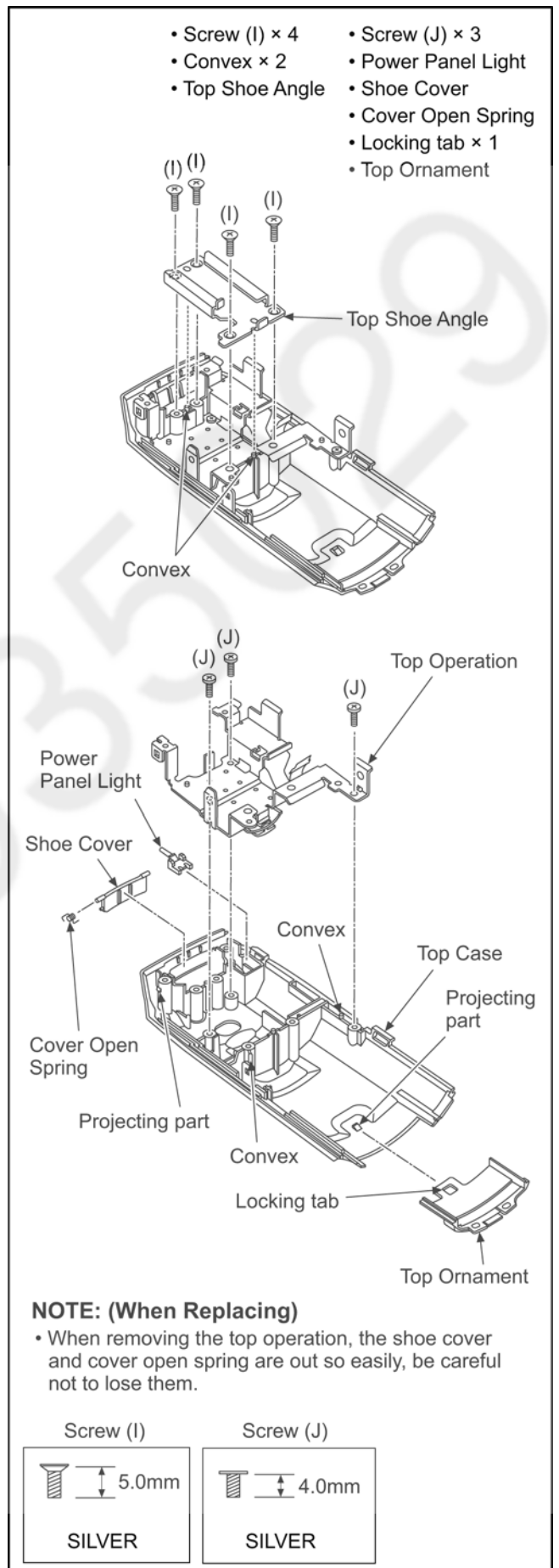
### 8.3.2. Removal of the Top Case, Top Operation



(Fig. D4)



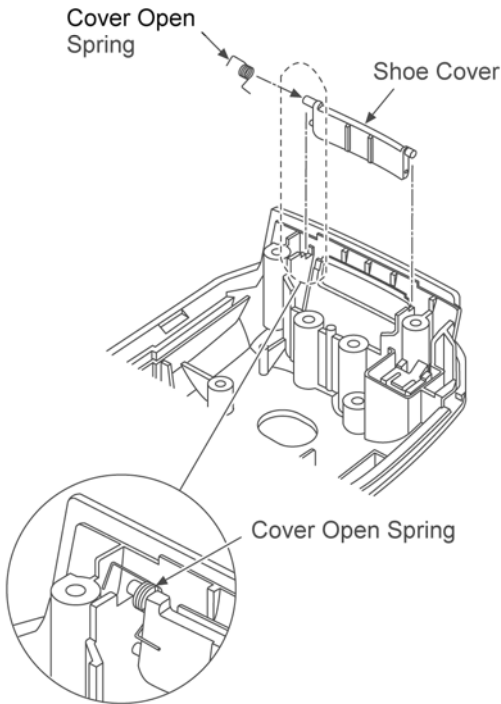
(Fig. D5)



(Fig. D6)

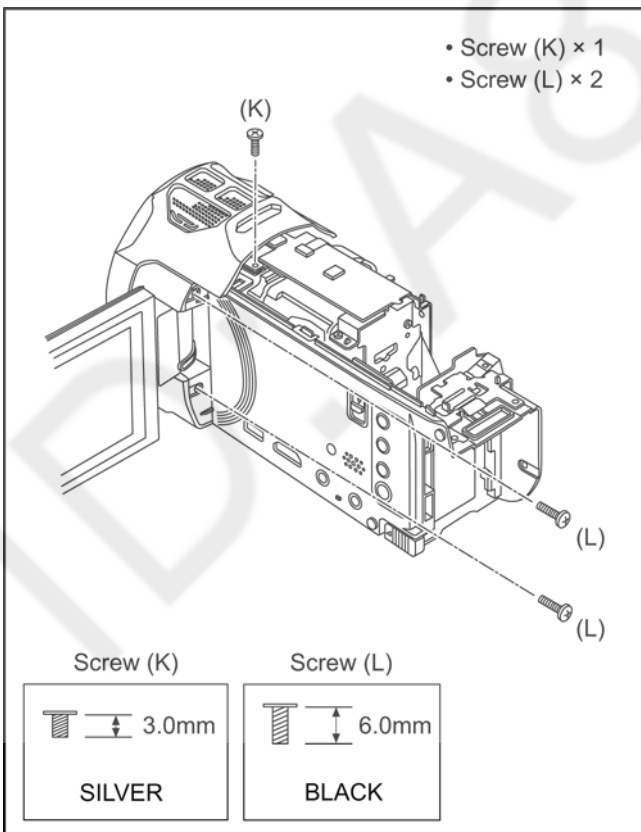
**NOTE: (When Installing)**

- When installing the cover open spring, attach the spring to the position shown in the figure below.



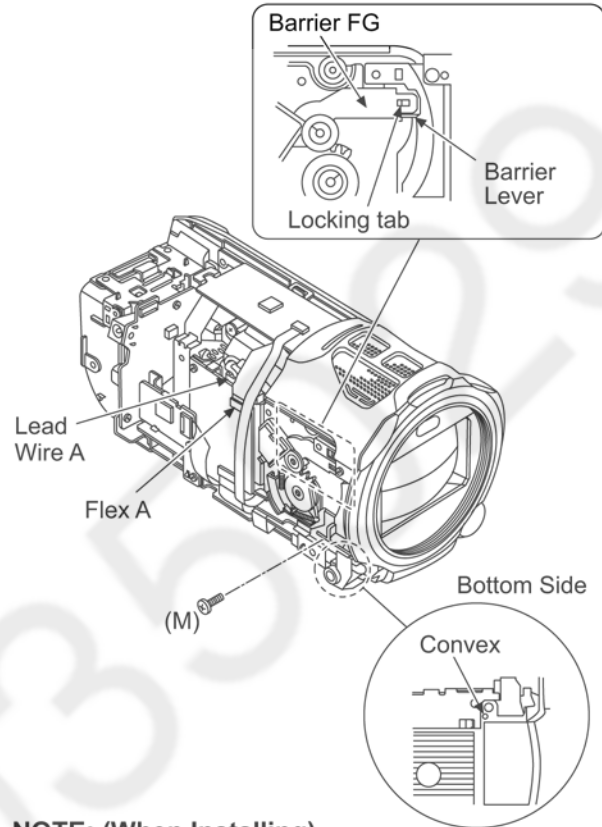
(Fig. D7)

**8.3.3. Removal of the Front Case Unit**



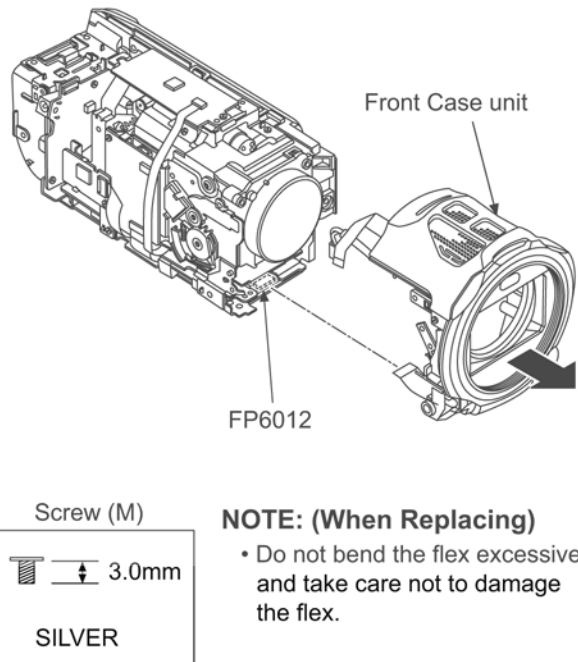
(Fig. D8)

- Flex A
- Lead wire A
- Screw (M) × 1
- Locking tab × 1
- Convex × 1
- FP6012 (Flex)



**NOTE: (When Installing)**

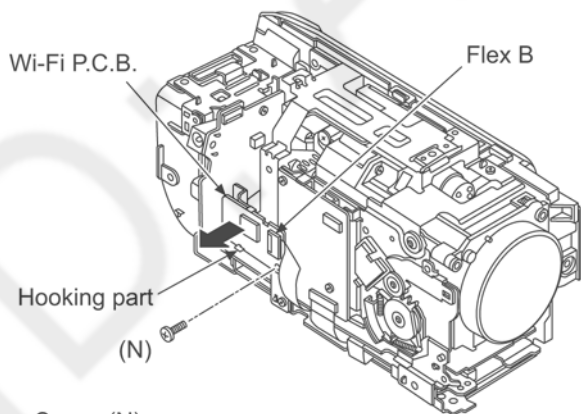
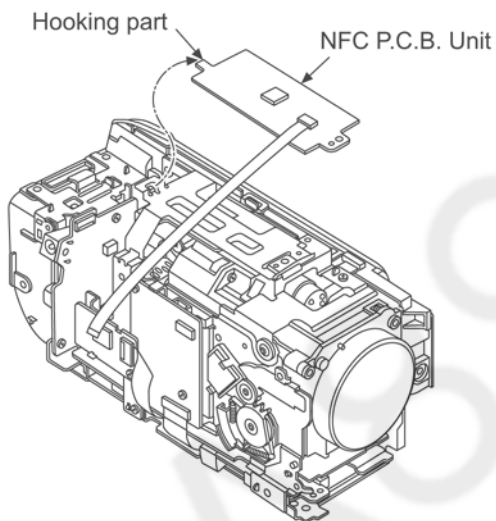
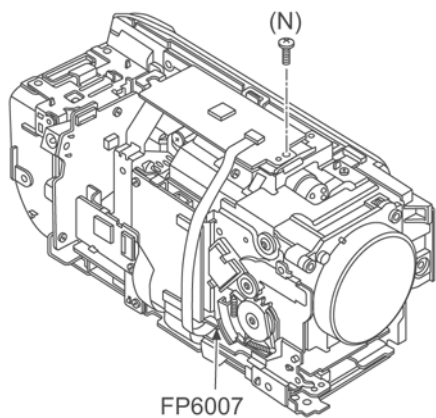
- Attach the barrier lever to barrier FG securely.  
(The locking tab of the barrier lever is not lacking.)
- Take care not to touch the spring when attaching.
- Do not damage the barrier FG and barrier lever.
- Take care not to put fingerprints on the surface of the Lens.



(Fig. D9)

### 8.3.4. (except HC-V760) Removal of the NFC P.C.B. Unit, Wi-Fi P.C.B.

- FP6007 (Flex)
- Hooking part × 1
- Screw (N) × 1
- Screw (N) × 1
- Flex B
- Hooking part × 1

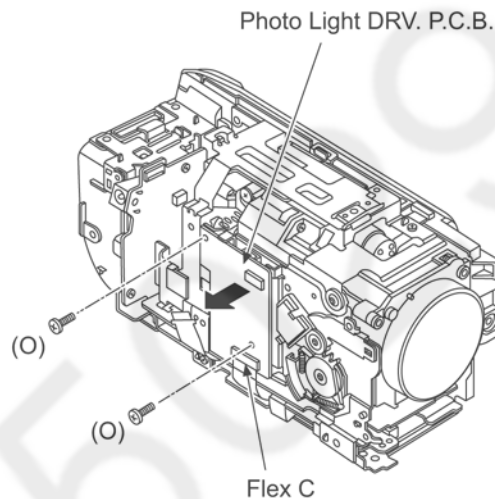


**NOTE: (When Replacing)**  
 • Do not bend the flex excessively and take care not to damage the flex.

(Fig. D10)

### 8.3.5. Removal of the Photo Light DRV P.C.B.

- Screw (O) × 2
- Flex C



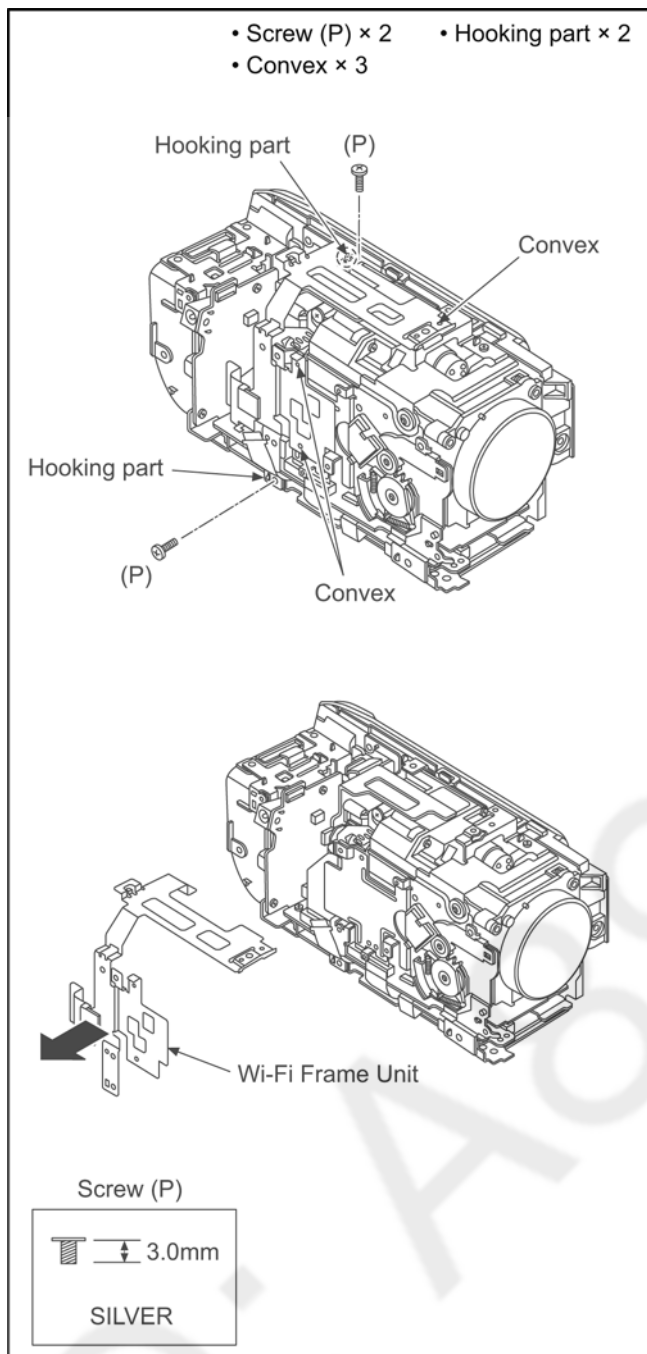
**NOTE: (When Replacing)**

- Do not bend the flex excessively and take care not to damage the flex.

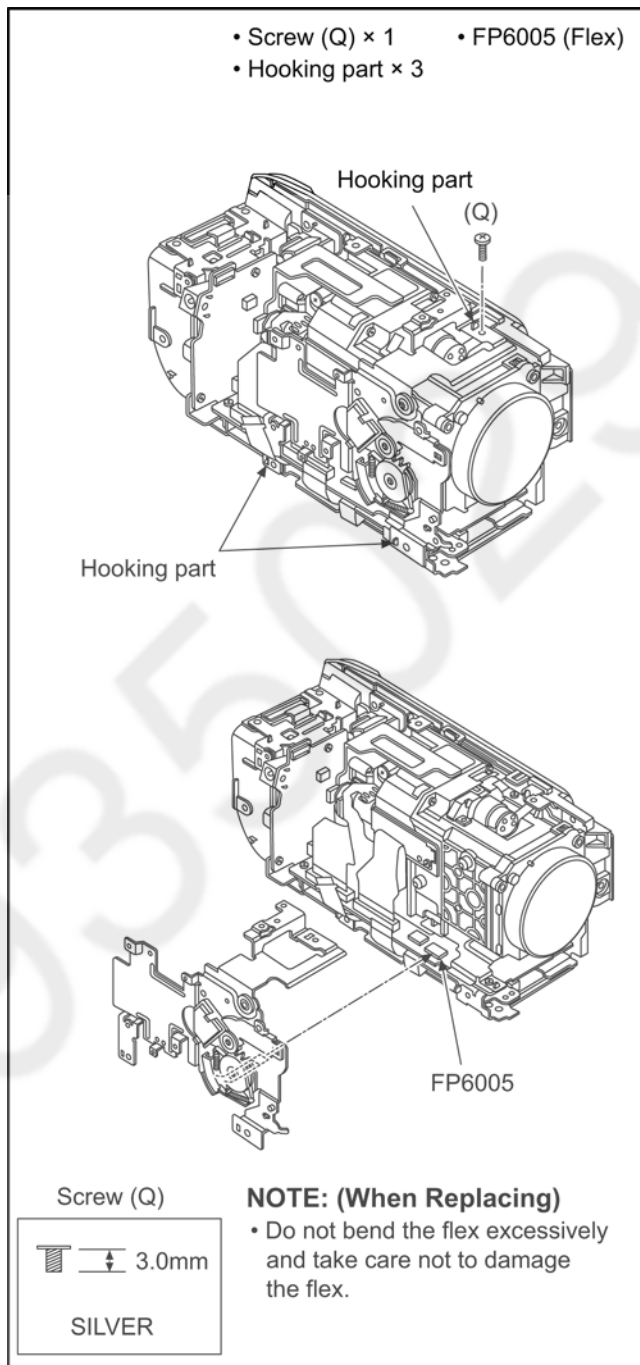


(Fig. D11)

### 8.3.6. Removal of the Wi-Fi Frame Unit, Lens Frame Unit, Barrier Motor Unit



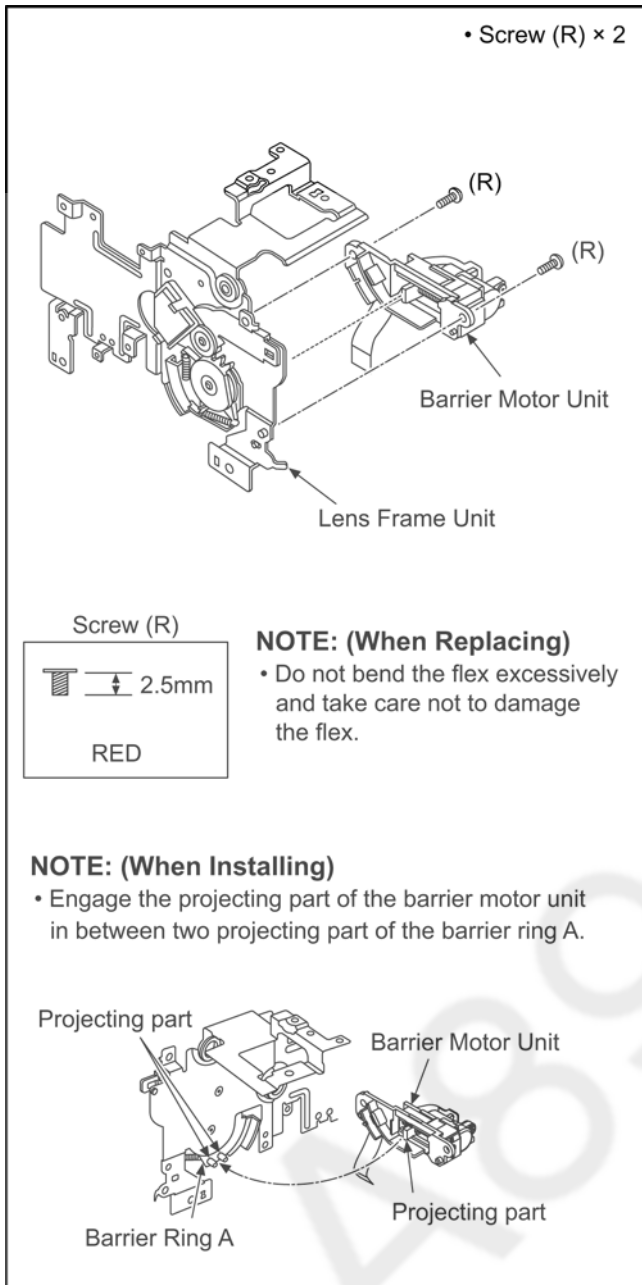
(Fig. D12)



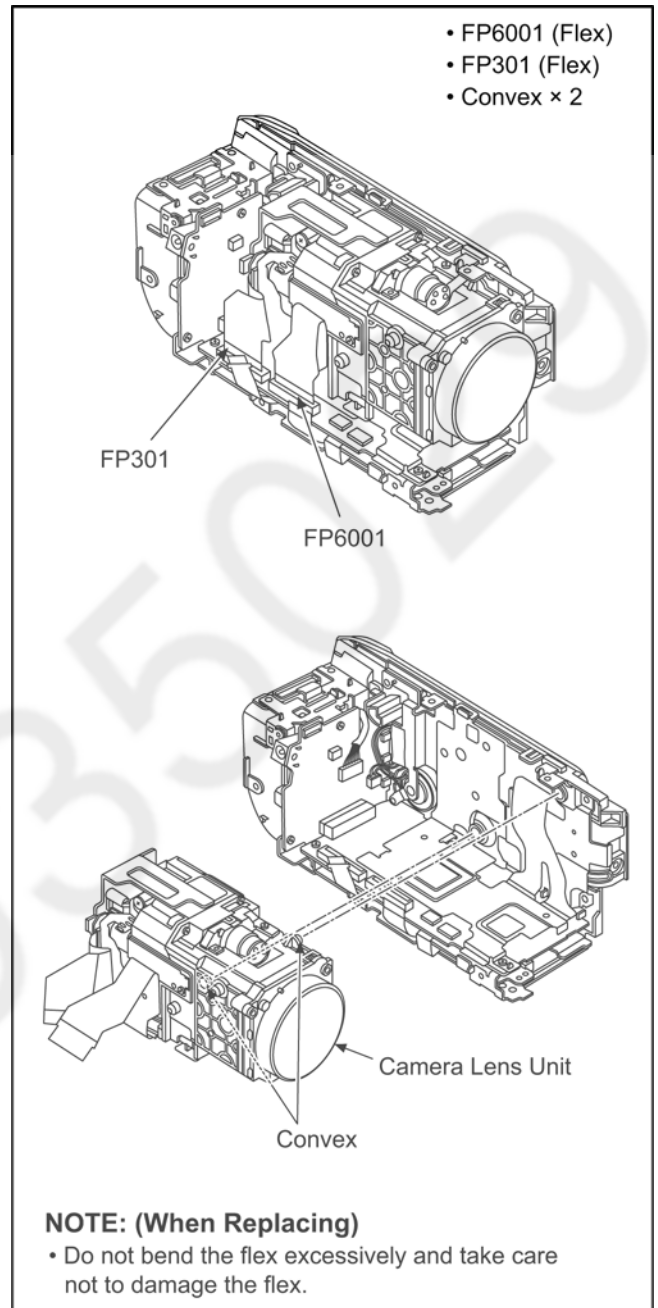
(Fig. D13)



### 8.3.7. Removal of the Camera Lens Unit

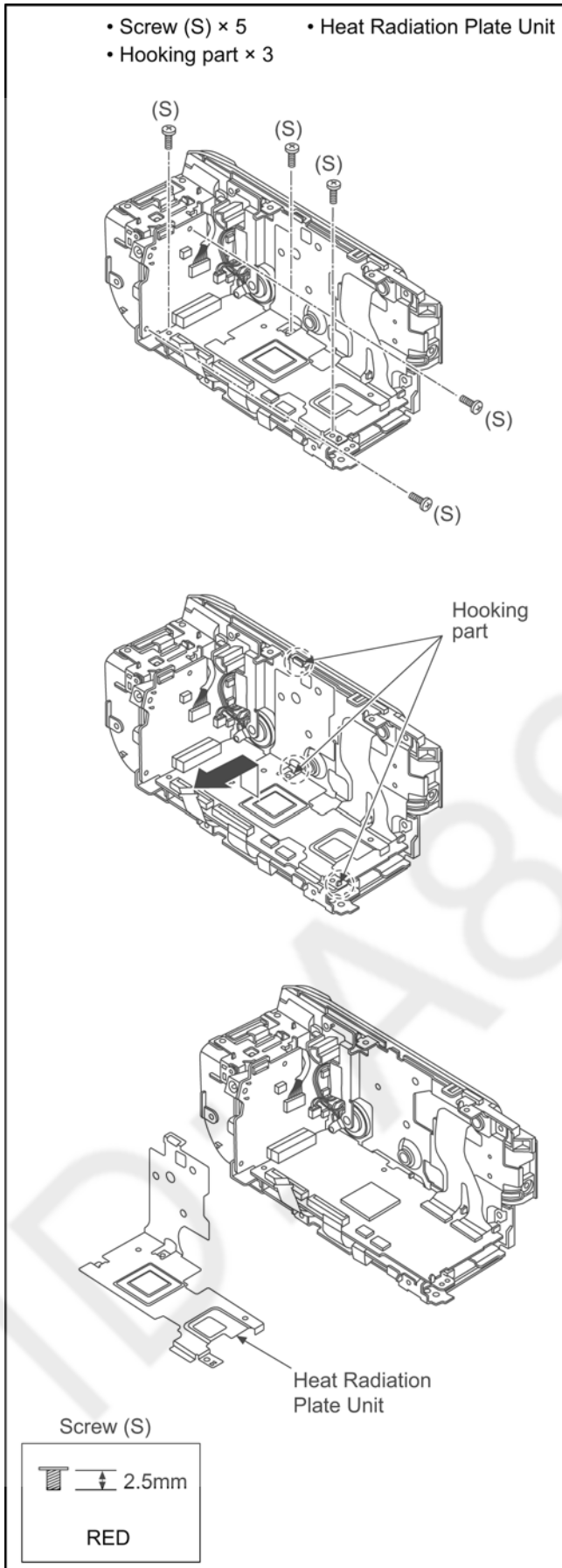


(Fig. D14)

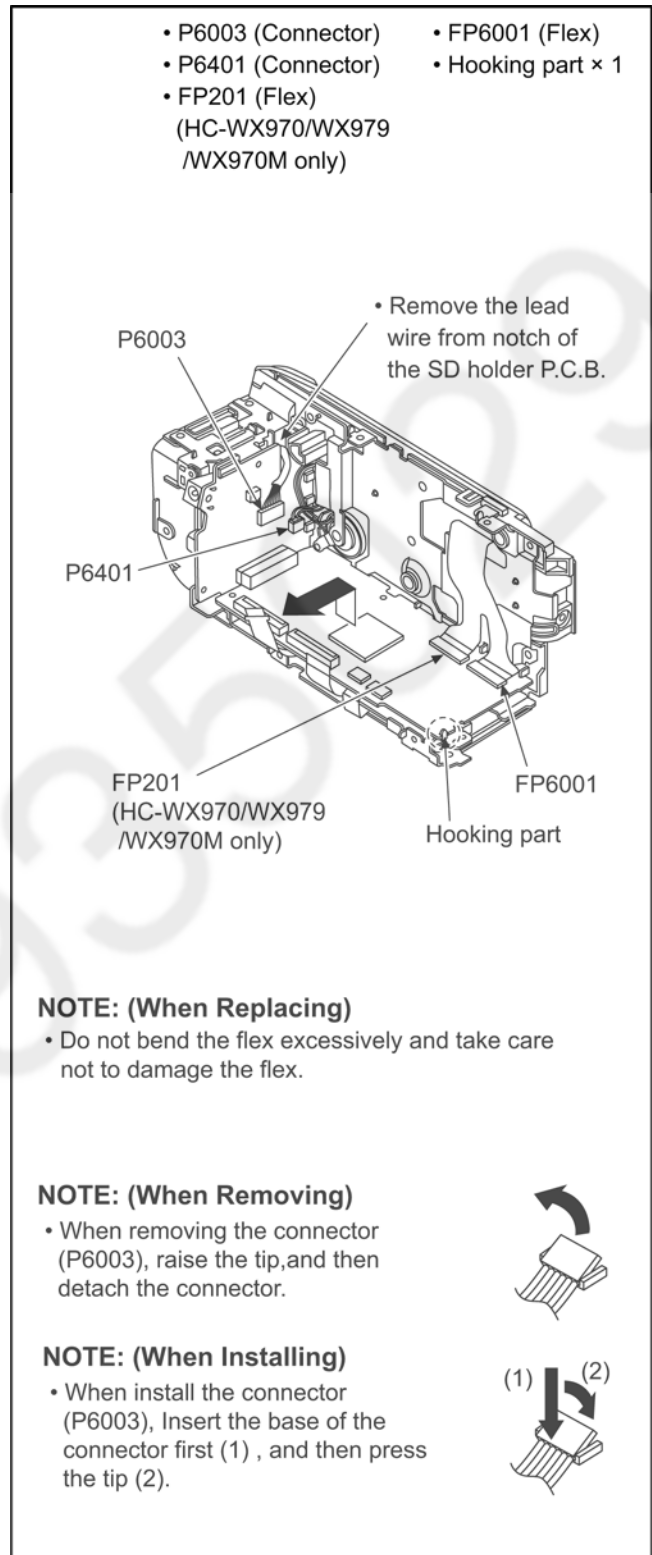


(Fig. D15)

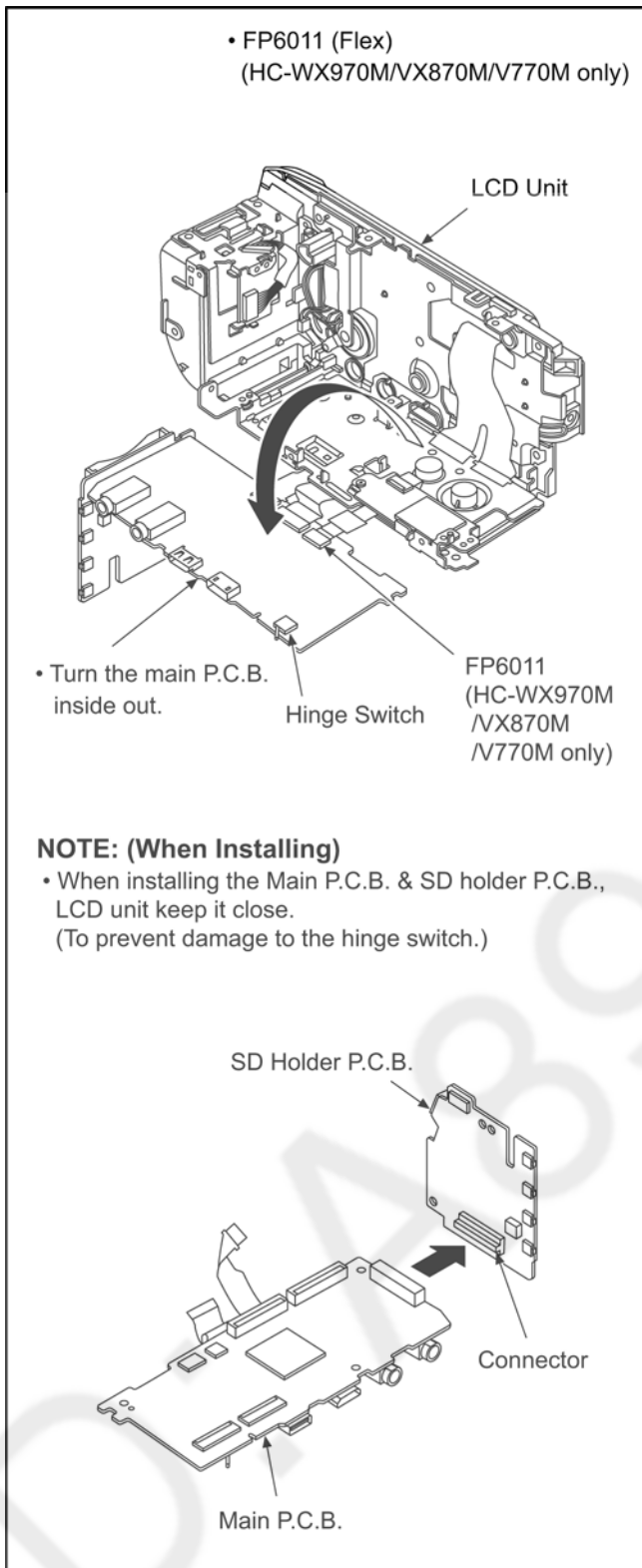
### 8.3.8. Removal of the Main P.C.B., SD Holder P.C.B.



(Fig. D16)

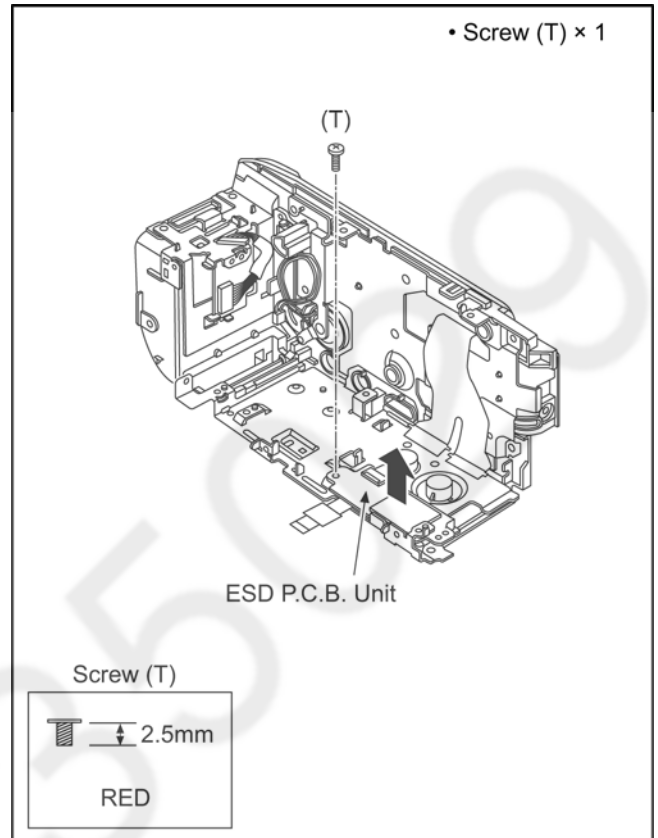


(Fig. D17)



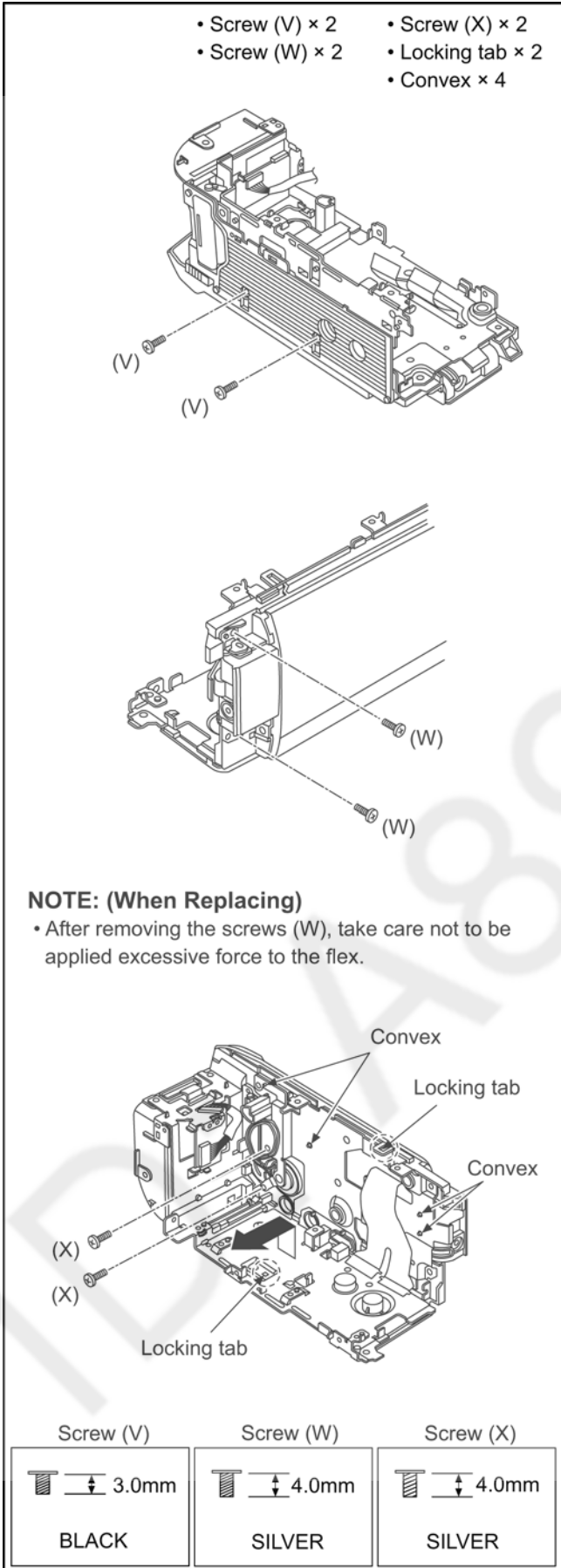
(Fig. D18)

### 8.3.9. (HC-WX970M/VX870M/V770M only) Removal of the ESD P.C.B. Unit

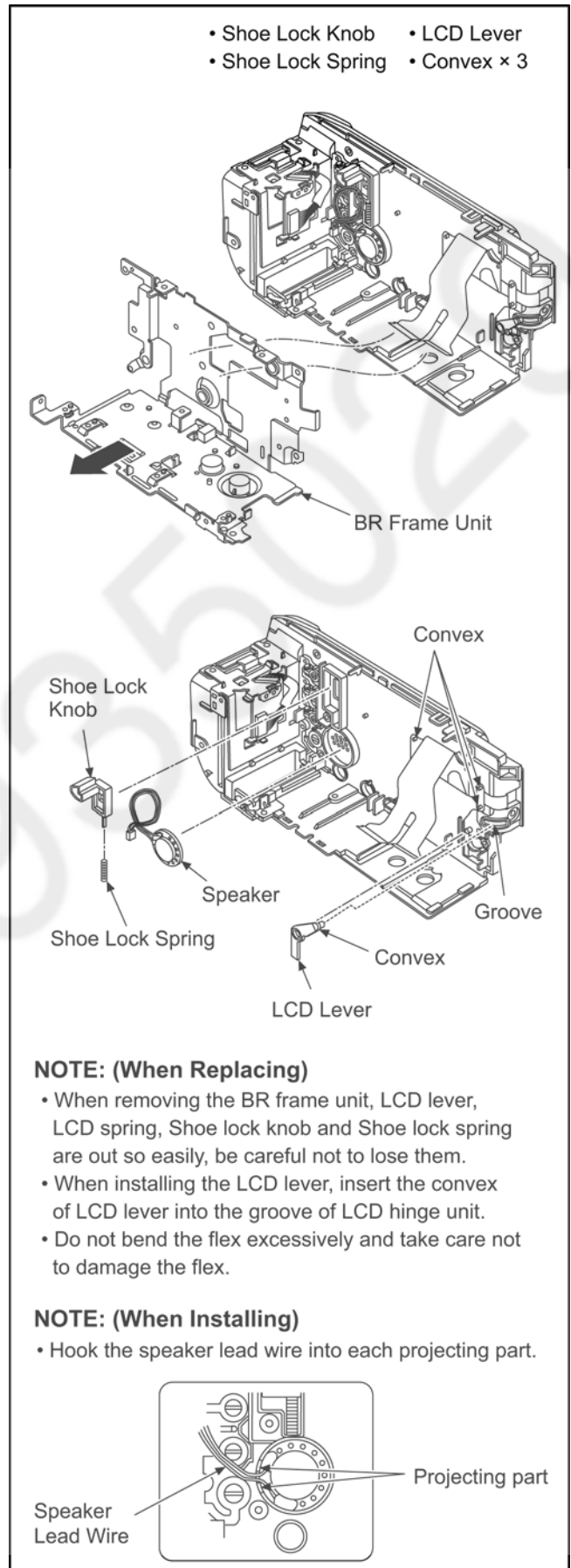


(Fig. D19)

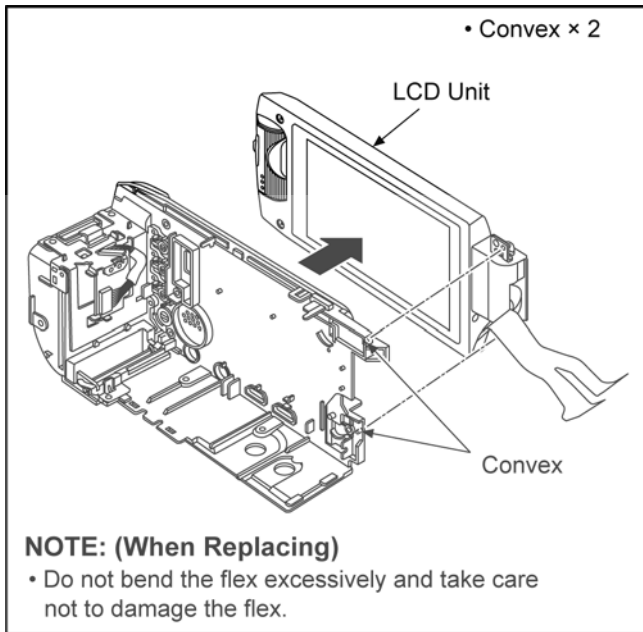
### 8.3.10. Removal of the BR Frame Unit, Speaker, LCD Unit



(Fig. D20)

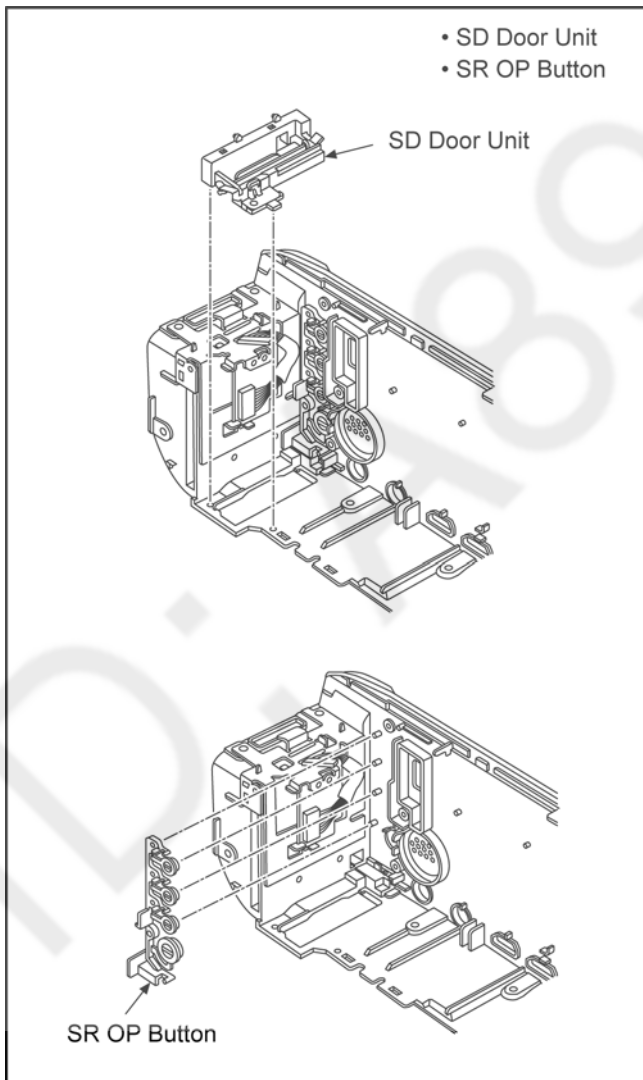


(Fig. D21)

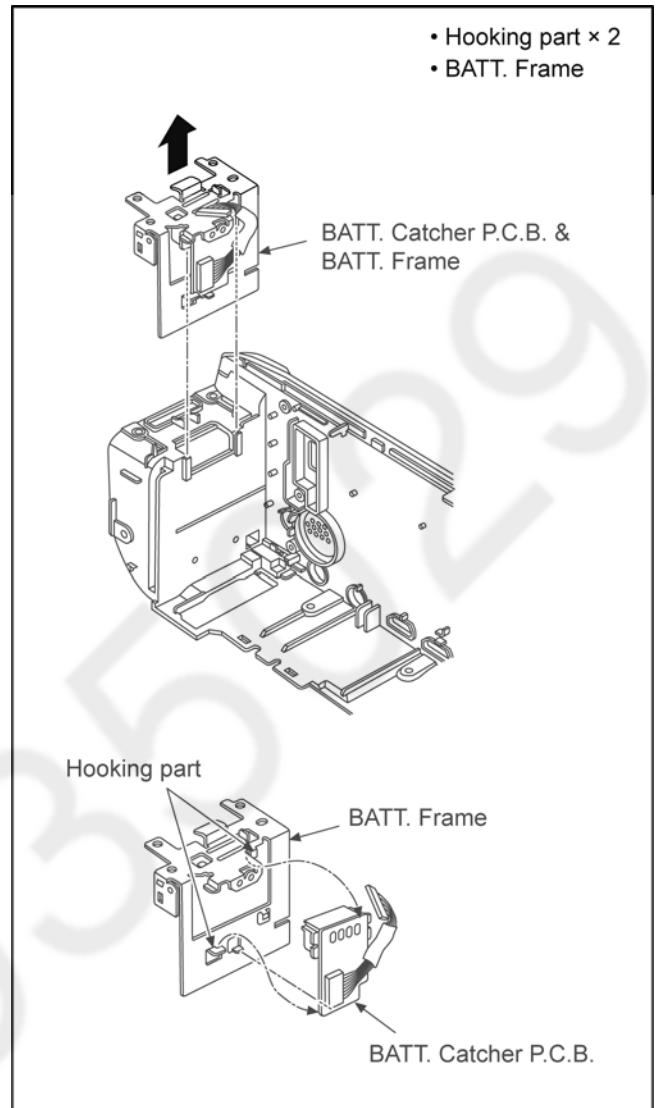


(Fig. D22)

### 8.3.11. Removal of the Batt. Catcher P.C.B.

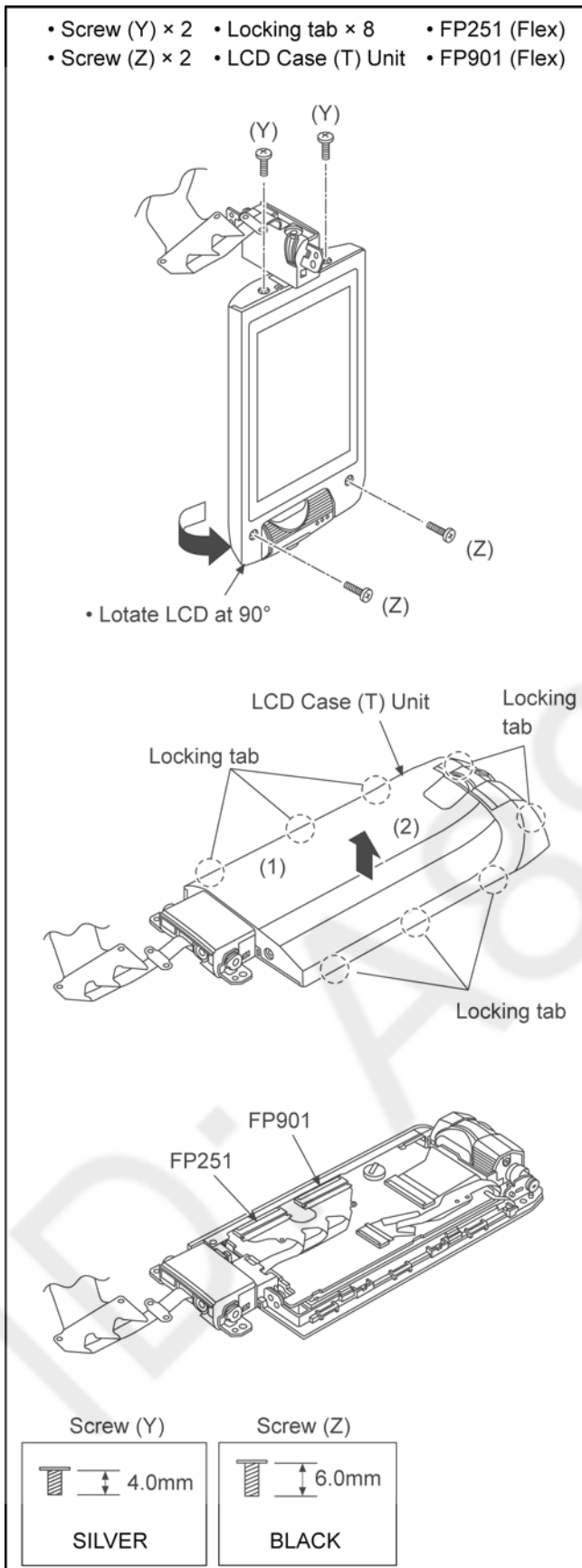


(Fig. D23)

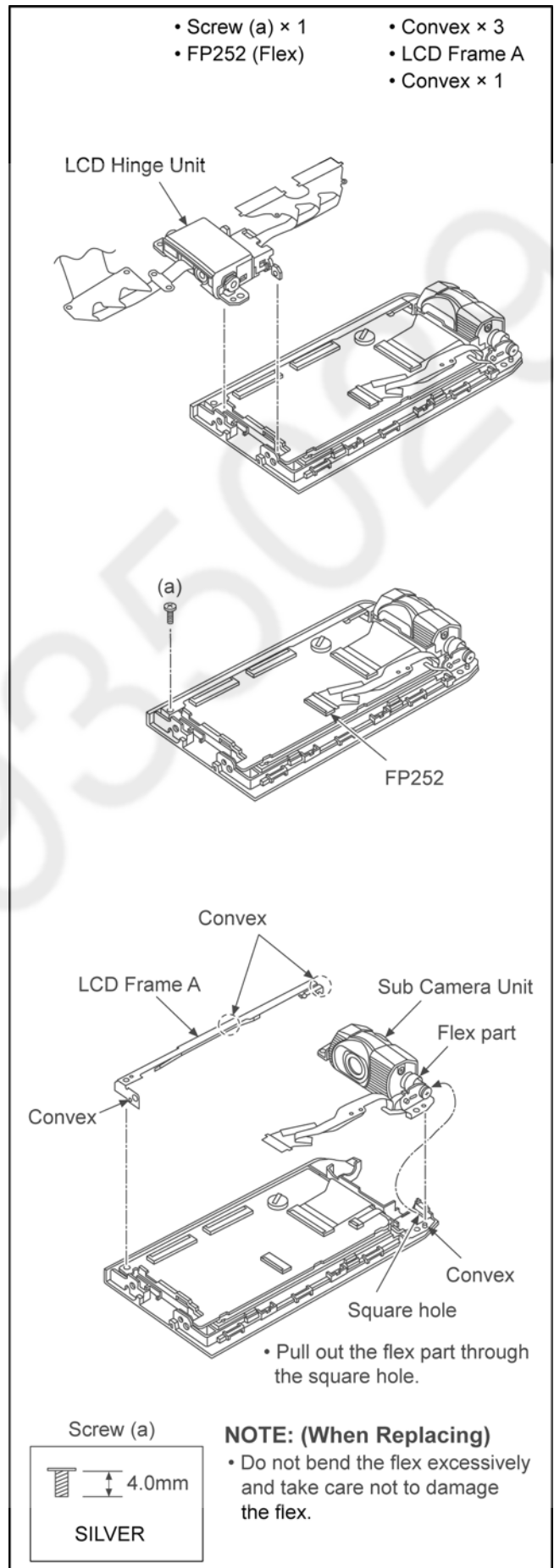


(Fig. D24)

### 8.3.12. (HC-WX970/WX979/WX970M) Removal of the LCD Hinge Unit, Sub Camera Unit

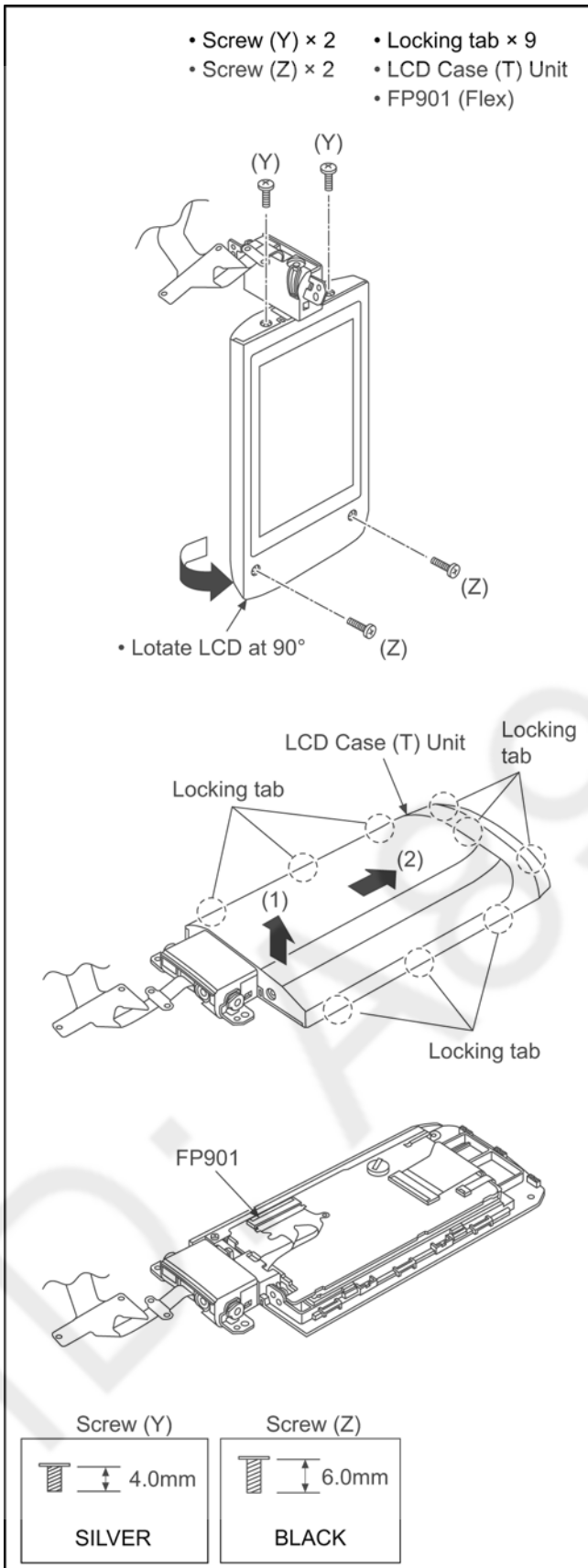


(Fig. D25)

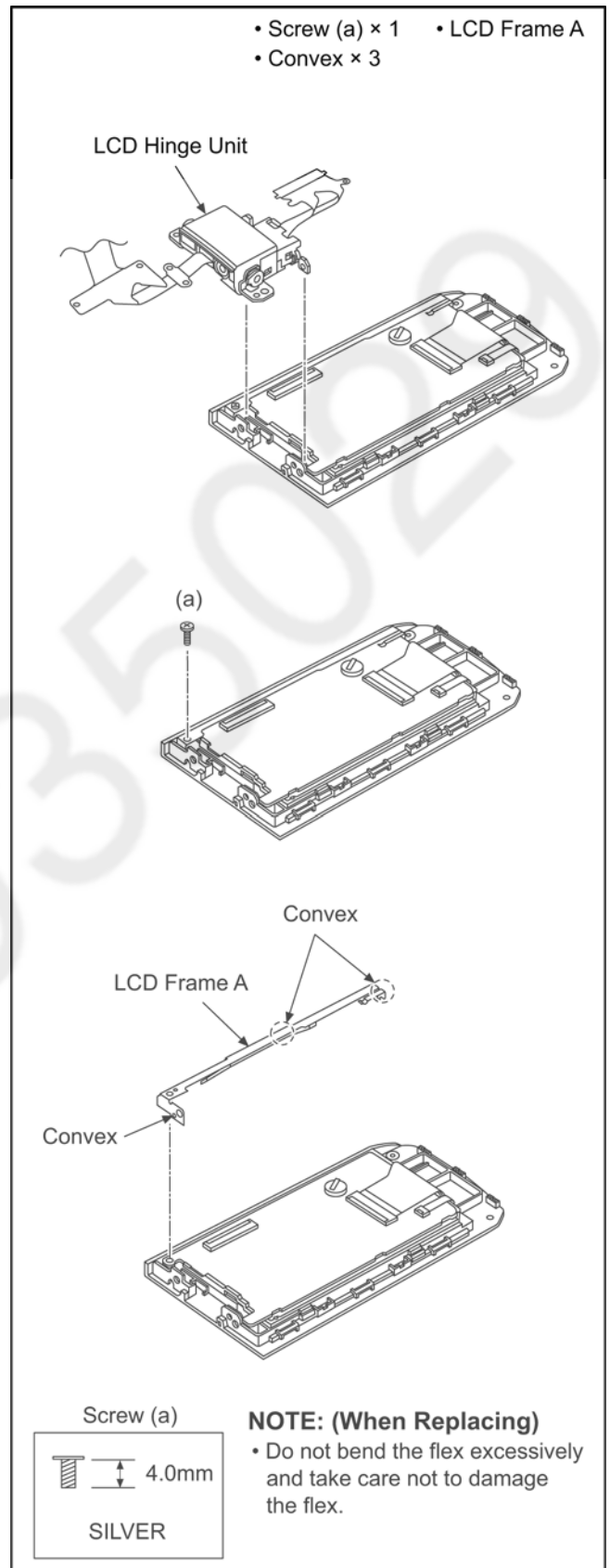


(Fig. D26)

**8.3.13. (HC-VX870/VX878/VX870M/V770/V777/V770M/V760) Removal of the LCD Hinge Unit**

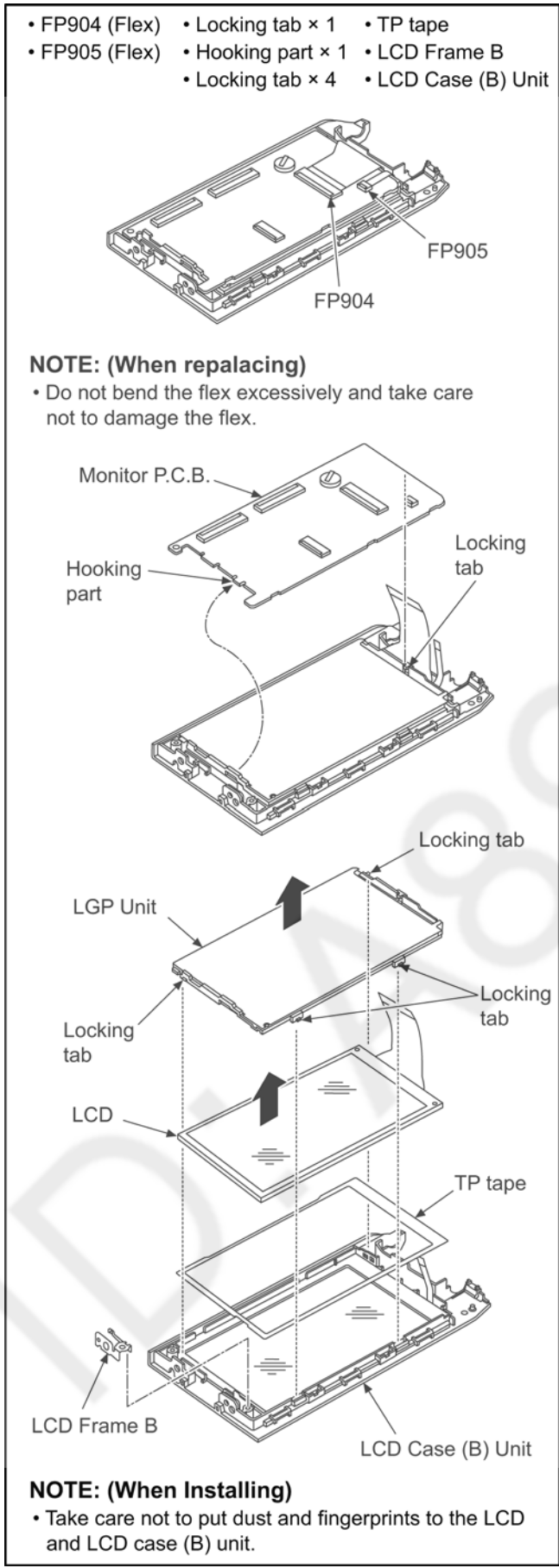


(Fig. D27)

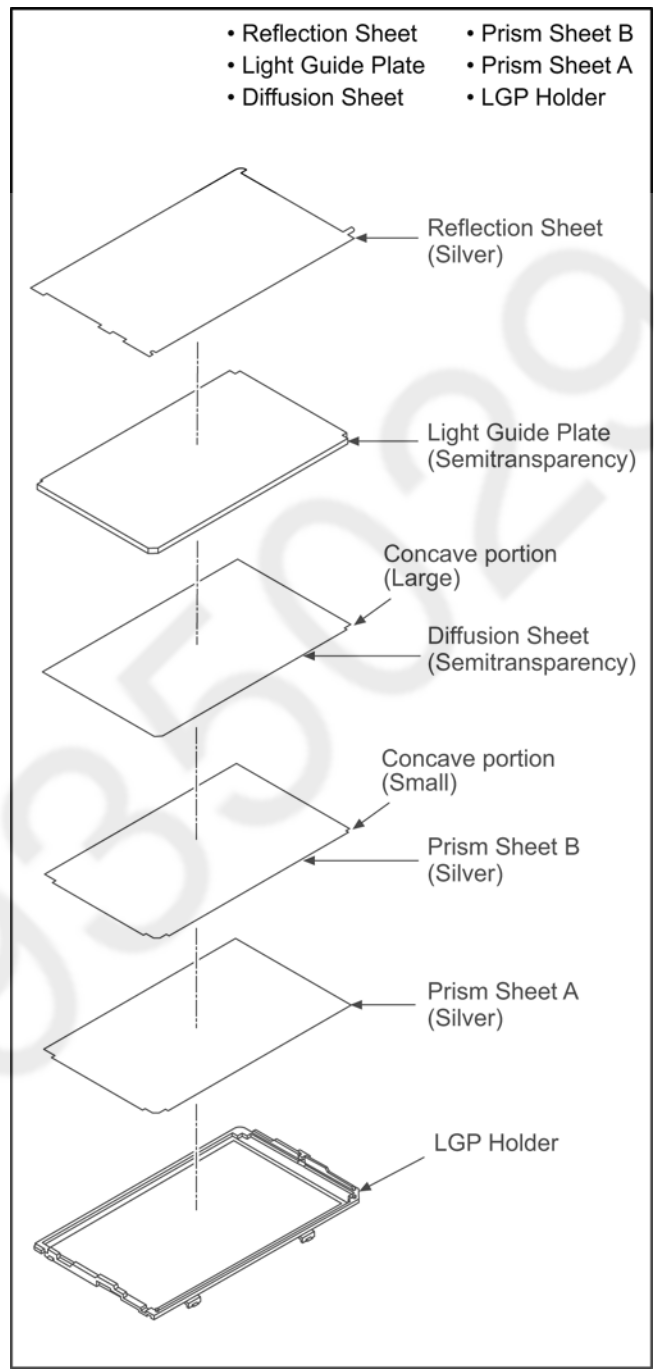


(Fig. D28)

### 8.3.14. Removal of the Monitor P.C.B., LGP Unit, LCD



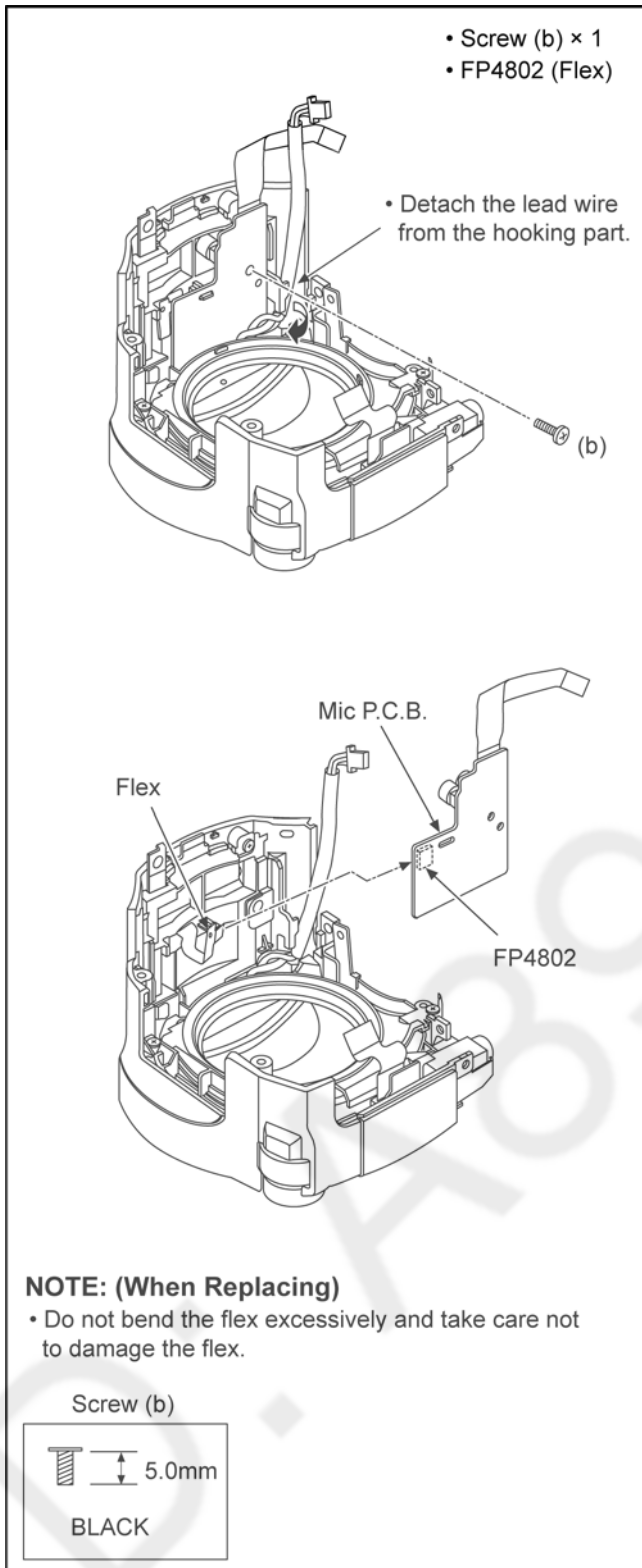
(Fig. D29)



(Fig. D30)

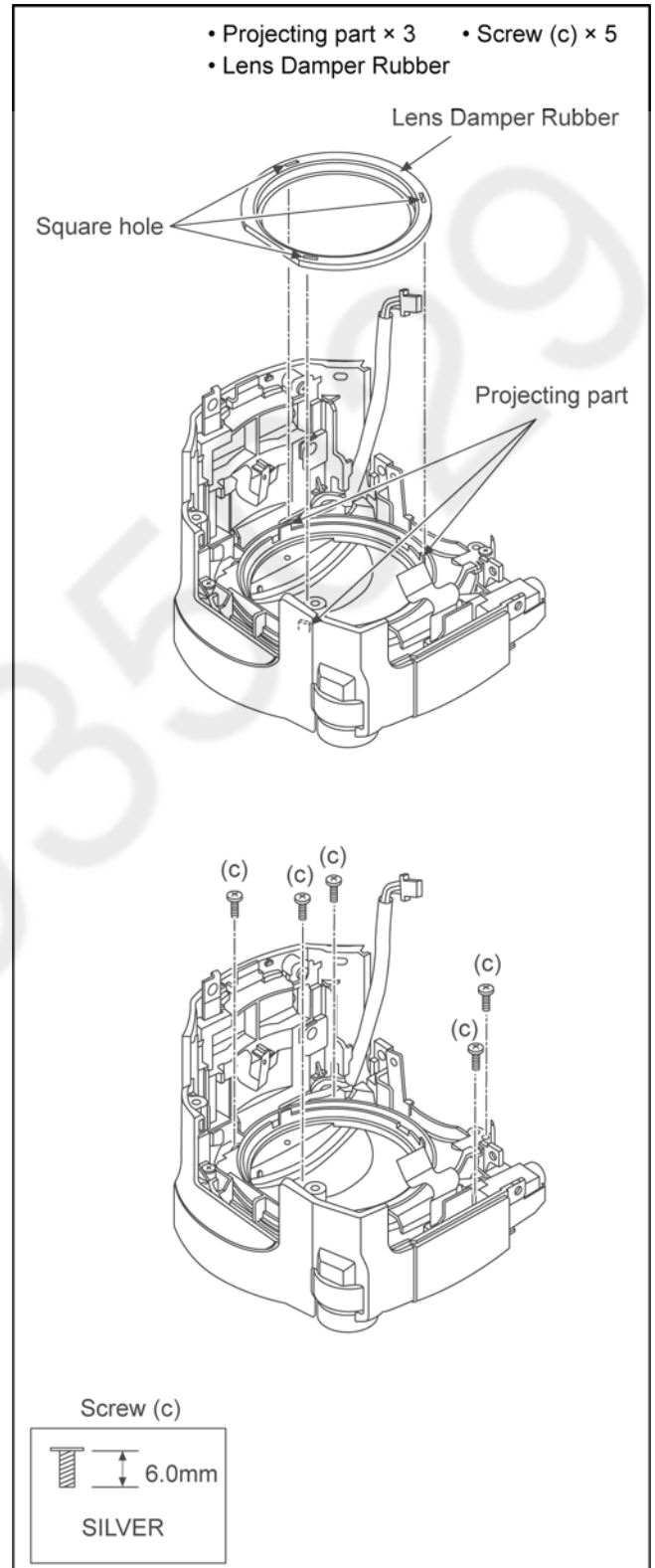


### 8.3.15. Removal of the Mic P.C.B.



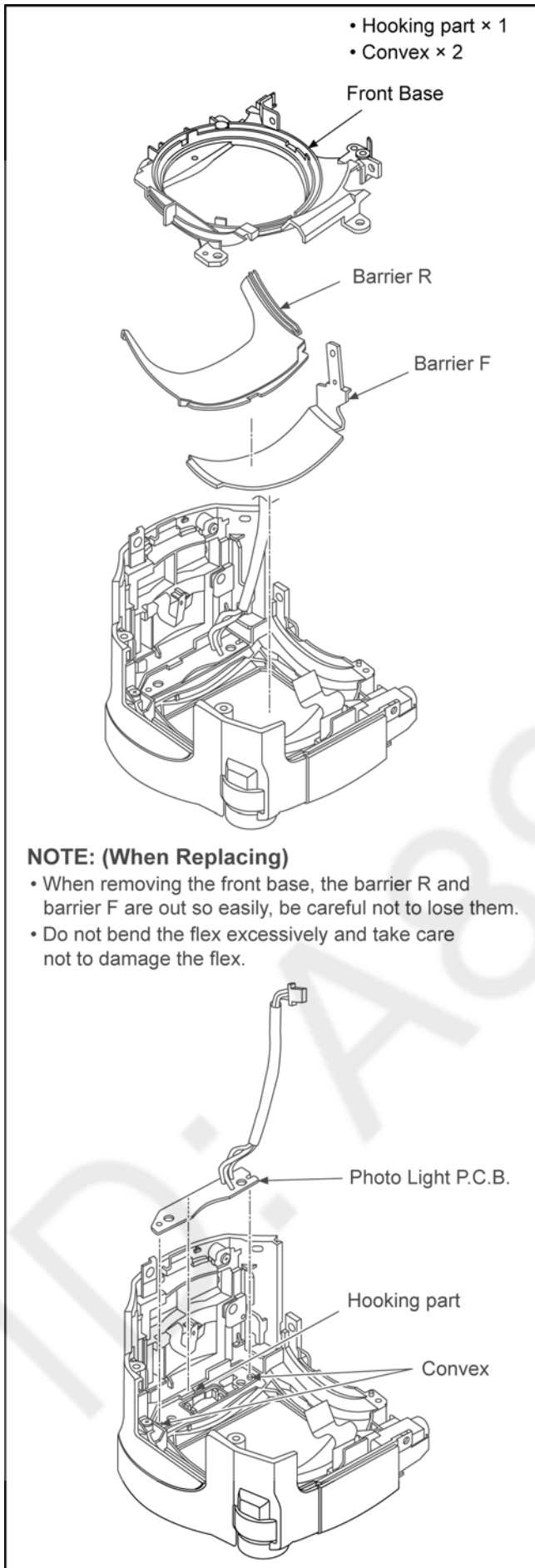
(Fig. D31)

### 8.3.16. Removal of the Front Base, Barrier R, Barrier F, Photo Light P.C.B.

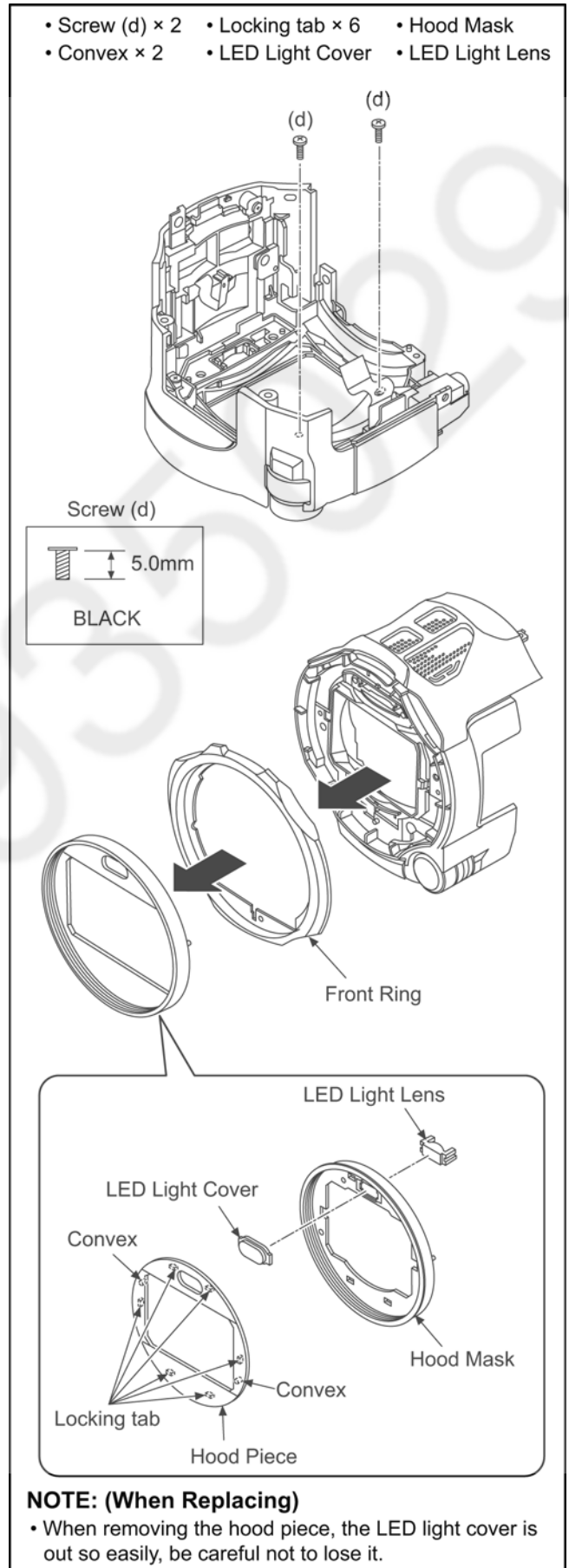


(Fig. D32)

### 8.3.17. Removal of the Front Ring, Hood Piece

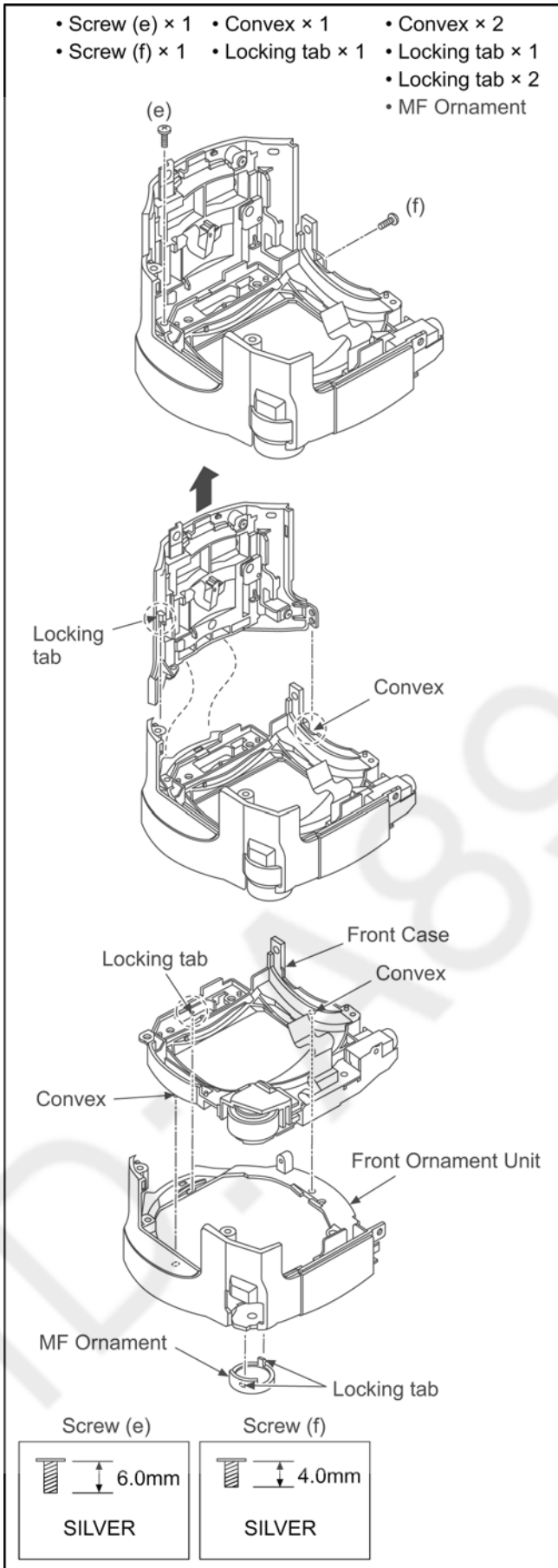


(Fig. D33)

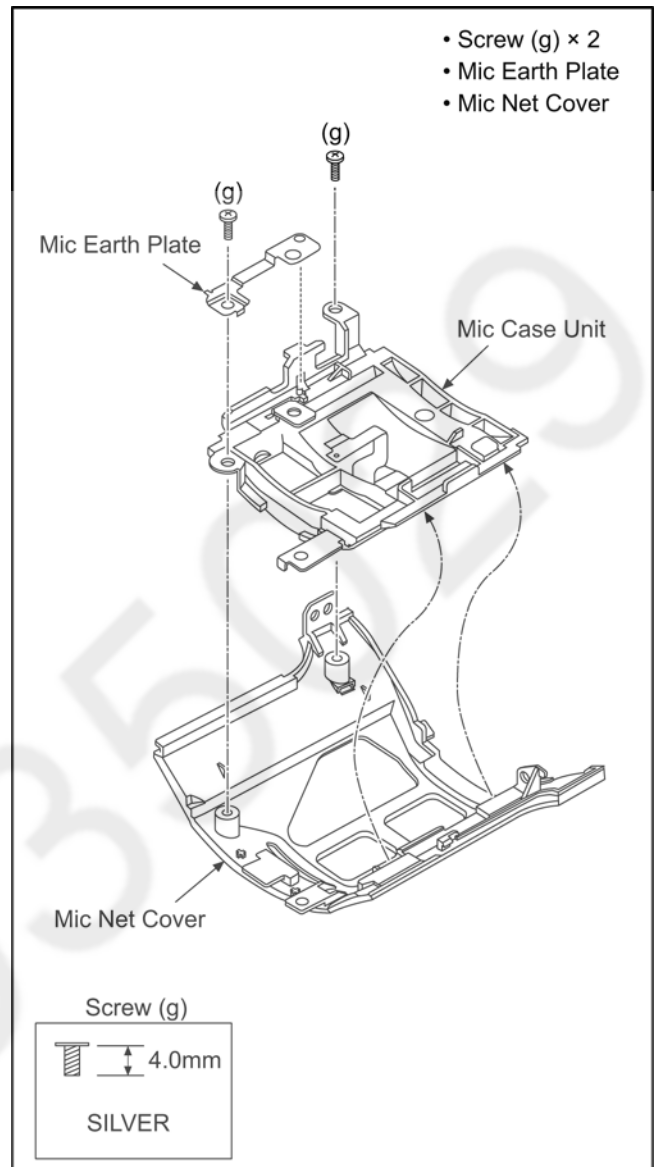


(Fig. D34)

### 8.3.18. Removal of the Front Case, Front Ornament Unit, Mic Case Unit

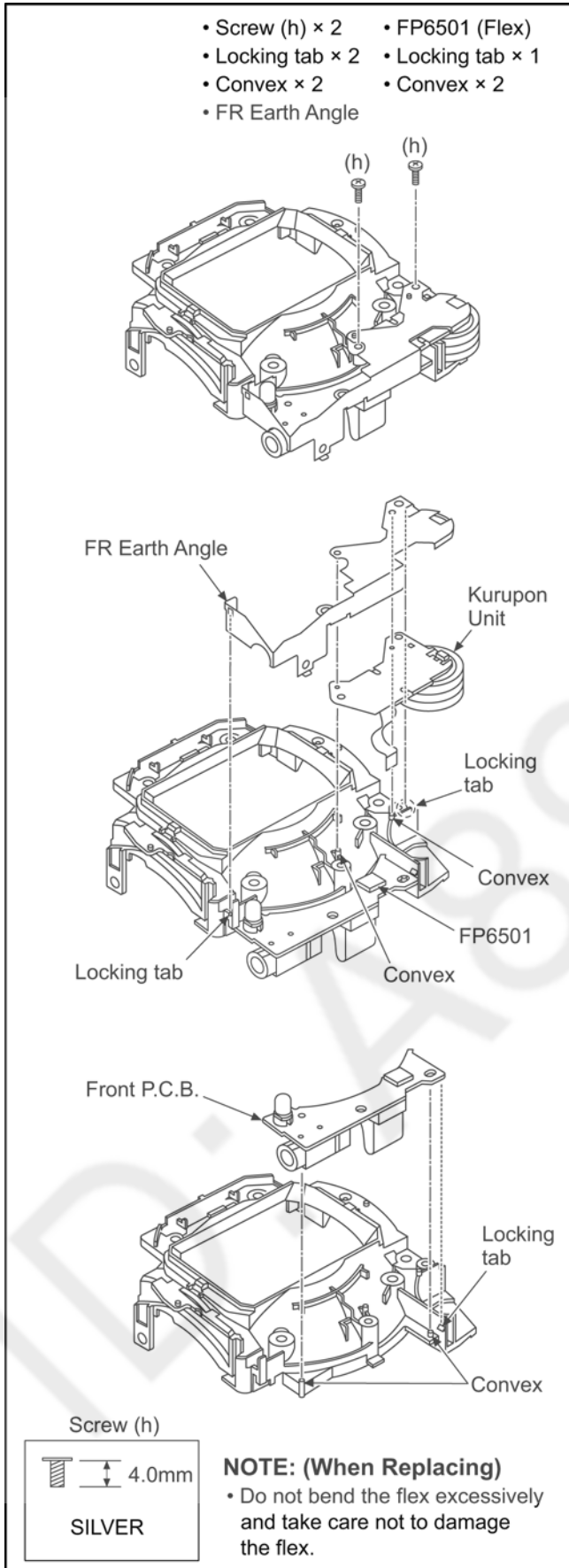


(Fig. D35)



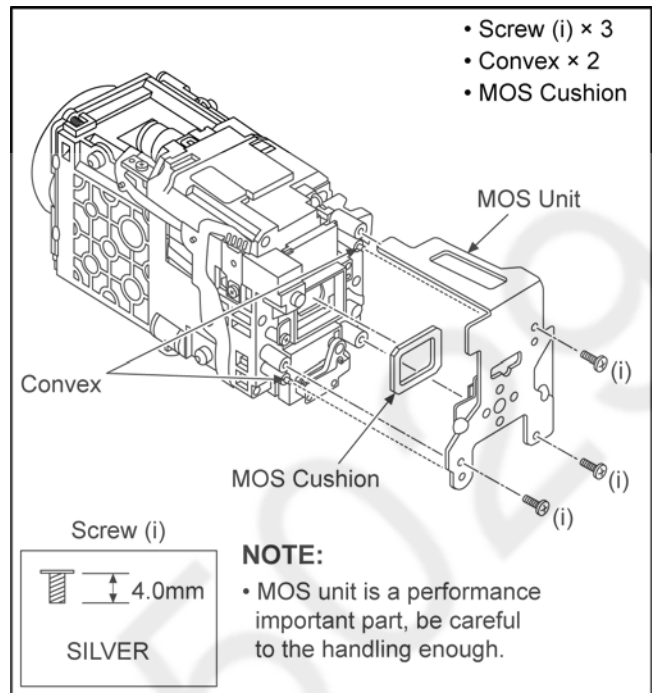
(Fig. D36)

### 8.3.19. Removal of the Kurupon Unit, Front P.C.B.



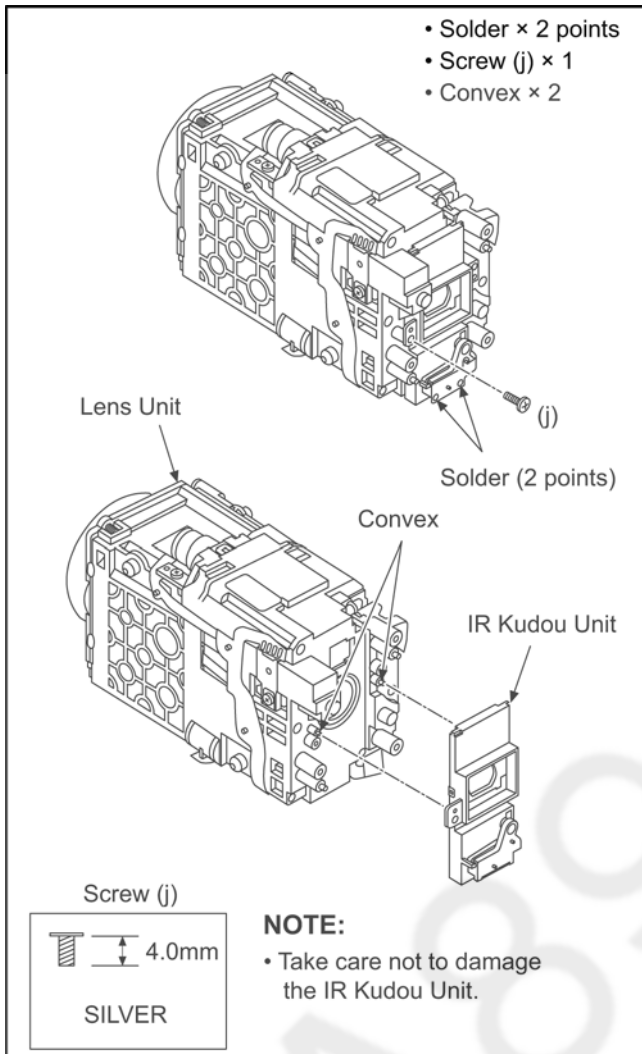
(Fig. D37)

### 8.3.20. Removal of the MOS Unit



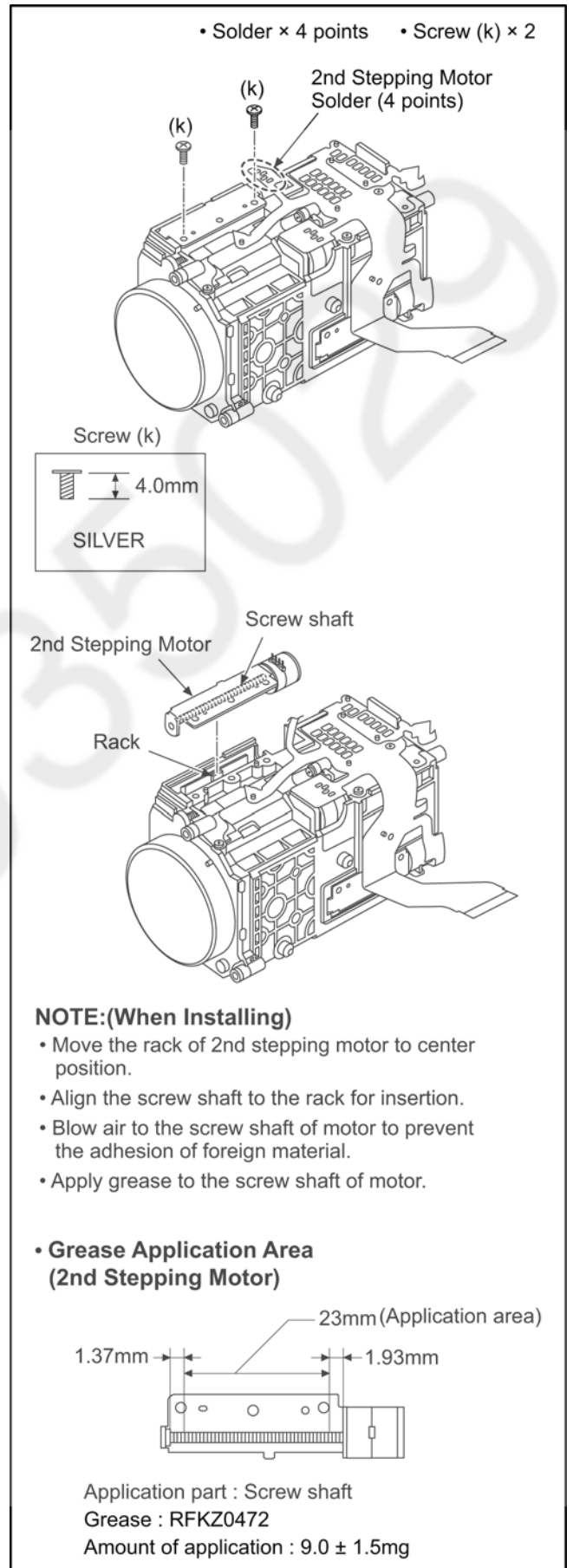
(Fig. D38)

### 8.3.21. (HC-WX970/WX979/WX970M/VX870/ VX878/VX870M only) Removal of the IR Kudou Unit



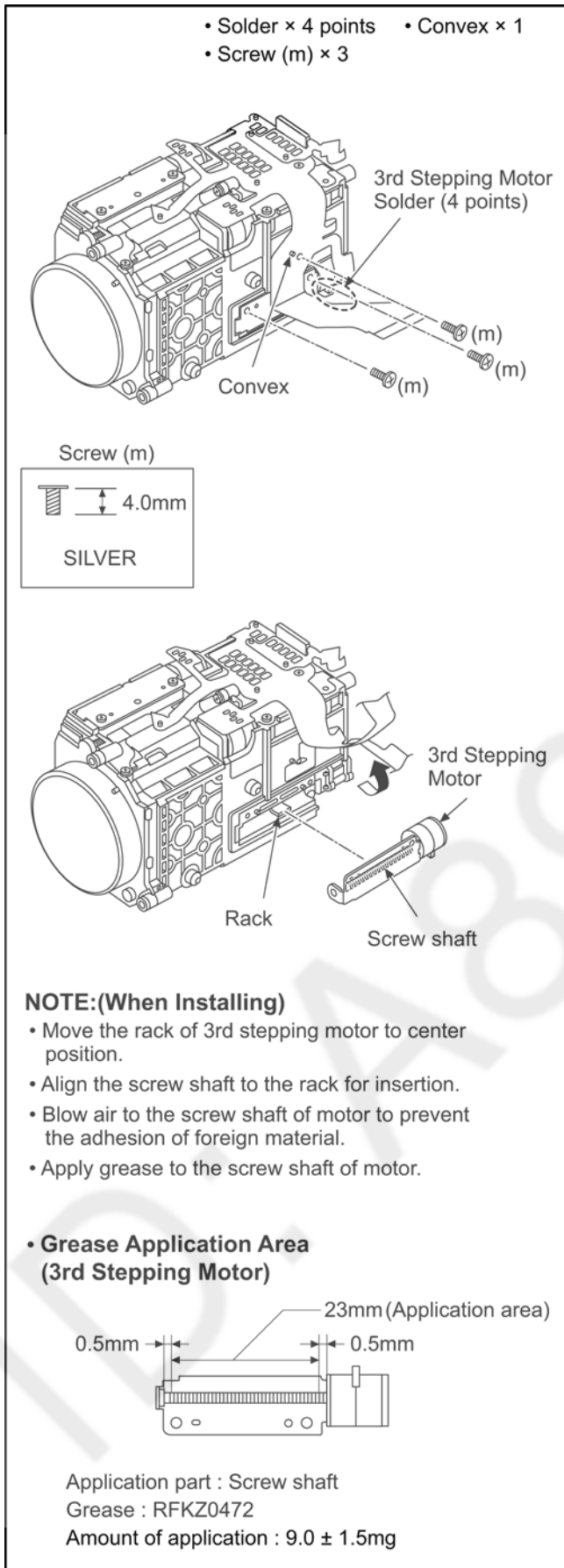
(Fig. D39)

### 8.3.22. Removal of the 2nd Stepping Motor



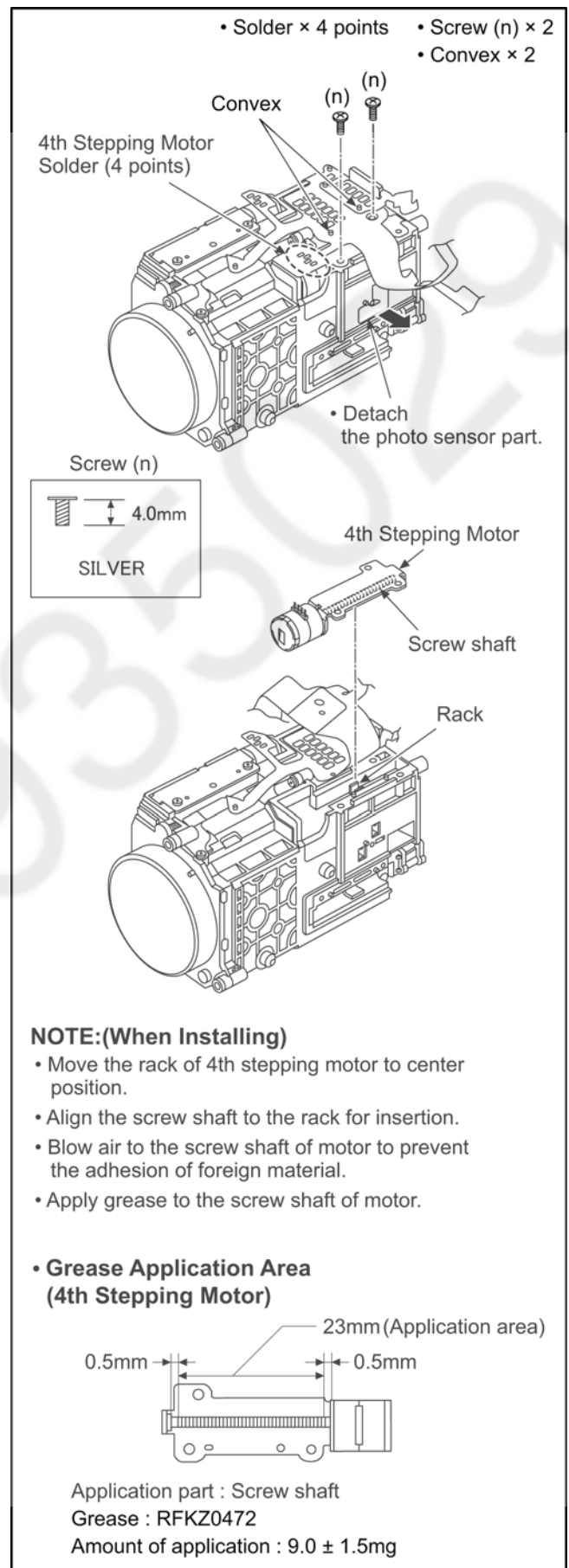
(Fig. D40)

### 8.3.23. Removal of the 3rd Stepping Motor



(Fig. D41)

### 8.3.24. Removal of the 4th Stepping Motor



(Fig. D42)

# 9 Measurements and Adjustments

## 9.1. Electric Adjustment

- An exclusive jig are necessary for electric adjustment.
- Connection method of the main unit and an exclusive adjustment jig as follows.

Figure of connection

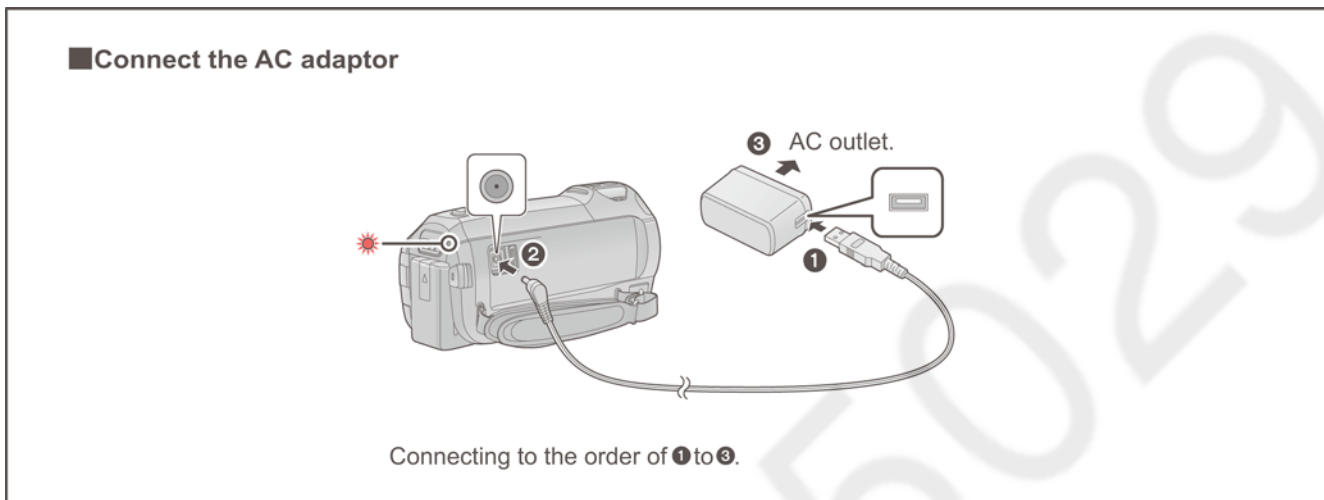
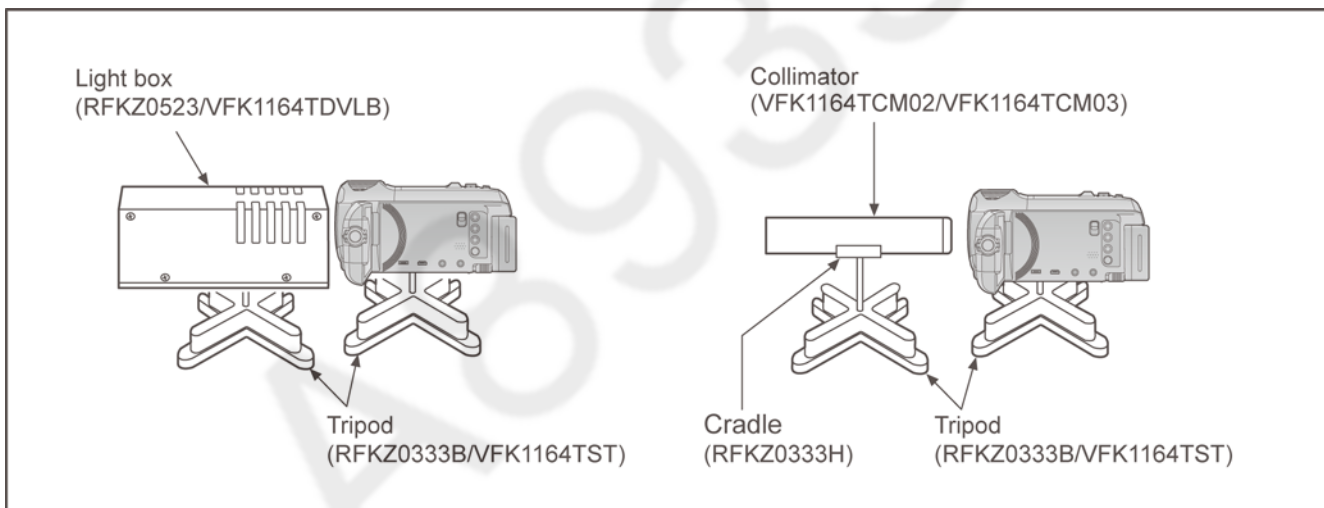


Figure of image when adjustment



## Part Number of jig

### 1. Basic Jig

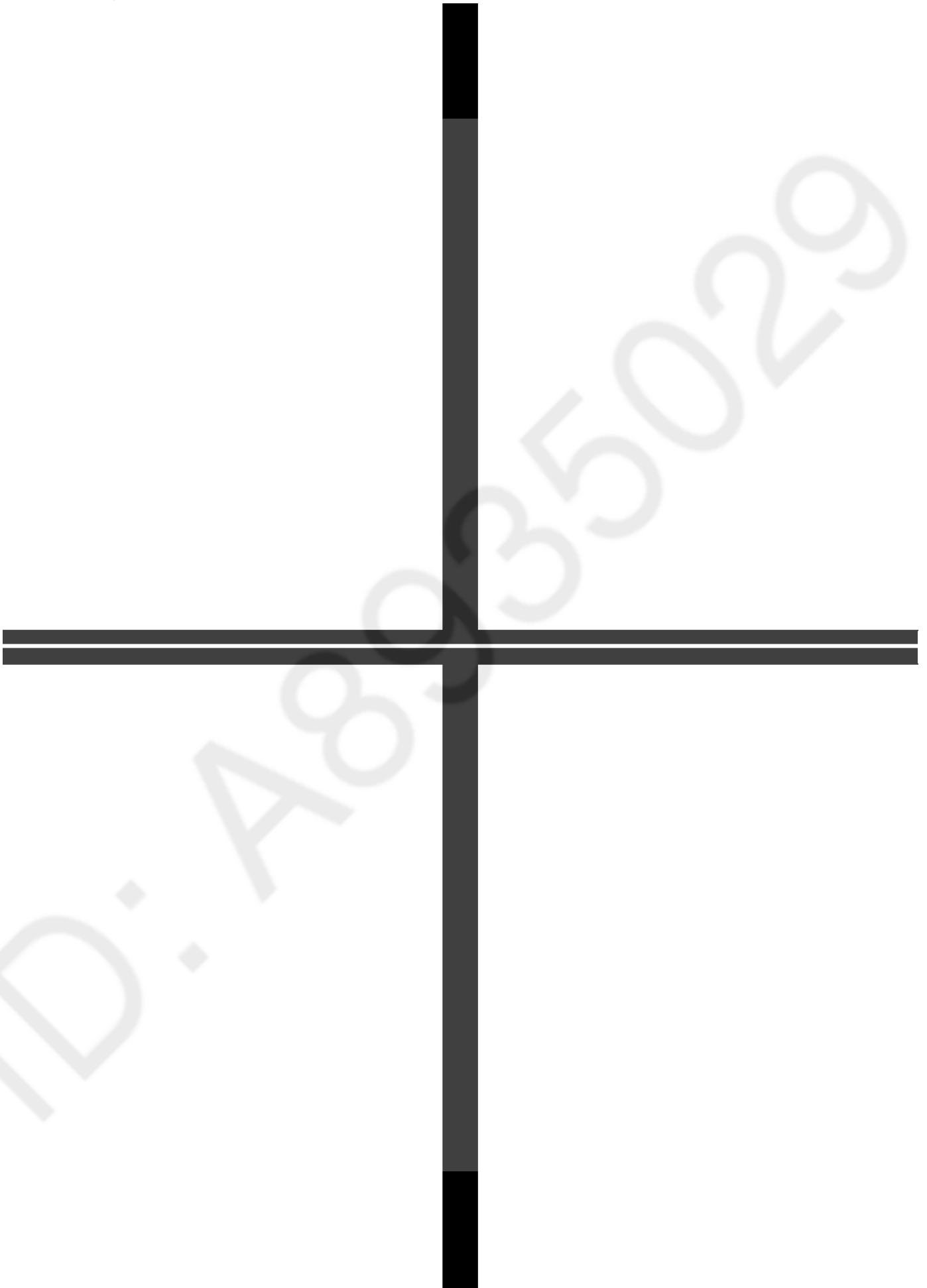
Item	Contents
AC adaptor	Banded with camcorder
DC Cable	Banded with camcorder

### 2. Optical Jig for Camera Adjustment

Item	Part number	Remarks	
Light box	VFK1164TDVLB/RFKZ0523*	Need external power supply: 12V $\pm$ 0.1V /1.8A or over	
Collimator with focus chart	VFK1164TCM02/VFK1164TCM03	Same as DSC	
CC filter	3100K/5100K	VFK1164CC10G	Need 2 set. For indoor/outdoor white balance adjustment
C2 Filter	5100K	VFK1164LBB2	For outdoor white balance adjustment
C8 Filter	5100K	VFK1164LBB8	For outdoor white balance adjustment
ND Filter 0.1	3100K	VFK1164ND01	For indoor white balance adjustment
ND Filter 0.6	3100K	VFK1164ND06	For indoor white balance adjustment
Adjustment chart for Level Shot	Banded with this Manual	For Level shot adjustment	

\* RFKZ0523 (same as DSC) is recommended.



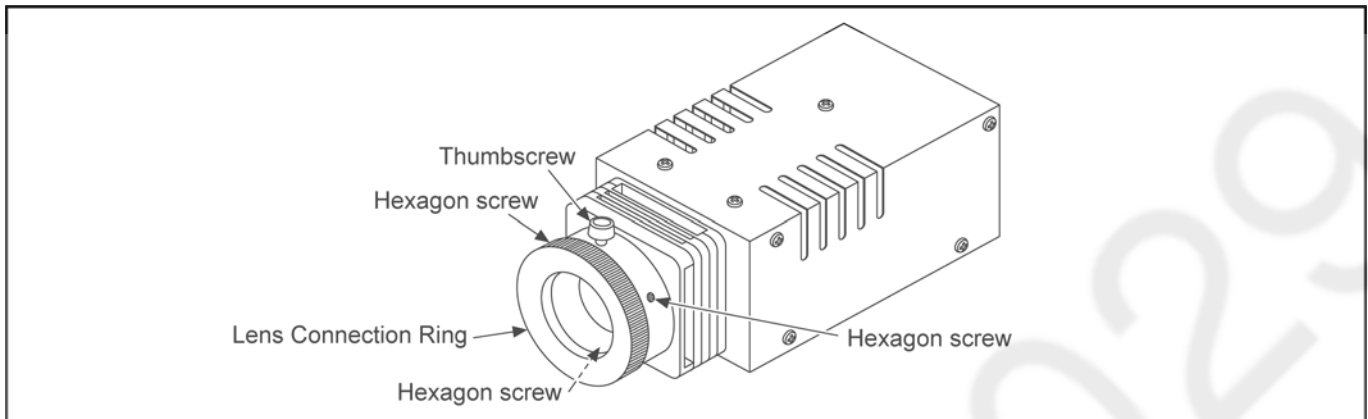


### 9.1.1. About Light Box

#### When using VFK1164TDVLB Light Box

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

\* RFKZ0523 Light Box has no lens connection ring.

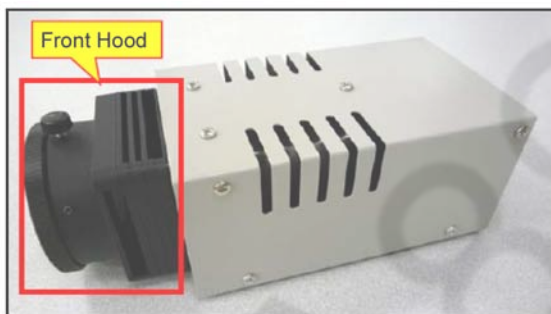


#### How to remove the Front Hood

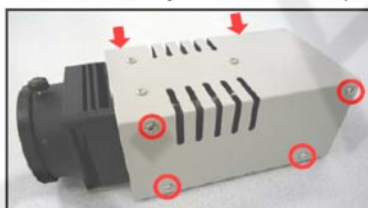
In order to utilize maximum of the diffusing surface of light box, some adjustment items need the distance between diffusing surface of light box and camera body becomes several centimeters.

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.



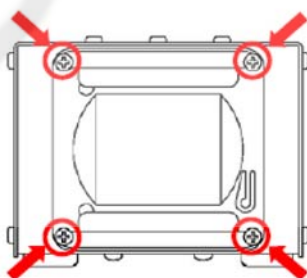
(2) Unscrew the 4 screws.



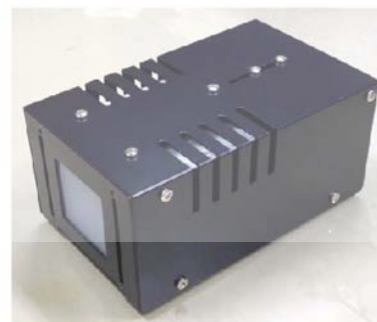
(3) Remove the front hood. Install the body case, then tighten the 8 screws.



#### [ For RFKZ0523 Light Box ]



Unscrew the 4 screws, then remove the front hood.



## 9.1.2. Adjustment Items

Adjustment item as follows.

Adjustment item			Adjustments						Settings		
			Camera Adjustments <sup>*1</sup>	Zoom Tracking Adjustment	Indoor White Balance Adjustment	Outdoor White Balance Adjustment	Level Shot adjustment <sup>*2</sup>	Touch Panel Calibration	Model setting	Factory settings	NFC initialization <sup>*4</sup>
Replacement part											
MAIN P.C.B.	IC701	LENS DRIVE IC	○	○	-	-	○	-	-	-	-
	IC751	ROLL GYRO	○	-	-	-	○	-	-	-	-
	IC1001	7CH DC/DC IC	○	○	○	○	○	-	-	-	-
	IC1421	REG 3V I/O	○	○	○	○	○	-	-	-	-
	IC3401	VENUS ENGINE	-	-	-	-	○	-	-	-	-
	IC3404	FLASH ROM	○	○	○	○	○	-	○	○	○
SD HOLDER P.C.B.			○	-	-	-	○	-	-	-	-
	IC6401	PIT/YAW GYRO	○	-	-	-	○	-	-	-	-
	IC6411	ACCELEROMETER	-	-	-	-	○	-	-	-	-
ESD P.C.B. <sup>*3</sup>			-	-	-	-	○	-	-	-	-
Wi-Fi P.C.B. <sup>*4</sup>			-	-	-	-	○	-	-	○	○
NFC P.C.B. UNIT <sup>*4</sup>			-	-	-	-	○	-	-	○	○
LENS UNIT			○	○	○	○	○	-	-	-	-
MOS UNIT			○	○	○	○	○	-	-	-	-
LCD CASE (B) UNIT			-	-	-	-	○	○	-	-	-

\*1...IRIS adjustment, OIS hall amp adjustment, Missing pixels compensation, OIS gyro adjustment, AGS adjustment .

\*2...Accelerometer : Since the assembly is accompanied, always need to be adjusted.

\*3...HC-WX970M/VX870M/V770M only

\*4...except HC-V760

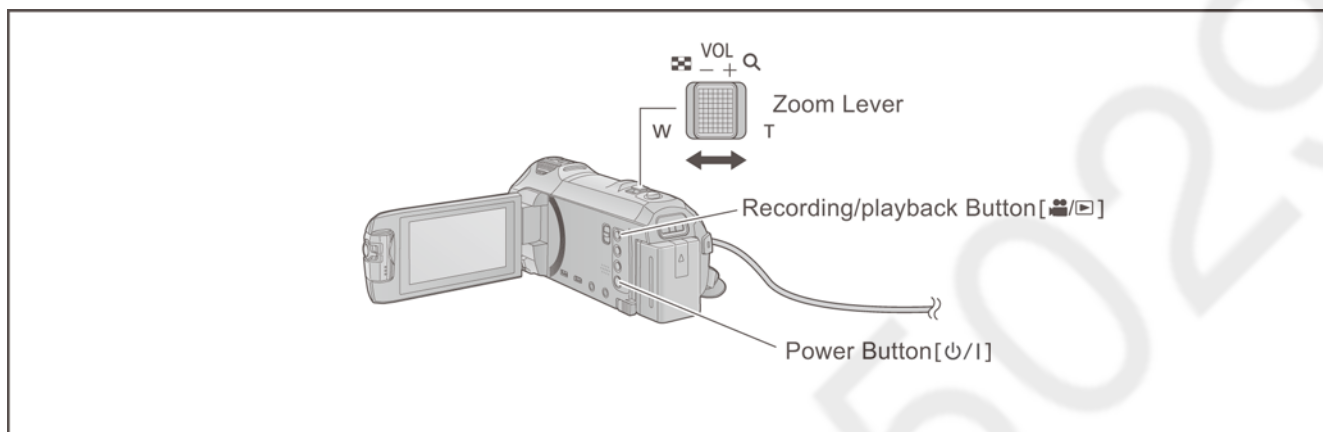
### 9.1.3. Adjustment Procedure

All adjustments except “Touch Panel Calibration”, “Factory Setting” and “NFC Initialization” performs using “14 Adjustment function for the service” in service mode menu.

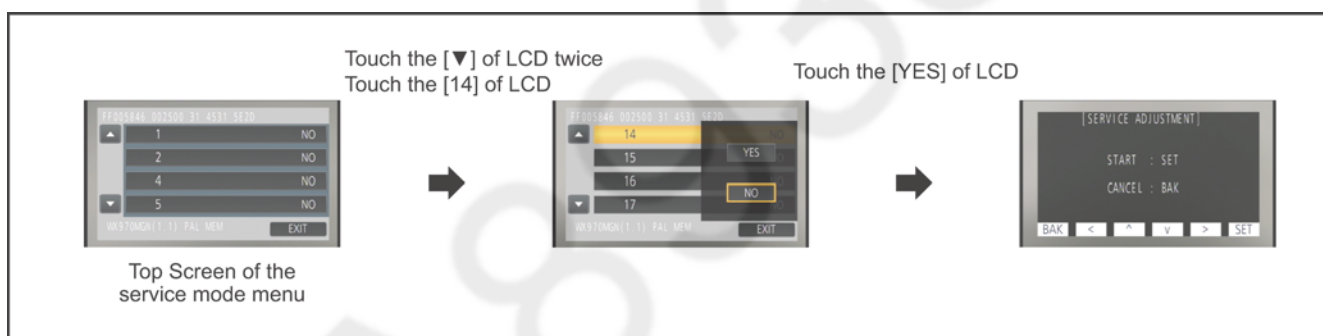
“Touch Panel Calibration” is performed using 16 of service mode menu and “Factory Setting” is performed using 1, “NFC Initialization” is performed using 17 of service mode menu. Refer to “6 Service mode” and “10 Factory Setting”.

#### [Execute adjustment function for service]

1. While the power is turned OFF, keep pressing the “Power” button, “Zoom Lever” to W side and “Recording/Playback” button for more than 3 seconds until the top screen of the Service Mode Menu being displayed.



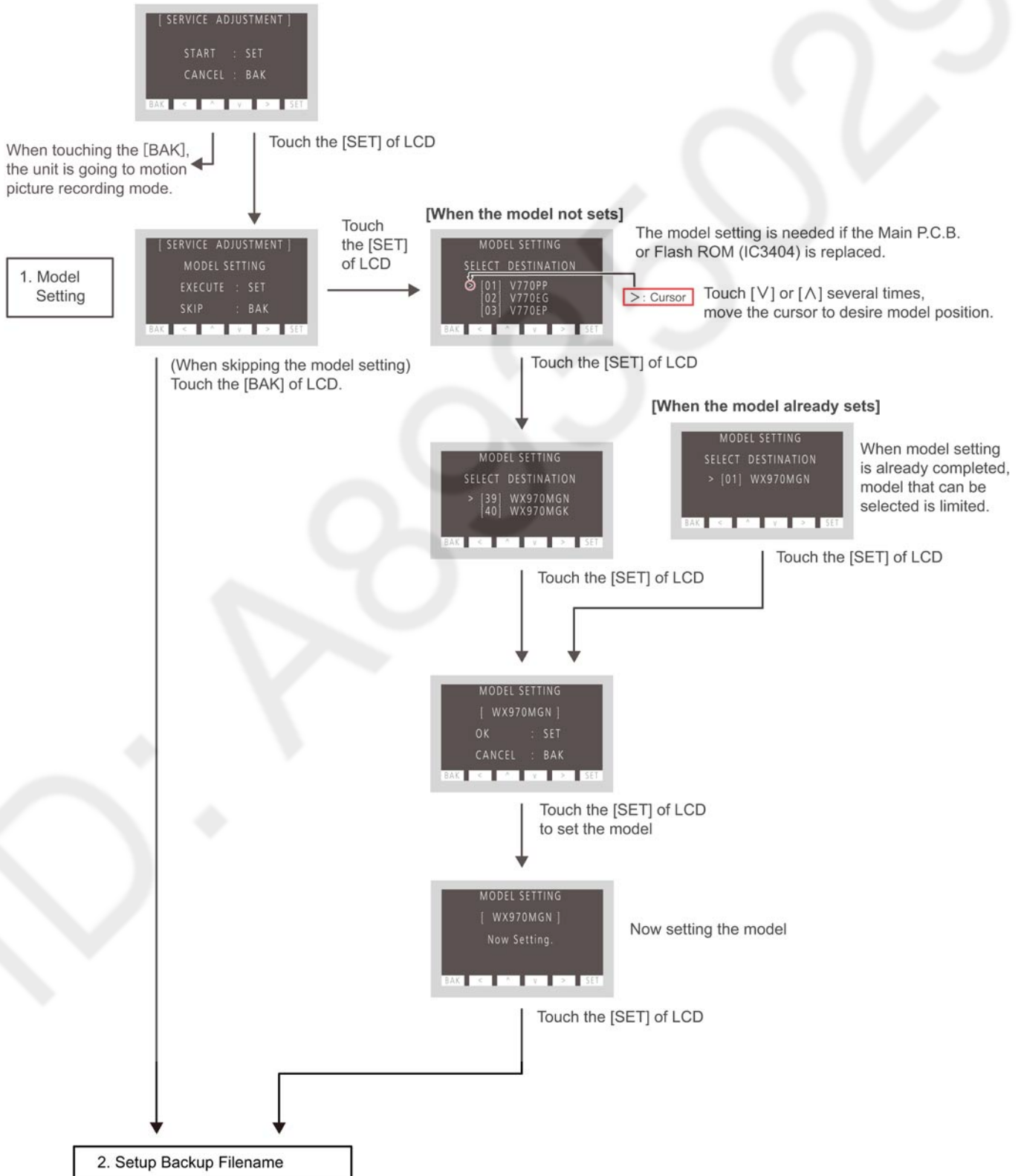
2. Touch the ▼ twice then touch the [14] of LCD.
3. Touch the [YES] of LCD.



**[Adjustment Procedure]**

Adjustments and settings are performed following order:

1. Model setting
2. Filename setting for backup to SD card
3. Backing up adjustment data to SD card
4. Checking switches
5. Camera adjustment
6. Zoom/tracking adjustment
7. Indoor white balance adjustment
8. Outdoor white balance adjustment
9. Level shot adjustment

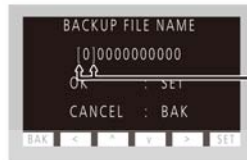


- < : Move cursor 1 position left
- > : Move cursor 1 position right
- ^ : Increase 1 character (0→1→2→…)
- v : Decrease 1 character (0→Z→Y→…)

2. Setup Backup Filename



Touch the [SET] of LCD



[ ] : Cursor

(When skipping the setup)  
Touch the [BAK] of LCD.  
Backup filename: 00000000000 (Default)  
or  
xxxxxxxxxxx (Previously set)  
(The backup filename is stored in Flash ROM.)

Touch the [SET] of LCD

For example, "ABCDE123456" as the specified backup filename;  
First, a new folder (folder name is "WX970" for HC-WX970, "VX870M" for HC-VX870M.) is created at root folder of SD card.  
Next, a new folder that is named first 5 letter of specified backup filename is created inside of model-named folder.  
Then, the adjustment data backup file which filename is last 6 letter of specified backup filename is created inside of above folder.

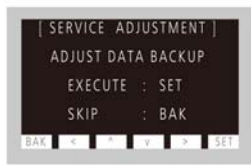


Touch the [BAK] of LCD

Touch the [SET] of LCD

3. Backup Execution

3. Backup Execution



Touch the [SET] of LCD



Adjustment data is backed up to SD card, and its filename is the specified backup filename of "2. Setup Backup Filename" or previous backup filename stored in Flash ROM.

(When skipping the backup) Touch the [BAK] of LCD

Touch the [SET] of LCD



Write error occurred

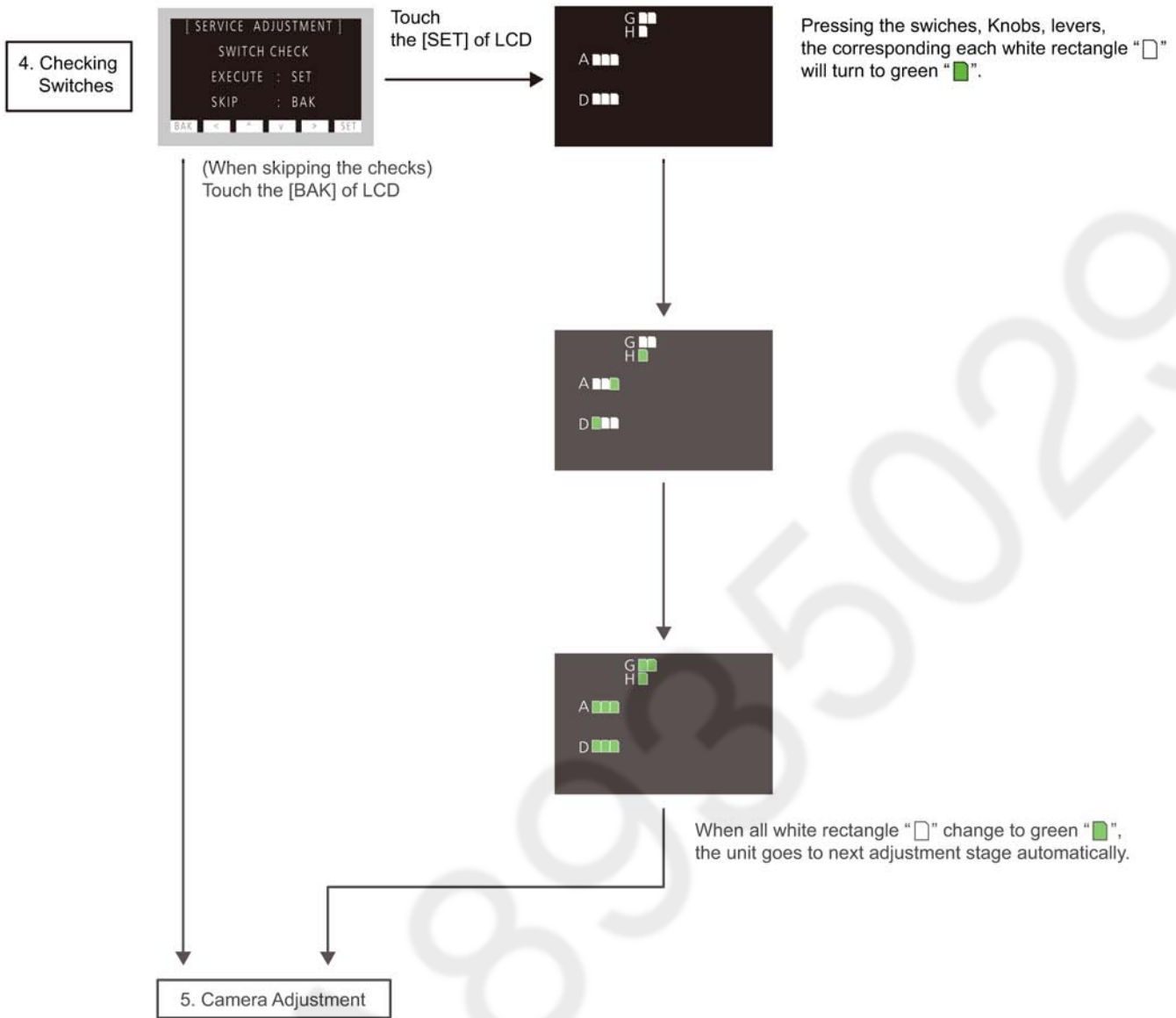
Touch the [SET] of LCD

Touch the [SET] of LCD

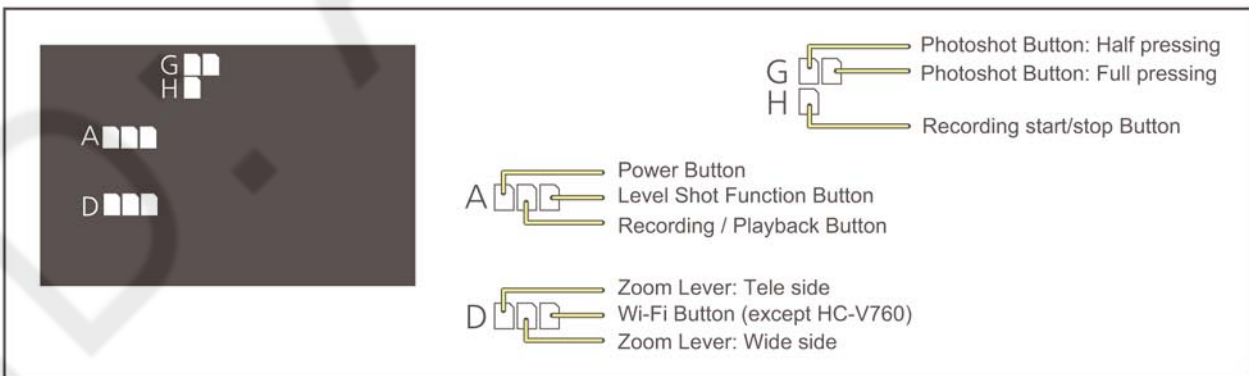


Touch the [SET] of LCD

4. Checking Switches



**< Switches arrangement >**





5. Camera Adjustment



Touch the [SET] of LCD



WT : Waiting for Adjust  
 RUN : Now adjusting  
 OK : Normal Condition  
 NG : Abnormal Condition  
 -- : Excluded

(When skipping the adjustment)  
 Touch the [BAK] of LCD

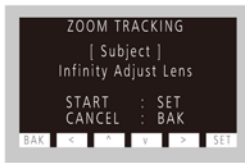
Adjustment Item	
LOCK	Confirmation that the lens lock has not occurred.
TEMP	(Excluded)
GYRO	Result of Gyro DC compensation.
IRIS	Result of Iris adjustment.
OIS	Result of OIS adjustment.
KIZU	Result of missing pixels compensation.
HYS	(Excluded)
WIFI	(Excluded)
RTC	Result of the RTC working normally.
KEY	Confirmation that all switches on the unit are released.
JACK	(Excluded)
TOUCH	(Excluded)
FAN	(Excluded)
SENSOR	(Excluded)
FORMAT	(Excluded)
DTEST	(Excluded)

6. Zoom/Tracking Adjustment

**6. Zoom/ Tracking Adjustment**



Touch the [SET] of LCD



(When skipping the adjustment)  
Touch the [BAK] of LCD

Touch the [SET] of LCD



Error Occurred



Normally terminated

**7. WB Adjustment (Indoor)**

**7. WB Adjustment (Indoor)**



Touch the [SET] of LCD



(When skipping the adjustment)  
Touch the [BAK] of LCD

Touch the [SET] of LCD



Error Occurred



Normally terminated

**8. WB Adjustment (Outdoor)**

**■Adjustment Conditions**

- Set up the collimator with focus chart in front of the lens.
- Set up the angle of view into near the center of the test chart at the tele edge.

**■Adjustment Jig**

- Collimator with focus chart.

**■Other**

- The focus adjustment value always starts from initial value.
- \*Supposing the adjustment after the lens replacement.

Touch the [SET] of LCD

**■Adjustment Conditions**

- Set up the position of light box to be fully displayed at the LCD.
- Stack two piece of CC filter and set up them in front of the lens.
- Stack ND filter (0.1) and (0.6), then set up then in front of the lens.

**■Adjustment Jig**

- Light box
- CC filter x 2
- ND filter (0.1)
- ND filter (0.6)

Touch the [SET] of LCD

- \* Too high or too low brightness causes adjustment error.
- \* Check the adjustment environment.

8. WB Adjustment (Outdoor)



Touch the [SET] of LCD



Touch the [SET] of LCD



Normally terminated

Error Occurred



■ Adjustment Conditions

- Set up the position of light box to be fully displayed at the LCD.
- Stack two piece of CC filter and set up them in front of the lens.
- Stack C2 filter and C8 filter, then set up them in front of the lens.

■ Adjustment Jig

- Light box
- CC filter x 2
- C2 filter
- C8 filter

Touch the [SET] of LCD

(When skipping the adjustment) Touch the [BAK] of LCD

9. Level Shot Adjustment

- \* Too high or too low brightness causes adjustment error.
- \* Check the adjustment environment.

9. Level Shot Adjustment



Touch the [SET] of LCD



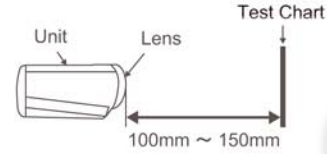
(When skipping the adjustment) Touch the [BAK] of LCD

Press the [Photo shot] button

■ Adjustment Conditions

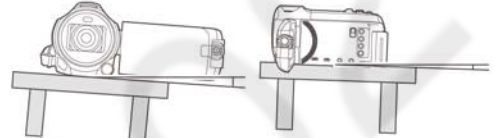
- Open the LCD and turn reverse, then close.
- Shot the test chart to be displayed in full screen.

Distance (between end of lens and the chart): 100mm~150mm



• Unit Installation Condition

- Horizontal Tilt (ROLL) : with in  $\pm 2^\circ$
- Vertical Tilt (PITCH) : with in  $\pm 1^\circ$



■ Adjustment Jig

• Test Chart



[Chart Size]

A4

Print the test chart that white line to be 0.7mm width inside the vertical line.

[Test Angle]

Confirm that the vertical line is with in  $\pm 30\%$  of the center of the screen.  
Confirm that the horizontal line is displayed in both ends of screen.

[Test Chart Levelness]

- Horizontal tilt (ROLL) : with in  $\pm 0.1^\circ$
- Horizontal tilt (YAW) : with in  $\pm 5.0^\circ$
- Vertical tilt (PITCH) : with in  $\pm 5.0^\circ$

Touch the [SET] of LCD

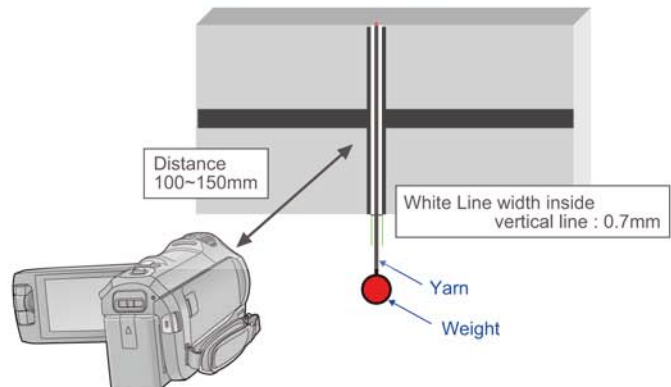


Error Occurred



Normally terminated

◇ Level Management by Yarn Hanging

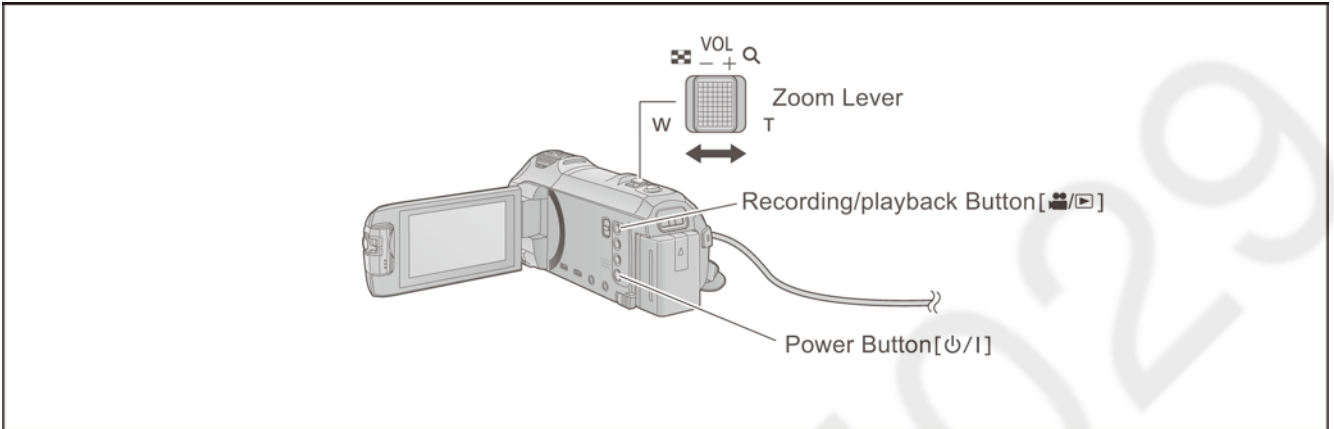


Press the power button and turn off. Adjustment completed.

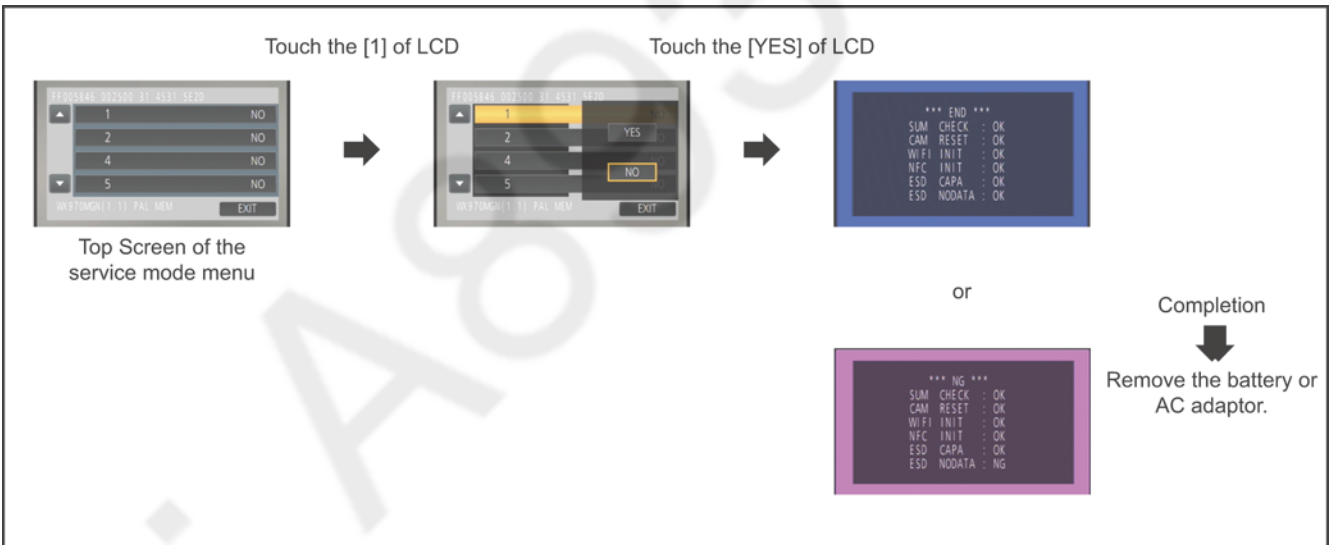
# 10 Factory Setting

## 10.1. How To Turn On The Factory Settings?

1. While the power is turned OFF, keep pressing the “Power” button, “Zoom Lever” to W side and “Recording/Playback” button for more than 3 seconds until the top screen of the Service Mode Menu being displayed.



2. Touch the [ 1 ] of LCD.
3. Touch the [ YES ] of LCD.
4. After few seconds “END” is displayed or “ESD NODATA” as “NG” is displayed on LCD monitor. Cutting of battery connection or AC power supply connection as a completion of the “FACTORY SETTINGS”.  
(After recording at least once, even if the physical format of the build-in memory will be performed, “ESD NODATA” as “NG” is indicated, but “FACTORY SETTINGS” is completed.)



## 10.2. What Is The Factory Settings?

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

1. Setting Values of menu.
2. Clear the time and date setting.
3. Initialize the Wi-Fi data settings. (except HC-V760)
4. Initialize the NFC data settings. (except HC-V760)
5. Confirm that the built-in memory capacity is correct. (HC-WX970M/VX870M/V770M only)  
(Checking of the built-in memory mounting error.)
6. Confirm that the data area of built-in memory is cleared. (HC-WX970M/VX870M/V770M only)
7. Close the lens cover

(HC-WX970M/VX870M/V770M only)

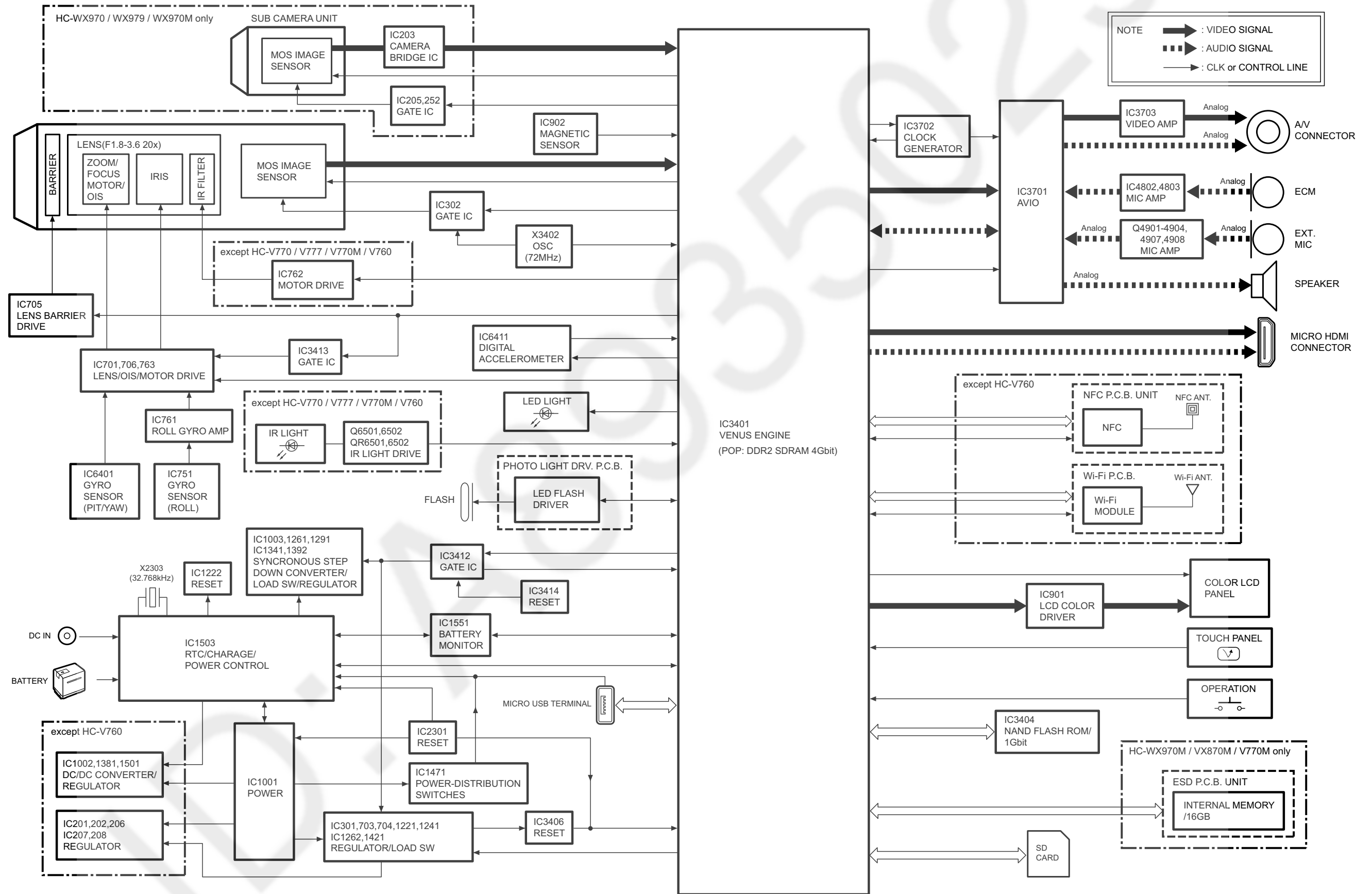
If the "Factory Settings" is completed, physical format of the build-in memory is not performed, execute physical format according to the following procedure.

To physically format the built-in memory, connect the unit via the AC adaptor, select [SETUP] → [FORMAT MEDIA] → [Built-inMemory] from the menu, and then press and hold the recording start/stop button on the screen below for about 3 seconds. When the built-in memory data deletion screen appears, select [YES], and then follow the on-screen instructions.



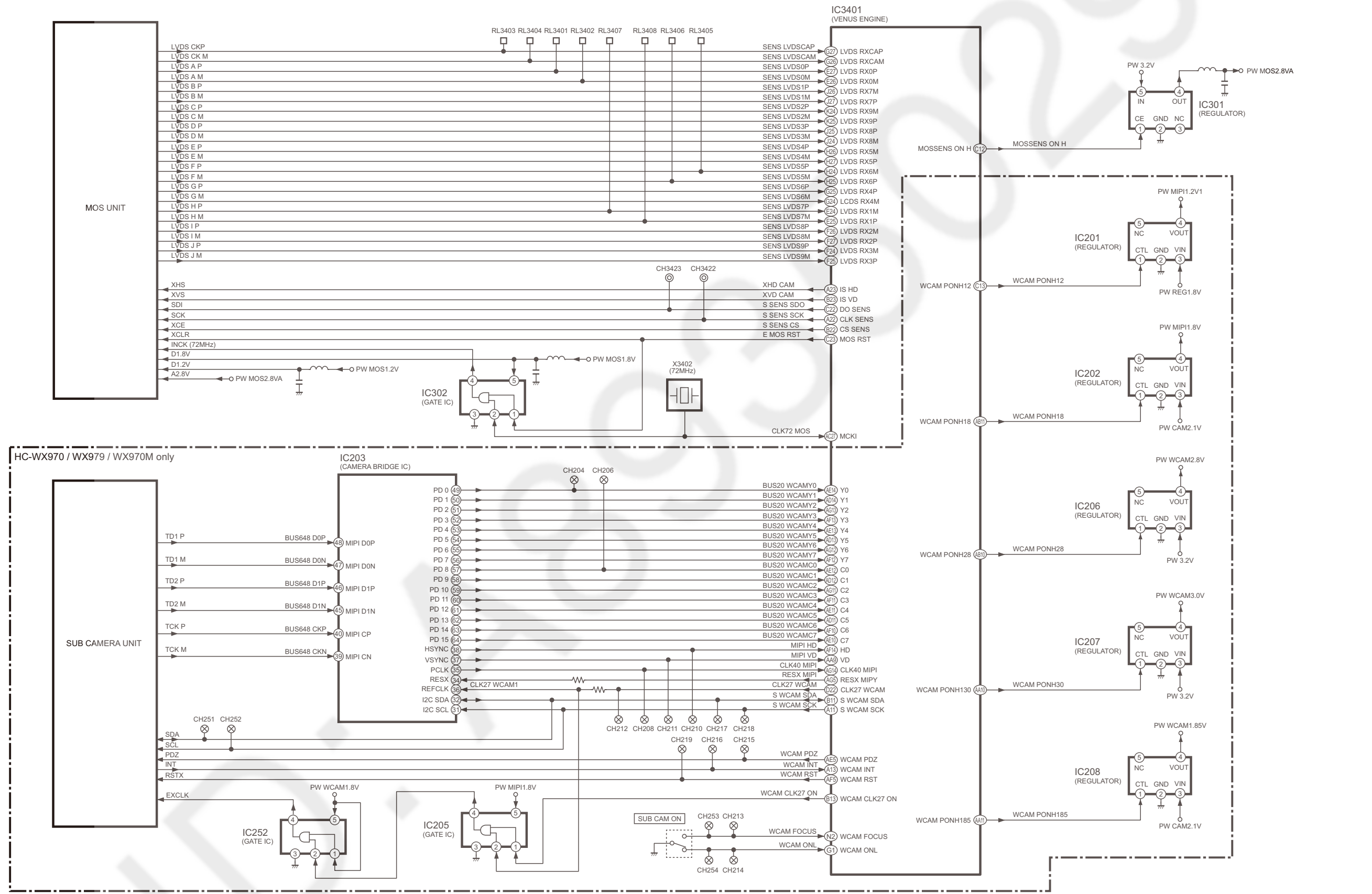
# 11 Block Diagram

## 11.1. Overall Block Diagram



HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 OVERALL BLOCK DIAGRAM

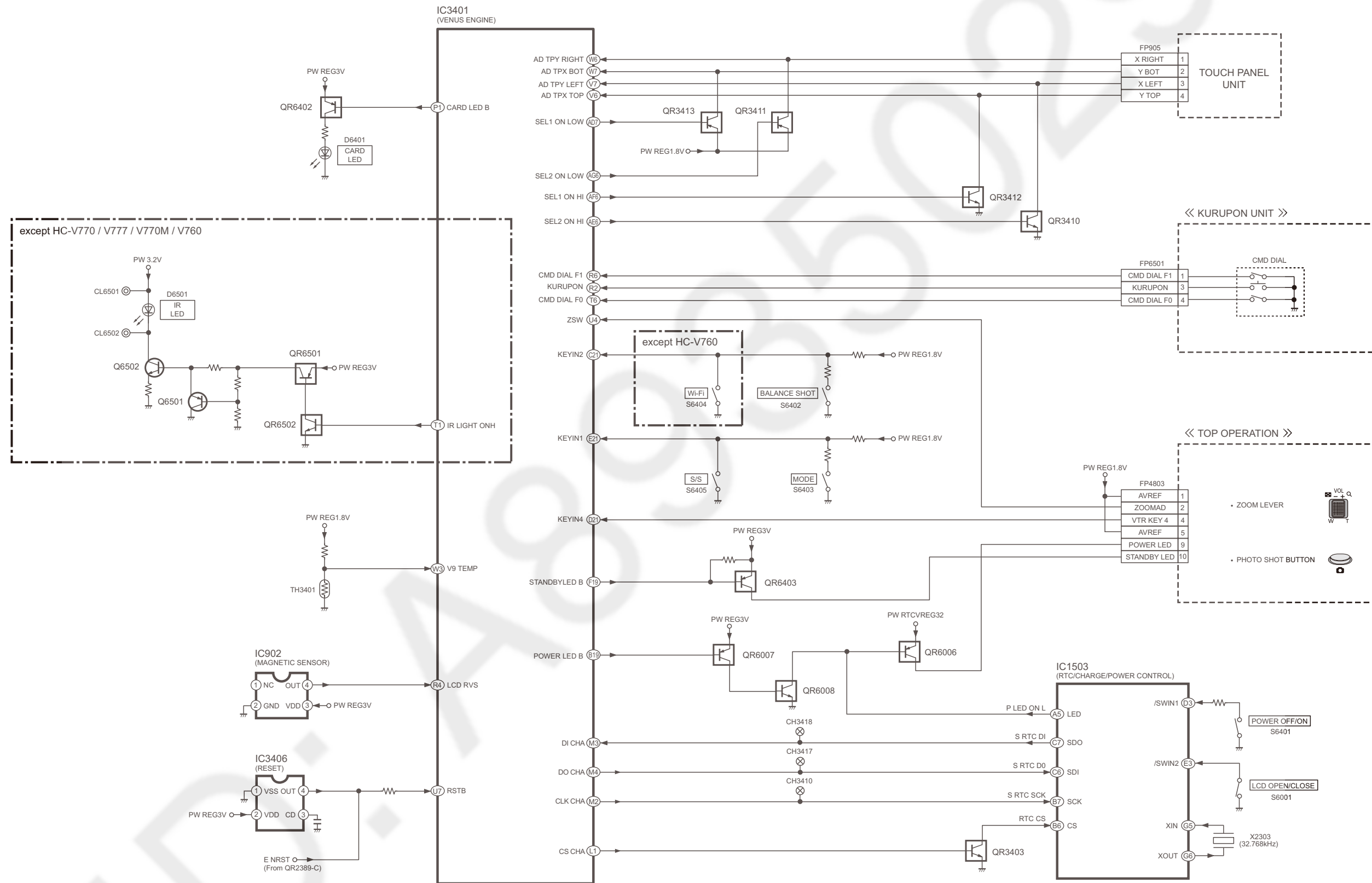
## 11.2. Camera Circuit Block Diagram



HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 CAMERA CIRCUIT BLOCK DIAGRAM

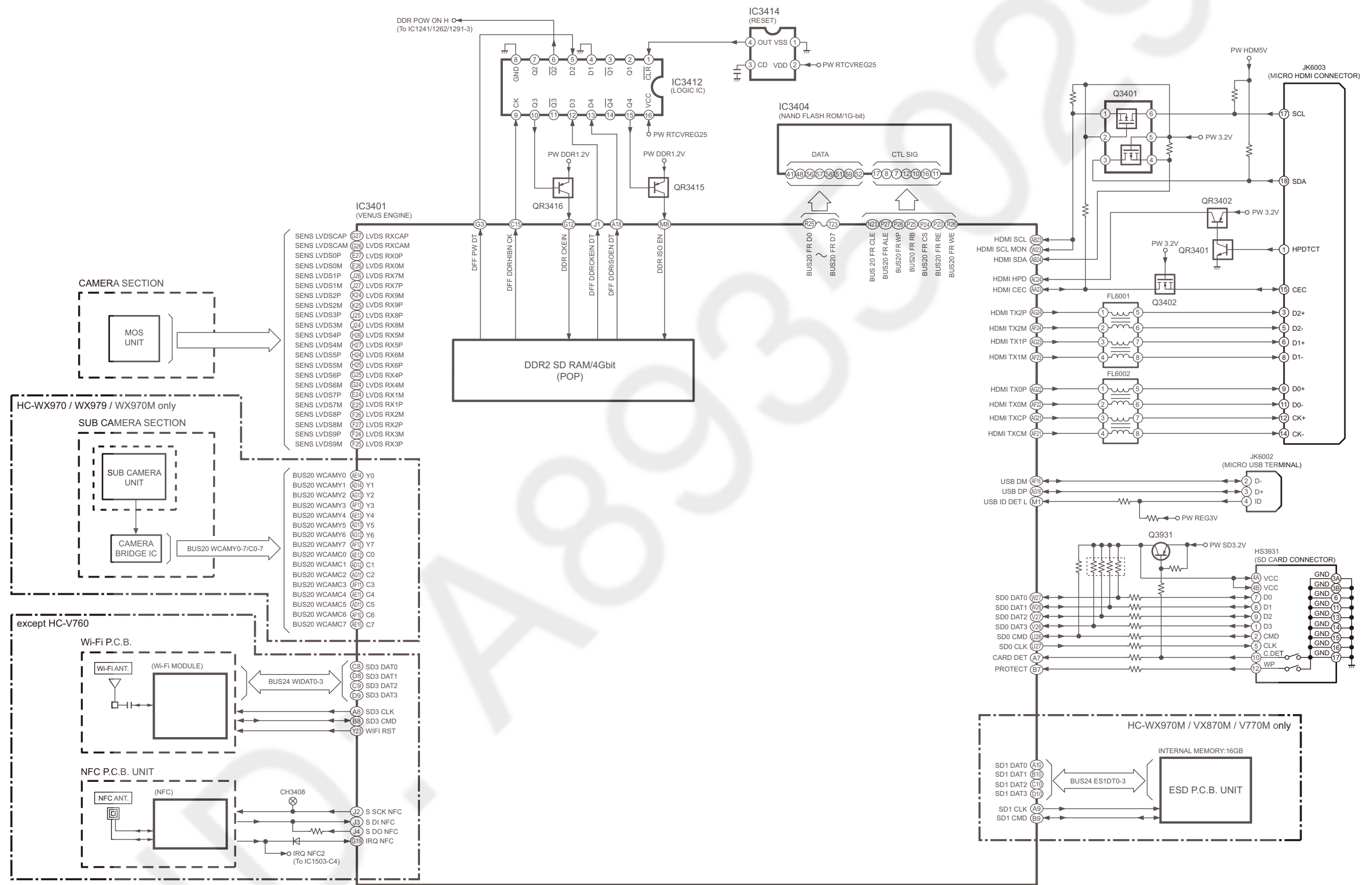


### 11.3. System Control Circuit Block Diagram



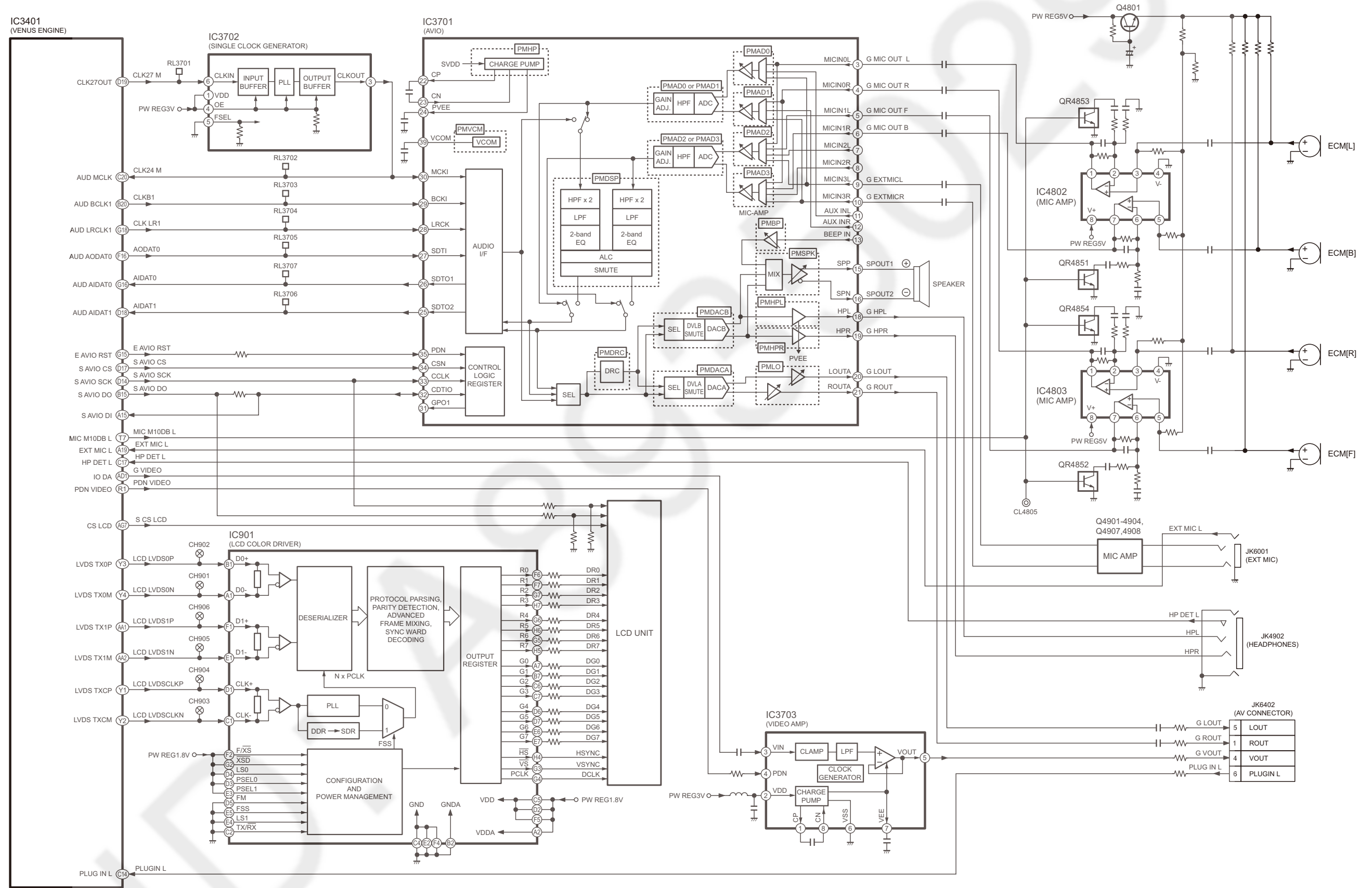
HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 SYSTEM CONTROL CIRCUIT BLOCK DIAGRAM

# 11.4. Video/Audio Signal Process(1) Circuit Block Diagram



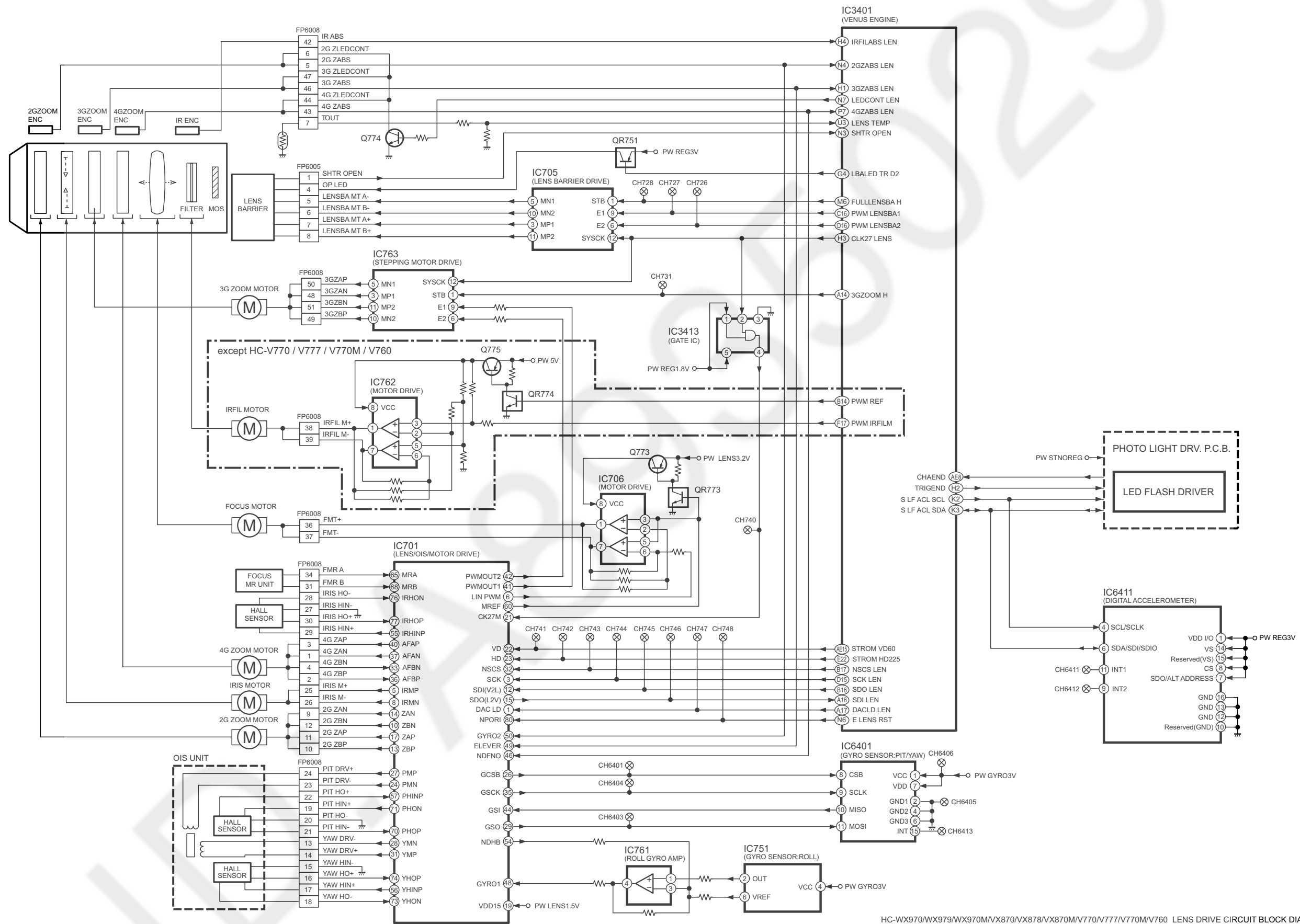
HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 VIDEO/AUDIO PROCESS(1) CIRCUIT BLOCK DIAGRAM

# 11.5. Video/Audio Signal Process(2) Circuit Block Diagram



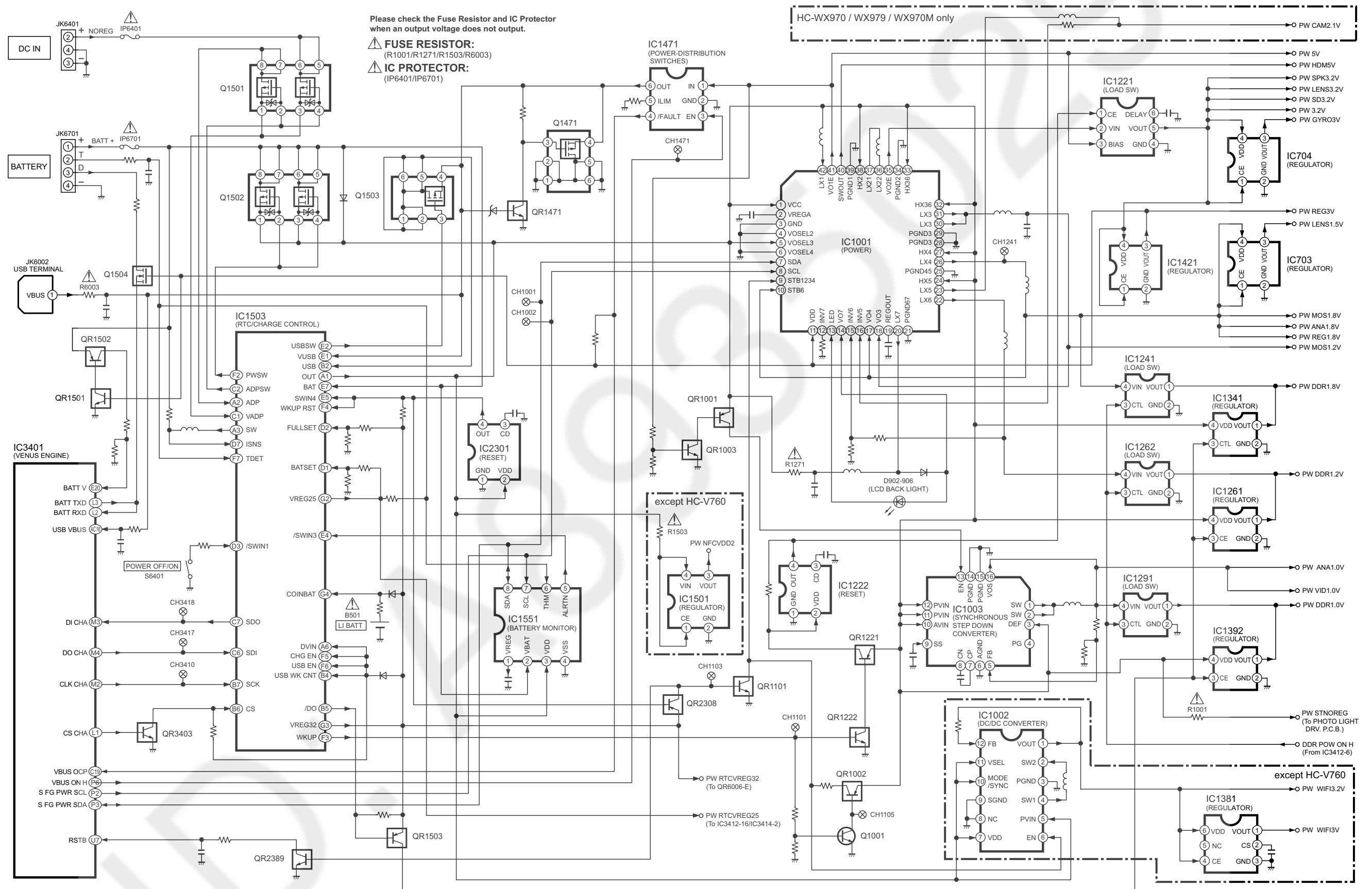
HC-WX970/WX979/WX970M/VX870/VX878/VX870M/N770/V777/N770M/N760 VIDEO/AUDIO PROCESS(2) CIRCUIT BLOCK DIAGRAM

# 11.6. Lens Drive Circuit Block Diagram



HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 LENS DRIVE CIRCUIT BLOCK DIAGRAM

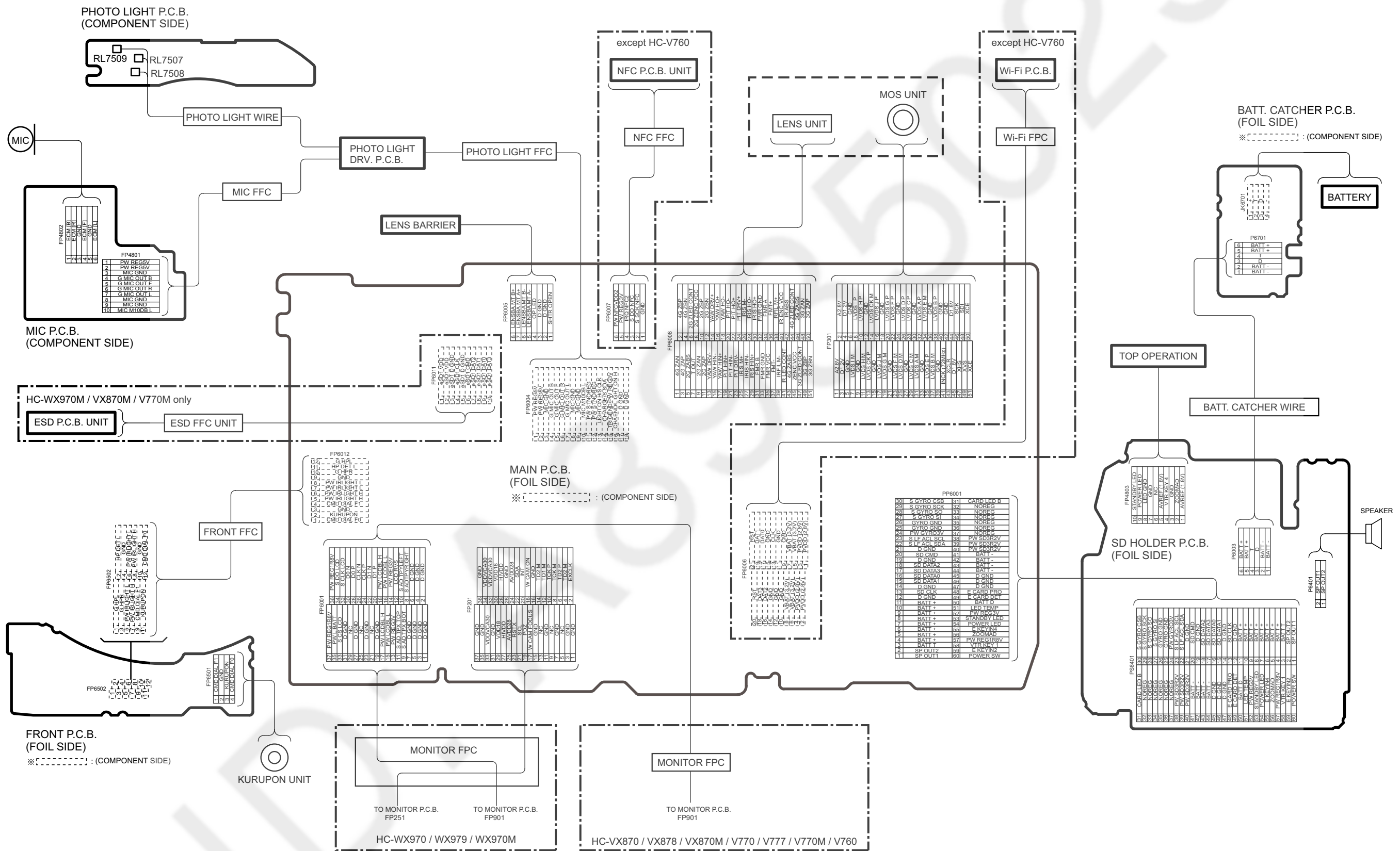
### 11.7. Power Supply Circuit Block Diagram



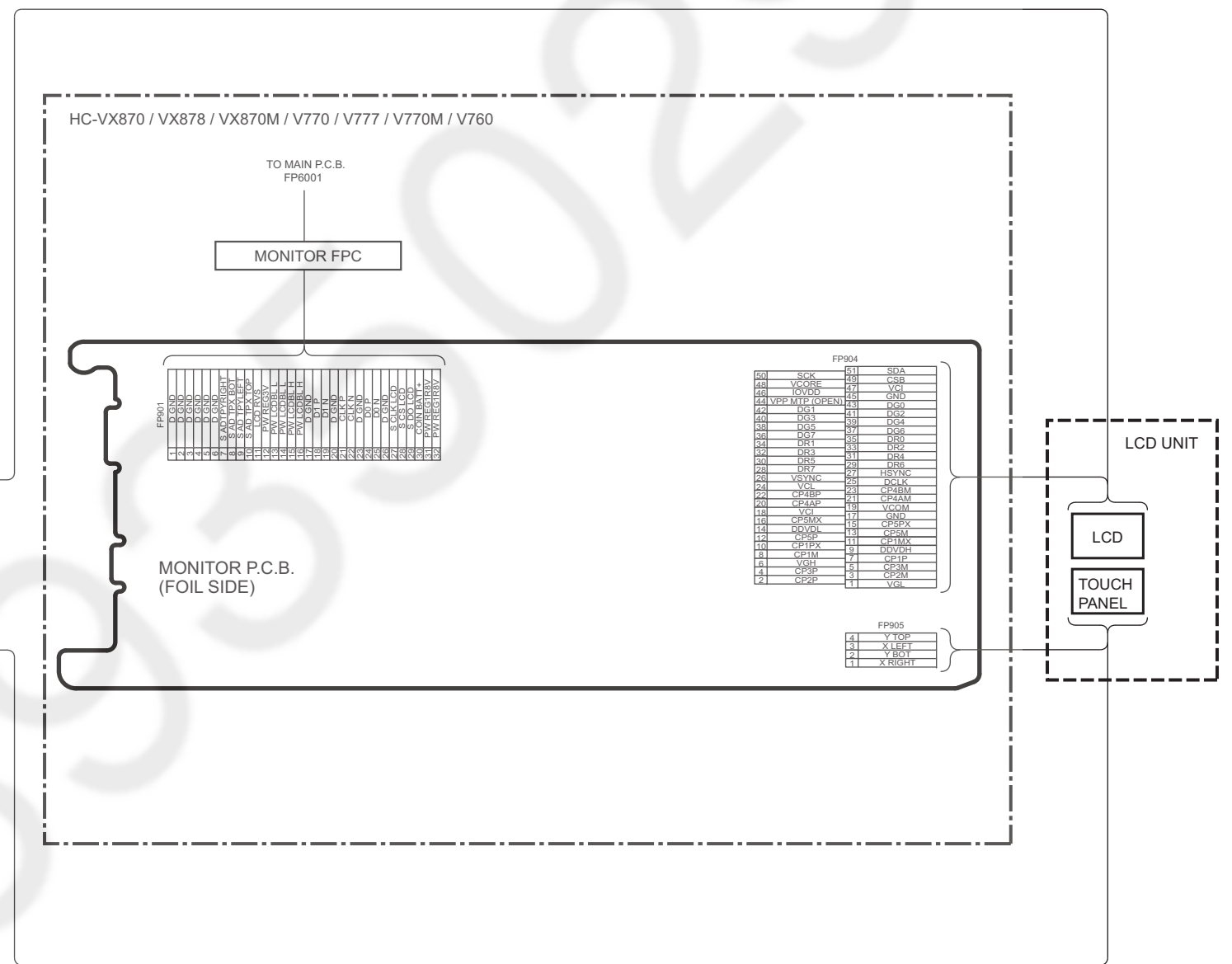
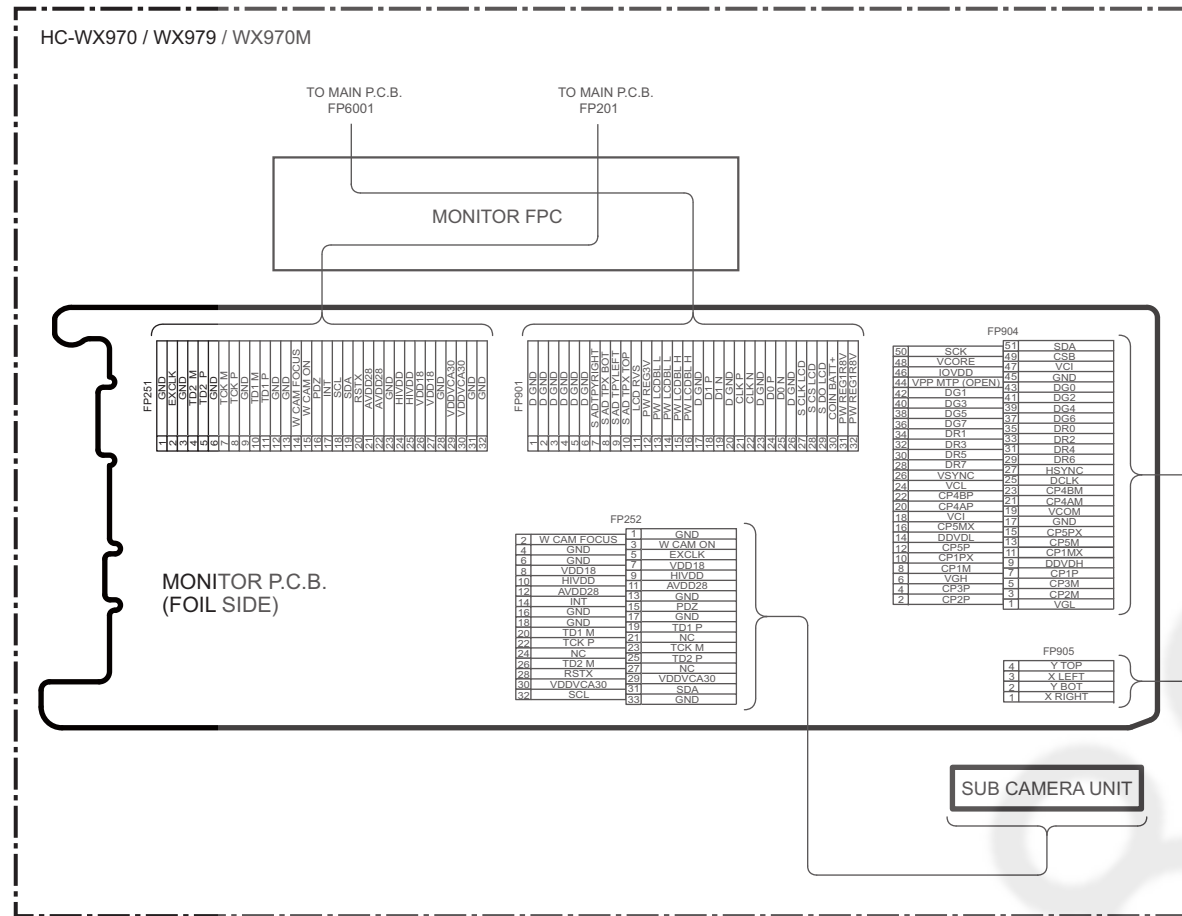
HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V771/V770M/V760 POWER SUPPLY CIRCUIT BLOCK DIAGRAM

# 12 Wiring Connection Diagram

## 12.1. Interconnection Diagram



HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 INTERCONNECTION DIAGRAM (1)



HC-WX970/WX979/WX970M/VX870/VX878/VX870M/V770/V777/V770M/V760 INTERCONNECTION DIAGRAM (2)