Technical Information
Samsung WB2000

Samsung camera

Contents

Part 1. Firmware

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1. Firmware

• **Checking Firmware**

Initialization

1. Turn on the Camera

2. Press and Wide Button + Down and then press the Power OFF.

②Power Off   ①Wide + Down

3. Turn on the camera and check whether the camera is reset or not.

1. Firmware

• Checking Firmware

Checking version

1. Power source should be full-charged battery.

2. Remove the memory card from the camera & turn off the camera.

3. Press and Down Button + Shutter button and then press the Power ON.

②Power On   ①Shutter + Down

4. After checking Firmware version, turn off the camera.

1. Firmware

• **Upgrading Firmware**

General Firmware

How To Upgrade Firmware

Firmware File Construction :

- Code Area : Being Included Operation codes for camera driving.

- Partition[1:3] : Being Included all kind of resources for camera driving.
  => Defective Pixel & Lens shading adjustment data goes to save in Partition3.

- User Area : Being saved all setting data while customer played their camera function,
  and other adjustment data, also.

Code	Partition 1	Partition 2	Partition 3	User Area

▷**[Reference] General F/W**

- **Upgrading the general firmware means that real action is occurred on**
  "Code" area + "Partition[1:2]" .
- **Do not change what saved on "User Area" & "Partition3"**

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1. Firmware

1. Insert the memory card included F/W file & Upgrading script file.

    * Being asked 2 files for FW Upgrading, those are F/W data file & Upgarding Script file.

    * Recommendation: When do the upgrading process, whole data should be back-up before.

        (Otherwise, whole data saved in Flash Memory will be deleted.)

2. Use the AC adapter or a fully charged battery.

    * To upgrade the firmware, the battery level indicator on the LCD monitor must be full (level three).

3. Turn on the camera.

Power On

4. The version of the FW to upgrade will be displayed on the LCD screen. When you press

the SHUTTER button, the FW upgrade will start.

Firmware is updating...

DSC   : up 911271 -> 1001071
OIS   : 0.9
FPGA   : 15.15

Press the Shutter button to upgrade the
firmware.

5. The progress of the FIRMWARE upgrade will be displayed on the LCD and the upgrade will proceed.

6. When the upgrade is completed, the camera will automatically be turned off.

1. Firmware

• **Upgrading Firmware**

Full Firmware

How to do Full Ver F/W upgrading

Firmware File Construction :

- Code Area : Being Included Operation codes for camera driving.

- Partition[1:3] : Being Included all kind of resources for camera driving.
    => Defective Pixel & Lens shading adjustment data goes to save in Partition3.

- User Area : Being saved all setting data while customer played their camera function,
             and other adjustment data, also.

Code	Partition 1	Partition 2	Partition 3	User Area

▷**[Reference] Full F/W**

- **Upgrading the general firmware means that real action is occurred on "Code" area +
    "Partition[1:2]" .**
- **Do not change what saved on "User Area" & "Partition3"**

1. Firmware

▷**[Reference] Full F/W**

- Upgrading Full Firmware means that real action is occurred on "Code" area + "Partition[1:3]"

- Some adjustment data saved on "User Area" will not be changed.

- Defective Pixel & Lens Shading adjustment data have to be reset,
    cause those files are saved on Partition3. Do not forget to re-adjust or do the back-up process for
        adjustments so that previous adjustment files are restored.

- While done the FULL F/W upgrading, adjustment files will be saved into the external memory card,
    automatically. Then, do uploading those adjustment files according to below steps. (No.1 ~ No.7)

- Automatically saved files into the external memory card
    : LSCLUT0.BIN, DefectivePixel0.bin, DefectivePixel1.bin (3 types)

1. Firmware

1. Insert the memory card included F/W file & Upgrading script file.

     * Being asked 2 files for FW Upgrading, those are F/W data file & Upgarding Script file.

     * Recommendation: When do the upgrading process, whole data should be back-up before.

         (Otherwise, whole data saved in Flash Memory will be deleted.)

2. Use the AC adapter or a fully charged battery.

     * To upgrade the firmware, the battery level indicator on the LCD monitor must be full (level three).

3. Turn on the camera.

Power On

4. The version of the FULL FW to upgrade will be displayed on the LCD screen.

5. To start the upgrading process, press the Shutter button.
   Then, process will be done, automatically.

5-1. Before done the Full F/W upgrading,
   being done some adjustment files are back-up to the external memory card,
automatically.

The calibration data is backed up.

5-2. Then, Full F/W upgrading also will be progressed. (Blinking the Green LED)

5-3. When the FULL FW upgrade is complete, the camera will automatically be turned off.

1. Firmware

6. To recover the adjusted data backed up, turn on the power of the camera again and press the shutter button (S1).

7. When you press the shutter button when the below screen is displayed, the adjusted data will be recovered.

8. When the adjusted data is recovered, the unit will standby in Power OFF condition.
   (Press the POWER button turn off the power.)

9. Check whether the adjusted data is recovered from the screen to check the firmware version.
(Each item – OK)

1. Firmware

▷ **FPGA Firmware**

1. Insert SD card with 2 FPGA FW files in the camera.

2. Use AC adaptor or fully recharged battery.
   The firmware can be upgraded only when the battery level indicated is full (with 3 bars).

3. Turn the camera on.

Power On

4. FPGA FIRWARE PROCESS is displayed on LCD and upgrade is carried out.
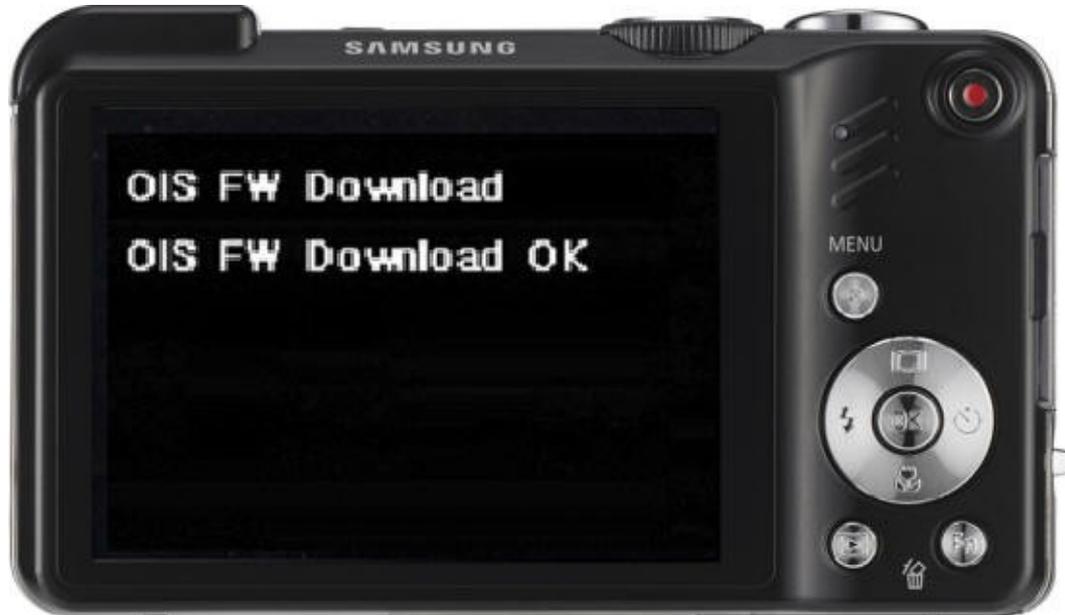
5. Once upgrade is completed, the camera is automatically off.

1. Firmware

▷ **Animation Firmware**

1. Insert SD card with 2 Animation FW files and Script in the camera.

2. Use AC adaptor or fully recharged battery.
   The firmware can be upgraded only when the battery level indicated is full (with 3 bars).

3. Turn the camera on.

4. Animation FIRWARE PROCESS is displayed on LCD and upgrade is carried out.

5. Once upgrade is completed, the camera is automatically off.

2. Adjustment

• **Basic Information of Adjustment**

Adjustment Caution

You have to make adjustments for each feature after replacing an electronic item in the WB 2000.

The following table represents necessary adjustments for each item replacement.

1. Adjust for each feature after replacing an electronic item, referring to the following table.

	MAIN PCB	POWER PCB	BARREL ASSY	CCD ASSY
FIRMWARE UPGRADE	●		●	
PUNT ADJ	●		●	●
SHUTTER CLOSE TIME, OB, LENS SHADING	●		●	●
FLASH ADJ	●	●		●
BATTERY LEVEL ADJ	●	●		
BURNING TEST & CCD DEFECT CELL	●	●	●	●
SERIAL NUMBER WRITING	●			
EEPROM READ				
EEPROM WRITE				

2. Adjustment Equipment

- AE TESTER : AE Tester supporting LV 12

- Infinitive collimator for PUNT adjustment.

- Gray Chart for FLASH & AWB adjustment.(18%) , DARK BOX

- POWER SUPPLY : 4.2V/2A

3. Adjustment program file

For each of the adjustments, copy the program for each of the adjustments into the
External Memory card.
The file names for each adjustment are the same as **"WB2000_ADJ.TXT."**

4. Adjustment Flow Chart


```
        Insert the SD card for the corresponding adjustment.
                              │
                              ▼
               Turn the power on. (Engineer)
                              │  Boot Up
                              ▼
        Automatically Test mode enter / adjustment script performance
                              │
                              ▼
   OK                 ◇ Check the Adjustment ID ◇                 NG
   │                                                              │
   ▼                                                              ▼
Inspection for each adjustment              Mark the last adjustment ID that
   │                                        has been completed normally.
   ▼                                                              │
Record a log file for each                                        │
adjustment (if necessary)                                         │
   │                                                              │
   OK          ◇ Determines whether it is Good or Bad. ◇    NG    │
   │                                                        │     │
   ▼                                                        ▼     │
Save the adjustment value              Save the adjustment value into
into the EEPROM.                       the EEPROM (if necessary)        │
   │                                                        │     │
   ▼                                                        ▼     │
The adjustment value, and whether it is   The adjustment value, and whether it is
OK or not, is displayed on the LCD.       OK or not, is displayed on the LCD.     │
   │                                                        │     │
   ▼                                                        │     │
Set the adjustment ID                                       │     │
(EEPROM)                                                    │     │
   │                                                        ▼     │
   ▼                                                              │
The camera is automatically             Turn the power          ◄─┘
turned off or stays on.                 off or wait.
```

2. Adjustment

• **OB Setting ADJ**

Defines the valid data range of conditions with low brightness by precisely determining the low signal level from the input signals by carrying out OB settings for preview and capture respectively.

< Adjustment Procedures >

a...Save the corresponding adjustment file into the External Memory card.

b...Put in the External Memory card containing the program file and turn the camera on.

c...The adjustment is conducted automatically.

① Check the brightness value for the preview with the shutter closed, and find an OB value by referring to the brightness value for the preview.

② Write the result of the adjustment value for the preview OB in the data file by referring to the CARD WRITE data.

③ Write the adjustment value for the preview in the EEPROM by referring to the EEPROM WRITE data.

2. Adjustment

④ Check the brightness value for capture with the shutter closed, and find an OB value
by referring to the brightness value for the preview.

⑤ Write the result of the adjustment value for the capture OB in the data file
by referring to the CARD WRITE data.

⑥ Write the adjustment value for the preview in the EEPROM
by referring to the EEPROM WRITE data.

⑦ Change the ISO and repeat steps 4 to 6.

d...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• **Lens Shading Adjustment**

Adjust the lens shading for the brightness of the periphery of the lens for each camera.

Brighten the periphery of the lens by adjusting its brightness per set,

since the brightness of the periphery of the lens per set is darker than the center.

< Adjustment Procedures >

a...Prepare the AE Tester.

   * The luminance specification for the Light Source Box is 12 LV.

   * The position of the Light Box is 10mm±1mm when the lens barrel is opened.

   * The Color Temperature of the Light Box is 3400K(± 200)..

b...Save the corresponding adjustment file into the External Memory card.

c...Insert the External Memory card containing the program file into the camera
and set the camera for the AE Tester.

Light source box

Camera

d...Mount the camera onto the AE meter and adjust the LV value to **12**.

2. Adjustment

e...If you turn the camera on, the adjustment is progressed automatically.

① Adjust the lens shading at the zoom "0" of the aperture.

② Write the result of the adjustment value in the EEPROM
by referring to the EEPROM WRITE data.

③ Write the result of the adjustment value in the data file
by referring to the CARD WRITE data.

④ Set the lower and upper specifications.

f...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• **Shutter Close Adjustment**

You can adjust the close timing of the camera's mechanical shutter.

Compensate for a particular camera's shutter timing deviation because each individual camera is different.

The AWB Low item and CCD Gain item are adjusted simultaneously.

< Adjustment Procedures >

a...Prepare an AE Tester that supports LV 12.
b...Place the camera onto the AE Tester.

Light source box
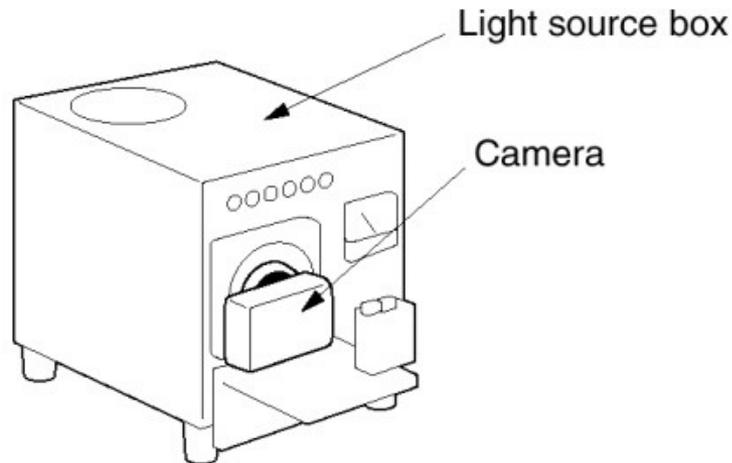
Camera

* The luminance specification for the Light Source Box is **12 LV**.
* The Colour Temperature of the Light Box is **3400K(± 200)**.

2. Adjustment

c...Put inl the External Memory card containing the program file and turn the camera on.

d...The adjustment is conducted automatically.

① Check the number of maximum adjustments which have been set,
and adjust the shutter closing time.

② Carry out inspection by referring to the specifications for brightness.
- The line delay and sub delay are adjusted to find the appropriate values
for the specifications for brightness.

③ If the result of the line delay falls within the min. to max. range,
treat it as if it is OK. Otherwise treat it as if it is NG.

④ Write the adjustment value in the EEPROM by referring to the EEPROM WRITE data.

⑤ Write the result of the adjustment value in the data file by referring to the CARD WRITE data.

e...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• CCD GAIN Adjustment

There are a difference for CCD saturation level upon CCD set.

That why we adjust the basic analog gain value for reducing the brightness difference value upon each samples.

< Adjustment Procedures >

a...Prepare the AE TESTER.

  * The luminance specification for the Light Source Box is 12 LV.
  * The position of the Light Box is 10mm±1mm when the lens barrel is opened.
  * The Color Temperature of the Light Box is 3400K(± 200).

b...Save the corresponding adjustment file into the External Memory card.

c...Insert the External Memory card containing the program file into the camera
   and set the camera for the AE Tester.

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2. Adjustment

Light source box
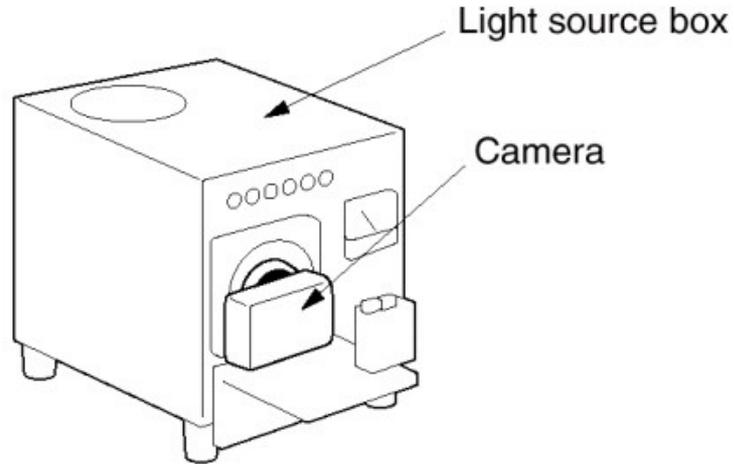
Camera

d...Mount the camera onto the AE meter and adjust the LV value to 12.

e...If you turn the camera on, the adjustment is progressed automatically.

① Adjust the Gain adjustment.

② Write the result of the adjustment value in the EEPROM
   by referring to the EEPROM WRITE data.

③ Write the result of the adjustment value in the data file
   by referring to the CARD WRITE data.

④ Set the lower and upper specifications.

2. Adjustment

f...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• **Flash Adjustment**

Limit range of brightness of the flash in order to identify hardware defects.

Fires the flash 2 times in order to identify cameras that are out permitted specification range, and acquires the R and B gain of the flash. AWB HIGH will be adjusted at the same time.

< Adjustment Procedures >

a...Put up a piece of 18% Reflector Paper in the darkroom (Dark box).

b...Set the camera up in a darkroom, using a tripod.

c...Set the distance between the Reflector Paper and the camera at **50cm**.
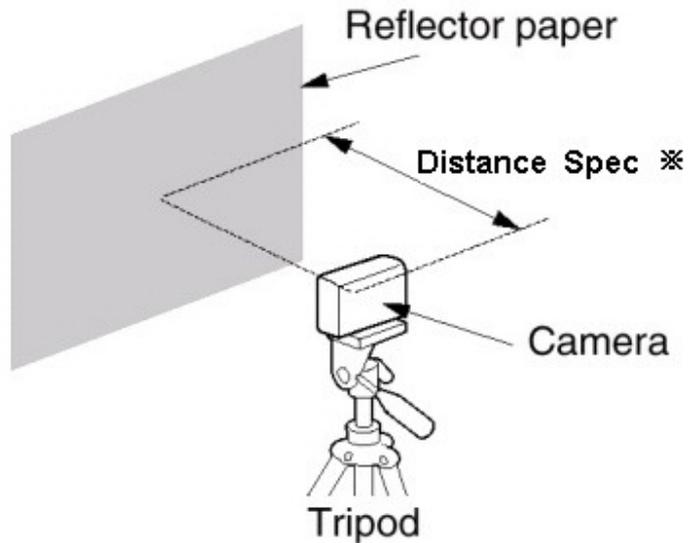
d...Save the corresponding adjustment file into the External Memory card.

e...Put inl the External Memory card containing the program file and turn the camera on.

2. Adjustment

f...The adjustment is conducted automatically.

① Flash 2 times & determine whether or not it is good compared
    to each standard brightness.

② Determine whether or not it is good after checking the R and B gains,
    with average value for 2 times flashing.

③ Write the R and B gains in the EEPROM if the R and B gains,
    as well as the flash process, are successful.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• **PUNT Adjustment**

Objective : Determine the searching range of the AF for optimal focus control of the
   barrel,
            after replaced Main PCB & Barrel

Required Equipment : Infinite Collimator

< Adjustment Procedures >

1. Save the corresponding adjustment file into the External Memory card.

2. Do the focus adjustment according to the below standard.

[2-1] Standard for Infinite Collimator

-. Set the brightness of Collimator as 6 LV.

-. Set the Camera Lens to infinite Collimator' lens into 1cm less.

-. Do not touch the camera body while done the adjustment process.

Infinity Callimator
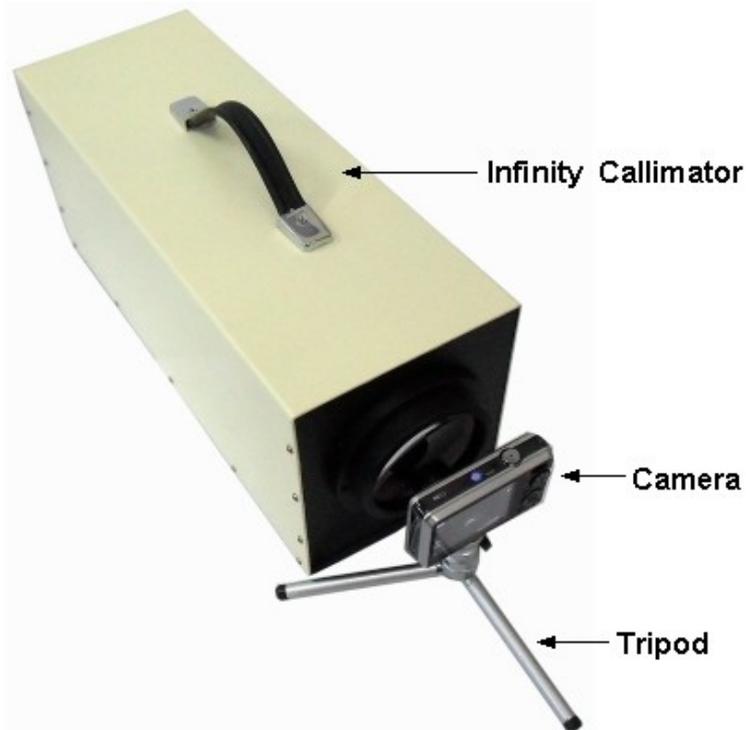
Camera

Tripod

2. Adjustment

[2-2] Standard for Infinite object

-. Set the camera body on the tripod.

-. Head the camera lens to an object put an infinite distance or over 500m. (Without Chart)

-. Choose the object having high contrast value, building etc

Liveview Window(LCD)

AF(PUNT) Window

0.18V

0.18H

V

H

An object should be located on an area, within 20% of the center position

Camera

Tripod
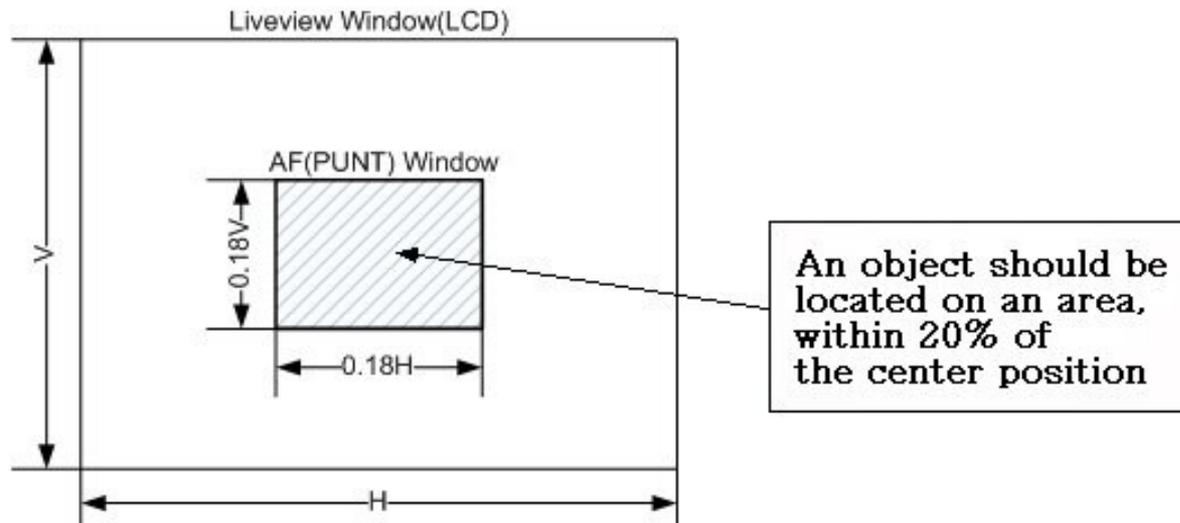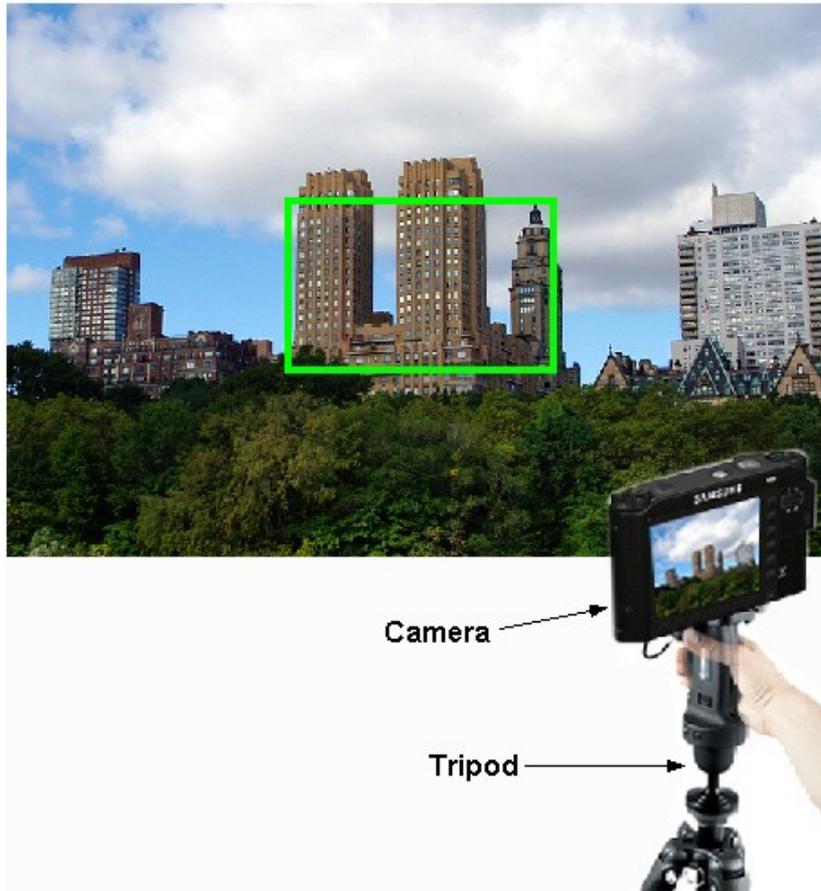
◻ Caution
Avoid the whole-glass building or what having low contrast value as an object,
and do not operate focus adjustment at night.

If being operated the focus adjustment with upper condition,
then the result will not be correct. (e,s Tele or Macro status)

2. Adjustment

3. Turn the camera on.

4. The adjustment is conducted automatically.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

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2. Adjustment

• B/T LEVEL TEST

You can adjust the voltage threshold for the battery level indicator.

< Adjustment Procedures >

a...Prepare the power supply.

b...Connect the power supply and the camera using the battery jig.

c...Set the voltage to 4V.

d...Save the corresponding adjustment file into the External Memory card.

e...Put in the External Memory card containing the program file and turn the camera on.

2. Adjustment

f...The adjustment is conducted automatically. Blank screen will be displayed during the adjustment.

① Carry out A/D conversion with the power on.

② Measure a value for A/D conversion for supply voltage,
and check if the value for A/D conversion falls within the tolerance range (idle mode).

[Min. A/D conversion value] <= [A/D conversion value for supply voltage] <= [Max. A/D conversion value]

③ Carry out inspection by referring to warnings and specifications for prohibited levels.

④ Write the adjustment value in the EEPROM by referring to the EEPROM WRITE data.

⑤ Write the result of the adjustment value in the data file by referring to the CARD WRITE data.

g...When the adjustment is complete, the camera will automatically be turned off.

2. Adjustment

• **CCD Defect Pixel Adjustment**

You can compensate for any defective CCD pixels in the camera.

< Adjustment Procedures >

a...Save the corresponding adjustment file into the External Memory card.

b...Put in the External Memory card containing the program file and turn the camera on.

c...The adjustment is conducted automatically.

   ① Check the reference level and exposure time which has been set,
     and compensate for defective pixels.

   ② Carry out inspection by referring to the specifications (max. number of defective cells).

   ③ Write the number of defective cells in the data file
     by referring to the CARD WRITE data.

d...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment.

2. Adjustment

• **Back Lash Adjustment**

Objective : To adjust the error, occurred while moving the lens inside.

< Adjustment Procedures >

a...Save the corresponding adjustment file into the External Memory card.

b...insert the External Memory card containing the program file into the camera
and turn the camera on.

c...the adjustment is progressed automatically

① Close the Lens barrel.

② PI count error value can be obtained, after completed lens barrel moving
(From Tele to initial status)

③ Get the average value from PI Count error value after repeated same process.

④ Check whether the calculatedavg value is included into the Max_backLash Range.

⑤ After write down the log-file, then shift to Wide status.

d...When the adjustment is complete, the camera will automatically be turned off.

< Adjustment Method >

Open and check a CSV file created in the memory card for adjustment._

2. Adjustment

• Burning Test

This is to detect hardware or software defects in a camera by repeated use of the camera functions.

  a...Save the corresponding adjustment file into the External Memory card.

  b...Put in the External Memory card containing the program file and turn the camera on.

  c...The camera operates automatically in sequence of set functions.

    ① Start booting.

    ② Start the functions after checking the preset repetitive motions cycle
      and the number of functions testing

     - function 1, function 2 and so on (the number is unlimited).

   * Save the completed functions codes and the remaining number of cycles in the
    EEPROM when a functional motion is completed (for malfunction differentiation).

  ☐ EEPROM Address
  ☐ - Mondrian_125uw : Address 744 (burn count) , Address 746 (Completed Cycle)

    ③ After the burning process, the camera turns off automatically.

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2. Adjustment

• IRIS adjustment

Objective : Adjust the close time of the equipment shutter of each camera.
When using the multi-layer iris, there might be deviation in the aperture of each layer.
Therefore, try to reduce the deviation of the aperture of each layer by adjusting each aperture set.

< Adjustment Procedures >

1. Prepare AE TESTER which is adjusted by LV 12.
2. Install AE TESTER on camera.
   * Brightness of the light box is 12 LV.
   * The color temperature of the light box is 3400K(± 200).

Light source box
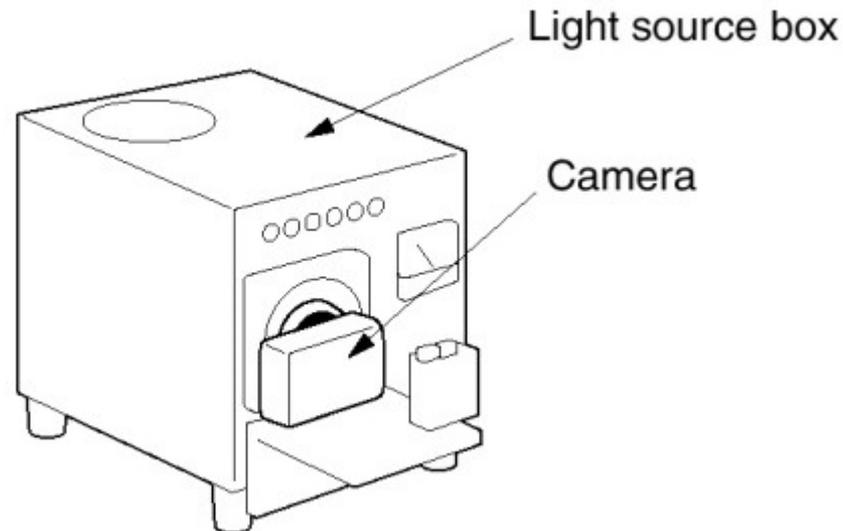
Camera

2. Adjustment

3. Install SD card with program files and then, turn the camera on.

4. Adjustment is made automatically.
   (1) Set an ideal AV value for each iris layer.
   (2) Set the exposure time and the gain value and change the iris layer and measure the preview G value for each iris layer.
   (3) 2 conditions is satisfied, if the preview G value for the big iris layer is bigger than that for the small one. If not, NG.
   (4) Determine if A V value calculated for each iris is within the iris adjustment range. If it is, Preview G value is satisfied. If not, NG.
- If the 2 conditions are satisfied, set the iris value to be actually used using the difference between the AV values of the iris layers calculated.
   (1) Refer to EEPROM WRITE information to write the adjusted value on EEPROM.
   (2)Refer to CARD WRITE information to write the adjusted value on a data file.

5. Once the adjustment is completed, the camera is automatically off.

<Adjustment result>
Open a CSV file created on the adjustment memory card to check the result.

<Restriction>
If the capacity of CSV file is more than 30KB, clear all of the previous data and then, record

2. Adjustment

• OIS Centering adjustment

Objective : Process to check if OIS performs well or not.

<Adjustment method>
1. Save OIS .hex file and script file on SD card.

2. Install SD card with a program file and then, turn the camera on.

3. Adjustment is made automatically.
   OIS module will be operated left/right/up/down 2-3 times.

4. When the adjustment is completed, the camera will be off automatically.

<Adjustment result>
Open the CSV file created on the adjustment memory card to check the result.

2. Adjustment

· **Serial number writing process**

Objective : -Save S/N on the label of the camera in non-volatile memory due to the illegal
distribution of DSC.
-When checking the version, check S/N to see if the camera is original or
illegally distributed one.

\<Caution when repairing\>
Copy the S/N writing script, transfered from scanned data, to camera through USB
Then, S/N writing process will be done, automatically, after disconnected USB cable. S/N writing
script file has deleted automatically, after finished the S/N writing process same with RTC test
script.

\<Process result\>
When checking the version (Press SHUTTER Button + Zoom Button to turn on), S/N appears on
the screen.

3. Disassembly & Reassembly

• **Disassemble Camera**

Caution

    1. Do the disassembling and assembling camera
      where the blocking static electricity mat is on the table.

    2. When handling the major PCBs of camera, please wearing the band
      which cuts off the electric current on the wrist.

    3. When handling the major parts, be careful of below caution.

Parts	Caution
F PCB type	When assembling the F PCB to the CONNECTOR by using pincette, be careful of tearing and hooking.
CCD & IR CUT	Be careful of the handprinting while handling them. Using the pincette which has soft tip. The spot will be shown by using normal alchol when cleaning them. Do the repairing where is no dust.
PCB type	Wearing the band which cuts off the electric current and do the reparing where the blocking static electricity mat is on by preventing the defect of parts.
CONTACT type	Be careful of defect and change by pincette.

3. Disassembly & Reassembly

• **Disassemble Camera**

Procedure of disassembly

1. Remove 2Screws.

2. Remove 2Screws.

3. Remove 2Screws.

4. Separate the Front Cover Assy.

5. Separate the 2Connectors and 2Locks.
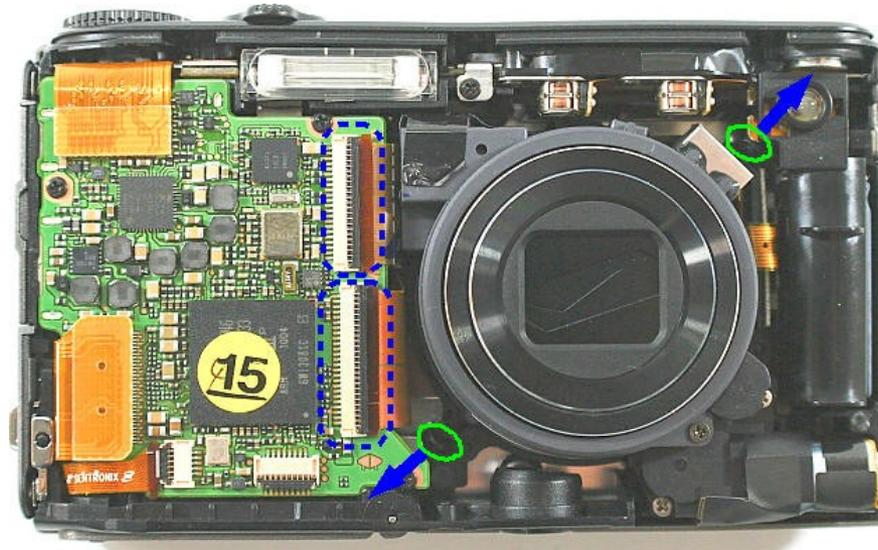
6. Separate the Barrel Assy.
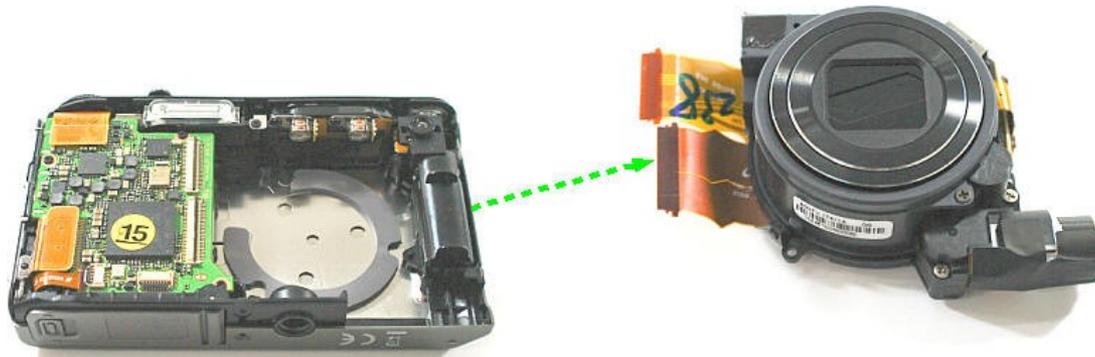
7. Remove 3Screws.
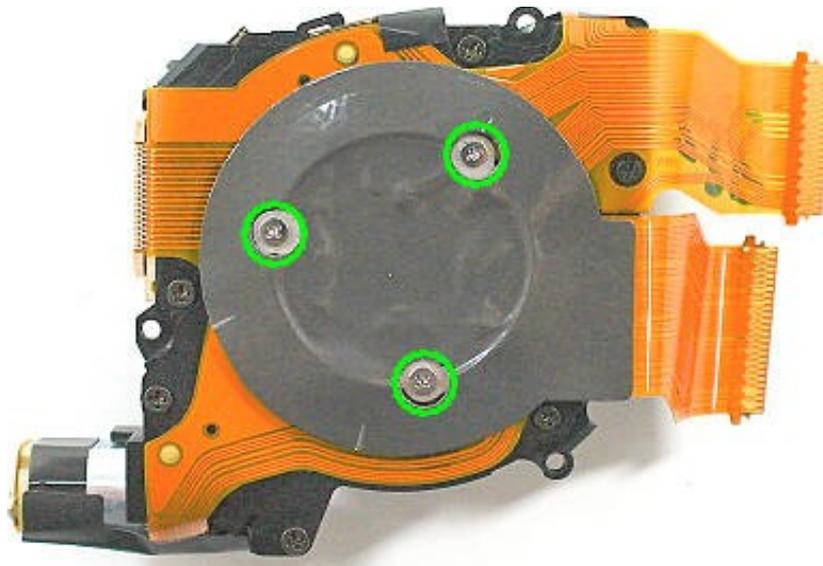
8. Separate the CIS FPCB Assy.
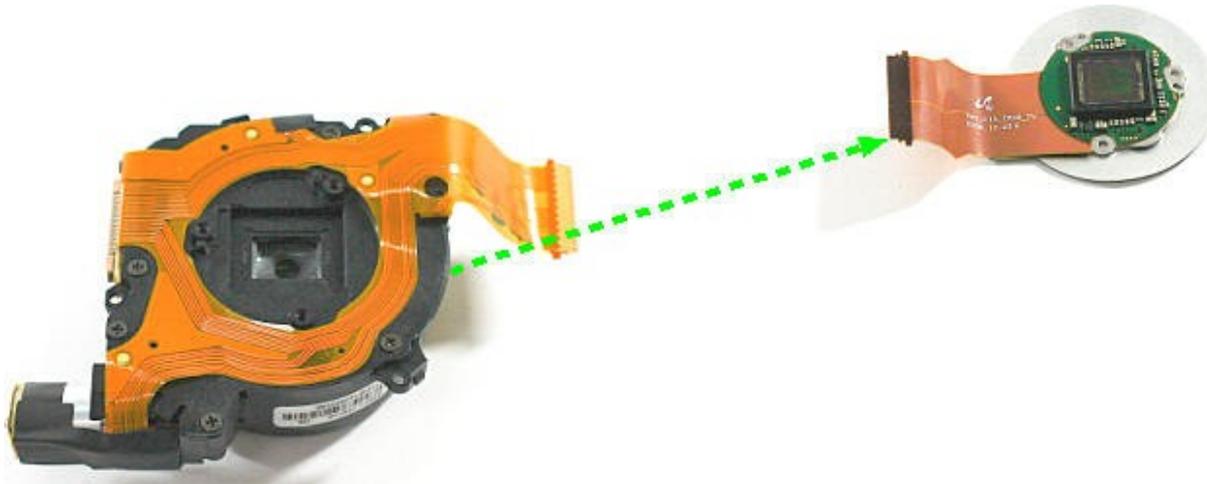
9. Separate the 3Connectors and 3Screws.
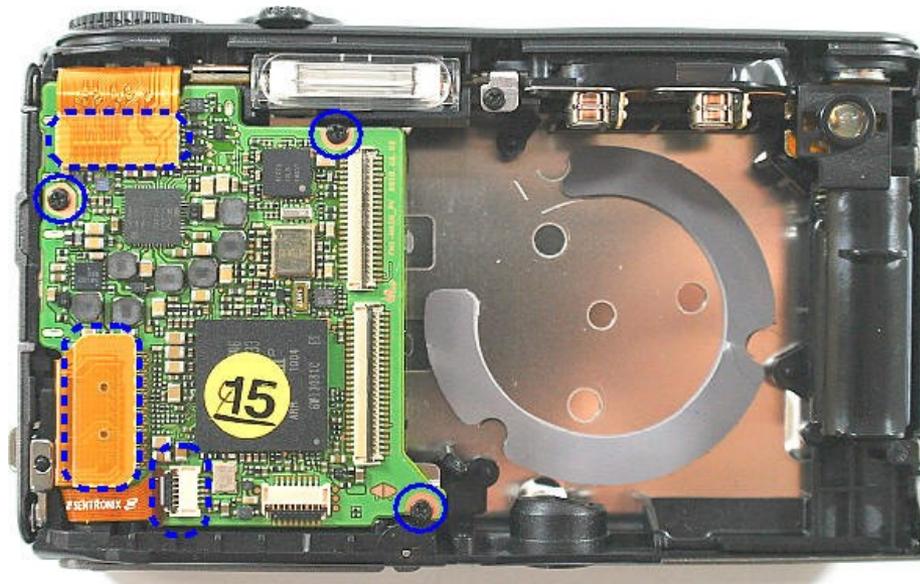
10. Separate the Main PCB Assy.
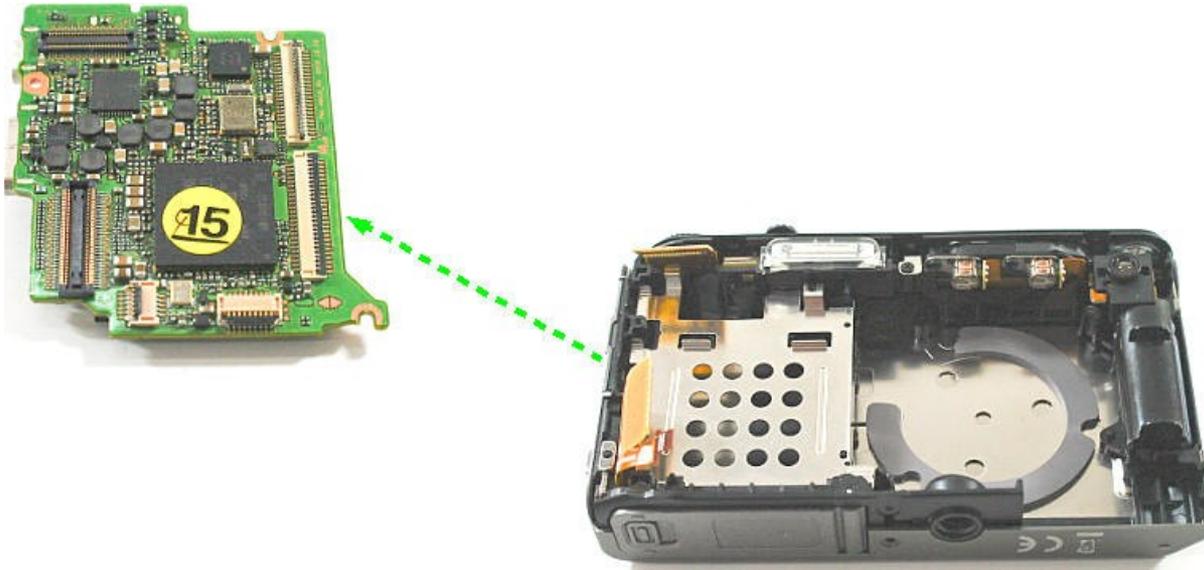
11. Separate the Back Cover Assy.

12. Separate the AMOLED.

13. Remove 1Screw.

14. Separate the Top Cover Assy.
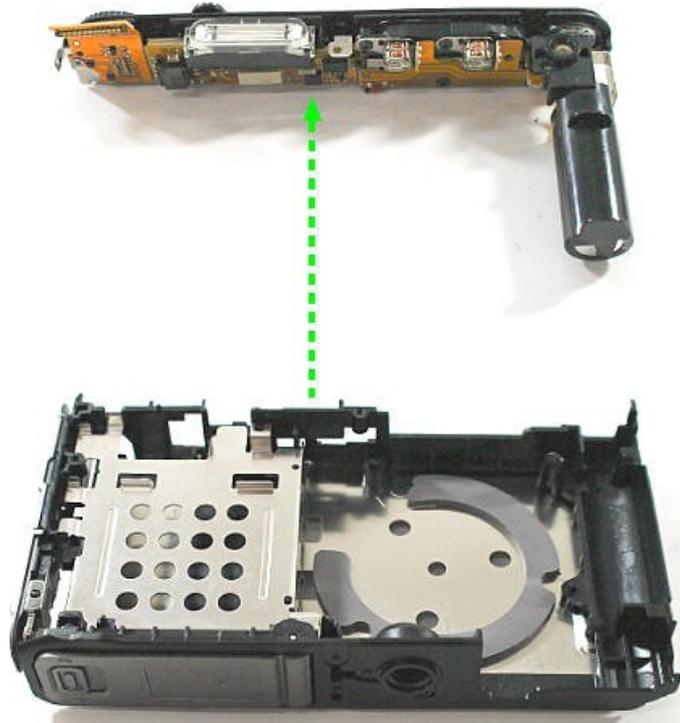
• **Disassemble Barrel**

1. Separate the Connector.

2. Remove 1Screw.

3. Remove 5Screws.
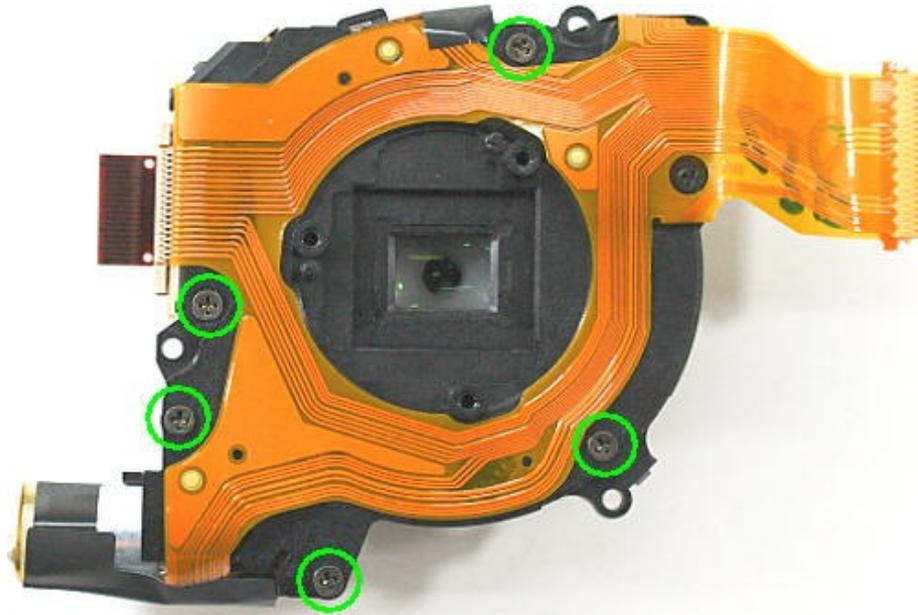
4. Separate the Lens Base Assy.
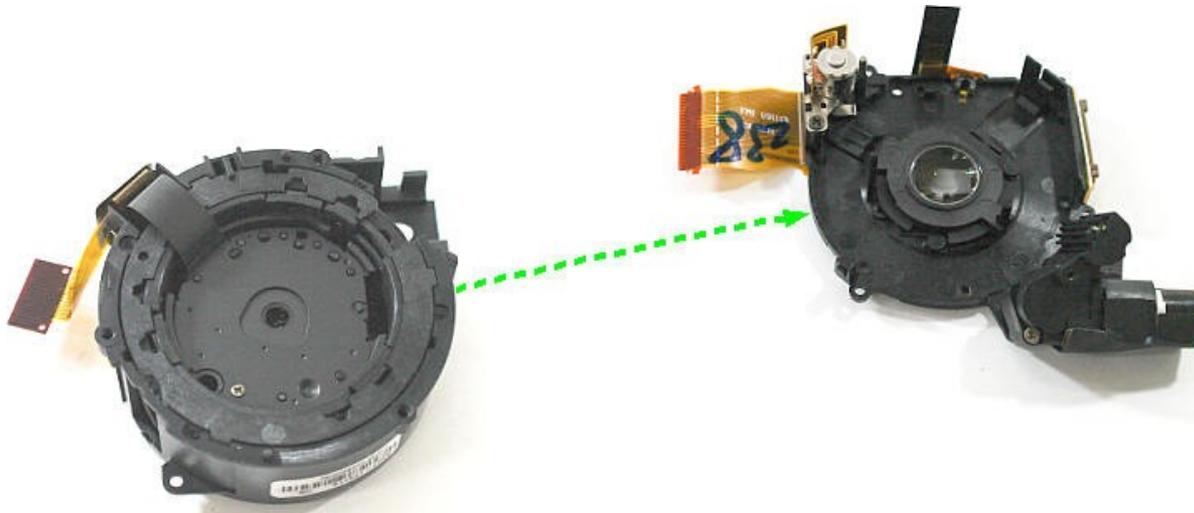
5. Separate the Shutter FPCB.
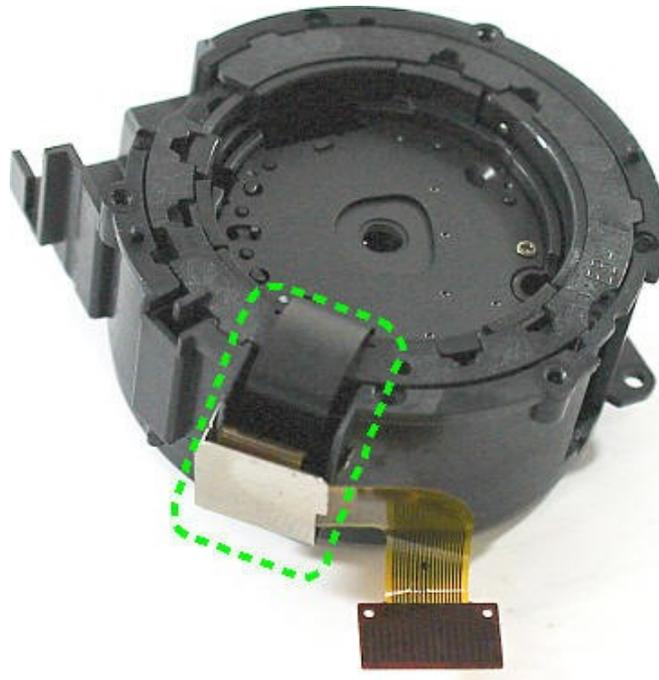
6. Separate the outer guide barrel.

7. Separate the outer guide barrel.
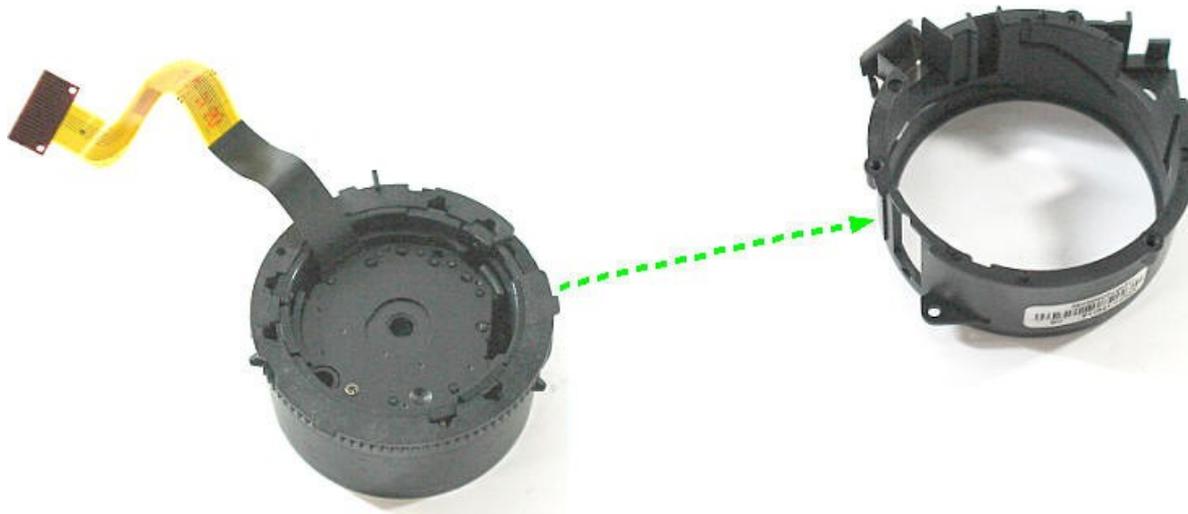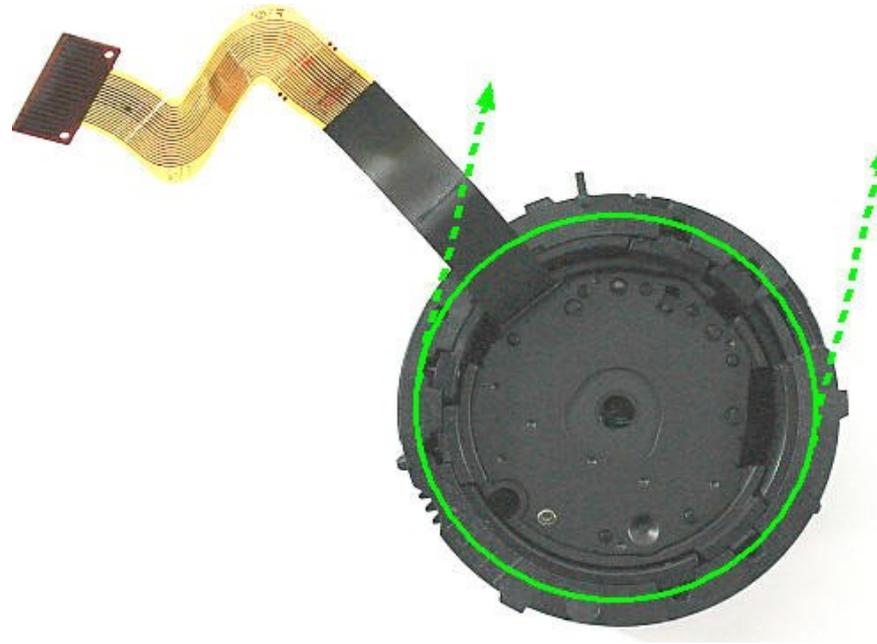
8. Separate the Cam Barrel Assy.

9. Separate the Cam Barrel Assy.

10. Separate the Cam Barrel.

11. Separate the Shutter Assy.

3. Disassembly & Reassembly

• **Assembly of barrel**

    1.   To assemble match the Point "a" & "b".
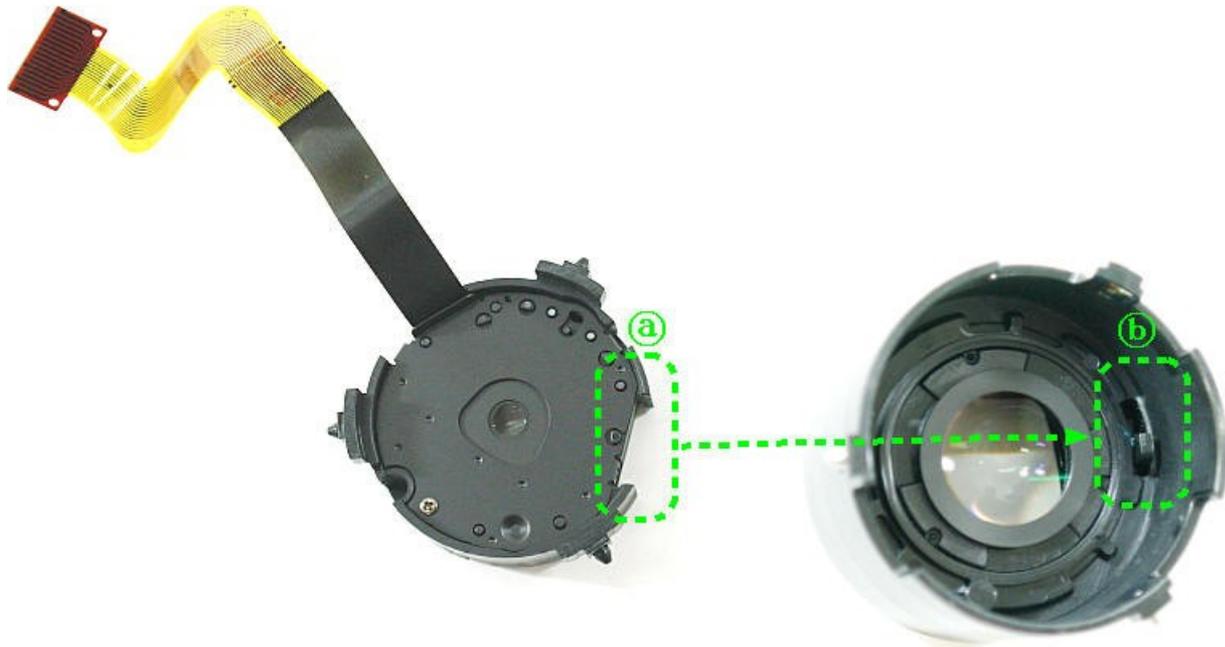
2. This is the assembled state of the Zoom Ring assembly.

3. To assemble match the Point "a" & "b".
   Caution : Be careful about the location of "c", "d"
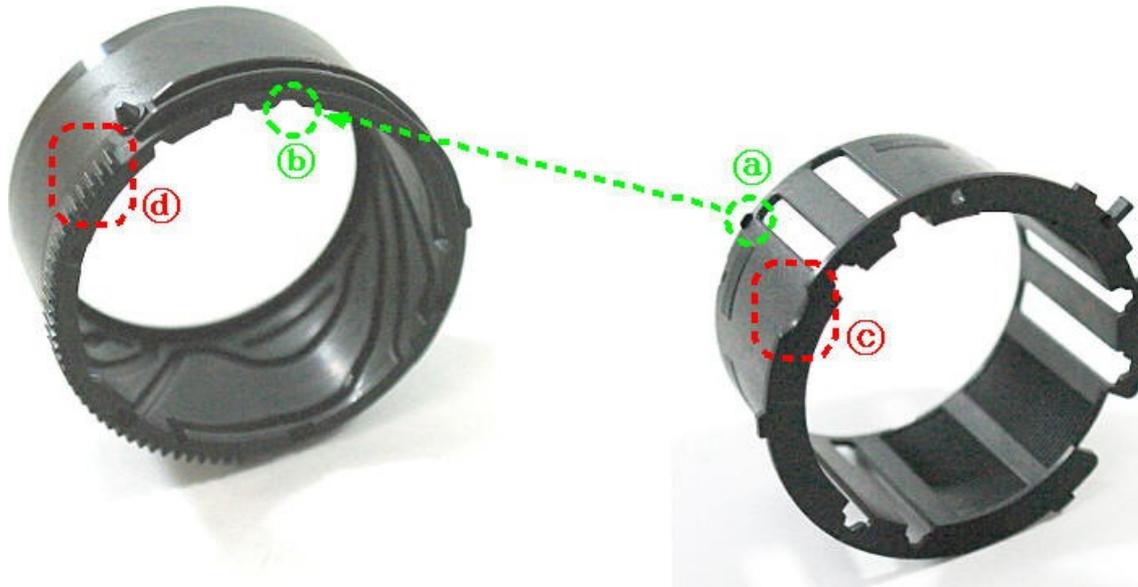
4. This is the assembled state of the Cam Barrel assembly.

5. This is the assembled state of the Shutter assembly.
   Caution : Be careful about the location of "a", "b"
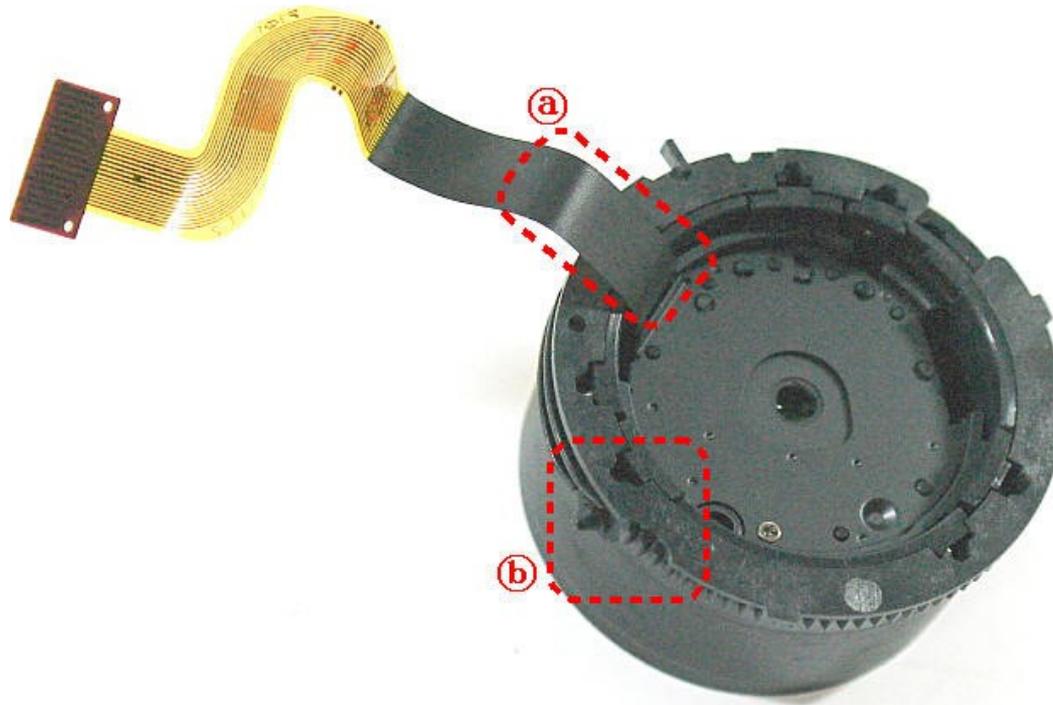
6. To assemble match the Point "a" & "b".
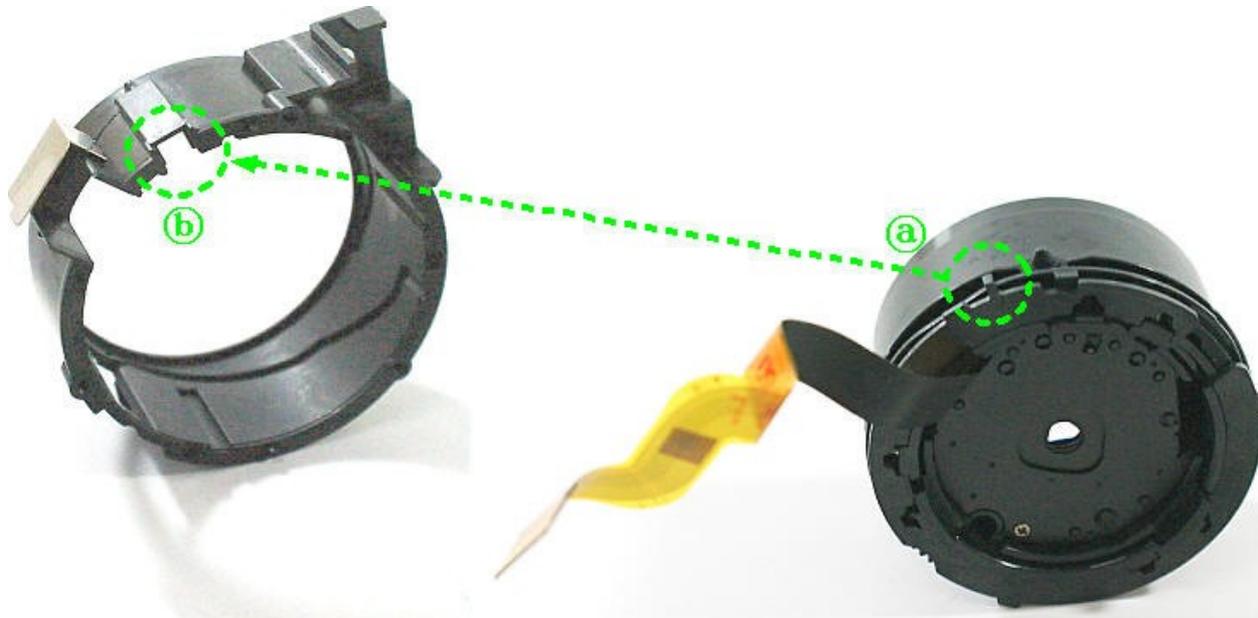
7. This is the assembled state of the Outer Guide Barrel assembly.

8. Assemble the Shutter FPCB.
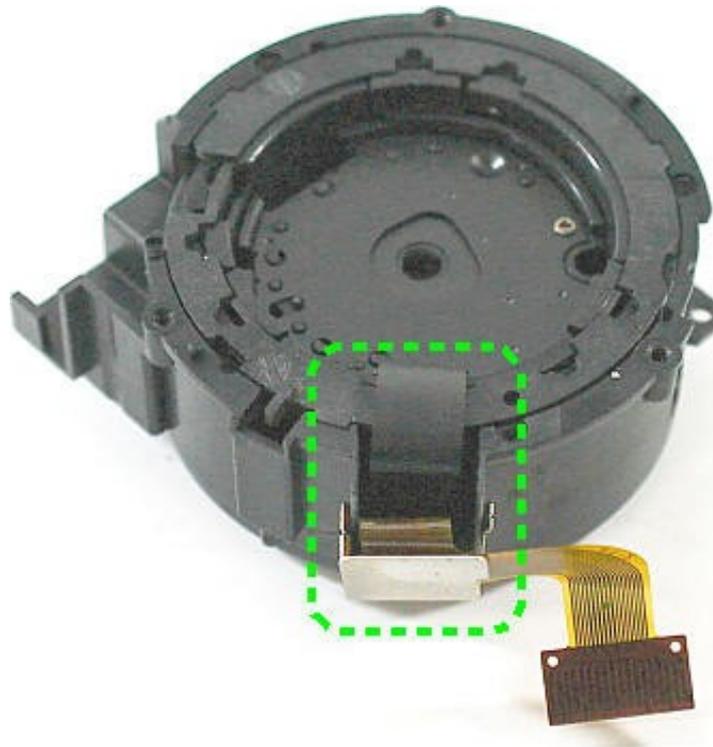
9. according to b part of a portion of the assembly.
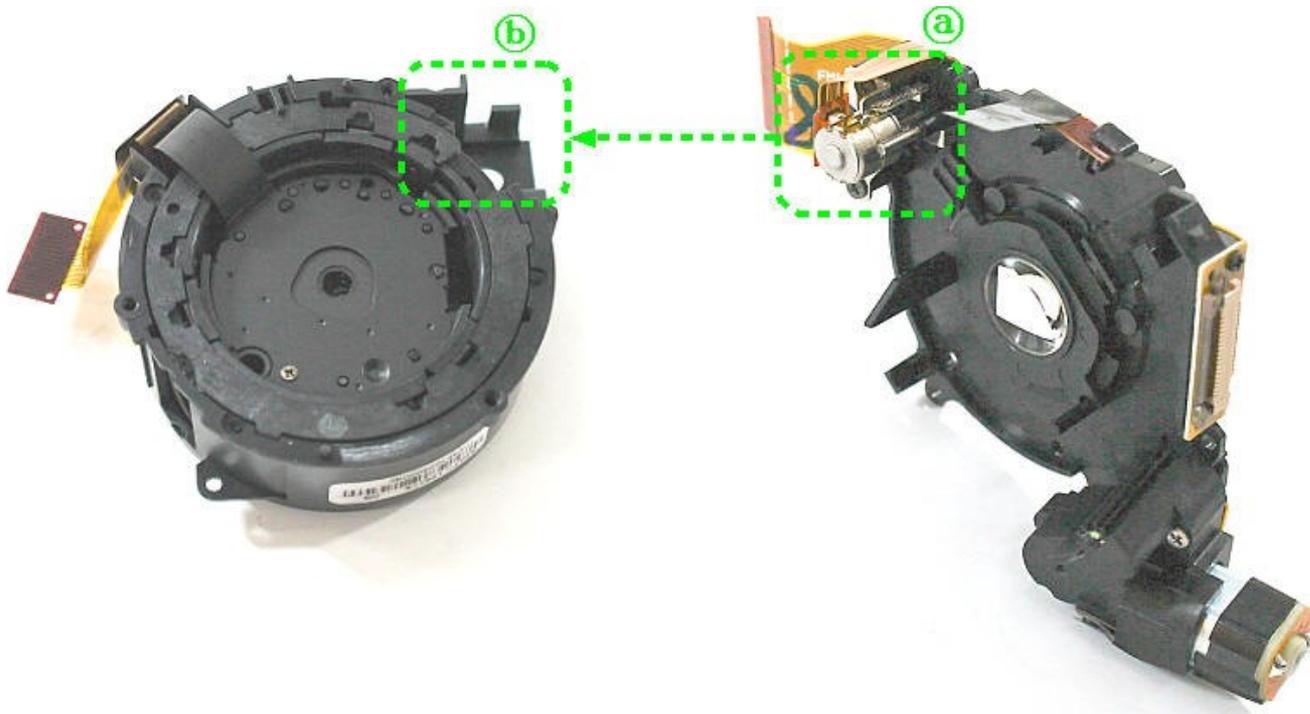
10. Assemble the 3Screws.
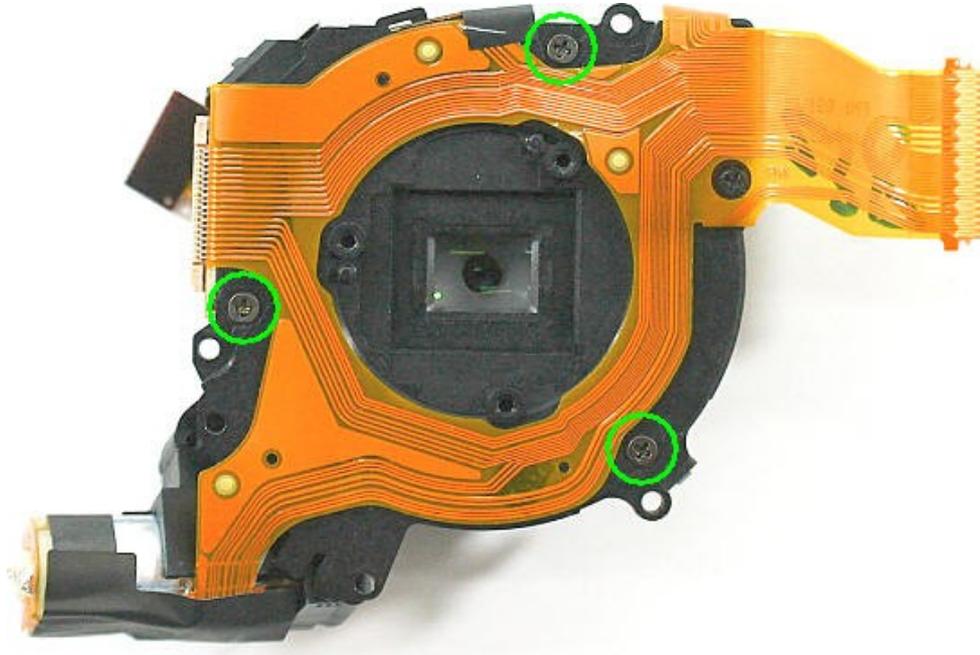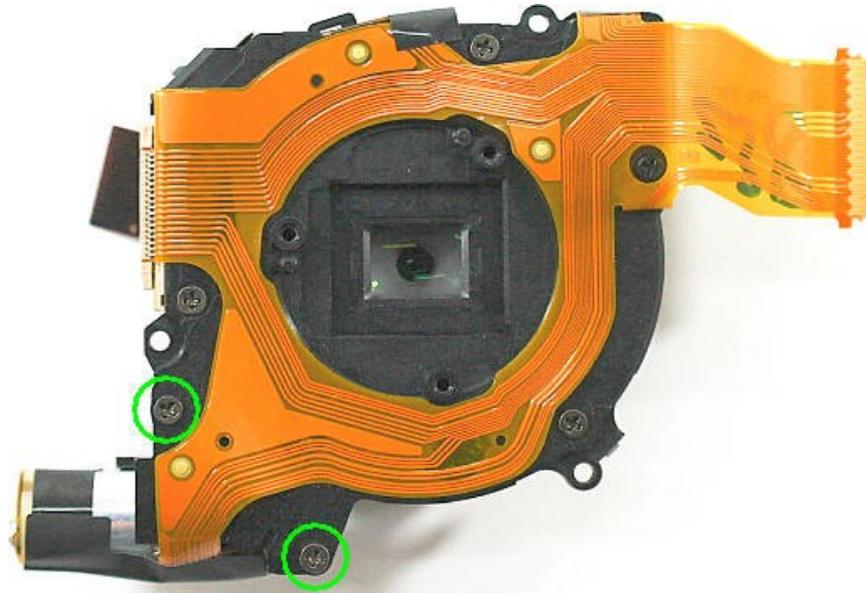
11. Assemble the 2Screws.

12. Assemble the 1Screw.

13. Assemble the Shutter FPCB.

14. Complete state.

Thank you