

INC

VBA21001-R. 3753. A

作成承認印

配布許可印



D60 VBA21001



REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

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Points to notice for Disassembly / Assembly

 WARNING	
	<p>Due to an internal high voltage area, take extra care not to get an electric shock when detaching covers.</p> <p>After removing covers, be sure to discharge the main condenser according to the instructions of repair manuals.</p>

Note:

- ① When disassembling/(re)assembling, be sure to use the conductive mat (J5033) and wrist strap (J5033-5) for static protection of electrical parts.
- ② Before disassembling, be sure to remove batteries or AC power wires.
- ③ When disassembling, make sure to memorize the processing state of wires and FPC, screws to be fixed and their types, etc.
- ④ Because the low pass filter of the imaging CCD PCB is easily damaged, handle it with enough care.

Points to notice for Lead-free solder products
<ul style="list-style-type: none"> ▪ Lead-free solder is used for this product. ▪ For soldering work, the special solder and soldering iron are required. ▪ Do NOT mix up lead-free solder with traditional solder. ▪ Use the special soldering iron respectively for lead-free solder and lead solder. <p style="text-align: center;">They cannot be used in common.</p>

Caution:

Whenever "Separation of Front and rear bodies", "Disassembly of CCD/FPC unit", or "Disassembly of Bayonet" are performed, be sure to perform "RESET AF-DEFOCUS COMPENSATION" of camera adjustment software after reassembling.

Disassembly

1. Separation of Front and Rear Bodies

Bottom Cover

- Take out the four screws (#5735) and five screws (#5674).
- Open the power-wire lid.
- Remove the bottom cover.

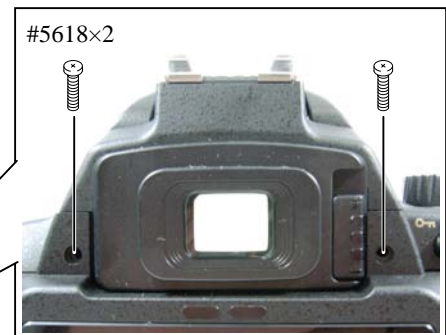


Rear cover

- Take out the four screws (#6690) and two screws (#5618).
- Remove the rear cover.

Note: Remove the rear cover slowly so as not to cut the rear FPC of the lower portion of the cover.

- Remove the rear FPC from the connector.



SB pop-up

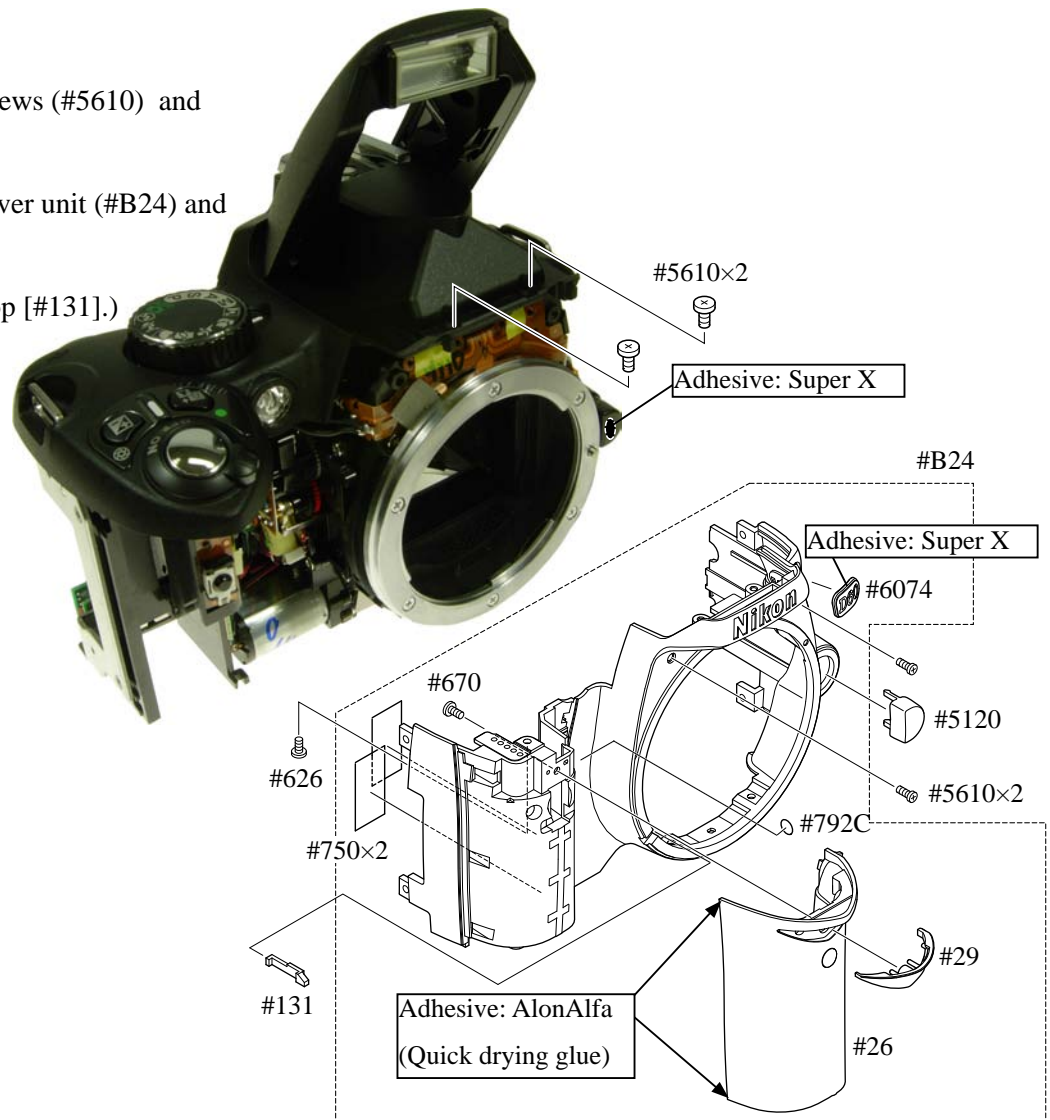
- Cut the tracing film sheet, etc into the below size of piece.
Then insert it into the clearance of the top cover pop-up part as shown right, and raise the SB by sliding the sheet in the direction of the arrow.



⚠ WARNING	
	<ul style="list-style-type: none"> • Due to an internal high voltage area, take extra care not to get an electric shock when detaching covers. • After removing the covers, be sure to discharge the main condenser according to the instructions of repair manuals.

Covers

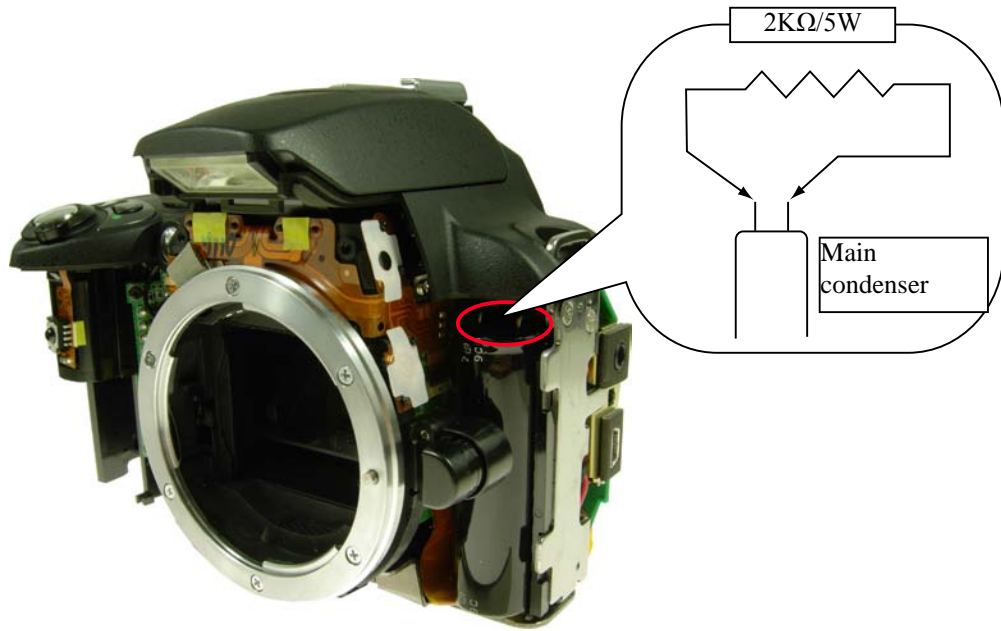
- Take out the four screws (#5610) and the screw (#626).
- Remove the front cover unit (#B24) and [#131].
(Be careful not to drop [#131].)



Discharge of Main condenser

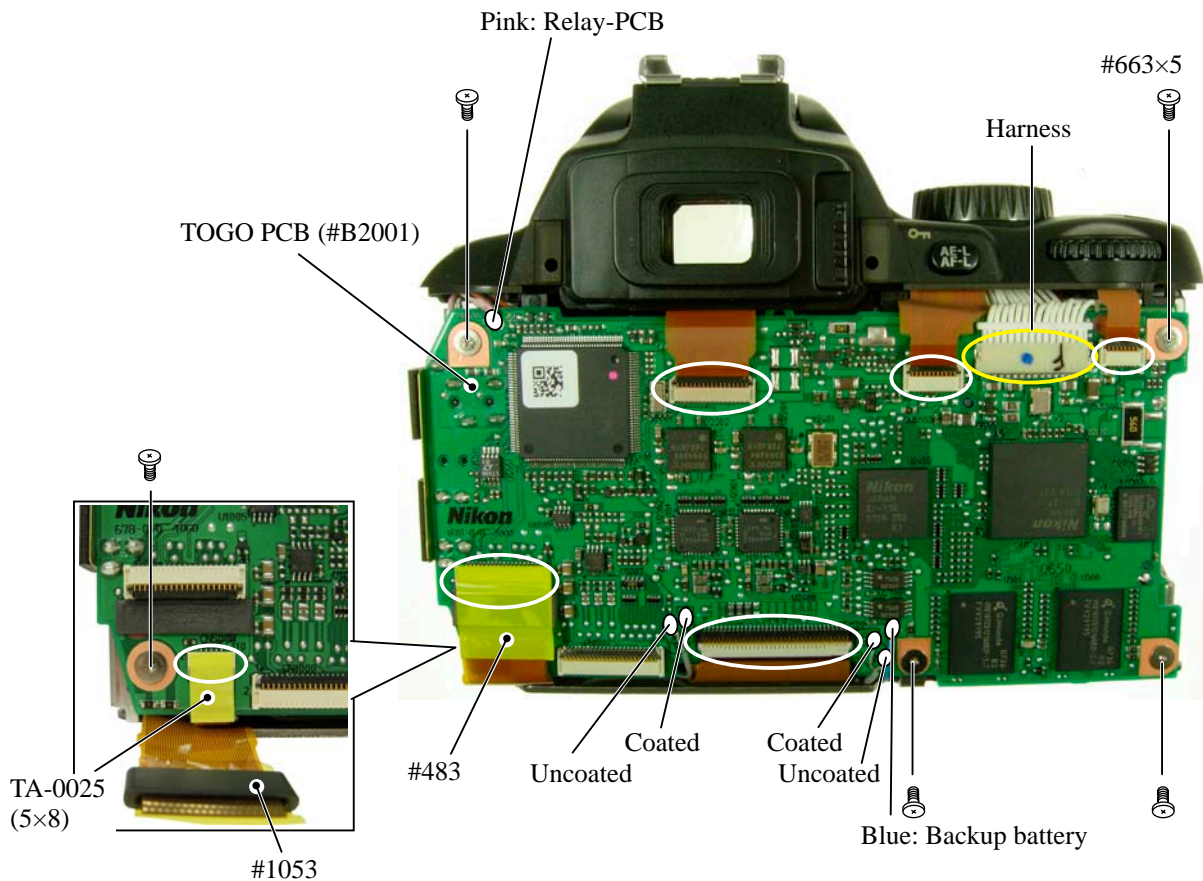
- Discharge the main condenser from its both ends.

Be careful so that the top cover does NOT touch the discharge tool.

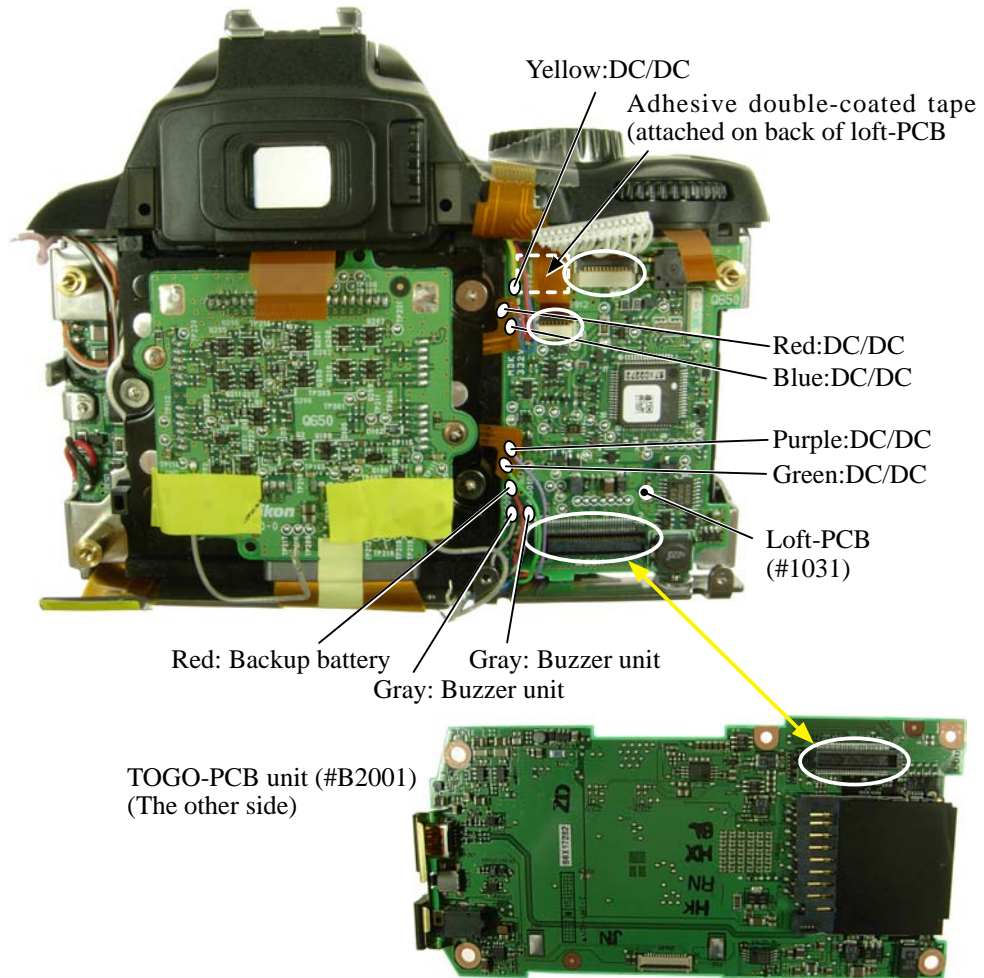


TOGO PCB unit / Loft PCB

- Disconnect the six FPCs and harness from the connector.
- Unsolder the six wires.
- Take out the five screws (#663).

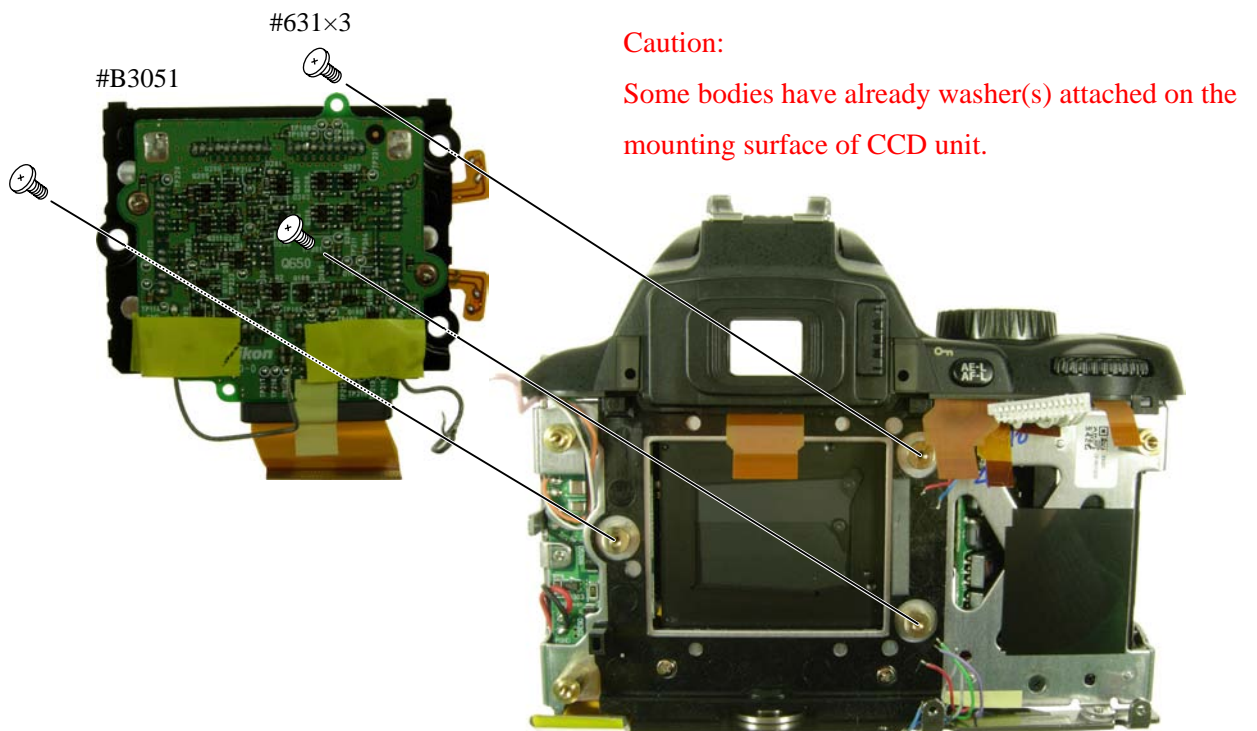


- Disconnect the TOGO-PCB unit (#B2001) from the connector, (while pressing the loft-PCB).
- Disconnect the two FPCs from each connector.
- Unsolder the eight wires.
- Remove the loft-PCB that is partially attached with the adhesive double-coated tape.



CCD unit

- Take out the three screws (#631), and remove the CCD unit (#B3051).



SB PCB

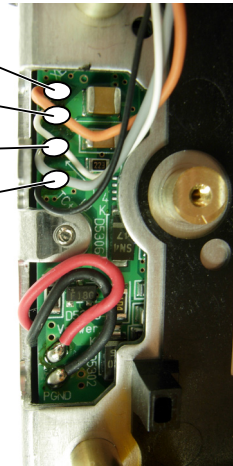
- Unsolder the four wires (connected from Top cover).

Orange: Top cover

White: Top cover

Gray: Top cover

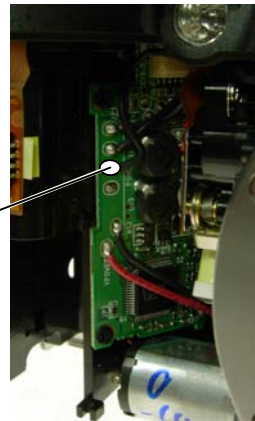
Black: Top cover



DC/DC PCB unit

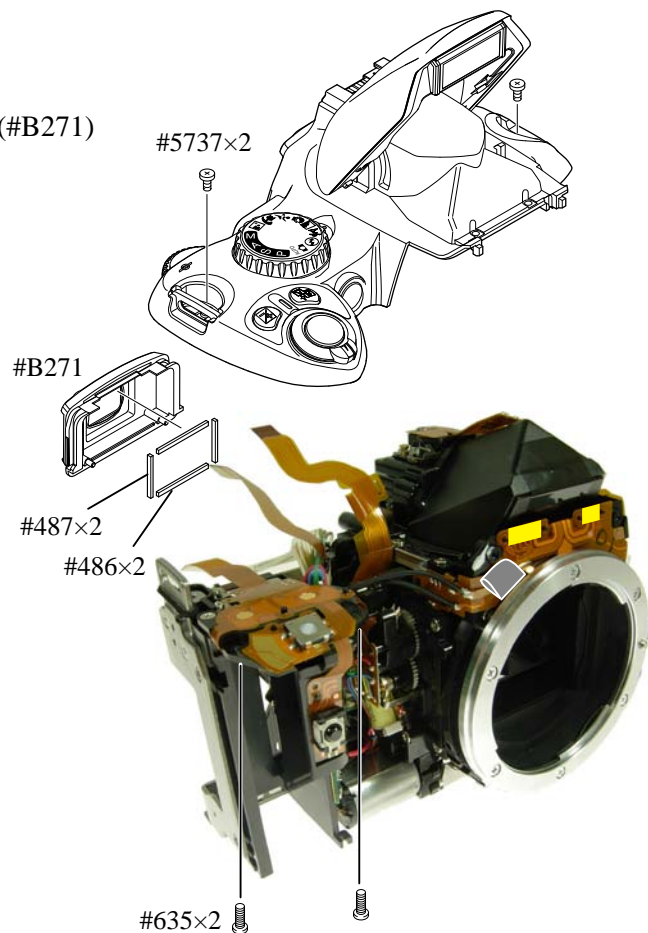
- Unsolder the wire (connected from Top cover).

Black: Top cover



Top cover

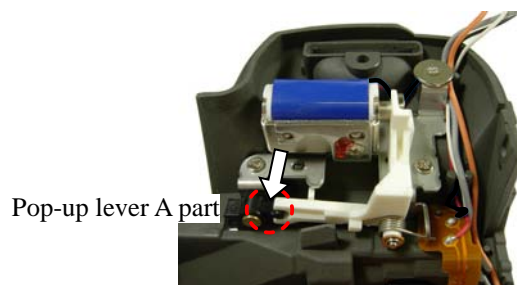
- Take out the two screws (#5737).
- Take out the two screws (#635).
- The top cover and rubber eyecap (#B271) come off.



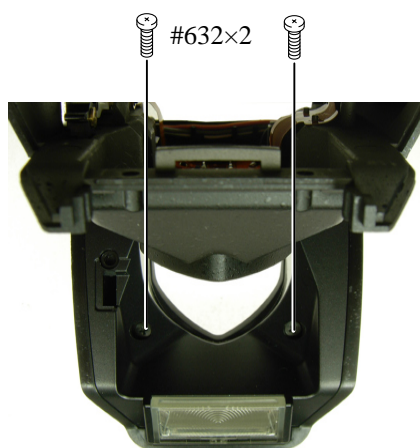
Disassembly of Top cover

SB upper case

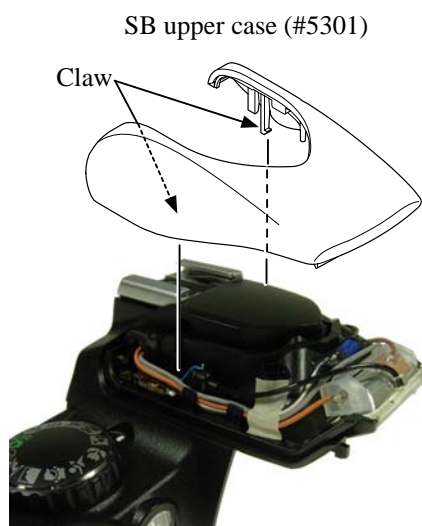
- Press "Pop-up lever A part" and raise the built-in SB.



- Take out two screws (#632).

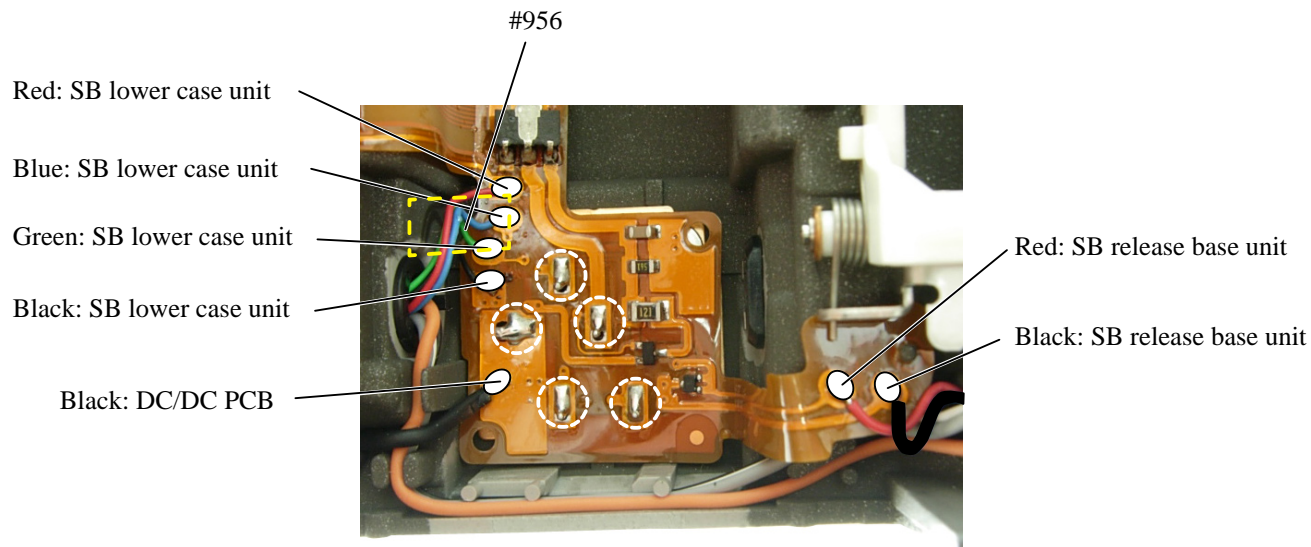


- Release the two claws. House the built-in SB and remove the SB upper case (#5301).



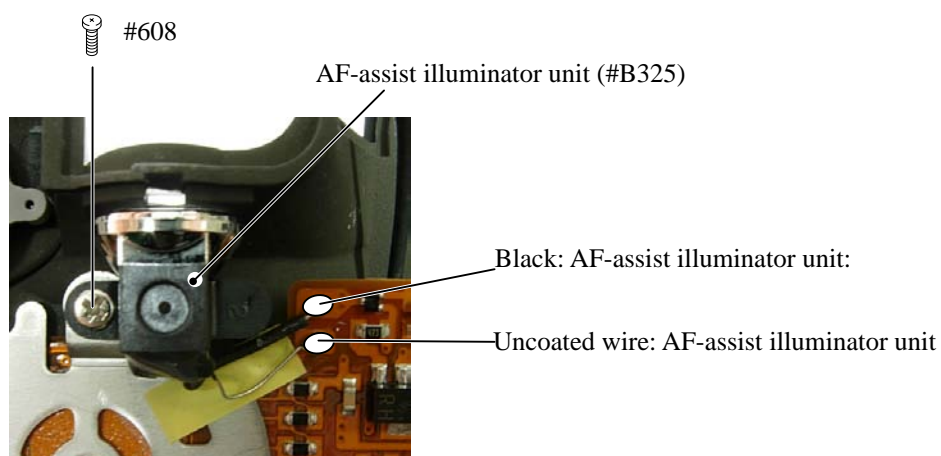
Top cover FPC / Wiring

- Remove the tape (#956).
- Unsolder the seven wires (connected from SB lower case unit and SB release base unit).
- Remove the five solder bridges.



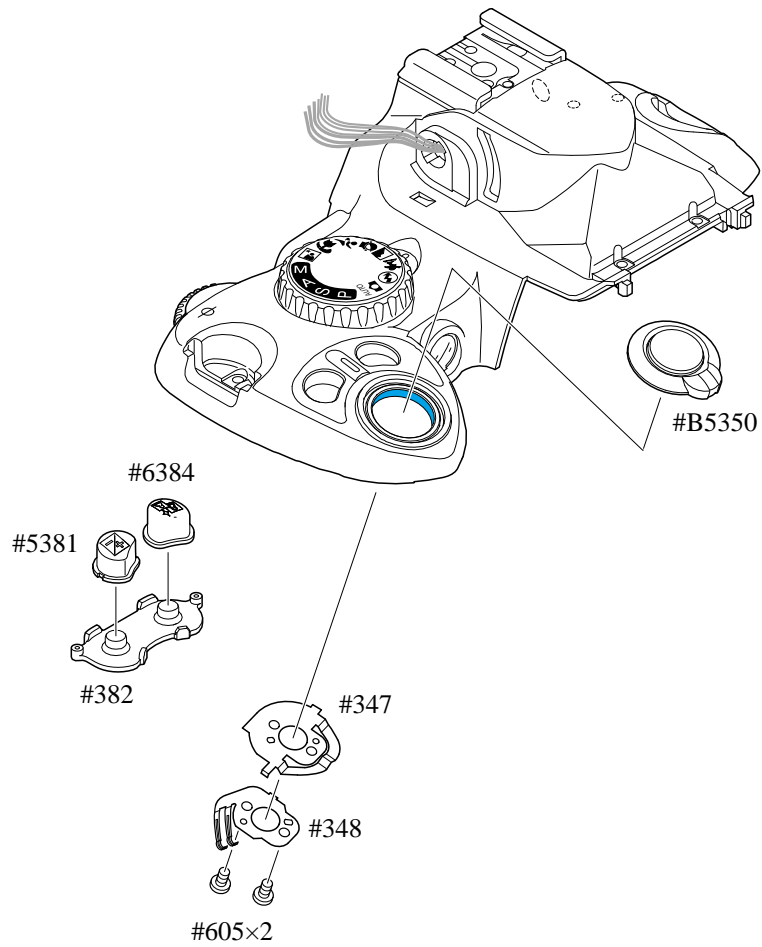
AF-assist illuminator unit

- Remove the two wires (black and uncoated) (connected from AF-assist illuminator unit).
- Take out the screw (#608), and remove the AF-assist illuminator unit (#B325).

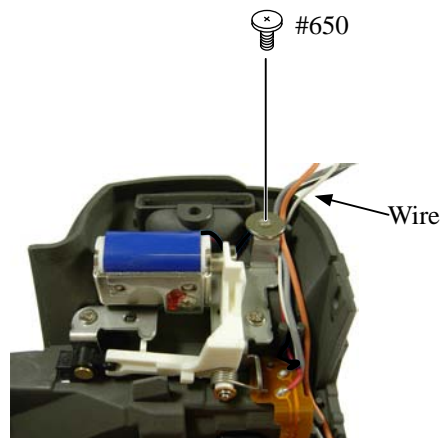


Release button unit / buttons / other small parts

- Remove the rubber SW (#382), and two buttons (#5381,#6384).
- Take out the two screws (#605), and remove [#348], [#347] and the release button unit (#B5350).

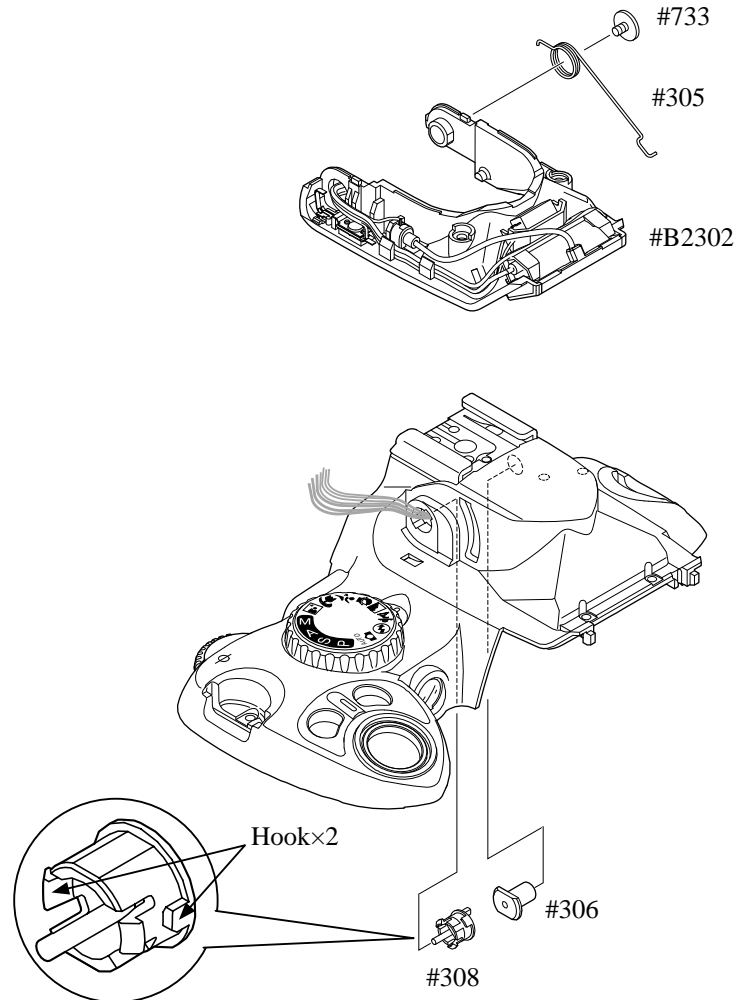


- Take out the screw (#650), and release the wire from the boss.



SB lower case unit

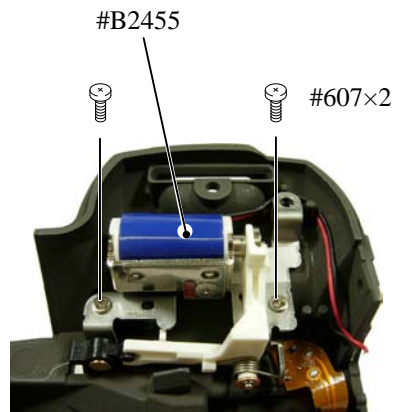
- Remove [#308], while releasing the two hooks.
- While pressing the SB case rotating shaft (#306), take out the screw (#733) and remove the SB-up spring (#305).
- While watching the wires, remove the SB lower case unit (#B2302).



△ (Revision) SB release plate unit

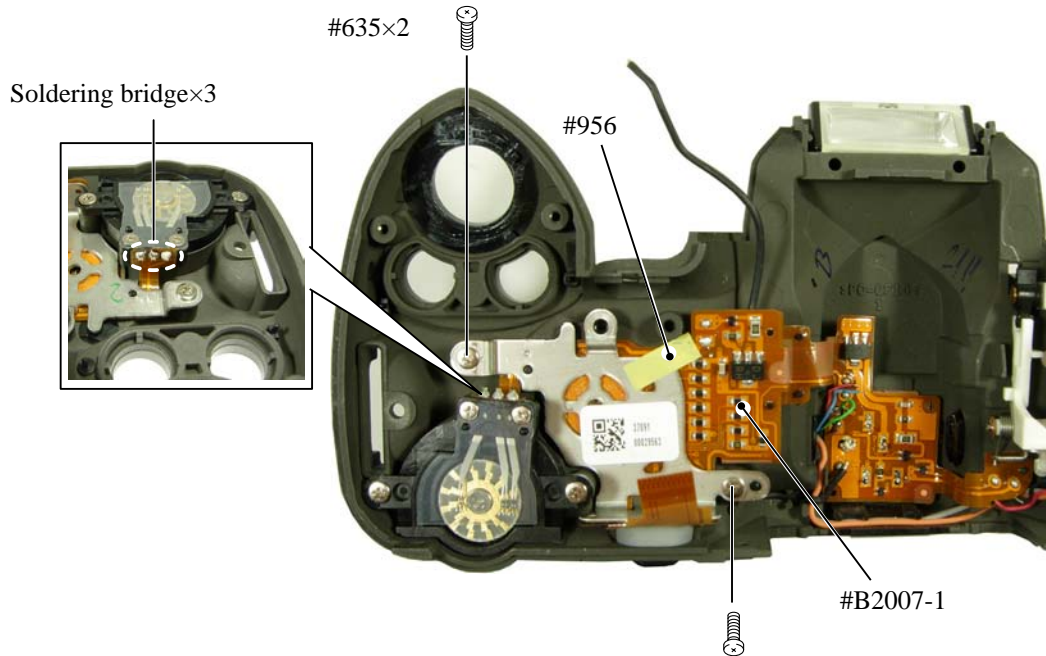
SB lower case unit

- Take out the two screws (#607), and remove the SB release base unit (#B2455).



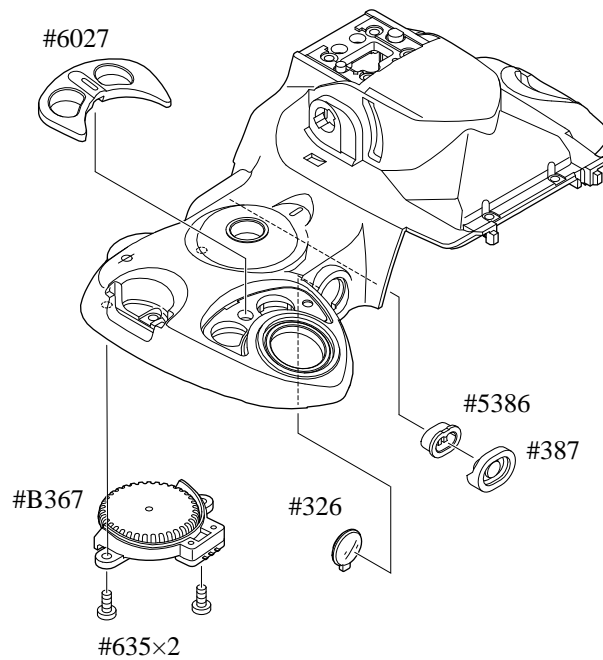
Top cover FPC unit

- Remove the three solder bridges.
- Take out the two screws (#635) and remove the top cover FPC unit (#B2007-1).



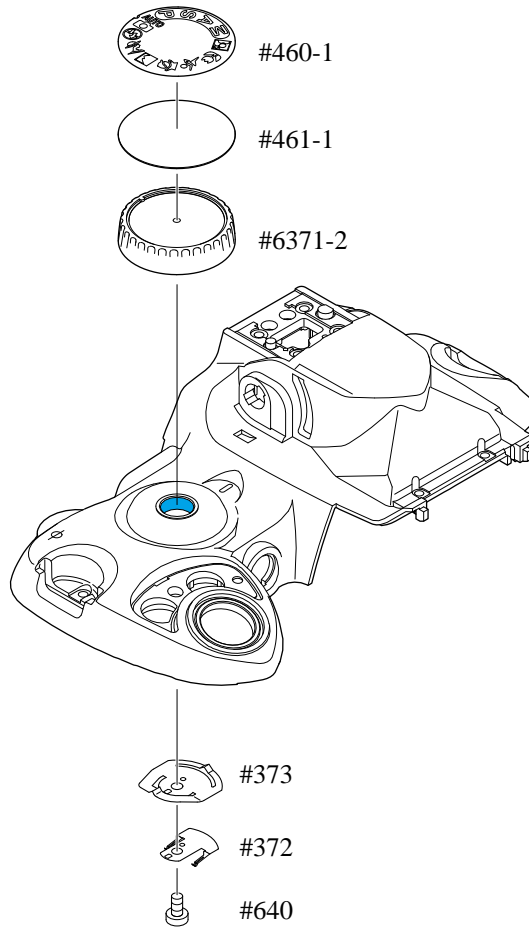
C/D unit / buttons / other small parts

- Remove the AF/AE lock button (#5386) and [#387].
- Take out the two screws (#635), and remove the C/D unit (#B367).



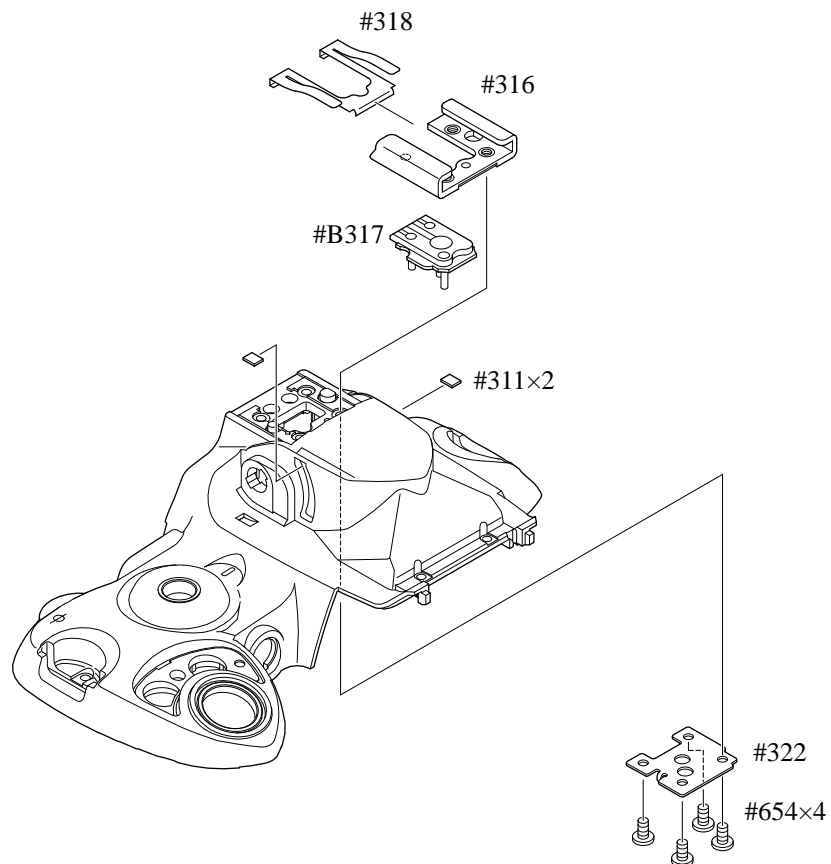
Mode dial unit

- Take out the screw (#640), and remove [#372], [#373], [#6371-2],[#461-1] and [#460-1].



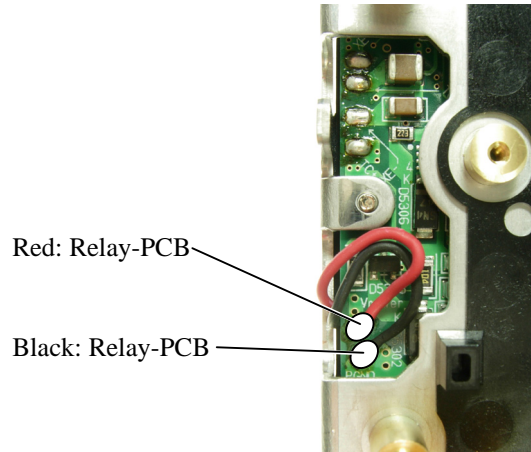
Shoe base

- Take out the four screws (#654), remove [#322], [#318], shoe base (#316) and [#B317].



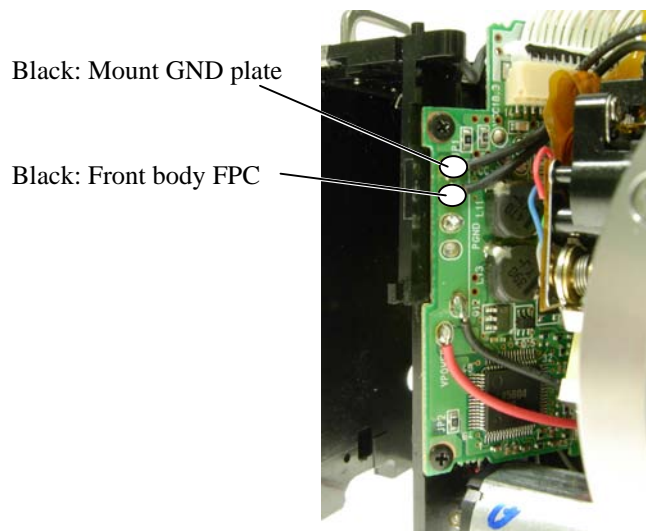
SB PCB

- Unsolder the two wires (connected from Relay-PCB).



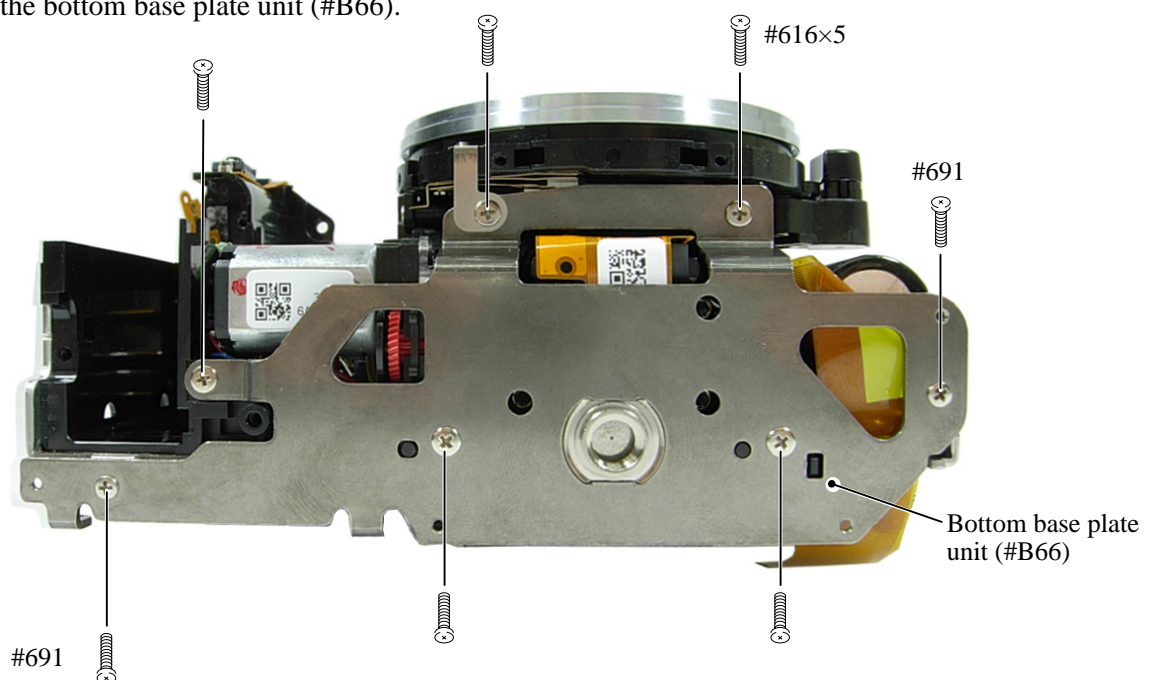
DC/DC PCB

- Unsolder the two wires (connected from Mount GND plate and Front body FPC).



Bottom base plate unit

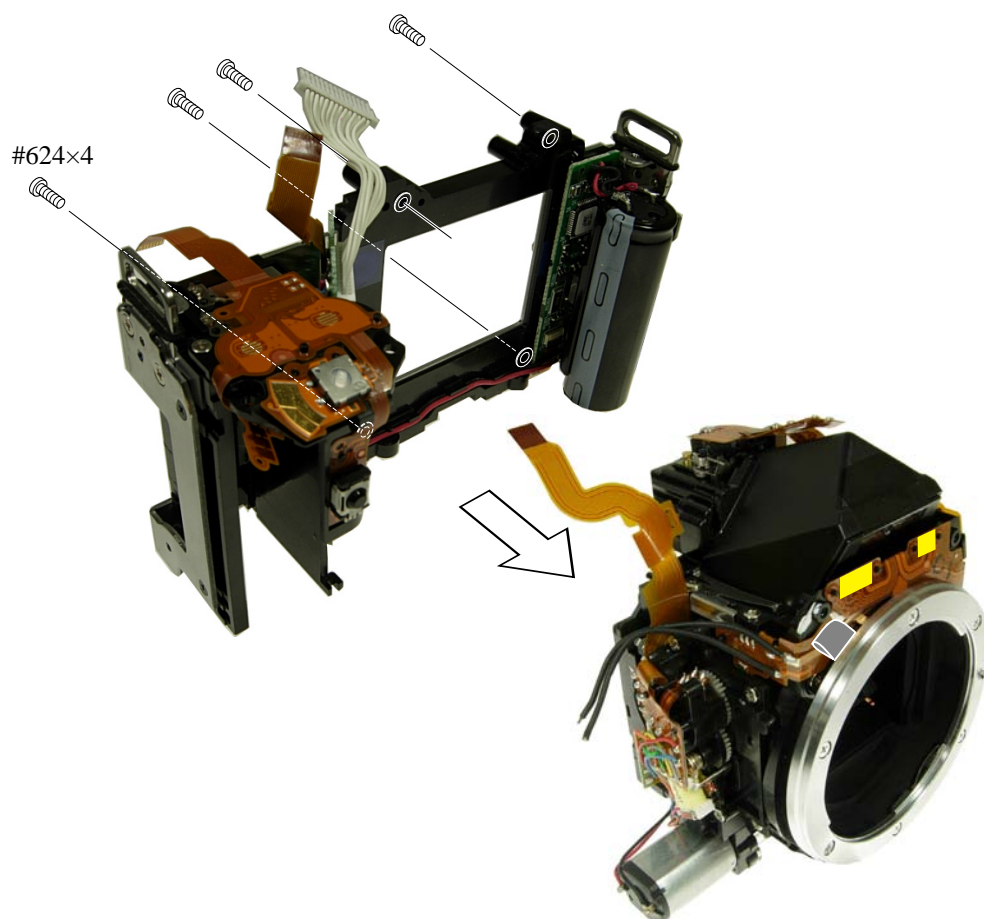
- Take out the five screws (#616).
- Take out the two screws (#691).
- Remove the bottom base plate unit (#B66).



Separation of Front and Rear bodies

- Take out the four screws (#624).
- Separate the front body from the rear body.

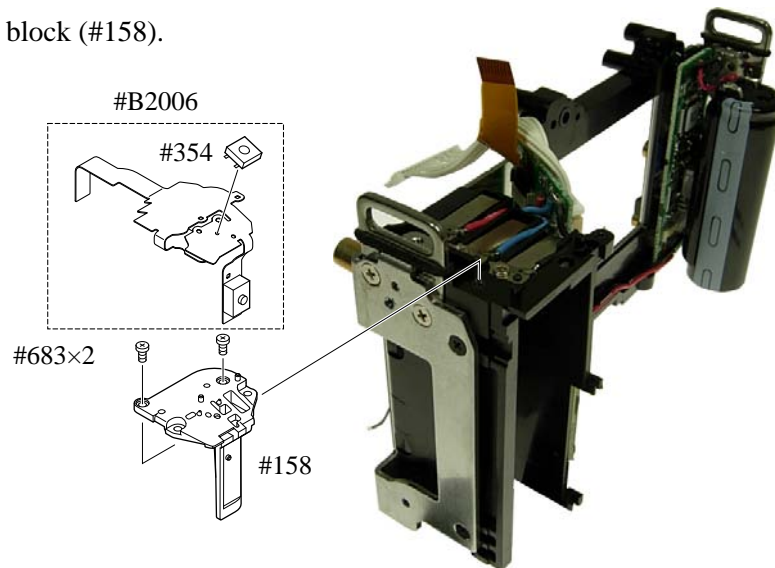
Caution: Separate them slowly so as NOT to cut the two wires of the relay-PCB that pass through between the SB PCB and main condenser.



2. Rear body

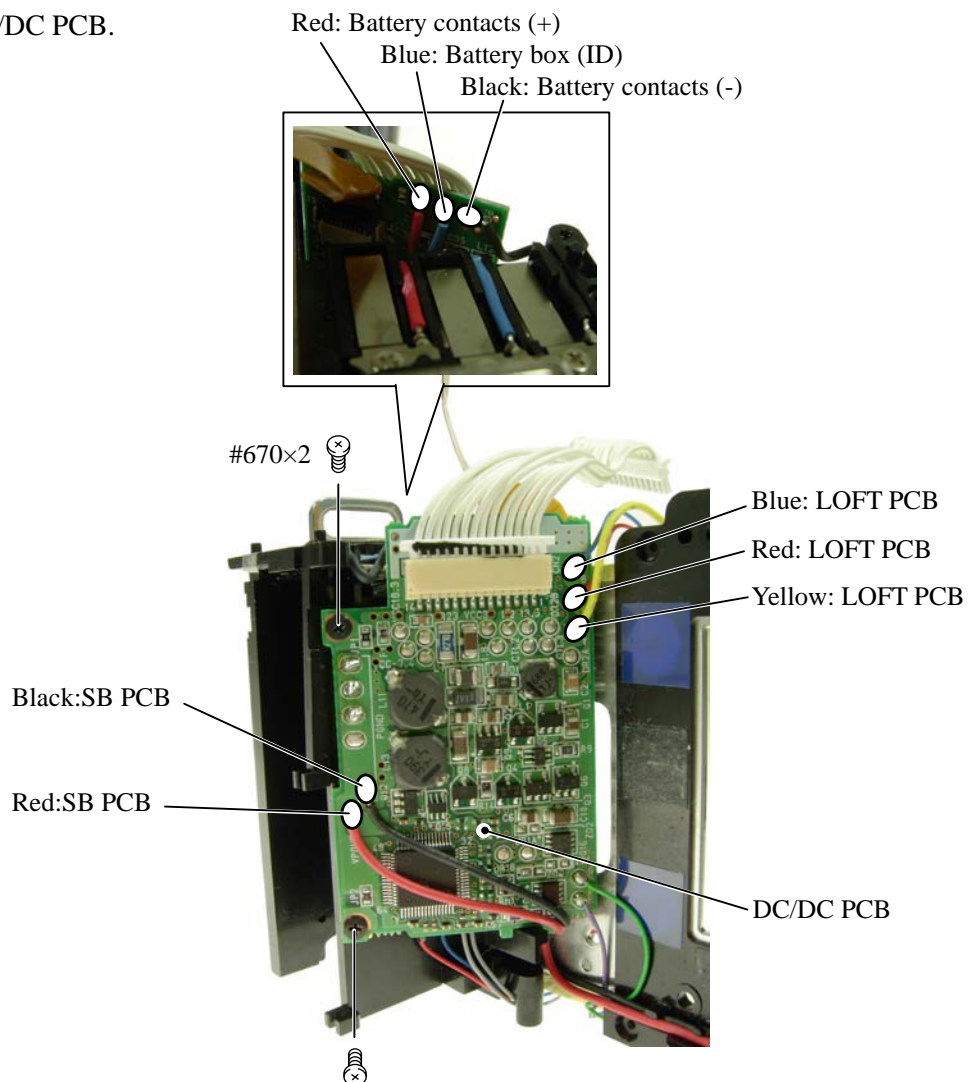
Remote block

- Remove SW-FPC [#B2006].
- Take the two screws (#683).
- Remove the remote block (#158).



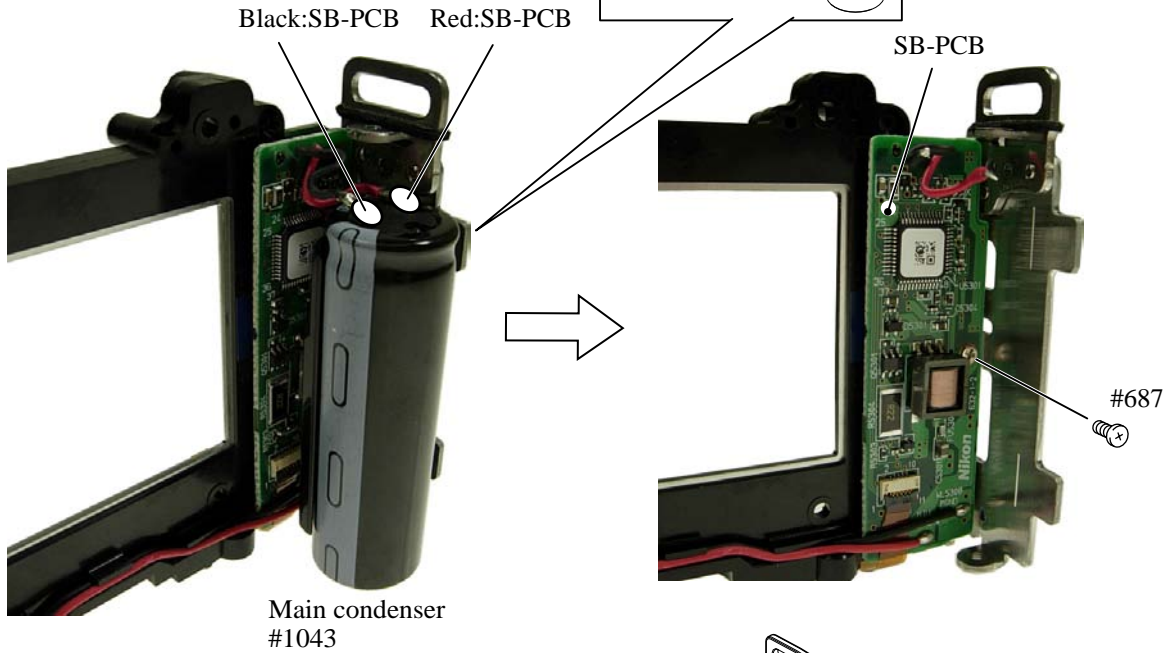
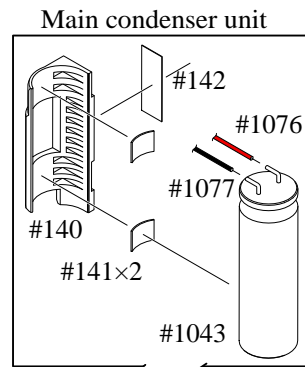
DC/DC PCB

- Remove the eight wires (connected from SB-PCB, LOFT PCB, Battery contacts, and Battery box).
- Take out the two screws (#670).
- Remove the DC/DC PCB.

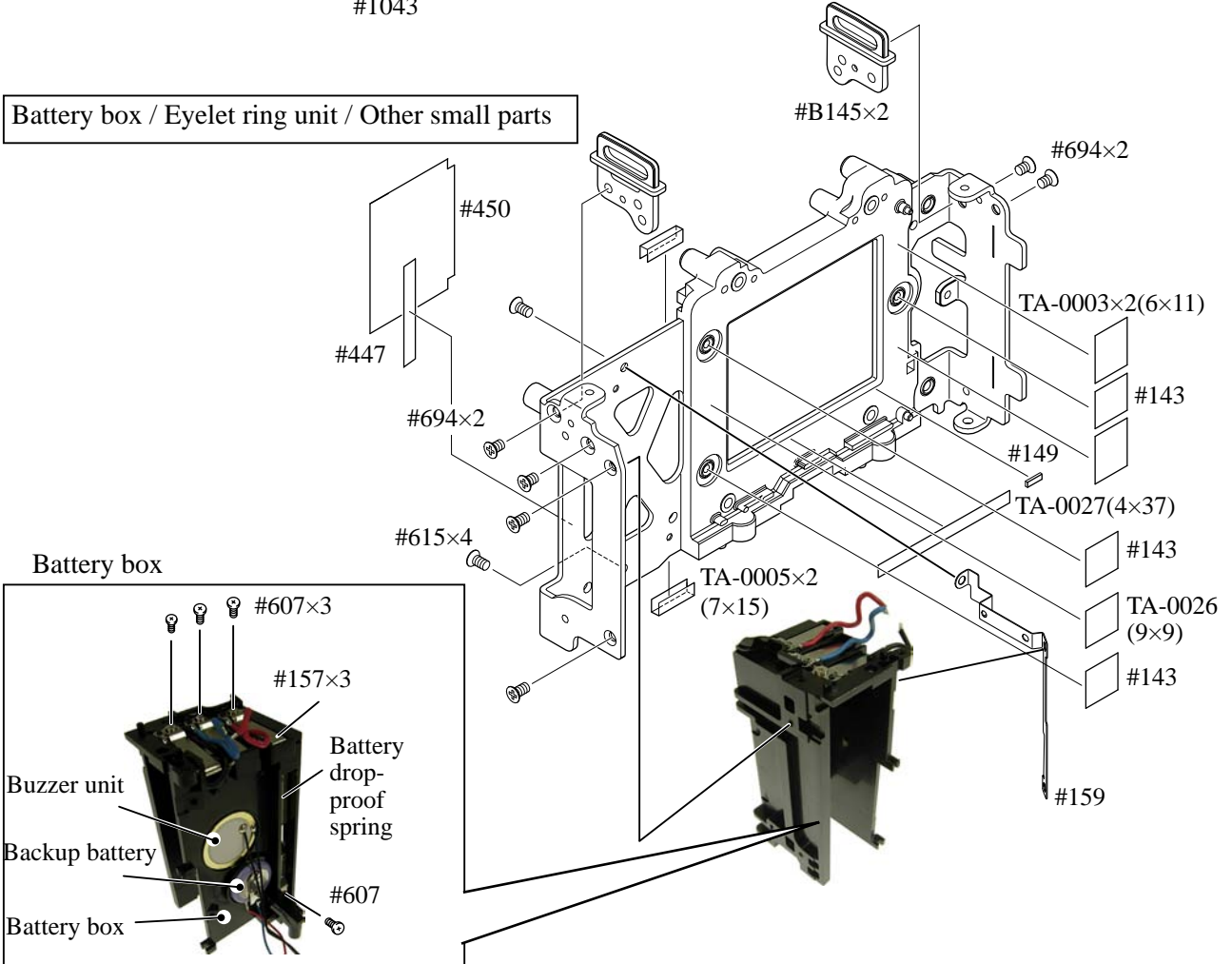


SB PCB

- Unsolder the two wires of the main condenser unit.
- Remove the main condenser that is attached on with the adhesive double-coated tape.
- Take out the screw (#687).
- Remove the SB PCB.



Battery box / Eyelet ring unit / Other small parts

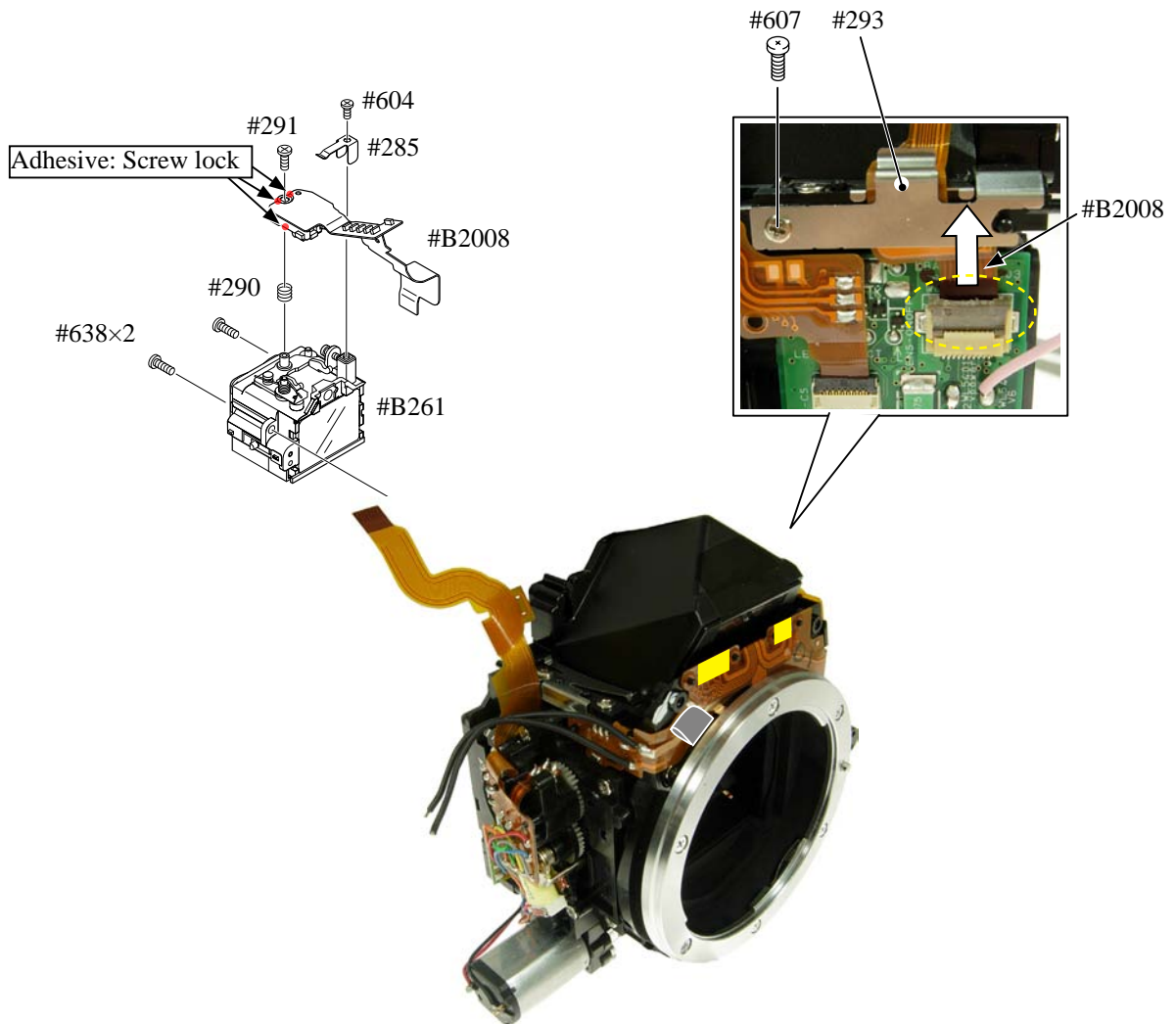


3. Front Body

Eyepiece barrel unit

AE FPC unit

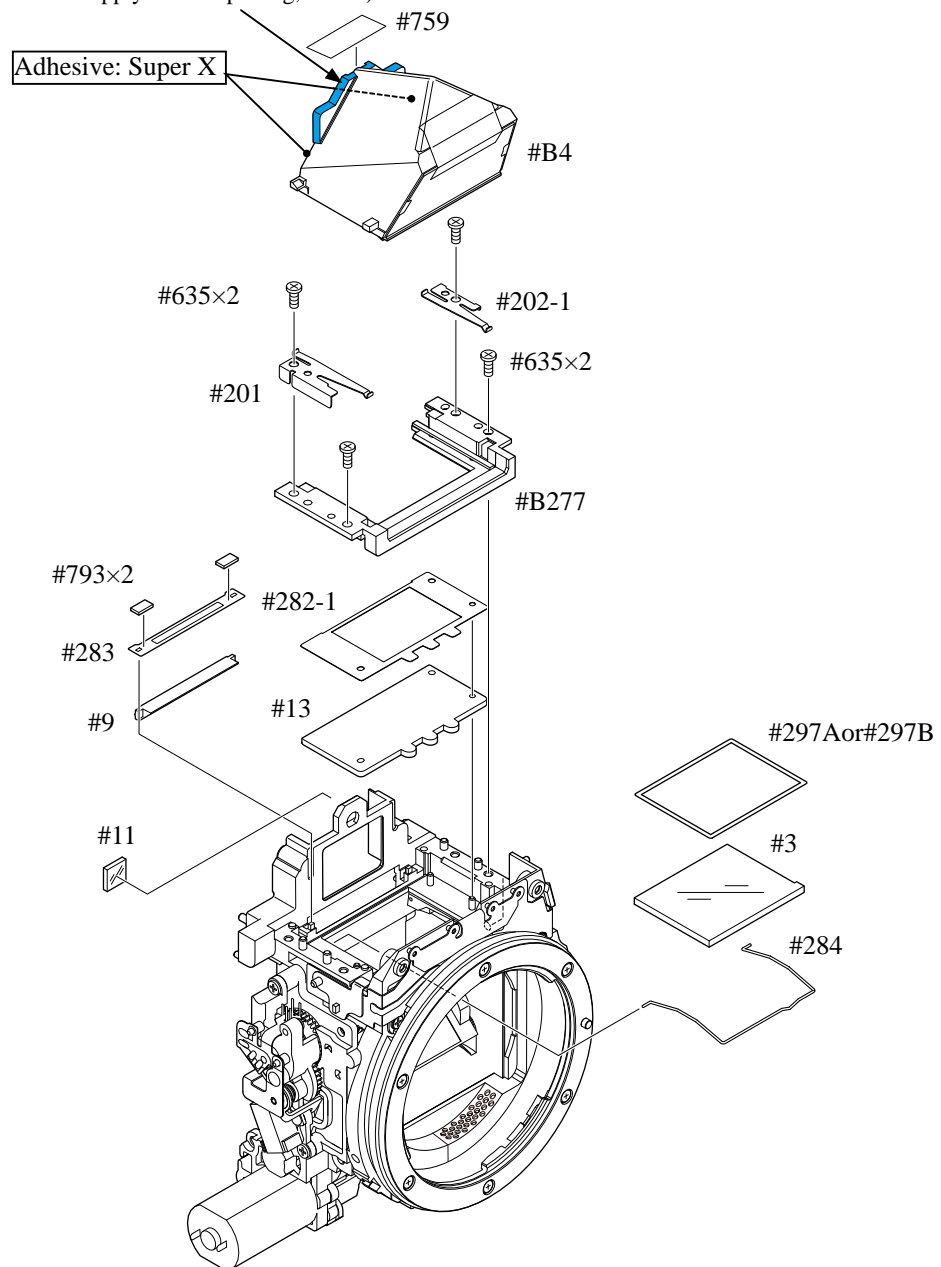
- Take out the screw (#607), and remove the AE FPC retainer plate (#293).
- Remove the FPC of the AE FPC unit (#B2008) from the connector.
- Take out the screw (#604), and remove the AE sensor plate spring (#285).
- Take out the screw (#291), and remove the AE FPC unit (#B2008) and AE sensor adjusting spring (#290).
- Take out the two screws (#638), and remove the eyepiece barrel unit (#B261).



Penta unit Screen areas

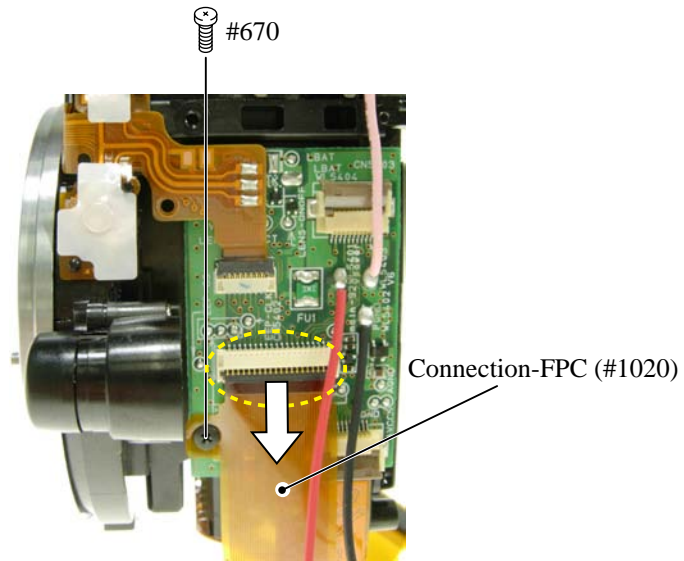
- Take out the two screws (#635), and remove [#201] and [#202-1].
- Remove the hollow penta prism unit (#B4), which is adhered by Super X.
- Remove the finder field frame 2 (#283).
- Take out the two screws (#635), and remove the SI retaining unit (#B277).
- Remove the finder field frame 1 (#282-1).
- Remove the in-finder display prism (#9).
- Remove the SI display plate (#13).
- Remove [#284], [#3], and [#297A or #297B].

Dust trap agent is applied here.
 (Do not wipe out. Do not apply when repairing, either.)



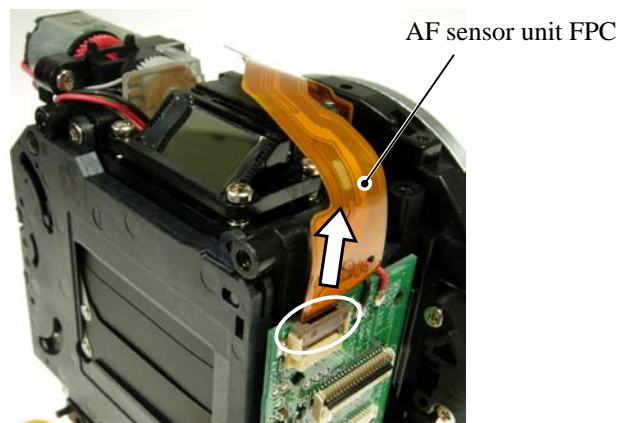
Connection-FPC

- Take out the screw (#670).
- Remove the connection-FPC (#1020) from the connector.

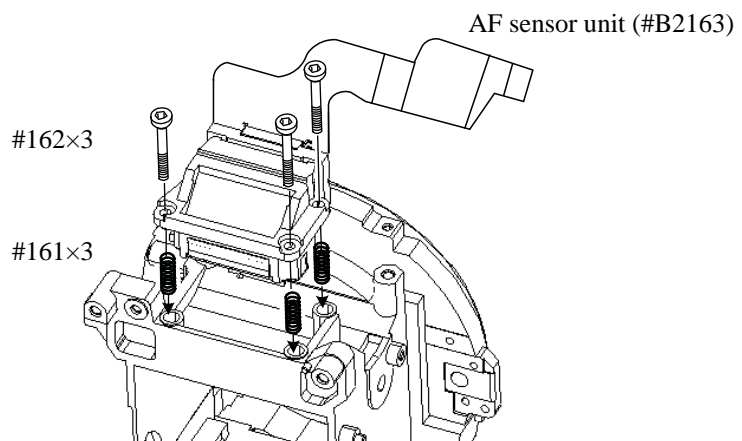


AF sensor unit

- Disconnect the AF sensor unit FPC from the connector.

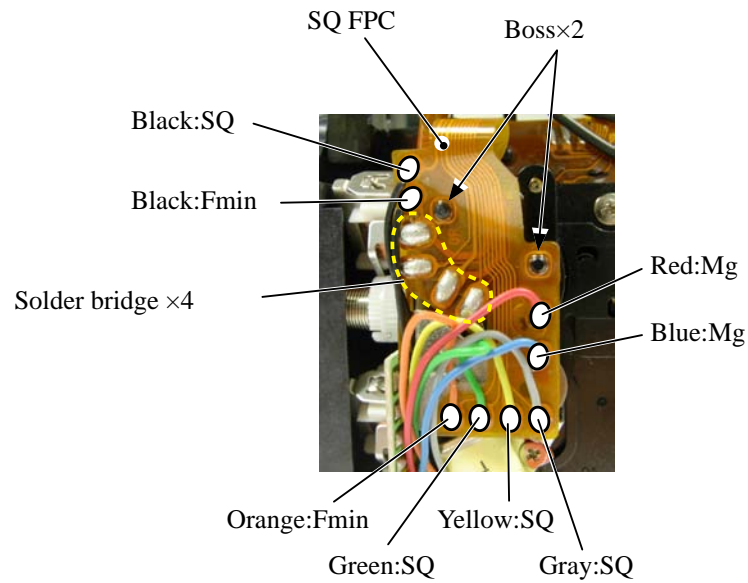


- Take out the three screws (#162) with hexagonal wrench ($\phi 1.5\text{mm}$).
- The AF sensor unit (#B2163) and the three springs (#161) come off.



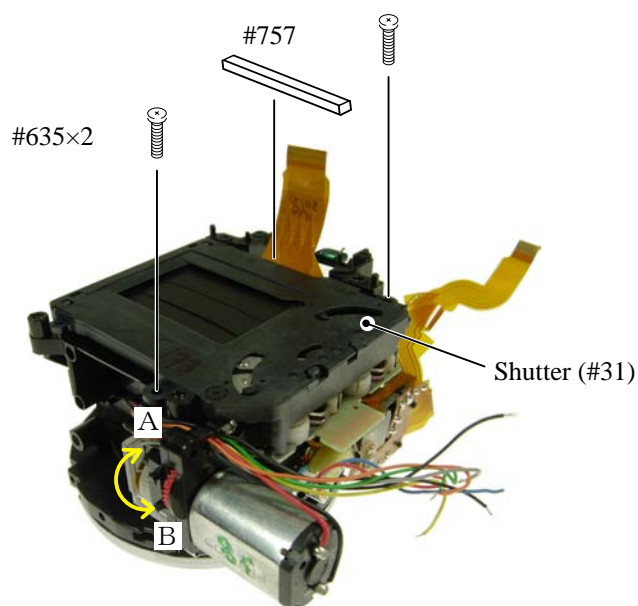
SQ FPC

- Unsolder eight wires (connected from SQ, Fmin, and Mg).
- Remove the four solder bridges.
- Remove the SQ FPC by releasing from the two bosses.



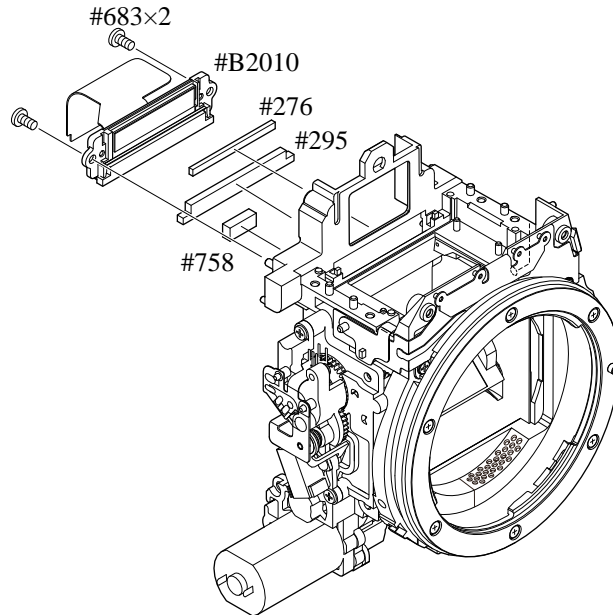
Shutter unit

- Remove [#757].
- Turn the white gear in the direction of "A", and raise the mirror.
- Take out the two screws (#635).
- Remove the shutter (#31).
- Turn the white gear in the direction of "B", and get the mirror down.



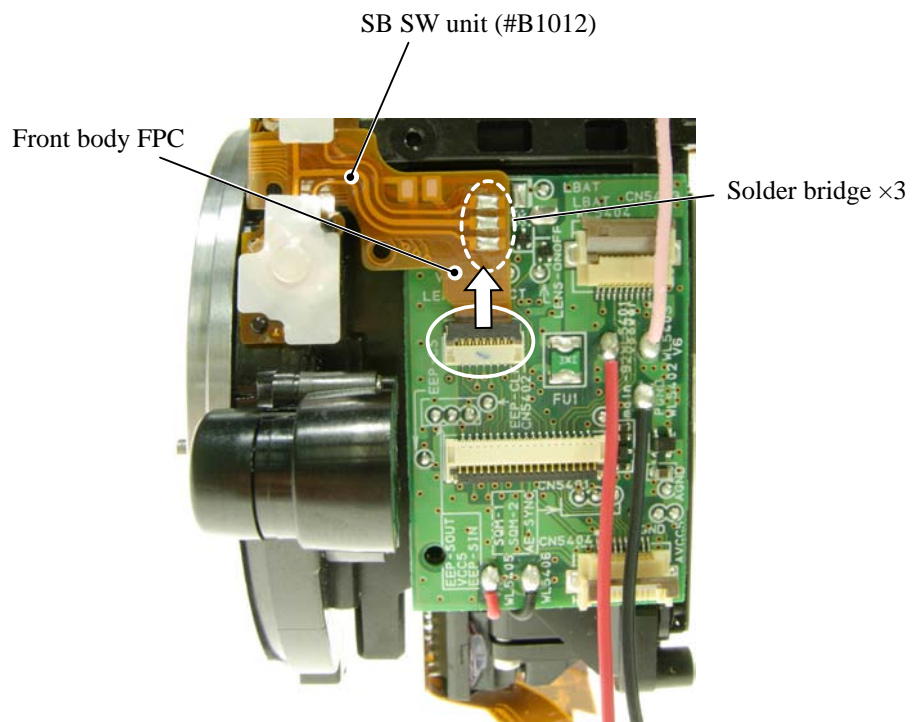
In-finder LCD unit

- Take out the two screws (#683).
- Remove the in-finder LCD unit (#B2010).



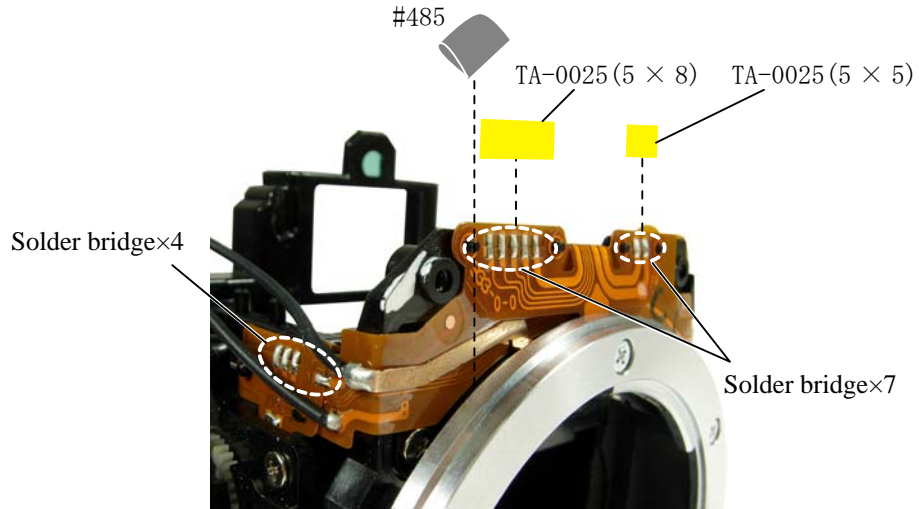
SB SW unit

- Remove the three solder bridges.
- Remove the SB SW unit (#B1012).
- Remove the front body FPC from the connector.

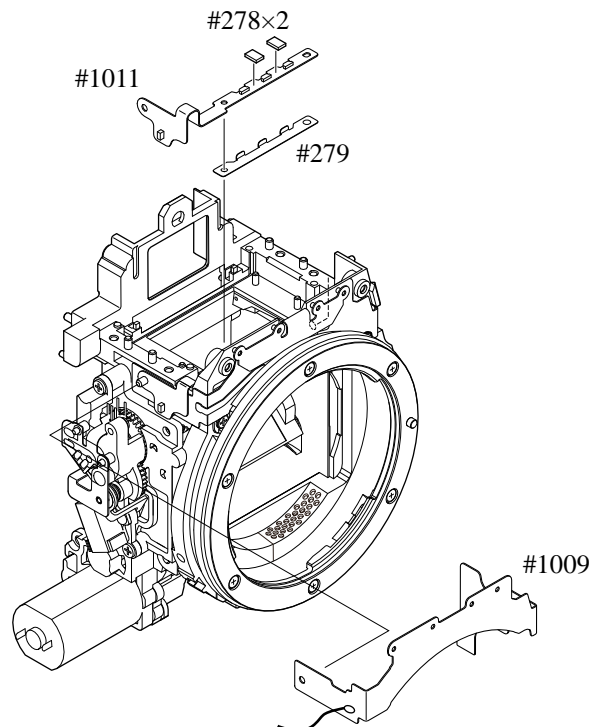


Front body FPC
SI LED-FPC

- Remove the gasket (#485), and two pieces of tape.
- Remove the seven solder bridges and the other four solder bridges.

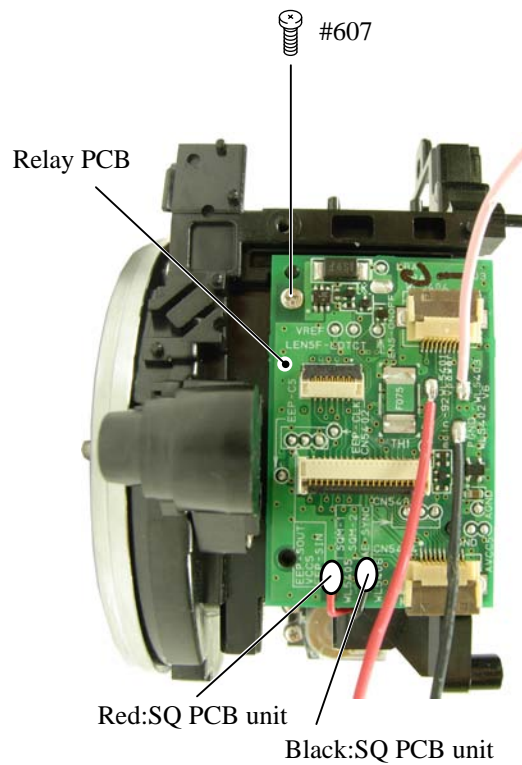


- Remove the SI LED-FPC (#1011) and [#279].
- Remove the front body FPC (#1009).



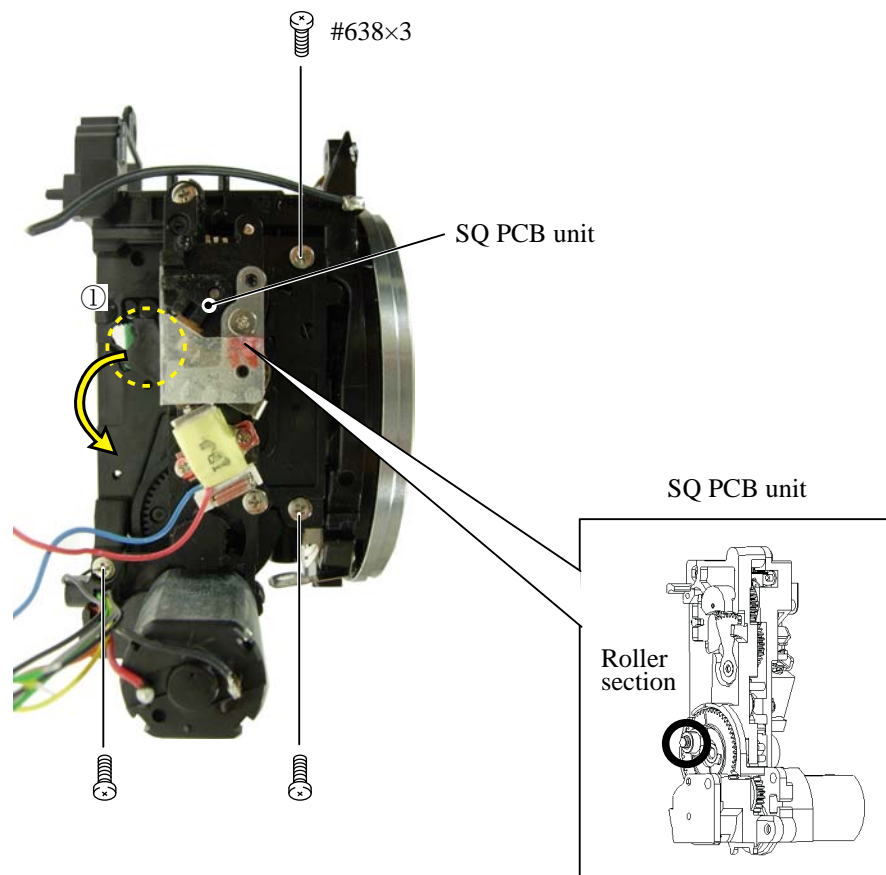
Relay PCB

- Unsolder the two wires (connected from SQ PCB unit).
- Take out the screw (#607).
- Remove the relay PCB.

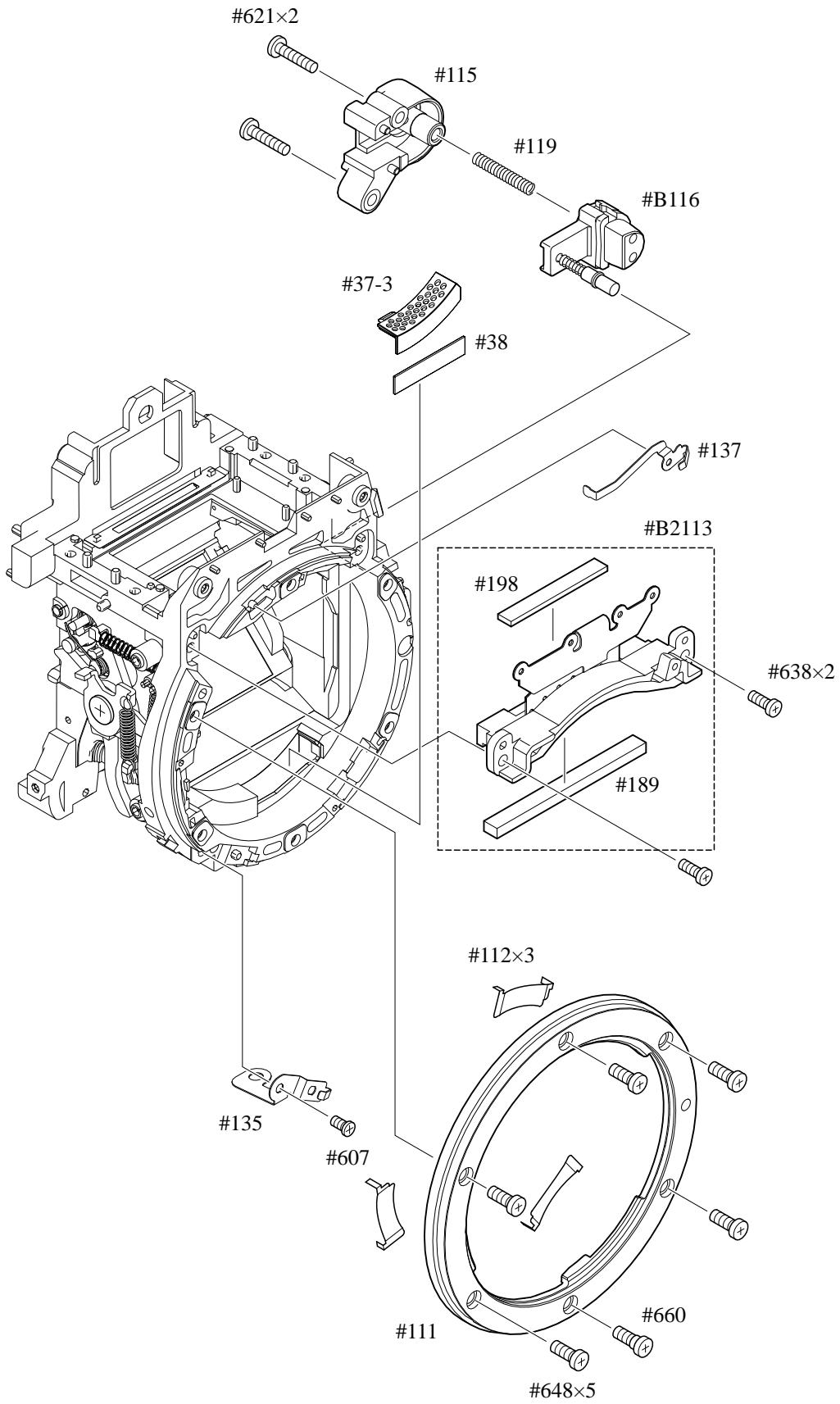


SQ PCB unit

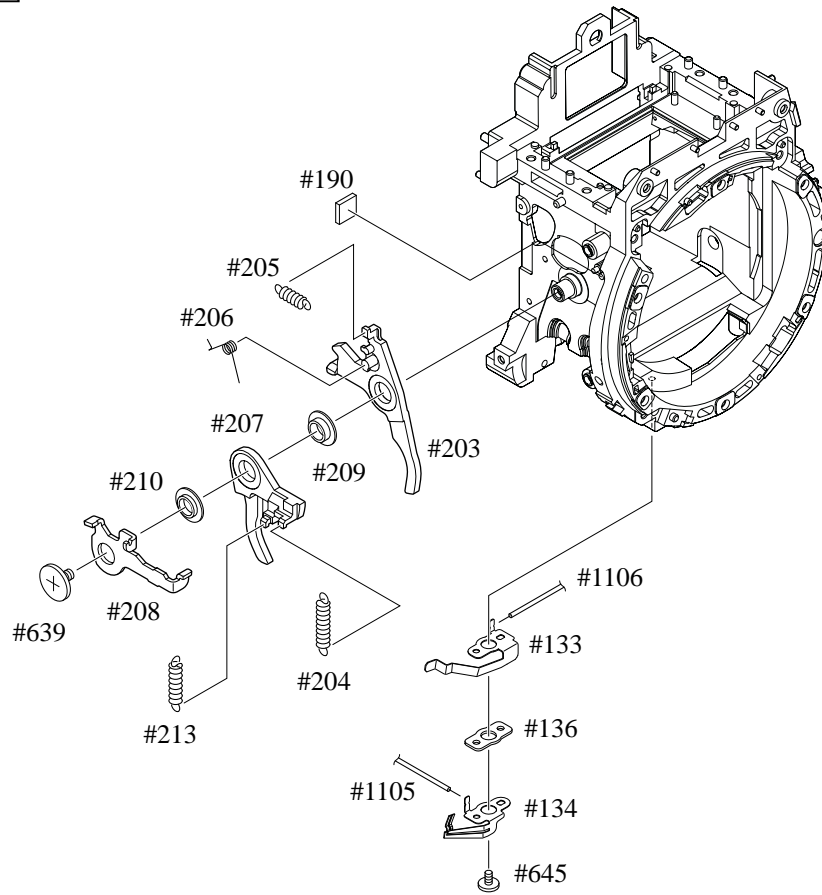
- Take out the three screws (#638).
- Turn " ① " part in the direction of the arrow, and remove the SQ PCB unit, while releasing from the roller section.



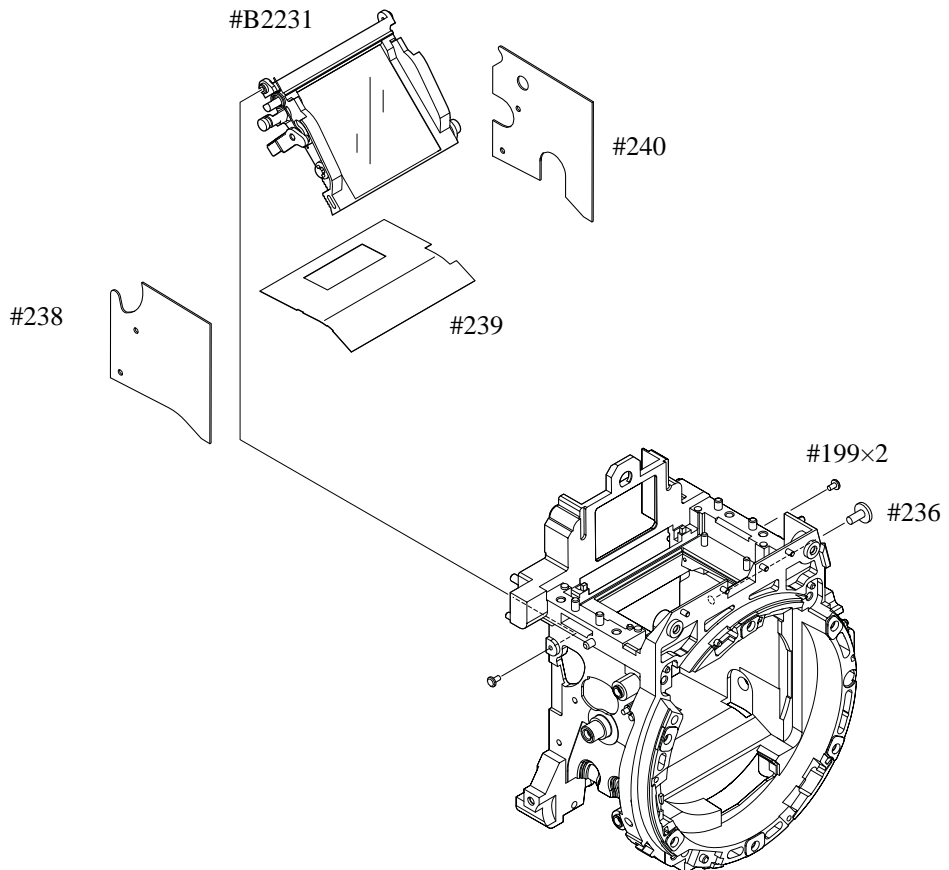
Bayonet /
A/M-change SW /
Lens-contact areas



Aperture lever /
F-min SW areas



Mirror unit

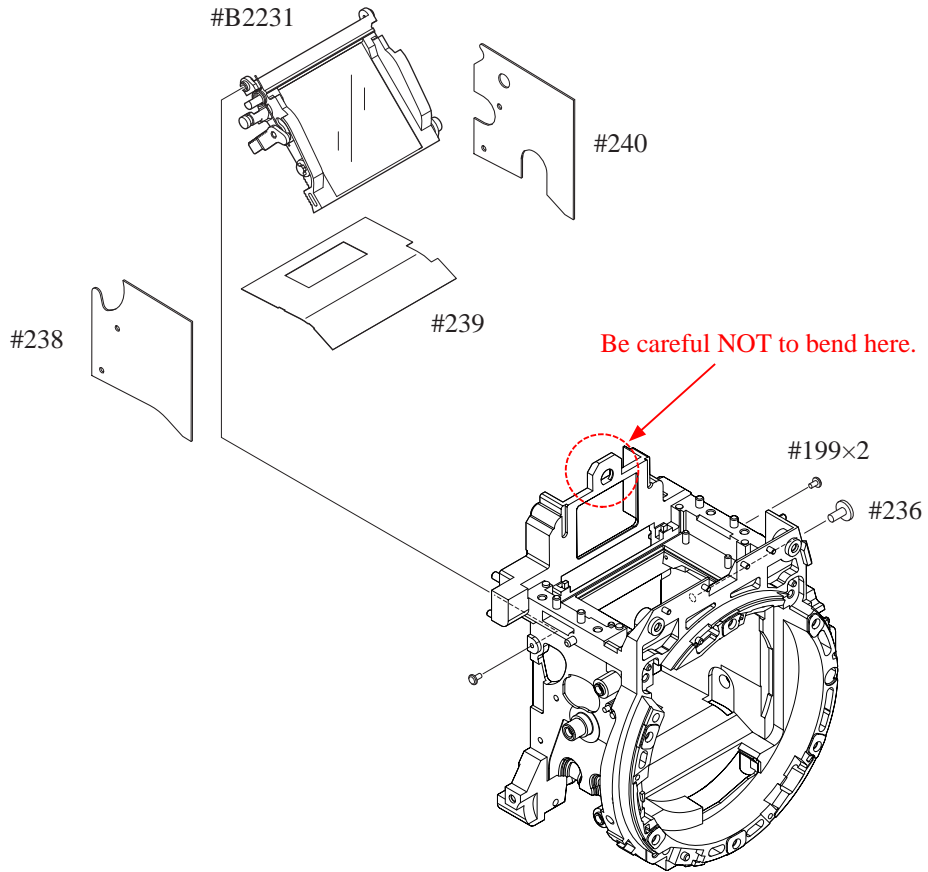


Assembly/ Adjustment

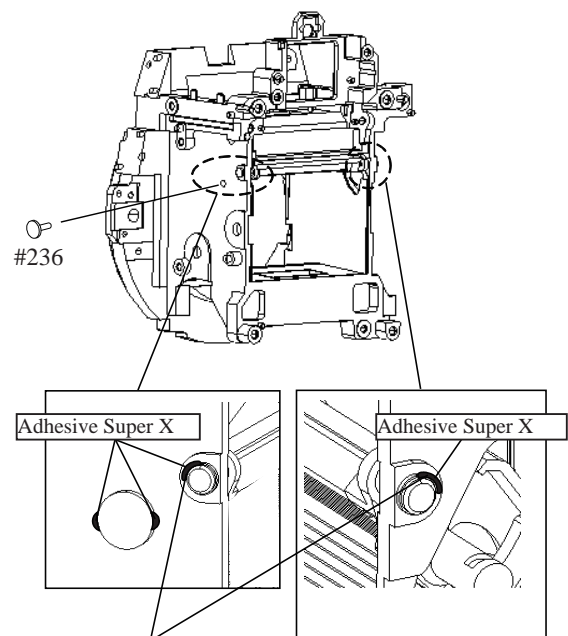
• NOTE: For undescribed tapes and sponges here in "Assembly", refer to PARTS LIST.

1. Front body

Mirror unit



- With the mirror being raised, assemble the pins and apply the adhesive (Super X) on each pin.

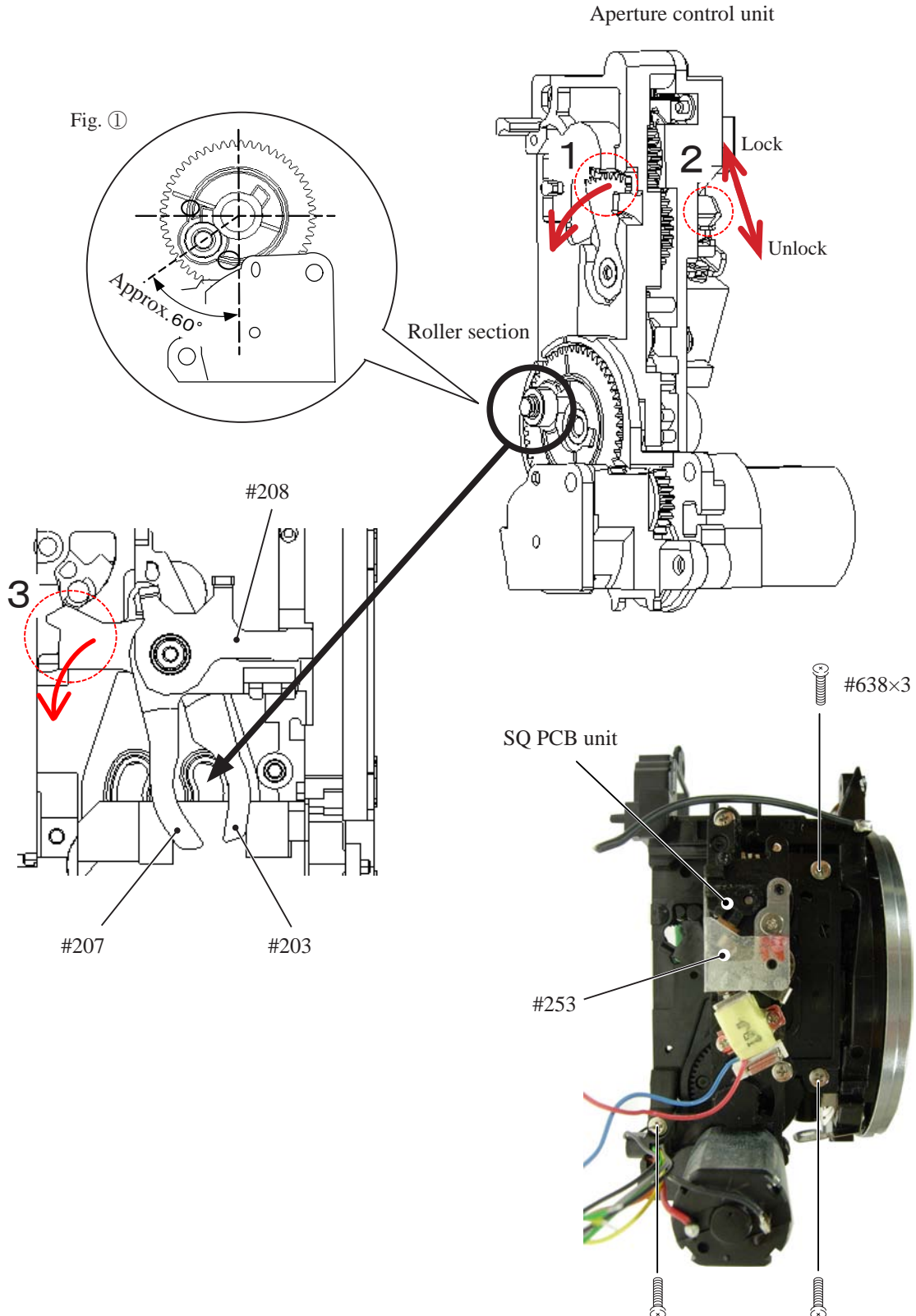


Apply the adhesive only on 1/4 periphery of the pin on mount side.

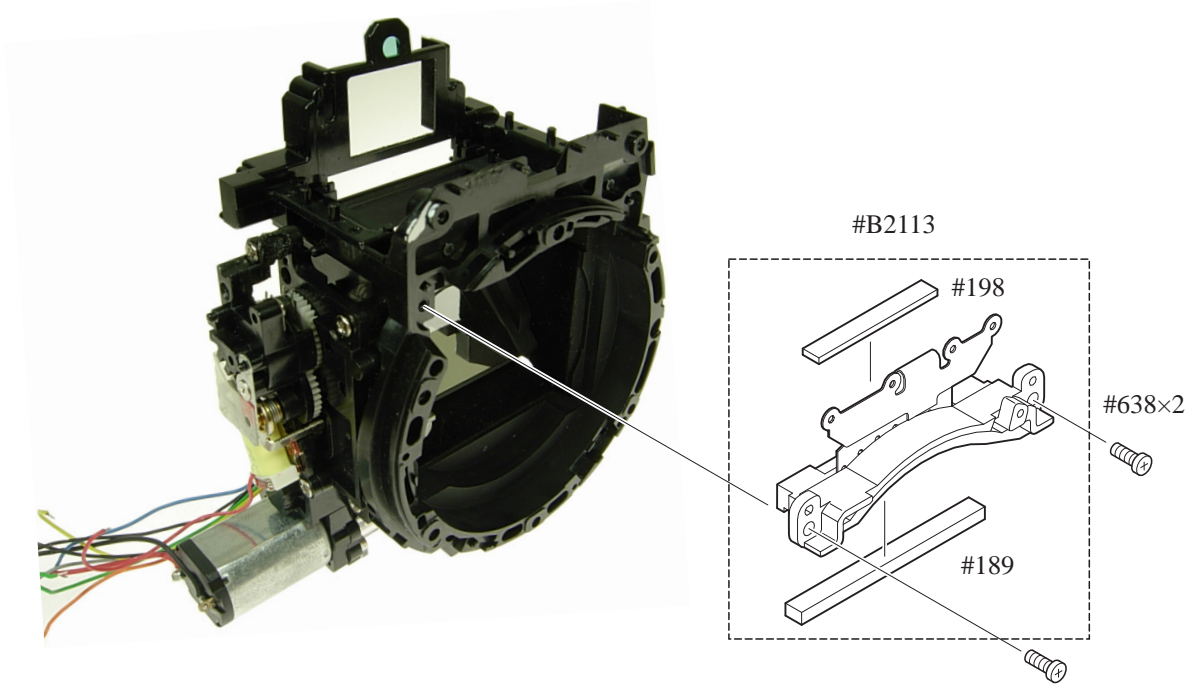
SQ PCB unit

- Move the roller section of the aperture control unit to the position as shown in Fig. ① .
- Turn " 1 " all the way to the end in the direction of the arrow. Then, Press " 2 " in the direction of "Lock".
- Turn " 3 ", and insert the roller section between [#207] and [#203].
- Tighten the three screws (#638).
- Press " 2 " in the direction of "Unlock".

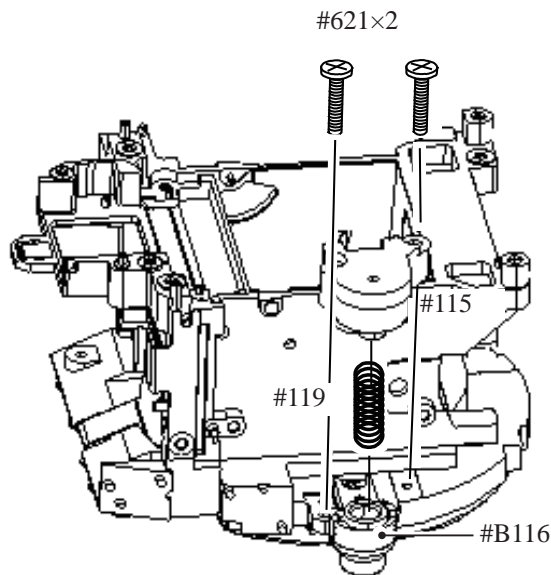
Note: Be careful not to bend contact blade of F-min SW.



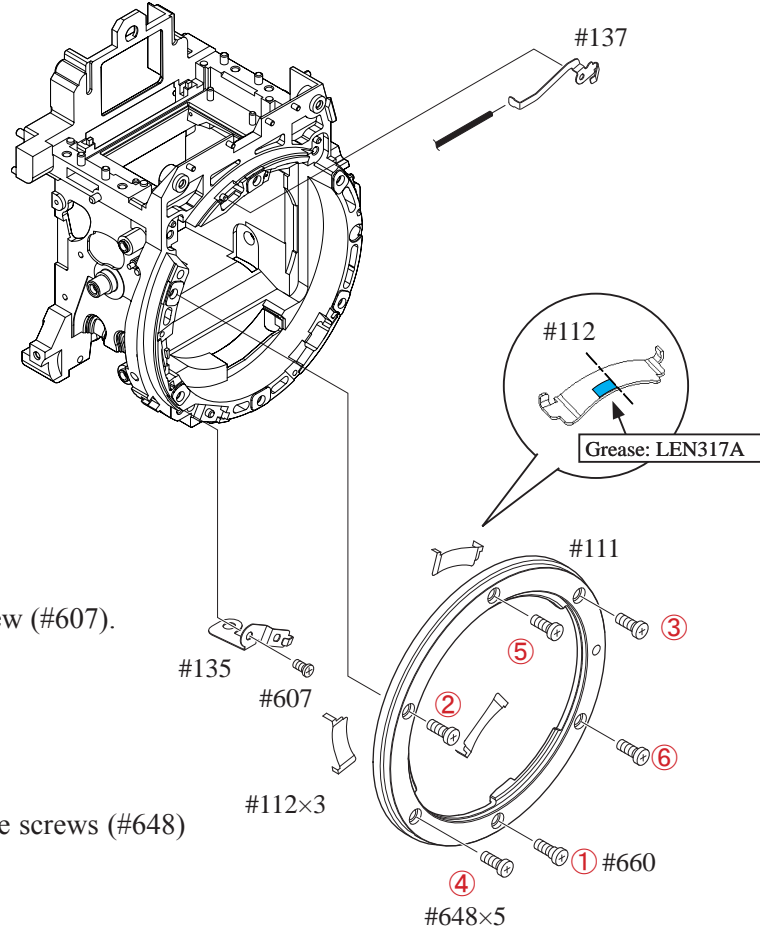
Lens contacts unit



Release button unit



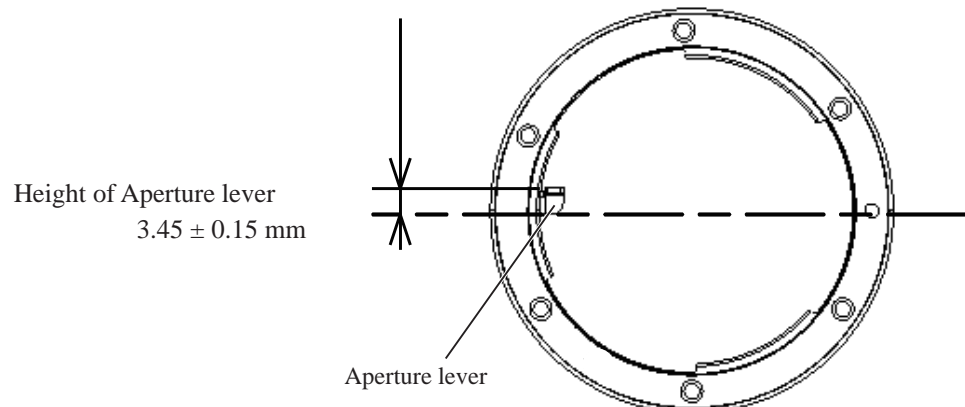
Bayonet
Mount GND plate



- Put [#135] and fix it with the screw (#607).
- Attach [#137].
- Attach three pieces [#112].
- Mount the bayonet (#111).
- Tighten the screw (#660) and five screws (#648) in the order from ① to ⑥ .

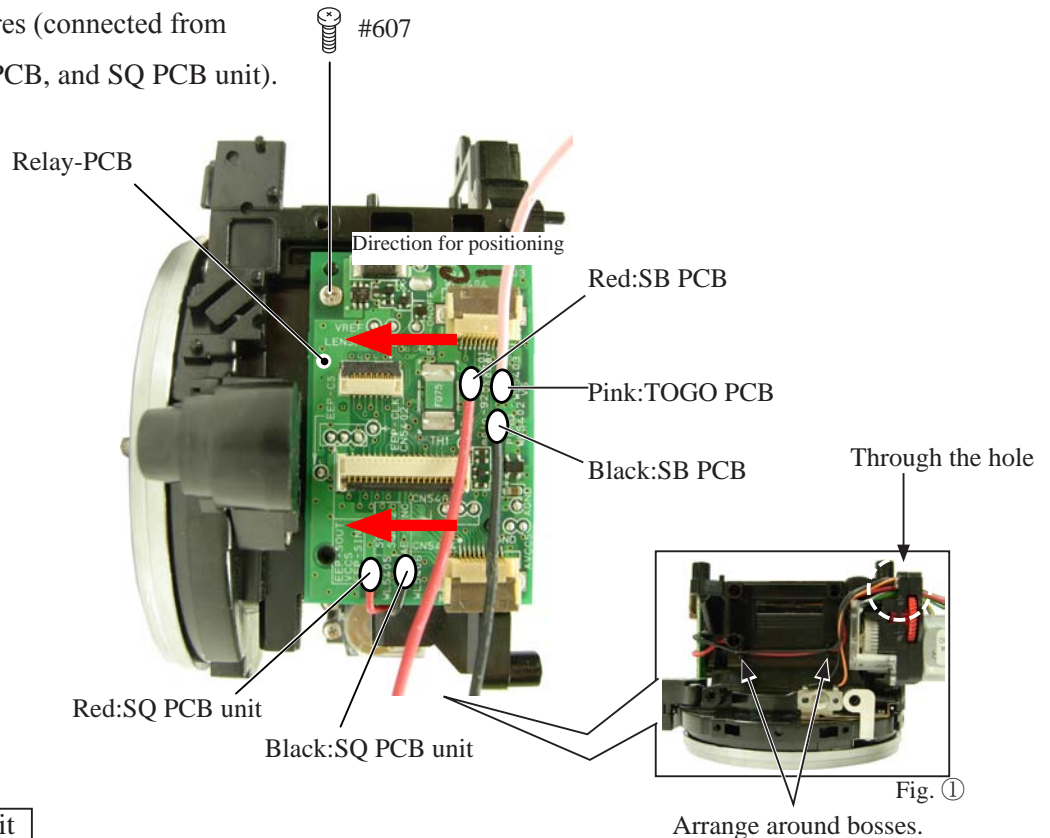
Height adjustment of Aperture lever

- Measure the height of the aperture lever by using the tool (J18004).
Standard: 3.45 ± 0.15 mm
 In case the value is out of standard, make an adjustment by bending the aperture lever.
Be careful NOT to bend the inner part of the lever when adjusting.



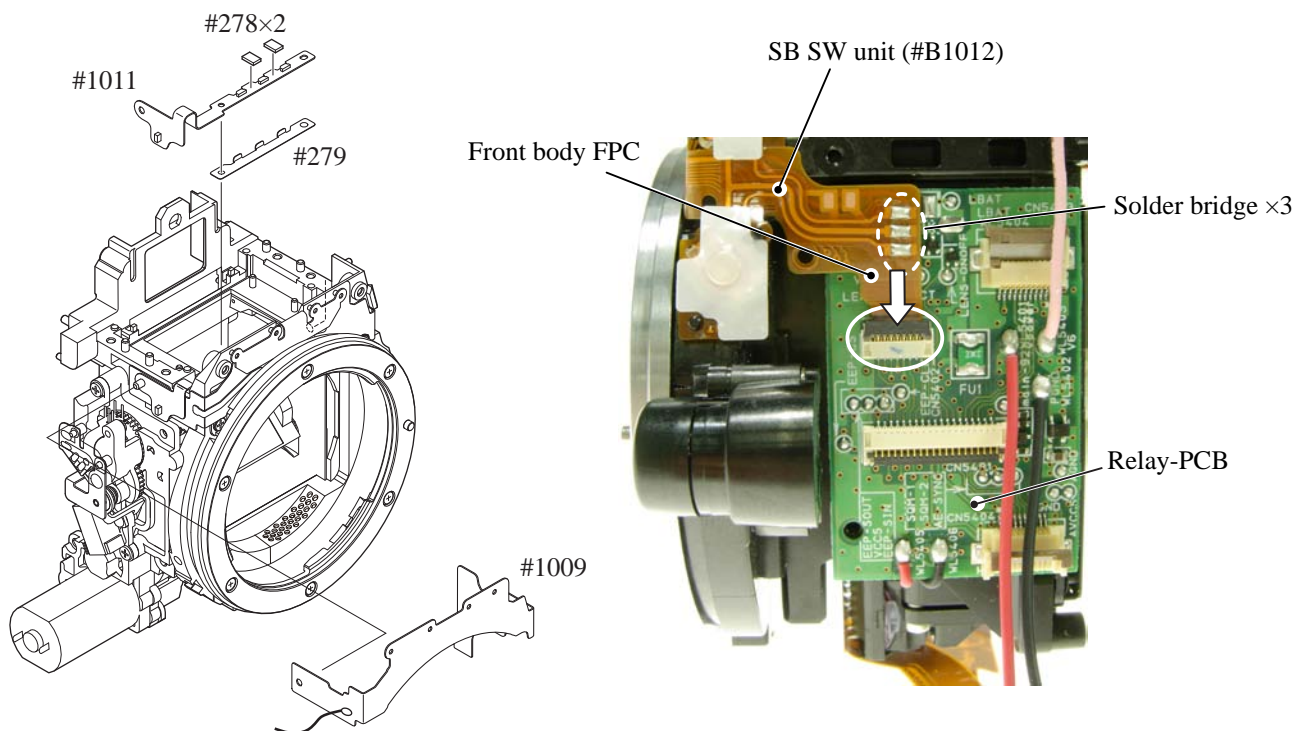
Relay-PCB unit

- Mount the relay-PCB unit (#1004) in the direction for positioning, and fix it with the screw (#607).
- Arrange the wires as shown in "Fig. ①".
- Solder the five wires (connected from SB-PCB, TOGO PCB, and SQ PCB unit).

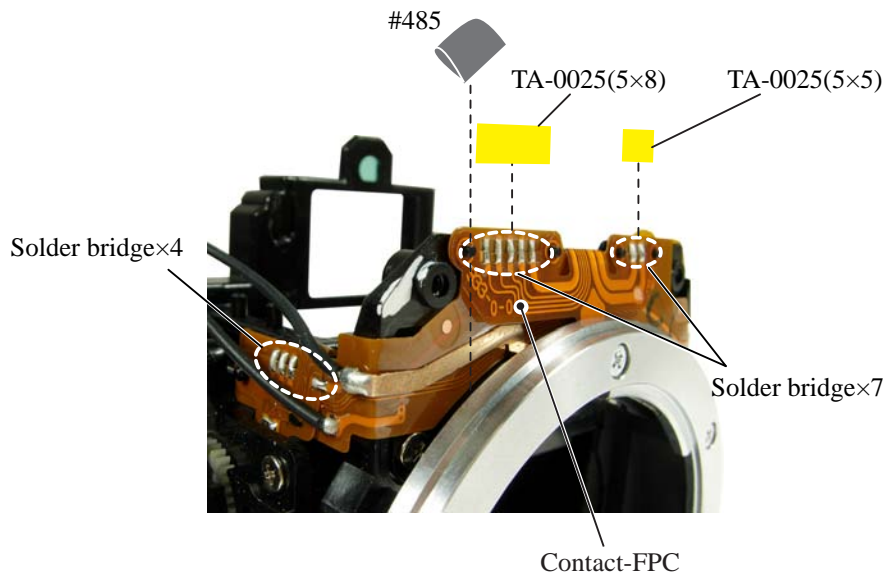


Front body FPC unit

- Attach the front body-FPC (#1009), and connect it to the connector of the relay-PCB unit.
- Attach the SI diffusing plate (#279) and SI-LCD FPC (#1011).
- Mount the SB SW unit (#B1012).
- Make the three solder bridges.

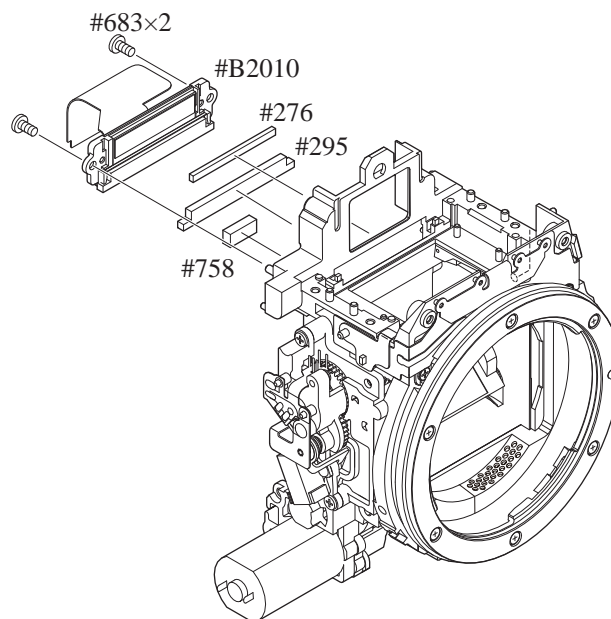


- Fold the contact-FPC down, and attach it by fitting the four bosses in the holes.
- Make seven solder bridges and four solder bridges.
- Attach the two pieces of tape and gasket.



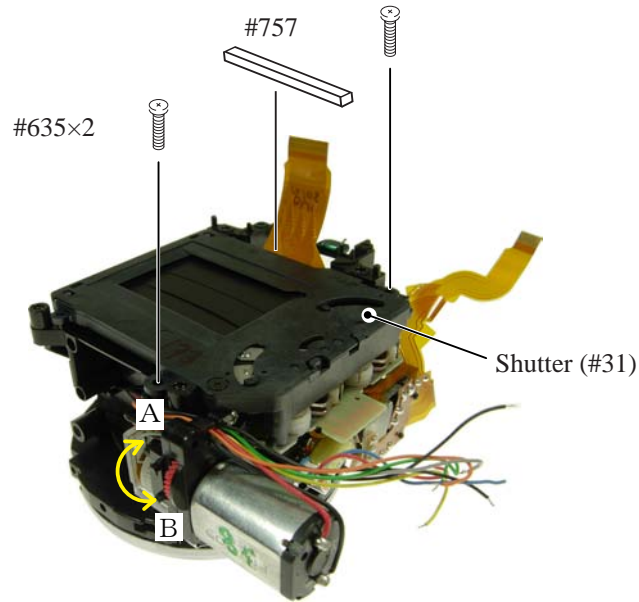
In-finder LCD unit

- Fix the in-finder LCD unit (#B2010) with the two screws (#683).



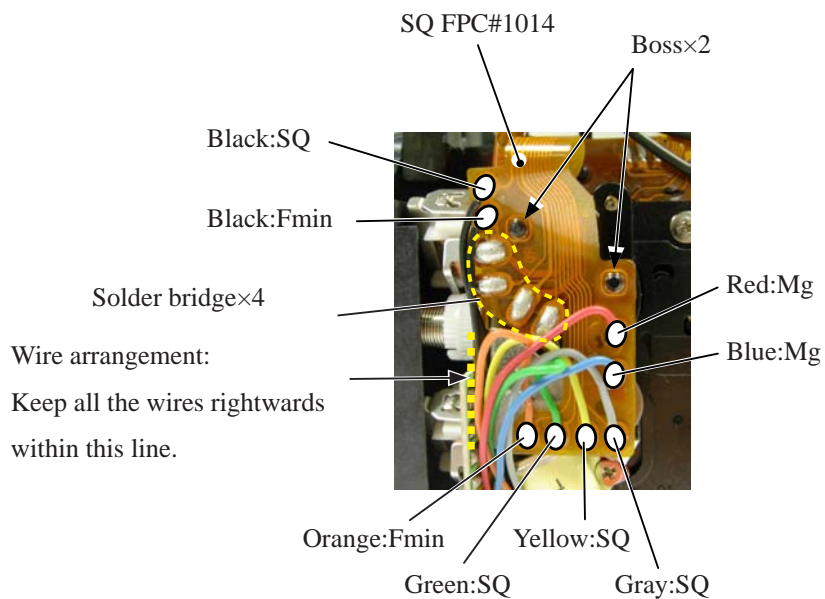
Shutter unit

- Turn the white gear in the direction of "A", and raise the mirror.
- Mount the shutter unit (#31), and fix it with two screws (#635).
- Turn the white gear in the direction of "B", and let the mirror down.
- Attach [#757].



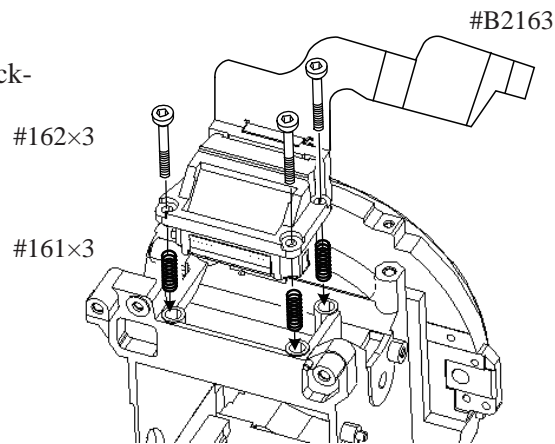
SQ FPC

- Attach the SQ FPC (#1014) by fitting the bosses of the SQ-PCB unit in the holes.
- Make four solder bridges.
- Solder the eight wires (connected from SQ, Fmin, and Mg).

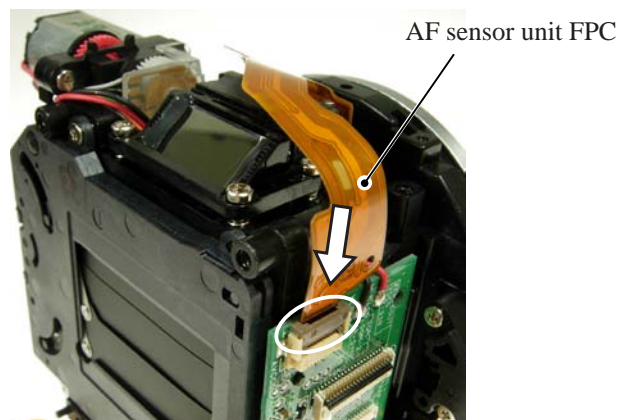


AF sensor unit

- Put three springs (#161) and mount the AF sensor unit [#B2163].
- Turn three screws (#162) with Hexagonal wrench ($\phi 1.5\text{mm}$) all the way lightly to the end, then give each two-turns counterclockwise.

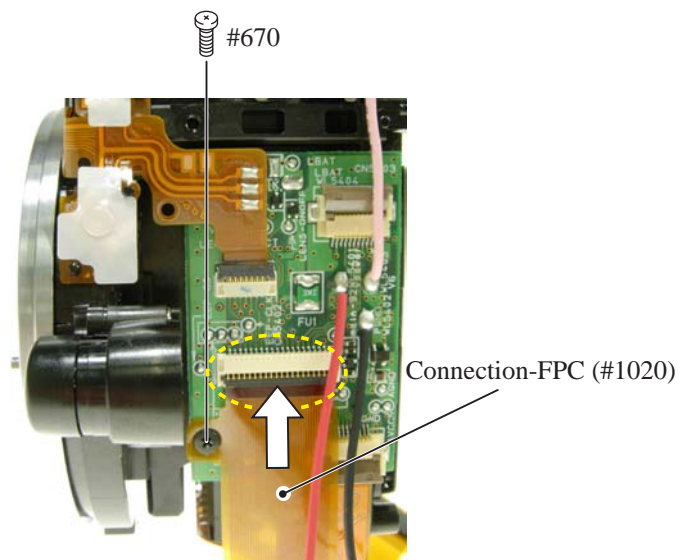


- Attach the AF sensor unit FPC by following the shape of the attaching surface, and connect it to the connector.



Connection-FPC

- Connect the connection-FPC (#1020) to the connector, and fix it with the screw (#670).

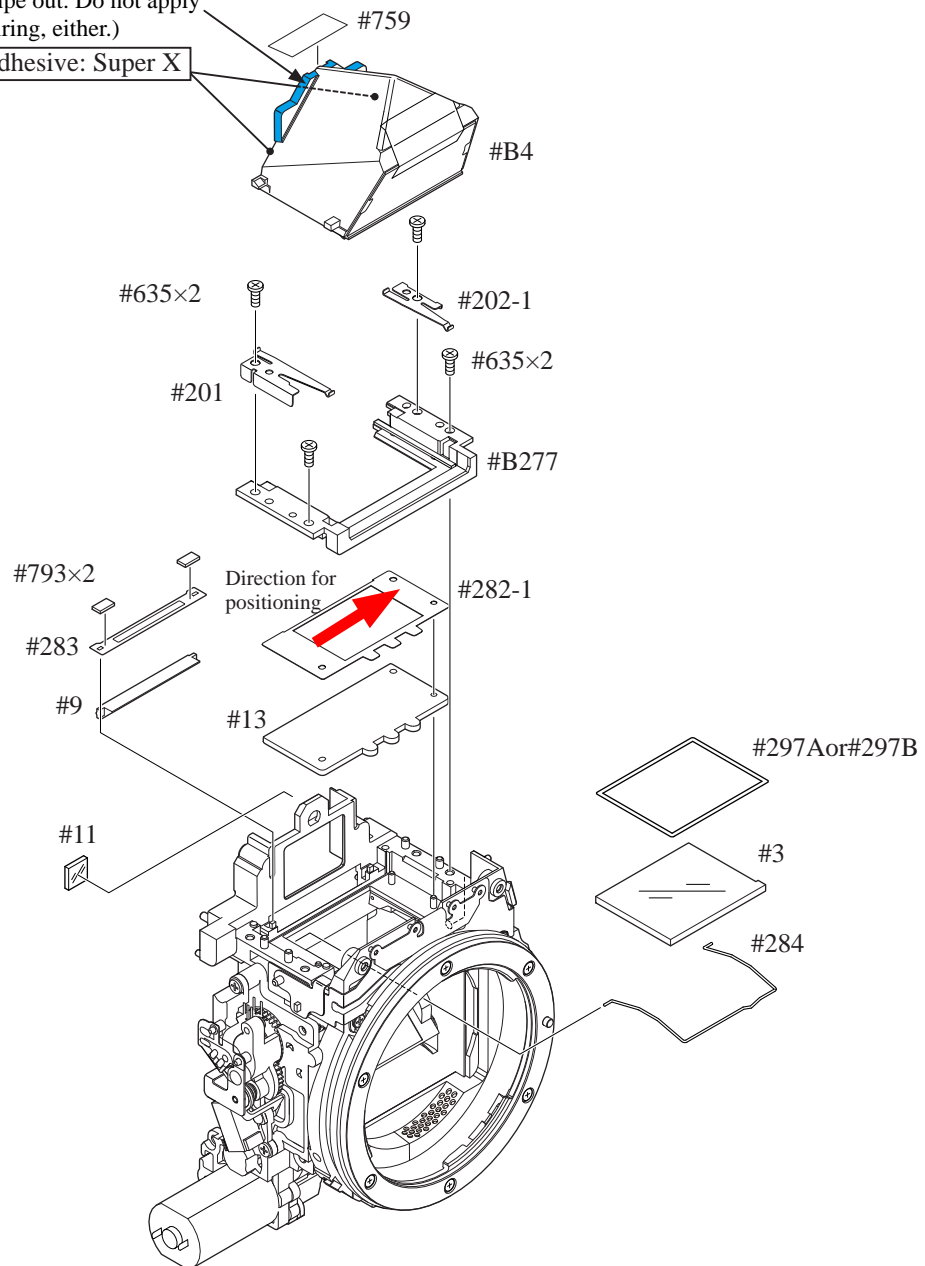


Penta unit Screen areas

- Mount SI (#13).
- Mount the finder field frame 1 (#282-1) by positioning towards the direction of the arrow.
- Attach the in-finder display prism (#9).
- Mount the SI-retaining unit (#B277) and fix it with two screws (#635).
- Mount the finder field frame 2 (#283).
- Mount the hollow penta (#B4).
- Attach the penta-retaining springs (#201 and #202-1) and fix them each with the two screws (#635).
- Mount [#284], then [#3] and [#297A or #297B].

Dust trap agent is applied here.
 (Do not wipe out. Do not apply
 when repairing, either.)

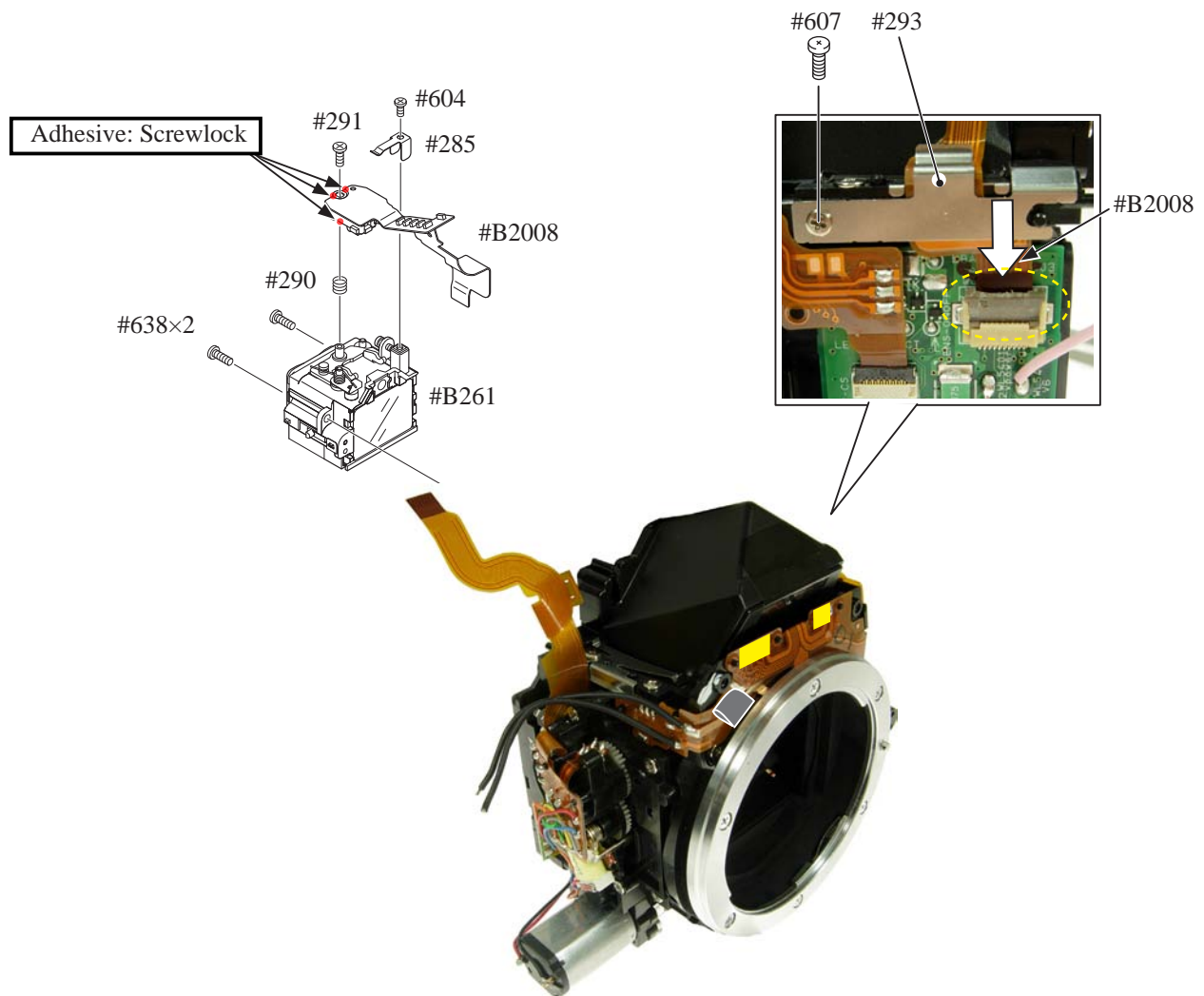
Adhesive: Super X



Eyepiece barrel unit

AE FPC unit

- Mount the eyepiece barrel unit (#B261), and fix it with two screws (#638).
- Put the AE sensor adjusting-spring [#290] and AE FPC unit [#B2008]. Turn the screw (#291) all the way lightly to the end, then give each two-and-half turns counterclockwise.
- Put the AE sensor plate-spring (#285), and fix it with the screw (#604).
- Connect the FPC of the AE FPC unit (#B2008) to the connector.
- Put the AE FPC retainer plate (#293), and fix it with the screw (#607).



Angle inspection and adjustment of Main mirror and sub-mirror

※ Procedure: Follow the operating instructions of the tool for main/sub mirror angle-inspection (J19132).

• Main mirror 45° adjustment

Caution: Before and after the adjustment, check the accuracy by moving the main mirror up- and downwards a few times.

① Check for the right-left deviation

In case the result of checking right-leftward deviation is out of standard, the front plate area or mirror unit should be defective.

② Check for the up-down deviation.

In case the result is out of standard, make the adjustment by turning the eccentric pin for the main mirror of "Fig. ".

• Sub-mirror 47.75° adjustment

Caution: Before and after the adjustment, check the accuracy by moving the main mirror up-and downwards a few times. Confirm that the two-pronged part of the sub-mirror firmly fits in the eccentric pin.

① Check for the up-down deviation

In case the result is out of standard, make the adjustment by turning the eccentric pin for the sub-mirror of "Fig. ".

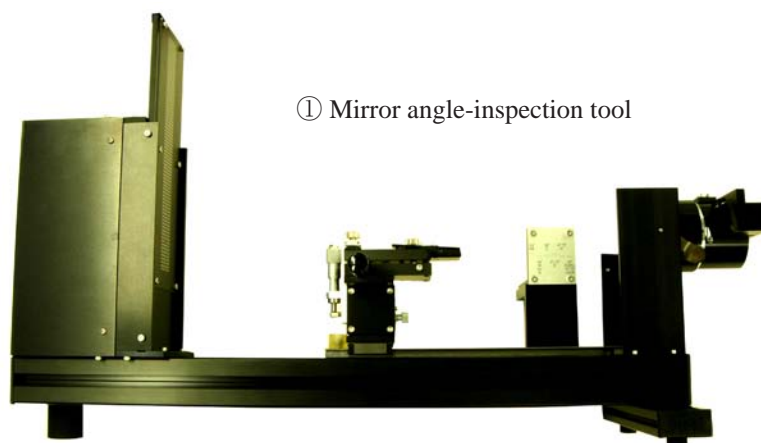
< Device >

1. For Main mirror adjustment

- ① Mirror angle inspection tool
- ② Reflection mirror (J18362)
- ③ Hexagonal wrench (φ1.5mm)

2. For sub-mirror adjustment

- ① Mirror angle inspection tool
- ② Inclined mirror (Camera model D : In common with D40, D40X)
- ③ Hexagonal wrench (φ1.5mm)



① Mirror angle-inspection tool

Eccentric pin for the sub-mirror

Eccentric pin for the main mirror

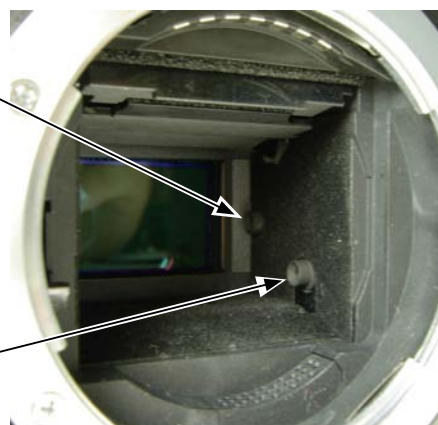


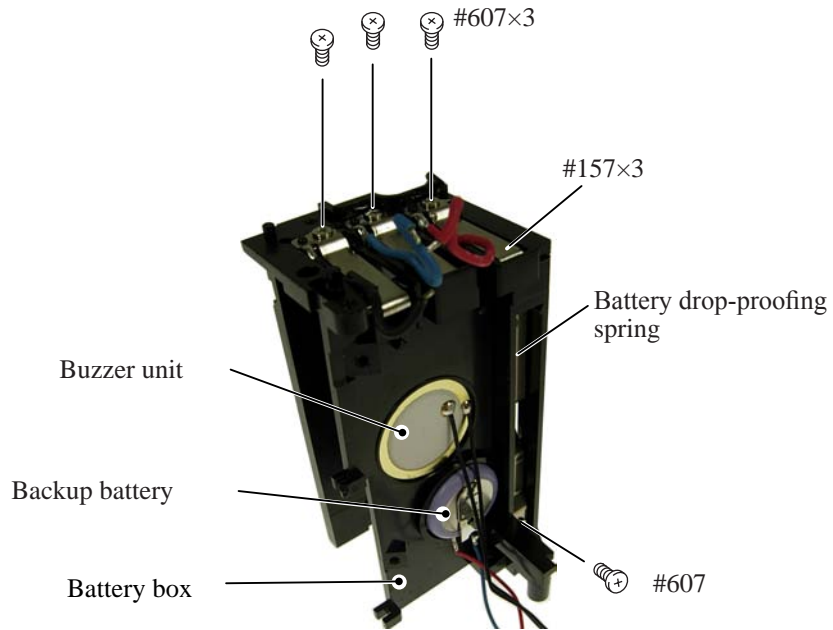
Fig.

< Standard value >

	Main mirror	Sub mirror
Left-right deviation	±30'	-
Up-down deviation	±2'	±10'
Distortion	6'or less	8'or less

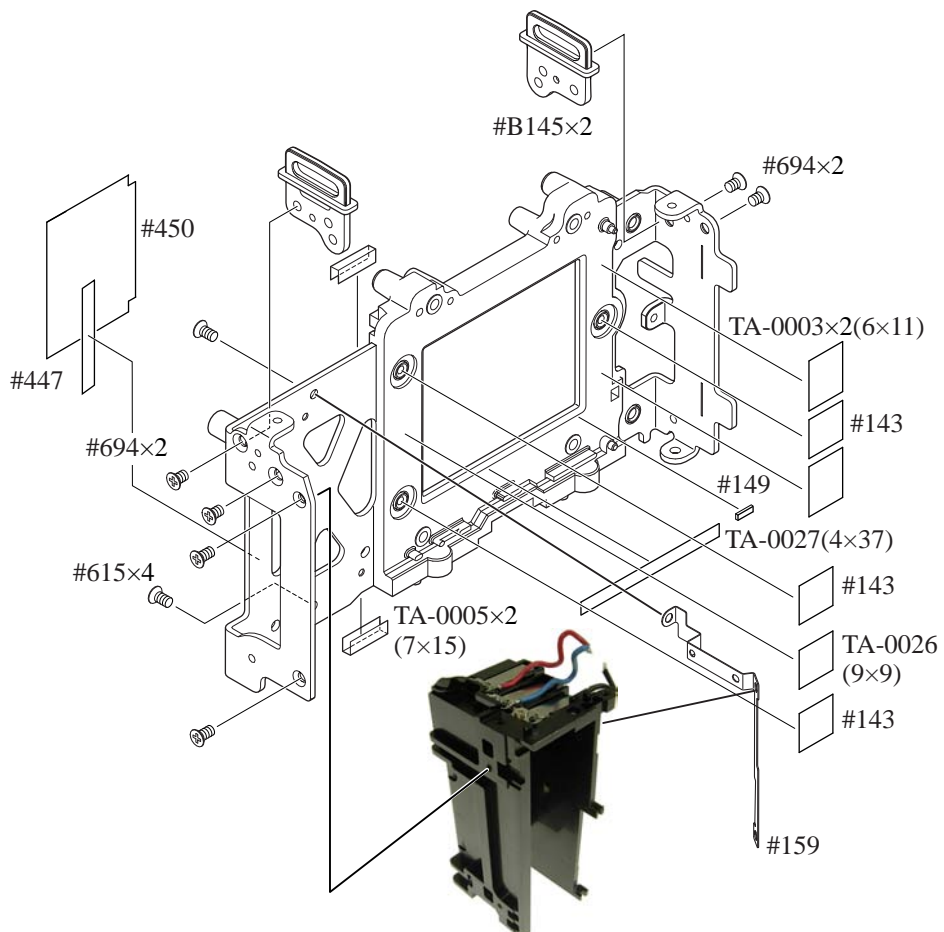
2. Rear body

Battery box



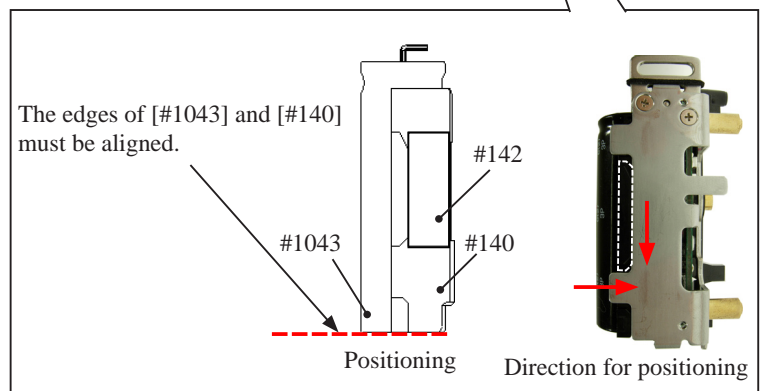
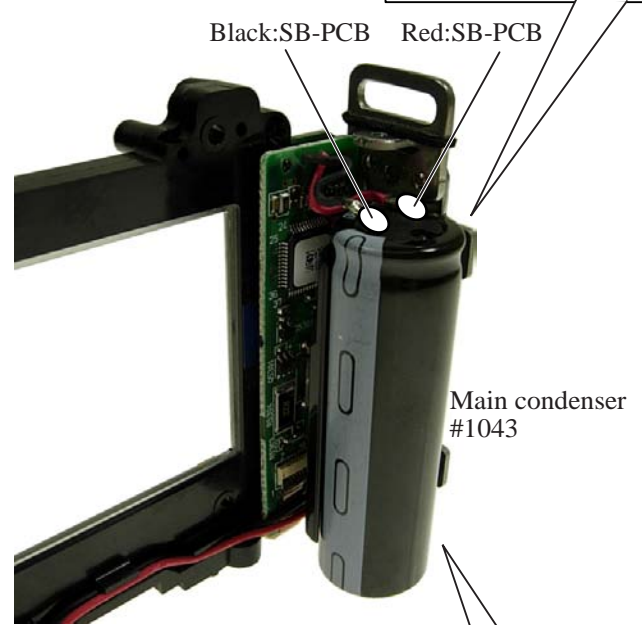
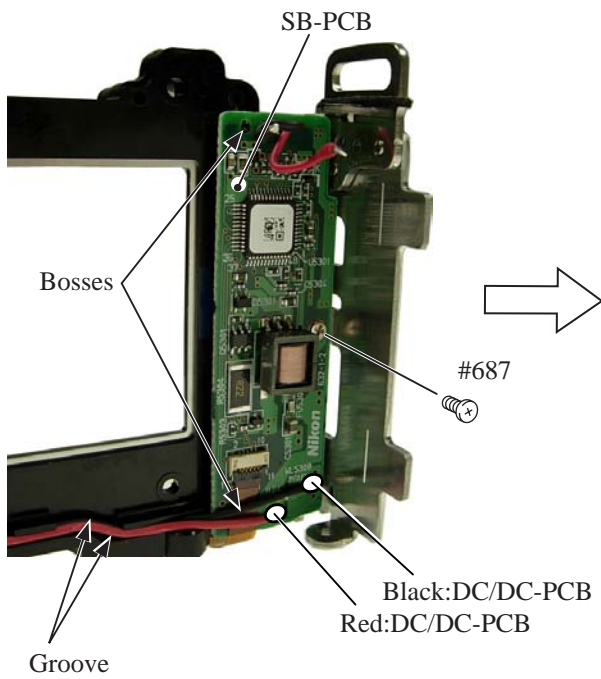
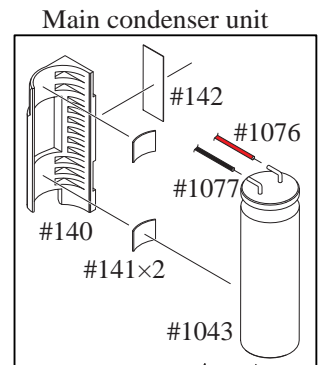
Battery box
Eyelet ring unit
Other small parts

- Put the DC/DC lug plate (#159) at the final stage, then fix the battery box with the four screws (#615).



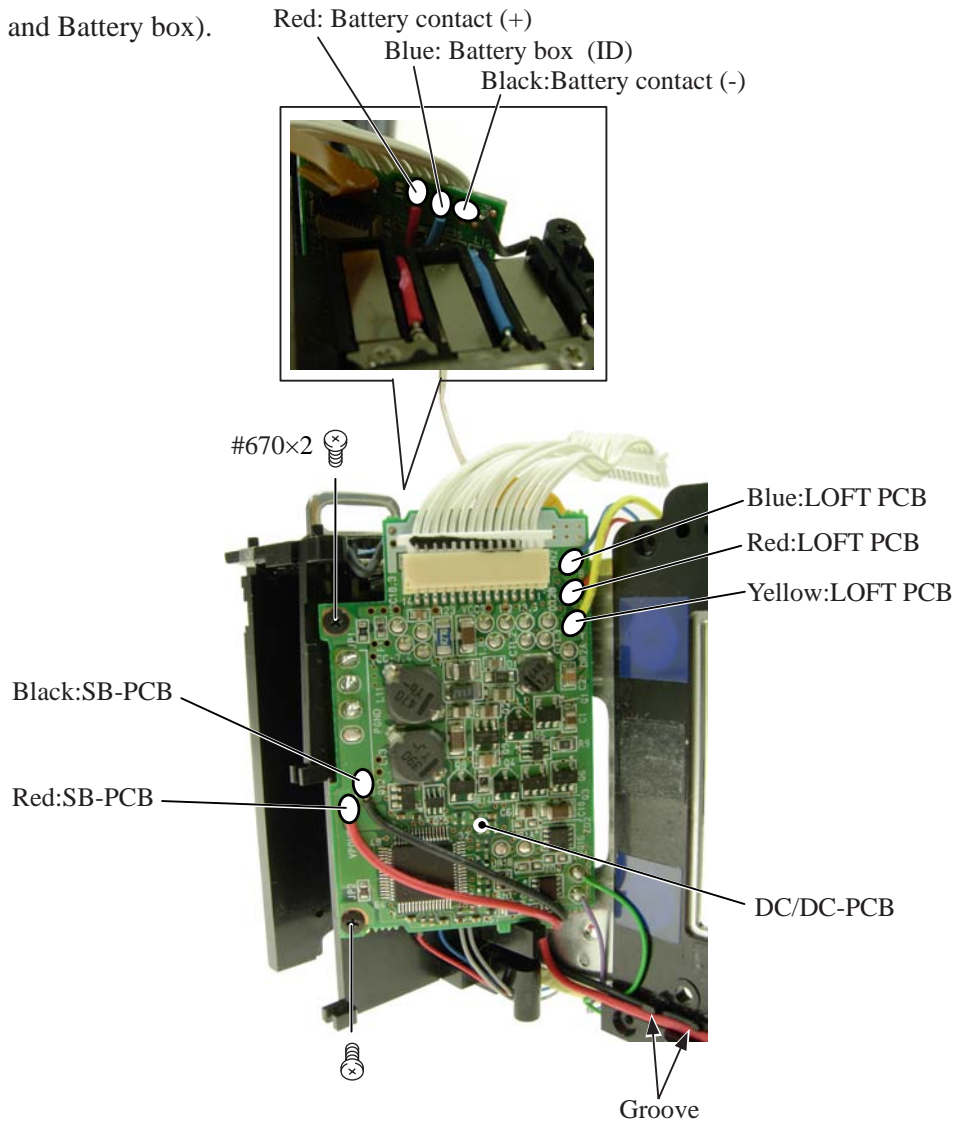
SB PCB

- Fit the SB-PCB with the boss, and fix it with the screw (#687).
- Solder the two wires (connected from DC/DC-PCB) and put them in the groove for arrangement.
- Adhere the main condenser unit with the adhesive double-coated tape by putting in the direction for positioning.
- Solder the two wires of the main condenser.



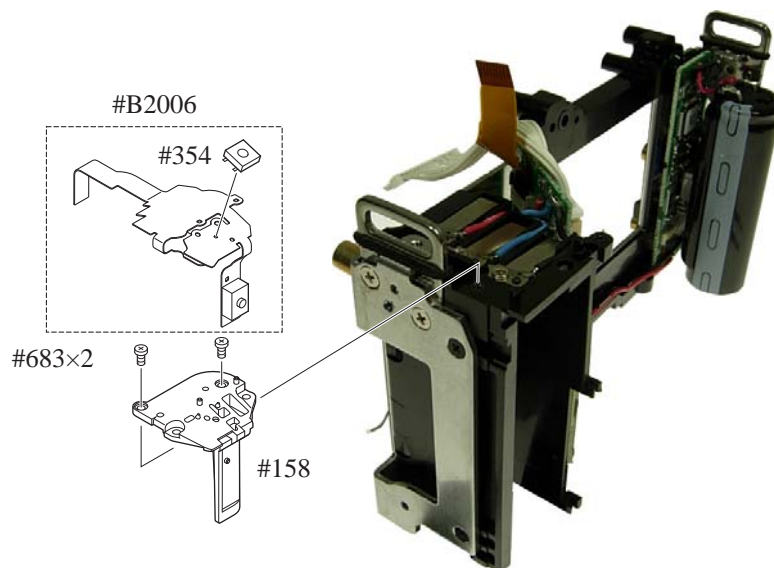
DC/DC PCB

- Mount the DC/DC-PCB, and fix it with two screws (#670).
- Put the wires in the groove for arrangement, and solder eight wires (connected from SB-PCB, LOFT PCB, Battery contacts and Battery box).



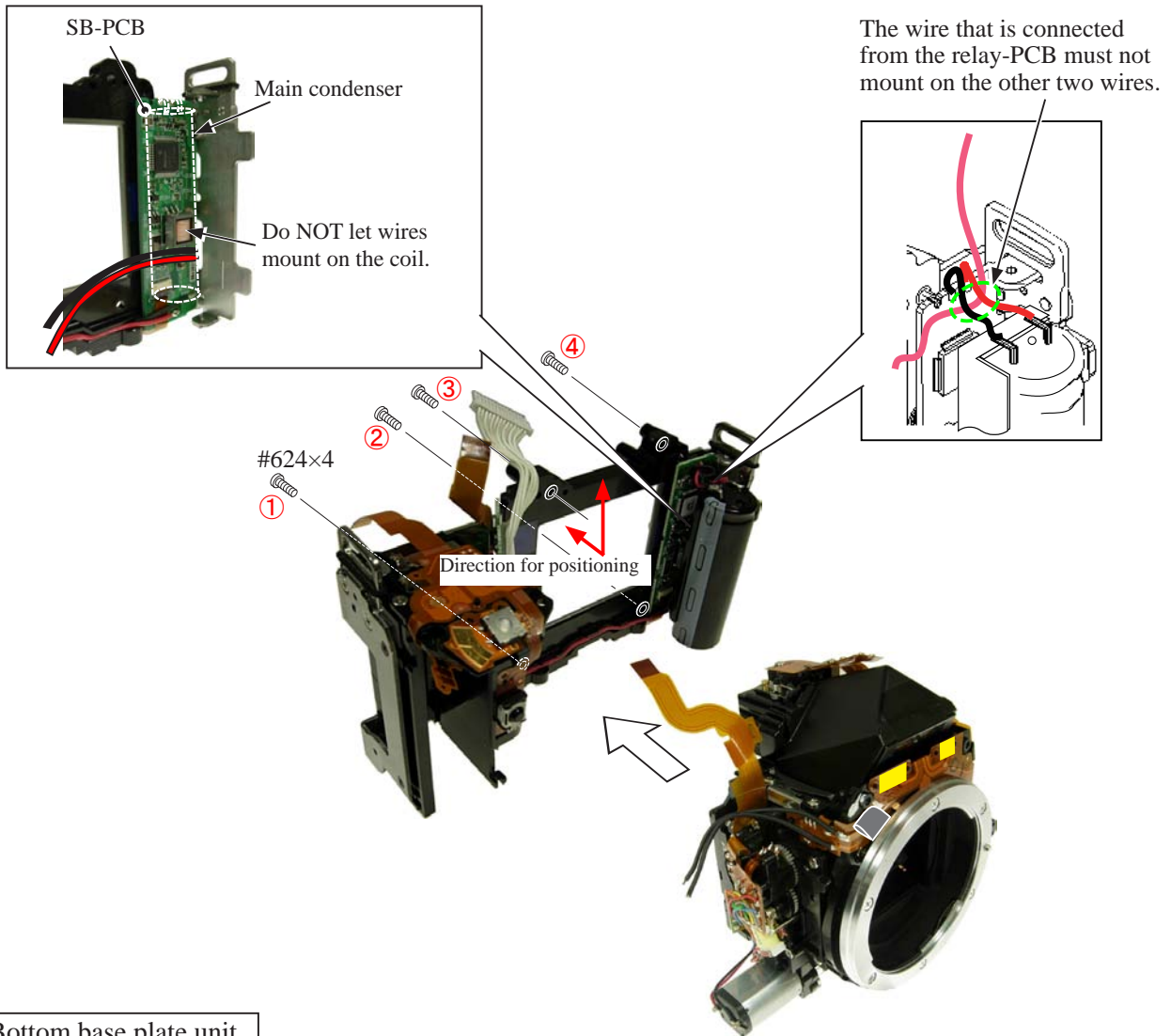
Remote block

- Mount the remote block (#158), and fix it with two screws (#683).
- Attach SW-FPC [#B2006].



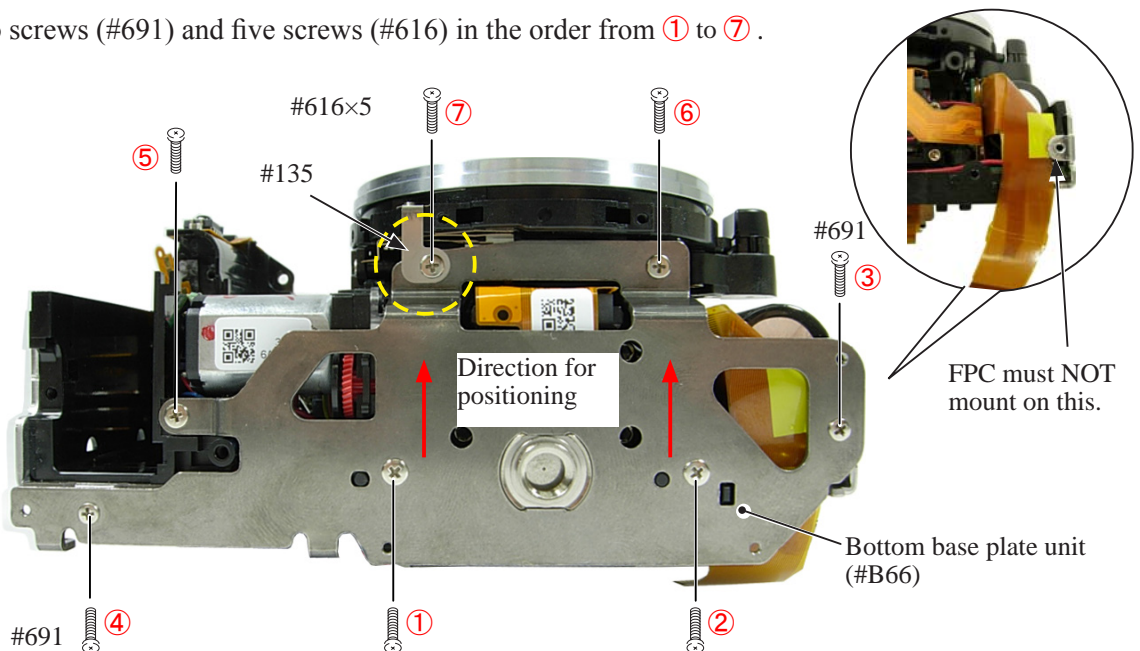
3. Mounting of Front body on Rear body

- Pass the wires of the relay-PCB through behind the main condenser, and assemble the front body into the rear body.
- Tighten four screws (#624) in the order from ① to ④.



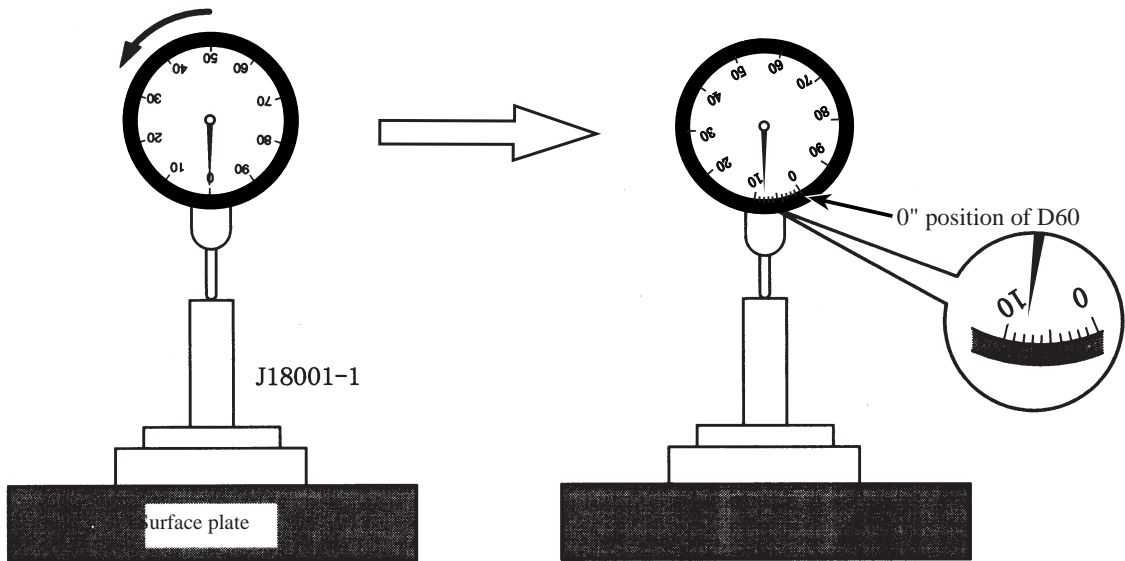
Bottom base plate unit

- Mount the bottom base plate unit (#B66) so that [#135] comes in front, and tighten two screws (#691) and five screws (#616) in the order from ① to ⑦.



Inspection and Adjustment of Body back

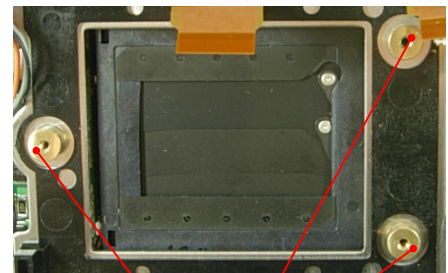
* "0" positioning of the dial gauge



- ① Put the tool (J18001-1) on the surface plate, and set the dial gauge to "0".
- ② Turn the index ring in the direction of the arrow from the above "0", and set the scale to "8". (This is "0"-position of D60.)
- ③ Measure the body back, based on "0" reference position of the index ring.

- Measure three parts from the bayonet face to the CCD-PCB attaching face.

Standard: 48.59±0.015mm/ Parallelism: 0.015mm or less



Measuring point

- In case it is out of standard, make adjustment by loosening screws that attach the front and rear bodies, or by putting the washer(s) on the contact surface between the front body and rear body.

Note: For some bodies, washer(s) or tracing-film sheet are already put on the attaching face of the CCD-bracket. There are three cases as follows.

1. Purpose : To adjust the height of the camera body
There are indications by color marker on the CCD-PCB attaching face of the camera body side .
{Blue =0.02mm (#87), Red = 0.01mm (#88), Green = 0.06mm (#89)}

* By adding the measured value to the thickness of washers, check if it is within the standard (48.59±0.015mm).

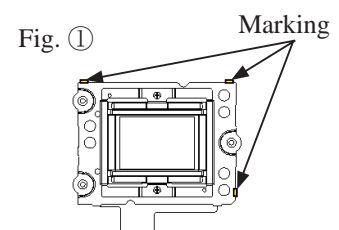
2. Purpose : To adjust the height of the CCD bracket
There are indications by marker on the CCD-bracket attaching face
One marking = Put three washers [#88 (0.02mm)] at three places
Two markings = Put three washers [#87 (0.1mm)] at three places

* When the CCD PCB is replaced, remove the washers.

3. Any marking(s) of the three in the right "Fig. ①" =

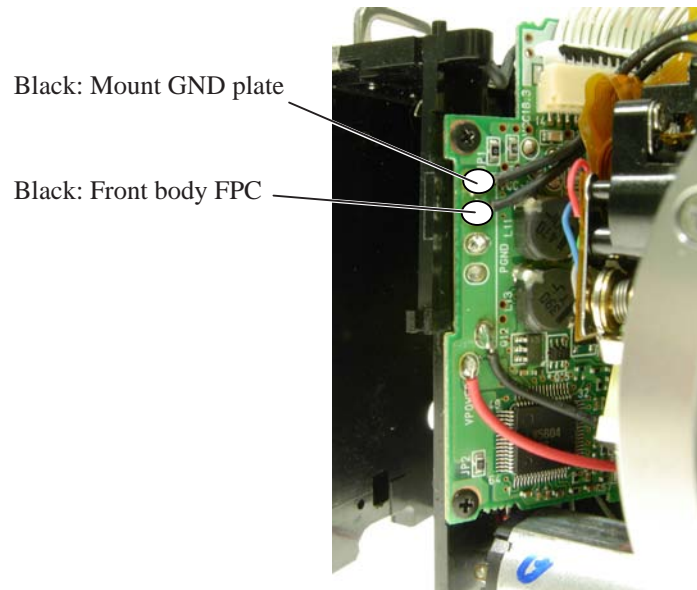
Put the tracing-film sheet (#84) in the marked place(s).

* When the CCD PCB is replaced, remove the tracing-film sheet.



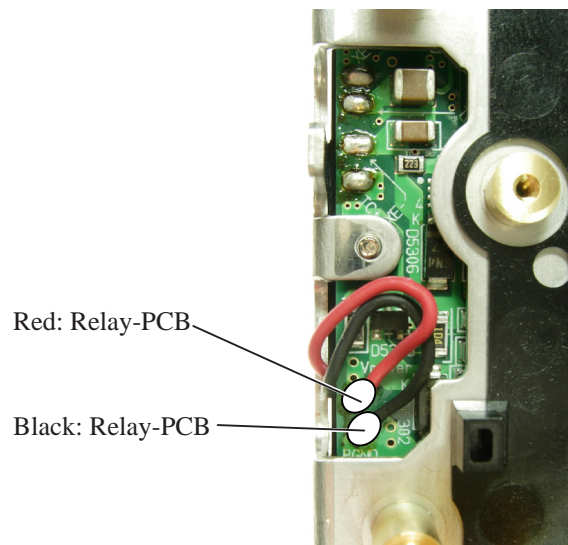
DC/DC PCB

- Solder the two wires (connected from Mount GND plate and Front body FPC).



SB PCB

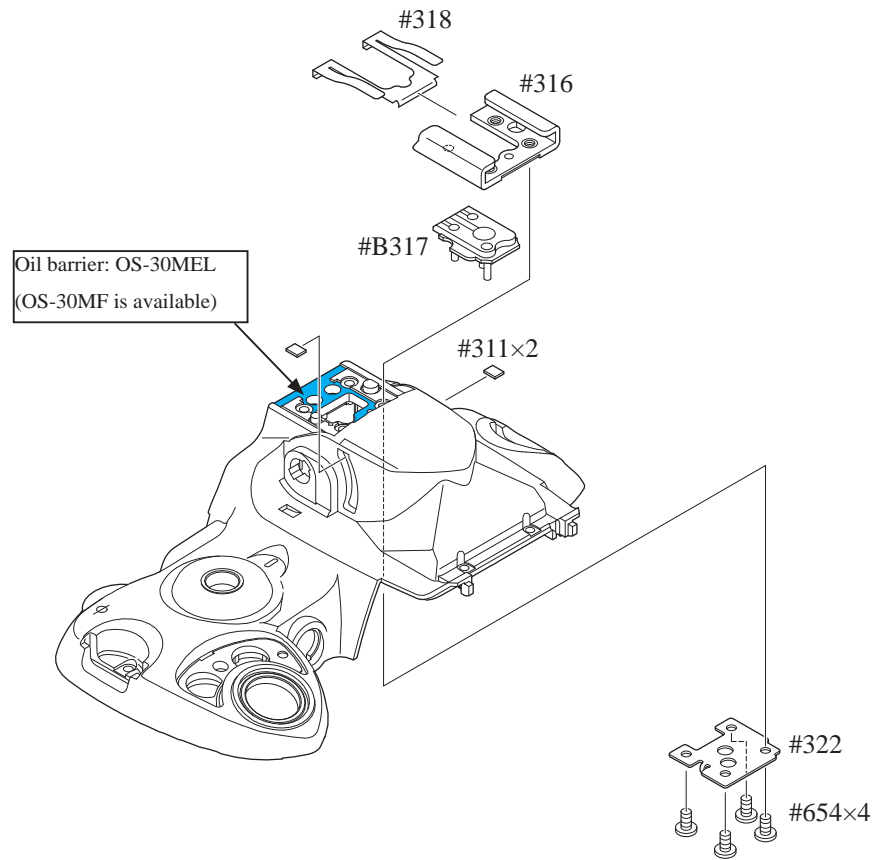
- Solder the two wires (connected from Relay-PCB).



Assembly of Top cover

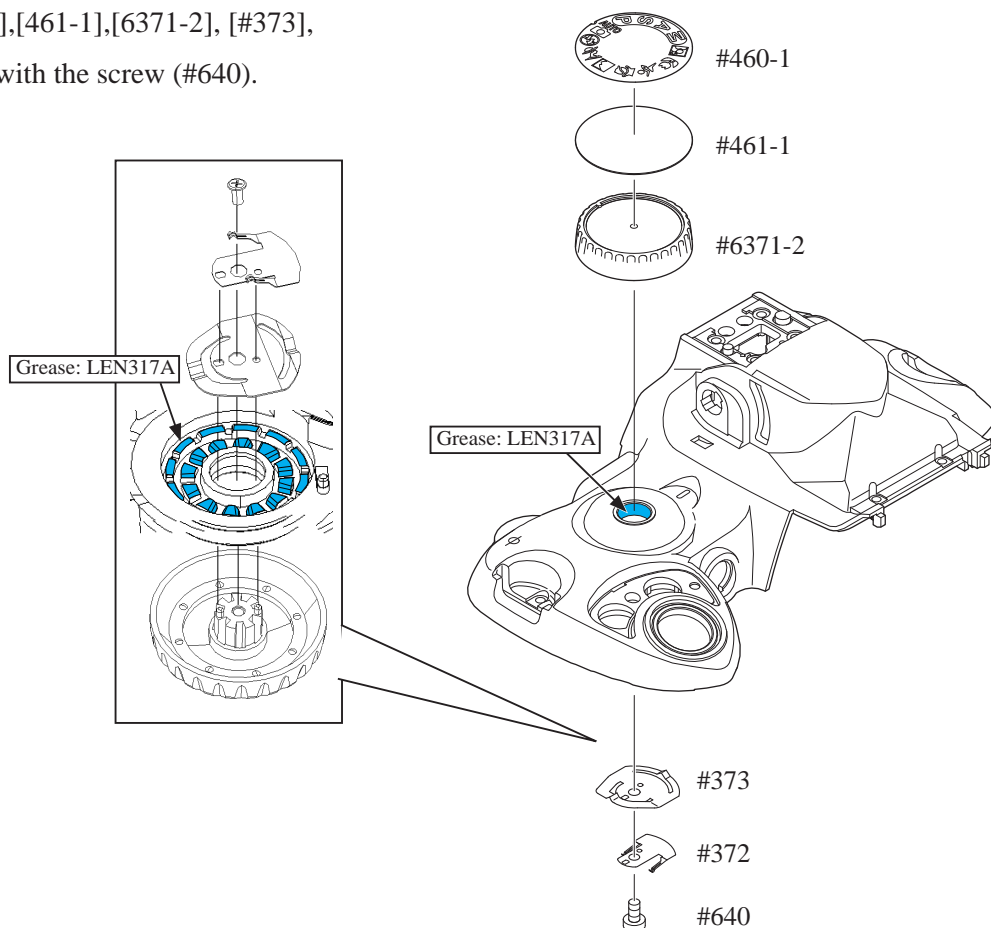
Shoe base

- Fix [#B317], shoe base (#316), [#318], and [#322] with four screws (#654).



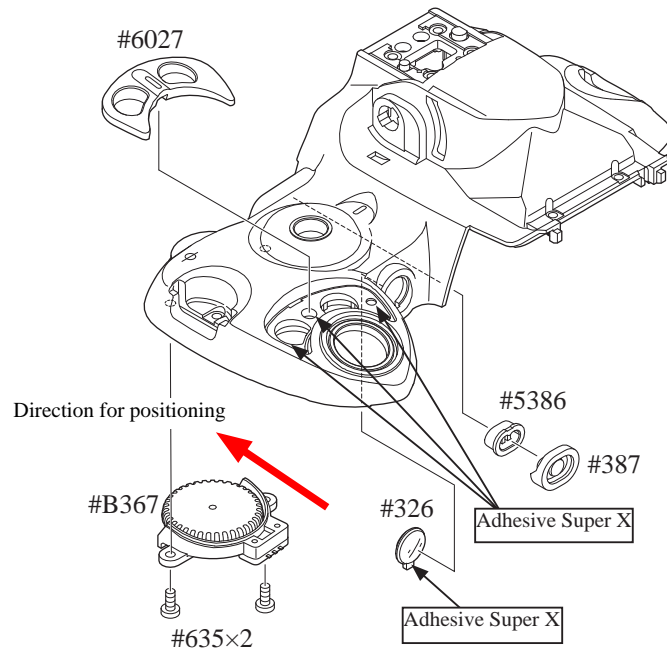
Mode dial unit

- Fix [#460-1],[461-1],[6371-2], [#373], and [#372] with the screw (#640).



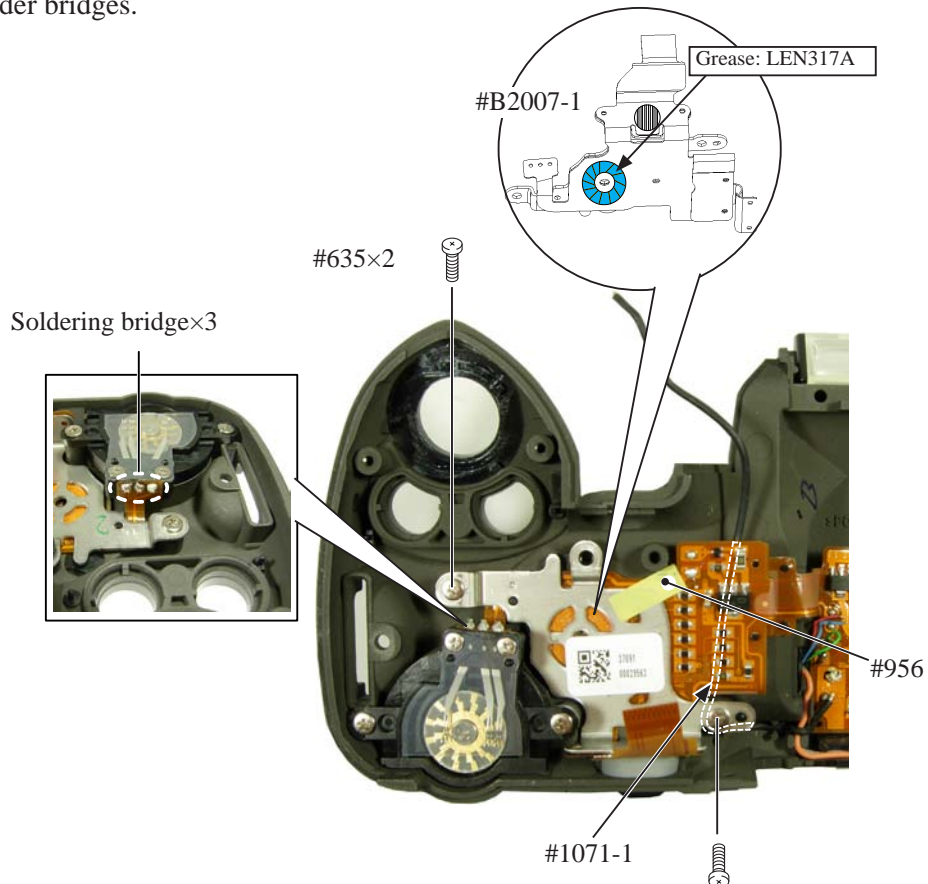
C/D unit / Buttons / Other small parts

- Fix the C/D unit (#B367) with two screws (#635).
- Attach [#387] and AF/AE lock button (#5386).



Top cover FPC unit

- Put the wire (#1071-1) in position as below.
- Mount the top cover FPC unit (#B2007-1), and fix it with two screws (#635).
- Make three solder bridges.
- Attach [#956].



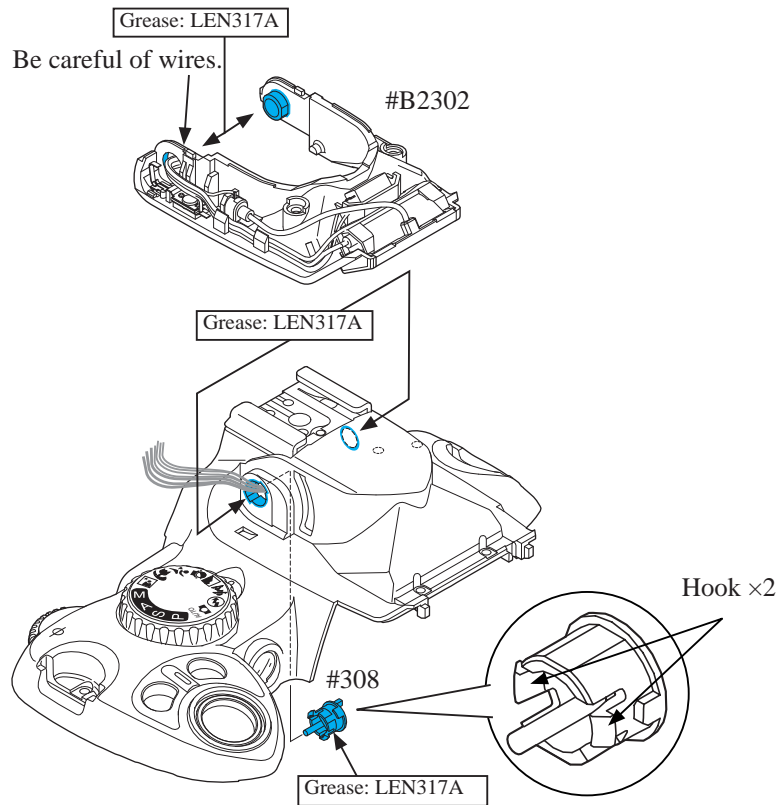
SB release base unit

- Mount the SB release base unit (#B2455), and fix it with two screws (#607).

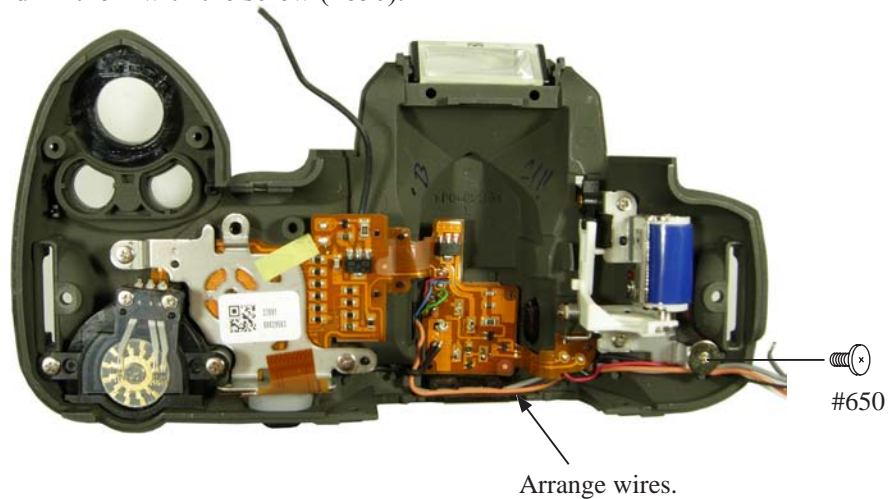


SB lower case unit / Other small parts

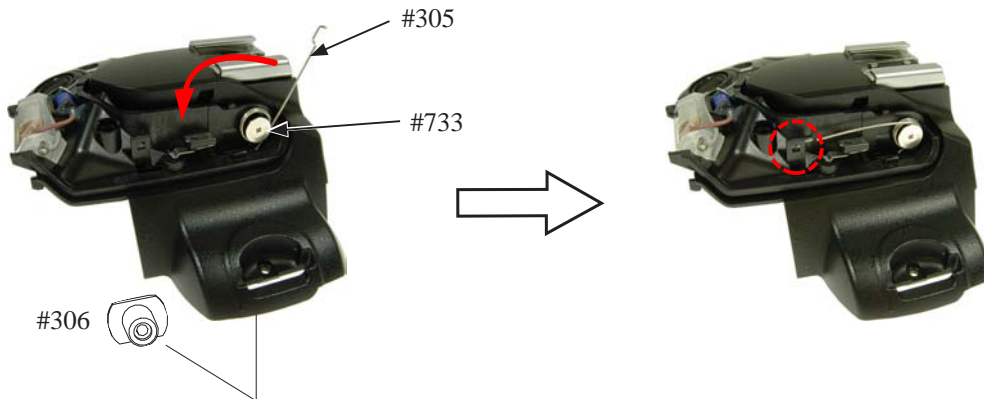
- By watching the wires, mount the SB lower case unit (#B2302).
- While releasing the two hooks, attach [#308].



- Arrange the wires, and fix them with the screw (#650).

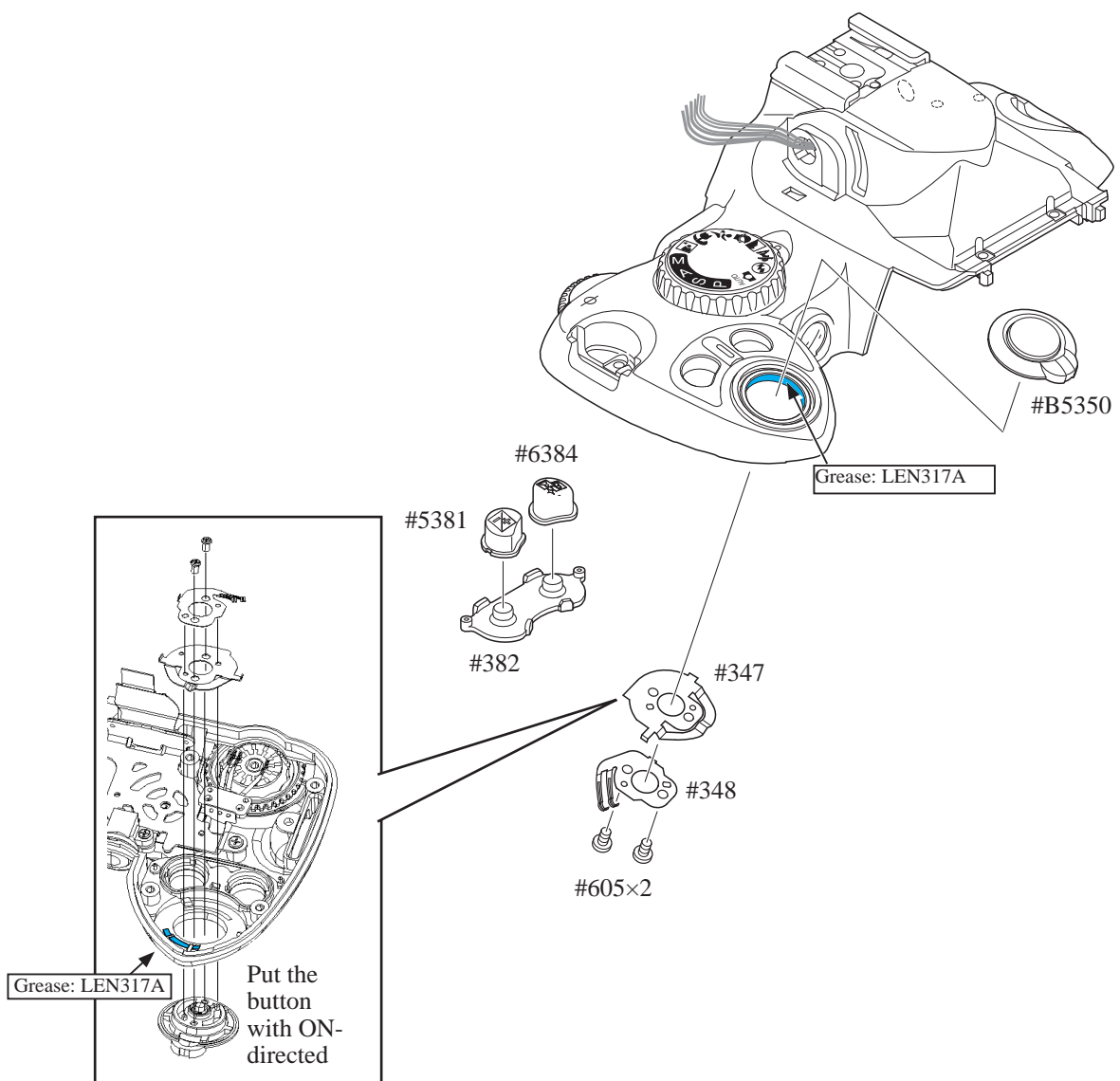


- While pressing the SB case rotating shaft (#306), attach the SB-up spring (#305) by pushing it in the direction of the arrow, then fix it with the screw (#733).



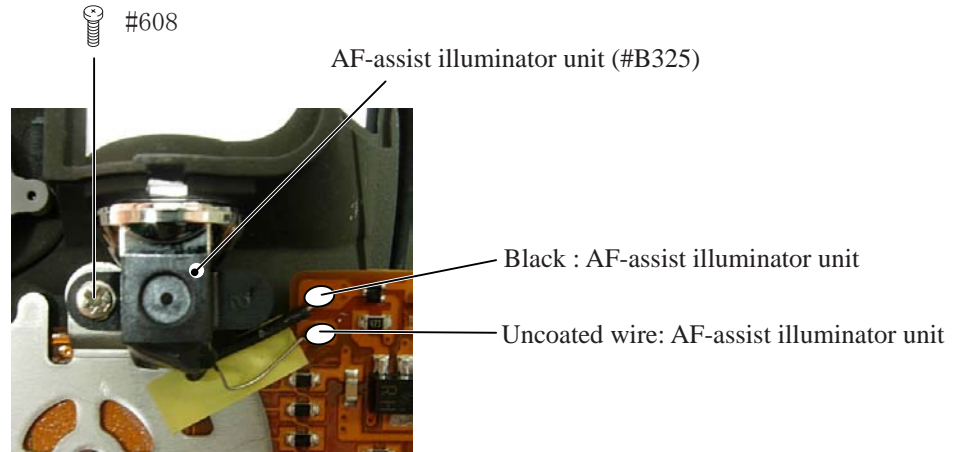
Release button unit / Buttons

- Mount the release button unit (#B5350), [#347], and [#348], and fix them with two screws (#605).
- Attach the button (#5381), (#6384) and rubber SW (#382).



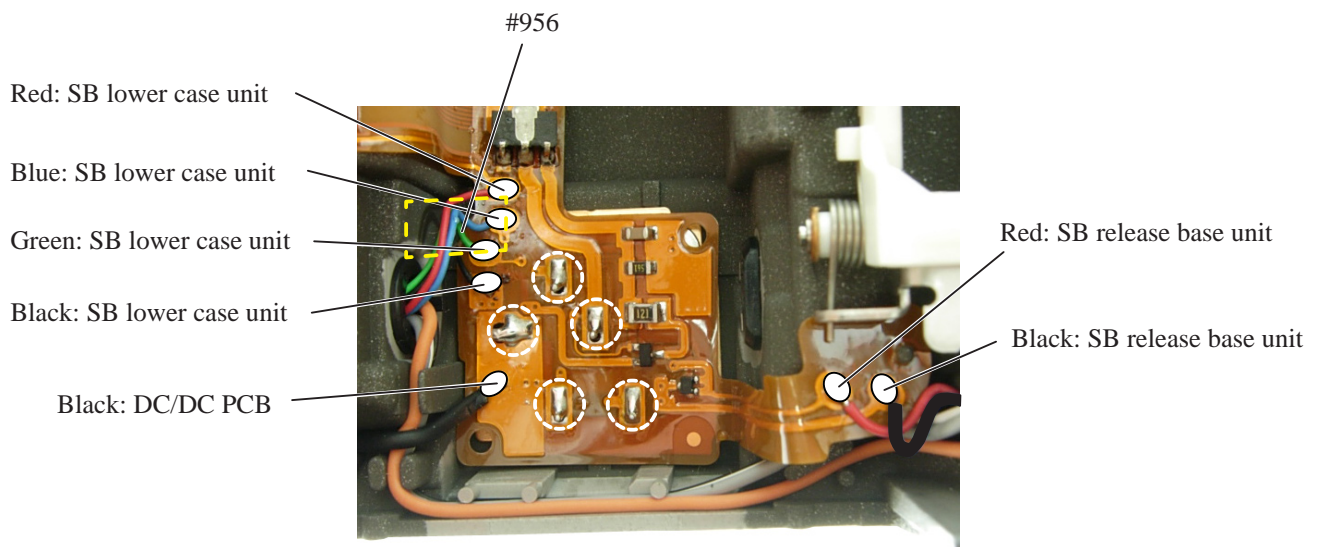
AF-assist illuminator unit

- Mount the AF-assist illuminator unit (#B325), and fix it with the screw (#608).
- Solder the two wires (connected from AF-assist illuminator unit).



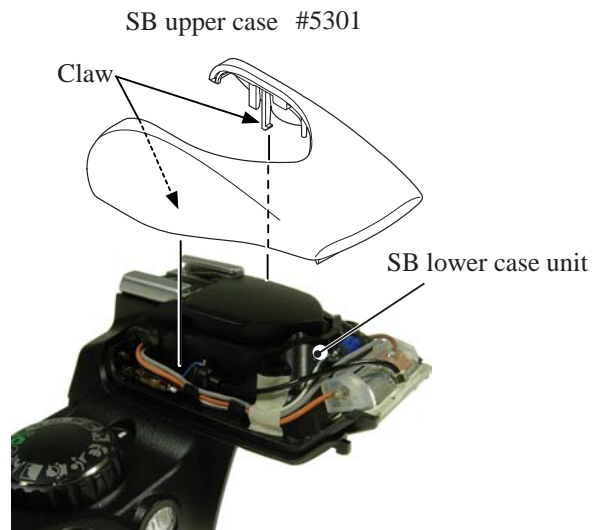
Top cover FPC / Wiring

- Make five solder bridges.
- Solder the seven wires (connected from SB lower case unit, DC/DC PCB and SB release base unit).
- Attach [#956].



SB upper case

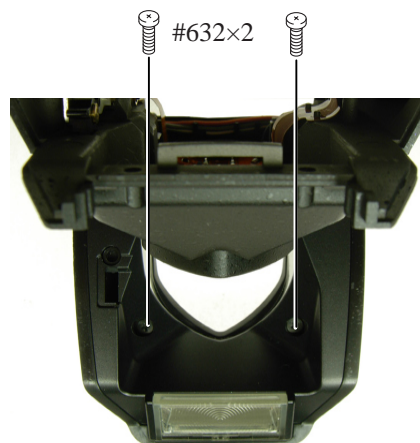
- Mount the SB upper case (#5301) on the SB lower case unit.



- Press the pop-up lever A part of the top cover unit, and raise the built-in SB.



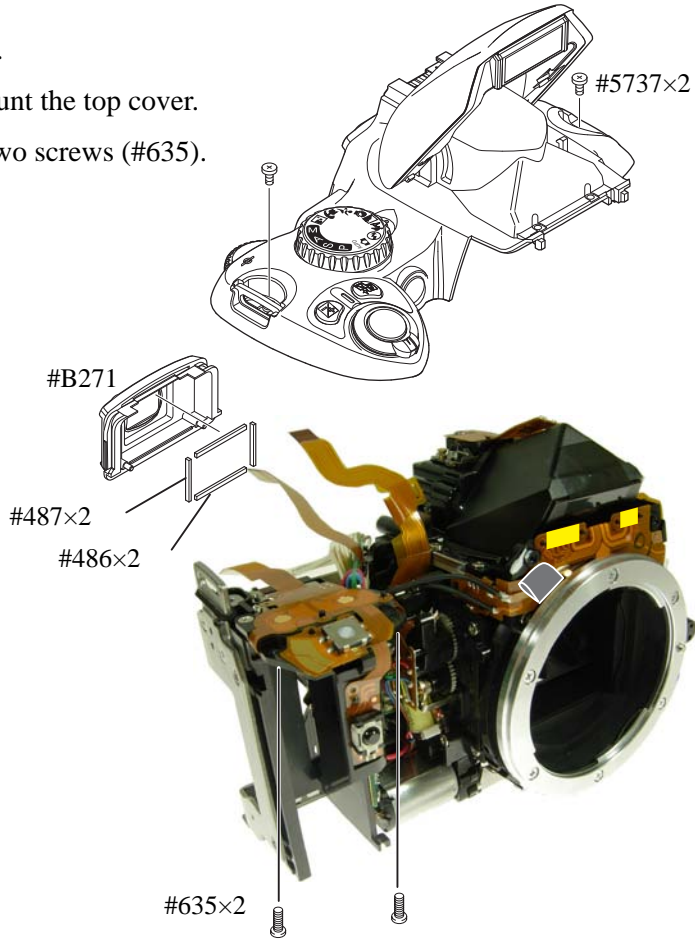
- Tighten two screws (#632).



When the AE-CCD positioning is adjusted, solder the only four wires that connected from the top cover to SB-PCB. Then, make a temporary assembly without mounting the rubber eyecap (#B271), and assemble up to Page A27.

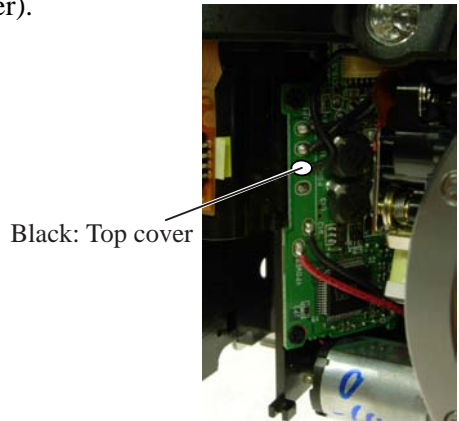
Top cover

- Mount the rubber eyecap (#B271).
- Watching the wires and FPCs, mount the top cover.
- Tighten two screws (#5737) and two screws (#635).



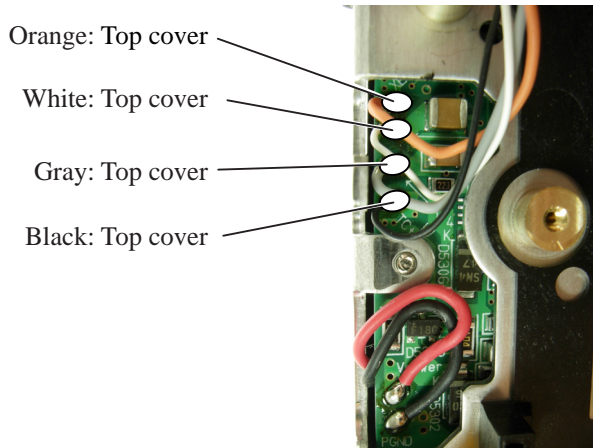
DC/DC PCB unit

- Solder the wire (connected from Top cover).



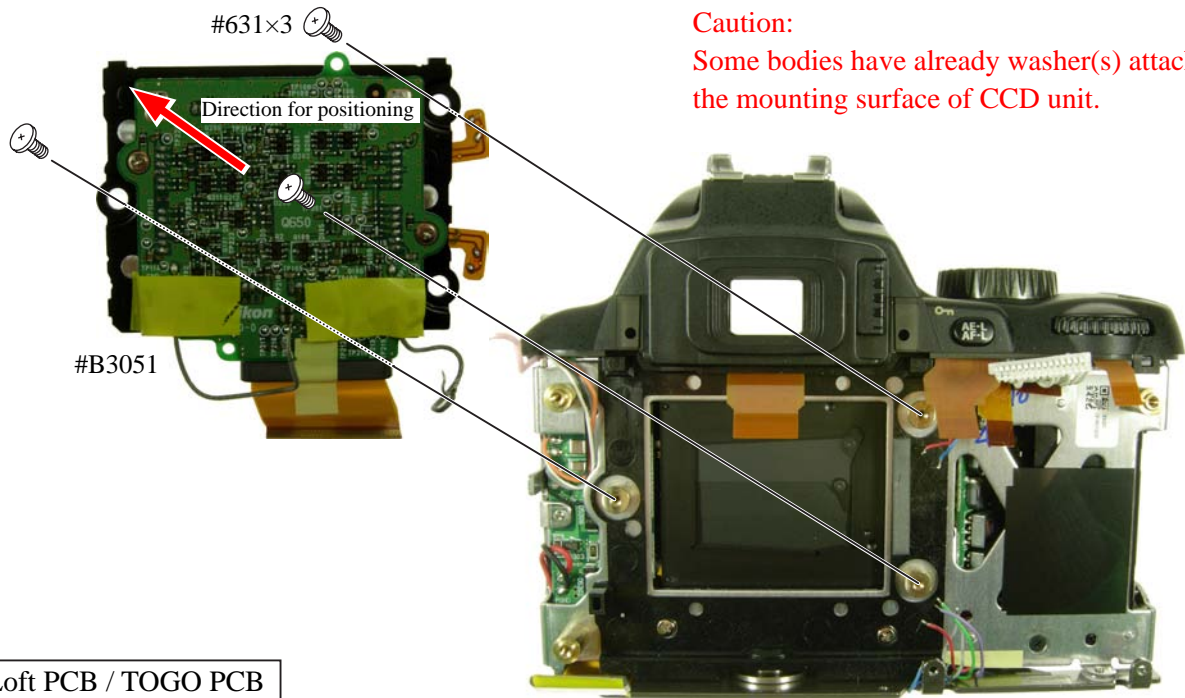
SB PCB

- Solder the four wires (connected from Top cover).



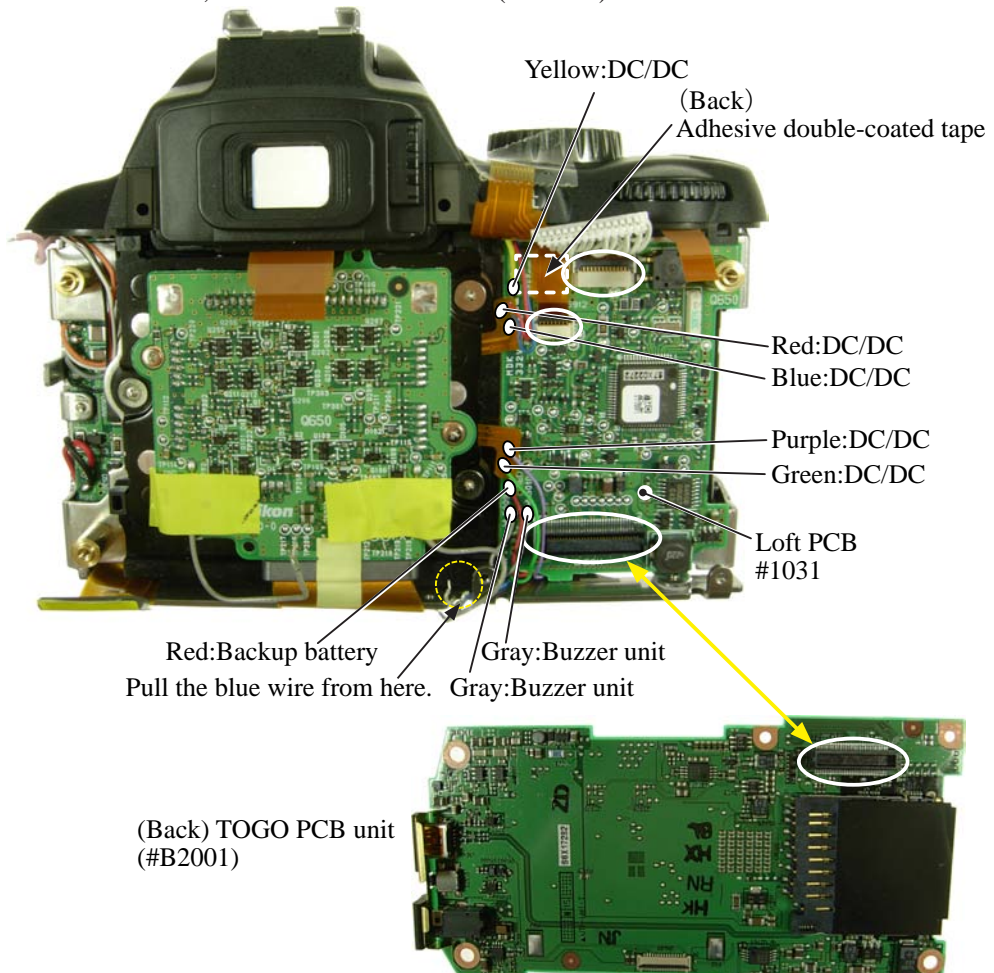
CCD unit

- Mount the CCD unit (#B3051) by following the direction for positioning, and fix it with three screws (#631).

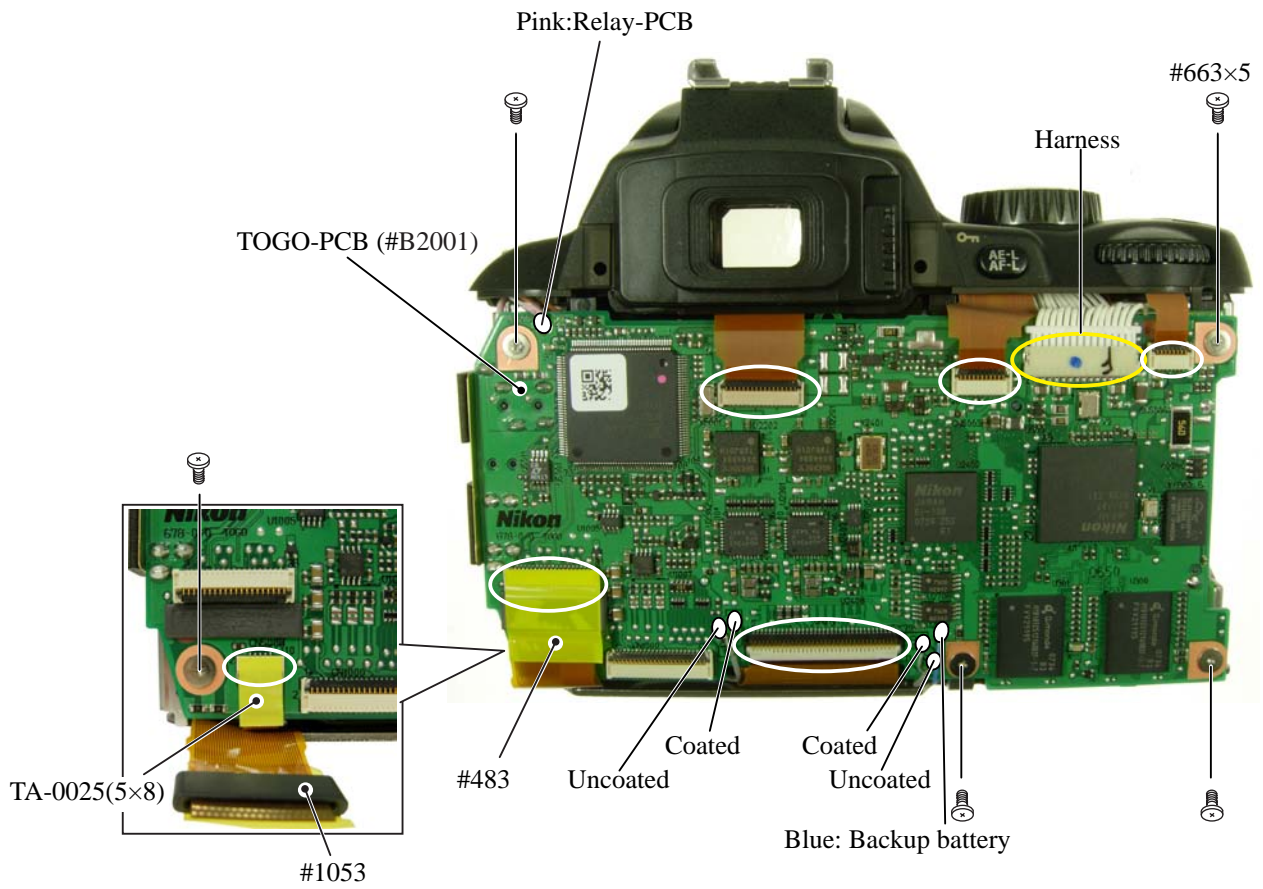


Loft PCB / TOGO PCB



- Attach the loft PCB partially with the adhesive double-coated tape.
- Solder the eight wires.
- Connect the two FPCs to each connector.
- By watching the wires and FPCs, mount the TOGO-PCB (#B2001).



- Connect the harness to the connector.
- Tighten five screws (#663).
- Solder six wires (two connected from Relay-PCB/Backup battery, two coated and two uncoated).
- Connect the six FPCs to each connector



Adjustment of AE CCD positioning

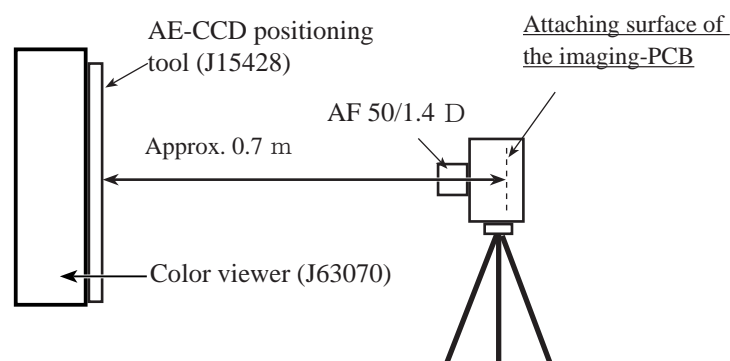
 WARNING	
	<ul style="list-style-type: none"> ● Take extra care not to get an electric shock when detaching covers. ● After removing covers, be sure to discharge the main condenser according to the instructions of repair manuals.

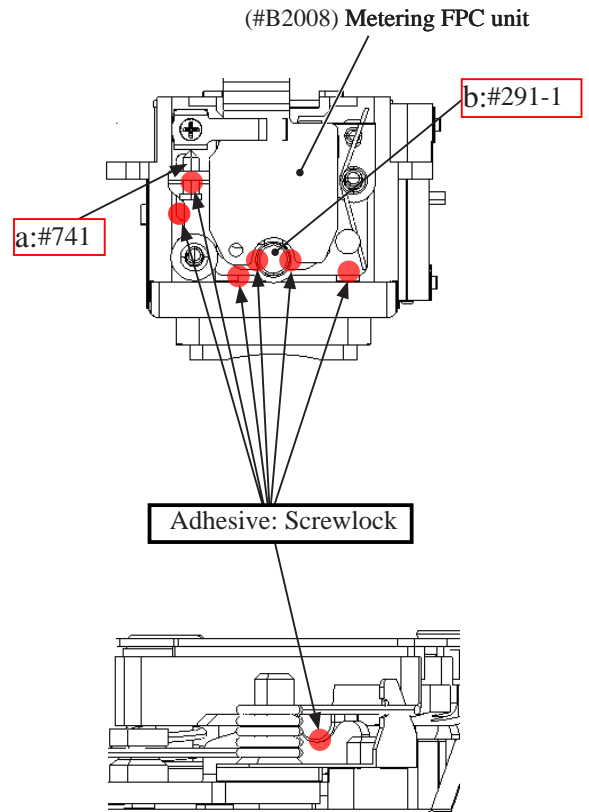
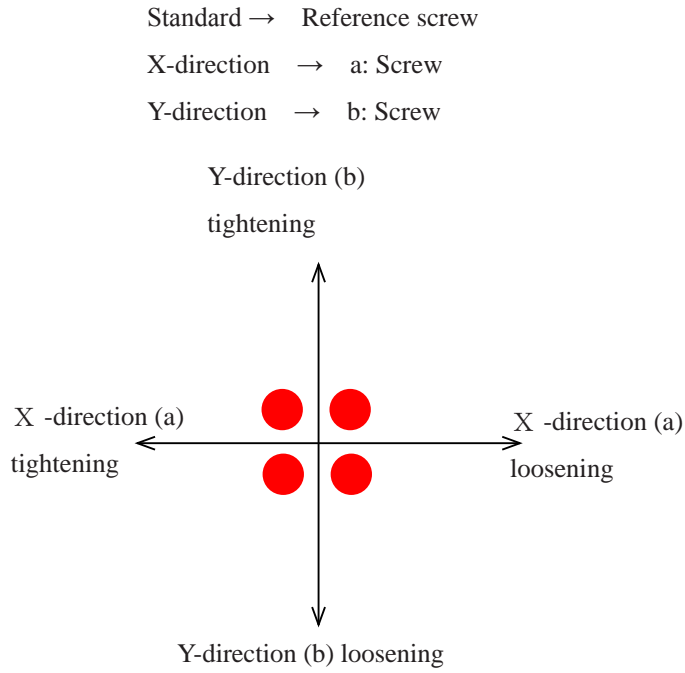
* Under the environment where the AE-CCD positioning is adjusted, use the reference body (and change the environment depending on measured results).

- In case the measured value is out of standard, check if there is no misalignment of the focus areas.
- In case the measured value is out of standard, change the environment of measurements. (e.g. setting place/direction, room brightness, etc)

Procedure

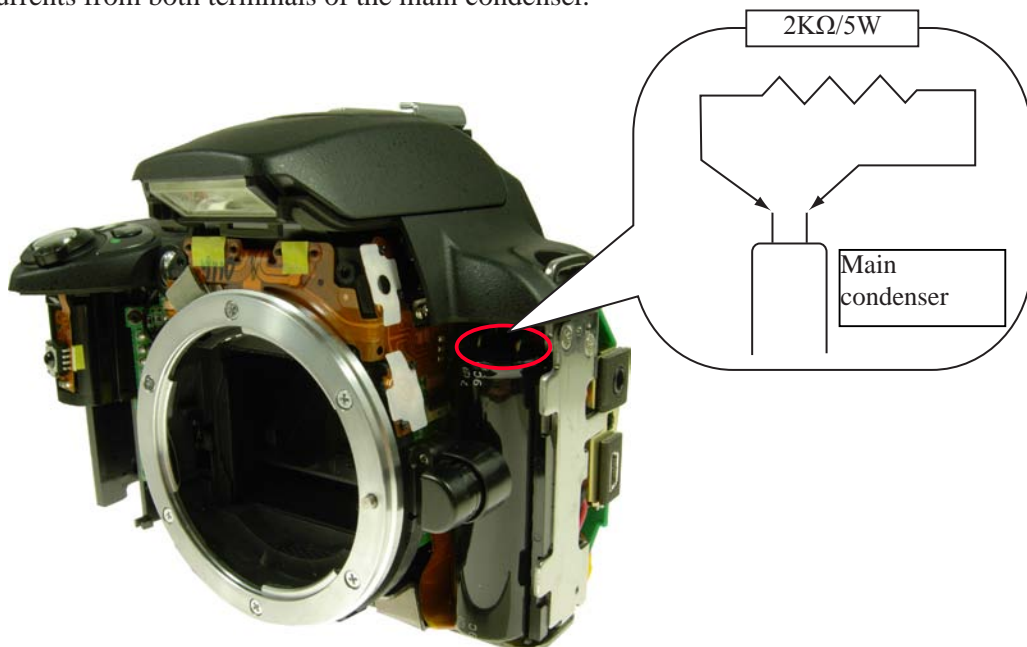
- ① Only solder the four wires (connected from the top cover) on the SB-PCB. Assemble temporarily without attaching the screws (for fixing the top cover) and mounting the rubber eyecap (#B271), then make a temporary assembly of the front cover unit (#B24) and rear cover with four screws (#6690).
- ② Mount "AF50/1.4D" on the camera, and fix them on the tripod horizontally.
- ③ Connect the camera and PC via USB cable (UC-E4).
- ④ Provide power by AC adapter (EH-5) and power connector (EP-5).
 - * Be careful NOT to cause a short-circuit at uncovered portions.
- ⑤ Attach the AE-CCD positioning tool (J15428) in the color viewer (J63070), and turn power ON.
- ⑥ Keep the 0.7-m distance between the front face of the AE-CCD positioning tool and the reference surface of the camera. Set the camera AF to manual, and the focus ring to "0.7 m" by rotating it.
- ⑦ Start up the inspection and adjustment software for D60 (J18443), and select "Inspection and Adjustment for AE CCD POSITION" then "Set Camera for AE CCD POSITION".
Looking through the viewfinder, move the camera so that the focus areas of the camera coincide with the circular holes of the AE-CCD positioning tool.
 - * Set the camera and AE-CCD positioning tool horizontally.
- ⑧ Select "Inspection and Adjustment for AE CCD POSITION".
 - * Cover the camera with a black cloth, etc, when measured.
- ⑨ Attach the metering FPC unit without tightening three screws (#291-1). Then give each screw two and half turns counterclockwise. By following instructions on PC, make the position adjustment of AE-CCD by the screws (a:#741, b:#291-1).
- ⑩ Fix the two screws with screwlock.
- ⑪ Fix the four locations of the AE CCD sensor-base with screwlock. (ref. Page A29 for the adhering positions.)





Discharge of Main condenser

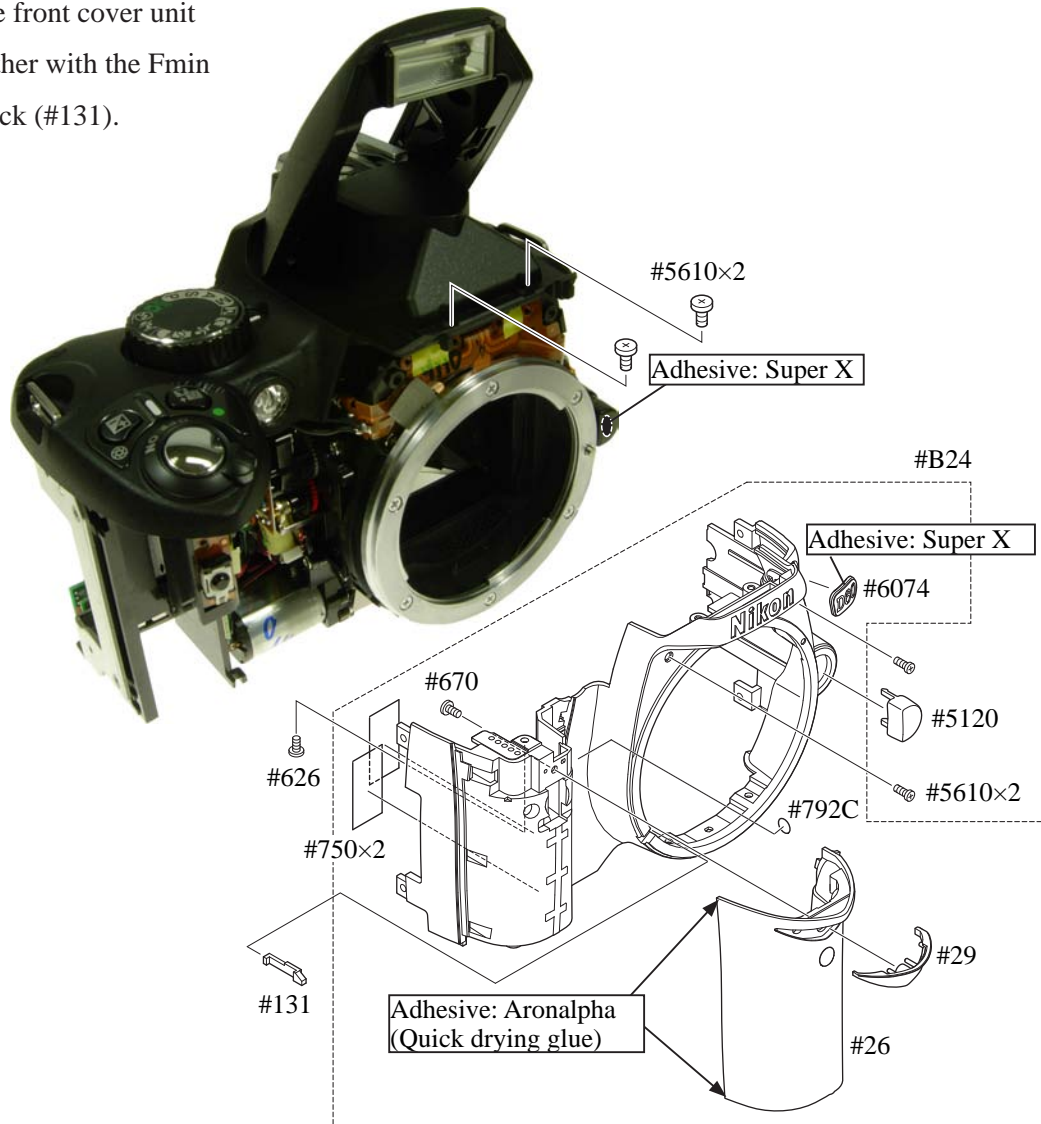
- Discharge currents from both terminals of the main condenser.



⑫ After completing the adjustment, remove the temporarily-assembled rear cover and front cover. Then mount the rubber eyepiece (#B271) and fix the top cover with two screws (#5737) and two screws (#635).

Covers

- Assemble the front cover unit (#B24) together with the Fmin coupling block (#131).



Gap adjustment of SB lighting unit

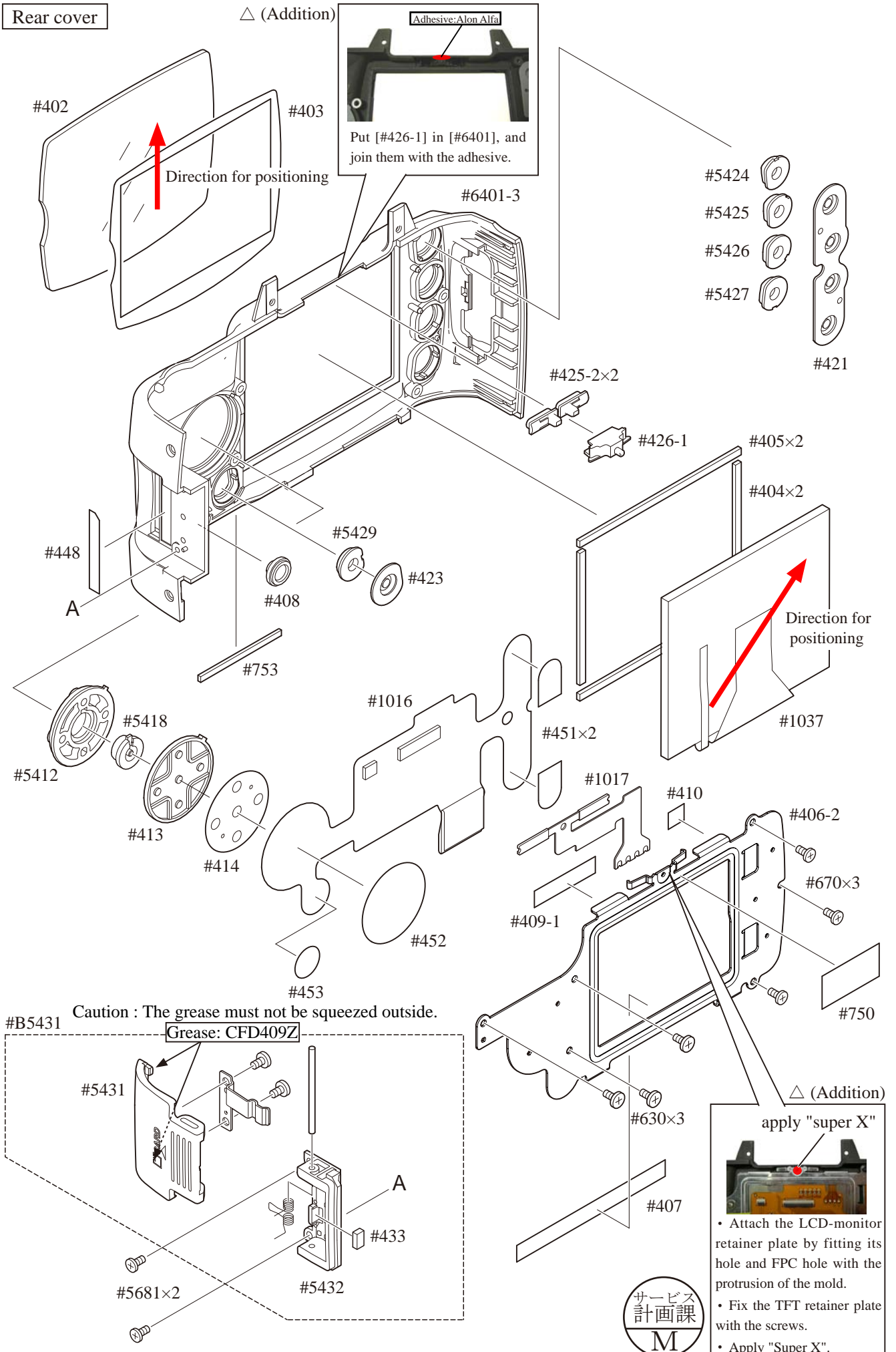
- In case the result is out of standard, raise the SB unit and make an adjustment by turning the adjusting dial with Hexagonal wrench.

Standard: 0.1 ~ 0.4mm



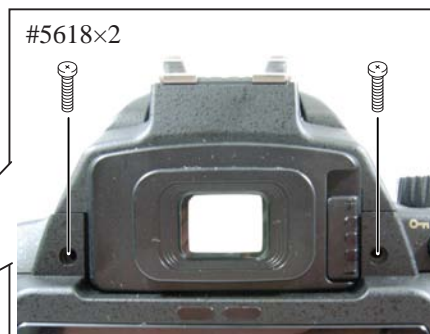
Adjusting dial

Rear cover

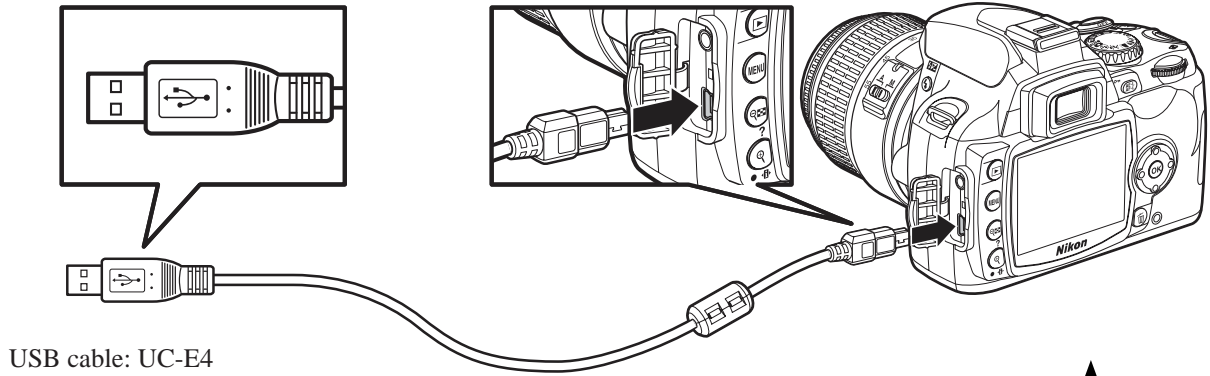


Rear cover (continued)

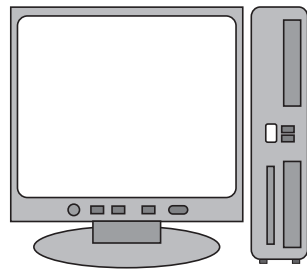
- Connect the TFT-PCB connection-FPC to the connector.
- Mount the rear cover.
- Tighten four screws (#6690) and two screws (#5618).



Accuracy inspection and adjustment (Camera body)



To USB terminal

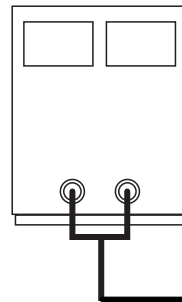


D60 adjustment software J18443



Stabilized power source (Set value = 7.4V
0.3Ω 5.0A)

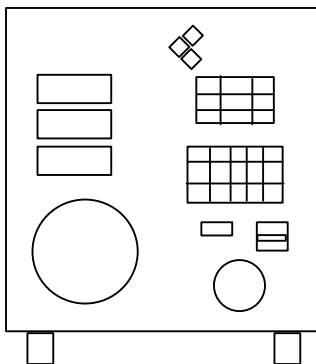
- + Power connector (EP-5)
- or
- AC adapter (EH-5)
- + Power connector (EP-5)



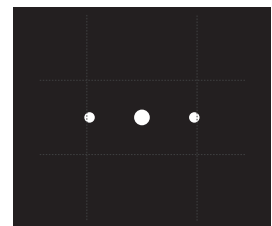
EP-5

Caution: When performing “Adjustment for BATTERY CHECK LEVEL”, process the power connector (EP-5) and use it.

Shutter tester (EF-1) (J19123)



Flash meter



AE-CCD positioning tool (J15428)

Set up in front of color viewer (J63070)



AF70-300/4-5.6D

or AF-SVR70-300/4.5-5.6



AF50/1.4D



AF28/2.8D

Caution:

When the inspection and adjustment are made with the shutter tester, turn the tester ON to light up a lamp, and carry out the aging for 3-5 minutes.

D60 Inspection and Adjustment Software (J18443)

This inspection and adjustment software runs on Windows.

Install the software by following the below procedure.

<Operating environment>

Check the following operating environment which is required for installing this program on PC.

PC	IBM PC/AT compatible
OS	Windows XP Professional Edition, Windows XP Home Edition, Windows2000,
CPU	Pentium II 300MHz ~
RAM (memory)	256 MB or more
HD	6MB-or-more free disk space is required when installing
Monitor resolution	1024 × 768 pixels or more
Interface	※ USB interface (V1.1, 2.0)

As long as the above hardware requirements are met, any PC such as desktop or laptop, etc is available.

< Cautions in starting program >

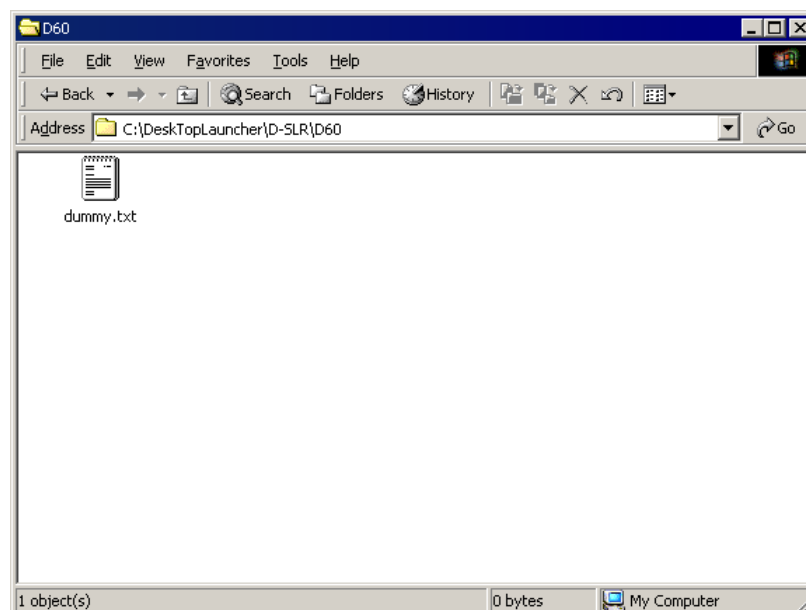
When starting this program, close all the other applications.

If some other applications are running, this program may not be activated.

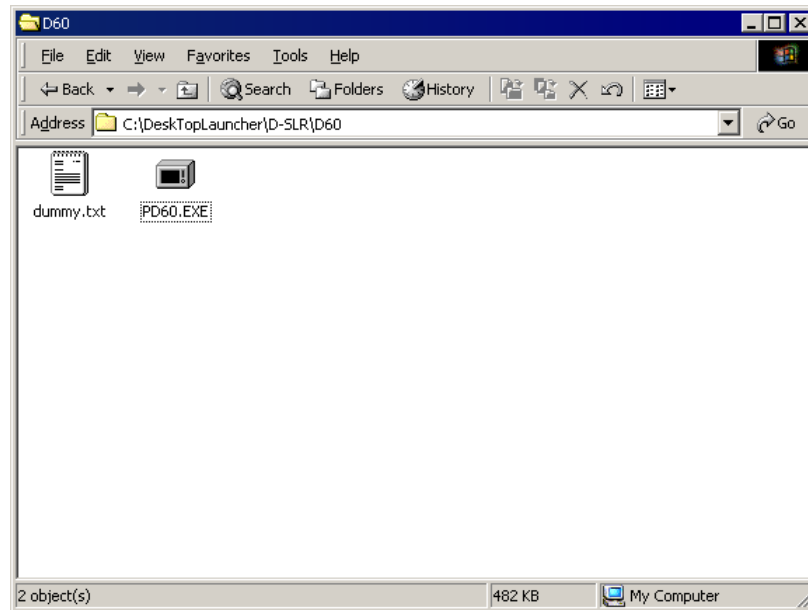
< Procedure for installation >

Because this is the self-extracting file, decompress the file before installing, and follow the next procedure.

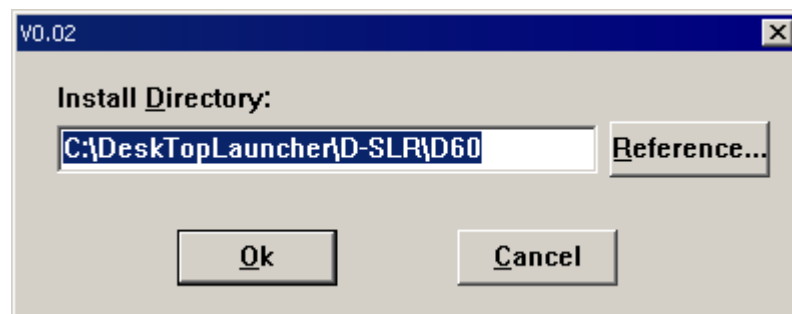
1. Execute the up-to-date “SetFolder.EXE”. The folder will be created automatically as shown in “C:\DeskTopLauncher\D-SLR\D60”.



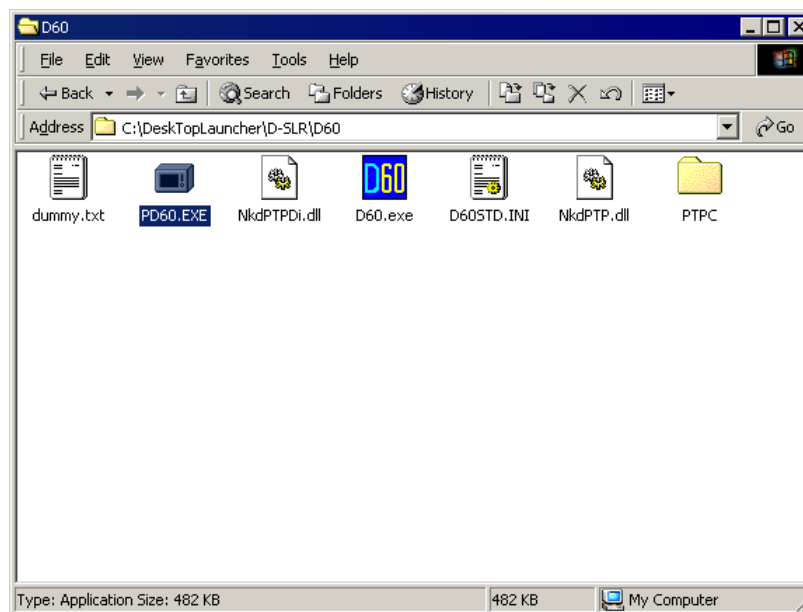
2. Paste the file (PD60.EXE) in the created folder.



3. Double-click on the pasted file to display the following screen.
Press the OK button, then decompression starts.



4. When the decompression of file is finished, the file (D60.exe) is created.



5. The install is completed.

< Procedure for installing USB driver > \triangle (Addition)
[When Windows 2000 is used]

If this program is used by the USB interface, installing the USB driver is necessary.

But if the OS is "Windows XP", the driver is already preloaded so it is not necessary to install it.

\triangle (Delete)

1. Set the USB of camera to "PTP".

—(SETUP menu \rightarrow USB-setting \rightarrow MTP/PTP)

\triangle (Revision)

1.2. Connect the camera and PC by USB cable.

2.3. Turn camera ON.

3.4. When "Add New Hardware Wizard" is displayed, click "Next".

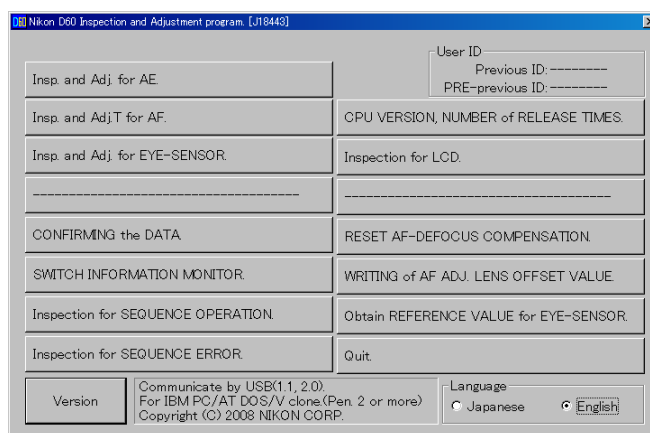
4.5. Select "Search for a better drive than the one your device is using now. (Recommended)", and click "Next".

5.6. Click "Reference". Select "DeskTopLauncher\D-SLR\D60\PTPC\" of C drive, and click "OK".

6.7. Reboot the PC and the install is completed.

<Start-up of Program>

1. Double-click the file (D60.exe), then Inspection and adjustment program for D60 starts.



2. To display in Japanese, select the radio button "JAPANESE" in "LANGUAGE" in the lower right-hand corner of the screen.

However, this is not properly viewed in the English OS.



3. When the "Version" button at the lower-left is pressed, the program version will be displayed.

4. Select each item button according to operation.

Follow the instructions on the next screen that will be shown after pressing the item button.

5. To finish the program, press the "Close (×)" button in the right-hand corner of the screen or "QUIT".

AE inspection and adjustment

- (1) AE CCD alignment inspection and adjustment (ref. Page A28, A29 for details)
- (2) AE accuracy inspection and adjustment
- (3) Aperture accuracy inspection
- (4) Adjustment for battery check level [Use the Power connector EP-5 and stabilized power supply.]
- (5) Built-in SB flash inspection and adjustment
[Tools required] ref. Page A33.

• AE accuracy inspection and adjustment

When AE accuracy inspection and adjustment is made, two types of lenses (AF50/1.4D, AF28/2.8D and AF70-300/4-5.6D or AF-SVR70-300/4.5-5.6G) are used.

Caution:

AE accuracy is not inspected in the traditional manner that uses the exposure value of the shutter tester. The metering value is displayed on PC screen.

• Battery check voltage level adjustment

Connect the Power connector (EP-5) of which the wire is processed to the camera. Then make adjustment.

• Built-in SB flash inspection and adjustment

Set the distance between camera and flash meter to 1 m, and inspect and adjust the light volume of the built-in SB. (ref. adjustment software for details)

AF inspection and adjustment

Note: When the adjustment software is used for the first time, prepare three D60 cameras and measure by "WRITING of AF ADJ. LENS OFFSET VALUE" on the main menu. If "LDATA.DAT" of D40(D40X) is obtained under the same environment, copy it into a folder of D60 adjustment software, and change "D40(D40X)" to "D60" of the file name "D40LDATA" to become usable.

- (1) AF accuracy adjustment (Make the overall following adjustment.)
- (2) YAW, PITCH inspection and adjustment
- (3) LARK adjustment (inc. CCD output adjustment)
- (4) AF shift adjustment
[Tools required]
1. In common with all adjustment/inspection items
ref. Page A33.
2. When inspecting AF accuracy
 - (1) AF adjustment Z lens (J18266)
 - (2) AF adjusting tool (J15259)
 - (3) Lens holder (J15280)
 - (4) AF accuracy measuring chart D40 (J18415), Chart board (J15409)
 - (5) Chart illuminator for AF (J15264)
3. When adjusting YAW, PITCH
YAW, PITCH tool (J18230)
4. When adjusting LARK

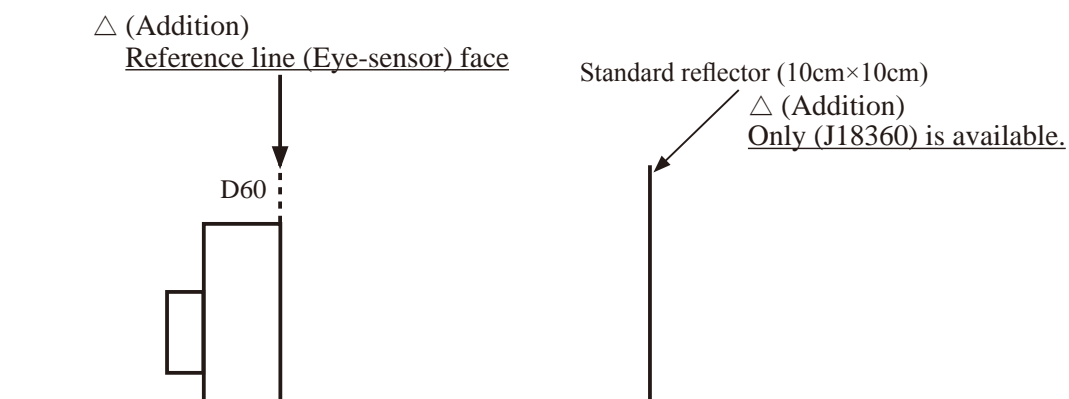
The above tool when inspecting AF accuracy

In "AF shift adjustment", the distance from the bayonet reference plane to the imaging area (CCD) is calculated by the actual shot photo, and its error is recorded in EEPROM as compensation amount, and adjusted.

Eye sensor inspection and adjustment

Caution:

When this adjustment software is used for the first time, prepare three units of D60, and get the reference values of the eye sensor for the main menu.



Move the camera closer to the standard reflector. Measure the distance where TFT monitor blacks out and input the average value of the three cameras.

Move the camera away from the standard reflector. Measure the distance where TFT monitor lights up and input the average value of the three cameras.

※ Input the value into the screen for getting reference values of the eye sensor.

Bottom cover

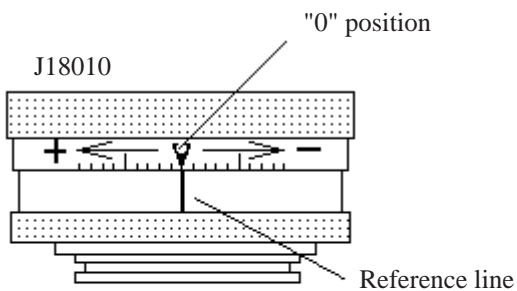
- Mount the bottom cover.
- Fix it with four screws (#5735) and five screws (#5674).



∞ Infinity focus inspection & adjustment

- Replace the finder screen with the infinity focus adjustment screen (J15410), and use the reference lens (J18010) and read the value. In case it is out of standard, increase or decrease washers (#297A, #297B) for adjustments.

Caution: For the replacement, put [J15410] with the silver spacers upward, which are attached on both sides.



Standard: $\pm 0.06\text{mm}$ 1 scale = 0.01mm

#297A	1K602-153	Infinity-focus adjusting washer (T=0.1) 0.10mm
#297B	1K602-154	Infinity-focus adjusting washer (T=0.2) 0.20mm

Necessary adjustments when parts are replaced

1. D60 adjustment items and Firmware updates

Adjustments Replacement parts	Writing of EEPROM fixed values	AE CCD positioning adjustment	AE accuracy inspection & adjustment	Aperture accuracy inspection	Battery check volt- age level adjustment	Built-in SB light volume inspection & adjustment	AF accuracy inspection & adjustment	Eye sensor inspection and adjust- ment
Shutter unit								
TOGO PCB unit * 2 (MAIN&RISC Firmware,register)	○	△* 1	○	○	○	○	○	○
LOFT PCB (Sub MCU mounted)								○
Relay-PCB * 2 (EEPROM)	○	△* 1	○	○	○	○	○	○
AF sensor unit							○	
Top cover or SB lower case unit						○		
DC/DC PCB					○	○		
AE FPC unit		○	○					
Aperture control PCB unit				○				
Eye sensor FPC								○
Rear FPC								○

* 1. Make inspection.

* 2. • When only TOGO PCB unit is replaced, be sure to update the MAIN&RISC firmware.

- When both TOGO PCB and relay-PCB are replaced at the same time, write the fixed values and update the MAIN &RISC firmware. Then, write the fixed values again and make adjustment.

Caution: If the MAIN firmware named (A60*****.bin) is not recognized, change the firmware name to (A650*****.bin), and update again.

If the RISC firmware named (B60****.BIN) is not recognized, change the firmware name to (B650****.BIN), and update again.

2. Shooting image adjustment items and Firmware updates

Adjustments Replacement parts	Serial no.input	* 1 Writing of fixed values	Gr/Gb difference compensation ADJ (G filter)	Sensitivity	Shading	Gr/Gb compensation adj. (R/B filter)	Sensitivity ratio	Image shutter adjustment	Pixel defect compensation - Black point	Pixel defect compensation - White point	TFT adjustment	Factory default setting	Ver. No/Ser. No
Shutter unit								○					
AF sensor unit													
DC/DC PCB unit													
AE FPC unit													
TOGO PCB unit (* 2 (MAIN&RISC Firmware, register)	○		○	○	○	○	○	○	○	○	○	○	
LOFT PCB													
Relay PCB (EEPROM)								○					
CCD/FPC PCB unit			○	○	○	○	○	○	○	○			
TFT monitor											○		
License sheet													○

* 1. When TOGO-PCB is adjusted, the fixed values are written automatically.

* 2. • When only TOGO PCB unit is replaced, be sure to update the MAIN&RISC firmware before writing the fixed values.

• When both TOGO PCB and relay-PCB are replaced at the same time, write the fixed values and update the MAIN &RISC firmware. Then, write the fixed values again and make an adjustment.

Caution: If the MAIN firmware named (A60*****.bin) is not recognized, change the firmware name to (A650*****.bin), and update again.

If the RISC firmware named (B60****.BIN) is not recognized, change the firmware name to (B650****.BIN), and update again.

Shooting Image Adjustment

1. Summary

When D60 shooting image-related and listed parts on Page A42 are replaced, be sure to make an adjustment by the shooting image adjustment software for D60 (J65108). The details of its function and how to use this software are as follows:

2. Adjustment software function

- (1) Gr/Gb difference compensation adjustment (G filter)
- (2) "Sensitivity" adjustment
- (3) Shading adjustment
- (4) Gr/Gb compensation adjustment (R/B filter) / Line crawl adjustment
- (5) "Sensitivity ratio" adjustment
- (6) Image shutter inspection and adjustment
- (7) Pixel defect compensation - black point
- (8) Pixel defect compensation - white point
- (9) Getting reference values
- (10) Factory default setting
- (11) Confirming the Data
- (12) Version no./ Serial no.
- (13) TFT adjustment

※ When the adjustments from (1) to (7) are made, get in advance the reference values of (9) by using the reference body, then perform the adjustments.

3. Hardware requirements

- OS : Windows2000, WindowsXP, Windows VISTA (32bit)
Japanese or English OS
- PC : CPU Pentium II or more
Memory 256MB or more
USB1.1 or 2.0
- Screen size: 1024×768 pixels or more

4. Basic usage

1. Execute "D60IMG.exe" to start up the main screen. (ref. Fig.1)
2. Select ENGLISH / JAPANESE in Language to display any menu. (ref. Fig.2)
3. Click the button to start adjustments.
- ※ When the adjustments from (1) to (7) are made, calculate to get the reference values of sensitivity and sensitivity ratio by using the reference body beforehand, then perform the adjustments.
4. Follow the instructions on screen.
5. To complete the procedure, click "QUIT" button or "X" button at the upper-right corner of the menu.

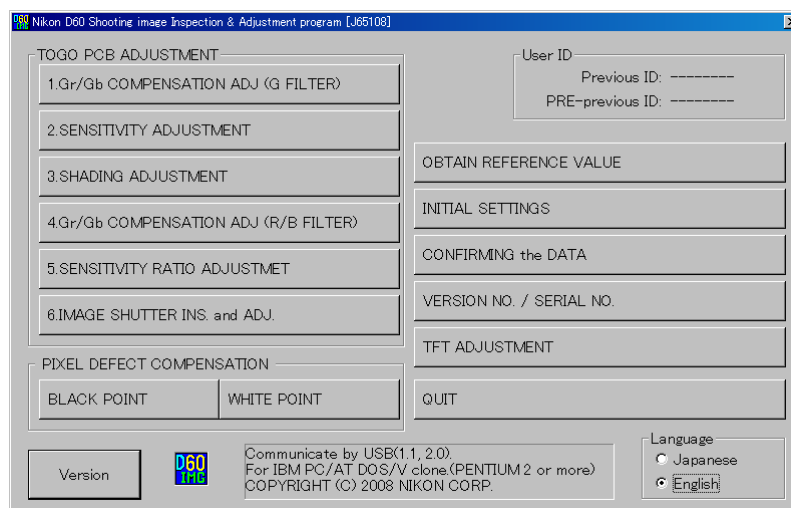


Fig.1



Fig.2

5. Required equipment and conditions

※ AC adapter EH-5 and USB cable (mini B type) UC-E4 are used for all adjustments so they are not specified in the list.

※ 5100K color viewer: Ex-model viewer 【J63049】 is also available.

※ For color viewer and shutter tester, use luminance meter MB-3000 【J63068】 for measurements.

	Item	Required device/condition					
		Color viewer 【J63070】	Shutter tester 【J19123】	Tool lens (to fix aperture) 【J61185】	ND filter (Commercial products are used.) 【J18191】 【J18358】	Color filter 【J63085】 【J63086】 【J63087】	Others
1	Gr/Gb difference compensation adjustment (G filter)	LV13	-	F5.6	-	SP2 (G)	
2	Sensitivity adjustment	LV13	-	F8	ND8×1 ND4×1 (5-step light reduction)	-	
3	Shading adjustment	LV13	-	F5.6	ND8×1 (3-step light reduction)	-	
4	Gr/Gb compensation adjustment (R/B filter) / Line crawl adjustment	LV13	-	F5.6	-	SP3 (R) SP1 (B)	
5	Sensitivity ratio adjustment	LV13	LV9	F5.6	ND8× 1 (3-step light reduction)	-	
6	Image shutter inspection and adjustment	-	LV9 LV15	F5.6	-	-	
7	Pixel defect compensation - black point	LV13	-	F5.6	-	-	
8	Pixel defect compensation - white point	-	-	-	-	-	Body cap or Lens cap Environmental temperature approx. 20 - 25°C
9	Getting of reference values	Same as "Sensitivity adjustment" and "sensitivity ratio adjustment".					
10	Factory default setting	None					
11	Confirming the Data	None					
12	Version no./ Serial no.	None					
13	TFT adjustment	None					

6. Summary

The summary on each adjustment is as follows:

(1) Gr/Gb difference compensation adjustment (G filter)

Camera is faced to the light-emitting box (color viewer) of LV13 equiv. with SP2 (G filter) being put between them. G-line crawl (3890×2606 pixels) is divided into (29×25) blocks, and the adjustment is made so that the difference between Gr and Gb output can fall in the standard range.

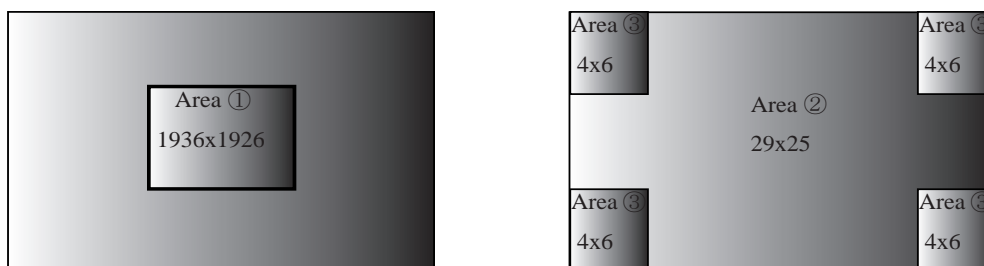
(2) Sensitivity adjustment

Camera is faced to the color viewer of LV13 equiv. with ND filter (-5 steps) being put between them, and the adjustment is made by changing the amp gain so that G output can fall in the standard range. The gain value is adjusted so that the G output average value (Average of Gr/Gb) in the center (425×425 pixels) can reach the target output level (approx. 1040LSB). The actual adjustment of the gain value is made only under the condition of ISO100 and ISO1600, and the medium sensitivity is calculated by the adjustment values of these 2 conditions.

For target output level, G output average of sensitivity reference value (ISO100) is used, which was calculated by the reference body.

(3) Shading adjustment (5100K color viewer is shot by this camera, and adjustment is made.)

Camera is faced to the color viewer of LV13 equiv. with ND filter (-3 steps) being put between them, and the adjustment of white balance distribution is made for 3 areas [Area ① : Central 1936×1926-pixel area; Area ② : All the divided areas except ③ -areas after dividing (3890×2606-pixels) into (29×25-pixels); Area ③ ; 4 corners of (4×6-pixels) after dividing (3890×2606-pixel) into (29×25-pixels)]



(4) Gr/Gb compensation adjustment (R/B filter) / Line crawl adjustment

Camera is faced to the light-emitting box (color viewer) of LV13 equiv. with SP3 (R filter) or SP1 (B filter) being put between them, and the adjustment is made so that the difference in G output average between B-G line and G-R line, when the whole screen is divided in areas, can fall in the standard range.

(5) Sensitivity ratio adjustment

With the shutter tester of LV9, the adjustment is made so that the R/G, B/G output becomes the same as the output ratio of the sensitivity ratio reference value that was calculated by the reference body. The adjustment is made under the condition of ISO100 and ISO400, and the average value of the center (425 pixels × 425 pixels) is used.

After the adjustment, the camera is faced to the 5100K color viewer (LV13 equiv.) with ND filter (-3 steps) being put between them, and confirm under the condition of ISO100 and ISO400.

(6) Image shutter inspection and adjustment

Based on the 1/60 sec. data of LV9, fine-tune the 1/4000 sec. data of LV15. After the adjustment, release the shutter and inspect data deviation nine points of the shot image.

(7) Pixel defect compensation - black point

When pixels of which the output level is under specified value with LV13 equiv., are detected, the coordinates of the detected pixels are rewritten as pixel defect compensation data.

(8) Pixel defect compensation - white point

Shots are taken on the dark surface. In case the pixel output is found to be beyond the standard value, the detected pixel coordinate is additionally written as the pixel defect compensation data.

(9) Getting of reference values

• Sensitivity reference value calculation

The reference body is faced to the color viewer of LV13 equiv. with the ND filter (-5 step) being put between them. Then, store the G output average value of the center (425 pixels × 425 pixels) is stored in the D60BSD.DAT file as the sensitivity reference value.

• Sensitivity ratio reference value calculation

The reference body is faced to the color viewer of LV9 equiv. (without filter) and to the color viewer of LV13 equiv. with the ND filter (-3 step) being put between them. Then, the sensitivity ratio reference value GR and GB is calculated, based on the G/R/B output average of the center (425 pixels × 425 pixels), and they are stored in the D60BSD.DAT file.

It is necessary to calculate the reference values of "Sensitivity" and "Sensitivity ratio" in order to prevent the color temperature fluctuation caused by color viewer's changes over time from affecting the results of the shooting image adjustment. By using the reference body, calculate the reference values once in about every 3 months, when the fluorescent of the color viewer is replaced.

The reference value file D60BSD,DAT is created after getting the reference values.

(10) Factory default setting

By reset the settings of camera, factory default settings are restored.

Select the language and video mode to perform.

Because this setting of RP TOGO-PCB is blank, be sure to set the initial default setting when the TOGO-PCB is replaced.

When this setting is used, the USB mode is set to "Mass Storage" mode.

(11) Confirming the Data

Storing and restoring each register is the function used when some trouble occurs and ask to send backup data to Service Planning for analysis.

(12) Version no./ Serial no.

RISC firmware version and serial number are indicated. Serial number can be written.

※ Whenever the license sheet is replaced, be sure to input the serial number.

(13) TFT adjustment

Flickering, color and luminance of TFT are adjusted.

※ Whenever the TOGO-PCB and TFT monitor are replaced, be sure to perform "REWRITING THE TFT FIXED VALUE".

7. Procedure

7-1. Shooting image adjustment **Caution: For D40X, use D80 as reference body.**

- Calculate the "Sensitivity" and "Sensitivity ratio" reference values by using D80 reference body beforehand, then perform the adjustments. (ref. ~~9-4~~^{△ (Revision) 7-4}.)
- For shooting image adjustment, make all items from (1) to (8). The adjustments from (1) through (8) are all programmed to be executed in serial order. When one item is completed, the software automatically goes on to the next adjustment.
- In case adjustments are interrupted by NG, the adjustments can be continued again after NG. As for adjustments that were ended with OK, the flash memory updates of the adjustment value are completed.

* **Note: Adjustments are not possible without resetting "Custom setting" of this camera.**

Before the adjustments, record the details of "Custom setting" set by customers if necessary.

Start adjustments

- Provide the power for the camera via AC adapter.
- Reset "Custom setting".
- Set "PTP" mode by Setup menu.
- Set the focus mode to M, exposure mode to M, and the exposure compensation to "0" of the camera.
- Connect the camera and PC via USB cable.
- Set the luminance of the color viewer to LV13 equivalent.
- Set the shutter tester to LV9. (for sensitivity ratio)

(1) Gr/Gb difference compensation adjustment (G filter)

- Click "1. Gr/Gb COMPENSATION ADJ (G FILTER)" of the main menu on screen.
- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and SP2 (G filter) to the camera.
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

(2) Sensitivity adjustment

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F8) and ND filter (ND 8× 1+ ND 4 ×1) to the camera.
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

(3) Shading adjustment

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and ND filter (ND 8× 1) to the camera.
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

(4) Gr/Gb compensation adjustment (R/B filter) / Line crawl adjustment

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and SP3 (R filter) to the camera.
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and SP1 (B filter) to the camera.
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Leave the camera with the tool lens (Aperture F5.6) and SP1 (B filter).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Select "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and SP3 (R filter).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) (without filter).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

(5) Sensitivity ratio adjustment

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) (without filter).
- Get the camera closest to the center of the illuminated surface of the shutter tester (LV9).
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and ND filter (ND8×1).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

(6) Image shutter inspection and adjustment

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6).
- Get the camera closest to the center of the illuminated surface of the shutter tester (LV9).
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6).
- Get the camera closest to the center of the illuminated surface of the shutter tester (LV15).
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

7-2. Pixel defect compensation - black point

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

* Note: In some cases, NG occurs due to dusts on the CCD.

Be sure to clean the CCD surface before adjustments.

7-3. Pixel defect compensation - white point

- Click "Start".
- Setting conditions are displayed.
- Cap the camera with the body cap or lens cap to shield light from the mount.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".

7-4. Getting of reference values

Obtain sensitivity reference value:

- Select "OBTAIN REFERENCE VALUE." of the menu on screen.
- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F8) and ND filter (ND8×1 + ND4×1).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".
- Click "Next".

Obtain sensitivity ratio reference value:

- Click "Start".
- Setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) (without filter).
- Get the camera closest to the center of the illuminated surface of the shutter tester (LV9).
- Click "OK".
- The adjustment starts. When it is completed, the next setting conditions are displayed.
- Attach the tool lens (Aperture F5.6) and ND filter (ND8×1).
- Get the camera closest to the center of the illuminated surface of the color viewer.
- Click "OK".
- The adjustment starts. When it is completed, "OK" is displayed.
- Click "OK".

※ After the acquisition of reference values is completed, the sensitivity and sensitivity ratio reference values are stored in the standard setting file (D60BSD.DAT).

※ After this procedure, when the shooting image adjustment is made, the sensitivity and sensitivity ratio that have been calculated this time will be used.

※ Calculate the sensitivity and sensitivity ratio reference values once in about every 3 months, and when the fluorescent of the color viewer is replaced.

7-5. Reading of RISC version

- Click "RISC VERSION" of the menu on screen.
- RISC version is displayed.

7-6. TFT adjustment

- Click "TFT ADJUSTMENT" on the menu.

Writing of TFT fixed values

- Click "REWRITING THE TFT FIXED VALUE".
- The message "Will you rewrite the CAMERA?" appears.
- Click "Yes".
- Writing is completed.
- Click "OK".

Flicker adjustment

- Usually default value is set and adjustment is not necessary.
- If flicker is recognized by visual check, adjust by the slider so that no flicker is visible.
- Remove the USB cable from the camera, then remove the AC adapter without turning the camera OFF.

Hue adjustment

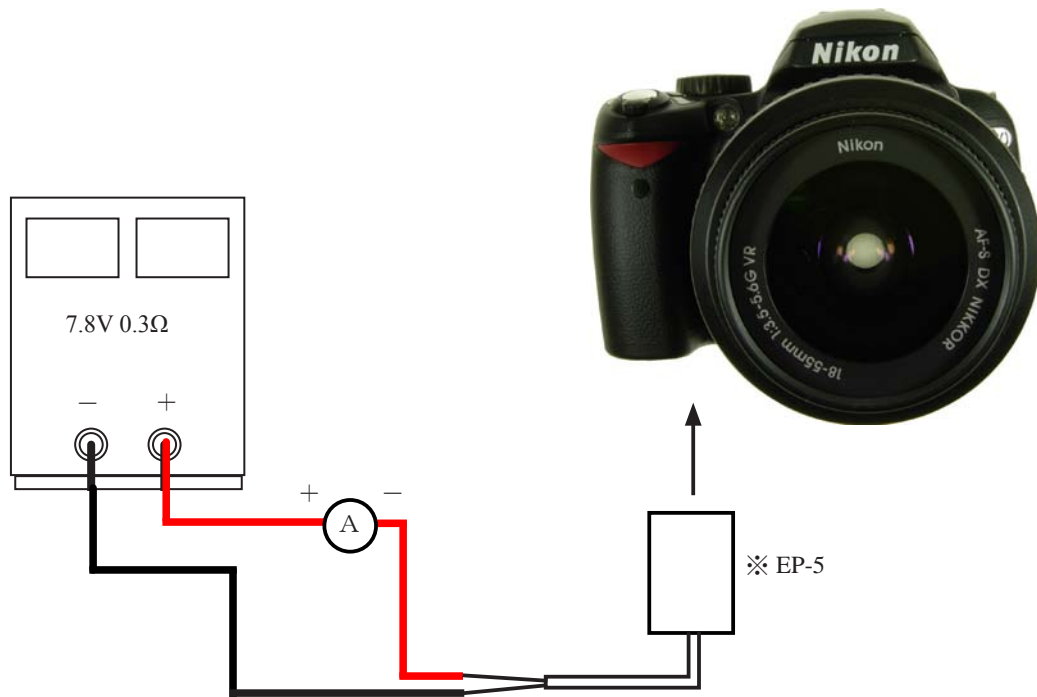
- Usually default value is set and adjustment is not necessary.
- If some problem is found with hue by visual check, adjust and correct it by the slider.
- Remove the USB cable from the camera, then remove the AC adapter without turning the camera OFF.

Brightness adjustment

- Usually default value is set and adjustment is not necessary.
- If some problem is found with brightness by visual check, adjust and correct it by the slider.
- Remove the USB cable from the camera, then remove the AC adapter without turning the camera OFF.

< Measurement of Consumption current value >

When this camera is used for measuring the consumption current value, connect the power connector (EP-5) and install wiring as follows for the measurement.



※ Cut out the power connection section of EP-5 and use it.

《Inspection standards》

Test item	Standard	Test condition
Main SW • OFF NONE of operational buttons are pushed.	200 μ A or less	ref. above.
Main SW • ON (Half-release timer OFF)	200 μ A or less	AF-S DX ED 18-55/3.5-5.6G、 EV12
Main SW • ON (Half-release timer ON)	200 m A or less	
Main SW • ON (TFT ON)	300 m A or less	

Caution

- * When the consumption current value is measured, backup battery must be fully charged.
It takes approx 3 days to fully charge the battery.

Inspection standards

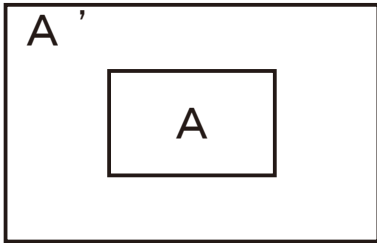
Items	Judgment standard	Remarks
<p>External view Step (height difference)</p> <p>Clearance</p>	<p>Between top cover and apron: 0.2 mm or less Other parts: 0.3 mm or less; Inside elements must not be seen. Moving parts: 0.5 mm or less</p> <p>from Top cover to Apron; to rear cover: 0.2 mm or less from Bottom cover to Apron; to rear cover: 0.2 mm or less When SB is housed, from SB upper case to Top cover; to Apron: 0.5 mm or less Other parts: 0.3 mm or less; Inside elements must not be seen. Moving parts: 0.5 mm or less</p>	<p>Visual check Digital micrometer</p>
<p>Size / Force Shutter release button</p> <p>Aperture lever</p> <p>Main mirror</p> <p>Sub-mirror</p> <p>Finder ∞ Infinity focus</p>	<p>Protrusion: 1.05 ± 0.2 mm Halfway pressing force: 100 ± 50 g Halfway pressing stroke: 0.5 ± 0.2 mm Releasing force: 260 ± 70 g Releasing stroke: 0.7 ± 0.25 mm Full stroke: 0.6 mm or more Difference btwn Half-releasing and Full pressing force: 51 g or more</p> <p>Height: $3.4 + \begin{matrix} +0.20 \\ -0.10 \end{matrix}$ mm</p> <p>45° angle: Up-down $\pm 10'$ Right-left $\pm 30'$ Distortion: 6' or less Clearance for up-mirror in mirror box: None</p> <p>47.75° angle: Up-down Collimator measurement value: $0' \begin{matrix} +20' \\ -45' \end{matrix}$ Distortion: 8' or less</p> <p>$\pm 100\mu\text{m}$</p>	<p>Digital micrometer Tension gauge</p> <p>3.4 height gauge</p> <p>Collimator Main mirror tool Visual check Feeling in hand</p> <p>Sub-mirror tool</p> <p>Collimator ∞ focus lens</p>

Items	Judgment standard	Remarks
AF accuracy Yaw Pitch Def amount	Center: 0 ± 4 mrad Others: 0 ± 12 mrad Center: 0 ± 5 mrad Others: 0 ± 10 mrad Difference btwn vertically and horizontally (center): $45\mu\text{m}$ or less	PC Special tool Brightness box
AF-assist illuminator Lighting level	Switchable from OFF to ON with EV5.2 - 6.2	Brightness box AF-S 18-55/3.5-5.6G
AE Exposure on image Accuracy Dispersion	1/4000 or higher speed: $0.2 \pm 0.65\text{EV}$ (excl. AMP) From lower-than 1/4000 to 1/2000 or higher speed: $0.1 \pm 0.65\text{EV}$ Lower than 1/2000 speed: $\pm 0.5\text{EV}$ 1/2000 or higher speed: 0.6EV or less Lower than 1/2000 speed: 0.6EV or less Difference in Metering mode: 0.3EV or less	AE-A mode, each metering mode, AE50/1.4D, F5.6, ∞ , A light source, ISO100, Shooting on illuminated surface of bright ness box Note that AMP: EV3 \sim 10 SPOT: EV2 \sim 20
Shutter accuracy Speed accuracy Dispersion Shutter curtain speed Shutter curtain bound Synchronization	Higher than 1/2000 speed: $\pm 0.55\text{EV}$ 1/2000: $\pm 0.35\text{EV}$ (1/2000) \sim 30 : $\pm 0.25\text{EV}$ 1/4000 - (1/2000): 0.4EV or less 1/2000 - (1/1000): 0.3EV or less 1/1000 - 30: 0.25EV or less Both front and rear curtains (16.4mm or less): approx. 3.8 ms or less Black/white bound (within screen frame): None Time taken from the first curtain entering the shutter frame to the switch turning ON for X-signal: - 0.05 \sim 0.55 ms	Shutter speed tester

Items	Judgment standard	Remarks						
<p>Viewfinder In-finder LCD position</p> <p>Finder field frame</p> <p>Field of viewfinder (frame coverage)</p> <p>Parallax (Difference in position from CCD center)</p>	<p>Tilt from finder screen: 1° or less</p> <p>Tilt: (Right-left tilt from the lower part of finder field frame): 90° ± 0.5° or less</p> <p>Relative angle to image sensor: 30' or less</p> <p>In height and width: 95 ± 3 %</p> <p>Up-down: 0.5 mm or less Right-left: 0.5 mm or less No vignetting</p>	<p>Visual check</p> <p>Shoot the finder field frame with the 0.2-mm-or-less tilt of optical axis from the viewfinder eyepiece optical axis, and measure the angle.</p> <p>AF50/1.4D, F5.6</p> <p>Measure a difference in the center btwn the marked finder field and actual shot object.</p>						
<p>Eye point</p>	<p>- 1 m⁻¹ equivalent position [1 click from Minus-end] : 17.9mm±10%</p>	<p>Eye point tool Vernier caliper</p>						
<p>Battery life EN-EL9</p>	<p>Professional mode</p> <p>Room temperature: 2500 frames or more 0°C : : 1900 frames or more</p> <ul style="list-style-type: none"> • Setting ISO100, Exposure mode: M, 1/250 sec., F16, AF-C, operation mode: C, Illuminated surface: LV12, Image quality: BASIC, Image size: M, White balance: A, Halfway press→ Card format → Repeat the below “Operation” → Remove the card when the no. of exposures remaining becomes “0” → Card format →... • Lens: AF-S 18-55/3.5-5.6G , AF-S 18-55/3.5-5.6G II • Operation: Halfway press for 3 sec. → AF-scan reciprocating motion 3 times → Continuous releases 6 times → TFT playback for 5 sec.→ Half-release timer OFF waiting for 6 sec. <p>General mode</p> <p>Room temperature: 500 frames or more 0°C : : 400 frames or more</p> <ul style="list-style-type: none"> • Setting ISO100, Exposure mode: M, 1/60 sec., F16, AF-C, operation mode: S, Illuminated surface: LV12, Image quality: NORM, Image size: L, White balance: A, Halfway press→ Card format → Repeat the below “Operation” → Remove the card when the no. of exposures remaining becomes “0” → Card format →... • Lens: AF-S 18-55/3.5-5.6G , AF-S 18-55/3.5-5.6G II • Operation: Repeat the following the odd-numbered shots and even-numbered shots until the number of exposures remaining becomes "0". Switch power OFF for 1 min. each time 10 frames are shot. <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Shots</th> <th style="width: 50%;">Odd-numbered shots</th> <th style="width: 25%;">Even-numbered shots</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">Repeat operation MENU ① - ⑤ .</td> <td style="vertical-align: top;"> ① Halfway press 5 sec. ② AF scan reciprocating motion once ③ Release... Built-in SB full flash ④ LCD monitor playback 4 sec. ⑤ Half-release timer OFF waiting 6 sec. ※ Activate the flash of AF-assist illuminator. </td> <td style="vertical-align: top;"> ① Halfway press 5 sec. ② AF scan reciprocating motion once ③ Release... Built-in SB full flash ④ LCD monitor playback 4 sec. ⑤ Half-release timer OFF waiting 6 sec. ※ Do NOT activate the flash of AF-assist illuminator. </td> </tr> </tbody> </table>		Shots	Odd-numbered shots	Even-numbered shots	Repeat operation MENU ① - ⑤ .	① Halfway press 5 sec. ② AF scan reciprocating motion once ③ Release... Built-in SB full flash ④ LCD monitor playback 4 sec. ⑤ Half-release timer OFF waiting 6 sec. ※ Activate the flash of AF-assist illuminator.	① Halfway press 5 sec. ② AF scan reciprocating motion once ③ Release... Built-in SB full flash ④ LCD monitor playback 4 sec. ⑤ Half-release timer OFF waiting 6 sec. ※ Do NOT activate the flash of AF-assist illuminator.
Shots	Odd-numbered shots	Even-numbered shots						
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Items	Judgment standard	Remarks
Standby / consumed current	Main SW / OFF: 200 μ A or less (when inner battery is fully charged) Main SW / ON (Half-release timer: OFF): 200 μ A or less (when inner battery is fully charged) Main SW / ON (Half-release timer: ON): 200mA or less (when no operations made) Main SW / ON (TFT monitor ON): 300mA or less	Power source: 7.8V Luminance: EV12 Lens: 18-55/3.5-5.6G Oscilloscope: measured by + current probe
Operation time	Lens scan 18-55/3.5-5.6G: 1700 ms or less Release without memory card (18-55/3.5-5.6G): 195ms or less (between mirror up and down)	Power source: 7.8V+0.3 Ω Luminance: EV12 Oscilloscope: measured by + current probe
Consumption current accumulated	Lens scan 18-55/3.5-5.6G: 850 mAs or less Release without memory card (18-55/3.5-5.6G): 320mAs or less (between mirror up and down)	
Clock accuracy (20 \pm 5 $^{\circ}$ C)	Difference par month: \pm 90 seconds	Wave clock
BC level	Level 5: 5 lights up Charge remaining: 70 ~ 100% Level 4: 4 lights up Charge remaining: 50 ~ 69% Level 3: 3 lights up Charge remaining: 35 ~ 49% Level 2: 2 lights up Charge remaining: 20 ~ 34% Level 1: 1 light up Charge remaining: 1 ~ 19% Level 0: 1 light blinking Charge remaining: 0%	Check the level in the LCD control panel on top of camera or TFT battery information Communication-capable battery tool
Bulb battery life	1 hour and 40 minutes or more	When battery is fully charged Clock

Item	Judgment standard	Remark
Image-related Appropriate level	<p><u>Judgment method</u></p> <p>When recorded in RAW format: Within the area of 425×425 pixels at the center of screen, calculate the average of G-12 bit data.</p> <p>When recorded in JPEG format: Within the area of 425×425 pixels at the center of screen, calculate the average of Y-8bit data.</p> <p><u>Standard</u></p> <p>ISO100 RAW: 520^{+80}_{-35} LSB</p> <p>JPEG (Tone compensation: Normal, Low/Less contrast)</p> <p style="padding-left: 40px;">Mode Ia: 121^{+10}_{-6} LSB</p> <p style="padding-left: 40px;">Mode II: 117^{+11}_{-6} LSB</p> <p style="padding-left: 40px;">Mode IIIa: 119^{+12}_{-7} LSB</p> <p>JPEG (Tone compensation: High/More contrast)</p> <p style="padding-left: 40px;">Mode Ia: 121^{+14}_{-8} LSB</p> <p style="padding-left: 40px;">Mode II: 117^{+14}_{-8} LSB</p> <p style="padding-left: 40px;">Mode IIIa: 119^{+15}_{-8} LSB</p> <p>ISO200-1600 RAW: 520 ± 35 LSB</p> <p>JPEG (Tone compensation: Normal, Low/Less contrast)</p> <p style="padding-left: 40px;">Mode Ia: 121^{+5}_{-6} LSB</p> <p style="padding-left: 40px;">Mode II: 117^{+5}_{-6} LSB</p> <p style="padding-left: 40px;">Mode IIIa: 119^{+6}_{-7} LSB</p> <p>JPEG (Tone compensation: High/More contrast)</p> <p style="padding-left: 40px;">Mode Ia: 121^{+7}_{-8} LSB</p> <p style="padding-left: 40px;">Mode II: 117^{+7}_{-8} LSB</p> <p style="padding-left: 40px;">Mode IIIa: 119^{+7}_{-8} LSB</p>	<p>AF50mm/F1.4D</p> <p>F5.6,1/30</p> <p>ISO100 LV10</p> <p>ISO200 LV9</p> <p>ISO400 LV8</p> <p>ISO800 LV7</p> <p>ISO1600 LV6</p> <p>Light source: 5100K viewer</p> <p>AE: M mode</p> <p>Distance to object: Closely contact</p> <p>focal length: Infinity</p> <p>Image size: L, M, S</p> <p>WB: Preset</p> <p>(Set for each sensitivity.)</p>
Resolution	<p><u>Judgment method</u></p> <p>When recorded in JPEG format: Take a picture by aligning the angle of view of the vertical direction of the chart.</p> <p>Adjust WB and exposure so that the image becomes 219×5LSB (8bit) in WB and exposure at white part of around center of the chart.</p> <p><u>Standard</u></p> <p>Horizontal resolution 1600 or more TV lines</p> <p>Vertical resolution</p>	<p>AFSVR70-200mm/ F2.8G</p> <p>105mm</p> <p>F5.6</p> <p>AE: M mode</p> <p>Color setting: Mode Ia, Mode II, Mode IIIa</p> <p>Image: JPEG FINE</p> <p>Image size: L</p> <p>WB: Preset</p> <p>ISO100</p>
White pixels against dark background	<p><u>Judgment method</u></p> <p>Judge the level of white pixels</p> <p><u>Standard</u></p> <p>When RAW recorded: At 25°C : 60 LSB or less At 40°C : 240 LSB or less</p> <p>When JPEG recorded: At 25°C : 30 LSB or less At 40°C : 60 LSB or less</p>	<p>1/30</p> <p>AE: M mode</p> <p>Color setting: Mode Ia, Mode II, Mode IIIa</p> <p>Image Quality :RAW JPEG</p> <p>Image size: L</p> <p>WB: Direct sunlight</p> <p>ISO100</p> <p>Temperature: 25±2°C 40⁺⁵₋₀ °C</p>

Item	Judgment standard	Remark
Dust in shot image	<p><u>Judgment method</u> Compensate exposure so that the center of "425×425 pixel" image becomes +1 EV (180 ±30 LSB), compared to correct exposure. Judge based on dust contrast, size, quantity, and distance btwn dusts, of the whole screen.</p> <p><u>Standard</u> Quantity: 10 dusts or less Size and Maximum contrast</p> <ul style="list-style-type: none"> • Point defect <ul style="list-style-type: none"> 19 pixels or less & 11% or less 21 pixels or less & 9% or less 29 pixels or less & 7.5% or less • Pixel defect <ul style="list-style-type: none"> 6 pixels or less & 11% or less <p>Distance between dust centers (centroids): 200 pixel or more</p>	AF105mm/F2.8D F16 AE: M mode Shoot object with 5100K viewer Color setting: Mode IIIa Image quality: JPEG FINE Image size: L WB: Preset ISO100
Backlight life	3000 hours or more (when 20mA is applied)	
TFT unit Pixel defects	<p>Luminescent pixels: 3 or less (In "A" zone, G=0, Other than $G \leq 1$) 2 defective pixels must not be in a row.</p> <p>Black pixels: 3 or less (1 or less in "A" zone.) 2 defective pixels must not be in a row.</p> <p>Total luminescent/black pixels: Total: 3 or less (1 or less in "A" zone.) Black pixels must be separated by 5 mm or more.</p> <p>In case the tthe above standard is not met, replace TFT monitor.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>※ A : 19.08 × 25.44mm A': 38.16 × 50.88mm (excluding "A") (The size in height and width is measured by aligning the center of the monitor.)</p>	

工 具 ・ TOOLS

★ : 新規設定工具 ・ NEW TOOL

工具番号 Tool No.	名 称 Name of tool	備 考 Others
J15428 	AE CCD 位置出し工具 AE CCD positioning tool	FOR D80, D40. D40X
J15410 	無限合致調整用スクリーン Infinity focus adjustment screen	FOR D70, D70s, D50, D40. D40X
J18362 	反射ミラー Reflection mirror	FOR D70, D70s, D50, D40. D40X
★ J18443 	D 6 0 調整用ソフト Adj. SOFT for D60	
★ J65108 	D 6 0 撮像調整ソフト D60 IMAGE SENSOR ADJ. SOFT	
J18230 	Y A W、 P I T C H 工具 Yaw, Pitch adjustment tool	FOR F5, F100, F90, F90X, D-SLR
J15259 	A F 調整工具台 AF adjusting tool	
J15280 	Z レンズ用支持ホルダー Lens holder	
J15264 	高周波タイプ蛍光灯器具 Illumination box for AF adjustment	
J18266 	A F 調整用 Z レンズ (1 m 用) Z adjustment lens (For 1m)	FOR F5, F100, D-SLR
J15409 	チャートボード Chart board	FOR D2series, D40. D40X
J18415 	A F 精度測定用チャート AF adjusting chart	FOR D-SLR






★ : 新規設定工具・NEW TOOL

工具番号 Tool No.	名称 Name of tool	備考 Others
J19132 	メイン・サブミラー角度検査機 MAIN/SUB MIRROR ANGLE INSPECTION TOOL	J19110 Back focus collimator J61218 Sub mirror inspection tool J18037-2 Optical parallel is available
J18004 	絞りレバー高さ点検工具 Aperture lever positioning gauge	
J19004-1 	インジケータ及びスタンド (ボディバック台、ゲージ) Dial indicator and Stand	
J18001-1 	ボディバック出し工具 Body back focus gauge	
J19001 	無限合致コリメーター F=600mm Collimator F=600mm	
J18010 	無限大合致基準レンズ 50/1.8 Infinity Standard Lens 50/1.8	払底品 out of stock
J19123 	シャッター試験機 EF-1 (CE) Shutter Tester EF-1 (CE)	共立電機製 KYORITSU ELECTRIC EF-8000 usable
J63070 	カラービューア Color Viewer	
J61185 	撮像関係調整用レンズ D1 Standard lens	FOR D-SLR
J63068 	輝度計 (BM-3000) Luminance Meter BM-3000	
J18360 △ (追加) △ (Addition) 	標準反射布 Standard reflector 1.5M x 1.5M	FOR C-DSC (L15, L11 etc)

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差し替えページ △×1

★ : 新規設定工具・NEW TOOL

工具番号 Tool No.	名称 Name of tool	備考 Others
J18191 	NDフィルター 8 X ND filter 8X	FOR D100, D2H, D70, D70s, D50 D200, D80, D40, D40X
J18358 	NDフィルター 4 X ND filter 4X	1 枚使用 It uses by one pieces
J63085 	フィルター SP1 (75X75MM) Filter SP1 (75X75MM)	FOR D2H, D70, D70s, D50, D200 D80, D40, D40X
J63086 	フィルター SP2 (75X75MM) Filter SP2 (75X75MM)	FOR D2H, D200, D80, D40X
J63087 	フィルター SP3 (75X75MM) Filter SP3 (75X75MM)	FOR D2H, D70, D70s, D50, D200 D80, D40, D40X
J61223 	ライティングルーペ LIGHTING LOUPE	FOR D-SLR
J61221 	D80 基準ボディ D80 REF. BODY	FOR D40X
CFD409Z	サンコール CFD409Z	AX-115 使用可 AX-115 is available
OS-30MEL 	ドライサーフ OS-30MEL DRY SURF OS-30MEL (OIL BARRIER)	OS-30MF 使用可 OS-30MF is available
LEN317A 	グリース LEN317A Grease LEN317A	
EDB0011 	ネジロック (赤) 1401C Screw lock 1401C	
C-8008B 	セメダイン 8008 (黒) Cemedain 8008 (BLACK)	

工具番号 Tool No.	名称 Name of tool	備考 Others
	アロンアルファ Quick drying glue	汎用品 RJ is Not available
	フラッシュメーター Flash Meter	汎用品 RJ is Not available
	デジタルマルチメータ Digital meter	汎用品 RJ is Not available
	ACアダプター EH-5 AC adapter EH-5	製品転用 RJ is Not available
	USBケーブル UC-E4 USB cable UC-E4	製品転用 RJ is Not available
	パーソナルコンピュータ Personal computer	汎用品 RJ is Not available
	安定化電源 (10 V 5 A) Power supply(10V 5A)	汎用品 RJ is Not available
	ヘクスキー (φ 1.5mm) HEX. KEY WRENCH (φ 1.5mm)	汎用品 RJ is Not available
	AF50/1.4D Lens AF50/1.4D	製品転用 RJ is Not available
	AF28/2.8D Lens AF28/2.8D	製品転用 RJ is Not available
	AF70-300/4-5.6D or AF-SVR70-300/4.5-5.6 LENSAF-SVR70-300/4-5.6 or LENSAF-SVR70-300/4.5-5.6	製品転用 RJ is Not available
	パワーコネクタEP-5 AC ADAPTER CONNECTOR EP-5	製品転用 RJ is Not available