VAA31001-R.3651.A

作成承認印	配布許可印
ニコン 映像カンパニー 品質保証部 GM	サービス 計画課 M

Nikon

COOLPIX5600

VAA31001

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

Printed in Japan February 2005

CONTENTS

SPECIFICATIONS

Type	E5600 digital camera
Effective pixels	5.1 million
CCD	1/2.5” high-density CCD; total pixels: 5.36 million
Image size (pixels)	2,592 × 1,944 (2592)
	2,048 × 1,536 (2048)
	1,024 × 768 (1024)
	640 × 480 (640)
Lens	3 × Zoom Nikkor
Focal length	F=5.7 - 17.1 mm
	(35-mm [135] camera-format equivalent: 35 - 105 mm)
f/-number	f/2.9 - f/4.9
Construction	Seven elements in six groups
Digital zoom	4 × (35-mm [135] camera-format equivalent:420 mm)
Autofocus (AF)	Contrast-detect through the lens (TTL) AF
Focus range	30 cm (1') - ∞ ; macro mode 4 cm/1.6” (M) - ∞
Focus-area selection	Center with five-area selection in frame assist mode
Viewfinder	Real-image zoom viewfinder with LED indication
Magnification	0.3 - 0.76 ×
Frame coverage	Approximately 82% horizontal and 82% vertical
Monitor	1.8”, 80,000-dot, amorphous silicon TFT LCD monitor
Frame coverage	
(shooting mode)	Approximately 97% horizontal and 97% vertical
Storage Media	Internal memory (14 MB)/SD memory cards
File system	Compliant with Design Rule for Camera File System (DCF),
	Exif 2.2, and Digital Print Order Format (DPOF)
File formats	Compressed: JPEG-baseline-compliant, Movies: QuickTime
Exposure	
Metering	256-segment matrix metering linked to AF area
	(when frame is displayed in frame-assisted scene mode)
Exposure control	Programmed auto exposure with exposure compensation
	(-2.0 - +2.0 EV in steps of 1/3 EV)
Range	W: +1.1 - +17.1 EV, T: +2.6 - +18.6 EV
Shutter	Mechanical and charge-coupled electronic shutter
Speed	4 - 1/3,000 s
Aperture	Electronically-controlled preset aperture
Range	Two steps (f/2.9 and f/4.9 [W])
Sensitivity	Approximately equivalent to ISO 50
	(auto gain of two to four times) (up to equivalent of ISO 200)
Self-timer	Ten-second duration

Built-in Speedlight	
Range (approx.)	W: 0.4 - 3.3 m/1'4" - 10'10" T: 0.4 - 2.0 m/1'4" - 6'7"
Flash control	Sensor flash system
Interface	USB
Video output	Can be selected from NTSC and PAL
I/O terminals	A/V out/digital I/O
Power sources	・Two rechargeable Nikon EN-MH1 NiMH batteries ・Two LR6 (AA) alkaline batteries ・Two ZR6 (AA) nickel manganese batteries ・Two FR6/L91 (AA) lithium batteries ・EH-62B AC adapter
Number of frames taken in succession	・220 frames (alkaline batteries) ・340 frames (EN-MH1) ・600 frames (lithium batteries) Measured at standard temperature (25℃/77°F) with fully charged batteries based on CIPA standard: zoom adjusted with each shot, flash used in approximately one half of shots, image type set to Normal.
Dimensions (W × H × D)	85 × 60 × 35 mm (3.3" × 2.4" × 1.3")
Approximate weight	130 g (4.6 oz) without battery or memory card
Operating environment	
Temperature	0 - 40℃ (32 - 104°F)
Humidity	Less than 85% (no condensation)

Disassembly

⚠ WARNING	
	● There are high voltage parts inside. Be careful of this electric shock, when you remove the cover. ● You must discharge the main condenser according to the instruction of this repair manual before you remove the cover.

Points to notice for Lead-free solder products
・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. They cannot be used in common.

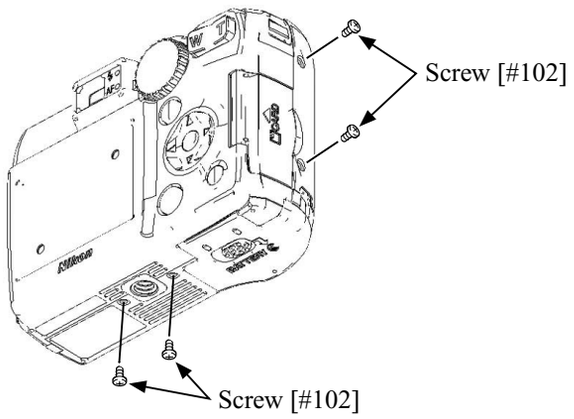
Note : ① Be sure to remove the SD memory card and batteries before disassembly.

② When disassembling, make sure to memorize the processing state of wires, screws to be fixed and their types, etc.

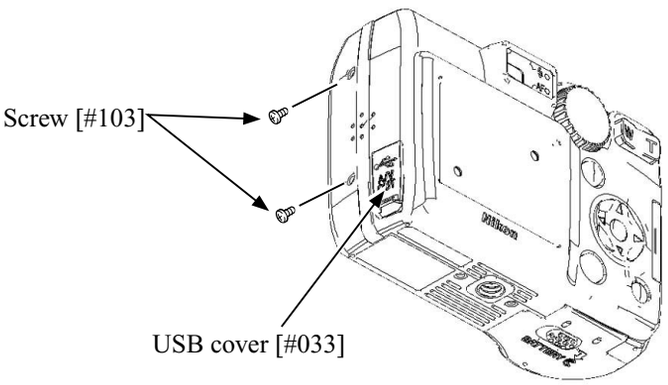
③ Because electrical parts are easily damaged by static electricity, make sure that you are well earthed/grounded.

REAR COVER

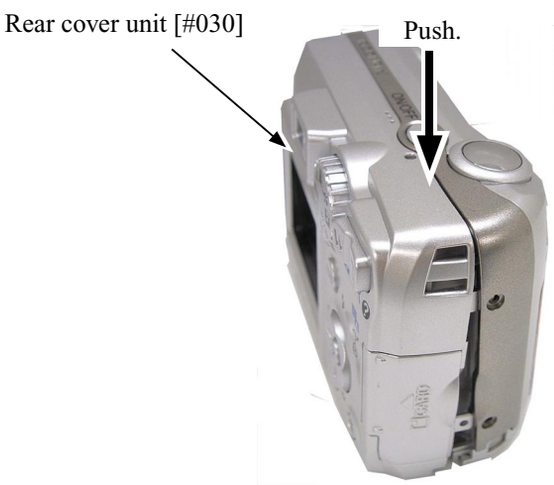
- Remove the four screws [#102].



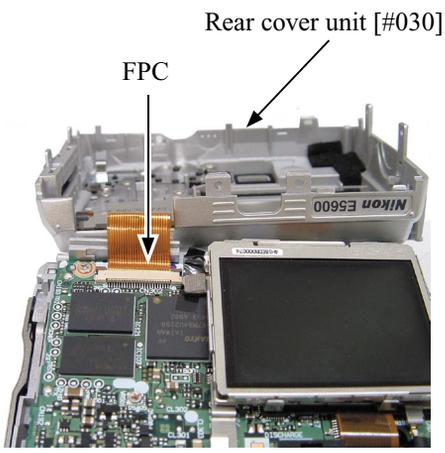
- Remove the two screws [#103].
- Open the USB cover [#033].



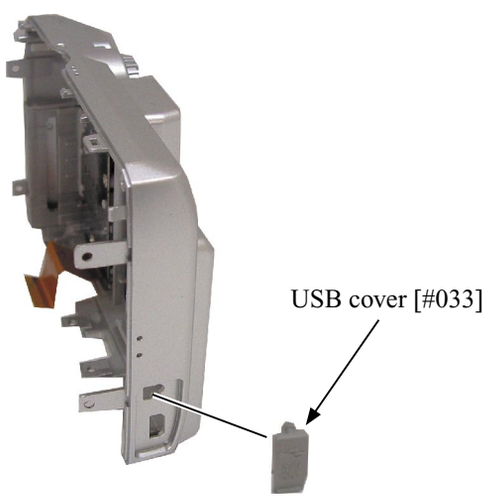
- As pushing the top side of the rear cover unit [#030] by your finger, perform unhooking.



- Open the rear cover unit [#030] slowly backward and remove the FPC.

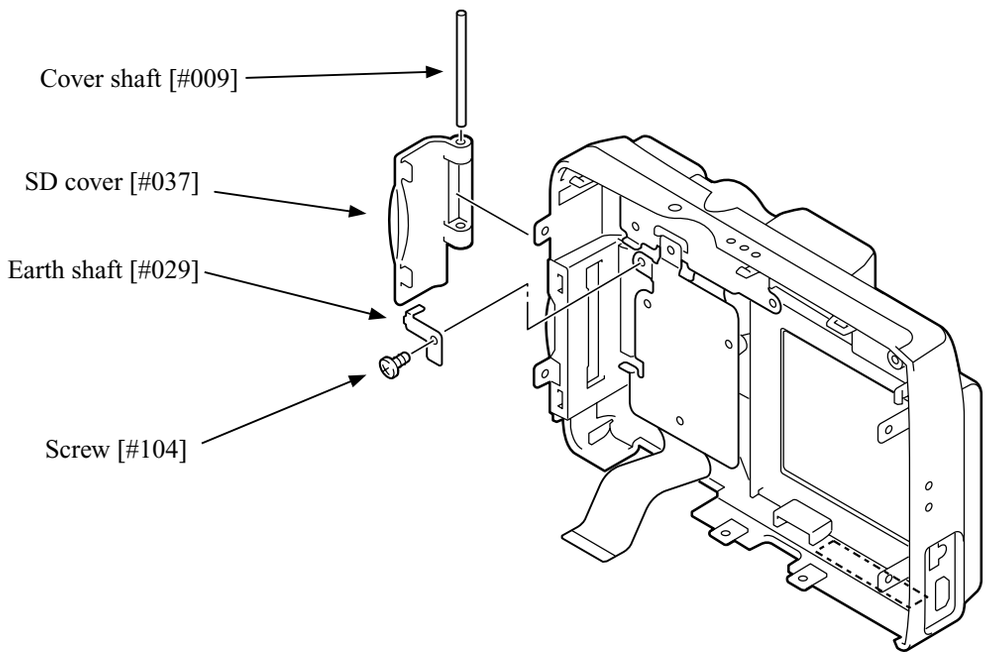


- Remove the USB cover [#033].



DISASSEMBLY OF REAR COVER

- Remove the screw [#104].
- Remove the earth shaft [#029].
- Remove the cover shaft [#009].
- Remove the SD cover [#037].

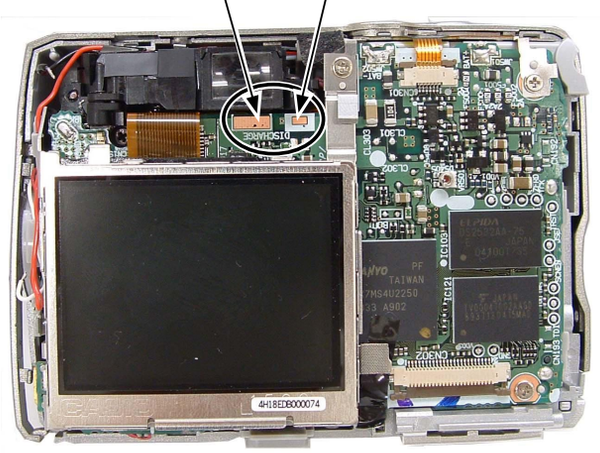


Discharging of main condenser

⚠ WARNING

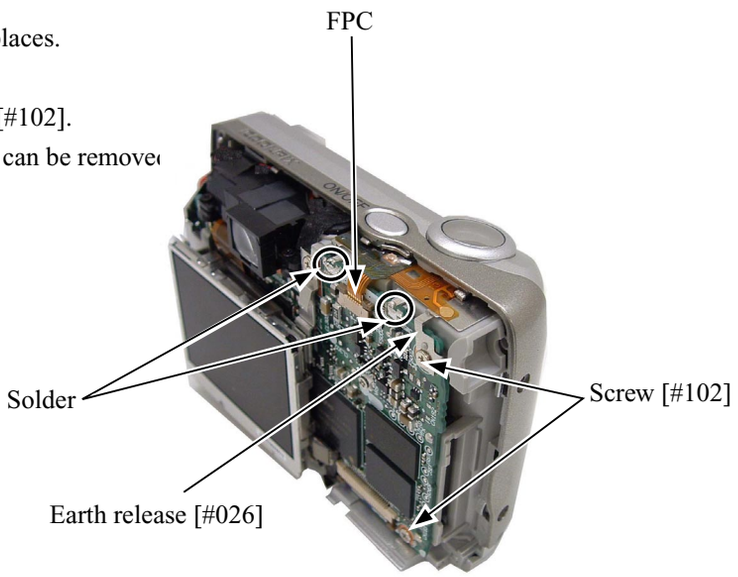
- There are high voltage parts inside. Be careful of this electric shock, when you remove the cover.
- You must discharge the main condenser according to the instruction of this repair manual before you remove the cover.

2KΩ/5W

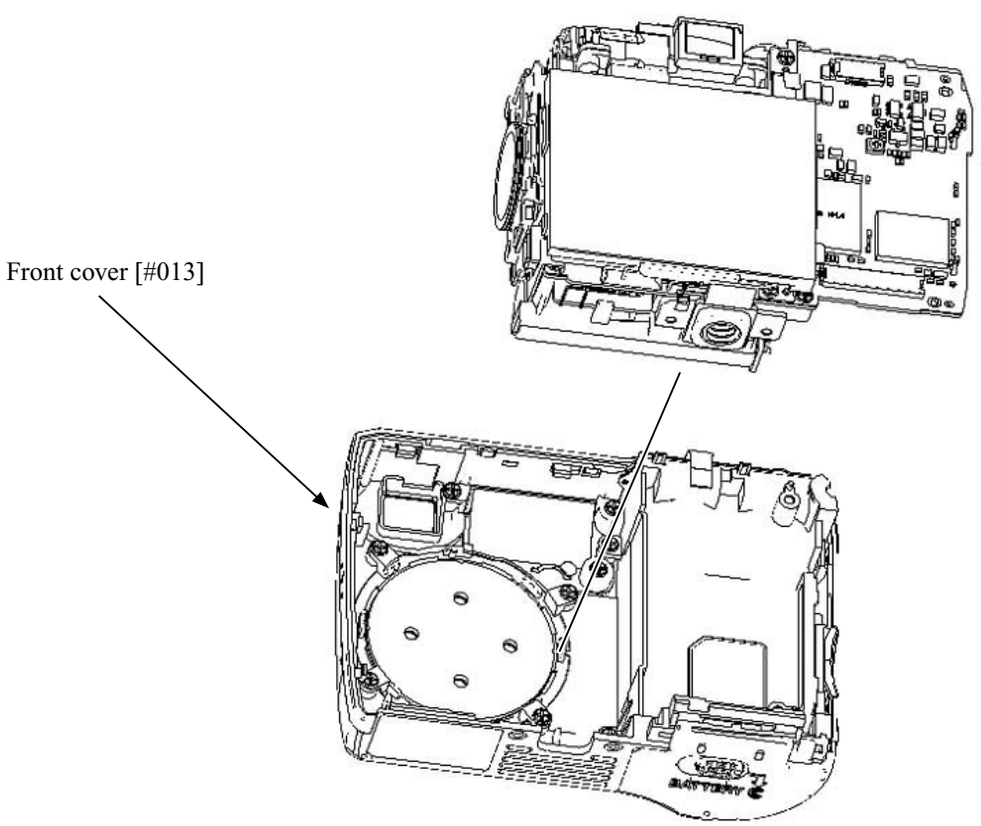


FRONT COVER

- Remove the solder at 2 places.
- Remove the FPC.
- Remove the two screws [#102].
- The earth release [#026] can be remove

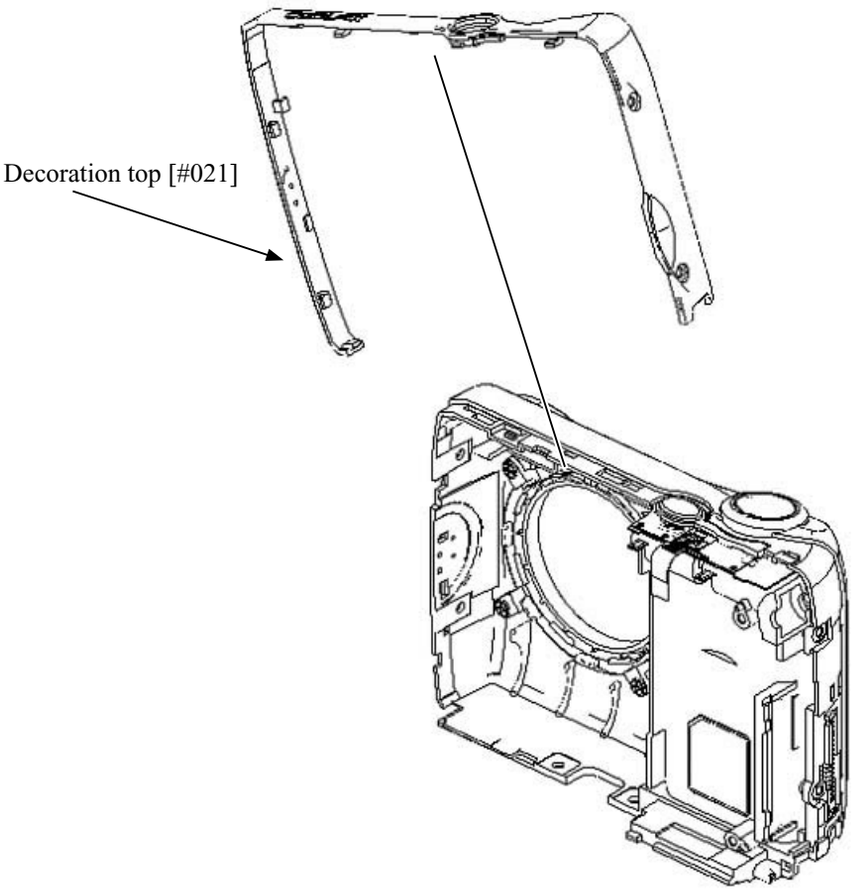


- Remove the front cover [#013].

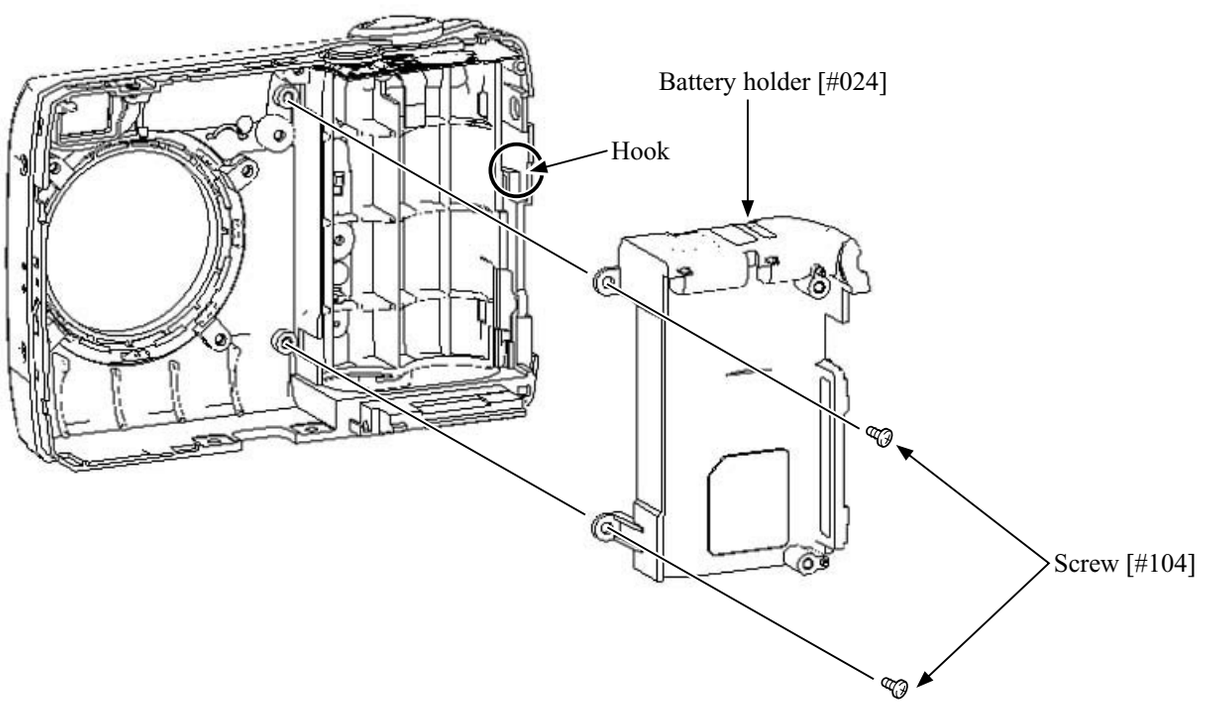


DISASSEMBLY OF FRONT COVER

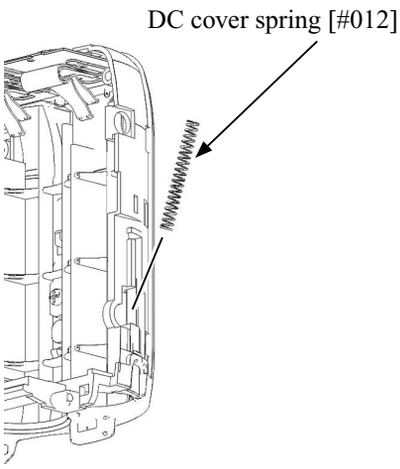
・Remove the decoration top [#021].



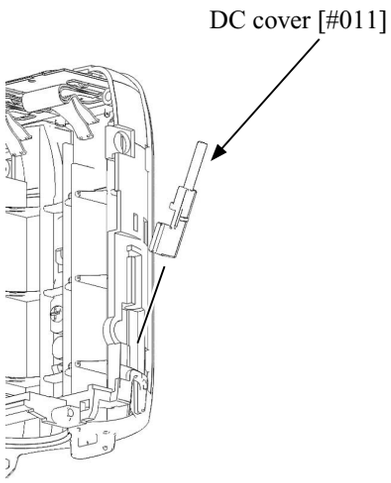
・Remove the two screws [#104].
・Unhook the battery holder [#024].



・Remove the DC cover spring [#012].

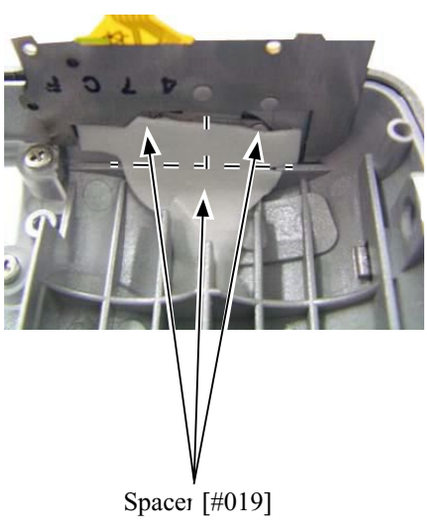


・Pull out the DC cover [#011].

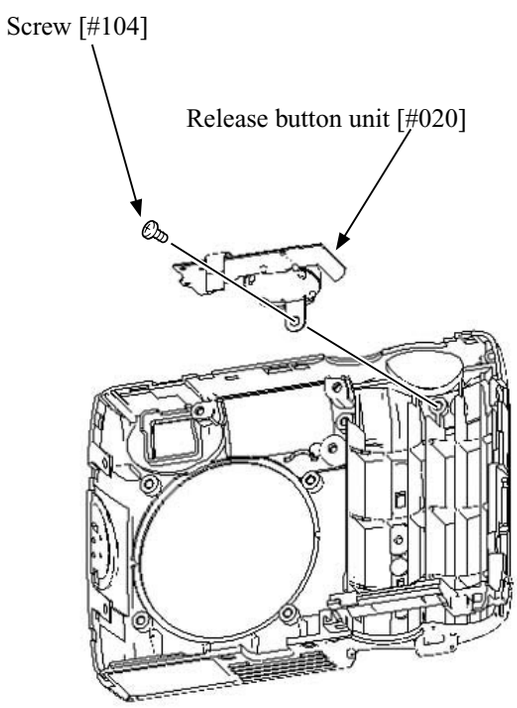


・Take off the spacer [#019] from the release button unit.

※ In the figure below, the spacer is divided into three pieces from the dotted line.

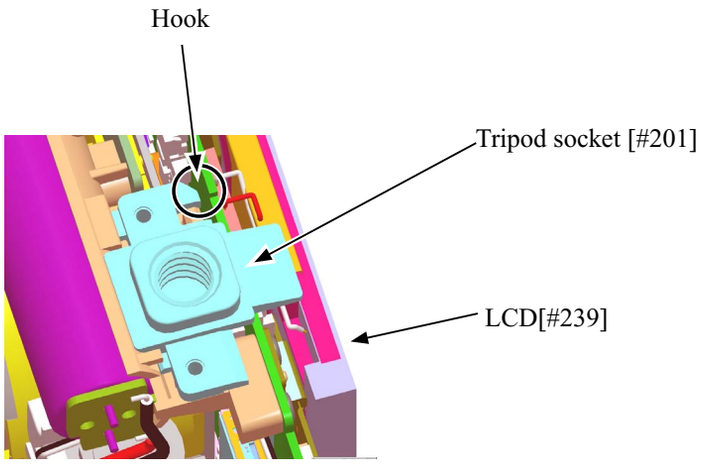


・Remove the screw [#104].
・Remove the release button unit [#020].



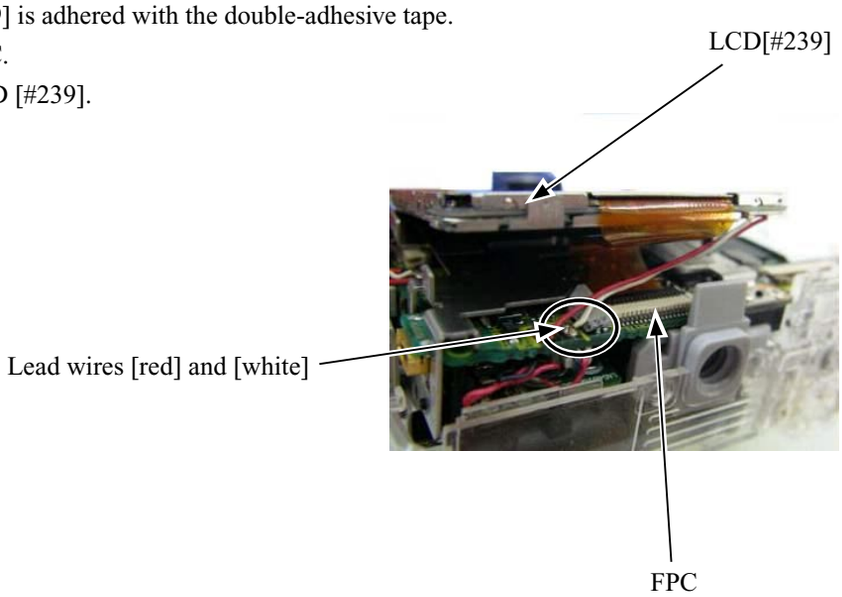
TRIPOD SOCKET

・Perform unhooking and remove the tripod socket [#201].



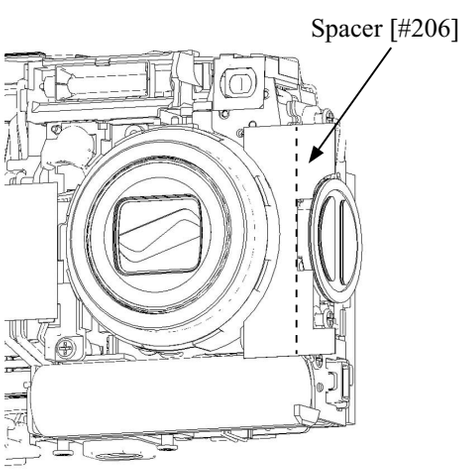
LCD

・Lift up the LCD [#239] and unsolder the lead wires [red] and [white].
※ The LCD [#239] is adhered with the double-adhesive tape.
・Remove the FPC.
・Remove the LCD [#239].

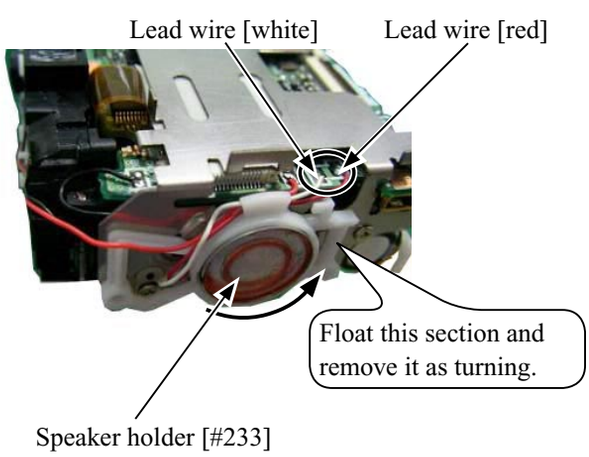


SPEAKER HOLDER

・Take off the spacer [#206].

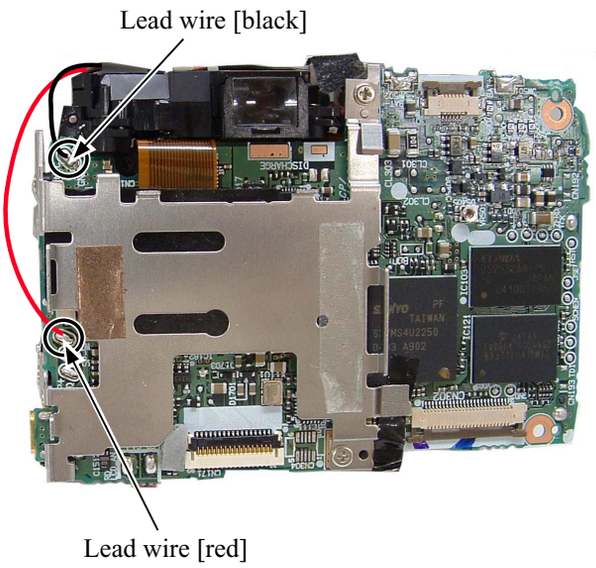


・Unsolder the lead wires [red] and [white].
・As turning counterclockwise, remove the speaker holder [#233].

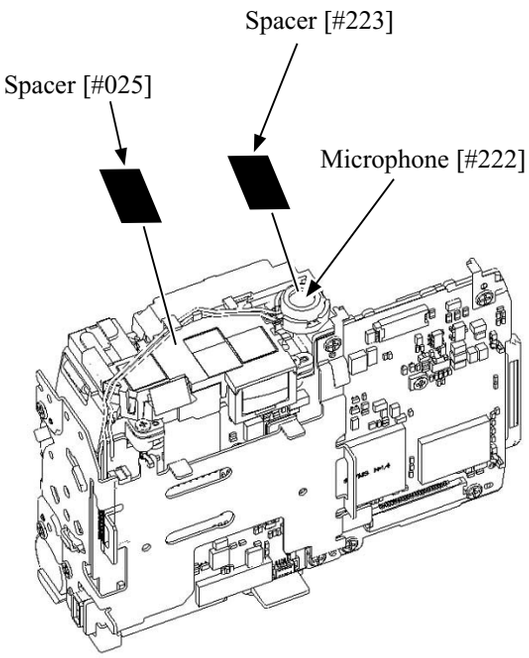


MICROPHONE

- Unsolder the lead wires [black] and [red].

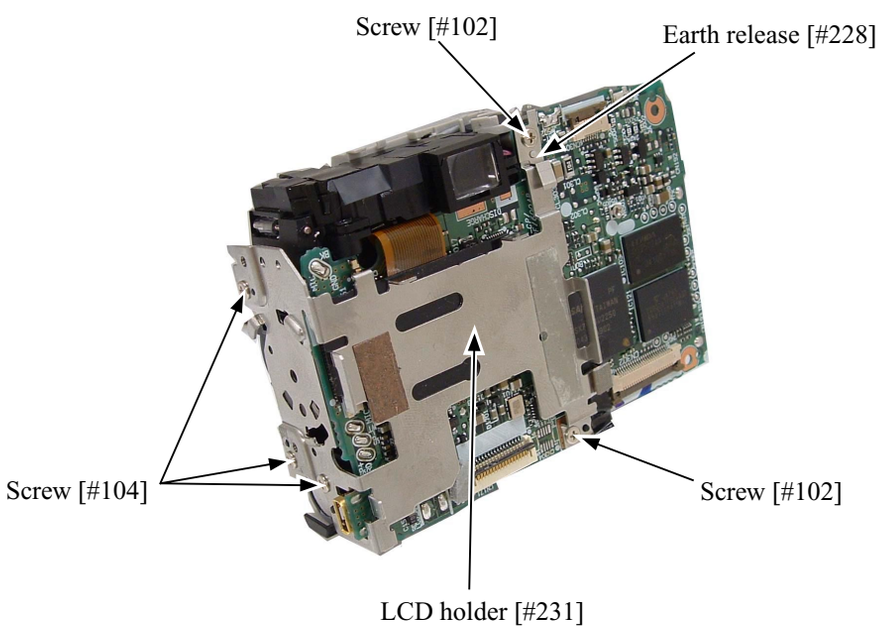


- Take off the spacer [#025].
- Take off the spacer [#223].
- Remove the microphone [#222].



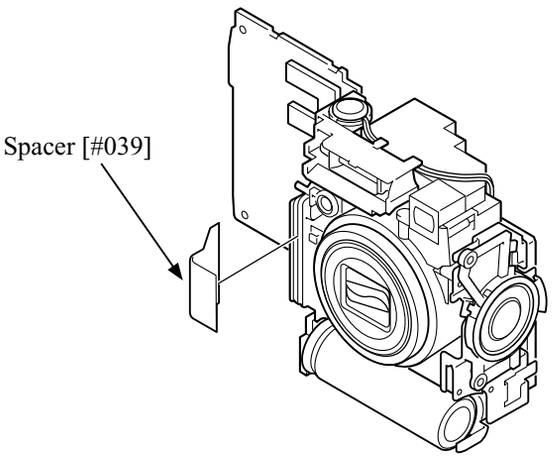
MONITOR HOLDER

- Remove the two screws [#102].
- Remove the earth release [#228].
- Remove the three screws [#104].
- Remove the LCD holder [#231].

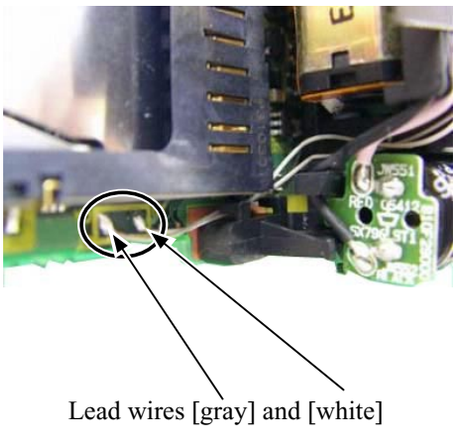


SB UNIT

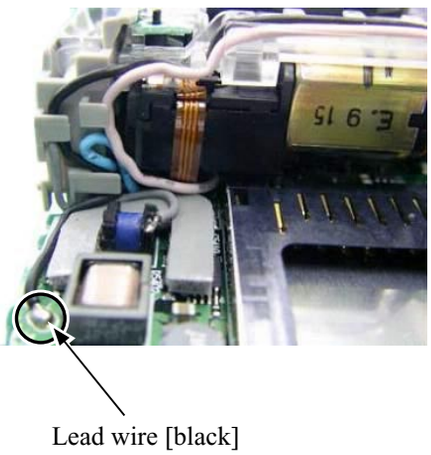
・Remove the spacer [#039].



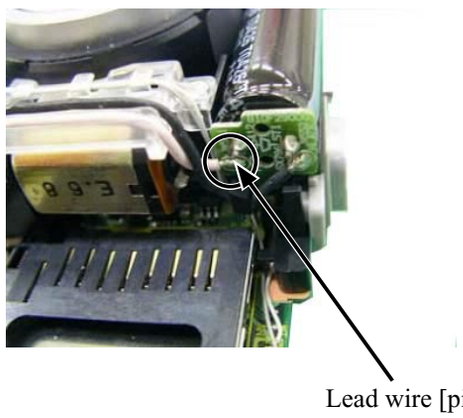
・Unsolder the lead wires [gray] and [white].



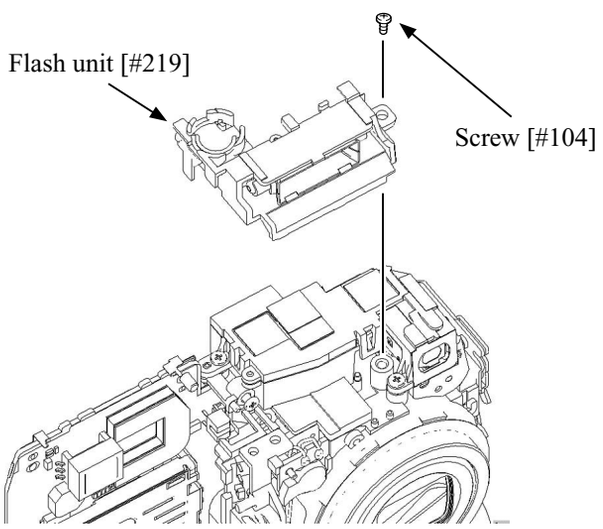
・Unsolder the lead wire [black].



・Unsolder the lead wire [pink].

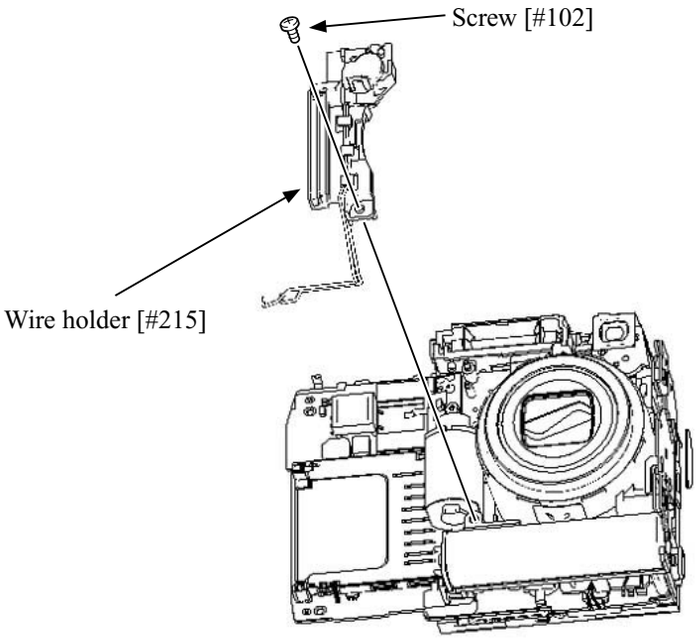


・Remove the screw [#104].
・Float the flash unit [#219].



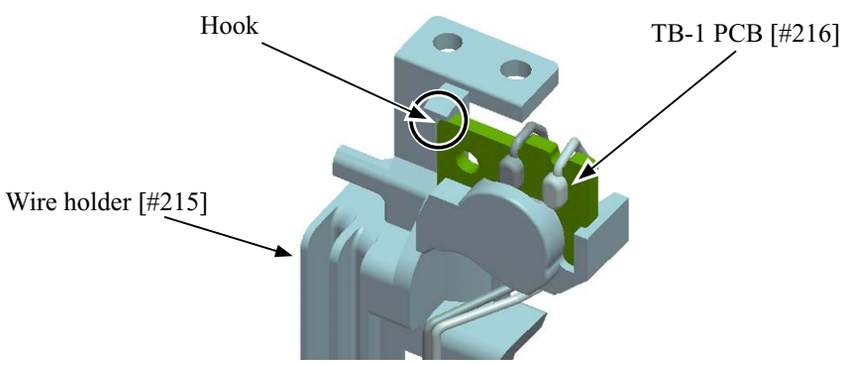
WIRE HOLDER

- Remove the screw [#102].
- Remove the wire holder [#215].



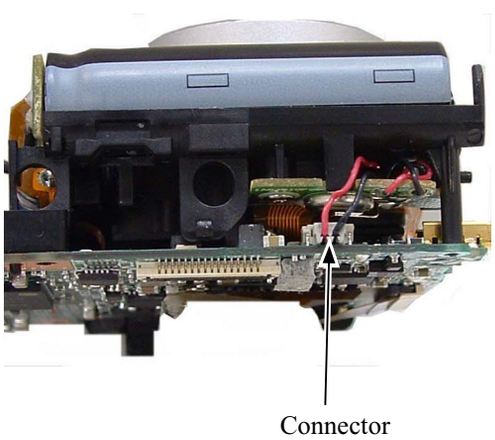
TB-1 PCB

- Perform unhooking and remove the TB-1 PCB [#216].

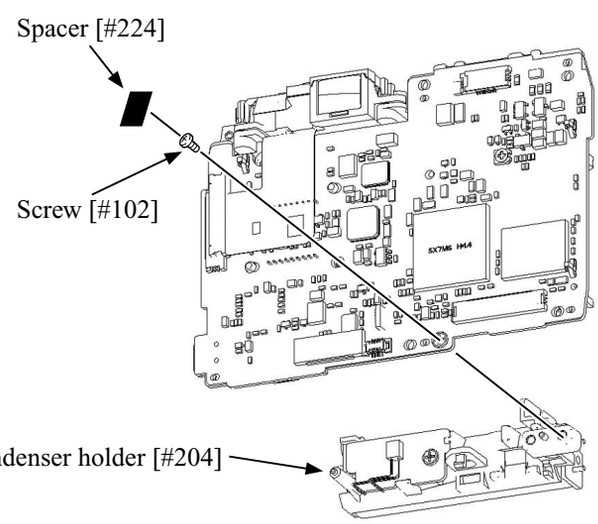


CONDENSER HOLDER

- Remove the connector.

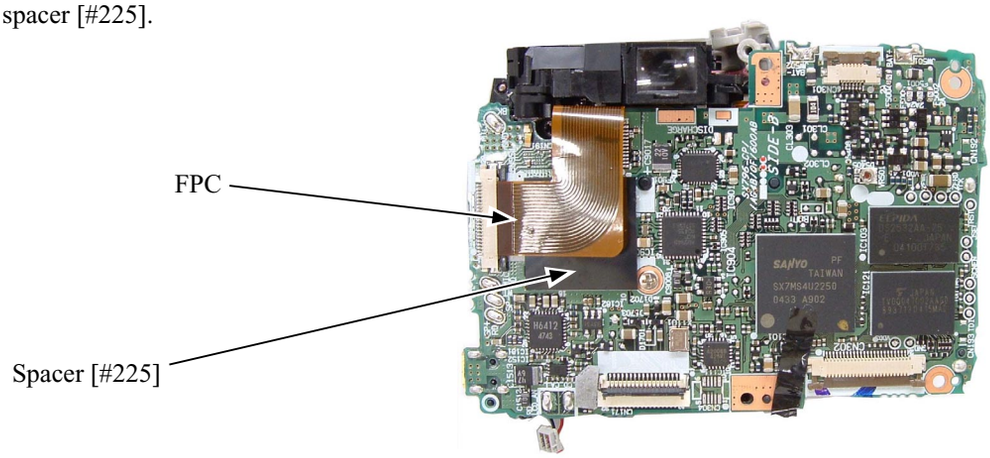


- Take off the spacer [#224].
- Remove the screw [#102].
- Remove the condenser holder [#204].

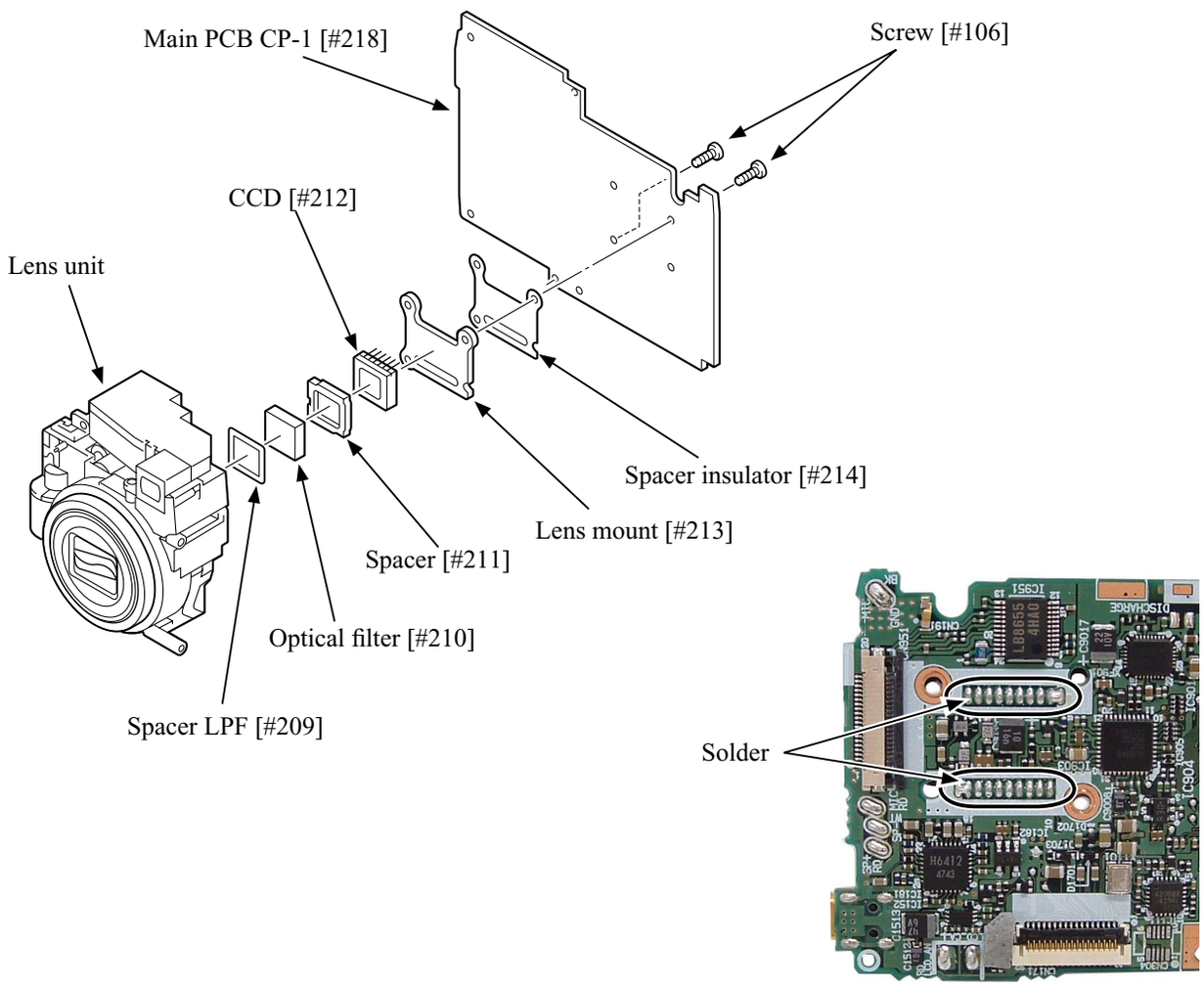


LENS UNIT

- Remove the FPC.
- Take off the spacer [#225].



- Remove the two screws [#106].
- The lens unit can be removed.
- The spacer LPF [#209], the optical filter [#210] and the spacer [#211] can be removed.
- Remove the solder fixing the CCD. (Fig. 1)
- Remove the CCD [#212], the lens mount [#213] and the spacer insulator [#214].



(Fig. 1)

Points to notice when disassembling / (re)assembling Lens unit

When the following parts are replaced for repairing the lens unit singularly, the lens unit checking tool is required for the FFD inspection and adjustment. Therefore, at service facilities where there is no tool, do NOT make a replacement

- 1st lens group unit
- 2nd lens group unit
- 3rd lens group unit

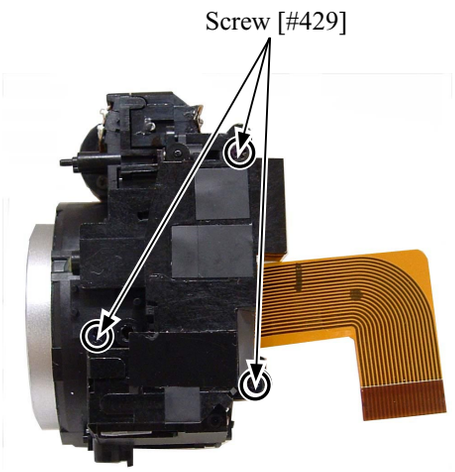
Tools required for FFD inspection and adjustment

Note: When the operation check and adjustment of the lens unit are made for repairing the lens unit singularly, the following tools are required.

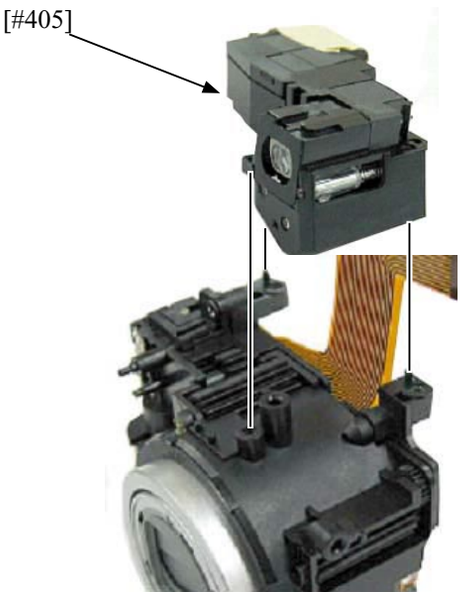
・Lens unit checking tool	: J61202
・Connection cable for lens	: J61202F
・PCI I/F board	: J61204
・Connection cable for PC	: J61204A
・Adjusting focus stand for APS	: J15327
・Adapter for J15327	: J15327A + J15327D
・E4600/E5600 lens unit checking program	: J65072

FINDER UNIT

- Remove the three screws [#429].

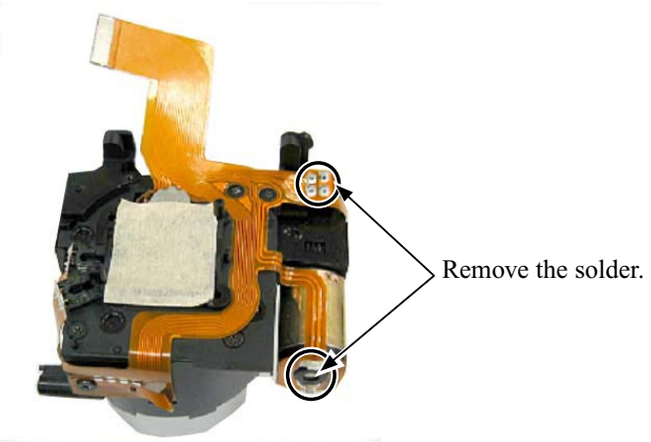


- Remove the finder unit [#405].

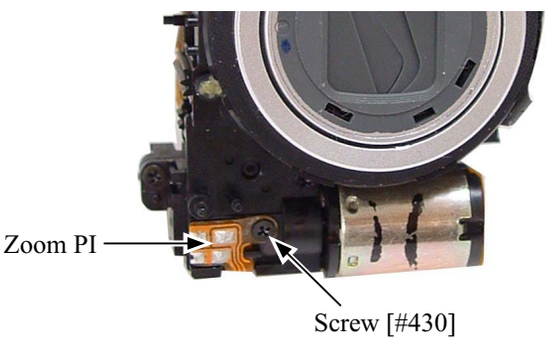


ZOOM MOTOR UNIT

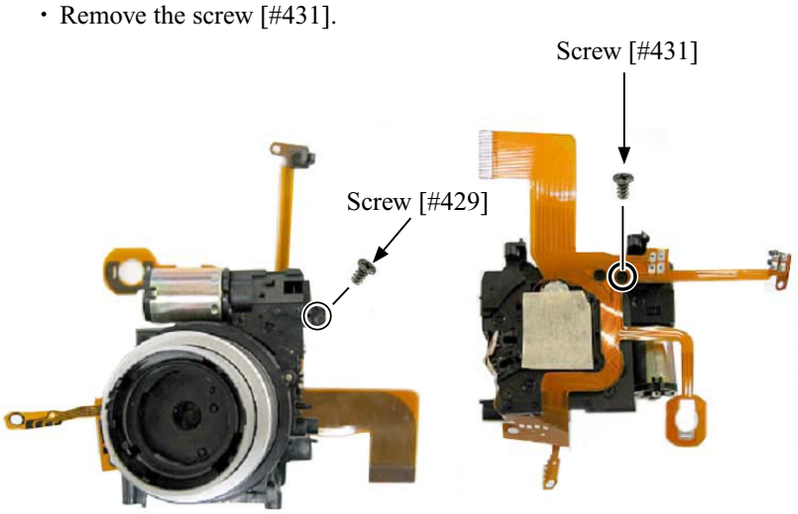
- Remove the solder of the motor at 2 places.
- Remove the solder of the FPC at 4 places.



- Remove the screw [#430].
- Remove the zoom PI.



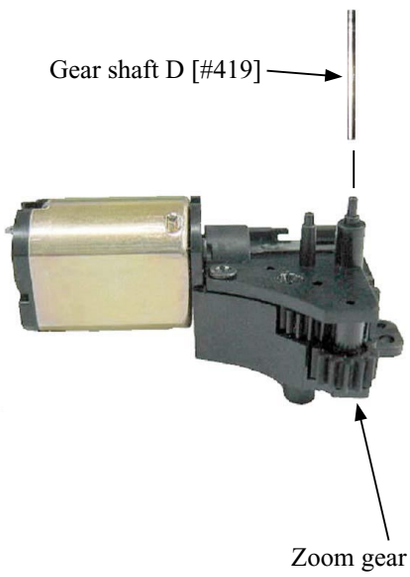
- Remove the screw [#429].
- Remove the screw [#431].



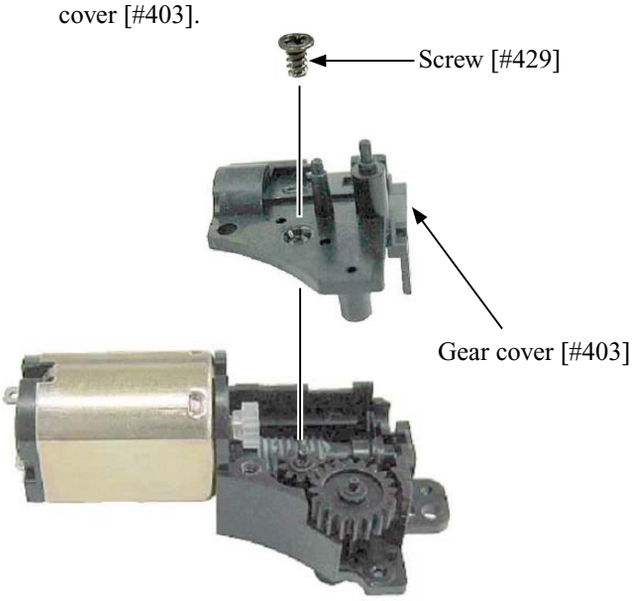
- Remove the zoom motor unit.

DISASSEMBLY OF ZOOM MOTOR UNIT

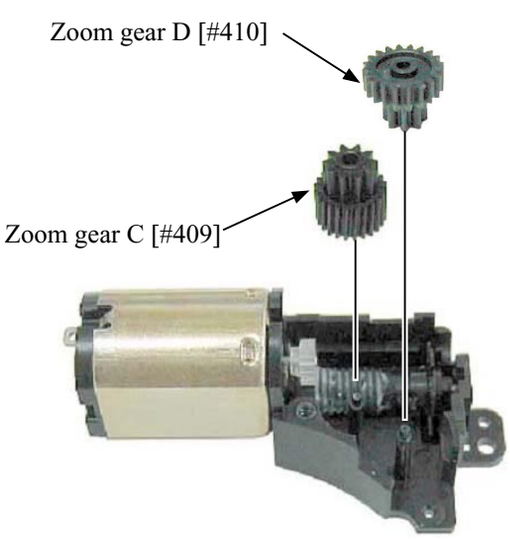
- Pull out the gear shaft D [#419].
- Remove the zoom gear E [#411].



- Remove the screw [#429] and then remove the gear cover [#403].

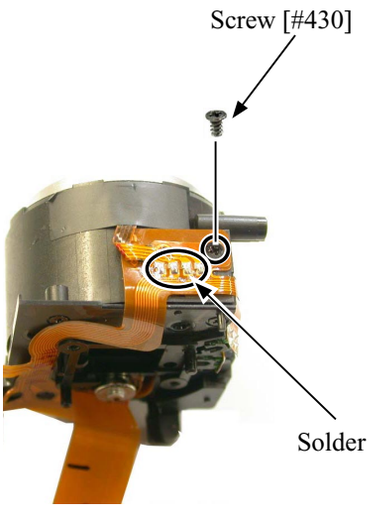


- Remove the zoom gear D [#410] and the zoom gear C [#409].

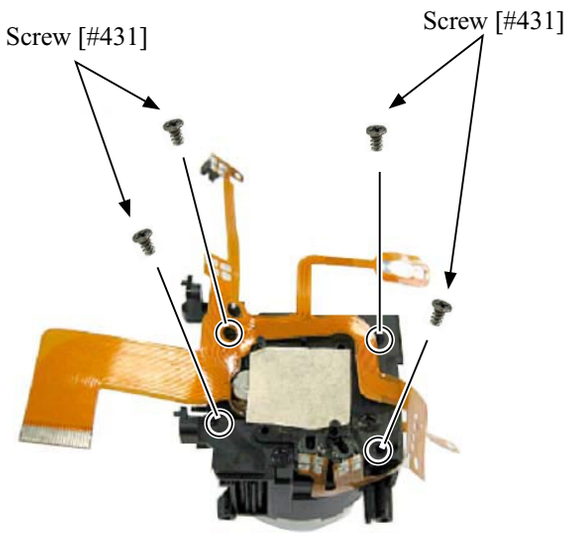


CCD FRAME

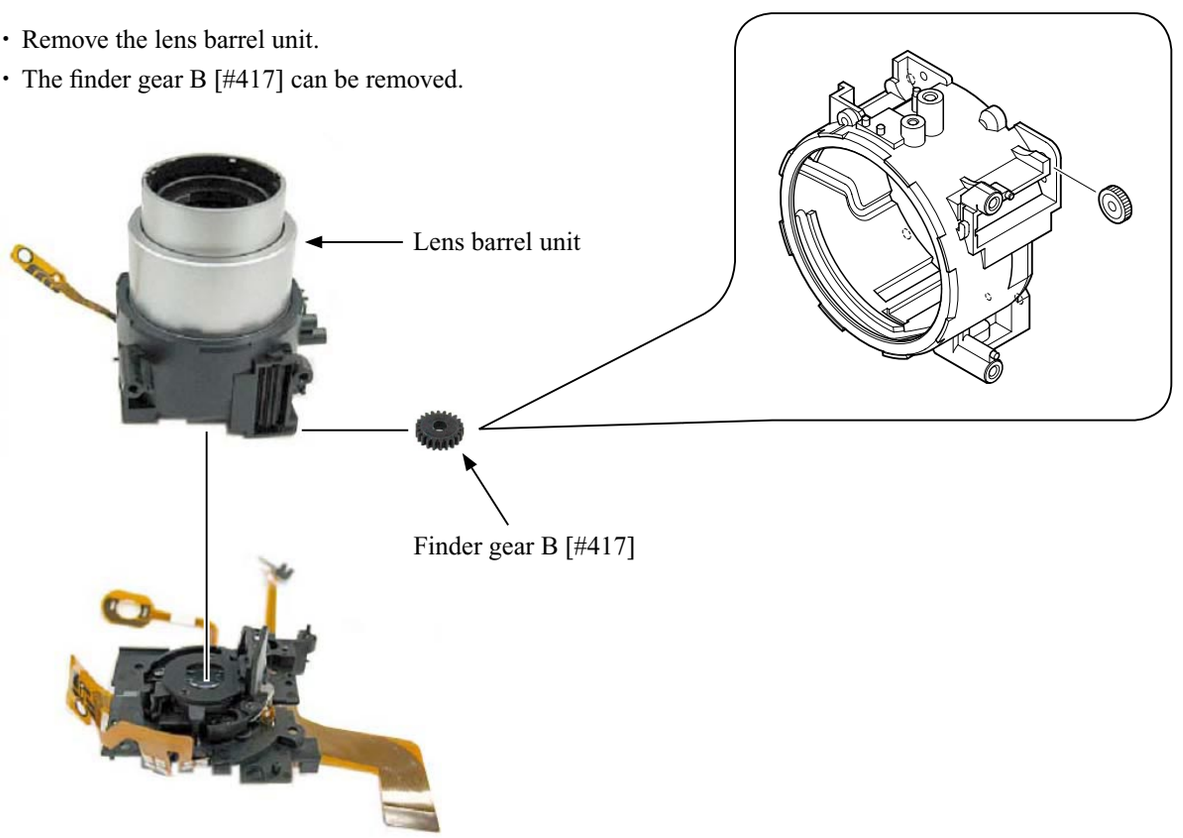
- Remove the solder.
- Remove the screw [#430].



- Remove the four screws [#431].

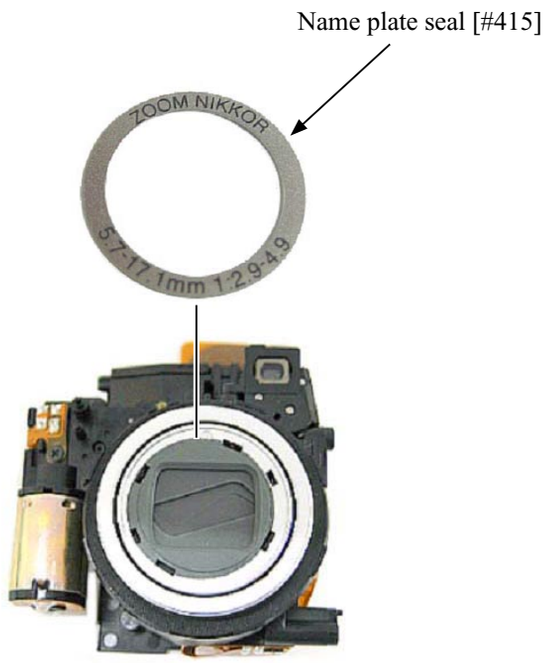


- Remove the lens barrel unit.
- The finder gear B [#417] can be removed.



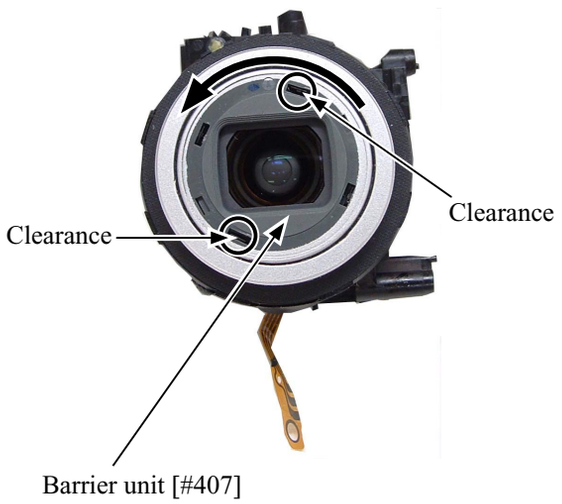
BARRIER UNIT

・Take off the name plate seal [#415].



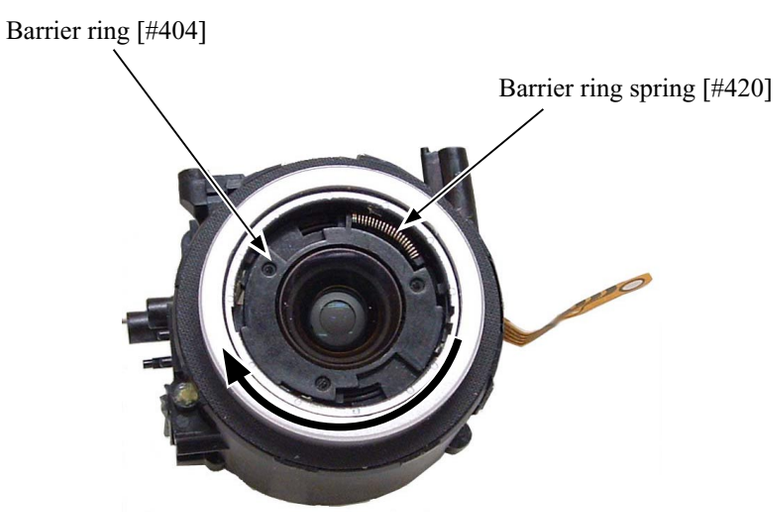
・Remove the barrier unit [#407] by turning counterclockwise.

※Insert tweezers into the clearance and turn the barrier unit counterclockwise. It will be removed easily.



・Remove the barrier ring spring [#420].

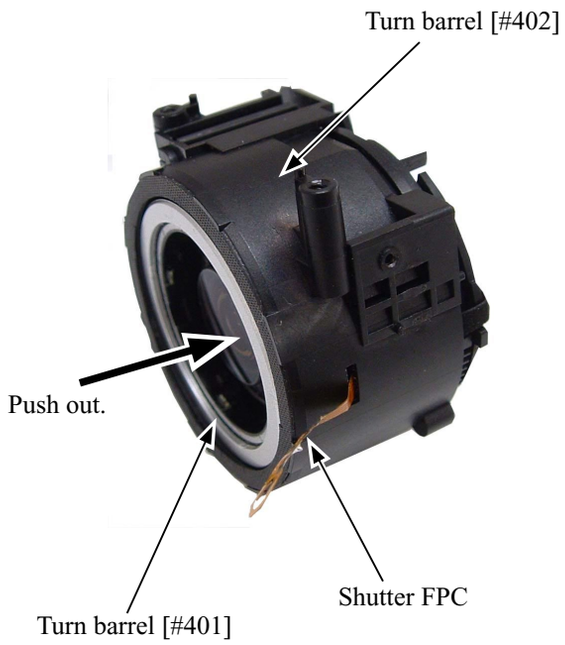
・Remove the barrier ring [#404] by turning clockwise.



FIXED BARREL

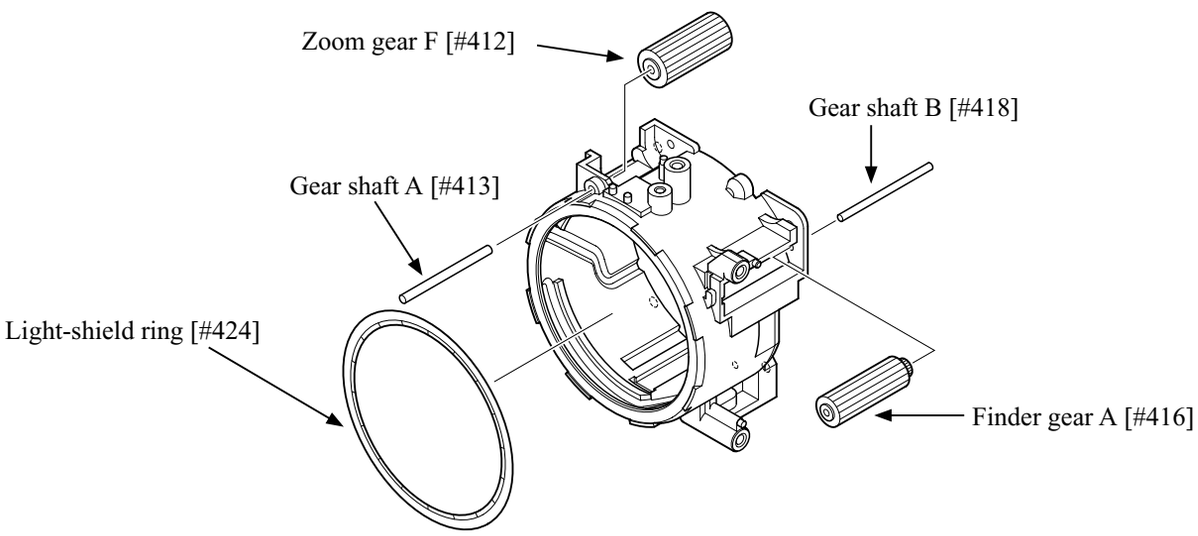
- Take off the FPC sheet [#423].

- Push out the turn barrel [#401]. As taking out the shutter FPC, remove the turn barrel [#402].



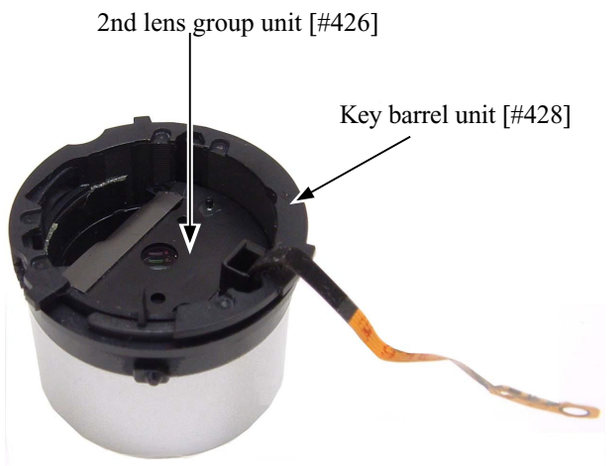
DISASSEMBLY OF FIXED BARREL

- Pull out the gear shaft A [#413] and remove the zoom gear F [#412].
- Pull out the gear shaft B [#418] and remove the finder gear A [#416].
- Remove the light-shield ring [#424].



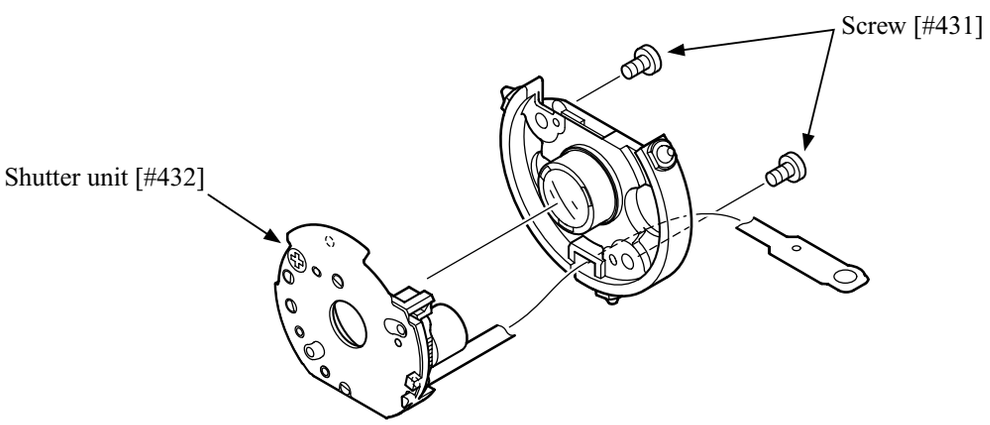
2ND LENS GROUP UNIT

- Turn the key barrel unit [#428] in the W-end direction to the limit.
- The 2nd lens group unit [#426] floats a little and can be removed.



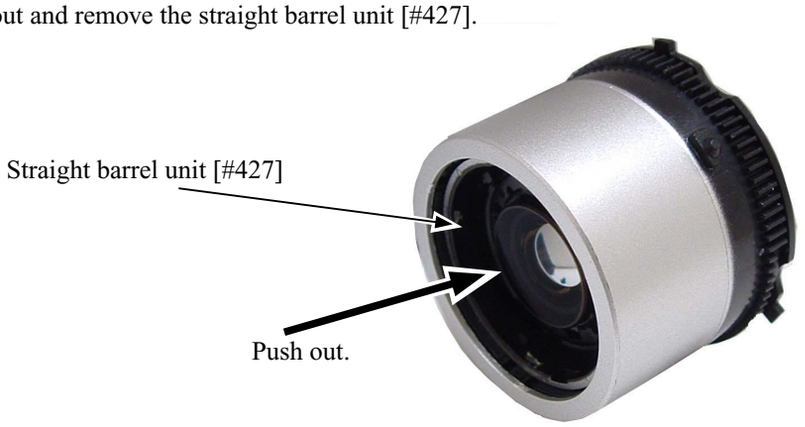
SHUTTER

- Remove the two screws [#431].
- Remove the shutter unit [#432].



STRAIGHT BARREL

- Push out and remove the straight barrel unit [#427].

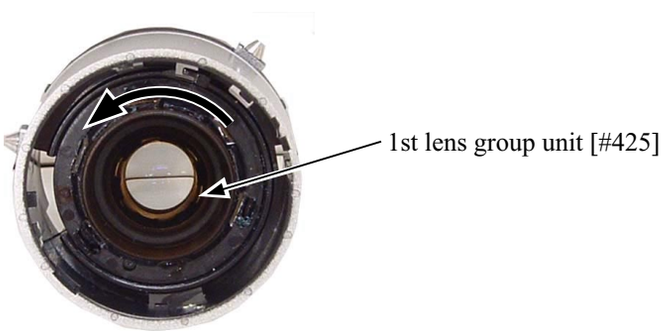


KEY BARREL・TURN BARREL

・Pull out the key barrel unit [#428] from the turn barrel [#401].

1ST LENS GROUP UNIT

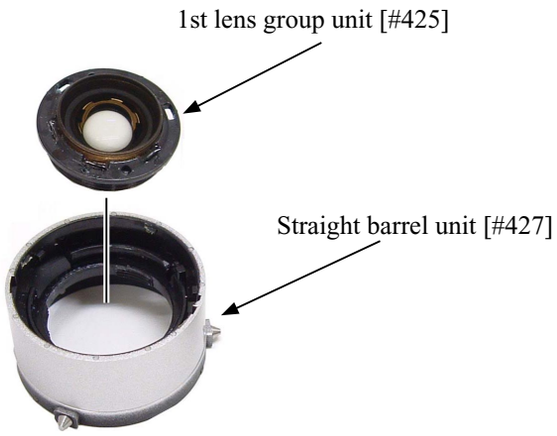
・Turn the 1st lens group unit [#425] counterclockwise.
・The 1st lens group unit [#425] can be removed.



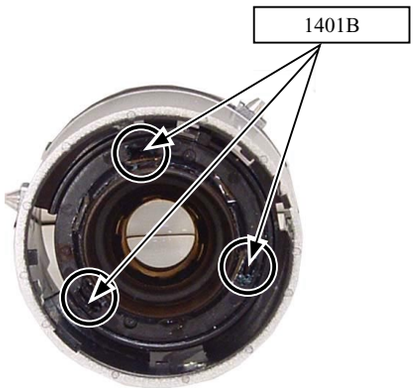
ASSEMBLY

1ST LENS GROUP UNIT

・Set the 1st lens group unit [#425] into the straight barrel unit [#427]. Turn the 1st lens group unit [#425] counterclockwise to be level and turn it clockwise to be installed correctly.

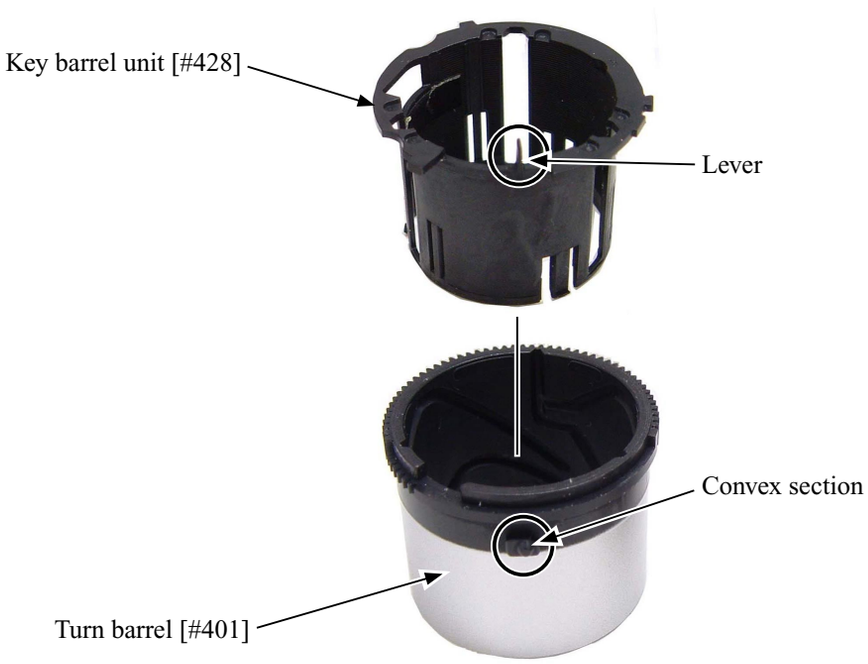


・Apply the adhesive (1401B) to 3 places.



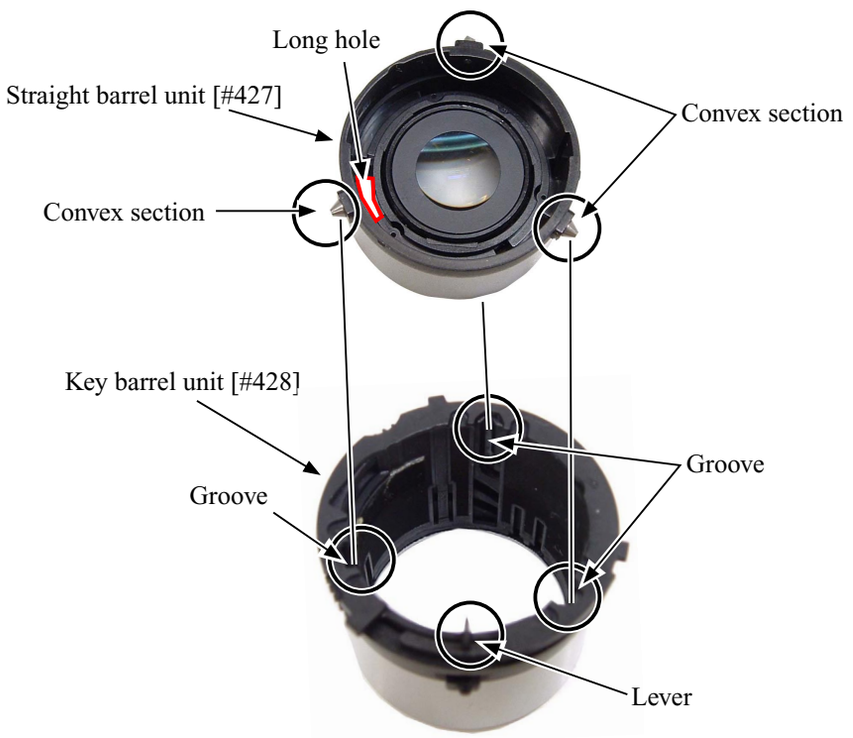
KEY BARREL・TURN BARREL

・There is a convex section on the side without gear on the turn barrel [#401]. Fit the lever position on the key barrel unit [#428] to this convex section and set the key barrel unit [#428] into the turn barrel [#401].



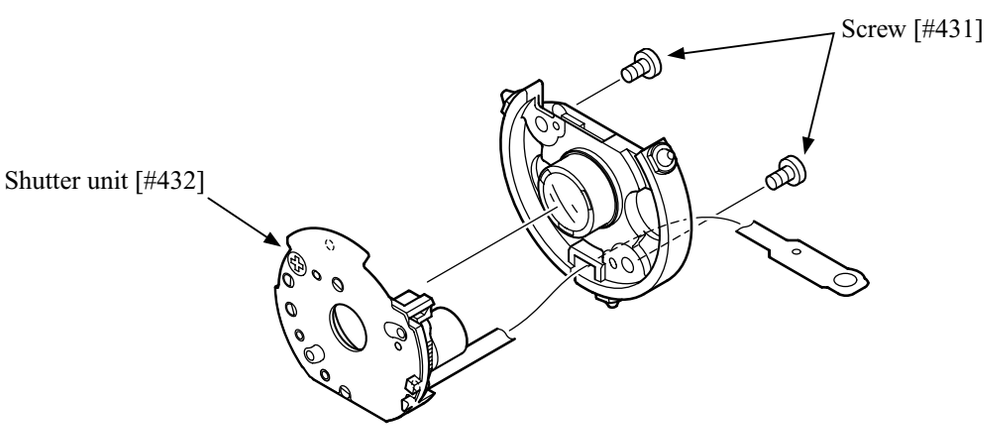
STRAIGHT BARREL

・Set the lever of the key barrel unit [#428] at the front side. Set the long hole of the straight barrel unit [#427] at the left side. Fit the convex sections to the grooves and then set the straight barrel unit [#427] into the key barrel unit [#428].



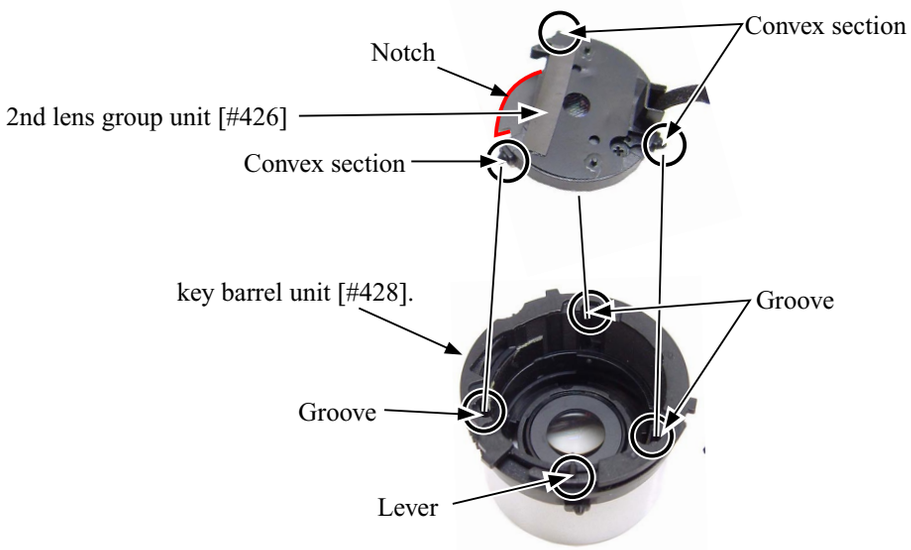
SHUTTER

・Install the shutter unit [#432] and tighten the two screws [#431].



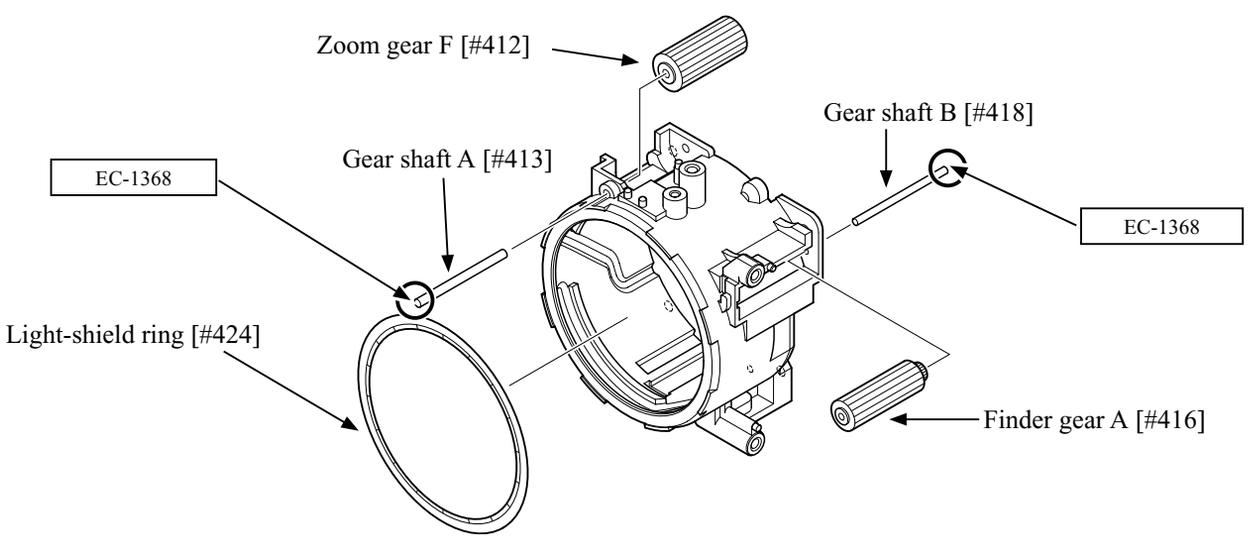
2ND LENS GROUP UNIT

- Set the lever of the key barrel unit [#428] at the front side. Set the notch of the 2nd lens group unit [#426] at the left side. Fit the convex sections to the grooves and set the 2nd lens group unit [#426] into the key barrel unit [#428].



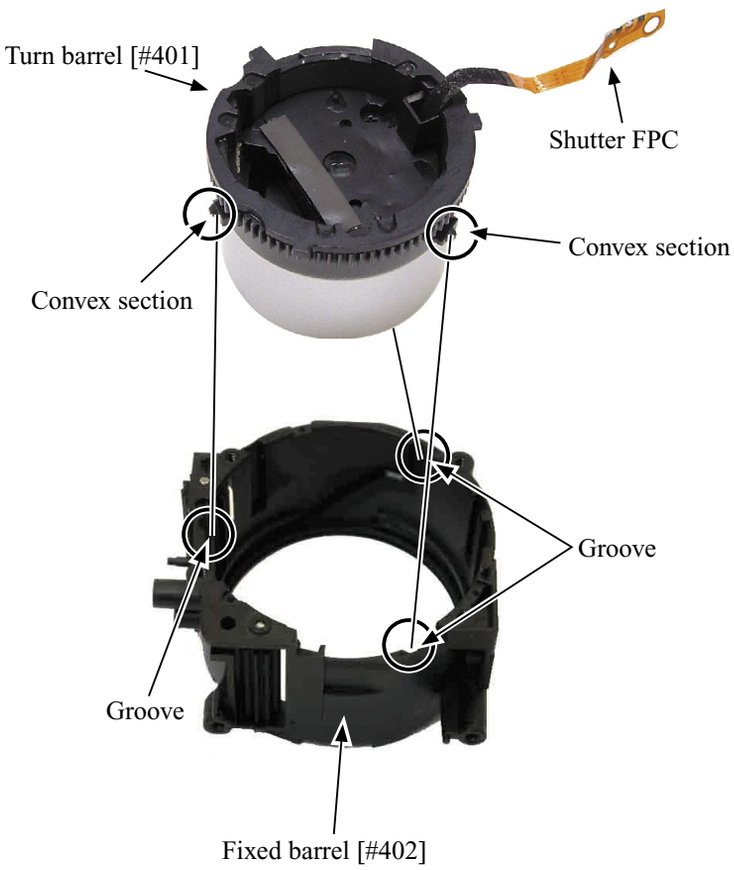
ASSEMBLY OF FIXED BARREL

- Set the light-shield ring [#424].
- Make the stepped difference side of the finder gear A [#416] face the CCD. Then, set the finder gear A [#416] and insert the gear shaft B [#418].
- Set the zoom gear F [#412] and insert the gear shaft A [#413].
- Apply the adhesive (EC-1368) to the gear shafts.



FIXED BARREL

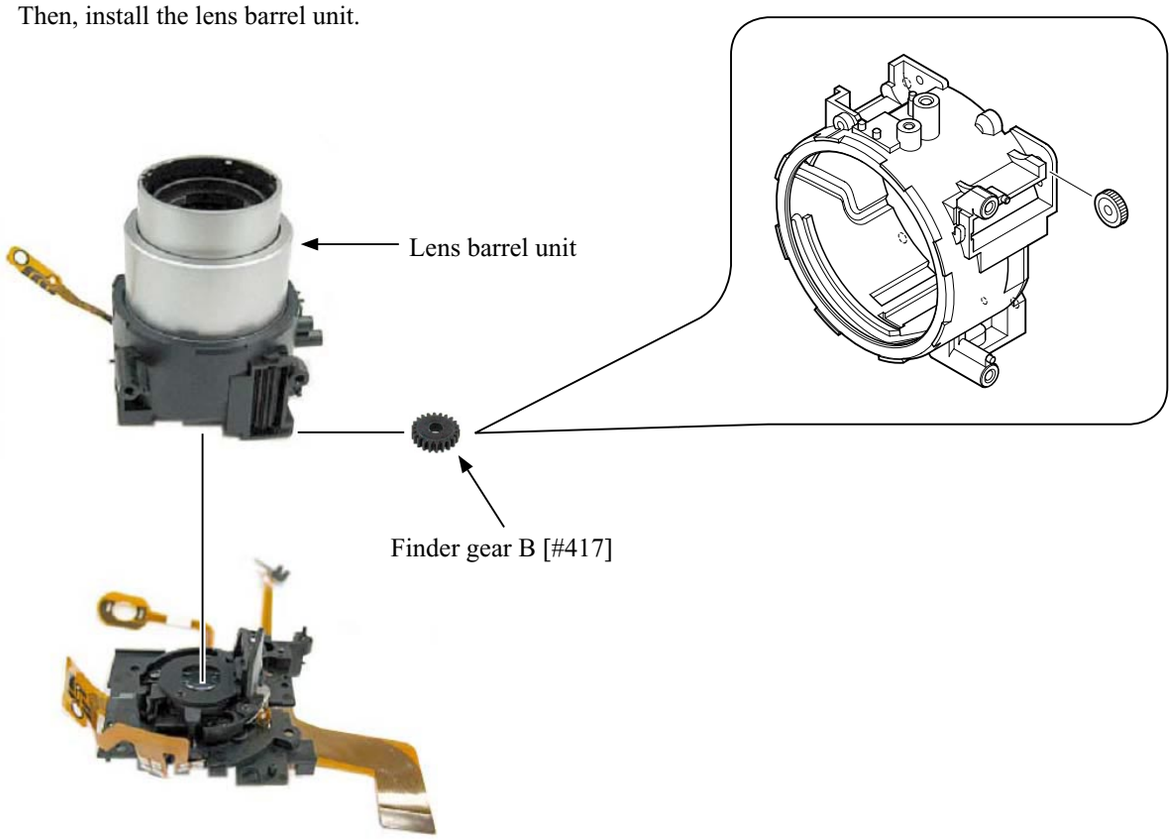
- Insert the shutter FPC into the hole on the side of the fixed barrel [#402].
- Fit the convex sections on the turn barrel [#401] to the grooves on the fixed barrel [#402]. Set the turn barrel [#401] into the fixed barrel [#402].



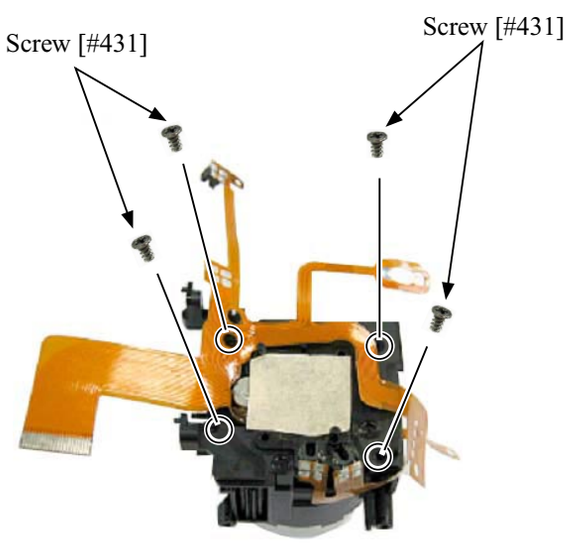
- Adhere the FPC sheet [#423].

CCD FRAME

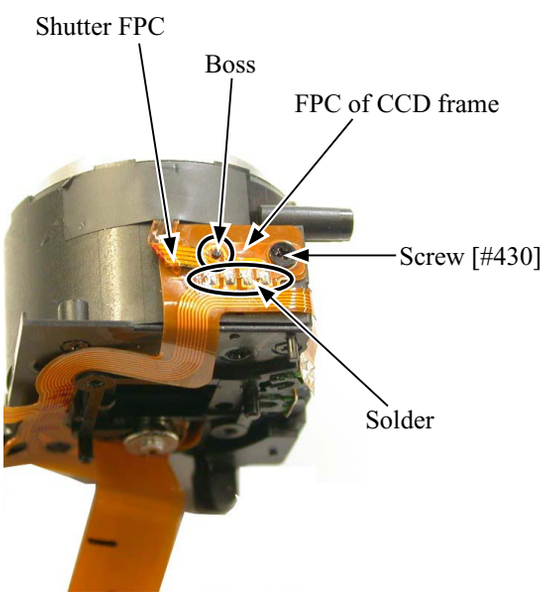
・Set the finder gear B [#417] into the lens barrel unit.
Then, install the lens barrel unit.



・Tighten the four screws [#431].

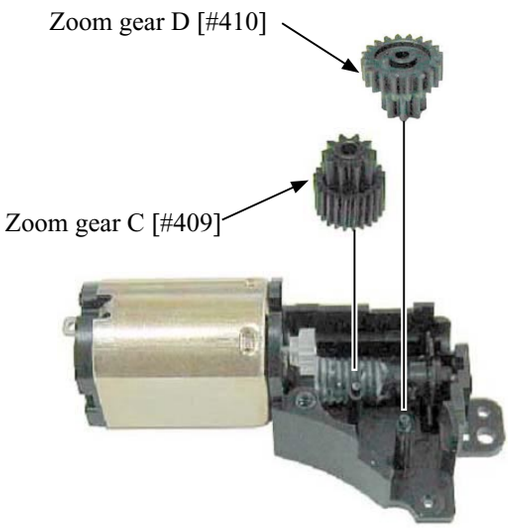


・Insert the FPC of the CCD frame into the boss.
・Insert the shutter FPC into the boss.
・Tighten the screw [#430].
・Perform soldering.

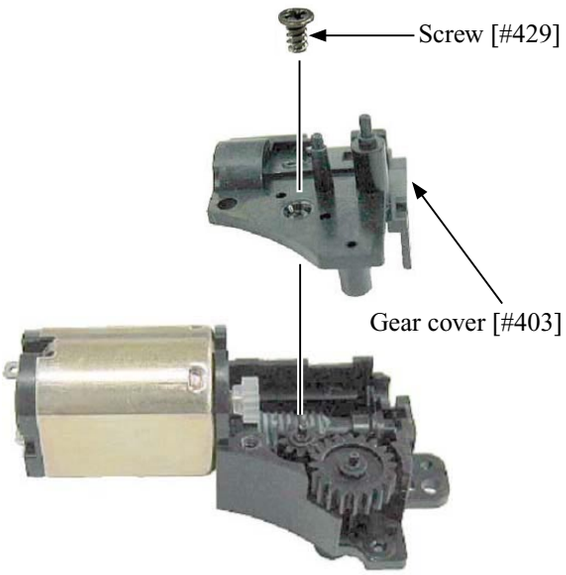


ASSEMBLY OF ZOOM MOTOR UNIT

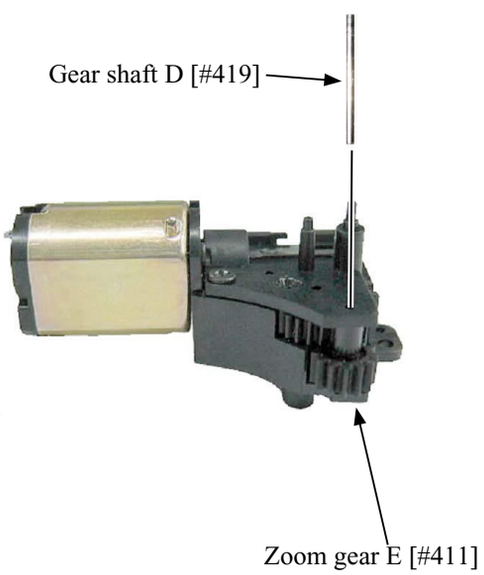
- Set the zoom gear C [#409] and the zoom gear D [#410].



- Set the gear cover [#403] and tighten the screw [#429].



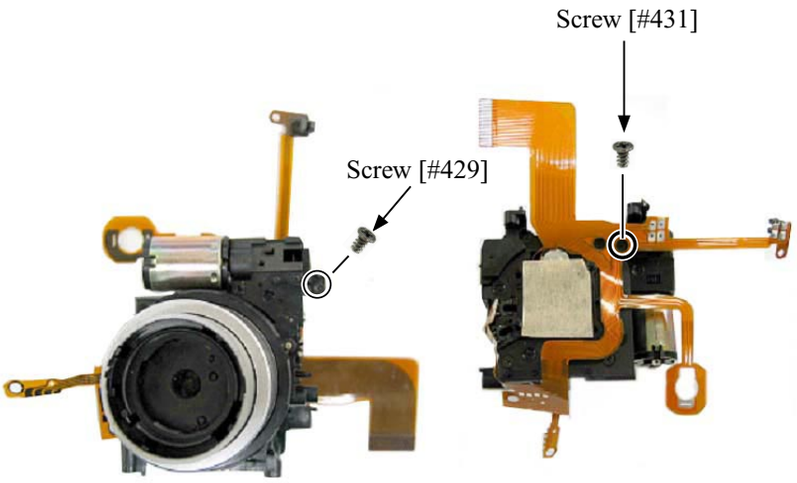
- Set the zoom gear E [#411] and insert the gear shaft D [#419].



ZOOM MOTOR UNIT

- Fit the zoom motor unit to the bosses on the CCD frame and set it.

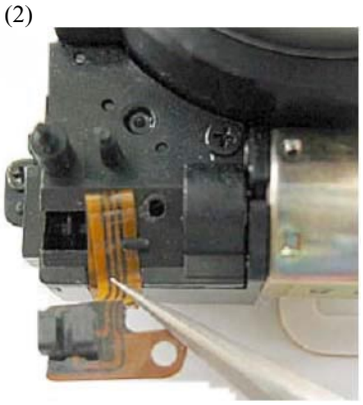
- Tighten the screw [#429].
- Tighten the screw [#431].



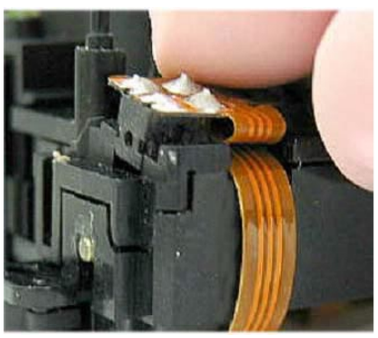
- Fold the FPC of the zoom PI as shown below and insert the zoom PI.

(1)

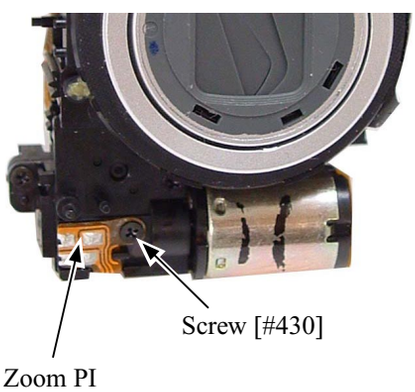
(2)



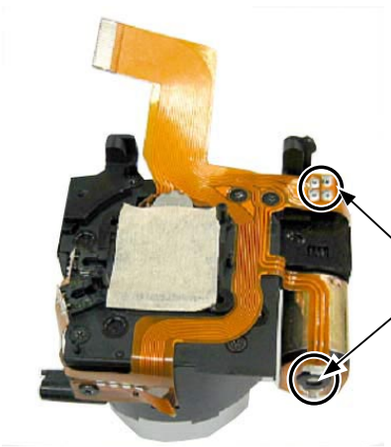
(3)



- Tighten the screw [#430].

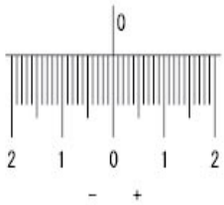


- Solder the FPC at 4 places.
- Solder the motor at 2 places.



FFD Inspection and adjustment (*FFD:Flange Focal Distance)

Preparation

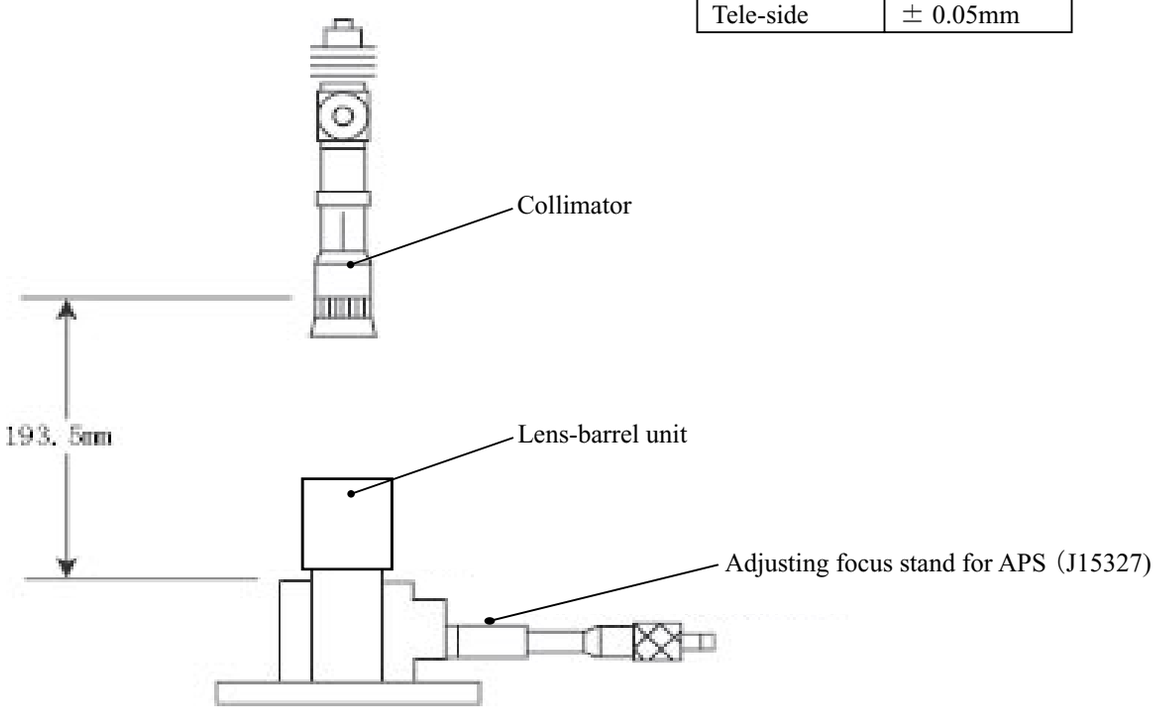


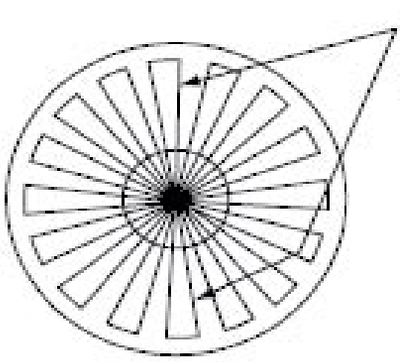
- Turn the objective glass of the collimator (J19019), and set degree to 0 (0 mm).
- Set the 0-position of "Adjusting focus stand for APS (J15327)" as follows:
  1. Replace the white acrylic plate of the above stand(J15327)with the new one(J15327A)
  2. Install J15327D to the micro stand.
  3. Align the upper surface of the white acrylic plate of the Adjusting focus stand (J15327A) with the mirror reflecting surface.

     Note: Because the mirror reflecting surface is easily damaged, carefully align with it at the same level by using the dial gauge, etc.
  4. Based on the above 0-position, turn the knob of the Adjuting focus stand further to set the -2.16-mm position.
  5. Press the reset button of the Adjusting focus stand again, and set the 0-position.

FFD inspection and adjustment

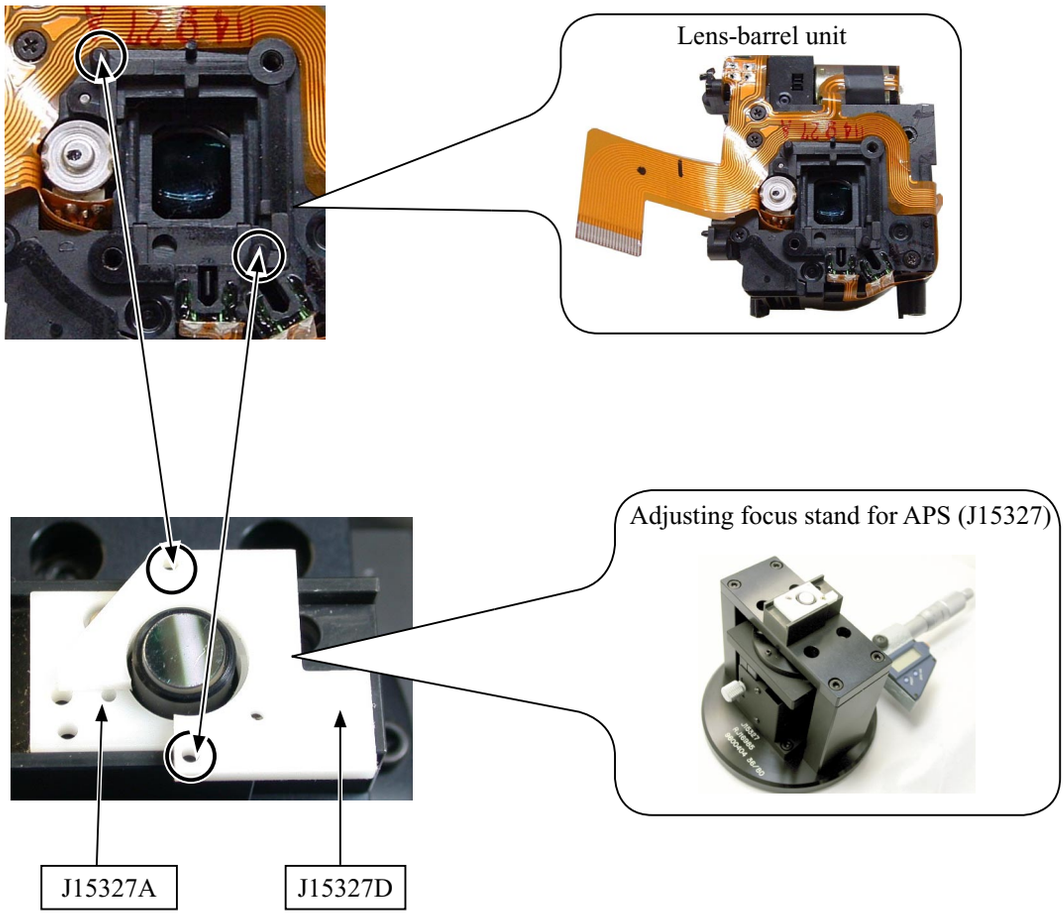
Zoom position	FFD standard
Wide-side	± 0.05mm
Tele-side	± 0.05mm



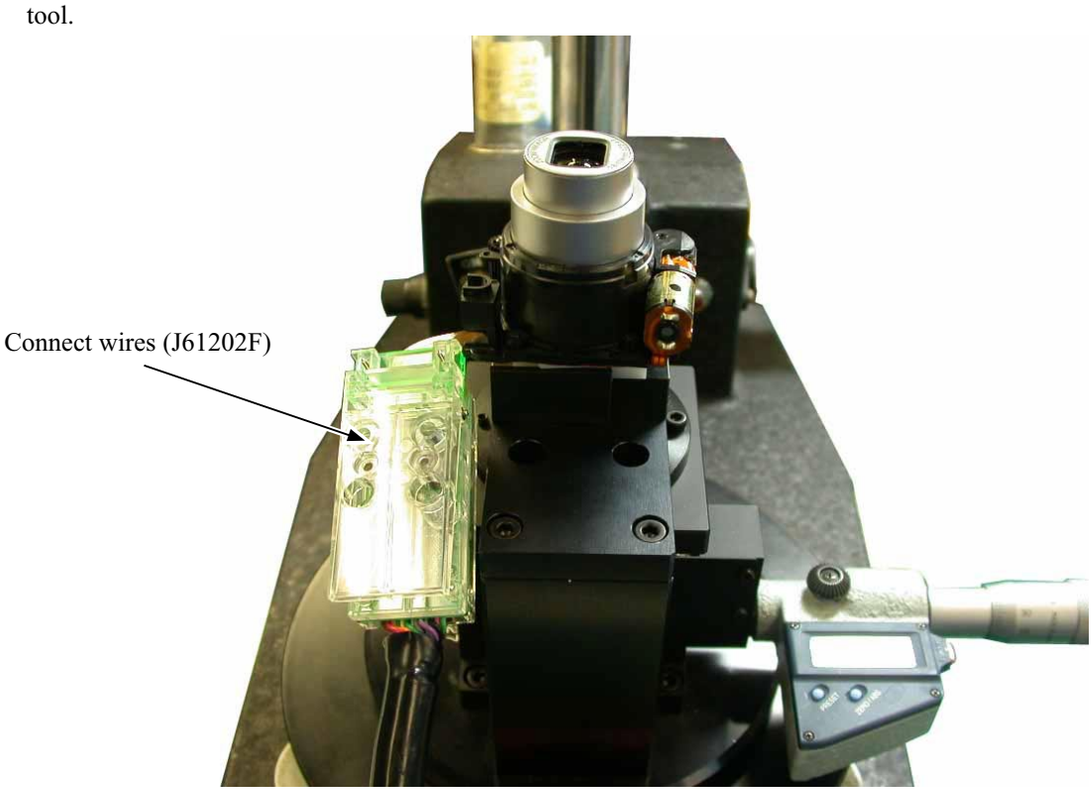


At the position where the color of vertical lines shifts from blue to red, read the measurement value of the Adjusting focus stand.

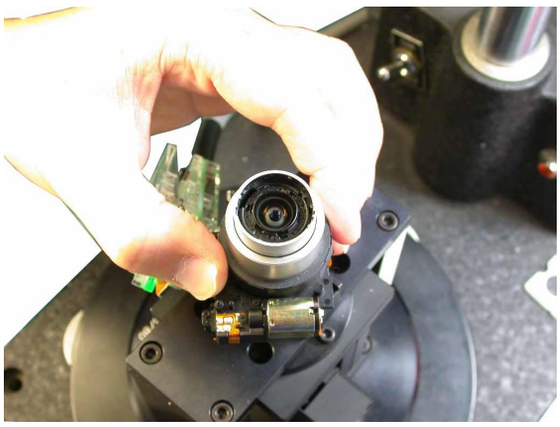
・As shown below, mount the lens-barrel unit on the Adjusting focus stand.



・After mounting the lens-barrel unit on the Adjusting focus stand, connect wires (J61202F) of the lens unit inspection tool.



・Hold the lens-barrel unit lightly with a hand, and run the program for inspecting the lens unit.



Note: If the lens-barrel unit is held too tightly, the FFD value cannot be measured correctly.

Note: Refer to supplied user manuals of the lens unit checking tool for how to run the program for inspecting the lens unit.

・ On the main menu of the lens unit checking program, click on "FFD Check" icon, and measure the FFD value according to instructions of the PC screen.

Note: At the position where the color of vertical lines shifts from blue to red, read the measurement value of the adjusting focus stand.

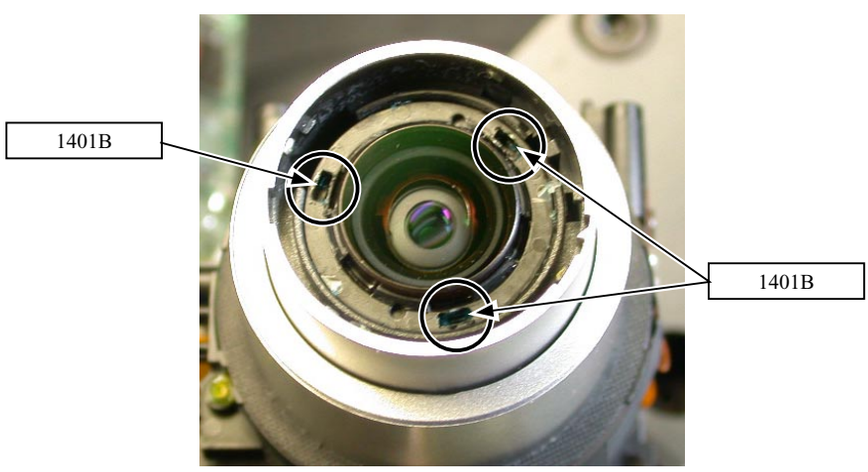
FFD adjustment

・ Make adjustment by turning the 1st lens group so that the FFD measured value may be within the standard as shown below.

Zoom position	FFD standard	Measured value in relation to reference value (-2.16mm)
Wide-side	± 0.05mm	-2.21 ～ -2.11
Tele-side	± 0.05mm	-2.21 ～ -2.11

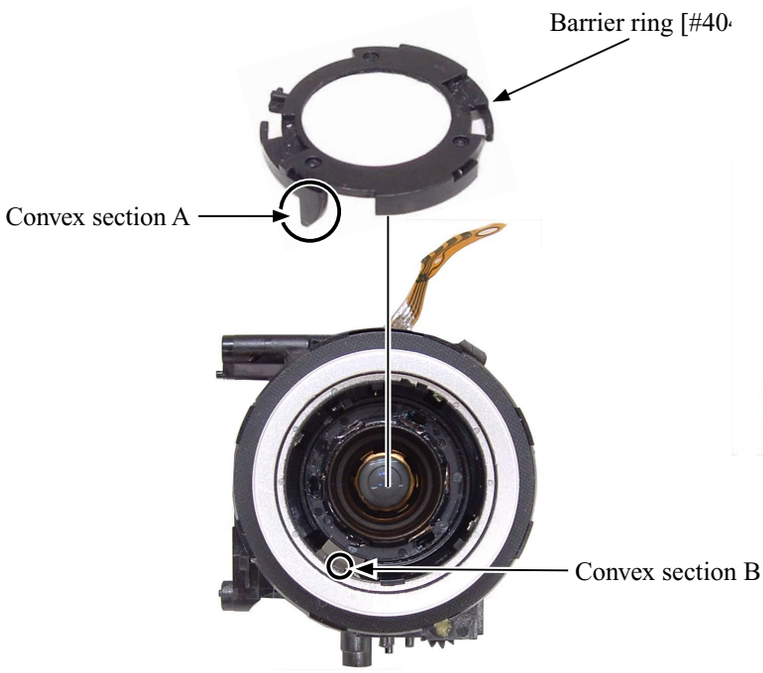
・ Make adjustment at the Tele-side.

・ After the adjustment is finished, apply the screw lock to the 1st lens group unit.

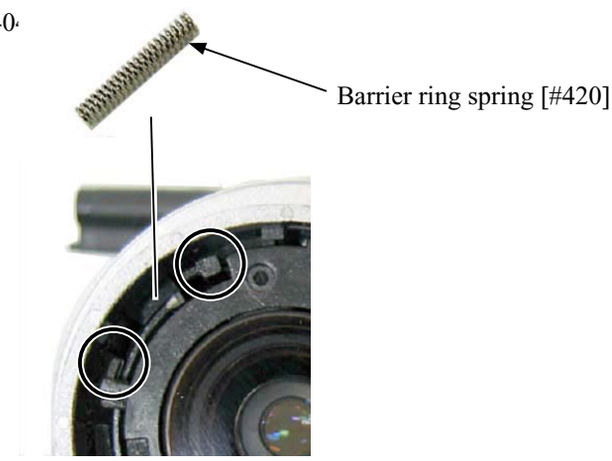


BARRIER UNIT

・Insert the convex section A on the barrier ring [#404] into the clockwise side of the convex section B in the lens barrel. Then, set the barrier ring [#404] and turn it counterclockwise.

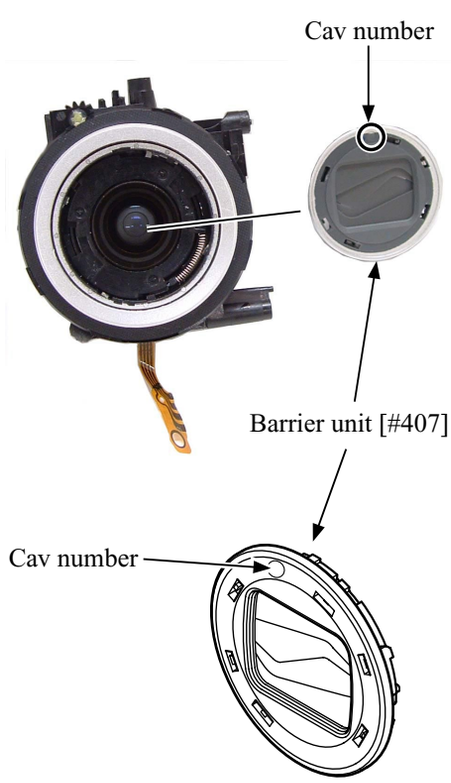


・Set the barrier ring spring [#420].

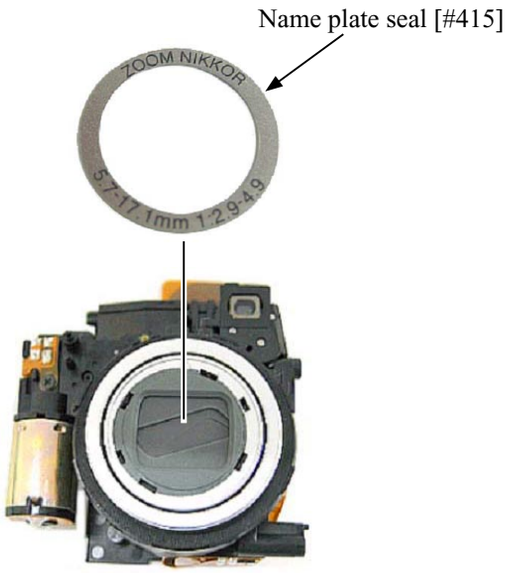


・Apply the adhesive (EC-1368) to 4 places on the back of the barrier unit [#407].

・Set the barrier unit [#407] with its cav number at the top side and turn it clockwise.



・Adhere the name plate seal [#415].



Operation inspection

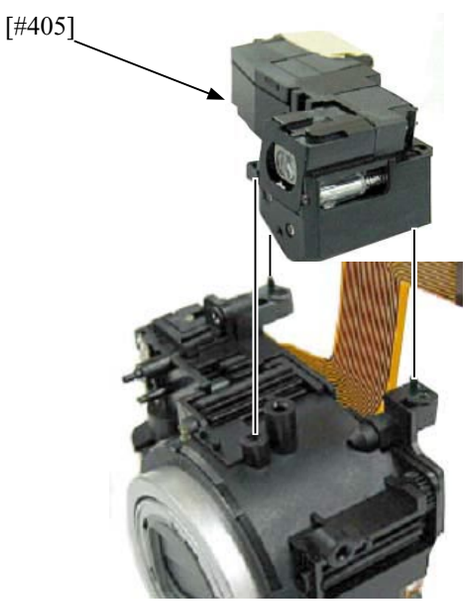
・It is possible to check the operation with the lens-barrel driving software at the service facilities equipped with the lens unit checking tool.

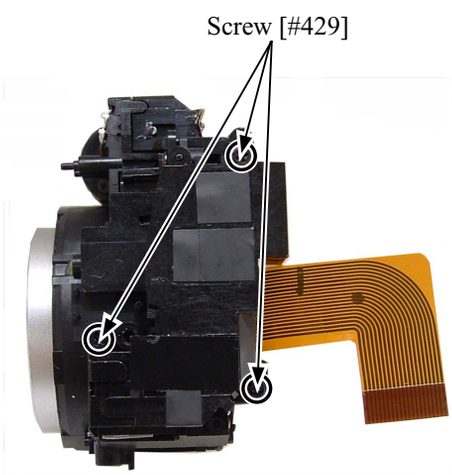
FINDER UNIT

・Set the finder unit [#405] at the W-end manually.

・Install the finder unit [#405].

・Tighten the three screws [#429].





Resolution inspection

When dissembling and repairing the lens-barrel, be sure to check the following after assembling it into the camera body.

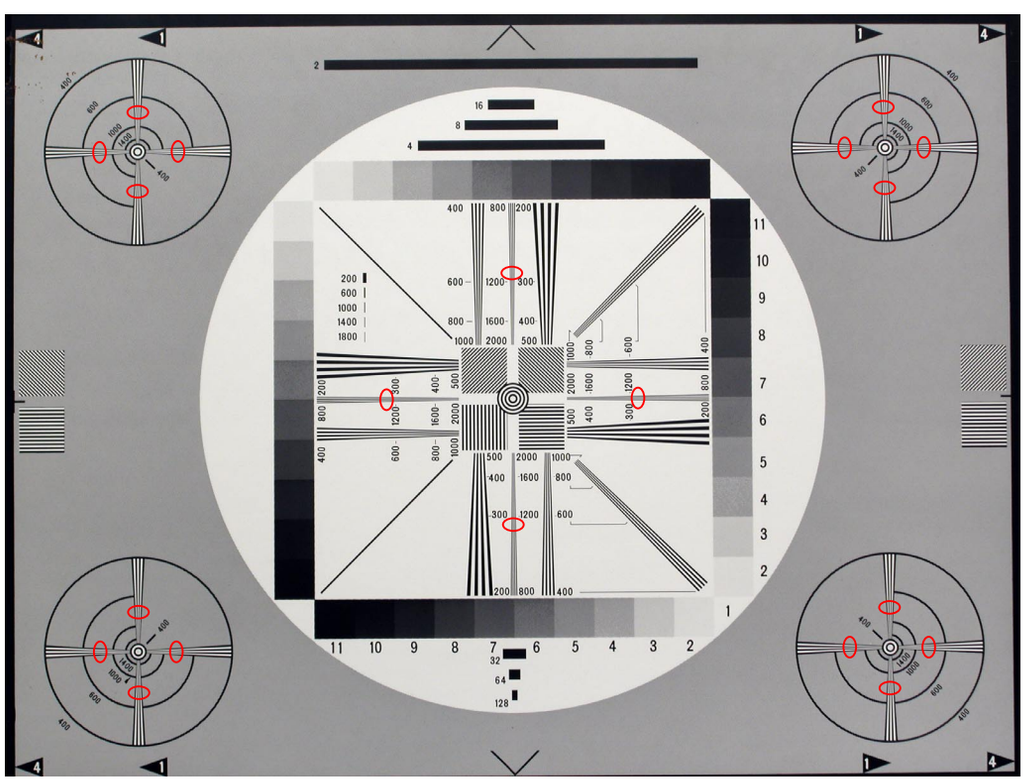
・Resolution inspection

By shooting the high-definition resolution chart (J63079), confirm that the number of TV lines is within the standard.

TV lines (standard): 1150 TV lines or more in the center; 750 TV lines or more at the periphery
(ref. The resolution is represented by “TV lines”, which are total number of black-and-white strips distinguishable on the TV screen.)

(a) To take pictures, set the camera as follows: Shooting-mode (AUTO), Image quality mode (High), Flash mode (Flash cancel)
(b) Check the zoom position at WIDE, MIDDLE and TELE.
The object distance: WIDE (approx. 0.53 m), MIDDLE (approx. 1.23 m), and TELE (approx.1.6 m).
Set the chart fully screened in the LCD of the camera and fix it on a tripod.
(c) Open the shot image by Photoshop, and confirm it by the magnified display, e.g. 100%, etc.
(d) Check if the resolution in the center and the 4 corners of the periphery is identifiable in black and white at the position circled in red as below.

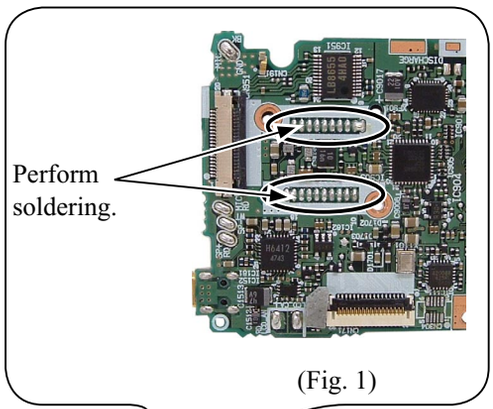
In case the resolution is defective, it is necessary to replace the lens-barrel group unit with the new one.



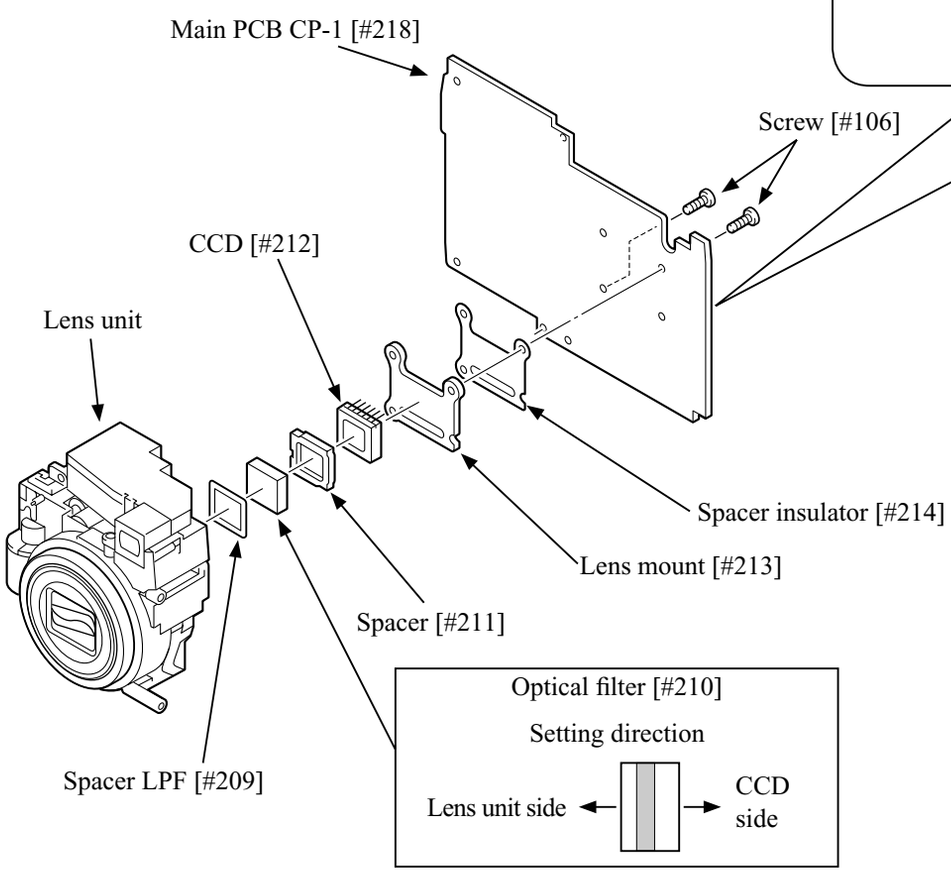
High-definition resolution chart (J63079)

LENS UNIT

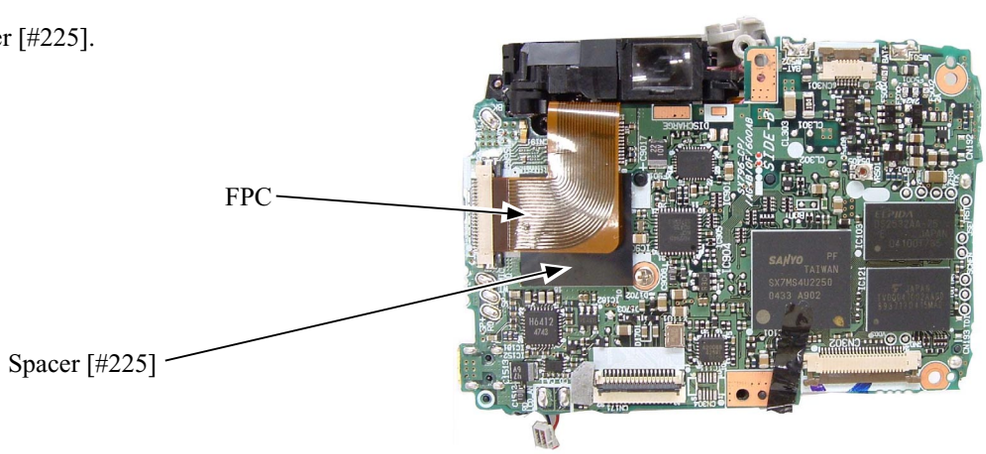
- Set the spacer LPF [#209] and the optical filter [#210] into the lens unit.
- As taking care about its direction, set the spacer [#211] into the lens unit.
- Set the spacer insulator [#214], the lens mount [#213] and the CCD [#212] and solder them to the main PCB CP-1 [#218]. (Fig. 1)
- Tighten the two screws [#106].



(Fig. 1)

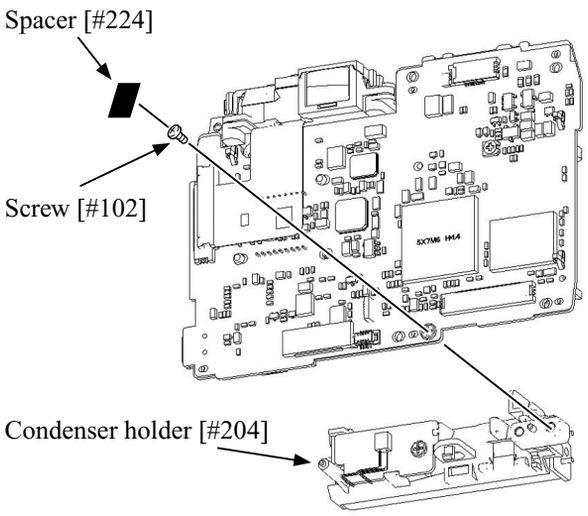


- Adhere the spacer [#225].
- Set the FPC.

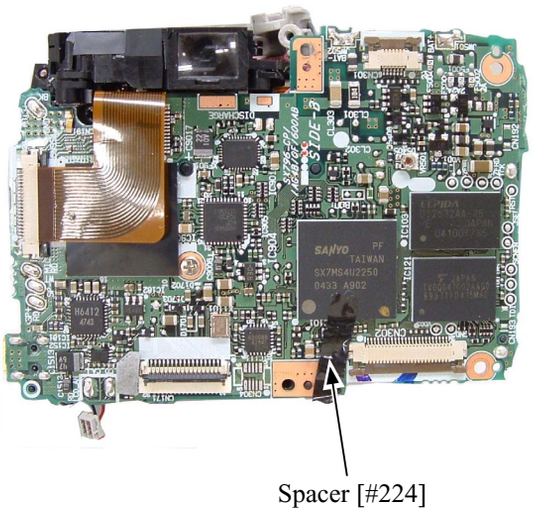


CONDENSER HOLDER

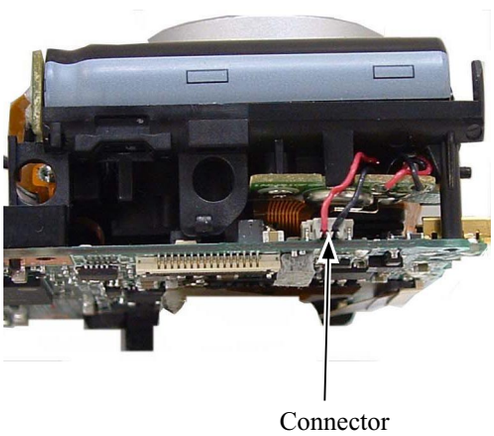
- Set the condenser holder [#204] and tighten the screw [#102].



- Adhere the spacer [#224].

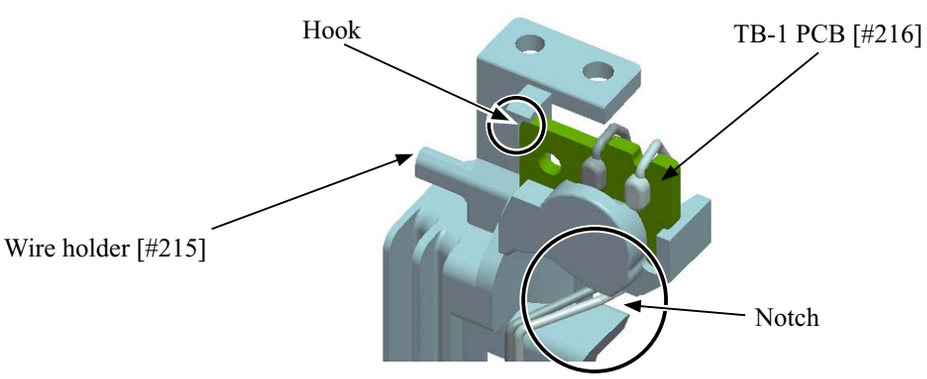


- Set the connector without crossing the cords above the connector and the PCB.



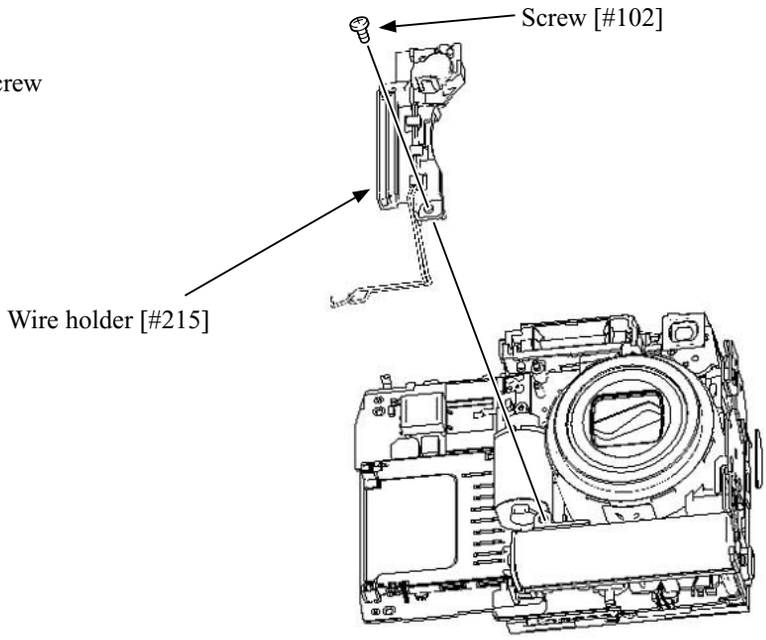
TB-1 PCB

- Set the TB-1 PCB [#216] onto the hook of the wire holder [#215].
- Pass the lead wire of the TB-1 PCB [#216] through the notch of the wire holder [#215].



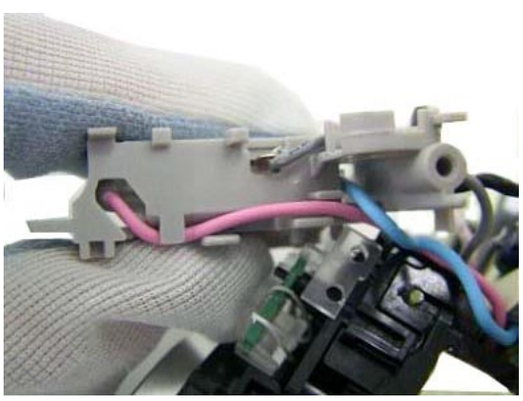
WIRE HOLDER

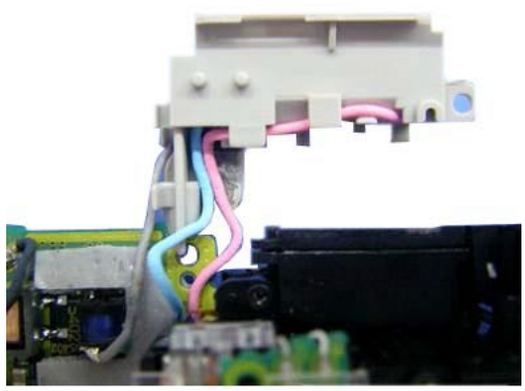
・Set the wire holder [#215] and tighten the screw [#102].



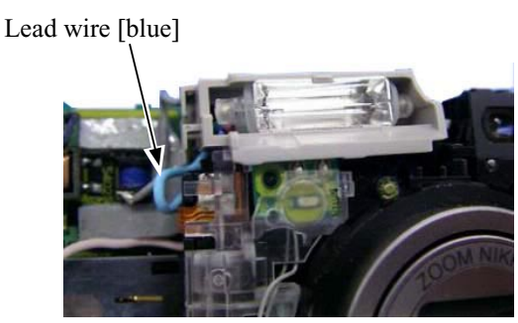
SB UNIT

・Arrange the lead wires [pink] and [blue] as shown below.

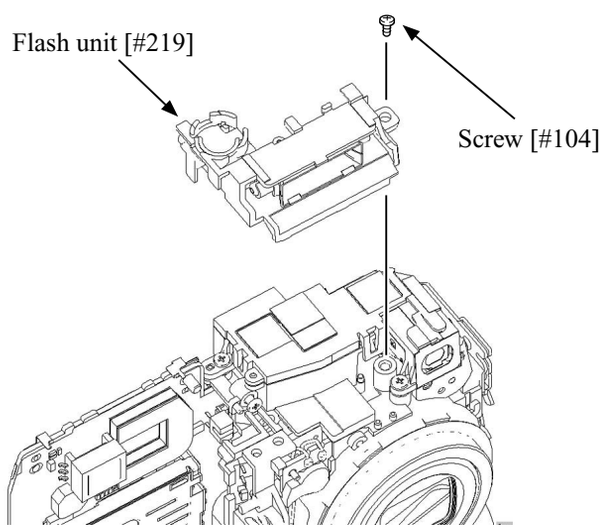




・As arranging the lead wire [blue] as shown below (Fig. 1), set the flash unit [#219] and tighten the screw [#104]. (Fig. 2)

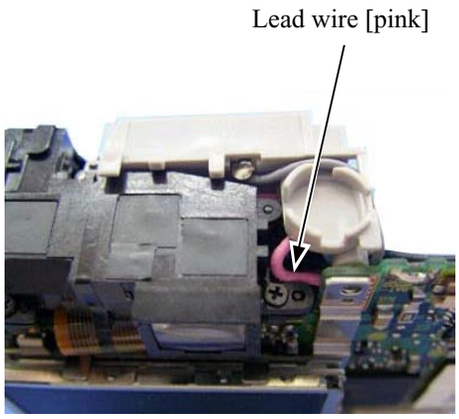


(Fig.1)

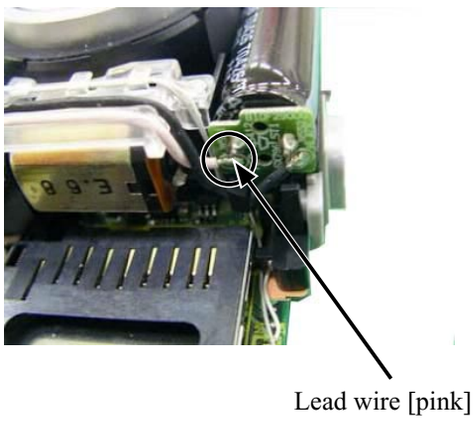


(Fig.2)

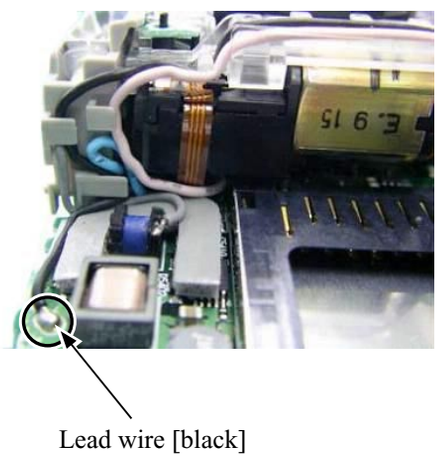
・Arrange the lead wire [pink] as shown below.



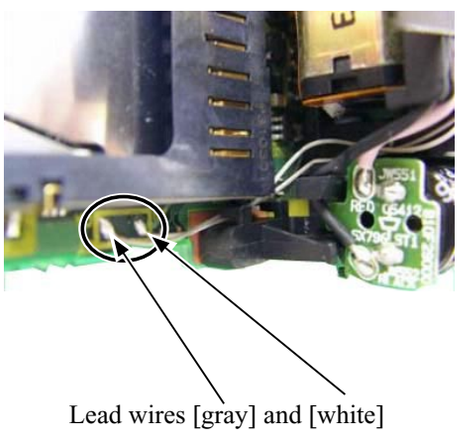
・Solder the lead wire [pink].



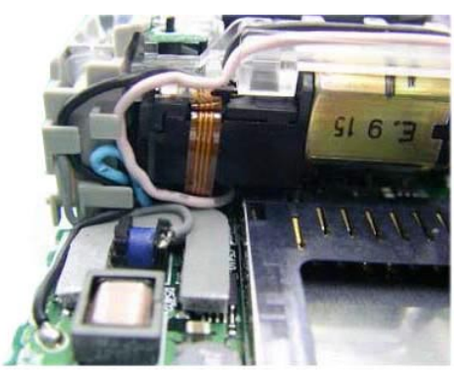
・Solder the lead wire [black].

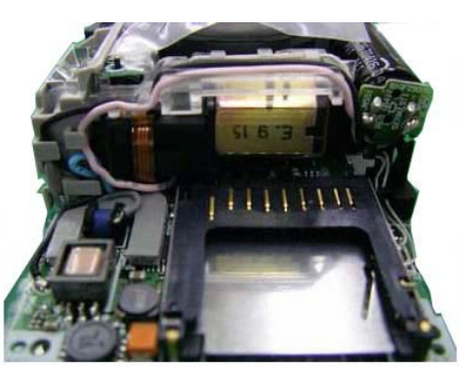


・Solder the lead wires [gray] and [white].

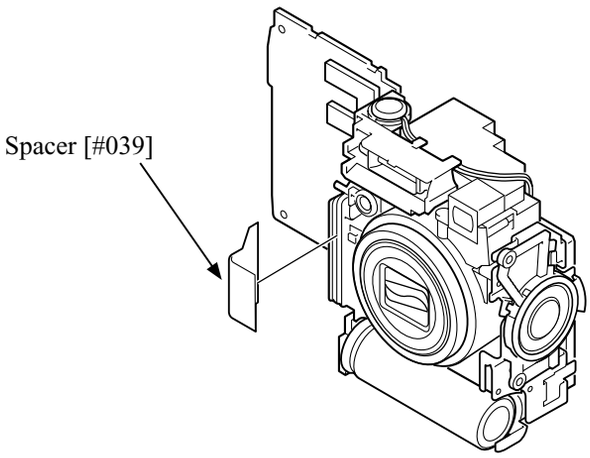


・Arrange the lead wires as shown below.



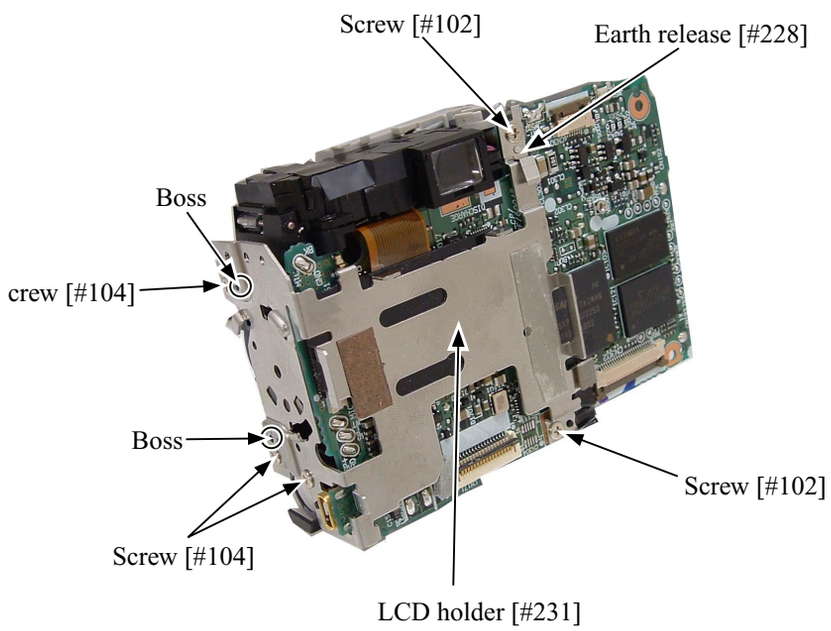


・Adhere the spacer [#039].



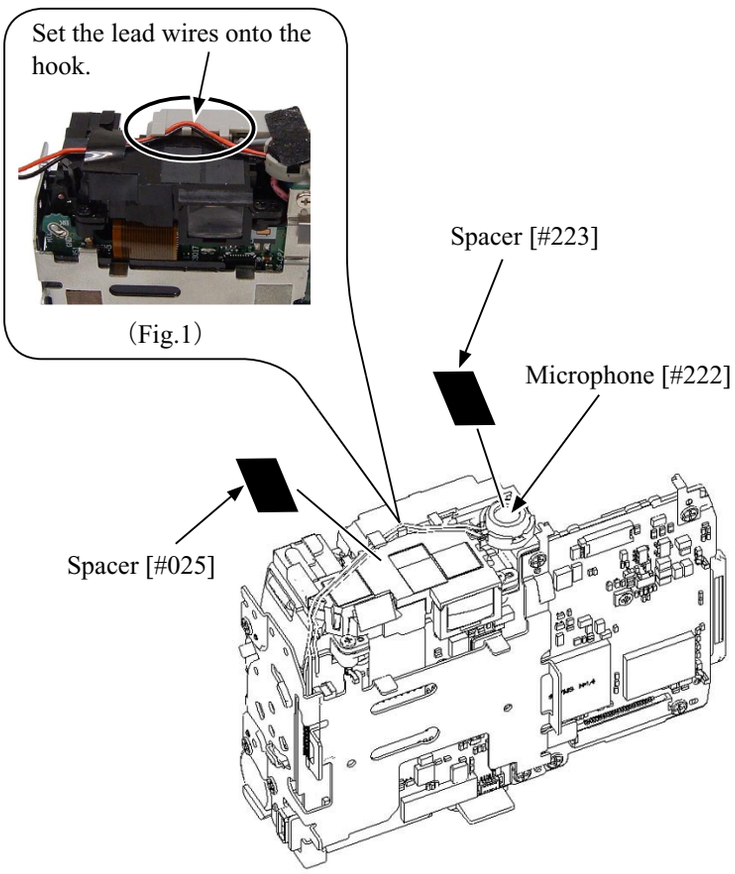
MONITOR HOLDER

・Fit the LCD holder [#231] to the bosses, set it and tighten the three screws [#104].
・Set the earth release [#228].
・Tighten the two screws [#102].

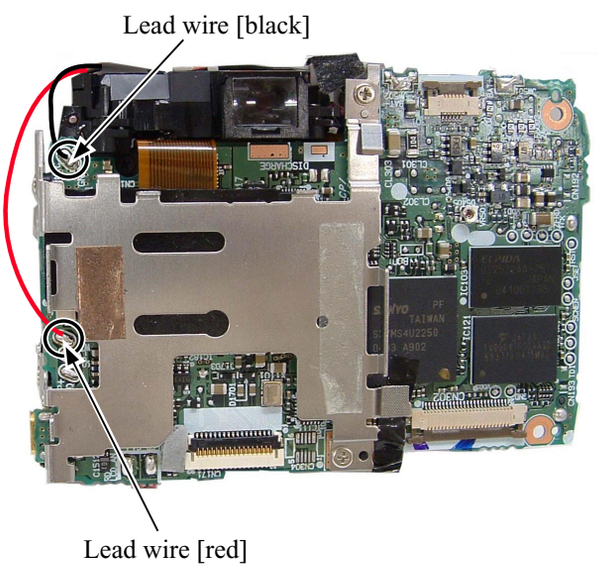


MICROPHONE

- Set the microphone [#222].
- Set the lead wires [black] and [red] onto the hook without crossing them. (Fig. 1)
- Set the spacer [#223].
- Set the spacer [#025].

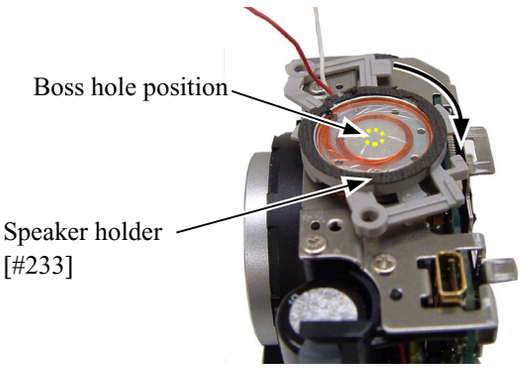


- Solder the lead wires [black] and [red].

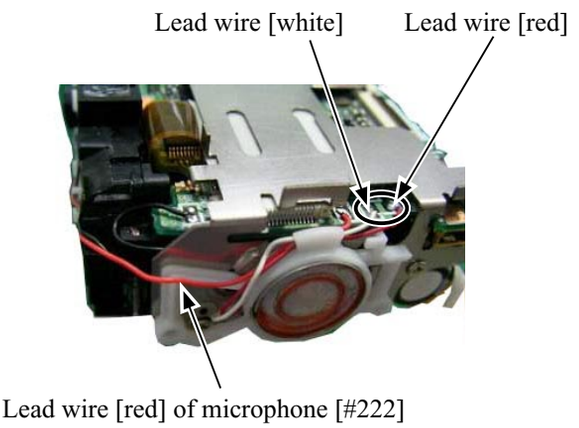


SPEAKER HOLDER

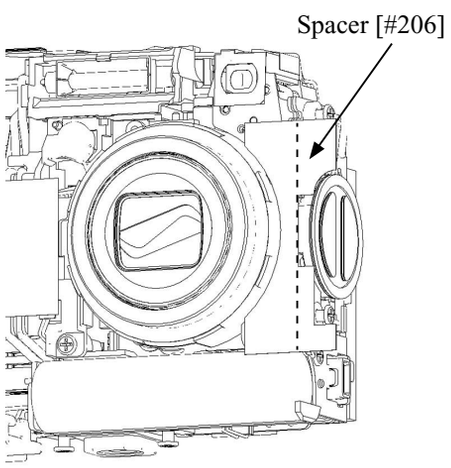
- Fit the center boss on the speaker holder [#233] into the boss hole on the LCD holder [#231]. Then, turn the speaker holder [#233] clockwise.



- Solder the lead wires [red] and [white].
- Arrange the lead wire [red] of the microphone [#222] and the lead wires [red] and [white] of the speaker as shown below.

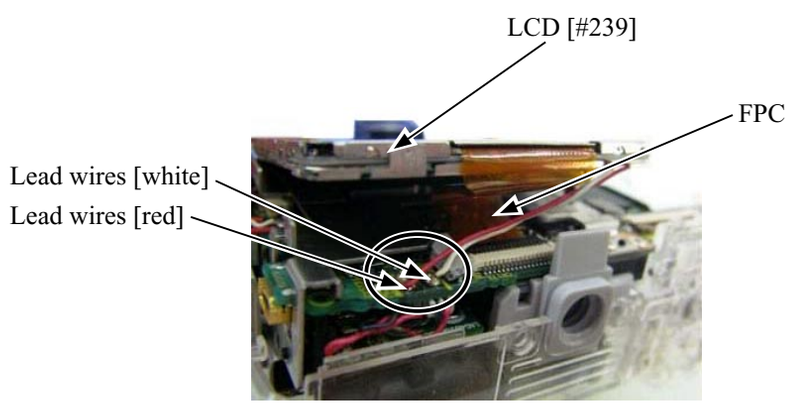


- Adhere the spacer [#206].



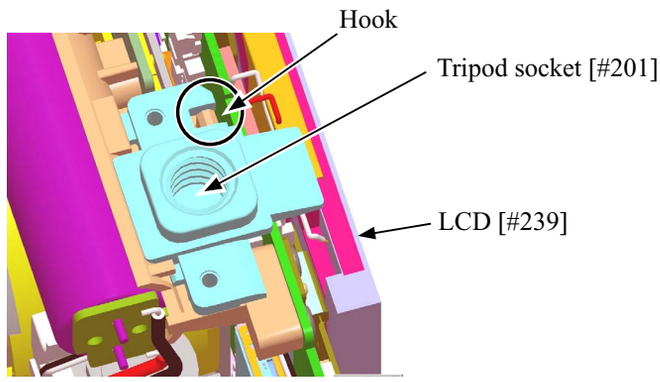
LCD

- Set the FPC.
- Solder the lead wires [red] and [white].
- Arrange the lead wires [red] and [white] as shown below. Fold the FPC and set the LCD [#239].



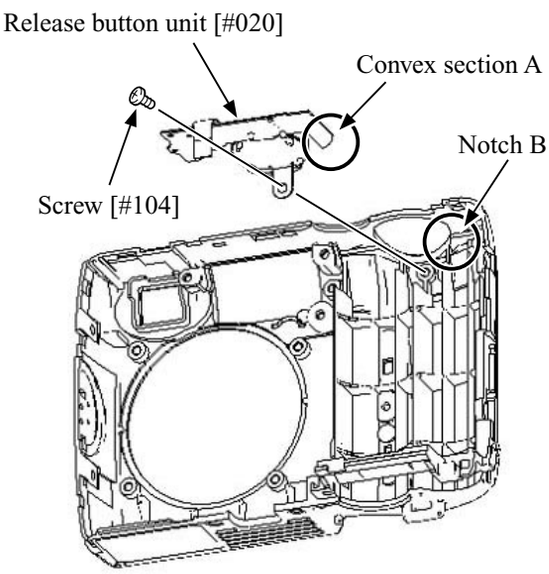
TRIPOD SOCKET

・Install the tripod socket [#201] by fitting onto the hook.

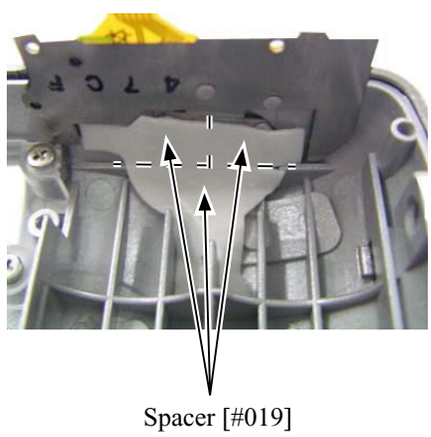


ASSEMBLY OF FRONT COVER

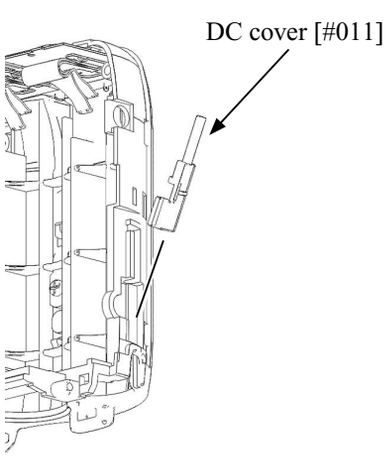
・Install the release button unit [#020] by inserting its convex section A into the notch B on the front cover [#013].
・Tighten the screw [#104].



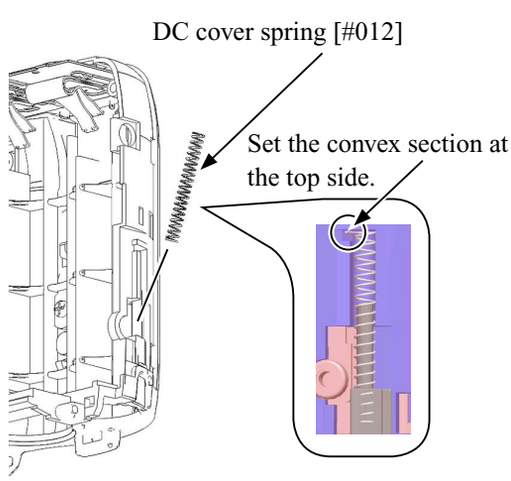
・Adhere the spacer [#019] of the release button unit as shown below.
※ The spacer [#019] is divided into three pieces from the dotted line in the figure.



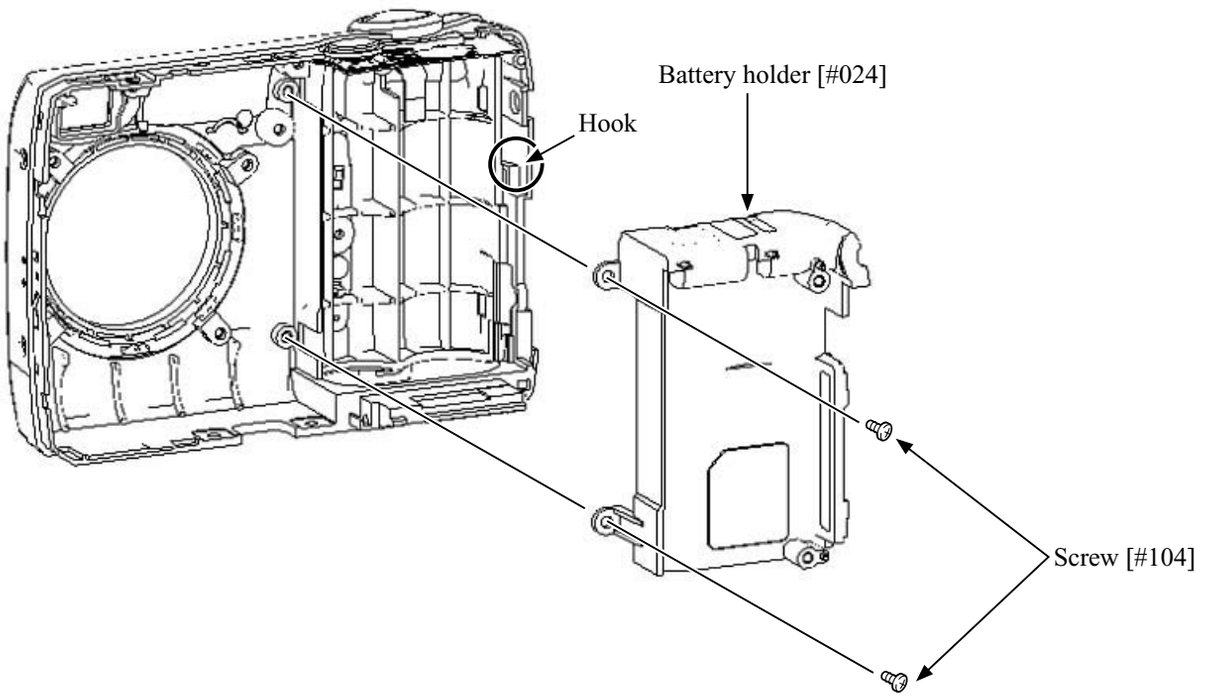
・Set the DC cover [#011].



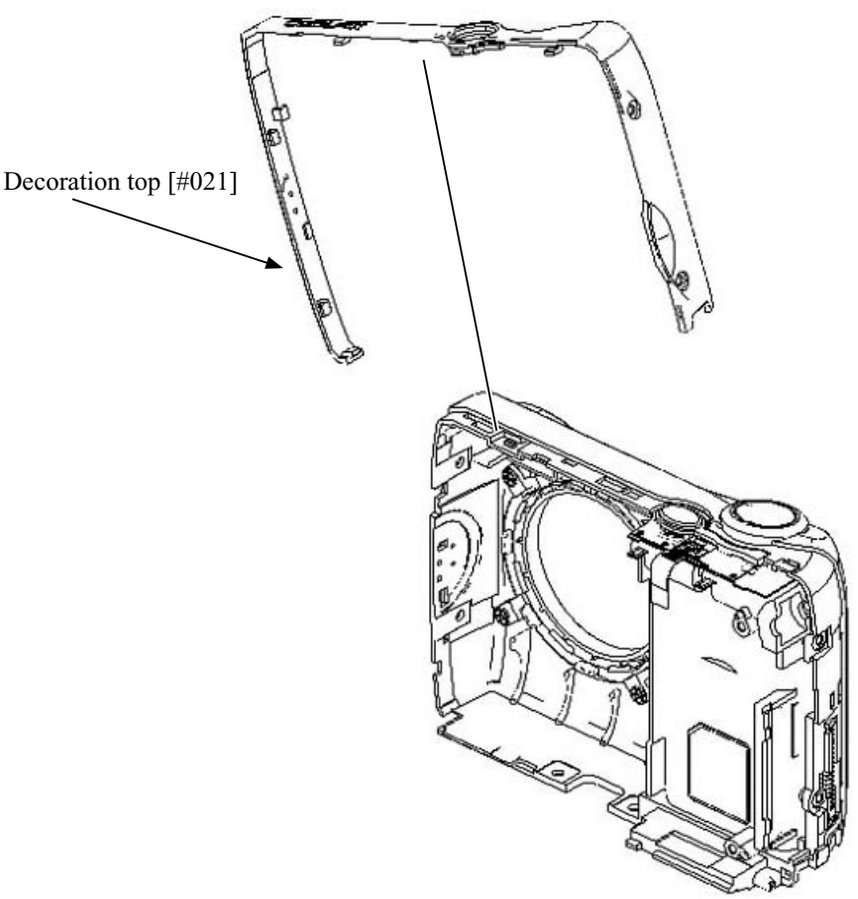
・Set the DC cover spring [#012].



・Set the battery holder [#024] by using the hook.
・Tighten the two screws [#104].

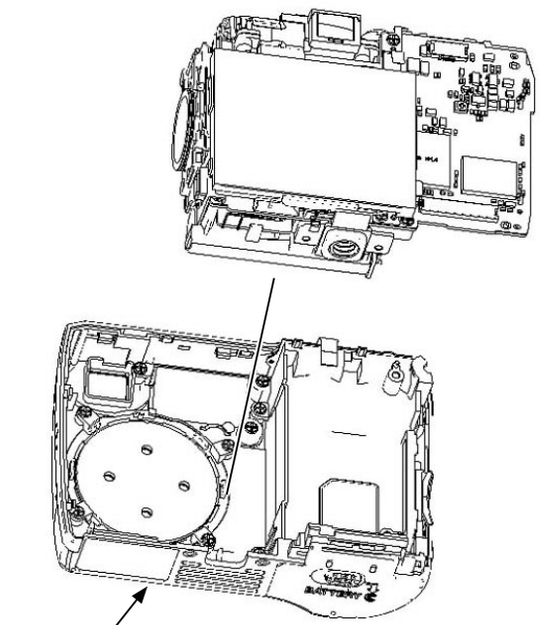


・Set the decoration top [#021].

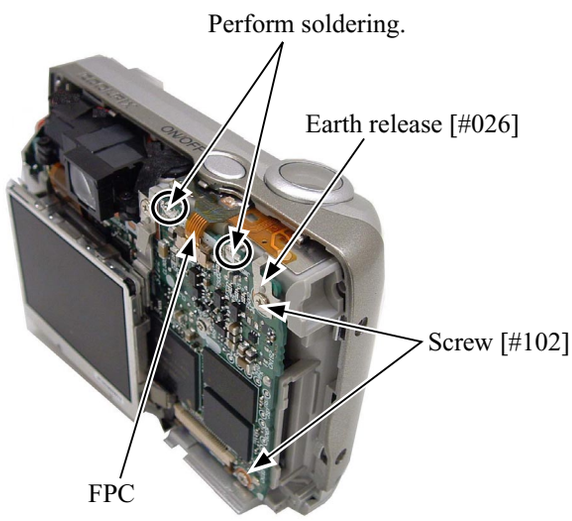


FRONT COVER

- Set the front cover [#013].

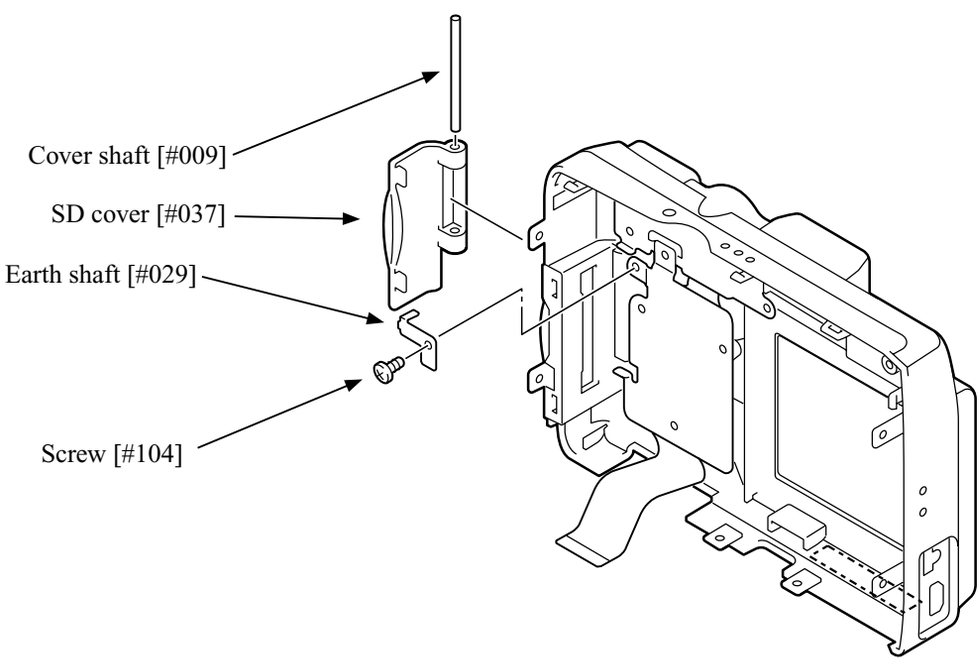


- Set the earth release [#026].
- Tighten the two screws [#102].
- Perform soldering.
- Set the FPC.



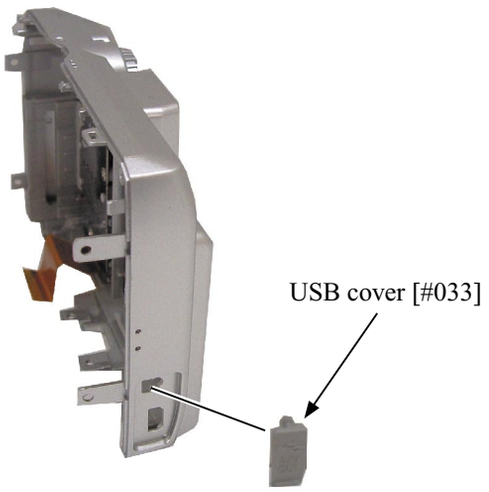
ASSEMBLY OF REAR COVER

- Set the SD cover [#037].
- Set the cover shaft [#009].
- Set the earth shaft [#029].
- Tighten the screw [#104].

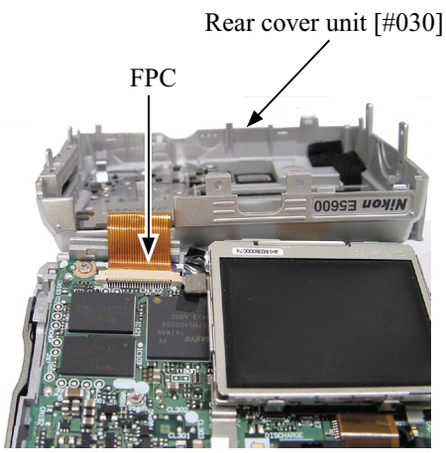


REAR COVER

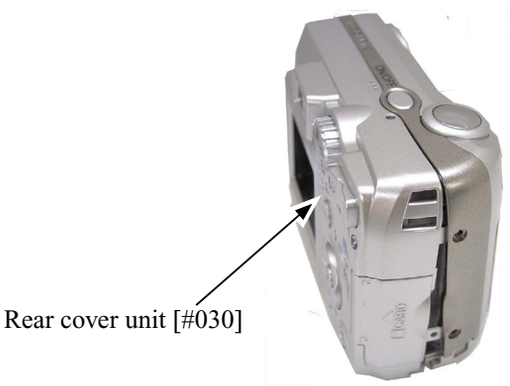
・Set the USB cover [#033].



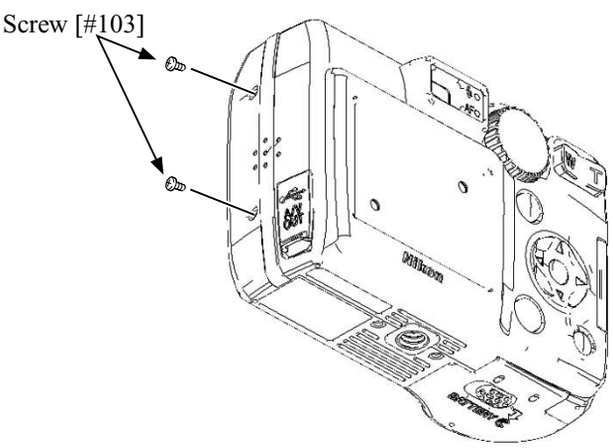
・Fold the FPC as shown below and set it.



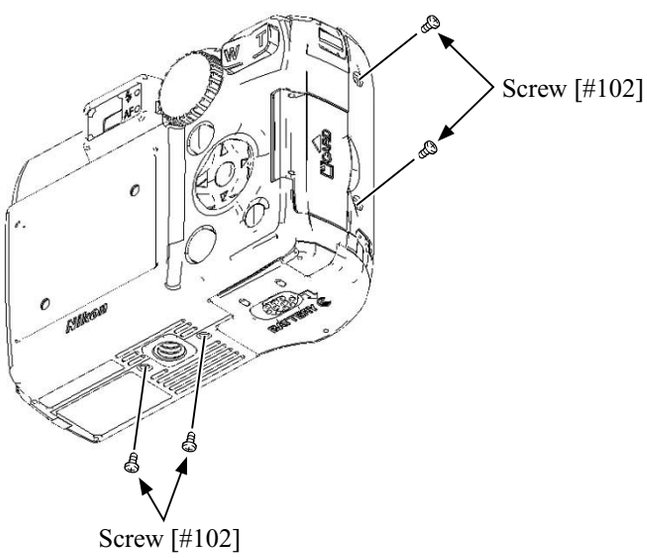
・Set the rear cover unit [#030].



・Tighten the two screws [#103].



・Tighten the four screws [#102].



ADJUSTMENT

1. Equipment

IBM compatible PC/AT • AC adapter EH-62B • USB cable (UC-E6)

2. Servicing tools

• Pattern box • Color meter • Luminance meter • Siemens star chart • Calibration software (J65071)

• Adjustment collimator (J63090) or Adjustment firmware

3. Adjustment items and order

Adjustment after replacing the CP-1 PCB of RP

1. Writing of the initial image data
2. Firmware up
3. Lens adjustment
4. AWB adjustment
5. CCD white dot defect compensation
6. CCD black dot/white dot defect adjustment
7. USB storage information registration

Note) If replacing the lens, CCD, optical filter, it is necessary to perform the above 3-7 adjustments again. 4-6 adjustments should be made in the above order.

4. Initial image data writing and Firmware upgrading

Write the data of initial images, and go on to upgrade the firmware.

Device

・ AC adapter (EH-62B)

・ Upgrading SD card X 1

[How to create an upgrading SD card]

1) Format SD card on PC.

2) Create a folder named "firmware" in the root directory of the SD card.

3) Copy "firmware.bin" into the created folder.

4) Copy "nanddat.bin" into the root directory of the same SD card.

Note) When only firmware upgrading is performed without replacing CP-1 PCB, copying "nanddat.bin" into the SD card is NOT necessary.

Procedure

・ Turn the camera OFF and connect the AC adapter.

・ Insert the upgrading SD card into camera.

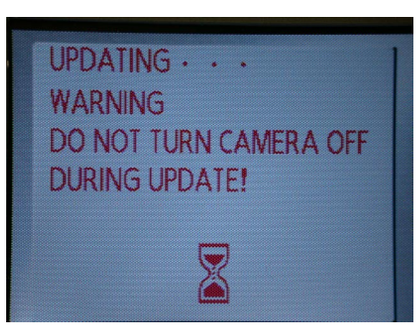
・ Set the mode dial to "SETUP" and turn power ON.

・ Highlight and select "Firmware version" to display the menu for data-writing of initial images. (Fig.1)

(Fig.1)

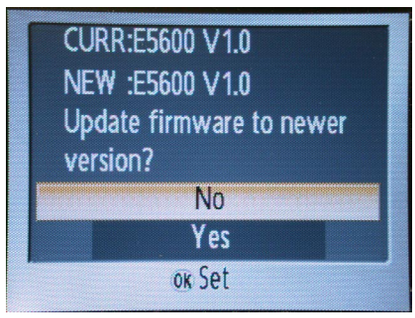
・ Select "Yes", and press the decision button to carry out data-writing of initial images. (Fig.2)

Note: Do NOT turn power OFF during upgrading.



(Fig.2)

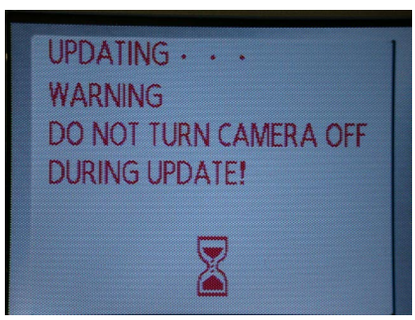
・When the data writing is completed, the menu for upgrading will be displayed. (Fig.3)



(Fig.3)

・Select "Yes", and press the decision button to carry out upgrading. (Fig.4)

Note: Do NOT turn power OFF during upgrading.

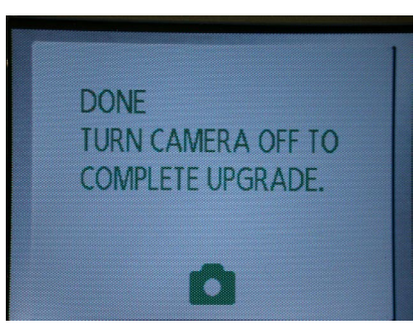


(Fig.4)

・When the screen indicates the completion of upgrading, turn power OFF and remove the SD card. (Fig.5)

・Turn power ON, and check the version by "Firmware version" on the menu.

・Turn power OFF to end.



(Fig.5)

5. Setup

1) System requirements

- Windows® 98 or Me, 2000, XP
- IBM-compatible PC/AT with Pentium or higher processor
- CD-ROM drive
- 3.5-inch 2HD diskette drive
- USB port
- 40 MB or more RAM
- Hard disk drive with 15 MB or more memory space
- VGA or SVGA monitor with 256 or more color display

2) Installing calibration software

- Insert the calibration software installation diskette into the diskette drive.
- Open Explorer.
- Copy "DscCalDi.exe, Camapi32.dll" folder of the floppy disk drive in any folder on the hard disk.

6. Installing USB driver

If the USB driver is necessary, install Nikon View via CD-ROM packed with the camera.

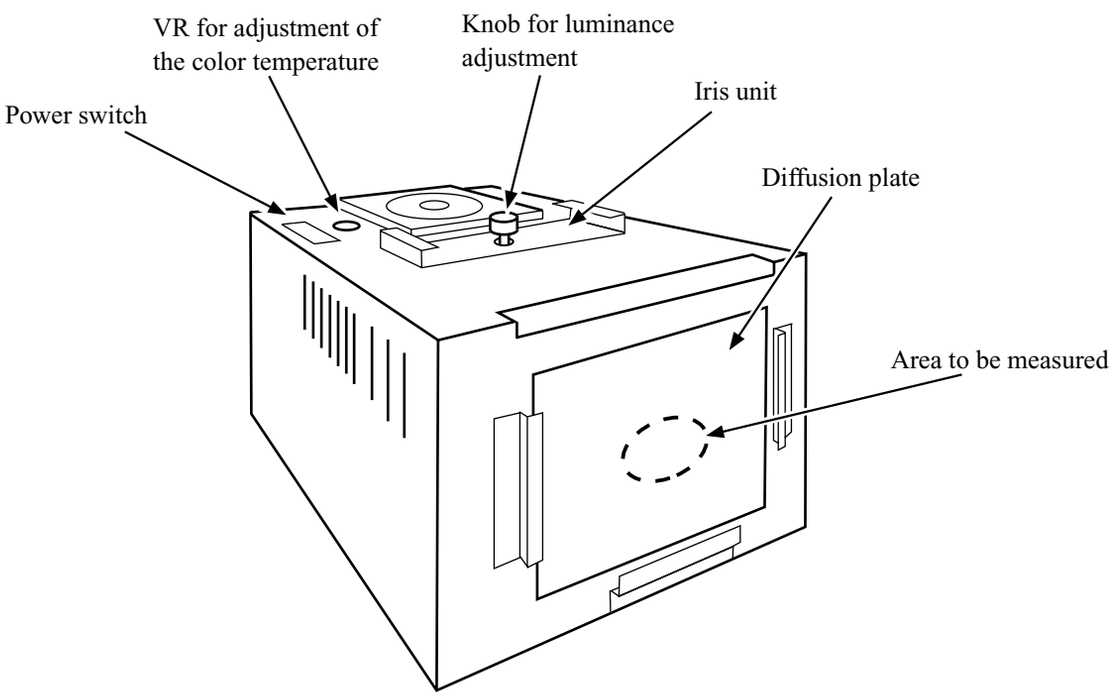
7. Pattern box

Before using the pattern box, turn its power on to carry out "Aging" approx. 30 minutes: the color temperature should be 3100 ± 20K by the adjustment with the color meter, and the luminance should be 900 ± 20cd/m^2 by the adjustment with the luminance meter. When using the pattern box and for a while after its power turns off, the lamp and its surroundings are subject to high temperatures, so care should be taken when handling.

• Procedure for correcting Pattern Box

Note: Be sure to perform the aging correction.

1) Measure the measuring point (center of diffusion plate) with the Color Meter (J63081).
2) Adjust the pattern box so that the color temperature should be 3100 ± 20K by using "VR for adjustment of the color temperature".
3) Measure the center of the diffusion plate with the Luminance Meter BM-3000 (J63068).
4) Adjust the pattern box so that the luminance should be 900 ± 20cd/m^{2}by using "Knob for luminance adjustment".
5) Repeat from 1) to 4) So that the color temperature should be 3100 ± 20k and luminance should be 900 ± 20cd/m^2



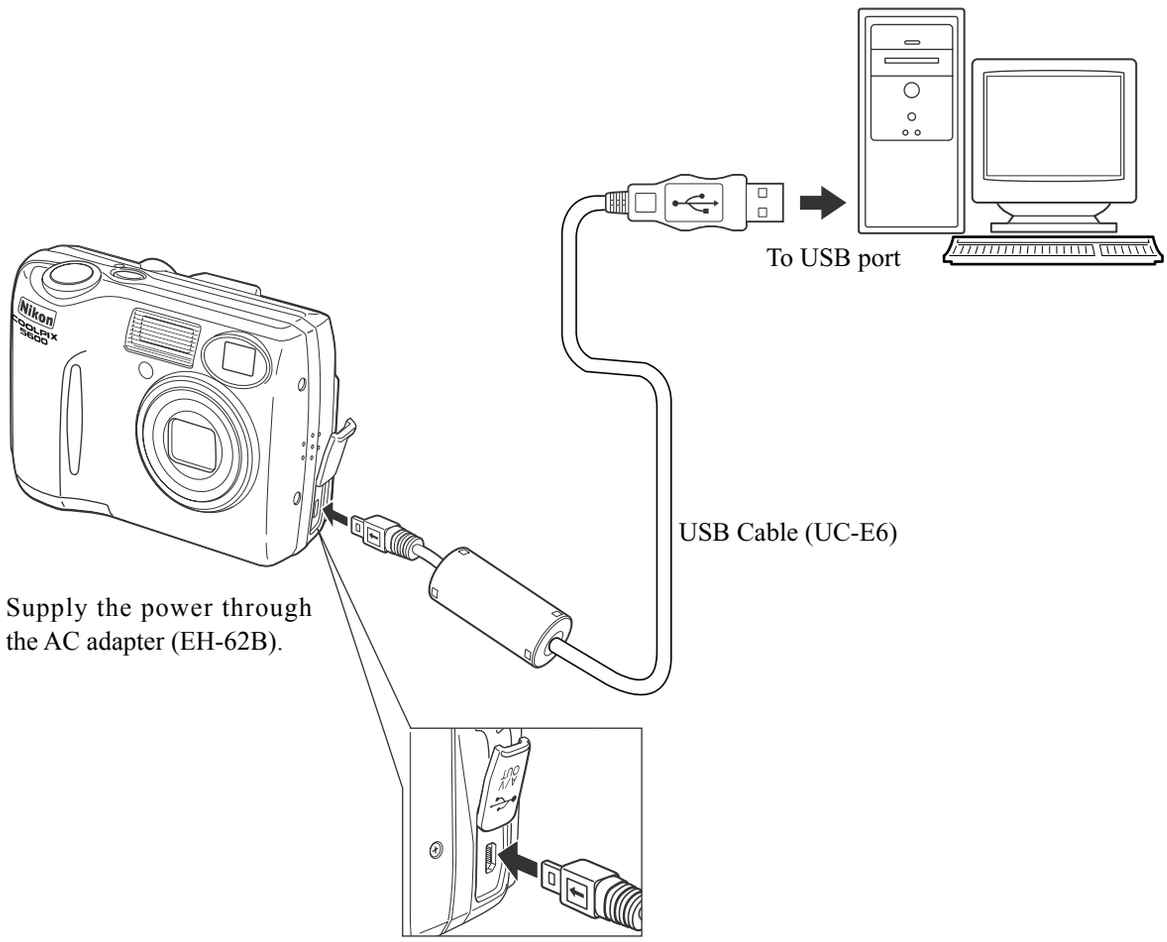
8. Adjustments required when parts are replaced

	Lens Adj.	AWB	CCD Defects	USB	Firmware up	Initial image data
Lens Unit	○	○	○	×	×	×
Optical filter	○	○	○	×	×	×
CCD	○	○	○	×	×	×
CP-1	○	○	○	○	○	○

○ Adjustment is necessary. × Adjustment is not necessary.

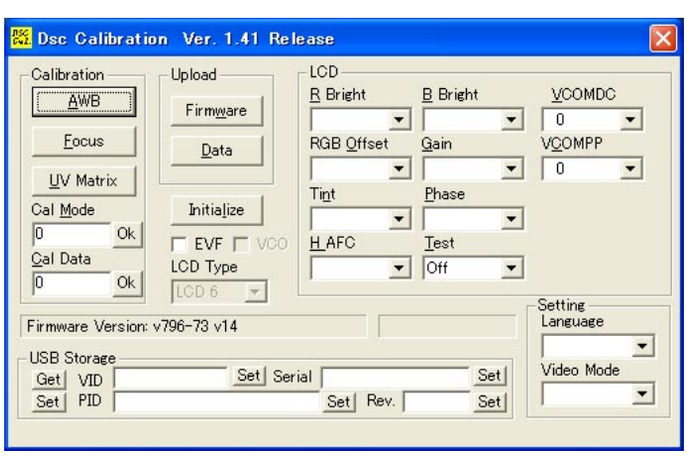
9. Connecting the camera to the computer

1) Insert the camera connector of USB cable in the notch of the camera's USB port.
2) Connect the cable to the USB port on PC.



10. Calibration software

- Turn on the power switch of the camera.
- When the calibration software starts, the following is displayed on the PC monitor.



11. Lens adjustment

※ For the lens adjustment, choose either the infinity adjustment with the collimator or the 1.5-m adjustment with the adjustment firmware. (However, in case of 1.5-m adjustment, the focus may not be sharp at infinity.)

11-1. Infinity adjustment

[Preparations]

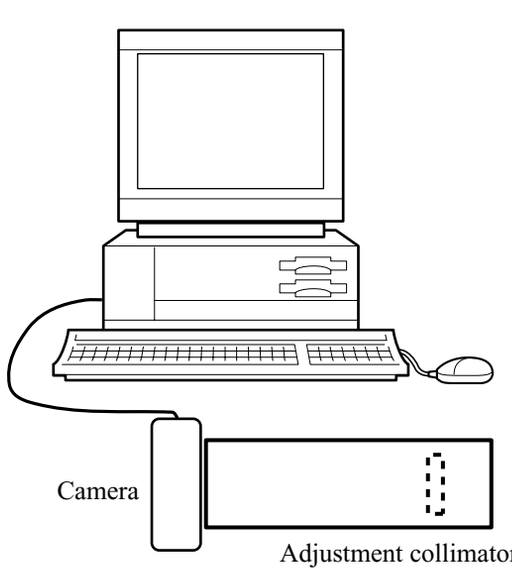
- Turn the power switch of the adjustment collimator (C-DSC) J63090 to on.
- Turn the power switch of the camera to on.
- Siemens star chart
- POWER switch of camera: ON

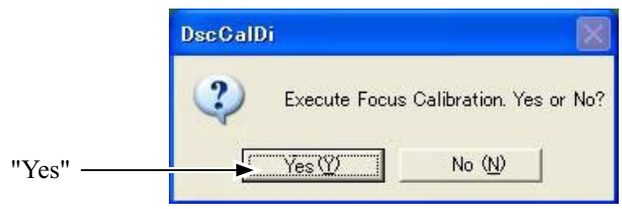
[Conditions]

- Set the adjustment collimator and the camera (front surface of lens) at the nearest distance between them.

[How to]

- Double-click on "DscCa1Di.exe".
- Set the siemens star chart so that it comes center of the screen by checking through the viewfinder.
- Click "Focus", then "Yes".
- Lens adjustment value will appear on the screen.
  Judgment standard: xd0 = 0 ± 55 , xd7 = 0 ± 55 , xd13 = 0 ± 55, xd19 = 0 ± 55
- Click "OK".





Result of adjustment

11-2. 1.5-m Adjustment

※ Before performing the 1.5-m adjustment in this machine, write the adjustment firmware on the camera. After adjustment, be sure to write the product firmware.

Procedure for setting Adjustment firmware

1) Save the adjustment firmware and the product firmware in any folder.
2) Start up "DscCa1Di.exe" and click on "Firmware" button on the main menu to write the adjustment firmware.
   (If the camera is activated after completing writing the adjustment firmware, "SERVICE" is indicated in red letters on LCD panel.)
3) Follow the instructions of the below [How-to].
4) Start "DscCaDi140" and click "Firmware" on the main menu to write the product firmware.

[Preparations]

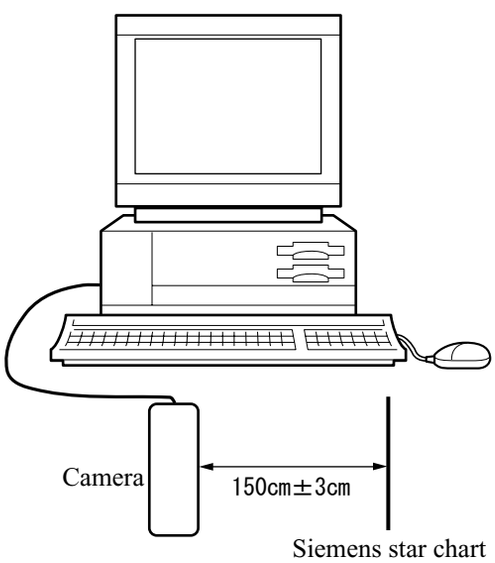
- Set the Siemens star chart.
- Turn the power switch of the camera to on.

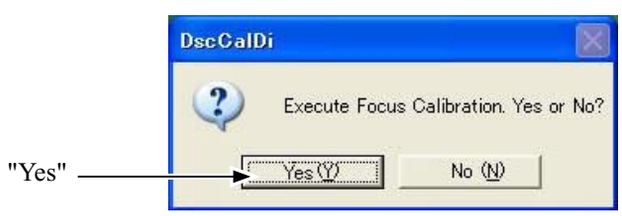
[Conditions]

- The siemens star chart should be A3-size or larger (Copy and enlarge A4-size siemens chart included in the service manual for the usage.)
- Illumination over the object should be 400 lux ± 10%
- Set the siemens star chart and the camera (front surface of lens) at 150 cm ± 3 cm distance between them.

[How-to]

- Double click on "DscCa1Di.exe".
- Set the siemens star chart so that it comes center of the screen by checking through the viewfinder.
- Click "Focus" then "Yes".
- Lens adjustment values will appear on the screen.
  Judgment standard: xd0=0 ± 55, xd7 = 0 ± 55, xd13= 0 ± 55 xd19 = 0 ± 55
- Click "OK".





Result of adjustment

12. AWB adjustment

[Preparations]

- Pattern Box(Color temperature: 3100 ± 20K, Luminance: 900 ± 20cd/m²)

[Conditions]

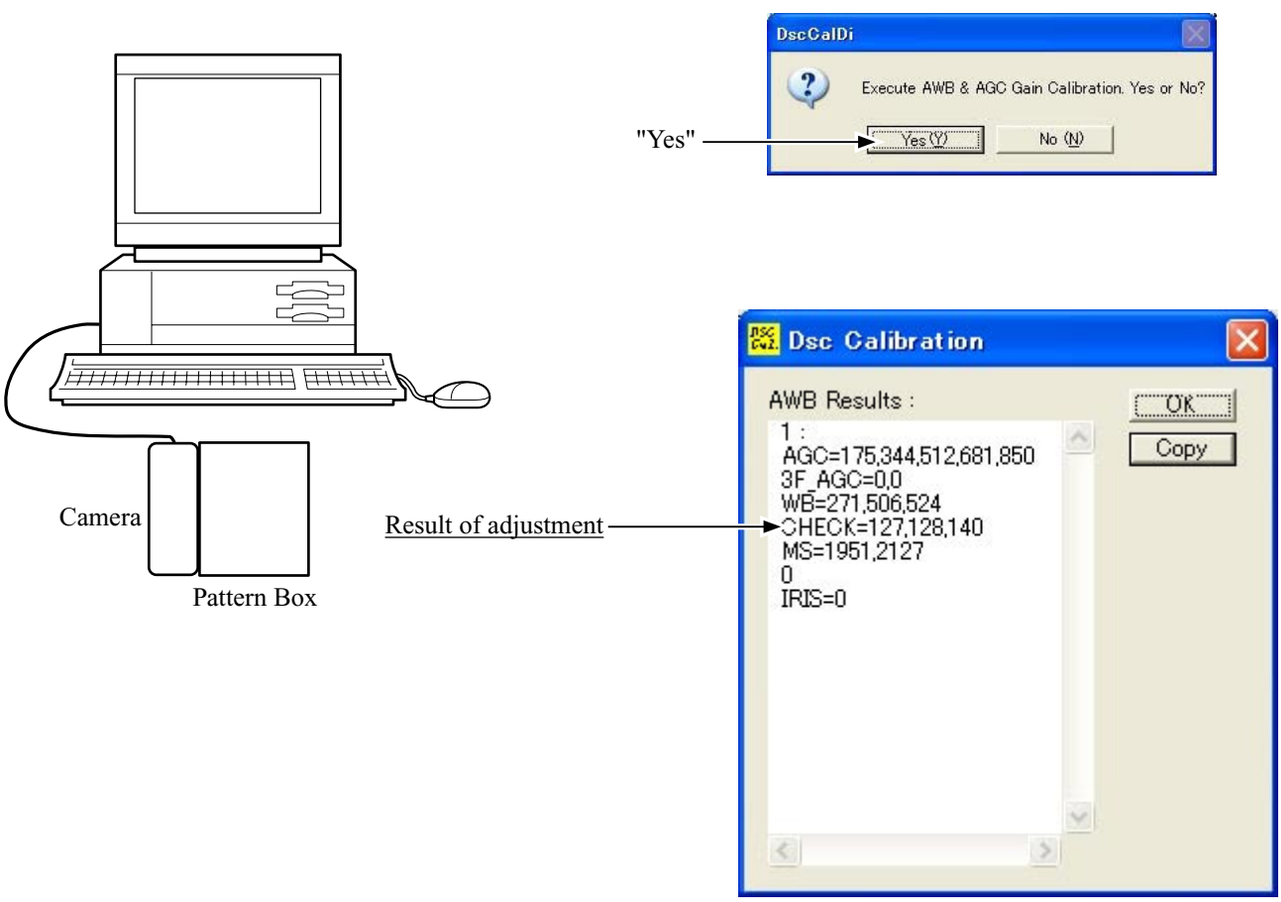
- Set the pattern box and camera (lens front) at "0cm" distance between them.

Note) Do not allow outside light to enter in.

[How to]

- Double-click on "DscCa1Di.exe".
- Click "AWB", then "Yes".
- AWB adjustment values will appear on the screen.

  Judgment standard: CHECK=128 ± 1, 128 ± 1, 130 ± 40
- Click "OK".



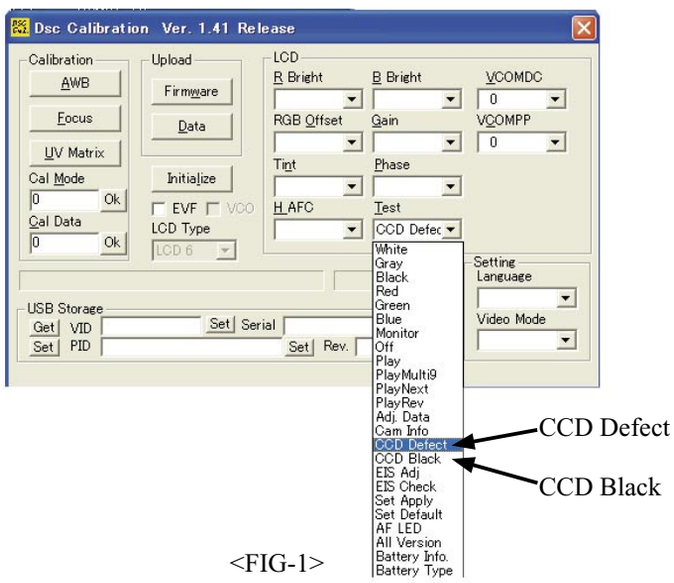
13. CCD white dot defect compensation

[Conditions]

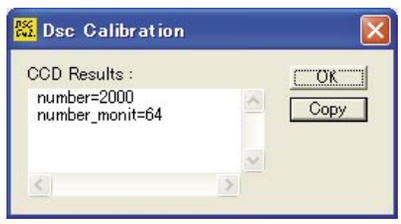
- With the lens shutter being closed, read the defect of CCD pixels. Then, make the correction data and rewrite the data by the following procedure.
  Correct the upper level of defective 2000 pixels from the brightest number of CCD pixels..

[How to]

- Double-click on "DscCa1Di.exe".
- Select "CCD Defect" from Test menu of Calibration Software and click the "OK". Refer to FIG-1.
- After adjustment, the adjustment value will appear on the screen. Refer to FIG-2.



<FIG-1>



<FIG-2>

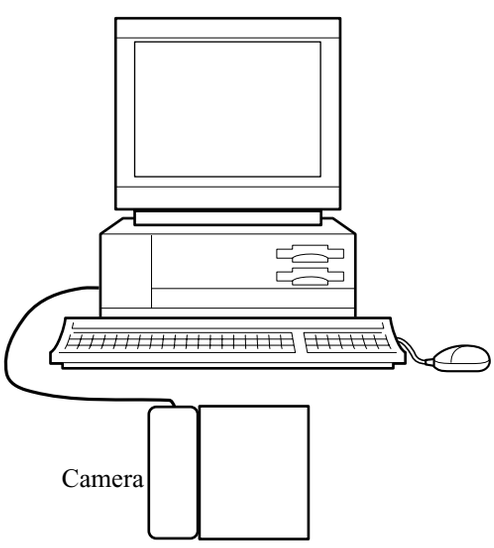
14. CCD black dot/white dot defect adjustment

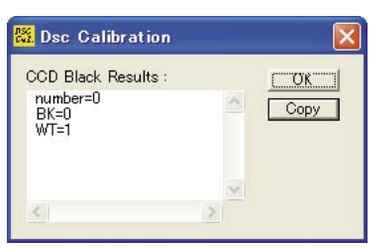
[Conditions]

- Fix the camera so that only the white part of the pattern box should be displayed on the screen.
  (Do not allow outside light to enter in as much as possible.)
- With the lens shutter being opend, read the defect (black dots) of CCD pixels. Then, make the correction data and rewrite the data by the following procedure.
  Correct the upper level of defective 256 pixels (black dots in bright place) of CCD pixels.

[How to]

- Double-click on "DscCa1Di.exe".
- Select "CCD Black" from Test menu of Calibration Software and click "OK". Refer to FIG-1.
- After adjustment, the adjustment value will appear on the screen. Refer to FIG-3.





(FIG-3)

15. USB storage information registration

USB storage data is important when the camera is connected to a computer via a USB connection.

If there are any errors in the USB storage data, or if it has not been saved, the USB specifications will not be satisfied, so always check and save the USB storage data.

[How to]

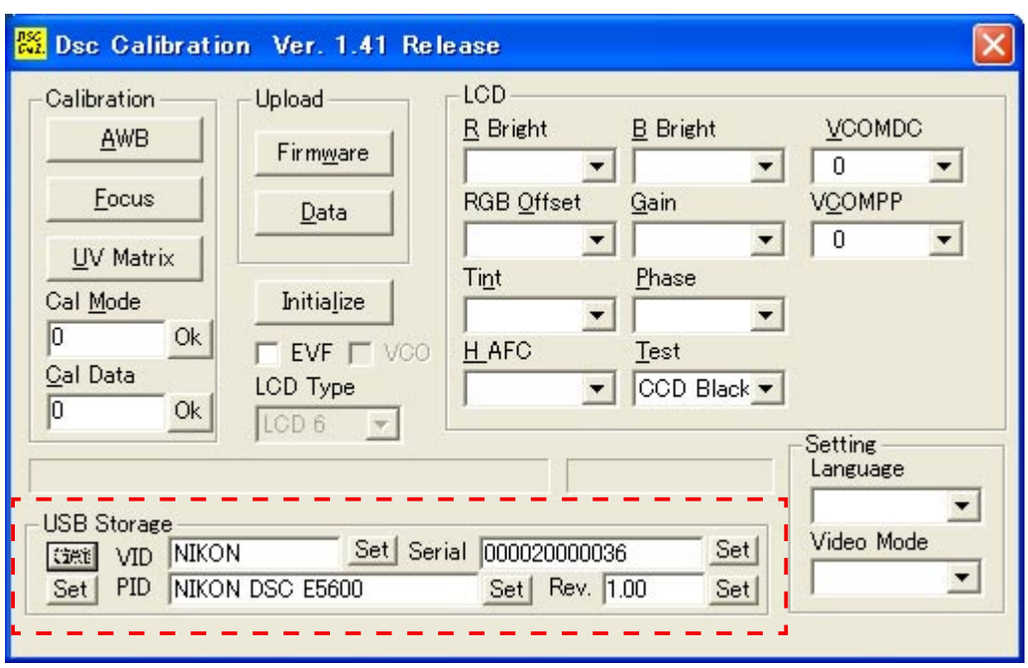
- Connect the camera to a computer.
- Double-click on the "DscCa1Di.exe".
- Click on the "Get" button in the USB storage window and check the USB storage data.

  VID: NIKON

  PID: NIKON DSC E5600

  Serial:

  Rev. : 1.00
- Check the “Serial” in the above USB storage data. If the displayed value is different from the serial number printed on the base of the camera, enter the number on the base of the camera, and click the "Set" button.
- Check VID and Rev. entries in the USB storage data. If any of them are different from the values in 3. above, enter the details of 3. and click the "Set" button.



1. OUTLINE OF CIRCUIT DESCRIPTION

1-1. CP1 CIRCUIT DESCRIPTION

1. IC Configuration

IC903 (MN39620PJJ)	CCD imager
IC901 (AN20101A)	V driver
IC905 (AD9948KCPZ)	CDS, AGC, A/D converter, H driver

2. IC903 (CCD)

[Structure]

Interline type CCD image sensor

Optical size	1/2.5 type format
Effective pixels	2620 (H) X 1984 (V)
Pixels in total	2690 (H) X 1994 (V)
Optical black	
Horizontal (H) direction:	Front 12 pixels, Rear 58 pixels
Vertical (V) direction:	Front 8 pixels, Rear 2 pixels
Dummy bit number	Horizontal : 28 Vertical :1

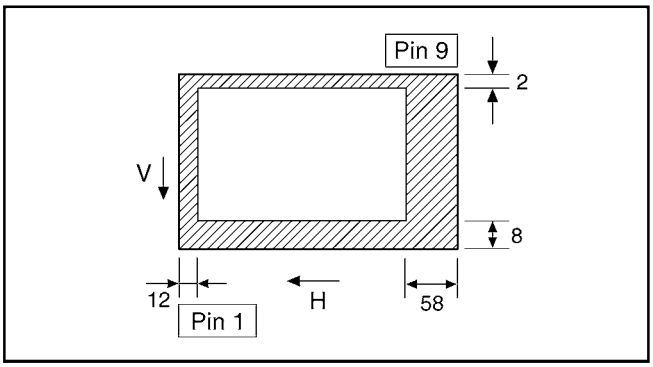


Fig. 1-1.Optical Black Location (Top View)

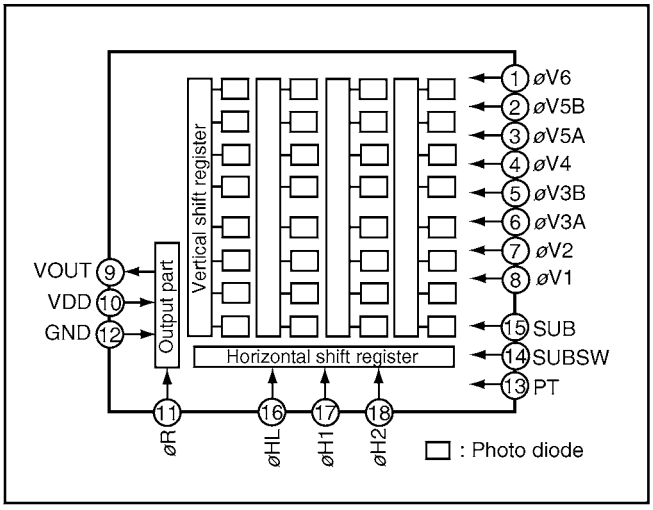


Fig. 1-2. CCD Block Diagram

Pin No.	Symbol	Pin Description	Waveform	Voltage
1	V_6	Vertical register transfer clock		-6.0 V, 0 V
2, 3	V_{5A}, V_{5B}	Vertical register transfer clock		-6.0 V, 0 V, 12 V
4, 7	V_2, V_4	Vertical register transfer clock		-6.0 V, 0 V
5, 6, 8	V_{3A}, V_{3B}, V_1	Vertical register transfer clock		-6.0 V, 0 V, 12 V
9	VO	Signal output	DC	Aprox. 12 V
10	OD	Circuit power	DC	12 V
11	ØR	Reset gate clock		4.5 V, 7.8 V
12	PW	GND	GND	0 V
13	PT	Protection transister bias	DC	-6.0 V
14	SUBC	Substrate control		0, 3.3 V (When importing all picture element: 3.3 V)
15	SUB	Substrate clock	DC	Aprox. 6 V (Different from every CCD)
16, 17	H_L, H_1	Horizontal register transfer clock		0 V, 3.3 V
18	H_2	Horizontal register transfer clock		0 V, 3.3 V

Table 1-1. CCD Pin Description

---- When sensor read-out

3. Part of IC905 (H Driver) and IC901 (V Driver)

An H driver (part of IC905) and V driver (IC901) are necessary in order to generate the clocks (vertical transfer clock, horizontal transfer clock and electronic shutter clock) which driver the CCD.

IC905 has the generation of horizontal transfer clock and the function of H driver, and is an inverter IC which drives the horizontal CCDs (H1 and H2). In addition the XV1-XV4 signals which are output from IC101 are vertical transfer clocks, and the XSG signal is superimposed onto XV1 and XV3 at IC901 in order to generate a ternary pulse. In addition, the XSUB signal which is output from IC101 is used as the sweep pulse for the electronic shutter, and the RG signal which is output from IC905 is the reset gate clock.

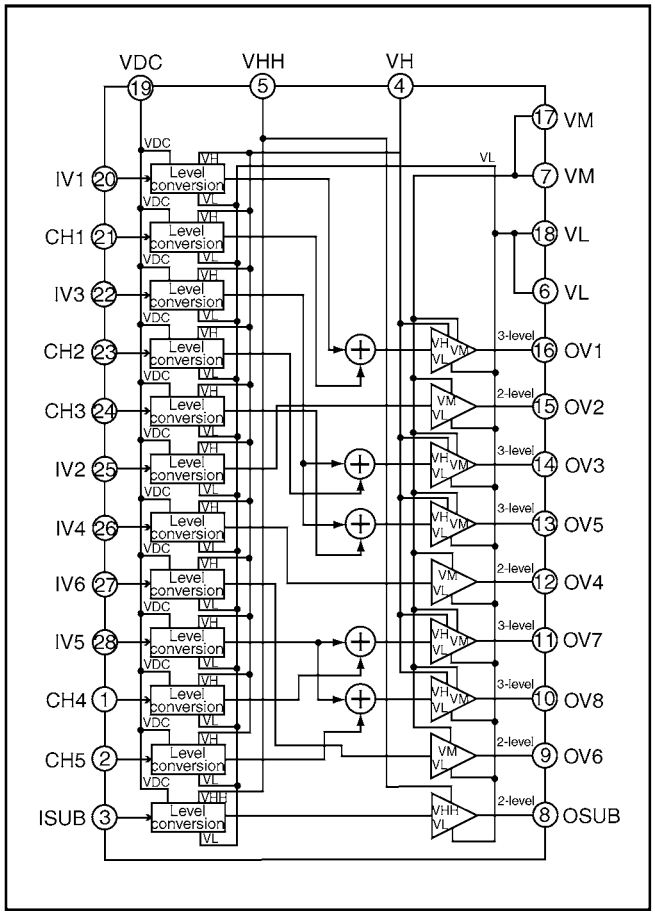


Fig. 1-3. IC901 Block Diagram

4. IC905 (H Driver, CDS, AGC and A/D converter)

IC905 contains the functions of H driver, CDS, AGC and A/D converter. As horizontal clock driver for CCD image sensor, HØ1 (A and B) and HØ2 (A and B) are generated inside, and output to CCD.

The video signal which is output from the CCD is input to pins (27) of IC905. There are sampling hold blocks generated from the SHP and SHD pulses, and it is here that CDS (correlated double sampling) is carried out.

After passing through the CDS circuit, the signal passes through the AGC amplifier (VGA: Variable Gain Amplifier). It is A/D converted internally into a 10-bit signal, and is then input to ASIC (IC101). The gain of the VGA amplifier is controlled by pin (31)-(33) serial signal which is output from ASIC (IC101).

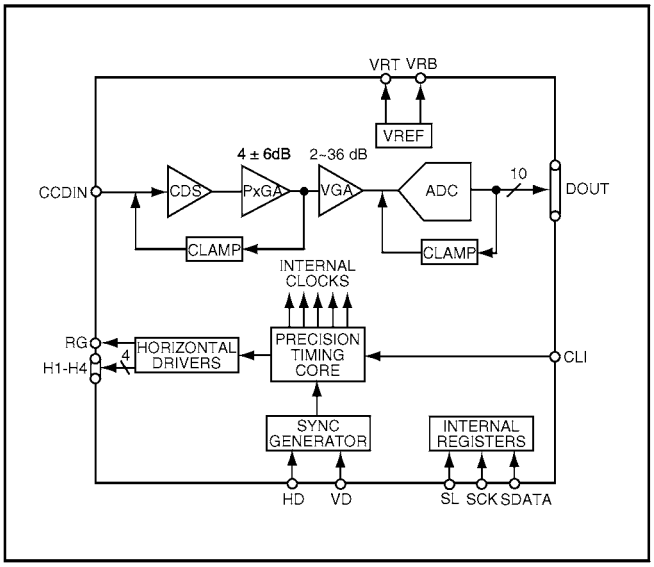


Fig. 1-4. IC905 Block Diagram

5. Circuit Description

5-1. Digital clamp

The optical black section of the CCD extracts averaged values from the subsequent data to make the black level of the CCD output data uniform for each line. The optical black section of the CCD averaged value for each line is taken as the sum of the value for the previous line multiplied by the coefficient k and the value for the current line multiplied by the coefficient 1-k.

5-2. Signal processor

1. γ correction circuit

This circuit performs (gamma) correction in order to maintain a linear relationship between the light input to the camera and the light output from the picture screen.

2. Color generation circuit

This circuit converts the CCD data into RGB signals.

3. Matrix circuit

This circuit generates the Y signals, R-Y signals and B-Y signals from the RGB signals.

4. Horizontal and vertical aperture circuit

This circuit is used gemerate the aperture signal.

5-3. AE/AWB and AF computing circuit

The AE/AWB carries out computation based on a 256-segment screen, and the AF carries out computations based on a 11-segment screen.

5-4. SDRAM controller

This circuit outputs address, RAS, CAS, CS and WE data for controlling the SDRAM. It also refreshes the SDRAM.

5-5. Communication control

1. SIO

This is the interface for the 8-bit microprocessor.

2. PIO/PWM/SIO for LCD

8-bit parallel input and output makes it possible to input and output individually, and three ports of them PWM output makes it possible to switch. It is prepared for 16-bit parallel output.

5-6. TG

Timing generated for 5 million pixels CCD control.

5-7. Digital encorder

It generates chroma signal from color difference signal.

5-8. JPEG encorder and decorder

It is compressed and elongated the data by JPEG system.

6. Outline of Operation

When the shutter opens, the reset signals and the serial signals ("take a picture" commands) from the 8-bit microprocessor are input to ASIC (IC101) and operation starts. When the TG/SG drives the CCD, picture data passes through the A/D and CDS, and is then input to the ASIC as 10-bit data. The AF, AE, AWB, shutter, and AGC value are computed from this data, and three exposures are made to obtain the optimum picture. The data which has already been stored in the SDRAM is read by the CPU and color generation is carried out. After AWB and γ processing are carried out by RGB data, a matrix is generated and aperture correction is carried out for the Y signal, and the data is then compressed by the JPEG method by (JPEG) and is then written to card memory (SD card). When the data is to be output to an external device, it is taken data from the memory and output via the USB. When played back on the LCD and monitor, data is transferred from memery to the SDRAM, and the data elongated by JPEG decorder is displayed over the SDRAM display area.

7. LCD Block

The LCD display circuit is located on the CP1 board, and consists of components such as a power circuit.

The signals from the ASIC are 6-bit digital signals, that is input to the LCD directly. The 6-bit digital signals are converted to RGB signals inside the LCD driver circuit . This LCD has a 3-wire serial, and functions such as the brightness and image quality are controlled.

Because the LCD closes more as the difference in potential between the VCOM (common polar voltage: AC) and the R, G and B signals becomes greater, the display becomes darker; if the difference in potential is smaller, the element opens and the LCD become brighter.

In addition, the timing pulses for signals other than the video signals are also input from the ASIC directory to the LCD.

8. Lens drive block

8-1. Focus drive

The five control signals (FSEN, FSMD1, FSMD2, FSIN1 and FSIN2) which are output from the ASIC (IC101) are converted into drive pulses (1A, 2A, 1B and 2B) by the motor driver (IC951), and are then used to drive the stepping motor for focusing operation. Detection of the standard focusing positions is carried out by means of the photointerruptor (FPI) inside the lens block.

8-2. Iris and shutter drive

The five control signals (FSEN, FSMD1, FSMD2, FSIN1 and FSIN2) which are output from the ASIC (IC101) are converted into drive pulses (IRIS+ and IRIS–) by the motor driver (IC951), and are then iris opened/little and moved.
The same five control signals are converted into a drive pulse (SHUTTER+ and SHUTTER–) by the motor driver (IC951), and are then shutter opened and closed.

8-3. Zoom drive

The two control signals (ZMIN1 and ZMIN2) which are output from ASIC (IC101) are converted into drive pulses (DC1 and DC2) by the motor drive (IC951), and are then used to drive the DC motor for zoom operation.
Detection of the standard zoom positions is carried out by means of the photointerruptor (ZOOM RESET1) inside the lens block. Getting of the zoom positions is carried out by means of the two photo-interrupters (ZOOM PLUSE1 and ZOOM PLUSE2) by counting inside the lens block.

1-2. PWA POWER CIRCUIT DESCRIPTION

1. Outline

This is the main power circuit, and is comprised of the following blocks.
Switching controller (IC501)
Digital and analog system power output
(L5003, Q5003, T5001, Q5001, IC502)
Digital 3.25 V power output (L5005)
Digital 1.41 V power output (L5006)
LCD 12 V system power output (L5004, Q5004)
Backlight power output (L5007)
Motor system power output (IC961, L9601, Q9601)

2. Switching Controller (IC501)

This is the basic circuit which is necessary for controlling the power supply for a PWM-type switching regulator, and is provided with seven built-in channels, only CH1 (digital system), CH2 (digital 3.25 V), CH3 (digital 1.41 V), CH4 (analog system), CH6 (LCD system) and CH7 (backlight system) are used. Feedback from digital system (CH1), 3.25 V (D) (CH2), 1.7 V (D) (CH3), analog system (CH4), LCD system (CH6) and backlight system (CH7) power supply outputs are received, and the PWM duty is varied so that each one is maintained at the correct voltage setting level.
Feedback for the backlight power (CH7) is provided to the both ends voltage of registance so that regular current can be controlled to be current that was setting.

2-1. Short-circuit protection circuit

If output is short-circuited for the length of time determined by the condenser which is connected to Pin (32) of IC501, all output is turned off. The control signal (P ON) are recontrolled to restore output.

3. Analog System Power Output

+12 V (A), +3.45 V (A) and -6.0 V (A) are output. Feedback for the +12 V (A) is provided to the switching controller (Pin (48) of IC501) so that PWM control can be carried out.

4. Digital 3.25 V Power Output

+3.25 V (D) is output. Feedback for the +3.25 V (D) is provided to the swiching controller (Pin (23) of IC501) so that PWM control can be carried out.

5. Digital 1.41 V Power Output

+1.41 V (D) is output. Feedback for the +1.41 V (D) is provided to the switching controller (Pin (22) of IC501) so that PWM control to be carried out.

6. Digital System Power Output

+4.6 V (D) is output. Feedback for the +4.6 V (D) is provided to the switching controller (Pin (27) of IC501) so that PWM control to be carried out.

7. LCD System Power Output

+12 V (L) are output. Feedback for the +12 V (L) is provided to the switching controller (Pin (40) of IC501) so that PWM control can be carried out.

8. Backlight Power Supply output

Regular current (20 mA) is being transmitted to LED for LCD backlight. Feedback for the both ends voltage of registance that is being positioned to in series LED are provided to the switching controller (Pin (37) of IC501) so that PWM control to be carried out.

9. Motor System Power Output

4.25 V is output. Feedback for the 4.25 V output is sent to pin (1) of IC961 for PWM control to be carried out.

1-3. SYA CIRCUIT DESCRIPTION

1. Configuration and Functions

For the overall configuration of the SYA block diagram, refer to the block diagram. The SYA block centers around a 8-bit microprocessor (IC301), and controls camera system condition (mode). The 8-bit microprocessor handles the following functions.
1. Operation key input, 2. Clock control and backup, 3. Power ON/OFF, 4. Storobe charge control.

Pin	Signal	I/O	Outline
1	MAIN RESET	O	System reset (MRST)
2	PW_LED	O	PW LED ON/OFF signal (L= lighting)
3	SB. LED (R)	O	SB LED (red)
4	AF. LED (G)	O	AF LED (green)
5	VSS	-	GND
6	XOUT	-	Main clock oscillation terminal
7	XIN	I	Main clock oscillation terminal (4MHz)
8	VDD	-	VDD
9	XCIN	I	Clock oscillation terminal for clock (32.768 kHz)
10	XCOUT	-	Clock oscillation terminal for clock
11	MMOD	I	MMOD (GND)
12	RESET	-	Reset input
13	SCAN IN 3/TDO	I	Keymatrix input and serial data input and output for flash
14	SCAN IN 4/TCLK	I	Keymatrix input and serial clock output for flash
15	AVREF	I	Analog standard voltage input terminal
16	SO	O	Serial data output
17	SI	I	Serial data input
18	SCK	O	Serial clock output
19	TEMP_BAT	I	Battery termperature detection
20	VMONIT	I	Main condenser charging voltage detection
21	BATTERY	I	Battery voltage detection
22	CARD	I	SD card detection (L= card)
23	VDD	-	VDD
24	BAT_OFF	I	Battery OFF detection signal input
25	USB CONNECT	I	USB power detection terminal
26	SREQ	I	Serial communication request signal
27	BEEP	O	Buzzer
28~32	SCAN OUT 0~4	O	Keymatrix output
33	SCAN IN 0	I	Keymatrix input (when power off, interrupt power on detection)
34~35	SCAN IN 1~2	I	Keymatrix input
36	P ON	O	D/D converter (digital system) ON/OFF signal
37	PA ON	O	D/D converter (analog system) ON/OFF signal
38	LCD ON	O	D/D converter (LCD system) ON/OFF signal
39	LCD ON 2	O	D/D converter (LCD system) ON/OFF signal
40	NOT USED	-	-
41	BACKUP_CTL	O	Backup battery charging control (L= charging)
42	CHG ON	O	Strobe charge control
43	AVREF ON	O	AD VREF ON/OFF signal
44	SELF LED	O	SELF LED (H= lighting)
45	ASIC TEST	O	ASIC control signal (ZTEST)
46	PLLEN	O	PLL oscillation ON/OFF
47	COMREQ/BOOT	O	Command request and compulsion boot control port
48	PA ON2	O	D/D converter (analog system) ON/OFF signal 2

Table 3-1. 8-bit Microprocessor Port Specification

2. Setting of external port and communication

The SYA block carries out overall control of camera operation by detecting the input from the keyboard and the condition of the camera circuits. The 8-bit microprocessor reads the signals from each sensor element as input data and outputs this data to the camera circuits (ASIC) or to the LCD display device as operation mode setting data. Fig. 3-1 shows the internal communication between the 8-bit microprocessor and ASIC.

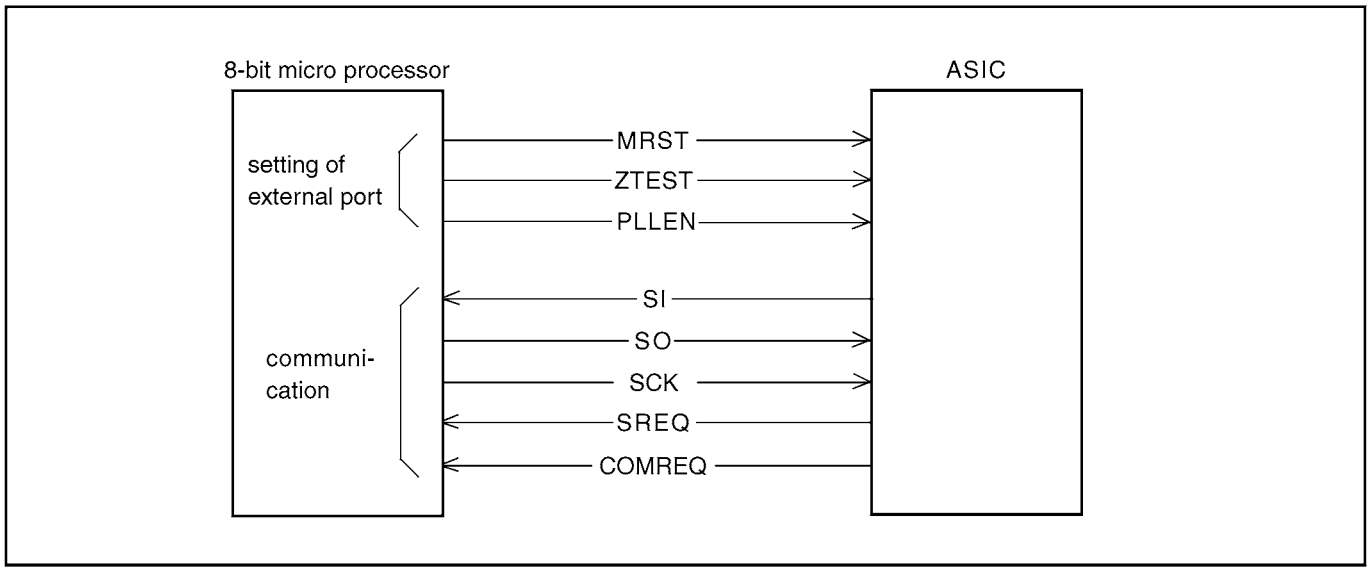


Fig. 3-1 Internal Bus Communication System

3. Key Operaiton

For details of the key operation, refer to the instruction manual.

SCAN OUT \ SCAN IN	0	1	2	3	4
0	PW_TEST	AUTO	SCENE	PORTRAIT	LANDSCAPE
1	TEST	MOVIE	SET UP	NIGHT SCENE	SPORTS
2	←	→	↑	↓	OK
3	PLAY	DEL	WIDE	TELE	MENU
4	PW_ON	1st	2nd	-	AV JACK

Table 3-2. Key Operation

4. Power Supply Control

The 8-bit microprocessor controls the power supply for the overall system.

The following is a description of how the power supply is turned on and off. When the battery is attached, IC961 is operating and creating 4.25 V, a regulated 3.2 V voltage is normally input to the 8-bit microprocessor (IC301) by IC302, clock counting and key scanning is carried out even when the power switch is turned off, so that the camera can start up again.

When the power switch is off, the 8-bit microprocessor halts 4 MHz of the main clock, and operates 32.768 kHz of subclock.

When the battery is removed, the 8-bit microprocessor power switches the secondary lithum battery for memory backup by IC302, and operates at low consumption. At this condition, the 8-bit microprocessor halts 4 MHz of the main clock, and operates clock counting by 32.768 kHz of sub clock.

Also, the secondary battery for backup is charged 10 hours from it to be attached.

When the power switch is on, the 8-bit microprocessor starts processing. The 8-bit microprocessor first sets both the PON signal at pin (36) and the PAON signal at pin (37) to High, and then turn on the power circuit. After PON signal is to High, sets external port of ASIC after approximately 100 ms. According to setting of this external port, carry out setting of the operating frequency and oscillation control in the ASIC. Also, it starts communication with ASIC, and confirms the system is operative.

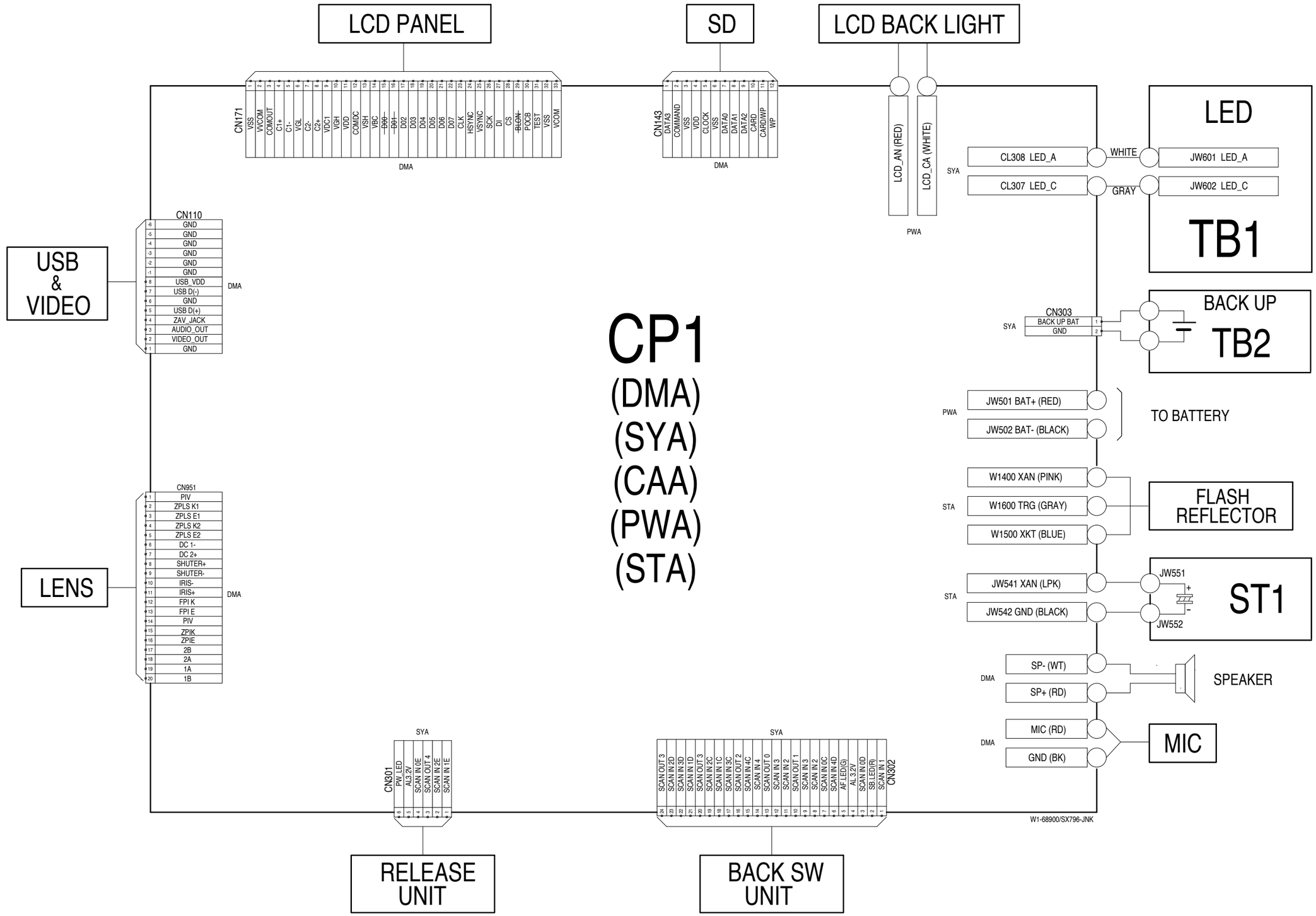
When the through image is operating, set the PAON signal to High and then turn on the CCD. When the through image is playing, set the PAON signal to Low and then turn off the CCD. When LCD panel turns on, set LCD ON signal at pin (38) and LCD ON2 signal at pin (39) to High, and then turn on the power. Set the BL_ON signal to High from ASIC, and turn on the backlight power.

When the power switch is off, the lens will be stowed, and PON, PAON, LCD ON, LCD ON2 and BLON signals to Low and the power supply to the whole system is halted. The 8-bit microprocessor halts oscillation of the main clock (4 MHz), and set operation mode of clock ocillation (32.768 kHz).

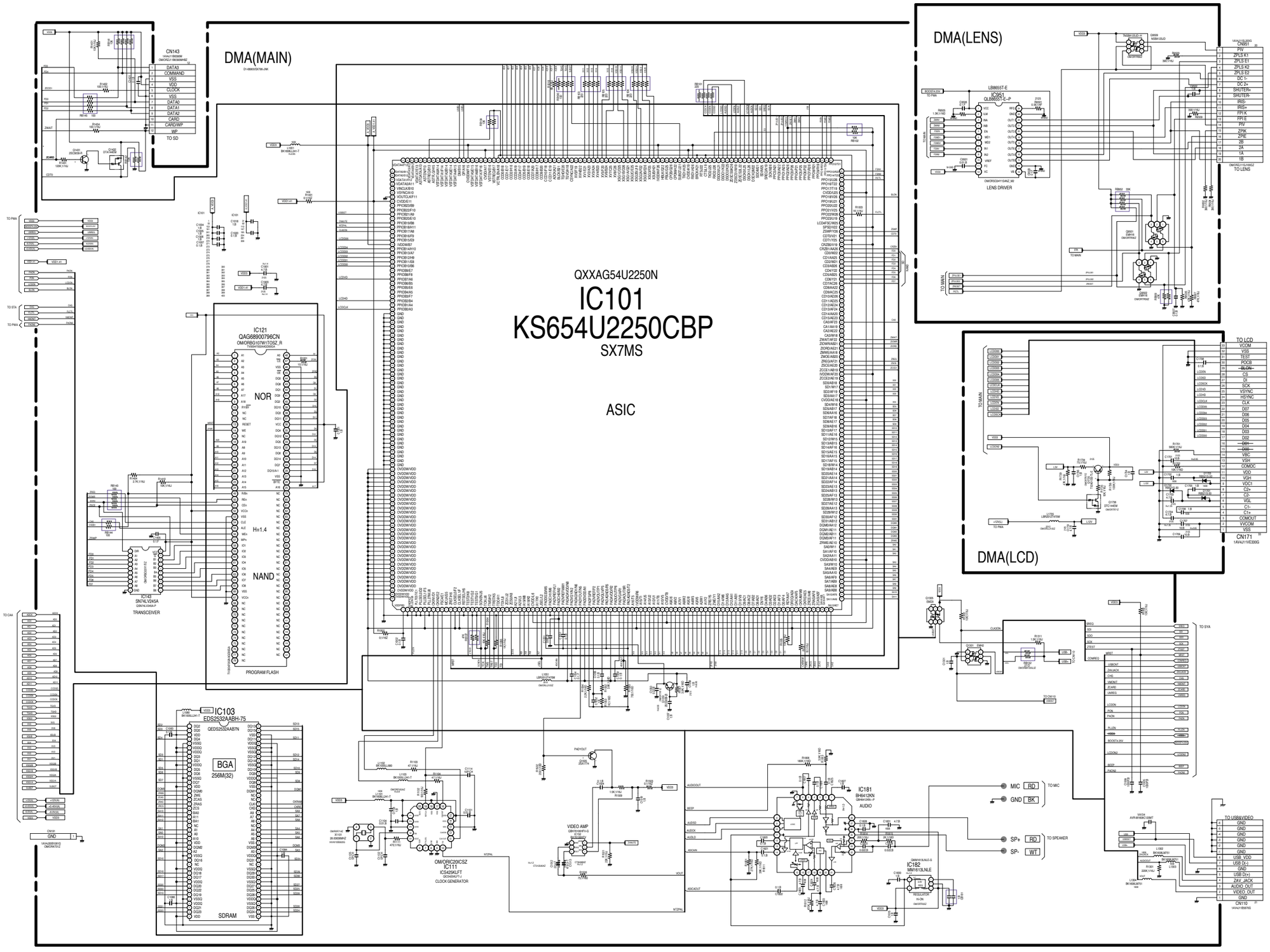
	ASIC, memory	CCD	8bit CPU	LCD MONITOR
Power supply voltage	1.41 V, 3.25 V	12.0 V, -6.0 V 3.45 V	3.2 V	12 V, 3.25 V
Power OFF	OFF	OFF	32KHz	OFF
Playback mode	ON	OFF	4MHz	ON
Shooting mode (LCD)	ON	OFF	4MHz	ON
Shooting mode (OVF)	OFF	OFF	4MHz	OFF
Shooting	ON	ON	4MHz	ON
USB connection	ON	OFF	4MHz	OFF

Table 3-3. Power supply control

総合結線図
OVERALL WIRING



CP1(DMA) 回路図
CP1(DMA)CIRCUIT DIAGRAM



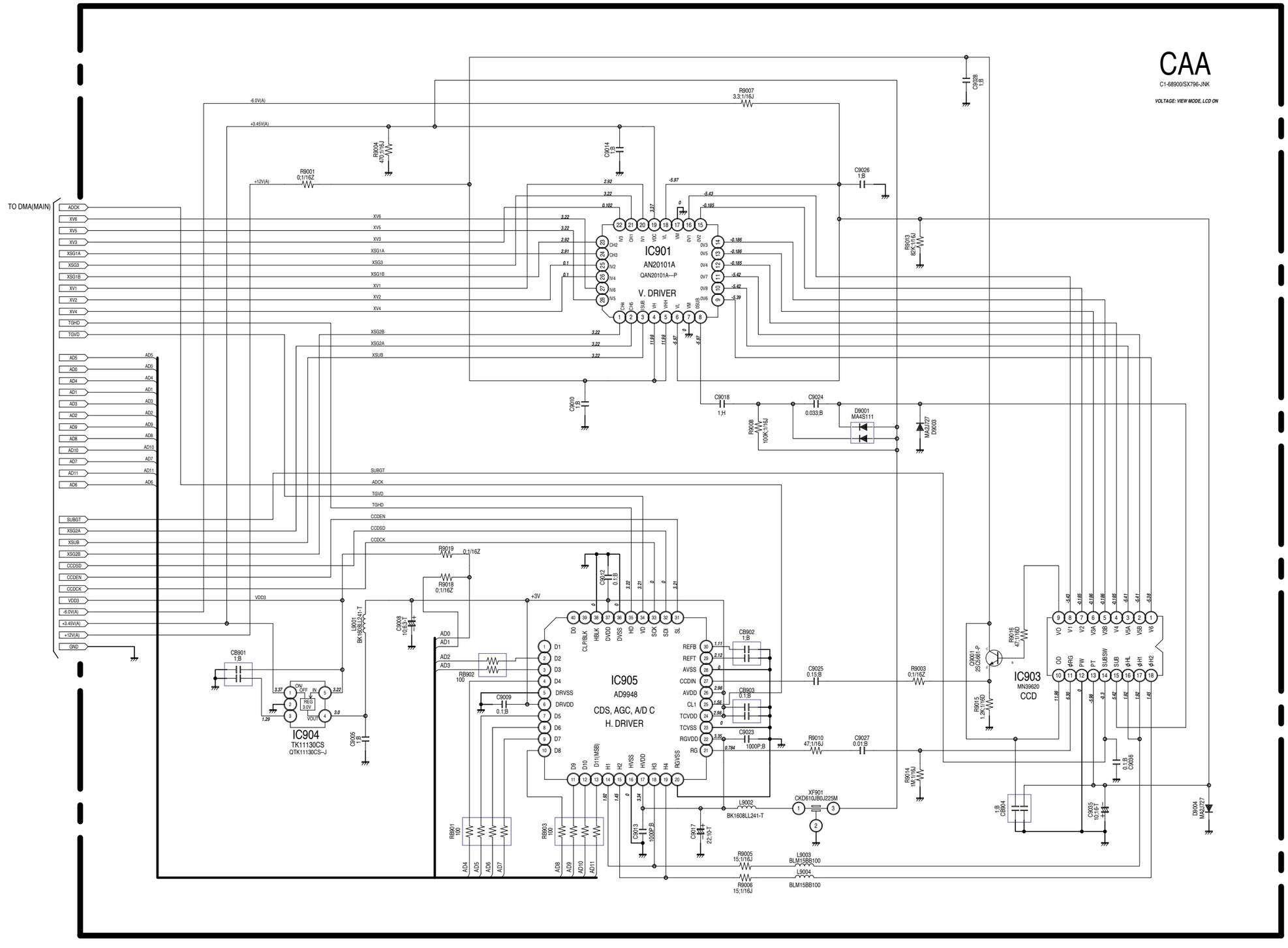
CP1(SYA) 回路図
CP1(SYA) CIRCUIT DIAGRAM

SYA

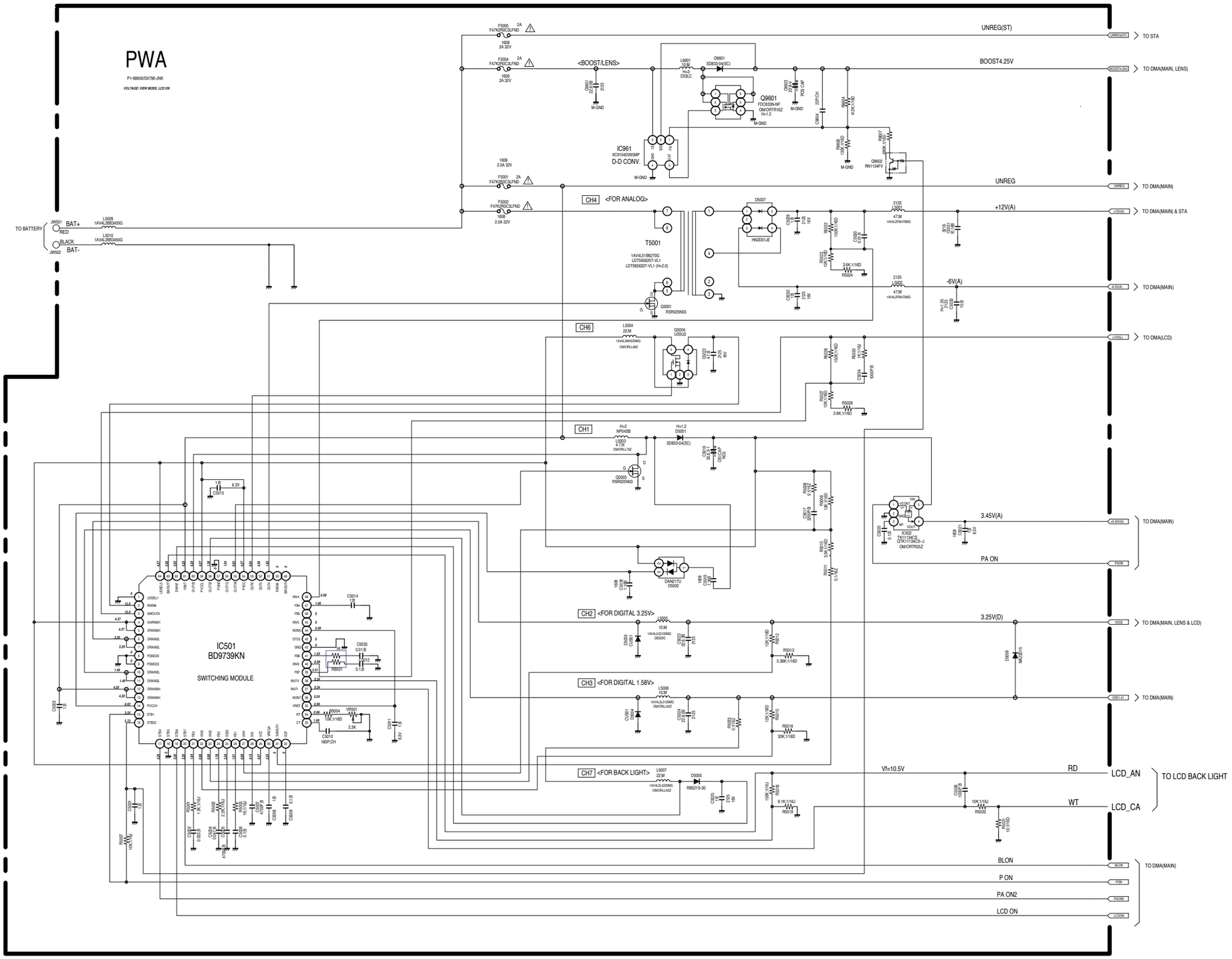
Y1-68900/SX796-JNK

SCAN IN / SCAN OUT	0	1	2	3	4
0	PW_TEST	AUTO	SCENE	PORTRAIT	LANDSCAPE
1	TEST	MOVIE	SET UP	NIGHT VIEW	SPORTS
2	LEFT	RIGHT	UP	DOWN	OK
3	PLAY	DEL	WIDE	TELE	MENU
4	PW_ON	1st	2nd	--	AV JACK

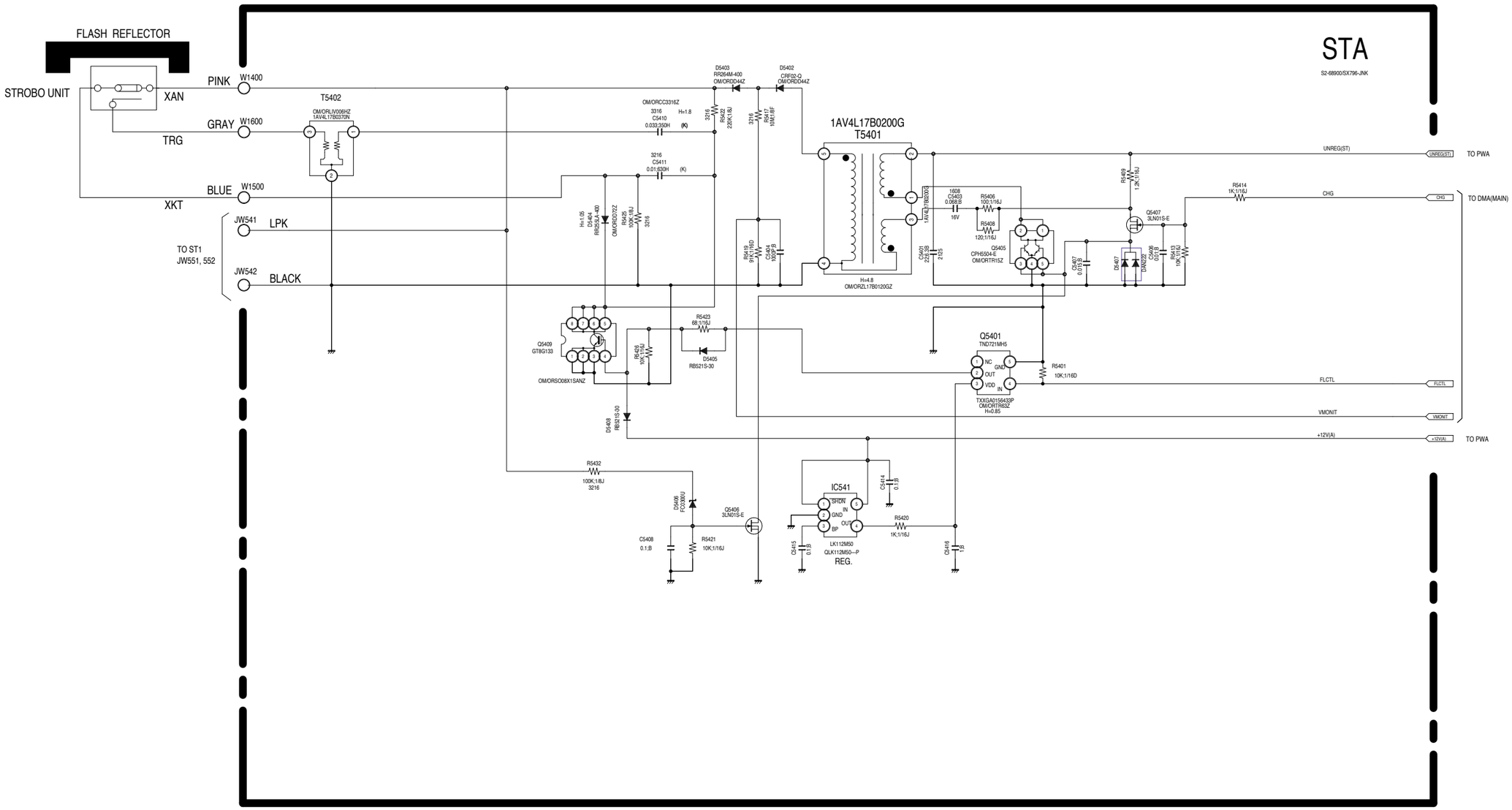
CP1(CAA) 回路図
CP1(CAA) CIRCUIT DIAGRAM



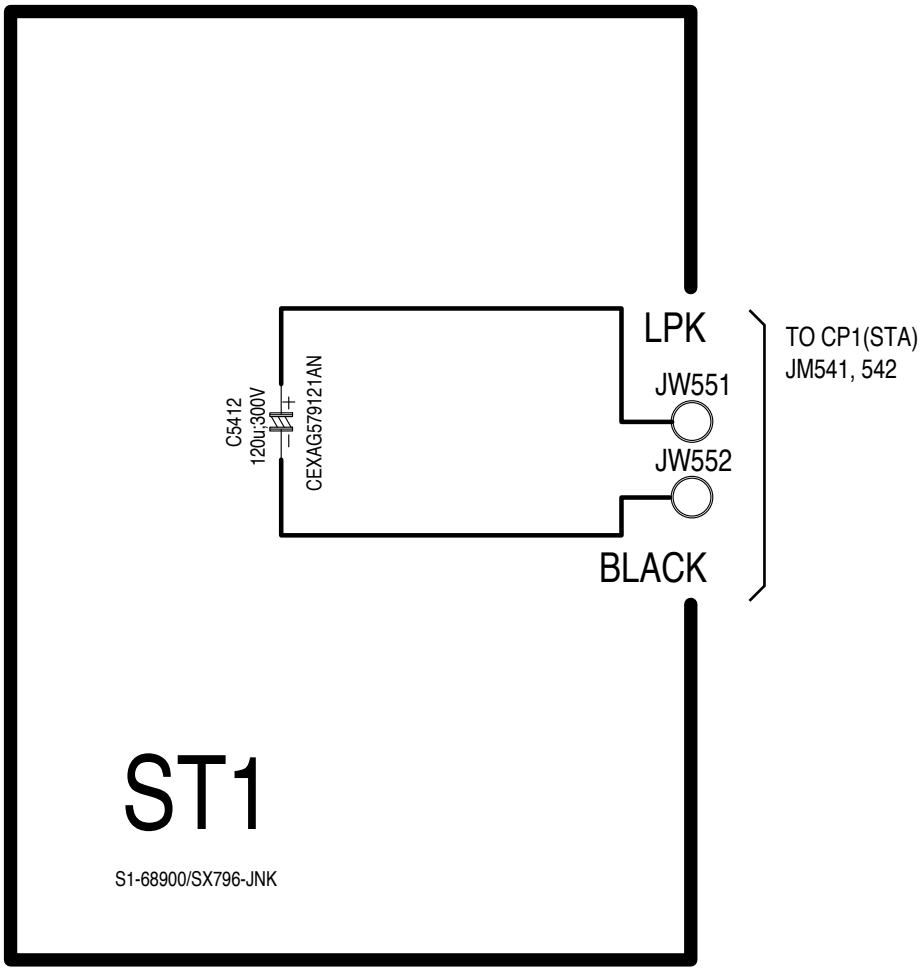
CP1(PWA) 回路図
CP1(PWA) CIRCUIT DIAGRAM



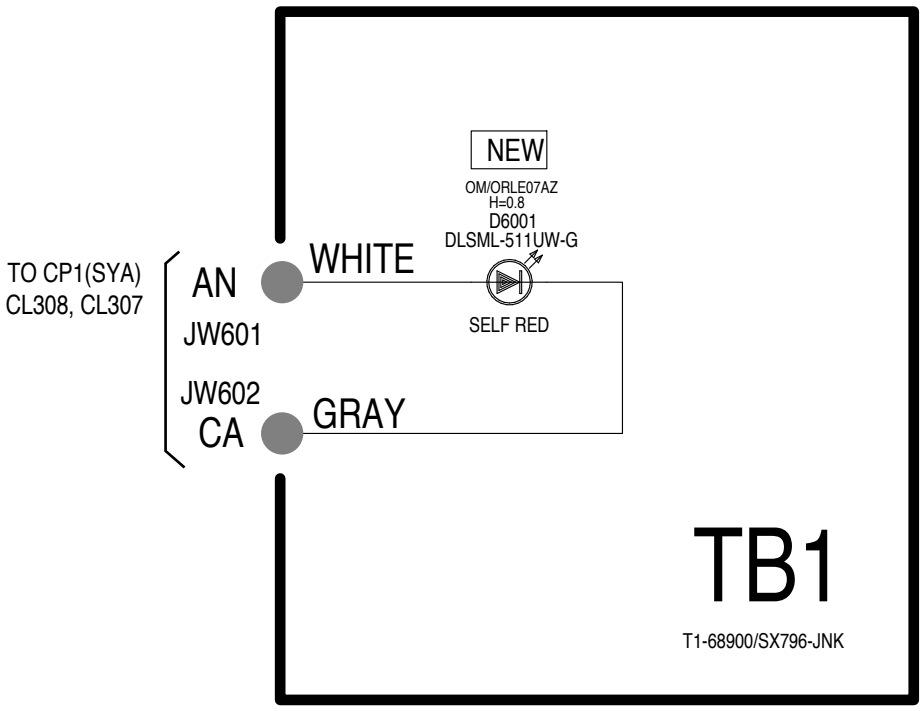
CP1(STA) 回路図
CP1(STA) CIRCUIT DIAGRAM



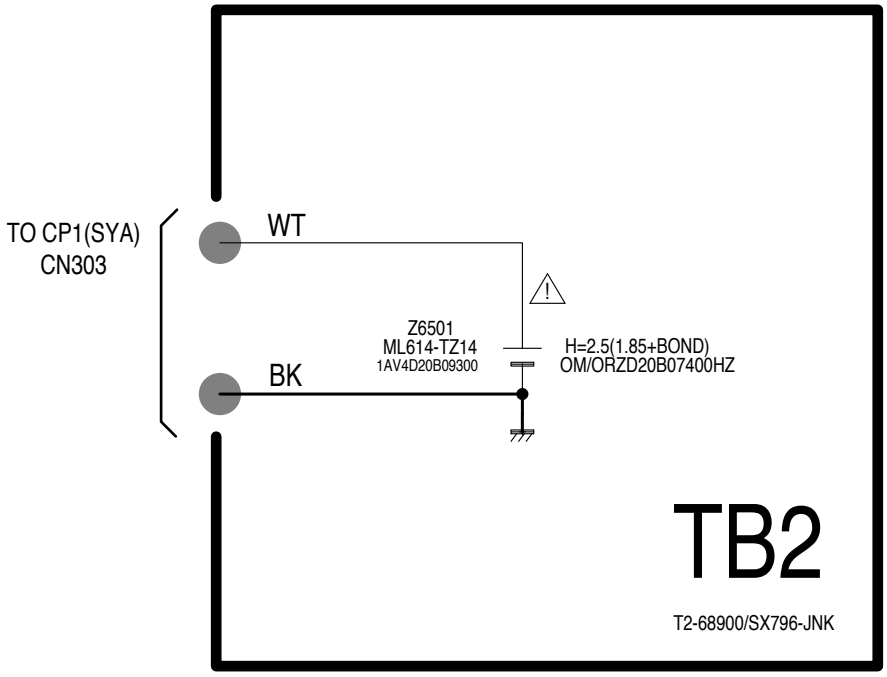
ST1 回路図
ST1 CIRCUIT DIAGRAM



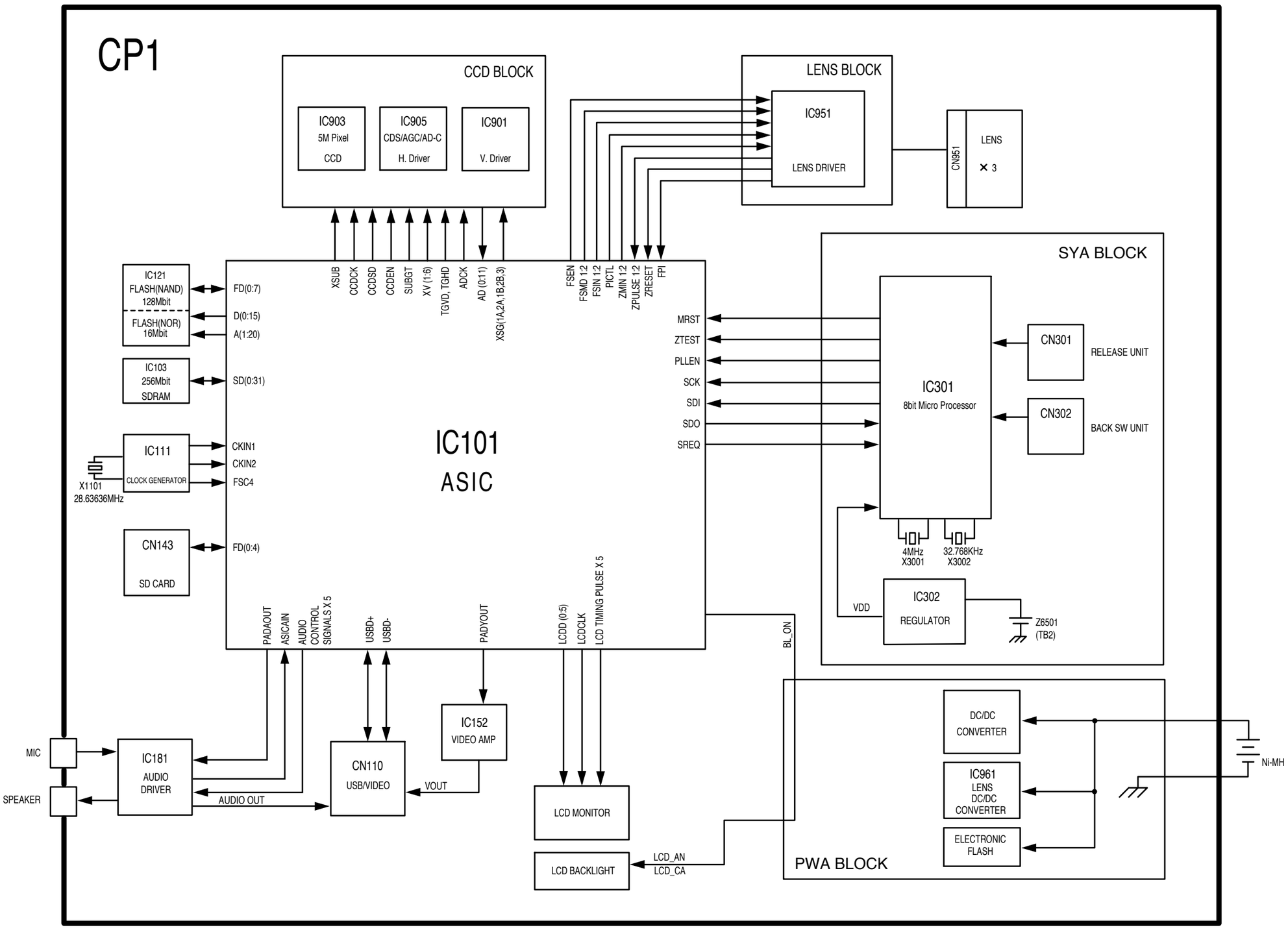
TB1 回路図
TB1 CIRCUIT DIAGRAM



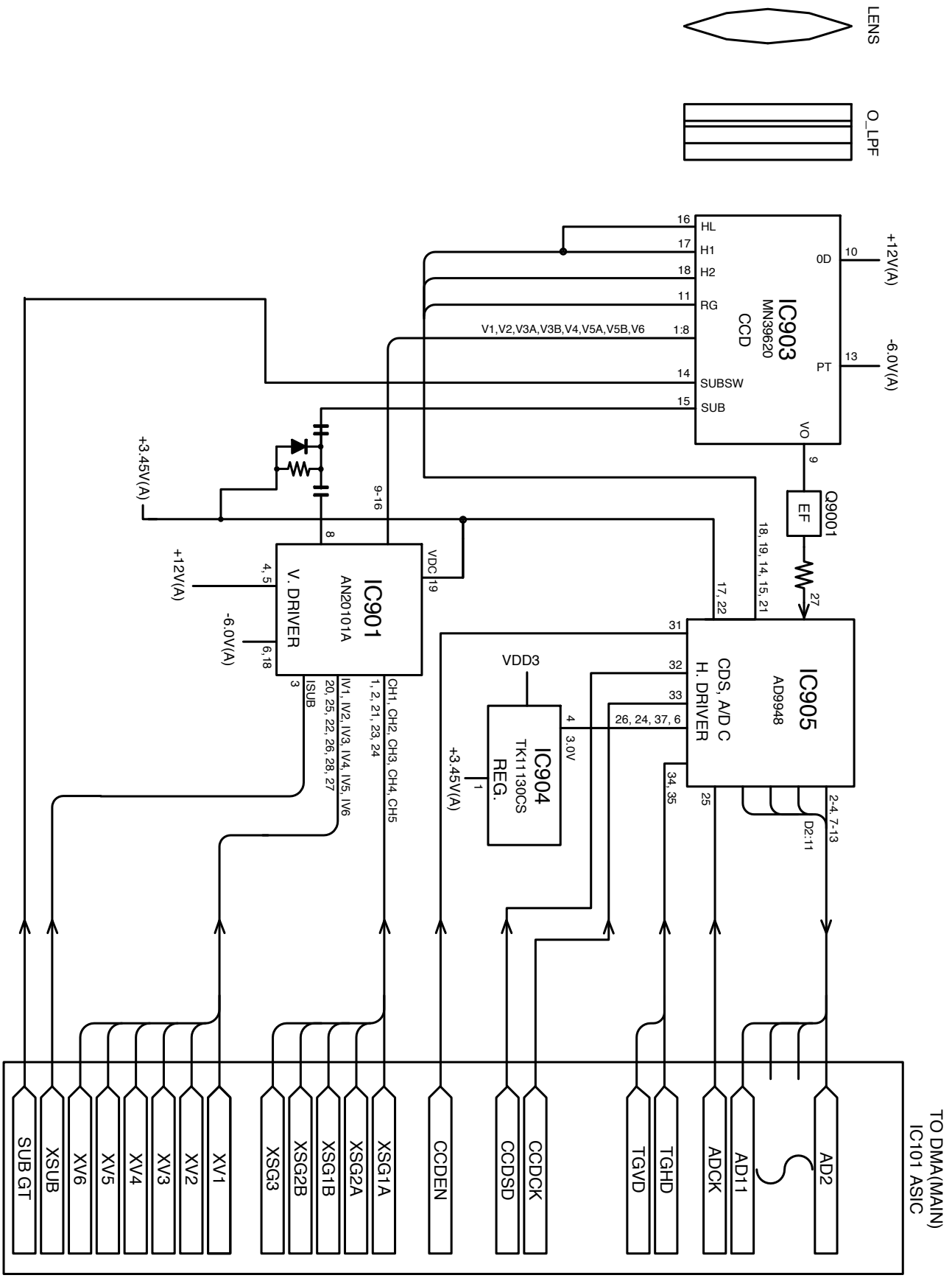
TB2 回路図
TB2 CIRCUIT DIAGRAM



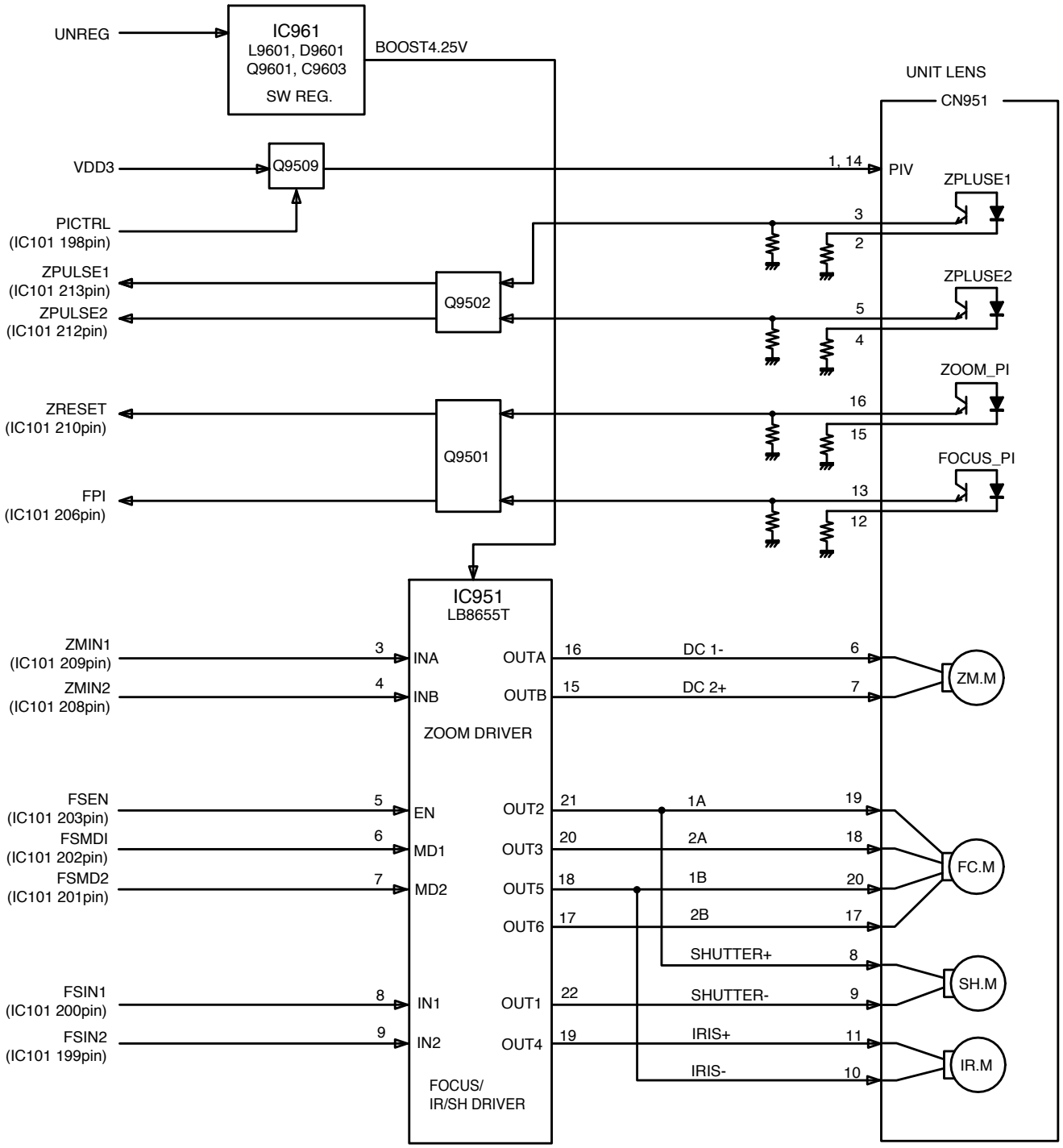
総合ブロック図
OVERALL BLOCK DIAGRAM



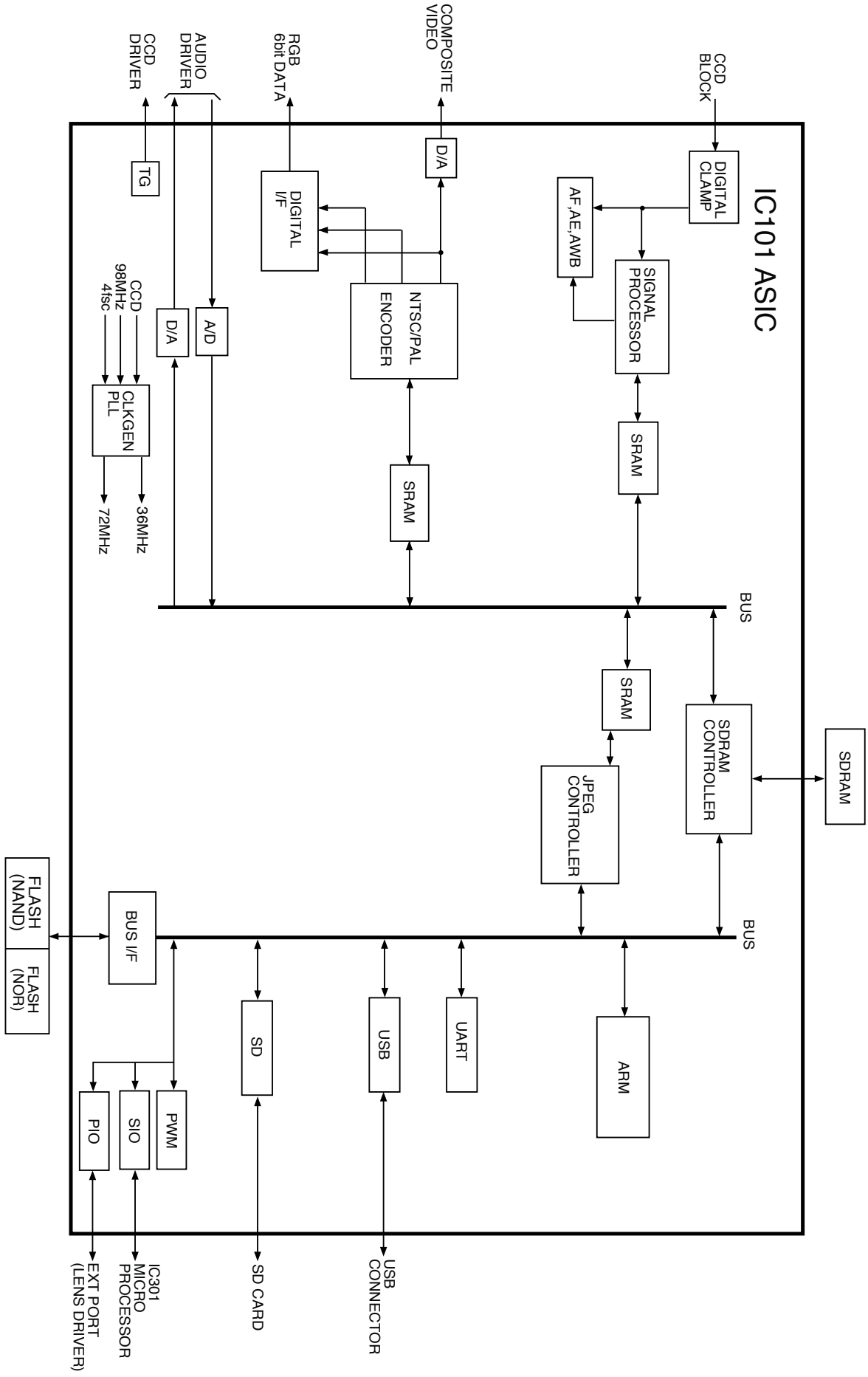
CCD ブロック図
CCD BLOCK DIAGRAM



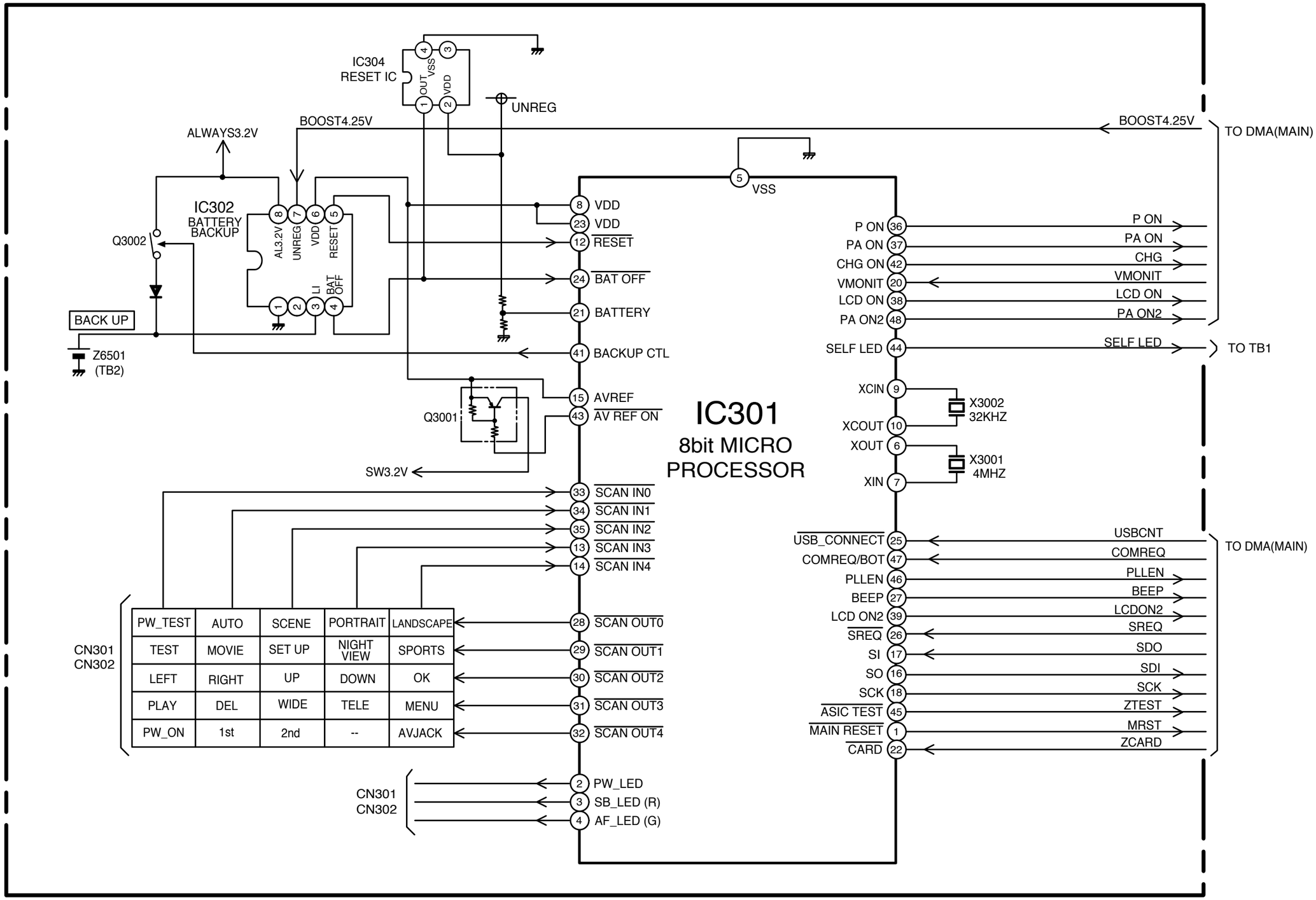
LENS ブロック図
LENS BLOCK DIAGRAM



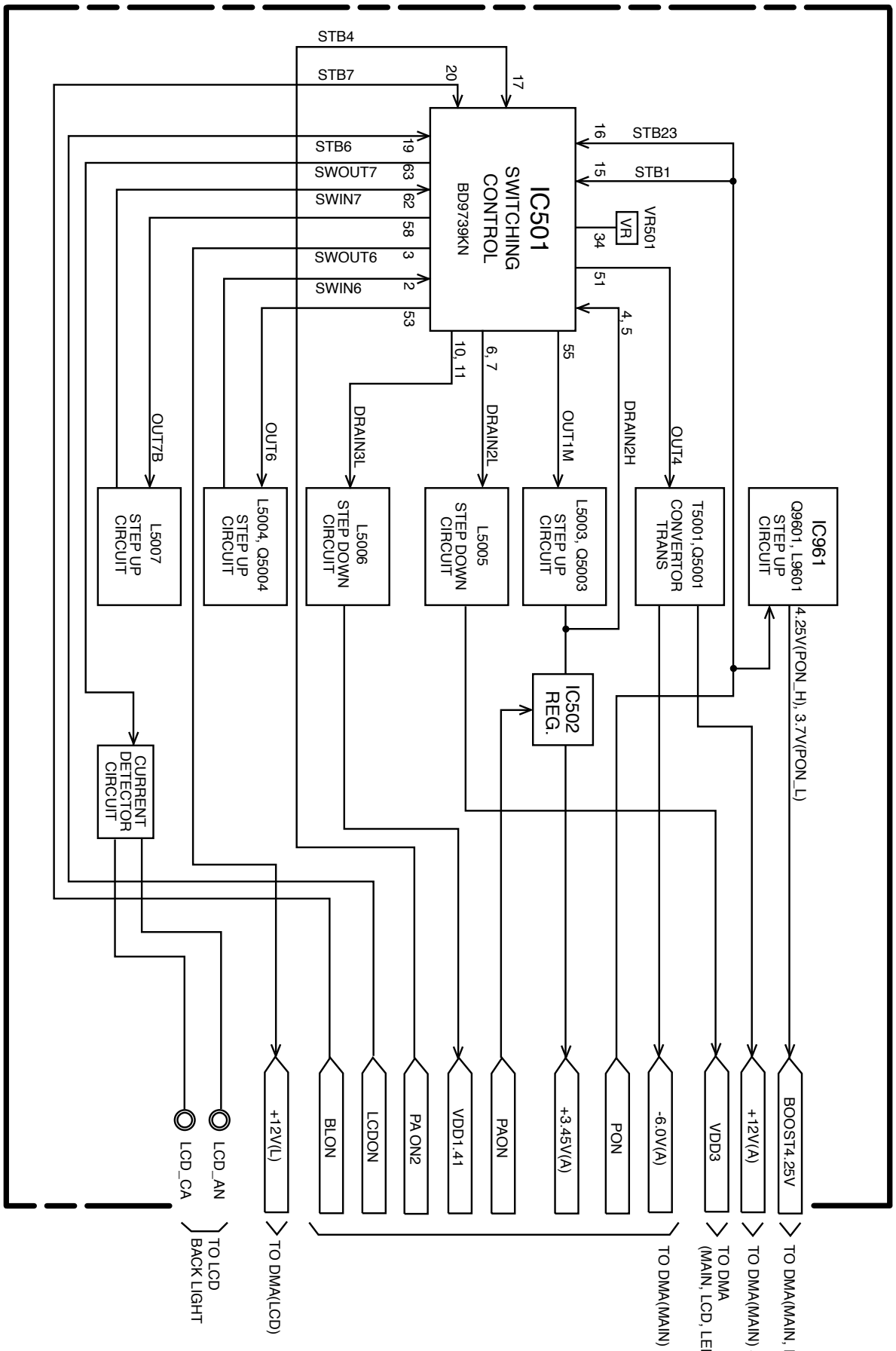
ASIC ブロック図
ASIC BLOCK DIAGRAM



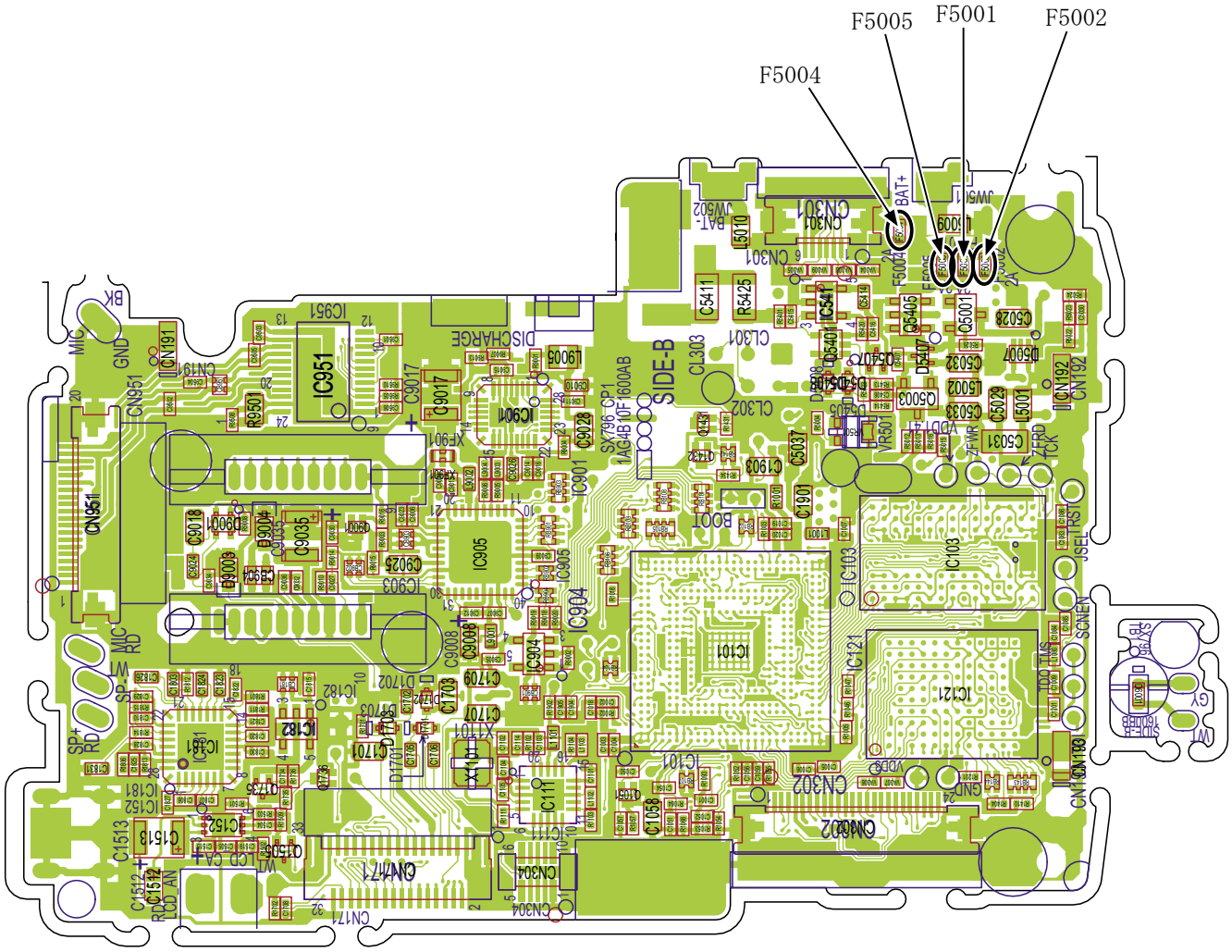
SYSTEM CONTROL ブロック図
SYSTEM CONTROL BLOCK DIAGRAM



POWER ブロック図
POWER BLOCK DIAGRAM



FUSE arrangement (CP1 PCB)



FUSE	Function of FUSE	Phenomenon when FUSE has blown out	Rating
F5001	Protection of the DC/DC converter and the system computer circuit	The power is not turned on.	2A 32V
F5002	Protection of the DC/DC converter	The power is not turned on.	2A 32V
F5004	Protection of the lens circuit	The power is not turned on.	2A 32V
F5005	Protection of the speed light circuit	The speed light is not charged.	2A 32V

The contents of inspection standards and tools for E5600

INSPECTION STANDARDS

Item	Criteria	Applied tool(s)
External view		
Gap/Difference in height	・General components Gap: 0.3mm or less Difference in height: 0.15mm or less ・When the battery case is opened/closed: Gap in its periphery: 0.3mm or less Gap in the bottom: 0.5mm or less Difference between right and left: 0.2mm or less Stepped difference: 0.5mm or less	Visual observation
Outside and inside status	・There must be no noticeable damage, stain, sink mark, welded mark, unevenness, crack or oil exudation. ・When pushing the main body, noticeable noise must not be heard. (Observe and check it by naked eyes under fluorescent lamp and natural sunshine.)	
Operation/Operability		
Operation	・While operating, any irregularities or irregular noise shall not be required. (Check it by shaking the camera while operating. Lightly hit the camera onto the Linoleum-laid desk while operating.)	Primary battery/ Secondary battery
Operability of buttons	・No cave-ins of the buttons shall be required. ・Operator must feel "click" on each button. ・"Click" must occur when or after a switch is ON. (Check it while operating normally.)	
Mode dial	・When clicking, normal touch shall be required. Any outstanding "caught-in-mechanism" touch or "rubbed-in-mechanism" touch or play shall not be required. (Check and observe the condition through normal operation.)	
Operation touch	・When operating a lever or knob by hand, any irregular conditions shall not be required. (Operate the camera in the actual photography procedure and check the operation touch.)	
Each cover	・When closed, there must not be an extreme play. ・Each cover can be opened/closed without any outstanding "caught-in-mechanism" touch or "rubbed-in-mechanism" touch or abnormal noise. (Open and close each cover and check it.)	

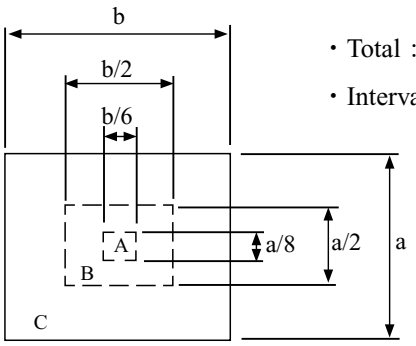
<table>
<tr><th>Item</th><th>Criteria</th><th>Applied tool(s)</th></tr>
<tr><td>Monitor
Shooting image</td><td>・Inclined degree of image shall be 0.5 degree or less.
・PC monitor and print output
(Output will be evaluated while the display range boundary of LCD unit is regarded as standard when the through-the-monitor image is made.)</td><td>Photoshop
Printer</td></tr>
<tr><td>Lens capacity
Focal length
Open aperture F No.</td><td>Wide-end position (Compelling ∞)
5.7 mm + 7.1%
- 1.1%
Tele-end position (Compelling ∞)
17.1 mm + 0.9%
- 6.9%
Wide-end position (Compelling ∞)
F2.9 + 5.8%
- 2.3%
Tele-end position (Compelling ∞)
F4.9 + 10.6%
+ 2.1%</td><td>Focal length
measuring instrument
Lens drive tool</td></tr>
<tr><td>Peripheral light reduction</td><td>・Against the picture center, the luminance of the nearest peripheral area must be 35% or more.
・Against the picture center, the luminance at 70% of the image height must be 55% or more.</td><td></td></tr>
<tr><td>Ghost/Flare
Point light source
Surface light source
Distortion</td><td>・There must not be an outstanding ghost/flare.
・There must not be an outstanding flare at the center.
・There must not be an outstanding deformation.</td><td>Visual observation</td></tr>
<tr><td>Dust in a picture</td><td>・There must not be an outstanding dust in a picture.
・When the picture center (within the circle whose diameter is 80% of the short side) is Zone I and its outside is Zone II, the light reduction against the periphery must be as follows :
<table><tr><th></th><th>a</th><th>b</th></tr><tr><td>Zone I</td><td>4 or less</td><td>0</td></tr><tr><td>Zone II</td><td>10 or less</td><td>2 or less</td></tr></table>a : 1.5% or less
b : More than 1.5% and less than 3.0%</td><td>Photoshop
CRT monitor
PC</td></tr>
</table>

Item	Criteria	Applied tool(s)
Lens barrel		
Zoom / Focus	・There must not be an abnormal action (for example, the unit operates one-sidedly or its operation is not smooth or it is caught). (As changing the camera's posture, check it in all the directions.)	Visual observation
AF		
Distance measurement operation	・In the case of normal AF: Focus must be fit at the picture center. ・In the case of the out-of-focus object: Focus must be fit at the 2m point. ・In the case of the scene mode: Focus must be fit in the selected area.	Visual observation
Shortest photograph distance	Focus must be fit at the following distance.	Tape measure EIAJ chart
Normal	・30cm (in whole area)	Siemens chart
Macro	・12cm(Z00) 、7.8cm(Z14) 、4cm(Z04) 、10.5 cm（Z19）、4.7cm(Z09)	
Shooting with a speed light		
Light adjustment accuracy	・Tele-end: 0.4 ~ 2.0m ・Wide-end: 0.4 ~ 3.3m ・Macro-wide-end 0.4 ～ 3.4 m In the above range, ± 0.5 Ev or less (Photography mode: AUTO , ・Speed light: Compelling flash)	Standard reflection plate
Guide No. FULL (ISO100・m)	・6.8 ± 0.4 EV (Charge for 10 seconds with the new primarybattery and perform measurement within 1 second.)	Flash meter New battery Measurement firmware
Recycling time	・Within 8 seconds ・Perform charging with a new primary battery for 10 seconds and carry out full flashing within 1 second. Then, measure the time taken until the speed light LED finishes blinking while pressing lightly the shutter release button (including the ON/OFF time of the monitor LCD).	Stop watch
Wrong flash	・Wrong flash must not occur. (Check by loading/unloading a battery, giving a light shock and operating mode buttons except S2.)	New battery

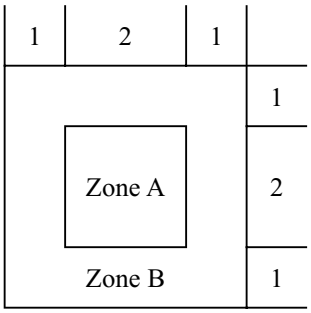
Item	Criteria	Applied tool(s)
Quality of image		
Resolution in AF	The resolution must be in compliance with the following values in all the postures of the EIA J chart evaluation. <High quality of image> Center horizontal/vertical: 1150 TV pcs. Periphery horizontal/vertical: 750 TV pcs. <Standard> Center horizontal/vertical: 1150 TV pcs. Periphery horizontal/vertical: 750 TV pcs. <3M> Center horizontal/vertical: 900 TV pcs. Periphery horizontal/vertical: 600 TV pcs. <Personal computer> Center horizontal/vertical: 450 TV pcs. Periphery horizontal/vertical: 300 TV pcs. <TV> Center horizontal/vertical: 250 TV pcs. Periphery horizontal/vertical: 150 TV pcs. <10 ～ 0.3m> (The whole zoom area) Center horizontal/vertical: 1150 TV pcs. <0.3 ～ 0.04m> (The whole zoom area) Center horizontal/vertical: 950 TV pcs. ・Take a picture on condition that aperture is "open" in the AUTO mode and image quality priority mode. ・Equip the 5100K viewer with the chart with WIDE-end, MIDDLE (Z08), TELE-end and the distance of 0.3m or more and shoot an object in the full range of angle of view. ・Then, open the recorded image data file through Photoshop and check the resolution visually. ・Check each posture and the difference of zoom reciprocation. ・Take a picture in each quality mode. ・Measure the TV resolution pieces at center.	EIAJ chart Photoshop Siemens chart
In the case of “Macro”	<Macro> Center horizontal/vertical: 950 TV pcs. ・Check at near distance (W12cm, M (Z08) 4cm, T10.5cm). ・Take a picture at the high image quality mode.	

Item	Criteria	Applied tool(s)
In the case of compelling infinity	<Compelling infinity> (The whole zoom area) Center horizontal/vertical: 950 TV pcs. ・Shoot the infinity collimator image on condition that aperture is "open" in the scene distance view/night view mode and the image quality priority mode. ・Then, open the recorded image data file through Photoshop and check the resolution visually.	Infinity chart
In the case of "our of focus"	<Out of focus> (The whole zoom area) Center horizontal/vertical: 950 TV pcs. ・Measure the TV resolution pieces at center. ・Check each posture and the difference of zoom reciprocation. ・Put a chart at the distance of 2m, set it in the "out of focus" condition and shoot it. (Use a white paper to set it in the "out of focus" condition.)	EIAJ chart Photoshop Siemens chart
Gradation/luminance level	[Histogram's gray average value] ・Black: 12 ± 5 Gray: 130 ± 15 White: 225 ± 10 ・Equip the 5100K viewer with a scale and shoot an object in the full range of angle of view while the AUTO mode and the image quality priority mode are set. Open the recorded image data file through Photoshop and pick up a measurement section with the each color (its central area 64 × 64 pixels) with the rectangle selector tool. ・Read the histogram's gray value and the gray standard deviation. ・Measurement section Luminance level: Upper left 1 step: Black, 6 steps: Gray, Center: White Lower left 6 steps: Gray, 11 steps: Black	5100K viewer ITE γ 0.45 Gray scale (standard) Photoshop

<table>
<tr><th>Item</th><th>Criteria</th><th>Applied tool(s)</th></tr>
<tr><td>Quality of image</td><td></td><td></td></tr>
<tr><td>Noise</td><td>[Histogram's standard deviation]
・Gray: 3.0 or less
Black: 3.0 or less
・Equip the 5100K viewer with a scale and shoot an object in the full range of angle of view while the AUTO mode and the image quality priority mode are set.
Open the recorded image data file through Photoshop and pick up a measurement section with the each color (its central area 64 × 64 pixels) with the rectangle selector tool.
・Read the histogram's gray standard deviation.
・Measurement section
Noise:
Upper left 2 step: Black, 6 steps: Gray
Lower left 6 steps: Gray, 10 steps: Black</td><td>5100K viewer
ITE γ 0.45
Gray scale (standard)
Photoshop</td></tr>
<tr><td>Reproduction of color</td><td>・Color
<table><tr><th></th><th>R</th><th>G</th><th>B</th></tr><tr><td>W</td><td>209 ± 20</td><td>209 ± 20</td><td>209 ± 20</td></tr><tr><td>Ye</td><td>209 ± 20</td><td>209 ± 20</td><td>47 ± 15</td></tr><tr><td>R</td><td>215 ± 20</td><td>15 ± 10</td><td>10 ± 10</td></tr></table>・Equip the 5100K viewer with a chart and shoot an object in the full range of angle of view in the AUTO mode and the image quality priority mode (high image quality mode).
・Open the recorded image data file through Photoshop and pick up a measurement section with each color (its central area 64 × 64 pixels) with the rectangle selector tool.
・Read the histogram's RGB.</td><td>Color bar chart
Photoshop</td></tr>
</table>

<table>
<tr><th>Item</th><th>Criteria</th><th>Applied tool(s)</th></tr>
<tr><td>Finder</td><td></td><td></td></tr>
<tr><td>View / Image</td><td>・There must be no blur, distortion, ghost, halation or other out-standing troubles in contrast, gradation, etc.</td><td>Visual observation</td></tr>
<tr><td>Visual field frame/ frame line</td><td>・Blur or difference in thickness must be within the proper range to operate the stamped line and visual field frame.</td><td>Visual observation</td></tr>
<tr><td>Shading</td><td>・You can check the whole finder visual field.</td><td></td></tr>
<tr><td>Operation</td><td>・The finder must be activated smoothly in a link operation with the lens barrel zooming action.</td><td></td></tr>
<tr><td>Dust, fluff and damage</td><td>・The position and quantity must be as follows
<table>
<tr><th>Zone / Size</th><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Less than 10 μm</td><td>0 pc</td><td>2pcs or less</td><td>3pcs or less</td></tr>
<tr><td>10 ～ 20 μm</td><td>0 pc</td><td>0 pc</td><td>1pcs or less</td></tr>
<tr><td>More than 20 μm</td><td>0 pc</td><td>0 pc</td><td>0 pcs</td></tr>
</table>


・Total：3pcs or less
・Interval：Less than b/2</td><td>Visual observation</td></tr>
</table>

Item	Criteria	Applied tool(s)
LCD and others		
Monitor LCD View	・The reproduction of W, B and RGB must not be interfered. ・The monitor LCD must comply with the SY monitor LCD performance standard. ・There must be no shading in the LCD display range. ・The inclination of the image and the monitor frame must be ± 0.75° or less. ・The vertical difference and horizontal difference of the black belt width in the image periphery must be within 0.3mm.	Visual observation Visual observation
Visual field ratio	・Through-the-monitor image: 96 to 100% ・Play-back image: 98 to 100%	Visual observation
Bright pixels or dim pixels on LCD	・Perform reproduction for each single color of R, G, B and white and check visually.  ・Bright pixels: Visible normally through 5% ND filter ・Dim pixels: Visible normally (Standard: Within the above quantity)	
Self-timer Operation time: LED blinks/lights	・10 ± 1 second ・Blinks 9 times and lights for 1 second. (Measure the time until release is done since the shutter release button was lightly pressed.)	Visual observation Stop watch

Zone	Bright pixel	Dim pixel
A	1	6
B	3	
Total	4	6

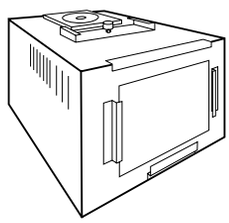
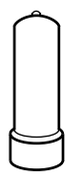
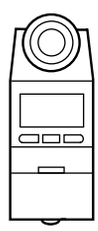
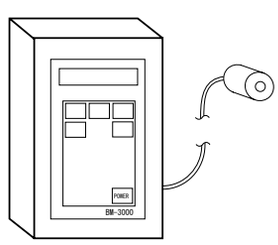
Item	Criteria	Applied tool(s)
Electric characteristics		Constant voltage
Consumption current		power supply
Stand-by	・When card is not used: 0.27mA or less (when the power switch is OFF)	Ammeter
		Dummy battery pack
	・When card is used: 0.39mA or less (when the power switch is OFF)	
Start (Photography)	・12mA or less (at "Sleep")	
	・0.75W or less (when the power switch is OFF	
B. C voltage		Constant voltage
When voltage		power supply
decreases		Volt meter
(Alkaline battery)		Dummy battery pack
Level 1	・2.125 ± 0.1V	
Level 2	・2.0 ± 0.1V(The battery mark blinks.)	
Level 3	・There is no regulation of voltage. (Power OFF)	
(Ni-MH)		
Level 1	・2.35 ± 0.1V	
Level 2	・2.0 ± 0.1V (The battery mark blinks.)	
Level 3	・There is no regulation of voltage. (Power OFF)	
(Li battery)		
Level 1	・2.425 ± 0.1V	
Level 2	・2.0 ± 0.1V (The battery mark blinks.)	
Level 3	・There is no regulation of voltage. (Power OFF)	
	・Connect the constant-voltage power supply to the dummy battery pack and decrease the power supply voltage 1 second before. The voltage is under the following conditions now. Measure the voltage (excluding "When voltage increases").	
	・Level 1 : The battery "half" mark lights on the monitor LCD.	
	・Level 2 : The "no battery capacity" warning appears on the monitor LCD.	
	・Level 3 : Power OFF	
	・In the case of the voltage at Level 1, also measure the voltage when pressing lightly the shutter release button.	
	・When measuring the voltage at Level 3, the power must be automatically turned off after 30 seconds since the voltage reached Level 2. The voltage must not be regulated.	

Item	Criteria	Applied tool(s)
Electric characteristics When voltage increases (Alkaline battery)		
Level 1	・2.25 ± 0.1V	
Level 2	・2.1 ± 0.1V	
(Ni-MH)		
Level 1	・2.45 ± 0.1V	
Level 2	・2.1 ± 0.1V	
(Li battery)		
Level 1	・2.6 ± 0.1V	
Level 2	・2.1 ± 0.1V	
	・Connect the constant-voltage power supply to the dummy battery pack and check the voltage at Level 3 ("no battery capacity" indication). Then, turn off the power, increase the voltage by 0.1V and change the power switch from OFF to ON. The voltage is under the following conditions now. Measure the voltage. (When changing the voltage, turn off the power.) ・Level 1 : The battery mark is turned off on the monitor LCD. ・Level 2 : The battery "half" mark lights on the monitor LCD.	

［2］工具一覧表　Tool List

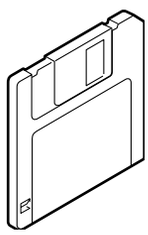
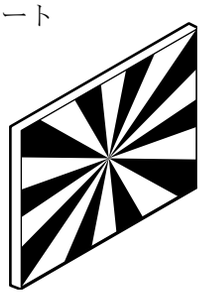
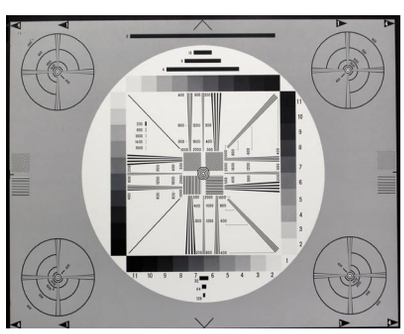
※：新規工具

※：New tool

工具番号 Tool No.	名　称 Name	備　考 Remarks
J63080	パターンボックス　LV-1450DC Pattern Box　LV-1450DC 	共通（E4300, E3500, E3100, E2100, E5400, E3700, E3200, E2200, E8700, E4100, E4600, E5600） Common（E4300, E3500, E3100, E2100, E5400, E3700, E3200, E2200, E8700, E4100, E4600, E5600）
J63080A	交換用ハロゲンランプ（LV-1450DC 用） Spare Harogen Lamp　(For LV-1450DC) 	LV-1450DC Exclusive
J63081	カラーメータ（ミノルタカラーメータⅢF） Color Meter(Minolta Color meter Ⅲ F) 	共通 Common
J63068	輝度計 BM-3000 Luminance Meter BM-3000 	共通 Common

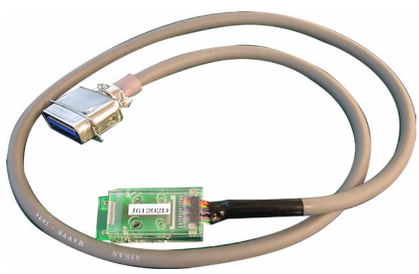
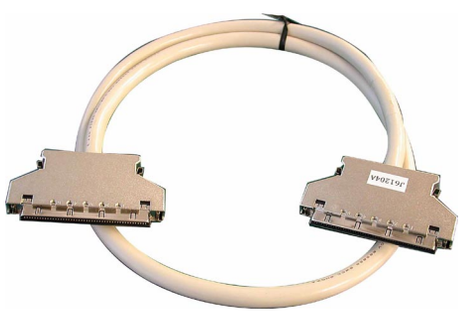
※：新規工具

※：New tool

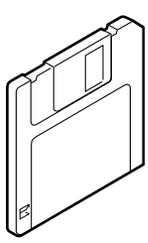
工具番号 Tool No.	名　　称 Name	備　考 Remarks
※J65071	キャリブレーションソフト Calibration Software 	共通（E995,E775,E885 E5000, E2500, E4500 E5700, E4300, E3500 E3100, E2100, E5400 E3700, E3200, E2200 E8700, E4100, E4600 E5600） Common（E995,E775,E885 E5000, E2500, E4500 E5700, E4300, E3500 E3100, E2100, E5400 E3700, E3200, E2200 E8700, E4100, E4600 E5600）
J63090	コリメータ（C-DSC） Collimator （C-DSC） 	共通 Common
サービスマニュアル添付 Attached in Service Manual	ジーメンスチャート 	共通 Common
J63079	ITE 高精細解像度ﾁｬｰﾄ（4:3 反射型） ITE HIGH RESOLUTION CHART （4:3 REFLECT TYPE） 	共通 Common

※：新規工具

※：New tool

工具番号 Tool No.	名　　称 Name	備　考 Remarks
※J61202	レンズユニット検査工具 Lens unit checking tool 	FFD 点検調整用 For FFD inspection and adjustment
※J61202F	接続コード Connection cable for lens 	FFD 点検調整用 For FFD inspection and adjustment
※J61204	デジタル通信ボード PCI I/F board 	FFD 点検調整用 For FFD inspection and adjustment
※J61204A	通信ボード用ケーブル Connection cable for PC 	FFD 点検調整用 For FFD inspection and adjustment

※：新規工具
※：New tool

工具番号 Tool No.	名　　称 Name	備　考 Remarks
※J15327	FFD 調整用マイクロ台 Adjusting focus stand for APS 	FFD 点検調整用 For FFD inspection and adjustment
※J15327A	FFD 調整用マイクロ台アダプター Adapter for J15327A 	FFD 点検調整用 For FFD inspection and adjustment
※J15327D	FFD 調整用マイクロ台アダプター Adapter for J15327D 	FFD 点検調整用 For FFD inspection and adjustment
※J65072	E4600/E5600 鏡筒駆動ソフト E4600/E5600 lens unit checking program 	FFD 点検調整用 For FFD inspection and adjustment

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