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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

COOLPIX3700

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

Recycled paper
再生紙を使用しています

Printed in Japan Jan 2004

CONTENTS

Specifications

Type	E3500 digital camera
Effective pixels	3.2 mega-pixels
CCD	1/2.7-inch high-density CCD; total pixels: 3.34 mega-pixels
Image size (pixels)	2048×1536 (2048), 1600×1200 (1600), 1024×768 (1024), 640×480 (640)
Lens Focal distance Aperture range Lens construction	3×Zoom Nikkor f = 5.4 to 16.2mm (35 ~ 105mm by conversion with 35mm-format) F2.8 ~ F4.9 7 elements in 6 groups
Digital zoom	Max. 4.0×
Auto focus (AF)	Contrast-detect through-the-lens (TTL) AF
Focus range	30 cm (1 ft.)-∞ at widest angle (W), 60 cm (2 ft.)-∞ at telephoto (T) (Approx. 4cm (Wide position in zooming) ~ ∞ in Macro mode)
AF area	Automatic 5-area multi AF; manual selection available
Finder	Real image type zoom finder, field of viewfinder: Approx. 80%
Monitor	1.5-inch 134,000-dot, High transmissive advanced TFT LCD monitor with 5 level brightness adjustment
Storage Media File system File format	 SD (Secure Digital) memory cards Compliant with Design rule for Camera File systems (DCF), Exif 2.2, Digital Print-Order Format (DPOF) Compressed: JPEG-baseline-compliant Movies: QuickTime
Exposure Metering Exposure control	 256-segment multi-metering, AF metering point (5 points) Programmed auto, exposure compensation (–2.0 ~ +2.0 EV in steps of 1/3 EV)
Range (ISO equivalent)	W: EV 1.0 to 17.1 T: EV 2.6 to 18.6
Shutter	Mechanical and charge-coupled electronic shutter
Shutter Speed	4-1/3000 sec.
Aperture Range	Electronically controlled preset aperture Two steps (f/2.8 and f/4.7 [W])
Sensitivity	Approximately equivalent to ISO50 (auto gain to ISO 200 equivalent)
Self-timer	10- or 3-second duration; sound release
Built-in Speedlight Range Flash control	 0.4-3.0 m/ 1'4" - 9'10" (W) 0.4-1.7m / 1'4" -5'7" (T) Sensor flash system

Interface	USB
Video output	Can be selected from NTSC and PAL
I/O terminals	DC input terminal, audio/video (A/V) out with digital I/O
Power sources	One rechargeable Nikon EN-EL5 lithium-ion battery (supplied) One CP1 lithium battery EH-62A AC adapter
Approximate battery life	200 shots (EN-EL5)/250 shots (CP1) Measured at standard temperature (20°C/68°F) with fully-charged batteries under standard Nikon test conditions: zoom adjusted with each shot, flash used with every other shot, image mode set to Normal.
Dimensions (W×H×D)	95.5×50×31mm
Weight	Approximately 130 g without battery and memory card
Operating environment Temperature Humidity	 0 - 40°C (32 – 104°F) Under 85% (no condensation)

DISASSEMBLY

⚠ WARNING

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

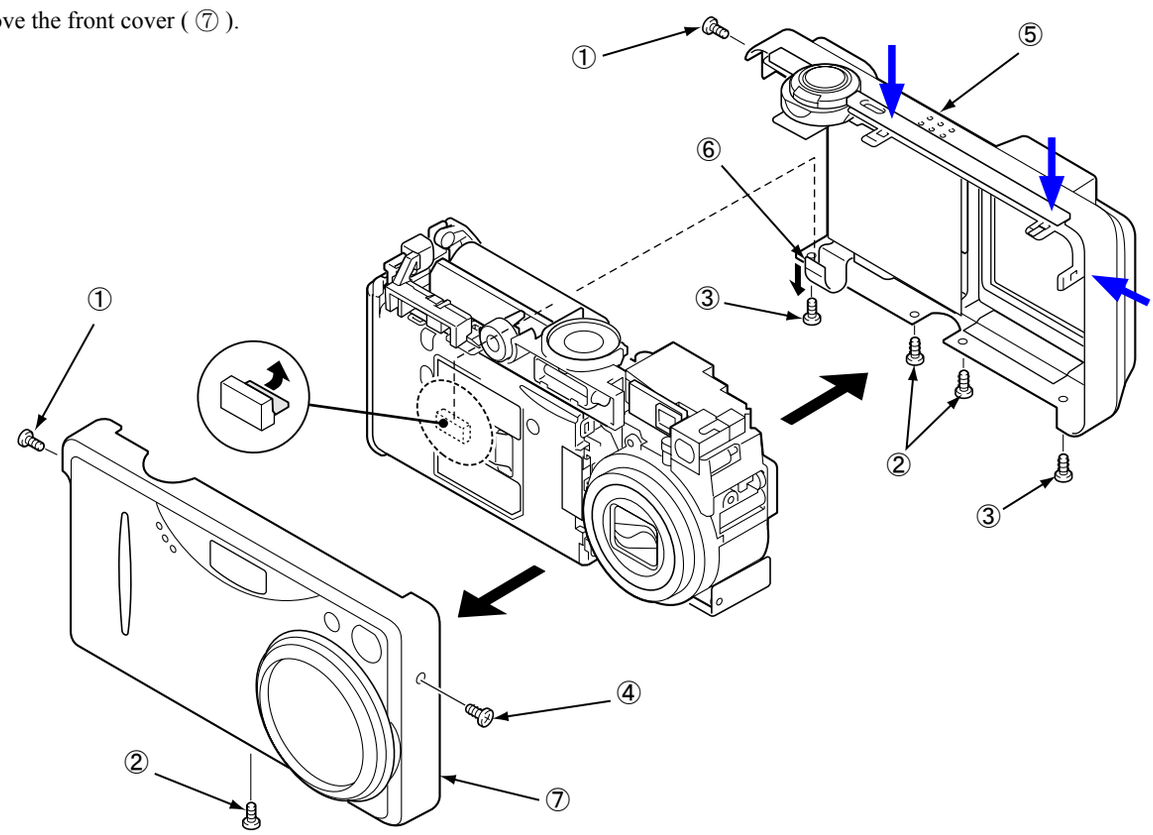
Points to notice for Lead-free solder products

- 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.

Front cover, Rear cover

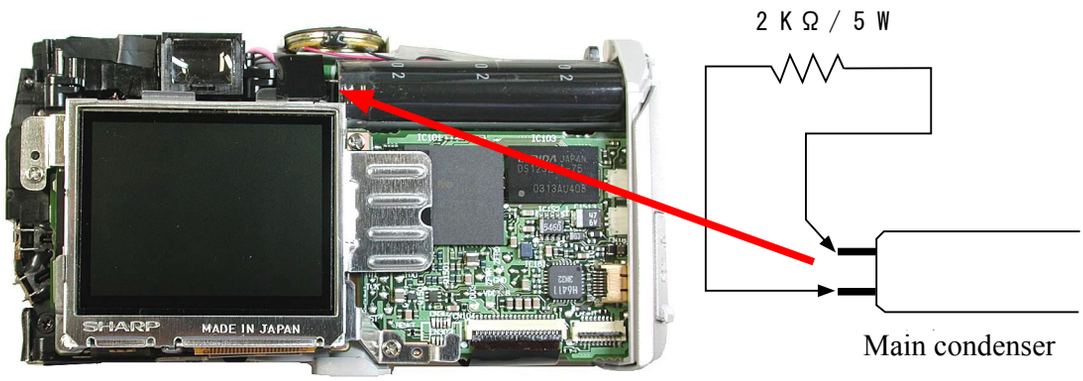
- Take out 2 screws (① : M1.4×3).
- Take out 3 screws (② : M1.7×4).
- Take out 2 screws (③ : M1.7×2.5).
- Take out 1 screws (④ : M1.7×3.5).
- While pushing in the direciton of (↓), open the rear cover (⑤) to remove the connector (⑥).
- Remove the front cover (⑦).



Discharge Main Condenser

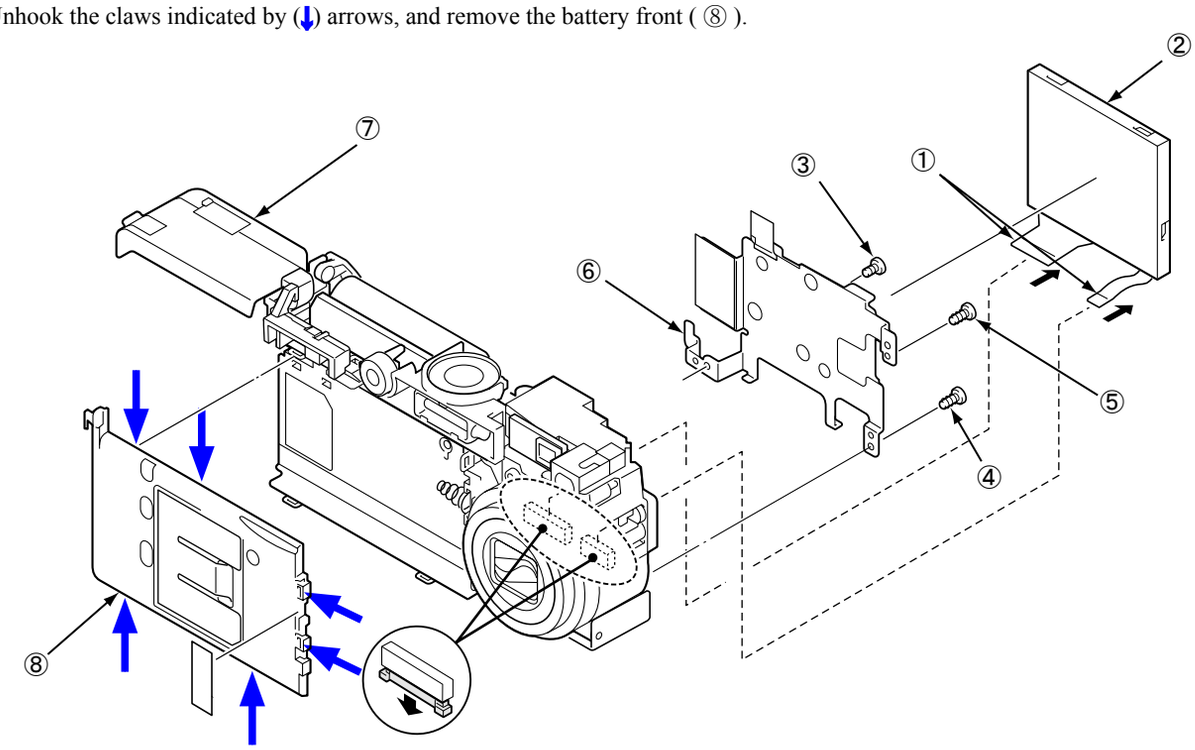
⚠ WARNING

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



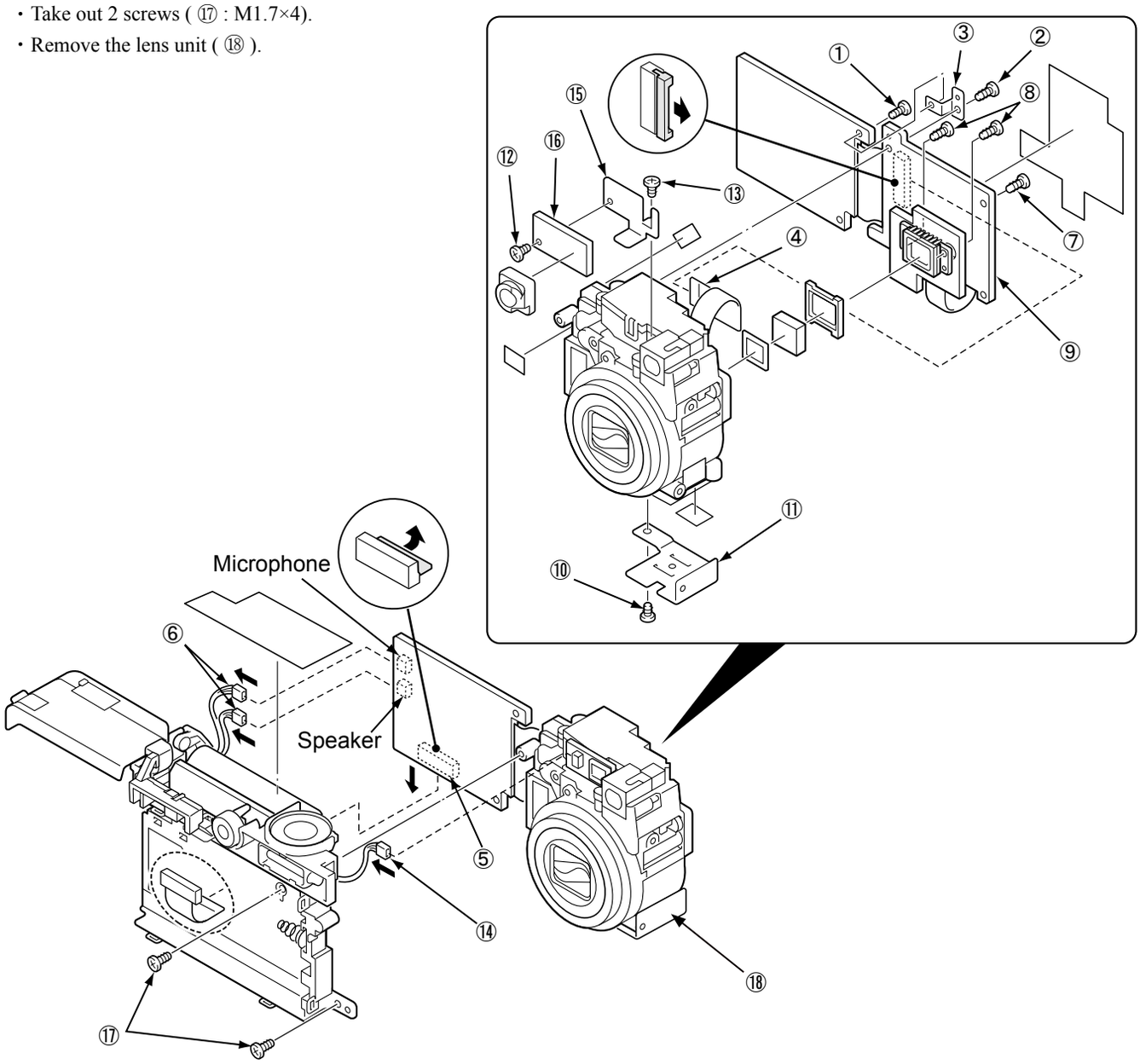
Battery holder unit, LCD unit

- Remove 2 connectors (①).
- Remove LCD (②).
- Take out 1 screw (③ : M1.7×2.5).
- Take out 1 screw (④ : M1.7×4).
- Take out 1 screw (⑤ : M1.7×3.5).
- Remove the LCD holder (⑥).
- Open the battery cover (⑦).
- Unhook the claws indicated by (⇩) arrows, and remove the battery front (⑧).



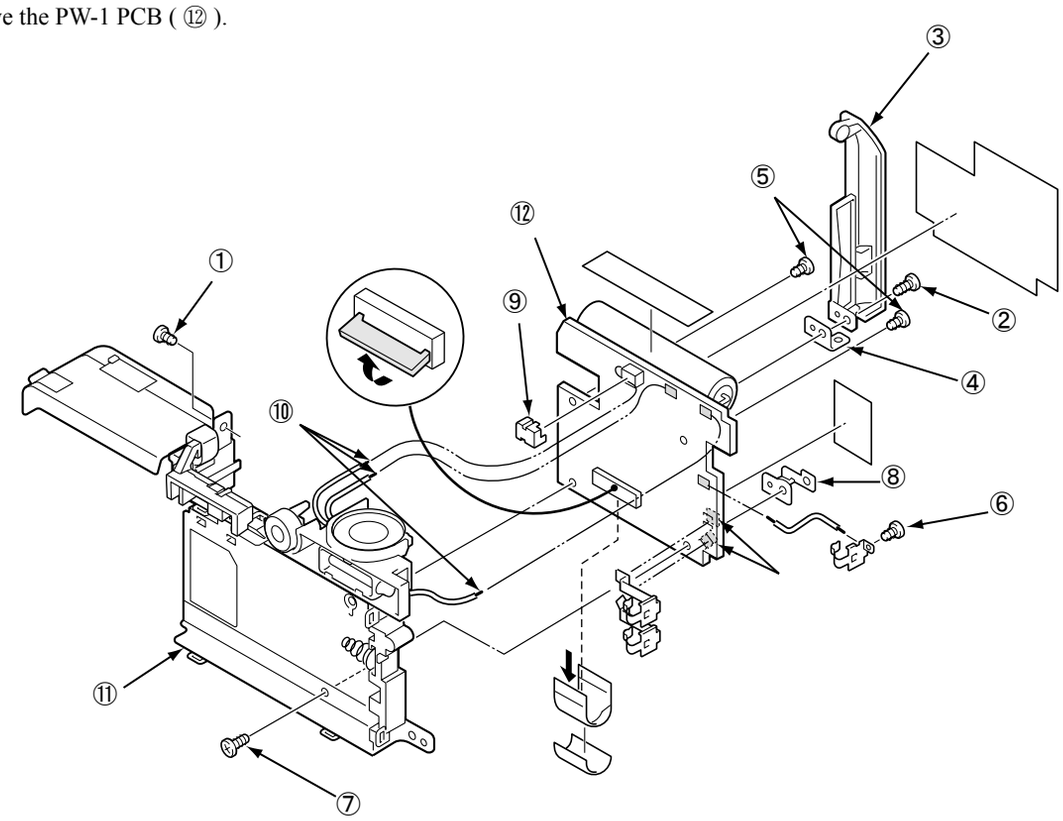
CP-1 PCB / TB-1 PCB

- Take out 1 screw (① : M1.7×2.5).
- Take out 1 screw (② : M1.7×4).
- Remove the holder PW-1/CP-A (③).
- Remove the connector (④).
- Remove the connector (⑤).
- Remove 2 connectors (⑥).
- Take out 1 screw (⑦ : M1.7×3.5).
- Take out 2 screws (⑧ : M1.4×3.5).
- Remove the CP-1 PCB (⑨).
- Take out 1 scrw (⑩ : M1.7×2.5).
- Remove the lens holder (⑪).
- Take out 1 screw (⑫ : M1.7×3).
- Take out 1 screw (⑬ : M1.4×3.5).
- Remove the connector (⑭).
- Remove the LED holder (⑮).
- Remove the TB1 PCB (⑯).
- Take out 2 screws (⑰ : M1.7×4).
- Remove the lens unit (⑱).

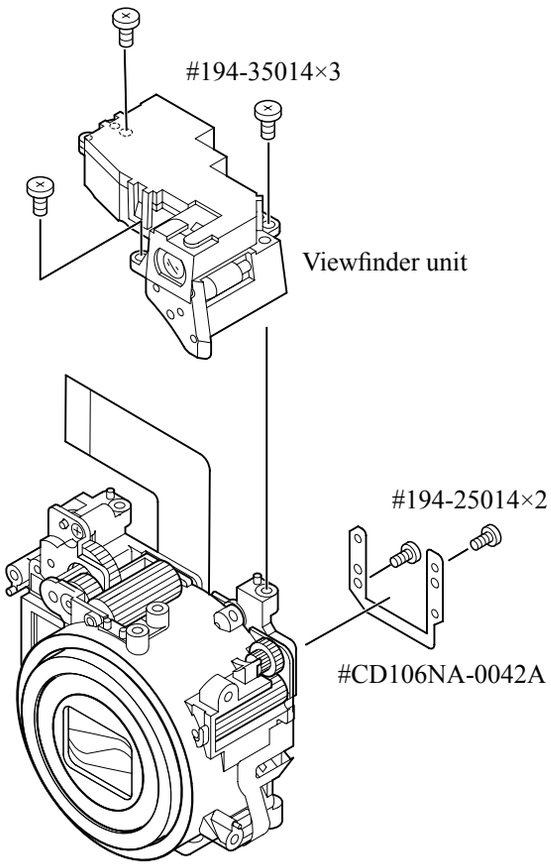


PW-1 / Battery holder

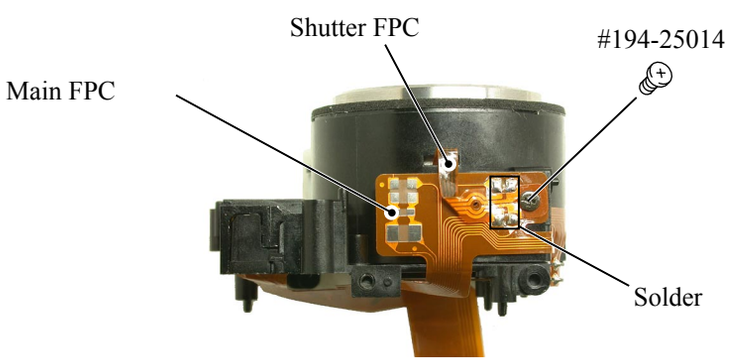
- Take out 1 screw (① : M1.7×3).
- Take out 1 screw (② : M1.7×4).
- Remove the card holder (③).
- Remove the holder PW-1/rear cover (④).
- Take out 2 screws (⑤ : M1.7×2.5).
- Take out 1 screw (⑥ : M1.7×4).
- Take out 1 screw (⑦ : M1.7×4.5).
- Remove the holder CP-A/CP-B (⑧).
- Remove the trigger cover (⑨).
- Remove 3 solders (⑩).
- Remove the battery back holder (⑪).
- Remove the PW-1 PCB (⑫).



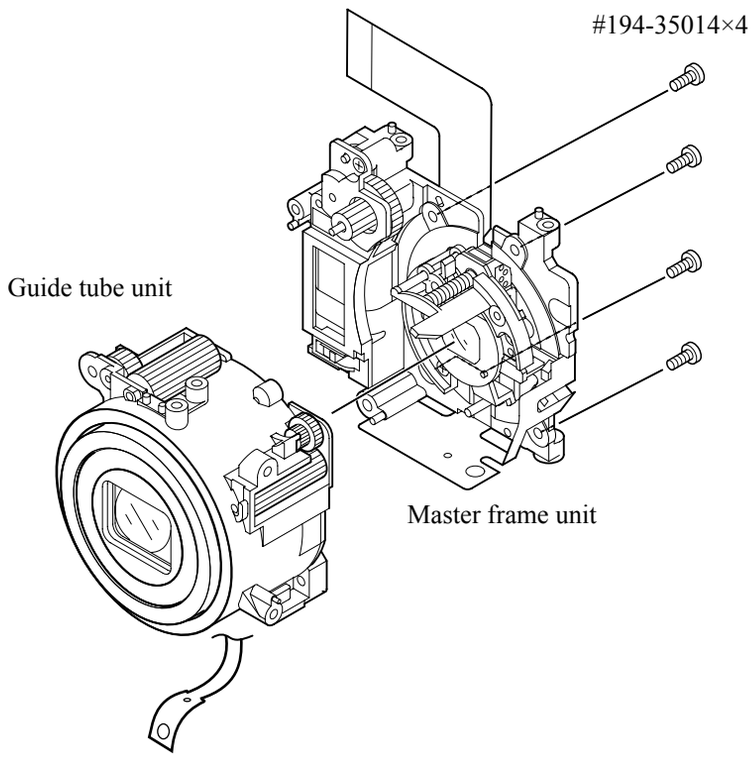
Viewfinder unit



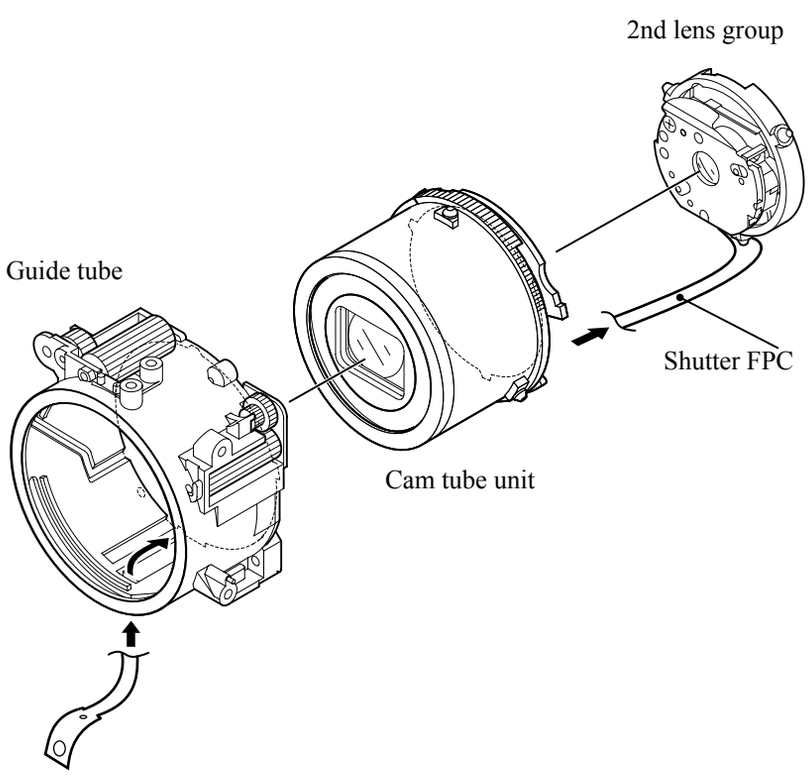
Unsolder



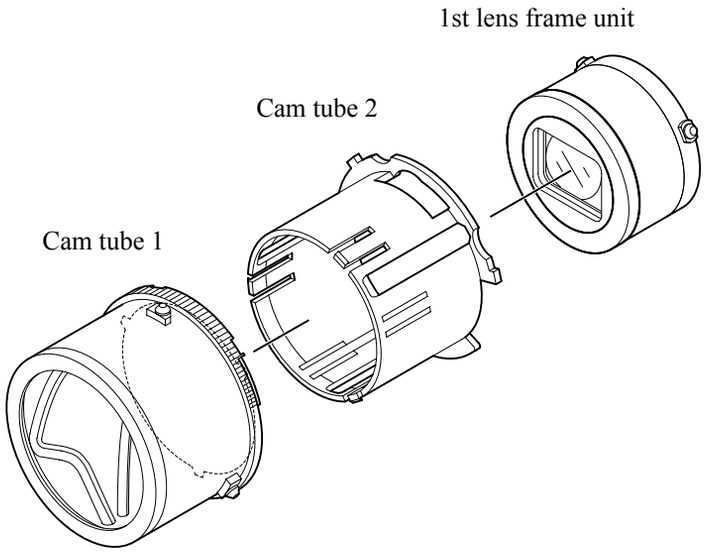
Guide tube unit



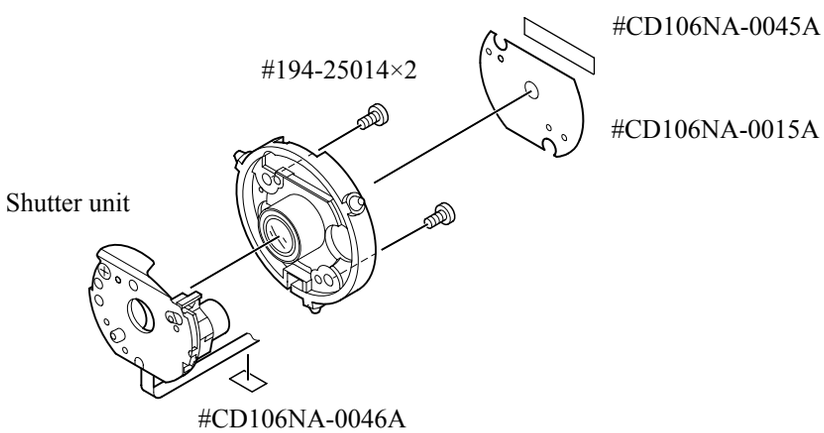
Cam tube unit / 2nd lens group



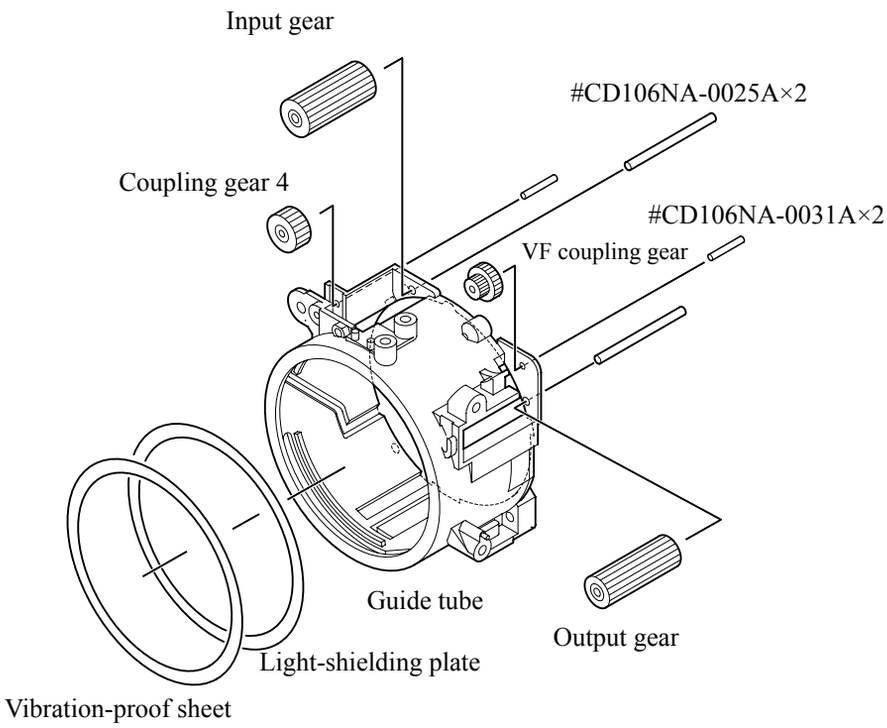
Cam tube



Shutter unit

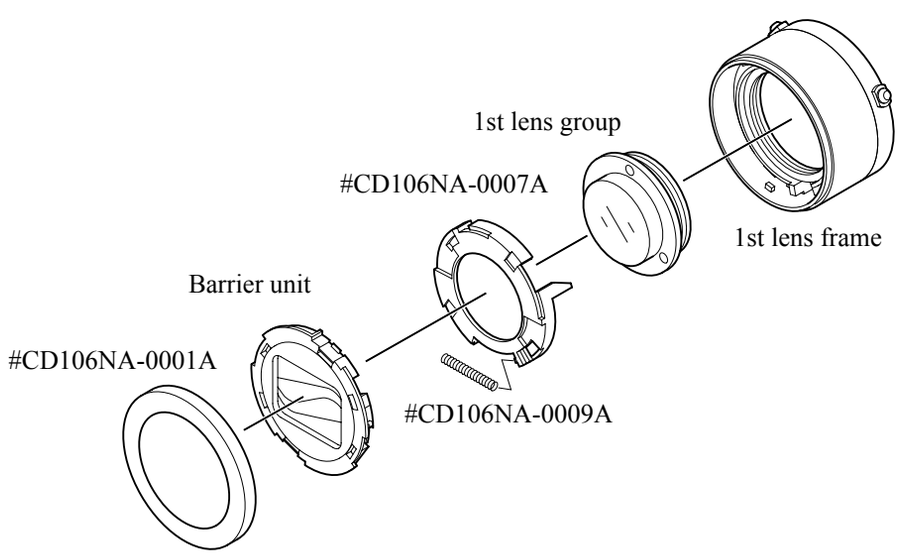


Light-shielding plate / Coupling gear

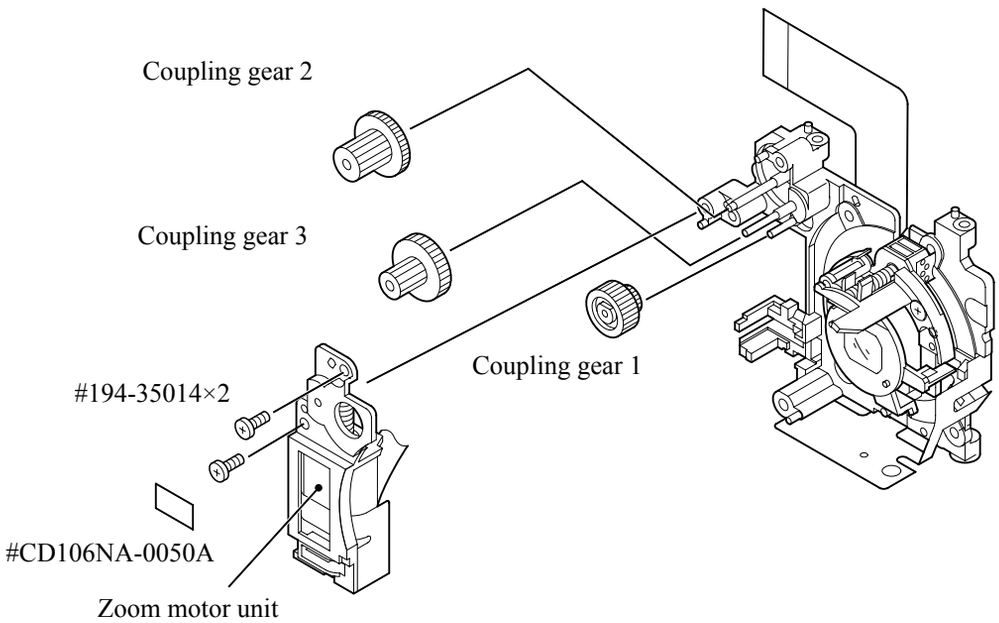


1st lens group / Barrier unit

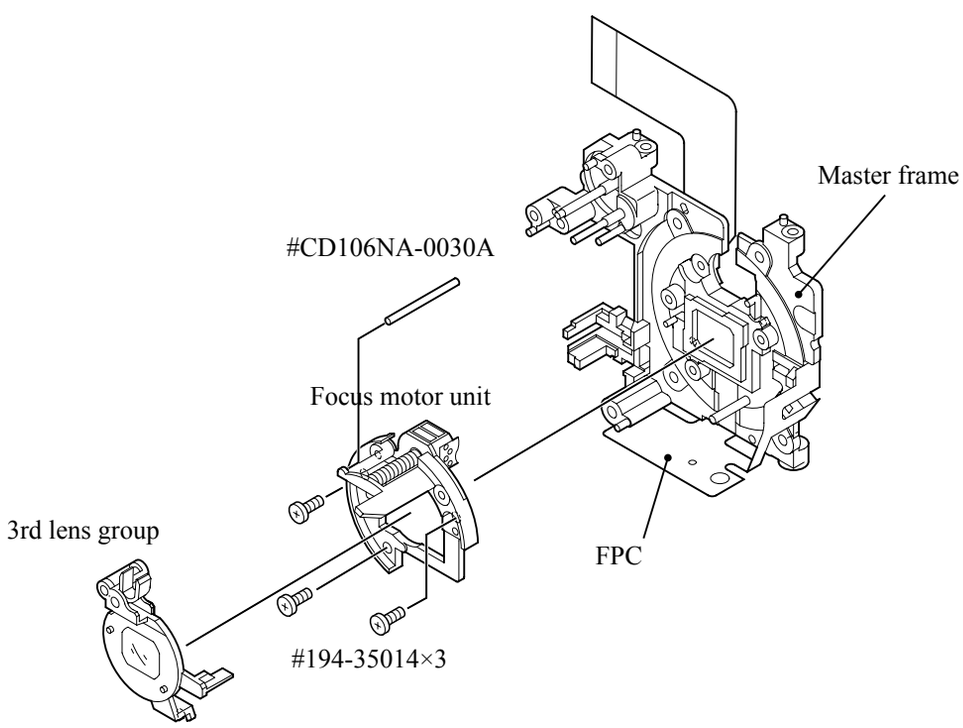
Note: When the 1st lens group is disassembled, it is necessary to make lens focusing adjustments for alignments from WIDE through TELE. Therefore, do NOT remove other parts than the 1st lens frame.



Zoom motor unit / Coupling gear



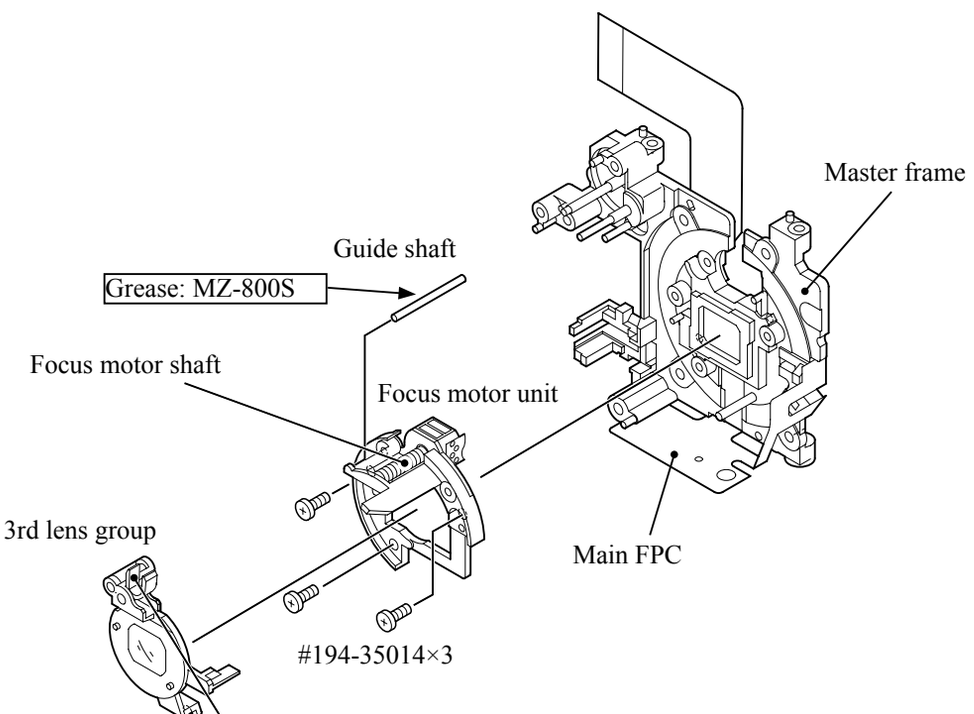
3rd lens group / Focus motor unit

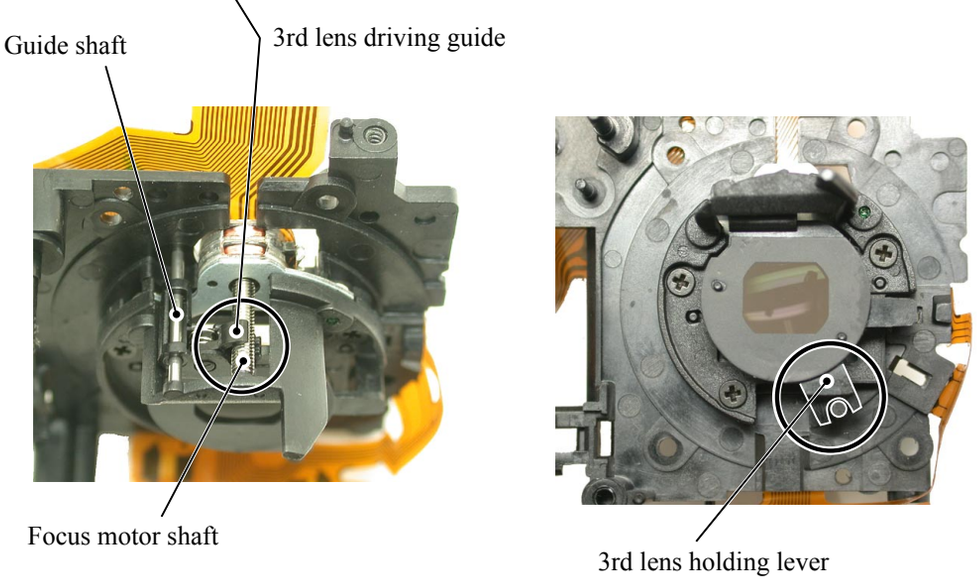


ASSEMBLY

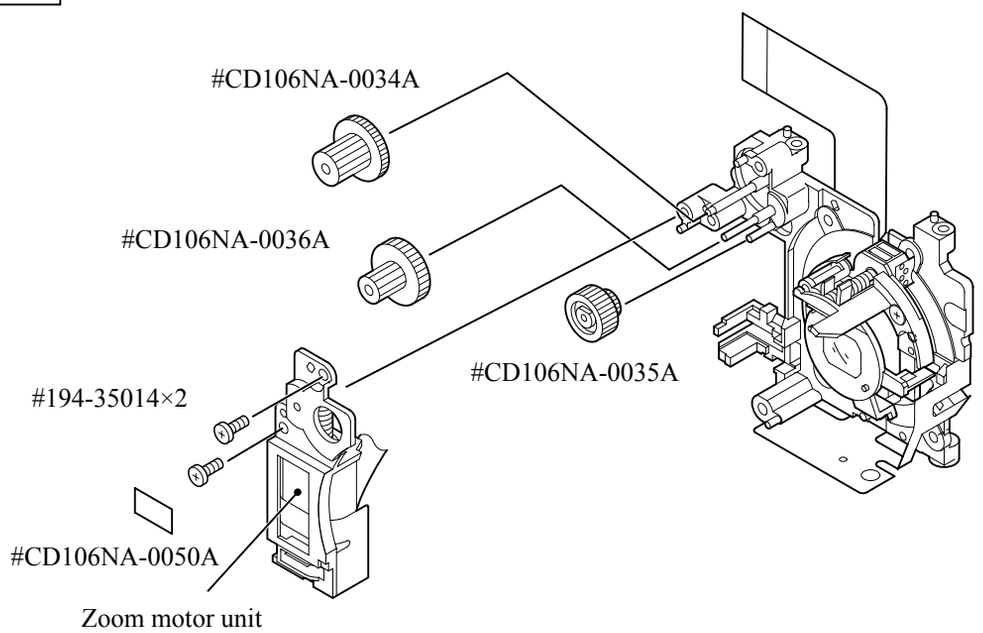
3rd lens group / Focus motor unit

① Apply the grease (MZ-800S) on the guide shaft (CD106NA-0030A).
② Fit the 3rd lens driving guide in the focus motor shaft, and put the guide shaft through the 3rd lens group and focus motor unit as shown below.
③ Position the 3rd lens holding lever as below and assemble it into the master frame.
④ Attach the focus motor unit with 3 screws (#194-35014).





Zoom motor unit



1st lens group / Barrier unit

Note: When the 1st lens group is disassembled, make lens focusing adjustments for alignments from WIDE through TELE.

① Assemble the 1st lens group into the 1st lens frame.

② Apply the adhesive from the inside to 3 parts. (ref. Fig.1 on next page)

③ Assemble the barrier coupling plate. (ref. Fig.2 on next page)

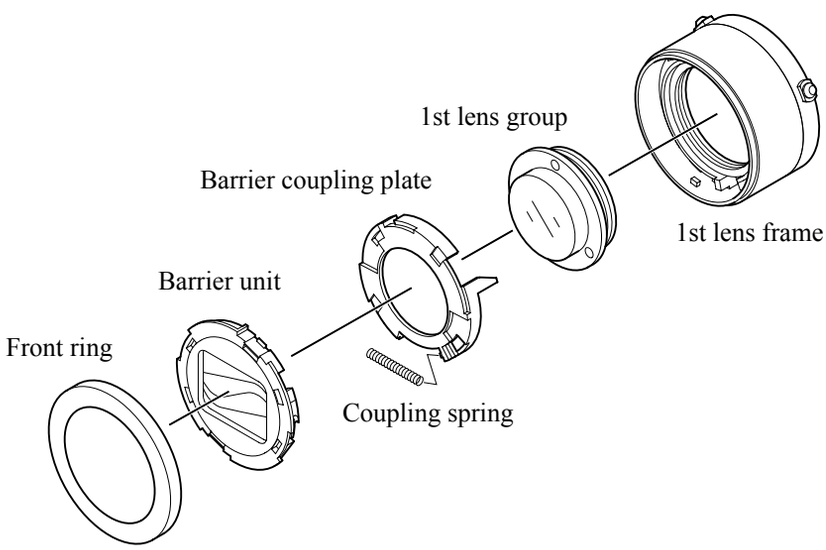
④ Assemble the coupling spring. (ref. Fig.2 on next page)

⑤ Move the barrier coupling-plate lever unit in the direction of the arrow, and hold it. (ref. Fig.3 on next page)

⑥ Assemble the barrier unit. (ref. Fig.4 on next page)

⑦ By moving the barrier coupling-plate lever unit into the direction of the arrow, check opening/closing motion of the barrier.

⑧ Apply the adhesive(C-8008B) on the inside of front ring, and assemble it. (ref. Fig.5 on next page)



1st lens group / Barrier unit

Apply adhesive on 1st lens group

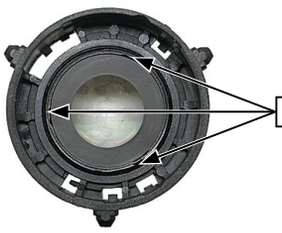


Fig.1

Position for attaching Barrier coupling plate and Coupling spring

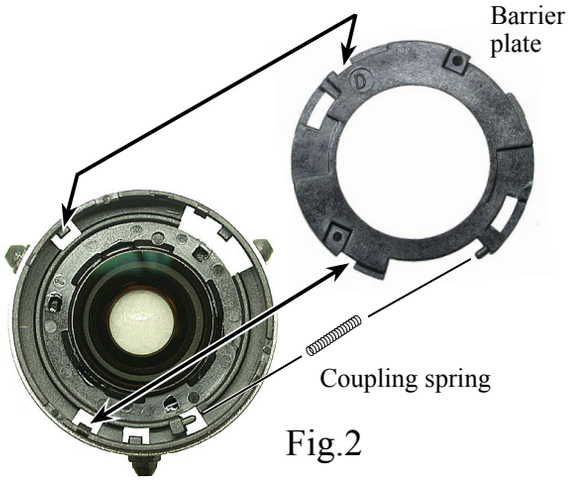


Fig.2

Barrier coupling plate lever unit

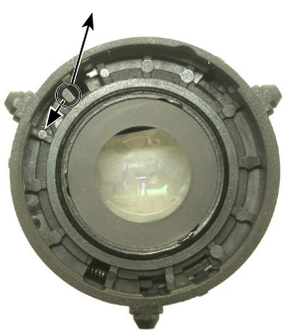


Fig.3

Position for attaching Barrier unit

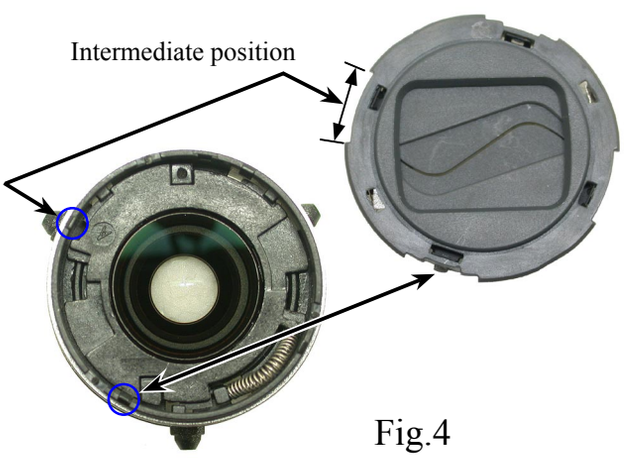


Fig.4

Position for attaching Front ring

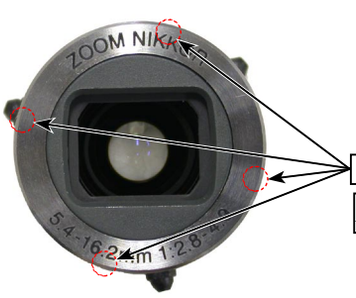
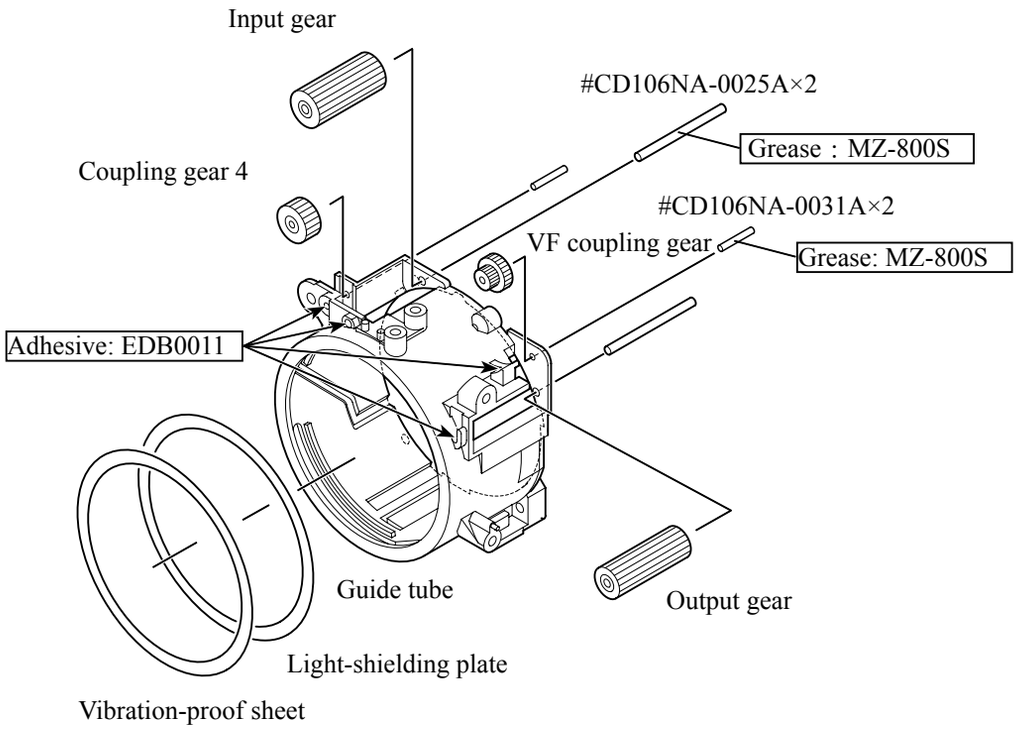
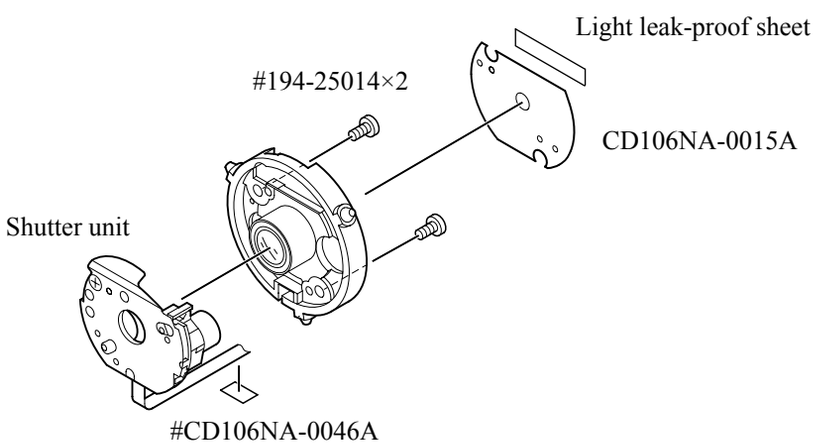


Fig.5

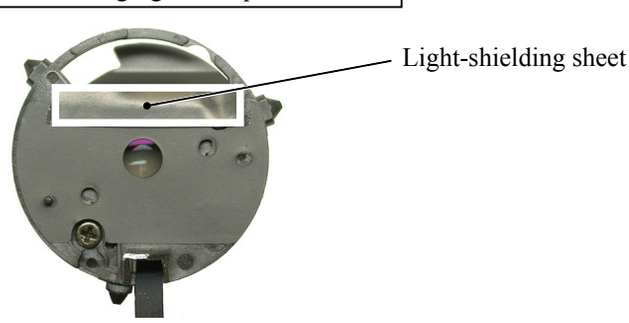
Light-shielding plate / Coupling gear



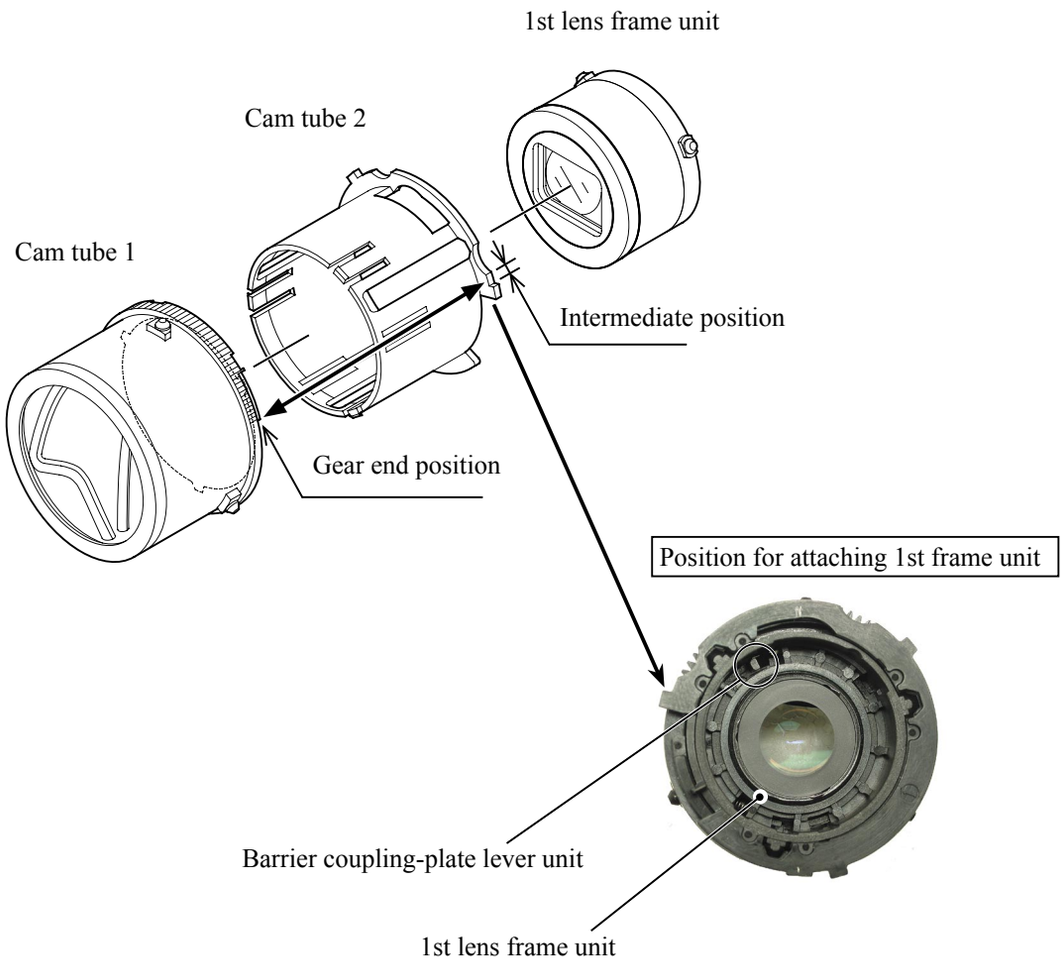
Shutter unit



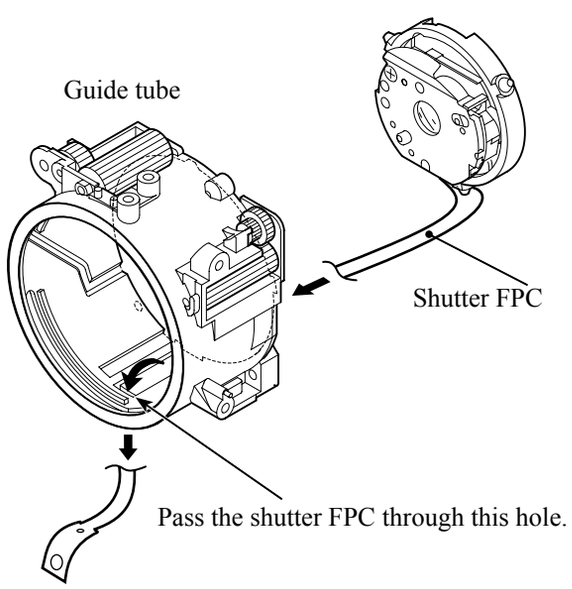
Position for attaching light leak-proof sheet



Cam tube



Shutter FPC

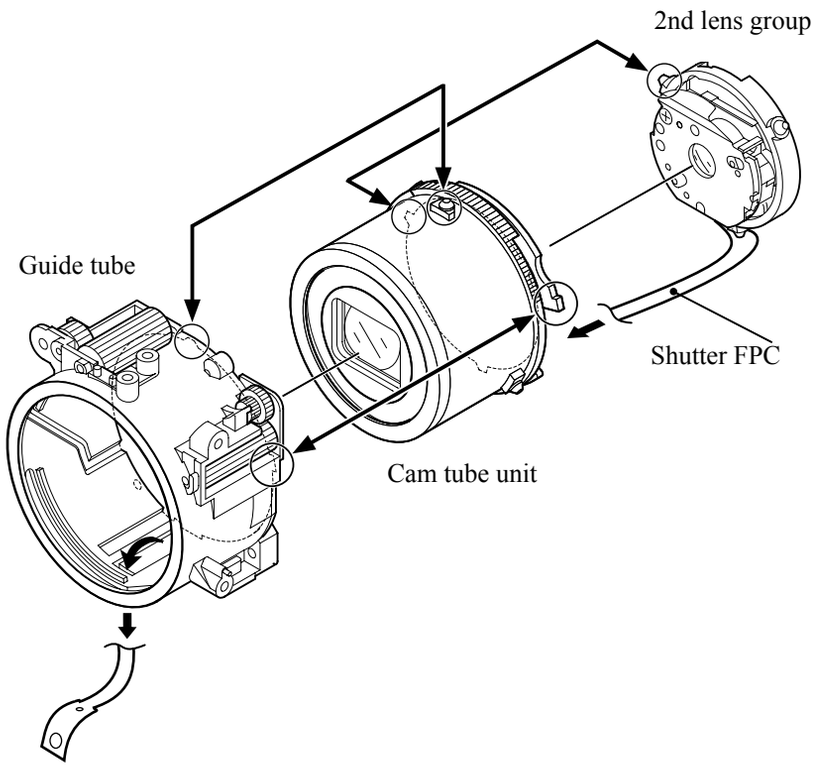


Cam tube unit / 2nd lens group

① While handling the shutter FPC with care, assemble the cam tube unit as shown below.
（In case of difficulty in assembling the cam tube unit, assemble it while turning the coupling gear on the guide tube.）

② Assemble the 2nd lens group as shown below.

③ By turning the cam tube, check if it turns smoothly.

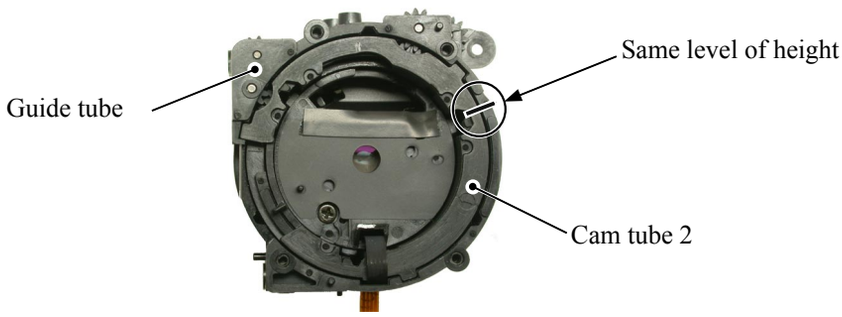


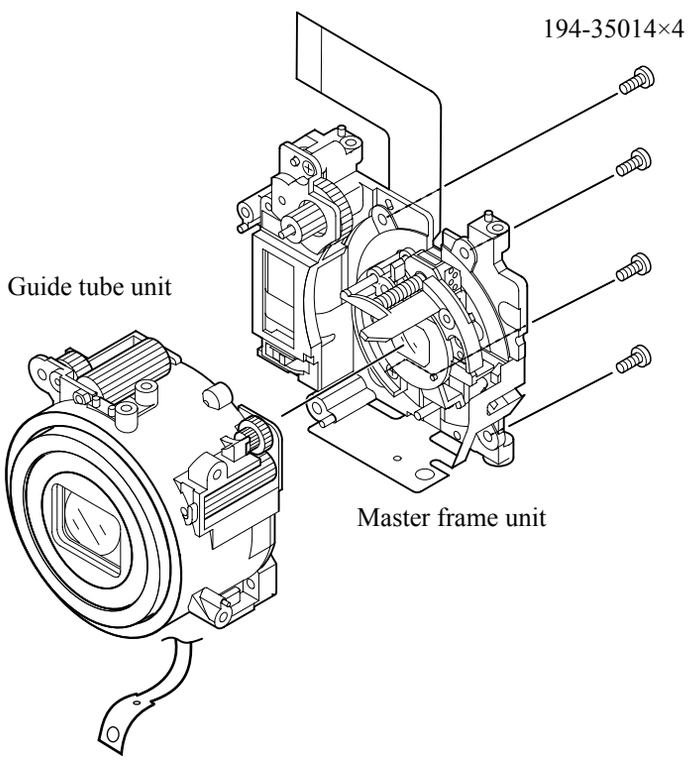
Guide tube unit

① Set the guide tube and cam tube 2 at the below position.

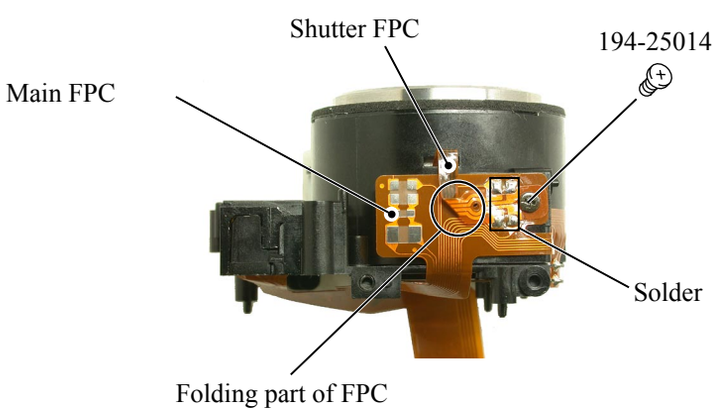
② Attach the guide tube unit on the master frame unit with 4 screws (#194-35014).

③ Check if the barrier is completely closed.





Soldering

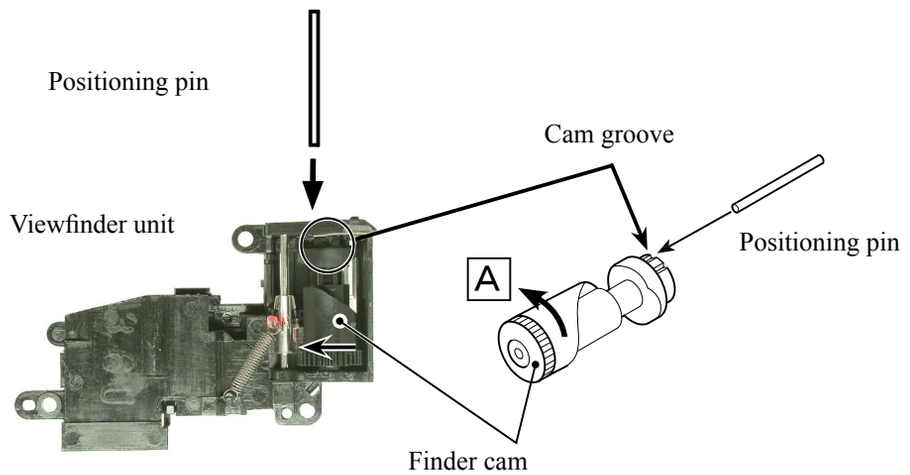


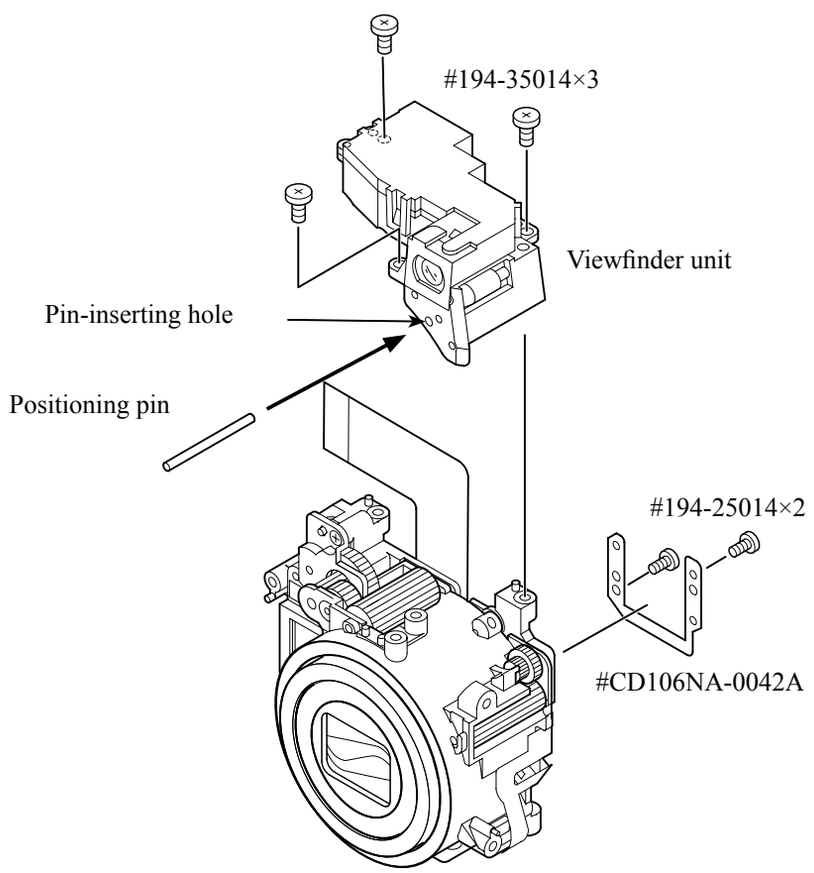
Viewfinder unit

① After turning the finder cam in the direction of the arrow (A) to the full up position, turn it back a little so that the 2nd cam groove and the pin-inserting hole are aligned. Then, insert the positioning pin (approx. 0.5 mm).

② Attach the viewfinder unit with 3 screws (#194-35014).

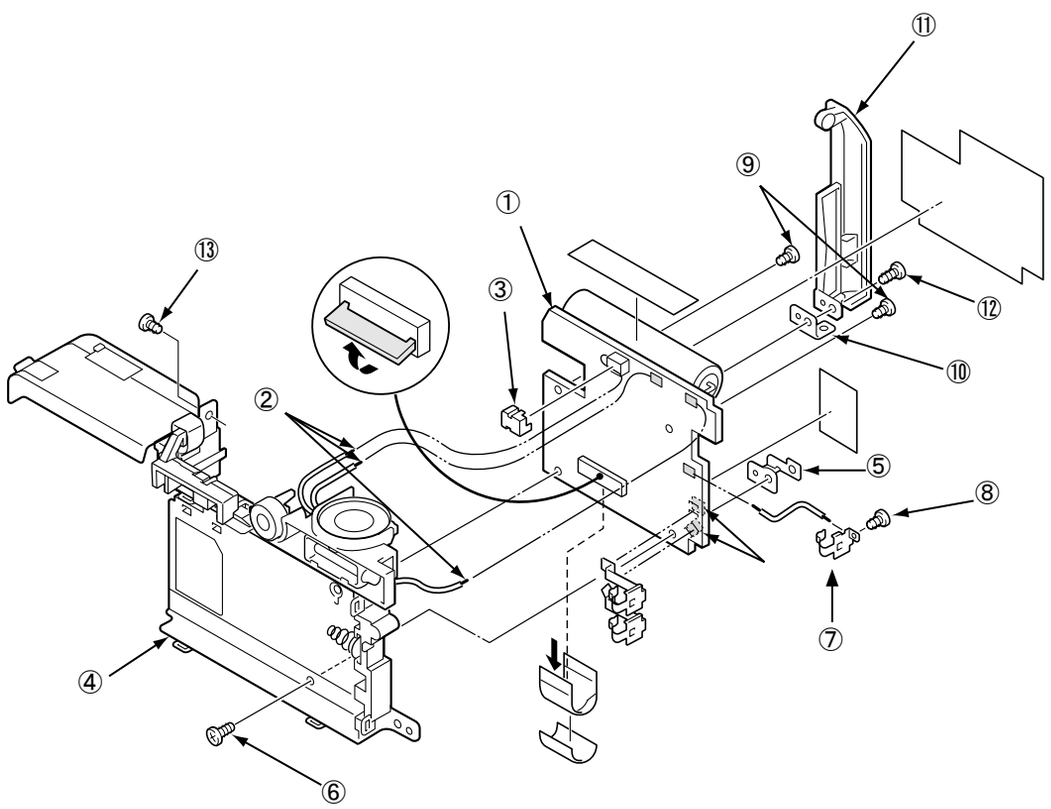
③ Attach the CCD spacer (CD106NA-0042A) with 2 screws (#198-25014).





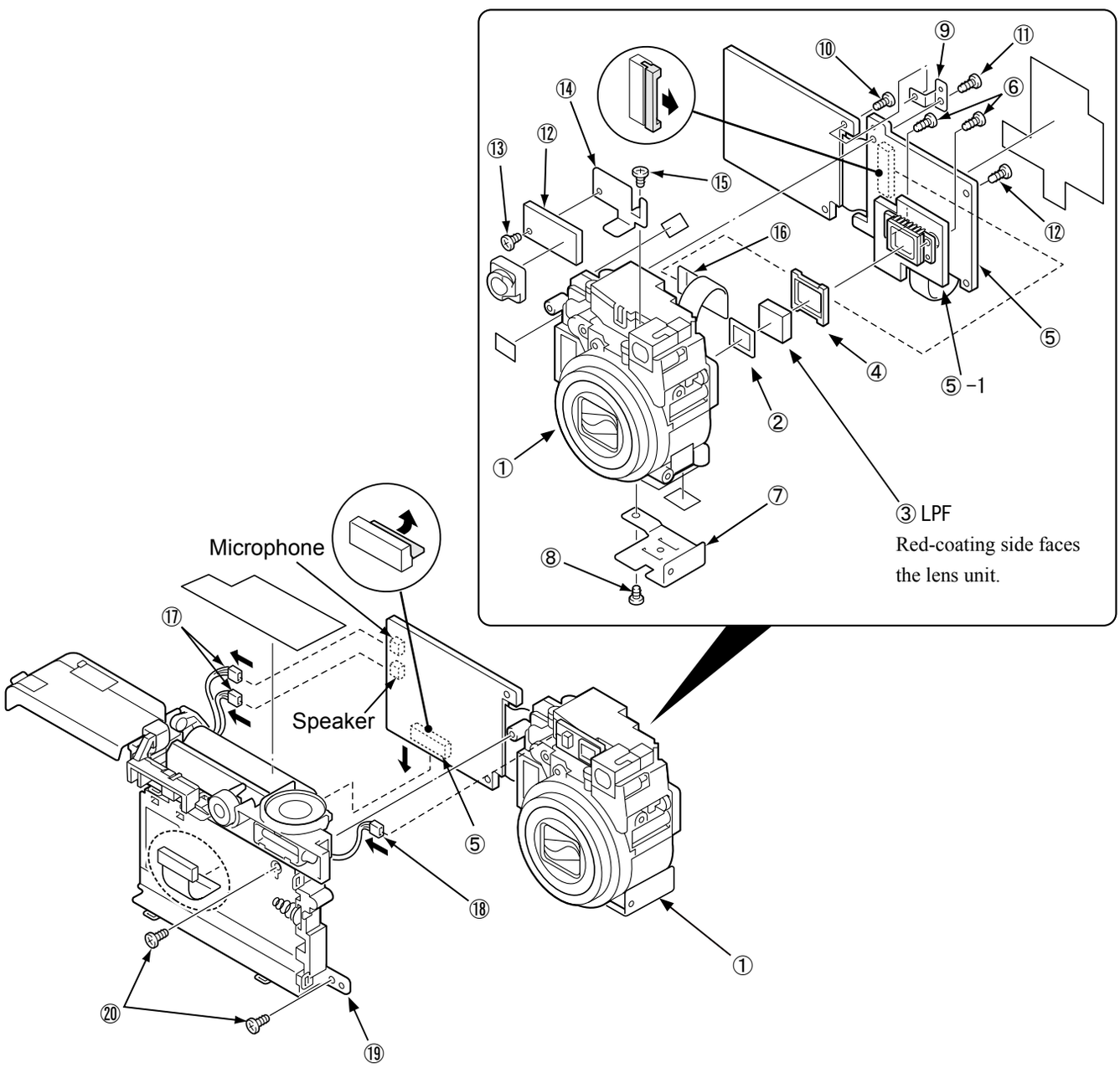
PW-1 / Battery holder

- Make 3 solders (②) on the PW-1 PCB (①).
- Attach the trigger cover (③).
- Attach the battery back holder (④) and the holder CP-A/CP-B (⑤) to the PW-1 PCB (①).
- Tighten 1 screw (⑥ : M1.7×4.5).
- Attach the back terminal A(⑦) to the battery back holder (④).
- Tighten 1 screw (⑧ : M1.7×4).
- Tighten 2 screws (⑨ : M1.7×2.5).
- Attach the holder PW-1/rear cover (⑩) and the card holder (⑪).
- Tighten 1 screw (⑫ : M1.7×4).
- Tighten 1 screw (⑬).



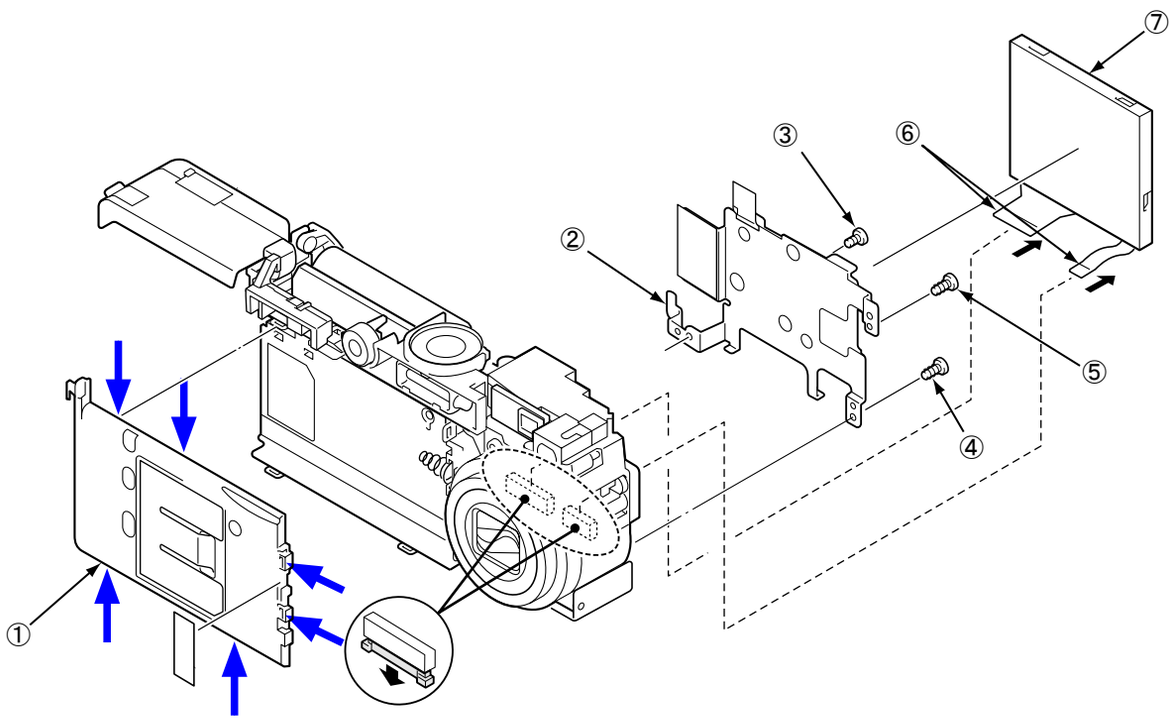
Lens unit / CP-1 PCB / TB-1 PCB

- Assemble the aperture (②), LPF (③) and spacer (④) into the lens unit (①).
- Assemble the CCD unit (⑤ -1) of the CP-1 PCB (⑤) into the lens unit (①).
- Tighten 2 screws (⑥ :M1.4×3.5).
- Attach the lens holder (⑦).
- Tighten 1 screw (⑧ : M1.7×2.5).
- Attach the holder PW-1/CP-A (⑨).
- Tighten 1 screw (⑩ : M1.7×2.5).
- Tighten 1 screw (⑪ : M1.7×4).
- Attach the TB1 PCB (⑫).
- Tighten 1 screw (⑬ : M1.7×3.5).
- Attach the LED holder (⑭).
- Tighten 1 screw (⑮ : M1.7×3.5).
- Connect the FPC (⑯).
- Connect 2 connectors (⑰).
- Connect 1 connector (⑱).
- Attach the battery back holder (⑲) to the lens unit (①).
- Tighten 2 screws (⑳ : M1.7×4).



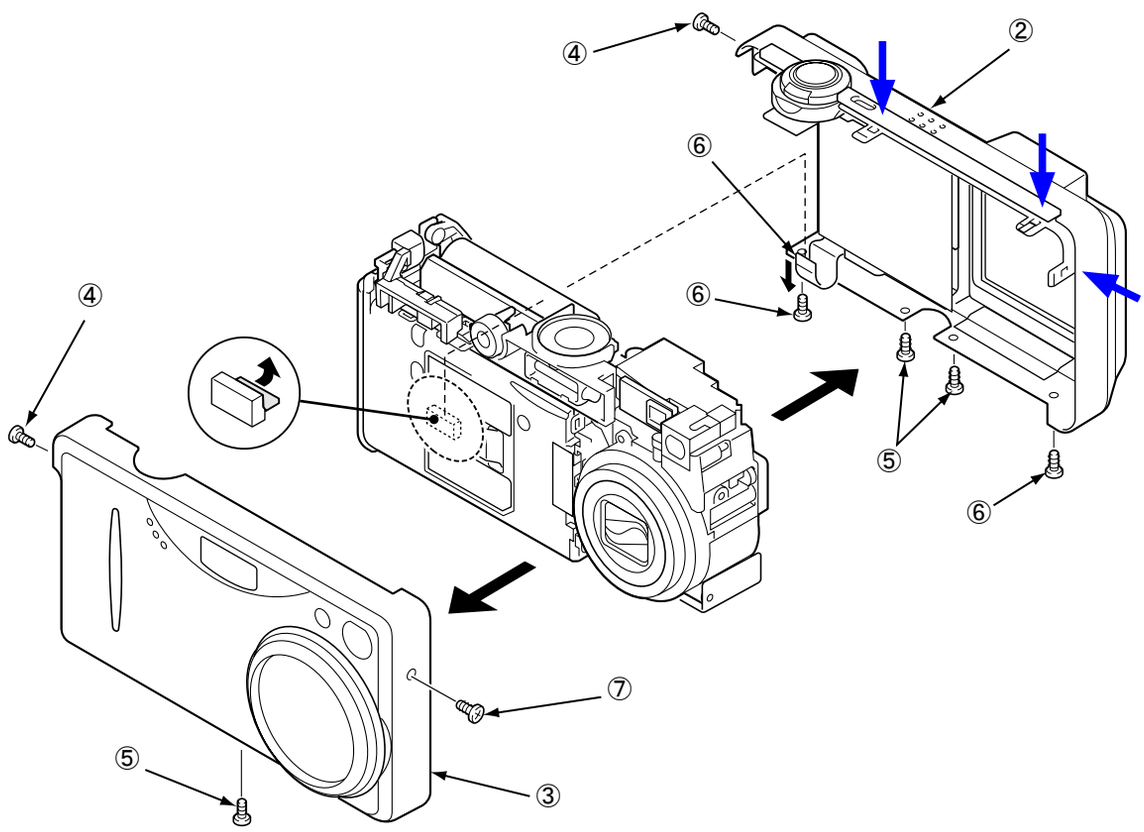
Battery holder unit, LCD unit

- Attach the battery front (①).
- Attach the LCD holder (②).
- Tighten 1 screw (③ : M1.7×2.5).
- Tighten 1 screw (④ : M1.7×4).
- Tighten 1 screw (⑤ : M1.7×3.5).
- Connect the FPC (⑥) at 2 parts.
- Attach the LCD (⑦).



Front cover, Rear cover

- Connect the FPC (①).
- Attach the rear cover (②).
- Attach the front cover (③).
- Tighten 2 screws (④ : M1.4×3).
- Tighten 3 screws (⑤ : M1.7×2.5) .
- Tighten 2 screws (⑥ : M1.7×2.5)
- Tighten 1 screws (⑦ : M1.7×3.5).



ADJUSTMENT

1. Equipment

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

2. Servicing tools

• Pattern box • Color meter • Luminance meter • Siemens star chart • Calibration software (J65042)

•Adjustment collimator (J63090) or Adjustment firmware

3. Adjustment items and order

1. Lens adjustment
2. AWB adjustment
3. CCD white point defect detect adjustment
4. CCD black point defect detect adjustment
5. USB storage information registration

Note) If replacing the lens, CCD, optical filter, CP-1 board, it is necessary to perform the above 1-5 adjustments again. 2-4 adjustments should be carried out in sequence.

4. Setup

1) System requirements

- Windows® 98 or Me, 2000, XP
- IBM-compatible PC/AT with Pentium processor
- CD-ROM drive
- 3.5-inch high-density diskette drive
- USB port
- 40 MB RAM
- Hard disk drive with at least 15 MB available
- VGA or SVGA monitor with at least 256-color display

2) Installing calibration software

- Insert the calibration software installation diskette into your diskette drive.
- Open Explorer.
- Copy the DscCalDI_130a folder on the floppy disk in the FD drive to a folder on the hard disk.

5. Installing USB driver

If the USB driver is necessary, install Nikon View packed with the camera.

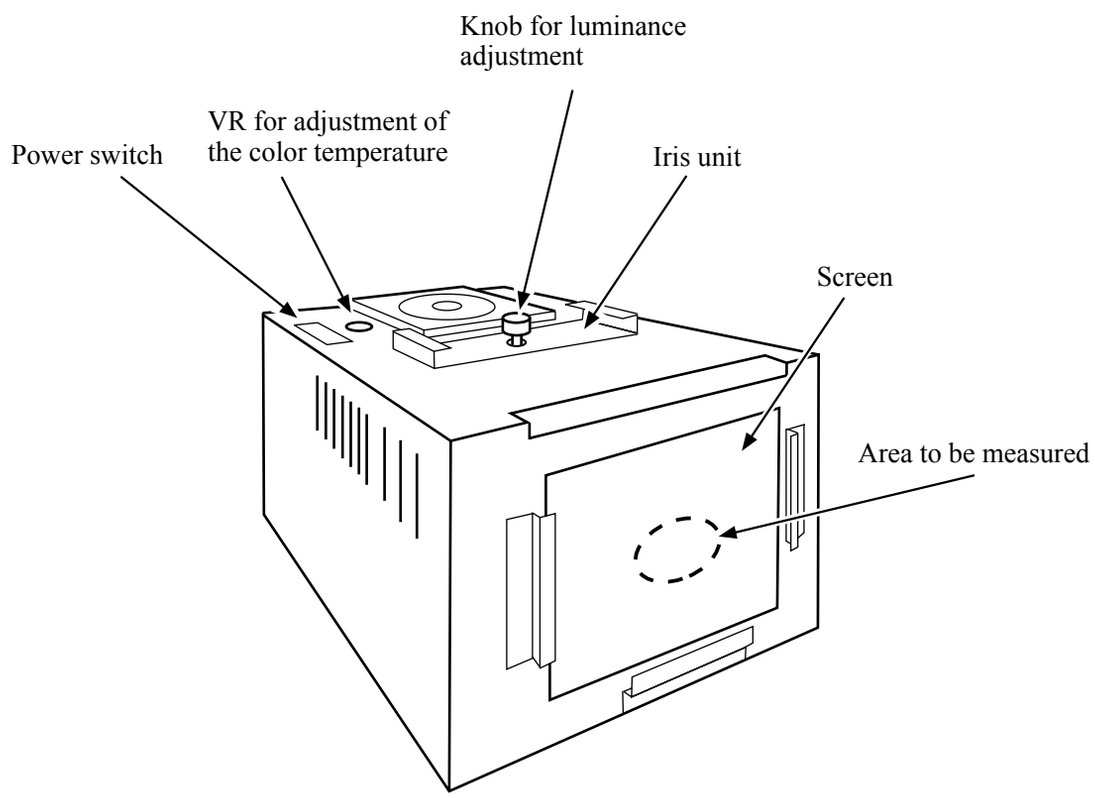
6. Pattern box

Turn on the switch and wait for 30 minutes for aging to take place before using the pattern box. It is used after adjusting the color temperature to 3100 ± 20 K with the color meter and the luminace to 900 ± 20 cd/m^2 with the luminance meter. Be careful of handling the lump and its circumference because it is hot during use and after power off for a while.

*Procedure for correcting Pattern Box

Note: Be sure to perform the aging correction.

1) Measure the center of screen with the Color Meter (J63081).
2) Adjust the pattern box so that the color temperature would be 3100±20K by using "VR for adjustment of the color temperature".
3) Measure the center of screen with the Luminance Meter BM-3000 (J63068).
4) Adjust the pattern box so that the luminance would be 900±20cd/m^2 by using "Knob for luminance adjustment".
5) Repeat process 1) to 4) until the color temperature would be 3100±20k and luminance would be 900± 20cd/m^2.



7. Adjustment items required at replacement of parts

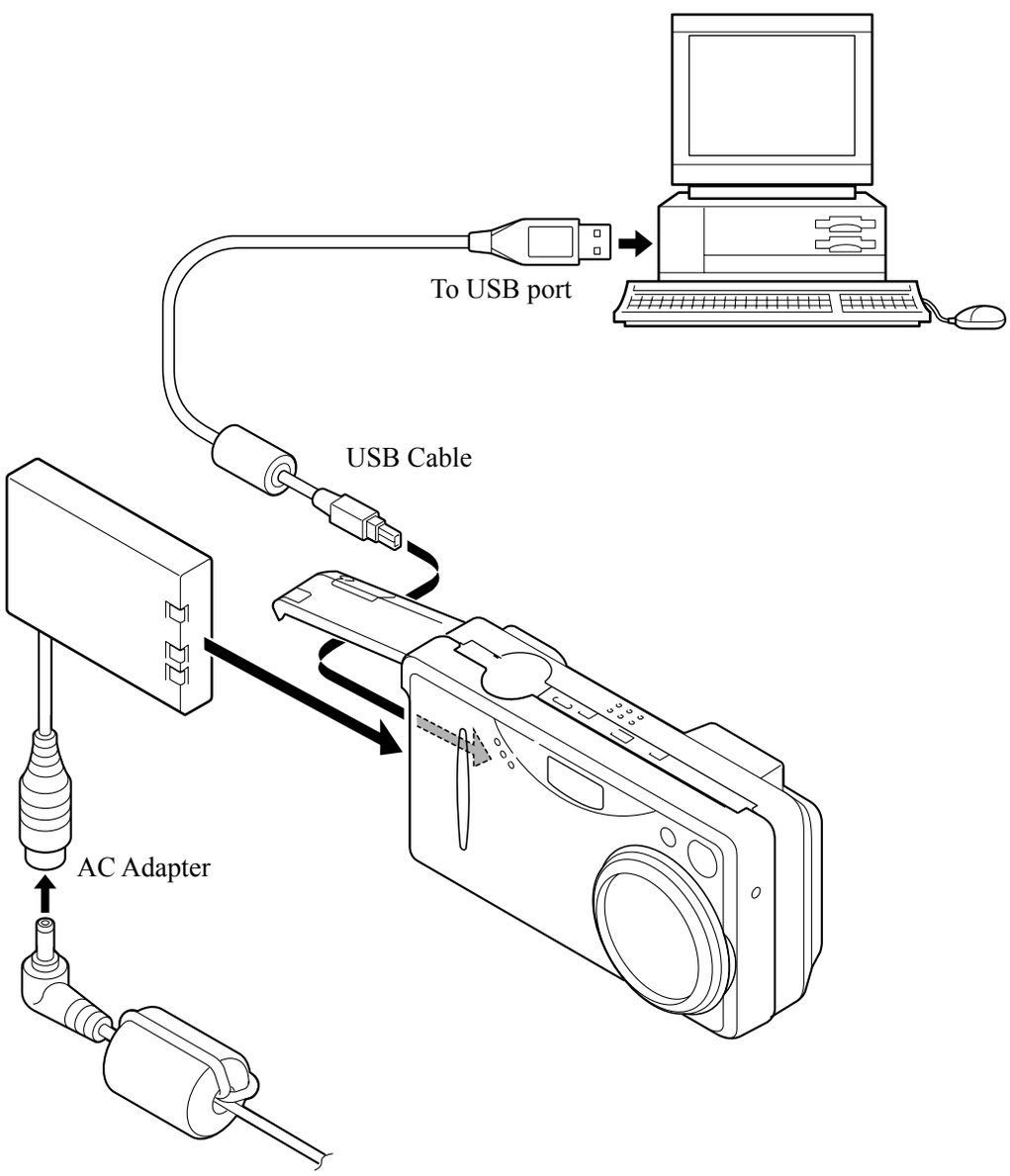
	Lens Adj.	AWB	CCD Defect	USB
Lens Unit	○	○	○	×
Optical filter	○	○	○	×
CCD	○	○	○	×
CP-1	○	○	○	○
PW-1	×	×	×	×

○ Adjustment is necessary. × Adjustment is not necessary.

△ Adjustment is done according to the need.

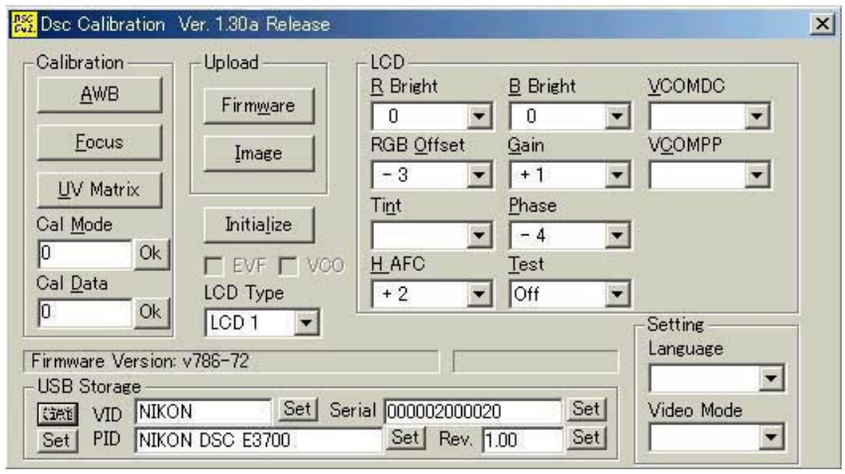
8. Connecting the camera to the computer

1) Fit the cable camera connector to the notch on the camera's USB port. Insert the connector.
2) Connect the cable to the USB port on the personal computer (PC).



9. Calibration software

After starting the applicable calibration software, the following is displayed on the PC monitor.



10. 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.)

10-1. 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

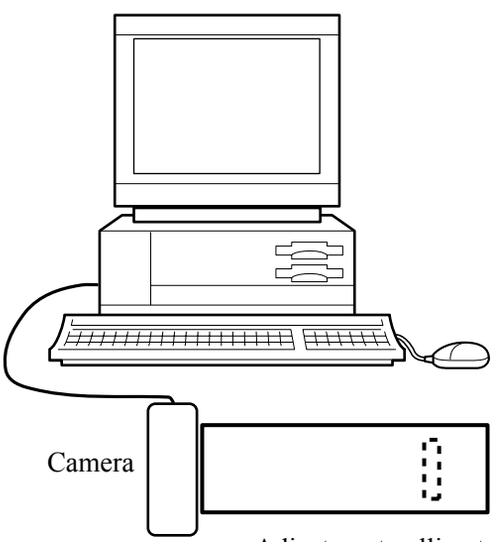
[Conditions]

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

[How to]

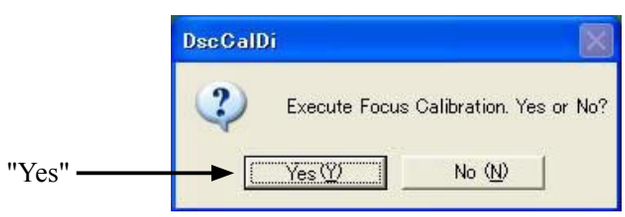
- Double-click on "DscCalDi130a".
- Set the siemens star chart so that it comes center of the screen by checking through the viewfinder.
- Click "Focus", then "Yes".
- Lens adjustment value will appear on the screen.

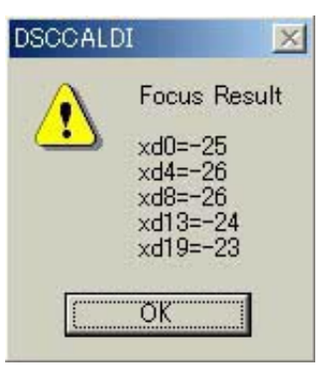
  Judgment standard: xd0=0 ± 50, xd4 = 0 ± 50, xd8 = 0 ± 50, xd13= 0 ± 50 xd19 = 0 ± 50
- Click "OK".



Adjustment collimator

(Siemens star chart built-in)





Result of adjustment

10-2. 1.5-m Adjustment

※ For 1.5-m adjustment, it is necessary to (re)write the adjustment firmware, so before the adjustment, be sure to (re)write the firmware. Also, after completing the adjustment, do NOT forget to restore the original product firmware.

Procedure for setting Adjustment firmware

1) Save the adjustment firmware and the product firmware in any folder.
2) Start up "DscCalDi130a" 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 "DscCalDi130a" 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.

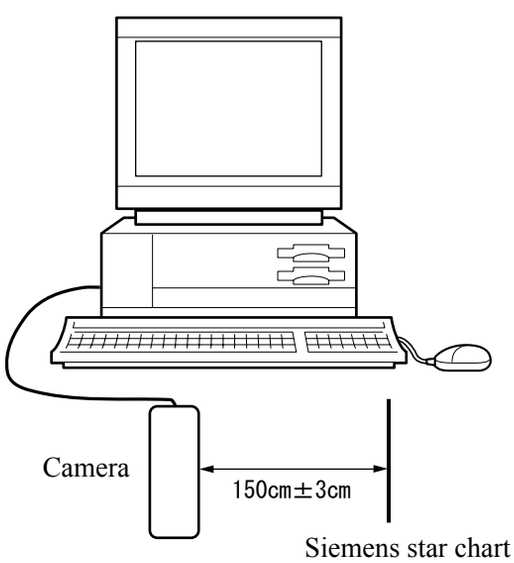
[Conditions]

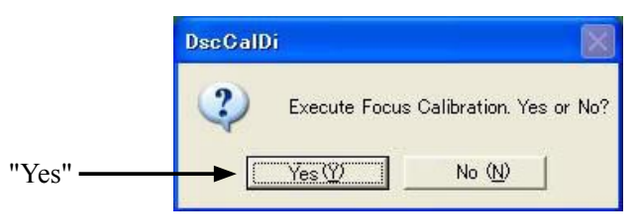
- The siemens star chart should be A3-size or larger (Copy and enlarge A4-size siemens chart included in the service manual for the usage.)
- Illumination over the object should be 400 lux ± 10%
- Set the siemens star chart and the camera (front surface of lens) at 150 cm ± 3 cm distance between them.

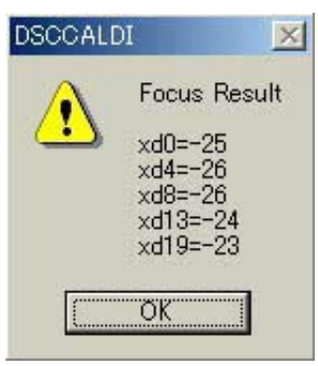
[How-to]

- Double click on "DscCalDi130a".
- 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 ± 50, xd4 = 0 ± 50, xd8 = 0 ± 50, xd13= 0 ± 50 xd19 = 0 ± 50
- Click "OK".







Result of adjustment

11. AWB adjustment

[Preparation]

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

[Adjustment condition]

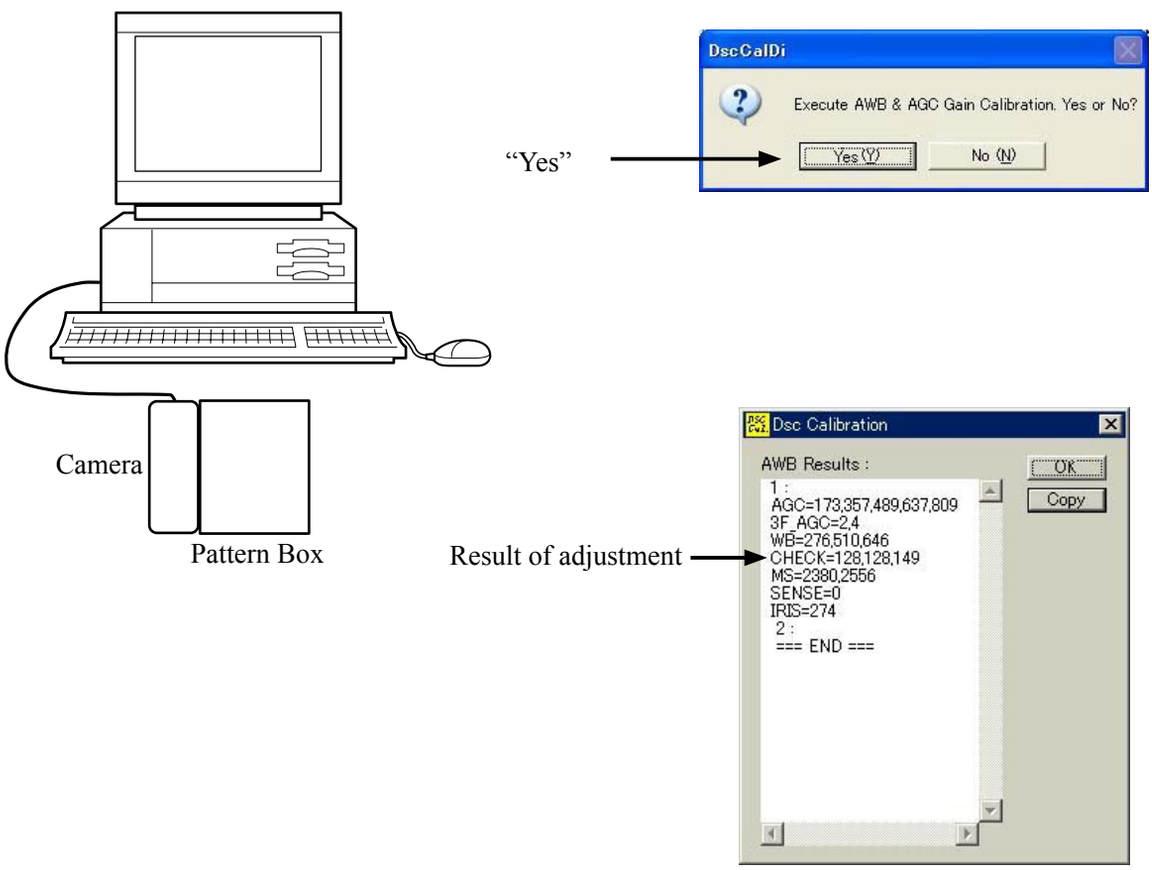
• Set the pattern box and camera (lens front) so that the distance between them is "0cm."

[Note] Any disturbing light must not enter this field.

[Adjustment method]

1. Double-click on the DscCalDi130a.
2. Click the AWB, and click the Yes.
3. AWB adjustment value will appear on the screen.

   Judgment standard: CHECK=128±2, 128±2, 130±30



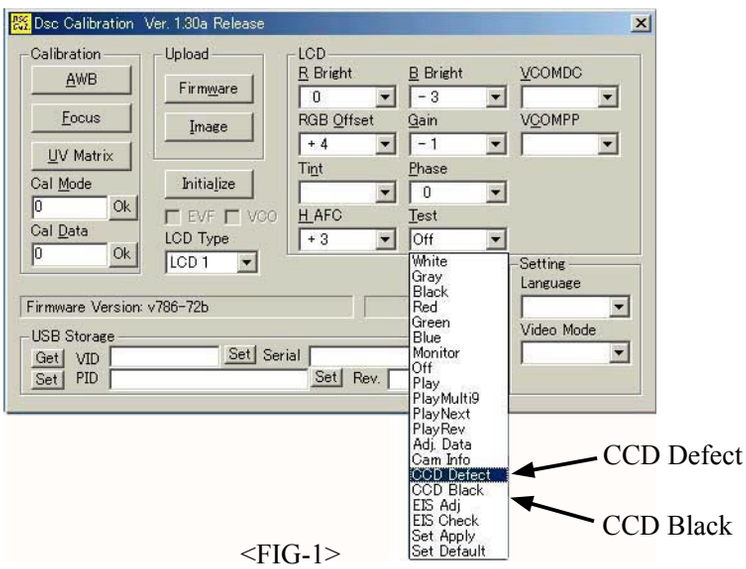
12. CCD white point defect detect adjustment

[Adjustment condition]

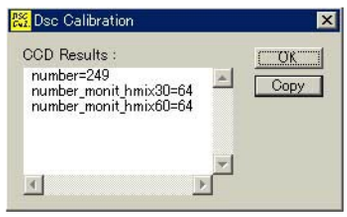
- While the shutter in the lens is closed, read the defect of CCD pixels. Then, make the correction data and rewrite the data in the following procedure.
  Correct the upper 512 pixels of the defect in CCD pixels.

[Adjustment method]

- Double-click on the DscCalDi130a.
- Select the CCD Defect from Test menu of Calibration Soft and click the OK. Refer to FIG-1.
- After adjustment, an adjustment value will appear on the screen. Refer to FIG-2.



<FIG-1>



<FIG-2>

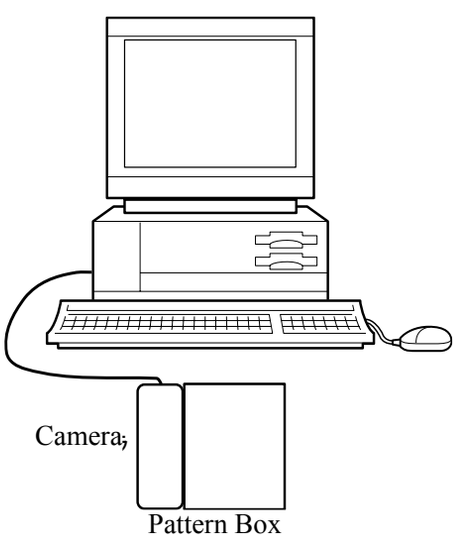
13. CCD black point defect detect adjustment

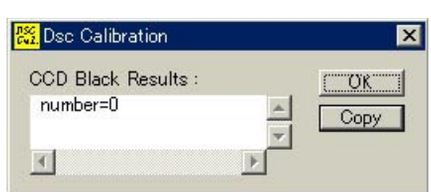
[Adjustment condition]

- Fix the camera so that only the white section of the pattern box may be displayed on the screen. (Any disturbing light must not enter the field.)
- While the shutter in the lens is opened, read the defect (black point) of CCD pixels. Then, make the correction data and rewrite the data in the following procedure.
  Correct the upper 30 pixels of the defect (black point) of CCD pixels.

[Adjustment method]

- Double-click on the DscCalDi130a.
- Select the CCD Black from Test menu of Calibration Soft and click the OK. Refer to FIG-1.
- After adjustment, an adjustment value will appear on the screen. Refer to FIG-3.





<FIG-3>

14. 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 specification conditions will not be satisfied, so always check and save the USB storage data.

[Adjustment method]

1. Connect the camera to a computer.
2. Double-click on the DscCalDi130a.
3. Click on the Get button in the USB storage window and check the USB storage data.

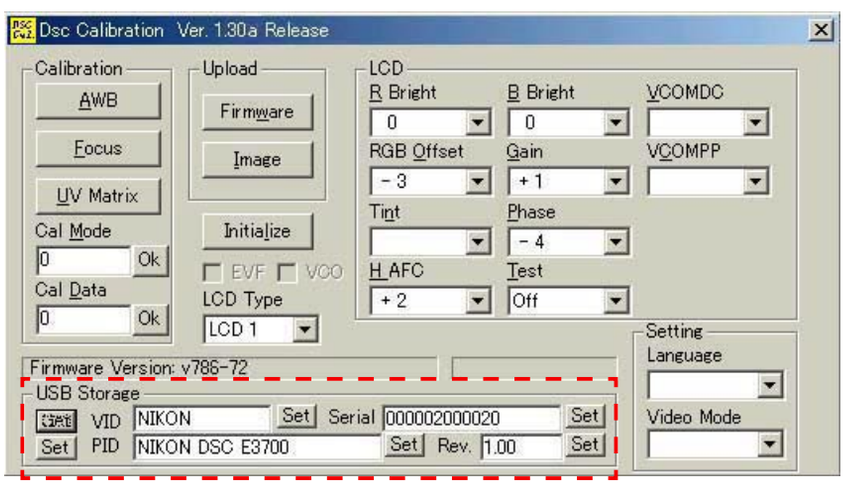
   VID: NIKON

   PID: NIKON DSC E3700

   Serial:

   Rev. : 1.00
4. 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.

   Then click the Set button.
5. Next, check VID and Rev. entries in the USB storage data. If any of them are different from



1. OUTLINE OF CIRCUIT DESCRIPTION

1-1. CP1 CIRCUIT DESCRIPTIONS

1. IC Configuration

IC901 (ICX451DQF) CCD imager
IC931 (H driver, CDS, AGC and A/D converter)

2. IC901 (CCD imager)

[Structure]
Interline type CCD image sensor

Image size	Diagonal 6.67 mm (1/2.7 type)
Pixels in total	2140 (H) x 1564 (V)
Recording pixels	2048 (H) x 1536 (V)

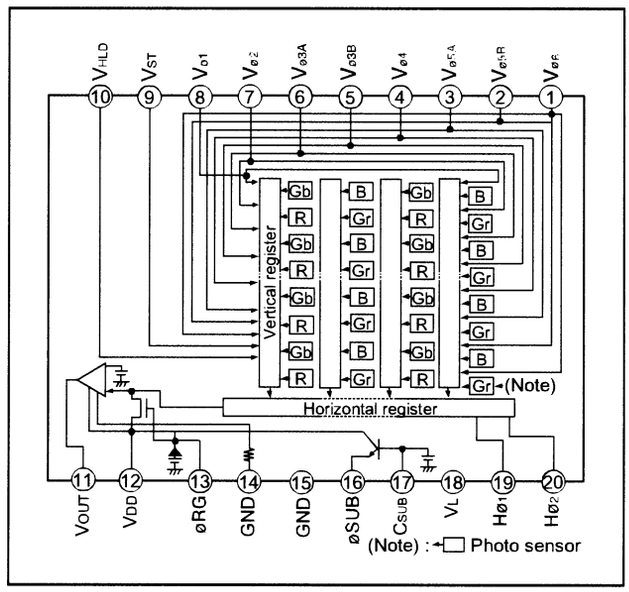


Fig. 1-1. CCD Block Diagram

Pin No.	Symbol	Pin Description	Pin No.	Symbol	Pin Description
1	Vø6	Vertical register transfer clock	11	VOUT	Signal output
2	Vø5B	Vertical register transfer clock	12	VDD	Circuit power
3	Vø5A	Vertical register transfer clock	13	øRG	Reset gate clock
4	Vø4	Vertical register transfer clock	14	GND	GND
5	Vø3B	Vertical register transfer clock	15	GND	GND
6	Vø3A	Vertical register transfer clock	16	øSUB	Substrate clock
7	Vø2	Vertical register transfer clock	17	CSUB	Substrate bias
8	Vø1	Vertical register transfer clock	18	VL	Protection transistor bias
9	VST	Horizontal addition control clock	19	Hø1	Horizontal register transfer clock
10	VHLD	Horizontal addition control clock	20	Hø2	Horizontal register transfer clock

Table 1-1. CCD Pin Description

3. IC934, IC935 (V Driver) and IC931 (H driver)

An H driver and V driver are necessary in order to generate the clocks (vertical transfer clock, horizontal transfer clock and electronic shutter clock) which driver the CCD.
IC934 and IC935 are V driver. In addition the XV1-XV6 signals which are output from IC101 are the vertical transfer clocks, and the XSG signal is superimposed at IC934 and IC935 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. A H driver is inside IC931, and H1, H2 and RG clock are generated at IC931.

4. IC931 (CDS, AGC Circuit and A/D Converter)

The video signal which is output from the CCD is input to Pin (29) of IC931. There are inside the sampling hold block, AGC block and A/D converter block.
The setting of sampling phase and AGC amplifier is carried out by serial data at Pin (37) of IC911. The video signal is carried out A/D converter, and is output by 10-bit.

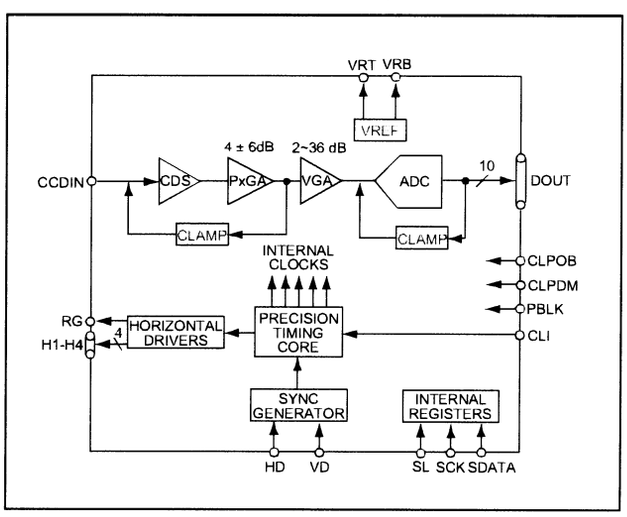


Fig. 1-2. IC931 Block Diagram

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/SG

Timing generated for 2 million/3 million/4 million/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. Each pixel is interpolated from the surrounding data as being either Ye, Cy, Mg and Gr primary color data to produce R, G and B data. At this time, correction of the lens distortion which is a characteristic of wide-angle lenses is carried out. After AWB and γ processing are carried out, 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 memery (compact flash). 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

LCD Block is in the CP1 board, and it is constructed by LCD driver (IC171) and around circuits.

The video signal from the ASIC are converted into RGB signals by the LCD driver, and these RGB signals and the control signal which is output by the LCD driver are used to drive the LCD panel. The RGB signals are 1H transposed so that no DC component is present in the LCD element, and the two horizontal shift register clocks drive the horizontal shift registers inside the LCD panel so that the 1H transposed RGB signals are applied to the LCD panel. Because the LCD closes more as the difference in potential between the COM (common polar voltage: DC) 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.

8. Lens drive block

8-1. Focus drive

The microstepping control signals (F MODE, F CLK, F OE, F RSTB and F CW) with different phases which are output from the ASIC (IC101) are converted into drive pulses (FOCUS 1A, FOCUS 1B, FOCUS 2A and FOCUS 2B) by the motor driver (IC952), 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 (FOCUS PI) inside the lens block.

8-2. Iris and shutter drive

The two control signals (IIN1 and IIN2) which are output from the ASIC (IC101) are converted into drive pulses (DP1 and DP2) by the motor driver (IC951), and are then iris opened/little and moved.

The two control signals (SIN1 and SIN2) which is output from the ASIC (IC101) is converted into a drive pulse (SHUTTER 1 and SHUTTER 2) by the motor driver (IC951), and are then shutter opened and closed.

8-3. Zoom drive

The two control signals (ZIN1 and ZIN2) which are output from 8-bit micro-processor are converted into drive pulses (ZOOM_DC1 and ZOOM_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 RESET) 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 8-bit micro-processor inside the lens block.

1-2. PW1 POWER CIRCUIT DESCRIPTION

1. Outline

This is the main power circuit, and is comprised of the following blocks.
Switching controller (IC501)
Analog system power output (T5001, Q5001)
Digital 3.3 V power output (L5006, Q5010)
Digital 1.8 V power output (L5007, Q5011)
LCD 12 V system power output (L5008, Q5012)
Backlight power output (L5010, Q5015)
Boost power output (IC955, L9551, Q9551)

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 six built-in channels, only CH1 (analog system), CH2 (digital 3.3 V), CH3 (digital 1.8 V), CH4 (LCD system) and CH5 (backlight system) are used. Feedback from +15 V (A) (CH1), 3.3 V (D) (CH2) , 1.8 V (D) (CH3) and +12.3 V (L) (CH4) power supply outputs are received, and the PWM duty is varied so that each one is maintained at the correct voltage settinglevel.
Feedback for the backlight power (CH5) 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 (37) of IC501, all output is turned off. The control signal (P ON) are recontrolled to restore output.

3. Analog System Power Output

+15 V (A), +3.45 V (A) and -7.6 V (A) are output. Feedback for the +15.0 V (A) is provided to the switching controller (Pins (40) of IC501) so that PWM control can be carried out.

4. Digital 3.3 V Power Output

3.3 V (D) is output. Feedback for the 3.3 V (D) is provided to the swiching controller (Pin (43) of IC501) so that PWM control can be carried out.

5. Digital 1.8 V Power Output

1.8 V (D) is output. Feedback for the 1.8 V is sent to pin (45) of the switching controller (IC501) for PWM control to be carriedout.

6. LCD System Power Output

12.3V (D) is output. Feedback for the 12.3 V (D) is provided to the switching controller (Pins (47) of IC501) so that PWM control can be carried out.

7. Backlight Power Supply output

Regular current (18 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 (2) of IC501) so that PWM control to be carried out.

8. Boost Power Output

4.4 V is output. Feedback for the 4.4 V is sent to pin (1) of IC955 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, 3. Power ON/OFF, 4. Storobe charge control, 5. Signal input and output for zoom and lens control.

Pin	Signal	I/O	Outline	
1~4	SCAN OUT 0~3	O	Key matrix output	
5	PON	O	DC/DC converter (digital system) ON/OFF signal	
6	PAON	O	DC/DC converter (analog system) ON/OFF signal	
7	BL_ON	O	Backlight ON/OFF	
8	BACKUP_CTL	O	Backup battery charge control	L : Charge
9	VSSO	-	GND	
10	VDDO	-	VDD	
11	PW_LED	O	Voice LED	L:Lighting
12	SB.LED (R)	O	VF. LED (red)	L:Lighting
13	AF. LED (G)	O	VF. LED (green)	L:Lighting
14	MAIN RESET	O	System reset (MRST)	
15	SI	I	Serial communication data input (← ASIC)	
16	SO	O	Serial communication data output (→ ASIC)	
17	SCK	O	Serial communication clock output (→ ASIC)	
18	PRG SI	I	Flash rewrite serial communication data input	
19	PRG SO	O	Flash rewrite serial communication data output	
20	PRG SCK	O	Flash rewrite serial communication clock output	
21~22	NOT USED	O	-	
23	CHG ON	O	Strobe charge control	
24	VDD1	-	VDD	
25	AVSS	-	GND	
26~28	SCAN IN 3~1	I	Key matrix input	
29	BATSEL	I	Battery selection	
30	TEMP	I	Lens temperature sensor input	
31	TEMP_BAT	I	Battery temperature sensor input	
32	VMONIT	I	Strobe capacitor charge voltage detection	
33	BATTERY	I	Battery voltage detection	
34	AVREF	I	Analog standard voltage input terminal	
35	AVDD	-	Analog power input terminal	
36	RESET	I	Reset input (↓ RESET)	
37	XCOUT	O	Clock oscillation terminal	
38	XCIN	I	Clock oscillation terminal (32.768 kHz)	
39	IC	-	Power for program writing	
40	XOUT	O	Main clock oscillation terminal	
41	XIN	I	Main clock oscillation terminal (4MHz)	
42	VSS1	-	GND	
43	BAT OFF	I	Battery off detection signal input	L : Battery off detection
44	SREQ	I	Serial communication requirement signal	L : Requirement
45	SCAN IN 0	I	Key matrix input	
46	ZPULSE1	I	Zoom motor drive pulse count	
47	COMREQ	I	Command request	
48	SCAN OUT 4	O	Key matrix output	

49	ZM IN 1	O	Zoom motor drive signal 1	
50	ZM IN 2	O	Zoom motor drive signal 2	
51	CARD	I	Card detection	L : Card
52	BEEP	O	BEEP	
53	BKUP CTL	O	Backup battery charge control	L : Charge
54	AVREF ON	O	AVREF ON/OFF signal	L : ON
55	ZRESET	I	Zoom standard position	
56	ZPULSE 2	I	Zoom moter drive pulse count	
57	USB CONNECT	I	USB power detection terminal (↓ detection)	
58	CLKSEL0	O	ARM system clock ON/OFF	H : ON
59	NOT USED	O	-	
60	NOT USED	O	-	
61	BL_ON	O	Backlight ON/OFF	
62	PLLEN	O	PLL oscillation ON/OFF	H : ON
63	ASIC TEST	O	ASIC control signal (ZTEST)	
64	SELF LED	I	SELF LED	H = Lighting

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.

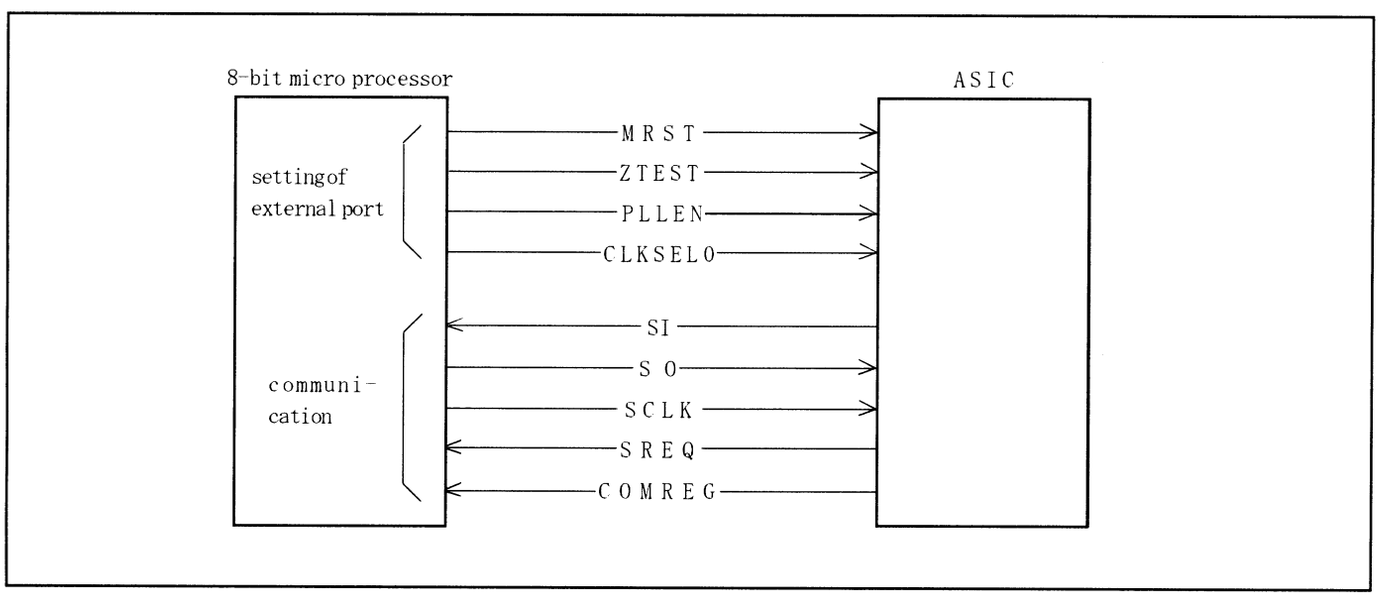


Fig. 3-1 Internal Bus Communication System

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_ON	S2	S1	WIDE	TELE
1	OK	←	→	↑	↓
2	TEST		AUTO	SCENE	M-CAMERA
3			MOVIE	AUDIO RECORD	SET UP
4	OK	MENU	AV JACK	DEL	MTR

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, IC952 is operating and creating 3.7 V (camera OFF) or 4.4 V (camera ON), 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 capacitor for memory backup by IC302, and operates at low consumption. At this condition, the 8-bit microprocessor halts the main clock, and operates clock counting by sub clock.

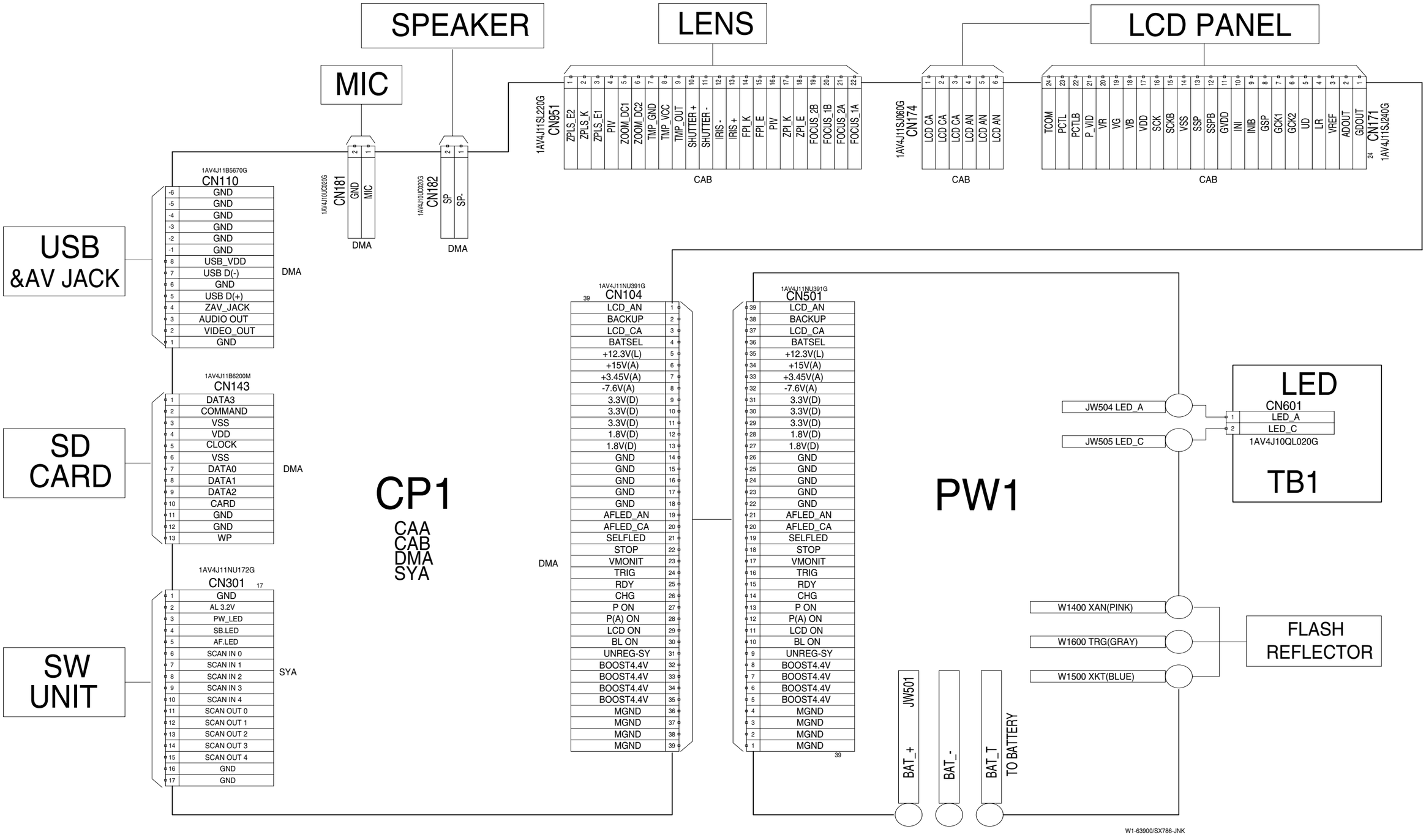
Also, the battery for backup is charged 16 hours from it to be attached.

When the power switch is on, the 8-bit microprocessor starts processing. The 8-bit microprocessor first sets both the PON signal at pin (5) and the PAON signal at pin (6) 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.

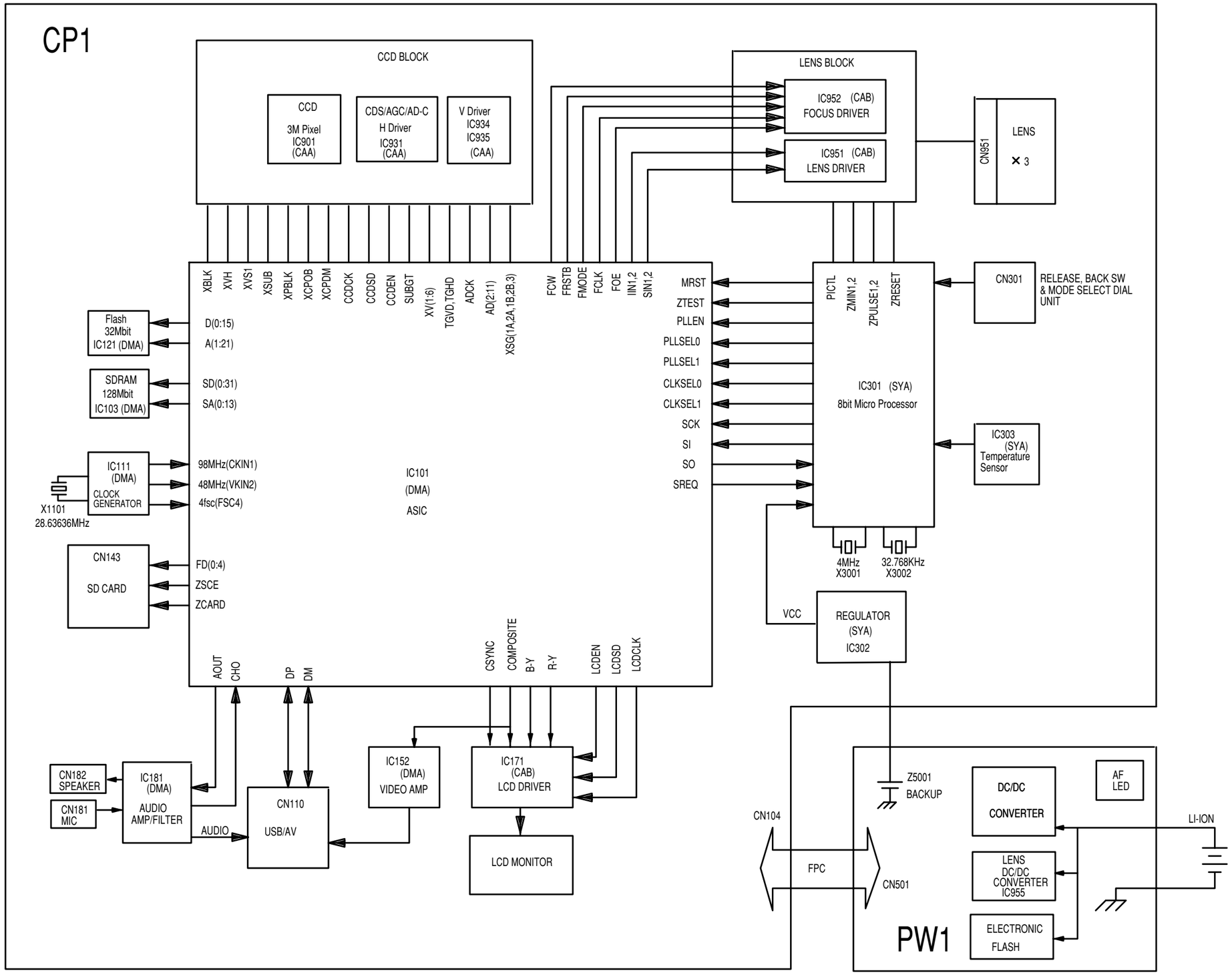
When the through image is operating, set the PAON signal to High and then turn on the CCD. When the through image is playing, set the PAON signal to Low and then turn off the CCD. When LCD panel turns on, set LCD ON signal at pin (7) to High, and then turn on the power. Set BLON signal at pin (61) to High, and turn on the backlight power.

When the power switch is off, the lens will be stowed, and PON, PAON, LCDON 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, and set operation mode of clock ocillation.

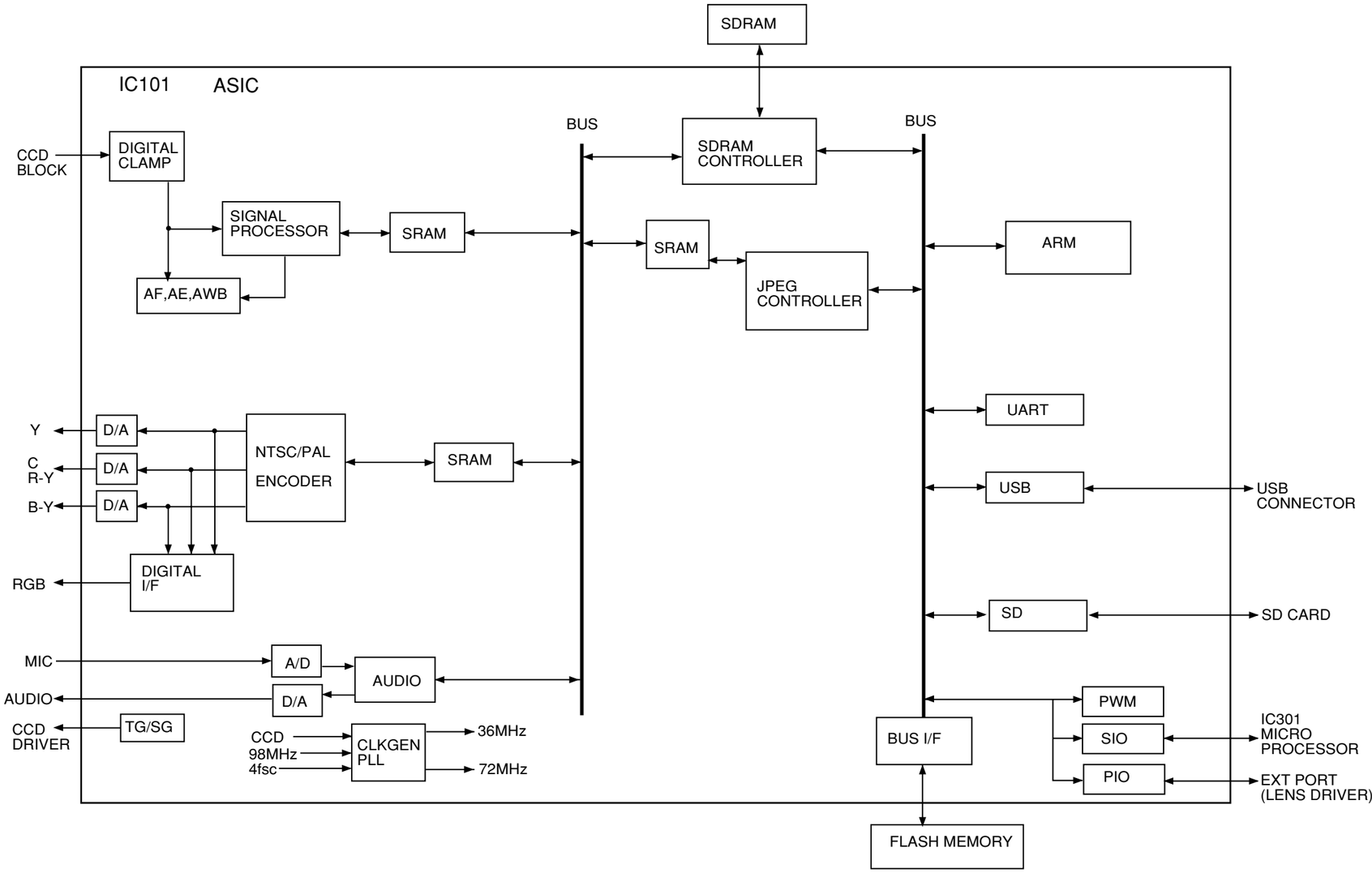
総合結線図
OVERALL WIRING



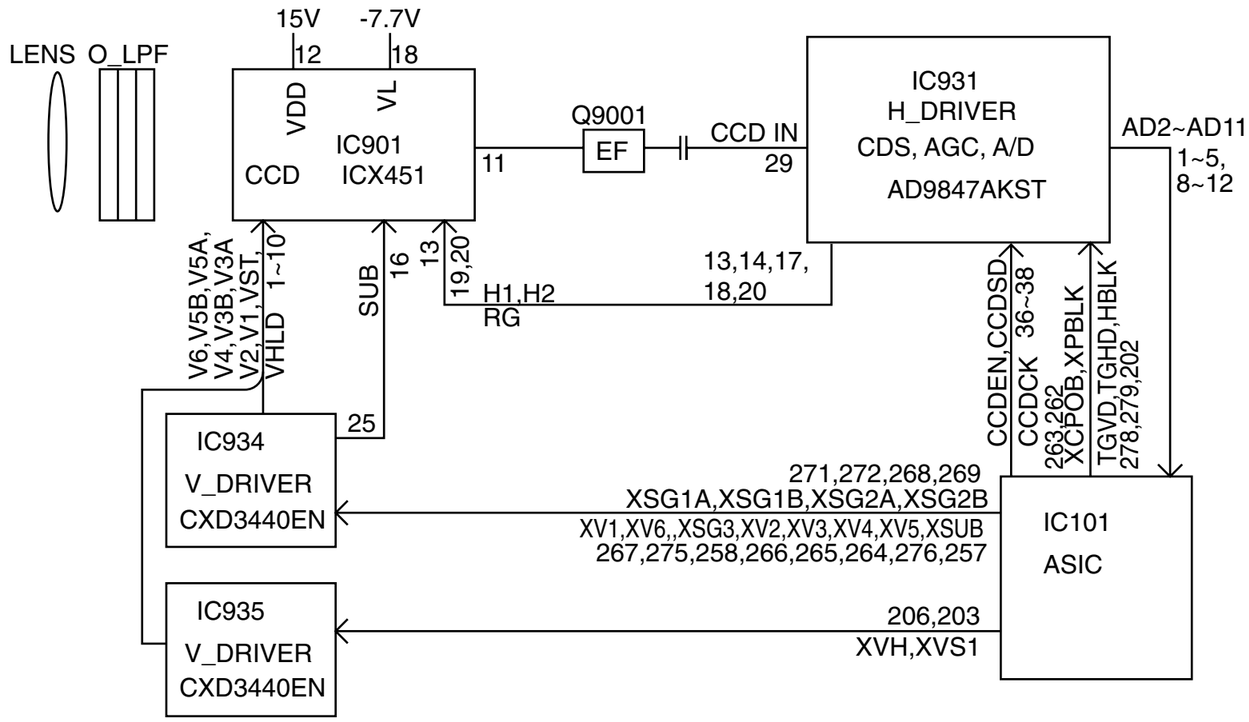
総合ブロック図
OVERALL BLOCK DIAGRAM



ASIC ブロック図
ASIC BLOCK DIAGRAM

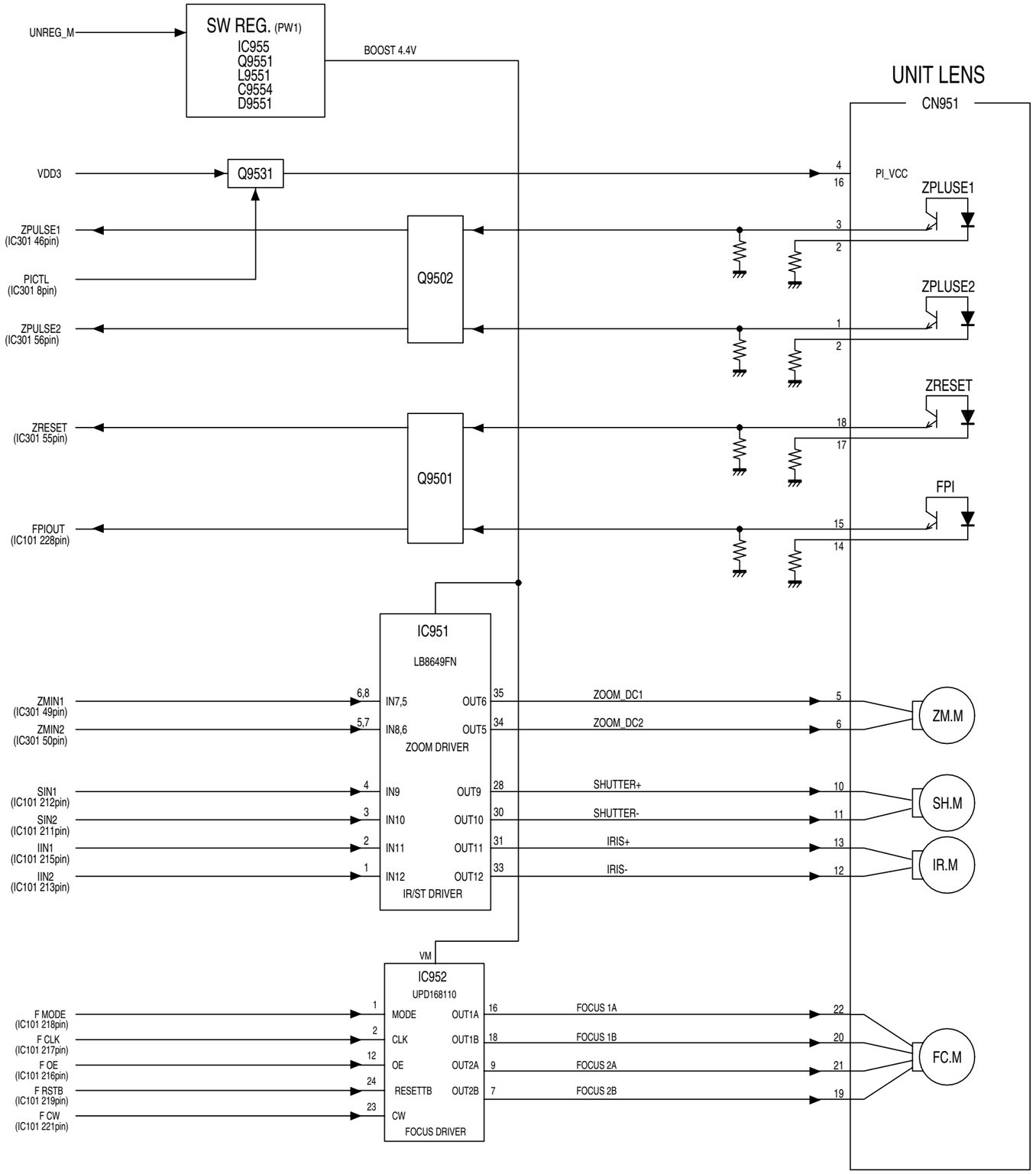


CCD ブロック図
CCD BLOCK DIAGRAM

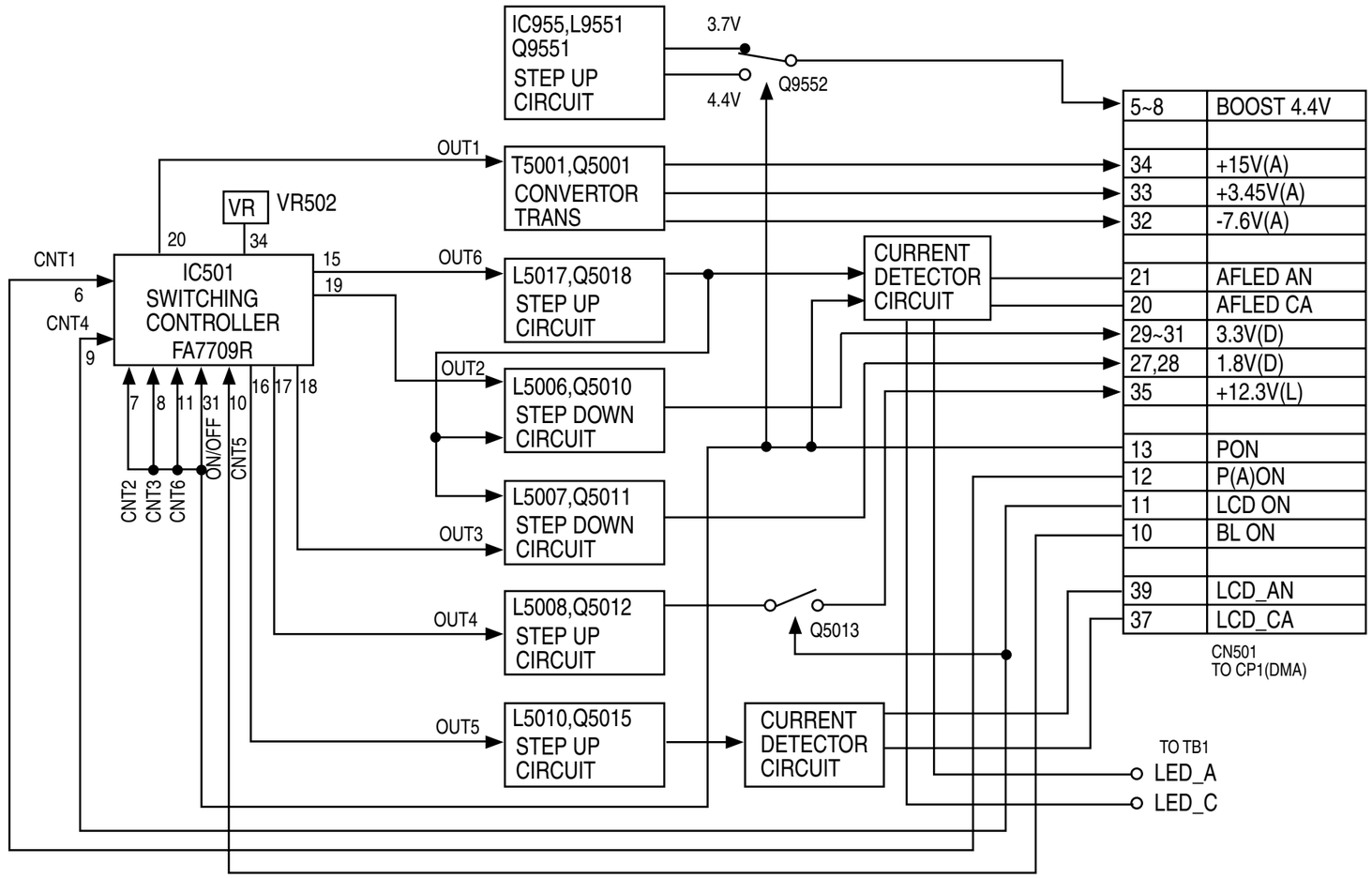


MODEL: E3700 series
CCD_BLOCK

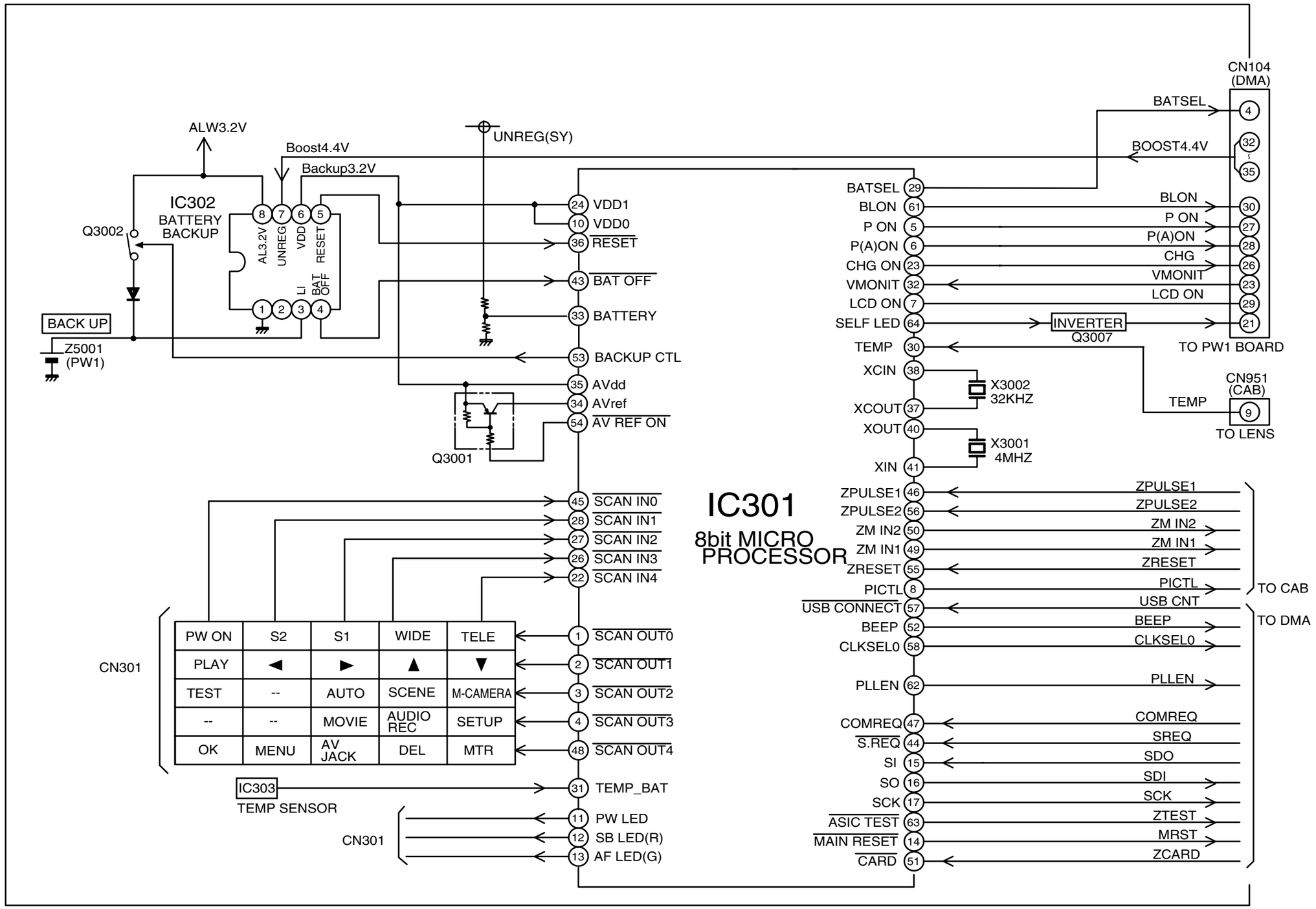
レンズ駆動ブロック図
LENS DRIVE BLOCK DIAGRAM



POWER ブロック図
POWER BLOCK DIAGRAM

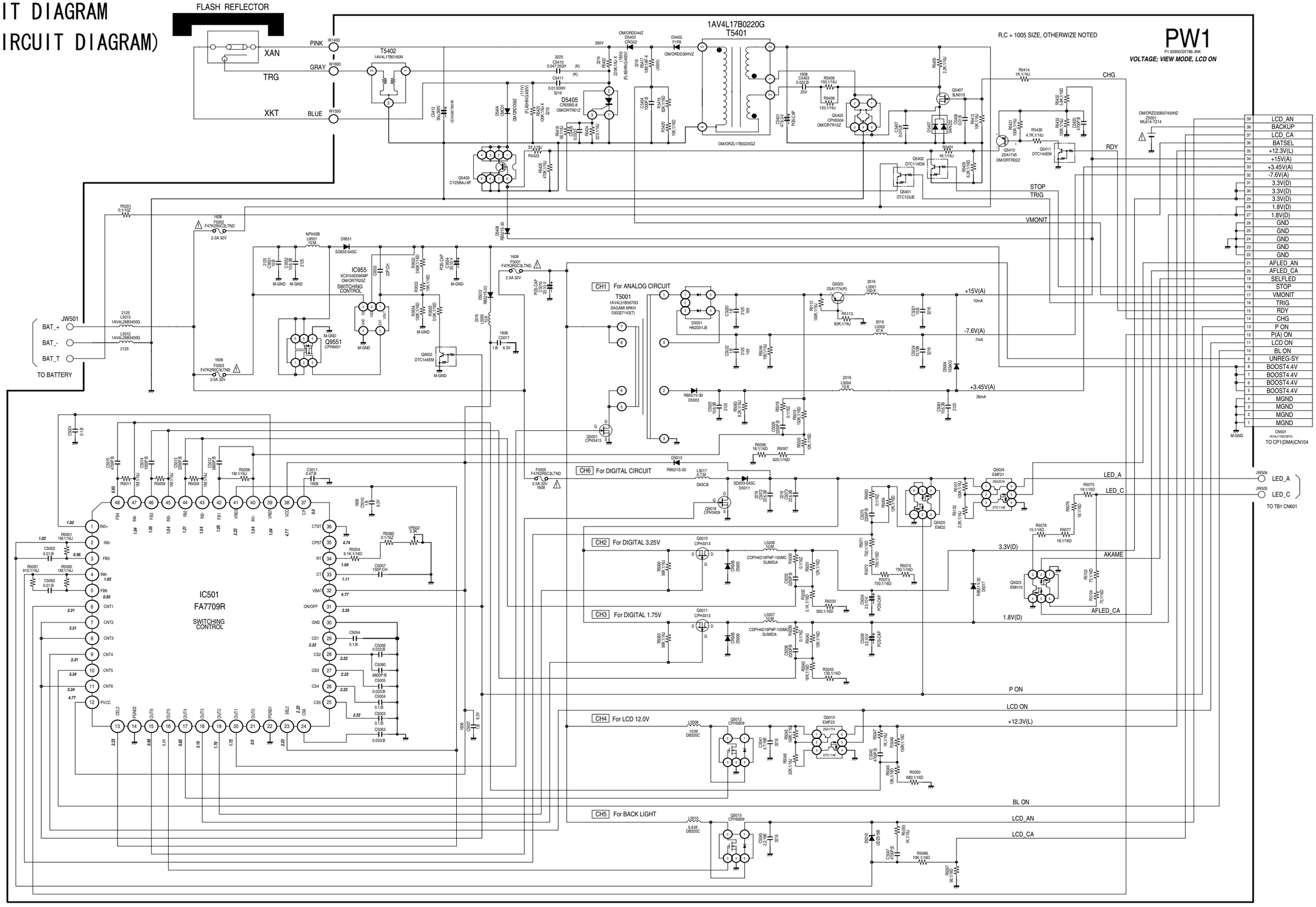


SYSTEM ブロック図
SYSTEM BLOCK DIAGRAM



PW1 回路図（ストロボ回路図）

PW1 CIRCUIT DIAGRAM (STROBE CIRCUIT DIAGRAM)



The contents of inspection standards and tools

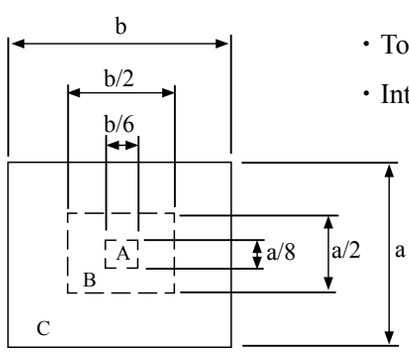
INSPECTION STANDARDS

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 cover is closed: Gap: 0.5mm or less (Difference between right and left must not be noticeable.)	
Outside and inside status	• There must be no noticeable damage and soil. • When pushing the main body, noticeable noise must not be heard. (Observe and check it by naked eyes under fluorescent lamp and natural sunshine.)	Visual observation
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. • Malfunctions shall not be required. • Operator must feel "click" on each button. • "Click" must occur when or after a switch is ON. (Check it while operating normally.)	
Lever/Knob	• 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.)	
Monitor		
Shooting image	・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.)	Photoshop Printer

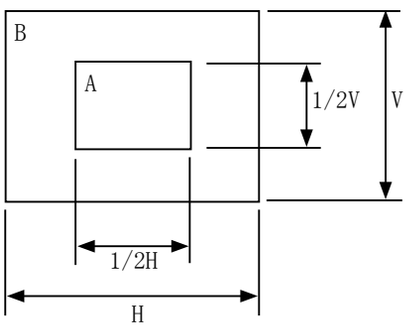
Item	Criteria	Applied tool(s)
Lens capacity		
Focal length	Wide-end position (Compelling ∞) 5.4 mm +7% -1% Tele-end position (Compelling ∞) 16.2 mm +1% -7%	Focal length measuring instrument Lens drive tool
Open aperture F No.	Wide-end position (Compelling ∞) F2.8 +7.8% -0% Tele-end position (Compelling ∞) F4.9 +9.9% -0%	Focal length measuring instrument Lens drive tool Visual observation
Peripheral light reduction	• There must not be an extreme light reduction.	
Ghost/Flare		
Surface ghost	• There must not be an outstanding malfunction.	
Distortion	• There must not be an outstanding flare at the center.	
Dust in a picture	• There must not be an outstanding deformation. • There must not be an outstanding dust in a picture.	
Lens barrel		
Zoom	• 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	• Focus must be fit in a selected area. (Select the AF area and check it.)	Visual observation
Shortest photograph distance	The focus of AF must be fit at the following distance.	Tape measure
Normal	• 30mm (in whole area)	
Macro	• 4cm (Macro)	

Item	Criteria	Applied tool(s)
Shooting with a speed light		
Light adjustment accuracy	• Tele-end: 0.4 ~ 1.7m • Wide-end: 0.4 ~ 3.0m • Macro-wide-end 0.4 ～ 3.0 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)	• 5.5 ±0.4 EV (Charge for 10 seconds with the new primarybattery and perform measurement within 1 second.)	Flash meter New battery
Recycling time	• Within 6.5 seconds (Charge for 10 seconds with the new primary battery and perform measurement within 1 second.)	Visual observation
Wrong flash	• Wrong flash must not occur. (Check by loading/unloading a battery, giving a light shock and operating mode buttons except S2.)	New primary battery
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. • Horizontal center: 900 TV lines Vertical center: 900 TV lines Horizontal line(s) at each corner: 600 TV lines Vertical line(s) at each corner: 600 TV lines • Photography mode: AUTO, Image quality mode: HIGH • Wide-end position, aperture "open," distance 0.3m or more • Equip the 5100K viewer with the chart 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.	EIAJ chart PHOTOSHOP

Item	Criteria	Applied tool(s)
Gradation/luminance level	[Histogram's gray average value] • Black: 11 ± 5 Gray: 137 ± 10 White: 230 ± 15 • Photography mode: AUTO, Image quality mode: HIGH • Wide-end position, aperture "open", distance: 0.3m or more • Equip the 5100K viewer with the chart and shoot an object in the full range of angle of view. 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 average value. • Measurement section Luminance level: Upper left 1 step: Black, 6 steps: Gray, Center: White Lower left 6 steps: Gray, 11 steps: Black	Gray scale chart PHOTOSHOP
Noise	[Histogram's standard deviation] ・Gray: 2.5 or less Black: 3.0 or less ・Photography mode: AUTO, Image quality mode: HIGH ・Wide-end position, aperture "open", distance: 0.3m or more ・Equip the 5100K viewer with the chart and shoot an object in the full range of angle of view. 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	Gray scale chart PHOTOSHOP

<table>
<tr><th>Item</th><th>Criteria</th><th>Applied tool(s)</th></tr>
<tr><td>Quality of image
Reproduction of color</td><td>
<table>
<tr><th>B</th><th>R</th><th>G</th><th>B</th></tr>
<tr><td>W</td><td>215±20</td><td>215±20</td><td>215±20</td></tr>
<tr><td>Y e</td><td>215±20</td><td>220±20</td><td>70±15</td></tr>
<tr><td>R</td><td>215±20</td><td>30±15</td><td>40±15</td></tr>
</table>
• Photography mode: AUTO, Image quality mode; HIGH
• Equip the 5100K viewer with the chart and shoot an object in the full range of angle of view.
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>
<tr><td>Finder
View Image</td><td>• There must be no blur, distortion, ghost, halation or other outstanding troubles in contrast, gradation, etc.</td><td>Visual observation</td></tr>
<tr><td>Visual field frame/ frame line</td><td>• Blur, dirt 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>Visual observation</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 10µm</td><td>0 pc</td><td>2pcs or less</td><td>3pcs or less</td></tr>
<tr><td>10 ～ 20µm</td><td>0 pc</td><td>0 pc</td><td>1pcs or less</td></tr>
<tr><td>More than 20µm</td><td>0 pc</td><td>0 pc</td><td>0 pcs</td></tr>
</table>


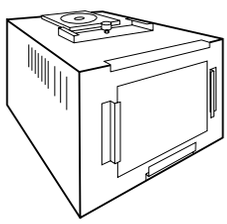
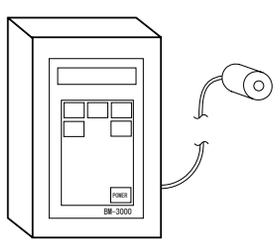
・Total：3pcs or less
・Interval：Less than b/2
</td><td>Visual observation</td></tr>
</table>

<table>
<tr><th>Item</th><th>Criteria</th><th>Applied tool(s)</th></tr>
<tr><td>LCD and others</td><td></td><td></td></tr>
<tr><td>Monitor LCD View</td><td>• There must be no shading in the LCD display range.
• Inclination between the monitor and the monitor frame must not be outstanding.</td><td>Visual observation</td></tr>
<tr><td>Visual field ratio</td><td>• Through-the-monitor image: 96 to 100%
• Play-back image: 98 to 100%</td><td>Visual observation</td></tr>
<tr><td>Bright pixels or dim pixels on LCD</td><td> 

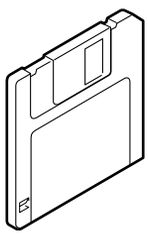
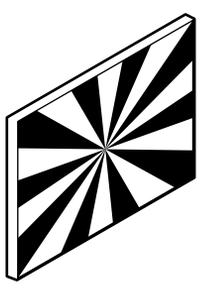
<table>
<tr><th>Zone</th><th>Bright pixel</th><th>Dim pixel</th></tr>
<tr><td>A</td><td>1</td><td>6</td></tr>
<tr><td>B</td><td>3</td><td>6</td></tr>
<tr><td>Total</td><td>3</td><td>6</td></tr>
</table>
Bright pixels: Visible normally through 5% ND filter
Dim pixels: Visible normally (Standard: Within the above quantity)</td><td>Visual observation</td></tr>
<tr><td>Self-timer
Operation time:10sec
LED blinks/lights</td><td>• 10 ± 1 second
• Blinks for 9 seconds and lights for 1 second.
(Measure the time until release is done since the shutter release button was lightly pressed.)</td><td>Visual observation
Stop watch</td></tr>
<tr><td>Electric characteristics</td><td></td><td></td></tr>
<tr><td>Consumption current</td><td></td><td>Constant voltage</td></tr>
<tr><td>Without SD Card</td><td>• 0.27mA or less (when the power switch is OFF)</td><td>power supply</td></tr>
<tr><td>With SD Card</td><td>• 0.39mA or less (when the power switch is OFF)</td><td>Ammeter</td></tr>
<tr><td>Stand-by</td><td>• 12mA or less (at "Sleep")
• 0.2mA or less (when the power switch is OFF)</td><td></td></tr>
<tr><td>Start (Photography)</td><td>• 0.7A or less (when the AUTO "0" start monitor is ON)
(Connect 4.2V from the constant-voltage power supply and perform measurement.)</td><td></td></tr>
<tr><td>B. C voltage</td><td></td><td></td></tr>
<tr><td>Secondary battery</td><td></td><td></td></tr>
<tr><td>Level 1</td><td>• 3.6 ± 0.1V (for battery) (Half battery mark)</td><td>Constant voltage</td></tr>
<tr><td>Level 2</td><td>• 3.1 ± 0.1V (Battery mark blinks.)</td><td>power supply</td></tr>
<tr><td>Level 3</td><td>• 2.75 ± 0.1V (Power OFF.)</td><td>Volt meter</td></tr>
<tr><td>Primary battery</td><td></td><td></td></tr>
<tr><td>Level 1</td><td>• 2.35 ± 0.1V (for battery) (Half battery mark)</td><td></td></tr>
<tr><td>Level 2</td><td>• 2.0 ± 0.1V (Battery mark blinks.)</td><td></td></tr>
<tr><td>Level 3</td><td>• Power turns OFF 30 secs.after reaching level 2 (2.0V)</td><td></td></tr>
</table>

［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） Common
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
J65042	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) Common（E995,E775,E885 E5000, E2500, E4500 E5700, E4300, E3500 E3100, E2100, E5400 E3700)
※ 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 Siemens chart 	共通 Common

ジーメンススターチャート