

作成承認印

配布許可印



# COOLPIX 990

VAA11101(JP.U)  
VAA11112(E)

## REPAIR MANUAL

**Nikon** | NIKON CORPORATION  
Tokyo, Japan

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# Table of Contents

	(PAGE)
I. Specification .....	A1 ~ A4
II. Disassembly and Assembly Procedure .....	B1 ~ B28
Adjustment Procedure .....	B29 ~ B40
III. Discription of Circuit .....	C1 ~ C14
IV. Circuit Diagram .....	E1 ~ E17
V. Inspection Standard .....	R1 ~ R5
Tool List .....	T1
Siemens star chart .....	T2

# Specifications

## 1 . Overview of specifications

- 1) Imaging device
  - Total number of pixels: Approx. 3.34 million
  - Number of active pixels: Approx. 3.2 million
  - Number of recording pixels: Approx. 3.145 million pixels  
(2048 x 1536)
  - 1/1.8-inch interline CCD, complementary color mosaic sequential array filter
- 2) Imaging lens: 3X zoom,  $f = 8.0$  to  $24.0$  mm (with 35 mm conversion: 38 to 115 mm),  
F2.5 to F4  
  
Imaging range: From 2 cm in front of lens to infinity (M) macro mode, speed mode,  
manual focus
- 3) Optical viewfinder: Real image optical viewfinder  
  
Field ratio: 84 to 88%, Magnification ratio: 0.4 to 1.1  
  
Viewing angle adjustment: -2 to +1
- 4) LCD monitor panel: 1.8-inch low temperature poly-silicon TFT  
110,000 pixels, brightness adjustment function (5 levels), hue adjustment  
(11 levels), field ratio: approx. 97% for through and freeze images and  
approx. 100% for reproduced images
- 5) Shutter: Uses both mechanical shutter and CCD electronic shutter  
(8 to 1/1000 sec, bulb)
- 6) Iris: 7-blade iris diaphragm by stepping motor  
  
Control level: 3 EV (1/3 EV step)
- 7) Brightness: Approx. ISO100  
  
Sensitivity settings (200, 400, AUTO), auto gain-up function,  
Multi-photometry (256 windows, used for imaging pixels)
- 8) Metering: Multi-photometry, central-weighted balance photometry, spot  
photometry, AF spot

- 9) Metering mode :Correspond to that matches the Spot Metering area automatically to selected focus area
- 1 0) Movable exposure area: EV-2 to 15.5 (W), EV-0.8 to 16.7 (T) (ISO100 conversion)
- 1 1) Exposure control : Shutter, iris-based program AE, program shift manual exposure mode, iris priority mode, shutter priority mode, AE lock  
Exposure correction (-2 to +2EV, in 1/3EV steps), fixed exposure, bracketing
- 1 2) Internal flash: Guide number;9 (ISO100), includes red eye reduction function using a pre-flash, IGBT-based serial control system (movable macro area), auto, red eye reduction, obligatory flash, flash prevention, slow synchronous, external strobe-based lighting function (allows independent flash of external strobe), illumination level correction (-2 to +2 EV, in 1/3 EV steps)
- 1 3) White balance: TTL auto-tracking, 5 level manual (allows fine adjustment)  
Preset white balance function
- 1 4) While half-press timer is on: 30 seconds (can be set using a menu: 1 minute, 5 minutes, or 20 minutes)
- 1 5) Auto focus: Contrast AF, multi-point (5 points), capable of AF (area selectable) オ
- 1 6) Focus mode: Continuous AF (when imaging using an LCD monitor) Single mode AF (when imaging without using an LCD monitor, menu setting), manual focus (50 points)
- 1 7) Imaging mode: Full auto, custom setting (set using a menu), single shot, continuous shot, rapid shot, multi-shot (16 screens), UH continuous shot (QVGA, 30 frames/sec, 80 photos), motion image (QVGA, 15 frames/sec, 40 sec), BSS (Best Shot Selector), level correction (AUTO, standard, contrast high/low, bright/dark, monochrome), edge enhancement setting (AUTO, high, standard, low, OFF), electronic zoom (max. 4X)

1 8 ) Recording mode: Recording size: Full (2048x1536), XGA (1024x768), VGA  
(640x480), 3:2 (2048x1360)

Compression ratio: Fine: 1/4, Normal: 1/8, Basic: 1/16, HI: Uncompressed  
mode (TIFF-RGB)

1 9 ) Recording media: Compact flash card, Type 1

2 0 ) Recording format: Conforms to JPEG standard (EXIF 2.1 DCF)  
Quick Time Motion JPEG (moving image)

2 1 ) Number of recordable images

	Fine	Normal	Basic
8MB	Approx. 5	Approx. 1 0	Approx. 1 9

[Table 1]

2 2 ) Control buttons and switches: Power switch, release switch, command dial, strobe  
button, focus mode button, monitor button, menu  
button, exposure correction button (FUNC2), mode  
button (FUNC1), Cross-key button

2 3 ) Reproduction functions: 1 frame reproduction, thumbnail reproduction  
(4,9 windows), slide shows, protect function, undisplay  
function, reproduction zoom (up to 4X, any location can  
be displayed), imaging information display, imaging  
detailed information display, highlight, histogram, peaking

2 4 ) Deletion function: Delete all frames, delete specified frame, delete folder, includes  
protect function

2 5 ) Interface: Serial interface (Win: 115 kbps, Mac: 230 kbps)  
USB interface (12 Mbps, approx. 2Mbps efficiency)  
Video output (NTSC/PAL menu select)

2 6 ) Display: LCD monitor: Electronic viewfinder display, reproduction display,  
menu settings for imaging and reproduction modes



Monochrome LCD: Imaging mode display, recording mode display

Viewfinder LED: Focus status display, speed light status display

ファインダLED：フォーカス状態表示、スピードライト状態表示

- 2 7 ) I/O jacks: External power input jack, video output jack, and digital output jack  
(used for both USB and serial lines)
- 2 8 ) Battery: Four, AAA alkaline batteries  
(Can use AAA NiCd, nickel-hydrogen, or lithium batteries)
- 2 9 ) Battery life: Approx. 90 min (when using LCD monitor)
- 3 0 ) Size: 148.7 (W) x 78.5 (H) x 38.4 (Grip 64) (D) mm
- 3 1 ) Weight: 390 g (batteries sold separately)
- 3 3 ) Operational temperature range: 0 °C to 40 °C

# Disassembly Procedure

 <b>WARNING</b>	
	<ul style="list-style-type: none"> <li>● There are high voltage parts inside. Be careful of this electric shock, when you remove the cover.</li> <li>● You must discharge the main condenser according to the instruction of this repair manual after you remove the front cover.</li> </ul>

Note : ① Always remove the batteries before disassembling the camera.

② When disassembling the camera, be sure to remember how the cords are attached, where the screws are located, and what types of screws are used.

③ The electronic components in this camera are vulnerable to damage from electrostatic discharge. Always wear a wrist strap or otherwise ground yourself when handling these electronic components.

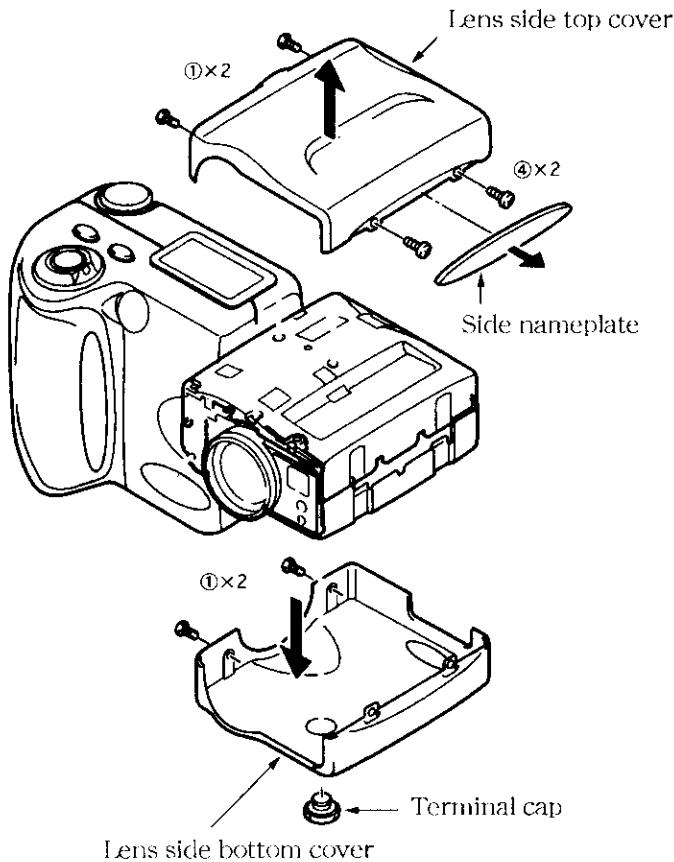
## Types of Screws Used

The following table lists the code numbers that are assigned to the screws that are referenced in the text and illustrations in the disassembly and assembly sections of the repair guidelines.

Designation	Size (mm)	Type	Size of head	Color	Part No.
①	1.7×3.5	Fine thread	Large	Black	412-058-8400
②	1.7×4.0	Tap	Small	Black	411-175-6504
③	1.7×4.0	Tap	Large	Black	411-177-4102
④	1.7×5.0	Tap	Large	Black	411-176-7005
⑤	1.7×3.5	Tap	Large	White	411-177-7103
⑥	1.7×3.5	Fine thread	Small	Black	411-018-3202
⑦	1.7×2.5	Fine thread	Small	White	411-018-1604
⑧	1.7×2.5	Tap	Large	Black	411-175-6405
⑨	1.7×6.0	Tap	Large	White	411-169-9603
⑩	1.7×2.5	Fine thread	Large	White	411-179-7408

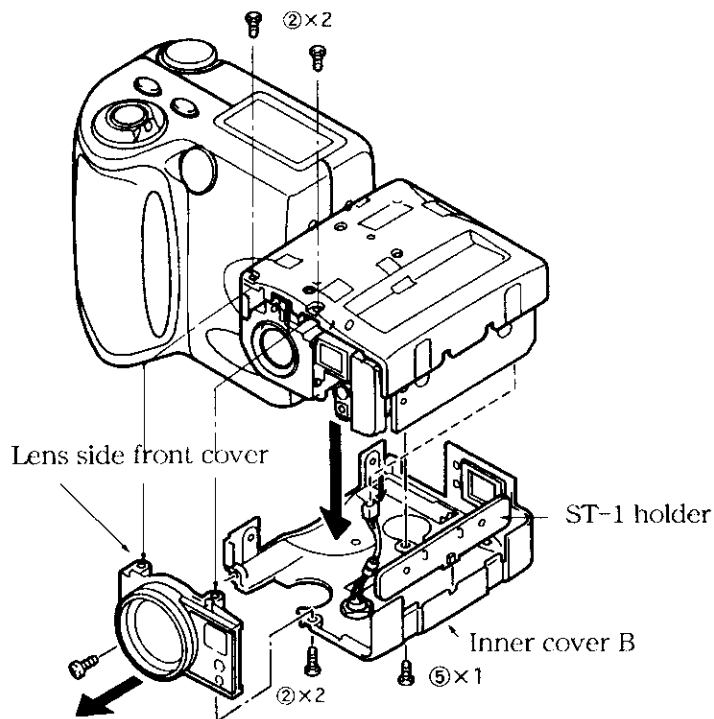
# Disassembly

## 1. Lens side top cover/lens side bottom cover



- Remove the terminal cap.
- Remove the side nameplate (held in place by double-sided tape).
- Remove screws ① x 2 and ④ x 2.
- Remove the lens side top cover.
- Remove screws ① x 2.
- Remove the lens side bottom cover.

## 2. Lens side front cover/inner cover B





- Remove screws ② x 4.
- Remove the lens side front cover.

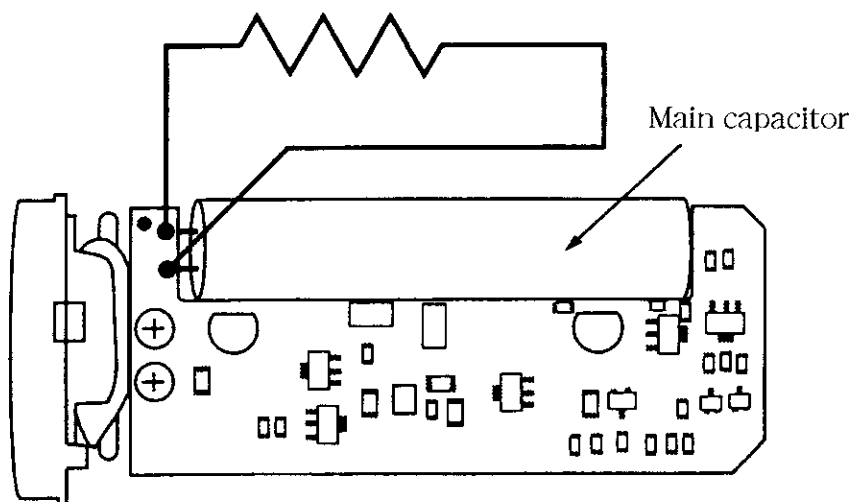
- Remove screw ⑤ x 1.
- Remove the inner cover B.
- Disconnect the connector.
- Remove the ST-1 holder.

### [Cautions]

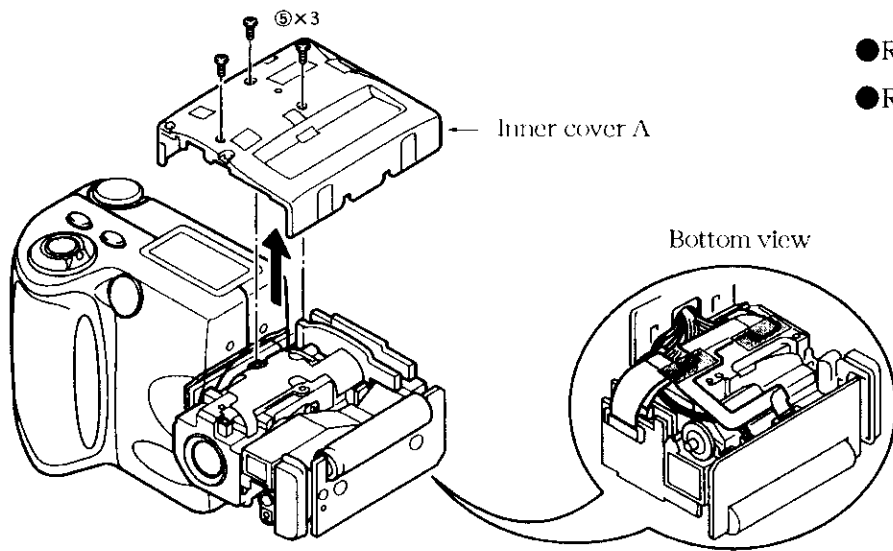
- Some internal components carry high voltage. Be careful of electric shock when removing the cover.
- After removing the cover, always be certain to discharge the main capacitor as instructed in the repair guidelines.



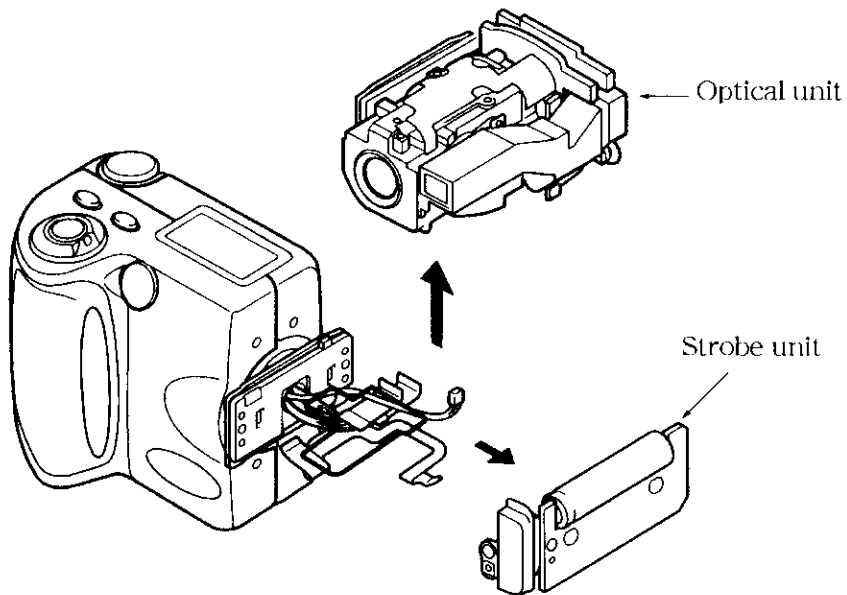
 <b>WARNING</b>	
	<ul style="list-style-type: none"><li>● There are high voltage parts inside. Be careful of this electric shock, when you remove the cover.</li><li>● You must discharge the main condenser according to the instruction of this repair manual after you remove the front cover.</li></ul>



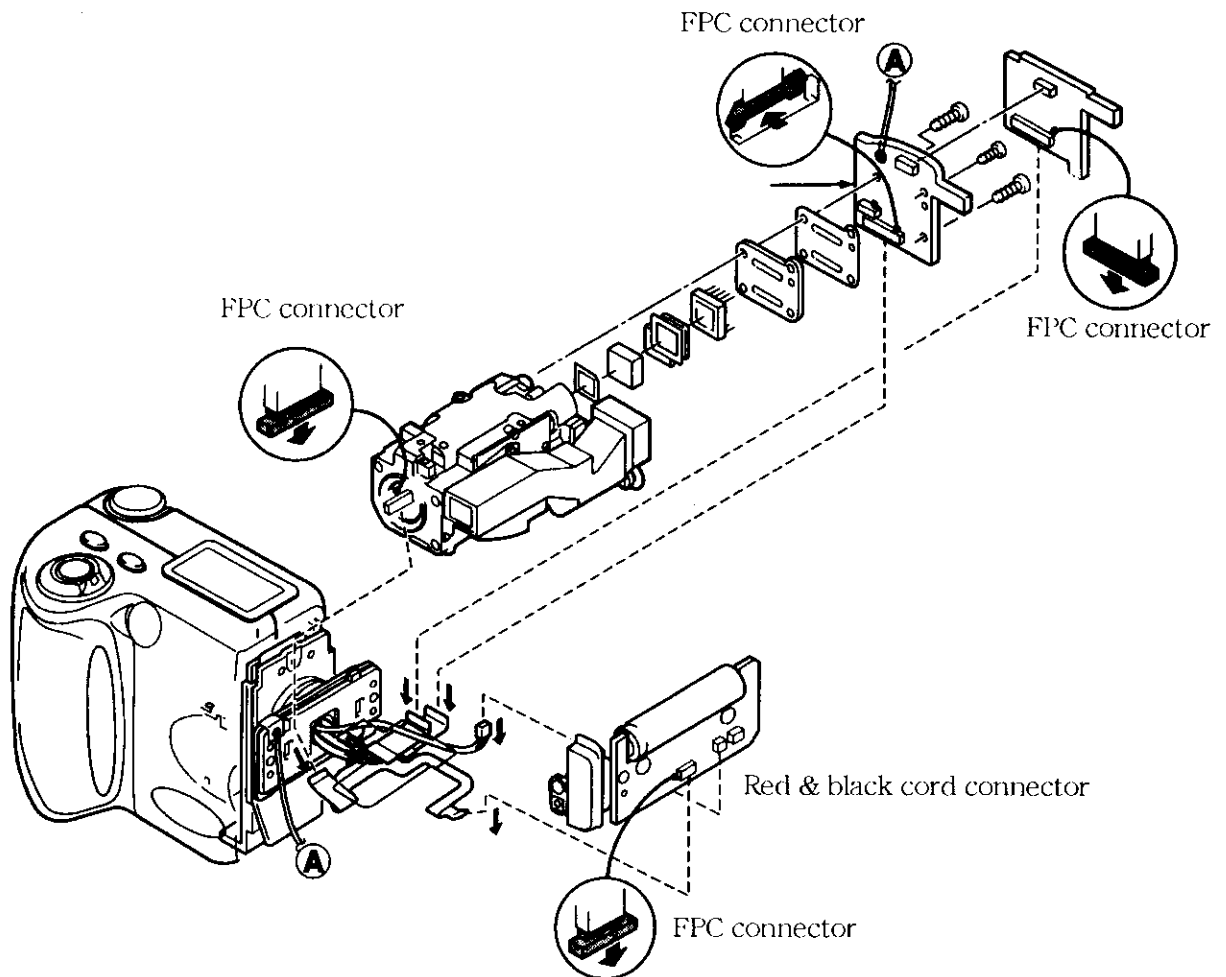
3. Inner cover A



4. Optical unit/strobe unit

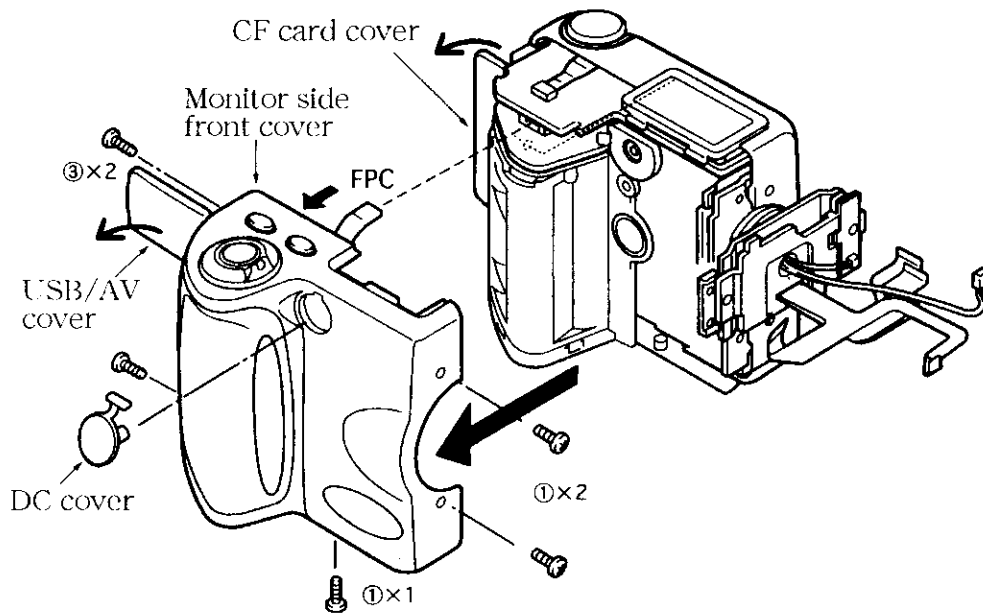


## 4-1. Optical unit lens assembly

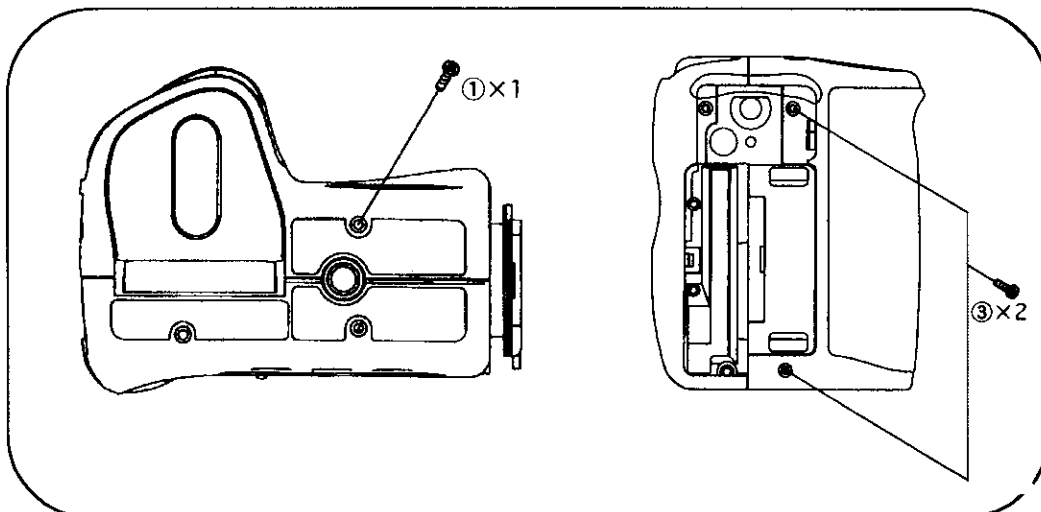


- Disconnect the red & black cord x 1 and the FPC connectors x 4.
- Because the FPC are affixed to the optical unit by means of double-sided tape, hold down the double-sided tape while peeling the FPC off the optical unit.  
[Caution] Be careful not to damage the FPC.
- Disconnect the GND wire (A) that leads from the CA-1 board from the joint assembly.
- Remove the CA-2 board.
- Remove screws ⑨ x 2 and screw ⑩ x 1.
- Remove the CA-1 board.
- [Caution] Do not scratch the optical filter.

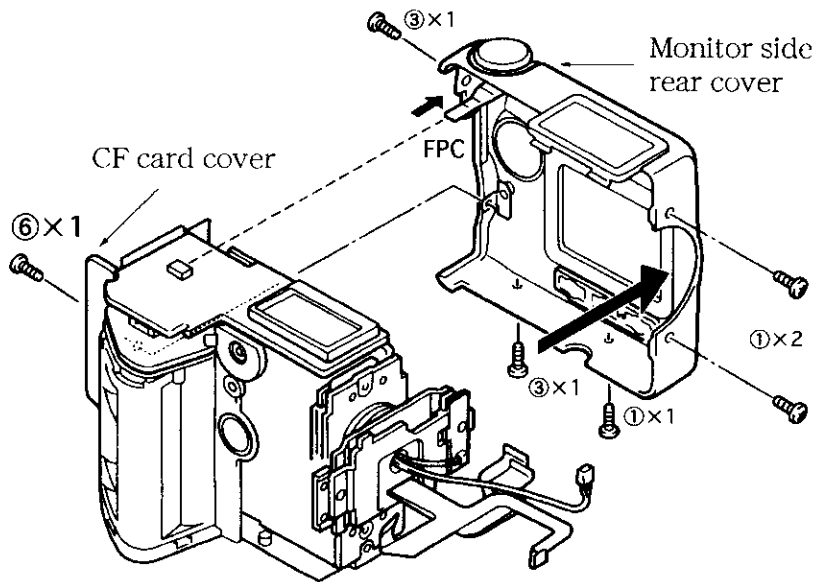
## 5. Monitor side front cover



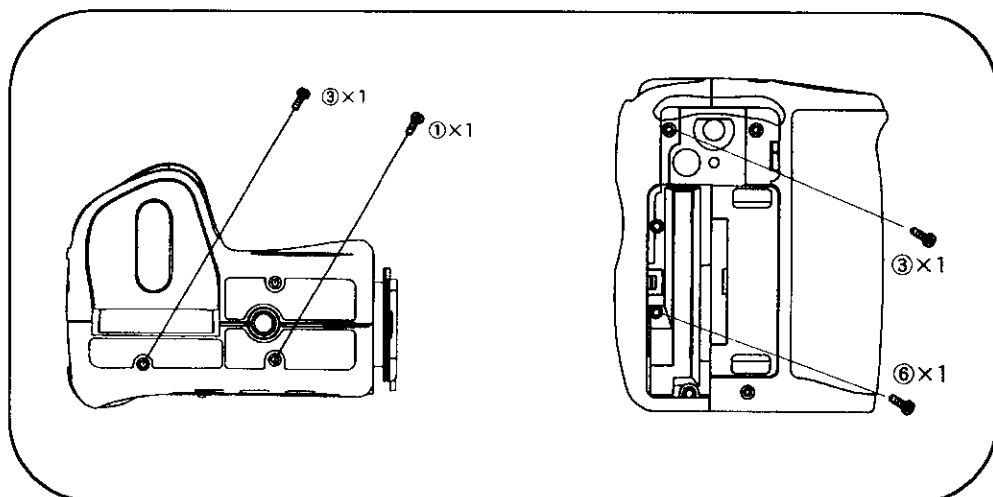
- Open the battery cover.
- Open the USB/AV cover.
- Remove screws ① x 3.
- Remove screws ③ x 2. (One of the screws ③ is located under the USB/AV cover.)
- Slide the monitor side front cover in the direction indicated by the arrow and disconnect the FPC from the board.
- Remove the DC cover.



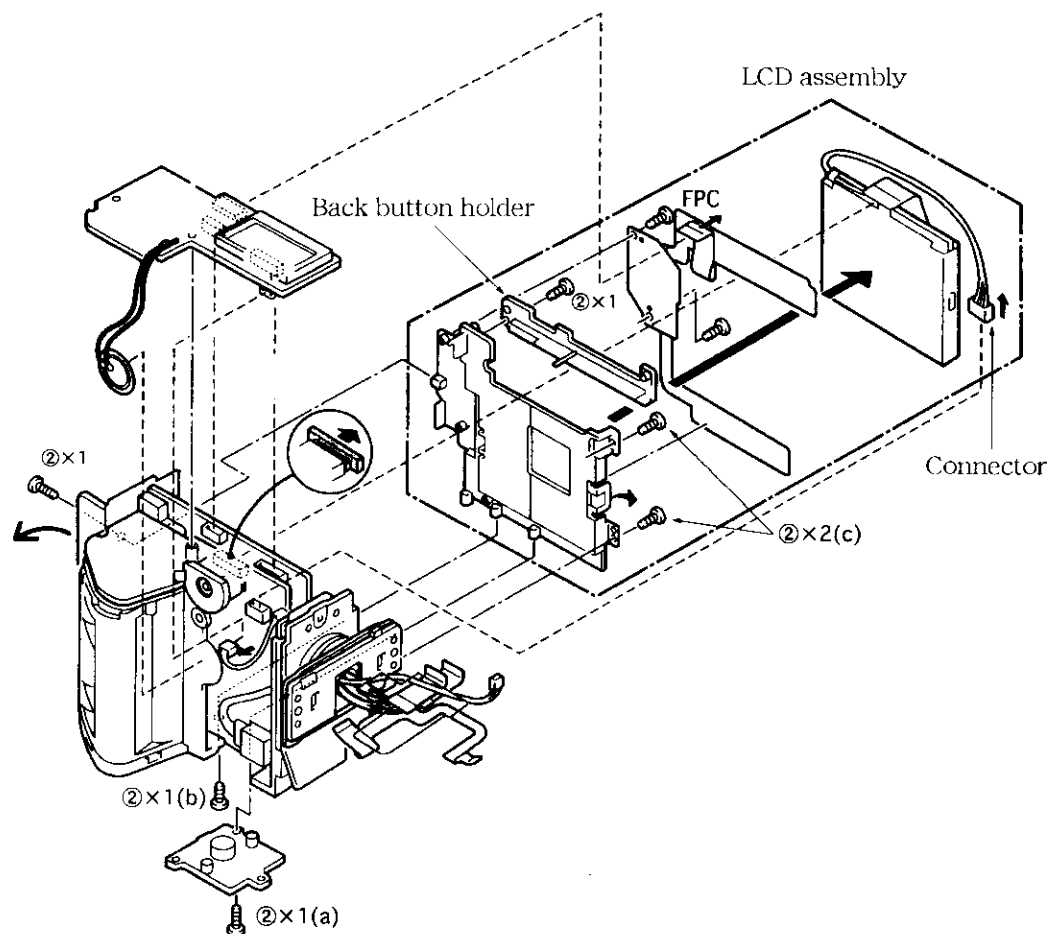
6. Monitor side rear cover



- Open the battery cover.
- Open the CF card cover.
- Remove screws ③ x 2.
- Remove screws ① x 3.
- Remove screw ⑥ x 1.
- Slide the monitor side rear cover in the direction indicated by the arrow and disconnect the FPC from the connector.



## 7. LCD monitor assembly



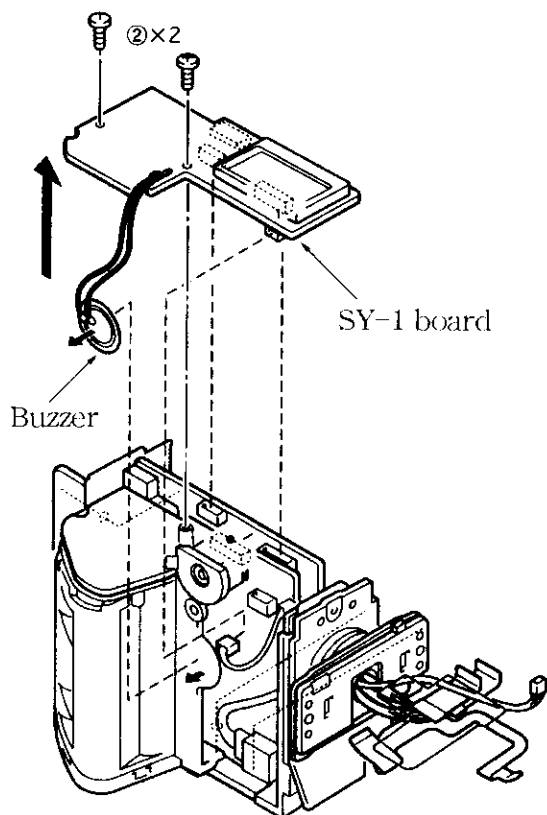
## Back button holder

- Remove screw ② x 1.
- Lift the grip side of the back button holder, and disconnect the FPC from the connector.
- Remove the back button holder joint hook.

## LCD monitor assembly

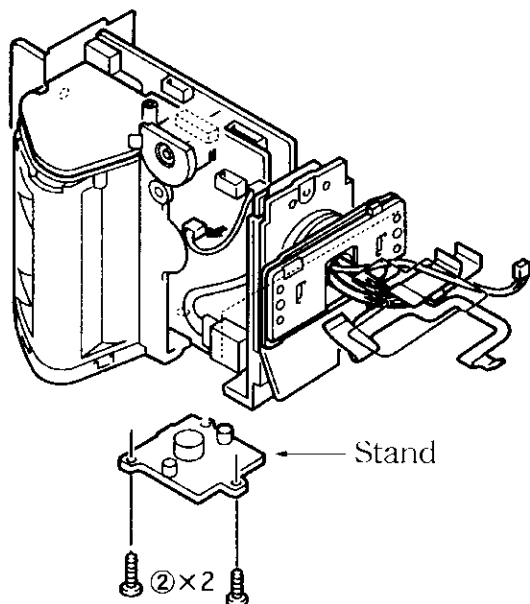
- Disconnect the LCD connector from the PW-1 board.
- Open the CF card cover and remove screw ② x 1.
- Remove screws ② x 4 (a, b, c x 2).
- Raise the entire LCD assembly (the portion enclosed by the dotted line) slightly, and disconnect the LCD FPC from the CA-3 board.
- Remove the entire LCD assembly (the portion enclosed by the dotted line).

8. Main Board Assembly (SY-1)



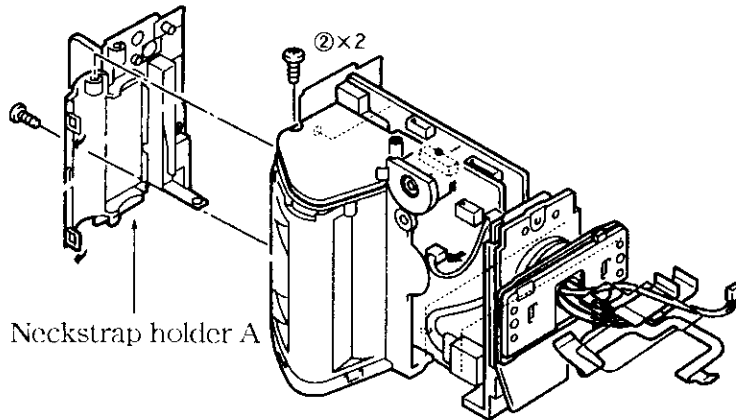
- Remove the buzzer. (Double-sided tape is used.)
- Remove screws ② x 2.
- Remove the SY-1 board. (Disconnect the connectors x 2 from the sockets on the PW-1 board and the CA-3 board.)
- Disconnect the connector that leads from the SY-2 board from the socket on the PW-1 board.

9. Stand

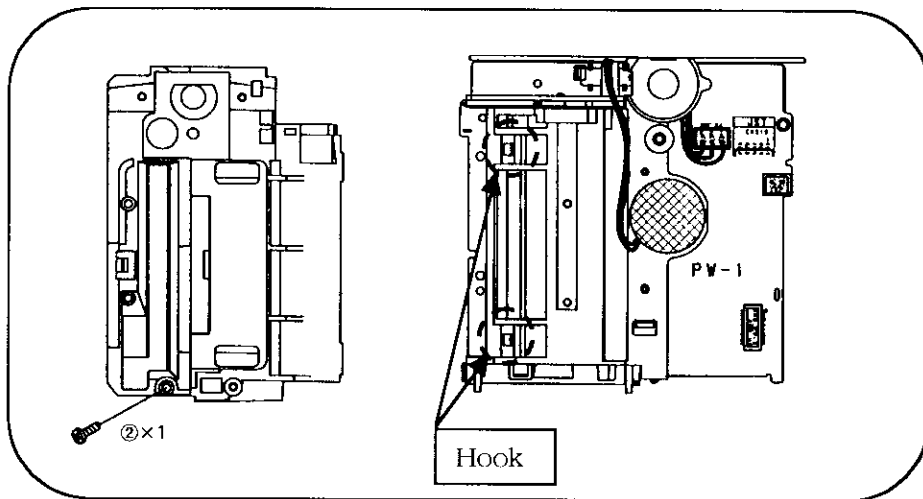


- Remove screws ② x 2.
- Remove the stand.

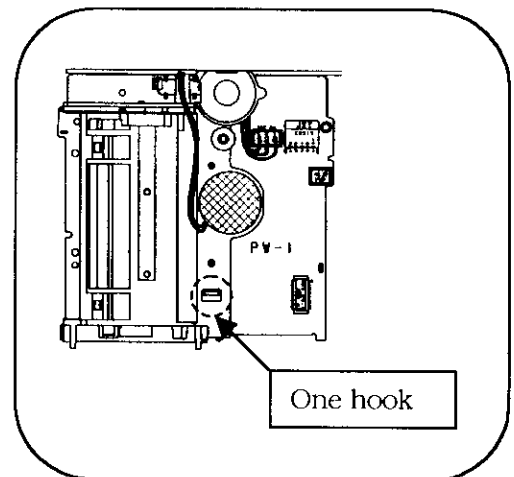
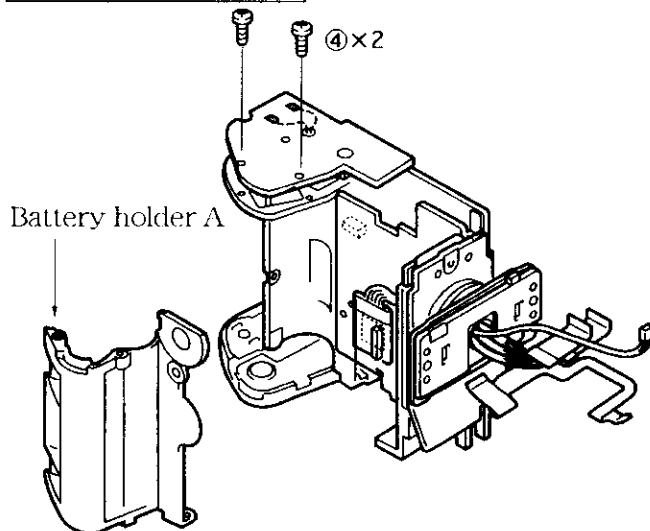
9. Neckstrap holder A



- Remove screws ② x 2.
- While disengaging the two hooks, remove neckstrap holder A.



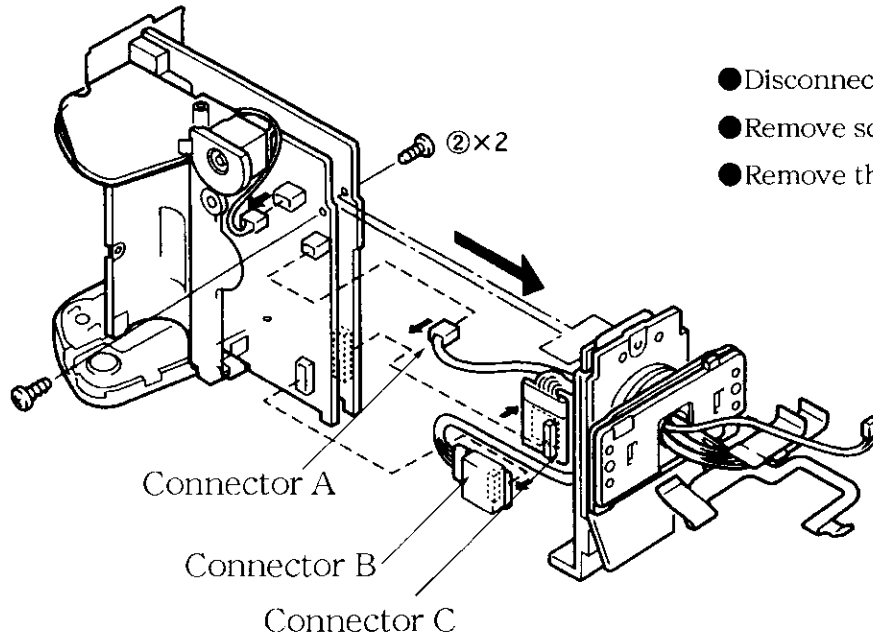
10. Battery holder A



- Remove screws ④ x 2.
- While disengaging the one hook, remove battery holder A.

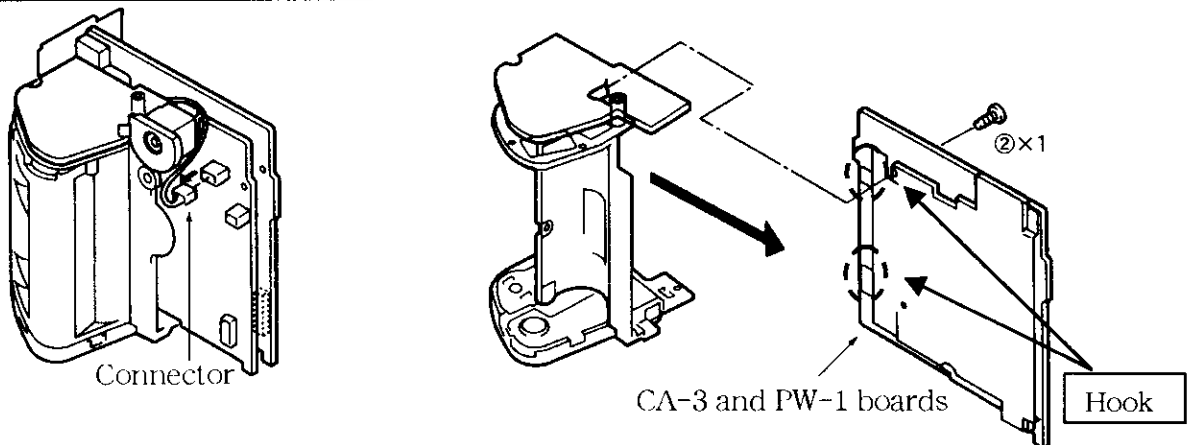


1 1. Joint unit

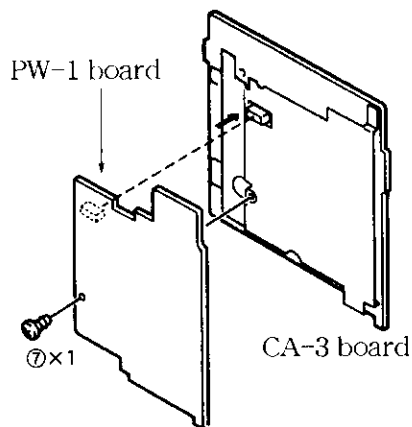


- Disconnect connectors A, B, and C.
- Remove screws ② x 2.
- Remove the joint unit.

1 2. CA-3 and PW-1 boards



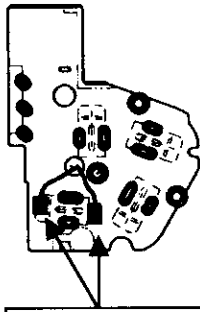
- Remove the connector.



- Remove screw ② x 1.
- Remove the CA-3 board and the PW-1 board.

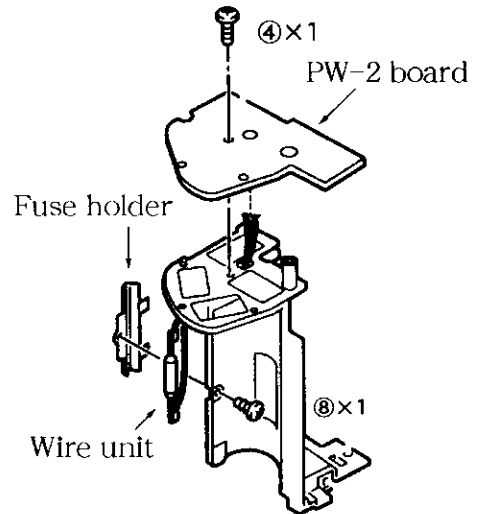
- Remove screw ⑦ x 1.
- Remove the CA-3 board and the PW-1 board.

1 3. Wire unit/PW-2 board



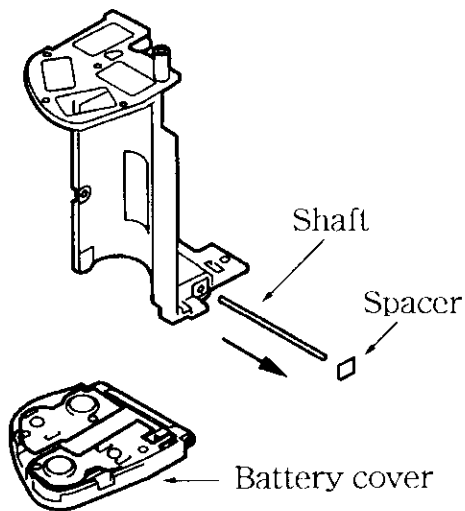
Two soldered connections  
\*No polarity

- Disconnect the two soldered connections.



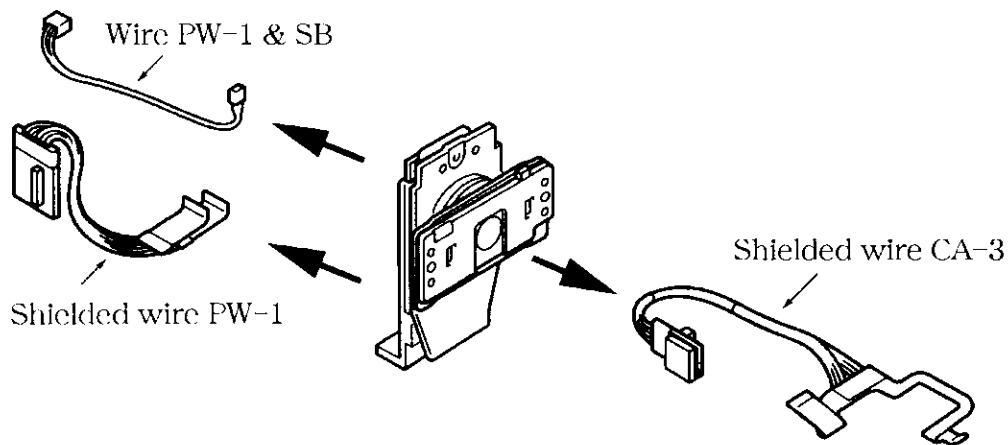
- Remove screws ④ x 2.
- Remove the PW-2 board.
- Remove screw ⑧ x 1.
- Remove the fuse holder.
- Pull the wire unit down and out.

1 4. Battery cover



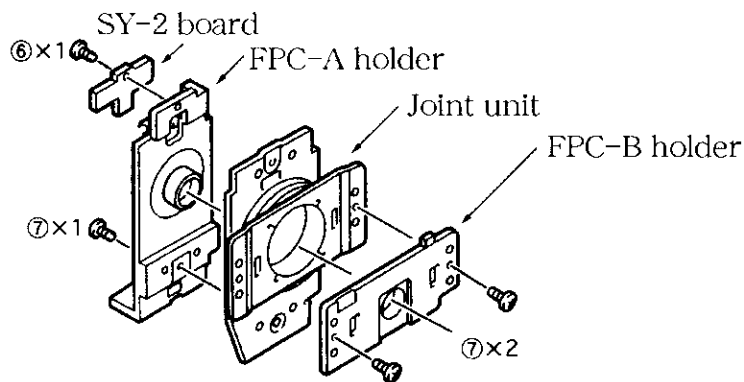
- Peel off the space.  
(The spacer is held in place by double-sided tape.)
- Pull the shaft out in the direction indicated by the arrow.
- Remove the battery cover.

1 5 . Shielded wire assembly



- Pull the wire PW-1 & SB out in the direction indicated by the arrow.
- While curling the tips of the shielded wire PW-1, pull each one out one at a time.
- Pull the shielded wire CA-3 out in the direction indicated by the arrow.

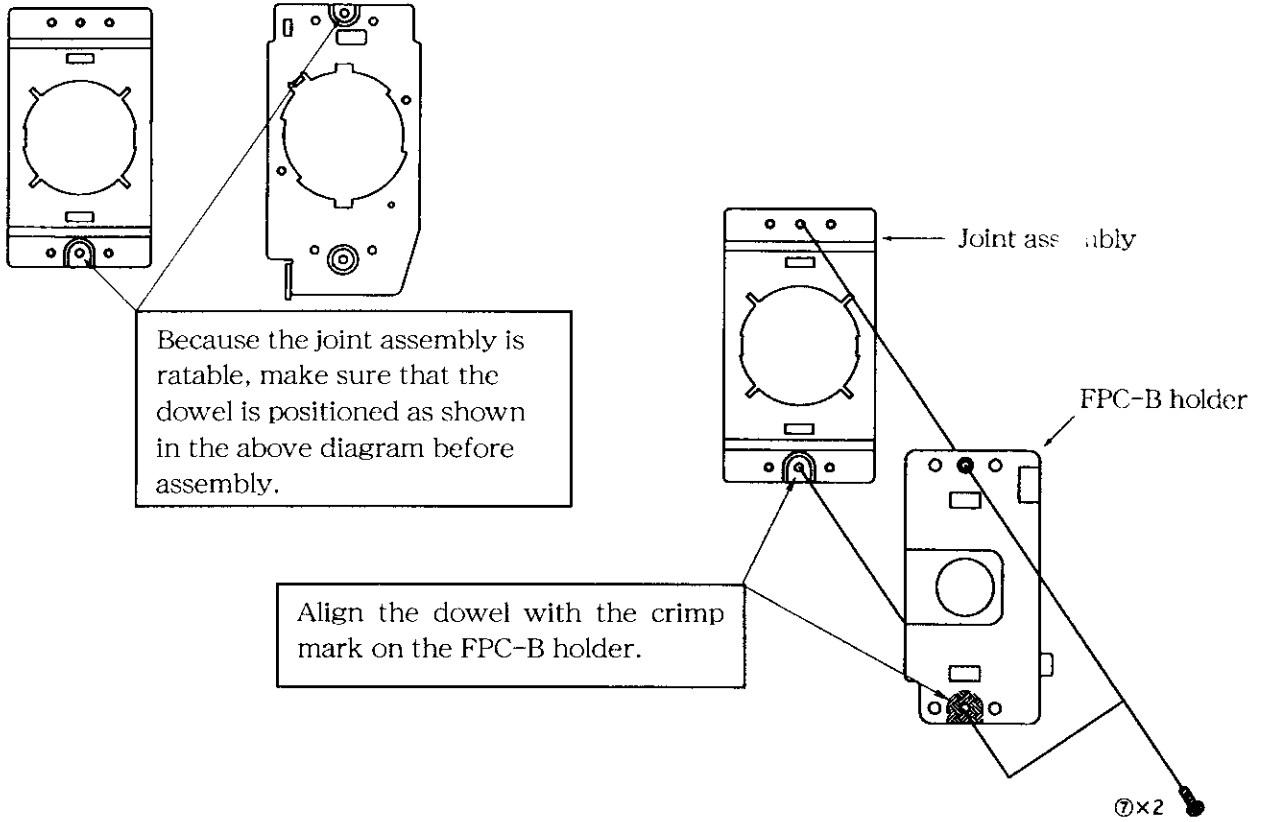
1 6 . Joint assembly



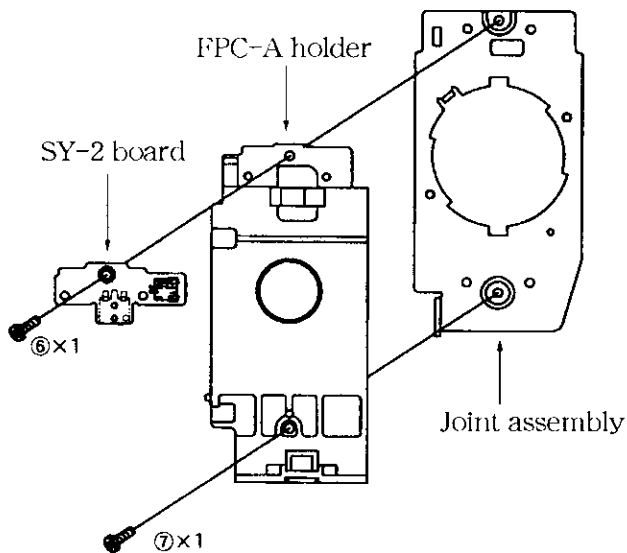
- Remove screw ⑥ x 1.
- Remove the SY-2 board.
- Remove screw ⑦ x 1.
- Remove the FPC-A holder.
- Remove screws ⑦ x 2.
- Remove the FPC-B holder.

# Assembly

## 1. Joint assembly

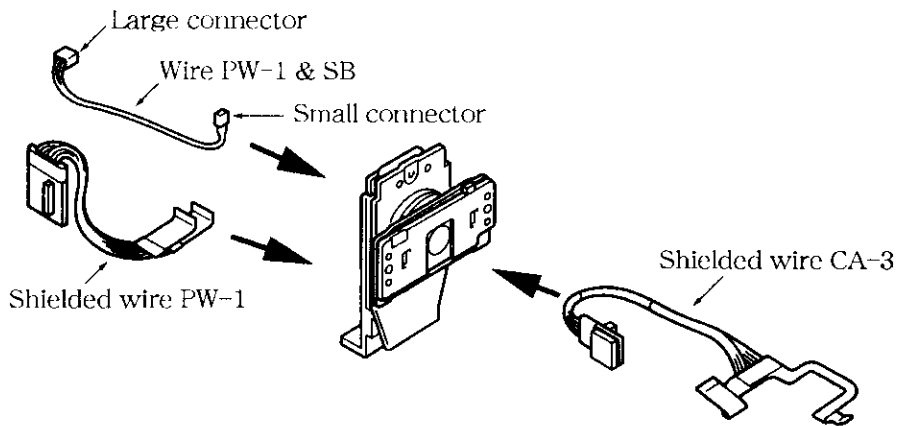


- Attach the FPC-B holder to the joint assembly with screws ⑦ x 2.



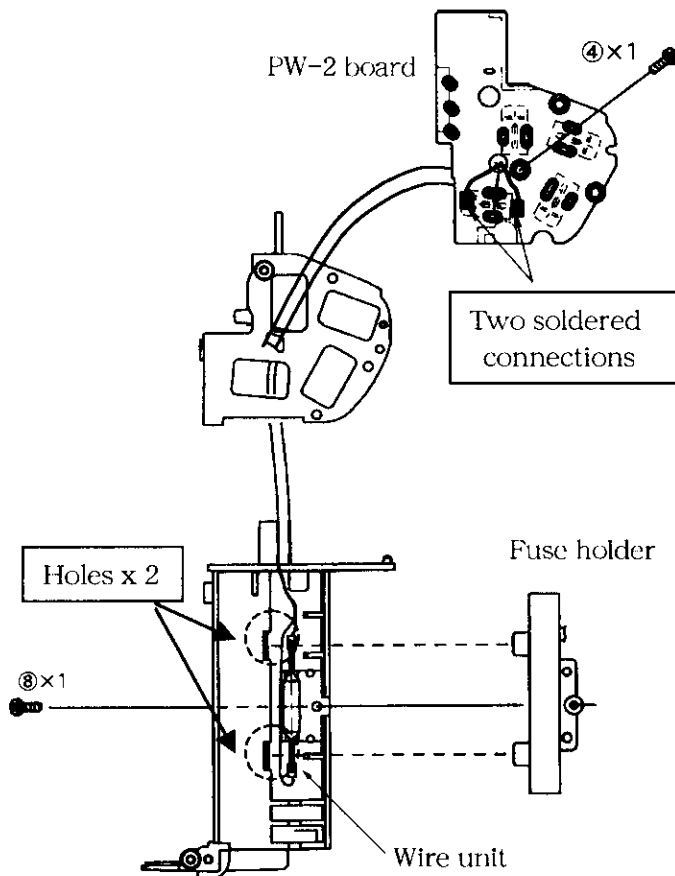
- Attach the FPC-A holder to the joint assembly with screw ⑦ x 1.
- Attach the SY-2 board with screw ⑥ x 1.

2. Shielded wire assembly



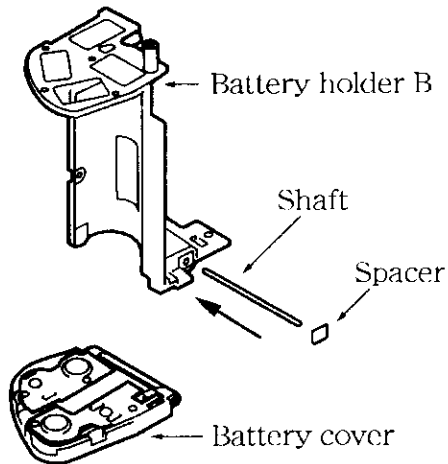
- Pass the small connector on the wire PW-1 & SB through the hole in the joint assembly.
- While curling the tips of the shielded wire PW-1, pass each one through the hole in the joint assembly one at a time.
- Pass the connector on the shielded wire CA-3 through the hole in the joint assembly.

3. Wire unit/PW-2 board



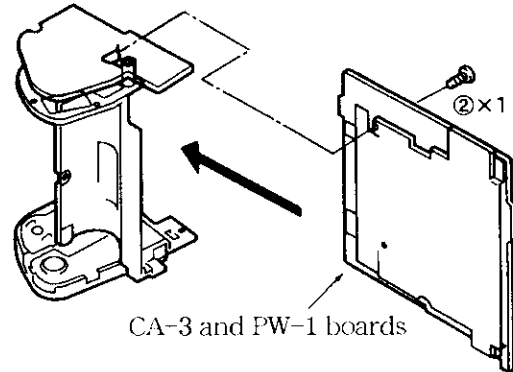
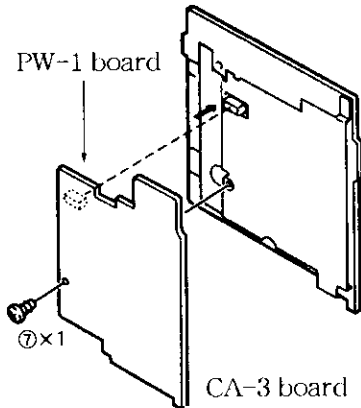
- Attach the wire unit to the battery holder B.  
(Attach so that the fuse fits into the semi-circular groove.)
- Attach the fuse holder with screw ⑧ x 1.  
(Make sure that the two tips of the fuse holder fit in the holes in battery holder B.)
- Pass the two lead wires through the hole in the PW-2 board, and then attach them to the battery holder PWB with screw ④ x 1.
- Solder the two leads to the circuit pattern on the PW-2 board.  
(The leads have no polarity.)

4. Battery cover



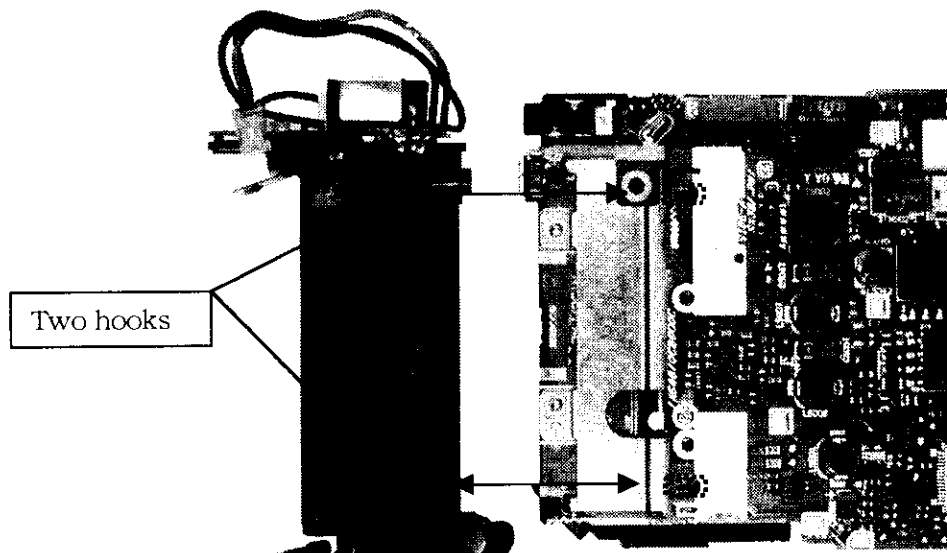
- Use the shaft to attach the battery cover to the battery holder B.
- Use a spacer to attach the shaft to the battery cover.  
(Use double-sided tape.)

5. CA-3 and PW-1 boards

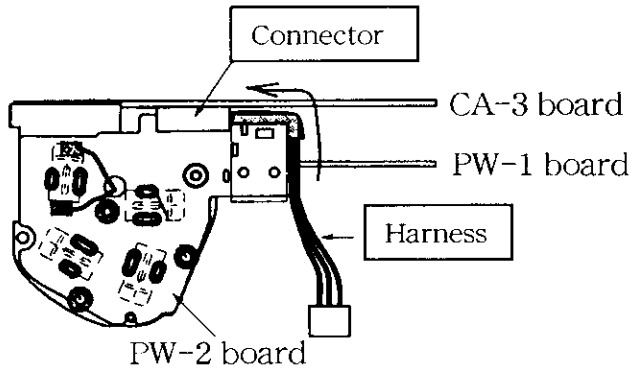


- Attach the CA-3 board to the PW-1 board with screw ⑦ x 1.

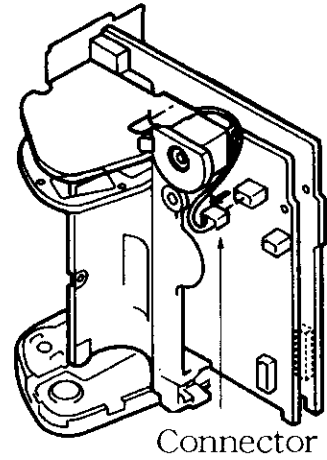
- Use the two hooks to attach the CA-3 and PW-1 boards to the battery holder B.



5 - 1. CA-3 and PW-1 boards

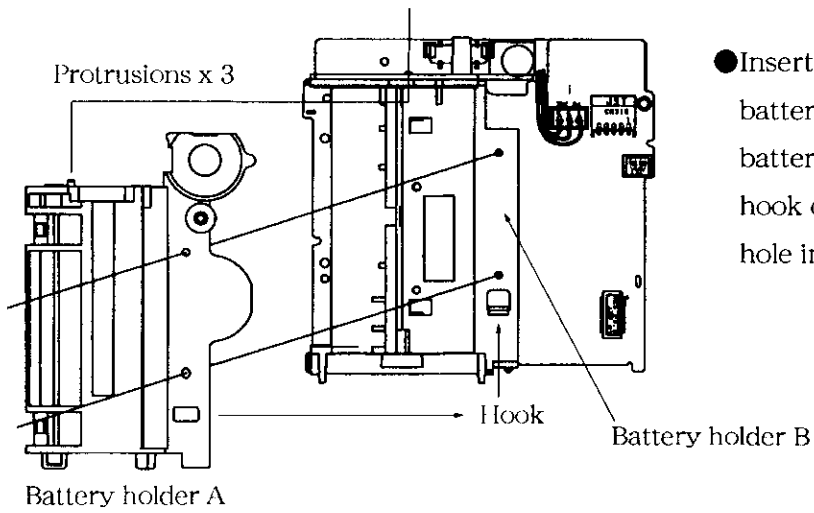


● Pass the harness under the connector.

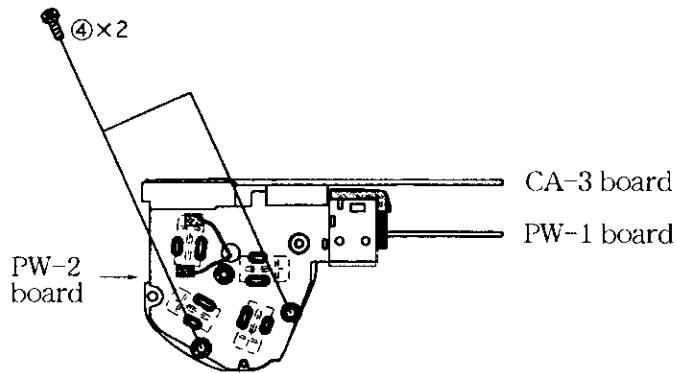


● Plug the connector into the PW-1 board.

6. Battery holder A



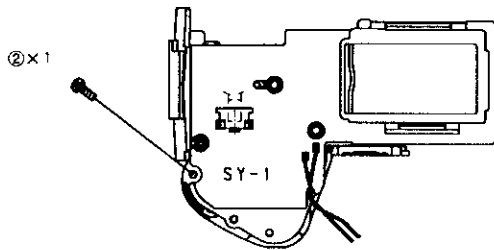
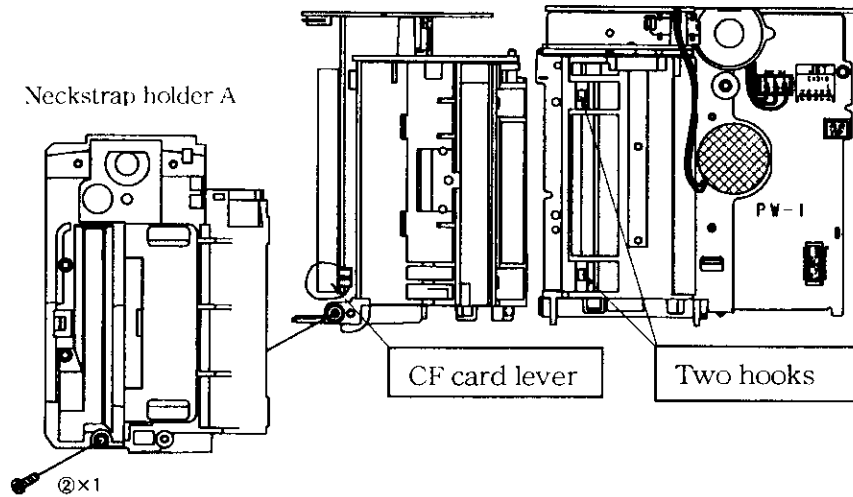
- Insert the three protrusions on battery holder A into the holes on battery holder B, and insert the hook on battery holder A into the hole in battery holder B.



- Attach the PW-2 board to battery holder A using screws ④ x 2.

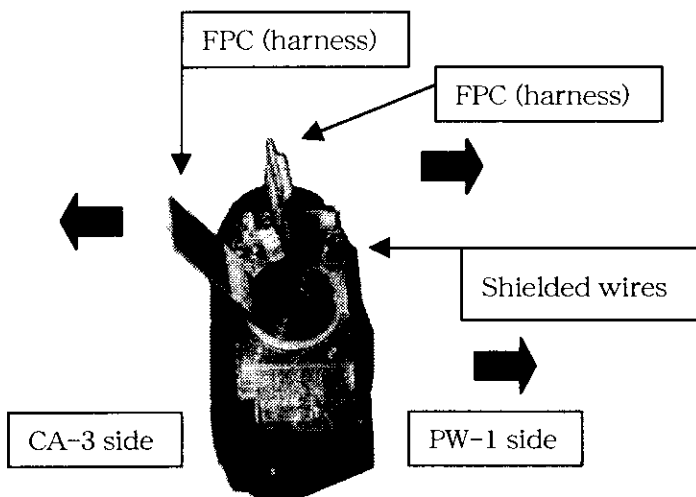


7. Neckstrap holder A



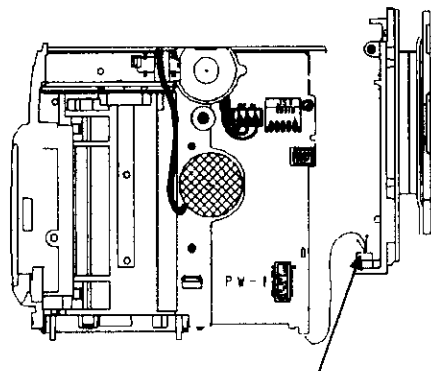
- Open the CF card cover.
- While holding down the CF card lever, attach the two hooks on neckstrap holder A.
- Insert screws ② x 2.

8. Joint assembly

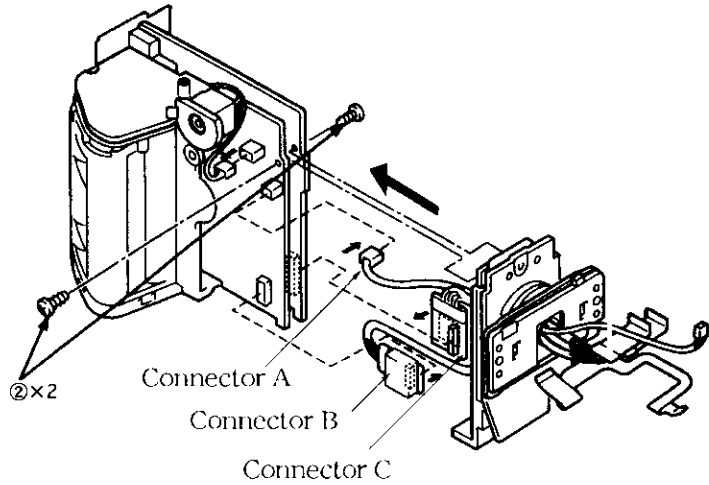


- Allocate the shielded wires and harness to the CA-3 side and the PW-1 side. Make sure that the wires are not intertwined.
- Do not attach the FPC harnesses upside-down.

8-1. Joint assembly

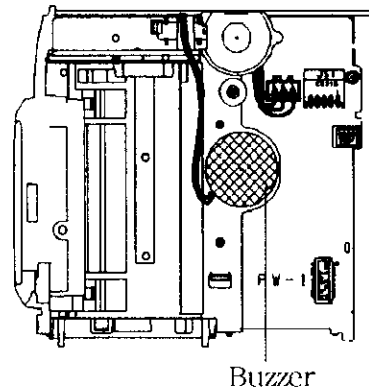
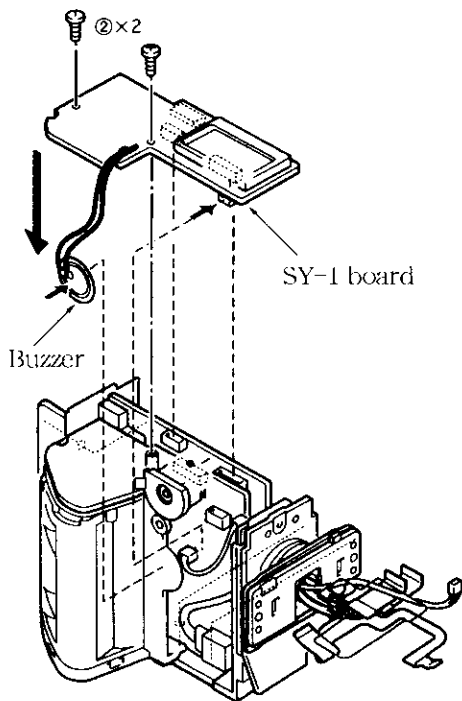


Insert the corner of the board into the hole.



- Connect connectors A, B, and C.
- Insert screws ② x 2.

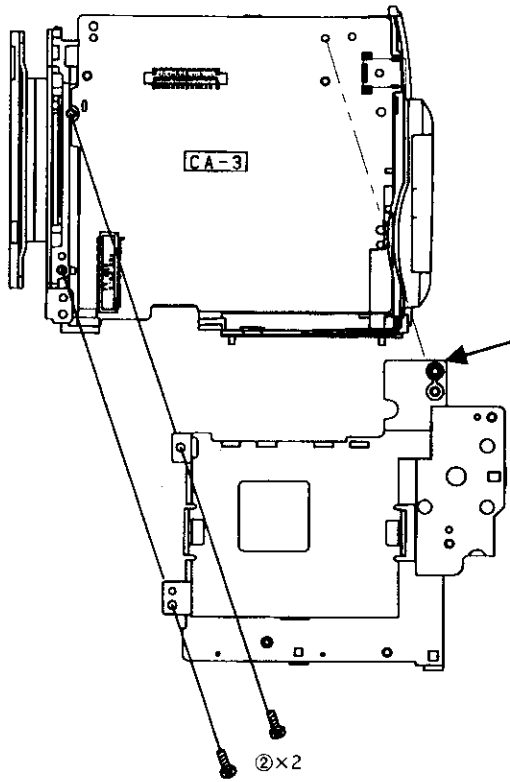
9. SY-1 board



Buzzer installation position

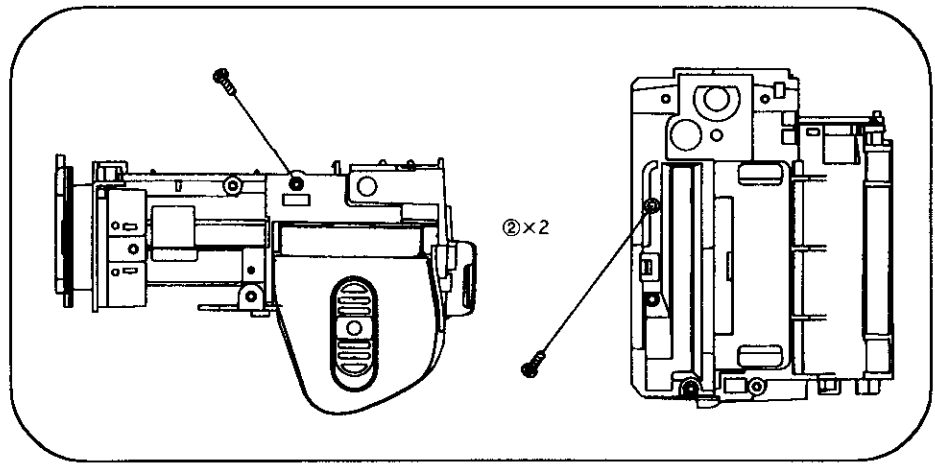
- Connect the three connectors to the PW-1 board, the sockets on the CA-3 board, and the connector from SY-2 to the SY-1 board.
- Attach the SY-1 board. (Be sure to insert it into the socket.)
- Attach the buzzer. (Use double-sided tape.)
- Insert screws ② x 2.

1 0 . Monitor LCD holder

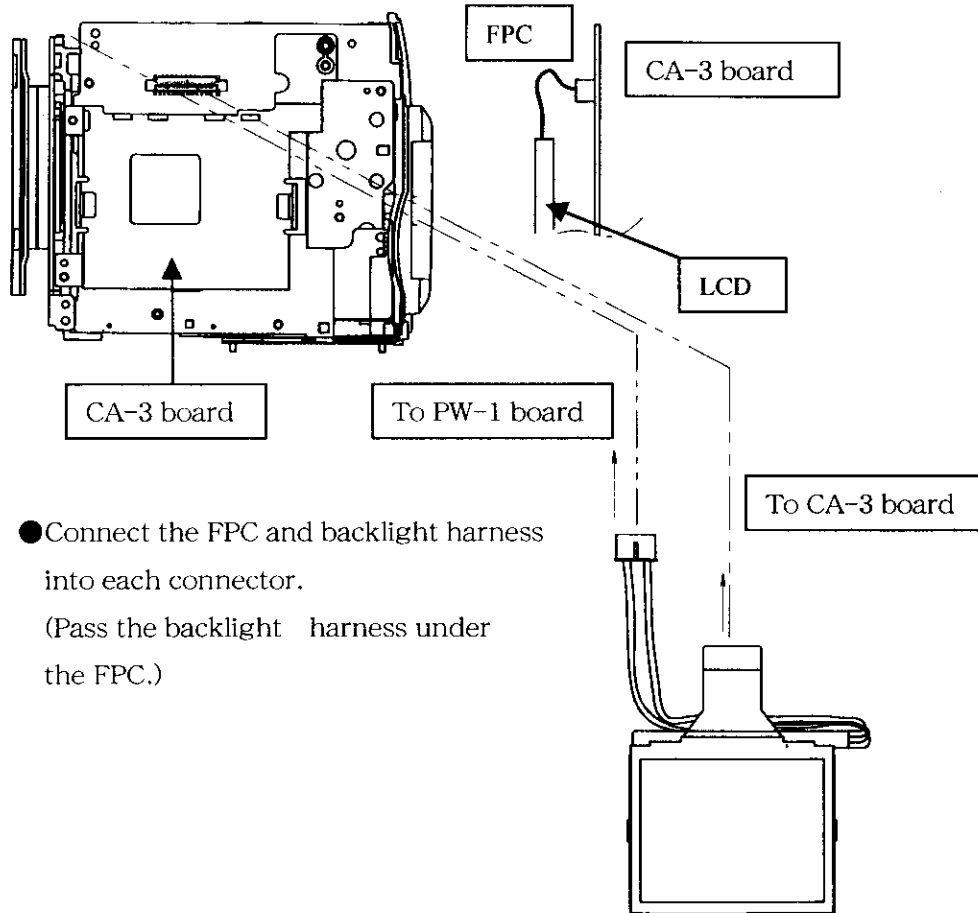


- When attaching the monitor holder, insert the positioning boss first.
- Insert screws ② x 4.

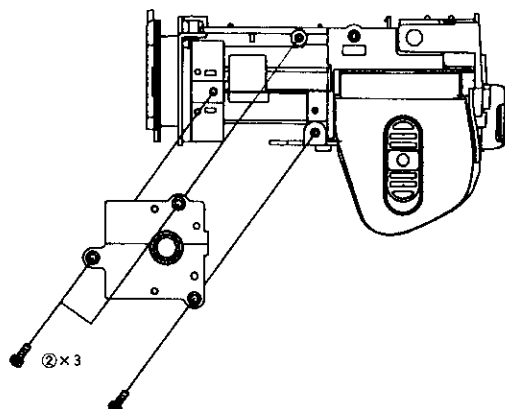
Positioning boss



1 1. LCD monitor assembly

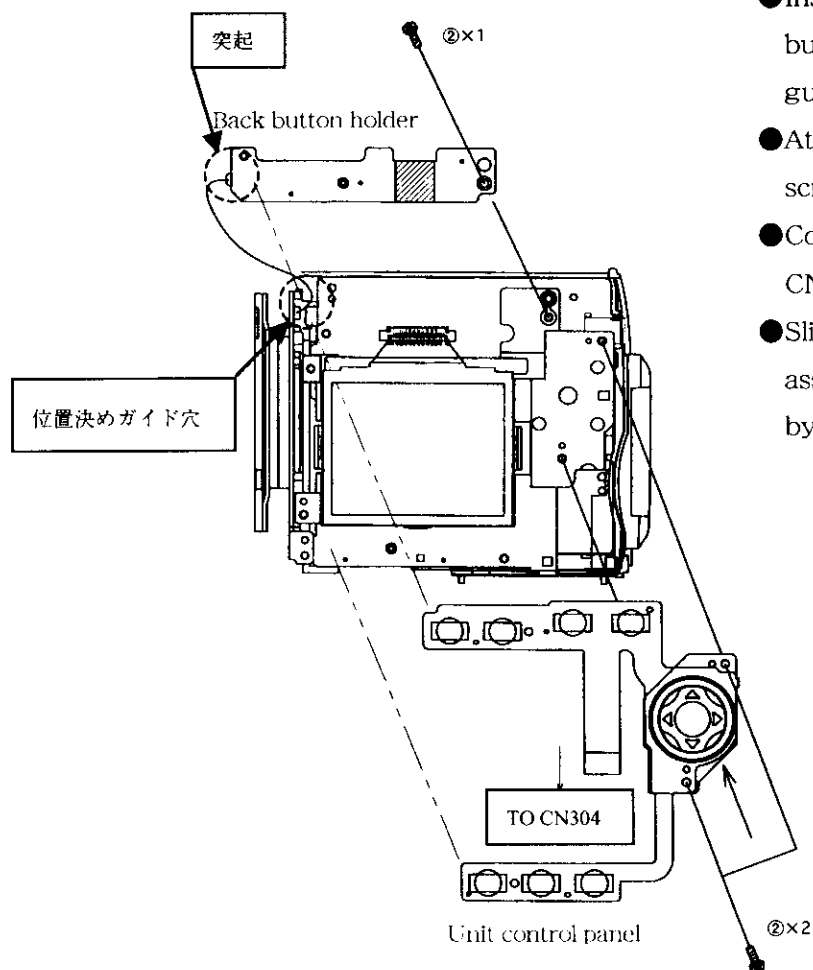


1 2. Stand

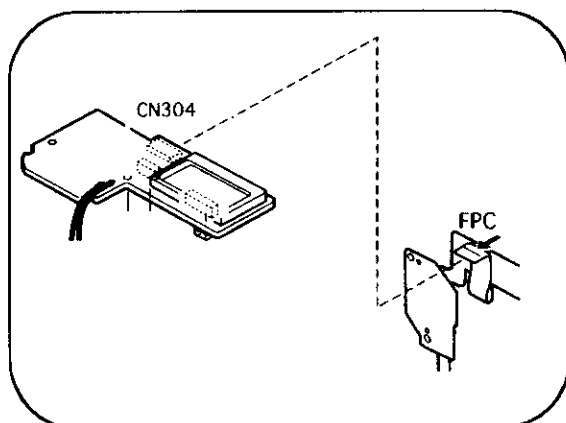


● Attach the stand using screws ② x 3.

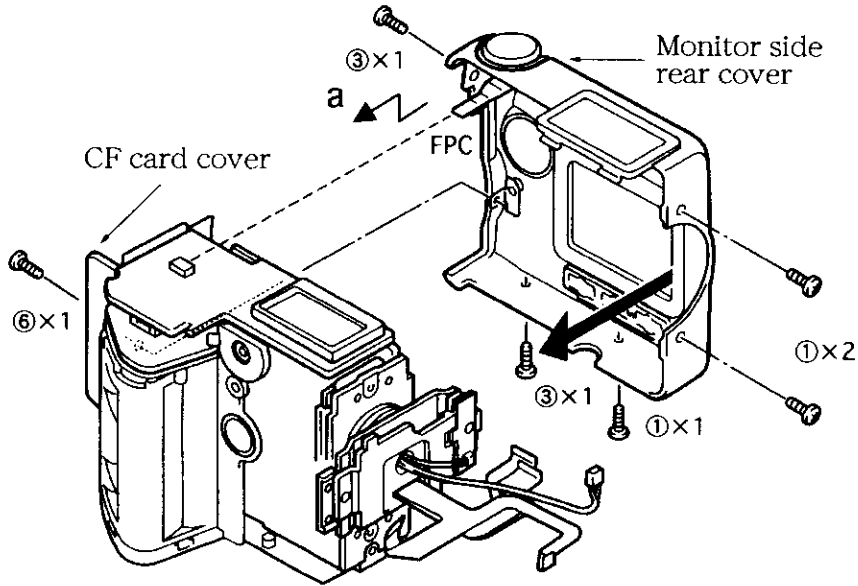
1 2. Back button holder/unit control panel



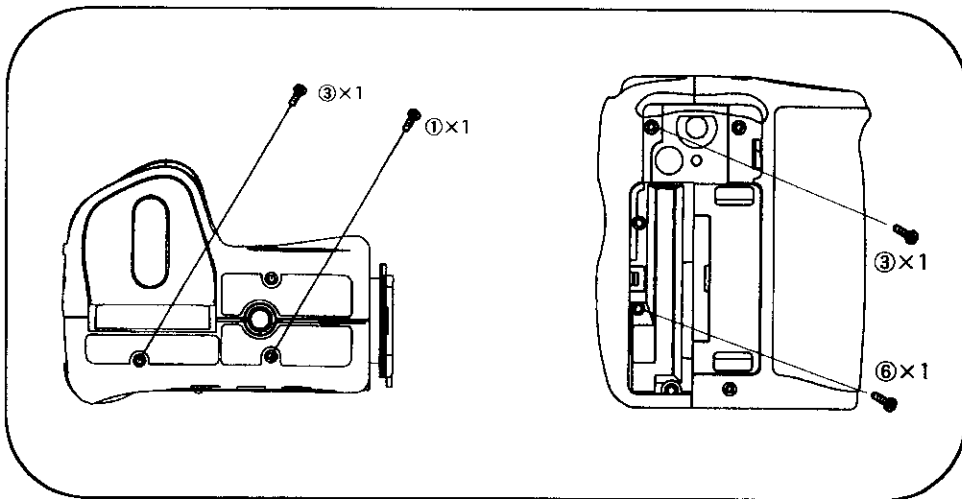
- Insert the protrusion on the back button holder into the positioning guide hole.
- Attach the back button holder using screw ② x 1.
- Connect the unit control panel to CN304 on the SY-1 board.
- Slide the direction key switch assembly in the direction indicated by the arrow and insert screws ② x 2.



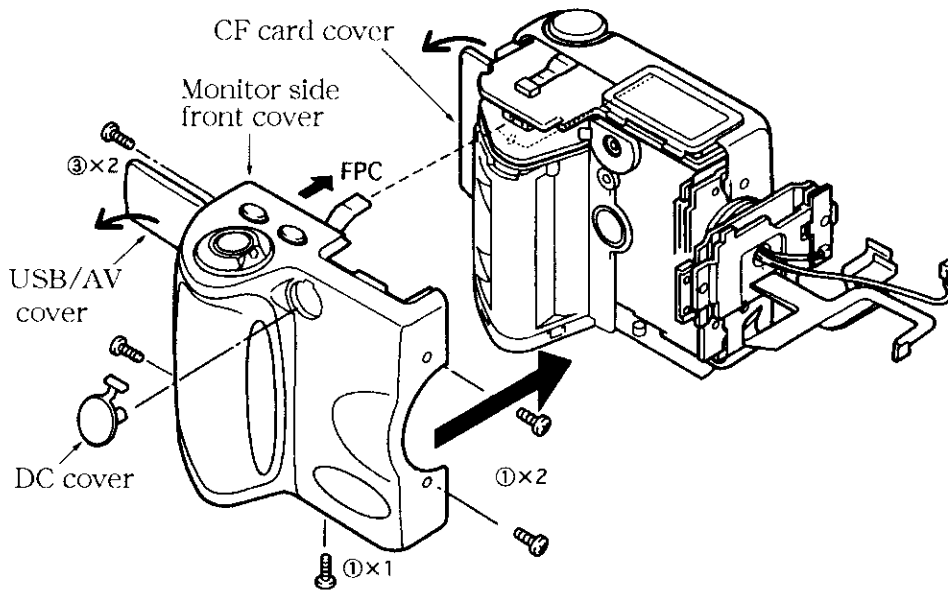
1 3. Monitor side rear cover



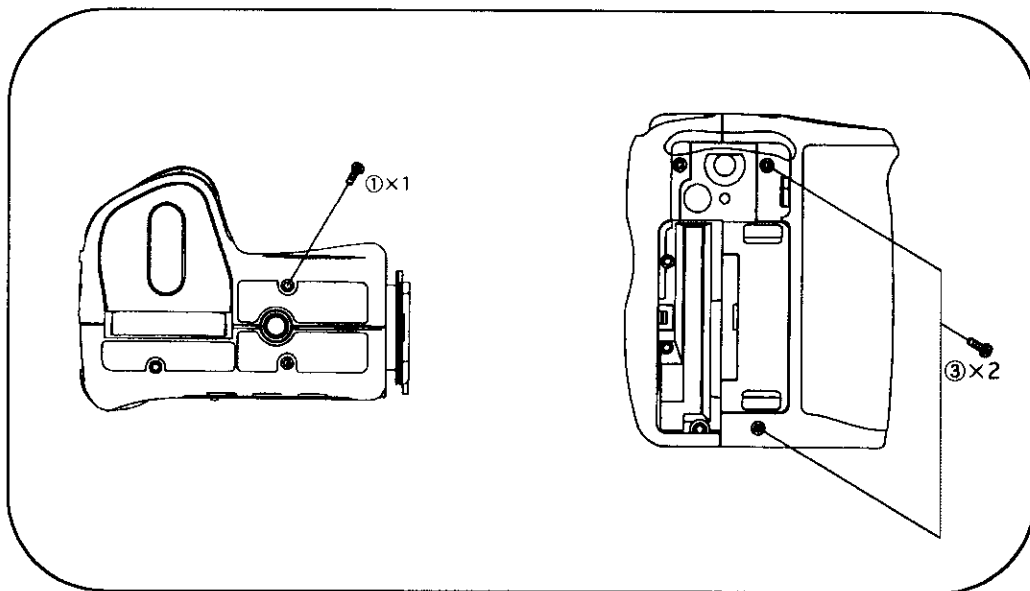
- Connect the FPC from the cabinet back LCD (bending the FPC in the direction indicated by arrow a) to the connector on the SY-1 board.
- Attach the cabinet back LCD. (Make sure that the ground USB does not curl up.)
- Insert screw ⑥ x 1, screws ① x 3, and screws ③ x 2.



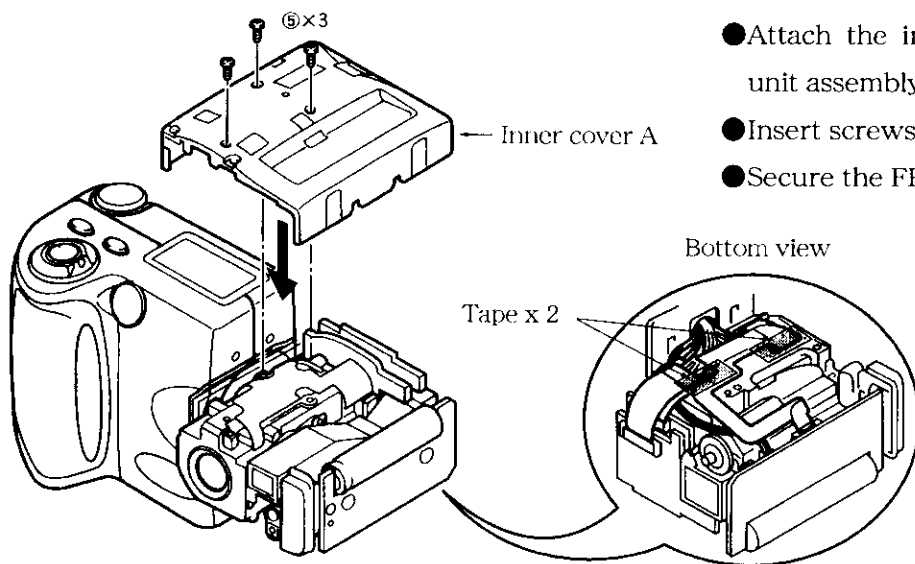
1 3. Monitor side front cover



- Connect the monitor side front cover FPC to the connector on the SY-1 board.
- Attach the USB/AV cover and the DC cover to the monitor side front cover.
- Attach the monitor side front cover to the main body.
- Insert screws ① x 3 and screws ③ x 2.

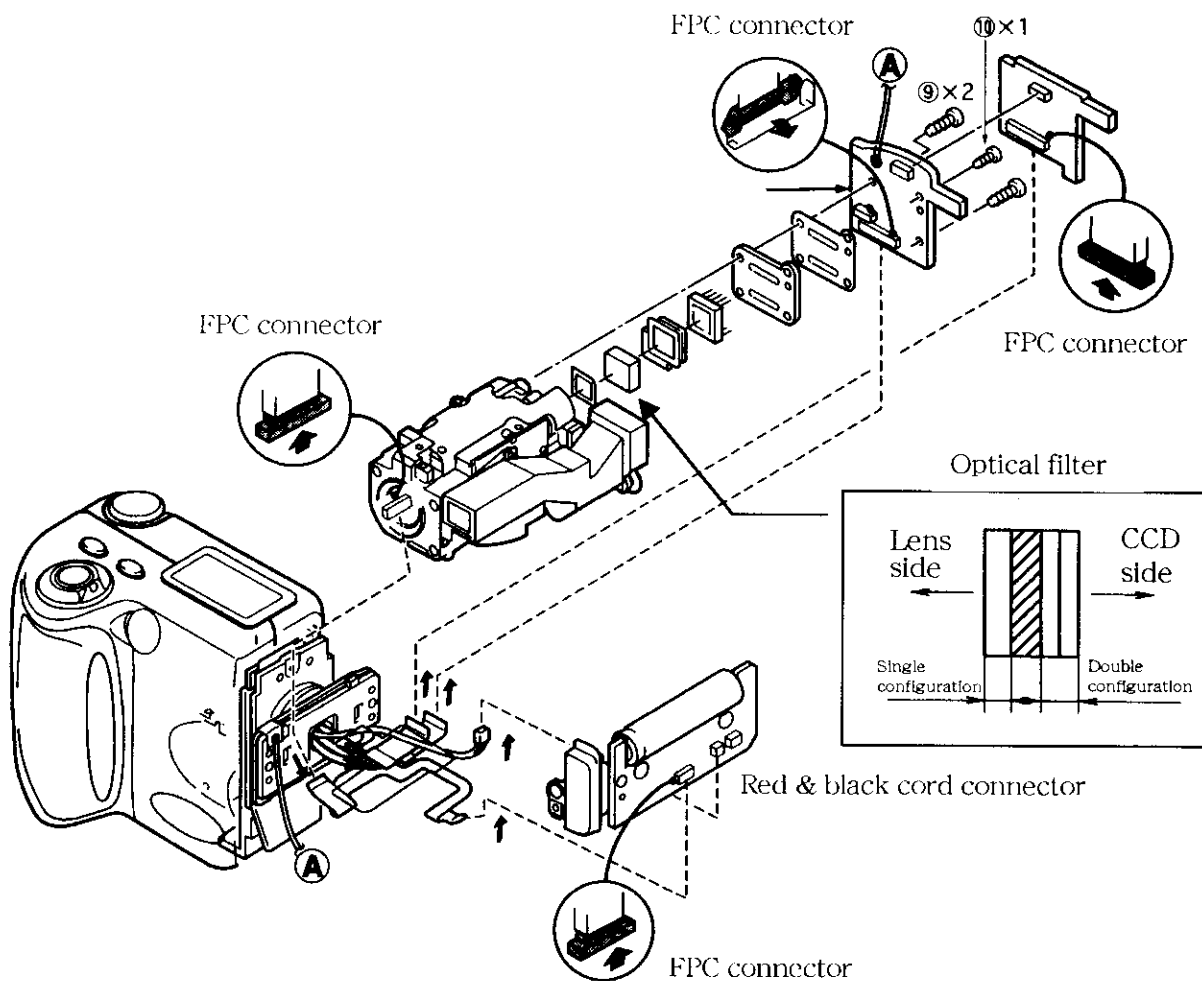


1 4. Inner cover A



- Attach the inner cover A to the optical unit assembly.
- Insert screws ⑤ x 3.
- Secure the FPC with two pieces of tape.

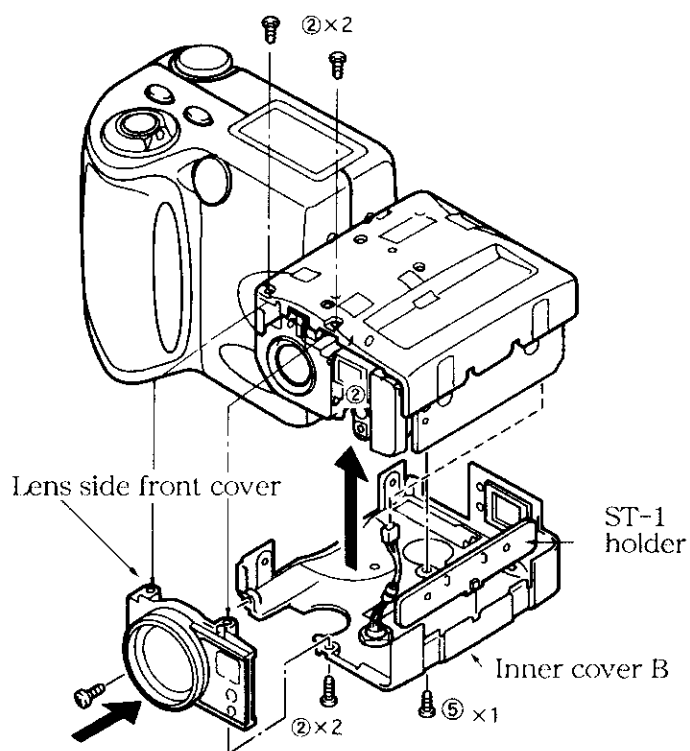
1 5. Optical lens unit assembly



- Connect the red & black cord and the four FPC to the five connectors.
- Attach the GND wire (A) from the CA-1 board to the joint assembly.
- Refer to the diagram for details on the optical filter orientation.

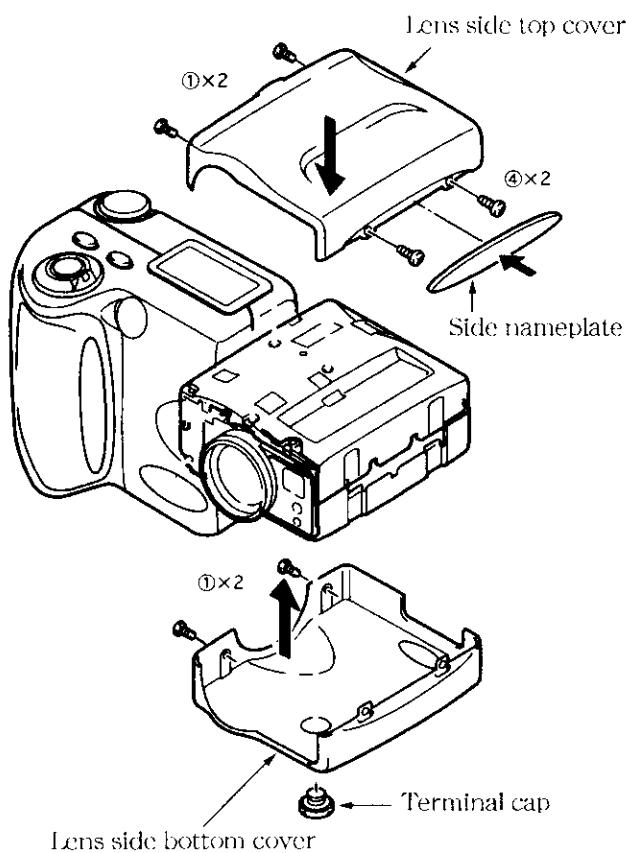


1 6 . Lens side front cover/inner cover B



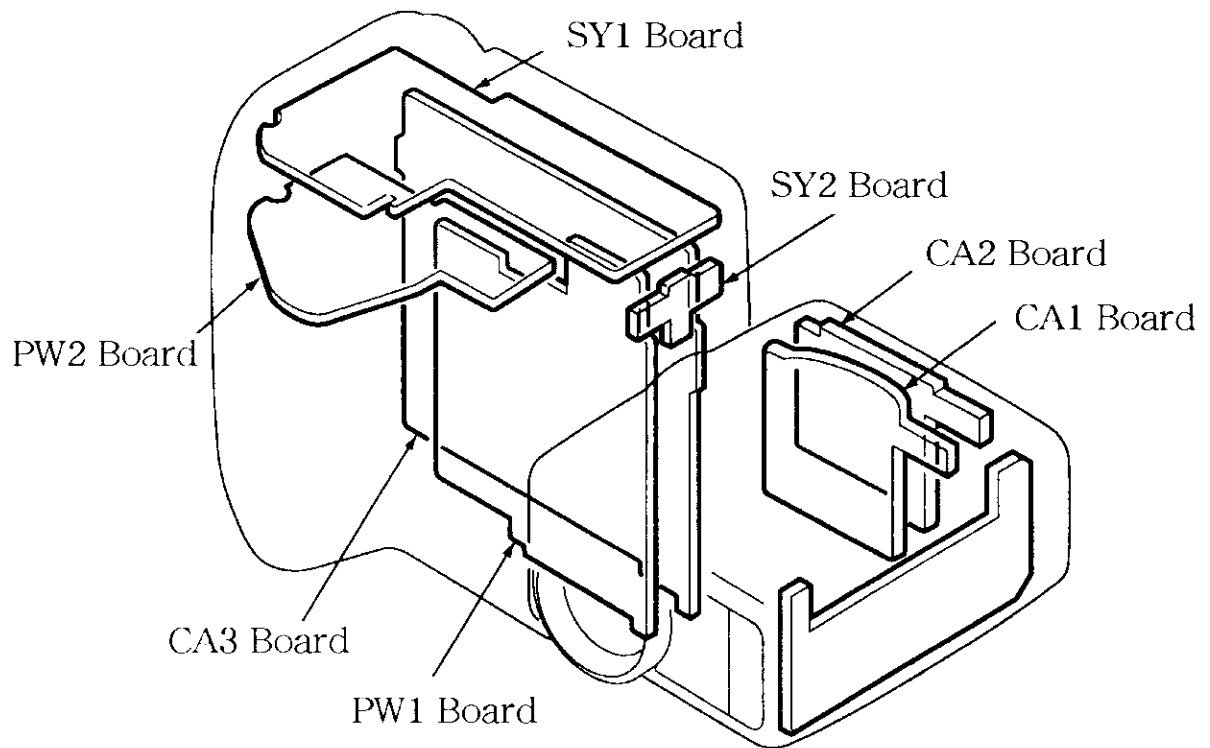
- Attach the ST-1 holder.
- Attach the terminal connector to the strobe board.
- Attach inner cover B.
- Insert screw ⑤ x 1.
- Attach the lens side front cover.
- Insert screws ② x 4.

1 7 . Lens side top cover/lens side bottom cover



- Attach the lens side bottom cover.
- Insert screws ① x 2.
- Attach the lens side top cover.
- Insert screws ① x 2.
- Insert screws ④ x 2.
- Attach the side nameplate.
- Attach the terminal cap.

1 7. BOARD LOCATION



# ELECTRICAL ADJUSTMENT

## 1. Equipment

- Oscilloscope
- AC adaptor (EH-31)
- IBM compatible PC

## 2. Servicing Tools

- Color viewer 5,100 K

Note : Due to 100 to 110 V specified for the color viewer, in case of using it in somewhere overseas, be sure to convert its voltage through the transformer in accordance with that country's voltage.

- Siemens star chart
- Calibration software
- Chart for color adjustment

## 3. Setup

### 3-1. System requirements

- Windows 95 or 98
- IBM R -compatible PC with 486 or higher processor
- CD-ROM drive
- 3.5-inch high-density diskette drive
- Serial port with standard RS-232C interface
- 8 MB RAM
- Hard disk drive with at least 15 MB available
- VGA or SVGA monitor with at least 256-color display

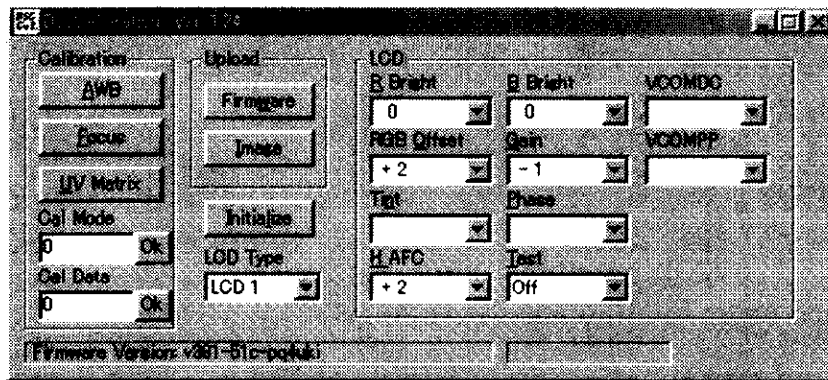
### 3-2. Installing calibration software

- Insert the calibration software installation diskette into your diskette drive.
- Open the explorer.
- Copy the DSC Cal folder on the floppy disk in the FD drive to a folder on the hard disk.
- Color Viewer

Turn on the switch and wait for 30 minutes for aging to take place before using Color Pure.

#### 4. Calibration software

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



#### 5. Adjustment Items and Order

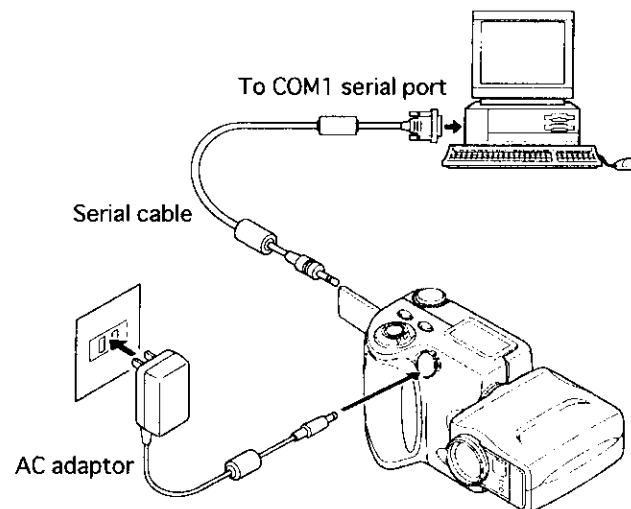
- ① Flange-back (Lens) Adjustment
- ② CCD Defect Detect Adjustment
- ③ AWB Adjustment
- ④ Color matrix Adjustment
- ⑤ LCD Panel Adjustment
- ⑥ Adjustment items required at replacement of parts

	Flange-back (Lens) Adjustment ①	CCD Defect Detect Adjustment ②	AWB Adjustment ③	Color matrix Adjustment ④	LCD Panel Adjustment ⑤
CA1	○	○	○	○	×
CA2	○	○	○	○	×
CA3	○	○	○	○	○
SY-1	○	×	×	×	×
SY-2	×	×	×	×	×
PW1,2	×	×	×	×	×
LCD	×	×	×	×	○
Lens Unit	○	○	○	○	×
CCD	○	○	○	○	×
Optical filter	○	○	○	○	×

○ : Adjustment required    × : Adjustment not required

## 6. Connecting the camera to the computer

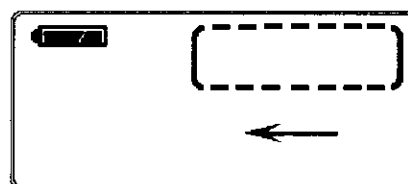
- Turn off both camera and computer.
- Locate the port cover on the side of the camera. Press on the arrows and slide the cover down to open it.
- Line up the arrow on the cable connector with the notch on the camera's serial port. Insert the connector.
- Locate a serial port on the back of your computer. You may have two serial ports labeled COM1 and COM2, or the ports may be labeled with icons. If you have two serial ports available, use port 1 to connect your camera.
- Line up the serial connector on the cable with one of the serial ports on your computer, and insert the connector.
- Turn on the camera and your computer system.



## 7. Communications between PC and the camera

After starting communications between PC and the camera, what is displayed on the top LCD on the camera is switched to the following figure.

The dotted line starts to go round clockwise, and after a fixed period of time, the move of line stops and the camera automatically goes to be switched to the communications mode. In addition, this move of line automatically appears every time each adjustment item in the applicable calibration software is operated on your demand.



Top LCD Panel

## 8. Flange-back (Lens) Adjustment

### [Preparation]

- Siemens star chart
- POWER switch: ON (set to A-REC, M-REC or PLAY MODE)

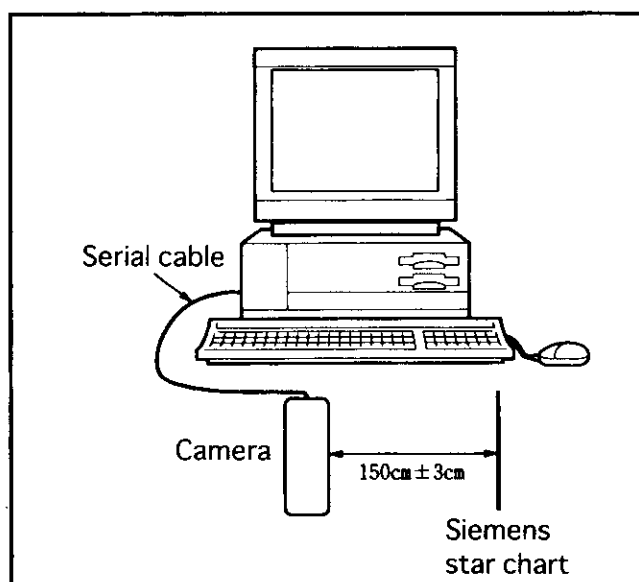
### [Adjustment condition]

- Make a copy of A4 size siemens chart in enlarged A3 size or larger.
- Illumination above the subject should be  $400 \text{ lux} \pm 10 \%$ .
- Set the siemens star chart  $150 \text{ cm} \pm 3 \text{ cm}$  (between Siemens star chart and the surface of camera's protection lens)

### [Adjustment method]

- Double-click on the DscCalDi.
- Select the monitor from TEST menu of Calibration Soft (refer to the FIG-2) so that LCD monitor will be turned on.
- Set the camera's LCD center to meet the Siemens star chart's center.
- Click the Focus, and click the Yes.
- Flange-back adjustment value will appear on the screen.
- Click 'OK'.

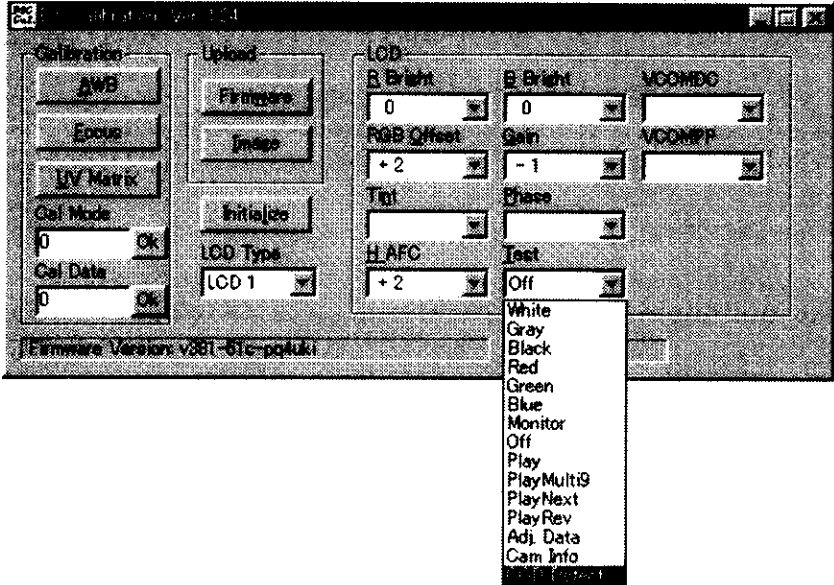
Note : In any adjustment error cases, the adjustment operation can not completely finish through the software. Or, slightly out-of-focus mode appears on the LCD on camera.



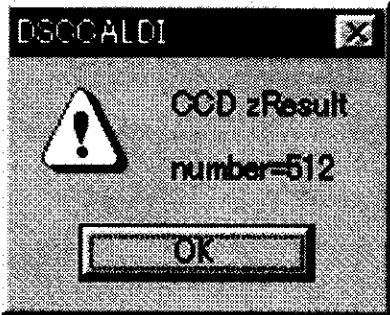
9. CCD Defect Detect Adjustment

[Adjustment method]

- Double-click on the DscCalDi.
- 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.



< F I G - 1 >



< F I G - 2 >

10. AWB Adjustment

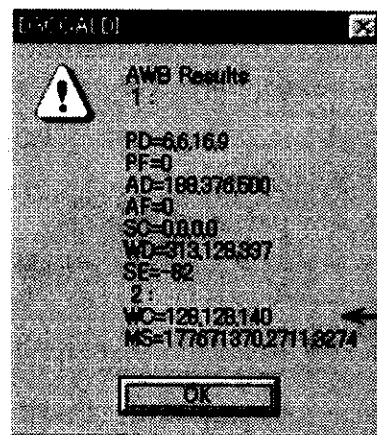
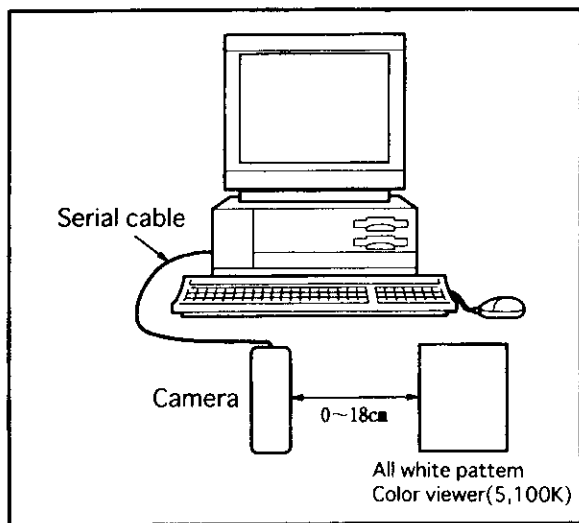
[Preparation]

- POWER switch: ON
- Color viewer

[Adjustment method]

- When setting the camera in place, set it to an angle so that nothing appears in any part of the color viewer except the white section. (Do not enter any light.)
- Double-click on the DscCalDi.
- Click the AWB, and click the Yes.
- AWB adjustment value will appear on the screen.  
(WC adjustment value is  $128 \pm 2, 128 \pm 2, 130 \pm 30$ )
- Click 'OK'.

Note : In any adjustment error cases, each value WC after adjustment turns to 1.





## 11. Color Matrix Adjustment

[Note] AWB adjustment should always be carried out first.

[Preparation]

- POWER switch: ON

[Adjustment condition]

- Set the color adjustment chart to the color viewer.

(Do not enter any light.)

- Set the siemens star chart so that it becomes center of the screen.

[Adjustment method]

- Double-click on the DscCalDi.

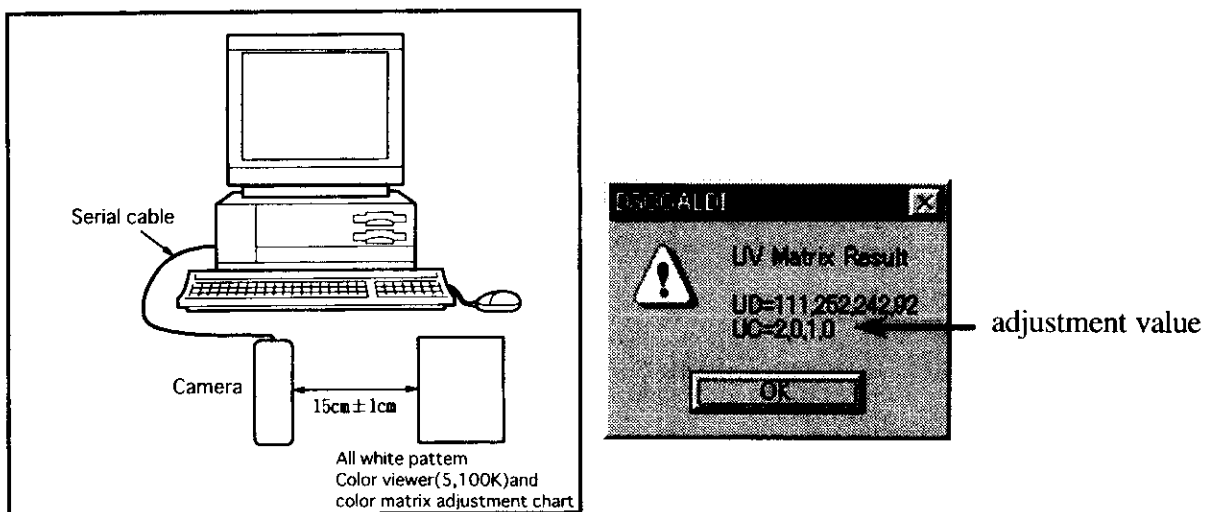
- Click the UV Matrix, and Click 'Yes'.

- UC adjustment value will appear on the screen.

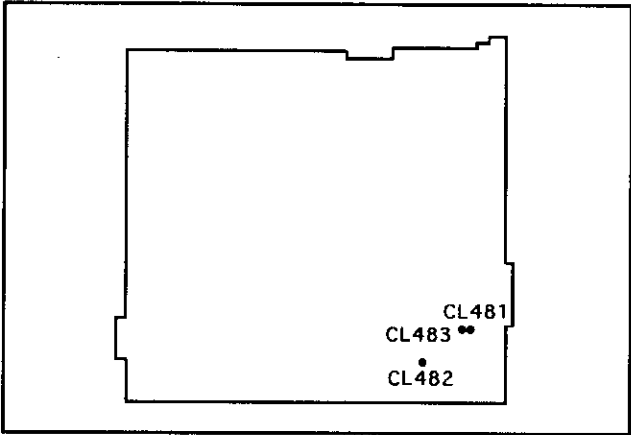
(UC adjustment value is  $0 \pm 2$ )

- Click 'OK'.

Note : In any adjustment error cases, each value UC after adjustment turns to 1.



12. LCD Panel Adjustment  
[CA3 board (Side B)]



12-1. LCD H AFC Adjustment

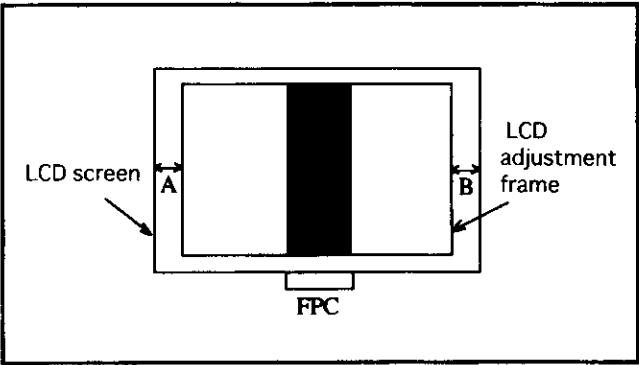
[Preparation]

- POWER switch: ON

[Adjustment method]

- Double-click on the DscCalDi.
- Select 0 on the LCD “H AFC”.
- While watching the LCD monitor, first of all, check whether the LCD adjustment frame is centered or not.

Then, if the frame is out of center, adjust to equally maintain the both-sided edge widths, which is  $A = B$ .



## 12-2. LCD RGB Offset Adjustment

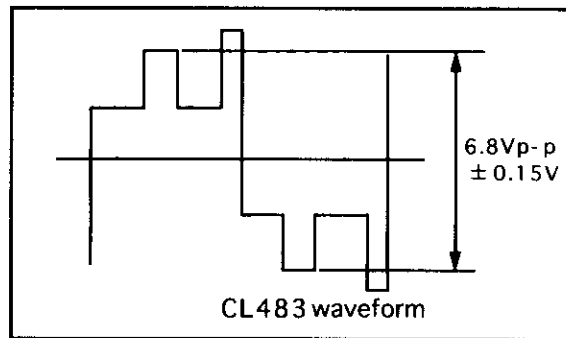
### [Preparation]

- Draw out three lead wires from each point, and then connect them with the oscilloscope.

Setting of oscilloscope : 1V/DIV, 20  $\mu$  sec/DIV (GND : Body)

### [Adjustment method]

- Adjust LCD "RGB offset" so that the amplitude of the CL483 waveform is 6.8 Vp-p  $\pm$  0.15 V.

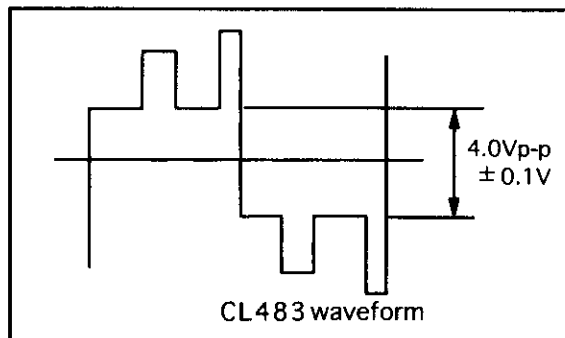


## 12-3. LCD Gain Adjustment

### [Adjustment method]

- Adjust LCD "Gain" so that the amplitude of the CL483 waveform is 4.0 Vp-p  $\pm$  0.1 V.

Note : LCD RGB Offset adjustment should always be carried out first.

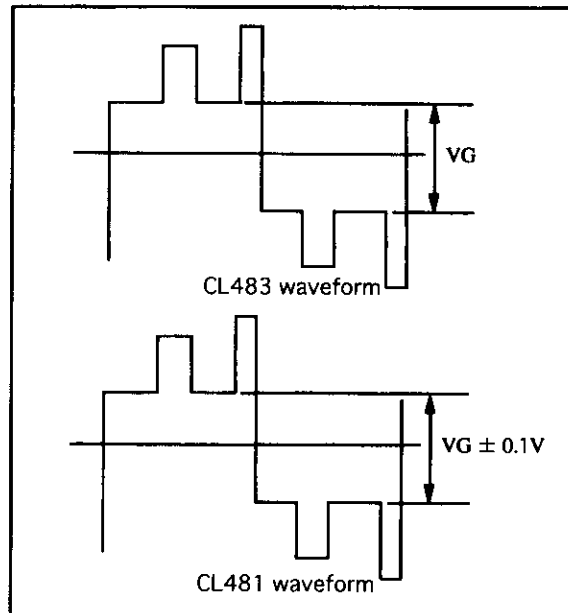


## 12-4. LCD Blue Brightness Adjustment

[Adjustment method]

- Adjust LCD "B Bright" so that the amplitude of the CL483 waveform is  $\pm 0.1$  V with respect to the CL481 (VG) waveform.

Note : LCD RGB Offset adjustment and LCD Gain adjustment should always be carried out first.

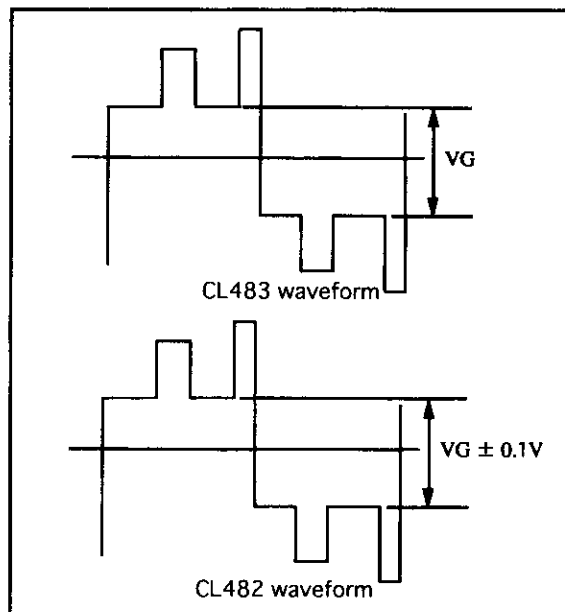


## 12-5. LCD Red Brightness Adjustment

[Adjustment method]

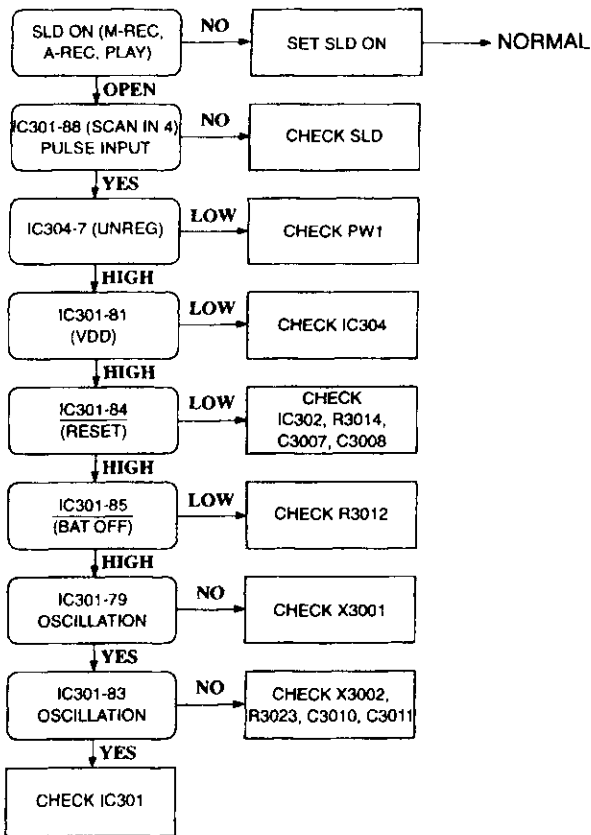
- Adjust LCD "R Bright" so that the amplitude of the CL483 waveform is  $\pm 0.1$  V with respect to the CL482 (VG) waveform.

Note : LCD RGB Offset adjustment and LCD Gain adjustment should always be carried out first.

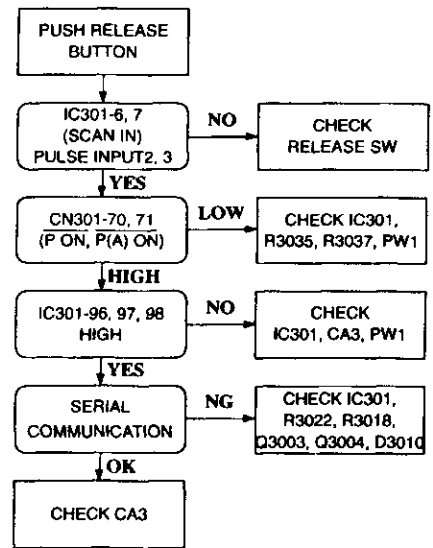


13.TROUBLESHOOTING GUIDE

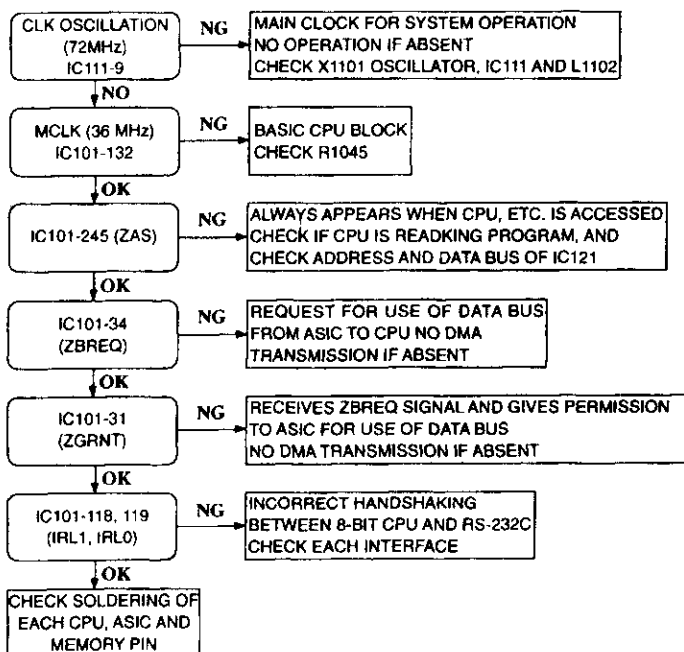
**POWER LOSS INOPERIVE**



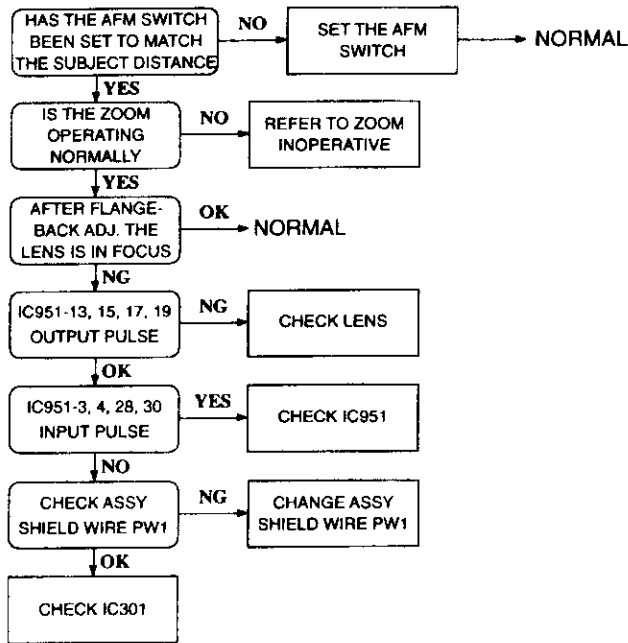
**TAKING INOPERATIVE**



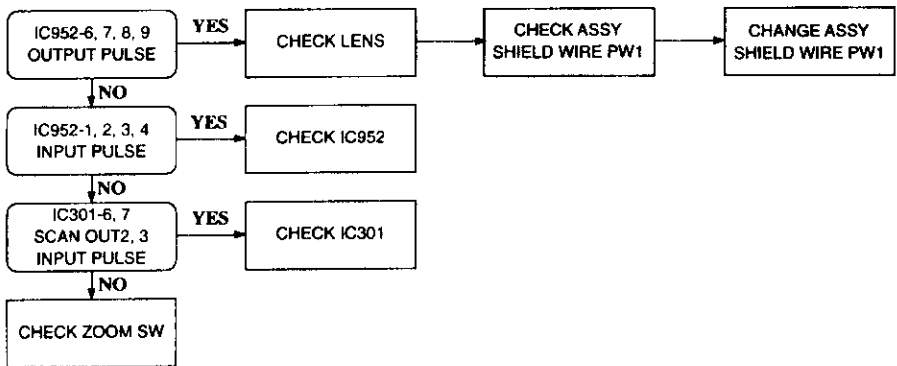
**NO PICTURE**



**FOCUS INOPERATIVE**



**FOCUS INOPERATIVE**



# Outline of Circuit description

## 1-1. CA1 CIRCUIT DESCRIPTION

### 1. IC Configuration

IC903 (ICX252AK-B)	CCD imager
IC902 (74ACT04MTC)	H driver
IC904 (CXD3400N)	V driver
IC905 (AD9842JST)	CDS, AGC, A/D converter

### 2. IC903 (CCD)

[Structure]

Interline type CCD image sensor

Optical size	1/108 type
Effective pixels	2088 (H) X 1550 (V)
Pixels in total	2140 (H) X 1560 (V)

Optical black

Horizontal (H) direction: Front 4 pixels, Rear 48 pixels

Vertical (V) direction: Front 8 pixels, Rear 2 pixels

Dummy bit number Horizontal : 28 Vertical : 1

(only even number field)

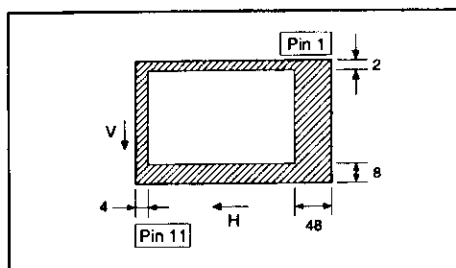


Fig. 1-1. Optical Black Location (Top View)

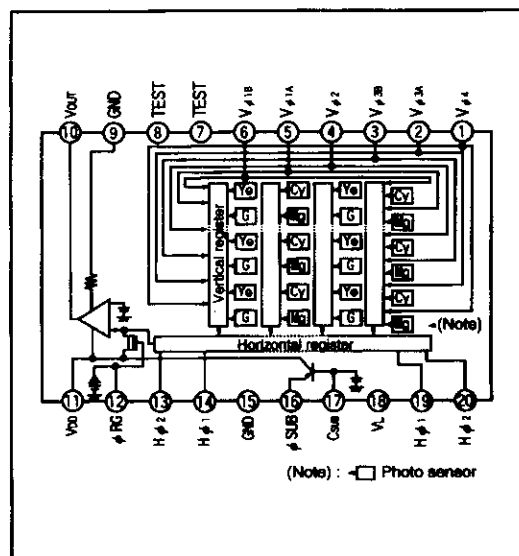


Fig. 1-2. CCD Block Diagram

Pin No.	Symbol	Pin Description	Waveform	Voltage
1	$V \phi 4$	Vertical register transfer clock		-7.5 V, 0 V
2, 3	$V \phi 3A, V \phi 3B$	Vertical register transfer clock		-7.5 V, 0 V, 15 V
4	$V \phi 2$	Vertical register transfer clock		-7.5 V, 0 V
5, 6	$V \phi 1A, V \phi 1B$	Vertical register transfer clock		-7.5 V, 0 V, 15 V
9, 15	GND	GND	GND	0 V
10	$V_{out}$	Signal output		Aprox. 10 V
11	$V_{DD}$	Circuit power	DC	15 V
12	$\phi$ RG	Reset gate clock		12.5 V, 16 V
13, 20	$H \phi 2$	Horizontal register transfer clock		0 V, 5 V
14, 19	$H \phi 1$	Horizontal register transfer clock		0 V, 5 V
16	$\phi$ SUB	Substrate clock	DC	Aprox. 8 V
17	$C_{sub}$	Substrate bias	DC	Aprox. 8V (Different from every CCD)
18	$V_L$	Protection transistor bias	DC	

Table 1-1. CCD Pin Description

---- When sensor read-out



3. IC902 (H Driver) and IC904 (V Driver)

An H driver (IC902) and V driver (IC904) are necessary in order to generate the clocks (vertical transfer clock, horizontal transfer clock and electronic shutter clock) which driver the CCD.

IC902 is an inverter IC which drives the horizontal CCDs (H1 and H2).

In addition the XV1-XV4 signals which are output from IC102 are the vertical transfer clocks, and the XSG1 and XSG signal which is output from IC102 is superimposed onto XV1 and XV3 at IC904 in order to generate a ternary pulse. In addition, the XSUB signal which is output from IC102 is used as the sweep pulse for the electronic shutter, and the RG signal which is output from IC102 is the reset gate clock.

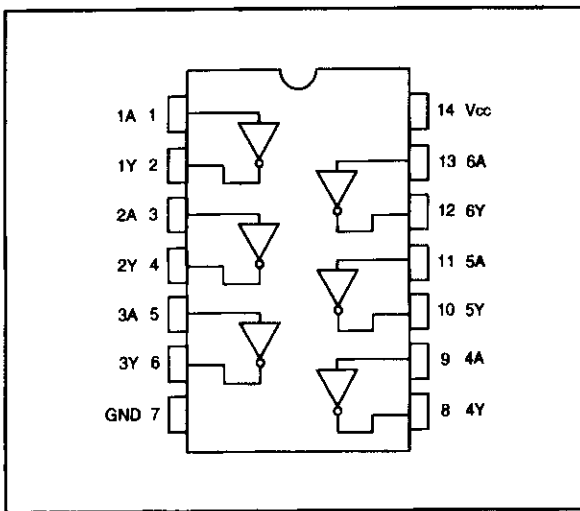


Fig. 1-3. IC902 Block Diagram

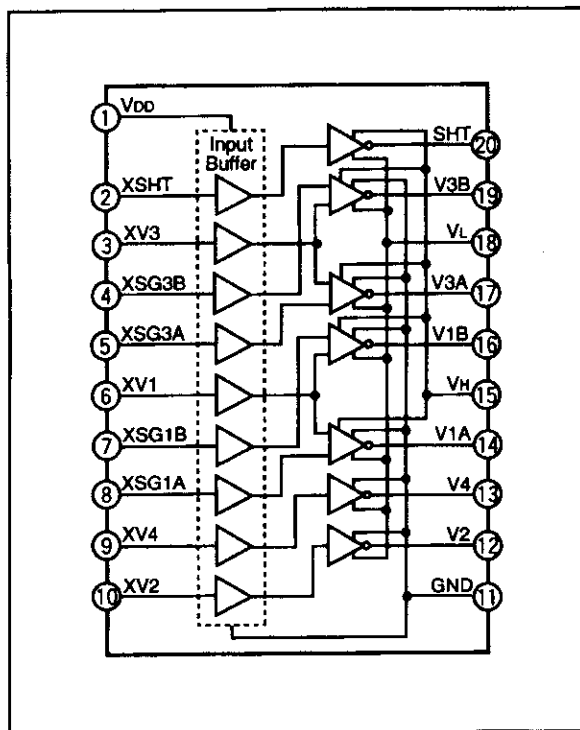


Fig. 1-4. IC904 Block Diagram

#### 4. Lens drive block

##### 4-1. Focus drive

The focus stepping motor drive signals (FM RESETB, FM CW, FM CLK and FM OEB) which are output from 8-bit microprocessor (IC301) are used to drive micro step by the motor driver (IC951). Detection of the standard focusing positions is carried out by means of the photointerruptor (FPI) inside the lens block.

##### 4-2. Zoom drive

The zoom stepping motor drive signals (ZIN1, ZIN2, ZIN3 and ZIN4) which are output from 8-bit microprocessor (IC301) are used to drive by the motor driver (IC952).

Detection of the standard zoom positions is carried out by means of photorefractor (ZPI) inside the lens block.

##### 4-3. Iris drive

The iris stepping motor drive signals (IIN1, IIN2, IIN3 and IIN4) which are output from the ASIC expansion port (IC106) are converted into drive by the motor drive (IC953), and are then used to drive the iris steps. Detection of the standard iris positions is carried out by means of the photorefractor (IRIS PR) inside the lens unit.

##### 4-4. Shutter drive

The two shutter motor drive signals (SIN1, SIN2) which are output from the ASIC expansion port (IC106) are converted into drive pulses by the motor drive (IC954), and the mecha shutter is opened and closed by regular current drive.

1-2. CA2 CIRCUIT DESCRIPTION

1. IC931 (CDS, AGC Circuit and Converter)

The video signal which is output from the CCD is input to Pins (30) of IC931. There are S/H blocks inside IC905 generated from the XSHP and XSHD 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, it is A/D converted internally into a 12-bit signal, and is then input to IC102 of the CA2 circuit board. The gain of AGC amplifier is controlled by pin (45)- (48) serial signal which is output from IC102 of the CA2 board.

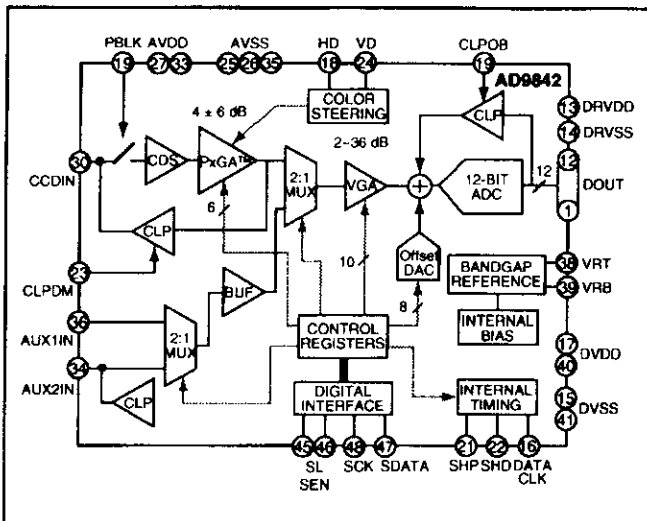


Fig. 2-1. IC931 Block Diagram

### 1-3. CA3 CIRCUIT DESCRIPTION

#### 1. Circuit Description

##### 1-1. 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  $1-k$ .

##### 1-2. Signal processor

###### 1. $\gamma$ 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 generate the aperture signal.

##### 1-3. AE/AWB and AF computing circuit

The AE/AWB carries out computation based on a 64-segment screen, and the AF carries out computations based on a 6-segment screen.

##### 1-4. SDRAM controller

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

##### 1-5. Communication control

###### 1. UART

The RS-232C can be used for both synchronous and asynchronous transmission.

###### 2. SIO

This is the interface for the 8-bit microprocessor.

### 3. PIO/PWM/SIO for LCD

8-bit parallel input and output makes it possible to switch between individual input/output and PWM input/output.

#### 1-6. TG/SG

Timing generated for 2 million/3 million pixels CCD control.

#### 1-7. Digital encoder

It generates chroma signal from color difference signal.

#### 1-8. JPEG encoder and decoder

It is compressed and elongated the data by JPEG system.

## 2. Outline of Operation

When the shutter opens, the reset signals (ASIC (IC102) and CPU (IC101)) and the serial signals ("take a picture" commands) from the 8-bit microprocessor are input 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  $\hat{E}_i$  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 memory (compact flash).

When the data is to be output to an external device, it is taken data from the memory and output via the UART. When played back on the LCD and monitor, data is transferred from memory to the SDRAM, and the data elongated by JPEG decoder is displayed over the SDRAM display area.

## 3. LCD Block

LCD Block is in the CA3 board, and it is constructed by LCD driver (IC171) and around circuits.

The video signal (Y/C signals) 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: fixed at 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.

#### 1-4. PW1 & PW2 POWER CIRCUIT DESCRIPTION

##### 1. PW1 Circuit Outline

This is the main power circuit, and is comprised of the following blocks.

Switching controller (IC501, IC503)

Digital 5 V and analog system power output (T5001, Q5001)

Digital 2.5 V system power supply (Q5009)

Digital 3.4 V system power supply (Q5011)

LCD system power supply (Q5010, T5002)

Backlight power supply output (Q5013, T5003)

##### 1-1. 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 four built-in channels, only CH1 (digital 5 V, analog system), CH3 (LCD system), CH2 (digital 2.5 V) and CH4 (digital 3.4 V) are used. Feedback from 5 V (D) (CH1), 2.5 V (D) (CH2), 5.0 V (L) (CH3) and 3.4 V (D) (CH4) power supply outputs are received, and the PWM duty is varied so that each one is maintained at the correct voltage setting level.

##### Short-circuit protection circuit

If output is short-circuited for the length of time determined by the condenser which is connected to Pin (17) of IC501, all output is turned off. The control signal (P ON, P(A) ON and LCD ON) are recontrolled to restore output.

##### 1-2. Switching Controller (IC503)

It is controlled backlight 7 V (L) by IC for switching regulator 1ch PWM. The control signal uses 5.1 V (L).

##### 1-3. Digital 3.4 V Power Output

3.35 V (D) is output. Feedback is sent to pin (7) of the switching controller (IC501) for PWM control to be carried out.

##### 1-4. Digital 5 V and Analog System Power Output

5.2 V (D), 15.2 V (A), -7.7 V (A), 5.1 V (A) and 3.9 V (A) are output. Feedback for the 5.2 V (D) is provided to the switching controller (Pins (29) of IC501) so that PWM control can be carried out.

#### 1-5. Digital 2.5 V System Power Output

2.55 V (D) is output. Feedback is provided to the switching controller (Pin (26) of IC501) so that PWM control can be carried out.

#### 1-6. LCD System Power Output

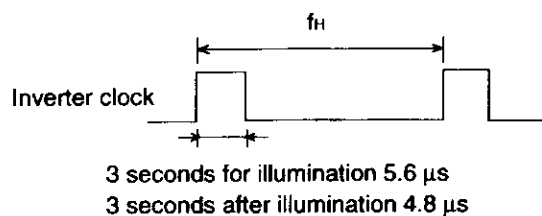
5.1 V (L), 12.4 V (L) and 15.0 V (L) are output. Feedback for the 5.1 V (L) is provided to the switching controller (Pin (11) of IC501) so that PWM control can be carried out.

#### 1-7. Backlight Power Supply output

7 V (L) is output. Feedback is sent to pin (1) of the switching controller (IC503) for PWM control to be carried out.

#### 1-8. Inverter Control

The backlight uses a 1.8-inch flat picture tube, and is illuminated by controlling T5003 with pulses which are driven by the inverter clock.



## 2. PW2 Circuit Outline

When both the AC adapter and the battery are installed, the connection of the AC adapter causes the switch between pins (2) and (3) of JK531 to turn off. This interrupts the path from the battery to GND, so that power is supplied from the AC adapter. Furthermore, D5302 between the battery (-) terminal and the circuit GND prevents the AC adapter from being isolated. If the AC adapter is disconnected during operation, the switch between pins (2) and (3) of JK531 remains off (the path from the battery to GND remains open) and the hot side of the AC adapter becomes open, so that the set is momentarily interrupted. Then, D5302 establishes the path from the battery to GND, so that power supply changes to the battery and operation continues without the set continuing to be interrupted.

D5301 is used to prevent reverse current flows to the battery.

### 2-1. Temperature Fuse

A temperature fuse is provided between the battery (+) terminal and the circuit in order to protect the battery from overheating. The fuse is located inside the battery case where the temperature of the battery can easily be transmitted. The fuse is rated to open at 117 degrees centigrade, and it cannot be reset.

If there is a malfunction in the switch between pins (2) and (3) of JK531 (the switch does not turn off), or if D5302 which prevents interruptions is shorted, the current paths for both the AC

adapter and the battery are closed. In addition, the AC adapter voltage is higher than the battery voltage, so a charging current flows from the AC adapter to the battery. If this condition continues, the battery can become abnormally hot, so the temperature fuse breaks the flow of current to the battery.

#### 2-2. AC Adapter and Battery Distinction

The system microprocessor distinguishes between the AC adapter and the battery by means of the DC\_IN signal from pin (1) of CN531. When the AC adapter is being used, the AC adapter power supply is applied to DC\_IN, which turns on the transistor on the SY1 circuit board. When the battery is being used, current flows to DC\_IN from D5301, so that the transistor is turned off.



## 1-5. SY1 CIRCUIT DESCRIPTION

## 1. Configuration and Functions

For the overall configuration of the SY1 circuit board, refer to the block diagram. The configuration of the SY1 circuit board centers around a 8-bit microprocessor (IC301).

The 8-bit microprocessor handles the following functions.

1. Operation key input, 2. Mode LCD display, 3. Clock control, 4. Power ON/OFF, 5. Strobe charge control, 6. Signal output for lens control of zoom, focus and so on.

Pin	Signal	I/O	Outline
1	ZOOM PI	I	Zoom motor standard position detection (analog input)
2	TEMP	I	Temperature detection (analog input)
3	CHG VOL	I	Strobe charge voltage detection (analog input)
4	FM PI	I	Focusing motor standard position detection (analog input)
5-7	SCAN IN 1-3	I	Key matrix input
8	AVDD	-	Analog power input terminal
9	AVREF	I	Analog standard voltage input terminal
10	FINDER LED1	O	Finder LED 1 (red) drive L : LED light
11	FINDER LED2	O	Finder LED 2 (green) drive L : LED light
12	VSS	-	GND
13	FM RESETB	O	Focusing motor drive phase reset signal
14	LCD ON	O	DC/DC converter (LCD system) ON/OFF signal
15	PWM	O	Dimmer D/A PWM output
16	FM CKO	O	Focusing motor drive clock output
17	FM CW	O	Focusing motor drive direction signal
18	FM OEB	O	Focusing motor output inable signal
19	FM CKI	I	Focusing motor drive clock count
20	SELF	O	Red-eye reduction, self-timer, AF support emission drive H : Lump light
21	BUZZER	O	Buzzer output
22	CHG ON	O	Strobe charge control circuit
23-26	COM0-3	O	Mode LCD common output
27	BIAS	-	Mode LCD drive power supply (connect to VLCO terminal)
28-30	VLCO-2	-	Mode LCD power input terminal (connect to outside resister connection)
31	VSS	-	GND
32-55	S1-S24	O	LCD segment output 1-24
56	DCINCHK	I	Outside DC power detection L : AC adaptor
57	PICTL	O	Photo interaptor ON/OFF control L : ON
58-59	NOT USED	O	-
60-63	ZOOM IN4-1	O	Zoom motor drive signal 4-1
64	WAKE UP	O	SPARC wake up terminal
65	ADVREF ON	O	AD VREF ON/OFF signal L : ON
66	CHG LIMIT	O	F-D terminal
67	KKR A	I	Command input A
68	BKUPCTL	O	Back up battery charge control
69	SCAN IN0	I	Key matrix input 0
70	PA ON	O	DC/DC converter (analog) ON/OFF signal H : ON
71	P ON	O	DC/DC converter (digital) ON/OFF signal H : ON
72	SELF BPS	O	Red-eye reduction lamp rush current limit L : Connection
73-74	NOT USED	O	-
75	SI	I	Serial data input (←ASIC)
76	SO	O	Serial data output (→ASIC)
77	SCK	O	Serial clock output (→ASIC)

See next page →

Pin	Signal	I/O	Outline
78	IC	-	Inside connection (connect to VSS terminal directly)
79	XOUT	O	Main clock oscillation terminal
80	XIN	I	Main clock oscillation terminal (3 MHz)
81	VDD	-	VDD
82	XCIN	I	Clock oscillation terminal (32.768 kHz)
83	XCOU	O	Clock oscillation terminal
84	RESET	I	Reset input
85	BAT OFF	I	Battery OFF detection signal
86	RXD	I	Host wake-up input terminal L : OFF
87	SREQ	I	Serial communication request signal L : Serial request
88	SCAN IN4	I	Key matrix input (SLD ON detection)
89	USB CONNECT	I	USB connection detection
90	KKR B	I	Command input B
91-95	SCAN OUT0-4	O	Key matrix output
96	ASIC TEST	O	ASIC control signal
97	ASIC RESET	O	ASIC reset signal L : Reset output
98	MAIN RESET	O	SPARC reset signal L : Reset output
99	AVSS	-	Analog GND input terminal
100	BATTERY	I	Battery check (analog input)

Table 4-1. 8-bit Microprocessor Port Specification

2. Internal Communication Bus

The SY1 circuit board 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.

4-1 shows the internal communication between the 8-bit microprocessor, ASIC and SPARC lite circuits.

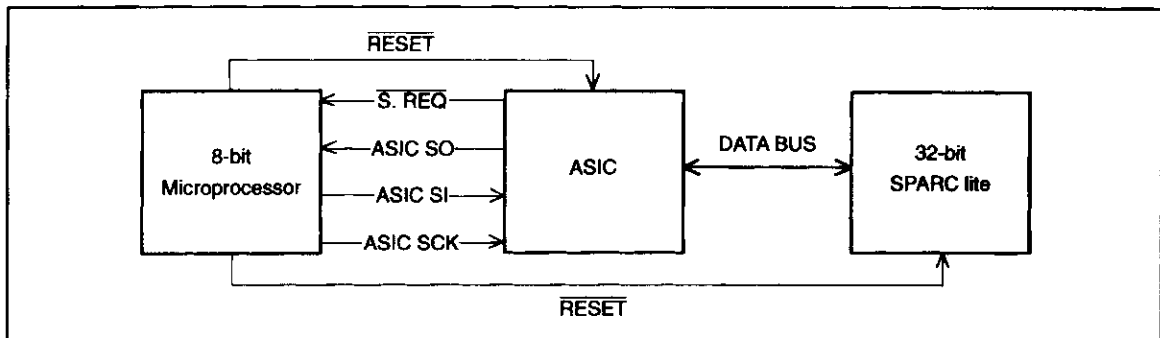


Fig. 4-1 Internal Bus Communication System

3. Key Operaiton

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

SCAN OUT \ SCAN IN	0	1	2	3	4
0	← (LEFT)	→ (RIGHT)	↑ (UP)	↓ (DOWN)	SLD 1
1	AFM	SBM	RELEASE (S2)	SHUTTER HALF PUSH (S1)	SLD 2
2	MENU	MTR	ZOOM UP	ZOOM DOWN	TEST
3	LCD INVERSION	+ / -	QSW	FUNC	
4	V JACK	CARD	DIN CONNECT		

Table 4-2. 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, a regulated 3.2 V voltage is normally input to the 8-bit microprocessor (IC301) by IC304, so that 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 battery is removed, the 8-bit microprocessor operates in sleep mode using the backup lithium ion battery. At this time, the 8-bit microprocessor only carries out clock counting, and waits in standby for the battery to be attached again. When a switch is operated, the 8-bit microprocessor supplies power to the system as required.

The 4-bit microprocessor first sets both the P (A) ON signal at pin (70) and the P ON signal at pin (71) to High, and then turns on the DC/DC converter. After this, High signals are output from pins (97) and (98) so that the ASIC and the SPARC lite are set to the active condition. If the LCD monitor is on, the LCD ON signal at pin (95) set to High, and the DC/DC converter for the LCD monitor is turned on. Once SPARC lite processing is completed, the ASIC and the SPARC lite return to the reset condition, all DC/DC converters are turned off and the power supply to the whole system is halted.

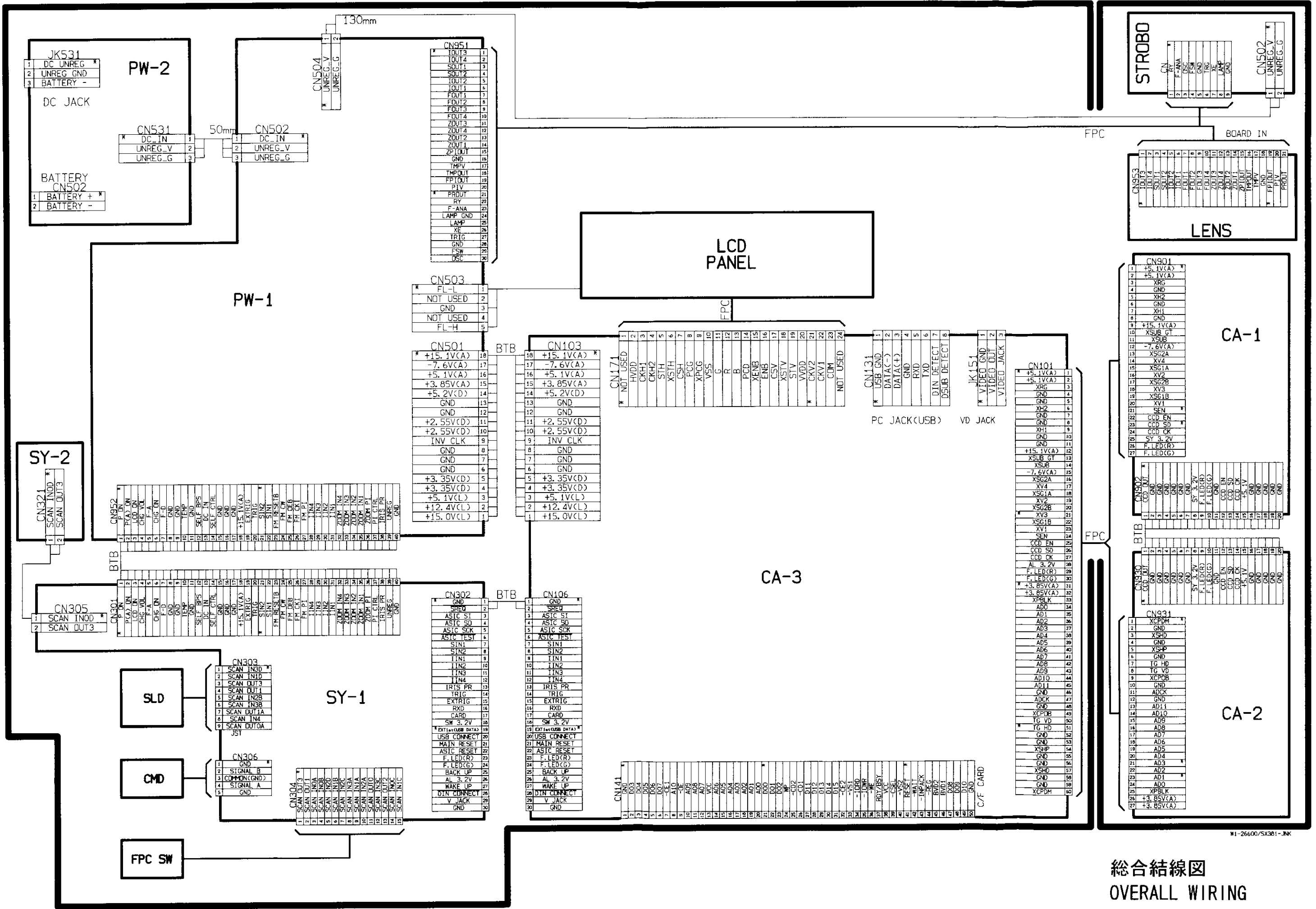
		SPARC Lite	ASIC, memory	RS232C driver	CCD	8 bit CPU	MODE LCD	LCD MONITOR	
Power voltage		3.3 V	3.3 V	5 V	5 V (A) +15 V -7.5 V	3.3 V (ALWAYS)	3.3 V (ALWAYS)	5V (L) +12V etc.	
SLD	OFF	OFF	OFF	OFF	OFF	32 KHz	OFF	OFF	
	PLAY	ON	ON	ON	OFF	3 MHz	ON	ON	
	M-REC A-REC	Power switch ON- Auto power OFF	OFF	OFF	OFF	OFF	3 MHz	ON	OFF
		Shutter switch ON	ON	ON	ON	ON → OFF	3 MHz	ON	OFF
		MOS, QSW, SBM etc. ON	OFF	OFF	OFF	OFF	3 MHz	ON	OFF
		LCD finder	ON	ON	ON	ON	3 MHz	ON	ON

Table 4-3. Camera Mode

		SPARC Lite	ASIC, memory	RS232C Driver	CCD	8 bit CPU	MODE LCD	LCD MONITOR	
Power voltage		3.3 V	3.3 V	5 V	5 V (A) +15 V -7.5 V	3.3 V (ALWAYS)	3.3 V (ALWAYS)	5 V (L) +12V etc.	
SLD	OFF	OFF	OFF	OFF	OFF	32 KHz	OFF	OFF	
	M-REC A-REC PLAY	Power switch ON- Auto power OFF	OFF	OFF	OFF	OFF	3 MHz	ON	OFF
		Take a picture	ON	ON	ON	ON → OFF	3 MHz	ON	OFF
		Erase image	ON	ON	ON	OFF	3 MHz	ON	OFF
		Download image	ON	ON	ON	OFF	3 MHz	ON	OFF
		Continuous image	ON	ON	ON	ON	3 MHz	ON	OFF
		Message from host	ON	ON	ON	ON	3 MHz	ON	OFF

Note) 3 MHz = Main clock operation, 32 kHz = Sub clock operation

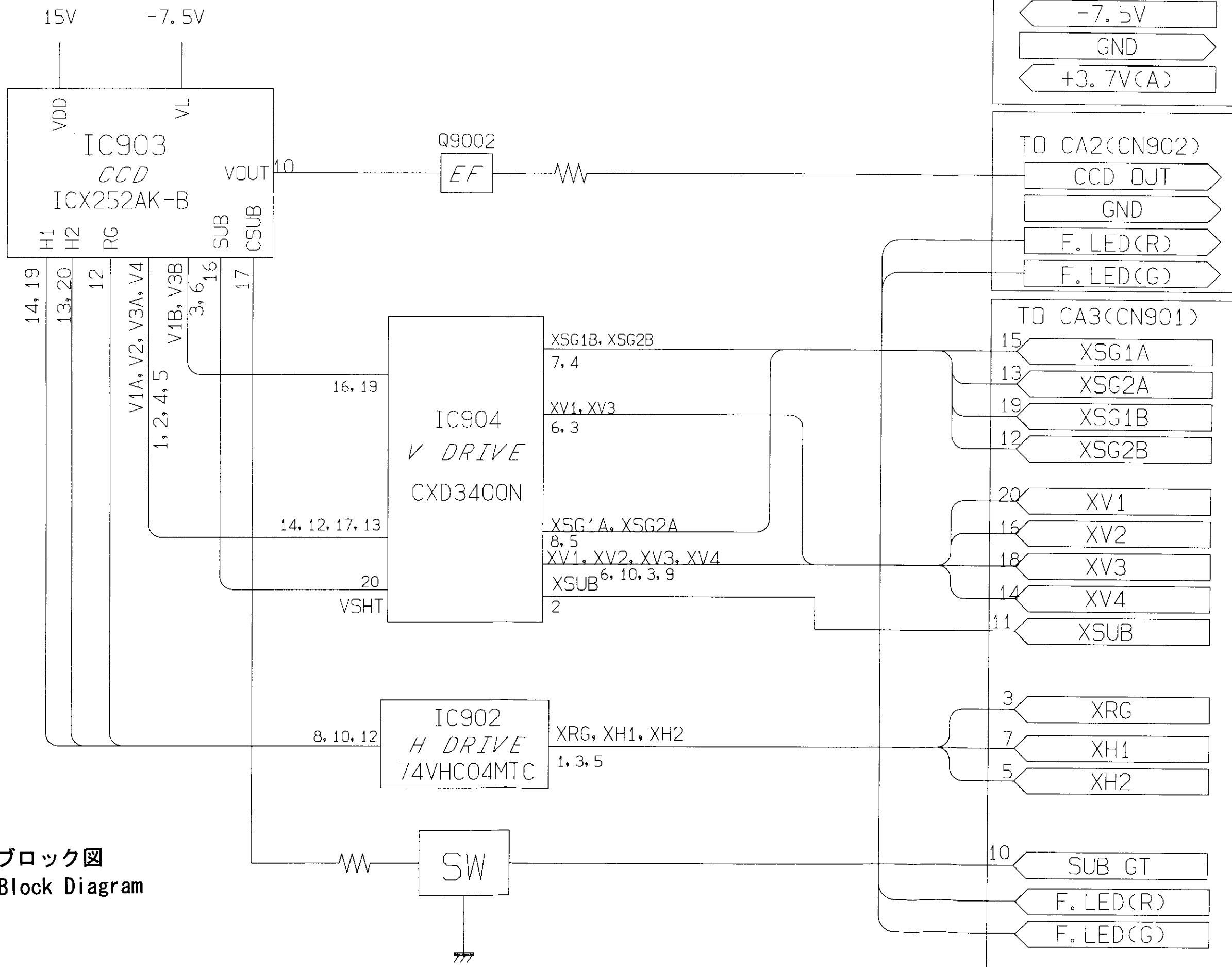
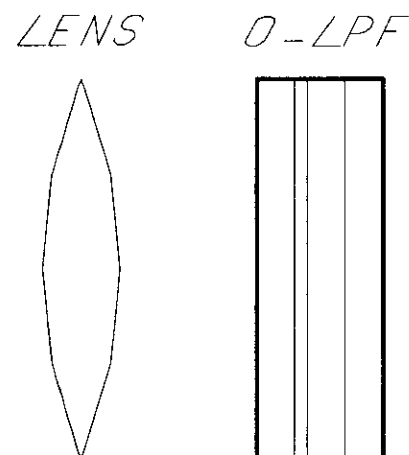
Table 4-4. Host Mode



総合結線図  
OVERALL WIRING



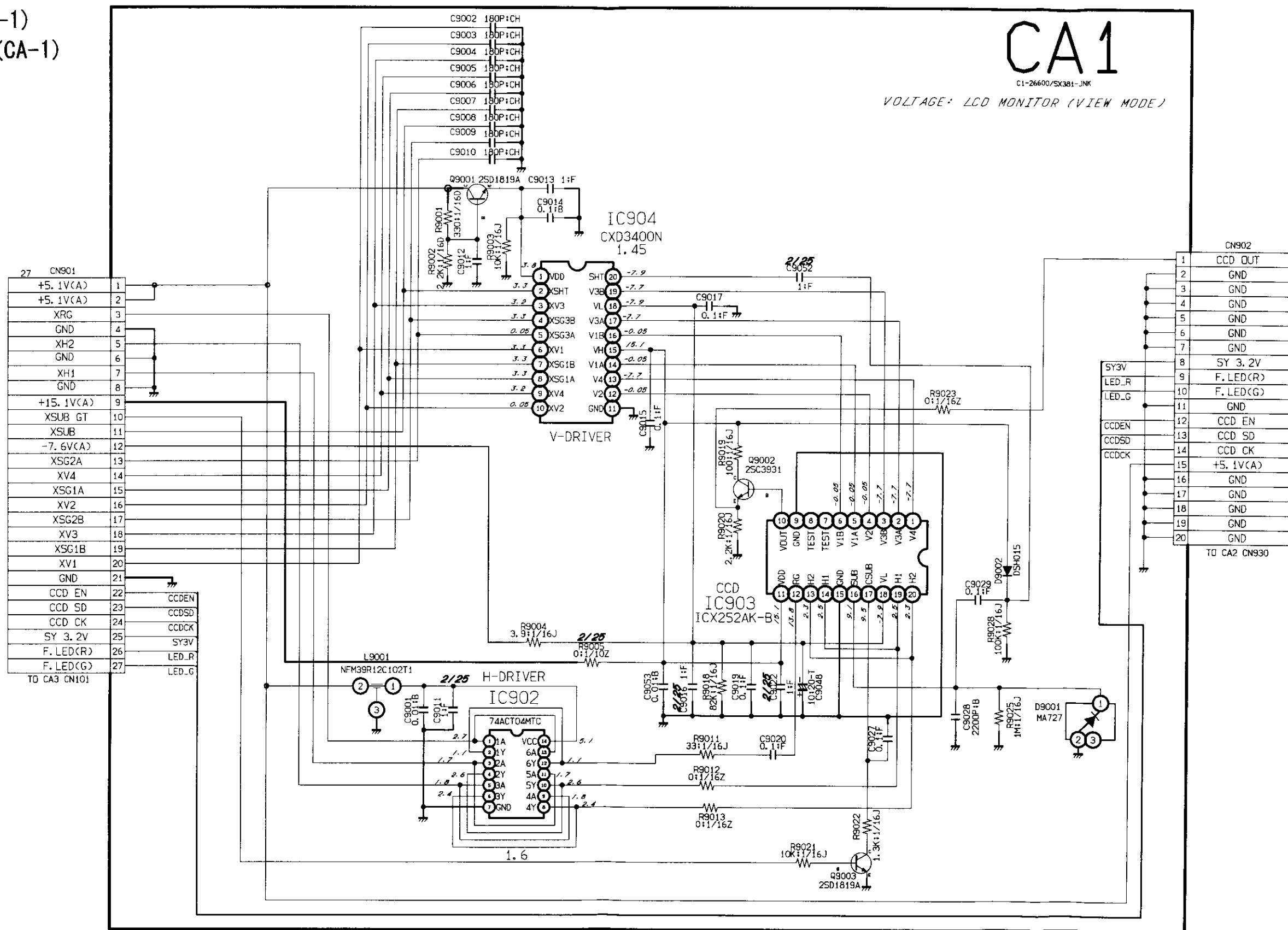
CCD基板 (CA-1)  
 CCD P. C. B. (CA-1)



ブロック図  
 Block Diagram

CN911 & CN912

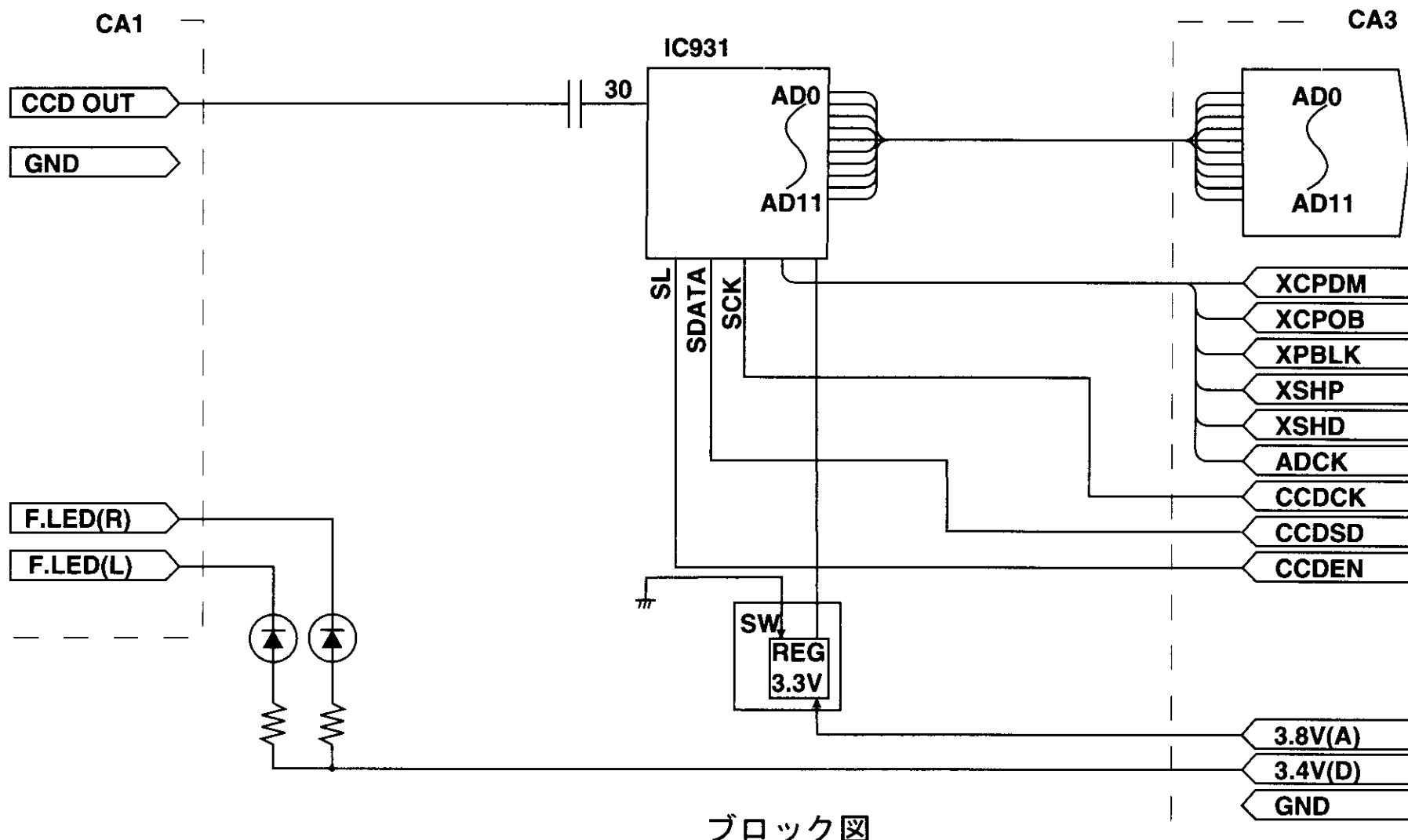
CCD基板 (CA-1)  
CCD P. C. B. (CA-1)



回路図  
Circuit Diagram



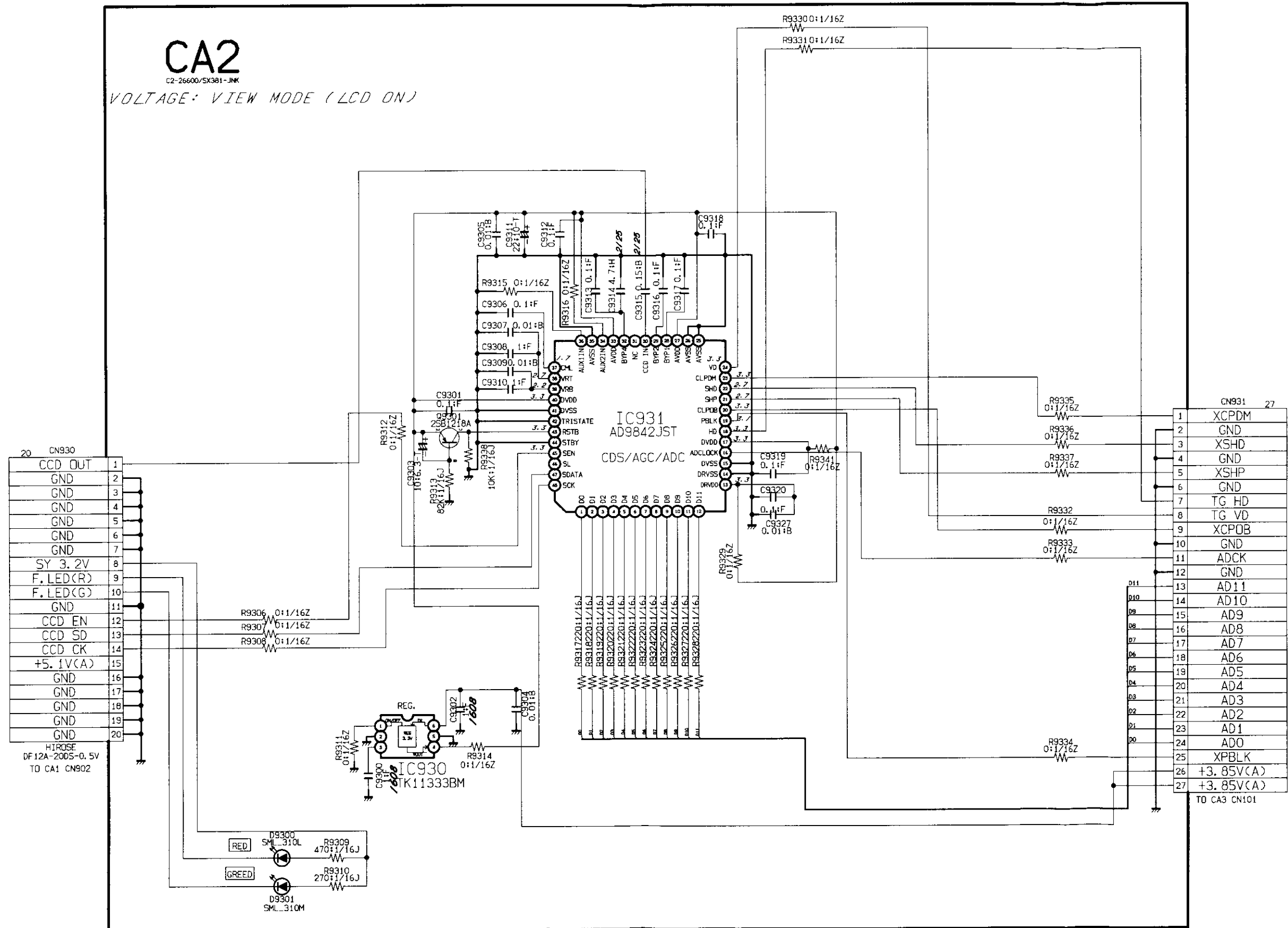
表示LCD基板 (CA-2)  
 DISPLAY LCD P. C. B. (CA-2)



ブロック図  
 Block Diagram

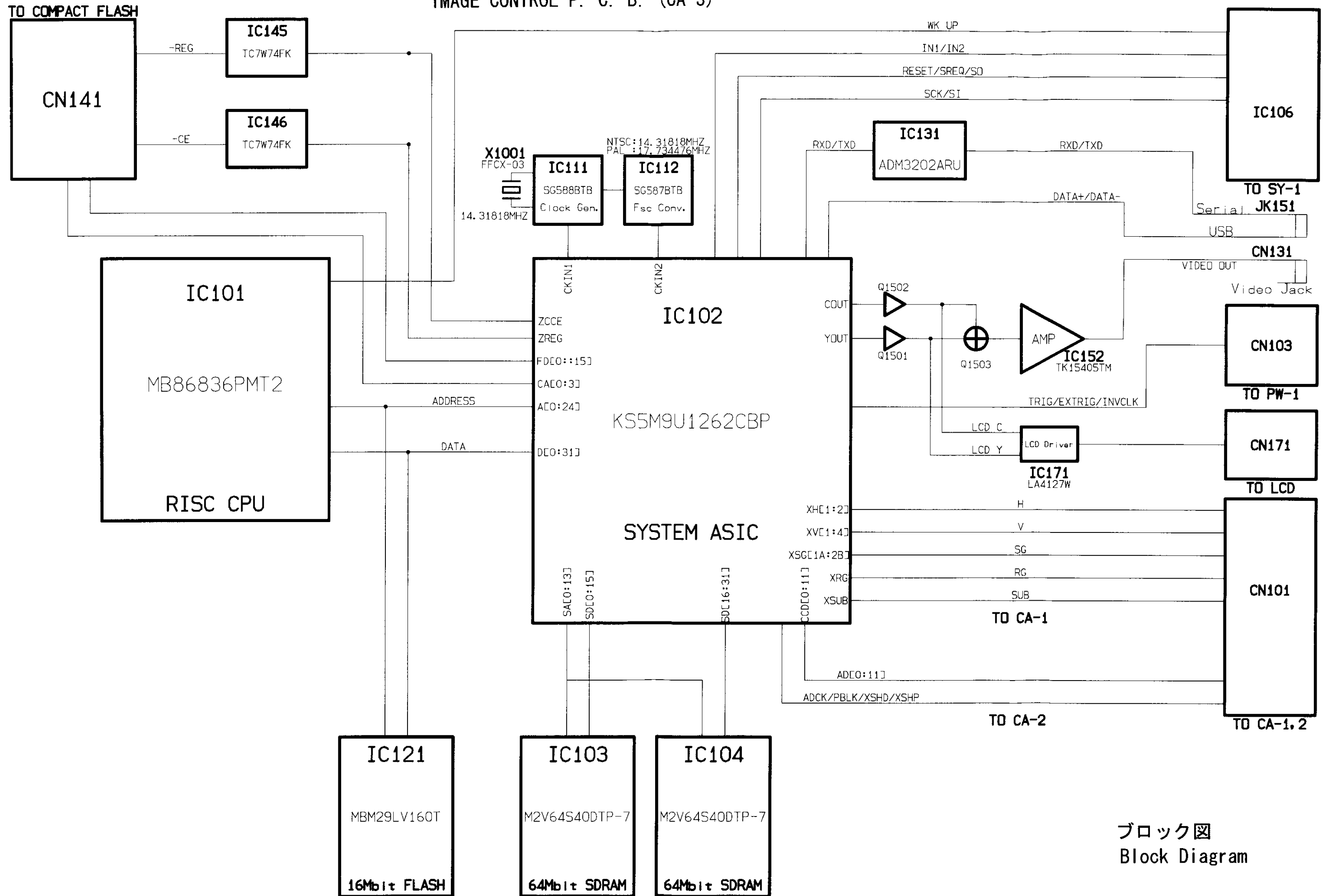
表示LCD基板 (CA-2)  
 DISPLAY LCD P. C. B. (CA-2)

VAA11101-R. 3504. A



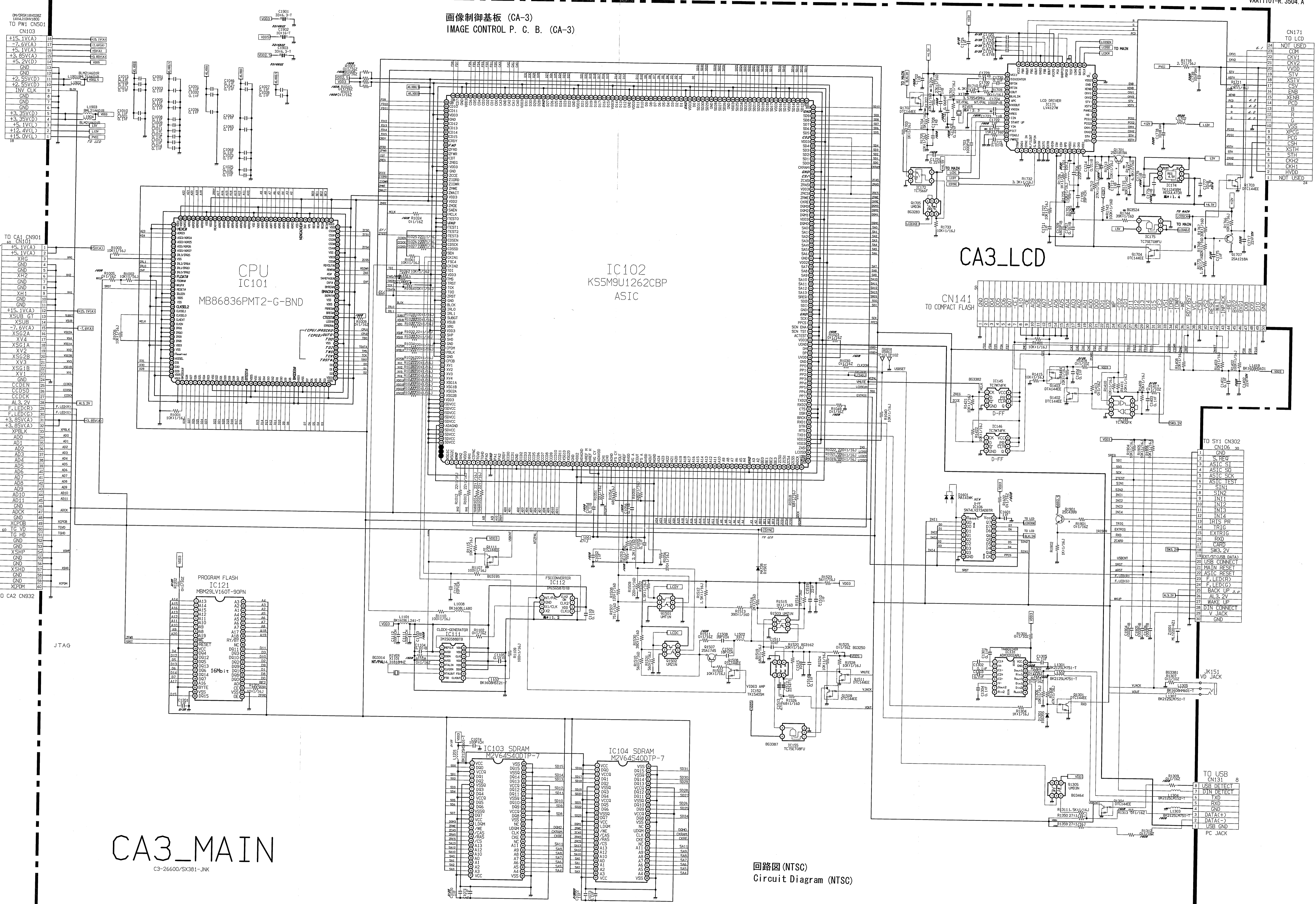
回路图  
 Circuit Diagram

画像制御基板 (CA-3)  
IMAGE CONTROL P. C. B. (CA-3)



ブロック図  
Block Diagram

画像制御基板 (CA-3)  
IMAGE CONTROL P. C. B. (CA-3)



CA3\_MAIN  
C3-2660/SX381-JNK

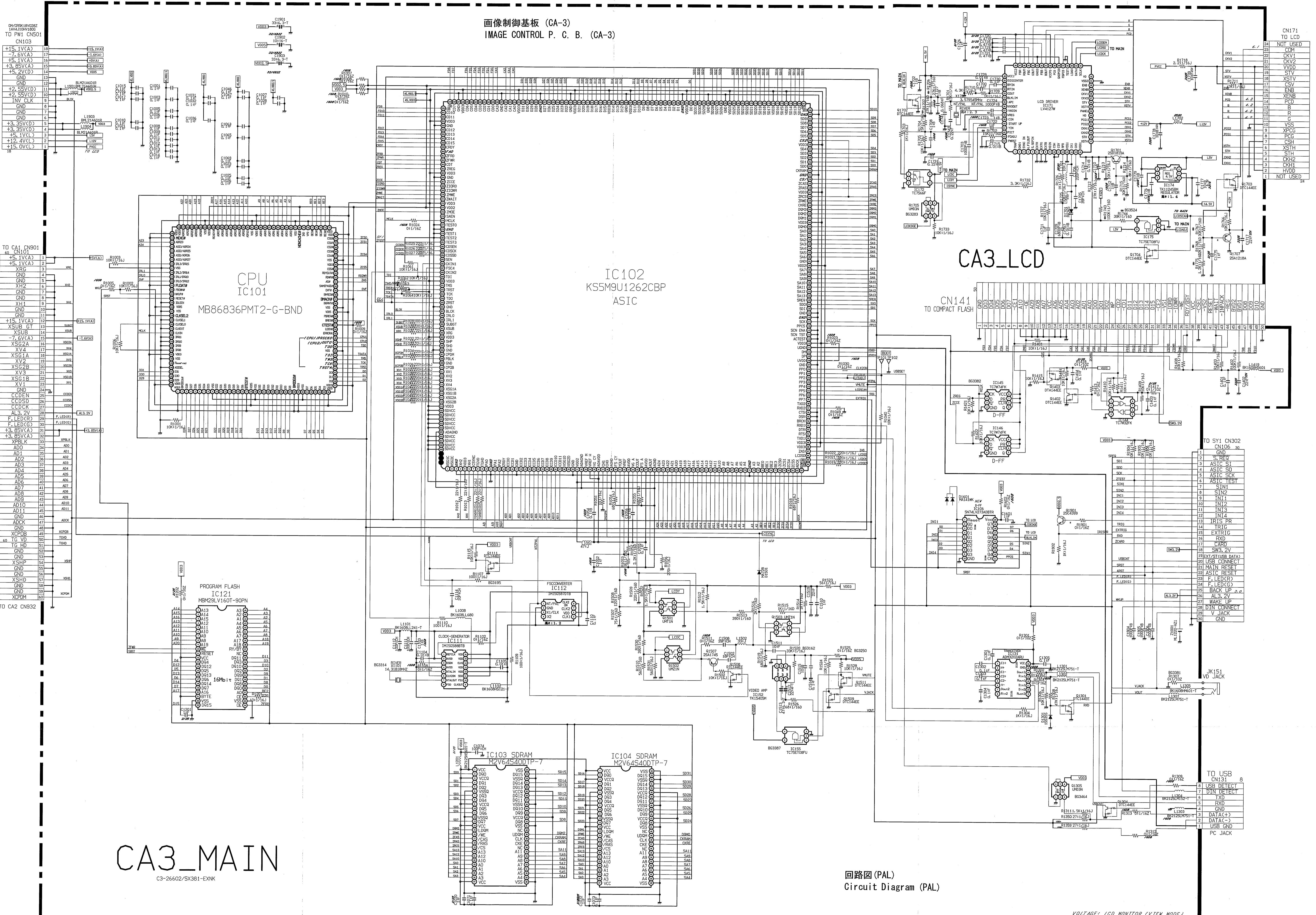
CA3\_LCD

回路図 (NTSC)  
Circuit Diagram (NTSC)

VOLTAGE: LCD MONITOR (VIEW MODE)



画像制御基板 (CA-3)  
IMAGE CONTROL P. C. B. (CA-3)

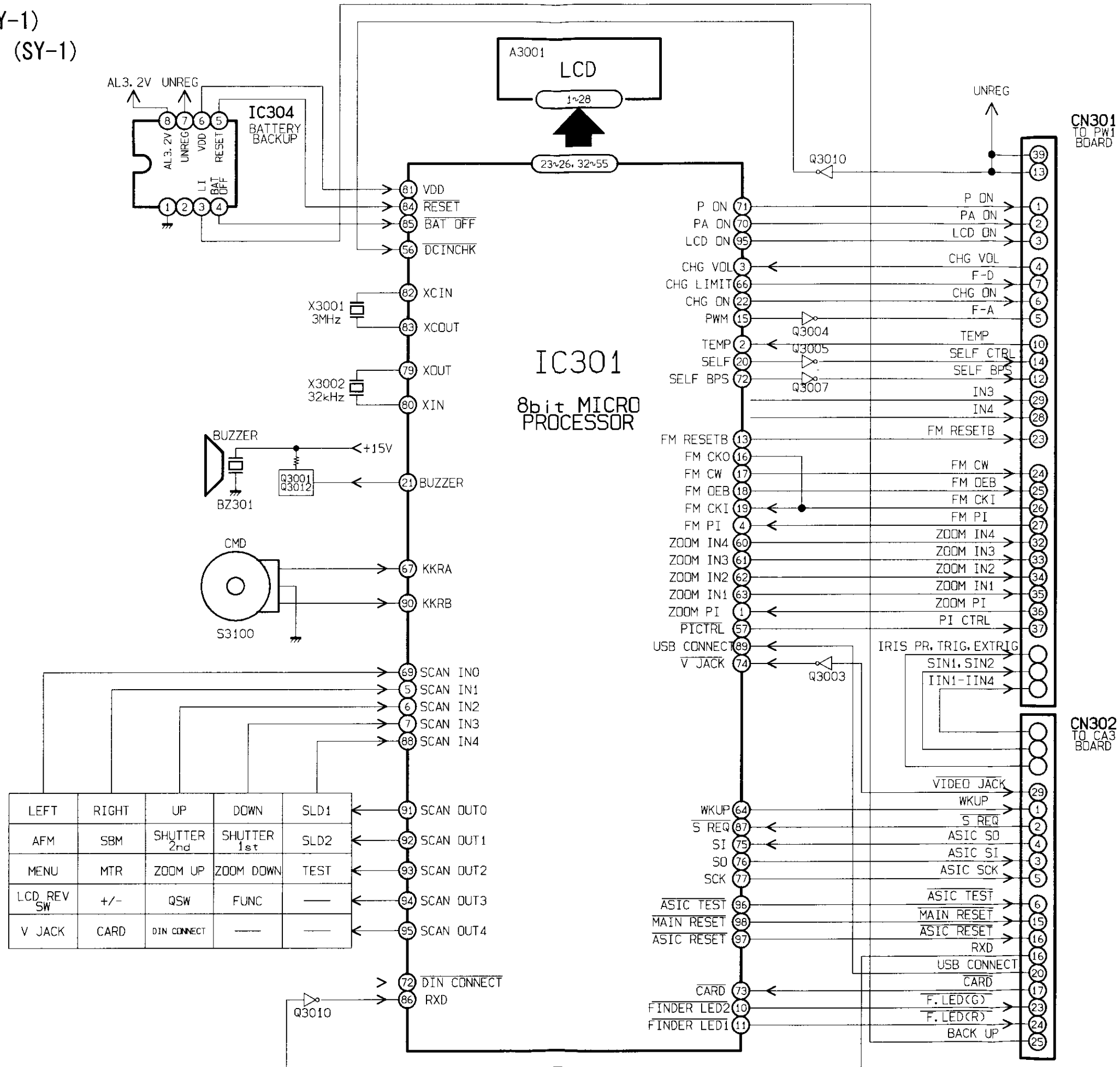


CA3\_MAIN  
C3-26602/SX381-EXNK

回路図 (PAL)  
Circuit Diagram (PAL)

VOLTAGE: LCD MONITOR (VIEW MODE)

メイン基板 (SY-1)  
MAIN P. C. B. (SY-1)

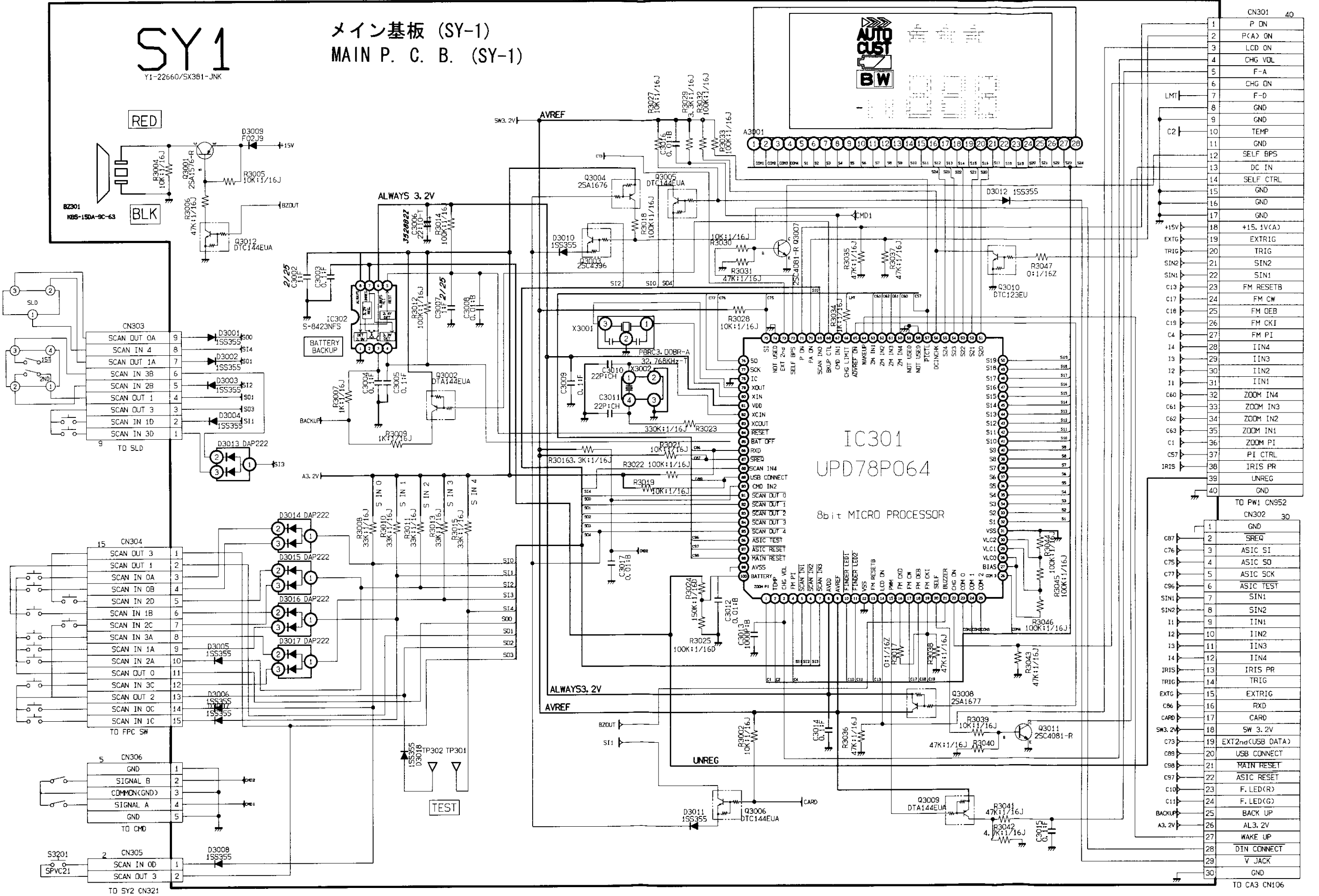


ブロック図  
Block Diagram

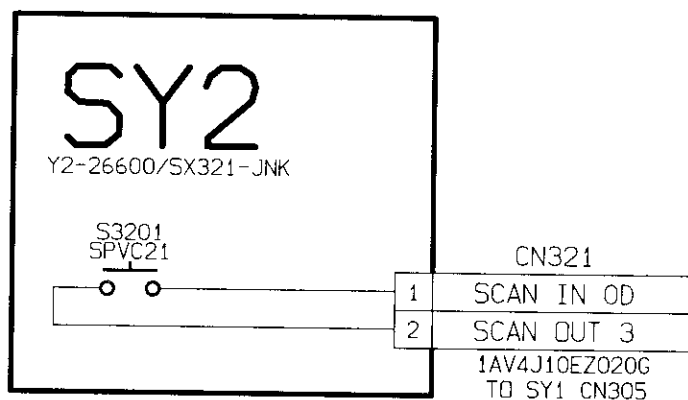
# SY1

Y1-22660/SX381-JNK

## メイン基板 (SY-1) MAIN P. C. B. (SY-1)



ジョイン基板 (SY-2)  
JOINT P. C. B. (SY-2)

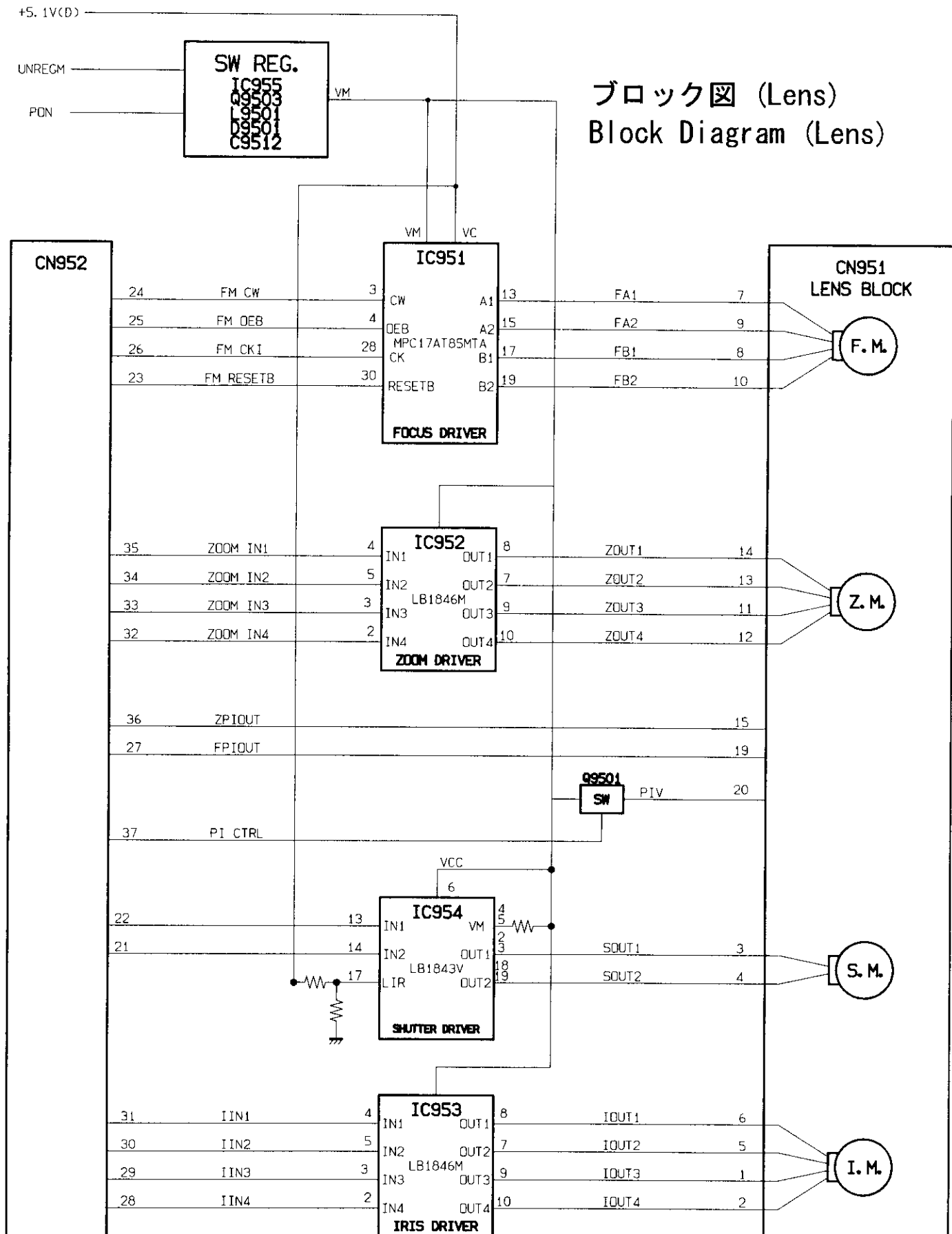


回路図  
Circuit Diagram



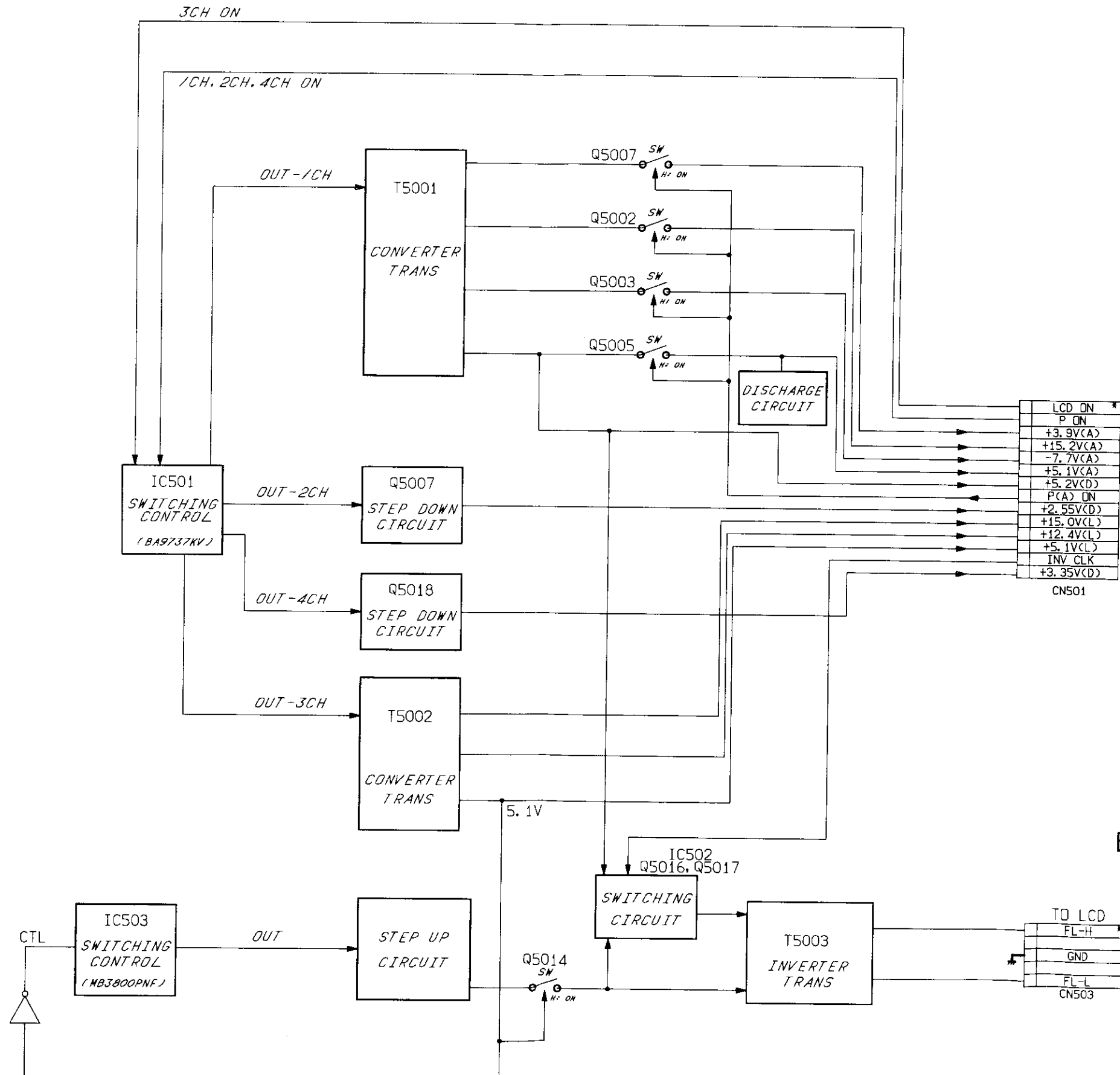
# 電源回路基板 (PW-1) POWER GENERATION P. C. B. (PW-1)

ブロック図 (Lens)  
Block Diagram (Lens)

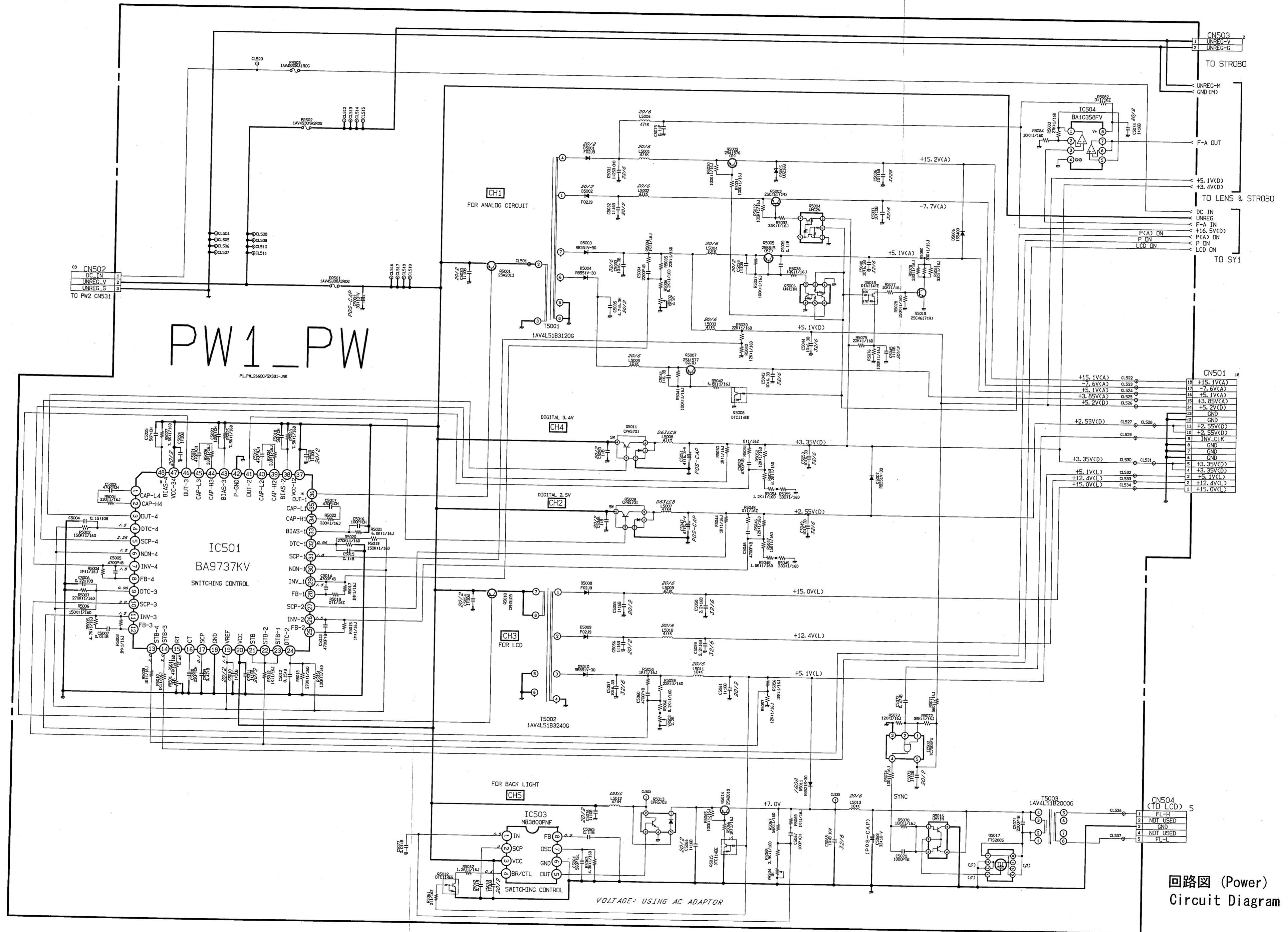




電源回路基板 (PW-1)  
POWER GENERATION P. C. B. (PW-1)

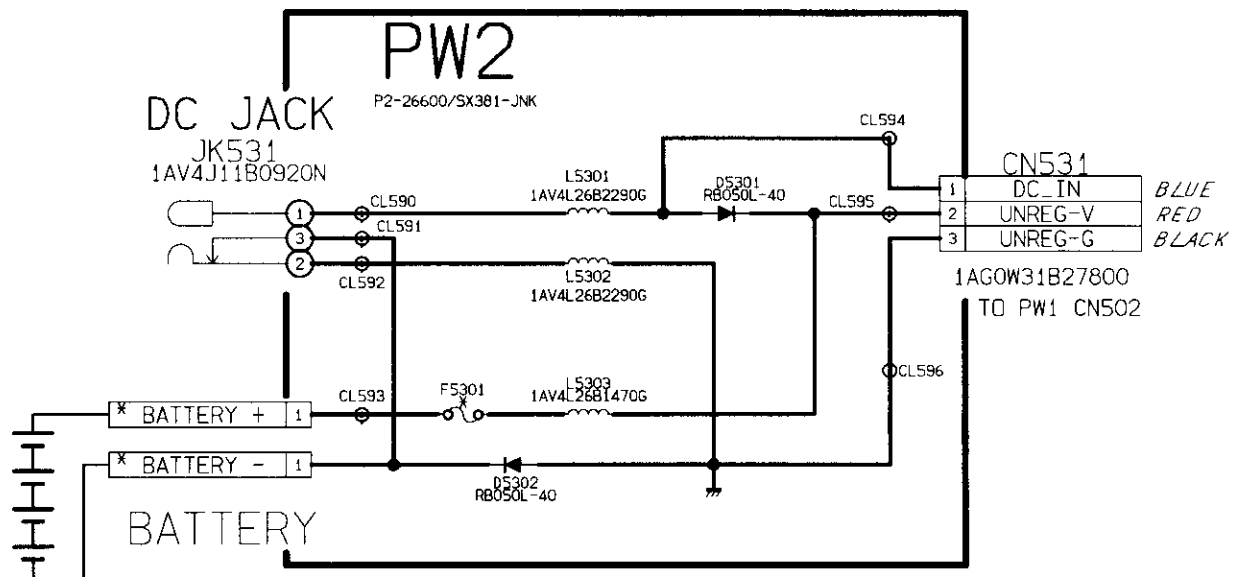


ブロック図 (Power)  
Block Diagram (Power)



回路図 (Power)  
Circuit Diagram (Power)

バッテリー基板 (PW-2)  
 BATTERY P. C. B. (PW-2)



回路図  
 Circuit Diagram

# The contents of inspection standards and tools for E990

[1] Inspection standards : R1 to R5

[2] Tools : T1

Conditions to be set and prepared for inspections

1. Physical stance to measure :

On the applicable product, its lens shall be set flat and its monitor shall be set to vertically stand up.

2. Room temperature and constantly controlled humidity :

$25 \pm 5^{\circ}\text{C}$

Relative humidity :  $65 \pm 20 \%$

3. Battery to be employed :

If not specified, Sanyo-manufactured alkaline AA-sized battery which is manufactured within four months from the manufacturing date shall be recommendable to use.

4. Standard power supply :

Specified AC power supply EH-31 shall be required.

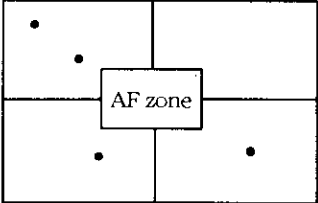
## [1] Inspection standards

	Item	Benchmark	Applied tool(s)
External view	Gap/ Difference in height	<ul style="list-style-type: none"> <li>- When closing the battery cover ,CF card cover, a gap between the cover and the body shall be less than 0.7 mm.</li> <li>- Gaps on the Mg cover be less than 0.5 mm. Difference in height between the body and the cover shall be less than 0.3mm. Check the condition by loading a battery and closing the cover</li> </ul>	Vernier caliper
	External view	<ul style="list-style-type: none"> <li>- Any conspicuous scratches or dirt shall not be required. Check it by naked eyes under fluorescent lamp or natural sunshine.</li> </ul>	Visual observation
Operation-ability / Operation mode	Operational mode	<ul style="list-style-type: none"> <li>- While operating, any irregularities or irregular noise shall not be required. Check it by shaking the camera while operating, or by intentionally lightly hitting the camera on to the linoleum-laid desk while operating.</li> </ul>	Battery Visual observation
	Operate-on ability Button(s)	<ul style="list-style-type: none"> <li>- While operating, any irregularities / Malfunctions shall not be required. No cave-ins of the buttons shall be required.</li> </ul>	
	On the lever, Knob, command dial	<ul style="list-style-type: none"> <li>- When clicking, normal touch shall be required. Any outstanding 'caught-in-mechanism' touch or 'rubbed-in-mechanism' touch shall not be required. Check and observe the condition through normal operation.</li> </ul>	
	Operation touch	<ul style="list-style-type: none"> <li>-While operating, any irregular conditions shall not be required.</li> </ul>	
	Each cover	<ul style="list-style-type: none"> <li>- Opening / closing each cover shall be smoothly made.</li> </ul>	
Monitor	Shooting image	<ul style="list-style-type: none"> <li>- Inclined degree of image shall be less than 0.5 degree.</li> </ul>	Photoshop Printer
Lens capacity	Focal distance	<ul style="list-style-type: none"> <li>-Wide-end position 8mm ± 6%</li> <li>-Tele-end position 24 mm ± 6%</li> </ul>	Dedicated tool(s)
	Open aperture F No.	<ul style="list-style-type: none"> <li>-Wide-end position (Compelling ∞) F2.5 ± 7%</li> <li>-Tele-end position (Compelling ∞) F4 ± 9%</li> </ul>	
Lens barrel	Driving noise	<ul style="list-style-type: none"> <li>-Induction evaluation :Any irregular noises shall not be required. Check it by listening to the operation noise in the macro mode.</li> </ul>	Visual observation, Regulated voltage power supply, Stop watch
	Timing to switch	<ul style="list-style-type: none"> <li>-For both directions of 'Wide to Tele' and 'Tele to Wide' it shall take W→T 2.3±0.2, T→W 2.6±0.2</li> </ul>	
	Driving current	<ul style="list-style-type: none"> <li>It shall be less than 300 mA.</li> </ul>	

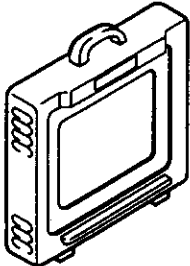
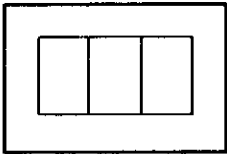
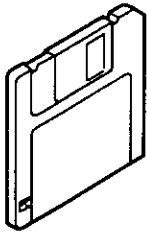
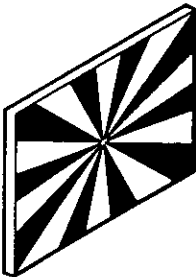
	Item	Benchmark	Applied tool(s)
AF	AF accurately	-The area which was chosen must focus	Visual observation
	Command infinite focus mode	-Both the distance view mark and the flash cancel mark shall appear on the LCD. Check it by setting to the command infinite focus mode and light pressing the shutter release button. -The speed light shall not work. Check it by releasing the shutter in the command Infinite focus mode.	
	LED blinking for impossibility in metering	-The LED shall blink in 8 Hz after lightly pressing the shutter release button. Check it by lightly pressing the shutter release button.	
Shooting with a speed light	Guide No. FULL Soon after flashing	(ISO100 · m) - $9 \pm 0.4EV$ -It shall be more than 6.5 EV; After charging for 18 sec. by a fully charged fresh battery, measure the guide No. within 1 sec. Then, in the speed of 2 times per sec., the shutter shall be released three times. Measure each lowest value at releasing the Shutter. Then, confirm that the lowest value is more than 6.5 EV.	Flash meter, Fully charged fresh battery, Visual observation
	Light distribution characteristics	-In the setting conditions of 'more than right side 22.5 degree vertically, left side 27.5 degree vertically' and 'more than 40 degree horizontally', the allowable drop in brightness shall be within 0.5EV'. The distance shall be taken 2 m. While changing the luminous level of tester, read the flashing period in sec.	
	Luminosity at flashing	-Auto mode : $TV = 1/30 \pm 0.5 TV$ at The Wide-end position ; Measure the guide No. and then compare it to the center's.	
	Red-eye reduction lamp	-Except the self-timer blinking, it shall not be turned on for any other functions / modes. While changing the mode, check that the lamp does not work.	
	Recycle time	-As a series of measuring the recycle time between 'the end of third flashing' and 'the fourth flashing', follow the procedures below. Spend 2 sec. as a recycle time between 'the end of second flashing' to 'the third flashing'. Then, release the shutter for the third flash and measure the recycle time from 'after the third shutter release' to 'the moment of fourth shutter release'. Then, the recycle time shall be within 6 sec. ·	



	Item	Benchmark	Applied tool(s)																																
	The shutter unable to release	-While lightly pressing the shutter release button, the red LED shall blink. Then, the shutter shall not be released. Unless it is in flashing mode, or the charged condition is not enough, LED blinking mode and shutter release lock can not work.																																	
	Flash	-In response to any button operations for some functions, light impact from outside, or shutter release, unexpected flashing shall not be required.																																	
Quality of image	Resolution	-The solution shall be in compliance with the following values. -Horizontal center : 1000lines Vertical center : 1000lines Horizontal line(s) at each corner : 700lines Vertical line(s) at each corner : 700lines In the setting conditions of 'Fine as the quality of image', 'Manual white balance under the fluorescent light', 'Center weighted metering / Open aperture', '0.5 m of a distance from the chart' and equipping the 5100K viewer , a subject shall be taken in the full range of angle of view. Then, its recorded image data file shall be opened by the dedicated software Photoshop, and its solution level shall be Judged by observing.	EIAJ chart 5100K viewer Photoshop																																
	Play-back of Color(s)	<table border="1" data-bbox="639 1126 1127 1496"> <thead> <tr> <th></th> <th>R</th> <th>G</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>W</td> <td>155-190</td> <td>170-185</td> <td>165-185</td> </tr> <tr> <td>Ye</td> <td>160-195</td> <td>175-190</td> <td>60-80</td> </tr> <tr> <td>Cy</td> <td>--</td> <td></td> <td></td> </tr> <tr> <td>G</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mg</td> <td></td> <td></td> <td></td> </tr> <tr> <td>R</td> <td>175-210</td> <td>5-20</td> <td>0-25</td> </tr> <tr> <td>B</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p data-bbox="545 1496 1193 1883">-Set the conditions of 'Fine as the quality of image', 'Manual white balance under the fluorescent light' ,and 'Center-weighted metering'. -Equip the chart with the 5100K viewer and take a subject in the full range of angle of view. Then, open the recorded image data file through the dedicated software Photoshop. Using the Marquee tool (M), pick up the image's central area 64 X 64 picture element, and read the histogram's RGB.</p>		R	G	B	W	155-190	170-185	165-185	Ye	160-195	175-190	60-80	Cy	--			G				Mg				R	175-210	5-20	0-25	B				Color bar chart
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	Item	Benchmark	Applied tool(s)
Finder	Operation mode	<ul style="list-style-type: none"> <li>- Only smooth operation mode shall be required.</li> <li>- 'Caught-in-mechanism' touch or any unstable or unsteadily zooming mode shall not be required.</li> </ul>	
	Dust, Fluff, Scratch(es)	<ul style="list-style-type: none"> <li>- Any dust / fluff / scratch(es) shall not exceed the half width of lines in the focus frame.</li> <li>- Any of them shall not be conspicuous either.</li> <li>- Any dust / fluff / scratch(es) shall not exceed the width of lines, not be conspicuous.</li> <li>- In case of anything where the conditions above can not apply, follow the conditions below.</li> </ul> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> <li>- Divide the finder into 5 areas as shown above and count the quantity of dust / fluff / scratch(es) in the AF zone.</li> <li>- In each area, there shall be less 2 pieces of them. As the total quantity of dust / fluff / scratch(es), 4 pieces or less shall be desirable. In the AF zone, 0 pieces of such dust / fluff / scratch(es) shall be desirable.</li> </ul>	Visual observation
LCD and others	Monitor LCD	<p>External view</p> <ul style="list-style-type: none"> <li>-No vignetting or shading on the LCD shall be required.</li> <li>-Inclination between the monitor and the monitor frame shall not be so outstanding.</li> </ul> <p>Field of view</p> <ul style="list-style-type: none"> <li>-Through-the-monitor image :96 to 100 %</li> <li>-Play-back image : 98 to 100 %</li> </ul>	Visual observation
	Self-timer; Working period Light blinking, Cancel of the self-timer	<ul style="list-style-type: none"> <li>-10 ± 3 sec. / 3 ± 1 sec.</li> <li>-Blinking for 9 sec. and then lighting for 1 sec.</li> <li>- Prior to releasing the shutter : By turning off either the AF switchover switch or the select dial, the self-timer can be cancelled.</li> <li>- After releasing the shutter : By turning off the select dial, it can be cancelled. Be sure to check the turn-off condition after canceling it.</li> </ul>	Visual Observation Stop watch

	Item	Benchmark	Applied tool(s)
Electrical Characteristics	For consumption current; Stand-by	- Less than 0.3 mA while turning off the main power switch. Less than 0.35 mA while sleeping. Supply 6.5V from the regulated voltage power supply to the camera, and measure the consumption current value after 12 hours from the time of supplied.	
	Start-up	- Select 'A-REC' from the select dial and check that any image appears on the LCD. Then, leave it for 15 sec. or a bit longer and then measure the consumption current value. The value shall be less than 1A.	
	For battery-check voltage;		
	Level 1	-4.7 ± 0.2 V	
	Level 2	-4.25 ± 0.25 V ; The battery mark blinks ; While lowering the power supply voltage, lightly press the shutter release button. Then, when the battery mark appears on the LCD, measure the voltage.	
	Level 3	-4.23 ± 0.2 V ; The LCD is turned off / The shutter release mode is locked ; While lowering the power supply voltage, lightly press the shutter release button. Then, when the LCD is turned off, measure the voltage.	

工具一覧表		Tool List	
工具番号 Tool No	名 称 Name	略 図 Illustration	備 考 Remarks
J63049 (100Volts) J63050 (110Volts) J63051 (230Volts) J63052 (240Volts)	カラービューア 5100 K Colour Viwer 5100 K		E900,E910 E950,E700 E800,E990 共通 Common
J63056	色調整用チャート Chart for Colour Adjustment		E900,E910 E950,E700 E800,E990 共通 Common
J65035	キャリブレーションソフト Calibration Software		E990 Exclusive
サ-ビスマニュアル添付 Attached in Service Manual	ジーメンスチャート Siemens star chart		E900,E910 E950,E700 E800,E990 共通 Common

Siemens star chart

