作成承認印	配布許可印

Nikon Digital Camera E950

COOLPIX950

MODEL [J : VAA10601]
MODEL [US/EN :VAA10602]
MODEL [EU:VAA10611]

SERVICE MANUAL

Nikon

NIKON CORPORATION Tokyo Japan

Table of Contents

Specification

1. Chief Specifications

1) CCD 211M pixels 1/2-in. high-desity
Full size : 1600 x 1200, XGA : 1024 x 768, VGA : 640 x 480

2) Lens 3x Zoom-Nikkor f=7.0mm～21.0mm
[35mm (135) format equivalent to 38 ～115mm) F2.6～F4 with macro

3) Degital Zoom 1.25x / 1.6x / 2x / 2.5x

4) Focus mode Continuous AF(4746 steps) / Single AF / Manual focus

5) Shooting distance 30cm (11.8in) ～∞ / 2cm (0.8in) ～∞ in macro mode

6) Optical viewfinder Real-image optical viewfinder, magnification : 0.44 ～1.2x
frame coverage : approx. 85% ; diopter adjustment : -2 ～+1 dpt;
LED indication

7) LCD monitor 2-in, 130,000-dot, low temp polysilicon TFT LCD;
Backlight / brightness adjustment available (3 steps)
frame coverage : approx. 97%

8) Storage CompactFlush Card

9) Type of image file JPEG / uncompressed TIFF

10) Compression Hi (uncompressed TIFF), Fine=1/4, Normal=1/8, Basic=1/16

11) Capacity Hi=1, Fine=8, Normal=16, Basic=32 (with 8Mbyte CF Card)

12) Shooting mode Fully Automatic (A-REC) mode / Custom M-REC can be memorized

13) Capture Mode Single / Continuous (approx, 1.5fps for full-size images)
Multiple continuous (16 frames in 1/16 size)

14) Expouser metering 256-segment Mtrix / Center-Weighted / Spot

15) Shutter — Mechanical and charged-coupled electric shutter, 8 - 1/750 sec

16) Aperture — Electrio-magnetically controlled

17) Expouser control — Programmed Auto / Shutter-Priority Auto / Aperture-Priority Auto / Expouser compensation (±2EV in 1/3 EV steps)

18) Expouser range — EV -2 ~+15.5(W), EV -0.8 ~+16.7(T) (ISO 100 equivalent)

19) Sensitivity — ISO 80 equivalent; dEf, +1, +2, 100

20) White balance — Automatic TTL control;can be set manually; presetting possible

21) Self-timer — 10 sec, 3 sec. duration

22) Speedlight
- Guide number : 9 (at ISO 100, m/ft)
- Flash contorl sensor flash system
- Flash modes Auto flash / Flash cancel / Anytime flash / Slow sync
- Red-eye reduction (illuminates for 0.8 sec.before main flash)
- External speedlight Multi-flush sync terminal connects to extrenal Nikon Speedlight SB-28, SB-26, SB-25, SB-24, SB-22s through the Multi-Flash Bracket Unit SK-E900;built-in Speedlight can be cancelled when external Speedlight(s) is used

23) Playback menu — Frame/Thumbnail (9 segments) / Slide show / 2x or 3x zoom playback (selectable from 9 segments)

24) Delete function — Dletes all frames or selected frames

25) Interface — Serial interface (Windows:115kbps, Macintosh:230kbps) / Video output (NTSC/PAL)

26) I/O terminal — Power input / Video output / High-speed serial terminal / Sync termial for external speedlight

27) Power requirements — 4 batteries:1.5V LR6[alkaline AA-size(L40)] / 1.5 FR6 Lithium/1.2V Ni-MH / 1.2V NiCd AA-size AC adapter(option)

28) Battery life	Approx:60 min. when using LCD monitor and four 1.5V LR6 batteries at normal temperature (20℃/68°F)
29) Dimensions (W x H x D)	143 x 7605 x 36.5mm(5.6x3.0x1.4 in)
30) Weight (without battery)	Approx. 350g (12.3oz)
31) Accesories included	Soft case / Lens cap / Neck strap / Video cable / 8MB CompactFlush card(EC-8CF) / Serial cables(Windows & Macintosh) / four 1.5V LR6[alkaline AA-size(L40)] batteries / Nikon View Ver2 CD-ROM / Open Me First Envelope / Instruction manual

Disassembly Procedure

⚠ WARNING

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

Notes: (1) Remove the battery prior to disassembly.

(2) During disassembly, make a note of the routing of the cords, which screws are mounted in which parts, etc.

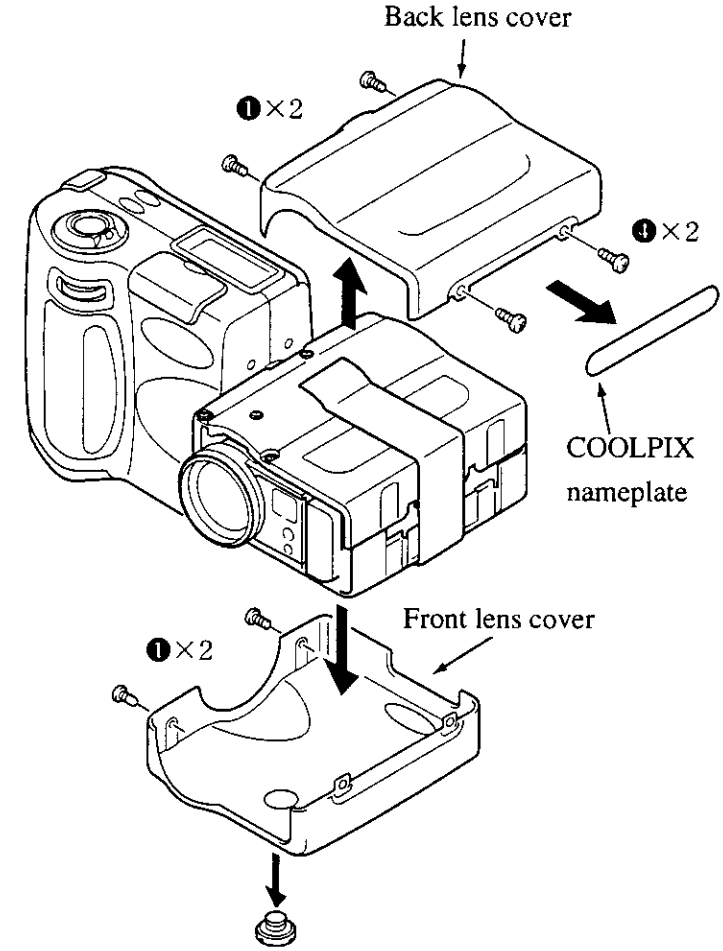
(3) Electrical parts must be grounded since they are easily damaged by static.

Types of screws used

The screws are indicated in the illustrations and text of the disassembly and reassembly sections of the Repair Guidelines by the numbers given in the table below.

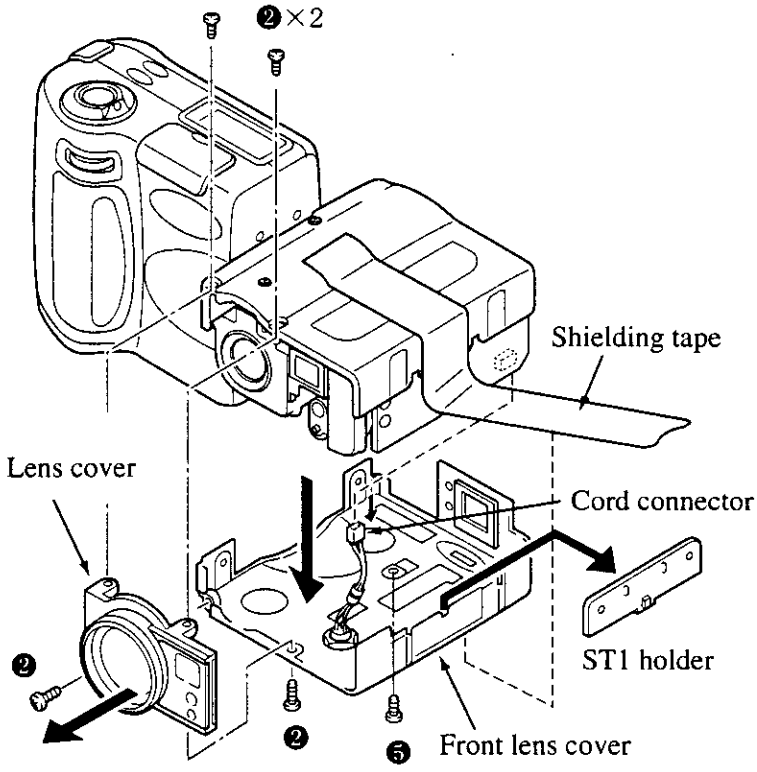
Designation	Size (mm)	Type	Head size	Color	Parts number
❶	1.7×3.5	Fine thread	Large	Black	412-058-8400
❷	1.7×4.0	Tap	Small	Black	411-175-6504
❸	1.7×4.0	Tap	Large	Black	411-177-4102
❹	1.7×5.0	Tap	Large	Black	411-176-7005
❺	1.7×3.5	Tap	Large	White	411-177-7103
❻	1.7×2.0	Fine thread	Large	White	411-175-3602
❼	1.7×3.5	Fine thread	Small	White	411-175-8904
❽	1.7×6.0	Tap	Large	White	411-169-9603
❾	1.7×4.0	Fine thread	Large	White	411-020-0701

1. Back lens cover, front lens cover



- Peel off the COOLPIX nameplate (which is adhered by the double-sided tape).
- Remove the two ❹ screws and two ❶ screws.
- The back lens cover can now be removed.
- Remove the synchro terminal cap.
- Remove the two ❶ screws.
- The front lens cover can now be removed.

2. Lens cover, front lens cover

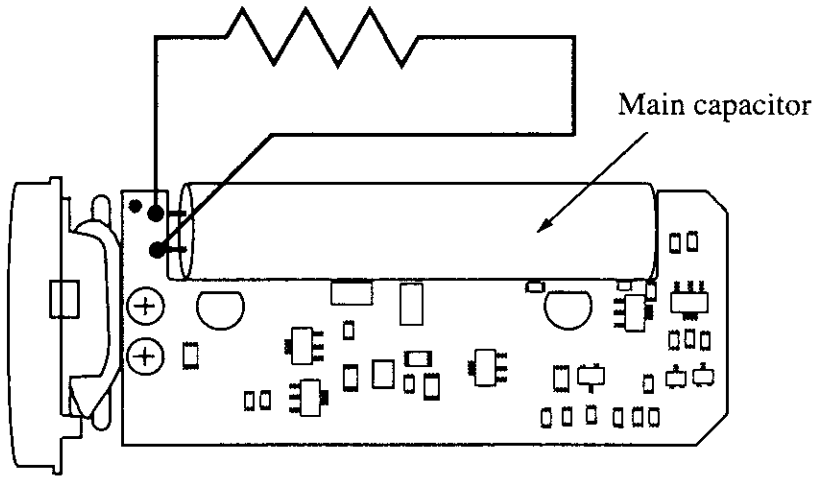


- Remove the four ❷ screws.
- The lens cover can now be removed.
- Peel off the shielding tape.
- Remove the ❺ screw.
- Disconnect the cord connector.
- The front lens cover can now be removed.
- Remove the ST1 holder while taking care to protect the SB board.

3. Discharging the main capacitor

⚠ WARNING

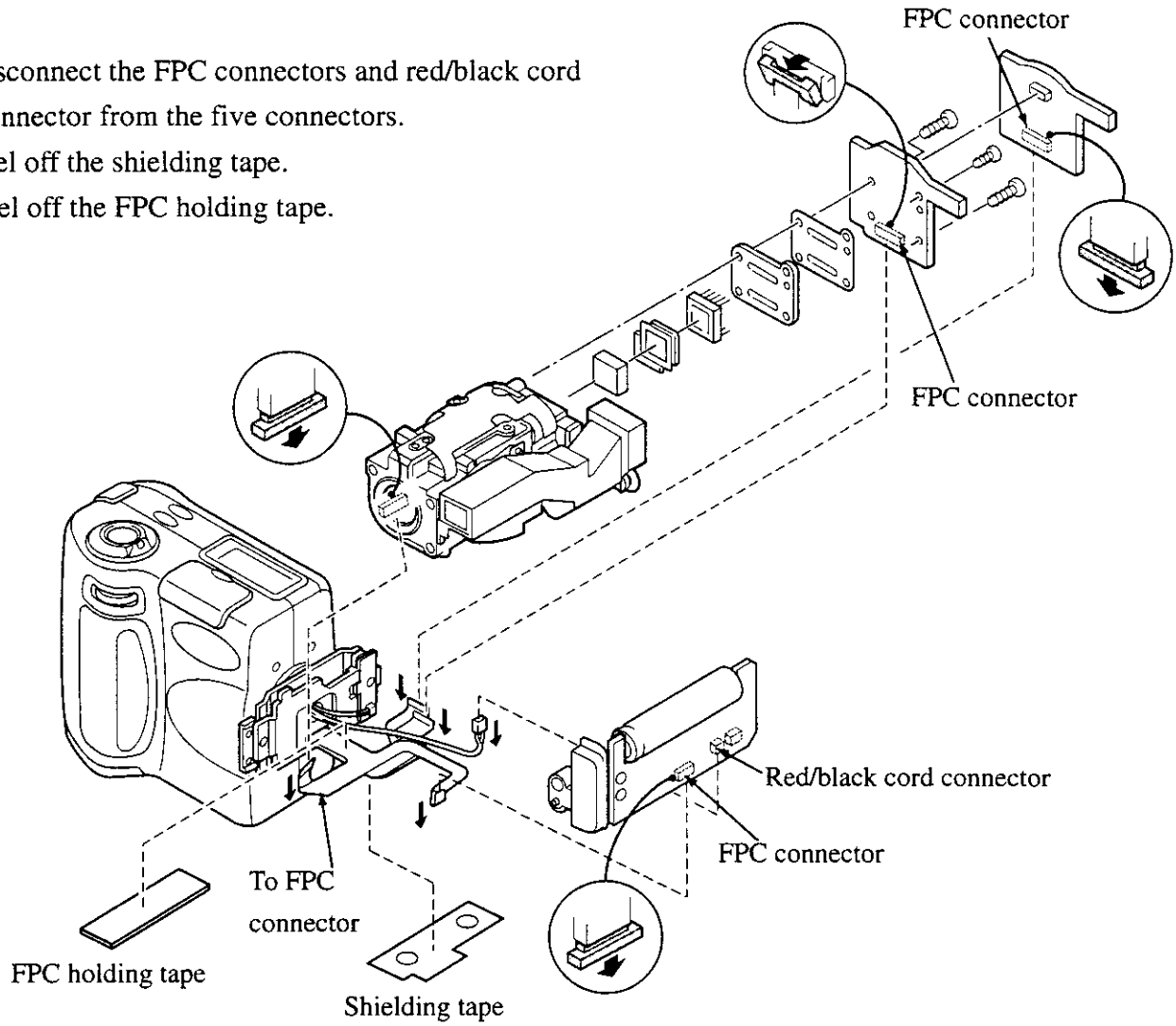
- There are high voltage parts inside. Be careful of this electric shock, when you remove the cover.
- You must discharge the main condenser according to the instruction of this repair manual after you remove the front cover.

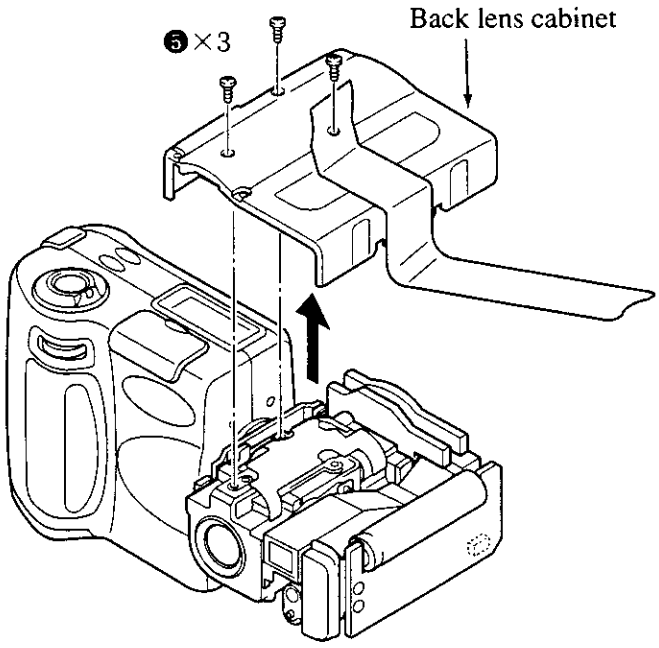


- The main capacitor must be discharged at the position shown in Fig .

4. Back lens cabinet

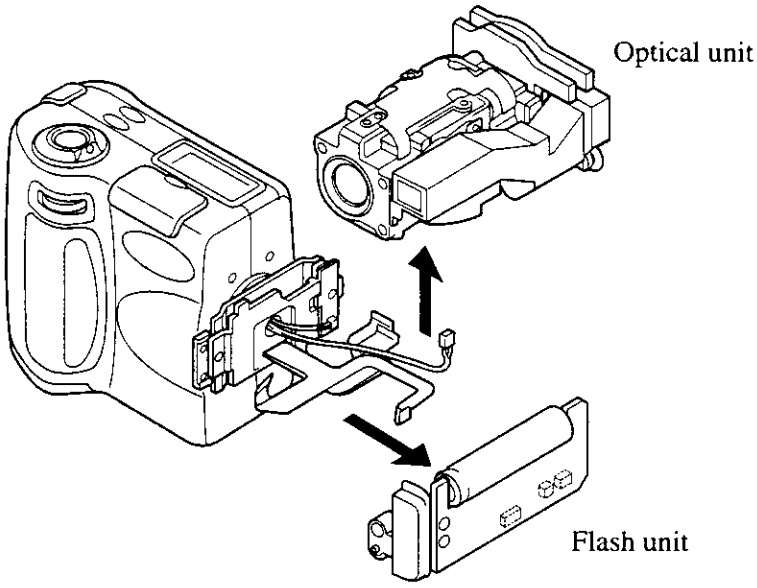
- Disconnect the FPC connectors and red/black cord connector from the five connectors.
- Peel off the shielding tape.
- Peel off the FPC holding tape.



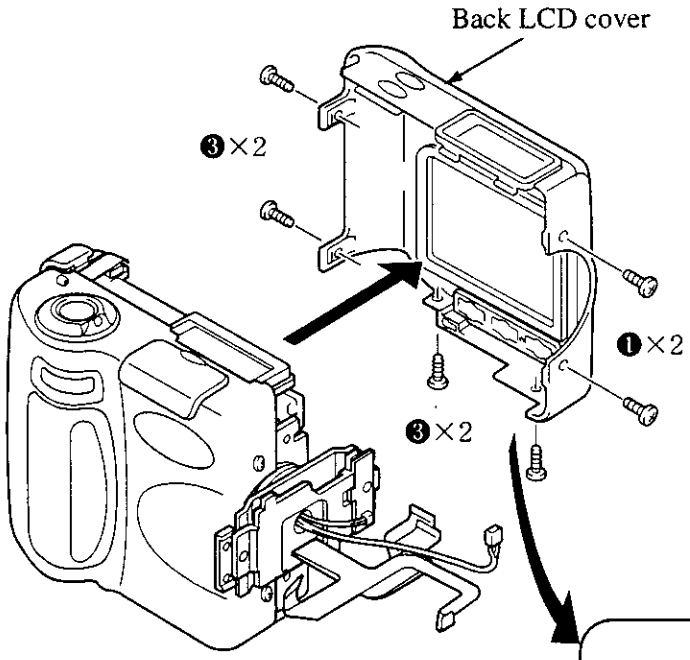


- Peel off the shielding tape.
- Remove the three ❺ screws.
- The back LCD cover can now be removed.

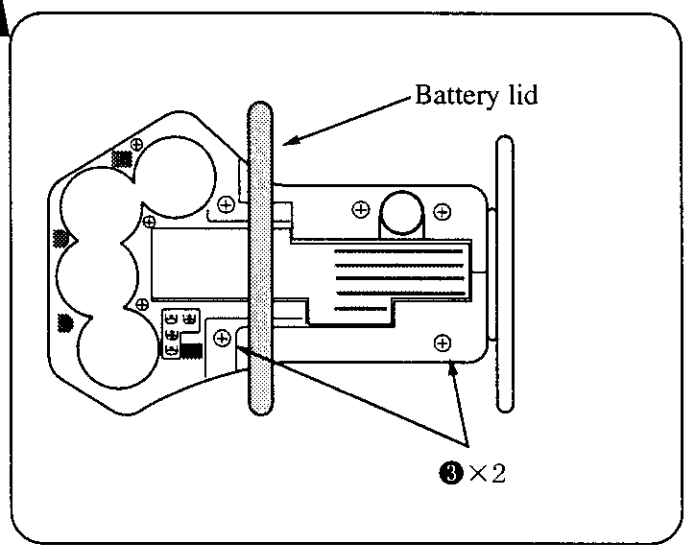
5. Flash unit, optical unit



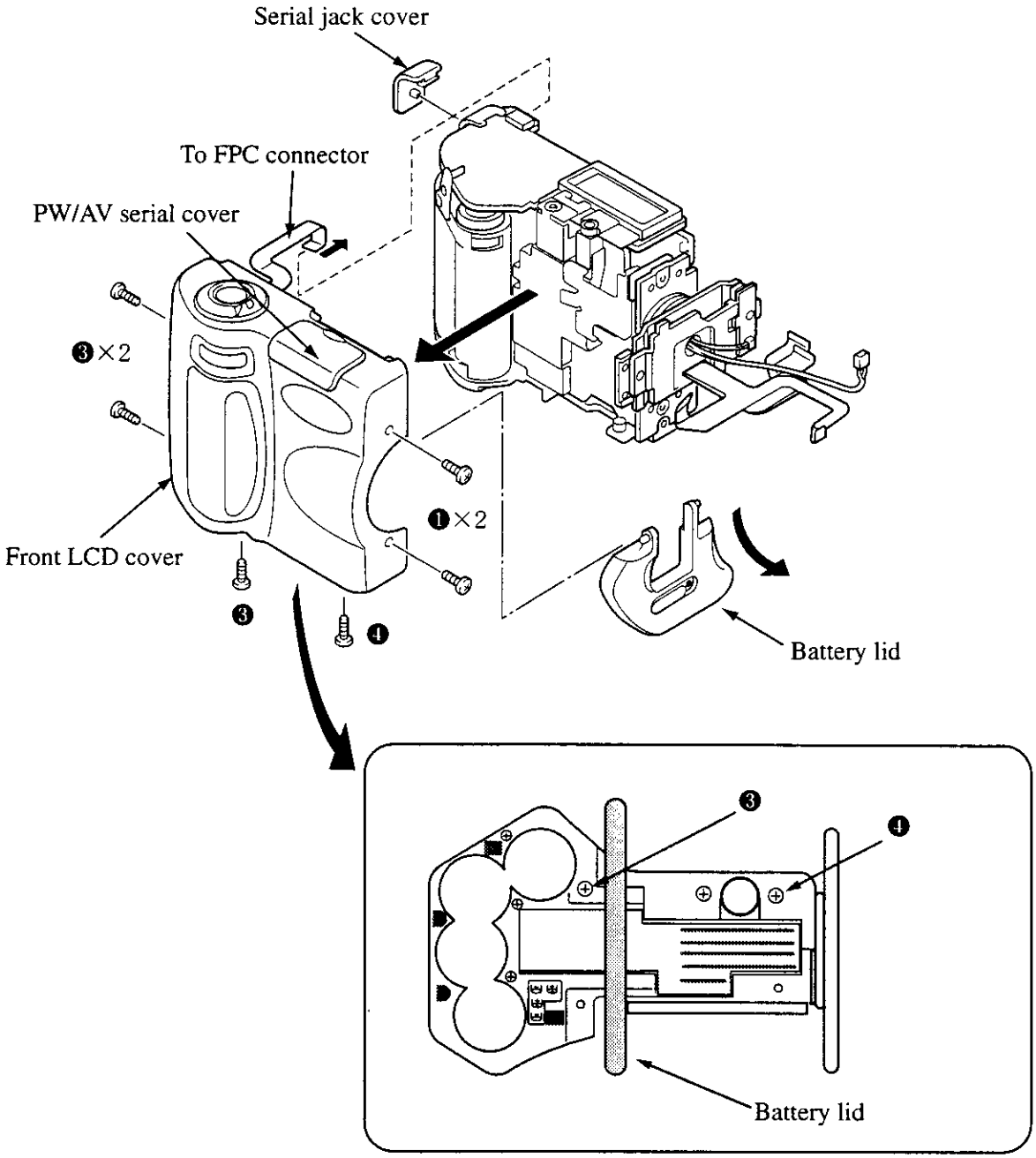
6. Back LCD cover



- Remove the two ❶ screws and four ❸ screws.
- The back LCD cover can now be removed.

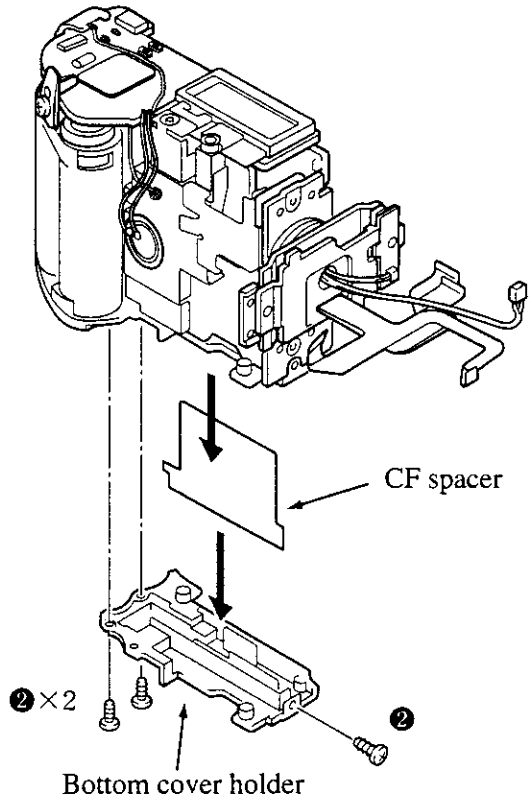


7. Front LCD cover



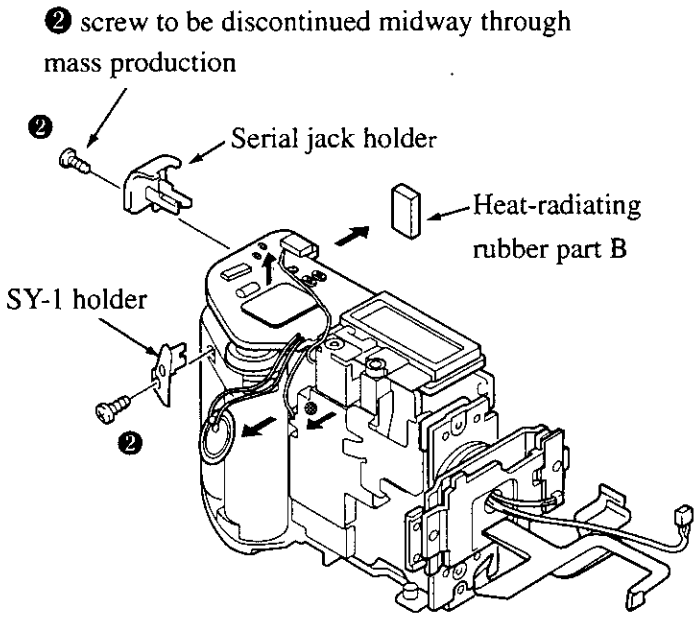
- Open the PW/AV serial cover.
- Disconnect the FPC connector.
- Remove the two ❶ screws, three ❸ screws and the ❹ screw.
- The front LCD cover can now be removed.
- The serial jack cover can now be removed.
- The battery lid can now be removed.

8. Bottom cover holder

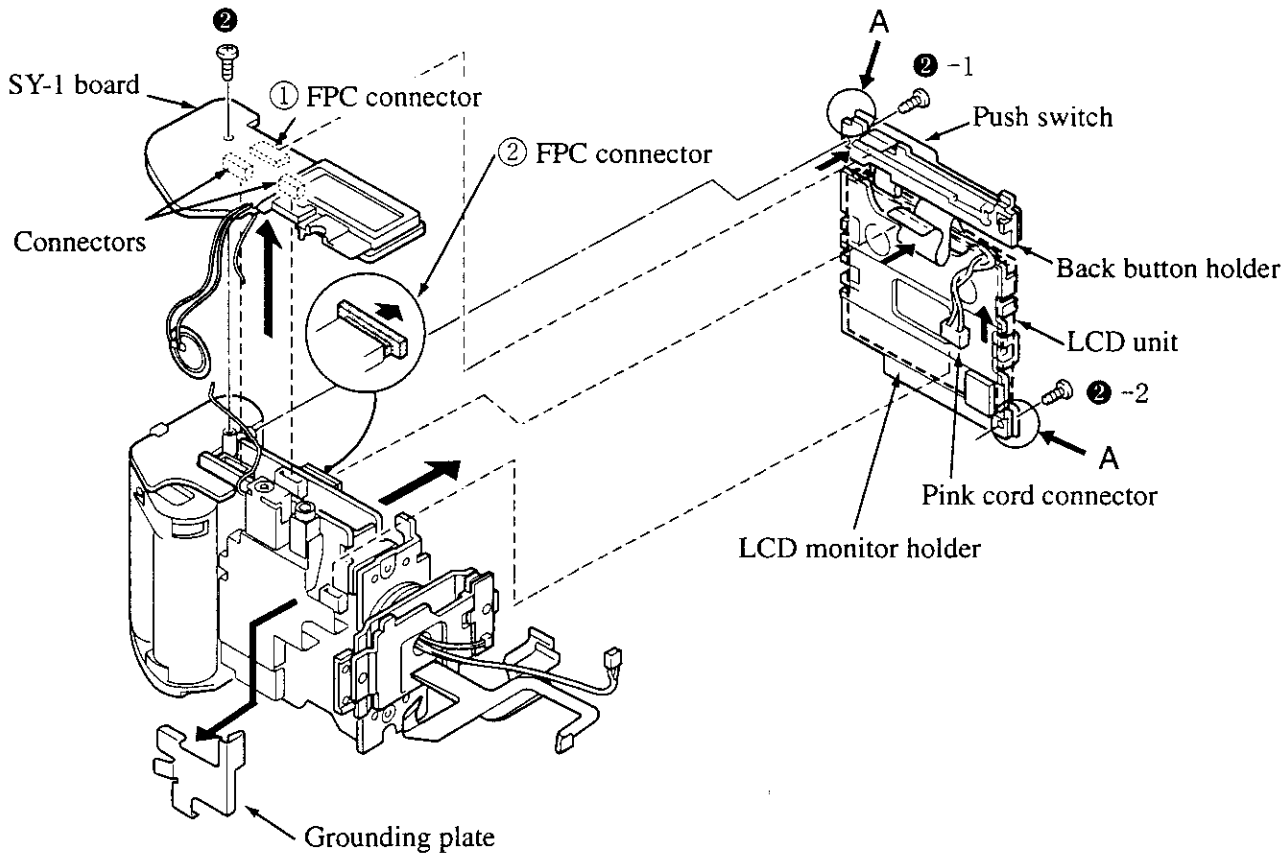


- Remove the three ❷ screws.
- The bottom cover holder can now b removed.
- The CF spacers can now be removed.

9. SY-1 board, LCD unit, LCD monitor holder, back button holder

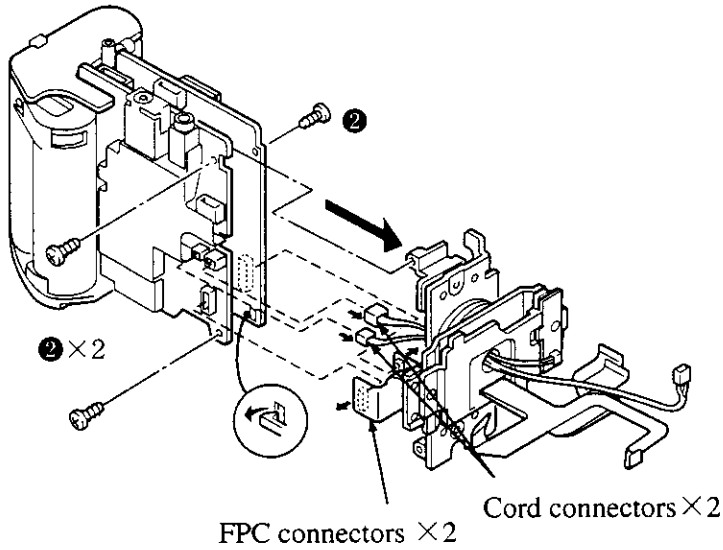


- Remove the ❷ screw for securing the serial jack holder.
- Remove the serial jack holder.
  (It is held in position by a hook.)
- Remove the ❷ screw, and remove the SY-1 holder.
- Remove the shielded cord soldering in two places.
- Peel off the buzzer from the camera body.
- Remove the heat-radiating rubber part B.



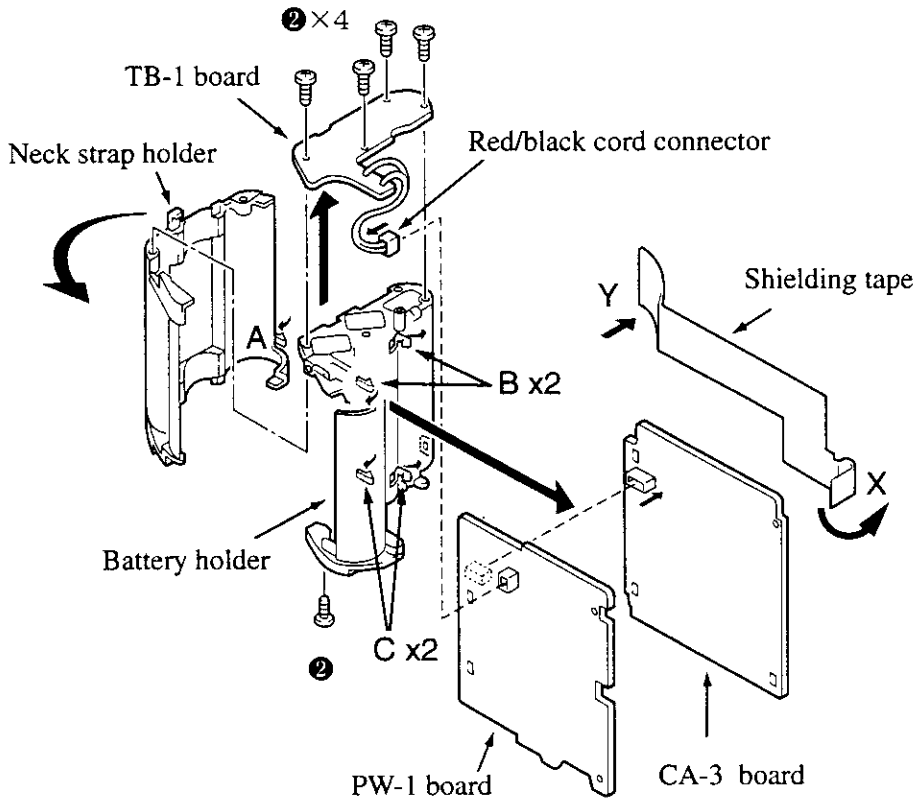
- Remove the grounding plate.
- Peel off the push switch in two places in area A until the screw underneath is visible.
  (Separate the button between the FPC base plate and back button holder.)
  At the same time, the ① FPC connector can now be removed.
- Remove the ❷-1 screw.
- Allow the back button holder to lift off from the camera body.
- Remove the ❷ screw.
- The SY-1 board can now be removed.
- Remove the ② FPC connector.
- Remove the pink cord connector.
- Remove the ❷-2 screw.
- The LCD unit, LCD monitor holder, back button holder and push switch can now be removed as an assembly.

10. Joint unit



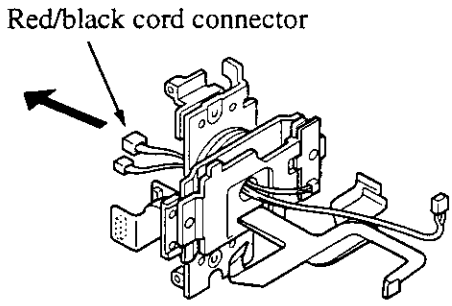
- Disconnect the two cord connectors.
- Disconnect the two FPC connectors.
- Remove the three ❷ screws.
- The joint unit can now be removed.
- Peel off the X part of the shielding tape. (See figure below)

11. Board units, other

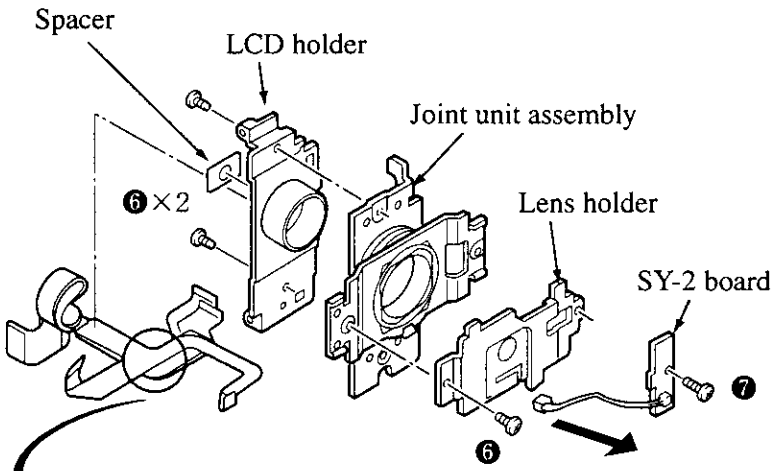


- Peel off the Y part of the shielding tape.
- Remove the five ❷ screws.
- Disengage the hook in area A, and rotate the neck strap holder in the direction of the arrow to remove it.
- Disconnect the red/black cord connector, and remove the TB-1 board.
- Hold the bottom side of the CA-3 and PW-1 boards between your fingers, disengage the hook C part, and then disengage the hook B part.
- The CA-3 and PW-1 boards can now be removed.

12. Joint unit



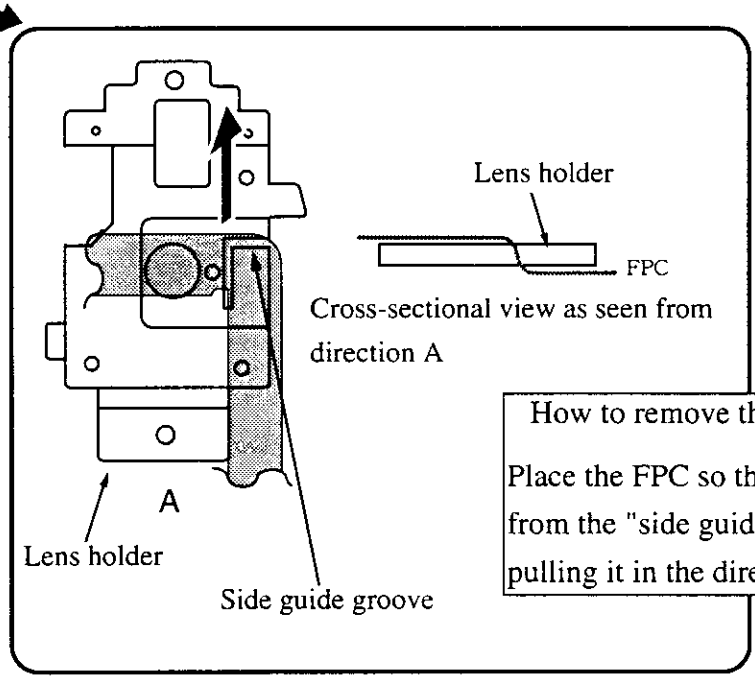
- Disconnect the red/black cord connector by pulling it in the direction of the arrow.



- Remove the ❼ screw, and remove the SY-2 board.
- Remove the ❻ screw, and remove the lens holder.

Note: Make a note of how the FPC is routed.

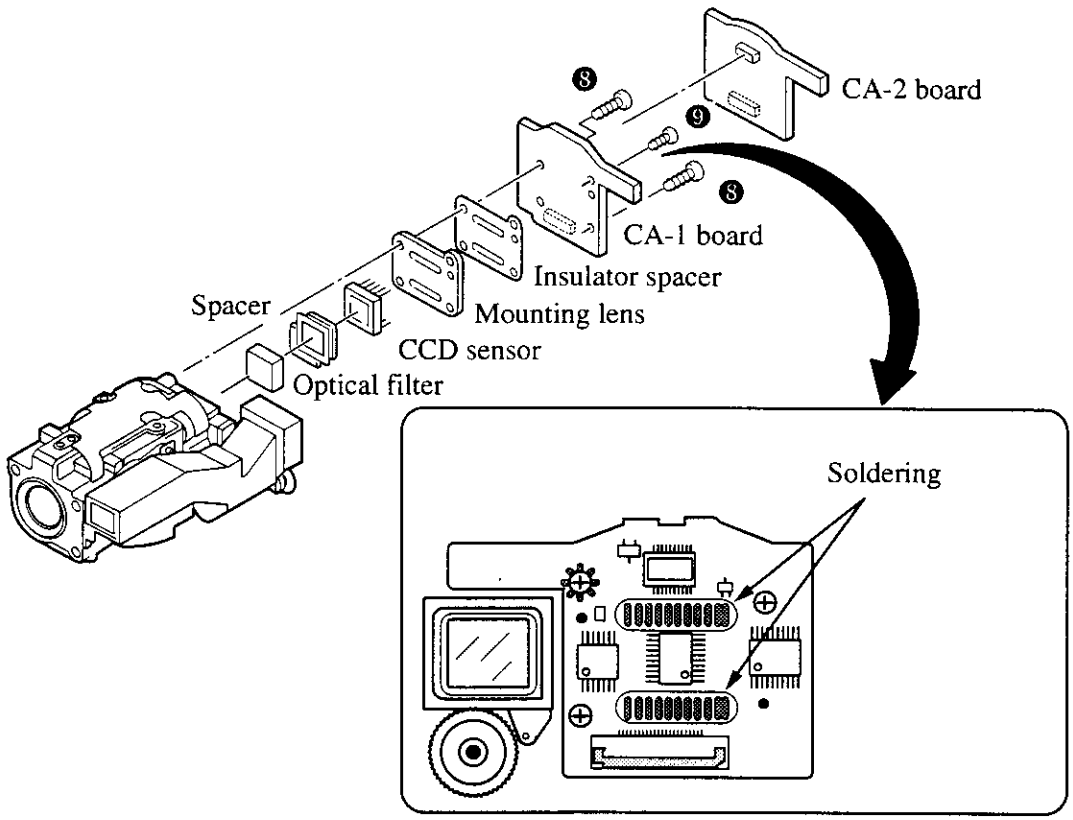
- Remove the lens holder from the FPC.
- Remove the spacer.
- Disconnect all the FPCs using the vertical groove in the LCD holder.
- Remove the two ❻ screws, and remove the LCD holder.



How to remove the FPC from the lens holder

Place the FPC so that it is flat, and disconnect it from the "side guide groove" of the lens holder by pulling it in the direction of the arrow.

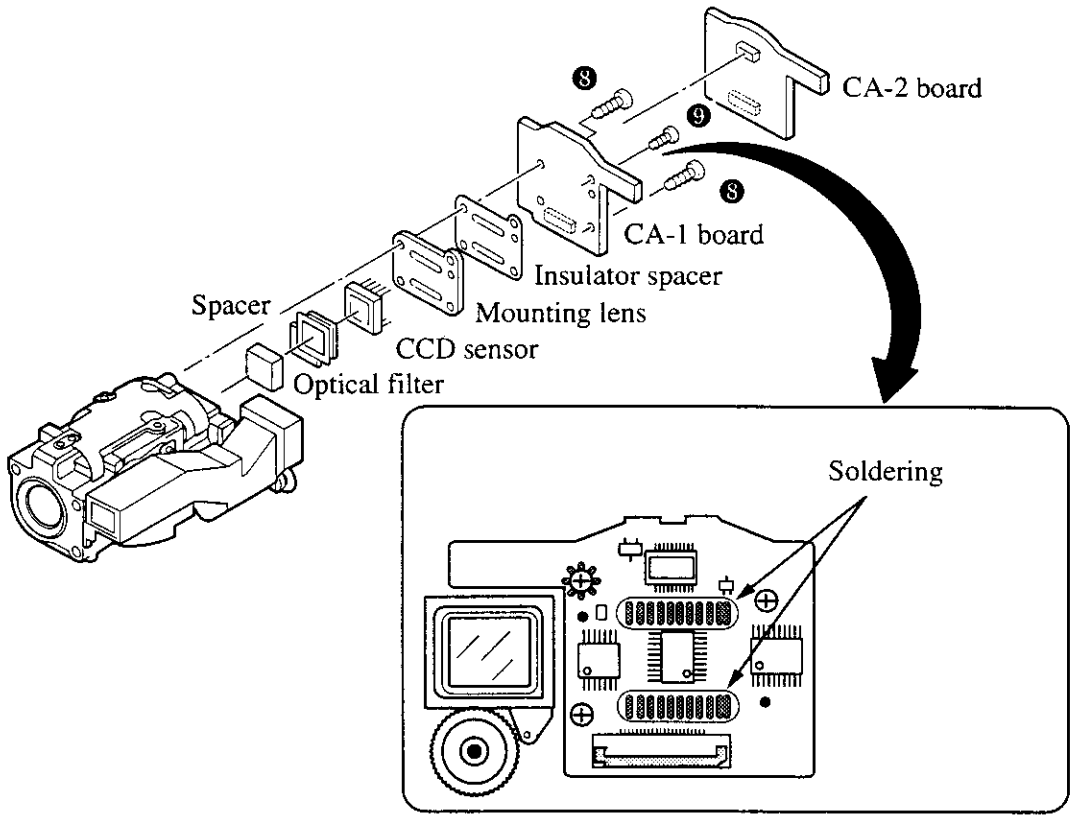
13. Optical unit



- Remove the CA-2 board.
- Remove the soldering on the CA-1 board.
- Remove the two ❽ screws and the ❾ screw.
- The CA-1 board, insulator spacer, mounting lens, CCD sensor, spacer and optical filter can now be removed in this order.

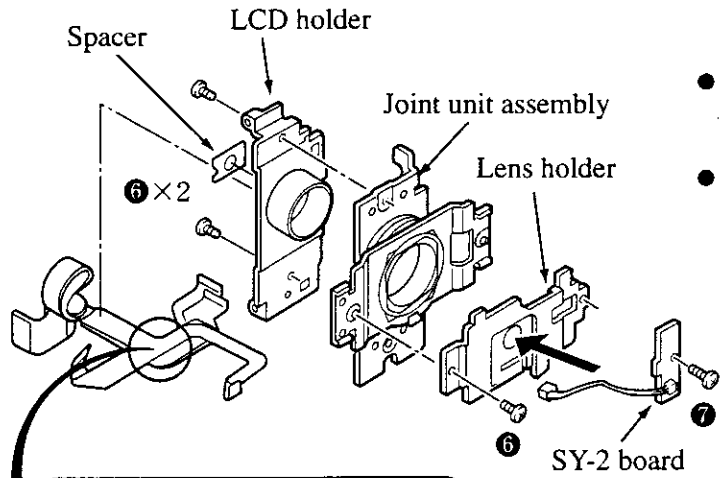
Re-assembly Procedure

1. Optical unit

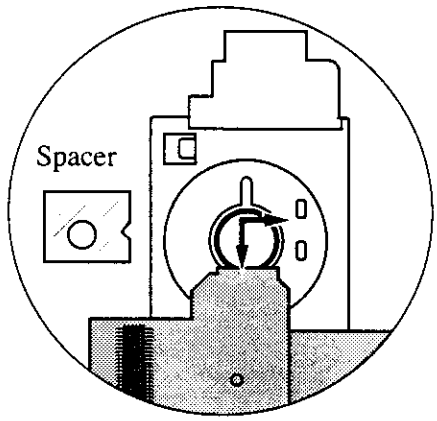


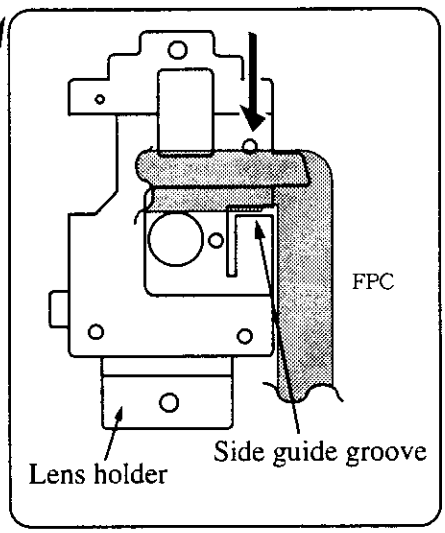
- Assemble the optical filter, spacer, CCD sensor, mounting lens, insulator spacer and CA-1 board into the optical unit body in this order.
- Mount the two ❽ screws and the ❾ screw.
- Solder the CA-1 board.
- Mount the CA-2 board.

2. Joint unit



- Mount the LCD holder onto the joint unit assembly using the two ❻ screws.
- Use the vertical groove in the LCD holder to install the FPC.
- Move the spacer in the direction of the arrow and mount.





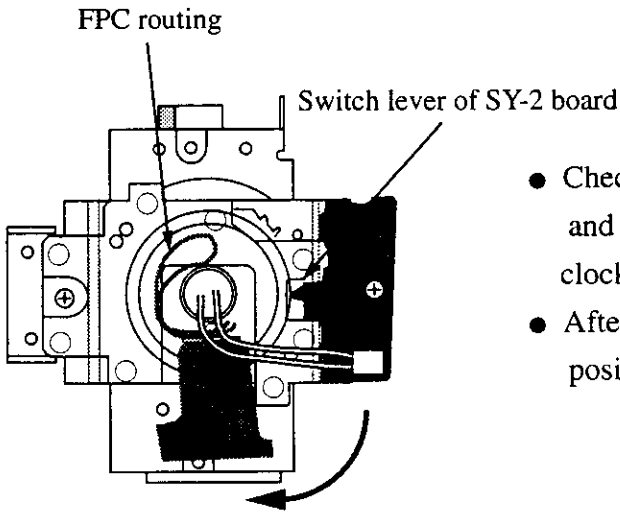
- Install the FPC in the lens holder.

Note: Refer to the figure below for the FPC routing.

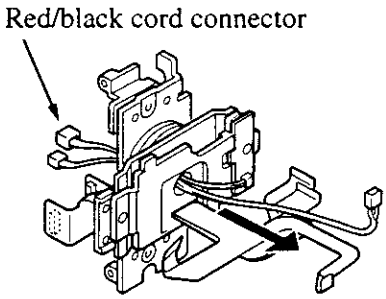
- Mount the lens holder on the joint unit assembly using the ❻ screw.
- Mount the SY-2 board using the ❼ screw.
- Pass the yellow/black cord connector in the direction of the arrow through the hole in the joint unit assembly.

How to assemble the FPC into the lens holder

Place the FPC so that it is flat, and mount it onto the holder lens from the "side guide groove" of the lens holder.

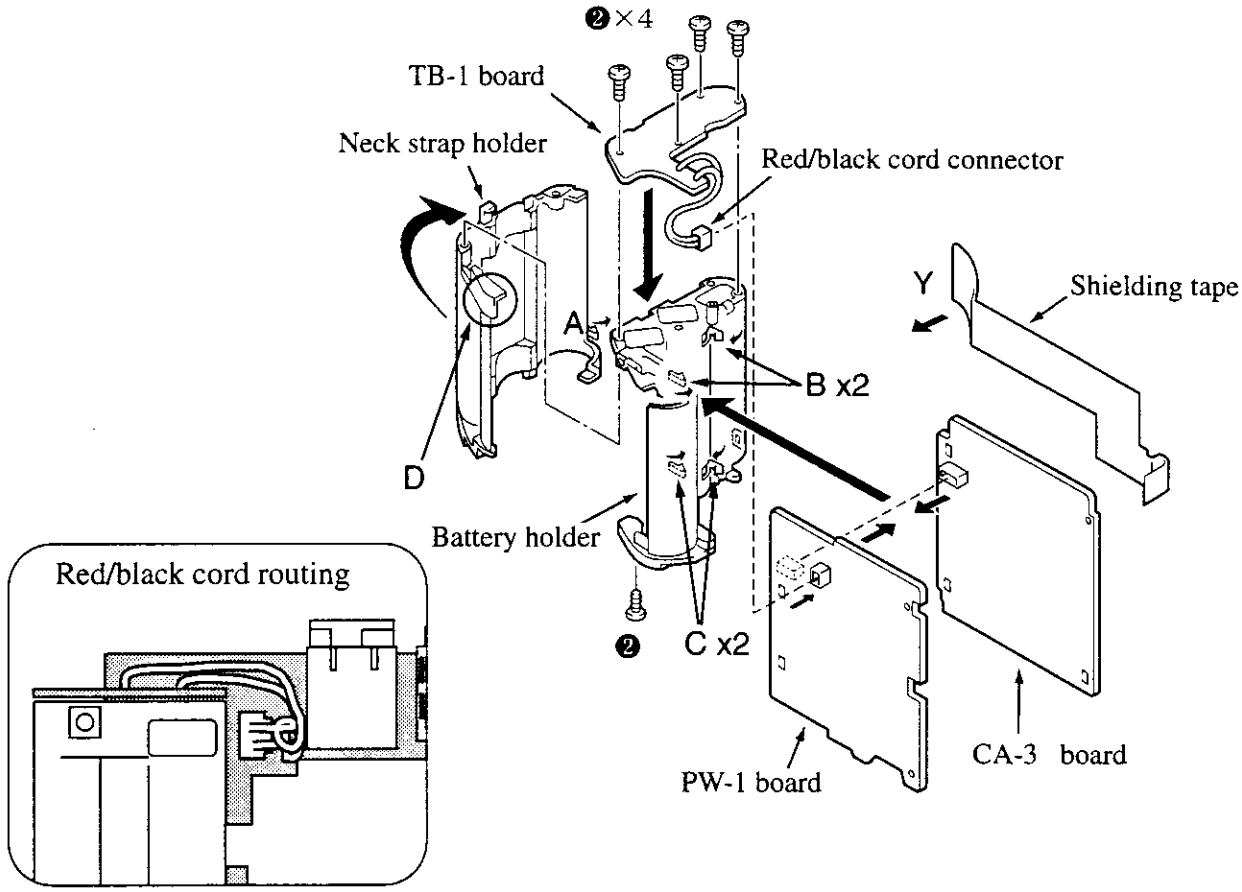


- Check that the switch lever of the SY-2 board is switched and concealed when the lens holder unit is rotated clockwise by 180 degrees.
- After checking, return the lens holder unit to its original position.



- Pass the red/black cord connector in the direction of the arrow through the hole in the joint unit assembly.

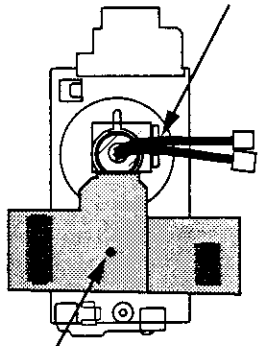
3. Board units, other



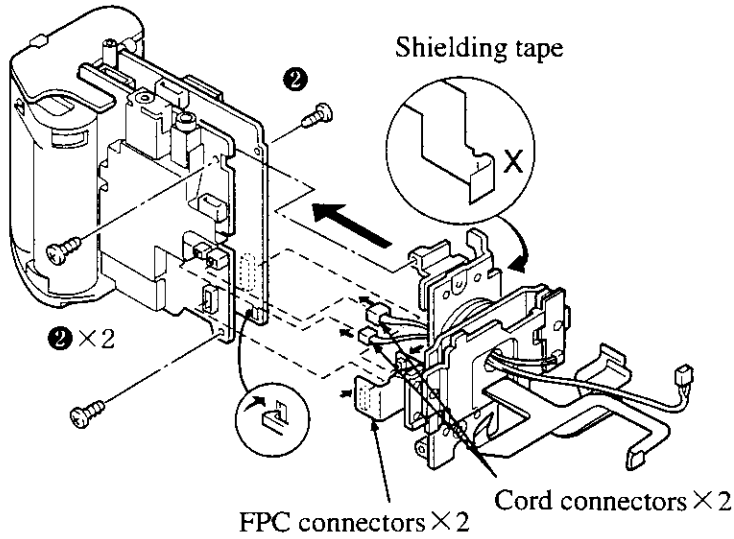
- Combine the CA-3 board and PW-1 board, and assemble them into the battery holder.
  (Join them together using the hook C and hook B areas.)
- Mount the TB-1 board, and connect the red/black cord connector.
- Install the D area of the neck strap holder into the batter holder, rotate the holder in the direction of the arrow, and connect using the area A hook.
- Mount the five ❷ screws.
- Adhere the Y part of the shielding tape.

4. Joint unit

Pass the cord connector through the fork.

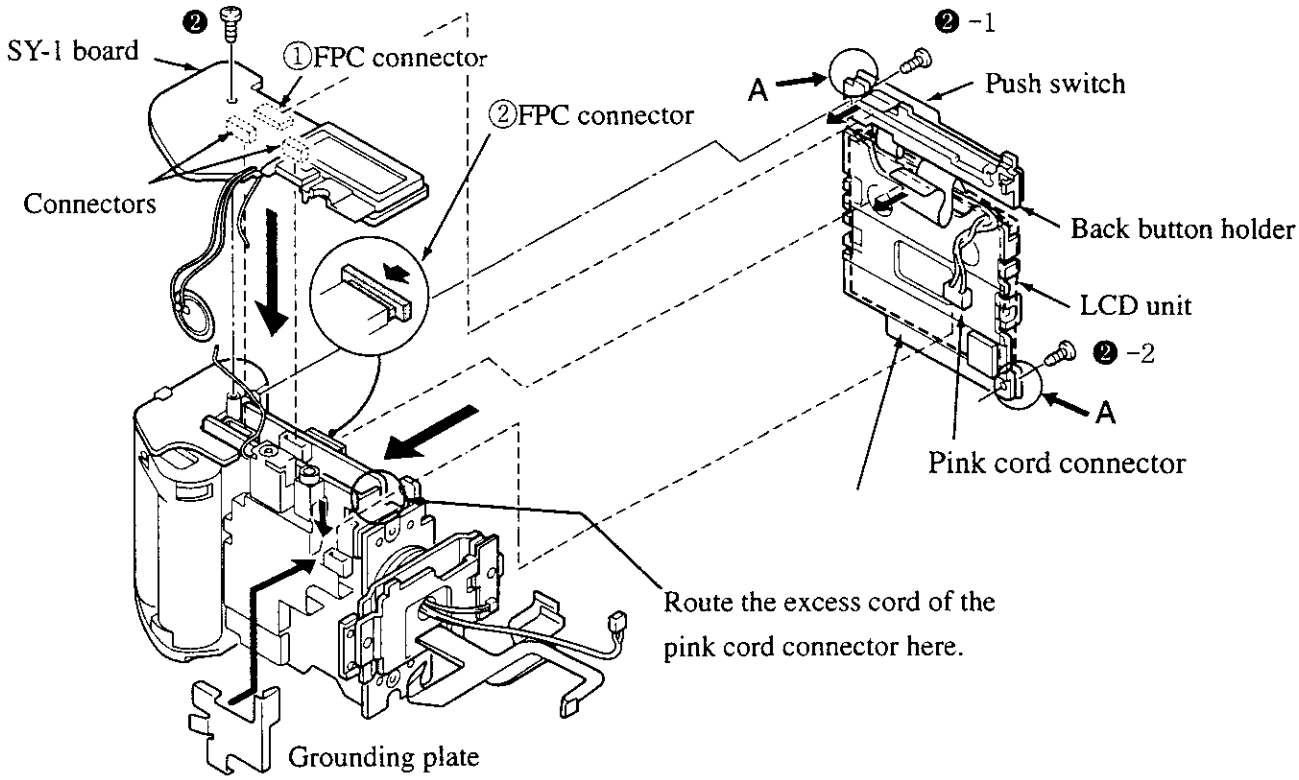


Pass the FPC through the LCD holder boss.



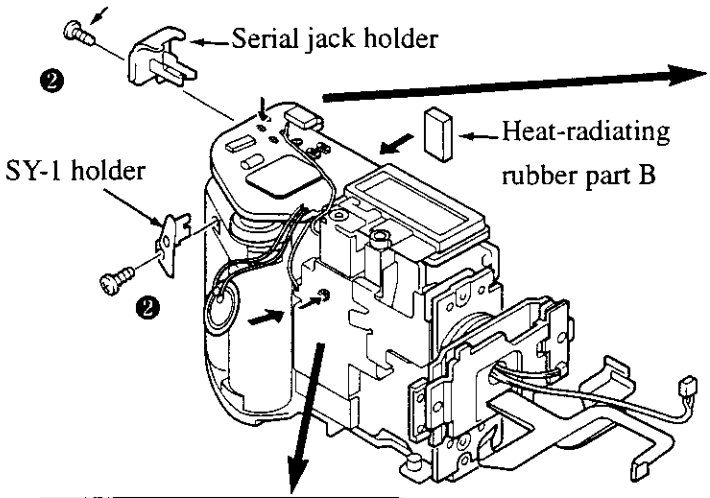
- Assemble the joint unit into the camera body, and attach using the hook and three ❷ screws.
- Connect the two FPC connectors and two cord connectors.
- Adhere the X part of the shielding tape to the joint.

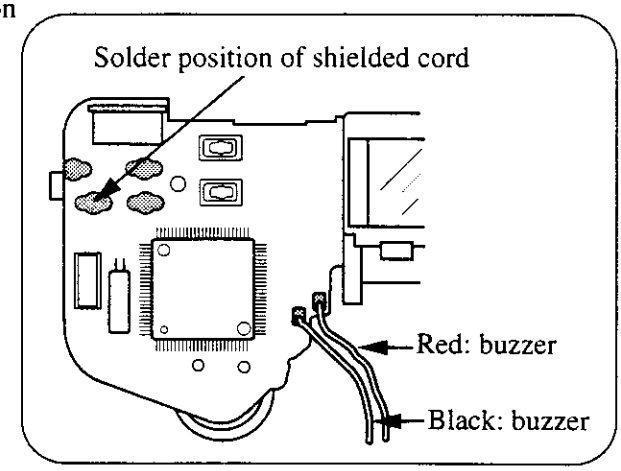
5. SY-1 board, LCD unit, LCD monitor holder, back button holder



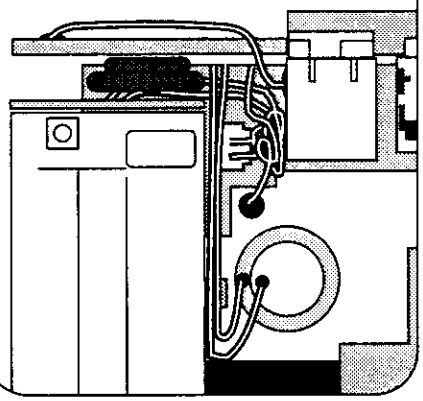
- Mount the LCD unit, LCD monitor holder, back button holder and push switch assembly into the camera body using the ❷-2 screw.
- Connect the pink cord connector and ② FPC connector.
- Mount the SY-1 board onto the camera body using the ❷ screw.
- Mount the back button holder onto the camera body using the ❷-1 screw.
- Connect the ① FPC connector, and adhere the push switch at the two area A locations.
- Mount the grounding plate.

❷screw to be discontinued midway through mass production



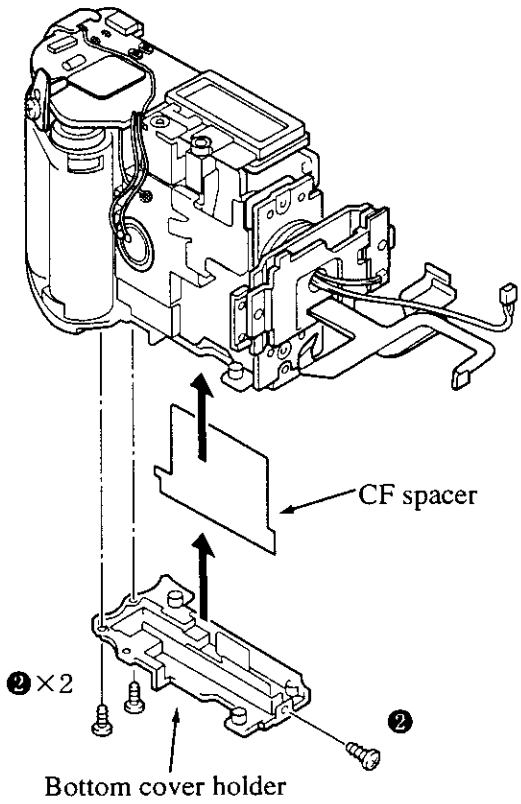


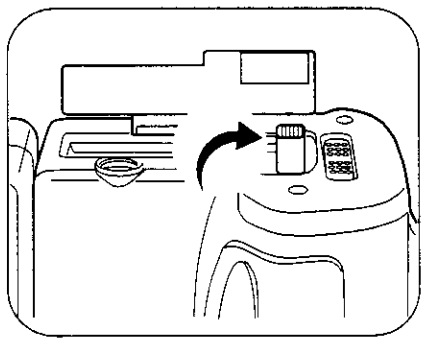
How to adhere the buzzer and solder position of shielded cord



- Adhere the buzzer to the camera body.
- Solder the shielded cord at the two locations.
- Attach the SY-1 holder to the camera body using the ❷ screw.
- Attach the serial jack holder.
- Attach the ❷ screw.

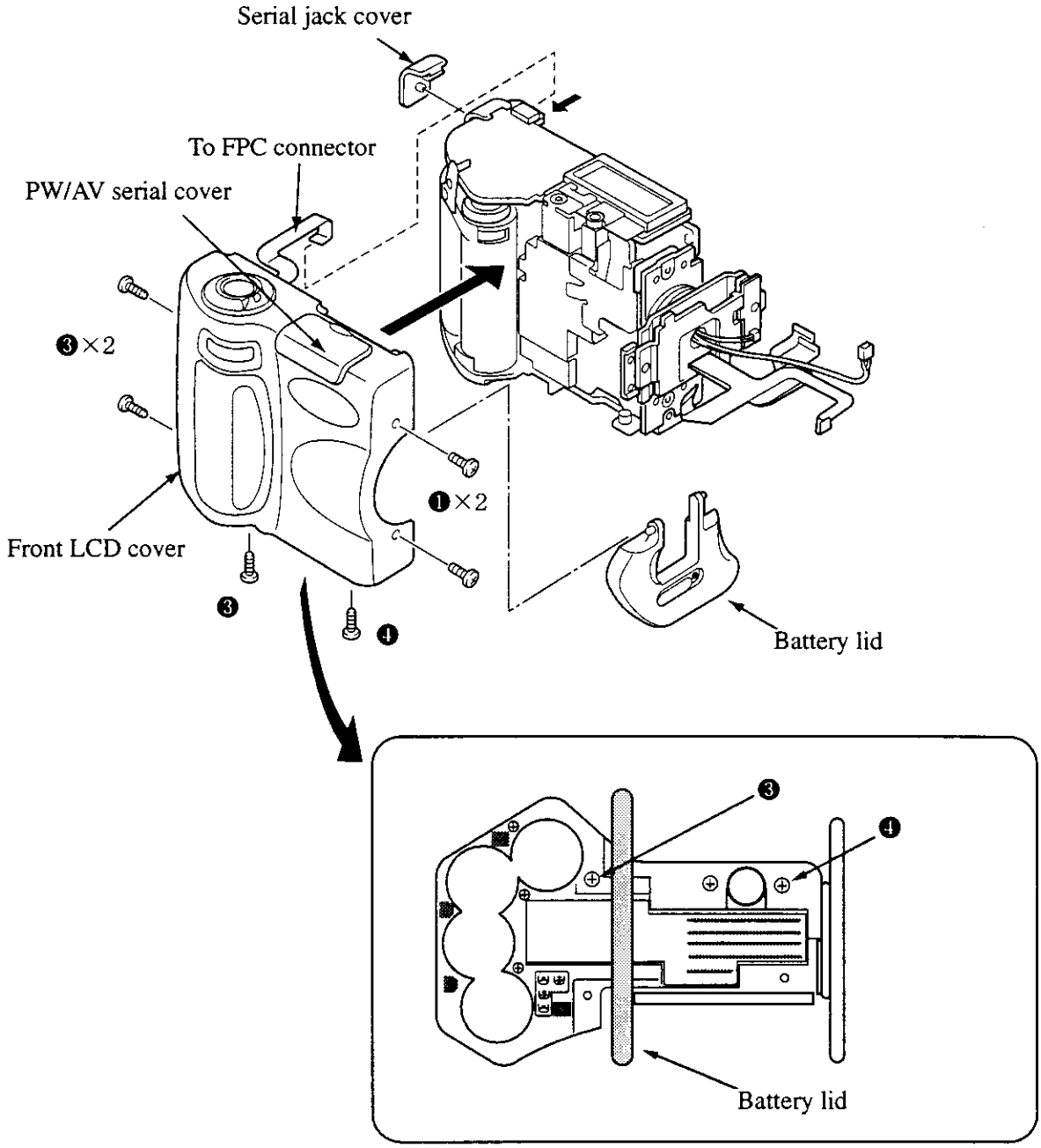
6. Bottom cover holder





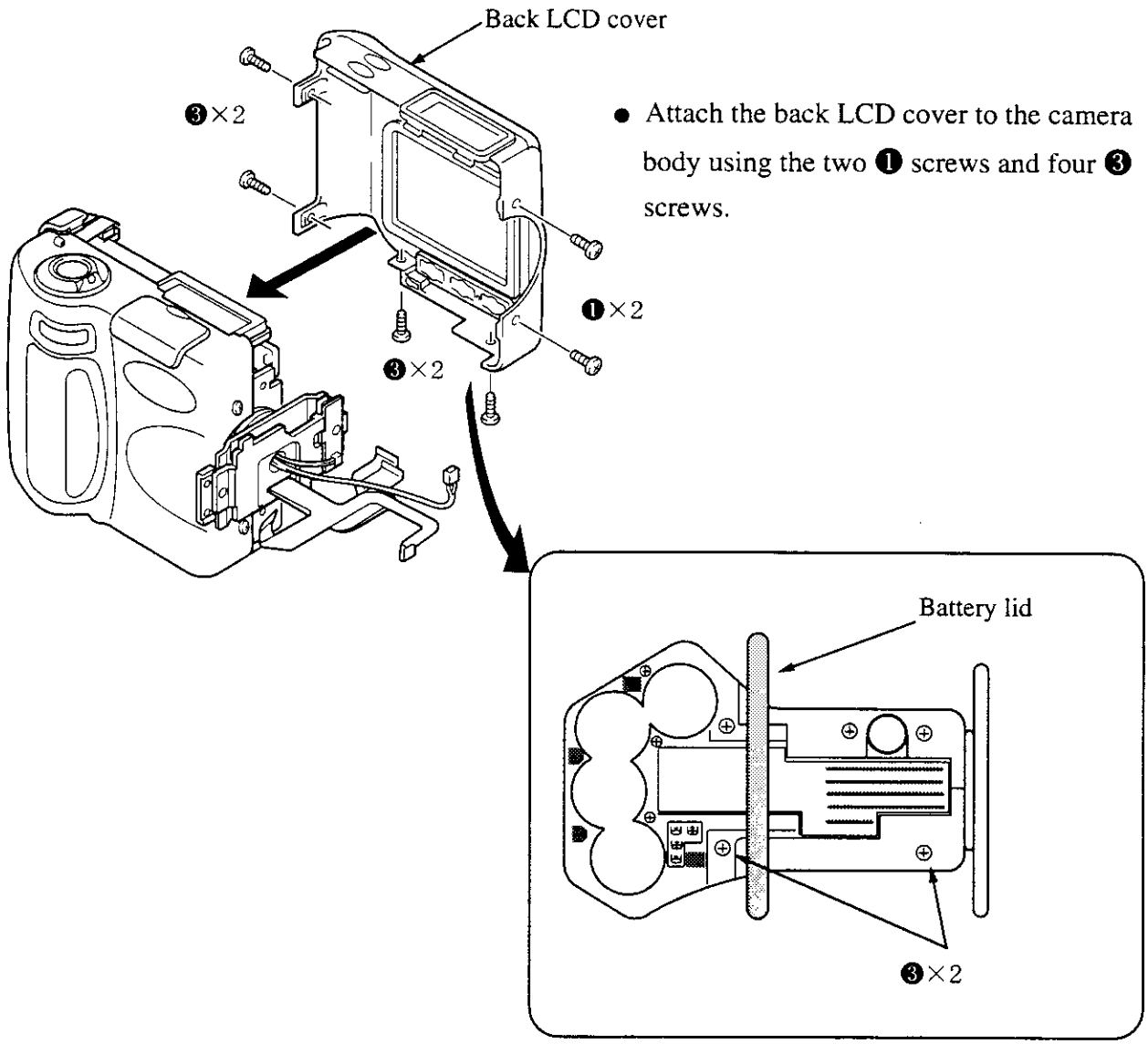
- Assemble the CF spacer into the camera body.
- Raise the compact flash card eject lever.
- Mount the bottom cover holder to the camera body using the three ❷ screws.

7. Front LCD cover



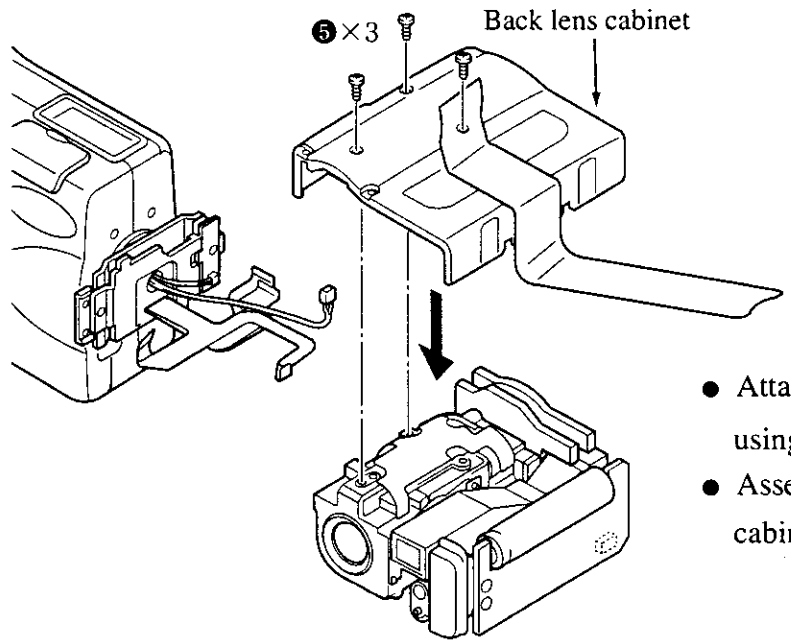
- Attach the serial jack cover to the camera body.
- While assembling the battery lid into the front LCD cover, attach the front LCD cover to the camera body using the two ❶ screws, three ❸ screws and ❹ screw.
- Connect the FPC connector.
- Check that the PW/AV serial cover opens and closes properly.

8. Back LCD cover

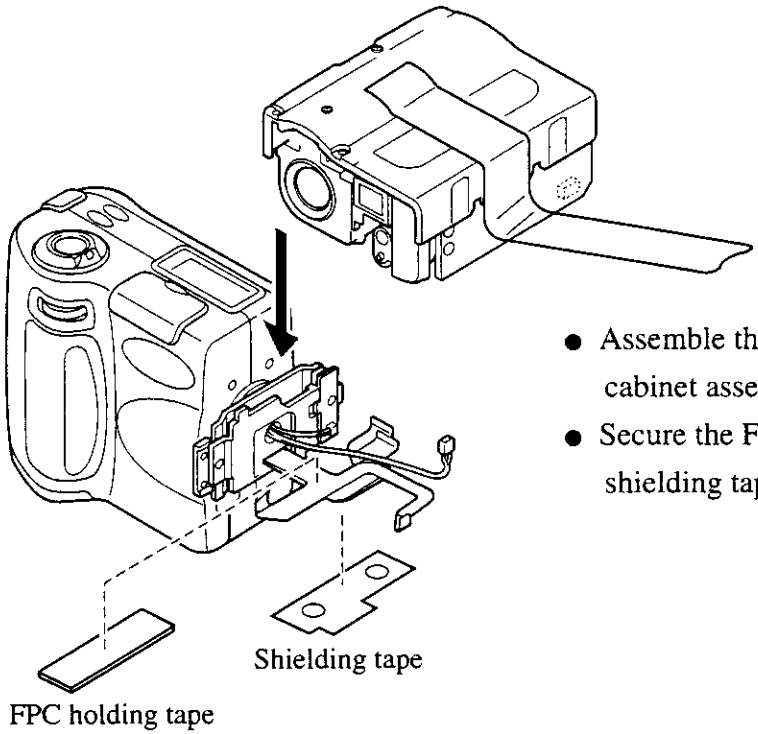


- Attach the back LCD cover to the camera body using the two ❶ screws and four ❸ screws.

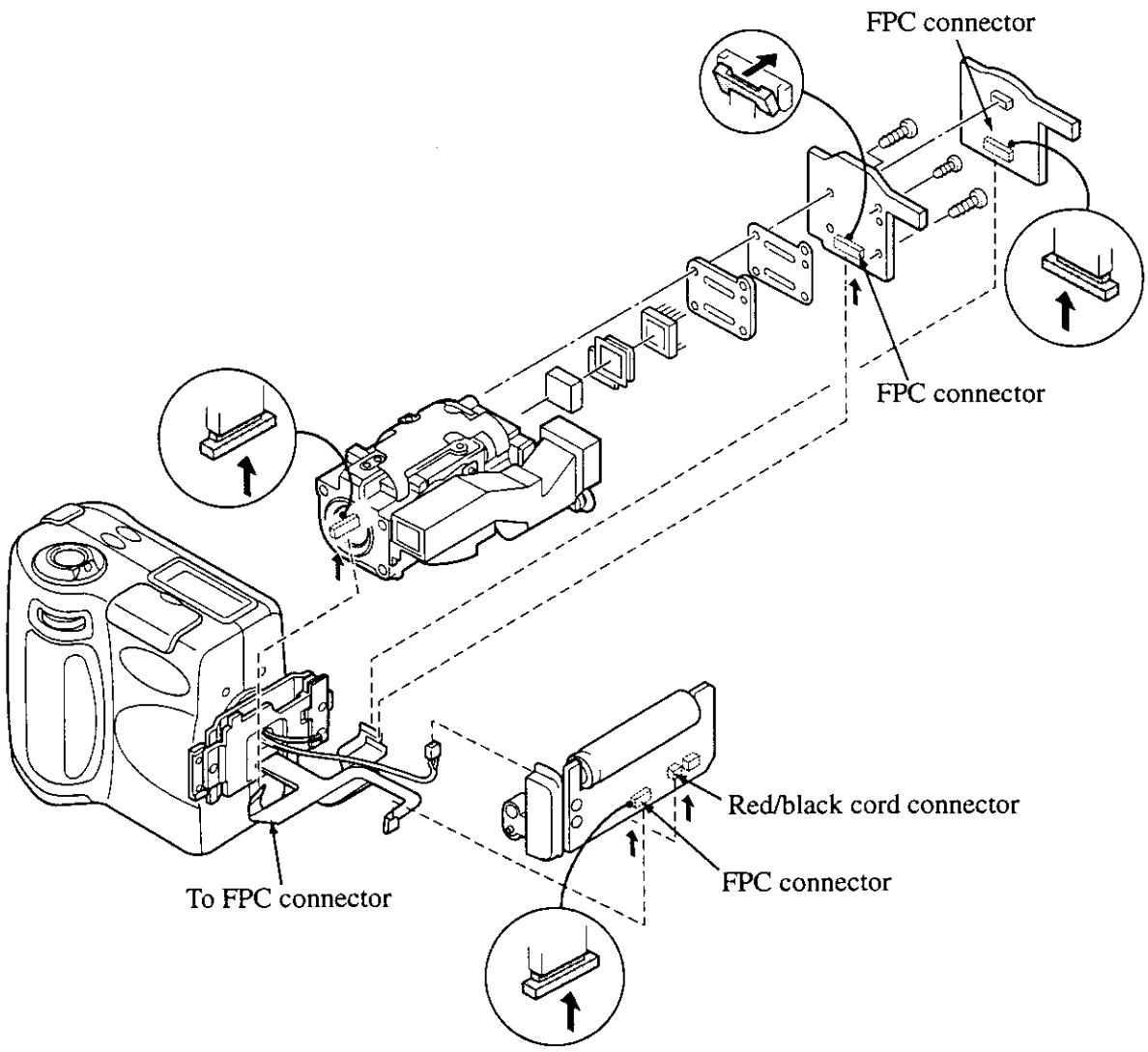
9. Flash unit, optical unit, back lens cabinet



- Attach the optical unit to the back lens cabinet using the three ❺ screws.
- Assemble the flash unit into the back lens cabinet.

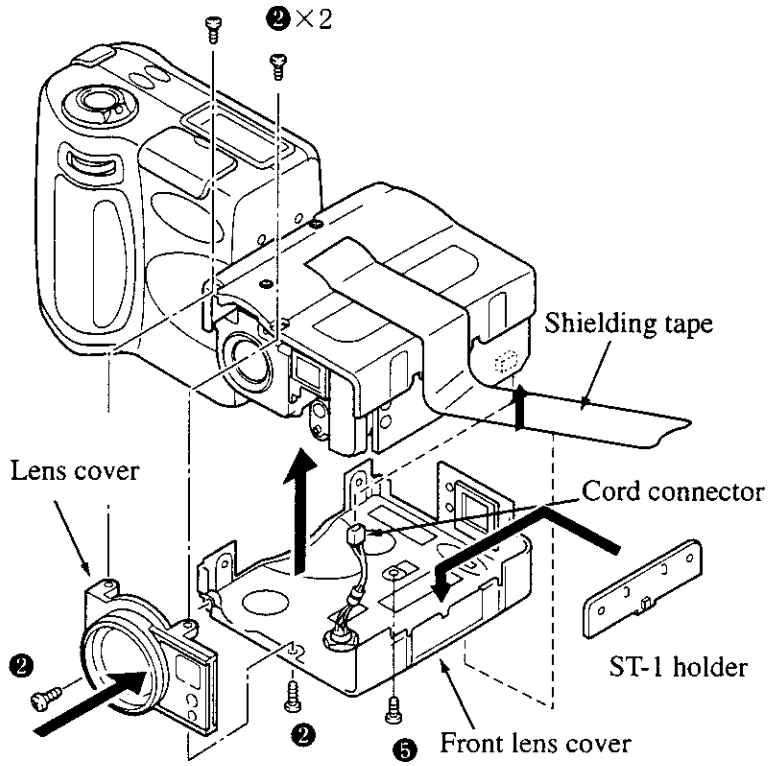


- Assemble the flash unit, optical unit and back lens cabinet assembly into the camera body.
- Secure the FPC using the FPC holding tape and shielding tape.



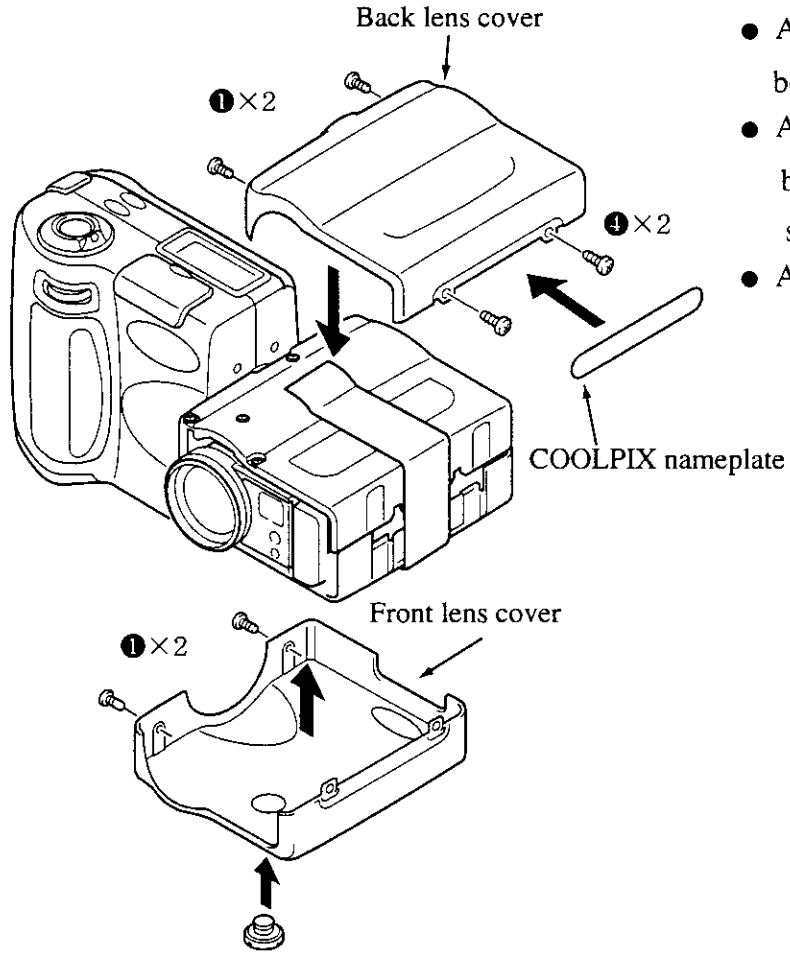
- Connect the FPCs and red/black cord connector to their respective connectors (x5).

10. Lens cover, front lens cover



- Assemble the ST1 holder into the camera body.
- Connect the cord connector.
- Attach the front lens cover to the camera body using the ❺ screw.
- Adhere the shielding tape.
- Attach the lens cover to the camera body using the four ❷ screws.

11. Back lens cover, front lens cover



- Attach the front lens cover to the camera body using the two ❶ screws.
- Attach the back lens cover to the camera body using the two ❹ screws and two ❶ screws.
- Adhere the COOLPIX nameplate.

ELECTRICAL ADJUSTMENT

1. Equipment

- OscilloscopeIBM R compatible PC
- AC adaptor (EH-30)
- IBM®R 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.

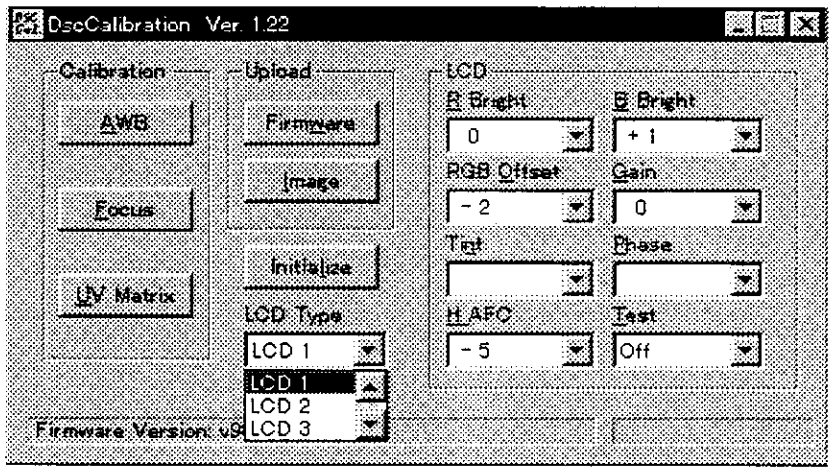
4. Calibration software

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

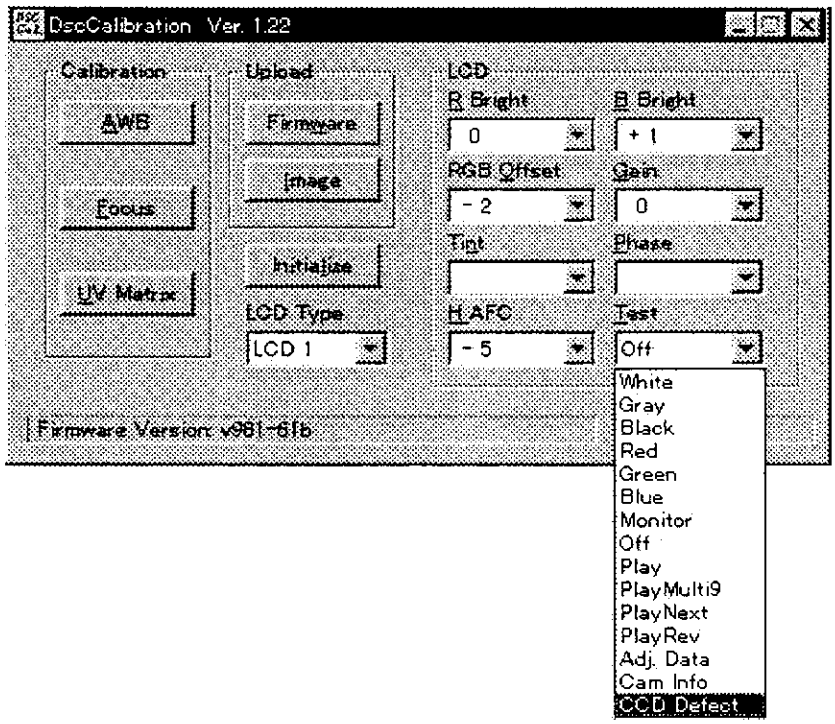
- For adjusting [10. LCD Panel Adjustment], select the camera's LCD type.

*LCD1 for E950

*LCD2 for E700



< F I G – 1 >



< F I G – 2 >

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

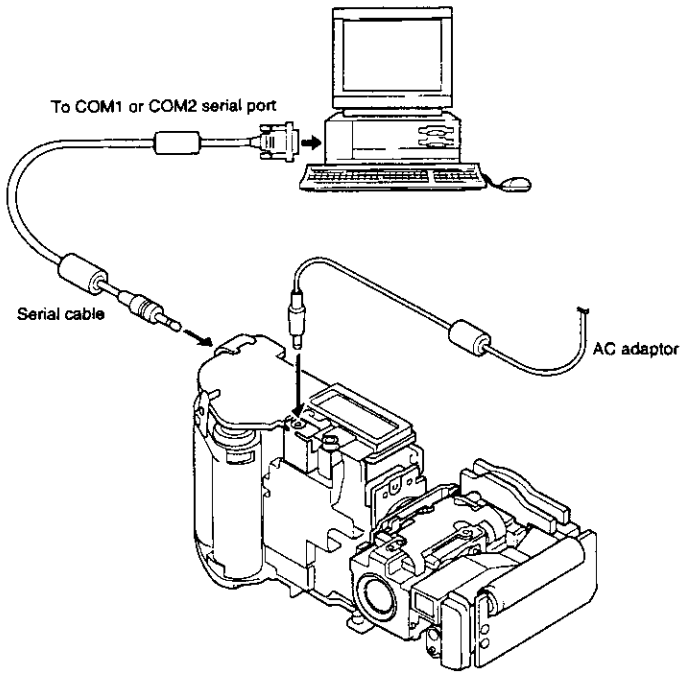
⑥Adjustment items required at replacement of parts

	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	×	×	×	×	×
Lens Unit	○	○	○	○	×
CCD	○	○	○	○	×
Optical filter	○	○	○	○	×

○ : Adjustment required × : Adjustment not required

6. Connecting the camera to the computer

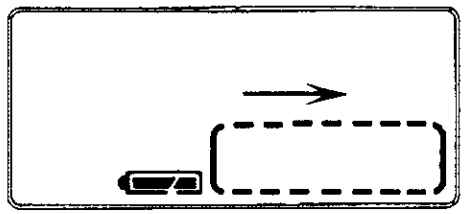
- Turn off both camera and computer.
- Locate the port cover on the side of the camera. Press on the arrows and slide the cover down to open it.
- Line up the arrow on the cable connector with the notch on the camera's serial port. Insert the connector.
- Locate a serial port on the back of your computer. 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)

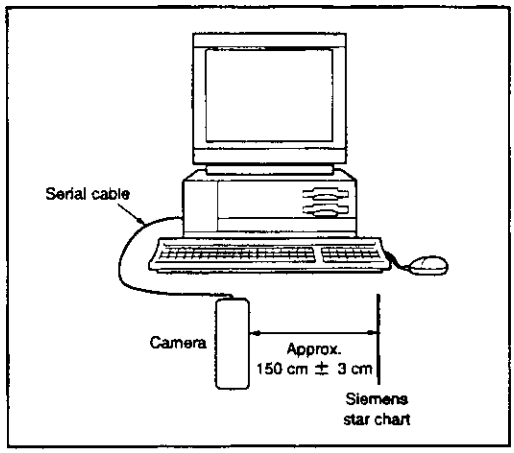
[Adjustment condition]

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

[Adjustment method]

- Double-click on the DscCalV122.
- 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 DscCalV122.
- Select the CCD Defect from Test menu of Calibration Soft and click the OK.
- After adjustment, An adjustment value will appear on the screen.

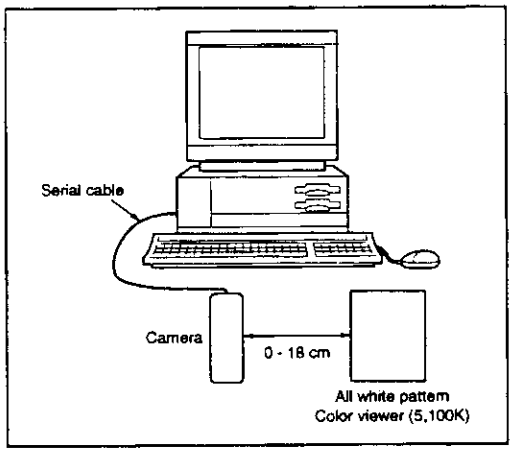
10. AWB Adjustment

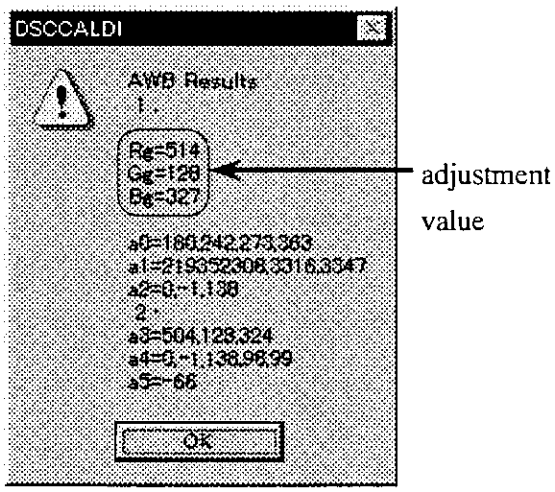
[Preparation]

- 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 DscCalV122.
- Click the AWB, and click the Yes.
- AWB adjustment value will appear on the screen.
(AGC3 adjustment value is 1019-1024 indicates an error.)
- Click 'OK'.





11. Color Matrix Adjust ment

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

[Preparation]

- POWER switch: ON

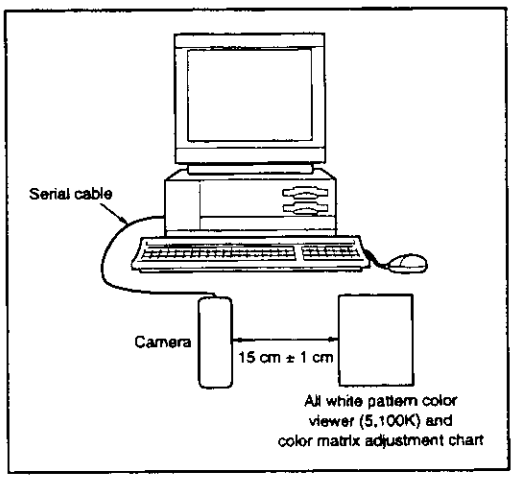
[Adjustment condition]

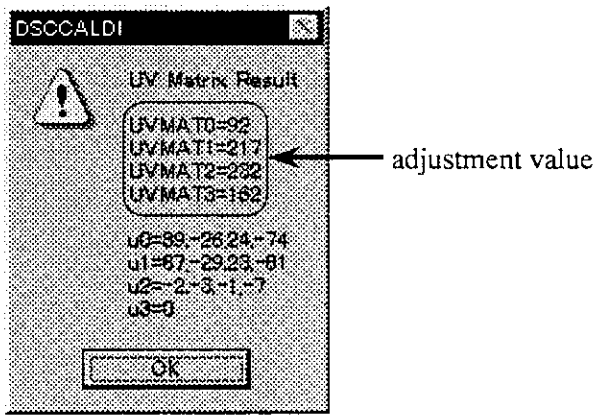
- Set the color adjustment chart to the color viewer.
  (Do not enter any light.)
- Set the siemens star chart so that it becomes center of the screen.

[Adjustment method]

- Double-click on the DscCalV122.
- Click the UV Matrix, and Click 'Yes'.
- Four color matrix (UVMAT0, UVMAT1, UVMAT2 and UVMAT3) adjustment value will appear on the screen.
- Click 'OK'.

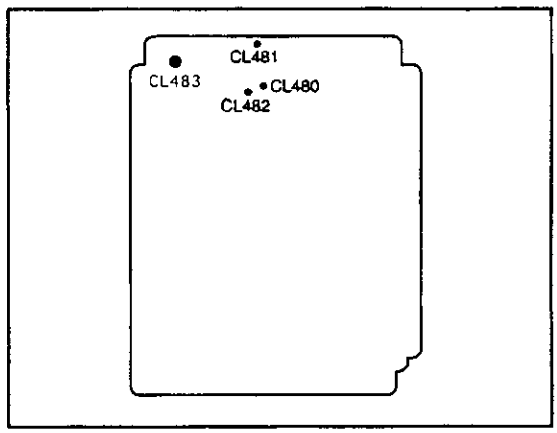
Note : The criteria for the adjustment value is from 0 to 255.
In any adjustment error cases, each value from UVMAT0 to UVMAT3 after adjustment turns to 1.





12. LCD Panel Adjustment

[CA3 board (Side B)]



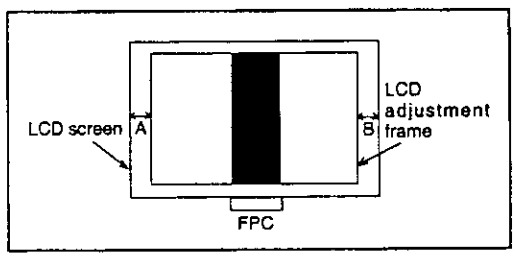
12-1. LCD H AFC Adjustment

[Preparation]

- POWER switch: ON

[Adjustment method]

- Double-click on the DscCalV122.
- Check that the "LCD Type" is set to "LCD1". (refer to the FIG-1)
- 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.



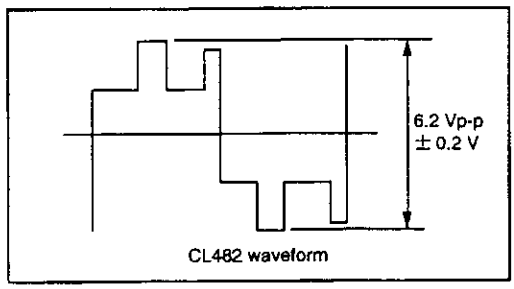
12-2. LCD RGB Offset Adjustment

[Preparation]

- Draw out four lead wires from each point, and then connect them with the oscilloscope.
  Setting of oscilloscope : 1V/DIV, 20 μ sec/DIV (GND : CL483)

[Adjustment method]

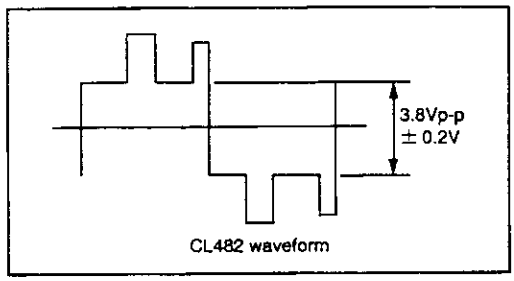
- Adjust LCD "RGB offset" so that the amplitude of the CL482 waveform is 6.2 Vp-p Å} 0.2 V.



12-3. LCD Gain Adjustment

[Adjustment method]

- Adjust LCD "Gain" so that the amplitude of the CL482 wave form is 3.8 Vp-p ± 0.2 V.
  Note : LCD RGB Offset adjustment should always be carried out first.

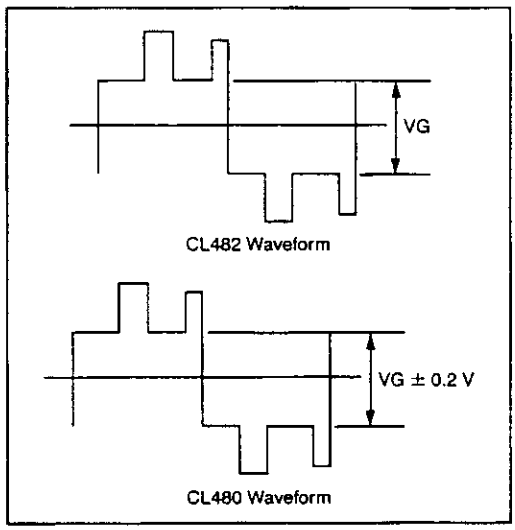


12-4. LCD Blue Brightness Adjustment

[Adjustment method]

- Adjust LCD "B Bright" so that the amplitude of the CL480 waveform is ± 0.2 V with respect to the CL482 (VG) wave-form.

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

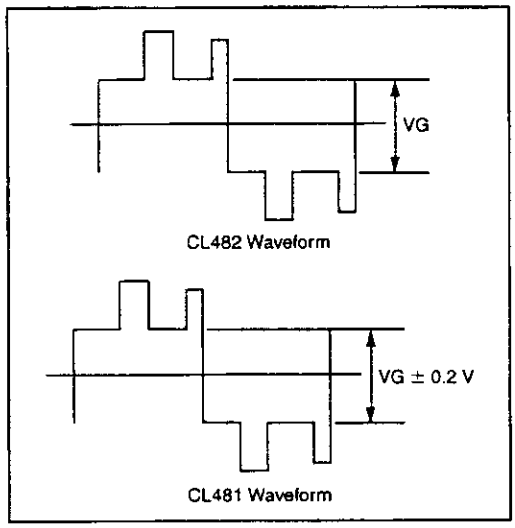


12-5. LCD Red Brightness Adjustment

[Adjustment method]

- Adjust LCD "R Bright" so that the amplitude of the CL481 waveform is ± 0.2 V with respect to the CL482 (VG) waveform.

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

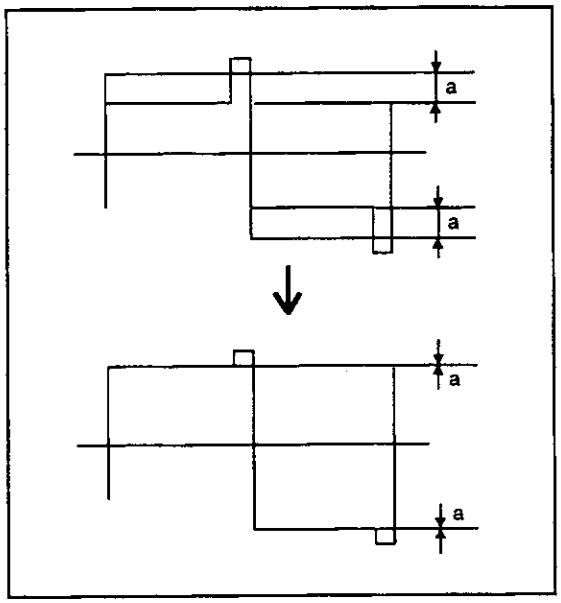


12-6. LCD TINT Adjustment (for PAL)

[Adjustment method]

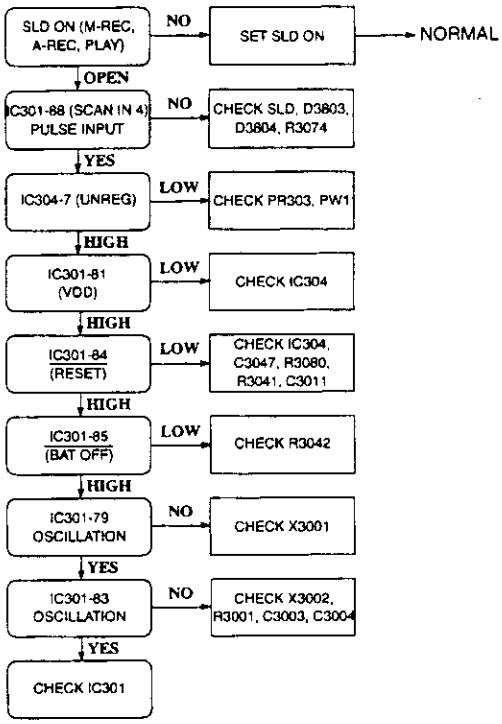
Adjust LCD "Tint" so that the amplitude of CL482 waveform is minimum.

Note : LCD TINT adjustment should always be carried out last.

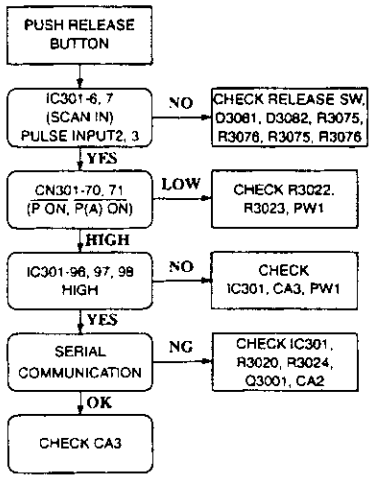


13. Trouble Shooting Guide

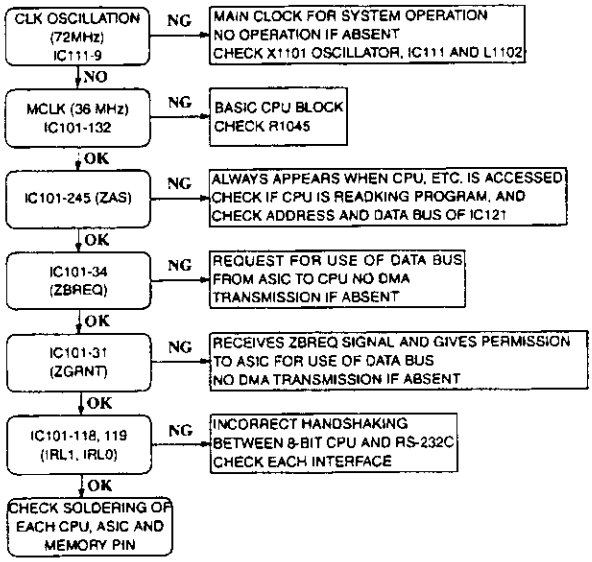
POWER LOSS INOPERTIVE



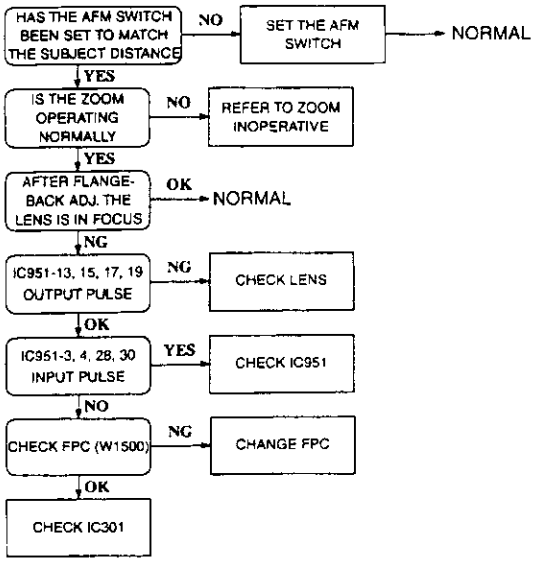
TAKING INOPERATIVE



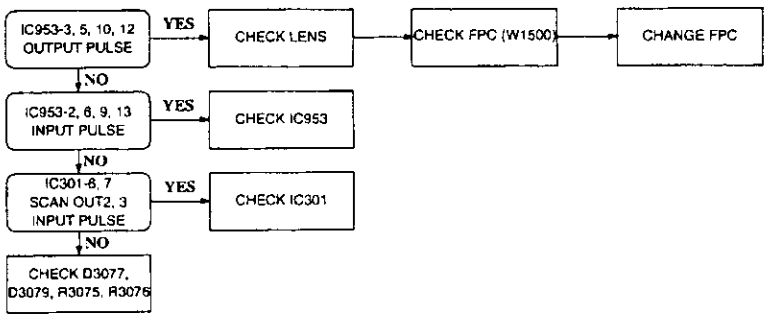
NO PICTURE



FOCUS INOPERATIVE



FOCUS INOPERATIVE



Outline of Circuit description

1. OUTLINE OF CIRCUIT DESCRIPTION

1-1. CA1 CIRCUIT DESCRIPTION

1. IC Configuration

IC903 (ICX224AK) CCD imager

IC902 (74ACT04MTC) H driver

IC904 (CXD1267AN) V driver

IC907 (CXA1267AN) V driver

2. IC903 (CCD)

[Structure]

Interline type CCD image sensor

Optical size 1/2.7 inch format

Effective pixels 1636 (H) x 1236 (V)

Pixels in total 1688 (H) x 1248 (V)

Optical black

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

Vertical (V) direction: Front 10 pixels, Rear 2 pixels

Dummy bit number Horizontal : 28 Vertical :1

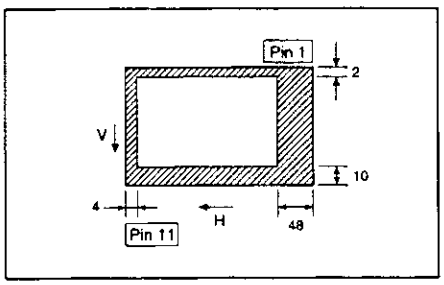


Fig. 1-1.Optical Black Location (Top View)

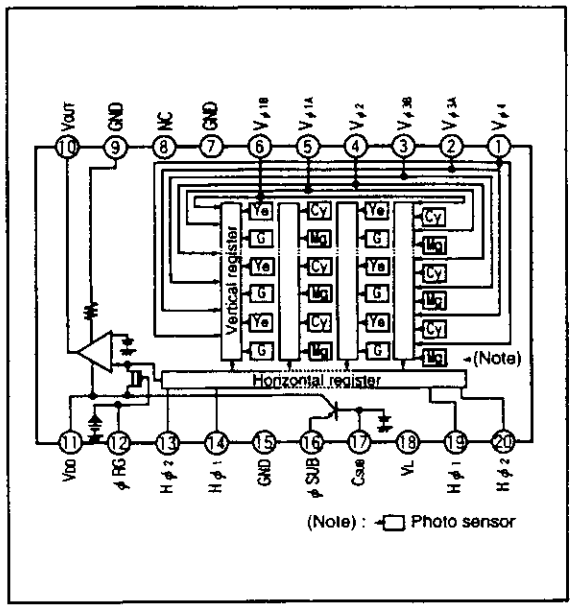


Fig. 1-2. CCD Block Diagram

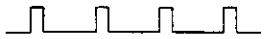
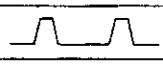
Pin No.	Symbol	Pin Description	Waveform	Voltage
1	$V\phi_4$	Vertical register transfer clock		-7.5 V, 0 V
2, 3	$V\phi_{3A}$, $V\phi_{3B}$	Vertical register transfer clock		-7.5 V, 0 V, 15 V
4	$V\phi_2$	Vertical register transfer clock		-7.5 V, 0 V
5, 6	$V\phi_{1A}$, $V\phi_{1B}$	Vertical register transfer clock		-7.5 V, 0 V, 15 V
7, 9	GND	GND	GND	0 V
10	V_{OUT}	Signal output		Aprox. 10 V
11	V_{DD}	Circuit power	DC	15 V
12	ϕ 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	ϕ 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, IC907 (V Driver)

An H driver (IC902) and V driver (IC904 and IC907) 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 and IC907 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.

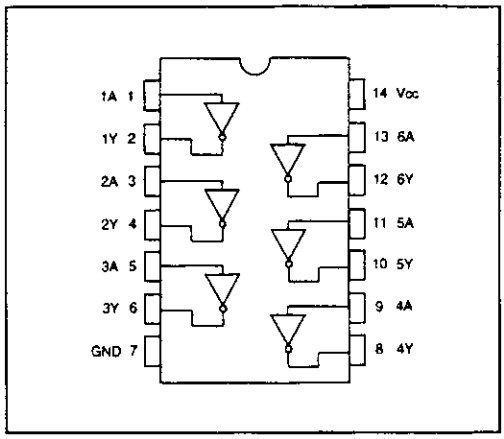


Fig. 1-3. IC902 Block Diagram

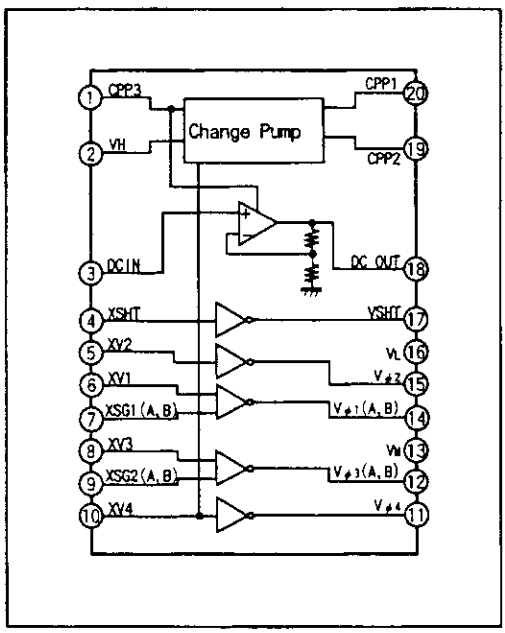


Fig. 1-4. IC904 and IC907 Block Diagram

1-2. CA2 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. 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.

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 sued 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 pixel CCD control.

1-7. Digital encorder

It generates chroma signal from color difference signal.

1-8. JPEG control

It is compressed and elongated the data.

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 É¡ 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 memery to the SDRAM, and the data elongated by inside ASIC is displayed over the SDRAM display area.

3. LCD Block

LCD Block is in the PW1 board, and it is constructed by LCD driver (IC171).

The two analog 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.

1-3. PW1 CIRCUIT DESCRIPTION

1. Outline

This is the main power circuit, and is comprised of the following blocks.
Switching controller (IC501)
Digital 5 V and analog system power output (T5001, Q5001)
Digital 3.4 V system power supply (Q5007)
LCD system power supply (Q5008, T5002)
Backlight power supply output (Q5013, T5003)

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 four built-in channels, only CH1 (digital 5 V, analog system), CH3 (LCD system), CH2 (digital 3.4 V) and CH4 (backlight) are used. Feedback from 5.1 V (D) (CH1), 3.4 V (D) (CH2) , 5.3 V (L) (CH3) and 6.3-8.9 V (L) (CH4) power supply outputs are received, and the PWM duty is varied so that each one is maintained at the correct voltage setting level.

2-1. Short-circuit protection circuit

If output is short-circuited for the length of time (aprox. 120 ms) 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.

3. Digital 5 V and Analog System Power Output

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

4. Digital 3.4 V System Power Output

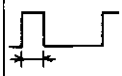
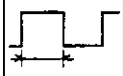
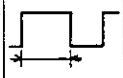
3.4 V (D) is output. Feedback is provided to the swiching controller (Pin (26) of IC501) so that PWM control can be carried out.

5. LCD System Power Output

5.3 V (L), 12.4 V (L) and 15 V (L) are output. Feedback for the 5.3 V (L) is provided to the switching controller (Pin (11) of IC501) so that PWM control can be carried out.

6. Backlight Power Supply output

The power which is input to the inverter transformer (T5003) is controlled by means of Q5013, and 6.3 V, 6.9 V, 7.5 V or 8.9 V is output depending on the luminance mode of the LCD panel.

	High luminance mode	Normal luminance mode	Low luminance mode	1 second after backlight illumination
Backlight output voltage	7.5 V	6.9 V	6.3 V	8.9 V
Inverter clock duty (R3175)	 15% 9.5 µs	 22% 13.9 µs	 29% 18.4 µs	"L" level

7. Lens Motor Circuit Description

The four pulses with differing phases (ZOOM IN1, ZOOM IN2, ZOOM IN3, ZOOM 1N4) which are output from the 8-bit microprocessor are converted to drive pulses (ZOUT1, ZOUT2, ZOUT3 and ZOUT4) by the motor driver (IC953), and they are then used to drive the zoom motor.

The focusing motor drive clock (FM CKO) which is output from the 8-bit microprocessor is used to create the drive signals (FA1, FA2, FB1 and FB2) from other signals such as the drive direction signal (FM CW), and these drive signals are then used to drive the focusing motor in micro-steps.

Furthermore, detection of the standard motor position is carried out by an 8-bit microprocessor which monitors the variations in output from the two sensors (photo interrupters) inside the lens unit.

Detection of the standard zoom position -> ZOOM PI output

Detection of the standard focus position -> FM PI output

The shutter drive signals (IN1 and IN2) which are output from the ASIC (IC102) are converted into drive pulses by the motor driver (IC952), and they are then used to drive the shutter motor. Furthermore, the aperture drive signals (IN3 and IN4) which are output from the 8-bit microprocessor are converted into drive pulses (IOUT3 and IOUT4) by the motor driver (IC952), and they are then used to drive the aperture motor.

1-4. STROBE CIRCUIT DESCRIPTION

1. Charging Circuit

When the power supply and the charging control signal (OSC) are supplied to the charging circuit (VB1), the main condenser (C6) becomes charged with a direct-current voltage. The charged condition can be monitored by monitoring a voltage which is 1/100 ths of the charged voltage by means of the charged voltage monitoring signal (RY).

1-1. Power switch cirucuit

When the OSC is Hi, Q1 turns ON and power is supplied to the step-up circuit. The power supply is then switched off by means of a stop signal sent from the overcharging prevention circuit.

1-2. Power supply filter circuit

C1 acts as a power supply filter to smooth current ripples caused by the switching of the transformer (T1).

1-3. Step-up circuit

When power is supplied to this circuit, an oscillating pulse with a frequency of about 60 kHz is generated. The low-voltage alternating current voltage resulting from this pulse is input to the primary side of T1, causing a high-voltage alternating current voltage to be induced at the secondary side of T1.

1-4. Rectifier circuit

This circuit rectifies the high-voltage alternating current voltage generated by the step-up circuit into a high-voltage direct current voltage which is then used to charge C6.

1-5. Overcharging prevention circuit

C6 is charged continuously as long as the OSC signal is still being sent. When the charged voltage reaches about 335 V (at normal temperature), a stop signal is output to the power supply switching circuit.

1-6. Charged voltage monitoring circuit

This circuit splits the C6 charging voltage to obtain a voltage which is 1/100th of the charged voltage. RY is only used to effect while power is being supplied to the step-up circuit.

2. Light emission circuit

When C6 is charged to a voltage of 260 V or higher (at normal temperature), the stroboscope emits light when the trigger signal (TRG) is input.

2-1. Emission control circuit

When the TRG switches to Hi, Q5 (Q6) turns on. When this happens, a light emission signal is sent to the trigger generation circuit, IGBT (IT1) gate voltage is supplied and a light emission start signal is output to the dimmer circuit. In addition, the light stop signal from the dimmer circuit causes RQ2 to turn on, and the IT1 gate voltage is interrupted. When EX is Hi, Q5 (Q6) turns on and a dimming start signal is output to the dimmer circuit. At this time, the stroboscope is prevented from emitting light.Furthermore, if an external stroboscope is connected to the light amplification connector in either of these cases, light emitted via RQ4 Æ RQ3 Æ SCR2 and the light stop signal from the dimmer circuit cause RQ5 to turn on, so that no light is emitted from the external stroboscope which is connected to the light amplification connector.

2-2. Trigger generation circuit

When a light emission signal is input from the light emission control circuit, IGBT (IT1) turns on and at the same time SCR1 of the trigger circuit turns on. When SCR1 is on, the electrical

charge which has accumulated in C7 is discharged by the trigger coil (T2), and a high voltage of about 5 kV is applied to the Xenon tube which is connected to secondary side of T2.

2-3. Xenon tube

When the high-voltage pulse from the trigger generation circuit is applied to the xenon tube, the charge which has been accumulated by C6 is discharged inside the xenon tube, and light is emitted.

3. Dimmer circuit

When the dimmer sensor detects that the stroboscope has emitted the specified amount of light, the dimmer circuit outputs an emission stop signal which is sent to the light emission circuit. The dimmer amount is determined by means of the analog voltage of the dimmer amount adjustment signal A (F-A) and by digital control from the dimmer amount adjustment signal D (F-D).

3-1. Emission control circuit

When the dimmer start signal (the power supplied to the dimmer circuit) is input, to this circuit, power is then supplied to the dimmer sensor. The comparator (IC1) judges when the optical current from the dimmer sensor has reached the specified level, and then outputs an emission stop signal.

The judgement voltage at the comparator is determined by F-A. Furthermore, F-D is used to change the capacities of the condensers (C11 and C12) in two steps in order to carry out voltage conversion of the optical current.

3-2. Emission sensor

This sensor generates an optical current in accordance with the amount of light input.

3-3. VR1

V1 is used to make fine adjustments so that the dimmer value becomes F2.55 ± 0.5 EV when F-D is Lo and F-A is 5 V, and so that it becomes F11.7 ± 0.5 EV when F-D is Hi and F-A is 5V. However, when F-D is Hi, check that D = 0.7 m.

(The dimmer value F is defined as the value at a distance of 1 m from a sheet of Oxford Gray standard reflecting paper with a reflection ratio of 18 %, converted in accordance with ISO 100.)

Lo: 0-0.5 V

Hi: 2.5-3.5 V

Beware of electric shocks.

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. Storobe 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	Temparature detection (analog input)	
3	CHG VOL	I	Storobe charge voltage input (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	$\overline{\text{FINDER LED1}}$	O	Finder LED 1 (red) drive	L : LED light
11	$\overline{\text{FINDER LED2}}$	O	Finder LED 2 (green) drive	L : LED light
12	VSS	-	GND	
13	FM RESETB	O	Focusing motor drive phase reset signal	
14	FM MOB	I	Focusing motor drive phase monitor 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 lump light emission drive	H : Lump light
21	BUZZER	O	Buzzer output	
22	CHG ON	O	Strobe charge ON/OFF signal	H : ON
23-25	COM0-2	O	Mode LCD common output	
26	NOT USED	O	-	
27	BIAS	-	Mode LCD drive power supply (connect to VLCO terminal)	
28-30	VLC0-2	-	Mode LCD power input terminal (outside resister connection)	
31	VSS	-	GND	
32-52	S1-S21	O	LCD segment output 1-21	
53-55	NOT USED	O	-	
56	$\overline{\text{DCINCHK}}$	I	Outside DC power detection	L : AC adaptor
57	$\overline{\text{PICTL}}$	O	Photo interaptor ON/OFF control	L : ON
58-59	IN3-4	O	Iris drive signal 1-2	
60-63	ZOOM IN4-1	O	Zoom motor drive signal 4-1	
64	WAKE UP	O	SPARC wake up terminal	
65	$\overline{\text{ADVREF ON}}$	-	AD VREF ON/OFF signal	L : ON
66	CHG LIMIT	O	Strobe emit light control signal (F-D terminal)	
67	KKR A	I	Command dial terminal 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	$\overline{\text{DIN CONNECT}}$	I	PC cable connection detection	L : Connection
73	$\overline{\text{CARD}}$	I	Memory card detection	L : Attachment
74	$\overline{\text{V JACK}}$	I	Video cable connection detection	L : Connection

See next page →

Pin	Signal	I/O	Outline	
75	SI	I	Serial data input (←ASIC)	
76	SO	O	Serial data output (→ASIC)	
77	SCK	O	Serial clock output (→ASIC)	
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 termianl (32.768 kHz)	
83	XCOUT	O	Clock oscillation terminal	
84	$\overline{\text{RESET}}$	I	Reset input	
85	$\overline{\text{BAT OFF}}$	I	Battery OFF detection signal	
86	RXD	I	Host wake-up input terminal	L : OFF
87	$\overline{\text{SREQ}}$	I	Serial communication request signal	L : Serial request
88	SCAN IN4	I	Key matrix input (SLD ON detection)	
89	IRIS PSB	O	Iris motor maintenance power control signal	
90	KKR B	I	Command dial terminal B	
91-94	SCAN OUT0-3	O	Key matrix output	
95	LCD ON	O	D/D converter (LCD) ON/OFF signal	H : ON
96	$\overline{\text{ASIC TEST}}$	O	ASIC control signal	
97	$\overline{\text{ASIC RESET}}$	O	ASIC reset signal	L : Reset output
98	$\overline{\text{MAIN RESET}}$	O	SPARC reset signal	L : Reset output
99	AVSS	-	Analog GND input terminal	
100	BATTERY	I	Battery voltage input (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.

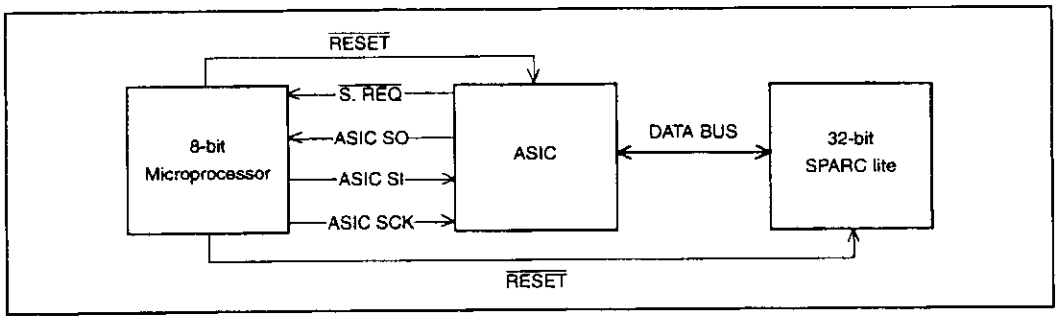


Fig. 4-1 Internal Bus Communication System

3. Key Operaiton

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

SCAN IN / SCAN OUT	0	1	2	3	4
0	AFM		SBS	TEST	SLD 1
1			SHUTTER 2nd	SHUTTER 1st	SLD 2
2	MENU	MTR	ZOOM UP	ZOOM DOWN	
3	LCD INVERSION SW	+/-	QSW	MODE	

Table 4-2. Key Operation

4. Power Supply Control

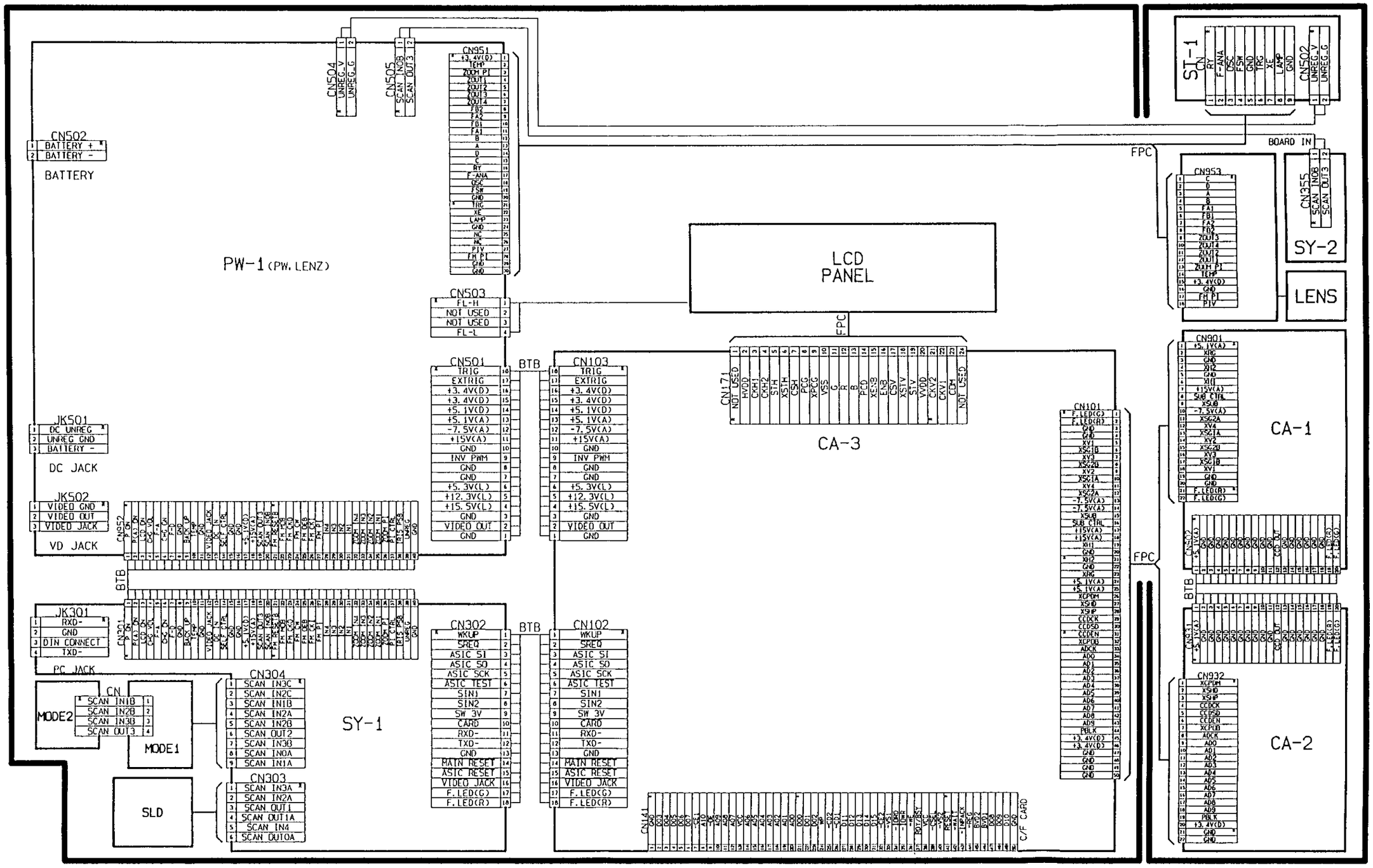
The 8-bit microprocessor controls the power supply for the overall system.

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 opererates in sleep mode using the backup lithum 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.

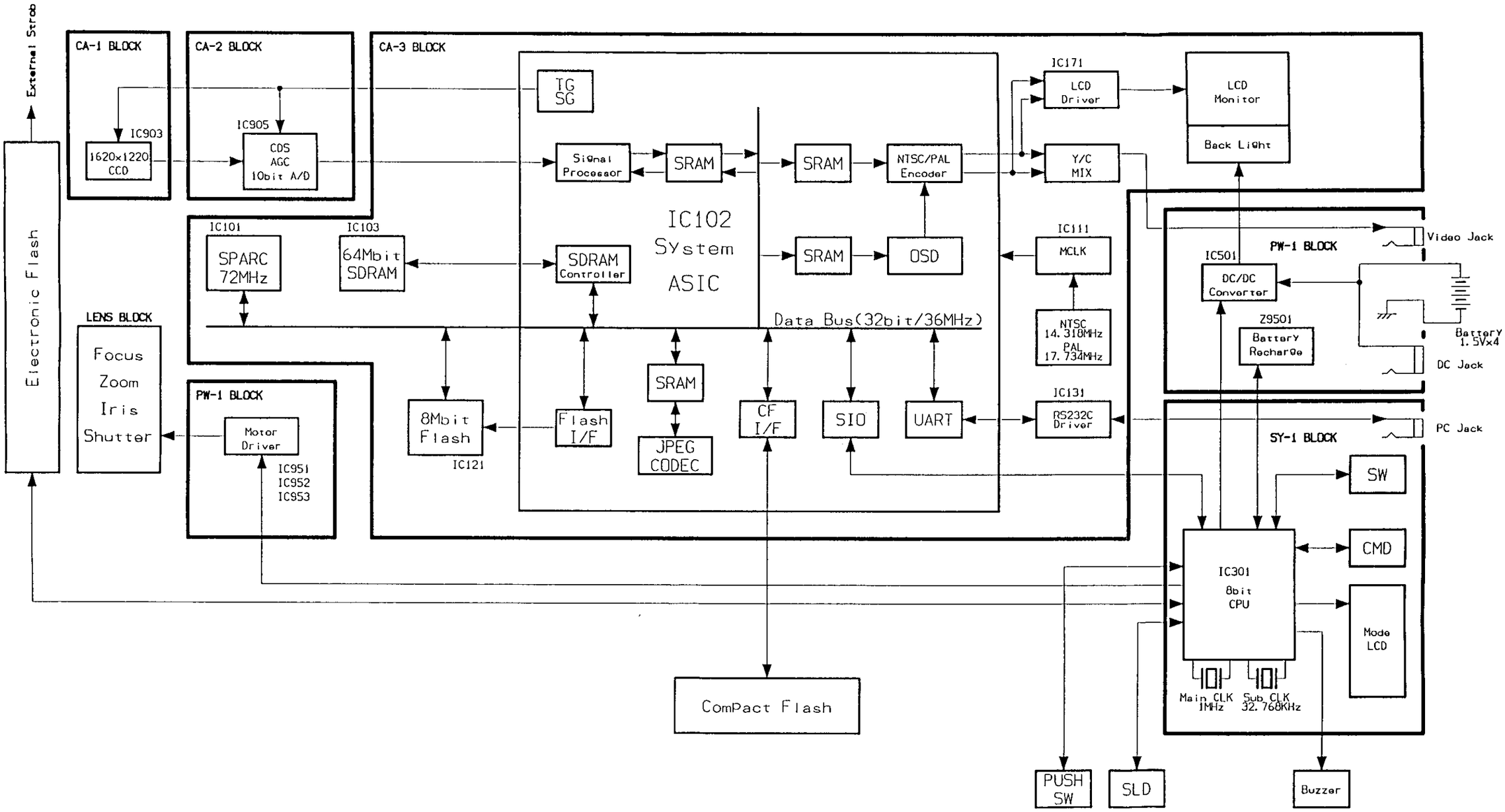
The 4-bit microprocessor first sets both the $\overline{\text{P (A) ON}}$ signal at pin (70) and the $\overline{\text{P ON}}$ signal at pin (71) to High, and then turns on the DC/DC converter. After this, High signals are output from pins (97) and (98) so that the ASIC and the SPARC lite are set to the active condition. If the LCD monitor is on, the $\overline{\text{LCD ON}}$ 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

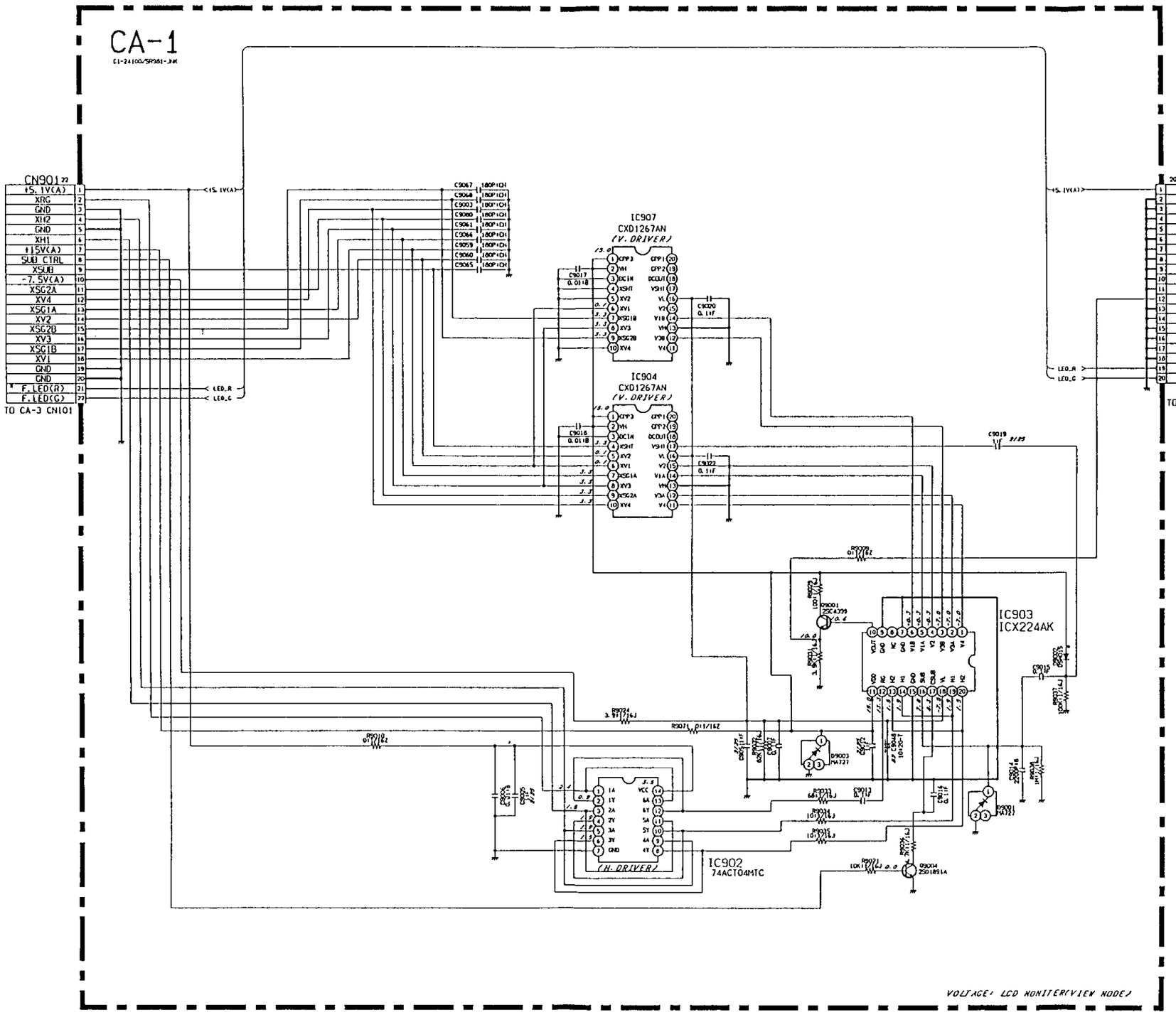
Table 4-3. Camera Mode



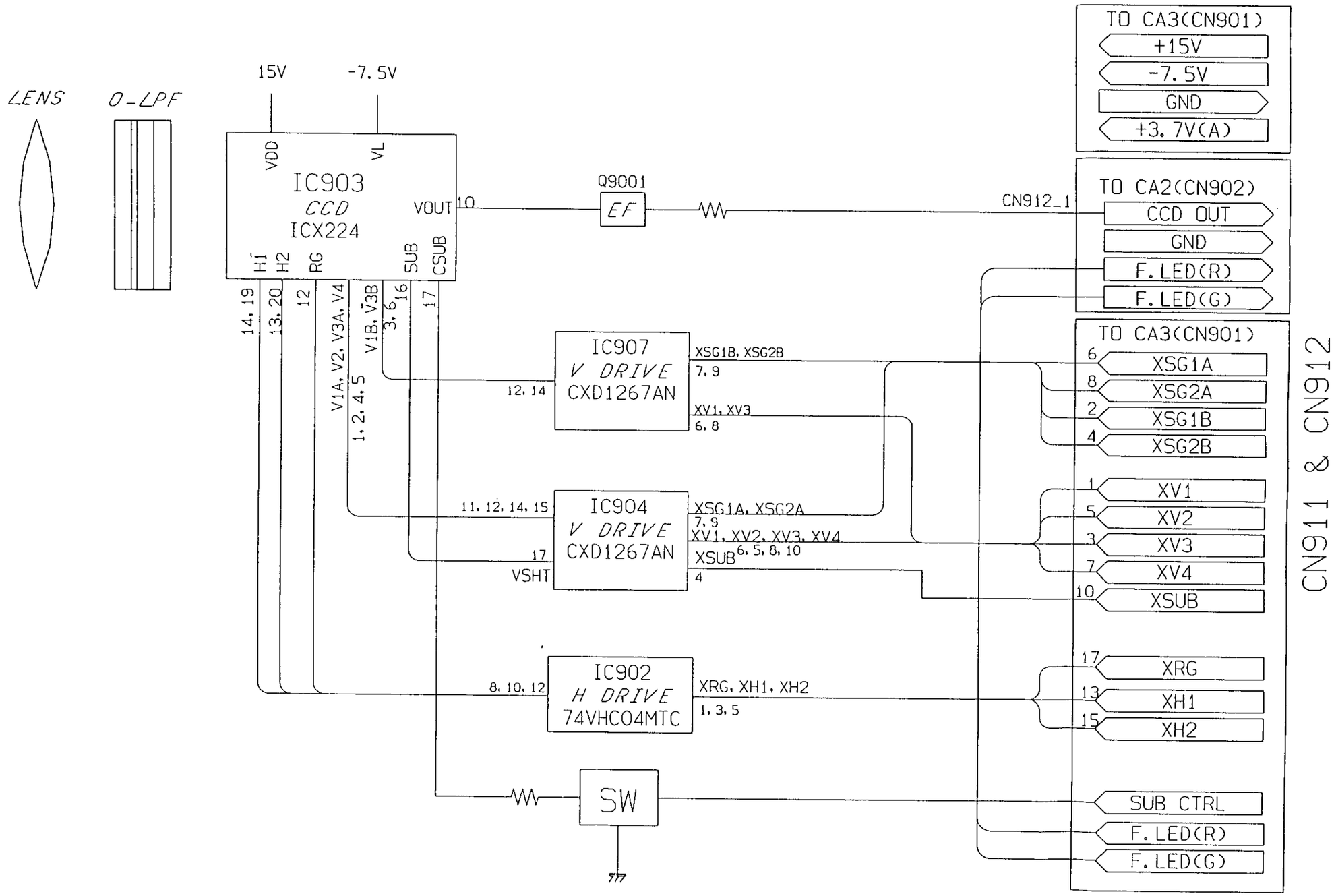
[OVERALL WIRING]


External Strob
Electronic Flash
CA-1 BLOCK
IC903
1620x1220 CCD
CA-2 BLOCK
IC905
CDS AGC 10bit A/D
CA-3 BLOCK
TG SG
Signal Processor
SRAM
SRAM
NTSC/PAL Encoder
IC102 System ASIC
IC101
SPARC 72MHz
IC103
64Mbit SDRAM
SDRAM Controller
SRAM
OSD
Data Bus(32bit/36MHz)
LENS BLOCK
Focus
Zoom
Iris
Shutter
PW-1 BLOCK
Motor Driver
IC951
IC952
IC953
8Mbit Flash
IC121
Flash I/F
SRAM
JPEG CODEC
CF I/F
SIO
UART
IC171
LCD Driver
LCD Monitor
Back Light
Y/C MIX
IC111
MCLK
NTSC 14.318MHz PAL 17.734MHz
IC131
RS232C Driver
PW-1 BLOCK
Video Jack
IC501
DC/DC Converter
Z9501
Battery Recharge
Battery 1.5Vx4
DC Jack
PC Jack
SY-1 BLOCK
SW
CMD
IC301
8bit CPU
Mode LCD
Main CLK 1MHz
Sub CLK 32.768KHz
ComPact Flash
PUSH SW
SLD
Buzzer

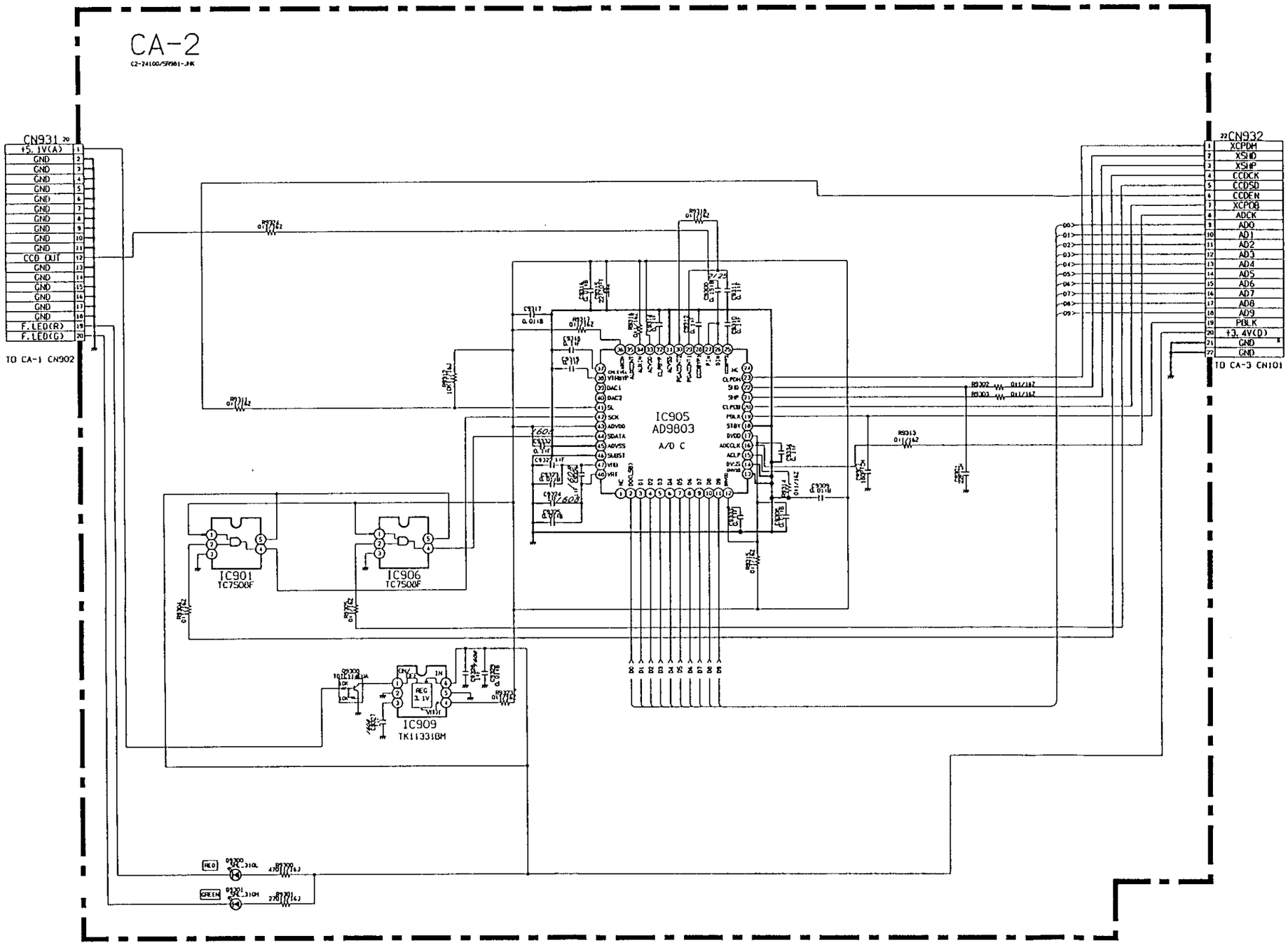
[OVERALL]



[CIRCUIT DIAGRAM CA-1]



[BLOCK DIAGRAM CA-1]



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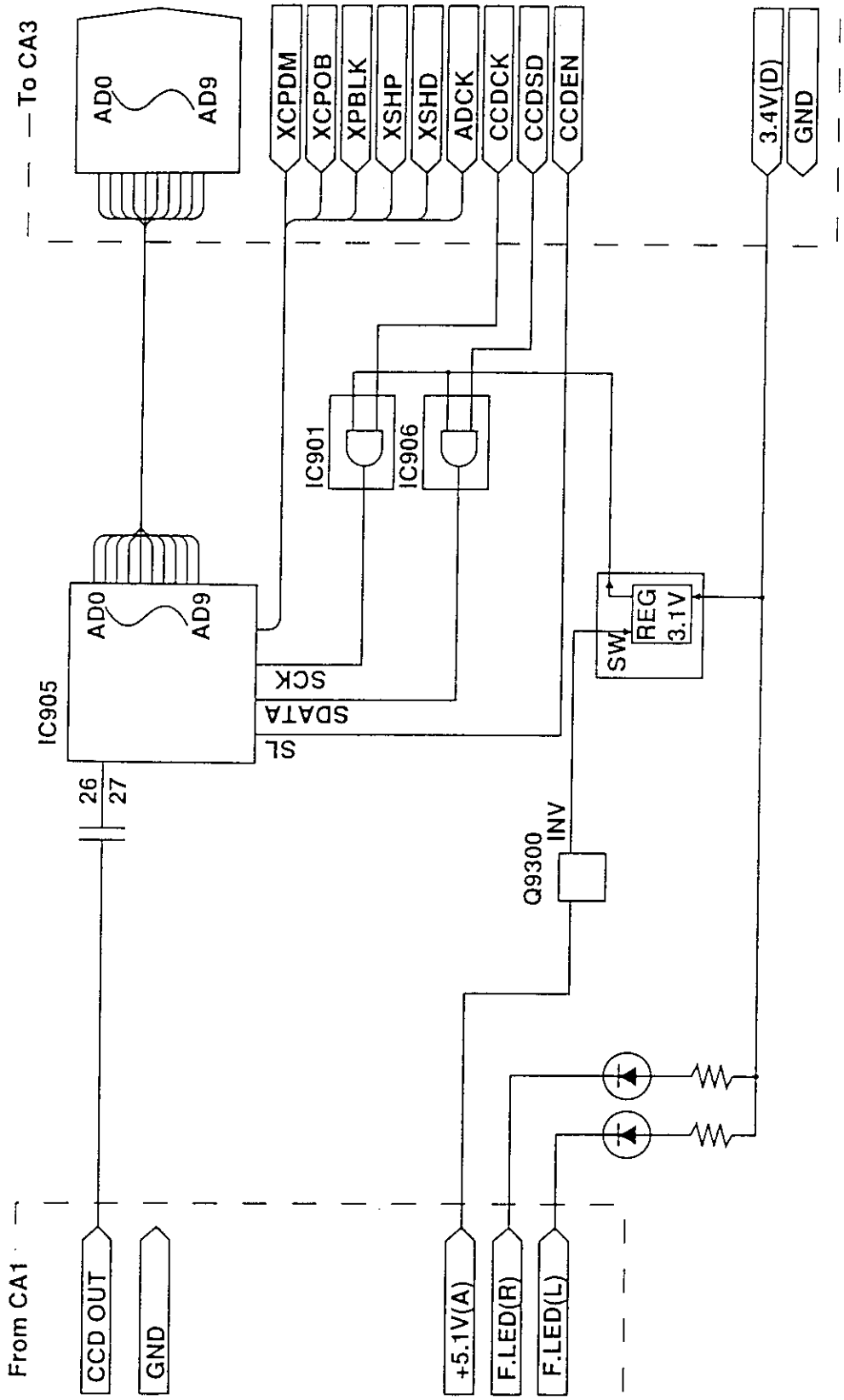


[BLOCK DIAGRAM CA-2]

CA-3

SR981_DA3

IC101
MB86835PMT2
CPU

IC102
M87L1100PBT-G
ASIC

IC171
LV4126W-A
LCD DRIVER

IC121
MBM29LV800T
FLASH MEMORY

IC103
SDRAM
UPD456416365-A10B-9JF

IC141
SN74LV245AP
BUFFER

IC142
SN74LV245AP
BUFFER

IC143
TC7S32F

IC144
TC7W02FU

IC145
TC7S00F

IC146
TC7W02FU

IC172
TK11245BM
REGULATOR

IC175
TC75ET05FU-F

IC111
CLOCK GENERATOR

IC151
TK15450M
VIDEO AMP

CN141
TO C/F CARD

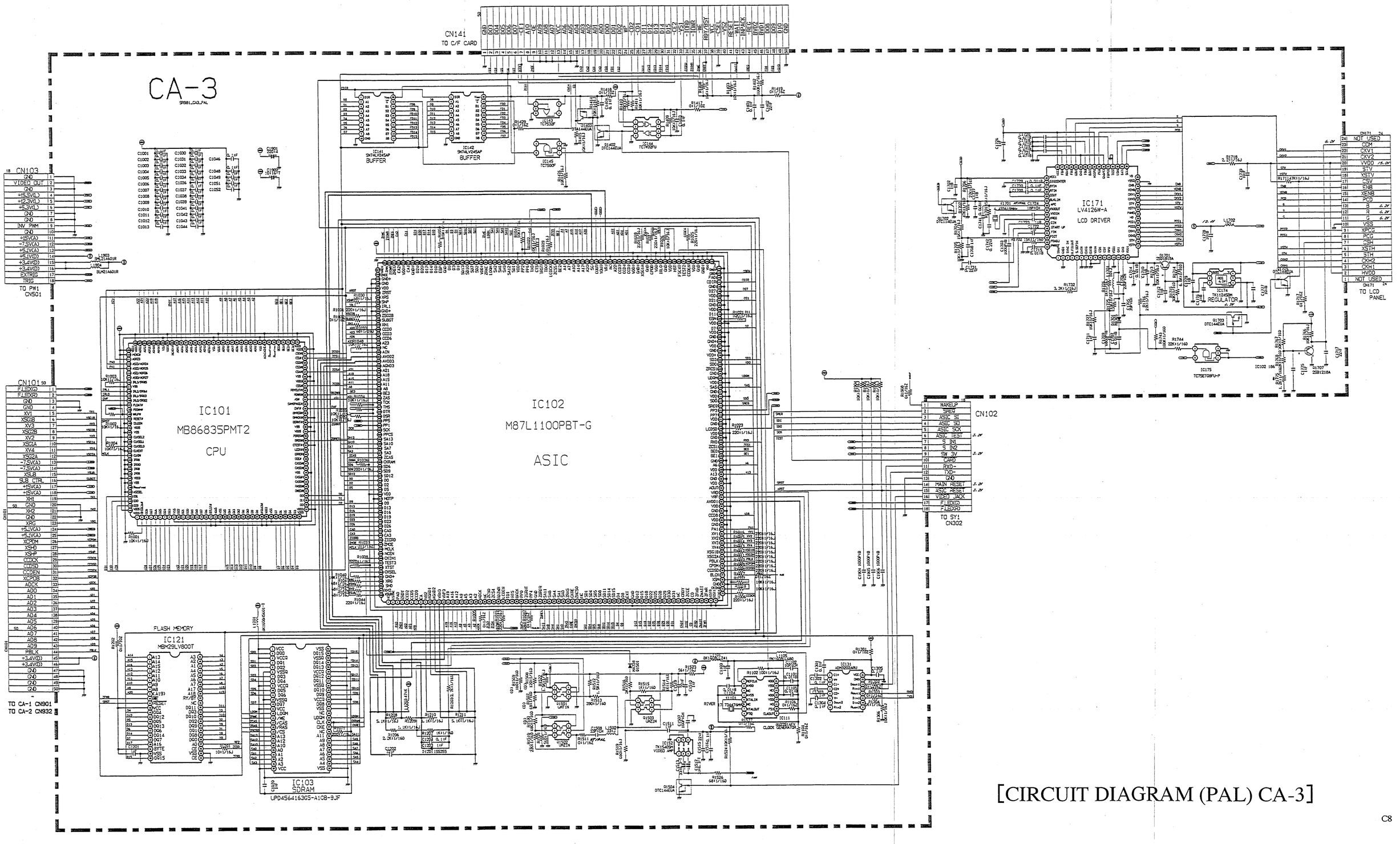
CN103
TO PW1 CN501

CN101
TO CA-1 CN901
TO CA-2 CN932

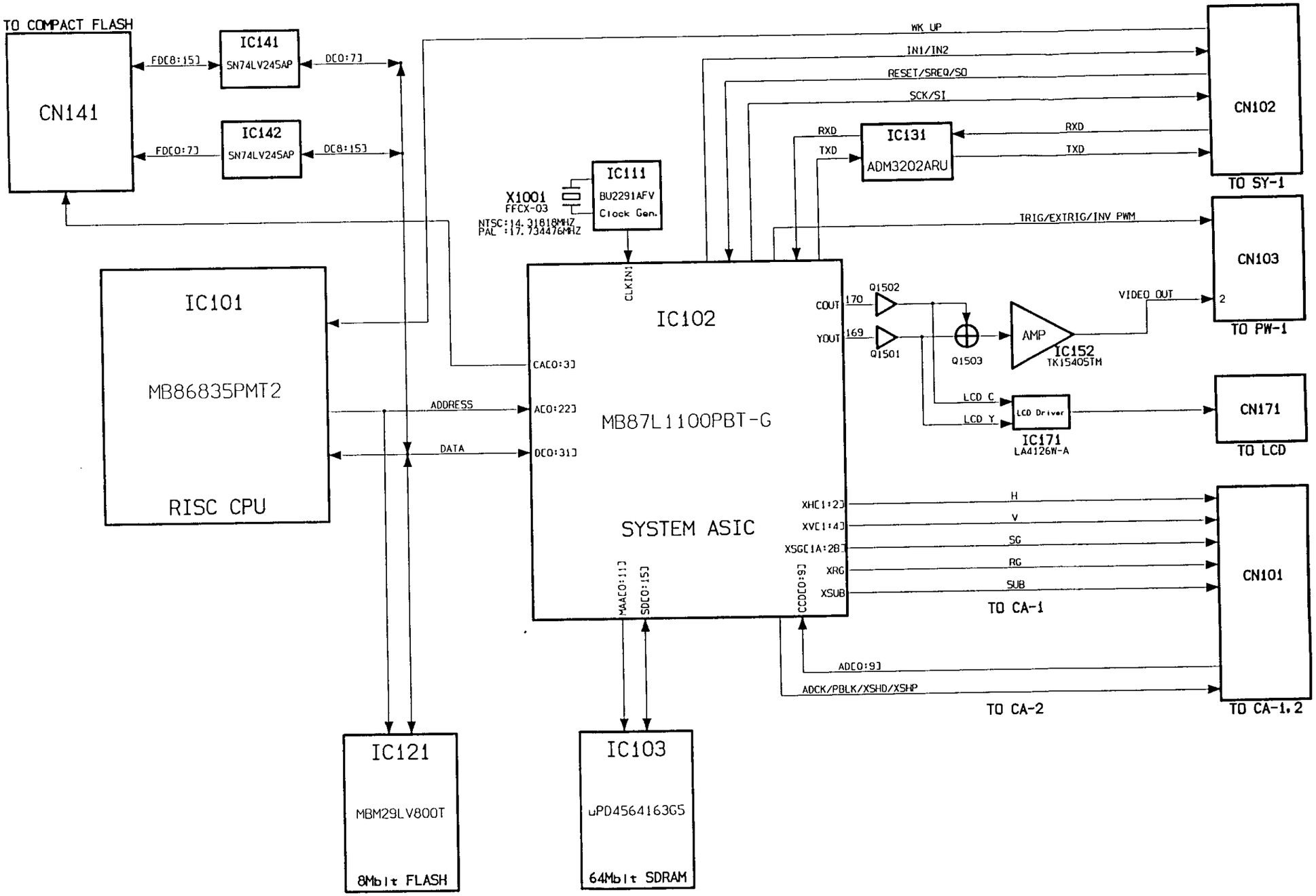
CN171
TO LCD PANEL

CN102
TO SY1 CN302

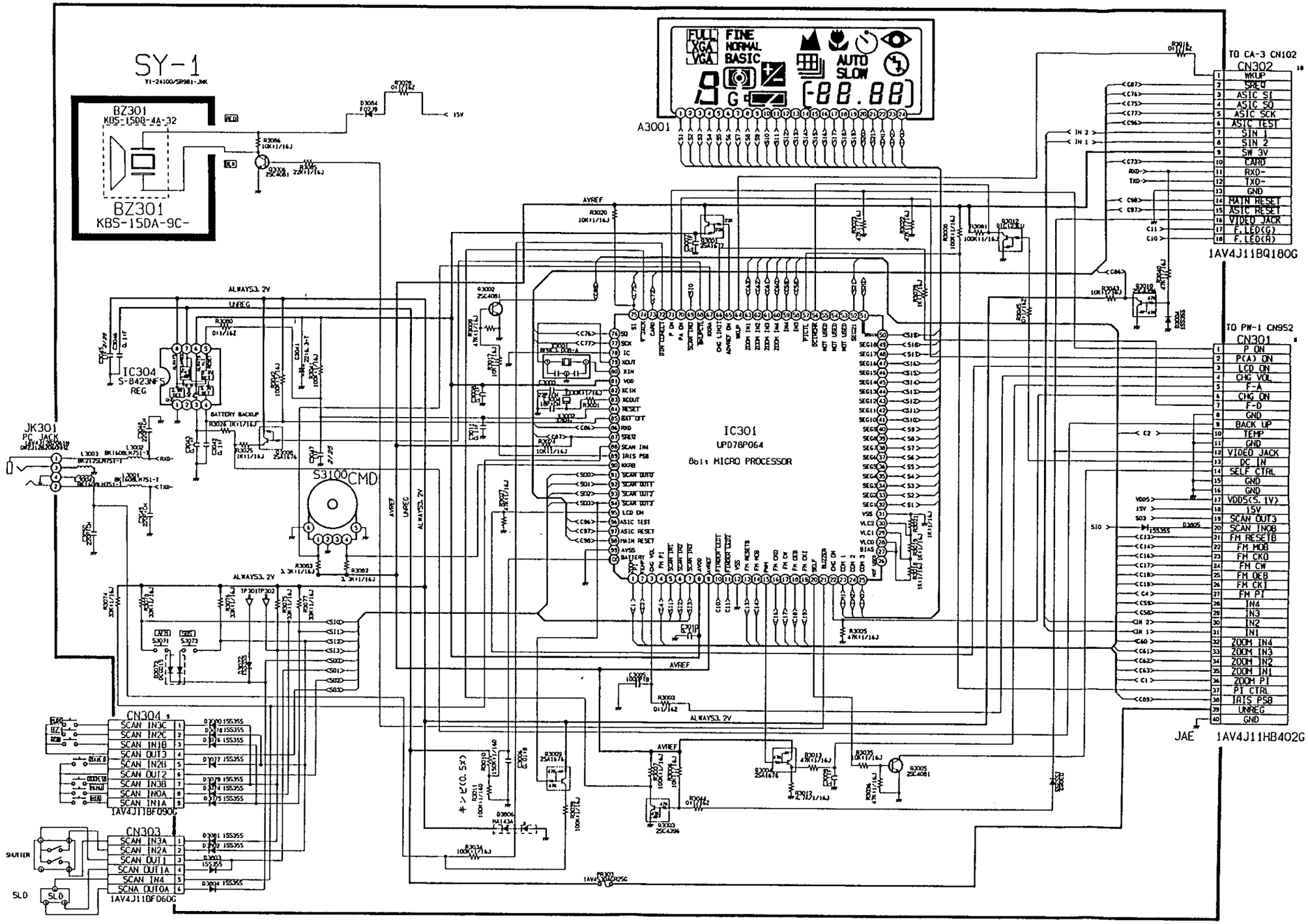
[CIRCUIT DIAGRAM (NTSC) CA-3]



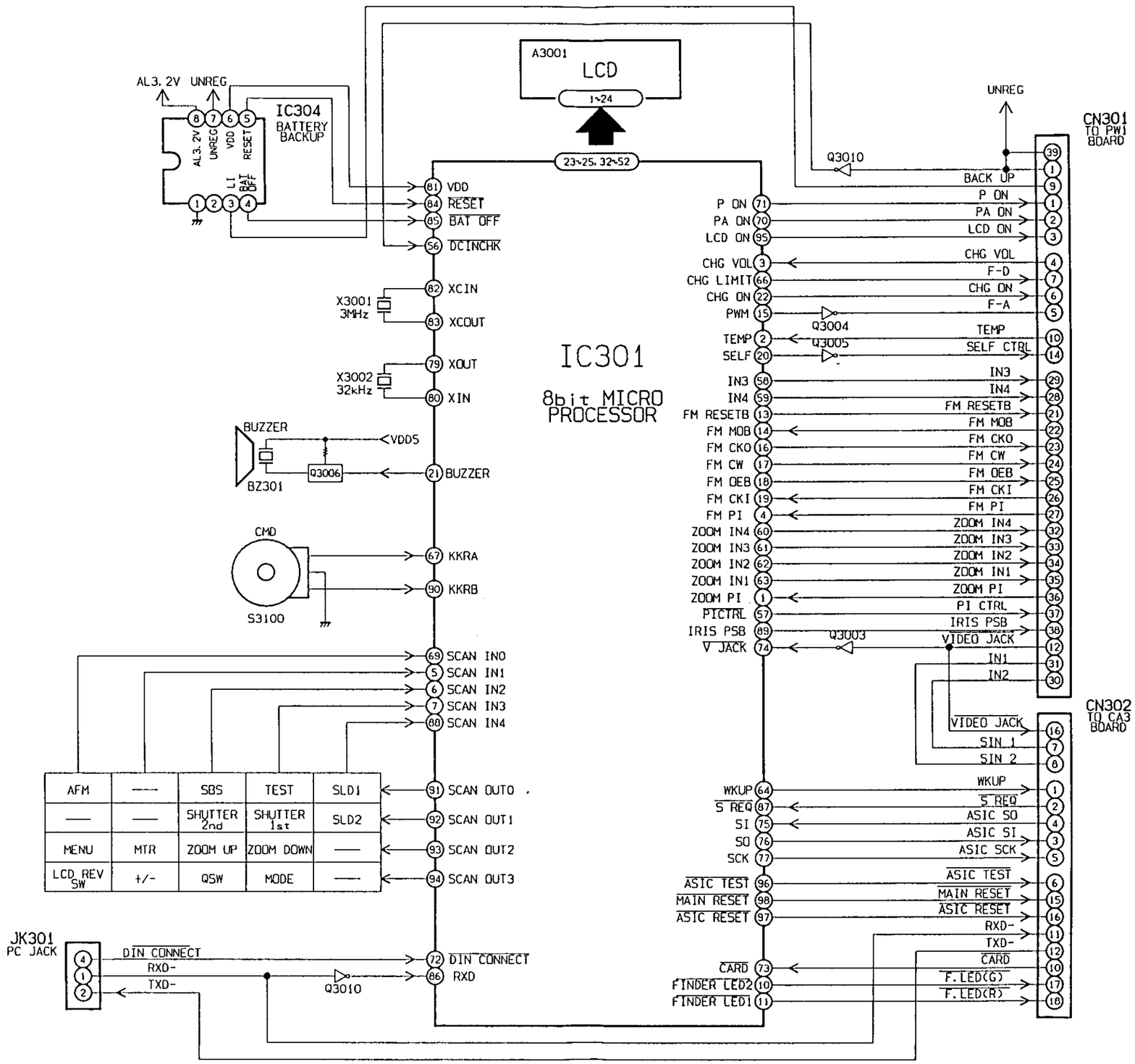
[CIRCUIT DIAGRAM (PAL) CA-3]



[BLOCK DIAGRAM CA-3]



[CIRCUIT DIAGRAM SY-1]



[BLOCK DIAGRAM SY-1]

PW-1_PW

PI_24100_SR981_JK

DC JACK
JK501
1AV4J11B0920N

CN502
BATTERY +
BATTERY -
BATTERY
1AV4J10HG020N

IC501
BA9737KV
CONTROL

CH1
TO ANALOG CIRCUIT

CH2
TO DIGITAL CIRCUIT

CH3
TO LCD

CH4 TO BACK LIGHT

IC503
NJM2904M

IC502
TA75S01F

T5001
1AV4L51B2470G

T5002
1AV4L51B2330G

T5003
1AV4L51B2060G

CN504
UNREG-V
UNREG-G
1AV4J10AU020N
TO ST-1

TO PW-1_LENS

CN505
SCAN IN2
SCAN OUT3
1AV4J10BS020N
TO SY-2 CN355

JK502
(VIDEO JACK)
1AV4J12B2180N

CN501
1AV4J11HK180G
TO CA-3 CN103

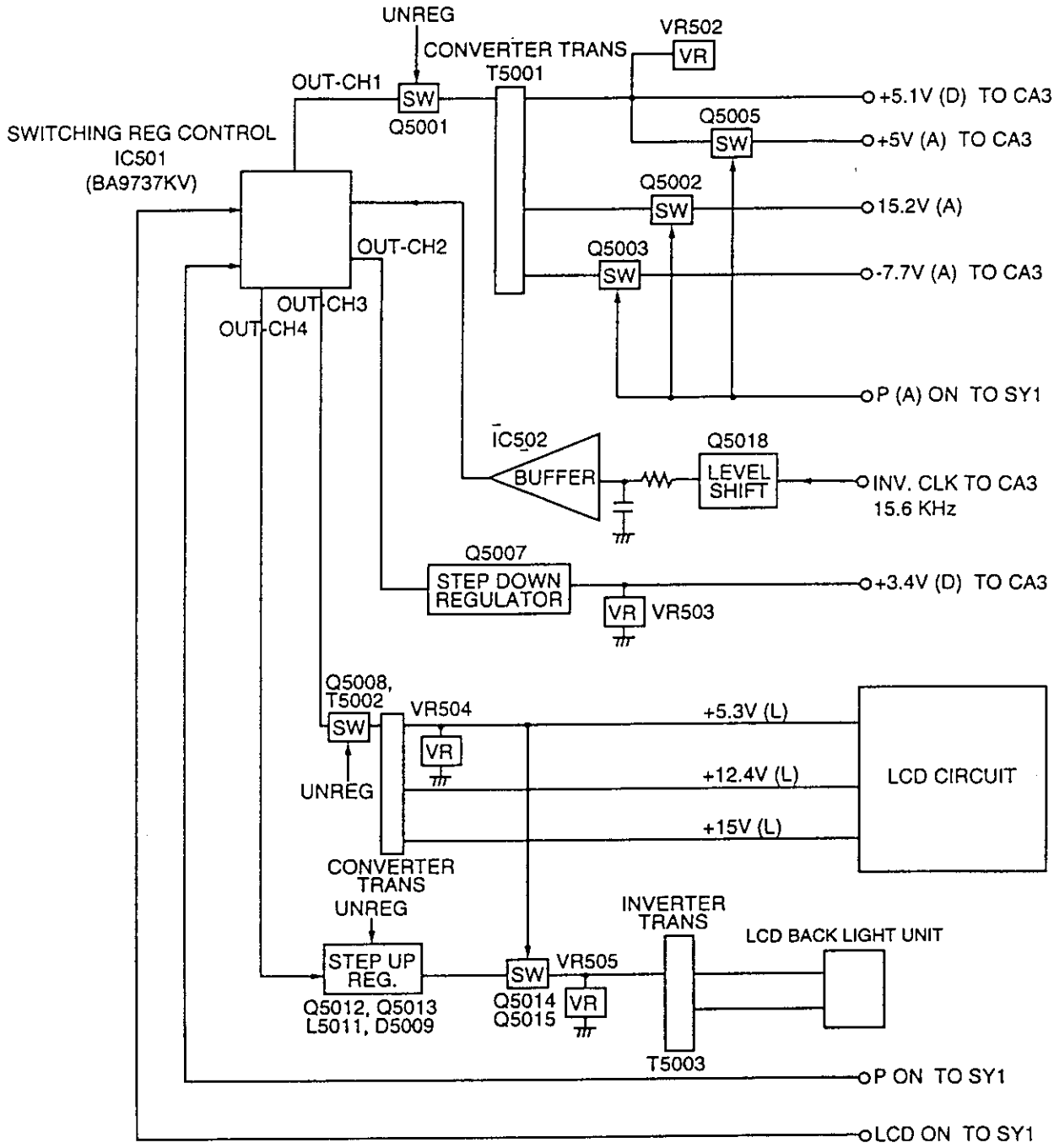
CN503
FL-H
NOT USED
NOT USED
FL-L
TO LCD PANEL

UNREG-V
UNREG-GND
F-A OUT
+3.4V(D)
+5.1V(D)
TRIG
EXTRIG
DC IN
+5.1V(D)
+16.5V(D)
UNREG
F-A IN
P ON
P(A) ON
LCD ON
VIDEO JACK
SCAN OUT3
SCAN IN2

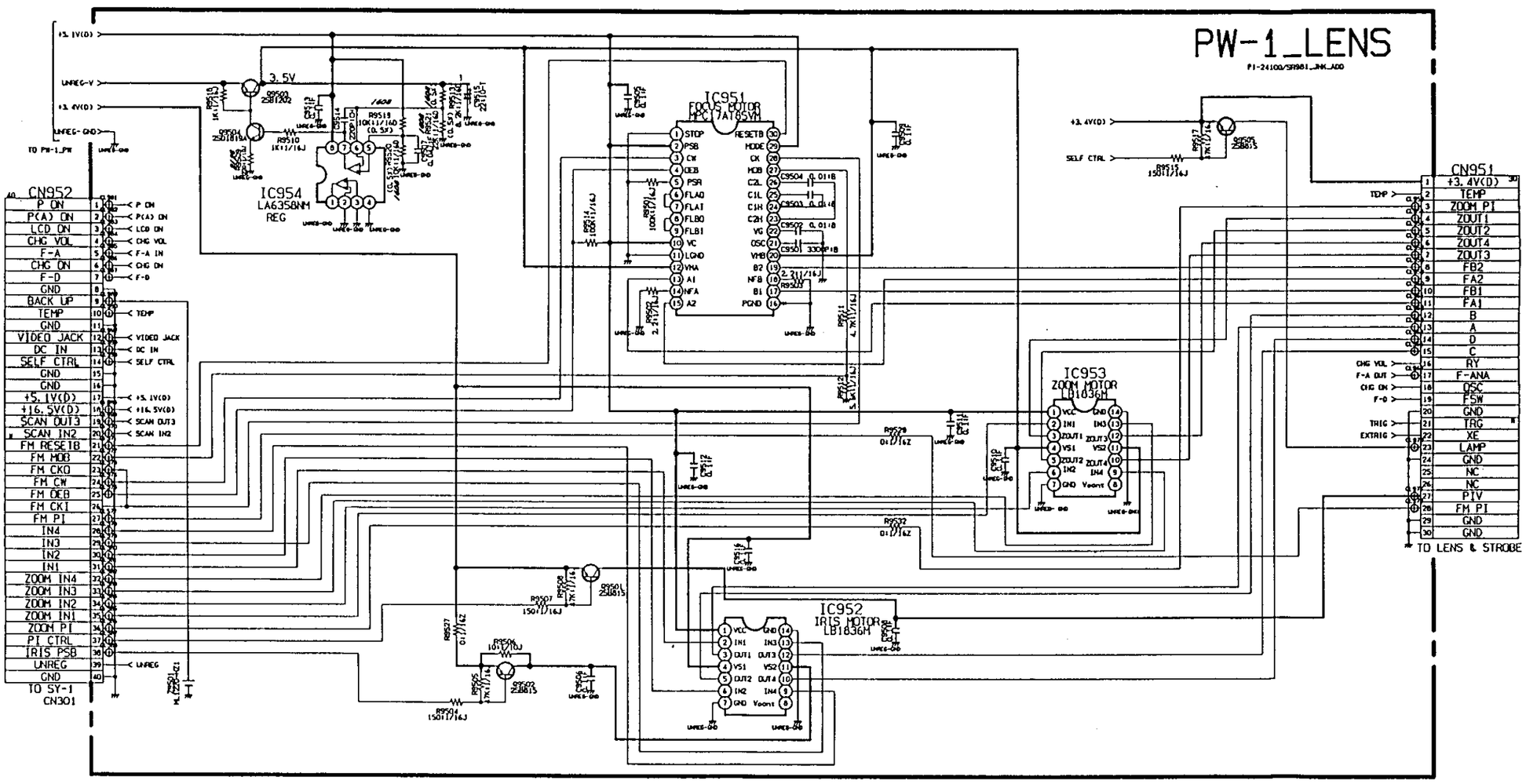
+15.2V(A)
-7.7V(A)
+5.1V(A)
+5.1V(D)
+3.4V(D)
+15V(L)
+12.4V(L)
+5.3V(L)

INV PWM = 15.6KHZ

[CIRCUIT DIAGRAM PW-1]

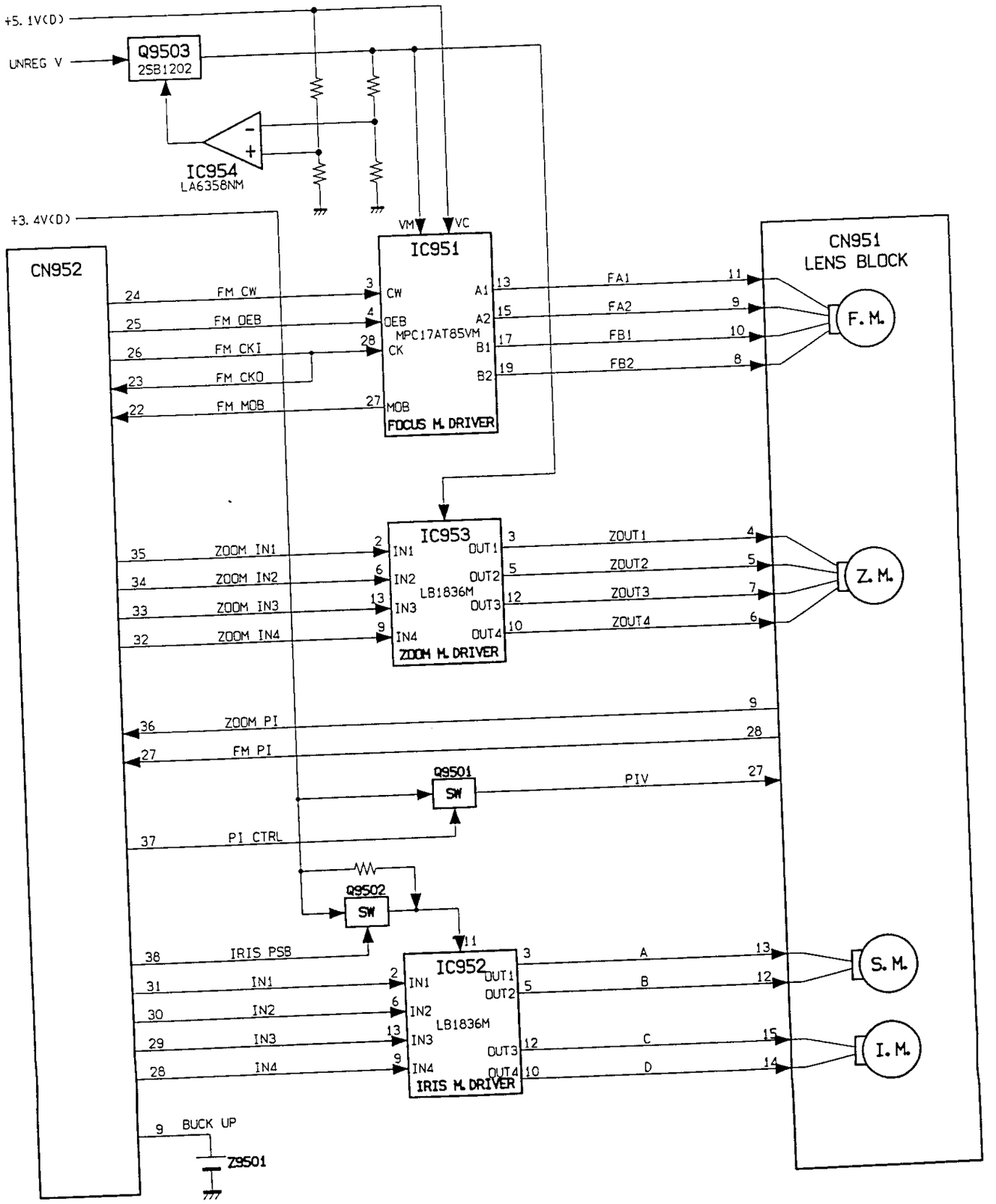


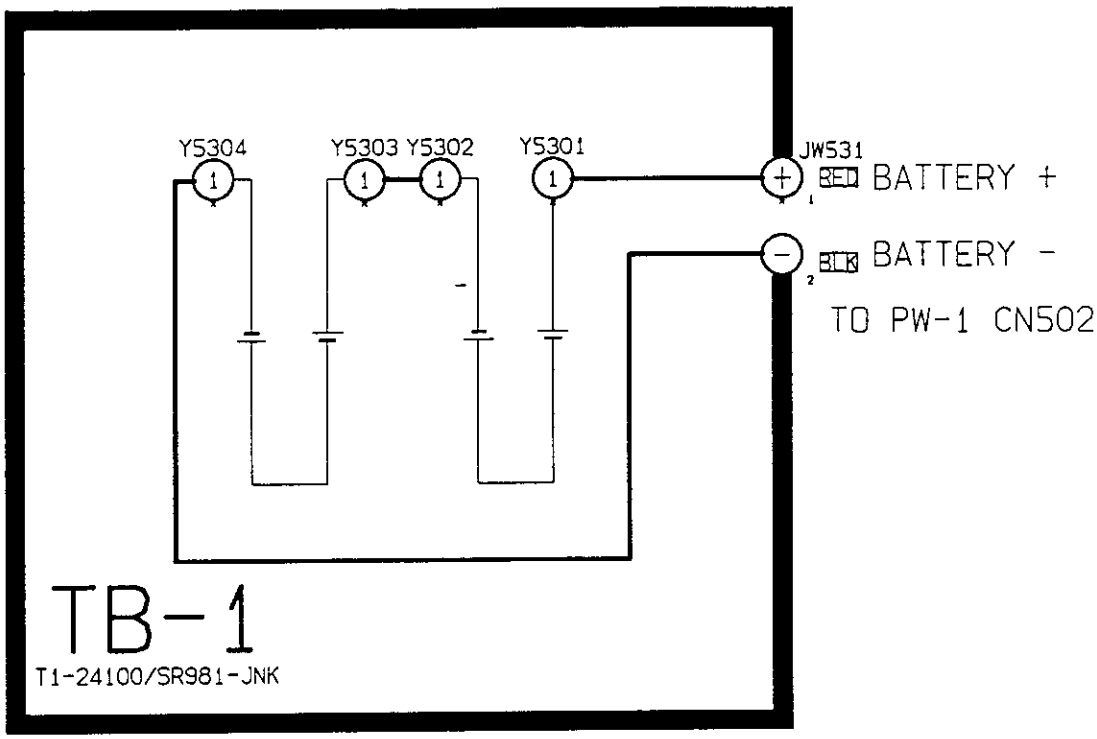
[BLOCK DIAGRAM (POWER) PW-1]



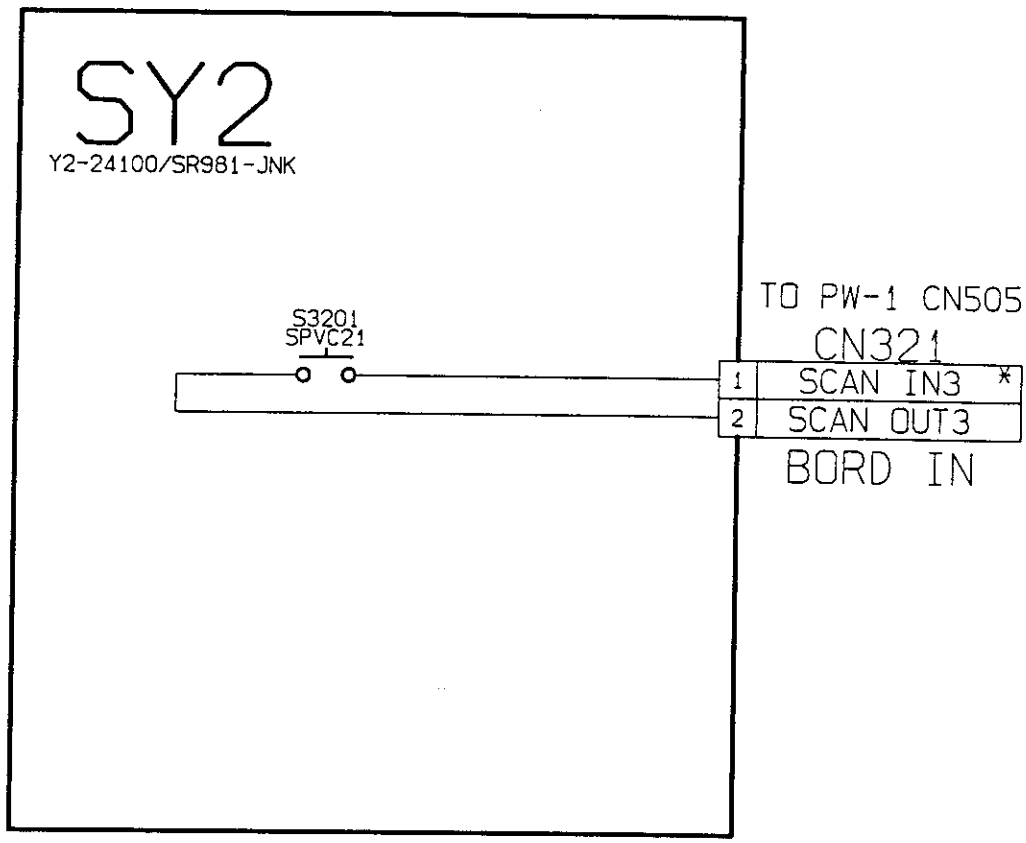
[CIRCUIT DIAGRAM(LENS) PW-1]

[BLOCK DIAGRAM(LENS) PW-1]

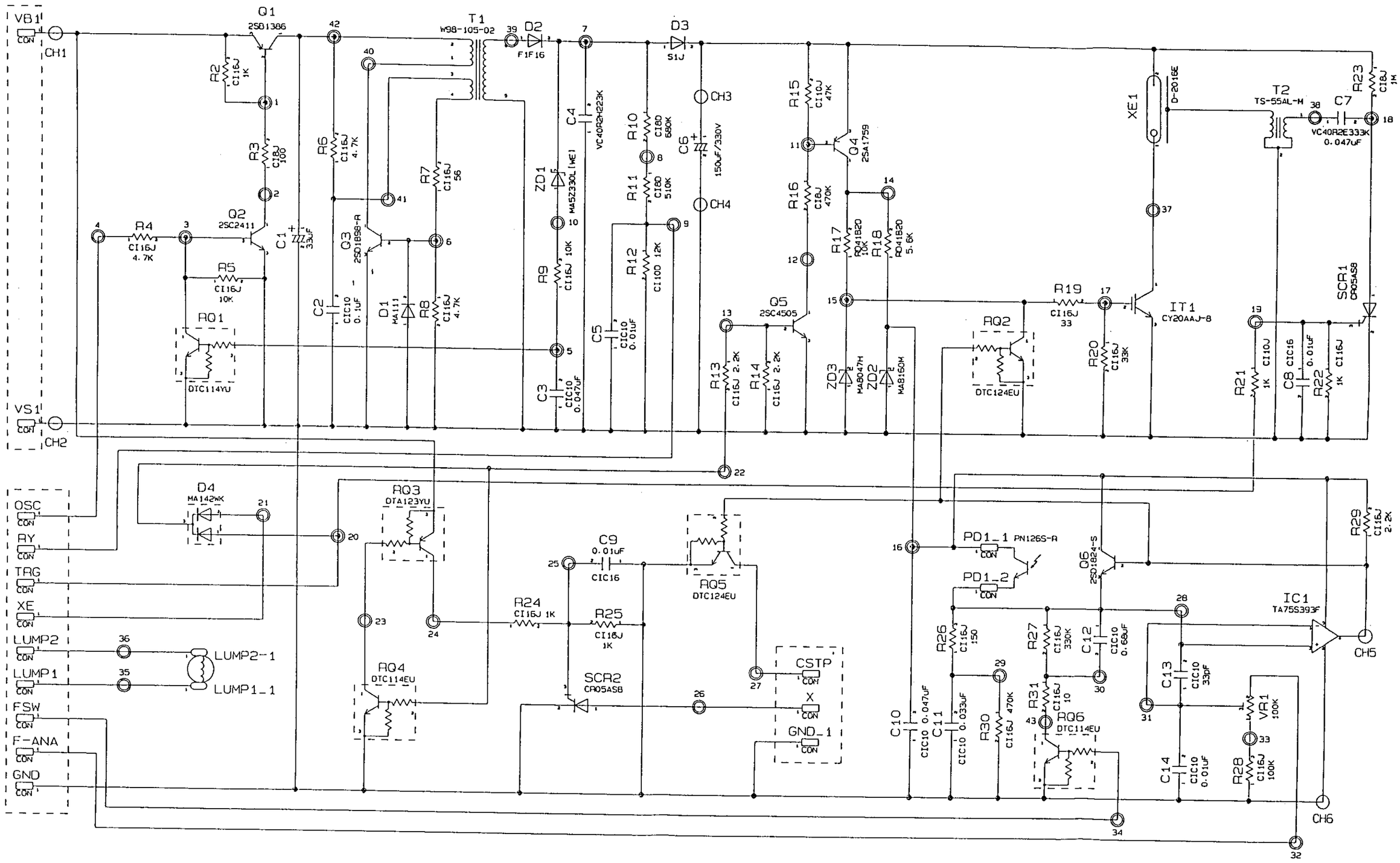




[CIRCUIT DIAGRAM TB-1]



[CIRCUIT DIAGRAM SY-2]



[CIRCUIT DIAGRAM SPEED LIGHT]