| 作成承認印 | 配布許可印 |
| --- | --- |
| | |

# Nikon Digital Camera E900s

# COOLPIX900

MODEL [ U / EN : VAA10522 EP : VAA10531 ]

## SERVICE MANUAL

Nikon

NIKON CORPORATION Tokyo Japan

## Contents

# 1. OUTLINE OF CIRCUIT DESCRIPTION

## 1-1. CA1 CIRCUIT DESCRIPTION

### 1. IC Configuration

| | |
|---|---|
| IC903 (ICX202AK) | CCD imager |
| IC902 (74VHC04MTC) | 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 | 1290 (H) X 966 (V) |
| Pixels in total | 1343 (H) X 972 (V) |
| Optical black | |
| Horizontal (H) direction: | Front 3 pixels, Rear 50 pixels |
| Vertical (V) direction: | Front 4 pixels, Rear 2 pixels |
| Dummy bit number | Horizontal : 30 Vertical :1 |

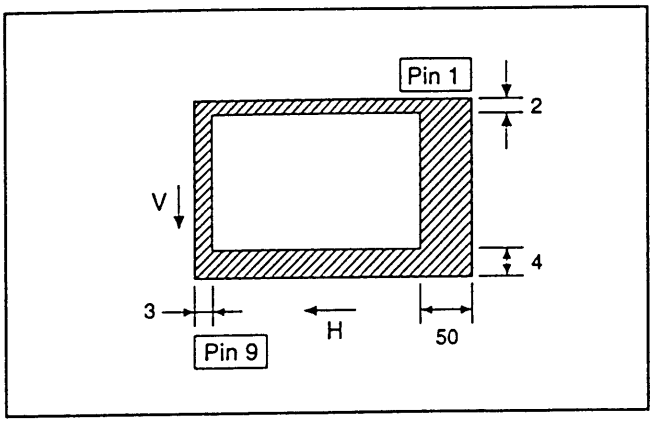



Fig. 1-1.Optical Black Location (Top View)

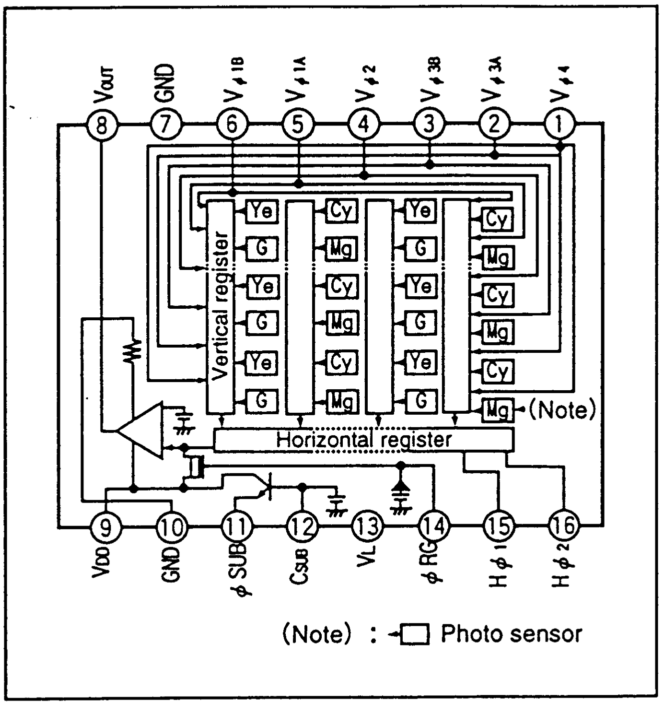



Fig. 1-2. CCD Block Diagram

| Pin No. | Symbol | Pin Description | Waveform | Voltage |
|---|---|---|---|---|
| 1 | V φ 4 | Vertical register transfer clock | | -7.5 V, 0 V |
| 2, 3 | V φ 3A, V φ 3B | Vertical register transfer clock | | -7.5 V, 0 V, 15 V |
| 4 | V φ 2 | Vertical register transfer clock | | -7.5 V, 0 V |
| 5, 6 | V φ 1A, V φ 1B | Vertical register transfer clock | | -7.5 V, 0 V, 15 V |
| 7, 10 | GND | GND | GND | 0 V |
| 8 | VOUT | Signal output | | Aprox. 10 V |
| 9 | VDD | Circuit power | DC | 15 V |
| 11 | φ SUB | Substrate clock | DC | Aprox. 8 V |
| 12 | CSUB | Substrate bias | DC | Aprox. 8V (Different from every CCD) |
| 13 | VL | Protection transistor bias | DC | |
| 14 | φ RG | Reset gate clock | | 12.5 V, 16 V |
| 15 | H φ 1 | Horizontal register transfer clock | | 0 V, 3.5 V |
| 16 | H φ 2 | Horizontal register transfer clock | | 0 V, 3.5 V |

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.

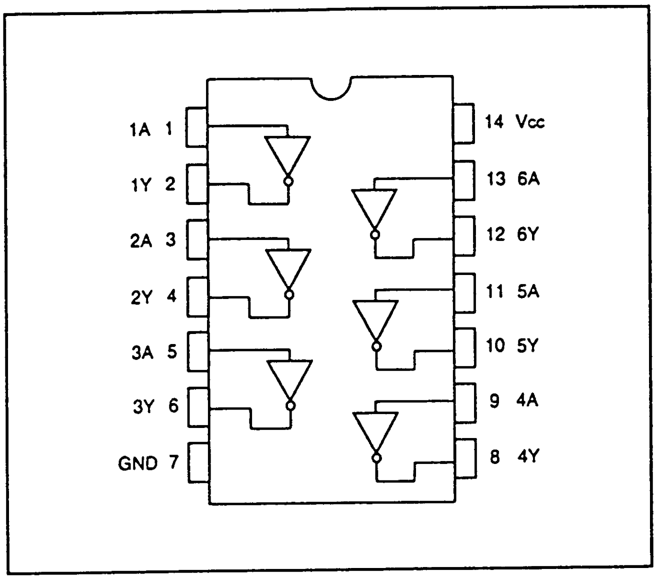



Fig. 1-3. IC902 Block Diagram

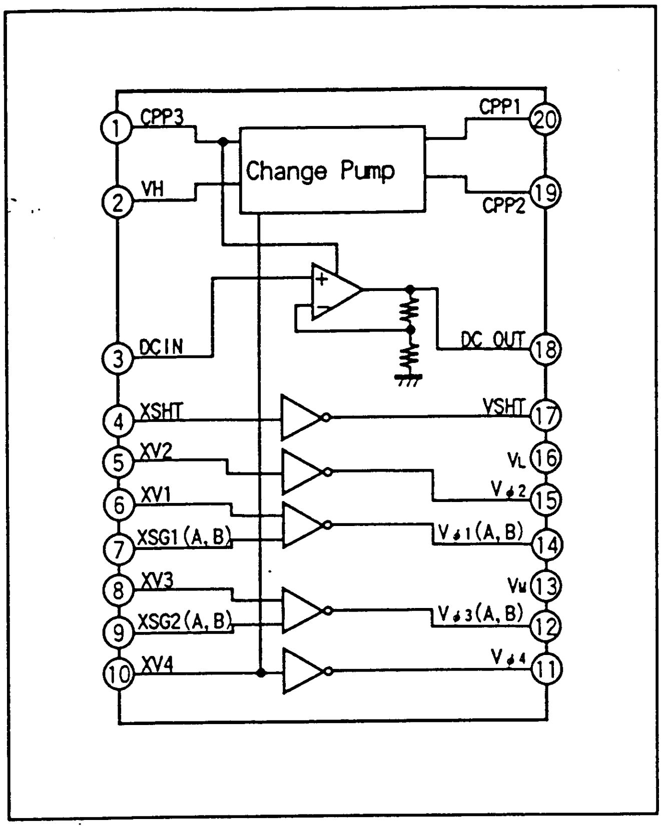



Fig. 1-4. IC904 and IC907 Block Diagram

## 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. USART**

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 1.3 million pixel/1.09 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 γ processing are carried out, a matrix is generated and aperture correction is carried out for the Y signal, and the data is then compressed by the JPEG method by JPEG IC (IC108) 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 USART. When played back on the LCD and monitor, data is transferred from memery to the SDRAM, and the data elongated by JPEG IC 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) and level shifta (IC172).
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. CA3 CIRCUIT DESCRIPTION

### 1. 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.

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. PW1 CIRCUIT DESCRIPTION

### 1. Outline

This is the main power circuit, and is comprised of the following blocks.
Switching controller (IC301)
Digital 5 V and analog system power output (T3101, Q3101)
Digital 3.4 V system power supply (Q3108)
LCD system power supply (Q3110, T3102)
Backlight power supply output (Q3113, T3103)

### 2. Switching Controller (IC311)

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 V (D) (CH1), 3.4 V (D) (CH2) , 5.0 V (L) (CH3) and 6.5-8.9 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. 260 ms) determined by the condenser which is connected to Pin (17) of IC311, 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 V (D) , 15 V (A), -7.5 V (A) and 5 V (A) are output. Feedback for the 5 V (D) is provided to the switching controller (Pins (29) of IC311) so that PWM control can be carried out.

### 4. Digital 3.4 V System Power Output

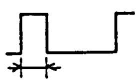
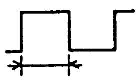
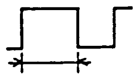
3.4 V (D) is output. Feedback is provided to the swiching controller (Pin (26) of IC311) so that PWM control can be carried out.

### 5. LCD System Power Output

5 V (L), 12 V (L) and 15.5 V (L) are output. Feedback for the 5 V (L) is provided to the switching controller (Pin (11) of IC311) so that PWM control can be carried out.

### 6. Backlight Power Supply output

The power which is input to the inverter transformer (T3103) is controlled by means of Q3113, amd 6.5 V, 7.7 V or 8.9 V is output depending on the luminance mode of the LCD panel.

| | High luminance mode 1 second after backlight illumination | Normal luminance mode | Low luminance mode |
|---|---|---|---|
| Backlight output voltage | 8.9 V | 7.7 V | 6.5 V |
| Inverter clock duty (R3175) |  42% |  50% |  58% |

## 1-5. 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 250 V or higher (at normal temperature), the stroboscope emits light when the trigger signal (TRG) is input.

### 2-1. Emission control circuit

When TRG is Hi, Q5 (Q6) turns ON. When this happens, a light emission signal is sent to the trigger generation circuit and a dimmer start signal is sent to the dimmer circuit. Furthermore, the emission stop signal output from the dimmer circuit causes Q7 to turn ON, and this stops the light emission signal from being output to the trigger generation circuit.

### 2-2. Trigger generation circuit

When a light emission signal is input to this circuit from the light emission control circuit, IGBT (IT1) turns ON, and at the same time the trigger coil (T2) applies a high-voltage pulse of about 5 kV to the xenon tube.

### 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 (IC2) 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 F4 ± 0.2 EV when F-D is Lo and F-A is 1.55 V, and so that it becomes F5.6 ± 0.5 EV when F-D is Hi and F-A is 1.1 V.
(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.)

**※ Beware of electric shocks.**

## 1-6. 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 4-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 | NOT USED | - | - | |
| 2 | TEMP | I | Temparature detection (analog input) | |
| 3 | CHG VOL | I | Storobe charge voltage input (analog input) | |
| 4 | NOT USED | - | - | |
| 5~7 | SCAN IN 1~3 | I | Key matrix input | |
| 8 | AVDD | - | Analog voltage 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 | $\overline{\text{ADVREF ON}}$ | O | AD VREF ON/OFF | L : ON |
| 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 | |
| 32~47 | S0~S15 | O | LCD segment output 0~15 | |
| 48~55 | 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 | ZOOM PI | I | Zoom motor standard position detection | |
| 65 | NOT USED | - | - | |
| 66 | CHG LIMIT | O | Strobe emit light control signal | |
| 67 | R/W-CLK | O | Sensitivity, integral mode, WR clock , data RD clock | |
| 68 | AD/EXT-END | O | Integral action compulsion close signal | |
| 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 | $\overline{\text{BKUPCTL}}$ | O | Back-up control | L : Li charge ON |
| 89 | IRIS PSB | O | Iris motor maintenance power control signal | |
| 90 | FM PI | I | Focusing motor standard position detection | |
| 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 | Battery OFF detection signal | L : OFF |
| 97 | $\overline{\text{ASIC RESET}}$ | O | ASIC control 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. 4-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.

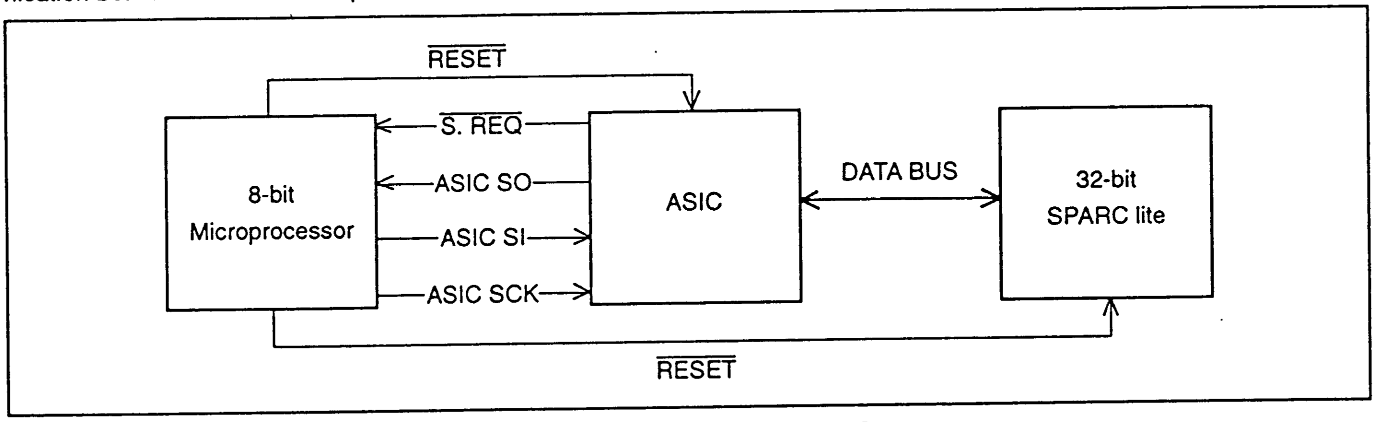



**Fig. 4-1 Internal Bus Communication System**

## 3. Key Operaiton

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

| SCAN OUT \ SCAN IN | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| 0 | AFM | MOS | SBS | (TEST) |
| 1 | ZOOM DOWN | ZOOM UP | SHUTTER 2nd | SHUTTER 1st |
| 2 | | | SLD 2 | SLD 1 |
| 3 | MENU | MTR | LCD TURN SW | |

**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 |
| SLD | PLAY | | ON | ON | ON | OFF | 3 MHz | ON | ON |
| SLD | M-REC A-REC | Power switch ON-Auto power OFF | OFF | OFF | OFF | OFF | 3 MHz | ON | OFF |
| SLD | M-REC A-REC | Shutter switch ON | ON | ON | ON | ON → OFF | 3 MHz | ON | OFF |
| SLD | M-REC A-REC | MOS, AFM, SBM ON | OFF | OFF | OFF | OFF | 3 MHz | ON | OFF |
| SLD | M-REC A-REC | LCD finder | ON | ON | ON | ON | 3 MHz | ON | ON |

**Table 4-3. Camera Mode**

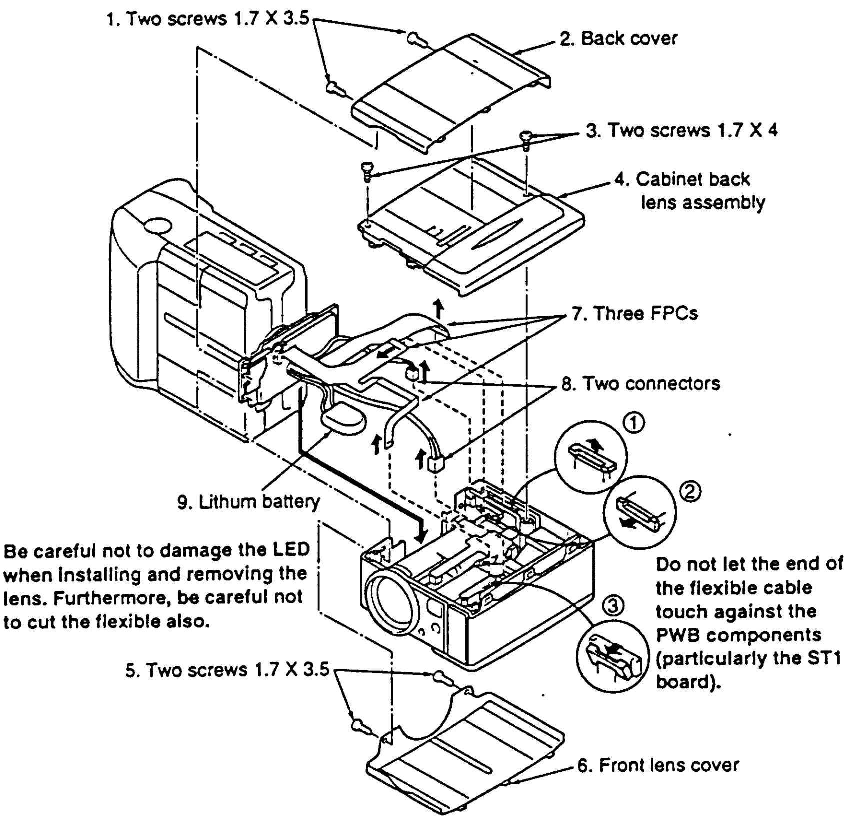
| | | | SPARC Lite | ASIC, memory | RS232C Driver | CCD | 8 bit CPU | MODE LCD | LCD MONITOR |
|---|---|---|---|---|---|---|---|---|---|
| Power voltage | | | 3.3 V | 3.3 V | 5 V | 5 V (A) +15 V -7.5 V | 3.3 V (ALWAYS) | 3.3 V (ALWAYS) | 5 V (L) +12V etc. |
| SLD | OFF | | OFF | OFF | OFF | OFF | 32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

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

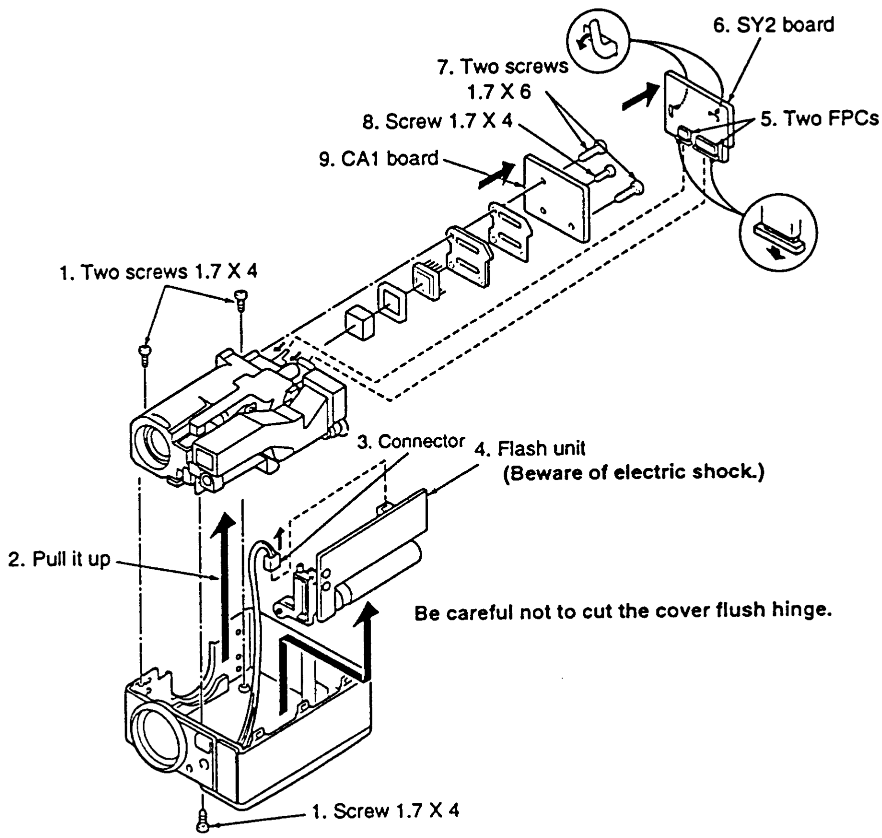
**Table 4-4. Host Mode**

# 2. DISASSEMBLY

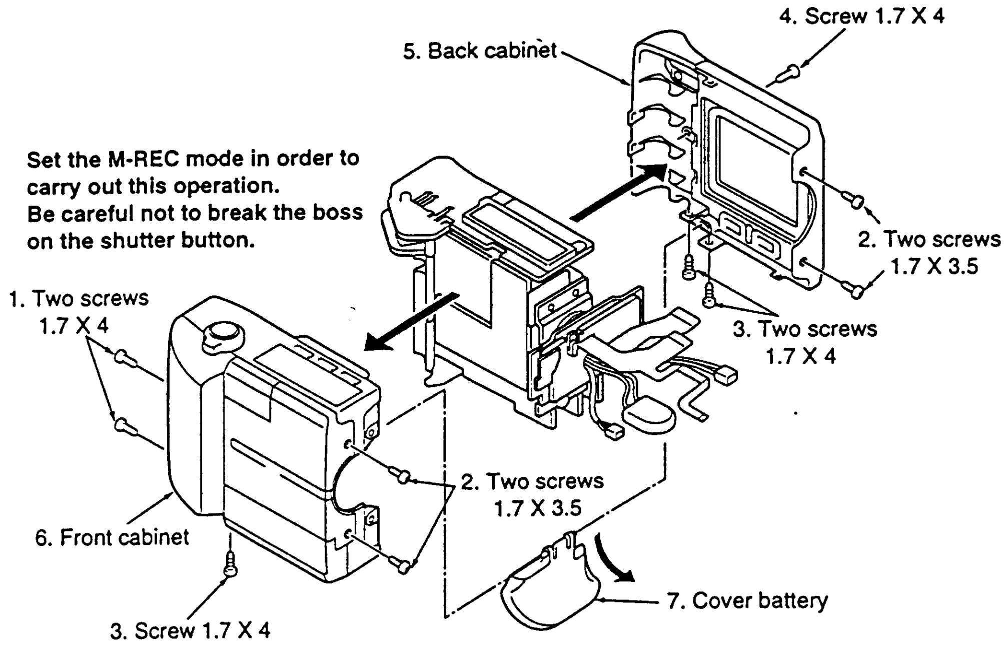
## 2-1. REMOVAL OF CABINET LENS ASSEMBLY (FRONT) AND CABINET LENS ASSEMBLY (BACK)




## 2-2. REMOVAL OF FLASH UNIT, SY2 BOARD AND CA1 BOARD

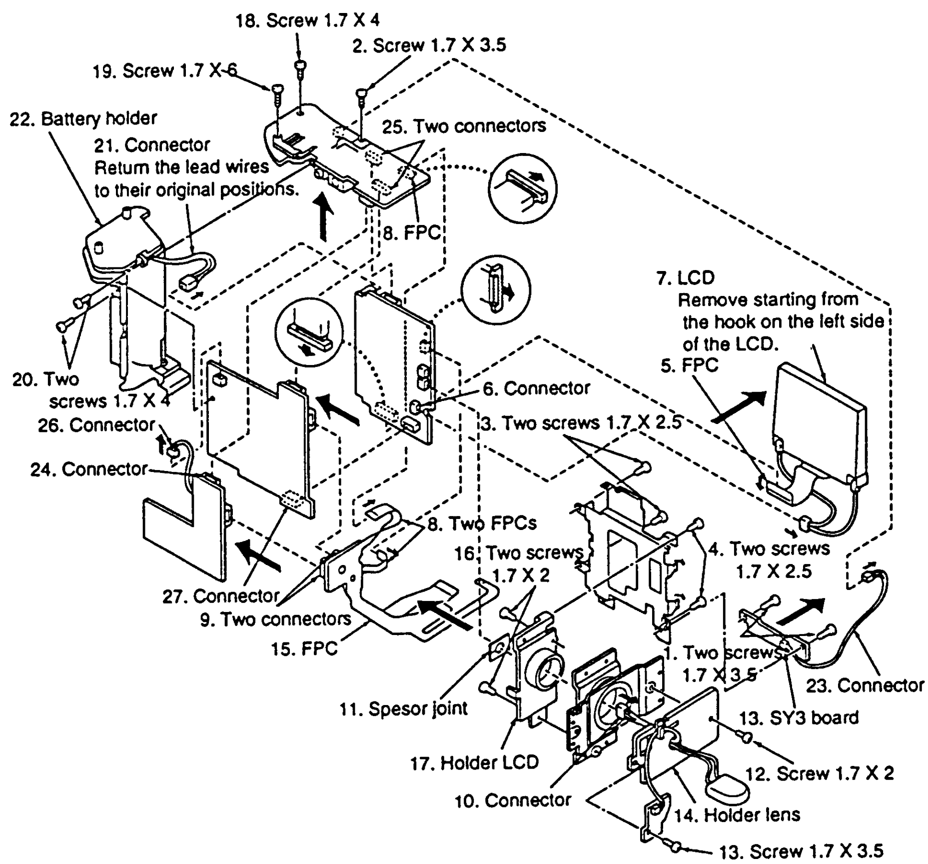


## 2-3. REMOVAL OF CABINET LCD ASSEMBLY (FRONT) AND CABINET LCD ASSEMBLY (BACK)

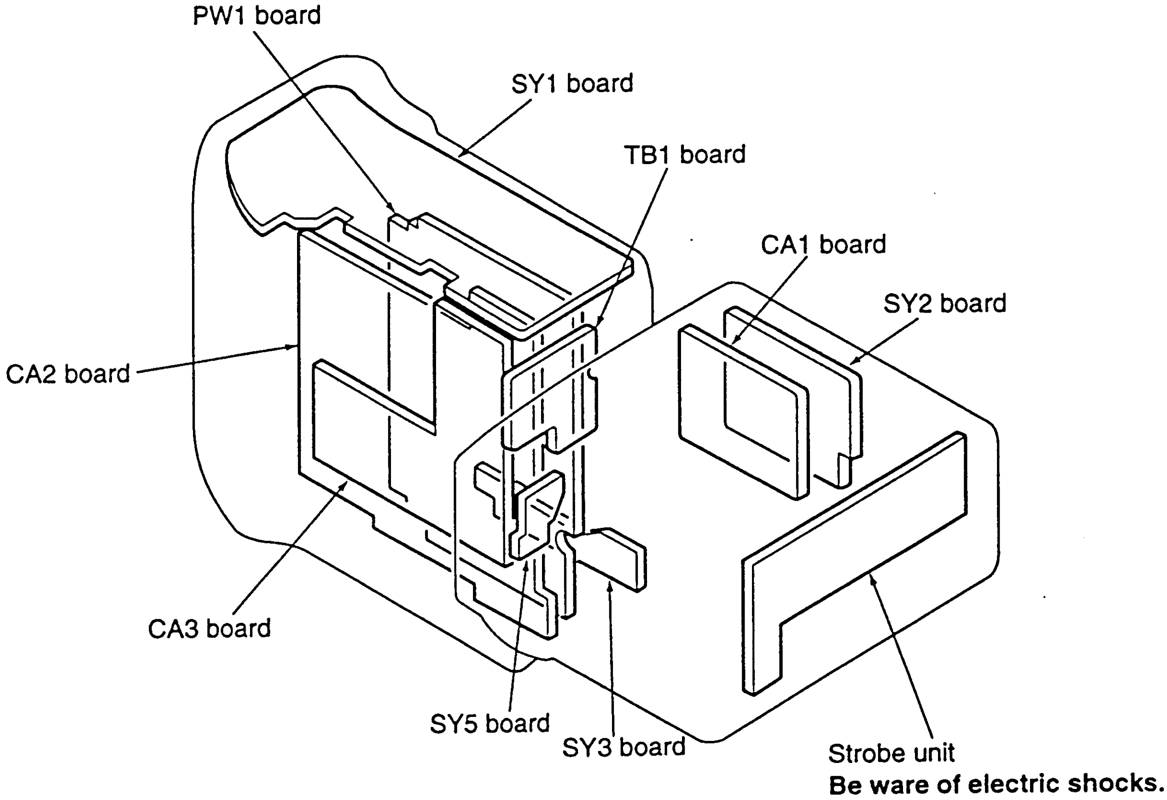



Pull out the assembly while pushing in the CF eject lever.

## 2-4. REMOVAL OF LCD, SY5 BOARD, SY3 BOARD, SY1 BOARD, CA3 BOARD, CA2 BOARD AND PW1 BOARD



## 2-5. BOARD LOCATION

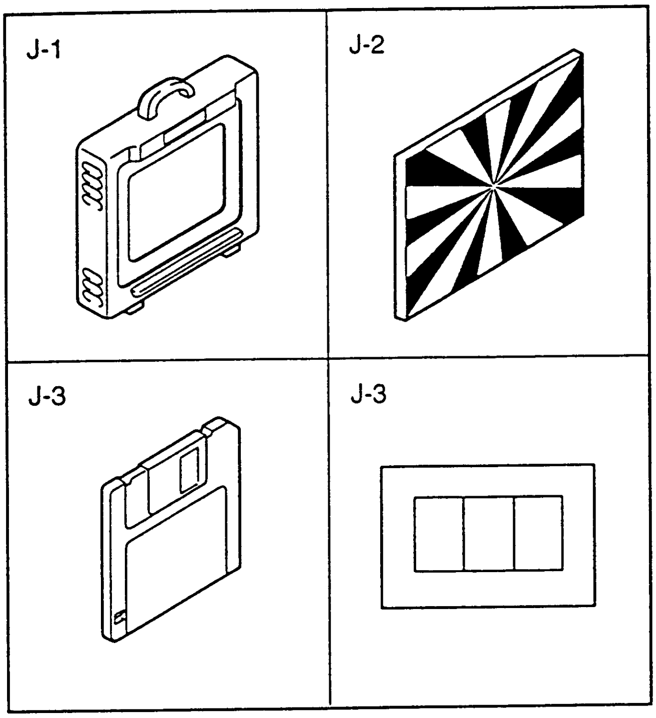


# 3. ELECTRICAL ADJUSTMENT

## 3-1. Table for Servicing Tools

| Ref. No. | Name | Part code |
|---|---|---|
| J-1 | Color viewer 5,100 K | VJ8-0007 |
| J-2 | Siemens star chart | |
| J-3 | Calibration software | VJ8-0156 |
| J-4 | Chart for color adjustment | VJ8-0155 |

**Note:** J-1 color viewer is 100 - 110 VAC only.




## 3-2. Equipment

1. Oscilloscope
2. Digital voltmeter
3. AC adaptor
4. IBM®-compatible PC
5. DC regulated power supply

## 3-3. Adjustment Items and Order

1. IC311 Oscillation Frequency Adjustment
2. 5.0 V (D) Voltage Adjustment
3. 3.4 V (D) Voltage Adjustment
4. 5.0 V (L) Voltage Adjustment
5. 7.7 V (L) Voltage Adjustment
6. Flange-back (Lens) Adjustment
7. AWB and AGC Adjustment
8. Color matrix Adjustment
9. LCD Panel Adjustment
   - 9-1. LCD H AFC Adjustment
   - 9-2. LCD RGB Offset Adjustment
   - 9-3. LCD Gain Adjustment
   - 9-4. LCD Blue Brightness Adjustment
   - 9-5. LCD Red Brightness Adjustment
   - 9-6. LCD Tint Adjustment (for PAL)
10. Judgement Method for Adjustment Result Values
    - 10-1. Flange-back (Lens) Adjustment
    - 10-2. AWB and AGC Adjustment
    - 10-3. Color Matrix Adjustment

## 3-4. Setup

**1. System requirements**

Windows 95
IBM®-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

**2. Installing calibration software**

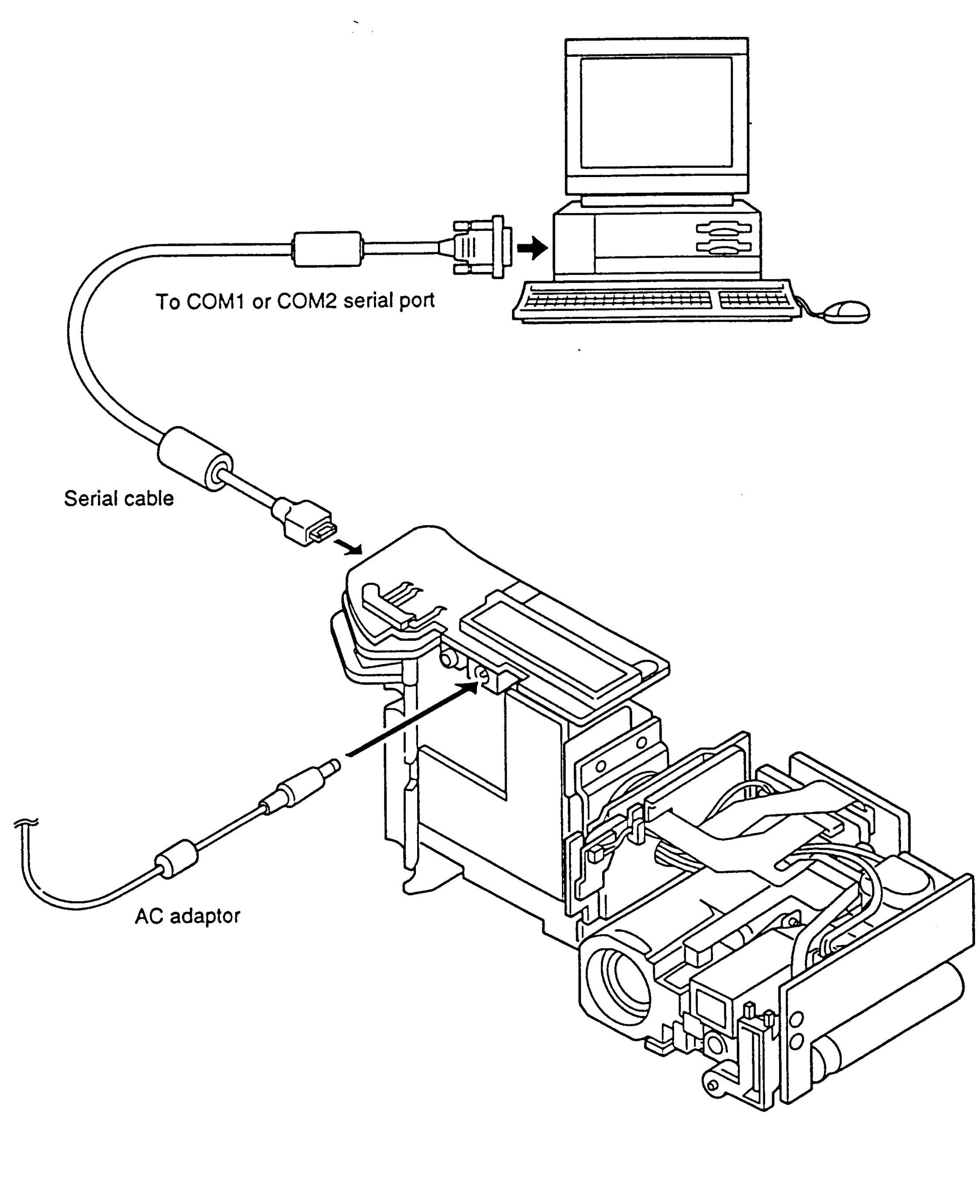
1. Insert the calibration software installation diskette into your diskette drive.
2. Open the explorer.
3. Copy the DSC Cal folder on the floppy disk in the FD drive to a folder on the hard disk.

**3. Color Viewer**

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

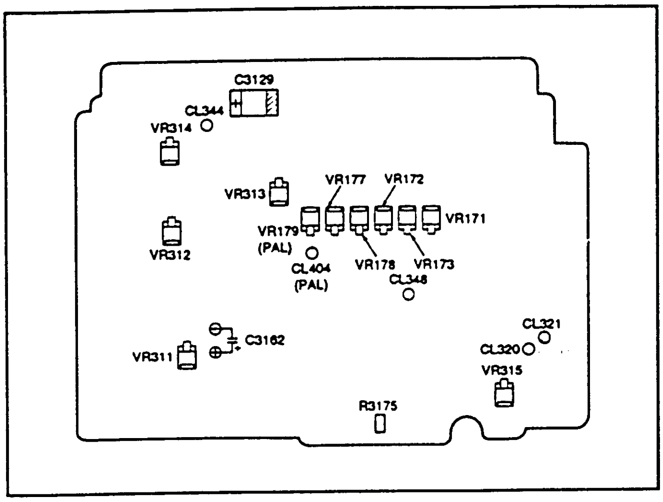
## 3-5. Connecting the camera to the computer

1. Turn off both camera and computer.
2. Locate the port cover on the side of the camera. Press on the arrows and slide the cover down to open it.
3. Line up the arrow on the cable connector with the notch on the camera's serial port. Insert the connector.
4. 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.
5. Line up the serial connector on the cable with one of the serial ports on your computer, and insert the connector.
6. Turn on the camera and your computer system.



## 3-6. Adjust Specifications

[PW1 board (Side B)]




**Note:**
It is necessary to adjust the voltage, when the adjustment value is out of rule.

**Preparation:**
1. If both terminals of S3078 on the SY-1 board are shorted, the mode switches to AUTO REC mode.
2. Adjustment can be carried out in MANUAL REC mode or AUTO REC mode.

### 1. IC311 Oscillation Frequency Adjustment

| | |
|---|---|
| **Measuring Point** | CL344 |
| **Measuring Equipment** | Frequency counter |
| **ADJ. Location** | VR311 |
| **ADJ. Value** | 200 ± 1 kHz |

**Adjustment method:**
1. Adjust with VR311 to 200 ± 1 kHz.

### 2. 5.0 V (D) Voltage Adjustment

| | |
|---|---|
| **Measuring Point** | CL321 |
| **Measuring Equipment** | Digital voltmeter |
| **ADJ. Location** | VR312 |
| **ADJ. Value** | 5.00 ± 0.05 V |

**Adjustment method:**
1. Adjust with VR311 to 5.00 ± 0.05 V.

### 3. 3.4 V (D) Voltage Adjustment

| | |
|---|---|
| **Measuring Point** | C3129 + or CL320 |
| **Measuring Equipment** | Digital voltmeter |
| **ADJ. Location** | VR313 |
| **ADJ. Value** | 3.40 ± 0.05 V |

**Adjustment method:**
1. Adjust with VR313 to 3.40 ± 0.05 V.

### 4. 5.0 V (L) Voltage Adjustment

| | |
|---|---|
| **Measuring Point** | CL348 |
| **Measuring Equipment** | Digital voltmeter |
| **ADJ. Location** | VR314 |
| **ADJ. Value** | 5.0 ± 0.05 V |

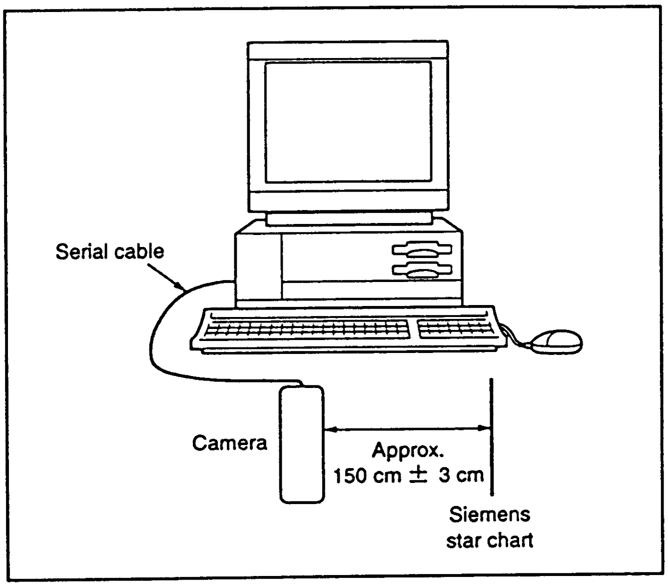
**Adjustment method:**
1.Adjust with VR314 to 5.0 ± 0.05 V.

### 5. 7.7 V (L) Voltage Adjustment

| | |
|---|---|
| **Measuring Point** | C3162 + |
| **Measuring Equipment** | Digital voltmeter |
| **ADJ. Location** | VR315 |
| **ADJ. Value** | 7.70 ± 0.05 V |

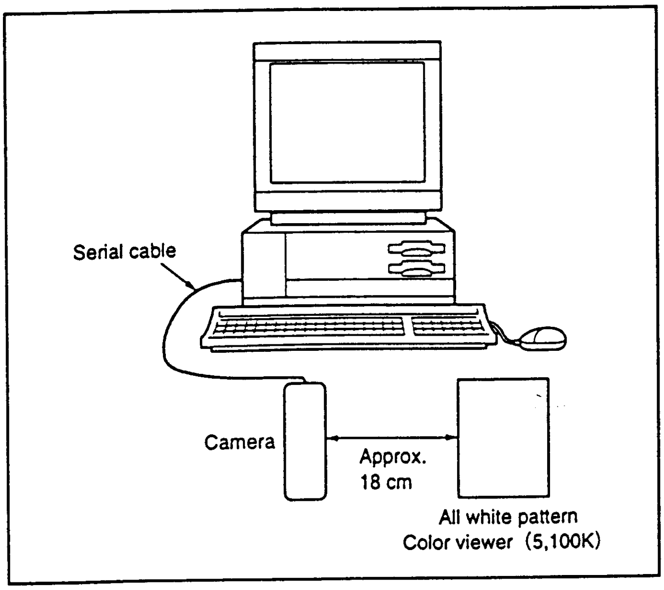
**Adjustment method:**
1. Check that the inverter clock duty at R3175 is 50 %.
2. Note that the inverter clock hi-duty is 42 % for 1 second after backlight illumination commences.
3. Adjust so that the voltage is 7.70 ± 0.05 V when the inverter clock duty is 50 %.

### 6. Frange-back (Lens) Adjustment



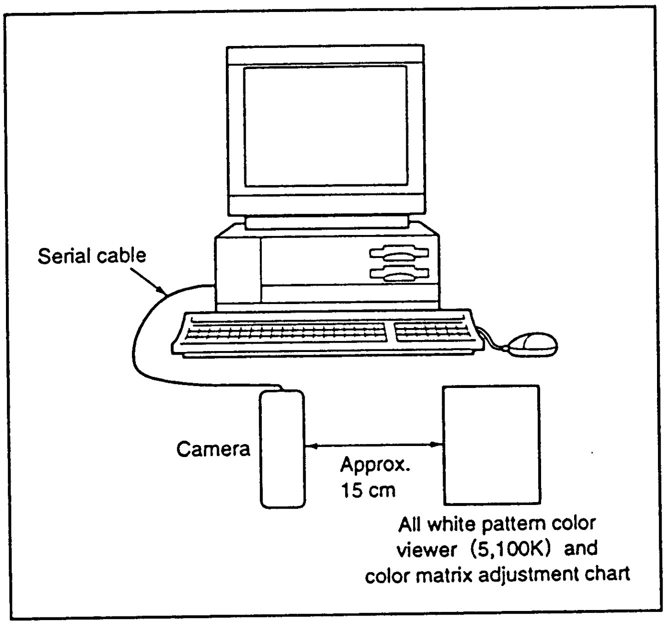

**Preparation:**
POWER switch: ON
**Adjustment condition:**
More than A3 size siemens star chart
Fluorescent light illumination with no flicker
Illumination above the subject should be 400 lux ± 10 %.
**Adjustment method:**
1. Set the siemens star chart 150 cm ± 3 cm so that it becomes center of the screen.
2. Double-click on the DscCalV120.
3. Click the Focus, and Click the Yes.
4. Flange-back adjustment value will appear on the screen.
5. Click the Yes.

## 7. AWB and AGC Adjustment




**Preparation:**
POWER switch: ON
The luminance of color viewer: 1000 ± 100 cd/m²
**Adjusting method:**
1. Set the camera so that area becomes less than quater near viewer. (Do not enter any light.)
2. Double-click on the DscCalV120.
3. Click the AWB, and click the Yes.
4. AWB adjustment value will appear on the screen. (Adjustment value is 241 indicates an error.)
5. Click the OK.

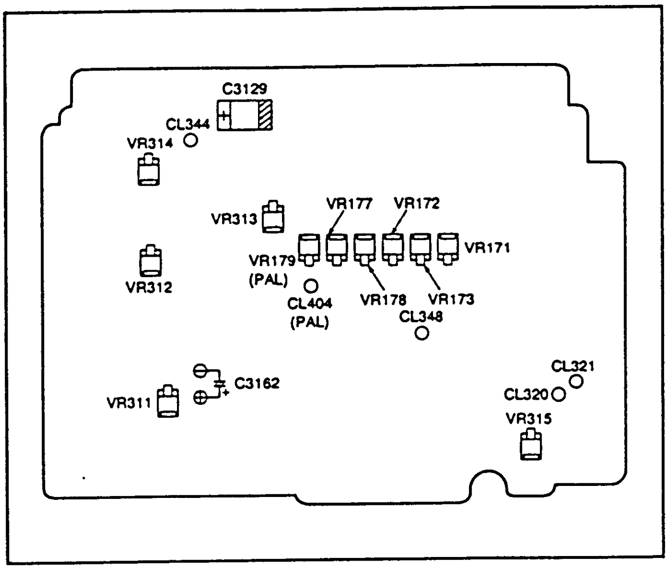
## 8. Color Matrix Adjust ment




**Preparation:**
POWER switch: ON
**Adjustment method:**
1. Set the color adjustment chart to the color viewer. (Do not enter any light.)
2. Set the siemens star chart so that it becomes center of the screen.
3. Double-click on the DscCalV120.
4. Click the UV Matrix, and Click the Yes.
5. Four color matrix (UVMAT0, UVMAT1, UVMAT2 and UVMAT3) adjustment value will appear on the screen.
6. Click the OK.

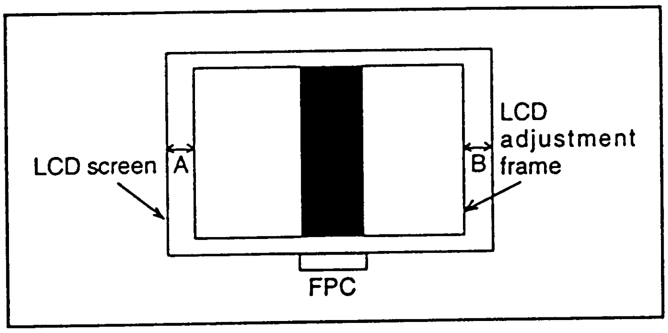
## 9. LCD Panel Adjustment

**[PW1 board]**



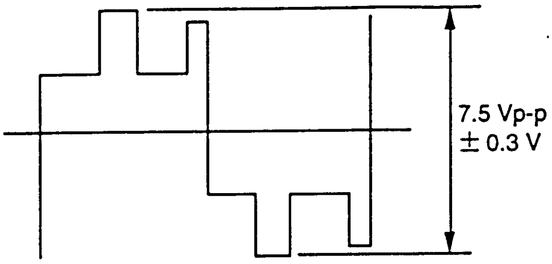

### 9-1. LCD H AFC Adjustment

**Preparation:**
POWER switch: ON
**Adjusting method:**
1. Double-click on the DscCalV120.
2. Select 0 on the LCD "RGB Offset".
3. While watching the LCD monitor, adjust VR171 so that the edge of the LCD adjustment frame are the same distance from the left and right edge of the LCD screen. (A = B)




### 9-2. LCD RGB Offset Adjustment

**Adjusting method:**
1. Double-click on the DscCalV120.
2. Adjust LCD RGB offset so that the amplitude of the CL404 waveform is 7.5 Vp-p ± 0.3 V.




CL404 waveform

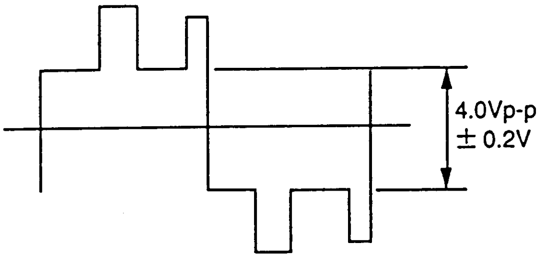
### 9-3. LCD Gain Adjustment

**Adjusting method:**

1. Double-click on the DscCalV120.
2. Adjust VR173 so that the amplitude of the CL404 waveform is 4.0 Vp-p ± 0.2 V.

**Note:**

9-2. LCD RGB Offset adjustment should always be carried out first.




CL404 waveform

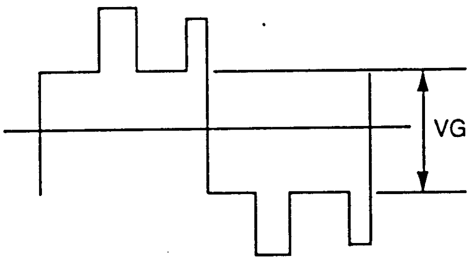
### 9-4. LCD Blue Brightness Adjustment

**Adjusting method:**

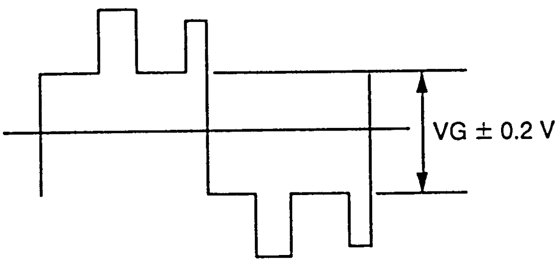
1. Adjust VR178 so that the amplitude of the CL406 waveform is ± 0.2 V with respect to the CL404 (VG) waveform.

**Note:**

9-2. LCD RGB Offset adjustment and 9-3. LCD Gain adjustment should always be carried out first.




CL404 Waveform




CL406 Waveform

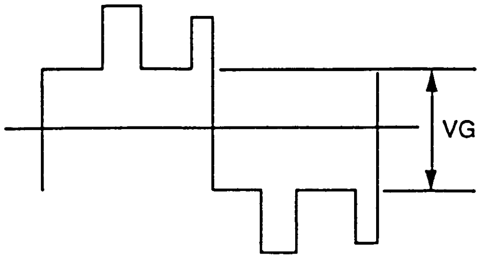
### 9-5. LCD Red Brightness Adjustment

**Adjusting method:**

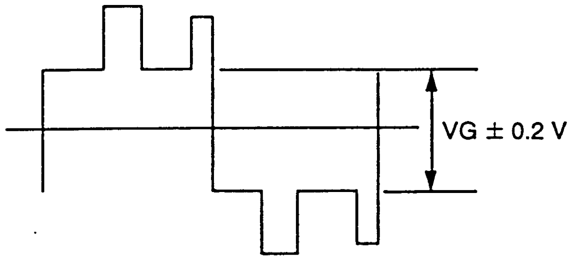
1. Adjust VR177 so that the amplitude of the CL405 waveform is ± 0.2 V with respect to the CL404 (VG) waveform.

**Note:**

9-2. LCD RGB Offset adjustment and 9-3. LCD Gain adjustment should always be carried out first.




CL404 Waveform




CL405 Waveform

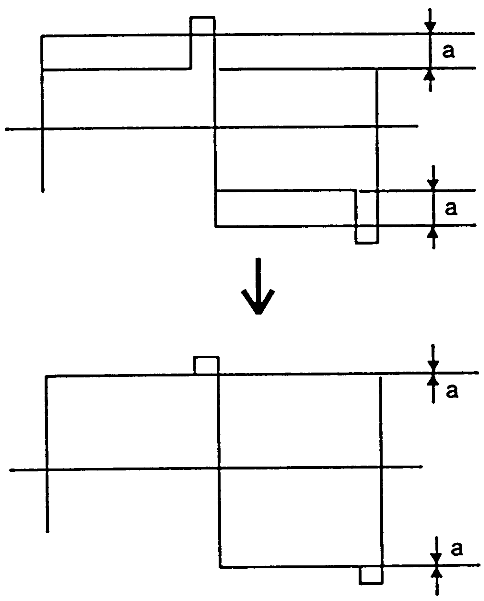
### 9-6. LCD TINT Adjustment (for PAL)

**Adjusting method:**

1. Adjust VR175 so that the amplitude of TP172 waveform is minimum.

**Note:**

9-6. LCD TINT adjustment should always be carried out last.



## 10. Judgement Method for Adjustment Result Values

### 10-1. Flange-back (Lens) Adjustment

Calculate the ZOOM and FOCUS adjustment result values from the flange-back (lens) adjustment result value, and compare the values obtained with the standard values.

1. Convert the adjustment result value from DEC (base 10) to HEX (base 16).
   ex. 589382 → 8FE46
   -655776 → FFFFF5FE60
2. Use the right 4 bytes (8 digits) of the converted value, and take the first four bytes (8 digits) of this value. The two bytes (4 digits) on the left side will be the ZOOM value, and the two bytes (4 digits) on the right side will be the FOCUS value (HEX = base16).
   ex. Flange-back (lens) adjustment result values

| | | |
|---|---|---|
| HEX | 8FE46 | FFFFF5FE60 |
| conversion | ↓ | ↓ |
| 4 bytes | 0008FE46 | FFF5FE60 |
| indication | ↓ | ↓ |
| ZOOM | 0008 | FFF5 |
| | ↓ | ↓ |
| FOCUS | FE46 | FE60 |

3. Convert each value from HEX (base 16) to DEC (base 10), and then compare them with the standard values. Furthermore, if the top bit of the HEX (base 16) value is F, the DEC (base10) value should be displayed with a minus sign.
   ex. ZOOM FOCUS
   0008 → 8 FE46 → -442
   FFF5 → -11 FE60 → -416
4. If the top bit of the HEX (base 16) value is F, the calculation method becomes as follows: subtract the displayed value from a number which is one digit longer than the displayed value, and which consists of a 1 followed by zeroes. (Calculate using HEX [base 16] values.) Convert the resulting value from HEX (base 16) to DEC (base 10), and then add a minus sign.

| ex. | | |
|---|---|---|
| HEX | FFF5 | FE46 |
| indication | ↓ | ↓ |
| calculation | 10000-FFF5 | 10000-FE46 |
| expression | ↓ | ↓ |
| calculation | B | 1BA |
| result | ↓ | ↓ |
| HEX → DEC | 11 | 442 |
| | ↓ | ↓ |
| minus display | -11 | -442 |

| Item | Standard values |
|---|---|
| FOCUS | -837 ~ 10 |
| ZOOM | -47 ~ 46 |

### 10-2. AWB and AGC Adjustment

**1. AWB**

Compare the RG and BG adjustment result values with the standard values.

**2. AGC**

Calculate AGC+2, AGC+1, AGC ± 0, AGC-1 from the AGC adjustment result value, and then compare the value of AGC ± 0 with the standard value.

1. Convert the adjustment result value from DEC (base 10) to HEX (base 16).
   ex. 1564288020 → 5D3D2414
2. Display the converted value in 4 bytes (8 digits). When read ing from the left, each byte (2 digits) will represent AGC+2, AGC+1, AGC ± 0 and AGC-1 respectively.
   ex. 5D3D2414 → 5D, 3D, 24, 14
3. Convert each HEX (base 16) value back to DEC (base 10), and then compare the value of AGC ± 0 with the standard value.
   ex. AGC+2, AGC+1, AGC ± 0, AGC-1
   5D → 93, 3D → 61, 24 → 36, 14 → 20
4. Calculate (AGC+2) / (AGC+1), (AGC+1) / (AGC ± 0) and (AGC ± 0) / (AGC-1), and compare these values with the standard values.

| Items | Standard values |
|---|---|
| UVMAT0 | 57 ~ 157 |
| UVMAT1 | -30 ~ 30 |
| UVMAT2 | -79 ~ -19 |
| UVMAT3 | 5 ~ 105 |

### 10-3. Color Matrix Adjustment

1. For UVMAT0, compare the adjustment result value with the standatd value.
2. For UVMAT1, compare the adjustment result value with the standard value if the adjustment result value is 128 or less. If the adjustment result value is 129 or more, subtract 256 from the adjustment result value and compare the value thus obained with the standard value.
3. For UVMAT2, compare the adjustment result value with the standard value if the adjustment result value is 128 or less. If the adjustment result value is 129 or more, subtract 256 from the adjustment result value and compare the value thus obtained with the standard value.
4. For UVMAT3, compare the adjustment result value with the standard value.

| Items | Standard value |
|---|---|
| RG | 200 ~ 400 |
| BG | 200 ~ 400 |
| AGC ± 0 value | 15 ~ 100 |
| (AGC+2) / (AGC+1) ratio | 1.1 ~ 2.8 |
| (AGC+1) / (AGC ± 0) ratio | 1.1 ~ 2.8 |
| (AGC ± 1) / (AGC-0) ratio | 1.1 ~ 2.8 |

## 4. TROUBLESHOOTING GUIDE

### POWER LOSS INOPERTIVE

- SLD ON (M-REC, A-REC, PLAY) — NO → SET SLD ON → NORMAL
  - OPEN ↓
- IC301-93 (SCAN IN 2) — NO → CHECKSLD, D3076, D3077, R3075, R3076
  - YES ↓
- IC304-7 (UNREG) — LOW → CHECK PR303, PW1
  - HIGH ↓
- IC301-81 (VDD) — LOW → CHECK IC304
  - HIGH ↓
- IC301-84 (RESET) — LOW → CHECK IC304, C3047
  - HIGH ↓
- IC301-85 (BAT OFF) — LOW → CHECK R3042
  - HIGH ↓
- IC301-79 OSCILLATION — NO → CHECK X3001
  - YES ↓
- IC301-83 OSCILLATION — NO → CHECK X3002, R3001, C3003, C3004
  - YES ↓
- CHECK IC301

### TAKING INOPERATIVE

- PUSH RELEASE BUTTON
  - ↓
- IC301-92 (SCAN IN 1) PULSE INPUT — NO → CHECK RELEASE SWITCH, D3071, D3072, R3075, R3076
  - YES ↓
- CN301-70, 71 (P ON, P(A) ON) — LOW → CHECK R3022, R3023, PW1
  - HIGH ↓
- IC301-96, 97, 98 HIGH — NO → CHECK IC301, CA2, PW1
  - YES ↓
- SERIAL COMMUNICATION — NG → CHECK IC301, R3020, R3024, Q3001, CA2
  - OK ↓
- CHECK CA2

### NO PICTURE

- CLK OSCILLATION (96MHz) IC111-5 — NG → MAIN CLOCK FOR SYSTEM OPERATION NO OPERATION IF ABSENT CHECK X1101 OSCILLATOR, IC111 AND L1102
  - NO ↓
- MCLK (24 MHz) IC101-132 — NG → BASIC CPU BLOCK CHECK R1045
  - OK ↓
- IC101-61 (ZAS) — NG → ALWAYS APPEARS WHEN CPU, ETC. IS ACCESSED CHECK IF CPU IS READKING PROGRAM, AND CHECK ADDRESS AND DATA BUS OF IC121
  - OK ↓
- IC101-52 (ZBREQ) — NG → REQUEST FOR USE OF DATA BUS FROM ASIC TO CPU NO DMA TRANSMISSION IF ABSENT
  - OK ↓
- IC101-56 (ZGRNT) — NG → RECEIVES ZBREQ SIGNAL AND GIVES PERMISSION TO ASIC FOR USE OF DATA BUS NO DMA TRANSMISSION IF ABSENT
  - OK ↓
- IC101-118, 119 (IRL1, IRL0) — NG → INCORRECT HANDSHAKING BETWEEN 8-BIT CPU AND RS-232C CHECK EACH INTERFACE
  - OK ↓
- CHECK SOLDERING OF EACH CPU, ASIC AND MEMORY PIN

### FOCUS INOPERATIVE

- IC953-3, 5, 10, 12 OUTPUT PULSE — YES → CHECK LENS
  - NO ↓
- IC953-2, 6, 9, 13 INPUT PULSE — YES → CHECK IC953
  - NO ↓
- CHECK FPC (W1500) — NG → CHANGE FPC
  - OK ↓
- IC301-92 SCAN OUT1 INPUT PULSE — YES → CHECK IC301
  - NO ↓
- CHECK D3075, R3077, R3078, S3074, S3075

## FOCUS INOPERATIVE