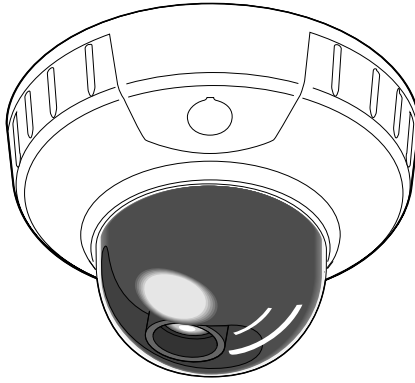


Service Manual

Color CCTV Camera
WV-CF224



SPECIFICATIONS

The Product with PbF

Pick-up device:	768 (H) x 492 (V) pixels, interline transfer CCD
Scanning area:	3.6 (H) x 2.7 (V) mm (equivalent to scanning area of 1/4" pick-up tube)
Synchronization:	Internal, Line-lock (24 V AC only) or multiplexed vertical drive (VD2), selectable
Scanning system:	2 : 1 interlace
Scanning:	525 lines / 60 fields / 30 frames
Horizontal:	15.734 kHz
Vertical:	59.94 Hz
Horizontal resolution:	480 lines
Video output:	1.0 V[p-p] NTSC composite 75 Ω
Automatic Gain Control (AGC):	+18 dB
Automatic Tracing White Balance (ATW):	ON only
Signal-to-noise ratio:	50 dB (equivalent to AGC Off, weight On)
Minimum illumination:	2.0 lx (0.2 foot-candle) at F1.4 (WIDE)
Back Light Compensation (BLC):	On or Off
Detail:	Sharp or Soft, selectable
Lens:	2x variable focal lens
Focal length:	f=2.8 - 6.0 mm
F number:	F1.4 - 1.8, close
Panning range:	$\pm 100^\circ$
Tilting range:	$\pm 75^\circ$
Azimuth range:	$\pm 100^\circ$
Ambient operating temperature:	-10 $^\circ\text{C}$ to +50 $^\circ\text{C}$ (14 $^\circ\text{F}$ to 122 $^\circ\text{F}$)
Ambient operating humidity:	Less than 90 %
Power source and power consumption:	12 V DC, 235 mA 24 V AC 60 Hz, 2.8 W
Dimensions:	$\phi 135$ mm x 90 mm (H) $\phi 5\text{-}5/16$ " x 3-9/16" (H)
Weights:	0.46 kg (1.01 lbs.)

Weights and dimensions indicated are approximate.
Specifications are subject to change without notice.

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.

It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.

Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

  CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN	 This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.	 This symbol alerts the user that important literature concerning the operation and maintenance of this has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-radiation, shock, fire, or other hazards. Do not modify the original design without permission of manufacture.

About Lead Free Solder (PbF)

Distribution of PbF PCB:

PCBs (manufactured) using lead free solder (PbF) will have a stamp on the PCB.

Caution:

- Lead free solder has a higher melting point than standard solder. Typically the melting points is 35 °C – 40 °C (95 °F – 104 °F) higher. Please use a soldering iron with temperature control and adjust it to 360 °C – 370 °C (680 °F – 698 °F). In case of using high temperature soldering iron, please be careful not to heat too long.
- Lead free solder will tend to splash when heated too high (600 °C / 1112 °F).
- Lead free solder (Sn - 3.0Ag – 0.5Cu) or equivalents are recommended on repairing our lead free soldered PCB.

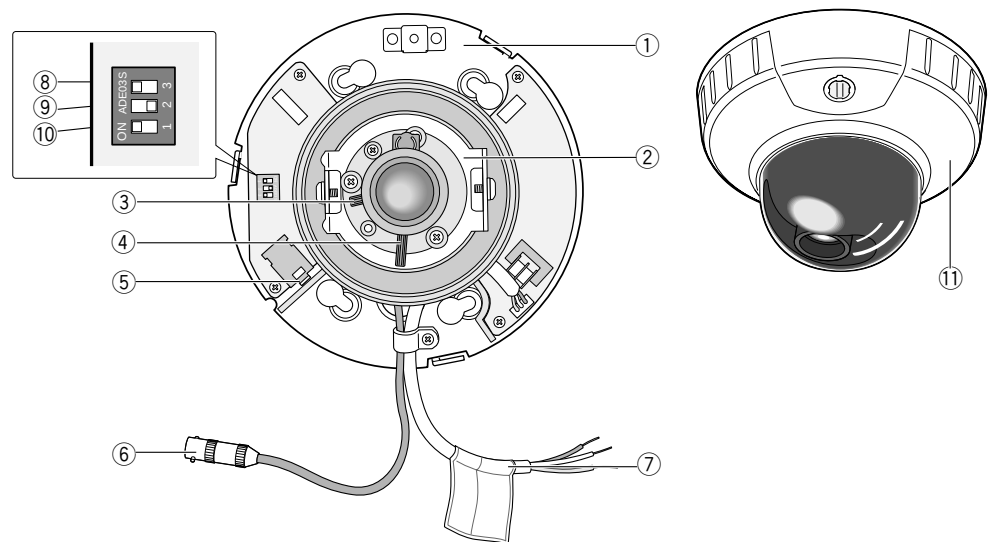
STANDARD ACCESSORIES

Operating Instructions.....1 pc
Rubber cap1 pc

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MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



- ① **Camera Panel**
- ② **Pan/Tilt/Azimuth Table**
Adjusts the panning/tilting and azimuth angle of the camera.
- ③ **Focus Lever**
Fixes the focus position after adjusting.
- ④ **Zoom Lever**
Fixes the zoom position after adjusting.
- ⑤ **Video Jack (3.5-diam. mini jack)**
For connecting an LCD monitor to adjust the camera images. Use an L-type plug to save space.
- ⑥ **Video Output Connector**
Supplies the video output signals. The signals will be interrupted when the video jack is connected to an LCD monitor.
- ⑦ **Power Cable**
Supplies 24 V AC or 12 V DC from an external power source.

- | | ON | OFF |
|------|--------|------|
| AP | SHARP* | SOFT |
| BLC | ON | OFF* |
| SYNC | INT* | LL |
- Diagram showing three switch positions. The first is labeled '3' and shows a switch moved to the right. The second is labeled '2' and shows a switch moved to the left. The third is labeled '1' and shows a switch moved to the left with a tilde symbol (~) above it.
- ⑧ **Aperture Level Selector**
SHARP: Sharpens the image outline.
SOFT: Softens the image outline.
The default setting is SHARP.
 - ⑨ **Back Light Compensation Selector**
ON: Compensates the background if it is brighter than the object.
OFF: Does not compensate.
The default setting is OFF.
 - ⑩ **Synchronization Mode Selector**
Specifies a source for synchronization.
INT: Internal 2:1 interlace.
LL: Line-lock mode driven by 24 V AC.
The default setting is INT.
Note: Do not set the switch to LL (Line-Lock) position when supplying 12 V DC to avoid synchronization error.
 - ⑪ **Panel Cover**

ADJUSTMENT PROCEDURE

1. Test Equipment Required

The following Test Equipment is required for Adjustment of the Color CCTV Camera WV-CF224.

- Oscilloscope
- Digital Voltmeter
- Frequency Counter
- Vectorscope
- Underscanned Color Video Monitor
- 12 V DC/24 V AC Power Supply Unit
- Personal Computer (IBM PC/AT type or equivalent)
- Lighting (140 footcandles (1 400 lx), Color Temperature 3 200°K)
- Lux Meter
- White Chart or White Paper
- Radiation Chart
- Color Chip Chart (Part Number: YWV2310RB98)
- Logarithmic Gray Scale Chart (Part Number: YWV2310RB99)
- Electric Variable Resistor (E.V.R.) Adjustment Kit (Part Number: YWV0JA0019AN) as shown in Fig. 1-1.

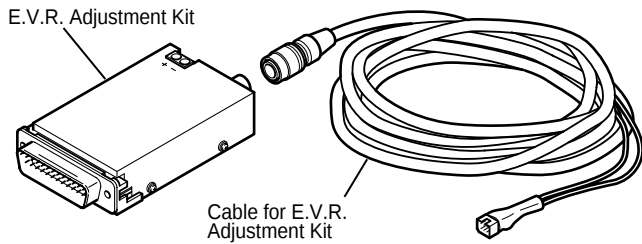


Fig. 1-1

- Extension Cable Ass'y as shown Fig. 1-2. (Part Number: V0EA1455AN)

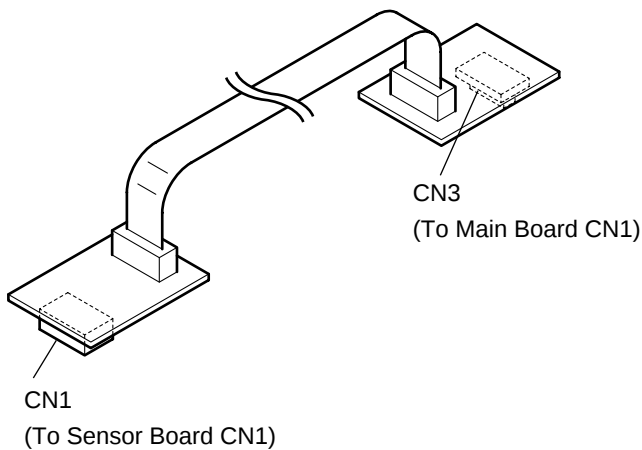


Fig. 1-2

2. Disassembly Procedure for Adjustment

- Referring to Fig. 2-1, remove the Rubber Cap from the Panel Cover Ass'y, and remove one screw that secures the Panel Cover Ass'y.
- Turn the Panel Cover Ass'y in the direction of the arrow and remove the Panel Cover Ass'y from the Camera Unit.

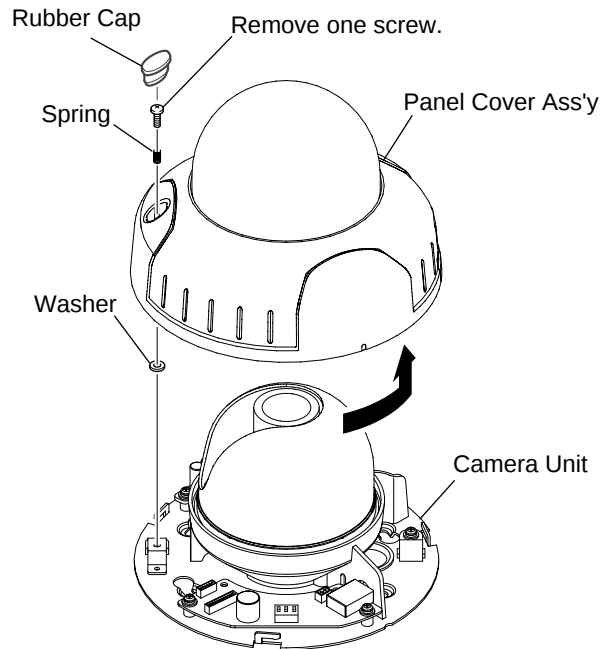


Fig. 2-1

- Referring to Fig. 2-2, remove the Inner Dome in the direction of the arrow from the Camera Unit carefully.

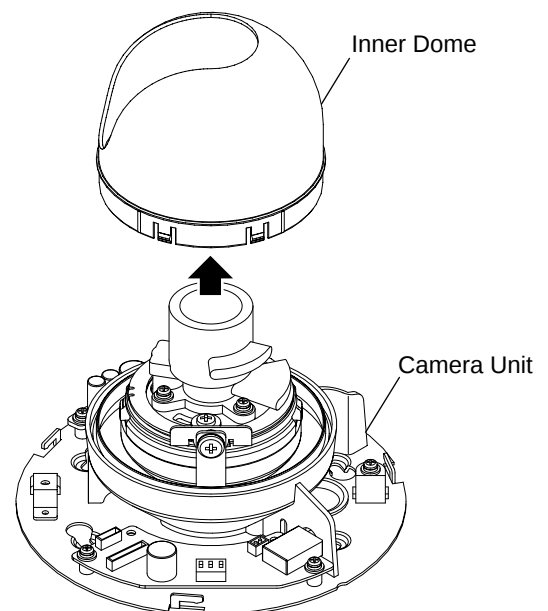


Fig. 2-2

- Referring to Fig. 2-3, remove two screws and three washers that secure the Main Unit, and remove the Main Unit from the Camera Unit.

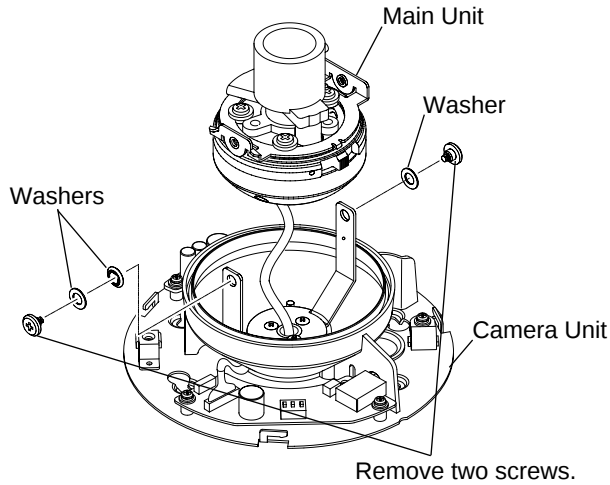


Fig. 2-3

- Referring to Fig. 2-4, remove two screws that secure the Camera Bottom Case and remove the Camera Bottom Case from the Main Unit.
- Disconnect the Connector CN3 on the Main Board and remove the Wire Ass'y.

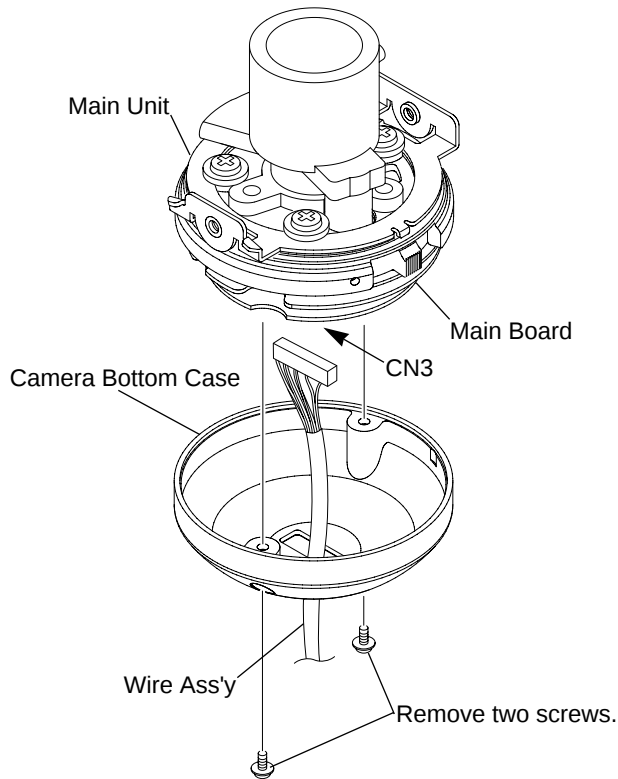


Fig. 2-4

- Referring to Fig. 2-5, remove two screws that secure the Main Board, disconnect the Connector CN1 on the Main Board and remove the Main Board from the Main Unit with the Sensor Board in order to service the Main Board.
- Remove two screws that secure the Sensor Board and remove the Sensor Board from the Main Unit in order to replace the Optical Ass'y (IC1) or service the Sensor Board.

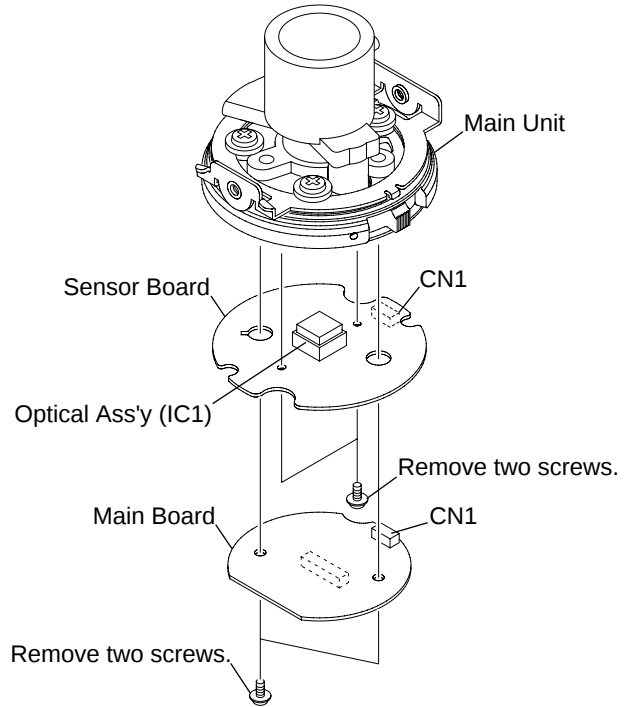


Fig. 2-5

- Reconnect the connectors by using Extension Cable Ass'y between CN1 on the Sensor Board and CN1 on the Main Board as follows in order to service.
- Referring to Fig. 2-6, connect the Connector CN1 on the Extension Cable Ass'y to CN1 on the Sensor Board.
- Connect the Connector CN3 on the Extension Cable Ass'y to CN1 on the Main Board.

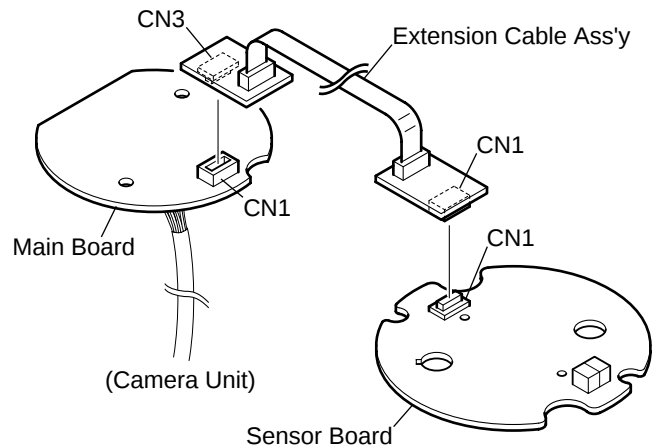


Fig. 2-6

3. Connection and Setting Up for Adjustment

3.1. Connection

- The Fig. 3-1 shows the connection diagram for the Adjustment Procedure.

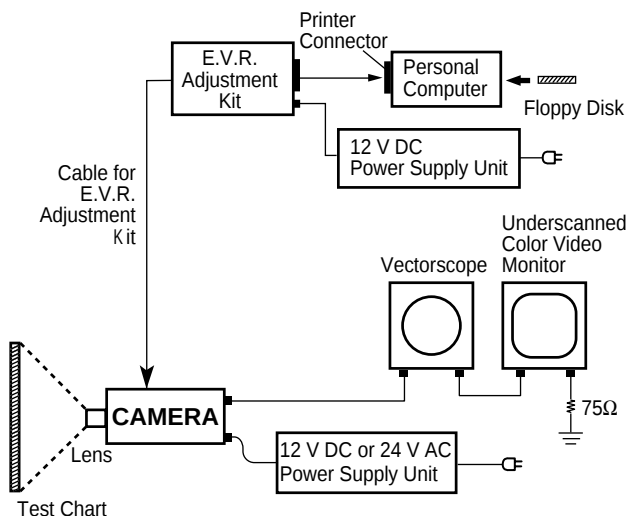


Fig. 3-1

- Connect the probe of the Digital Voltmeter, Oscilloscope or Frequency Counter at the desired Test Point in each adjustment step.

3.2. Setting Up for E.V.R. Adjustment Kit

(1). Connecting for E.V.R. Adjustment Kit

- Referring to Fig. 3-1, connect the E.V.R. Adjustment Kit to CN3 on the Sensor Board of the Camera using the Cable for E. V. R. Adjustment Kit.
- Connect the connector of the E.V.R. Adjustment Kit to Personal Computer (IBM PC/AT type) using the printer connector.
- Insert original floppy disk of E.V.R. Adjustment Kit to the computer.

(2). Installing E.V.R. Adjustment Program

- Make a copy of following necessary files to your computer from original floppy disk of the E.V.R. Adjustment Kit.

LADJ.EXE

CF224P.SEQ

CF224P.EVR

(3). Procedure

1. Confirm that the CONFIG.SYS file on your computer contains DEVICE=ANSI.SYS.
2. Insert floppy disk containing E.V.R.adjustment program into your floppy drive (for example,drive:A) and type **A:**
3. At the prompt, type **CD IBMPC** and press **ENTER** key.
4. Type **COPY LADJ.EXE B:** and press **ENTER** key.
5. Type **CD** and press **ENTER** key.
6. Type **CD SEQ** and press **ENTER** key.
7. Type **COPY CF224P.SEQ B:** and press **ENTER** key.
8. Type **CD** and press **ENTER** key.
9. Type **CD EVR** and press **ENTER** key.
10. Type **COPY CF224P.EVR B:** and press **ENTER** key.
11. After completing installation of program, you are ready to use the E.V.R. adjustment program.

3.3. Setting Up

- An initial setting of the Switches SW1 on the SW Board as follows:
Synchronization Mode Selector (INT,LL).....INT
Back Light Compensation Mode Selector (BLC ON,OFF)OFF
Aperture Level Selector (SOFT,SHARP).....SHARP
- The adjustments should be done with this initial setting, unless otherwise specified.
- The adjustments should be done after 10 minutes warm up.

4. Adjustment Procedure

- Refer to the Wiring Diagram on page 3-1.

4.1. Adjustment Procedure-1

(1). Line Lock VCO Adjustment

Test Point: TP1 (LL VCO) **Main Board**

Adjust: L301 (LL VCO) **Sensor Board**

- Set the Synchronization Mode Selector (on the SW Board SW1) to LL position.
- Connect the Digital Voltmeter to TP1.
- Adjust L301 so that the voltage becomes $1.65\text{ V} \pm 0.35\text{ V}$.
- Return the Synchronization Mode Selector (on the SW Board) SW1 to INT position.

(2). Flange-back Adjustment

Test Point: Video Output Connector

Adjust: Flange-back Adjusting Cam

- Referring to Fig. 4-1, loosen the Zoom Lock Screw at the tip of the Zoom Lever.
- Move the Zoom Lever to TELE side fully.
- Loosen the Focus Lock Screw at the tip of the Focus Lever.
- Move the Focus Lever to FAR side fully.
- Set the Radiation Chart.
- Aim the Camera at the Radiation Chart 10m away.
- Loosen the Flange-back Lock Screw that secures the Flange-back Adjusting Cam.
- Adjust the Flange-back Adjusting Cam to obtain best focal point.

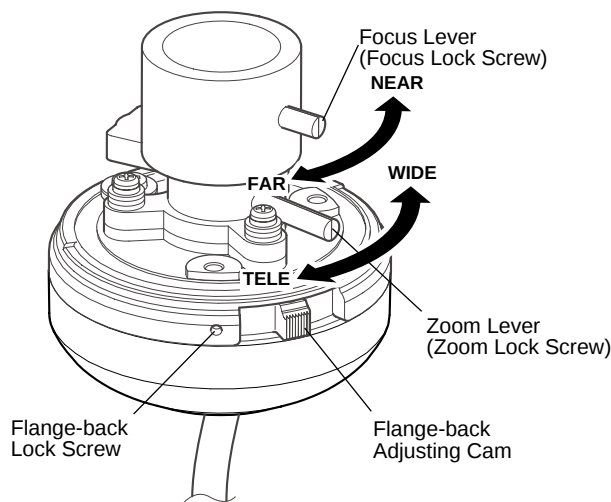


Fig. 4-1

- Move the Zoom Lever to WIDE side fully.
- Confirm that the focal point can be obtained by moving the Focus Lever.
- Tighten the Flange-back Lock Screw that secures the Flange-back Adjusting Cam carefully.
- Tighten the Zoom Lock Screw at the tip of the Zoom Lever carefully.
- Tighten the Focus Lock Screw at the tip of the Focus Lever carefully.

4.2. Adjustment Procedure-2 (E.V.R. Adjustment)

- Insert new disk containing the E.V.R. Adjustment program into IBM PC/AT and turn on the Power Switch of IBM PC/AT.
- When starting an adjustment, at the prompt, type **LADJ CF224P** and press the **ENTER** key, an initial menu will be displayed in Table 4-1.

```
PANASONIC REMOTE EVR ADJUSTMENT SYSTEM (C) MCI Co. CCTV PRODUCT:CF224 EEPROM:0
*****MENU***** Page (1/1)*****NTSC
1. FSC ADJUSTMENT
3. ALC LEVEL
4. AGC OFF GAIN
5.1. OB LEVEL
5.2. VIDEO OUT GAIN
5.3. OB CONFIRM
6. BURST LEVEL
7.1. 3200K R GAIN
7.2. 3200K B GAIN
7.3. 3200K PHASE
7.5. COLOR CENTER POINT ADJUSTMENT
8.1. ATW CONFIRM
8.2. HI LIGHT CHROMA CLIP
<CONTENTS> IC5 - 3 PIN [CCD] 28.63636 MHz + - 40Hz
<INSTRUCTION> PLEASE CHOOSE MENU DATA BY ARROW-KEY
LOAD (F1)   QUIT (F3)   SAVE (F5)
```

Table 4-1

- Press the **SAVE (F5)** key of the Computer, then the Computer will ask you for the file name.
- Type **xxxxxxx.EVR**. Give an appropriate file name for **xxxxxxx** within 8 letters, but do not use **CF224P**.
- Press the **ENTER** key.
- This saving procedure is recommended to keep the current adjustment status of the Camera.
- Press the **LOAD (F1)** key and type **CF224P.EVR** and press the **ENTER** key for presetting adjustment of the Camera.
- Press the **ENTER** key to start adjustment.

(1). FSC Adjustment

Test Point: Pin 3 of IC5 (28MHz) **Sensor Board**

- Confirm that the Synchronization Mode Selector (on the SW Board SW1) is set to INT Position.
- Connect the Frequency Counter to Pin 3 of IC5.
- Adjust data with the **ARROW** keys so that the Subcarrier Frequency becomes 28.63636 MHz $\pm$ 40 Hz.
- Press the **ENTER** key for next adjustment.

(3). ALC Level Adjustment

Test Point: Pin 1 of CN2 (CDS OUT) **Sensor Board**

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to Pin 1 of CN2.
- Adjust data with the **ARROW** keys so that the CDS OUT signal level becomes 300 mV $\pm$ 30 mV as shown in Fig. 4-2.

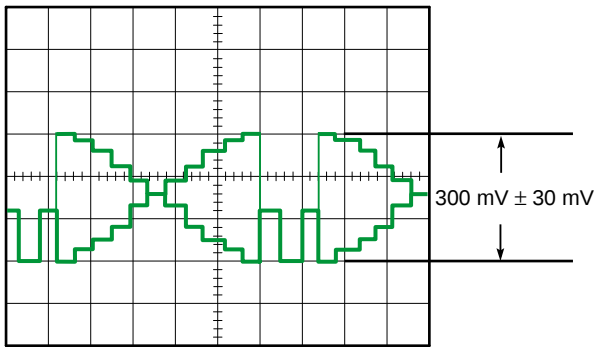


Fig. 4-2

- Press the **ENTER** key for next adjustment.

(4). AGC OFF Gain Adjustment

Test Point: Pin 3 of CN2 (AGC OUT) **Sensor Board**

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to Pin 3 of CN2.
- Adjust data with the **ARROW** keys so that the AGC OUT signal level becomes 300 mV $\pm$ 30 mV as shown in Fig. 4-3.

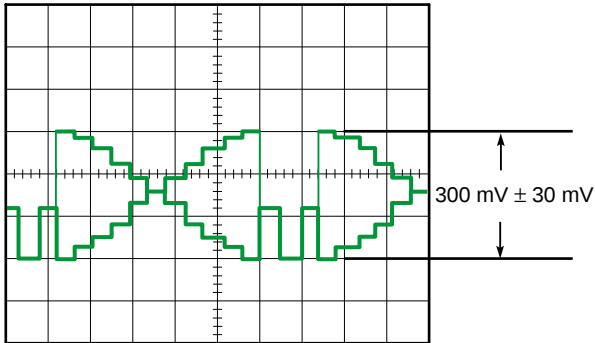


Fig. 4-3

- Press the **ENTER** key for next adjustment.

(5.1). OB Level Adjustment

Test Point: Video Output Connector

- Connect the terminated Oscilloscope with 75Ω to Video Output Connector.
- Adjust data with the **ARROW** keys so that the Pedestal level becomes 50 mV $\pm$ 10 mV as shown in Fig. 4-4.

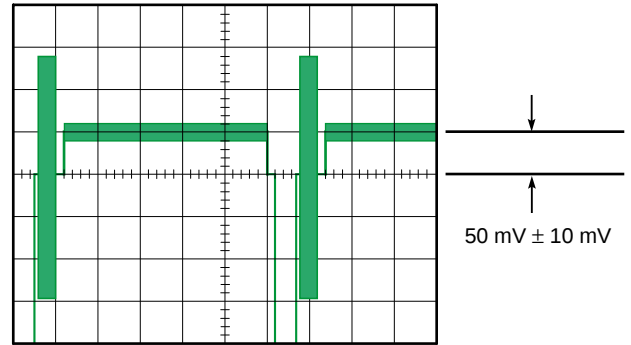


Fig. 4-4

- Press the **ENTER** key for next adjustment.

(5.2). Video Output Gain Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the terminated Oscilloscope with 75Ω to Video Output Connector.
- Adjust data with the **ARROW** keys so that the Video signal level becomes 714 mV $\pm$ 50 mV as shown in Fig. 4-5.

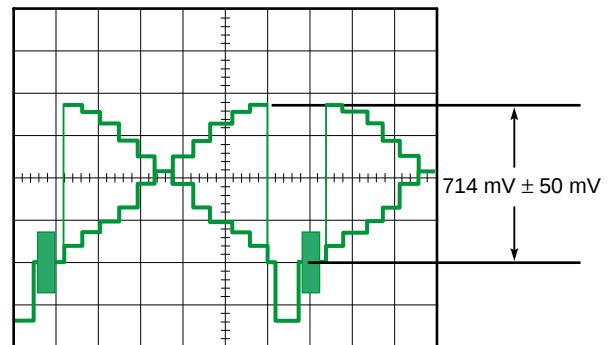


Fig. 4-5

- Press the **ENTER** key for next adjustment.

(5.3). OB Confirmation (Don't Change Data)

- Press the **ENTER** key for next adjustment.

(6). Burst Level Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Logarithmic Gray Scale Chart.
- Connect the Oscilloscope to Video Output Connector.
- Adjust data with the **ARROW** keys so that the Burst level becomes $286 \text{ mV} \pm 10 \text{ mV}$ as shown in Fig. 4-6.

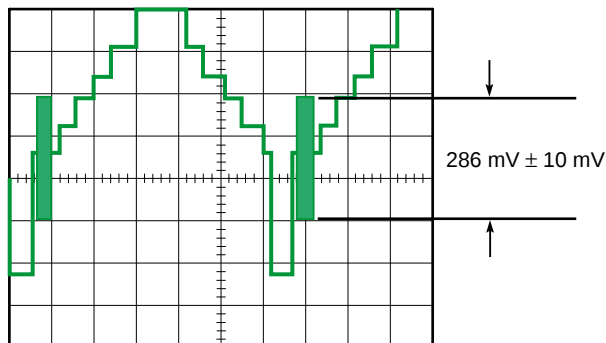


Fig. 4-6

- Press the **ENTER** key for next adjustment.

(7.1). 3200°K R Gain Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Color Chip Chart.
- Adjust data with the **ARROW** keys so that the Red gain becomes $220 \% \pm 5 \%$.
- Press the **ENTER** key for next adjustment.

Note: Chrominance phase and gain are adjusted to proper position as shown in Fig. 4-7 and Table 4-2.

(7.2). 3200°K B Gain Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Color Chip Chart.
- Adjust data with the **ARROW** keys so that the Yellow gain becomes $100 \% \pm 5 \%$.
- Press the **ENTER** key for next adjustment.

Note: Chrominance phase and gain are adjusted to proper position as shown in Fig. 4-7 and Table 4-2.

(7.3). 3200°K Phase Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Color Chip Chart.
- Adjust data with the **ARROW** keys so that the Red vector phase becomes $104^\circ \pm 2^\circ$.
- Repeat adjustment steps (7.1). to (7.3). until both chrominance phase and gain are adjusted to proper position as shown in Fig. 4-7 and Table 4-2.

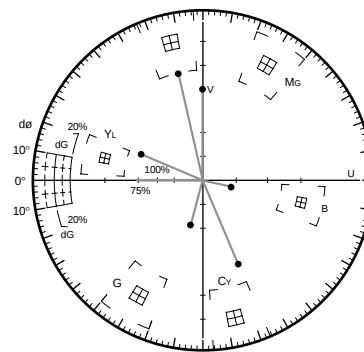


Fig. 4-7

	Red	Yellow
Phase	$104^\circ \pm 2^\circ$	$160^\circ \pm 5^\circ$
Gain	$220 \% \pm 5 \%$	$100 \% \pm 5 \%$

Table 4-2

- Press the **ENTER** key for next adjustment.

(7.5). Color Center Point Adjustment

Test Point: Video Output Connector

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the Color Chip Chart.
- Adjust data with the **ARROW** keys so that data becomes "040".
- While observing the Vectorscope, decrease data so that the Red gain becomes unstable as shown in Fig. 4-8(b).
- After that, decrease data with the **DOWN** key again until the Red gain becomes stable at about 150% as shown in Fig. 4-8(c).
- Raise data with the **UP** key in turn until the Red gain becomes unstable, then raise data by 1 again so that Red gain becomes stable at about 200% as shown in Fig.4-8(a).
- Press the **ENTER** key for next adjustment.

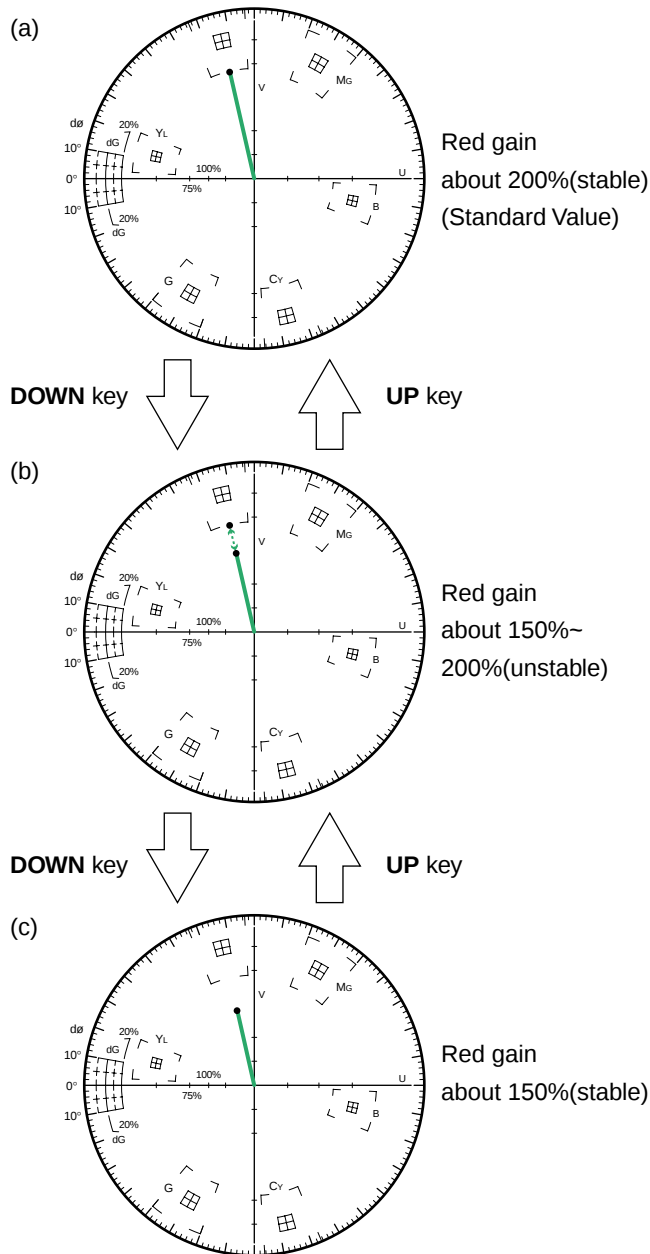


Fig. 4-8

(8.1). ATW Confirmation (Don't Change Data)

- Press the **ENTER** key for next adjustment.

(8.2). High Light Chroma Clip Adjustment

Test Point: Video Output Connector

Adjust: RAM (038)

- Keep the Color Temperature at 3 200°K.
- Aim the Camera at the White Chart or White Paper.
- Adjust data with the **ARROW** keys so that the false chrominance level becomes minimum as shown in Fig. 4-9.

Note: The Data of 038 should be adjusted from FF, the first minimum point of the false chrominance signal is as adjusting point.

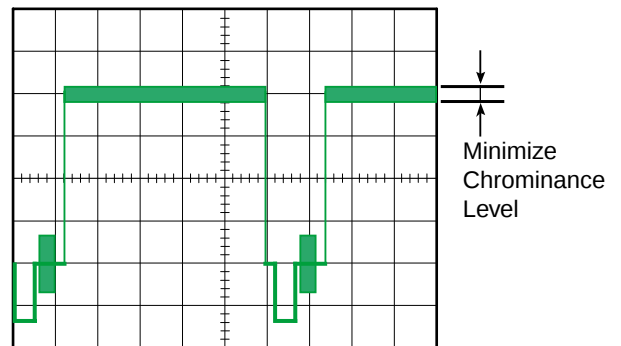
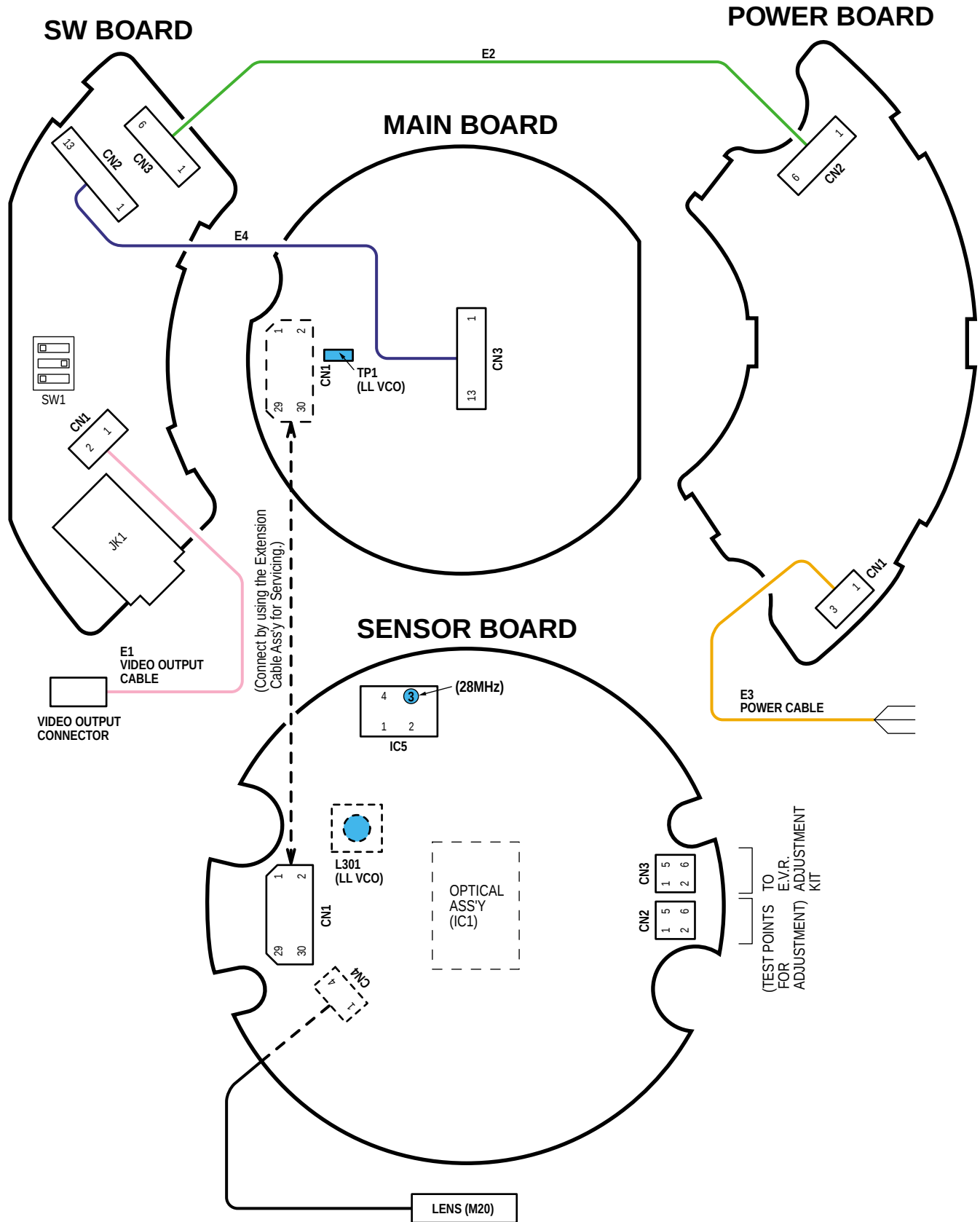


Fig. 4-9

- After completing the adjustment, press the **QUIT (F3)** key, then the menu as shown in "<SAVE CAMERA DATA TO FILE : ***, EVR? Y/N>" will be displayed.
- Press the **N** key, and then press the **ENTER** key to finish this adjustment procedure.

WIRING DIAGRAM



SCHEMATIC DIAGRAM OF SENSOR BOARD

SENSOR BOARD

Note :
• IC1 (Optical Ass'y) is not included in the Sensor Board Assy.

<INDEX>

SENSOR BOARD

IC1 D1
IC2 B2
IC3 D2,D3
IC4 B2,B3
IC5 B3,B4,
C3,C4
B4,B5,
C4,C5
IC6 A5
IC7 B6
IC8 D5
IC301 D5

Q1 C1,D1
Q2 B2
Q4 A4
Q5 A5

D1 D2
D2 A5
D301 D5
D302 D5
D303 C5,C6

1 3.3V
2 5V
3 -9V
4 OSC CONT
5 VCO LFP
6 BLC ON/OFF
7 SOFT/SHARP
8 +15V
9 PCO
10 ALC/ELC
11 DAMP
12 DRIVE
13 AF OUT
14 IRS ADJ
15 CO LFP
16 ALC VREF
17 FLC
18 GND
19 Y OUT
20 GND
21 C OUT
22 GND
23 GND
24 DAC BW
25 V2
26 LL DET
27 LL PULSE
28 FWH
29 CSYNC
30 CLK

TO MAIN BOARD CN1

TO E.V.R. ADJUSTMENT KIT

TO LENS (M20)

Note: The value indicated in the schematic diagram should be read as follows:
Multiplier (0-5)
2nd Significant Digit (0-9)
1st Significant Digit (0-9)

<Example>
For Resistor:
330 → 33 x 10⁰ = 33 Ω
561 → 56 x 10¹ = 560 Ω
123 → 12 x 10³ = 12k Ω
0R00=0 Ω

For Capacitor (Exclude Electrolytic and Tantalum Capacitor):
820 → 82 x 10⁰ = 82PF
102 → 10 x 10² = 1,000PF = 0.001μF
104 → 10 x 10⁴ = 100,000PF = 0.1μF
2R0 = 2.0 PF

For Coil:
270 → 27 x 10⁰ = 27 μH
101 → 10 x 10¹ = 100 μH
8R2 = 8.2 μH

D

C

B

A

1

2

3

4

5

6

SCHEMATIC DIAGRAM OF MAIN BOARD

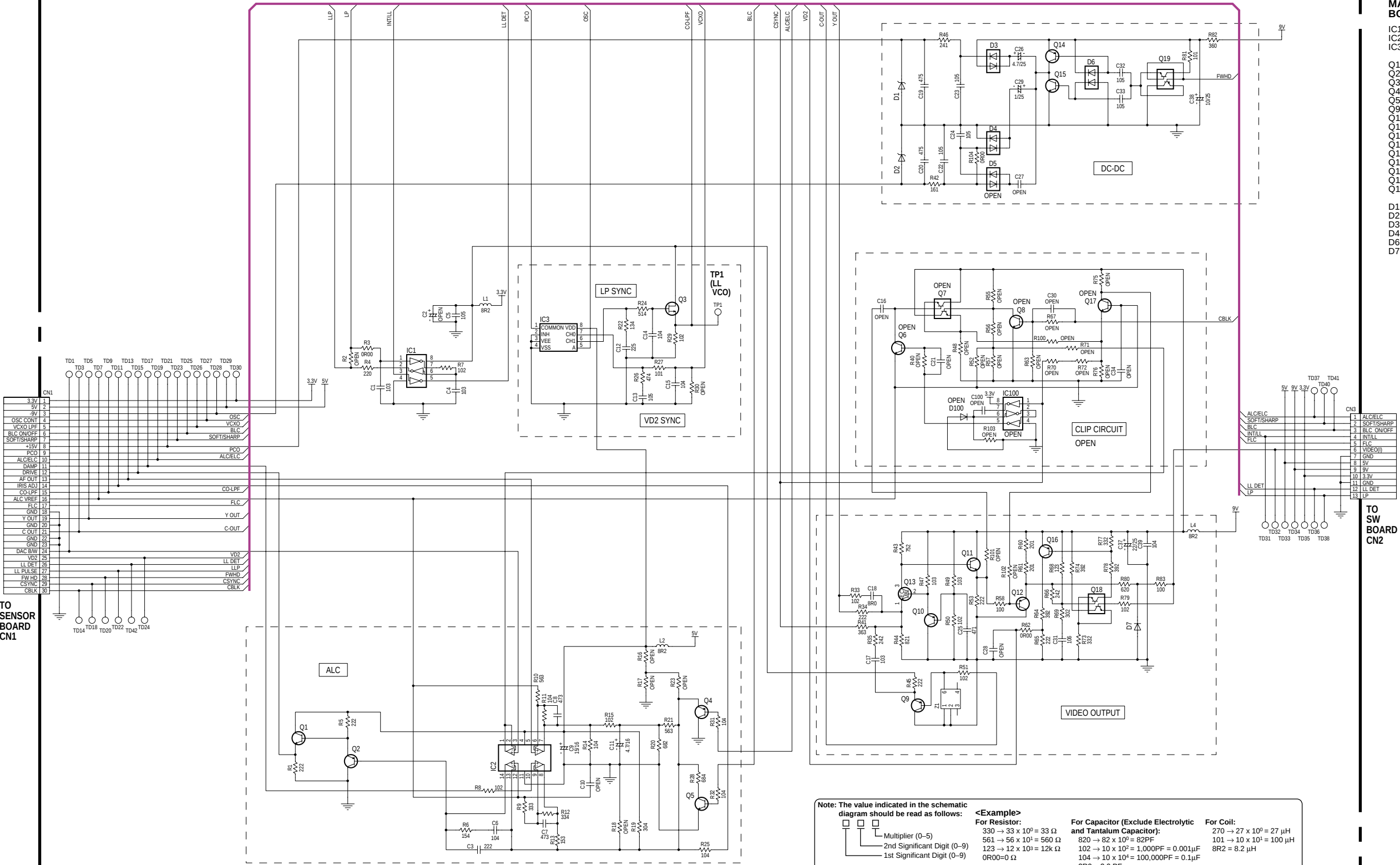
MAIN BOARD

D

C

B

A



<INDEX>

MAIN BOARD

IC1	C2
IC2	A3
IC3	C3
Q1	A2
Q2	A2
Q3	C3
Q4	A3
Q5	A3
Q9	A4
Q10	B4
Q11	B4
Q12	B5
Q13	B4
Q14	D5
Q15	D5
Q16	B5
Q18	B5
Q19	D5
D1	D4
D2	C4,D4
D3	D5
D4	D5
D6	D5
D7	B5

Note: The value indicated in the schematic diagram should be read as follows:

<Example>

For Resistor:

- 330 → 33 × 10⁰ = 33 Ω
- 561 → 56 × 10¹ = 560 Ω
- 123 → 12 × 10³ = 12k Ω
- 0R00 = 0 Ω

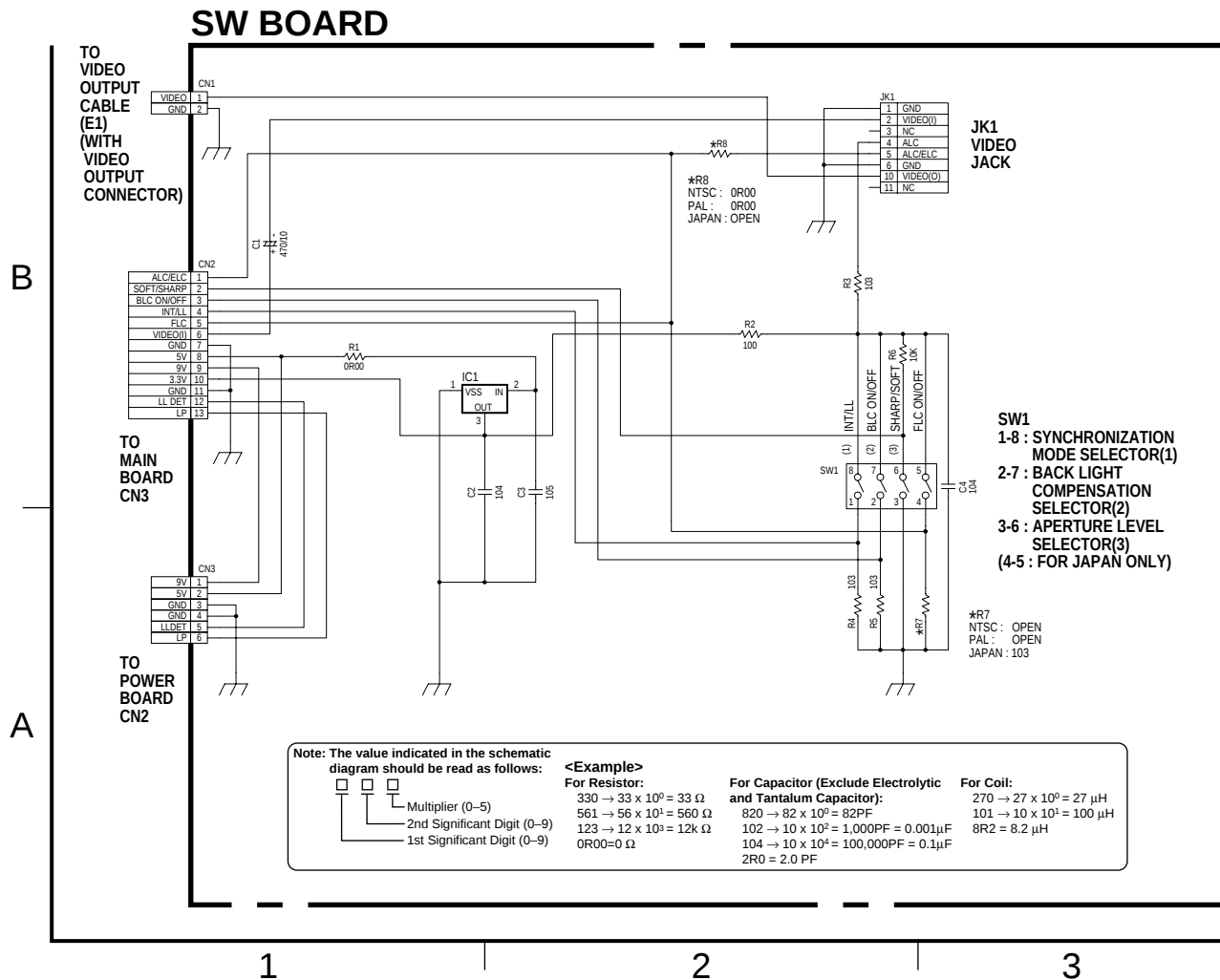
For Capacitor (Exclude Electrolytic and Tantalum Capacitor):

- 820 → 82 × 10⁰ = 82PF
- 102 → 10 × 10² = 1,000PF = 0.001μF
- 104 → 10 × 10⁴ = 100,000PF = 0.1μF
- 2R0 = 2.0 PF

For Coil:

- 270 → 27 × 10⁰ = 27 μH
- 101 → 10 × 10¹ = 100 μH
- 8R2 = 8.2 μH

SCHEMATIC DIAGRAM OF SW BOARD

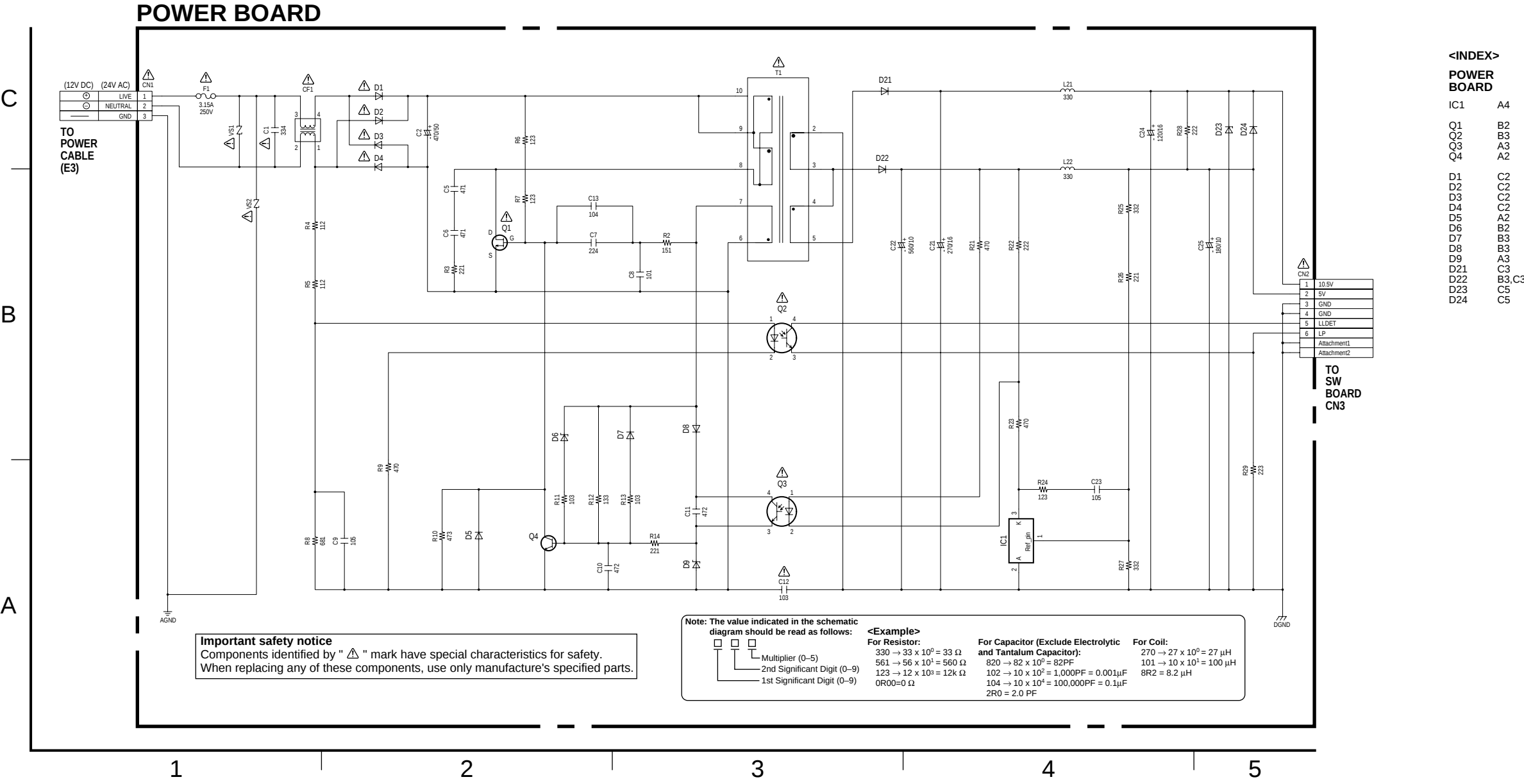


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SW BOARD

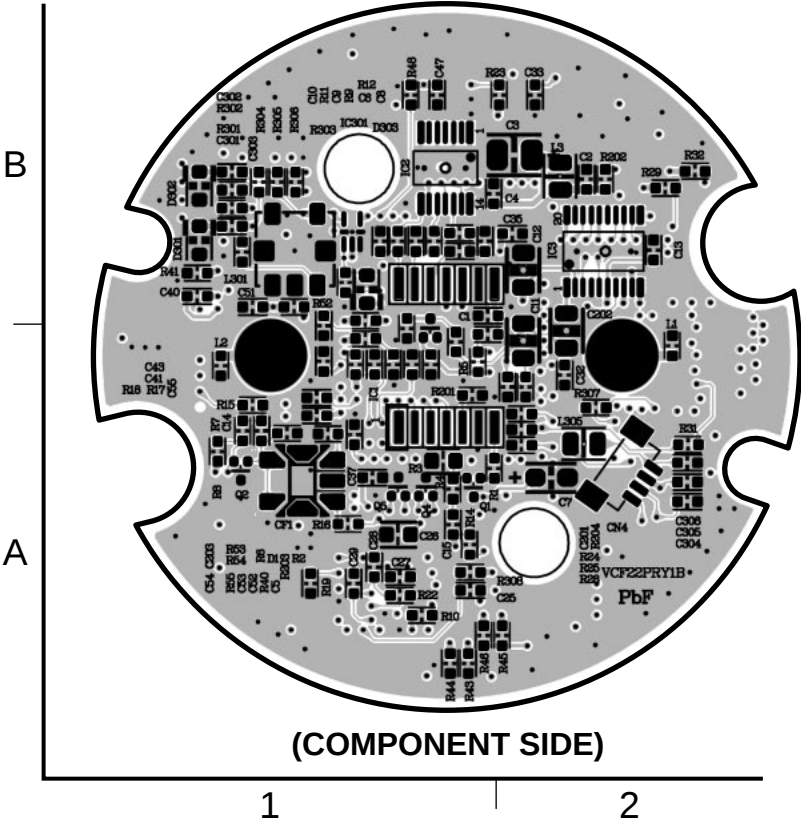
IC1 B1,B2

SCHEMATIC DIAGRAM OF POWER BOARD



CONDUCTOR VIEW OF SENSOR BOARD

SENSOR BOARD

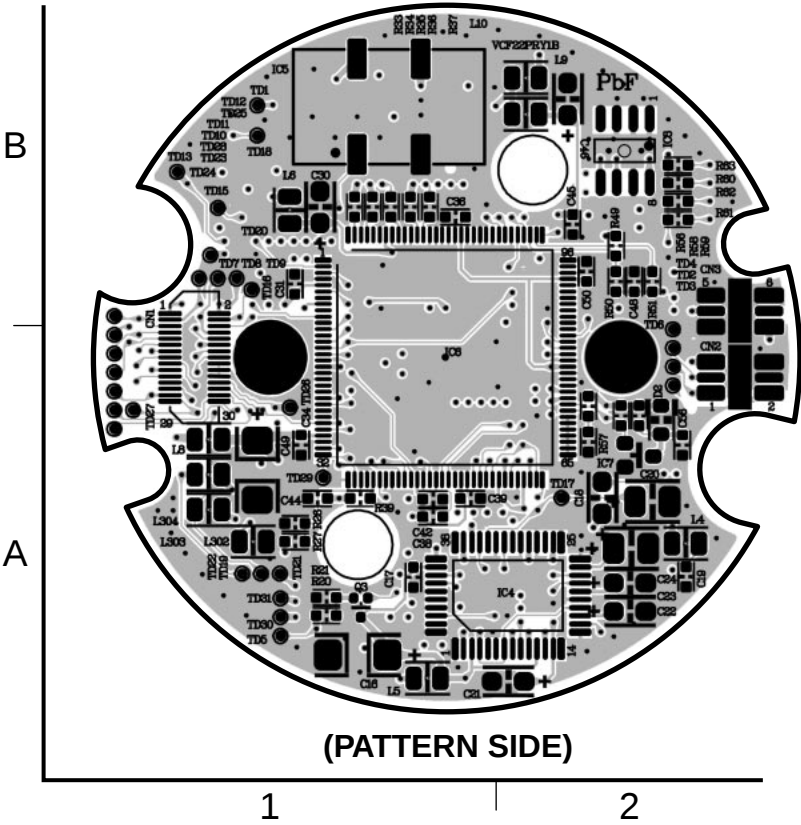


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SENSOR BOARD
(COMPONENT SIDE)

IC1	A1,A2,B1,B2
IC2	B1
IC3	B2
IC301	B1
Q1	A1
Q2	A1
Q4	A1
Q5	A1
D1	A1,B1
D301	B1
D302	B1
D303	B1

SENSOR BOARD



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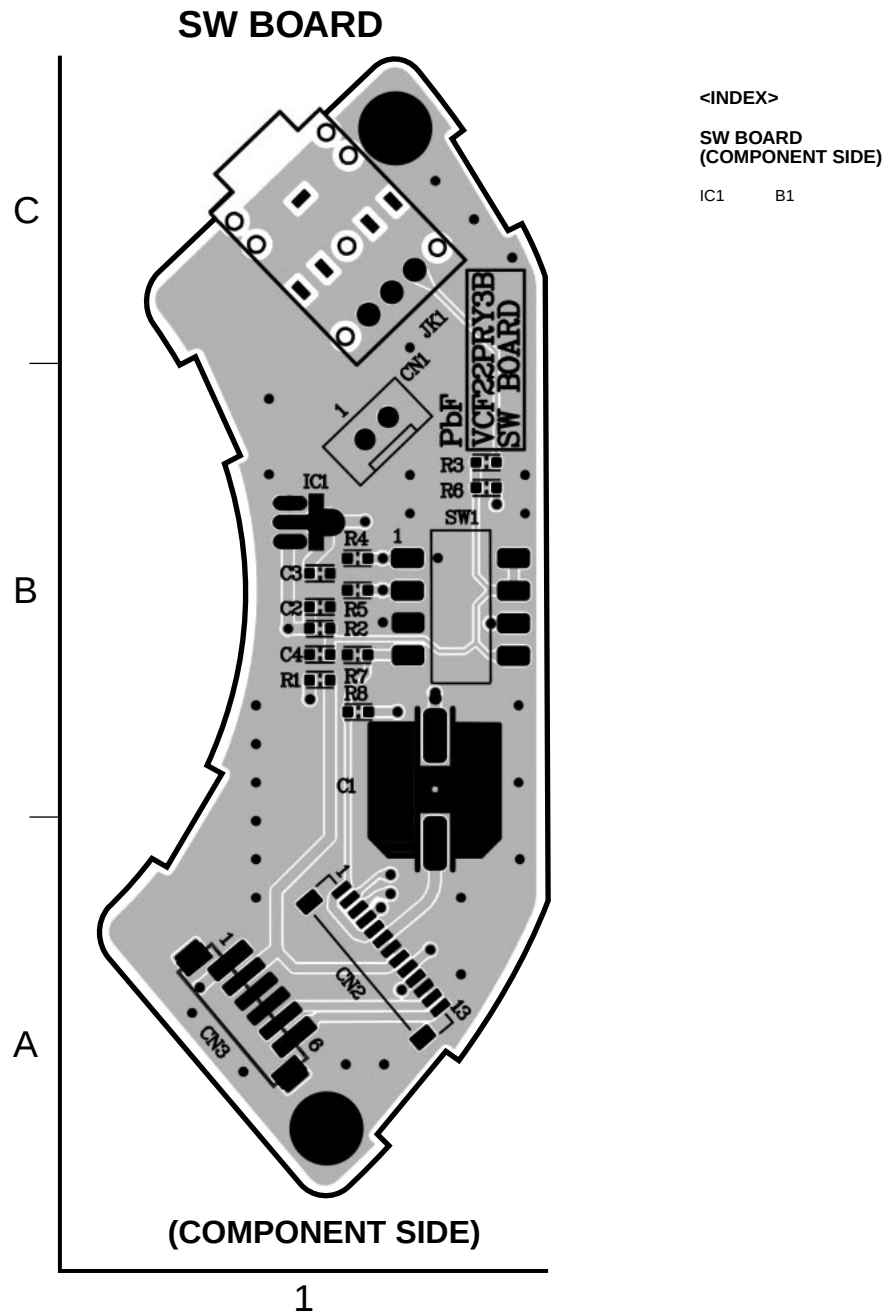
SENSOR BOARD
(PATTERN SIDE)

IC4	A1,A2
IC5	B1
IC6	A1,A2,B1,B2
IC7	A2
IC8	B2
D2	A2

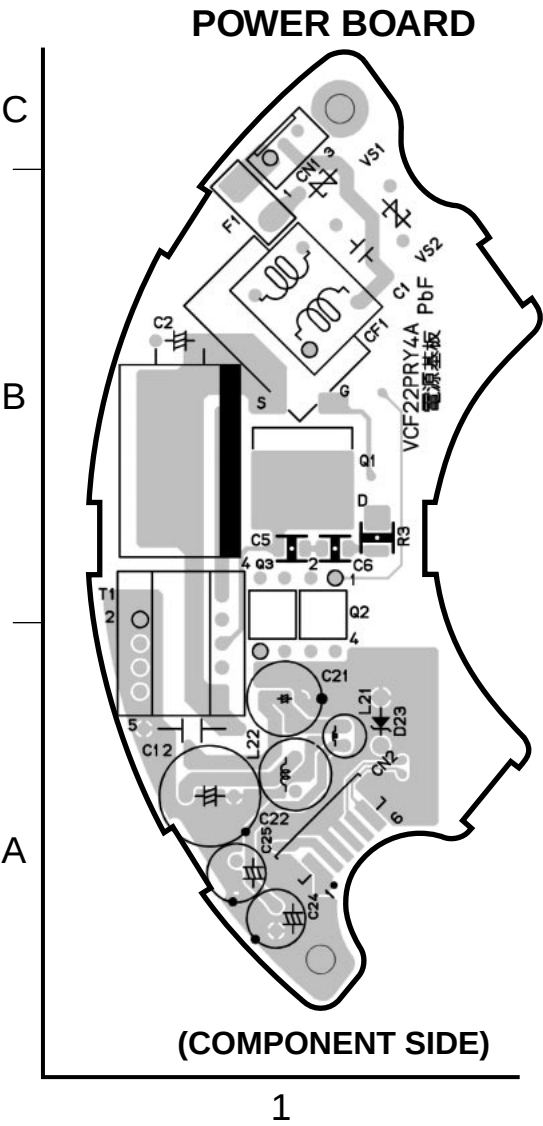
MAIN BOARD



CONDUCTOR VIEW OF SW BOARD



CONDUCTOR VIEW OF POWER BOARD



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**POWER BOARD
(COMPONENT SIDE)**

Q1	B1
Q2	A1,B1
Q3	A1,B1
D23	A1

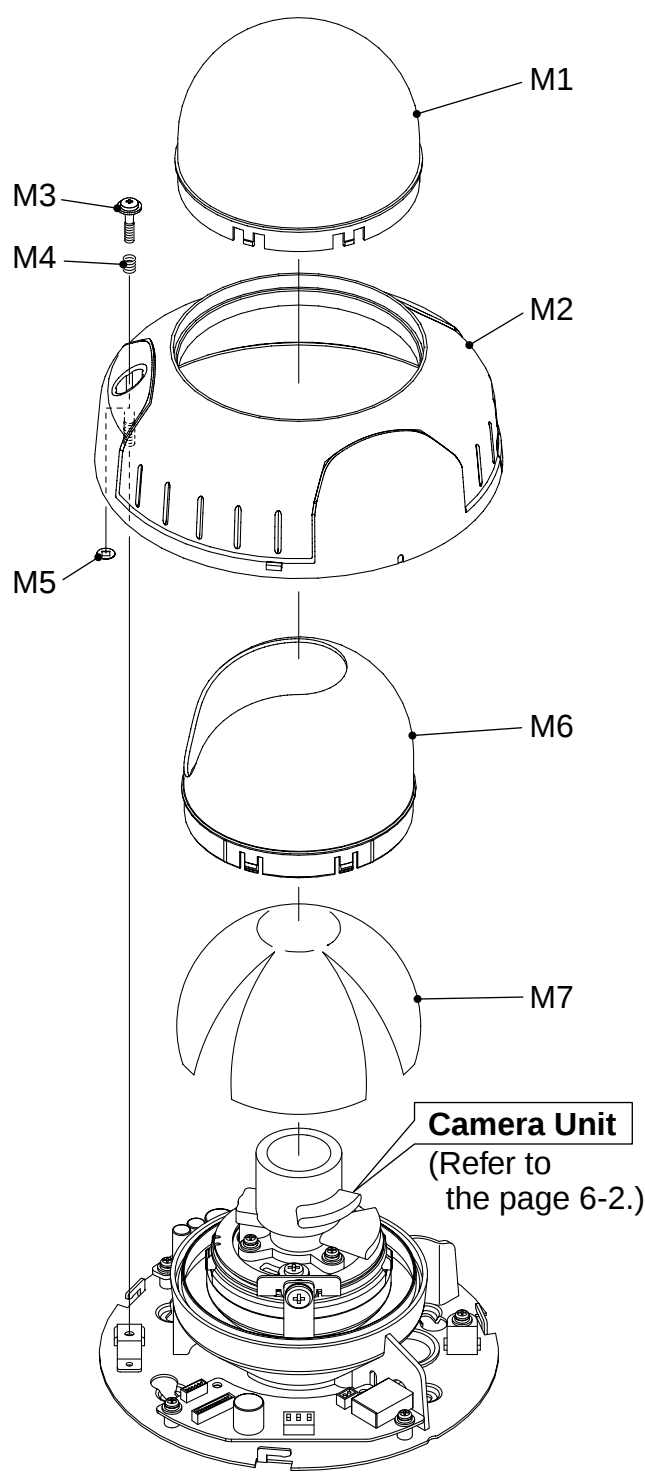


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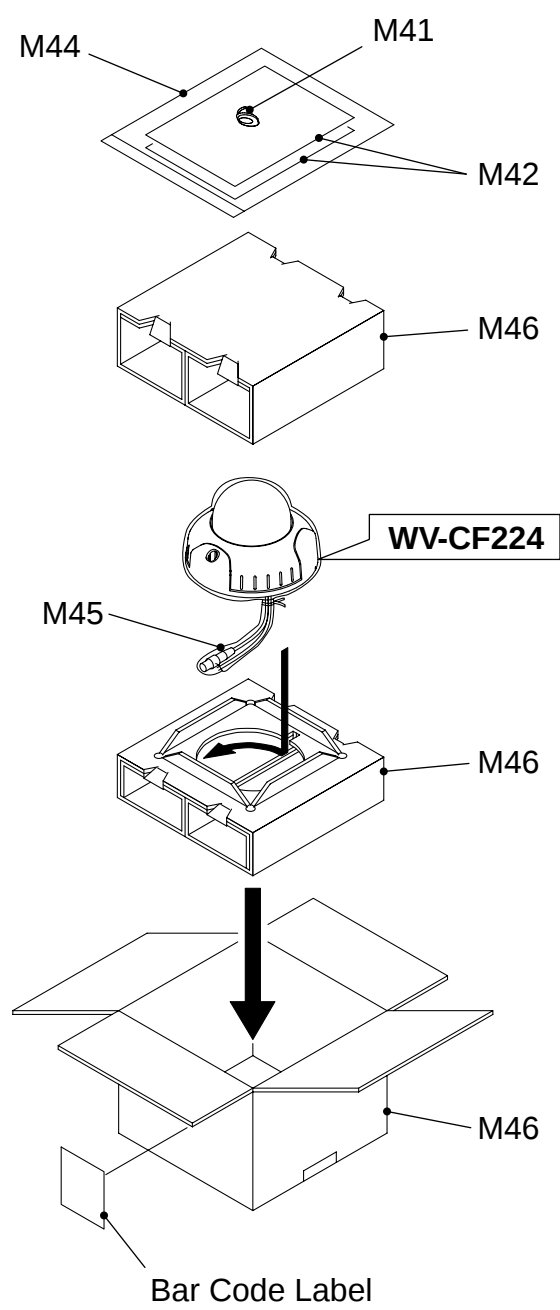
**POWER BOARD
(PATTERN SIDE)**

IC1	A1
Q4	B1
D1	B1
D2	B1
D3	B1
D4	B1
D5	B1
D6	B1
D7	B1
D8	B1
D9	B1
D21	A1
D22	A1
D24	A1

EXPLODED VIEW (1/3)



PACKAGING

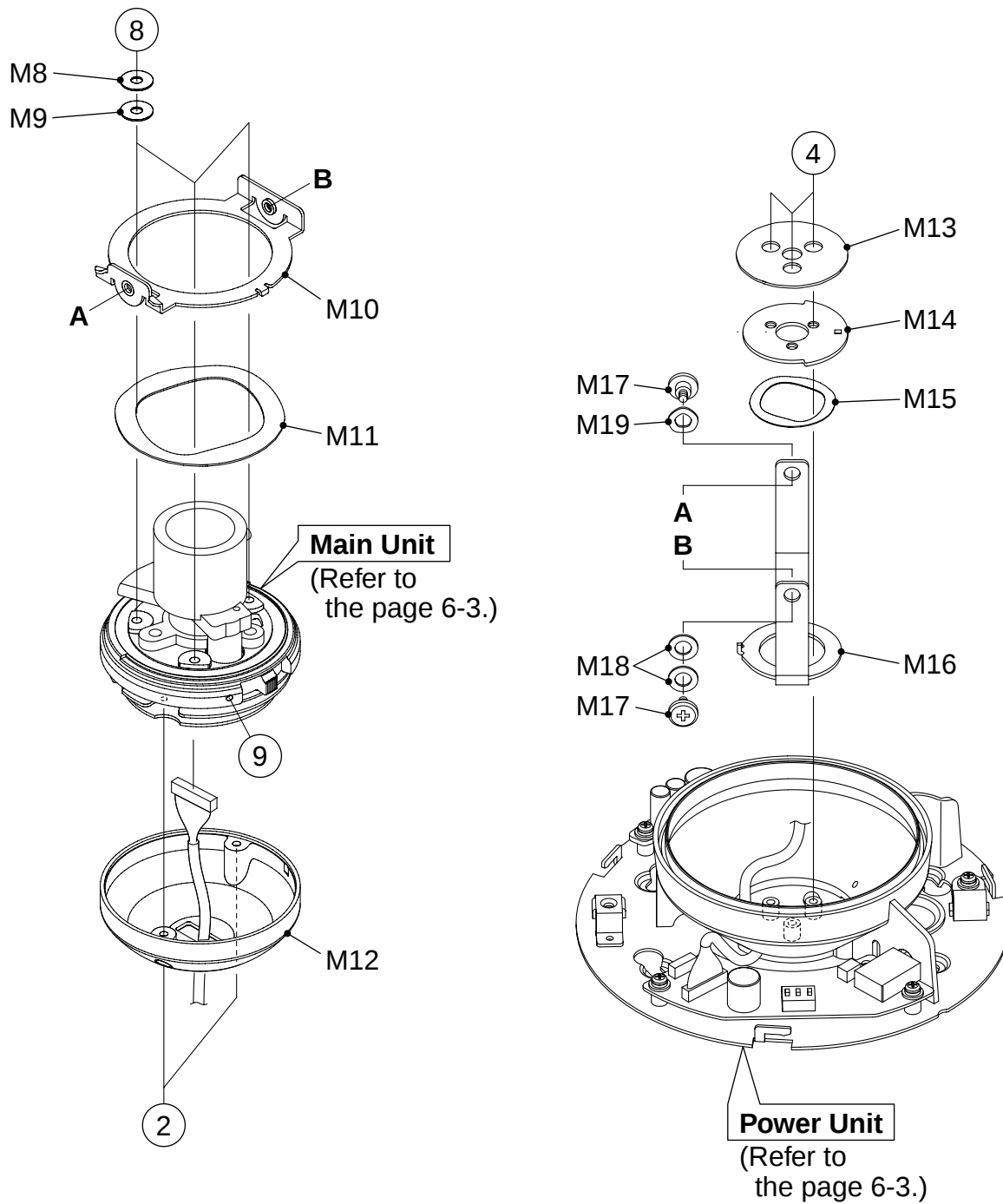


EXPLODED VIEW (2/3)

○Numbers show screws and washers.

No.	Screws	Description
②	XYN2+J4FN	Pan Head Machine Screw and Washer Ass'y
④	XSS26+5FN	Flush Head Machine Screw
⑧	XSB3+5FZK	Binding Head Machine Black Screw
⑨	XXE2D3FZK	Binding Head Machine Black Screw

Camera Unit

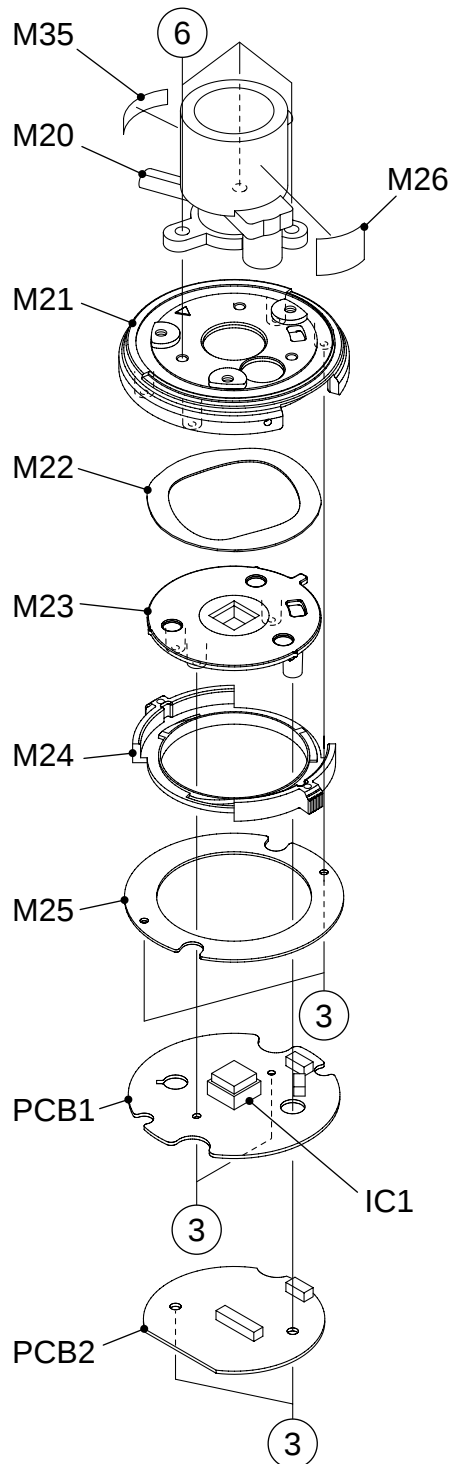


EXPLODED VIEW (3/3)

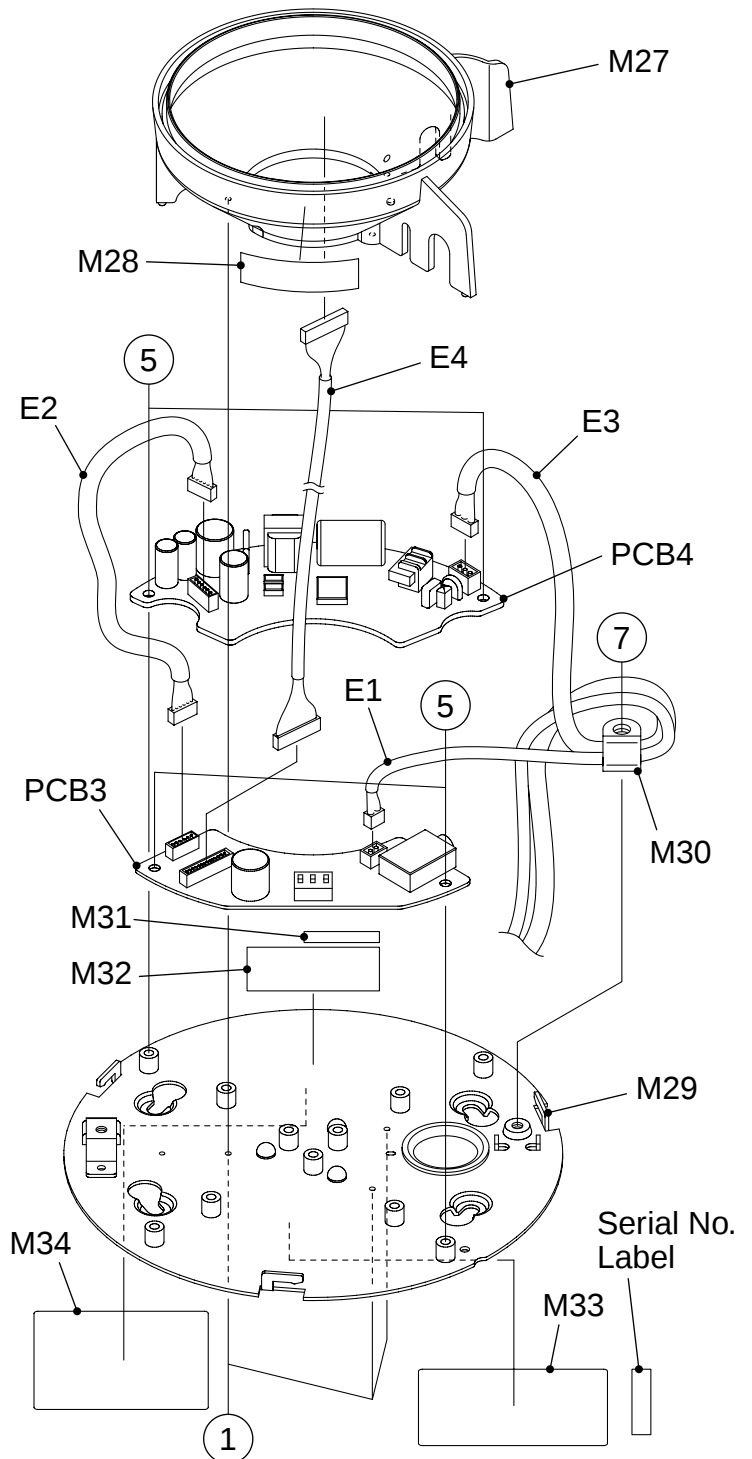
○Numbers show screws and washers.

No.	Screws	Description
①	XTB2+6GFX	Binding Head Tapping Screw
③	XYN2+J5FN	Pan Head Machine Screw and Washer Ass'y
⑤	XYN26+J5FN	Pan Head Machine Screw and Washer Ass'y
⑥	XYN26+F9FZK	Pan Head Machine Black Screw and Washer Ass'y
⑦	XSB3+5FN	Binding Head Machine Screw

Main Unit



Power Unit



REPLACEMENT PARTS LIST

Important Notice

- Components identified by "△" mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
- RTL : Retention Time Limited (No longer available after discontinuing product).

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
MISCELLANEOUS			SENSOR BOARD		
IC1	VCF224PA2A	Optical Ass'y (CCD)	• IC1 (Optical Ass'y) is not supplied as the Sensor Board Ass'y (PCB1). See MISCELLANEOUS for ordering.		
E1	VCF224L01	Video Output Cable for SW Board CN1			
E2	VCF224L02	Wire Ass'y for Power Board CN2 and SW Board CN3	PCB1 (RTL)	VCF22PKY1A	Printed Circuit Board Ass'y
E3	VCF224L03A	Power Cable for Power Board CN1	IC2	C0JBAB000196	Hex Inverters
E4	VCF224L05A	Wire Ass'y for Main Board CN3 and SW Board CN2	IC3	MN3112SA-E1	Vertical Driver
			IC4	NN2038FAQ	Video Signal Processor
M1 △	3DA001191AAA	Dome Cover	IC5	C9ZB00000071	VCXO
M2 △	3CE001421AAA	Upper Case			
M3	3AB001093AAA	Special Screw	IC6	MN6732741	Digital Signal Processor
M4	3CW001056AAA	Spring	IC7	MN13821-FP	Reset Signal Generator
M5	YVW1KA0131A4	Screw Stopper Washer	IC8	C3EBDC000020	EEPROM (See Note below.)
			IC301	YWTC7SH00FUL	2-input NAND Gate
M6 △	3DA001213AAA	Inner Dome	Q1	B1ABDB000023	Transistor
M7	3CV001135AAA	Transport Cushion			
M8	3AF001014AAA	Metal Washer	Q2,4	B1ADCF000040	Transistor
M9	3AF001015AAA	Plastic Washer	Q5	B1ADCF000040	Transistor
M10	3CR001028AAA	Hinge	D1	MA3S132K0L	Diode
			D2	MA2Z72800L	Diode
M11	3AF001019AAA	Wave Washer	D301	YWHVU359TRF	Diode
M12 △	3CE001420AAA	Camera Bottom Case			
M13	3CZ001056AAA	Cable Protecting Barrier	D302	YWHVU17TRF	Diode
M14	3CB001730AAA	Pan Plate	D303	MA2Z72800L	Diode
M15	3AF001033AAA	Wave Washer	R1,2	ERJ3GEYJ100V	Metal 10 ohms 1/16W
			R3	ERJ6GEYJ222V	Metal 2.2K ohms 1/10W
M16	3CR001029AAA	Tilt Frame	R4	ERJ3GEY0R00V	Metal 0 ohm 1/16W
M17	3AB001060AAA	Special Screw (Tilt)			
M18	3AF001017AAA	Plain Washer	R5	ERJ3GEYJ220V	Metal 22 ohms 1/16W
M19	3CW001071AAA	Wave Washer	R6	ERJ3GEYJ104V	Metal 100K ohms 1/16W
M20	3VB001012AAA	Lens	R7	ERJ3GEYJ302V	Metal 3K ohms 1/16W
			R8	ERJ3GEYJ562V	Metal 5.6K ohms 1/16W
M21	3CC001238AAA	Lens Mounting Bracket	R9-11	ERJ3GEYJ100V	Metal 10 ohms 1/16W
M22	3AF001020AAA	Wave Washer (Flange-back)			
M23	3CC001239AAA	CCD Mounting Bracket	R12	ERJ3GEYJ360V	Metal 36 ohms 1/16W
M24 △	3FH001002AAA	Flange-back Adjusting Cam	R15	ERJ3GEYJ103V	Metal 10K ohms 1/16W
M25	3CU001013AAA	Flange-back Hold Plate	R16	ERJ3GEYJ561V	Metal 560 ohms 1/16W
			R17	ERJ3GEYJ562V	Metal 5.6K ohms 1/16W
M26	3PC001091AAA	Lens Caution Label	R18	ERJ3GEYJ182V	Metal 1.8K ohms 1/16W
M27 △	3CE001422AAA	Bottom Case			
M28	3PD001688AAA	Dip Switch Label	R19	ERJ3GEYJ562V	Metal 5.6K ohms 1/16W
M29	V9AA3146A3	Camera Panel Ass'y	R22	ERJ3GEYJ103V	Metal 10K ohms 1/16W
M30	1CL001054AAA	Cord Clamp	R23	ERJ3GEYJ202V	Metal 2K ohms 1/16W
			R25,26	ERJ3GEY0R00V	Metal 0 ohm 1/16W
			R29,32	ERJ3GEY0R00V	Metal 0 ohm 1/16W
M31 △	V7MA1171A4	Fuse Label			
M32 △	V7SA4570A4	Fuse Replacement Label	R33-35	ERJ3GEYJ161V	Metal 160 ohms 1/16W
M33 △	3PA002134AAA	Main Label	R36,37	ERJ3GEYJ101V	Metal 100 ohms 1/16W
M34 △	3PC001090AAA	FCC / DOC Label	R39	ERJ3GEYJ102V	Metal 1K ohms 1/16W
M35	3DA001707BAA	Light Shielding Label	R40	ERJ3GEYJ302V	Metal 3K ohms 1/16W
			R41	ERJ3RHD202V	Metal 2K ohms 1/16W
			Note: • IC8 (EEPROM) is empty when it is supplied as IC only. Loading the Initial Data is required.		

REF. NO.	PART NO.	DESCRIPTION		REF. NO.	PART NO.	DESCRIPTION	
R43	ERJ3GEYJ201V	Metal	200 ohms 1/16W	C46	ECST1AY106R	Tantalum	10 µF 10V
R44	ERJ3RHD201V	Metal	200 ohms 1/16W	C47	MCUV1E104ZFV	Ceramic	0.1 µF
R45	ERJ3GEYJ102V	Metal	1K ohms 1/16W	C48	F1H1A105A004	Ceramic	1 µF
R46	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W	C49	F3H1A476A001	Tantalum	47 µF 10V
R48,49	ERJ3GEYJ103V	Metal	10K ohms 1/16W	C50	MCUV1E104ZFV	Ceramic	0.1 µF
R51	ERJ3GEYJ103V	Metal	10K ohms 1/16W	C51,52	F1H1A105A004	Ceramic	1 µF
R52	ERJ3GEYJ562V	Metal	5.6K ohms 1/16W	C53-55	MCUV1E104ZFV	Ceramic	0.1 µF
R54,55	ERJ3GEYJ103V	Metal	10K ohms 1/16W	C56	F1H1E393A002	Ceramic	0.039 µF
R56	ERJ3GEY0R00V	Metal	0 ohm 1/16W	C201	F1H1H222A190	Ceramic	2200 pF
R58	ERJ3GEYJ472V	Metal	4.7K ohms 1/16W	C202	MCUN1C105ZFM	Ceramic	1 µF
R59	ERJ3GEYJ473V	Metal	47K ohms 1/16W	C301,302	F1H1H101A004	Ceramic	100 pF
R60,61	ERJ3GEYJ101V	Metal	100 ohms 1/16W	C303	MVUV1C104KBV	Ceramic	0.1 µF
R62,63	ERJ3GEYJ103V	Metal	10K ohms 1/16W	CF1	YW4FS7374	Filter	
R202,203	ERJ3GEY0R00V	Metal	0 ohm 1/16W	L1,2	J0JBC0000046	Coil	
R204	ERJ3GEYJ105V	Metal	1M ohms 1/16W	L3,4	ELJFC330KF	Coil	33 µH
R301,302	ERJ3GEYJ103V	Metal	10K ohms 1/16W	L5	ELJFC470KF	Coil	47 µH
R303	ERJ3GEYJ104V	Metal	100K ohms 1/16W	L6	ELJFC8R2MF	Coil	8.2 µH
R304	ERJ3GEYJ105V	Metal	1M ohms 1/16W	L8	ELJPC150KF	Coil	15 µH
R305	ERJ3GEYJ621V	Metal	620 ohms 1/16W	L9	ELJFC8R2MF	Coil	8.2 µH
R306	ERJ3GEYJ102V	Metal	1K ohms 1/16W	L10	ELJPC150KF	Coil	15 µH
R307,308	ERJ3GEY0R00V	Metal	0 ohm 1/16W	L301	G3A1R9C00001	Coil	
C1	F1H1C473A005	Ceramic	0.047 µF	L302-305	ELJFC8R2MF	Coil	8.2 µH
C2	F1H1H103A190	Ceramic	0.01 µF	CN1	K1KA30A00081	30-pin Connector	
C3	F3G1C156A002	Tantalum	15 µF 16V	CN2,3	YW31756316	6-pin Connector	
C4	F1H1H103A190	Ceramic	0.01 µF	CN4	K1KA04A00315	4-pin Connector	
C5,6	MVUV1C104KBV	Ceramic	0.1 µF	MAIN BOARD			
C7	ECST1VY105ZR	Tantalum	1 µF 35V				
C11	F1K1H104A024	Ceramic	0.1 µF	PCB2 (RTL)	VCF22PKY2A	Printed Circuit Board Ass'y	
C12	YW426106FZT	Ceramic	10 µF	IC1	YWTC7W14FUL	Schmitt Inverters	
C13	F1H1A105A004	Ceramic	1 µF	IC2	YWNJM2902VT1	Quad Operational Amplifiers	
C14	F1H1H1R0A260	Ceramic	1 pF	IC3	YWTC4W53FUL	Analog Multiplexer	
C15	MCUV1E104ZFV	Ceramic	0.1 µF	Q1	2SD1819QRSTX	Transistor	
C16	F3H1A476A001	Tantalum	47 µF 10V	Q2	B1ADCF000040	Transistor	
C17	MCUV1E104ZFV	Ceramic	0.1 µF	Q3	2SK10694TL	FET	
C18	ECST1CY225R	Tantalum	2.2 µF 16V	Q4	B1ADCF000040	Transistor	
C19	F1H1H150A004	Ceramic	15 pF	Q5	B1ABCF000060	Transistor	
C20	ECST0JX336R	Tantalum	33 µF 6.3 V	Q9,10	B1ADCF000040	Transistor	
C21	ECST1AY106R	Tantalum	10 µF 10V	Q11	B1ABCF000060	Transistor	
C22	ECST1CY105R	Tantalum	1 µF 16V	Q12	B1ADCF000063	Transistor	
C23	ECST1VY334R	Tantalum	0.33 µF 35 V	Q13	2SC4618	Transistor	
C24	TAJB226M010R	Tantalum	22 µF 10V	Q14	2SB12190WL	Transistor	
C25	MCUV1E104ZFV	Ceramic	0.1 µF	Q15	2SD18200WL	Transistor	
C26	F1J1A4750004	Ceramic	4.7 µF	Q16	B1ADCF000063	Transistor	
C27	MCUV1E104ZFV	Ceramic	0.1 µF	Q18	B1HBCFA00006	Transistor	
C28,29	F1H1A105A004	Ceramic	1 µF	Q19	B1HFCFA00003	Transistor	
C30	ECST1AY106R	Tantalum	10 µF 10V	D1	MAZ81200ML	Diode	
C31-33	MCUV1E104ZFV	Ceramic	0.1 µF	D2	MA8051	Diode	
C34	F1H1A105A004	Ceramic	1 µF	D3,4	MA4X72600L	Diode	
C35-37	MCUV1E104ZFV	Ceramic	0.1 µF	D6	YWDA227TL	Diode	
C38	F1H1A105A004	Ceramic	1 µF	D7	B0ACCJ000014	Diode	
C39	MCUV1E104ZFV	Ceramic	0.1 µF	R1	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W
C40	F1H1A105A004	Ceramic	1 µF	R3	ERJ3GEY0R00V	Metal	0 ohm 1/16W
C41-43	MCUV1E104ZFV	Ceramic	0.1 µF				
C44	F1H1H100A226	Ceramic	10 pF				
C45	F1H1A105A004	Ceramic	1 µF				

REF. NO.	PART NO.	DESCRIPTION		REF. NO.	PART NO.	DESCRIPTION	
R4	ERJ3GEYJ220V	Metal	22 ohms 1/16W	C3	F1H1H222A013	Ceramic	2200 pF
R5	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W	C4	F1H1H103A190	Ceramic	0.01 µF
R6	ERJ3GEYJ154V	Metal	150K ohms 1/16W	C5	F1H1A105A004	Ceramic	1 µF
R7	ERJ3RHD102V	Metal	1K ohms 1/16W	C6	MCUV1E104ZfV	Ceramic	0.1 µF
R8	ERJ3GEYJ102V	Metal	1K ohms 1/16W	C7,8	F1H1C473A005	Ceramic	0.047 µF
R9	ERJ3GEYJ333V	Metal	33K ohms 1/16W	C9	F3G1C156A002	Tantalum	15 µF 16V
R10	ERJ3GEYJ563V	Metal	56K ohms 1/16W	C11	ECST1CY475R	Tantalum	4.7 µF 16V
R11	ERJ3GEYJ104V	Metal	100K ohms 1/16W	C12	YW400225FZT	Ceramic	2.2 µF
R12	ERJ3GEYJ334V	Metal	330K ohms 1/16W	C13	F1H1A105A004	Ceramic	1 µF
R13	ERJ3GEYJ153V	Metal	15K ohms 1/16W	C14,15	MVUV1C104KBV	Ceramic	0.1 µF
R14	ERJ3GEYJ104V	Metal	100K ohms 1/16W	C17	F1H1H103A190	Ceramic	0.01 µF
R15	ERJ3GEYJ102V	Metal	1K ohms 1/16W	C18	F1H1H8R00003	Ceramic	8 pF
R19	ERJ3GEYJ304V	Metal	300K ohms 1/16W	C19	YW32Y475F25T	Ceramic	4.7 µF
R20	ERJ3GEYJ682V	Metal	6.8K ohms 1/16W	C20	F1J1A4750004	Ceramic	4.7 µF
R21	ERJ3GEYJ563V	Metal	56K ohms 1/16W	C22	F1J1C1050002	Ceramic	1 µF
R22	ERJ3GEYJ134V	Metal	130K ohms 1/16W	C23	F1K1E105A017	Ceramic	1 µF
R24	ERJ3GEYJ514	Metal	510K ohms 1/16W	C24	MCUV1C105KBM	Ceramic	1 µF
R25	ERJ3GEYJ104V	Metal	100K ohms 1/16W	C25	F1H1H471A004	Ceramic	470 pF
R26	ERJ3GEYJ474V	Metal	470K ohms 1/16W	C26	ECST1EX475R	Tantalum	4.7 µF 25V
R27	ERJ3GEYJ101V	Metal	100 ohms 1/16W	C29	ECST1EY105R	Tantalum	1 µF 25V
R28	ERJ3GEYJ684V	Metal	680K ohms 1/16W	C31	YW32Y106F16T	Ceramic	10 µF
R29	ERJ3GEYJ102V	Metal	1K ohms 1/16W	C32,33	F1J1C1050002	Ceramic	1 µF
R31,32	ERJ3GEYJ104V	Metal	100K ohms 1/16W	C37	F3H1E226A002	Tantalum	22 µF 25V
R33	ERJ3GEYJ102V	Metal	1K ohms 1/16W	C38	F3H1E106A001	Tantalum	10 µF 25V
R34	ERJ3RHD222V	Metal	2.2K ohms 1/16W	C39	MCUV1E104ZfV	Ceramic	0.1 µF
R35	ERJ3RHD242V	Metal	2.4K ohms 1/16W	L1,2	ELJFC8R2MF	Coil	8.2 µH
R41	ERJ3GEYJ363V	Metal	36K ohms 1/16W	L4	ELJFC8R2MF	Coil	8.2 µH
R42	YF2116161JT	Metal	160 ohms 1/10W	CN1	AXK5S30045P	30-pin Connector	
R43	ERJ3RHD752V	Metal	7.5K ohms 1/16W	CN3	K1KA13A00067	13-pin Connector	
R44	ERJ3GEYJ821V	Metal	820 ohms 1/16W	TP1	YWRCT2125TPV	Test-pin	
R45	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W	SW BOARD			
R46	YF2116241JT	Metal	240 ohms 1/10W				
R47,49	ERJ3GEYJ103V	Metal	10K ohms 1/16W				
R50,51	ERJ3GEYJ102V	Metal	1K ohms 1/16W				
R53	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W				
R58	ERJ3GEYJ100V	Metal	10 ohms 1/16W	PCB3 (RTL)	VCF22PKY3A	Printed Circuit Board Ass'y	
R60,61	YF2116201JT	Metal	200 ohms 1/10W	IC1	XC62FP3302PR	Voltage Regulator	
R62	ERJ3GEY0R00V	Metal	0 ohm 1/16W	R1	ERJ3GEY0R00V	Metal	0 ohm 1/16W
R64	ERJ3GEYJ392V	Metal	3.9K ohms 1/16W	R2	ERJ3GEYJ100V	Metal	10 ohms 1/16W
R65	ERJ3GEYJ222V	Metal	2.2K ohms 1/16W	R3-6	ERJ3GEYJ103V	Metal	10K ohms 1/16W
R66	ERJ3RHD242V	Metal	2.4K ohms 1/16W	R8	ERJ3GEY0R00V	Metal	0 ohm 1/16W
R68	ERJ3RHD123V	Metal	12K ohms 1/16W	C1	YWRVJ1A471M	Electrolytic	470 µF 10V
R69	ERJ3RHD302V	Metal	3K ohms 1/16W	C2	MCUV1E104ZfV	Ceramic	0.1 µF
R73	ERJ3GEYJ332V	Metal	3.3K ohms 1/16W	C3	F1H1A105A004	Ceramic	1 µF
R74	ERJ3GEYJ392V	Metal	3.9K ohms 1/16W	C4	MCUV1E104ZfV	Ceramic	0.1 µF
R77	ERJ3GEYJ332V	Metal	3.3K ohms 1/16W	SW1	K0D333A00005	Dip Switch	
R78	ERJ3GEYJ392V	Metal	3.9K ohms 1/16W	CN1	YWB2BEH	2-pin Connector	
R79	ERJ3GEYJ102V	Metal	1K ohms 1/16W	CN2	K1KA13A00067	13-pin Connector	
R80	ERJ3GEYJ620V	Metal	62 ohms 1/16W	CN3	YWB6BZRSMT3TF	6-pin Connector	
R81	ERJ3GEYJ101V	Metal	100 ohms 1/16W	JK1	K2HC103B0135	Jack	
R82	ERJ6GEYJ360	Metal	36 ohms 1/10W				
R83	ERJ3GEYJ100V	Metal	10 ohms 1/16W				
R104	ERJ3GEY0R00V	Metal	0 ohm 1/16W				
Z1	J0E3584B0019	LC Filter					
C1	F1H1H103A190	Ceramic	0.01 µF				

REF. NO.				PART NO.				DESCRIPTION			
POWER BOARD											
PCB4 (RTL)				VCF22PKY4A				Printed Circuit Board Ass'y			
IC1				AN1431ME1				Shunt Regulator			
Q1				B1DFGM000001				FET			
Q2,3				YWPC817X7				Photocoupler			
Q4				B1ABGF000003				Transistor			
D1-4				B0JCMG000003				Diode			
D5				B0ACCK000005				Diode			
D6				B0BA4R700007				Diode			
D7,8				B0ACCK000005				Diode			
D9				B0BA4R700007				Diode			
D21,22				B0JCMG000003				Diode			
D23				B0BA01200008				Diode			
D24				B0ACCK000005				Diode			
VS1				ERZV07D680				Varistor			
VS2				ERZV07D471				Varistor			
R2				D0GG151JA002				Metal 150 ohms 1/4W			
R3				D0GG221JA002				Metal 220 ohms 1/4W			
R4,5				D0GG112JA002				Metal 1.1K ohms 1/4W			
R6,7				D0GD123JA003				Metal 12K ohms 1/8W			
R8				RRJ6GEYJ681V				Metal 680 ohms 1/10W			
R9				D0GD470JA003				Metal 47 ohms 1/8W			
R10				D0GD473JA003				Metal 47K ohms 1/8W			
R11				D0GD103JA003				Metal 10K ohms 1/8W			
R12				YF2116133JT				Metal 13K ohms 1/10W			
R13				ERJ6GEYJ103V				Metal 10K ohms 1/10W			
R14				RRJ6GEYJ221V				Metal 220 ohms 1/10W			
R21				D0GD470JA003				Metal 47 ohms 1/8W			
R22				D0GD222JA003				Metal 2.2K ohms 1/8W			
R23				D0GD470JA003				Metal 47 ohms 1/8W			
R24				D0GD123JA003				Metal 12K ohms 1/8W			
R25				YWR1220P332D				Metal 3.3K ohms 1/10W			
R26				RRJ6GEYJ221V				Metal 220 ohms 1/10W			
R27				YWR1220P332D				Metal 3.3K ohms 1/10W			
R28				D0GD222JA003				Metal 2.2K ohms 1/8W			
R29				D0GD223JA003				Metal 22K ohms 1/8W			
C1				ECQV1334JM				Plastic 0.33 μF			
C2				EEUEB1H471				Electrolytic 470 μF 50V			
C5,6				F1K2J471A005				Ceramic 470 pF			
C7				YWU212F224ZT				Ceramic 0.22 μF			
C8				F1J1H101A410				Ceramic 100 pF			
C9				MCUV1A105KBN				Ceramic 1 μF			
C10,11				F1J1H472A400				Ceramic 4700 pF			
C12				ECQE6103KF				Plastic 0.01 μF			
C13				MCUV1E104KBN				Ceramic 0.1 μF			
C21				EEUFC1C271				Electrolytic 270 μF 16V			
C22				EEUFC1A561				Electrolytic 560 μF 10V			
C23				MCUV1A105KBN				Ceramic 1 μF			
C24				EEUFC1C121				Electrolytic 120 μF 16V			
C25				EEUFC1A181				Electrolytic 180 μF 10V			
CF1				JOMBA0000012				Line Filter			

REF. NO.				PART NO.				DESCRIPTION			
L21				G0ZZ00002012				Coil 33 μH			
L22				YWSL675330				Coil 33 μH			
T1				G4D1A0000050				Power Transformer			
F1				K5G312B00010				Current Fuse 3.15A 250V			
CN1				YWB3BPHKS				3-pin Connector			
CN2				YWB6BZRSM3TF				6-pin Connector			
ACCESSORY PARTS / PACKAGING PARTS											
M41				3DA001583AAA				Rubber Cap			
M42				3TR001728AAA				Printed Operating Instructions (English)			
				3TR001729AAA				Printed Operating Instructions (French)			
M44				PE20X35C05B				Polyethylene Bag			
M45				PE35X50C05B				Polyethylene Bag			
M46				V9CA4873AN				Packaging Ass'y			