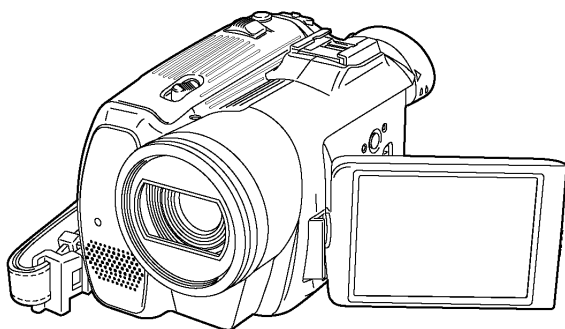


Service Manual

Digital Video Camera/Recorder



NV-GS230EG

NV-GS230E

NV-GS230EB

NV-GS230EP

NV-GS230EF

NV-GS230EK

NV-GS230GC

NV-GS230GN

NV-GS238GK

VOL.1

A-MECHANISM

Colour

(S).....Silver Type

Panasonic®

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SPECIFICATIONS

Digital Video Camera

ITEM	SPECIFICATION	ITEM	SPECIFICATION
POWER	Source: DC 7.9 / 7.2 V Consumption: Recording 3.5 W (When using Viewfinder) 3.7 W (When using LCD Monitor)	STANDARD ILLUMINATION	1,400 lx
		MINIMUM REQUIRED ILLUMINATION	1 lx (Colour Night View Mode)
RECORDING FORMAT	Mini DV (Consumer-use Digital Video SD Format)	USB	Card reader / writer function, USB 2.0 compliant (Hi-Speed) No copyright protection support Pict Bridge-Compliant
TAPE USED	6.35 mm digital video tape		DIGITAL INTERFACE
RECORDING / PLAYBACK TIME	SP mode: 80 min. with DVM80 LP mode: 120 min. with DVM80	MICROPHONE	Stereo (with a zoom function)
CAMERA	Filter Diameter: 37.0 mm	SPEAKER	1 round speaker ϕ 20 mm
	Zoom: 10:1 Power Zoom	OPERATING TEMPERATURE	0 °C - 40 °C
	Monitor: 2.5-inch LCD	OPERATING HUMIDITY	10 % - 80 %
	Lens: Auto Iris, F1.8 (WIDE)/F2.8 (TELE), Focal Length; 2.45 - 24.5 mm Macro (Full Range AF)	WEIGHT	Approx. 410 g (without supplied Battery, DV Cassette and lens cap) Approx. 480 g (with supplied Battery, DVM60 and lens cap)
	Image Sensor: 1/6-inch 3CCD Image Sensor		DIMENSIONS
Viewfinder: Colour Electronic Viewfinder	VIDEO	STANDARD ACCESSORIES	1 pc. AC Adaptor 1 pc. Battery Pack Unit 1 pc. DC Cable 1 pc. AC Cord (Except NV-GS230GC) 2 pcs. AC Cord (NV-GS230GC) 1 pc. AV Cable 1 pc. Remote Controller 1 pc. Bottom-type Battery 1 pc. CD-ROM 1 pc. USB Connection Cable 1 pc. Hood Cap Unit
Compression: Motion JPEG Image Size: 320 \times 240 pixels (QVGA) Frame Rate: Approx. 6 fps			AUDIO
Recording System: Digital Component Television System: CCIR; 625 Lines, 50 Fields PAL Colour Signal	Recording System: PCM Digital Recording 16 bit (48 kHz/2 ch) 12 bit (32 kHz/4 ch)	Audio Output Level (Line): 316 mV, 600 ohm Mic Input: Mic sensitivity -50dB (0dB=1V/Pa, 1kHz) (Stereo Mini Jack)	
WEB CAMERA	Recording Media: SD Memory Card Still Picture Recording File Format: JPEG (Design rule for Camera File system, based on Exif 2.2 standard), DPOF corresponding		
	Still Image Size: Mega-pixel Recording; 1760 \times 1320 (2.3 million pixels) 1280 \times 960 (1.2 million pixels) VGA Recording; 640 \times 480		

Weight and dimensions are approximate values.
Specifications may change without prior 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.

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1 INTRODUCTION

1.1. INTRODUCTION

This service manual contains technical information which will allow service personnel's to understand and service this model. Please place orders using the parts list and not the drawing reference numbers.

If the circuit is changed or modified, this information will be followed by supplement service manual to be filed with original service manual.

Note 1:

These movie camera uses AC Adaptor VSK0651A or VSK0651B.

Note 2:

1) This service manual does not contain the following information, because of the impossibility of servicing at component level.

1. Schematic Diagram, Block Diagram and P.C.B. layout of Main P.C.B./ Sub P.C.B.
2. Parts List for individual parts of Main P.C.B./ Sub P.C.B.

2) The following category is/are recycle module part. Please send it/them to Central Repair Center.

*Main P.C.B. (VEP03G73AA: NV-GS230EG/E/EB/EP/EF, VEP03G73AB: NV-GS230EK,
VEP03G73AC: NV-GS230GC/GN, VEP03G73AD: NV-GS238GK)

*Sub P.C.B. (VEP23670A: NV-GS230EG/E/EB/EP/EF/EK/GC/GN, GS238GK)

When a part replacement is required for repairing each Main P.C.B. and Sub P.C.B., replace the assembly parts.

(Main P.C.B. and Sub P.C.B.)

The following circuits are contained in Main P.C.B.

1. Main Connection Circuit
2. AVIO Circuit
3. Video Circuit
4. Power Circuit
5. Control Circuit

The following circuits are contained in Sub P.C.B.

1. Sub Connection Circuit
2. LCD Circuit
3. Lens Drive Circuit
4. Sub Power Circuit
5. Camera Circuit

1.2. ABOUT LEAD FREE SOLDER (PbF)

The lead free solder has been used in the mounting process of all electrical components on the printed circuit boards used for this equipment in considering the globally environmental conservation.

The normal solder is the alloy of tin (Sn) and lead (Pb). On the other hand, the lead free solder is the alloy mainly consists of tin (Sn), silver (Ag) and Copper (Cu), and the melting point of the lead free solder is higher approx.30 degrees C (86°F) more than that of the normal solder.

Definition of PCB Lead Free Solder being used

The letter of "PbF" is printed either foil side or components side on the PCB using the lead free solder. (See right figure)	PbF
---	------------

Service caution for repair work using Lead Free Solder (PbF)

- The lead free solder has to be used when repairing the equipment for which the lead free solder is used.
(Definition: The letter of "PbF" is printed on the PCB using the lead free solder.)
- To put lead free solder, it should be well molten and mixed with the original lead free solder.
- Remove the remaining lead free solder on the PCB cleanly for soldering of the new IC.
- Since the melting point of the lead free solder is higher than that of the normal lead solder, it takes the longer time to melt the lead free solder.
- Use the soldering iron (more than 70W) equipped with the temperature control after setting the temperature at 350±30 degrees C (662±86°F).

Recommended Lead Free Solder (Service Parts Route.)

- The following 3 types of lead free solder are available through the service parts route.
RFKZ03D01K-----(0.3mm 100g Reel)
RFKZ06D01K-----(0.6mm 100g Reel)
RFKZ10D01K-----(1.0mm 100g Reel)

Note

- * Ingredient: tin (Sn), 96.5%, silver (Ag) 3.0%, Copper (Cu) 0.5%, Cobalt (Co) / Germanium (Ge) 0.1 to 0.3%

2 CAUTION FOR AC CORD (VJA0940 TYPE)

2.1. INFORMATION FOR YOUR SAFETY

IMPORTANT

Your attention is drawn to the fact that recording of pre-recorded tapes or discs or other published or broadcast material may infringe copyright laws.

WARNING

To reduce the risk of fire or shock hazard, do not expose this equipment to rain or moisture.

CAUTION

To reduce the risk of fire or shock hazard and annoying interference, use the recommended accessories only.

FOR YOUR SAFETY

DO NOT REMOVE THE OUTER COVER

To prevent electric shock, do not remove the cover. No user serviceable parts inside. Refer servicing to qualified service personnel.

2.2. CAUTION FOR AC MAINS LEAD

For your safety, please read the following text carefully.

This appliance is supplied with a moulded three-pin mains plug for your safety and convenience.

A 5-ampere fuse is fitted in this plug.

Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 5 amperes and it is approved by ASTA or BSI to BS1362

Check for the ASRA mark or the BSI mark on the body of the fuse.



If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.

If you lose the fuse cover, the plug must not be used until a replacement cover is obtained.

A replacement fuse cover can be purchased from your local Panasonic Dealer.

If the fitted moulded plug is unsuitable for the socket outlet in your home then the fuse should be removed and the plug cut off and disposed of safely.

There is a danger of severe electrical shock if the cut off plug is inserted into any 13-ampere socket.

If a new plug is to be fitted please observe the wiring code as shown below.

If in any doubt, please consult a qualified electrician.

2.2.1. Important

The wires in this mains lead are coloured in accordance with the following code:

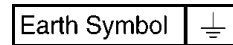
Blue	Neutral
Brown	Live

As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.

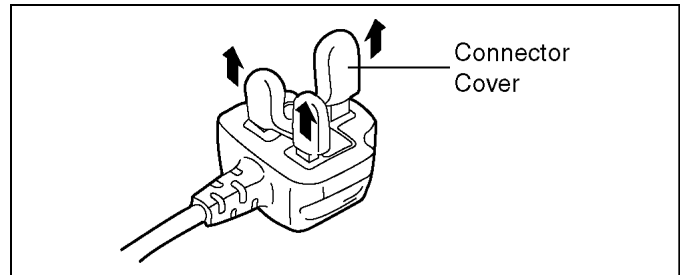
The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

Under no circumstances should either of these wires be connected to the earth terminal of the three pin plug, marked with the letter E or the Earth Symbol.



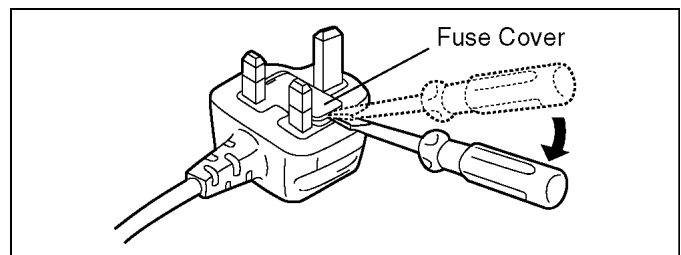
2.2.2. Before use

remove the Connector Cover as follows.

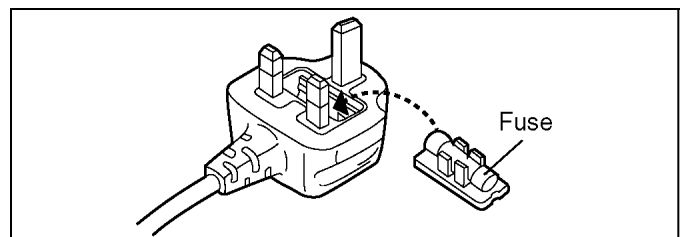


2.2.3. How to replace the Fuse

1. Remove the Fuse Cover with a screwdriver.

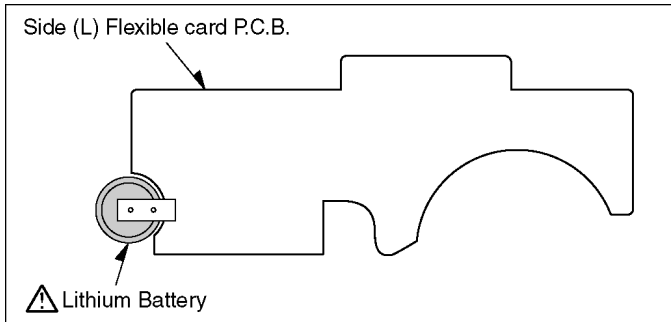


2. Replace the fuse and attach the Fuse cover.



3 HOW TO REPLACE THE LITHIUM BATTERY (PROCEDURE)

1. Remove the Side Case (L) P.C.B.. (Refer to Disassembly Procedures.)
2. Unsolder the Lithium Battery "ML-621S/F9D" and then replace the new one. (See Fig. B1.)
3. Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.



CAUTION

The battery used in this device may present a risk of fire or chemical burn if mistreated.
Do not recharge, disassemble, heat above 100°C (212°F), or incinerate.
Replace battery with Panasonic part number ML-621S/F9D only.
Use of another battery may present a risk of fire or explosion.
Dispose of used battery promptly.
Keep away from children.
Do not disassemble and do not dispose of in fire.

Fig. B1

Note:

The lithium battery is a critical component. (Type No.: ML-621S/F9D Manufactured by Panasonic)
It must never be subjected to excessive heat or discharge.
It must therefore only be fitted in equipment designed specifically for its use.
Replacement batteries must be of the same type and manufacture.
They must be fitted in the same manner and location as the original battery, with the correct polarity contacts observed.
Do not attempt to re-charge the old battery or re-use it for any other purpose.
It should be disposed of in waste products destined for burial rather than incineration.

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the equipment manufacturer.
Discard used batteries according to manufacturer's instructions.

PRECAUTION

Le fait de remplacer incorrectement la pile peut présenter des risques d'explosion.
Remplacer la pile uniquement par une pile identique ou de type équivalent recommandée par le fabricant. Se débarrasser des piles usagées conformément aux instructions du fabricant.

VORSICHT

Bei einer falsch eingesetzten Batterie besteht Explosionsgefahr. Nur mit einer vom Hersteller empfohlenen Batterie vom gleichen Typ ersetzen.
Verbrauchte Batterien beim Fachhändler oder einer Sammelstelle für Sonderstoffe abliefern.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

ADVARSEL!

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitätä käytetty paristo valmistajan ohjeiden mukaisesti.

4 ADJUSTMENT PROCEDURES

4.1. DISASSEMBLE FLOW CHART

This flow chart indicates the disassembly steps the cabinet parts, P.C.B. and Mecha. Unit in order to access to be serviced. When reinstalling, perform the steps in the reverse order.

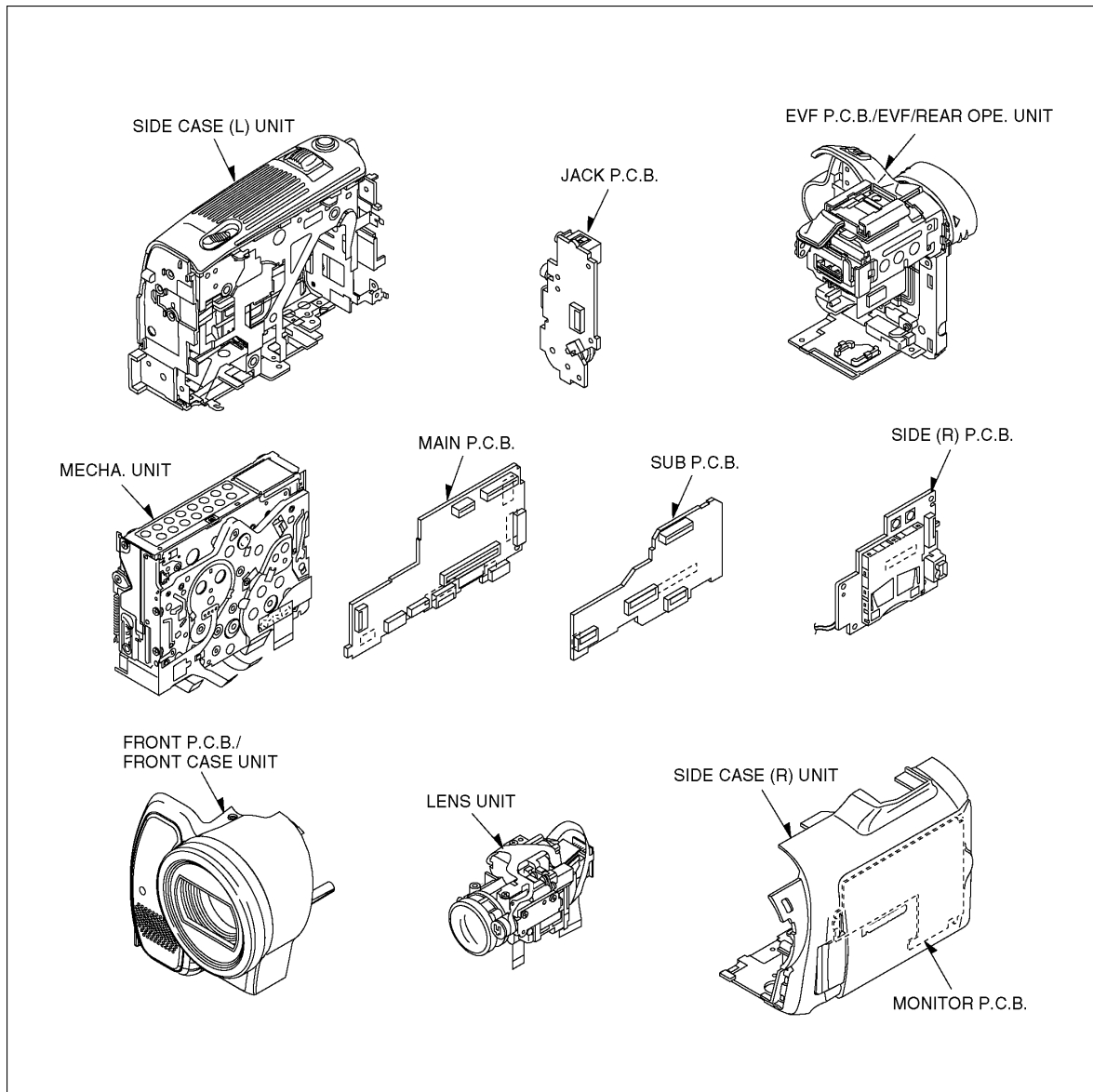
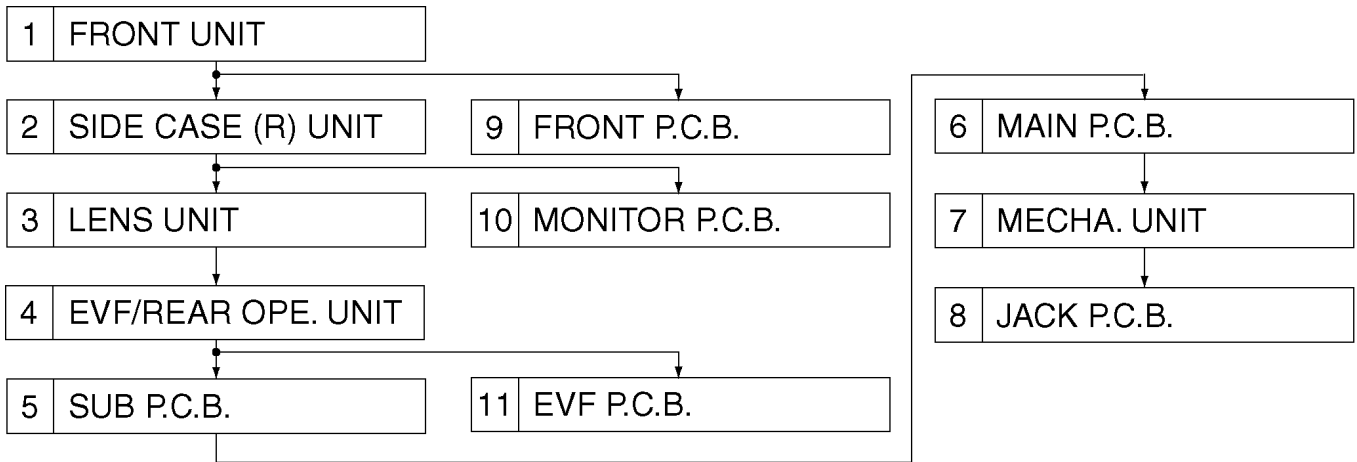


Fig. F1

4.2. DISASSEMBLY PROCEDURES

Flow-Chart for Disassembly Procedure

No.	Item / Part	Fig.	Removal (Screw,Connector,Flex. & Other)
1	Front Case Unit	Fig. D2	1-Screw (A)
		Fig. D3	Open the LCD Unit 1-Screw (B), 2-Screws (C)
		Fig. D4	1-Connector FP4801 Front Case Unit
2	Side Case (R) Unit	Fig. D5	2-Screws (D)
		Fig. D6	2-Screws (E), 1-Screw (F)
		Fig. D7	2-Connectors FP602, FP6503 Side Case (R) Unit
3	Lens Unit	Fig. D8	1-Screw (G) 2-Connectors FP201, FP701 Lens Unit
4	EVF/Rear Operation Unit, Sub P.C.B.	Fig. D9	1-Screw (H), 2-Screws (I), 1-Screw (J) 3-Connectors FP601, FP1001, FP6502 EVF/Rear Operation Unit 1-Connector FS3001 Sub P.C.B.
5	Main P.C.B.	Fig. D10	8-Connectors FP2201, FP2202, FP2203, FP2204, FP5001, FP6501, FP6504, FP6505 1-Screw (K) 4-Tabs Main P.C.B.
6	Mecha. Unit	Fig. D11	Open the Cassette Cover 3-Screws (L) Mecha. Unit
7	Jack P.C.B.	Fig. D12	1-Screw (M), 1-Screw (N), 1-Screw (O) Jack P.C.B.
8	Front P.C.B.	Fig. D13	5-Screws (P) 3-Tabs Front P.C.B.
9	Monitor P.C.B.	Fig. D14	1-Screw (Q), 3-Screws (R) Rear Cover
		Fig. D15	Turning the LCD Unit 2-Screws (S) LCD Unit
		Fig. D16	2-Screws (T) 6-Tabs LCD Case (Upper) Unit
		Fig. D17	1-Connector FP902 LCD Hinge Unit
		Fig. D18	1-Connector FP901 2-Tabs Monitor P.C.B.
10	EVF P.C.B.	Fig. D19	View ADJ. Unit is Drawn 1-Screw (U) Rear Operation Unit
		Fig. D20	2-Tabs EVF Hold Piece
		Fig. D21	2-Screws (V) 2-Tabs View ADJ. Unit 2-Screws (W), 2-Slide Spacers (X) 1-Connector FP801 EVF LCD Unit
		Fig. D22	2-Screws (Y) EVF Plate / Click Spring
		Fig. D23	1-Connector FP802 3-Tabs EVF P.C.B.

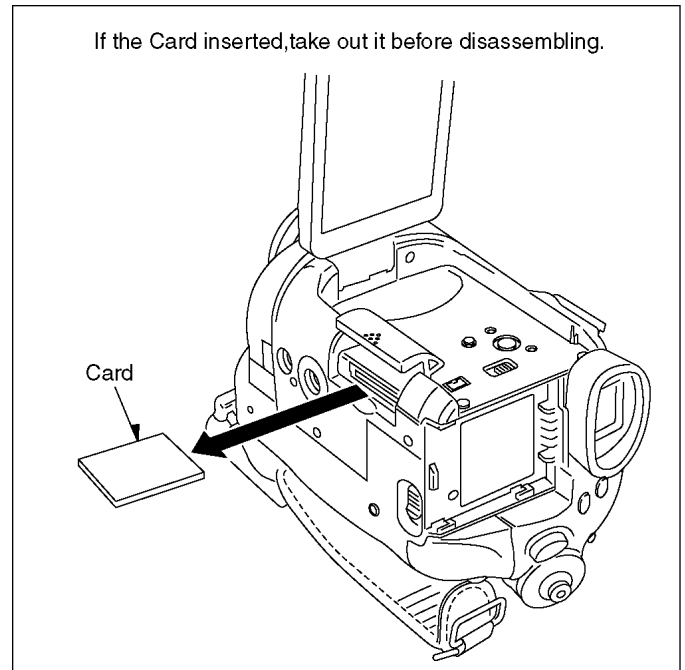


Fig. D1

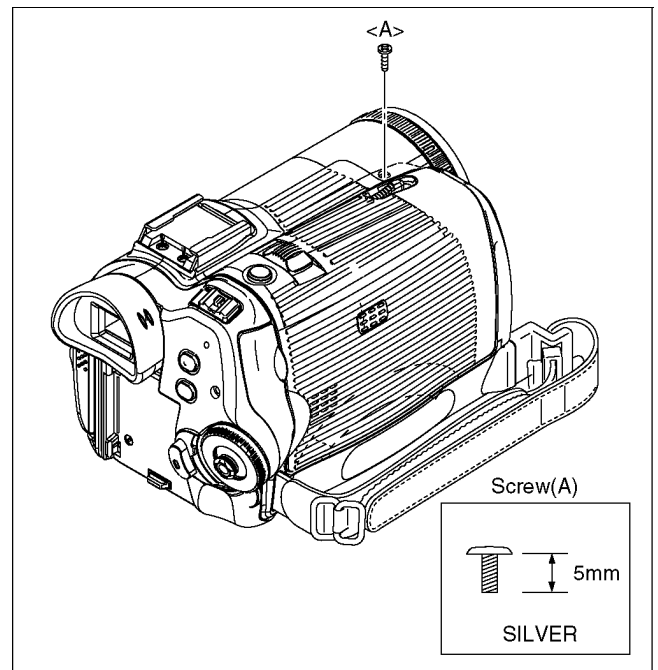


Fig. D2

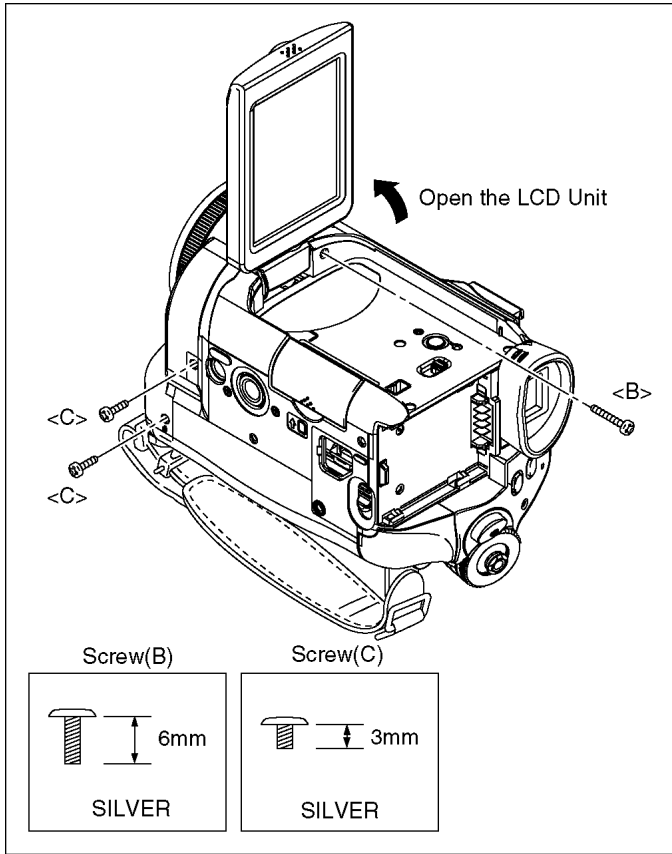


Fig. D3

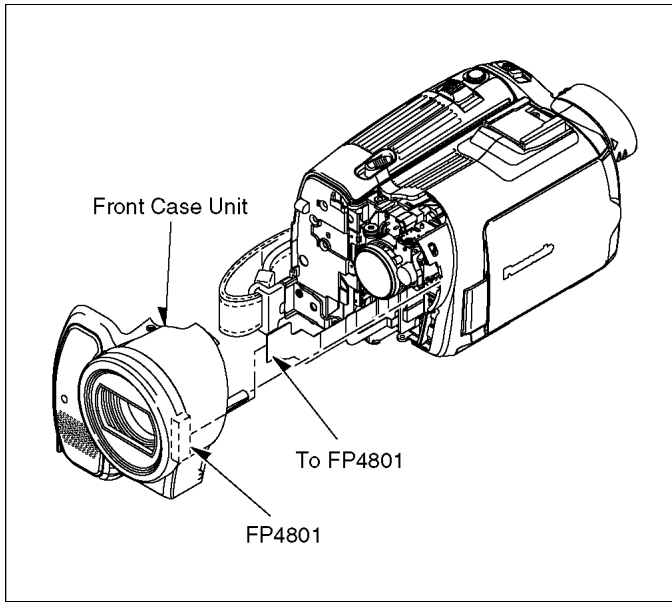


Fig. D4

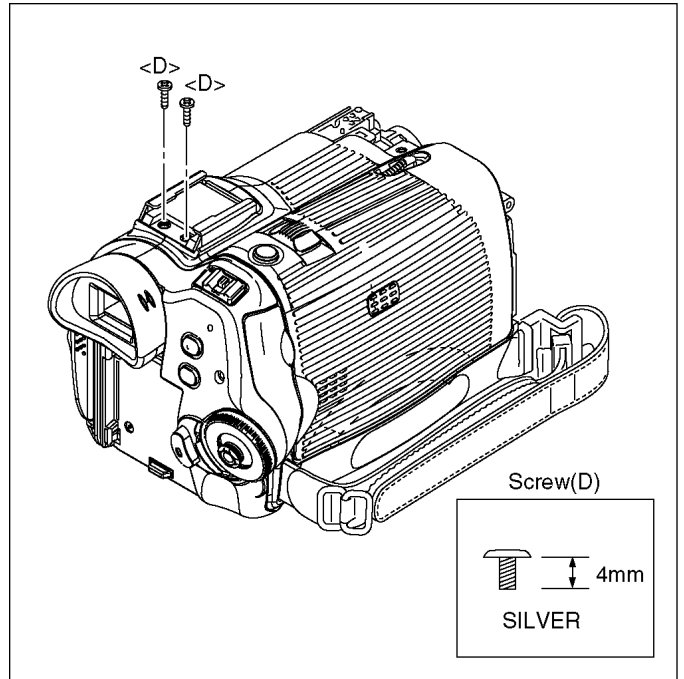


Fig. D5

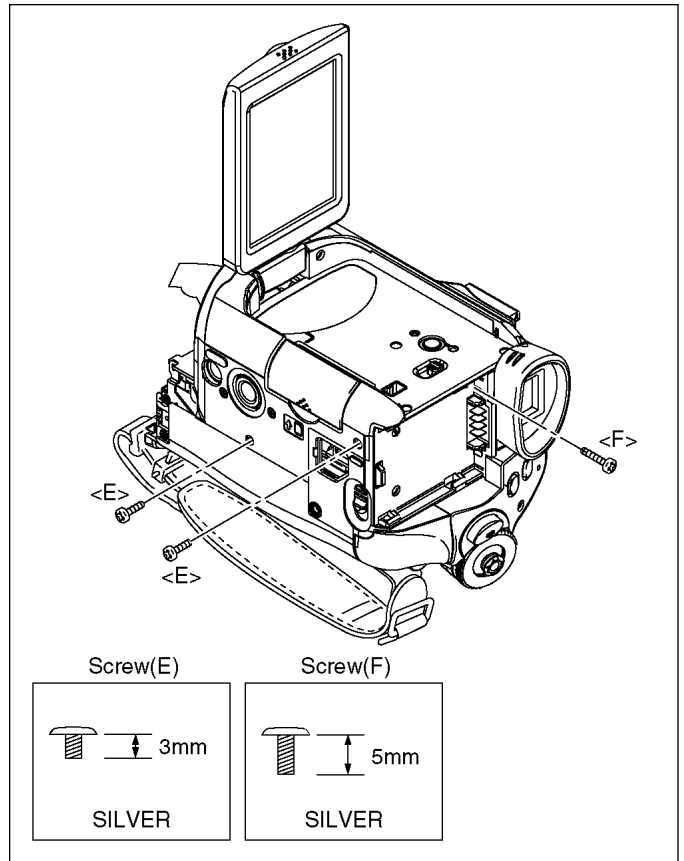


Fig. D6

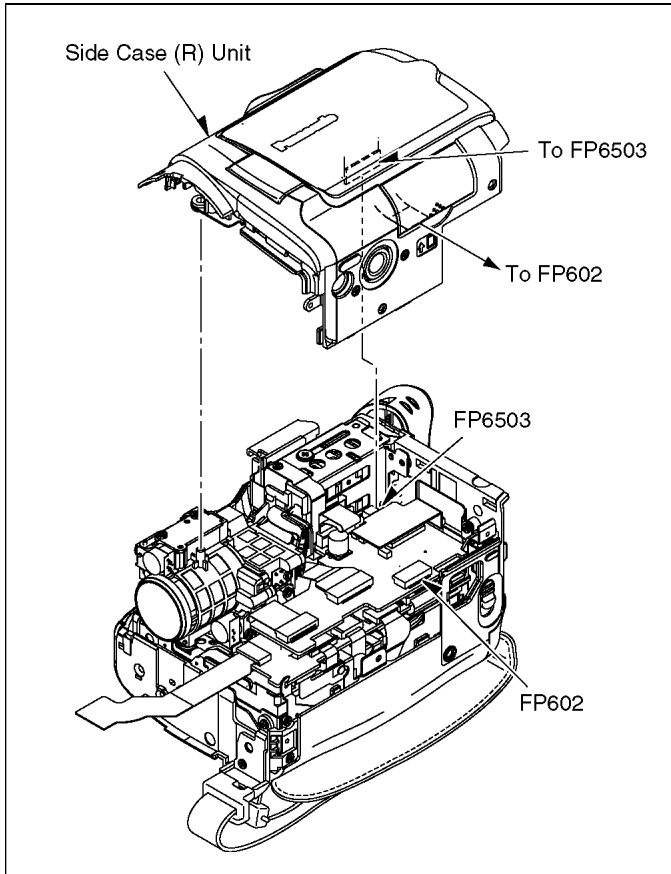


Fig. D7

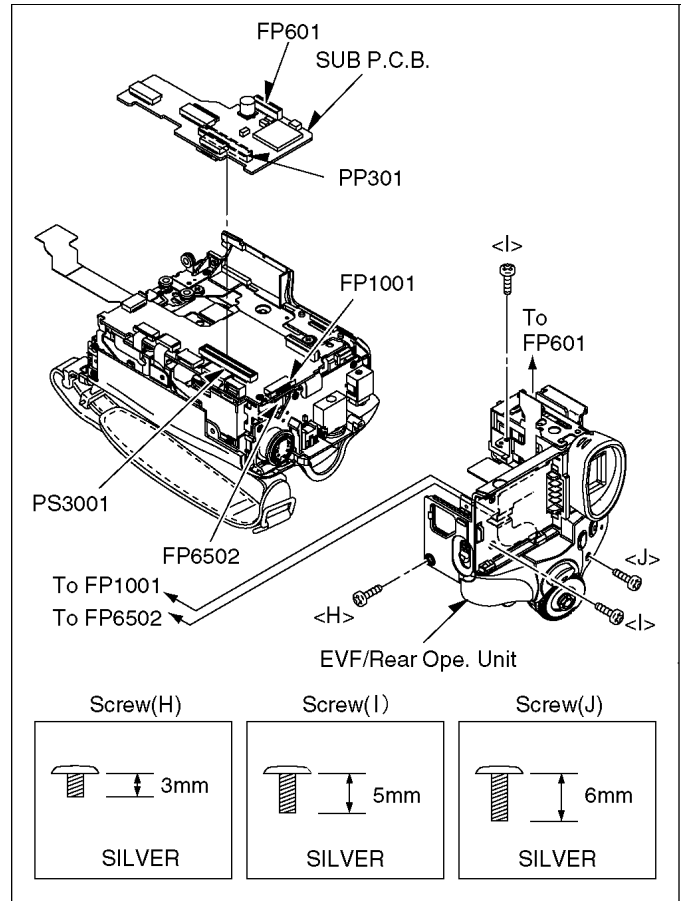


Fig. D9

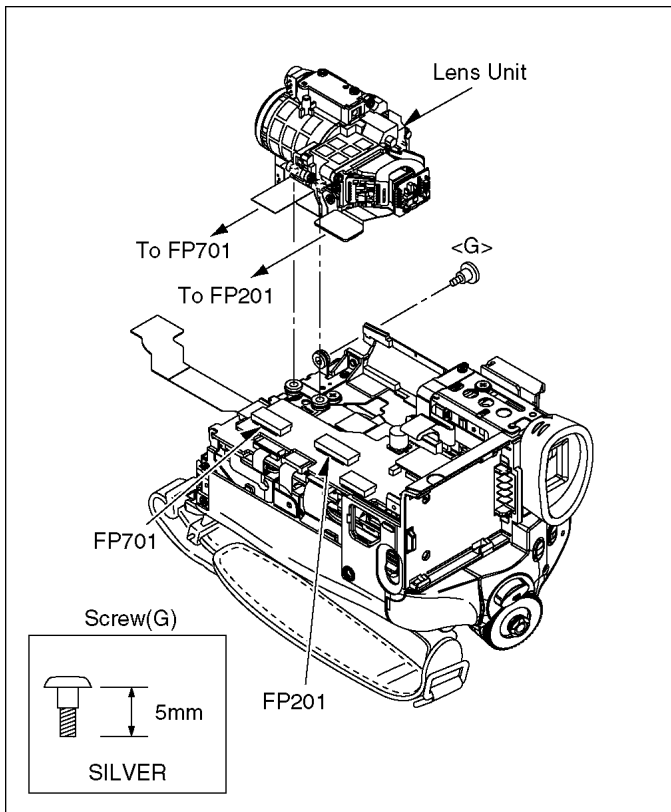


Fig. D8

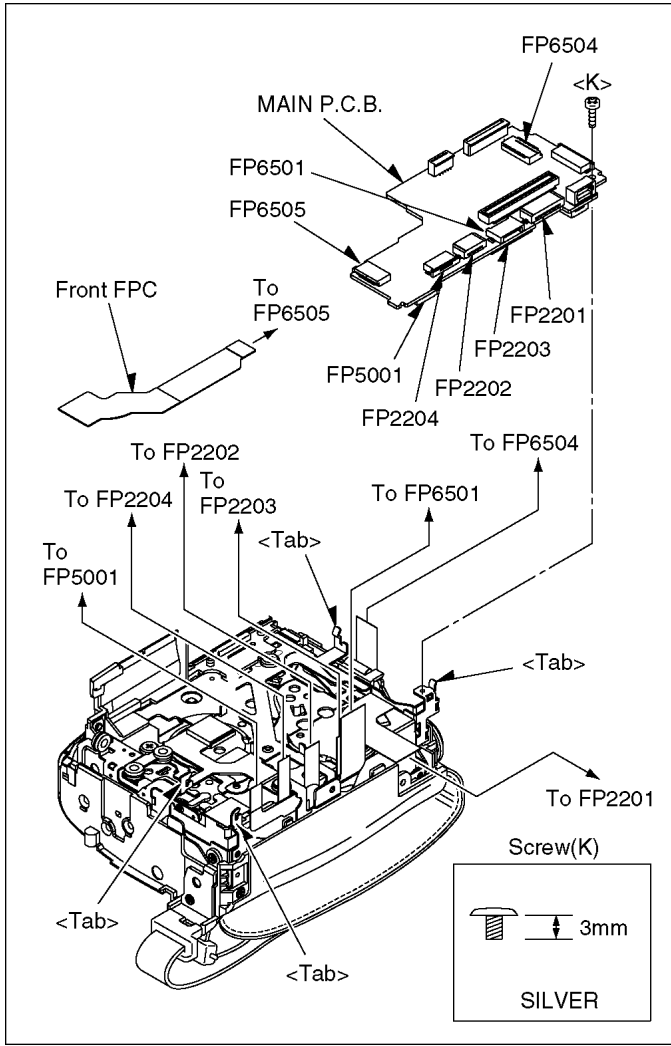


Fig. D10

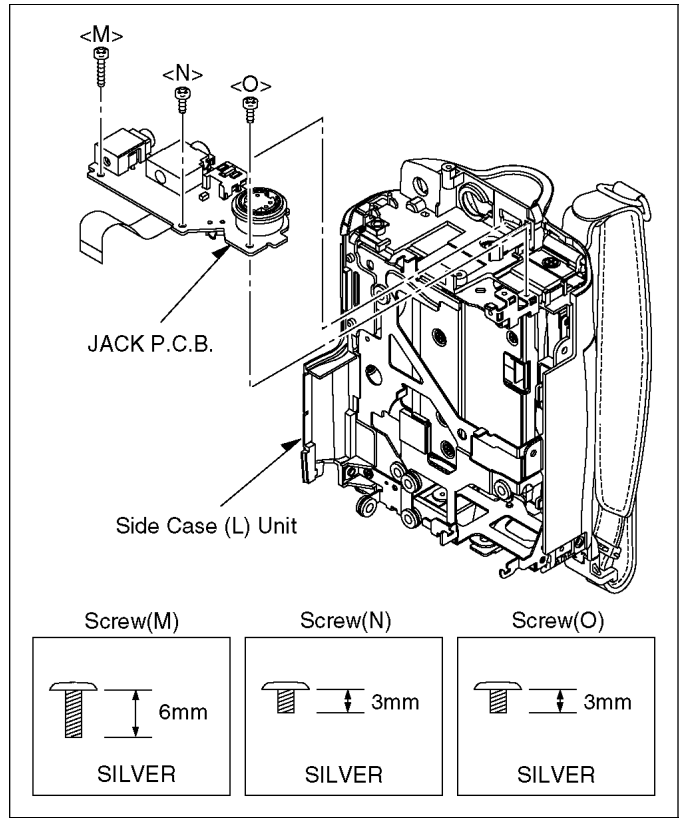


Fig. D12

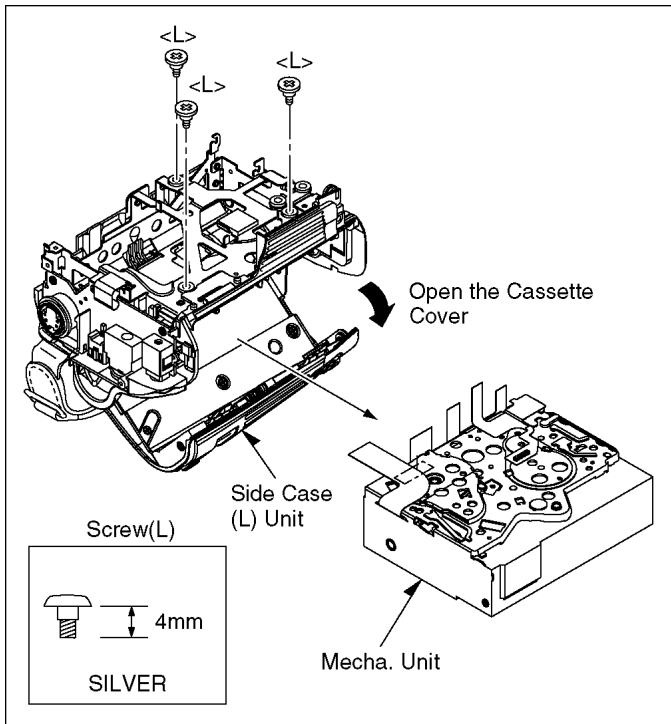


Fig. D11

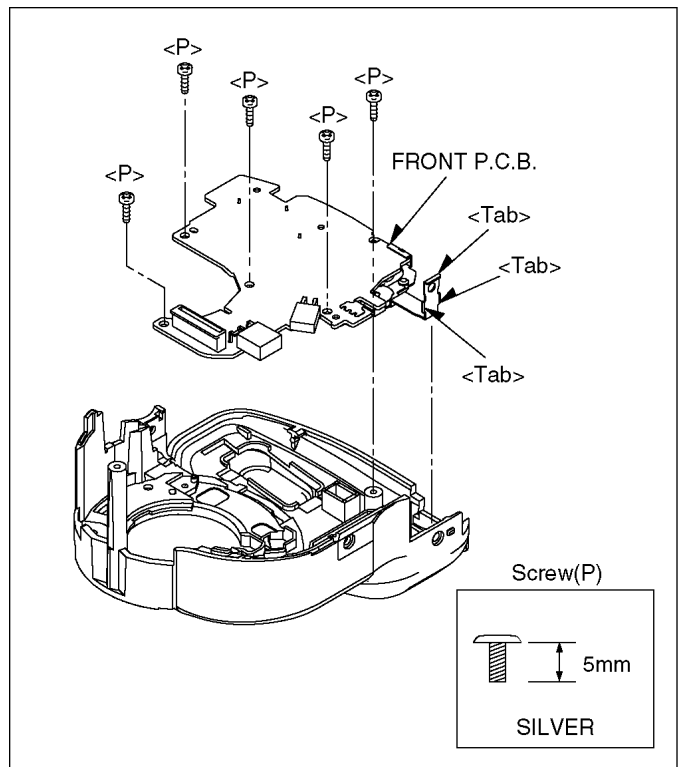


Fig. D13

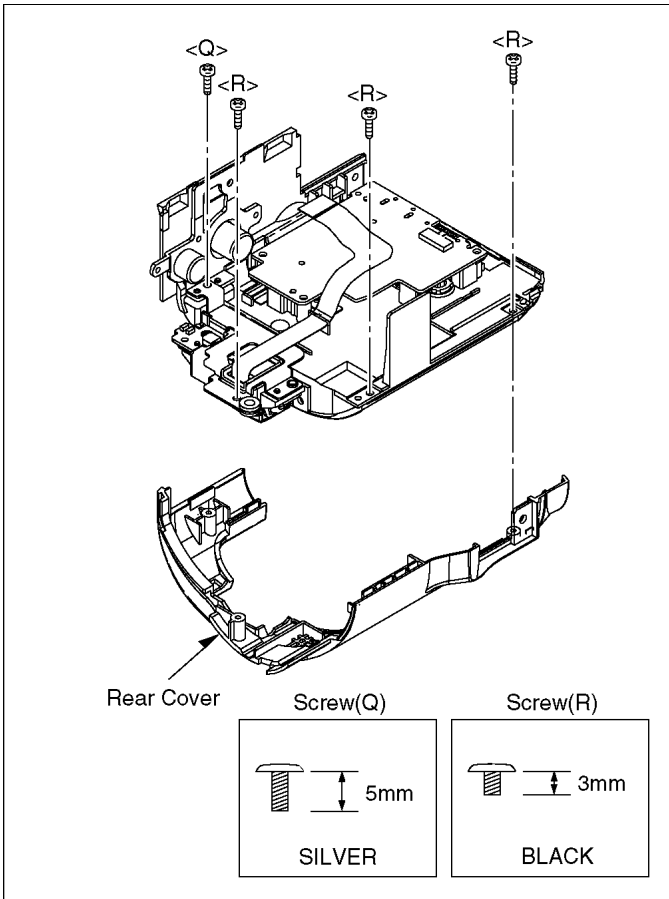


Fig. D14

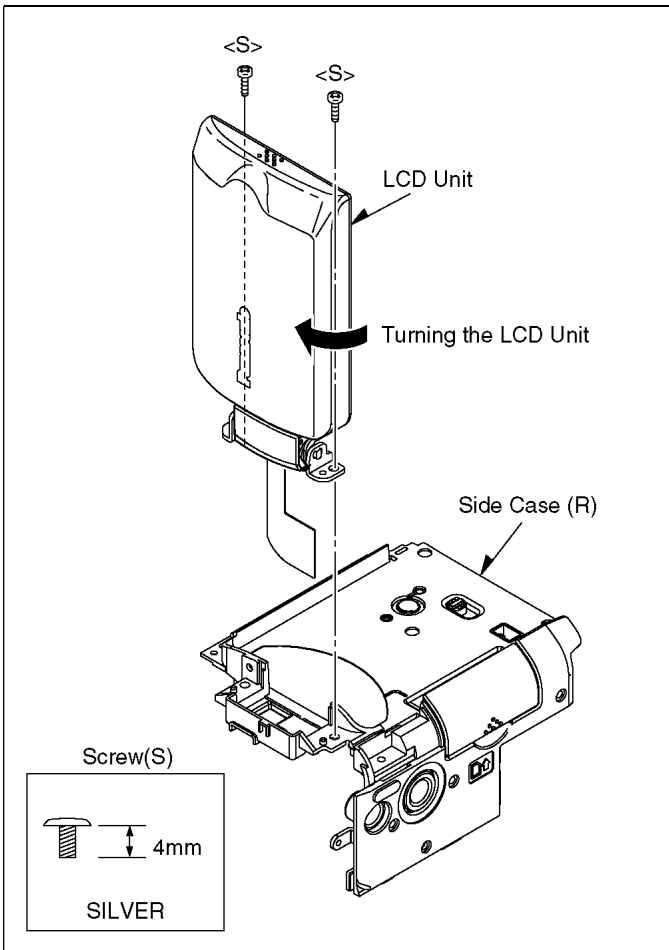


Fig. D15

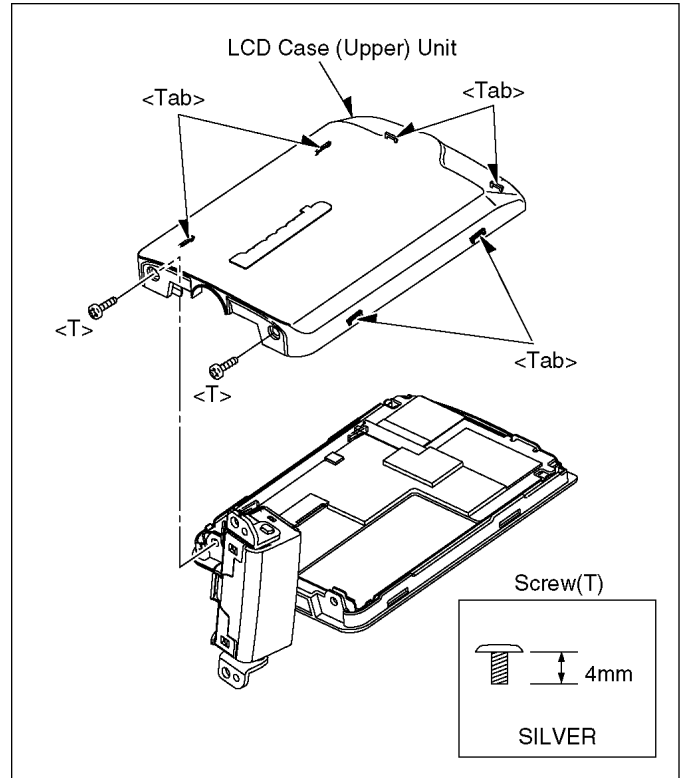


Fig. D16

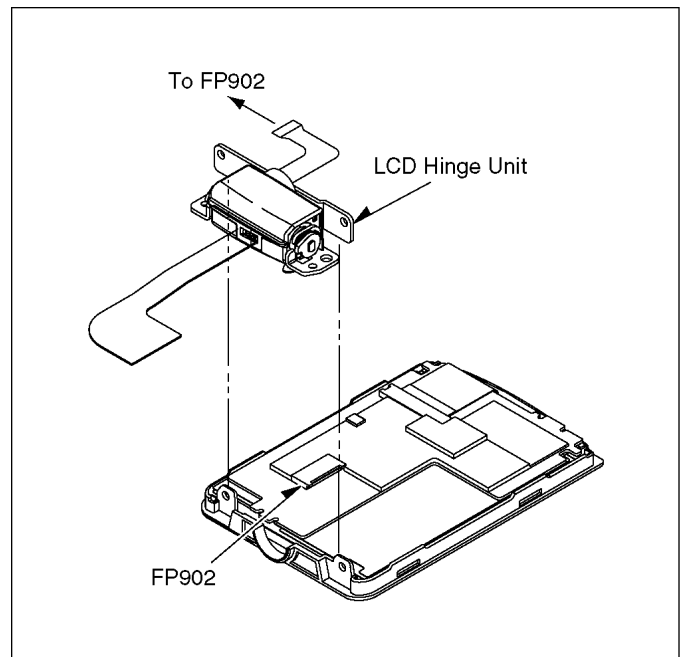


Fig. D17

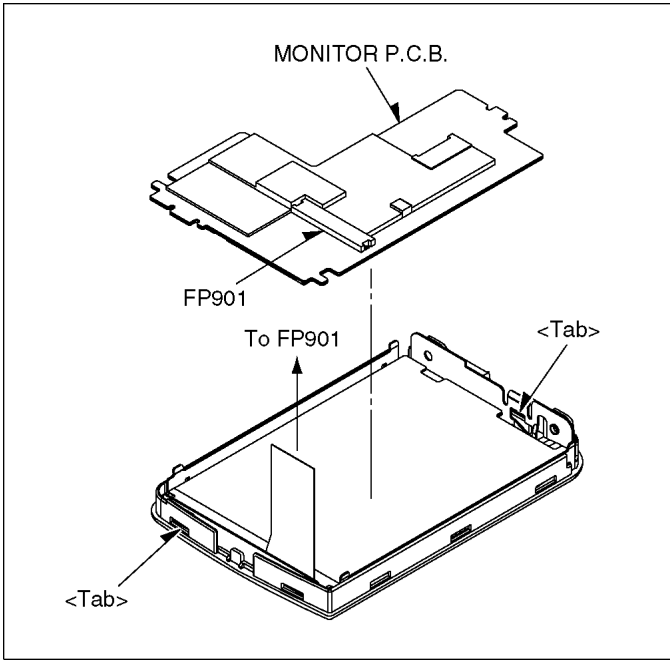


Fig. D18

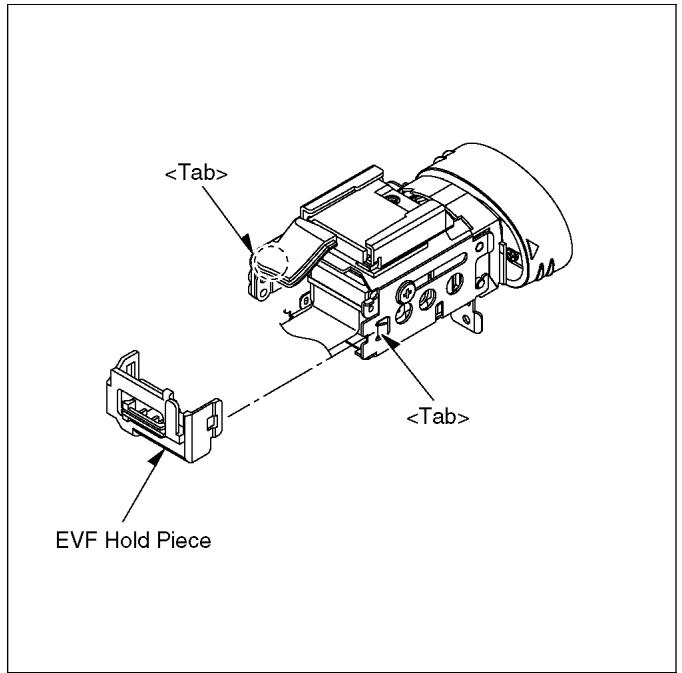


Fig. D20

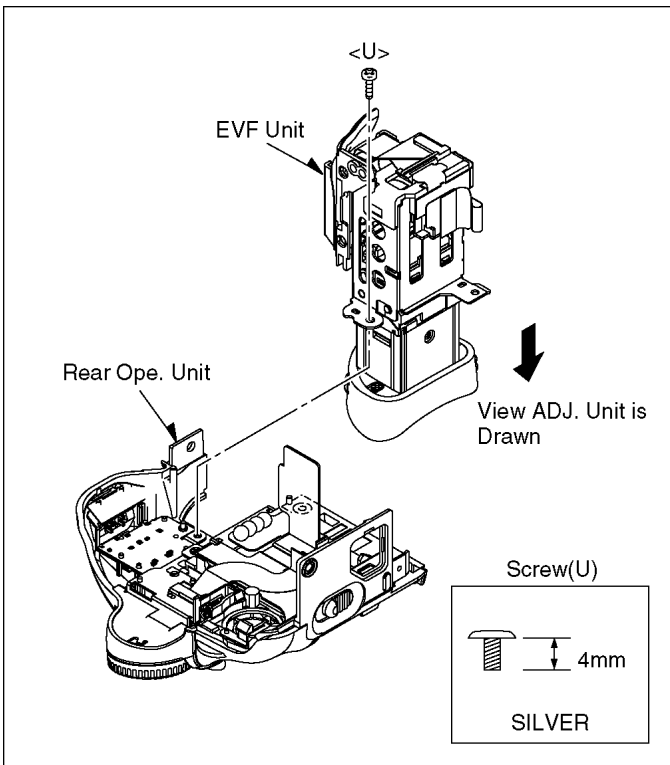


Fig. D19

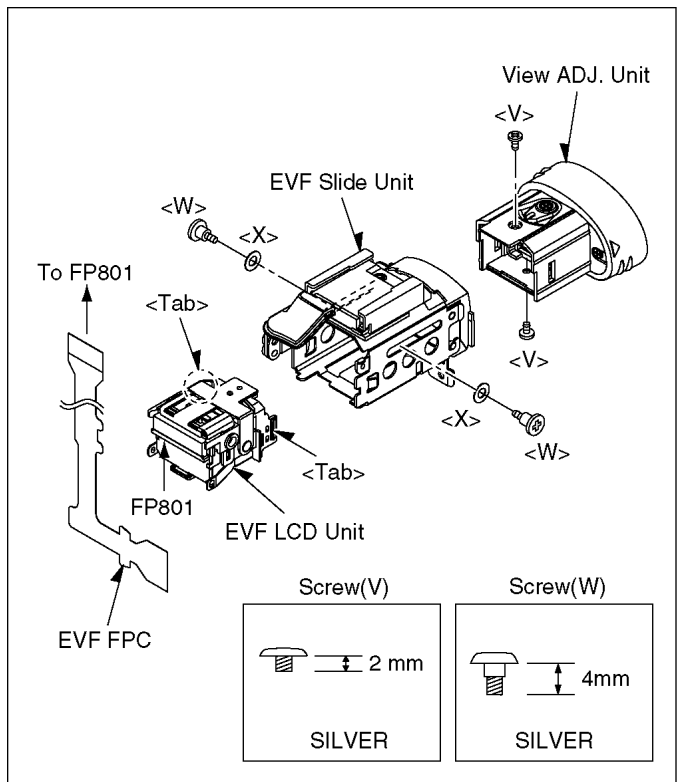


Fig. D21

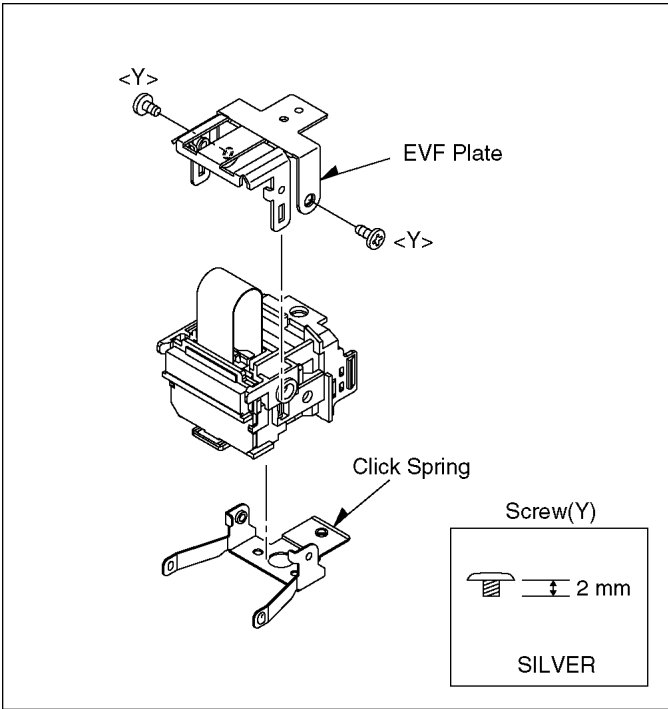


Fig. D22

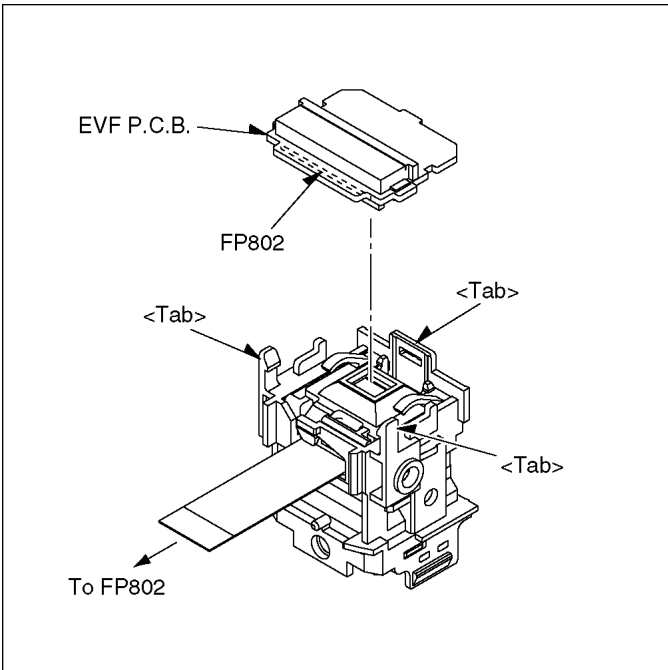


Fig. D23

4.3. DISASSEMBLY PROCEDURES MECHA. UNIT

Flow-Chart for Disassembly Procedures

No.	Item / Part	Fig.	Removal (Screw, Connector, Flex. & Other)
1	Cassette Up Unit	Fig. M1	It makes the mechanism position in Eject condition (For Battery)
		Fig. M2	3-Screws (A)
		Fig. M3	3-Tabs I remove the piece arrangement unit from rail department
2	Cylinder Unit	Fig. M4	1-Screw (B)
		Fig. M5	3-Screw (C) Cylinder Unit

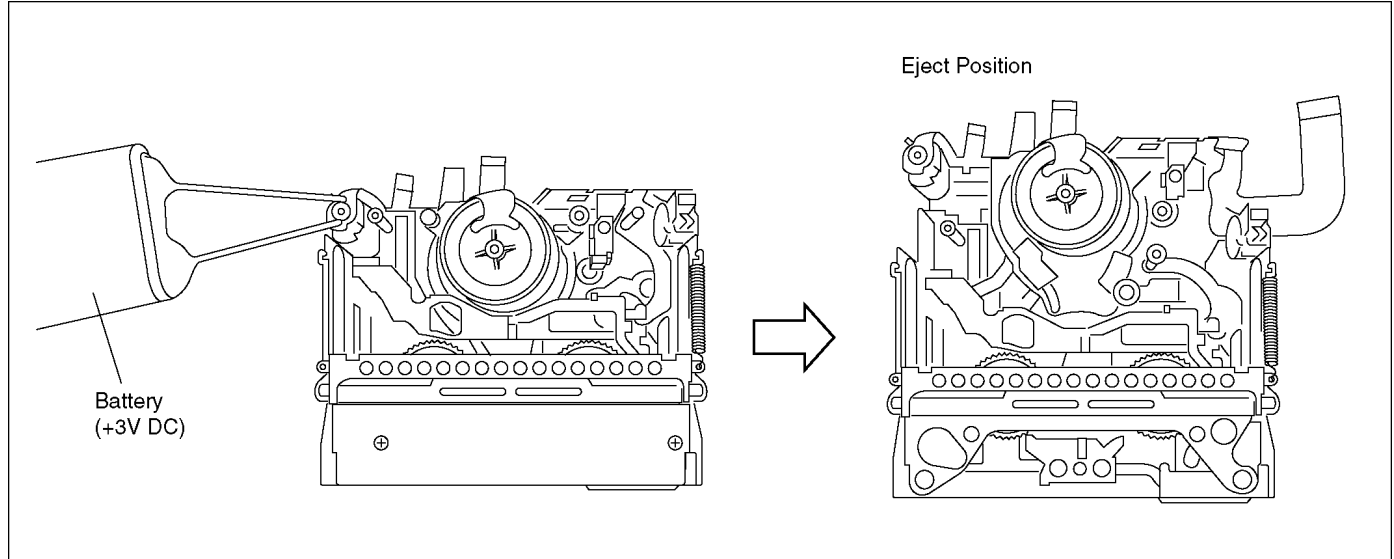


Fig. M1

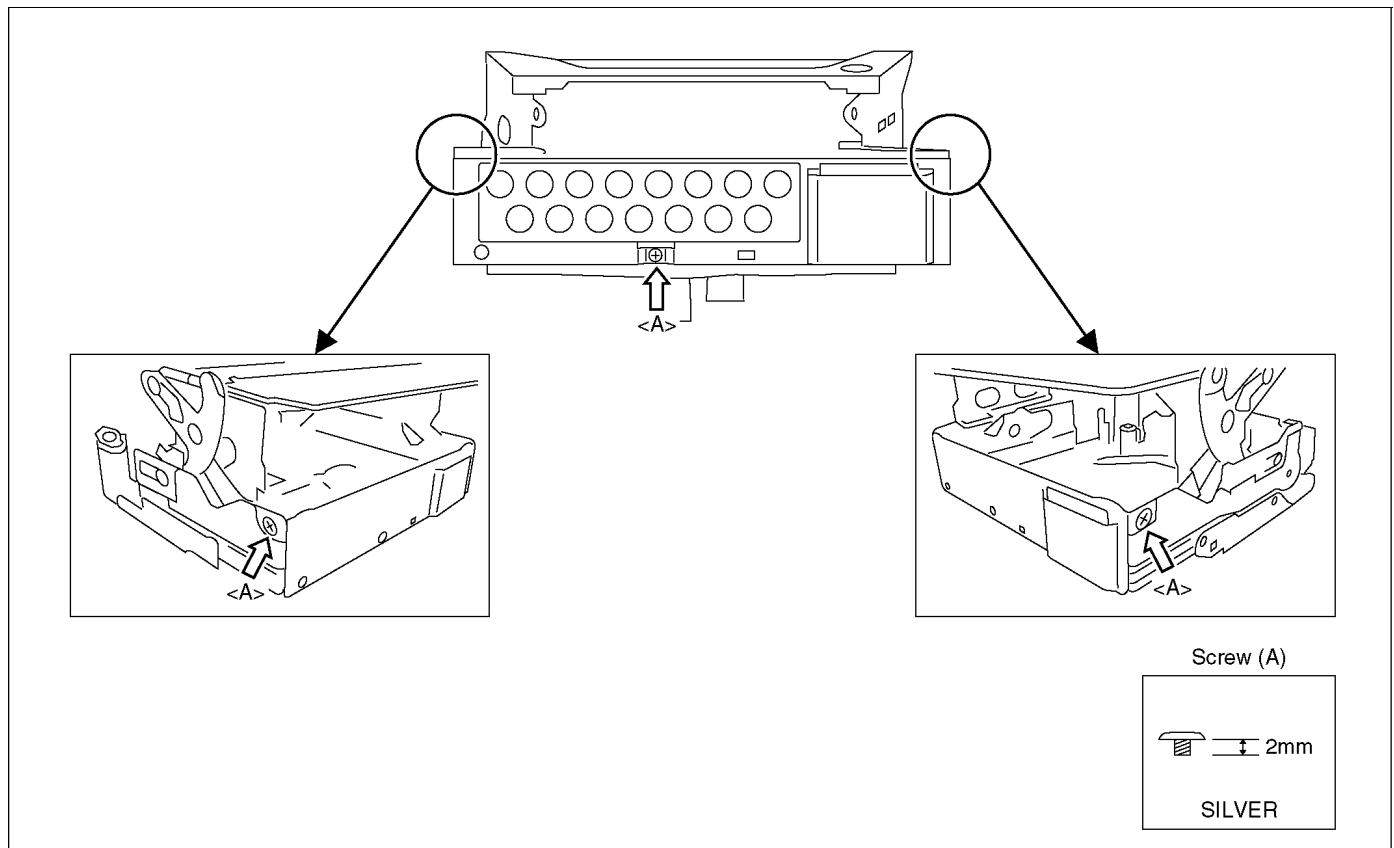


Fig. M2

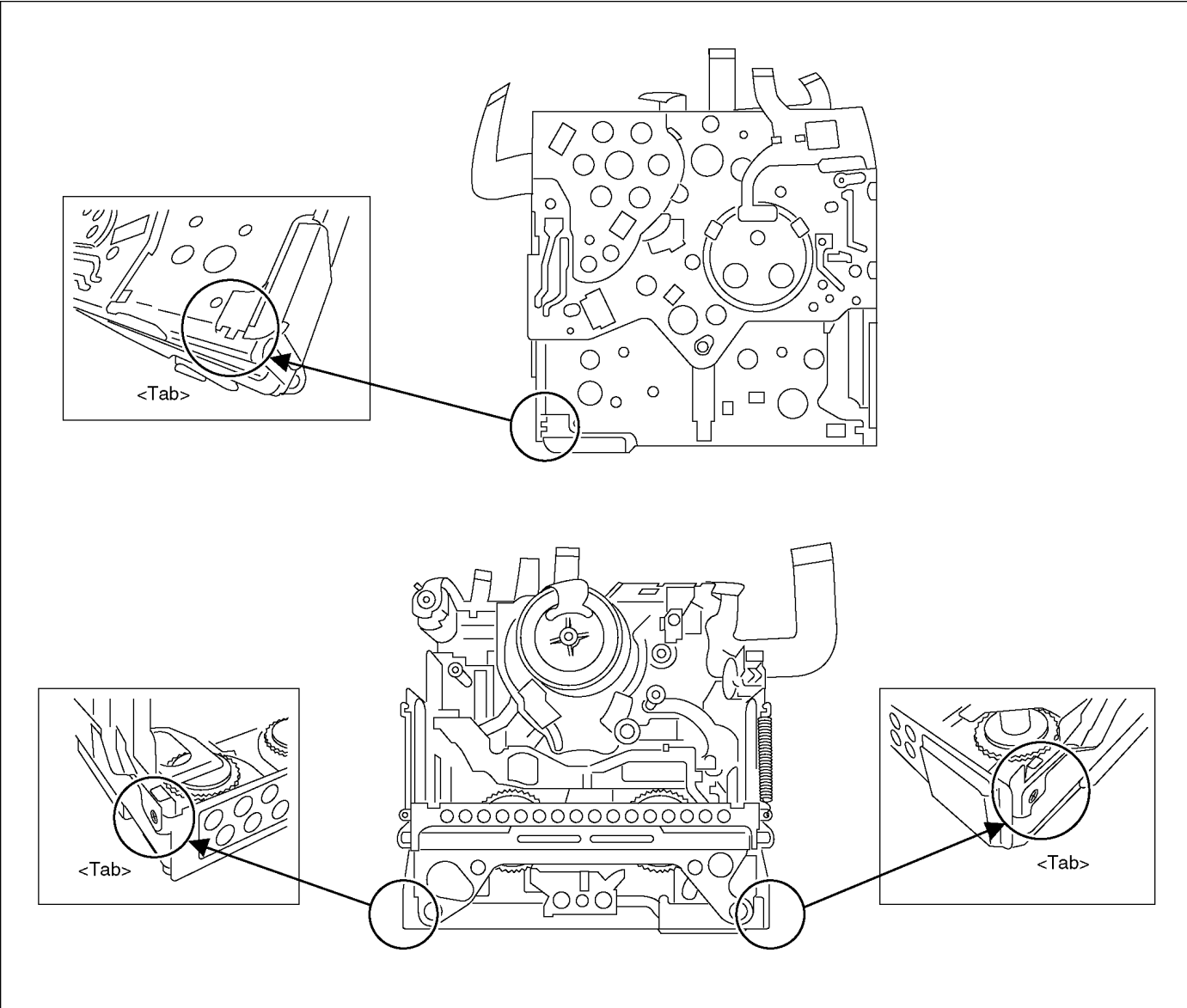


Fig. M3

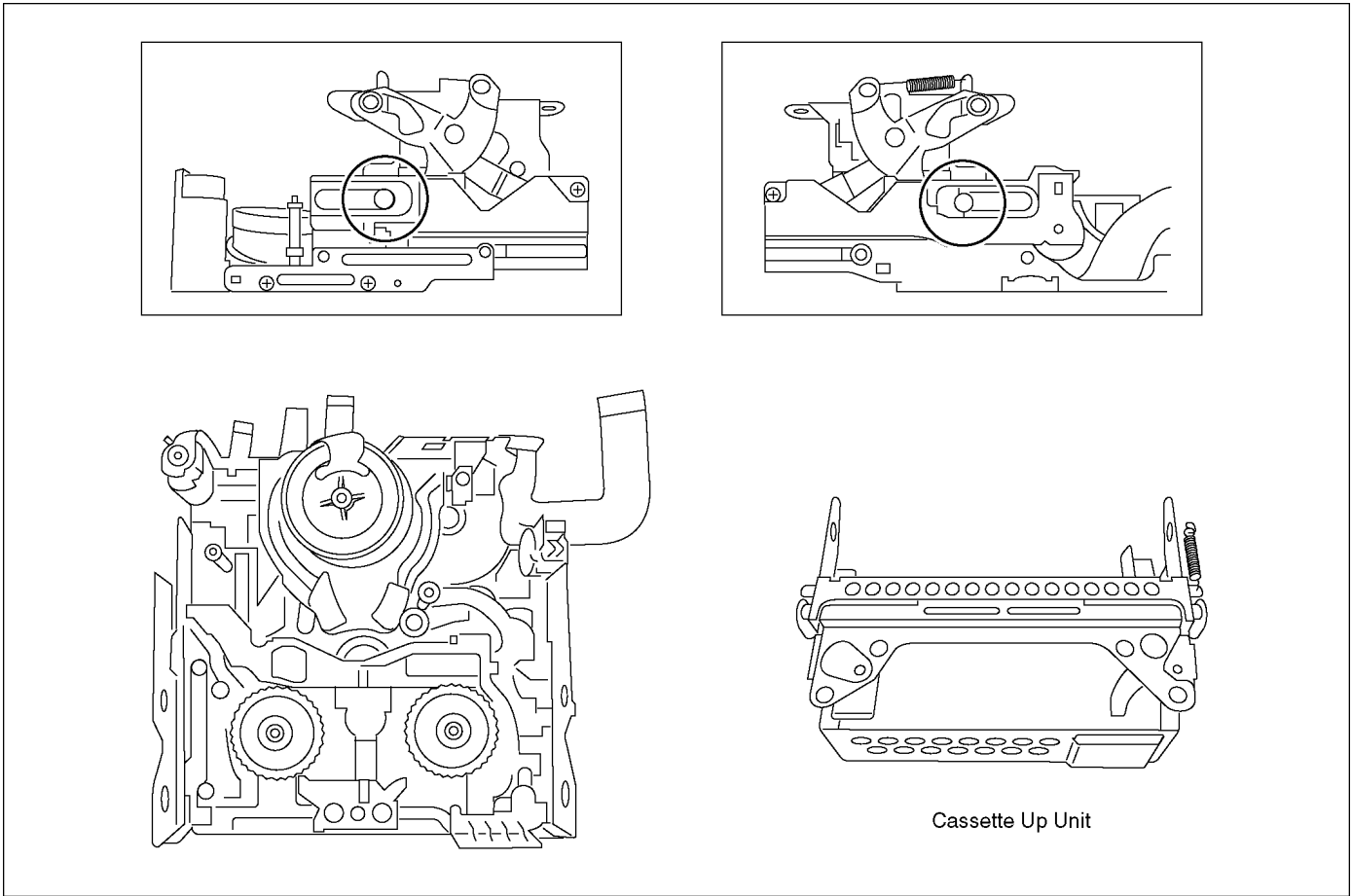


Fig. M4

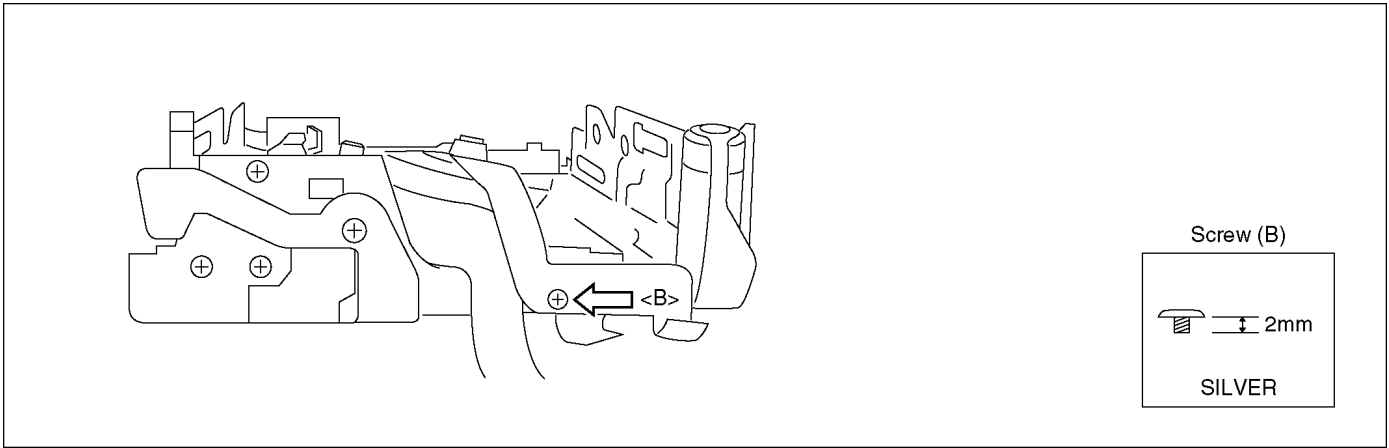


Fig. M5

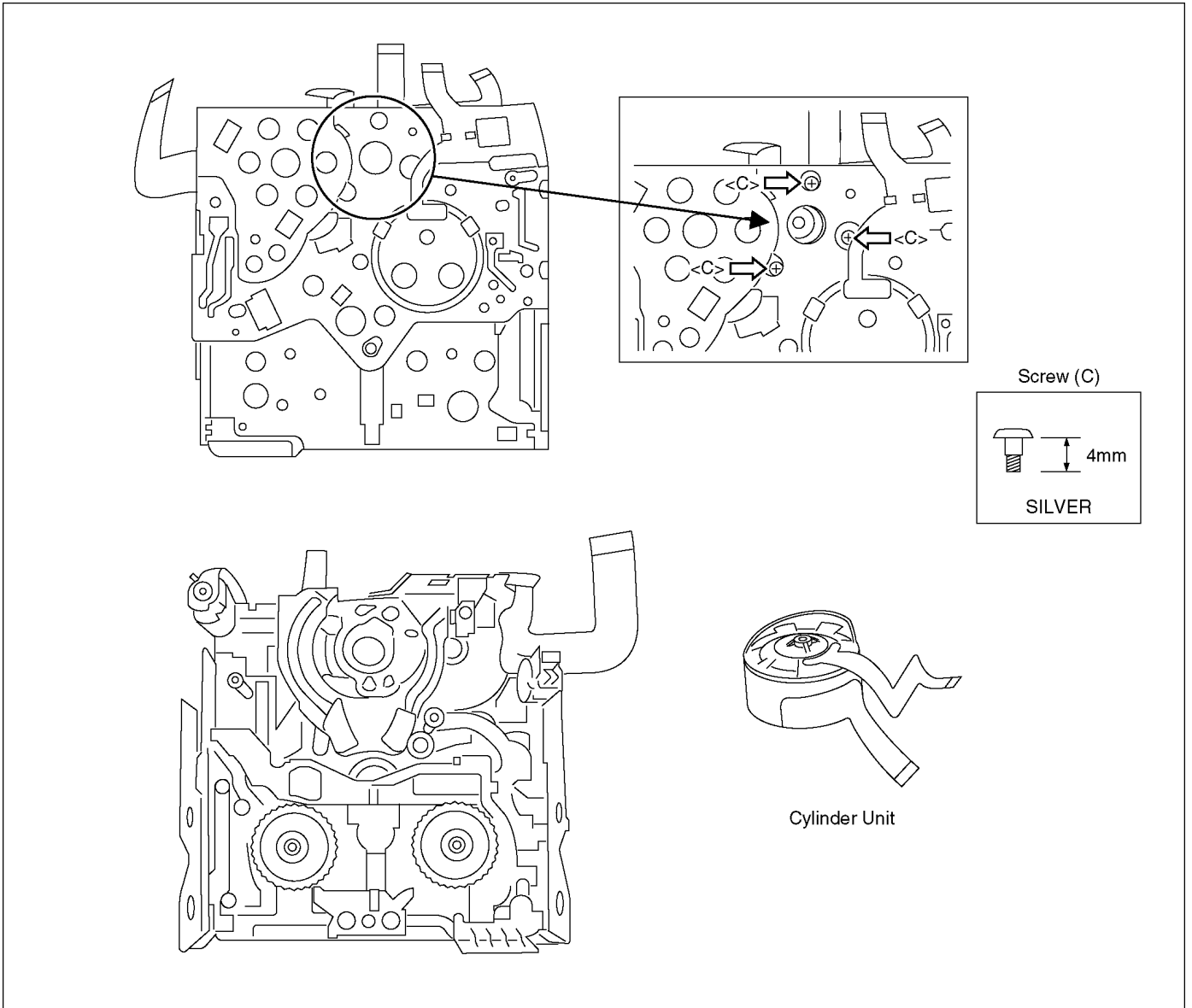


Fig. M6

4.4. DISASSEMBLY PROCEDURES OF CAMERA LENS UNIT

The following flowchart describes order or steps for removing the Camera lens unit and certain printed circuit boards in order to make access to the item needing service.

To reassemble the unit follow the steps in reverse order.

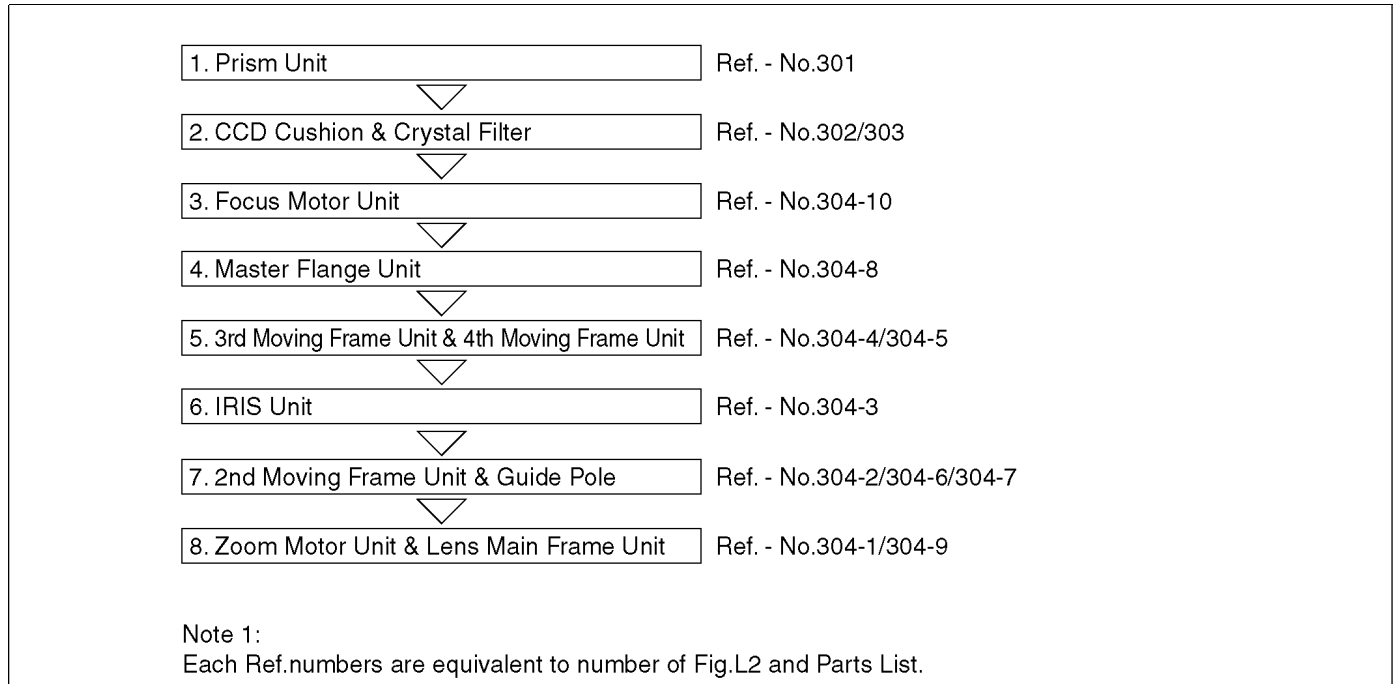


Fig. L1

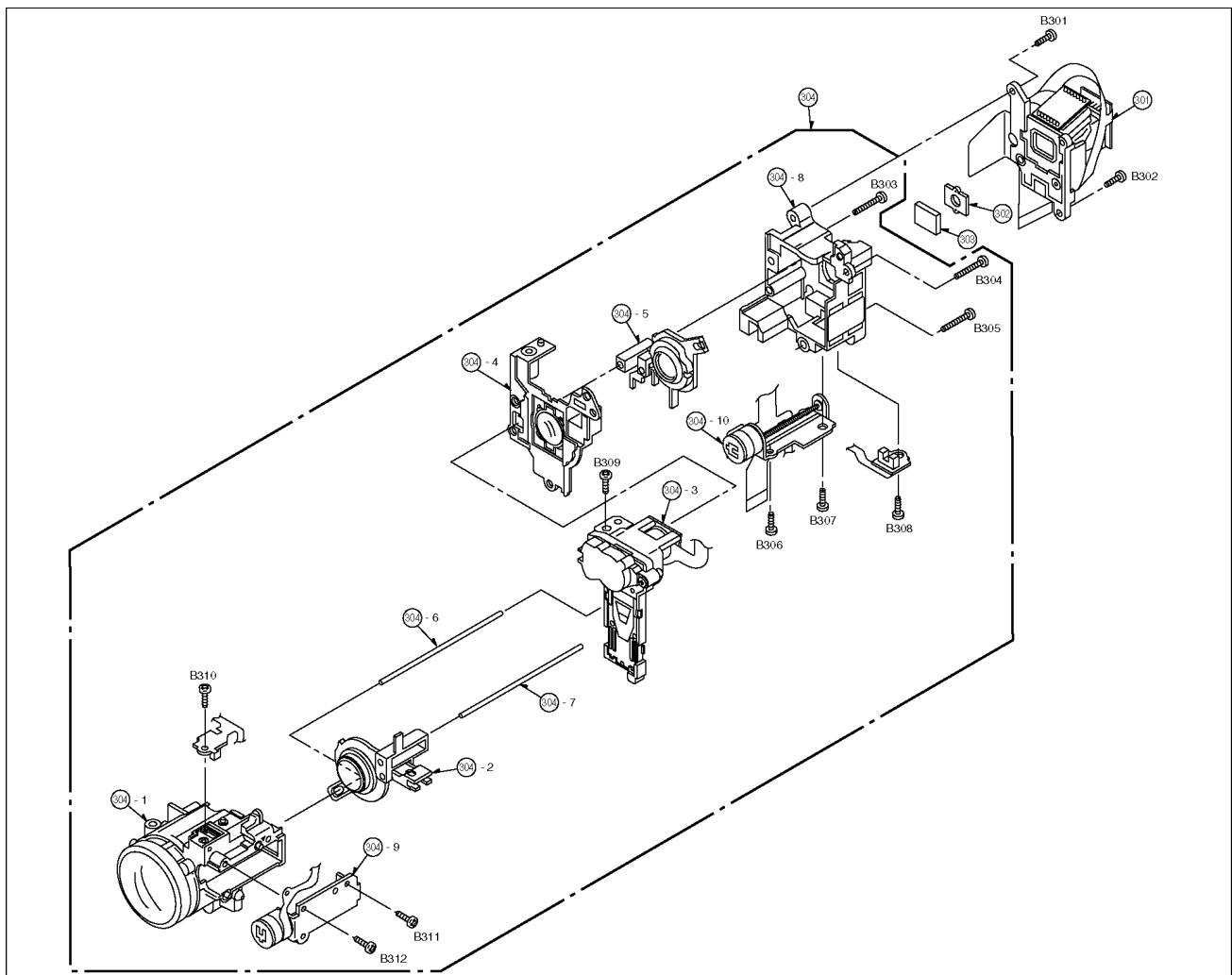


Fig. L2

5 SERVICE CAUTION

5.1. EEPROM DATA FOR SPARE PARTS OF THE MAIN P.C.B.

When the Main P.C.B. is replaced, the fixed and average data must be changed by Tatsujin kit according to the Movie Camera's suffix.

Then, confirm and/or adjust the VTR and Camera section one by one.

5.2. SERVICE EXTENSION CABLES

This models is required the following extension cables for all connections.

Note 1:

Use the following extension cables when checking or adjusting individual circuit boards except module Parts.

(Main P.C.B. and Sub P.C.B.)

Ref.	Part No.	Pin	Part Name	Connection	Q'ty	Remarks
(1)	VFK1173	14	Flat Cable	FP6502 (Main) - Rear Operation Unit	1	as NV-DS7
(2)	VFK1442	21	Flat Cable	FP6505 (Main) - FP4801 (Front)	1	as NV-DS7
(3)	VFK1442	21	Flat Cable	FP701 (Sub) - Lens Unit	1	as NV-DS7
(4)	VFK1459	39	Flat Cable	FP201 (Sub) - PP201 (Prism Unit)	1	as NV-DS7
(5)	VFK1492	26	Flat Cable	FP6503 (Main) - FP6301 (Side R)	1	as NV-DS9
(6)	VFK1491	27	Flat Cable	FP602 (Sub) - FP902 (Monitor)	1	as NV-DS9
(7)	VFK1173	14	Flat Cable	FP1001 (Main) - Battery Catcher	1	as NV-DS7
(8)	VFK1491	27	Flat Cable	FP6504 (Main) - FP6201 (Jack)	1	as NV-DS9
(9)	VFK1282	22	Flat Cable	FP601 (Sub) - FP801 (EVF)	1	as NV-DP1

How to use extension cables.

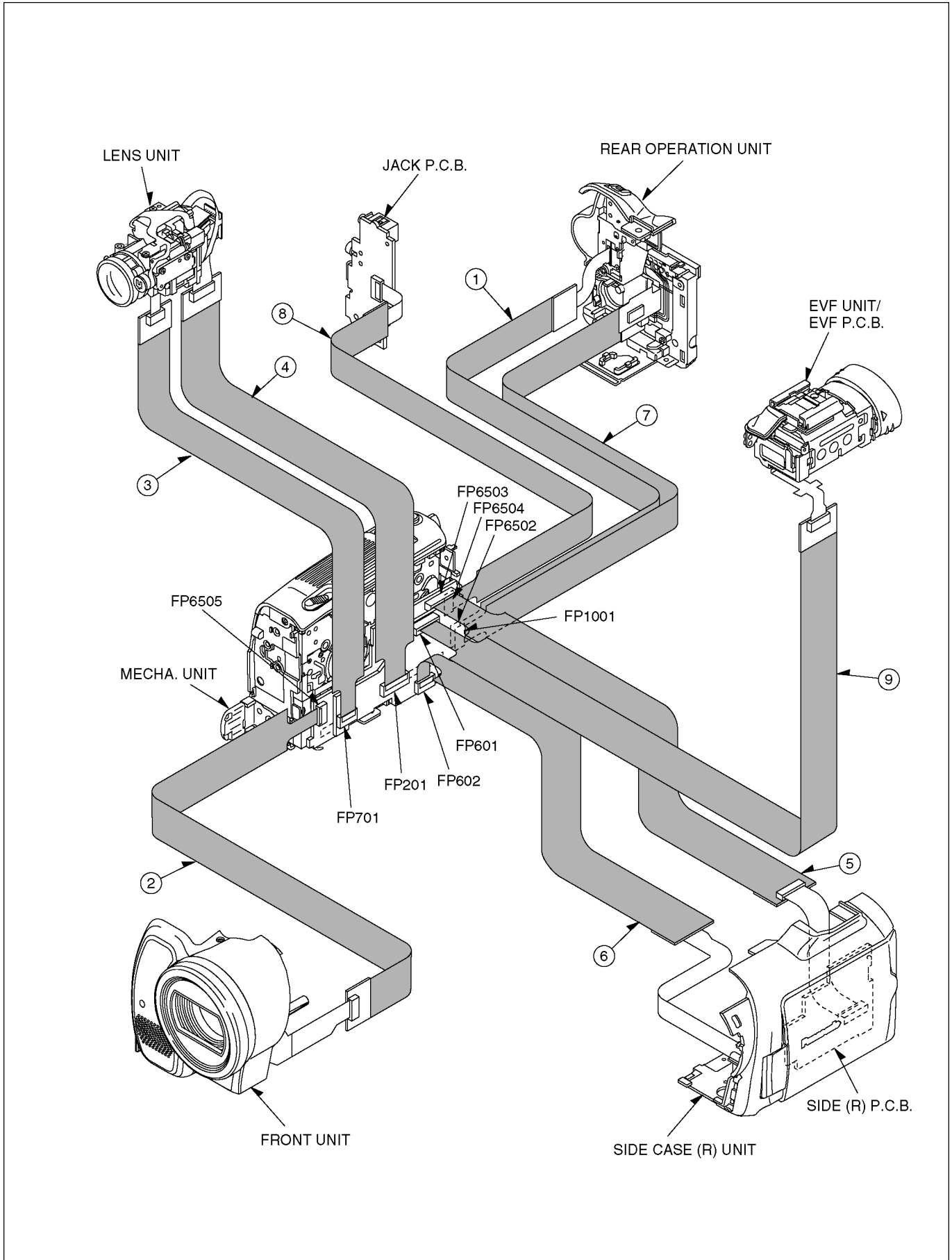
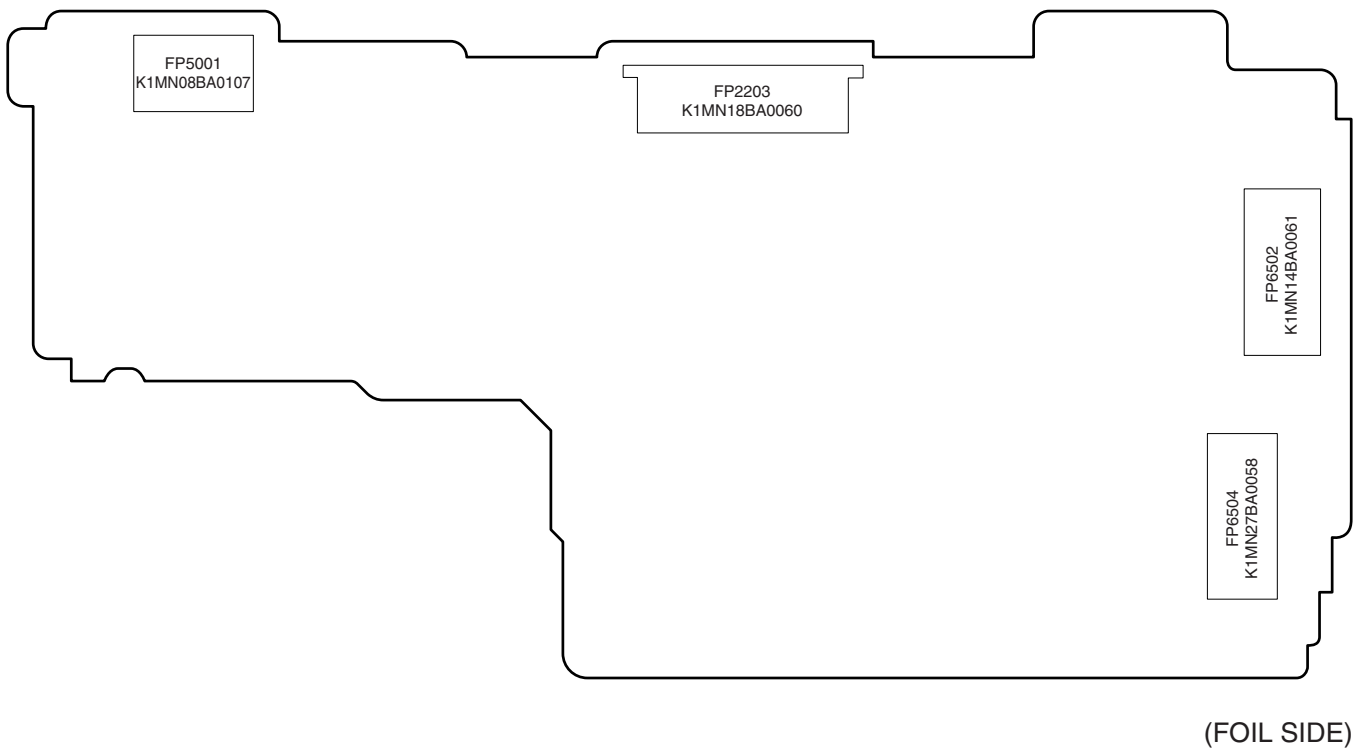
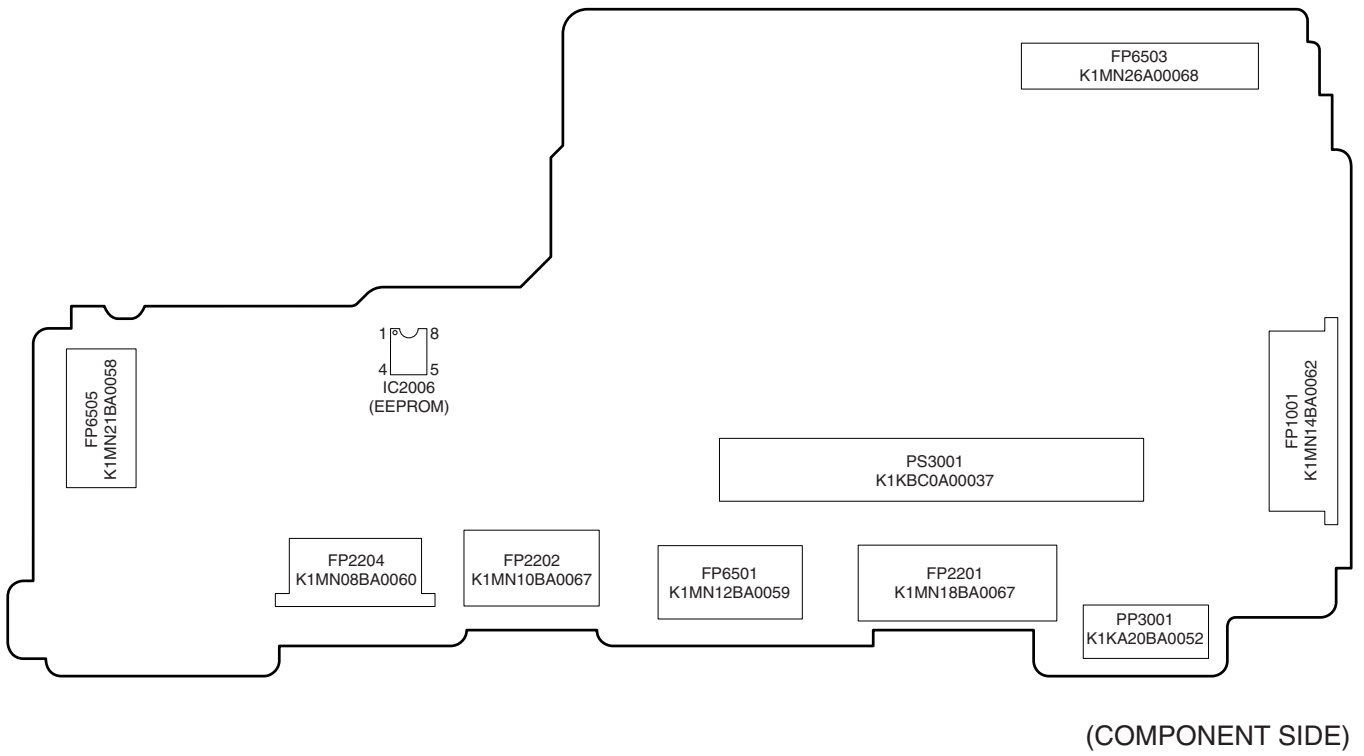


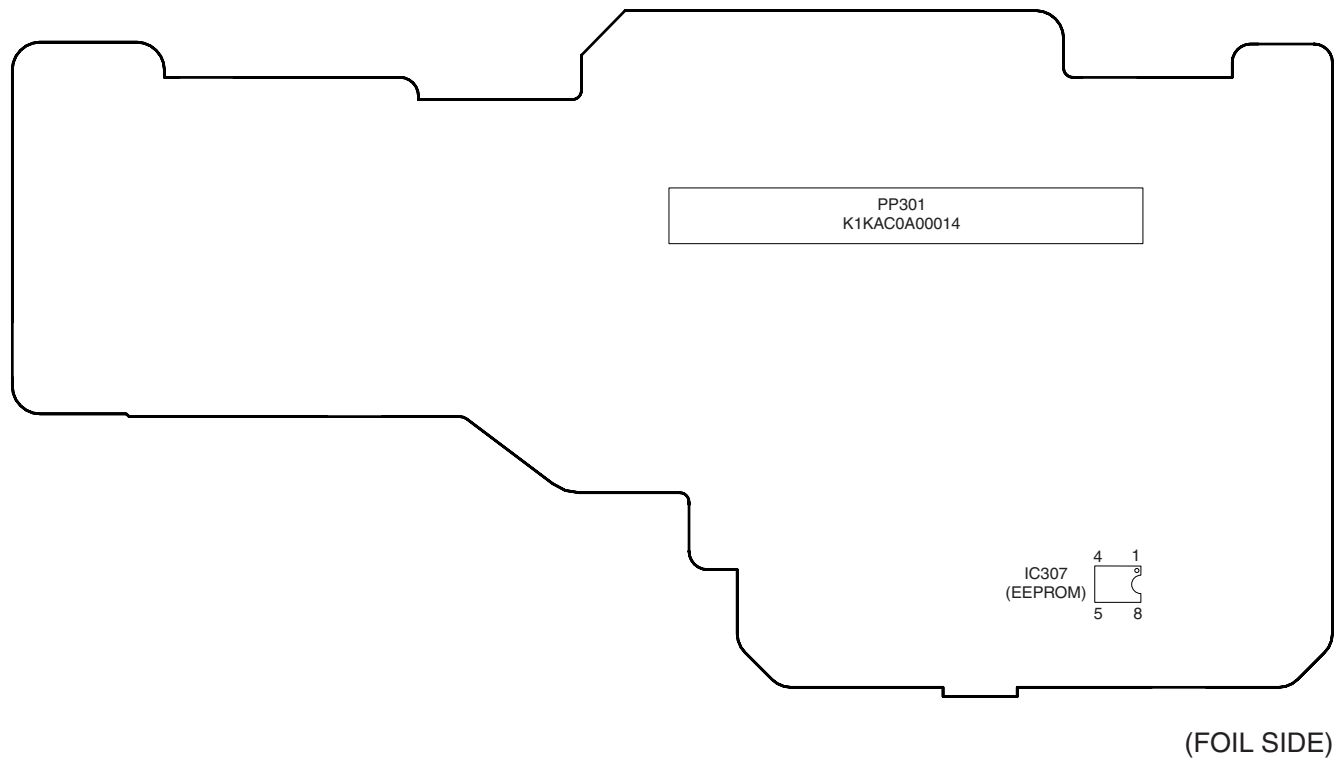
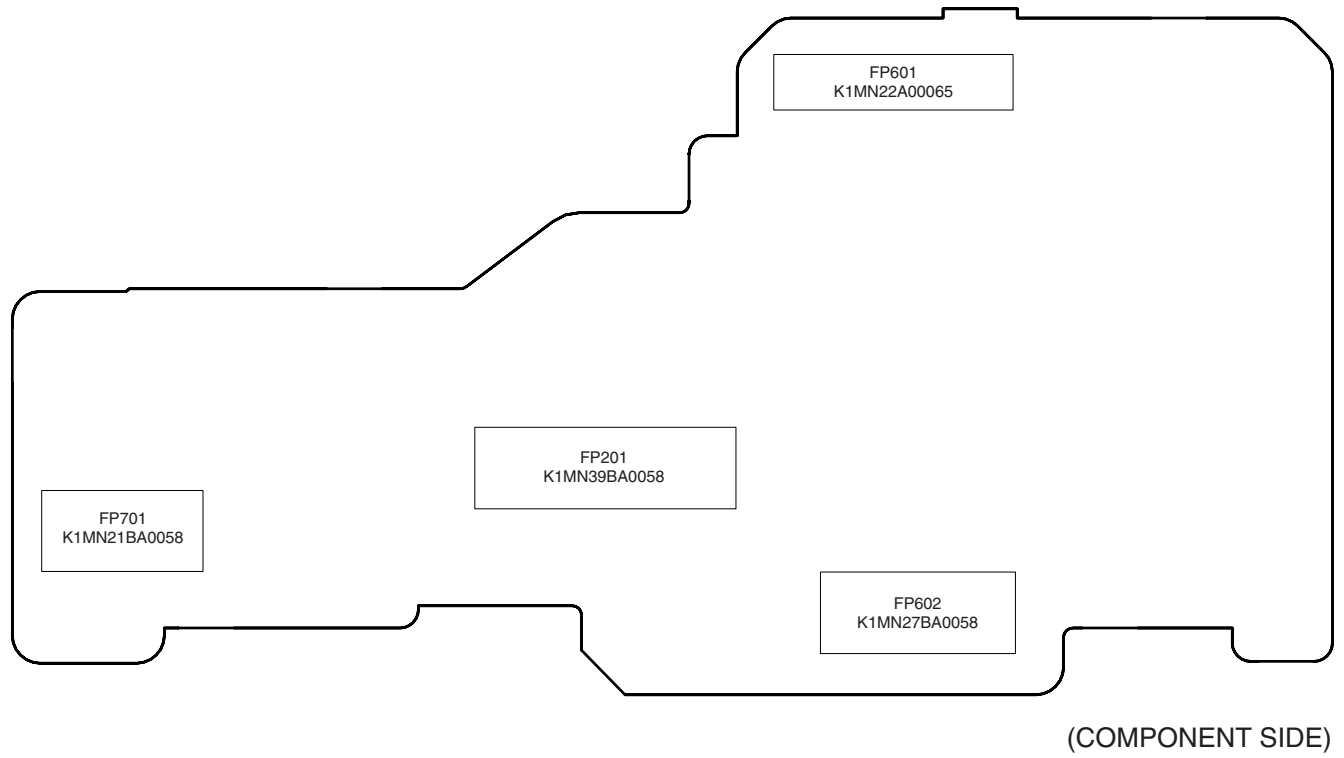
Fig. T1

5.3. LOCATION FOR CONNECTORS OF THE MAIN P.C.B. & SUB P.C.B.

5.3.1. MAIN P.C.B.



5.3.2. SUB P.C.B.



6 ELECTRICAL ADJUSTMENT PROCEDURES

6.1. COMPUTER ASSISTED ADJUSTMENT SYSTEM <TATSUJIN> ADJUSTMENT

This unit employs the computer assisted system named; "TATSUJIN PC-Adjustment" for Electrical adjustment.

6.2. SET-UP MANUAL FOR DV-Camcorder

1. SAVE THE SOFTWARE

Install the effective model's TATSUJIN Software to PC: Personal Computer.

2. SET-UP (CONNECTION)

a. Remove the EVR cover of the DV Camcorder.

Unlock the locking tab and remove the EVR cover as shown in Fig. E1.

b. Make a connection.

Connect the PC, the PC/IF Unit and the DV Camcorder as shown in Fig.E2 and E3.

c. Check the SW position on Measuring Board.

The position of SW on Measuring Board checks as shown in Fig. E4.

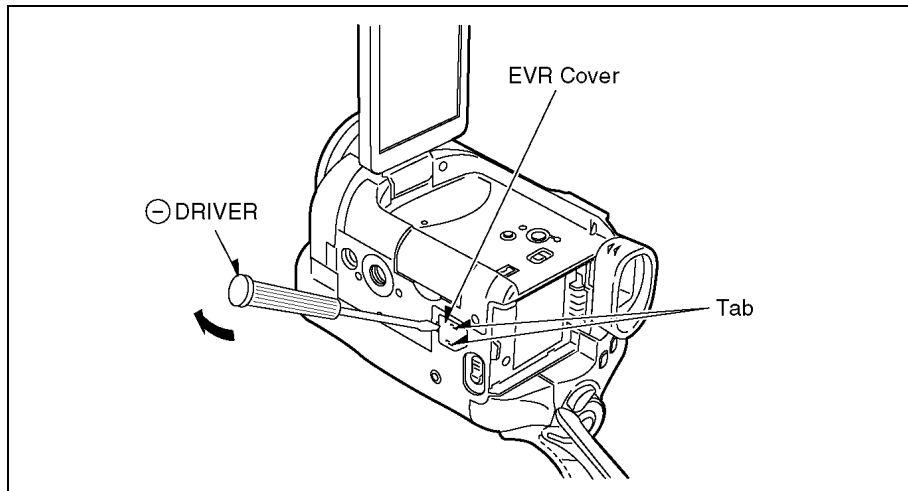


Fig. E1

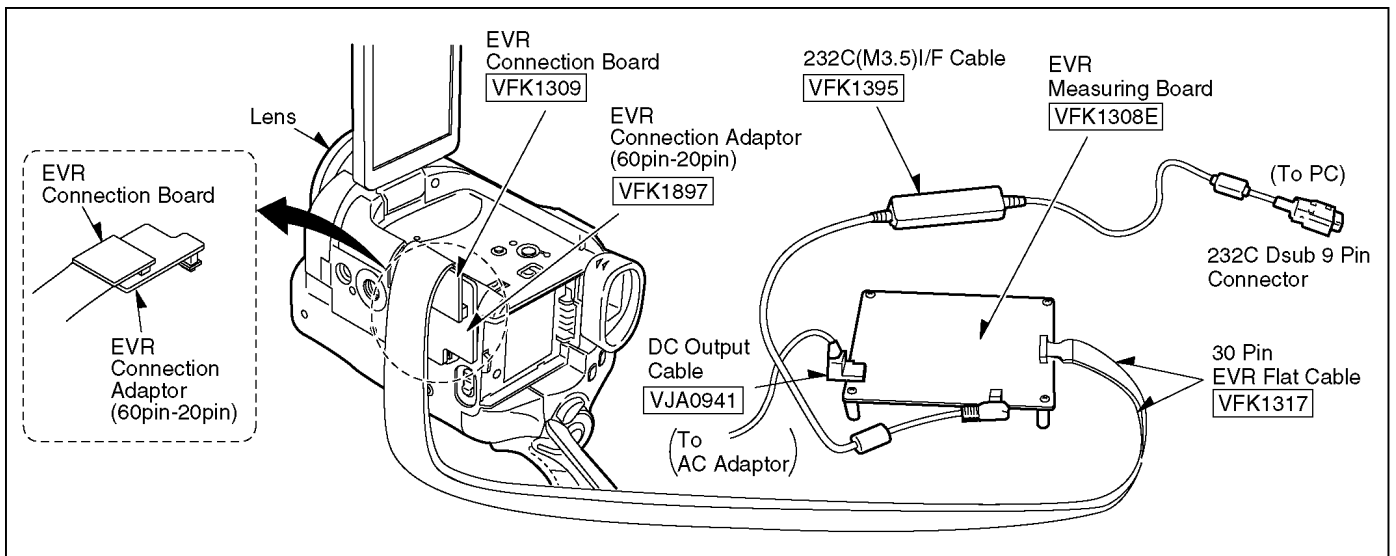


Fig. E2 Necessary Equipment & Tools for Connection.

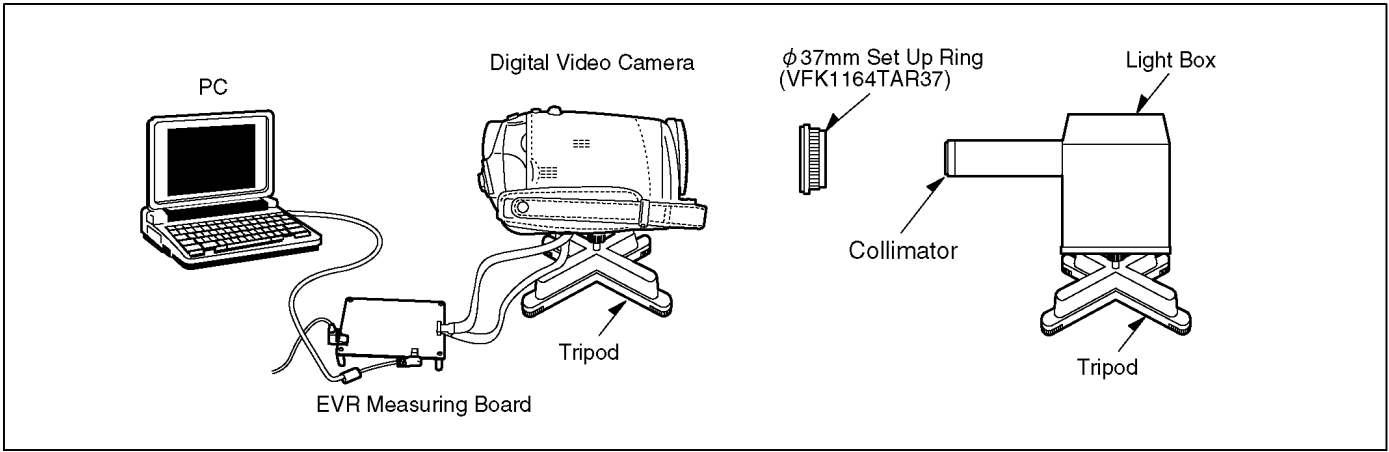


Fig. E3 Rough image of set-up connection

Ref	Name	Parts No.	Q'ty	Remarks
1	DV Camcorder	---	1	The Camcorder being adjusted.
2	Personnel Computer	---	1	With Tatsujin Software.
3	AC Adaptor	---	2	The AC Adaptor for DV Camcorder. The AC Adaptor for M. Board.
4	DC output Cable	---	2	The AC Adaptor for DV Camcorder. The AC Adaptor for M. Board.
5	232C (M3.5) I/F Cable	VJA0941	1	
6	Measuring Board	VFK1308E	1	
7	30 pin Flat Cable	VFK1317	2	
8	Step Up Ring	VFK1164TAR37	1	For Collimator 37mm
9	Connection Board	VFK1309	1	
10	Connection Adaptor (60-20pin)	VFK1897	1	
11	TATSUJIN PC-Adjustment Program	VF0D2003AV30	1	

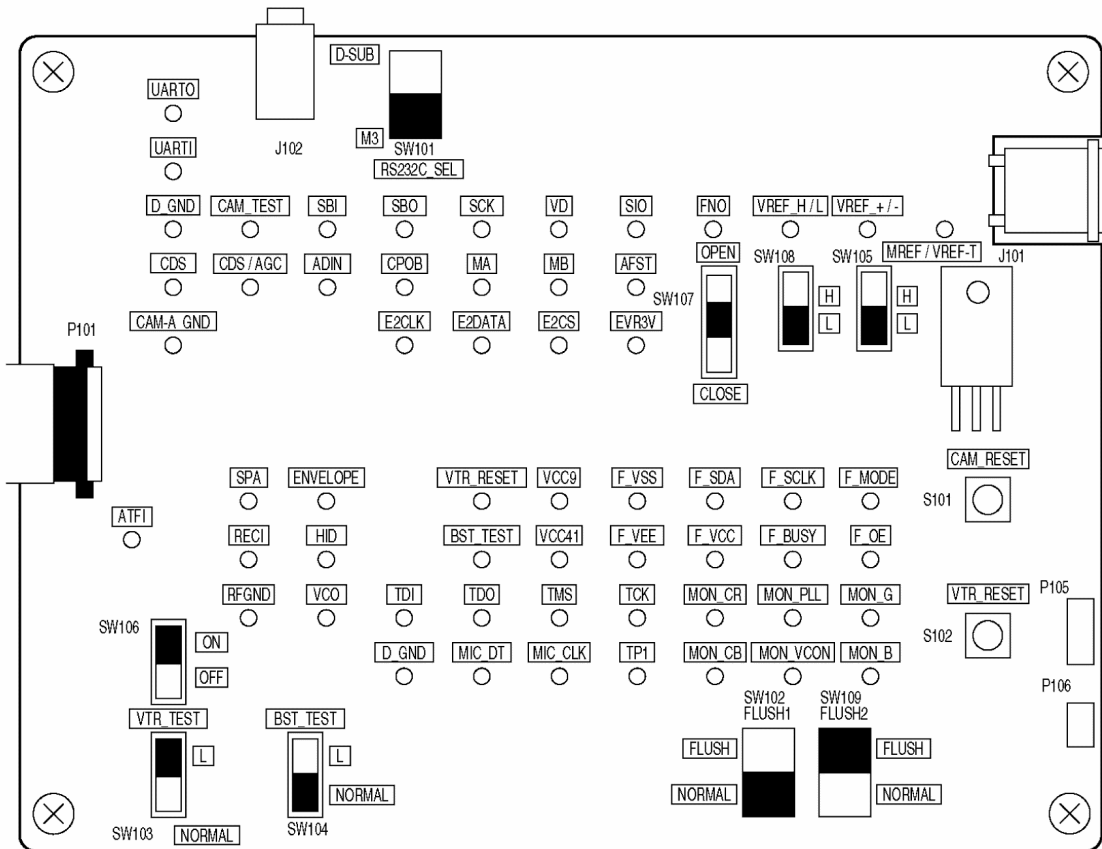
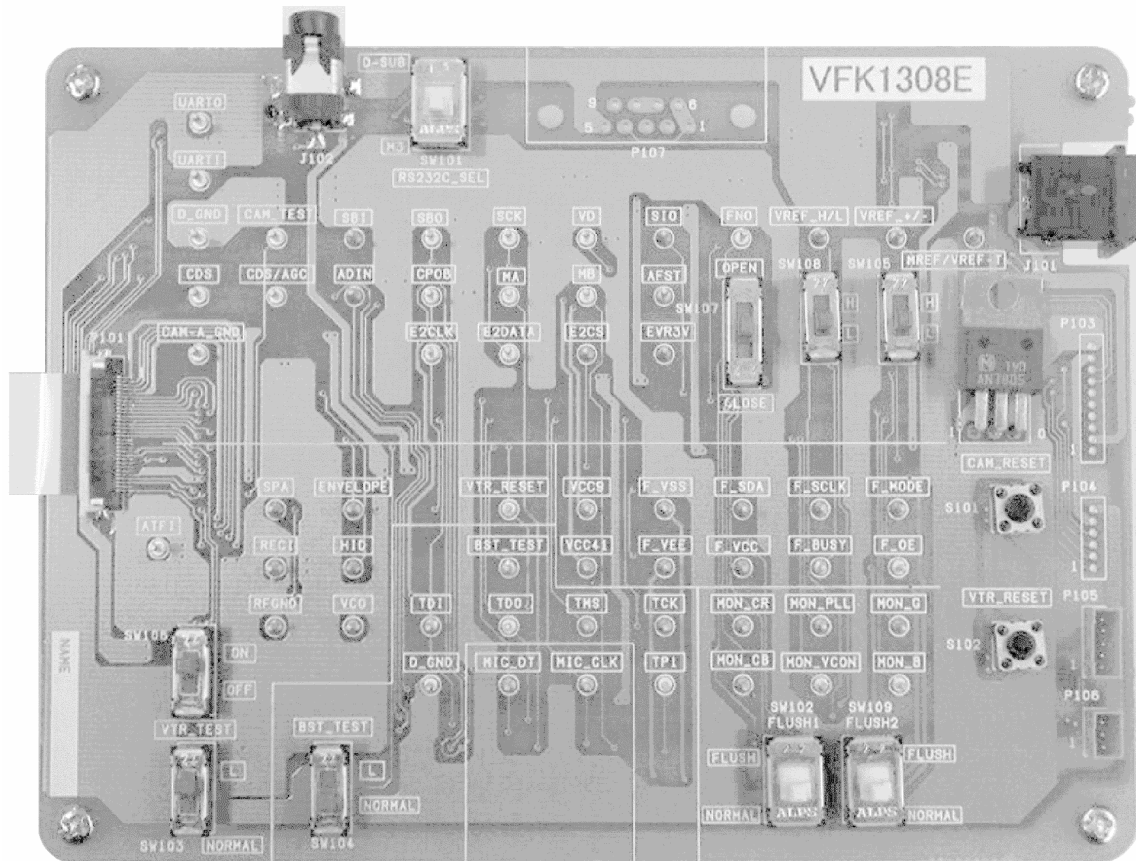


Fig. E4

(Extension cables (VFK1317 × 2pcs) ----- Measuring Board (VFK1308E) ----- 232C I/F Cable (VFK1395))

6.3. SET-UP PC-EVR ADJUSTMENT PROGRAM

1. Turn on the PC and install the TATSUJIN Adjustment Program into the PC.
2. TATSUJIN PC-Adjustment Program start in the following procedure.

PC Menu : [Start] → [Program] → [win Tatsujin] → [DV Movie] → [NV-GS230 Series]

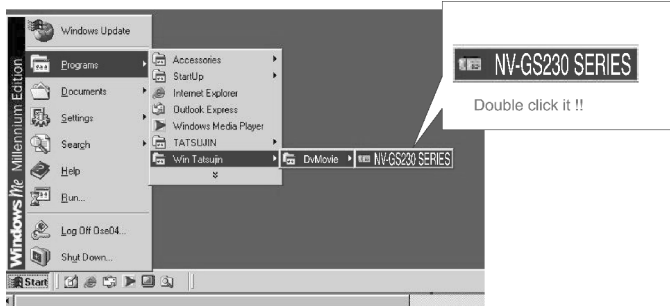
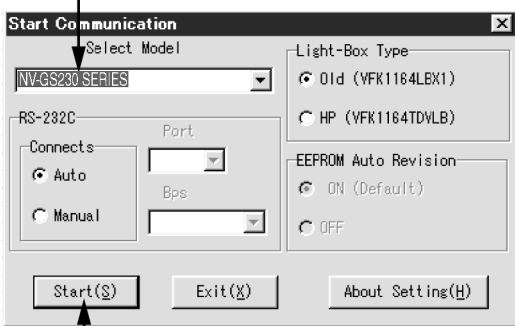


Fig. E5-1

The main menu display will be displayed.

3. Select the desired model.
4. Turn on the camcorder. Then, click "Start."

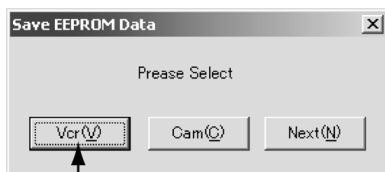
① Select the desired model.



② Click to start.

Fig. E5-2

5. The communication is complete, and the dialog will appear. Then, click "VCR (V) or Cam (C)" to save the EEPROM data,



③ Click.

Fig. E5-3

6. Saving for EEPROM data is complete, menu will appear. To perform each adjustment, display the adjustment menu by selecting the desired menu from "Camera Adjust," "Video Adjust," "LCD Adjust" or "EVF Adjust" and select each adjustment item.

④ Select the desired menu.

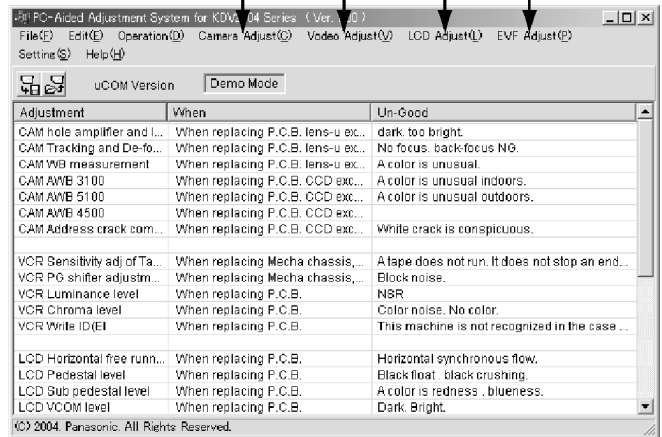


Fig. E5-4

Note:

The adjustment data is stored to the EEPROM IC after each adjustment.

7. After adjustment, to end the software, select "Exit" in File menu or close the window.

⑤ Select "Exit" or close the window.

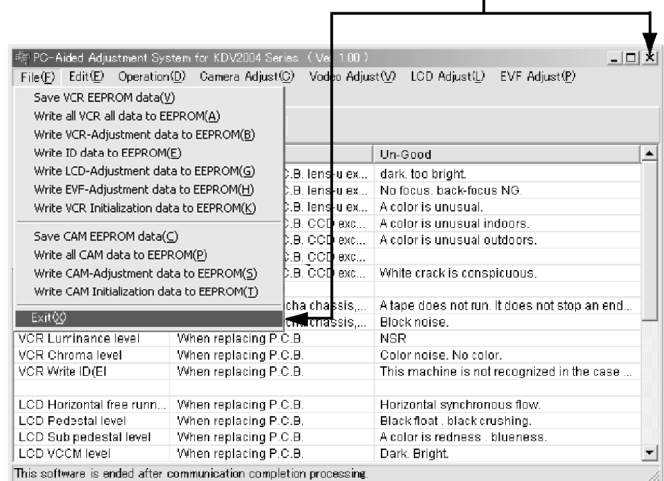


Fig. E5-5

6.4. INITIAL GUIDELINE

The table below shows which adjustments are necessary according to the unit parts and individual parts to be replaced. Make sure to perform these adjustments shown below as necessary.

Adjustment Item		Replacement Parts									
		Sub P.C.B.	Main P.C.B.	IC307 (EEPROM)	IC2006 (EEPROM)	Lens Unit	Prism Unit	Iris Unit	4ht Moving Frame Unit	Cylinder Unit	Main Chassis Unit
Camera	CAM hole amplifier / Iris PWM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	CAM Tracking and De-focus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	CAM Revision CCD scratch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	CAM AWB adjustment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Video	VCR Sensitivity ADJ. of Tape sensors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	VCR PG shifter adjustment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	VCR Luminance level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	VCR Chroma level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Note : : Adjustment Item

7 MECHANICAL ADJUSTMENT PROCEDURES

7.1. ADJUSTMENT ITEM

Item	Adjustment at the time of the part exchange		
	Half finished goods mechanism	Cylinder	Remarks
Linearity adjustment & BER value confirmation	○	○	

7.2. ADJUSTMENT PROCEDURES

Linearity adjustment & BER value confirmation

1. Remove the mechanism adjustment cover of this machine as shown in Fig. D1.
2. The special tool at the time of electricity adjustment is connected.
Reference of the connection figure of electricity adjustment.
3. The envelope detection special tool board (VFK1641) is connected to EVR adjustment board as shown in Fig. D2.
4. The envelope detection special tool board is connected to oscilloscope as shown in Fig. D2.
5. The post is adjusted with the post driver(VFK1899) so that recycles the normal tape which recorded NTSC signal and the detection wave-link become a flat as shown in Fig. D3.
*At the time of the cylinder unit exchange unnecessary.
6. The post is adjusted with the post driver so that recycles an alignment tape(VFM3110EDS) and the detection wave-link become a flat once again.
7. Recycling the tape that video-taped it with this machine after adjustment, the BER value is confirmed with the item of the BER the item of the BER confirmation of expert soft inside.

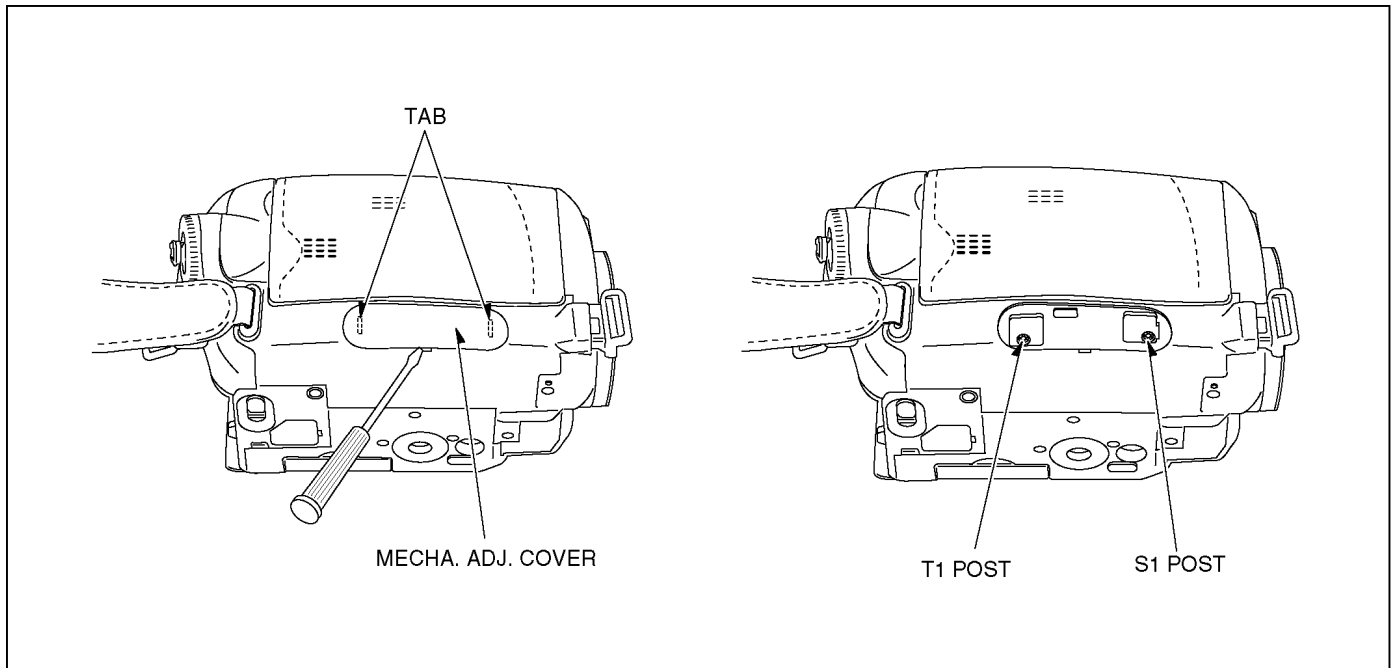


Fig. D1

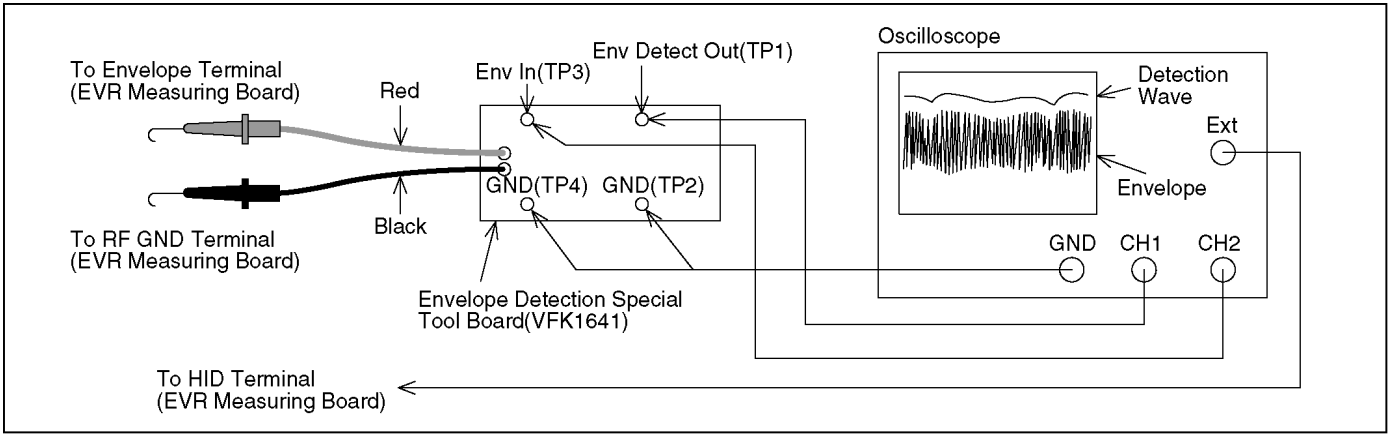


Fig. D2

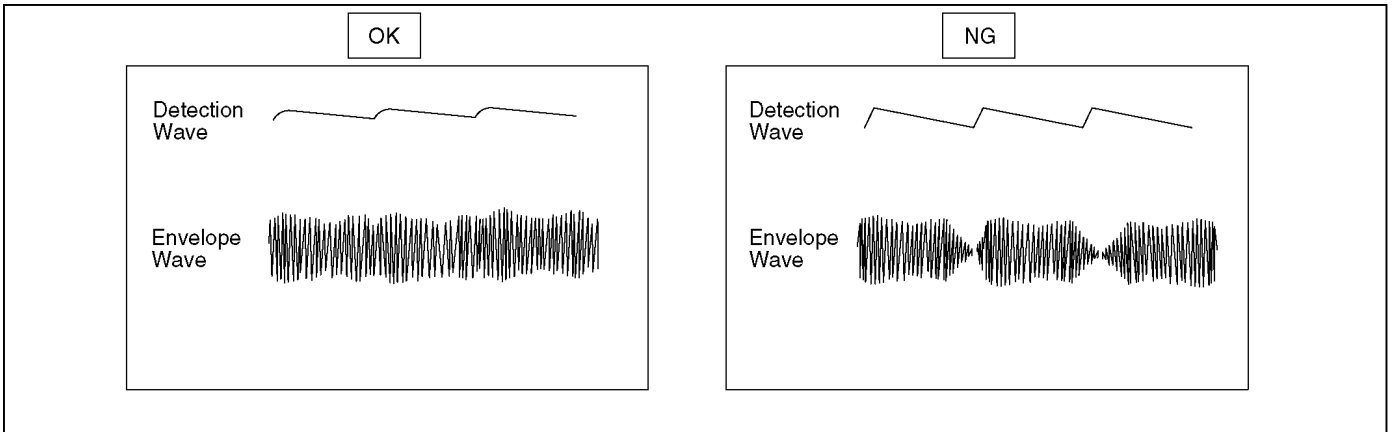
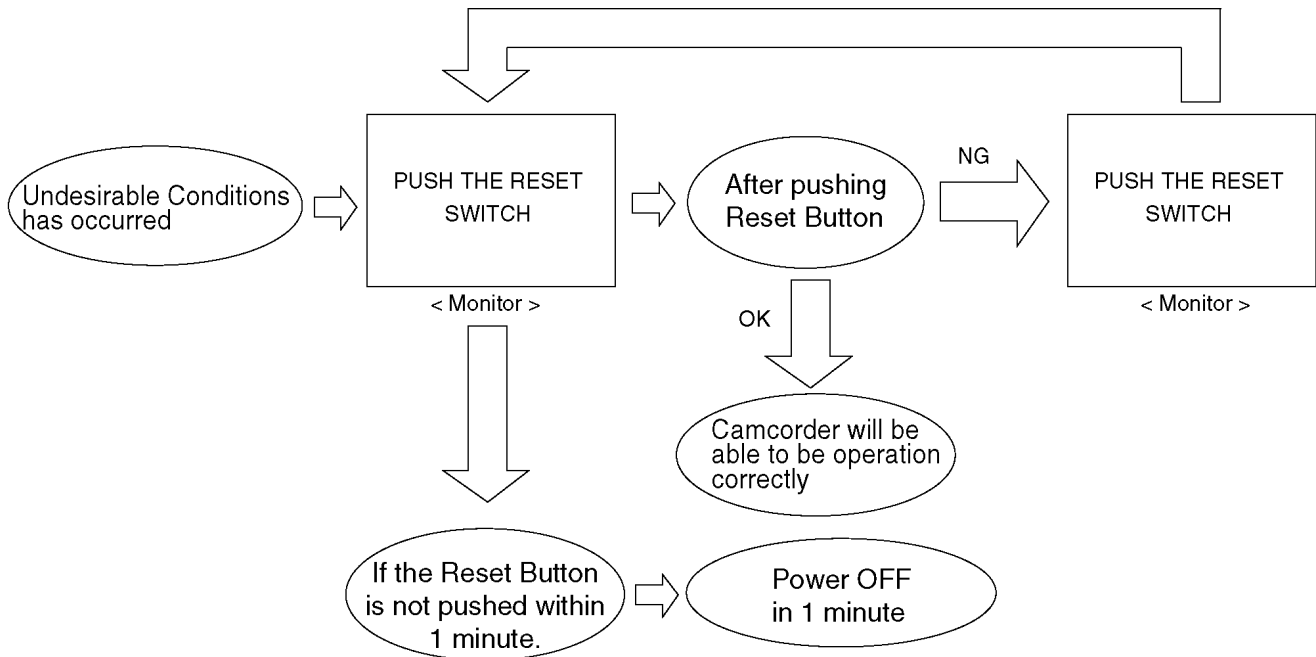


Fig. D3

8 SERVICE MODE

8.1. ERROR DISPLAY

"PUSH THE RESET SWITCH" is displayed automatically on the EVF or the LCD Monitor when an undesirable condition has occurred.



Note:

When "PUSH THE RESET SWITCH" is displayed repeatedly, required. Check the Error Code which is listed in the Service Menu.

8.2. Service Menu

When abnormal detection contents are confirmed a When I do the following operation automatic diagnosis cord is displayed.

1. Preparation
Remove the card and tape from this machine.
2. Service menu is displayed. (see Fig. S1)
Pushed [QUICK START] button and [JOYSTICK LEFT ◀] button and [PHOTO SHOT] button simultaneously for 3 seconds.
3. Operating automatic diagnosis cord is displayed.
Item [3] is selected with the [JOYSTICK UP or DOWN ▲/▼] button.
[NO] is selected with the [JOYSTICK RIGHT ▶] button.
[YES] is selected with the [JOYSTICK UP or DOWN ▲/▼] button.
Press the [CURSOR CENTER] button.

672C00 010C 22	
1	NO
2	NO
3	NO
4	NO
5	NO
SETUP ENTER EXIT MENU	

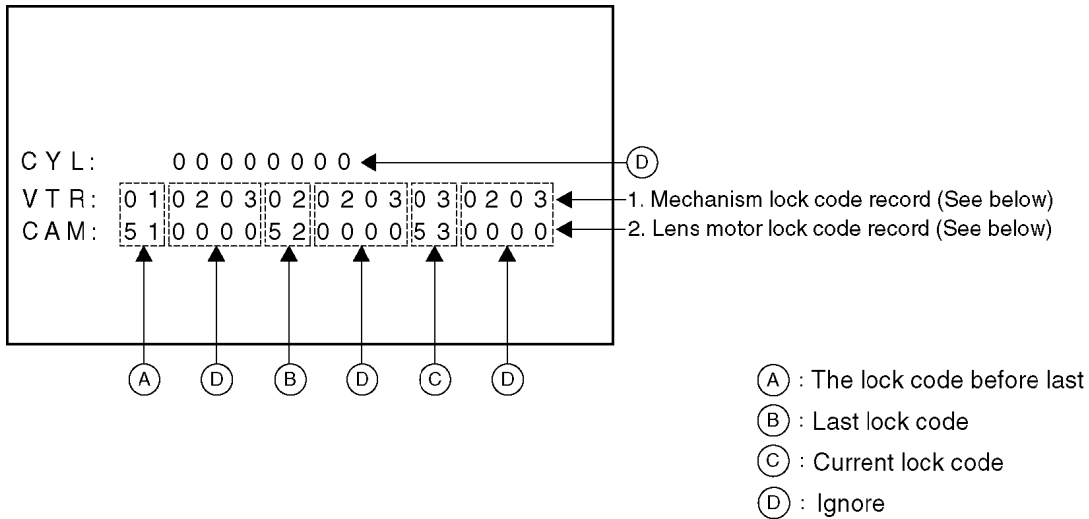
ITEM →

Fig. S1

NOTE:

Do not operate items Except for 3 in the Service Menu.

Self diagnosis cord contents are as follows.



Display contents (self diagnosis cord contents)

Mechanism & Lens motor lock code	
DISPLAY	CONDITION
01	T-REEL LOCK
02	S-REEL LOCK
03	UNLOADING LOCK
04	LOADING LOCK
05	CYLINDER
51	ZOOM MOTOR LOCK
52	FOCUS MOTOR LOCK

Turn off the power supply after confirmation.


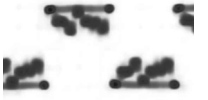
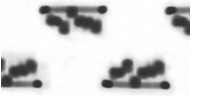
Please do the error cord backup record the clear after repair completion.

CLEAR METHOD

If the Card and tape inserted, take out it before Service Mode operation.

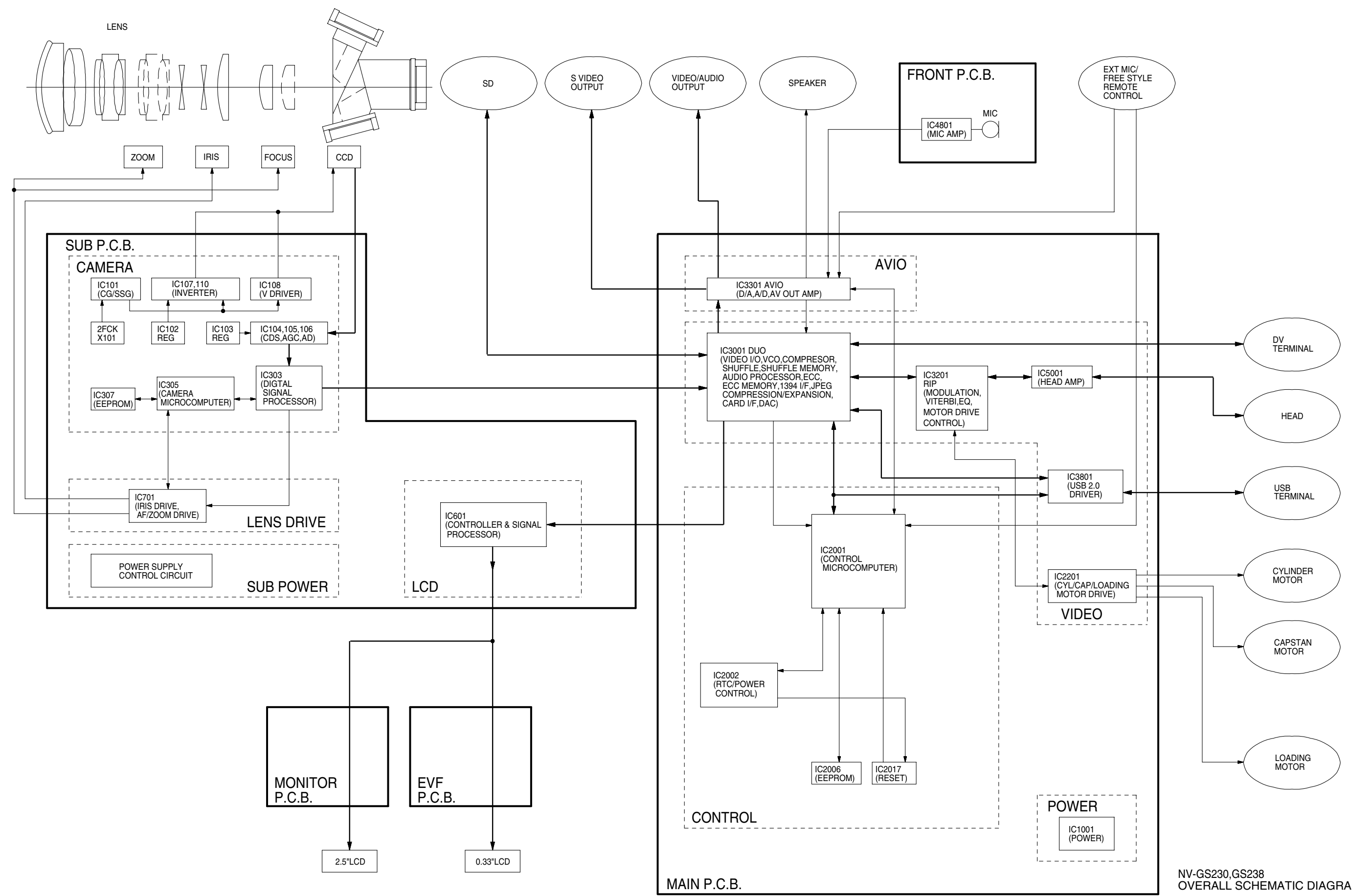
Making the mode dial of This Machine a tape recording mode, push [JOYSTICK LEFT ◀] button and [QUICK START] button and [RECORDING START/STOP] button simultaneously for 3 seconds.

9 WAVEFORM TABLE

 <p>R908 REC/PLAY 3.0Vp-p (20usec.div.)</p>	 <p>R909 REC/PLAY 3.0Vp-p (20usec.div.)</p>	 <p>R907 REC/PLAY 3.0Vp-p (20usec.div.)</p>		

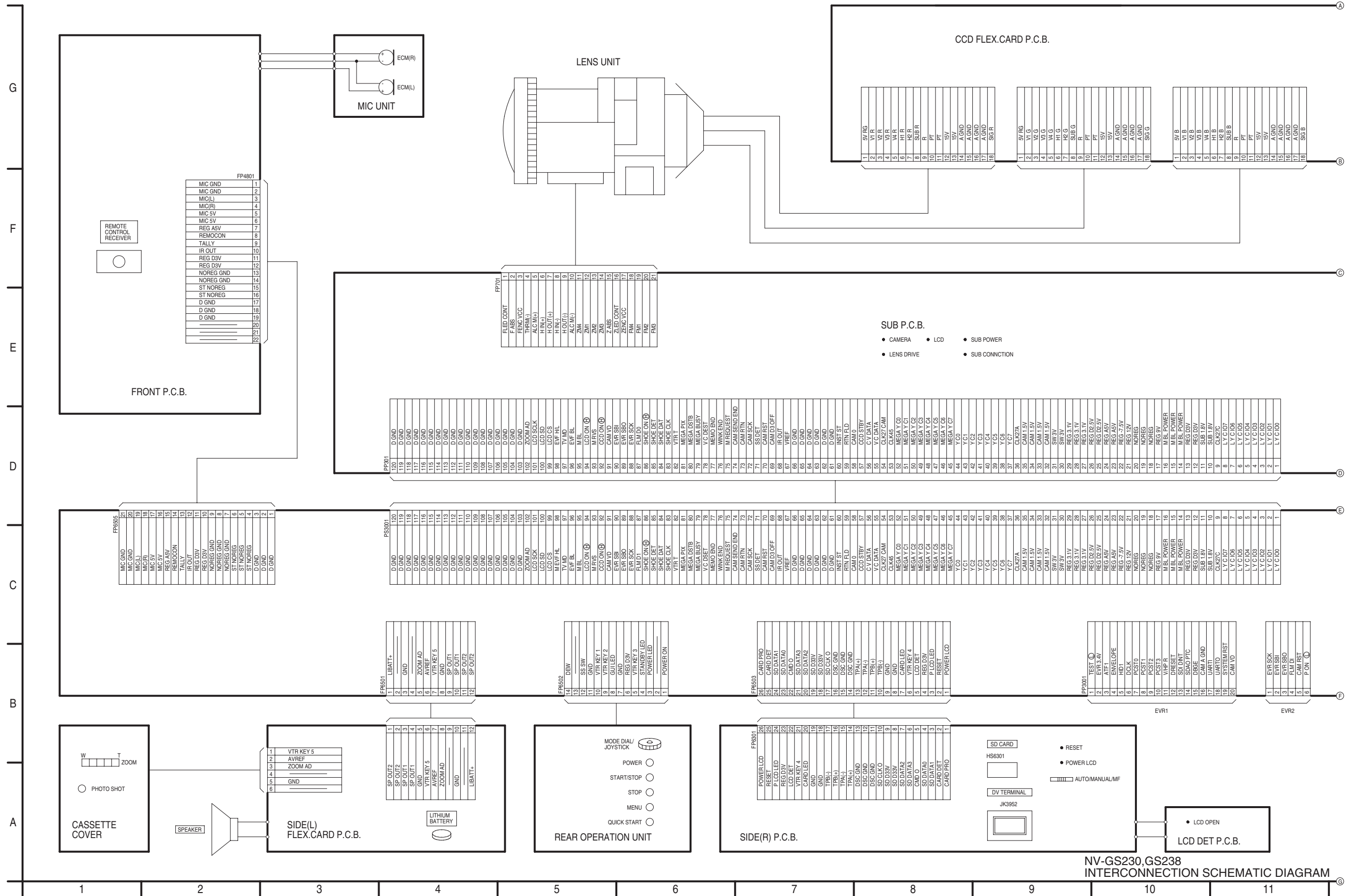
10 SCHEMATIC DIAGRAM

10.1. OVERALL SCHEMATIC DIAGRAM

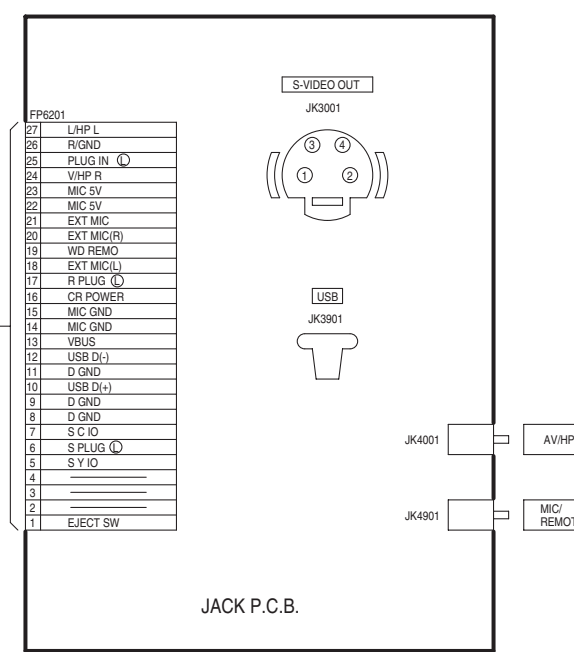
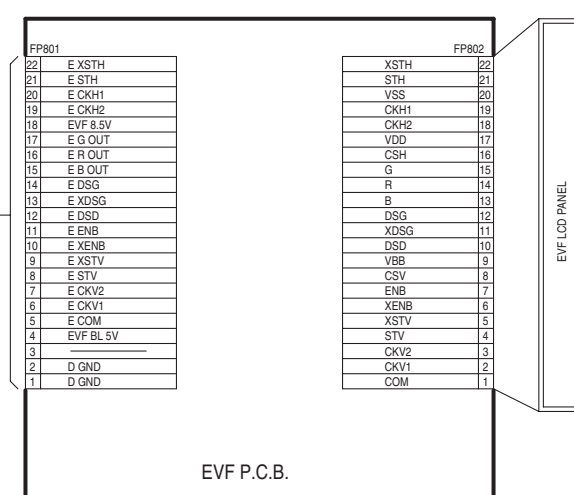
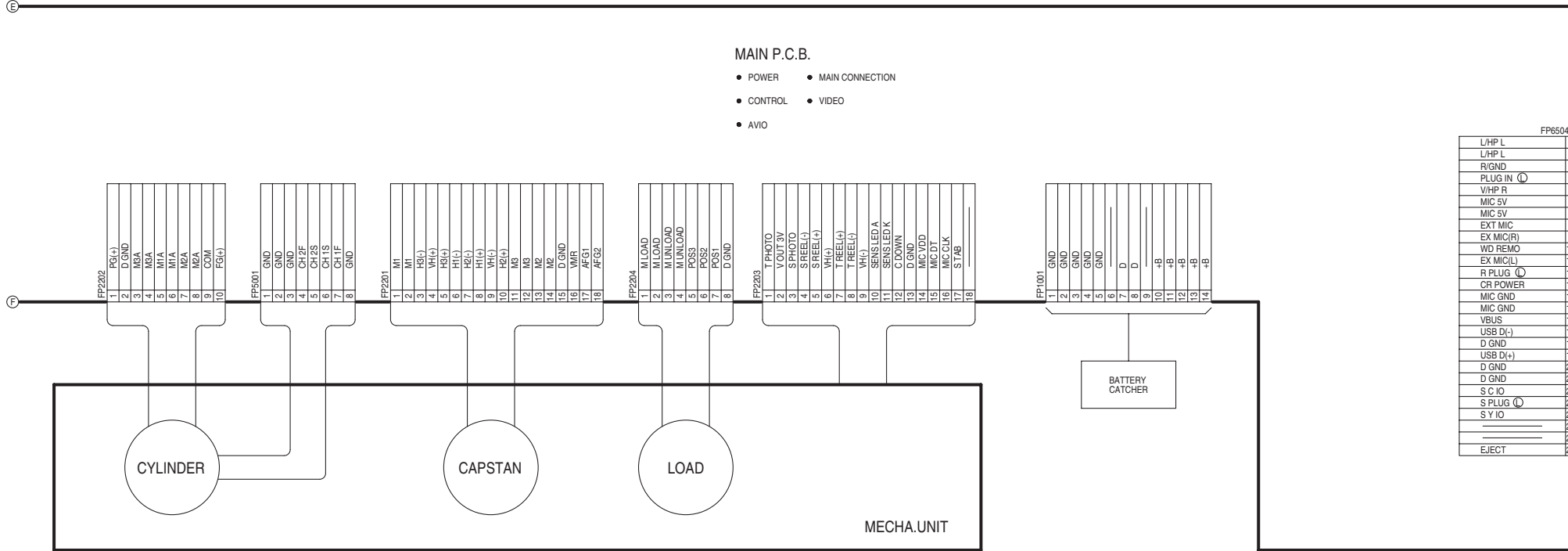
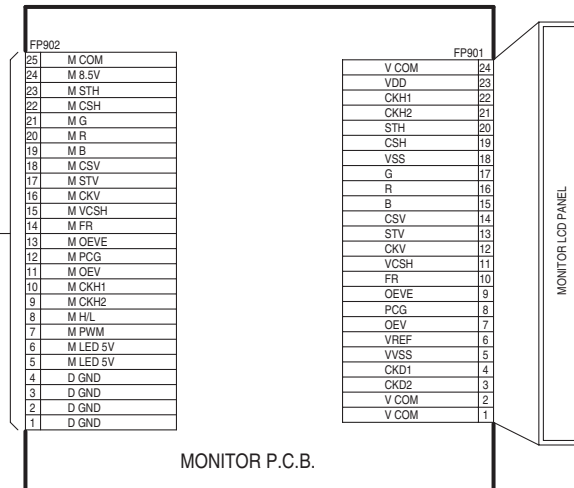
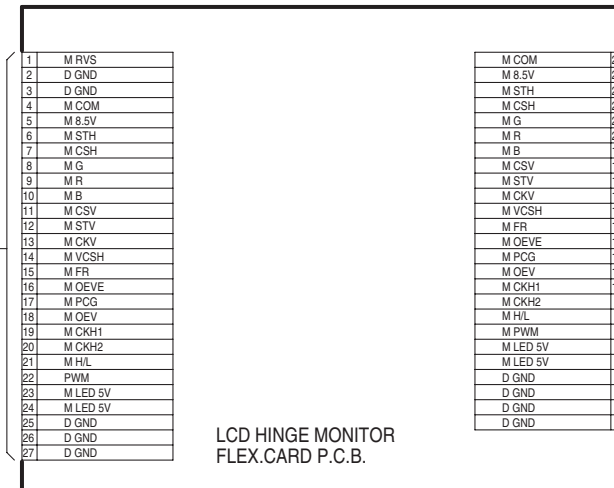
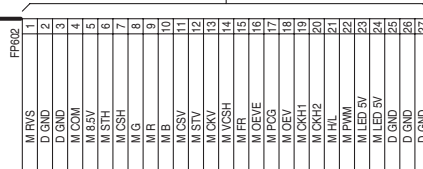
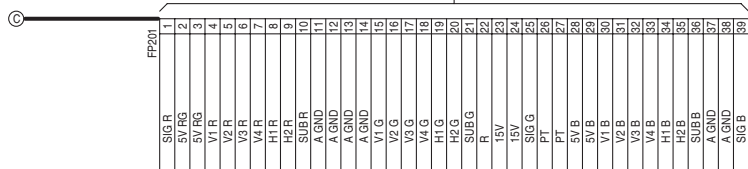
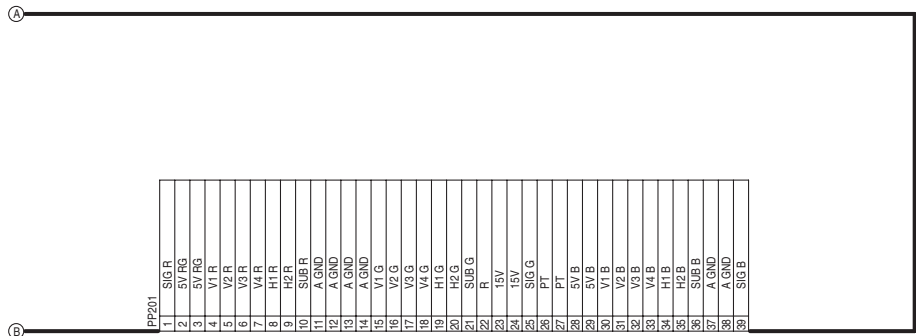


NV-GS230,GS238 OVERALL SCHEMATIC DIAGRAM

10.2. INTERCONNECTION SCHEMATIC DIAGRAM



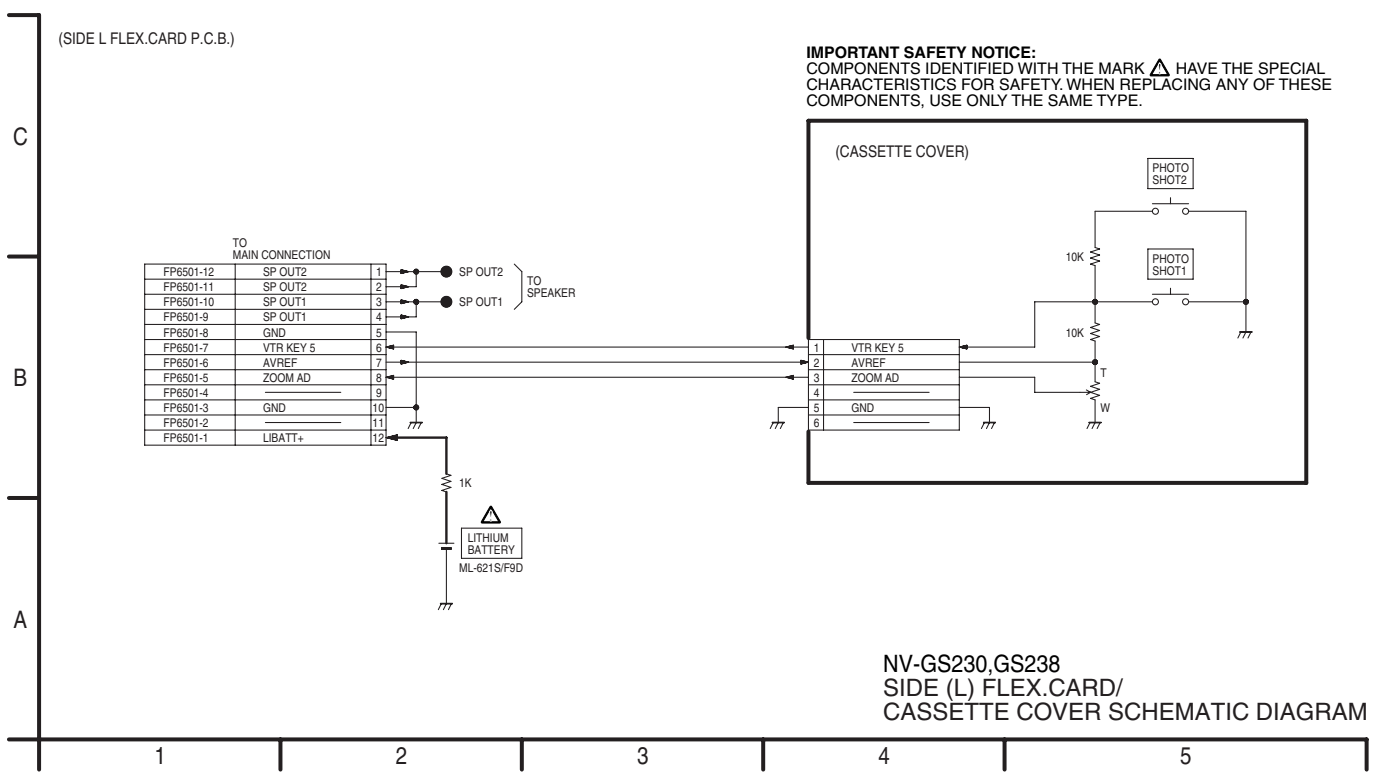
NV-GS230,GS238 INTERCONNECTION SCHEMATIC DIAGRAM



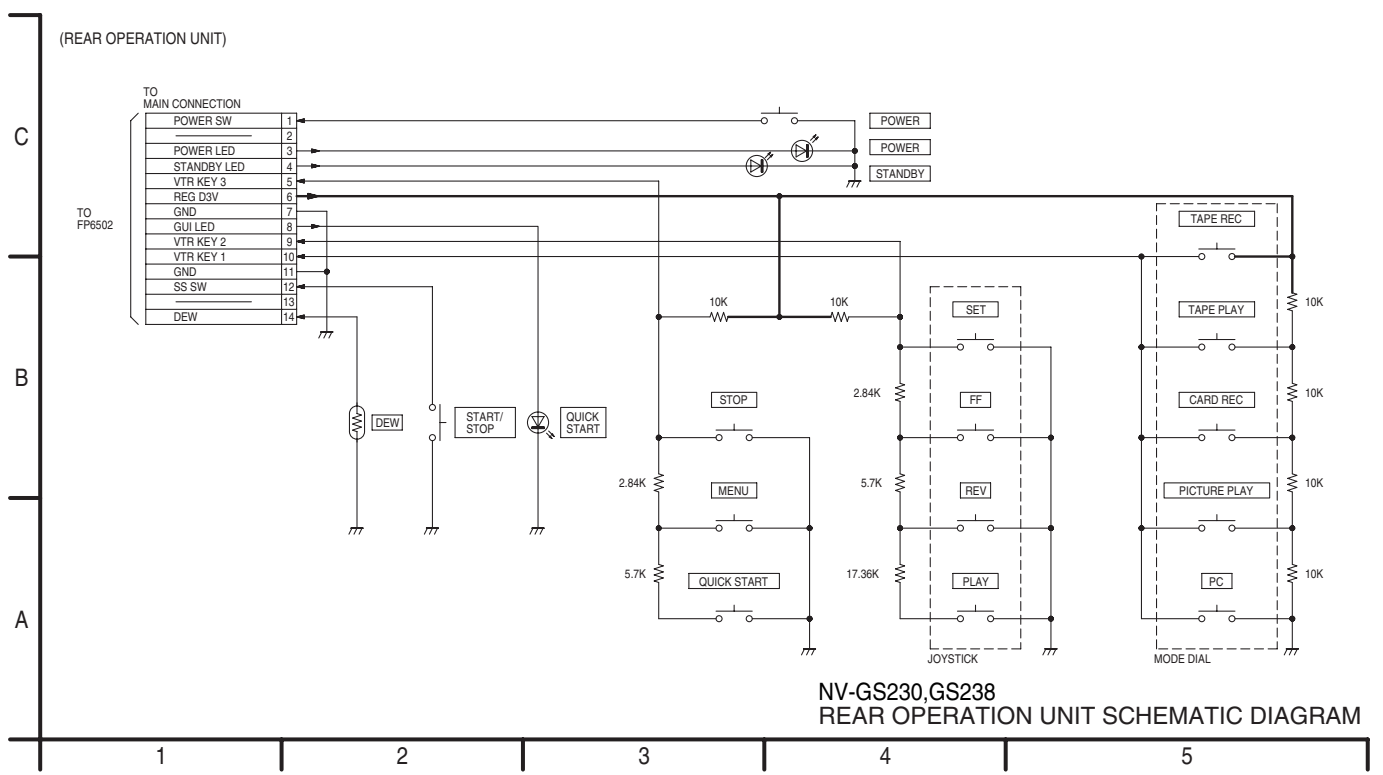
NV-GS230,GS238 INTERCONNECTION SCHEMATIC DIAGRAM

NV-GS230,GS238 INTERCONNECTION SCHEMATIC DIAGRAM

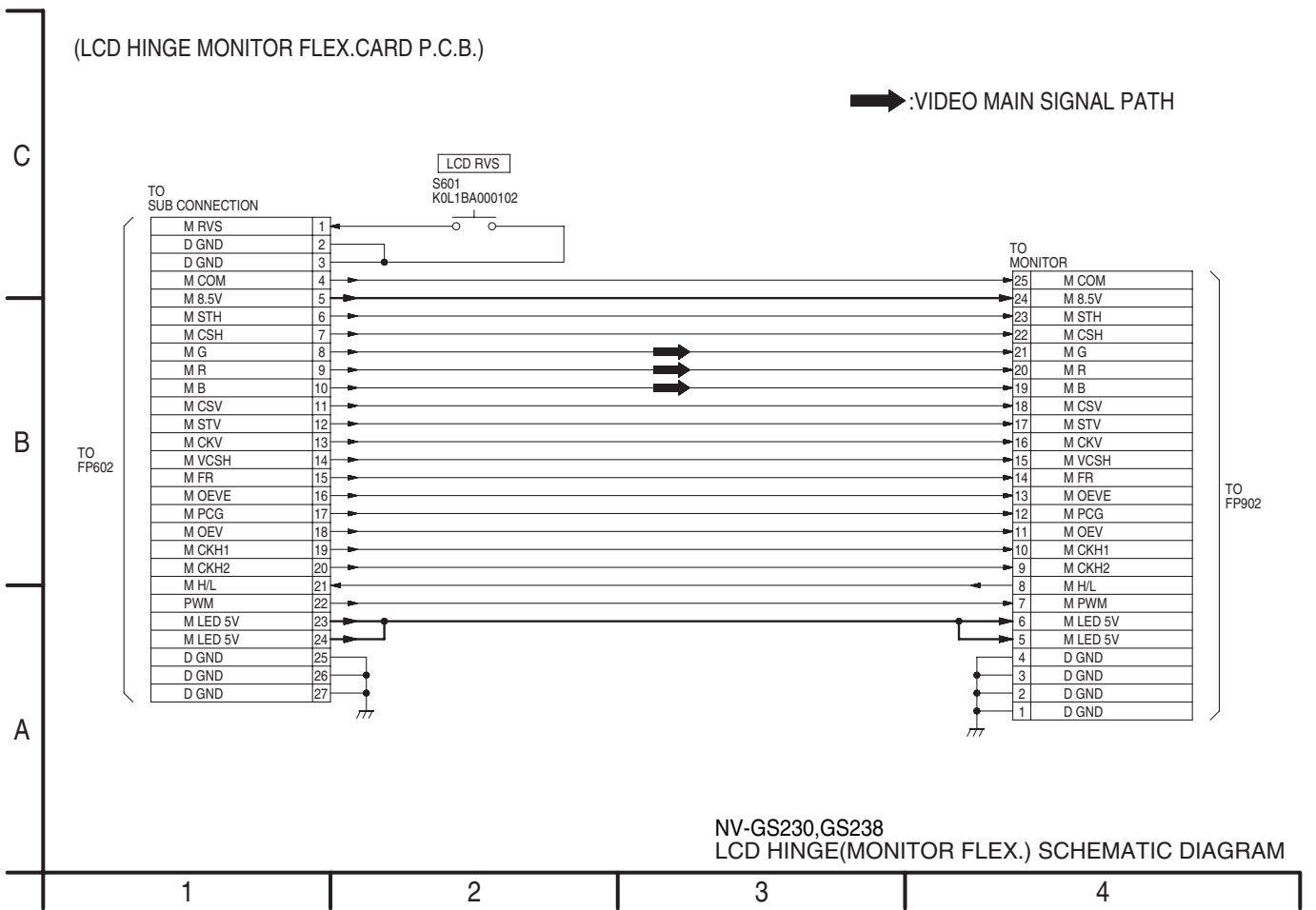
10.3. SIDE (L) FLEX. CARD / CASSETTE COVER SCHEMATIC DIAGRAM



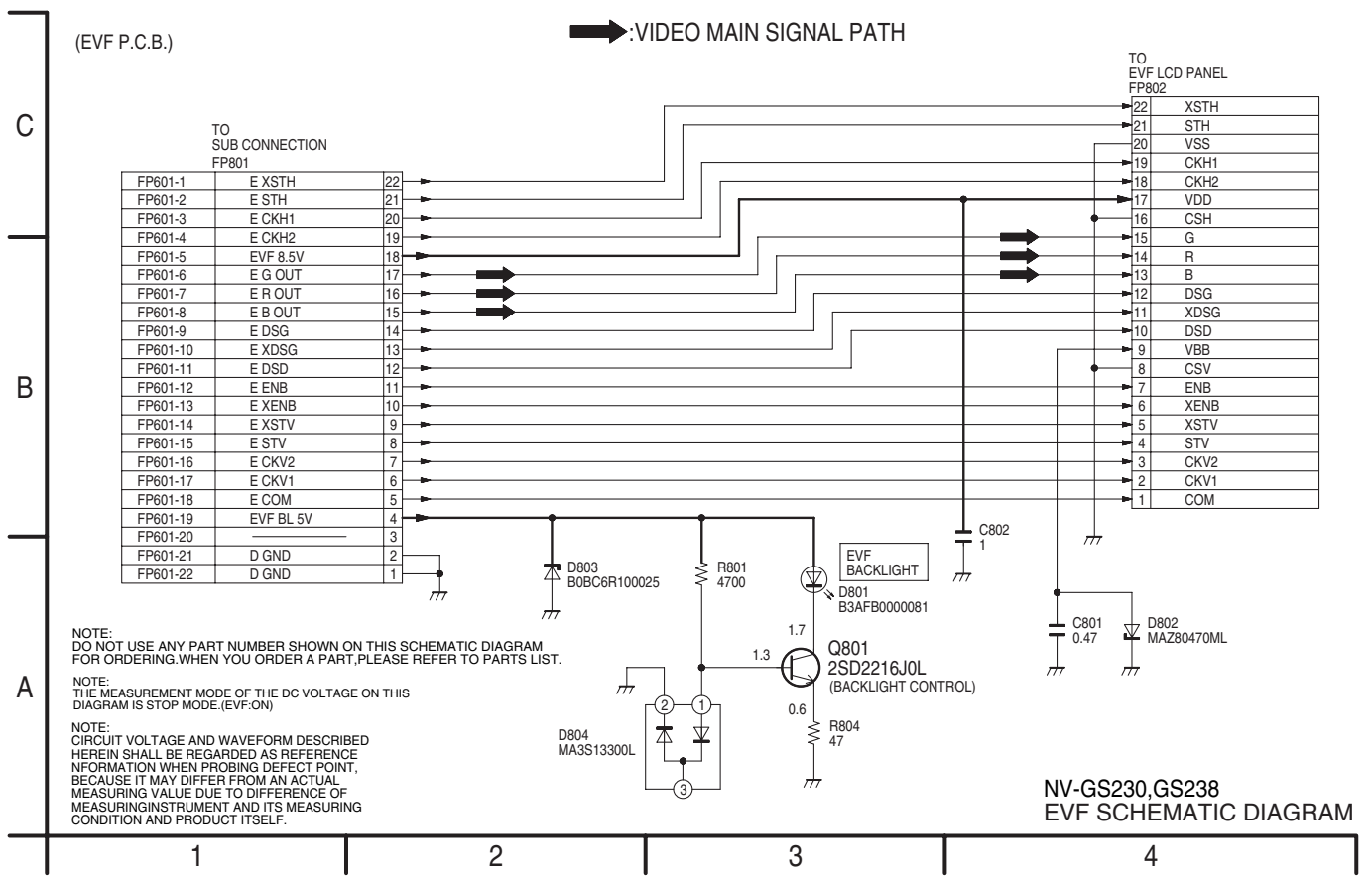
10.5. REAR OPERATION UNIT SCHEMATIC DIAGRAM



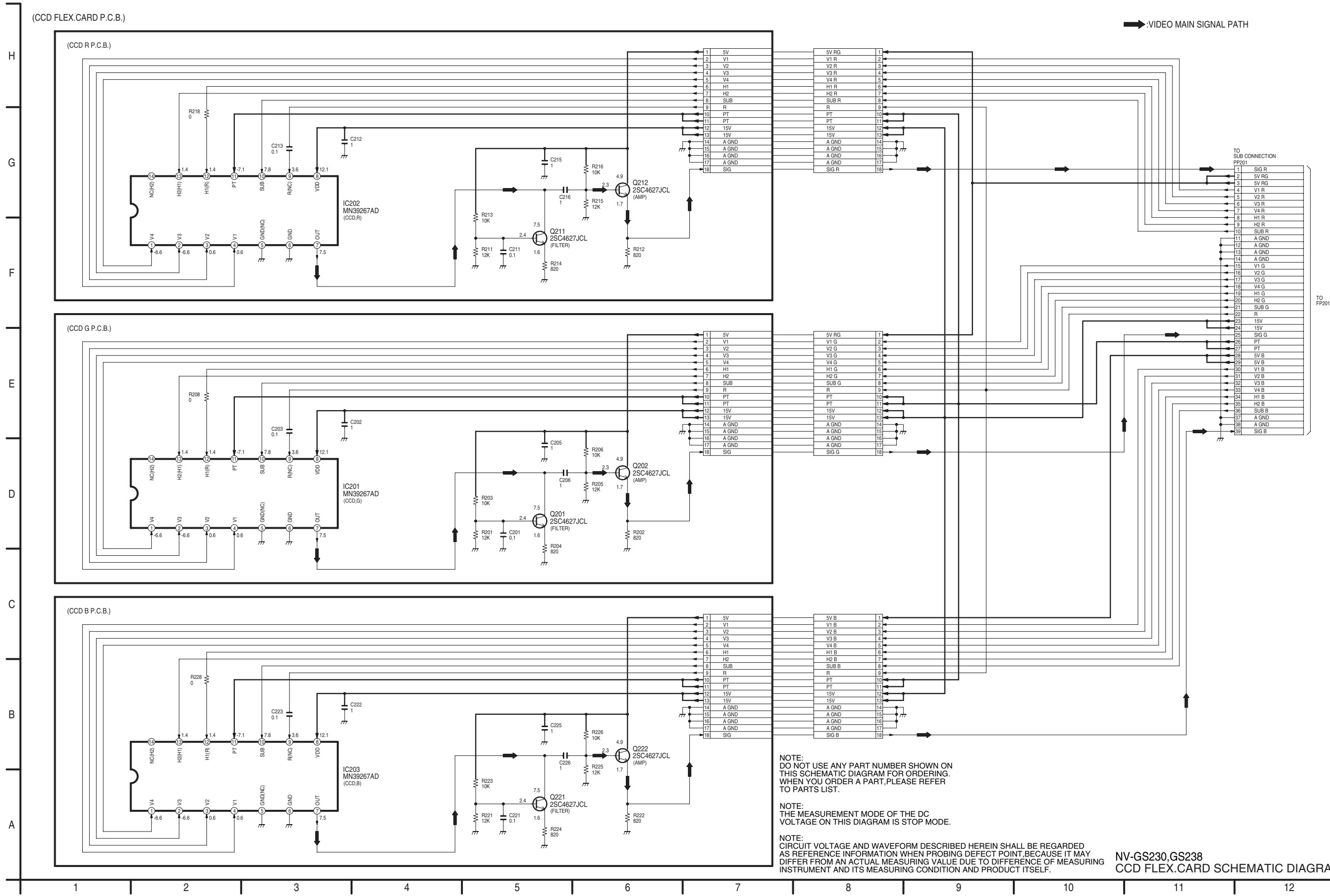
10.4. LCD HINGE (MONITOR FLEX.) SCHEMATIC DIAGRAM



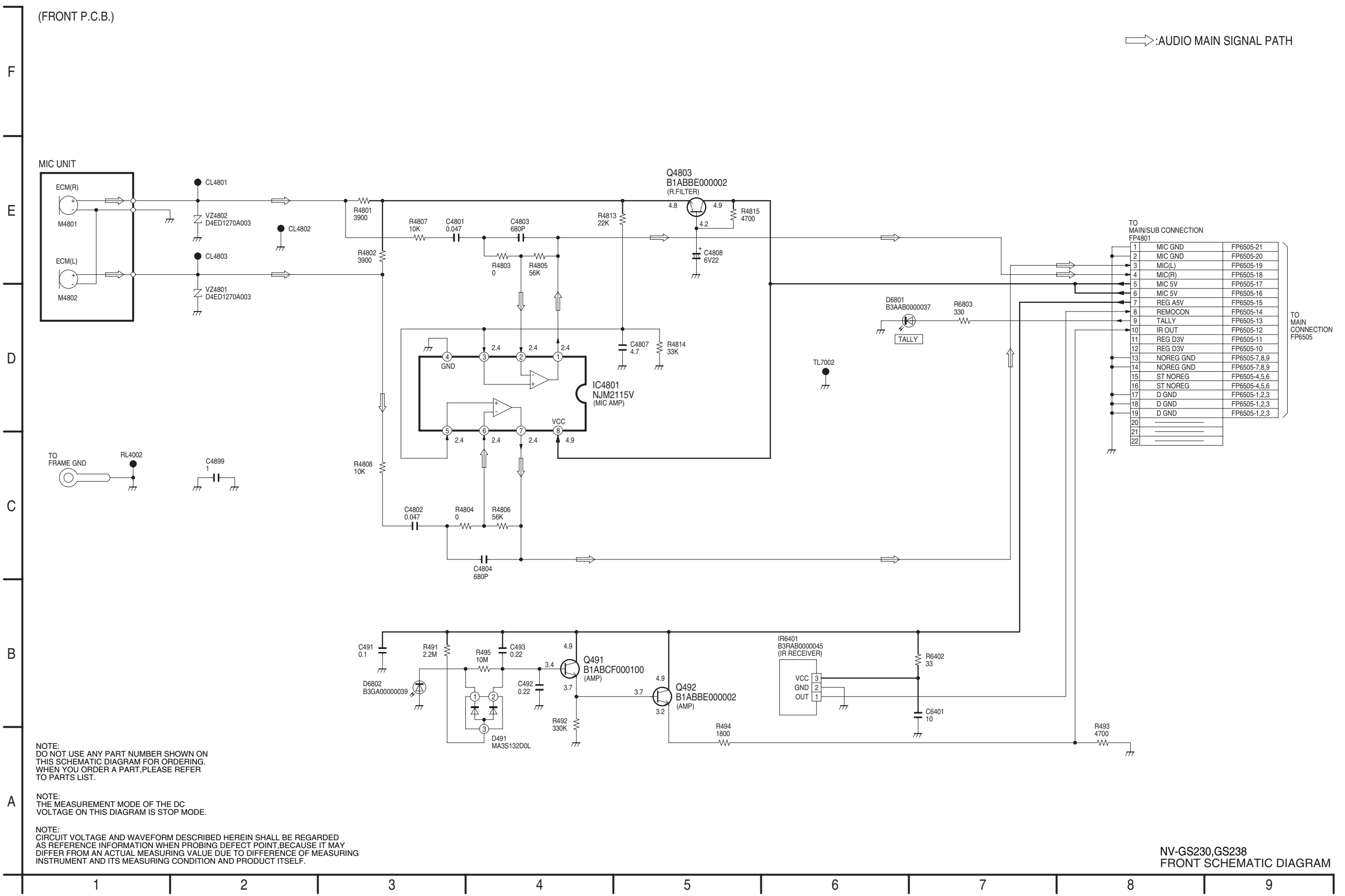
10.6. EVF SCHEMATIC DIAGRAM



10.7. CCD FLEX. CARD SCHEMATIC DIAGRAM

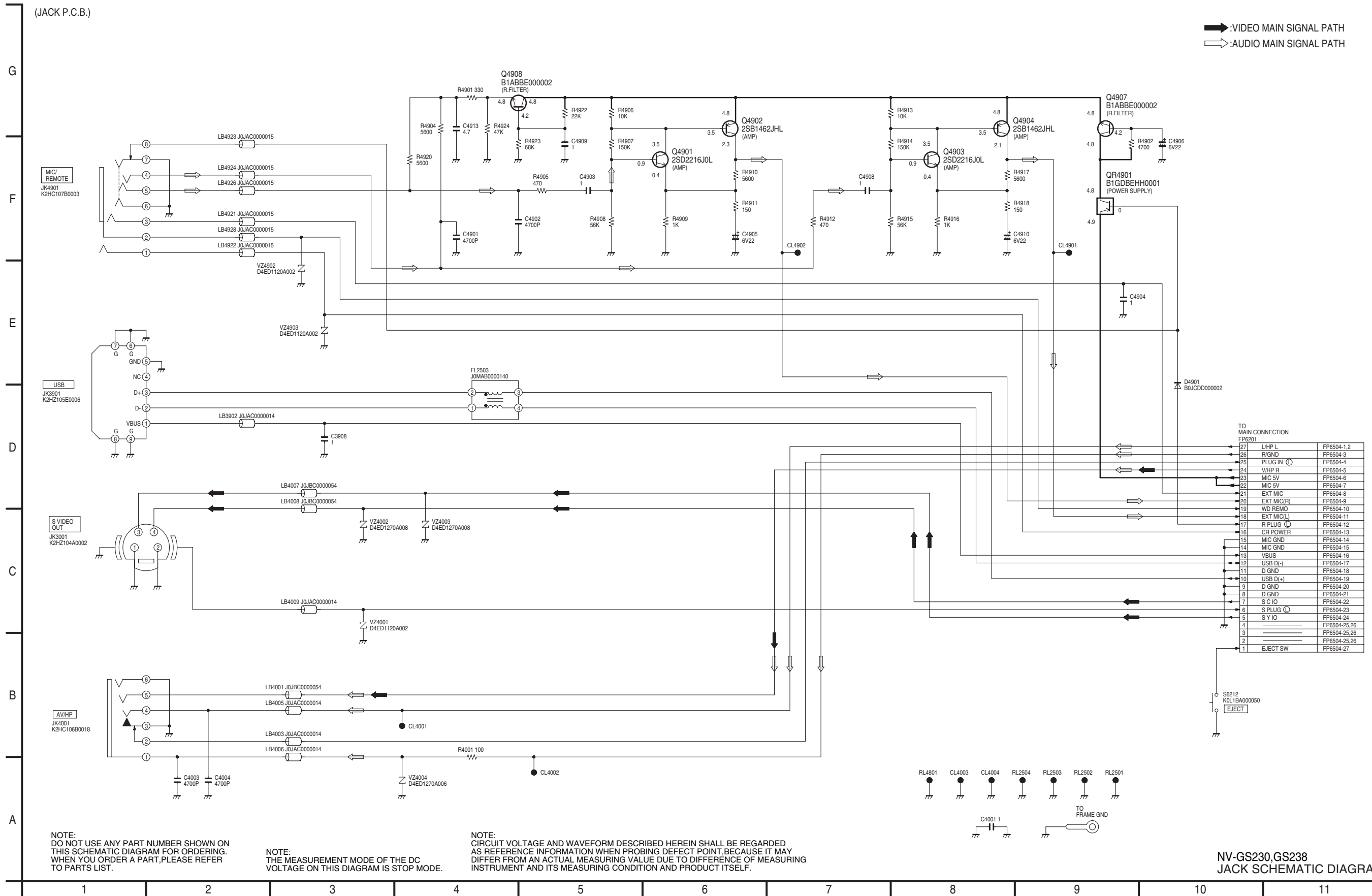


10.8. FRONT SCHEMATIC DIAGRAM



NV-GS230,GS238 FRONT SCHEMATIC DIAGRAM

10.9. JACK SCHEMATIC DIAGRAM

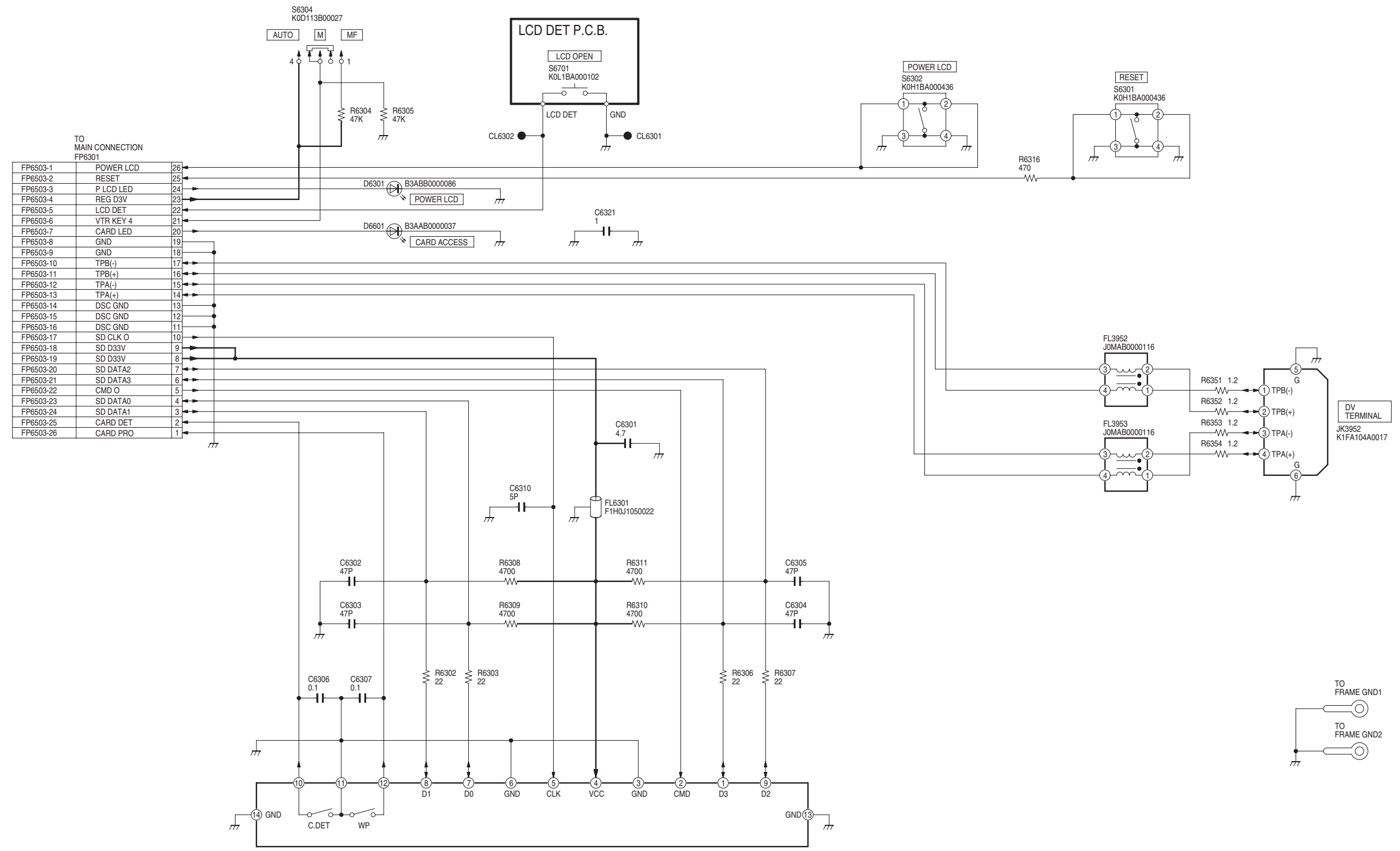


NV-GS230,GS238
 JACK SCHEMATIC DIAGRAM

10.10. SIDE (R) / LCD DET. SCHEMATIC DIAGRAM

(SIDE R P.C.B.)

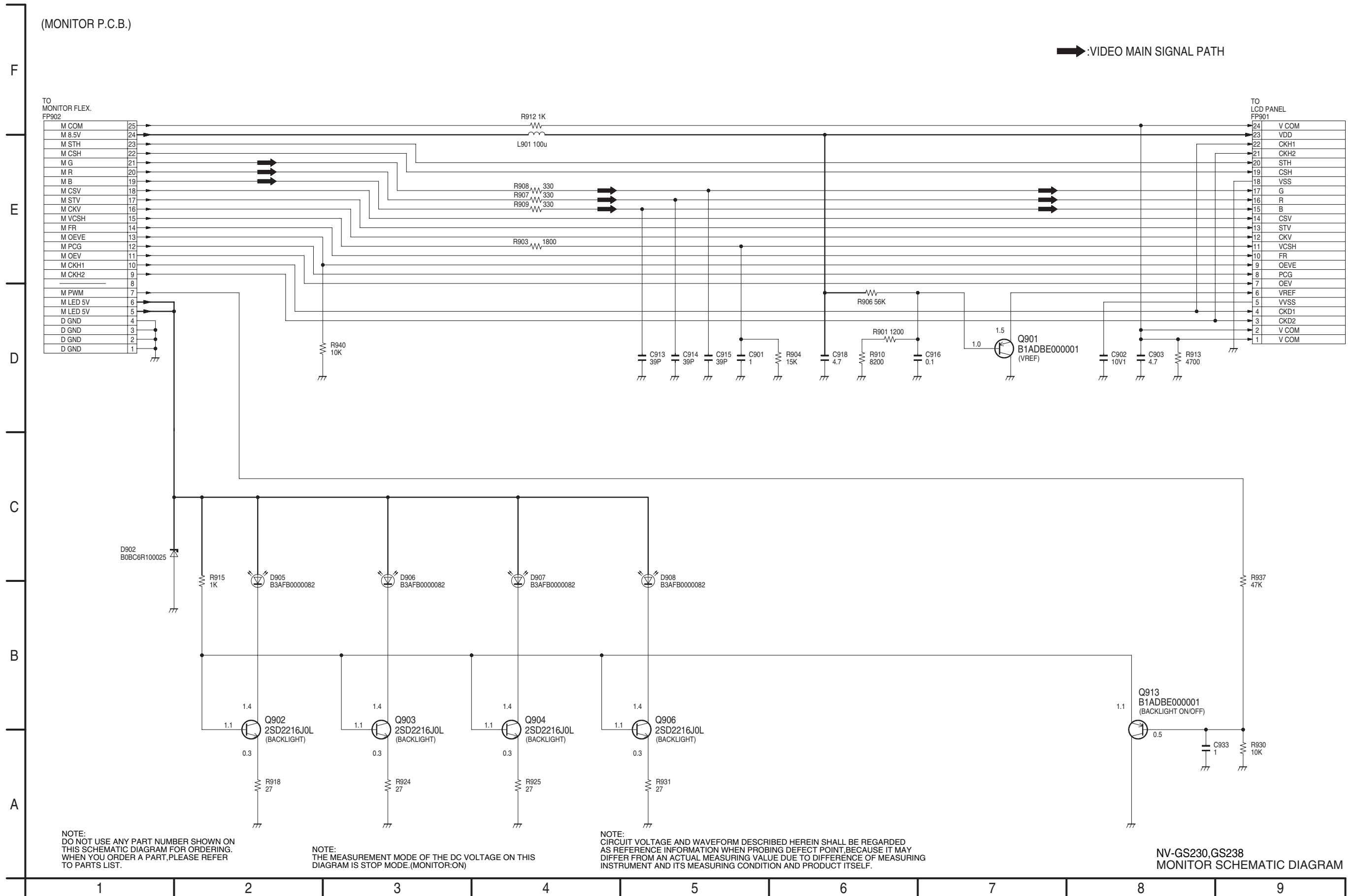
F
E
D
C
B
A



NOTE:
DO NOT USE ANY PART NUMBER SHOWN ON THIS SCHEMATIC DIAGRAM FOR ORDERING. WHEN YOU ORDER A PART, PLEASE REFER TO PARTS LIST.

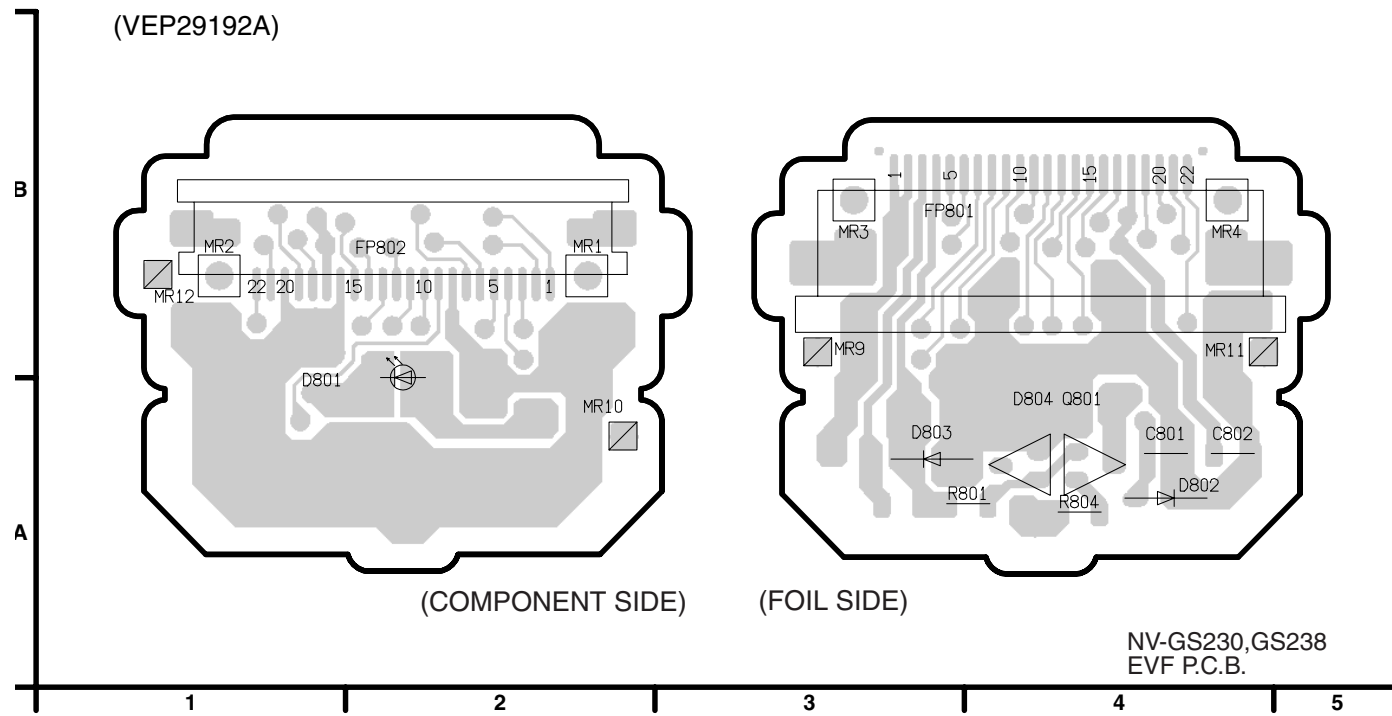
NV-GS230, GS238
SIDE (R)/LCD DET. SCHEMATIC DIAGRAM

10.11. MONITOR SCHEMATIC DIAGRAM

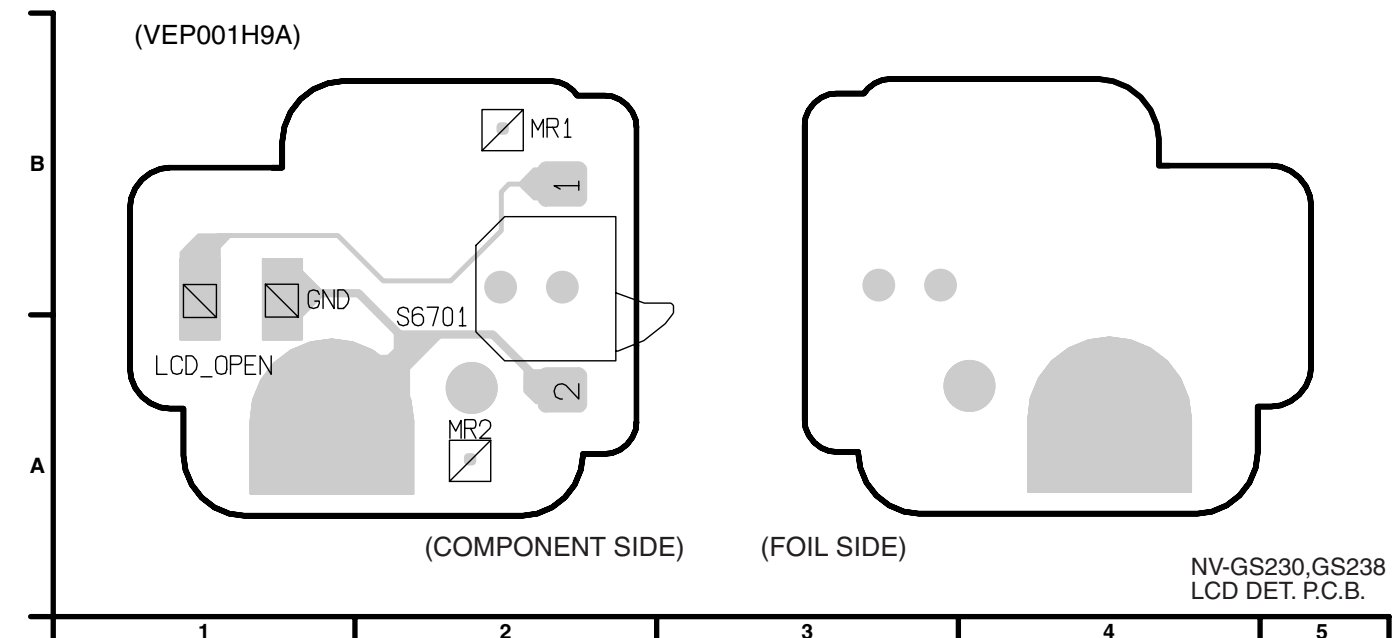


11 CIRCUIT BOARD ASSEMBLIES

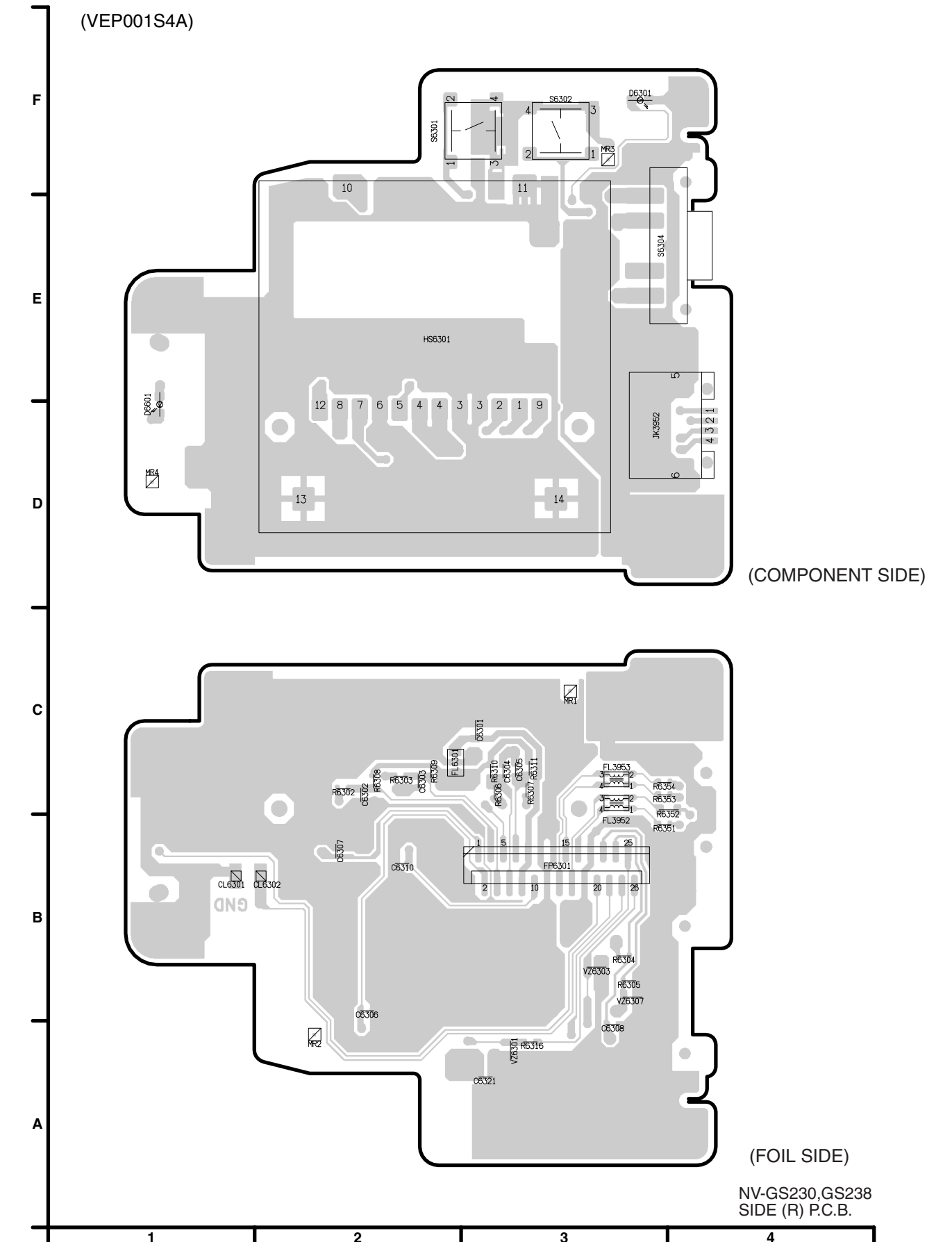
11.1. EVF P.C.B.



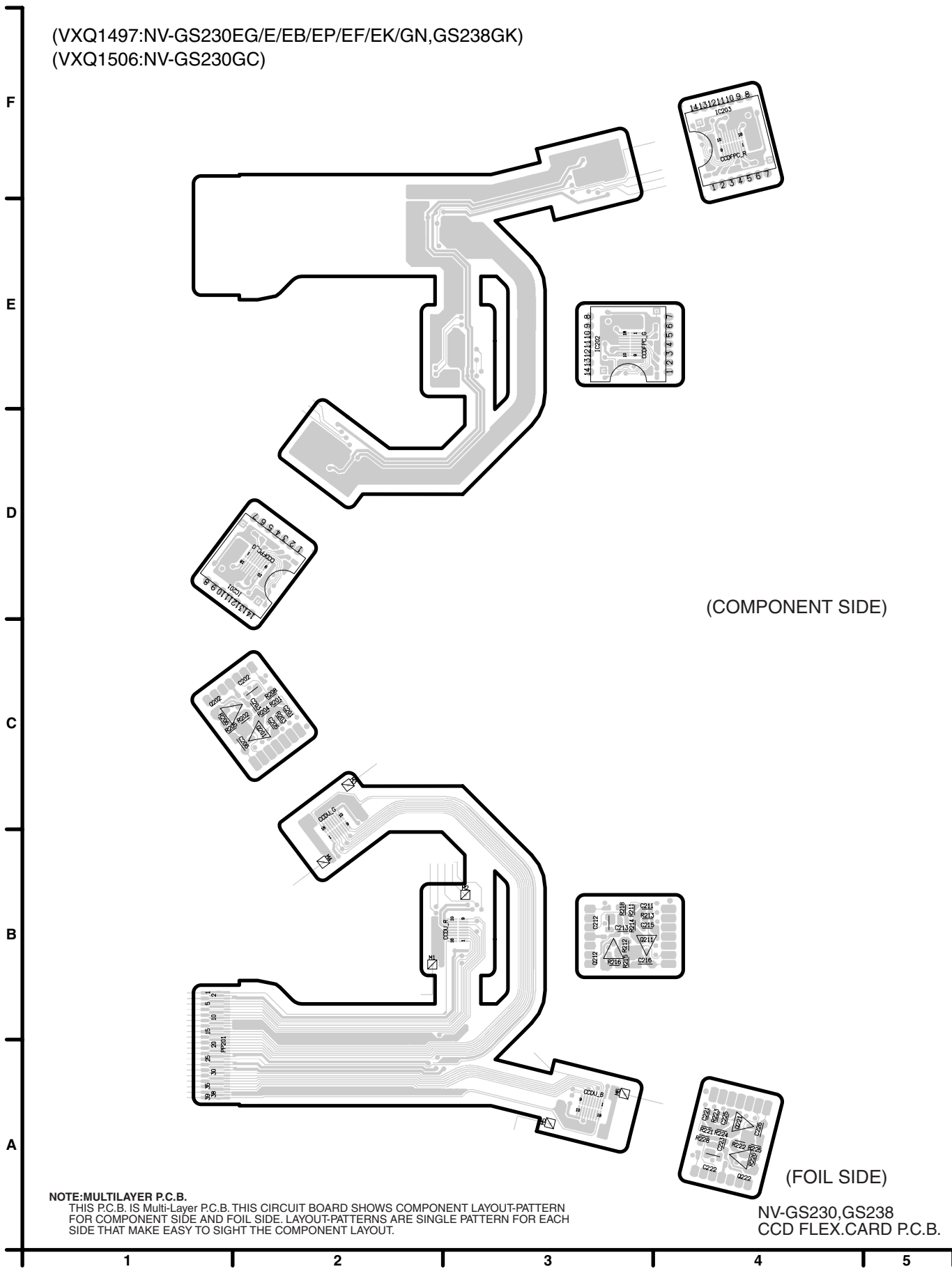
11.2. LCD DET. P.C.B.



11.3. SIDE (R) P.C.B.

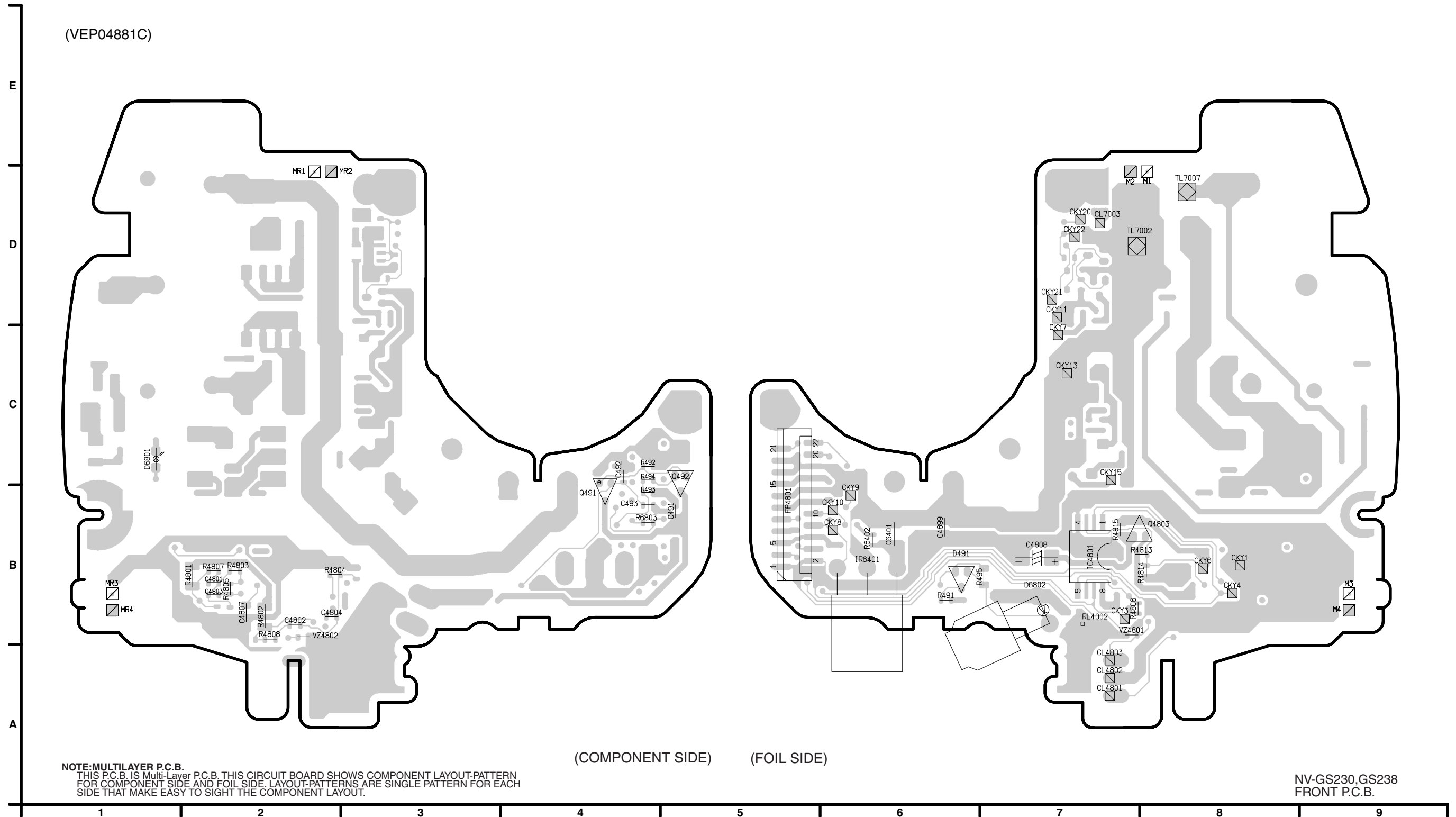


11.4. CCD FLEX. CARD C.B.A.



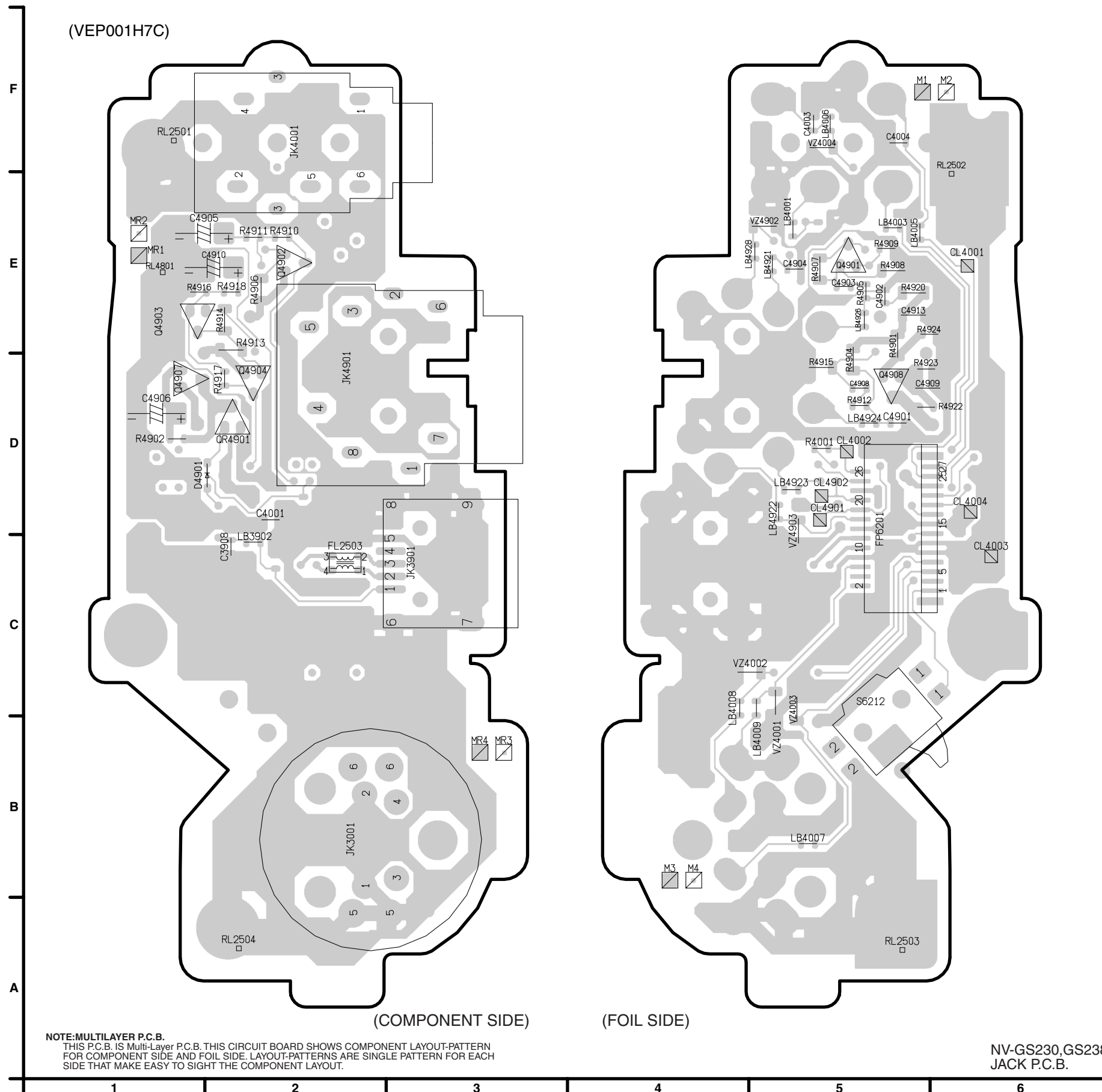
11.5. FRONT P.C.B.

(VEP04881C)



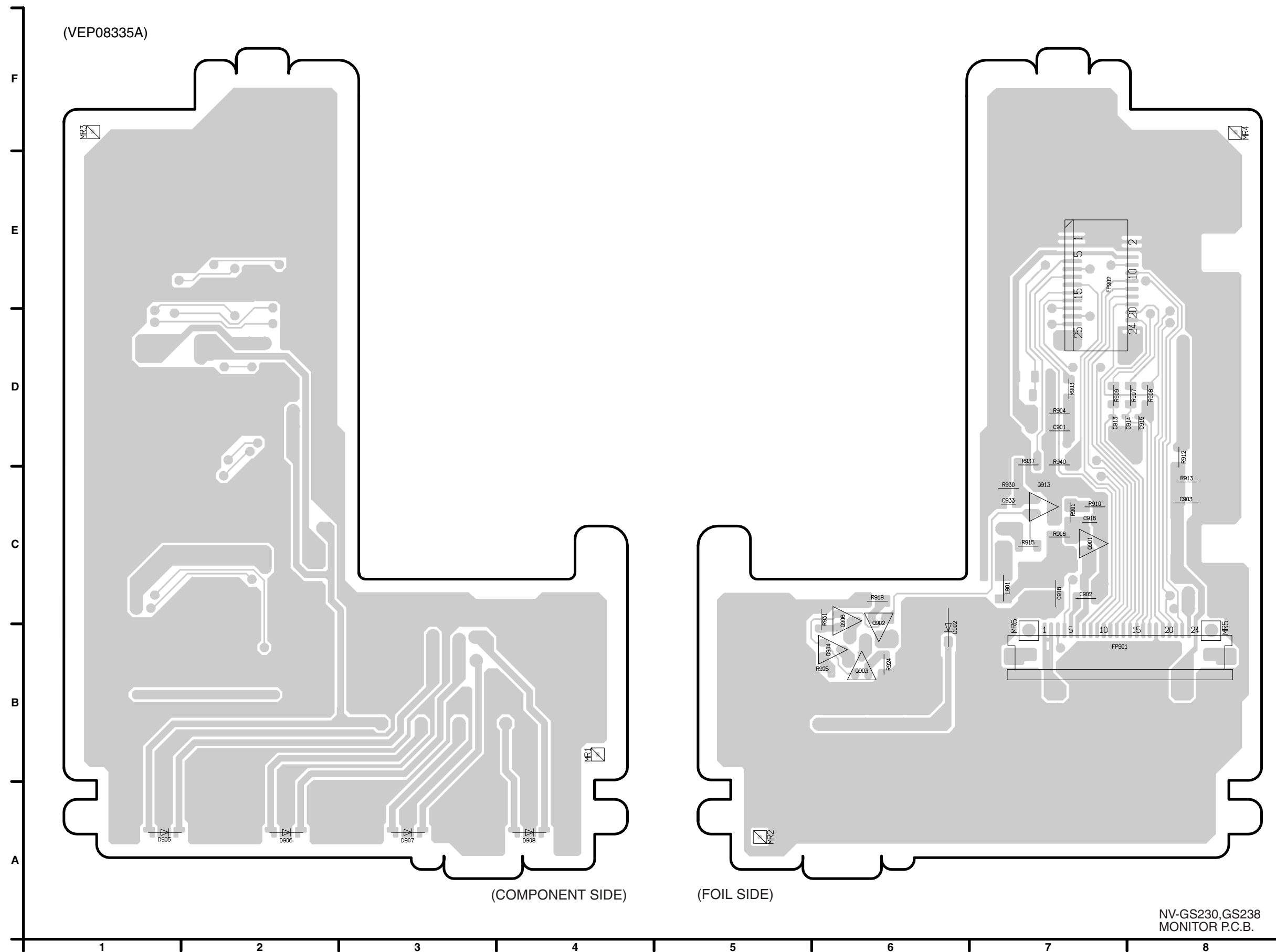
NV-GS230,GS238
FRONT P.C.B.

11.6. JACK P.C.B.



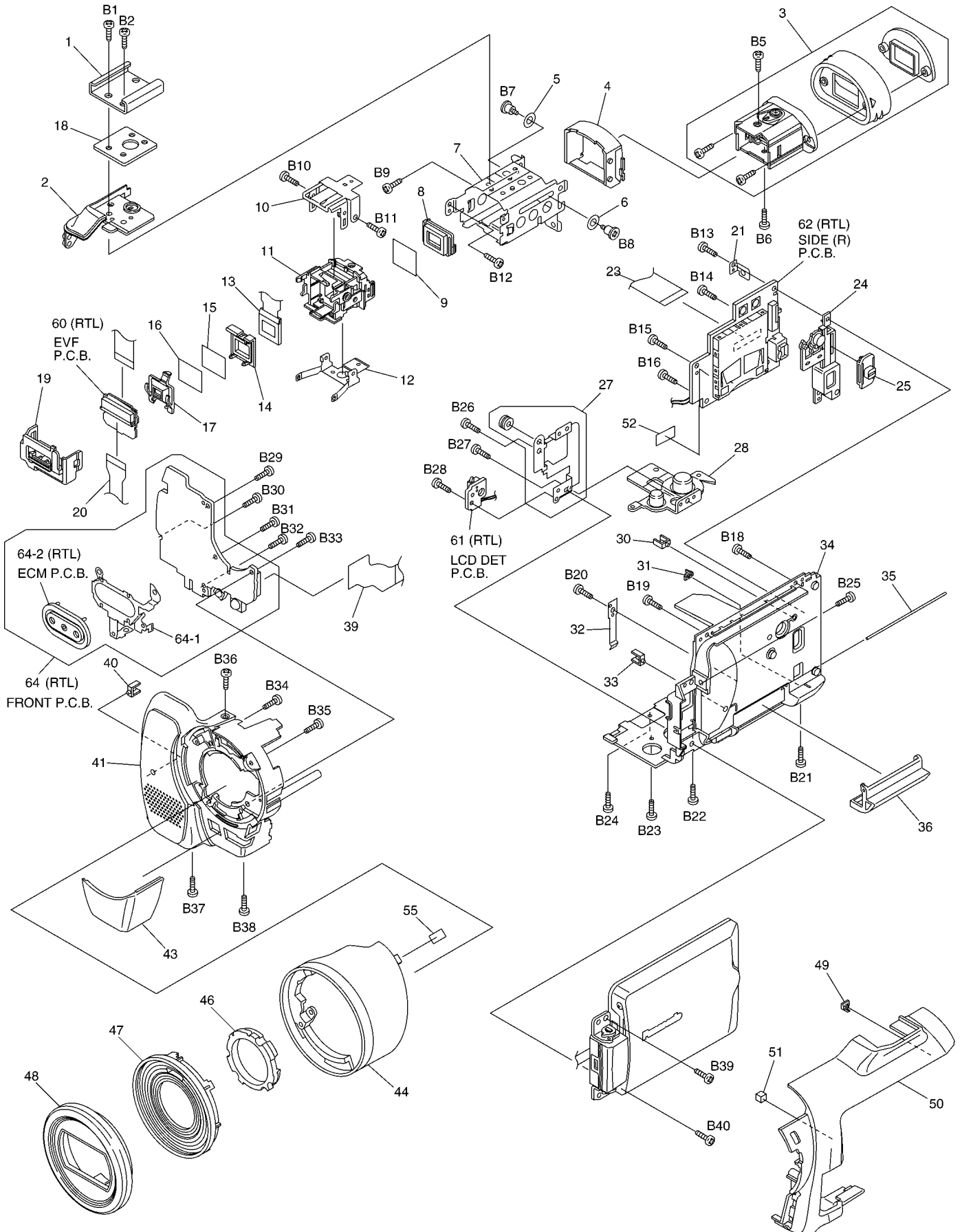
Jack C.B.A.			
Transister		LB4007	B-5
Q4901	E-5	LB4008	B-4
Q4902	E-2	LB4009	B-5
Q4903	E-1	LB4921	E-5
Q4904	D-2	LB4922	C-5
Q4907	D-1	LB4923	D-5
Q4908	D-5	LB4924	D-5
Transister & Resister		LB4926	E-5
QR4901	D-2	LB4928	E-5
Test Point		Capacitor	
CL4001	E-6	C3908	C-2
CL4002	D-5	C4001	C-2
CL4003	C-6	C4003	F-5
CL4004	D-6	C4004	F-5
CL4901	C-5	C4901	D-5
CL4902	D-5	C4902	E-5
RL2501	F-1	C4903	E-5
RL2502	E-6	C4904	E-5
RL2503	A-5	C4905	E-1
RL2504	A-2	C4906	D-1
RL4801	E-1	C4908	D-5
Connector		C4909	D-5
FP6201	C-5	C4910	E-2
Jack		C4913	E-5
JK3001	B-2	Resistor	
JK3901	C-3	R4001	D-5
JK4001	F-2	R4901	D-5
JK4901	D-2	R4902	D-1
Diode		R4904	D-5
D4901	D-1	R4905	E-5
Absorber		R4906	E-2
VZ4001	B-5	R4907	E-5
VZ4002	C-5	R4908	E-5
VZ4003	B-5	R4909	E-5
VZ4004	F-5	R4910	E-2
VZ4902	E-5	R4911	E-2
VZ4903	C-5	R4912	D-5
Filter		R4913	D-2
FL2503	C-2	R4914	E-2
Switch		R4915	D-5
S6212	B-5	R4916	E-1
Coil		R4917	D-2
LB3902	C-2	R4918	E-2
LB4001	E-5	R4920	E-5
LB4003	E-5	R4922	D-6
LB4005	E-5	R4923	D-5
LB4006	F-5	R4924	D-5

11.7. MONITOR P.C.B.

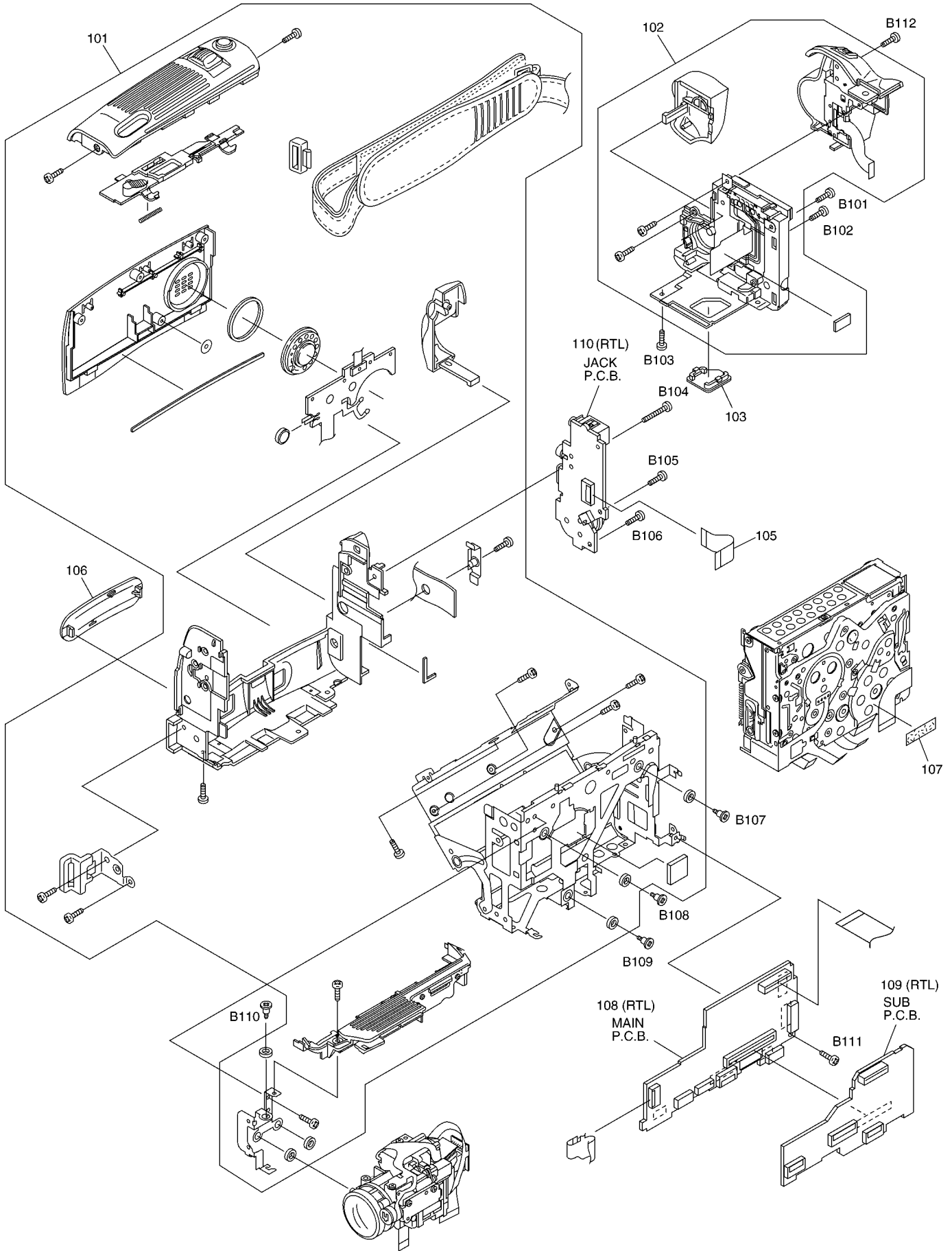


12 EXPLODED VIEWS

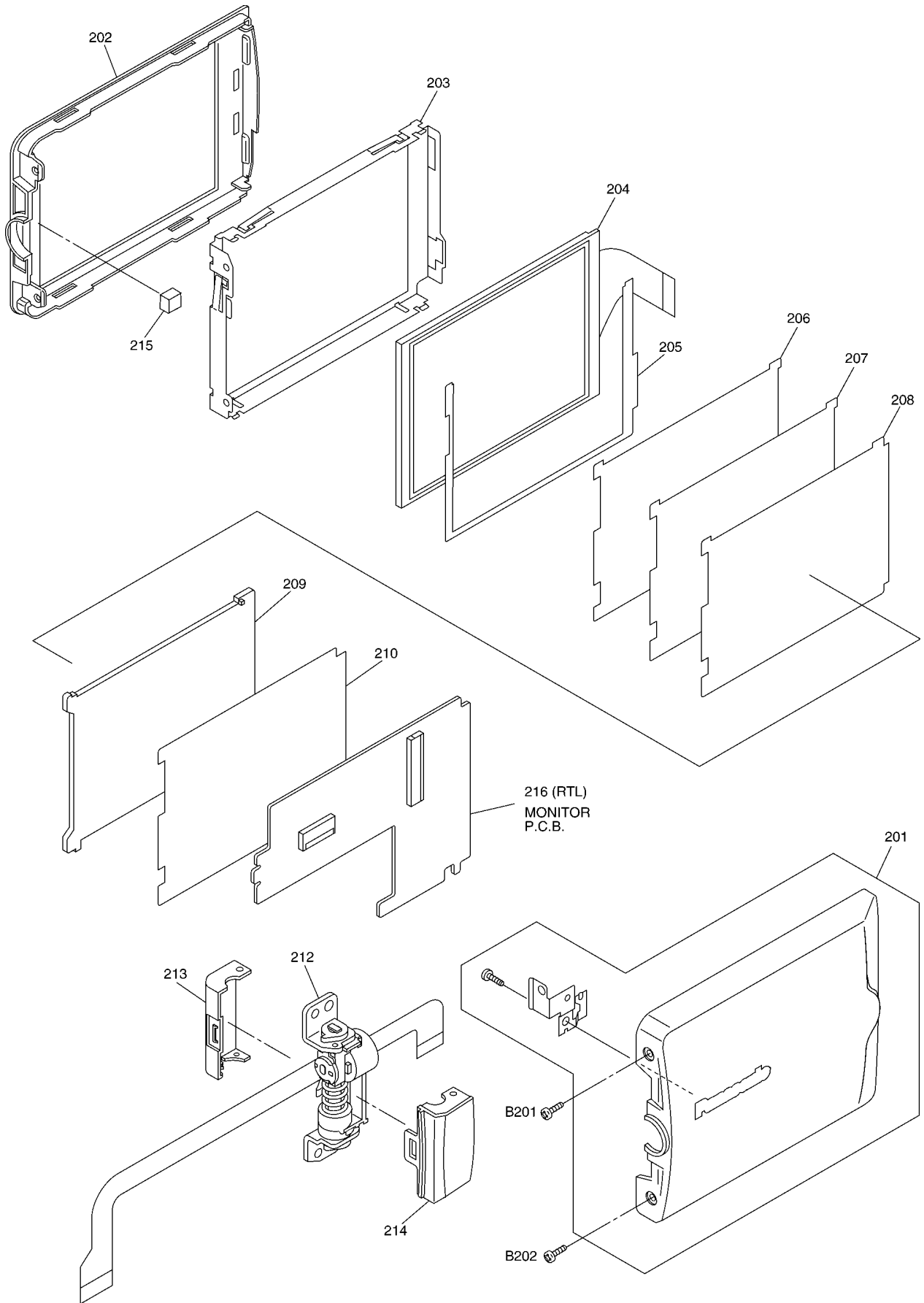
12.1. FRAME & CASING SECTION (1)



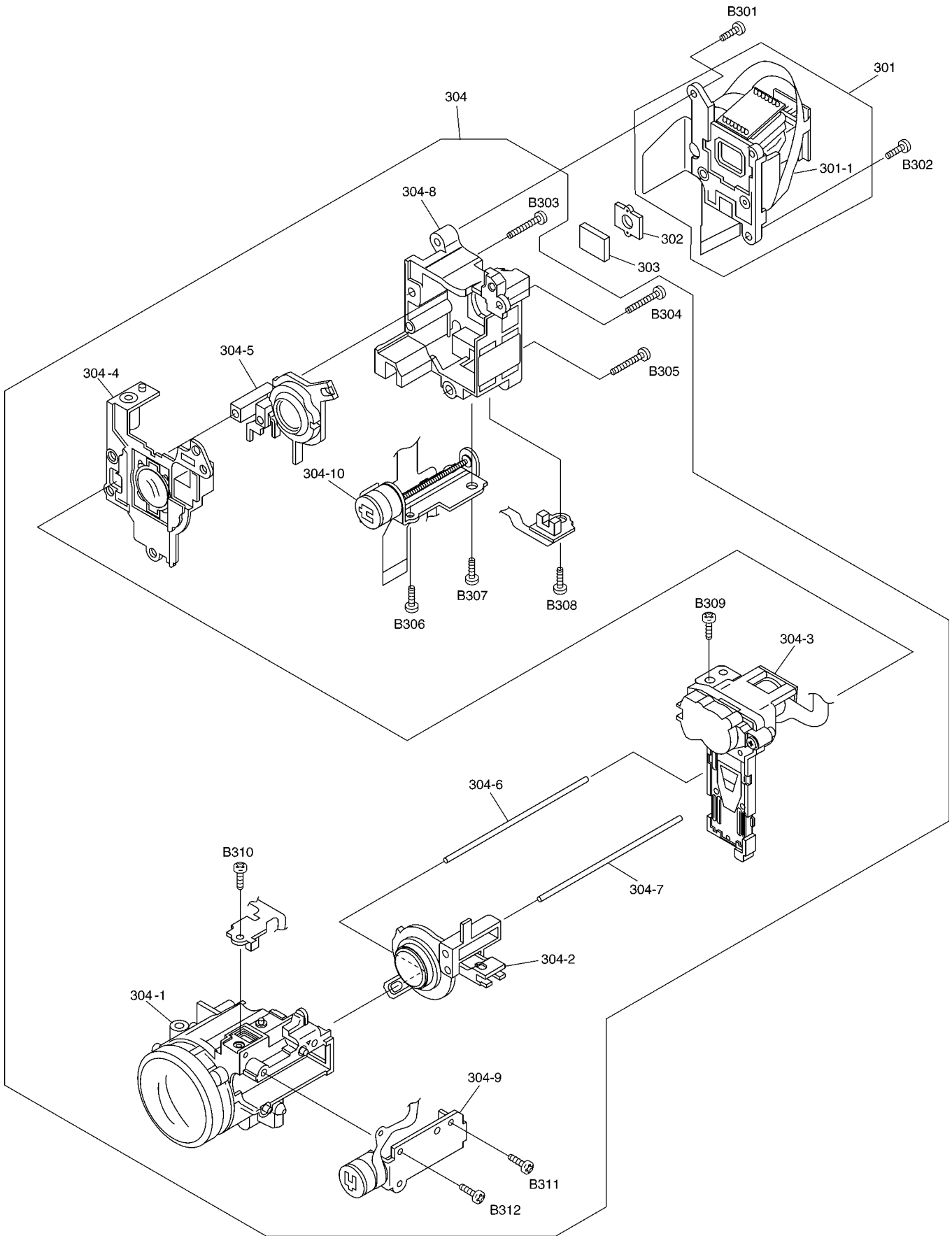
12.2. FRAME & CASING SECTION (2)



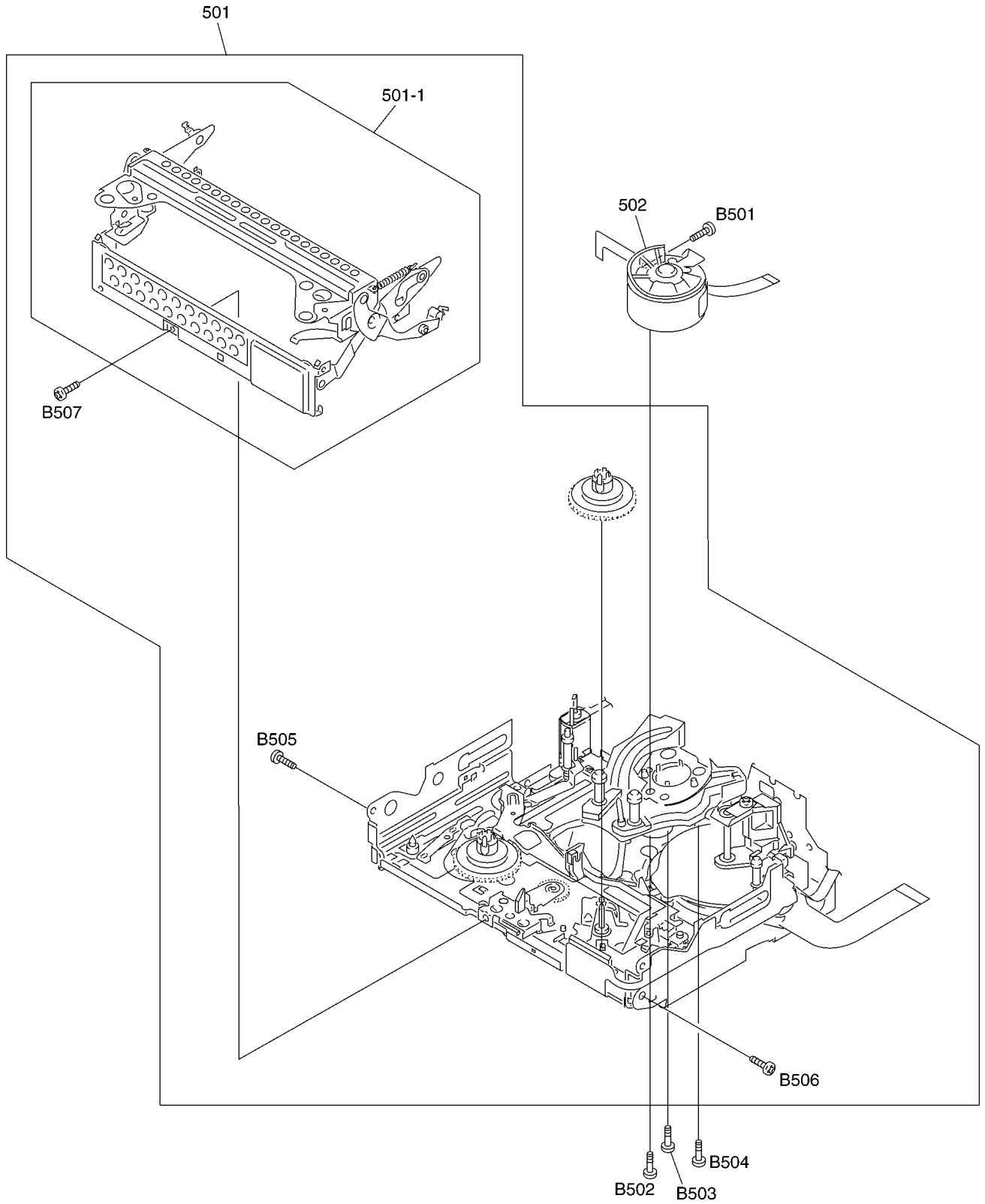
12.3. LCD SECTION



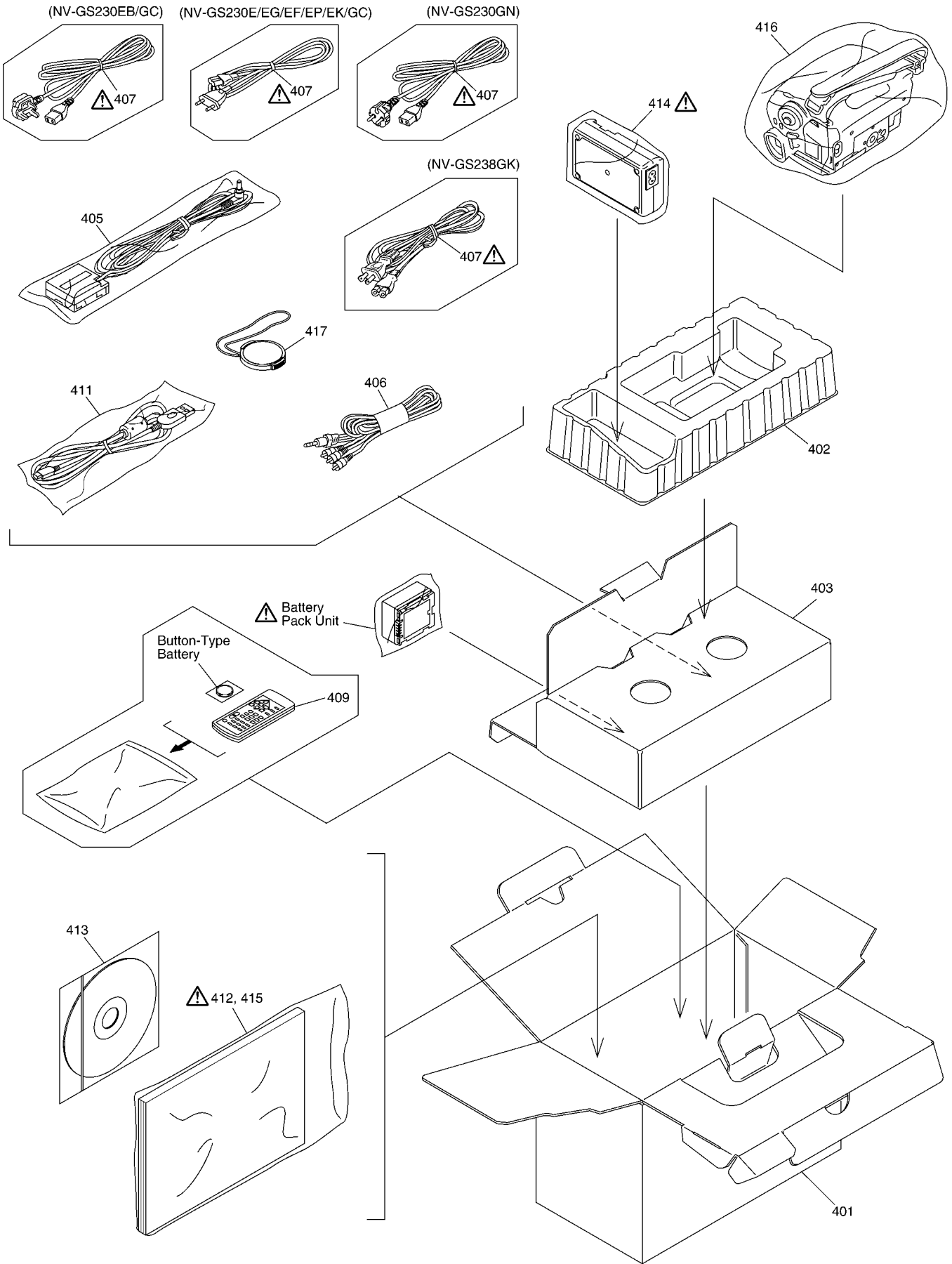
12.4. CAMERA LENS SECTION



12.5. VCR MECHANISM SECTION



12.6. PACKING PARTS & ACCESSORIES SECTION



13 REPLACEMENT PARTS LIST

13.1. FRAME & CASING SECTION (1) PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
2. IMPORTANT SAFETY NOTICE
Components identified with the mark △ have the special characteristics for safety. When replacing any of these components, use only the same type.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
1	VMP8796	COLD SHOE	1	
2	VGQ9313	SHOE DECORATION	1	
3	VYK1R78	EVF VIEW ADJ. UNIT	1	
4	VGQ8289	SLIDE CASE HOLDER	1	
5	VGQ9196	SLIDE SPACER	1	
6	VGQ9196	SLIDE SPACER	1	
7	VMP8212	EVF FRAME -3	1	
8	VGQ7689	PLATE HOLDING PIECE	1	
9	VGL1136	LENS PANEL	1	
10	VMP8211	EVF PLATE	1	
11	VGQ8284	LCD HOLDER PIECE	1	
12	VMC1951	EVF CLICK SPRING	1	
13	L5BDDXH00014	EVF PANEL	1	
14	VGQ8346	LCD PIECE	1	
15	VGL1145	BL PRISM PANEL	1	
16	VGL1244	EVF DEFUSION SHEET	1	
17	VGQ7102	BL PIECE	1	
18	VGQ9314	SHOE PIECE	1	
19	VGQ8291	EVF PIECE	1	
20	VWJ1755	EVF FPC	1	
21	VMP8208	SR PLATE	1	
23	VWJ1753	R FPC	1	
24	VGQ9310	KNOB HOLDER	1	
25	VGU0B01	MODE CHANGE KNOB	1	
27	VXA7974	HINGE HOLD PLATE	1	
28	VMP8207	TRIPOD PLATE	1	
30	VGL1142	PANEL LIGHT	1	
31	VGQ8542	R PIECE	1	
32	VMC1956	SD DOOR SPRING	1	
33	VGL1142	PANEL LIGHT	1	
34	VYK2A83	SIDE CASE (R) 1U	1	
35	VMS7555	SD SHAFT	1	
36	VKF4181	SD DOOR	1	
39	VWJ1842	FRONT FPC	1	
40	VGL1135	PANEL LIGHT	1	
41	VYK2A91	FRONT (2) U	1	
43	VKW3262	SENSOR WINDOW	1	
44	VGK3184	LENS ORNAMENT	1	
46	VMG1672	RUBBER	1	
47	VDW1247	SHUTTER PLATE	1	
48	VYK2A92	LENZ HOOD U	1	
49	VGQ8542	R PIECE	1	
50	VKM7085	R COVER	1	
51	VGQ8316	SR PORON	1	
52	VGQ6816	SHEET	1	
55	VGQ8439	FRONT SHEET	1	
60	VEP29192A	EVF P.C.B.	1	(RTL)
61	VEP001H9A	LCD DET P.C.B	1	(RTL)
62	VEP001S4A	SIDE (R) P.C.B.	1	(RTL)
64	VEP04881C	FRONT P.C.B.	1	(RTL)
64-1	VMP8214	MIC ANGLE	1	
64-2	VEP04882A	ECM P.C.B.	1	(RTL)
B1	XQS2+A4FN	SCREW	1	
B2	XQS2+A4FN	SCREW	1	
B5	VHD1775	SCREW	1	
B6	VHD1775	SCREW	1	
B7	VHD1642	SCREW	1	
B8	VHD1642	SCREW	1	
B9	XQN16+BJ4FN	SCREW	1	
B10	VHD1393	SCREW	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
B11	VHD1393	SCREW	1	
B12	XQN16+B5FN	SCREW	1	
B13	XQN16+BJ6FN	SCREW	1	
B14	XQN16+BJ6FN	SCREW	1	
B15	XQN16+BJ6FN	SCREW	1	
B16	XQN14+BJ5FJK	SCREW	1	
B18	XQN16+BJ35FN	SCREW	1	
B19	XQN16+BJ35FN	SCREW	1	
B20	XQN16+BJ35FN	SCREW	1	
B21	XQN16+B3FN	SCREW	1	
B22	XQN16+B3FN	SCREW	1	
B23	XQN16+B3FN	SCREW	1	
B24	XQN16+B3FN	SCREW	1	
B25	XQN16+BJ6FN	SCREW	1	
B26	VHD1908	SCREW	1	
B27	XQN16+BJ6FN	SCREW	1	
B28	XQN16+B3FN	SCREW	1	
B29	XQN16+BJ5FN	SCREW	1	
B30	XQN16+BJ5FN	SCREW	1	
B31	XQN16+BJ5FN	SCREW	1	
B32	XQN16+BJ5FN	SCREW	1	
B33	XQN16+BJ5FN	SCREW	1	
B34	XQN16+BJ5FN	SCREW	1	
B35	XQN16+BJ5FN	SCREW	1	
B36	XQN16+B5FN	SCREW	1	
B37	XQN16+B3FN	SCREW	1	
B38	XQN16+B3FN	SCREW	1	
B39	VHD1411	SCREW	1	
B40	VHD1411	SCREW	1	

13.2. FRAME & CASING SECTION (2) PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
2. IMPORTANT SAFETY NOTICE
Components identified with the mark △ have the special characteristics for safety. When replacing any of these components, use only the same type.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
101	N9ZZ00000365	SIDE CASE (L) 1U	1	EG, E, EB, EF, EP, EK, GN
101	N9ZZ00000364	SIDE CASE (L) 1U	1	GC, GK
102	N9ZZ00000363	REAR OPERATION U	1	
103	VKF3963	EVR COVER	1	
105	VWJ1752	JACK FPC	1	
106	VKF3965	MECHA. ADJ. COVER	1	
107	VGQ8455	CAPSTAN FPC SHEET	1	
108	VEP03G73AA	MAIN P.C.B.	1	(RTL) EG, E, EB, EF, EP
108	VEP03G73AB	MAIN P.C.B.	1	(RTL) EK
108	VEP03G73AC	MAIN P.C.B.	1	(RTL) GC, GN
108	VEP03G73AD	MAIN P.C.B.	1	(RTL) GK
109	VEP23670A	SUB P.C.B.	1	(RTL)
110	VEP001H7C	JACK P.C.B.	1	(RTL)
B101	XQN16+BJ6FN	SCREW	1	
B102	XQN16+B5FN	SCREW	1	
B103	XQN16+B3FN	SCREW	1	
B104	XQN16+B6FN	SCREW	1	
B105	XQN16+BJ3FN	SCREW	1	
B106	XQN16+B3FN	SCREW	1	
B107	VHD1133	SCREW	1	
B108	VHD1133	SCREW	1	
B109	VHD1133	SCREW	1	
B110	VHD1353	SCREW	1	
B111	XQN16+B3FN	SCREW	1	
B112	XQN16+CG4FN	SCREW	1	

13.3. LCD SECTION PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
 2. IMPORTANT SAFETY NOTICE
 Components identified with the mark Δ have the special characteristics for safety. When replacing any of these components, use only the same type.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
201	VYK2A85	LCD CASE (UPPER) UNIT	1	EG, E, EB, EP, EK
201	VYK2B61	LCD CASE (UPPER) UNIT	1	EF
201	VYK2B62	LCD CASE (UPPER) UNIT	1	GC, GN
201	VYK2B64	LCD CASE (UPPER) UNIT	1	GK
202	VKM7084	LCD CASE (UNDER)	1	
203	VSC5681	LCD SHIELD CASE	1	
204	L5BDDYH00019	LCD PANEL UNIT	1	
205	VGQ8351	MONITOR SHEET	1	
206	VGL1240	PRISM SHEET A	1	
207	VGL1241	PRISM SHEET B	1	
208	VGL1242	DIFFUSION SHEET	1	
209	VKW3178	POLARIZATION PLATE	1	
210	VGL1243	REFLECTION SHEET	1	
212	VXD0441	LCD HINGE (1) UNIT	1	
213	VGQ9312	HINGE COVER (B)	1	
214	VGQ9311	HINGE COVER (T)	1	
215	VGQ8445	LCD PORON	1	
216	VEP08355A	MONITOR P.C.B.	1	(RTL)
B201	VHD1828	SCREW	1	
B202	VHD1828	SCREW	1	

13.4. CAMERA LENS SECTION PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
 2. IMPORTANT SAFETY NOTICE
 Components identified with the mark Δ have the special characteristics for safety. When replacing any of these components, use only the same type.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
301	VXQ1497	PRISM UNIT	1	EG, E, EB, EF, EP, EK, GN, GK
301	VXQ1506	PRISM UNIT	1	GC
301-1	VEK0H35	CCD FPC	1	
302	VMX3456	CCD CUSHION	1	
303	VDL1646	CRYSTAL OPTICS FILTER	1	
304	VXW0701	LENS UNIT	1	
304-1	VXQ1308	LENS MAIN FRAME UNIT	1	
304-2	VXP2429	2ND MOVING FRAME UNIT	1	
304-3	VXP2434	IRIS UNIT	1	
304-4	VXQ1309	3RD MOVING FRAME UNIT	1	
304-5	VXP2431	4TH MOVING FRAME UNIT	1	
304-6	VMS7312	GUIDE POLE	1	
304-7	VMS7312	GUIDE POLE	1	
304-8	VDW1109	MASTER FLANGE	1	
304-9	L6HA64NC0001	ZOOM MOTOR UNIT	1	
304-10	L6HA64NC0002	FOCUS MOTOR UNIT	1	
B301	XQN16+CJ5FJ	SCREW	1	
B302	XQN16+CJ5FJ	SCREW	1	
B303	XQN16+CJ7FJ	SCREW	1	
B304	XQN16+CJ7FJ	SCREW	1	
B305	XQN16+CJ7FJ	SCREW	1	
B306	XQN16+CJ5FJ	SCREW	1	
B307	XQN16+CJ5FJ	SCREW	1	
B308	XQN16+CJ5FJ	SCREW	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
B309	XQN16+CJ5FJ	SCREW	1	
B310	XQN16+CJ5FJ	SCREW	1	
B311	XQN16+CJ5FJ	SCREW	1	
B312	XQN16+CJ5FJ	SCREW	1	

13.5. VCR MECHANISM SECTION PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
 2. IMPORTANT SAFETY NOTICE
 Components identified with the mark Δ have the special characteristics for safety. When replacing any of these components, use only the same type.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
501	VXK1855	MECHANISM U	1	
501-1	VXA8334	CASSETTE UP U	1	
502	VEG1704	CYLINDER U	1	
B501	VHD1632	SCREW	1	
B502	VHD1861	SCREW	1	
B503	VHD1861	SCREW	1	
B504	VHD1861	SCREW	1	
B505	VHD1754	SCREW	1	
B506	VHD1754	SCREW	1	
B507	VHD1755	SCREW	1	

13.6. PACKING PARTS & ACCESSORIES SECTION PARTS LIST

Note: 1. *Be sure to make your orders of replacement parts according to this list.
 2. IMPORTANT SAFETY NOTICE
 Components identified with the mark Δ have the special characteristics for safety. When replacing any of these components, use only the same type.
 3. Supply of CD-ROM, in accordance with license protection, is allowable as replacement parts only for customers who accidentally damaged or lost their own.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
401	VPG1M75	PACKING CASE	1	EG, E, EB, EF, EP, EK, GC, GN
401	VPG1M76	PACKING CASE	1	GK
402	VPN6275	CUSHION	1	
403	VPK3313	ACCESSORIES BOX	1	
405	K2GJ2DZ00018	DC CABLE	1	
406	K2KC4CB00018	AV CABLE	1	
407	K2CQ2CA00006	AC CORD	1	EG, E, EF, EP, EK, GC Δ
407	K2CT3CA00004	AC CORD	1	EB, GC Δ
407	K2CJ2DA00008	AC CORD	1	GN Δ
407	K2CA2CA000020	AC CORD	1	GK Δ
409	N2QAEC000021	REMOTE CONTROLLER	1	
411	VFA0453-A	USB CABLE	1	
412	VQT0T81-2	O/I (GE/IT)	1	EG, EK Δ
412	VQT0T82-2	O/I (FR/DU)	1	EG, EF, EK Δ
412	VQT0T81-1	O/I (FR/DA)	1	EG, EK Δ
412	VQT0T83-1	O/I (PR/SP)	1	E Δ
412	VQT0T84-1	O/I (SW/DA)	1	E Δ
412	VQT0T87-1	O/I (EN)	1	EB Δ
412	VQT0T85-1	O/I (EN/PO)	1	EP Δ
412	VQT0T86-1	O/I (CZ/HU)	1	EP Δ
412	VQT0T88-1	O/I (CO/EN)	1	GC Δ
412	VQT0T89-1	O/I (RU/AR)	1	GC Δ
412	VQT0T93-1	O/I (EN)	1	GN Δ
412	VQT0T94-3	O/I (CN)	1	GK Δ
413	VFF0305-S	CD-ROM	1	SEE "NOTES"
414	VSK0651B-2	AC ADAPTOR	1	EG, E, EB, EF, EP, EK, GC, GN Δ

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
414	VSK0651A-2	AC ADAPTOR	1	GK Δ
415	VQT0T12-2	O/I CD-ROM (GE/FR/IT/DU)	1	EG, EF, EK
415	LSQT1038C	O/I CD-ROM (TK)	1	EG, EK
415	VQT0T15-2	O/I CD-ROM (PR/SP/SW/DA)	1	E
415	VQT0T20-2	O/I CD-ROM (EN)	1	EB, GN
415	VQT0T18-2	O/I CD-ROM (EN/PO/CZ/HU)	1	EP
415	VQT0T23-2	O/I CD-ROM (CO/EN/RU/AR)	1	GC
415	VQT0T31-2	O/I CD-ROM (CN)	1	GK
416	VPF1129	POLYETHYLENE BAG	1	
417	VYF3031	HOOD CAP UNIT	1	

13.7. ELECTRICAL REPLACEMENT PARTS LIST

Note: 1. Be sure to make your orders of replacement parts according to this list.
 2. IMPORTANT SAFETY NOTICE: Components identified with the mark Δ have the special characteristics for safety. When replacing any of these components, use only the same type.
 3. Unless otherwise specified, All resistors are in OHMS, K=1,000 OHMS. All capacitors are in MICROFARADS (uf), P=uuf.
 4. The P.C. Board units marked with "■" show below the main assembled parts.
 5. The marking (RTL) indicates the retention time is limited for this item.
 After the discontinuation of this assembly in production, it will no longer be available.

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
n	VEP04881C	FRONT P.C.B.		(RTL)
C491	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
C492	F1G0J224A004	C.CAPACITOR CH 6.3V 0.22U	1	
C493	F1G0J224A004	C.CAPACITOR CH 6.3V 0.22U	1	
C4801	ECJ0EB1A473K	C.CAPACITOR CH 10V 0.047U	1	
C4802	ECJ0EB1A473K	C.CAPACITOR CH 10V 0.047U	1	
C4803	ECUX1E681KBQ	C.CAPACITOR CH 25V 680P	1	ECJ0EB1E681K
C4804	ECUX1E681KBQ	C.CAPACITOR CH 25V 680P	1	ECJ0EB1E681K
C4807	F1H0J475A010	C.CAPACITOR CH 6.3V 4.7U	1	
C4808	F3F0J226A055	E.CAPACITOR CH 6.3V 22U	1	
C4899	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
C6401	F1J0J106A049	C.CAPACITOR CH 6.3V 10U	1	
D491	MA3S132D0L	DIODE	1	
D6801	B3AAB0000137	DIODE	1	
D6802	B3GA00000039	PHOTO DIODE	1	
FP4801	K1MN22A00065	CONNECTOR 22P	1	
IC4801	NJM2115V	IC	1	COABBB000104
IR6401	B3RAB0000045	IR RECEIVER	1	
Q491	B1ABCF000100	TRANSISTOR	1	
Q492	2SC6054J0L	TRANSISTOR	1	
Q4803	2SC6054J0L	TRANSISTOR	1	
R491	ERJ2GEJ225	M.RESISTOR CH 1/16W 2.2M	1	ERJ2RMJ225X
R492	ERJ2GEJ334	M.RESISTOR CH 1/16W 330K	1	
R493	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R494	ERJ2GEJ182	M.RESISTOR CH 1/16W 1.8K	1	
R495	ERJ3GEYJ106	M.RESISTOR CH 1/10W 10M	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
R4801	ERJ6GEYG392	M.RESISTOR CH 1/10W 3.9K	1	
R4802	ERJ6GEYG392	M.RESISTOR CH 1/10W 3.9K	1	
R4803	D0YAR0000007	M.RESISTOR CH 1/16W 0	1	
R4804	D0YAR0000007	M.RESISTOR CH 1/16W 0	1	
R4805	ERJ2GED563X	M.RESISTOR CH 1/16W 56K	1	ERJ2RHD563X
R4806	ERJ2GED563X	M.RESISTOR CH 1/16W 56K	1	ERJ2RHD563X
R4807	ERJ2GEJ103	M.RESISTOR CH 1/16W 10K	1	
R4808	ERJ2GEJ103	M.RESISTOR CH 1/16W 10K	1	
R4813	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
R4814	ERJ2GEJ333	M.RESISTOR CH 1/16W 33K	1	
R4815	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R6402	ERJ2RKD330	M.RESISTOR CH 1/16W 33	1	
R6803	ERJ2GEJ331	M.RESISTOR CH 1/16W 330	1	
VZ4801	D4ED1270A003	SURGE ABSORBER	1	
VZ4802	D4ED1270A003	SURGE ABSORBER	1	
n	VEP001H7C	JACK P.C.B.		(RTL)
C3908	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
C4001	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
C4003	ECJ0EB1E472K	C.CAPACITOR CH 25V 4700P	1	
C4004	ECJ0EB1E472K	C.CAPACITOR CH 25V 4700P	1	
C4901	ECJ0EB1E472K	C.CAPACITOR CH 25V 4700P	1	
C4902	ECJ0EB1E472K	C.CAPACITOR CH 25V 4700P	1	
C4903	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
C4904	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
C4905	F3F0J226A055	E.CAPACITOR CH 6.3V 22U	1	
C4906	F3F0J226A055	E.CAPACITOR CH 6.3V 22U	1	
C4908	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
C4909	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
C4910	F3F0J226A055	E.CAPACITOR CH 6.3V 22U	1	
C4913	F1H0J475A010	C.CAPACITOR CH 6.3V 4.7U	1	
D4901	B0JCDD000002	DIODE	1	
FL2503	J0MAB0000214	FILTER	1	
FP6201	K1MN27B00036	CONNECTOR 27P	1	
JK3001	VJJ0670	S-JACK	1	K2HZ104A0002
JK3901	K2HZ105E0008	JACK	1	
JK4001	K2HC106B0018	JACK	1	
JK4901	K2HC107B0003	JACK	1	
LB3902	J0JYC0000061	FILTER	1	
LB4001	J0JYC0000059	FILTER	1	
LB4003	J0JYC0000061	FILTER	1	
LB4005	J0JYC0000061	FILTER	1	
LB4006	J0JYC0000061	FILTER	1	
LB4007	J0JYC0000059	FILTER	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
LB4008	J0JYC0000059	FILTER	1	
LB4009	J0JYC0000061	FILTER	1	
LB4921	J0JAC0000015	FILTER	1	J0JAC0000017
LB4922	J0JAC0000015	FILTER	1	J0JAC0000017
LB4923	J0JAC0000015	FILTER	1	J0JAC0000017
LB4924	J0JAC0000015	FILTER	1	J0JAC0000017
LB4926	J0JAC0000015	FILTER	1	J0JAC0000017
LB4928	J0JAC0000015	FILTER	1	J0JAC0000017
Q4901	2SD2216J0L	TRANSISTOR	1	
Q4902	2SB1462JHL	TRANSISTOR	1	
Q4903	2SD2216J0L	TRANSISTOR	1	
Q4904	2SB1462JHL	TRANSISTOR	1	
Q4907	2SC6054J0L	TRANSISTOR	1	
Q4908	2SC6054J0L	TRANSISTOR	1	
QR4901	UNR91A3J0L	TRANSISTOR	1	
R4001	ERJ2GEJ101	M.RESISTOR CH 1/16W 100	1	
R4901	ERJ3RBD331	M.RESISTOR CH 1/16W 330	1	
R4902	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R4904	ERJ3RBD562	M.RESISTOR CH 1/16W 5.6K	1	
R4905	ERJ2GEJ471	M.RESISTOR CH 1/16W 470	1	
R4906	ERJ3RBD103	M.RESISTOR CH 1/16W 10K	1	
R4907	VRE0071E154	M.RESISTOR 150K	1	D0HB154ZA004
R4908	ERJ3RBD563	M.RESISTOR CH 1/16W 56K	1	ERJ3RBD563V
R4909	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	ERJ2RMJ102X
R4910	ERJ2GEJ562	M.RESISTOR CH 1/16W 5.6K	1	
R4911	ERJ2GEJ151	M.RESISTOR CH 1/16W 150	1	
R4912	ERJ2GEJ471	M.RESISTOR CH 1/16W 470	1	
R4913	ERJ3RBD103	M.RESISTOR CH 1/16W 10K	1	
R4914	VRE0071E154	M.RESISTOR 150K	1	D0HB154ZA004
R4915	ERJ3RBD563	M.RESISTOR CH 1/16W 56K	1	ERJ3RBD563V
R4916	ERJ2GEJ102X	M.RESISTOR CH 1/16W 1K	1	ERJ2RMJ102X
R4917	ERJ2GEJ562	M.RESISTOR CH 1/16W 5.6K	1	
R4918	ERJ2GEJ151	M.RESISTOR CH 1/16W 150	1	
R4920	ERJ3RBD562	M.RESISTOR CH 1/16W 5.6K	1	
R4922	ERJ2GEJ223	M.RESISTOR CH 1/16W 22K	1	
R4923	ERJ2GEJ683	M.RESISTOR CH 1/16W 68K	1	
R4924	ERJ2GEJ473Y	M.RESISTOR CH 1/16W 47K	1	
S6212	K0L1BA000121	SWITCH	1	
VZ4001	D4ED1120A002	SURGE ABSORBER	1	
VZ4002	D4ED1270A008	SURGE ABSORBER	1	
VZ4003	D4ED1270A008	SURGE ABSORBER	1	
VZ4004	D4ED1270A006	SURGE ABSORBER	1	
VZ4902	D4ED1120A002	SURGE ABSORBER	1	
VZ4903	D4ED1120A002	SURGE ABSORBER	1	
II	VEP001S4A	SIDE (R) P.C.B.		(RTL)
C6301	F1H0J475A010	C.CAPACITOR CH 6.3V 4.7U	1	
C6302	F1G1H470A566	C.CAPACITOR CH 50V 47P	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
C6303	F1G1H470A566	C.CAPACITOR CH 50V 47P	1	
C6304	F1G1H470A566	C.CAPACITOR CH 50V 47P	1	
C6305	F1G1H470A566	C.CAPACITOR CH 50V 47P	1	
C6306	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
C6307	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
C6310	ECJ0EC1H050C	C.CAPACITOR CH 50V 5P	1	
C6321	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
D6301	B3ABB0000086	DIODE	1	
D6601	B3AAB0000137	DIODE	1	
FL3952	JOMAB0000212	FILTER	1	
FL3953	JOMAB0000212	FILTER	1	
FL6301	F1H0J1050022	C.CAPACITOR CH 6.3V 1U	1	
FP6301	K1MN26A00068	CONNECTOR 26P	1	
HS6301	K1NA09E00038	CONNECTOR 9P	1	
JK3952	K1FA104A0017	JACK	1	
R6302	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R6303	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R6304	ERJ2GEJ473Y	M.RESISTOR CH 1/16W 47K	1	
R6305	ERJ2GEJ473Y	M.RESISTOR CH 1/16W 47K	1	
R6306	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R6307	ERJ2GEJ220	M.RESISTOR CH 1/16W 22	1	
R6308	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R6309	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R6310	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R6311	ERJ2GEJ472	M.RESISTOR CH 1/16W 4.7K	1	
R6316	ERJ2GEJ471	M.RESISTOR CH 1/16W 470	1	
R6351	ERJ2GEJ1R2	M.RESISTOR CH 1/16W 1.2	1	
R6352	D1JB1R26A005	RESISTOR	1	
R6353	ERJ2GEJ1R2	M.RESISTOR CH 1/16W 1.2	1	
R6354	ERJ2GEJ1R2	M.RESISTOR CH 1/16W 1.2	1	
S6301	K0H1BA000436	SWITCH	1	
S6302	K0H1BA000436	SWITCH	1	
S6304	VSS0533	SWITCH	1	K0D112A00116
II	VEP001H9A	LCD DET P.C.B.		(RTL)
S6701	K0L1BA000102	SWITCH	1	
II	VEP08355A	MONITOR P.C.B.		(RTL)
C901	ECJ1VB0J105K	C.CAPACITOR CH 6.3V 1U	1	
C902	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
C903	F1J1A475A023	C.CAPACITOR CH 10V 4.7U	1	
C913	ECJ0EC1H390J	C.CAPACITOR CH 50V 39P	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
C914	ECJ0EC1H390J	C.CAPACITOR CH 50V 39P	1	
C915	ECJ0EC1H390J	C.CAPACITOR CH 50V 39P	1	
C916	F1G1A104A012	C.CAPACITOR CH 10V 0.1U	1	
C918	F1J1A475A023	C.CAPACITOR CH 10V 4.7U	1	
C933	F1G0J105A001	C.CAPACITOR CH 6.3V 1U	1	
D902	MAZ80620ML	DIODE	1	
D905	B3AFB0000181	LED	1	
D906	B3AFB0000181	LED	1	
D907	B3AFB0000181	LED	1	
D908	B3AFB0000181	LED	1	
FP901	K1MN24BA0055	CONNECTOR 24P	1	
FP902	K1MN25B00072	CONNECTOR 25P	1	
L901	G1C101KA0055	CHIP INDUCTOR 100UH	1	
Q901	B1ADCE000018	TRANSISTOR	1	
Q902	2SD2216J0L	TRANSISTOR	1	
Q903	2SD2216J0L	TRANSISTOR	1	
Q904	2SD2216J0L	TRANSISTOR	1	
Q906	2SD2216J0L	TRANSISTOR	1	
Q913	B1ADCE000018	TRANSISTOR	1	
R901	ERJ3RBD122	M.RESISTOR CH 1/16W 1.2K	1	
R903	ERJ3RBD182	M.RESISTOR CH 1/16W 1.8K	1	
R904	ERJ3RBD153	M.RESISTOR CH 1/16W 15K	1	
R906	ERJ3RBD563	M.RESISTOR CH 1/16W 56K	1	ERJ3RBD563V
R907	ERJ3GEYJ331	M.RESISTOR CH 1/10W 330	1	
R908	ERJ3GEYJ331	M.RESISTOR CH 1/10W 330	1	
R909	ERJ3GEYJ331	M.RESISTOR CH 1/10W 330	1	
R910	ERJ3RBD822	M.RESISTOR CH 1/16W 8.2K	1	
R912	ERJ3RBD102	M.RESISTOR CH 1/16W 1K	1	
R913	ERJ3RBD472	M.RESISTOR CH 1/16W 4.7K	1	
R915	D0GB102JA057	M.RESISTOR CH 1/10W 1K	1	
R918	ERJ3RED270	M.RESISTOR CH 1/16W 27	1	
R924	ERJ3RED270	M.RESISTOR CH 1/16W 27	1	
R925	ERJ3RED270	M.RESISTOR CH 1/16W 27	1	
R930	ERJ3RBD103	M.RESISTOR CH 1/16W 10K	1	
R931	ERJ3RED270	M.RESISTOR CH 1/16W 27	1	
R937	ERJ3RBD473	M.RESISTOR CH 1/16W 47K	1	
R940	D0GB103JA057	M.RESISTOR CH 1/10W 10K	1	
n	VEP29192A	EVF B/L P.C.B.		(RTL)
C801	ECJ1VB0J474K	C.CAPACITOR CH 6.3V 0.47U	1	
C802	ECJ1VB1A105K	C.CAPACITOR CH 10V 1U	1	
D801	B3AFB0000129	DIODE	1	
D802	MAZ80470ML	DIODE	1	
D803	MAZ80620ML	DIODE	1	
D804	MA3S13300L	DIODE	1	

Ref. No.	Part No.	Part Name & Description	Pcs	Remarks
FP801	K1MN22BA0056	CONNECTOR 22P	1	
FP802	K1MN22BA0055	CONNECTOR 22P	1	
Q801	2SD2216J0L	TRANSISTOR	1	
R801	ERJ3GEYJ472	M.RESISTOR CH 1/10W 4.7K	1	
R804	ERJ3RED680	M.RESISTOR CH 1/16W 68	1	ERJ3RED680V