Service Manual

17-inch LCD Monitor
f1723/FP7317/L1702/ vf17/FP17

Service Manual Versions and Revision

No.	Version	Release Date	Revision
1.	1.0	Feb. 20, 2003	Original release
2.	2.0	April 8, 2003	Update

f1723 / FP7317 / L1702 / vf17 / FP17 Service Manual.

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1) Circuit Description

1. Audio circuit (Circuit diagrams Main PWB 5/5) (Optional)

1.1 Audio input

The audio signal input received from the audio input terminal (P305) is applied to the amplifier I309 of 1 and 9 through the low-pass filter consisting of R361, R360, C370, C371, C361 and C363.

In this audio circuit, controls of Volume, and mute are conducted. The audio signal controlled by a VR determines the attenuation of output of the amplifiers.

1.2 Audio output

The audio signal is output from the jack output terminal (P306) to the internal speaker system.

2. Interface board and panel power supply (Circuit daigrams MAIN PWB 2/5)

2.1 P301 connector

A 5V power supply for LCD module, CPU, and logic is generated from the P301 connector.

2.2 I301-pin 1 :4-terminal regulator

A 3.3V power supply for Scaler IC I304, is generated from the 5V source.

2.3 I301-pin 1:5-terminal regulator

A 2.5V power supply for Scaler IC I304 is generated from the 5V source.

Q302, Q303 ON/OFF control for LCD Module

ON/OFF control is performed for power ON/OFF and also for the power saving sequence.

3. Video input circuit (Circuit diagram MAIN PWB 3/5)

The analog video signal input entered from P302, the AC-coupled video signal is used to clamp the black level at 0V).

4. Definition converter LSI peripheral circuit (Circuit diagram MAIN PWB 4/5)

I304 gm2121 is the definition converter LSI.

The analog R, G, B signal input entered from the video input circuit is converted into the digital data of video signal through the incorporated A/D converter. Based on this conversion, this device performs interpolation during pixel extension. The source voltage for this device is 3.3V, 2.5V and the system clock frequency is 14.318 MHz. The withstand voltage level for the input signal voltage of I304 is 3.3V and 5V.

5. System reset, LED control circuit (Circuit diagram MAIN PWB 4/5, 2/5)

5.1 System reset

System reset is performed by detecting the rising and falling of the 5V source voltage at I305.

5.2 LED control circuit

Green / amber is lit with the control signal of the LED GREEN and LED AMBER signal pin 34, 33 from I304

6. E^2PROM (Circuit diagram MAIN PWB 4/5)

Data transfer between I307 (24LC16) and Scaller IC I304 is effected through the IIC bus SCL (pin 37) and SDA (pin 36) of I304. The data to be transferred to each device are stored in I307.

- I304 control data.
- OSD related setting data.
- Other control data for service menu.

7. Controller circuit (Circuit diagram MAIN PWB 4/5)

Scaller IC I304 functions as the Controller.

The source voltage for the device are 3.3V and 2.5V and the system clock frequency is 14.318MHz.

7.1 Detection of POWER switch status

The CPU identifies the ON status of the two power supplies. The identification is made when the power supply is turned off. For example, if the power supply is turned off with the POWER switch, the POWER switch must be turned on when activating the power supply again. If the power supply is turned off by pulling out the power cord, then this power supply can be turned on by connecting the power cord, without pressing the POWER switch.

7.2 Display mode identification

7.2.1 Functions

(1) Display mode identification

- The display mode of input signal is identified based on Table 1.
- When the mode has been identified through the measurement of horizontal and vertical frequencies, the total number of lines is determined with a formula of " Horizontal frequency / Vertical frequency = Total number of lines. "Final identification can be made by examining the coincidence of the obtained figure with the number of lines for the mode identified from the frequency. The boundary number of lines in each mode is shown in Table 2.
- When the detected frequency if the sync signal has changed, the total number of lines should be counted even though it is an identified frequency in the same mode.

(2) Power save mode.

The power save mode is assumed when the horizontal / vertical signals are as specified below.

- If there is no horizontal sync signal input.
- If there is no vertical sync signal input.
- If the horizontal sync signal is outside the measuring range of gm2121.
- If the vertical sync signal is outside the measuring range of gm2121.

Table 1

Mode	Resolution	H-freq (KHz)	Band Width (MHz)	Polarity	
				H	V
1.	VGA 640 x 480 60Hz	31.47	25.175	-	-
2.	VESA 640 X 480 72Hz	37.86	31.5	-	-
3.	VESA 640 X 480 75Hz	37.5	31.5	-	-
4.	VGA 720 x 400 70Hz	31.47	28.322	-	+
5.	VESA 800 x 600 60Hz	37.88	40	+	+
6.	VESA 800 x 600 72Hz	48.08	50	+	+
7.	VESA 800 x 600 75Hz	46.88	49.5	+	+
8.	MAC 832 x 624 75Hz	49.72	57.283	-	-
9.	VESA 1024 x 768 60Hz	48.36	65	-	-
10.	VESA 1024 x 768 70Hz	56.48	75	-	-
11.	VESA 1024 x 768 75Hz	60.02	78.75	+	+
12.	MAC 1152 x 870 75Hz	68.68	100	-	-
13.	SUN 1152 x 90 76Hz	71.71	105.6	-	-
14.	SXGA 1280 x 1024 60Hz	64	108	+	+
15.	SXGA 1280 x 1024 75Hz	80	135	+	+

Table 2 the number of the lines, Vsync distinction

Indication resolution	The number of the distinction lines	Distinction Vsync
640 x 480	487 < LINE ≤ 607	fV ≤ 63 Hz
		63 Hz < fV ≤ 68 Hz
		68 Hz < fV ≤ 74 Hz
		74 Hz < fV ≤ 78 Hz
800 x 600	607 < LINE ≤ 777	fV ≤ 58 Hz
		58 Hz < fV ≤ 63 Hz
		63 Hz < fV ≤ 73 Hz
		73 Hz < fV ≤ 78 Hz
832 x 624	640 ≤ LINE	-
1024 x 768	768 < LINE ≤ 870	fV ≤ 63 Hz
		68 Hz < fV ≤ 73 Hz
		73 Hz < fV ≤ 78 Hz
1152 x 864	870 < LINE ≤ 1031	
1280 x 960	960 < LINE ≤ 1027	
1280 x 1024	1027 < LINE	

7.3 User Control

7.3.1 Related ports and pin of I304

Port	Pin No.	I/O	Signal name	Function	Remarks
GPIO3	I304, 26	I	MENU	EXIT/ENTER switch input	
GPIO7	I304, 32	I	MINUS	◀ switch input	Auto-Adj.
GPIO6	I304, 29	I	PLUS	▶ switch input	
GPIO21	I304, 16	I	POWER	soft power switch input	

7.3.2 Functions

Control is effected for the push-switches to be used when the user changes the parameters, in order to modify the respective setting values. Whether the switch has been pressed is identified with the switch input level that is turned “L”.

Each switch input port is pulled up at outside of ASIC

Each parameter is stored in the EEPROM, the contents of which are updated as required.

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7.4 Control of definition converter LSI

7.4.1 Functions

Major function of I304 are as follows:

(1) Expansion of the display screen.

(2) Timing control for various signal types.

(3) Power-supply sequence (LCD panel).

7.5 I^2C bus control

7.5.1 I^2C-controlled functions

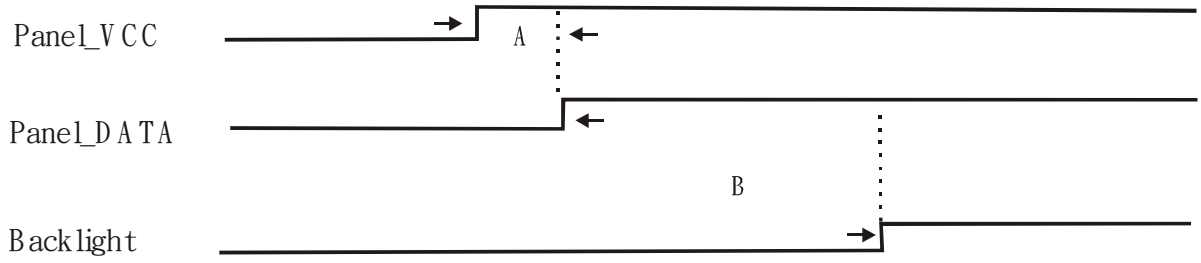
The following functional controls are effected by I^2C.

(1) Control of EEPROM I307 for parameter setting.

(2) Control of audio preamplifier.

7.6 Power ON sequence

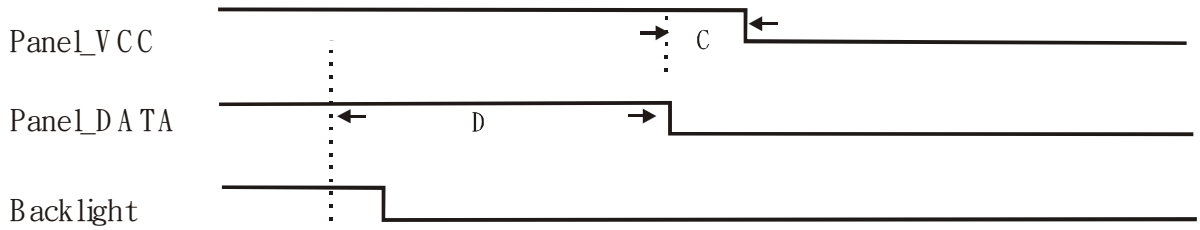
When the POWER switch is pressed, the POWER signal is turned “L”. When this “L” potential is detected, the CPU begins to establish the respective power supplies according to the sequence shown below.



	A	B
Panel-AU	0 ms min	250 ms min
Panel-HD	20~50 ms	500 ms min
Panel-LG	0.01~50 ms	200 ms min

7.7 Power OFF sequence

When the POWER switch is pressed while the power supply is ON, the POWER signal is turned “L”. When this “L” potential is detected, the CPU begins to turn off the respective power supplies according to the sequence shown below.



	C	D
Panel-AU	0 ms min	0 ms min
Panel-HD	0~50 ms	100 ms min
Panel-LG	0.01~50 ms	200 ms min

7.8 List of GPIO Pin Assignments of the I304

Port	Pin No.	Signal Name	Initial Setting	Function	Remark
GPIO1	24	MUTE	H	Audio Mute Enable	
GPIO21	16	KEY_POWER	H	ON/OFF Monitor Power	
GPIO4	27	UART_DI	H	UART interface data IN	
GPIO5	28	UART_DO	H	UART interface data OUT	
GPIO13	37	NVRAM_SCL	H	NVRAM_SCL	
GPIO12	36	NVRAM_SDA	H	NVRAM_SDA	
GPIO9	33	LED_AMBER	L	LED_AMBER Enable	
GPIO10	34	LED_GRN	H	LED_GRN Enable	
GPIO7	32	KEY_MINUS	H	KEY_LEFT Enable	
GPIO0	23	BKLT-ADJ	-	Backlight Brightness Control	
GPIO11	35	WRn	-	Flash Rom Write Enable	
GPIO18	12	A16	-	Address Input	
GPIO19	11	A17	-	Address Input	
GPIO26	29	KEY_PLUS	H	KEY_RIGHT	
PBIAS	41	BKLT_EN	H	Backlight_Enable	
PPWR	40	PANEL_EN	H	Panel_Vcc Enable	

8. Power Board Operation Therory

8.1 Line filter consists of C801, T801, C802, C803, C804, C837, C838. It eliminates high frequency interference to meet EMI's requirement.

8.2 Rec & Filter

Bridge diode D801 converts AC source into pulsed DC. This pulsed DC is smoothed and filtered by C805. R802 is an NTC (negative thermal coefficient) resistor, used to reduce inrush current to be within safe range.

8.3 Power transformer :

T802 converts energy for square wave from power source C805 to secondary side to generate +12V and +22.5V.

8.4 Output :

The square wave from T802 is rectified by D809, D810, then filtered by C817, C822 to generate +22.5V and +12V respectively.

8.5 Driver :

Q803 drive T802 from PWM control of I801 for power converted.

8.6 FB :

Negative feedback CKT consists of photo coupler I802 and adjustable regulator I803. It can maintain output voltages +22.5V and +12V at a stable level.

8.7 PWM :

8.7.1 Start : When power is turned on. C807 is charged a 15 volt and a starting current above 40uA to pin 7 of I801. I801 starts to oscillate and outputs a pulse train through pin 6 to drive Q803.

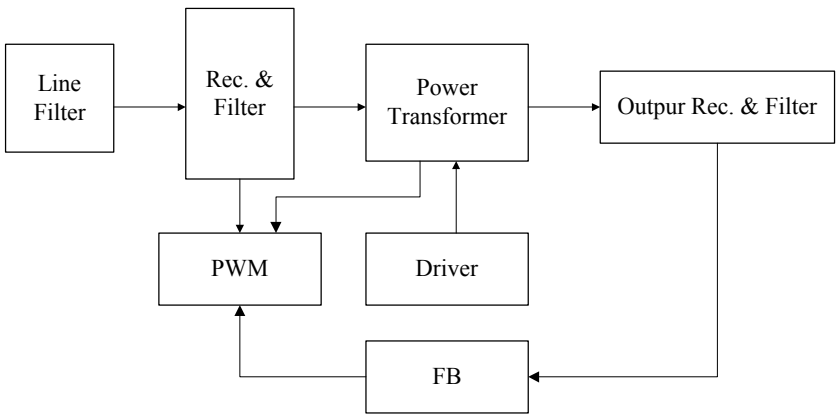
8.7.2 OPP : When Q803 turns on, C805 supplies a linearly increasing triangle current through the primary inductance of T802 to the driver Q803, once the peak value of this current multiplied by R811 exceeds1 volt, pulse train will be turn off immediately to protect Q803, T802 from being burned out.

8.7.3 Regulation : If output voltage +22.5V goes up, the R terminal of I803 gets more bias, accordingly photo transistor and photo diode flows more current. The voltage of pin 2 goes up too, making the pulse width of pin 6 to become narrower. So the output voltage +22.5V will be pulled down to a stable value.

8.7.4 OVP : If +22.5V goes up too much, the induced voltage on pin 4 of T802 becomes large also. Suppose that it is over 18 volts, ZD801 conducts, pin 3 of I801 is pulled up over 1 volt. The pulse train at pin 6 goes down to zero, shutting Q803 off immediately.

8.7.5 SCP : If output terminal is short to ground, photo transistor does not conduct, hence Q806 does not conduct either. Then oscillation of I801 is stop, shutting Q803 off immediately.

HPD-K17AA Power Board Block Diagram



9. Inverter Circuit

This unit operates on an output voltage of 15V from power source.

9.1 Regulator: Q101 get a +5VDC for I101 power supply.

9.2 UVP: Q106 turns off when the Vin is under 10V. Then pin 3 of I101 is pulled low and inverter off immediately. That is the under voltage protection.

9.3 Control IC: I101 (OZ960S)

9.3.1 Enable : When pin 3 of I101 is over 1.5V, I101 works. If it is under 1.5V, I101 turns off.

9.3.2 OSC: When I101 enabled, R108/C115 (pin 17/pin18 of I101) determine the operating frequency.

9.3.3 SST: C104 (pin 4 of I101) provides soft start function.

9.3.4 Ignition: R109 (pin 8 of I101) provides higher operating frequency for more striking voltage until regulation of feedback of lamp current. C103 (pin 1 of I101) determine the striking time.

9.3.5 Dimming control: The divided voltage of R106/R105/R104 control the duty pulse of burst-mode to drive Q105 and perform a wide dimming control for the CCFL. The burst-mode frequency is determined by C116.

9.3.6 Regulation: Pin 9/pin 10 of I101 provide regulation of the CCFL current from feedback. The non-inverting reference (pin 10 of I101) is at 1.25V nominal.

9.3.7 Protection: Open-lamp protection in the ignition period is provided through both pin1 and pin 2 of I101. Removal of the CCFL during normal operation will trigger Q107 to turns on and shuts off the inverter. This is latch function.

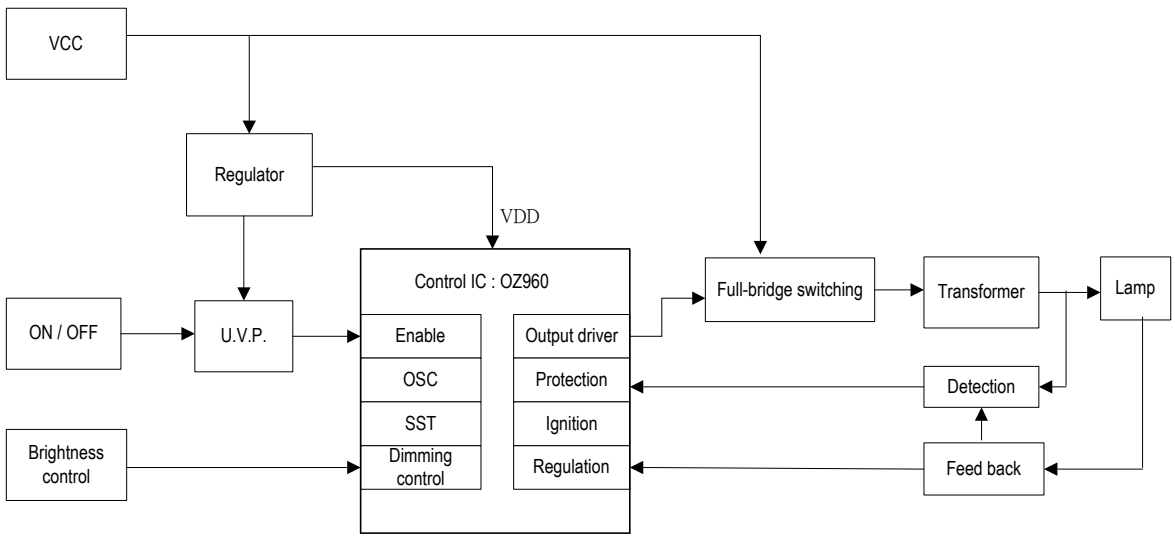
9.3.8 Output drivers: The configuration prevents any shoot-through issue associated with bridge-type power conversion applications. Adjusting the overlap conduction between I102 P-MOSFET and I103 N-MOSFET, I102 N-MOSFET and I103 P-MOSFET, the CCFL current regulation is achieved, same as I104 and I105.

9.4 Full-bridge swit ching/Transformer: I102/I103/C123/I104/I105/C137/T101/T102 compose full-bridge swit ching to convert DC into AC for driver the CCFL.

9.5 Detection: C128/C129/C130/C131/C132/C133 detect the output voltage and ensure a rated voltage by pin2 of I101/ Q108/Q109 ensure not a open-lamp.

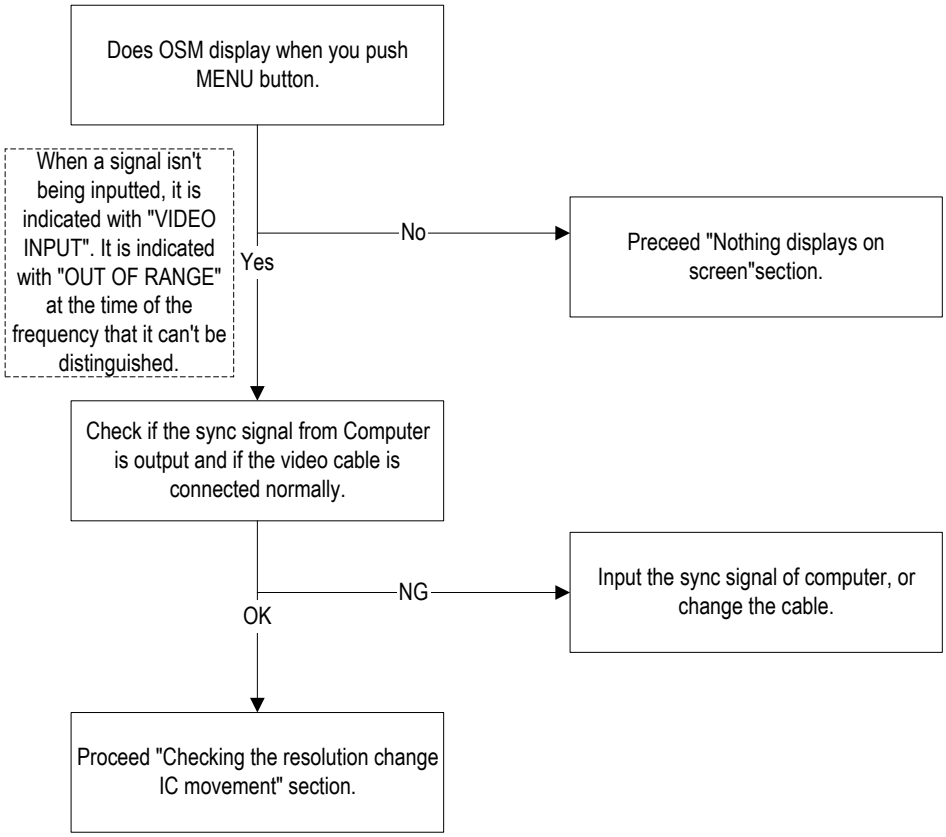
9.6 Feedback: D116/D117/D122/D123/D109/R120/R121/D108 sense the lamp current for negative feedback and regulation.

Inverter Board Block Diagram

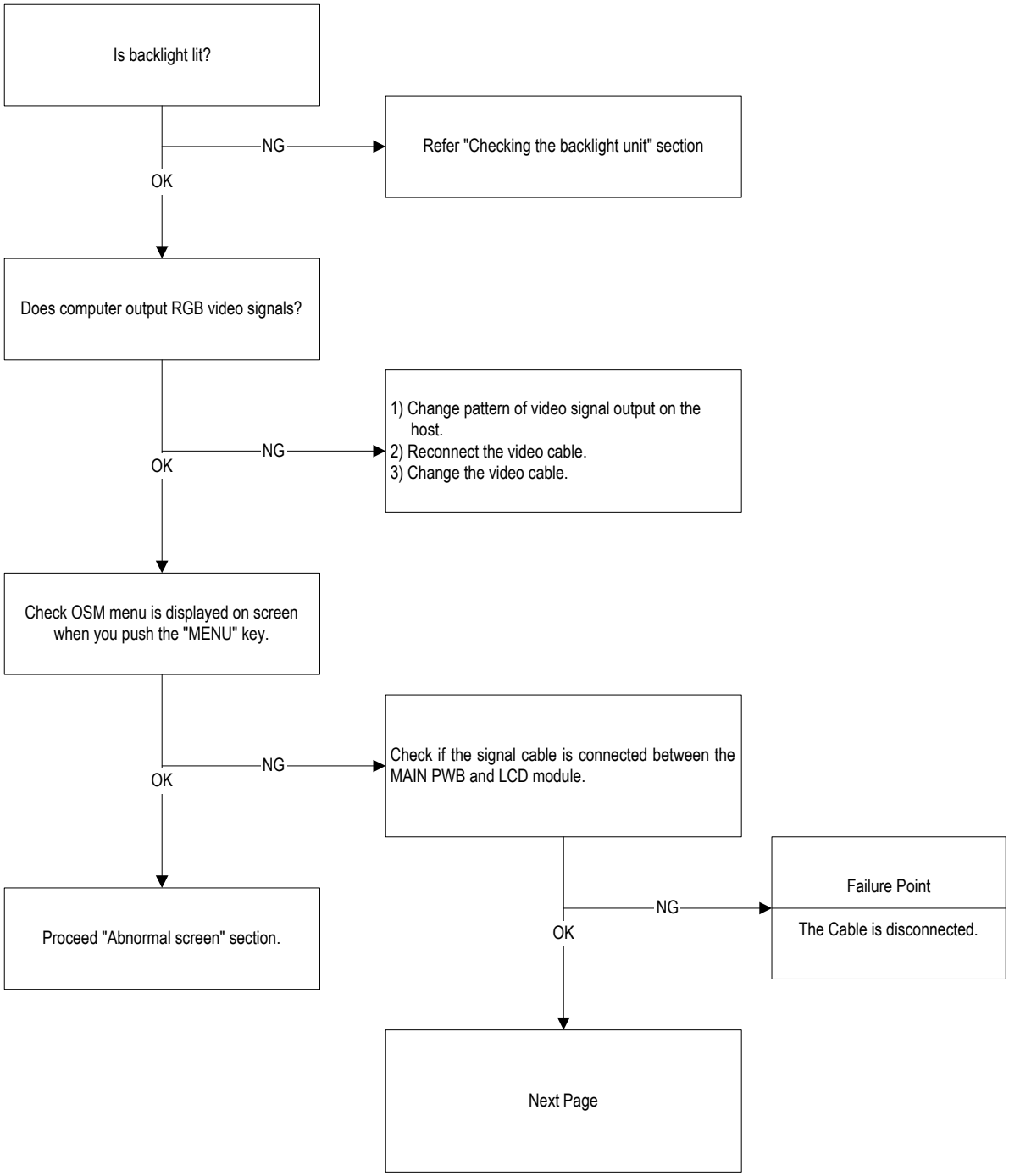


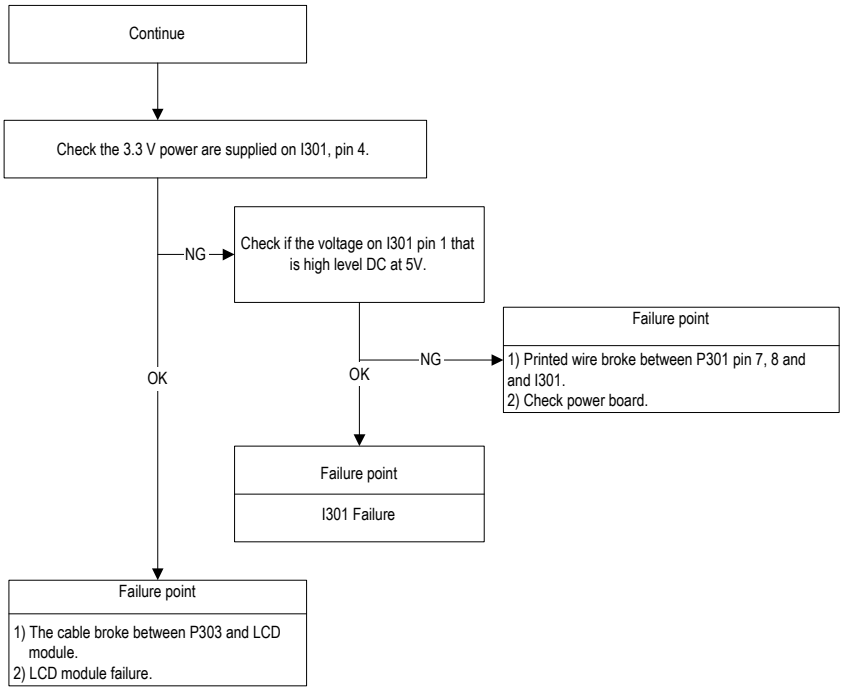
2) Trouble Shooting

1. No display of screen (Screen is black, color of LED is amber)

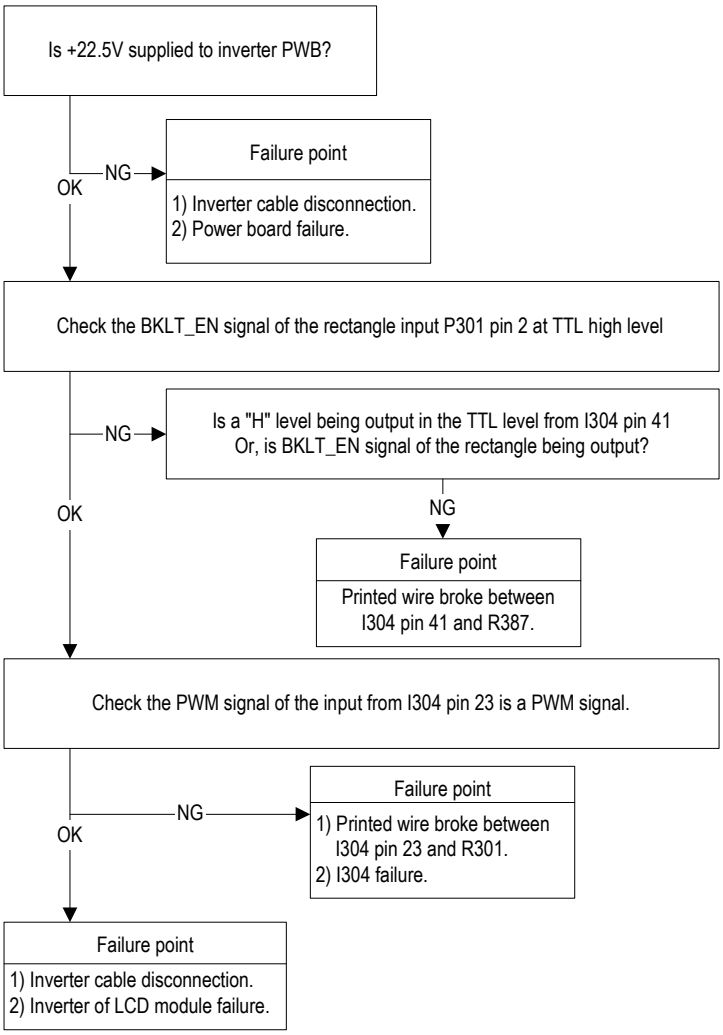


2. Nothing displays on screen (Screen is black, color of LED is green)

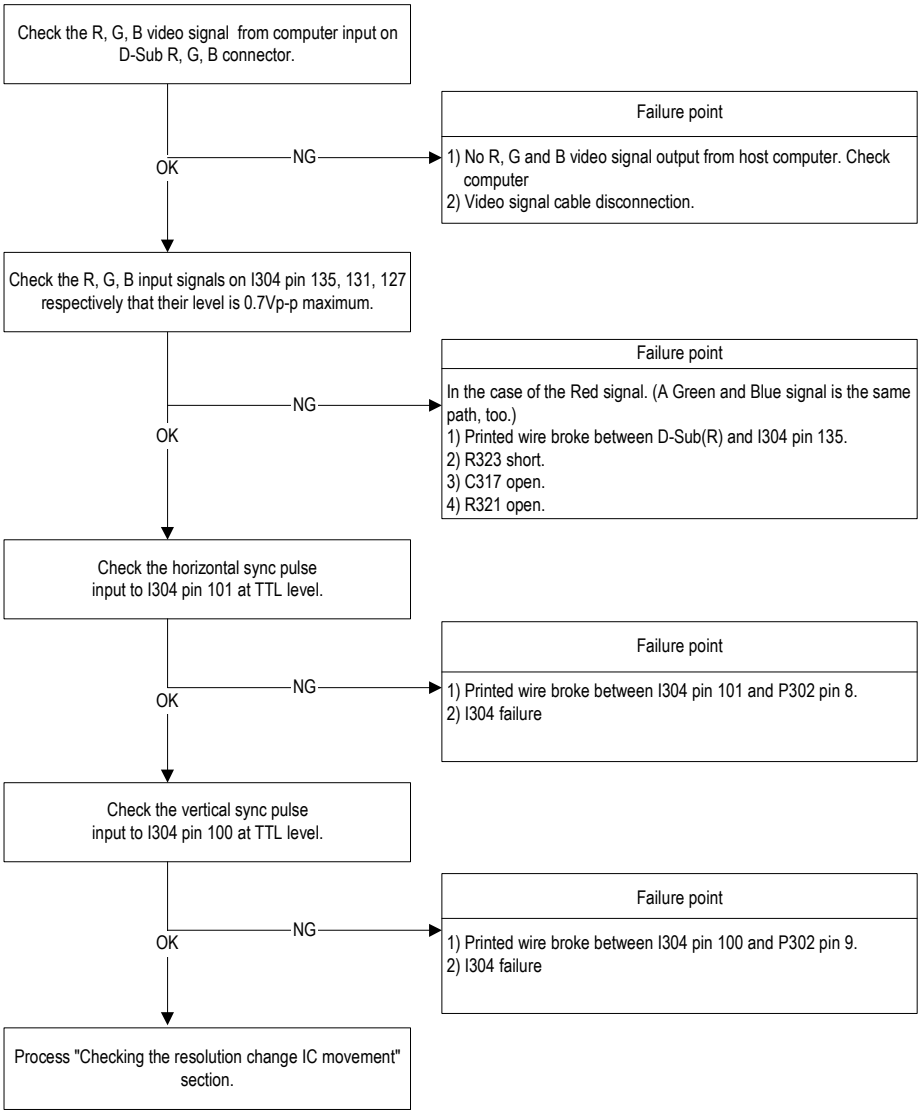



Continue
Check the 3.3 V power are supplied on I301, pin 4.
NG
Check if the voltage on I301 pin 1 that is high level DC at 5V.
NG
Failure point
1) Printed wire broke between P301 pin 7, 8 and and I301.
2) Check power board.
OK
OK
Failure point
I301 Failure
OK
Failure point
1) The cable broke between P303 and LCD module.
2) LCD module failure.

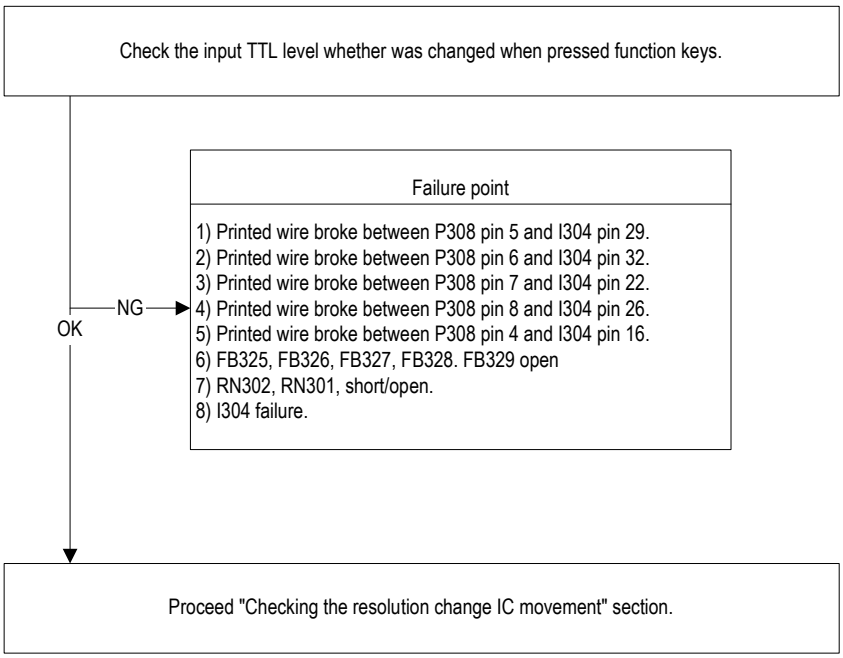
3. Checking the back light unit



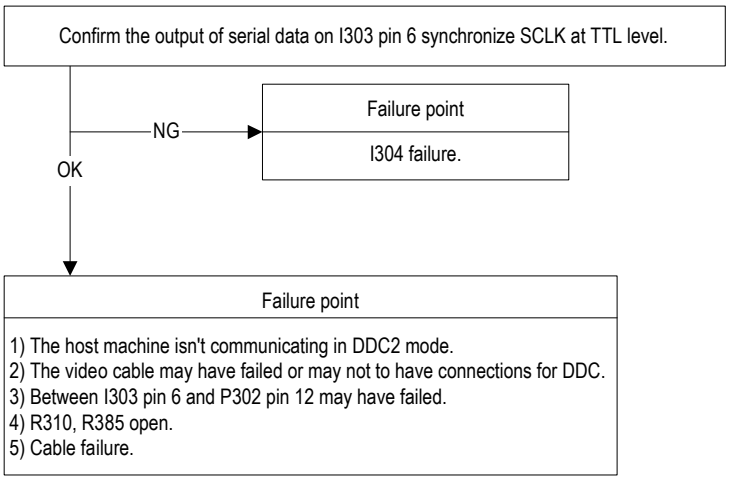
4. Abnormal screen



5. No OSM display

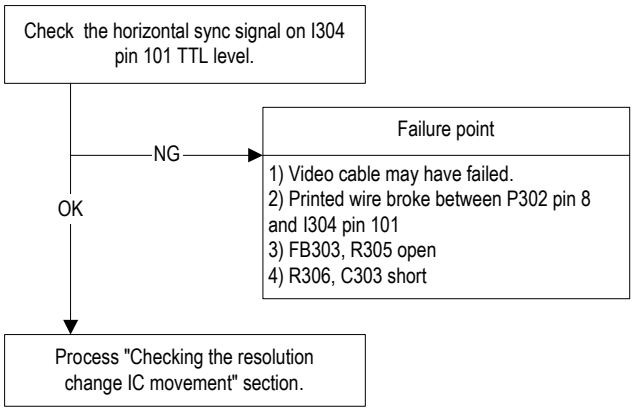


6. Abnormal plug and play operation

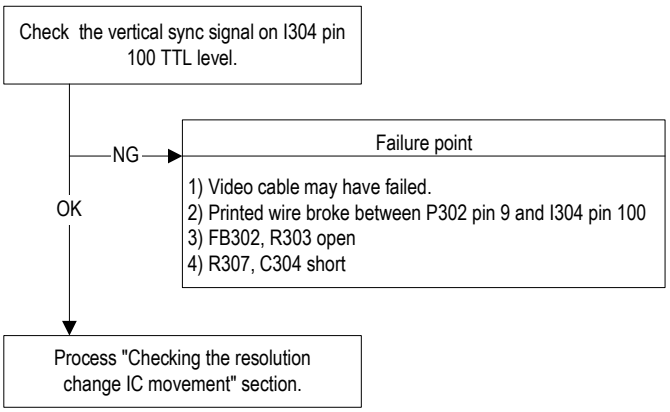


7. Checking the interface circuit of sync signal

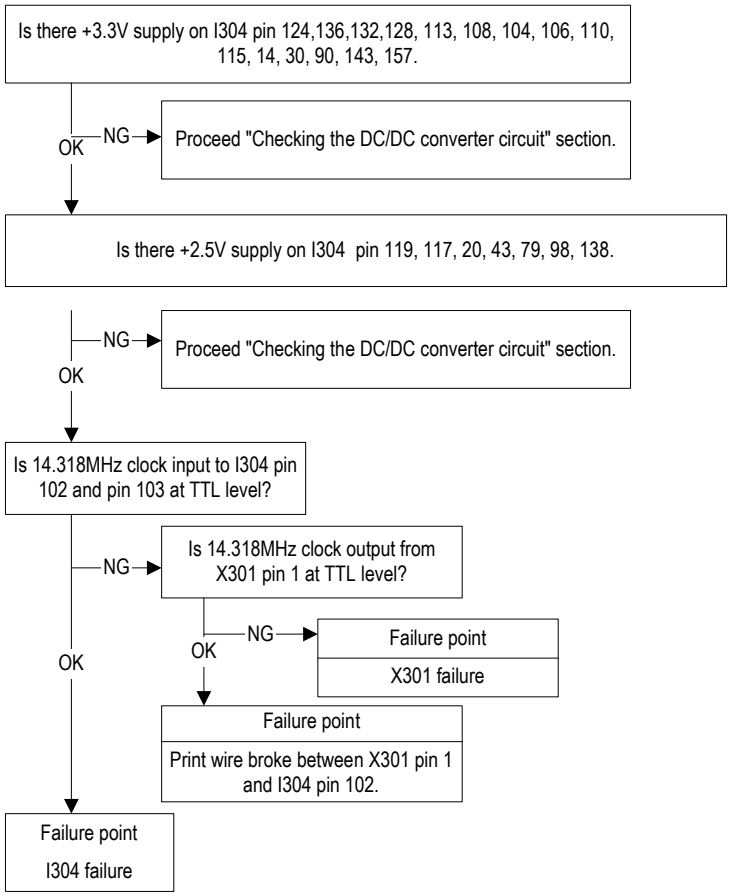
7.1 Checking the control circuit of horizontal sync pulse



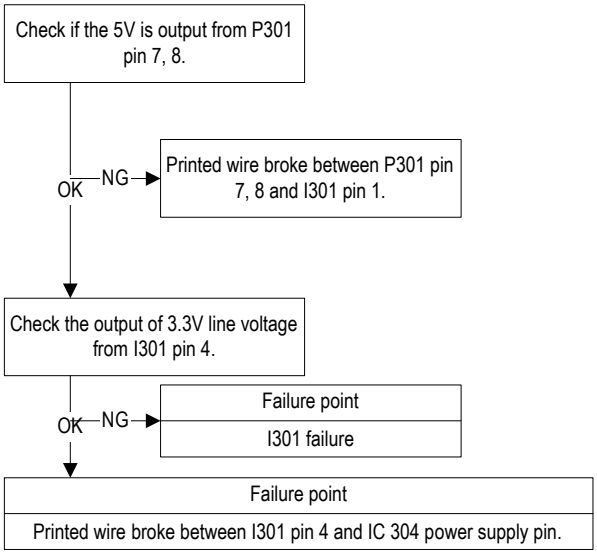
7.2 Checking the control circuit of vertical sync pulse



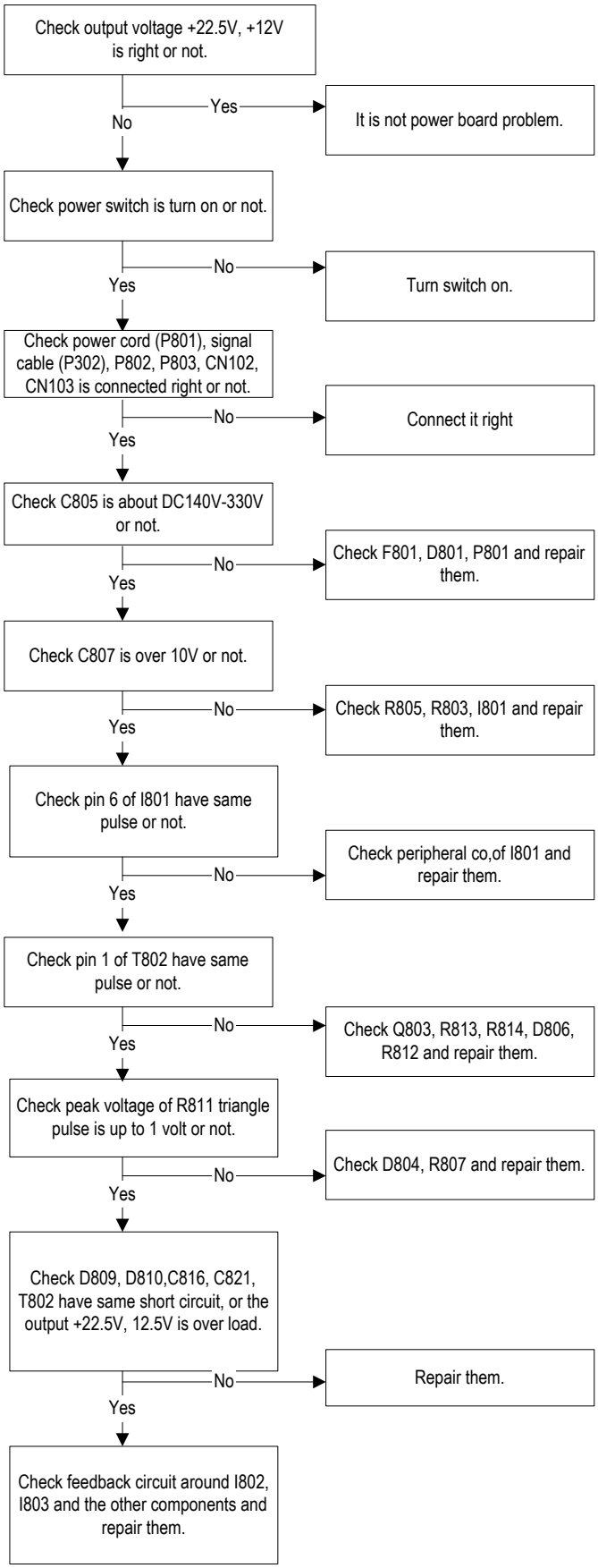
8. Checking the resolution change IC movement



9. Checking the DC/DC converter circuit



10. Power Board



1. Recommended Parts List

Note: 1. The components identified by " ⚠ " mark are critical for X-ray safety. Replace these with only the same parts specified.

2. The components identified by " * " mark are critical parts.

3. There is only OTP IC at the model beginning (FPR stage or before). When it put in mass production and there must be Mask coming out. Please checkyou have spart parts need, please check BOM to get the last release part number and related information.

	No.	Location	Part Number	Description
⚠	1 *	V170	6814700100 6841700900 6814701300	Panel-AU-M170EN05 Panel-HD-HT12E12-200 Panel-LG-LM170E01-A5K2
	2	I307	6448016508	IC 24LC16B/SN 8P SOP
	3	I303	6448018208	IC 24LC02B 8PIN SOP MICROCHIP
⚠	4 *	I309	6442015400	IC-LINEAR TDA1517/N3-9PIN SIL9MPF-PHILIPS
	5	I308	6444010438	IC CMOS SST395SF020A-70-4C-NH-32PIN
⚠	6 *	I304	6444012806	IC CMOS GM2121 208PIN
	7	I301	6442033908	IC LINEAR FAN1537PA 5PIN
	8	X301	6449006400	X'TAL 14.318MHZ AT-49
	9	I801	6442032800 6442022030	IC 0Z960 IC SG3842
	10	T101 T102	6131020600	XFMER TPW-1097
	11	L802	6111156136	COIL CHOKE 15uH
	12	I804	6442035900	IC MP1410EP
	13	I102~I105	6444011300	IC CMOS-A09600

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