



Internal Use Only

website:<http://biz.LGservice.com>

LCD TV

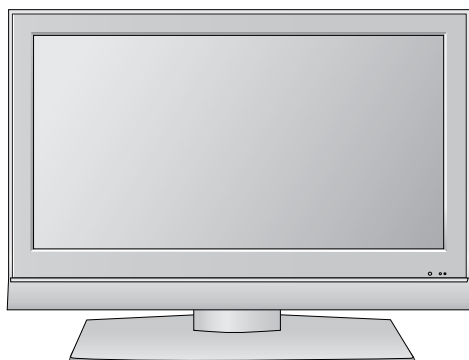
SERVICE MANUAL

CHASSIS : LD73B

MODEL : 22LS4D 22LS4D-ZB

CAUTION

BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



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SAFETY PRECAUTIONS

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by $\triangle$ in the Schematic Diagram and Replacement Parts List.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An **isolation Transformer should always be used** during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1W), keep the resistor 10mm away from PCB.

Keep wires away from high voltage or high temperature parts.

Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between $1M\Omega$ and $5.2M\Omega$.

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

Do not use a line Isolation Transformer during this check.

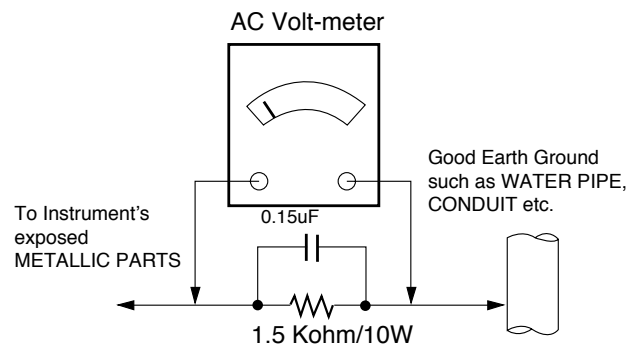
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

Leakage Current Hot Check circuit



SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
 - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
 - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
 - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.

CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
CAUTION: This is a flammable mixture.
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.
Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.

CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called *Electrostatically Sensitive (ES) Devices*. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the

unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500°F to 600°F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
 - a. Allow the soldering iron tip to reach normal temperature. (500°F to 600°F)
 - b. Heat the component lead until the solder melts.
 - c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
 - a. Allow the soldering iron tip to reach a normal temperature (500°F to 600°F)
 - b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
 - c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
CAUTION: Work quickly to avoid overheating the circuit board printed foil.
 - d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

IC Remove/Replacement

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush.
(It is not necessary to reapply acrylic coating to the areas).

"Small-Signal" Discrete Transistor

Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

Power Output, Transistor Device

Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

Fuse and Conventional Resistor

Removal/Replacement

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.

CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

At IC Connections

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife.
Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.
Carefully crimp and solder the connections.

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

1. General Specification(TV)

No	Item	Specification	Remark
1.	Video input applicable system	PAL-D/K, B/G, I, SECAM	
2.	Receivable Broadcasting System	1) PAL/SECAM BG 2) PAL/SECAM DK 3) SECAM L/L' 4) DVB-T	EU(PAL Market)
3.	RF Input Channel	VHF : E2 ~ E12 UHF : E21 ~ E69 CATV : S1 ~ S20 HYPER : S21~ S47	PAL
4.	Input Voltage	100-240V~ / 50Hz, 60Hz	
5.	Market	EU	
6.	Picture Size	22 inch	
7.	Tuning System	FVS 100 program	PAL, 200 PR.(Option)
8.	Operating Environment	1) Temp : 0 ~ 40 deg 2) Humidity : 10~90 %	
9.	Storage Environment	3) Temp : -20 ~ 50 deg 4) Humidity : 10~90 %	
10.	Display	LCD Module	LPL

2. General Specification(LCD Module)

No	Item	Specification		Remark
1	Panel	22" TFT WSXGA LCD		
2	Frequency range	H : 51.495 ~ 81.522 kHz V : 48 ~ 77Hz		
3	Power consumption	29.25 W		
4	LCD Module- LPL	Type Size	493.7 x 320.1 x 16.5 (mm)	(H)x(V)x(D)
		Pixel Pitch	0.282 x 0.282 (mm)	
		Pixel Format	1680 horiz. By 1050 vert. Pixels RGB strip arrangement	
		Coating	Hard coating (3H), Anti-glare (Haze 25%) treatment of the front polarizer,	
		Back Light	4 CCFL	

3. Optical Feature

No	Item	Specification		Min.	Typ.	Max.	Remark
1	Viewing Angle [CR>10]	R/L, U/D		140, 130			
2	Luminance	Luminance(cd/m ²)		190	250		
		Variation		75%			Min/Max
3	Contrast Ratio	CR		400	700		All White/All Black
4	CIE Color Coordinates	White	Wx	Typ -0.03	0.313	Typ +0.03	
			Wy		0.329		
		Red	Xr		0.635		
			Yr		0.342		
		Green	Xg		0.292		
			Yg		0.611		
		Blue	Xb		0.147		
			Yb		0.070		

4. Component Video Input (Y, P_B, P_R)

No	Specification				Proposed
	Resolution	H-freq(kHz)	V-freq(Hz)		
1.	720X480	15.73	60.00	SDTV, DVD 480i	
2.	720X480	15.63	59.94	SDTV, DVD 480i	
3.	720X480	31.47	59.94	480p	
4.	720X480	31.50	60.00	480p	
5.	720X576	15.625	50.00	SDTV, DVD 625 Line	
6.	720X576	31.25	50.00	HDTV 576p	
7.	1280X720	45.00	50.00	HDTV 720p	
8.	1280X720	44.96	59.94	HDTV 720p	
9.	1280X720	45.00	60.00	HDTV 720p	
10.	1920X1080	31.25	50.00	HDTV 1080i	
11.	1920X1080	33.75	60.00	HDTV 1080i	
12.	1920X1080	33.72	59.94	HDTV 1080i	
13.	1920X1080	67.50	60.00	HDTV 1080p	

6. RGB PC INPUT Mode Table

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1.	720X400	31.468	70.08	28.321	
2.	640X480	31.469 37.684	59.94 75.00	25.17 31.50	VESA
3.	800X600	37.879 46.875	60.31 75.00	40.00 49.50	VESA
4.	832X624	49.725	74.55	57.283	Macintosh
5.	1024X768	48.363 56.470 60.123	60.00 70.00 75.029	65.00 75.00 78.75	VESA(XGA)
6.	1280X768	47.693	59.99	80.125	VESA(WXGA)
7.	1360X768	47.649	59.94	84.625	VESA(WXGA)
8.	1366X768	47.649	59.94	84.625	Supported
9.	1280X1024	63.981	60.020	108.00	VESA(SXGA)
10	1440X900	55.469	59.901	88.750	CVT Red. Blanking
11.	1440X900	55.935	59.887	106.5	CVT
12.	1400X1050	64.744	59.948	101.00	CVT Red. Blanking
13.	1400X1050	65.317	59.978	121.750	CVT
14.	1680X1050	64.674	59.883	119.00	CVT Red. Blanking
15.	1680X1050	65.290	59.954	146.25	CVT
16.	1920X1080	66.647	59.988	138.625	WUXGA

7. HDMI DTV Table

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Remark	Proposed
1.	720X480	31.47	59.94	27.00	SDTV 480p 60Hz(4:3)	
2.	720X480	31.50	60	27.027	SDTV 480p 60Hz(4:3)	
3.	640X480	31.50	59.94	25.175	SDTV 480p 60Hz(4:3)	
4.	640X480	31.50	60	25.20	SDTV 480p 60Hz(4:3)	
5.	720X480	31.47	59.94	27.00	SDTV 480p 60Hz(16:9)	
6.	720X480	31.47	60	27.027	SDTV 480p 60Hz(16:9)	
7.	720X576	31.25	50.00	27.000	SDTV 576p 50Hz	
8.	1280X720	45.00	50.00	74.176	HDTV 720p 50Hz	HDCP
9.	1280X720	44.96	59.94	74.176	HDTV 720p 60Hz	HDCP
10.	1280X720	44.96	60	74.250	HDTV 720p 60Hz	HDCP
11.	1920X1080	28.13	50.00	74.250	HDTV 1080i 50Hz	HDCP
12.	1920X1080	33.72	59.94	74.176	HDTV 1080i 60Hz	HDCP
13.	1920X1080	33.75	60	74.250	HDTV 1080i 60Hz	HDCP
14.	1920X1080	27	24	74.250	HDTV 1080P 24Hz	HDCP
15.	1920X1080	56.25	50.00	148.500	HDTV 1080P 50Hz	HDCP
16.	1920X1080	67.43	59.94	148.352	HDTV 1080P 60Hz	HDCP
17.	1920X1080	67.50	60	148.500	HDTV 1080P 60Hz	HDCP

8. HDMI PC Table

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed
1.	720X400	31.468	70.08	28.321	
2.	640X480	31.469 37.500	59.94 75.00	25.17 31.50	VESA
3.	800X600	37.879 46.875	60.31 75.00	40.00 49.50	VESA
4.	832X624	49.725	74.55	57.283	
5.	1024X768	48.363 56.476 60.023	60.00 70.00 75.03	65.00 75.00 78.75	VESA(XGA)
6.	1280X768	47.693	59.99	80.125	VESA(WXGA)
7.	1360X768	47.649	59.94	84.625	VESA(WXGA)
8.	1366X768	47.649	59.94	84.625	Supported
9.	1280X1024	63.981	60.020	108.00	VESA(SXGA)
10	1440X900	55.469	59.901	88.750	CVT Red. Blanking
11.	1440X900	55.935	59.887	106.5	CVT
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13.	1400X1050	65.317	59.978	121.750	CVT
14.	1680X1050	64.674	59.883	119.00	CVT Red. Blanking
15.	1680X1050	65.290	59.954	146.25	CVT
16.	1920X1080	66.647	59.988	138.625	WUXGA

ADJUSTMENT INSTRUCTION

1. Application Range

This spec. sheet is applied to all of the LD73B chassis manufactured at LG TV Plant all over the world.

2. Specification.

- 1) Because this is not a hot chassis, it is not necessary to use an isolation transformer.
However, the use of isolation transformer will help to protect test instruments
- 2) Adjustment must be done in the correct sequence.
- 3) The adjustment must be performed at 25±5°C temperature and 65±10% relative humidity if there is no specified designation.
- 4) The input voltage of the receiver must be kept between 100-220V~, 50/60Hz.
- 5) Before adjustment, execute Heat-Run for 30 minutes at RF no signal.

3. Channel Memory

3.1. Setting up the LGIDS

- 1) Press ADJ key in Adjust remote control.
- 2) Select "Channel Recover" by using ▲/▼ (CH+/-) key, and press ► (VOL+).
- 3) When Channel Recover is completed, set will be turned off and LED light go to stand-by mode.

4. EDID

* Caution

- 1) Use the proper signal cable for EDID Download
 - Analog EDID : Pin3 exists
 - Digital EDID : Pin3 exists
- 2) Never connect HDMI & D-sub Cable at the same time.
- 3) Use the proper cables below for EDID Writing.

For Analog EDID	For HDMI EDID	
D-sub to D-sub	DVI-D to HDMI or HDMI or HDMI	
		

4.1. EDID Data

Item	Condition	Data(Hex)
Manufacturer ID	GSM	1E6D
Version	Digital : 1	01
Revision	Digital : 3	03

4.2. Data

(1) ANALOG (128 bytes)

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	(a)		(b)			
0x01	(c)		01	03	08	2F	1E	78	0A	AE	C5	A2	57	4A	9C	25
0x02	12	50	54	A5	6E	00	81	80	95	00	D1	C0	01	01	01	01
0x03	01	01	01	01	01	01	7C	2E	90	A0	60	1A	1E	40	30	20
0x04	36	00	D9	28	11	00	00	1C	21	39	90	30	62	1A	27	40
0x05	68	B0	36	00	D9	28	11	00	00	1C	00	00	00	FD	00	38
0x06	4B	1C	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC
0x07	00	32	32	4C	53	34	44	2D	5A	42	0A	20	20	20	00	(e-2)

(2) HDMI 1 (256 bytes)=>

	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	00	FF	FF	FF	FF	FF	FF	00	1E	6D	(a)		(b)			
0x01	(c)		01	03	80	2F	1E	78	0A	AE	C5	A2	57	4A	9C	25
0x02	12	50	54	A5	6E	00	81	80	95	00	D1	C0	01	01	01	01
0x03	01	01	01	01	01	01	7C	2E	90	A0	60	1A	1E	40	30	20
0x04	36	00	D9	28	11	00	00	1C	21	39	90	30	62	1A	27	40
0x05	68	B0	36	00	D9	28	11	00	00	1C	00	00	00	FD	00	38
0x06	4B	1C	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC
0x07	00	32	32	4C	53	34	44	2D	5A	42	0A	20	20	20	01	(e-2)
0x08	02	03	21	F1	4E	81	02	03	15	12	13	04	14	05	20	21
0x09	22	1F	10	23	09	07	07	83	01	00	00	65	03	0C	00	10
0x0A	00	01	1D	00	80	51	D0	1C	20	40	80	35	00	BC	88	21
0x0B	00	00	1E	8C	0A	D0	8A	20	E0	2D	10	10	3E	96	00	13
0x0C	8E	21	00	00	18	02	3A	80	18	71	38	2D	40	58	2C	45
0x0D	00	06	44	21	00	00	1E	01	1D	80	18	71	1C	16	20	58
0x0E	2C	25	00	C4	8E	21	00	00	9E	4E	1F	00	80	51	00	1E
0x0F	30	40	80	37	00	BC	88	21	00	00	18	00	00	00	00	(f)

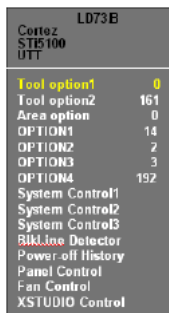
=> Detail EDID Options are below (a, b, c, d, e-1, e-2)

- (a) Product ID
- (b) Serial No: Controlled on production line.
- (c) Month, Year: Controlled on production line:
ex) Monthly : '09' -> '09'
Year : '2006' -> '10'
- (d) Model Name(Hex):
- (e-1, e-2, f) Checksum: Changeable by total EDID data.

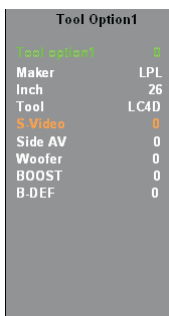
* Before AV ADC Calibration, should be executed the "Tool option 1"

5. Select method of Tool option 1

- 1) Press ADJ Key in the Adjust remote control.
- 2) Select "Tool option 1" by using ▲/▼ (CH+/-) key, and press ■(ENTER).



- 3) Select "Maker" by using ▲/▼ (CH+/-) key, and change the module maker and. applied module classification by using ◀/▶ (VOL+/-).
- 4) Select "Inch" by using ▲/▼ (CH+/-) key, and change the module according to the inch of model.
- 5) Select "Tool" by using ▲/▼ (CH+/-) key, and change the tool name according to the model.



(Inch of model : 26", 32", 37", 42", Applied module under the classification)

- 6) After changing Tool option 1, push the EXIT key.

6. ADC Calibration

ADC	RF/AV/S-VIDEO		Component	RGB-PC
MSPG925FS	PALJ		Model:215 (720P)	Model: 60
	INPUT SELECT	AV2	Pattern:65	(1024*768 60Hz)
	Model: 202 (PAL-BGDHI)		720P/50Hz	Pattern: 65
	Pattern: 65		7 Color Bar	
	PAL 7 Color Bar			

<Caution>

- System control RS-232 Host should be "PC" for adjustment.
- Before AV ADC Calibration, execute the "Module selection".

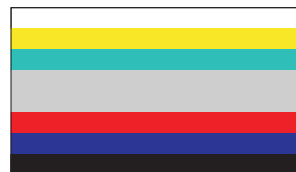
6.1. Adjustment of RF/AV/S-VIDEO

(1) Required Equipments

- Remote controller for adjustment
- MSPG-925FS Pattern Generator (Which has Video Signal: 7 Color Bar Pattern shown in Fig. 1)
=> Model: 202 / Pattern: 65

(2) Method of Auto RF/AV/S-VIDEO Color Balance.

- 1) Input the Video Signal : 7 Color Bar signal into AV1 or AV2.
- 2) Set the PSM to Dynamic mode in the Picture menu.
- 3) Press **IN-START** key on R/C for adjustment.
- 4) Press the ►(Vol.+) key to operate the set, then it becomes automatically.
- 5) Auto-RGB OK means the adjustment is completed.



<Fig. 1>

6.2. Adjustment of Component

(1) Required Equipments

- Remote controller for adjustment
- MSPG-925FS Pattern Generator (Which has 720p/50Hz YPbPr output Pattern shown in Fig.1)
=> Model:215/Pattern: 65

(2) Method of Auto Component Color Balance

- 1) Input the Component 720p/50Hz 7 Color Bar(MSPG-925FS model:215, pattern:65) signal into Component.
- 2) Set the PSM to Dynamic mode in the Picture menu
- 3) Press the IN-START key on R/C for adjustment.
- 4) Press the ►(Vol.+) key to operate the set , then it becomes automatically.
- 5) Auto-RGB OK means the adjustment is completed.

6.3 Adjustment of RGB

(1) Required Equipments

- Remote controller for adjustment
- MSPG-925F Pattern Generator (Which has XGA [1024*768] 60Hz 8 Color Bar 100% pattern shown in Fig.1)

(2) Method of Auto RGB Color Balance

- 1) Input the PC 1024x768@60Hz 100% Color Bar pattern (MSPG-925F model:37, pattern:33) into RGB.
(Using D-sub to D-sub cable)
- 2) Set the PSM to Dynamic mode in Picture menu.
- 3) Press the IN-START key on R/C for adjustment
- 4) Press the ►(Vol.+) key operate To set , then it becomes automatically.
- 5) Auto-RGB OK means adjustment is completed.

* Before White-balance, the AV ADC should be done.

7. White Balance

* Test Equipment

Color Analyzer (CA-210/CH.9)

-> When you adjust LCD color temperature, on Color analyzer (CA-210), you should use Channel 9 which is Matrix compensated (White, Red, Green, Blue revised) by CS-1000 and adjust in accordance with White balance adjustment coordinate which is specified on the next.

* Color temperature standards according to CSM and Module

Cool : 11,000k

Medium : 9,300k

Warm : 6,500k

* White balance adjustment coordinate and color temperature

Cool	CS-1000	CA-210(CH 9)
x	0.276	0.276±0.002
y	0.283	0.283±0.002
Δuv	0.000	0.000
Medium	CS-1000	CA-210(CH 9)
x	0.285	0.285±0.002
y	0.293	0.293±0.002
Δuv	0.000	0.000
Warm	CS-1000	CA-210(CH 9)
x	0.313	0.313±0.002
y	0.329	0.329±0.002
Δuv	0.004	0.004

- PC (for communication through RS-232C)

-> UART Baud rate : 115200 bps

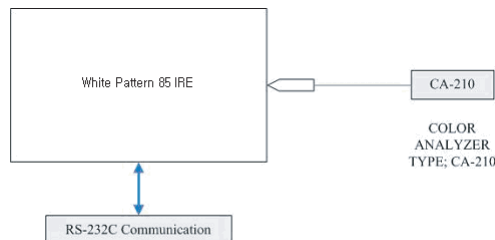
- Luminance Y AV : upper 100 cd/m² (Typ : 250 cd/m²)

-> Applying to Cool, Medium, Warm mode

* Connecting picture of the measuring instrument (On Automatic control)

Inside PATTERN is used when W/B is controlled. Connect to auto controller or push control R/C IN-START

-> Enter the mode of White-Balance, the pattern will come out.



<Fig. 2> Connecting picture (On Automatic Control)

* Auto adjustment Map (RS-232C)

Type	LD73B				
Baud Rate	Data bit		Stop bit		Parity
115200	8		1		None
Index	Cmd 1	Cmd 2	Data	Min Value	Max Value
R-Gain_Normal	j	a		00(00)	128(80)
G-Gain_Normal	j	b		00(00)	128(80)
B-Gain_Normal	j	c		00(00)	128(80)
R-Gain_Warm	j	d		00(00)	128(80)
G-Gain_Warm	j	e		00(00)	128(80)
B-Gain_Warm	j	f		00(00)	128(80)
R-Gain_Cool	j	g		00(00)	128(80)
G-Gain_Cool	j	h		00(00)	128(80)
B-Gain_Cool	j	i		00(00)	128(80)
R-Offset_Normal	l	j		00(00)	128(80)
G-Offset_Normal	l	k		00(00)	128(80)
B-Offset_Normal	l	l		00(00)	128(80)
R-Offset_Warm	l	m		00(00)	128(80)
G-Offset_Warm	l	n		00(00)	128(80)
B-Offset_Warm	l	o		00(00)	128(80)
R-Offset_Cool	l	p		00(00)	128(80)
G-Offset_Cool	l	q		00(00)	128(80)
B-Offset_Cool	l	r		00(00)	128(80)
Internal Pattern signal	w	b	00	Starting W/B ADJ	
Internal Pattern signal	w	b	10	Using internal Pattern	
Internal Pattern signal	w	b	ff	Ending W/B ADJ	

* Auto-control interface and directions

- 1) Adjust in the place where the influx of light like floodlight around is blocked. (illumination is less than 10ux).
- 2) Adhere closely the Color Analyzer (CA-210) to the module less than 10cm distance, keep it with the surface of the Module and Color Analyzer's Prove vertically.(80~100°).
- 3) Aging time
 - After aging start, keep the power on (no suspension of power supply) and heat-run over 15 minutes.
 - Using 'no signal' or 'full white pattern' or the others, check the back light on.

7.1. Auto white Balance

(Set:RS-232, Host:PC, Baud Rate:115200bps, Download:Cortez)

Inside pattern is used when balance is controlled.

Connect as below figure and click the start button on W/B execution program.

W/B is automatically processing Cool --> Medium --> Warm in order.

When W/B is completed, you can see 'OK' on PC monitor.

7.2. Manual white Balance

- One of R Gain / G Gain / B Gain should be kept on 80, and others are controlled lowering from 80
- 1) Press 'power on' of the control R/C, set heat run to white by pressing ►, and heat run over 15 minutes. (Set : RS-233 Host : PC, Baud Rate : 115200bps, Download : Cortez)
- 2) Zero Calibrate CA-210, and when controlling, stick the sensor to the center of LCD module surface.
- 3) Double click In-start key on Controlling R/C and get in 'white balance'.
- 4) Set test-pattern on and display inside pattern. Control is carried out on three color temperature, COOL, MEDIUM, WARM. (Control is carried out three times,)
- 5) When the R/G/B GAIN is 80 on OSD, it is the FULL DYNAMIC Range of the Module. In order to control white balance without the saturation of FULL DYNAMIC Range and DATA, one of R Gain / G Gain / B Gain should be kept on 80, and other two is controlled lowering from 80.

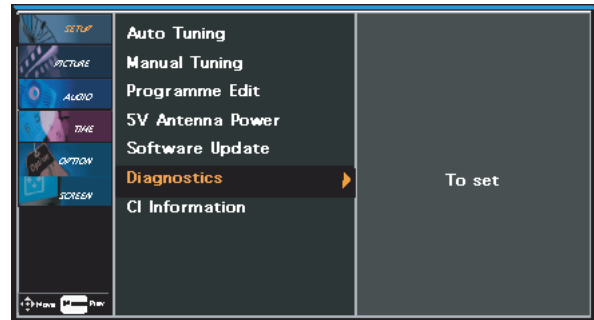
* Color Temperature: Cool, Medium, Warm

- 1) When R GAIN is set to 80
 - Control G GAIN and B GAIN by lowering from 80.
 - 2) When B GAIN is set to 80
 - Control R GAIN and G GAIN by lowering from 80.
 - 3) When G GAIN is set to 80
 - Control R GAIN and B GAIN by lowering from 80.
- One of R Gain / G Gain / B Gain should be kept on 80, and adjust other two lower than 80.

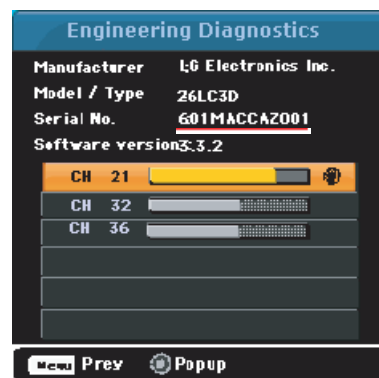
(When R/G/B GAIN are all 80, it is the FULL DYNAMIC Range of Module)

(2) Bar-code scanning

- 1) Push the menu button in DTV mode.
Select the STATION -> Diagnostics -> To set



- 2) Check the Serial Number.



8. Set information(Serial No & Model name)

- (1) Setting up like bottom figure (After setting white balance, this is set)
 - 1) Press ADJ Key in the Adjust remocon.
 - 2) Select "System Control 2" by using ▲/▼(CH+/-) key, and press ■(ENTER).
 - 3) Using Adjust remocon, RS-232 Host & Baud Rate & Download value change (RS-232 Host:Gprobe, Baud Rate:115200bps, Download:Cortez)

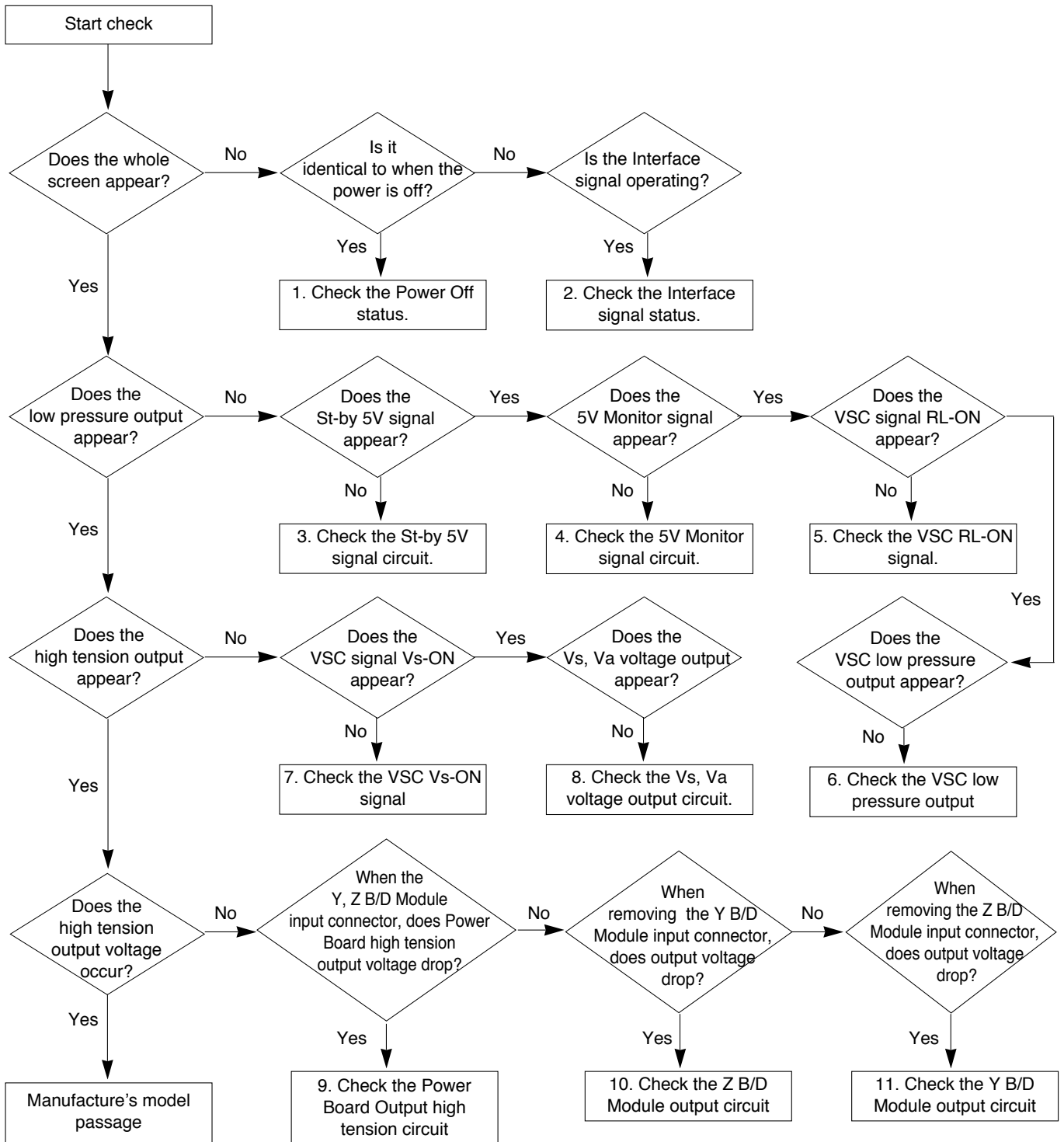
LD73B	
Cortez	1.00
Sti 5100	1.00
UTT	40 Hr.
Tool Option1	197
Tool Option2	97
Area Option	0
OPTION1	14
OPTION2	2
OPTION3	3
OPTION4	192
System Control1	
System Control2	
System Control3	
BlkLine Detector	
Power-off History	
Panel control	
Fan control	
XSTUDIO Control	

System Control2	
System	4-SYS
Spread on	On
RS-232 Host	Gprobe
Baud rate	115200bps
Download	Cortez
AGC-L	0 140
Audio Delay	0
DVI EQ	2
EQ Gain	OFF

TROUBLESHOOTING

1. Power Board

1-1. The full flowchart for the voltage output



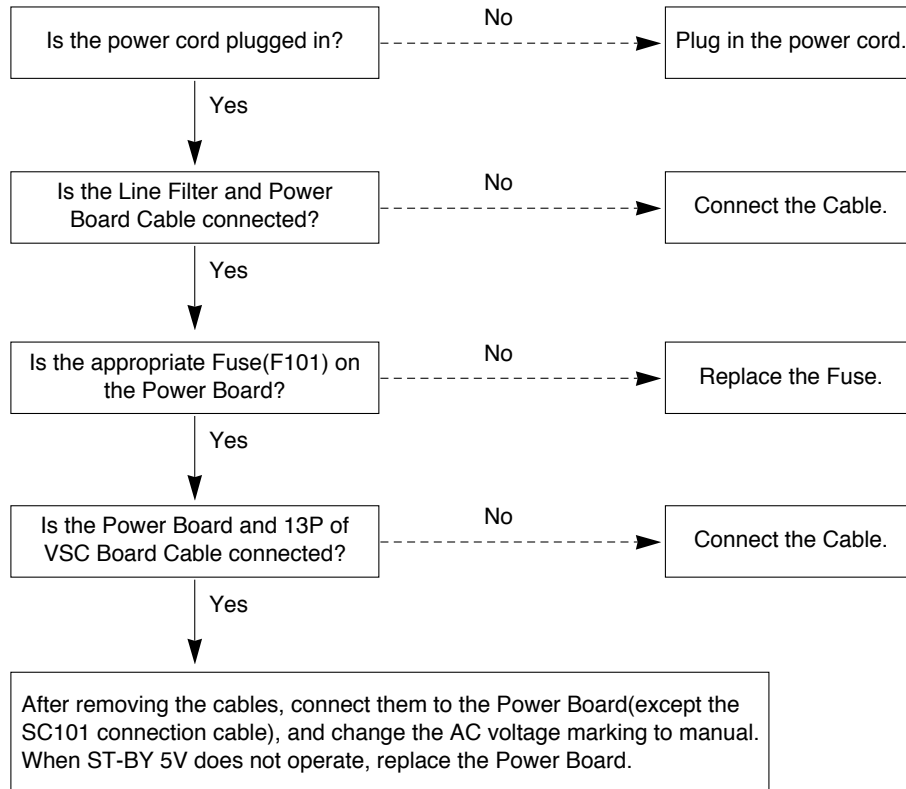
2. No Power

(1) Symptom

- 1) Does not minute discharge at module.
- 2) Non does not come into the front LED.



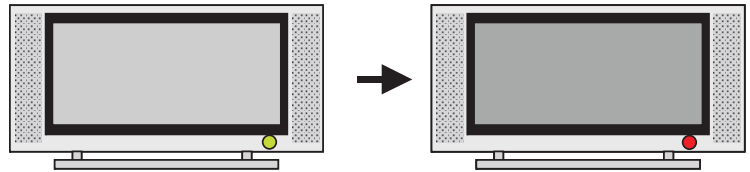
(2) Procedure check



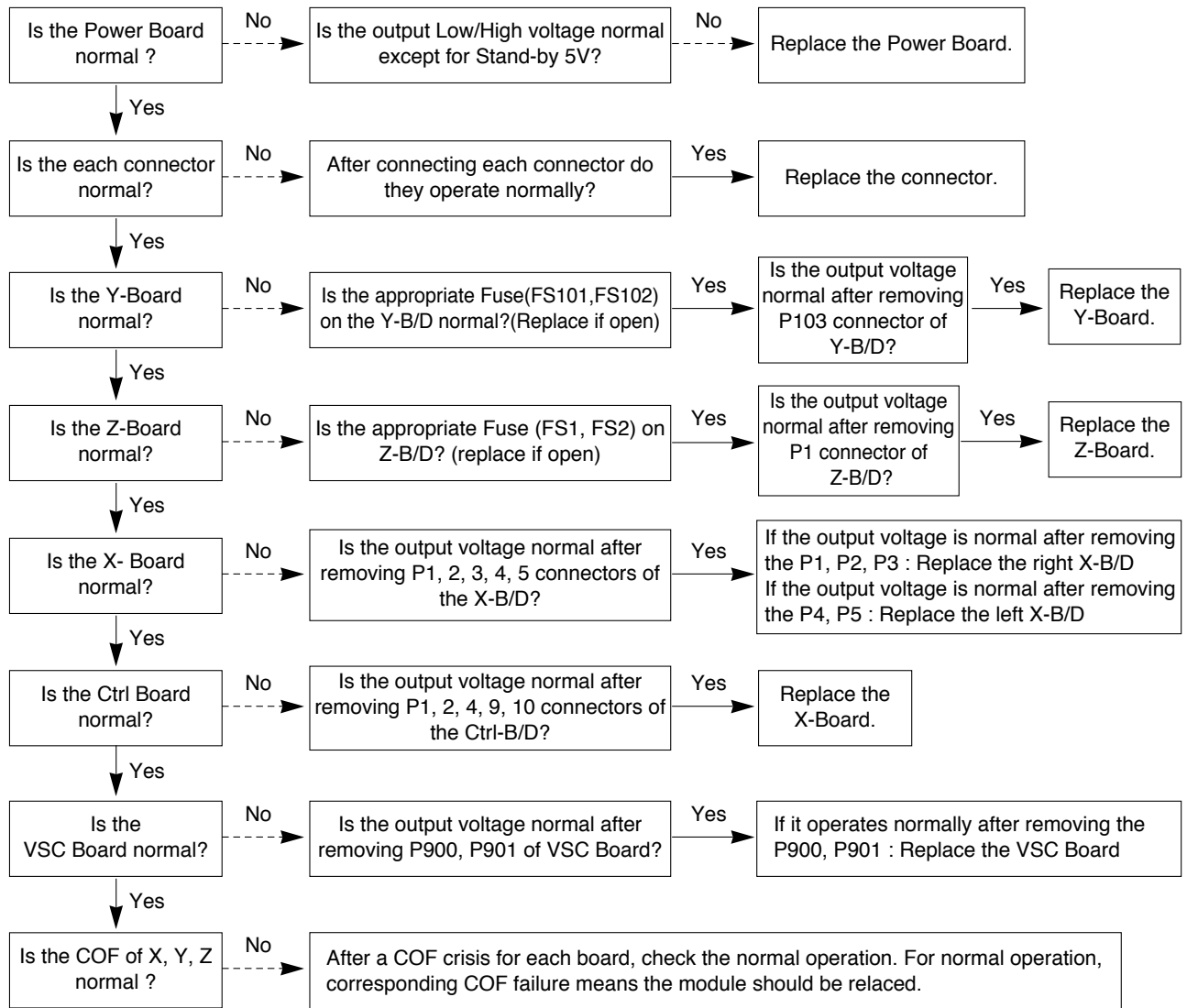
3. Protect Mode

(1) Symptom

- 1) After lighting up once, it does not discharge minutely from module.
- 2) The rely falls.(there is an audible "click")
- 3) The color of the front LED turns from green to red.



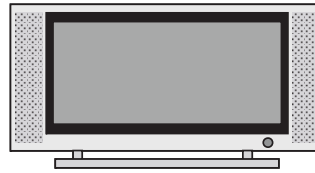
(2) Procedure check



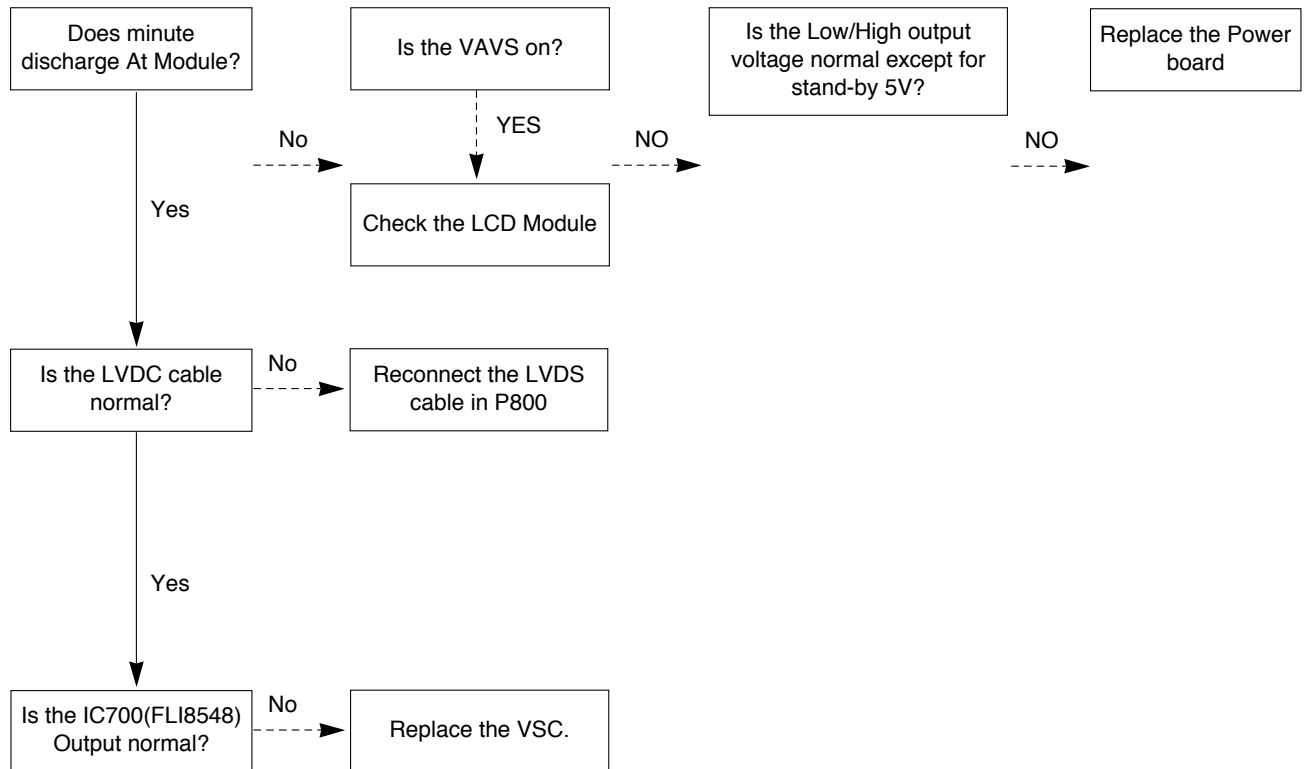
4. No Raster

(1) Symptom

- 1) No OSD and image occur at screen.
- 2) It maintains the condition where the front LED is green.



(2) Procedure check

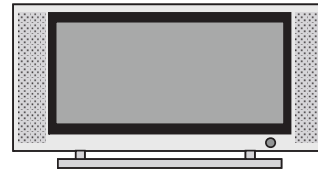


5. In case of strange screen display in specific modes

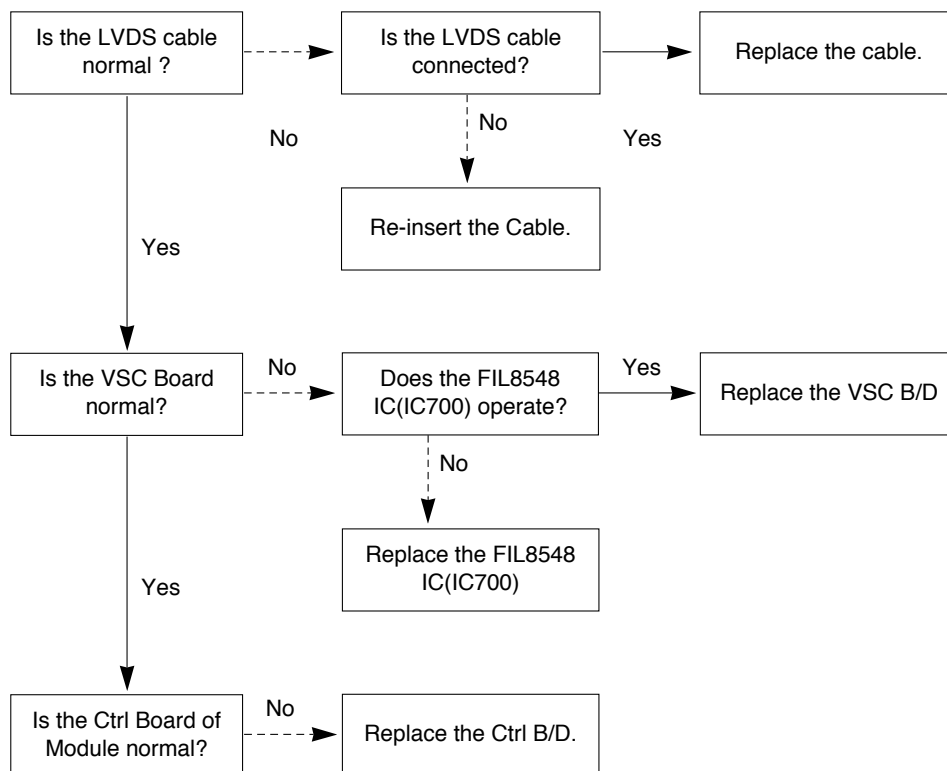
5-1. In case of no OSD display

(1) Symptom

- 1) LED is green.
- 2) The minute discharge is continuously accomplished from the module.



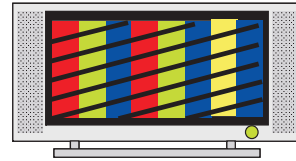
(2) Procedure check



5-2. In case there is no display on the screen in specific modes

(1) Symptom

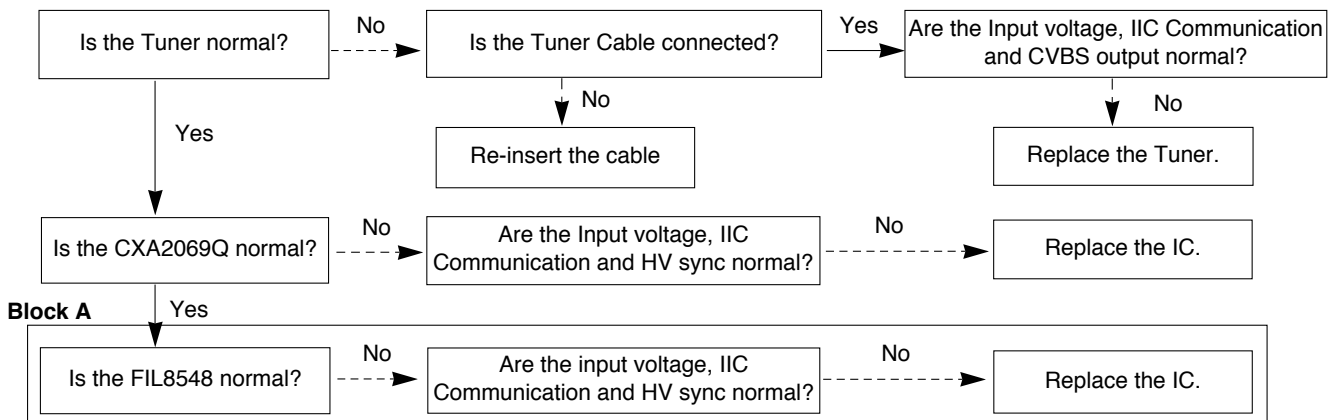
- 1) There is no screen display from a specific input mode (RF, AV, Component, RGB, DVI).



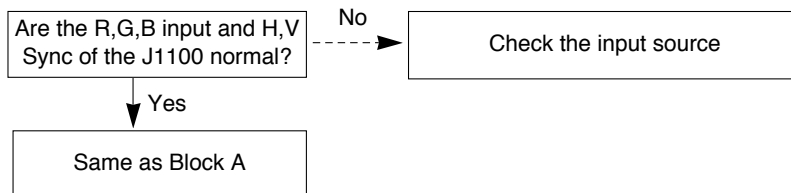
(2) Procedure check

- 1) Check the all input modes have normal display.
- 2) Check the video(main)/ data(sub), video(main)/ video(sub) have normal displays from the PIP mode or DW mode(re-check it/ swap).

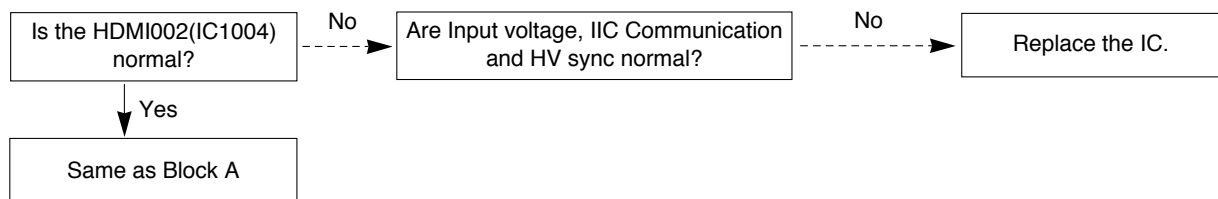
(3) In case of an unusual display in RF mode



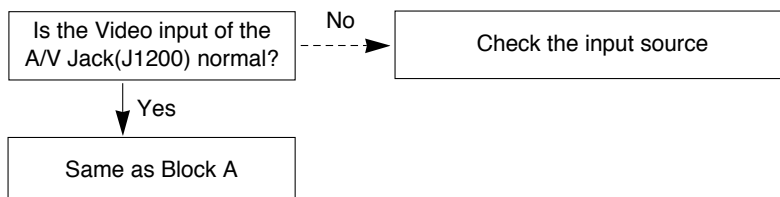
(4) In case of an unusual display in Component, RGB mode



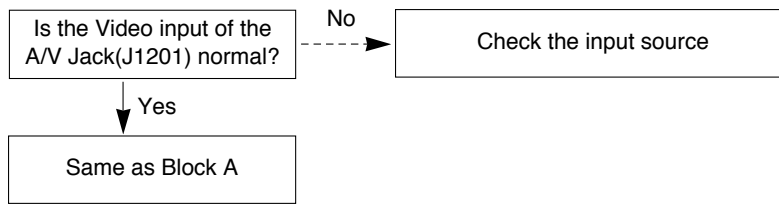
(5) In case of an unusual display in HDMI mode



(6) In case of an unusual display in SCART1 mode



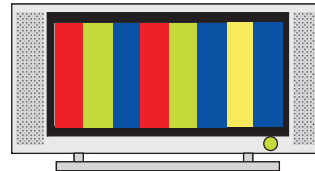
(7) In case of an unusual display in SCART2 mode



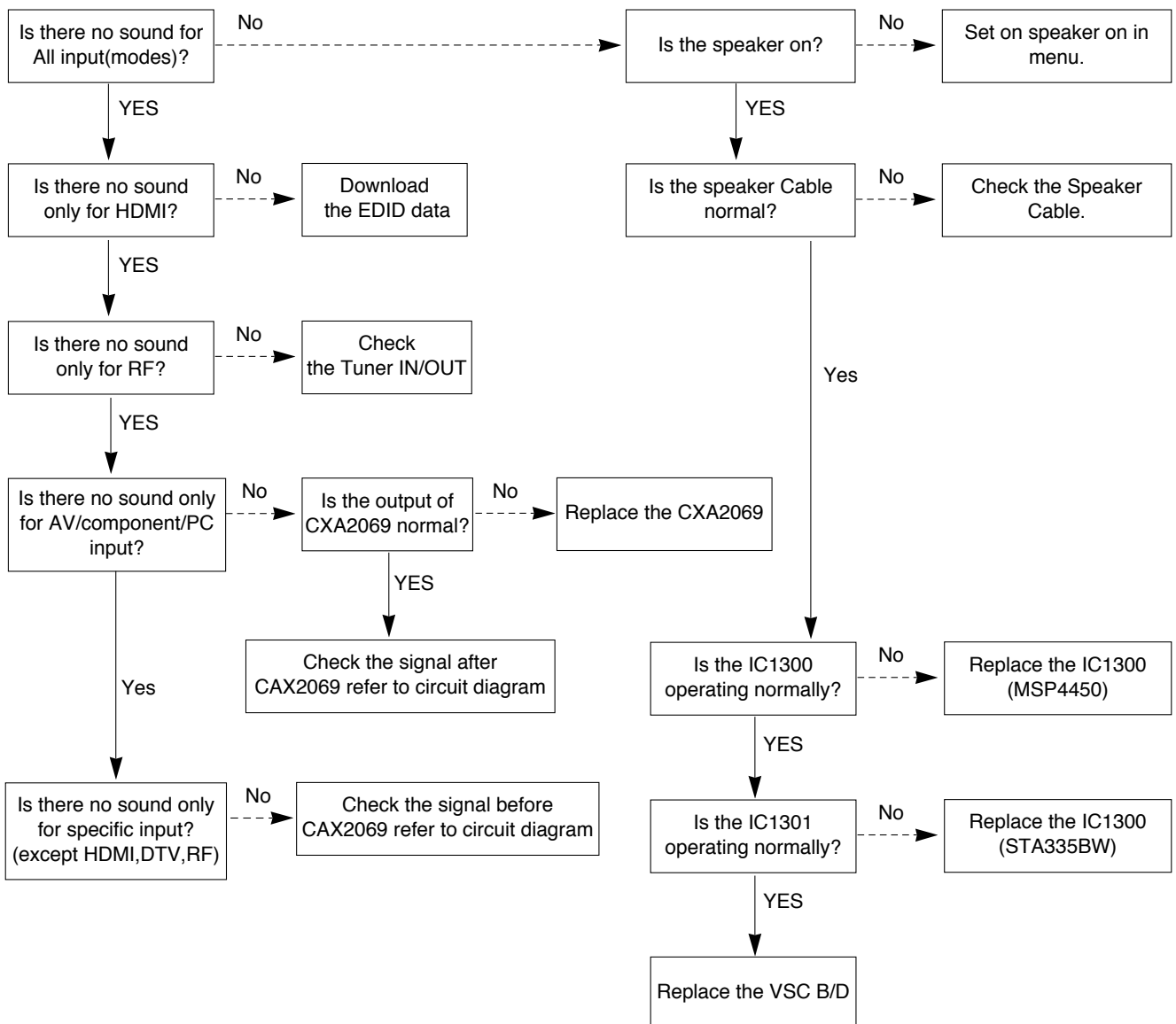
6. In case of no sound

(1) Symptom

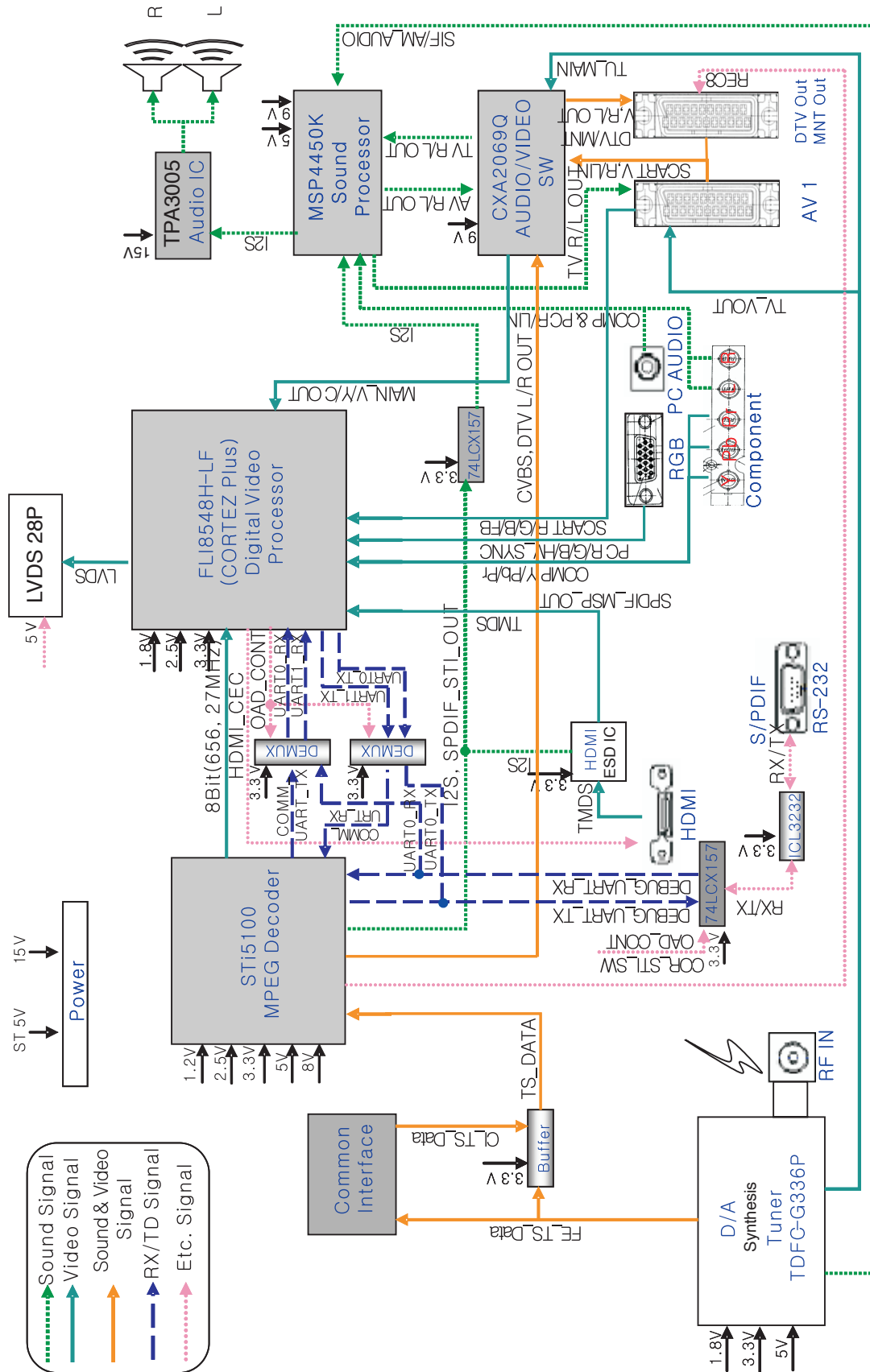
- 1) LED is Green.
- 2) Screen display appears but there is no sound.



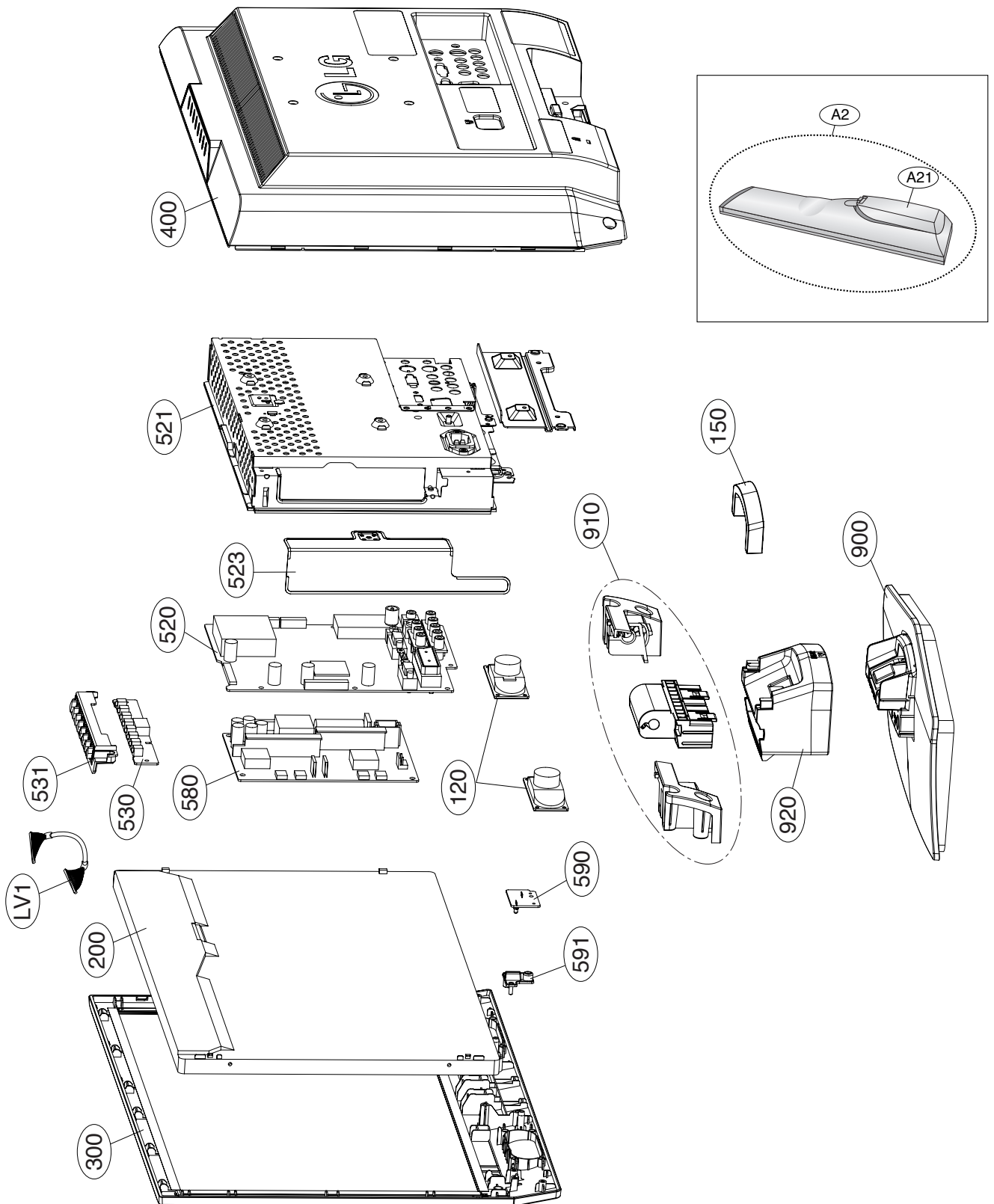
(2) Procedure check

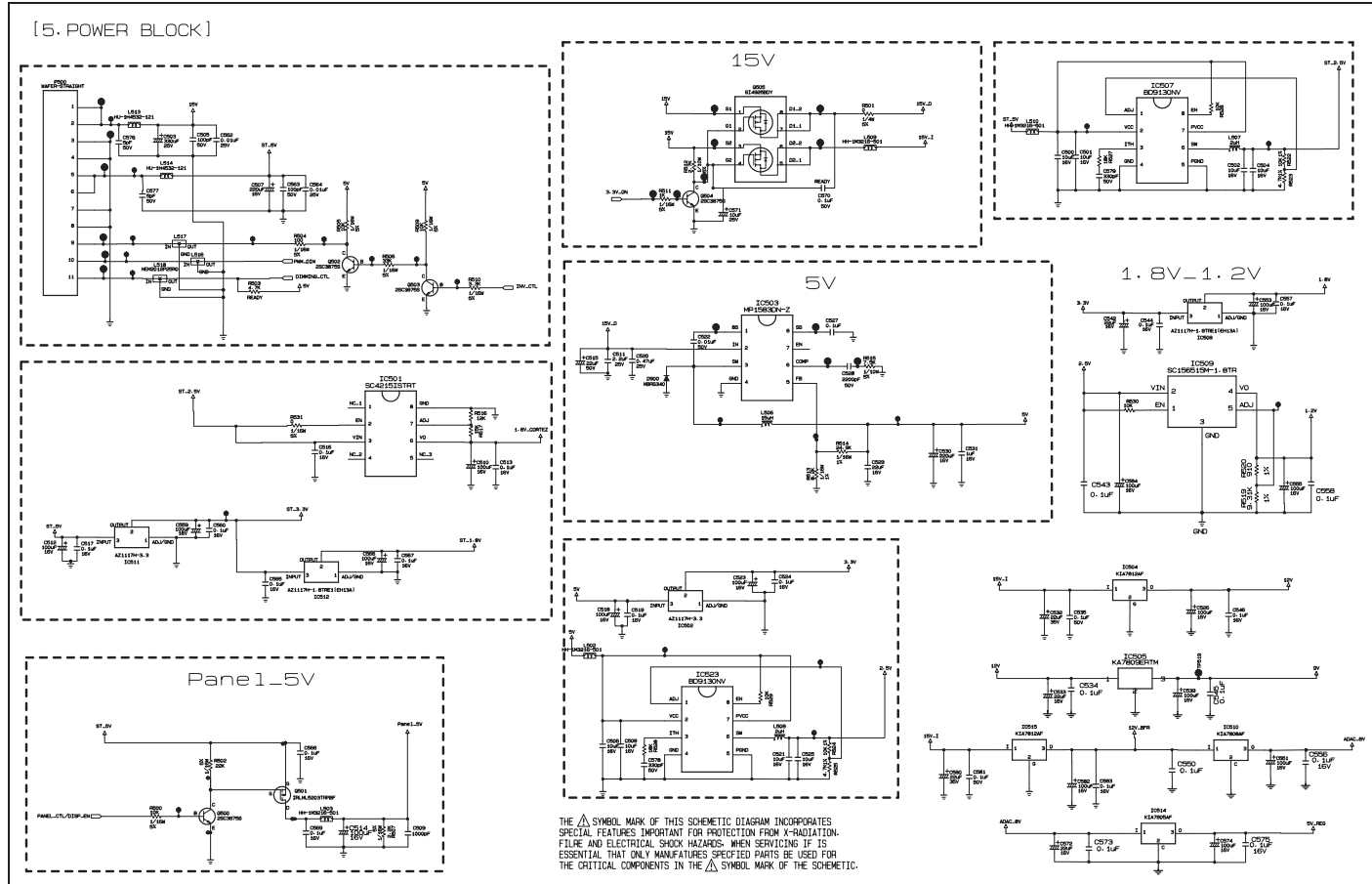
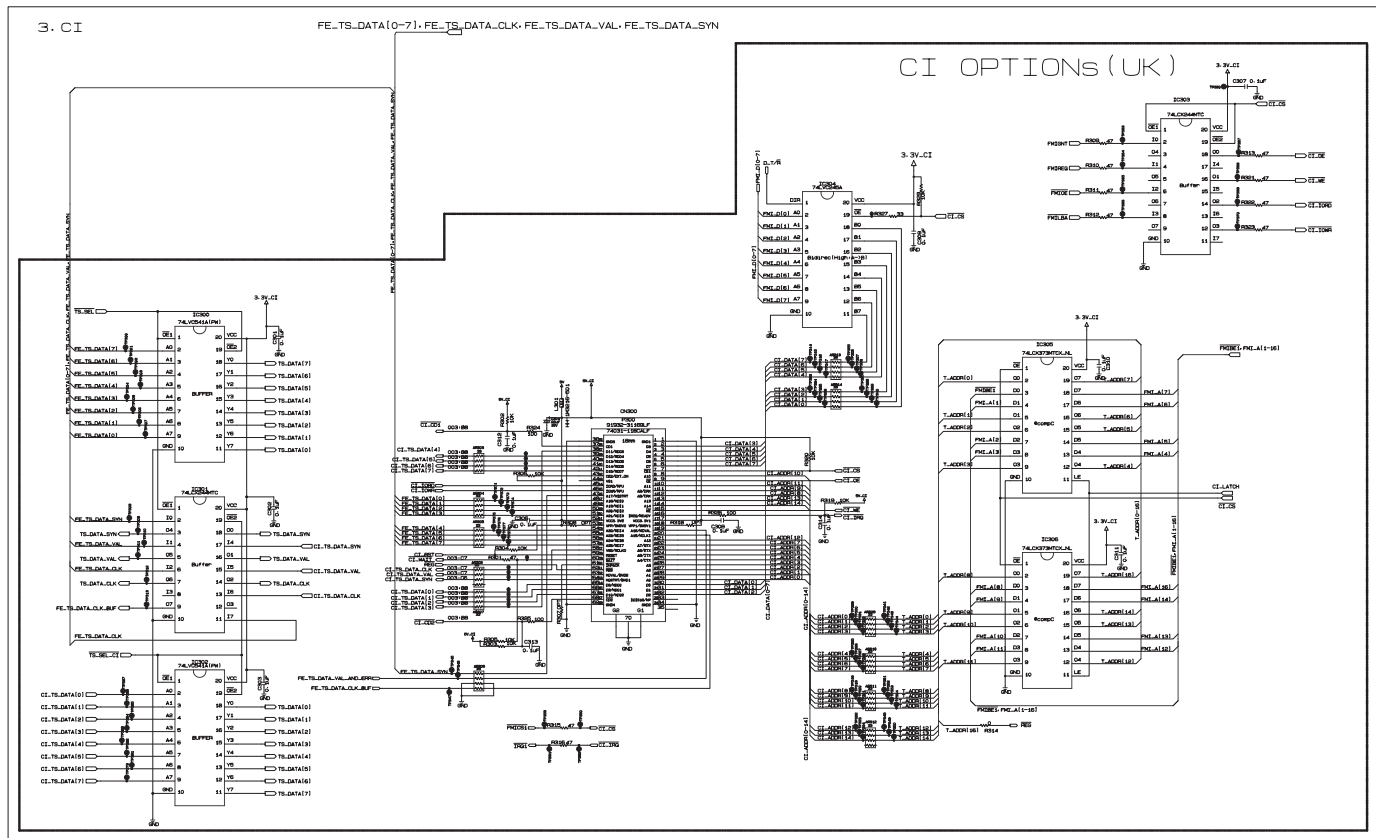
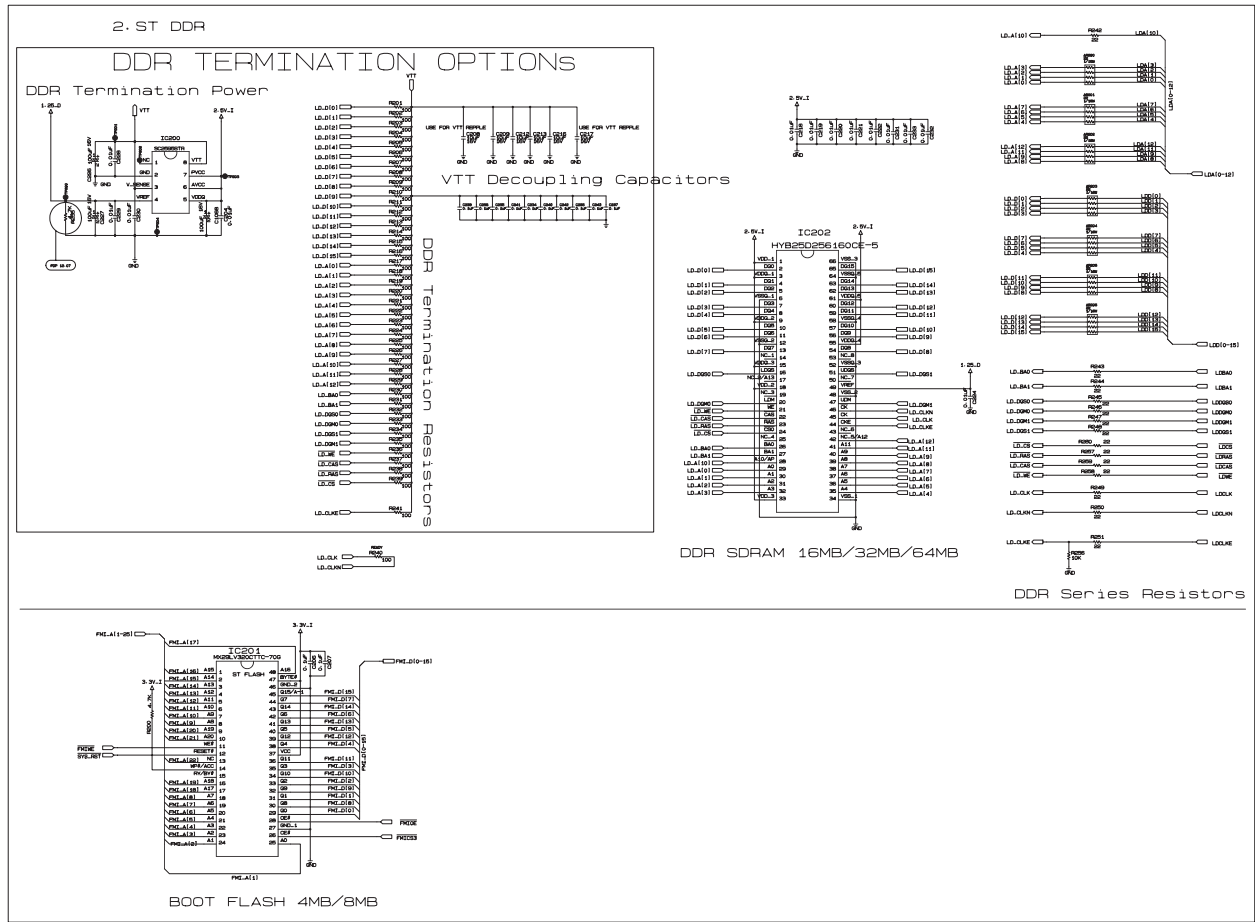
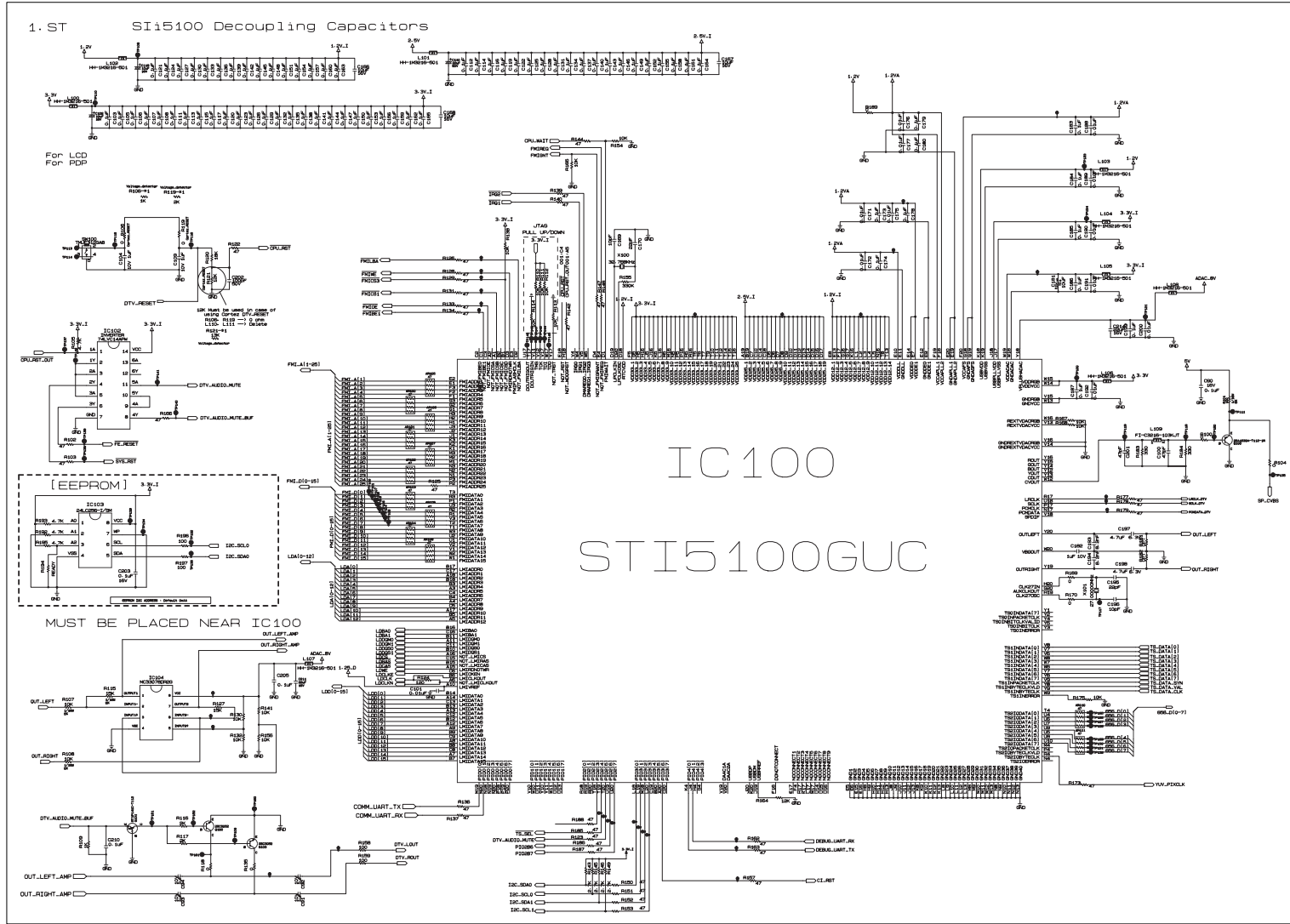


BLOCK DIAGRAM

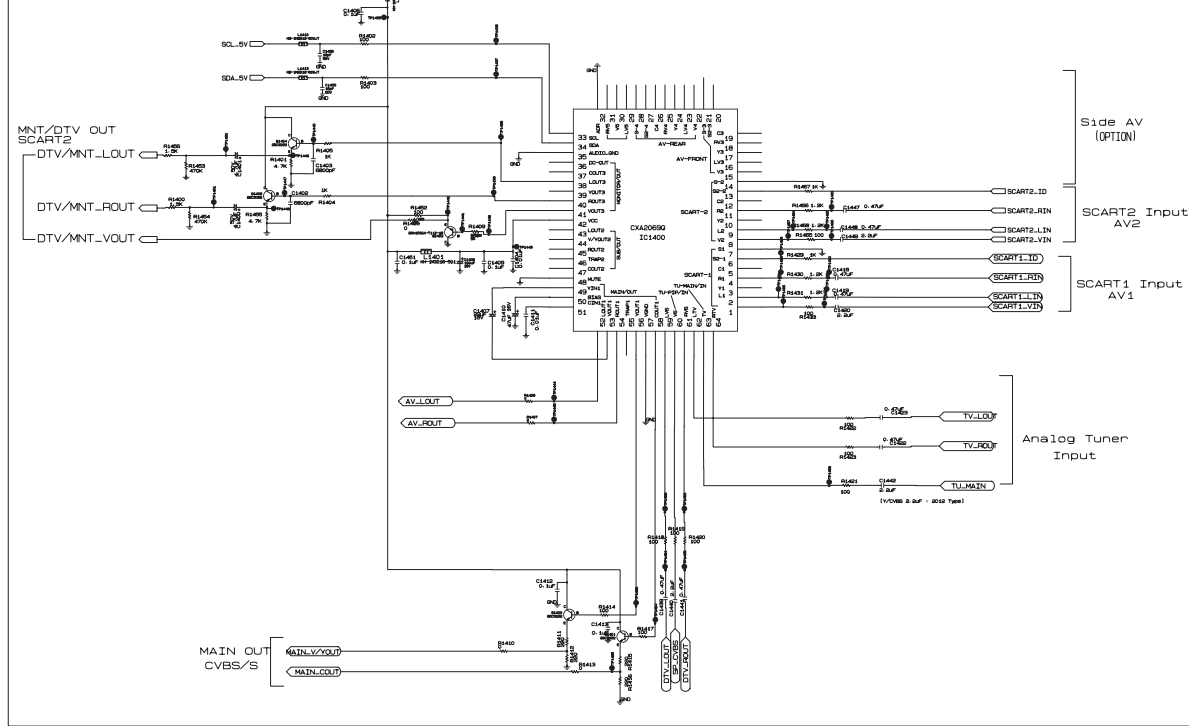


EXPLODED VIEW

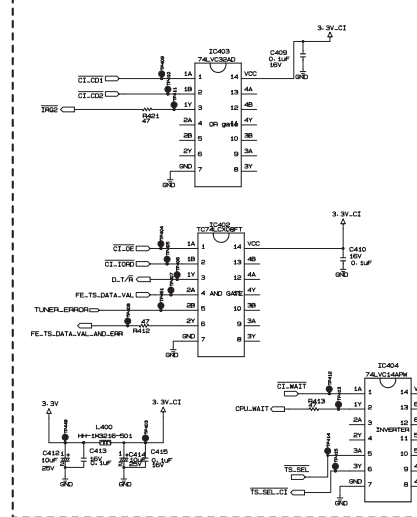




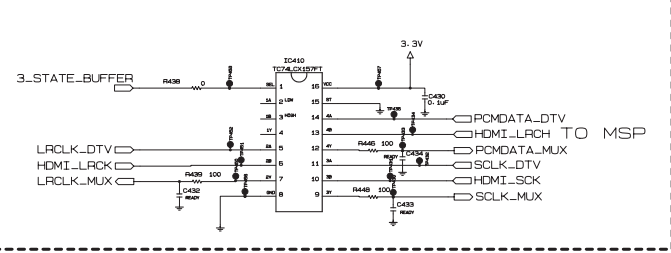
14. AV SWITCH



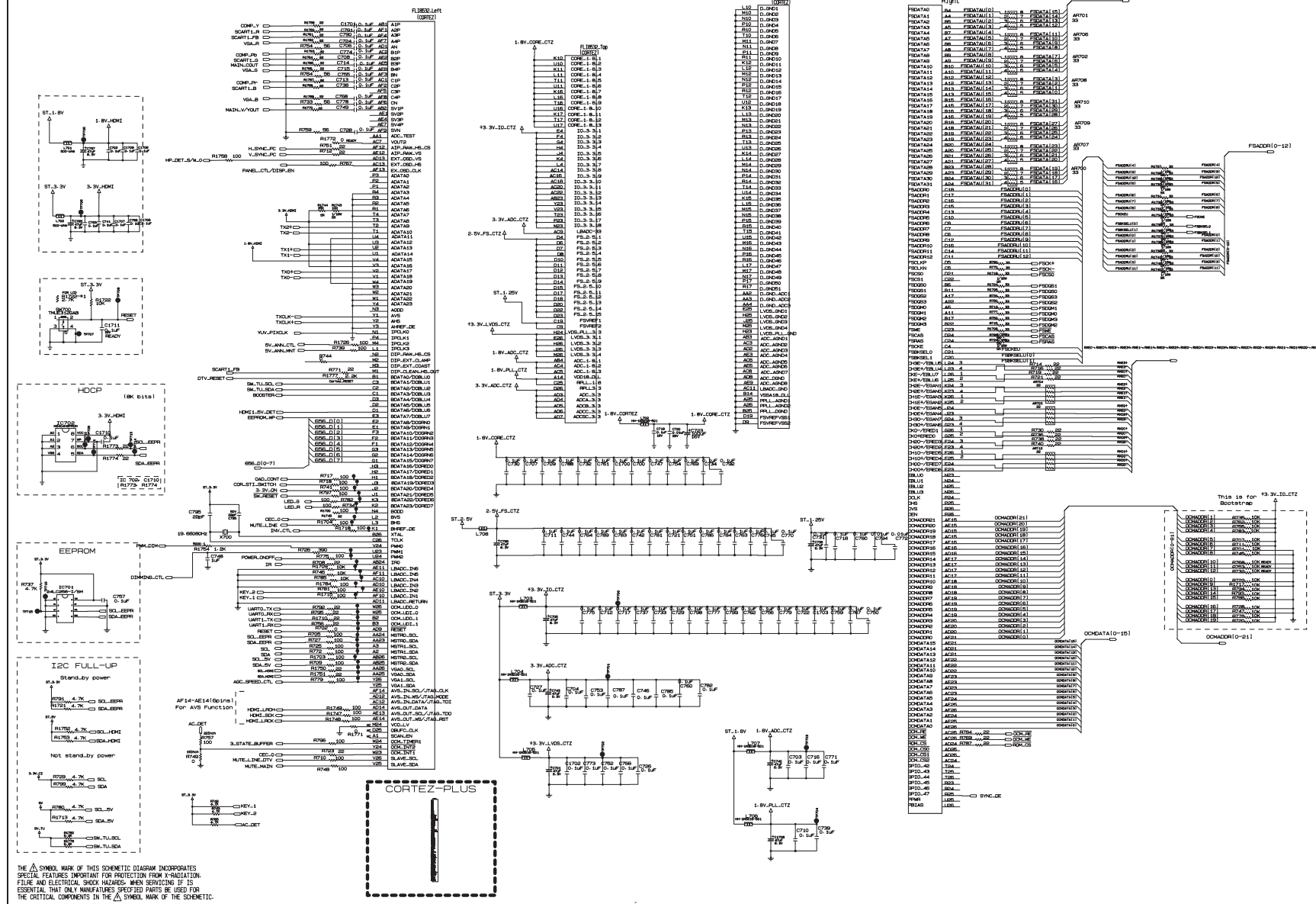
CI OPTIONS (UK)



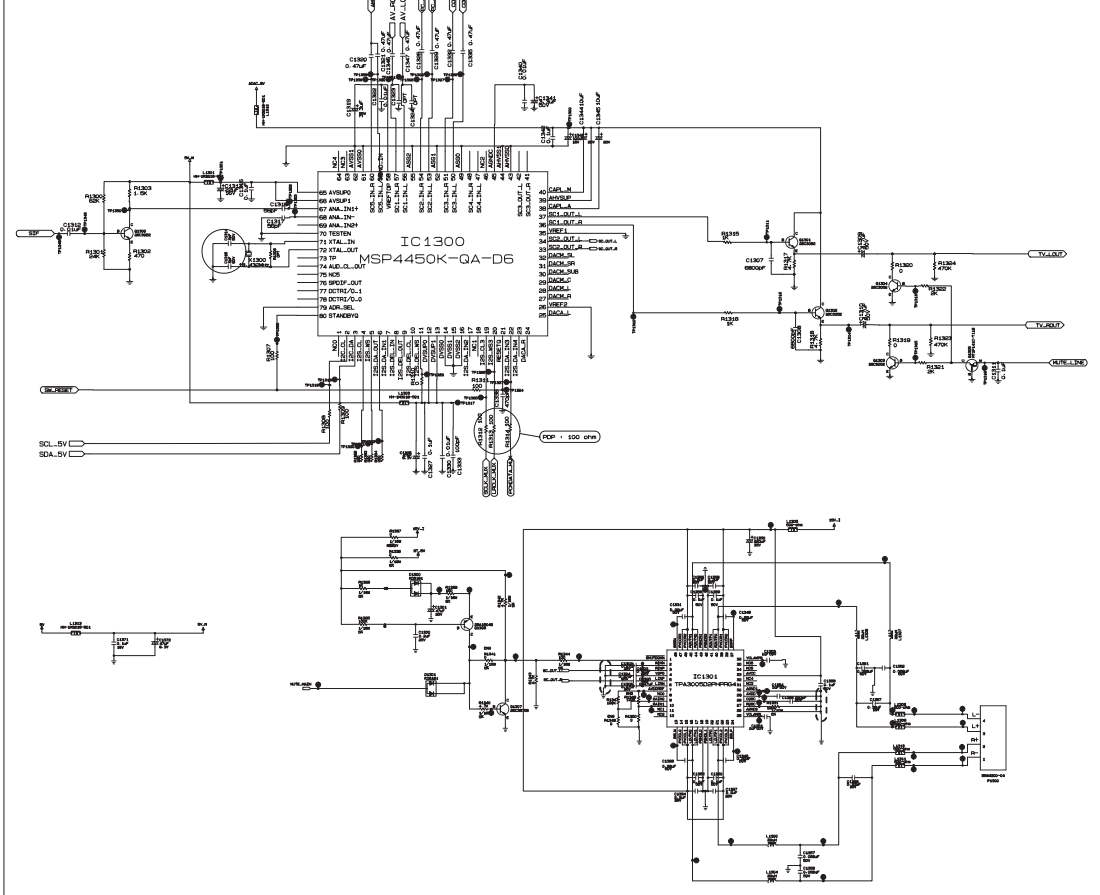
I2S SWITCHING (DTV&HDMI)



7. CORTEZ_PLUS



13. AUDIO BLOCK



THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILTRATION AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURER SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.



P/NO : MFL36695320

Aug., 2007
Printed in Korea

