



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

LCD TV

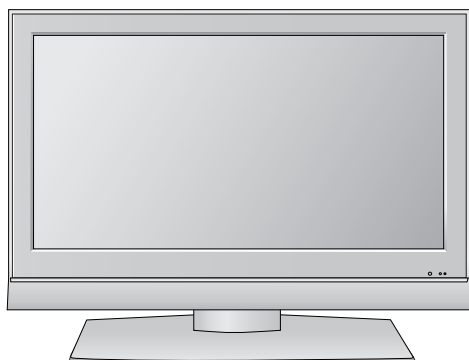
SERVICE MANUAL

CHASSIS : LN72A

MODEL : 22LS4R 22LS4R-MA

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.

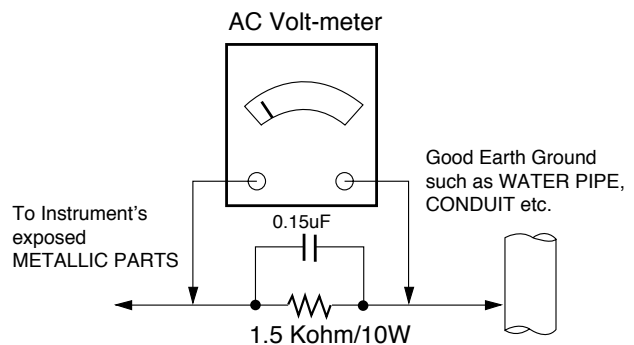
Connect 1.5K/10watt resistor in parallel with a 0.15uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

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. Application range

This specification is applied to the 19"/ 22" Wide LCD TV used
LN72A chassis.

2. Requirement for Test

Testing for standard of each part must be followed in below
condition.

- (1) Power : Standard input voltage (100-240V~, 50/60Hz)
*Standard Voltage of each products is marked by models.
- (2) Specification and performance of each parts are followed
each drawing and specification by part number in
accordance with BOM.
- (3) The receiver must be operated for about 20 minutes prior
to the adjustment.

3. General Specification(TV)

No	Item	Specification	Remark
1	Video input applicable system	NTSC, NTSC 4.43	
2	Receivable Broadcasting System	PAL N/M, NTSC M	Central and South America
3	RF Input Channel	VHF : 2 ~ 13 UHF : 14 ~ 69 CATV : 1 ~ 125	PAL N/M, NTSC
4	Input Voltage	100-240V~, 50/60Hz	
5	Market	Central and South America	
6	Tuning System	FS	PAL N/M, NTSC
7	Operating Environment	Temp : 0 ~ 40 deg Humidity : 10~90 %RH	
8	Storage Environment	Temp : -20 ~ 50 deg Humidity : 10~90 %RH	
9	Display	LCD Module	

4. Module Specification

4.1. 22" LCD MODULE (LPL LM220WE1-TLA1)

No.	Item		Min	Typ.	Max	Unit	Remark
1	Display area		473.4 (H) x 296.1 (V)			mm	
2	Outline dimension		493.7 (H) x 320.1 (V) x 16.5 (D)			mm	Max
3	Number of Pixels		1680 (H) x 1050 (V)				1Pixel=3RGB Cells
4	Cell pitch		0.282mm (H) x 0.282mm (V)			mm	1Pixel=3RGB Cells
5	Color arrangement		RGB vertical stripe				
6	Weight(net)		TBD			Kg	
7	Operating Environment	Temperature	0 ~ 50			deg	
		Humidity	10 ~ 90			%	
8	Storage Environment	Temperature	-20 ~ 60			deg	
		Humidity	10 ~ 90			%	
9	Electrical Interface		LVDS				
10	Back light Unit		4 CCFL (4 lamps)				
11	Response Time		5ms			Typ	

4.2. Electro optical characteristic specifications(module standard)

No.	Item	Specification				Remark	
			Min	Typ.	Max		
1	Viewing Angle <CR≥10>	R/L U/D		80/80 75/85			
2	Luminance	Luminance (cd/m ²)	190	250		APC:Clear, ACC:Cool, White(100 IRE)	
3	Contrast Ratio	CR	500	800		All white / All black	
4	CIE Color Coordinates	WHITE	Wx	Typ. -0.03	0.285	Typ. +0.03	APC : Clear ACC : Cool White(85 IRE)
			Wy		0.293		
		RED	Rx		0.635		
			Ry		0.342		
		GREEN	Gx		0.297		
			Gy		0.611		
		BLUE	Bx		0.147		
			By		0.070		

5. Model Specification

No	Item	Specification	Remark
1	Market	Central and South America	
2	Broadcasting system	PAL N/M, NTSC M	Central and South America
3	RF Input Channel	VHF : 2 ~ 13 UHF : 14 ~ 69 CATV : 1 ~ 125	NTSC
4	Video Input (1EA)	PAL N/M, NTSC	3 System(Rear) :PAL50/60, NTSC
5	S-Video Input (1EA)	PAL N/M, NTSC	3 System(Rear) :PAL50/60, NTSC
6	Component Input (1EA)	Y/ Pb/Pr	480i/576i/567P/480P/720P/1080i
8	RGB Input (1EA)	RGB-PC, RGB-DTV	
9	HDMI Input (1EA)	HDMI-PC HDMI-DTV	
10	Audio Input (2EA)	2EA : CVBS, PC Audio	L/R Input

6. Component Video Input (Y, PB, PR)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed
1	720*480	15.73	59.94	13.500	SDTV, DVD 480I(525I)
2	720*480	15.75	60.00	13.514	SDTV, DVD 480I(525I)
3	720*576	15.625	50.00	13.500	SDTV, DVD 576I(625I)
4	720*480	31.47	59.94	27.000	SDTV 480P
5	720*480	31.50	60.00	27.027	SDTV 480P
6	720*576	31.25	50.00	27.000	SDTV 576P
7	1280*720	44.96	59.94	74.176	HDTV 720P
8	1280*720	45.00	60.00	74.250	HDTV 720P
9	1280*720	37.50	50.00	74.250	HDTV 720P 50Hz
10	1920*1080	33.72	59.94	74.176	HDTV 1080I
11	1920*1080	33.75	60.00	74.250	HDTV 1080I
12	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz

7. RGB Input (PC)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1	720*400	31.469	70.08	28.32	DOS	
2	640*480	31.469	59.94	25.17	VESA(VGA)	
3	800*600	37.879	60.31	40.00	VESA(SVGA)	
4	1024*768	48.363	60.00	65.00	VESA(XGA)	
5	1280*1024	63.981	60.02	108.0	VESA(WXGA)	
6	1440*900	55.5	59.90	88.75	WXGA	19LS4R-MA only
7	1680*1050	65.290	59.954	146.25	WXGA+	22LS4R-MA only

8. RGB input (DTV)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed
1	720*480	31.47	59.94	27.000	SDTV 480P
2	720*480	31.50	60.00	27.027	SDTV 480P
3	720*576	31.25	50.00	27.000	SDTV 576P
4	1280*720	37.5	50.00	74.250	HDTV 720P 50Hz
5	1280*720	44.96	59.94	74.176	HDTV 720P
6	1280*720	45.00	60.00	74.250	HDTV 720P
7	1920*1080	33.72	59.94	74.176	HDTV 1080I
8	1920*1080	33.75	60.00	74.250	HDTV 1080I
9	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz

9. HDMI/DVI input (PC)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1	720*400	31.469	70.08	28.32	DOS	
2	640*480	31.469	59.94	25.17	VESA(VGA)	
3	640*350	31.468	70.090	25.175	DOS	
4	800*600	37.879	60.31	40.00	VESA(SVGA)	
5	1024*768	48.363	60.00	65.00	VESA(XGA)	
6	1280*1024	63.981	60.02	108.0	VESA(WXGA)	
7	1440*900	55.5	59.90	88.75	WXGA+	19LS4R-MA only
8	1680*1050	65.290	59.954	146.25	WXGA+	22LS4R-MA only

10. HDMI/DVI input (DTV)

No	Resolution	H-freq(kHz)	V-freq.(kHz)	Pixel clock(MHz)	Proposed
1.	720*480	31.47	59.94	27.000	SDTV 480P
2.	720*480	31.50	60.00	27.027	SDTV 480P
3.	720*576	31.25	50.00	27.000	SDTV 576P
4.	1280*720	37.5	50.00	74.250	HDTV 720P 50Hz
5.	1280*720	44.96	59.94	74.176	HDTV 720P
6.	1280*720	45.00	60.00	74.250	HDTV 720P
7.	1920*1080	33.72	59.94	74.176	HDTV 1080I
8.	1920*1080	33.75	60.00	74.250	HDTV 1080I
9.	1920*1080	28.125	50.00	74.250	HDTV 1080I 50Hz

ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied to 19"/ 22" LCD TV which is manufactured in TV (or Monitor) Factory or is produced on the basis of this data.

2. Specification

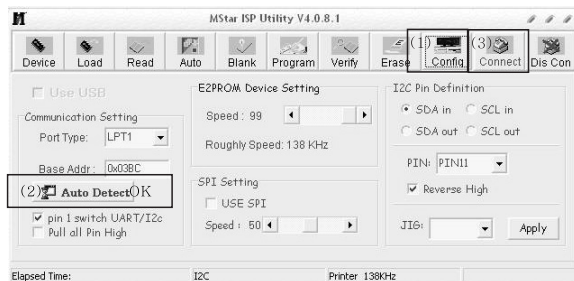
- 1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.
- 2) Power Adjustment: Free Voltage
- 3) Magnetic Field Condition: Nil.
- 4) Input signal Unit: Product Specification Standard
- 5) Reserve after operation: Above 30 Minutes
- 6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), Pattern Generator (MSPG-925L or Equivalent), DDC Adjustment Jig equipment, SVC remote control

3. Main PCB check process

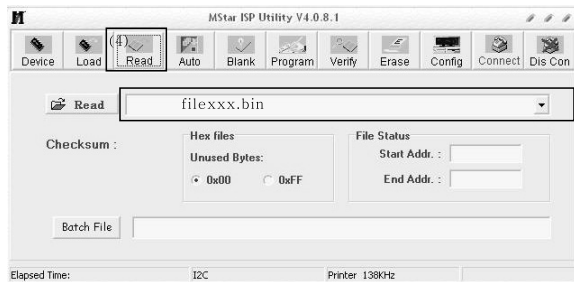
* APC - After Manual-Insult, executing APC

3.1. Download

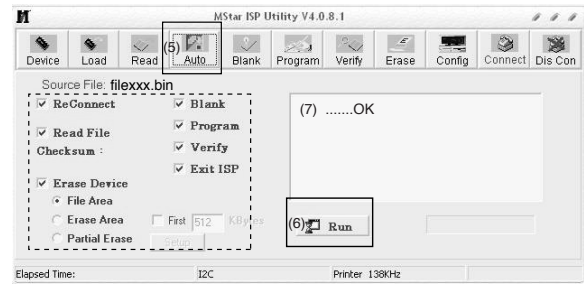
- 1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.
- 2) Set as below, and then click "Auto Detect" and check "OK" message.
If display "Error", Check connect computer, jig, and set.
- 3) Click "Connect" tab.
If display "Can't", Check connect computer, jig, and set.



- 4) Click "Read" tab, and then load download file(XXXX.bin) by clicking "Read".



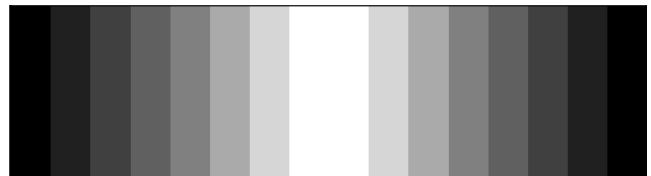
- 5) Click "Auto" tab and set as below
- 6) click "Run".
- 7) After downloading, check "OK" message.



3.2. ADC Process

(1) PC input ADC

- 1) Auto RGB Gain/Offset Adjustment
 - Convert to PC in Input-source
 - Signal equipment displays
Output Voltage : 730 mVp-p
Impress Resolution **XGA** (1024x 768 @ 60Hz)
Model : 107 in Pattern Generator
Pattern : 28 in Pattern Generator (MSPG-925 Series)
[gray pattern that left & right is black and center is white signal (Refer below picture)].



<Adjustment pattern (PC)>

- Adjust by commanding **AUTO_COLOR_ADJUST** (0xF1) 0x00 0x02 instruction.

2) Confirmation

- We confirm whether "**0x8C**" address of **EEPROM** "**0xB4**" is "0xAA" or not.
- If "0x8C" address of EEPROM "0xB4" isn't "0xAA", we adjust once more.
- We can confirm the ADC values from "**0x00~0x05**" addresses in a page "0xB4"

* Manual ADC process using Service Remote control.
After enter Service Mode by pushing "INSTANT" key, execute "Auto-RGB" by pushing "►" key at "Auto-RGB".

(2) COMPONENT input ADC

- 1) Component Gain/Offset Adjustment
 - Convert to Component in Input-source
 - Signal equipment displays
Impress Resolution **480P**
MODEL : 212 in Pattern Generator
(480p Mode, Y : 100%, Pb/Pr : 75%)
PATTERN : 08 in Pattern Generator
(MSPG-925 Series)



- Adjust by commanding AUTO_COLOR_ADJUST (0xF1) 0x00 0x02 instruction.

2) Confirmation

- We confirm whether “0x8E” address of EEPROM “0xB4” is “0xAA” or not.
- If “0x8E” address of EEPROM “0xB4” isn’t “0xAA”, we adjust once more.
- We can confirm the ADC values from “0x00~0x05” addresses in a page “0xB4”.

3.3. Function Check

■ Check display and sound

- Check Input and Signal items. (cf. work instructions)
 - 1) TV
 - 2) Video
 - 3) COMPONENT (480P)
 - 4) RGB (PC : 1024 x 768 @ 60hz)
 - 5) HDMI
 - 6) PC Audio In and H/P Out
- * Display and Sound check is executed by Remote control.

4. Total Assembly line process

4.1. Adjustment Preparation

- (1) Above 30 minutes H/run in RF no signal
- (2) 15 Pin D-Sub Jack is connected to the signal of Pattern Generator.

4.2. Confirm color coordinate of RGB

- (1) Set Input to RGB.
- (2) Input signal : (1440 x 900@60Hz) -> 19LS4R
Full white 216/255 gray level (85 IRE, Model : 112, Pattern : 78 at MSPG925L)
- (3) Input signal : (1680 x 1050@60Hz) -> 22LS4R
Full white 216/255 gray level (85 IRE, Model : 112, Pattern : 78 at MSPG925L)
- (4) Set ACC : Cool
- (5) Confirm whether $x = 0.285 \pm 0.03$, $y = 0.293 \pm 0.03$ or not.

4.3. Confirm color coordinate of Video

- (1) Set Input to AV2.
- (2) Input signal : CVBS, NTSC@60Hz
- (3) Set APC : Clear / ACC : Cool
- (4) Confirm whether $x = 0.285 \pm 0.015$, $y = 0.293 \pm 0.015$ or not.

4.4. Confirm color coordinate of component

- (1) Set Input to COMPONENT.
- (2) Input signal : 480P
Full white 216/255 gray level (85 IRE Model : 212, Pattern : 78 at MSPG925L)
- (3) Set APC : Dynamic / ACC : Cool
- (4) Confirm whether $x = 0.285 \pm 0.03$, $y = 0.293 \pm 0.03$ or not.

4.5. Other quality

- Confirm that each items satisfy under standard condition that was written product spec.
- Confirm Video and Sound at each source.

(1) Video

- Select input Video(CVBS, S-video) and whether picture is displayed or not

(2) TV

- Select input TV whether picture is displayed or not.

(3) RGB

- Select input RGB and whether picture is displayed or not.

(4) COMPONENT

- Select input COMPONENT and whether picture is displayed or not.

(5)HDMI

- Select input HDMI and whether picture is displayed or not

4.6. DPM operation confirmation

- Check if Power LED Color and Power Consumption operate as standard.
 - (1) Set Input to RGB and connect D-sub cable to set.
 - (2) Measurement Condition : 230V@ 50Hz (Analog)
 - (3) Confirm DPM operation at the state of screen without Signal

4.7 DDC EDID Write

- 1) Connect D-sub Signal Cable to D-Sub Jack.
- 2) Connect HDMI Signal Cable to HDMI Jack.
- 3) Write EDID DATA to EEPROM(24C02) by using DDC2B protocol.
- 4) Check whether written EDID data is correct or not. (refer to Product spec).

(1) 22LS4R EDID DATA

1) ANALOG DATA 128Byte

	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	4B	56	01	01	01	01
0x01	01	11	01	03	08	2F	1E	78	0A	AE	C5	A2	57	4A	9C	25
0x02	12	50	54	21	08	00	95	00	81	80	01	01	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	3A
0x06	3F	1C	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC
0x07	00	4C	47	20	54	56	0A	20	20	20	20	20	20	00	11	

2) DIGITAL DATA 256Byte

	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	4C	56	01	01	01	01
0x01	01	11	01	03	80	2F	1E	78	0A	AE	C5	A2	57	4A	9C	25
0x02	12	50	54	21	08	00	95	00	81	80	01	01	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	3A
0x06	3F	1C	53	0F	00	0A	20	20	20	20	20	20	00	00	00	FC
0x07	00	4C	47	20	54	56	0A	20	20	20	20	20	20	01	97	
	0x00	0x01	0x02	0x03	0x04	0x05	0x06	0x07	0x08	0x09	0x0A	0x0B	0x0C	0x0D	0x0E	0x0F
0x00	02	03	1C	72	23	09	07	02	49	07	16	81	03	05	14	13
0x01	12	04	83	01	00	00	65	03	0C	00	10	00	01	1D	80	18
0x02	71	1C	16	20	58	2C	25	00	D9	28	11	00	00	9E	01	1D
0x03	80	D0	72	1C	16	20	10	2C	25	80	D9	28	11	00	00	9E
0x04	01	1D	00	BC	52	D0	1E	20	B8	28	55	40	D9	28	11	00
0x05	00	1E	8C	0A	D0	90	20	40	31	20	0C	40	55	00	D9	28
0x06	11	00	00	18	01	1D	00	72	51	D0	1E	20	6E	28	55	00
0x07	D9	28	11	00	00	1E	00	00	00	00	00	00	00	00	00	14

- All Data : HEXA Value
- Changeable Data
 - * Serial No : Controlled/ Data : 01
 - ** Month : Controlled/ Data : 00
 - *** Year : Controlled
 - **** Check sum

4.8. HDCP SETTING

(High-Bandwidth Digital Contents Protection)

- 1) Connect D-sub Signal Cable to D-Sub Jack.
- 2) Input HDCP key with HDCP-key- in-program.
- 3) HDCP Key value is stored on EEPROM(AT24C64) which is E00~F20 addresses of 0xBC~0xBE page.
- 4) AC off/ on and on HDCP button of MSPG925 and confirm whether picture is displayed or not of using MSPG925.
- 5) HDCP Key value is different among the sets.

4.9. Outgoing condition Configuration

- 1) After all function test., press IN-STOP Key by SVC Remote control. And Make Ship Condition.
- 2) When pressing IN-STOP key by SVC remote control, Green and red LED are blinked alternatively. And then Automatically turn off. (Must not AC power OFF during blinking)

4.10. Internal pressure

- Confirm whether is normal or not when between power board's ac block and GND is impacted on 1.5kV(dc) or 2.2kV(dc) for one second.

4.11 Option data setting (SVC OSD setting)

(1) Model (Change by Suffix) - Tool option

	19LS4R-MA	22LS4R-MA
	12161(19")	12162(22")
Resolution	1	2
Module	0	0
TV	1	1
Video	1	1
COMPONENT	1	1
PC-RGB	1	1
DVI	0	0
HDMI	1	1

(2) Area Option S.Am

No.	Item	Condition	Remark
Option1			
1	BOOSTER	0	
Option2			
1	A2 Threshold	1	Acting FM-ST after checking Nicam
2	V-CURVE	0	
3	MONO	0	
Option3			
1	KEY-TYPE	2	2 : 8 key
Option4			
1	Default Lang	0	
Option5			
1	2 HR-OFF	1	0 : 2 Hour off option-OFF 1 : 2 Hour off option-ON
2	TV-LINK-TUNER	0	
3	FACTORY MODE	0	0 : EEPROM Write Protection On 1 : EEPROM Write Protection Off
4	CHANNEL-MUTE	1	

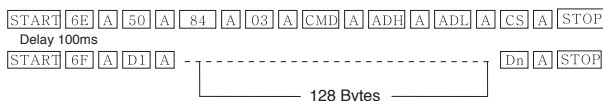
5. Adjustment Command

5.1. Adjustment Commands(LENGTH=84)

Adjustment Contents	CMD(hex)	ADR	VAL	Description
FACTORY ON	E0	00	00	Factory mode on
FACTORY OFF	E2	00	00	Factory mode off
EEPROM ALL INIT.	E4	00	00	EEPROM All clear
EEPROM Read	E7	00	00	EEPROM Read
EEPROM Write	E8	00	data	EEPROM Write by some values
COLOR SAVE (R/G/B cutoff, Drive, Contrast, Bright)	EB	00	00	Color Save
H POSITION	20	00	00 ~ 100	They have different range each mode, FOS Adjustment
V POSITION	30	00	00 ~ 100	
CLOCK	90	00	00 ~ 100	
PHASE	92	00	00 ~ 100	
R DRIVE	16	00	00 ~ FF	Drive adjustment
G DRIVE	18	00	00 ~ FF	
B DRIVE	1A	00	00 ~ FF	
R CUTOFF	80	00	00 ~ 7F	Offset adjustment
G CUTOFF	82	00	00 ~ 7F	
B CUTOFF	84	00	00 ~ 7F	
BRIGHT	10	00	00 ~ 3F	Bright adjustment
CONTRAST	12	00	00 ~ 64	Luminance adjustment
AUTO_COLOR_ADJUST	F1	00	02	Auto COLOR Adjustment
CHANGE_COLOR_TEMP	F2	00	0,1,2,3	0: COOL 1: NORMAL 2: WARM 3: USER
FACTORY_DEFAULT	F3	00	00	Factory mode off & II_SW is "1" & Input change to "TV"
AUTO_INPUT CHANGE	F4	00	0,1,2,4	0: TV 1: AV1 2: AV2 3: Component 4: RGB 5: DVI

5.2 EEPROM DATA READ

(1) Signal Table



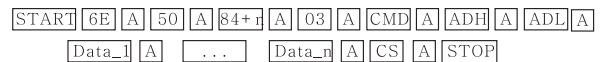
(2) Command Set

Adjustment contents	CMD(hex)	ADH(hex)	ADL(hex)	Details
EEPROM READ	E7	A0	0	0-Page 0~7F Read
			80	0-Page 80~FF Read
		A2	0	1-Page 0~7F Read
			80	1-Page 80~FF Read
		A4	0	2-Page 0~7F Read
			80	2-Page 80~FF Read
		A6	0	3-Page 0~7F Read
			80	3-Page 80~FF Read

* Purpose : To read the appointment Address of E2PROM by 128(80h)-byte

5.3. E2PROM Data Write

(1) Signal Table



LEN : 84h+Bytes

CMD : 8Eh

ADH : E²PROM Slave Address(A0,A2,A4,A6,A8), Not 00h(Reserved by BufferToEEPROM)

ADL : E²PROM Sub Address(00~FF)

Data : Write data

(2) Command Set

Adjustment contents	CMD(hex)	ADH(hex)	Details
EEPROM WRITE	E8	94	16-Byte Write
		84+n	n-byte Write

* Purpose

- 1) EDID write : 16-byte by 16-byte, 8 order (128-byte) write(TO "00 ~ 7F" of "EEPROM Page A4").
- 2) FOS Default write : 16-mode data (HFh, HFI, VF, STD, HP, VP, Clk, ClkPh, PhFine) write.
- 3) Random Data write : write the appointment Address of E2PROM.

5.4. VRAM Read

- 1) Send CMD(70h) to read Video RAM value from MICOM And save its value to 128-Bytes Buffer.(Common Buffer for the use of EDID)

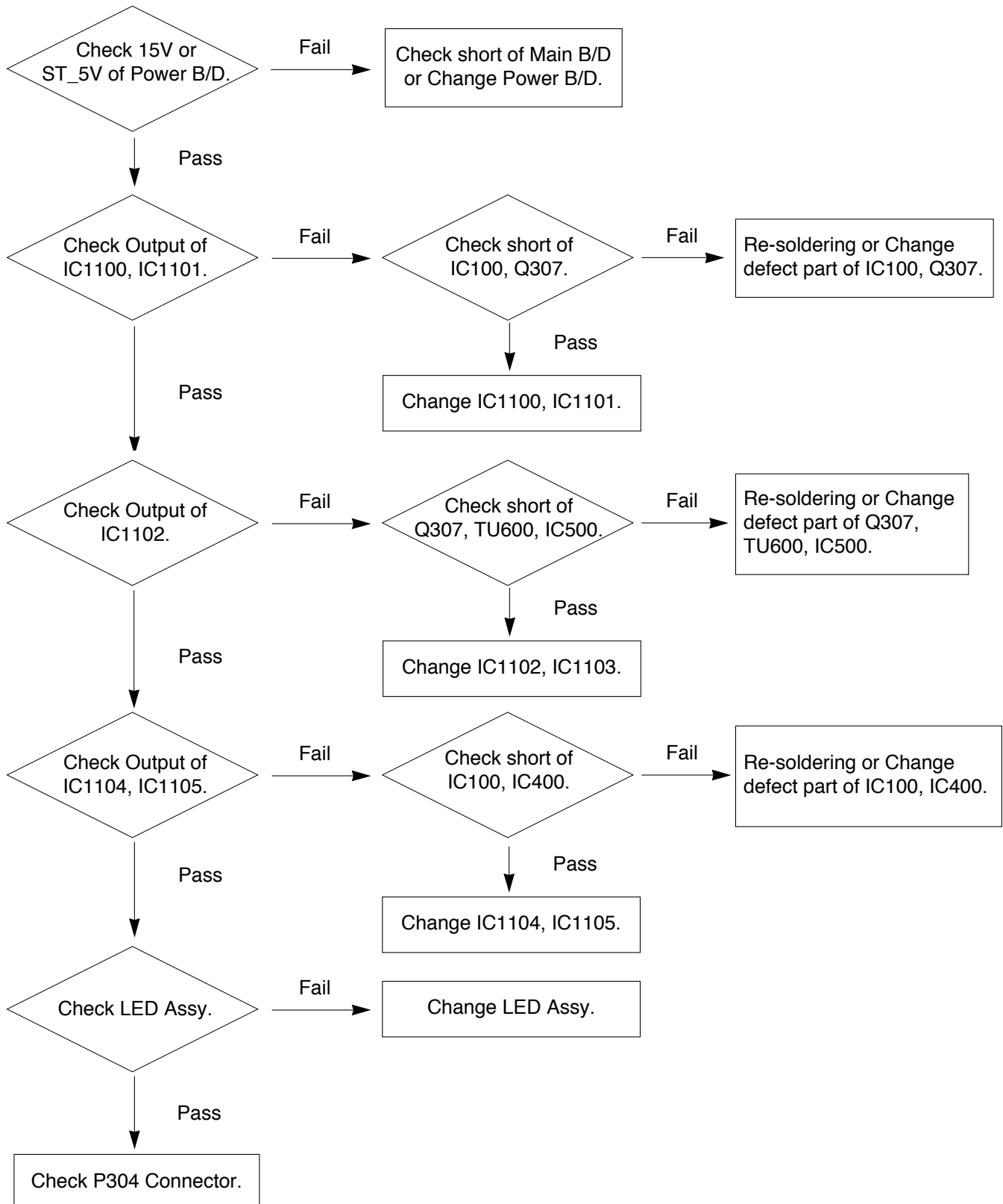


- 2) Delay 500ms. (Time to Wait and Read Video RAM from MICOM)
- 3) Be transmitted the contents of MICOM's 128-bytes Buffer to PC. (128th Data is the CheckSum of 127-bytes data : That's OK if the value of adding 128-bytes Data is Zero)

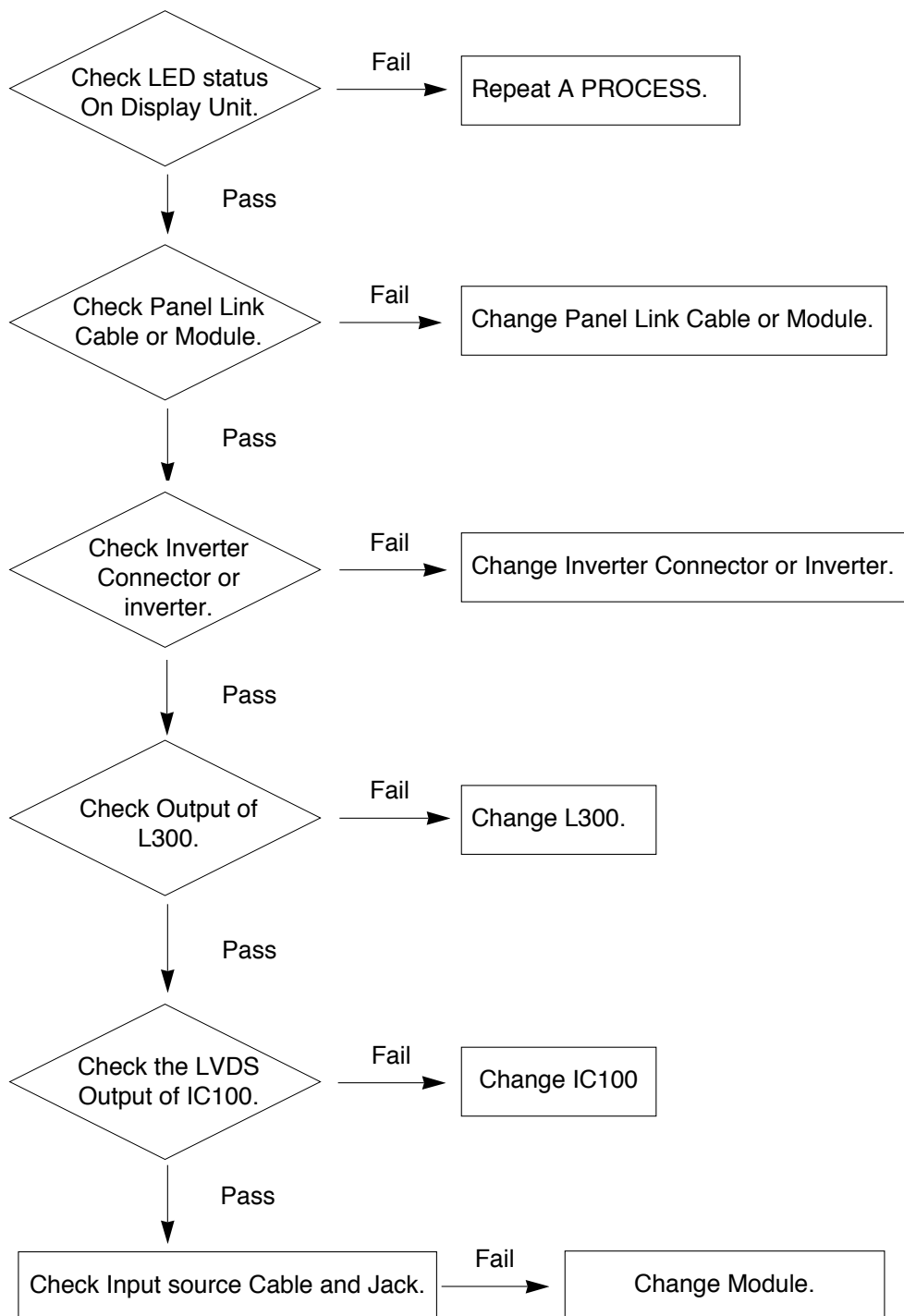


TROUBLE SHOOTING

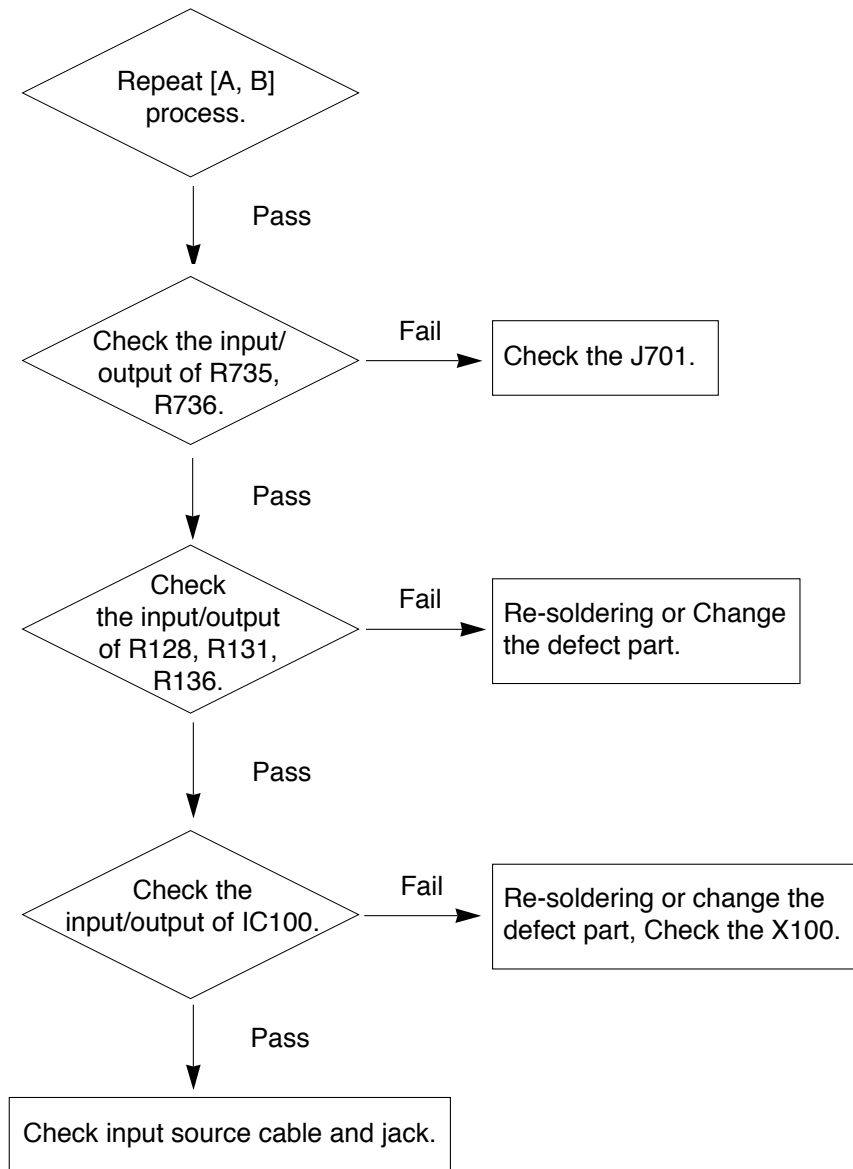
1. No Power (LED indicator off) : [A] Process



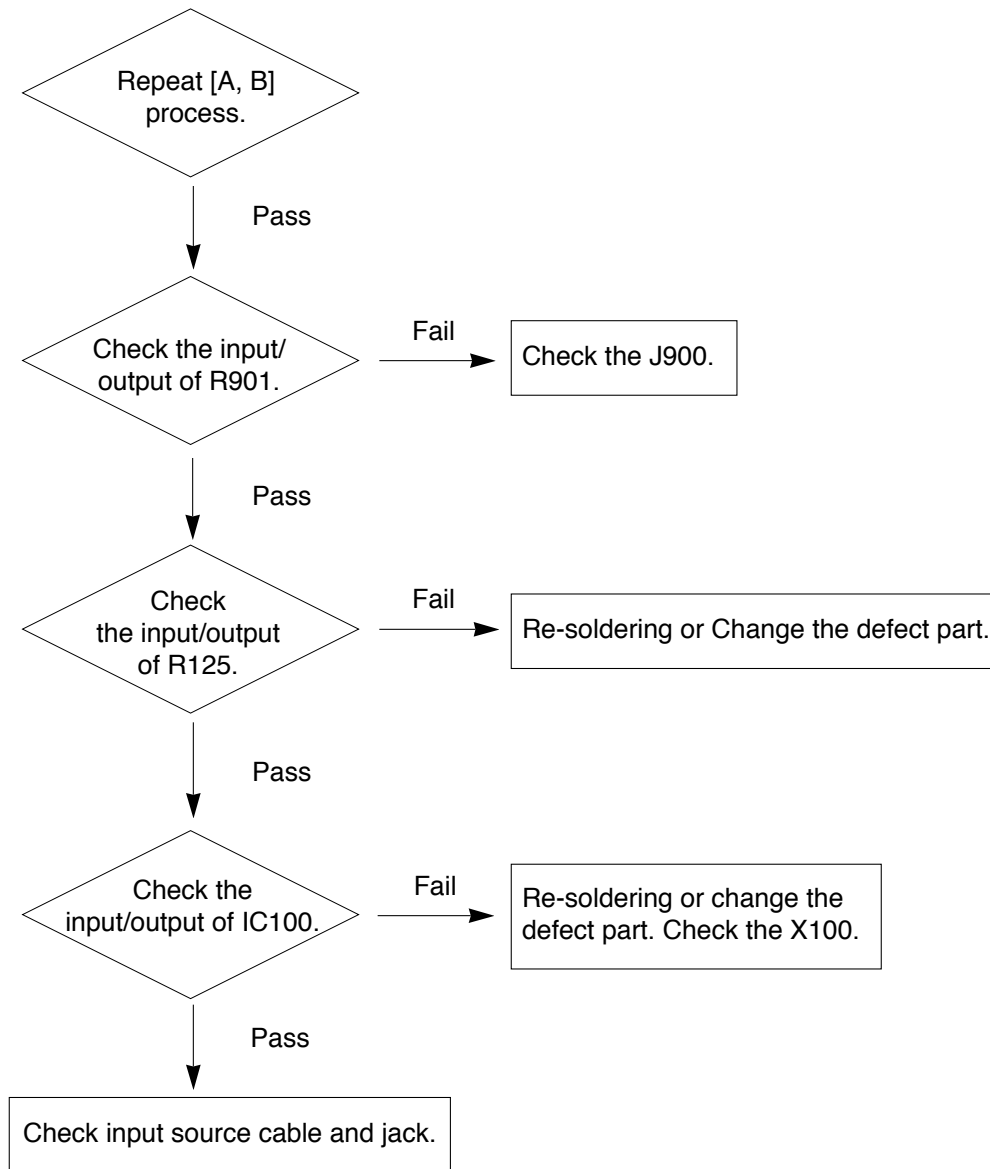
2. No RASTER : [B] Process



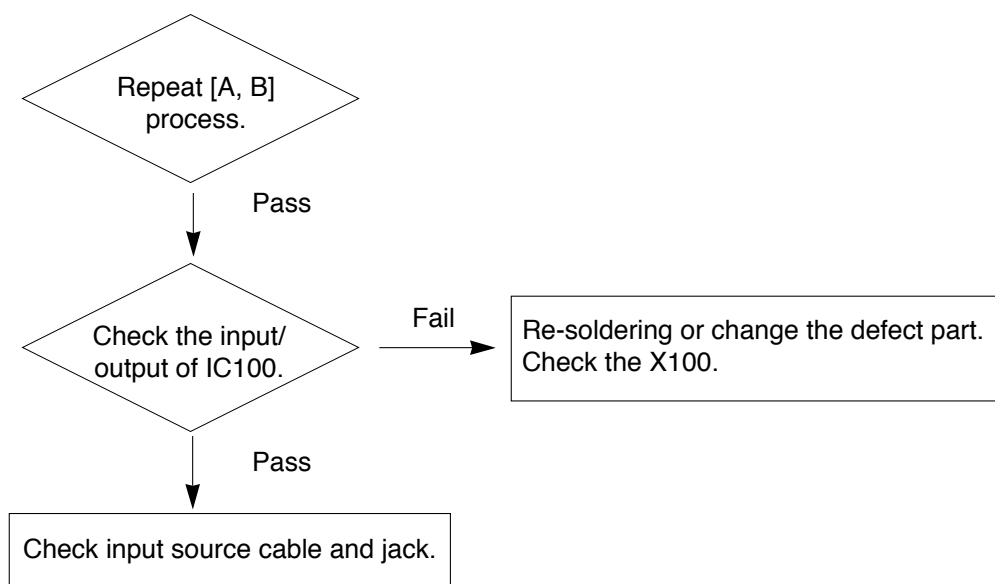
3. No RASTER on PC Signal



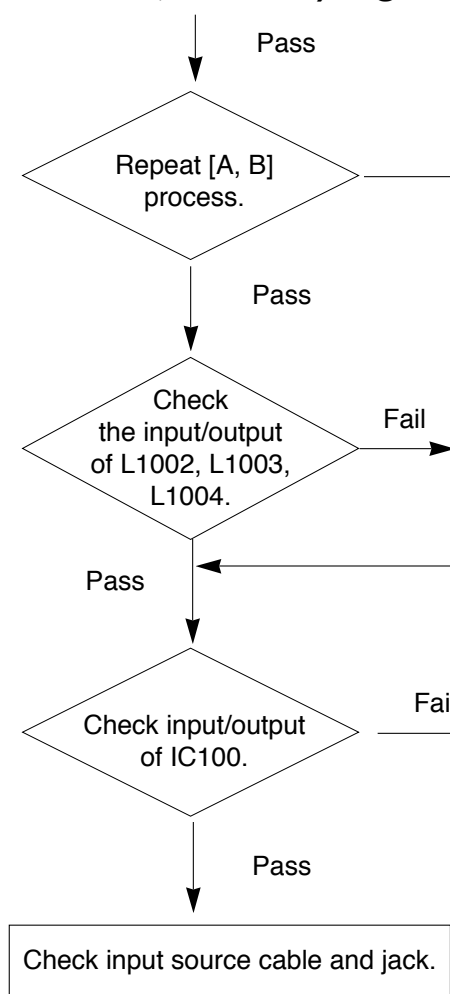
4. No Raster on Component Signal



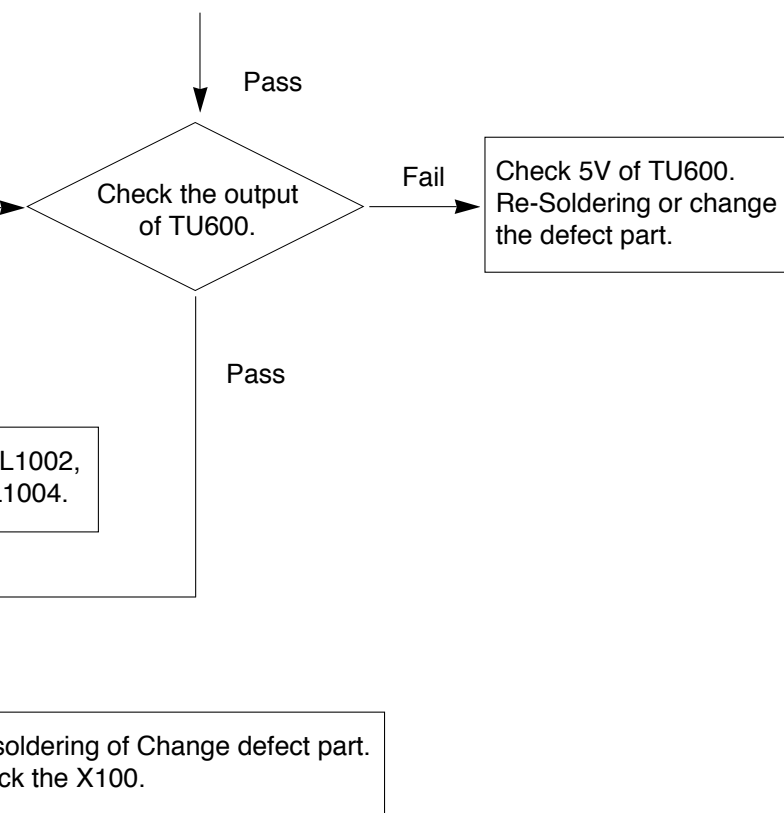
5. No Raster on HDMI Signal



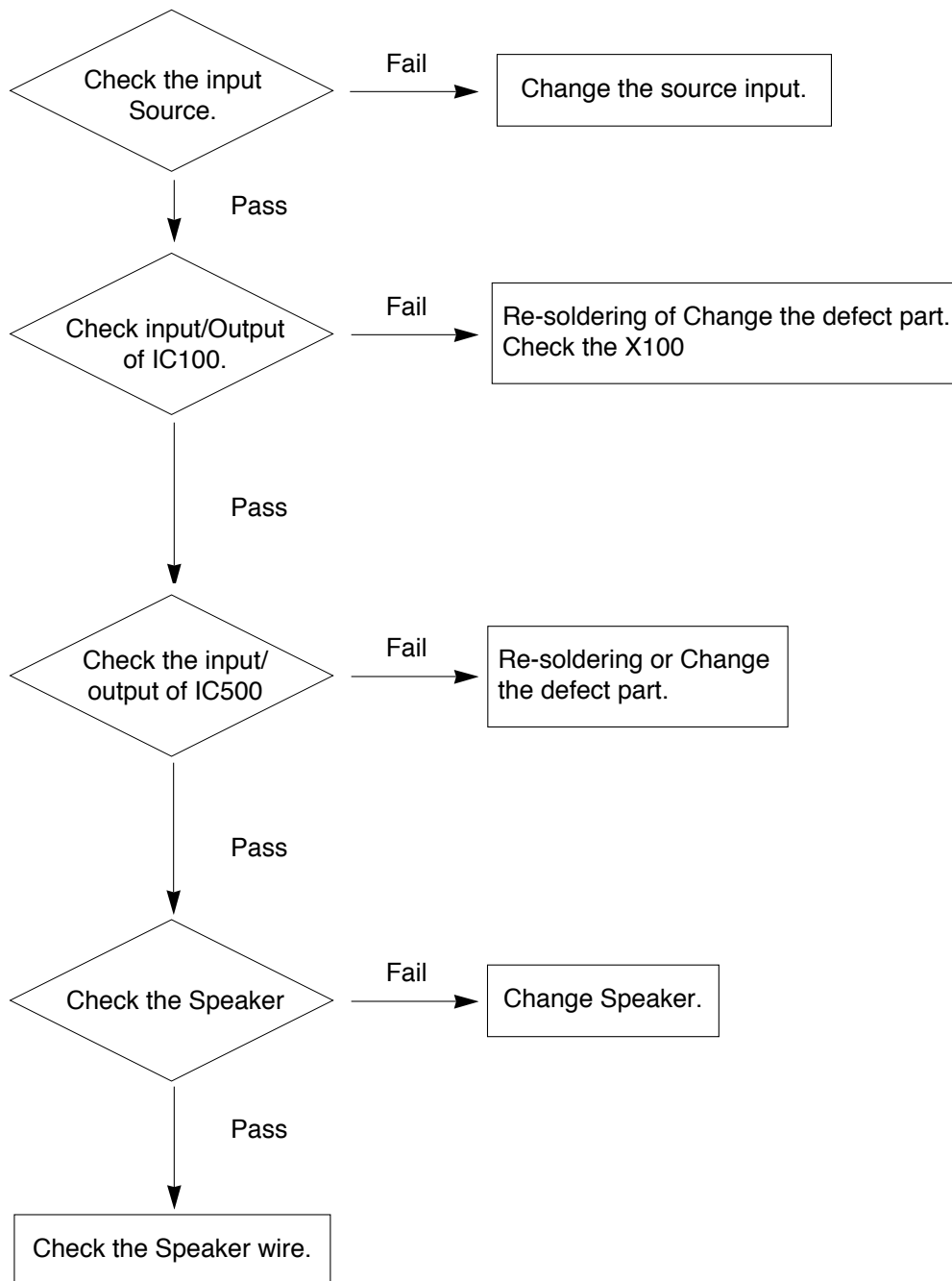
6. No Raster on AV(Scart in Video, S-Video) Signal



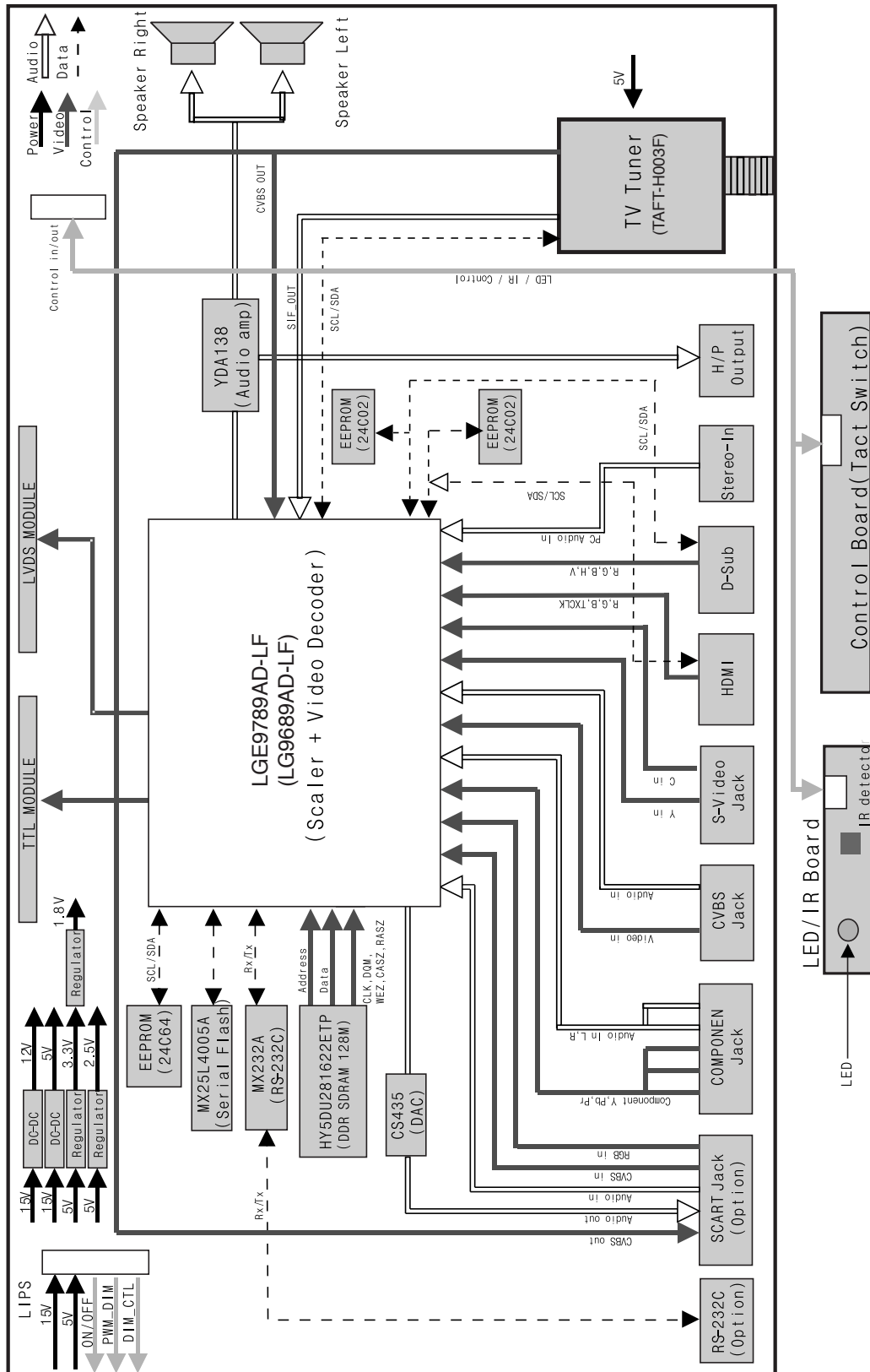
7. No Raster on TV(RF) Signal



8. No sound

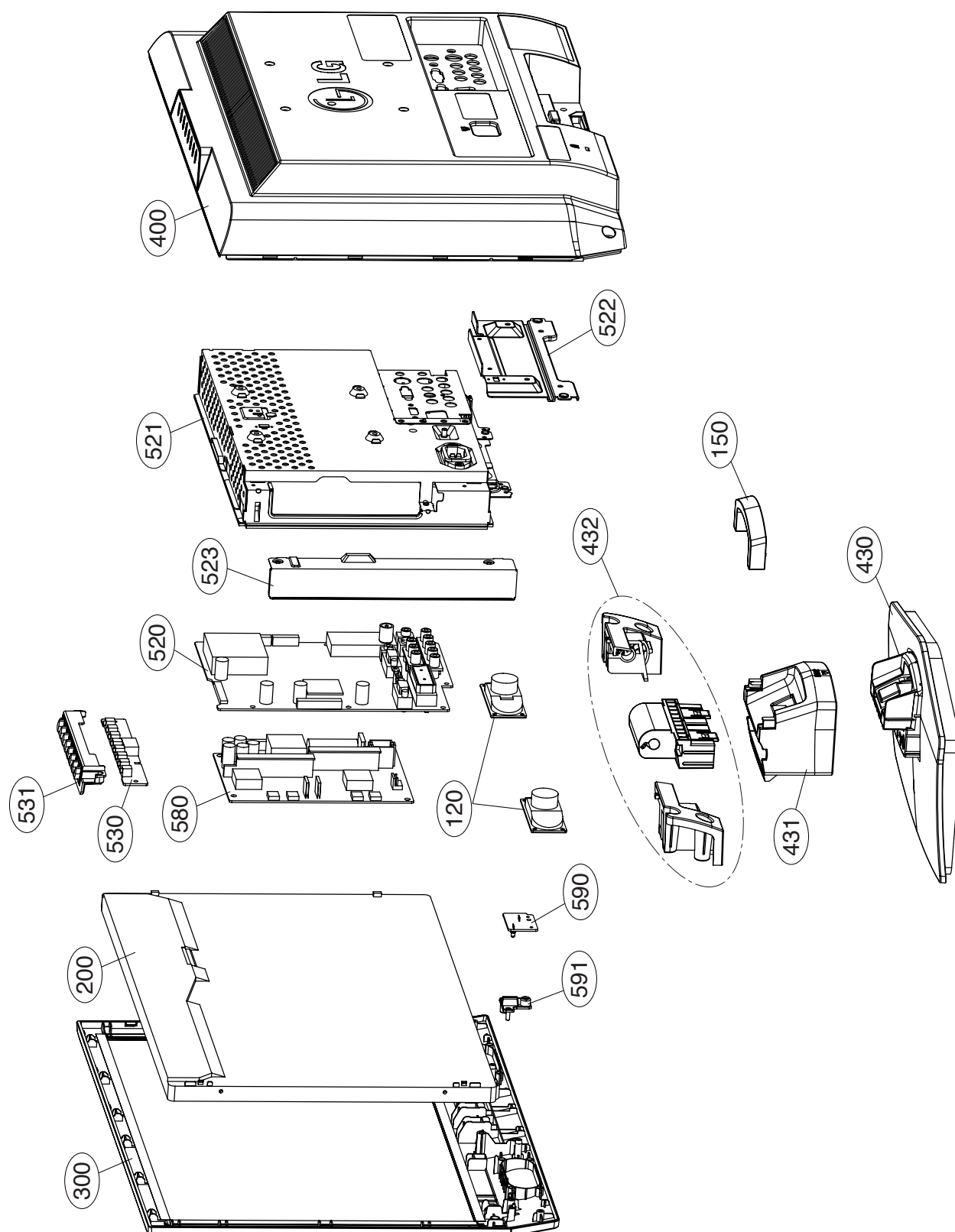


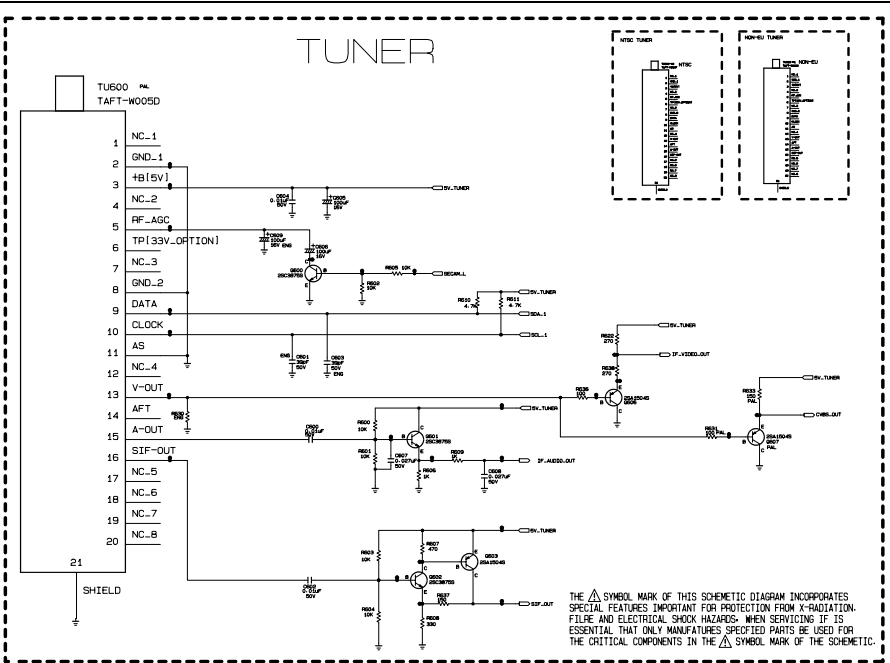
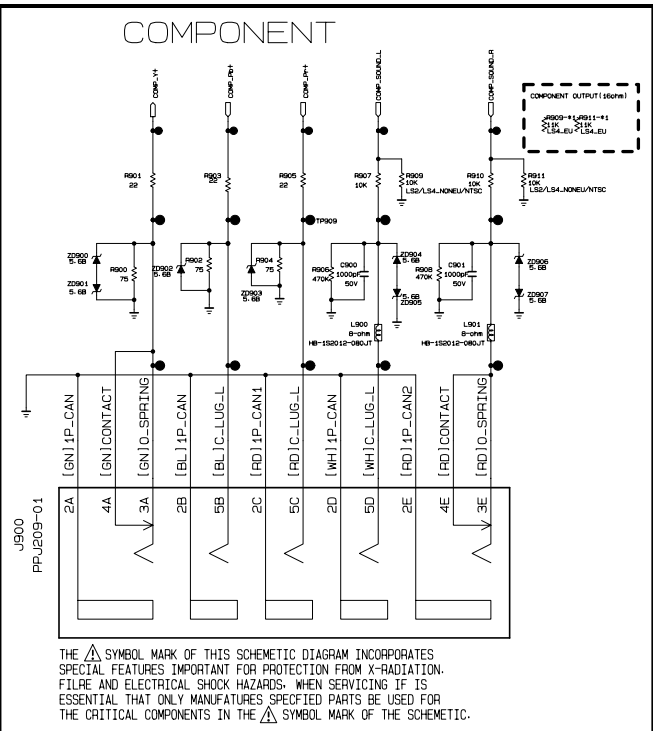
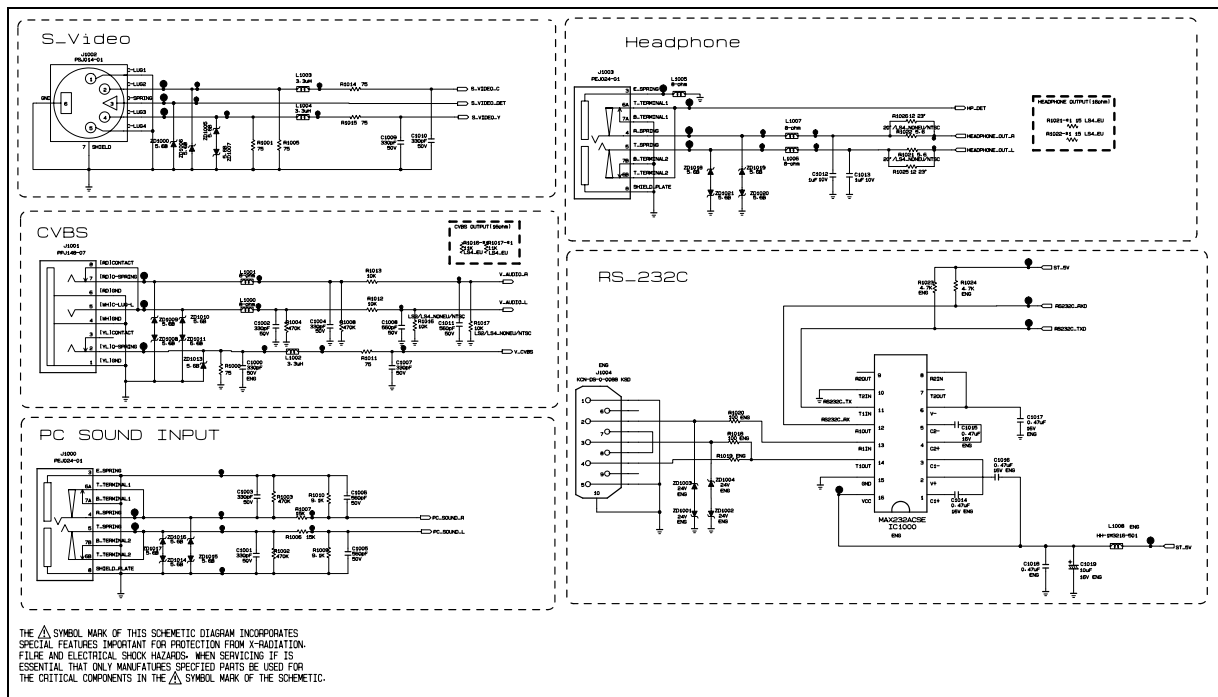
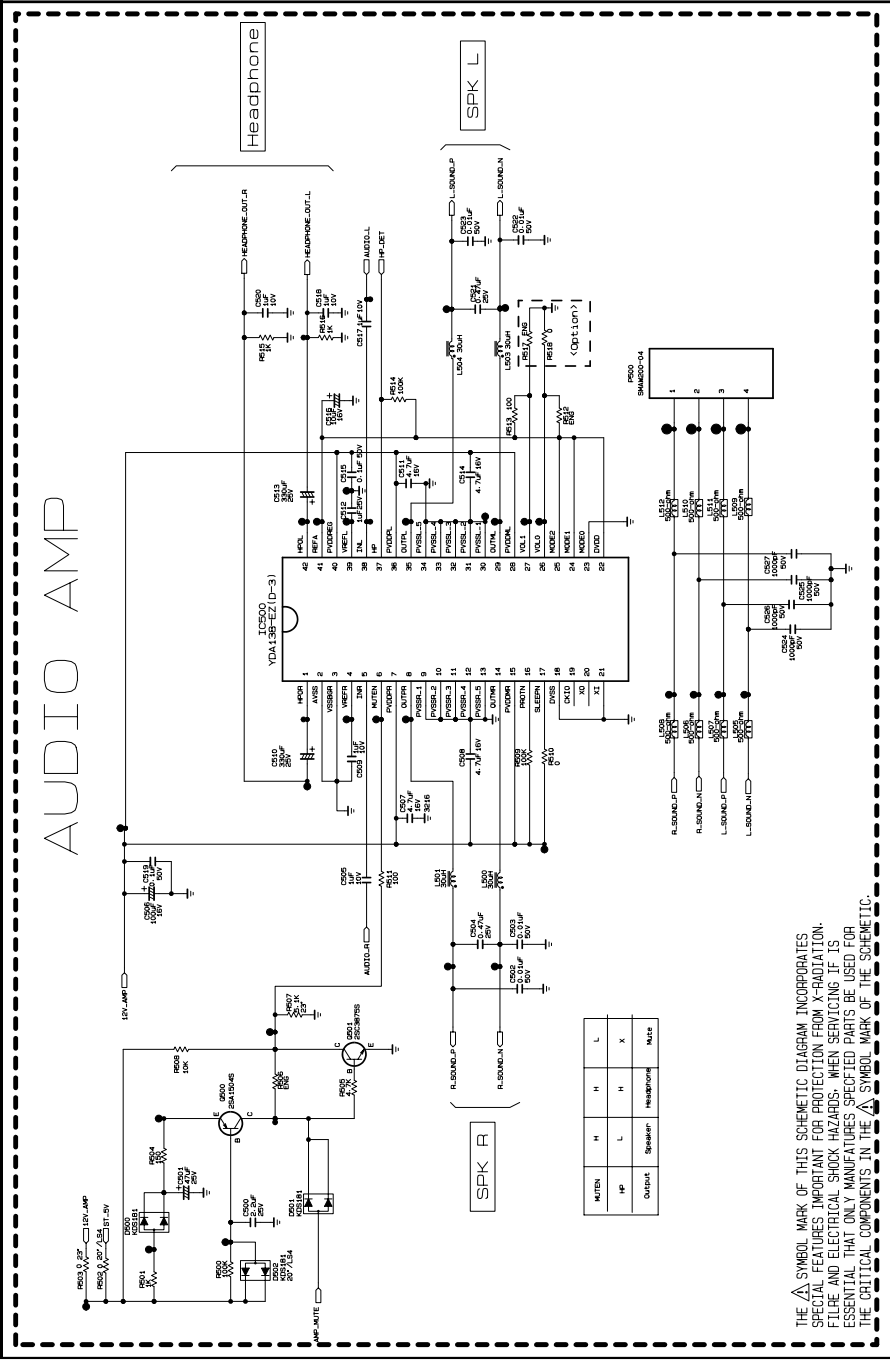
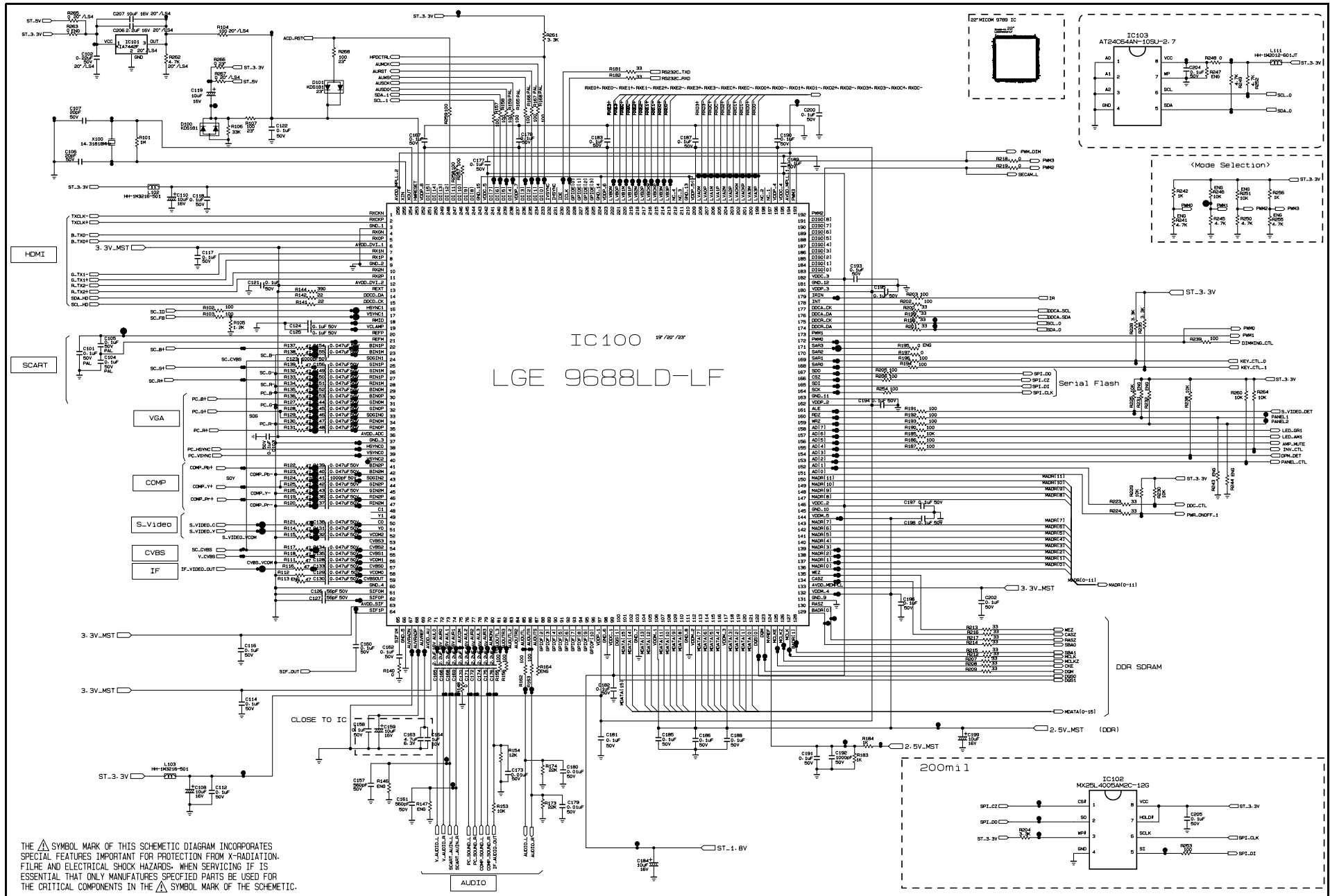
BLOCK DIAGRAM

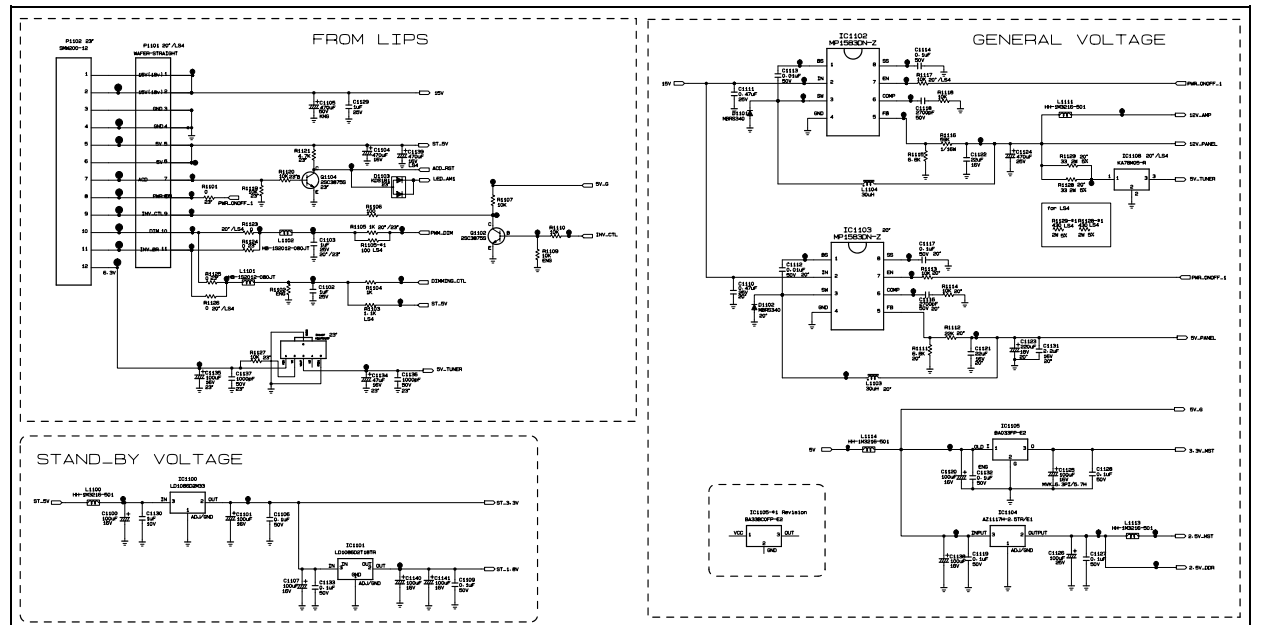
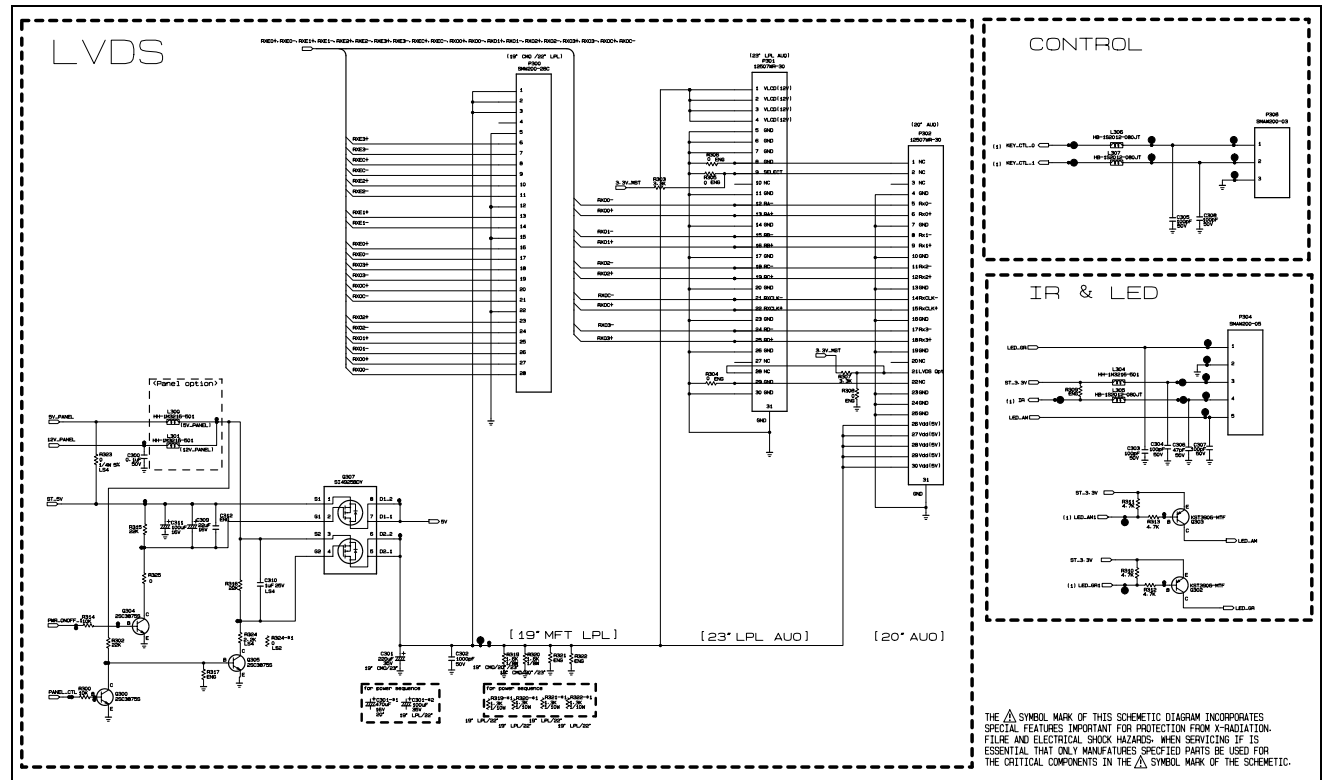
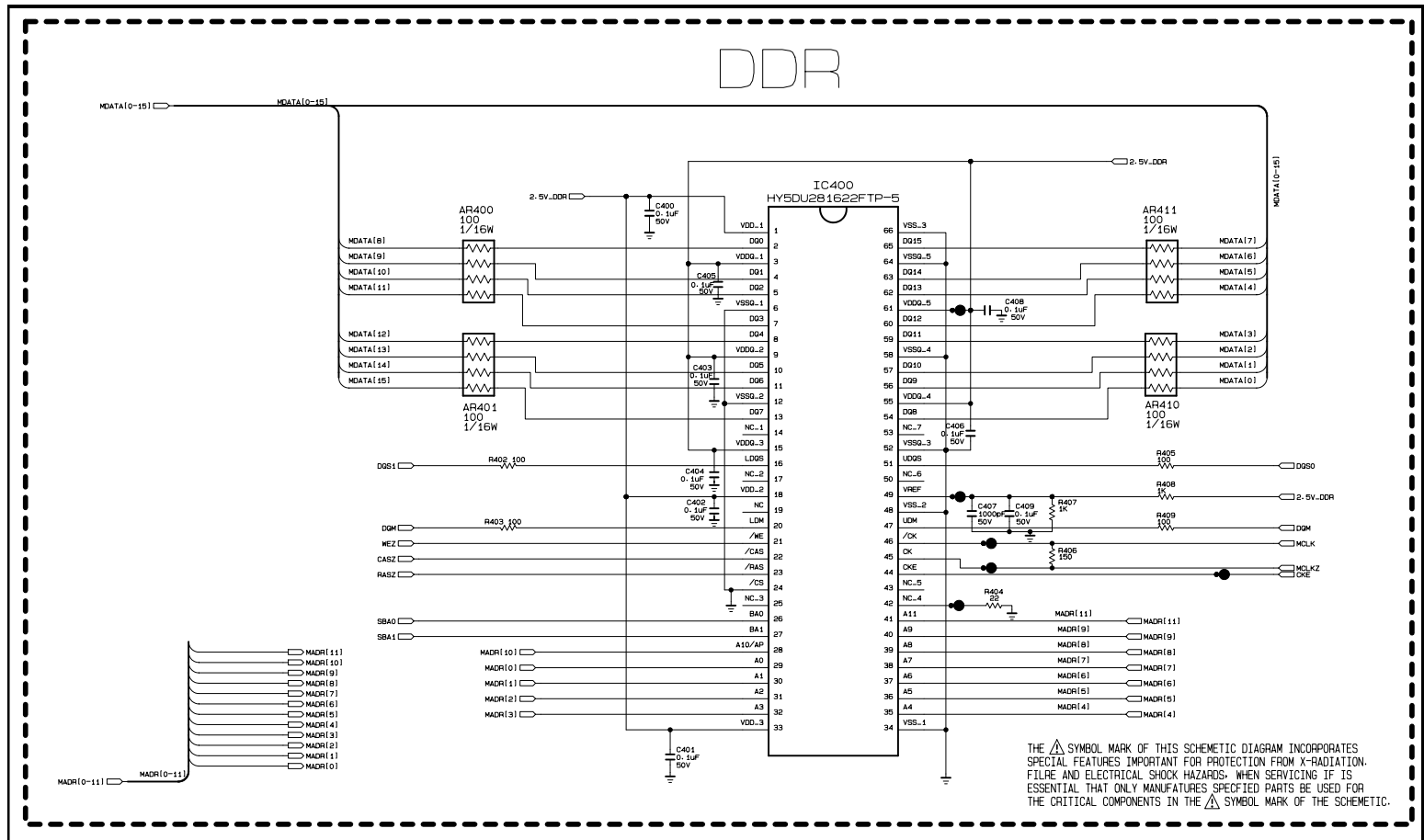
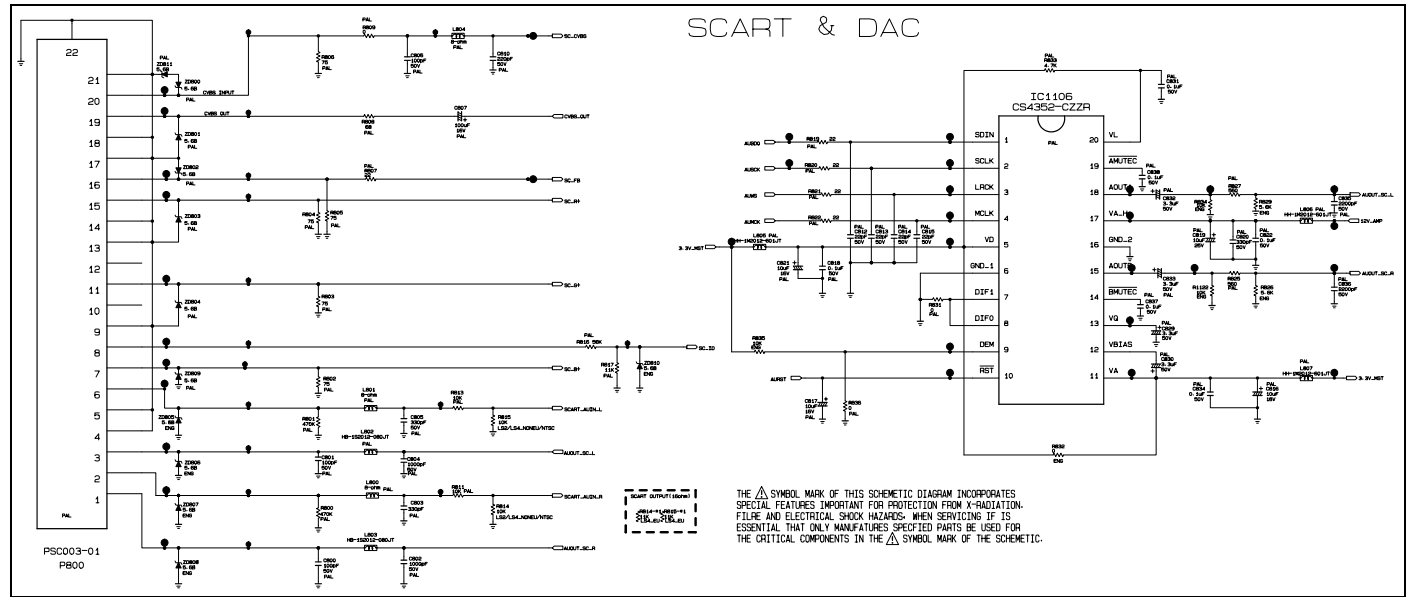
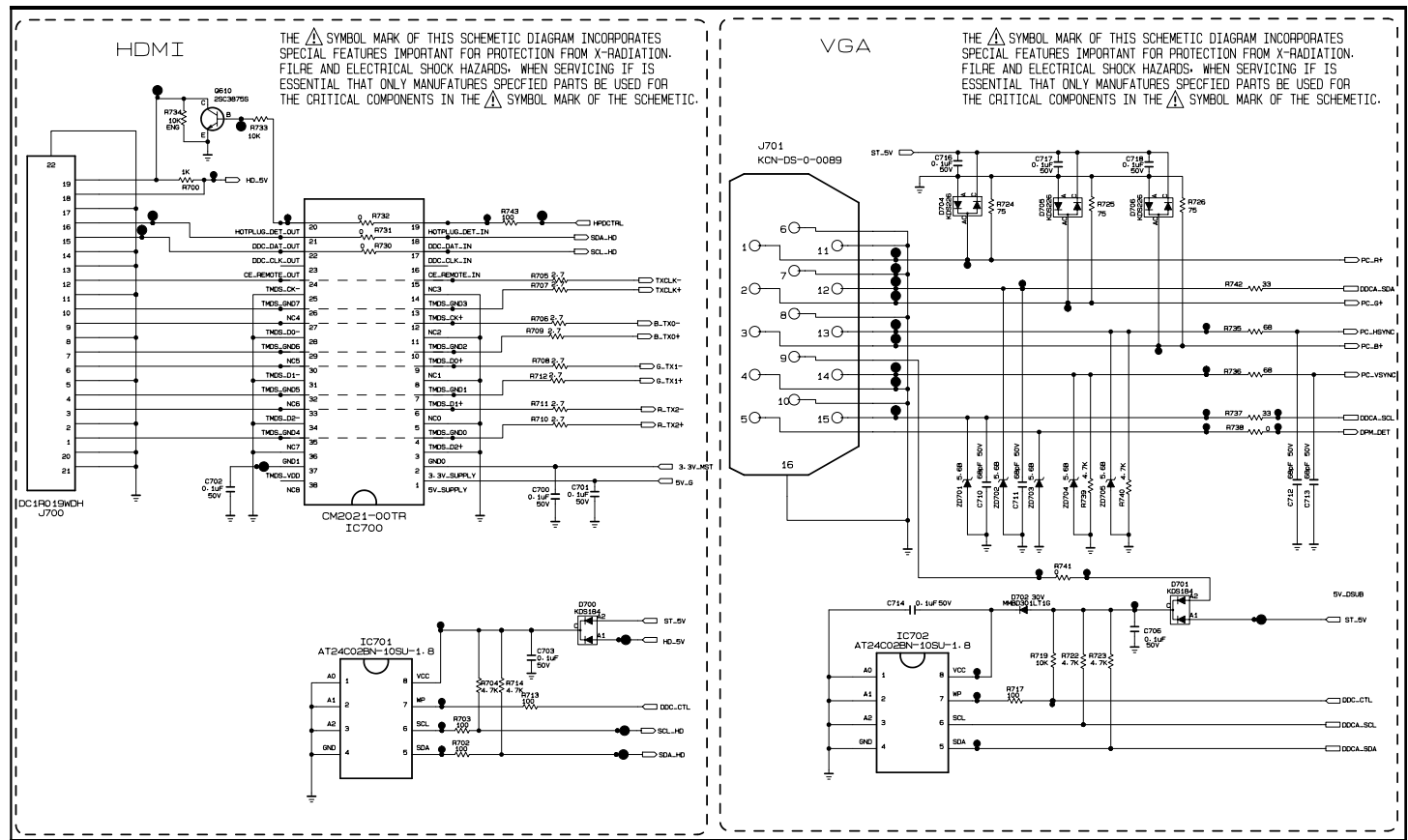


MEMO

EXPLODED VIEW









P/NO : MFL37731902

Mar., 2007
Printed in Korea