LCD TV
SERVICE MANUAL

CHASSIS : LP78A

MODEL : 32LB9R/RA  32LB9R/RA-TD
   32LB9R1/RB  32LB9R1/RB-TB

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 in the Schematic Diagram and Exploded View. 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 1MΩ and 5.2MΩ. 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 is 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

[Diagram of 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 in 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.

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

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 are commonly 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 of 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.

**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.

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.

7. 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.
1. Application range
This specification is applied to LP78A chassis.

2. Requirement for Test
Testing for standard of each part must be followed in below condition.
(1) Temperature : 25 ± 5°C(77 ± 9°F), CST : 40 ± 5°C
(2) Humidity : 65% ± 10%
(3) Power : Standard input voltage (100-240V~, 50/60Hz)
   *Standard Voltage of each products is marked by models
(4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
(5) The receiver must be operated for about 20 minutes prior to the adjustment.

3. Test method
(1) Performance : LGE TV test method followed
(2) Demanded other specification
   Safety : CE, IEC Specification
   EMC : CE, IEC

4. General Specification(LCD Module)

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
<th>Measurement</th>
<th>Result</th>
<th>Remark</th>
</tr>
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<tr>
<td>Display Screen Device</td>
<td>26/27/32/37/42&quot; wide Color Display Module</td>
<td>LCD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspect Ratio</td>
<td>16:9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCD Module</td>
<td>26/27/32/37/42&quot; TFT WXGA LCD</td>
<td>MAKER : AUO/CMO/LPL/CPT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Environment</td>
<td>Temp. : 0 ~ 40 deg, Humidity : 0 ~ 85%</td>
<td>LGE SPEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage Environment</td>
<td>Temp. : -20 ~ 60 deg, Humidity : 0 ~ 85 %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Voltage</td>
<td>100-240V~, 50/60Hz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Power on (Green) ≤ TBD (42&quot;) ≤ max (26&quot;, 27&quot;, 32&quot;, 37&quot;)</td>
<td>Volume: 1/8 volume of sound distortion point</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>St-By (Red) : 1.0 W</td>
<td></td>
<td></td>
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<tr>
<td>LCD Module</td>
<td>AUO Outline Dimension 26&quot; 626.0 x 373.0 x 47.5 mm (H) x (V) x (D) [with inverter]</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>32&quot; 760.0 x 450.0 x 45 mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>37&quot; 877.0 x 514.6 x 54.7 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>26&quot; 0.4215 mm</td>
<td>mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>32&quot; 0.51075</td>
<td>mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>37&quot; 0.6 x 0.6</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Light</td>
<td>26&quot;,32&quot; 8 U-lamp</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37&quot; 10 U-lamp</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMO Outline Dimension 27&quot; 637.55 x 379.8 x 40.7 mm (H) x (V) x (D) [with inverter]</td>
<td>mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>32&quot; 760 x 450 x 47.53 mm</td>
<td></td>
<td></td>
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<tr>
<td>Pixel Pitch</td>
<td>27&quot; 0.1455 x 0.4365 mm</td>
<td>mm</td>
<td></td>
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<tr>
<td></td>
<td>32&quot; 0.1730 x 0.5190 mm</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back Light</td>
<td>27&quot; 14 CCFL</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32&quot; 16 CCFL</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPL Outline Dimension 26&quot; 626 x 373 x 44.1 mm (H) x (V) x (D) [with inverter]</td>
<td>mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32&quot; 760.0 x 450.0 x 48.0 mm</td>
<td></td>
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<tr>
<td></td>
<td>37&quot; 877.0 x 516.8 x 55.5 mm</td>
<td></td>
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<tr>
<td></td>
<td>42&quot; 1006 x 610 x 56 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pixel Pitch</td>
<td>26&quot; 0.1405 x 0.4215 mm</td>
<td>mm</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>32&quot; 0.17025 x 0.51075 mm</td>
<td>mm</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>37&quot; 0.200 x 0.600 mm</td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>42&quot; 0.227 x 0.681 mm</td>
<td>mm</td>
<td></td>
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</tr>
<tr>
<td>Back Light</td>
<td>26&quot; 18 EEFL (17 EEFL) (LC260WX2-SLB3)</td>
<td>(LPL 26&quot;)</td>
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<td></td>
</tr>
<tr>
<td>Display Colors</td>
<td>16.7M (16,777,216)</td>
<td>mm</td>
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</tr>
<tr>
<td>Coating</td>
<td>3H, AG</td>
<td>mm</td>
<td></td>
<td></td>
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5. Model Specification (NON EU)

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<thead>
<tr>
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<th>Specification</th>
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<td>NON EU, CHINA</td>
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<tr>
<td>Broadcasting system</td>
<td>PAL BG/DK, PAL III, NTSC-M</td>
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<tr>
<td>Available Channel</td>
<td>BAND PAL NTSC China(DK) Australia(BG)</td>
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<tr>
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<td>VHF/UHF C1–C69 2–83</td>
<td>VHF/UHF C1–C62 C1–C75</td>
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<td></td>
<td>CATV S1–S47 1–71</td>
<td>CATV S1–S41 S2–S44</td>
</tr>
<tr>
<td>Receiving system</td>
<td>Upper Heterodyne</td>
<td></td>
</tr>
<tr>
<td>Video Input (2EA)</td>
<td>PAL, SECAM, NTSC</td>
<td>Rear 1EA, Side 1EA</td>
</tr>
<tr>
<td>AV Output (1EA)</td>
<td>PAL, SECAM, NTSC</td>
<td>Rear 1EA</td>
</tr>
<tr>
<td>S-Video Input (1EA)</td>
<td>PAL, SECAM, NTSC</td>
<td>Side AV</td>
</tr>
<tr>
<td>Component Input (2EA)</td>
<td>Y/Ch/Cr, Y/Pr/Pb</td>
<td>S-Video Priority</td>
</tr>
<tr>
<td>RGB Input (1EA)</td>
<td>RGB-PC</td>
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</tr>
<tr>
<td>HDMI Input (2EA)</td>
<td>HDMI-DTV</td>
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</tr>
<tr>
<td>Audio Input (5EA)</td>
<td>PC Audio, Component (2EA), AV (2EA)</td>
<td>L/R Input(PC 1EA, Component 1EA, Rear 1EA, Side 1EA)</td>
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<tr>
<td>Variable Audio out(1EA)</td>
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6. Component Video Input (Y, Ps, Pr)

<table>
<thead>
<tr>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(kHz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>720'480</td>
<td>15.73</td>
<td>59.94</td>
<td>13.500</td>
<td>SDTV, DVD 480(525I)</td>
</tr>
<tr>
<td>720'480</td>
<td>15.75</td>
<td>60.00</td>
<td>13.514</td>
<td>SDTV, DVD 480(525I)</td>
</tr>
<tr>
<td>720'576</td>
<td>15.625</td>
<td>50.00</td>
<td>13.500</td>
<td>SDTV, DVD 576(625I) 50Hz</td>
</tr>
<tr>
<td>720'480</td>
<td>31.47</td>
<td>59.94</td>
<td>27.000</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>720'480</td>
<td>31.50</td>
<td>60.00</td>
<td>27.027</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>720'576</td>
<td>31.25</td>
<td>50.00</td>
<td>27.000</td>
<td>SDTV 576P 50Hz</td>
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<tr>
<td>1280'720</td>
<td>44.96</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 720P</td>
</tr>
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<td>45.00</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 720P</td>
</tr>
<tr>
<td>1280'720</td>
<td>37.50</td>
<td>50.00</td>
<td>74.250</td>
<td>HDTV 720P 50Hz</td>
</tr>
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<td>33.72</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 1080i</td>
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<tr>
<td>1920'1080</td>
<td>33.75</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>1920'1080</td>
<td>28.125</td>
<td>50.00</td>
<td>74.250</td>
<td>HDTV 1080i 50Hz</td>
</tr>
</tbody>
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7. RGB Input (Analog PC)

<table>
<thead>
<tr>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(kHz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>640'350</td>
<td>31.468</td>
<td>70.80</td>
<td>25.17</td>
<td>EGA</td>
<td></td>
</tr>
<tr>
<td>720'400</td>
<td>31.469</td>
<td>70.80</td>
<td>28.321</td>
<td>DOS</td>
<td></td>
</tr>
<tr>
<td>640'480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA(VGA)</td>
<td></td>
</tr>
<tr>
<td>800'600</td>
<td>37.879</td>
<td>60.31</td>
<td>40.00</td>
<td>VESA(SVGA)</td>
<td></td>
</tr>
<tr>
<td>1024'768</td>
<td>48.363</td>
<td>60.00</td>
<td>65.00</td>
<td>VESA(XGA)</td>
<td></td>
</tr>
<tr>
<td>1280'768</td>
<td>47.776</td>
<td>59.87</td>
<td>79.50</td>
<td>WXGA</td>
<td>XGA only</td>
</tr>
<tr>
<td>1360'768</td>
<td>47.720</td>
<td>59.799</td>
<td>84.75</td>
<td>WXGA</td>
<td>XGA only</td>
</tr>
<tr>
<td>1366'768</td>
<td>47.720</td>
<td>59.799</td>
<td>84.75</td>
<td>WXGA</td>
<td>XGA only</td>
</tr>
</tbody>
</table>
## 8. HDMI input (DTV)

<table>
<thead>
<tr>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(kHz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>720*480</td>
<td>15.75</td>
<td>60.00</td>
<td>13.514</td>
<td>SDTV, DVD 480(525i)</td>
</tr>
<tr>
<td>720*480</td>
<td>15.73</td>
<td>59.94</td>
<td>13.500</td>
<td>SDTV, DVD 480(525i)</td>
</tr>
<tr>
<td>720*576</td>
<td>15.625</td>
<td>50.00</td>
<td>13.500</td>
<td>SDTV, DVD 576(625i) 50Hz</td>
</tr>
<tr>
<td>720*480</td>
<td>31.47</td>
<td>59.94</td>
<td>27.000</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>720*480</td>
<td>31.50</td>
<td>60.00</td>
<td>27.027</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>720*576</td>
<td>31.25</td>
<td>50.00</td>
<td>27.000</td>
<td>SDTV 576P 50Hz</td>
</tr>
<tr>
<td>1280*720</td>
<td>44.96</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 720P</td>
</tr>
<tr>
<td>1280*720</td>
<td>45.00</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 720P</td>
</tr>
<tr>
<td>1280*720</td>
<td>37.50</td>
<td>50.00</td>
<td>74.250</td>
<td>HDTV 720P 50Hz</td>
</tr>
<tr>
<td>1920*1080</td>
<td>33.72</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>1920*1080</td>
<td>33.75</td>
<td>60.00</td>
<td>74.250</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>1920*1080</td>
<td>28.125</td>
<td>50.00</td>
<td>74.250</td>
<td>HDTV 1080i 50Hz</td>
</tr>
<tr>
<td>1920*1080</td>
<td>67.432</td>
<td>59.94</td>
<td>148.350</td>
<td>HDTV 1080P</td>
</tr>
<tr>
<td>1920*1080</td>
<td>67.5</td>
<td>60.00</td>
<td>148.5</td>
<td>HDTV 1080P</td>
</tr>
<tr>
<td>1920*1080</td>
<td>56.250</td>
<td>50.00</td>
<td>148.5</td>
<td>HDTV 1080P 50Hz</td>
</tr>
</tbody>
</table>
ADJUSTMENT INSTRUCTION

1. Application Range

This spec sheet is applied all of the 26/32/37/42" LCD TV(LP78A) by manufacturing 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 protect test instrument.
2) Adjustment must be done in the correct order.
3) The adjustment must be performed in the circumstance of 25±5°C of temperature and 65±10% of relative humidity if there is no specific designation.
4) The input voltage of the receiver must keep 100~220V, 50/60Hz.
5) Before adjustment, execute Heat-Run for 30 minutes at RF no signal.

3. Adjustment items

3.1. PCB assembly adjustment items
1) Download the VCTP main software (IC500,VCT_Pro)
2) Channel memory (IC501,EEPROM)
3) Color carrier Adjustment

3.2. SET assembly adjustment items
1) DDC Data input.
2) Adjustment of White Balance.
3) Factoring Option Data input.

4. PCB assembly adjustment method (Using VCTP Download program)

4.1. Download program installation
(1) Extract a Zip file
(2) Visual I2C & LPT Driver Installation

LPT Port Driver (LptDrv) Setups : Program Files > Micronas > Visual I2C > Port_Driver
*Use for Windows 95/98 : Setup_LptDrv_v0104_9x.exe
*Use for Windows NT : Setup_LptDrv_v0104_NT.exe

(3) Verification (Start > Programs > Micronas > Visual I2C or LptDrv)

(4) LPT delay setting(File > Preference > LPT preferences)

* LPT SETTING
  - Delay => 1
  - Time out => 500 ms

(5) Exchange the bootloader.bat file.
4.2. S/W program download

(1) Download method 1 (PCB Ass'y)

1) Connect the download jig to D-sub jack
2) Execute ‘Download.v2c’ program in PC, then a main window will be opened
3) Double click the blue box and confirm “Bootloader Version” as 42.
4) Click the “Erase Flash” button
5) Double click the download file low, then “edit” window will be opened.
6) Click the choice button in the “edit window”, then “file choice window” will be opened.
7) Choose the Hex file in folder and execute downloading with click “open” button.

=> Select the "Bootloader.bat" file(install > VCTP_download > Bootloader)
=> Push "OK"

=> Finish the program, after saving the file "download_cs.v2c"
(if you click [X], the massage appears automatically)
8) Click OK button at the "edit window".
9) Under Downloading process

10) If download is failed, for example "No acknowledge from slave". Execute download again from (1).

(2) Download method 2 (AV Plate Ass'y)

1) Push S/W 'ON' (connect SCL to GND using switch at Jig) and connect the download jig to D-sub jack.

2) Supply the power (Stand-by 5V) and wait for 3 seconds.

3) Push the S/W off (Disconnect SCL to GND using switch at Jig).

4) Execute 'Download.vi2c' program in PC, then a main widow will be opened.

5) Double click the blue box and confirm "Bootloader Version" as 42.

6) Click the "Erase Flash" button.

7) Double click the download file low then, "edit" window will be opened.

8) Chick the choice button in the "edit window", then "file choice window" will be opened.
9) Choose the Hex file in folder and execute downloading with click "open button".

2) Connect Zig to TV using a D-sub cable.

10) Click OK button at the "edit window".

3) Execute 'Download_CS.vi2c' program in PC, then a main widow will be opened.

11) Under Downloading progress.

4) Click "GO" button.

12) If download is failed, for example "No acknowledge from slave", execute download again from (1).

If you don’t push the "go", the Hex file would not be downloaded although the download proceeds normally at first glance.

5) Double click the blue box and confirm "Bootloader Version" as 42.

(3) Download method 3 (SET)

1) Push the "Tilt" button in an Adjust Remote control Then the LCD TV will change a "slave mode".

6) Click the "Erase Flash" button
7) Double click the download file low then, "edit" window will be opened.

8) Chick the choice button in the "edit window", then "file choice window" will be opened.

9) Choose the Hex file in folder and execute downloading with click "open button".

10) Click OK button at the "edit window".

11) Downloading

12) If download is failed, for example "No acknowledge from slave", execute download again from (1).

4.3. Channel memory download

(1) Connect the download jig to D-sub jack.

(2) Execute ‘Channel.vi2c’ program in PC, then a main window will be opened.

(3) Push the button change and select the Channel memory data.

(4) Check the communication is OK or not. => Push the Read area (Ackn. Check) and check Cyan area is OK message.

(5) Push the Update NVM from File
4.4. Tool Option Area Option Change
Before PCB check, have to change the Tool option and Area option
Option values are below
(If on changed the option, the input menu can differ the model spec.)
The input methods are same as other chassises(Use adj Key
on the Adjust Remote control)
- 32LB9R : 21712

4.5. Color carrier Adjustment
(Inspection process)
(1) Profile : To have the margin about the deviation of color
carrier to satisfy the spec.
(2) Equipment :
: adjustment remocon, Pal RF signal, NTSC RF signal
(3) Connection : TV set should connected with the pal RF
signal (EU 5CH) or NTSC RF signal (US 4CH).
(4) Adjustment method
  1) Tuning the RF signal
    : PAL Philips Pattern(with color Bar), NTSC-US 4CH
  2) push the "adj" key in the adjustment remote control.

5. EDID(The Extended Display Identification Data )
/DDC(Display Data Channel) download
* Caution
  - Use the proper signal cable for EDID Download.
  - Never connect HDMI & D-SUB Cable at the same time.
  - Use the proper cables below for EDID Writing.

* EDID Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer ID</td>
<td>GSM</td>
<td>1E6D</td>
</tr>
<tr>
<td>Version</td>
<td>Digital : 1</td>
<td>01</td>
</tr>
<tr>
<td>Revision</td>
<td>Digital : 3</td>
<td>03</td>
</tr>
</tbody>
</table>

* VGA
<Analog (RGB)>

---

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<tbody>
<tr>
<td>Manufacturer ID</td>
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<td>Digital : 1</td>
<td>01</td>
</tr>
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<td>Digital : 3</td>
<td>03</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer ID</td>
<td>GSM</td>
<td>1E6D</td>
</tr>
<tr>
<td>Version</td>
<td>Digital : 1</td>
<td>01</td>
</tr>
<tr>
<td>Revision</td>
<td>Digital : 3</td>
<td>03</td>
</tr>
</tbody>
</table>

---
5.1. Required Test Equipment
(1) Adjusting PC with S/W for writing EDID data. (S/W: EDID TESTER Ver.2.5)
(2) A Jig for EDID Download.
(3) Cable: Serial(9Pin or USB) to D-sub 15Pin cable, D-sub 15Pin cable, DVI to HDMI cable.

5.2. Preparation for Adjustment
(1) As above Fig 5, Connect the Set, EDID Download Jig, PC & Cable.
(2) Turn on the PC & EDID Download Jig. And execute the S/W : EDID TESTER Ver.2.5.
(3) Set up the S/W option.
   Repeat Number : 5
   Device Address : A0
   PageByte : 8

(4) Power on the Set.

5.3. Sequence of Adjustment
(1) DDC data of Analog-RGB
   1) Init the data
   2) Load the EDID data. (Open file)
      [Analog - RGB : LP78A_RGB.ANA]
      [Digital - HDMI1 : LP78A_HDMI1.DVI]
      [Digital - HDMI2 : LP78A_HDMI2.DVI]

"Fig.5 Connector Diagram of DDC download"
3) Set the S/W as below.

4) Push the "Write Data & Verify" button. And confirm “Yes”.
5) If the writing is finished, you will see the "OK" message.

6. Adjustment of White Balance

6.1. Purpose and Principle for adjustment of the color temperature

(1) Purpose: Adjust the color temperature to reduce the deviation of the module color temperature.
(2) Principle: To adjust the white balance without the saturation, fix the one of R/G/B gain to 80 and decrease the others.

6.2. Adjustment mode

- Two modes of Cool and Warm
  (Medium data is automatically calibrated by the cool data)

6.3. Required Equipment

(1) Remote control for adjustment
(2) Color Analyzer (CA-100+ or CA-210 or same product)
(3) Auto W/B adjustment instrument (only for Auto adjustment)

6.4. Connecting diagram of equipment for measuring (For Automatic Adjustment)

(1) Enter the adjustment mode of the white balance
   - Enter the white balance adjustment mode at the same time heat-run mode when pushing the power on by power only key.
   - Maintain the white balance adjustment mode with same condition of Heat-run. (Maintain after AC off/on in status of Heat-run pattern display)

(2) Release the white balance adjustment mode
   - Release the adjust mode after AC off/on or std-by off/on in status of finishing the Heat-run mode
   - Release the Adjust mode when receiving the aging off command (F3 00 00) from adjustment equipment
   - Need to transmit the aging off command to TV set after finishing the adjustment.

- Standard color coordinate and temperature when using the CA-100+ or CA210 equipment

<table>
<thead>
<tr>
<th>Mode</th>
<th>Color coordinate</th>
<th>Temp</th>
<th>Δuv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>0.276±0.002</td>
<td>0.283±0.002</td>
<td>11,000K</td>
</tr>
<tr>
<td>Medium</td>
<td>0.285±0.002</td>
<td>0.293±0.002</td>
<td>9,300K</td>
</tr>
<tr>
<td>Warm</td>
<td>0.313±0.002</td>
<td>0.329±0.002</td>
<td>6,500K</td>
</tr>
</tbody>
</table>

- Synchronization relation between PSM and CSM

<table>
<thead>
<tr>
<th>PSM</th>
<th>CSM</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic</td>
<td>Cool</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>Warm</td>
<td></td>
</tr>
</tbody>
</table>
6.5. Adjustment of White Balance

(For Manual adjustment)
- Adjustment mode : Two modes of Cool (Dynamic) and Warm(Mild) (Medium data is automatically calibrated by the cool data)
- Color analyzer(CA110, CA210) should be used in the calibrated ch by CS-1000.(LCD : CH9, PDP : CH10)
- Operate the zero-calibration of the CA-110 or CA-210, then stick sensor to the module when adjusting.
- For manual adjustment, it is also possible by the following sequence

(1) Select white pattern of heat-run by pressing "POWER ON" key on remote control for adjustment then operate heat run longer than 15 minutes. (If not executed this step, the condition for W/B will be differ.)
(2) Changing to the av mode by remote control.(av mode : av1 or av2 or av3)
(3) Display the internal pattern of the VCT-Pro IC by pushing the IN-START.
(4) Stick sensor to center of the screen and select each items (Red/Green/Blue Gain and Offset) using ▲▼(CH ±) key on R/C.
(5) Adjust R/G/B Gain using ◀▶(VOL ±) key on R/C.
(6) Adjust two modes of Cool(Dynamic) and Warm(Mild) as below figure. (Fix the one of R/G/B and change the others)
   1) Push the one time the in-start key : Dynamic(Cool)
   2) Push the two more the in-start key : Mild(Warm)

   1) x, y > target
      - First decrease B, so make y a little more than the target.
      - Adjust x value by decreasing the R
   2) x < target, y > target
      - First decrease B, so make x a little more than the target.
      - Adjust x value by decreasing the G.

(7) When adjustment is completed, Exit adjustment mode using EXIT key on R/C.

6.6. Input the Shipping Option Data

1) Push the ADJ key in a Adjust Remote control.
2) Input the Option Number that was specified in the BOM, into the Shipping area.
3) The work is finished, Push ■ Key.

7. Default Value in Adjustment mode

( Default values maybe modified the module condition)

8. Internal press test

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric Voltage (AC &lt;&gt; FG)</td>
<td>1.5</td>
<td>kV</td>
<td>At 100mA for 1sec (Line)</td>
</tr>
<tr>
<td>Dielectric Voltage (Without FG)</td>
<td>3</td>
<td>kV</td>
<td>At 100mA for 1min (OQC)</td>
</tr>
</tbody>
</table>

9. Sound spec.

<table>
<thead>
<tr>
<th>Item</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio Practical Max Output, L(Mono)/R</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>W</td>
<td>LCD</td>
</tr>
</tbody>
</table>
TROUBLESHOOTING

1. No power

(1) Symptom
   1) Minute discharge does not occur at module.
   2) Front LED does not activate.

(2) Press check

Start Check

Is the power cord plugged in?
   No ➔ Plug in the power cord.
   Yes

Are the line filter and PSU connected?
   No ➔ Connect the cable (SC100).
   Yes

Is the correct fuse for the PSU in place? LCD(F100)
   No ➔ Replace the fuse.
   Yes

Is the PSU and 13-14pin cable connected to the VSC board?
   No ➔ Connect the 13-14pin cable.
   Yes

Next remove all cables connected to the PSU and switch the AV voltage to manual.
If the ST-by 5V does not operate, replace the PSU.
2. Protect mode

(1) Symptom
1) After lighting once it does not discharge minutely from the module.
2) The relay falls.(there is an audible “Click”.)
3) The color of the front LED turns from green to red.

(2) Follow check

Start Check

Is the Power Board normal?
- Yes
- No
  Is the output the normal Low/High voltage except for the Stand-by 5V?
    - No
      Replace Power Board.
    - Yes
      Are all the connectors normal?
        - Yes
        - No
          After checking each connector does it operate correctly?
            - Yes
            - No
              Replace the connector.
        - No
          Is the Y-Board normal?
            - Yes
            - No
              Is the appropriate fuse (FS2,FS3) on the Y-B/D?
                - No
                  Replace the Y-Board.
                - Yes
                  Replace the fuse.
          - No
            Is the Z-Board normal?
              - Yes
              - No
                Is appropriate fuse (FS1,FS2) on the Z-B/D?
                  - No
                    Replace the Z-Board.
                  - Yes
                    Replace the fuse.
          - No
            Is the X-Board normal?
              - Yes
              - No
                Is the output voltage normal after removing the P1 connector of the X-B/D?
                  - No
                    Replace the fuse.
                  - Yes
                    After removing the P100, 110 and the output voltage is normal : Replace the Right X-B/D
                    After removing the P200, 210 and the output voltage is normal : Replace the Left X-B/D
                    Replace the Y-Board.
3. No Raster

(1) Symptom
1) No OSD or image are displayed on the screen.
2) The front LED remains green.

(2) Follow check

Start Check

- Does minute discharge at Module?
  - No
  - Is the inverter /VaVs on?
    - No
    - Is output the normal Low/High voltage except for the Stand-by 5V?
      - Replace the Power board.
    - Yes
      - Check the LCD Module
  - Yes
    - Check the LCD Module

- Is there a fault with the link cable?
  - No
    - Is the output for the IC500 normal?
      - No
        - Replace the VSC.
      - Yes
        - Is the LVDS Cable connected?
          - No
            - Re-insert the cable.
          - Yes
            - Change the IC(IC500)

  - Yes
    - Is the video output of the Tuner normal? (Check TU400_Pin13)
      - No
        - Is the input voltage normal? (Check Pin3)
          - Yes
            - Is the I2C communication normal? (Check Pin9, Pin10)
              - Yes
                - Is the LVDS Cable connected?
                  - No
                    - Check the power.(L1103)
                  - Yes
                    - Change the IC(IC500)
          - No
            - Check the Tuner.
      - Yes
        - Re-insert the cable.

4. In the case an unusual display in RF mode.

- Is the video output of the Tuner normal? (Check TU400_Pin13)
  - No
    - Is the input voltage normal? (Check Pin3)
      - Yes
        - Is the I2C communication normal? (Check Pin9, Pin10)
          - Yes
            - Is the LVDS Cable connected?
              - No
                - Check the power.(L1103)
              - Yes
                - Change the IC(IC500)
          - No
            - Check the Tuner.
5. In the case of an unusual display in rear AV mode.

Is video input of the A/V jack normal? (Check R172)

- Yes: Sam as Block A
- No: Check the input source.

6. In the case of an unusual display in Side AV mode.

Is the video input of the A/V jack normal? (Check CN703 Pin9)

- Yes: Sam as Block A
- No: Check the input source.

7. In the case of an unusual display in Side S-Video mode.

Is the video input of the A/V jack normal? (Check CN703 Pin1, Pin3)

- Yes: Sam as Block A
- No: Check the input source.
8. In the case of an unusual display in SCART 1 mode.

- Is the video input of the A/V jack normal? (Check R172)
  - Yes: Sam as Block A
  - No: Check the input source.

9. In the case of an unusual display in SCART 1_RGB mode.

- Is the video input of the A/V jack normal? (Check R110, R170, R171, R173)
  - Yes: Sam as Block A
  - No: Check the input source.

10. In the case of an unusual display in SCART 2 mode.

- Is the video input of the A/V jack normal? (Check R174)
  - Yes: Sam as Block A
  - No: Check the input source.
11. In the case of an unusual display in component 1 mode.

Is the video input of the A/V jack normal? (Check R248, R249, R250)

Yes

Change the IC(IC500)

No

Check the input source.

12. In the case of an unusual display in component 2 mode.

Is the video input of the A/V jack normal? (Check R241, R242, R243)

Yes

Change the IC(IC500)

No

Check the input source.

13. In the case of an unusual display in RGB mode.

Is the R, G, B input and H, V sync of the JK201 normal? (Check R220, R221, R253, R254, R255)

Yes

Change the IC(IC500)

No

Check the input source.
14. No Sound

(1) Symptom
1) LED is green.
2) There is a picture but no sound.

(2) Follow check

Is there sound in any mode? Yes

Is there no sound only for HDMI? Yes

Is there no sound only AV/COM2/PC? Yes

Is there no sound only for RF? No

Is the speaker on? Yes

Is the speaker cable normal? Yes

Is the output of IC600 (R607, R608) normal? Yes

Download the EDID data.

Set speaker on in the menu.

Is the speaker cable normal? Yes

Is the IC600 operating normal? Yes

Check the signal after IC600. refer to circuit diagram.

Replace the IC600

No

Is the IC500 operating normal? Yes

Replace the IC500

No

Is the IC601 operating normal? Yes

Replace the IC601

No

Check the Tuner In/Out.

Replace the VSC BD
15. HDMI mode

Is only video normal?

Yes → Download EDID data each port.

No → Is only audio normal?

Yes → Check the TMDS line wave. (R312~E3273)

No → Check HDMI source. Change to another source or cable.

Is the wave continuous?

Yes → 1. Check TV input mode. (HDMI 1 port support HDMI and DVI. So if you input DVI signal and PC audio from phone jack, You can hear PC audio.)
2. Unplug and plug in the HDMI cable. (sometimes ESD surge occurred at HDMI port.)
3. Check the HDMI Mute register. (0x68, offset 0x37)
4. Check the Audio-out channel mute register (0x68, offset 0x32) is appropriately enabled.

No → Reset TMDS power down/ on register. - 0x60, offset 0x3f => 0xff

Yes → Normal video, Normal audio?

No → Replace the IC303.
EXPLODED VIEW

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by △ in the Schematic Diagram and EXPLODED VIEW. It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.