LCD TV

SERVICE MANUAL

CHASSIS : LD91A
MODEL : 37LH2000  37LH2000-ZA
             37LH2010  37LH2010-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 △ 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 it's 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)

Plugging 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

When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than 0.1 Ω

*Base on Adjustment standard
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.
   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 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.
   Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach a normal temperature. (500°F to 600°F)
   b. Heat the component lead and the foil.
   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 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.
NOTE: Specifications and others are subject to change without notice for improvement.

1. Application range
This specification is applied to the LCD TV used LD91A chassis.

2. Requirement for Test
Each part is tested as below without special appointment.

1) Temperature: 25±5°C (77±9°F), CST: 40±5°C
2) Relative Humidity: 65±10%
3) Power Voltage: 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 5 minutes prior to
   the adjustment.

3. Test method
1) Performance: LGE TV test method followed
2) Demanded other specification
   - Safety: CE, IEC/EN60065
   - EMC: CE, IEC

4. Electrical specification
   - Module General Specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screen Device</td>
<td>37&quot; wide color display module LCD</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Aspect Ratio</td>
<td>16:9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LCD Module</td>
<td>37&quot; TFT LCD HD LGD</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Storage Environment</td>
<td>Temp.: -20~60 deg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity: 10~90%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Input Voltage</td>
<td>AC100-240V~, 50/60Hz</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Power Consumption</td>
<td>Typ: 123.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LCD(Module) + Backlight(Lamp)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Module Size</td>
<td>877.0 (H) x 516.8 (V) x 55.5 (D)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Pixel Pitch</td>
<td>0.200(H) x 0.600(V)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Back Light</td>
<td>16 EEFL</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Display Colors</td>
<td>1.06Billion(FHD LGD), 16.7M (others)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Coating</td>
<td>3H, AG</td>
<td></td>
</tr>
</tbody>
</table>
## 5. Chroma & Brightness
- Module optical specification

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Specification</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Viewing Angle&lt;CR&gt;10&gt;</td>
<td>Right/Left/Up/Down</td>
<td>178</td>
<td></td>
<td></td>
<td>Degree</td>
</tr>
<tr>
<td>2</td>
<td>Luminance</td>
<td>Luminance (cd/m²)</td>
<td>400</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variation</td>
<td>-</td>
<td></td>
<td>1.3</td>
<td>MAX /MIN</td>
</tr>
<tr>
<td>3</td>
<td>Contrast Ratio</td>
<td>CR</td>
<td>800</td>
<td>1200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>CIE Color Coordinates</td>
<td>White WX</td>
<td>0.279</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WY</td>
<td>0.292</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RED Xr</td>
<td>0.636</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yr</td>
<td>0.335</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green Xg</td>
<td>0.290</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yg</td>
<td>0.610</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blue Xb</td>
<td>0.144</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yb</td>
<td>0.063</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Standard Test Condition (The unit has been ‘ON’)
2) Stable for approximately 30 minutes in a dark environment at 25±2°C.
3) The values specified are at approximate distance 50Cm from the LCD surface
4) Ta=25±2°C, VLCD=12.0V, fV=60Hz, Dclk=74.25MHz VBR_A=1.65V, ExtVBR_B=100%

## 6. Component Video Input (Y, Cb/Pb, Cr/Pr)

<table>
<thead>
<tr>
<th>No</th>
<th>Resolution</th>
<th>Specification</th>
<th>H-freq(kHz)</th>
<th>V-freq(Hz)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>720x480</td>
<td></td>
<td>15.73</td>
<td>60.00</td>
<td>SDTV,DVD 480i</td>
</tr>
<tr>
<td>2</td>
<td>720x480</td>
<td></td>
<td>15.63</td>
<td>59.94</td>
<td>SDTV,DVD 480i</td>
</tr>
<tr>
<td>3</td>
<td>720x480</td>
<td></td>
<td>31.47</td>
<td>59.94</td>
<td>480p</td>
</tr>
<tr>
<td>4</td>
<td>720x480</td>
<td></td>
<td>31.50</td>
<td>60.00</td>
<td>480p</td>
</tr>
<tr>
<td>5</td>
<td>720x576</td>
<td></td>
<td>15.625</td>
<td>50.00</td>
<td>SDTV,DVD 625 Line</td>
</tr>
<tr>
<td>6</td>
<td>720x576</td>
<td></td>
<td>31.25</td>
<td>50.00</td>
<td>HDTV 576p</td>
</tr>
<tr>
<td>7</td>
<td>1280x720</td>
<td></td>
<td>45.00</td>
<td>50.00</td>
<td>HDTV 720p</td>
</tr>
<tr>
<td>8</td>
<td>1280x720</td>
<td></td>
<td>44.96</td>
<td>59.94</td>
<td>HDTV 720p</td>
</tr>
<tr>
<td>9</td>
<td>1280x720</td>
<td></td>
<td>45.00</td>
<td>60.00</td>
<td>HDTV 720p</td>
</tr>
<tr>
<td>10</td>
<td>1920x1080</td>
<td></td>
<td>31.25</td>
<td>50.00</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>11</td>
<td>1920x1080</td>
<td></td>
<td>33.75</td>
<td>60.00</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>12</td>
<td>1920x1080</td>
<td></td>
<td>33.72</td>
<td>59.94</td>
<td>HDTV 1080i</td>
</tr>
<tr>
<td>13</td>
<td>1920x1080</td>
<td></td>
<td>56.250</td>
<td>50</td>
<td>HDTV 1080p</td>
</tr>
<tr>
<td>14</td>
<td>1920x1080</td>
<td></td>
<td>67.5</td>
<td>60</td>
<td>HDTV 1080p</td>
</tr>
</tbody>
</table>
### 7. RGB (PC)

<table>
<thead>
<tr>
<th>No</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq(Hz)</th>
<th>Pixel Clock(MHz)</th>
<th>Proposed</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>720*400</td>
<td>31.468</td>
<td>70.08</td>
<td>28.321</td>
<td></td>
<td>For only DOS mode</td>
</tr>
<tr>
<td>2.</td>
<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA</td>
<td>Input 848<em>480 60Hz, 852</em>480 60Hz -&gt; 640*480 60Hz Display</td>
</tr>
<tr>
<td>3.</td>
<td>800*600</td>
<td>37.879</td>
<td>60.31</td>
<td>40.00</td>
<td>VESA</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<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>5.</td>
<td>1280*768</td>
<td>47.78</td>
<td>59.87</td>
<td>79.5</td>
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<tr>
<td>6.</td>
<td>1360*768</td>
<td>47.72</td>
<td>59.8</td>
<td>84.75</td>
<td>WXGA</td>
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<td>7.</td>
<td>1280*1024</td>
<td>63.595</td>
<td>60.0</td>
<td>108.875</td>
<td>SXGA</td>
<td>FHD model</td>
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<tr>
<td>8.</td>
<td>1920*1080</td>
<td>66.587</td>
<td>59.93</td>
<td>138.625</td>
<td>WUXGA</td>
<td>FHD model</td>
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### 8. HDMI Input (PC/DTV)

#### (1) DTV Mode

<table>
<thead>
<tr>
<th>No</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>720*480</td>
<td>31.469 /31.5</td>
<td>59.94 /60</td>
<td>27.00/27.03</td>
<td>SDTV 480P</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>720*576</td>
<td>31.25</td>
<td>50</td>
<td>54</td>
<td>SDTV 576P</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>1280*720</td>
<td>37.500</td>
<td>50</td>
<td>74.25</td>
<td>HDTV 720P</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>1280*720</td>
<td>44.96 /45</td>
<td>59.94 /60</td>
<td>74.17/74.25</td>
<td>HDTV 720P</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>1920*1080</td>
<td>33.72 /33.75</td>
<td>59.94 /60</td>
<td>74.17/74.25</td>
<td>HDTV 1080i</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>1920*1080</td>
<td>28.125</td>
<td>50.00</td>
<td>74.25</td>
<td>HDTV 1080i</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>1920*1080</td>
<td>26.97 /27</td>
<td>23.97 /24</td>
<td>74.17/74.25</td>
<td>HDTV 1080P</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>1920*1080</td>
<td>33.716 /33.75</td>
<td>29.976 /30.00</td>
<td>74.25</td>
<td>HDTV 1080P</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>1920*1080</td>
<td>56.250</td>
<td>50</td>
<td>148.5</td>
<td>HDTV 1080P</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>1920*1080</td>
<td>67.43 /67.5</td>
<td>59.94 /60</td>
<td>148.35/148.50</td>
<td>HDTV 1080P</td>
<td></td>
</tr>
</tbody>
</table>

#### (2) PC Mode

<table>
<thead>
<tr>
<th>No</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>720*400</td>
<td>31.468</td>
<td>70.08</td>
<td>28.321</td>
<td></td>
<td>HDCP</td>
</tr>
<tr>
<td>2.</td>
<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA</td>
<td>HDCP</td>
</tr>
<tr>
<td>3.</td>
<td>800*600</td>
<td>37.879</td>
<td>60.31</td>
<td>40.00</td>
<td>VESA</td>
<td>HDCP</td>
</tr>
<tr>
<td>4.</td>
<td>1024*768</td>
<td>48.363</td>
<td>60.00</td>
<td>65.00</td>
<td>VESA(XGA)</td>
<td>HDCP</td>
</tr>
<tr>
<td>5.</td>
<td>1280*768</td>
<td>47.78</td>
<td>59.87</td>
<td>79.5</td>
<td>WXGA</td>
<td>HDCP</td>
</tr>
<tr>
<td>6.</td>
<td>1360*768</td>
<td>47.72</td>
<td>59.8</td>
<td>84.75</td>
<td>WXGA</td>
<td>HDCP</td>
</tr>
<tr>
<td>7.</td>
<td>1280*1024</td>
<td>63.595</td>
<td>60.0</td>
<td>108.875</td>
<td>SXGA</td>
<td>HDCP/FHD model</td>
</tr>
<tr>
<td>8.</td>
<td>1920*1080</td>
<td>67.5</td>
<td>60.00</td>
<td>138.625</td>
<td>WUXGA</td>
<td>HDCP/FHD model</td>
</tr>
</tbody>
</table>
ADJUSTMENT INSTRUCTION

1. Application Range
   This specification sheet is applied to all of the LCD TV with LD91A chassis.

2. Designation
   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 5 Minutes (Heat Run)
      Temperature: at 25±5°C
      Relative humidity: 65±10%
      Input voltage: 220V, 60Hz
   6) Adjustment equipments: Color Analyzer (CA-210 or CA-110), DDC Adjustment Jig equipment, SVC remote controller
   7) Push The “IN STOP KEY” - For memory initialization.

3. Main PCB check process
   * APC - After Manual-Insult, executing APC
   * Boot file 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 “Error” is displayed, Check connection between computer, jig, and set.
      3) Click “Read” tab, and then load download file (XXXX.bin) by clicking “Read”
      4) Click “Connect” tab. If “Can’t” is displayed, check connection between computer, jig, and set.
      5) Click “Auto” tab and set as below
      6) Click “Run”.
      7) After downloading, check “OK” message.

* USB DOWNLOAD
   1) Put the USB Stick to the USB socket
   2) Automatically detecting update file in USB Stick
      - If your downloaded program version in USB Stick is Low, it didn’t work. But your downloaded version is High, USB data is automatically detecting
   3) Show the message “Copying files from memory”
4) Updating is staring.

5) Fishing the version uploading, you have to put USB stick and “AC Power” off.
6) After putting “AC Power” on and check updated version on your TV.
* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn’t have a DTV/ATV test on production line.

* After downloading, have to adjust Tool Option again.
1) Push “IN-START” key in service remote controller
2) Select “Tool Option 1” and Push “OK” button.
3) Punch in the number. (Each model hax their number)
4) Completed selecting Tool option.

3.1. ADC Process
(1) ADC
- Input signal : Component 480i
- Signal equipment displays.

Adjustment pattern
- Component 480i
MODEL: 209 in Pattern Generator(480i Mode)
PATTERN : 65 in Pattern Generator(MSPG-925 SERIES)
- After enter Service Mode by pushing “ADJ” key,
- Enter Internal ADC mode by pushing “G” key at “5. ADC Calibration”

<Caution> Using ‘power on’ button of the Adjustment R/C , power on TV.
* ADC Calibration Protocol (RS232)

Adjust Sequence
- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 0060 [RGB Input (1024*768)]
- ad 00 10 [Adjust 1024*768 RGB]
- aa 00 90 End Adjust mode
* Required equipment : Adjustment R/C.

Adjustment pattern

3.2. Function Check
(1) Check display and sound
- Check Input and Signal items. (cf. work instructions)
1) TV
2) AV (SCART1/SCART2/ CVBS)
3) COMPONENT (480i)
4) RGB (PC : 1024 x 768 @ 60hz)
5) HDMI
6) PC Audio In
* Display and Sound check is executed by Remote controller.
4. Total Assembly line process

4.1. Adjustment Preparation

- W/B Equipment condition
  - CA210 : CH 9, Test signal : Inner pattern (85IRE)
  - Above 5 minutes H/run in the inner pattern. ("power on" key of adjust remote control)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>K</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>11.000k</td>
<td>K</td>
<td>0.276±0.002</td>
<td>0.283±0.002</td>
</tr>
<tr>
<td>Medium</td>
<td>9.300k</td>
<td>K</td>
<td>0.285±0.002</td>
<td>0.293±0.002</td>
</tr>
<tr>
<td>Warm</td>
<td>6.500k</td>
<td>K</td>
<td>0.313±0.002</td>
<td>0.329±0.002</td>
</tr>
</tbody>
</table>

* Connecting picture of the measuring instrument (On Automatic control)
Inside PATTERN is used when W/B is controlled. Connect to auto controller or push Adjustment R/C POWER ON -> Enter the mode of White-Balance, the pattern will come out.

* 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 (CA210) 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 5minutes.
   - Using ‘no signal’ or ‘full white pattern’ or the others, check the back light on.

  - After enter Service Mode by pushing “ADJ” key,
  - Enter White Balance by pushing “►” key at “6. White Balance”.

* After done all adjustments, Press “In-start” button and compare Tool option and Area option value with its BOM, if it is correctly same then unplug the AC cable. If it is not same, then correct it same with BOM and unplug AC cable. For correct it to the model’s module from factory JIG model.
* Push The “IN STOP KEY” after completing the function inspection.

4.2. DDC EDID Write (RGB 128Byte)

- Connect D-sub Signal Cable to D-sub Jack.
- Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.
* For SVC main Ass’y, EDID have to be downloaded to Insert Process in advance.

4.3. DDC EDID Write (HDMI 256Byte)

- Connect HDMI Signal Cable to HDMI Jack.
- Write EDID Data to EEPROM(24C02) by using DDC2B protocol.
- Check whether written EDID data is correct or not.
* For SVC main Ass’y, EDID have to be downloaded to Insert Process in advance.

4.4. EDID DATA

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

** Caution **
Color Temperature : COOL, Medium, Warm.
One of R Gain/G Gain/ B Gain should be kept on 0xC0, and adjust other two lower than C0.
(when R/G/B Gain are all C0, it is the FULL Dynamic Range of Module)

---

Cool 11,000k °K X=0.276±0.002 <Test Signal>
Medium 9,300k °K X=0.285±0.002 Inner pattern
Warm 6,500k °K X=0.313±0.002 (216gray,85IRE)

--
- Auto Download
  - After enter Service Mode by pushing “ADJ” key,
  - Enter EDID D/L mode.
  - Enter “START” by pushing “OK” key.

- Manual Download
  * 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
  4) Download HDMI1, HDMI2, separately because HDMI1 is
different from HDMI3

<table>
<thead>
<tr>
<th>Item</th>
<th>CMD1</th>
<th>CMD2</th>
<th>Data0</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Download</td>
<td>A</td>
<td>A</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>‘Mode In’</td>
<td></td>
<td></td>
<td></td>
<td>When transfer the ‘Mode In’, Carry the command.</td>
</tr>
<tr>
<td>Download</td>
<td>A</td>
<td>E</td>
<td>00</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Automatically Download (The use of a internal pattern)</td>
</tr>
</tbody>
</table>

* Edid data and Model option download (RS232)

- 1) HD RGB EDID data

- 2) HD HDMI EDID data

* Detail EDID Options are below

- Product ID
  - Model Name(HEX)

- List of EDI Data

<table>
<thead>
<tr>
<th>Item</th>
<th>Condition</th>
<th>Data(Hex)</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>

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4.5. Outgoing condition Configuration
- When pressing IN-STOP key by SVC remocon, Red LED are blinked alternatively. And then Automatically turn off. (Must not AC power OFF during blinking)

4.6. 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

5. Model name & Serial number D/L
- press “Power on” key of service remocon.
  (Baud rate : 115200 bps)
- Connect RS232 Signal Cable to RS-232 Jack.
- Write Serial number by use RS-232.
- Must check the serial number at the Diagnostics of SET UP menu. (Refer to below).

5.1. Signal TABLE

<table>
<thead>
<tr>
<th>No.</th>
<th>CMD</th>
<th>LENGTH</th>
<th>ADH</th>
<th>ADL</th>
<th>Data_1</th>
<th>…</th>
<th>Data_n</th>
<th>CS</th>
<th>DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EEPROM WRITE</td>
<td>A0h</td>
<td>84h+n</td>
<td>n-bytes Write (n = 1~16)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2. Command Set

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>CMD(hex)</th>
<th>LENGTH(hex)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EEPROM WRITE</td>
<td>A0h</td>
<td>84h+n</td>
</tr>
</tbody>
</table>

* Description
  FOS Default write : <7mode data> write
  Vtotal, V_Frequency, Sync_Polarity, Htotal, Hstart, Vstart, 0, Phase
  Data write : Model Name and Serial Number write in EEPROM.

5.3. method & notice
A. Serial number D/L is using of scan equipment.
B. Setting of scan equipment operated by Manufacturing Technology Group.
C. Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download (Model Name and Serial Number)
If the TV set is downloaded by OTA or Service man, Sometimes model name or serial number is initialized. (Not always)
There is impossible to download by bar code scan, so It need Manual download.
1) Press the ‘instart’ key of ADJ remote controller.
2) Go to the menu ‘5.Model Number D/L’ like below photo.
3) Input the Factory model name(ex 42LH4000-ZA) or Serial number like photo.
4) Check the model name Instart menu -> Factory name displayed (ex 42LH4000-ZA)
5) Check the Diagnostics (DTV country only) ->s Buyer model displayed (ex 42LH4000)
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.
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRMWARE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURE SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
Only for 37LH4000

*M+S : Main B/D + T-con B/D

37 GIP Block Diagram

TCON with FRC

MST7327N

IC101

P-Gamma IC
BUF16821
IC402

SPI_CZ/CK & DI/DO
DDR_A_D[0:15]
DDR_A_A[0:12]
DDR_B_A[0:12]

LVDS Wafer P[10]/N

From Main Board

Panel 12V

Multi Channel
DC/DC Converter
TPS 65161
IC401

FRC IIC
FRC Reset

LVDS (10Bit)
FRC IIC
FRC Reset

FRC 3.3V
FRC 1.8V
FRC 1.26V
LVDS (10Bit)

Level Shifter
MAX17108
IC403

Serial Flash
W25X32VSSIG
IC102

Multi Channel
DC/DC Converter
TPS 65161
IC401

LDO
SC4215
IC303

DC/DC Converter
BD9130
IC301

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<table>
<thead>
<tr>
<th>No.</th>
<th>Error symptom (High category)</th>
<th>Error symptom (Mid category)</th>
<th>Page</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Video error</td>
<td>No video/Normal audio</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>No video/No audio</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Video error, video lag/stop</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Color error</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Vertical/Horizontal bar, residual image, light spot, external device color error</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B. Power error</td>
<td>No power</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Off when on, off while viewing, power auto on/off</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>C. Audio error</td>
<td>No audio/Normal video</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Wrecked audio/discontinuation/noise</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>D. Function error</td>
<td>No response in remote controller, key error, recording error, memory error</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>External device recognition error</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>E. Noise</td>
<td>Circuit noise, mechanical noise</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>F. Exterior error</td>
<td>Exterior defect</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

First of all, Check whether there is SVC Bulletin in GCSC System for these model.
First of all, Check whether all of cables between board is inserted properly or not.
(Main B/D↔ Power B/D, LVDS Cable, Speaker Cable, IR B/D Cable,..)

- No video
  - Normal audio
    - Check Back Light On
      - On
        - Check Power Board 12v, 5v etc.
          - On
            - Normal voltage
              - Y
                - Replace Main Board
              - N
                - Repair Power Board or parts
          - N
            - Normal voltage
              - Y
                - Replace Inverter or module
              - N
                - Repair Power Board or parts
        - N
          - Move to No video/No audio
    - N
      - Replace Main Board

※ Precaution
Always check & record S/W Version and White Balance value before replacing the Main Board

- Replace Main Board
  - Re-enter White Balance value
## A. Video error

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No video/ No audio</td>
<td>2008. 3.05</td>
<td>2/13</td>
</tr>
</tbody>
</table>

### Standard Repair Process

**LCD TV**

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Establish date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No video/ No audio</td>
<td>2008. 3.05</td>
<td>2/13</td>
</tr>
</tbody>
</table>

### Diagram:

1. **No Video/ No audio**
2. Check various voltages of Power Board (5V, 12V, 20V or 24V...)
3. **Normal voltage?**
   - **Y**: Check and replace MAIN B/D
     - **End**
   - **N**: Replace Power Board and repair parts
A. Picture Problem

- **Check RF Signal level**
  - By using Digital signal level meter
  - By using Diagnostics menu on OSD
    - Signal strength (Normal: over 50%)
    - Signal Quality (Normal: over 50%)

- **Check RF Cable Connection**
  1. Reconnection
  2. Install Booster

- **Check Normal Picture?**

- **Check whether other equipments have problem or not.**
  (By connecting RF Cable at other equipment)
  → DVD Player, Set-Top-Box, Different maker TV etc.

- **S/W Upgrade**

- **SVC Bulletin?**
  - **Booster menu**
    - On → Off: Check Off → On: Check

- **Check Tuner soldering**
  - Replace Main B/D

**Established date:** 2008. 3.05

**Revised date:** 3/13
A. Video error

- Check color by input
  - External Input
  - COMPONENT
  - RGB
  - HDMI/DVI

- Check error color input mode

- Check Test pattern

- External Input/Component error

- External device/Cable error

- RGB/HDMI/DVI error

- Check external device and cable

- Check external device and cable

- Check and replace Link Cable (LVDS) and contact condition

- Color error?
  - Y
    - Replace Main B/D
  - N

- Color error?
  - Y
    - Replace Main B/D
  - N

- Color error?
  - Y
    - Replace Main B/D
  - N

- Color error?
  - Y
    - Replace T-Con Board And Adjust VCOM
    - LGD Module Only
  - N

Other Module

- Replace module

- External device/Cable normal

- Request repair for external device/cable

- N
  - Replace Main B/D

- Y
  - Replace Main B/D

- End

Established date: 2008. 3. 05
Revised date: 4/13

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A. Video error

Vertical / Horizontal bar, residual image, light spot, external device color error

**Standard Repair Process**

<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Error symptom</th>
<th>A. Video error</th>
<th>Established date</th>
<th>2008. 3. 05</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vertical / Horizontal bar, residual image, light spot, external device color error</td>
<td></td>
<td>Revised date</td>
<td>5/13</td>
</tr>
</tbody>
</table>

**LCD TV**

1. **Screen normal?**
   - Y: Check external device connection condition
   - N: Replace module

2. **Check color condition by input**
   - External Input
   - Component
   - RGB
   - HDMI/DVI

3. **Screen normal?**
   - Y: Check and replace Link Cable
   - N: Replace Main B/D

4. **End**

**External device screen error - Color error**

1. **Check S/W Version**
   - Y: S/W Upgrade
   - N: Check version

2. **Screen normal?**
   - Y: Connect other external device and cable (Check normal operation of External Input, Component, RGB and HDMI/DVI by connecting Jig, pattern Generator , Set-top Box etc.)
   - N: Replace Main B/D

**LGD Module Only**

- Replace T-Con Board And Adjust VCOM

**Other Module**

- Replace Module

- Replace module in abnormal displaying after exchanging T-Con B’d

---

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LCD TV

B. Power error

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>B. Power error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No power</td>
<td></td>
<td>2008. 3. 05</td>
<td>6/13</td>
</tr>
</tbody>
</table>

Standard Repair Process

- **Check Power LED**
- **Power LED On?**
  - **Y**: DC Power on by pressing Power Key On Remote control
  - **N**: Check Power LED was inserted properly
    - ※ **Check & Repair Mechanical Power switch on Local control of TV**
      - **N**: Normal? (Y/N)
      - **Y**: Close
      - **N**: Check ST-BY 5V
        - **Y**: Normal voltage? (Y/N)
          - **Y**: Replace Main B/D
          - **N**: Replace Power B/D
        - **N**: Replace Power B/D
      - Replace Main B/D

- **Normal operation?**
  - **N**: Check Power On "High" (Y/N)
    - **Y**: Replace Power B/D
    - **N**: Replace Main B/D
  - **Y**: OK? (Y/N)
    - **Y**: Replace Power B/D
    - **N**: Replace Main B/D

- '09 years new model apply mechanical power switch to reduce power consumption in stand-by status.
  - If mechanical power switch off
    - Doesn't turn on by remote control
    - Doesn't appear LED light
  - Please refer to the A21 Page
* Please refer to the all cases which can be displayed on power off mode.
C. Audio error

No audio/ Normal video

- Check user menu > Speaker off
  - Off
    - Check audio B+ 20V or 24V of Power Board
      - Normal voltage
        - Y: Replace Power Board and repair parts
        - N: Check Speaker disconnection
      - N: Cancel OFF and describe
  - N: Replace MAIN Board
    - Y: Replace Speaker
→ Wrecked audio/discontinuation/noise is same after “Check input signal” compared to No audio

- Check input signal
  - RF
  - External Input signal

- Signal normal?
  - Y: Check and replace speaker and connector
  - N: Normal audio?
    - Y: Check audio B+ Voltage (20V or 24V)
    - N: Wrecked audio/Discontinuation/Noise for all audio

- Replace Main B/D

- Normal voltage?
  - Y: Replace Power B/D
  - N: Replace Main B/D

- (When RF signal is not received)
  - Request repair to external cable/ANT provider

- (In case of External Input signal error)
  - Check and fix external device

- Wrecked audio/Discontinuation/Noise only for D-TV

- Replace Main B/D

- Wrecked audio/Discontinuation/Noise only for Analog

- Replace Main B/D

- Wrecked audio/Discontinuation/Noise only for External Input

- Connect and check other external device

- Normal audio?
  - Y: Check and fix external device
  - N: Replace Main B/D
1. Remote control (R/C) operating error

- Check R/C itself Operation
  - Normal operating?
    - Y: Check & Repair Cable connection Connector solder
      - Check B+ 5V On Main B/D
        - Normal Voltage?
          - Y: Check IR Output signal
            - Normal Signal?
              - Y: Normal Signal?
              - N: Check 5v on Power B/D
                - Replace Power B/D or Replace Main B/D (Power B/D don’t have problem)
              - N: Repair/Replace IR B/D
            - N: Repair/Replace IR B/D
          - N: Check B+ 5V On Main B/D
        - N: Check & Replace Battery of R/C
  - N: Check R/C Operating
    - When turn off light in room
      - Normal operating?
        - Y: Close
        - N: Replace R/C
    - If R/C operate, Explain the customer cause is interference from light in room.

2. Local(Mechanical) switch operating error

- Check R/C Operation
  - Normal operating?
    - Y: Check & Repair Cable connection Connector solder
      - Move Power problem Section
    - N: Check & Replace Assembly status (Key PCB + tool )
      - Normal operating?
        - Y: Normal Signal?
          - Y: Normal Signal?
          - N: Check Key Output signal
            - Normal Signal?
              - Y: Normal Signal?
              - N: Replace Main B/D
            - N: Repair/Replace Local switch B/D
          - N: Repair/Replace IR B/D
        - N: Check & Replace Assembly status (Key PCB + tool )
  - N: Check R/C Operation
    - Normal operating?
      - Y: Close
      - N: Replace R/C
**Standard Repair Process**

<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Error symptom</th>
<th>D. Function error</th>
<th>Established date</th>
<th>Revised date</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>External device recognition error</td>
<td>2008. 3.05</td>
<td>11/13</td>
</tr>
</tbody>
</table>

- **Check input signal**
  - **Y** Check technical information
    - Fix information
    - S/W Version
  - **N** Check and fix external device/cable
- **Y** Fix in accordance with technical information
- **N** External Input and Component Recognition error
  - RGB, HDMI, DVI, Optical Recognition error
    - Replace Main B/D
Standard Repair Process

<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Error symptom</th>
<th>E. Noise</th>
<th>Established date</th>
<th>2008. 3.05</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Circuit noise, mechanical noise</td>
<td>Revise date</td>
<td></td>
<td>12/13</td>
</tr>
</tbody>
</table>

- **Identify noise type**
  - **Circuit noise**
    - Check location of noise
      - **Replace inverter**
        - **<With Inverter Module>**
      - **Replace LIPS B/D**
        - **<Without Inverter Module>**
  - **Mechanical noise**
    - Check location of noise
      - When the noise is severe, replace the module (For models with fix information, upgrade the S/W or provide the description)
      - If there is a “Tak Tak” noise from the cabinet, refer to the KMS fix information and then proceed as shown in the solution manual (For models without any fix information, provide the description)

※ Mechanical noise is a natural phenomenon, and apply the 1st level description. When the customer does not agree, apply the process by stage.
※ Describe the basis of the description in “Part related to nose” in the Owner's Manual.
<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Error symptom</th>
<th>F. Exterior defect</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Exterior defect</td>
<td>2008. 3 .05</td>
<td>13/13</td>
</tr>
</tbody>
</table>

- **Zoom part with exterior damage**
  - Module damage
    - Replace module ➔ Adjust VCOM
  - Cabinet damage ➔ Replace cabinet
  - Remote controller damage ➔ Replace remote controller
  - Stand dent ➔ Replace stand
# LCD TV Repair Process Index

- Trouble shooting by input block (Component level check)

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<td>USB / Remocon Problem</td>
<td>USB no connect / Remocon</td>
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<td>Intelligent Sensor</td>
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<td>Power-Up Boot Fail</td>
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<td>2/34</td>
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</tbody>
</table>

**Symptom:** Power-Up Boot Fail

1. **P801 Pin #5–#6 Voltage Level = 5V?**
   - **NO** → **Check Power connector OK?** → **YES** → **Replace Power Board**
   - **YES** → **Replace Power Board**

2. **P801 Pin #1, 2 = 15V?**
   - **NO** → **Replace Power Board**
   - **YES** → **Replace MAIN B’D IC801**

3. **MAIN B’D L803 = 3.3V?**
   - **NO** → **Replace MAIN B’D IC805**
   - **YES** → **Replace MAIN B’D IC806**

4. **MAIN B’D L813 = 1.26V?**
   - **NO** → **Replace MAIN B’D IC805**
   - **YES** → **Replace MAIN B’D IC806**

5. **MAIN B’D L805 = 3.3V?**
   - **NO** → **Replace MAIN B’D IC806**
   - **YES** → **Check MAIN B’D X100 Clock 12MHz**

6. **Check MAIN B’D X100 Clock 12MHz**
   - **NO** → **Replace MAIN B’D IC100**
   - **YES** → **Replace MAIN B’D IC102 NAND FLASH**

7. **Replace MAIN B’D IC102 NAND FLASH**
   - **NO** → **Replace MAIN B’D IC103 Serial Flash**
   - **YES** → **Replace MAIN B’D IC100**

8. **Replace MAIN B’D IC103 Serial Flash**
   - **NO** → **Replace MAIN B’D IC300, IC301 DDR2 Memory**
   - **YES** → **Replace MAIN B’D IC100**

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<th>No OSD</th>
</tr>
</thead>
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<td></td>
<td>P800 Pin #20 Voltage level = 2V</td>
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</tr>
<tr>
<td></td>
<td>Check Power connector OK ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace Power Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P800 Pin #13, 14 = 12V P800 Pin #17, 18 = 24V ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace MAIN B’D Q802</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN B’D L1300 = 12V ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace MAIN B’D Q806</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check LVDS Cable OK ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace Main Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace LVDS Cable</td>
<td></td>
</tr>
</tbody>
</table>

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26~42LH2000
32~47LH3000/LH4000
No OSD

1. Check Power connector: OK?
   - If YES: Replace Power Board
   - If NO: Replace MAIN B'D Q802

2. If MAIN B'D L1300 = 12V?
   - If YES: Replace MAIN B'D Q806
   - If NO: Check LVDS Cable: OK?
     - If YES: Replace Main Board
     - If NO: Replace LVDS Cable

Symptom: No OSD

P801 Pin #9: Voltage level = 2V

P801 Pin #1, 2 = 15V?
Check RF Cable

<table>
<thead>
<tr>
<th>MAIN B’D L1201 = 5V ?</th>
<th>Replace MAIN B’D IC808</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAIN B’D L1202 = 3.3V ?</th>
<th>Replace MAIN B’D IC809</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAIN B’D IC804 Pin #2 = 1.2V ?</th>
<th>Replace MAIN B’D IC804</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAIN B’D R1210 Clock ?</th>
<th>Replace MAIN B’D TU1200</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

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**Analog TV Video Problem**

1. Check RF Cable
   - YES
   - NO
      - **MAIN B’D L1201 = 5V ?**
         - NO
            - Replace MAIN B’D IC808
         - YES
            - **MAIN B’D L1202 = 3.3V ?**
               - NO
                  - Replace MAIN B’D IC809
               - YES
                  - **MAIN B’D IC804 Pin #2 = 1.2V ?**
                     - NO
                        - Replace MAIN B’D IC804
                     - YES
                        - **MAIN B’D R1210 Clock ?**
                           - NO
                              - Replace MAIN B’D TU1200
                           - YES

**Models:**
26~42LH2000
32~47LH3000/LH4000

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### LCD TV Symptom

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<td><strong>Making</strong></td>
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</table>

- **Check Signal format**: Is it supported?  
  - YES
  - **Check the SCART Cable**
    - YES
    - **Check MAIN B'D R1117 Video Signal?**
      - NO
        - **Replace MAIN B'D JK1100**  
      - YES
    - **Check MAIN B'D C210 Video Signal?**
      - NO
        - **Replace MAIN B'D C210**  
      - YES
        - **Replace MAIN B'D IC 100**  

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- **Revision**: 7/34
- **26~42LH2000**
- **32~47LH3000/LH4000**
<table>
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<th>Symptom</th>
<th>AV1(Scart RGB) No Video Problem</th>
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<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Symptom:** AV1(Scart RGB) No Video Problem

1. **Check Signal format Is it supported?**
   - YES
   - **Check the SCART Cable**
     - YES
     - **Check MAIN B'D JK1100**
       - NO → Replace MAIN B'D JK1100
       - YES
       - **Check MAIN B'D C200 (RED)**
         - C201 (GREEN)
         - C202 (BLUE)
         - Video Signal ?
           - NO → Replace MAIN B'D C200, C201, C202
           - YES
           - Replace MAIN B'D IC 100

26~42LH2000
32~47LH3000/LH4000
## AV2 No Video Problem

### Check Signal format
- **Is it supported?**
  - YES

### Check the SCART Cable
- **YES**

### Check MAIN B’D R1133
- **Video Signal?**
  - NO → **MAIN B’D JK1101 Check**
  - YES

### MAIN B’D JK1101 Check
- **YES**
  - Replace MAIN B’D JK1101

### NO → **Replace MAIN B’D C211**

### Check MAIN B’D C211
- **Video Signal?**
  - NO → **Replace MAIN B’D C211**
  - YES

### Replace MAIN B’D IC 100

---

**LCD TV** | **Symptom** | **AV2 No Video Problem**
--- | --- | ---

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LCD TV | Symptom | AV3(CVBS) No Video Problem |
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<td>Revision: 10/34</td>
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</tbody>
</table>

AV3(CVBS) No Video Problem

- **Check Signal format**
  - Is it supported?
  - **YES**
  - **Check the CVBS Cable**
    - **YES**
    - **Check MAIN B’D R400 Video Signal?**
      - **NO**
        - **Replace MAIN B’D JK402**
      - **YES**
    - **Replace MAIN B’D IC 100**
  - **NO**
- **Check MAIN B’D JK402**
  - **NO**
    - **Replace MAIN B’D JK402**
  - **YES**
    - **Replace MAIN B’D C217**

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<table>
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<th>AV1 No Video Out Problem</th>
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<td>Making: 2009.2.1</td>
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<td></td>
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<td>Revision: 11/34</td>
</tr>
</tbody>
</table>

**Symptom:** AV1 No Video Out Problem

- **Check Spec (Refer to User Manual)**
  - **Is it supported?**
  - **YES**
  - **Check the SCART Cable**
    - **YES**
    - **Check MAIN B'D C1107 Video Signal?**
      - **YES**
      - **MAIN B'D JK1100 Check**
    - **NO**
    - **Check MAIN B'D R1205 Video Signal?**
      - **NO**
      - **Check the Trouble Shooting Guide Analog TV No video**
    - **YES**
    - **Replace MAIN B'D Q1205**

**Models:**
- 26~42LH2000
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</tbody>
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### Diagram

1. **Check Spec (Refer to User Manual)**
   - Is it supported?
     - YES

2. **Check the SCART Cable**
   - YES

3. **Check MAIN B’D C1122 Video Signal?**
   - YES
   - MAIN B’D JK1101 Check
   - NO
   - Replace MAIN B’D IC 100

---

26~42LH2000
32~47LH3000/LH4000

---

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<td><strong>Check the Component Cable</strong></td>
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<td><strong>YES</strong></td>
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<tr>
<td><strong>Check MAIN B’D R419 Video Signal?</strong></td>
</tr>
<tr>
<td><strong>NO</strong></td>
</tr>
<tr>
<td><strong>YES</strong></td>
</tr>
<tr>
<td><strong>Check MAIN B’D C209, C215 (Y) C216 (Pb) C214 (Pr) Video Signal?</strong></td>
</tr>
<tr>
<td><strong>NO</strong></td>
</tr>
<tr>
<td><strong>YES</strong></td>
</tr>
<tr>
<td><strong>Replace MAIN B’D IC 100</strong></td>
</tr>
<tr>
<td><strong>Replace MAIN B’D C209 or C214 or C215 or C216</strong></td>
</tr>
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LCD TV | Symptom | RGB No Video Problem | Making | 2009. 2. 1
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- **Check Signal format**
  - Is it supported?
  - YES
  - **Check the RGB Cable**
    - YES
    - MAIN B'D P400 Pin #2 Video signal? R437 has Vsync? R440 has Hsync?
      - NO
      - MAIN B'D P400 Check
        - NO
        - Replace MAIN B'D P400
      - YES
      - Check MAIN B'D C208 (Video) R246 (HSYNC) R245 (VSYNC)
        - NO
        - Replace MAIN B'D C208 or R246 or R247
      - YES
      - Replace MAIN B'D IC 100

---

26~42LH2000
32~47LH3000/LH4000
Check Signal format
Is it supported?

YES

Check the RGB Cable

YES

MAIN B'D P400
Pin #3 (BLUE)
Pin #2 (GREEN)
Pin #1 (RED)
Video signal?

NO

MAIN B'D P400 Check

NO

Replace MAIN B'D P400

YES

Check MAIN B'D C212 (RED)
C207 (GREEN)
C213 (BLUE)
Video Signal?

NO

Replace MAIN B'D C212 or C207 or C213

YES

Replace MAIN B'D IC 100

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</tr>
</tbody>
</table>

**HDMI 1~3 All No Video Problem**

- **Check Signal format Is it supported?**
  - YES
- **Check the HDMI Cable**
  - YES
- **Check the ADJUST MENU EDID OK?**
  - NO ➔ **Download EDID (Refer to Adjustment Spec)** ➔ YES
- **Replace MAIN B’D IC107 (HDCP KEY)**
  - NO ➔ **Replace MAIN B’D IC 100**

**HDMI1 – ALL MODELS**

**HDMI2 – Except for 19/22LH20**

**HDMI3 – Except for 19/22LU40**, 19/22LU50**, 19/22LH20**
Check Signal format
Is it supported?

YES

Check the HDMI Cable

YES

MAIN B'D JACK Check
JK600 -> HDMI1
JK601 -> HDMI2
JK602 -> HDMI3

YES

Replace MAIN B'D IC 100

This case is that HDMI Video doesn't display at the same HDMI input, not all.

HDMI1 – ALL MODELS
HDMI2 – Except for 19/22LU40**, 19/22LU50**, 19/22LU20**
HDMI3 – Except for 19/22LU40**, 19/22LU50**, 19/22LU20**
If headphone is connected, Speaker sound doesn’t work.
<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Symptom</th>
<th>Digital TV No Audio Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Digital TV Video OK ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace MAIN B'D IC 100</td>
<td></td>
</tr>
</tbody>
</table>

26~42LH2000
32~47LH3000/LH4000
Analog TV Video OK?

- Yes
  - Check MAIN B'D C231 Signal (SIF)
    - Yes: Replace MAIN B'D IC100
    - No: Replace MAIN B'D TU1200

- No
  - MAIN B'D TU1200 Pin #17 Signal (SIF)
    - Yes: Replace MAIN B'D TU1200
    - No: Repeat Check MAIN B'D C231 Signal (SIF)
# LCD TV Symptom

## AV1 No Audio Problem

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AV1 Video OK?</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Check the SCART Cable</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Check MAIN B'D JK1100</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Replace MAIN B'D JK1100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAIN B'D C229 (Right Sound) C230 (Left Sound) signal?</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Replace MAIN B'D IC 100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check MAIN B'D C229, C230</td>
<td>NO</td>
</tr>
</tbody>
</table>

---

**Making:** 2009. 2. 1  
**Revision:** 21/34  

26~42LH2000  
32~47LH3000/LH4000
Check the SCART Cable

YES

Check MAIN B’D C2008 (Right Sound) C2009 (Left Sound) signal ?

YES

Replace MAIN B’D IC 100

NO

Replace MAIN B’D JK1101

NO

Check MAIN B’D C2008, C2009

YES
LCD TV | Symptom | AV3 No Audio Problem | Making | 2009. 2. 1 | Revision | 23/34

- AV3 Video OK?
  - YES
  - NO
    - Check the CVBS Cable
      - YES
        - Check MAIN B'D JK402
          - YES
            - Replace MAIN B'D JK402
          - NO
            - MAIN B'D C2011 (Right Sound) C2012 (Left Sound) signal?
              - YES
                - Replace MAIN B'D IC 100
              - NO
                - Check MAIN B'D C2011, C2012

26~42LH2000
32~47LH3000/LH4000
## Component No Audio Problem

<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Symptom</th>
<th>Component No Audio Problem</th>
<th>Making</th>
<th>2009. 2 . 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Revision</td>
<td>24/34</td>
</tr>
</tbody>
</table>

### @Component Video is OK?

- YES

### Check the CVBS Cable

- YES

### Check MAIN B'D JK400

- NO ⇒ Replace MAIN B'D JK400

- YES

### MAIN B'D C2013 (Right Sound) C2014 (Left Sound) signal?

- YES ⇒ Replace MAIN B'D IC 100

- NO ⇒ Check MAIN B'D C2013, C2014

---

26~42LH2000
32~47LH3000/LH4000

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2009. 2 . 1
24/34
<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Symptom</th>
<th>RGB, HDMI-PC No Audio Problem</th>
<th>Making</th>
<th>Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>2009. 2. 1</td>
<td>25/34</td>
</tr>
</tbody>
</table>

**RGB Video OK?**
- **YES**
  - Check the PC Audio Cable
  - **YES**
    - Check MAIN B'D JK401
      - **NO**
        - Replace MAIN B'D JK401
      - **YES**
        - MAIN B'D C2015 (Right Sound) C2016 (Left Sound) signal ?
          - **YES**
            - Replace MAIN B'D IC 100
          - **NO**
            - Check MAIN B'D C2015, C2016

26~42LH2000
32~47LH3000/LH4000
## LCD TV Symptom: HDMI-DTV No Audio Problem

<table>
<thead>
<tr>
<th>Making</th>
<th>2009. 2. 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision</td>
<td>26/34</td>
</tr>
</tbody>
</table>

**HDMI Video OK?**
- **YES**
- **NO**
  - **Check the ADJUST MENU**
    - **YES**
    - **NO**
      - **Check the HDMI Cable**
        - **YES**
        - **Replace MAIN B’D IC100**
      - **Download EDID (Refer to Adjustment Spec)**

**Model Numbers:**
- 26~42LH2000
- 32~47LH3000/LH4000
Check the SCART Cable

YES

Replace MAIN B’D IC1103

R239 (Right Sound)  
R240 (Left Sound)  
signal ?

NO

YES

Check the Trouble Shooting Guide  
Analog TV No video

NO

YES

Check MAIN B’D JK1100

Replace MAIN B’D JK1100

NO

YES

MAIN B’D  
R239 (Right Sound)  
R240 (Left Sound) 
signal ?

Replace MAIN B’D IC 100

NO

YES

Replace MAIN B’D IC1103
Check the SCART Cable

YES

Check MAIN B'D JK1101

YES

Check the Trouble Shooting Guide Related to Audio Problem

NO

Replace MAIN B'D JK1101

YES

MAIN B'D R250 (Right Sound) R251 (Left Sound) signal ?

NO

Replace MAIN B'D IC 100

YES

Replace MAIN B'D IC1103
**Headphone No Audio Problem**

1. **Speaker Audio OK**
   - **YES**
   - **NO**

2. **Check the Headphone Cable**
   - **YES**
   - **NO**

3. **Check MAIN B’D JK700 or JK701**
   - **YES**
   - **NO**

4. **MAIN B’D R237 (Right Sound) R238 (Left Sound) signal ?**
   - **YES**
   - **NO**

5. **Replace MAIN B’D IC 100**
   - **YES**
   - **NO**

6. **Replace MAIN B’D IC700**

---

**Related to Audio Problem**

- 26~42LH2000
- 32~47LH3000/LH4000
Check the SPDIF Cable

YES

Check MAIN B'D R230

PWM Signal?

YES

Replace MAIN B'D IC 100

NO

NO

Check the Trouble Shooting Guide Related to Audio Problem

NO

Replace MAIN B'D JK403

YES

Check MAIN B'D JK403

NO

Check MAIN B'D JK403
Check that the USB Memory & HDD are supported by Spec (Refer to User Manual’s USB cautions)

- Check MAIN B’D JK405 OK?
  - NO: Replace MAIN B’D JK405
  - YES: Check MAIN B’D JK405 Pin #1 5V?
    - YES: Replace MAIN B’D IC 100
    - NO: Check MAIN B’D R801 5V?
      - YES: Replace MAIN B’D IC402
      - NO: Check MAIN B’D R848 12V?
        - YES: Replace MAIN B’D IC808
        - NO: Replace MAIN B’D IC402
Remote Control Problem

Check MAIN B’D P1304 Wafer & Connector

YES → Replace IR B’D

NO → Check IR B’D P1 Wafer & Connector

YES → Replace it

NO → Replace IR B’D

26~42LH2000
32~47LH3000/LH4000
<table>
<thead>
<tr>
<th>LCD TV</th>
<th>Symptom</th>
<th>Remote Control Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Check MAIN B'D P1305 Wafer &amp; Connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES Replace it</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IR B'D IC1 Pin #3 Voltage 4V ( \uparrow ) ?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YES Replace IR B'D IC1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO Replace MAIN B'D IC100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO Replace MAIN B'D IC100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check IR B'D P1 Wafer &amp; Connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

19~22LH2000
Check MAIN B'D P1304 Wafer & Connector

Check IR B'D P1 Wafer & Connector

Replace it

Replace IR B'D