LCD TV
SERVICE MANUAL

CHASSIS : LA92G
MODEL : 47LH41  47LH41-UE

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**

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 slick or comparable non-abrasive applicator; 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength)
   CAUTION: This is a flammable mixture.

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 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 chemical cleaners. 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 small wire-bristle (0.5 inch, or 1.25cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.

5. Use the following unsoldering technique
   a. Allow the soldering iron tip to reach normal temperature. (500°F to 600°F)
   b. Heat the component lead until the solder melts.
   c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.

6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach a normal temperature (500°F to 600°F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.
IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

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

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

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

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

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

Fuse and Conventional Resistor Removal/Replacement
1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.

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

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

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).
1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

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

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.
NOTE: Specifications and others are subject to change without notice for improvement.

1. Application range
This specification is applied to the LCD TV used LA92G 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: UL, CSA, IEC specification, CE
   - EMC: FCC, ICES, IEC specification, CE

4. 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>Display Screen Device</td>
<td>47 wide Color Display Module</td>
<td>1920 x1080</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>LC470WUH-SBA1(without inverter )</td>
<td>FHD+Tconless 47LH40-UA</td>
</tr>
<tr>
<td>4</td>
<td>Available Channel</td>
<td>1) VHF: 02 ~ 13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) UHF: 14 ~ 69</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) DTV: 02 ~ 69</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) CATV : 01 ~ 135</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) CADTV : 01 ~ 135</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Operating Environment</td>
<td>Temp.:0 ~ 40 deg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity: ~ 80 %</td>
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</tr>
<tr>
<td>6</td>
<td>Storage Environment</td>
<td>Temp.:20 ~ 60 deg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity: ~ 85 %</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Input Voltage</td>
<td>AC100 ~240V,50/60Hz</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Tuning system</td>
<td>FS</td>
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### 5. Chroma & Brightness

#### 5.1 Module optical specification

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<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>Max Luminance (Center1-point/ Ful white pattern)</td>
<td>Modele</td>
<td>400</td>
<td>500</td>
<td>cd/m²</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Luminance uniformity</td>
<td>Luminance</td>
<td>77</td>
<td>1400: 1 (DCR)</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Contrast Ratio</td>
<td>WX Typ</td>
<td>0.279</td>
<td>Typ</td>
<td>0.276</td>
<td>0.278</td>
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<tr>
<td></td>
<td></td>
<td>WW Typ</td>
<td>-0.03</td>
<td>0.292</td>
<td>+0.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RED</td>
<td>Xr</td>
<td>636</td>
<td>0.281</td>
<td>0.283</td>
<td>0.285</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yr</td>
<td>334</td>
<td>0.291</td>
<td>0.293</td>
<td>0.295</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Xg</td>
<td>290</td>
<td>0.311</td>
<td>0.313</td>
<td>0.315</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yg</td>
<td>608</td>
<td>0.327</td>
<td>0.329</td>
<td>0.331</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>Xb</td>
<td>145</td>
<td>0.327</td>
<td>0.329</td>
<td>0.331</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yb</td>
<td>064</td>
<td>0.327</td>
<td>0.329</td>
<td>0.331</td>
</tr>
</tbody>
</table>

#### Max Luminance & Contrast measure standard specification
- Max Luminance measure specification
  1) In non-impressed condition, measure peak brightness displayable as much as possible LCD module.
  2) Measuring instrument: CA-210 or a sort of Color Analyzer.
  3) Pattern Generator: VG-828 or a sort of digital pattern generator (displayable Full White & 1/25 White Window pattern)
  4) Measure condition
    - Test pattern: in center, 1/5(H)*1/5(V) of Window Pattern (white pattern in non-impressed condition)
    - SET condition: Contrast & Brightness Level 100%
    - Environment condition: Dark room in the non outside light
    - Video menu option condition

<table>
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<tr>
<th>Signal</th>
<th>Picture Mode</th>
<th>Dynamic Contrast</th>
<th>Dynamic Color</th>
<th>Black Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF</td>
<td>NTSC-M</td>
<td>Vivid</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>AV</td>
<td>NTSC-J</td>
<td>Vivid</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Component</td>
<td>720P</td>
<td>Vivid</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>RGB</td>
<td>1024x768</td>
<td>Vivid</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>HDMI</td>
<td>DTV 720P</td>
<td>Vivid</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

5) Measurement
- Do heat-run LCD module at 30minutes in normal temperature (25°C) by using full white pattern of 15% signal level (38 gray level).
- Impress test pattern signal in 1/5(H)*1/5(V) White Window of 100% (255 Gray Level)
- Measure 3 times brightness of central white window and mark peak brightness in max brightness degree
- Measure the same condition in video signal /RGB signal.
- Luminance uniformity measure specification
  1) Impress 100% (255 Gray Level) full white pattern at the same peak brightness measurement.
  2) Measure average brightness in 5 points.
- Contrast ratio measure specification

1) Test display signal: 30*30 dots White Window signal & all Black Raster signal
2) Dark room measure condition: Using touch type Color analyzer CA-210 Dark room in the non outside light
3) Bright room measure condition: In bright room of 150Lx illumination in the panel surface, locate a source of light on the above 45° of the panel surface.
4) Measure method
   • In standard test condition, impress 30*30 dots White Window Pattern signal.
   • Measure center peak brightness degree Lw of white window
   • Impress black Raster signal as contrast ratio measurement signal.
   • Measure black brightness degree Lb of PDP central
   Calculate the following numerical formula.
   Contrast ratio = Lw / Lb
   If it does not use Prior measurement, use generally simple test measurement. The Correct measure specification is followed by IEC61988-2/CD, JAPAN EIAJ-2710
### 6. Component Video Input (Y, CB/Pb, CR/Pr)

<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>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>720*480</td>
<td>15.73</td>
<td>60</td>
<td>13.5135</td>
<td>SDTV, DVD 480I</td>
</tr>
<tr>
<td>2.</td>
<td>720*480</td>
<td>15.73</td>
<td>59.94</td>
<td>13.5</td>
<td>SDTV, DVD 480I</td>
</tr>
<tr>
<td>3.</td>
<td>720*480</td>
<td>31.47</td>
<td>60</td>
<td>27.027</td>
<td>SDTV 480P</td>
</tr>
<tr>
<td>4.</td>
<td>720*480</td>
<td>31.47</td>
<td>59.94</td>
<td>27.0</td>
<td>DTV 480P</td>
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<tr>
<td>5.</td>
<td>1280*720</td>
<td>45.00</td>
<td>60.00</td>
<td>74.25</td>
<td>HDTV 720P</td>
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<tr>
<td>6.</td>
<td>1280*720</td>
<td>44.96</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 720P</td>
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<td>7.</td>
<td>1920*1080</td>
<td>33.75</td>
<td>60.00</td>
<td>74.25</td>
<td>HDTV 1080I</td>
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<td>1920*1080</td>
<td>33.72</td>
<td>59.94</td>
<td>74.176</td>
<td>HDTV 1080I</td>
</tr>
<tr>
<td>9.</td>
<td>1920*1080</td>
<td>67.500</td>
<td>60</td>
<td>148.50</td>
<td>HDTV 1080P</td>
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<td>10.</td>
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<td>67.432</td>
<td>59.939</td>
<td>148.352</td>
<td>HDTV 1080P</td>
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<td>11.</td>
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<td>24.000</td>
<td>74.25</td>
<td>HDTV 1080P</td>
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<td>12.</td>
<td>1920*1080</td>
<td>26.97</td>
<td>23.94</td>
<td>74.176</td>
<td>HDTV 1080P</td>
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<tr>
<td>13.</td>
<td>1920*1080</td>
<td>33.75</td>
<td>30.000</td>
<td>74.25</td>
<td>HDTV 1080P</td>
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<tr>
<td>14.</td>
<td>1920*1080</td>
<td>33.71</td>
<td>29.97</td>
<td>74.176</td>
<td>HDTV 1080P</td>
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</table>

### 7. RGB

#### 7.1 PC INPUT

<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>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>640*350</td>
<td>31.468</td>
<td>70.09</td>
<td>25.17</td>
<td>EGA</td>
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<td>2.</td>
<td>720*400</td>
<td>31.469</td>
<td>70.08</td>
<td>28.32</td>
<td>DOS</td>
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<tr>
<td>3.</td>
<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA(VGA)</td>
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<tr>
<td>4.</td>
<td>640*480</td>
<td>37.861</td>
<td>72.80</td>
<td>31.50</td>
<td>VESA(VGA)</td>
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<td>5.</td>
<td>640*480</td>
<td>37.500</td>
<td>75.00</td>
<td>31.50</td>
<td>VESA(VGA)</td>
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<tr>
<td>6.</td>
<td>800*600</td>
<td>35.156</td>
<td>56.25</td>
<td>36.00</td>
<td>VESA(SVGA)</td>
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<tr>
<td>7.</td>
<td>800*600</td>
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7.2 EDID

7.2.1 Equipment

- Adj. R/C
- Since embedded EDID data is used, EDID download jig, HDMI cable and D-sub cable are not need.

7.2.2 Download method

Press Adj. key On the Adj. R/C, press Adj. key then select EDID D/L. By pressing Enter key, EDID download will begin.
1) If Download is successful, OK is displayed.
2) If Download is a failure, NG is displayed.
3) Re-try download.

7.2.3 EDID Data

• Reference: Download is only possible in POWER ON MODE.

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## 8. HDMI Input (PC/DTV)

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<td>1 ~ 135CH (CADTV)</td>
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<td>Video Resolution</td>
<td>ATSC 18 FORMAT</td>
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<td>VSB RF Input</td>
<td>75Ω unbalanced F type Connector input</td>
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<td>Sync Stable Time</td>
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### 10. Power

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<td>V</td>
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<td>AC Power Shut Down Voltage</td>
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<td>V</td>
<td>Wide Range PSU</td>
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### 11. Mechanical specification

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<td>LG(51)G2-2001</td>
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<td>Appearance</td>
<td>quality Satisfy appearance inspection</td>
<td>LG(51)G1-1030</td>
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<td>Print specification</td>
<td>Distinguish printed matter at a distance of 40cm</td>
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<td>Product Dimension</td>
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<td>After Packing 1485 (W) X 860 (H) X 255 (D)</td>
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<td>With BOX</td>
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<td>degree</td>
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<td>Fixed Stand</td>
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ADJUSTMENT INSTRUCTION

1. Application Range
This specification sheet is applied to all of the LCD TV with LA92G chassis.

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 characteristic 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 100~240V, 50/60Hz.
5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.
6) In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours.
7) In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours.

*Caution
When still image is displayed for a period of 20 minutes or longer (especially where W/B scale is strong. Digital pattern 13ch and/or Cross hatch pattern 09ch), there can some afterimage in the black level area.

3. Adjustment items
3.1 Board-level adjustment
• Adjust 480i Component1 adjustment
• Adjust 1080p Component1 adjustment
• Adjust 1024*768 RGB adjustment
Above adjustment items can be also performed in Final Assembly if needed.
Both Board-level and Final assembly adjustment items can be check using In-Start Menu 1. Adjust Check.
3.2 Final assembly adjustment
• EDID/DDC download
• White Balance adjustment
• RS-232C functionality check
• Factory Option setting per destination
• Ship-out mode setting (In-Stop)
3.3 Etc.
• Ship-out mode
• Service Option Default
• USB Download(S/W Update, Option)

4. Board-level adjustment
4.1 ADC adjustment
4.1.1 Overview
ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.
4.1.2 Equipment & Condition
1) Jig (RS-232C protocol)
2) Internal pattern is used. No external signal is needed.
4.1.3 Adjustment
4.1.3.1 Method
• Using RS-232, adjust items listed in 3.1 in the order shown in “4.1.3.3”.
4.1.3.2 Adjustment protocol

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<tr>
<td>Source Input</td>
<td>kb 00 04</td>
<td>b 00 OK04x (Adjust 480i/1080p Comp1 )</td>
</tr>
<tr>
<td>Change</td>
<td>kb 00 06</td>
<td>b 00 OK06x (Adjust 1024*768 RGB)</td>
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<tr>
<td>Begin adj.</td>
<td>ad 00 10</td>
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<tr>
<td>Return ad. result</td>
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<td>OKx (Success)</td>
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<tr>
<td>Return adjust</td>
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<td>NGx (Fail)</td>
</tr>
<tr>
<td>Read adj. data</td>
<td>(main)</td>
<td>000000000000000000000000000000007c007b006dx (main input )</td>
</tr>
<tr>
<td>(sub )</td>
<td>ad 0020</td>
<td>000000000000000000000000000000007c00830077x (Sub input)</td>
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<td>Confirm adj.</td>
<td>ad 00 99</td>
<td>NG 03 00x (Fail)</td>
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<td>End adj.</td>
<td>ad 00 90</td>
<td>d 00 OK90x</td>
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4.1.3.3 Adjustment order
• ad 00 00 [Enter ADC adjustment mode]
• kb 00 04 [Component1 Input Change]
• ad 00 10 [Adjust 480i Component1]
• ad 00 10 [Adjust 1080p Component1]
• kb 00 06 [RGB Input Change]
• ad 00 10 [Adjust 1024*768 RGB]
• ad 00 90 [End adjustment mode]
5. Final Assembly adjustment

5.1 ADC(Saturn5) adjustment

5.1.1 Overview
ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.

5.1.2 Equipment & Condition
1) IN-START. remote
2) 801GF(802B, 802F, 802R) or MSPG925FA Pattern Generator
   - Resolution:
     - 480i Comp1 (MSPG-925FA: model-209, pattern-65)
     - 1080p Comp1 (MSPG-925FA: model-225, pattern-65)
     - 1024*768 RGB (MSPG-925FA: model-60, pattern-65)
   - Pattern Name: Horizontal 100% Color Bar Pattern
   - Pattern Level: 0.7±0.1 Vp-p
   - Image
3) Use the certificated cable.

5.1.3 Method

5.1.3.1 ADC 480i Comp1
Set Component 480i mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to “NORMAL”.
After get the signal, wait more a second and enter the “IN START” with press In-Start key of Service remocon. After then select “6. External ADC-> Comp 480i” with navigator button and press “Enter”. It is automatically adjustment
You can see “ADC Component Success” message after Adjustment success Error Messages: When its adjustment is not correct, “ADC Component Fail” message displayed.
If its signal don’t out, then “Check Signal Status” message displayed. These messages will be displayed just a second.

5.1.3.2 ADC 1080p Comp1
Set Component 1080P mode and 100% Horizontal Color Bar Pattern(HozTV31 Bar), then set TV set to Component1 mode and its screen to “NORMAL”.
After get the signal, wait more a second and enter the “IN START” with press In-Start key of Service remocon. After then select “6. External ADC-> Comp 1080P” with navigator button and press “Enter”. It is automatically adjustment
You can see “ADC Component Success” message after Adjustment success Error Messages: When its adjustment is not correct, “ADC Component Fail” message displayed.
If its signal don’t out, then “Check Signal Status” message displayed. These messages will be displayed just a second.

5.1.3.3 ADC 1024*768 RGB-PC
Set RGB-PC 1024*768 mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to “NORMAL”.
After get the signal, wait more a second and enter the “IN START” with press In-Start key of Service remocon. After then select “6. External ADC-> RGB” with navigator button and press “Enter”. It is automatically adjustment
You can see “ADC Component Success” message after Adjustment success Error Messages: When its adjustment is not correct, “ADC Component Fail” message displayed.
If its signal don’t out, then “Check Signal Status” message displayed. These messages will be displayed just a second.

5.2 White Balance adjustment

5.2.1 Overview

5.2.2 Equipment
2) Adjustment Computer (During auto adj., RS-232C protocol is needed)
3) Adjustment R/C
4) Video Signal Generator MSPG-925F 720p/216Gray (Model:217, Pattern:78)
   - Only when internal pattern is not available
   *Color Analyzer Matrix should be calibrated using CS-1000

5.2.3 Equipment connection map

5.2.4 Adjustment Command (Protocol)

5.2.4.1 Protocol
- Len: Number of Data Byte to be send
- CMD: Command
- Val: FOS Data
- CS: Checksum of sent Data
- A: Acknowledge
Ex) [Send: JA_00_DD] / [Ack: A_00_okDX]
RS-232C Command used during auto-adjustment

<table>
<thead>
<tr>
<th>CMD</th>
<th>ID</th>
<th>DATA</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>wb</td>
<td>00</td>
<td>00</td>
<td>Begin White Balance adj.</td>
</tr>
<tr>
<td>wb</td>
<td>00</td>
<td>ff</td>
<td>End White Balance adj. (internal pattern disappears)</td>
</tr>
</tbody>
</table>

Ex) wb 00 00 -> Begin white balance auto-adj.
wb 00 10 -> Gain adj.
ja 00 ff -> Adj. data
jb 00 c0
...
wb 00 1f -> Gain adj. complete
*(wb 00 20(Start), wb 00 2f(End)) -> Off-set adj.
wb 00 ff -> End white balance auto-adj.

5.2.5 Adjustment method

5.2.5.1 Auto adjustment method
1) Set TV in adj. mode using POWER On Key
2) Zero calibrate probe then place it on the center of the Display
3) Connect Cable(RS-232C)
4) Select mode in adj. Program and begin adj.
5) When adj. is complete (OK Sign), check adj. status per mode (Warm, Medium, Cool)
6) Remove probe and RS-232C cable to complete adj.

5.2.5.2 Manual adj. method
1) Set TV in adj. mode using POWER On Key
2) Press ADJ key -> EZ adjust using adj. R/C
3) Using CH + / - KEY, select 7.TEST PATTERN then press Enter to place inHEAT RUN mode and wait for 5 minutes.
4) Zero calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
5) Press ADJ key -> 6. White-Balance then press the cursor to the right (KEY ➤ )
   (When ➤ is pressed Full White internal pattern will be displayed)
6) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
7) Adjustment is performed in COOL, MEDIUM, WARM 3 modes of color temperature

5.2.6 Reference

(White Balance adj. coordinate and color temperature)

- Luminance: Full white 216 Gray
- Standard color coordinate and temperature using CS-1000

<table>
<thead>
<tr>
<th>Mode</th>
<th>Coordinate x</th>
<th>y</th>
<th>Temp</th>
<th>∆uvA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>0.276</td>
<td>0.283</td>
<td>11000K</td>
<td>0.0000</td>
</tr>
<tr>
<td>Medium</td>
<td>0.285</td>
<td>0.293</td>
<td>9300K</td>
<td>0.0000</td>
</tr>
<tr>
<td>Warm</td>
<td>0.313</td>
<td>0.329</td>
<td>6500K</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

5.3 Manual V-Com adjustment Method

* V-Com needs to be adjusted. (Default value is “450”)
1) Set TV in adj. mode using POWER On Key
2) Press ADJ key -> EZ adjust using adj. R/C
3) Using CH + / - KEY, select “10.V-Com”
4) Store the optimized default value “440” if there is no flicker on the picture.
5) But is there flicker on the picture, Adjust V-Com using VOL + / - KEY
6) Stop adjusting V-Com if green pattern doesn’t show flicker. and then stored current value and exit.

5.4 Option selection per country

5.4.1 Overview
- Option selection is only done for models in Non-USA North America due to rating
- Applied model: LA92G Chassis applied None USA Model(Canada, Mexico)

5.4.2 Method
1) Press ADJ key on the Adjustment R/C, then select Country Group Menu
2) Depending on destination, select KR or US, then on the lower option, select US, CA, MX. Selection is done using +, - KEY
5.5 EYE-Q function check
Step 1) Turn on TV
Step 2) Press EYE key of Adj. R/C
Step 3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
Step 4) Confirm that R/G/B value is lower than 10 of the “Raw Data (R: G: B: )”.
If after 6 seconds, R/G/B value is not lower than 10, replace Eye Q II sensor
Step 5) Remove your hand from the Eye Q II sensor and wait for 6 seconds
Step 6) Confirm that “B. Light(xxx)” value increases from 0.
If change is not seen, replace Eye Q II sensor

5.7 Ship-out (Default) mode check (Instop)
• After final inspection, press In-Stop key of the Adjustment R/C and check that the unit goes to Stand-by mode.
• After final inspection, Mechanical S/W(AC S/W) to the “on” position.

6. GND and Internal Pressure check
6.1 Method
1) GND & Internal Pressure auto-check preparation
   - Check that Power Cord is fully inserted to the set
     (If loose, re-insert)
2) Perform GND & Internal Pressure auto-check
   - Unit w/ fully inserted power cord and A/V arrives to the auto-check process.
   - Connect D-terminal AV JACK TESTER
   - Auto CONTROLLER(GWS103-4) ON
   - Perform GND TEST
   - If NG, Buzzer will sound to inform the operator
   - If OK, changeover to I/P check automatically
     (Remove CORD,A/V from AV Jack Box)
   - Perform I/P test
   - If NG, Buzzer will sound to inform the operator
   - If OK, Good lamp will lit up and the stopper will allow the pallet to move on to next process.

6.2 Checkpoint
• TEST voltage
  - GND: 1.5KV/min at 100mA
  - Signal: 3KV/min at 100mA
• Test time: 1 second
• Test point
  - GND test = Power cord GND & signal cable metal GND
  - Internal pressure TEST = POWER CORD GND & LIVE & NEUTRAL
• LEAKAGE CURRENT: At 0.5mA

7. USB S/W Download (option)
7.1 Overview
• USB download allows fast SW upgrade in SVC areas or during Board-level production
7.2 Download Method
1) After set on, confirm that image is displayed
2) Insert USB memory stick that contains the SW and after few seconds similar image to the picture below will appear
3) In [Current TV Software Version Information] confirm current version, and in [New Found TV Software Version Information] confirm to-be version then press Enter by selecting Start
4) Progress bar will appear as below and after completion, the set will reset (if the process does not advance to the picture below, reset the unit and repeat the steps)
5) After download is complete, remove USB memory stick
6) By pressing In-Start on the adj. R/C, check the version
1. Power-up boot check

- Check standby Voltage
  - P700 8pin : +5V_ST
    - OK
    - NO
      - Check Power connector and AC S/W on?
        - OK
        - Replace Power board
      - Check Fuse
        - OK
        - Replace Power board

- Check X100 clock
  - 12MHz
    - OK
    - NO
      - Replace X100

- Check P700 PWR_ON
  - 2Pin : 5V
    - OK
    - NO
      - Re-download software
        - OK
        - Replace Mstar(IC100) or Main board
      - Replace Q706

- Check Q706 Output Level
  - 5V
    - OK
    - NO
      - Replace Q706

- Check Multi Voltage
  - P700 13pin : 12V,
    - 18pin : 20V
    - OK
    - NO
      - Replace Power board

- Check inverter control & error
  - P700 22pin : Low
    - P700 20pin : high
    - OK
    - NO
      - Check Power board or Module

- Check IC704 output voltage
  - 3.3V
    - OK
    - NO
      - Replace IC704

- Check Mstar LVDS output
  - R1109, R1110, R1111, R1120
    - OK
    - NO
      - Replace Mstar(IC100) or Main board

- Check URSA2 mini-LVDS output
  - P1400, P1401
    - OK
    - NO
      - Replace Mstar(IC700) or Main board

- Check
  - P1400, P1401
    - OK
    - NO
      - Replace Mstar(IC700) or Main board
2. Digital TV Video

- Check RF Cable & Signal
  - OK
  - Check Tuner 5V Power
    - TU1001 4Pin
      - NO
        - Check IC1002
      - OK
        - Check IF_P/N Signal
          - NO
            - Replace Tuner.
          - OK
            - Check Check Demodulator Input
              - Clock(X1005-25MHz)
                - NO
                  - Replace X1005
                - OK
                  - Check IC1004(LGDT) Output
                    - NO
                      - Replace IC1004
                    - OK
                      - Check Mstar LVDS output
                        - R1109, R1110, R1111, R1120
                          - NO
                            - Replace Mstar(IC100) or Main board

3. Analog TV Video

- Check RF Cable
  - OK
  - Check Tuner 5V Power
    - TU1001 4Pin
      - NO
        - Check IC1002
      - OK
        - Check CVBS signal.
          - TU1001 #19 Pin
            - NO
              - Replace Tuner.
            - OK
              - Check Mstar LVDS output

4. Component Video

- Check input signal format.
  - Is it supported?
    - OK
    - Check Component Cable.
      - OK
        - Check JK1206
          - NO
            - Replace Jack.
          - OK
            - Check Mstar LVDS output
              - NO
                - Replace Mstar(IC100) or Main board
5. RGB Video

Check input signal format.
Is it supported?

OK

Check RGB Cable connectors for damage.

OK

Check JK1201

NO Replace Jack.

OK

Check EDID

NO Re-download EDID data.

OK

Check signal R/G/B/H/V-Sync R1234/1235/1236/1233/1232

NO Check other set.
If no problem, check signal line

OK

Check Mstar LVDS output

NO Replace Mstar(IC100) or Main board

6. AV Video

Check input signal format.
Is it supported?

OK

Check AV Cable for damage or open connector.

OK

Check JK1206, JK1202

NO Replace Jack.

OK

Check Mstar LVDS output

NO Replace Mstar(IC100) or Main board
7. HDMI Video

Check input signal format.  
Is it supported?

OK

Check HDMI Cable for damage or open connector.

OK

Check JK500,501,502,503

NO

Replace Jack.

OK

Check EDID

NO

Re-download EDID data.

OK

Check HDCP key NVRAM(IC105)  
power & I2C Signal (pin 5, 6)

NO

Replace the defective IC.

OK

Check HDMI Signal

NO

Check other set.  
If no problem, check signal line.

NO

Replace Main board

OK

Check Mstar LVDS output

NO

Replace Mstar(IC100)  
or Main board
8. All Source Audio

- Make sure you can’t hear any audio.
- First check the TV SPEAKER Menu (Menu > Sound > TV Speaker) NO Toggle the menu
- Check Mstar AUDIO_MASTER_CLK R603 OK Replace Mstar(IC100) or Main board
- Check Mstar I2S Output R604, R605, R606 NO Check signal line Or replace IC100
- Check IC600 Power *20V, 3.3V, 1.8V. NO Check Regulator IC601.IC704
- Check Output Signal P600 1,2,3,4 PIN NO Replace NTP(Audio AMP) IC600
- Check Connector & P600 NO Replace connector if found to be damaged.
- Check speaker resistance and connector damage. NO Replace speaker.
9. Digital TV Audio

Check Tuner 5V Power TU1001 4Pin

OK

Check Tuner 5V Power TU1001 4Pin

NO

Check IC1002 19/22 inch model check IC1005

Check IF_P/N Signal

OK

Check IF_P/N Signal

NO

Replace Tuner.

Check Check Demodulator Input Clock(X1005-25MHz)

OK

Check Check Demodulator Input Clock(X1005-25MHz)

NO

Replace X1005

Check IC1004(LGDT3305) Output - AR1070, AR1071

OK

Check IC1004(LGDT3305) Output - AR1070, AR1071

NO

Replace IC1004

Check Output Signal P600 1,2,3,4 PIN

OK

Check Output Signal P600 1,2,3,4 PIN

NO

Replace NTP3100L (Audio AMP) IC600

Check Connector & P600

OK

Check Connector & P600

NO

Replace connector if found to be damaged.

Check speaker resistance and connector damage.

OK

Check speaker resistance and connector damage.

NO

Replace speaker.

10. Analog TV Audio

Check RF Cable

OK

Check RF Cable

NO

Replace Mstar(IC100) or Main board

Check Tuner 5V Power TU1001 4Pin

OK

Check Tuner 5V Power TU1001 4Pin

NO

Check IC1002 Check IC1005(19",22")

Bad Tuner. Replace Tuner.

Check SIF buffer signal.

OK

Check SIF buffer signal.

NO

Check SIF Signal line.

Follow procedure All source audio trouble shooting guide.

OK

Follow procedure All source audio trouble shooting guide.

NO

Replace Mstar(IC100) or Main board
11. No Video (for 42/47LH40-UA)

- Check 12V DC Voltage - L1300
  - OK
  - Check Q706 - pin 4 2V DC voltage
    - OK
    - Check PANEL_CTRL - LOW (0V)
      - OK
      - Replace Q706
      - Check Q704/Q705

- Check 3.3V/16V/26V DC Voltage - R1447, R1446, R1450
  - NO
  - Replace IC1300
  - or Main board

- Check IC1301 pin 28 (Vcom)
  - NO
  - Replace IC1301

- Detach the P1400/P1401 FFC Cable
  - Check Vcom
  - OK

- Replace LCD Module

- Check URSA2 mini-LVDS output P1400, P1401
  - NO
  - Replace LCD Module

12. No Video (for 37LH40-UA)

- Check 12V DC Voltage - L1300
  - OK
  - Check Q706 - pin 4 2V DC voltage
    - OK
    - Check PANEL_CTRL - LOW (0V)
      - OK
      - Replace Q706
      - Check Q704/Q705

- Check 3.3V/16V/26V DC Voltage - R1327, R1371, R1378
  - NO
  - Replace IC1300
  - or Main board

- Check IC1301 pin 28 (Vcom)
  - NO
  - Check IC1302 input / output
    - OK

- Detach the P1400/P1401 FFC Cable
  - Check Vcom
  - OK

- Replace LCD Module
T-Con block (non GIP)
Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by "\(^{\text{\textbullet}}\)" 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.
Audio Amp.
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.