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 \( \Delta \) 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 \( \Omega \)

*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 apply 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.
   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 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 unless 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. Use only a grounded-tip soldering iron to solder or unsolder 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.)

5. Do not use freon-propelled spray-on cleaners.

6. Do not remove a replacement ES device from its protective package unless 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).

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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.
1. Application range
This specification is applied to the LCD TV used LJ91L 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 specification
   - EMC: CE, IEC specification

4. Electrical specification
4.1 General Specification

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<td></td>
<td>4) CATV : 01~13</td>
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<td>3</td>
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<td>2) Humidity : ~ 85 %</td>
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5. Chromiance & Luminance spec.

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6. Component Input (Y, CB/PB, CR/PR)

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<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(kHz)</th>
<th>Pixel clock</th>
<th>Proposed</th>
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### 7. RGB Input (PC)

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<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
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<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA(VGA)</td>
</tr>
<tr>
<td>4</td>
<td>800*600</td>
<td>35.156</td>
<td>60.25</td>
<td>36.00</td>
<td>VESA(SVGA)</td>
</tr>
<tr>
<td>5</td>
<td>800*600</td>
<td>37.879</td>
<td>59.87</td>
<td>40.00</td>
<td>VESA(XGA)</td>
</tr>
<tr>
<td>6</td>
<td>1024*768</td>
<td>48.363</td>
<td>60.00</td>
<td>50.00</td>
<td>VESA(SVGA)</td>
</tr>
<tr>
<td>7</td>
<td>1280*768</td>
<td>47.776</td>
<td>59.87</td>
<td>59.50</td>
<td>VESA(WXGA)</td>
</tr>
<tr>
<td>8</td>
<td>1360*768</td>
<td>47.712</td>
<td>60.015</td>
<td>59.50</td>
<td>VESA(WXGA)</td>
</tr>
<tr>
<td>9</td>
<td>1280*1024</td>
<td>63.981</td>
<td>60.020</td>
<td>108.00</td>
<td>VESA</td>
</tr>
<tr>
<td>10</td>
<td>1600*1200</td>
<td>75.00</td>
<td>60.00</td>
<td>162</td>
<td>VESA(UXGA)</td>
</tr>
</tbody>
</table>
| 11 | 1920*1080   | 67.5        | 60          | 148.5            | HDTV_1080P|** RGB PC Monitor Range Limits**
- Min Vertical Freq - 56 Hz
- Max Vertical Freq - 62 Hz
- Min Horiz. Freq - 30 kHz
- Max Horiz. Freq - 80 kHz
- Pixel Clock - 170 MHz

### 8. HDMI Input (PC/DTV)

<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>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DDC</td>
</tr>
<tr>
<td>1</td>
<td>640*350</td>
<td>31.468</td>
<td>70.09</td>
<td>25.17</td>
<td>EGA</td>
</tr>
<tr>
<td>2</td>
<td>720*400</td>
<td>31.469</td>
<td>70.08</td>
<td>25.32</td>
<td>DOS</td>
</tr>
<tr>
<td>3</td>
<td>640*480</td>
<td>31.469</td>
<td>59.94</td>
<td>25.17</td>
<td>VESA(VGA)</td>
</tr>
<tr>
<td>4</td>
<td>800*600</td>
<td>35.156</td>
<td>60.25</td>
<td>36.00</td>
<td>VESA(SVGA)</td>
</tr>
<tr>
<td>5</td>
<td>800*600</td>
<td>37.879</td>
<td>59.87</td>
<td>40.00</td>
<td>VESA(SVGA)</td>
</tr>
<tr>
<td>6</td>
<td>1024*768</td>
<td>48.363</td>
<td>60.00</td>
<td>50.00</td>
<td>VESA(SVGA)</td>
</tr>
<tr>
<td>7</td>
<td>1280*768</td>
<td>47.776</td>
<td>59.87</td>
<td>59.50</td>
<td>VESA(WXGA)</td>
</tr>
<tr>
<td>8</td>
<td>1360*768</td>
<td>47.712</td>
<td>60.015</td>
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<tr>
<td>9</td>
<td>1280*1024</td>
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<td>60.020</td>
<td>108.00</td>
<td>VESA</td>
</tr>
<tr>
<td>10</td>
<td>1600*1200</td>
<td>75.00</td>
<td>60.00</td>
<td>162</td>
<td>VESA(UXGA)</td>
</tr>
</tbody>
</table>
| 11 | 1920*1080   | 66.587      | 59.934      | 138.5            | HDTV_1080P|** HDMI Monitor Range Limits**
- Min Vertical Freq - 56 Hz
- Max Vertical Freq - 62 Hz
- Min Horiz. Freq - 30 kHz
- Max Horiz. Freq - 80 kHz
- Pixel Clock - 170 MHz
### 9. Consigned Setting (OUTGOING CONDITION)

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Input Mode TV02CH</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Volume Level 10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mute Off</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Aspect Ratio 16:9</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>System Color PAL-M</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Booster On</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Picture Mode</td>
<td>Vivid</td>
</tr>
<tr>
<td></td>
<td>Backlight</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Contrast</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Brightness</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Sharpness</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Tint</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Color Temperature</td>
<td>Cool</td>
</tr>
<tr>
<td></td>
<td>Picture Reset</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sound Mode Standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Auto Volume Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clear Voice</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>SRS TruSurround XT Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balance</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>TV Speaker On</td>
<td>On</td>
</tr>
<tr>
<td>9</td>
<td>Clock Auto</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off Timer / On Timer</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td>Sleep Timer / Auto Sleep</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Language (Menu/Audio) Portugues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SimpLink On</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Key Lock Off</td>
<td>On</td>
</tr>
<tr>
<td></td>
<td>Caption Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set ID 1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Channel Memory RF : 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 30, 51, 63 CATV : 15, 16, 17</td>
<td></td>
</tr>
</tbody>
</table>
ADJUSTMENT INSTRUCTION

1. Application Range

This specification sheet is applied all of the LJ91T LCD TV models, which produced in manufacture department or similar LG TV factory.

2. Notice

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. But it is flexible when its factory local problem occurs.
3) The adjustment must be performed in the circumstance of 25 ±5°C of temperature and 65±10% of relative humidity if there is no specific designation.
4) The input voltage of the receiver must keep 100~220V, 50/60Hz.
5) Before adjustment, execute Heat-Run for 5 minutes.
   • After Receive 100% Full white pattern (06CH) then process Heat-run (or “8. Test pattern” condition of Ez-Adjust status)
   • How to make set white pattern
     1) Press Power ON button of Service Remocon
     2) Press ADJ button of Service remocon. Select “8. Test pattern” and, after select “White” using navigation button, and then you can see 100% Full White pattern.

* In this status you can maintain Heat-Run useless any pattern generator

* Notice: if you maintain one picture over 20 minutes (Especially sharp distinction black with white pattern – 13Ch, or Cross hatch pattern – 09Ch) then it can appear image stick near black level.

3. Adjustment Items

3.1 PCB Assembly adjustment
   • CPLD DOWNLOAD
   • Adjust 480i Comp1
   • Adjust 1080p Comp1/RGB
     - If it is necessary, it can adjustment at Manufacture Line
     - You can see set adjustment status at “1. ADJUST CHECK” of the “In-start menu”

3.2 Set Assembly Adjustment
   • EDID (The Extended Display Identification Data ) / DDC (Display Data Channel) download
   • Color Temperature (White Balance) Adjustment
   • Make sure RS-232C control
   • Selection Factory output option

4. PCB Assembly Adjustment

4.1. CPLD DOWNLOAD : JTAG MODE

4.2. << PRINT PORT >> PIN MAP

<table>
<thead>
<tr>
<th>Pin</th>
<th>JTAG Mode Signal Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TCK</td>
</tr>
<tr>
<td>3</td>
<td>TMS</td>
</tr>
<tr>
<td>8</td>
<td>TDI</td>
</tr>
<tr>
<td>11</td>
<td>TDO</td>
</tr>
<tr>
<td>13</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>VCC</td>
</tr>
<tr>
<td>18 TO 25</td>
<td>GND</td>
</tr>
</tbody>
</table>
4.3. << 10P WAFER >> PIN MAP

Table 2 identifies the 10-pin female plug's pin names for the corresponding download mode.

<table>
<thead>
<tr>
<th>Pin</th>
<th>PS Mode</th>
<th>JTAG Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D0L0</td>
<td>VCC</td>
</tr>
<tr>
<td>2</td>
<td>VDD</td>
<td>VDD</td>
</tr>
<tr>
<td>3</td>
<td>COMP_CTL</td>
<td>TDO</td>
</tr>
<tr>
<td>4</td>
<td>VSS</td>
<td>VSS</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>TDO</td>
</tr>
<tr>
<td>6</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>7</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>8</td>
<td>N/C</td>
<td>N/C</td>
</tr>
<tr>
<td>9</td>
<td>DATA</td>
<td>DATA</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>

Circuit Board Header Connection
The BynElanMV Hoppin female plug connects to a 10-pin male header on the circuit board. The 100-pin male header has two rows of five pins, which are connected to the device's programming or configuration pins. The BynElanMV cable connects power and downloads data via the male header. Figure 4 shows the dimensions of a typical 10-pin male header.

Operating Conditions

Table 3. BynElanMV Cable Absolute Minimum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>Supply voltage</td>
<td>With respect to ground</td>
<td>-1.0</td>
<td>2.7</td>
<td>V</td>
</tr>
<tr>
<td>Vcc</td>
<td>DC input voltage</td>
<td>With respect to ground</td>
<td>-1.0</td>
<td>5.5</td>
<td>V</td>
</tr>
</tbody>
</table>

Table 4. BynElanMV Cable Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCC</td>
<td>Supply voltage</td>
<td>3.3V operation</td>
<td>2.7</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>Vcc</td>
<td>DC input voltage</td>
<td>3.3V operation</td>
<td>2.7</td>
<td>5.5</td>
<td>V</td>
</tr>
</tbody>
</table>
4.4. Using RS-232C

Adjust 3 items at 3.1 PCB assembly adjustments “4.1.3 sequence” one after the order.

O Adjustment protocol

<table>
<thead>
<tr>
<th>Order</th>
<th>Command</th>
<th>Set response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inter the Adjustment mode</td>
<td>ad 00 00</td>
<td>d 00 OK00x</td>
</tr>
<tr>
<td>2. Change the Source</td>
<td>kb 00 40</td>
<td>b 00 OK40x (Adjust 480i Comp1/1080p Comp1)</td>
</tr>
<tr>
<td></td>
<td>kb 00 60</td>
<td>b 00 OK60x (Adjust 1080p RGB)</td>
</tr>
<tr>
<td>3. Start Adjustment</td>
<td>ad 00 10</td>
<td></td>
</tr>
<tr>
<td>4. Return the Response</td>
<td></td>
<td>OKx (Success condition)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGx (Failed condition)</td>
</tr>
<tr>
<td>5. Read Adjustment data</td>
<td>(main) ad 00 20</td>
<td>(main : component1 480i, RGB 1080p) 000000000000000000000000007c007b006dx</td>
</tr>
<tr>
<td>(main) ad 00 30</td>
<td>(main : component1 1080p) 0000000000000000000000000007c00830077x</td>
<td></td>
</tr>
<tr>
<td>6. Confirm Adjustment</td>
<td>ad 00 99</td>
<td>NG 03 00x (Failed condition)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG 03 01x (Failed condition)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG 03 02x (Failed condition)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OK 03 03x (Success condition)</td>
</tr>
<tr>
<td>7. End of Adjustment</td>
<td>ad 00 90</td>
<td>d 00 OK90x</td>
</tr>
</tbody>
</table>

See ADC Adjustment RS232C Protocol_Ver1.0

* Adjustment protocol
- Pattern Generator : (MSPG-925FA)
- Adjust 480i Comp1 (MSPG-925FA : model :209 , pattern : 65)
- Adjust 1080p Comp1/RGB(MSPG-925FA:model : 225 , pattern : 65)

* If you want more information then see the below Adjustment method (Factory Adjustment)

O Adjustment sequence
- ad 00 00 : Enter the ADC Adjustment mode.
- xb 00 40: Change the mode to Component1 (No actions)
- ad 00 10: Adjust 480i Comp
- ad 00 10: Adjust 1080p Comp
- xb 00 60: Change to RGB-PC mode(No action)
- ad 00 10: Adjust 1080p RGB
- ad 00 90: End of the adjustment
5. Factory Adjustment

5.1 Manual Adjust Component 480i/1080p RGB 1080p

- **Summary**: Adjustment component 480i/1080i and RGB 1080p is Gain and Black level setting at Analog to Digital converter, and compensate the RGB deviation

- **Using instrument**
  - Adjustment remote, 801GF(802B, 802F, 802R) or MSPG925FA pattern generator (It can output 480i/1080i horizontal 100% color bar pattern signal, and its output level must setting 0.7V±0.1V p-p correctly)

![Adjustment pattern: 480i / 1080p 60Hz Pattern]

* You must make it sure its resolution and pattern cause every instrument can have different setting

- **Adjustment method 480i Comp1, Adjust 1080p Comp1/RGB (Factory adjustment)**
  - ADC 480i Component1 adjustment
    - Check connection of Component1
    - MSPG-925FA É Model: 209, Pattern 65
  - Set Component 480i mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to “NORMAL”
  - ADC 1080p Component1 / RGB adjustment
    - Check connection both of Component1 and RGB
    - MSPG-925FA Model: 225, Pattern 65
  - Set Component 1080p mode and 100% Horizontal Color Bar Pattern(HozTV31Bar), then set TV set to Component1 mode and its screen to “NORMAL”
  - After get each the signal, wait more a second and enter the “IN-START” with press IN-START key of Service remote. After then select “7. External ADC” with navigator button and press “Enter”.
  - After Then Press key of Service remote “Right Arrow(VOL+)”
    - You can see “ADC Component1 Success”
    - Component1 1080p, RGB 1080p Adjust is same method.
    - Component 1080p Adjustment in Component1 input mode
      - RGB 1080p adjustment in RGB input mode
      - If you success RGB 1080p Adjust. You can see “ADC RGB-DTV Success”

5.2 EDID (The Extended Display Identification Data) / DDC (Display Data Channel) Download

- **Summary**
  - It is established in VESA, for communication between PC and Monitor without order from user for building user condition. It helps to make easily use realize “Plug and Play” function.
  - For EDID data write, we use DDC2B protocol.

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

Caution: - Never connect HDMI & D-sub Cable when the user downloading .
  - Use the proper cables below for EDID Writing.
**Manual Download**

- Write HDMI EDID data

  - Using instruments
    - => Jig. (PC Serial to D-Sub connection) for PC, DDC adjustment.
    - => S/W for DDC recording (EDID data write and read)
    - => D-sub jack
    - => Additional HDMI cable connection Jig.

  - Preparing and setting.
    - => Set instruments and Jig. Like pic.5), then turn on PC and Jig.
    - => Operate DDC write S/W (EDID write & read)
    - => It will operate in the DOS mode.

Pic.3) For write EDID data, setting Jig and another instruments.

- EDID data for LJ91D Chassis (Model name = LG TV)
  - HDMI-1 EDID table (0x3D, 0x2C)
  - HDMI-2 EDID table (0x3D, 0x1C)
  - HDMI-3 EDID table (0x3D, 0x0C)
  - Analog (RGB) EDID table (0x9B, 0x25)

See Working Guide of you want more information about EDID communication.
5.3 Adjustment Color Temperature (White balance)

**Using Instruments**
- Color Analyzer: CA-210 (CH 9)
  - Using LCD color temperature, Color Analyzer (CA-210) must use CH 9, which Matrix compensated (White, Red, Green, Blue compensation) with CS-2100. See the Coordination belowed one.
- Auto-adjustment Equipment (It needs when Auto-adjustment – It is availed communicate with RS-232C : Baud rate: 115200)
  - Video Signal Generator MSPG-925F 720p, 216Gray (Model: 217, Pattern 78)

**Connection Diagram (Auto Adjustment)**
- Using Inner Pattern
- Using HDMI input

**White Balance Adjustment**
If you can't adjust with inner pattern, then you can adjust it using HDMI pattern. You can select option at "Ez-Adjust Menu – 7. White Balance" there items "NONE, INNER, HDMI". It is normally setting at inner basically. If you can't adjust using inner pattern you can select HDMI item, and you can adjust.

In manual Adjust case, if you press ADJ button of service remocon, and enter "Ez-Adjust Menu – 7. White Balance", then automatically inner pattern operates. (In case of "Inner" originally "Inner" will be selected.

- Connect all cables and equipments like Pic.5
- Set Baud Rate of RS-232C to 115200. It may set 115200 orignally.
- Connect RS-232C cable to set
- Connect HDMI cable to set

**RS-232C Command (Commonly apply)**
- wb 00 00: White Balance adjustment start.
- wb 00 10: Start of adjust gain (Inner white pattern)
- wb 00 1f: End of gain adjust
- wb 00 20: Start of offset adjust(Inner white pattern)
- wb 00 2f: End of offset adjust
- wb 00 ff: End of White Balance adjust(Inner pattern disappeared)

- "wb 00 00": Start Auto-adjustment of white balance.
- "wb 00 10": Start Gain Adjustment (Inner pattern)
- "wb 00 20": Start Offset Adjustment (Inner pattern)
- "wb 00 2f": End of Offset Adjustment (Inner pattern)
- "wb 00 ff": End of white balance adjustment (inner pattern disappear)
White Balance Adjustment (Manual adjustment)

- Test Equipment: CA-210
- Using LCD color temperature, Color Analyzer (CA-210) must use CH 9, which Matrix compensated (White, Red, Green, Blue compensation) with CS-2100. See the Coordination bellowed one.
- Manual adjustment sequence is like bellowed one.
  - Turn to “Ez-Adjust” mode with press ADJ button of service remocon.
  - Let CA-210 to zero calibration and must has gap more 10cm from center of LCD module when adjustment.
  - Press “ADJ” button of service remocon and select “7.White-Balance” in “Ez-Adjust” then press “►” button of navigation key. (When press “►” button then set will go to full white mode)
  - Adjust at three mode (Cool, Medium, Warm)
  - If “cool” mode
    - Let B-Gain to 192 and R, G, B-Cut to 64 and then control R, G gain adjustment High Light adjustment.
  - If “Medium” and “Warm” mode
    - Let R-Gain to 192 and R, G, B-Cut to 64 and then control G, B gain adjustment High Light adjustment.
  - All of the three mode
    - Let R-Gain to 192 and R, G, B-Cut to 64 and then control G, B gain adjustment High Light adjustment.
  - With volume button (+/-) you can adjust.
  - After all adjustment finished, with Enter (■ key) turn to Ez-Adjust mode. Then with ADJ button, exit from adjustment mode

Attachment: White Balance adjustment coordination and color temperature.

Using CS-1000 Equipment.
- COOL : T=11000K, △uv=0.000, x=0.276 y=0.283
- MEDIUM : T=9300K, △uv=0.000, x=0.285 y=0.293
- WARM : T=6500K, △uv=0.000, x=0.313 y=0.329

5.4 EYE-Q Function check.
1) Turn on TV
2) Press EYE Key of Adj R/C
3) Cover the Eye Q II sensor on the front of the using your hand and wait for 6 seconds
4) Confirm that R/G/B va:ie os :pwer tjam 10 of the “Raw Data (Sensor data, Back light)”. If after 6 seconds, R/G/B value is not lower than 10, re[ace EYE Q II sensor.
5) Remove your hand from the EYE Q II sensor and wait for 6 second
6) Confirm that “OK” pop up.
If change is not seen, replace EYE Q II sensor

5.5 Test of RS-232C control
Press IN-Start button of service remocon then set the “4.Baud rate” to 15200, Then check RS-232C control and

5.6 Selection of Country option.
Selection of country option is allowed only North American model (Not allowed Korean model). It is selection of Country about Rating and Time Zone.
- Models: All models which use LA75A Chassis (See the first page.)
  - Press “IN-Start” button of Service Remocon, then enter the “Option” Menu with “PIP CH-” Button
  - Select one of these three (USA, CANADA, MEXICO) defends on its market using “Vol. +/-”button.
* Caution : Don’t push The Instop Key after completing the function inspection.

5.7 Check the Ginga(Data Broadcasting)
1) Turn on TV
2) Press the OK Button on the ADJ R/C
3) Check the Ginga icon
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.

MCLK SDATA WCK BCK TP is necessary
Monitor0_1_2 TP is necessary

CHANGE 22uH(L504,L505) TO 15uH/6.3mm AFTER DV1

2A => 5A

THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
When using FUNDAMENTAL then series R = 0 ohm and CL = 8 pF
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. ENSURE THAT ONLY MANUFACTURED SPECIFIED PARTS ARE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
Block Diagram

- I2C channel [LH70]

CH0
- TUNER 1
  - 0xC2
  - Demod(0x30)
  - QPSK(0x32)

CH1
- AMP
  - NTP3100L
  - 0x54
- HDMI SW
  - TDA9996

CH2
- EEPROM
  - AT24C512
  - 0xA6
- Micom
  - MTV416
  - 0x50

CH3
- FRC
  - MST7323

CH0 (+3.3V)
CH1 (+3.3V)
CH2 (+3.3V)
CH3 (+3.3V)
< Signal Interface >
1. Power-Up Boot Fail Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

AV1
\[ \text{CVBS, L/R, AV_DET} \]

AV2
\[ \text{SIDE_CVBS, SIDE_L/R, SIDE_DET} \]

Component 1
\[ \text{Y Pb Pr, L/R, DET} \]

Component 2
\[ \text{Y Pb Pr, L/R, DET} \]

D-sub RGB
\[ \text{RGB/H/V} \]

Audio L/R (for RGB)
\[ \text{Audio L/R} \]

HDMI 1
\[ \text{3x1 HDMI Switch} \]

HDMI 2

HDMI 3

Digital Audio (Optic)
\[ \text{SPDIF} \]

RS-232C (Ctrl./SVC)
\[ \text{RX/TX} \]

Bluetooth Module

USB
\[ \text{USB_DM1, USB_DP1, USB_DM2, USB_DP2} \]

O.C. Protector

Reset Switch

Reset IC

XC_12MHz

DDRR2 (1Gbit)
\[ \text{Elpida/Hynix} \]

DDDR2 (512Mbit)
\[ \text{NAND Flash} \]

NTP3100L

MICOM
\[ \text{MTV416GMF} \]

JTAG

Digital AMP

(512Mbit)

FRC Block

LCD Module
\[ \text{(FHD, 120Hz)} \]

LCDS

FRC IC
\[ \text{MST7323S} \]

JACK BACK at REAR

54MHz

+5V

+5V

X-tal

X-tal

X-tal

X-tal
1. Power-Up Boot Fail Trouble Shooting

1. Check P801 All Voltage Level (24V, 12V, 5V_ST)
   - Y → Check Power connector → Y → Replace Power board
   - N → Check All Voltage Level at L805/L807/L808 → N → Replace one of L805/L807/L808 & Recheck
      - Y → Replace one of IC809/Q812/L828/L829/L830/L822 & Recheck
      - N → Check Voltage Level 2.5V at L827 → N → Replace one of IC803/L824/L827 & Recheck
         - Y → Replace one of IC802/IC805/L815 & Recheck
         - N → Check Voltage Level 1.8V at IC802 #2 pin or L815 → N → Replace one of IC804/Q809/L811/L817/L821 & Recheck
            - Y → Check Voltage Level 1.2V at L821 → N → Replace one of IC804/Q809/L811/L817/L821 & Recheck
               - Y → Check X903 Clock 54MHz → N → Replace X903
               - Y → Check signal transition at IC101 #9 pin → N → Maybe BCM3556 has troubles
               - Y → Replace IC101 Flash Memory
2. No OSD Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

- VA1G5BFR005
- D-sub RGB
- HDMI 1, HDMI 2, HDMI 3
- AV1, AV2
- Component 1, Component 2
- D-sub RGB
- Audio L/R (for RGB)
- HDMI Switch
- MAX3232
- MAX3232
- 3x1 HDMI Switch
- DDR2 (1Gbit)
- Elpida/Hynix
- NAND Flash (512Mbit)
- Digital AMP (NTP3100L)
- MICOM (MTV416GMF)
- MAX3232
- X-tal
- Bluetooth Module
- USB
- O.C. Protector
- Reset Switch
- JTAG
- LCD Module (FHD, 120Hz)
- LVDS
- DDR (256Mbit)
- Elpida/Hynix
- Reset IC
- FRC IC
- LCD Module (FHD, 120Hz)

JACK BACK at REAR

- Component 1
- Component 2
- Audio L/R (for RGB)
- CVBS, L/R, AV_DET
- Y Pb Pr, L/R, DET
- RGB/H/V
- Audio L/R
- SPDIF
- USB
- DP1/DM1
- DP2/DM2
- RX/TX
- RX/TX
- RX/TX
- RX/TX
- +5V
- +5V
- +5V
- +5V
- 54MHz
- X-tal

Overall Block Diagram for Brazil DTV (LH70)
2. No OSD Trouble Shooting

- Check 12V Voltage Level at P801 #13 Pin
  - Y → Check Power connector
  - N → Replace Power board

- Check 12V Voltage Level at L801
  - Y → Replace one of L801/Q804 & Recheck
  - N → Check Power connector

- Check 12V Voltage Level at L909
  - Y → Replace one of Q802/Q803/Q804/L801 & Recheck
  - N → Replace one of L801/Q804 & Recheck

- Check Voltage Level 2.5V at L827
  - Y → Replace one of IC803/L824/L827 & Recheck
  - N → Replace one of IC802/IC805/L815 & Recheck

- Check Voltage Level 1.8V at IC802 #2 pin or L815
  - Y → Replace one of IC802/IC805/L815 & Recheck
  - N → Replace IC807 & Recheck

- Check Voltage Level 1.26V at IC807 #6 pin
  - Y → Replace IC807 & Recheck
  - N → Replace one of IC803/L824/L827 & Recheck

- Check P903 #16(TXAC-), #17(TXAC+), #32(TXBC-), #33(TXBC+)
  - Y → Maybe BCM3556(IC100) or 7329A(IC901) has troubles
  - N → Replace one of IC803/L824/L827 & Recheck

- Check LVDS Cable
  - Y → Replace Cable
  - N → Check Voltage LCD Module
3. Digital TV Video Trouble Shooting

Check RF Cable

- **Y**
  - Check Tuner(TU101) Power (5.0V, 2.5V, 3.3V, 1.2V)

- **N**
  - Replace one of IC101, IC102 at Jack Board or IC803/ IQ812/ C804/ Q809/+5V_ST and +12V of P801 at Main Board& Recheck

  - **Y**
    - Maybe BCM3556(IC100) has problems

  - **N**
    - Maybe Tuner(TU101) has problems

  - **N**
    - Check TP Clock, Data, Sync R107, R108, R109

  - **Y**
    - Maybe Tuner(TU101) has problems

  - **N**
    - Check Tuner(TU101) Power (5.0V, 2.5V, 3.3V, 1.2V)

  - **N**
    - Maybe Tuner(TU101) has problems

- **Y**
  - Maybe Cable Pin has problems

- **N**
  - Check cable between P203 at Jack Board and P701 at Main Board
4. Analog TV Video Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

- **AV1**: CVBS, L/R, AV_DET
- **AV2**: SIDE CVBS, SIDE L/R, SIDE_DET
- **Component 1**: Y Pb Pr, L/R, DET
- **Component 2**: Y Pb Pr, L/R, DET
- **D-sub RGB**: RGB/H/V
- **Audio L/R (for RGB)**: Audio L/R
- **HDMI 1**, **HDMI 2**, **HDMI 3**: HDMI Switch
- **Digital Audio (Optic)**: SPDIF
- **RS-232C (Ctrl./SVC)**: MAX3232
- **Bluetooth Module**: DP1/DM1, DP2/DM2
- **USB**: USB_DM1, USB_DM2, USB_DP1, USB_DP2
- **Reset Switch**: O.C. Protector
- **Reset IC**: X-tal 54MHz

- **Digital AMP**: NTP3100L
- **NVRAM**: MICOM (MTV416GMF)
- **JTAG**: X-tal 24MHz

- **DDR2 (256Mbit)**: Qimonda/Hynix
- **DDR2 (1Gbit)**: Elpida/Hynix
- **DDR2 (1Gbit)**: Elpida/Hynix
- **NAND Flash**: (512Mbit)
- **LVDS**: LCD Module (FHD, 120Hz)

- **X-tal 12MHz**: X-tal
- **LVDS**: X-tal

- **Overall Block Diagram for Brazil DTV (LH70)**
4. Analog TV Video Trouble Shooting

- **Check RF Cable**

  - **Y**
    - **Check Tuner(TU101) Power** (5.0V, 2.5V, 3.3V, 1.2V)
    - **Y**
      - **Check CVBS Signal TU101 #7 Pin and R118**
      - **Y**
        - **Check cable between P203 at Jack Board and P701 at Main Board**
        - **Y**
          - **Check CVBS Signal R703 and C110 at Main Board**
          - **Y**
            - **Maybe BCM3556(IC100) has problems**
            - **Y**
          - **N**
            - **Replace one of R703 and C110 & Recheck**
      - **N**
        - **Maybe Tuner(TU101) has problems**
  - **N**
    - **Check CVBS Signal R703 and C110 at Main Board**
    - **N**
      - **Maybe Cable Pin has problems**
      - **N**
        - **Maybe BCM3556(IC100) has problems**
      - **Y**
        - **Replace one of IC101, IC102 at Jack Board or IC803/ Q812/ IC804/ IC809/Q809/+5V_ST and +12V of P801 at Main Board & Recheck**
    - **Y**
      - **Check Tuner(TU101) Power** (5.0V, 2.5V, 3.3V, 1.2V)
      - **N**
        - **Maybe BCM3556(IC100) has problems**
5. Component Video Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

AV1

AV2

Component 1

Component 2

D-sub RGB

Audio L/R (for RGB)

HDMI 1

HDMI 2

HDMI 3

Digital Audio (Optic)

RS-232C (Ctrl./SVC)

Bluetooth Module

USB

JACK BACK at REAR

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5. Component Video Trouble Shooting

- **Check Signal Format**
  - Is it supported signal?
  - **Y**
    - **Check Component Cable**
    - **Y**
      - **Check Component Jack JK209 at Jack Board**
      - **N**
        - **Replace Jack at Jack board**
      - **Y**
        - **Check Component Signal**
        - **R292, R293, R294, R295, R296, R297 at Jack Board**
        - **N**
          - **Replace one of R292, R293, R294, R295, R296, R297 L212, L213, L214, L215, L216, L217 & Recheck**
        - **Y**
          - **Check cable between P203 at Jack Board and P701 at Main Board**
          - **N**
            - **Maybe Cable Pin has problems**
          - **Y**
            - **Replace it**
      - **Y**
    - **N**
      - **Check Component Signal**
      - **C130, C131, C132, C133, C134, C135**
      - **N**
        - **Replace it**
      - **Y**
        - **Maybe BCM3556(IC100) has problems**
6. RGB Video Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

- **AV1**
  - CVBS, L/R, AV_DET
  - Y Pb Pr, L/R, DET
- **AV2**
  - SIDE_CVBS, SIDE_L/R, SIDE_DET
  - Y Pb Pr, L/R, DET
- **Component 1**
  - Y Pb Pr, L/R, DET
- **Component 2**
  - Y Pb Pr, L/R, DET
- **D-sub RGB**
  - RGB/H/V
- **Audio L/R (for RGB)**
  - Audio L/R
- **HDMI 1**
- **HDMI 2**
- **HDMI 3**
- **Digital Audio (Optic)**
  - SPDIF
- **RS-232C (Ctrl./SVC)**
  - RX/TX
- **Bluetooth Module**
  - DP1/DM1
  - DP2/DM2
- **USB**
  - +5V
  - USB_DM1
  - USB_DP1
  - USB_DM2
  - USB_DP2
  - Reset Switch
- **Reset IC**
- **MAX3232**
- **3x1 HDMI Switch**

**Overall Block Diagram**

- **BCM3556 (Brazil)**
- **DDR2 (256Mbit)**
  - Qimonda/Hynix
- **DDR2 (1Gbit)**
  - Elpida/Hynix
- **NAND Flash (512Mbit)**
- **Digital AMP**
- **NVRAM**
- **MICO**
- **MICOM (MTV416GMF)**
- **JTAG**
- **LCD Module**
  - (FHD, 120Hz)

**JACK BACK at REAR**

- **RF_Switch**
- **Gain_Switch**
- **SDA0/SCL0_3.3V**
- **Reset Switch**
- **SCL, SDA_3.3V**
- **CLK, TDI, TDO, MS, RST**
- **X-tal 24MHz**

**Additional Components**

- **JACK BACK at REAR at REAR**
- **BT Module**
- **FRC BLOCK**
  - **FRC IC**
    - (MST7323S)
  - **LVDS**
    - LCD Module
  - **X-tal 12MHz**
  - **54MHz**
  - **54MHz**

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6. RGB Video Trouble Shooting

- Check Signal Format
  - Is it supported signal?

- Check RGB Cable

- Check RGB Jack JK208 at Jack Board

- Check RGB Signal L207, L208, L209 at Jack Board

- Check cable between P203 at Jack Board and P201 at Main Board

- Check RGB Signal C127, C128, C129 at Main Board

- Maybe BCM3556(IC100) has problems

- Replace one of L207, L208, L209 at Jack Board & Recheck

- Replace JK208 at Jack board

- Maybe Cable Pin has problems

- Replace it
7. AV Video Trouble Shooting

Check Signal Format
Is it supported signal?

Y → Check AV Cable

Y → Check AV Jack JK209 at Jack Board
N → Replace JK209 at Jack board

Y → Check AV Signal R203, R204, R214, R215 at Jack Board
N → Replace one of R203, R204, R214, R215 at Jack Board & Recheck

Y → Check cable between P203 at Jack Board and P701 at Main Board
N → Maybe Cable Pin has problems

Y → Check AV Signal C124, C125 at Main Board
N → Replace it

Y → Maybe BCM3556(IC100) has problems
8. HDMI Video Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

AV1
- CVBS, L/R, AV_DET
- DVI, H/V

AV2
- CVBS, L/R, AV_DET
- DVI, H/V

Component 1
- Y Pb Pr, L/R, DET

Component 2
- Y Pb Pr, L/R, DET

D-sub RGB
- RGB/H/V

Audio L/R (for RGB)
- Audio L/R

HDMI 1
- CVBS, L/R, AV_DET

HDMI 2
- Y Pb Pr, L/R, DET

HDMI 3
- Audio L/R (for RGB)

Digital Audio (Optic)
- SPDIF

RS-232C (Ctrl./SVC)
- MAX3232

Bluetooth Module
- DP1/DM1
- DP2/DM2

USB
- USB_DM1
- USB_DM2
- USB_DP1
- USB_DP2

X-tal
- 24MHz

LVDS

DDR2 (1Gbit)
- Elpida/Hynix

NAND Flash
- (512Mbit)

Digital AMP
- NTP3100L

MICOM
- (MTV416GMF)

JTAG

LCD Module
- (FHD, 120Hz)
8. HDMI Video Trouble Shooting

Check Signal Format
Is it supported signal?

Y
Check HDMI Cable

Y
Check HDMI Jack JK600, JK601, JK602

N
Replace Jack

Y
Check IC601 Voltage Level +1.8V_HDMI, +5.0V_HDMI

N
Replace one of L601/L602/R619/R615

Y
Check I2C Signal R624/R625/R157/R158

N
Replace It & Recheck

Y
Maybe BCM3556(IC100) has problems
9. All Source Audio Trouble Shooting

Make sure you can't hear any audio

- Y
  - Check Speaker
    - Y
      - Check Connector P501
        - Y
          - Check IC501 Power 24V, 3.3V, 1.8V
            - Y
              - Check BCM3556 I2S Output R505, R506, R507
                - Y
                  - Maybe BCM3556(IC100) has problems

    - N
      - Replace one of L508/L509/L510/L507/L504/L505 & Recheck
        - Y
          - Replace Speaker

    - N
      - Replace Connector

- N
  - Replace Speaker
10. Digital TV Audio Trouble Shooting

Check video output

Follow procedure:

1. All source audio trouble shooting

Follow procedure digital TV video trouble shooting

Maybe BCM3556 internal audio DSP has problems. Replace it
11. Analog TV Audio Trouble Shooting

- **Check video output**
  - N → Follow procedure analog TV video trouble shooting
  - Y → Check Tuner(TU101) Power (5.0V, 2.5V, 3.3V, 1.2V)
    - N → Replace one of IC101, IC102 at Jack Board or IC803/Q812/IC804/IC809/Q809/5V_ST and +12V of P801 at Main Board & Recheck
    - Y → Check SIF Signal TU101 #6 Pin and R118 at Jack Board
      - N → Maybe Tuner(TU101) has problems
      - Y → Check SIF Signal IC501 #4 Pin
        - N → Replace one of L505/L514/C502/C511/Q500/Q502 IC501 & Recheck
        - Y → Check SIF Signal C128 at Jack Board
          - N → Replace one of C123, R120, R121, R124, L109, Q101, C128 & Recheck
          - Y → Check SIF Signal TU101 #6 Pin and R118 at Jack Board
            - N → Replace one of R704/R128/C106 & Recheck
            - Y → Check cable between P203 at Jack Board and P701 at Main Board
              - N → Maybe Cable Pin has problems
              - Y → Check SIF Signal R704 and C106 at Main Board
                - N → Maybe BCM3556 audio block has problems. Replace it
                - Y → Follow procedure All source audio trouble shooting
12. Component / RGB / AV Audio Trouble Shooting

- **Check Video Output**
  - Y ➔ Follow procedure external input video trouble shooting
  - N ➔ Replace Jack

- **Check Jack JK208/JK209**
  - Y ➔ Check Signal
    - R235, R236 (Comp1)
    - R216, R217 (Comp2)
    - R249, R250 (RGB)
    - R219, R221 (AV1)
    - R218, R220 (AV2)
    - at Jack Board
  - N ➔ Replace one of
    - R235/R236/C231/C232 (Comp1)
    - R216/R217/C207/C208 (Comp2)
    - R219/R221/C210/C212 (AV1)
    - R218/R220/C209/C211 (AV2)
    - R249/R250/C246/C247 (RGB)
    & Recheck at Jack Board

- **Check cable between P203 at Jack Board and P701 at Main Board**
  - Y ➔ Maybe Cable Pin has problems
  - N ➔ Replace one of
    - R215/R228/C211/C232 (Comp1)
    - R229/R230/C220/C221 (Comp2)
    - R204/R214/C206/C210 (AV1)
    - R231/R232/C224/C225 (AV2)
    - R233/R234/C226/C227 (RGB)
    & Recheck at Main Board

- **Check Signal**
  - C206, C210, C211, C232, C220, C221, C224, C225, C226, C227
  - at Main Board
  - Y ➔ Follow procedure All source audio trouble shooting

- **Follow procedure All source audio trouble shooting**
  - Y ➔ Maybe BCM3556 audio block has problems. Replace It
  - N ➔ Replace one of
    - R215/R228/C211/C232 (Comp1)
    - R229/R230/C220/C221 (Comp2)
    - R204/R214/C206/C210 (AV1)
    - R231/R232/C224/C225 (AV2)
    - R233/R234/C226/C227 (RGB)
    & Recheck at Main Board
13. HDMI Audio Trouble Shooting

- Check video output
  - Y
  - Follow procedure HDMI video trouble shooting
  - N
  - Re-download EDID data
    - Y
    - Follow procedure All source audio trouble shooting
    - N
    - Maybe BCM3556 audio block has problems. Replace it
  - N
  - Replace IC601
14. USB Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

AV1
AV2
Component 1
Component 2
D-sub RGB
Audio L/R (for RGB)
HDMI 1
HDMI 2
HDMI 3
Digital Audio (Optic)
RS-232C (Ctrl./SVC)
Bluetooth Module
USB
JACK BACK at REAR

BCM3556 (Brazil)

DDR2(256Mbit) Elpida/Hynix
FRC IC (MST7323S)
NAND Flash (512Mbit)

Digital AMP
NVRAM
MICOM (MTV416GMF)
JTAG

FRC Block

X-tal 12MHz

X-tal 54MHz

+5V

overall_diagram
14. USB Trouble Shooting

- Exception
  - USB power could be disabled by inrushing current
  - In this case, remove the device and try to reboot the TV (AC power off/on)
14. USB Trouble Shooting

Check Bluetooth Module

Y → Replace Bluetooth

N → Check Cable between Bluetooth and Main Board

Y → Replace cable

N → Check P705

Y → Replace Jack

N → Check Signal R3022, R3023

Y → Replace one of R3022, R3023 & Recheck

N → Maybe BCM3556(IC100) has problems. Replace it.
15. Digital TV Recording Fail Trouble Shooting

Overall Block Diagram for Brazil DTV (LH70)

- AV1
  - CVBS, L/R, AV_DET
  - SIDE CVBS, SIDE_L/R, SIDE_DET

- AV2
  - CVBS, L/R, AV_DET
  - SIDE CVBS, SIDE_L/R, SIDE_DET

- Component 1
  - Y Pb Pr, L/R, DET

- Component 2
  - Y Pb Pr, L/R, DET

- D-sub RGB
  - RGB/H/V
  - Audio L/R

- HDMI 1
  - HDMI Switch

- HDMI 2

- HDMI 3

- Digital Audio (Optic)
  - SPDIF

- RS-232C (Ctrl./SVC)
  - MAX3232

- Bluetooth Module
  - DP1/DM1
  - DP2/DM2

- USB
  - USB_DM1
  - USB_DM2
  - USB_DP1
  - USB_DP2

JACK BACK at REAR

- RF Switch, Gain Switch
- TU_SCLK, TU_SDATA, TU_SYNC
- TU_CVBS_IN
- TU_SIF
- SDA0/SCL0, 3.3V
- RF_Switch, Gain_Switch
- TU_SIF
- SDA0/SCL0, 3.3V

- Digital AMP
  - MICOM
  - MTV416GMF

- NVRAM

- Micom
  - NTP3100L

- X-tal
  - 12MHz

- LCD Module
  - (FHD, 120Hz)
  - 54MHz

- DDR2 (1Gbit)
  - Elpida/Hynix

- DDR2 (256Mbit)
  - Qimonda/Hynix

- NAND Flash
  - (512Mbit)

- O.C. Protector

- +5V

- X-tal
  - 54MHz

- X-tal
  - 24MHz

- X-tal
  - 24MHz

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15. Digital TV Recording Fail Trouble Shooting

- Check video/audio output
  - Y
  - Check USB
  - N
  - Follow procedure digital TV video/audio trouble shooting
  - N
  - Follow procedure USB trouble shooting
18. Digital TV Video Trouble Shooting while recording (Watch & Record)

**Overall Block Diagram for Brazil DTV (LH70)**

- **AV1**: CVBS, L/R, AV_DET
- **AV2**: CVBS, L/R, AV_DET
- **Component 1**: Y Pb Pr, L/R, DET
- **Component 2**: Y Pb Pr, L/R, DET
- **D-sub RGB**: RGB/H/V
- **Audio L/R (for RGB)**: Audio L/R
- **HDMI 1**, **HDMI 2**, **HDMI 3**: 3x1 HDMI Switch
- **Digital Audio (Optic)**: SPDIF
- **RS-232C (Ctrl./SVC)**: MAX3232
- **Bluetooth Module**: DP1/DM1, DP2/DM2
- **USB**: USB_DM1, USB_DM2, USB_DP1, USB_DP2, +5V
- **Reset Switch**: Reset IC
- **X-tal**: 54MHz

**Overall Block Diagram for Brazil DTV (LH70)**

- **LCD Module (FHD, 120Hz)**
- **FRC Block**: FRC IC (MST7323S)
- **DDR2 (256Mbit)**: Qimonda/Hynix
- **DDR2 (1Gbit)**: Elpida/Hynix
- **NAND Flash (512Mbit)**
- **Digital AMP**: NTP3100L
- **NVRAM**: MTV416GMF
- **MICOM**: (MTV416GMF)
- **MAX3232**: (Brazil)
- **Qimonda/Hynix**: DDR2 (256Mbit)
- **O.C. Protector**: +5V
- **U.C. Protector**: +5V
- **I2S**: 24MHz
- **SPI Interface**: 3.3V
- **JTAG**: 24MHz

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18. Digital TV Video Trouble Shooting while recording (Watch & Record)

Check RF Cable
  Y
  Check video/audio output
  Y
  Check USB
  Y
  Check Watch
  Y
  Check HDD (User)
  N
  Replace Jack
  N

Follow procedure digital TV video/audio trouble shooting
Follow procedure USB trouble shooting
Follow procedure OSD trouble shooting
19. Digital TV Audio Trouble Shooting while recording (Watch & Record)

Overall Block Diagram for Brazil DTV (LH70)

**Components and Connections**

- **AV1**
  - CVBS, L/R, AV_DET
- **AV2**
  - SIDE CVBS, SIDE L/R, SIDE_DET
- **Component 1**
  - Y Pb Pr, L/R, DET
- **Component 2**
  - Y Pb Pr, L/R, DET
- **D-sub RGB**
  - RGB/H/V
- **Audio L/R (for RGB)**
  - Audio L/R
- **HDMI1**
- **HDMI2**
- **HDMI3**
- **Digital Audio (Optic)**
  - SPDIF
- **RS-232C (Ctrl./SVC)**
- **Bluetooth Module**
- **USB**
  - O.C. Protector
- **Reset Switch**
- **MAX3232**
  - RX/TX
- **DP1/DM1**
- **DP2/DM2**
  - USB_DM1
  - USB_DM2
  - USB_DP1
  - USB_DP2
- **O.C. Protector**
  - +5V
- **Reset IC**
- **X-tal**
  - 54MHz
- **FRC IC**
  - (MST7323S)
- **DDR2 (256Mbit)**
  - Elpida/Hynix
- **DDR2 (1Gbit)**
  - Elpida/Hynix
- **NAND Flash**
  - (512Mbit)
- **NVRAM**
- **Digital AMP**
  - (MTV416GMF)
- **FRC Block**
- **LCD Module**
  - (FHD, 120Hz)
- **LVDS**
19. Digital TV Audio Trouble Shooting while recording (Watch & Record)

Check video output

Follow procedure All source audio trouble shooting

Follow procedure digital TV video trouble shooting while recording (watch & record)

Maybe BCM3556 internal audio DSP has problems. Replace it