CAUTION
BEFORE SERVICING THE CHASSIS,
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.

LED TV
SERVICE MANUAL

CHASSIS : LD41V
MODEL : 79UG880V  79UG880V-ZA
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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 1 W), keep the resistor 10 mm 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 1 MΩ and 5.2 MΩ. 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 1.5 K / 10 watt resistor in parallel with a 0.15 uF 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 0.5 mA.

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

![Leakage Current Hot Check circuit](image)

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

*Base on Adjustment standard
SERVICING PRECAUTIONS

CAUTION: Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the SAFETY PRECAUTIONS on page 3 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions
1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   CAUTION: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   CAUTION: This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead. Always remove the test receiver ground lead last.
8. Use with this receiver only the test fixtures specified in this service manual.
   CAUTION: Do not connect the test fixture ground strap to any heat sink in this receiver.

Electrostatically Sensitive (ES) Devices
Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.
1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines
1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range or 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 cm) 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.
   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 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 that it does not touch components or sharp edges.

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1. Application range
This specification is applied to the LED TV used LD41V chassis.

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

1) Temperature: 25 °C ± 5 °C(77 °F ± 9 °F), CST: 40 °C ± 5 °C
2) Relative Humidity: 65 % ± 10 %
3) Power Voltage
   - Standard input voltage (AC 100-240 V~, 50/60 Hz)
   * 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
   - Wireless : Wireless HD Specification (Option)

4. Model General Specification

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<th>Item</th>
<th>Specification</th>
<th>Remarks</th>
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<tr>
<td>1</td>
<td>Market</td>
<td>EU(PAL Market-36Countries)/CIS + Morocco(Africa)</td>
<td>DTV &amp; Analog (Total 37 countries) DTV (MPEG2/4, DVB-T) : 26 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Belgium, Luxemburg, Greece, Czech, Turkey, Morocco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Slovakia, Belarus DTV (MPEG2/4, DVB-T2) : 8 countries UK(Ireland), Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan, Russia, Italy, Croatia, Serbia DTV (MPEG2/4, DVB-C) : 37 countries Germany, Netherland, Switzerland, Hungary, Austria, Slovenia, Bulgaria, France, Spain, Italy, Belgium, Russia, Luxemburg, Greece, Czech, Croatia, Turkey, Morocco, Ireland, Latvia, Estonia, Lithuania, Poland, Portugal, Romania, Albania, Bosnia, Serbia, Slovakia, Belarus, UK, Sweden, Denmark, Finland, Norway, Ukraine, Kazakhstan Supported satellite : 35 satellites ABS1 75.0E, AMOS 4.0W, ASIASAT3S 105.5E, ASTRA 19.2E, ASTRA 23.5E, ASTRA 28.2E, ASTRA 4.8E, ATLANTIC BIRD2 8.0W, ATLANTIC BIRD3 5.0W, BADR 26.0E, DIRECTV-1R 56.0E, EUROBIRD 9A 9.0E, EUROBIRD3 33.0E, EUTELSAT 36 A/B 36.0E, EUTELSAT W2A 10.0E, EUTELSAT W3A 7.0E, EUTELSAT7WA 7.3VEUTELSAT 16.0E, EXPRESS AM1 40.0E, EXPRESS AM3 140.0E, EXPRESS AM33 96.5E, HELASSAT 39.0E, HISPASAT 1CE 30.0W/HOTBIRD 13.0E, INTELSAT10A 68.5E, INTELSAT15 85.2E, INTELSAT1R 50.0W, INTELSAT903 33.5W, INTELSAT904 60.0E, NILESAT 7.0W, NSS12 57.0E, THOR 0.8W, TURKSAT 42.0E, YAMAL201 90.0E, OTHER</td>
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| 2   | Broadcasting system | 1) Digital TV  
- DVB-T/T2  
- DVB-C  
- DVB-S/S2  
2) Analogue TV  
- PAL/SECAM B/G/I/D/K  
- SECAM L/L' | |
| 3   | Program coverage | 1) Digital TV  
- VHF, UHF  
- C-Band, Ku-Band  
2) Analogue TV  
- VHF : E2 to E12  
- UHF : E21 to E69  
- CATV : S1 to S20  
- HYPER : S21 to S47 | |
| 4   | Receiving system | Analog : Upper Heterodyne  
Digital : COFDM, QAM | ▶ DVB-T  
- Guard Interval(Bitrate_Mbit/s)  
1/4, 1/8, 1/16, 1/32  
- Modulation : Code Rate  
QPSK : 1/2, 2/3, 3/4, 5/6, 7/8  
16-QAM : 1/2, 2/3, 3/4, 5/6, 7/8  
64-QAM : 1/2, 2/3, 3/4, 5/6, 7/8  
▶ DVB-T2  
- Guard Interval(Bitrate_Mbit/s)  
1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256,  
- Modulation : Code Rate  
QPSK : 1/2, 2/5, 2/3, 3/4, 5/6  
16-QAM : 1/2, 2/5, 2/3, 3/4, 5/6  
64-QAM : 1/2, 2/5, 2/3, 3/4, 5/6  
256-QAM : 1/2, 2/5, 2/3, 3/4, 5/6 |
| 5   | Scart (1EA) | PAL, SECAM | Scart jack is Full scart and support ATV/DTV-OUT  
(not support DTV Auto AV)  
System : PAL, SECAM, PAL60 |
| 6   | Video Input RCA(1EA) | PAL, SECAM, NTSC4.43 | 4 System : PAL, SECAM, NTSC4.43, PAL60  
Hybrid Type |
| 7   | Head phone out | Antenna, AV1, AV2, Component, HDMI1,  
HDMI2, HDMI3, HDMI4, USB1, USB2, USB3 | |
| 8   | Component Input (1EA) | Y/Cb/Cr  
Y/Pb/Pr | |
| 9   | HDMI Input (4EA) | HDMI1-DTV  
HDMI2-DTV  
HDMI3-DTV  
HDMI4-DTV | HDMI1: PC support(HDMI version 1.3)  
Support HDCP |
| 10  | Audio Input (3EA) | DVI Audio Component/AV2  
AV1 | L/R Input |
| 11  | SPDIF out (1EA) | SPDIF out | |
| 12  | USB (3EA) | EMF, Divx HD, For SVC (download)  
| JPEG, MP3, DivX HD | |
| 13  | Ethernet Connect(1EA) | Ethernet Connect | |
| 14  | PCMCIA Card slot (1EA) | PCMCIA slot | |
## 5. External Input Support Format

### 5.1. Component (Y, P\textsubscript{B}, P\textsubscript{R})

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#### 6.2. HDMI Input

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<td>5 Top-and-Bottom Side-by-side(half)</td>
<td>Primary(HDTV 1080I)</td>
<td>Primary(HDTV 1080I)</td>
</tr>
<tr>
<td></td>
<td>56.25</td>
<td>50.00</td>
<td>148.5</td>
<td>20 Frame packing Field alternative</td>
<td>Primary(HDTV 1080I)</td>
<td>Primary(HDTV 1080I)</td>
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<tr>
<td></td>
<td>67.432/67.5</td>
<td>59.94 / 60</td>
<td>148.35/148.5</td>
<td>5 Frame packing Field alternative</td>
<td>Primary(HDTV 1080I)</td>
<td>Primary(HDTV 1080I)</td>
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<tr>
<td>7</td>
<td>1920*1080</td>
<td>28.125</td>
<td>50.00</td>
<td>74.25</td>
<td>33</td>
<td>Top-and-Bottom Side-by-side(half)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>28.125</td>
<td>50.00</td>
<td>148.5</td>
<td>33</td>
<td>Top-and-Bottom Side-by-side(half)</td>
</tr>
<tr>
<td></td>
<td>33.716 / 33.75</td>
<td>29.976 / 30.00</td>
<td>74.18/74.25</td>
<td>34 Top-and-Bottom Side-by-side(half)</td>
<td>Primary(HDTV 1080P)</td>
<td>Secondary(HDTV 1080P)</td>
</tr>
<tr>
<td></td>
<td>33.716 / 33.75</td>
<td>29.976 / 30.00</td>
<td>148.35/148.5</td>
<td>34 Top-and-Bottom Side-by-side(half)</td>
<td>Primary(HDTV 1080P)</td>
<td>Secondary(HDTV 1080P)</td>
</tr>
<tr>
<td></td>
<td>43.94/54</td>
<td>23.97 / 24</td>
<td>148.35/148.5</td>
<td>32 Frame packing Line alternative</td>
<td>Primary(HDTV 1080P)</td>
<td>Primary(HDTV 1080P)</td>
</tr>
<tr>
<td></td>
<td>56.25</td>
<td>25</td>
<td>148.5</td>
<td>33 Frame packing Line alternative</td>
<td>Primary(HDTV 1080P)</td>
<td>Primary(HDTV 1080P)</td>
</tr>
<tr>
<td></td>
<td>67.432 / 67.5</td>
<td>29.976 / 30.00</td>
<td>148.35/148.5</td>
<td>34 Frame packing Line alternative</td>
<td>Primary(HDTV 1080P)</td>
<td>Primary(HDTV 1080P)</td>
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<tr>
<td></td>
<td>56.250</td>
<td>50</td>
<td>148.5</td>
<td>31 Top-and-Bottom Side-by-side(half)</td>
<td>Primary(HDTV 1080P)</td>
<td>Secondary(HDTV 1080P)</td>
</tr>
<tr>
<td></td>
<td>67.43 / 67.5</td>
<td>59.94 / 60</td>
<td>148.35/148.50</td>
<td>16 Top-and-Bottom Side-by-side(half)</td>
<td>Primary(HDTV 1080P)</td>
<td>Secondary(HDTV 1080P)</td>
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</tbody>
</table>
### (3) HDMI-PC Input (3D) (3D Supported mode manually)

<table>
<thead>
<tr>
<th>No.</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(kHz)</th>
<th>Pixel clock(MHz)</th>
<th>Proposed</th>
<th>3D input proposed mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1024*768</td>
<td>48.36</td>
<td>60</td>
<td>65</td>
<td>HDTV 768P</td>
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<tr>
<td>2</td>
<td>1360*768</td>
<td>47.71</td>
<td>60</td>
<td>85.5</td>
<td>HDTV 768P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
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<tr>
<td>3</td>
<td>1920*1080</td>
<td>67.500</td>
<td>60</td>
<td>148.50</td>
<td>HDTV 1080P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom, Checker Board, Single Frame Sequential, Row Interleaving, Column Interleaving</td>
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<tr>
<td>4</td>
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<td>Others</td>
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<td>-</td>
<td>-</td>
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### (4) Component Input (3D) (3D Supported mode manually)

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<tbody>
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<td>60.00</td>
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<td>59.94</td>
<td>74.176</td>
<td>HDTV 720P</td>
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</tr>
<tr>
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<td>60.00</td>
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<tr>
<td>5</td>
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<td>33.72</td>
<td>59.94</td>
<td>74.176</td>
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<td>50</td>
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<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
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<td>9</td>
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<td>24.000</td>
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<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
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<td>74.25</td>
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<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
</tr>
<tr>
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<td>50</td>
<td>74.25</td>
<td>HDTV 1080P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
</tr>
<tr>
<td>12</td>
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<td>26.97</td>
<td>23.976</td>
<td>74.176</td>
<td>HDTV 1080P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
</tr>
<tr>
<td>13</td>
<td>1920*1080</td>
<td>33.75</td>
<td>30.000</td>
<td>74.25</td>
<td>HDTV 1080P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
</tr>
<tr>
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<td>1920*1080</td>
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<td>29.97</td>
<td>74.176</td>
<td>HDTV 1080P</td>
<td>2D to 3D, Side by Side(half), Top &amp; Bottom</td>
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### 6.3. USB - Movie (3D) (3D supported mode manually)

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<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>3D input proposed mode</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-</td>
<td>-</td>
<td>2D to 3D</td>
</tr>
<tr>
<td>2</td>
<td>Over 704x480</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom</td>
</tr>
<tr>
<td></td>
<td>Under 1080P</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Side by Side(Half), Top &amp; Bottom, Checker Board, Row Interleaving, Column Interleaving, Frame Sequential</td>
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<tr>
<td>3</td>
<td>Over 704x480</td>
<td>50 / 60</td>
<td>-</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom, Checker Board, Row Interleaving, Column Interleaving</td>
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<tr>
<td></td>
<td>Under 1080P</td>
<td>-</td>
<td>others</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom, Checker Board, Row Interleaving, Column Interleaving</td>
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<tr>
<td>4</td>
<td>Over 2160P</td>
<td>24/25/30/50/60</td>
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<td>-</td>
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### 6.4. USB - Photo (3D) (3D supported mode manually)

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<tr>
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<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>3D input proposed mode</th>
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</thead>
<tbody>
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<td>Under 320x240</td>
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<tr>
<td>2</td>
<td>Over 320x240</td>
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<td>-</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom</td>
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### 6.5. USB (3D) (3D supported mode automatically)

<table>
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<th>No.</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>3D input proposed mode</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1080p</td>
<td>33.75</td>
<td>30</td>
<td>74.25</td>
<td>Side by Side(Half), Top &amp; Bottom, Checker Board, Frame Sequential</td>
</tr>
<tr>
<td>2</td>
<td>2160p</td>
<td>67.5</td>
<td>30</td>
<td>297</td>
<td>MPO(Photo), JPS(Photo)</td>
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### 6.6. Miracast, Widi (3D supported mode manually)

<table>
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<th>No.</th>
<th>Resolution</th>
<th>H-freq(kHz)</th>
<th>V-freq.(Hz)</th>
<th>Pixel clock(MHz)</th>
<th>3D input proposed mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1024*768p</td>
<td>-</td>
<td>30/60</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom</td>
</tr>
<tr>
<td>2</td>
<td>1280*720p</td>
<td>-</td>
<td>30/60</td>
<td>-</td>
<td>2D to 3D, Side by Side(Half), Top &amp; Bottom</td>
</tr>
<tr>
<td>3</td>
<td>1920*1080p</td>
<td>-</td>
<td>30/60</td>
<td>-</td>
<td>2D to 3D</td>
</tr>
<tr>
<td>4</td>
<td>Others</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2D to 3D</td>
</tr>
</tbody>
</table>

**Remark:** 3D Input mode

<table>
<thead>
<tr>
<th>No.</th>
<th>Side by Side</th>
<th>Top &amp; Bottom</th>
<th>Checker board</th>
<th>Single Frame Sequential</th>
<th>Frame Packing</th>
<th>Line Interleaving</th>
<th>Column Interleaving</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>L R</td>
<td>L R</td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Only for training and service purposes
1. Application Range
This specification sheet is applied to all of the LED TV with LD41V chassis.

2. Designation
(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 °C ± 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 AC 100-240 V~, 50/60 Hz.
(5) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15.

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.

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. Automatic Adjustment
3.1. MAC address D/L, CI+ key D/L, Widevine key D/L, ESN D/L, HDCP14/20 D/L, DTCP Communication Prot connection
- Com 1,2,3,4 and 115200(Baudrate)
- Mode check: Online Only
- Check the test process: DETECT → MAC → CI → Widevine → ESN → HDCP14 → HDCP20 → DTCP*
- DTCP key is downloaded only for EU suffix models
- Play: Press Enter key
- Result: Ready, Test, OK or NG
- Printer Out (MAC Address Label)

3.2. LAN Inspection
3.2.1. Equipment & Condition
- Each other connection to LAN Port of IP Hub and Jig

3.2.2. LAN inspection solution
- LAN Port connection with PCB
- Setting automatic IP

- If you want manual connection, enter Network connection at MENU Mode of TV. Press Start connection key, then Network will be connected.

3.2.3. WIDEVINE key Inspection
- Confirm key input data at the "IN START" MENU Mode.
3.3. LAN PORT INSPECTION (PING TEST)

Connect SET → LAN port ↔ PC → LAN Port

3.3.1. Equipment setting
(1) Play the LAN Port Test PROGRAM.
(2) Input IP set up for an inspection to Test Program.
   *IP Number : 12.12.2.2

3.3.2. LAN PORT inspection (PING TEST)
(1) Play the LAN Port Test Program.
(2) Connect each other LAN Port Jack.
(3) Play Test (F9) button and confirm OK Message.
(4) Remove LAN cable.

3.4. Model name & Serial number Download

3.4.1. Model name & Serial number D/L
   - Press "P-ONLY" key of service remote control.
     (Baud rate : 115200 bps)
   - Connect RS-232C Signal to USB Cable to USB.
   - Write Serial number by use USB port.
   - Must check the serial number at Instart menu.

3.4.2. Method & notice
(1) Serial number D/L is using of scan equipment.
(2) Setting of scan equipment operated by Manufacturing Technology Group.
(3) Serial number D/L must be conformed when it is produced in production line, because serial number D/L is mandatory by D-book 4.0.

* Manual Download (Model Name and Serial Number)
If the TV set is downloaded by OTA or service man, sometimes model name or serial number is initialized. (Not always)
It is impossible to download by bar code scan, so it need Manual download.
1) Press the "Instart" key of Adjustment remote control.
2) Go to the menu "7.Model Number D/L" like below photo.
3) Input the Factory model name(ex 47LB650V-ZA) or Serial number like photo.
4) Check the model name Instart menu. → Factory name displayed. (ex 47LB650V-ZA)
5) Check the Diagnostics.(DTV country only) → Buyer model displayed. (ex 47LB650V-ZA)

3.5. CI+ Key checking method
Check whether the key was downloaded or not at ‘In Start’ menu. (Refer to below).

3.5.1. Check the method of CI+ Key value
(1) Check the method on Instart menu
(2) Check the method of RS232C Command
   1) Into the main ass'y mode(RS232: aa 00 00)
      CMD 1 CMD 2 Data 0
      A A 0 0
   2) Check the key download for transmitted command (RS232: ci 00 10)
      CMD 1 CMD 2 Data 0
      C I 1 0
   3) Result value
      - Normally status for download : OKx
      - Abnormally status for download : NGx

3.5.2. Check the method of CI+ key value(RS232)
   1) Into the main ass’y mode(RS232: aa 00 00)
      CMD 1 CMD 2 Data 0
      A A 0 0

3.6. WIFI MAC ADDRESS CHECK
(1) Using RS232 Command

<table>
<thead>
<tr>
<th>H-freq(kHz)</th>
<th>V-freq.(Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission</td>
<td>[A][I][ ][Set ID][ ][20][Cr]</td>
</tr>
</tbody>
</table>

(2) Check the menu on in-start
4. Manual Adjustment

4.1. ADC adjustment

(1) Remove Component and SCART Input Signal.
(2) Press Adj. key on the Adjustment remote control, then select “9.ADC Calibration”.
(3) Change ADC Type to Internal
(4) Move cursor on the Start.
(5) Press OK.

4.2. EDID(The Extended Display Identification Data)/DDC(Display Data Channel) download

4.2.1. Overview
It is a VESA regulation. A PC or a MNT will display an optimal resolution through information sharing without any necessity of user input. It is a realization of "Plug and Play".

4.2.2. Equipment
- Since embedded EDID data is used, EDID download JIG, HDMI cable and D-sub cable are not need.
- Adjustment remote control

4.2.3. Download method
(1) Press "ADJ" key on the Adjustment remote control, then select "12.EDID D/L", By pressing "Enter" key, enter EDID D/L menu.
(2) Select "Start" button by pressing "Enter" key, HDMI1/HDMI2/HDMI3/ HDMI4 are writing and display OK or NG.

4.2.4. EDID DATA

- Reference
- HDMI1 ~ HDMI3

- In the data of EDID, bellows may be different by Input mode.

<table>
<thead>
<tr>
<th>Month, Year: Controlled on production line: ex) Monthly : '01' → '01', Year : '2013' → '17'</th>
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<tr>
<td>Block Type : CEA EDID Timing Version 3</td>
</tr>
<tr>
<td>Block Type : EDID 1.3</td>
</tr>
<tr>
<td>Block Type : CEA EDID Timing Extension Version 3</td>
</tr>
<tr>
<td>Block Type : EDID 1.3</td>
</tr>
<tr>
<td>Block Type : EDID 1.3</td>
</tr>
</tbody>
</table>

© Product ID
© Serial No: Controlled on production line.
© Month, Year: Controlled on production line: ex) Monthly : '01' → '01', Year : '2013' → '17'
© Model Name(Hex): LGTV
© Checksum(LG TV): Changeable by total EDID data.
© Vendor Specific(HDMI)
EDID Block 1, Bytes 128-255 [80H-FFH]  
Block Type : CEA EDID Timing Extension Version 3

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<th>B</th>
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# HDMI3 (C/S: 0x0a1, 0x3a3)_Deep Color Off

EDID Block 0, Bytes 0-127 [00H-7FH]
Block Type : EDID 1.3

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# HDMI4 (C/S: 0xe7, 0xd4)

EDID Block 0, Bytes 0-127
Block Type : EDID 1.3

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4.3. White Balance Adjustment

4.3.1. Overview

- W/B adj. Objective & How-it-works
  (1) Objective: To reduce each Panel's W/B deviation
  (2) How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.
  (3) Adjustment condition: normal temperature
    1) Surrounding Temperature: 25 °C ± 5 °C
    2) Warm-up time: About 5 Min
    3) Surrounding Humidity: 20 % ~ 80 %

4.3.2. Equipment

- Color Analyzer: CA-210 (LED Module : CH 14)
- Adjustment Computer(During auto adj., RS-232C protocol is needed)
- Adjustment Remote control
- Video Signal Generator MSPG-925F 720p/216-Gray
  (Model: 204, Pattern: 49)
  → Only when internal pattern is not available
- Color Analyzer Matrix should be calibrated using CS-100.

4.3.3. Equipment connection MAP

4.3.4. Adj. Command (Protocol)

<Command Format>

START | 8E | A | 50 | A | LEN | A | D | CMD | A | 00 | A | VAL | A | CS | STOP

- LEN: Number of Data Byte to be sent
- CMD: Command
- VAL: FOS Data value
- CS: Checksum of sent data
- A: Acknowledge
Ex) [Send: JA_00_DD] / [Ack: A_00_okDDX]
4.3.5. Adj. method

(1) Auto adj. method
1) Set TV in adj. mode using POWER ON.
2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
3) Press ADJ key → EZ adjust using adj. R/C → 7. White-Balance then press the cursor to the right(key ▶).
   *(When right key(▶) is pressed 216 Gray internal pattern will be displayed)*
4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
5) Adjustment is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

   **G-fix adjustment**
   Adjust modes (Cool), Fix the G gain to 172 (default data) and change the others (G/B Gain).
   Adjust two modes(Medium / Warm), Fix the one of R/G/B gain to 192 (default data) and decrease the others.
   *If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Test-pattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.*

4.3.6. Reference (White balance adjustment coordinate and color temperature)

   • Luminance : 206 Gray
   • Standard color coordinate and temperature using CS-1000 (over 26 inch)

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<thead>
<tr>
<th>Mode</th>
<th>Coordinate</th>
<th>Temp</th>
<th>Δuv</th>
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</thead>
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<td>x</td>
<td>y</td>
<td></td>
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<tr>
<td>Cool</td>
<td>0.271</td>
<td>0.270</td>
<td>13000 K</td>
</tr>
<tr>
<td>Medium</td>
<td>0.286</td>
<td>0.289</td>
<td>9300 K</td>
</tr>
<tr>
<td>Warm</td>
<td>0.313</td>
<td>0.329</td>
<td>6500 K</td>
</tr>
</tbody>
</table>

   • Standard color coordinate and temperature using CA-210(CH 14)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Coordinate</th>
<th>Temp</th>
<th>Δuv</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>Cool</td>
<td>0.271 ± 0.002</td>
<td>0.270 ± 0.002</td>
<td>13000 K</td>
</tr>
<tr>
<td>Medium</td>
<td>0.286 ± 0.003</td>
<td>0.289 ± 0.003</td>
<td>9300 K</td>
</tr>
<tr>
<td>Warm</td>
<td>0.313 ± 0.002</td>
<td>0.329 ± 0.002</td>
<td>6500 K</td>
</tr>
</tbody>
</table>

4.3.5. Adj. method

   (2) Manual adjustment. method
1) Set TV in Adj. mode using POWER ON.
2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10 cm of the surface.
3) Connect Cable.(RS-232C to USB)  
4) Select mode in adj. Program and begin adj.
5) When adj. is complete (OK Sign), check adj. status pre mode. (Warm, Medium, Cool)
6) Remove probe and RS-232C cable to complete adj.

   • W/B Adj. must begin as start command “wb 00 00”, and finish as end command “wb 00 ff”, and Adj. offset if need.
4.3.7. EDGE & IOL LED White balance table

- EDGE LED module change color coordinate because of aging time.
- Apply under the color coordinate table, for compensated aging time.
- (Normal line) Edge & ALEF LED White balance table
  - gumi(Mar. ~ Dec.) & Global
    Model : (normal line) LGD, CMI
  - gumi Winter table(Jan., Feb.)- Gumi producing model use only
    Model : (normal line) LGD, CMI
- (Aging Chamber) Edge & ALEF
  Model : (aging chamber)LGD, CMI

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<th>Aging time (Min)</th>
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<th>Warm</th>
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<td>9 Over 120</td>
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4.4. Local Dimming Function Check

(1) Turn on TV. (Power only mode)
(2) Press TILT key on the Adj.Remote.
(3) Check that Backlight move from left to right as below picture.
(4) Press "exit" Key to stop Local dimming check.

4.5. Magic Motion Remote control test

- Equipment : RF Remote control for test, IR-KEY-Code Remote control for test
- You must confirm the battery power of RF-Remote control before test(recommend that change the battery per every lot)
- Sequence (test)
  1) If you select the 'start key(OK)' on the Adjustment remote control, you can pairing with the TV SET.
  2) You can check the cursor on the TV Screen, when select the "OK" key on the Adjustment remote control.
  3) You must remove the pairing with the TV Set by select 'Mute + OK Key' on the Adjustment remote control.

4.6. 3D function test

(Pattern Generator MSHG-600, MSPG-6100[Support HDMI1.4])

* HDMI mode NO. 872 , pattern No.83
(1) Please input 3D test pattern like below.
(2) When 3D OSD appear automatically, then select green key.
(3) Don't wear a 3D Glasses, Check the picture like below.
4.7. Option selection per country

4.7.1. Overview
- Option selection is only done for models in AJ/JA/IL

4.7.2. Method
(1) Press "ADJ" key on the Adjustment remote control, then select Country Group Menu.
(2) Depending on destination, select Country Group Code or Country Group then on the lower Country option, select US, CA, MX. Selection is done using +, -, or ►◄ KEY.

4.8. HDMI ARC Function Inspection
(1) Test equipment
- Optic Receiver Speaker
- MSHG-600 (SW: 1220 ↑)
- HDMI Cable (for 1.4 version)
(2) Test method
1) Insert the HDMI Cable to the HDMI ARC port from the master equipment (HDMI1)
2) Check the sound from the TV Set
3) Check the Sound from the Speaker or using AV & Optic TEST program (It's connected to MSHG-600)

4.9. Tool Option selection
- Method : Press "ADJ" key on the Adjustment remote control, then select Tool option.

<table>
<thead>
<tr>
<th>Model</th>
<th>Tool 1</th>
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4.10. Ship-out mode check (In-stop)
- After final inspection, press In-Stop key of the Adjustment remote control and check that the unit goes to Stand-by mode.

5. GND and Internal Pressure check

5.1. 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 fully inserted Power cord, Antenna cable and A/V arrive to the auto-check process.
- Connect D-terminal to 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 form 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.

5.2. Checkpoint
- TEST voltage
  - GND: 1.5 KV / min at 100 mA
  - SIGNAL: 3 KV / min at 100 mA
- 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 0.5 mArms

6. Audio

<table>
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<td>12</td>
<td>W</td>
<td></td>
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<td>2</td>
<td>Speaker (8 Ω Impedance)</td>
<td>10</td>
<td>12</td>
<td>W</td>
<td>EQ On AVL On Clear Voice On</td>
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</table>

Measurement condition:
(1) RF input: Mono, 1 KHz sine wave signal, 100 % Modulation
(2) CVBS, Component: 1 KHz sine wave signal 0.5 Vrms
7. USB S/W download (Service only)
(1) Put the USB Stick to the USB socket.
(2) Go to General menu then enter to About This TV

(3) Enter the USB EXPERT MODE.

(4) Updating is starting.
(5) Updating Completed, The TV will restart automatically.
(6) If your TV is turned on, check your updated version and Tool option. (explain the Tool option, next stage)
   * If downloading version is more new than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

   * After downloading, have to adjust TOOL OPTION again.
      1) Push "ADJ" key in service remote control.
      2) Select "Tool Option 1" and push "OK" key.
      3) Punch in the number. (Each model has their number.)
1. External

**BLOCK DIAGRAM**
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 Shock, Fire, or other Hazards. Do not modify the original design without permission of manufacturer.
LGE Internal Use Only

Power_UP_SEQUENCE
5V/3.3V->2.5V->1.5V/1.1V->1.0V
LG1154D  : 3.3V->2.5V->1.5V->1.1V
LG1154AN  : 3.3V->2.5V->1.0V

THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIFIC FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
+5.0V normal & USB for UB model

Vout=0.6*(1+R1/R2)=5.1V
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
The symbol mark of this schematic diagram incorporates special features important for protection from X-radiation, fire, and electrical shock hazards. When servicing, it is essential that only manufacturer-specified parts be used for the critical components in the symbol mark of the schematic.
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURER SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

UB85/95/UC97 only

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FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IP IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

USB3.0 redriver IC EQ setting

-> EQ2: Low / DE1: Low

Place under DUT Near SN65LVPE502CP PIN VCC

+3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL +3.3V_NORMAL

USB1 (3.0) MAX 1.2A

USB2 (2.0) MAX 1.0A

USB3 (2.0) MAX 1.0A

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THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES
SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION.
FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING, IT IS ESSENTIAL
THAT ONLY MANUFACTURER SPECIFIED PARTS BE USED FOR THE CRITICAL
COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

Full Scart(18 Pin Gender)

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Ethernet Block
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURE SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
The symbol mark of this schematic diagram incorporates special features important for protection from X-radiation, fire, and electrical shock hazards. When servicing IF is essential that only manufacturers-specified parts be used for the critical components in the symbol mark of the schematic.
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

B-CAS (SMART CARD) INTERFACE

- Place CLK C3 far from C2, C7, C4 and C8
- 75 ohm in I/O is for short circuit protection

INT CMDVCC : STATUS--------------------------------- HIGH HIGH CARD PRESENT LOW HIGH CARD not PRESENT

CLKDIV1 CLKDIV2 : F_CRD_CLK----------------------------- 1 0 CLKIN

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1. should be guarded by ground
2. No via on both of them
3. Signal Width >= 12mil
4. Signal to Signal Width = 12mil

+3.3V_TU
Ground Width >= 24mil
L6500
+3.3V_LNA_TU
C6519
0.1uF close to TUNER
1
TU_M/W_CN/HK/TW/CO/BR
R6504 1K
R6502
RF_SWITCH_CTL_TU
RF_SWITCH_CTL
2
10K
C6502 0.1uF
TU_ALL_IntDemod
C6500
IF_AGC_TU
R6503 100
0.1uF
TU_ALL_IntDemod
R6501
0.1uF
TU_ALL_2178B
I2C_SCL6
TU_Non_BR/TW
R6515
33
200
I2C_SDA6
TU_H/W/W_KR/US/BR/TW
R6510
33
R6510
-*1
I2C_SCL6
C6516
R6515
0.1uF
C6506
C6515
R6515
-*2
300
R6505
200
TU_ALL_2178B
R6516
10
TU_W_AJ
IF_P_TU
TU_ALL_IntDemod
R6518
0
R6517
10
TU_SIF_TU
6
R6518
-*1
TU_M/W
7
R6518
-*2
300
TU_M/W
8
R6518
0
TU_W_AJ
IF_N_TU
TU_SIF
9
R6518
0
TU_CVBS
11
C6509
0.1uF
TU_M/W
12
C6501
15pF50V
TU_M/W
13
T2 : Max 1.7A
else : Max 0.7A

\[ V_{out} = 0.6 \times \left(1 + \frac{R_1}{R_2}\right) \]

Global F/E Option Name
1. TU
2. Tuner Name = TUS'G', TUS'G'...
3. Country Name = TUS'G1, TUS'G1, TUS'G1, TUS'G3...

Example of Option name
TUS'G1 = apply DVB-T2 type tuner and TU country
TUS'G1 = apply DVB-T2 Type Tuner

Tuner Type for Global
TUS'G7 = G501D : T/C Half NIM Horizontal Type
TUS'Q3 = G501D : T/C/S Combo Horizontal Type
TUS'Q7 = G501D : T/C/S Combo Vertical Type
TUS'G2 = G501D : T/C/S Japan/DVB-T Combo Isolator Type
TUS'Q7 = G501D : Japan Dual NIM
TUS'G7 = Brazil 2Tuner
TUS'Q7 = Brazil 2Tuner
TUS'G7 = Columbia EPG:2T 2Tuner

vout = 0.6 × (1 + R1/R2)
RS-232C Control INTERFACE
THERMAL SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

DVB-S2 LNB Part Allegro

Input trace widths should be sized to conduct at least 3A
Output trace widths should be sized to conduct at least 2A

---

The A symbol mark of this schematic diagram incorporates special features important for protection from X-radiation. When servicing it is essential that only manufacturers specified parts be used for the critical components in the A symbol mark of the schematic.

---

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Don’t Connect Power At VDDI (Just Internal LDO Capacitor)
UB85/95/UC89 only
The symbols mark of this schematic diagram incorporate special features important for protection from X-radiation. Fire and electrical shock hazards. When servicing the TV, ensure that only manufacturer-specified parts are used for the critical components in the symbol mark of the schematic.
Vout = 0.765 \times (1 + R1 / R2) = 1.516V

Vout = 0.6 \times (1 + R1 / R2)
Temp: Improvement of EU_S4

URSA9 I2C cap. Ready

UB85/95/UC89 temp. only
UB85/95/UC97 only
Front speaker
Repair Guide
`14 years New Models
# Contents of Standard Repair Process

<table>
<thead>
<tr>
<th>No.</th>
<th>Error symptom (High category)</th>
<th>Error symptom (Mid category)</th>
<th>Page</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Video error</td>
<td>No video/Normal audio</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>No video/No audio</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Picture broken/ Freezing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Color error</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Vertical/Horizontal bar, residual image, light spot, external device color error</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B. Power error</td>
<td>No power</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Off when on, off while viewing, power auto on/off</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>C. Audio error</td>
<td>No audio/Normal video</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Wrecked audio/discontinuation/noise</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>D. Function error</td>
<td>Remote control &amp; Local switch checking</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>MR13 operating checking</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Wifi operating checking</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Camera operating checking</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>External device recognition error</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>E. Noise</td>
<td>Circuit noise, mechanical noise</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>F. Exterior error</td>
<td>Exterior defect</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

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

1. **No video**
   - **Normal audio**
     - **Y**
       - **Check Back Light**
       - **On with naked eye**
       - **Y**
         - **Check Power Board**
         - **24V, 12V, 3.5V etc.**
         - **Y**
           - **Normal voltage**
           - **Y**
             - **Replace T-con/Main Board or module**
             - And Adjust VCOM
           - **N**
             - **Repair Power Board or parts**
       - **N**
         - **Replace Inverter or module**
         - **End**
     - **N**
       - **Move to No video/No audio**

2. **A18**
   - **Check Power Board 24V output**
   - **Y**
     - **Normal voltage**
     - **Y**
       - **Replace Inverter or module**
     - **N**
       - **Repair Power Board or parts**
   - **N**
     - **End**

*Precaution A4 & A2*

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

- **Replace Main Board**
  - **Re-enter White Balance value**
Standard Repair Process

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>A. Video error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No video/ No audio</td>
<td>Check various voltages of Power Board (3.5V, 12V, 20V or 24V...)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Normal voltage?</td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check and replace MAIN B/D</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace Power Board and repair parts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End

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## A. Video error

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>A. Video error</th>
<th>Established date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture broken/ Freezing</td>
<td></td>
<td>Revised date</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3/16</td>
</tr>
</tbody>
</table>

### A3

**Check RF Signal level**

- By using Digital signal level meter
- By using Diagnostics menu on OSD
  - (Setting → Quick Setting → Programmes → Programme Tuning → Manual Tuning → Check the Signal)
  - Signal strength (Normal: over 50%)
  - Signal Quality (Normal: over 50%)

---

**A4**

- Normal Signal?
  - Y: Check whether other equipments have problem or not.
    - (By connecting RF Cable at other equipment)
    - → DVD Player, Set-Top-Box, Different maker TV etc`
  - N: Check RF Cable Connection
    - 1. Reconnection
    - 2. Install Booster

---

- Normal Picture?
  - Y: Check S/W Version
  - N: Contact with signal distributor or broadcaster (Cable or Air)

---

- SVC Bulletin?
  - Y: Close
  - N: S/W Upgrade

---

- Normal Picture?
  - Y: Replace Main B/D
  - N: Close

---

- Check Tuner soldering
  - Y: Close
  - N: Replace Main B/D

---

*By using Digital signal level meter*

*By using Diagnostics menu on OSD*

- (Setting → Quick Setting → Programmes → Programme Tuning → Manual Tuning → Check the Signal)

- Signal strength (Normal: over 50%)
- Signal Quality (Normal: over 50%)

---

*Check whether other equipments have problem or not.*

*Check RF Cable Connection*

1. Reconnection
2. Install Booster

---

*Check RF Signal level*

*Check whether other equipments have problem or not.*

(By connecting RF Cable at other equipment)

→ DVD Player, Set-Top-Box, Different maker TV etc`

---

*Check Tuner soldering*

---

*Check RF Cable Connection*

1. Reconnection
2. Install Booster

---

*Normal Picture?*

- Y: Check S/W Version
- N: Contact with signal distributor or broadcaster (Cable or Air)

---

*Check Tuner soldering*

---

*Check RF Cable Connection*

1. Reconnection
2. Install Booster

---

*Normal Picture?*

- Y: Replace Main B/D
- N: Close

---

*Check Tuner soldering*

---

*Check RF Cable Connection*

1. Reconnection
2. Install Booster

---

*Normal Picture?*

- Y: Replace Main B/D
- N: Close

---

*Check Tuner soldering*

---

*Check RF Cable Connection*

1. Reconnection
2. Install Booster

---

*Normal Picture?*

- Y: Replace Main B/D
- N: Close

---

*Check Tuner soldering*
### A. Video error

**Color error?**

- **Y**
  - Check error color input mode
  - **N** Check and replace Link Cable (V by one) and contact condition

- **N** End

**Check error color input mode**

**Check Test pattern**

- **Y** Y Check and replace Link Cable (V by one) and contact condition
  - **N** End

**Y** Replace Main B/D

**Y** Replace module

**N** Replace Main/T-con B/D

**Y** Replace Main/T-con B/D

**N** Replace Main/T-con B/D

**Check color by input**

- **External Input**
- **COMPONENT**
- **AV**
- **HDMI**

**Check color input mode**

**Check and replace Link Cable (V by one) and contact condition**

**Check external device and cable**

**Request repair for external device/cable**

**Established date**

- Color error

**Revised date**

- 4/16

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Table:

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>A. Video error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical / Horizontal bar, residual image, light spot, external device color error</td>
<td></td>
</tr>
</tbody>
</table>

Flowchart:

**Vertical/Horizontal bar, residual image, light spot**

1. **A6**
   - Check color condition by input
     - External Input
     - Component
     - HDMI
   - Screen normal?
   - Y: Check and replace Link Cable
   - N: Replace Main/T-con B/D (adjust VCOM)
     - For LGD panel
   - N: Screen normal?
     - Y: End
     - N: Replace Main B/D
       - For other panel
   - N: Request repair for external device
   - Y: Replace module

**External device screen error-Color error**

1. **A8**
   - Check Test pattern

2. Check S/W Version
   - N: Check version
     - Y: S/W Upgrade
     - N: Normal screen?
       - Y: End
       - N: Screen normal?
         - Y: Connect other external device and cable (Check normal operation of External Input, Component, RGB and HDMI/DVI by connecting Jig, pattern Generator, Set-top Box etc.)
         - N: Screen normal?
           - Y: Replace Main/T-con B/D
           - N: Replace Main /T-con B/D
         - N: Request repair for external device
   - Y: External Input error
     - Connect other external device and cable (Check normal operation of External Input, Component, RGB and HDMI/DVI by connecting Jig, pattern Generator, Set-top Box etc.)
### B. Power error

#### Error symptom

- **No power**

#### Established date

- Revised date: 6/16

---

**Check Logo LED**

- **Power LED On?**
  - **Y**
    - DC Power on by pressing Power Key On Remote control
  - **N**
    - Check Power cord was inserted properly

- **Normal operation?**
  - **Y**
    - Normal voltage?
      - **Y**
        - Check ST-BY 3.5V
          - **Y**
            - Measure voltage of each output of Power B/D
              - **Y**
                - Replace Main B/D
              - **N**
                - Replace Main B/D
          - **N**
            - Replace Power B/D
      - **N**
        - Replace Power B/D
  - **N**
    - Replace Main B/D

**A17**

- Stand-By: Red or Turn On
- Operating: Turn Off

**A18**

- **Replace Power B/D**
- **Replace Main B/D**

---

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### B. Power error

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Established date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off when on, off while viewing, power auto on/off</td>
<td>Revised date</td>
</tr>
</tbody>
</table>

#### Standard Repair Process

1. Check outlet
2. Check A/C cord
3. Check for all 3-phase power out
4. Fix A/C cord & Outlet and check each 3-phase out

---

### Error Symptom

**Normal**
- "POWEROFF_REMOTEKEY"  Power off by REMOTE CONTROL
- "POWEROFF_OFFTIMER"  Power off by OFF TIMER
- "POWEROFF_SLEPTIMER"  Power off by SLEEP TIMER
- "POWEROFF_INSTOP"  Power off by INSTOP KEY
- "POWEROFF_AUTOOFF"  Power off by AUTO OFF
- "POWEROFF_ONTIMER"  Power off by ON TIMER
- "POWEROFF_RS232C"  Power off by RS232C
- "POWEROFF_RESREC"  Power off by Reservated Record
- "POWEROFF_RECEND"  Power off by End of Recording
- "POWEROFF_SWDOWN"  Power off by S/W Download
- "POWEROFF_UNKNOWN"  Power off by unknown status except listed case

**Abnormal**
- "POWEROFF_ABNORMAL1"  Power off by abnormal status except CPU trouble
- "POWEROFF_CPUABNORMAL"  Power off by CPU Abnormal

---

*Please refer to the all cases which can be displayed on power off mode.*
C. Audio error

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>C. Audio error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>No audio/ Normal video</td>
<td></td>
<td></td>
<td>8/16</td>
</tr>
</tbody>
</table>

- **A20**
  - No audio
  - Screen normal
  - Check user menu > Speaker off
- **A21+A18**
  - Check audio B+ 24V of Power Board
  - Normal voltage
- **Disconnection**
  - Check Speaker disconnection
  - Replace Speaker
- End

- Off: Y → Replace Power Board and repair parts
- N → Cancel OFF

Established date: 8/16
Revised date: 8/16
C. Audio error

Wrecked audio/ discontinuation/noise

Check and replace speaker and connector

Replace Main B/D

Replace Power B/D

Check audio B+ Voltage (24V)

A21+A18

End

Check and fix external device

Replace Main B/D

→ abnormal audio/discontinuation/noise is same after “Check input signal” compared to No audio

Check input signal
- RF
- External Input signal

Y

N

Signal normal?

Normal voltage?

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

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

Wrecked audio/ Discontinuation/ Noise for all audio

Wrecked audio/ Discontinuation/ Noise only for D-TV

Wrecked audio/ Discontinuation/ Noise only for Analog

Wrecked audio/ Discontinuation/ Noise only for External Input

Y

N

Signal normal?

Check and replace speaker and connector

Replace Main B/D

Replace Power B/D

Check audio B+ Voltage (24V)

A21+A18

Established date

Revised date

9/16

Error symptom

Wrecked audio/ discontinuation/noise

Signal normal?

N

Y

Check input signal

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1. Remote control (R/C) operating error

Check R/C itself Operation

- Normal operating?
  - Y: Check & Repair Cable connection Connector solder
  - N: Replace R/C

Check R/C Operating When turn off light in room

- Normal operating?
  - Y: Normal operating?
    - Y: Check B+ 3.5V On Main B/D
      - Y: Check IR Output signal
        - Y: Replace Main B/D
        - N: Repair/Replace IR B/D
      - N: Check 3.5V on Power B/D
        - Replace Power B/D or Replace Main B/D (Power B/D don't have problem)
    - N: Check & Replace Battery of R/C

If R/C operate, Explain the customer cause is interference from light in room.

- Normal operating?
  - Y: Close
  - N: Replace R/C

Check & Repair Battery of R/C

- Normal operating?
  - Y: Close
  - N: Replace R/C
2. MR13(Magic Remocon) operating error

- Check the INSTART menu
  - Y: RF Receiver ver is “00.00”? (A4)
  - N: Check MR13 itself Operation (A23)
  - Y: Check & Repair RF assy connection
  - N: RF Receiver ver is “00.00”? (A4)
  - Y: Down load the Firmware
    - * INSTANT MENU→14.RF Remocon Test→3. Firmware download
  - N: Close

- Check MR13 itself Operation
  - Y: Normal operating? (N: Replace MR13, Y: Close)

- Press the wheel
  - Y: Is show ok message? (N: Turn off/on the set and press the wheel)
  - Y: Is show ok message? (N: Press the back key about 5sec)

- * If you conduct the loop at 3times, change the M4.
3. Wifi operating error

- Check the INSTART menu
  - Wi-Fi Mac value is “NG”?
    - Y: Check & Repair Wifi cable connection
    - N: Close
  - A24

- Check the Wifi wafer 1pin
  - Normal Voltage?
    - Y: Close
    - N: Replace Main B/D
  - A4

- Wi-Fi Mac value is “NG”?
  - N: Close
  - Y: Change the Wifi assy

- Established date: 12/16

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4. Camera operating error

- **Check the INSTART menu**
  - **Camera Ver. is “NULL”?**
    - **A25**
      - **Check & Repair Camera cable connection**
      - **A4**
        - **Camera Ver. is “NULL”?**
          - **Y**
            - Change the Camera assy
          - **N**
            - **Close**
    - **Y**
      - **Close**
    - **N**
      - **Check the Camera wafer P4200 12,13pin**
      - **A4**
        - **Normal Voltage?**
          - **N**
            - Replace Main B/D
          - **Y**
            - **Close**
<table>
<thead>
<tr>
<th>Error symptom</th>
<th>D. Function error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>External device recognition error</td>
<td></td>
<td>14/16</td>
<td></td>
</tr>
</tbody>
</table>
**E. Noise**

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Circuit noise, mechanical noise</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
</table>

- **Identify nose type**
- **Circuit noise** → Check location of noise → Replace PSU
- **Mechanical noise** → Check location of noise

- **※** Mechanical noise is a natural phenomenon, and apply the 1st level description. When the customer does not agree, apply the process by stage.
  - Describe the basis of the description in “Part related to nose” in the Owner’s Manual.

- **※** When the nose is severe, replace the module (For models with fix information, upgrade the S/W or provide the description)

- **OR**
  - **※** If there is a “Tak Tak” noise from the cabinet, refer to the KMS fix information and then proceed as shown in the solution manual (For models without any fix information, provide the description)
Standard Repair Process

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>F. Exterior defect</th>
<th>Established date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exterior defect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Revised date</td>
<td>16/16</td>
</tr>
</tbody>
</table>

- Zoom part with exterior damage
- Module damage → Replace module
- Cabinet damage → Replace cabinet
- Remote controller damage → Replace remote controller
- Stand dent → Replace stand
## Contents of Standard Repair Process Detail Technical Manual

<table>
<thead>
<tr>
<th>No.</th>
<th>Error symptom</th>
<th>Content</th>
<th>Page</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Video error_ No video/Normal audio</td>
<td>Check LCD back light with naked eye</td>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Check White Balance value</td>
<td>A2</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>A. Video error_ video error /Video lag/stop</td>
<td>TUNER input signal strength checking method</td>
<td>A3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>LCD−TV Version checking method</td>
<td>A4</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Tuner Checking Part</td>
<td>A5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>A. Video error _Vertical/Horizontal bar, residual image, light spot</td>
<td>LCD TV connection diagram</td>
<td>A6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>A. Video error_ Color error</td>
<td>Check Link Cable (EPI) reconnection condition</td>
<td>A7</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Adjustment Test pattern – ADJ Key</td>
<td>A8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Exchange Main Board (1)</td>
<td>A–1/5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Exchange Main Board (2)</td>
<td>A–2/5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>&lt;Appendix&gt;</td>
<td>Exchange Power Board (PSU)</td>
<td>A–3/5</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Exchange Module (1)</td>
<td>A–4/5</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Exchange Module (2)</td>
<td>A–5/5</td>
<td></td>
</tr>
</tbody>
</table>

<Appendix>

Defected Type caused by T−Con/Inverter/Module

---

Continue to the next page
### Contents of Standard Repair Process Detail Technical Manual

<table>
<thead>
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<th>No.</th>
<th>Error symptom</th>
<th>Content</th>
<th>Page</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>B. Power error_ No power</td>
<td>Check front display LED</td>
<td>A17</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Check power input Voltage &amp; ST-BY 3.5V</td>
<td>A18</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>B. Power error_Off when on, off while viewing</td>
<td>POWER OFF MODE checking method</td>
<td>A19</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>C. Audio error_ No audio/Normal video</td>
<td>Checking method in menu when there is no audio</td>
<td>A20</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Voltage and speaker checking method when there is no audio</td>
<td>A21</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>D. Function error</td>
<td>Remote controller operation checking method</td>
<td>A22</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>Motion Remote operation checking method</td>
<td>A23</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>Wifi operation checking method</td>
<td>A24</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>Camera operation checking method</td>
<td>A25</td>
<td>Not Used</td>
</tr>
<tr>
<td>25</td>
<td>E. Etc</td>
<td>Tool option changing method</td>
<td>A26</td>
<td></td>
</tr>
<tr>
<td>Error symptom</td>
<td>Content</td>
<td>Established date</td>
<td>Revised date</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---------</td>
<td>------------------</td>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>A. Video error_No video/Normal audio</td>
<td>Check LCD back light with naked eye</td>
<td></td>
<td>A1</td>
<td></td>
</tr>
</tbody>
</table>

After turning on the power and disassembling the case, check with the naked eye, whether you can see light from locations.
## Entry method

1. Press the ADJ button on the remote controller for adjustment.

2. Enter into White Balance of item 10.

3. After recording the R, G, B (GAIN, Cut) value of Color Temp (Cool/Medium/Warm), re-enter the value after replacing the MAIN BOARD.
Quick Settings ➔ Programmes ➔ Programme Tuning ➔ Manual Tuning

When the signal is strong, use the attenuator (-10dB, -15dB, -20dB etc.)
<ALL MODELS>

1. Checking method for remote controller for adjustment

Press the IN-START with the remote controller for adjustment
Checking method:
1. Check the signal strength or check whether the screen is normal when the external device is connected.
2. After measuring each voltage from power supply, finally replace the MAIN BOARD.
A. Video error _Vertical/Horizontal bar, residual image, light spot

As the part connecting to the external input, check the screen condition by signal
## Standard Repair Process Detail Technical Manual

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>A. Video error_Color error</th>
<th>Established date</th>
<th>Revised date</th>
<th>A7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Check Link Cable (LVDS) reconnection condition</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### A7

<ALL MODELS>

![Diagram of Link Cable and LVDS connection]

Check the contact condition of the Link Cable, especially dust or mis insertion.

* Tuner is different from region
### Standard Repair Process Detail Technical Manual

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>A. Video error_Color error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Adjustment Test pattern - ADJ Key</td>
<td></td>
<td>A8</td>
</tr>
</tbody>
</table>

You can view 6 types of patterns using the ADJ Key

Checking item:
1. Defective pixel  
2. Residual image  
3. MODULE error (ADD-BAR,SCAN BAR..)  
4. Video error (Classification of MODULE or Main-B/D!)
Appendix : Exchange Main Board (1)
Appendix : Exchange Main Board (2)

- Abnormal Power Section
- Abnormal Power Section
- Solder defect, Short/Crack
- Solder defect, Short/Crack
- Fuse Open, Abnormal power section
- Abnormal Display
- GRADATION
- Noise
- GRADATION
Appendix : Exchange Power Board (PSU)

No Light

Dim Light

Dim Light

Dim Light

No picture/Sound Ok

A - 3/5
Appendix : Exchange the Module (1)

Panel Mura, Light leakage

Panel Mura, Light leakage

Press damage

Crosstalk

Press damage

Crosstalk

Un-repairable Cases
In this case please exchange the module.

Press damage
Appendix : Exchange the Module (2)

Un-repairable Cases
In this case please exchange the module.
### B. Power error _No power_

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Content</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check front Power Indicator</td>
<td></td>
<td>A17</td>
</tr>
</tbody>
</table>

#### Using the joystick button

You can operate the TV by pressing the button or moving the joystick left, right, up, or down.

### Basic Functions

<table>
<thead>
<tr>
<th>Button</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power On</td>
<td>When the TV is turned off, place your finger on the joystick button and press it once and release it.</td>
</tr>
<tr>
<td>Power Off</td>
<td>When the TV is turned on, place your finger on the joystick button and press it once for a few seconds and release it.</td>
</tr>
<tr>
<td>Volume Control</td>
<td>If you place your finger over the joystick button and move it left or right, you can adjust the volume level you want.</td>
</tr>
<tr>
<td>Programmes Control</td>
<td>If you place your finger over the joystick button and move it up or down, you can scroll through the saved programmes you want.</td>
</tr>
</tbody>
</table>

#### NOTE

- When your finger over the joystick button and push it to the up, down, left or right, be careful not to press the joystick button. If you press the joystick button first, you can not adjust the volume level and saved programmes.

#### Adjusting the Menu

When the TV is turned on, press the joystick button one time. You can adjust the Menu items ( , , , ) moving the joystick button up, down, left or right.

<table>
<thead>
<tr>
<th>Button</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TV OFF</td>
<td>Turns the power off.</td>
</tr>
<tr>
<td>CLOSE</td>
<td>Clears on-screen displays and return to TV viewing.</td>
</tr>
<tr>
<td>INPUT</td>
<td>Changes the input source.</td>
</tr>
</tbody>
</table>

---

**ST-BY condition:** On or Off

**Power ON condition:** Turn Off

---

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## B. Power error _No power_

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>Content</th>
<th>Established date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Check power input voltage and ST-BY 3.5V</td>
<td>Revised date A18</td>
</tr>
</tbody>
</table>

**Check the DC 24V, 12V, 3.5V.**

### P_main  
**Maker:** Yeonho  
**28Pin SMAW200-H28S5K**  
**’14Y_28Pin map (LPB)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PWR ON</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>P_DIM #1</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>3.5V</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>3.5V</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>GND</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>12V</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td>12V</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>12V</td>
<td>16</td>
</tr>
<tr>
<td>17</td>
<td>GND</td>
<td>18</td>
</tr>
<tr>
<td>19</td>
<td>24V</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>24V</td>
<td>22</td>
</tr>
<tr>
<td>23</td>
<td>GND</td>
<td>24</td>
</tr>
<tr>
<td>25</td>
<td>SCLK</td>
<td>26</td>
</tr>
<tr>
<td>27</td>
<td>SIN</td>
<td>28</td>
</tr>
</tbody>
</table>
**Entry method**

1. Press the IN-START button of the remote controller for adjustment

2. Check the entry into adjustment item 3
### Checking method

1. Press the Setting button on the remote controller
2. Select the Sound function of the Menu
3. Select the Sound Out
4. Select TV Speaker

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>C. Audio error_No audio/Normal video</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Checking method in menu when there is no audio</td>
<td></td>
<td>A20</td>
</tr>
</tbody>
</table>
**Checking order when there is no audio**

1. Check the contact condition of or 24V connector of Main Board

2. Measure the 24V input voltage supplied from Power Board
   (If there is no input voltage, remove and check the connector)

3. Connect the tester RX1 to the speaker terminal and if you hear the Chik Chik sound when you touch the GND and output terminal, the speaker is normal.
## Checking order to check remote controller

1. Check IR cable condition between IR & Main board. (Check picture number ① and ②)
2. Check the standby 3.5V on the terminal 16 pin (③)
3. AS checking the Pre-Amp (IR LED light), the power is in ON condition, an Analog Tester needle should move slowly, otherwise, it’s defective.

### Remote controller operation checking method

<table>
<thead>
<tr>
<th>Error symptom</th>
<th>D. Function error</th>
<th>Established date</th>
<th>Revised date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>Remote controller operation checking method</td>
<td>A22</td>
<td></td>
</tr>
</tbody>
</table>

### Error symptom

<table>
<thead>
<tr>
<th>#</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>+3.5V WOL</td>
<td>3.5V Wake On LAN</td>
</tr>
<tr>
<td>3</td>
<td>BT_RESET</td>
<td>Bluetooth Reset</td>
</tr>
<tr>
<td>4</td>
<td>USB_DM</td>
<td>USB Data DM</td>
</tr>
<tr>
<td>5</td>
<td>NC</td>
<td>No Connect</td>
</tr>
<tr>
<td>6</td>
<td>USB_DP</td>
<td>USB Data</td>
</tr>
<tr>
<td>7</td>
<td>WOL</td>
<td>Wake On LAN</td>
</tr>
<tr>
<td>8</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>SDA</td>
<td>Serial Data</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>11</td>
<td>SCL</td>
<td>Serial Clock</td>
</tr>
<tr>
<td>12</td>
<td>KEY1</td>
<td>Key 1</td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>14</td>
<td>KEY2</td>
<td>Key 2</td>
</tr>
<tr>
<td>15</td>
<td>IR</td>
<td>Infrared</td>
</tr>
<tr>
<td>16</td>
<td>+3.5V_ST</td>
<td>3.5V Standby</td>
</tr>
<tr>
<td>17</td>
<td>LED_R</td>
<td>LED Red</td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

---

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### Error symptom

<table>
<thead>
<tr>
<th>Motion</th>
<th>Remote / Wifi operation checking method</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Function error</td>
<td></td>
</tr>
<tr>
<td>Established date</td>
<td>Revised date</td>
</tr>
</tbody>
</table>

#### Error symptom

**①** Checking order

1. Check BT/Wifi cable condition between BT/Wifi assy & Main board.
2. Check the 3.5V on the terminal 16

#### Checking order to check motion remote/wifi

**Checking order**

1. Check BT/Wifi cable condition between BT/Wifi assy & Main board.
2. Check the 3.5V on the terminal 16