LED TV
SERVICE MANUAL

CHASSIS : LA32B
MODEL : 32LN5300  32LN5300-UB

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

IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by △ in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

General Guidance

An isolation Transformer should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 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

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

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

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

**General Servicing Precautions**
1. Always unplug the receiver AC power cord from the AC power source before;
   a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
   b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
   
   **CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.

2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc".

3. Do not spray chemicals on or near this receiver or any of its assemblies.

4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator: 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)
   
   **CAUTION:** This is a flammable mixture.
   Unless specified otherwise in this service manual, lubrication of contacts in not required.

5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.

6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.

7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.

8. Use with this receiver only the test fixtures specified in this service manual.
   
   **CAUTION:** Do not connect the test fixture ground strap to any heat sink in this receiver.

**Electrostatically Sensitive (ES) Devices**

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor “chip” components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.

4. Use only an anti-static type solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ES devices.

5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.

6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).

7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   
   **CAUTION:** Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

**General Soldering Guidelines**

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.

2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.

3. Keep the soldering iron tip clean and well tinned.

4. Thoroughly clean the surfaces to be soldered. Use a mall wire-bristle (0.5 inch, or 1.25 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. (500 °F to 600 °F)

6. Use the following soldering technique:
   a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
   b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   
   **CAUTION:** Work quickly to avoid overheating the circuit board printed foil.

   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.
IC Remove/Replacement
Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

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

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

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

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

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

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

3. Solder the connections.

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

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

At IC Connections
To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

At Other Connections
Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

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

CAUTION: Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.
1. Application range
   This spec sheet is applied LED TV with LA32Bchassis

2. Test condition
   Each part is tested as below without special notice.
   1) Temperature : 25 °C ± 5 °C(77 ± 9 °F) , CST : 40 °C±5 °C
   2) Relative Humidity: 65 % ± 10 %
   3) Power Voltage

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<th>Input voltage</th>
<th>Frequency</th>
<th>Remark</th>
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<td>50/60Hz</td>
<td>Standard Voltage of each product is marked by models</td>
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4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM

5) The receiver must be operated for about 20 minutes prior to the adjustment

3. Test method
   1) Performance: LGE TV test method followed
   2) Demanded other specification
      - Safety : UL, CSA, IEC specification
      - EMC: FCC, ICES, IEC specification

4. General Specification

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5. Supported video resolutions

5.1. Component input(Y, CB/PB, CR/PR)

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5.2. HDMI Input (DTV)

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<th>V-freq.(kHz)</th>
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<td>29.97</td>
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</tr>
</tbody>
</table>
ADJUSTMENT INSTRUCTION

1. Application
This spec. sheet applies to LA32B Chassis applied LED TV all models manufactured in TV factory

2. Specification
(1) Because this is not a hot chassis, it is not necessary to use an isolation transformer. However, the use of isolation transformer will help protect test instrument.
(2) Adjustment must be done in the correct order.
(3) The adjustment must be performed in the circumstance of 25 ±5 °C of temperature and 65±10% of relative humidity if there is no specific designation.
(4) The input voltage of the receiver must keep 100~240V, 50/60Hz.
(5) At first Worker must turn on the SET by using Power Only key.
(6) The receiver must be operated for about 5 minutes prior to the adjustment when module is in the circumstance of over 15 °C.
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. Adjustment items
3.1. Main PCBA Adjustments
(1) ADC adjustment : ADC adjustment is OTP (Auto ADC)
(2) EDID download : HDMI
- Above adjustment items can be also performed in Final Assembly if needed.
Both Board-level and Final assembly adjustment items can be check using In-Start Menu (1.Adjust Check).

3.2. Final assembly adjustment
(1) White Balance adjustment
(2) RS-232C functionality check
(3) Factory Option setting per destination
(4) Shipment mode setting (In-Stop)
(5) GND and HI-POT test

3.3. Appendix
(1) Shipment conditions
(2) Tool option menu
(3) USB Download (S/W Update, Option and Service only)
(4) Preset CH Information

4. MAIN PCBA Adjustments
* Download
(1) Execute ISP program “Mstar ISP Utility” and then click “Config” tab.
(2) Set as below, and then click “Auto Detect” and check “OK” message.
If display “Error”, Check connect computer, jig, and set.
(3) Click “Connect” tab. If display “Can’t “, Check connect computer, jig, and set.
(4) Click “Read” tab, and then load download file(XXXX.bin) by clicking “Read”.
(5) Click “Auto” tab and set as below.
(6) Click “Run”.
(7) After downloading, check “OK” message.
4.1. ADC Adjustment

4.1.1. Overview

▪ ADC adjustment is needed to find the optimum black level and gain in Analog-to-Digital device and to compensate RGB deviation.
▪ ADC adjustment is OTP (Auto ADC)

4.2. EDID 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

(1) Since EDID data is embedded, EDID download JIG, HDMI cable is not need.
(2) Adjust by using remote controller

4.2.3. Download method (using DFT)

※ PC(for communication through RS-232C), UART baud rate: 115200 bps
Command : aa 00 00 (Start Factory mode)
Command : ae 00 10 (Download All EDID)
Command : aa 00 90 (End of Factory mode)

4.2.4. Download method (using Service Remocon)

(1) Press Adj. key on the Adj. R/C.
(2) Select EDID D/L menu.
(3) By pressing Enter key, EDID download will begin
(4) If Download is successful, OK is display, but If Download is failure, NG is displayed.
(5) If Download is failure, Re-try downloads.
※ Caution : When EDID Download, Must remove HDMI Cable.

4.2.5. EDID DATA

4.2.5.1. North America (PCM)

4.2.5.1.1. FHD Model

■ HDMI 1-FHD-8BIT (C/S : E808)
EDID Block 0, Bytes 0-127 [00H-7FH]

<table>
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<th>FF</th>
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<td>03</td>
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<td>4C</td>
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<td>01</td>
<td>EE</td>
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<td>50</td>
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<td>00</td>
<td>1B</td>
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<td>20</td>
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<td>00</td>
<td>01</td>
<td>E8</td>
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EDID Block 1, Bytes 128-255 [80H-FFH]

| 0 | 02 | 03 | 19 | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 07 | 67 | 03 | 0C | 00 | 00 | 00 | 00 | 80 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D |
| 20 | 40 | 50 | 84 | 63 | 00 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 30 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 | 00 | 9E | 01 | 1D | 00 |
| 40 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 8C |
| 50 | 0A | D0 | 8A | 20 | E0 | 0D | 10 | 10 | 3E | 96 | 00 | 40 | 84 | 63 | 00 | 00 |
| 60 | 18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 70 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

■ HDMI 2-FHD-8BIT (C/S : E8F8)
EDID Block 0, Bytes 0-127 [00H-7FH]

| 0 | 02 | 03 | 19 | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 07 | 67 | 03 | 0C | 00 | 00 | 00 | 00 | 80 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D |
| 20 | 40 | 50 | 84 | 63 | 00 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 30 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 | 00 | 9E | 01 | 1D | 00 |
| 40 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 8C |
| 50 | 0A | D0 | 8A | 20 | E0 | 0D | 10 | 10 | 3E | 96 | 00 | 40 | 84 | 63 | 00 | 00 |
| 60 | 18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 70 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

EDID Block 1, Bytes 128-255 [80H-FFH]

| 0 | 02 | 03 | 19 | F1 | 48 | 90 | 22 | 20 | 05 | 04 | 03 | 02 | 01 | 23 | 09 | 57 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 07 | 67 | 03 | 0C | 00 | 00 | 00 | 00 | 80 | 01 | 02 | 3A | 80 | 18 | 71 | 38 | 2D |
| 20 | 40 | 50 | 84 | 63 | 00 | 00 | 00 | 1E | 66 | 21 | 50 | B0 | 51 | 00 | 1B | 30 |
| 30 | 1C | 16 | 20 | 58 | 2C | 25 | 00 | 40 | 84 | 63 | 00 | 00 | 9E | 01 | 1D | 00 |
| 40 | 72 | 51 | D0 | 1E | 20 | 6E | 28 | 55 | 00 | 40 | 84 | 63 | 00 | 00 | 1E | 8C |
| 50 | 0A | D0 | 8A | 20 | E0 | 0D | 10 | 10 | 3E | 96 | 00 | 40 | 84 | 63 | 00 | 00 |
| 60 | 18 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 70 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

EDID D/L (PCM)
HDMI1 : OK
HDMI2 : OK
4.3. Tool Option Input

- Input Model Tool Option according to BOM

5. Final Assembly Adjustment

5.1. White Balance Adjustment

5.1.1. Overview

5.1.1.1. 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) Adj. condition: normal temperature
- Surrounding Temperature: 25±5 ºC
- Warm-up time: About 5 Min
- Surrounding Humidity: 20% ~ 80%
- Before White balance adjustment, Keep power on status, don't power off

5.1.1.2. Adj. condition and cautionary items

(1) Lighting condition in surrounding area surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
(2) Probe location: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~ 100°)
(3) Aging time
- After Aging Start, Keep the Power ON status during 5 Minutes.
- In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

5.1.2. Equipment

(1) Color Analyzer: CA-210 (NCG: CH 9 / WCG: CH12 / LED: CH14)
(2) Adj. Computer(During auto adj., RS-232C protocol is needed)
(3) Adjust Remocon
(4) Video Signal Generator MSPG-925F 720p/204-Gray (Model:217, Pattern:49)
→ Only when internal pattern is not available
※ Color Analyzer Matrix should be calibrated using CS-1000
5.1.3. Equipment connection

![Diagram of equipment connection]

- **RS-232C**
- **Color Analyzer**
- **Computer**
- **Pattern Generator**
- **Signal Source**
- **TV Service Only Jack**
- **Phone jack cable**
- **RS-232C cable**

※ TV internal pattern is used, not needed

5.1.4. Adjustment Command (Protocol)

(1) RS-232C Command used during auto-adj

<table>
<thead>
<tr>
<th>RS-232C COMMAND</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wb 00 00</td>
<td>Begin White Balance adj.</td>
</tr>
<tr>
<td>Wb 00 ff</td>
<td>End White Balance adj. (internal pattern disappears)</td>
</tr>
</tbody>
</table>

(2) Adjustment Map

<table>
<thead>
<tr>
<th>Adj. item</th>
<th>Command (lower case ASCII)</th>
<th>Data Range (Hex.)</th>
<th>Default (Decimal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cool</td>
<td>R Gain j g</td>
<td>00 C0</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>G Gain j h</td>
<td>00 C0</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>B Gain j i</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>R Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>G Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>B Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>Medium</td>
<td>R Gain j a</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>G Gain j b</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>B Gain j c</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>R Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>G Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>B Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>Warm</td>
<td>R Gain j d</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>G Gain j e</td>
<td>00 C0</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>B Gain j f</td>
<td>00 C0</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>R Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>G Cut</td>
<td></td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>B Cut</td>
<td></td>
<td>128</td>
</tr>
</tbody>
</table>

5.1.5. Adjustment method

5.1.5.1. Auto WB calibration

(1) Set TV in ADJ mode using P-ONLY key (or POWER ON key)
(2) Place optical probe on the center of the display
   - It need to check probe condition of zero calibration before adjustment.
(3) Connect RS-232C Cable
(4) Select mode in ADJ Program and begin a adjustment.
(5) When WB adjustment is completed with OK message, check adjustment status of pre-set mode (Cool, Medium, Warm)
(6) Remove probe and RS-232C cable.
※ W/B Adj. must begin as start command “wb 00 00” , and finish as end command “wb 00 ff”, and Adj. offset if need.

5.1.5.2. Manual 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 10cm of the surface.
(3) Press ADJ key -> EZ adjust using adj. R/C -> 6. White-Balance then press the cursor to the right (KEY►).
(When KEy► is pressed 204 Gray(80IRE) 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) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.

※ CASE
First adjust the coordinate far away from the target value(x, y).
(1) x, y > target
   i) Decrease the R, G.
   (2) x, y < target
   i) First decrease the B gain,
   ii) Decrease the one of the others.
(3) x > target , y < target
   i) First decrease B, so make y a little more than the target.
   ii) Adjust x value by decreasing the R
(4) x < target , y > target
   i) First decrease B, so make x a little more than the target.
   ii) Adjust x value by decreasing the G

► How to adjust
(1) Fix G gain at least 172
   Adjust R, B Gain (In Case of Mostly Blue Gain Saturation)
(2) When R or B Gain > 255, Release Fixed G Gain and Readjust

※ CASE Medium / Warm
First adjust the coordinate far away from the target value(x, y).
(1) x, y > target
   i) Decrease the R, G.
(2) x, y < target
   i) First decrease the B gain,
   ii) Decrease the one of the others.
(3) x > target , y < target
   i) First decrease B, so make y a little more than the target.
   ii) Adjust x value by decreasing the R
(4) x < target , y > target
   i) First decrease B, so make x a little more than the target.
   ii) Adjust x value by decreasing the G
5.1.6. Reference
(White Balance Adj. coordinate and color temperature)

- Luminance: 204 Gray, 80IRE
- Normal line
  model: (normal line) LN5xxx, LA6xxx, LA7xxx, LA8xxx

<table>
<thead>
<tr>
<th>H/R Time (Min)</th>
<th>Cool</th>
<th>Medium</th>
<th>Warm</th>
</tr>
</thead>
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<td>277</td>
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<tr>
<td>7</td>
<td>271</td>
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<td>8</td>
<td>270</td>
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</tr>
<tr>
<td>9</td>
<td>269</td>
<td>273</td>
<td>285</td>
</tr>
</tbody>
</table>

- Aging chamber line
  (Aging chamber) Model: LN5xxx, LA6xxx, LA7xxx, LA8xxx
  Standard color coordinate and temperature using CA-210(CH-14) – by aging time

<table>
<thead>
<tr>
<th>H/R Time (Min)</th>
<th>Cool</th>
<th>Medium</th>
<th>Warm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>y</td>
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<tr>
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<td>285</td>
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</tbody>
</table>

5.2. Option selection per country
5.2.1. Overview
(1) Tool option selection is only done for models in Non-USA North America due to rating
(2) Applied model: LA32B Chassis applied to CANADA and MEXICO

5.2.2. Country Group selection
(1) Press ADJ key on the Adj. R/C, and then select Country Group Menu
(2) Depending on destination, select US, then on the lower Country option, select US, CA, MX.
   Selection is done using +, - KEY
(3) Using DFT(Auto)
   ※ PC (for communication through RS-232C) -> UART Baud rate : 115200 bps
   Command : ah 00 00 DATA(Area Number(hexadecimal))

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DATA (Area Number)</th>
<th>AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AREA OPTION1</td>
<td>0</td>
<td>USA</td>
</tr>
<tr>
<td>1</td>
<td>CANADA</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>MEXICO</td>
<td></td>
</tr>
</tbody>
</table>

5.2.3. Tool Option inspection
(1) Press Adj. key on the Adj. R/C, then select Tool option

<table>
<thead>
<tr>
<th>Model</th>
<th>Module</th>
<th>Tool option1</th>
<th>Tool option2</th>
<th>Tool option3</th>
<th>Tool option4</th>
</tr>
</thead>
<tbody>
<tr>
<td>32LN5300-UB</td>
<td>LGD</td>
<td>545</td>
<td>41478</td>
<td>37004</td>
<td>12031</td>
</tr>
<tr>
<td>47LN5400-UA</td>
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<td>1569</td>
<td>33286</td>
<td>37004</td>
<td>46847</td>
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<tr>
<td>55LN5400-UA</td>
<td>LGD(POLA)</td>
<td>2065</td>
<td>33286</td>
<td>37004</td>
<td>40703</td>
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<tr>
<td>50LN5400-UA</td>
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<td>41478</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>42LN5300-UA</td>
<td>AUO</td>
<td>9505</td>
<td>41478</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>42LN5300-UA</td>
<td>LGD(POLA)</td>
<td>1297</td>
<td>41478</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>39LN5300-UB</td>
<td>CM(POLA)</td>
<td>5137</td>
<td>41478</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>39LN5300-UA</td>
<td>AUO(POLA)</td>
<td>9233</td>
<td>41478</td>
<td>37004</td>
<td>03839</td>
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<tr>
<td>32LN5300-UB</td>
<td>CSOT(POLA)</td>
<td>4625</td>
<td>41478</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>32LN530B-UB</td>
<td>LGD</td>
<td>545</td>
<td>45574</td>
<td>37004</td>
<td>03839</td>
</tr>
<tr>
<td>32LN530B-UB</td>
<td>LGD(POLA)</td>
<td>545</td>
<td>45574</td>
<td>37004</td>
<td>03839</td>
</tr>
</tbody>
</table>

※ Tool option can be reconstructed by Software

5.3. Ship-out mode check (In-stop)
(1) After final inspection, press In-Stop key of the Adj. R/C and check that the unit goes to Stand-by mode
6. GND and HI-POT Test

6.1. GND & HI-POT auto-check preparation
(1) Check the POWER CABLE and SIGNAL CABLE insertion condition

6.2. GND & HI-POT auto-check
(1) Pallet moves in the station. (POWER CORD / AV CORD is tightly inserted)
(2) Connect the AV JACK Tester.
(3) Controller (GWS103-4) on.
(4) GND Test (Auto)
   - If Test is failed, Buzzer operates.
   - If Test is passed, execute next process (Hi-pot test).
   (Remove AV CORD from A/V JACK BOX)
(5) HI-POT test (Auto)
   - If Test is failed, Buzzer operates.
   - If Test is passed, GOOD Lamp on and move to next process automatically

6.3. Checkpoint
(1) Test voltage
   - GND: 1.5KV/min at 100mA
   - SIGNAL: 3KV/min at 100mA
(2) TEST time: 1 second
(3) TEST POINT
   - GND Test = POWER CORD GND and SIGNAL CABLE GND.
   - Hi-pot Test = POWER CORD GND and LIVE & NEUTRAL.
(4) LEAKAGE CURRENT: At 0.5mA

7. AUDIO output check

7.1. Audio input condition
(1) RF input: Mono, 1KHz sine wave signal, 100% Modulation
(2) CVBS, Component: 1KHz sine wave signal (0.4VRms)

7.2. Specification

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Audio practical max Output, L/R (Distortion=10% max Output)</td>
<td>9.0</td>
<td>8.5</td>
<td>10.9</td>
<td>9.3</td>
<td>12.0</td>
</tr>
</tbody>
</table>

* USB S/W Download (option, Service only)
(1) Put the USB Stick to the USB socket.
(2) Automatically detecting update file in USB Stick.
   - If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting
(3) Show the message "Copying files from memory"
(4) Updating is staring.
(5) After updating is complete, The TV will restart automatically.
(6) If TV turns on, check your updated version and Tool option.
   (refer to the next page about tool option)
   * If downloading version is higher 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, TOOL OPTION setting is needed again.
(1) Push "IN-START" key in service remote controller.
(2) Select "Tool Option 1" and Push "OK" button.
(3) Punch in the number. (Each model has their number.)
1. Power-up boot check

- Check stand-by Voltage. P401 3, 5pin : +3.5V_ST
  - No: Check 18pin Power connector ok
  - Ok: Main B/D 3.5V Line Short Check ok
  - No: Replace Power board.

- Check stand-by Voltage L404, L408 : +3.5V
  - No: Replace L404, L408
  - Ok: Replace X201

- Check X201 clock 24 MHz
  - Ok: Replace X201

- Check P401 PWR_ON. 1pin : 3.3V
  - No: Re-download software. No: Replace Mstar(IC101) or Main board
  - Ok: Replace Power Board

- Check Multi Voltage P401 9, 10pin : 24V / 13, 14, 15pin:12V
  - Ok: Replace Power Board

- Check IC402/3/7 Output Voltage IC402 : 2.5V
  - Ok: Replace IC402, IC403, IC407, Q403

- Check LVDS Power Voltage Q409 : 12V
  - Ok: Replace Q409

- Check Mstar LVDS Output
  - Ok: Replace Mstar(IC101) or Main Board

- Check DRV ON Control P403 2 pin : High
  - Ok: Change Module
  - No: Check Power Board
2. Digital/Analog TV Video

- Check RF Cable & Signal
  - ok
  - No
  - Replace L3703

- Check Tuner 3.3V Power
  - L3703
  - ok
  - No
  - Replace L3703

- Check Tuner 1.8V Power
  - IC3703 2 pin : 1.8V
  - ok
  - No
  - Replace IC3703

- Check IF_P/N Signal
  - TU3700 10/11 Pin
  - ok
  - No
  - Bad Tuner. Replace Tuner.

- Check Mstar LVDS Output
  - ok
  - No
  - Replace Mstar(IC101) or Main Board.

3. AV Video

- Check input signal format. Is it supported?
  - ok

- Check AV Cable for damage
  - for damage or open conductor
  - ok

- Check JK1702, CVBS Signal Line
  - R1722
  - ok
  - No
  - Replace Jack

- Check CVBS_DET Signal
  - ok
  - No
  - Replace R1713

- Check Mstar LVDS Output
  - ok
  - No
  -
4. Component Video

Check input signal format.
Is it supported?

Check Component Cable for damage or open conductor.

Check JK1702 Y/Pb/Pr signal Line

Check COMP_DET Signal

Check Mstar LVDS Output

5. HDMI Video

Check input signal format.
Is it supported?

Check HDMI Cable conductors for damage or open conductor.

Check EDID R832, R833, R834, R835 I2C Signal

Check JK801, JK803

Check HDMI_DET (HPD)

Check HDMI Signal

Check Mstar LVDS Output

Replace Jack

Replace R1712 or R1713

Replace the defective IC or re-download EDID data

Replace R803, R801, R826, R807, R817, Q801, R819, R818, R830

Check other set
If no problem, check signal line

Replace Main Board

Replace Mstar(IC101) or Main Board.
6. MHL Video

Check input signal format. Is it supported?

Check MHL Cable conductors for damage or open conductor.

Check MHL Signal (R214, R215)

Check JK803

Check CD_Sense, Cbus, Vbus

Check MHL Signal

Check Mstar LVDS Output

Replace the defective IC or re-download EDID data

Replace Jack

Replace R810, R802, R831, R830, IC802, D800

Check other set
If no problem, check signal line

Replace Main Board

Replace Mstar(IC101) or Main Board.
7. All Source Audio

Check the TV Speaker Menu
(Menu -> Audio -> TV Speaker)

On

Off

Toggle the Menu

Check AMP IC(IC3401) Power
24V, 3.3V

No

Replace Amp IC(IC501)

Check Mstar AUDIO_MASTER_CLK
R148

No

Replace Mstar(IC101) or Main Board.

Check AMP I2C Line
R3406, R3407

No

Check signal line. Or replace Mstar(IC101)

Check Mstar I2S Output
IC3401 37,38,39 Pin

No

Check signal line. Or replace Mstar(IC101)

Check Output Signal P3401
1, 2, 3, 4 pin.

No

Replace Audio AMP IC(IC3401)

Check Connector & P3401

No

Replace connector
if found to be damaged.

Check speaker resistance
and connector damage.

No

Replace speaker.

8. Digital/Analog TV Audio

Check RF Cable & Signal

Ok

Check Tuner 3.3V Power
L3703

No

Replace L3703

Check Tuner 1.8V Power
IC3703 2 pin : 1.8V

No

Replace IC3703

Check IF_P/N Signal
TU3700 10/11 Pin

No

Bad Tuner. Replace Tuner.

Follow procedure
‘7. All source audio’
trouble shooting guide.
9. AV Audio

Check AV Cable for damage for damage or open conductor

Check JK1702 Signal Line R1714, R1715

No
Replace Jack

Follow procedure ‘7. All source audio’ trouble shooting guide.

10. Component Audio

Check Component Cable for damage or open conductor.

Check JK1702 Signal Line R1714, R1715

No
Replace Jack

Follow procedure ‘7. All source audio’ trouble shooting guide.
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.
TP for NON-EU models (except EU and China)

TP for CI slot

TP for SCART

TP for Headphone

TP for S2

TP for FE_TS_DATA

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 MANUFACTURED SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
IR/LED and Control
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 MANUFACTURED SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

USB (SIDE)

+5V_USB
C700 22uF 10V
RCLAMP0502BA
OPT

USB (SIDE)
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 MANUFACTURED 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 ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

EU pin assign is different from NON EU. Because of position of HD wafer.

[30Pin LVDS Connector] (For HD 60Hz_Normal)

[51Pin LVDS Connector] (For FHD 60Hz)

FOR FHD REVERSE (10bit)
Change in S7LR

MIRROR Pol-change Shift

FOR FHD REVERSE (8bit)
Change in S7LR

MIRROR Pol-change Shift

LVDS_SEL

[30Pin LVDS Connector] (For HD 60Hz_Normal)
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 MANUFACTURED SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.
THE SYMBOL MARK OF THIS SCHEMETIC DIAGRAM INCORPORATES SPECIAL 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.
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. PROPER 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.
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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 ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.