1080P Direct View LCD Training

47LE8500 LED Backlights

LCD-DV Troubleshooting
47" Class Full HD 1080P LCD TV (47" diagonally)

Published July 23, 2010
Updated August 3rd, 2010
OUTLINE

Preliminary Section:
Contact Information, Preliminary Matters, Specifications, LCD Overview, General Troubleshooting Steps, Signal Distribution, Disassembly Instructions and Voltages

Disassembly Section: Removal of Circuit Boards
Troubleshooting Section: Board Operation Troubleshooting of:

- Switch Mode Power Supply
- Inverter Boards Main and Secondary (LED Backlight Drivers)
  - Main Board
    - Extension Boards
    - Ft Control Board
  - Soft Touch Keys
  - Speakers
Overview of Topics to be Discussed

47LE8500 LCD Direct View Display

Section 1

This Section will cover Contact Information and remind the Technician of Important Safety Precautions for the Customers Safety as well as the Technician and the Equipment.

Basic Troubleshooting Techniques which can save time and money sometimes can be overlooked. These techniques will also be presented.

This Section will get the Technician familiar with the Disassembly, Identification and Layout of the LCD Display Panel.

At the end of this Section the Technician should be able to Identify the Circuit Boards and have the ability and knowledge necessary to safely remove and replace any Circuit Board or Assembly.
**IMPORTANT SAFETY NOTICE**

The information in this training manual is intended for use by persons possessing an adequate background in electrical equipment, electronic devices, and mechanical systems. In any attempt to repair a major Product, personal injury and property damage can result. The manufacturer or seller maintains no liability for the interpretation of this information, nor can it assume any liability in conjunction with its use. When servicing this product, under no circumstances should the original design be modified or altered without permission from LG Electronics. Unauthorized modifications will not only void the warranty, but may lead to property damage or user injury. If wires, screws, clips, straps, nuts, or washers used to complete a ground path are removed for service, they must be returned to their original positions and properly fastened.

**CAUTION**

To avoid personal injury, disconnect the power before servicing this product. If electrical power is required for diagnosis or test purposes, disconnect the power immediately after performing the necessary checks. Also be aware that many household products present a weight hazard. At least two people should be involved in the installation or servicing of such devices. Failure to consider the weight of an product could result in physical injury.
Today’s sophisticated electronics are electrostatic discharge (ESD) sensitive. ESD can weaken or damage the electronics in a manner that renders them inoperative or reduces the time until their next failure. Connect an ESD wrist strap to a ground connection point or unpainted metal in the product. Alternatively, you can touch your finger repeatedly to a ground connection point or unpainted metal in the product. Before removing a replacement part from its package, touch the anti-static bag to a ground connection point or unpainted metal in the product. Handle the electronic control assembly by its edges only. When repackaging a failed electronic control assembly in an anti-static bag, observe these same precautions.

Regulatory Information

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna; Increase the separation between the equipment and the receiver; Connect the equipment to an outlet on a different circuit than that to which the receiver is connected; or consult the dealer or an experienced radio/TV technician for help.
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New: Software Downloads
Technical Assistance
Presentations with Audio/Video
and Screen Marks

New Training Materials on
the Learning Academy site

Also available on the Plasma Page:
PDP Panel Alignment Handbook, Schematics with Bookmarks
Plasma Control Board ROM Update (Jig required)
**LCD Direct View Overview**

Safety and Handling Regulations

1. Approximately 20 minute pre-run time is required before making any picture performance adjustments from the Menu.
2. Refer to the Voltage/Current silk screening on the Switch Mode Power Supply.
3. C-MOS circuits are sensitive to static electricity.
   Use caution when dealing with these IC and circuits.
4. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
5. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.

Checking Points to be Considered

1. Check the appearance of the Replacement Panel and Circuit Boards for both physical damage and part number accuracy.
2. Check the model label. Verify model names and board model matches.
3. Check details of defective condition and history. Example: Oscillator failure dead set, etc…
Basic Troubleshooting Steps

Define, Localize, Isolate and Correct

**Define**  
Look at the symptom carefully and determine what circuits could be causing the failure. Use your senses Sight, Smell, Touch and Hearing. Look for burned parts and check for possible overheated components. Capacitors will sometimes leak dielectric material and give off a distinct odor. Frequency of power supplies will change with the load, or listen for relay closing etc. Observation of the front Power LED may give some clues.

**Localize**  
After carefully checking the symptom and determining the circuits to be checked and after giving a thorough examination using your senses the first check should always be the DC Supply Voltages to those circuits under test. Always confirm the supplies are not only the proper level but be sure they are noise free. If the supplies are missing check the resistance for possible short circuits.

**Isolate**  
To further isolate the failure, check for the proper waveforms with the Oscilloscope to make a final determination of the failure. Look for correct Amplitude Phasing and Timing of the signals also check for the proper Duty Cycle of the signals. Sometimes “glitches” or “road bumps” will be an indication of an imminent failure.

**Correct**  
The final step is to correct the problem. Be careful of ESD and make sure to check the DC Supplies for proper levels. Make all necessary adjustments and lastly always perform a Safety AC Leakage Test before returning the product back to the Customer.
This section of the manual will discuss the specifications of the 47LE8500 LCD Direct View Display.
Wireless Media Box (Sold Separately)

The Wireless Media box communicates to the television via a wireless receiver called a “Dongle”. The Dongle attaches to the Television via two connections:

1. HDMI Cable from the Dongle to the TV to transfer Audio and Video Signals.
2. Wired Remote cable between the TV and Dongle for Control Functions.
**Wireless LAN (DLNA Adaptor)**

**Wireless LAN (Sold Separately)**

Using the LG Wireless LAN for Broadband/IDLNA Adaptor, which is sold separately, allows the TV to connect to a wireless LAN network. The DLNA adaptor attaches to the Television via either of the two USB connections:

1(DLNA: Digital Living Network Alliance)
Basic Specifications

Key TV Features

- INFINIA Series*
- Full LED Slim w/Local Dimming
- THX Certified Display
- NetCast™ Entertainment Access* (Wi-Fi® Ready)
- Wireless 1080p Ready*
- DLNA Certified®
- TruMotion 240Hz
- Full HD 1080p Resolution
- 9M:1 Dynamic Contrast Ratio
- Seamless Design
- Picture Wizard II (Easy Picture Calibration)
- Smart Energy Saving
- ENERGY STAR® Qualified

- XD Engine
- Intelligent Sensor
- AV Mode II (Cinema, Sports, Game)
- Clear Voice II
- ISFccc® Ready
- 24P Real Cinema
- USB 2.0 (JPEG, MP3, DivX HD)
- DivX® HD
- 4 HDMI™ V.1.3 w/Deep Color
- SIMPLINK™ Connectivity
- Dolby® Digital 5.1 Decoder
- Infinite Sound
New definition television. LG’s INFINIA TVs are redefining home entertainment. Even beyond their jaw-dropping design, they offer access to virtually unlimited entertainment through broadband connectivity and freedom with wireless HD capability.

You don’t have to take our word for it that this is an amazing TV. To earn THX certification, our TV’s passed more than 30 rigorous tests, ensuring you’re bringing an uncompromised HD experience home - as the director wanted it.

Entertainment on tap. NetCast Entertainment Access brings the best Internet services direct to your TV—no computer required. Instantly access movies and TV shows, news and weather and the world’s largest library of HD movies in 1080p.
Invisible Speaker

Personally tuned by Mr. Mark Levinson for LG

TAKE IT TO THE EDGE newly introduces ‘Invisible Speaker’ system, guaranteeing first class audio quality personally tuned by Mr. Mark Levinson, world renowned as an audio authority. It provides Full Sweet Spot and realistic sound equal to that of theaters with its Invisible Speaker.

Dual XD Engine

Realizing optimal quality for all images

One XD Engine optimizes the images from RF signals as another XD Engine optimizes them from External inputs. Dual XD Engine presents images with optimal quality two times higher than those of previous models.
AV Mode "One click" Cinema, THX Cinema, Sport, Game mode. TAKE IT TO THE EDGE is a true multimedia TV with an AV Mode which allows you to choose from 4 different modes of Cinema, Sports and Game by a single click of a remote control.

Clear Voice Clearer dialogue sound
Automatically enhances and amplifies the sound of the human voice frequency range to provide high-quality dialogue when background noise swells.

Save Energy, Save Money
It reduces the plasma display's power consumption. The default factory setting complies with the Energy Star requirements and is adjusted to the comfortable level to be viewed at home. (Turns on Intelligent Sensor).

Save Energy, Save Money
Home electronic products use energy when they're off to power features like clock displays and remote controls. Those that have earned the ENERGY STAR use as much as 60% less energy to perform these functions, while providing the same performance at the same price as less-efficient models. Less energy means you pay less on your energy bill. Draws less than 1 Watt in stand by.
Wireless Ready
Wireless 1080p Connectivity lets you cut loose from messy wires and still get a stunning Full HD picture. Disclaimer: Wireless media kit required and sold separately.

Picture Wizard
Get easy self-calibration with on-screen reference points for key picture quality elements such as black level, color, tint, sharpness and backlight levels. Take the guesswork out of picture adjustments with this simple-to-use feature. It's not actually magic, but it will sure seem that way.

Seamless Design
You'll love the stunning picture while it's on and marvel at its appearance while it's off. The display is a seamless, edge-to-edge panel of glass over an ultra-slim, almost unnoticeable bezel. It's a sleek, elegant, virtually border-free design that will appeal to even the most refined sense of style.

TruMotion 240Hz
See sports, video games and high-speed action with virtually no motion blur and in crystal clarity with LG’s TruMotion 240Hz technology. Now your TV can keep up with the fastest moving scenes.
Accessing the Service Menu

To access the Service Menu.
1) You must have either Service Remote. p/n 105-201M or p/n MKJ39170828
2) Press “In-Start”
3) A Password screen appears.
4) Enter the Password.

Note: A Password is required to enter the Service Menu. Enter: 0000

Note: If 0000 does not work use 0413.
**TV Rear Input / Output Jacks**

**Rear In/Out Jacks**

- USB1 or USB2 for Software Upgrades, Wireless Dongle, Music and Photos

**Side In/Out**

- USB 2
- USB 1
- Component or Composite Video/Audio 3
- Head Phones
- HDMI 4

**MAIN BOARD**

Rear and Side Input/Output locations

**Wireless Media Box Remote Jack**

**LAN**
Software Updates (New and Changed Functions)

A wireless Internet Connection will work for Automatic Software Downloads., however if there are problems completing download, a Wired Internet Connection is preferred.

For network setup assistance, press the green button for the Simple Manual.

Bring up the Customer’s Menu then Press the Red button on Remote.

With Software Update Highlighted, Press Select on Remote.

Scroll down to item 9 Network Connections.

Continue on next page.
Software Updates (New and Changed Functions) Continued

Automatic Internet Software Update
- Off: Automatic Software update does not work
- On: if new Software released, Software download notice appears at turn on with two choices, Yes and Remind Me Later.

Check Update version
- comparison current software version and Released software version

Additional TV Checks can be made by Scrolling down.
Picture, Sound and Network Test
After completion of the test, a Pop up menu is displayed with preloaded back ground picture. Select NO if everything is OK.

If you select Yes;
Service call number, Model name, SW version and serial No. is displayed.
Note: Confirm the “Suffix” of the model number.

If the Main board is replaced, the Model and Serial number must be reinserted into memory. See Model Number D/L.
**USB Automatic Software Download Instructions**

1) Create an LG_DTV folder on the USB Flash Drive

2) Copy new software (xxx.epk) to "LG_DTV" folder. Make sure to have correct software file.

3) With TV turned on, insert USB flash drive.

4) You can see the message “TV Software Upgrade” (See figure to right)

5) Cursor left and highlight "START" Button and push “Enter” button using the remote control.

6) You can see the download progress Bar.

7) Do not unplug until unit has automatically restarted.

8) When download is completed, you will see “COMPLETE”.

9) Your TV will be restarted automatically.

*CAUTION: Do not remove AC power or the USB Flash Drive. Do not turn off Power, during the upgrade process. Software Files are now available from LGTechassist.com
Manual Software Download:

Prepare the Jump Drive as described in the “USB Automatic Download” section and insert it into either of the USB ports. Bring up the Customer’s Menu and scroll to “OPTIONS”. Press the “FAV” key 7 times to bring up the Manual Download Screen.

Highlight the Software update file and press “SELECT” to begin the download process.

Example of files found on the Jump Drive

WARNING:
Use extreme Caution when using the Manual “Forced” Download Menu. Any file can be downloaded when selected and may cause the Main board to become inoperative if the incorrect file was selected.
Service Menu: Adding the Model and Serial Number

Bring up the Service Menu using the Service Remote.
Scroll down to item 6. Model Number D/L to highlight.
Press “Select” or “Cursor Right”.

Change the Model and Serial Number to match.

To Change the Model Number
Use the cursor right or left to select the area to change. Use the cursor up or down to change.
Cursor right until there is no text cursor blinking.
Scroll down to highlight “Serial Number” and change.
Service Menu: Downloading EDID Data Pg 1 of 2

1) Press “ADJ” key.

2) Select menu, Either “PCM EDID D/L” or AC3 EDID D/L

EZ ADJUST

0. Tool Option1
1. Tool Option2
2. Tool Option3
3. Tool Option4
4. Tool Option5
5. Country Group
6. ADC Calibration
7. White Balance
8. 10 Point WB
9. Test Pattern
10. PCM EDID D/L
11. AC3 EDID D/L
12. Sub B/C

EZ ADJUST

0. Tool Option1
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7. White Balance
8. 10 Point WB
9. Test Pattern
10. PCM EDID D/L
11. AC3 EDID D/L
12. Sub B/C
Service Menu: Downloading EDID Data Pg 2 of 2

3) Highlight “Start” then Press “Select” key.

4) When Writing appears
   Downloading in progress

5) Downloading Complete

When PCM EDID D/L was selected

<table>
<thead>
<tr>
<th>PCM EDID D/L</th>
<th>PCM EDID D/L</th>
<th>PCM EDID D/L</th>
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</thead>
<tbody>
<tr>
<td>HDMI1</td>
<td>NG</td>
<td>OK/(PCM)</td>
</tr>
<tr>
<td>HDMI2</td>
<td>NG</td>
<td>OK/(PCM)</td>
</tr>
<tr>
<td>HDMI3</td>
<td>NG</td>
<td>OK/(PCM)</td>
</tr>
<tr>
<td>RGB</td>
<td>NG</td>
<td>OK/(PCM)</td>
</tr>
</tbody>
</table>

When AC3 EDID D/L was selected

<table>
<thead>
<tr>
<th>AC3 EDID D/L</th>
<th>AC3 EDID D/L</th>
<th>AC3 EDID D/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDMI1</td>
<td>NG</td>
<td>OK/(AC3)</td>
</tr>
<tr>
<td>HDMI2</td>
<td>NG</td>
<td>OK/(AC3)</td>
</tr>
<tr>
<td>HDMI3</td>
<td>NG</td>
<td>OK/(AC3)</td>
</tr>
<tr>
<td>RGB</td>
<td>NG</td>
<td>OK/(AC3)</td>
</tr>
</tbody>
</table>

Note: When PCM is downloaded, AC3 will be N/G and when AC3 is downloaded PCM will be N/G. This means that when PCM is OK, PCM audio is priority and when AC3 is OK, AC3 audio is priority.
**47LE8500 Product Dimensions**

- **Wattage**
  - Local Dimming 90W
  - Full White 130W
  - Stand By 0.1W

- **There must be at least 4 inches of Clearance on all sides**

- **Model No.**, **Serial No.**, **Label**

- **Center**

- **Remove 4 screws to remove stand for wall mount**

- **Weight w/o Stand**: 59.4 lbs
- **Weight with Stand**: 70 lbs

---

**Dimensions:**
- **7.7/8"** (200mm)
- **27.13/16"** (706.43mm)
- **30.3/16"** (767.08mm)
- **2.3/8"** (60.32mm)
- **19.11/16"** (490mm)
- **19.5/16"** (490mm)
- **13.15/16"** (353.22mm)
- **11.5/8"** (295mm)
- **8.7/16"** (214mm)
- **7.7/8"** (200mm)
- **1.3/8"** (106.68mm)
- **10.13/16"** (274.32mm)

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**July 2010**

**47LE8500**

**LCD-DV**
Disassembly:
This section of the manual will discuss Disassembly, Layout (Circuit Board Identification) of the 47LE8500 LCD Direct View Television.

Upon completion of this section the Technician will have a better understanding of the disassembly procedures, the layout of the printed circuit boards and be able to identify each board.
Removing the Back Cover

Remove the 26 screws indicated. Pay attention to the size and type of screw as there are many different types. Putting in an improper screw when reassembling may cause damage.

The Stand has to be removed before removing the back.

The AC Cord Does Not Unplug

Stand Base is Glass Handle with Care
Clips hold the front glass in place, use caution. Suggest adding screw while servicing.

Warning: The Frame has very sharp edges.
If the Panel is replaced, reset the UTTTime.
Service Menu, System 1 Item 12
**Power Supply Board Removal**

Board is “Thin”, be careful not to flex.

1. Disconnect P201, P205, P204 and AC In SK101.

2. Remove the 6 screws indicated by the arrows.

---

Press in gently on the two tabs to release lock.

SK101 fits very snug into it’s connector.

Press in on the two tabs to release lock.
Removing the Main Board

1. Disconnect P7500, P7501, P7900, P7901, P8000, P8200 and P8800

2. Remove any tape holding down any cables. Remove the 7 screws indicated by the arrows.

3. Remove decorative plastic and remove the board.

NOTE: Always check on top and behind the Large ICs. And look for a piece of Chocolate (Heat Transfer Material). Be sure to transfer to new Board if present.

Flip the locking tab upward, pull the LVDS ribbon out.

Disconnect P7500, P7501, P7900, P7901, P8000, P8200 and P8800

Press in on the top and bottom release tabs to remove.

Decorative Metal Plate

After removing the Main, there are tabs sticking through the Main board holding the Metal plate in place.

p/n EBU60842601
Removing the Inverter (Main) Board

1. Disconnect CN1, CN2, CN3 and CN11.
2. Remove the 4 screws indicated by the arrows.
   Remove the Inverter.

Use caution, do not allow screws to fall.

NOTE: If Servicing the Board, leave the screws installed to provide stability and grounding.

p/n AFB72950101 (Comes with Inverter Secondary)

Board will run without Inverter (Secondary)

Flip the locking tab upward, pull the ribbons out.

On CN2, CN3, CN4 and CN5
Flip the locking tab upward, pull the ribbons out.
Removing the Inverter (Secondary) Board

1. Disconnect CN101, CN103, CN104 and CN105.

2. Remove the 4 screws indicated by the arrows. Remove the Inverter.

Use caution, do not allow screws to fall.

NOTE: If Servicing the Board, leave the screws installed to provide stability and grounding.

Board will run without Inverter (Main)

p/n AFB72950101 (Comes with Inverter Main)

On CN104 and CN105 Flip the locking tab upward, pull the ribbons out.
Removing Front IR Board

1. Disconnect CON1, CON2 and CON3 connectors.

2. Press upward on the two tabs at the top. Tilt the board downward and lift straight up.
Troubleshooting:

This section of the manual will discuss troubleshooting.

Upon completion of this section the Technician will have a better understanding of how to diagnosis and resolve problems.
**POWER SUPPLY SECTION**

This switch mode power supply develops Stand By 3.5V at all times when AC is applied.
At power on, it develops 12V and 24V for the Main board
And 24V for the Inverters.

This power supply draws less than 1 watt during stand by mode. The fuse F501 reads 159.6V (from hot ground) during this time. (F101 is <3V)

When the controller chip receives the PWR-ON command 3.3V via P201 Pin 1, the primary section increases its current supplying ability. Both Primary fuses F101 and F501 now read a little more than 390V.

**P201 Connector: (To Main Board)**
12V is routed out P201 pins 17, 19 and 21 and 24V is routed out P201 pins 2, 3 and 4.

**P204 Connector: (To Inverter Main Board)**
24V is routed out P204 pins 1 through 5.

**P205 Connector: (To Inverter Secondary Board)**
24V is routed out P205 pins 1 through 5.
Power Supply (SMPS) Board Layout

- F101: 3.15A/250V, STBY 2.9V, Run 393.3V, From Hot Gnd
- F501: 3.15A/250V, STBY 159.6V, Run 392.6V, From Hot Gnd
- F100: 6.3A/250V, AC Protect

Hot Ground Shock Hazard
**47LE8500 Power Supply Start Up Sequence**

**POWER SUPPLY (SMPS)**

1. **AC In**
   - Primary side fuse: Stand-By 159.6V
   - Run 392.6V (Hot Gnd)

2. **Bridge**
3. **Stand By 3.5V Reg**
4. **12V/24V Regulators**
5. **Inverter On**
6. **24V B+ for the Inverters**

**Main Board**

- **P8000**
  - **3.5V_ST**
  - **Other Regs**
  - **Power On**
  - **RL_ON**
  - **INV_CTL**

**Microprocessor IC8101**

- Model 1_Opt1 Panel Control
- Key 1 or IR

**Reset Generator**

**Power On**

**12V Video Processing**

**IC8003 5V_Normal**

- Tuner B+

**12V Audio**

**24V**

**P-DIM Global Dimming**

**Local Dimming**

**Global Dimming**

**1.8V Dimming**

**IC9302 Dimming IC**

**IC9103 DC to DC**

**IC900 Video Processor**

**Video Processor IC900**

**IC9003 Dimming IC**

**IC9012 HVDD**

- **VCC 3.3V, VDD 16V, VGL -5V, VGH 26V,**
- **7.8V**
- **3.3V, 16V, -5V, 26V,**
- **216 Blocks V1 ~ V216**

**After Mute Released**

**P7500 LVDS Video**

**P7501 Tru-Motion LVDS Video**

**Ft IRKey**

**Ft IRKey**

**Soft Touch Key**

**Remote or Power Button Key**

**CN11 CN3**

**CN1**

**CN104**

**CN101**

**CN2**

**CN3**

**CN102**

**CN103**

**CN104**

**CN25-CN33**

**CN3-CN11**

**CN14-CN22**

**To Panel Backlights**

**120Hz Manipulates Backlight LEDs Low = Bright**

**At point 3 TV is in Stand-By state. Energy Star compliant. 0.1 Watts**
PWM-DIM (PWM Dimming) can vary according to incoming video IRE level, OSD Backlight setting and Intelligent Sensor (room light condition).
Range 0.37V to 3.3V.
**Power Supply Board Low Voltage Test 1**

AC Should not be applied at any time while adding jumpers or while unplugging connectors as damage to the circuit Board may occur.

a) When AC is applied, the SMPS “MUST” be producing STBY 3.5V on pins 9, 10, 11 or 12 of P201.

If 3.5V Standby is not being generated, the SMPS is defective and must be replaced. There is no need to continue with the next test. But, make sure AC is arriving at the connector SK101.

(b) Unplug P8000 on the Main Board to make insertion of the Jumpers easier. Use P700 Side to insert resistors

**TEST 1:**

(1) Add a jumper between (3.5V STBY) pin 7, 8, 9 or 10 and Pin 1 (PWR_ON). Apply AC. This will turn on the power supply, relays will click.
   a) Check that the 24V and 12V power supplies are turned on,
      • P201 (12V pins 17, 19 and 21)
      • P201 (24V pins 2, 3 and 4)
      • P204 and P205 (24V pins 1 through 5) to the Inverters

(2) Remove AC power

---

Pin 1 is the Brown Wire

No Backlights during this test
**Power Supply Board Backlights Test 2**

Continue if the 1st test was OK.
Leave original jumper in place.

(3) Add another jumper between (STBY_3.5V) pin 9, 10, 11 or 12 and Pin 18 (INV_On).

(4) Apply AC Power. Simulating a Power and Backlight On command.

**Backlights Normal:**
- a) If normal, the backlights should turn on.
  SMPS OK, Inverter OK.

**Backlights Abnormal:**
- a) Recheck all connections.
- b) Confirm the INV On/Off line pulling up to at least 3V and arriving at both Inverters.
- c) Check the connections to the Inverters.

If the 24V and the Inverter On command is arriving at the Inverters in, then see Inverter Section for further testing.
Note: Either Inverter can run separately.

**REMOVE AC POWER:**
Power Supply Connector P201 Voltage and Diode Check

P201 Connector “SMPS” to “Main” P8000

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
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<tbody>
<tr>
<td>1</td>
<td>PWR-ON</td>
<td>0V</td>
<td>3.3V</td>
<td>1.68V</td>
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<tr>
<td>2-4</td>
<td>24V</td>
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<td>GND</td>
<td>GND</td>
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<td>19</td>
<td>12V</td>
<td>0.42V</td>
<td>11.9V</td>
<td>1.39V</td>
</tr>
<tr>
<td>20</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V~3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>12V</td>
<td>0V</td>
<td>11.9V</td>
<td>1.39V</td>
</tr>
<tr>
<td>22</td>
<td>n/c</td>
<td>n/c</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>n/c</td>
<td>n/c</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>24</td>
<td>ERROR</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

(1) PDIM Pin 20 can vary according to incoming video IRE level, OSD Backlight setting and then Intelligent Sensor (room light condition) Output from the Video Processor IC900. Range 0.37V to 3.3V.

Diode Mode values taken with all Connectors Removed
Power Supply Connector P204 / P205 Voltage and Diode Check

P204 "SMPS” to CN14 “Inverter Main"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>24V</td>
<td>0V</td>
<td>24.6V</td>
<td>0.424V</td>
</tr>
<tr>
<td>6-10</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V~3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>(2) I-C</td>
<td>0V</td>
<td>2.92V</td>
<td>Open</td>
</tr>
<tr>
<td>13</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
<td>Open</td>
</tr>
<tr>
<td>14</td>
<td>ERROR</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

P205 "SMPS” to CN201 “Inverter Secondary"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>24V</td>
<td>0V</td>
<td>24.6V</td>
<td>0.424V</td>
</tr>
<tr>
<td>6-10</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V~3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>(2) I-C</td>
<td>0V</td>
<td>2.92V</td>
<td>Open</td>
</tr>
</tbody>
</table>

(1) PDIM Pin 20 can vary according to incoming video IRE level, OSD Backlight setting and then Intelligent Sensor (room light condition) Output from the Video Processor IC900. Range 0.37V to 3.3V.

(2) I-C is the Inverter On Control Signal

Diode Mode values taken with all Connectors Removed
Power Supply Connector SK101 Voltage and Diode Check

Diode Mode values taken with all Connectors Removed

**SK101 "SMPS" to AC IN**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL131</td>
<td>L</td>
<td>120Vac</td>
<td></td>
<td>OL</td>
</tr>
<tr>
<td>EL132</td>
<td>N</td>
<td></td>
<td></td>
<td>OL</td>
</tr>
</tbody>
</table>

AC Voltage Readings (From Hot Ground)
Pins 1 and 2 for STBY and RUN.

F100 (Diode Check)
Main Power Switch Closed
Red or Black Lead on Fuse (Open)
Other Lead on Hot Ground
Power Supply F101 and F501 Voltage Checks

If reading the voltage on F101 right after power off, it takes a very long time to bleed down to the reading given here.
INVERTER (LED BACKLIGHTS) SECTION

The Inverter (Main) receives 24V from the SMPS on CN1 pins 1~5 and Inverter (Secondary) receives 24V on CN101 pins 1~5. The Inverter On (INV ON) command arriving on CN1 or CN101 pin 12 starts the Inverter drive signals, (120Hz).

P-DIM is delivered from the Main board through the SMPS to the Inverter on CN1 or CN101 pin 11. The Inverters are responsible for delivering B+ approx. 13V to each of the 216 LED Blocks. This is accomplished by 3 DC to DC Converters, 2 on Inverter (Main) and 1 on Inverter (Secondary)

Inverter (Main) 13V
- U101, Q4, Q5, L101 and C75, out CN2 and CN3.
- U102, Q7, Q8, L102 and C89, out CN4 and CN5.

Inverter (Secondary) 13V
- U101, Q105, Q106, L206 and C151, out CN104 and CN105.

The Inverters must also deliver grounding pulses (Drive Signals) to each of the 216 LED Blocks. This is accomplished by the 14 switching components, 10 on Inverter (Main) U9~U11 and U13 and 5 on Inverter (Secondary) U2~U5 and U13.

Inverter (Main) has 4 Connectors CN2~CN5 that connect to Extensions boards. The Left hand Extension board (as viewed from the rear) connects to CN2 and CN3 and the Center Extension board connects to CN4 and CN5.

Inverter (Secondary) has 2 Connectors CN104~CN105 that connect to the right hand Extension board (as viewed from the rear) which connects to CN23 and CN24. Each Extension board has 9 connections to the Backlight LEDs. There are 4 LEDs per/block, 216 Blocks, 8 Blocks per/cartridge, 3 Cartridges per/bar, 9 bars (rows), 32 LEDs per/cartridge, 96 LEDs per/bar. With a total of 864 LEDs.
IOP Structure  Integrated Optic Plate

The Image below shows the actual Backlight Bars used in the 47LE8500. The Cartridges are assembled from the bottom to the top, like shingles on a roof.
IOP Structure Information

4 LEDs per/block (216 Blocks) 8 Blocks per/cartridge, 9 bars with 3 cartridges per/bar, 32 LEDs per/cartridge, 96 LEDs per/bar. 864 LEDs total.
Each Connector has 10 pins. 2 are B+ 13V and 8 block controls.

LED Bar 32 LEDs 4 LEDs per/block 8 blocks

The Individual LEDs can be checked using the Diode Mode forward bias test. The LED will light.
47LE8500 IOP Block Structure Information

Backlight Blocks
9 Bars (24 Blocks Ea.)
216 Blocks
V1 through V216

LVDS To TFT Panel
3 Extension Boards
9 Connectors Ea.
2 (13V) B+ pins Ea.
8 (V) Connections Ea.
216 (V) Connections
1. Case-Top Ass’y
2. TFT Panel Ass’y
3. Guide Panel
4. Sheet DBEFD
5. Sheet Prism U
6. Sheet Prism L
7. Sheet Diffuser L
8. Plate Diffuser
9. Cartridge Ass’y
10. Cover Bottom
11. Driver Boards (2)
12. Extension Boards (3)
13. FRC

Flexible Ribbon Cables
47LE8500 Inverter Secondary Layout

F101 12A/65V
C101 A0950
Q109 1050C+
Q108 L207
Q106
Q105
Q104
Q103
Q102
Q101

U103 3.3V
U101 3.4V
U2
U5
U4
U3

DO NOT MEASURE

INVERTER (SECONDARY) BOTH INVERTERS
p/n: AFB72950101

13V POWER SUPPLY
For CN104 / CN105

INVERTER (SECONDARY)
Both Inverters
p/n: AFB72950101

13V POWER SUPPLY
For CN104 / CN105
47LE8500 Inverter (Main) B+ Routing

To CN 1 Extension Left
CN3 B+ for LED Blocks.
Pins 1~2, 11~12, 21~22, 31~32, 41~42.

To CN 2 Extension Left
CN2 B+ for LED Blocks.
Pins 9~10, 11~12, 21~22, 31~32.

To CN 12
Extension Cent
CN4 B+ for LED Blocks.
Pins 11~12, 21~22, 31~32, 41~42.

To CN 13
Extension Cent
CN5 B+ for LED Blocks.
Pins 9~10, 19~20, 29~30, 39~40, 49~50.

Q4  Q5  Q7  Q8
1  18.3V 1  5V  1  18.1V 1  5V  A  12.92V For Main Extensions Board A (Left Side). To Connectors CN2 and CN3.
2  24.6V 2  12.9V 2  24.6V 2  12.8V  B  12.92V For Main Extensions Board B (Center). To Connectors CN4 and CN5.
3  12.9V 3  Gnd 3  12.8V 3  Gnd
47LE8500 Inverter (Secondary) B+ Routing

Q105
1 18.15V
2 24.6V
3 12.8V
Q106
1 5V
2 12.8V
3 Gnd

13V For Secondary Extensions Board (Right Side) Connectors. To Connectors CN23 and CN24.

To CN 23
Extension Right
B+ to LED Blocks pins
19~20, 29~30, 39~40, 49~50

To CN 24
Extension Right
B+ to LED Blocks pins
1~2, 11~12, 21~22, 31~32, 41~42.
Inverter 13V LED B+ DC to DC Converter Troubleshooting

Q5, Q8 or Q106 Pin 1

Q4, Q7 or Q105 Pin 1

Q4, Q7 or Q105 Pin 3

Each of the Pin numbers for the Components listed above are the same. Q5, Q8 or Q106 Pin 3 is Ground
**P-DIM (Global Dimming) Explained:**

*P-DIM (May also be called PWM-DIM, VBR-B, PDS, BCM-VBR-B)*

The Video Processor has the output that controls P-DIM. If the Microprocessor is separate from the video processor, then the customer’s menu Backlights setting is communicated to the video processor via I2C.

**Maximum P-DIM Voltage**

*100% Cust Backlight Setting*

**P-DIM Voltage**

Establishes the maximum threshold or brightness level of the backlights

After the max. threshold is established by the Customer’s Menu, the DC Level of P-DIM is manipulated by:

**Midrange P-DIM Voltage**

*50% Cust Backlight Setting*

**Brightness of Backlights**

Overall Contrast Ratio

Monitored by the BCM or Mstar Video Processor.

As the overall brightness of the video content decreases, so does P-DIM voltage.

If the Intelligent Sensor is utilized, it too manipulates P-DIM.

As the overall room light decreases in intensity, P-DIM decreases. This data represents nearly 5000 steps in room light monitoring. It is routed from the Front IR board through I2C data back to the Main board’s Microprocessor.

**Minimum P-DIM Voltage**

*0% Cust Backlight Setting*

**Backlights Dim**

Brightness and Contrast adjustments do not affect P-DIM

Analog Dimming is not used.

It is a fixed voltage. Also called BR1, VBR-A, BCM-VBR-A, ADM
Inverter (Main) Fuse F1 and Inverter (Secondary) Fuse F101 Check

Top Left of the Board Just under CN1 Connector

Inverter (Main)

F1 (Diode Mode Check)
1.365V (Red Lead on Fuse)
0.58V (Black Lead on Fuse)

Top Left of the Board Just to the right of CN101 Connector

Inverter (Secondary)

F101 (Diode Mode Check)
1.385V (Red Lead on Fuse)
0.58V (Black Lead on Fuse)
Inverter Crystals Y1, Y501 (Main) and Y501 on (Secondary) Information

- Inverter (Main)
- Inverter (Secondary)
- Y501

Use Top Leg
Use Bottom Leg

8Mhz

1V per/div 40nS 3.82V p/p
The Inverters deliver grounding pulses (Drive Signals) to each of the 216 LED Blocks. This accomplishes Global Dimming and Local Dimming. Each output is labeled Vxx. Grounding each block is accomplished by the 14 switching components, 10 on Inverter (Main) U9~U11 and U13 and 5 on Inverter (Secondary) U2~U5 and U13.

Inverter (Main) has 4 Connectors CN2~CN5 that connect to Extensions boards. The Left hand Extension board (rear view) connects to CN2 and CN3 and the Center Extension board connects to CN4 and CN5.

Voltage Supplies from Inverter (Main) To Extension Boards Left and Center

<table>
<thead>
<tr>
<th>CN2 13V Line Pins</th>
<th>CN3 13V Line Pins</th>
<th>CN4 13V Line Pins</th>
<th>CN5 13V Line Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>9<del>10, 11</del>12, 21<del>22, 31</del>32</td>
<td>1<del>2, 11</del>12, 21<del>22, 31</del>32, 41~42</td>
<td>11<del>12, 21</del>22, 31<del>32, 41</del>42</td>
<td>9<del>10, 19</del>20, 29<del>30, 39</del>40, 49~50</td>
</tr>
</tbody>
</table>

Inverter (Secondary) has 2 Connectors CN104~CN105 that connect to the right hand Extension board (rear view).

Each Extension board has 9 connections to the Backlight LEDs.

Voltage Supplies from Inverter (Secondary) To Extension Board Right

<table>
<thead>
<tr>
<th>CN104 13V Line Pins</th>
<th>CN105 13V Line Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>19<del>20, 29</del>30, 39<del>40, 49</del>50</td>
<td>1<del>2, 11</del>12, 21<del>22, 31</del>32, 41~42</td>
</tr>
</tbody>
</table>

Note: Some of the Vxx numbers are repeated on the Silk Screen between Inverter (Main) and Inverter (Secondary). But there are a total of 216 (V1 through V216).
Global Dimming (which affects every LED block at the same time) is accomplished by the P-DIM signal arriving on CN1 pin 11 (Inv Main) and CN101 pin 11 (Inv Secondary). As P-DIM voltage goes up, all drive signals will remain low longer. As P-DIM voltage goes down, all drive signals will remain high longer. P-DIM has a range of 0.37V to 3.3V.

Local Dimming (which affects individual LED blocks) is also accomplished by these drive signals which are manipulated by the Control Signals entering on CN11 Inv (Main) and CN103 Inv (Secondary).

Drive Signals being delivered to the LED Blocks V1 ~ V216

100 IRE
3.68V p/p 120Hz

5 IRE
3.88V p/p 120Hz

Note: If a particular block is exhibiting a dimmer level than the other or the overall brightness seems dim, be sure to first check the customer's Menu setting for Backlights. Raise the percentage and see if the overall brightness returns to normal. If not,

1st Check the P-DIM level, it should rise with the percentage shown on screen. 0% = 0.37V to 100% = 3.3V.
Follow the P-DIM signal all the way to each Inverter.

2nd Turn off the set and unplug the connector to the Inverters coming from the Main board. If the brightness returns to normal, the Main board is defective. If not, investigate all inverter voltages, if OK, use the grounding of each V block procedure to test the panel’s backlight LEDs.
### Inverter Board Connector CN3 to Extension (Left) (Voltages)

This gives an example of how the output from an Inverter gets to the individual LED block, but there are 216 blocks (pins) spread out over 6 (50 pin) connectors, please use the Interconnect Diagram for details on all pins.

Inverter Run voltages taken with built in test pattern full white and black screens.

<table>
<thead>
<tr>
<th>CN3 to CN2</th>
<th>Extension Board Left</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inverter Main</strong></td>
<td><strong>In</strong></td>
</tr>
<tr>
<td>CN3 BLOCK</td>
<td>CN2</td>
</tr>
<tr>
<td>50</td>
<td>V96</td>
</tr>
<tr>
<td>49</td>
<td>V95</td>
</tr>
<tr>
<td>48</td>
<td>V94</td>
</tr>
<tr>
<td>47</td>
<td>V93</td>
</tr>
<tr>
<td>46</td>
<td>V92</td>
</tr>
<tr>
<td>45</td>
<td>V91</td>
</tr>
<tr>
<td>44</td>
<td>V90</td>
</tr>
<tr>
<td>43</td>
<td>V89</td>
</tr>
<tr>
<td>42</td>
<td>B+</td>
</tr>
<tr>
<td>41</td>
<td>B+</td>
</tr>
<tr>
<td>40</td>
<td>V88</td>
</tr>
<tr>
<td>39</td>
<td>V87</td>
</tr>
<tr>
<td>38</td>
<td>V86</td>
</tr>
<tr>
<td>37</td>
<td>V85</td>
</tr>
<tr>
<td>36</td>
<td>V84</td>
</tr>
<tr>
<td>35</td>
<td>V83</td>
</tr>
<tr>
<td>34</td>
<td>V82</td>
</tr>
<tr>
<td>33</td>
<td>V81</td>
</tr>
<tr>
<td>32</td>
<td>B+</td>
</tr>
<tr>
<td>31</td>
<td>B+</td>
</tr>
</tbody>
</table>
Inverter (Main and Secondary) CN1 and CN101 (Voltage and Diode Check)

### CN1 "Inverter Main" Connector To P204 "SMPS"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1~5</td>
<td>24V</td>
<td>0V</td>
<td>24.6V</td>
<td>0.42V</td>
</tr>
<tr>
<td>6~10</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V~3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>I-C</td>
<td>0V</td>
<td>2.92V</td>
<td>Open</td>
</tr>
<tr>
<td>13</td>
<td>N/C</td>
<td>N/C</td>
<td>N/C</td>
<td>Open</td>
</tr>
<tr>
<td>14</td>
<td>ERROR</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

(1) PDIM Pin 20 can vary according to incoming video IRE level, OSD Backlight setting and then Intelligent Sensor (room light condition) Output from the Video Processor IC900. Range 0.37V to 3.3V.

### CN101 "Inverter Secondary" Connector To P205 "SMPS"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1~5</td>
<td>24V</td>
<td>0V</td>
<td>24.6V</td>
<td>0.42V</td>
</tr>
<tr>
<td>6~10</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V~3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>I-C</td>
<td>0V</td>
<td>2.92V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Diode Mode values taken with all Connectors Removed

Inverter On Control

Not Used

Inverter On Control
### Inverter (Main) CN11 & Inverter (Secondary) CN103 (Voltage and Diode Check)

Inverter Run voltages taken with built in test pattern

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L_VS</td>
<td>0V</td>
<td>0.05V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>M0_MOSI</td>
<td>0V</td>
<td>*0.04V~3.26V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>M0_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>M1_MOSI</td>
<td>0V</td>
<td>*0.04V~3.26V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>M1_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>S_CS_N</td>
<td>0V</td>
<td>2.6V</td>
<td>1.65V</td>
</tr>
<tr>
<td>9</td>
<td>S_MOSI</td>
<td>0V</td>
<td>*0.18V~0.28V</td>
<td>1.61V</td>
</tr>
<tr>
<td>10</td>
<td>S_SCLK</td>
<td>0V</td>
<td>2.99V</td>
<td>1.62V</td>
</tr>
</tbody>
</table>

*Black to White

Diode Mode values taken with all Connectors Removed

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R_VS</td>
<td>0V</td>
<td>0.04V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>GND</td>
<td>Gnd</td>
<td>GND</td>
</tr>
<tr>
<td>3</td>
<td>M2_MOSI</td>
<td>0V</td>
<td>*0.04V~3.2V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>M2_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>n/c</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>n/c</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

*Black to White

Diode Mode values taken with all Connectors Removed
Inverter Main and Secondary Local Dimming Control Signals Waveforms

For clearer details see the Interconnect Diagram
MAIN BOARD SECTION

The Main board receives its operational B+ from the Power Supply via P8000. There are two LVDS cable feeds that are output from the on-board T-CON (TFT Driver) section directly to the Panel. These carry the duel 12 bit LVDS Video signals and the TruMotion 60Hz duel 12 bit LVDS. These signals have already been prepared for the Panel’s H and V boards. The Main board also includes the Tuner, Audio and Audio/Video inputs and selection circuits.

Input Voltages from SMPS.

**STAND-BY**
- STBY 3.5V (P8000 pins 9~12)

**RUN**
- 12V pins 13 and 14
- 24V pins 17 and 18.

The Main board also develops several B+ sources on the board.

**STAND-BY VOLTAGES**
- 3.3V_ST (Voltage direct from SMPS)

**LVDS**
- Panel_VCC (12V Not generated, but switched from the 12V arriving from the SMPS)

**TUNER and VSB CIRCUIT**
- 5V_Normal which is used to make 5V TU
- 5V_TU
- 3.3V_TU
- 1.26V_TU

**WIRELESS VOLTAGES**
- 24V (Switched from 24V from SMPS)

**GENERAL**
- 5V_Normal
- 5V_EXT
- 5V_USB

**AUDIO**
- 1.8V
- 3.3V

**BCM IC900 Video Processors**
- 1.2V
- IC9301 Tru-Motion and Dimming IC.
- 1.26V_MEMC, 1.5V_MEMC, D1.5V, D1.8V, and 3.3V
- T-CON IC9001
- 3.3V_VCC, -5V_VGL, 25V_VGH, 16V_VDD and HVDD (7.7V)
Main Board Layout

P7900 To Inverter (Main)
P7901 To Inverter (Secondary)
P7500

See next page for component identification

P9000 n/c

P8100 n/c

LAN

Wireless Remote

P8800 To Speakers

P8200 To Front IR

To Panel

P8000 To SMPS

VIDEO
PROCESSOR
IC900, T-CON
IC9001 and
Tru-Motion IC9301
runs Hot.
This is normal.

Component These connectors are Mini plug type

July 2010 LCD TV 47LE8500
47LE8500 Main (Front Side) Component Voltages
47LE8500 Main (Back Side) Component Voltages

- **IC602**
  - D1.8V Regulator
  - [1] 0V (Gnd)
  - [2] 3.29V (PWR On/Off1 Ctl)
  - [3] 0.9V (DDR_VTT)
  - [4] 0.93V
  - [5] 1.83V
  - [6] 3.38V (In)
  - [7] 1.8V (Out)
  - [8] 0.91V (DDR_VTT)

- **IC8100**
  - EEPROM
  - [1] 0V (Gnd)
  - [2] 0V (Gnd)
  - [3] 0V (Gnd)
  - [4] 0V (Gnd)
  - [5] 3.37V
  - [6] 3.37V
  - [7] 0V (Gnd)
  - [8] 3.37V

- **IC8200**
  - RS232 Routing
  - [1] 0V
  - [2] 0V
  - [3] 0V
  - [4] 0V
  - [5] 0V
  - [6] (-5.47V)
  - [7] nc (5.59V)
  - [8] nc (0V)
  - [9] nc (0.3V)
  - [10] nc (0.2V)
  - [11] nc (3.3V)
  - [12] 3.35V
  - [13] 0V
  - [14] (-5.47V)
  - [15] 0V (Gnd)
  - [16] 3.37V

- **IC8400**
  - RGB H/V Sync
  - [1] 1.9V
  - [2] 1.9V
  - [3] 4.4V
  - [4] 0V
  - [5] 0.9V
  - [6] nc (4.5V)
  - [7] 0V (Gnd)
  - [8] nc (4.5V)
  - [9] nc (1.9V)
  - [10] nc (1.9V)
  - [11] nc (4.5V)
  - [12] 0.9V
  - [13] 0.9V
  - [14] 5V

- **IC8401**
  - EDID Data PC
  - [1] 0V (Gnd)
  - [2] 0V (Gnd)
  - [3] 0V (Gnd)
  - [4] 0V (Gnd)
  - [5] 0.7V
  - [6] 4.1V
  - [7] 4.6V
  - [8] 4.5V (In)

- **IC9000**
  - Serial Flash T-CON
  - [1] 0.06V
  - [2] 0.67V
  - [3] 3.3V (In)
  - [4] 0V (Gnd)
  - [5] 0V
  - [6] 0.34V
  - [7] 3.31V (In)
  - [8] 3.34V (In)

- **IC9030**
  - EEPROM for LG5111
  - [1] 0V (Gnd)
  - [2] 0V (Gnd)
  - [3] 0V (Gnd)
  - [4] 0V (Gnd)
  - [5] 0.7V
  - [6] 4.1V
  - [7] 4.6V
  - [8] 4.5V (In)

- **IC8700**
  - Wireless Buffer
  - [1] 0V (3.3V Dongle In)
  - [2] 3.3V (3.3V Dongle In)
  - [3] nc
  - [4] nc
  - [5] nc
  - [6] Gnd
  - [7] Gnd
  - [8] Gnd
  - [9] nc
  - [10] 0.02V
  - [11] 0V
  - [12] 3.3V
  - [13] 0V (3.3V Dongle In)
  - [14] 3.3V
  - [15] 3.3V
  - [16] 3.3V

- **Q200**
  - (1.8V_HDMI) Switch
  - [1] 1.83V (Out)
  - [2] 3.35V (PWR On/Off2 Ctl)
  - [3] 1.83V (In)

- **Q701**
  - Tuner SIF (Sound) Buffer
  - [1] 0.16V
  - [2] Gnd
  - [3] E.83V

- **Q702**
  - Tuner Video (Analog) Buffer
  - [1] 2.05V
  - [2] 2.70V
  - [3] E.9n

- **Q901**
  - FLASH_WP for IC901
  - [1] 0V (Flash_WP)
  - [2] 0V
  - [3] 0V (Gnd)
  - [4] 0V (Gnd)
  - [5] 3.37V
  - [6] 3.37V
  - [7] 3.34V
  - [8] E.37V (In)

- **Q8000**
  - RL_ON (PWR_On)
  - [1] 0.66V
  - [2] 0V

- **Q8002**
  - PWR_ON Switch
  - [1] 3.36V (In)
  - [2] 0V
  - [3] 3.3V (Out)

- **Q8203**
  - IR Wireless Pass (1st Driver)
  - [1] 0V
  - [2] 1st Driver

- **Q8205**
  - IR Wireless Pass (2nd Driver)
  - [1] 0V
  - [2] -8V
  - [3] 0V
  - [4] Gnd

- **Q8300, 2**
  - HDMI 2
  - [1] 0V
  - [2] Det

- **Q8303, 4, 5**
  - HDMI 3
  - [1] 0V
  - [2] Det

- **Q8308**
  - CEC Remote
  - [1] 0V
  - [2] Det

- **Q8701**
  - IR Wireless Pass (2nd Driver)
  - [1] 0V (24.5V Dongle In)
  - [2] 24.5V
  - [3] 2.3V
  - [4] 2.3V (Dongle I)
  - [5] 2.4V
  - [6] 0V (24.5V Dongle In)
Main Board X9001 and X9000 Crystal Checks

IC9301 TruMotion / Dimming Crystal

X9001
- 25Mhz
- 1.58V
- 3.19V p/p
- 4.86V p/p

IC9001 T-CON Crystal

X9000
- 12Mhz
- 1.56V
- 2.54V p/p
- 3.27V p/p

Runs when set is On
Main Board X8100 and X1001 Crystal Checks

IC8100 Micro Crystal

X8100
- 3.13V p/p
- 2.26V p/p
- 1.95V
- 1.52V

IC900 BCM Crystal

X1001
- 781mV p/p
- 789mV p/p
- 1.52V
- 1.3V

Either leg

10Mhz
- Runs all The time

54Mhz
- Runs when set is On

MAIN Board

X8100 X8101

X1001

LG TRAINING CENTER
Main Board DC to DC Converter (Voltages for Panel) Checks

-5V VGL
+16V VDD
+27V VGH
+7.81V HVDD
+3.3V VCC
+16V VDD
Panel 12V
Location: Top Center of Board
IC9102
L9100
L9102
L9104
B+ for IC9102 IC9103
Panel 12V
L9101
IC9103
D9101
D9102
L9102
+27V VGH
-5V VGL
+7.81V HVDD
+3.3V VCC
Main Board Additional Panel Voltage Checks

Location: Top Left of Board

-4.8V (VDD-ODD)
Location: Top Left of Board
From IC9101 Pin 21
-4.8V (VDD-EVEN)
From IC9101 Pin 20
-4.7V (VST)
From IC9101 Pin 19
## Main Board Connector P8000 to Power Supply Voltage and Diode Check

### P8000 “Main Board” to P201 “SMPS”

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
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<tbody>
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<td>1</td>
<td>PWR-ON</td>
<td>0V</td>
<td>3.3V</td>
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<td>2-4</td>
<td>24V</td>
<td>0V</td>
<td>24.6V</td>
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<tr>
<td>5-8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9-12</td>
<td>3.5V</td>
<td>3.45V</td>
<td>3.44V</td>
<td>1.24V</td>
</tr>
<tr>
<td>13-15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>16</td>
<td>n/c</td>
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<td>n/c</td>
<td>Open</td>
</tr>
<tr>
<td>17</td>
<td>12V</td>
<td>0V</td>
<td>11.9V</td>
<td>Open</td>
</tr>
<tr>
<td>18</td>
<td>INV-ON</td>
<td>0V</td>
<td>2.92V</td>
<td>1.63V</td>
</tr>
<tr>
<td>19</td>
<td>12V</td>
<td>0V</td>
<td>11.9V</td>
<td>Open</td>
</tr>
<tr>
<td>20</td>
<td>(1) P-DIM</td>
<td>0V</td>
<td>0.37V–3.3V</td>
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<tr>
<td>21</td>
<td>12V</td>
<td>0V</td>
<td>11.9V</td>
<td>Open</td>
</tr>
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<td>22</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
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<td>n/c</td>
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<tr>
<td>24</td>
<td>ERROR</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
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</table>

Diode Mode values taken with all Connectors Removed

(1) PDIM Pin 20 can vary according to incoming video IRE level, OSD Backlight setting and Intelligent Sensor (room light condition). Range 0.37V to 3.3V.
## Main Board Connector P7500 to the Panel Voltage and Diode Check

### P7500 Connector “Main” to the “Panel”

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Check</th>
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<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>GMA1</td>
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<tr>
<td>3</td>
<td>GMA3</td>
<td>13.5V</td>
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</tr>
<tr>
<td>4</td>
<td>GMA4</td>
<td>12.78V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>GMA6</td>
<td>11.88V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>GMA7</td>
<td>10.02V</td>
<td>Open</td>
</tr>
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<td>GMA9</td>
<td>8.02V</td>
<td>Open</td>
</tr>
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<td>8</td>
<td>GMA10</td>
<td>7.48V</td>
<td>Open</td>
</tr>
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<td>9</td>
<td>GMA12</td>
<td>5.99V</td>
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<td>GMA13</td>
<td>4.08V</td>
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<td>GMA15</td>
<td>2.98V</td>
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<td>12</td>
<td>GMA16</td>
<td>2.35V</td>
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</tr>
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<td>13</td>
<td>GMA18</td>
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<td>Gnd</td>
<td>Gnd</td>
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<td>2.06V</td>
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<td>H_CONV</td>
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<td>POL</td>
<td>0.62V</td>
<td>1.06V</td>
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<td>SOE</td>
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<td>20</td>
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<td>Gnd</td>
<td>Gnd</td>
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</table>

There are no Stand-By Voltages for the Connector

Diode Mode values taken with all Connectors Removed

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Check</th>
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<tbody>
<tr>
<td>21</td>
<td>LV0+</td>
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<td>22</td>
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<td>1.09V</td>
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<tr>
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<td>LV1+</td>
<td>1.4V</td>
<td>0.9V</td>
</tr>
<tr>
<td>24</td>
<td>LV1-</td>
<td>1.3V</td>
<td>1.09V</td>
</tr>
<tr>
<td>25</td>
<td>LV2+</td>
<td>1.03V</td>
<td>0.9V</td>
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<td>LV2-</td>
<td>1.3V</td>
<td>1.09V</td>
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<td>LVCLK+</td>
<td>1.16V</td>
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<td>LVCLK-</td>
<td>1.17V</td>
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<td>LV3+</td>
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<td>1.09V</td>
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<td>LV4+</td>
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<td>0.9V</td>
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<td>1.09V</td>
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<td>LV5+</td>
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<td>0.9V</td>
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<td>LV5-</td>
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<td>HVDD</td>
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<table>
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<tr>
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<th>Label</th>
<th>Run</th>
<th>Diode Check</th>
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<td>Gnd</td>
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<td>Gnd</td>
<td>Gnd</td>
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<td>VST</td>
<td>(-4.7V)</td>
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<td>VGI_N (VGH)</td>
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<td>1.5V</td>
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<tr>
<td>60</td>
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<td>Gnd</td>
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**LG TRAINING CENTER**
Main Board Connector P7501 to the Panel Voltage and Diode Check

There are no Stand-By Voltages for the Connector Diode Mode values taken with all Connectors Removed

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Check</th>
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<tbody>
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<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>2</td>
<td>Z_OUT</td>
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<td>Open</td>
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<td>3</td>
<td>CLK1</td>
<td>8V</td>
<td>1.5V</td>
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<td>VGH</td>
<td>(-5V)</td>
<td>0.6V</td>
</tr>
<tr>
<td>11</td>
<td>VGH_ODD</td>
<td>(-4.8V)</td>
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</tr>
<tr>
<td>12</td>
<td>VGH_EVEN</td>
<td>(-4.8V)</td>
<td>1.5V</td>
</tr>
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<td>13</td>
<td>VGL</td>
<td>(-5V)</td>
<td>0.6V</td>
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<tr>
<td>14</td>
<td>VST</td>
<td>(-4.7V)</td>
<td>1.5V</td>
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<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<td>16</td>
<td>VCOM_FB</td>
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<td>17</td>
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<td>18</td>
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<td>19</td>
<td>VDD</td>
<td>15.57V</td>
<td>Open</td>
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<td>20</td>
<td>VDD</td>
<td>15.57V</td>
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<table>
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<tr>
<th>Pin</th>
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<tbody>
<tr>
<td>21</td>
<td>HVDD</td>
<td>7.81V</td>
<td>Open</td>
</tr>
<tr>
<td>22</td>
<td>HVDD</td>
<td>7.81V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>24</td>
<td>VCC</td>
<td>3.3V</td>
<td>1.64V</td>
</tr>
<tr>
<td>25</td>
<td>VCC</td>
<td>3.3V</td>
<td>1.64V</td>
</tr>
<tr>
<td>26</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>27</td>
<td>RV0+</td>
<td>1.07V</td>
<td>1.09V</td>
</tr>
<tr>
<td>28</td>
<td>RV0-</td>
<td>1.12V</td>
<td>0.9V</td>
</tr>
<tr>
<td>29</td>
<td>RV1+</td>
<td>1.13V</td>
<td>1.09V</td>
</tr>
<tr>
<td>30</td>
<td>RV1-</td>
<td>1.23V</td>
<td>0.9V</td>
</tr>
<tr>
<td>31</td>
<td>RV2+</td>
<td>1.13V</td>
<td>1.09V</td>
</tr>
<tr>
<td>32</td>
<td>RV2-</td>
<td>1.22V</td>
<td>0.9V</td>
</tr>
<tr>
<td>33</td>
<td>RVCLK+</td>
<td>1.17V</td>
<td>1.09V</td>
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<tr>
<td>34</td>
<td>RVCLK-</td>
<td>1.18V</td>
<td>0.9V</td>
</tr>
<tr>
<td>35</td>
<td>RV3+</td>
<td>1.08V</td>
<td>1.09V</td>
</tr>
<tr>
<td>36</td>
<td>RV3-</td>
<td>1.27V</td>
<td>0.9V</td>
</tr>
<tr>
<td>37</td>
<td>RV4+</td>
<td>1.12V</td>
<td>1.09V</td>
</tr>
<tr>
<td>38</td>
<td>RV4-</td>
<td>1.22V</td>
<td>0.9V</td>
</tr>
<tr>
<td>39</td>
<td>RV5+</td>
<td>1.13V</td>
<td>1.09V</td>
</tr>
<tr>
<td>40</td>
<td>RV5-</td>
<td>1.22V</td>
<td>0.9V</td>
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</table>

7.81V 7.81V 1.07V 1.09V 1.17V 1.18V 1.08V 1.09V 1.27V 1.12V 1.22V 1.13V 1.22V

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
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<tbody>
<tr>
<td>41</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>42</td>
<td>SOE</td>
<td>0.3V</td>
<td>1.06V</td>
</tr>
<tr>
<td>43</td>
<td>POL</td>
<td>0.62V</td>
<td>1.06V</td>
</tr>
<tr>
<td>44</td>
<td>VST_IN</td>
<td>0V</td>
<td>1.06V</td>
</tr>
<tr>
<td>45</td>
<td>H_CONV</td>
<td>1.07V</td>
<td>Gnd</td>
</tr>
<tr>
<td>46</td>
<td>OPT_N</td>
<td>1.06V</td>
<td>2.06V</td>
</tr>
<tr>
<td>47</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>48</td>
<td>GMA18</td>
<td>1.06V</td>
<td>Open</td>
</tr>
<tr>
<td>49</td>
<td>GMA16</td>
<td>2.35V</td>
<td>Open</td>
</tr>
<tr>
<td>50</td>
<td>GMA15</td>
<td>2.98V</td>
<td>Open</td>
</tr>
<tr>
<td>51</td>
<td>GMA13</td>
<td>4.08V</td>
<td>Open</td>
</tr>
<tr>
<td>52</td>
<td>GMA12</td>
<td>5.99V</td>
<td>Open</td>
</tr>
<tr>
<td>53</td>
<td>GMA10</td>
<td>7.48V</td>
<td>Open</td>
</tr>
<tr>
<td>54</td>
<td>GMA9</td>
<td>8.02V</td>
<td>Open</td>
</tr>
<tr>
<td>55</td>
<td>GMA7</td>
<td>10.02V</td>
<td>Open</td>
</tr>
<tr>
<td>56</td>
<td>GMA6</td>
<td>11.88V</td>
<td>Open</td>
</tr>
<tr>
<td>57</td>
<td>GMA4</td>
<td>12.79V</td>
<td>Open</td>
</tr>
<tr>
<td>58</td>
<td>GMA3</td>
<td>13.5V</td>
<td>Open</td>
</tr>
<tr>
<td>59</td>
<td>GMA1</td>
<td>14.91V</td>
<td>Open</td>
</tr>
<tr>
<td>60</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>
# Main Board Connector P1200 to (Ft. IR/Intelligent Sensor) Voltage and Diode Check

P8200 Connector "MAIN Board" To P100 "IR Board"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(1) SCL</td>
<td>3.45V</td>
<td>3.45V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>(1) SDA</td>
<td>3.45V</td>
<td>3.45V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>KEY 1</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.9V</td>
</tr>
<tr>
<td>5</td>
<td>KEY 2</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.9V</td>
</tr>
<tr>
<td>6</td>
<td>3.5V_ST</td>
<td>3.45V</td>
<td>3.45V</td>
<td>1.24V</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>8</td>
<td>LED_LOGO</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>9</td>
<td>(2) IR</td>
<td>1.57V</td>
<td>1.54V</td>
<td>Open</td>
</tr>
<tr>
<td>10</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>+3.3V_Normal</td>
<td>0V</td>
<td>3.3V</td>
<td>0.59V</td>
</tr>
<tr>
<td>12</td>
<td>LED_R/BUZZ</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

(1) Clock pulses only present when Intelligent Sensor is turned on. (3.7V p/p)
(2) IR pulses (1.6V p/p)

Diode Mode values taken with all Connectors Removed
**Main P7900 / P7901 (Voltage and Diode Check)**

Inverter Run voltages taken with built in test pattern

### P7900 “Main” to “Inverter Main” CN11

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L_VS</td>
<td>0V</td>
<td>0.05V</td>
<td>1.08V</td>
</tr>
<tr>
<td>2</td>
<td>M0_MOSI</td>
<td>0V</td>
<td>*0.04V~3.26V</td>
<td>1.08V</td>
</tr>
<tr>
<td>3</td>
<td>M0_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>1.08V</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>5</td>
<td>M1_MOSI</td>
<td>0V</td>
<td>*0.04V~3.26V</td>
<td>1.08V</td>
</tr>
<tr>
<td>6</td>
<td>M1_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>1.08V</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>S_CS_N</td>
<td>0V</td>
<td>2.6V</td>
<td>1.08V</td>
</tr>
<tr>
<td>9</td>
<td>S_MOSI</td>
<td>0V</td>
<td>*0.18V~0.28V</td>
<td>1.08V</td>
</tr>
<tr>
<td>10</td>
<td>S_SCLK</td>
<td>0V</td>
<td>2.99V</td>
<td>1.08V</td>
</tr>
</tbody>
</table>

*Black to White

### P7901 “Main” to “Inverter Secondary” CN103

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R_VS</td>
<td>0V</td>
<td>0.04V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>M2_MOSI</td>
<td>0V</td>
<td>*0.04V~3.2V</td>
<td>1.1V</td>
</tr>
<tr>
<td>4</td>
<td>M2_SCLK</td>
<td>0V</td>
<td>0.23V</td>
<td>1.1V</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>M3_MOSI</td>
<td>0V</td>
<td>0V</td>
<td>1.1V</td>
</tr>
<tr>
<td>7</td>
<td>M3_SCLK</td>
<td>0V</td>
<td>0V</td>
<td>1.1V</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

*Black to White

Diode Mode values taken with all Connectors Removed
Main Board Connector P8800 to Speakers Voltage and Diode Check

Q8800 (Mute) Active Low.
Normal 3.3V Collector to Pin 25

Use speaker out to test for defective Audio Amp IC8801
Note: (Normal, ½ Audio B+)

Diode Mode values taken with all Connectors Removed

<table>
<thead>
<tr>
<th>Pin</th>
<th>LABEL</th>
<th>SBY</th>
<th>Run</th>
<th>Diode Check</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>SPK-R(-)</td>
<td>0V</td>
<td>12.3V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>SPK-R(+)</td>
<td>0V</td>
<td>12.3V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>SPK-L(-)</td>
<td>0V</td>
<td>12.3V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>SPK-L(+)</td>
<td>0V</td>
<td>12.3V</td>
<td>Open</td>
</tr>
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</table>

Q8800 Amp Mute
IC8800 Amp 1.8V

Mute Pin 25
Audio B+ 24V Pins 49-52

P8800
Main JK8700 Wireless Dongle Jack (Voltage and Diode Check)

JK8700 Jack "MAIN Board" To "Wireless Dungle"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>*24V</td>
<td>0V</td>
<td>24V</td>
<td>0.98V</td>
</tr>
<tr>
<td>7</td>
<td>Detect</td>
<td>0V</td>
<td>0.3V</td>
<td>0.98V</td>
</tr>
<tr>
<td>8</td>
<td>Interrupt</td>
<td>0V</td>
<td>3.3V</td>
<td>1.2V</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>n/c</td>
<td>0V</td>
<td>3.3V</td>
<td>1.1V</td>
</tr>
<tr>
<td>11</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>12</td>
<td>I2C_SCL</td>
<td>0V</td>
<td>3.3V</td>
<td>1.02V</td>
</tr>
<tr>
<td>13</td>
<td>I2C_SDA</td>
<td>0V</td>
<td>3.3V</td>
<td>1.02V</td>
</tr>
<tr>
<td>14</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>15</td>
<td>Wireless_RX</td>
<td>0V</td>
<td>3.3V</td>
<td>1.17V</td>
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<tr>
<td>16</td>
<td>Wireless_TX</td>
<td>0V</td>
<td>3.3V</td>
<td>1.22V</td>
</tr>
<tr>
<td>17</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>18</td>
<td>IR</td>
<td>0.67V</td>
<td>3.3V</td>
<td>1.37V</td>
</tr>
<tr>
<td>19-20</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Diode Mode values taken with all Connectors Removed

Voltages with Dongle plugged in.
(Use Dongle side to read voltages. Remove cover).
*24V Switched from Q8701 Drain Back side of the board.
Q8701 turned on by Q8700 front side of the board.
Q8700 turned on by Microprocessor pin 38.
The Intelligent Sensor and IR board (located on the bottom left as viewed from the rear) contains the IR (Infrared Remote Sensor) and the Intelligent Sensor. This board also connects with the Soft Touch Key Board and the Center LG Logo board. The Center LG Logo lights after power on and the picture appears. Then dims down in about 2 seconds. At power off, it does the reverse.

The IR board receives its operating B+ via CON1 pin 6 (STBY 3.5V).

The IR (Infrared) remote receiver can be measured (1.57V) at pin 9 of connector CON1 or P8200 on the Main board in Stand-By. During run pin 9 reads (1.54V).

The IR pulses (1.6V p/p) CON1 pin 9 are sent to P8200 on the Main board and on to the Microprocessor (IC8101) via pin 16.

The Intelligent Sensor communicates with the Micro/Video Processor IC900 BCM Chip via clock and data lines SCL1 and SDA1 arriving on connector CON1 from P8200 pins 1 and 2 on the Main board.

The Front Power LEDs are controlled by these same Clock and Data lines which communicate with the LED Driver IC U1 on the Soft Touch Key board.

The Key board is routed to the IR board via CON2 and output on CON1 Key 1 and Key 2 lines, (Key 1 pin 4 and Key 2 pin 5). Arriving at P8200 pins 4 and 5 on the Main Board. Then to the Microprocessor 25 and 26 lines.
Front IR Board (Connections Identified)

- **P100**
  - To Center Logo Board
  - To Soft Touch Keyboard

**CON2**
- To Main Board

**IR board and Intelligent Sensor board**

p/n EBR64966401
## Front Board Connectors CON1, CON2 and CON3 Voltage and Diode Check

### CON1 "Front IR" to P8200 "MAIN"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(1) SCL</td>
<td>3.45V</td>
<td>3.45V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>(1) SDA</td>
<td>3.45V</td>
<td>3.45V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>KEY 1</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>KEY 2</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>3.5V_ST</td>
<td>3.45V</td>
<td>3.45V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>8</td>
<td>LED_LOGO</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>9</td>
<td>(2) IR</td>
<td>1.57V</td>
<td>1.54V</td>
<td>Open</td>
</tr>
<tr>
<td>10</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>+3.3V_Normal</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>LED_R/BUZZ</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

1. Clock pulses only present when Intelligent Sensor is turned on. (3.7V p/p)
2. IR pulses (1.6V p/p)

Diode Mode values taken with all Connectors Removed

### CON2 "Front IR" to “Soft Touch Key Board"

<table>
<thead>
<tr>
<th>Pin</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.45V</td>
<td>3.36V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>0V</td>
<td>1.63V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>3.3V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>3.28V</td>
<td>3.28V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>3.45V</td>
<td>3.36V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>3.45V</td>
<td>3.36V</td>
<td>Open</td>
</tr>
</tbody>
</table>

### CON3 "Front IR" to “LG Logo Board"

<table>
<thead>
<tr>
<th>Pin</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.45V</td>
<td>3V</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>1.36V</td>
<td>0.6V</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Diode Mode values taken with all Connectors Removed
The 47LE8500 contains the Invisible Speaker system. The Full Range Speakers point downward, so there is no front viewable speaker grill or air ports.

**Installed**

**Top View**

**Side View**

**Front View**

**Speaker**

p/n EAB60961501
INTERCONNECT DIAGRAM (11 X 17 FOLDOUT SECTION)

This section shows the 11X17 foldout that’s available in the Paper and Adobe version of the Training Manual.

The Adobe version of this Training Manual allows the viewer to zoom in and out making reading of the small text easier. This Power Point shows a graphical representation of the 11 X 17 foldout page so clarity is limited.
CN1 INVERTER (MAIN) FROM P7900 MAIN BOARD

- Inverter Main CN11 pin 01: Black or White Screen
- Inverter Main CN11 pin 02: Black Screen
- Inverter Main CN11 pin 02: White Screen
- Inverter Main CN11 pin 03: Black Screen
- Inverter Main CN11 pin 03: White Screen

1V per/div 4MSes 3.66V p/p 1V per/div 4MSes 3.70V p/p 1V per/div 4MSes 4.22V p/p 1V per/div 4MSes 3.70V p/p 1V per/div 4MSes 3.96V p/p

CN103 INVERTER (SECONDARY) FROM P7901 MAIN BOARD

- Inverter Secondary CN103 pin 01: Black or White Screen
- Inverter Secondary CN103 pin 02: Black Screen
- Inverter Secondary CN103 pin 02: White Screen
- Inverter Secondary CN103 pin 03: Black Screen
- Inverter Secondary CN103 pin 03: White Screen
- Inverter Secondary CN103 pin 04: Black or White Screen

1V per/div 4MSes 3.52V p/p 1V per/div 4MSes 3.56V p/p 1V per/div 4MSes 3.56V p/p 1V per/div 4MSes 3.56V p/p 1V per/div 4MSes 3.56V p/p 1V per/div 4MSes 3.62V p/p
This concludes the 47LE8500 training session.