42LG70

Direct View LCD

LG
Life's Good

FULL HD 1080P
OUTLINE

Section 1
Contact Information, Preliminary Matters, Specifications, LCD Overview, General Troubleshooting Steps, Signal Distribution, Disassembly Instructions and Voltages

Section 2
Circuit Board Operation, Troubleshooting of:
- Switch mode Power Supply
- Ballast Board
- Main Board
- T-CON Board
- Ft Control Board
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.
CONTACT INFORMATION

Customer Service (and Part Sales)  (800) 243-0000
Technical Support (and Part Sales)  (800) 847-7597
USA Website (GCSC)  aic.lgservice.com
Customer Service Website  us.lgservice.com
LG CS Academy  lgcsacademy.com
LG Web Training  lge.webex.com

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SECTION 1: LCD OVERVIEW

Safety & Handling Regulations

1. Approximately 20 minute pre-run time is required before any adjustments are performed.
2. Refer to the Voltage Sticker on the Switch Mode Power Supply silk screening. (+/- ½ volt).
3. Be cautious of electric shock from the Backlight section, it uses high voltage AC. Check that the Power Supply and Drive Circuits are completely discharged because of residual current stored before Circuit Board removal.
4. C-MOS circuits are sensitive to static electricity. Use caution when dealing with these IC and circuits.
5. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
6. 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 42LG70 LCD Direct View Display Panel.
Basic Specifications

- Full HD 1080p Resolution (1920 x 1080)
- 50,000:1 Dynamic Contrast Ratio
- TruMotion 120Hz
- 4x HDMI™ V.1.3 with Deep Color
- Intelligent Sensor
- 24p Real Cinema
- AV Mode (Cinema, Sports, Game)
- Clear Voice
- LG SimpLink™ Connectivity
- Invisible Speaker System
- USB 2.0 (JPEG, MP3)
- ISFccc
Full HD 1080p Resolution
Displays HDTV programs in full 1920 x 1080p resolution for a more detailed picture.

TruMotion 120Hz
Advance 120Hz panel provides clear, smooth images, even during fast action scenes creating a stable structure for a crisper picture.

Intelligent Sensor
Unlike other sensors which can only sense brightness of ambient light, LG’s “Intelligent Sensor” uses 4,096 sensing steps to evaluate its surroundings. Using a sophisticated algorithm, the LG processes picture quality elements including brightness, contrast, color, sharpness and white balance. The result is a picture optimized for it’s surroundings, more pleasing to watch and which can also save up to 50% in power consumption.

24p Real Cinema
Hi-def movies run at exactly 24 frames per second speed that they were originally filmed in, making your home-cinema experience one step closer to a “Real Cinema” experience.
**Clear Voice Technology**
Automatically enhances and amplifies the sound of the human voice frequency range to provide high-quality dialogue when background noise swells.

**SIMPLINK**
Allows for convenient control of other LG SimpLink products using the existing HDMI connection.

**Invisible Speaker System**
A new invisible speaker system tuned by renowned audio expert, Mr. Mark Levinson. This unique system incorporates speaker actuators around the perimeter of the entire bezel, eliminating traditional speaker drivers and associated grills. This not only allows for a sleek, finished look, but also offers a wider “sweet spot” by creating a virtual “wall” of sound.
Remote Control Familiarization

TOP PORTION

- TV
- POWER
- DVD
- STB
- Q.MENU
- MENU
- VCR
- INPUT
- EXIT
- SIMPLINK
- AV MODE

BOTTOM PORTION

- +
- VOL
- -
- MUTE
- FAV
- CH
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 0
- PAGE
- FLASH/EX
- ENTER
- EXIT

LG TRAINING CENTER
Accessing the Service Menu

To access the Service Menu:
1) Turn the Set On
2) Simultaneously, Press and “Hold” the Menu Key on the Side Key pad and Press and “Hold” the Menu Key on the Remote approximately 5 seconds.
3) If Customer’s Menu appears, continue to hold until it disappears.
4) The Service Menu appears

Note: It is possible, dependant upon the Software Version, a Password may be required to enter the Service Menu.
If a password is required, enter 0000
Rear and Side Input Jacks

Rear Input Jacks

Side Input Jacks
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 42LG70 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

The Stand does not need to be removed. Remove the 16 screws indicated.

Pay attention to the size and type of screw as there are many different types. Putting in the improper screw when reassembling may cause damage.
Power Supply PWB Removal

Disconnect P201, AC In and P204.

Remove the 4 screws indicated by the arrows.
Main PWB Shield Removal

Remove the two screws holding the Decorative plastic piece on the right side. Remove the plastic piece.

Remove the two pieces of tape on the left side holding down the cables and the one at the top.

Remove the remaining 11 screws indicated by the arrows.
**MAIN PWB Removal**

Disconnect P1000, P1001, P800, P404 and P501

Note: In the top right is a connector P200. This is an open connection.

Remove the 2 screws securing the Main PWB.

Note: The top 2 and bottom 2 screws were removed during the shield removal process.

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**NOTE:** Look carefully on top and behind the BCM and Micronas IC. Look for a piece of Chocolate (Heat Transfer Material). Be sure to transfer to new PWB if replaced.
**T-CON (TFT Drive) PWB Removal**

Remove the 2 screws at the top of each bracket. Remove the 3 Screws in the T-CON shield. Lift up the left bracket and work the shield out and off.

Remove and save the tape over the LVDS Cables.

The three screws shown in the picture below are for the Service Position. They would already be removed in the previous step.

Disconnect CN1, CN2, CN4 and CN5. See next slide for details.
To remove the flex cables to the TFT Panel, CN4 or CN5: Place a soft sharp object like a fingernail underneath the black locking tab and gently lift upward. (Shown by the arrows in Fig 1)

Flip the lock up and back from the flex cable. Then the flex cable can be easily removed. (Unlocked)

To remove the LVDS cables for CN1 or CN2; Press in on the two tabs and slowly rock the cable out of the connector. (Shown by the arrows in Fig 3)

The locking tab is flipped upward
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.
Circuit Board Layout

- BALLAST p/n EAY56798701
- T-CON p/n EAT56803001

- POWER SUPPLY
  - Main “Digital” Under Shield
  - LVDS Cables
- Side Control
- Tweeter
- Ft Control
- AC Input
- Rear Inputs
- Side Inputs
- RF Input
- Backlight Connection To Right Side
- Backlight Connection To Left Side
- Ballast Under Shield
- Woofer
Power Supply (SMPS) PWB Layout

- **F100**
  - 6.3A/250V
  - AC IN

- **F101**
  - 3.15A/250V
  - Run 385.7V
  - Stby 155.8V
  - From Hot Gnd

- **P201**
  - To Main
  - Not used

- **P204**
  - To Ballast

**Hot Ground Shock Hazard**
Power Supply turn on sequence from Micro Processor

At point (3) TV is in Stand-By state. Energy Star compliant. Less than 1 Watt
VBR-B (PWM Dimming) Manipulates the Backlight Brightness via Customer's OSD. Manipulates the Backlight Brightness via the BCM Chip. Darker Picture, Darker Backlights to facilitate improved Contrast Ratio. 0.9V – 3.2V Range

VBR-A (Analog Diming) Fixed Value.
Power Supply (SMPS) PWB Operational Troubleshooting

Power Supply Troubleshooting

Ac voltage is supplied to the Power Supply at Connector SC100. AC Detect is generated and should be present at connector P201 pin 8 (5V). The AC input also generates a Hot Ground primary power supply that runs in two states, Stand-By (156V) and Run (386V) measured at Fuse F101. This primary voltage develops all other voltages that are output from the power supply. During Stand-By, the 5 Volt Standby should be present at connector P201, Pins 9,10,11 or 12. If Missing remove AC Power and unplug Connector P201, apply AC Power and recheck for presence of both 5 Volt Standby and AC Detect. Loss of either 5 Volt Standby or AC Detect would be a Power Supply Failure. Presence of 5 Volt Standby and AC Detect would be an indication of a failure on the Main Board. Suspect a possible short circuit loading the supply. **Remember to observe the Front Power Indicating LED this may save some time a lit LED indicates the Stand-By 5V voltage is present!**

The Main Board sends two commands to the Power Supply Board one being PWR the other is INV ON. These two voltages are used to control the power on turn on sequence. First via PWR (Pin 19) also known as RL ON activates the 24Volt to the Ballast and the 16 Volt and 12 Volt lines to the Main board. The 2\textsuperscript{nd} command is INV ON. It passes through the Power Supply to the Ballast Board as a Lamp Lighting Command Signal.

If either command voltage (PWR or INV ON) is missing it will result in a no picture symptom. These voltages can easily be checked with the volt meter! Remove AC Power, unplug Connector P204, reapply AC Power and press the ON-OFF Button on either the Remote Control or Power Button on the Unit. Watch for the Power ON LED to change color from red to blue. This is an indication the PWR Signal was created on the the Main board. Check P800 or P201 pin 19 for the PWR command (2.8V) to the Power Supply. Check P201 for 16V (Pins 1 or 2) and 12V (Pins 5 or 6). Check P204 Pins 1,2,3,4 or 5 for the presence of the 24 Volt Supply. Confirm Pin 12 of P204 went to 3.3V. This is the INV ON signal needed to light the Lamps.

Problems with either voltage can be easily solved by following the simple steps on the next page.
TEST 1 Power Supply PWB Low Voltage Test

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

a) The SMPS PWB “MUST” be producing STBY 5V on either pin 9, 10, 11 or 12 (5V).
b) The SMPS PWB “MUST” be generating ACD (AC Detect).

If the conditions (a) or (b) above are not met, the SMPS PWB is defective and must be replaced. There is no need to continue with the test.

(c) Unplug P201 or P800 and P204 to the ballast.

TEST 1:

(2) Add a 10K resistor between (5V STBY) pin 9, 10, 11 or 12 and Pin 19 (PWR). Apply AC. This will turn on the power supply.
   a) Check that the 16V and 12V power supplies are turned on, P201 (16V pins 1 and 2) (12V pins 5 and 6)
   b) Check that the 24V on P204 pins 1~5 (Ballast Voltage) is turned on.

(3) Remove AC power. Reinsert the plug P204 to the ballast.
Continue if the 1st test was successful. Leave original 10K resistor in place.

(4) Add a jumper wire between Pin 20 (INV On/Off) to Pin 19 (PWB).

(5) Apply AC Power. This simulates a Power On and Backlight On command.

Observe the Backlights.
   a) If normal, the backlights should turn on.
   b) If only ½ the backlights light, (Right side or Left Side), confirm connectors are OK. If yes, panel defective.
   c) If no backlight activity, reconfirm the 24V is being generated and output on P204 connector Pin 1~5. If not, unplug P204 and recheck. If not SMPS is defective. If yes, Ballast is loading down the 24V line.
   d) Confirm the INV On/Off line Pin 12 is going to 3V.

**NOTE:** Pin 11 and 12 on P204 or Pin 12 and 13 on P201 (ADIM/PDIM) must be above 1V or the backlights will be extremely dim. This is controlled by the Customer’s OSD settings. 0% (0.9V) to 100% (3.3V). Manipulated by the BCM Chip. (Video Processor)
## Power Supply Connector P201 Voltage and Resistance

### P201 Odd "SMPS" to P800 "Main PWB"

<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>16V</td>
<td>0V</td>
<td>16.2V</td>
<td>0.49V</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>12V</td>
<td>0V</td>
<td>12.3V</td>
<td>1.6V</td>
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<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>5V</td>
<td>5.1V</td>
<td>5.1V</td>
<td>1.27V</td>
</tr>
<tr>
<td>11</td>
<td>5V</td>
<td>5.1V</td>
<td>5.1V</td>
<td>1.27V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>17</td>
<td>ERR</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
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<tr>
<td>19</td>
<td>PWR</td>
<td>0V</td>
<td>2.8V</td>
<td>1.6V</td>
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<tr>
<td>21</td>
<td>¹ADIM</td>
<td>0V</td>
<td>1.7V</td>
<td>0V</td>
</tr>
<tr>
<td>23</td>
<td>SEL</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
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¹ADIM Pin 21 Fixed and not used

### P201 Even "SMPS" to P800 "Main PWB"

<table>
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<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
</thead>
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<tr>
<td>2</td>
<td>16V</td>
<td>0V</td>
<td>16.2V</td>
<td>0.49V</td>
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<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
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<td>6</td>
<td>12V</td>
<td>0V</td>
<td>12.3V</td>
<td>1.6V</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5V</td>
<td>5.1V</td>
<td>5.1V</td>
<td>1.27V</td>
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<tr>
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<td>1.27V</td>
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<td>14</td>
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<td>Gnd</td>
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<td>16</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>18</td>
<td>ACD</td>
<td>5V</td>
<td>5V</td>
<td>2.1V</td>
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<tr>
<td>20</td>
<td>INV</td>
<td>0V</td>
<td>3.2V</td>
<td>0V</td>
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<td>22</td>
<td>²PDIM</td>
<td>0V</td>
<td>1.4V</td>
<td>0V</td>
</tr>
<tr>
<td>24</td>
<td>SYNC</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
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²PDIM Pin 22 can vary according to type of signal being processed, OSD Backlight setting. 0.9V 0% to 3.3V 100% and the Intelligent Sensor. Output from the BCM chip.

Diode Mode values taken with all Connectors Removed.
### Power Supply Connector P204 and SC100 Voltage and Resistance

#### P204 MCN1 "SMPS" to MCN1 "BALLAST"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
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</thead>
<tbody>
<tr>
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<tr>
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</tr>
<tr>
<td>3</td>
<td>24V</td>
<td>0V</td>
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<td>0.72V</td>
</tr>
<tr>
<td>4</td>
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<td>0.72V</td>
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<tr>
<td>5</td>
<td>24V</td>
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<td>0.72V</td>
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<tr>
<td>6</td>
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<td>Gnd</td>
<td>Gnd</td>
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<td>7</td>
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<td>11</td>
<td>*BR1</td>
<td>0V</td>
<td>1.7V</td>
<td>OL</td>
</tr>
<tr>
<td>12</td>
<td>On/Off</td>
<td>0V</td>
<td>3.2V</td>
<td>OL</td>
</tr>
<tr>
<td>13</td>
<td>*PWM-DIM</td>
<td>0V</td>
<td>1.4V</td>
<td>OL</td>
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#### SC100 "SMPS" to AC IN

<table>
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<th>Run</th>
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<tbody>
<tr>
<td>1</td>
<td>L</td>
<td></td>
<td>120Vac</td>
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<tr>
<td>2</td>
<td>N</td>
<td></td>
<td></td>
<td>OL</td>
</tr>
</tbody>
</table>

READING FROM PIN 1 TO PIN 2 for STBY and RUN voltages.

1. BR1 (ADIM Pin 21) Fixed and not used
2. PWM-DIM (PDIM Pin 22) can vary according to type of signal being processed, OSD Backlight setting. 0.9V 0% to 3.3V 100% and the Intelligent Sensor. Output from the BCM chip.

Diode Mode values taken with all Connectors Removed
**General Backlight Information**

- **Ballast**
- **To Backlights Over 1.2KV**

**EEFL (External Electrode Fluorescent Lamp)**

**LOW COST** Large number of lamps driven by a single inverter

Currently, number of lamps “Unknown”
Introducing EEFL

CCFL (Cold Cathode Fluorescent Lamp)

EEFL (External Electrode Fluorescent Lamp)

Simple structure, Low price

Complicated structure

Simple structure
Lamp manufacturing process
Lamp assembly structure

Low Cost
Large number of Lamp
Drive by single inverter

35 Spring 2009 LCD DV 42LG70
Introducing EEFL Contacts (Bulb Design)

**CCFL (Cold Cathode Fluorescent Lamp)**

- Glass Bead
- Electrode
- Lead
- Kov

Key: Long Life Time

- Hg
- Electron

**EEFL (External Electrode Fluorescent Lamp)**

- External electrode
- Phosphor

Key: Long Life Time

- Hg
- Electron

For CCFL, Hg gas is consumed mainly near the internal electrode.
For EEFL, longer life time is expected because there is no internal electrode consuming Hg gas.
Ballast PWB Layout

BALLAST p/n EAY56798701

FS1
Protects 24V 15A/65V

MCN1
To Power Supply

To Backlights Left Side

To Backlights Right Side

TOP

T1
T2
T3
T4
Ballast PWB Transformer Check

Caution: Over 1.2kV

ANY TRANSFORMER PRIMARY SIDE WAVEFORM CHECK

PIN 1

1V p/div 5us p/div 5V p/p

PIN 6

1V p/div 5us p/div 4.3V p/p

TOP

T1 T2

T4 T3
**Ballast Control Signals Circuit Diagram**

**VBR-B** (PWM Dimming) Manipulates the Backlight Brightness via Customer's OSD. Manipulates the Backlight Brightness via the BCM Chip. Darker Picture, Darker Backlights to facilitate improved Contrast Ratio. 0.9V ~ 3.2V Range

**VBR-A** (Analog Dimming) Fixed Voltage.
VBR-B
PWMDIM manipulates the Burst Triangle Oscillator in the ballast drive IC.

VBR-A
BR1 (ADIM) also manipulates the Burst Triangle Oscillator. But it is not used.
RF NOISE DAMPENING AND HEAT TRANSFER MATERIAL PADS. MAKE SURE TO SAVE THESE IF REPLACING THE BALLAST.

There is a white box outlined on the PWB silk screen indicating where the Chocolate goes.
Ballast PWB and Shield (Heat Transfer and RF Insulation Material Pads).

- Insulates and Heat Transfer for T1 and T2
- Insulates and Heat Transfer for Q7, Q8, Q9 and Q10
- Insulates and Heat Transfer for T3 and T4

RF NOISE DAMPENING AND HEAT TRANSFER MATERIAL PADS. MAKE SURE TO SAVE THESE IF REPLACING THE BALLAST.

MAKE SURE THEY ARE PLACED IN THE CORRECT LOCATION BEFORE REINSTALLING THE SHIELD.
### Ballast Connector MCN1 Voltage and Resistance

Diode Mode values taken with all Connectors Removed

#### MCN1 "Ballast" 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</td>
<td>VIN</td>
<td>0V</td>
<td>24V</td>
<td>OL</td>
</tr>
<tr>
<td>2</td>
<td>VIN</td>
<td>0V</td>
<td>24V</td>
<td>OL</td>
</tr>
<tr>
<td>3</td>
<td>VIN</td>
<td>0V</td>
<td>24V</td>
<td>OL</td>
</tr>
<tr>
<td>4</td>
<td>VIN</td>
<td>0V</td>
<td>24V</td>
<td>OL</td>
</tr>
<tr>
<td>5</td>
<td>VIN</td>
<td>0V</td>
<td>24V</td>
<td>OL</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>Gnd_1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>¹VBR_A</td>
<td>0V</td>
<td>1.7V</td>
<td>OL</td>
</tr>
<tr>
<td>12</td>
<td>On/Off</td>
<td>0V</td>
<td>3.2V</td>
<td>OL</td>
</tr>
<tr>
<td>13</td>
<td>²VBR_B</td>
<td>0V</td>
<td>1.4V</td>
<td>OL</td>
</tr>
<tr>
<td>14</td>
<td>ERROR-OUT</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
</tbody>
</table>

¹VBR-A Pin 11 Fixed and not used

²VBR-B Pin 13 can vary according to type of signal being processed, OSD Backlight setting. 0.9V 0% to 3.3V 100% and the Intelligent Sensor. Output from the BCM chip.
**LCD Controller Board**

The T-Con IC UC1 receives from the Main Board at CN1 and CN2 Quadruple 12 Bit LVDS Signals which it processes into TFT Drive Signals which through connectors CN4 and CN5 controls the LCD Panel. IC’s U15 and U16 are “Dynamic Ram IC’s which are High Speed Storage Devices used to store the data until it is time to be addressed. 12V is supplied to the T-Con Board on connector CN1 from the Main Board (easily measured at fuse F1). Diode LD1 is a boot up indicator and is helpful in troubleshooting as a quick indication of a loss of supply and or a Boot Up problem.

Next 2 Slide gives greater layout details
T-CON (TFT DRIVE) PWB WITH SHIELD

Two LVDS feeds from Main PWB
Remember to replace screws for ground purposes if turning on the set is required.
**T-CON (TFT Drive) PWB Checks**

- **Check the Regulator US1 for Correct Voltage**
- **Check Fuse F1 for 12V**
- **Use LD1 to determine if The boot up sequence of The T-CON is OK. This LED will turn bright Blue Shortly after power is applied then go out shortly after backlights illuminate if all is OK.**

<table>
<thead>
<tr>
<th>State</th>
<th>Anode</th>
<th>Cathode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Off</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>Power 1st On</td>
<td>11.6V</td>
<td>0V</td>
</tr>
<tr>
<td>Power On</td>
<td>11.6V</td>
<td>9.5V</td>
</tr>
</tbody>
</table>

LED OFF | LED ON | LED OFF
Main PWB IC100 Broadcom Overview

Input Signal Processing

The Broadcom or BCM Chip IC1000 is the main signal processor and is responsible for:

- ATSC, NTSC, and QAM reception and processing
- RS 232 service only Port (software upgrades and home theater environment)
- Wired Remote Port
- (2) Component Inputs Y, Pr, Pb and Audio L R
- (3) HDMI Inputs (back) (1) HDMI (Side Input)
- RGB PC
- USB (Side Input) (software upgrades using flash drive)
- AV Composite
- SIF and SAP

Output Signals

- Quadruple 12 Bit LVDS to the T-CON Board
- Audio output signals to the Speakers
- Digital Audio Output Coaxial and Optical
- ON OFF Controls to the SMPS turning on low voltage generation and Backlights
- Backlight intensity control signals
The Main PWB contains the **MICRONAS** chip IC1000. This IC is a Full-HD Rate Converter with Motion Blur Removal and Film De-Juddering for 1080p 100/120 Hz LCD panels.

- **Vector Based Motion Compensation with Frame Rate Conversion** (eliminates the need for 3:2 Pull Down)
- **Internal Dual 10 bit LVDS input**
- **Quadruple 12 bit LVDS output**

Motion Blur Removal increases the video frames by Interpolating a new image frame between each original frame (Motion Estimated Data Insertion) **MEDI.**

Juddering is a phenomenon which appears on film based programming due to the 24 frames per second system used for recording, the picture develops visual artifacts when converted to 60 frames per second. 3:2 Pull Down was developed to eliminate this problem. Frame Rate Conversion (Real Cinema) eliminates the need for 3:2 Pull Down.
TruMotion 120Hz (Vector Based Motion Compensation)

TruMotion 120 Hz can reduce blurring on fast moving scenes. TruMotion carefully analyses the picture signal by using advanced algorithms to automatically calculate a new image frame between each original frame (MEDI).
Frame Rate Conversion eliminates the need for 3:2 Pull Down Conversion

- **24P (Film)**
  - Frame Rate: 1/24 [sec]
  - Scene A

- **Conventional (60Hz)**
  - Frame Rate: 1/60 [sec]
  - Judder
    - Scene A
    - Scene B
    - Scene C

- **5:5 TruCinema (120Hz)**
  - Frame Rate: 1/120 [sec]
  - No Judder
    - Scene A
    - Scene B
    - Scene C

An irregular sequence of frames in a movie or video image.

Judder is eliminated by Frame Rate Conversion.
RUNS HOT, THIS IS NORMAL.

If odd Video problems are found, use some freeze spray around IC100/IC1000 and its circuits, if video returns to normal, PWB needs to be replaced.

Look carefully on top and behind the BCM IC and Micronas IC for Chocolate (Heat Transfer) material. Be sure to transfer to new PWB if replaced.

LD803 3.3V-BCM OK when Green

For Software Upgrade via Jig

To SMPS
P800

To Front PWB Assembly
P404

IC100 Micronas

IC100 Broadcom

IC407 uP

X400

To Speakers
P501

USB

Tuner

Both P1000 and P1001 to T-COM PWB

16

X200

P1000

P1001

IC1000 Micronas

For Software Upgrade via Jig

P1001

P1000

VIDEO PROCESSOR BCM
IC100 and MICRONAS IC1000

To Front PWB Assembly
P404

LD803 3.3V-BCM OK when Green

Look carefully on top and behind the BCM IC and Micronas IC for Chocolate (Heat Transfer) material. Be sure to transfer to new PWB if replaced.

To Speakers
P501
Voltages given on the 11X17 foldout “Interconnect Diagram”

Main PWB (Back View)
### Main PWB (Front Side Regulators)

<table>
<thead>
<tr>
<th>IC405</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>Micro Reset control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pins 1</td>
<td>0V</td>
<td>3.3V</td>
<td>Input 3.3VST-Micom</td>
</tr>
<tr>
<td>Pins 2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>0V</td>
<td>Hi then Lo to Q400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IC803</th>
<th>STBY</th>
<th>RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>9V Regulator Also source for IC812</td>
<td></td>
</tr>
<tr>
<td>Pins 1</td>
<td>0V</td>
<td>12V</td>
</tr>
<tr>
<td>Pins 2</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>9V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IC812</th>
<th>STBY</th>
<th>RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>5V-TU Regulator</td>
<td></td>
</tr>
<tr>
<td>Pin 1</td>
<td>0V</td>
<td>9V</td>
</tr>
<tr>
<td>Pin 2</td>
<td>0V</td>
<td>3.3V</td>
</tr>
<tr>
<td>Pin 3</td>
<td>0V</td>
<td>5V</td>
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<tr>
<td>Pin 4</td>
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<td>n/c</td>
</tr>
<tr>
<td>Pin 5</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
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<table>
<thead>
<tr>
<th>Q400</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>Reset to Micro</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0.59V</td>
<td>0.59V</td>
<td>Input from IC405</td>
</tr>
<tr>
<td>C</td>
<td>0V</td>
<td>0V</td>
<td>Hi-Lo to IC407 pin 4</td>
</tr>
<tr>
<td>E</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Q900</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>LVDS Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pins 1,3</td>
<td>0V</td>
<td>12V</td>
<td>Input</td>
</tr>
<tr>
<td>Pins 2,4</td>
<td>0V</td>
<td>6V</td>
<td>On/Off</td>
</tr>
<tr>
<td>Pins 5-8</td>
<td>0V</td>
<td>12V</td>
<td>Output LVDS 12V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q901</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function:</td>
<td>Turns on Q900 LVDS Switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>0V</td>
<td>0.7V</td>
<td>LVDS-Panel-Control</td>
</tr>
<tr>
<td>C</td>
<td>0V</td>
<td>0V</td>
<td>On low/Off hi</td>
</tr>
<tr>
<td>E</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>IC102</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>-----</td>
<td>-------</td>
</tr>
<tr>
<td>Function:</td>
<td>EEPROM for HDMI HDCP Key</td>
<td>Function:</td>
<td>Controls Q804 +5V Switch</td>
</tr>
<tr>
<td>Pins 1,2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3,4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pin 5</td>
<td>0V</td>
<td>3.78V</td>
<td>SDA</td>
</tr>
<tr>
<td>Pin 6</td>
<td>0V</td>
<td>3.78V</td>
<td>SCL</td>
</tr>
<tr>
<td>Pin 7</td>
<td>0V</td>
<td>0V</td>
<td>Write Protect</td>
</tr>
<tr>
<td>Pin 8</td>
<td>0V</td>
<td>5V</td>
<td>Vcc+5V</td>
</tr>
<tr>
<td>IC400</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
</tr>
<tr>
<td>Function:</td>
<td>BCM Reset Generator Drives IC401</td>
<td>Function:</td>
<td>+5V Switch</td>
</tr>
<tr>
<td>Pins 1</td>
<td>0V</td>
<td>3.3V</td>
<td>Input D3.3V-BCM</td>
</tr>
<tr>
<td>Pins 2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>0V</td>
<td>Hi then Lo to IC401</td>
</tr>
<tr>
<td>IC401</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
</tr>
<tr>
<td>Function:</td>
<td>BCM Reset Smitt Trigger</td>
<td>Function:</td>
<td>3.3VST-MICON Regulator</td>
</tr>
<tr>
<td>Pins 1</td>
<td>0V</td>
<td>3.3V</td>
<td>Input Reset</td>
</tr>
<tr>
<td>Pins 2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>0V</td>
<td>Hi then Lo to IC401</td>
</tr>
<tr>
<td>IC406</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
</tr>
<tr>
<td>Function:</td>
<td>Micro EEPROM</td>
<td>Function:</td>
<td></td>
</tr>
<tr>
<td>Pins 1,2,4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>3.3V</td>
<td>Pull Up</td>
</tr>
<tr>
<td>Pin 14</td>
<td>0V</td>
<td>3.3V</td>
<td>B+ for IC +3.3V</td>
</tr>
<tr>
<td>Pin 6</td>
<td>3.3V</td>
<td>3.3V</td>
<td>SCL</td>
</tr>
<tr>
<td>Pin 7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>Pin 8</td>
<td>3.3V</td>
<td>3.3V</td>
<td>3.3VST-Micom</td>
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### Main PWB (Back Side Regulators) Slide 2

<table>
<thead>
<tr>
<th>IC403</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
<th>IC807</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
<th>IC1003</th>
<th>STBY</th>
<th>RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function: NV RAM-OLD</td>
<td>Pins 1,2,3</td>
<td>0V</td>
<td>4.9V</td>
<td>Pull Up</td>
<td>Pins 1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Pin 1</td>
<td>0V</td>
</tr>
<tr>
<td>Pins 4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td></td>
<td>Pins 2</td>
<td>0V</td>
<td>1.8V</td>
<td>Output</td>
<td>Pin 2</td>
<td>0.68V</td>
</tr>
<tr>
<td>Pin 5</td>
<td>0V</td>
<td>3.4V</td>
<td>SDA</td>
<td></td>
<td>Pins 3</td>
<td>0V</td>
<td>3.3V</td>
<td>Input</td>
<td>Pin 3</td>
<td>0.6V</td>
</tr>
<tr>
<td>Pin 6</td>
<td>0V</td>
<td>3.4V</td>
<td>SCL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pin 4</td>
<td>0V</td>
</tr>
<tr>
<td>Pin 7</td>
<td>0V</td>
<td>0V</td>
<td>Write Protect</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin 8</td>
<td>0V</td>
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<td>Vcc+5V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>IC802</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
<th>IC809</th>
<th>STBY</th>
<th>RUN</th>
<th>Label</th>
<th>IC1004</th>
<th>STBY</th>
<th>RUN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function: 3.3V Regulator</td>
<td>Pins 1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Pin 1</td>
<td>0V</td>
<td>1.2V</td>
<td>On/Off Power-CTL</td>
<td>Pin 2</td>
<td>0V</td>
</tr>
<tr>
<td>Pins 2</td>
<td>0V</td>
<td>3.3V</td>
<td>Output</td>
<td></td>
<td>Pins 4</td>
<td>0V</td>
<td>3.4V</td>
<td>Output</td>
<td>Pin 5</td>
<td>0V</td>
</tr>
<tr>
<td>Pins 3</td>
<td>0V</td>
<td>5V</td>
<td>Input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC701</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
<td>IC810</td>
<td>STBY</td>
<td>RUN</td>
<td>Label</td>
<td>IC1004</td>
<td>STBY</td>
<td>RUN</td>
</tr>
<tr>
<td>Function: EEPROM for HDMI</td>
<td>Pin 1</td>
<td>0V</td>
<td>2.5V</td>
<td>Input</td>
<td>Pin 1</td>
<td>0V</td>
<td>0.78V</td>
<td>0V</td>
<td>Pin 3</td>
<td>0.7V</td>
</tr>
<tr>
<td>Pins 1,2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td></td>
<td>Pins 2</td>
<td>0V</td>
<td>1.2V</td>
<td>On/Off Power-CTL 2.6V</td>
<td>Pin 5</td>
<td>0V</td>
</tr>
<tr>
<td>Pins 3,4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td></td>
<td>Pins 3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Pin 6</td>
<td>0V</td>
</tr>
<tr>
<td>Pin 5</td>
<td>0V</td>
<td>5V</td>
<td>SDA</td>
<td></td>
<td>Pin 4</td>
<td>n/c</td>
<td>3.3V</td>
<td>ADJ</td>
<td>Pin 7</td>
<td>0V</td>
</tr>
<tr>
<td>Pin 6</td>
<td>0V</td>
<td>4.7V</td>
<td>SCL</td>
<td></td>
<td>Pin 5</td>
<td>Gnd</td>
<td>5V</td>
<td>Output</td>
<td>Pin 8</td>
<td>0V</td>
</tr>
<tr>
<td>Pin 7</td>
<td>0V</td>
<td>5V</td>
<td>Write Protect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin 8</td>
<td>0V</td>
<td>4.73V</td>
<td>Vcc+5V</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>
### Main PWB (Back Side Regulators) Slide 3

#### IC702

<table>
<thead>
<tr>
<th>Function:</th>
<th>Label</th>
<th>Pin 1</th>
<th>Pin 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EEPROM for RS232</td>
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</table>

| Pins 1,2   | Gnd | Gnd | Gnd |
| Pins 3,4   | Gnd | Gnd | Gnd |
| Pin 5      | 0V  | 0.15V | SDA |
| Pin 6      | 5V  | 0.13V | SCL |
| Pin 7      | 0V  | 0.13V | Write Protect |
| Pin 8      | 0V  | 5V  | Vcc+5V |

#### IC805

<table>
<thead>
<tr>
<th>Function:</th>
<th>Label</th>
<th>Pin 1</th>
<th>Pin 2</th>
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<tbody>
<tr>
<td>D1.2V-BCM Regulator</td>
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<td>0V</td>
<td>3.3V</td>
</tr>
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</table>

| Pin 1      | 0V  | 6V | RST |
| Pin 2      | 0V  | 5V | Input |
| Pin 3      | 0V  | 1.2V | Output |
| Pin 4      | 0V  | 0V | Gnd |
| Pin 5      | 0V  | 3.3V | On/Off Power-CTL |
| Pin 6      | 0V  | 1.2V | FB |
| Pin 7      | 0V  | 1V  | COMP |
| Pin 8      | 0V  | 0V  | Gnd |

#### IC1005

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#### IC1006

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#### IC1007

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#### IC1008

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#### IC1009

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<tbody>
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<td>2.5V</td>
</tr>
</tbody>
</table>
Main PWB X400 X200 and X1000 Check

Microprocessor Crystal

X400 Location

X400 Location

X200 Location

MAIN PWB

2.4Vp/p
24Mhz

Set on or off

X200

Video Processor (BCM) Crystal

Use bottom of L206

Micronas Crystal

X1000 Location

X1000 Location

X400 Location

1Vp/p
20.25Mhz

Only when set is on

780mVp/p 54Mhz

Only when set is on
Main PWB LD803 Function

Use LD803 as a visual aid. This lets you know if the +5V is being converted to 3.3V for the BCM chip IC100. If LD803 is illuminated GREEN, +3.3V is OK.

Note: Only ½ of the dual LED is used.

Circuit turning on LD803 shown on next slide
Main PWB LD803 Circuit Details
For Easy Access, pop the shield off the tuner

If you leave the shield on you can still access the same pins. Be careful not to accidentally ground out your test lead on the shield.
(Note: This is a picture from a different model, but the concept is the same)
Main PWB Tuner Video and SIF Output Check

- **TU1**
  - 1: NC_1
  - 2: RF-AGC
  - 3: +B (5V)
  - 4: VTU
  - 5: NC_2
  - 6: GND
  - 7: SDA
  - 8: SCL
  - 9: AS
  - 10: DIGITAL_IF1
  - 11: DIGITAL_IF2
  - 12: IC_AG
  - 13: AUDIO_OUT
  - 14: SIF
  - 15: IF_AS
  - 16: VIDEO_OUT
  - Shield

**Pin 14 “SIF” Signal**
- 850mVp/p 20nSec rate

**Pin 16 “Video” Signal**
- 1Vp/p 20uSec rate

**Tuner Location**

**USING SMTE COLOR BAR SIGNAL INPUT**
Main PWB LVDS P1000 Output Check

To confirm that the Main PWB is outputting Picture Content signals, check P1000 (LVDS) cable for output. Check pins 11-22 and 27-38. This signals vary from each other, but looking for signals like the ones shown below on any of these pins will confirm the output of video content. This signal is using standard SMTE Color Bar output from a generator as the input source.

This is just a sample of two pins on the LVDS. There are 24 pins on P1000 carrying video.
**Main PWB LVDS P1001 Output Check**

To confirm that the Main PWB is outputting Picture Content signals, check P1001 (LVDS) cable for output. Check pins 1-12 and 15-26. This signals vary from each other, but looking for signals like the ones shown below on any of these pins will confirm the output of video content. This signal is using standard SMTE Color Bar output from a generator as the input source.

This is just a sample of two pins on the LVDS. There are 24 pins on P1001 carrying video.
# Main PWB Connector P800 Odd Pins Voltage and Resistance

## P800 CONNECTOR "Main" Odd Pins to P201 "SMPS PWB"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
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</thead>
<tbody>
<tr>
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<td>16V</td>
<td>0V</td>
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<td>OL</td>
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<td>3</td>
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<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<td>ST-5V</td>
<td>ST-5V</td>
<td>5.1V</td>
<td>1.48V</td>
</tr>
<tr>
<td>11</td>
<td>ST-5V</td>
<td>ST-5V</td>
<td>5.1V</td>
<td>1.48V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<td>*PWM-VBRA</td>
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<tr>
<td>23</td>
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<td>0V</td>
<td>OL</td>
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</table>

Pin 21 PWM-VBRA (ADIM) Is Fixed and is not used

Diode Mode values taken with all Connectors Removed
**Main PWB Connector  P800 Even Pins Voltage and Resistance**

### P800 CONNECTOR "Main" Even Pins to P201 "SMPS PWB"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
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</thead>
<tbody>
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<td>PWM-VBRB</td>
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<td>n/c</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
</tbody>
</table>

**Pin 22 PWM-VBRB** (VBR-B) can vary according to type of signal being processed, OSD Backlight setting. (0.9V 0% to 3.3V 100%) and the Intelligent Sensor. Output from the BCM chip.

Diode Mode values taken with all Connectors Removed
# Main PWB Connector P1000 “Odd Pins” Voltage and Resistance

Diode Mode values taken with all Connectors Removed

<table>
<thead>
<tr>
<th>Pin</th>
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<th>Diode Check</th>
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</table>
### Main PWB Connector P1000 “Even Pins” Voltage and Resistance

P1000 CONNECTOR "Main" Odd Pins to CN1 "T-CON PWB"

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<th>Run</th>
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- **Switched LVDS 12V**
- **Gnd**
- **n/c**
- **Video Signal Pins**
- **LVDS-SEL**
- **Video Signal Pins**
- **AFLC-EN**

Diode Mode values taken with all Connectors Removed
### Main PWB Connector P1001 Voltage and Resistance

#### P1001 “Odd Pins” to CN2 “T-CON PWB”

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#### P1000 “Even Pins” to CN2 “T-CON PWB”

<table>
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<tr>
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<td>1.27V</td>
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</table>

Pins identified in **Bold** and **Blue** are used to send video content to the T-CON PWB.

Diode Mode values taken with all Connectors Removed.
# Main PWB Connector P404 Voltage and Resistance

P404 Connector "MAIN PWB" to "Front PWB Assy"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
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<td>1.48V</td>
</tr>
<tr>
<td>9</td>
<td>Ready</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>10</td>
<td>IR</td>
<td>3.9V</td>
<td>3.9V</td>
<td>1.24V</td>
</tr>
<tr>
<td>11</td>
<td>EYEQ-Reset</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>13</td>
<td>Ready</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>14</td>
<td>PWB-Buzz</td>
<td>0V</td>
<td>0V</td>
<td>3V</td>
</tr>
<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Diode Mode values taken with all Connectors Removed
Main PWB Connector P501 Voltage and Resistance

P501 CONNECTOR "Main" to "Speakers"

<table>
<thead>
<tr>
<th>Pin</th>
<th>SBY</th>
<th>Run</th>
<th>Diode Check</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>0V</td>
<td>8V</td>
<td>2.58V</td>
</tr>
<tr>
<td>2</td>
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<td>3</td>
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</tr>
<tr>
<td>4</td>
<td>0V</td>
<td>8V</td>
<td>2.58V</td>
</tr>
</tbody>
</table>

Use speaker out to test for defective Audio Amp IC501

Diode Mode values taken with all Connectors Removed
The Touch Sensitive Power Switch, Intelligent Sensor and IR Sensor are located on the front of this PWB.

Light Diffuser for the Intelligent Sensor

IR Sensor

To Side Key Control PWB

To Main PWB
Front PWB Assembly (Front View) Layout

- Power LED
- IR Sensor
- Light Diffuser for the Intelligent Sensor
- 3 Sensors
- Sensor Close Up
### Front Control Connector J1 and J3 Voltage and Resistance

#### J1 CONNECTOR "Front Keys" to "MAIN PWB" P404

<table>
<thead>
<tr>
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<th>Run</th>
<th>Diode Check</th>
</tr>
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<tbody>
<tr>
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<td>3.25V</td>
<td>3.25V</td>
<td>OL</td>
</tr>
<tr>
<td>2</td>
<td>3.25V</td>
<td>3.25V</td>
<td>OL</td>
</tr>
<tr>
<td>3</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>4</td>
<td>0V</td>
<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>5</td>
<td>3.3V</td>
<td>3.3V</td>
<td>OL</td>
</tr>
<tr>
<td>6</td>
<td>3.3V</td>
<td>3.3V</td>
<td>OL</td>
</tr>
<tr>
<td>7</td>
<td>0V</td>
<td>3.3V</td>
<td>OL</td>
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<tr>
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<td>5V</td>
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<td>0V</td>
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</tr>
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<td>0V</td>
<td>0V</td>
<td>OL</td>
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<td>0V</td>
<td>OL</td>
</tr>
<tr>
<td>15</td>
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<td>0V</td>
<td>Gnd</td>
</tr>
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#### J3 from Ft Control to Side Key P100

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<th>Run</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
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<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>3.3V</td>
<td>3.3V</td>
</tr>
<tr>
<td>4</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>5</td>
<td>0.1V</td>
<td>0.1V</td>
</tr>
<tr>
<td>6</td>
<td>5.1V</td>
<td>5.1V</td>
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</tbody>
</table>

Diode Mode values taken with all Connectors Removed
This section shows the 11X17 foldout that’s available in the Paper and Adobe version of the Training Manual.
42LG70 LVDS P1000 WAVEFORMS

Waveforms taken using SMTP Color Bar input. All readings give the Scale 10mV and Time Base related to scope settings. Top waveform in each image gives a slower rate, 2us per division. Outlined area is shown in the bottom waveform at 500ns per division time base.
42LG70 LVDS P1001 WAVEFORMS

Waveforms taken using SMTP Color Bar input. All readings give the Scale 10mV and Time Base related to scope settings. Top waveform in each image gives a slower rate, 2us per division. Outlined area is shown in the bottom waveform at 500ns per division time base.
This concludes the 42LG70 training session.