Overview of Topics to be Discussed

Section 1

Contact Information, Preliminary Matters, Specifications, Plasma Overview, General Troubleshooting Steps, Disassembly Instructions, Voltage and Signal Distribution

Section 2

Circuit Board Operation, Troubleshooting and Alignment of:

- Switch mode Power Supply
- Y-SUS Board Delivers Logic Signals and FG5V to both upper and lower boards.
- Y-Drive Boards (2) Upper and Lower. Lower board delivers Scan to Upper
- Z-SUS Output Board (Also uses one Z-SUB board for bottom panel connector)
- Control Board
- X Drive Boards (3)
- Main Board
- Main Power Switch (Version 3). Shuts off standby 5V.
Overview of Topics to be Discussed

50PQ30 Plasma 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 Plasma 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.
Safety and Handling, Checking Points

Safety & Handling Regulations

1. Approximately 10 minute pre-run time is required before any adjustments are performed.
2. Refer to the Voltage Sticker inside the Panel when making adjustments on the Power Supply, Y-SUS and Z-SUS Boards.
3. Always adjust to the specified voltage level (+/- ½ volt) unless otherwise specified.
4. Be cautious of electric shock from the PDP module since the PDP module uses high voltage, check that the Power Supply and Drive Circuits are completely discharged because of residual current stored before Circuit Board removal.
5. C-MOS circuits are used extensively for processing the Drive Signals and should be protected from static electricity.
6. The PDP Module must be carried by two people. Always carry vertical NOT horizontal.
7. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
8. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.
9. New Panels and Frames are much thinner than previous models. Be Careful with flexing these panels. Be careful with lifting Panels from a horizontal position. Damage to the Frame mounts or panel can occur.
10. New Plasma models have much thinner cabinet assemblies and mounts. Be extremely careful when moving the set around as damage can occur.

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: Y Board Failure, Mal-discharge on screen, 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 LEDs 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 50PQ30 Advanced Single Scan Plasma Display Television.
50PQ30 Specifications

720P PLASMA HDTV
50” Class (50” diagonal)

- 720p HD Resolution
- 600 Hz sub field driving
- 1,500 cd/m2 Brightness
- Dual XD Engine™
- 2000,000:1 Dynamic Contrast Ratio
- Smart Energy Saving
- 3x HDMI™ V.1.3 with Deep Color (2 Rear, 1 side).
- AV Mode (Cinema, Sports, Game)
- Clear Voice
- LG SimpLink™ Connectivity
- Invisible Speaker System
- 100,000 Hours to Half Brightness (Typical)
- PC Input
600Hz Sub Field Driving

(600 Hz Sub Field Driving)

- 600 Hz Sub Field Driving is achieved by using 10 sub-fields per frame process (vs. Comp. 8 sub-field/frame)
- No smeared images during fast motion scenes

Sub Field firing occurs using wall charge and polarity differences between Y-SUS and Z-SUS signals.
Picture Wizard easily guides consumers through the calibration process using on-screen reference points.

Customers can customize picture performance without the need for additional expense.
**HD RESOLUTION 720p**

High definition television is the highest performance segment of the DTV system used in the US. It’s a wide screen, high-resolution video image, coupled with multi-channel, compact-disc quality sound.

**HDMI (1.3 Deep Color)**

HDMI (1.3 Deep color) provides a wider bandwidth (340MHz, 10.2Gbps) than that of HDMI 1.2, delivering a broader range of colors, and also drastically improves the data-transmission speed.

**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.
50PQ30 Remote Control

TOP PORTION

BOTTOM PORTION
50PQ30 Rear and Side Input Jacks

Software Upgrades

Music and Photos

USB

HDMI 3

AC In

SIDE INPUTS

REAR INPUTS

LG TRAINING CENTER

16 November 2009  50PQ30 Plasma
50PQ30 Dimensions

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

Power:
279W (Typical)
0.13W (Stand-By)

Weight:
74.3 lbs with Stand
68.8 lbs without Stand

Model No.
Serial No.
Label

Remove 4 screws to remove stand for wall mount

Published November 2009  50PQ30 Plasma
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 50PQ30 Advanced Single Scan Plasma Display Panel.

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

To remove the back cover, remove the 26 screws (The Stand does not need to be removed). Indicated by the arrows.

PAY CLOSE ATTENTION TO THE TYPE, SIZE AND LENGTH Of the screws when replacing the back cover. Improper type can damage the front.
Disassembly Procedure for Circuit Board Removal

Notes: 1) All Plugs listed are from left to right Pin 1,2, 3, ETC.
2) Remember to be cautious of ESD as some semiconductors are CMOS and prone to static failure.

Switch Mode Power Supply Board Removal

Disconnect the following connectors: P811, P813, SC101.
Remove the 8 screws holding the SMPS in place.
Remove the board.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Also, re-confirm VSC, -Vy and Z-Bias as well.

Y-SUS Board Removal

Disconnect the following connectors: P201, P206, P101, P202.
Remove the 8 screws holding the Y-SUS in place.
Remove the Y-SUS by lifting slightly to clear standoff and slide it to the right.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VSC, -Vy and Z-bias as well.

Y-Drive Boards Removal

Disconnect the following Flexible Ribbon Connectors: P101~P103 and/or P201~P203.
Disconnect the following connectors: P209 and/or P108.
Remove the 3 screws holding either of the Y-Drive boards in place.
Remove the Y-Drive by lifting slightly and sliding the board to the left unseating P106, P107, P109 and/or P205, P206 and P208 from the Y-SUS Board.

Note: Y, Z-SUS and Y-Drive boards are mounted on board stand-offs that have a small collar.
The board must be lifted slightly to clear these collars.
Disassembly Procedure for Circuit Board Removal (2)

**Z-SUS Board Removal**

Disconnect the following connectors: P100, P101.
Disconnect the following connectors: P104, P105 and P302. These are the FPC cables. Pull the locking caps to the right. Lift carefully the Flexible Printed Circuits (FPCs) and slide them out to the right.
Remove the 5 screws holding the Z-SUS in place and the one holding the Z-SUB in place.
Lift the Z-SUS up and remove the board. Remove the Z-SUB by pulling it off the Z-SUS.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VS, -Vy and Z-bias as well.

**Main Board Removal**

Disconnect the following connectors: P1001, P1003, P1005 and P1006.
Remove the 1screws holding on the decorative plastic piece on the right side.
Remove the 4 screws holding the Main board in place and Remove the board.

**Control Board Removal**

Disconnect the following connectors: P121 LVDS, P101, P161 Ribbon, P162 Ribbon by lifting up the locking tab. Remove the 4 screws holding the Control board in place Remove the board.

**Front Key and LED Board Removal**

Remove the 2 screws holding the Key board in place. Remove the board by releasing the two black tabs and lifting the board upward. Disconnect P101.
(Note: LED board is behind the Key board. Remove it’s 2 screws and remove.
Disconnect J1 and J2.
Lay the Plasma down carefully on a padded surface.
Make sure AC is removed and remove the Back Cover and the Stand.
Carefully remove the LVDS Cable P121 from the Control Board by pressing the Locking Tabs together and pull the connector straight back to remove the cable. (This prevents possible damage). See illustration below.

(A) Remove the Stand (4 Screws removed during back removal).
(B) Remove the Stand Metal Support Bracket (5 Screws).
(C) Remove connector P1001 to Front IR board and P1005 to the Speakers.
(D) Remove the 4 screws from the Main Board Mounting Bracket. Carefully reposition the Main Board and Mounting Bracket up and off to the right side.
(E) Remove the metal support Braces marked “E”. Note: There is a Left and a Right brace. (3 Screws per/bracket).
(F) Remove the 9 screws holding the Heat Sink. (Warning: Never run the set with this heat sink removed).

X-DRIVE LEFT, CENTER AND RIGHT REMOVAL:
Disconnect all TCP ribbon cables from the defective X-Drive board. Remove the 3 screws in either the Left or Right X-Drive board or the 4 screws holding the Center X-Drive in place.
Remove the board. Reassemble in reverse order. Recheck Va / Vs / VScan / -VY / Z-Drive.
Getting to the X Circuit Boards

Warning: Never run the TV with the TCP Heat Sink removed

Warning Shorting Hazard: Conductive Tape. Do not allow to touch energized circuits.
**Left and Right X Drive Removal**

After removing the back cover, the Main board is lifted out of the way, the 9 screws removed from heat sink covering the TCPs and connectors to the TCPs are removed, the X-Drive boards can be removed.

There may be tape on the connectors P231 or P232

Remove tape (if present) and Gently pry the locking mechanism upward and remove the ribbon cable from the connector.

**Removing Connectors to the TCPs.**

Gently lift the locking mechanism upward on all TCP connectors

- Left X: P101~105
- Center X: P201~206
- Right X: P301~305

Carefully lift the TCP ribbon up and off. It may stick, be careful not to crack TCP. (See next page for precautions)
TCP (Tape Carrier Package) Generic Removal Precautions

TCP Connector Removal

Lift up the lock as shown by arrows. (The Lock can be easily broken. It needs to be handled carefully.)

The TCP has two small tab on each side which have to be lifted up slightly to pull the connector out. Note: TCP is usually stuck down to the heat transfer material, be very careful when lifting up on the TCP ribbon cable.

Pull TCP apart as shown by arrow. (TCP Film can be easily damaged. Handle with care.)
Left and Right X Drive Removal

Remove the 3 screws for either left or right board or 4 for the center. 8 total for all three.
(The screws between the boards, secures both boards)

The Left X Board drives the right side of the screen vertical electrodes

The Center X Board drives the Center of the screen vertical electrodes

The Right X Board drives the left side of the screen vertical electrodes
CIRCUIT OPERATION, TROUBLESHOOTING AND CIRCUIT ALIGNMENT SECTION

50PQ30 Plasma Display

This Section will cover Circuit Operation, Troubleshooting and Alignment of the Power Supply, Y-SUS Board, Y-Drive Boards, Z-SUS Board, Control Board, Main Board and the X Drive Boards.

At the end of this Section the technician should understand the operation of each circuit board and how to adjust the controls. The technician should be able with confidence to troubleshoot a circuit board failure, replace the defective circuit and perform all necessary adjustments.
Panel Label Explanation

(1) Panel Model Name
(2) Bar Code
(3) Manufacture No.
(4) Adjusting Voltage DC, Va, Vs
(5) Adjusting Voltage (Set Up / -Vy / Vsc / Ve / Vzb)
(6) Trade name of LG Electronics
(7) Manufactured date (Year & Month)
(8) Warning
(9) TUV Approval Mark
(10) UL Approval Mark
(11) UL Approval No.
(12) Panel Model Name
(13) Max. Watt (Full White)
(14) Max. Volts
(15) Max. Amps
**Adjustment Notice**

All adjustments (DC or Waveform) are adjusted in WHITE WASH. 
Customer’s Menu, Select “Options”, select “ISM” select “WHITE WASH”.

It is critical that the DC Voltage adjustments be checked when:
1) SMPS, Y-SUS or Z-SUS board is replaced.
2) Panel is replaced, Check Va/Vs since the SMPS does not come with new panel
3) A Picture issue is encountered
4) As a general rule of thumb when ever the back is removed

**ADJUSTMENT ORDER “IMPORTANT”**

**DC VOLTAGE ADJUSTMENTS**
1) POWER SUPPLY: Va Vs (Always do first)
2) Y-SUS: Adjust –Vy, Vscan,
3) Z-SUS: Adjust Z-Bias (VZB)

**WAVEFORM ADJUSTMENTS**
1) Y-SUS: Set-Up, Set-Down

Remember, the Voltage Label MUST be followed, it is specific to the panel’s needs.

The Waveform adjustment is only necessary
1) When the Y-SUS board is replaced
2) When a “Mal-Discharge” problem is encountered
3) When an abnormal picture issues is encountered

Model : PDP 50G2####
Voltage Setting: 5V / Va:60V / Vs:193V
N.A. / -185 / 133 / N.A. / 80
Max Watt : 350 W (Full White)

All label references are from a specific panel. They are not the same for every panel encountered.


**SWITCH MODE POWER SUPPLY SECTION**

This Section of the Presentation will cover troubleshooting the Switch Mode Power Supply for the Single Scan Plasma. Upon completion of the section the technician will have a better understanding of the operation of the Power Supply Circuit and will be able to locate voltage and test points needed for troubleshooting and alignments.

- DC Voltages developed on the SMPS
- Adjustments VA and VS.

- Always refer to the Voltage Sticker located on the back of the panel, in the upper Left Hand side for the correct voltage levels for the VA, VS, -VY, Vscan, and Z Bias as these voltages will vary from Panel to Panel even in the same size category.
- Set-Up and Ve are just for Label location identification and are not adjusted in this panel.

**SMPS P/N** EAY58316301

Check the silk screen label on the top center of the Power Supply board to identify the correct part number. (It may vary in your specific model number).

On the following pages, we will examine the Operation of this Power Supply.
EXAMPLE: Voltage Label. Use the voltage label off your specific panel for adjustments.

Hot Ground Symbol represents a SHOCK Hazard

Model: PDP 50G2####
Voltage Setting: 5V / Va: 60V / Vs: 193V
N.A. / -185 / 133 / N.A. / 80
Max Watt: 350 W (Full White)
## Switch Mode Power Supply Overview

### The Switch Mode Power Supply Board Outputs to the:

<table>
<thead>
<tr>
<th>Y-SUS Board</th>
<th>VA</th>
<th>Primarily responsible for Display Panel Vertical Electrodes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VS</td>
<td>Drives the Display Panel’s Horizontal Electrodes</td>
</tr>
<tr>
<td>M5V</td>
<td></td>
<td>Used to develop Bias Voltages on the Y-SUS, X Drive, and Control Boards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Board</th>
<th>STBY 5V</th>
<th>Microprocessor Circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17V</td>
<td>Audio B+ Supply</td>
</tr>
<tr>
<td></td>
<td>12V</td>
<td>Tuner B+ Circuits</td>
</tr>
<tr>
<td></td>
<td>5V</td>
<td>Signal Processing Circuits</td>
</tr>
</tbody>
</table>

### Adjustments

There are 2 adjustments located on the Power Supply Board VA and VS. The 5V VCC is pre-adjusted and fixed. All adjustments are made with relation to Chassis Ground. Use “Full White Raster” 100 IRE.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VA</td>
<td>RV502</td>
</tr>
<tr>
<td>VS</td>
<td>RV901</td>
</tr>
</tbody>
</table>
Power Supply Circuit Layout

- **PFC Circuit**
- **Primary Source**
- **VA Source**
- **VS Source**
- **17V Source**

- **Main Bridge Rectifier**
- **Fuse F801 (1Amp/250V)**
- **Fuse F302 (1Amp/250V)**
- **Bridge Rectifier**
- **STBY 5V 5V, 12V Source**
- **AC Input SC 101**
- **VA VR502**
- **IC701 Sub Micon**
- **Main Fuse F101 (10Amp/250V)**
- **P811 To Y-SUS**
- **P813 To MAIN**

**Power Supply Components**

- **4Amp/250V**
- **123V Stby 382V Run**
- **160V Stby 382V Run**
Power Supply Basic Operation

AC Voltage is supplied to the SMPS Board at Connector SC101 from the AC Input assembly. Standby 5V is developed from 160V source supply (which during run measures 380V measured from the primary fuse F302). This supply is also used to generate all other voltages on the SMPS.

The STBY5V (standby) is B+ for the Controller (IC701) on the SMPS and output at P813 pins 11 and 23 then sent to the Main board for Microprocessor (IC1) operation. AC Detect is generated on the SMPS, by rectifying a small sample of the A/C Line at D102 and associated circuitry and routed to the Controller (IC701) where it outputs at pin 15 and sent to P813 pin 18 to the Main Board where it is sensed and monitored by the Main Microprocessor (IC1). The AC Det in this set works differently than most. If AC Det is missing the Microprocessor will turn off the television in about 10 seconds after turn on. This will happen each time turn on is attempted.

A new feature included on the side keypad is called a Main Power Switch which opens a ground allowing the “Key On” line of P813 Pin 24 to go high, turning off the 5V STB line defeating the Micro Processor (IC1) on the Main Board and Remote Control Operation.

When the Microprocessor (IC1) on the Main Board receives an “ON” Command from either the Power button or the Remote IR Signal, it outputs a high called RL ON at Pin 19 of P813. This command causes the RelaY-Drive Circuit to close both Relays RL102 and RL103 bringing the PFC source up to full power by increasing the 160V standby to 380V run which can be read measuring voltage at Fuse F302 and F801 from “Hot” Ground. At this time the run voltages 12V, and +5V sources become active and are sent to the Main Board via P813 (12V at pins 5 and 6 and 5V at pins 9,10, and 12). The 5V detect line from the SMPS Board to the Main Board can be measured at pin 17 of P813. It is not used.

The next step is for the Microprocessor (IC1) on the Main Board to output a high on M5V ON Line to the SMPS at P813 Pin 21 which is sensed by the Controller (IC701) turning on the M5V line and output at P811 pins 9 and 10 to the Y-SUS board P201 pins 9, 10. Then it is routed to the Control and Z-SUS boards.

Full Power occurs when the Microprocessor (IC1) on the Main Board brings the VS-ON line high at Pin 20 of P813 of the SMPS Board. VS-ON is routed to the Controller (IC701) which turns on the 17V Audio, VA, and the VS supplies. VA and VS output at P811 to the Y-SUS board. (VA pins 6 and 7 and VS pins 1 and 2). The 17V Audio supply outputs to the Main board at P814 pins 1 and 2 and used for Audio processing and amplification.

AUTO GND Pin 22 of P813: This pin is grounded on the Main board. When it is grounded, the Controller IC701 works in the normal mode, meaning it turns on the power supply via commands sent from the Main board. When this pin is floated (opened), it pulls up and turns the Controller IC701 on in the Auto mode. In this state, the Controller turns on the power supply in stages automatically. A load is necessary to perform a good test of the SMPS if the Main board is suspect.
Standby 5V will not be output if the Main Power Switch is off.

In Stand-By Primary side is 160V/123V
In Run (Relay On) Primary side is 386V

50PQ30 POWER SUPPLY START UP SEQUENCE

POWER SUPPLY (SMPS)

AC In

Stand By 5V Reg

5V Mnt.

5V/12V Regulators

RL On

17V Reg

17V On

5V Mnt.

17V Audio

12V Tuner

B+ stepped down to 5V

Video Processing

At point TV is in Stand-By state.

It is Energy Star Compliant.

Less than 1 Watt

FG5V Floating Gnd 5V

Y DRIVE

Upper

Y DRIVE

Lower

CONTROL

Y-SUS

Z-SUS

17V Audio

17V M5V

3.3V

5V

17V

17V

+5V

HDMI EDID

Relay On

Relay On

AC Det.

If missing, the set will turn off in 10 seconds.

3.3V Reg IC301

AC-Det

Microprocessor (BCM) IC1

Power On IR

Power On

Front IR Board

Remote Or Key

Power Button

Published November 2009 50PQ30 Plasma
**Power Supply Va and Vs Adjustments**

**Important: Use the Panel Label**
Not this book for all voltage adjustments.

**Use Full White Raster “White Wash”**

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**Va TP**
- P811
- Pin 6 or 7

**Vs TP**
- P811
- Pin 1 or 2

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**Example Voltage Label**
- Model: PDP 42G2####
- Voltage Setting: 5V / Va: 60V / Vs: 194V
- N.A. / -175 / 140 / N.A. / 80
- Max Watt: 330 W (Full White)

**Va Adjust**
- Place voltmeter on pin 6 or 7 of P811. Adjust VR502 until the reading matches your label.

**Vs Adjust**
- Place voltmeter on pin 1 or 2 of P811. Adjust VR901 until the reading matches your label.
Using two 100 Watt light bulbs, attach one end to Vs and the other end to ground. Apply AC to SC101. If the light bulbs turn on and VS is the correct voltage, allow the SMPS to run for several minutes to be sure it will operate under load. If this test is successful and all other voltages are generated, you can be fairly assured the power supply is OK.

Note: To be 100% sure, you would need to read the current handling capabilities of each power supply listed on the silk screen on the SMPS and place each supply voltage under the appropriate load.

Note: This SMPS will run without a load, however if the Vs is not loaded, the 17V may pulsate up and down. It is always best to test the SMPS under a load using the 2 light bulbs.
Power Supply Static Test (Forcing on the SMPS in stages)

(A) Ground the Auto Ground (Pin 22) on P813.

(B) When AC Power is applied, Check AC_Det (Pin 18) and 5V Stand-By (Pins 12 and 23) are 5V.

(C) 100Ω ¼ watt resistor added from STBY 5V (Pins 12 or 23) (Note pins 9~11 are not on yet) to RL_ON (Pin 19) closes relay RL101 and RL103 turning on the 5V and 12V Supplies.

(D) 100Ω ¼ watt resistor added from 5V (Pins 9 ~ 11) to M5 ON (Pin 21) brings the M5V (P811 pins 9, 10) line high.

(E) 100Ω ¼ watt resistor added from STBY 5V (Pins 9 ~ 11) to VS ON (Pin 20) brings the
- 17V (P813 pins 1 and 2) lines high.
- VA and VS (P811 pins 1 and 2 Vs and Pins 6 and 7 Va) lines high.

WARNING: Remove AC when adding or removing any plug or resistor.

P811 disconnected from the Y-SUS or the SMPS.

P1006 disconnected from the Main board.

Use the holes in the connector P1006 side to insert the resistor or jumper leads.
# Connector P813 Identification, Voltages and Diode Check

## P813 CONNECTOR “SMPS” to “Main” P1006

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a17V</td>
<td>0V</td>
<td>17.3V</td>
<td>2.2V</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>b12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>b5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>11</td>
<td>b5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>17</td>
<td>5V Det</td>
<td>.15V</td>
<td>5V</td>
<td>Open</td>
</tr>
<tr>
<td>19</td>
<td>RL On</td>
<td>0V</td>
<td>3.73V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>M5 ON</td>
<td>0V</td>
<td>3.24V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Stby 5V</td>
<td>5V</td>
<td>5V</td>
<td>Open</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>a17V</td>
<td>0V</td>
<td>17.3V</td>
<td>2.2V</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>b12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>b5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>12</td>
<td>Stby 5V</td>
<td>5V</td>
<td>5V</td>
<td>1.13V</td>
</tr>
<tr>
<td>14</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>16</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Not Used</td>
</tr>
<tr>
<td>18</td>
<td>AC Det</td>
<td>5V</td>
<td>5V</td>
<td>Open</td>
</tr>
<tr>
<td>20</td>
<td>VS On</td>
<td>0V</td>
<td>3.2V</td>
<td>Open</td>
</tr>
<tr>
<td>22</td>
<td>Auto Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>24</td>
<td>cKey On</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

- **aNote:** The 17V turns on when the VS On command arrives.
- **bNote:** The 5V/12V turns on when the RL On command arrives.
- **cNote:** If the Key On line is 4.39V, the Main Power Switch is open. Stand-By 5V will shut off.

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
## Connector SC101 and P811 Identification, Voltages and Diode Check

### SC101 AC INPUT

<table>
<thead>
<tr>
<th>Connector</th>
<th>Pin Number</th>
<th>Standby</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC101</td>
<td>1 and 3</td>
<td>120VAC</td>
<td>120VAC</td>
<td>Open</td>
</tr>
</tbody>
</table>

### P811 CONNECTOR "Power Supply" to Y-SUS "P201"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>Vs</td>
<td>0V</td>
<td>*194V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>4, 5</td>
<td>Gnd</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>6, 7</td>
<td>Va</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>9, 10</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>0.86V</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
Y-SUS BOARD SECTION (Overview)

Y-SUS Board develops the V-Scan drive signal to the Y-Drive boards.

This Section of the Presentation will cover troubleshooting the Y-SUS Board for the Single Scan Plasma. Upon completion of the Section the technician will have a better understanding of the operation of the circuit and will be able to locate voltage and Diode mode test points needed for troubleshooting and alignments.

- Adjustments
- DC Voltage and Waveform Checks
- Diode Mode Measurements

Operating Voltages

<table>
<thead>
<tr>
<th>SMPS Supplied</th>
<th>VA</th>
<th>VA supplies the Panel Vertical Electrodes (Routed to the Left X-Board)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>VS</td>
<td>VS Supplies the Panel Horizontal Electrodes (Also routed to the Z-SUS board)</td>
</tr>
<tr>
<td>M5V</td>
<td>5V</td>
<td>5V Supplies Bias to Y-SUS (Then Routed to the Control board and Z-SUS board)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y-SUS Developed</th>
<th>-VY VR502</th>
<th>-VY Sets the Negative excursion of the Y-SUS Drive Waveform</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VSC VR501</td>
<td>VSC Set the amplitude of the complex waveform.</td>
</tr>
<tr>
<td></td>
<td>V SET UP VR601</td>
<td>SET UP sets amplitude of the Top Ramp of the Drive Waveform</td>
</tr>
<tr>
<td></td>
<td>V SET DN VR602</td>
<td>SET DOWN sets the Pitch of the Bottom Ramp of the Drive Waveform</td>
</tr>
<tr>
<td></td>
<td>15V</td>
<td>To the Control Board then routed to the Z-SUS board</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Floating Ground</th>
<th>FG 5V</th>
<th>Used on the Y-Drive boards (Measured from Floating Gnd)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FG 15V</td>
<td>Used in the Development of the V-Scan signal (Measured from Floating Gnd)</td>
</tr>
</tbody>
</table>
Simplified Block Diagram of Y-Sustain Board

- **Power Supply Board - SMPS**
  - Distributes Vs and M5V
  - Distributes Vs, Va and M5V

- **Control Board**
  - Distributes 15V
  - Distributes 15V and 5V

- **Z-SUS Board**
  - Distributes 15V

**Left X Board**
- Distributes VA
- Circuits generate Y-Sustain Waveform
- FETs amplify Y-Sustain Waveform
- Logic signals needed to scan the panel

**Y-Drive Boards**
- Receive Scan Waveform
- Logic signals needed to generate drive waveform

**Y-Drive Boards**
- Receive Scan Waveform
- Logic signals needed to generate drive waveform

**Y-SUS Board**
- Generates Vsc and -Vy from M5V by DC/DC Converters
  - Also controls Set Up/Down
- Generates Floating Ground 5V by DC/DC Converters
- Distributes Vs and M5V

**Display Panel**
- Logic signals needed to scan the panel

**Display Panel**
- Logic signals needed to scan the panel

**Display Panel**
- Logic signals needed to scan the panel
VSC and -VY Adjustments

These are DC level Voltage Adjustments

Voltage Reads Positive

Set should run for 15 minutes, this is the “Heat Run” mode.
Set screen to “White Wash”.
Adjust –Vy to Panel Label voltage (+/- 1V)
Adjust VSC to Panel Label voltage (+/- 1V)

Lower Center of board
Just below Heat Sinks
Y-Drive Upper Test Point (Bottom of Board)

Overall signal observed 4mS/div

There are several other test points on either the Upper or Lower Y-Drive boards that can be used. Basically any output pin on any of the FPC to the panel are OK to use.

Highlighted signal from waveform above observed 400uS/div

Highlighted signal from waveforms above observed 100uS/div

NOTE: The Waveform Test Points are fragile. If by accident the land is torn and the run lifted, make sure there are no lines left to right in the screen picture.

Y-Drive Lower Test Point (Top of Board)

80VRms

516V p/p

100uS

NOTE: The Waveform Test Points are fragile. If by accident the land is torn and the run lifted, make sure there are no lines left to right in the screen picture.
Observing (Capturing) the Y-Drive Signal for Set Up Adjustment

Fig 1:
As an example of how to lock in to the Y-Drive Waveform. Fig 1 shows the signal locked in at 4ms per/div. Note the 2 blanking sections. The signal for SET-UP is outlined within the Waveform.

Fig 2:
At 2mSec per/division, the waveform to use for SET-UP is now becoming clear. Now, the two blanking signal are still present.

Fig 3:
At 400us per/div. the signal for SET-UP is now easier to recognize. It is outlined within the Waveform. Remember, this is the first large signal to the right of blanking.

Fig 4:
At 40uSec per/division, the adjustment for SET-UP can be made. It will make this adjustment easier if you use the “Expanded” mode of your scope.

Set must be in “WHITE WASH”
All other DC Voltage adjustments should have already been made.
**Observing (Capturing) the Y-Drive Signal for Set Up Adjustment**

**Fig 1:**
As an example of how to lock in to the Y-Drive Waveform. Fig 1 shows the signal locked in at 4ms per/div. Note the 2 blanking sections. The signal for **SET-DN** is outlined within the Waveform.

**Fig 2:**
At 2mSec per/division, the waveform to use for **SET-DN** is now becoming clear. Now the two blanking signals are still present.

**Fig 3:**
At 400us per/div. the signal for **SET-DN** is now easier to recognize. It is outlined within the Waveform. Remember, this is the first large signal to the right of blanking.

**Fig 4:**
At 20uSec per/division, the adjustment for **SET-DN** can be made. It will make this adjustment easier if you use the “Expanded” mode of your scope.

Set must be in “WHITE WASH”
All other DC Voltage adjustments should have already been made.
Set Up and Set Down Adjustments

Set must be in “WHITE WASH”
All other DC Voltage adjustments should have already been made.

Observe the Picture while making these adjustments. Normally, they do not have to be done.

**Set Up Adjust:**
1) Adjust VR601 and set the (A) portion of the signal to match the waveform above. (150V ± 5V)

**Set-DN Adjust:**
2) Adjust VR401 and set the (B) time of the signal to match the waveform above. (100uSec ± 5uSec)
Set Up Adjustment Too High or Low

Set Up swing is Minimum 80V Max 200V

Ramp (SET UP) Too High (200V)
Full Counter Clock Wise

Ramp (SET UP) Too Low (80V)
Full Clock Wise

Panel Waveform Adjustment

The center begins to wash out and arc due to SET UP

Very little alteration to the picture, the wave form indicates a distorted SET UP. The peek widens due to the SET UP peeking too quickly.
Panel Waveform Adjustment

**Set Down Adjustment Too High or Low**

*Set Dn* swing is Minimum 73uS Max 166uS+

**Note:** If *Set DN* too high, this set may go excessive bright, then shutdown. If this happens, remove the LVDS from Control board and make necessary adjustments. Then reconnect LVDS select White Wash and adjust correctly.

All of the center washes out due to increased *SET_DN* time.

The center begins to wash out and arc due to decreased *SET DN* time.
Y-SUS How to Check the Output FETs (1 of 2)

Name is printed on the components. Readings “In Circuit”.

<table>
<thead>
<tr>
<th>Component</th>
<th>Shown</th>
<th>Reverse</th>
</tr>
</thead>
<tbody>
<tr>
<td>45F122 Q34</td>
<td>0.6V</td>
<td>1.64V</td>
</tr>
<tr>
<td></td>
<td>0.38V</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>2.02V</td>
<td>Open</td>
</tr>
<tr>
<td>RJP4584 Q32</td>
<td>0.69V</td>
<td>0.67V</td>
</tr>
<tr>
<td></td>
<td>0.483V</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>1.09V</td>
<td>Open</td>
</tr>
<tr>
<td>K3667 *Q18 Q31</td>
<td>0.59V~0.6V</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>0.5V</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>Open</td>
<td>2.18V</td>
</tr>
<tr>
<td>RF2001 D31 D32 D33 D34 D36 D717</td>
<td>Shorted</td>
<td>Shorted 0.3 Ohms</td>
</tr>
<tr>
<td></td>
<td>0.37V~0.38V</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td>0.37~0.38V</td>
<td>Open</td>
</tr>
</tbody>
</table>
Y-SUS How to Check the Output FETs (2 of 2)

Name is printed on the components. Readings “In Circuit”.

- **I4F14229**
  - Q16: Shown: 0.876V, Reverse: 1.56V
  - Q17: Shown: 0.46V, Reverse: Open

- **30J124**
  - Q11: Shown: 0.668V, Reverse: 0.6V
  - Q12: Shown: 0.392V, Reverse: Open
  - Q13: Shown: 0.998V, Reverse: Open

- **RF020**
  - D11: Shown: Shorted, Reverse: Shorted (0.3 Ohm)
  - Shown: 0.392V, Reverse: Open
Y-SUS Board P207 (Bottom Connector) Explained

TIP: Use P207 pins 1 or 2 or the Right Side of C213 to test for Y Scan signal if the Y-Drive boards are removed.

P207 Pins 1 and 2 Y Scan signal

Y-SUS Board

Y-Drive Lower Board

Bottom Connector P207

C213

FL201

P207

P205

11) V Scan

10) V Scan

9) n/c

8) 5V VF

7) 5V VF

6) Ground (F)

5) STB

4) OC1

3) DATA

2) OC2

1) Ground (F)

FG5V measured from Pins 7 or 8 Floating Gnd Pins 1 or 6

P207 Pins 2, 3, 4, and 5 are Logic (Drive) Signals to the Y-Drive lower. P209 carries the Y-Drive signals to the upper via P108.

400V p/p (No Y-Drives)

440V p/p (With Y-Drives)
**Y-SUS P207 (Drive Output Plug) Diode Mode Testing**

**Checking the Y-SUS Board P207**

NOTE: Disconnected from the Y-DRIVE boards

<table>
<thead>
<tr>
<th>Y-Drive Sig</th>
<th>12) V Scan</th>
<th>11) V Scan</th>
<th>10) n/c</th>
<th>9) 5V VF</th>
<th>8) 5V VF</th>
<th>7) Ground (F)</th>
<th>6) CLK</th>
<th>5) STB</th>
<th>4) OC1</th>
<th>3) DATA</th>
<th>2) OC2</th>
<th>1) Ground (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED LEAD Blk Lead FG</td>
<td>Open</td>
<td>Open</td>
<td>Open</td>
<td>1.9V</td>
<td>1.9V</td>
<td>0V</td>
<td>1.43V</td>
<td>1.43V</td>
<td>1.43V</td>
<td>1.53V</td>
<td>1.53V</td>
<td>1.43V</td>
</tr>
<tr>
<td>BLACK LEAD Red Lead FG</td>
<td>Open</td>
<td>Open</td>
<td>Open</td>
<td>0.557V</td>
<td>0.557V</td>
<td>0V</td>
<td>0.66V</td>
<td>0.66V</td>
<td>0.68V</td>
<td>0.66V</td>
<td>0.68V</td>
<td>0.68V</td>
</tr>
</tbody>
</table>

**Meter in the Diode Mode**

Y-Drive Board should be disconnected for this test.
Y-SUS Board P209 (Top Connector) Explained

P209 Pins 7, 8, 9, and 10 are Logic Signals from the Control board routed through the Y-SUS to the Y-Drive upper.

Between the Y-Drive upper and lower is P209, P108 which carries the Y-Drive (Scan) signals from the lower to the upper.

FG5V (+5V F) measured from Pins 4 or 5 to Floating Gnd
Pins 1~3, 6 or 11
Y-SUS P209 Diode Mode Testing

Checking the Y-SUS Board P209
NOTE: Disconnected from the Y-DRIVE boards

<table>
<thead>
<tr>
<th>Reading from Floating Ground (Pin 1~3)</th>
<th>RED LEAD Blk Lead FG</th>
<th>BLACK LEAD Red Lead FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating Gnd</td>
<td>12) Ground (F)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>11) DATA</td>
<td>1.53V</td>
</tr>
<tr>
<td></td>
<td>10) OC1</td>
<td>1.43V</td>
</tr>
<tr>
<td></td>
<td>9) STB</td>
<td>1.53V</td>
</tr>
<tr>
<td></td>
<td>8) CLK</td>
<td>1.43V</td>
</tr>
<tr>
<td></td>
<td>7) STB</td>
<td>1.43V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>6) Ground (F)</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>5) 5V VF</td>
<td>1.94V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>4) 5V VF</td>
<td>1.94V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>3) Ground (F)</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>2) Ground (F)</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>1) Ground (F)</td>
<td>0V</td>
</tr>
</tbody>
</table>

Y-Drive Board should be disconnected for this test.
# Y-SUS P201 to SMPS P812 Plug Information

Voltage and Diode Mode Measurement

## P201 CONNECTOR "Y-SUS" to "Power Supply" P811

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vs</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Vs</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>Va</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Va</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>0.86V</td>
</tr>
<tr>
<td>10</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>0.86V</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
**Y-SUS P202 to X Drive P122 Plug Information**

Voltage and Diode Mode Measurements for the Y-SUS Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
</tr>
<tr>
<td>5</td>
<td>VA</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>VA</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>VA</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
**Y-SUS P206 to Z Drive P101 Plug Information**

Voltage and Diode Mode Measurements for the Y-SUS Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>0.86V</td>
</tr>
<tr>
<td>3-6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
</tr>
<tr>
<td>8, 9</td>
<td>Er Com</td>
<td>0V</td>
<td>*89V</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
</tr>
<tr>
<td>11, 12</td>
<td>VS</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
**P101 Y-SUS 15V and 5V to Control board P111 Information**

Voltage Measurements for the Y-SUS Board

Y-SUS Board B+ checks for the P101 connector.

**FS201**
5V to run the Control Board.
Leaves the Control Board on P101 pins 4~7.
Can also be checked at J843 M5V TP.
Standby: 0V    Run: 5V
Diode Check: 0.86V

**FS501 and 15V Test Point**
15V to run the Z-SUS Board.
Routed out P101 to the Control Board.
Leaves the Control Board on P101 pins 11 and 12.
Can also be checked at J642 15V TP.
Standby: 0V    Run: 15V
Diode Check: Open

Location: Just below P201
Location: Bottom Center Right
Y-SUS Floating Ground (15V) and (5V) Checks

Voltage Measurements for the Y-SUS Board

Floating Ground checks must be made from Floating Ground. Use any pin on P204, P203, P205 or P208.

FG5V Test Point
Floating Ground referenced 5V. Used for low voltage signal processing on the Y-Drive board. Leaves the Y-SUS board on P207 pins 8 and 9. AND P209 pins 5 and 5. Checked at J795 (+5V (F) Test Point.

Standby: 0V  Run: 5V  Diode Check: 1.94V

FG15V Test Point
FG15V to develop the Y-Drive signal.

Checked at J644 (+15V (F) Test Point.

Standby: 0V  Run: 15.2V  Diode Check: 1.5V

Floating Ground J643

Location: Bottom Center of the two large black heat sinks.
Y-SUS P101 to Control P111 Plug Information (Tip)

“Y-SUS” P101 CONNECTOR to “Control board” P111
(30 Pin Connector)

With Ribbon Cable

Without Ribbon Cable

Pin 1

Only Odd pins are easily accessible with Ribbon Cable inserted

Pin 29

TIP:
For Voltage readings,
Check Odd pins on Y-SUS board
Check Even pins on Control board

See next page
For Voltage readings

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
# Y-SUS P101 to Control P111 Plug Voltage Checks

## “Y-SUS” P101 CONNECTOR to “Control” P111

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15V</td>
<td>17.04V</td>
<td>1.37V</td>
</tr>
<tr>
<td>3</td>
<td>15V</td>
<td>17.04V</td>
<td>1.37V</td>
</tr>
<tr>
<td>5</td>
<td>5V</td>
<td>5V</td>
<td>2V</td>
</tr>
<tr>
<td>7</td>
<td>5V</td>
<td>5V</td>
<td>2V</td>
</tr>
<tr>
<td>9</td>
<td>CTRL_OE</td>
<td>0.1V</td>
<td>1.3</td>
</tr>
<tr>
<td>11</td>
<td>Gnd (Y Enable)</td>
<td>0V</td>
<td>1.78V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>Delta VY Det</td>
<td>1.99V</td>
<td>0.9V</td>
</tr>
<tr>
<td>17</td>
<td>Set On</td>
<td>0.5V</td>
<td>0.9V</td>
</tr>
<tr>
<td>19</td>
<td>Det Level Sel</td>
<td>1.29V</td>
<td>0.9V</td>
</tr>
<tr>
<td>21</td>
<td>Slope Rate Sel</td>
<td>0.17V</td>
<td>0.9V</td>
</tr>
<tr>
<td>23</td>
<td>ER DN</td>
<td>0.114V</td>
<td>0.9V</td>
</tr>
<tr>
<td>25</td>
<td>SUS DN</td>
<td>2.6V</td>
<td>0.9V</td>
</tr>
<tr>
<td>27</td>
<td>ER UP</td>
<td>0.14V</td>
<td>0.9V</td>
</tr>
<tr>
<td>29</td>
<td>YSUS UP</td>
<td>0.11V</td>
<td>0.9V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>15V</td>
<td>17.04V</td>
<td>1.37V</td>
</tr>
<tr>
<td>4</td>
<td>5V</td>
<td>4.95V</td>
<td>2V</td>
</tr>
<tr>
<td>6</td>
<td>5V</td>
<td>4.95V</td>
<td>2V</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>OE</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>14</td>
<td>OC2</td>
<td>1.82V</td>
<td>0.9V</td>
</tr>
<tr>
<td>16</td>
<td>Data</td>
<td>0V</td>
<td>0.9V</td>
</tr>
<tr>
<td>18</td>
<td>OC1</td>
<td>1.44V</td>
<td>0.9V</td>
</tr>
<tr>
<td>20</td>
<td>STB</td>
<td>1.45V</td>
<td>0.9V</td>
</tr>
<tr>
<td>22</td>
<td>CLK</td>
<td>0.6V</td>
<td>0.9V</td>
</tr>
<tr>
<td>24</td>
<td>SET UP</td>
<td>024V</td>
<td>0.9V</td>
</tr>
<tr>
<td>26</td>
<td>Ramp Slope OPT 1</td>
<td>3.12V</td>
<td>0.9V</td>
</tr>
<tr>
<td>28</td>
<td>Blocking</td>
<td>1.1V</td>
<td>0.9V</td>
</tr>
<tr>
<td>30</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

### There are No Stand By Voltages on this Connector

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
Y-Drive Boards work as a path supplying the Sustain and Reset waveforms which are made in the Y-Sustain board and sent to the Panel through Scan Driver IC’s.

The Y-Drive Boards supply a waveform which selects the horizontal electrodes sequentially starting at the top and scanning down the panel.

* 50PQ30 uses 8 Driver ICs on 2 Y-Drive Boards

Warning: To facilitate scope attachment, solder a small wire (Stand Off) at this point. Be very careful, these are fragile and can peel off with excessive heat or stress.
Upper Y-Drive Layout

FG5V Volts from the Y-SUS board and Logic Signals from the Control through the Y-SUS board are supplied to the Upper Y-Drive Board on Connector P109.

Y-Drive signal (VSC) from the Y-SUS board through the Y-Drive lower is supplied to the Upper Y-Drive Board on Connector P108.

TIP: The connectors to the Y-SUS board are very easy to misalign and plugged in. The Connector will be below the actual pins on the Y-SUS. Look carefully. See Tip section page 133-134.
Upper Y-Drive P109 (Top Connector) Explained

P109 Pins 7, 8, 9, and 10 are Logic Signals from the Control board routed through the Y-SUS to the Y-Drive upper. Between the Y-Drive upper and lower is P108/P209 which carries the Y-Drive (Scan) signal from the lower to the upper.

FG5V (+5V F) measured from Pins 4 or 5 to Floating Gnd
Pins 1~3, 6 or 11

11) Ground (F)
10) DATA
9) OC1
8) STB
7) CLK
6) Ground (F)
5) 5V VF
4) 5V VF
3) Ground (F)
2) Ground (F)
1) Ground (F)
Upper Y-Drive Upper P109 Diode Mode Testing

Checking the Upper Y-Drive BOARD P109

NOTE: Disconnected from the Y-SUS Board

All Readings from Floating Ground (Pin 1~3, 6 or 12)

<table>
<thead>
<tr>
<th></th>
<th>RED LEAD Blk Lead FG</th>
<th>BLACK LEAD Red Lead FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating Gnd</td>
<td>Ground (F) 0V</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td>11) OC2 Open</td>
<td>0.52V</td>
</tr>
<tr>
<td></td>
<td>10) DATA Open</td>
<td>0.67V</td>
</tr>
<tr>
<td></td>
<td>9) OC1 Open</td>
<td>0.54V</td>
</tr>
<tr>
<td></td>
<td>8) STB Open</td>
<td>0.54V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>7) CLK Open</td>
<td>0.54V</td>
</tr>
<tr>
<td></td>
<td>6) Ground (F) 0V</td>
<td>0V</td>
</tr>
<tr>
<td></td>
<td>5) 5V VF 1.94V</td>
<td>0.43V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>4) 5V VF 1.94V</td>
<td>0.43V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>3) Ground (F) 0V</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>2) Ground (F) 0V</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>1) Ground (F) 0V</td>
<td>0V</td>
</tr>
</tbody>
</table>

TIP: This test will check “All” scan buffers Low Voltage input side on the Y-Drive Upper board.

Y-Drive Upper Board

Y-SUS Board

FL101

P109  P209

Y-SUS Board should be disconnected for this test.
FG5V Volts from the Y-SUS board and Logic Signals from the Control through the Y-SUS board are supplied to the Lower Y-Drive Board on connector P205.

Y-Drive signal (VSC) from the Y-SUS board is supplied to the Lower Y-Drive Board on connector P205 pins 11 and 12. Then the Lower Y-Drive delivers the V-Scan signal to the upper via P209 to P108.

TIP: The connectors to the Y-SUS board are very easy to misalign and plugged in. The Connector will be below the actual pins on the Y-SUS. Look carefully. See Tip section page 133-134.
Y-Drive Lower P205 (Bottom Connector) Explained

TIP: Use P207 pins 1 or 2 or the Right Side of C213 to test for Y Scan signal if the Y-Drive boards are removed.

P207 Pins 1 and 2 Y Scan signal 516V p/p

FG5V measured from Pins 7 or 8 Floating Gnd Pins 1 or 6

P207 Pins 2, 3, 4, and 5 are Logic (Drive) Signals to the Y-Drive lower P209 carries the Y-Drive signals to the Upper Y-Drive board

TIP: Use P207 pins 1 or 2 or the Right Side of C213 to test for Y Scan signal if the Y-Drive boards are removed.

11) V Scan
10) V Scan
9) n/c
8) 5V VF
7) 5V VF
6) Ground (F)
5) STB
4) OC1
3) DATA
2) OC2
1) Ground (F)
Lower Y-Drive P205 Diode Mode Testing

Checking the Lower Y-Drive Board P205
NOTE: Disconnected from the Y-SUS board

<table>
<thead>
<tr>
<th>Y-Drive Sig</th>
<th>RED LEAD Blk Lead FG</th>
<th>BLACK LEAD Red Lead FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>12) V Scan</td>
<td>Open</td>
<td>1.0V</td>
</tr>
<tr>
<td>11) V Scan</td>
<td>Open</td>
<td>1.0V</td>
</tr>
<tr>
<td>10) n/c</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td>9) 5V VF</td>
<td>Open</td>
<td>0.425V</td>
</tr>
<tr>
<td>8) 5V VF</td>
<td>Open</td>
<td>0.425V</td>
</tr>
<tr>
<td>Floating Gnd7) Ground (F)</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>6) CLK</td>
<td>Open</td>
<td>0.538V</td>
</tr>
<tr>
<td>5) STB</td>
<td>Open</td>
<td>0.538V</td>
</tr>
<tr>
<td>4) OC1</td>
<td>Open</td>
<td>0.538V</td>
</tr>
<tr>
<td>3) DATA</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td>2) OC2</td>
<td>Open</td>
<td>0.521V</td>
</tr>
<tr>
<td>Floating Gnd1) Ground (F)</td>
<td>Open</td>
<td>0V</td>
</tr>
</tbody>
</table>

NOTE: Disconnected from the Y-SUS board

TIP: This test will check “All” scan buffers Low Voltage input side on the Y-Drive lower board.

Y-SUS Board should be disconnected for this test.

Meter in the Diode Mode
**Y-Drive P108 and P209 Voltage and Diode Mode Check**

TIP: This test will check “All” scan buffers Input side on the board.

Voltage and Diode Mode Measurements (Taken from Floating Ground)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode Red Lead</th>
<th>Diode Mode Black Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FGnd</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>2</td>
<td>FGnd</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.2V</td>
</tr>
<tr>
<td>4</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.2V</td>
</tr>
<tr>
<td>5</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.2V</td>
</tr>
</tbody>
</table>

**P108 CONNECTOR “Y-Drive Upper to Lower”**

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode Red Lead</th>
<th>Diode Mode Black Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FGnd</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>2</td>
<td>FGnd</td>
<td>0V</td>
<td>0V</td>
<td>0V</td>
</tr>
<tr>
<td>3</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.0V</td>
</tr>
<tr>
<td>4</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.0V</td>
</tr>
<tr>
<td>5</td>
<td>Y Scan</td>
<td>*134V</td>
<td>Open</td>
<td>1.0V</td>
</tr>
</tbody>
</table>

Note: This voltage will vary in accordance with Panel Label
**Removing (Panel) Flexible Ribbon Cables from Y-Drive Upper or Lower**

*Flexible Ribbon Cables shown are from a different model, but process is the same.*

To remove the Ribbon Cable from the connector first carefully lift the Locking Tab from the back and tilt it forward (lift from under the tab as shown in Fig 1). The locking tab must be standing straight up as shown in Fig 2. Lift up the entire Ribbon Cable gently to release the Tabs on each end. (See Fig 3) Gently slide the Ribbon Cable free from the connector.

To reinstall the Ribbon Cable, carefully slide it back into the slot see (Fig 3), be sure the Tab is seated securely and press the Locking Tab back to the locked position see (Fig 2 then Fig 1).
Incorrectly Seated Y-Drive Flexible Ribbon Cables

The Ribbon Cable is clearly improperly seated into the connector. You can tell by observing the line of the connector compared to the FPC, they should be parallel.

The Locking Tab will offer a greater resistance to closing in the case.

Note the cable is crooked. In this case the Tab on the Ribbon cable was improperly seated at the top. This can cause bars, lines, intermittent lines abnormalities in the picture.

Remove the ribbon cable and re-seat it correctly.
Y-Drive Buffer Troubleshooting

YOU CAN CHECK ALL 8 BUFFER ICs USING THIS PROCEDURE

BACK SIDE OF Y-DRIVE BOARD
BUFFER IC FLOATING GROUND (FGnd)

Using the “Diode Test” on the DVM, check the pins for shorts or abnormal loads.

- Any of these output lugs can be tested.
- Look for shorts indicating a defective Buffer IC

128 Output Pins per/FPC (Flexible Printed Circuit)
6 Ribbon cables (Horizontal Electrodes)
768 Total Horizontal Electrodes controlling Vertical resolution

BLACK LEAD ON “ANY” OUTPUT LUG.
READING 0.798 V

RED LEAD ON BUFFER IC FGnd
Indicated by white outline

BLACK LEAD ON “ANY” OUTPUT LUG.
READING “OPEN”
This Section of the Presentation will cover troubleshooting the Z-SUS Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate voltage and diode mode test points needed for troubleshooting and all alignments.

**Locations**
- DC Voltage and Waveform Test Points
- Z BIAS Alignment
- Diode Mode Test Points

**Operating Voltages**
- Power Supply Supplied: VS M5V
- Control Board Supplied: But developed on the Y-SUS 17V
- Developed on Z-SUS: Z Bias
Z-SUS Block Diagram

Z-SUS board receives VS and M5V from Y-SUS and 17V from the Control board.

Circuits generate erase, sustain waveforms.

Generates Z Bias 100V.

FET Makes Drive waveform.

POWER SUPPLY Board:
- M5V and VS

Control Board:
- 5V, 17V

Y-SUS Board:
- M5V and VS

Z-SUB:
- NO IPMs
- Flexible Printed Circuits

Via 3 FPC

Display Panel

Simplified Block Diagram of Z-SUSTain Board
Logic Signals from the Control board  
Also +15V generated on the Y-SUS and routed through the Control board.
**Z-SUS Waveform**

The Z-SUS (in combination with the Y-SUS) generates a SUSTAIN Signal and an ERASE PULSE for generating SUSTAIN and DISCHARGE in the Panel.

This waveform is supplied to the panel through FPC (Flexible Printed Circuit) P104, P105 and also P103 to the Z-SUB which connects to the panel via P302.

**TIP:** The Z-Bias (VZB) Adjustment is a DC level adjustment. This is only to show the effects of Z-Bias on the waveform.

![Z Drive Waveform](image)

(Vzb) Z Bias VR200

Oscilloscope Connection Point.
J27 to check Z Output waveform.
Right Hand side Center.

This Waveform is just for reference to observe the effects of Zbz adjustment.
**VZB (Z-Bias) Adjustment**

Read the Label on the back of the upper left hand side of the panel when adjusting VR200.

Set should run for 15 minutes, this is the “Heat Run” mode.
Set screen to “White Wash” mode or 100 IRE White input.

Adjust VZ (Z-Bias) to Panel Label (± 1V)

Note: You can also measure across C239 for the VZB (Zbias) adjustment.

**Model:** PDP 50G2####
Voltage Setting: 5V / Va: 60V / Vs: 193V
N.A. / -185 / 133 / N.A. / 80

**Measured from Chassis Ground**
## Connector P101 to Y-SUS P206 Voltages and Diode Checks

Voltage and Diode Mode Measurements

### P101 CONNECTOR “Z-SUS” to “Y-SUS” P206

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>M5V</td>
<td>5V</td>
<td>Open</td>
</tr>
<tr>
<td>3~6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>8, 9</td>
<td>ER COM</td>
<td>*94.9V</td>
<td>Open</td>
</tr>
<tr>
<td>10</td>
<td>n/c</td>
<td>n/c</td>
<td>Open</td>
</tr>
<tr>
<td>11, 12</td>
<td>VS</td>
<td>*193V</td>
<td>Open</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

There are no Stand-By voltages on this connector

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
### Connector P100 to Control P101 Voltages and Diode Checks

Voltage and Diode Mode Measurements

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>Z Enable</td>
<td>0.05V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Z Bias</td>
<td>1.8V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Z Ramp</td>
<td>1.7V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>Z ER UP</td>
<td>0.3V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Z ER DN</td>
<td>0.4V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Z-SUS UP</td>
<td>0.2V</td>
<td>Open</td>
</tr>
<tr>
<td>9</td>
<td>Z-SUS DN</td>
<td>0.8V</td>
<td>Open</td>
</tr>
<tr>
<td>10</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>+15V</td>
<td>17V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>+15V</td>
<td>17V</td>
<td>Open</td>
</tr>
</tbody>
</table>

There are no Stand-By voltages on this connector

Diode Mode Readings taken with all connectorsDisconnected. DVM in Diode Mode.
Z-SUS How to Check the Output FETs 1 of 2

Name is printed on the components. Readings “In Circuit”.

<table>
<thead>
<tr>
<th>Component</th>
<th>Shown</th>
<th>Reverse</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20NF20</td>
<td>Short</td>
<td>Short</td>
<td>0.1 Ohms</td>
</tr>
<tr>
<td>Q311</td>
<td></td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.52V</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>33N25T</td>
<td>0.678V</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>Q312</td>
<td>Open</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shown: 0.52V</td>
<td>Reverse: Open</td>
<td></td>
</tr>
<tr>
<td>RF2001</td>
<td>Short</td>
<td>Short</td>
<td>0.1 Ohms</td>
</tr>
<tr>
<td>D301 D305</td>
<td></td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>D302 D306</td>
<td>0.36V</td>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>D303 D311</td>
<td></td>
<td>Reverse: Open</td>
<td></td>
</tr>
<tr>
<td>D304 D312</td>
<td>0.36V</td>
<td>Reverse: Open</td>
<td></td>
</tr>
</tbody>
</table>
Z-SUS How to Check the Output FETs 2 of 2

Name is printed on the components. Readings “In Circuit”.

45F122
AQ302 Q315
AQ304 Q317
BQ313 Q318
BQ314

- Shown: 1.496V
- Reverse: 0.782V

- Shown: 0.364V
- Reverse: Open

A Q302 Q315
B Q313 Q318

5N50C
Q321

- Shown: 1.22V
- Reverse: Open

- Shown: 0.536V
- Reverse: Open

B0.95V

- Shown: Open
- Reverse: 1.14V
- Reverse: Open

B Reverse: Open
Z-SUS How to Check the Z-SUS if the Y-SUS Has Failed

When you apply AC to the SMPS, check the Z-Bias waveform TP for 100V P/P signal.

All this assumes the Power supply and Control board are working correctly.

Jump STBY 5V to any 5V location

Jump M5V to Pin 1 or 1

Jump Vs to Pin 11 or 12

Jump 17V to any FS101

Leave P101 to P100 Connected

When you apply AC to the SMPS, check the Z-Bias waveform TP for 100V P/P signal.

All this assumes the Power supply and Control board are working correctly.
CONTROL BOARD SECTION

This Section of the Presentation will cover troubleshooting the Control Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate voltage and diode mode test points needed for troubleshooting.

- DC Voltage and Waveform Test Points
- Diode Mode Test Points

**Signals**

- Main Board Supplied: Panel Control and LVDS Signals
- Control Board Generated: Y-SUS and Z-SUS Drive Signals (Sustain)
  - X Board Drive Signals (RGB Address)

**Operating Voltages**

- Y-SUS Supplied: +5V (M5V) Developed on the SMPS
  - +17V (Routed to the Z-SUS)

- Developed on the Control Board: +1.8V for internal use
  - +3.3V for internal use
  - +3.3V for the X-Boars (TCPs)
Unplug all connectors. Jump 5V from SMPS (P813 pins 9~12) to pin 1 of IC211. Observe LED. If it blinks, most likely Control PWB is OK. FL111 and FL112 should be checked.

Disconnect P201 from the Y SUS Board and connect a Jumper from Pin 10 of P812 (M5V) to Pin 10 P201 (5V). The 5V will be routed to the Control Board via FS201, Ribbon Cable P101 on the Y SUS Board to P111 on the Control board. Then through FL111 and FL112 to all regulators on the Control Board. For Control Board operation verification, watch D201 for blinking.

* If the complaint is no video and if shorting the two points (AutoGen) causes video to appear suspect the Main board or LVDS cable.

Note: IC221 (3.3V Regulator) routed out P162 (56~60) to X-PWBs

M5V
Gnd
Gnd
M5V

Data and Clocks to Y-SUS and Y-Drive

P111 Ribbon Cable

Pin 1~3 (17V) Pin 4~7 (M5V)

With the unit on, if D201 does not blink on/off, check 5V supply. If present replace the Control PCB

Short across the two points labeled Auto Gen to generate a test pattern. (LVDS Cable Must Be Removed)

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Control Board Additional Troubleshooting Tips

For quick Control board test. (All connectors Disconnected).

Jump 5V from Power Supply to IC201 Pin 3. (Bottom Pin)
If the LED blinks, Pretty much guaranteed, Control Board is OK.

When the Television has a problem related to;
1) Shutdown caused by Main Board.
2) No Video (No Picture) Sound OK.
This can be checked by the following.
(1) Disconnect the Main board from all connectors. Apply AC power.
Since P813 is not connected to the SMPS, the set will come on.
Short the two pins on the Auto Test Pattern lands.
If there is a picture of cycling colors and patterns, the Y-SUS, Y-Drive, Z-SUS, Power Supply, Control board, X-Boards, TCPs and Panel are all OK.
Use the same test for problem (2) above to tell if the No Video is caused by the Main board or failed LVDS cable.

Confirm B+ to Control the Control Board
VS_DA
3V ~ 3.3V
(Note, this TP can also be Used as an External Trigger For scope when locking onto the Y-Drive signal).

Quick observation Of LED blinking Tell if the Control Board is running.
Checking the Crystal X101 “Clock” on the Control Board

Check the output of the Oscillator (Crystal). The frequency of the sine wave is 25 MHZ. Missing this clock signal will halt operation of the panel drive signals.

DC Voltage Check
1.5V ~ 1.8V

Osc. Check: 25Mhz

Connect Scope between Crystal X101 right side and Gnd

CONTROL BOARD
CRYSTAL LOCATION

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Control Board LVDS Signals

LVDS

Video Signals from the Main Board to the Control Board are referred to as Low Voltage Differential Signals or LVDS. Their presence can be confirmed with the Oscilloscope by monitoring the LVDS signals with no input signal selected while pressing the Menu Button “on” and “off” with the Remote Control or Keypad. Loss of these Signals would confirm the failure is on the Main Board!

Example of Normal Signals measured at 200mv/cm at 5µs/cm.
Control Board Signal (Simplified Block Diagram)

The Control Board supplies Video Signals to the TCP (Tape Carrier Package) ICs. If there is a bar defect on the screen, it could be a Control Board problem.

Control Board to X Board Address Signal Flow

This Picture shows Signal Flow Distribution to help determine the failure depending on where the it shows on the screen.
Removing the LVDS Cable from the Control Board

The LVDS Cable has two “Interlocks” that must be disengaged to remove the LVDS Cable.
To Disengage, press the two Locking Tabs Inward and pull the plug out.
Control Board Connector P111 to Y-SUS P101 Voltages and Diode Mode Checks

These pins are very close together. When taking Voltage measurements use Caution.

- FL111 and FL112 +5V Fuse
  - Pins 1, and 2 Receive +15V from the Y-SUS.
  - Pins 3, 4, 5, 6, and 7 Receive +5V from the Y-SUS.

- Pins 9, 10, 11 and 30 Are Ground

- All the rest are delivering Y-SUS Waveform development and Y-Drive logic signals to the Y-SUS Board (Y-Drive logic signals are simply routed right through the Y-SUS to the Y-Drive boards).

The +17V is not used by the Control board, it is routed to the Z-SUS leaving on P101 Pins 11 and 12.

Tip: For Checking Voltages, Check the Odd pins on the Control board and the Even pins on the Y-SUS board.
Control Board Connector P111 Silkscreen Can Be Misleading

P111 The silkscreen indicates that taking voltage or signal readings on P111 show Odd pins on the Left and Even pins on the Right.

Silkscreen Label:
The pin numbers are correct. Remember Odd pins on the left and even pins are on the right.

Example:
If there were room for Labeling

Odd Pins

Even Pins

Silkscreen Label:
The pin numbers are correct. Remember Odd pins on the left and even pins are on the right.
### Control P111 to Y-SUS P101 Plug Information

**Tip:** For Checking Voltages, Check the Odd pins on the Control board and the Even pins on the Y-SUS board.

#### P111 CONNECTOR “Control Board” to “Y-SUS" P101

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>+15V</td>
<td>17.04V</td>
<td>Open</td>
</tr>
<tr>
<td>03</td>
<td>+15V</td>
<td>17.04V</td>
<td>Open</td>
</tr>
<tr>
<td>05</td>
<td>+5V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>07</td>
<td>+5V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>09</td>
<td>GND</td>
<td>0.1V</td>
<td>Open</td>
</tr>
<tr>
<td>11</td>
<td>Y_ENABLE</td>
<td>0V</td>
<td>1.76V</td>
</tr>
<tr>
<td>13</td>
<td>GND</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>SET_ON</td>
<td>1.99V</td>
<td>Open</td>
</tr>
<tr>
<td>17</td>
<td>DELTA_VY</td>
<td>0.57V</td>
<td>Open</td>
</tr>
<tr>
<td>19</td>
<td>DET_LEVEL_SEL</td>
<td>1.29V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>SLOPE_RATE_SEL</td>
<td>0.17V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Y_ER_DN</td>
<td>0.114V</td>
<td>Open</td>
</tr>
<tr>
<td>25</td>
<td>YO_SYS_DN</td>
<td>2.6V</td>
<td>Open</td>
</tr>
<tr>
<td>27</td>
<td>Y_ER_UP</td>
<td>0.14V</td>
<td>Open</td>
</tr>
<tr>
<td>29</td>
<td>Y_SUS_UP</td>
<td>0.11V</td>
<td>Open</td>
</tr>
<tr>
<td>02</td>
<td>+15V</td>
<td>17.04V</td>
<td>Open</td>
</tr>
<tr>
<td>04</td>
<td>+5V</td>
<td>4.95V</td>
<td>0.97V</td>
</tr>
<tr>
<td>06</td>
<td>+5V</td>
<td>4.95V</td>
<td>0.97V</td>
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<tr>
<td>08</td>
<td>GND</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>14</td>
<td>OC2</td>
<td>1.82V</td>
<td>Open</td>
</tr>
<tr>
<td>16</td>
<td>DATA</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>18</td>
<td>OC1</td>
<td>1.44V</td>
<td>Open</td>
</tr>
<tr>
<td>20</td>
<td>STB</td>
<td>1.45V</td>
<td>Open</td>
</tr>
<tr>
<td>22</td>
<td>CLK</td>
<td>0.6V</td>
<td>Open</td>
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<tr>
<td>24</td>
<td>SLOPE_OPT</td>
<td>024V</td>
<td>Open</td>
</tr>
<tr>
<td>26</td>
<td>SET_UP</td>
<td>3.12V</td>
<td>Open</td>
</tr>
<tr>
<td>28</td>
<td>Y_PASS_TOP</td>
<td>1.1V</td>
<td>Open</td>
</tr>
<tr>
<td>30</td>
<td>GND</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

There are no Stand-By voltages on this connector.

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.

**Control Board P101 to Z-SUS P100 Plug Information**

P101 CONNECTOR “Control Board” to “Z-SUS” P100

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>Z_ENABLE</td>
<td>0.05V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Z_Bias</td>
<td>1.8V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>SLOPE_CTRL</td>
<td>1.7V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>ZO_ER_Up</td>
<td>0.3V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>ZO_ER_Dn</td>
<td>0.4V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>ZO_SUS_Up</td>
<td>0.2V</td>
<td>Open</td>
</tr>
<tr>
<td>9</td>
<td>ZO_SUS_Dn</td>
<td>0.8V</td>
<td>Open</td>
</tr>
<tr>
<td>10</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>15V</td>
<td>17V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>15V</td>
<td>17V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Pin 1 at the bottom of the connector
Control Board Connector P161 and P162 to X-Drive Boards

P161 and P162 Connectors from the "Control Board" to "X Drive Center". These pins may be covered with tape for transportation issues. (Tape can be removed).

**Note:** In this set, both connectors go to the Center X-Board

The rest of the pins are much too close together for a safe test.

- **P161**
- **P162**

Delivers only RGB drive signals

3.3V created by IC221
**X BOARDS SECTION**

**X Board Left, Center and Right (Commonly known as A-BUS)**

The X Drive Boards deliver the Color drive signals to the Vertical Grids via TCPs. The 50PQ30 has a Left, Center and a Right X-Drive board. The Center X-Board has 6 connectors to a TCPs. The Left and Right have 5 connections to TCPs. Each TCP has 2 internal buffers. Each buffer controls 128 vertical grids lines (256 per/TCP).

Generally speaking, there isn’t many active components on the X-Drive Boards. So they are not very prone to failure.

In this section the X-Drive will be discussed and information given allowing the service technician to determine if a failure has occurred in the X-Drive section.

---

**X-BOARDS CONTROL THE VERTICAL ELECTRODES WHICH DETERMINE THE HORIZONTAL PIXEL COUNT. TOTAL VERTICAL ELECTRODES 4096. TOTAL HORIZONTAL PIXELS 1365.**

Total Buffer Count = 36
(TCPs = 16 @ 2 buffers per/TCP)

Total Output Pins = 4096
(128 per buffer X 36 total)

Total Pixels (Horizontal) 1365
(4096 / 3) Three cells per pixel (Red, Green and Blue)
Left, Center and Right X Boards (Commonly known as A-BUS)

Warning: DO NOT attempt to run the set with the Heat Sink over the TCPs removed. After a very short time, these ICs will begin to self destruct due to overheating.
TCP (Tape Carrier Package)

TCP ICs receive RGB 16 bit signal and deliver it to the PDP by connecting the PAD Electrode of the PANEL with the X Board.
TCP Testing

Typical Reading 0.56~0.65V
Forward biased
Reverse Leads Reads Open
Reversed biased

All 16 TCPs have the same connection. P101~P105, P201~P206 and P301~P305

On any Gnd
10, 11, 12, 13, 14, 27, 28, 2
3, 30, 37, 38, 39, 40, 41

On any Va
5, 6, 7, 44, 45, 46, 47

On 3.3V
4, 5, 6, 7, 44, 45, 46, 47
32 or 33

On any signal
15, 16, 18, 19, 21, 22, 24, 26, 31, 36

Look for any TCPs being discolored. Ribbon Damage. Cracks, folds. Pinches, scratches, etc...

Flexible Printed Ribbon Cable to TCP IC
TCP 3.3V B+ Check

Warning: DO NOT attempt to run the set with the Heat Sink over the TCPs removed.

Checking IC221 for 3.3V use center pin.

3.3V in on Pins 1~5
Warning: DO NOT attempt to run the set with the Heat Sink over the TCPs removed. After a very short time, these ICs will begin to self destruct due to overheating.

This damaged TCP can,
a) Cause the Power Supply to shutdown
b) Generate abnormal vertical bars
c) Cause the entire area driven by the TCP to be “All White”
d) Cause the entire area driven by the TCP to be “All Black”
e) Cause a “Single Line” defect
# X Drive Left Connector P122 Voltages and Diode Check

Voltage and Diode Mode Measurements for the Left X Drive Board

**P122 CONNECTOR "X Drive Left" to “Y-SUS” P202**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>n/c</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>5</td>
<td>VA</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>VA</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>VA</td>
<td>*60V</td>
<td>Open</td>
</tr>
</tbody>
</table>

* Note: This voltage will vary in accordance with Panel Label

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
X Drive Left and Right Connector P232 and P331

Voltage and Diode Mode Measurements for the X Drive Board

Voltage and Diode Mode Measurements for these connectors are difficult to read. They are too close together for safe test.

The pins are also protected by a layer of tape to prevent the tab from being released causing separation from the Cable and the connector.
This Section of the Presentation will cover troubleshooting the Main Board. Upon completion of this Section the technician will have a better understanding of the operation of the circuit and will be able to locate voltage and diode mode test points needed for troubleshooting and for all alignments.

- DC Voltage and Waveform Checks
- Diode Mode Measurements

**Operating Voltages**

<table>
<thead>
<tr>
<th>SMPS Supplied</th>
<th>5V Stand-By</th>
<th>12V (Tuner B+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5V</td>
<td>16V (Audio B+)</td>
<td></td>
</tr>
<tr>
<td>5V Stand-By</td>
<td>12V (Tuner B+)</td>
<td></td>
</tr>
<tr>
<td>3.3V (MST)</td>
<td>3.3V (VST)</td>
<td></td>
</tr>
<tr>
<td>3.3V (MST)</td>
<td>3.3V (DVDD)</td>
<td></td>
</tr>
<tr>
<td>3.3V (PVSB)</td>
<td>2.5V</td>
<td></td>
</tr>
<tr>
<td>2.5V</td>
<td>3.3V (PVSB)</td>
<td></td>
</tr>
<tr>
<td>1.8V (MST)</td>
<td>1.2V (VDDC)</td>
<td></td>
</tr>
<tr>
<td>1.2V (PVSB)</td>
<td>5V (TU)</td>
<td></td>
</tr>
<tr>
<td>1.2V (VDDC)</td>
<td>9V (TU)</td>
<td></td>
</tr>
<tr>
<td>9V (TU)</td>
<td>5V (TU)</td>
<td></td>
</tr>
</tbody>
</table>
Main Board Layout and Identification

- **LVDS (Video)** To Control
- **IC1001** To Front Controls
- **IC501** SPK Out
- **P1003** To Power Supply
- **IC1** Micro.
- **IC302** 25 Mhz
- **SW100** 12 Mhz
- **RGB/PC** Audio RGB/DVI
- **IC203** Audio
- **IC204** Tuner
- **IC302** HDMI 3
- **USB** Wired Remote
- **AV In 3** A/V Composite inputs
- **RF** HDMI inputs
- **S-In** Wired Remote
- **Component inputs** A/V Composite inputs

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50PQ30 MAIN PWB (Front Side) COMPONENT LAYOUT

For component voltages, see the 50PQ30 Interconnect Section page 3.
For component voltages, see the 50PQ30 Interconnect Section page 3.
Main Board Tuner Check (Shield Off, Pins Exposed)

- Video Pin 19 Video Test Point
- SIF Pin 16 Audio Test Point
- DIG IF (-) Pin 13
- DIG IF (+) Pin 12
- Digital Channel Test Point
- Pin 15 Tuner B+ (5V)
- Data Pin 9
- Clock Pin 8
- Pin 4 Tuner B+ (5V)
- Pin 1

MAIN Board Tuner Location
Main Board Tuner Video and SIF Output Check

USING COLOR BAR SIGNAL INPUT

Note:
“Video Out” Signal only when receiving an analog Channel.

Pin 19 “Video” Signal

2.24Vp/p

500mV / 10uSec

Pin 16 “SIF” Signal

100mV / 1uSec

700mVp/p

200mV / 2uSec

“Dig IF” Signal

450mVp/p

Note:
“Dig IF” Signal only when receiving a Digital Channel.
Main PWB Tuner Clock and Data Lines

Note:
SCL and SDA only active during an actual Channel Change.

TDVW-H103F
or UCA36AL
TU1001

Not Used
1.
NC_1

Not Used
2.
NC_2

GND (1)

Not Used
3.
+B (5V)

RF-AGC

Not Used
4.
NC-(VT)

GND (2)

Not Used
5.
SDA

SCL

Not Used
6.
AS

Not Used
7.
NC_3

DIF (+)

Outputs On
8.
DIF (-)

Digital Channels

Outputs On
9.
IF_AGc

10.
+B (2)

Analogue Channels

11.
SIF

12.
NC_4

13.
AUDIO_OUT

14.
VIDEO_OUT

15.
1V per/div

16.
100uS

17.
5V p/p

18.
1V per/div

19.
100uS

20.
5V p/p

Pin 8 SDA

Pin 9 SCL
Main Board Crystal X1 and X501 Check

- **Left Side (1.576V DC) / (2.5V p/p)**
- **Right Side (1.6V DC) / (3V p/p)**

**12Mhz**
- Runs all the time

**Top (1.49V DC)/(3.84V p/p)**
- Bottom (1.58V DC)/(5.27V p/p)

**25Mhz**
- Runs only on Digital Channels
Main Board P1002 LVDS Video Signal Check

See Interconnect Diagram (Page 2) for all LVDS cable video signal Waveforms.

Using a SMPTE Color Bar Signal

Pin 11
5uSec per/Div

Pin 11
2uSec per/Div

Pin 18
5uSec per/Div

Pin 18
2uSec per/Div

700mVp/p

P1003 LVDS (Pin 11) 5uSec / 718mV

P1003 LVDS (Pin 11) 2uSec / 718mV

P1003 LVDS (Pin 11) 5uSec / 642mV

P1003 LVDS (Pin 11) 2uSec / 642mV
### Main Board Plug P1006 to Power Supply Voltages and Diode Check

#### Voltage and Diode Mode Measurements

Diode Mode Readings with all Connectors Disconnected. DVM in the Diode mode.

**P301 CONNECTOR "Main" to "Power Supply" P813**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17V</td>
<td>0V</td>
<td>17.3V</td>
<td>Open</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>12V</td>
<td>Open</td>
</tr>
<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>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>11</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>17</td>
<td>5V Det</td>
<td>0V</td>
<td>4.6V</td>
<td>Open</td>
</tr>
<tr>
<td>19</td>
<td>RL On</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>M5 ON</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Stby 5V</td>
<td>5V</td>
<td>5V</td>
<td>1.36V</td>
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<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>17V</td>
<td>0V</td>
<td>17.3V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</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>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>12</td>
<td>STBY5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>14</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>16</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>18</td>
<td>AC Det</td>
<td>4.6V</td>
<td>4.5V</td>
<td>Open</td>
</tr>
<tr>
<td>20</td>
<td>VS On</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>22</td>
<td>Auto Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>24</td>
<td>*Key On</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

*Note: If the Key On line is 5V, the Main Power Switch is open. Stand-By 5V will shut off.*
Main Board Plug P1003 “LVDS” Voltage and Diode Check

Diode Mode Readings with all Connectors Disconnected. DVM in the Diode mode.

This line is held low if the Main board has no power. Auto Gen on Control board will not work unless LVDS cable is removed.

### P1003 CONNECTOR "Main" to P121 "Control"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>3</td>
<td>ROM_RX1</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>Module_SCL1</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>11</td>
<td>RE2+</td>
<td>1.3V</td>
<td>0.78V</td>
</tr>
<tr>
<td>13</td>
<td>RD2+</td>
<td>1.3V</td>
<td>0.96V</td>
</tr>
<tr>
<td>15</td>
<td>RCCLK2+</td>
<td>1.3V</td>
<td>0.78V</td>
</tr>
<tr>
<td>17</td>
<td>RC2+</td>
<td>1.3V</td>
<td>0.88V</td>
</tr>
<tr>
<td>19</td>
<td>RB2+</td>
<td>1.27V</td>
<td>0.78V</td>
</tr>
<tr>
<td>21</td>
<td>RA2+</td>
<td>1.37V</td>
<td>0.98V</td>
</tr>
<tr>
<td>23</td>
<td>PC_SER_CLK</td>
<td>0V</td>
<td>1.02V</td>
</tr>
<tr>
<td>25</td>
<td>DISP_EN</td>
<td>2.82V</td>
<td>0.495V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>4</td>
<td>ROM_TX1</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>Module_SDA1</td>
<td>3.29V</td>
<td>0.889V</td>
</tr>
<tr>
<td>12</td>
<td>RE2-</td>
<td>1.23V</td>
<td>0.85V</td>
</tr>
<tr>
<td>14</td>
<td>RD2-</td>
<td>1.21V</td>
<td>0.847V</td>
</tr>
<tr>
<td>16</td>
<td>RCCLK2-</td>
<td>1.24V</td>
<td>0.78V</td>
</tr>
<tr>
<td>18</td>
<td>RC2-</td>
<td>1.26V</td>
<td>0.849V</td>
</tr>
<tr>
<td>20</td>
<td>RB2-</td>
<td>1.21V</td>
<td>0.78V</td>
</tr>
<tr>
<td>22</td>
<td>RA2-</td>
<td>1.12V</td>
<td>0.869V</td>
</tr>
<tr>
<td>24</td>
<td>PC_SER_DATA</td>
<td>3.29V</td>
<td>1.37V</td>
</tr>
<tr>
<td>26</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>
Main Board Plug P1001 to Ft IR Voltages and Diode Checks

Voltage and Diode Mode Measurements for the Main Board

P1001 CONNECTOR "MAIN Board" to "Front IR“ J1

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IR</td>
<td>5V</td>
<td>5V</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>Key1</td>
<td>0V</td>
<td>3.3V</td>
<td>1.9V</td>
</tr>
<tr>
<td>4</td>
<td>Key2</td>
<td>0V</td>
<td>3.3V</td>
<td>1.9V</td>
</tr>
<tr>
<td>5</td>
<td>P Key</td>
<td>0V *(5V)</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>EYE-SCL</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>EYE-SDA</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5VST</td>
<td>5V</td>
<td>5V</td>
<td>1.3V</td>
</tr>
<tr>
<td>11</td>
<td>3.3VST</td>
<td>0V</td>
<td>5.13V</td>
<td>0.629V</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>13</td>
<td>LED-R</td>
<td>3.3V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>14</td>
<td>LED-W</td>
<td>0V</td>
<td>03.25</td>
<td>Open</td>
</tr>
<tr>
<td>15</td>
<td>PWM</td>
<td>Gnd</td>
<td>Gnd</td>
<td>0.961V</td>
</tr>
</tbody>
</table>

* Pin 5 (Power Key) This pin is 0V when the button is lock “On” (In) and 5V when Locked “Off” (Out)

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
**Main Board Speaker Plug P1005 Voltages and Diode Checks**

P1005 CONNECTOR "Main" to "Speakers"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>SBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R+</td>
<td>0V</td>
<td>8.65V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>R-</td>
<td>0V</td>
<td>8.65V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>L+</td>
<td>0V</td>
<td>8.65V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>L-</td>
<td>0V</td>
<td>8.65V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Speakers are 8 Ohms

Diode Mode Readings with all Connectors Disconnected. DVM in the Diode mode.
**FRONT CONTROL BOARD (IR and LED) KEY BOARD SECTION**

**Key Board Removal**

The Key Board (with Power Switch) is located (as viewed from the rear) in the lower left hand section.

**REMOVAL:** Remove the 2 screws, push tabs inward while lifting upward on the board. Unplug the connector P101.

Master Power Switch Set will not function with this “Mechanical” switch down in the open position. “Disengaged”
Front IR and Power LED Board Removal

The (IR, LED and Intelligent Sensor) board is located (as viewed from the rear) in the lower left hand section.

REMOVAL: Remove the 2 screws, pay attention to the Ground Strap on the left screw. Be sure to return this strap and IR problems may occur without it. Unplug the connectors J1 and J2.
**Ft Power LED (IR) Board Layout**

The Ft Power LED board includes the IR Receiver and the Intelligent Sensor. The Front POWER LED is also located on this board.
**Ft Power LED (IR) Board Component Checks**

**Front View**
- Place Voltmeter in Diode Mode.
- Leads opposite = Open
- ZN1 0.653V  ZN3 0.7V  ZN2 0.687V

**Front Power LEDs**
- Place Voltmeter in Diode Mode.
- Red on bottom of either LED black lead on top and they light.

**Back View**
- IR Sensor
- Intelligent Sensor
- Place Voltmeter in Diode Mode.
- Black on Gnd.
- 0.652V Gnd 0.652V

---

LG TRAINING CENTER
Front LED Board Plug J1 to Main Voltages

Voltage and Diode Mode Measurements for the Main Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IR</td>
<td>4.8V</td>
<td>5V</td>
<td>3.2V</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>Key1</td>
<td>0V</td>
<td>3.3V</td>
<td>1.6V</td>
</tr>
<tr>
<td>4</td>
<td>Key2</td>
<td>0V</td>
<td>3.3V</td>
<td>1.6V</td>
</tr>
<tr>
<td>*5</td>
<td>P Key</td>
<td>0V *(5V)</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>EYE-SCL</td>
<td>0V</td>
<td>3.3V</td>
<td>2.5V</td>
</tr>
<tr>
<td>8</td>
<td>EYE-SDA</td>
<td>0V</td>
<td>3.3V</td>
<td>2.5V</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5VST</td>
<td>5V</td>
<td>5V</td>
<td>1.06V</td>
</tr>
<tr>
<td>11</td>
<td>3.3VST</td>
<td>0V</td>
<td>5V</td>
<td>1.11V</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>13</td>
<td>LED-R</td>
<td>3.23V</td>
<td>0V</td>
<td>3.22V</td>
</tr>
<tr>
<td>14</td>
<td>LED-W</td>
<td>0V</td>
<td>03.23</td>
<td>Open</td>
</tr>
<tr>
<td>15</td>
<td>PWM</td>
<td>0V</td>
<td>0V</td>
<td>1V</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.

* Pin 5 (Power Key)
  This pin is 0V when the Main Power button is locked “On” (In) and 5V when it is locked “Off” (Out)

* Pin 5 (Power Key)
  When this switch is out, Stand-By 5V turns off.
Front IR Board Plug J2 to Key Board Voltages and Diode Check

Voltage and Diode Mode Measurements for the Main Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>LABEL</th>
<th>*STBY1</th>
<th>*STBY2</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>KEY 1</td>
<td>0V</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>KEY 2</td>
<td>0V</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>PWR SW</td>
<td>4.38V</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>*1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>*Open</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.
SIDE KEY BOARD SECTION

Side Key Board Layout (Component Identification)

To Ft IR J2
P101

Main Power Button
In (On) Out (Off)

SW103  SW108  SW106  SW102
SW107  SW105  SW104

INPUT  MENU  ENTER  VOL  CH  POWER

INPUT Button  MENU Button  ENTER Button  VOLUME Buttons  CHANNEL Buttons  POWER Button
Side Key Board Layout

The Ft Key board contains the Master Power Switch, Volume Up/Down and Channel Up/Down keys. Also the Menu and Select keys.
Side Key Assembly

P101 Resistance Measurements with Key pressed.

<table>
<thead>
<tr>
<th>KEY</th>
<th>Pin 4 measured from Pin 1</th>
<th>KEY</th>
<th>Pin 3 measured from Pin 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH (Up)</td>
<td>6K Ohms</td>
<td>Volume (+)</td>
<td>3.54K Ohms</td>
</tr>
<tr>
<td>CH (Dn)</td>
<td>9K Ohms</td>
<td>Volume (-)</td>
<td>0.62K Ohms</td>
</tr>
<tr>
<td>Input</td>
<td>3.5K Ohms</td>
<td>Enter</td>
<td>22K Ohms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Menu</td>
<td>9K Ohms</td>
</tr>
</tbody>
</table>

P101 Voltage Measurements with Key pressed.

<table>
<thead>
<tr>
<th>KEY</th>
<th>Pin 4 measured from Pin 1</th>
<th>KEY</th>
<th>Pin 3 measured from Pin 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH (Up)</td>
<td>0.19V</td>
<td>Volume (+)</td>
<td>0.86V</td>
</tr>
<tr>
<td>CH (Dn)</td>
<td>1.57V</td>
<td>Volume (-)</td>
<td>0.19V</td>
</tr>
<tr>
<td>Input</td>
<td>0.88V</td>
<td>Enter</td>
<td>2.2V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Menu</td>
<td>1.56V</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

P101 Connector “Side Key” to “IR/LED Control Board“ J2 (No Key Pressed)

<table>
<thead>
<tr>
<th>Pin</th>
<th>LABEL</th>
<th>*STBY1</th>
<th>*STBY2</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>PWR SW</td>
<td>4.38V</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>KEY 2</td>
<td>0V</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>KEY 1</td>
<td>0V</td>
<td>0V</td>
<td>3.3V</td>
<td>Open</td>
</tr>
</tbody>
</table>

* This pin is open in reference to Chassis Ground.

* Use this pin for all readings.
The Invisible Speaker System keeps the speaker grills off the front of the TV. The speakers actually point downward.

At the top of the speaker is a rubber cushion. Be sure to return this to its proper position to prevent vibrations.
Floating Ground checks must be made from Floating Ground. Use any pin on P204, P203, P205 or P208.

**TIP:**

**SYMPTOM:**
The panel indicates a brief flash during start up, then “No Picture” symptom.

**CHECKS:**
1. Z-SUS does not produce a correct signal. (All voltages check normal except 17V).
2. Y-SUS does not produce a correct signal. (No negative portion).
3. On Y-SUS: 17V starts off at 17V then very quickly drops to 5V.
4. Floating Ground 5V and 15V are not produced. *(See pages 60~61 for more details).*
5. Removing all connectors on the Z-SUS board (Except the panel connectors) does not change test results.
6. Removing Y-Drive boards cause all voltages to return to normal. Including the Y-Drive signal checked on the right side of C213.
7. Reconnecting all connectors on the Z-SUS board shows it is not creating a correct waveform. Just spikes. (17V now stays up).
8. Using the Diode Checks for the Y-Drive boards do not indicate a problem. *(See pages 67, 70, 71 and 74 for more details).*

**FIX:**
Replacing the Z-SUS board fixed the problems.
No Remote Function Service Tip:

SYMPTOM:

When the set turns on and a picture appears, the bottom of the picture shows the Input selection screen.

The Remote did not work.

The Front Function Keys did not work. (Except the Main Power Switch).

CHECKS:

1. Main Board: Reading the Key 1 and Key 2 lines found that Key 2 was at 0.8V. Key 1 read normal at 3.3V. *(See page 124 for more details).*

2. Feeling the Function buttons found that the right hand button (as viewed from the rear) did not feel the same as the others. It was stuck.

FIX:

1. Removing and repositioning the button assembly freed up the button. The set return to normal function. *(See page 116 for more details).*
**Checking the Y-Drive Upper or Lower Board Tip:**

**TIP:**

**SYMPTOM:**

Set shuts down at turn on.

**CHECKS:** (See pages 67, 70, 71 and 74 for more details).

1. V-Scan signal input to Lower Y-Drive board low ohms or low volts (Diode Mode).
2. Output from any buffer shows low ohms or low volts (Diode Mode).

**FIX:** Found Defective Y-Drive Upper or Lower (See the Y-Drive section for checks)

1. After determining which Y-Drive board is defective using the checks shown in the Y-Drive section, the other board can be tested separately.
   - If the Upper Y-Drive is found defective, the Lower Y-Drive board can be tested. Remove the Upper Y-Drive. Disconnect the Connector P209. Turn on the set and confirm that the bottom half of the picture looks normal.
   - If the Lower Y-Drive is found defective, the Upper Y-Drive board can be tested. Remove the Lower Y-Drive. Disconnect the Connector P209.
     - Jump either Pin 1 or 2 of P207 (V-Scan from the Y-SUS) to pin 4 or 5 of connector P108 on the Upper Y-Drive board.
     - Turn on the set and confirm that the top half of the picture looks normal.
**½ of the Picture is missing Top or Bottom Tip:**

**TIP:**

**SYMPTOM:**
When the set turns on, either the Top or Bottom ½ of the picture is black. It is possible that the whole picture could be black if P207 or P207(Y-SUS) is involved.

**CHECKS:**
1. Look careful the connections between the Y-SUS and Upper and Lower Y-Drive boards. It is very possible that the can be improperly seated.

**FIX:**
1. Remove and reseat the board correctly.
2. Note: This can happen if either the Y-SUS or Y-Drive boards are replaced or pulled off to perform checks.

![Improperly Seated Connector](image1)

Note the pins are visible across the top inside of the connector.

![Properly Seated Connector](image2)

Note now the pins are not visible across the top inside of the connector.
This section shows the 11X17 foldout that’s available in the Adobe version of the Training Manual.

For Printing purposes, choose the 11X17 paper size.

The Interconnect Diagram has a great deal of quick reference servicing aids. Use this in conjunction with the Training Manual.
NOTE: Diode tests are conducted with the PWB disconnected.

If all supplies do not run when A/C is reapplied, disconnect P811 to isolate the excessive load. Use two (100W) light bulbs in series connected between Vs and Gnd to test under a load.

To run the Z-SUS without the SMPS, jump VS from the SMPS to pin 11 or 12 P101. Jump M5V to pin 1 or P201. Jump Audio 17V from SMPS to pin 11 or 12 P101. Jump M5V to the Control Board.

To check if M5V route, disconnect P201 from the Y-SUS Board and connect a Jumper from Pin 1 of P811 (M5V) to Pin 10 P201 (5V).

With the unit on, if D201 does not blink on/off, check 5V supply. If present replace the Control PCB. If missing, see "To Test Control Board"

Connect Scope between Waveform TP on Y-Drive and Gnd to observe LED. If it blinks, most likely Control PWB is OK. FL111 and FL112 on the Control Board for Control Board operation verification. Watch D201 for blinking to confirm.

Short across the two points labeled Auto Gen to generate a test system. (Note: Must Remove LVDS Cable).

* If the complaint is no video and shorting the points (AutoGen) causes video to appear suspect the Main board or LVDS cable.

Speakers (All Pins 0V)

LVDS

To Z-SUS Signal

V3 to Z-SUS and Error Com from the Z-SUS

Connect Scope between Waveform TP on Z-SUS and Use RMS information just to check for board activity.

NOTE: Test points are not identified on the board.

Just below P101

50PQ30 (50G2 Panel) CIRCUIT INTERCONNECT DIAGRAM

50VAC ms 400us 316V P/P
NOTE: LVDS P1003 Information
There are actually 12 pins carrying Video 2, pins are carrying clock signals (17 and 18) to the Control board. With high activity video, pins 21 and 22 would have signals present.

WAVEFORMS:
Waveforms taken using SMTP Color Bar input. All readings give their Time Base related to scope settings. All waveforms taken from the P1003.
### 50PQ30 MAIN (BACK SIDE) SIMICONDUCTORS

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
<th>Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC201</td>
<td>NVRAM</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC304</td>
<td>1.8VMST</td>
<td>2-pin</td>
</tr>
<tr>
<td>IC505</td>
<td>5V (Tuner)</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC602</td>
<td>RS232 RAM</td>
<td>3-pin</td>
</tr>
<tr>
<td>Q1001</td>
<td>Pow Down</td>
<td>2-pin</td>
</tr>
<tr>
<td>Q502</td>
<td>Video Buffer</td>
<td>2-pin</td>
</tr>
<tr>
<td>Q890/2</td>
<td>HDMI1/2</td>
<td>2-pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
<th>Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC202</td>
<td>HDCP</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC601</td>
<td>RS232 Control</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC305</td>
<td>3.3VMST</td>
<td>3-pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
<th>Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC301</td>
<td>5VST to 3.3V VST</td>
<td>3-pin</td>
</tr>
</tbody>
</table>

### 50PQ30 MAIN (FRONT SIDE) SIMICONDUCTORS

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
<th>Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC302</td>
<td>1.3V VDDC</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC804</td>
<td>USB 5V</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC503</td>
<td>9V Reg</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC805</td>
<td>HDMI3 EDID</td>
<td>3-pin</td>
</tr>
<tr>
<td>Q301</td>
<td>Turns on</td>
<td>3-pin</td>
</tr>
<tr>
<td>Q303</td>
<td>HDMI CEC Amp</td>
<td>3-pin</td>
</tr>
<tr>
<td>ZD601</td>
<td>Wired Remote T</td>
<td>4-pin</td>
</tr>
<tr>
<td>Q1002</td>
<td>Pow Down</td>
<td>1-pin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Function</th>
<th>Pins</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC804</td>
<td>USB 5V</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC503</td>
<td>9V Reg</td>
<td>3-pin</td>
</tr>
<tr>
<td>IC805</td>
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<td>Q1002</td>
<td>Pow Down</td>
<td>1-pin</td>
</tr>
</tbody>
</table>

---

**Notes:**
- **IC201** and **IC304** are NVRAM and 1.8VMST devices, respectively.
- **IC505** is a 5V (Tuner) device.
- **IC602** is a RS232 RAM device.
- **Q1001** and **Q502** are Pow Down and Video Buffer devices, respectively.
- **Q890/2** is a HDMI1/2 device.
- **IC202** is an HDCP device.
- **IC601** is a RS232 Control device.
- **IC305** is a 3.3VMST device.
- **IC301** is a 5VST to 3.3V VST device.
- **IC302** is a 1.3V VDDC device.
- **IC804** is a USB 5V device.
- **IC503** is a 9V Reg device.
- **IC805** is a HDMI3 EDID device.
- **Q301** and **Q303** are Turn on and HDMI CEC Amp devices, respectively.
- **ZD601** is a Wired Remote T device.
- **Q1002** is a Pow Down device.

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**Additional Pins:**
- **IC301** has pins for 1.8VMST and 3.3V VST.
- **Q303** has pins for 5V, 1.2V PV/SB, On Digital CH / Off Analog, and Pin Switch Ctl.
- **ZD601** and **IC503** have pins for Wired Remote T and Pow Down, respectively.
End of Presentation

This concludes the Presentation

Thank You