LG TRAINING CENTER

Training Manual

50PK950 Plasma Display

Advanced Single Scan Troubleshooting
50" Class Full HD 1080p Plasma TV
(50" diagonally)
Wireless Ready

Published October 13th, 2010

Overview of Topics to be Discussed

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

Troubleshooting:
Circuit Board Operation, Troubleshooting and Alignment of :

- Switch Mode Power Supply No "VS On" command input to SMPS from the Main Board.
- Y-SUS Board
- Y-Drive Boards (1 Upper and 1 Lower).

  Either can run separately, but you ***must*** remove the other ***completely.***
- Z-SUS Board Uses a Z-SUB Board for panel drive connection.
- Control Board
- X Drive Boards (3)
- Main Board: Wireless capabilities, Internet via LAN or Wireless using Dongle through USB.
- Front IR/Intelligent Sensor, Center LOGO and Motion Remote Boards

Interconnect Diagram: 11X17 Foldout Section used as a quick reference sheet.

50PK950 Plasma Display

Section 1

This Section will cover Contact Information and remind the Technician of Important Safety Precautions for the Customer's Safety as well as the Technician's 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.

LG Contact Information

Customer Service (and Part Sales)	**(800) 243-0000**
Technical Support (and Part Sales)	**(800) 847-7597**
USA Website (GSFS)	**http://gsfs-america.lge.com**
Customer Service Website	**us.lgservice.com**
Knowledgebase Website	**lgtechassist.com** ← New: Software Downloads Technical Assistance
LG Web Training	**lge.webex.com** ← Presentations with Audio/Video and Screen Marks
LG CS Academy	**lgcsacademy.com** ← **http://136.166.4.200**

LCD-DV:	**32LG40, 32LH30, 37LH55, 42LG60, 42LG70, 42LH20, 42LH40, 42LH50, 42LH90, 42SL80, 47LG90, 47LH85, 47LE8500**
PLASMA:	**42PG20, 42PQ20, 42PQ30, 50PG20, 50PJ350, 50PK950, 50PK950, 50PS80, 50PS60, 60PK750, 60PS11, 60PS60, 60PS80**

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

New Training Materials on the Learning Academy site

Published October 2010 by LG Technical Support and Training
LG Electronics Alabama, Inc.
201 James Record Road, Huntsville, AL, 35813.

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.

ESD Notice (Electrostatic Static Discharge)

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 on 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. **The Plasma television should be transported vertically NOT horizontally.**
8. Exercise care when making voltage and waveform checks to prevent costly short circuits from damaging the unit.
9. Be cautious of lost screws and other metal objects to prevent a possible short in the circuitry.
10. **New Plasma Models have thinner Display Panels and Frames than previous models. Be careful when lifting Plasma Display's because flexing the panel may damage the frame mounts or panel.**

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-SUS or Y-Drive 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.

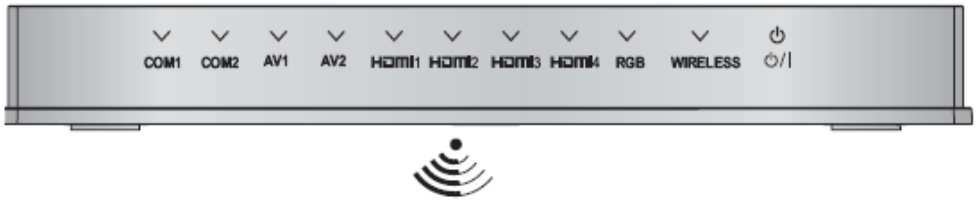
50PK950 PRODUCT INFORMATION SECTION

This section of the manual will discuss the specifications of the 50PK950 Advanced Single Scan Plasma Display Television.

Wireless Media Box (Sold Separately)

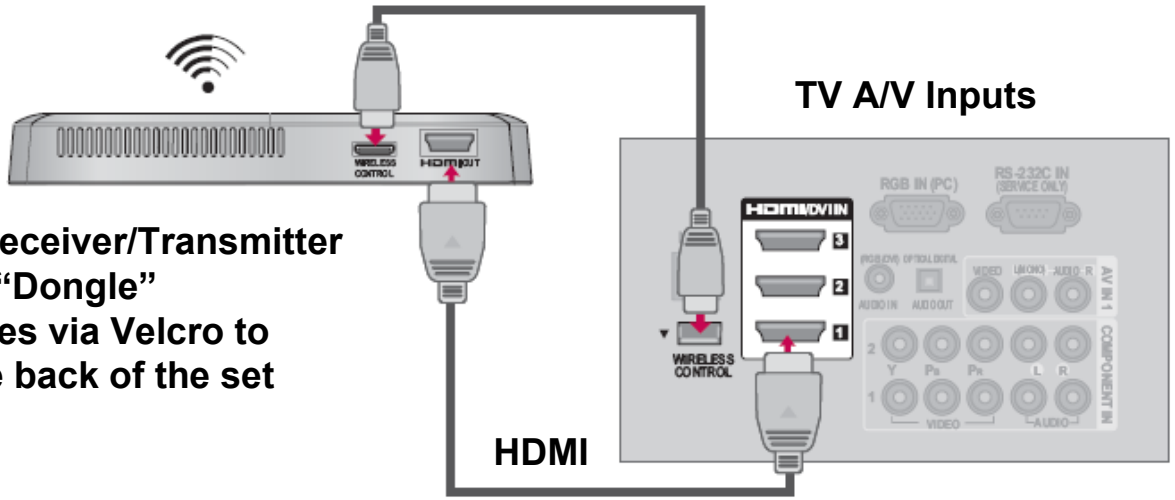
The Wireless Media box communicates to the television via a wireless receiver called a "Dongle". The Dongle attaches to the Television via two connections:

1. HDMI Cable from the Dongle to the TV to transfer Audio and Video Signals.
2. Wired Remote cable between the TV and Dongle for Control Functions.



Media Box

Wired Remote to control the Media Box



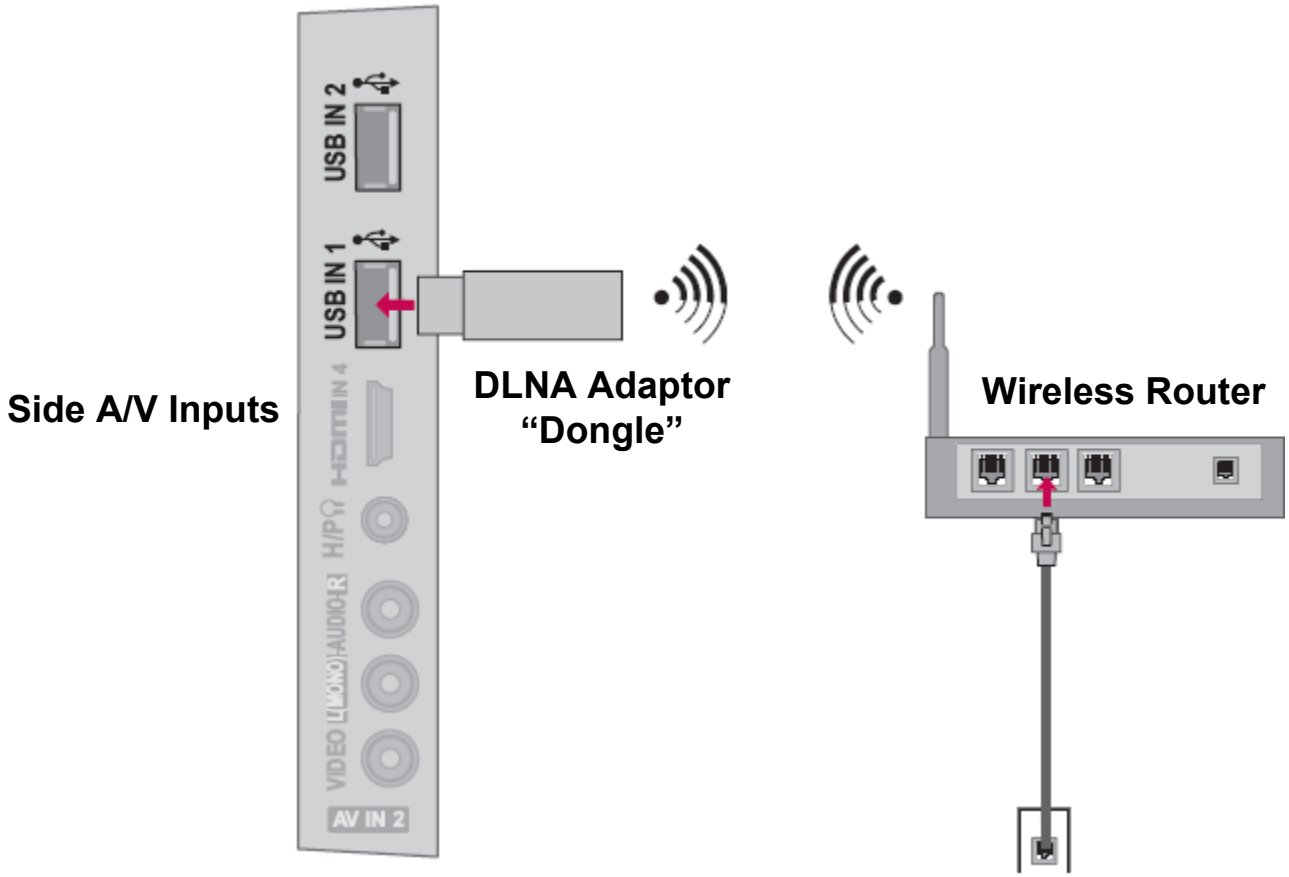
TV A/V Inputs

Wireless Receiver/Transmitter "Dongle" Attaches via Velcro to the back of the set

HDMI

Wireless LAN (Sold Separately)

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



1080P PLASMA HDTV

50" Class (50" diagonal)

For Full Specifications
See the Specification Sheet

- **INFINIA Series**
- **Tru-Black Filter**
- **THX Certified**
- **1080P Full HD Resolution**
- **600 Hz sub field driving**
- **1,500 cd/m2 Brightness**
- **Dual XD Engine™**
- **3,000,000:1 Dynamic Contrast Ratio**
- **Smart Energy Saving**
- **4x HDMI™ V.1.3 with Deep Color (3 Rear, 1 side).**
- **AV Mode II (Cinema, Sports, Game)**
- **Clear Voice II**
- **LG SimpLink™ Connectivity**
- **Invisible Speaker System**
- **100,000 Hours to Half Brightness (Typical)**
- **PC Input**
- **USB 2.0 (JPEG, MP3, MP4, Divx)**
- **NetCast™ Entertainment Access**
  - **Yahoo!® TV Widgets**
  - **Vudu™ (Streaming)**
  - **Picasa™ Web Albums**
  - **Netflix® Instant Streaming Ready**
  - **YouTube™**
  - **AccuWeather®**
- **Wi-Fi Certified ™ (Adaptor Included)**
- **Wireless 1080p Ready**
- **Full 1080p Resolution**
- **5M:1 Contrast Ration**
- **Seamless Design**
- **Magic Motion Remote**
- **Picture Wizard II (Easy Picture Calibration)**
- **Intelligent Sensor**
- **Dual XD Engine**
- **ISFccc® Ready**
- **24P Real Cinema**
- **DivX® HD**
- **DNLA Certified® (JPEG Only)**
- **SIMPLINK ™Connectivity**
- **Dolby® Digital 5.1 Decoder**
- **Infinite Sound**

50PK950 Logo Familiarization Page 1 of 3

New definition television. LG's INFINIA TVs are redefining home entertainment. Even beyond their jaw-dropping design, they offer access to virtually unlimited entertainment through broadband connectivity and freedom with wireless HD capability.

The new black. Don't let the lamp in the corner keep you from seeing what's going on in the movie. LG's TruBlack Filter helps block glare while boosting images on the screen to improve picture quality and contrast ratio.

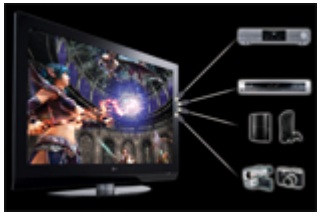
You don't have to take our word for it that this is an amazing TV. To earn THX certification, our TV's passed more than 30 rigorous tests, ensuring you're bringing an uncompromised HD experience home - as the director wanted it.

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

50PK950 Logo Familiarization Page 2 of 3

FULL HD RESOLUTION 1080P HD Resolution Pixels: 1920 (H) × 1080 (V)
Enjoy twice the picture quality of standard HDTV with almost double the pixel resolution. See sharper details like never before. Just imagine a Blu-ray disc or video game seen on your new LG Full HD 1080p TV.

HDMI (1.3 Deep Color) Digital multi-connectivity
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.

50PK950 Logo Familiarization Page 3 of 3

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.

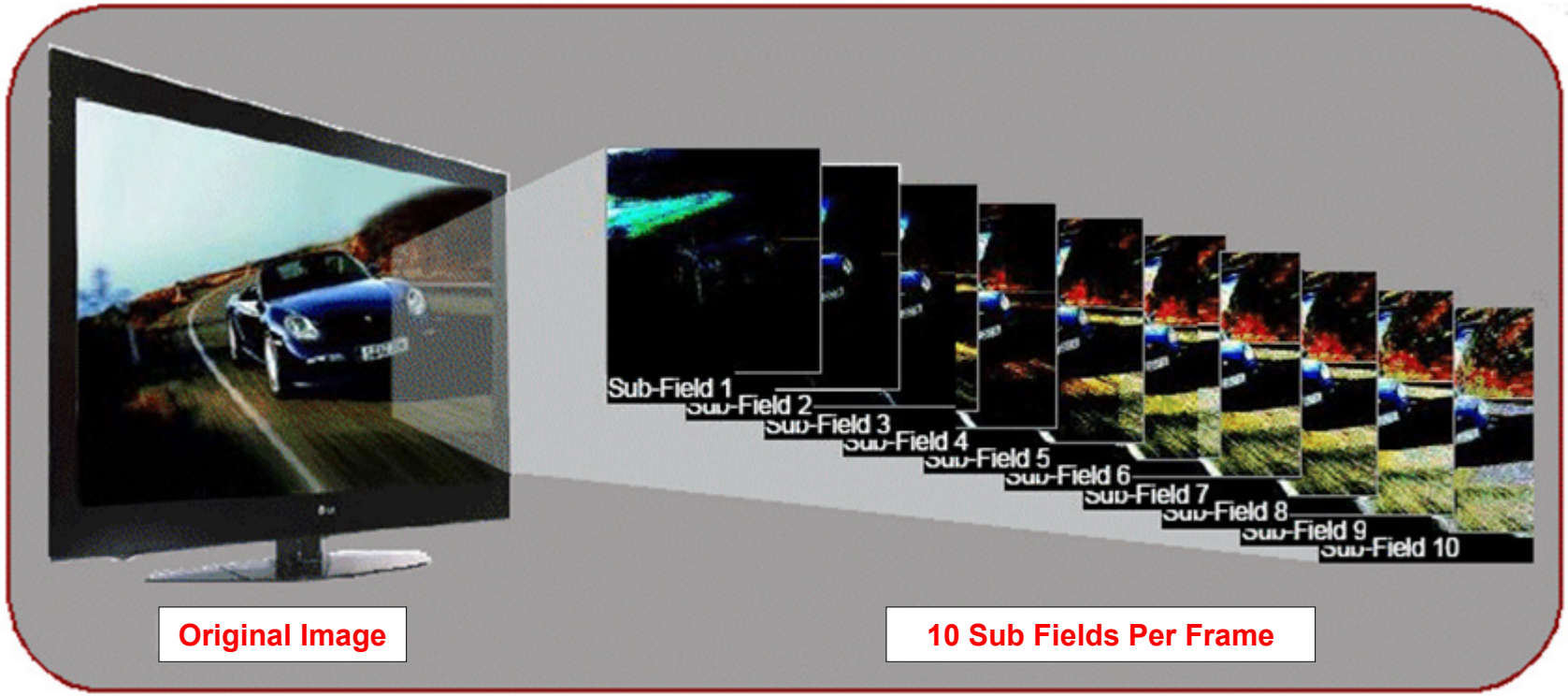
Save Energy, Save Money
It reduces the plasma display's power consumption.
The default factory setting complies with the Energy Star requirements and is adjusted to the comfortable level to be viewed at home.
(Turns on Intelligent Sensor).

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.

(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.

50PK950 Remote Control

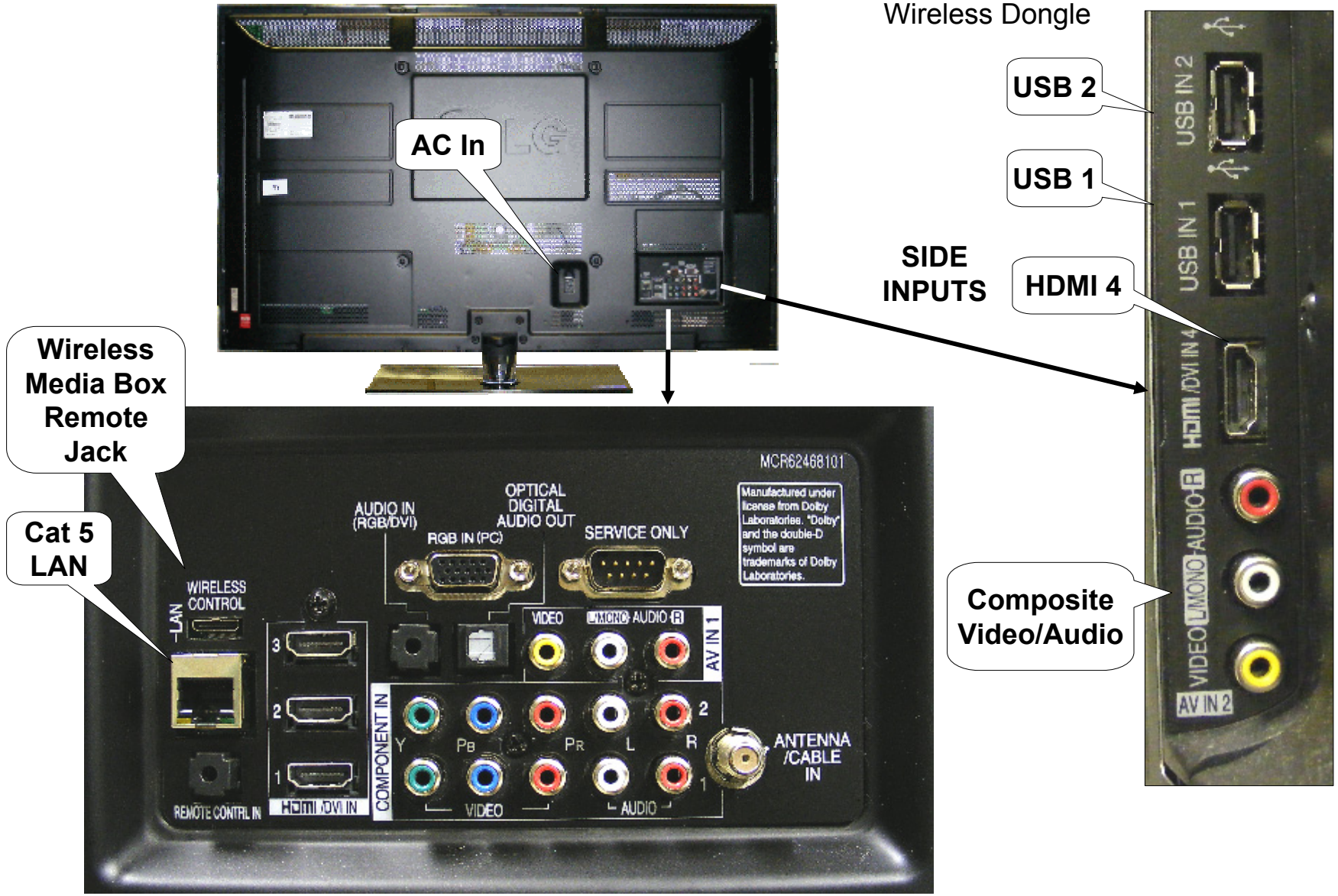
p/n AKB729140002

TOP PORTION

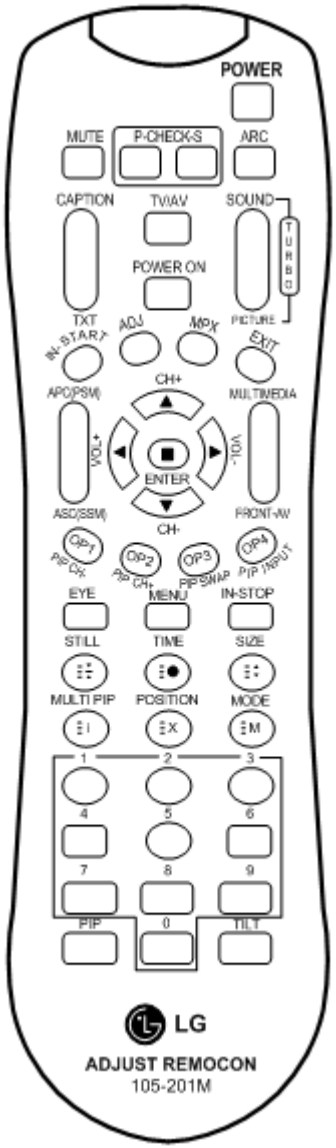
BOTTOM PORTION

50PK950 Rear and Side Input Jacks

Either USB port for Software Upgrades, Music, Videos and Photos and the Wireless Dongle



Accessing the Service Menu



105-201M

To access the Service Menu.

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

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

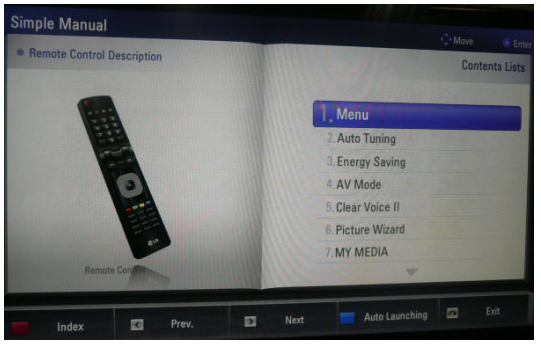
Note: If **0000** does not work use **0413.**

MKJ39170828

Software Updates (New and Changed Functions)

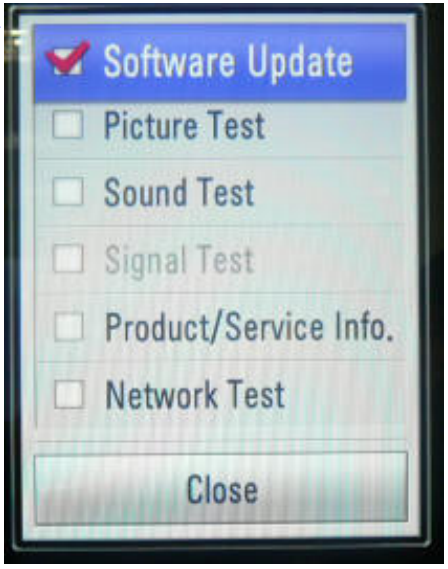
A wireless Internet Connection will work for Automatic Software Downloads., however if there are problems completing download, a Wired Internet Connection is preferred

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

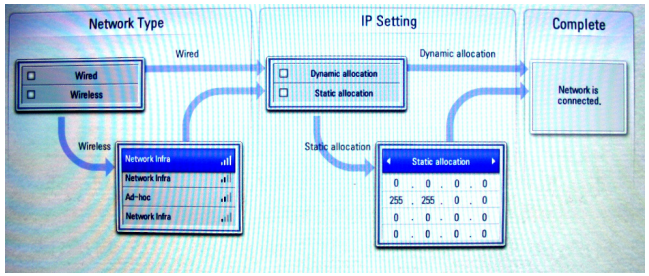


Bring up the Customer's Menu then Press the Red button on Remote

With Software Update Highlighted, Press Select on Remote

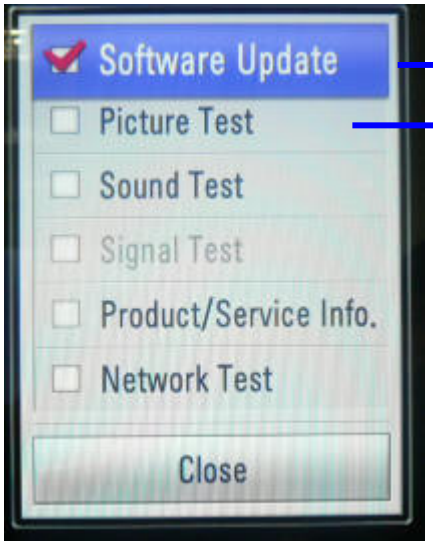


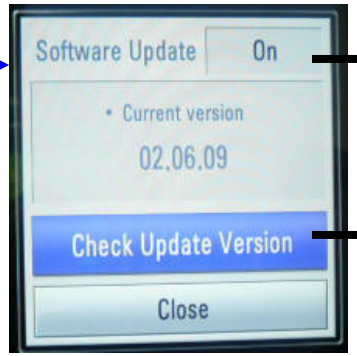
Scroll down to item 9 Network Connections



Continue on next page

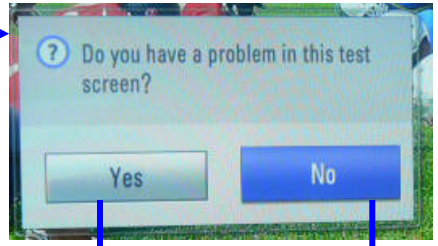
Software Updates (New and Changed Functions) Continued





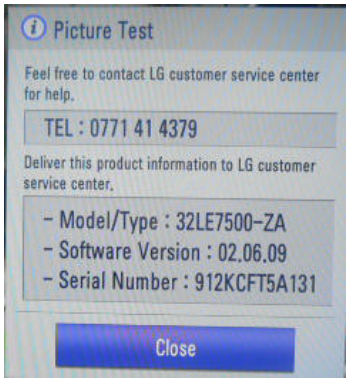
Automatic Internet Software Update
- Off : Automatic Software update does not work
- On : if new Software released, Software download notice appears at turn on with two choices, Yes and Remind Me Later.

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



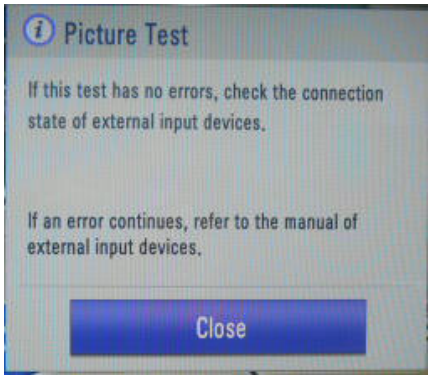
Additional TV Checks can be made by Scrolling down.
Picture, Sound and Network Test

After completion of the test, a Pop up menu is displayed with preloaded back background picture.
Select NO if everything is OK.



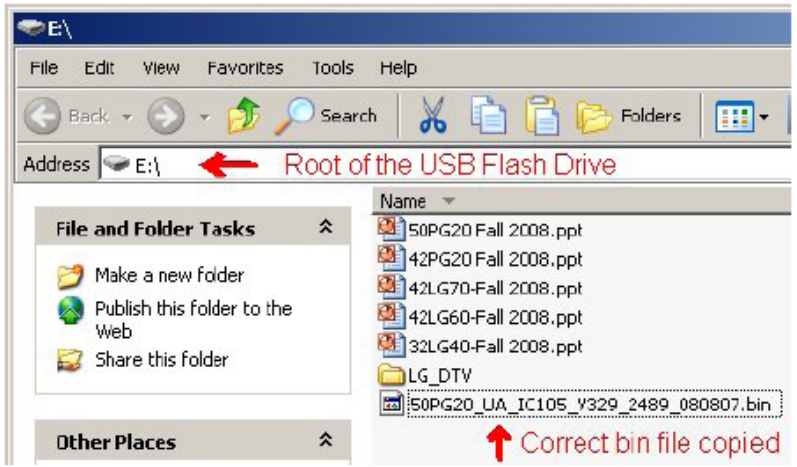
If you select Yes;
Service call number, Model name, SW version and serial No. is displayed.
Note: Confirm the “Suffix” of the model number.

If the Main board is replaced, the Model and Serial number must be reinserted into memory. See Model Number D/L.

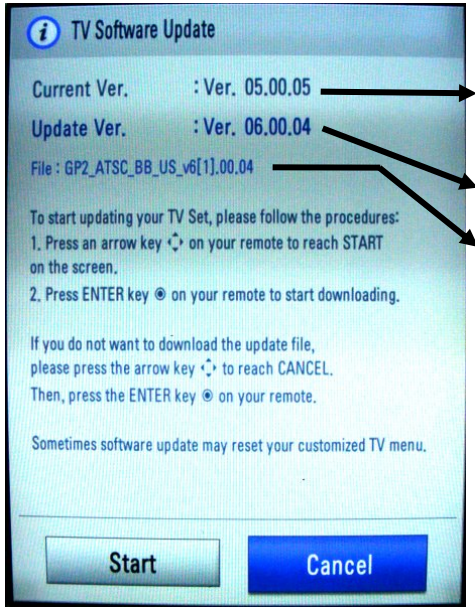


Generic Plasma USB Automatic Software Download Instructions

1) Download the Software File.



2) Copy new software (xxx.bin) into the root of the Jump Drive. Make sure you have the correct software file.
3) With TV turned on, insert USB flash drive.
4) You can see the message
"TV Software Upgrade" (See figure on right)
5) Cursor left and highlight "START" Button and push "Enter" button using the remote control.
6) You can see the download progress Bar.
7) Do not unplug until unit has automatically restarted.
8) When download is completed, you will see "COMPLETE".
9) Your TV will be restarted automatically.



Currently Installed Version

Software Version found on the USB Flash Drive

File found on the USB Flash Drive

Highlight Start Press Select

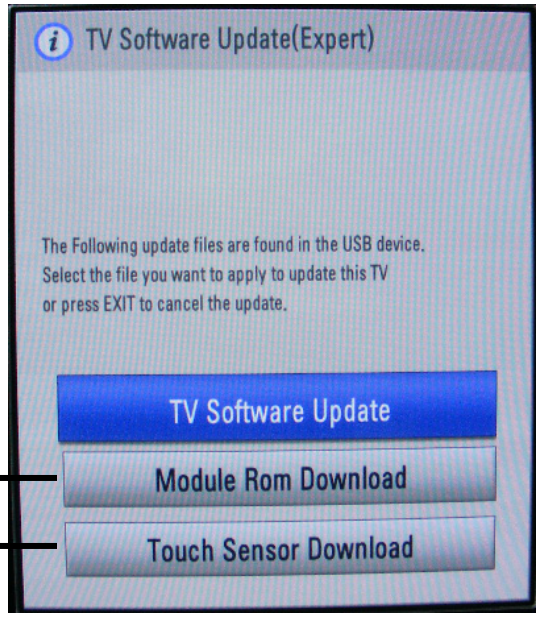
*** CAUTION:**
Do not remove AC power or the USB Flash Drive.
Do not turn off Power, during the upgrade process.

Software Files are now available from LGTechassist.com

Manual Software Download:

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

1

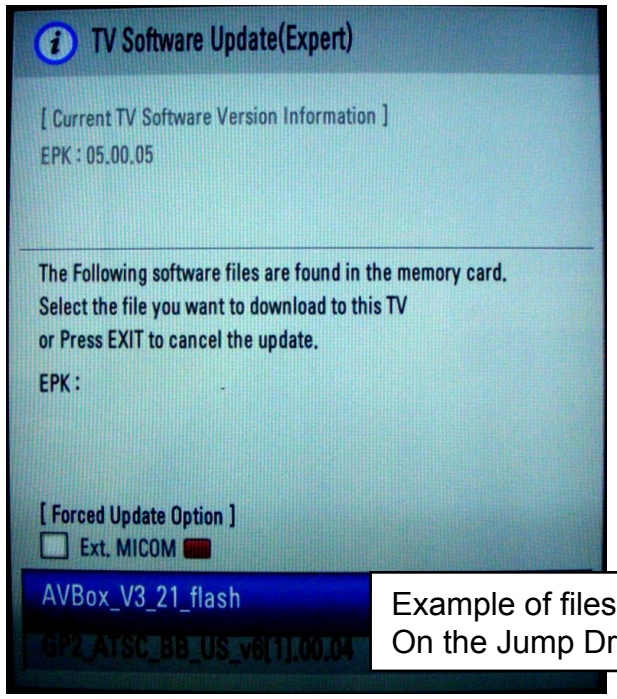


When Touch Sensor Update files become available

When Control Board ROM Update files become available

Highlight TV Software Update and press “SELECT” to bring up the next screen.

2



Example of files found On the Jump Drive

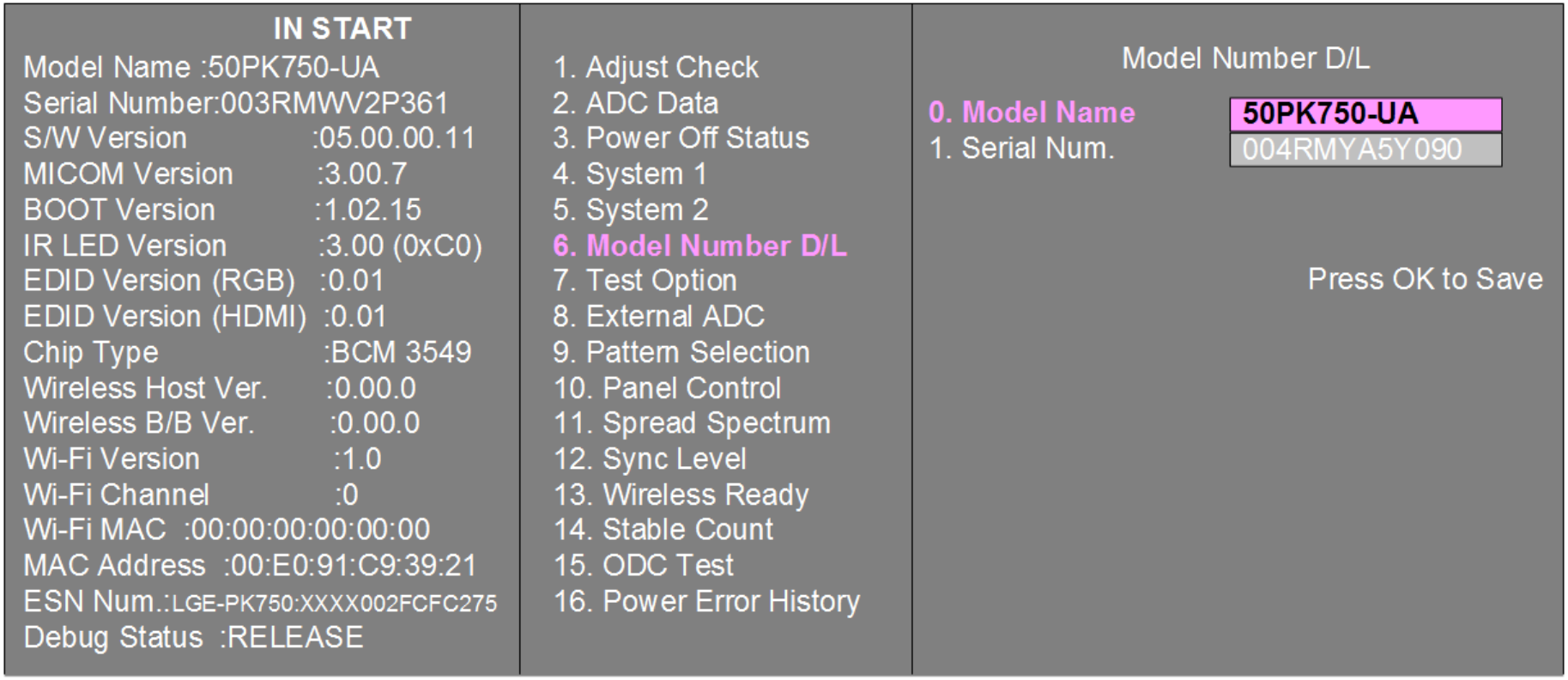
Highlight the Software update file and press “SELECT” to begin the download process.

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

Service Menu: Adding the Model and Serial Number

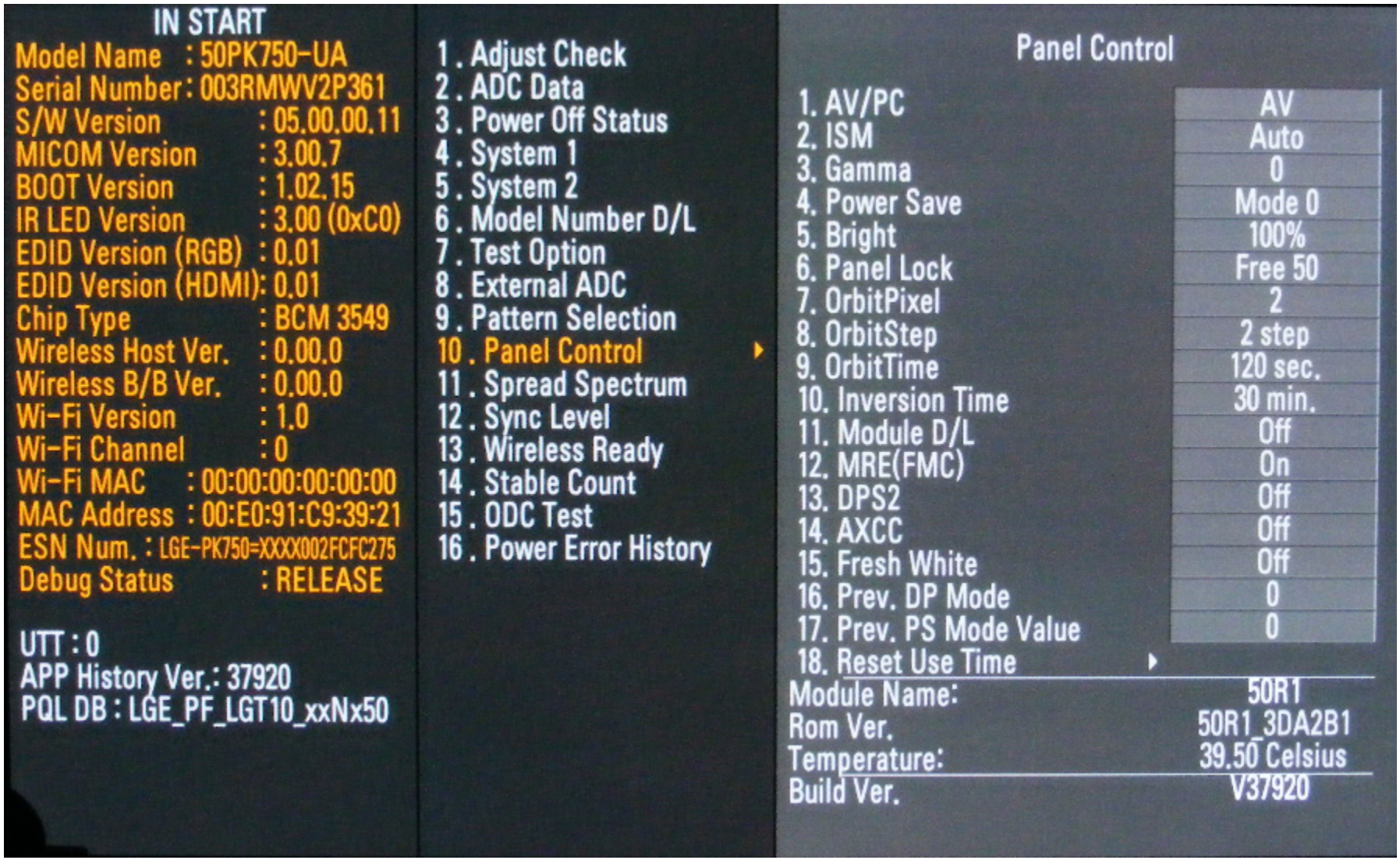
Bring up the Service Menu using the Service Remote.
Scroll down to item 6. Model Number D/L to highlight.
Press “Select” or “Cursor Right”.

Change the Model and Serial Number to match.
To Change the Model Number
Use the cursor right or left to select the area to change. Use the cursor up or down to change.
Cursor right until there is no text cursor blinking.
Scroll down to highlight “Serial Number” and change.



Service Menu: Panel Control Shows Control Board Information

At the bottom right you can see the Panel Model Number, Control board Software Version and the Panel Temperature



Service Menu: Downloading EDID Data Pg 1 of 2

1) Press "ADJ" key.

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

EZ ADJUST

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

EZ ADJUST

0. Tool Option1
1. Tool Option2
2. Tool Option3
3. Tool Option4
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EZ ADJUST

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

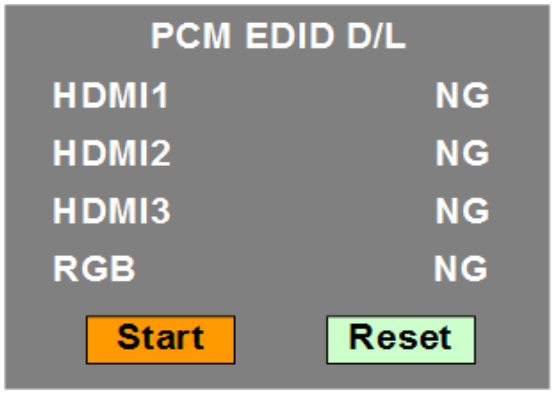
Service Menu: Downloading EDID Data Pg 2 of 2

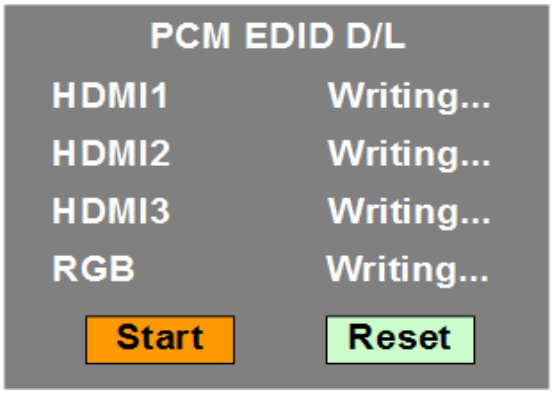
3) Highlight "Start" then Press "Select" key.

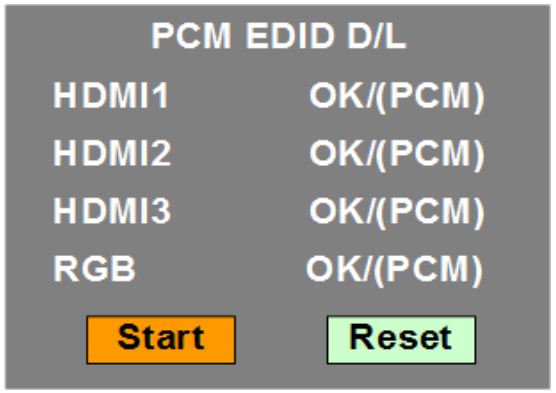
4) When Writing appears Downloading in progress

5) Downloading Complete

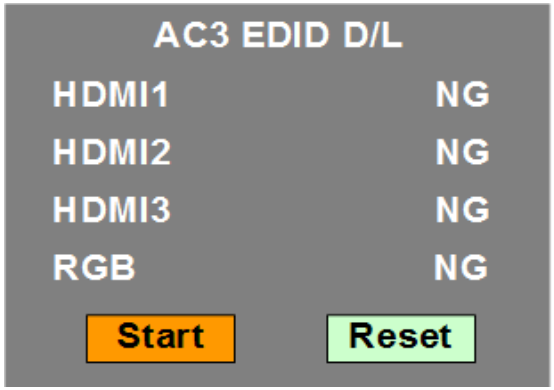
When PCM EDID D/L was selected

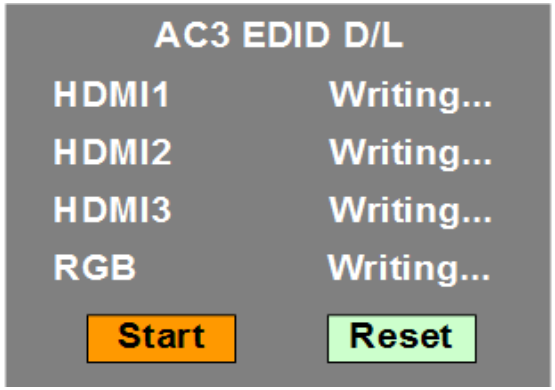


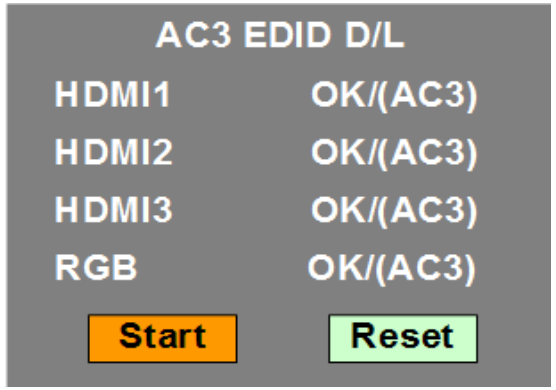




When AC3 EDID D/L was selected





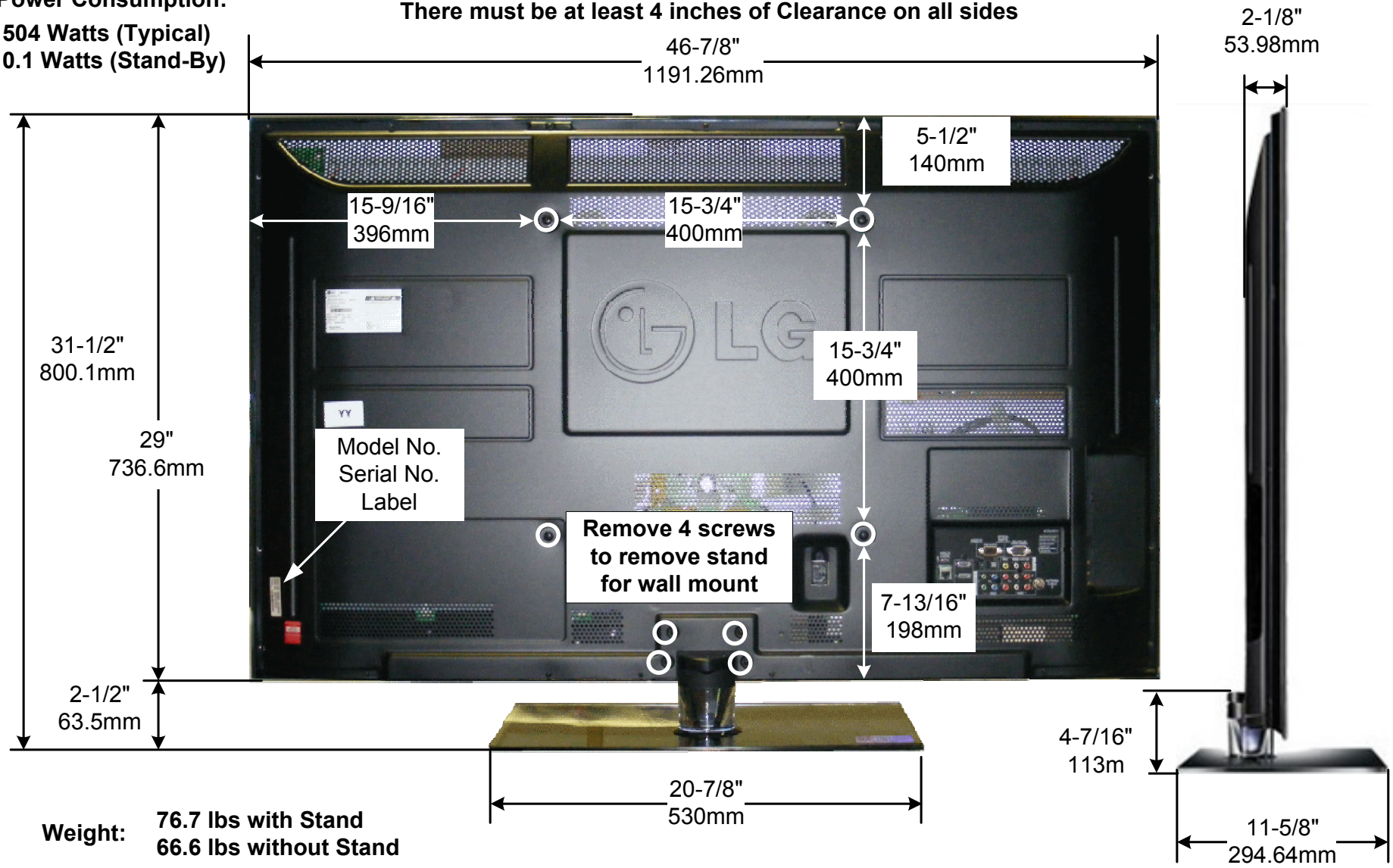


Note: When PCM is downloaded, AC3 will be N/G and when AC3 is downloaded PCM will be N/G. This means that when PCM is OK, PCM audio is priority and when AC3 is OK, AC3 audio is priority.

50PK950 Dimensions

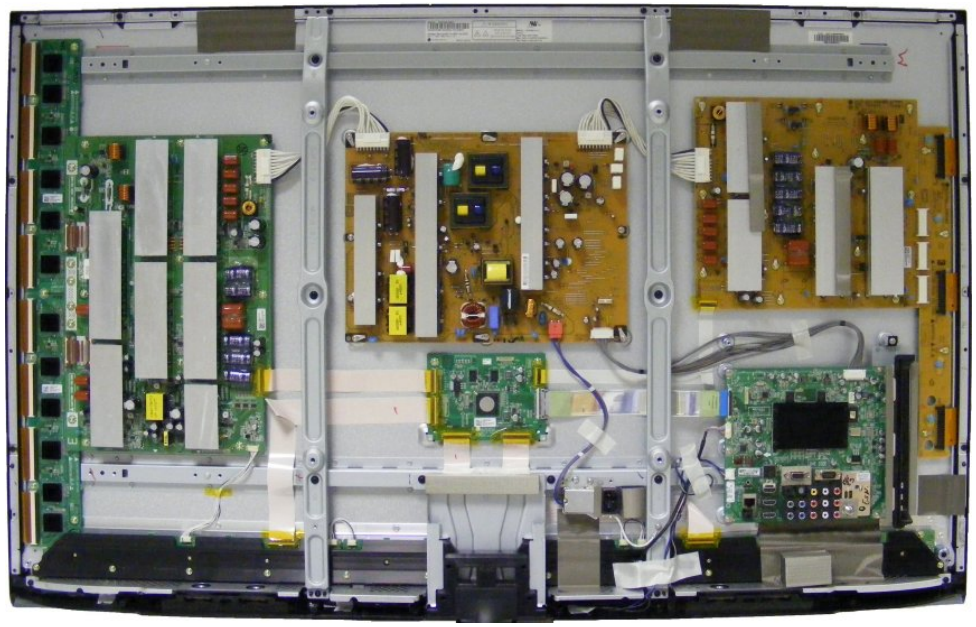
Power Consumption:
504 Watts (Typical)
0.1 Watts (Stand-By)

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



Weight: **76.7 lbs with Stand**
66.6 lbs without Stand

DISASSEMBLY SECTION

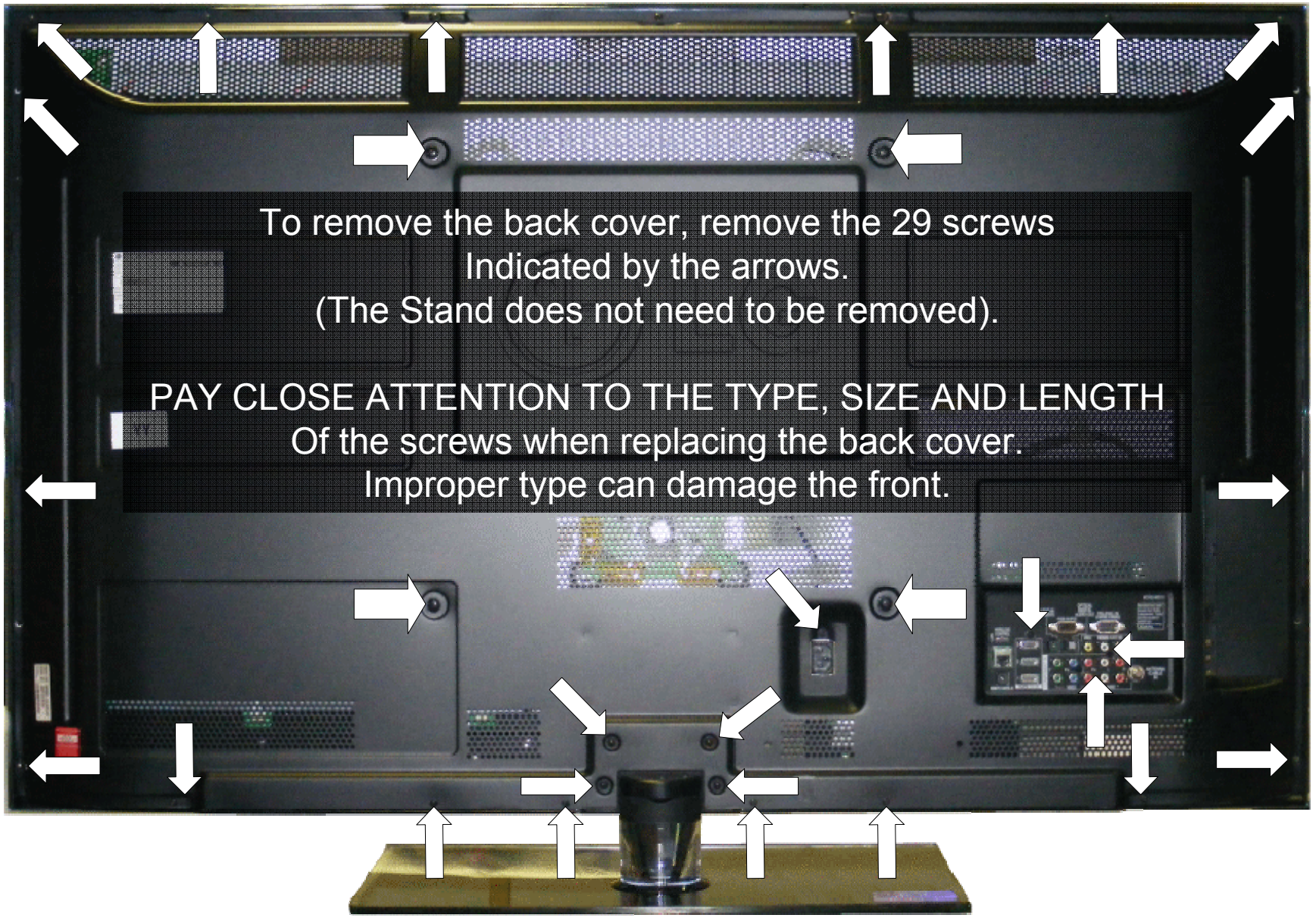


This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 50PK950 Advanced Single Scan Plasma Display Panel.

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.

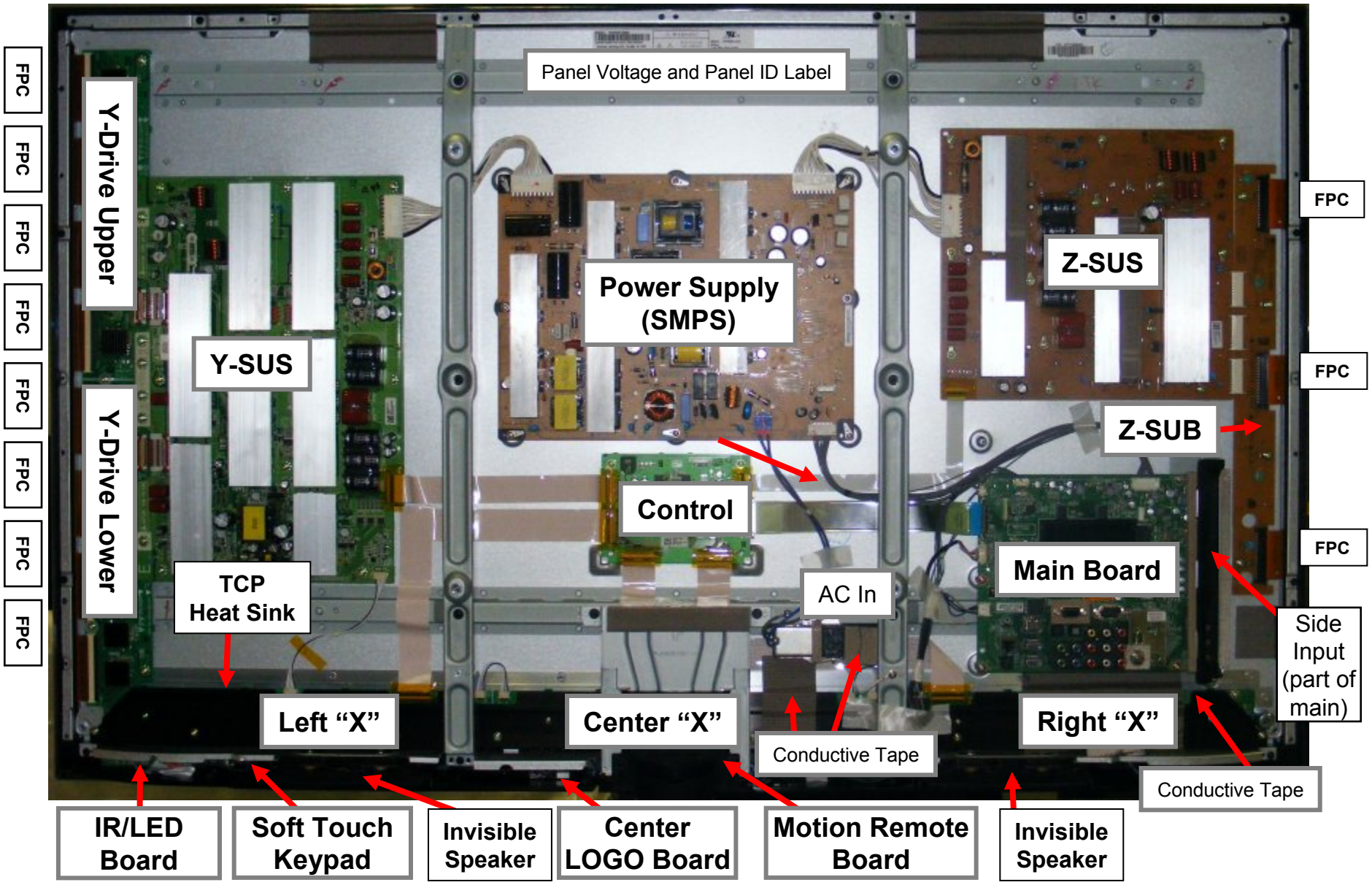
Removing the Back Cover

Caution: The Back may have very sharp edges

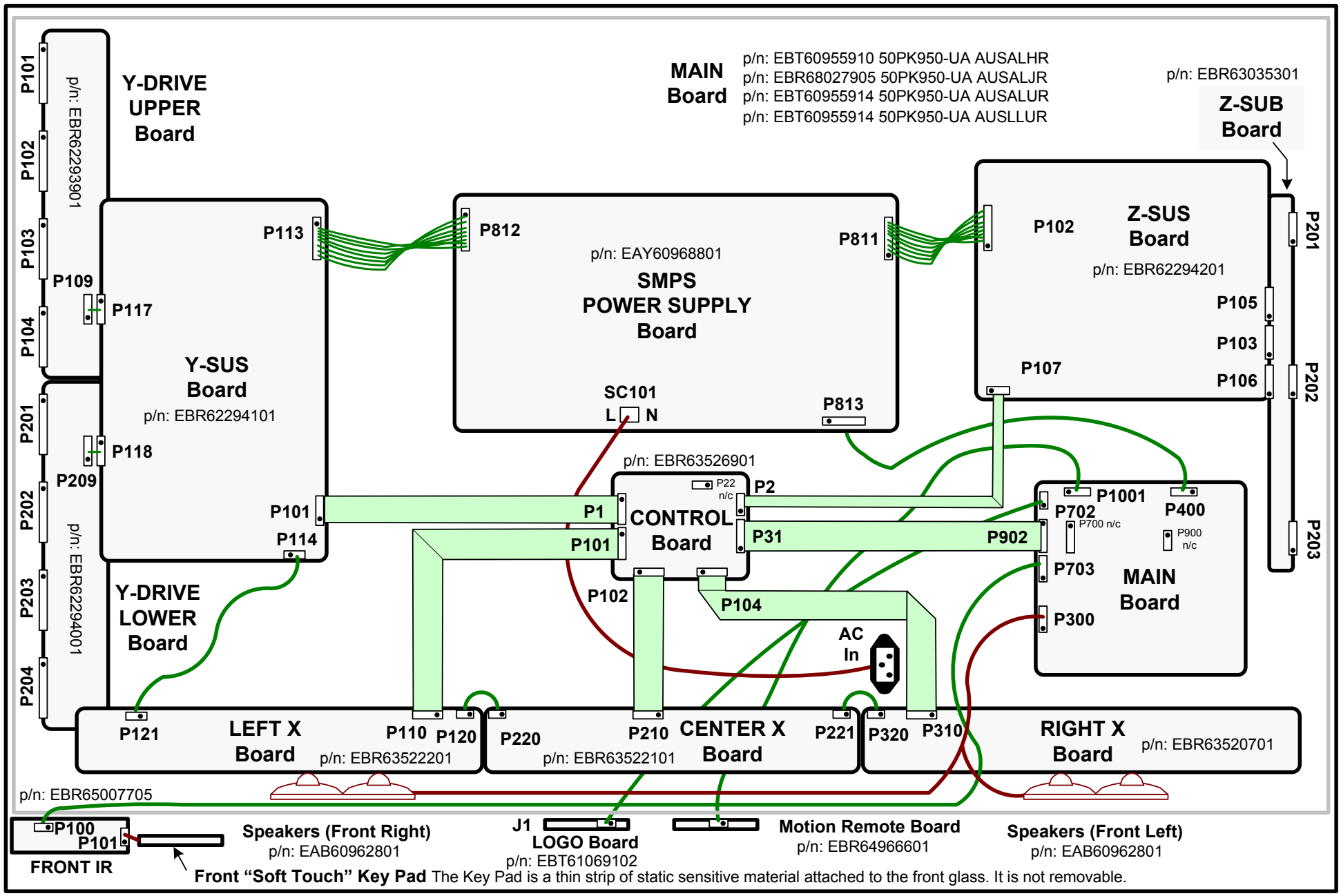


Circuit Board Layout

Identifying the Circuit Boards



50PK950 Connector Identification Diagram



Disassembly Procedure for Circuit Board Removal

Note: Remove AC Power before doing any circuit board removal procedures.

Switch Mode Power Supply Board Removal

Disconnect the following connectors: P811, P812, P813 and SC101.
Remove the 7 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.

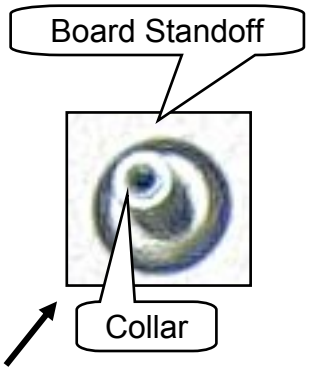
Y-SUS Board Removal

Note: The Y-SUS does not come with the connectors between the Y-SUS and Y-Drive

Disconnect the following connectors: P113, P114 and Ribbon Cable P101.
Remove the connectors P117 and P118 by pressing in on the locking mechanism and lifting upward.
Remove the 15 screws holding the Y-SUS in place. ***Do not run the set with P117 or P118 removed.***
Remove the Y-SUS board. 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

Note: The Y-SUS does not come with the connectors between the Y-SUS and Y-Drive



Disconnect the following Flexible Ribbon Connectors P101~P104 and/or P201~P204:
Disconnect the following Connectors P109 and/or P209 by pressing in on the locking mechanism and lifting upward. ***Do not run the set with these connectors removed.***
Remove the 6 screws holding either of the Y-Drive Boards in place.
Lift up slightly, then slide to the left. Remove the Y-Drive Board.
Note: Y-SUS, 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. Behind each board are Rubber pieces that act as a cushion. They may make the board stick when removing.

Disassembly Procedure for Circuit Board Removal (2)

Z-SUS Board Removal

Disconnect the following connectors: P102 and P107.
Remove the 10 screws holding the board in place.
Lift up slightly to clear the screw stand-offs and pull the Z-SUS to the left to unseat P103, P105 and P106 from the Z-SUB board and remove the board.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VS, -Vy and Z-bias as well.

Z-SUB Board Removal

Disconnect the following connector: P102 and remove P107 by pulling the locking mechanism upward and remove the flexible ribbon cable.
Remove the 10 screws holding the board in place.
Remove the Z-SUB board.

Main Board Removal

Disconnect the following connectors: P902 LVDS (press inward on the locking tabs), P400, P703 and P300. Remove the 4 screws holding the Main board in place and Remove the board.

Control Board Removal

Disconnect the following connectors: P31 LVDS, P1 Ribbon, P2, and P101, P102, P104 Ribbons by lifting up the locking tab. Remove the 2 screws holding the Control board in place. Lift up the Control board to unseat it from the two metal supports at the bottom and Remove the board.

Front IR and Key Pad Removal

FRONT IR/INTELLIGENT SENSOR and POWER BUTTON:

Remove the 2 screws. Remove the Board.
Disconnect P100 and P101. Note: P101 is a ribbon connector. Lift up the locking mechanism and slide the ribbon cable out.

KEY PAD:

The Key Pad is a thin strip of static sensitive material attached to the front glass. It is not removable.

X Drive Circuit Board Removal

Remove AC and Lay the Television down carefully on a padded surface.
Make sure to use at least two people for this process so as not to flex the panel glass.
Refer to next 3 pages for disassembly and precautions.

a) Remove the Back Cover.
b) Remove the Stand (4 Stand Screws were removed during back removal).
c) Remove the Stand Metal Support Bracket (5 Screws) 2 Plastic tap thread and 3 Metal thread.
d) Remove the Vertical support Braces marked “E”.
   Note: There is a Left and a Right brace. (5 Screws per/bracket) 2 Plastic tap thread and 3 Metal thread.
   (Note, the right brace has a Grounding wire from the AC input which must also be removed).
e) Remove the 13 screws holding the Heat Sink. (Warning: Never run the set with this heat sink removed).
   To remove the heat sink, lift up to release the tacky Chocolate (heat transfer material) and slide the heat sink to the left to clear the connector wires on the right side.
   Note: There are two large pieces of conductive tape on the right side of the Right X Board that must be removed.
   Also, note that there are several pieces of Chocolate heat transfer material attached all the way across the underside of the heat sink.

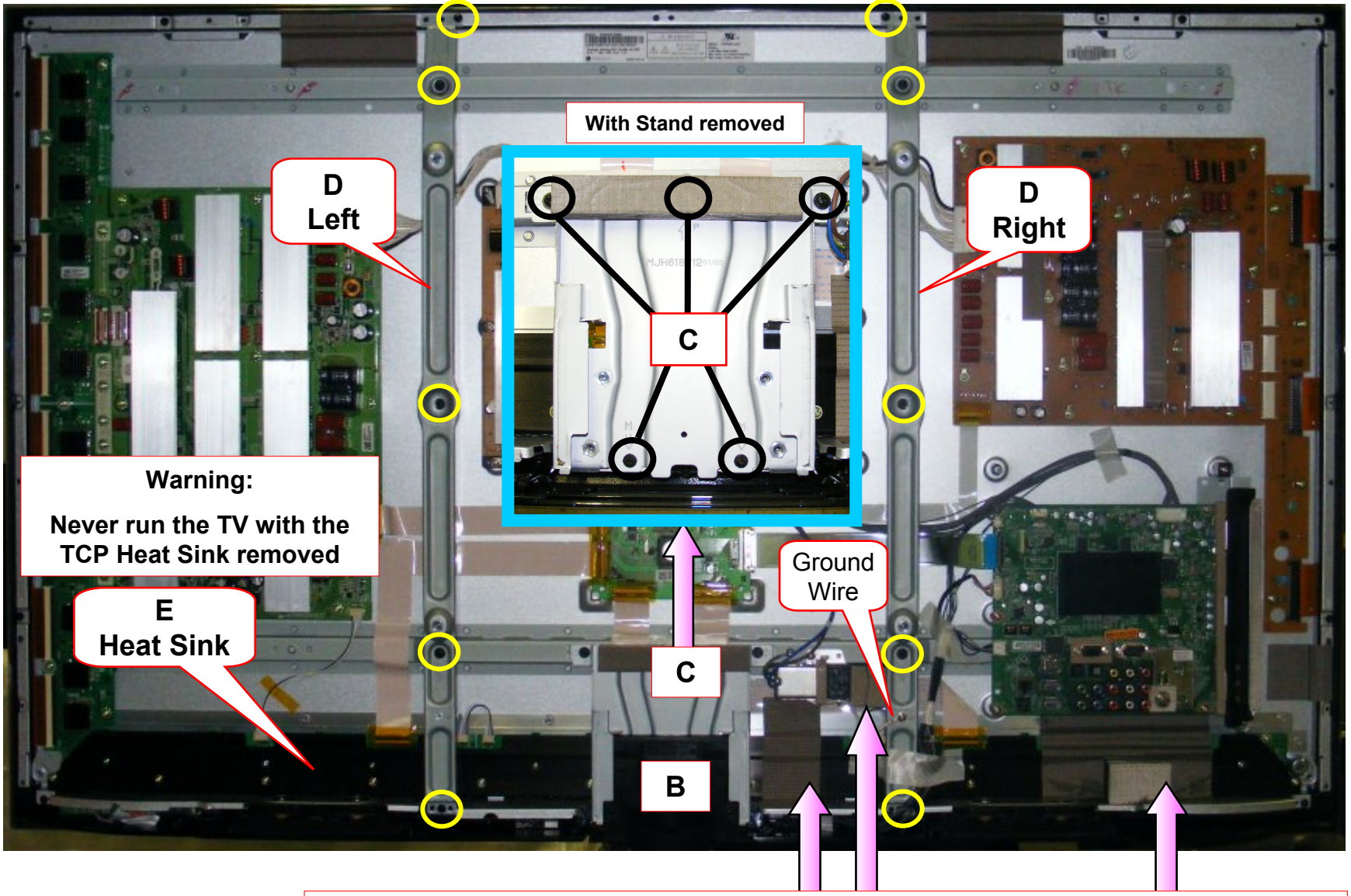
X-DRIVE LEFT, CENTER AND RIGHT REMOVAL:

Disconnect all TCP ribbon cables from the defective X-Drive board and all other Ribbon cables going to the board.

Remove the 5 screws holding the defective X-Drive board in place.

Remove the board. Reassemble in reverse order. Recheck VA / VS / VSC / -VY / Z-Bias.

Getting to the X Circuit Boards

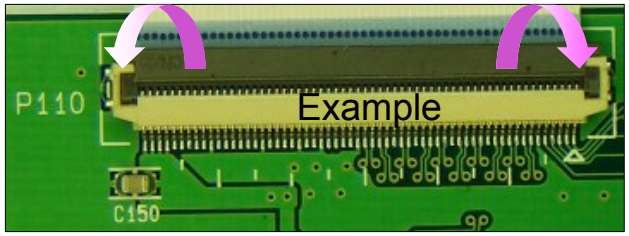


Left and Right X Drive Connector Removal

See below to Remove the Connections on the X-Boards.

From the Control Board to the X-Boards.
There may be tape on these connectors.

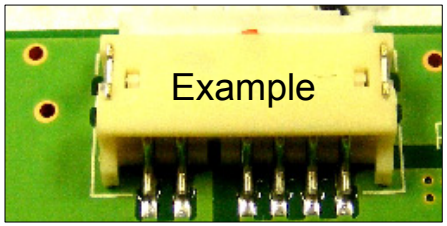
P110
P210
P310
Are all the same



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

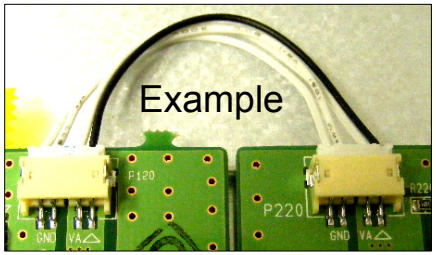
Disconnect connector P121

Va from the Y-SUS to Left X Only



Disconnect Va from Left to Center to Center to Right X Boards

P120 to P220
Left to Center X
P221 to P320
Center to Right X



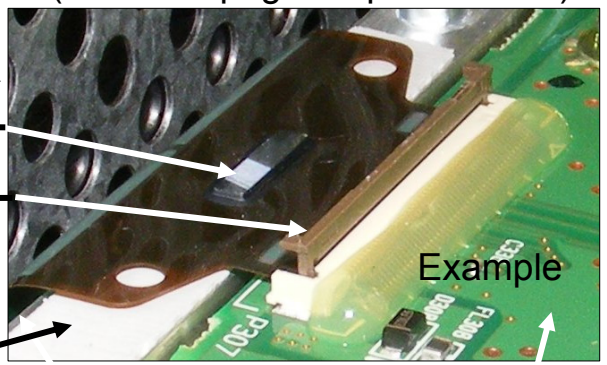
Removing Connectors to the TCPs.

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

TCP

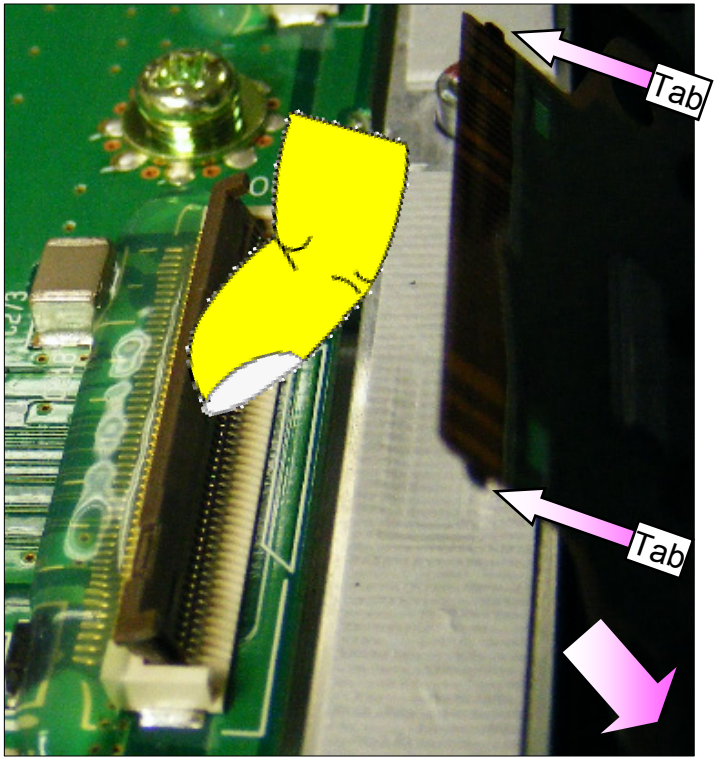
Gently lift the locking mechanism upward on all TCP connectors
Left X: P101~108
Center X: P201~207
Right X: P301~308

Cushion (Chocolate)



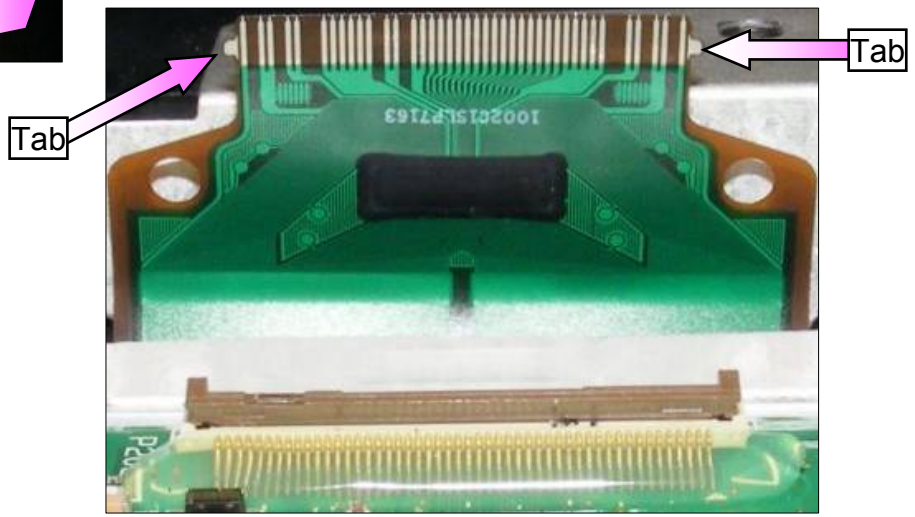
Flexible ribbon cable connector

TCP (Tape Carrier Package) Generic Removal Precautions



Lift up the locking mechanism as shown to release the ribbon cable.
(The Lock can be easily damaged, and needs to be handled carefully.)

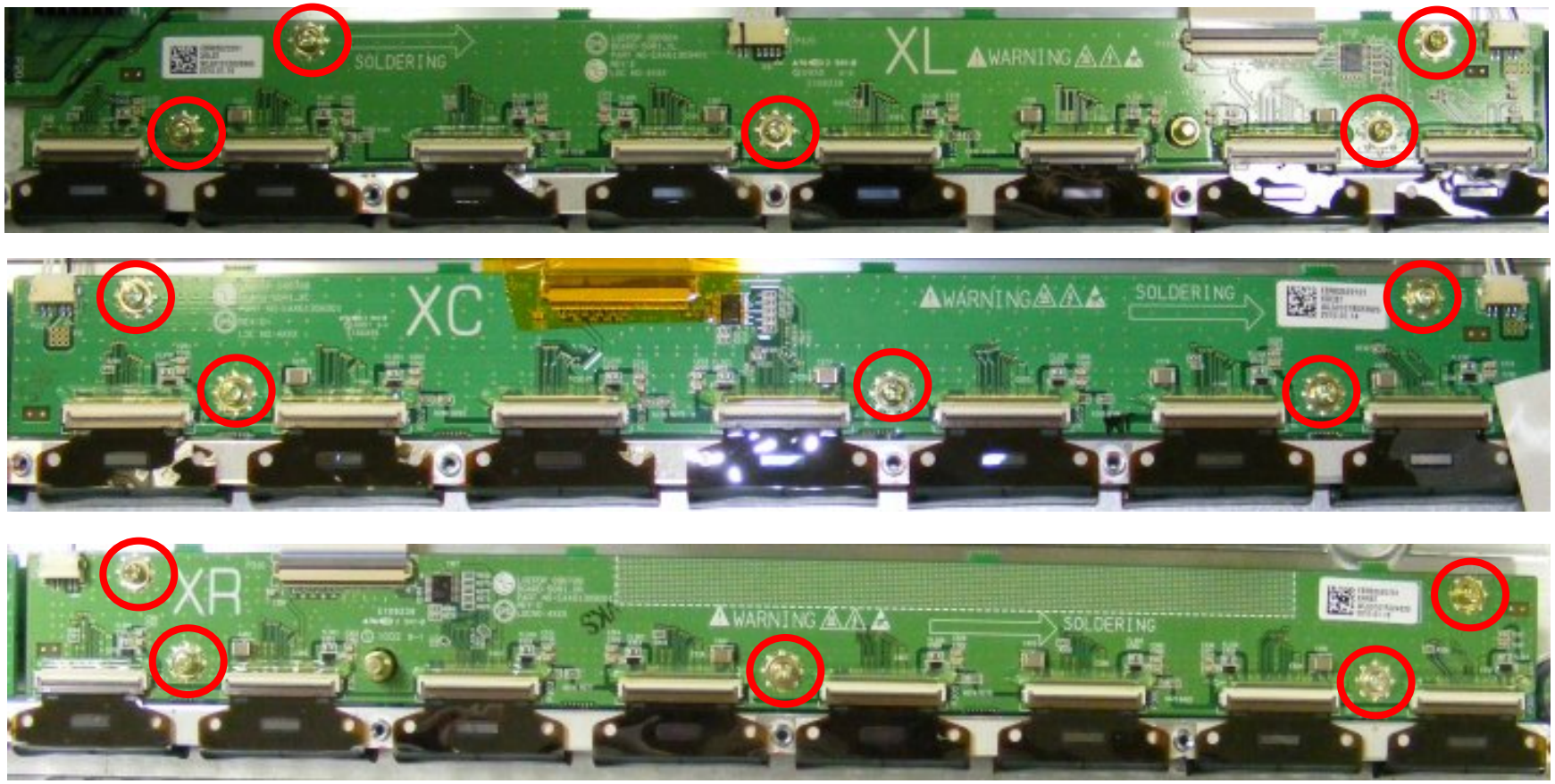
Separate the TCP Ribbon Cable from the connector as shown.
TCP Film can be easily damaged. Handle with care.



The TCP Ribbon Cable has two small tabs on each side which help secure it into the connector. They have to be lifted up slightly to pull the Ribbon Cable out.
Note: TCP is usually stuck down to the Chocolate heat transfer material, be Very Careful when lifting up on the TCP ribbon cable.

Left and Right X Drive Removal

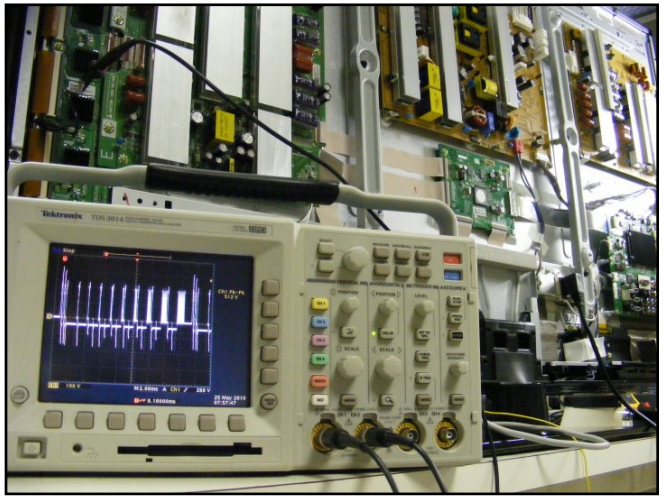
Remove the 5 screws in any X-Board. 15 total for all three.



The Left X Board passes drive signals to 8 TCP's on the right side of the screen
The Center X Board passes drive signals to 7 TCP's in the center of the screen
The Right X Board passes drive signals to 8 TCP's on left side of the screen

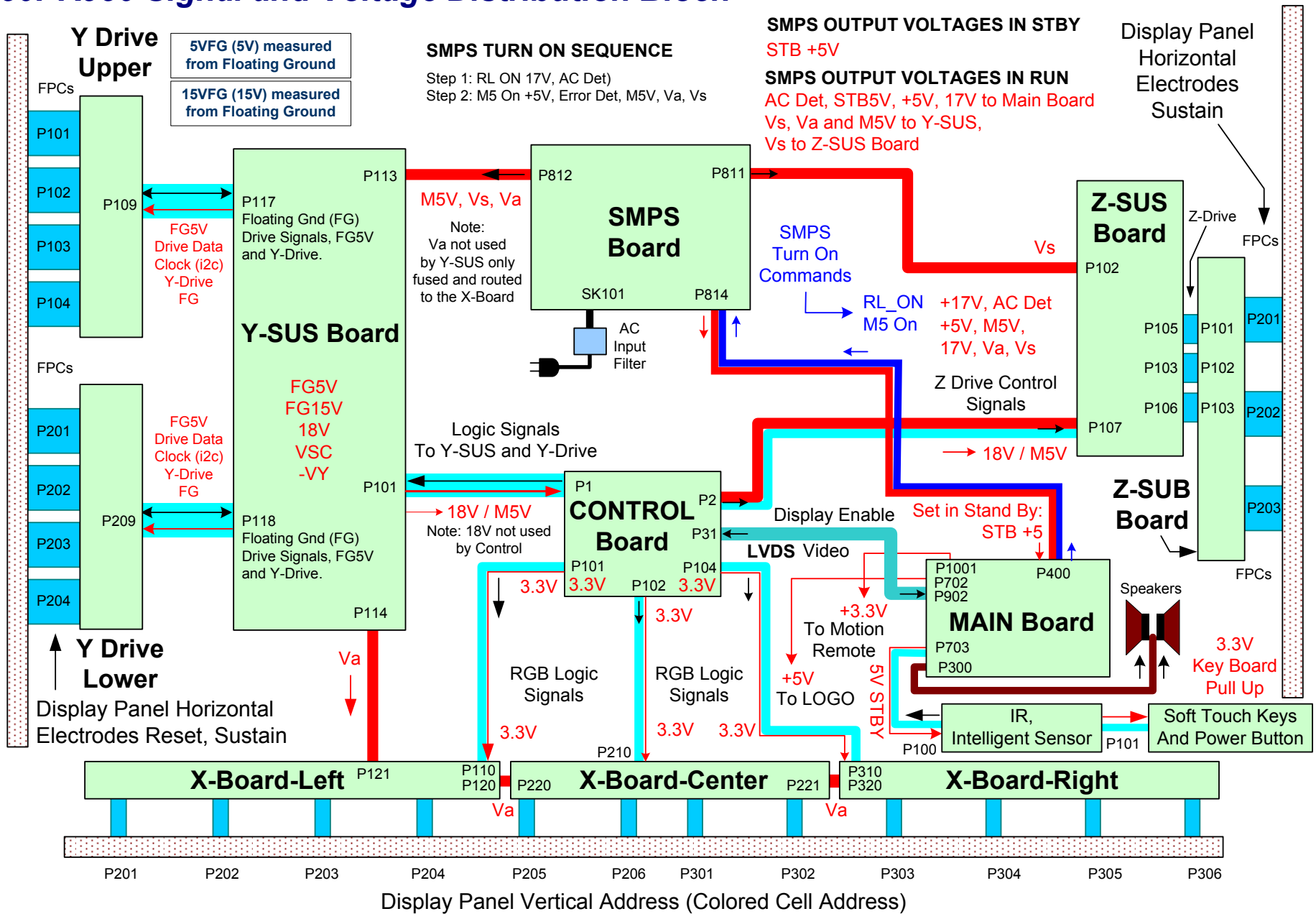
50PK950 Plasma Display

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

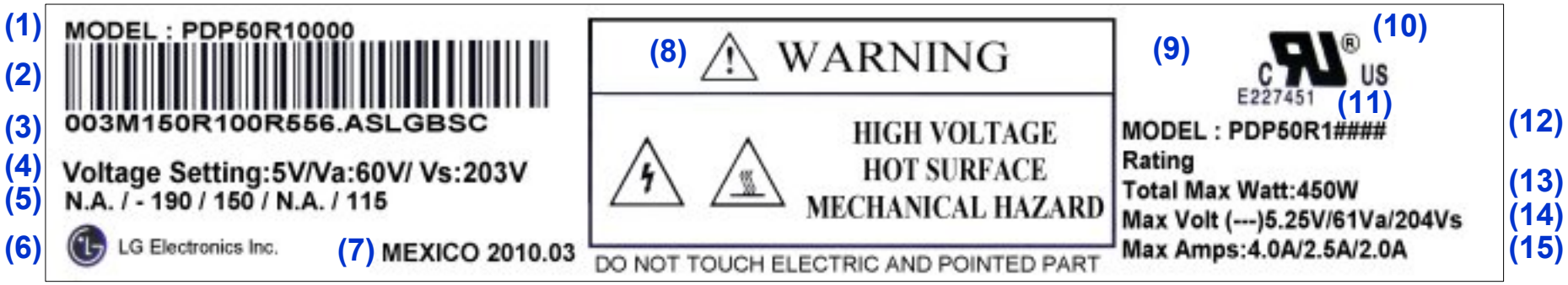


At the end of this Section the technician should understand the operation of each circuit board and how to adjust the controls. The technician should be able to troubleshoot a circuit board failure, replace the defective circuit and perform all necessary adjustments.

50PK950 Signal and Voltage Distribution Block



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 (Not Used)
(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: VS, VA** (Always do first)
2) **Y-SUS: Adjust –Vy, VSC**
3) **Z-SUS: Adjust Z-Bias (VZB)**

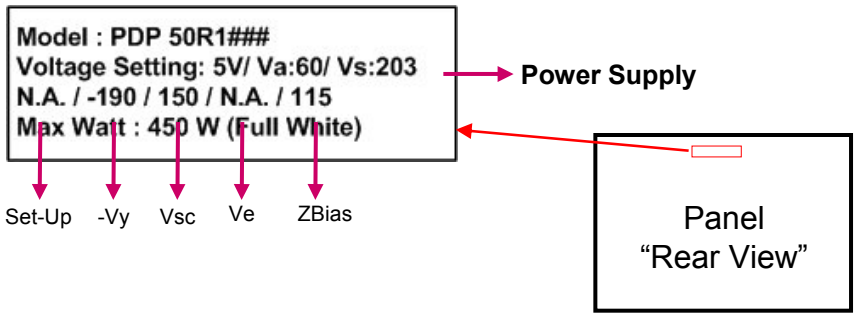
WAVEFORM ADJUSTMENTS

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

The Waveform adjustment is only necessary

1) When the Y-SUS board is replaced
2) When a "Mal-Discharge" problem is encountered
3) When any abnormal picture issue is encountered

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



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 covers troubleshooting the Switch Mode Power Supply. 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 test points needed for troubleshooting and alignments.

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

Always refer to the Voltage Sticker on the back of the panel, located at the upper Center, for the correct voltage levels for the VA and VS supplies as these voltages will vary from Panel to Panel even on the same Model.

SMPS P/N EAY60968801
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.

SMPS p/n: EAY60968801

The Switch Mode Power Supply Board Outputs to the :

Y-SUS Board	**VS**	**Drives the Display Panel's Horizontal Electrodes.**
	VA	**To Y-SUS, fused then to the X-Boards. (Not used by Z-SUS). Primarily responsible for Display Panel Vertical Electrodes.**
	M5V	**Used to develop Bias Voltages on the Y-SUS, Z-SUS Boards.**
Z-SUS Board	**VS**	**Drives the Display Panel's Horizontal Electrodes.**
Main Board	**STBY 5V**	**Microprocessor Circuits**
	17V	**Audio B+ Supply, Tuner B+ Circuits**
	5V	**Signal Processing Circuits**
		AC_Det and Error_Det

Adjustments

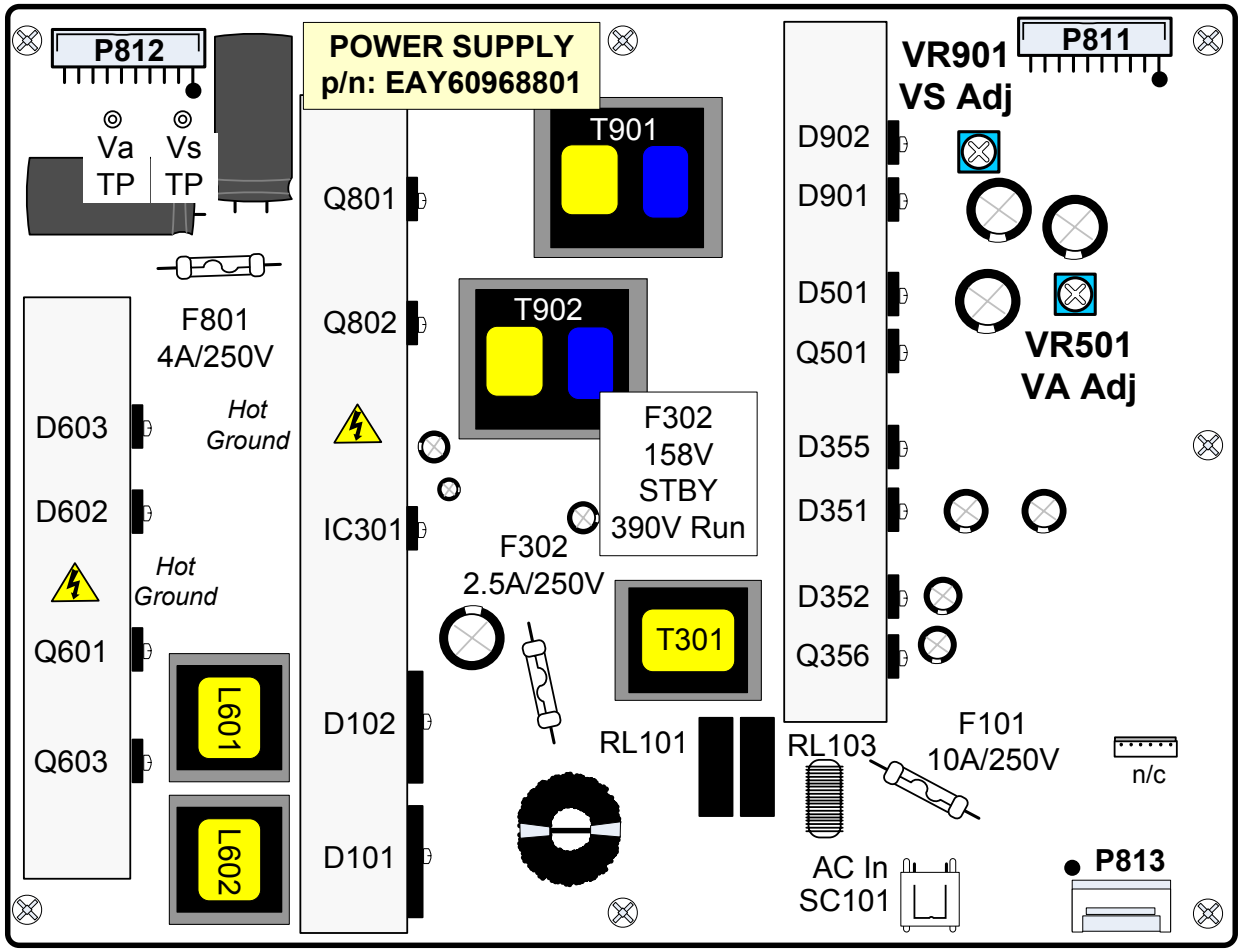
There are 2 adjustments located on the Power Supply Board VA and VS. The M5V is pre-adjusted and fixed. All adjustments are made referenced to Chassis Ground. Use "Full White Raster" 100 IRE

VS	**VR901**
VA	**VR501**

50PK950 SMPS Layout Drawing

F801
0.8V STBY
390V Run

At Power Off
3sec 1st click
4sec 2nd click



[a] Note: The RL_On command turns on the 17V and AC_DET.
[b] Note: The M-On command turns on +5V, M5V, Va and Vs.
[c] Note: The Error Det line is not used in this model.
[d] Note: If the AC Det line is Missing, the TV will not turn on, except the Relays, then no other functions. LOGO On.
[e] Note: Pin 18 is grounded on the Main. If opened, the power supply turn on automatically.

P812
1-2) VS
3) n/c
4-5) Gnd
6-7) VA
8) Gnd
9-10) M5V

Example Panel Label:

Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

VA **VS**

Input: 100~240V 50/60Hz 5.8A
17V = 1.7A
5.1V = 3.0A
STBY5V (5V) = 1.0A
VS 195~204V = 1.9A
VA 60V = 2.5A
M5V (5.1V) = 3.5A
PDP Module MAX 450W

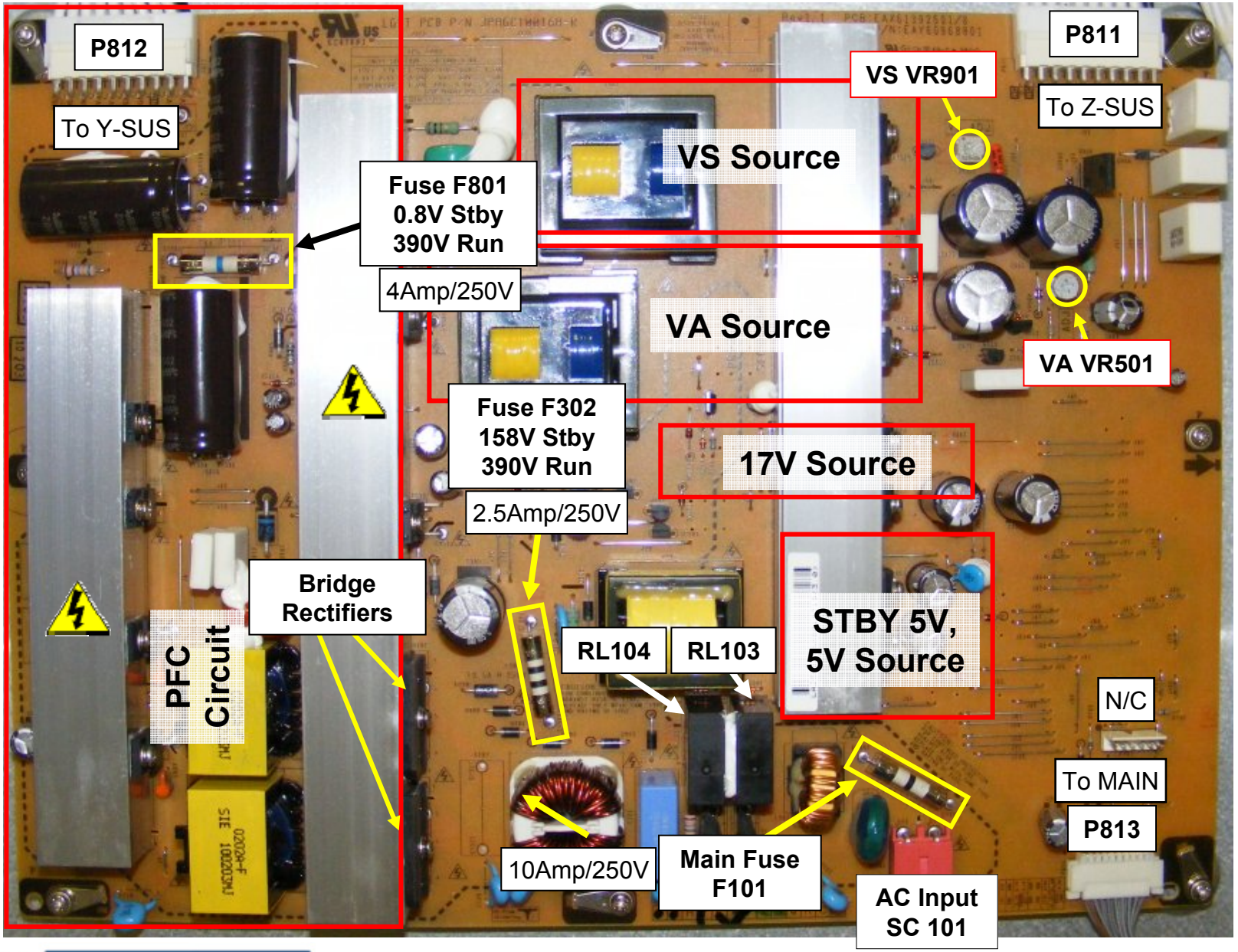
CURRENT LABEL

P811
1-2) VS
3) n/c
4-5) Gnd
6-7) VA
8) Gnd
9-10) M5V

Pin	Label	STBY	Run	Diode
1, 2	[a]17V	0V	16.9V	3.186V
3, 4	Gnd	Gnd	Gnd	Gnd
5, 7	[b]5V	0.4V	5.19V	1.16V
8	[c]Error Det	3.47V	4.11V	3.09V
9-12	Gnd	Gnd	Gnd	Gnd
13-14	Stby 5V	3.49V	5.15V	2.55V
15	[a]RL_ON	0V	3.26V	Open
16	[a d]AC_Det	0V	4.07V	3.06V
17	[b]M_ON	0V	3.26V	Open
18	[e]Auto_Gnd	Gnd	Gnd	Open

Power Supply Circuit Layout

SMPS p/n: EAY60968801



Power Supply Basic Operation

AC Voltage is supplied to the SMPS Board at Connector SC101 from the AC Input assembly, routed to the two Bridge Rectifiers D101 and D102 which then route the primary voltage to the PFC circuit (Power Factor Controller). Standby 5V is developed from 158V source supply (which during run measures 390V 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 chip on the back of the board (IC701) on the SMPS and output at P813 pins 13 and 14 then sent to the Main board for Microprocessor (IC701) operation (STBY 3.49V RUN 5.15V).

When the Microprocessor (IC701) on the Main Board receives a “POWER ON“ Command from either the Power button or the Remote IR Signal, it outputs a high (3.26V) called **RL_ON** at Pin 15 of P813. This command causes the Relay Circuit to close both Relays RL101 and RL103 bringing the PFC circuit up to full power by increasing the 170V standby to 390V run which can be read measuring voltage at Fuse F302 and F801 (390V) from “Hot” Ground. AC Detection (AC Det) is generated on the SMPS, by rectifying a small sample of the A/C Line and routed to the Controller (IC701) where it outputs at P813 pin 16 (4.07V) and sent to P400 to the Main Board where it is sensed and monitored by the Main Microprocessor (IC701). If AC Det is missing the set will not come on, the relays will click when **RL_ON** arrives, but then no other functions from that point.

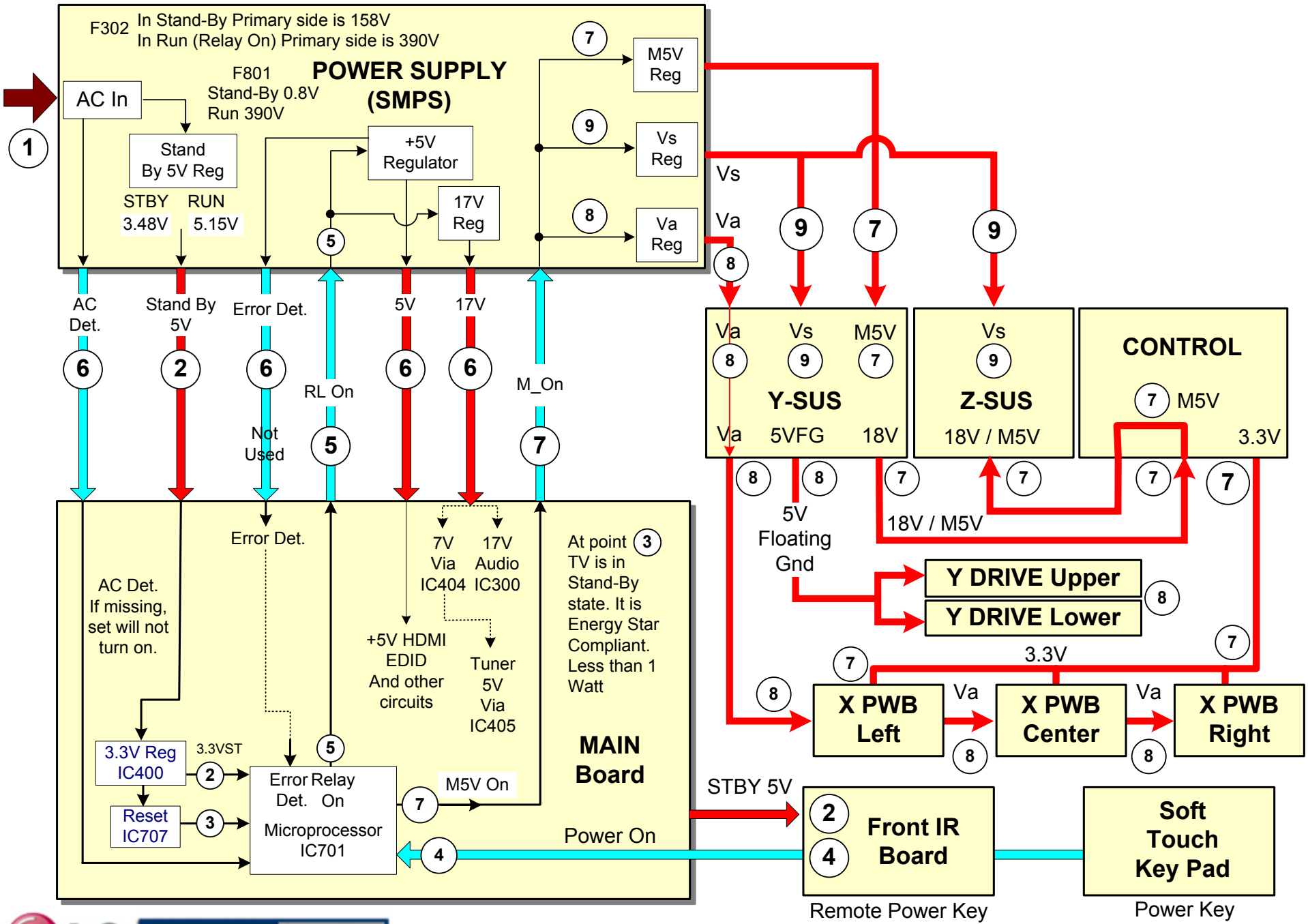
When **RL_ON** arrives, the run voltage +5V source becomes active and is sent to the Main Board via P813 (+5V at pin 5, 6 and 7). The (Error Det) from the SMPS Board to the Main Board can be measured at pin 8 of P813 (3.47V STBY and 4.11V RUN), but it is not used. The **RL-ON** command also turns on the 17V (Audio B+) which is also sent to the Main Board. The 17V (16.9V) Audio supply outputs to the Main board at P813 pins 1 and 2 and used for Audio processing and amplification as well as Tuner B+ once its stepped down to TU-5V.

The next step is for the Microprocessor IC701 on the Main Board to output a high (3.28V) on **M_ON** Line to the SMPS at P813 Pin 17 which is sensed by the Controller IC701, turning on the M5V line and outputs at P812 pins 1 and 2 to the Y-SUS board.

The Controller (IC701) also uses the **M_ON** line to turn on the VA and the VS supplies. (Note there is no VS On Command in this set). VS is output at P811 to the Z-SUS board and VS and Va are output on P812 to the Y-SUS board P113. (VA pins 4 and 5 and VS pins 9 and 10). Note: The Va is fused on the Y-SUS then routed out P114 to the X-Board Left.

AUTO GND Pin 18 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 **AUTO GND** is floated (opened), it pulls up and places the Controller (IC701) into 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.

50PK950 Television Turn On Sequence



Turn On Sequence Text

The text below is related to the previous page.

STBY 5V (Stepped down to 3.3V_ST by IC400) powers on the Microprocessor IC701 on the Main board. This also starts the 10Mhz Oscillator (X700) however, the Microprocessor is not functional until after it is Reset. The Reset circuit (IC701) is energized when 3.3V_ST arrives.

AC Det is 0V when the set is in Stand-By, but rises to 4.07V when the set turns on by the Relay-On Command. AC Det is routed to the Microprocessor. If AC Det is missing, the TV will not turn on. The Relays will engage, but after that, no other functions.

At power on the 1st output from the Microprocessor is, the Relay On command called (RL-ON) which turns on the following SMPS supplies: +5V for Video Processing 17V for Audio Amplification and Tuner B+.
On the Main board, 17V is stepped down to 7V (IC404) then 5V (5V_TU by IC405). The 17V is also sent to the Audio Amp (IC300). The SMPS (+5V) creates a signal called (ERROR DET) and is sent to the Main Board. ERROR DET is Not used by the Main board.

The 2nd output from the Microprocessor is the (M_ON) command which turns on (3) supplies:

(1) M5V (Monitor 5V): For the Control Board, Y-SUS Board and Z-SUS Board. (The M5V is routed through the Y-SUS to the Control Board then to the Z-SUS).

(2) Va: (Voltage for Address) For amplification voltage for the TCPs driving the vertical electrodes. (Voltage routed through the Y-SUS then to the X-Drive boards.

(3) Vs: Voltage for Sustain sent to the Y-SUS and to the Z-SUS) used for amplification voltage driving the horizontal electrodes.

On the Y-SUS, when M5V arrives, it develops 3 voltages: FG15V, FG5V (FG=Floating Ground) and 18V.
The 18V is routed through the Control board to the Z-SUS. The FG5V is routed to the Y-Drive boards for the low voltage processing voltage. When Vs arrives on the Y-SUS, it develops 2 additional voltages; -Vy and VSC which are adjustable.

When the M5V from the SMPS through the Y-SUS arrives on the Control board, the control develops 3.3V and 1.8V for internal use and 3.3V which is routed down to the each X-Board for each TCP's low voltage processing voltage.

Power Supply Va and Vs Adjustments

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

Use Full White Raster "White Wash"

Example Voltage Label

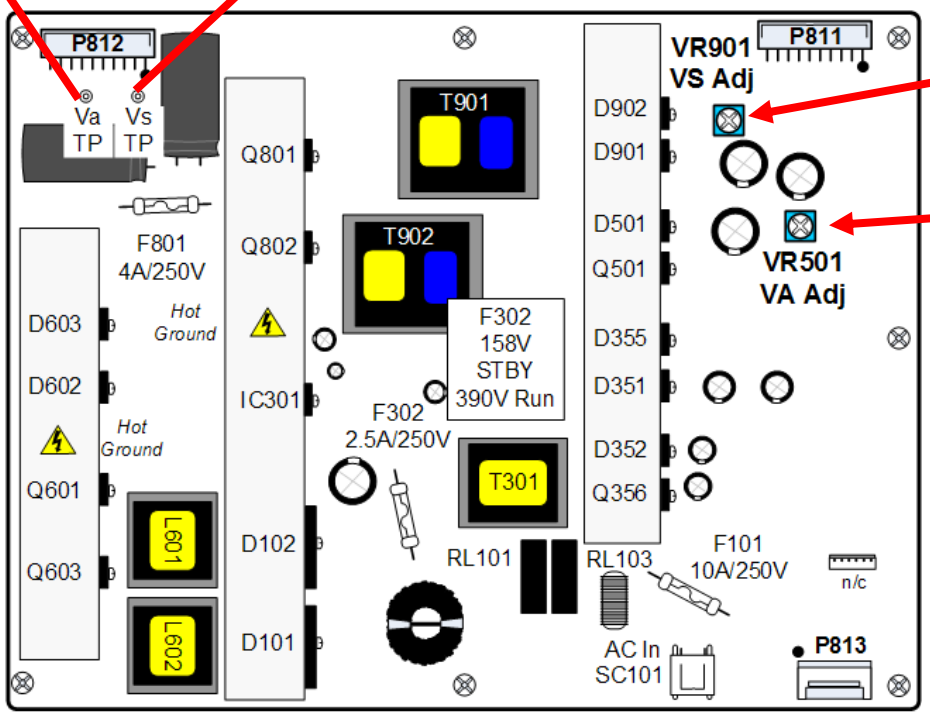
Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

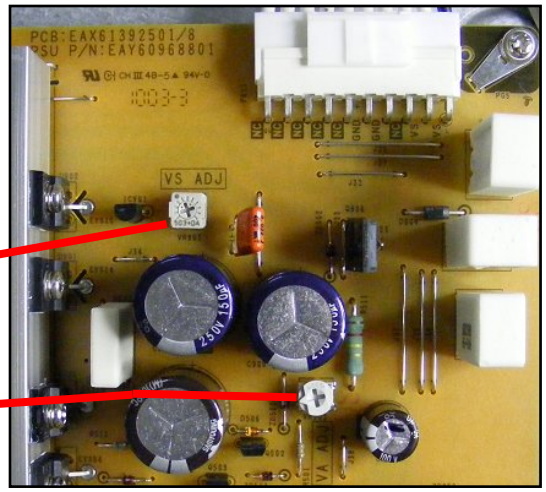
VA Voltage

VS Voltage

Va TP P812 Pin 6 or 7

Vs TP P812 Pin 1 or 2



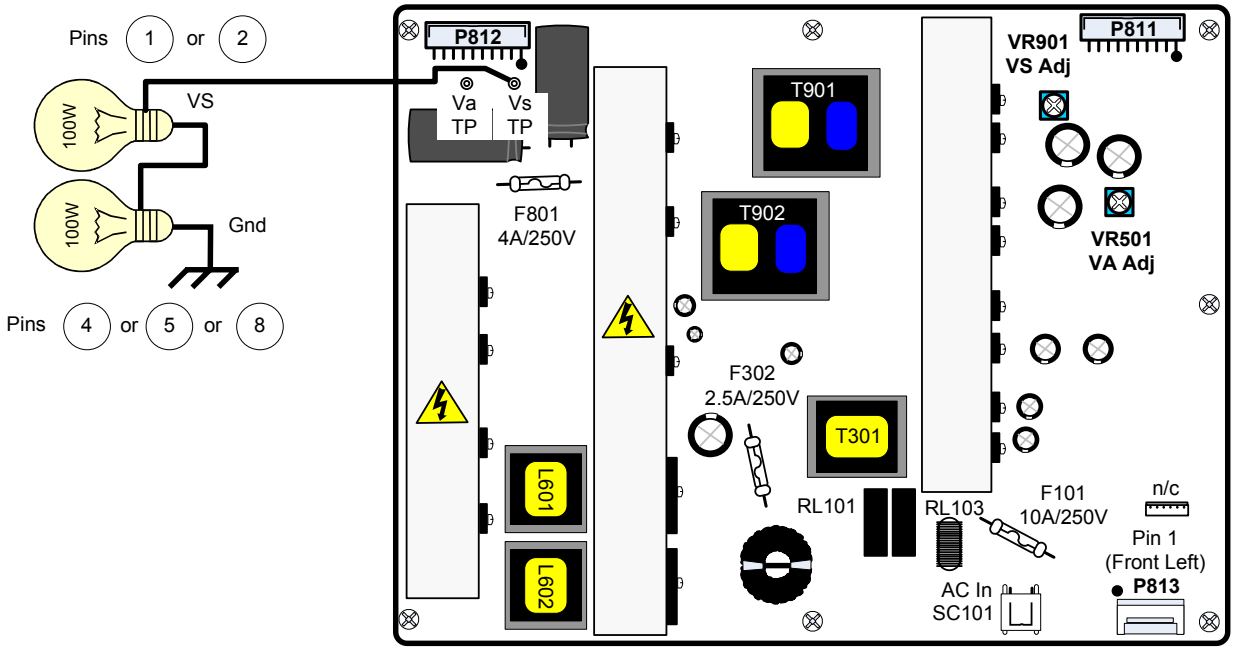


Vs Adjust:
Place voltmeter on VS TP.
Adjust VR901 until the reading matches your Panel's label.

Va Adjust:
Place voltmeter on VA TP.
Adjust VR501 until the reading matches your Panel's label.

Power Supply Static Test with Light Bulb Load

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.



P811 or P812
Check Pins 1 or 2 for Vs voltage

P811 or P812
Check Pins 6 or 7 for Va voltage

Note:
Always test the SMPS under a load using the 2 light bulbs. Abnormal operational conditions may result if not loaded.

Note:
To turn on the Power Supply;
1) With Main Board connected, press power.
2) Without Main Board connected SMPS will turn on automatically.

Any time AC is applied to the SMPS, STBY 5V will be 3.49V and will be 5.13V when the set turns on.
AC DET WILL NOT be present until set comes on.
If AC Det is missing, the TV will NOT come on.

P813

Check Pins 13 or 14 for 5V SBY (5.13V)	Check Pins 1 or 2 For 17V (17.3V)
Check Pin 8 for Error Det (4.1V)	Check Pin 5,6 and 7 for (+5.17V)
Check Pin 16 for AC Det (4.06V)	

Power Supply Static Test (Forcing on the SMPS in stages)

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

TEST CONDITIONS:
Connectors going to the Y-SUS P812 and Z-SUS P811 are disconnected.
P400 on the Main board disconnected (coming in on P813).
Use the holes on the connector P400 (Main Board side) to insert the resistors and jumper lead.
Connect (2) 100 Watt light bulbs in series between VS and Ground.

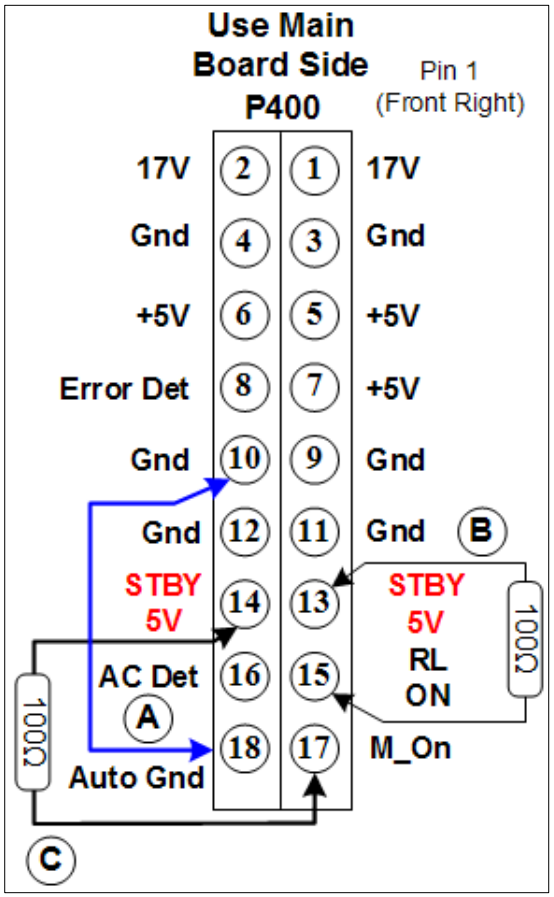
When the supply is operational in its normal state the Auto Ground line at Pin 18 of P813 is held at ground by the Main Board.
This Power Supply can be powered on sequentially to test the Controller Chip IC701 operational capabilities and for troubleshooting purposes.
By disconnecting P400, pin 18 is opened. To return the SMPS to the normal state for this test procedure, this pin must be grounded.
(See first step A below).

Note: Leave previous installed 100Ω resistor in place when adding the next resistor.

(A) Ground the Auto Gnd Line (Pin 18) will allow the supply to be powered up one section at a time.

(B) Add a 100Ω ¼ watt resistor from 5V Standby to RL_ON and the 17V and 5V Run Lines on P813 will become active. Also AC-Det (4.06V) and Error_Det (4.1V) become active.

(C) Add a 100Ω ¼ watt resistor from any 5V line to M_ON to make the (Monitor) M5V, VS and VA lines operational.
P811, P812 (VS pins 1 and 2) and (VA pins 5 and 6).

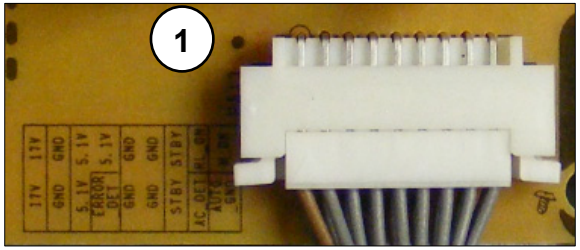


SMPS Connector P813 Identification, Voltages and Diode Check

P813 Connector "SMPS" to "Main" P400

Pin	Label	STBY	Run	Diode Mode
1-2	[a] 17V	0V	17.3V	3.186V
3-4	Gnd	Gnd	Gnd	Gnd
5-7	[a] 5V	0V	5.17V	1.16V
8	[a c] Error Det	3.47V	4.1V	3.09V
9-12	Gnd	Gnd	Gnd	Gnd
13-14	Stby 5V	3.49V	5.13V	2.55V
15	RL On	0V	3.26V	Open
16	[a d] AC Det	0V	4.06V	3.06V
17	[b] M_ON	0V	3.28V	Open
18	[e] Auto Gnd	Gnd	Gnd	Open

P813



Note: This connector has two rows of pins.
Odd on bottom row.

[a] Note: ***The 17V, 5V, AC_Det and Error Det turn on when the RL_On command arrives.***
[b] Note: ***The M5V, Va and Vs turn on when the M_On (Monitor On) command arrives.***
[c] Note: ***The Error Det line is not used in this model.***
[d] Note: If the ***AC Det line is Missing, the TV will not turn on. (Relays will click, then no functions).***
[e] Note: Pin 18 is grounded on the Main board. If this line is floated, the SMPS turns on Automatically when AC is applied.

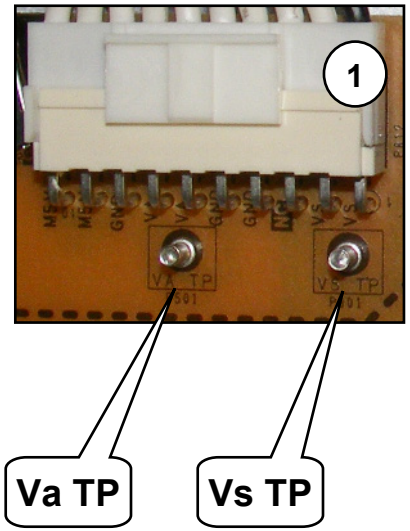
Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.

SMPS Connector SC101 and P811/P812 Identification, Voltages and Diode Check

SC101 AC INPUT

Connector	Pin Number	Standby	Run	Diode Mode
SC101	L and N	120VAC	120VAC	Open

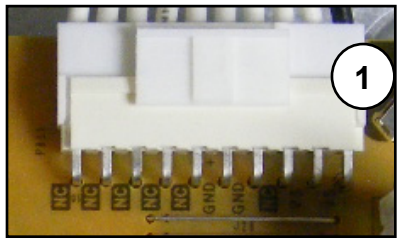
P812



P812 "Power Supply“ to Y-SUS “P113”
P811 "Power Supply“ to Z-SUS “P102”

Pin	Label	Run	Diode Mode
1, 2	*Vs	*203V	Open
3	n/c	n/c	n/c
4, 5	Gnd	Gnd	Gnd
6, 7	*Va	*60V	Open
8	Gnd	Gnd	Gnd
9, 10	M5V	5V	2.16V

P811



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

P102 Z-SUS does not use Va or M5V from P811.
M5V routed through Y-SUS, Control board, in on P107.

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

Y-SUS BOARD SECTION (Overview)

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

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

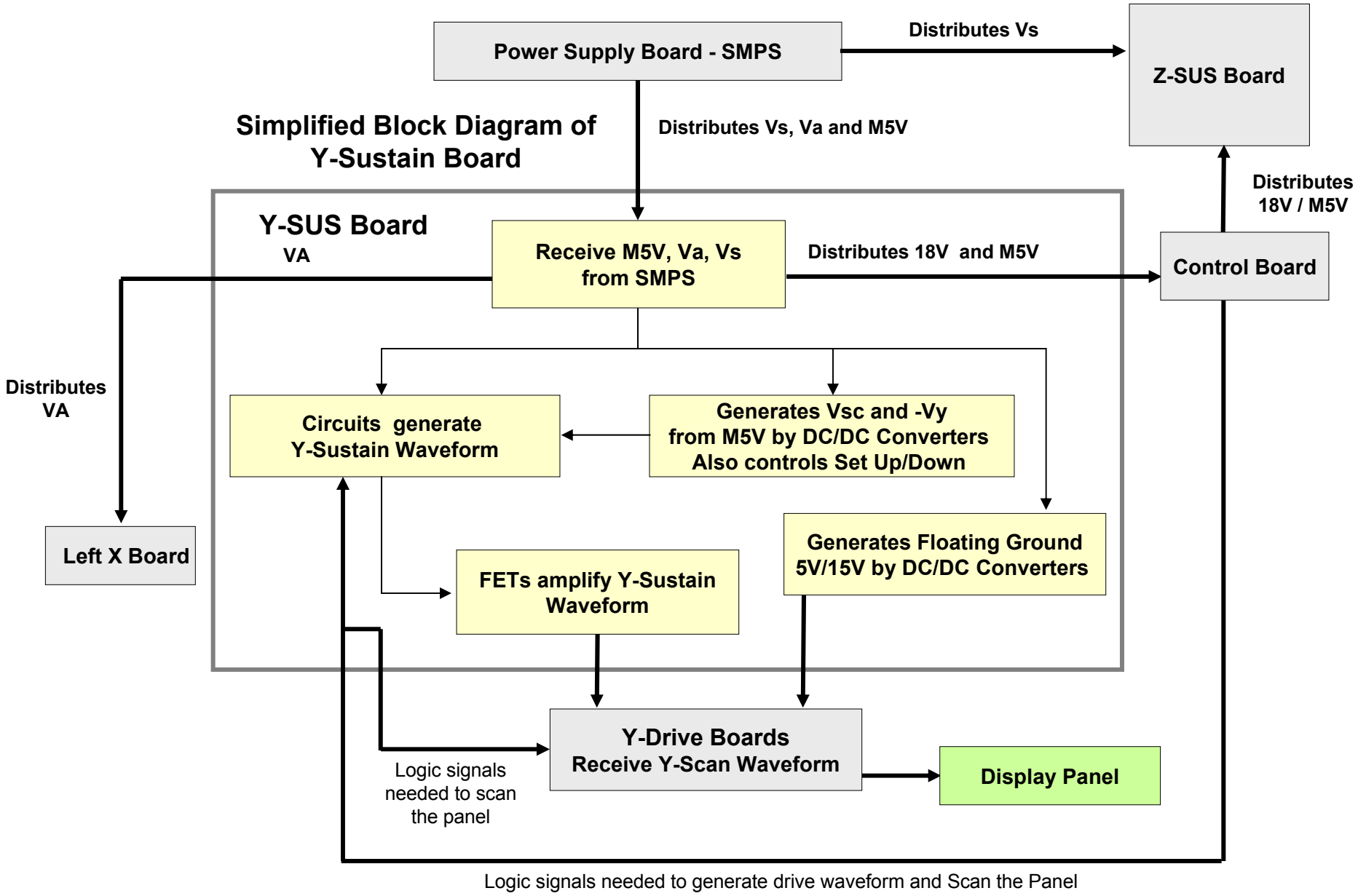
- Adjustments
- DC Voltage and Waveform Checks
- Diode Mode Measurements

Operating Voltages

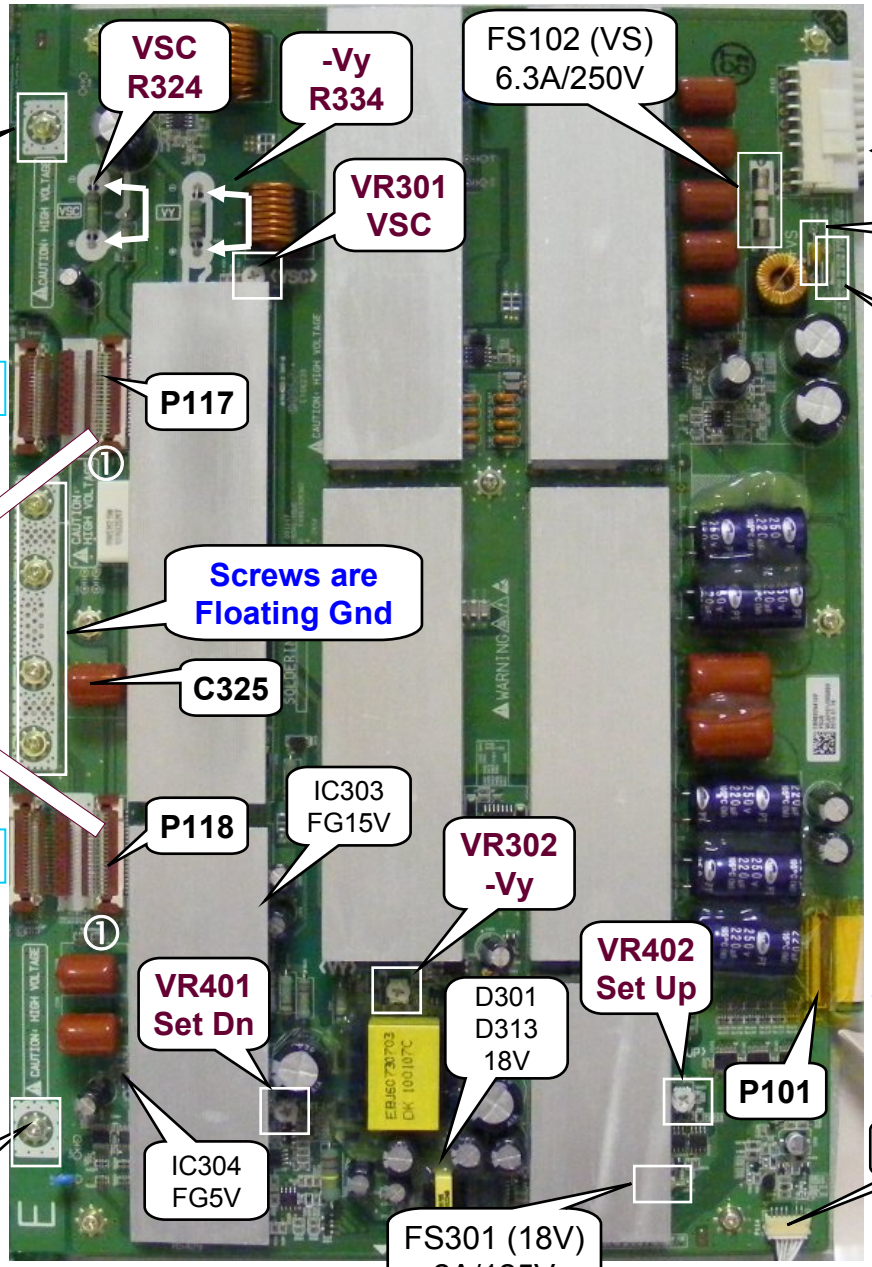
SMPS Supplied	VA	VA supplies the Panel's Vertical Electrodes (Routed to the Left X-Board)
	VS	VS Supplies the Panel's Horizontal Electrodes.
	M5V	M5V Supplies Bias to Y-SUS. (From Y-SUS routed to the Control Board then Z-SUS).
Y-SUS Developed	-VY VR302	-VY Sets the Negative excursion of Reset in the Drive Waveform
	VSC VR301	VSC Sets the amplitude of the complex waveform.
	V SET UP VR402	SET UP sets amplitude of the Top Ramp of Reset in the Drive Waveform
	V SET DN VR401	SET DOWN sets the Pitch of the Bottom Ramp for Reset in the Waveform
	18V	Used internally to develop the Y-Scan signal. (Also routed to the Control Board then routed to the Z-SUS board).
Floating Ground	FG 5V	Used on the Y-Drive boards (Measured from Floating Gnd)
	FG 15V	Used in the Development of the Drive Waveform (Measured from Floating Gnd)

-Vy and VSC generated when Vs arrives on the board. FG5V, FG15V and 18V generated when M5V arrives on the board.

Y-SUS Block Diagram



Y-SUS Board Layout



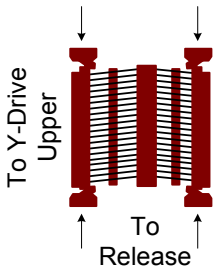
VSC R324
-Vy R334
VR301 VSC
FS102 (VS) 6.3A/250V
VS, VA and M5V Input from the SMPS
P113
FS103 (VA) 4A/125V
FS101 (M5V) 10A/125V
Screw is Floating Gnd
To Y-Drive Upper
P117
Pins 1-5
Or use the Right Side of C325
Pins 16-20
Screws are Floating Gnd
C325
IC303 FG15V
P118
To Y-Drive Lower
VR302 -Vy
18V (pins 46~50) to Control for Z-SUS
M5V (pins 44-40)
Ribbon
Logic Signals from the Control Board
VR402 Set Up
VR401 Set Dn
D301 D313 18V
P101
P114
IC304 FG5V
FS301 (18V) 2A/125V
Va to Left X Board Pins 5~7
Screw is Floating Gnd

WARNING: P117 and P118 use a plug in wire type connector between Y-SUS and Y-Drive. These do not come with a new board. Remove the Y-Drive boards completely if these connectors are removed or the boards will fail.

Y-SUS Board Component Layout

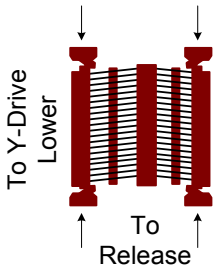
WARNING: The upper Y-DRIVE Board has to be Removed Completely if P117 is pulled.

P109 P117



Note: These connectors DO NOT come with a new board

P209 P118

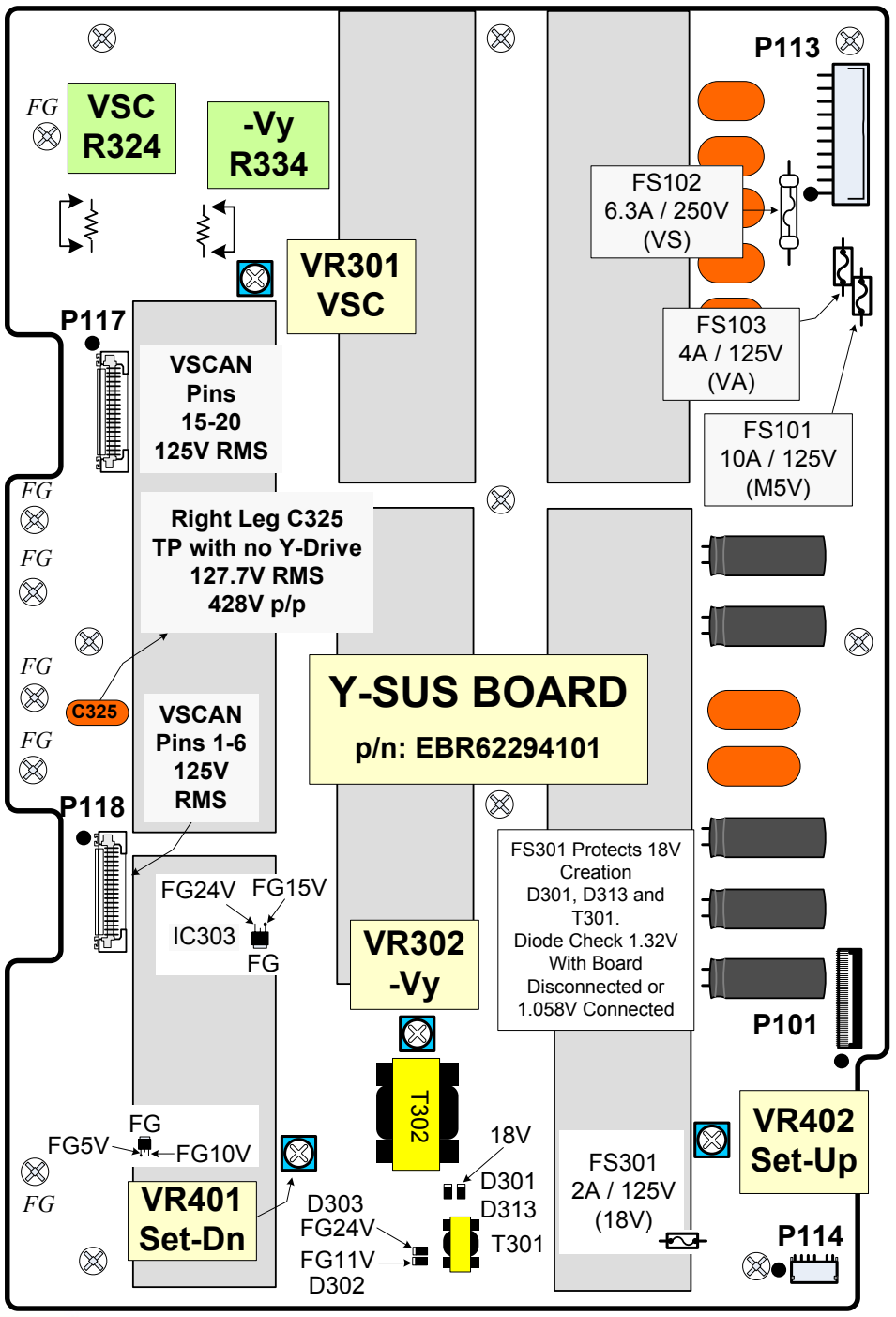


WARNING: The lower Y-DRIVE Board has to be Removed Completely if P118 is pulled.

P117 to P109
1-2) FG5V
03 n/c
04) CLK
05) FGnd
06) STB
07) FGnd
08) OC2
09) FGnd
10) OC2
11) FGnd
12) Data
13) FGnd
14) n/c
15-20) Scan

P118 to P209
1-6) Scan
07) n/c
08) FGnd
09) Data
10) FGnd
11) OC2
12) FGnd
13) OC1
14) FGnd
15) STB
16) FGnd
17) CLK
18) n/c
19-20) FG5V

Note With No Y-Drives:
FG24V reads 24.5V
FG10V reads 11.1V



Pin 1 inverted from the SMPS

P113
9-10) VS
8) n/c
6-7) Gnd
4-5) VA
3) Open
1-2) M5V

P117 to P109	RUN	DIODE
1-2) FG5V	5.06V	1.787V
03 n/c	Open	Open
04) CLK	0.68V	1.74V
05) FGnd	FGnd	FGnd
06) STB	4.25V	1.74V
07) FGnd	FGnd	FGnd
08) OC2	1.95V	1.74V
09) FGnd	FGnd	FGnd
10) OC2	2.99	1.74V
11) FGnd	FGnd	FGnd
12) Data	0.06V	1.74V
13) FGnd	FGnd	FGnd
14) n/c	Open	Open
15-20) Scan	150V	Open

FS102 Vs or FS103 Va Diode Check reads Open with Board Disconnected or Connected

FS101 M5V Diode Check reads 0.948V Board Connected or 1.295 Disconnected

Example:

Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

-Vy VSC

P101
47-50) 18V
41-45) M5V

P114
1-4) VA
5) n/c
6-7) Gnd

P118 to P209	RUN	DIODE
1-6) Scan	150V	Open
07) n/c	Open	Open
08) FGnd	FGnd	FGnd
09) Data	0.06V	1.74V
10) FGnd	FGnd	FGnd
11) OC2	2.99V	1.74V
12) FGnd	FGnd	FGnd
13) OC1	1.95V	1.74V
14) FGnd	FGnd	FGnd
15) STB	4.28V	1.74V
16) FGnd	FGnd	FGnd
17) CLK	0.68V	1.74V
18) n/c	Open	Open
19-20) FG5V	5.06V	1.787V

VSC and -VY Adjustments

CAUTION: Use the actual panel label and not the book for exact voltage settings.

These are DC level Voltage Adjustments

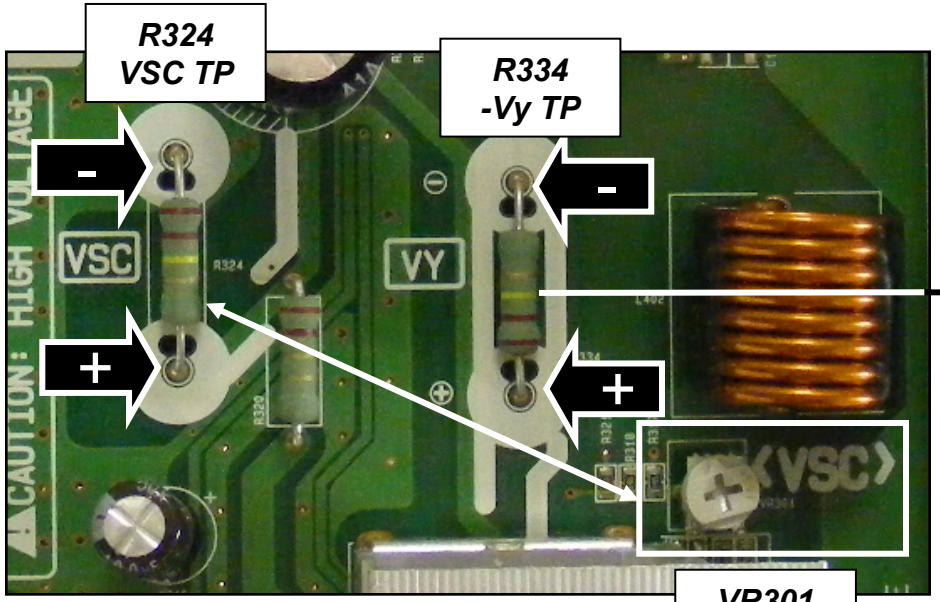
This is just for example

Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

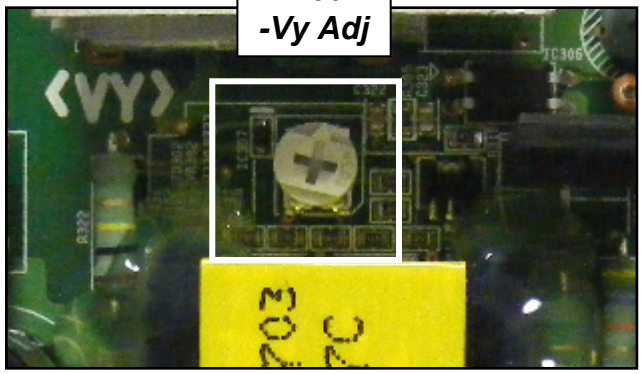
-Vy ***VSC***

Set should run for 10 minutes, this is the "Heat Run" mode.
Set screen to "White Wash".
1) Adjust –Vy to Panel's Label voltage (+/- 1/2V)
2) Adjust VSC to Panel's Label voltage (+/- 1/2V)

Location: Top Left of the board



Both voltages read positive



Location: Bottom Center of board
Just above Transformer

Y-Scan Signal Overview

Y-Drive Lower Test Point
Just under 2nd Buffer from Top

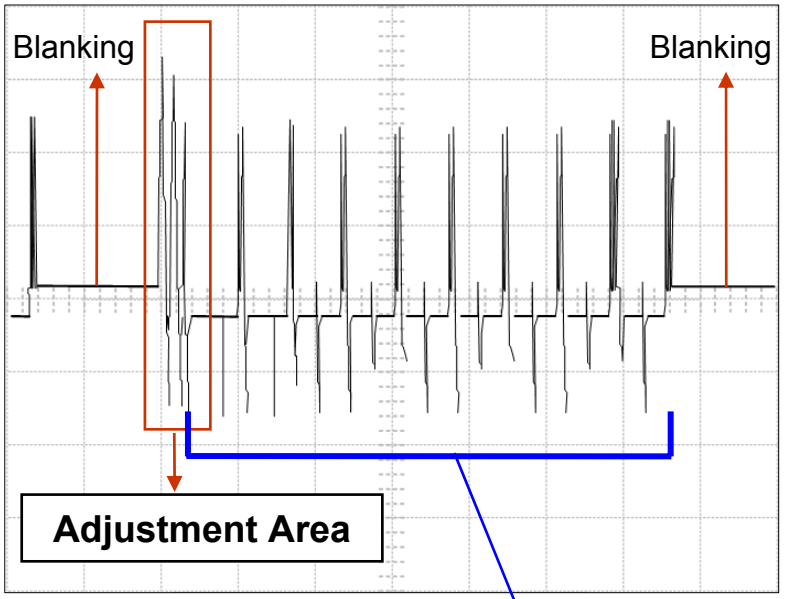
NOTE: The Waveform Test Points are fragile. If by accident the land is torn and the run lifted, make sure there are no lines left to right in the screen picture.

There is another test point on the Upper Y-Drive board that can be used.
Basically any output pin to any of the FPC to the panel are OK to use.

Overall signal observed 2mS/div

67 to 81 VRMS **502V p/p**

White to Black

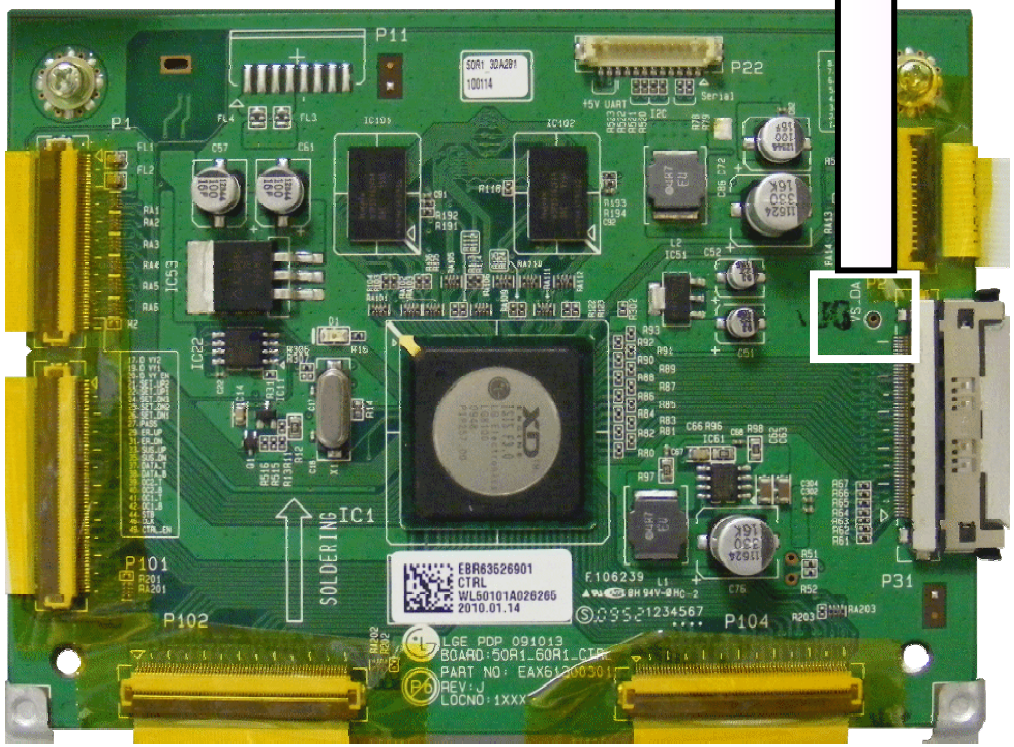


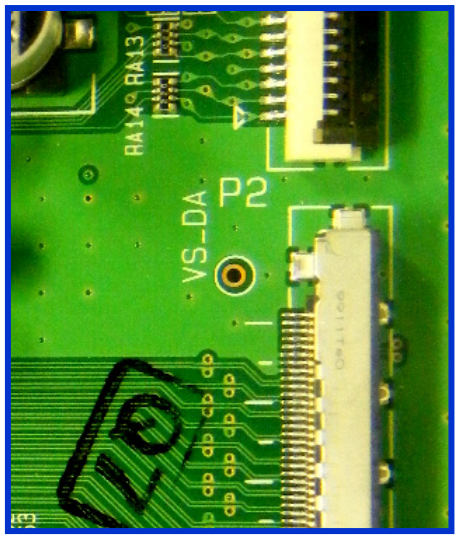
X10 Sub Field Firing
(600Hz)
Video

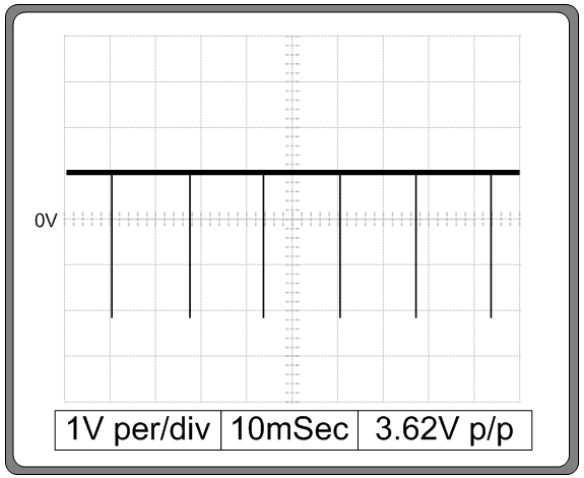
Locking on to the Y-Scan Waveform Tip

Note, this TP (VS_DA) can be used as an External Trigger for scope when locking onto the Y-Scan (Scan) or the Z-Drive signal.

This signal can also be used to help lock the scope when observing the LVDS video signals.







Observing (Capturing) the Y-Scan Signal for Set Up Adjustment

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

Fig 1:
As an example of how to lock in to the Y-Scan Waveform.
Fig 1 shows the signal locked in at 4ms per/div.
Note the 3 blanking sections.
The area for adjustment is pointed out within the Waveform

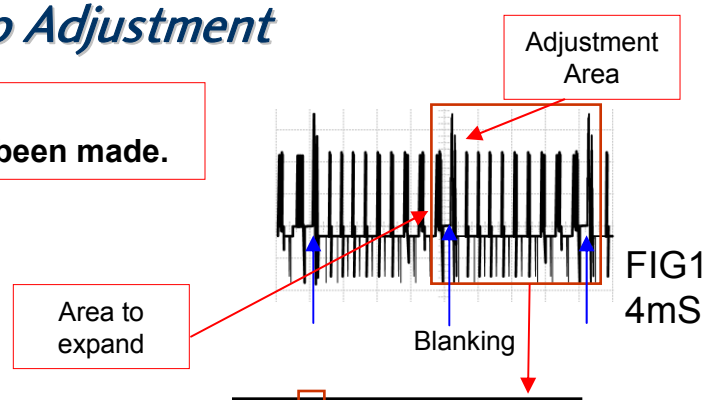


FIG1
4mS

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

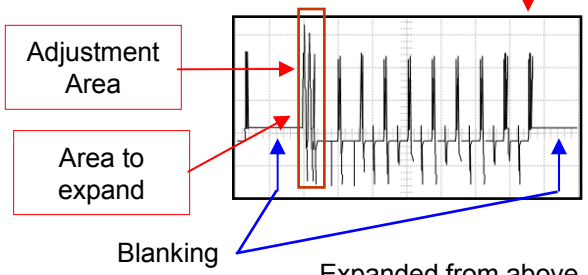


FIG2
2mS

Fig 3:
At 100us per/div the area for adjustment of **SET-UP** or **SET-DN** is now easier to recognize. It is outlined within the Waveform.
Remember, this is the 2ND large signal to the right of blanking.

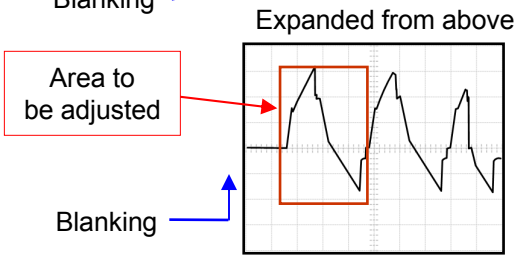


FIG3
100uS

Fig 4:
At 40uSec per/division, the adjustment for **SET-UP** can be made using **VR402** and the **SET-DN** can be made using **VR401**.
It will make this adjustment easier if you use the "Expanded" mode of your scope.

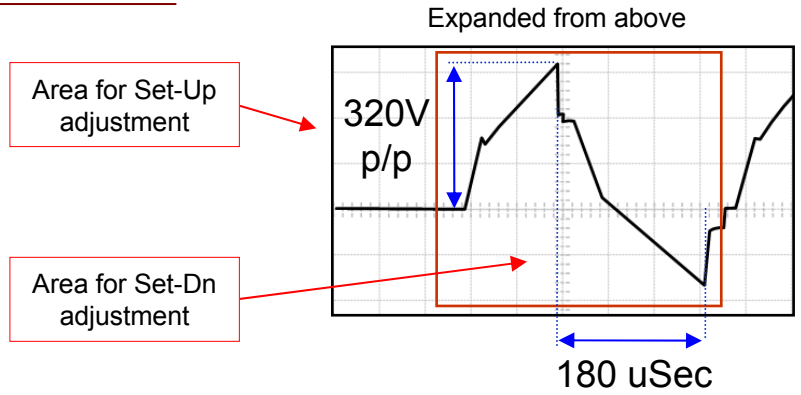


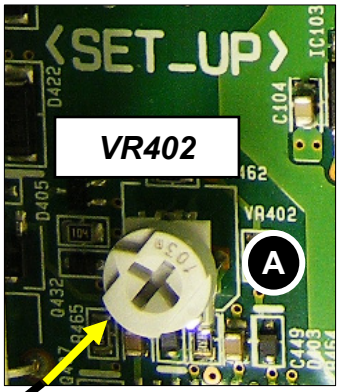
FIG4
40uS

Set Up and Set Down Adjustments

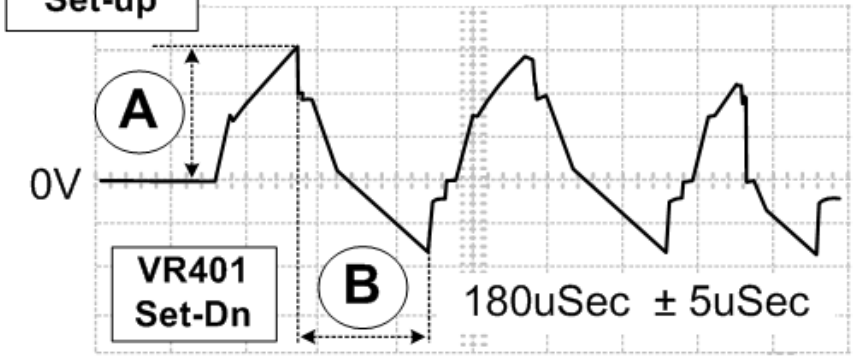
Set must be in "WHITE WASH"
All other DC Voltage adjustments should have already been made.

Y-Scan Test Point

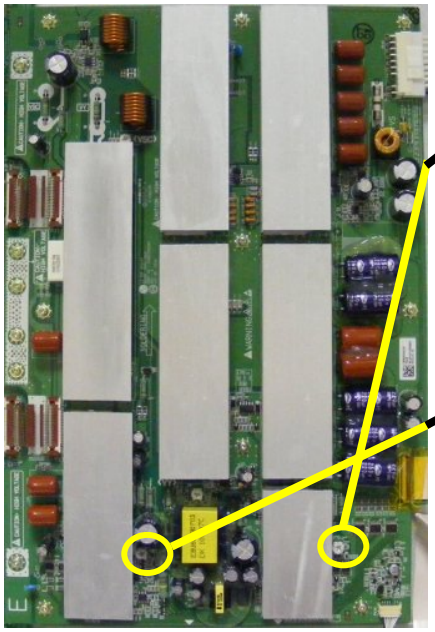
Lower Y-Drive

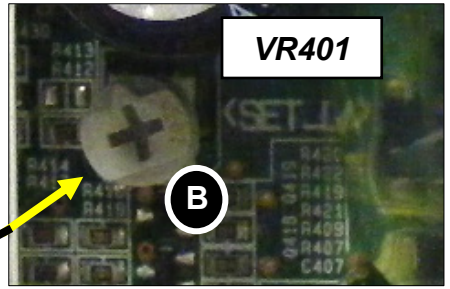


VR402 Set-up 320V p/p ± 5V



67VAC rms "White" 81VAC rms "Black"	100V	100uS	502V p/p





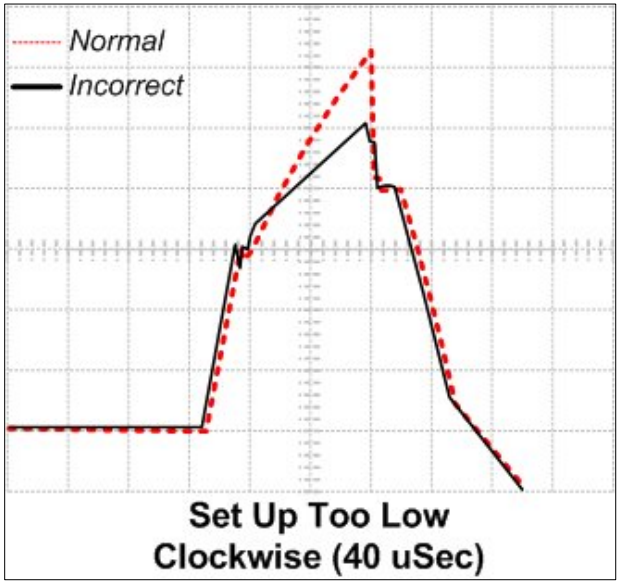
SET-UP ADJUST:
1) Adjust **VR402** and set the **(A)** portion of the signal to match the waveform above. (320V p/p ± 5V)

SET-DN ADJUST:
2) Adjust **VR401** and set the **(B)** time of the signal to match the waveform above. (180uSec ± 5uSec)

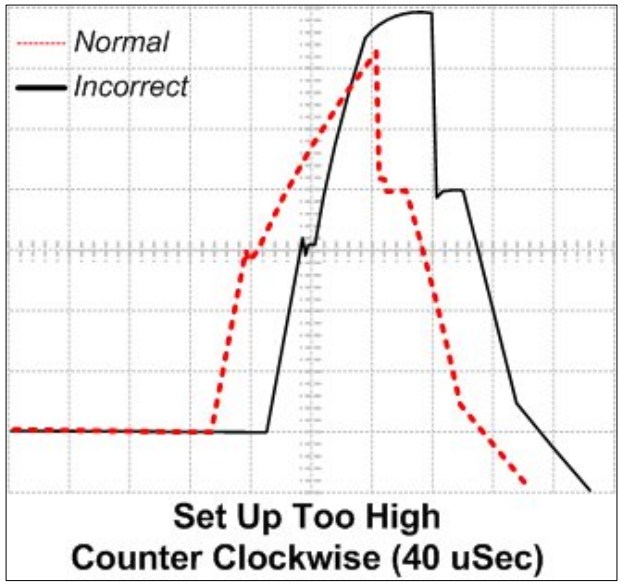
ADJUSTMENT LOCATIONS:
Bottom of the board.

Set Up/Down Adjustments Too High or Low

Set Up swing is Minimum 250V p/p Max 350V p/p



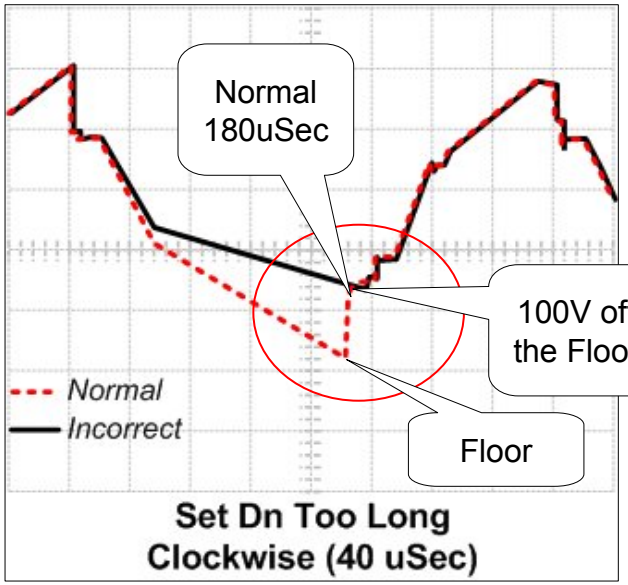
Set Up Too Low
Clockwise (40 uSec)



Set Up Too High
Counter Clockwise (40 uSec)

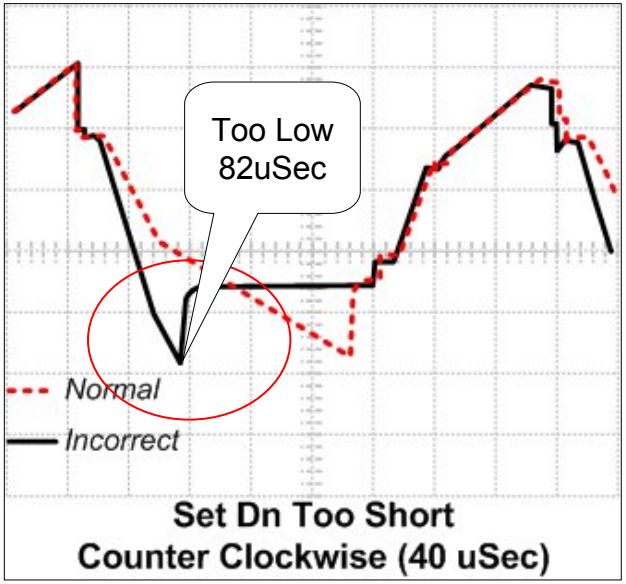
This will cause
The black
Portions of the
Picture to
Lighten.
Black floor Up.

Set Dn swing is Minimum 73uSec Max 196uSec



Set Dn Too Long
Clockwise (40 uSec)

This will cause
The bottom of
The picture to distort.



Set Dn Too Short
Counter Clockwise (40 uSec)

NOTE: If abnormal settings cause excessive brightness then shutdown, remove the LVDS from Control board and make necessary adjustments. Then reconnect LVDS cable, select White Wash and adjust correctly.

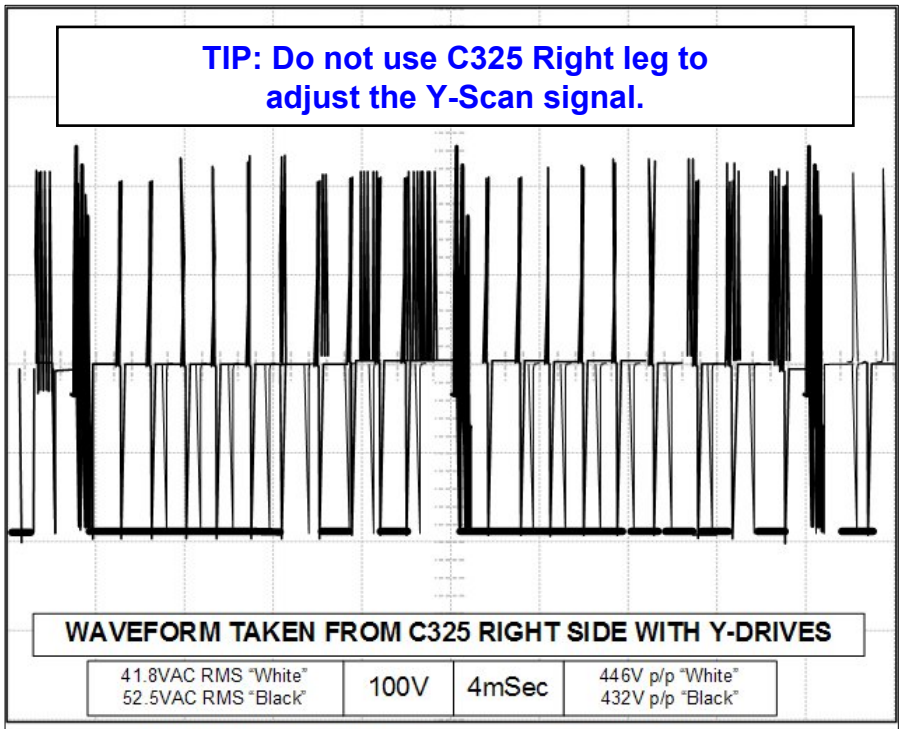
Y-SUS Board Troubleshooting Y-Drive

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

This Section of the Presentation will cover troubleshooting the Y-SUS Board.

Warning: Never run the Y-SUS with P118 or P117 removed unless the Y-Drive boards are removed completely.

TIP: Do not use C325 Right leg to adjust the Y-Scan signal.

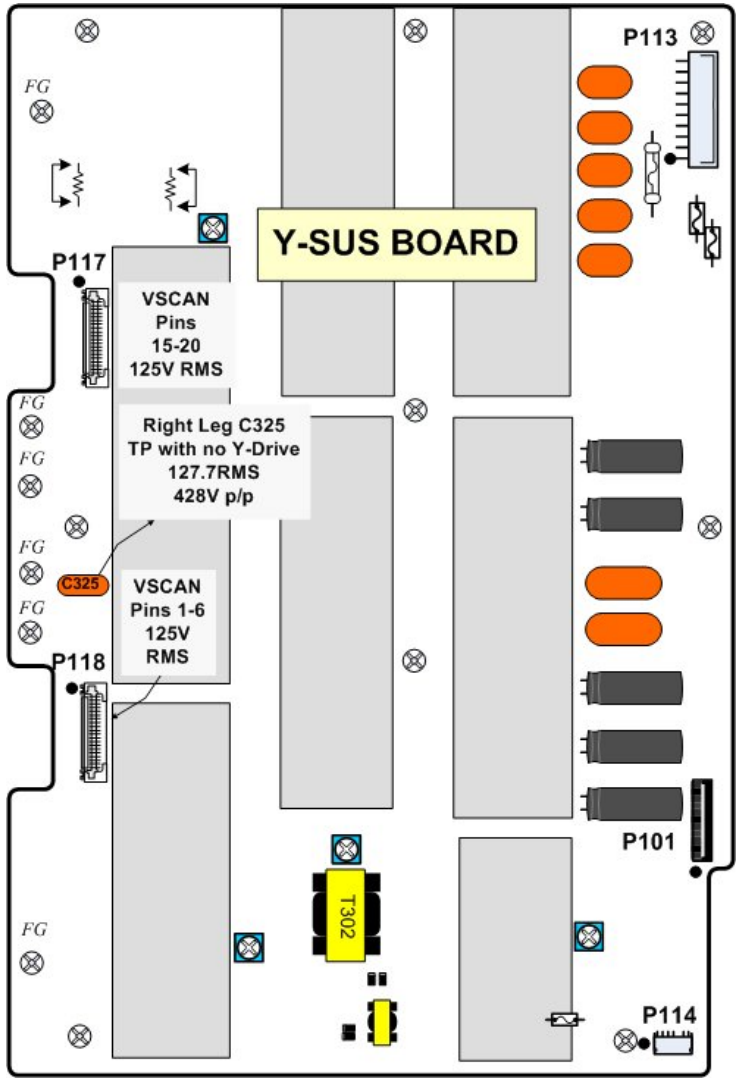


WAVEFORM TAKEN FROM C325 RIGHT SIDE WITH Y-DRIVES			
41.8VAC RMS "White" 52.5VAC RMS "Black"	100V	4mSec	446V p/p "White" 432V p/p "Black"

WITH NO Y-DRIVES (Remove the boards first)			
127.7VAC RMS	100V	4mSec	428V p/p

TIP: Use C325 Right leg to check the Y-Scan signal if the Y-Drive boards are removed

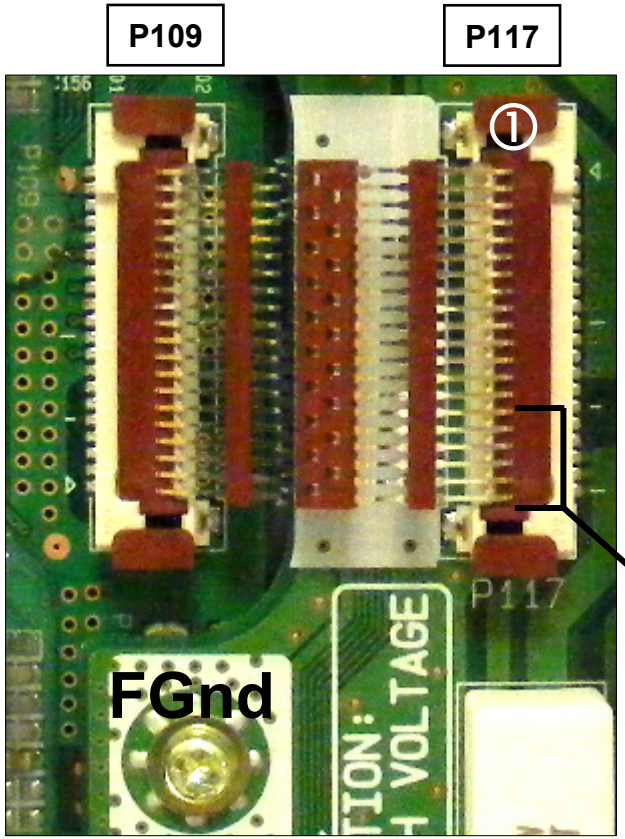
P/N EBR62294101



Y-SUS Board P117 Connector to P109 Upper Y-Drive (Scan and FG5V)

TIP: The connectors between P117 to P109 and P118 to P209 do not come with a new Y-SUS or Y-Drive.

TIP: Use C325 Right leg to check the Y-Scan signal if the Y-Drive boards are removed



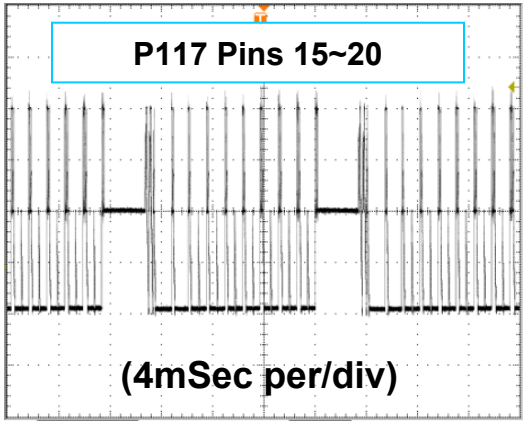
Y-Drive Upper | **Y-SUS Board**

1-2) FG5V
03 n/c
04) CLK
05) FGnd
06) STB
07) FGnd
08) OC2
09) FGnd
10) OC2
11) FGnd
12) Data
13) FGnd
14) n/c
15-20) Y-Scan

FG5V measured from Pins 1 or 2
To Floating Gnd
Use screw just below P117 on the Y-SUS

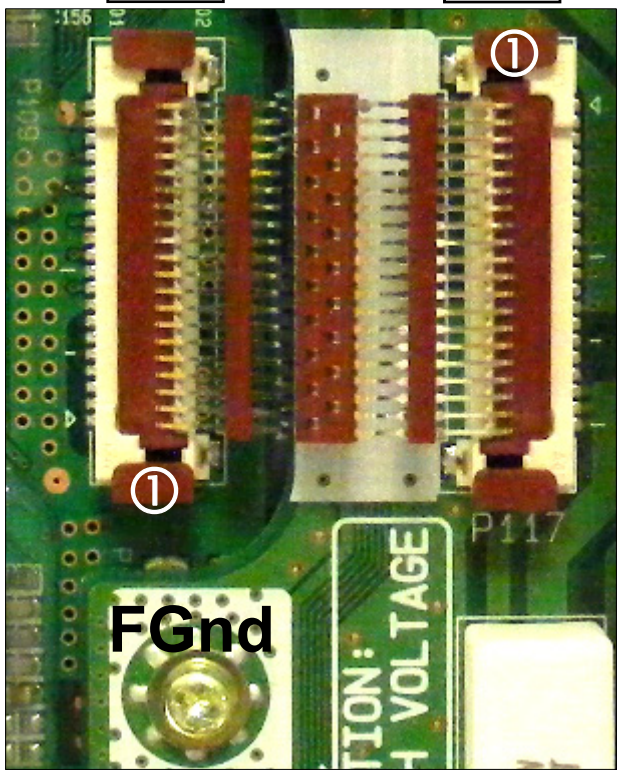
41.8VAC RMS "White"
52.5VAC RMS "Black"
Chassis Gnd

150VAC RMS
From Floating Gnd



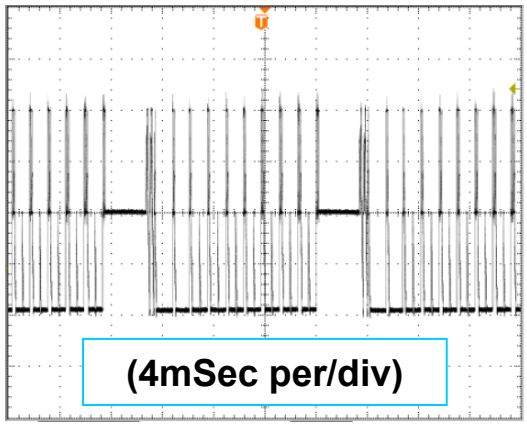
Y-Drive Connected 432~446V p/p
Y-Drive Removed 428V p/p

Y-SUS Board P117 to Upper Y-Drive P109 Logic Signals Explained



1-2) FG5V
03 n/c
04) CLK
05) FGnd
06) STB
07) FGnd
08) OC2
09) FGnd
10) OC2
11) FGnd
12) Data
13) FGnd
14) n/c
15-20) Y-Scan

P117 Pins 4, 6, 8, 10, 12



(4mSec per/div)

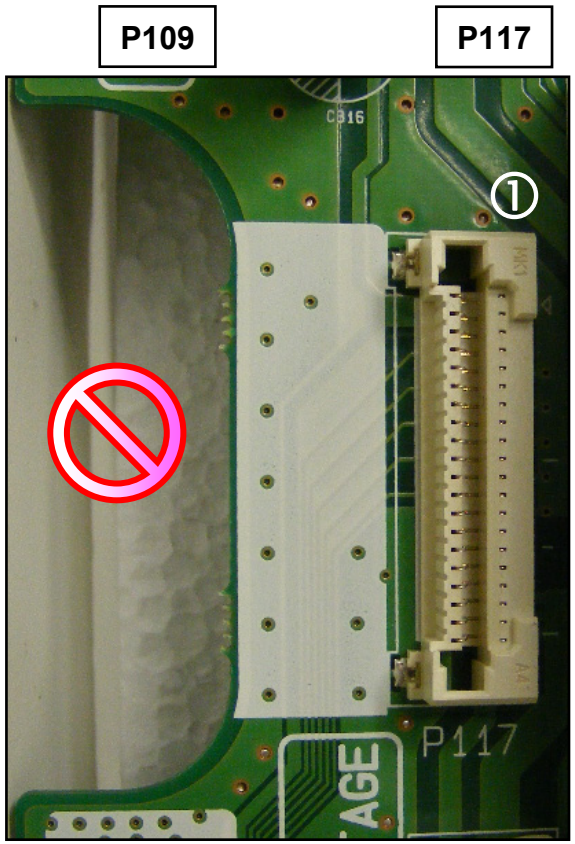
The signal for these pins look very similar due to the fact they are read from Chassis Gnd, but they are actually Floating Ground related. DO NOT hook scope Gnd to Floating Gnd TP without an Isolation Transformer.

All logic pins about (432V p/p) with Y-Drives

All logic pins about (392V p/p) without Y-Drives

P117 Pins 4, 6, 8, 10, 12 are Logic (Drive) Signals to the Y-Drive Upper.

Y-SUS P117 Connector to Y-Drive Upper P109 Diode Mode Testing



Y-Drive Board should be disconnected for this test.

Checking the Y-SUS Board P117
NOTE: Y-SUS Disconnected from the Y-DRIVE

Readings from Floating Ground
Use screw just below P117 on the Y-SUS for FGnd

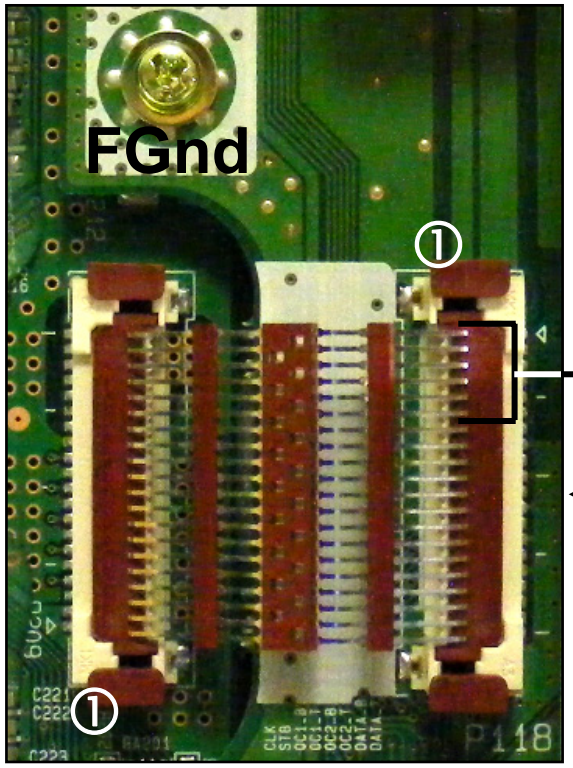
		RED LEAD Blk Lead FG	BLACK LEAD Red Lead FG
Floating Gnd	1-2) FG5V	1.78V	0.544V
	03 n/c	n/c	n/c
	04) CLK	1.73V	0.627V
	05) FGnd	0V	0V
	06) STB	1.73V	0.627V
	07) FGnd	0V	0V
	08) OC2	1.73V	0.629V
	09) FGnd	0V	0V
	10) OC2	1.73V	0.631V
	11) FGnd	0V	0V
	12) Data	1.73V	0.629V
	13) FGnd	0V	0V
	14) n/c	n/c	n/c
	15-20) Y-Scan	Open	3.04

Meter in the Diode Mode

Y-SUS Board P118 Connector to P209 Lower Y-Drive (Y-Scan and FG5V)

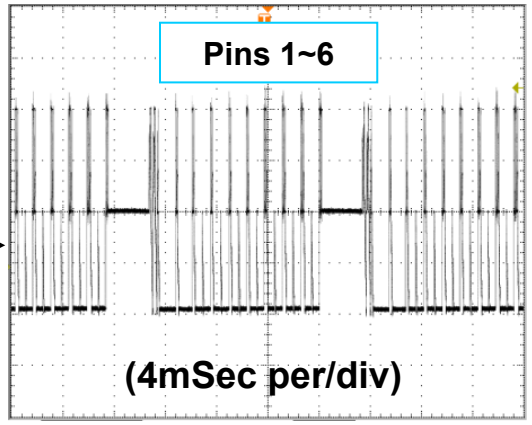
TIP: The connectors between P117 to P109 and P118 to P209 do not come with a new Y-SUS or Y-Drive.

TIP: Use C325 Right leg to check the Y-Scan signal if the Y-Drive boards are removed



Y-Drive Lower | **Y-SUS Board**

1-6) Y-Scan
07) n/c
08) FGnd
09) Data
10) FGnd
11) OC2
12) FGnd
13) OC1
14) FGnd
15) STB
16) FGnd
17) CLK
18) n/c
19-20) FG5V



Y-Drive Connected 432~446V p/p
Y-Drive Removed 428V p/p

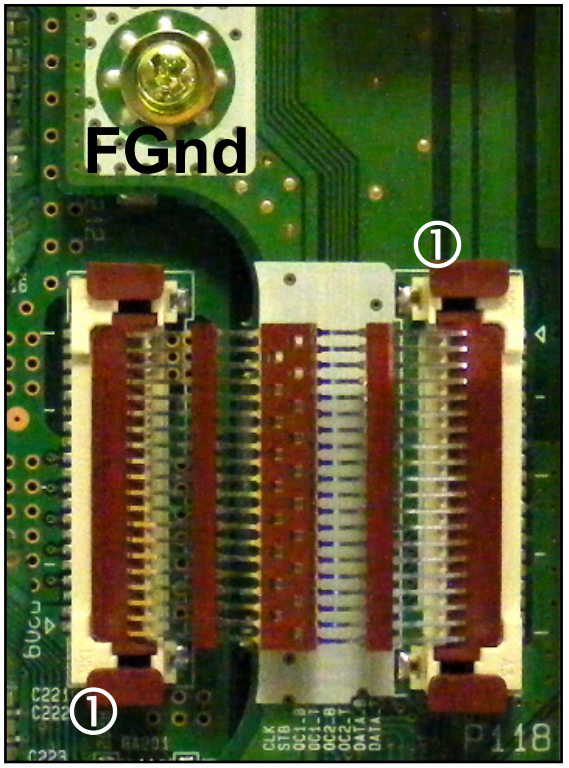
41.8VAC RMS "White"
52.5VAC RMS "Black"
Chassis Gnd

150VAC RMS
From Floating Gnd

FG5V measured from Pins 19 or 20 to Floating Gnd
Use screw just above P118 on the Y-SUS

P118 Pins 1~6 is the Y-Scan Signal to the Y-Drive Lower.

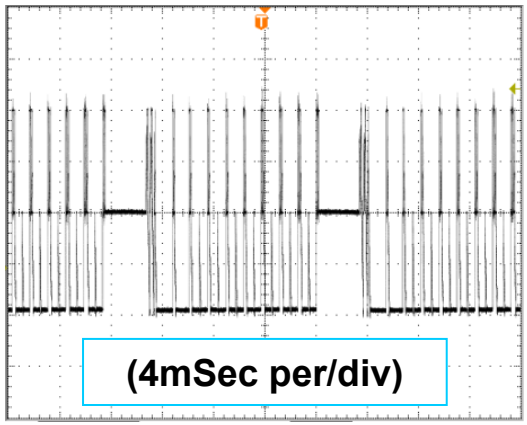
Y-SUS Board P118 to Lower Y-Drive P209 Logic Signals Explained



Y-Drive Lower | Y-SUS Board

1-6) Y-Scan
07) n/c
08) FGnd
09) Data
10) FGnd
11) OC2
12) FGnd
13) OC1
14) FGnd
15) STB
16) FGnd
17) CLK
18) n/c
19-20) FG5V

P118 Pins 9, 11, 13, 15, 17



The signal for these pins look very similar due to the fact they are read from Chassis Gnd, but they are actually Floating Ground related. DO NOT hook scope Gnd to Floating Gnd TP without an Isolation Transformer.

All logic pins about (432V p/p) with Y-Drives

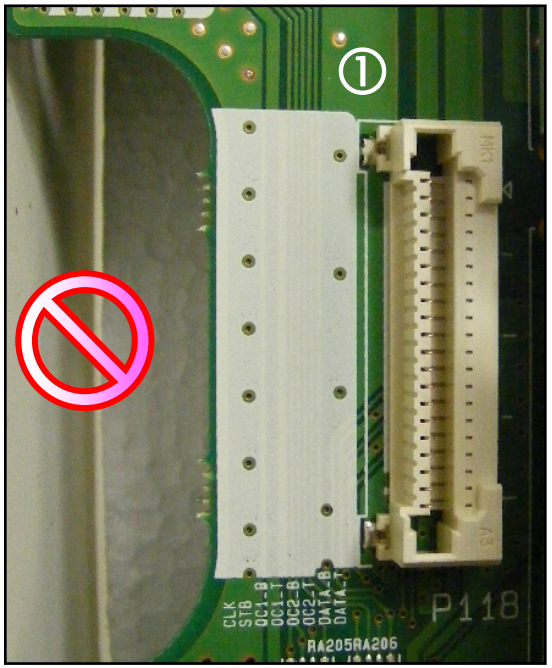
All logic pins about (392V p/p) without Y-Drives

P118 Pins 9, 11, 13, 15, 17 are Logic (Drive) Signals into the Y-Drive Upper.

Y-SUS P118 Connector Diode Mode Testing

Checking the Y-SUS Board P118
NOTE: Y-SUS Disconnected from the Y-DRIVE

P209 P118

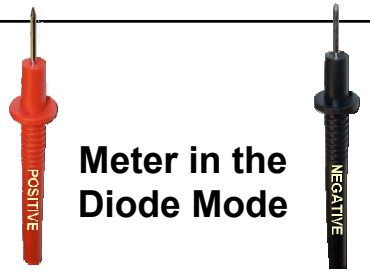


Y-Drive Lower | Y-SUS Board

Y-Drive Board should be disconnected for this test.

Readings from Floating Ground
Use screw just below P118 on the Y-SUS for FGnd

		RED LEAD Blk Lead FG	BLACK LEAD Red Lead FG
Floating Gnd	1-6) Y-Scan	Open	Open
	07) n/c	n/c	n/c
	08) FGnd	0V	0V
	09) Data	1.73V	0.629V
	10) FGnd	0V	0V
	11) OC2	1.73V	0.631V
	12) FGnd	0V	0V
	13) OC1	1.73V	0.629V
	14) FGnd	0V	0V
	15) STB	1.73V	0.627V
	16) FGnd	0V	0V
	17) CLK	1.73V	0.627V
	18) n/c	n/c	n/c
	19-20) FG5V	1.78V	0.544V



Meter in the Diode Mode

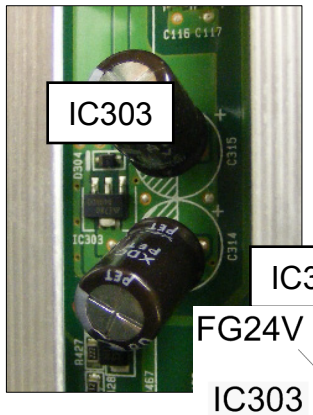
Y-SUS Floating Ground (FG 15V) and (FG 5V) Checks

Voltage Measurements for the Y-SUS Board

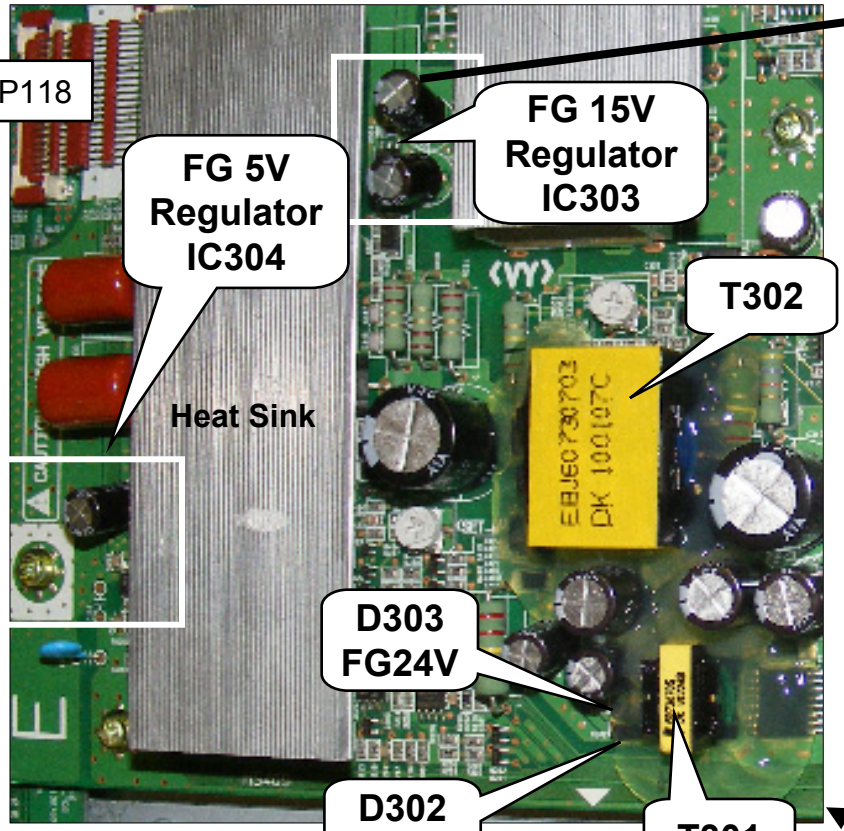
Tip: M5V turns on these supplies.

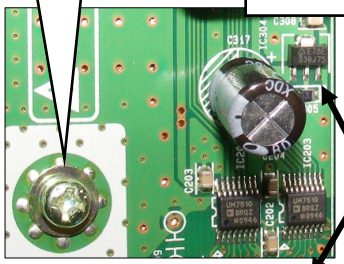
FG15V (Floating Ground 15V). Checked at IC303 Top Right Leg.

Floating Ground checks must be made from Floating Ground. Use any screw on the far left hand side of the Y-SUS.



Use left leg to check for source



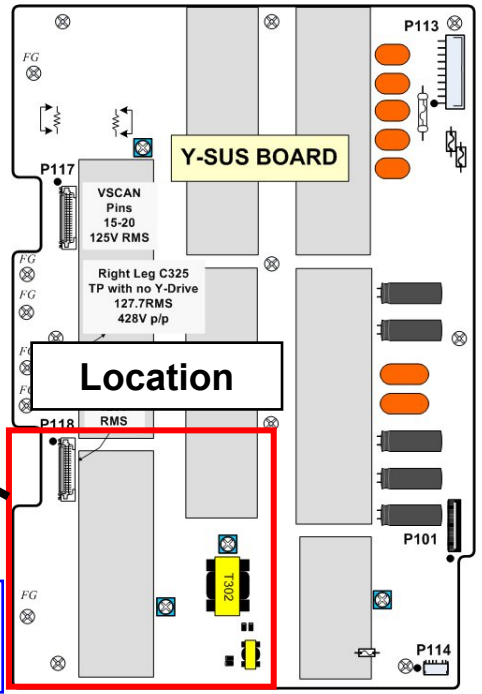


FG

FG5V FG10V

IC304

Use right leg to check for source



FG5V (Floating Ground 5V). Checked at IC304 Left Leg.
Leaves the Y-SUS board on P118 pins 19 and 20 and P117 pins 1 and 2

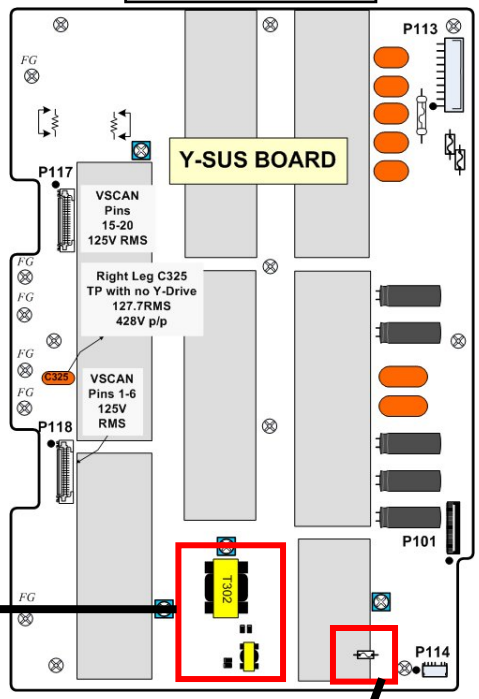
Y-SUS 18V Generation Checks

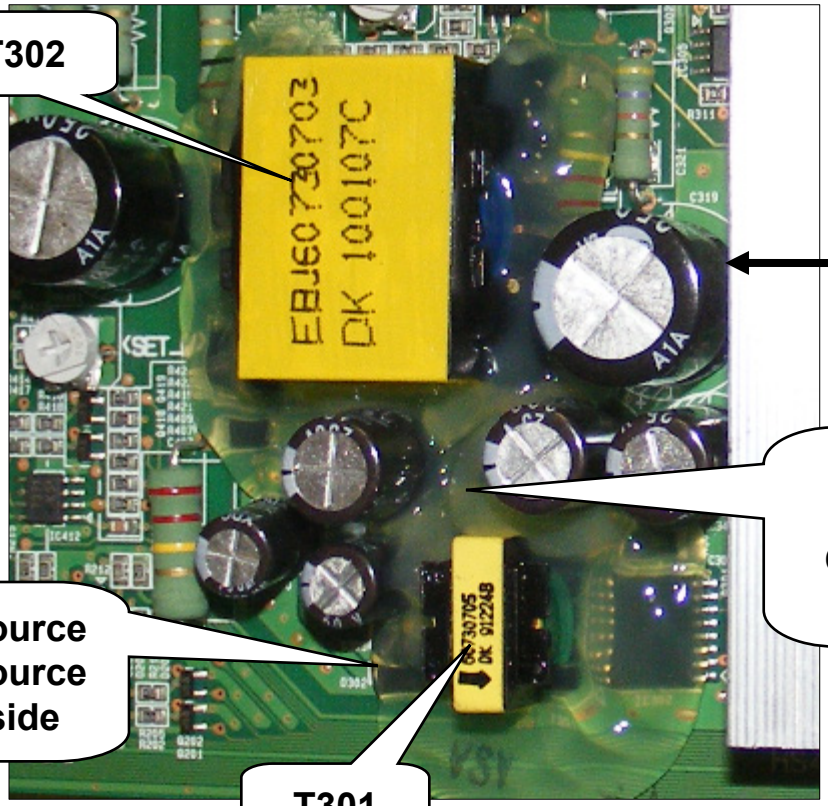
Voltage Measurements for the Y-SUS Board

18V Test Point
Used in the Y-SUS for Waveform Creation and Leaves the Y-SUS board on P101 pins 47~50 to the Control Board.
Checked at Cathode Side D301 and/or D313.

Standby: 0V Run: 18V Diode Check: 1.32V

Location





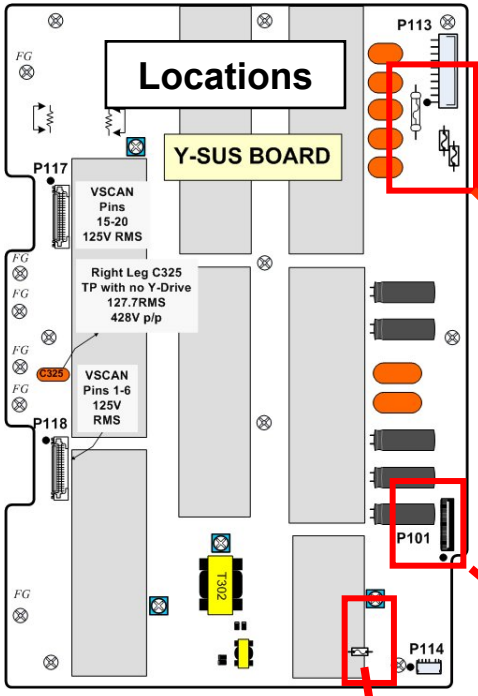
Tip: M5V turns on this supply.

D301, D313
18V Source
Cathode Top Side
Just above T301

D303 FG10V Source
D302 FG24V Source
Cathode left side

Tip: Use FS301 to check this supply.

P101 Y-SUS to Control Board Fuse Information



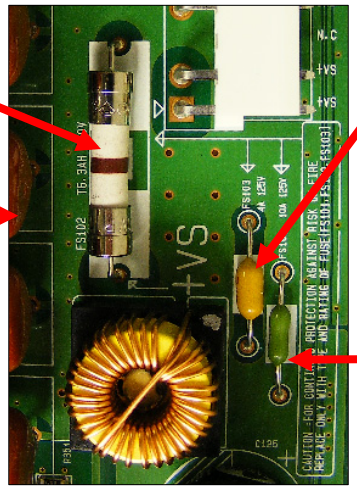
P113

FS102 (VS)
6.3A / 250V

Diode Check Open
With Board Disconnected or Connected

FS103 (VA)
4A / 125V

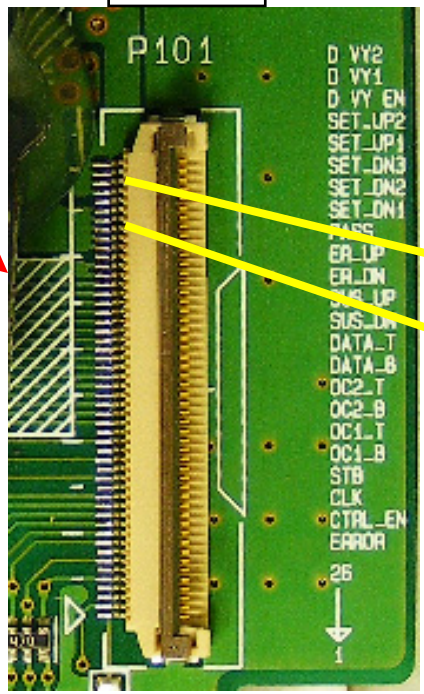
Diode Check
Open
With Board
Disconnected
or Connected



FS101 (M5V)
10A / 125V

Diode Check
1.295V
With Board
Disconnected.
0.948V with board
connected.

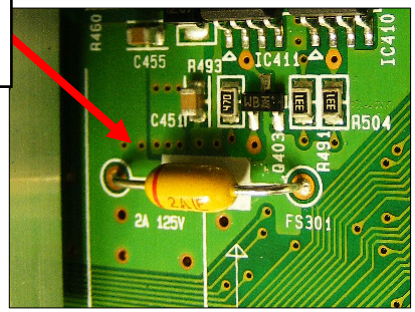
P101



18V Pins 47 through 50

M5V Pins 42 through 46

FS104
(18V)
2A / 125V



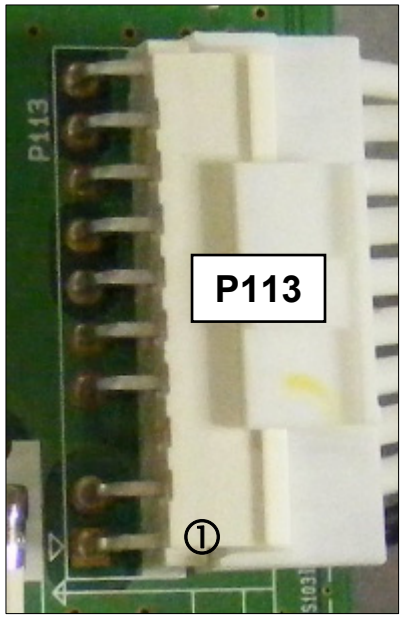
Diode Check
1.32V
With Board
Disconnected.
1.06V with
board
connected.

Y-SUS P113 and P114 Plug Information

Voltage and Diode Mode Measurement

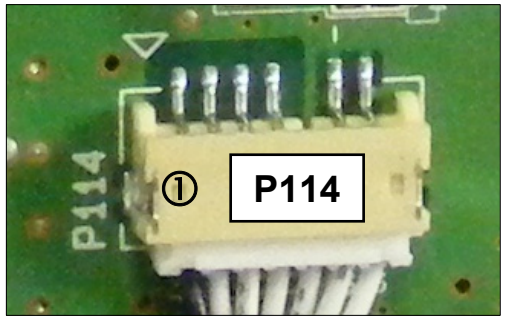
P113 Connector "Y-SUS" to "Power Supply" P812

Pin	Label	Run	Diode Mode
9-10	M5V	5.1V	1.29V
8	Gnd	Gnd	Gnd
6-7	Va	*60V	Open
4-5	Gnd	Gnd	Gnd
3	n/c	n/c	n/c
1-2	Vs	*203V	Open



P114 Connector "Y-SUS" to "X-Drive" Left P121

Pin	Label	Run	Diode Mode
1-4	VA	*60V	Open
5	n/c	n/c	n/c
6-7	Gnd	Gnd	Gnd



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

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

Y-SUS P101 to Control P1 Plug Voltage Checks

"Y-SUS" P101 Connector to "Control" P1

Pin	Label	Run	Diode
1	Error	13.57V	Open
2	CTRL_EN	0.09V	3.17V
3	n/c	n/c	Open
4	Gnd	Gnd	Gnd
5	CLK	0.384V	2.83V
6	Gnd	Gnd	Gnd
7	STB	2.87V	2.84V
8	Gnd	Gnd	Gnd
9	OC1_B	1.12V	2.82V
10	OC1_T	1.13V	2.83V
11	OC2_B	1.13V	2.83V
12	OC2_T	1.13V	2.83V
13	DATA_B	0V	2.82V
14	DATA_T	0V	2.82V
15	Gnd	Gnd	Gnd
16	SUS_DN	2.46V	2.82V
17	Gnd	Gnd	Gnd
18	SUS_UP	0.12V	2.83V
19	Gnd	Gnd	Gnd
20	ER_DN	0.12V	2.82V
21	Gnd	Gnd	Gnd
22	ER_UP	1.14V	2.83V

Pin	Label	Run	Diode
23	Gnd	Gnd	Gnd
24	PASS	2.03V	2.84V
25	SET_DN1	2.12V	2.84V
26	SET_DN2	2.12V	2.84V
27	SET_DN3	2.36	2.83V
28	Gnd	Gnd	Gnd
29	SET_UP1	0.88V	2.82V
30	SET_UP2	0V	2.82V
31	D_VY_EN	0.26V	3.0V
32	D_VY1	0V	2.83V
33	GND	Gnd	Gnd
34	D_VY2	0.28V	2.82V
35	NC1	0.6V	2.84V
36	NC2	0V	3.0V
37	NC3	2.03V	2.82V
38	GND	Gnd	Gnd
39	GND	Gnd	Gnd
40	n/c	n/c	Open
41-45	M5V	4.92V	1.3V
46	n/c	n/c	n/c
47-50	18V	18.3V	1.32V

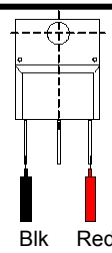
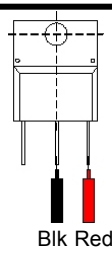
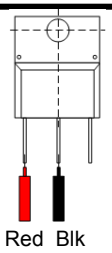
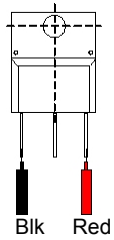
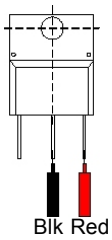
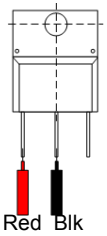
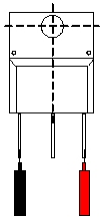
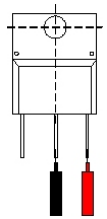
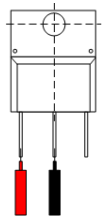
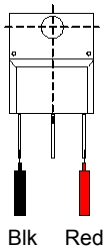
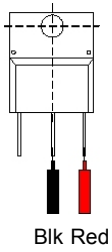
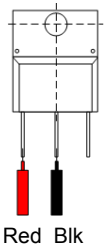
There are No Stand By Voltages on this Connector

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

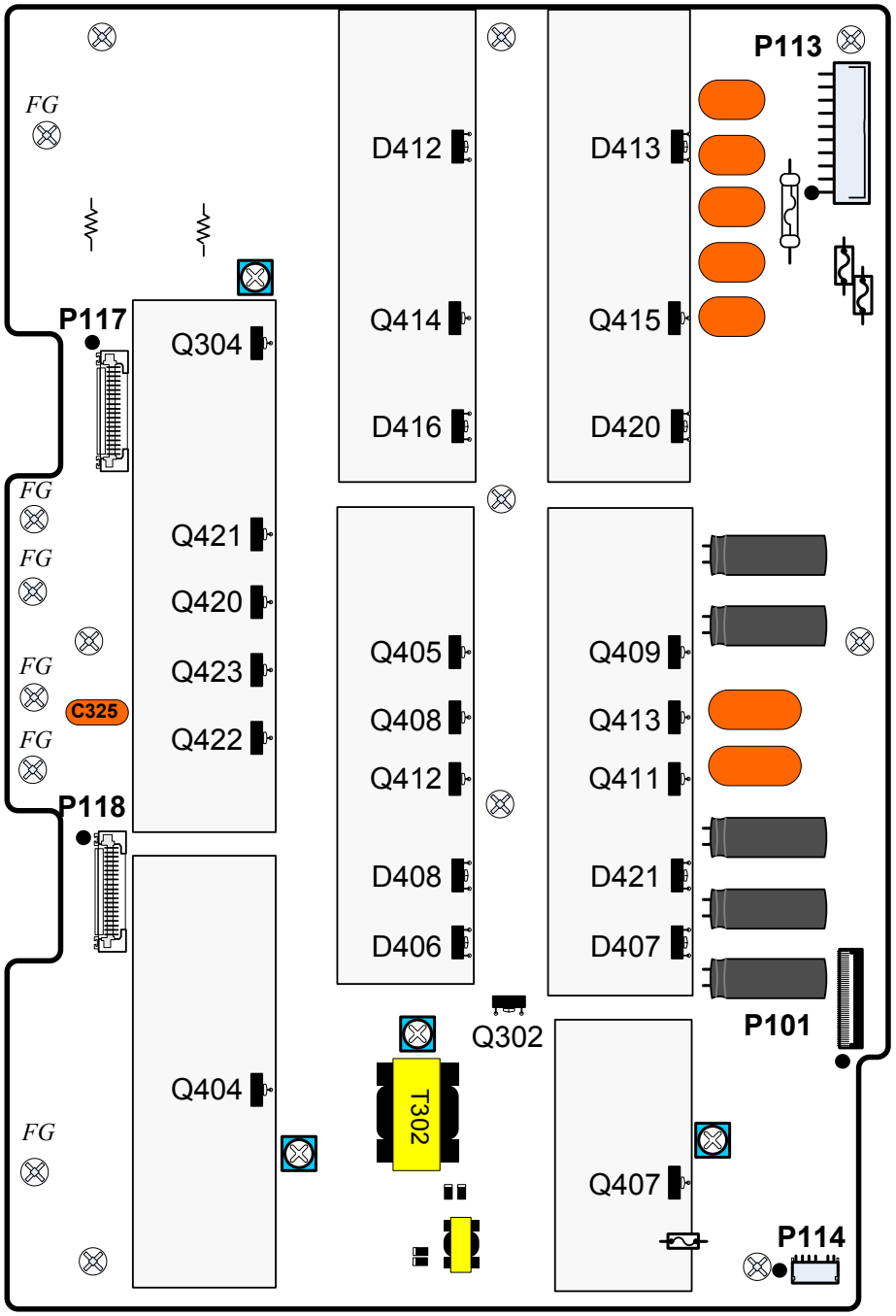
Y-SUS How to Check the Output FETs

Name is printed on the components.
Readings "In Circuit" with Board Removed.

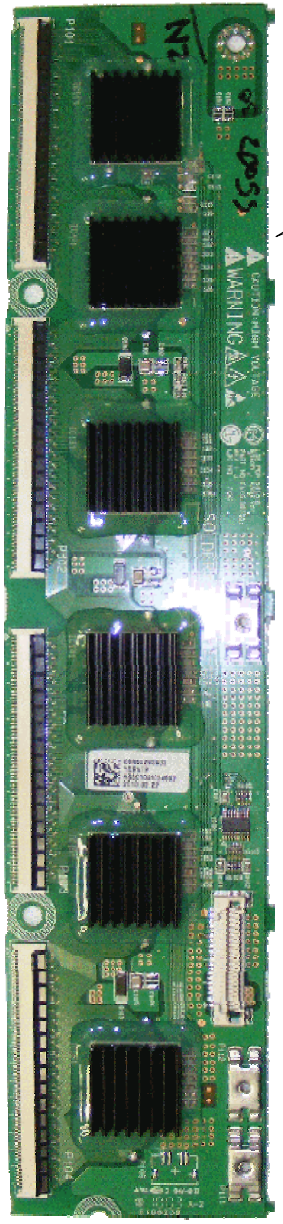
See the Y-SUS drawing (next page) for FET Locations and Identification

30F124 Q405, Q408, Q409, Q411, Q412, Q413, Q414, Q415, Q416		Shown: 1.13V Reverse: 1.9V		Shown: 0.35V Reverse: Open		Shown: 2.23V Reverse: Open
1K38BY Q420, Q421, Q423 **1A02BT** Q302 **1K38AK** **1K44AB** Q422 [a]Q304		Shown: 0.7V Reverse: 1.78V [a]Open		Shown: 0.5V Reverse: Open		Shown: 2.16V [a]Open Reverse: Open
K3667 [a]Q404 Q407		Shown: 0.51V Reverse: 1.37V [a]1.9V		Shown: 0.36V [a]0.5V Reverse: Open		Shown: 1.4V [a]2.1V Reverse: Open
RF2001 D406, D407, D408 D413, D420, D421, D412		Shown: Shorted Reverse: Shorted 0.3 Ohms		Shown: 0.35V Reverse: Open		Shown: 0.35 Reverse: Open

Y-SUS FET Identification and Location



Y-DRIVE BOARD SECTION (Y-Drive Explained)



Y-DRIVE UPPER (TOP)

Y-DRIVE LOWER (BOTTOM)

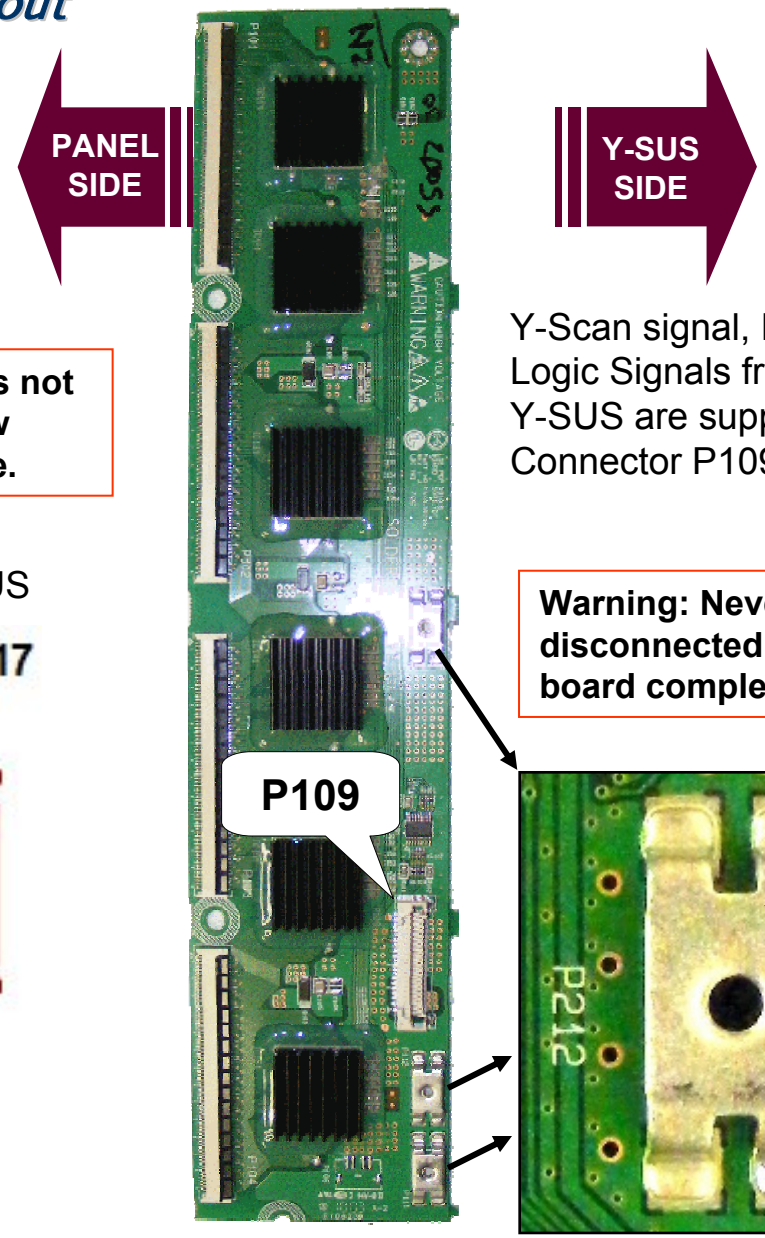
Y-Drive Boards work as a path supplying the Sustain and Reset waveforms which are made in the Y-Sustain board and sent to the Panel through Scan Driver IC's.

The Y-Drive Boards receive a waveform (Y-Drive) developed on the Y-SUS board then selects the horizontal electrodes sequentially starting at the top and scanning down the panel. Scanning is synchronized by receiving Logic scan signals from the Control board.

The 50PK950 uses 12 Driver ICs on 2 Y-Drive Boards commonly called "Y-Drive Buffers" but are actually Gate Arrays.

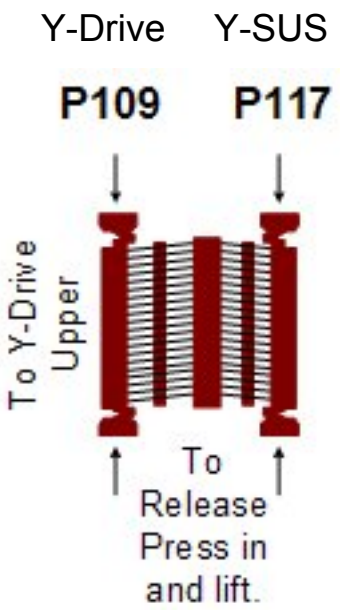
Y-Drive Upper Layout

p/n: EBR62293901



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

This connector does not come with a new Y-SUS or Y-Drive.



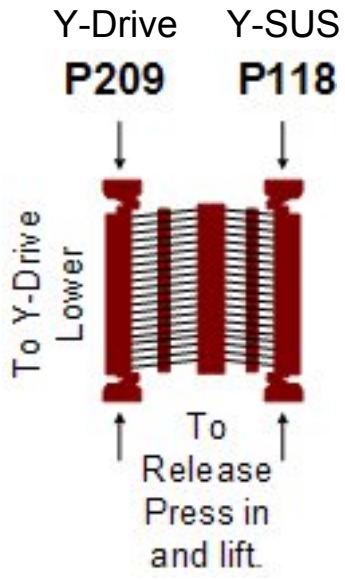
Warning: Never run the Y-SUS with just P109 disconnected. You must remove the Upper Y-Drive board completely due to these FG lugs.

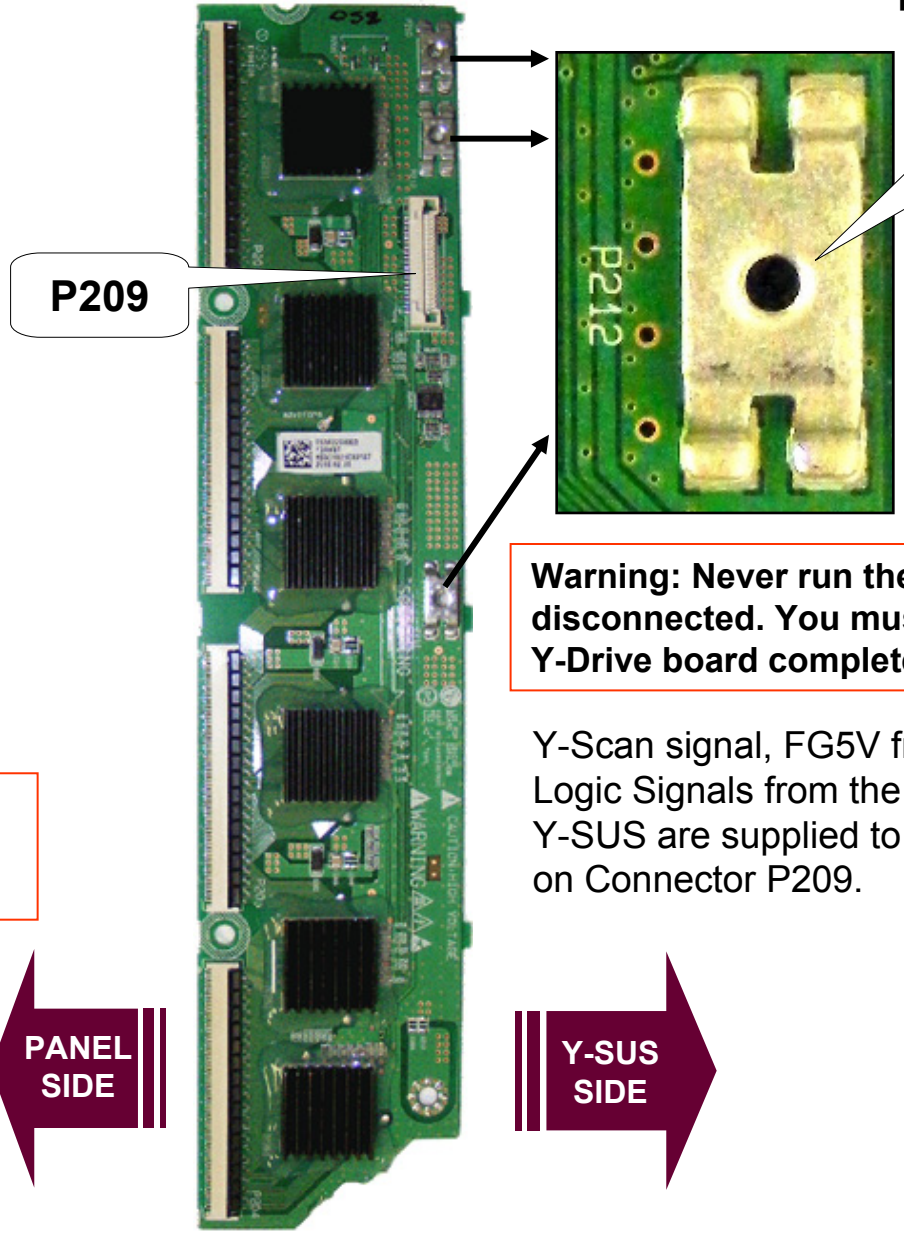
Floating Ground Standoff

The Floating Ground Standoff delivers FG To the Y-Drive Boards. There are 3 per/board.

Y-Drive Lower Layout

p/n: EBR63461101





The Floating Ground Standoff delivers FG To the Y-Drive Boards. There are 3 per/board.

Warning: Never run the Y-SUS with just P209 disconnected. You must remove the Lower Y-Drive board completely due to these FG lugs.

This connector does not come with a new Y-SUS or Y-Drive.

Y-Scan signal, FG5V from the Y-SUS board and Logic Signals from the Control board through the Y-SUS are supplied to the Lower Y-Drive Board on Connector P209.

Y-Drive Upper Board P109 Connector to P117 Y-SUS (Scan and FG5V)

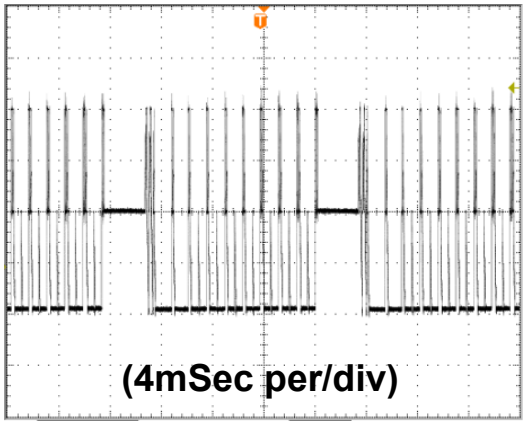
FG5V measured from Pins 1 or 2
To Floating Gnd
Use screw just below P117 on the Y-SUS

TIP: Use C325 Right leg to check the
Y-Scan signal if the Y-Drive boards are removed

41.8VAC RMS "White"
52.5VAC RMS "Black"
Chassis Gnd

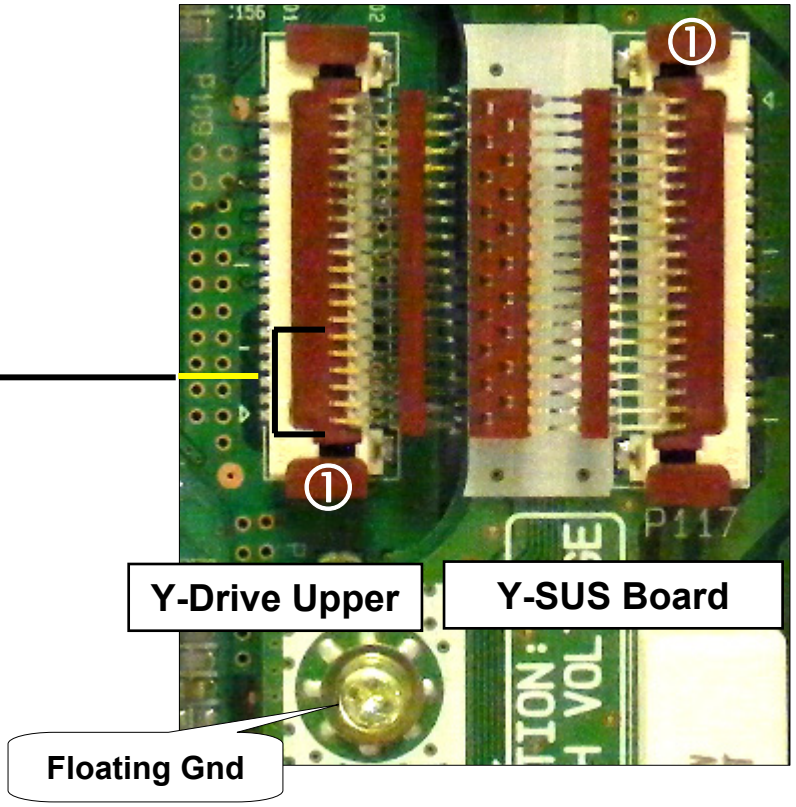
150VAC RMS
From Floating Gnd

P109 Pins 15~20 is the Y-Scan Signal into the Y-Drive Upper.



(4mSec per/div)

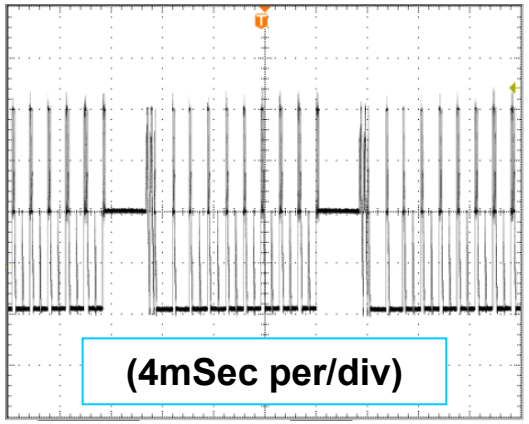
Y-Drive Connected 432~446V p/p
Y-Drive Removed 428V p/p



19-20) FG5V
18) n/c
17) CLK
16) FGnd
15) STB
14) FGnd
13) OC2
12) FGnd
11) OC2
10) FGnd
09) Data
08) FGnd
07) n/c
01-06) Y-Scan

Y-Drive Upper P109 to Y-SUS Board P117 Logic Signals Explained

P109 Pins 9, 11, 13, 15, 17



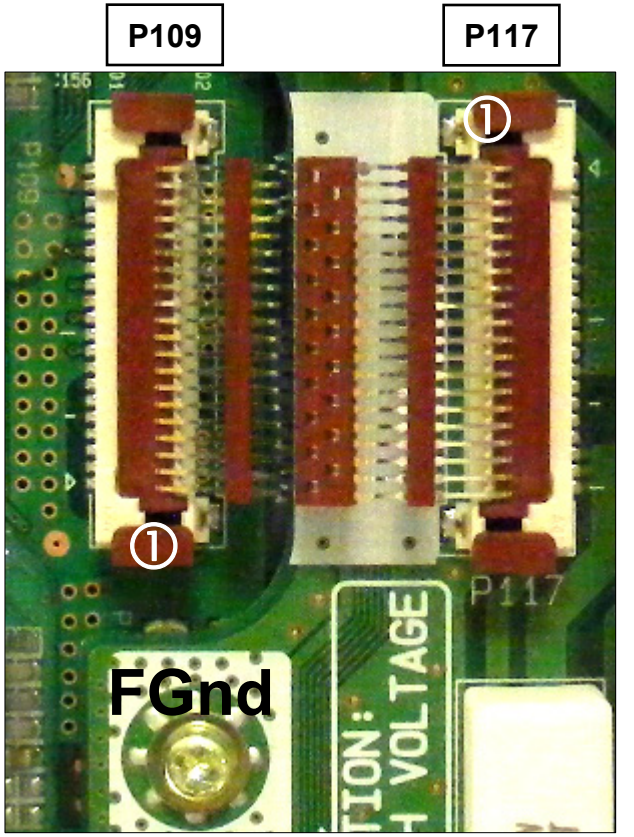
(4mSec per/div)

The signal for these pins look very similar due to the fact they are read from Chassis Gnd, but they are actually Floating Ground related. DO NOT hook scope Gnd to Floating Gnd TP without an Isolation Transformer.

All logic pins about (432V p/p)

Read from Floating Gnd

PIN	VOLTS
19-20) FG5V	5.06V
18) n/c	n/c
17) CLK	0.68V
16) FGnd	FGnd
15) STB	4.28V
14) FGnd	FGnd
13) OC2	1.95V
12) FGnd	FGnd
11) OC2	2.99V
10) FGnd	FGnd
09) Data	0.06V
08) FGnd	FGnd
07) n/c	n/c
01-06) Y-Scan	150V

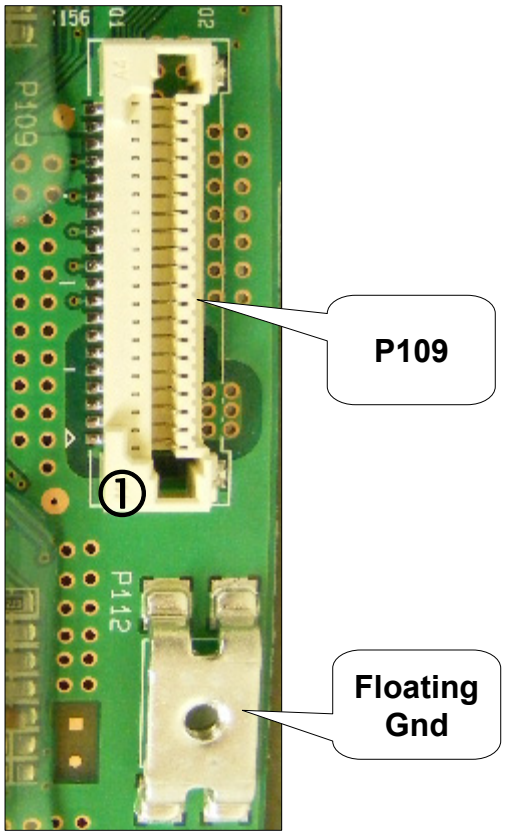


Y-Drive Upper **Y-SUS Board**

P109 Pins 9, 11, 13, 15, 17 are Logic (Drive) Signals to the Y-Drive Upper.

Y-Drive Upper P109 Connector Diode Mode Testing

Checking the Y-Drive Board P109
NOTE: Y-SUS Disconnected from the Y-DRIVE



Y-Drive Upper

Readings from Floating Ground
Use the Screw just below P109 for Floating Gnd TP

		RED LEAD Blk Lead FG	BLACK LEAD Red Lead FG
Floating Gnd	19-20) FG5V	Open	0.39V
	18) n/c	Open	Open
	17) CLK	2.83V	0.77V
	16) FGnd	FGnd	FGnd
	15) STB	Open	0.77V
	14) FGnd	FGnd	FGnd
	13) OC2	2.83V	0.77V
	12) FGnd	FGnd	FGnd
	11) OC2	2.83V	0.77V
	10) FGnd	FGnd	FGnd
	09) Data	2.83V	0.77V
	08) FGnd	FGnd	FGnd
	07) Open	Open	Open
	4-6) VPP	Open	1.04V
	1-3) VSC	Open	1.58V

Meter in the Diode Mode

Y-Drive Lower Board P209 Connector to P118 Y-SUS (Scan and FG5V)

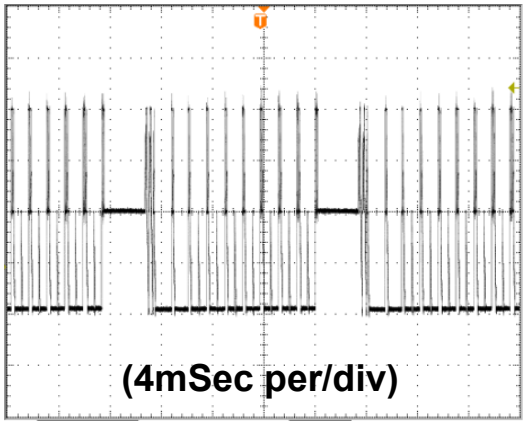
FG5V measured from Pins 19 or 20
To Floating Gnd
Use screw just above P209 on the Y-Drive

TIP: Use C325 Right leg to check the
Y-Scan signal if the Y-Drive boards are removed

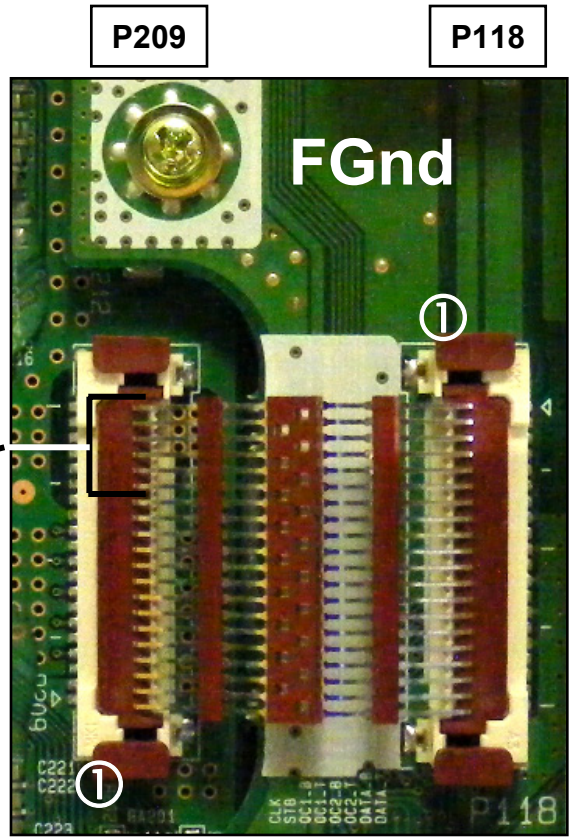
41.8VAC RMS "White"
52.5VAC RMS "Black"
Chassis Gnd

150VAC RMS
From Floating Gnd

P209 Pins 1~6 is the Y-Scan Signal into the Y-Drive Lower.



Y-Drive Connected 432~446V p/p

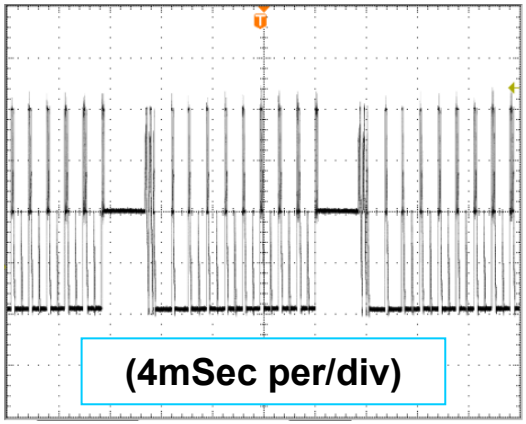


Y-Drive Lower | **Y-SUS Board**

1-6) Y-Scan
07) n/c
08) FGnd
09) Data
10) FGnd
11) OC2
12) FGnd
13) OC1
14) FGnd
15) STB
16) FGnd
17) CLK
18) n/c
19-20) FG5V

Y-Drive Lower P209 to Y-SUS Board P118 Logic Signals Explained

P209 Pins 9, 11, 13, 15, 17



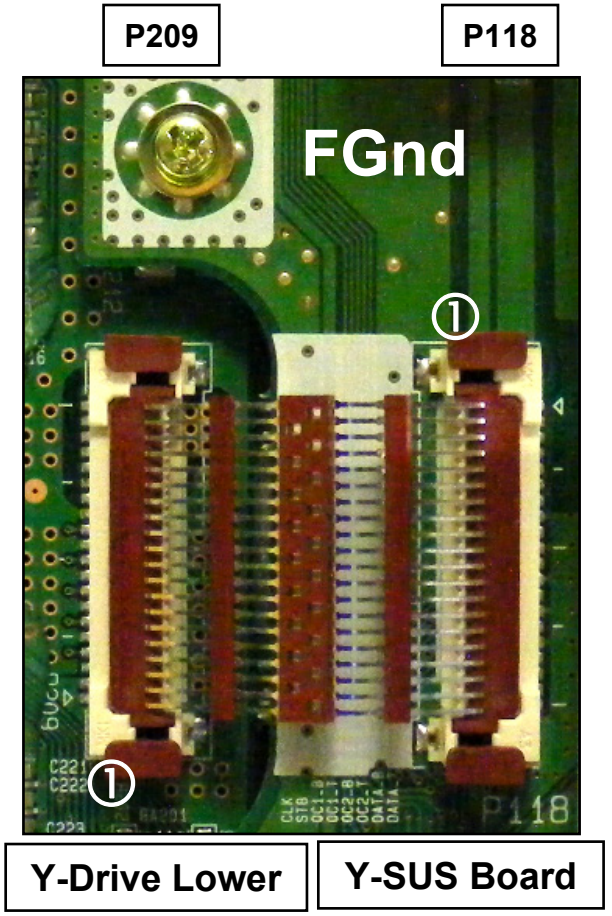
(4mSec per/div)

The signal for these pins look very similar due to the fact they are read from Chassis Gnd, but they are actually Floating Ground related. DO NOT hook scope Gnd to Floating Gnd TP without an Isolation Transformer.

All logic pins about (432V p/p)

Read from Floating Gnd

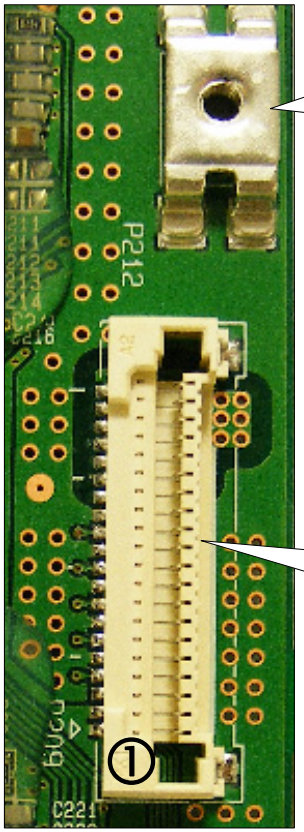
PINS	VOLTS
1-6) Y-Scan	150V
07) n/c	n/c
08) FGnd	FGnd
09) Data	0.06V
10) FGnd	FGnd
11) OC2	2.99V
12) FGnd	FGnd
13) OC1	1.95V
14) FGnd	FGnd
15) STB	4.28V
16) FGnd	FGnd
17) CLK	0.68V
18) n/c	n/c
19-20) FG5V	5.06V



Y-Drive Lower **Y-SUS Board**

P209 Pins 9, 11, 13, 15, 17 are Logic (Drive) Signals to the Y-Drive Lower.

Y Drive Lower P209 Connector Diode Mode Testing



Y-Drive Lower

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

Readings from Floating Ground
Use screw just above P209 on the Y-Drive Lower

		RED LEAD Blk Lead FG	BLACK LEAD Red Lead FG
Floating Gnd	1-3) VSC	Open	1.58V
	4-6) VPP	Open	1.04V
	07) n/c	Open	Open
	08) FGnd	FGnd	FGnd
	09) Data	2.83V	0.77V
	10) FGnd	FGnd	FGnd
	11) OC2	2.83V	0.77V
	12) FGnd	FGnd	FGnd
	13) OC1	2.83V	0.77V
	14) FGnd	FGnd	FGnd
	15) STB	Open	0.77V
	16) FGnd	FGnd	FGnd
	17) CLK	2.83V	0.77V
	18) n/c	n/c	n/c
	19-20) FG5V	Open	0.39V

Meter in the Diode Mode

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.

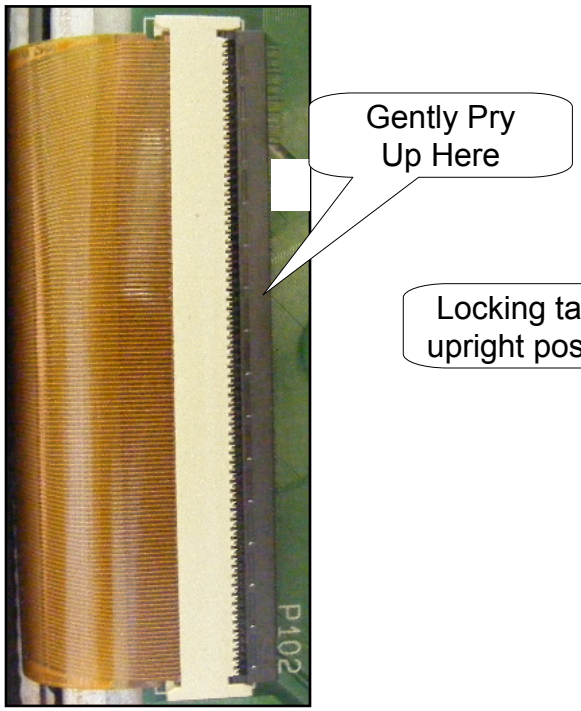


Fig 1

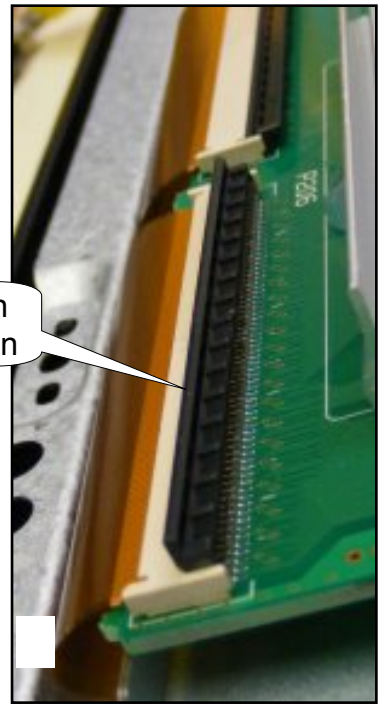


Fig 2

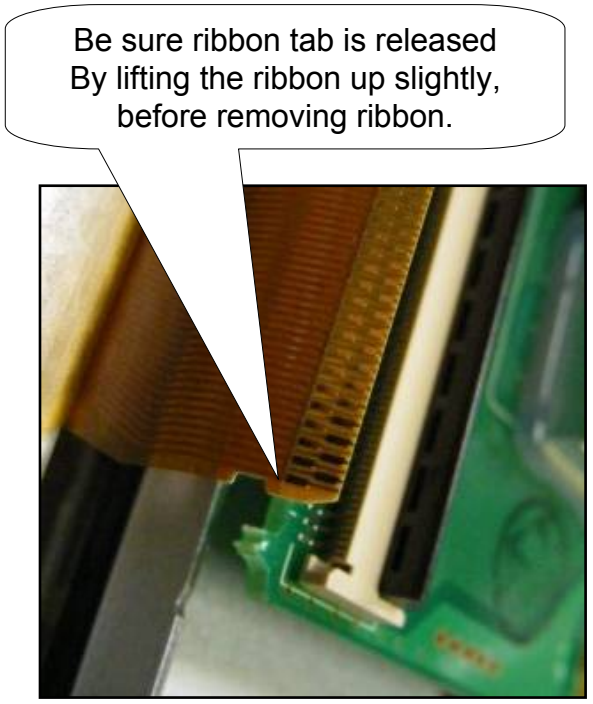


Fig 3

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).

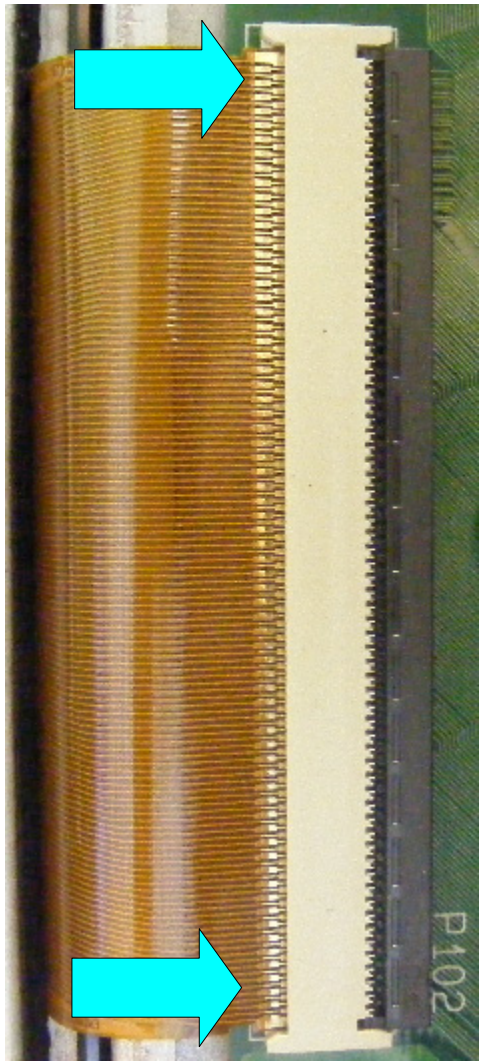
Incorrectly Seated Y-Drive Flexible Ribbon Cables

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 because 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.

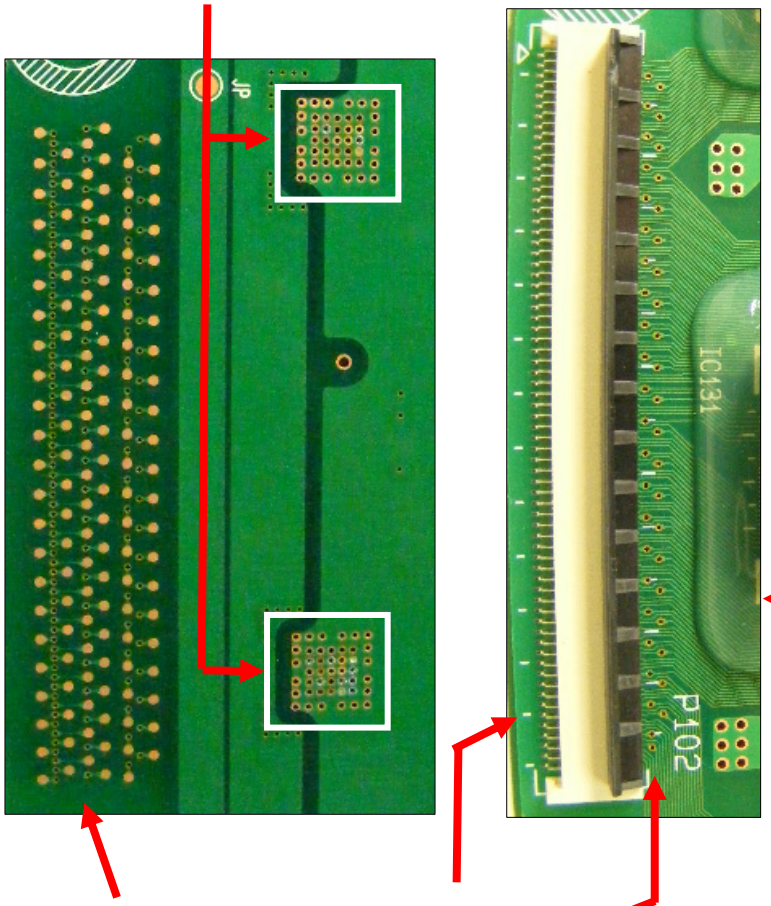


Y-Drive Buffer Troubleshooting

HOW TO CHECK FOR A SHORTED BUFFER IC

BACK SIDE **FRONT SIDE**

BUFFER IC FLOATING GROUND (FGnd)



Any of these output lugs can be tested.

Look for shorts indicating a defective Buffer IC

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

RED LEAD On Floating Ground
Indicated by white outline

BLACK LEAD On "ANY" Output Lug Reads 0.78V

Reversing the leads reads Open

FRONT SIDE OF Y-DRIVE BOARD

8 Ribbon cables communicating with the Panel's (Horizontal Electrodes) totaling 1080 lines determining the Panel's Vertical resolution pixel count.

Z-SUS SECTION

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 test points needed for troubleshooting and all alignments.

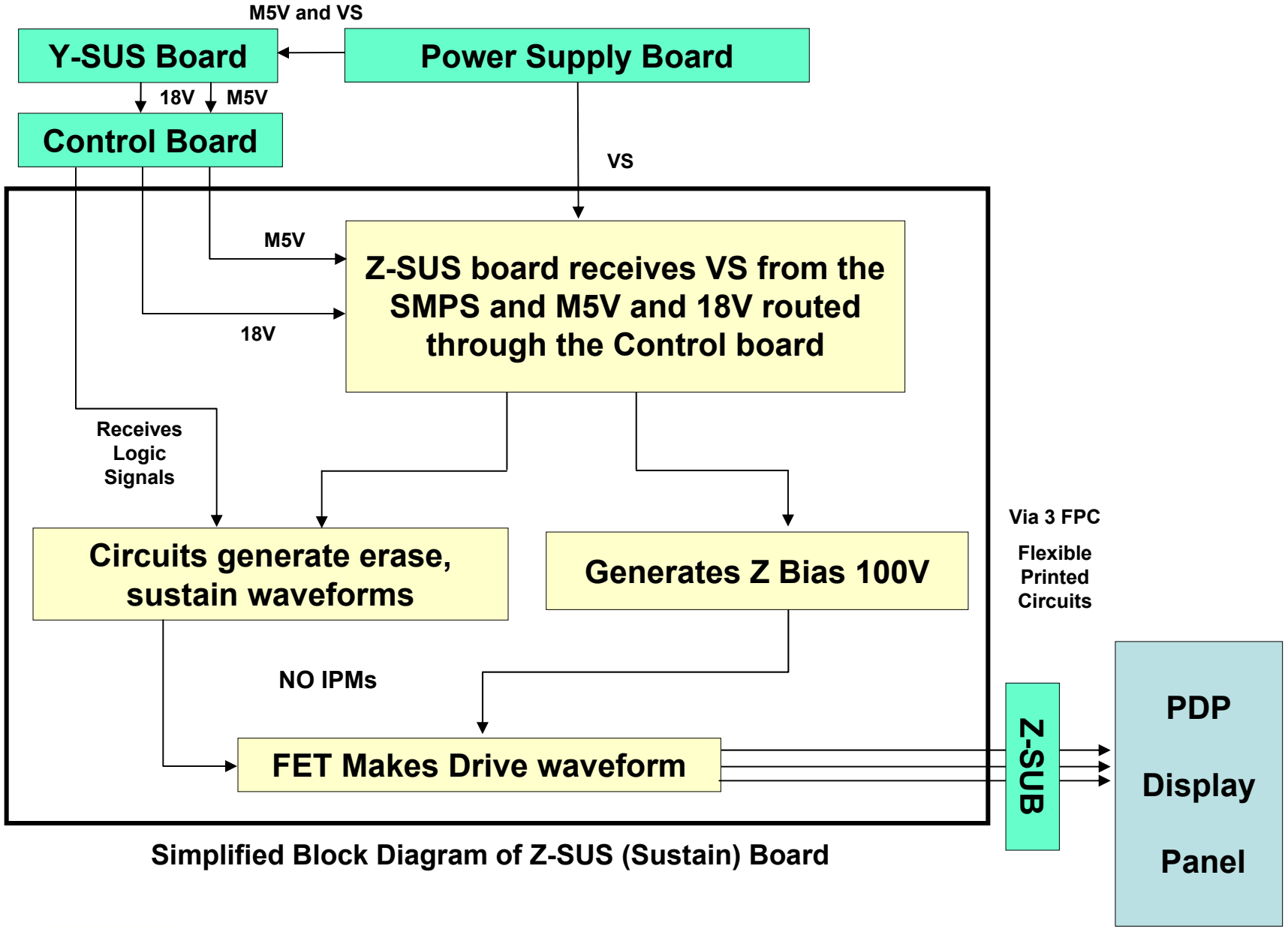
Locations

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

Operating Voltages

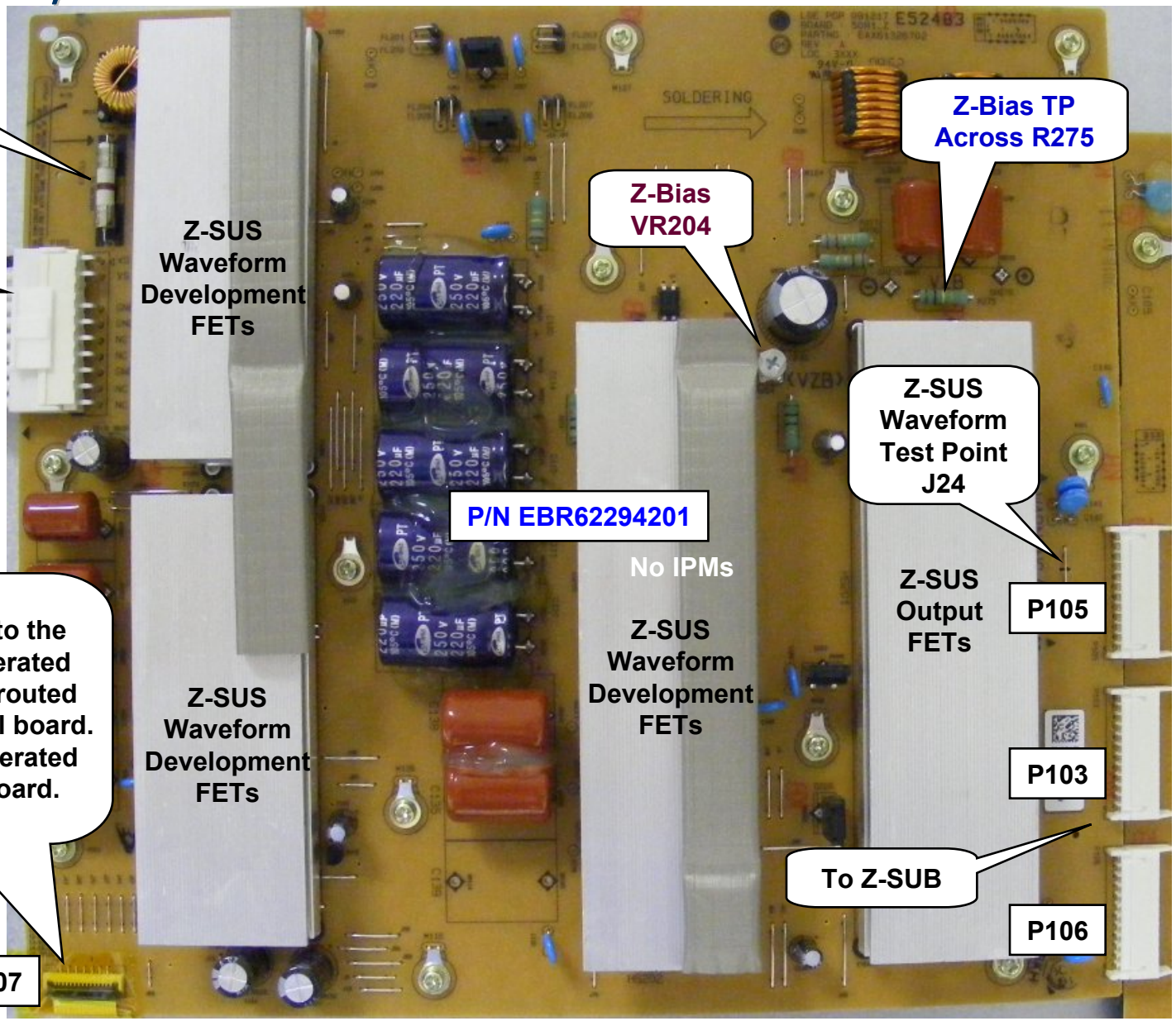
Power Supply Supplied	VS
	M5V *Routed through Control Board*
Y-SUS Supplied	18V *Routed through Control Board*
Developed on Z-SUS	Z Bias

Z-SUS Block Diagram



Simplified Block Diagram of Z-SUS (Sustain) Board

Z-SUS Board Component Identification



50PK950 Z-SUS Board Drawing

Example:

Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

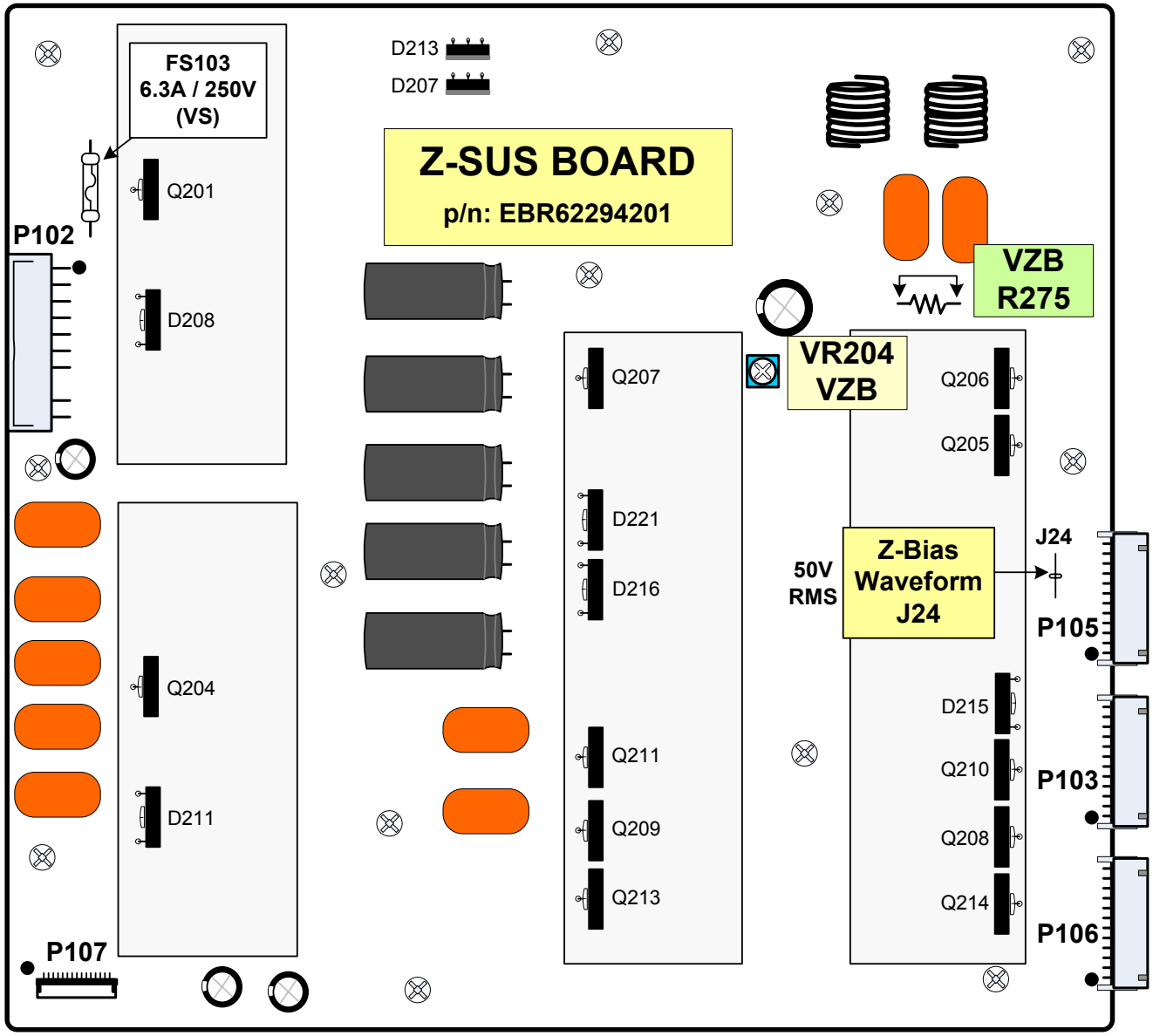
ZBZ (Z Bias)

P102

PIN	RUN	DIODE
1-2) VS	203V	Open
03) n/c	(n/c)	(n/c)
4-5) Gnd	Gnd	Gnd
6-7) n/c	60V	(n/c)
08) Gnd	Gnd	Gnd
09-10) n/c	4.92V	(n/c)

P107

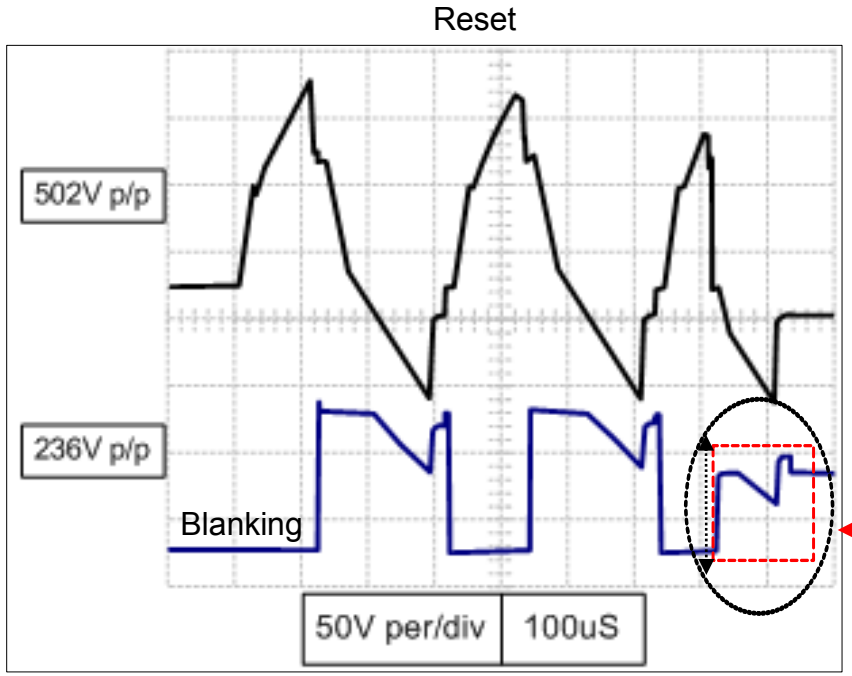
1-2) 18V	(18.3V)
03) n/c	(n/c)
4-5) M5V	(4.92V)
6-7) Gnd	(Gnd)
08) SUS_DN	(0.80V)
09) CTRL_EN	(0.40V)
10) SUS_UP	(0.15V)
11) VZB2	(2.5V)
12) ER_DN	(0.13V)
13) VZB1	(0V)
14) ER_UP	(0.87V)
15) ZBIAS	(1.90V)



Z-SUS Waveform

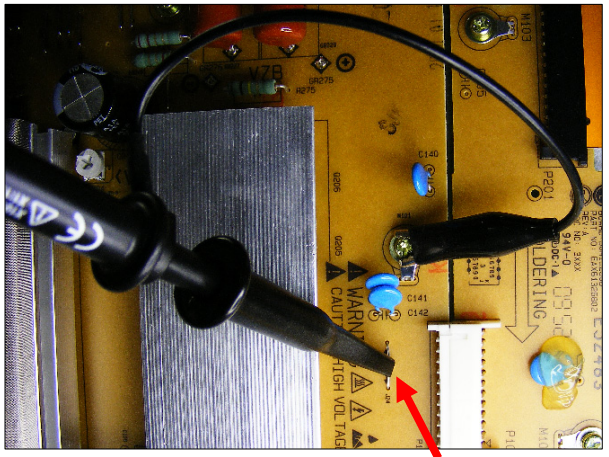
The Z-SUS (in combination with the Y-SUS) generates a SUSTAIN Signal and an ERASE PULSE for generating SUSTAIN and DISCHARGE in the Panel.

This waveform is supplied to the panel through Z-SUB and then to FPC (Flexible Printed Circuit) connections P102, P104 and P103.



Y Drive Waveform

Z Drive Waveform



Oscilloscope Connection Point.

J24 to check Z Output waveform.

Right Hand Side Center.

Z Bias VR204 manipulates the offset of the Z-Drive waveform segment.

Vzb (Z-Bias) voltage 115V ± 1/2V

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

This Waveform is just for reference to observe the effects of Z Bias adjustment

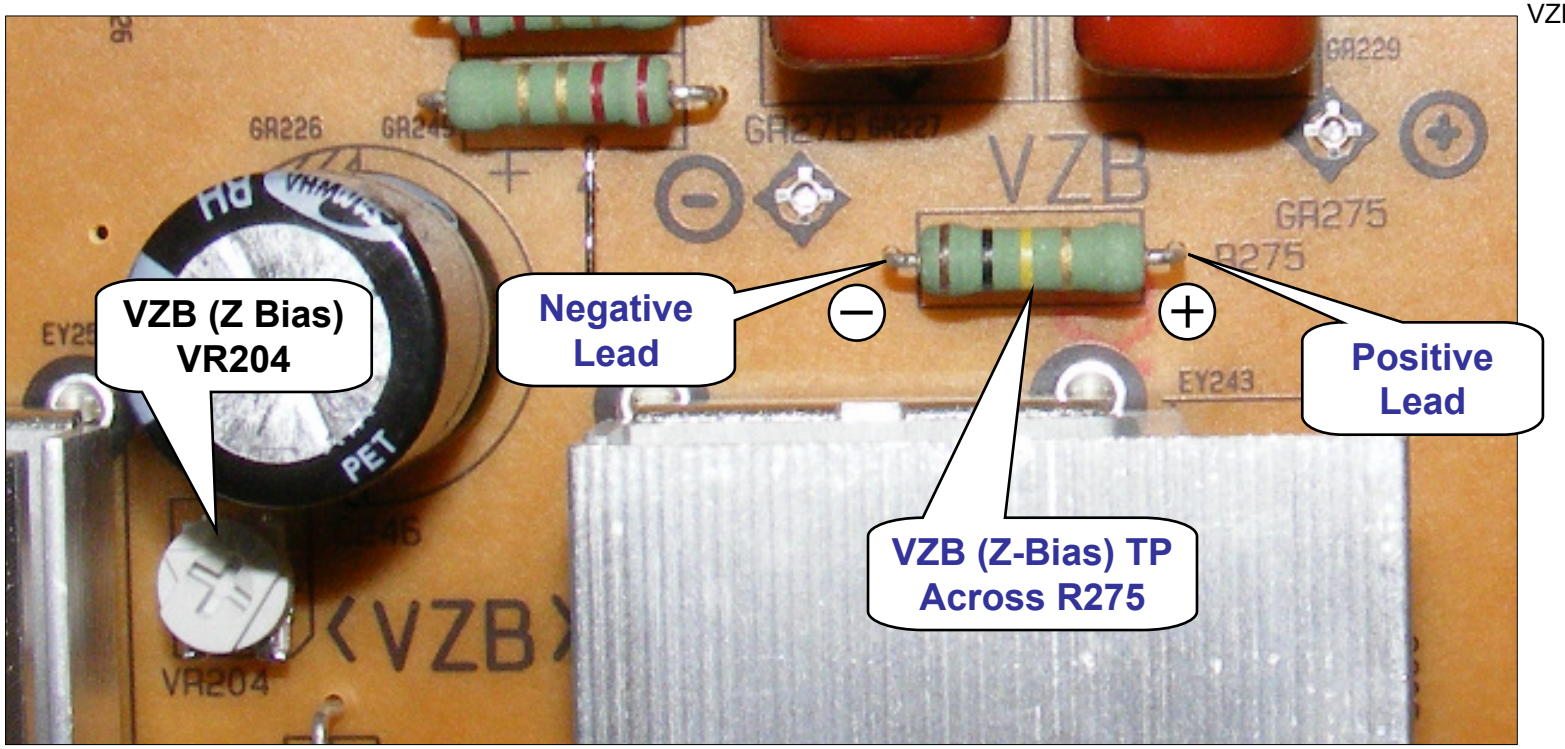
Z-Bias (VZB) VR204 Adjustment

Read the Voltage Label on the back top center of the panel when adjusting VR204.

Example of a voltage label:

Model : PDP 50R1###
Voltage Setting: 5V/ Va:60/ Vs:203
N.A. / -190 / 150 / N.A. / 115
Max Watt : 450 W (Full White)

VZB (Z-Bias)



Location Top Right of Z-SUS Board

Set should run for 10 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 (± 1/2V)

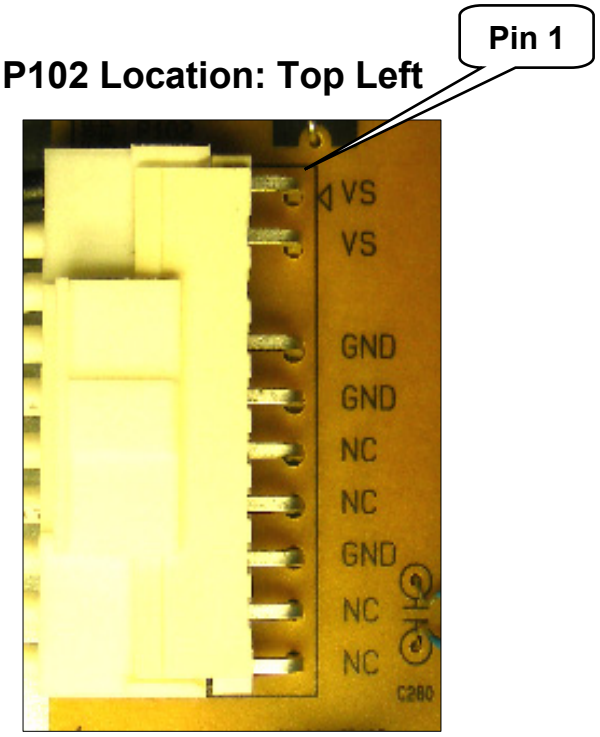
Connector P102 to SMPS P811 Voltages and Diode Checks

Voltage and Diode Mode Measurements

P102 Connector "Z-SUS" to "SMPS" P811

Pin	Label	Run	Diode Mode
1-2	VS	*202V	Open
3	n/c	n/c	n/c
4-5	Gnd	Gnd	Gnd
6-7	n/c	*60V	n/c
8	Gnd	Gnd	Gnd
9-10	n/c	5V	n/c

P102 Location: Top Left



*** 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.

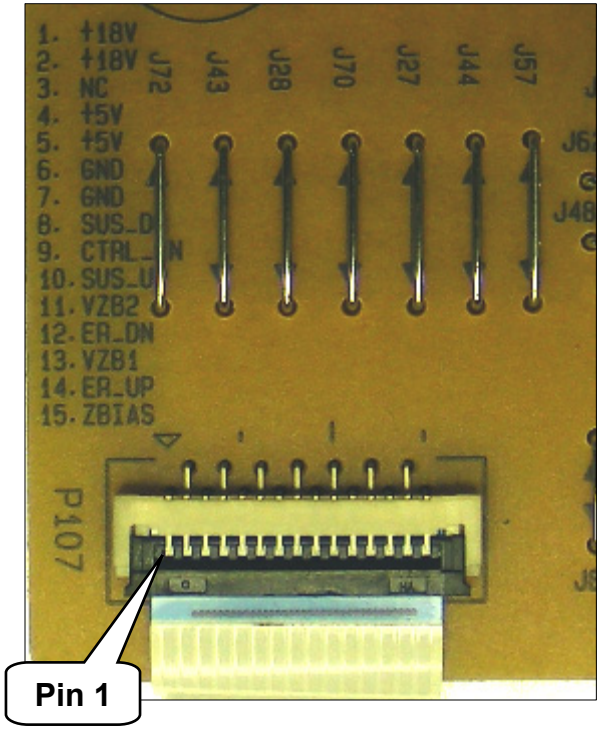
Connector P107 to Control P2 Voltages and Diode Checks

Voltage and Diode Mode Measurements

P107 Connector "Z-SUS" to "Control" P2

Pin	Label	Run	Diode Mode
1, 2	18V	18.3V	1.64V
3	n/c	n/c	n/c
4, 5	M5V	4.92V	Open
6, 7	Gnd	Gnd	Gnd
8	SUS_DN	0.80V	2.83V
9	CTRL_ON	0.40V	Open
10	SUS_UP	0.15V	2.83V
11	VZB2	2.50V	2.83V
12	ER_DN	0.13V	2.83V
13	VZB1	0V	2.83V
14	ER_UP	0.09V	2.83V
15	ZBIAS	1.90V	2.83V

P107 Location:
Bottom Left hand side



There are no Stand-By voltages on this connector

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

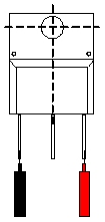
Z-SUS How to Check the Output FETs

See the Z-SUS drawing (5 pages back) for FET Locations and Identification

Name is printed on the components. Readings "In Circuit".

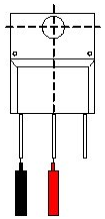
30F124

[a]Q201-Q203
[a]Q202-Q204
[b]Q209-Q211
[b]Q213-Q215
[b]Q208
[b]Q212,Q214



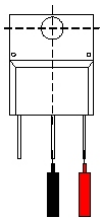
Shown: [a]0.6V
[b]1.14V

Reverse: 1.9V



Shown: Open

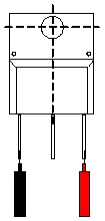
Reverse: 2.28V



Shown: 0.36V
Reverse: Open

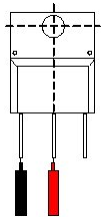
1K38AD
[a]Q207

1K49AD
[b]Q205-Q206



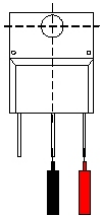
Shown: 0.79V

Reverse: Open



Shown: Open

Reverse: Open

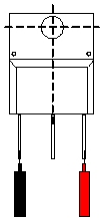


Shown: [a]Short
[b]0.51V

Reverse: Short

RF2001

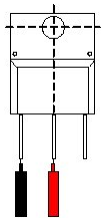
D208,~D210
D209~D211
D221~D216
D215
D207-D213
D220-D203



Shown: Short

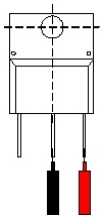
Reverse: Short

0.1 Ohms



Shown: Open

Reverse: 0.35V



Shown: 0.35V

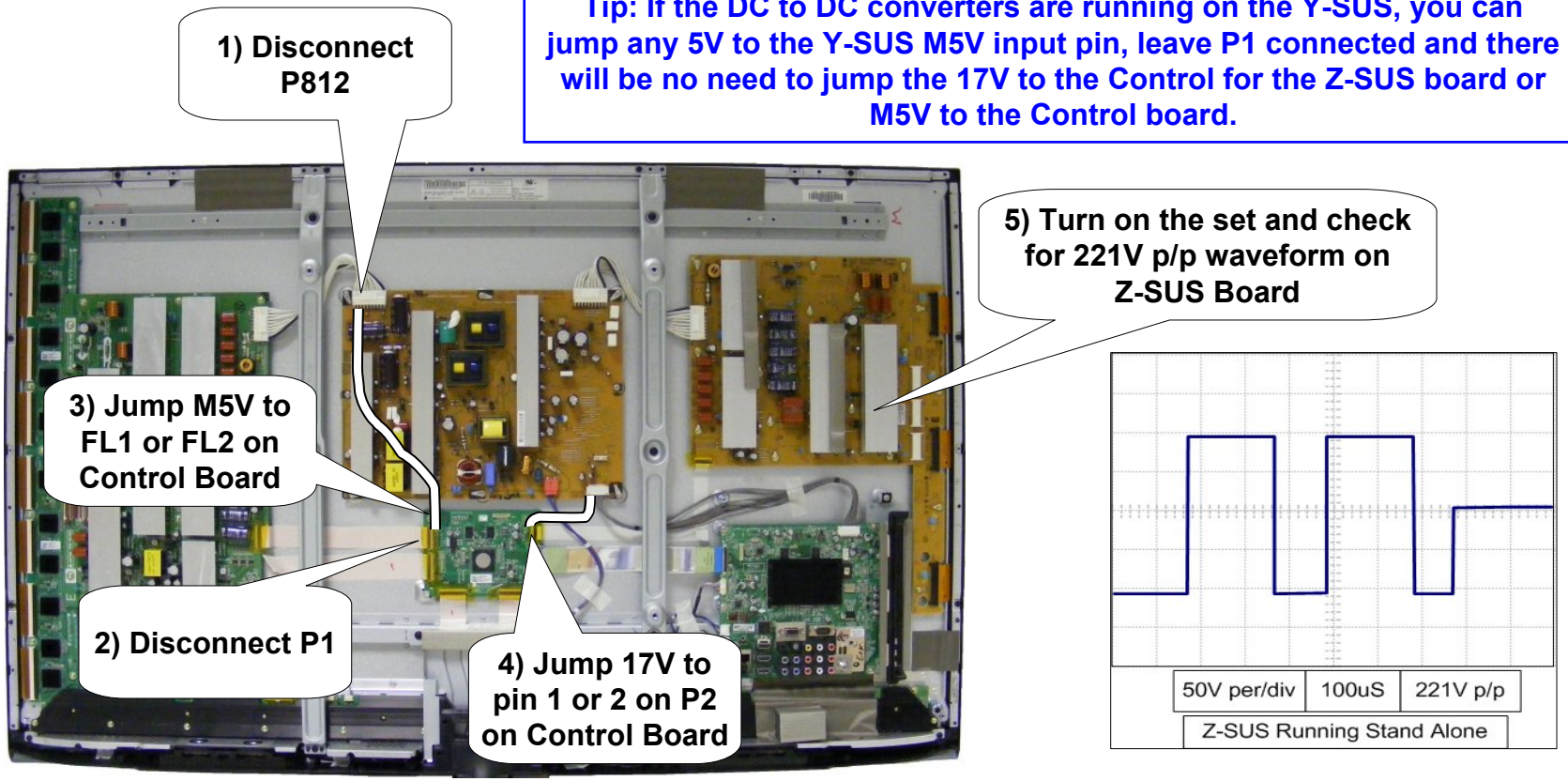
Reverse: Open

Z-SUS How to Check Stand-Alone

The Power Supply should be producing VS or you can substitute voltage matching VS from an external source to either pin 1 or 2 P102 on the Z-SUS board.

The Power Supply should be producing M5V or you can substitute voltage matching M5V from an external source to either FL1, FL2 or FL5 on the Control board.

Tip: If the DC to DC converters are running on the Y-SUS, you can jump any 5V to the Y-SUS M5V input pin, leave P1 connected and there will be no need to jump the 17V to the Control for the Z-SUS board or M5V to the Control board.



The Power Supply should be producing 17V or you can substitute voltage matching 17V from an external source to either pins 1 or 2 on connector P2 on the Control board.

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 test points needed for troubleshooting.

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

Signals

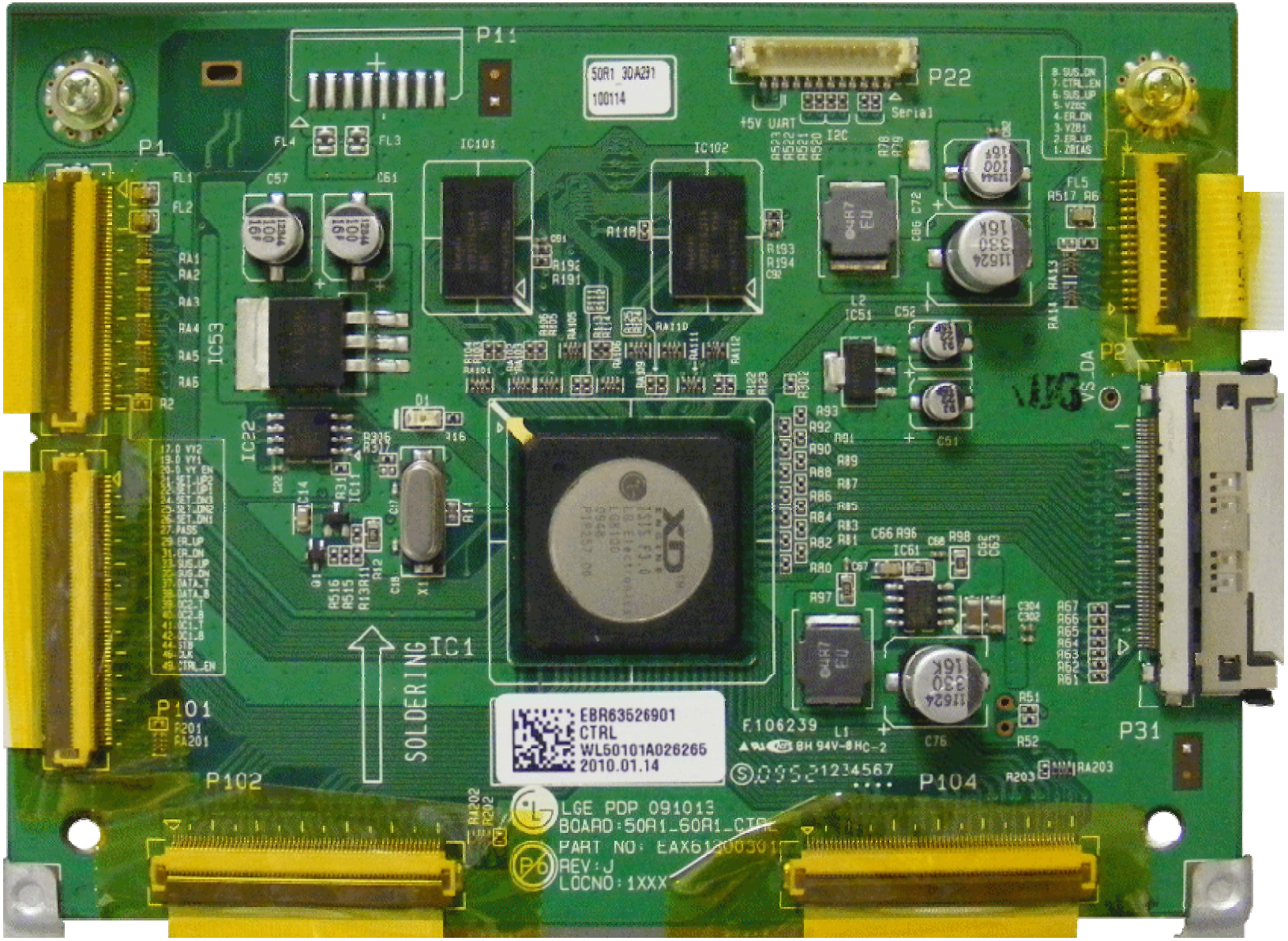
Main Board Supplied	Panel Control and LVDS (Video) Signals
Control Board Generated	Y-SUS and Z-SUS Drive Signals (Sustain)
	X Board Drive Signals (RGB Address)

Operating Voltages

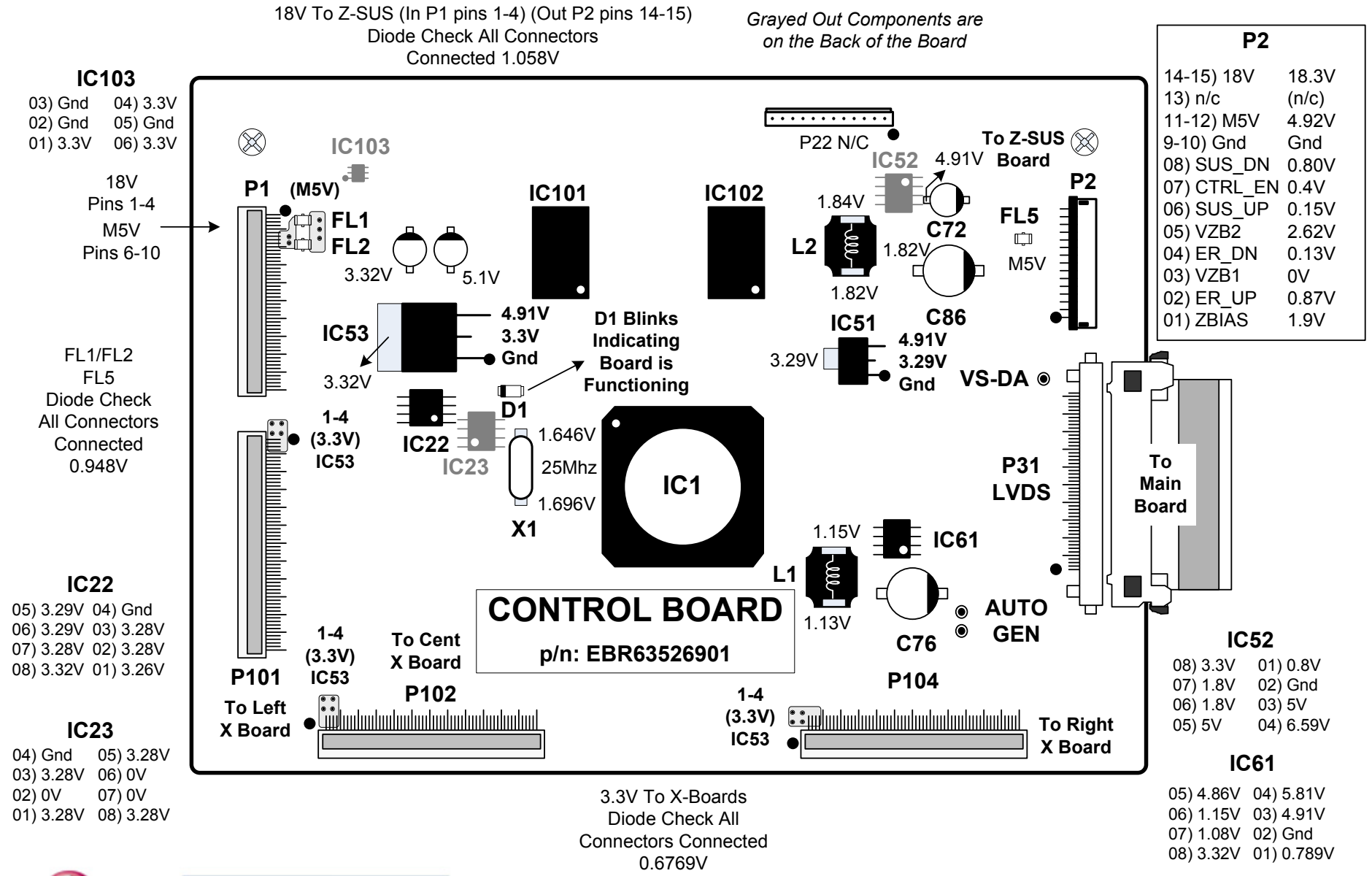
Y-SUS Supplied	+5V (M5V) Developed on the SMPS
	+18V (Routed to the Z-SUS)
	(Not used by the Control Board)
Developed on the Control Board	+1.8V for internal use
	+3.3V for internal use
	+3.3V for the X-Boards (TCPs)

Control Board Component Identification

p/n: EBR63526901

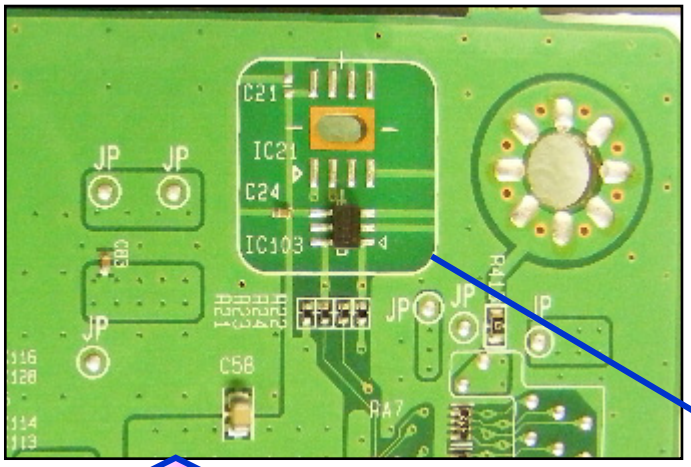


50PK950 Control Board Layout Drawing

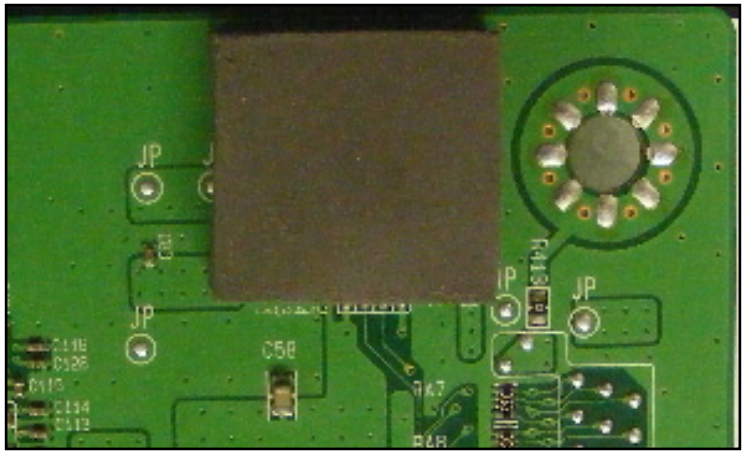


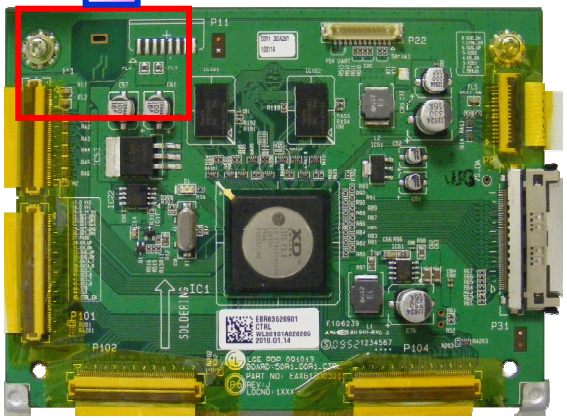
Control Board Temperature Sensor Location (Chocolate)

BACK SIDE OF THE BOARD

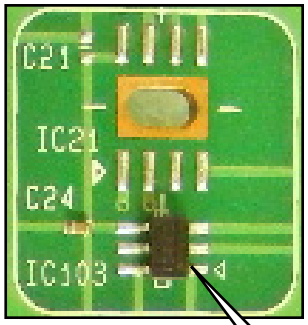


With Chocolate (Heat Transfer Material)





CONTROL BOARD TEMPERATURE SENSOR LOCATION



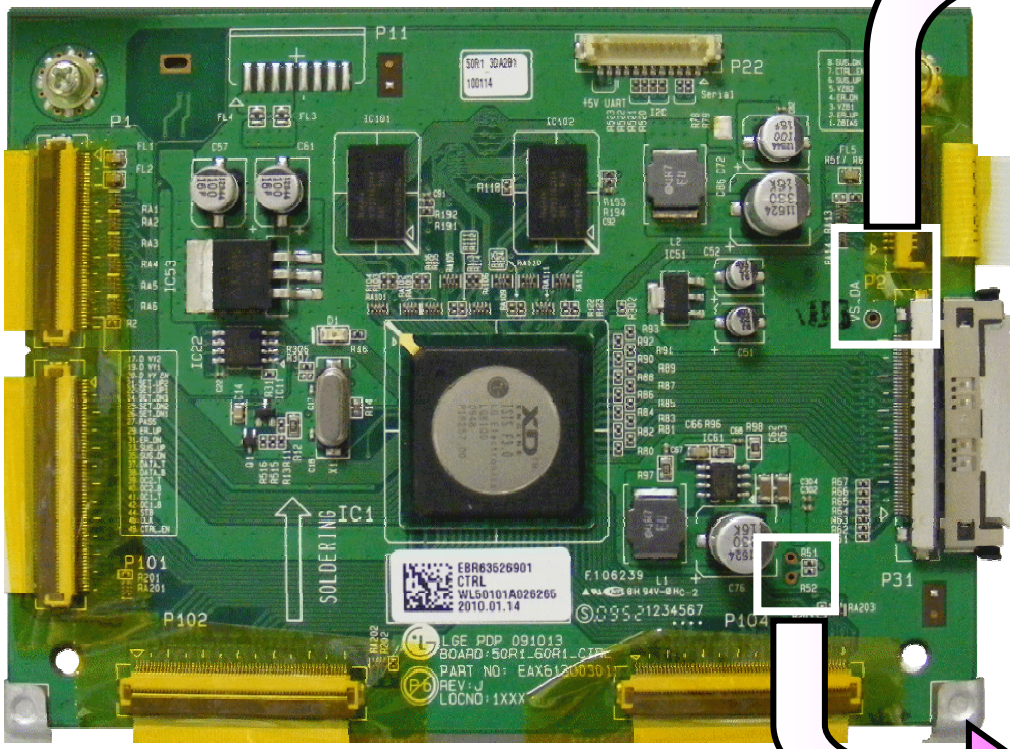
IC103

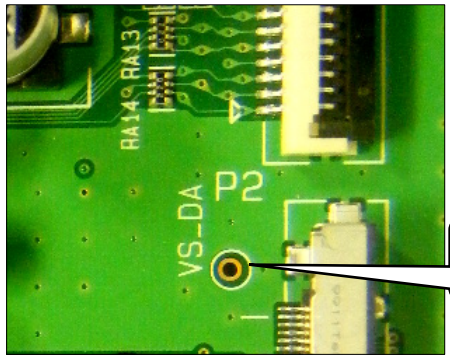
04) 3.3V	03) Gnd
05) Gnd	02) Gnd
06) 3.3V	01) 3.3V

Pin 1

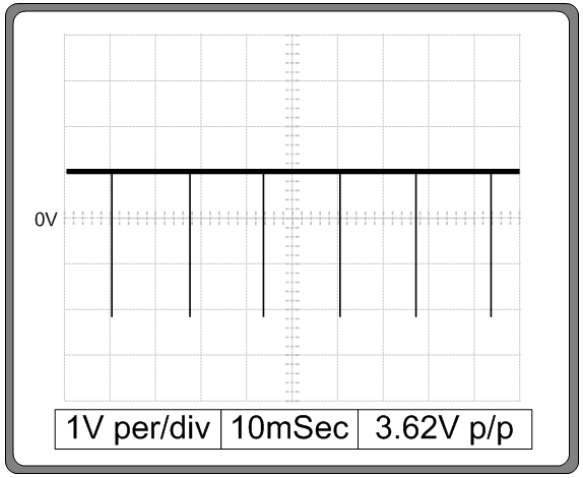
Control Board TP Tips

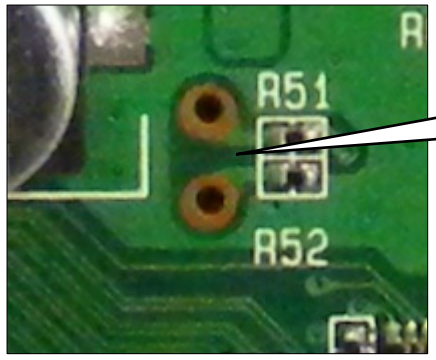
EXTERNAL TRIGGER: (VS_DA) can be used as an External Trigger for your scope when locking onto the Y-Scan or the Z-Drive signal.





VS_DA



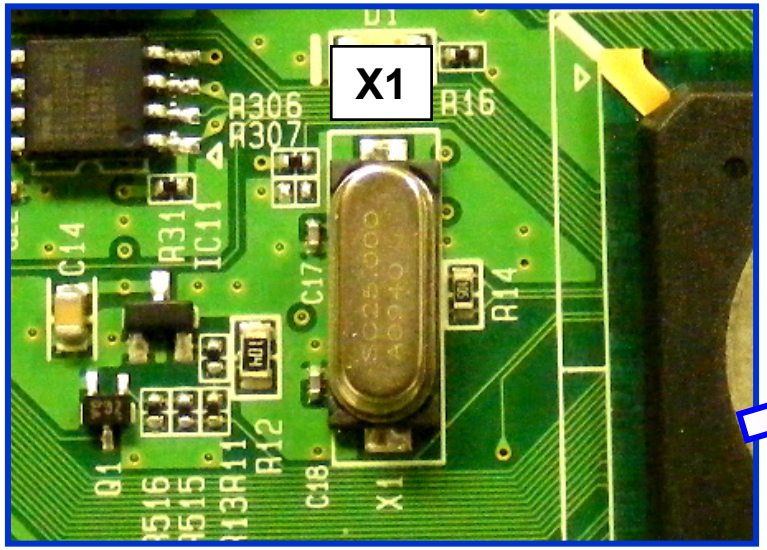


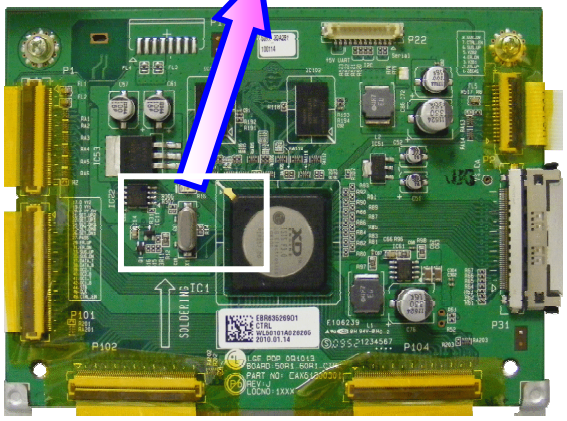
AUTO GEN

Auto Gen (Internal Automatic Generator)
Short these two pins together to generate patterns on the screen for a Panel Test.
If patterns do not appear, try removing the LVDS Cable.

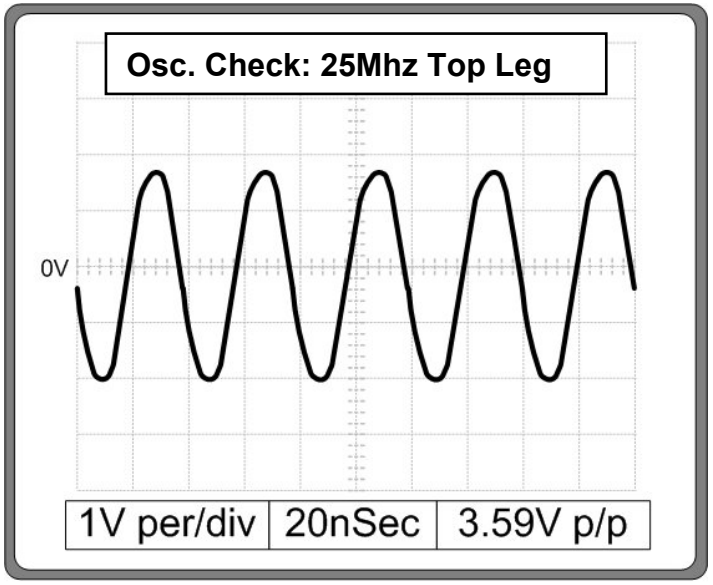
Checking the Crystal X1 "Clock" on the Control Board

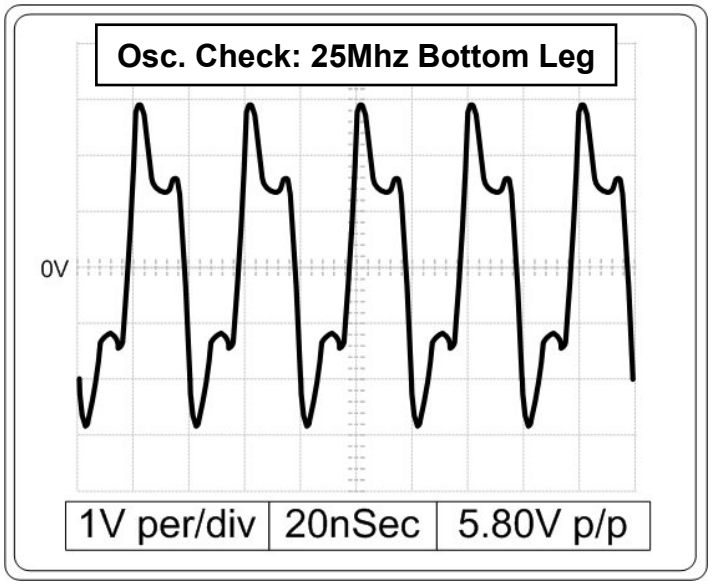
Check the output of the Oscillator (Crystal) X1.
The frequency of the sine wave is 25 MHZ.
Missing this clock signal will halt operation of the panel drive signals.





CONTROL BOARD CRYSTAL LOCATION





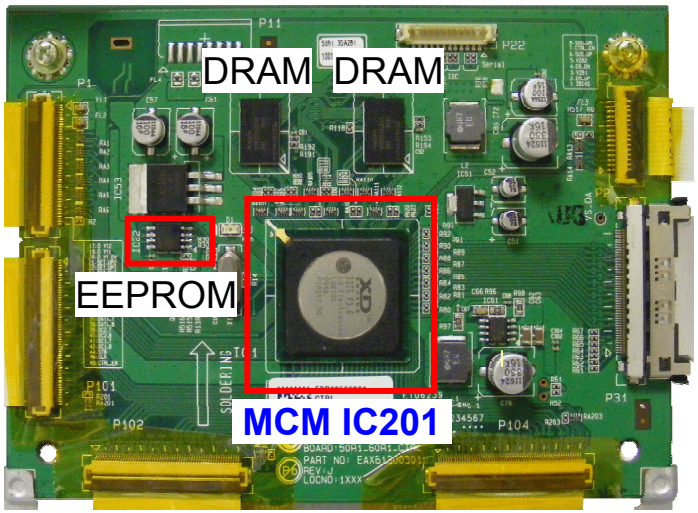
Control Board Signal (Simplified Block Diagram)

The Control Board supplies Video Signals to the TCP (Taped 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 problem appears on the screen.

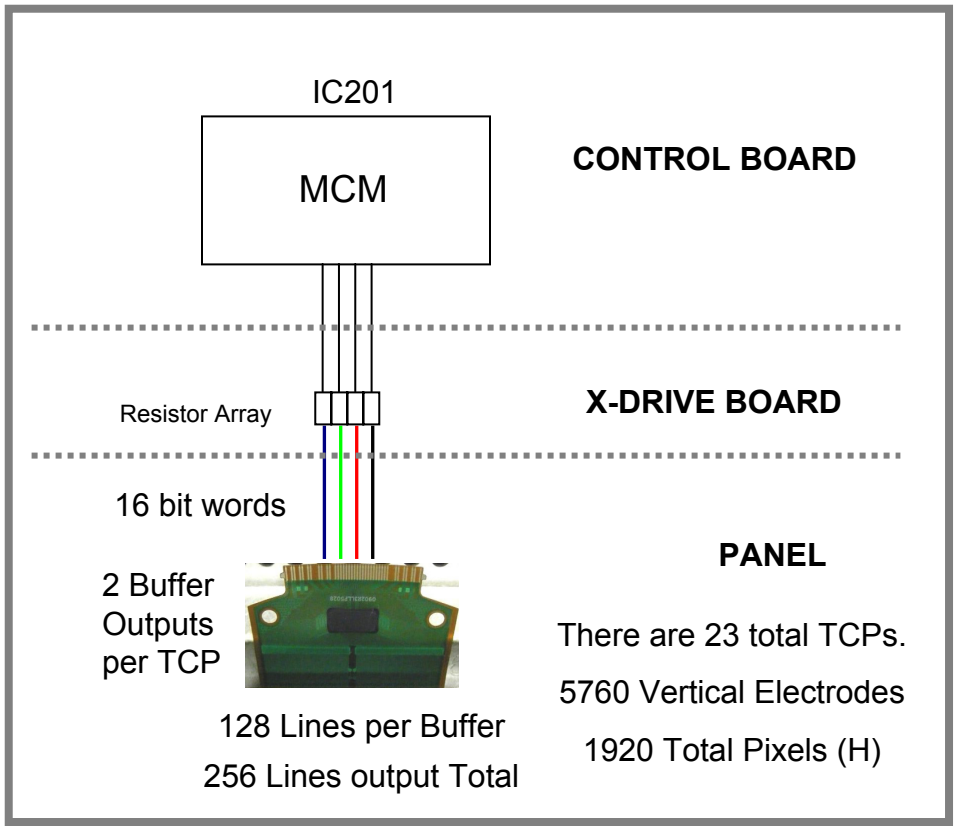


To Left X-Board

To Center X-Board

To Right X-Board

Basic Diagram of Control Board



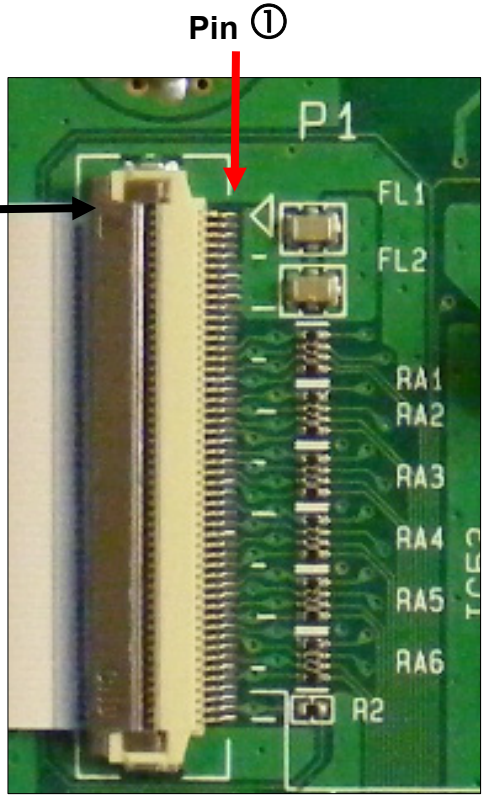
Control Board Connector P1 to Y-SUS P101 Voltages and Diode Mode Checks

These pins are very close together. Use Caution when taking Voltage measurements.

Pins 1 through 4
Receive 18V from the Y-SUS.

Pins 6 through 10
Receive M5V from the Y-SUS.

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).



Note: The +18V is not used by the Control board, it is routed to the Z-SUS leaving on P2 Pins 14~15.

P1 Label Silk Screen

Starting at pin 16 every pin not identified is ground.

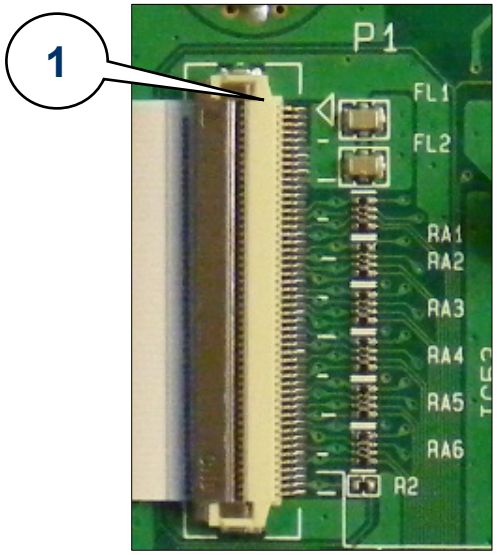
Control P1 to Y-SUS P101 Plug Information

Pin 1 on Control is Pin 50 on Y-SUS.
Note: There are no voltages in Stand-By mode

P1 Connector "Control Board" to "Y-SUS" P101

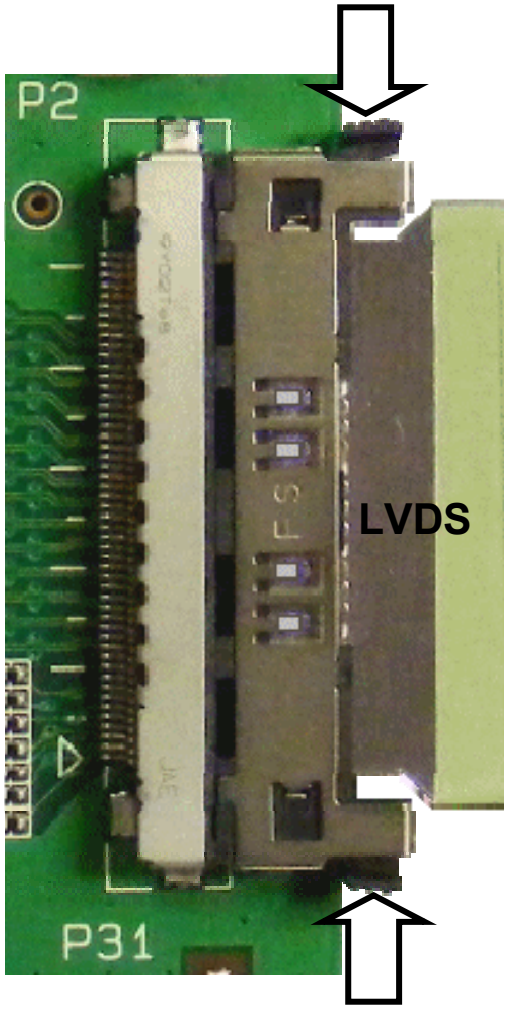
Pin	Label	Run	Diode
1-4	18V	18V	1.3V
5	n/c	n/c	n/c
6-10	M5V	5V	1.3V
11	n/c	n/c	Open
12	GND	Gnd	Gnd
13	GND	Gnd	Gnd
14	NC3	2.03V	2.82V
15	NC2	0V	3.0V
16	NC1	0.6V	2.84V
17	D_VY2	0.28V	2.82V
18	GND	Gnd	Gnd
19	D_VY1	0V	2.83V
20	D_VY_EN	0.26V	3.0V
21	SET_UP2	0V	2.82V
22	SET_UP1	0.88V	2.82V
23	Gnd	Gnd	Gnd
24	SET_DN3	2.36V	2.83V
25	SET_DN2	2.12V	2.84V
26	SET_DN1	2.12V	2.84V
27	PASS	2.03V	2.84V
28	Gnd	Gnd	Gnd
29	ER_UP	1.14V	2.83V

Pin	Label	Run	Diode
30	Gnd	Gnd	Gnd
31	ER_DN	0.12V	2.82V
32	Gnd	Gnd	Gnd
33	SUS_UP	0.12V	2.83V
34	Gnd	Gnd	Gnd
35	SUS_DN	2.46V	2.82V
36	Gnd	Gnd	Gnd
37	DATA_T	0V	2.82V
38	DATA_B	0V	2.82V
39	OC2_T	1.128V	2.83V
40	OC2_B	1.128V	2.83V
41	OC1_T	1.128V	2.83V
42	OC1_B	1.12V	2.82V
43	Gnd	Gnd	Gnd
44	STB	2.87V	2.84V
45	Gnd	Gnd	Gnd
46	CLK	0.384V	2.83V
47	Gnd	Gnd	Gnd
48	n/c	n/c	Open
49	CTRL_EN	0.09V	3.17V
50	Error	0V	Open



Control Board LVDS P31 Signals

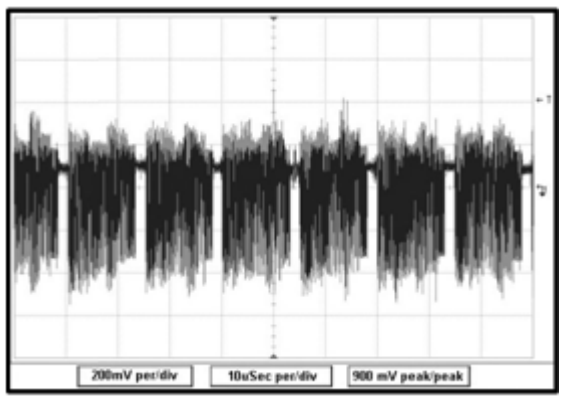
LVDS Cable P31 on Control board shown.
Press two outside tabs inward to release.

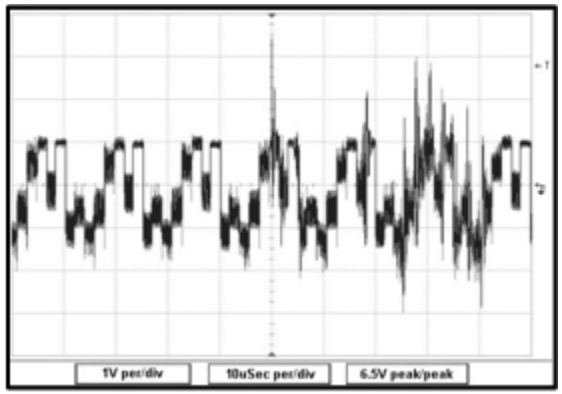


Pins are close together.

Video Signals from the Main Board to the Control Board are referred to as Low Voltage Differential Signals or LVDS. The video is delivered in 24 bit LVDS format. Their presence can be confirmed with the Oscilloscope by monitoring the LVDS signals with SMPTE Color Bar input. Loss of these Signals would confirm the failure is on the Main Board or the LVDS Cable itself.

Example of LVDS Video Signal





Example of Normal Signals measured at 1V p/p at 10µSec

Pins 12~17, 19~20, 22~33, 35~36, 38~43.
Pins 19~20 and 35~36 are clock signals for the data.

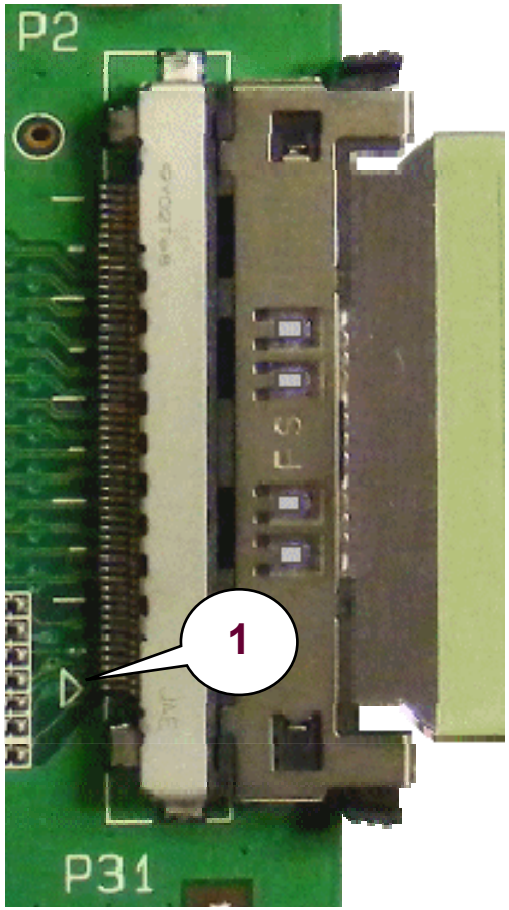
Control Board LVDS P31 Connector Voltages and Diode Check

P31 Connector "Control Board" to "Main "P902"

Pin	Label	Run	Diode
50-51	n/c	n/c	n/c
49	UART_TXD	3.29V	Open
48	UART_RXD	3.29V	Open
47	n/c	n/c	n/c
46-44	Gnd	Gnd	Gnd
*41	TB4+	1V	1.0V
*40	TB4-	1.3V	1.0V
*39	TB3+	1.3V	1.0V
*38	TB3-	1.2V	1.0V
37	Gnd	Gnd	Gnd
36	TBC+	1.19V	1.0V
35	TBC-	1.14V	1.0V
34	Gnd	Gnd	Gnd
*33	TB2+	1V	1.0V
*32	TB2-	1.1V	1.0V
*31	TB1+	1.3V	1.0V
*30	TB1-	1.2V	1.0V
*29	TB0+	1.1V	1.0V
*28	TB0-	1.3V	1.0V
26-27	n/c	n/c	n/c
*25	TA4+	1.1V	1.0V
*24	TA4-	1.3V	1.0V

Pin	Label	Run	Diode
*23	TA3+	1.29V	1.0V
*22	TA3-	1.22V	1.0V
21	Gnd	Gnd	Gnd
20	TAC+	1.19V	1.0V
19	TAC-	1.14V	1.0V
18	Gnd	Gnd	Gnd
*17	TA2+	1V	1.0V
*16	TA2-	1.1V	1.0V
*15	TA1+	1.3V	1.0V
*14	TA1-	1.2V	1.0V
*13	TA0+	1.1V	1.0V
*12	TA0-	1.3V	1.0V
11	Gnd	Gnd	Gnd
7-10	n/c	n/c	n/c
6	SDA	3.29V	Open
5	DISP_EN	3.3V	Open
4	SCL	3.28V	Open
3	PC_SER_DATA	3.29V	Open
2	PC_SER_CLK	3.3V	Open
1	Gnd	Gnd	Gnd

Pins 7, 10, 47, 50, 51 are n/c
Pins 1, 11, 18, 21, 34, 37, 44~46 are Ground

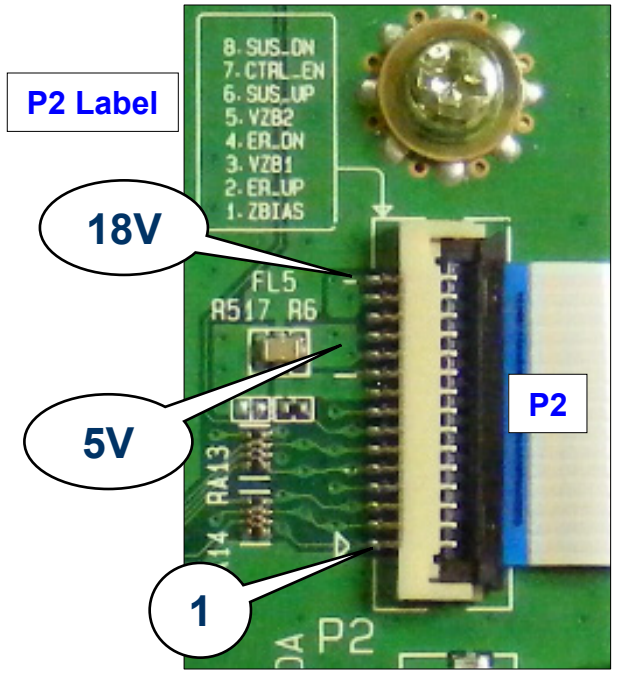


*** Indicates video signal**

Note: There are no voltages in Stand-By mode.

Control Board P2 Connector Pin ID and Voltages

Voltage and Diode Mode Measurements for the Control Board.
Note: There are no voltages in Stand-By mode.



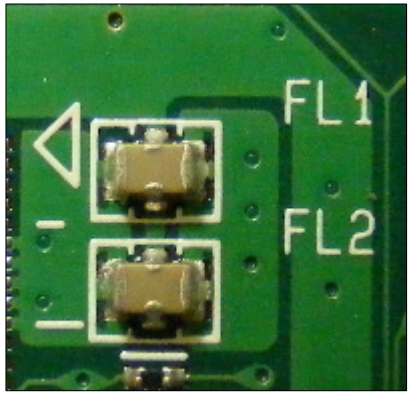
P2 Connector "Control Board" to "Z-SUS Board" P107

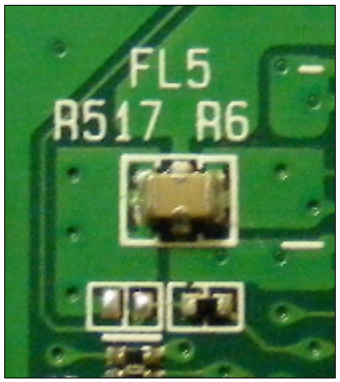
Pin	Label	Run	Diode Mode
14-15	15V_DD	18.3V	Open
13	n/c	n/c	n/c
11-12	+5V	4.92V	1.25V
9-10	Gnd	Gnd	1.49V
8	SUS_DN	0.80V	Open
7	CTRL_EN	0.40V	Open
6	SUS_UP	0.15V	Open
5	VZB2	2.50V	Open
4	ER_DN	0.128V	Open
3	VZB1	0V	Open
2	ER_UP	0.087V	Open
1	ZBIAS	1.90V	Open

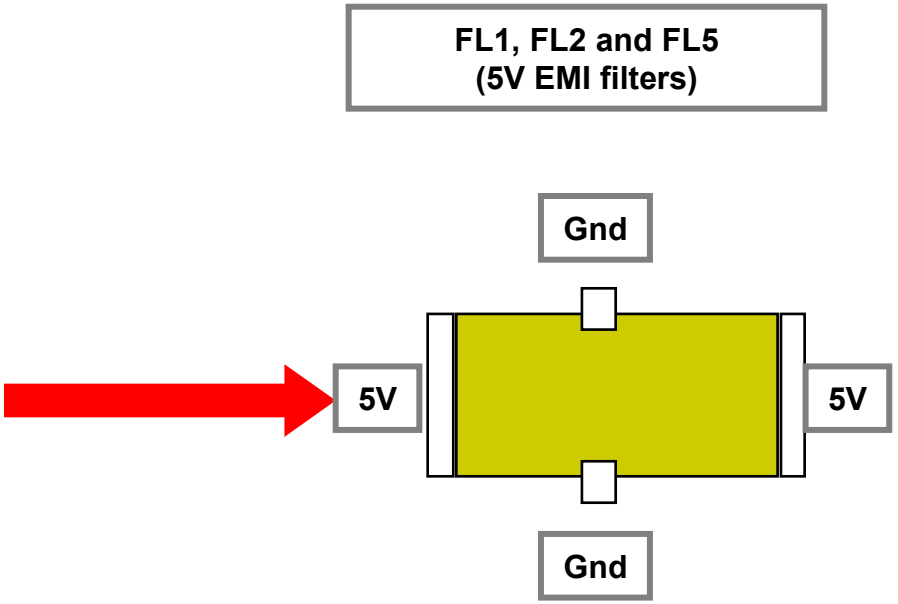
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

Control Board (EMI Filter) Explained

The two EMI Filters just to the top right of P1 and one just to the top left of P2 are surface mount mini devices which shunt high frequencies to ground. These high frequencies are generated on the SMPS, Y-SUS and Control Board.
Each EMI filter has 4 pins as shown in the example.
The left and right are the B+ route, the two side solder points are Chassis Gnd.





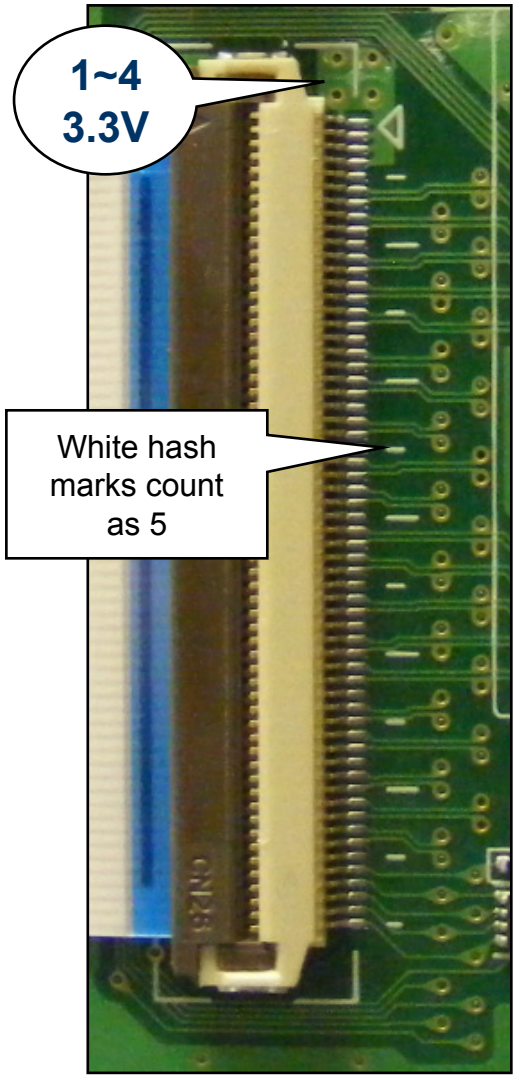


P101 Connector "Control Board" to "Left X Board" P110

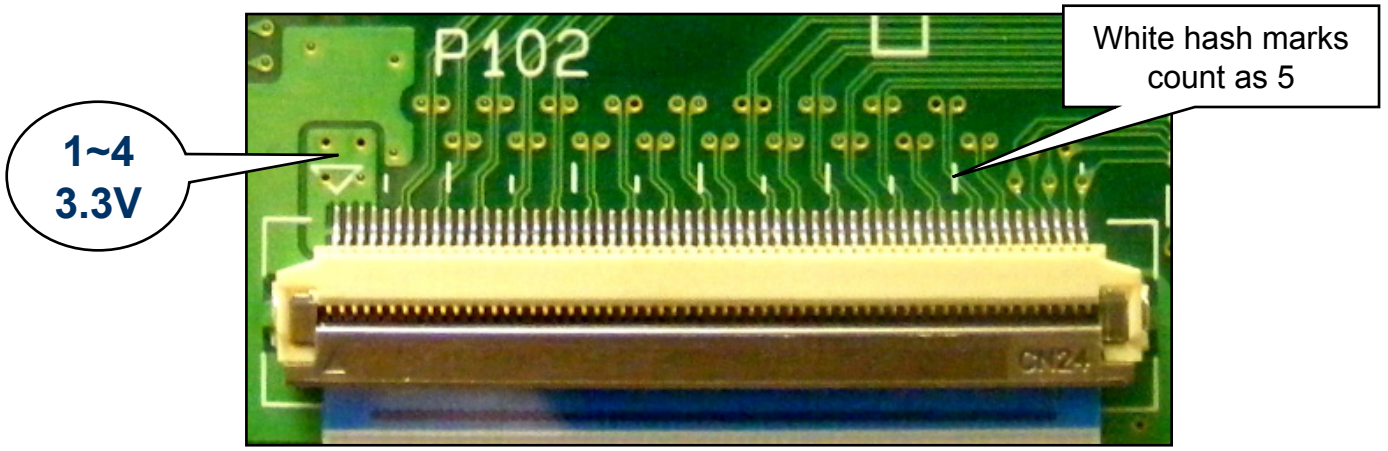
P101 Connector to the Left X-Board P110 ***(Pins not shown are n/c or Gnd)***

Pin	Run	Diode Mode
1~4	3.3V	0.67V
6	1.0V	0.97V
7	1.27V	0.97V
8	1.0V	0.97V
9	1.27V	0.97V
11	1.0V	0.97V
12	1.27V	0.97V
13	1.0V	0.97V
14	1.27V	0.97V
15	1.0V	0.97V
16	1.27V	0.97V
18	1.0V	0.97V
19	1.27V	0.97V
20	1.0V	0.97V
21	1.27V	0.97V
23	1.0V	0.97V
24	1.27V	0.97V
26	1.0V	0.97V
27	1.27V	0.97V
28	1.0V	0.97V
29	1.27V	0.97V
31	1.0V	0.97V
32	1.27V	0.97V

Pin	Run	Diode Mode
33	1.0V	0.97V
34	1.27V	0.97V
36	1.0V	0.97V
37	1.27V	0.97V
39	1.0V	0.97V
40	1.27V	0.97V
41	1.0V	0.97V
42	1.27V	0.97V
44	1.0V	0.97V
45	1.27V	0.97V
46	1.0V	0.97V
47	1.27V	0.97V
49	1.0V	0.97V
50	1.27V	0.97V
51	1.0V	0.97V
52	1.27V	0.97V
53	1.0V	0.97V
54	1.27V	0.97V
56	0.5V	1.2V
57	0.5V	1.2V
58	3.24V	1.2V
59	1.83V	1.2V
60	1.86V	1.2V



P102 Connector "Control Board" to "Center X Board" P210



P102 Connector to the Center X-Board P110 *(Pins not shown are n/c or Gnd)*

Pin	Run	Diode Mode
1~4	3.3V	0.67V
6	1.0V	0.97V
7	1.27V	0.97V
9	1.0V	0.97V
10	1.27V	0.97V
12	1.0V	0.97V
13	1.27V	0.97V
15	1.0V	0.97V
16	1.27V	0.97V
18	1.0V	0.97V
19	1.27V	0.97V

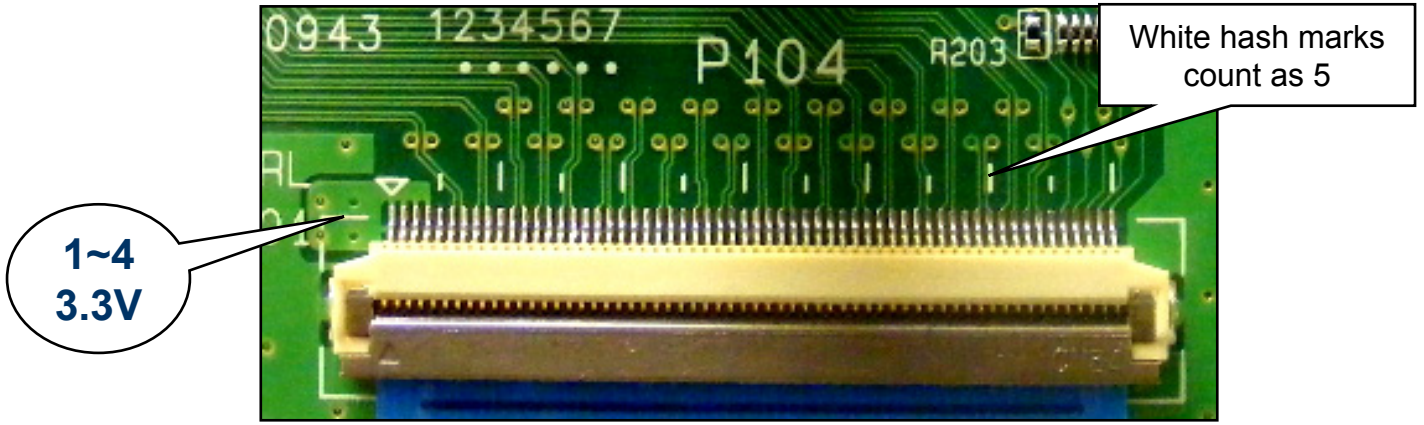
Pin	Run	Diode Mode
21	1.27V	0.97V
22	1.0V	0.97V
24	1.0V	0.97V
25	1.27V	0.97V
27	1.0V	0.97V
28	1.27V	0.97V
30	1.0V	0.97V
31	1.27V	0.97V
33	1.0V	0.97V
34	1.27V	0.97V
36	1.0V	0.97V

Pin	Run	Diode Mode
37	1.27V	0.97V
39	1.0V	0.97V
40	1.27V	0.97V
42	1.0V	0.97V
43	1.27V	0.97V
45	1.0V	0.97V
46	1.27V	0.97V
48	1.0V	0.97V
49	1.27V	0.97V
51	1.0V	0.97V
52	1.27V	0.97V

Pin	Run	Diode Mode
53	1.0V	0.97V
54	1.27V	0.97V
56	0.5V	1.2V
57	0.5V	1.2V
58	3.24V	1.2V
59	1.83V	1.2V
60	1.86V	1.2V

Note:
There are no voltages in Stand-By mode.

P104 Connector "Control Board" to "Right X Board" P310



P104 Connector to the Right X-Board P310

(Pins not shown are n/c or Gnd)

Pin	Run	Diode Mode
1~4	3.3V	0.67V
6	1.0V	0.97V
7	1.27V	0.97V
9	1.0V	0.97V
10	1.27V	0.97V
12	1.0V	0.97V
13	1.27V	0.97V
15	1.0V	0.97V
16	1.27V	0.97V
18	1.0V	0.97V
19	1.27V	0.97V

Pin	Run	Diode Mode
21	1.27V	0.97V
22	1.0V	0.97V
24	1.0V	0.97V
25	1.27V	0.97V
27	1.0V	0.97V
28	1.27V	0.97V
30	1.0V	0.97V
31	1.27V	0.97V
33	1.0V	0.97V
34	1.27V	0.97V
36	1.0V	0.97V

Pin	Run	Diode Mode
37	1.27V	0.97V
39	1.0V	0.97V
40	1.27V	0.97V
42	1.0V	0.97V
43	1.27V	0.97V
45	1.0V	0.97V
46	1.27V	0.97V
48	1.0V	0.97V
49	1.27V	0.97V
51	1.0V	0.97V
52	1.27V	0.97V

Pin	Run	Diode Mode
53	1.0V	0.97V
54	1.27V	0.97V
56	0.5V	1.2V
57	0.5V	1.2V
58	3.24V	1.2V
59	1.83V	1.2V
60	1.86V	1.2V

Note:
There are no voltages in Stand-By mode.

X BOARD (LEFT, RIGHT and CENTER) SECTION

The following section gives detailed information about the X boards. These boards deliver the Color information signal developed on the Control board to the TCPs, (Taped Carrier Packages). The TCPs are attached to the vertical FPCs, (Flexible Printed Circuits) which are attached directly to the panel. The X boards are the attachment points for these FPCs.
These boards have no adjustment.

These boards receive their main B+ from the:

- ***Originally developed on the Switch Mode Power Supply Va (Voltage for Address) is routed through the Y-SUS board and then to the Left X board via P121 pins 1~4. Va also leaves P120 and is sent to the Center X via P220 pins 1~2. Then it leaves on P221 and goes to the Right X P320 pins 1~2.***
- ***Control board develops 3.3V (IC53) and routes to each X-Board via ribbon connectors P110, P210 and P310.***

X Board Additional Information

There are three X boards, the Left, Center and the Right (As viewed from the rear of the set).

The three X boards have very little circuitry. They are basically signal and voltage routing boards.

- They route Va voltage to all of the Taped Carrier Packages (TCPs). Va is introduced to the Left X board first, then the Left X sends Va to the Center X and then the Center X sends Va to the Right X.
- They route the Logic (Color) signals from the Control board to all of the Taped Carrier Packages (TCPs).
- The X boards have connectors to 23 TCPs, 8 on the left and right. The Center X board has connections to 7 TCPs.

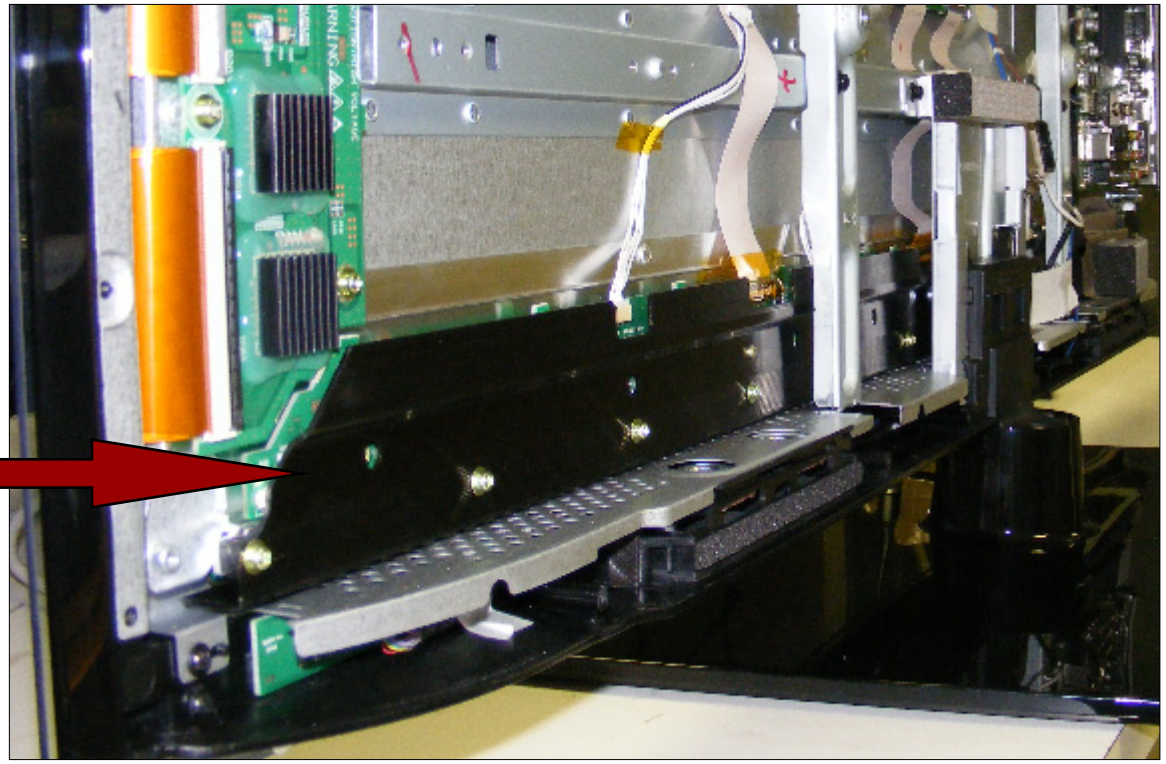
There are a total of 23 TCPs and each TCP has 2 buffers, so there are a total of 46 buffers feeding the panel's 5760 vertical electrodes.

X Board TCP Heat Sink Warning

NEVER run the television with this heat sink removed.
Damage to the TCPs will occur and cause a defective panel.

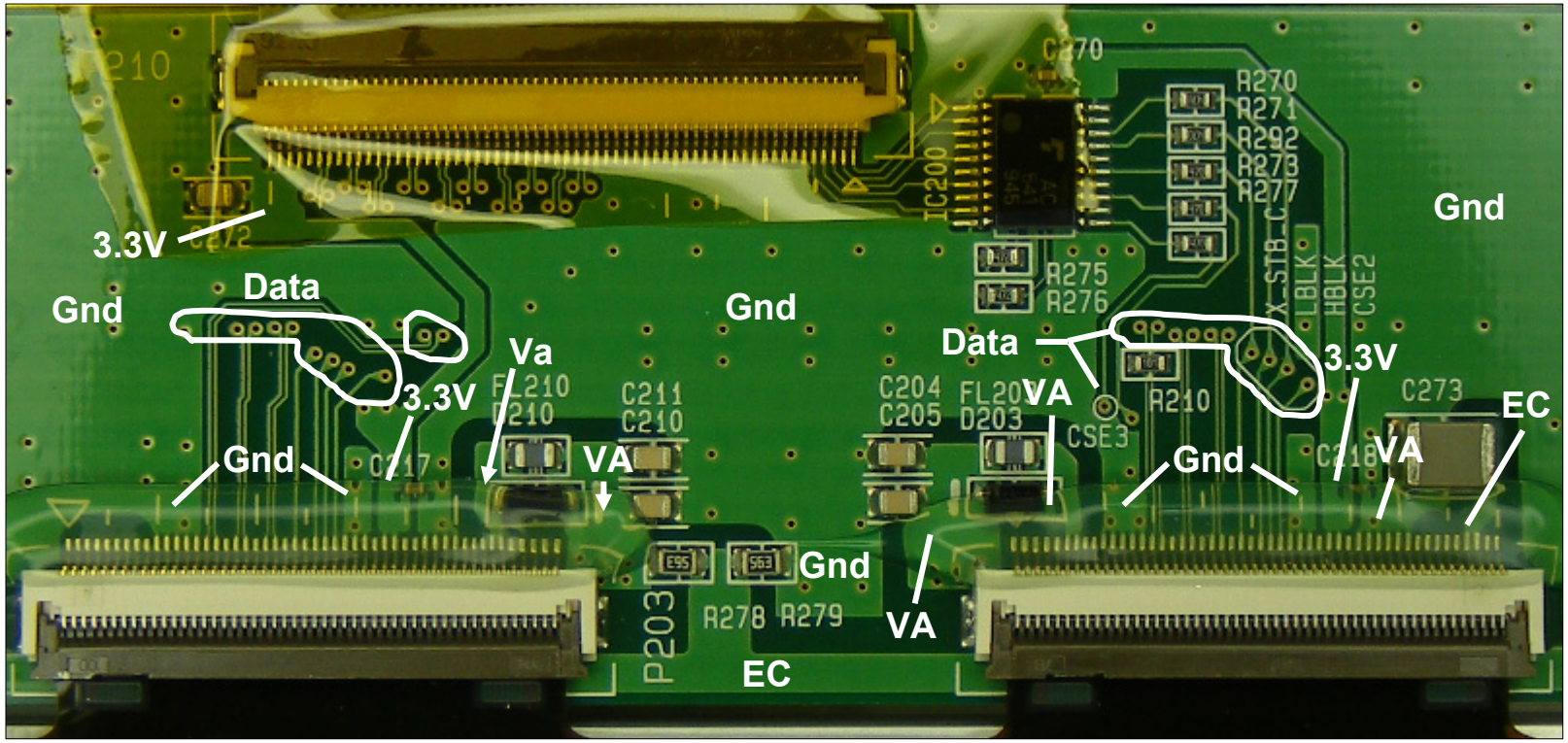
The Vertical Address buffers (TCPs) have one heat sink indicated by the arrow.

It protects all 23 TCPs.



X Board Layout Primary Circuit Diode Check

The three X-Boards have similar circuit layouts for the connections going to the TCPs, as shown below.



On Gnd

On the below:

On any Va (0.42V) TCPs connected.
On any Va (Open) TCPs disconnected.
On 3.3V (0.33V) TCPs connected.
On 3.3V (0.33V) TCPs disconnected.
On any EC (Open) TCPs connected.
On any EC (Open) TCPs disconnected.

VA source disconnected from Left X board

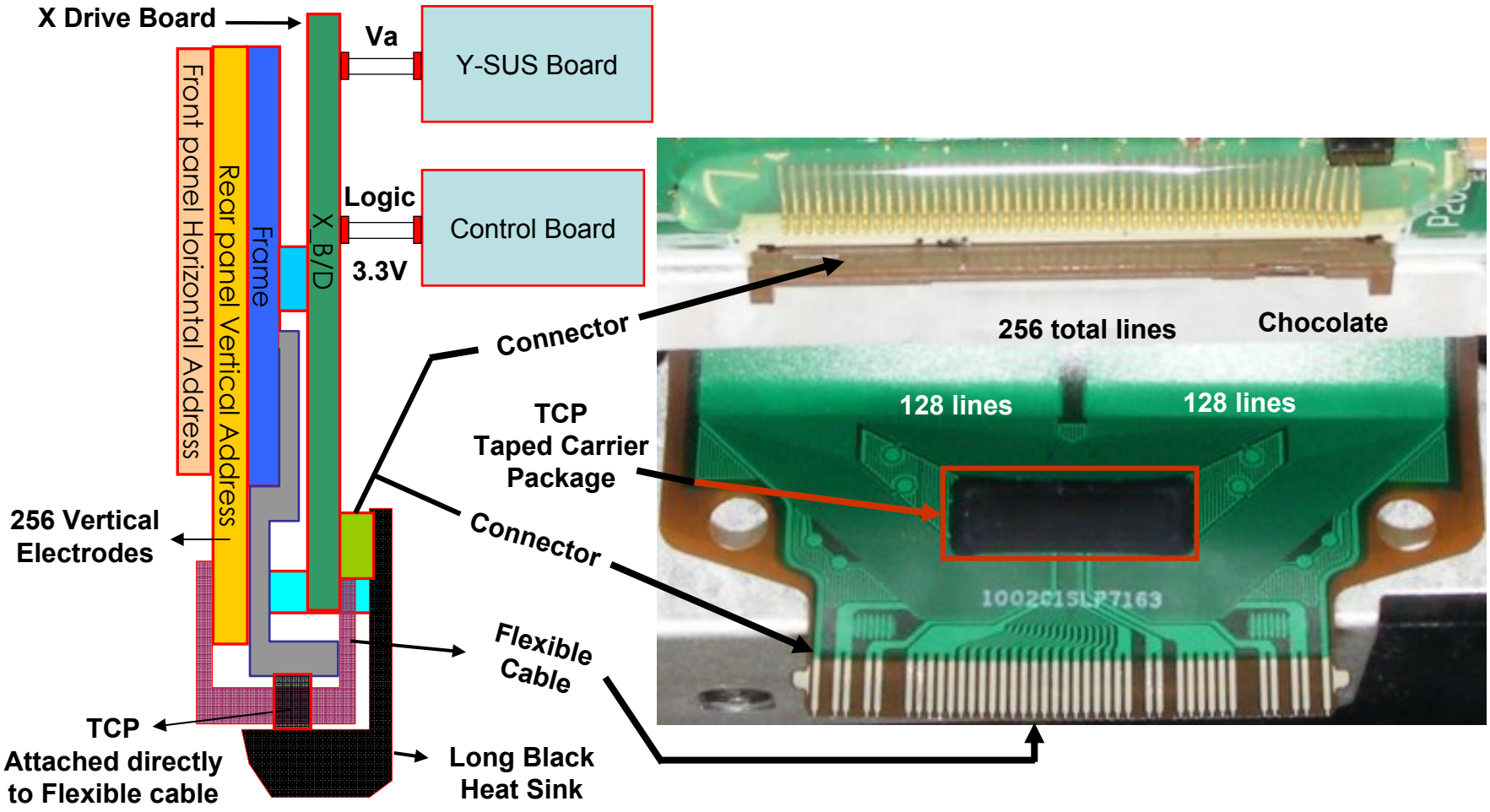
On Gnd

On the below:

On any Va (Open) TCPs connected.
On any Va (Open) TCPs disconnected.
On 3.3V (0.66V) TCPs connected.
On 3.3V (0.66V) TCPs disconnected.
On any EC (Open) TCPs connected.
On any EC (Open) TCPs disconnected.

TCP (Tape Carrier Package)

This shows the layout of the bottom ribbon cables connecting to the Panel's Vertical electrodes, (Address Bus). Note that each ribbon cable has a solid state device called a TCP attached.



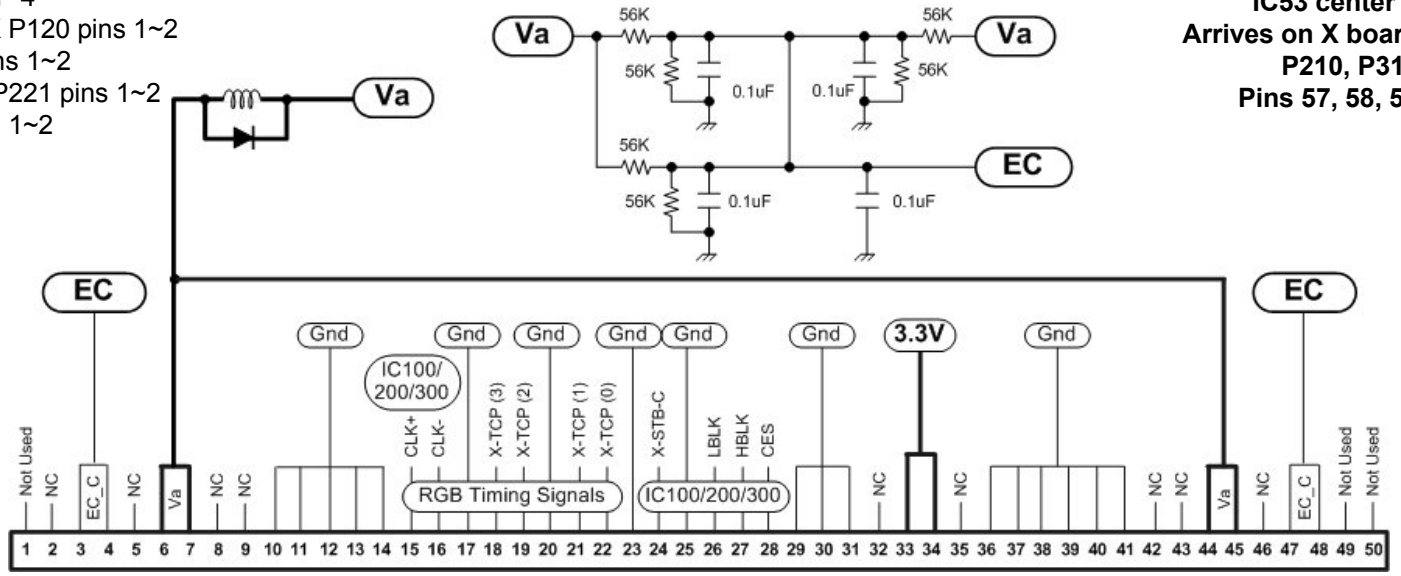
Back side of TCP Ribbon

TCP Testing

50PK950 X Board TCP Connector Distribution
Any X Board to Any TCP P101~P108 or P201~P207 or P301~P308

Va: Comes from Y-SUS P114 1~4
Va: Comes In on:
Left X : P121 pins 1~4
Leaves to Center X P120 pins 1~2
Center X : P220 pins 1~2
Leaves to Right X P221 pins 1~2
Right X : P320 pins 1~2

3.3V Origination
From Control board
IC53 center leg.
Arrives on X boards P110, P210, P310
Pins 57, 58, 59, 60



Flexible Printed Ribbon Cable to TCP IC

Must be checked on flexible cable.

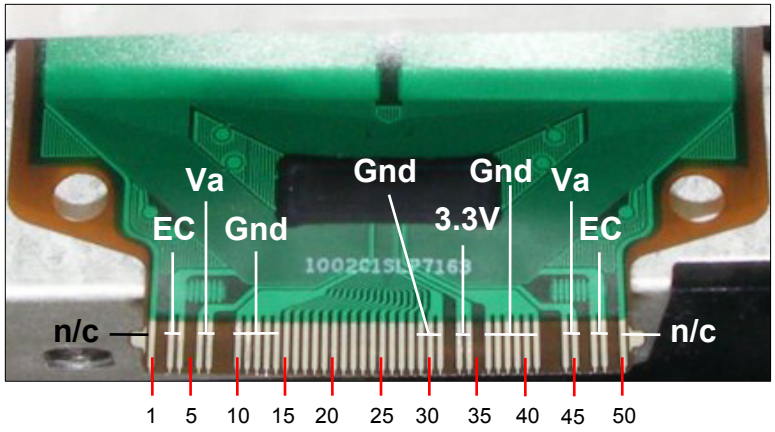
(+) On any Gnd

(-) On the below:

On Va (0.51V)
On 3.3V (0.54V)
On EC (Open)

Reversed

On Va (Open)
On 3.3V (2.8V)
On EC (Open)



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

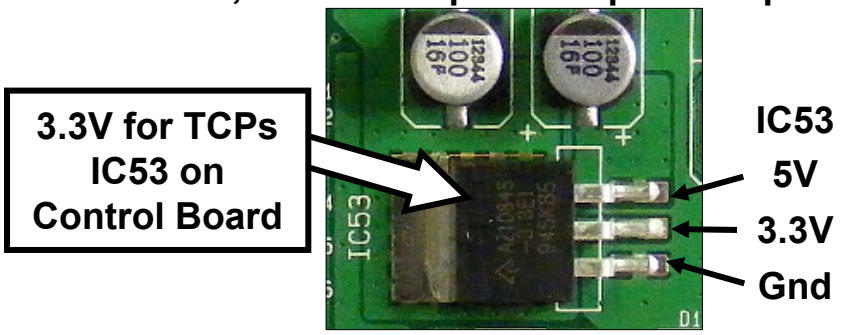
TCP 3.3V B+ Check

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

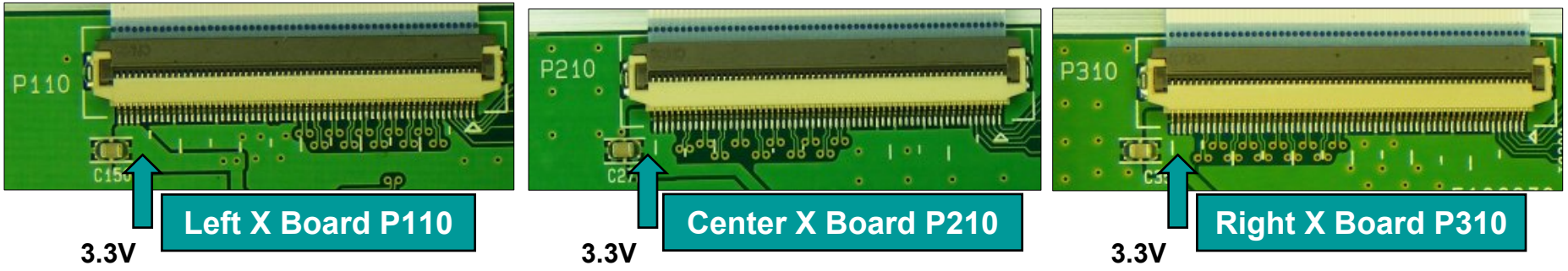
For Connectors P101, P102 and P104 on the Control board, see Control board section.

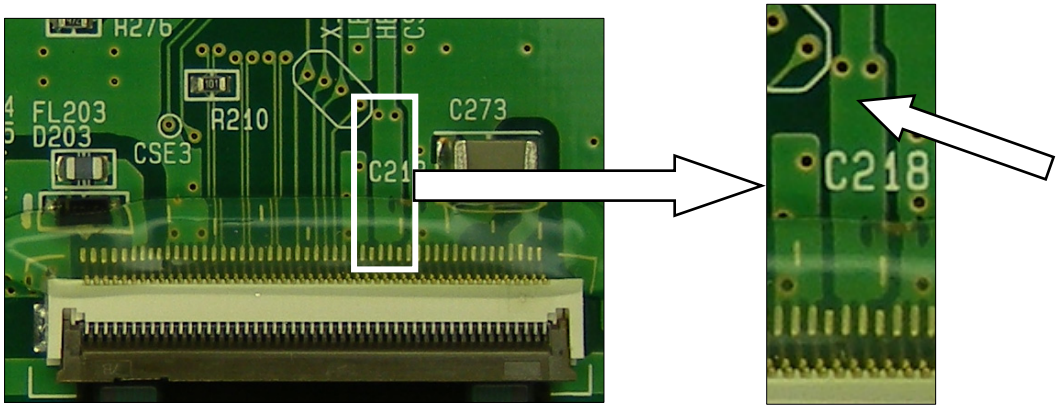
Checking IC53 for 3.3V, use center pin or Top of component.

With all connectors connected, place the Red Lead On 3.3V Diode Check (0.66V)
Black Lead On 3.3V Diode Check (0.33V)
This also test IC100, IC200 and IC300



3.3V in on Pins 57 ~ 60 on any connector from the Control board





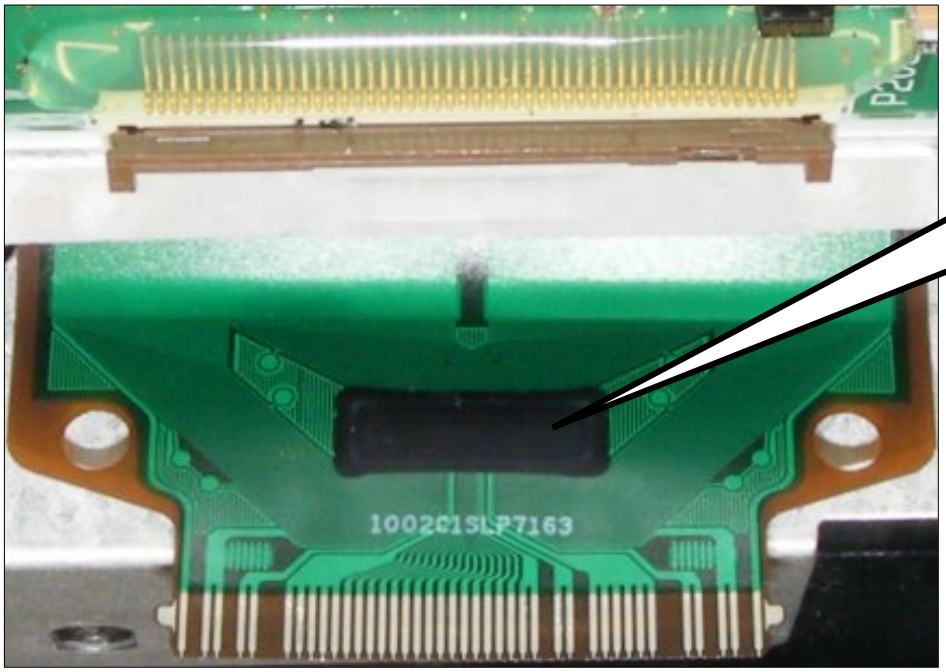
All Connectors to All TCPs look very similar for the 3.3V test point. The trace at pins 33 and 34 of each connector. There will be two small feed troughs', (TP) you can use for Test Points. Example here from P203. You can only check for continuity back to IC53, you can not run the set with heat sink removed.

TCP Visual Observation. Damaged TCP

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, (at the location of the TCP).

a) Cause the Power Supply to shutdown. (VA shorted, 3.3V shorted).
b) Generate abnormal vertical bars, (colored noise).
c) Cause the entire area driven by the TCP to be "All White" or "ALL BLACK".
d) Cause a "Single Pixel Width Line" defect. The line can be Red, Green or Blue.
e) A dirty contact at the connector can cause b, c and d also.

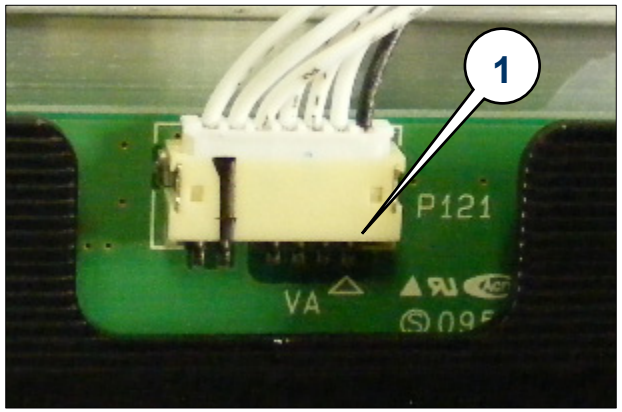


Look for burns, pin holes, damage, etc.

Left X Drive P121 Connector from Y-SUS P114 Information

Voltage and Diode Mode Measurement (No Stand-By Voltages)

With Heat Sink



P121 Connector " X-Drive Left Board" from "Y-SUS" P114

Pin	Label	Run	Diode Mode
1-4	VA	*60V	Open
5	n/c	n/c	n/c
6-7	Gnd	Gnd	Gnd

*** Note: This voltage will vary in accordance with Panel Label.**
There are no Stand-By voltages on this connector.

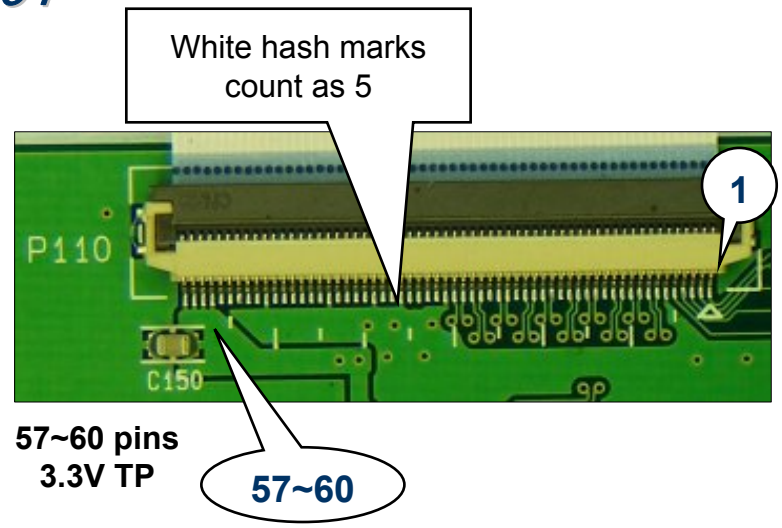
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

P110 Connector "Left X Board" to "Control" P101

P110 Left Connector to the Control Board P101

Pin	Run	Diode Mode
1	1.86V	Open
2	1.83V	Open
3	3.24V	Open
4	0.5V	2.81V
5	0.5V	2.54V
6	Gnd	Gnd
7	1.27V	Open
8	1.0V	Open
9	1.27V	Open
10	1.0V	Open
11	Gnd	Gnd
12	1.0V	Open
13	1.27V	Open
14	Gnd	Gnd
15	1.0V	Open
16	1.27V	Open
17	1.0V	Open
18	1.27V	Open
19	Gnd	Gnd
20	1.0V	Open
21	1.27V	Open
22	Gnd	Gnd

Pin	Run	Diode Mode
23	1.0V	Open
24	1.27V	Open
25	1.0V	Open
26	1.27V	Open
27	Gnd	Gnd
28	1.0V	Open
29	1.27V	Open
30	1.0V	Open
31	1.27V	Open
32	Gnd	Gnd
33	1.0V	Open
34	1.27V	Open
35	Gnd	Gnd
36	1.0V	Open
37	1.27V	Open
38	Gnd	Gnd
39	1.0V	Open
40	1.27V	Open
41	Gnd	Gnd
42	1.0V	Open
43	1.27V	Open
44	Gnd	Gnd



Pin	Run	Diode Mode
45	1.0V	Open
46	1.27V	Open
47	Gnd	Gnd
48	1.0V	Open
49	1.27V	Open
50	Gnd	Gnd
51	1.0V	Open
52	1.27V	Open
3	Gnd	Gnd
54	1.0V	Open
56	n/c	Open
55	1.27V	Open
57~60	3.3V	Open

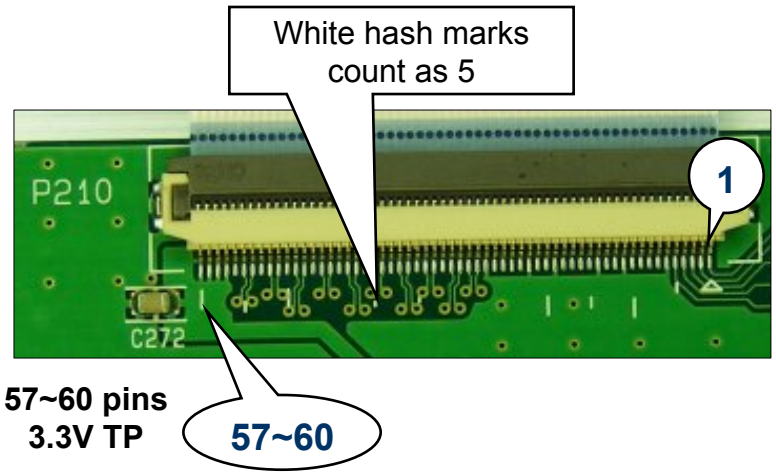
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

P210 Connector "Center X Board" to "Control Board" P102

P210 Connected to the Control Board P102

Pin	Run	Diode Mode
1	1.86V	Open
2	1.83V	Open
3	3.24V	Open
4	0.5V	2.81V
5	0.5V	2.54V
6	Gnd	Gnd
7	1.27V	Open
8	1.0V	Open
9	1.27V	Open
10	1.0V	Open
11	Gnd	Gnd
12	1.0V	Open
13	1.27V	Open
14	Gnd	Gnd
15	1.0V	Open
16	1.27V	Open
17	1.0V	Open
18	1.27V	Open
19	Gnd	Gnd
20	1.0V	Open
21	1.27V	Open
22	Gnd	Gnd

Pin	Run	Diode Mode
23	1.0V	Open
24	1.27V	Open
25	1.0V	Open
26	1.27V	Open
27	Gnd	Gnd
28	1.0V	Open
29	1.27V	Open
30	1.0V	Open
31	1.27V	Open
32	Gnd	Gnd
33	1.0V	Open
34	1.27V	Open
35	Gnd	Gnd
36	1.0V	Open
37	1.27V	Open
38	Gnd	Gnd
39	1.0V	Open
40	1.27V	Open
41	Gnd	Gnd
42	1.0V	Open
43	1.27V	Open
44	Gnd	Gnd



Pin	Run	Diode Mode
45	1.0V	Open
46	1.27V	Open
47	Gnd	Gnd
48	1.0V	Open
49	1.27V	Open
50	Gnd	Gnd
51	1.0V	Open
52	1.27V	Open
3	Gnd	Gnd
54	1.0V	Open
56	n/c	Open
55	1.27V	Open
57~60	3.3V	Open

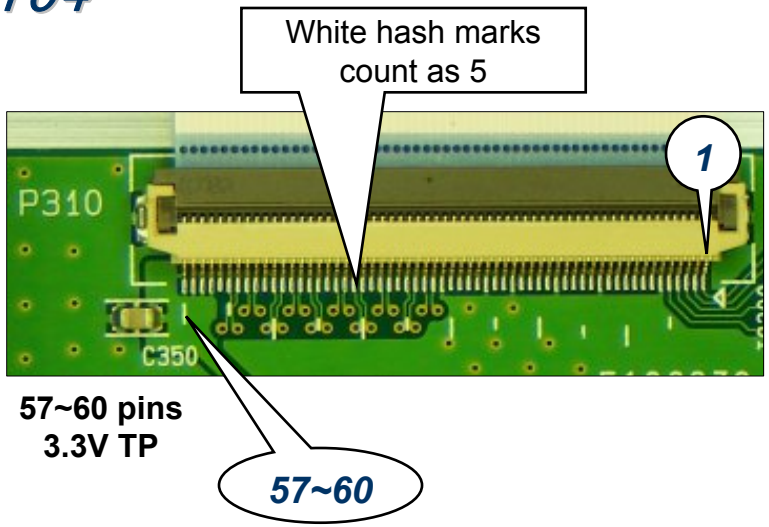
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

P310 Connector "Right X Board" to "Control" P104

P310 Connected to the Control Board P104

Pin	Run	Diode Mode
1	1.86V	Open
2	1.83V	Open
3	3.24V	Open
4	0.5V	2.81V
5	0.5V	2.54V
6	Gnd	Gnd
7	1.27V	Open
8	1.0V	Open
9	1.27V	Open
10	1.0V	Open
11	Gnd	Gnd
12	1.0V	Open
13	1.27V	Open
14	Gnd	Gnd
15	1.0V	Open
16	1.27V	Open
17	1.0V	Open
18	1.27V	Open
19	Gnd	Gnd
20	1.0V	Open
21	1.27V	Open
22	Gnd	Gnd

Pin	Run	Diode Mode
23	1.0V	Open
24	1.27V	Open
25	1.0V	Open
26	1.27V	Open
27	Gnd	Gnd
28	1.0V	Open
29	1.27V	Open
30	1.0V	Open
31	1.27V	Open
32	Gnd	Gnd
33	1.0V	Open
34	1.27V	Open
35	Gnd	Gnd
36	1.0V	Open
37	1.27V	Open
38	Gnd	Gnd
39	1.0V	Open
40	1.27V	Open
41	Gnd	Gnd
42	1.0V	Open
43	1.27V	Open
44	Gnd	Gnd



Pin	Run	Diode Mode
45	1.0V	Open
46	1.27V	Open
47	Gnd	Gnd
48	1.0V	Open
49	1.27V	Open
50	Gnd	Gnd
51	1.0V	Open
52	1.27V	Open
3	Gnd	Gnd
54	1.0V	Open
56	n/c	Open
55	1.27V	Open
57~60	3.3V	Open

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

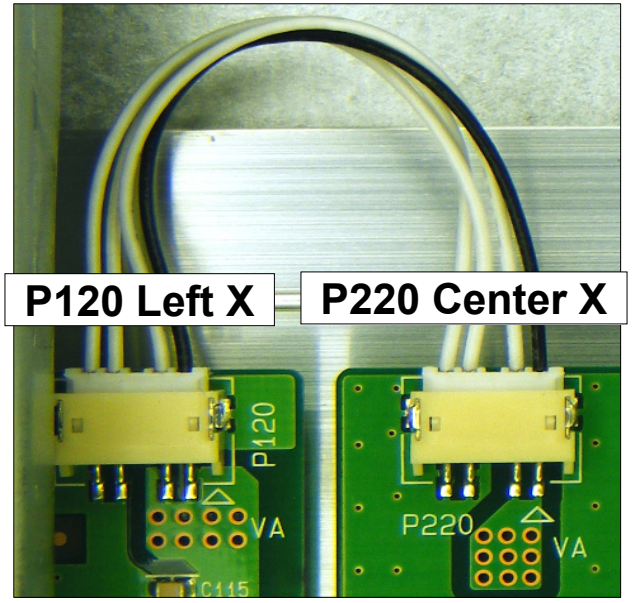
P120, P220, P221 and P320 Connector Va from Left to Center to Right X

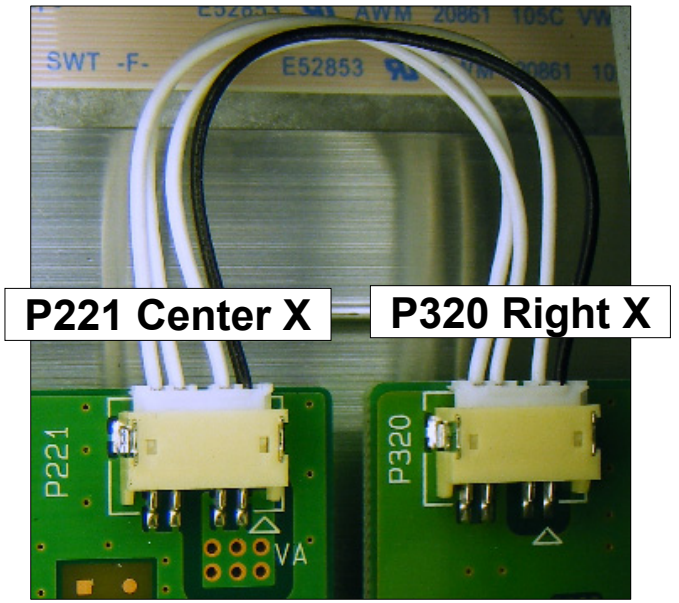
Voltage and Diode Mode Measurement (No Stand-By Voltages)

All Connectors are 4 Pin

Pin	Label	Run	Diode Mode
1-2	VA	*60V	Open
3-4	Gnd	Gnd	Gnd

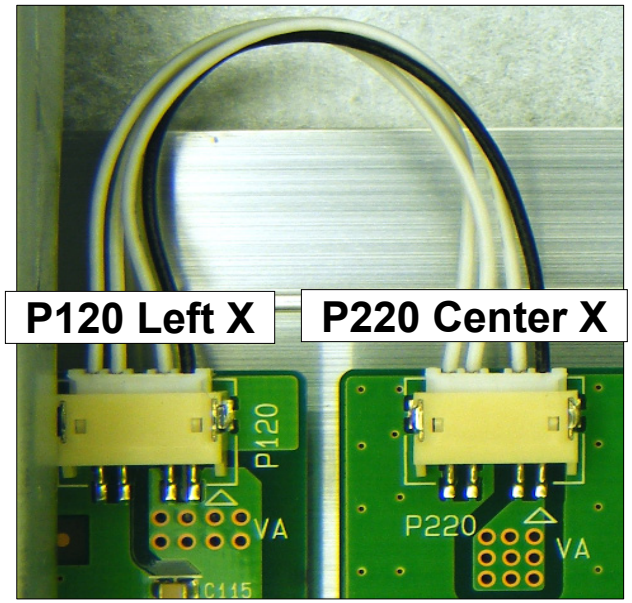
*** Note: This voltage will vary in accordance with Panel Label.**
There are no Stand-By voltages on this connector.





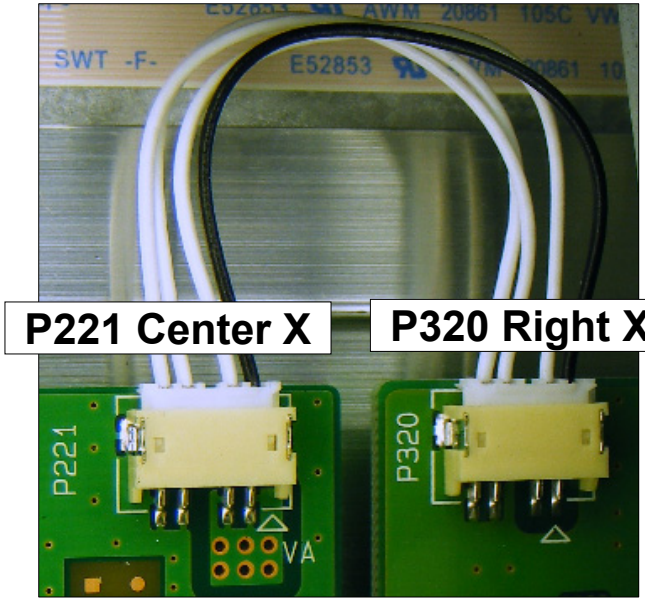
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

P120, P220, P221 and P320 X Board Connector (VA Diode Check)



Va Right 2 pins
Gnd Left 2 pins

Both Connectors



Va Right 2 pins
Gnd Left 2 pins

Both Connectors

- On Chassis Gnd
- \+ On Va (3.276V) all connectors connected.
  On Va (Open) Y-SUS connector removed, TCPs connected.
  On Va (Open) all connectors removed, TCPs disconnected.

\+ On Chassis Gnd

- On Va (0.42V) all connectors connected.
  On Va (0.42V) Y-SUS connector removed, TCPs connected.
  On Va (0.5V) all connectors removed, TCPs disconnected.

MAIN BOARD SECTION

The following section gives detailed information about the Main board. This board contains the Microprocessor, Audio section, video section and all input, outputs. It also receives all input signals and processes them to be delivered to the Control board via the LVDS cable.
The (VSB, 8VSB and QAM) tuner is located on the main board. This board is also where the television's software upgrades are accomplished through the USB input.
The Main board also has a LAN (CAT5) input to allow open Internet access. In addition, the Main board has an output to the Wireless Media box (Dongle) for control and either one of the USB ports can accept the Dongle wireless receiver.
This board has no mechanical adjustments.

The Main Board Receives its operational voltage from the SMPS:

DURING STAND-BY: From SMPS

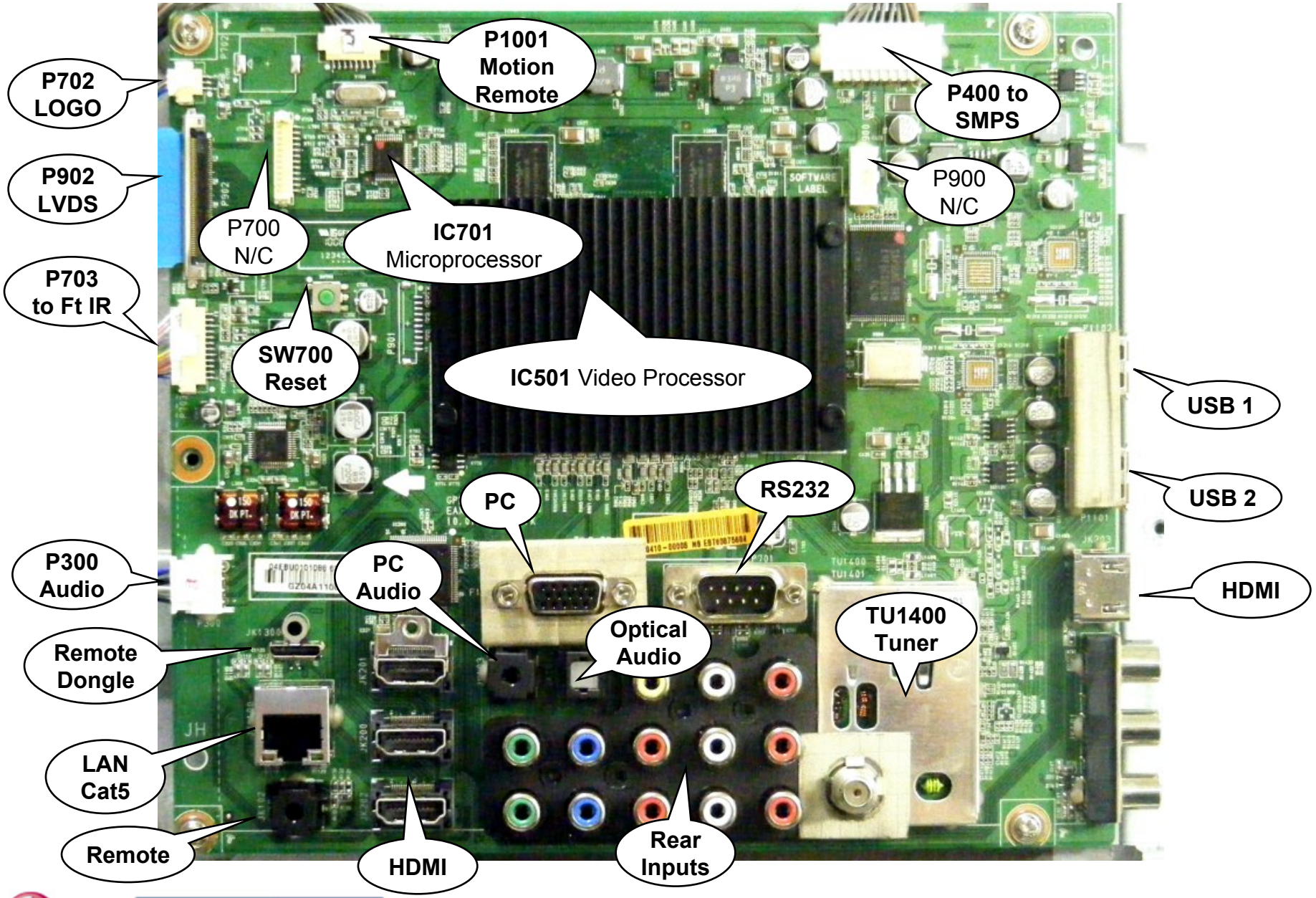
- ***STBY 5V***

DURING RUN From SMPS : (STBY 5V remains):

- ***+5V for Video processing***
- ***17V for Audio and Tuner B+*** *(Stepped down to 5V)*

- Distributes Key 1 and Key 2 to the Front IR Board then to the Front Key Pad.
- Receives Intelligent Sensor data from the Front IR Board (via SCL/SDA).
- Drives front Power LEDs.
- Distributes +3.3V_ST to the Front IR Board.

Main Board Layout and Identification



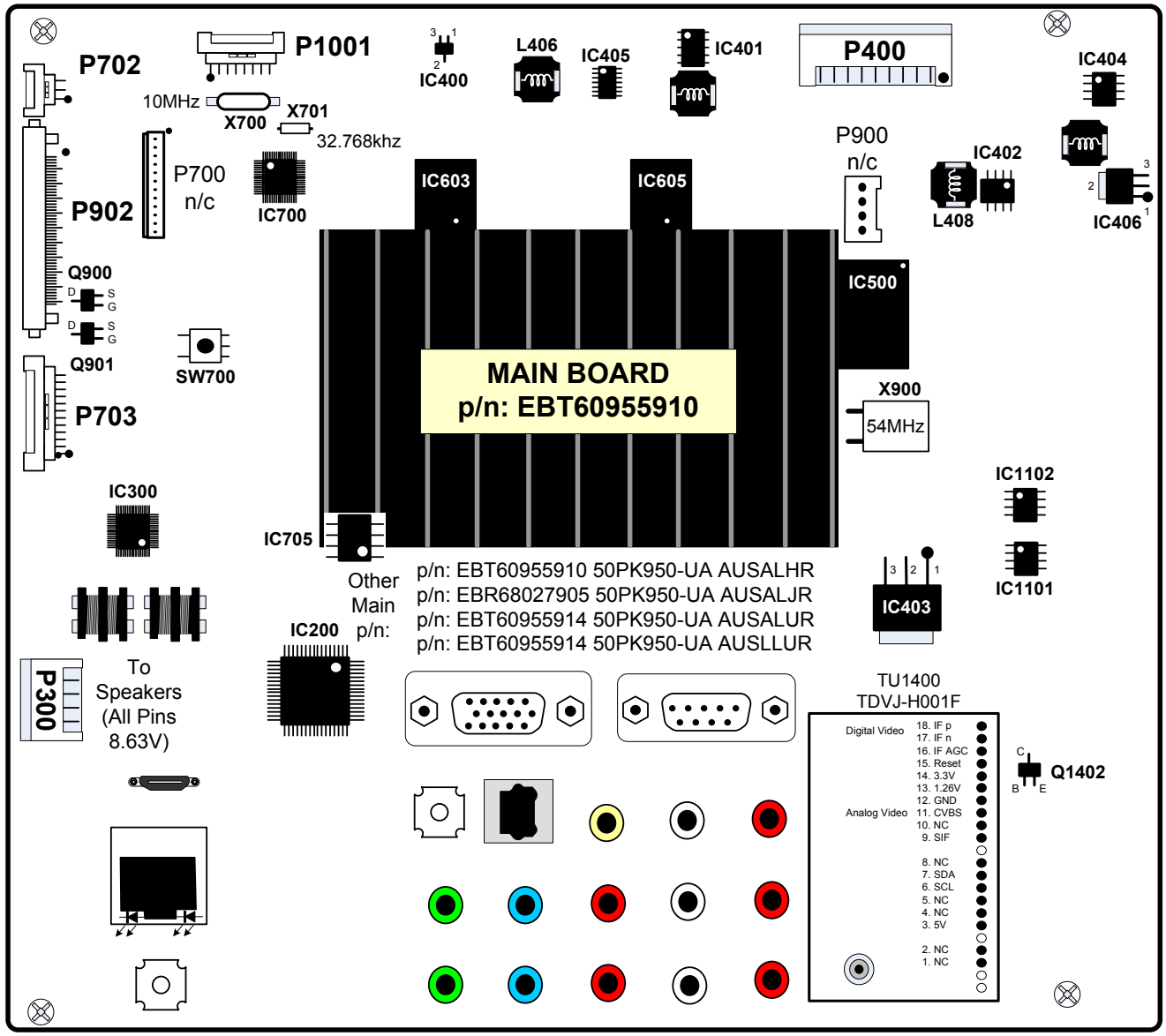
50PK950 Main Front Layout Drawing

P400 Main to P813 SMPS

Pin	Label	STBY	Run	Diode
1, 2	[a]17V	0V	17.3V	Open
3, 4	Gnd	Gnd	Gnd	Gnd
5, 7	5V	0.4V	5.17V	1.21V
8	[c]Error Det	3.47V	4.1V	1.84V
9-12	Gnd	Gnd	Gnd	Gnd
13-14	Stby 5V	3.49V	5.13V	1.24V
15	[a]RL_ON	0V	3.26V	1.93V
16	[d]AC_Det	0V	4.06V	1.93V
17	[b]M5_ON	0V	3.28V	1.93V
18	[e]Auto_Gnd	Gnd	Gnd	Gnd

P703 (Main) to P100 (Ft IR)

Pin	Label	STBY	Run	Diode
1	IR	2.82V	2.82V	2.68V
2	Gnd	Gnd	Gnd	Gnd
3	Key 1	3.14V	3.13V	1.83V
4	Key 2	3.28V	3.28V	1.83V
5	LED-R	3.15V	0V	1.87V
6	Gnd	Gnd	Gnd	Gnd
7	SCL	0.57V	3.28V	1.82V
8	SDA	0.8V	3.28V	1.82V
9	Gnd	Gnd	Gnd	Gnd
10	3.3V_ST	3.28V	3.28V	1.24V
11	3.3V_Multi	0.42V	5.17V	1.24V
12	LED W	0V	0V	1.7V



50PK950 Main Board Front Side Component Voltages

IC400

Pin	3.3V_NEC_ST Regulator
[1]	Gnd
[2]	3.3V
[3]	5V

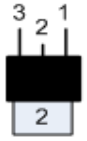
IC401

Pin	DDR 1.8V Regulator
[1]	6.75V
[2]	5.0V
[3]	1.85V
[4]	Gnd
[5]	Gnd
[6]	2.356V
[7]	0.9V
[8]	1.0V
[9]	2.4V
[10]	3.3V

IC402

Pin	D3.3V / +3.3V Regulator
[1]	5V
[2]	3.3V
[3]	3.3V
[4]	7.48V
[5]	3.3V
[6]	0.8V
[7]	5V
[8]	Gnd

IC403



Pin	A2.5V Regulator
[1]	1.26V
[2]	2.5V
[3]	5V

IC404

Pin	7V (to IC405) Regulator
[1]	17.1V
[2]	7.11V
[3]	7.11V
[4]	11.95V
[5]	3.3V
[6]	0.8V
[7]	5.0V
[8]	Gnd

Q701

Pin	RS232 IR Buffer
[B]	0.574V
[E]	Gnd
[C]	0V

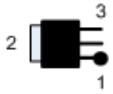
Q900

Pin	SCL to LVDS FET
[G]	3.28V
[S]	3.28V
[D]	3.28V

IC405

Pin	D1.2V / A1.2V Regulator
[1]	Gnd
[2]	4.99V
[3]	Gnd
[4]	1.26V
[5]	0V
[6]	n/c
[7]	6.17V
[8]	5.0V
[9]	5.0V
[10]	5.0V
[11]	1.27V
[12]	Gnd
[13]	3.3V
[14]	0.83V

IC406



Pin	5V (Tuner) Reg
[1]	7.13V
[2]	5V
[3]	7V

Q901

Pin	SDA to LVDS FET
[G]	3.276V
[S]	3.289V
[D]	3.28V

Q1402

Pin	Video Buffer
[B]	2.05V
[E]	2.75V
[C]	Gnd

IC705

Pin	NVRAM
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.28V
[6]	3.28V
[7]	Gnd
[8]	3.28V

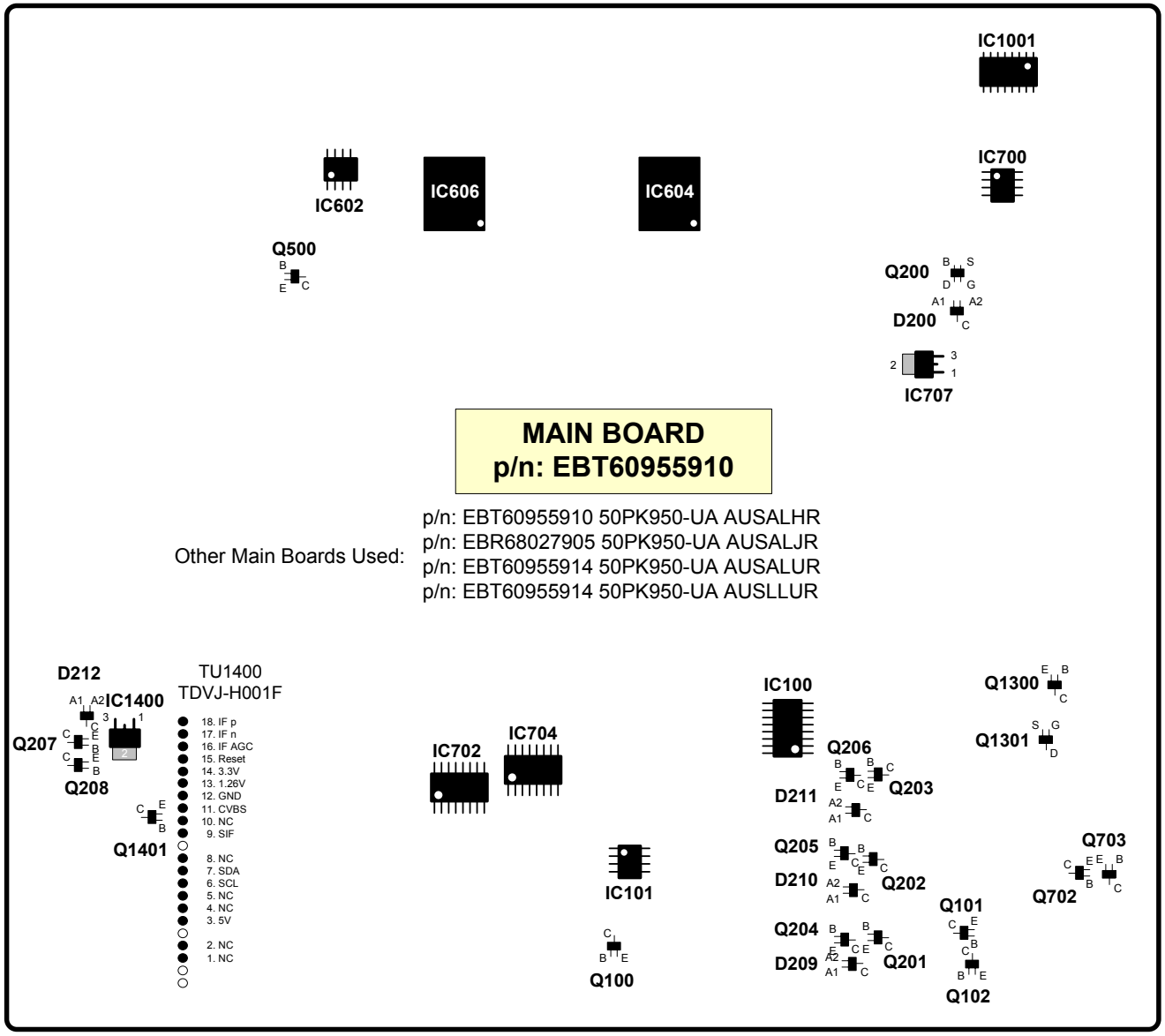
IC1101

Pin	USB1 5V
[1]	5.0V
[2]	Gnd
[3]	3.2V
[4]	0V
[5]	0V
[6]	5.1V
[7]	0V
[8]	3.28V

IC1102

Pin	USB2 5V
[1]	Gnd
[2]	5.14V
[3]	5.14V
[4]	0.04V
[5]	3.28V
[6]	4.94V
[7]	4.94V
[8]	n/c

50PK950 Main Back Layout Drawing



50PK950 Main Board Back Side Component Voltages

IC100 — RS232 Control

Pin	
[1]	1.65V
[2]	1.65V
[3]	4.56V
[4]	1.65V
[5]	1.65V
[6]	4.66V
[7]	Gnd
[8]	n/c
[9]	1.657V
[10]	0V
[11]	4.5V
[12]	0V
[13]	1.657V
[14]	5.12V

IC101 — RS232 EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	4.325V
[6]	4.8V
[7]	5.12V
[8]	5.0V

IC602 — DDR_VTT Regulator

Pin	
[1]	Gnd
[2]	3.3V
[3]	0.43V
[4]	0.94V
[5]	1.857
[6]	3.3V
[7]	1.86V
[8]	0.93V

IC700 — Micro EEPROM

Pin	
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	Gnd
[8]	3.3V

IC702 — RS232 Selector

Pin	
[1]	3.34V
[2]	5.78V
[3]	0V
[4]	0V
[5]	0.2V
[6]	(-5.68V)
[7]	5.78V
[8]	Gnd
[9]	n/c
[10]	Gnd
[11]	3.3V
[12]	0V
[13]	0V
[14]	(-5.68V)
[15]	Gnd
[16]	3.3V

D209

Pin	HDMI Hot Swap Routing HDMI1
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

D210

Pin	HDMI Hot Swap Routing HDMI2
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

IC704 — RS232 Selector

Pin	
[1]	3.26V
[2]	3.26V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	n/c
[8]	Gnd
[9]	Gnd
[10]	4.99V
[11]	4.99V
[12]	0.88V
[13]	3.3V
[14]	3.3V
[15]	3.3V
[16]	5V

IC707 — Reset IC

Pin	
[1]	3.3V
[2]	Gnd
[3]	3.31V

IC1400 — Reset IC

Pin	
[1]	0V
[2]	1.29V
[3]	3.27V

D211

Pin	HDMI Hot Swap Routing HDMI3
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

D212

Pin	HDMI Hot Swap Routing HDMI4
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

IC1001 — Motion Remote IC

Pin	
[1]	0V (3.3V M_Remote Used)
[2]	3.3V (0.3V M_Remote Used)
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	Gnd
[8]	Gnd
[9]	n/c
[10]	0.02V
[11]	0V
[12]	3.3V
[13]	0V (3.3V M_Remote Used)
[14]	3.3V
[15]	3.3V
[16]	3.3V

Q100 — RGB W/P

Pin	
[B]	0V
[C]	5.12V
[E]	Gnd

Q101 — Wired IR 1st Buffer

Pin	
[B]	0V
[C]	3.33V
[E]	Gnd

Q102 — Wired IR 2nd Buffer

Pin	
[B]	0.6V
[C]	0V
[E]	Gnd

Q200 — CEC Remote HDMI CEC

Pin	
[B]	2.59V
[G]	3.3V
[S]	2.58V
[D]	3.25V

Q201 — Hot Swap HDMI1

Pin	
[B]	4.27V
[C]	0V
[E]	Gnd

Q202 — Hot Swap HDMI2

Pin	
[B]	4.27V
[C]	0V
[E]	Gnd

D200 — HDMI CEC Limiter

Pin	
[A1]	0V
[A2]	3.31V
[C]	3.18V

Q203 — Hot Swap HDMI3

Pin	
[B]	4.27V
[C]	0V
[E]	Gnd

Q204 — Hot Swap HDMI1

Pin	
[B]	0V
[C]	4.26V
[E]	Gnd

Q205 — Hot Swap HDMI2

Pin	
[B]	0V
[C]	4.26V
[E]	Gnd

Q206 — Hot Swap HDMI3

Pin	
[B]	0V
[C]	4.26V
[E]	Gnd

Q207 — Hot Swap HDMI4

Pin	
[B]	4.28V
[C]	0V
[E]	Gnd

Q208 — Hot Swap HDMI4

Pin	
[B]	0V
[C]	5V
[E]	Gnd

Q500 — Flash WP

Pin	
[B]	0V (Flash_WP)
[C]	3.36V
[E]	Gnd

Q702 — IR Out 2nd Buffer

Pin	
[B]	0V
[C]	3.32V
[E]	Gnd

Q703 — IR Out 1st Buffer

Pin	
[B]	0.62V
[C]	0V
[E]	Gnd

Q1300 — Wired IR 1st Buffer

Pin	
[E]	Gnd
[B]	0V
[C]	17V

Q1301 — Wired IR 2nd Buffer

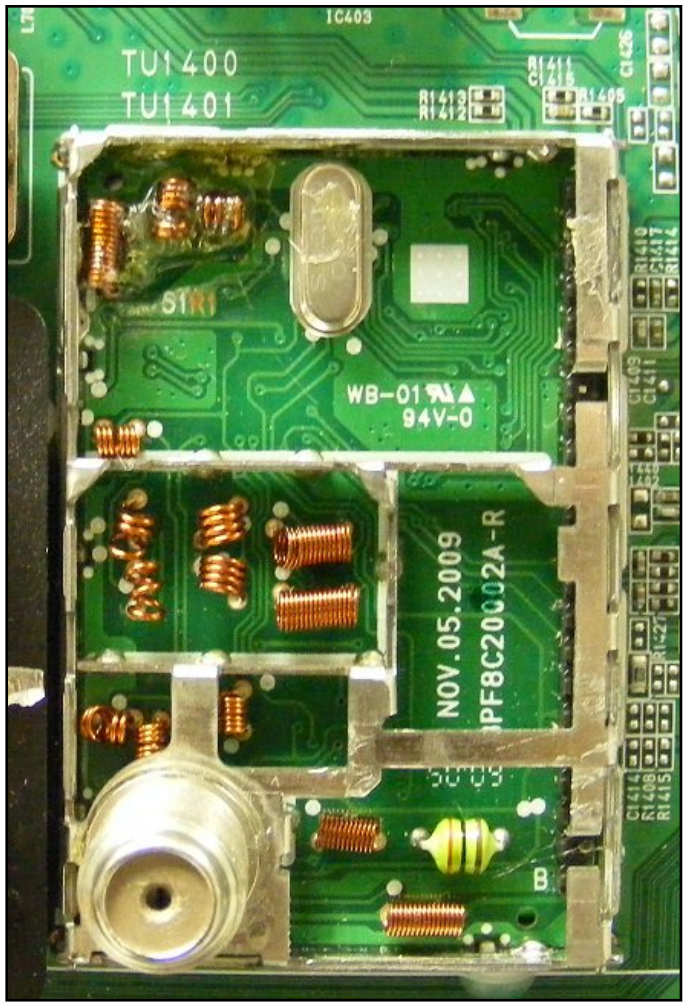
Pin	
[G]	17V
[S]	17.1V
[D]	0V

Q1401 — SIF Buffer

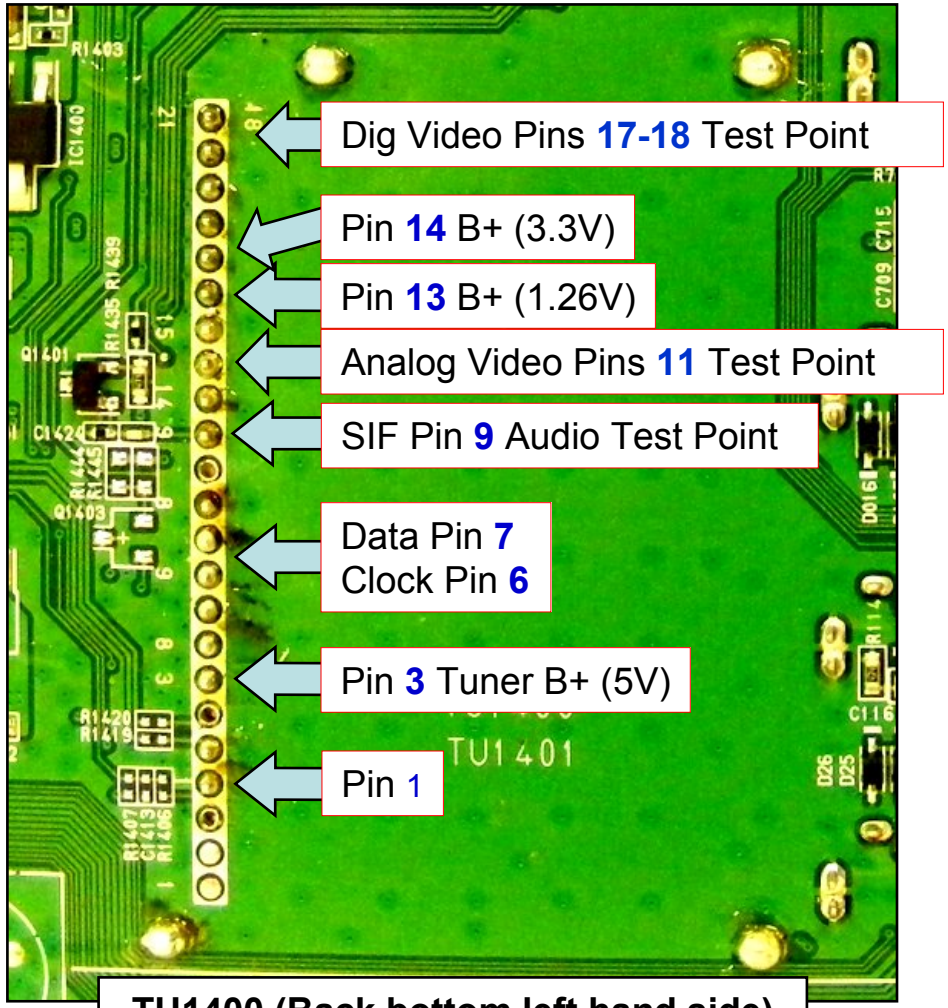
Pin	
[B]	0.165V
[E]	0.83V
[C]	Gnd

Main Board Tuner Check (Shield Off) Pins Exposed TDVJ-H001F

The pins can not be accessed from the front with the cover removed. Use the back of the board.
Data Pin **7** Clock Pin **6** Only present during Channel Change



TU1400 (Front bottom right hand side)

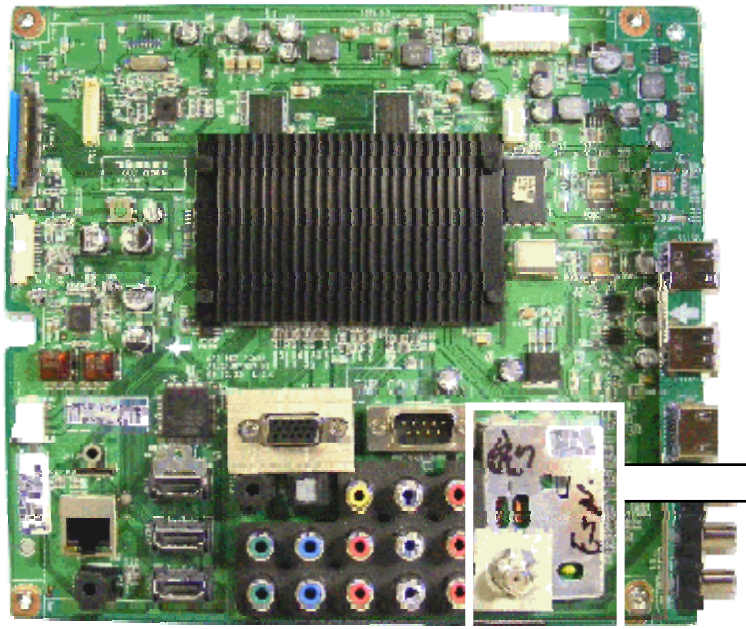


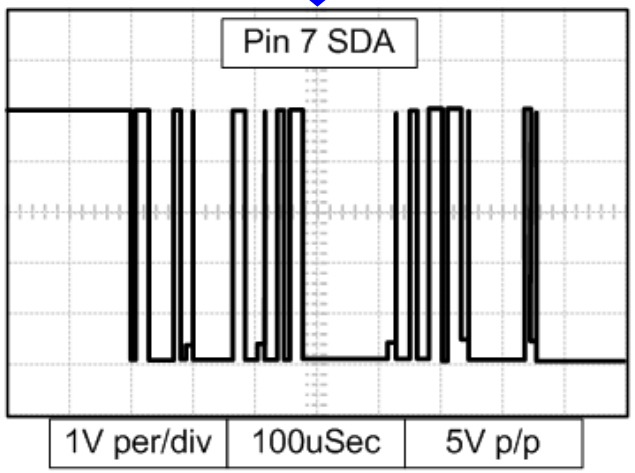
TU1400 (Back bottom left hand side)

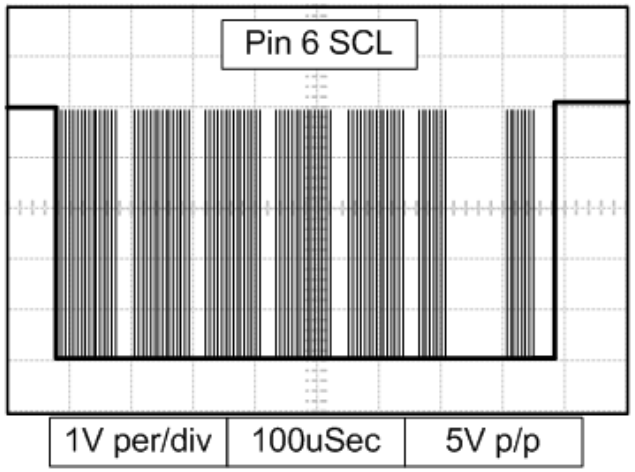
Main Board Tuner Check (Shield Off) Pins Exposed TDVW-H103F

You must use the back of the board for Test Points.

Data Pin **7** Clock Pin **6**
Only present during
Channel Change







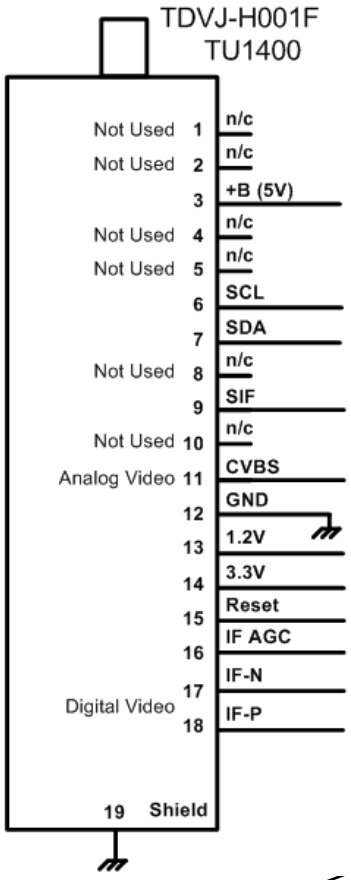
To keep the Data and Clock lines running so they can be measured easily, place the unit into “Auto Tuning”.

Main Board Tuner Video and SIF Output Check

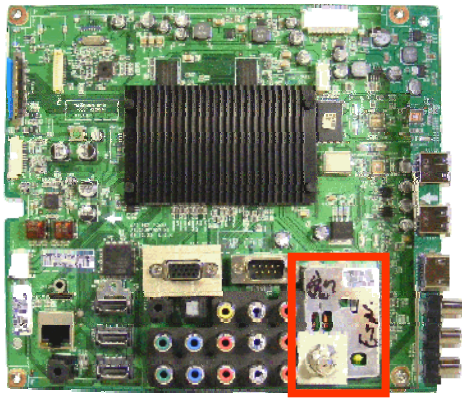
You must use the back of the board for Test Points.

Note: NTSC Only
"Video Out" Signal only when receiving an analog Channel.

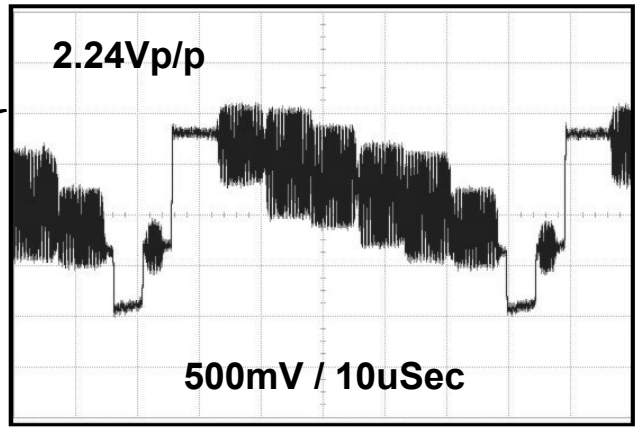
USING COLOR BAR SIGNAL INPUT



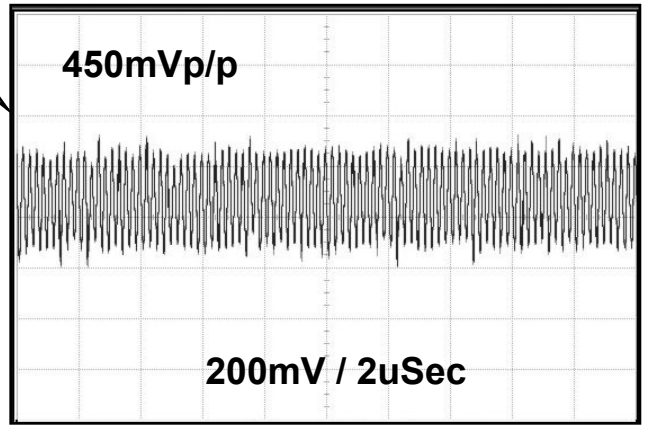
MAIN Board
Tuner Location



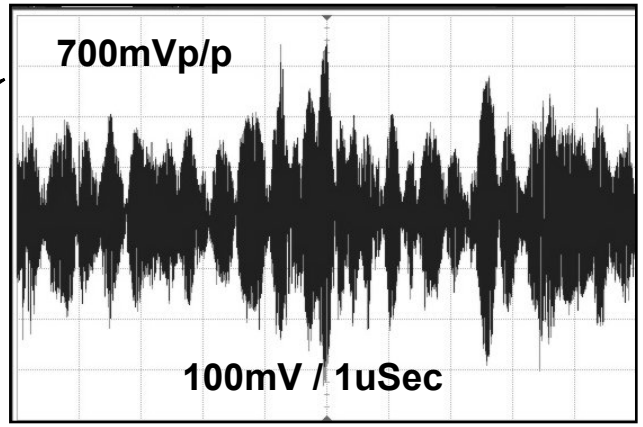
Pin 11 "Analog Video" Signal



Pin 9 "SIF" Signal

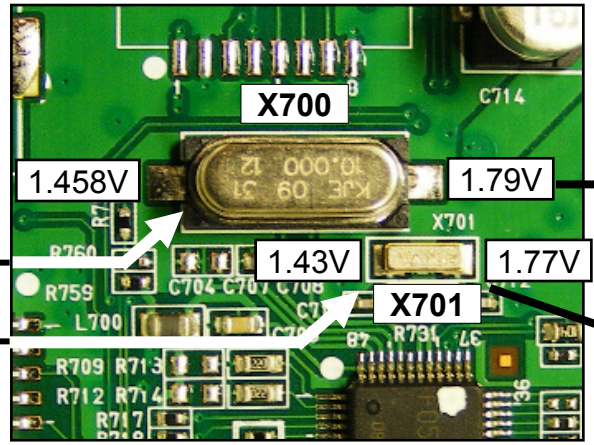


Note: Pin 17 and Pin 18
"Dig IF" Signal
8VSB or QAM
Only when receiving a Digital Channel.



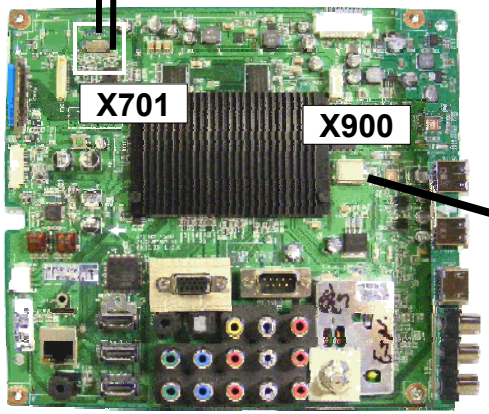
Main Board Crystal X700, X701 and X900 Check

X700 Runs all the time (Micro Crystal)

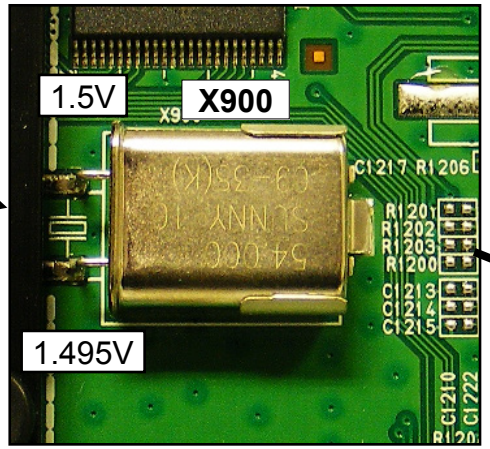


X701 Runs all the time (Micro Halt Crystal)

X700

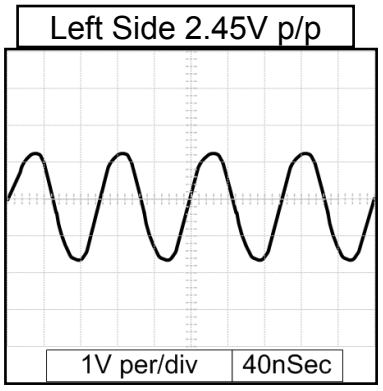


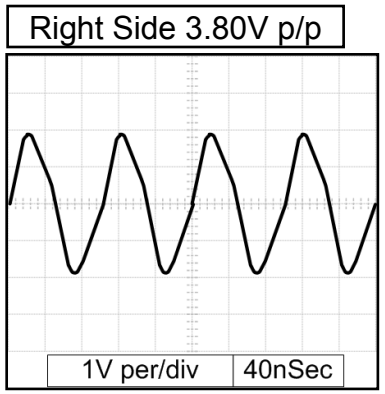
MAIN Board
Crystal Location



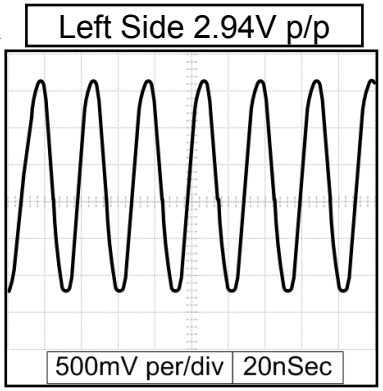
X900 Runs only during "On"
(Overtone Crystal)

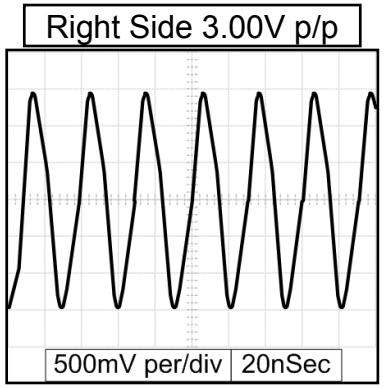
X700 10Mhz

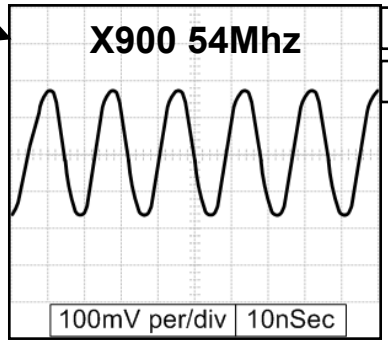




X701 32.768KHZ







Top Side 312mV p/p

Bottom Leg 328mV p/p

Very Noisy

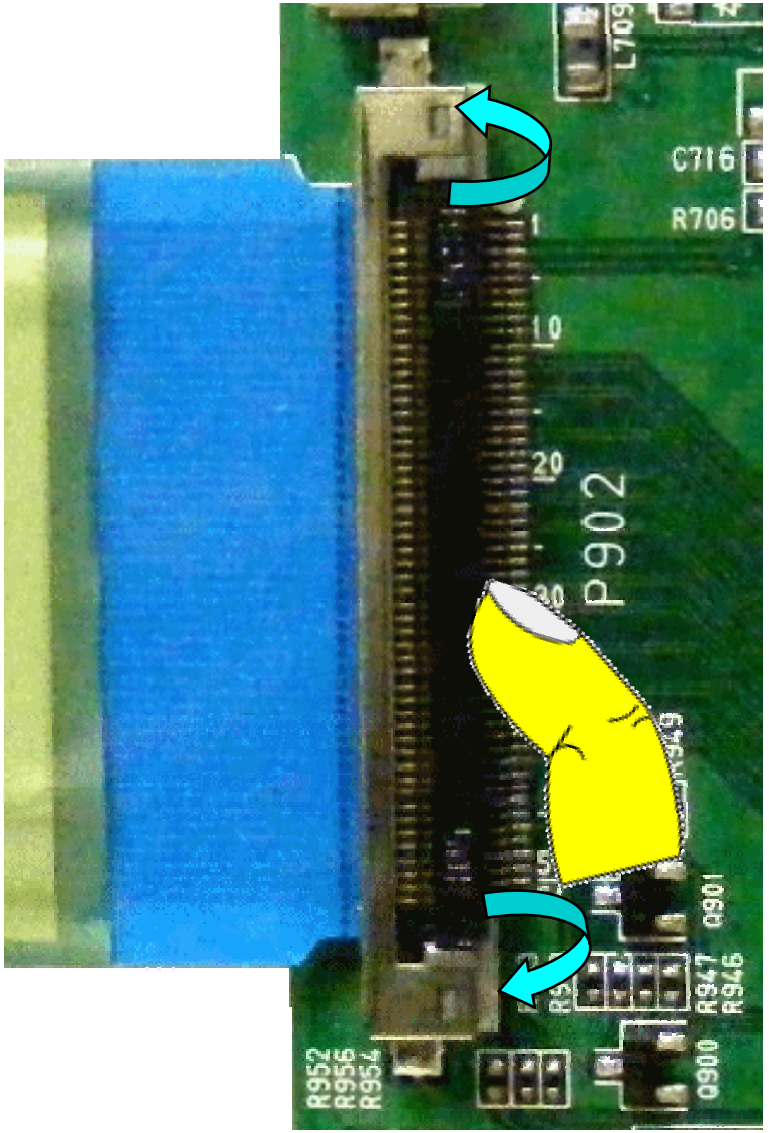
Reading this Crystal may cause video lock up

Main Board P902 (Removing the LVDS Cable

(1) Using your fingernail, lift up the locking mechanism.

Since the locking tab is very thin and fragile, its best to lift slightly one end, then work across the locking tab a little at a time, back and forth until the tab is released.

(2) Pull the Cable from the Connector



Main Board Plug P400 to Power Supply Voltages and Diode Check

Diode Mode Check with the Board Disconnected. DVM in the Diode mode.

Pin ① front

Front pins are odd
Back pins are even

P400 Connector "Main" to "SMPS Board" P813

Pin	Label	STBY	Run	Diode Mode
1-2	[a]17V	0V	16.9V	Open
3-4	Gnd	Gnd	Gnd	Gnd
5-7	[a]5V	0V	5.19V	1.22V
8	[a] [c]Error Det	3.47V	4.11V	1.84V
9-12	Gnd	Gnd	Gnd	Gnd
13-14	Stby 5V	3.49V	5.15V	1.17V
15	RL On	0V	3.26V	1.85V
16	[a] [d]AC Det	0V	4.07V	1.78V
17	[b]M_ON	0V	3.26V	1.84V
18	[e]Auto Gnd	Gnd	Gnd	Gnd

[a] Note: *The 17V, 5V, AC_Det and Error Det turn on when the RL_On command arrives.*
[b] Note: *The M5V, Va and Vs turn on when the M_ON (Monitor On) command arrives.*
[c] Note: *The Error Det line is not used in this model.*
[d] Note: If the *AC Det line is Missing, the TV will not turn on.*
(Relays will click, then no functions. LOGO stays on).
[e] Note: Pin 18 is grounded on the Main board. If this line is floated, the SMPS turns on Automatically when AC is applied.

Main Board Plug P703 to Ft Keys

Voltage and Diode Mode Measurements for the Main Board

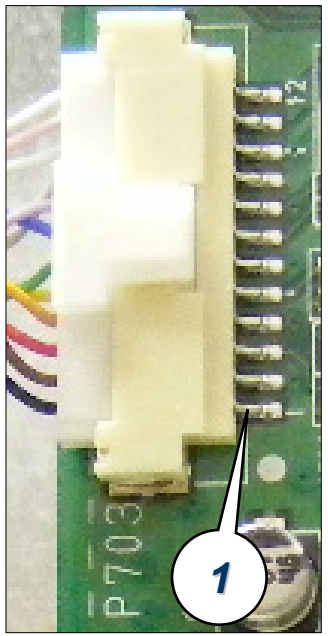
P703 Connector "Main Board" to P100 "Front Keys"

Pin	Label	STBY	Run	Diode Check
1	IR	2.82V	2.83V	2.68V
2	Gnd	Gnd	Gnd	Gnd
3	Key1	3.14V	3.14V	1.83V
4	Key2	3.28V	3.28V	1.77V
5	LED-RED	3.15V	0V	1.77V
6	Gnd	Gnd	Gnd	Gnd
7	SCL	0.77V	3.28V	1.76V
8	SDA	0.77V	3.28V	1.76V
9	Gnd	Gnd	Gnd	Gnd
10	3.3V_ST	3.29V	3.28V	1.13V
11	3.3V_MULTI	0.41V	5.18V	1.22V
12	LED-WHITE	0V	0V	1.65V

To IR Board for Soft Touch Key Pad.

7 & 8 Intelligent Sensor

Stand-By 3.3V



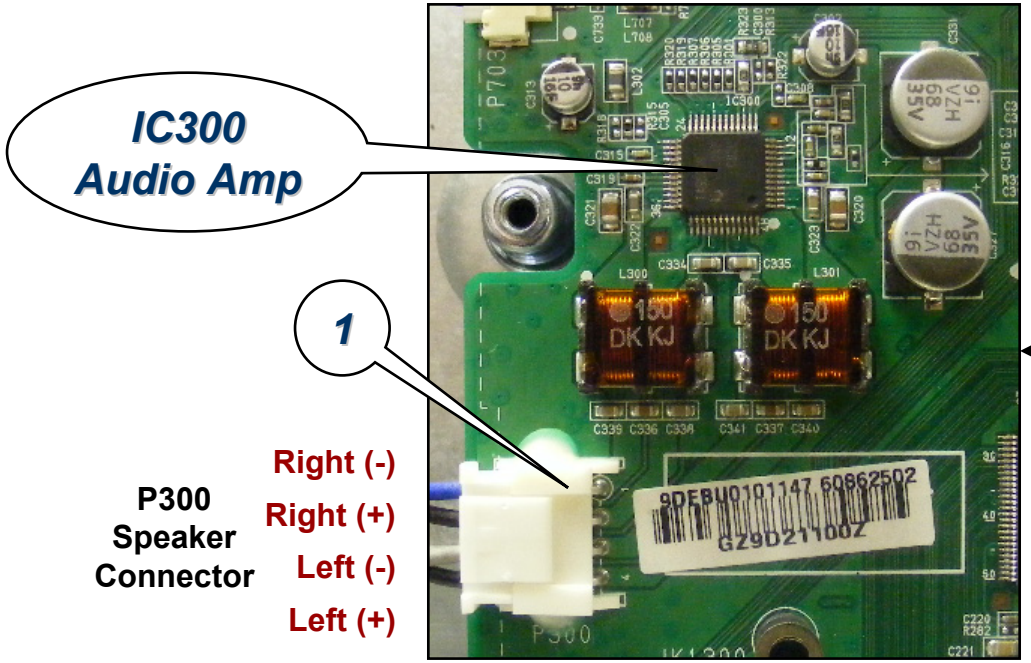
Diode Mode Readings taken with all connectors Disconnected. DVM in Diode Mode.

Main Board Speaker Plug P300 Voltage and Diode Check

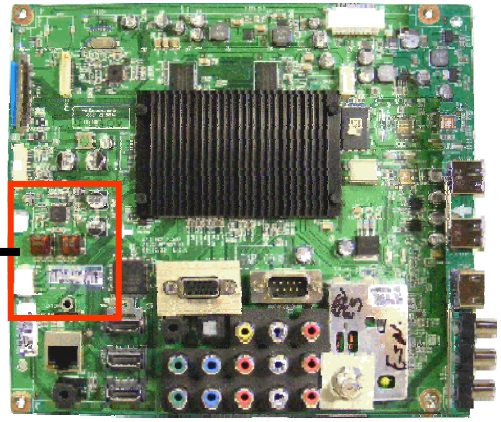
Voltage and Diode Mode Measurements for the Main Board Speaker Plug

P300 Connector "Main" to "Speakers"

Pin	Label	SBY	Run	Diode Mode
1	R-	0V	8.44V	Open
2	R+	0V	8.44V	Open
3	L-	0V	8.44V	Open
4	L+	0V	8.44V	Open

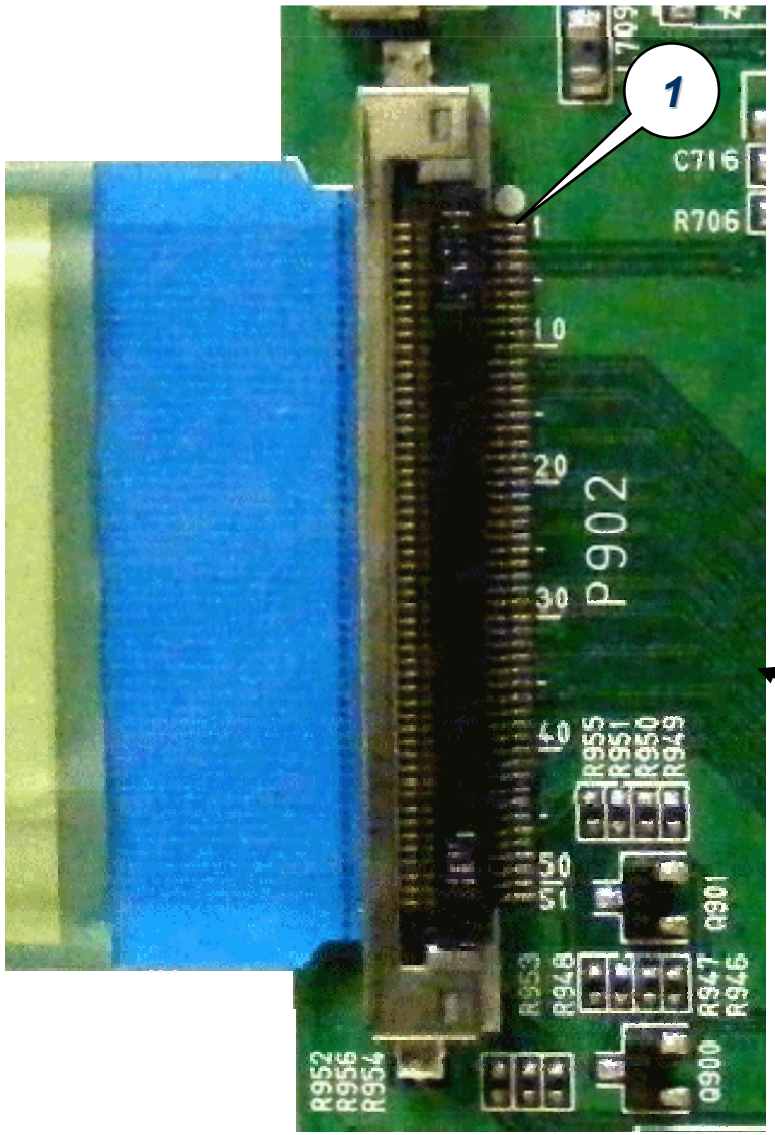


Main Board Location



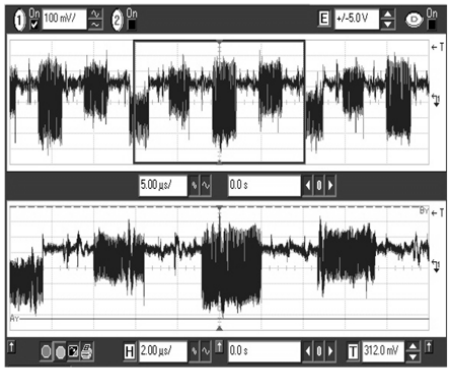
Diode Mode Check with the Board Disconnected. DVM in the Diode mode.

Main Board P902 LVDS Video Signal Test Points

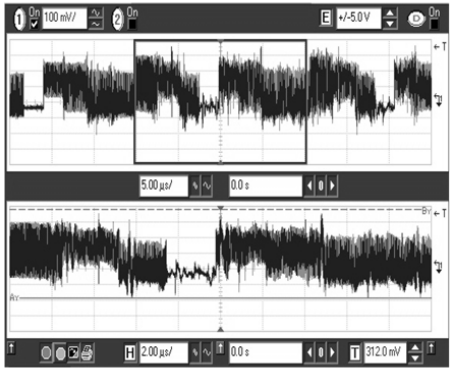


Waveforms Taken from P902 pins 11 and 12, but there are actually 24 pins carrying video.
Input Signal SMPT Color Bar

P902 LVDS (Pin 11) 5uSec / 718mV



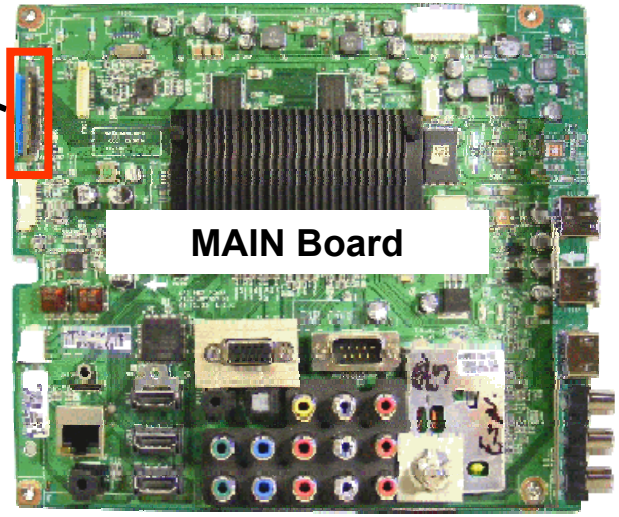
P902 LVDS (Pin 12) 5uSec / 565mV



P902 LVDS (Pin 11) 2uSec / 718mV

P902 LVDS (Pin 12) 2uSec / 565mV

Main Board P902 Location



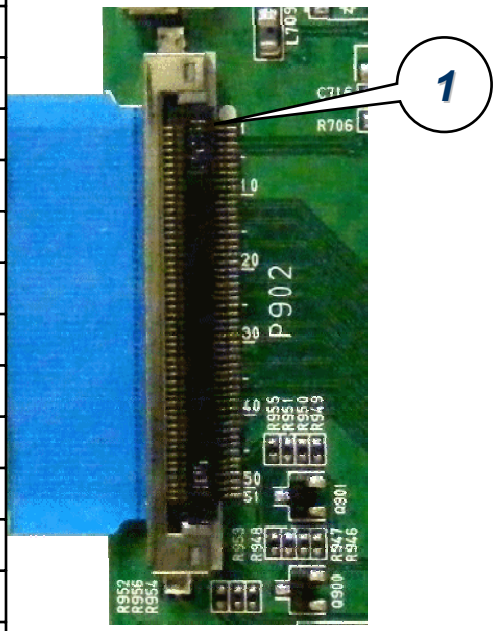
Main Board Plug P902 "LVDS" Voltages

Voltage and Diode Test for the Main Board

P902"Main Board" Connector to P31 "Control Board"

Pin	Label	Run	Diode
1-2	n/c	n/c	n/c
3	UART_TXD	3.29V	Open
4	UART_RXD	3.29V	Open
5	n/c	n/c	n/c
6-10	Gnd	Gnd	Gnd
*11	TB4+	1V	1.0V
*12	TB4-	1.3V	1.0V
*13	TB3+	1.3V	1.0V
*14	TB3-	1.2V	1.0V
15	Gnd	Gnd	Gnd
16	TBC+	1.19V	1.0V
17	TBC-	1.14V	1.0V
18	Gnd	Gnd	Gnd
*19	TB2+	1V	1.0V
*20	TB2-	1.1V	1.0V
*21	TB1+	1.3V	1.0V
*22	TB1-	1.2V	1.0V
*23	TB0+	1.1V	1.0V
*24	TB0-	1.3V	1.0V
25-26	n/c	n/c	n/c
*27	TA4+	1.1V	1.0V
*28	TA4-	1.3V	1.0V

Pin	Label	Run	Diode
*29	TA3+	1.29V	1.0V
*30	TA3-	1.22V	1.0V
31	Gnd	Gnd	Gnd
32	TAC+	1.19V	1.0V
33	TAC-	1.14V	1.0V
34	Gnd	Gnd	Gnd
*35	TA2+	1V	1.0V
*36	TA2-	1.1V	1.0V
*37	TA1+	1.3V	1.0V
*38	TA1-	1.2V	1.0V
*39	TA0+	1.1V	1.0V
*40	TA0-	1.3V	1.0V
41	Gnd	Gnd	Gnd
42-45	n/c	n/c	n/c
46	SDA	3.29V	Open
47	DISP_EN	3.3V	Open
48	SCL	3.28V	Open
49	PC_SER_DATA	3.29V	Open
50	PC_SER_CLK	3.3V	Open
51	Gnd	Gnd	Gnd



*** Indicates video signal**

Note:
There are no voltages in Stand-By mode.

Diode Mode Check with the Board Disconnected.

Main Board P1001 and P702 Connector Voltage and Diode Check

P1001 “Main" to “Motion Remote Board“

Pin	Label	STBY	Run	Diode Check
1	**+3.3V**	0V	3.33V	0.5V
2	**Gnd**	Gnd	Gnd	Gnd
3	**M_REMOTE_RX**	0V	3.3V	1.2V
4	**M_REMOTE_TX**	0V	3.3V	1.2V
5	**RF_Reset**	0V	2.99V	2.36V
6	**DC**	0V	3.1V	1.72V
7	**DD**	0V	3.1V	1.72V
8	**Gnd**	Gnd	Gnd	Gnd

P702 “Main" to “Center LOGO Board“ J1

Pin	Label	STBY	Run	Diode Check
1	**+5V**	0V	5V	1.23V
2	***LED_Breathing**	0V	*0V~3V	1.77V
3	**Gnd**	Gnd	Gnd	Gnd

* 3V When the LOGO LED is On.
This line gradually goes high to turn on and down when going off.

Diode Mode values taken with all Connectors Removed

FRONT IR, POWER LED and MOTION REMOTE RECEIVER SECTION

The following section gives detailed information about the Front IR and Motion Remote Sensor. The IR board contains the Infrared Receiver, Intelligent Sensor and Power LEDs section. The Motion Remote Receiver receives signals from the Motion Remote to manipulate the pointer.
The Power LED Driver and Intelligent Sensor IC communicate with the Main Board Microprocessor (IC701) via Clock and Data lines.
These boards have no adjustments.

The Front Control Board (IR and Intelligent Sensor) receives its operational B+ from the Main Board:

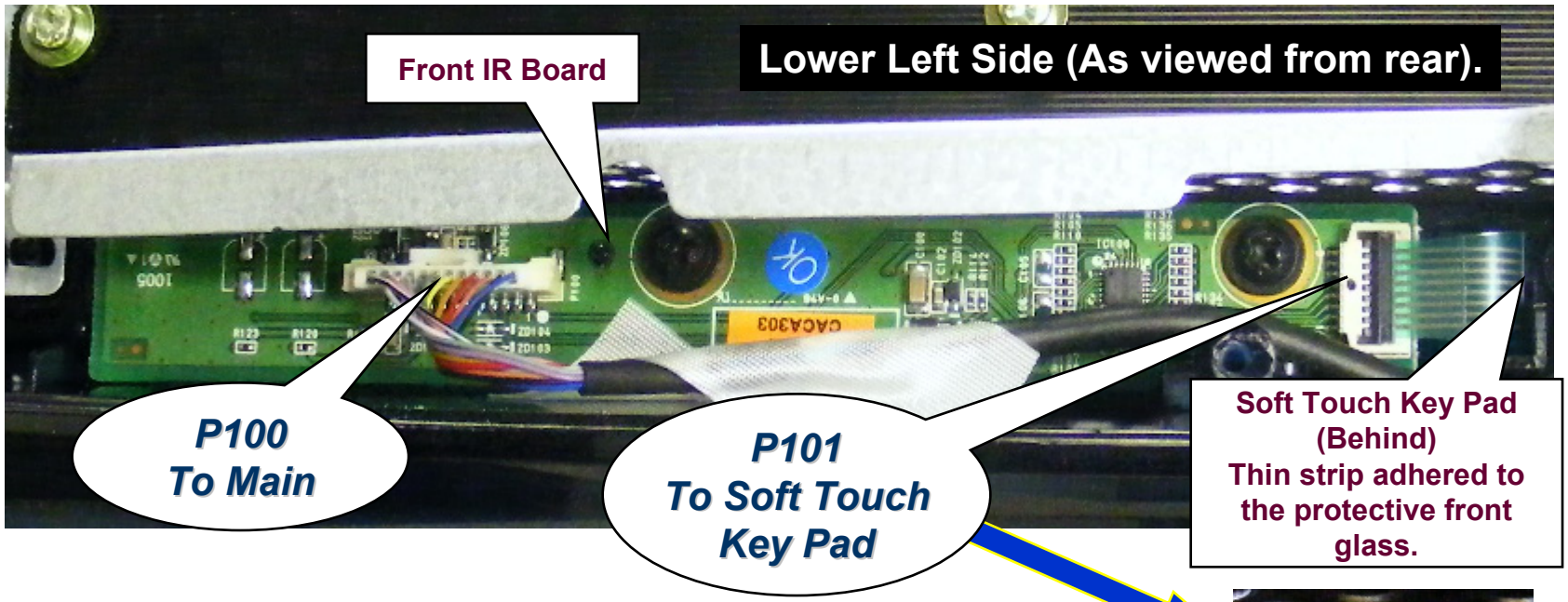
- ***3.3V_ST from the Main Board. This voltage is generated on the Main Board (IC400)***
- ***3.3V_MULTI generated on the Main Board (IC402).***

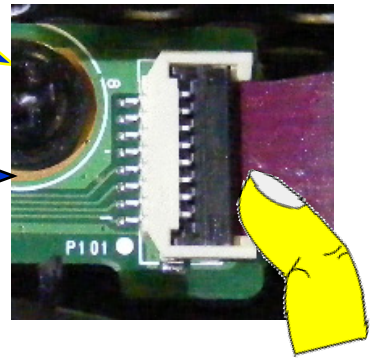
The Front Power LEDs are driven by 2 separate pins from the Main board SCL/SDA pins 7 and 8.

The IR signal is routed back to the Main Board via pin 1.

Also, the Motion Remote routes it's output signal back to the Main Board P1001 pin 4.

Front Control (IR and Intelligent Sensor) Board and Power LED Board Location



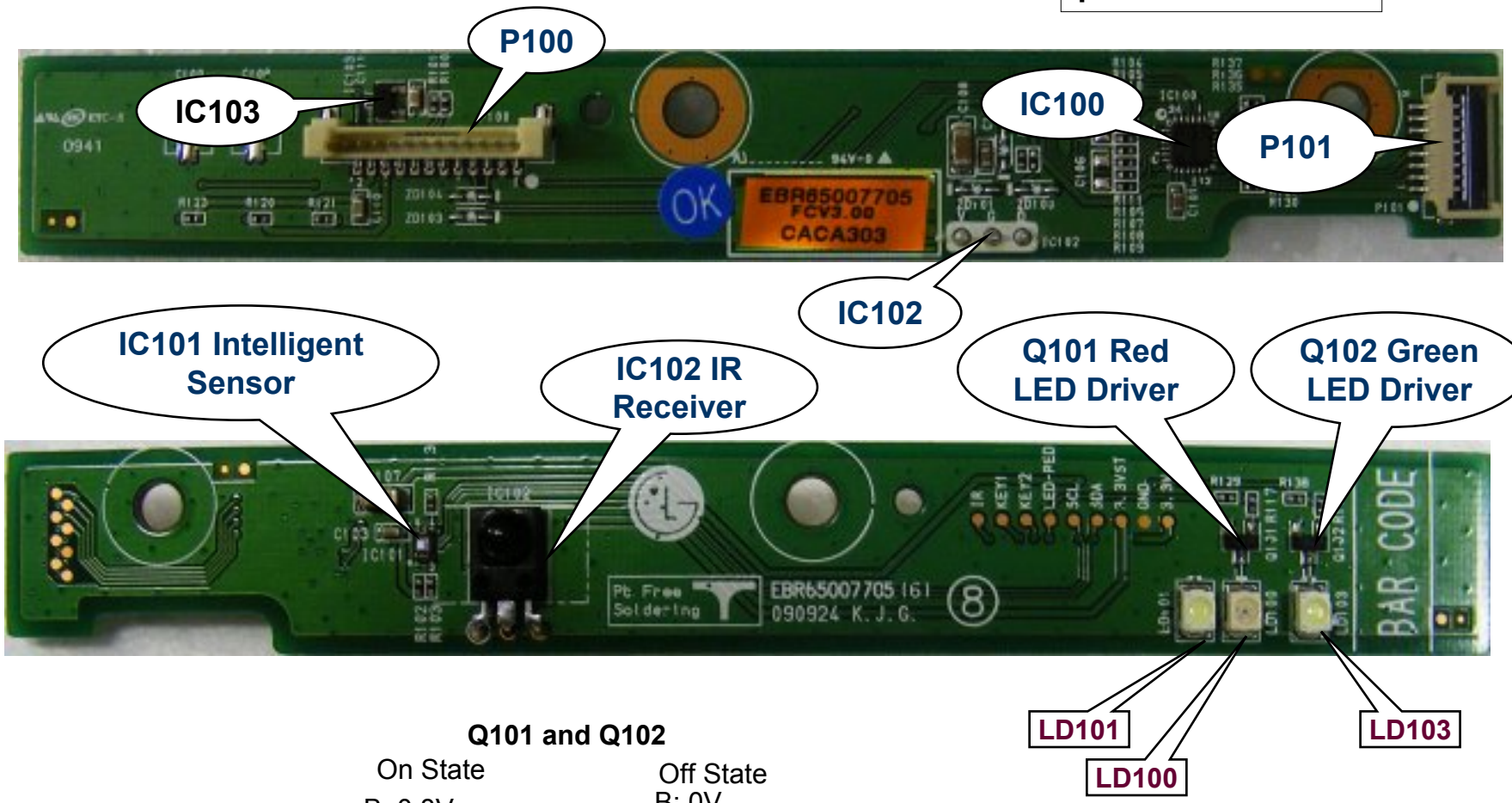


To remove P101 ribbon, using your fingernail, lift up the locking mechanism. Slide the board out to the left to release the ribbon cable.

To facilitate reinstallation, slide the board to the right just enough to place a slight bow in the ribbon cable, then using a small object, press down gently on the ribbon. When properly seated, the ribbon will be under the two plastic tabs in the connector.

Front IR and Intelligent Sensor Board Voltages

p/n: EBR65007705



Q101 and Q102

On State
B: 0.8V
C: 0V
E: Gnd

Off State
B: 0V
C: 3.24V
E: Gnd

IC102 IR Receiver

Label	Readings
G: Ground	0V
V: B+	3.24V
O: Output	2.85V

Power LEDs

Green on Left	Red on Center	Green on Right

Q101 Red On in Stand-By
Q102 Green On in Run

The Green LEDs come on during power on, but turn off shortly after the set comes on.

Front IR Board Connector P100 Voltage and Pin Identification

P100 Connector "IR Board" to P703 "Main Board"

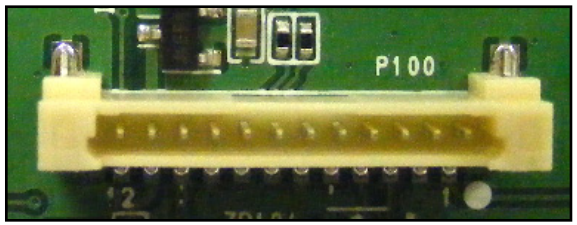
Pin	Label	STBY	Run	Diode Check
1	IR	2.82V	2.82V	Open
2	Gnd	Gnd	Gnd	Gnd
3	Key1	3.14V	3.13V	1.83V
4	Key2	3.28V	3.3V	1.83V
5	LED-RED	3.16V	3.28V	Gnd
6	Gnd	Gnd	Gnd	Gnd
7	SCL	0.57V	3.28V	1.8V
8	SDA	0.8V	3.28V	1.8V
9	Gnd	Gnd	Gnd	Gnd
10	3.3V_ST	3.28V	3.28V	1.22V
11	3.3V_MULTI	0.42V	5.17V	1.21V
12	LED-WHITE	0V	0V	1.739V

For the Soft Touch Key Pad section.

7 & 8 Front LEDs and Intelligent Sensor

Stand-By 3.3V

For Readings when any Key is touched, see Soft Key Pad Section For Key 1 and Key 2.



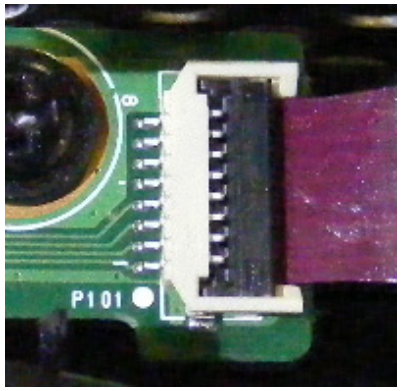
Diode Mode Readings taken with all connectors Disconnected. Black lead on Gnd. DVM in Diode Mode.

Front IR Board Plug P101 to Soft Touch Keys (Voltages and Pin Identification)

Voltage and Diode Mode Measurements for the Main Board

P101 CONNECTOR “Ft IR Board" to "Ft Key Pad”

Pin	STBY	Run	Diode Mode
1-4	0V	0V	Open
5-8	n/c	n/c	Open



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

MOTION REMOTE SECTION

The first time the Motion Remote has it's batteries installed and pointed at the Television, the Motion Remote is synchronized with the TV. After that, when pointing the remote at the TV and pressing the Enter key, a pointer appears on screen, then by moving the Motion Remote around, the pointer moves with the movement of the remote. When the pointer is placed over a selectable button, you can press the center "Enter" button and active the object. This makes navigation much easier.

You can also adjust the volume, change channels and mute the audio with the Motion Remote.

A convenient wrist band can be attached to the remote to avoid dropping and damaging the remote.

The Motion Remote utilizes a specialized receiver to receive the IR signal and this information is then routed to P1001 and on to the IC1001 where the signal is then routed to the BCM IC for pointer positioning and interpretation of the other functions.

Motion Remote "Magic Remote" AKB73035402

Motion Remote Connector Voltage and Diode Check

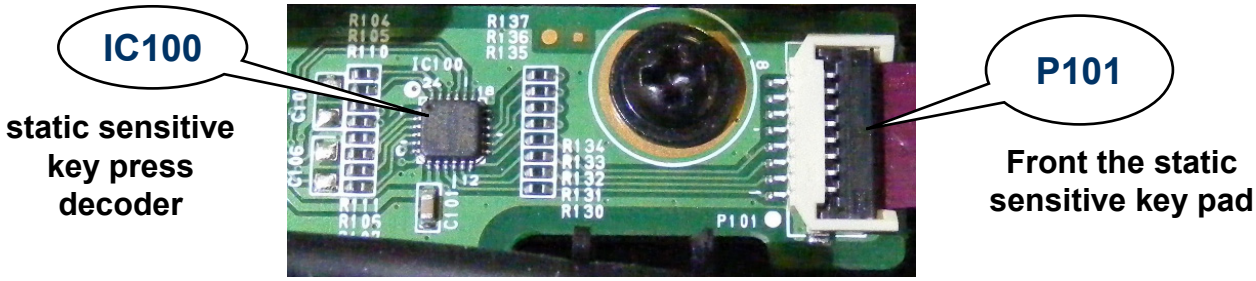
“Motion Remote" to “Main Board“ P1001 Motion Remote

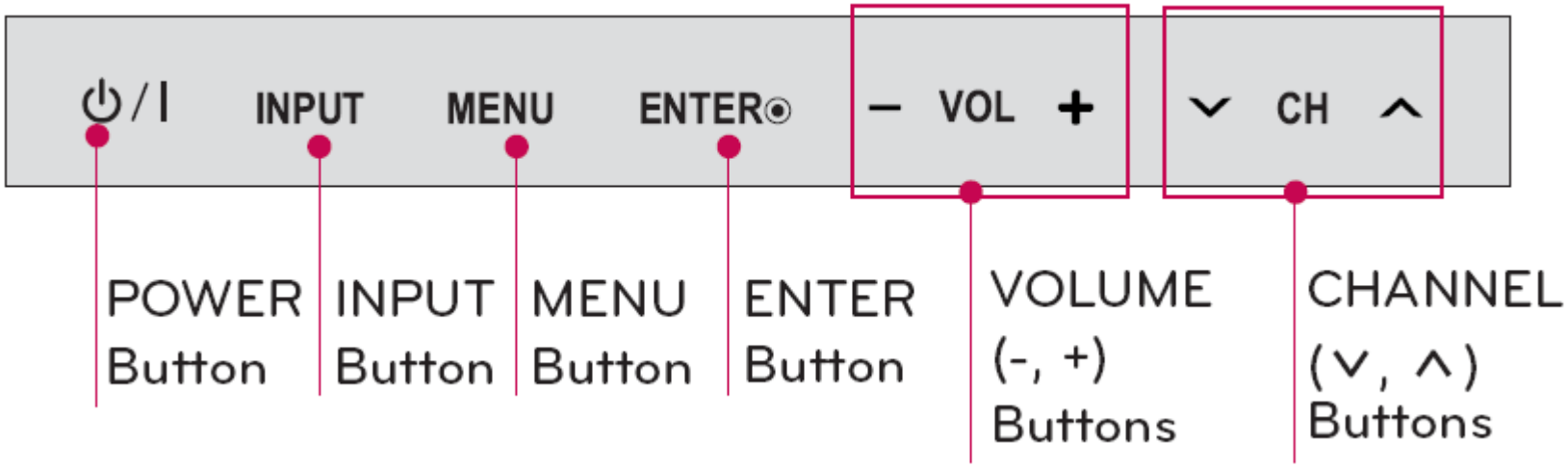
Pin	Label	STBY	Run	Diode Check
1	+3.3V	0V	3.33V	1.17V
2	Gnd	Gnd	Gnd	Gnd
3	M_REMOTE_RX	0V	3.3V	1.95V
4	M_REMOTE_TX	0V	3.3V	1.95V
5	RF_Reset	0V	2.99V	Open
6	DC	0V	3.1V	1.96V
7	DD	0V	3.1V	1.96V
8	Gnd	Gnd	Gnd	Gnd

Diode Mode values taken with all Connectors Removed

SOFT TOUCH KEY PAD SECTION (Board Layout and Identification)

The Soft Touch Key Pad is a thin "Static" sensitive pad that is adhered to the front protective shield. The Soft Touch Key Pad requires a static sensitive key press decoder IC to change the key press data into R2 Ladder (Resistive data) which the Microprocessor can understand. This IC is on the Front IR board IC100 which receives key press data from P101. The output from this IC simply selects the appropriate resistor to inject into the Key 1 or Key 2 line which is then interpreted by the Microprocessor in the Main board IC701.

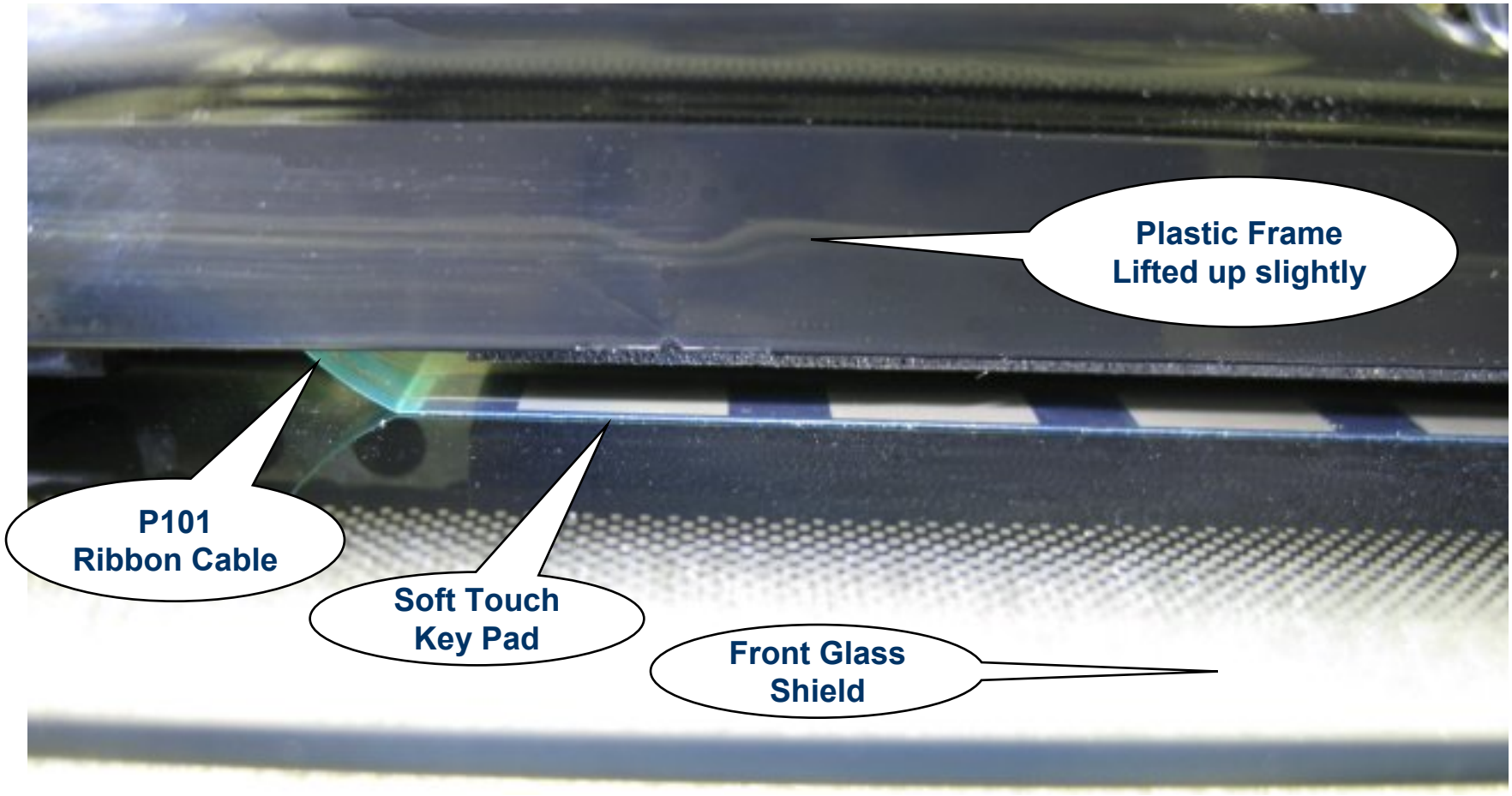




Button Identification for the Front the static sensitive key pad

Soft Touch Key Pad

The Soft Touch Key Pad is a thin "Static" sensitive pad that is adhered to the inside of the front protective shield.



The bottom decorative plastic piece has been removed.

Soft Touch Key Pad Resistance and Diode Mode Checks

IC100 on the Front IR Board is generating these Resistance changes when a Soft Touch Key is touched. This in turn pulls down the Key 1 and Key 2 lines to be interpreted by the Microprocessor.

P100 (Key 1, Key 2) Resistance Reading with Soft Touch Key pressed.

KEY	Pin 3 measured from Gnd		KEY	Pin 4 measured from Gnd
CH (Up)	2.08M Ohms		Volume (+)	8.81M Ohms
CH (Dn)	16.85M Ohms		Volume (-)	2.08M Ohms
Input	8.81M Ohms		Enter	37.3M Ohms
Power	23.24M Ohms		Menu	16.85M Ohms

P100 Voltage Measurements with Soft Touch Key pressed.

KEY	Pin 3 measured from Gnd		KEY	Pin 4 measured from Gnd
CH (Up)	0.21V		Volume (+)	0.88V
CH (Dn)	1.59V		Volume (-)	0.21V
Input	0.86V		Enter	2.4V
Power	2.3V		Menu	1.65V

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

P100 Connector "IR/LED Control Board" to P703 "Main" (No Key Pressed)

Pin	Label	STBY	Run	Diode Mode
3	KEY 1	3.14V	3.14V	1.83V
4	KEY 2	3.28V	3.28V	1.83V

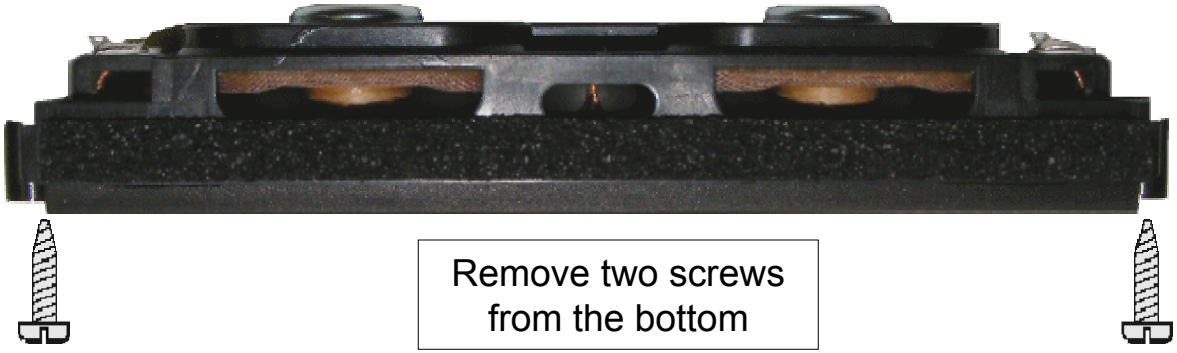
INVISIBLE SPEAKER SYSTEM SECTION

Invisible Speaker System Overview (Full Range Speakers)

p/n: EAB60962801

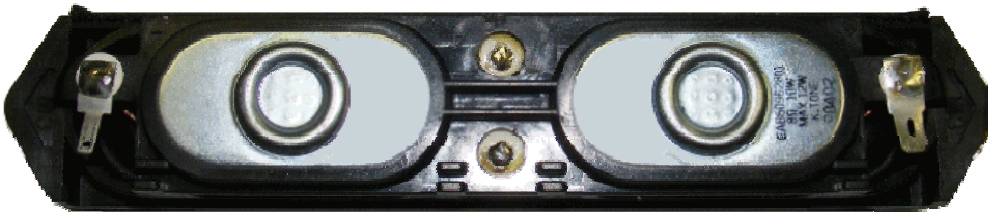
The 50PK950 contains the Invisible Speaker system.
The Full Range Speakers point downward, so there are no front viewable speaker grills or air ports.

Installed View



Remove two screws from the bottom

Top View



Reading across speaker wires, 8.2 ohm.

Cone View

INTERCONNECT DIAGRAM (11 X 17 Foldout) SECTION

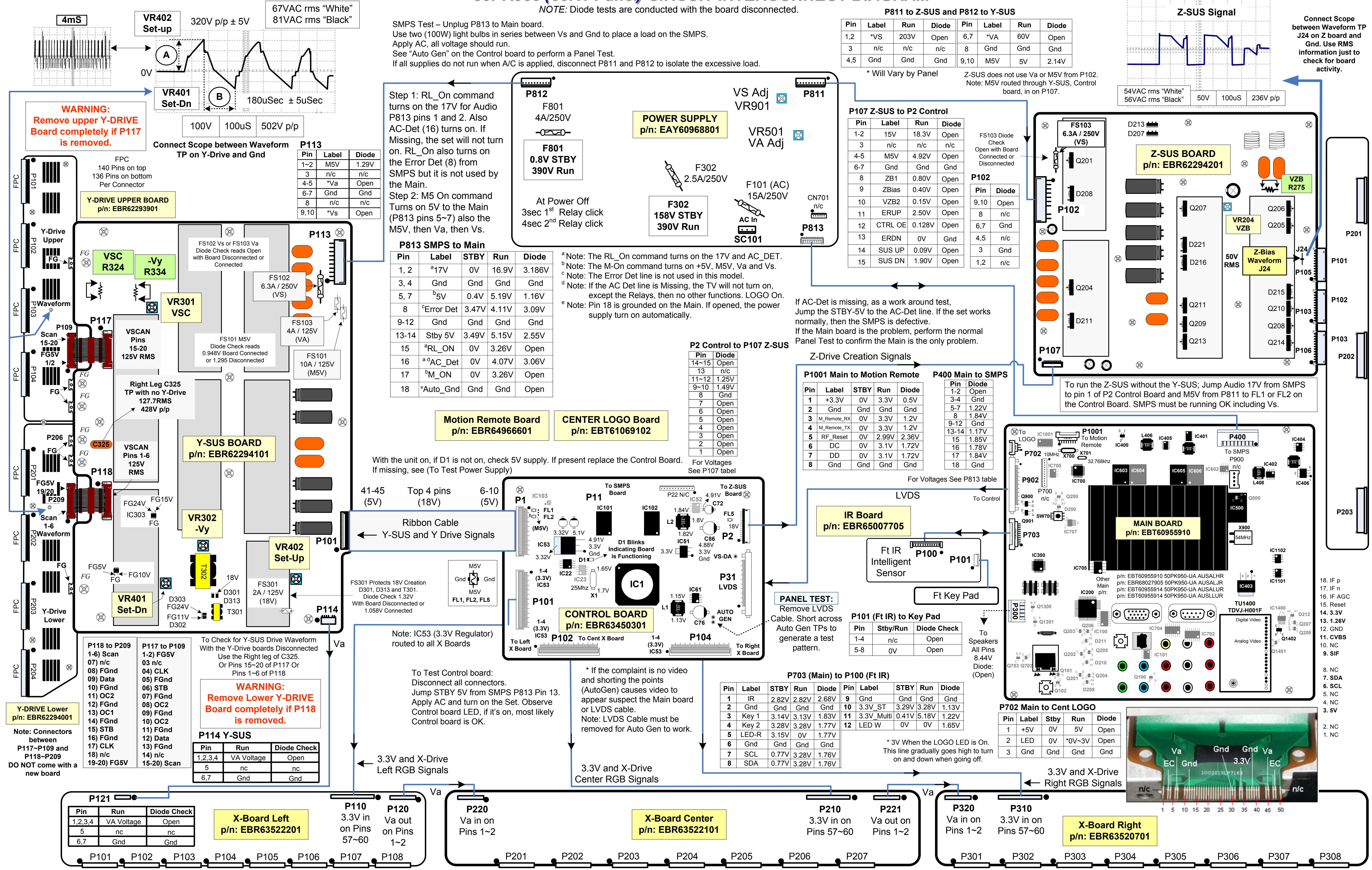
This section shows the Interconnect Diagram called the 11X17 foldout that's available in the Paper and Adobe version of the Training Manual.

Use the Adobe version to zoom in for easier reading.

When Printing the Interconnect diagram, print from the Adobe version and print onto 11X17 size paper for best results.

50PK950 (50R1 Panel) CIRCUIT INTERCONNECT DIAGRAM

NOTE: Diode tests are conducted with the board disconnected.



4mS
VR402 Set-up
320V p/p ± 5V
67VAC rms "White"
81VAC rms "Black"
0V
VR401 Set-Dn
180uSec ± 5uSec
100V
100uS
502V p/p
WARNING: Remove upper Y-DRIVE Board completely if P117 is removed.
Connect Scope between Waveform TP on Y-Drive and Gnd
FPC
140 Pins on top
136 Pins on bottom
Per Connector
Y-DRIVE UPPER BOARD p/n: EBR62293901
Y-Drive Upper
VSC R324
-Vy R334
VR301 VSC
VSCAN Pins 15-20 125V RMS
Right Leg C325 TP with no Y-Drive 127.7RMS 428V p/p
VSCAN Pins 1-6 125V RMS
Y-SUS BOARD p/n: EBR62294101
VR302 -Vy
VR401 Set-Dn
VR402 Set-Up
FS102 Vs or FS103 Va Diode Check reads Open with Board Disconnected or Connected
FS102 6.3A / 250V (VS)
FS103 4A / 125V (VA)
FS101 M5V Diode Check reads 0.948V Board Connected or 1.295 Disconnected
FS101 10A / 125V (M5V)
FS301 2A / 125V (18V)
FS301 Protects 18V Creation D301, D313 and T301. Diode Check 1.32V With Board Disconnected or 1.058V Connected
Y-Drive Lower
Y-DRIVE Lower p/n: EBR62294001
Note: Connectors between P117~P109 and P118~P209 DO NOT come with a new board
P812
F801 4A/250V
F801 0.8V STBY 390V Run
At Power Off 3sec 1st Relay click 4sec 2nd Relay click
POWER SUPPLY p/n: EAY60968801
VS Adj VR901
VR501 VA Adj
F302 2.5A/250V
F101 (AC) 15A/250V
F302 158V STBY 390V Run
P811
P813
SC101
Ribbon Cable Y-SUS and Y Drive Signals
41-45 (5V)
Top 4 pins (18V)
6-10 (5V)
Motion Remote Board p/n: EBR64966601
CENTER LOGO Board p/n: EBT61069102
CONTROL BOARD p/n: EBR63450301
D1 Blinks Indicating Board is Functioning
IR Board p/n: EBR65007705
Ft IR Intelligent Sensor
Ft Key Pad
PANEL TEST: Remove LVDS Cable. Short across Auto Gen TPs to generate a test pattern.
Z-SUS Signal
54VAC rms "White" 56VAC rms "Black"
50V
100uS
236V p/p
Connect Scope between Waveform TP J24 on Z board and Gnd. Use RMS information just to check for board activity.
Z-SUS BOARD p/n: EBR62294201
FS103 6.3A / 250V (VS)
FS103 Diode Check Open with Board Connected or Disconnected
VZB R275
VR204 VZB
Z-Bias Waveform J24
50V RMS
Z-Drive Creation Signals
LVDS
MAIN BOARD p/n: EBT60955910
To Speakers All Pins 8.44V Diode: (Open)
3.3V and X-Drive Left RGB Signals
3.3V and X-Drive Center RGB Signals
3.3V and X-Drive Right RGB Signals
X-Board Left p/n: EBR63522201
X-Board Center p/n: EBR63522101
X-Board Right p/n: EBR63520701
P110 3.3V in on Pins 57~60
P120 Va out on Pins 1~2
P220 Va in on Pins 1~2
P210 3.3V in on Pins 57~60
P221 Va out on Pins 1~2
P320 Va in on Pins 1~2
P310 3.3V in on Pins 57~60
18. IF p
17. IF n
16. IF AGC
15. Reset
14. 3.3V
13. 1.26V
12. GND
11. CVBS
10. NC
9. SIF
8. NC
7. SDA
6. SCL
5. NC
4. NC
3. 5V
2. NC
1. NC

SMPS Test – Unplug P813 to Main board.
Use two (100W) light bulbs in series between Vs and Gnd to place a load on the SMPS.
Apply AC, all voltage should run.
See "Auto Gen" on the Control board to perform a Panel Test.
If all supplies do not run when A/C is applied, disconnect P811 and P812 to isolate the excessive load.

Step 1: RL_On command turns on the 17V for Audio P813 pins 1 and 2. Also AC-Det (16) turns on. If Missing, the set will not turn on. RL_ON also turns on the Error Det (8) from SMPS but it is not used by the Main.
Step 2: M5 On command Turns on 5V to the Main (P813 pins 5~7) also the M5V, then Va, then Vs.

P113

Pin	Label	Diode
1~2	M5V	1.29V
3	n/c	n/c
4-5	*Va	Open
6-7	Gnd	Gnd
8	n/c	n/c
9,10	*Vs	Open

P811 to Z-SUS and P812 to Y-SUS

Pin	Label	Run	Diode	Pin	Label	Run	Diode
1,2	*VS	203V	Open	6,7	*VA	60V	Open
3	n/c	n/c	n/c	8	Gnd	Gnd	Gnd
4,5	Gnd	Gnd	Gnd	9,10	M5V	5V	2.14V

* Will Vary by Panel

Z-SUS does not use Va or M5V from P102. Note: M5V routed through Y-SUS, Control board, in on P107.

P813 SMPS to Main

Pin	Label	STBY	Run	Diode
1, 2	[a]17V	0V	16.9V	3.186V
3, 4	Gnd	Gnd	Gnd	Gnd
5, 7	[b]5V	0.4V	5.19V	1.16V
8	[c]Error Det	3.47V	4.11V	3.09V
9-12	Gnd	Gnd	Gnd	Gnd
13-14	Stby 5V	3.49V	5.15V	2.55V
15	[a]RL_ON	0V	3.26V	Open
16	[a d]AC_Det	0V	4.07V	3.06V
17	[b]M_ON	0V	3.26V	Open
18	[e]Auto_Gnd	Gnd	Gnd	Open

[a] Note: The RL_On command turns on the 17V and AC_DET.
[b] Note: The M-On command turns on +5V, M5V, Va and Vs.
[c] Note: The Error Det line is not used in this model.
[d] Note: If the AC Det line is Missing, the TV will not turn on, except the Relays, then no other functions. LOGO On.
[e] Note: Pin 18 is grounded on the Main. If opened, the power supply turn on automatically.

If AC-Det is missing, as a work around test, Jump the STBY-5V to the AC-Det line. If the set works normally, then the SMPS is defective. If the Main board is the problem, perform the normal Panel Test to confirm the Main is the only problem.

P107 Z-SUS to P2 Control

Pin	Label	Run	Diode
1-2	15V	18.3V	Open
3	n/c	n/c	n/c
4-5	M5V	4.92V	Open
6-7	Gnd	Gnd	Gnd
8	ZB1	0.80V	Open
9	ZBias	0.40V	Open
10	VZB2	0.15V	Open
11	ERUP	2.50V	Open
12	CTRL OE	0.128V	Open
13	ERDN	0V	Gnd
14	SUS UP	0.09V	Open
15	SUS DN	1.90V	Open

P102

Pin	Diode
9,10	Open
8	n/c
6,7	Gnd
4,5	n/c
3	Gnd
1,2	n/c

P2 Control to P107 Z-SUS

Pin	Diode
14~15	Open
13	n/c
11~12	1.25V
9~10	1.49V
8	Gnd
7	Open
6	Open
5	Open
4	Open
3	Open
2	Open
1	Open

For Voltages See P107 table

To run the Z-SUS without the Y-SUS; Jump Audio 17V from SMPS to pin 1 of P2 Control Board and M5V from P811 to FL1 or FL2 on the Control Board. SMPS must be running OK including Vs.

P1001 Main to Motion Remote

Pin	Label	STBY	Run	Diode
1	+3.3V	0V	3.3V	0.5V
2	Gnd	Gnd	Gnd	Gnd
3	M_Remote_RX	0V	3.3V	1.2V
4	M_Remote_TX	0V	3.3V	1.2V
5	RF_Reset	0V	2.99V	2.36V
6	DC	0V	3.1V	1.72V
7	DD	0V	3.1V	1.72V
8	Gnd	Gnd	Gnd	Gnd

P400 Main to SMPS

Pin	Diode
1-2	Open
3-4	Gnd
5-7	1.22V
8	1.84V
9-12	Gnd
13-14	1.17V
15	1.85V
16	1.78V
17	1.84V
18	Gnd

For Voltages See P813 table

With the unit on, if D1 is not on, check 5V supply. If present replace the Control Board. If missing, see (To Test Power Supply)

FL1, FL2, FL5: M5V Gnd Gnd M5V

Note: IC53 (3.3V Regulator) routed to all X Boards

To Check for Y-SUS Drive Waveform With the Y-Drive boards Disconnected Use the Right leg of C325. Or Pins 15~20 of P117 Or Pins 1~6 of P118

WARNING: Remove Lower Y-DRIVE Board completely if P118 is removed.

P118 to P209	P117 to P109
1-6) Scan	1-2) FG5V
07) n/c	03 n/c
08) FGnd	04) CLK
09) Data	05) FGnd
10) FGnd	06) STB
11) OC2	07) FGnd
12) FGnd	08) OC2
13) OC1	09) FGnd
14) FGnd	10) OC2
15) STB	11) FGnd
16) FGnd	12) Data
17) CLK	13) FGnd
18) n/c	14) n/c
19-20) FG5V	15-20) Scan

P114 Y-SUS

Pin	Run	Diode Check
1,2,3,4	VA Voltage	Open
5	nc	nc
6,7	Gnd	Gnd

To Test Control board:
Disconnect all connectors.
Jump STBY 5V from SMPS P813 Pin 13.
Apply AC and turn on the Set. Observe Control board LED, if it's on, most likely Control board is OK.

* If the complaint is no video and shorting the points (AutoGen) causes video to appear suspect the Main board or LVDS cable.
Note: LVDS Cable must be removed for Auto Gen to work.

P101 (Ft IR) to Key Pad

Pin	Stby/Run	Diode Check
1-4	n/c	Open
5-8	0V	Open

P703 (Main) to P100 (Ft IR)

Pin	Label	STBY	Run	Diode	Pin	Label	STBY	Run	Diode
1	IR	2.82V	2.82V	2.68V	9	Gnd	Gnd	Gnd	Gnd
2	Gnd	Gnd	Gnd	Gnd	10	3.3V_ST	3.29V	3.28V	1.13V
3	Key 1	3.14V	3.13V	1.83V	11	3.3V_Multi	0.41V	5.18V	1.22V
4	Key 2	3.28V	3.28V	1.77V	12	LED W	0V	0V	1.65V
5	LED-R	3.15V	0V	1.77V					
6	Gnd	Gnd	Gnd	Gnd					
7	SCL	0.77V	3.28V	1.76V					
8	SDA	0.77V	3.28V	1.76V					

* 3V When the LOGO LED is On. This line gradually goes high to turn on and down when going off.

P702 Main to Cent LOGO

Pin	Label	Stby	Run	Diode
1	+5V	0V	5V	Open
2	LED	0V	*0V~3V	Open
3	Gnd	Gnd	Gnd	Gnd

P121

Pin	Run	Diode Check
1,2,3,4	VA Voltage	Open
5	nc	nc
6,7	Gnd	Gnd

50PK750 Main Board Component Voltages

50PK950 Main Board (Front Side) Component Voltages

IC400

Pin	3.3V_NEC_ST Regulator
[1]	Gnd
[2]	3.3V
[3]	5V

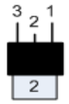
IC401

Pin	DDR 1.8V Regulator
[1]	6.75V
[2]	5.0V
[3]	1.85V
[4]	Gnd
[5]	Gnd
[6]	2.356V
[7]	0.9V
[8]	1.0V
[9]	2.4V
[10]	3.3V

IC402

Pin	D3.3V / +3.3V Regulator
[1]	5V
[2]	3.3V
[3]	3.3V
[4]	7.48V
[5]	3.3V
[6]	0.8V
[7]	5V
[8]	Gnd

IC403



Pin	A2.5V Regulator
[1]	1.26V
[2]	2.5V
[3]	5V

IC404

Pin	7V (to IC405) Regulator
[1]	17.1V
[2]	7.11V
[3]	7.11V
[4]	11.95V
[5]	3.3V
[6]	0.8V
[7]	5.0V
[8]	Gnd

IC405

Pin	D1.2V / A1.2V Regulator
[1]	Gnd
[2]	4.99V
[3]	Gnd
[4]	1.26V
[5]	0V
[6]	n/c
[7]	6.17V
[8]	5.0V
[9]	5.0V
[10]	5.0V
[11]	1.27V
[12]	Gnd
[13]	3.3V
[14]	0.83V

IC406

Pin	5V (Tuner) Reg
[1]	7.13V
[2]	5V
[3]	7V

IC705

Pin	NVRAM
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.28V
[6]	3.28V
[7]	Gnd
[8]	3.28V

IC1101

Pin	USB1 5V Regulator
[1]	5.0V
[2]	Gnd
[3]	3.2V
[4]	0V
[5]	0V
[6]	5.1V
[7]	0V
[8]	3.28V

IC1102

Pin	USB2 5V
[1]	Gnd
[2]	5.14V
[3]	5.14V
[4]	0.04V
[5]	3.28V
[6]	4.94V
[7]	4.94V
[8]	n/c

Q701

Pin	RS232 IR Buffer
[B]	0.574V
[E]	Gnd
[C]	0V

Q900

Pin	SCL to LVDS FET
[G]	3.28V
[S]	3.28V
[D]	3.28V

Q901

Pin	SDA to LVDS FET
[G]	3.276V
[S]	3.289V
[D]	3.28V

Q1402

Pin	Video Buffer
[B]	2.05V
[E]	2.75V
[C]	Gnd

50PK950 Main Board (Back Side) Component Voltages

IC100

Pin	RS232 Control
[1]	1.65V
[2]	1.65V
[3]	4.56V
[4]	1.65V
[5]	1.65V
[6]	4.66V
[7]	Gnd
[8]	n/c
[9]	1.657V
[10]	0V
[11]	4.5V
[12]	0V
[13]	1.657V
[14]	5.12V

IC101

Pin	RS232 EEPROM
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	4.325V
[6]	4.8V
[7]	5.12V
[8]	5.0V

IC602

Pin	DDR_VTT Regulator
[1]	Gnd
[2]	3.3V
[3]	0.43V
[4]	0.94V
[5]	1.857
[6]	3.3V
[7]	1.86V
[8]	0.93V

IC700

Pin	Micro EEPROM
[1]	Gnd
[2]	Gnd
[3]	Gnd
[4]	Gnd
[5]	3.3V
[6]	3.3V
[7]	Gnd
[8]	3.3V

IC702

Pin	RS232 Selector
[1]	3.34V
[2]	5.78V
[3]	0V
[4]	0V
[5]	0.2V
[6]	(-5.68V)
[7]	5.78V
[8]	Gnd
[9]	n/c
[10]	Gnd
[11]	3.3V
[12]	0V
[13]	0V
[14]	(-5.68V)
[15]	Gnd
[16]	3.3V

IC704

Pin	RS232 Selector
[1]	3.26V
[2]	3.26V
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	n/c
[8]	Gnd
[9]	Gnd
[10]	4.99V
[11]	4.99V
[12]	0.88V
[13]	3.3V
[14]	3.3V
[15]	3.3V
[16]	5V

IC1001

Pin	Motion Remote IC
[1]	0V (3.3V M_Remote Used)
[2]	3.3V (0.3V M_Remote Used)
[3]	n/c
[4]	n/c
[5]	n/c
[6]	Gnd
[7]	Gnd
[8]	Gnd
[9]	n/c
[10]	0.02V
[11]	0V
[12]	3.3V
[13]	0V (3.3V M_Remote Used)
[14]	3.3V
[15]	3.3V
[16]	3.3V

IC707

Pin	Reset IC
[1]	3.3V
[2]	Gnd
[3]	3.31V

IC1400

Pin	Reset IC
[1]	0V
[2]	1.29V
[3]	3.27V

Q100

Pin	RGB W/P
[B]	0V
[C]	5.12V
[E]	Gnd

Q101

Pin	Wired IR 1st Buffer
[B]	0V
[C]	3.33V
[E]	Gnd

Q102

Pin	Wired IR 2nd Buffer
[B]	0.6V
[C]	0V
[E]	Gnd

Q200

Pin	CEC Remote HDMI
[B]	2.59V
[G]	3.3V
[S]	2.58V
[D]	3.25V

Q201

Pin	Hot Swap HDMI1
[B]	4.27V
[C]	0V
[E]	Gnd

Q202

Pin	Hot Swap HDMI2
[B]	4.27V
[C]	0V
[E]	Gnd

Q203

Pin	Hot Swap HDMI3
[B]	4.27V
[C]	0V
[E]	Gnd

Q204

Pin	Hot Swap HDMI1
[B]	0V
[C]	4.26V
[E]	Gnd

Q205

Pin	Hot Swap HDMI2
[B]	0V
[C]	4.26V
[E]	Gnd

Q206

Pin	Hot Swap HDMI3
[B]	0V
[C]	4.26V
[E]	Gnd

Q207

Pin	Hot Swap HDMI4
[B]	4.28V
[C]	0V
[E]	Gnd

Q208

Pin	Hot Swap HDMI4
[B]	0V
[C]	5V
[E]	Gnd

Q500

Pin	Flash WP
[B]	0V (Flash_WP)
[C]	3.36V
[E]	Gnd

Q702

Pin	IR Out 2nd Buffer
[B]	0V
[C]	3.32V
[E]	Gnd

Q703

Pin	IR Out 1st Buffer
[B]	0.62V
[C]	0V
[E]	Gnd

Q1300

Pin	Wired IR 1st Buffer
[E]	Gnd
[B]	0V
[C]	17V

Q1301

Pin	Wired IR 2nd Buffer
[G]	17V
[S]	17.1V
[D]	0V

Q1401

Pin	SIF Buffer
[B]	0.165V
[E]	0.83V
[C]	Gnd

D200

Pin	HDMI CEC Limiter
[A1]	0V
[A2]	3.31V
[C]	3.18V

D209

Pin	HDMI Hot Swap Routing HDMI1
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

D210

Pin	HDMI Hot Swap Routing HDMI2
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

D211

Pin	HDMI Hot Swap Routing HDMI3
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

D212

Pin	HDMI Hot Swap Routing HDMI4
[A1]	5.13V
[A2]	0.15V
[C]	4.67V

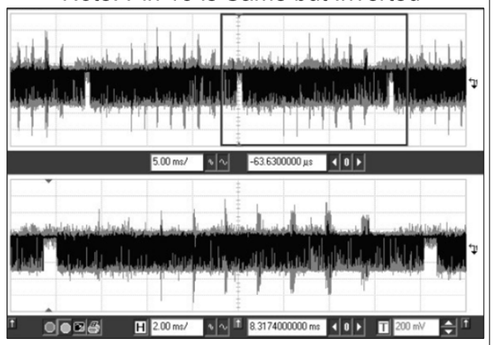
50PK950 LVDS Control Board P31 from P902 Main Board Waveforms

Main P902 Pin	Control P31 Pin	
1	50-51	
3	49	
4	48	
5	47	
6	46-44	
*11	*41	
*12	*40	
*13	*39	
*14	*38	
15	37	
16	36	Clock
17	35	Clock
18	34	
*19	*33	
*20	*32	
*21	*31	
*22	*30	
*23	*29	
*24	*28	
25-26	26-27	
*27	*25	
*28	*24	
*29	*23	
*30	*22	
31	21	
32	20	Clock
33	19	Clock
34	18	
*35	*17	
*36	*16	
*37	*15	
*38	*14	
*39	*13	
*40	*12	
41	11	
42-45	7-10	
46	6	
47	5	
48	4	
49	3	
50	2	
51	1	

NOTE: LVDS P31 Information
There are actually 20 pins carrying Video 4 pins are carrying clock signals to the Control board. With 1080P, pins 35 and 36 would have signals present.

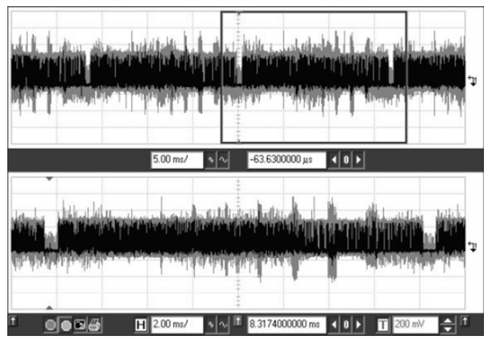
WAVEFORMS:
Waveforms taken using 1080P SMTP Color Bar input. All readings give their Time Base related to scope settings.

P31 LVDS (Pin 12) 5Msec / 728mV
Note: Pin 13 is Same but Inverted



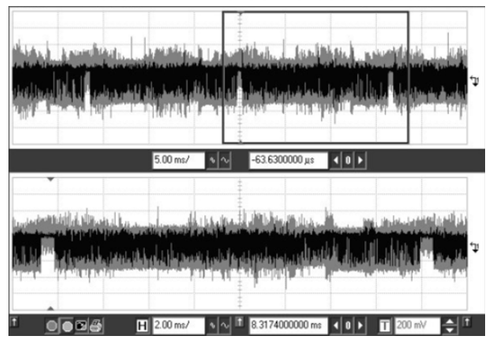
P31 LVDS (Pin 11) 2uSec / 728mV

P31 LVDS (Pin 14) 5Msec / 618mV
Note: Pin 15 is Same but Inverted



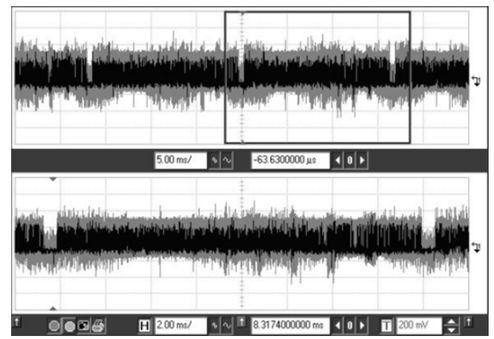
P31 LVDS (Pin 14) 2uSec / 618mV

P31 LVDS (Pin 16) 5Msec / 738mV
Note: Pin 17 is Same but Inverted



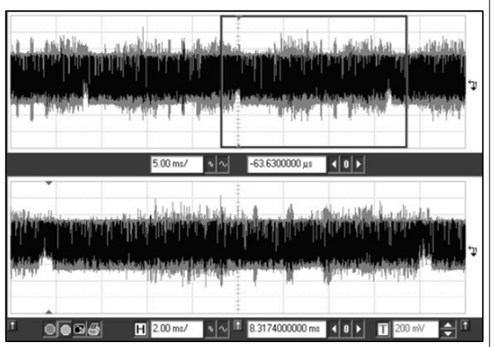
P31 LVDS (Pin 16) 2uSec / 738mV

P31 LVDS (Pin 19) 5Msec / 758mV
Note: Pin 20 is Same but Inverted



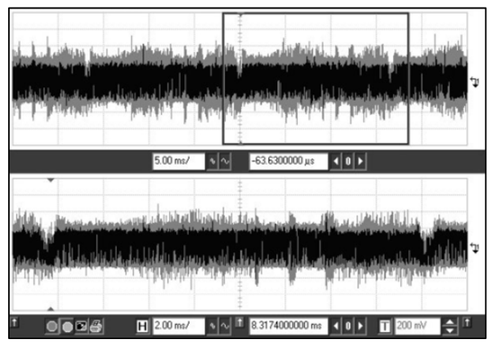
P31 LVDS (Pin 19) 2uSec / 758mV

P31 LVDS (Pin 22) 5Msec / 683mV
Note: Pin 23 is Same but Inverted



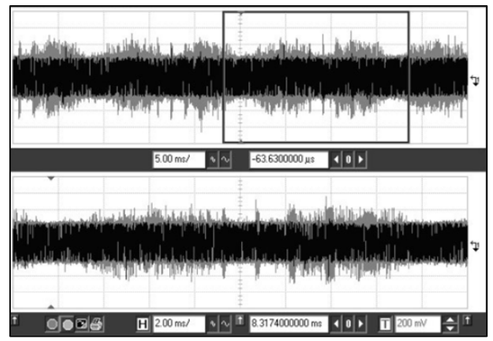
P31 LVDS (Pin 226) 2uSec / 683mV

P31 LVDS (Pin 24) 5Msec / 448mV
Note: Pin 25 is Same but Inverted



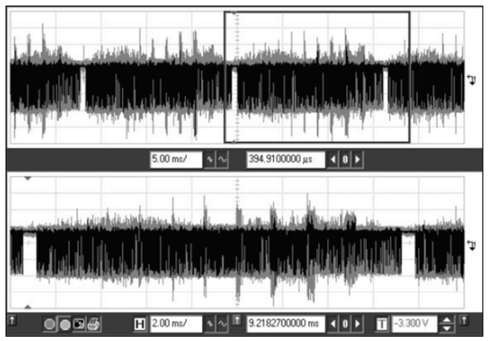
P31 LVDS (Pin 24) 2uSec / 448mV

P31 LVDS (Pin 28) 5Msec / 768mV
Note: Pin 29 is Same but Inverted



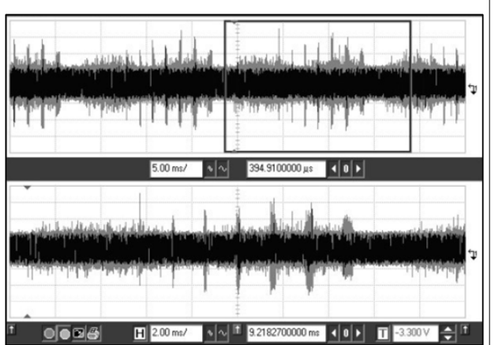
P31 LVDS (Pin 28) 2uSec / 768mV

P31 LVDS (Pin 30) 5Msec / 1.3V
Note: Pin 31 is Same but Inverted



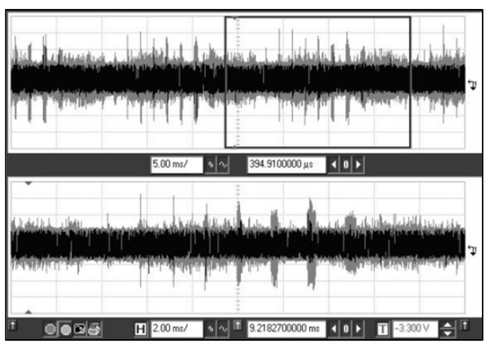
P31 LVDS (Pin 30) 2uSec / 1.3V

P31 LVDS (Pin 32) 5Msec / 1.12V
Note: Pin 33 is Same but Inverted



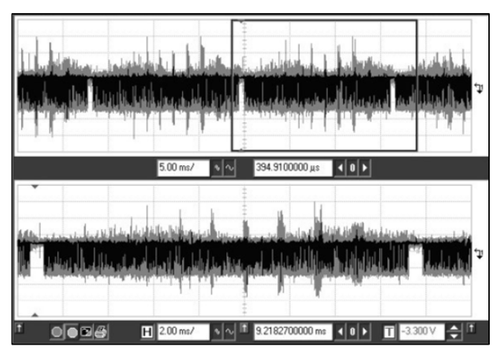
P31 LVDS (Pin 32) 2uSec / 1.12V

P31 LVDS (Pin 35) 5Msec / 1V
Note: Pin 36 is Same but Inverted



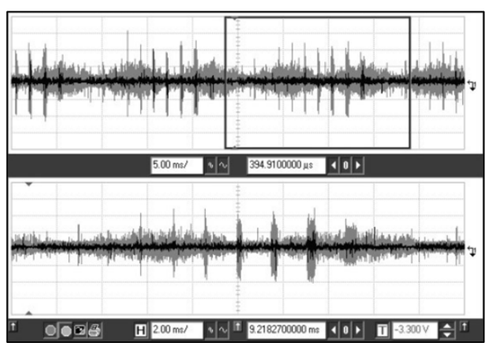
P31 LVDS (Pin 35) 2uSec / 1V

P31 LVDS (Pin 38) 5Msec / 1.15V
Note: Pin 39 is Same but Inverted



P31 LVDS (Pin 38) 2uSec / 1.15V

P31 LVDS (Pin 40) 5Msec / 910mV
Note: Pin 41 is Same but Inverted



P31 LVDS (Pin 41) 2uSec / 910mV

End of Presentation

This concludes the Presentation
Thank You

LG
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