Training Manual

42PQ30 Plasma Display

Scan Troubleshooting

NOTICE: ALL INFORMATION CONTAINED WITHIN THIS PACKAGE IS BASED ON PRE-SALES MODEL. INFORMATION SUBJECT TO CHANGE AT FINAL PRODUCTION

Original February 16th, 2009
Updated: April 21st, 2010
Overview of Topics to be Discussed

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

Section 2
Circuit Board Operation, Troubleshooting and Alignment of:
- Switch mode Power Supply
- Y SUS Board
- Y Drive Boards (Receives Y Drive signals from Y-SUS Board)
- Z SUS Output Board (Connects directly with FPC to Panel)
- Control Board
- X Drive Boards (2)
- Main Board

NEW
- Main Power Switch, deactivates all inputs from IR or Keys
Overview of Topics to be Discussed

42PQ30 Plasma Display
Section 1

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

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

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

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

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

CAUTION

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

**REGULATORY INFORMATION**

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

<table>
<thead>
<tr>
<th>Service</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Service (and Part Sales)</td>
<td>(800) 243-0000</td>
</tr>
<tr>
<td>Technical Support (and Part Sales)</td>
<td>(800) 847-7597</td>
</tr>
<tr>
<td>USA Website (GSFS)</td>
<td><a href="http://gsfs-america.lge.com">http://gsfs-america.lge.com</a></td>
</tr>
<tr>
<td>Customer Service Website</td>
<td>us.lgservice.com</td>
</tr>
<tr>
<td>LG Web Training</td>
<td>lge.webex.com</td>
</tr>
<tr>
<td>LG CS Academy</td>
<td>lgcsacademy.com</td>
</tr>
</tbody>
</table>

**Presentations with Audio/Video and Screen Marks**

**Also available on the Plasma page**

- **Plasma Panel Alignment Handbook**
- New Training Materials on the Learning Academy site

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February 16th, 2009 Plasma 42PQ30
PLASMA OVERVIEW SECTION

Safety & Handling Regulations

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

Checking Points to be Considered

1. Check the appearance of the Replacement Panel and Circuit Boards for both physical damage and part number accuracy.
2. Check the model label. Verify model names and board model matches.
3. Check details of defective condition and history. Example: Y Board Failure, Mal-discharge on screen, etc.
Basic Troubleshooting Steps

Define, Localize, Isolate and Correct

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

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

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

• Correct   The final step is to correct the problem. Be careful of ESD and make sure to check the DC Supplies for proper levels. Make all necessary adjustments and lastly always perform a Safety AC Leakage Test before returning the product back to the Customer.
This section of the manual will discuss the specifications of the 42PQ30 Advanced Single Scan Plasma Display Panel.
720P PLASMA HDTV
42” Class (41.5” diagonal)

- 720p HD Resolution
- Dual XD Engine™
- 20,000:1 Contrast Ratio
- Fluid Motion
- 3x HDMI™ V.1.3 with Deep Color
- AV Mode (Cinema, Sports, Game)
- Clear Voice
- LG SimpLink™ Connectivity
- Invisible Speaker System
- 100,000 Hours to Half Brightness (Typical)
- PC Input
HD RESOLUTION 720p HD Resolution Pixels: 1024 (H) × 768 (V)
High definition television is the highest performance segment of the DTV system used in the US. It’s a wide screen, high-resolution video image, coupled with multi-channel, compact-disc quality sound.

HDMI (1.3 Deep Color) 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.
AV Mode "One click" - Cinema, Sports, Game mode.
TAKE IT TO THE EDGE is a true multimedia TV with an AV Mode which allows you to choose from 3 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.
**42PQ30 Specifications FluidMotion Familiarization**

**FluidMotion (180 Hz Effect)**
Enjoy smoother, clearer motion with all types of programming such as sports and action movies. The moving picture resolution give the impression of performance of up to 3x the panels actual refresh rate.

**Moving Picture Response Time**
is 16.5 milliseconds  
(120Hz takes MPRT to 8.25ms)

Panel Response Time  
is 4 to 8 milliseconds

**Panel Response Time**
is less than 1 millisecond
42PQ30 Remote Control

TOP PORTION

BOTTOM PORTION

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Rear and Side Input Jacks

AC In

USB Software Upgrades
There must be at least 4 inches of Clearance on all sides.

Weight without Stand: 50 lb
Weight with Stand: 54.7 lb

Remove 4 screws to remove stand for wall mount.
This section of the manual will discuss Disassembly, Layout and Circuit Board Identification, of the 42PQ30 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.
To remove the back cover, remove the 26 screws (The Stand does not need to be removed). Indicated by the arrows.

PAY CLOSE ATTENTION TO THE TYPE, SIZE AND LENGTH Of the screws when replacing the back cover. Improper type can damage the front.
42PQ30 Circuit Board Layout

- Y Drive
- Panel Voltage Label
- Panel ID Label
- FPC
- Y SUS Board
- Power Supply (SMPS) Board
- Z-SUS Board
- Control Board
- Main Board
- Side Input (part of main)
- Conductive Tape Under Main Board
- Left “X”
- TCP Heat Sink
- AC In
- Right “X”
- Invisible Speakers
- Master Power
- Control Keys
- Invisible Speakers
- LG TRAINING CENTER
Disassembly Procedure for Circuit Board Removal

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

Switch Mode Power Supply Board Removal

Disconnect the following Connectors: P811, P813, SC101
Remove the 8 screws holding the Board in place
Remove the Board
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VSC, -Vy and ZBias as well.

Y-SUS Board Removal

Disconnect the following Connectors: P201, P206, P101, P202
Remove the 7 screws holding the Board in place
Remove the Board by lifting slightly and sliding it to the right.
When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label.
Confirm VSC, -Vy and Zbias as well.

Y Drive Board Removal

Disconnect the following Flexible Ribbon Connectors: P1, P2, P3, P4, P5, P6, P7 and P8
Disconnect the following Connectors: P201, P801, P101, P202
Remove the 3 screws holding the Board in place
Remove the Board by lifting slightly and sliding the Board to the left unseating P204 and P200 from the Y-SUS Board.
Note: Board stand-offs have a small collar. The board must be lifted slightly to clear these collars.
Disassembly Procedure for Circuit Board Removal (2)

Z-SUS Board Removal
- Disconnect the following Connectors: P3, P2.
- Disconnect the following Connectors: P6 and P7. These are the FPC cables. Pull the locking caps to the right. Lift carefully the Flexible Printed Circuits (FPCs) and slide them out to the right.
- Remove the 5 screws holding the Board in place
- Lift the Board up and remove the Board.
- When replacing, be sure to readjust the Va/Vs voltages in accordance with the Panel Label. Confirm VS, -Vy and Zbias as well.

Main Board Removal
- Disconnect the following Connectors: P301, P1001, P1002 and P1005
- Remove the 1 screws holding on the decorative plastic piece on the right side
- Remove the 4 screws holding the Board in place and Remove the Board.

Control Board Removal
- Disconnect the following Connectors: P121 LVDS, P101, P111 Ribbon, P161 Ribbon and P162 Ribbon.
- Remove the 4 screws holding the Board in place Remove the Board.

Front Key and LED Board Removal
- Remove the 2 screws holding the Key Board in place. Remove the Board. Disconnect P101, (Note: LED Board is behind the Key Board. Remove it’s 2 screws and remove. Disconnect J1 and J2.

X-Drive Boards Removal
- Disconnect the following Connectors: P232, P211, P311 and P331
- Remove the 6 screws holding the Heat Sink in place. Rock back and slide down to remove.
- Disconnect the following Connectors: P201 through P206 and P301 through P306
- Remove the 3 screws holding each of the X Drive Boards in place (8 total)
- Remove the Boards.
Lay the Plasma down carefully on a padded surface.
Make sure AC is removed and remove the Back Cover and the Stand.
Carefully remove the LVDS Cable **P121** from the Control Board by pressing the Locking Tabs together and Pull the Connector straight back to remove the cable see illustration below. (This prevents possible damage).

(A) Remove the Stand mount (4 Screws removed during back removal).
(B) Remove the Stand Metal Support Bracket (4 Screws).
(C) Remove Connector P1001 and P1005.
(D) Remove the 4 screws from the Main Board Mounting Bracket. (Note: Decorative Plastic Piece on right does not need to be removed)
   Carefully reposition the Main Board and Mounting Bracket up and off to the right side.
(E) Remove the metal support Braces marked “E”. Note: There is a Left and a Right brace. (3 Screws per/bracket).
(F) Remove the 13 screws holding the Heat Sink.

**X-DRIVE Boards REMOVAL:**
Disconnect all TCP ribbon cables from the defective X-Drive Board. Remove the 4 screws holding the Board in place.
Remove the Board. Reassemble in reverse order. Recheck Va / Vs / VScan / -VY / Z-Drive.
Getting to the X Circuit Boards

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

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

After removing the back cover, Main Board is lifted out of the way, 6 screws removed from heat sink covering heat sink and TCPs removed, the X-Drive Boards can be removed.

Showing the tape on the Connectors P232 or P331

Peel the tape off the Connectors

Gently pry the locking mechanism upward and remove the ribbon cable from the Connector.

**Removing TCPs.**

Gently lift the locking mechanism upward on all TCP Connectors P201~206 or P301~306

Carefully lift the TCP ribbon up and off.

Cushion (Chocolate)
TCP
Flexible ribbon cable
TCP (Tape Carrier Package) Generic Removal Precautions

Note:
These picture are taken from a different model. But the precautions are the same.

TCP Connector Removal

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

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

Remove the 4 screws for either Board or 7 total for both. (The Center screw secures both Boards)

Left X Board drives the right side of the screen

Right X Board drive the left side of the screen
42PQ30 Plasma Display

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

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

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

DC VOLTAGE ADJUSTMENTS
1) SMPS Board: Va Vs (Always do SMPS first)
2) Y-SUS Board: Adjust –Vy, Vscan,
3) Z-SUS Board: Adjust ZBias

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

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

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

All label references are from a specific panel. They are not the same for every panel encountered.
**SWITCH MODE POWER SUPPLY Troubleshooting**

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

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

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

**SMPS P/N** EAY58349601

Check the silk screen label on the top center of the Board of the Power Supply itself to identify the Board P/N.

We will examine the Operation of this Power Supply.
Power Supply Board Layout

Hot Ground Symbol represents a SHOCK Hazard

P811
- M5V
- M5V
- Gnd
- VA
- VA
- Gnd
- N/C
- VS
- VS

P813
1. 17V
2. 17V
3. Gnd
4. Gnd
5. 12V
6. 12V
7. Gnd
8. Gnd
9. 5V
10. 5V
11. 5V
12. 5V
13. Gnd
14. Gnd
15. Gnd
16. N/C
17. 5V Det
18. AC Det
19. RL ON
20. VS ON
21. M5 ON
22. Auto Gnd
23. Stby5V
24. Key On
Switch Mode Power Supply Overview

The Switch Mode Power Supply Board Outputs to the:

- **VS**: Drives the Display Panel Horizontal Grid
- **VA**: Primarily responsible for Display Panel Vertical Grid
- **M5V VCC**: Used to develop Bias Voltages on the Y-SUS, X Drive, and Control Boards

Main Board:
- **16V**: Audio B+ Supply
- **5V**: Signal Processing Circuits

Adjustments:
- **VA**: RV901
- **VS**: RV951

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

- **PFC Circuit**
- **380V Source**
- **VS Source**
- **VA Source**
- **STBY 5V 17V, 12V Source**

- **Main Bridge Rectifier**
- **338V Stby 388V Run Fuse F801** 4Amp/250V
- **338V Stby 388V Run Fuse F302** 1Amp/250V
- **Main Fuse F101** 6.3Amp/250V
- **AC Input SC 101**
- **Fuse F801** 1Amp/250V
- **Fuse F302**
- **IC701 Sub Micon**
- **VA VR502**
- **VA VR901**
- **P811 To Y-SUS**
- **P813 To MAIN**
AC Voltage is supplied to the SMPS Board at Connector SC101 from the AC Input Filter. Standby 5V is developed from 90V source supply (which during run measures 359V). This supply is also used to generate all other voltages on the SMPS.

The 5V (standby) voltage is routed to the Sub Micon circuit (IC701) on the SMPS and through P813 to the Main Board for Micon (IC1) operation. AC detect Pin 18, P813 is generated on the SMPS by monitoring the AC input and rectifying a small sample voltage. This AC Detect Voltage is routed to (IC701) the Sub Micon on the SMPS and through pin 18 of PG813 to the Micon (IC1) located on the Main Board and is used to Reset the Main Board.

When the Micon (IC1) on the Main Board receives an “ON” Command from either the Keyboard or the Remote IR Signal it outputs a high called RL ON. This signal first turns on a DC level shifter on the main board which creates a voltage called 5V General. This 5V General now provides the pull up voltages which supply the output control circuits to the SMPS. The RL ON enters the SMPS Board (Pin 19 of P813). At the same time, the 5V General voltage also creates a signal called 5V Det. This is routed to the main Micon and to the SMPS (Pin 17 PG813) notifying the SMPS sub-Micon that the main board is functioning. The RL ON Voltage is sensed by the Sub Micon (IC701) circuit which causes the Relay Drive Circuit to close both Relays RL101 and RL103 bringing the PFC source up to full power by increasing the 90V standby to 340V which can be read Fuse F801. At this time the 17V and 12V sources becomes active and are sent to the Main Board via P813. (17V pins 1 and 2 and 12V at pins 5 and 6 of P813)

The next step is for the Micon (IC1) on the Main Board to output a high on M5V ON Line to the SMPS at P813 Pin 21 which is sensed by the Sub Micon IC (IC701) on the SMPS turning on the M5V line from P811pins 9 and 10 to the Y-SUS board.

The last step to bring the supply to “Full Power” occurs when the Micon (IC100) on the Main Board brings the VS-ON line high at Pin 20 of P813 on the SMPS Board which when sensed by the Sub Micon IC (IC701) turns on the VA and VS Supplies (VA pins 6 and 7 is brought high before VS pins 1 and 2) and output from P811 to the Y-SUS board.
POWER SUPPLY (SMPS)

AC In

Stand By 5V Reg

In Stand-By Primary side is 90V

AC Det.

Stand By 5V

5V Det.

Relay On

12V/16V Regulators

12V 17V

M5V On

Vs Reg

Va Reg

5V and 15V

In Run (Relay On) Primary side is 370V

Vs/Va (DC Voltage)

POWER SUPPLY

Y-SUS PWB

M5V (DC Voltage)

Also develops 15V

Vs/Va (DC Voltage)

Va

Vs

15V

5V

5V and 15V From Y-SUS to Control PWB

Vs from Y-SUS

Z-SUS PWB

15V

5V

X PWBs

Va From Y-SUS

12V Video

16V Audio

MAIN PWB

12V 17V

M5V Reg

5V Reg

5V Video

16V Audio

5V and 15V

At point TV is in Stand-By state. Energy Star compliant. Less than 1 Watt

Microprocessor or BCM

Both LEDs On Looks Amber

Power On

Remote Or Key

Resets Main Board

5V and 15V

From Y-SUS to Control PWB

5V 15V

5V Reg

Vs Reg

Va Reg

12V

17V

M5V Reg

42PQ30 Power Supply Turn On Sequence
Understanding the Power On Sequence when Troubleshooting a possible Power Supply Failure will simplify the process of isolating which circuit board failed to operate properly. In this Section we will investigate the Power on Sequence and examine ways to locate quickly where the failure occurred.

When Power is pressed, listen for a Relay Click, the click of the Relay is an indication of RL-ON going high. RL-ON is sent from the Main Board to the SMPS and when present the IC701 controls the operation of both Relays. RL-ON going High and no Relay is a failure of the SMPS, RL-ON staying low is a failure of the Main Board or something between.

Relay Operation means that the SMPS if working properly will output the 17V and 12V Supplies to the Main Board. These voltages will allow the Tuner, Audio and Video Circuits on the Main Board to function and if connected to an Antenna Input, Audio would be present. If the Relays closes and these supplies failed suspect a problem with the SMPS or an excessive load on the line.

The next step of operation calls for the M5V ON line from the Main Board to the SMPS to go high on P813 pin 21. A high on the M5V ON Line activates the M5V line to the Y-SUS Board. Loss of M5V results in no “Raster”, no Display Panel Reset, no Y, Z, Control or X Board operation. Loss of M5V and/or M5V ON going high could be caused by any of these boards or failure of the SMPS. M5V ON staying low indicates a problem on the Main Board.

VS-ON is the last step of the Power Sequence and is responsible for bringing the VS and VA Voltages up. The VS ON signal pin 20 P813 is sent from the Main Board to the SMPS as a high, VS and VA and full operation of the Display Panel are now enabled. Loss of VS-ON results in loss of VA and VS and no Raster, no Panel Display Reset but Audio would be present. If VS-ON went high and VS and VA where missing the problem could be caused by a failure on the SMPS or a circuit using these voltages. A Resistance check should narrow the possible failures quickly.
Switch Mode Power Supply Static Test

This test can confirm the proper operation of the SMPS without the need to exchange the board. This Power Supply can operate in a No Load State. This means that by applying AC power to SC101 and all other plugs disconnected, this power supply will function. Simply removing P813 (Lower Right Hand Side of the Board), will cause the “AUTO” Pin 22 to go high from its normal low state allowing the Power Supply to go to full power on mode when AC Power is Supplied. Be careful after this test and make sure the VA and VS lines have discharged before reconnecting the supply cables.

For a “Stand-Alone” static test for the Power Supply, apply the usual 2 100Watt light Bulbs in series test between Vs output and chassis ground for a simulated 200Watt load. If the Power Supply operates in this condition, it is assured it can maintain its output power under load.

If the Y-SUS, Z-SUS and X Boards are working normal, when the SMPS comes up to full power on, “Display Panel Reset” will be visible. Shorting the Auto Pattern Gen. test points at this time should result with test patterns on the screen.

If either Y-SUS or Z-SUS is causing the power supply to shutdown, unplug the Z-SUS. (Remember, Vs is routed to the Z-SUS Board P3 from the Y-SUS P206 pins 1 & 2. This will allow the Y-SUS to function. Also, if you unplug the Y-SUS from the SMPS and jump the 5V VCC line to any 5V location on the Control Board the Control Board will function.)
Static Test with Light Bulb Load on Power Supply

Using two 100 Watt light bulbs, attach on end to Vs and the other end to ground. Apply AC to SC101. If the light bulbs turn on, 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 assured the power supply is OK.

The Main PWB will not function without both of these arriving from the SMPS:

- Check Pins 9, 10, 11 or 12 for 5VSBY
- Check Pin 18 for AC Det 5V

Any time AC is applied to the SMPS, STBY 5V and AC DET should be present.

- Check Pins 1 or 2 for 17V
- Check Pins 5 or 6 for 12V

Note: The light bulb test is not necessary for the SMPS to turn on and stay on. This SMPS will run without a load. But it is necessary to test the SMPS under a load.
**Switch Mode Power Supply Static Test (Forcing on the SMPS in stages)**

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

(B) When AC Power is applied, Check AC Det (Pin 18) and 5V Stand-By (Pins 9 ~ 12) are 5V.

(C) 100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to RL ON (Pin 19) closes relay RL101 and RL103 turning on the 17V and 12V Supplies.

(D) 100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to M5 ON (Pin 21) brings the M5V (P811 pins 9, 10) line high.

(E) 100Ω ¼ watt resistor added from 5V STB (Pins 9 ~ 12) to VS ON (Pin 20) brings the VA and VS (P811 pins 1 and 2 Vs and Pins 6 and 7 Va) Lines high

P811 disconnected from the Power Supply.  
P813 disconnected from the Main PWB.
SMPS Va and Vs Adjustments

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

Use Full White Raster “White Wash”

SMPS Va and Vs Adjustments

Va TP
P811
Pin 6 or 7

Vs TP
P811
Pin 1 or 2

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

VA Adjust
VR502

VS Adjust
VR901

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# P813 Odd Pins ID and Voltage and Diode Checks

Voltage and Diode Mode Measurements for the SMPS

P813 Connector “SMPS” to “Main Board” P301

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17V</td>
<td>0V</td>
<td>17.3V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>11</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>17</td>
<td>5V Det</td>
<td>.15V</td>
<td>5V</td>
<td>3.1V</td>
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<tr>
<td>19</td>
<td>RL On</td>
<td>0V</td>
<td>3.73V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>M5 ON</td>
<td>0V</td>
<td>3.24V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Stby 5V</td>
<td>5V</td>
<td>5V</td>
<td>Open</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>17V</td>
<td>0V</td>
<td>17.3V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>6</td>
<td>12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>12</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>14</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
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<tr>
<td>16</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Not Used</td>
</tr>
<tr>
<td>18</td>
<td>AC Det</td>
<td>5V</td>
<td>5V</td>
<td>1.0V</td>
</tr>
<tr>
<td>20</td>
<td>VS On</td>
<td>0V</td>
<td>3.2V</td>
<td>Open</td>
</tr>
<tr>
<td>22</td>
<td>Auto Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>24</td>
<td>*Key On</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
</tbody>
</table>

*Note: If the Key On line is 4.38V, the Main Power Switch is open. Stand-By 5V will shut off.

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
## SC101 and P811 Pin ID and Voltage and Diode Checks

### Voltage and Diode Checks Measurements for the SMPS.

**SC101 AC INPUT**

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

**P811 Connector "Power Supply Board" to Y-SUS**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vs</td>
<td>0V</td>
<td>*194V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Vs</td>
<td>0V</td>
<td>*194V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>4</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>Va</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Va</td>
<td>0V</td>
<td>*60V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>0V</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>2.99V</td>
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<tr>
<td>10</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>2.99V</td>
</tr>
</tbody>
</table>

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
**Y-SUS Board SECTION (Overview)**

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

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

- Adjustments
- DC Voltage and Waveform Checks
- Resistance Measurements

**Operating Voltages**

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

<table>
<thead>
<tr>
<th>Y-Z SUS Developed</th>
<th>-VY VR502</th>
<th>VSC VR501</th>
<th>V SET UP VR601</th>
<th>V SET DN VR602</th>
<th>15V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-Z SUS Developed</td>
<td>-VY Sets the Negative excursion of the Y SUS Drive Waveform</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VSC Set the amplitude of the complex waveform.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ramp UP sets amplitude of the Top Ramp of the Drive Waveform</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V Set Down sets the Pitch of the Bottom Ramp of the Drive Waveform</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>To the Control Board then routed to the Z-SUS board</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floating Ground</td>
<td>FG 5V</td>
<td>Used on the Y-Drive boards (Measured from Floating Gnd)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Preliminary Information 42PQ30

**Y-SUS Board Layout**

- **P203, P208, P205 and P207** Plugs into Y-Drive board. Pin 1 Y-SUS opposite on Y-Drive.

- **P203, P208 and P205** All Floating Ground.

- **P207** Pins 1 and 2 Y Scan signal.

- **Floating Gnd 5V** Pins 4 and 5.

- **P207** Pins 1 and 2 Y Scan signal.

- **VSC TP** R520/J263

- **-VY TP** R201

- **VSC ADJ** VR501

- **-VY ADJ** VR502

- **SET UP** VR 601

- **V SET DN** VR 401

- **FS201(5V)** 4A

- **FS201(15V)** 4A

- **15V TP** J269

- **FS203 (Va)** 10A

- **VS, VA and M5V Input from the SMPS**

- **Logic Signals from the Control Board**

- **5V and 15V**

- **FS202 (Vs)** 4A 250V

- **VS to Z-SUS**

- **Floating Gnd 5V** Pins 4 and 5

- **Pins 7, 8, 9, 10 and 11 Logic (Drive) Signals to the Y Drive Boards**

- **Model: PDP 42G2####**
  - Voltage Setting: 5V / Va: 60V / Vs: 194V
  - N.A. /-175 / 140 / N.A. / 80
  - Max Watt: 330 W (Full White)
**Y-SUS Board P207 Explained**

- Use the Left Side of C213 to test for Y Scan signal
- Y-Drive Board
- Y-SUS Board

**P207 Pins 1 and 2**
- Y Scan signal

**5V measured from Floating Gnd**
- Pins 4 or 5 P207

**P207 Pins 7, 8, 9, 10 and 11**
- Logic (Drive) Signals to the Y Drive Boards

- FL1
- Bottom Connector P207

**Pin List**
1. Scan Sig
2. Scan Sig
3. n/c
4. 5V FG
5. 5V FG
6. SUS_Dn
7. CLK
8. STB
9. OC1
10. DATA
11. n/c
12. SUS_Dn

**Use the Left Side of C213 to test for Y Scan signal**
**VSC and -VY Adjustments**

**Y SUSTAIN ADJUSTMENT DETAILS**

These are DC level Voltage Adjustments

---

**Model:** PDP42G2###

---

Voltage Setting: 5V / Va: 60 / Vs: 193
NA -180 / 140 / N.A. / 80

---

- VY TP R201
- VSC TP R520 / J263

---

Voltage Reads Positive

---

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

Adjust –VY to Panel Label voltage (+/- 1V)
Adjust VSC to Panel Label voltage (+/- 1V)

---

**CAUTION:** Use the actual panel label and not the book for exact voltage settings.
Y-Drive Signal Overview

Y-Drive Board Test Point
(Top of Y-Drive Board)

1. Overall signal observed 4mS/div

2. Highlighted signal from waveform above observed 400uS/div

3. Highlighted signal from waveforms above observed 100uS/div

NOTE: The Waveform Test Point is 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.

NOTE: The two test points just below and to the left will also work for the Y-Drive waveform Test Point.

528V p/p

100uS
**Observing (Capturing) the Y-Drive Signal for \( V_{\text{setup}} \) and \( \text{Set DN} \)**

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 into the Y-Drive Waveform. Fig 1 shows the signal locked in at 4ms per/div. Note the 2 blanking sections. The signal for \( \text{SET-UP} \) or \( \text{SET-DN} \) is outlined within the Waveform.

**Fig 2:**
At 2mSec per/division, the waveform area to use for \( \text{SET-UP} \) or \( \text{SET-DN} \) is now becoming clear.

**Fig 3:**
At 400us per/div. the signal for \( \text{SET-UP} \) or \( \text{SET-DN} \) is now easier to recognize. It is outlined within the Waveform.

**Fig 4:**
At 40uSec per/division, the adjustment for \( \text{SET-UP} \) can be made.

**Fig 5:**
At 40uSec per/division, the adjustment for \( \text{SET-DN} \) can be made.
V-Set Up and V-Set Down Adjustments

Y SUSTAIN ADJUSTMENT DETAILS (Vs, Va, VSC and –VY must have already been completed). Set in White Wash.

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

SET-UP ADJUST:
1) Adjust VR601 and set the (A) portion of the signal to match the waveform above.

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

ADJUSTMENT LOCATION:
Just to the bottom right of the right hand heat sink.

Waveform TP on the Y-Drive PWB

- VR601 Set-up
- VR401 Set-Dn

Connect Scope between Waveform TP on Y-Drive and Gnd

160V ± 1V

0V

185μSec ± 5μSec

50VAC rms  100V  100uS  483V p/p
V Set Up Too High or Low

Panel Waveform Adjustment

The center begins to wash out and arc due to Vset UP. Peeking too late and alters the start of the Vset DN phase.

Very little alteration to the picture, the wave form indicates a distorted Vset UP. The peek widens due to the Vset UP peeking too quickly.
**V Set Dn Too High or Low**

Vset Dn swing is Minimum 110uS Max 200uS+

- **Vset Dn too high**
  - All of the center washes out due to increased Vset_DN time.

- **Vset Dn too low**
  - The center begins to wash out and arc due to decreased Vset Dn time.

**Panel Waveform Adjustment**

NOTE: If VSET-DN is too high, this set will go to excessive bright, then shutdown. To correct, remove the LVDS from control Board and make necessary adjustments.
Block Diagram of Y-Sustain Board

Power Supply Board - SMPS

Receive M5V, Va, Vs from SMPS

Generates Vsc and -Vy from Vs by DC/DC Converters Also controls Ramp Up/Down

Circuits generate Y Sustain Waveform

Distributes VA

FETs amplify Sustain Waveform

Generates Floating Ground 5V by DC/DC Converters

Y Drive Board Receives Scan Waveform

Control Board

Distributes 15V and 5V

Logic signals needed to generate drive waveform

Y Drive Board

Display Panel

Z-SUS Board

Distributes 15V

Left X Board

Generates Floating Ground 5V by DC/DC Converters
Y-SUS How to Check the Output FETs

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

**IRFP4332**
- Forward: 0.5V ~ 0.7V
- Reverse: 1.1V

**IRGP4086**
- Forward: 0.6V ~ 0.7V
- Reverse: 1.3V

**RF2001**
- Forward: Shorted
- Reverse: Shorted

**30N45T**
- Forward: 0.6V
- Reverse: Shorted

**K3667**
- Forward: 0.22V
- Reverse: Open

**IRFP4332**
- Forward: 0.4V ~ 0.5V
- Reverse: Open

**IRGP4086**
- Forward: 0.39V ~ 0.5V
- Reverse: Open

**RF2001**
- Forward: 0.4V
- Reverse: Open

**30N45T**
- Forward: 0.6V
- Reverse: Shorted

**K3667**
- Forward: 0.5V
- Reverse: Open

**IRFP4332**
- Forward: 1.6V
- Reverse: Open

**IRGP4086**
- Forward: 0.6V ~ 0.7V
- Reverse: 1.3V

**RF2001**
- Forward: 0.38V
- Reverse: Open

**30N45T**
- Forward: 0.6V
- Reverse: Shorted

**K3667**
- Forward: 0.4V ~ 0.5V
- Reverse: Open
## Y–SUS P201 to SMPS P812 Voltage and Diode Checks

### Voltage and Diode Checks Measurement

#### P201 Connector "Y-SUS" to "Power Supply Board" P811

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vs</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Vs</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
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<td>NC</td>
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<td>NC</td>
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<td>4</td>
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<td>7</td>
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<td>9</td>
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<tr>
<td>10</td>
<td>M5V</td>
<td>0V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
</tbody>
</table>

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
**Y-SUS P202 to X Drive P211 and P311 Voltage and Diode Checks**

Voltage and Diode Mode Measurements for the Y SUS Board

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

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
**Y-SUS P801 to Z Drive P1 Voltage and Diode Checks**

Voltage and Diode Mode Measurements for the Y SUS Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Er Com</td>
<td>0V</td>
<td>* 94.9V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Er Com</td>
<td>0V</td>
<td>*94.9V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
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<tr>
<td>4</td>
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<td>Gnd</td>
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<tr>
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<td>Gnd</td>
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</tr>
<tr>
<td>6</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
</tr>
<tr>
<td>7</td>
<td>VS</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>VS</td>
<td>0V</td>
<td>*193V</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
P101 Y-SUS to Control Board P111 Plug Information

Voltage Measurements for the Y SUS Board

These Connector pins are too close to read without possible damage to the Board

Actually a 30 Pin Connector “Measurements can be made on the Control Board

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

FS201
5V to run the Control Board.
Also sent to the Z-SUS Board.
Routed through the Control Board.
Leaves the Control Board on P101 pins 10.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>0V</td>
</tr>
<tr>
<td>Run</td>
<td>5V</td>
</tr>
<tr>
<td>Diode Check</td>
<td>1.1V</td>
</tr>
</tbody>
</table>

15V Test Point
17V to run the Z-SUS Board.
Routed out P101 through the Control Board.
Leaves the Control Board on P101 pins 11 and 12.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
<td>0V</td>
</tr>
<tr>
<td>Run</td>
<td>15V</td>
</tr>
<tr>
<td>Diode Check</td>
<td>0.78V</td>
</tr>
</tbody>
</table>
**Y-SUS P101 to Control P111 Voltage and Diode Checks**

“Y-SUS” P101 Connector to “Control Board” P111

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>n/a</td>
<td>0V</td>
<td>0.1V</td>
<td>0.65V</td>
</tr>
<tr>
<td>5</td>
<td>n/a</td>
<td>0V</td>
<td>1.28V</td>
<td>0.65V</td>
</tr>
<tr>
<td>7</td>
<td>n/a</td>
<td>0V</td>
<td>0V</td>
<td>0.65V</td>
</tr>
<tr>
<td>9</td>
<td>n/a</td>
<td>0V</td>
<td>0.6V</td>
<td>0.65V</td>
</tr>
<tr>
<td>11</td>
<td>n/a</td>
<td>0V</td>
<td>2.96V</td>
<td>0.65V</td>
</tr>
<tr>
<td>13</td>
<td>n/a</td>
<td>0V</td>
<td>1.4V</td>
<td>0.65V</td>
</tr>
<tr>
<td>15</td>
<td>n/a</td>
<td>0V</td>
<td>0V</td>
<td>0.65V</td>
</tr>
<tr>
<td>17</td>
<td>n/a</td>
<td>0V</td>
<td>1.89V</td>
<td>0.65V</td>
</tr>
<tr>
<td>19</td>
<td>n/a</td>
<td>0V</td>
<td>2.16V</td>
<td>0.65V</td>
</tr>
<tr>
<td>21</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>23</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>25</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.44V</td>
</tr>
<tr>
<td>27</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.44V</td>
</tr>
<tr>
<td>29</td>
<td>15V</td>
<td>0V</td>
<td>15V</td>
<td>Open</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>n/a</td>
<td>0V</td>
<td>0.12V</td>
<td>0.65V</td>
</tr>
<tr>
<td>4</td>
<td>n/a</td>
<td>0V</td>
<td>0.13V</td>
<td>0.65V</td>
</tr>
<tr>
<td>6</td>
<td>n/a</td>
<td>0V</td>
<td>0.2V</td>
<td>0.65V</td>
</tr>
<tr>
<td>8</td>
<td>n/a</td>
<td>0V</td>
<td>1.05V</td>
<td>0.65V</td>
</tr>
<tr>
<td>10</td>
<td>n/a</td>
<td>0V</td>
<td>0.17V</td>
<td>0.65V</td>
</tr>
<tr>
<td>12</td>
<td>n/a</td>
<td>0V</td>
<td>2.5V</td>
<td>0.65V</td>
</tr>
<tr>
<td>14</td>
<td>n/a</td>
<td>0V</td>
<td>0V</td>
<td>0.65V</td>
</tr>
<tr>
<td>16</td>
<td>n/a</td>
<td>0V</td>
<td>0V</td>
<td>0.65V</td>
</tr>
<tr>
<td>18</td>
<td>n/a</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>20</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>22</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>24</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.44V</td>
</tr>
<tr>
<td>26</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.44V</td>
</tr>
<tr>
<td>28</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.44V</td>
</tr>
<tr>
<td>30</td>
<td>15V</td>
<td>0V</td>
<td>15V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
Y-SUS P207 Voltage Readings

All voltages taken from Floating Ground.

Warning: Do not hook scope ground up unless set plugged into an isolation transformer.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>VSC</td>
<td>140V</td>
</tr>
<tr>
<td>2)</td>
<td>VSC</td>
<td>140V</td>
</tr>
<tr>
<td>3)</td>
<td>Nc</td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>5V VF</td>
<td>5V</td>
</tr>
<tr>
<td>5)</td>
<td>5V VF</td>
<td>5V</td>
</tr>
<tr>
<td>6)</td>
<td>SUS_DN</td>
<td>FGnd</td>
</tr>
<tr>
<td>7)</td>
<td>CLK</td>
<td>0.96V</td>
</tr>
<tr>
<td>8)</td>
<td>STB</td>
<td>2.3V</td>
</tr>
<tr>
<td>9)</td>
<td>OC1</td>
<td>2.3V</td>
</tr>
<tr>
<td>10)</td>
<td>DATA</td>
<td>0V</td>
</tr>
<tr>
<td>11)</td>
<td>Nc</td>
<td></td>
</tr>
<tr>
<td>12)</td>
<td>SUS_DN</td>
<td>FGnd</td>
</tr>
</tbody>
</table>
**Y-SUS P207 (Drive Output Plug) TESTING**

**P104 OF THE Y-DRIVE Board**

**P207 OF THE Y-DRIVE Board**

---

**CHECKING THE Y-SUS Board**
Disconnected from the Y-DRIVE Board

---

**Readings from Floating Ground (Pin 1)**

<table>
<thead>
<tr>
<th>RED LEAD Blk Lead FG</th>
<th>BLACK LEAD Red Lead FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y Drive Sig</td>
<td></td>
</tr>
<tr>
<td>1.) VSC</td>
<td>Open</td>
</tr>
<tr>
<td>2.) VSC</td>
<td>Open</td>
</tr>
<tr>
<td>3.) nc</td>
<td>Open</td>
</tr>
<tr>
<td>4.) FG+5V</td>
<td>1.78V</td>
</tr>
<tr>
<td>5.) FG+5V</td>
<td>1.78V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td></td>
</tr>
<tr>
<td>6.) SUS Dn</td>
<td>0V</td>
</tr>
<tr>
<td>7.) CLK</td>
<td>1.57V</td>
</tr>
<tr>
<td>8.) LE</td>
<td>1.57V</td>
</tr>
<tr>
<td>9.) OC1</td>
<td>1.67V</td>
</tr>
<tr>
<td>10.) Data</td>
<td>1.57V</td>
</tr>
<tr>
<td>11.) nc</td>
<td>1.67V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td></td>
</tr>
<tr>
<td>12.) SUS Dn</td>
<td>0V</td>
</tr>
</tbody>
</table>

**Meter in the Diode Mode**

---

**Pin 1 Floating Ground**

**Pin 1 on Y-SUS is backwards compared to Y-Drive**
BACK SIDE OF THE Y-SUS BOTTOM CENTER OF THE BOARD

Read 17V from Chassis Ground

Read FG voltages from Floating Ground

Use External 5V Source connected to M5V Input for test.

Y-SUS FG5V, FG15V And 17V Testing

FG 20V
FG 15V
FG 9V
FG 5V

D506 Cathode 17V Source
D508 Cathode FG20V Source
D509 Cathode FG9V Source

IC507
IC508

T502
Y-DRIVE BOARD SECTION (Y-Drive Explained)

Y-Drive Board works as a path supplying the Sustain and Reset waveforms which are made in the Y SUSTAIN Board and sent to the Panel through SCAN DRIVER IC’s. The Y Drive Boards supply a waveform which selects the horizontal electrodes sequentially.

* 42PQ30 uses 8 DRIVER ICs on 1 Y Drive Board

To facilitate scope attachment, solder a small wire (Stand Off) at this point.
**Y Drive Board ID**

5 Volts, Y Drive and Logic Signals from Y SUS Board are supplied to the Drive Board on Connectors P104.

Floating Ground from the Y SUS Board P101, P103, P102 and pins 1 and 7 of P104

Y Drive Scan Signal Input

Floating Gnd +5V

Y Drive and Logic Signals (Clock and Data) from the Y SUS Board

---

Check 5V supply using FL1 or across C18. Measured from Floating Ground

Y Drive Scan (VSC) Signal Input TP
Or measure at Pins 1 and 2 of P104
Y Drive P207 Voltage Readings

All voltages taken from Floating Ground.

Warning: Do not hook scope ground up unless set plugged into an isolation transformer.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>VSC</td>
<td>140V</td>
</tr>
<tr>
<td>2)</td>
<td>VSC</td>
<td>140V</td>
</tr>
<tr>
<td>3)</td>
<td>Nc</td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td>5V VF</td>
<td>5V</td>
</tr>
<tr>
<td>5)</td>
<td>5V VF</td>
<td>5V</td>
</tr>
<tr>
<td>6)</td>
<td>SUS_DN</td>
<td>FGnd</td>
</tr>
<tr>
<td>7)</td>
<td>CLK</td>
<td>0.96V</td>
</tr>
<tr>
<td>8)</td>
<td>STB</td>
<td>2.3V</td>
</tr>
<tr>
<td>9)</td>
<td>OC1</td>
<td>2.3V</td>
</tr>
<tr>
<td>10)</td>
<td>DATA</td>
<td>0V</td>
</tr>
<tr>
<td>11)</td>
<td>Nc</td>
<td></td>
</tr>
<tr>
<td>12)</td>
<td>SUS_DN</td>
<td>FGnd</td>
</tr>
</tbody>
</table>
**Y-Drive Board Buffer Troubleshooting**

**CHECKING THE Y-DRIVE Board**
Disconnected from the Y-SUS Board

<table>
<thead>
<tr>
<th>Y Drive Sig</th>
<th>RED LEAD Blk Lead FG</th>
<th>BLACK LEAD Red Lead FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y Drive Sig</td>
<td>12.) VSC 1.15V</td>
<td>Open</td>
</tr>
<tr>
<td>Y Drive Sig</td>
<td>11.) VSC 1.15V</td>
<td>Open</td>
</tr>
<tr>
<td>Y Drive Sig</td>
<td>10.) nc Open</td>
<td>Open</td>
</tr>
<tr>
<td>Y Drive Sig</td>
<td>9.) FG+5V 0.4V</td>
<td>Open</td>
</tr>
<tr>
<td>Y Drive Sig</td>
<td>8.) FG+5V 0.4V</td>
<td>Open</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>7.) SUS Dn 0V</td>
<td>0V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>6.) CLK 0.5V</td>
<td>2.9V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>5.) LE 0.5V</td>
<td>2.9V</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>4.) OC1 0.5V</td>
<td>Open</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>3.) Data 0.62V</td>
<td>Open</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>2.) nc 0.48V</td>
<td>Open</td>
</tr>
<tr>
<td>Floating Gnd</td>
<td>1.) SUS Dn 0V</td>
<td>0V</td>
</tr>
</tbody>
</table>

Meter in the Diode Mode

Pin 1 Floating Ground

Pin 1 on Y-SUS is backwards compared to Y-Drive
**Removing (Panel) Flexible Ribbon from Y Drive**

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

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

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

The Ribbon Cable is clearly improperly seated into the Connector. You can tell by observing the linearity.

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

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

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

**YOU CAN CHECK ALL 8 BUFFER ICs USING THIS PROCEDURE**

**BACK SIDE OF Y-DRIVE Board**

**BUFFER IC FLOATING GROUND (FGnd)**

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

- **RED LEAD ON BUFFER IC FGnd**
  - Indicated by white outline
  - READING 0.78 V

- **BLACK LEAD ON “ANY” OUTPUT LUG.**
  - READING “OPEN”

**128 Output Pins per/buffer**

- 6 Ribbon cables (Horizontal Grids)
- 768 Total Horizontal Grids controlling Vertical resolution

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

This Section of the Presentation will cover troubleshooting of the Z-SUS Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate Voltage and Diode Checks test points needed for troubleshooting and alignment.

Locations

- DC Voltage and Waveform Test Points
- Z BIAS Alignment
- Resistance Test Points

Operating Voltages

- Y SUS Supplied
  Developed on Y SUS and sent through the Control Board
  5V Vcc
  15V

- Z Bias

Developed on Y SUS
Z-SUS Board Layout

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

Logic Signals from the Control Board
Also +15V and +5V

VS Input from the Y-SUS

Z-SUS Board Layout

Z SUS Waveform Development ICs

Z SUS Waveform Test Point J27

Z Bias ADJ VR8

VZ (Z-Bias) TP Right side R49 or R50

No IPMs

VS Input from the Y-SUS

Logic Signals from the Control Board
Also +15V and +5V

Z SUS Output ICs

VZ (Z-Bias) TP Right side R49 or R50

Logic Signals from the Control Board
Also +15V and +5V

Z Bias ADJ VR8

FPC

P6

P3

P2
**Z-SUS Waveform**

Provides the SUSTAIN PULSE and ERASE PULSE for generating SUSTAIN discharge in the panel by receiving Drive signals from the Y-Z-SUS Board.

This waveform is supplied to the panel through FPC (Flexible Printed Circuit).

Z-Bias is a “DC” adjustment. The effects of this adjustment can be observed on the scope looking at the Z-SUS output.

Note: The Vzb Adjustment is a DC level adjustment.
**VZ (Z-Bias) Adjustment**

Read the Label on the back of the upper left hand side of the panel. Adjust using VR8.

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

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

---

**Model:** PDP42G2###

809K442G2000568.AKLGGD

Voltage Setting: 5V / Va:60 / Vs:193
NA / -180 / 140 / N.A. / 80

Z Bias

---

**Measured from Chassis Ground**
Z-SUS Block Diagram

Control Board

- Distributes Logic Signals
- NO IPMs

Y-SUS Board

- Receives VS from Y-SUS and 15V, 5V from Control Board
- Generates Z Bias 100V

Z-SUS Board

- Circuits generate erase, sustain waveforms

POWER SUPPLY Board

- M5V, VA, VS

Display Panel

- Via FPC (flexible printed circuit)

5V, 15V

Via FPC

5V, 15V
Z-SUS P3 Connector to Y-SUS P206 Voltage and Diode Checks

Voltage and Diode Mode Measurements

P3 Connector “Z-SUS Board” to “Y-SUS Out” P206

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ER COM</td>
<td>0V</td>
<td>*94.9V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>ER COM</td>
<td>0V</td>
<td>*94.9V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>6</td>
<td>nc</td>
<td>nc</td>
<td>nc</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>VS</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>VS</td>
<td>0V</td>
<td>*193V</td>
<td>Open</td>
</tr>
</tbody>
</table>

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
**Z-SUS P2 Connector to Control P101 Voltage and Diode Checks**

Voltage and Diode Mode Measurements

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z SUS DN</td>
<td>0V</td>
<td>0.79V</td>
<td>2.8V</td>
</tr>
<tr>
<td>2</td>
<td>Z SUS UP</td>
<td>0V</td>
<td>0.13V</td>
<td>2.8V</td>
</tr>
<tr>
<td>3</td>
<td>Z ER UP</td>
<td>0V</td>
<td>0.19V</td>
<td>2.8V</td>
</tr>
<tr>
<td>4</td>
<td>Z ER DN</td>
<td>0V</td>
<td>0.4V</td>
<td>2.8V</td>
</tr>
<tr>
<td>5</td>
<td>Z BIAS</td>
<td>0V</td>
<td>1.9V</td>
<td>2.8V</td>
</tr>
<tr>
<td>6</td>
<td>OE</td>
<td>0V</td>
<td>0.8V</td>
<td>Open</td>
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<td>7</td>
<td>CTRL_OE</td>
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<td>1.9V</td>
<td>Open</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>+5V</td>
<td>0V</td>
<td>4.9V</td>
<td>Open</td>
</tr>
<tr>
<td>11</td>
<td>+15V</td>
<td>0V</td>
<td>16.9V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>+15V</td>
<td>0V</td>
<td>16.9V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
This Section of the Presentation will cover troubleshooting the Control Board Assembly. Upon completion of this section the Technician will have a better understanding of the circuit and be able to locate voltage and resistance test points needed for troubleshooting.

- DC Voltage and Waveform Test Points
- Resistance Test Points

**Signals**
- Main Board Supplied: LVDS Signal
- Control Board Generated:
  - Y and Z Sustain Drive Signals (Luminance)
  - X Board Drive Signals (Color)

**Operating Voltages**
- Y SUS Supplied:
  - +5V (Also Routed to the Z-SUS)
  - +15V (Routed to the Z-SUS)
- Developed on the Control board:
  - +1.8V
  - (2) +3.3V
Unplug all connectors. Jump 5V from SMPS (P813 pins 9~12) to pin 1 of IC211. Observe LED. If it blinks, most likely Control PWB is OK. FL111 and FL112 should be checked.

Disconnect P201 from the Y SUS Board and connect a Jumper from Pin 10 of P812 (M5V) to Pin 10 P201 (5V). The 5V will be routed to the Control Board via FS201, Ribbon Cable P101 on the Y SUS Board and FL111 and FL112 on the Control Board for Control Board operation verification.

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

Short across the two points labeled Auto Gen to generate a test pattern.

* If the complaint is no video and shorting the points (AutoGen) causes video to appear suspect the Digital PCB.
Control Board Testing

For quick Board test. (All Board Connectors Disconnected).

Jump 5V from Power Supply to IC201 Pin 1. (Bottom Pin)
If the LED blinks, Pretty much guaranteed, Board is OK.

Quick observation Of LED blinking Tell if the Control Board is running.

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

Confirm B+ to Control Board VS_DA
Control Board Check 3V ~ 3.3V
(Note, this TP can also be Used as an External Trigger For scope when locking onto the Y-Drive signal).
Checking the Crystal X101 “Clock” on the Control Board

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

DC Voltage Check
1.5V ~ 1.8V
LVDS

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

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

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

Control Board to X Board Address Signal Flow

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

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

P111 These pins are very close together. When taking Voltage measurements use Caution.

- FL111 and FL112 +5V Fuse
- Pins 1, and 2 Receive +15V from the Y-SUS.
- Pins 3, 4, 5, 6, and 7 Receive M5V from the Y-SUS.
- Pins 9, 10, 11 and 30 Are Ground
- All the rest are delivering Y-Drive logic signals to the Y-SUS Board
- The +15V is not used by the Control board, it is routed to the Z-SUS, leaving on P101 Pins 11 and 12.
- The M5V from the Y-SUS is also routed through the Control and out to the Z-SUS, leaving on P101 Pins 10.
Control Board Connector P111 Silkscreen Can Be Misleading

P111 The silkscreen indicates the left side is 1~15 and the right side is 16~30, however this is not correct. Use the normal Left Side Odd and Right Side Even pin configuration.

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

Example:

Odd Pins

Even Pins

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

### P111 Connector “Control Board” to “Y-SUS” P101

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15V</td>
<td>0V</td>
<td>15V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>15V</td>
<td>0V</td>
<td>15V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>4</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>5</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>6</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.97V</td>
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<tr>
<td>7</td>
<td>5V</td>
<td>0V</td>
<td>5V</td>
<td>0.97V</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>11</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>12</td>
<td>Dummy 2</td>
<td>0V</td>
<td>2.16V</td>
<td>2.8V</td>
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<tr>
<td>13</td>
<td>OE</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
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<tr>
<td>14</td>
<td>OC2</td>
<td>0V</td>
<td>1.89V</td>
<td>2.8V</td>
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<tr>
<td>15</td>
<td>SUS-DN</td>
<td>0V</td>
<td>0V</td>
<td>2.8V</td>
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<tr>
<td>16</td>
<td>Data</td>
<td>0V</td>
<td>0V</td>
<td>2.8V</td>
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<tr>
<td>17</td>
<td>ER_DN</td>
<td>0V</td>
<td>0V</td>
<td>2.8V</td>
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<tr>
<td>18</td>
<td>BLK</td>
<td>0V</td>
<td>1.4V</td>
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<td>19</td>
<td>Set_Up</td>
<td>0V</td>
<td>2.5V</td>
<td>2.8V</td>
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<td>20</td>
<td>STB</td>
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<td>2.8V</td>
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<td>21</td>
<td>Dummy 5</td>
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<td>0.17V</td>
<td>2.8V</td>
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<tr>
<td>22</td>
<td>CLK</td>
<td>0V</td>
<td>0.6V</td>
<td>2.8V</td>
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<tr>
<td>23</td>
<td>Dummy 1</td>
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<td>1.05V</td>
<td>2.8V</td>
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<td>24</td>
<td>Dummy 3</td>
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<td>0V</td>
<td>2.8V</td>
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<tr>
<td>25</td>
<td>ER_UP</td>
<td>0V</td>
<td>0.2V</td>
<td>2.8V</td>
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<tr>
<td>26</td>
<td>Dummy 4</td>
<td>0V</td>
<td>1.28V</td>
<td>2.8V</td>
</tr>
<tr>
<td>27</td>
<td>SUS_UP</td>
<td>0V</td>
<td>0.13V</td>
<td>2.8V</td>
</tr>
<tr>
<td>28</td>
<td>CTRL_OE</td>
<td>0V</td>
<td>0.1V</td>
<td>3.2V</td>
</tr>
<tr>
<td>29</td>
<td>SET_DN</td>
<td>0V</td>
<td>0.12V</td>
<td>2.8V</td>
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<tr>
<td>30</td>
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<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
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<td>31</td>
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<tr>
<td>32</td>
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<td>Gnd</td>
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<td>Gnd</td>
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<td>33</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
## Control P101 to Z-SUS P2 Plug Information

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

### P101 Connector “Control Board” to “Z-SUS” P2

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Z SUS Dn</td>
<td>0V</td>
<td>0.75V</td>
<td>Open</td>
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<tr>
<td>2</td>
<td>Z SUS Up</td>
<td>0V</td>
<td>0.18V</td>
<td>0.65V</td>
</tr>
<tr>
<td>3</td>
<td>Z ER Up</td>
<td>0V</td>
<td>0.16V</td>
<td>0.65V</td>
</tr>
<tr>
<td>4</td>
<td>Z ER Dn</td>
<td>0V</td>
<td>0.3V</td>
<td>0.65V</td>
</tr>
<tr>
<td>5</td>
<td>Z Bias</td>
<td>0V</td>
<td>2V</td>
<td>0.65V</td>
</tr>
<tr>
<td>6</td>
<td>OE</td>
<td>0V</td>
<td>0.07V</td>
<td>0.65V</td>
</tr>
<tr>
<td>7</td>
<td>CTRL_OE</td>
<td>0V</td>
<td>0.06V</td>
<td>0.65V</td>
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<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
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<td>10</td>
<td>5V</td>
<td>0V</td>
<td>4.9V</td>
<td>0.97V</td>
</tr>
<tr>
<td>11</td>
<td>15V</td>
<td>0V</td>
<td>17V</td>
<td>Open</td>
</tr>
<tr>
<td>12</td>
<td>15V</td>
<td>0V</td>
<td>17V</td>
<td>Open</td>
</tr>
</tbody>
</table>

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

P161 and P162 Connectors from the "Control Board" to "X Drive

These pins are covered with tape for transportation issues. (Tape can be removed).

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

3.3V created by IC221
The X Drive Boards deliver the Color drive signals to the Vertical Grids. The 42PQ30 has a Left and a Right X-Drive board. Each with 6 Connectors to a TCP. And each TCP with 2 buffers. Each buffer controls 128 vertical grids lines.

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

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

| X-BOARDS CONTROL THE VERTICAL GRIDS WHICH DETERMINE THE HORIZONTAL PIXEL COUNT. |
|------------------------------|----------------------------------|-----------------|------------------|
| TOTAL HORIZONTAL GRIDS 3072. TOTAL HORIZONTAL PIXELS 1024. |

Total Buffer Count = 24  
(TCPs = 12 @ 2 buffers per/TCP)

Total Output Pins = 3072  
(128 per buffer X 24 total)

Total Pixels (Horizontal) 1024  
(3072 / 3) Three cells per pixel (Red, Green and Blue)
**Left and Right X Drive (Commonly known as A-BUS)**

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

TCP IC’s shown are part of the Ribbon Cable.
TCP (Tape Carrier Package)

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

On any Gnd
10, 11, 12, 13, 14, 27, 28, 29, 30, 37, 38, 39, 40, 41

On any Va or 3.3V
4, 5, 6, 7, 44, 45, 46, 47

Typical Reading 0.65V

Reverse leads Reading Open

ANY X BOARD CONNECTION TO TCP P201~P206 or P301~P306

Va Origination
From SMPS P811 pin 6, 7 to Y-SUS P201 (Fused by FS203)
From Y-SUS PWB P202 pin 5, 6 and 7
To Left X-PWB P233.
Also goes to Right X PWB via P211 Pins 4 and 5 to P311

3.3V

Origination
From Control PWB P161/P162
To Left X P232/Right X P331 pins 10/11/12

Flexible Printed Ribbon Cable to TCP IC

Look for any TCPS being discolored.
Ribbon Damage. Cracks, folds
Pinches, scratches, etc…
TCP 3.3V B+ Check

Checking IC221 for 3.3V, use center pin.

IC221
5V 3.3V 0V

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

Use only a continuity check from 3.3V source to destination.

3.3V in on Pins 49-50-51

3.3V in on Pins 49-50-51
**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,

a) Cause the Power Supply to shutdown  
b) Generate abnormal vertical bars  
c) Cause the entire area driven by the TCP to be “All White”  
d) Cause the entire area driven by the TCP to be “All Black”  
e) Cause a “Single Line” defect
# X Drive Left Connector P233 Voltage and Diode Checks

Voltage and Diode Mode Measurements for the X Drive Board

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

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
X Drive Left Connector P211 and P311 Voltage and Diode Checks

Voltage and Diode Mode Measurements for the X Drive Board

P211 and P311 Connectors "X Drive Left" to "X-Drive Right"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>0V</td>
<td>Gnd</td>
<td>Gnd</td>
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<td>3</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>3</td>
<td>VA</td>
<td>0V</td>
<td>*64.9V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>VA</td>
<td>0V</td>
<td>*64.9V</td>
<td>Open</td>
</tr>
</tbody>
</table>

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

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

Voltage and Diode Mode Measurements for the X Drive Board

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

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

- DC Voltage and Waveform Checks
- Resistance Measurements

### Operating Voltages

<table>
<thead>
<tr>
<th>SMPS Supplied</th>
<th>5V Stand-By</th>
</tr>
</thead>
<tbody>
<tr>
<td>12V</td>
<td></td>
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<tr>
<td>16V</td>
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### Developed on the Main Board

<table>
<thead>
<tr>
<th>5V</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3V (2)</td>
</tr>
<tr>
<td>2.5V</td>
</tr>
<tr>
<td>1.8V</td>
</tr>
<tr>
<td>8V then to 5V for Tuner</td>
</tr>
</tbody>
</table>
Main Board Layout and Identification

- Tuner
- IC1
- Micro / Video Processor
- Component inputs
- LVDS (Video) To Control Board
- RGB/PC
- P301
- P1001
- P1002
- AV In 3
- To Power Supply
- To Front Controls
- SPK Out
- IC503
- IC302
- IC203
- IC1 Micro / Video Processor
- X1 12 Mhz
- Reset SW100
- IC204
- Tuner X501 25 Mhz
- USB
- HDMI inputs
- HDMI 3
- LD501
- AV In 3
- IC504
- Wired Remote
- IC1001
- Optical Audio
- IC1005
- RS232
- RGB/PC
- Wired Remote
- RF IN
- S-In
- A/V Composite inputs
- Component inputs
- Optical Audio
- HDMI inputs
- AV In 3
42PQ30 Main Board Regulator Checks (Front Side)

- 12V
- 0V
- 8V regulator
- 3.1V REG

Front of the board

- 5.4V
- 0.9V
- 5V
- 1.5V
- 1.3V
- 4.9V
- 0V
- 3.6V

8V regulator
- 1) 12V
- 2) 0V
- 3) 8V
- EDID
- 1, 2, 3, 4) 0V
- 5) 4.7V
- 6) 4.7V
- 7) 3.3V
- 8) 4.7V

IC302
IC503
IC1
X1
P1006
IC203
P1002 LVDS
IC805
**42PQ30 Main Board Regulator Checks (Back Side)**

**MAIN PWB**
(Back Side View)

---

**IC505**
1) 3.8V
2) 5V
3) 8V
4) 3.4V
5,6,7,8) 0V

**IC201**
1,2) 3.4V
3) 0V

**IC202**
1,2) 3.4V
3) 0V
4) 3.4V
5,6) 0V
7) 3.39V
8) 0V

**IC304**
1) 0.63V
2) 1.93V
3) 3.4V
4) 3.4V
5,6,7,8) 0V

**IC305**
1) 0V
2) 3.4V
3) 05.1V
3) 13.8V

**IC305**
1) 3.4V
2) 0V
3) 3.4V
4) 3.4V
5,6) 0V

**IC305**
1) 0V
2) 3.4V
3) 05.1V
3) 13.8V

**IC305**
1) 8V
2) 0V
3) 3.4V
4) 3.4V
5,6) 0V

**IC502**
+1.2V PVSB regulator

**P1002**

**P1006**

**P1005**

---

**IC301**
3.3V_ST Regulator

**IC302**
3.4V

**IC301**
1) 5V
2) 0V
3) 8V

**IC302**
1,2,3) 0V
4) 3.4V
5,6,7,8) 0V

**IC304**
1) 8V
2) 0V
3) 3.4V
4) 3.4V
5,6) 0V

---

**IC202**
HDCP EEPROM

**IC201**
NVRAM

**Q303** 5VMST Switch

**IC803**
HDMI 1

**IC802**
HDMI 4

**IC803**
HDMI 1

** IC803** 5,6) 0V
7) 3.6V
8) 4.8V

**IC802**
HDMI 4

PC SCL/SDA IC602

RS232 RX/TX

Simplink SCL/SDA

---

**IC505**
Tuner 5V Reg

**TU501**
TUNER

---

**IC502**
1.2V PVSB regulator

---

**IC501**
1) 9.3V
2) 0V
3) 13.8V

---

**IC503**
1) 3.8V
2) 0V
3) 3.4V
4) 3.4V
5,6,7) 0V

---

**IC504**
1.8V_MST regulator

---

**IC602**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC601**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC803**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC802**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC801**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC800**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC709**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC708**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC707**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC706**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC705**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC704**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC703**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC702**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC701**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC700**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC600**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC500**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC400**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC300**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC200**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**IC100**
1,2,3) 0V
4) 4.73V
5) 4.73V
6) 3.44V
7) 4.71V
8) 0V

---

**01000000**
Main Board Tuner Check (Shield Off) Pins Exposed

- Video Pin 19 Video Test Point
- SIF Pin 16 Audio Test Point
- DIG IF (-) Pin 13
- DIG IF (+) Pin 12
- Digital Channel Test Point
- Pin 4 Tuner B+ (5V)
- Data Pin 9
- Clock Pin 8
- Pin 15 Tuner B+ (5V)
- MAIN Board Tuner Location
Main Board Tuner Video and SIF Output Check

Using Color Bar Signal Input

Pin 19 “Video” Signal

Pin 16 “SIF” Signal

Pin 12 and Pin 13 “Dig IF” Signal

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

Note:
“Dig IF” Signal only when receiving a Digital Channel.
Main Board Crystal X1 and X501 Check

Crystal Location

X1 (1.5V DC) / (2.4V p/p)
12Mhz

Runs all the time

X501 (1.5V DC) / (110mV p/p)
25Mhz

Runs only at first turn on when LD501 is illuminated.

LD501
Main Board P1002 LVDS Video Signal Check

P1002 Location

MAIN Board

Pin 1

Pin 11
10uSec per/Div

Pin 18
2uSec per/Div

Pin 1

Pin 11
2uSec per/Div

Pin 18
10uSec per/Div

Pin 18
2uSec per/Div

700mVp/p

USING GRAY SCALE SIGNAL INPUT

100mV 10uSec 500mV p/p

100mV 2uSec 500mV p/p

100mV 10uSec 500mV p/p

100mV 2uSec 500mV p/p
**Main Board Plug P1002 “LVDS” Checks**

Voltage and Diode Checks Measurements for the Main Board

**P1002 Connector "Main" Odd Pins to P121 "Control Board"**

<table>
<thead>
<tr>
<th>Pin</th>
<th>SBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>0V</td>
<td>3.29V</td>
<td>2.49V</td>
</tr>
<tr>
<td>5</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>0V</td>
<td>3.29V</td>
<td>2.49V</td>
</tr>
<tr>
<td>11</td>
<td>0V</td>
<td>1.25V</td>
<td>0.85V</td>
</tr>
<tr>
<td>13</td>
<td>0V</td>
<td>1.25V</td>
<td>0.85V</td>
</tr>
<tr>
<td>15</td>
<td>0V</td>
<td>1.27V</td>
<td>0.77V</td>
</tr>
<tr>
<td>17</td>
<td>0V</td>
<td>1.22V</td>
<td>0.77V</td>
</tr>
<tr>
<td>19</td>
<td>0V</td>
<td>1.24V</td>
<td>0.77V</td>
</tr>
<tr>
<td>21</td>
<td>0V</td>
<td>1.24V</td>
<td>0.85V</td>
</tr>
<tr>
<td>23</td>
<td>0V</td>
<td>0.58V</td>
<td>1.01V</td>
</tr>
<tr>
<td>25</td>
<td>0V</td>
<td>2.81V</td>
<td>0.49V</td>
</tr>
</tbody>
</table>

**P1002 Connector "Main" Even Pins to P121 "Control Board"**

<table>
<thead>
<tr>
<th>Pin</th>
<th>SBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0V</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>0V</td>
<td>3.28V</td>
<td>2.49V</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>8</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>0V</td>
<td>3.29V</td>
<td>2.44V</td>
</tr>
<tr>
<td>12</td>
<td>0V</td>
<td>1.21V</td>
<td>0.77V</td>
</tr>
<tr>
<td>14</td>
<td>0V</td>
<td>1.21V</td>
<td>0.85V</td>
</tr>
<tr>
<td>16</td>
<td>0V</td>
<td>1.21V</td>
<td>0.91V</td>
</tr>
<tr>
<td>18</td>
<td>0V</td>
<td>1.25V</td>
<td>0.81V</td>
</tr>
<tr>
<td>20</td>
<td>0V</td>
<td>1.21V</td>
<td>0.85V</td>
</tr>
<tr>
<td>22</td>
<td>0V</td>
<td>1.18V</td>
<td>0.77V</td>
</tr>
<tr>
<td>24</td>
<td>0V</td>
<td>3.29V</td>
<td>1.3V</td>
</tr>
<tr>
<td>26</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

Resistance Readings with the Board Disconnected. DVM in the Diode mode.
# Main Board Plug P1001 to Ft Keys Voltage and Diode Checks

Voltage and Diode Mode Measurements for the Main Board

**P1001 Connector "MAIN Board" to "Front Keys"**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IR</td>
<td>5V</td>
<td>5V</td>
<td>3.17V</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>Key1</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.85V</td>
</tr>
<tr>
<td>4</td>
<td>Key2</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.85V</td>
</tr>
<tr>
<td>5</td>
<td>P Key</td>
<td>0V *(5V)</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>EYE-SCL</td>
<td>0V</td>
<td>3.28V</td>
<td>2.49V</td>
</tr>
<tr>
<td>8</td>
<td>EYE-SDA</td>
<td>0V</td>
<td>3.28V</td>
<td>2.49V</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5VST</td>
<td>5V</td>
<td>5V</td>
<td>1.06V</td>
</tr>
<tr>
<td>11</td>
<td>3.3VST</td>
<td>0V</td>
<td>5.13V</td>
<td>1.1V</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>13</td>
<td>LED-R</td>
<td>3.3V</td>
<td>0V</td>
<td>3.22V</td>
</tr>
<tr>
<td>14</td>
<td>LED-W</td>
<td>0V</td>
<td>03.25</td>
<td>Open</td>
</tr>
<tr>
<td>15</td>
<td>PWM</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

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

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
Main Board Plug P301 to Power Supply Voltages “Odd Pins”

Voltage and Diode Mode Measurements

*Note: If the Key On line is 4.38V, the Main Power Switch is open. Stand-By 5V will shut off.

P301 Connector "Main" to "SMPS Board" P813

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>17V</td>
<td>0V</td>
<td>17.3V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>5</td>
<td>12V</td>
<td>0V</td>
<td>12V</td>
<td>Open</td>
</tr>
<tr>
<td>7</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>9</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>11</td>
<td>5V</td>
<td>5V</td>
<td>5V</td>
<td>1.1V</td>
</tr>
<tr>
<td>13</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>15</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>17</td>
<td>5V Det</td>
<td>.15V</td>
<td>5V</td>
<td>2.98V</td>
</tr>
<tr>
<td>19</td>
<td>RL On</td>
<td>0V</td>
<td>3.73V</td>
<td>Open</td>
</tr>
<tr>
<td>21</td>
<td>M5 ON</td>
<td>0V</td>
<td>3.24V</td>
<td>Open</td>
</tr>
<tr>
<td>23</td>
<td>Stby 5V</td>
<td>0V</td>
<td>3.24V</td>
<td>Open</td>
</tr>
</tbody>
</table>

Resistance Readings with the Board Disconnected. DVM in the Diode mode.
Main Board Speaker Plug P1005 Voltage and Diode Checks

Voltage and Diode Mode Measurements for the Main Board Speaker Plug

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

Resistance Readings with the Board Disconnected. DVM in the Diode mode.
The Control Switch Board and Power Switch Board are located (as viewed from the rear) in the lower left hand section.

REMOVAL: Remove the 2 screws and unplug the Connector P101. Then remove the 2 screws from the Front IR and Power LED Board. Remove J1 Connector.
**Ft Power LED (IR) Board Layout**

The Ft Power LED Board includes the IR Receiver and the Intelligent Sensor. The Front POWER LED is also located on this board.
**Front LED Board Plug J1 to Main Voltage and Diode Checks**

Voltage and Diode Mode Measurements for the Main Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>STBY</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IR</td>
<td>5V</td>
<td>5V</td>
<td>3.2V</td>
</tr>
<tr>
<td>2</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>3</td>
<td>Key1</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.6V</td>
</tr>
<tr>
<td>4</td>
<td>Key2</td>
<td>3.29V</td>
<td>3.29V</td>
<td>1.6V</td>
</tr>
<tr>
<td>5*</td>
<td>P Key</td>
<td>0V *(5V)</td>
<td>0V</td>
<td>Open</td>
</tr>
<tr>
<td>6</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>7</td>
<td>EYE-SCL</td>
<td>0V</td>
<td>3.28V</td>
<td>2.5V</td>
</tr>
<tr>
<td>8</td>
<td>EYE-SDA</td>
<td>0V</td>
<td>3.28V</td>
<td>2.5V</td>
</tr>
<tr>
<td>9</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>10</td>
<td>5VST</td>
<td>5V</td>
<td>5V</td>
<td>1.06V</td>
</tr>
<tr>
<td>11</td>
<td>3.3VST</td>
<td>0V</td>
<td>5.13V</td>
<td>1.1V</td>
</tr>
<tr>
<td>12</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
<tr>
<td>13</td>
<td>LED-R</td>
<td>3.3V</td>
<td>0V</td>
<td>3.22V</td>
</tr>
<tr>
<td>14</td>
<td>LED-W</td>
<td>0V</td>
<td>03.25</td>
<td>Open</td>
</tr>
<tr>
<td>15</td>
<td>PWM</td>
<td>Gnd</td>
<td>Gnd</td>
<td>1V</td>
</tr>
</tbody>
</table>

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

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

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

Voltage and Diode Mode Measurements for the Main Board

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>*STBY1</th>
<th>*STBY2</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key 1</td>
<td>0V</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Key 2</td>
<td>0V</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>PWR Key</td>
<td>4.38V</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

*STBY1 Main Power Switch “OUT” Vacation

*STBY2 Main Power Switch “IN” Normal

Diagram showing J2 connector with pin labels and voltage readings.

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
The Ft Key Board contains the Master Power Switch, Volume Up/Down and Channel Up/Down keys. Also the Menu and Select keys.
Front LED Board Plug P101 to Ft LED Board Voltage and Diode Checks

Voltage and Diode Mode Measurements for the Main Board

P101 Connector “Ft Key Board” to "Ft LED"

<table>
<thead>
<tr>
<th>Pin</th>
<th>Label</th>
<th>*STBY1</th>
<th>*STBY2</th>
<th>Run</th>
<th>Diode Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key 1</td>
<td>0V</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>2</td>
<td>Key 2</td>
<td>0V</td>
<td>3.29V</td>
<td>3.29V</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>PWR Key</td>
<td>4.38V</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Open</td>
</tr>
<tr>
<td>4</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
<td>Gnd</td>
</tr>
</tbody>
</table>

*STBY1 Main Power Switch “OUT” Vacation
*STBY2 Main Power Switch “IN” Normal

Diode Mode Readings taken with all Connectors Disconnected. DVM in Diode Mode.
The Invisible Speaker System keeps the speaker grills off the front of the TV. The speakers actually point downward.

The picture above shows the additional “plastic support” Housing Under the speaker.

At the top of the speaker is a rubber cushion. Be sure to return this to its proper position to prevent vibrations.
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.
Connector P1002 Configuration

- indicates signal pins.

Pin 11  10mV  10uS
Pin 12  10mV  10uS
Pin 13  10mV  2uS
Pin 14  10mV  10uS
Pin 15  10mV  2uS
Pin 16  10mV  10uS
Pin 17  10mV  10uS
Pin 18  10mV  2uS
This concludes the 42PQ30 Presentation

Thank You