Technical Guide

9th Generation Plasma Display
Symptoms and Cures

Panasonic Service and Technology Company

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Warning

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Topics

- **Power Supply/System Control Interaction**
- **Boards Isolation**
- **Understanding SOS Condition**
- **Video Processing**
- **Troubleshooting**

9th Generation Plasma Display Television

- What really happens when the TV is plugged in?

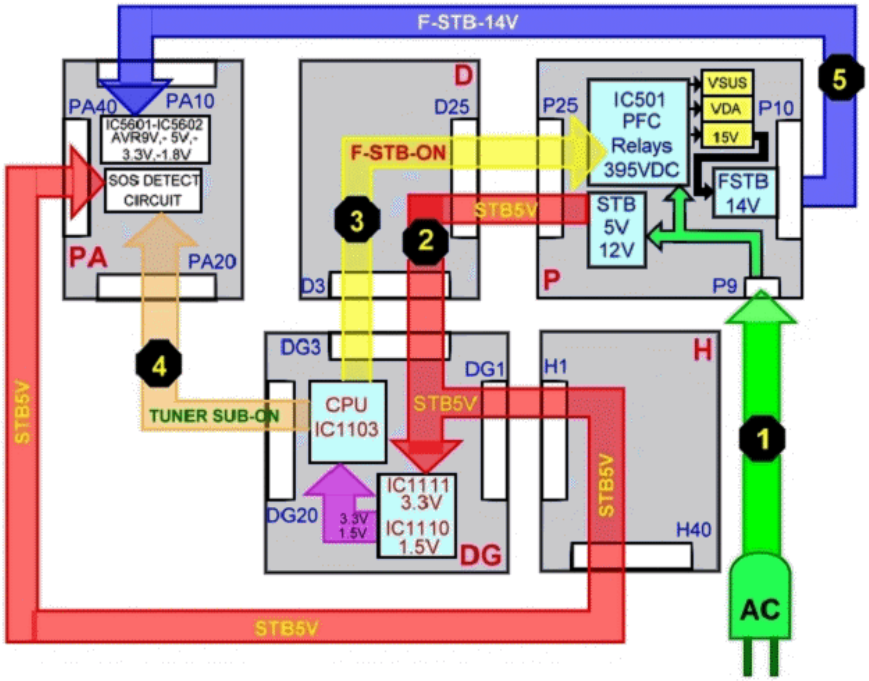
Sequence of Events when the TV is Plugged In

When the Plasma TV is plugged in, there're a few indications of normal operation. Knowing this will help us understand what's going on with the unit when an abnormality occurs.

1. There is a click from the relays **RL402** and **RL403** when they are activated.
2. The LED in the Optical Jack inside the DT board turns on for approx. 4 seconds.
3. Immediately after that, one of the Tuner LEDs (Right) turns on **(Solid Red)** for approximately 20 seconds.
4. The LED in the Optical Jack inside the DT board turns on again for approx. 1 second and both LEDs (tuner and optical jack) turn off.
5. Then you will hear another click from the relays **RL402** and **RL403** indicating that they are no-longer engaged. (Note: At this time the Tuner and the Optical Jack LED turn off.)

By paying attention to this sequence of events, we could determine where the problem is originated if there's something wrong with the TV.

Standby Block (Part 1)

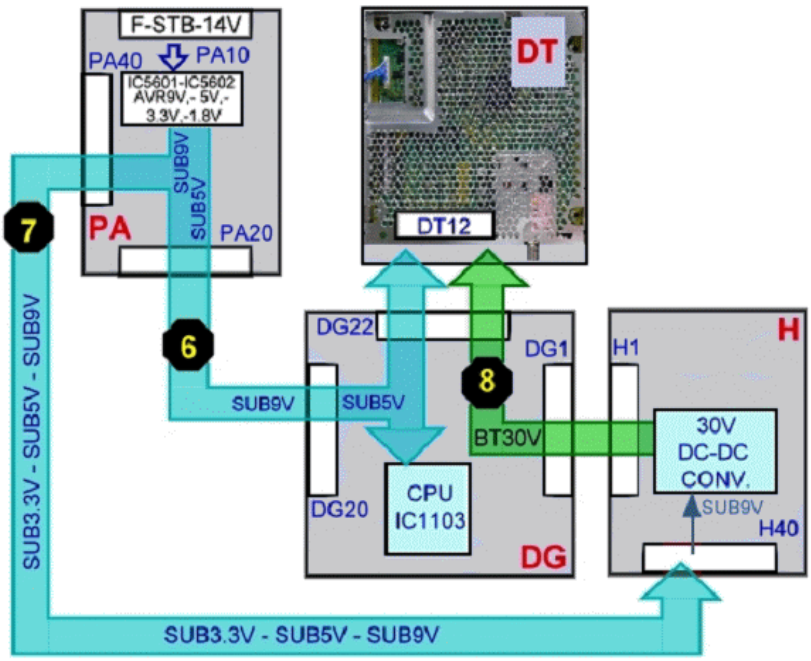


This block diagram shows the sequence of events that takes place inside the TV during standby.

When the TV is plugged in:

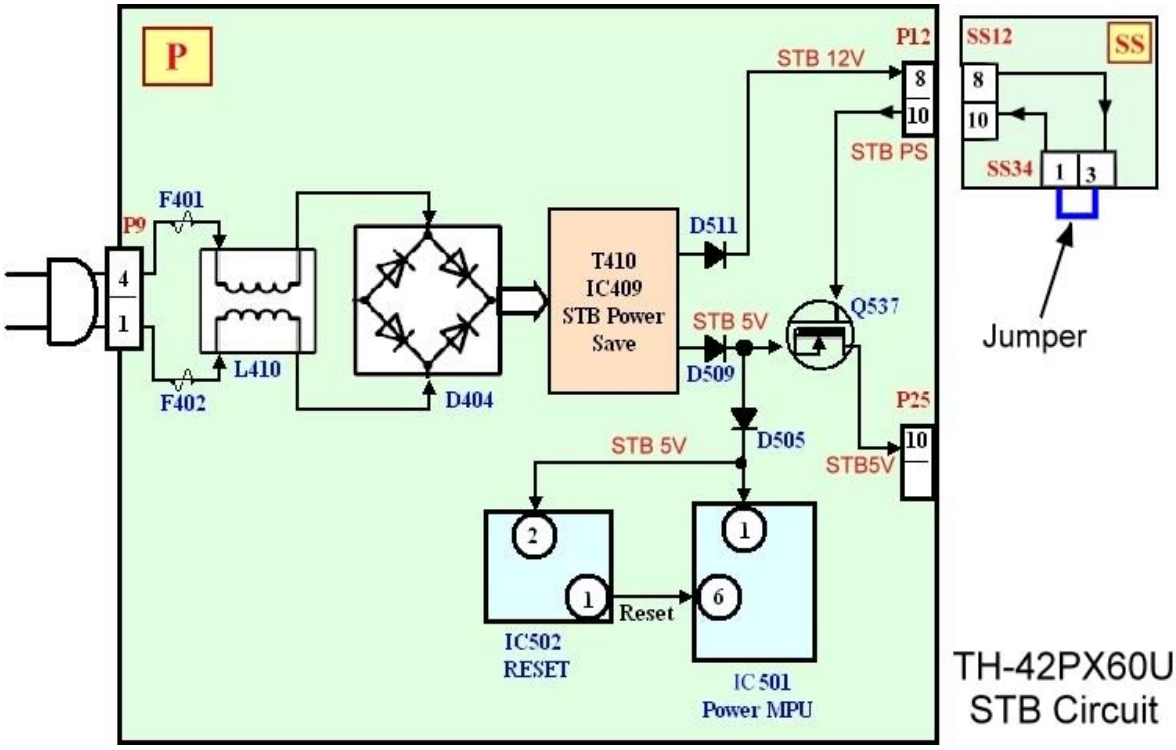
1. AC is applied to the power supply board (P) through connector P9. The AC is applied to the standby circuit to produce STB12V and STB5V. The STB12V is only used to turn on a circuit whose function is to allow the output of the STB5V through connector P25.
2. The STB5V passes through the D board via the connectors D25 and D3 and enters the DG, the H, and the PA boards. The STB5V is applied to a 3.3V and a 1.5V regulator circuit to power the Main CPU (IC1103) on the DG board.
3. When IC1103 receives 3.3V and 1.5V, it outputs a command that is provided to both the P and the PA board. This command only lasts approximately 15 seconds. The command applied to the P board is called “F-STB-ON” and it is routed through the D board via connectors D3 and D5. The function of this command is to turn on the circuit that generates the “F-STB-14V” in the P board.
4. The command applied to the PA board through connector PA20 is called “TUNER-SUB-ON”. The function of this command along with the STB5V from connector PA40, is activate the “SOS DETECT” circuit in the PA board.
5. The F-STB14V from connector P10 on the P board is applied to the PA board through connector PA10. This voltage is applied to a regulator circuit that generates: SUB9V, SUB5V, and SUB3.V.

Standby Block (Part 2)



6. The STB9V and STB5V from the PA board are provided to the Main CPU IC1103 on the DG board as 9V detect and 5V detect lines. If any of these voltages is missing, the TV goes into shutdown and the power LED blinks 10 times as soon as the unit is plugged into the wall outlet. The STB9V and the STB5V are also applied to the DT.
7. The H board also receives STB9V and STB5V with the addition of the SUB3.3V. The SUB9V is applied to a DC-DC converter to generate the BT30V.
8. The BT30V is connected to the DT board via the DG board through connectors DG1 and DG22.

Power Supply (Standby Circuit)



This is the sequence of events that takes place during the standby operation.

The line filter L410 filters the AC from connector P9 and then the bridge rectifier D404 rectifies it. The DC from D404 is applied to the standby circuit (T410, IC409) where 12V and 5V are developed.

The STB5V is applied to pin 1 of the Power MPU IC, IC501 and pin 2 of the Reset IC, IC502.

The STB5V is also applied to the source of Q537 and the STB12V is applied to the gate of the transistor to turn it on. As a result, the STB5V comes out on pin 10 of connector P25.

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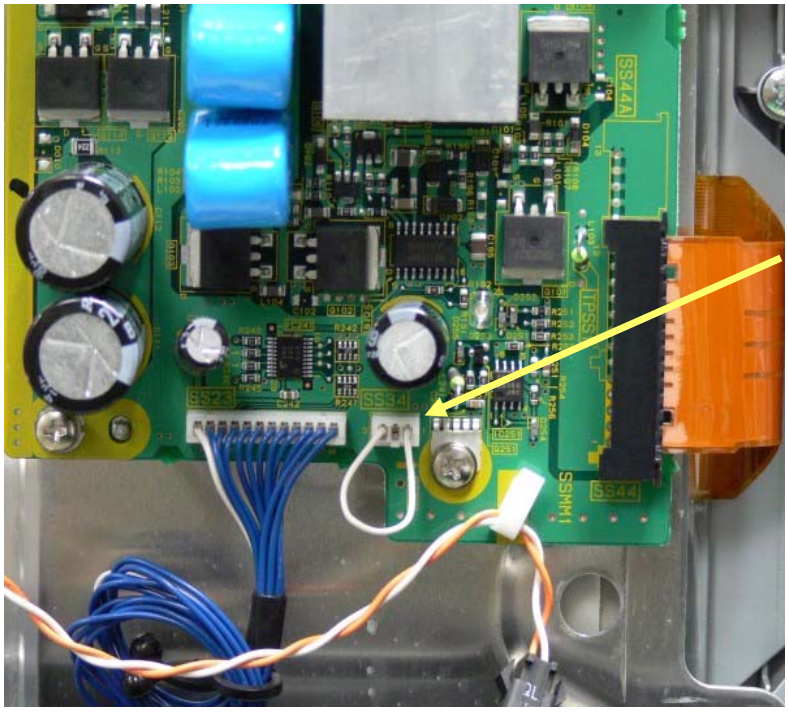

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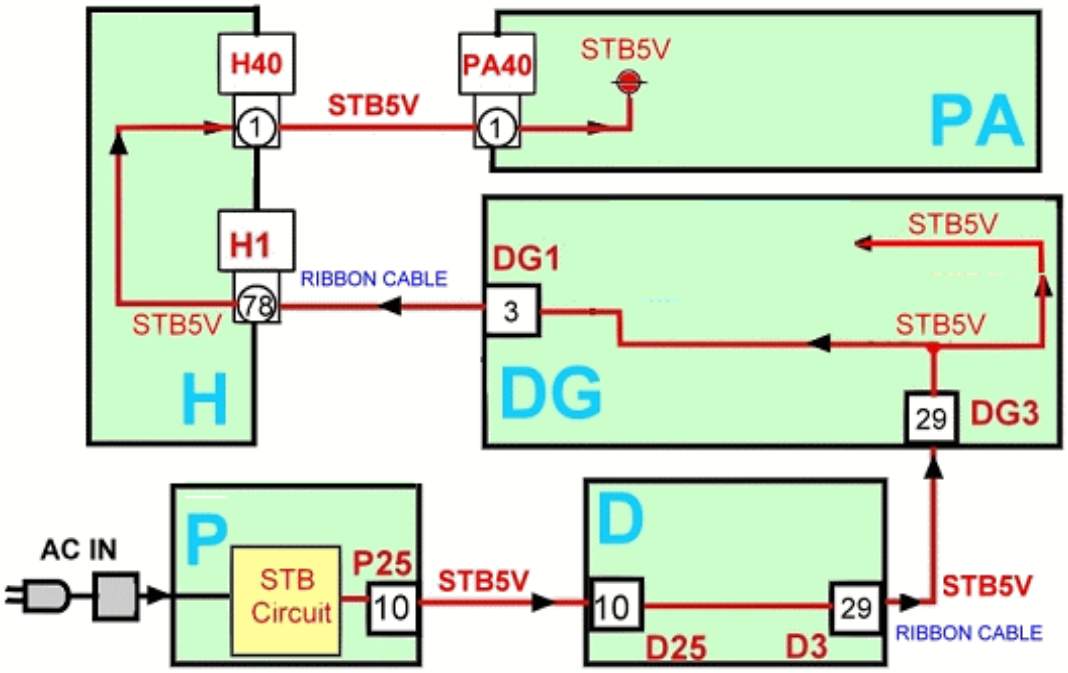
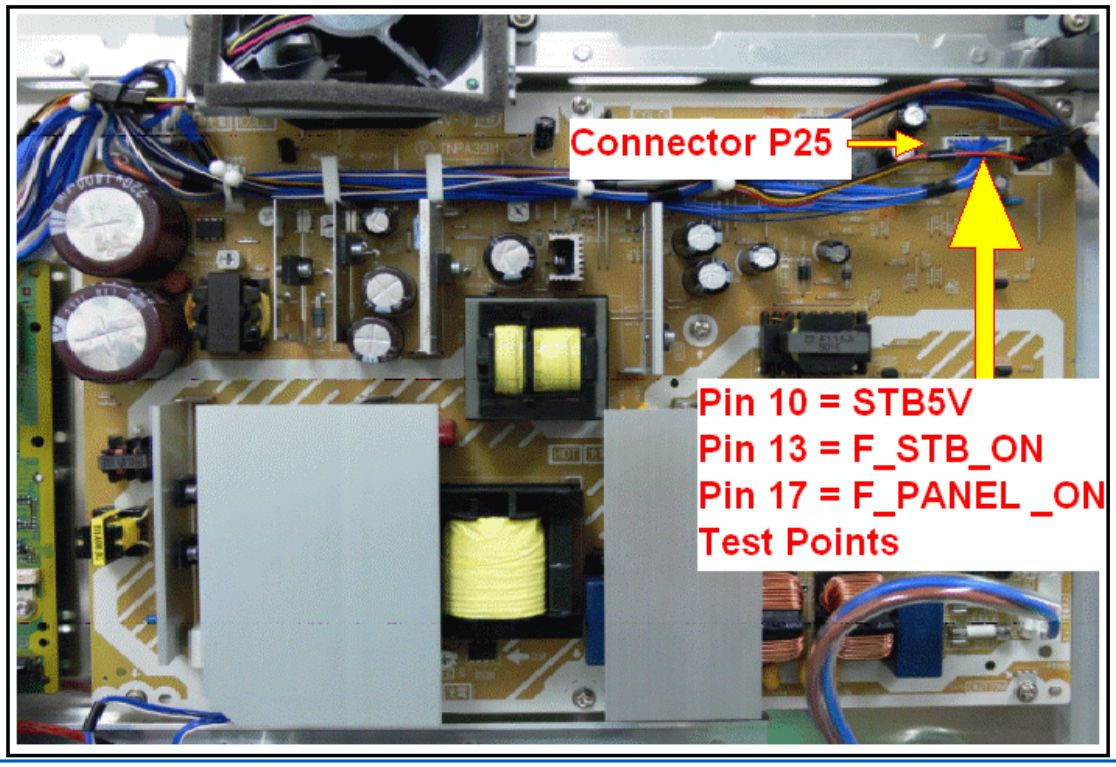
STB5V Distribution



The STB5V is routed through the D board to be connected to the DG board. In the DG board, the STB5V is used to generate the 1.5V and the 3.3V to power the CPU (IC1103). The STB5V is also routed through the H board and applied to the PA SOS detect circuit.

The explanation for the circuit that generates the STB3.3V and STB1.5V is covered in the next slide.

STB5V Test Point (P board)



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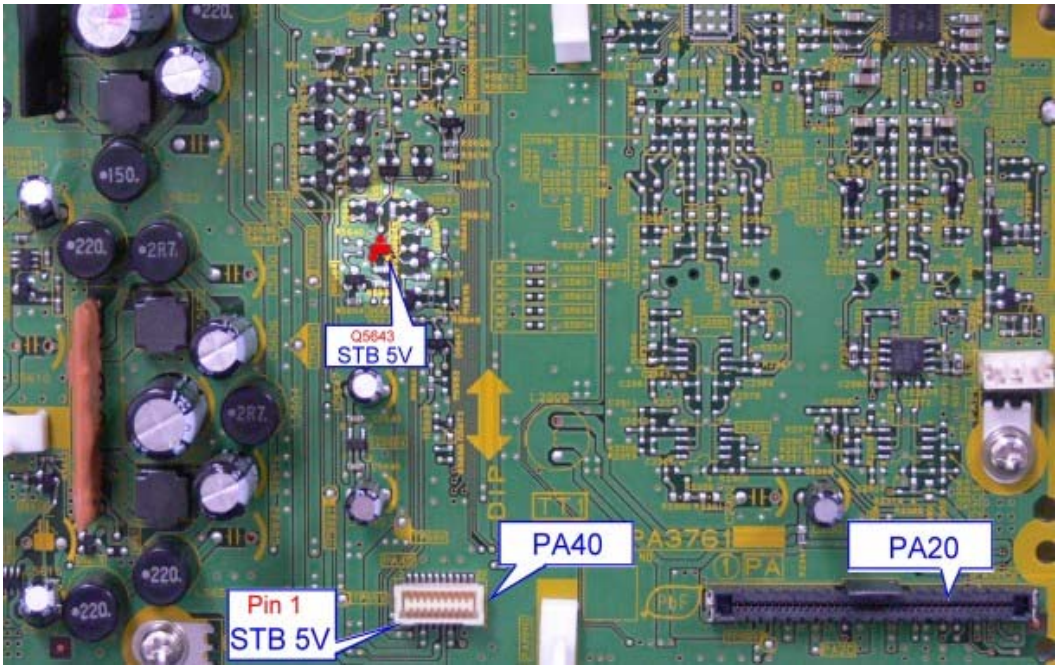
STB5V Test Point (PA board)



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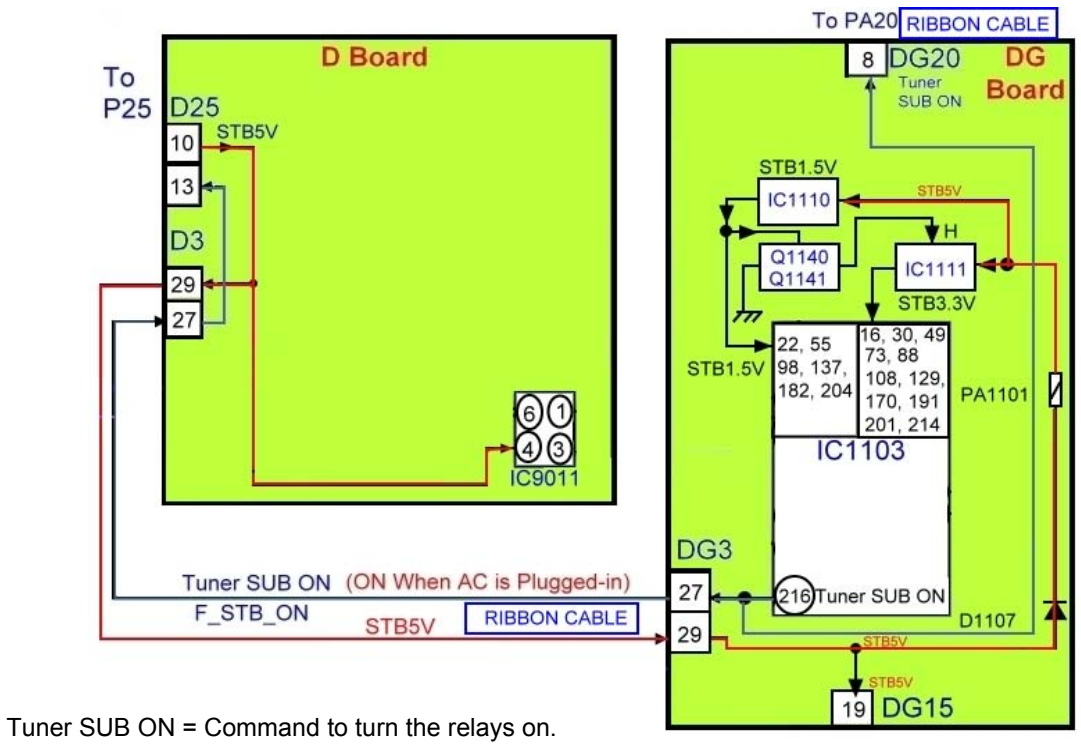
Power Supply (Standby Circuit)



Tuner SUB ON = Command to turn the relays on.

The STB5V from the P board is connected to the D board via connector D25. From there, it is provided to the DG board via pin 29 of connector DG3.

On the DG board, the STB5V is connected to a 3.3V regulator, and a 1.5V regulator.

IC1110 provides the STB1.5V to the CPU IC1103 and the switching circuit consisting of Q1140 and Q1141. The switching circuit outputs a high to turn on the STB3.3V regulator (IC1111).

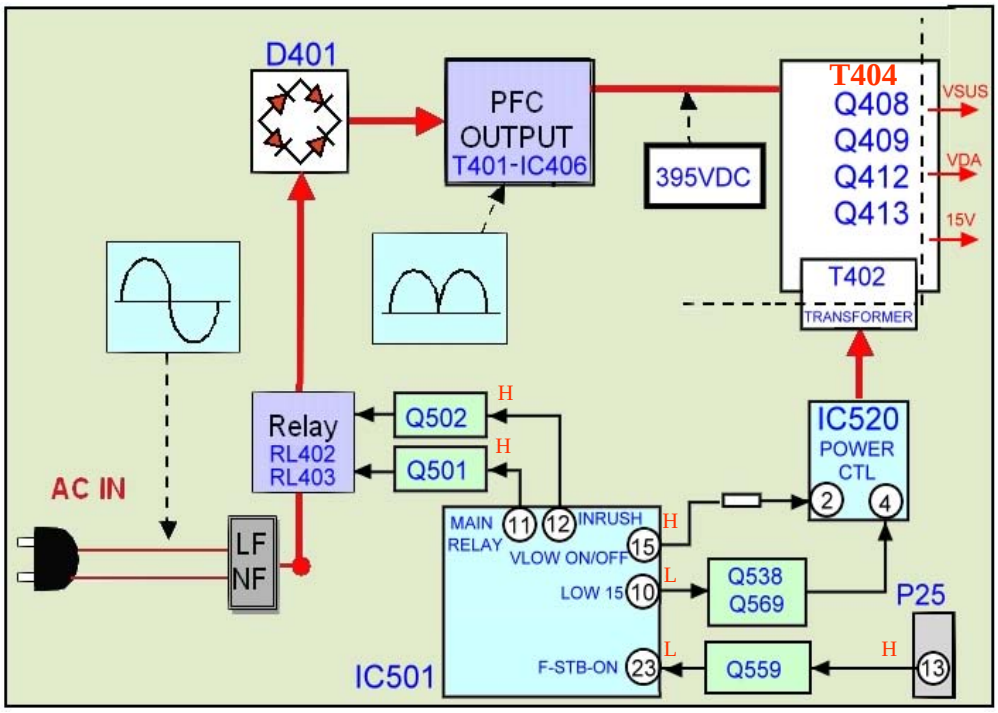
The 3.3V from IC1111 is provided to the CPU IC1103.

When IC1103 receives both 1.5V and 3.3V, it sends out a 3.2V command out of pin 216.

This command is provided to two different circuits and is given a different name in each of these circuits. It first goes to pin 8 of connector DG20 under the name of “Tuner-Sub-ON” and from there it goes to connector PA20 on the PA board to activate the protection circuit of the PA board.

This command also goes to pin 27 of connector DG3 under the name of “F-STB-14V ON”. From there it goes to pin 13 of connector D25/P25 of the power supply circuit (P board).

F-STB-ON (Primary)

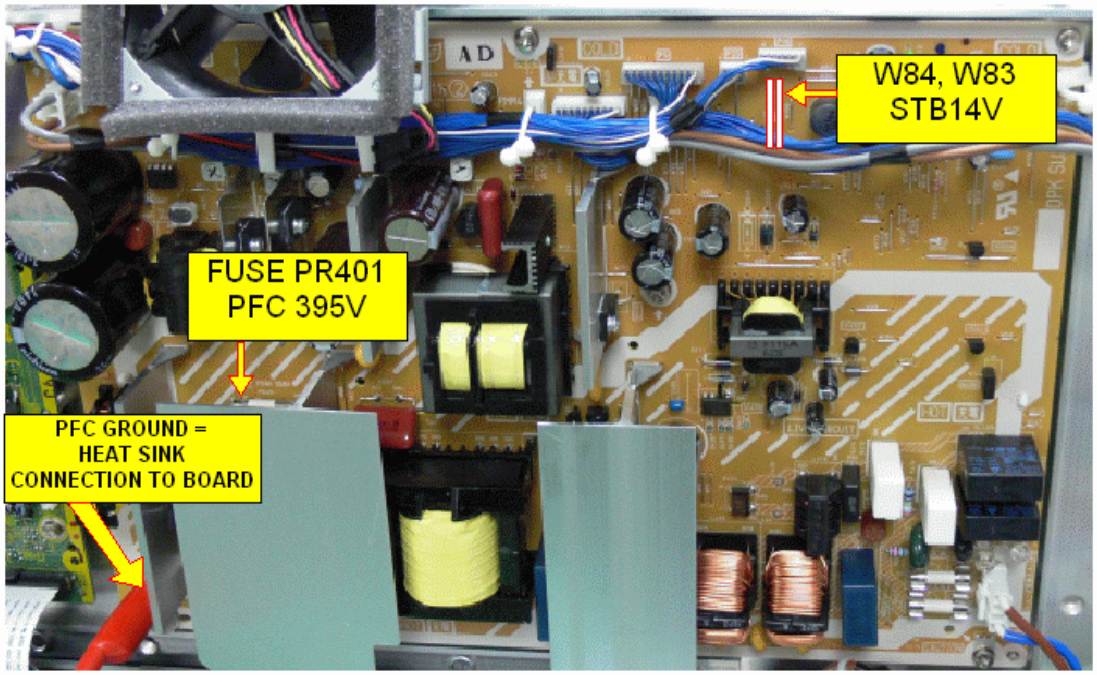


The F-STB-ON voltage (3.2) from pin 13 of connector P25 is applied to pin 23 of the Power CPU (IC501) on the P board.

IC501 sends out commands to first turn on the primary circuit of the power supply, and then the circuit that allows the FSTB14V to develop on the secondary circuit.

1. The relay commands (high) from pins 11 and 12 of IC501 are used to trigger the relays RL402 and RL403. The incoming AC passes through the relays and enters the bridge rectifier D401. The DC voltage from D401 is applied to the Power Factor Control (PFC) circuit (T401 and IC406). The PFC outputs 395VDC is applied to the switching circuit (Q408, Q409, Q412, and Q413). The operation of this switching circuit is controlled by the transformer T402 which is driven by the power control IC, IC520.
2. A low from pin 10 and a high from pin 15 of IC501 are used to turn on the power control IC (IC520) to energize the primary of transformer T402 and allow the switching circuit to drive transformer T404 (not shown in the diagram.
3. The secondary circuit of transformer T404 outputs the VSUS, VDA, and 15V voltage sources.

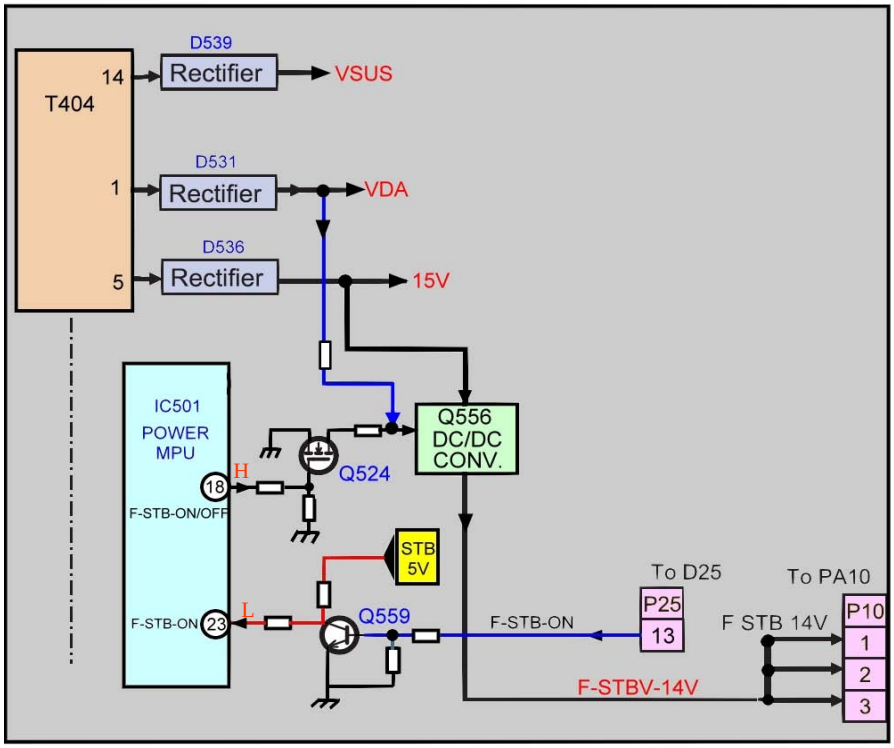
F-STB-14V and PFC Test Points



The 15V output from the secondary circuit of the power supply is applied to Q556.

In order to generate the FSTB14V, the F STB ON/OFF command (high) from pin 18 of IC501 is applied to the gate of Q524 to turn it on. Q524 outputs a low to turn on Q556. The transistor Q556 outputs the FSTB14V to pin 1, 2, and 3 of connector P10.

F-STB-14V



16

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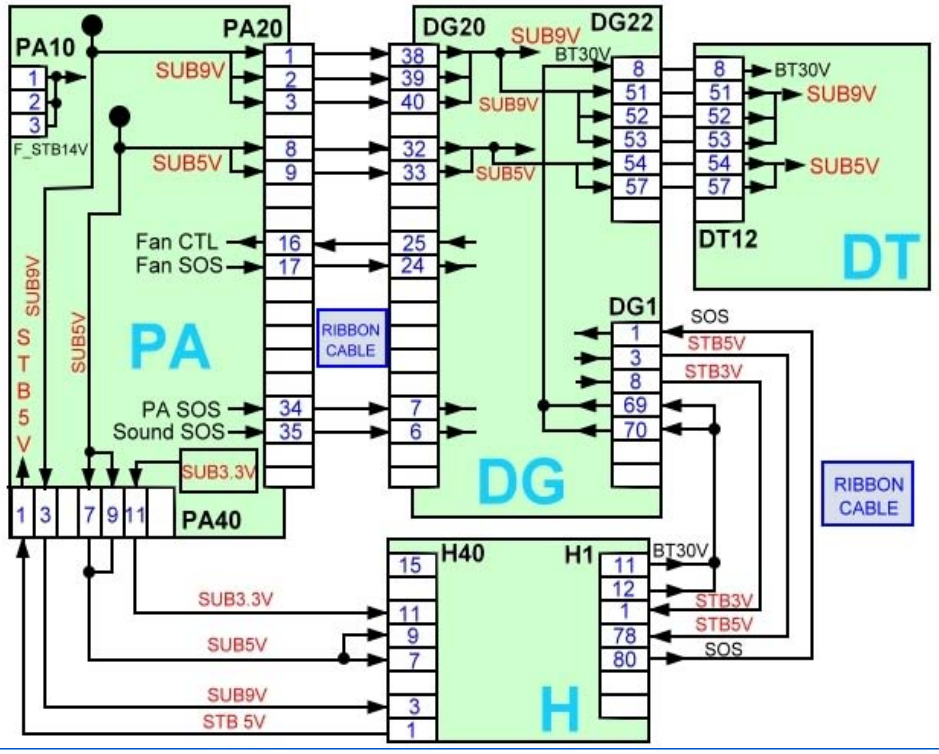
In order to generate the FSTB14V, the F STB ON/OFF command (high) from pin 18 of IC501 is applied to the gate of Q524 to turn it on. Q524 outputs a low to turn on Q556. The transistor Q556 outputs the FSTB14V to pin 1, 2, and 3 of connector P10.

SUB-Voltages Output From the PA Board



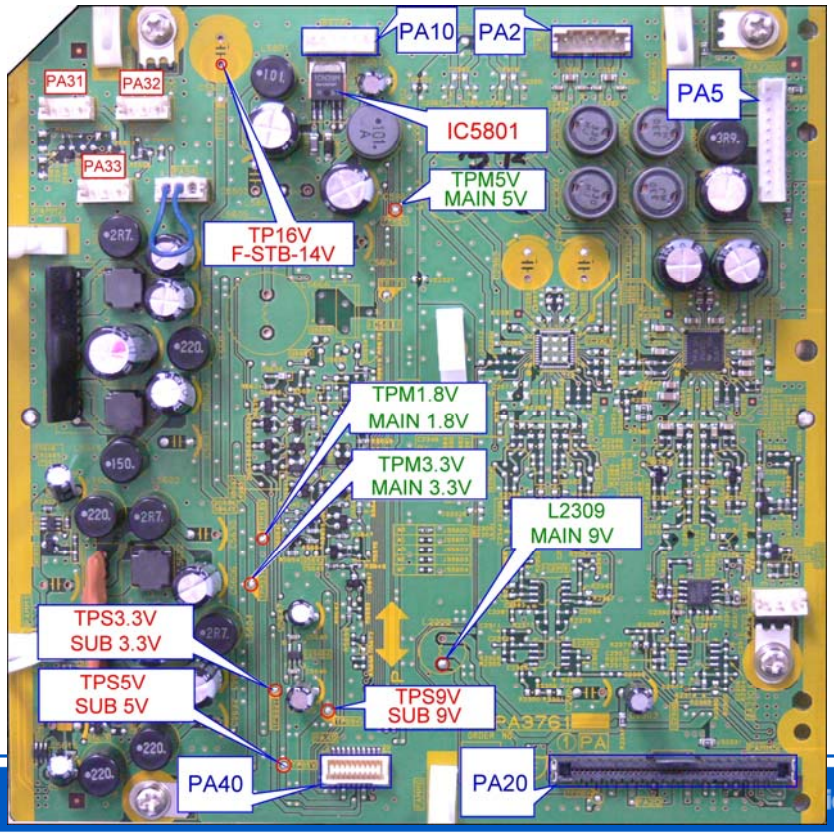
17 Panasonic ideas for life

When FSTB14V is applied to the PA board through PA10, immediately a set of voltages is developed, lasting only approximately 15 seconds after AC has been applied to the TV. These voltages are: SUB9V, SUB5V, and SUB3.3V.

The SUB9V and the SUB5V are used by the DG board and the DT board. The H board also uses the SUB9V and the SUB5V, in addition to the SUB3.3V.

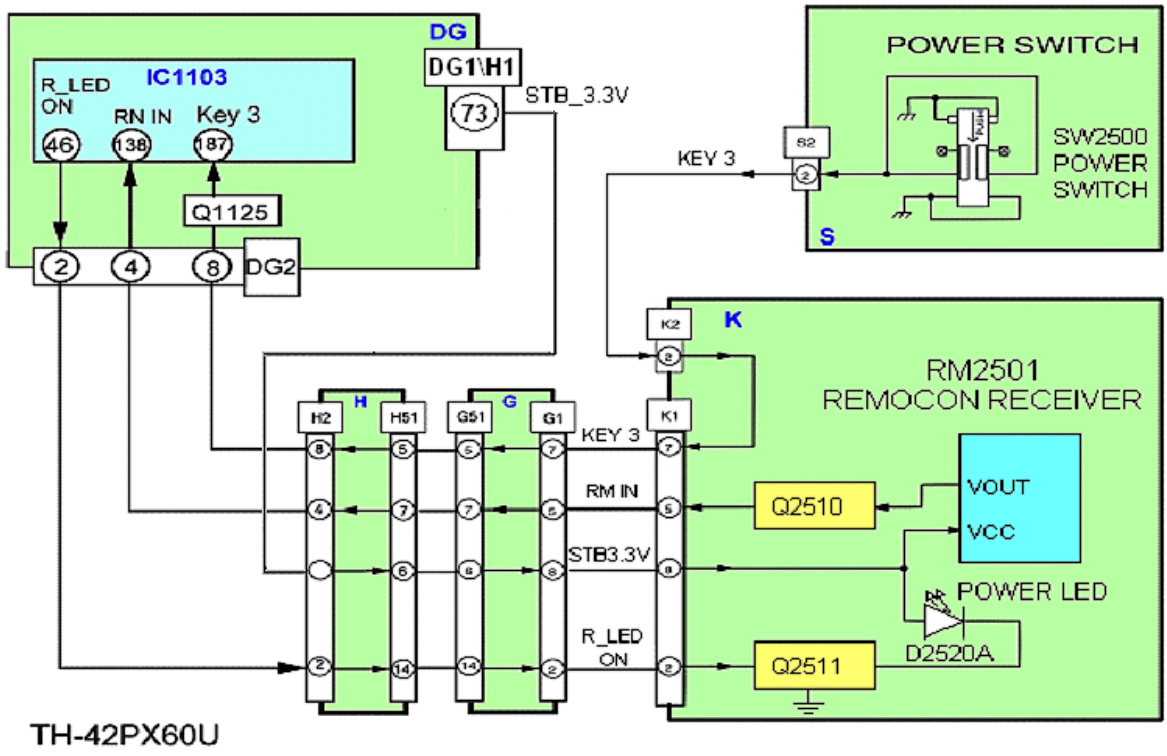
Unlike the previous models, the BT30V is developed in the H board instead of the PA board. The SUB9V is applied to a DC-DC converter that generates the BT30V on the H board. The BT30V is provided to the DT board through connectors DG1 and DG22 on the DG board.

PA Board Test Points

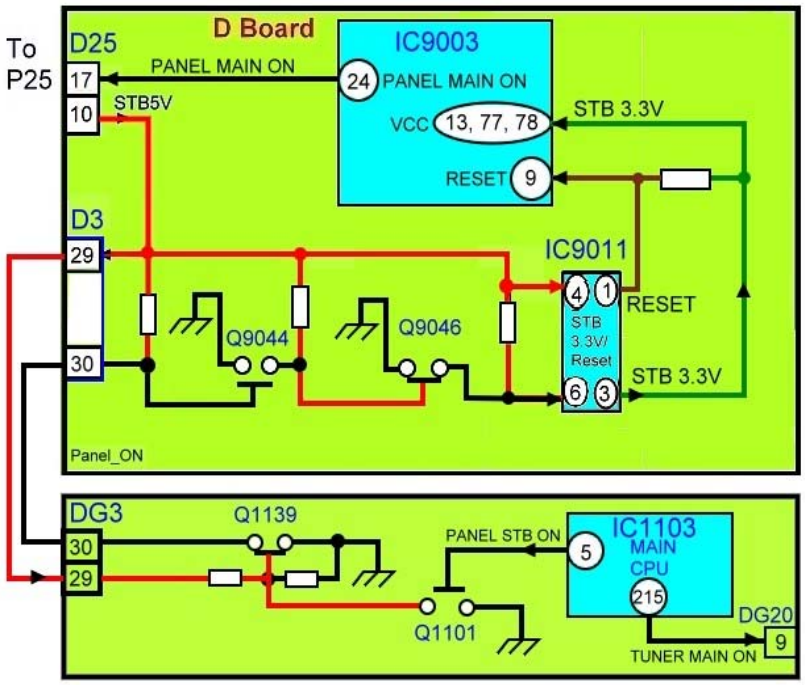


This picture shows the location of all the connectors and the test points on the PA board.

Power On/Off Operation



Power Off



When the CPU on the DG board IC1103 receives the power on command from either the power switch on the TV panel or the remote control, both pin 5 and pin 215 go high (3.2V).

The 3.2V from pin 215 is provided to the PA board through connector DG20. It is used to turn on the circuit that generates the “MAIN” voltages on the PA board.

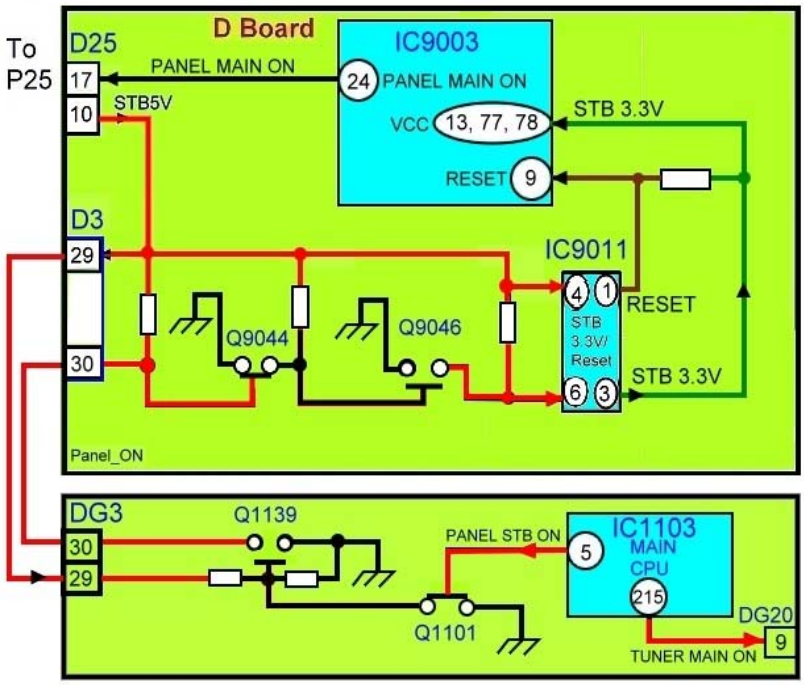
The 3.2V from pin 5 of IC1103 turns on Q1101. When Q1101 conducts, a low is applied to the base of Q1139 turning it off. When Q1139 is off, pin 30 of connector DG3 goes high (Pin 30 is kept high by a pull-up resistor connected to the STB5V on the D board).

The “PANEL STB ON” high from pin 30 of connector D3 is applied to the base of Q9044 on the D board, turning it on. Q9044 outputs a low to turn off Q9046 allowing pin 6 of the STB3.3V Regulator and Reset IC IC9011 to go high. When pin 6 goes high, IC9011 outputs the reset command at pin 1 and the STB3.3V at pin 3.

The STB3.3V is applied to the VCC pins of the CPU IC9003 (pins 13, 77, and 78). The CPU then outputs a high (3.2V) at pin 24. The 3.2V is directed to the power supply via pin 17 of connector D25/P25.

At the same time pin 5 (Ready – Status) of IC9003, also goes high (3.2). This voltage is used to provide the power status information of IC9003 to the CPU on the DG board IC1103. The “Ready – Status” enters pin 4 of the CPU via pin 34 of connector D3/DG3.

Power On



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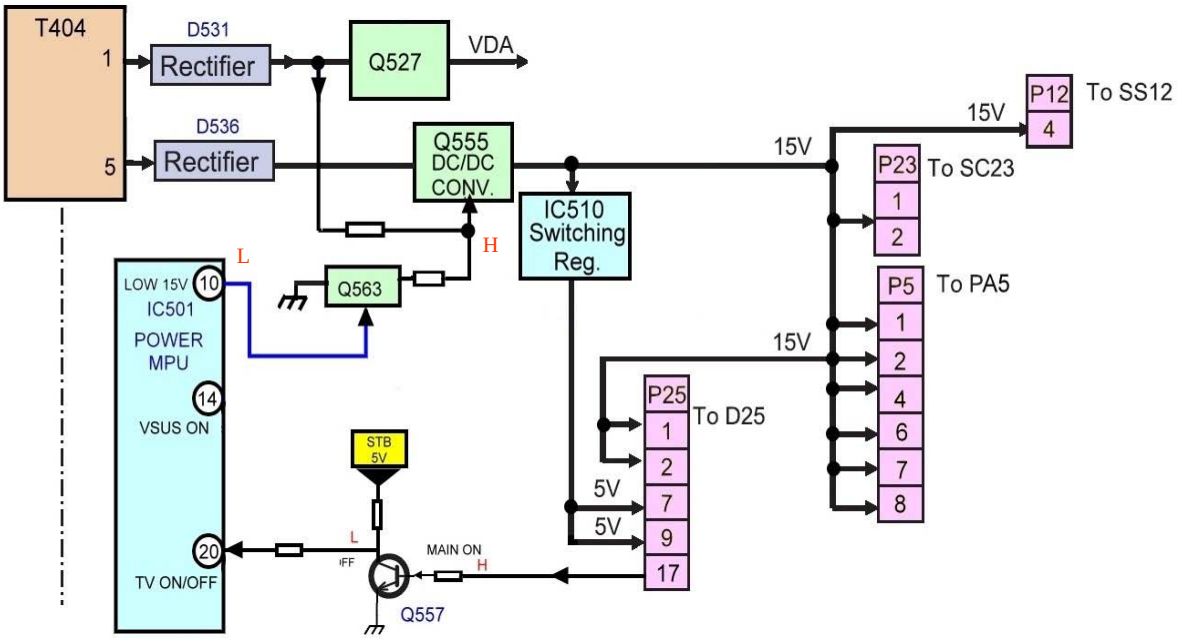
Power Supply Secondary Circuit (1)



The 3.2V from pin 17 of connector P25 is used to output the voltages that were developed when the TV entered the standby mode (STB14V and 395VDC). Then it turns on the secondary circuit of the power supply to generate the VSUS, VDA, 15V and 5V.

This high is applied to the base of Q557 to turn it on. When Q557 is on, a low is applied to the TV ON/OFF pin (20) of the POWER CPU (IC501).

When pin 20 goes low, pin 14 goes high and pin 10 goes low.

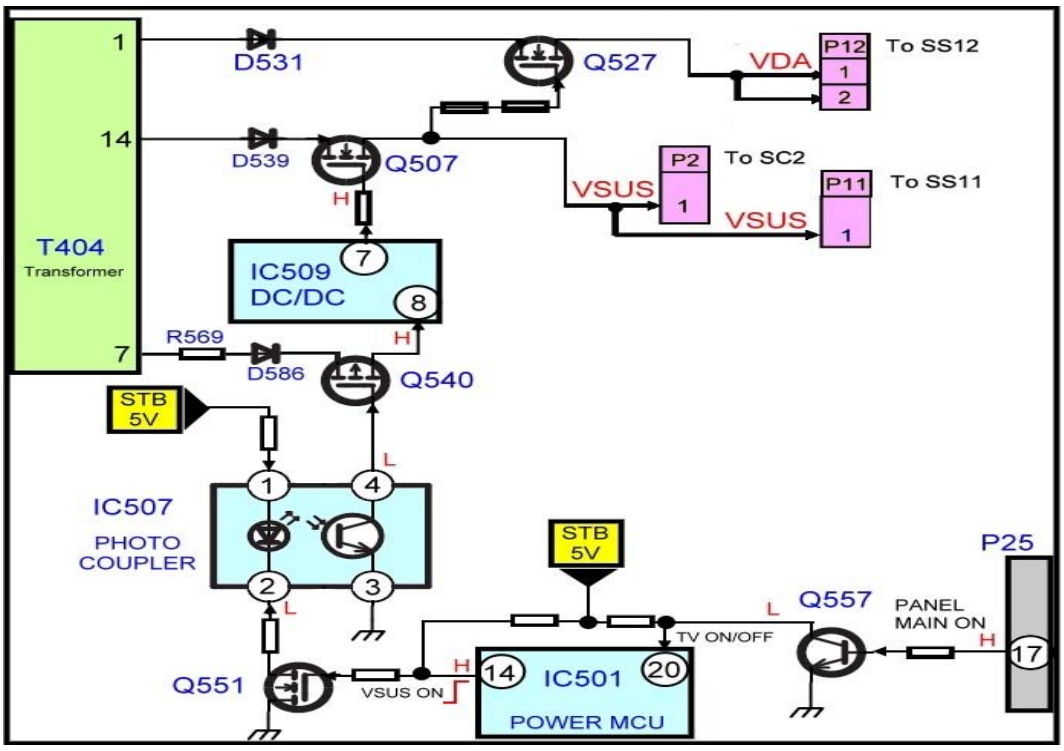
The high from pin 14 causes the network consisting of Q551, IC507, Q540, and IC509 to output a high and turn on Q507.

Q507 outputs the VSUS. The VSUS is also used to turn on Q527 to generate the VDA.

The 15V is output when the low from pin 10 turns off Q563 allowing for a high to be applied to Q555.

The 5V is derived from the 15V line.

Power Supply Secondary Circuit (2)



The 3.2V from pin 17 of connector P25 is applied to the base of Q557 to turn it on. When Q557 is on, a low is applied to the TV ON/OFF pin (20) of the POWER CPU (IC501). When pin 20 goes low, pin 14 goes high to turn on Q551. When Q551 is on, it provides the ground path to turn on the LED within the photocoupler IC507. The light from the LED turns on the phototransistor within the photocoupler and its collector goes low to turn on Q540. When Q540 is on, the DC voltage from the rectifier D586 is applied to pin 8 of IC509. This makes pin 7 go high to turn on Q507.

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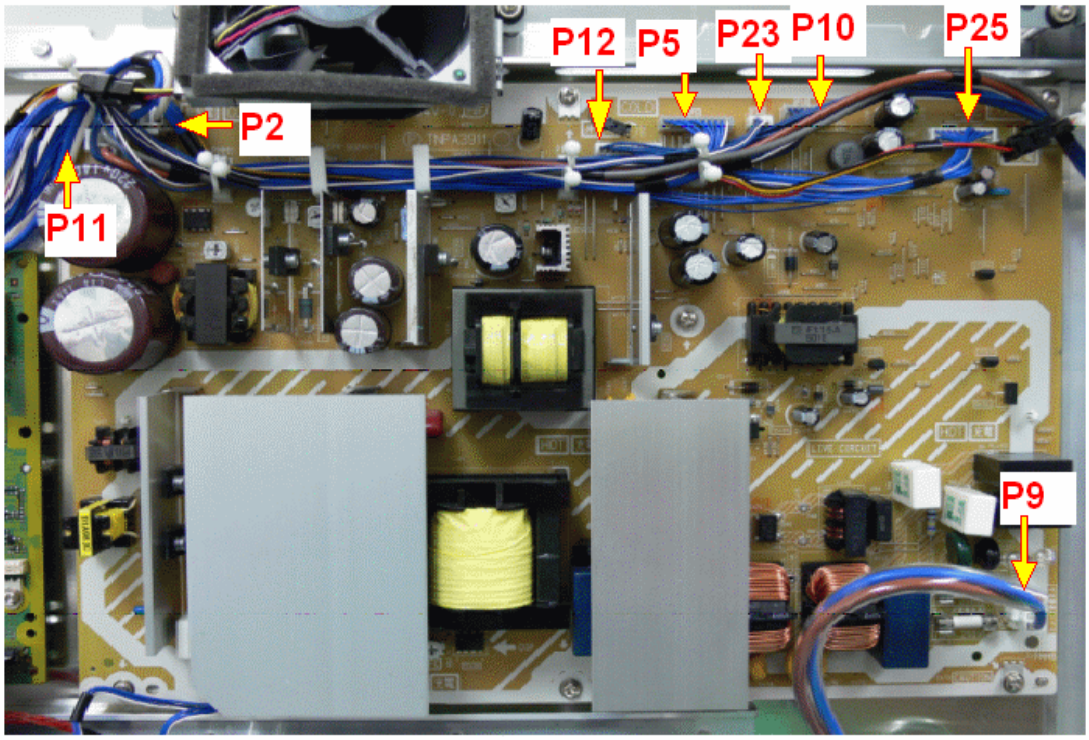
Power Supply Connectors



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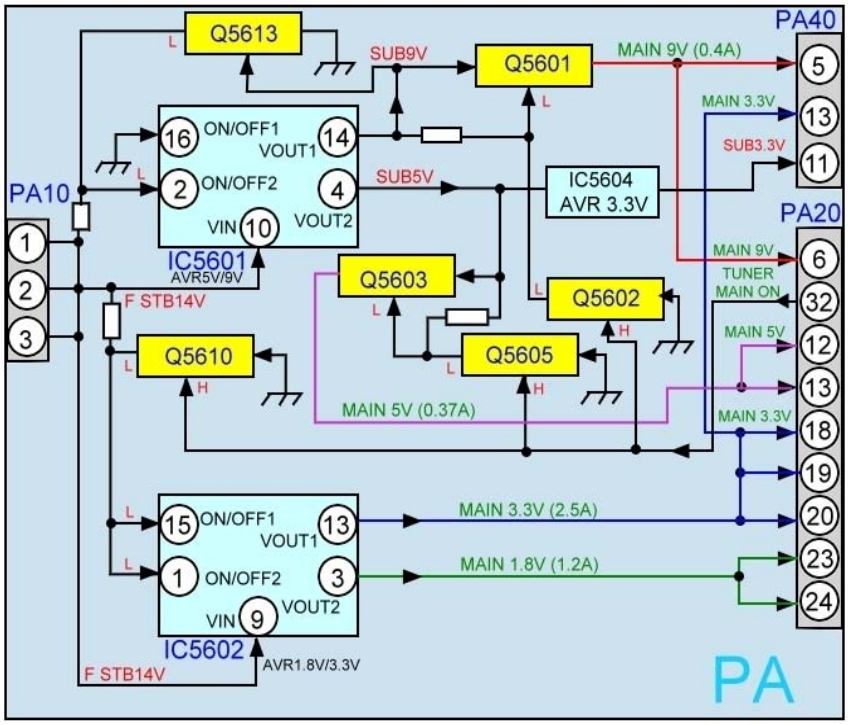
PA board Circuit Explanation



The “F-STB-14V” at connector PA10 is supplied to the voltage input pins of both regulators IC5601 and IC5602.

IC5601 is a dual voltage regulator. It generates 9V and 5V.

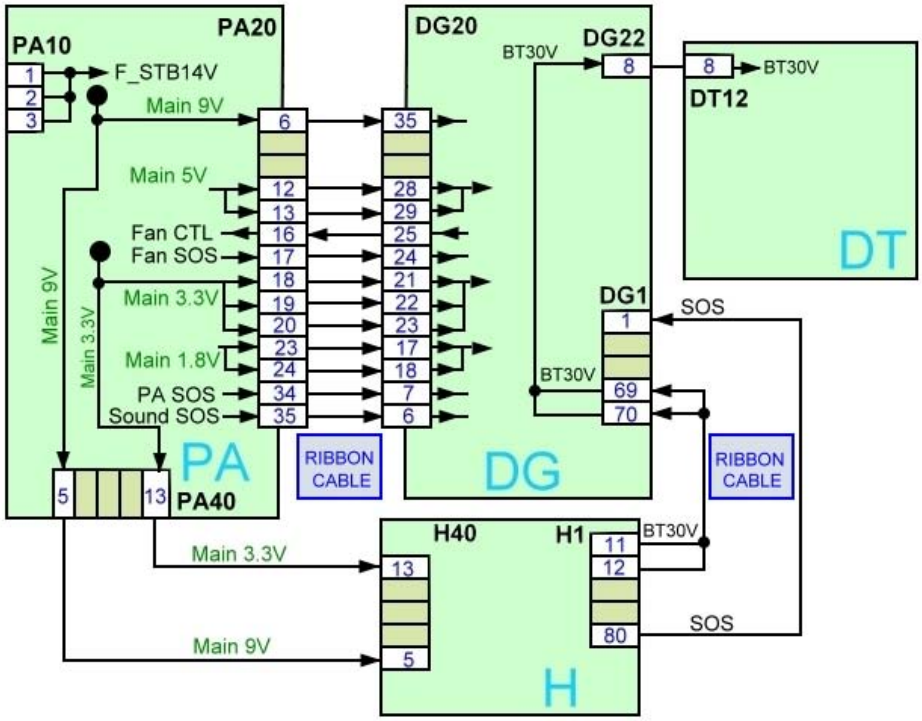
The SUB9V is output at pin 14 of IC5601 as soon as the STB14V is applied to pin 10. The ON/OFF pin (pin 16) is permanently grounded. The SUB9V is used to turn on Q5613 to provide a low to the second ON/OFF pin (pin 2), thus allowing the SUB5V to be output from pin 4.

When the power is turned on, the “TUNER MAIN ON” line from pin 32 of connector PA20, goes high (3.2V). This high is applied to Q5602 to turn it on. Q5602 outputs a low to turn on Q5601. When Q5601 is on, it outputs the “MAIN 9V” to pin 5 of connector PA40.

The “TUNER MAIN ON” voltage is also applied to the base of Q5605 to turn it on. Q5601 outputs a low to turn on Q5603. When Q5603 is on, it outputs the “MAIN 5V” to pins 12 and 13 of connector PA20.

Q5610 also turns on when the “TUNER MAIN ON” voltage is applied to it, outputting a low. This low is applied to both “ON/OFF” pins (15 and 1) of IC5602 allowing the “MAIN 3.3V” and the “MAIN 1.8V” to output at pins 13 and 3 respectively.

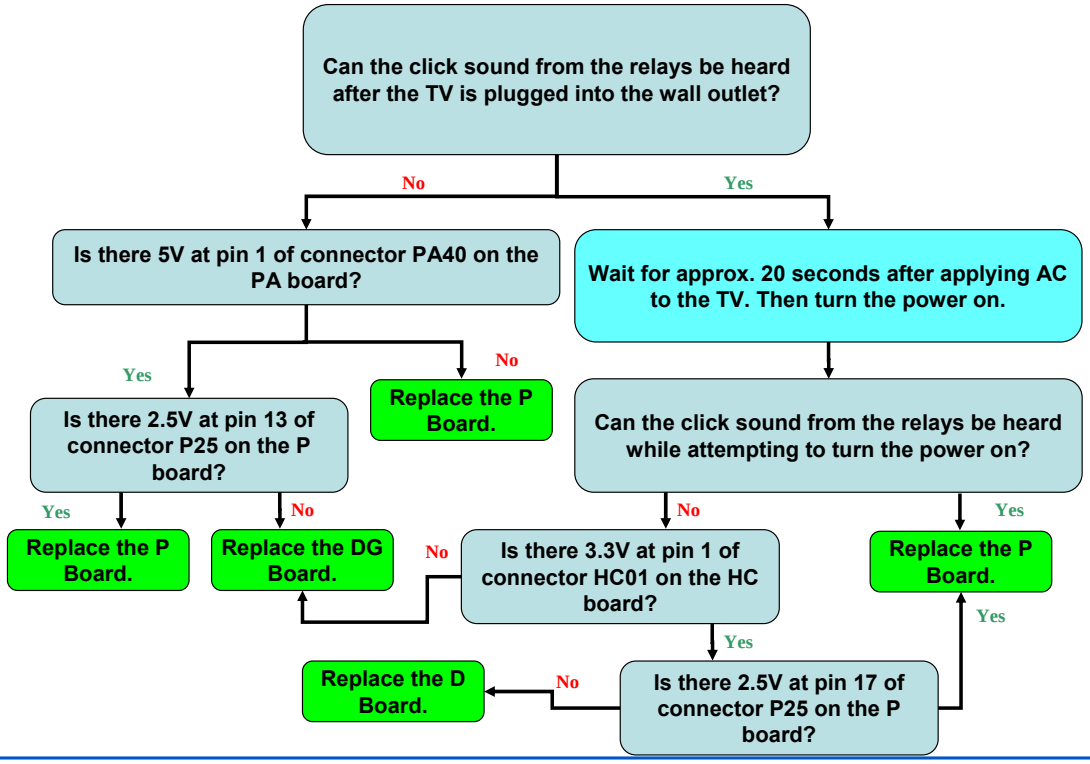
Main-Voltages Output From the PA Board



When the power is turned on, a set of voltages, similar to the voltages developed when the unit was plugged in, is developed. These voltages are: Main9V, Main5V, Main3.3V, and Main1.8V.

All these voltages are used by different circuits in the DG board. The H board uses the Main9V and the Main3.3V.

No Power Troubleshooting Chart



Shutdown Detect Circuits

Understanding how the SHUTDOWN circuit works

SOS

What will normally cause the TV to shut down?

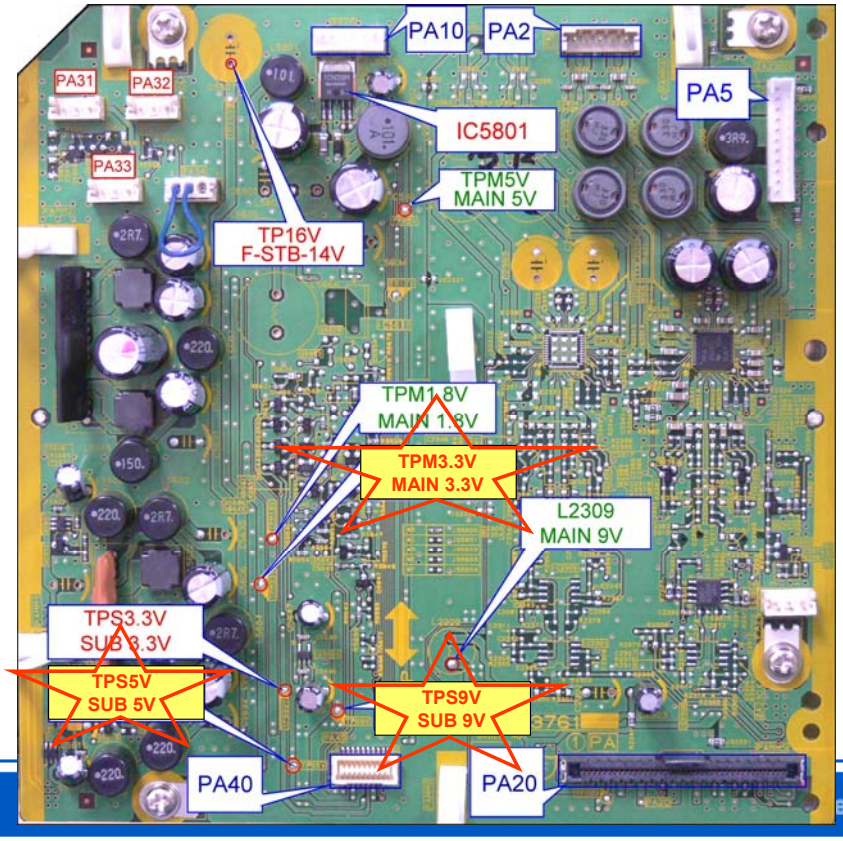
- A short circuit on any of the voltage lines
- An over-voltage condition
- Abnormality in the Control Drive Pulse circuit (SC, SU, SD, and SS boards)

Cases When Missing Voltages Can Cause the TV to Shut Down

- Missing the source voltage to the PA board (STB14V) from the P board
- Missing output voltage from the PA board to the DG board.
- Missing 15V or VSUS on either the SS or SC boards while the control drive pulses from the D board are being provided

Cases When Missing Voltages Can Cause the TV to Shut Down

If the SUB 5V, SUB 9V or MAIN 3.3V is missing on the DG Board, the unit goes into shutdown.
The power LED blinks ten times.
The voltages are monitored on the DG board by the MPU, IC1103.



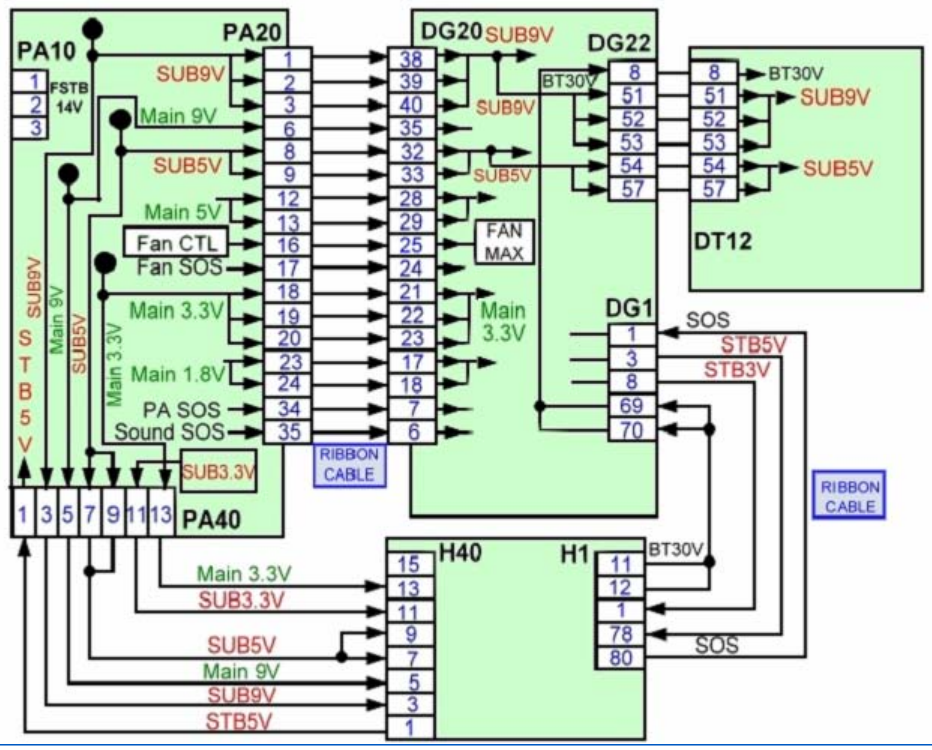
TV Shutdown due to Over-voltage or Short Circuit

This could happen if there's a short circuit in one of the B+ lines from the PA board, an over-voltage condition, or missing STB 14V from the P board.

PA Voltage Output

If any of the SUB or MAIN voltages that are high-lighted on the DG Board is missing, the unit goes into shutdown. The power LED blinks ten times.

If any of the voltages created on the PA Board is excessive or shorted, the unit goes into shut-down. The power LED blinks ten times.



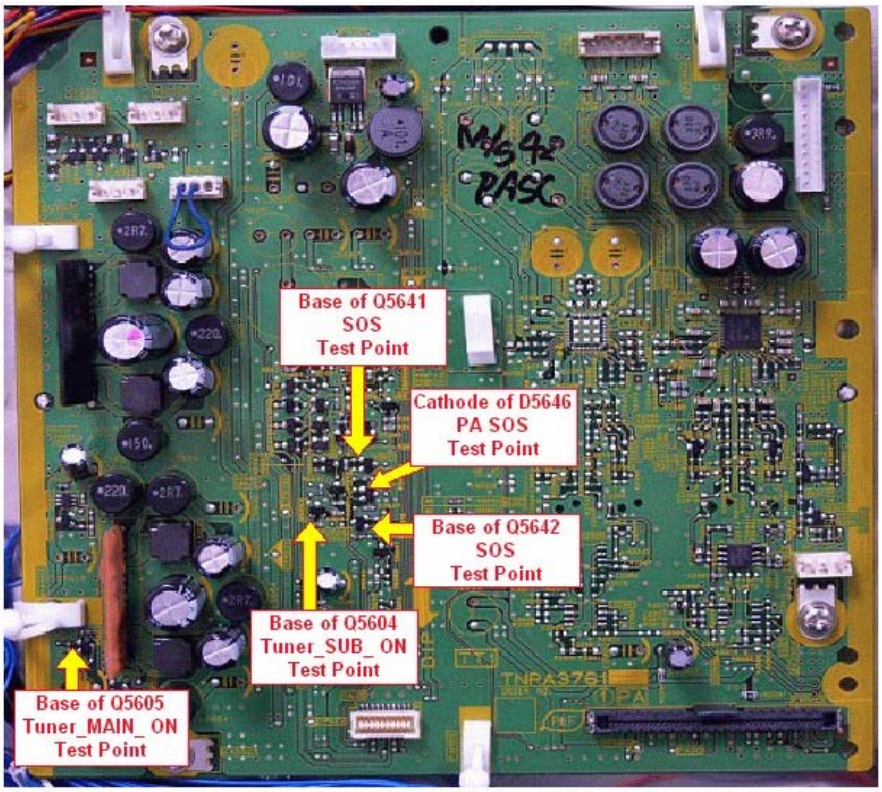
This diagram depicts the distribution of the PA board voltages to the DG, H, and DT boards. A high output at pin 34 of connector PA20 will cause the unit to shut down and generate ten blinks of the power LED. This SOS condition is created when there is an abnormality of any of the voltages shown in the diagram.

A high output at pin 35 of connector PA20 causes the unit to shut down and generate twelve blinks of the power LED. This SOS condition is created when there is an abnormality in the audio amplifier circuit or its 15V source.

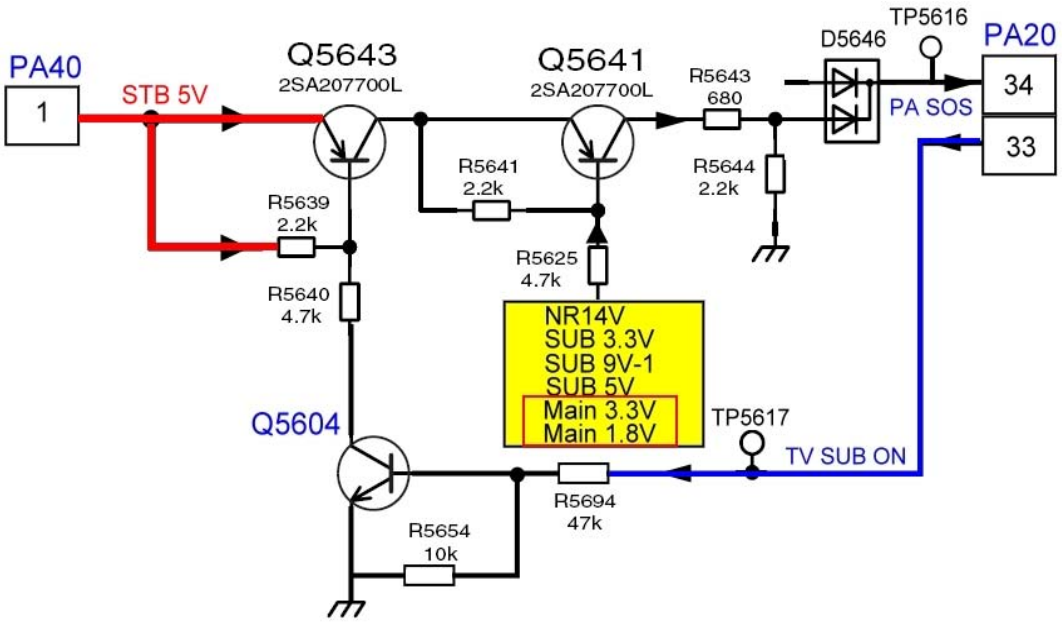
TV Shutdown due to Over-voltage or Short-circuit

The base of Q5642 being low indicates a short circuit in the Main 1.8V, Main 9V, or Main 5V output of the PA board.

The base of Q5641 being low indicates a short circuit or an over-voltage condition in the NR14V, Main 1.8V, Main 3.3V, SUB 9V, SUB 3.3V or SUB 5V output of the PA board.

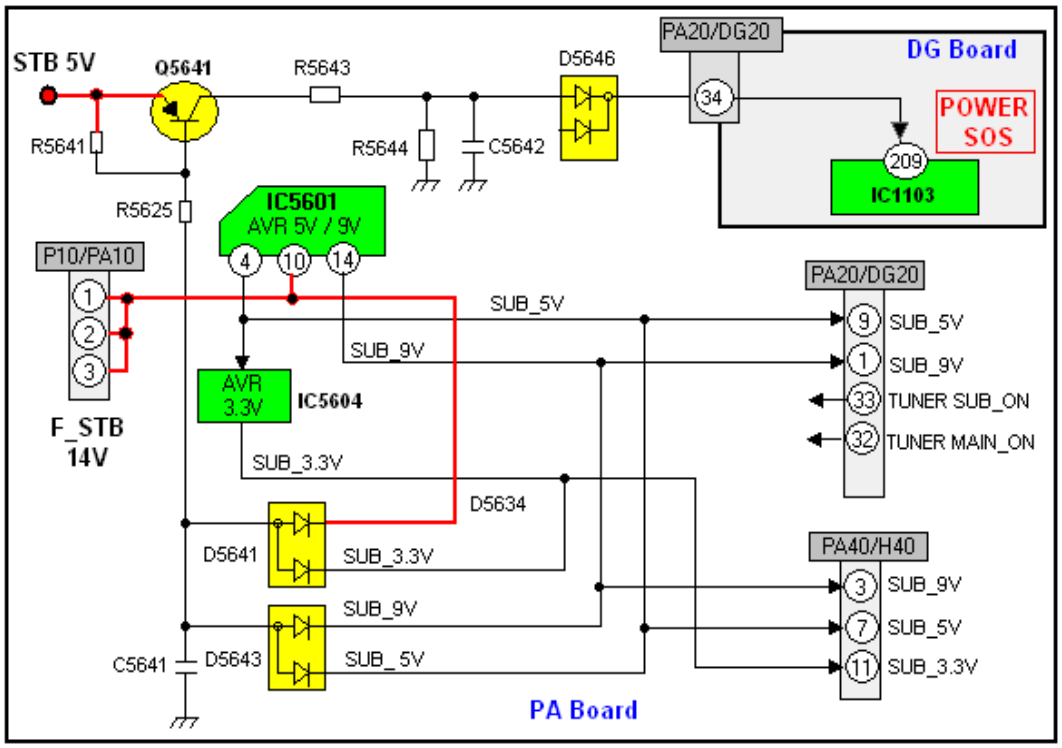


PA SOS Detect Circuit

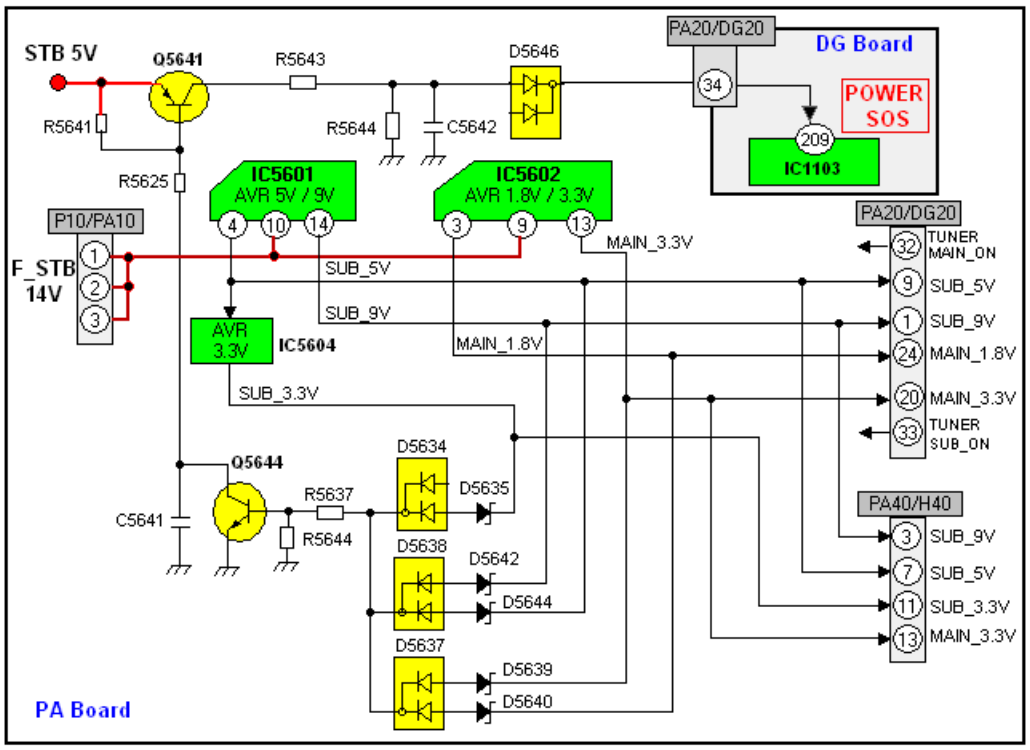


Upon connecting the television to the wall outlet, the STB 5V created by the P board is applied to the PA board via pin 1 of connector PA40. The TV SUB ON command of the DG board MPU (IC1103) enters pin 33 of connector PA20 and turns on Q5604. As a result, Q5643 turns on and outputs the STB 5V to the biasing circuit of the transistor Q5641. The transistor Q5641 remains off until one of the voltages connected to R5625 becomes shorted.

PA-Board_Loss of Sub-Voltage Protection



PA Board_Over-Voltage Protection

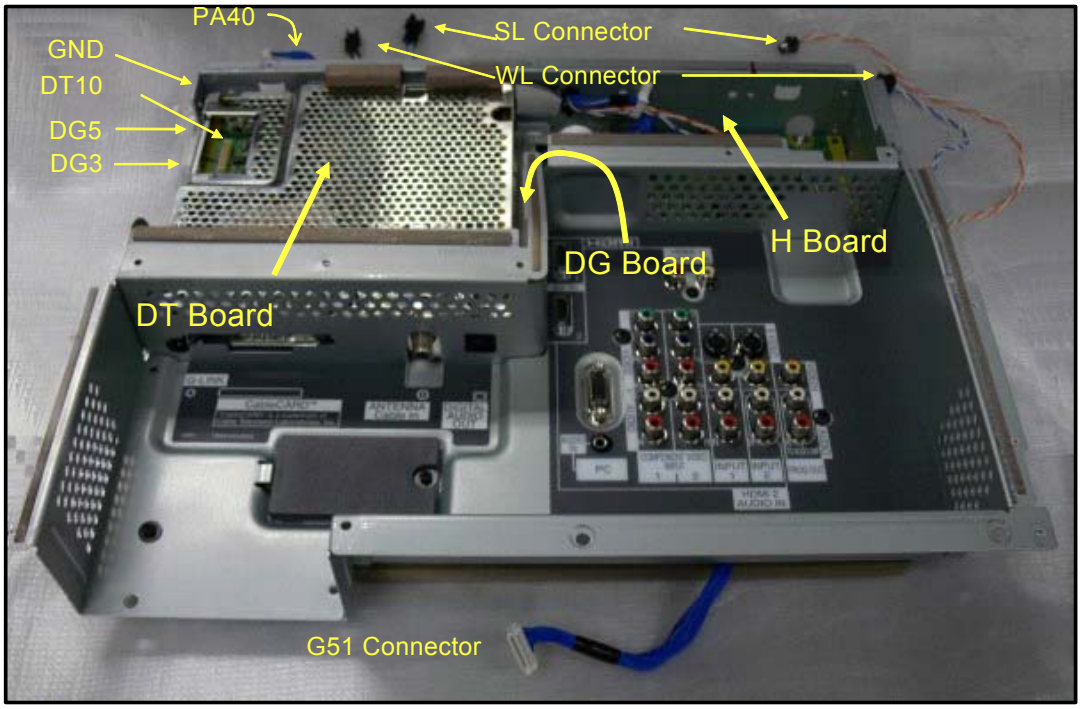


To rule out the P board (Use a Peak Hold Meter for voltage reading)

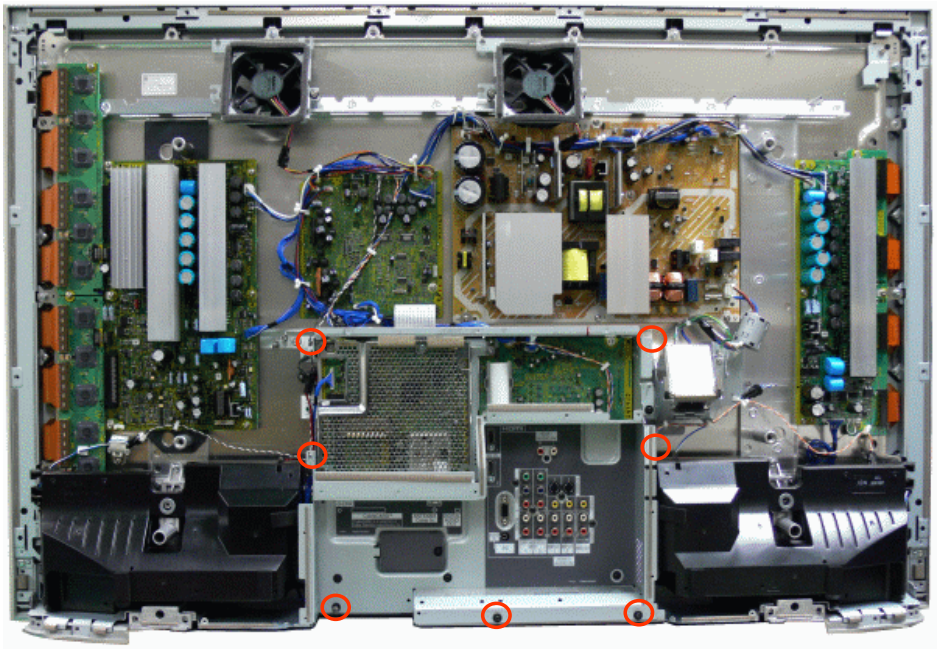
Note: Follow this procedure when the click sound of the relay can be heard after the unit is plugged in. If the relay does not click, check the STB 5V from the P board. If the STB 5V is missing, the P board may be defective. (If STB 5V is OK, the DG board may be defective.)

- Disconnect connector P10 in the P board (Make sure the TV is unplugged).
- Because you only have 2 to 3 seconds to measure the STB 14V, place your meter's probe at **pin 1 of connector P10** on the P board before plugging the TV to the AC line.
- Plug the TV to the AC line while still holding the probe at **pin 1**.
- Check to see if the 14V comes up. If it doesn't come up, the **P** board is defective. If it does, (since it may take some involvement to determine which of the PA or the DG board is defective) it's OK to order Both the **DG** and **PA** boards together.

DT, DG, H Board Assembly



Removal of Board Assembly



To uninstall the board assembly, remove the 7 screws indicated by the red circles

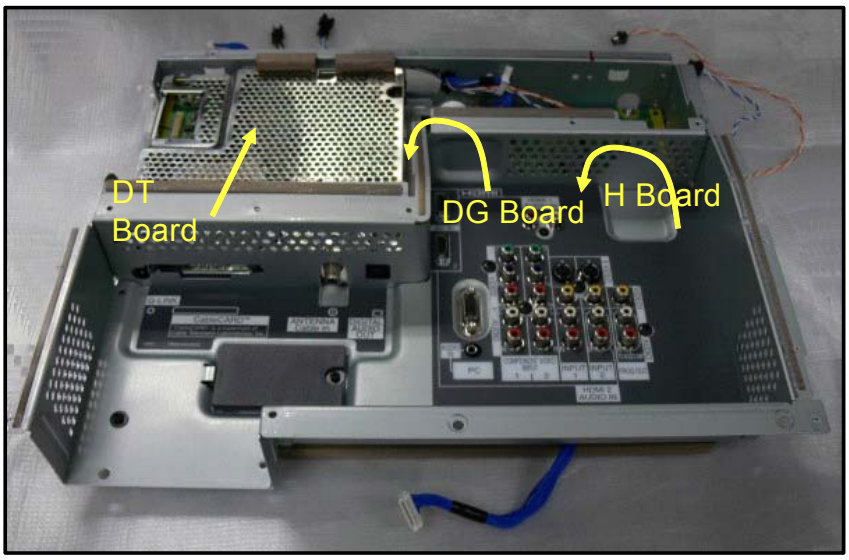
Board Assembly (Hidden Connector)

Board Layout Without the Assembly

Panasonic ideas for life

Power LED blinks 10 times

When the power LED blinks 10 times right after the TV has been plugged-in into the AC line and the Power is OFF, the P, the PA, the DG, the H, or the DT may be defective.



The DT, DG, and H board are part of the assembly. For troubleshooting, the DT board must be removed.

To rule out the H board:

Disconnect connector **H40** and plug the TV into the AC line

Note: If the Power LED stops blinking, the **H** board may be defective.

If the power LED still blinks, See the next slide.

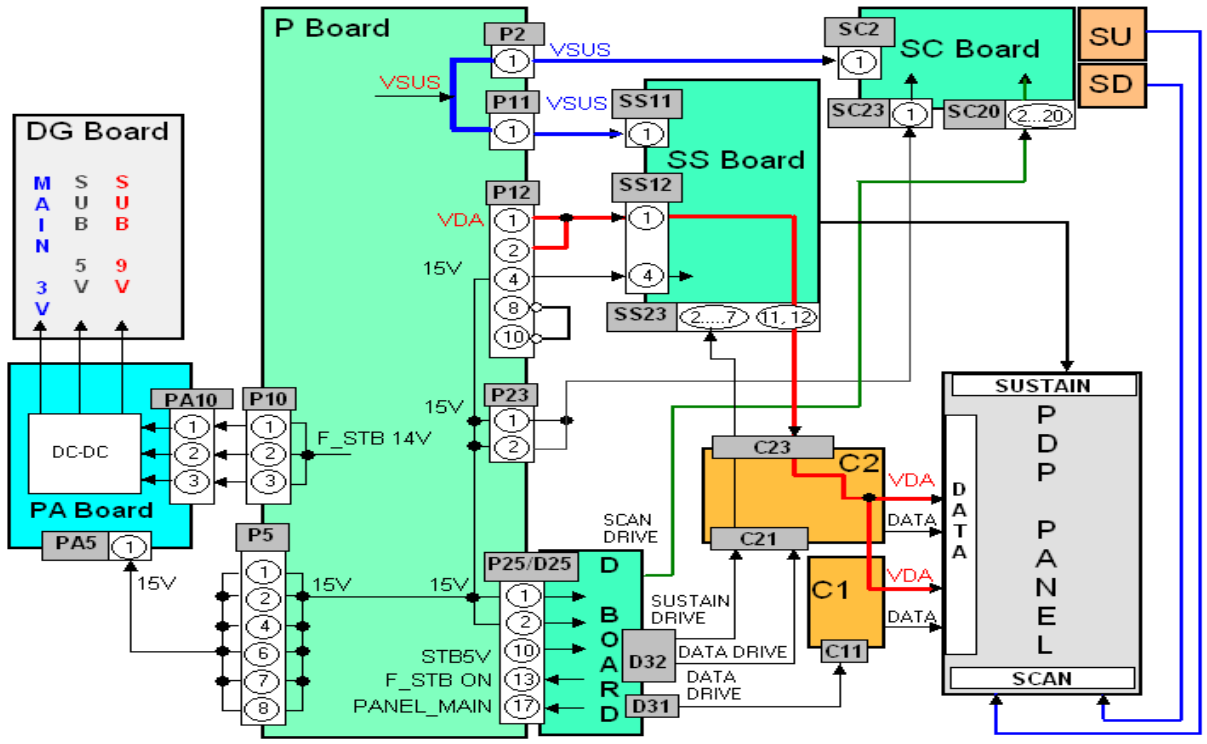
Keep in mind, every time the H board is suspected to be defective, change both the PA and the H board at the same time before applying power to the unit.

Power LED blinks 10 times

To rule out the DT board (Digital Tuner):

1. Remove the screws securing the DT board. Plug the TV into the AC line.
2. Note: If the Power LED stops blinking, the **DT** board may be defective.
3. Note: When the DT board is removed, the unit will power up with all functions disabled due to a lack of data communication.
4. If the Power LED still blinks, it is possible that the problem is the **PA** or the DG board.

10 Blinks Due to VSUS or VDA Voltage



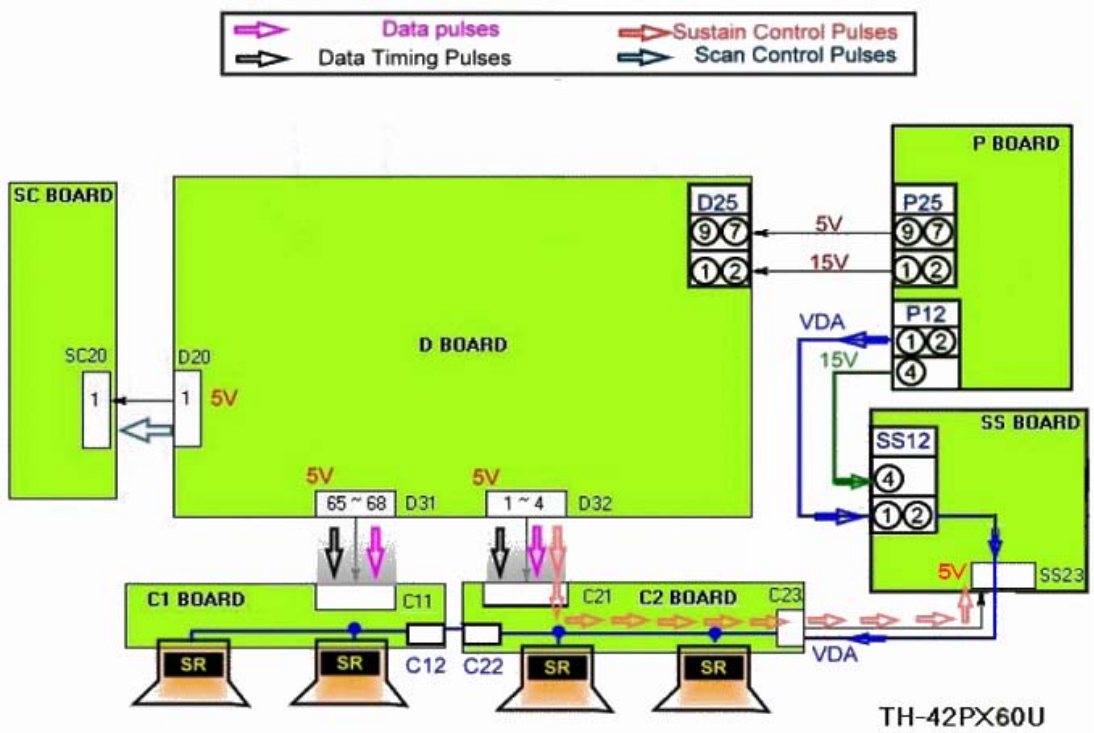
Power LED blinks 5 times

This is caused by abnormalities on the 5V line.

This could also happen if the VDA voltage is shorted.

SOS

5V, VDA, Data, Scan, Sustain Distribution



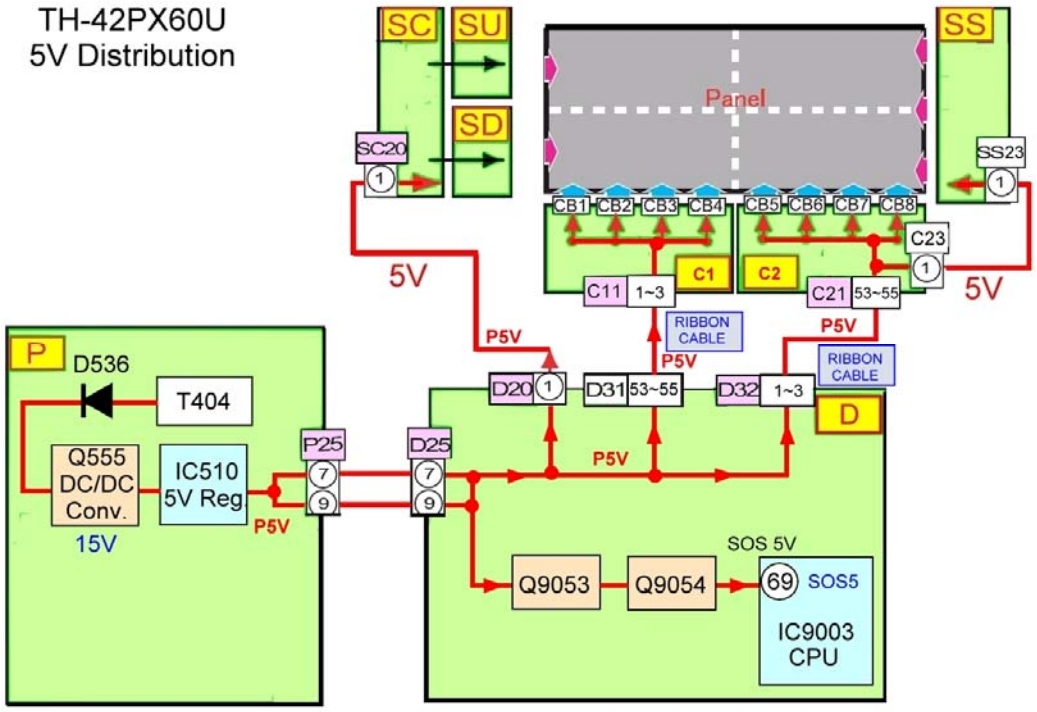
The switched 5V from the power supply board is applied first to the D board through connector D25. From there, the 5V is connected to the following boards:

1. The scan (SC) board through connector D20.
2. The data drive circuit board (C1) through connector D31.
3. The data drive circuit board (C2) through connector D32. From there the 5V goes to the sustain board through connector C23.

The 5V is monitored By Q9053 and Q9054 on the D board for short circuit. Normally the SOS5 pin (pin 69) of IC9003 is high. When the 5V is shorted, Q9053 is turned off allowing Q9054 to turn on and output a low to pin 69.

When pin 69 goes low, the TV shuts down and the power LED blinks 5 times.

5V Distribution



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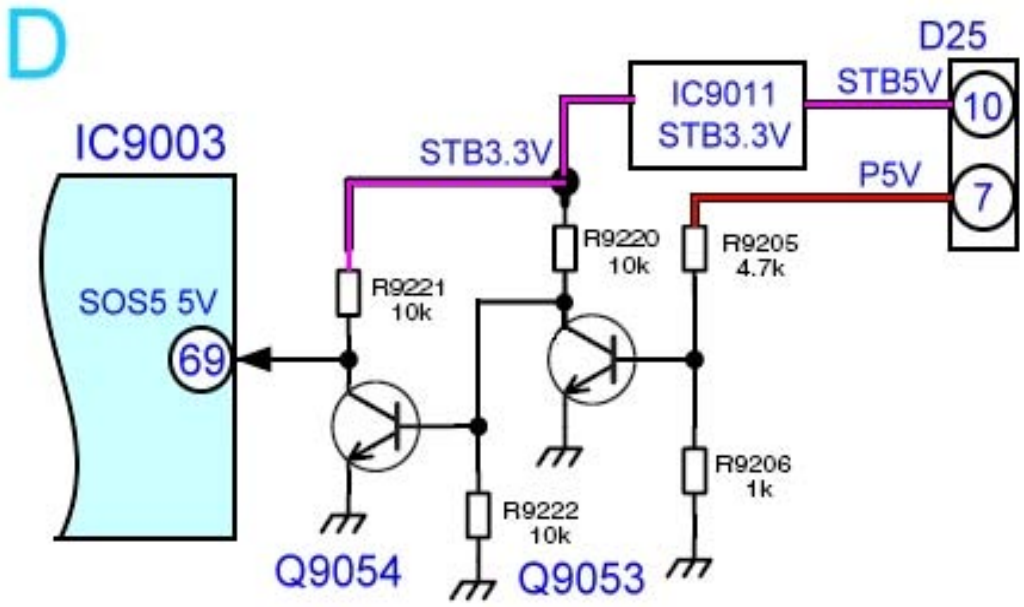
When pin 69 goes low, the TV shuts down and the power LED blinks 5 times.

5V SOS Detection Circuit



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When pin 69 goes low, the TV shuts down and the power LED blinks 5 times.

Other Causes of 5V SOS

- The Power LED could also blink 5 times if the VDA voltage is shorted [Normally by the Panel (de-multiplexer ICs)].
- To understand the reason, see the next slide

The switched 5V from the power supply board is applied first to the D board through connector D25. From there, the 5V is connected to the following boards:

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2. The data drive circuit board (C1) through connector D31.
3. The data drive circuit board (C2) through connector D32. From there the 5V goes to the sustain board through connector C23.

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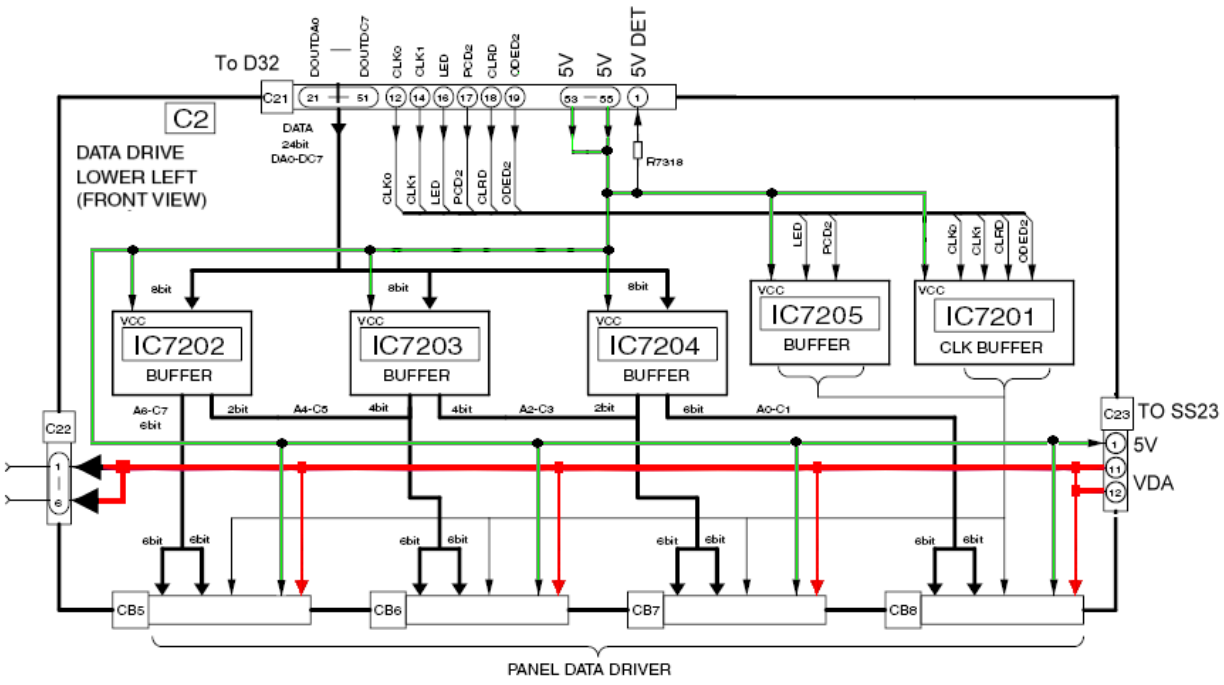
When pin 69 goes low, the TV shuts down and the power LED blinks 5 times.

5V and VDA Distribution on the C Board



The switched 5V from the power supply board is applied first to the D board through connector D25. From there, the 5V is connected to the following boards:

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2. The data drive circuit board (C1) through connector D31.
3. The data drive circuit board (C2) through connector D32. From there the 5V goes to the sustain board through connector C23.

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When pin 69 goes low, the TV shuts down and the power LED blinks 5 times.

How to properly isolate the C boards

- When the ribbon cables from the D board to the C boards are disconnected in order to isolate the C boards, the Power LED will blink 6 times.
- The following circuit explains the reason why.
- To properly isolate the C boards without having the Power LED blink, the test point TP9387 (Labeled TP9387 on the D board) should be grounded through a 1K resistor.
- The VDA connector should be also disconnected.

The switched 5V from the power supply board is applied first to the D board through connector D25. From there, the 5V is connected to the following boards:

1. The scan (SC) board through connector D20.
2. The data drive circuit board (C1) through connector D31.
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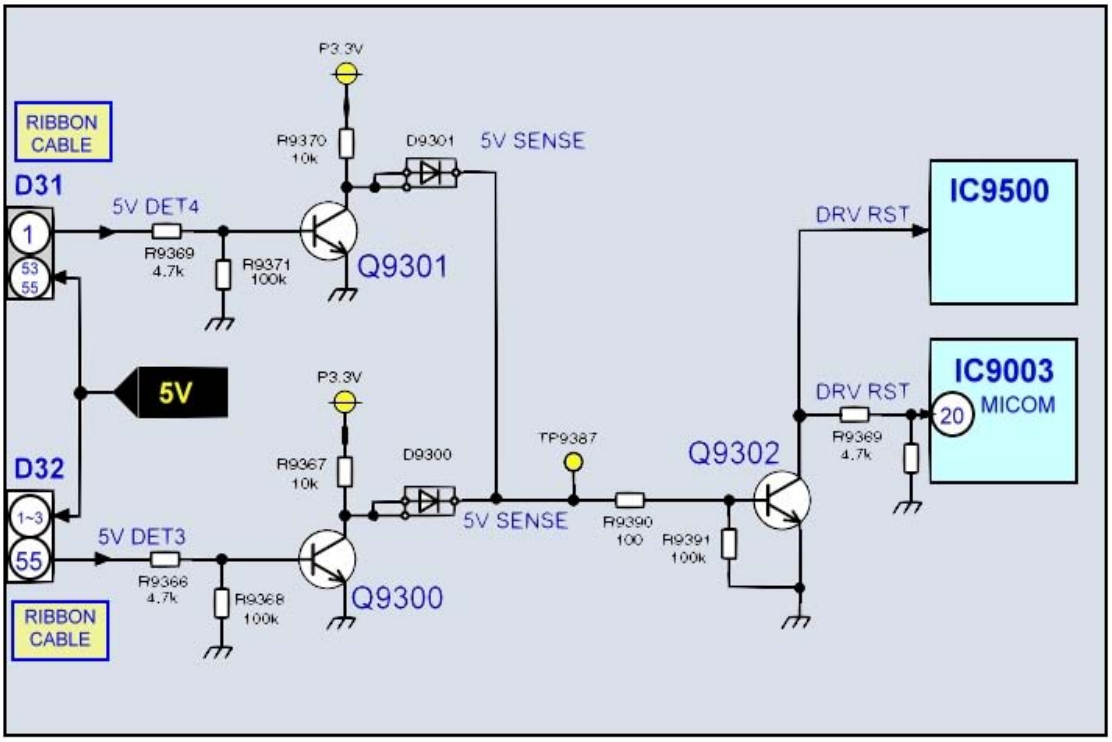
Drive Reset Circuit



DRV RST input to IC9500 and IC9003 must be high for the unit to operate. The D board provides the 5V source needed to power the C boards. On the C board, the 5V is routed back to the D board to activate the 5V SENSE circuit. A voltage divider consisting of R9369 and R9371 causes the collector of transistor Q9301 to become low. As a result, the base voltage of Q9302 also becomes low causing its collector to become high. The output voltage is applied to IC9500 and IC9003 as DVR RST.

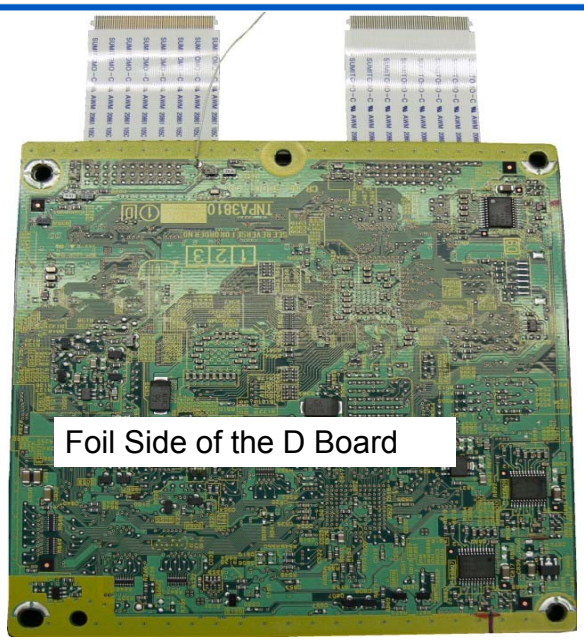
The operation of the 5V SENSE circuit of the C2 board is the same.

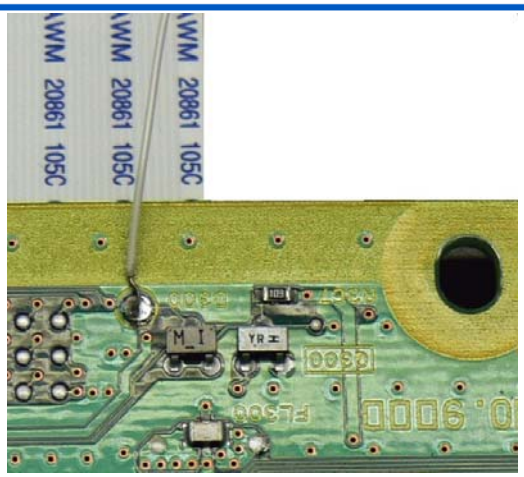
The diodes D9301 and D9302 are used to isolate the two 5V SENSE circuits.

When the 5V SENSE circuit does not detect 5V from any of the C boards, the DVR RST output becomes low. The unit goes into shutdown and the power LED blinks 6 times.

Test Point TP9387 is the ideal location to check for DRV RST.

Drive Reset Circuit Test Point





TP9387 is not shown on the board.

The test point shown in these pictures is a substitute for TP9387. It is located on the foil side of the board. To make the ground connection, the board has to be removed.

DRV RST input to IC9500 and IC9003 must be high for the unit to operate. The D board provides the 5V source needed to power the C boards. On the C board, the 5V is routed back to the D board to activate the 5V SENSE circuit. A voltage divider consisting of R9369 and R9371 causes the collector of transistor Q9301 to become low. As a result, the base voltage of Q9302 also becomes low causing its collector to become high. The output voltage is applied to IC9500 and IC9003 as DVR RST.

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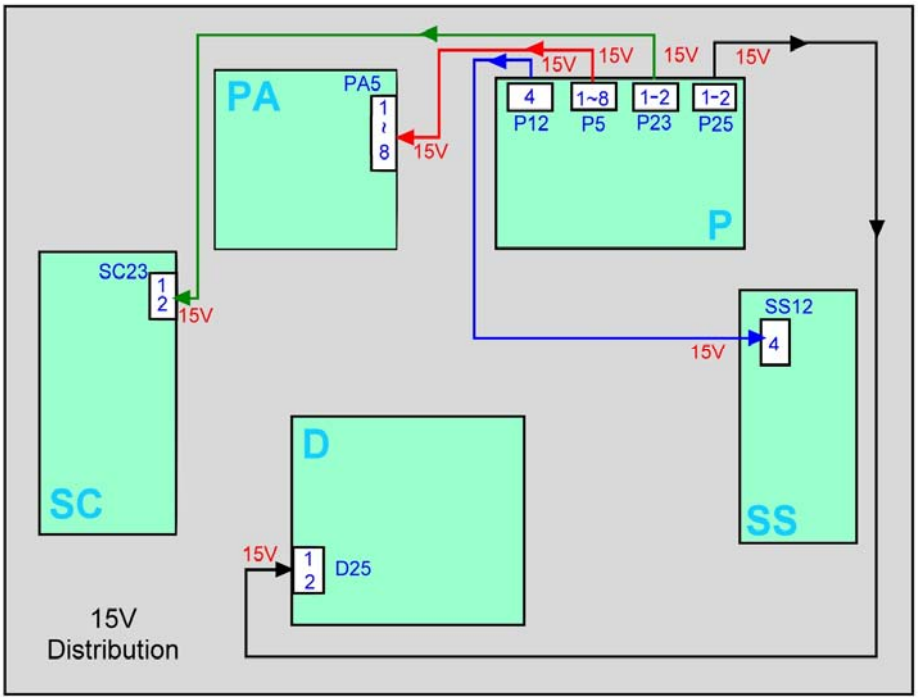
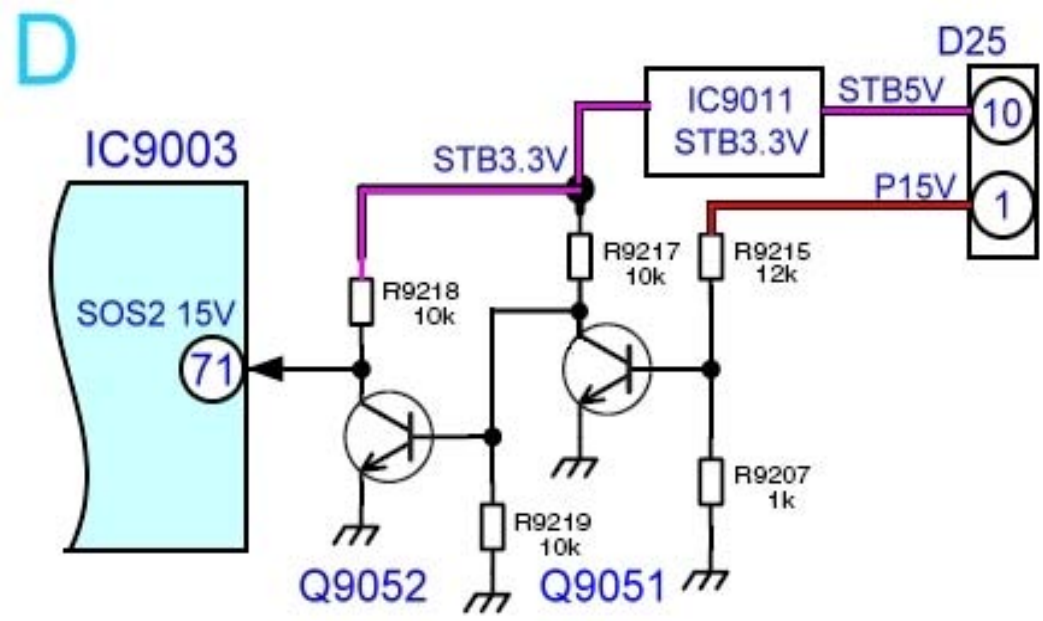
Test Point TP9387 is the ideal location to check for DRV RST.

15V Distribution



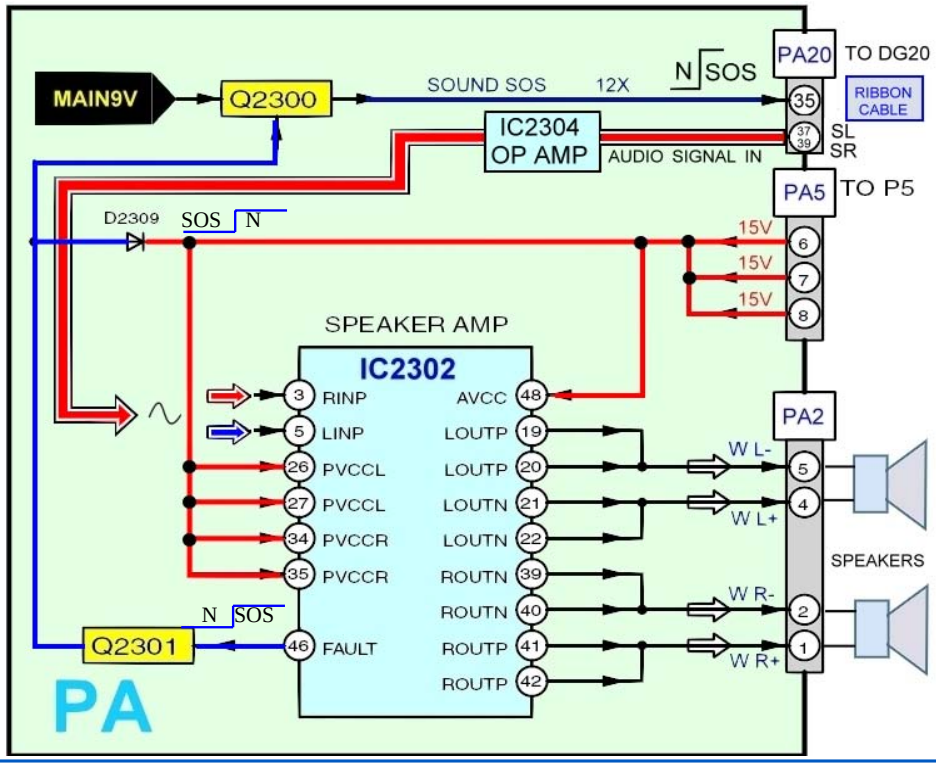
The 15V supply is created on the P board. It is distributed to the PA, SC, D, and SS boards.

15V SOS Detection Circuit



The 15V supply is created on the P board. It is distributed to the PA, SC, D, and SS boards.

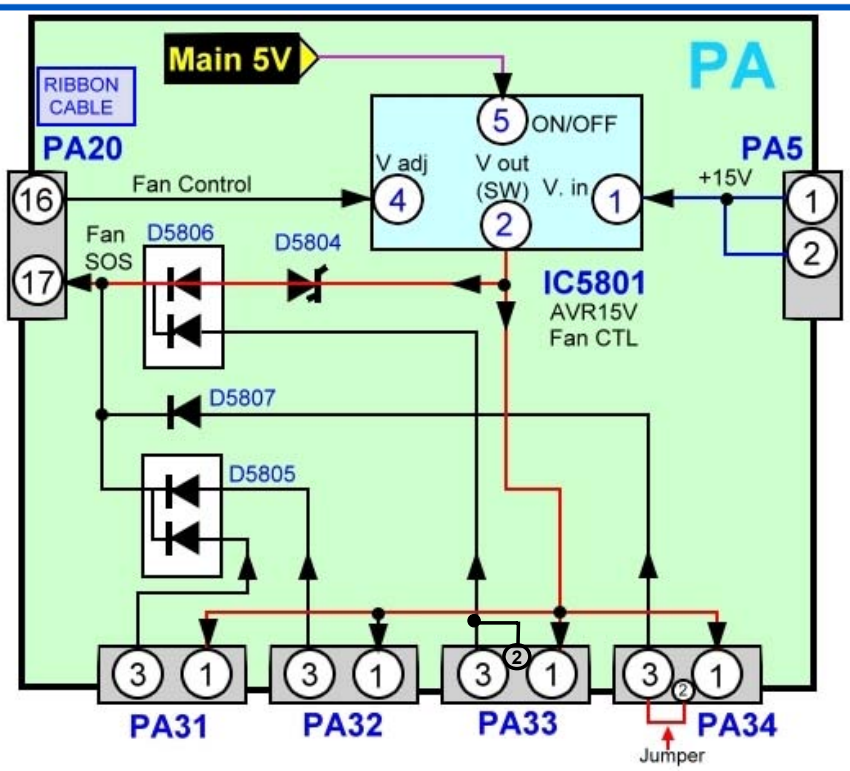
Sound SOS Detection Circuit



The transistor Q2301 monitors the speaker amplifier IC (IC2302). If the IC or one of the speakers develops a short circuit, a high is output at pin 46 of the IC causing Q2301 to go into conduction and output a low to the base of Q2300. As a result, Q2300 comes on and outputs a high to the DG board.

A short circuit of the 15V line causes the diode D2309 to go into conduction. The base voltage of Q2300 becomes low and a high is output to the DG board.

Fan SOS



59

Panasonic ideas for life

The PA board contains the fan drive circuit. To control the speed of the fan, a PWM signal that originates in the DG board Microprocessor(IC1103) is applied to pin 4 of IC5801. The duty cycle of the PWM signal is varied according to the internal temperature of the unit. The result is different levels of DC voltage being applied to the fans to keep the unit cool.

If the supply voltage at pin 2 of IC5801 becomes excessive, the inline zener diode (D5804) goes into conduction and forward biases the diode D5806. As a result, a High is output at pin 17 of connector PA20 to trigger the SOS condition.

If any of the fans becomes defective, A high is output at pin 3 of the fan connector to forward bias the inline diode. The DC output of the diode is provided to pin 17 of connector PA20 to trigger the SOS condition.

Fan SOS

To determine if a fan is the cause of the 11 blinks of the power LED, simply use a peak-hold voltmeter to determine if pin 3 of the fan connector goes High before shutdown. If it does, the fan is defective. If it does not, check the other fans and the fan drive drive circuit.

The PA board contains the fan drive circuit. To control the speed of the fan, a PWM signal that originates in the DG board Microprocessor(IC1103) is applied to pin 4 of IC5801. The duty cycle of the PWM signal is varied according to the internal temperature of the unit. The result is different levels of DC voltage being applied to the fans to keep the unit cool.

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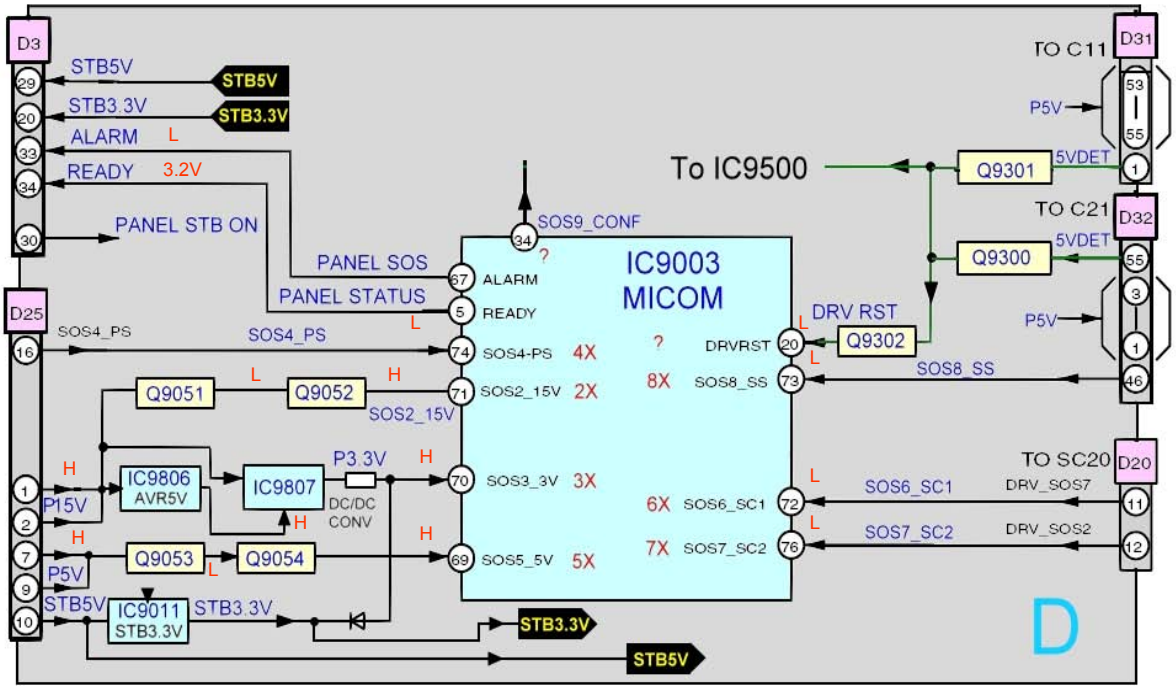
If any of the fans becomes defective, A high is output at pin 3 of the fan connector to forward bias the inline diode. The DC output of the diode is provided to pin 17 of connector PA20 to trigger the SOS condition.

D Board SOS Detect

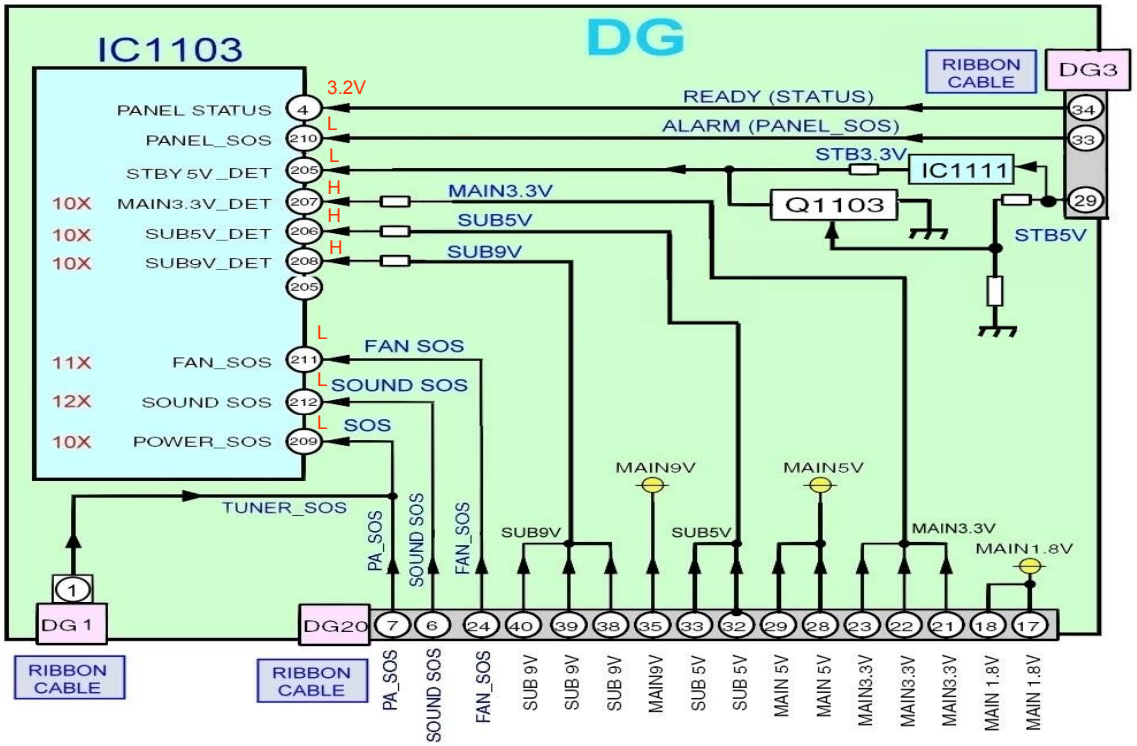


H (High) or L (Low) = Logic State during normal operation

Power supply abnormalities detected on the P board are reported to IC9003 via the SOS4 input. SOS2_15V, SOS3_3V and SOS5_5V of IC9003 monitor for a short circuit of the 15V, 3.3V and 5V inputs to the D board. The DRV RST input monitors for the presence of 5V on the C boards. The remaining SOS inputs monitor for abnormal operation of the SC and SS boards.

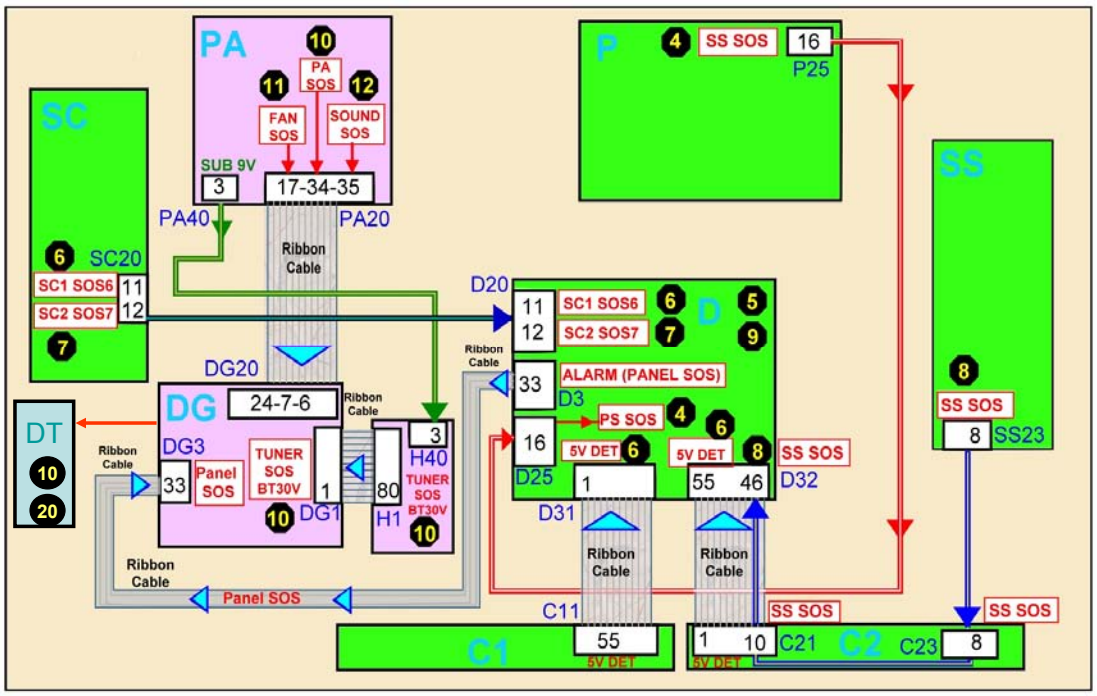
Since the D board does not control the blinking pattern of the power LED, any detected SOS condition must be reported to the DG board MPU (IC1103). The alarm pin of IC9003 reports all SOS detections to the DG board MPU.. The “ready” pin of IC9003 is an acknowledgement line that reports to the DG board MPU, the operational status of the D board.

DG Board SOS Detect



1. The MPU (IC1103) of the DG board monitors the MAIN3.3V, SUB5V and SUB9V sources of the PA. If any of these voltages is missing, IC1103 shuts down the unit and the power LED blinks 10 times.
2. The FAN SOS detection input monitors for irregularities in the fan drive circuit. A broken fan or excessive voltage output of the fan regulator circuit causes the power LED to blink 11 times.
3. The SOUND SOS detection input monitors for irregularities in the sound output circuit of the PA board. A defective speaker or excessive current drain of the audio power amplifier IC causes the power LED to blink 12 times.
4. The POWER SOS detection input monitors for irregularities in the voltage outputs of the PA board. Excessive voltage output or excessive current drain causes the power LED to blink 10 times.
5. Since the D board does not control the blinking pattern of the power LED, any SOS condition detected by IC1103 must be reported to the DG board MPU. The PANEL_ SOS input receives a report of any SOS detection of the D board MPU. The PANEL STATUS pin of IC1103 is an acknowledgement line that reports to the DG board MPU the operational status of the D board.
6. Pin 205 of IC1103 monitors the STB5V line for immediate shutdown of the STB5V if the STB5V disappears. Under normal condition, the voltage drop at the base of Q1103 causes Q1103 to turn on and output a low to pin 205 of the MPU. If the STB5V is no longer present, pin 205 of the MPU rises to 3.3V to trigger the shutdown of the unit.

Origin of Power LED Blinks



This drawing shows the relationship of most of the boards in the unit. It also shows the most likely board to replace when there is a shutdown condition and a blinking pattern emitted by the power LED.

D Board SOS Detect

D Board SOS Detect		
SOS LINE	LINE MONITORED	NUMBER OF TIMES THE POWER LED BLINKS
SOS 2	15V	2 BLINKS
SOS 3	P3.3V (15V & STB5V)	3 BLINKS
SOS 4	PS	4 BLINKS
SOS 5	5V	5 BLINKS
SOS 6	SC1	6 BLINKS
DRVRST	5V DET	6 BLINKS
SOS 7	SC2	7 BLINKS
SOS 8	SS	8 BLINKS
SOS 9	CONF. DC LEVEL SHIFTER	9 BLINKS ?

DG Board SOS Detect

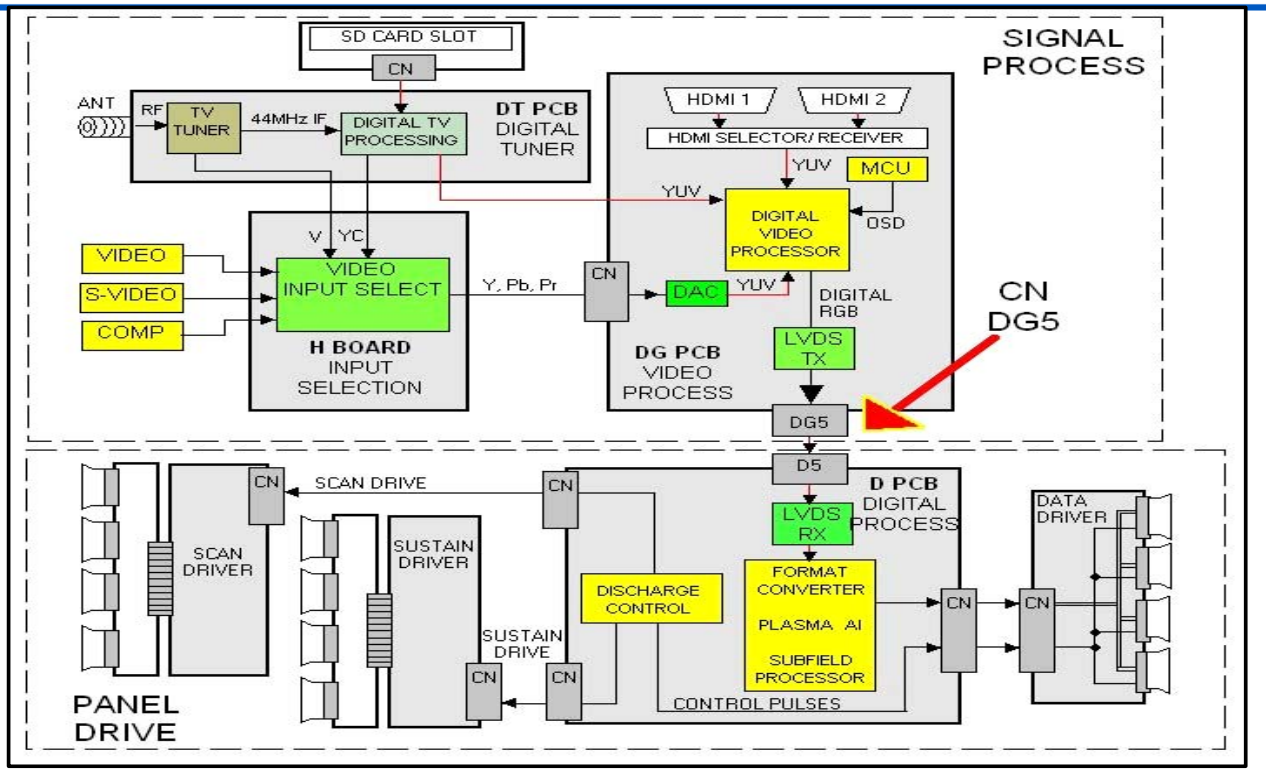
DG Board SOS Detect		
SOS LINE	LINE MONITORED	NUMBER OF TIMES THE POWER LED BLINKS
STB 3.3V DET	STB 3.3V	10 BLINKS
MAIN 3.3V DET	MAIN 3.3V	10 BLINKS
SUB 5V DET	SUB 5V	10 BLINKS
SUB 9V DET	SUB 9V	10 BLINKS
PA-TUNER SOS	PA & TUNER+30V	10 BLINKS
FAN SOS	FAN CIRCUIT	11BLINKS
SOUND	SOUND OUT CIRCUIT	12 BLINKS

No video, No OSD

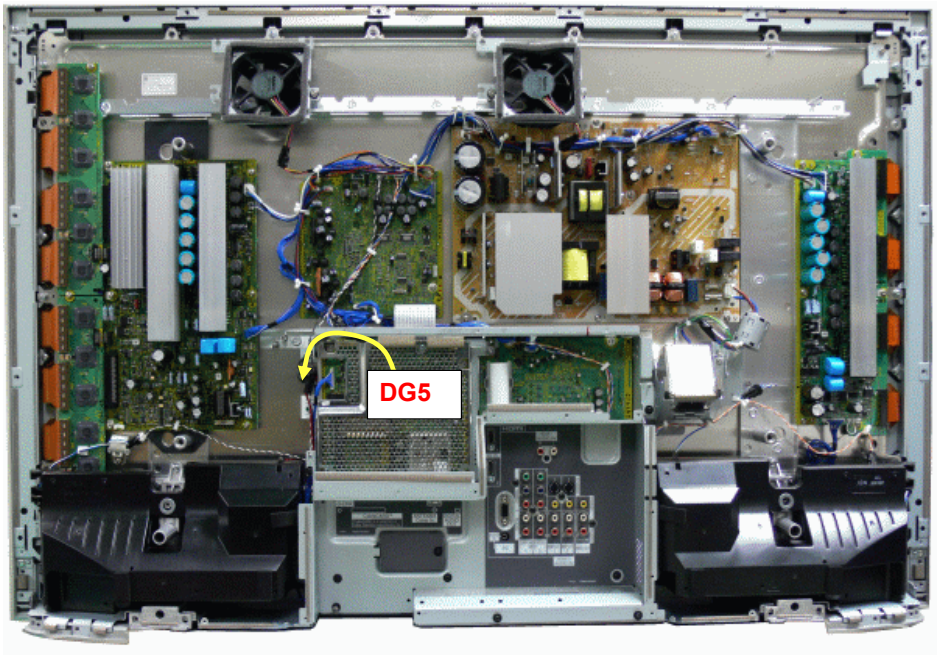
Determining whether a No video, No OSD symptom is caused by the video process or the panel drive circuit

1. Unplug the unit from the wall outlet.
2. Disconnect the connector DG5 from the DG board.
3. Plug the unit into the wall outlet and turn on the power.
4. If the unit displays a white screen, It is a video process problem.
5. If the unit does not display a white screen, Proceed to check the panel drive circuits.

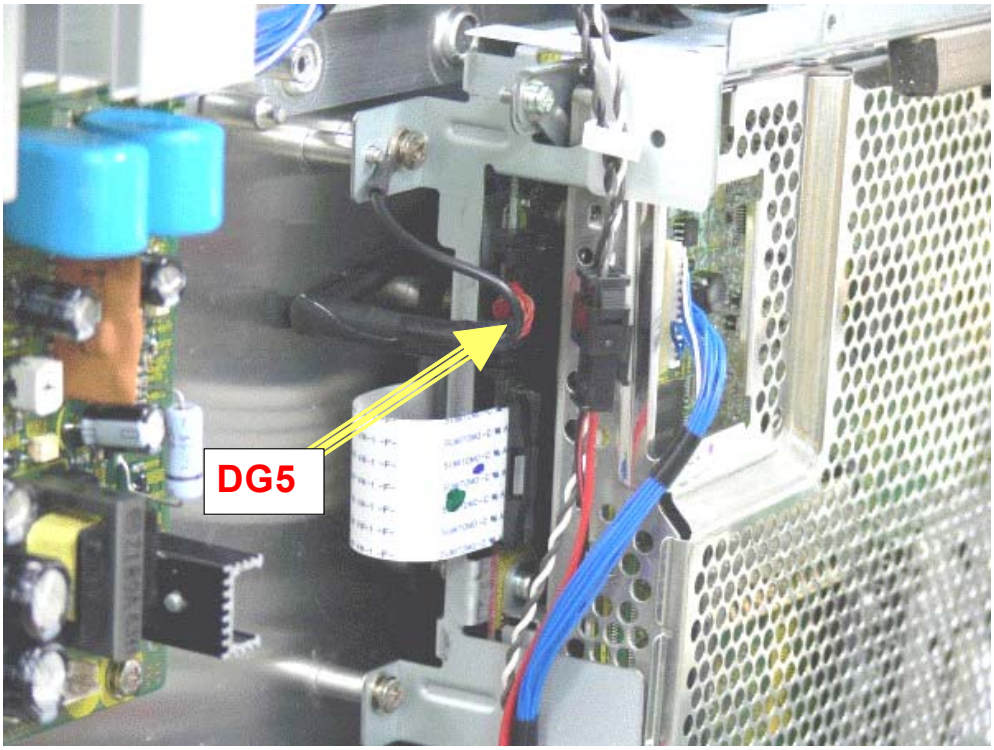
Electrical Location of Connector DG5



Physical Location of Connector DG5



Physical Location of Connector DG5 (Close-Up View)



Isolation of the SC and SS Boards

If any of the connectors providing the 15V or VSUS voltage to the SC or SS board is disconnected while the connectors that provide the Scan and Sustain Drive pulses from the D board are still connected, the TV will shut down.

Isolation of the SC and SS Boards

Precaution: **Do not let the TV run for more than 30 seconds while isolating any of the circuit boards.**

The Scan Board (SC) and the Sustain (SS) board could be easily isolated.

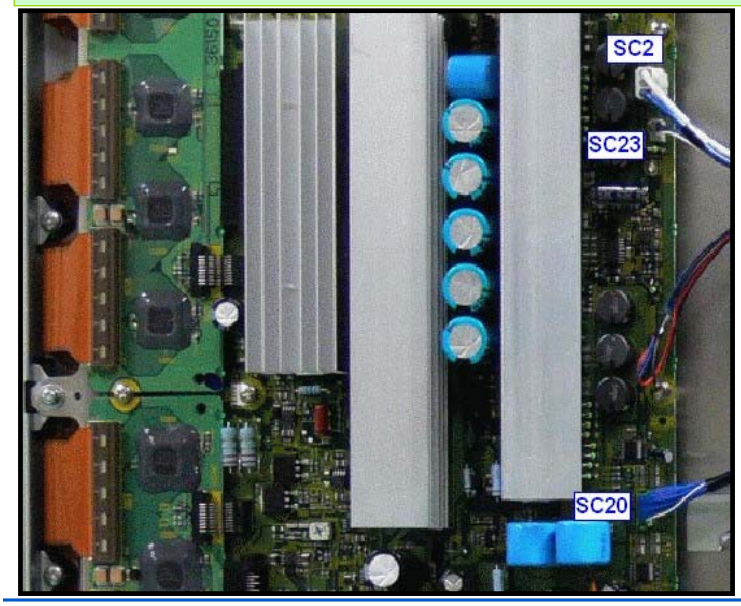
This can be useful to diagnose:

1. Shutdown Problems
2. Video Problems.

Isolation of the SC Board

Connector Location

The SC board could be isolated from the sources (Supplied Voltage & Scan Control Pulses)



Supplied Voltage = *VSUS* (Connector SC2) ***15V*** (Connector SC23)

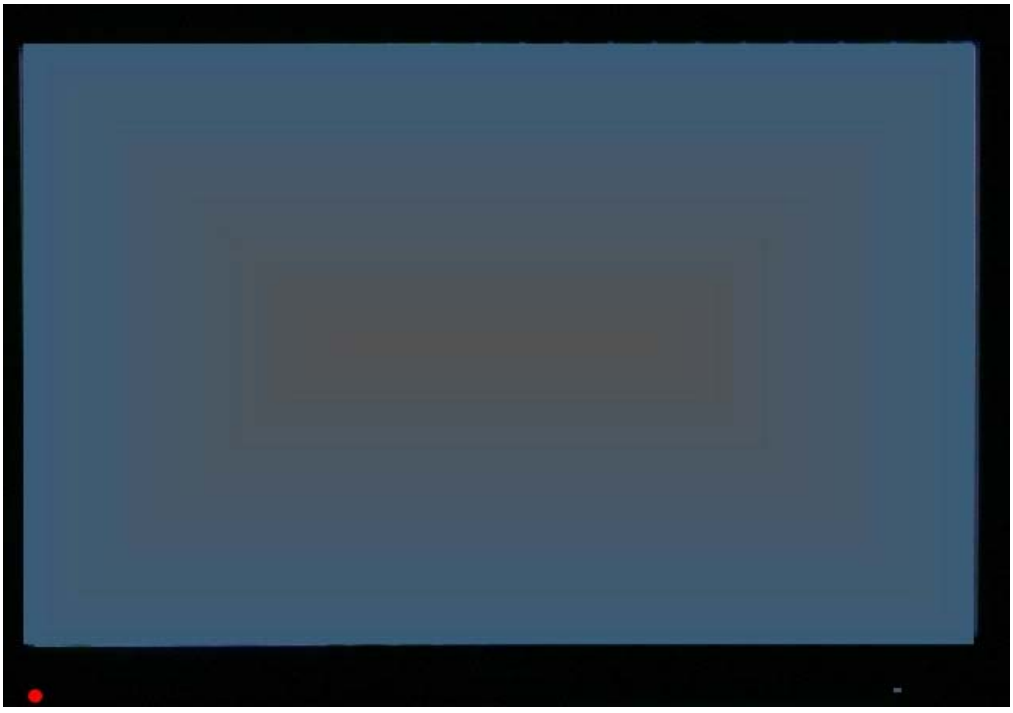
From Power Supply (P board)

Scan Control

Pulses = Connector SC20 from the SC board

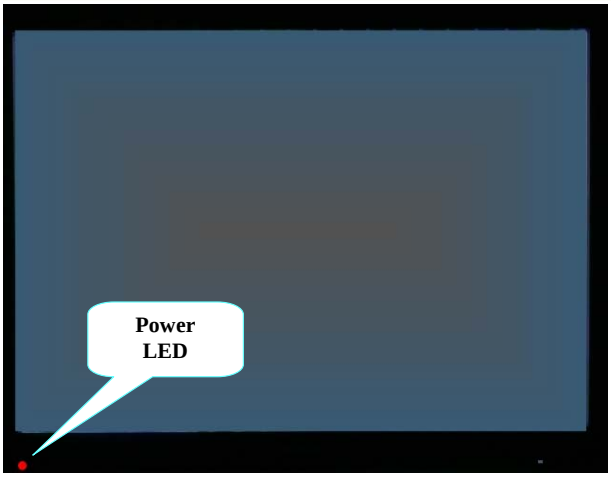
SC2, SC23, and SC20 Disconnected

SC board completely isolated from the sources (P and D boards)



Expectation when Isolating the SC Board

The Supplied voltage VSUS and 15V (SC2 & SC23) cannot be disconnected while the Scan Control pulses (SC20) are being supplied to the SC board. This will cause a shutdown condition.



If only SC2 is disconnected while SC23 and SC20 are connected:

The Power LED blinks 6 Times

If only SC23 is disconnected while SC2 and SC20 are connected:

The Power LED blinks 7 Times

If both SC2 and SC23 are disconnected while SC20 is still connected:

The Power LED blinks 7 Times

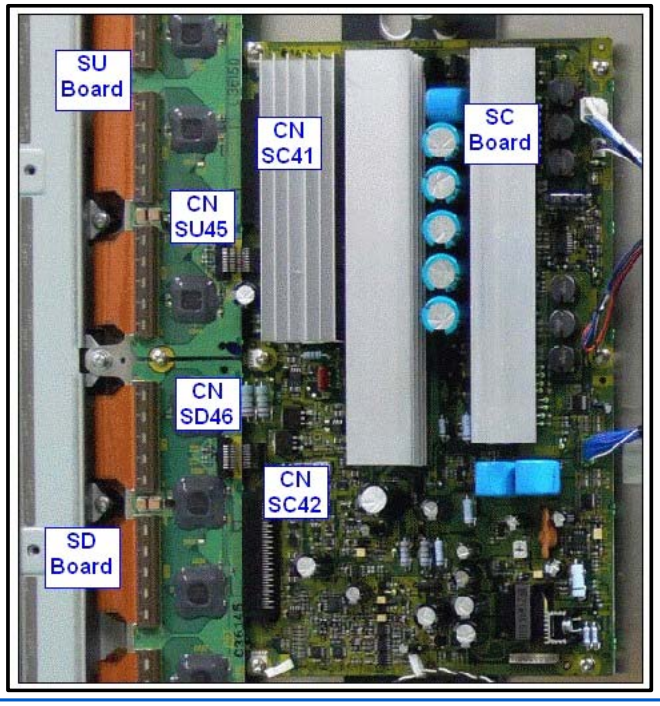
If SC20 is disconnected while SC2 and SC23 are still connected:

The Power turns ON (Black Picture – No OSD – Sound is OK, and there should be video out of the Monitor Jack))

SS LED is ON and SC LED is OFF

Isolation of the SC Board

The SC board could be isolated from the Driver Boards (SU &SD)



Sometimes the TV goes into "Shutdown" indicating that the problem is located on the SC board. This does not necessarily means that the SC board is the cause of the problem.

When this occurs, Disconnect both the SU and the SD boards from the SC board.
Note: To disconnect, remove 2 screws holding each of these boards in place and disconnect SC41, SU45, SD46 and SC42.

Isolation of the SC Board

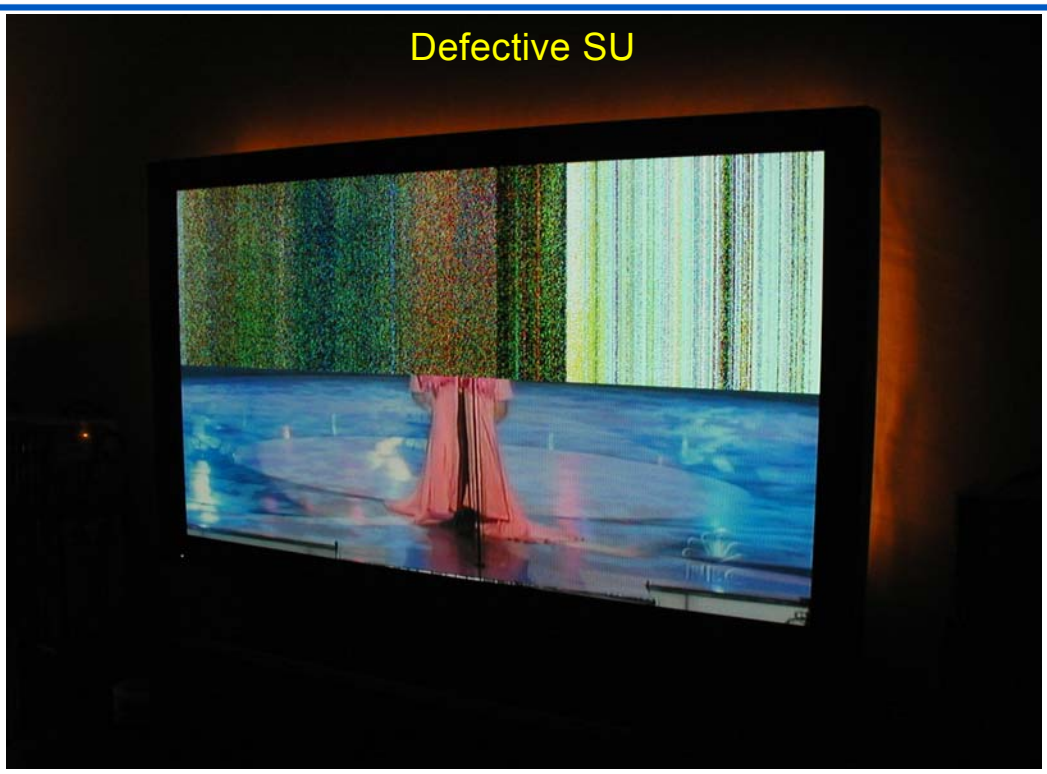
The SC board could be isolated from the Driver Boards (SU &SD)

Sometimes the TV may not go into “Shutdown” when there is a scan problem. This symptom seems to be caused by a defective D or SC board. When in reality, it is caused by the SU board.

Disconnecting the SU board yields a good picture at the bottom half of the screen and a completely black area in the upper half of the screen.

When this occurs, disconnect the SU board from the SC board. Note: To disconnect, remove 2 screws holding the boards in place and disconnect SC41, SU45.

Isolation of the SU Board



Display Problem

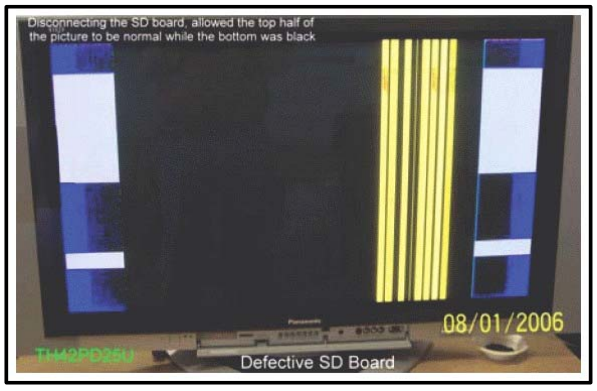
Please no wild guess _

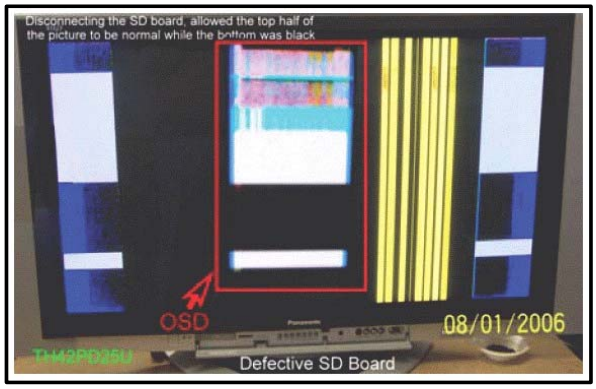
1. What is the cause of this symptom?
2. How do you isolate a problem of this kind?

Isolation of the SD Board

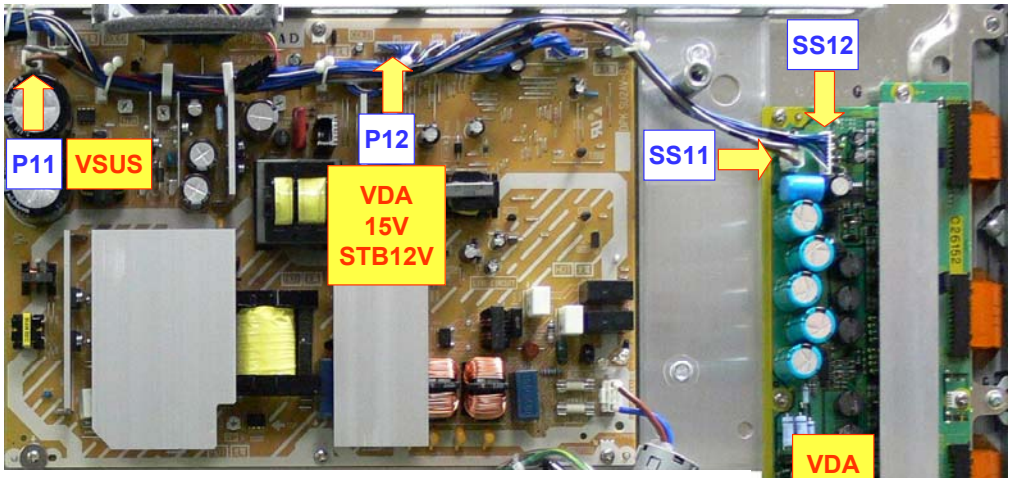
Please no wild guess _

1. What is the cause of this symptom?
2. How do you isolate a problem of this kind?





Supply Voltage from P to SS board



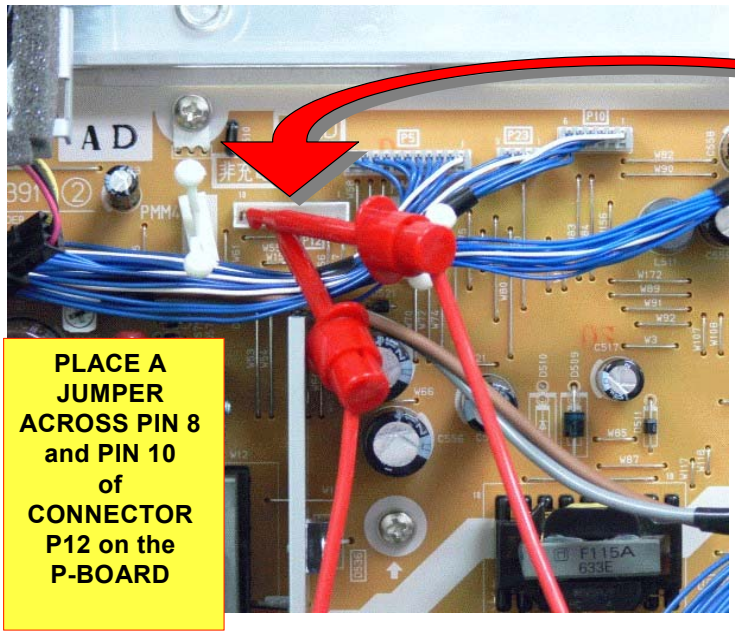
To completely isolate the SS board:

1. Disconnect P12 and P11 on the P board and SS23 on the SS board.
2. Place a jumper at pin 8 and 10 of connector P12.

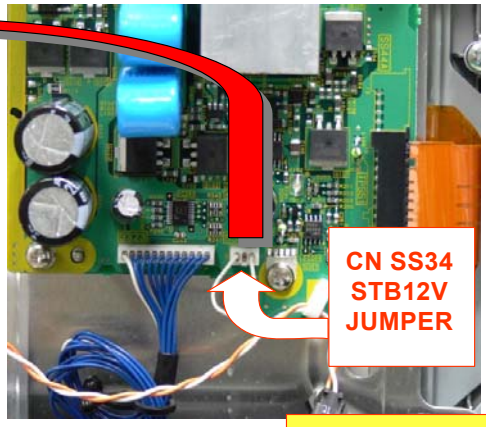
80

The screen is black because there is no VDA voltage from P12 of SS23 provided to the C boards.

Supply Voltage from P to SS board



PLACE A JUMPER ACROSS PIN 8 and PIN 10 of CONNECTOR P12 on the P-BOARD



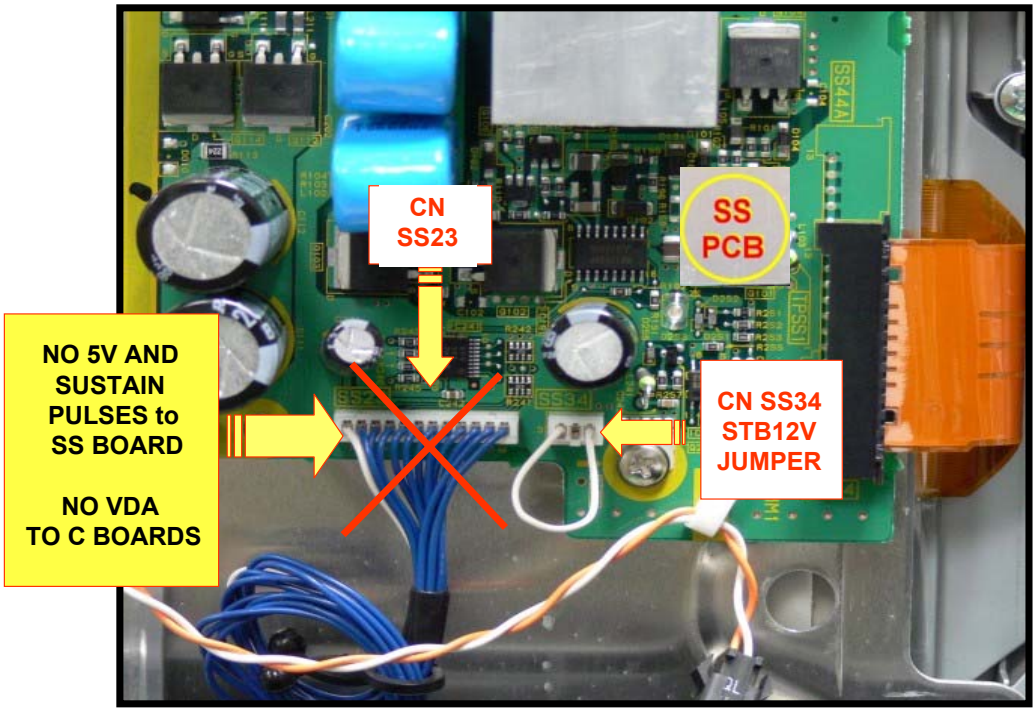
CN SS34 STB12V JUMPER

Or MOVE THE JUMPER FROM SS34 TO PIN 8 and PIN 10 of CONNECTOR P12

If P12 or SS12 is disconnected, pin 8 should be connected to pin 10.

If P12 is disconnected, in order for the TV to turn on, pin 8 should be grounded.

No output to SS board from the D board



82 Only SS23 Disconnected

Panasonic ideas for life

Test point location to check for various pulses and voltages coming into the SS board.

No output to SS board from D board

83 Only SS23 Disconnected

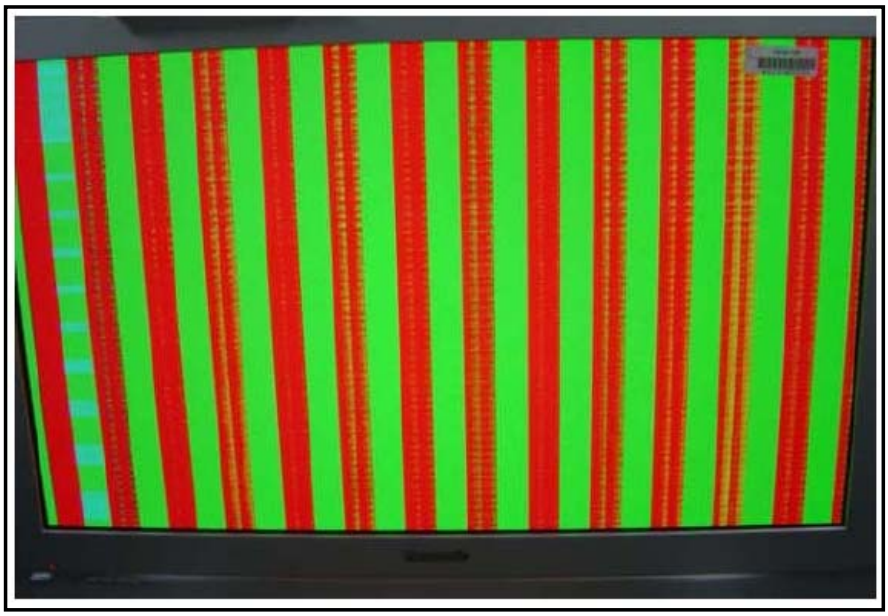
Panasonic ideas for life

Explain that the bottom portion of the screen is black because there's no VDA voltage been provided to C3 and C4. (See the previous slide where you can see that the VDA voltage is provided to the C's board through connector SS32)

No output to SS board from D board

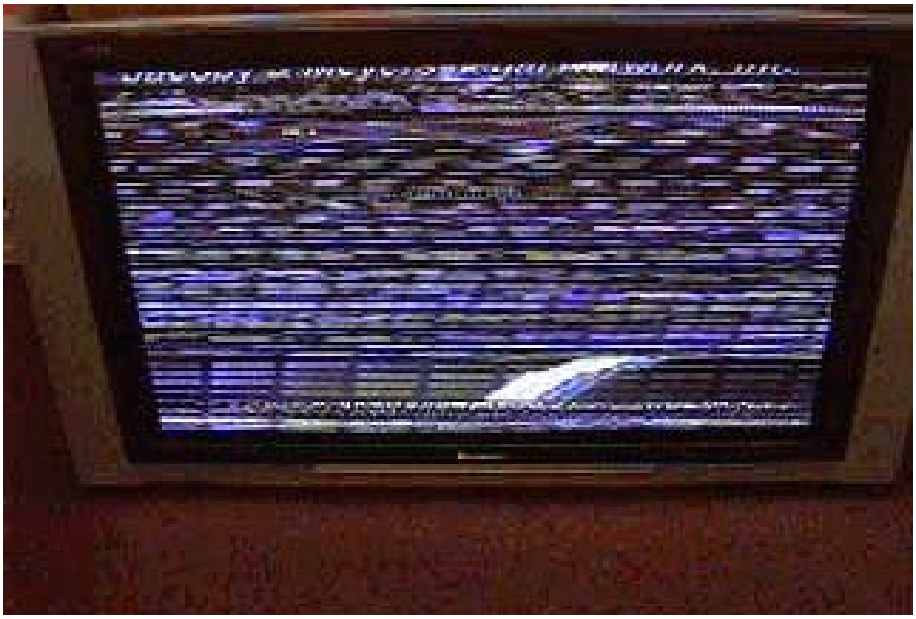
To provide VDA voltage to pin 12 of connector SS32 while SS32 is disconnected, insert a small solid piece of wire or the lead of a ¼ watt resistor into pin 12 of the disconnected side of SS32, and then place a jumper cable between pin 1 of P12 on the P board, and the wire or resistor lead at pin12 of SS32

Defective D board



Defective D board

Defective D board



SC Board

SC Board

Defective DG board

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