

PHILIPS

Service Training BASICS of PDP Trouble shooting

L. van der Niet
Philips CE / Euroservice
PDP repair part 2
March 2007



PHILIPS

Basics of PDP Trouble shooting – An Introduction

Target Audience

This module is intended for Service Engineers repairing Plasma Television.

Objective

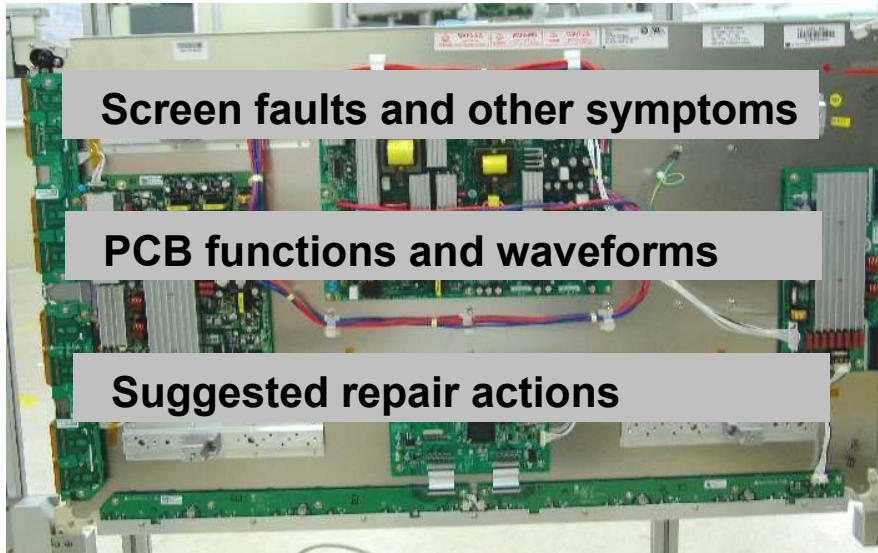
This module provides a basic knowledge on how to diagnose and trouble shoot Plasma Display panels in general. It is not model specific. This knowledge enables the learner to better recognize major fault symptoms of PDP's and to identify the parts that most probably cause the problem.

Prerequisites

Students should have an understanding of the Basics of Television and finished the module PDP Basics.



MAIN TOPICS



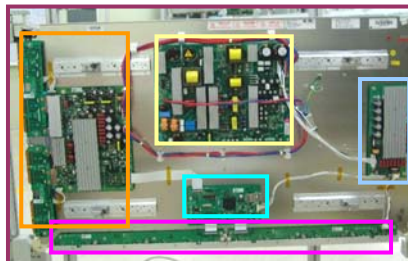
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INTRODUCTION

Trouble shooting on the PLASMA DISPLAY Panel is done on board level. This training module shows a number of common faults that can be encountered in all PDP Televisions.

- Plasma panel faults
- Scan & Sustain board faults
- Common & Sustain board
- Address driver board faults
- Control Logic board faults
- Power Supply Unit



More product specific faults are treated in separate service training modules.

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Panel Error Examples and Solutions

Vertical line

Vertical black bar (1)

Vertical black bar (2)

Vertical lines

Flicker noise

Image retention, but no image sticking



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Panel Error Examples and Solutions

Vertical line

Vertical black bar (1)

Vertical black bar (2)

Vertical lines

Flicker noise

Image retention, but no image sticking



Check the COF

1. Inspect 10 ohm resistors and drive IC's

2. Inspect the film where the COF connects to the Address drive board

3. Replace the Plasma panel



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Panel Error Examples and Solutions

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Panel Error Examples and Solutions

Vertical line

Vertical black bar (1)

Vertical black bar (2)

Vertical lines

Flicker noise

Image retention, but no image sticking

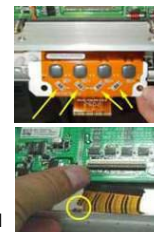


Check the COF

1. Inspect 10 ohm resistors and drive IC's

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3. Replace the Plasma panel



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Panel Error Examples and Solutions

Vertical line

Vertical black bar (1)

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Flicker noise

Image retention, but no image sticking



Check the COF

2. Inspect the film where the COF connects to the Address drive board



3. Replace the Plasma panel



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Panel Error Examples and Solutions

Vertical line

Vertical black bar (1)

Vertical black bar (2)

Vertical lines

Flicker noise

Image retention, but no image sticking



Replace the Control Board

1. Check if the screen retains outlines such as Teletext and/or menu's
2. Replace the control board



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Panel Error Examples and Solutions

Vertical line

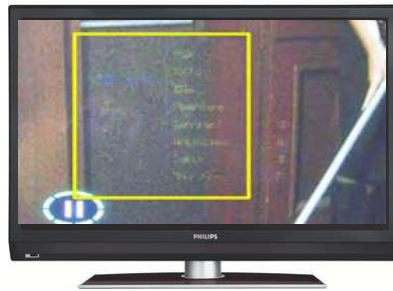
Vertical black bar (1)

Vertical black bar (2)

Vertical lines

Flicker noise

Image retention (burn-in)



Replace the Control Board

1. Check if the screen retains outlines such as Teletext and/or menu's

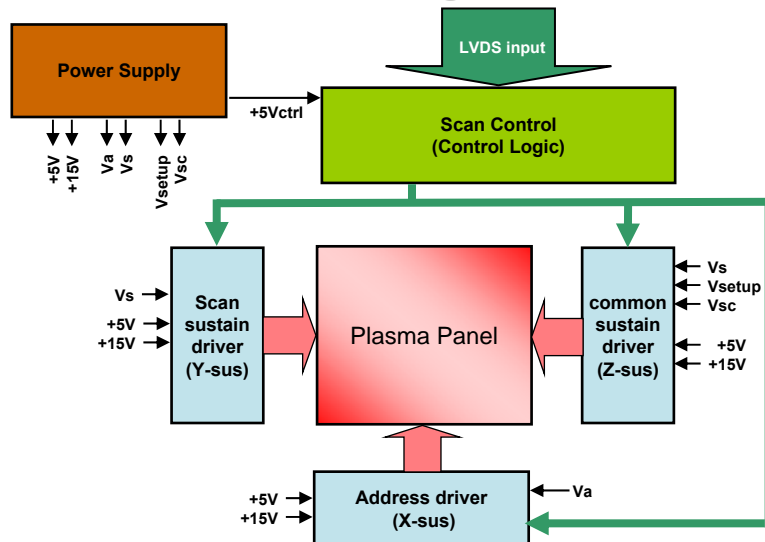
2. Replace the control board



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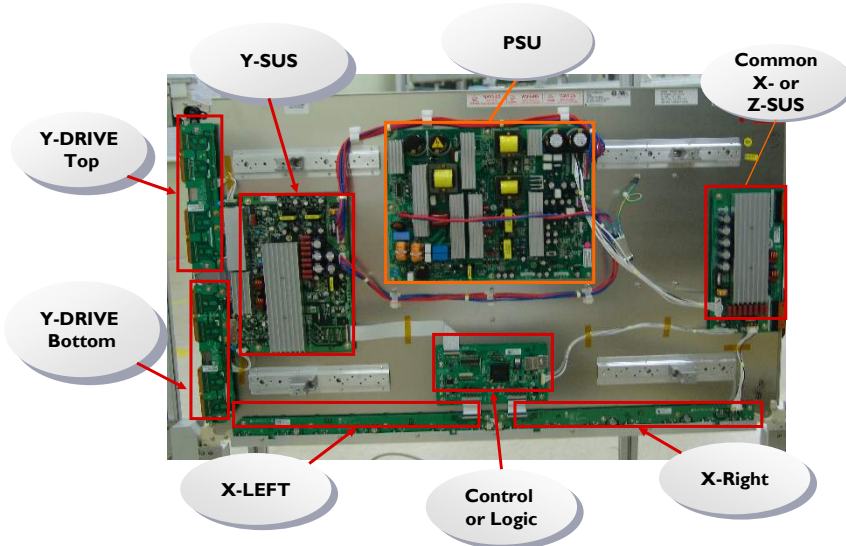
PDP General Block Diagram



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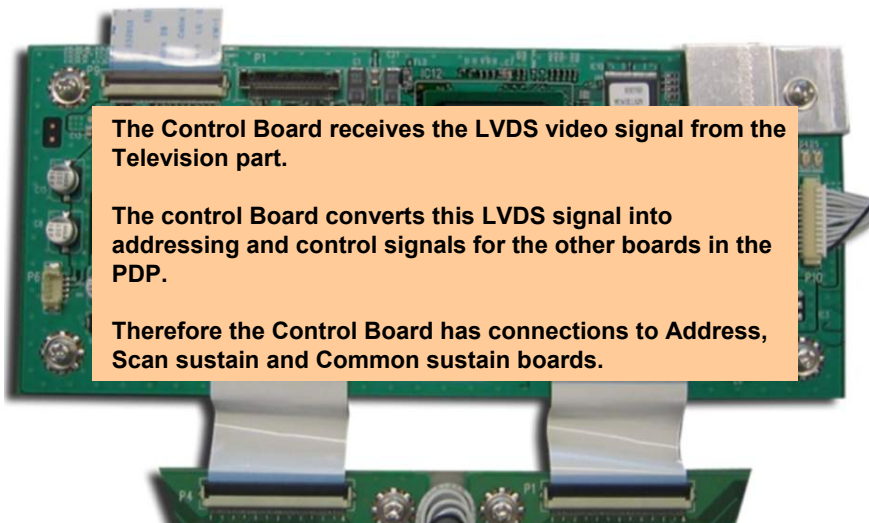
Typical PDP board layout



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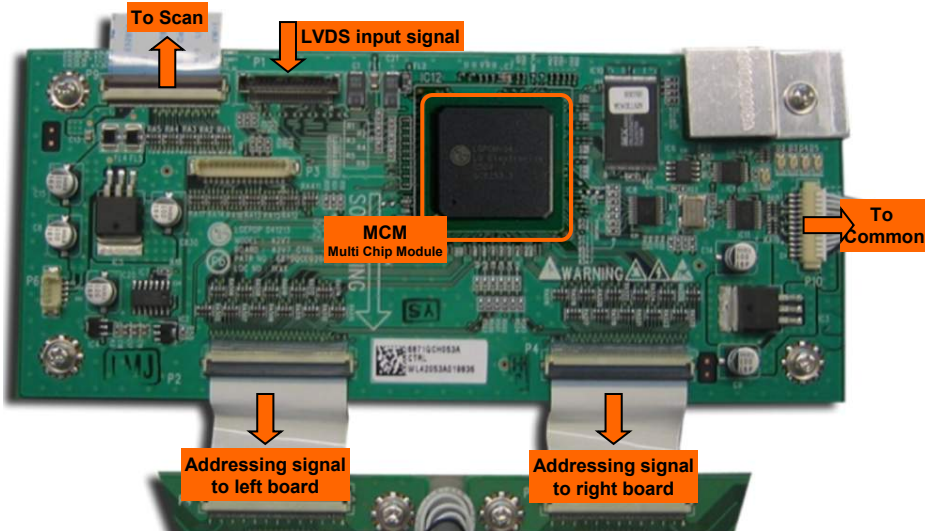
Control Logic Board



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Control Board



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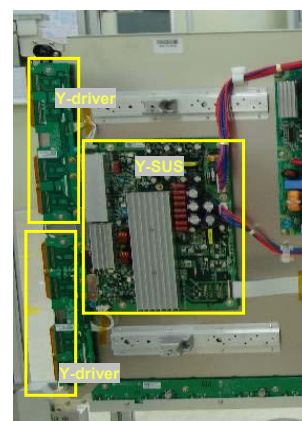
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Y-Driver

Two Y-driver boards are located on the left-hand side (looking from the back) of the TV. Each is supporting half of the screen. The upper one the top half of the screen and the lower board the lower half.

The sustain and reset waveform from the Y-SUS board is passed on via the scan driver IC's on both Y-boards to the plasma panel.

In case of a 42 inch screen, 8 scan driver IC's (4 on each Y-board) are needed to address every horizontal line (Y sustain electrode).

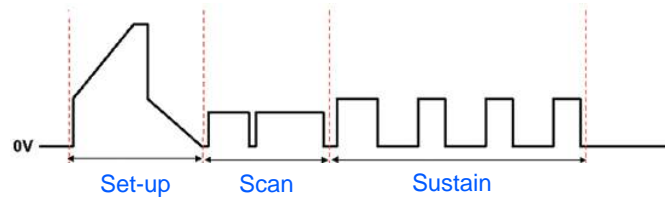


Next slide shows how the Y-waveform is built up

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Y-waveform



Set-up (or erase) phase Creating the wall-charge

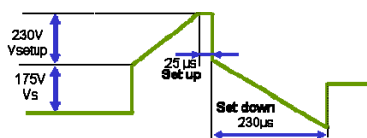
Scan (or address) phase Addressing the sub-pixel to be fired

Sustain phase Generating visible light by addressed sub-pixel

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Y driver Voltage levels



Voltage level is critical to get a good picture.

Vs is too low → Too dark picture
(The brightness of the picture will be too low)

Vs is too high → Black parts (e.g. shadows)
will become too bright
(The brightness of the picture will be too high)

If Vsetup is not correct, it will result in flicker noise or solarization.



Flicker noise



Solarization

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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

Moving OSD "curtain"

Picture is shown, but wrong discharge



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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

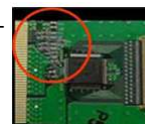
Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. The SUS-up and SUS-down diodes might be damaged (check with Ohm-meter)



2. Replace the Y-board



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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

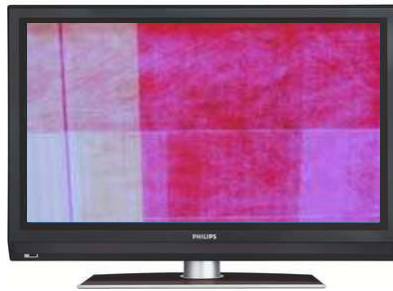
No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. Check and readjust voltage levels of Vs and Vsetup
2. Check if 15V to the Control board is present
3. Replace the Y-board

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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

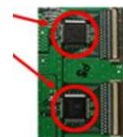
Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. Check the SCAN driver IC of the Y-driver board
2. Check the connector
3. Replace the Y-board



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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. The FPC on the Y-driver board is not well connected or polluted
2. Reposition and clean the FPC
3. If problem still exists then replace the Y-board



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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

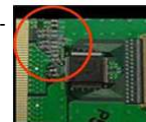
Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. The SUS-up and SUS-down diodes might be damaged (check with Ohm-meter)
2. Replace the Y-board



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Y board: Error Examples and Solutions

No picture shown and flicker, wrong discharge (1)

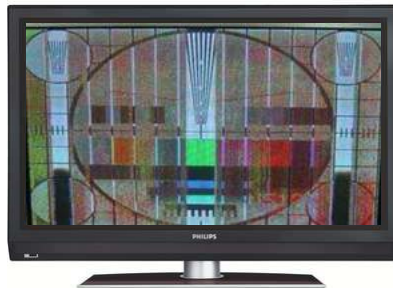
No picture shown and flicker, wrong discharge (2)

Large black horizontal bar

Horizontal line or lines

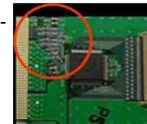
Moving OSD "curtain"

Picture is shown, but wrong discharge



Replace the Y-board

1. The SUS-up and SUS-down diodes might be damaged (check with Ohm-meter)



2. Replace the Y-board

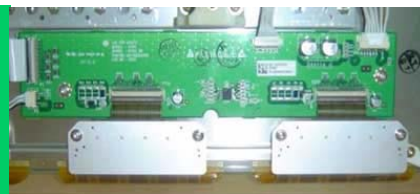


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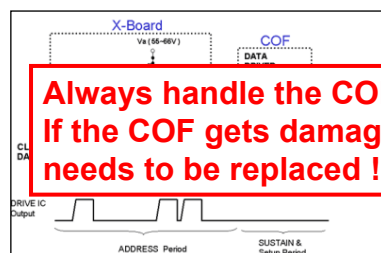
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Address (X) -board

The **X-board** generates the address pulses during the scan phase.
The **x-waveform** is passed on to the plasma panel via Chips On Film (COF).



The X-board receives the information, about which pixel should be turned on and which should be off, from the control board.



**Always handle the COF with extreme care.
If the COF gets damaged, the whole plasma panel
needs to be replaced !!!!**



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X-board trouble shooting

A problem with the X-board is recognized by vertical lines / bars on the screen.

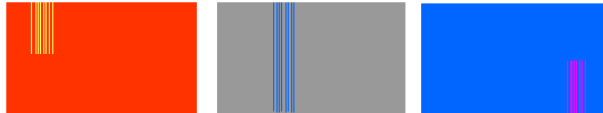
Single line failures

One single line having a failure is related to the plasma panel itself and the panel has to be replaced.



Multiple line failures

With a multiple line failure, the problem is likely to be on the X-board, the connection between the X-board and the Control board, the Control board or the COF.



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X-board: Error examples and Solution

Vertical bar or bars in part of screen



Replace the X-board

1. Check the signal cable from the control board to the X-board. If not correct replace the cable.
2. Check the 5V power (cable). If not correct change the power cable or board
3. If the problem still exists or cabling is OK, then replace the X-board



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Common sustain (Z)-Board

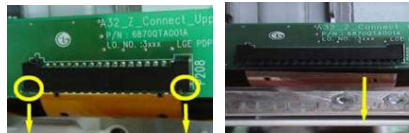
The **Z-board** provides the signal for the Z-electrodes in the sustain phase of the sub-pixel. During the scan period the signal is high and during the sustain period the signal is alternating on and off opposite to the Y-electrode. The Z-board is controlled by the Control board.



Be careful when replacing the Z-board. Just like the X and Y board the FPC, which is part of the plasma panel, must be handled with extreme care.

How to replace the Z-board

1. Unlock the connector
2. Pull out the FPC gently



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Z-board: Error examples and Solutions

Picture is dark and has noise (wrong discharge)



Replace the Z-board

1. Check connectors and cables to the Z-board. If not correct replace them.
2. Check the input voltages on the Z-board. If not correct adjust them on the power board.
3. If the problem still exists, then replace the Z-board.



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Power Supply

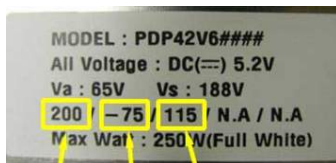
AC / DC

changes the input AC voltage (100~240V) to DC voltage (380V)

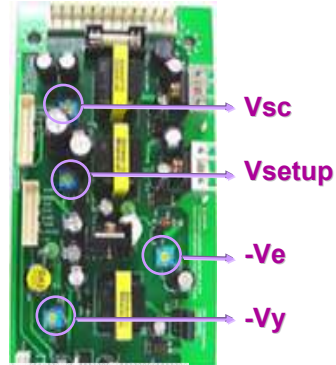
DC / DC

generates a number of DC voltages from the DC 380V DC:

- Low voltages: Stand-By 5V, 5/12/15/30V
- High voltages: V_a , V_s , Vset-up, $-V_y$, V_{sc}



Vsetup $-V_y$ V_{sc}



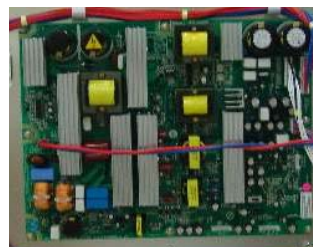
Typical voltage levels

V_a	Address Voltage	~70 V
V_s	Sustain Voltage	~180 V
V_{set_up}	Setup Voltage	~265 V
V_{sc}	Scan Voltage	~120 V
V_y		~-75 V

PSU trouble shooting

The Plasma Display might have an auto-protection mechanism which shuts the panel down after some seconds, when there is something wrong in the set. This could be a wrong voltage level or no specific power level at.

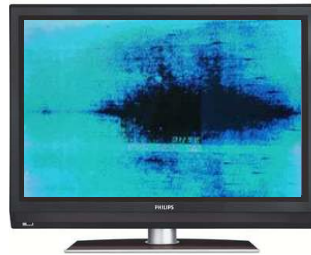
In case the status indicator LED returns to RED after a few seconds when switching the set on, then check if the following voltages are down:



180V (V_s)	Check Y-SUS, Z-SUS and PSU
75V (V_a)	Check X-board
120V (V_{sc})	Check Y-SUS or PSU
240V (Vsetup)	Y-SUS or PSU

Power Supply error example

This is the result when the 15V drops under 14V

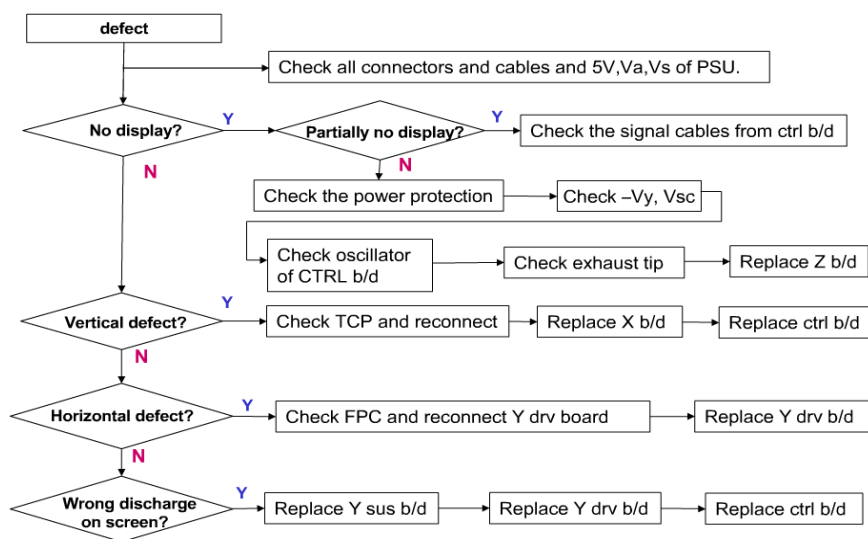


- Check the 15V from the Power Supply board
- Check for short circuits on the X-board
- Replace the Power Supply board or the X-board

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Check-up Flowchart: Summary



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**End of Module
Basic PDP Trouble shooting**