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Service Training

BASICS of PLASMA Display

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PDP repair part 1
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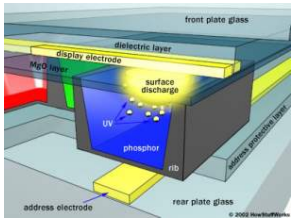

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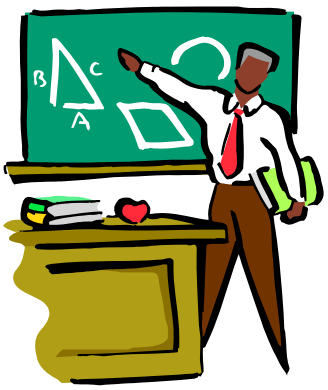
PDP Basics – An Introduction

Target Audience
This module is intended for Service Engineers and Call Centre Backliners.

Objective
This module provides a basic understanding of the working and functional layout of a Plasma Display Panel. This basic knowledge enables the learner to better recognize and solve problems in the field.

Prerequisites
Students should have an understanding of the Basics of Television



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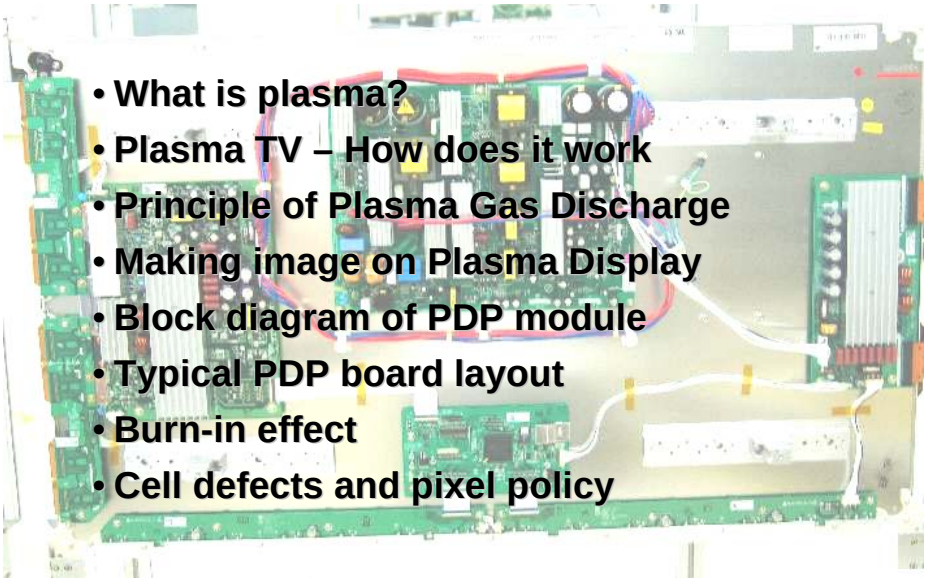
MAIN TOPICS



- What is plasma?
- Plasma TV – How does it work
- Principle of Plasma Gas Discharge
- Making image on Plasma Display
- Block diagram of PDP module
- Typical PDP board layout
- Burn-in effect
- Cell defects and pixel policy

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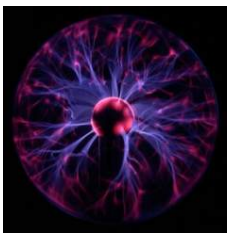
What is Plasma?

- Plasma is a gas made up of free-flowing ions (electrical charged atoms) and electrons (negatively charged particles)
- Plasma is often called the "Fourth State of Matter".
- The other three being solid, liquid and gas.
- In addition to being important in many aspects of our daily lives, plasmas are estimated to constitute more than 99 percent of the visible universe.



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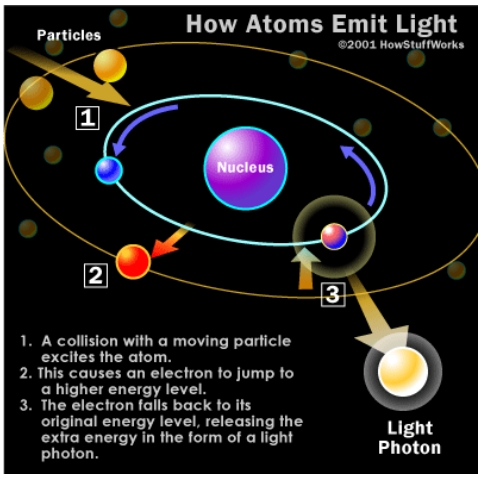
How atoms emit light

- Free electrons are created by applying electrical voltage to the gas
- Particles are constantly colliding with into each other
- Plasma atoms excites causing the release of light photons (UV light)
- UV light excites the phosphors in a plasma display giving off coloured light.



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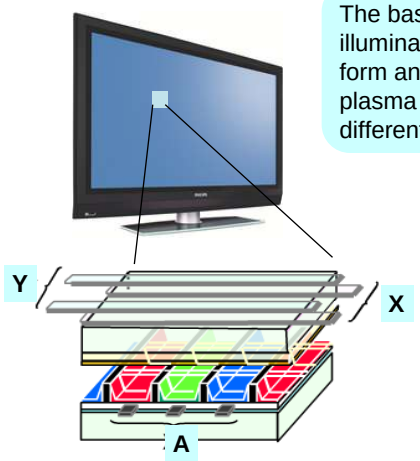
Plasma TV – How does it work?



Note: The names for the display electrodes vary per brand

The basic idea of a plasma display is to illuminate tiny, coloured fluorescent lights to form an image. Just like a CRT television, the plasma display varies the intensities of the different lights to produce a full range of colours.

Each pixel is made up of 3 sub-pixels

- One sub pixel for Blue, one for Red and one for Green light.
- Each sub pixel acts as a little fluorescent tube
- Gas brought in plasma state will generate UV light
- UV light hits phosphor layer that produces visible light

Plasma Display technology

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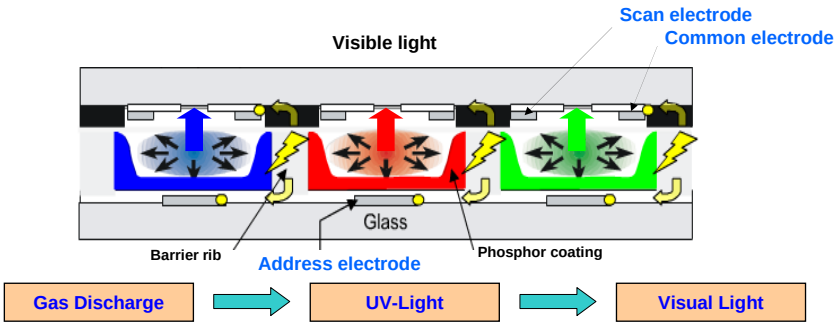
Plasma Gas Discharge principle

DISCHARGE principle

- PDP uses mix of Neon and Xenon gases
- 160 - 250V AC discharge in cell stimulates **ultraviolet (UV)** radiation
- UV stimulation causes color phosphors to glow and form picture element



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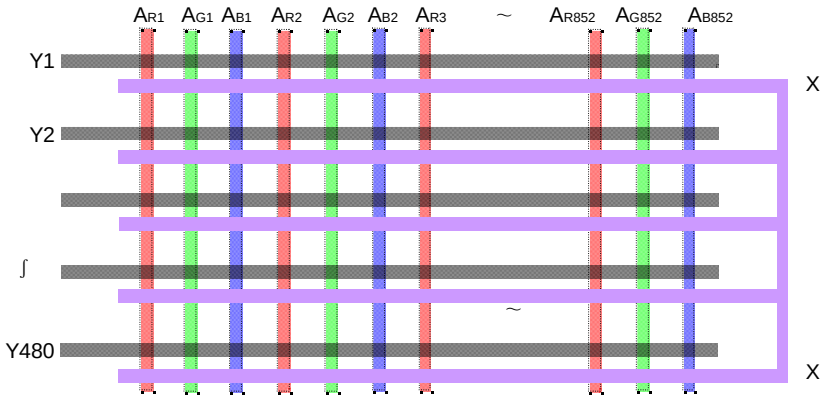
Arrangement of Display Electrodes



A = Address electrode
X = Common and Sustain electrode
Y = Scan & Sustain electrode

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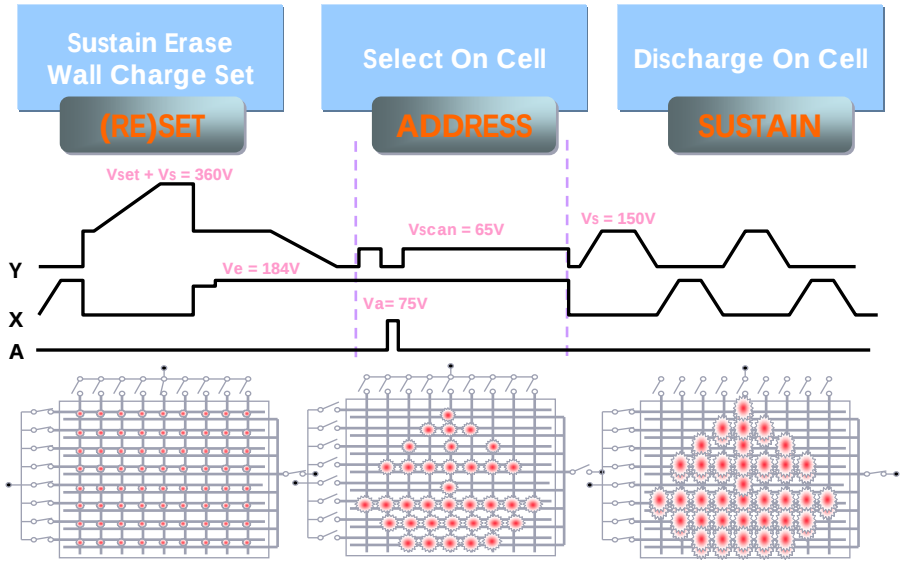
Display scheme



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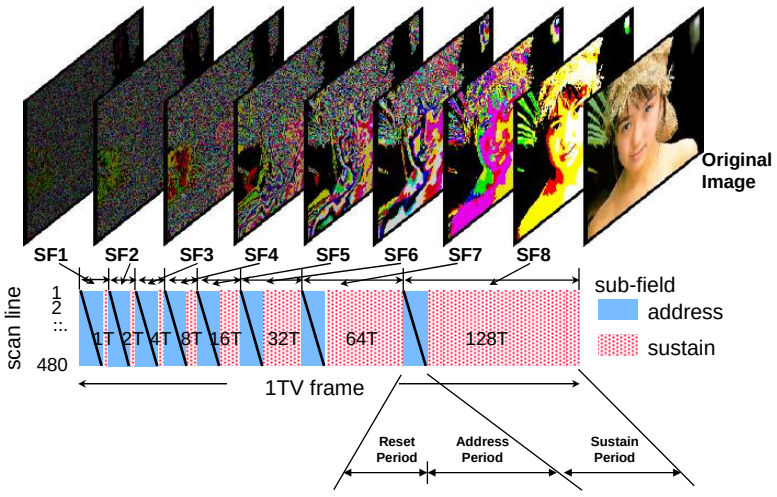
Making image on PDP

Gray scale : Controlling width of sustain period in each sub-field



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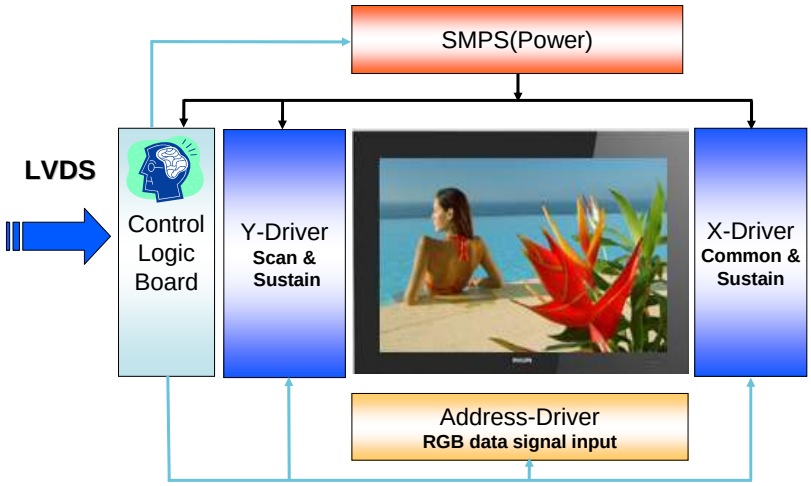
Block Diagram of PDP Module



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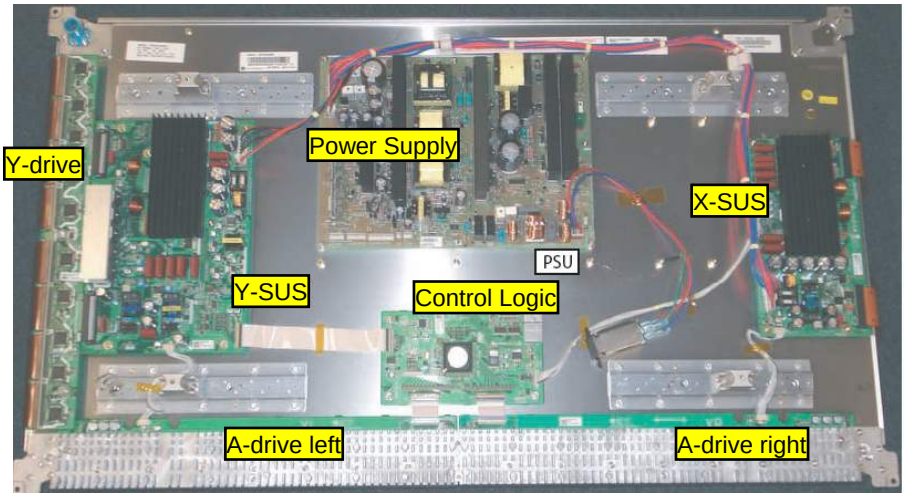
Typical PDP board layout



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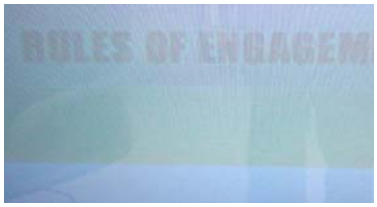
Burn-in effect

The phosphor fluorescent substance loses its brightness with the lapse of the lighting time. Long activation leads to decay of the phosphor layers in certain spots, resulting in a permanent, static, ghost picture.



This phenomenon is called Burn-in.

Burn-in can be prevented by:

1. Constantly changing picture (no static picture elements as broadcast logos)
2. Pixel-shift procedure (shifting the screen at regular time intervals by some pixels in direction right-down-left-up)
3. Image Sticking Minimization mode (automatically and slowing decreasing the brightness when the picture is freezed during a particular period of time).

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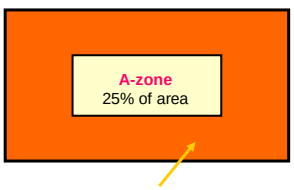
Cell defects and Pixel Policy

3 types of cell defects

1. **Dark or unstable cell** is caused by a defect or stain in the dielectric layer or by pollution (dust) in a cell.
2. **Uncontrollable cell** is caused by phosphor of one colour in another colour cell, i.e. green phosphor on the red cell. This could be the case by a broken rib or it was already contaminated during production.
3. **Non-extinguishing cell** is caused by a thin area in the dielectric layer.

The number of non-functioning cells which is still acceptable in each zone of the screen is written down in the so-called Pixel Defect specification.
Click on the icon to open the Pixel Spec.

PDP pixel defect spec



A-zone: 25% of display area

End of Module PDP basics