PDP (Plasma Display Panel) Display

1. What is Plasma?
2. What is Plasma Display Panel (PDP)?
3. LG PDP Display (MNT & STB)
4. SVC Precaution
5. One Point SVC Guide
1. What is Plasma?

Plasma?

Plasma is by far the most common form of matter. Plasma in the stars and in the tenuous space between them makes up over 99% of the visible universe and perhaps most of that which is not visible.

Plasma consists of a collection of free-moving electrons and ions - atoms that have lost electrons. Energy is needed to strip electrons from atoms to make plasma. The energy can be of various origins: thermal, electrical, or light (ultraviolet light or intense visible light from a laser). With insufficient sustaining power, plasmas recombine into neutral gas.

Solid $\Rightarrow$ Liquid $\Rightarrow$ Gas $\Rightarrow$ Ion, Electron : The 4th State of Matter

- Plasma can be accelerated and steered by electric and magnetic fields which allows it to be controlled and applied. Plasma research is yielding a greater understanding of the universe.
  - It also provides many practical uses: new manufacturing techniques, consumer products, and the prospect of abundant energy.

Ex.) Lightning, Aurora, Nebula, Flames, Neon Sign, Solar core ....
Plasma - The 4th State of Matter

<table>
<thead>
<tr>
<th>Solid</th>
<th>Liquid</th>
<th>Gas</th>
<th>Plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>Example</td>
<td>Example</td>
<td>Example</td>
</tr>
<tr>
<td>Ice</td>
<td>Water</td>
<td>Steam</td>
<td>Ionized Gas</td>
</tr>
<tr>
<td>$H_2O$</td>
<td>$H_2O$</td>
<td>$H_2O$</td>
<td>$H_2 \rightarrow H^+ + H^+ + 2e^{-}$</td>
</tr>
<tr>
<td>Cold</td>
<td>Warm</td>
<td>Hot</td>
<td>Hotter</td>
</tr>
<tr>
<td>$T&lt;0^\circ C$</td>
<td>$0&lt;T&lt;100^\circ C$</td>
<td>$T&gt;100^\circ C$</td>
<td>$T&gt;100,000^\circ C$</td>
</tr>
<tr>
<td>Molecules Fixed in Lattice</td>
<td>Molecules Free to Move</td>
<td>Molecules Free to Move, Large Spacing</td>
<td>Ions and Electrons Move Independently, Large Spacing</td>
</tr>
</tbody>
</table>

Plasmas - The 4th State of Matter

- Magnetic fusion reactor
- Solar core
- Solar wind
- Neon sign
- Interstellar space
- Aurora
- Flames

Temperature (K)

Number Density (Charged Particles / m^3)
2. What is Plasma Display Panel (PDP)?

(1) How does it work?
(2) The Structure and mechanism of PDP
(3) Flow chart of a PDP fabrication
(4) Advantage of PDP Display
(5) Comparison of Display Devices
(6) Display Product Segments
(7) Usage of PDP Display
2. What is Plasma Display Panel (PDP)?

Plasma display panel is the latest display technology and the best way to achieve flat panel displays with excellent image quality and large screen size that is easily viewable in any environment. PDP is an array of cells, known as pixels, which are composed of 3 sub-pixels, corresponding to the colors Red, Green and Blue. Gas in a plasma state is used to react with phosphors in each sub-pixel to produce colored light (red, green or blue). These phosphors are the same types used in Cathode Ray Tube (CRT) devices such as televisions and standard computer monitors. You get the rich, dynamic colors that you expect. Each sub-pixel is individually controlled by advanced electronics to produce over 16 million different colors. All of this means that you get perfect images that are easily viewable in a display that is less than 6 inches thick.
(2) The structure and mechanism of Panel Protection

< Upper Panel >

ITO Electrode
(MgO) Protection

< Lower Panel >

Barrier Rib
W/B
Fluorescent

Fluorescent (R,G,B)

UV light

Barrier Rib

Visible Light

Plasma

Address Electrode Glass
(3) Flow chart of a PDP fabrication

Front Glass
- Sustain Electrode (ITO)
- Bus Electrode (Ag, Cu, Au)
- Dielectric Layer (PbO)
- Protection Layer (MgO)
- Sealing
- Exhausting & Filling Gas (Xe+He/Ne/Ar)
- Aging

Rear Glass
- Address Electrode (Ag, Cu)
- Dielectric Layer (PbO)
- White Back (Screen Printing)
- Barrier Lib (Sand Blasting) (130 μm)
- Phosphor layer (R, G, B)

PDP Panel
(4) Advantages of PDP Display

Wide Screen

Wide Viewing angle

Light Weight

Clean & Even Pictures

Thin

Unaffected by magnetic field

PDP 160° or more

1/6 of a CRT

1/10 of a CRT

PDP

PDP

N

S

PDP

CRT

TOP in Digital
(5) Comparison of Display devices

<table>
<thead>
<tr>
<th></th>
<th>size</th>
<th>space</th>
<th>View Angle</th>
<th>Full Color</th>
<th>Resolution</th>
<th>Brightness</th>
<th>Contrast</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDP</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>△</td>
</tr>
<tr>
<td>CRT</td>
<td>△</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>△</td>
</tr>
<tr>
<td>LCD</td>
<td>✗</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Projector Rear Projection</td>
<td>☐</td>
<td>✗</td>
<td>△</td>
<td>☐</td>
<td>△</td>
<td>△</td>
<td>△</td>
<td>△</td>
</tr>
</tbody>
</table>
### (6) Display Market Segments

<table>
<thead>
<tr>
<th>PDA/Car Nav. Potable TV</th>
<th>Notebook PC</th>
<th>PC Monitor / TV</th>
<th>Public Screen</th>
<th>Jumbo Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRT</td>
<td>LCD</td>
<td>FED</td>
<td>PDP</td>
<td>Projection</td>
</tr>
<tr>
<td>Potable TV</td>
<td>Notebook PC</td>
<td>PC Monitor / TV</td>
<td>Public Screen</td>
<td>Jumbo Screen</td>
</tr>
</tbody>
</table>

#### Display Types
- **FED**: Field Emission Display
- **EL**: Organic Electro Luminescent Diode
- **PDP**: Plasma Display Panel
- **Projection (Rear CRT/LCD)**

#### Screen Sizes
- 10”
- 20”
- 30”
- 40”
- 50”
- 60”
- 70”

---

* FED: Field Emission Display
** EL: Organic Electro Luminescent Diode
(7) Usage of PDP Display

=> Home Theatre, A digital “poster” for the showroom, Visual guide or digital art display, Information display in reception areas, Business presentations, Easy-to-see monitor for fitness club
3. LG PDP Display(TV & MNT)

(1) PDP Display System Structure(1)

Interface between MP-40PA10 PDP Monitor and other AV machines

- External Input (Right-Audio Left-Video)
- Component Audio
- Audio Input
  - Right - Left
  - RGB-PC/DTV
- RGB-PC input(VGA,SVGA)
- RGB-DTV(480P/720P/1080i)
- COMPONENT (480i/480P/720P/1080i)
- DVD / DTV INPUT
- Y, Pb, Pr
- Composite Video (Input output)
- DVD (480i/480P)
- Set Top Box (HD STB)
MN-40PA10 (PDP) connection

MN-40PA10 + RN-BA10 (Analog STB)

- RGB-PC input (VGA, SVGA)
- RGB-DTV input (480P/720P/1080i)
- COMPONENT 2 input (480P/720P/1080i)
- COMPONENT 1 (480i input)

- Set Top Box (HD STB)
- DVD/DTV INPUT
- DVD
- VCR
- ANT IN

- S Video input
- RGB INPUT/CONTROL Audio OUTPUT Right/Left 25Pin D-Sub.
- Output (Right-Audio, Left-Video)

- Input1,2 (R-voice, L-image)
(2) Accessories (Option Items)

Wall Mount (Fix) (AP-40WA10)  
Wall Mount (Tilt) (AP-40WA20M)  
Desk Top Stand (AP-40DA10)  

Floor Stand (AP-40FA10)  
Floor Stand (Moving) (AP-40FA20M)  
SPEAKER (AP-40SA10)  

* There are Ceiling, Pole & Rack type as well as Above accessories (Refer to Catalogue)
<table>
<thead>
<tr>
<th>Description</th>
<th>Model Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLASMA Monitor</td>
<td>MN-40PA10</td>
</tr>
<tr>
<td>Desktop Stand</td>
<td>AP-40DA10</td>
</tr>
<tr>
<td>Wall Mounting Bracket</td>
<td>AP-40WA10</td>
</tr>
<tr>
<td>Tilt Wall Mounting Bracket</td>
<td>AP-40WA20M</td>
</tr>
<tr>
<td>Floor Type Stand</td>
<td>AP-40FA10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Model Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Mounting Bracket</td>
<td>AP-40CA10</td>
</tr>
<tr>
<td>Speaker</td>
<td>AP-40SA10</td>
</tr>
<tr>
<td>Speaker Stand</td>
<td>AP-40SA10D</td>
</tr>
<tr>
<td>Floor Type Speaker Stand</td>
<td>AP-40SA10F</td>
</tr>
<tr>
<td>PDP Tuner</td>
<td>RN-BA10</td>
</tr>
</tbody>
</table>
(3) External Connection Terminals

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Cord Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGB IN/Control</td>
<td>3000 mm</td>
</tr>
<tr>
<td>External SPK</td>
<td>5000 mm</td>
</tr>
<tr>
<td>AC Input</td>
<td>2500 mm</td>
</tr>
</tbody>
</table>

1.40”/42”

2. 60”

TOP in Digital

LG Electronics
4-1) MP-40PA10 (40" PDP)

- Fixing Points: Fix with M5 screws (★3, 4, 5, 6, 7, 8; 6 points)
- SPK Fixing Points: Fix with 3 tapping screws (★1, 2, 9, 10 (2 points each); 8 Points)

Wall Mount Fixing Points

D/T, F/S Fixing Points

TOP in Digital
4-2) MN-60PZ10 (60" PDP)

- Fix with M8 Screw
- Total 16 fixing points
  (★; Wall Mount Holder or FLOOR STAND Fixing)
- ★1, ★3, ★4, ★6: For SPK

Pre-Fixing Point

Fixing Points

D/T, F/S Fixing Points
### 5-1) MONITOR PART

#### (5) EXPLODE VIEW

<table>
<thead>
<tr>
<th>NO.</th>
<th>NAME</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cabinet</td>
<td>3091V00288C</td>
</tr>
<tr>
<td>2</td>
<td>Filter</td>
<td>3790V00266B</td>
</tr>
<tr>
<td>3</td>
<td>Supporter, Filter</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Module Assy</td>
<td>6348Q-A002A</td>
</tr>
<tr>
<td>5</td>
<td>Line Filter</td>
<td>3501V00028A</td>
</tr>
<tr>
<td>6</td>
<td>PCB ASSY, VSC</td>
<td>6871VMM602B</td>
</tr>
<tr>
<td>7</td>
<td>PCB ASSY, POWER</td>
<td>3501V00027E</td>
</tr>
<tr>
<td>8</td>
<td>Supporter, Vertical</td>
<td>4980V00164B/C</td>
</tr>
<tr>
<td>9</td>
<td>Back Cover Assy</td>
<td>3809V00212C</td>
</tr>
<tr>
<td>10</td>
<td>Plate, Rear A/V</td>
<td>3301V00005A</td>
</tr>
</tbody>
</table>
5-2) SET TOP BOX ASSY

<table>
<thead>
<tr>
<th>NO.</th>
<th>NAME</th>
<th>Material</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Panel, Control</td>
<td>ABS</td>
<td>3720V00080B</td>
</tr>
<tr>
<td>2</td>
<td>Panel, Front</td>
<td>HIPS</td>
<td>3720V00079A</td>
</tr>
<tr>
<td>3</td>
<td>Case, Bottom</td>
<td>SECC 1.0t</td>
<td>3110V00101B</td>
</tr>
<tr>
<td>4</td>
<td>Case, Rear</td>
<td>SECC 1.0t</td>
<td>3110V00111C</td>
</tr>
<tr>
<td>5</td>
<td>Case, Top</td>
<td>SECC 1.0t</td>
<td>3110V00102A</td>
</tr>
</tbody>
</table>
5-3) PSU & VSC Board

VSC (Video Scan Converter)
TOP in Digital

(6) Inter-Connection Guide
VSC Board Block

IC203
VPC3230
Decoder
80 Pin

IC204
SDA9410
De-interlace &
D/A
100 Pin

IC303
CXA2101AQ
Video & Chroma
80 Pin

IC304
THS8083
100 Pin

IC401
MX88L284
3X2M
Scan Converter
208 Pin

PD501
(41Pin)

PC-R/G/B/HS/VS

Y/Pb/Pr
( 480 p )

3X8
(R/G/B)(D)

Heat-Run pattern.
Outputs Blue/Red/
Green/White Pattern
with 225 steps

PDP
Module

CVBS

Y,Cb,Cr
( 480 i )

TV-Y/U/V/HS/VS

LUM0-7
CHR0-7
LLC1/2

3 CXA-R/G/B

TOP in Digital
42”/60” New VSC Board

- **Color Decoder** (VPC3230D)
- **Video Switch** (M52758FP)
- **A/D Converter** (CXA3516R)
- **Scaler** (JAG200)
- **Digital Video Enhancer** (FLI2220)
- **Color Control & Video Switch** (CXA2101Q)
- **Comb Filter Video Processor** (FLI2200)
- **EPLD** (GEN. CLAMP)
- **Monostable Multibib.** (74LS123)
- **Memory** (6M-BYTE)
- **Memory** (4M-BYTE)
- **Digital Video De-Interlacer/Line Doubler**
- **A/D Converter**
- **Digital Component Video De-Interlacer/Line Doubler**
- **8bit 135Mhz ADC(3), PLL(3), PIP, Gamma, High order 3’rd generation Scaling**
- **Multi-Component Processor** (Baseband Video Signal Processor)
- **Bipolar IC which integrates baseband signal processing, RGB signal processing and 4 video switching systems (including HV sync signal processing) using YCbCr inputs developed for multi-scan TV & configuring high-end TV systems**

**Comb Filter Video Processor**
- High quality video front-end, which is targeted for 4:3 for 16:9, 50/60 & 100/120Hz TV sets, color decoder, PAL/NTSC/SECAM, PIP processing.

**Audio Amp**
- LA4282 (L & R)
- MICOM (M62320X4)
- ROM (AT29C010)
- EEPROM (X2416P)
- Port Exp (M62320X4)
Power Supply Unit (40”)

A: Vsc(75V) Trans
B: Vsetup(275V) Trans
C: Va Inductor Trans
D: 5V Inductor Trans
E: Multi Inductor Trans
F: Multi(5V/15V/12V/30V/Va) Trans
G: St-By(5V/15V) Trans
H: Vs Inductor Trans
I: Vs(180V) Trans
J: PFC Inductor Trans

<Adjustment Point>

VR802 : Va adjust(typ.70±5V)
VR804 : Vs adjust(typ.180±5V)
VR805 : Vsetup adjust(typ.275V)
VR806 : Vsc adjust(typ.75V)
(8) Basic Structure of Optical Filter (Screen Filter)

Features of Optical Filter

- Reduce Electromagnetic Radiation and NIR (Near infrared light) emission.
  - EMI regulation (FCC A-class for Industry use, B-class for consumer use)
- Transparency Control (40 ~ 70%),
  - ex) FCC - A (sheet resistance = 2.5~3.5 W) @ 60%, FCC - B (sheet resistance = 1.1~1.5 W) @ 45%
- Color Control: Color Temperature & Color Reproducibility control
- Reduce Surface Reflection
- Enhancement of Contrast
- Protection of PDP panel
(9) PDP Tuner (Set Top Box)

RT-BA10 (N-EU Multi)
RZ-BA10 (EU Multi)
RN-BA10 (NTSC)
RP-BA10 (Latin America)

SMPS Board
Interface Board
Main Board

Top View
Back Panel (Signal Input)
Inside
(10) RT-BA10( STB ) Inter-Connection

STB-CONTROL B/D

P001 12P

PF01

P003 8P

Tuner

STB Interface B/D

12P PX002

10P PX001

7P PX003

STB - MAIN

P402

P401

P002 10P

P810S

STB - POWER

10P

P003 8P

8P P870S

Power Switch
TOP in Digital

- Sound processors (Dolby Virtual)
- Multi-standard color decoder
- A/D converter
- Y/C mix circuit
- DPF (Digital Comb Filter)
- Single chip multi-standard
- Internal broadband RGB s/w
  - Wideband video Amp (20MHz, -3dB)
- PC Audio (Stereo)
- PC/DTV OUT

Components:
- IC 201 CXA2069Q 64pin
- IC 601 MSP3401 80pin
- IC 301 VPCR2320 80pin
- IC 302 BA7657 24pin
- IC 401 CXA2101AQ 80pin
- IC 701 LGTV1001 64pin
- IC 701 LGTV2001 64pin
- IC 402 BA7657F 24pin
- ICX 001 BA7657F
- ICX 001 M37277 u-COM
- IS 501 (25Pin Cable)

Other Features:
- 7input/3output wideband video Amp (20MHz, -3dB)
- A/V switch featuring I2C BUS
- 8bit UVin, 8bit UVout, 8bit Yin, 8bit Yout
- Improve the Image
- Format converter
- Interface Board
- Input select switch for high definition display
- Internal broadband RGB s/w

(11) STB Block Diagram(1)
## (12) Function Descriptions

<table>
<thead>
<tr>
<th>Parts</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y-Board (Scan Driver)</td>
<td>Connected to Scan(Y) electrode and FPC to operate Scan and Sustain</td>
</tr>
<tr>
<td>Z-Board (Common Sustain Driver)</td>
<td>Connected to Sustain(Z) electrode and FPC to operate Sustain</td>
</tr>
<tr>
<td>X-Board (Address Driver)</td>
<td>Connected to lower address(X) electrode and FPC to operate Address</td>
</tr>
<tr>
<td>Control Board</td>
<td>Generates and distributes display data and driver timing of Video and Audio signal from external input to X,Y,Z Board.</td>
</tr>
<tr>
<td>DC/DC-2 Board</td>
<td>With input voltages-Vs,Va,Vcc, converts into Circuit login voltage(5V), Va,Vsc, Vs &amp; Vsetup and distributes to X,Y,Z Board.</td>
</tr>
<tr>
<td>FPC (Flexible Plate Circuit)</td>
<td>Connect line to line with PCB and pattern of Panel</td>
</tr>
<tr>
<td>ACF (Asymmetric Conductive Fundamental)</td>
<td>Charged material between Panel and FPC. Used for heat pressing material to connect FPC and pattern of Panel(Glass) and constituted by conductive metal(Ni,Au,etc) and thermosetting high polymer organism powder.</td>
</tr>
<tr>
<td>Heat Sink</td>
<td>Electrical parts are attached to absorb and radiate heat generated at Panel when operating.</td>
</tr>
<tr>
<td>COF (Chip On Film)</td>
<td>Unifying IC chip on the PCB and FPC, and it realizes simplified structure and miniaturization.</td>
</tr>
</tbody>
</table>
### A. Definition

<table>
<thead>
<tr>
<th>Item</th>
<th>Definition</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark Dot</td>
<td>Non lighting Cell Defect</td>
<td>Foreign material at Cell or structural defect</td>
</tr>
<tr>
<td>Flashing Cell Defect</td>
<td>Toggles On/Off</td>
<td></td>
</tr>
<tr>
<td>Non-extinguishing Cell Defect</td>
<td>Turn on always</td>
<td></td>
</tr>
<tr>
<td>High Intensity Cell Defect</td>
<td>Brighter than other cell at same color or display other color</td>
<td></td>
</tr>
</tbody>
</table>

### B. Specification

<table>
<thead>
<tr>
<th></th>
<th>A zone</th>
<th>B zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark Dot</td>
<td>( N \leq 2 ) [cell/scn]  ( \leq 1 ) Neighboring over 3 Cells  0</td>
<td>( N \leq 4 ) [cell/scn] ( \leq 1 ) Neighboring over 3 Cells  0</td>
</tr>
<tr>
<td>Bright Dot</td>
<td>( N \leq 2 ) [cell/scn]  ( \leq 1 ) Neighboring over 3 Cells  0</td>
<td>( N \leq 4 ) [cell/scn] ( \leq 1 ) Neighboring over 3 Cells  0</td>
</tr>
<tr>
<td>Flashing Dot</td>
<td>( N \leq 2 ) [cell/scn]  ( \leq 1 ) Neighboring over 3 Cells  0</td>
<td>( N \leq 4 ) [cell/scn] ( \leq 1 ) Neighboring over 3 Cells  0</td>
</tr>
<tr>
<td>High Intensity Dot</td>
<td>( N \leq 0 ) [cell/scn]  0</td>
<td>( N \leq 0 ) [cell/scn]  0</td>
</tr>
</tbody>
</table>
1) X-Board COF Connector separation

When you handle COF CONNECTOR, don’t pressure. First release LOCK and separate. If COF CONNECTOR is damaged, you should replace MODULE ASS’Y. So, be aware of this!!

Warning

When you exchange X-Board, first you should separate COF Connector. Be careful to handle it. COF Connector is attached to Module. When COF Connector is broken, Module ASS’Y must be replaced a new one.
2) X - Board Connector separation

Lift up each edge of left/right.

Lifted condition
Be careful to handle LOCK or it can be broken.
When LOCK is broken, replace a new X-BOARD.

Warning
It’s easy to separate it by releasing Connector Lock.
Do not pressure or it can be hurt.
When LOCK is broken, replace a new X-BOARD.
Pull the white LOCK as shown in arrow.

Separate COF CONNECTOR by pulling in the left.

**Warning**

Be careful to handle LOCK and COF Connector. When LOCK part is damaged, you should replace a new Y-Board. In case of COF Connector, Module Assembly.
4) Z - Board COF Connector separation

Separate the fixed Screw of Z-Board. Pull out Lock as shown in arrow.

Condition in Lock part is pulled. Pull COF Connector as shown in arrow.

It’s easy to separate COF on condition that Z-Board Screw is separated. In case Z-Board is assembled, it’s really hard to separate.

**Warning**

Be careful not to tear COF Connector. If COF Connector is torn, replace a new Module Assembly.
5) Connector separation Guide

Push LOCK and pull out
6) Control Board & VSC Board Connector
7) Gas injection (Sealing up) condition

Be sealed up after gas injection

Be sealed up after gas injection

Warning
Be careful to handle the sealed-up part after gas injection. If it is broken, the gas escapes. So, replace the Module.
Power is on and off 2~3 minutes (Protection)

- P301 Connector Open Check
  - OK → X-Board Top Right Change

- P302 Connector Open Check
  - OK → X-Board Top Left Change

- P303 Connector Open Check
  - OK → X-Board Bottom Right Change

- P304 Connector Open Check
  - OK → X-Board Bottom Left Change

- P102 Connector Open Check
  - OK → Z-Board Change

- P3, P2 Connector Open Check
  - OK → Y-Board Change

- P005, P003 Connector Open Check
  - OK → VSC-Board Change

- P006 Connector Open Check
  - OK → VSC-Board Change

  Sound Output IC Short Check

PROTECT operation;
When the load voltage is short.
When each voltage doesn’t work (in general)

Power Board Change
Symptom: As soon as the power on, it’s off in 2-3 minutes.
(PROTECT operation)

Cause:
- No VS voltage
- L813 Coil cold soldering.

Check:
Open the Connector connecting to each Board to check the power is off.
if each Board is same, check the Power Board and voltage.
ADD BAR inspection and repair

Press the ADJ KEY and check the position of add bar by changing WHITE or RED or BLUE or GREEN

HEATRUN : WHITE

Top Right  Top Left
Bottom Right  Bottom Left

MP-40PA10 uses 4 boards such as left, right, top, and bottom. Divide the screen in 4 and once you see ADD BAR check COF CONNECTOR between MODULE and X-BOARD. If there is no defect in COF CONNECTOR replace X-BOARD. But the problem still remains and check the connector between X-BOARD and CONTROL BOARD. And if you can’t find a defect, check CONTROL.
Symptom: B color 1 Address line Open
Cause: Dented COF

COF is dented
Symptom: Inferior R Address color
Cause: Inferior DATA output by cold soldering 16 pin of IC14 in X-L-TOP (Normal waveform after tearing off IC Pin)
Countermeasure: Replace X-L-TOP board.
The blue spreads on the screen (Mis-discharge) and power off in 2 ~ 3 seconds. If you turn on again, it will be same problem.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Causes</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>If 15V line voltage reduces below 14V, Mis-discharge occurs and power off because of protection circuit.</td>
<td>Replace PSU (Power Supply Unit) and defective X-Board.</td>
<td>Defective X-Board</td>
</tr>
</tbody>
</table>

Check

If when Power on, screen shows like above and turn off in 2 seconds, check if turning off or not by disconnecting all X & Y boards.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The top left part of screen is broken (Top Right X-BOARD)</td>
<td>No 5V supply to Top right X-Board.</td>
<td>Connect 5V line</td>
</tr>
</tbody>
</table>

**Check**

- Check Top right X-BOARD 5V. (If 0V, it happens)
- Check 5V line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Pinkish screen in the top left. (Top right X-BOARD)" /></td>
<td>No Va(70V) supply to Top right X-Board.</td>
<td>Connect 70V line</td>
</tr>
</tbody>
</table>

**Check**

- Check Top right X-BOARD Va(70V). (If 0V, it happens)
- Check 70V(Va) line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 3/5 top left in the screen is blank (Top Right X-BOARD)</td>
<td>No 12V supply to Top right X-Board.</td>
<td>Connect 12V line</td>
</tr>
<tr>
<td></td>
<td>No Va(70V) supply to Top right X-Board.</td>
<td>Connect 70V line</td>
</tr>
<tr>
<td></td>
<td>Check Top right X-BOARD 12V. (If 0V, it happens)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check Top right X-BOARD Va(70V). (If 0V, it happens)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check 12V &amp; 70V(Va) line from SMPS to X-BOARD.</td>
<td></td>
</tr>
<tr>
<td>Symptom</td>
<td>Cause</td>
<td>Countermeasure</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>The 3/5 top right of the screen is blank.</td>
<td>No 12V supply to Top left X-Board.</td>
<td>Connect 12V line</td>
</tr>
<tr>
<td></td>
<td>No Va(70V) supply to Top left X-Board.</td>
<td>Connect 70V line</td>
</tr>
</tbody>
</table>

- Check Top left X-BOARD 12V. (If 0V, it happens)
- Check Top left X-BOARD Va(70V). (If 0V, it happens)
- Check 12V & Va(70V) line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinkish screen in the 1/5 top right (Top left X-BOARD)</td>
<td>P1 COF connector on Top left X-Board is open.</td>
<td>Reassemble it</td>
</tr>
</tbody>
</table>

Check the contact point and Locking of P1 on Top left X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 3/5 bottom left of screen is broken. (BOTTOM RIGHT X-BOARD)</td>
<td>No 5V supply to bottom right X-Board.</td>
<td>Connect 5V line</td>
</tr>
</tbody>
</table>

**Check**

- Check Bottom right X-BOARD 5V. (If 0V, it happens)
- Check 5V line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
</table>
| The 3/5 bottom left of the screen is Blank. (Bottom Right X-BOARD) | No 12V supply to bottom right X-Board.  
No Va(70V) supply to bottom right X-Board. | Connect 12V line |

**Check**

Check Bottom right X-BOARD 12V. (If 0V, it happens)

Check 12V line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 2/5 right of the screen is broken. (Bottom left X-BOARD)</td>
<td>No 5V supply to bottom left X-Board.</td>
<td>Connect 5V line</td>
</tr>
</tbody>
</table>

Check Bottom left X-BOARD 5V. (If 0V, it happens)

Check 5V line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The 2/5 right part of the screen is blank. (Bottom left X-BOARD)</td>
<td>No 12V supply to bottom left X-Board.</td>
<td>Connect 12V line</td>
</tr>
</tbody>
</table>

Check Bottom left X-BOARD 12V. (If 0V, it happens)
Check 12V line from SMPS to X-BOARD.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS bar appears in the right bottom of the screen. (X-BOARD BOTTOM LEFT)</td>
<td>The connecting of X-Board bottom left connector is bad.</td>
<td>Reassemble it.</td>
</tr>
</tbody>
</table>

Check

Check connecting of the connector of bottom left X-BOARD.

Reassemble it.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen is divided in top and bottom, and vertical bar appears.</td>
<td>Connector(P13) is OPEN or Connecting condition is bad</td>
<td>Reassemble P13.</td>
</tr>
</tbody>
</table>

**Check**

- P13 CONNECTOR contact point inferior CHECK.
- P13 CONNECTOR SIGNAL CHEK.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screen is broken and has the vertical/horizontal bar.</td>
<td>VSC Board Connector is Open.</td>
<td>Reassemble VSC Board Connector</td>
</tr>
</tbody>
</table>

Check

Check the connector connecting
Reassemble the Connector
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The screen is bluish (Mosaic screen)</td>
<td>Loose VSC Board Connector</td>
<td>Reassemble VSC BOARD Connector</td>
</tr>
</tbody>
</table>

**Check**

Check the connection condition of the Connector.

Reassemble the Connector.
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>The mosaic appears in the screen when it connects to VIDEO Input.</td>
<td>Bad IC203</td>
<td>Replace IC203(VPC3230D)</td>
</tr>
<tr>
<td>(The sensibility of Y-signal is low.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When connected to Component Input, it is O.K.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Check**

- Check if X201 on VSC board oscillates.
- Check Video In/Out of IC203 on VSC board.

**IC201 (VPC3230D)**
Decoder IC
IC201(VPC3230D) Decoder is inferior
<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal</td>
<td>Bad Connector connecting Control Board and VSC B/D.</td>
<td>Change the Connector</td>
</tr>
<tr>
<td>Normal</td>
<td>Contact point and signal condition of Connector Control Board and VSC Board.</td>
<td></td>
</tr>
</tbody>
</table>

Noise with division of colors

Bad Connector
<table>
<thead>
<tr>
<th>Name</th>
<th>No signal Vertical Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptom</strong></td>
<td></td>
</tr>
<tr>
<td>1. Cause: Bad IC2 (DA1)</td>
<td></td>
</tr>
<tr>
<td>▶ IC2 DA1 (Data Arrange) No.162 Pin output is changing depending on the temperature. ⇒ abnormal X-B’d Buffer IC</td>
<td></td>
</tr>
<tr>
<td>* Room temperature: 2.5V Output (Normal Pin = over 2.8V)</td>
<td></td>
</tr>
<tr>
<td>* Heated: 1.5V Output (Normal Pin = 2.7V)</td>
<td></td>
</tr>
<tr>
<td>⇒ Bad IC2 (DA1)</td>
<td></td>
</tr>
<tr>
<td>2. Countermeasure: Replace IC2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Realization**

When ASIC Chip (IC2 DA1 LGD4001) on Control Board gets high temperature, you can observe it (In normal temperature it’s O.K.)

- <Waveform of normal pin>
  - heated

- <Waveform of abnormal pin>
  - heated

Buffer (74ACT541) waveform abnormally narrows.

→ In this case, it is impossible for Flip Flop (74AC574) on X B/D to read data.
<table>
<thead>
<tr>
<th>Name</th>
<th>Add Open (Green 1 Line)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptom</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cause and Countermeasure</strong></td>
<td></td>
</tr>
</tbody>
</table>

1. **cause:** Add. COF Drive IC inferior

**COF 불량시 부품변경 가능한가?**

- **Add. COF Drive IC**

**Normal Line Data waveform**

**Open Line Data output waveform**

- the output of inferior line less than that of the normal Line
- **Add. COF Drive IC inferior**
- **COF inspection 검사기:** 24V Open check (normal 50V)
<table>
<thead>
<tr>
<th>Name</th>
<th>Vertical bar when Power off/on (Mis-discharge)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Symptom</strong></td>
</tr>
<tr>
<td></td>
<td>1. PDP Power on Mode  external input</td>
</tr>
<tr>
<td></td>
<td>(regardless of wire/wireless signal but it’s easy to reenact in wireless signal)</td>
</tr>
<tr>
<td></td>
<td>2. Remove Power Cord (Power’s off)</td>
</tr>
<tr>
<td></td>
<td>3. after about 20 minutes, insert Power cord</td>
</tr>
<tr>
<td></td>
<td>(automatically the Power’s on and the vertical bar is shown as above)</td>
</tr>
</tbody>
</table>

|      | **Cause and Countermeasure**                   |
|      | 1. Cause : Control board malfunctions when Power off/on. |
|      | 2. Countermeasure: Change some parts on Control board. |
|      | 3. Changing parts : A32_CTRL_03 B/D (Marked on PCB) |
|      | - R14, 17, 18, 21 : 330 ==> 4.7K (Chip Resistor) |
|      | - R15, 16, 19, 20 : 22K ==> 4.7K (Chip Resistor) |
|      | - C504, 505 : 0.1uF / 50V add (Chip Capacitor) |

Realization

1. PDP Power on Mode  external input
   (regardless of wire/wireless signal but it’s easy to reenact in wireless signal)
2. Remove Power Cord (Power’s off)
3. after about 20 minutes, insert Power cord
   (automatically the Power’s on and the vertical bar is shown as above)