



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



Forum Tec



ND Division

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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.

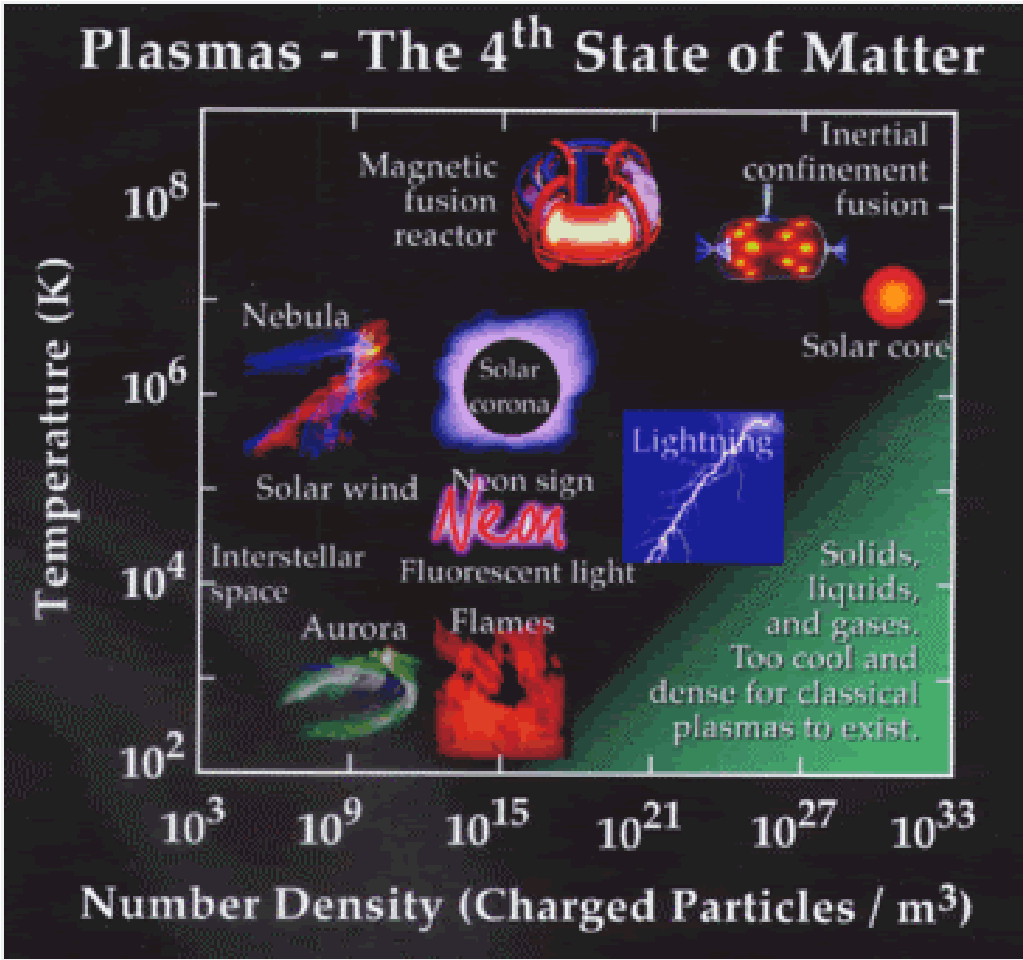
Solid \Rightarrow Liquid \Rightarrow Gas \Rightarrow Ion, Electron : The 4th State of Matter

- ▶ 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

Solid	Liquid	Gas	Plasma
Example Ice H_2O	Example Water H_2O	Example Steam H_2O	Example Ionized Gas $H_2 \rightarrow H^+ + H^+ + 2e^-$
Cold $T < 0^\circ C$	Warm $0 < T < 100^\circ C$	Hot $T > 100^\circ C$	Hotter $T > 100,000^\circ C$ $1 > 10$ electron Volts
			
Molecules Fixed in Lattice	Molecules Free to Move	Molecules Free to Move, Large Spacing	Ions and Electrons Move Independently, Large Spacing



2. What is Plasma Display Panel(PDP)?

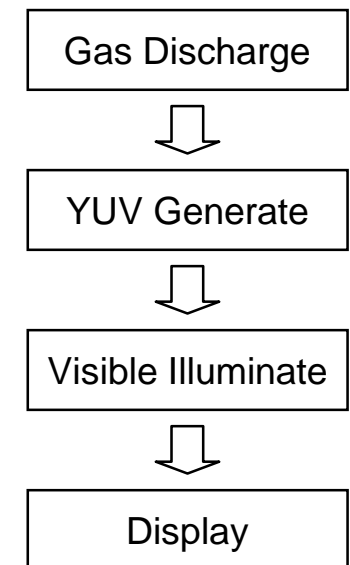
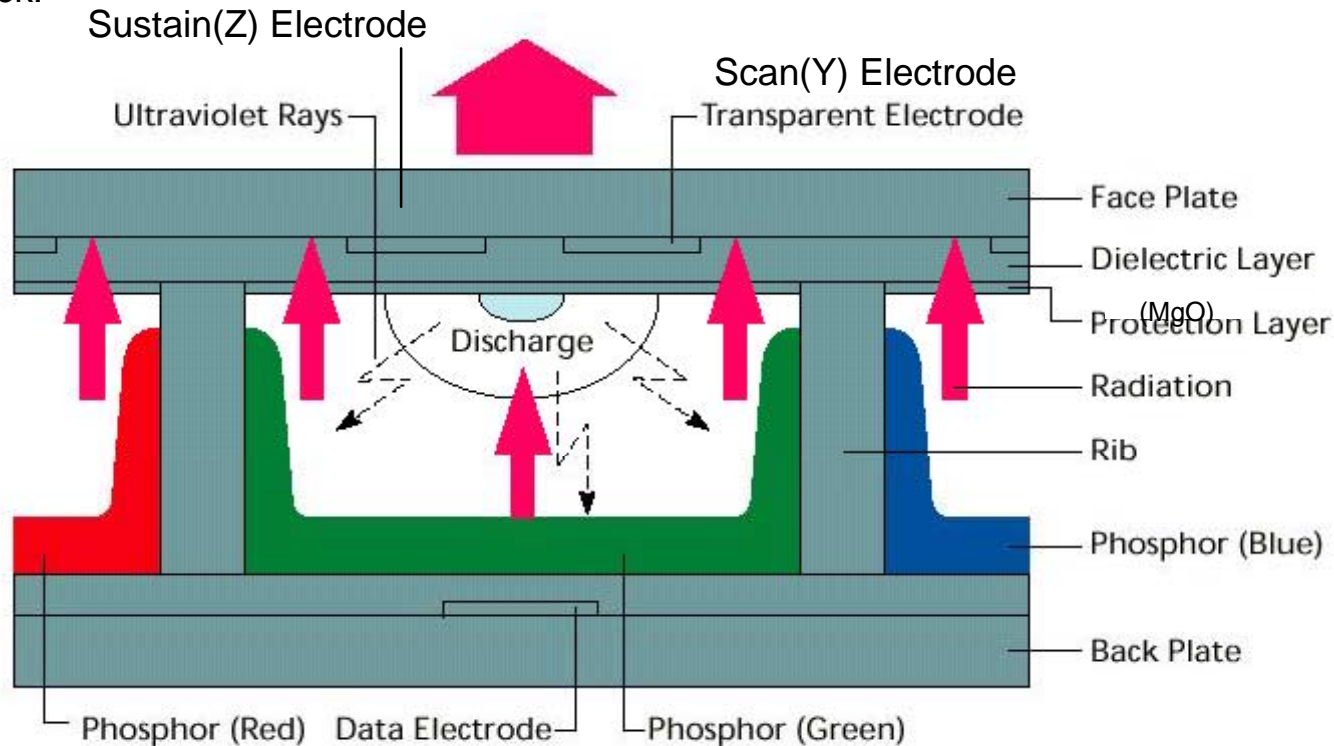
- (1) How does it work?**
- (2) The Structure and mechanism of PDP**
- (3) Flow chart of a PDP fabrication**
- (4) Advantage of PDP Display**
- (5) Comparison of Display Devices**
- (6) Display Product Segments**
- (7) Usage of PDP Display**

2.What is Plasma Display Panel(PDP)?

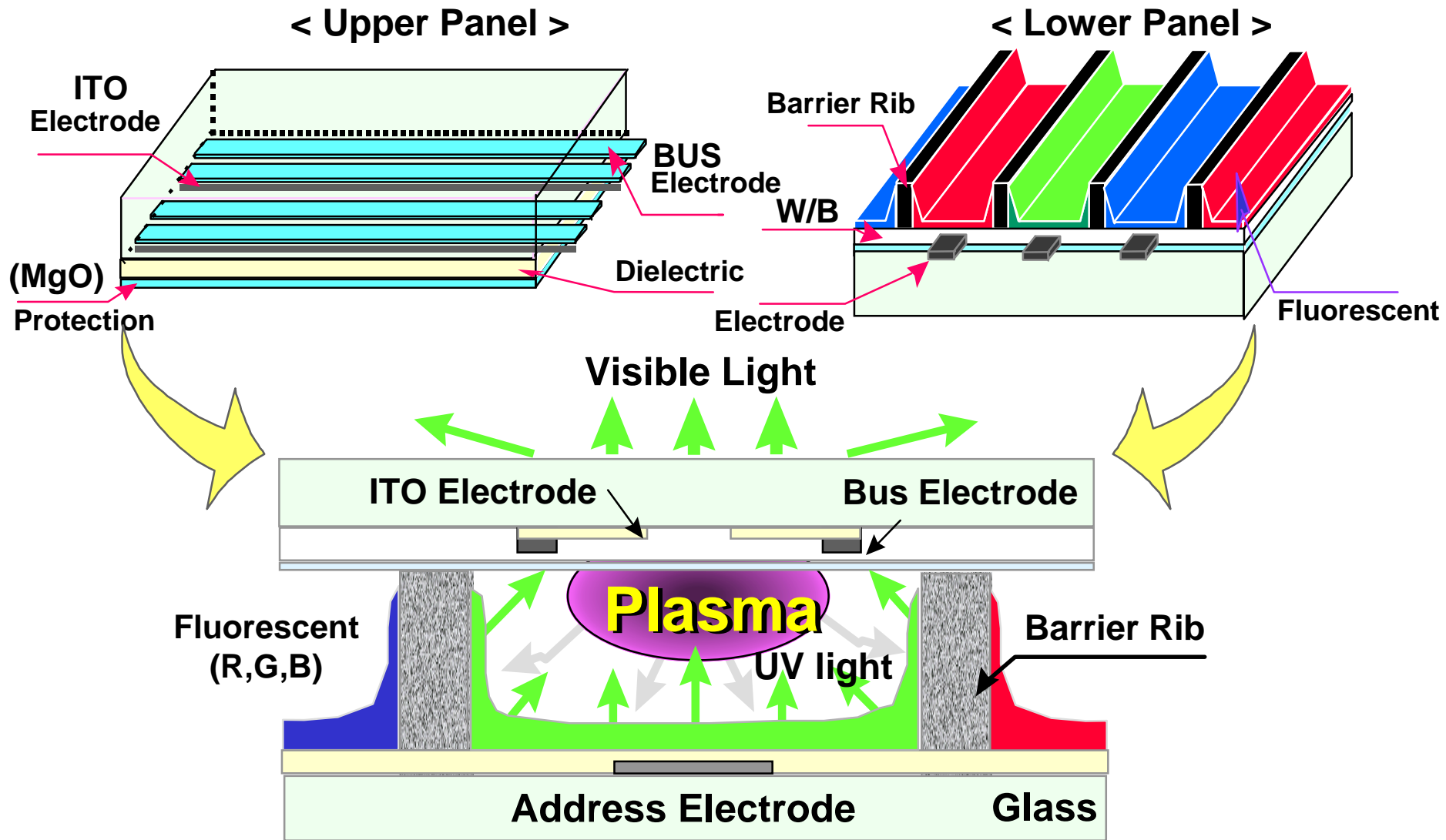
(1) How does it work?

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.

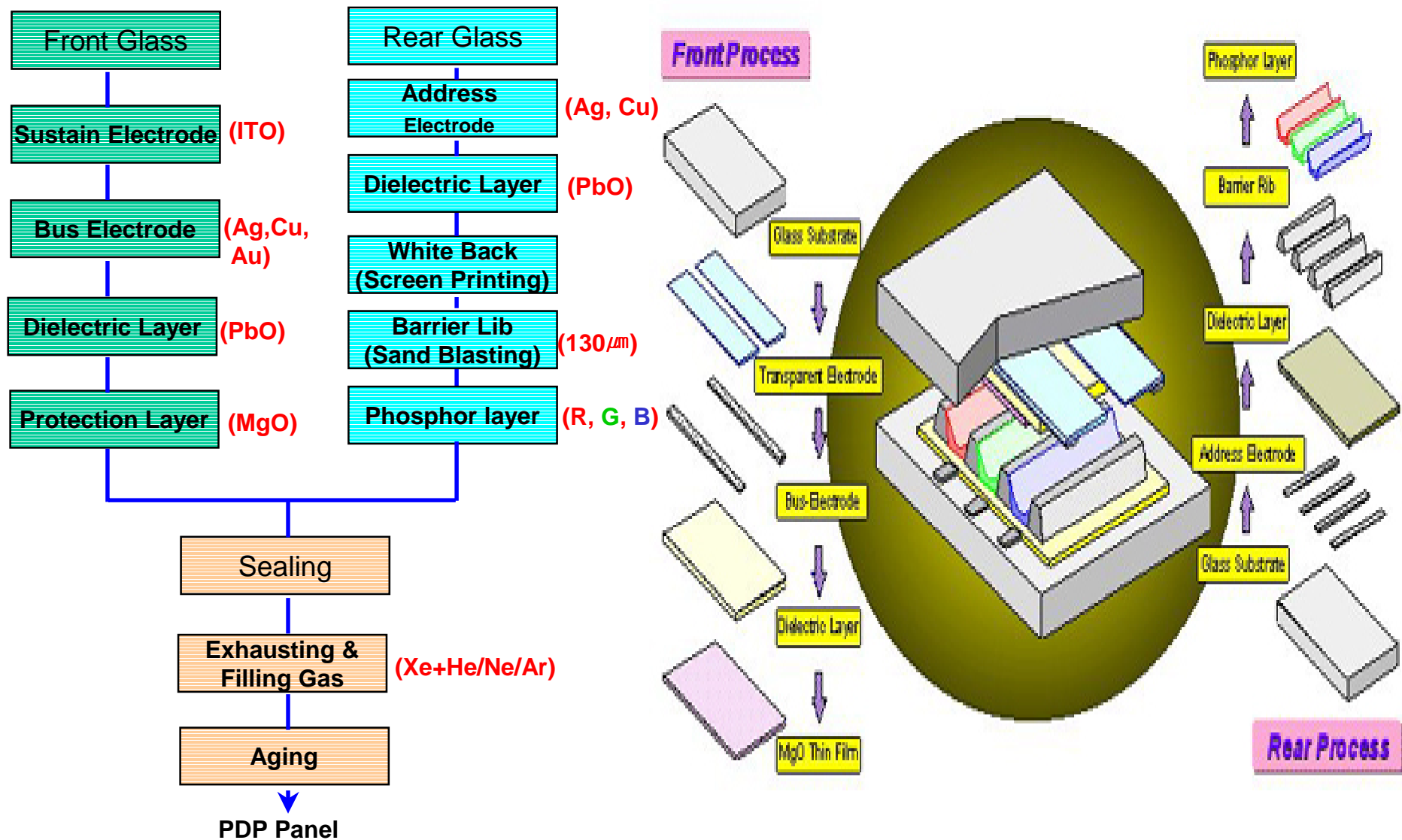
PDP is an array of cells, known as pixels, which are composed of 3 sub-pixels, corresponding to the colors Red, Green and Blue. Gas in a plasma state is used to react with phosphors in each sub-pixel to produce colored light (red, green or blue). These phosphors are the same types used in Cathode Ray 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.



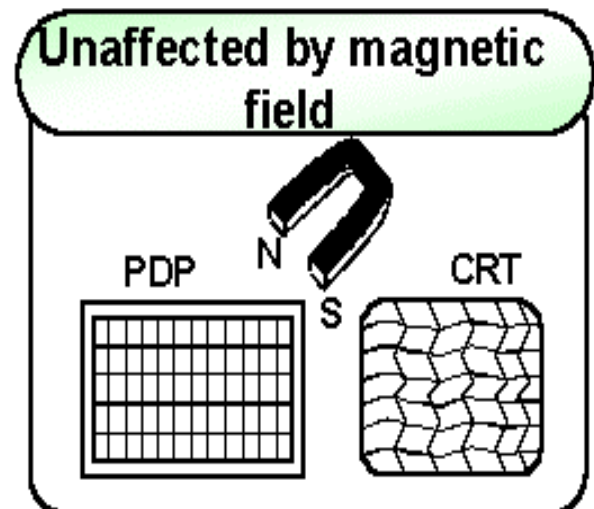
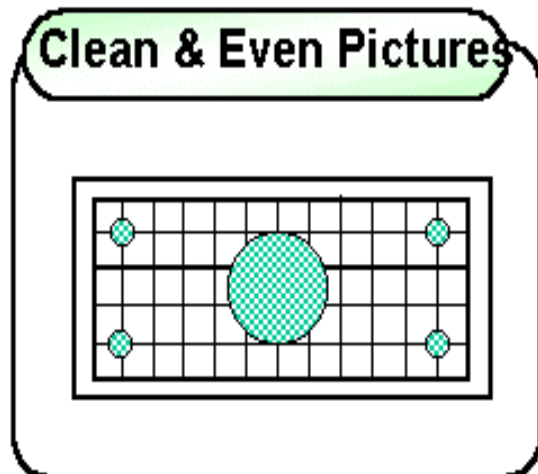
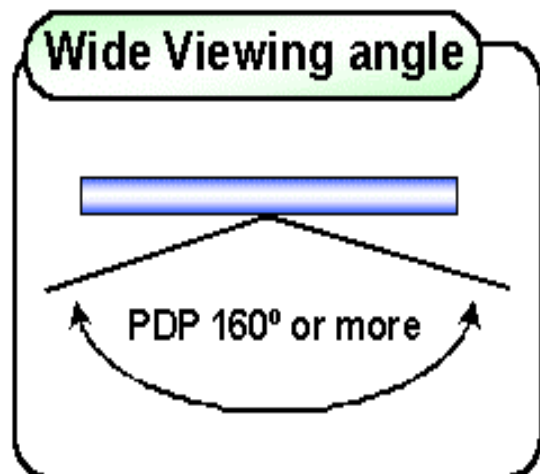
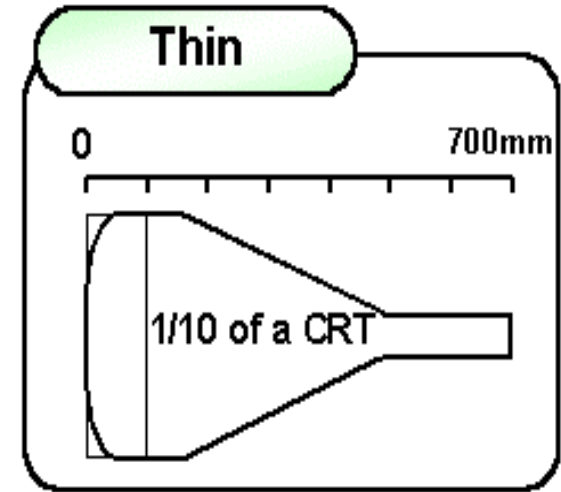
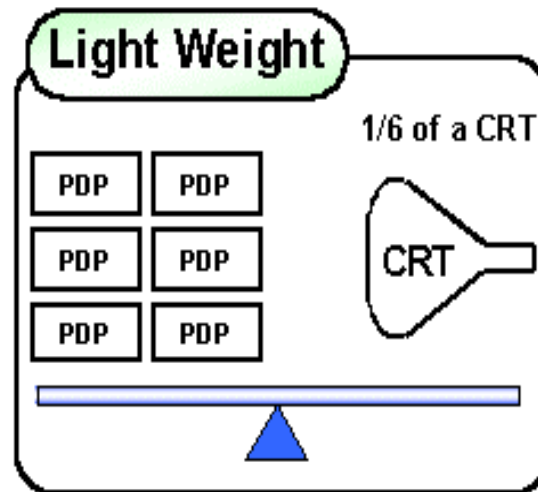
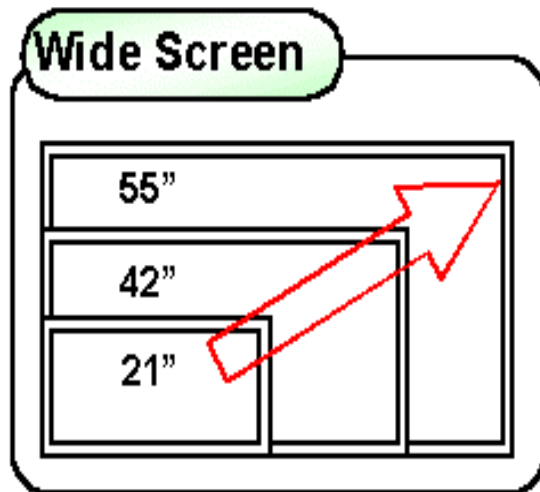
(2) The structure and mechanism of Panel



(3) Flow chart of a PDP fabrication



(4) Advantages of PDP Display

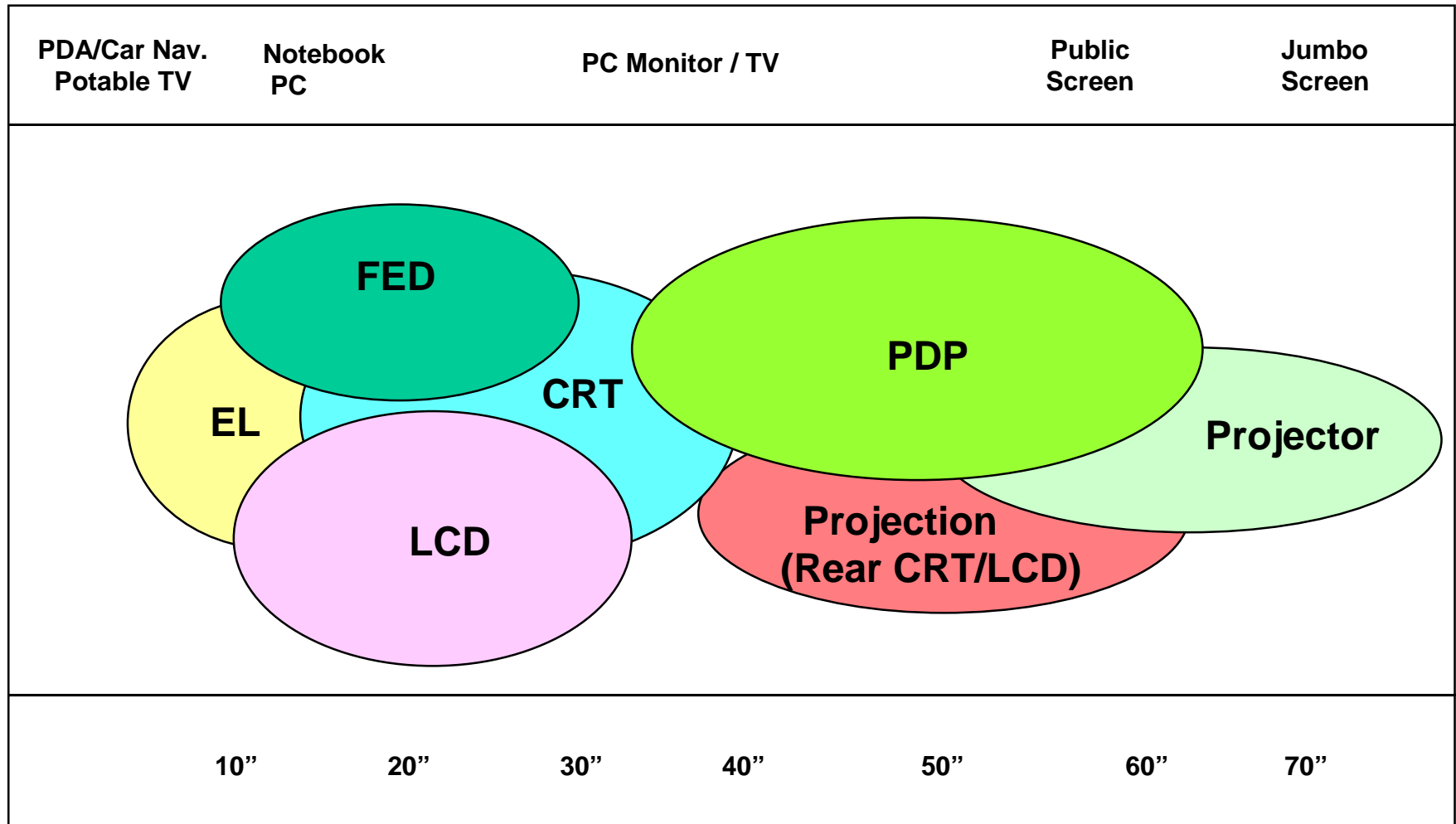


(5) Comparison of Display devices

For 40 inch class

	size	space	View Angle	Full Color	Resol- ution	Bright- ness	Cont- rast	Power
PDP	◎	◎	◎	◎	○	○	○	△
CRT	△	X	◎	◎	○	◎	◎	△
LCD	X	◎	○	◎	◎	○	○	◎
Discontinued Rear Projection	◎	X	△	◎	△	△	△	△

(6) Display Market Segments



* 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



Home Theatre



Information Board



Conference Room



Commercial Shop

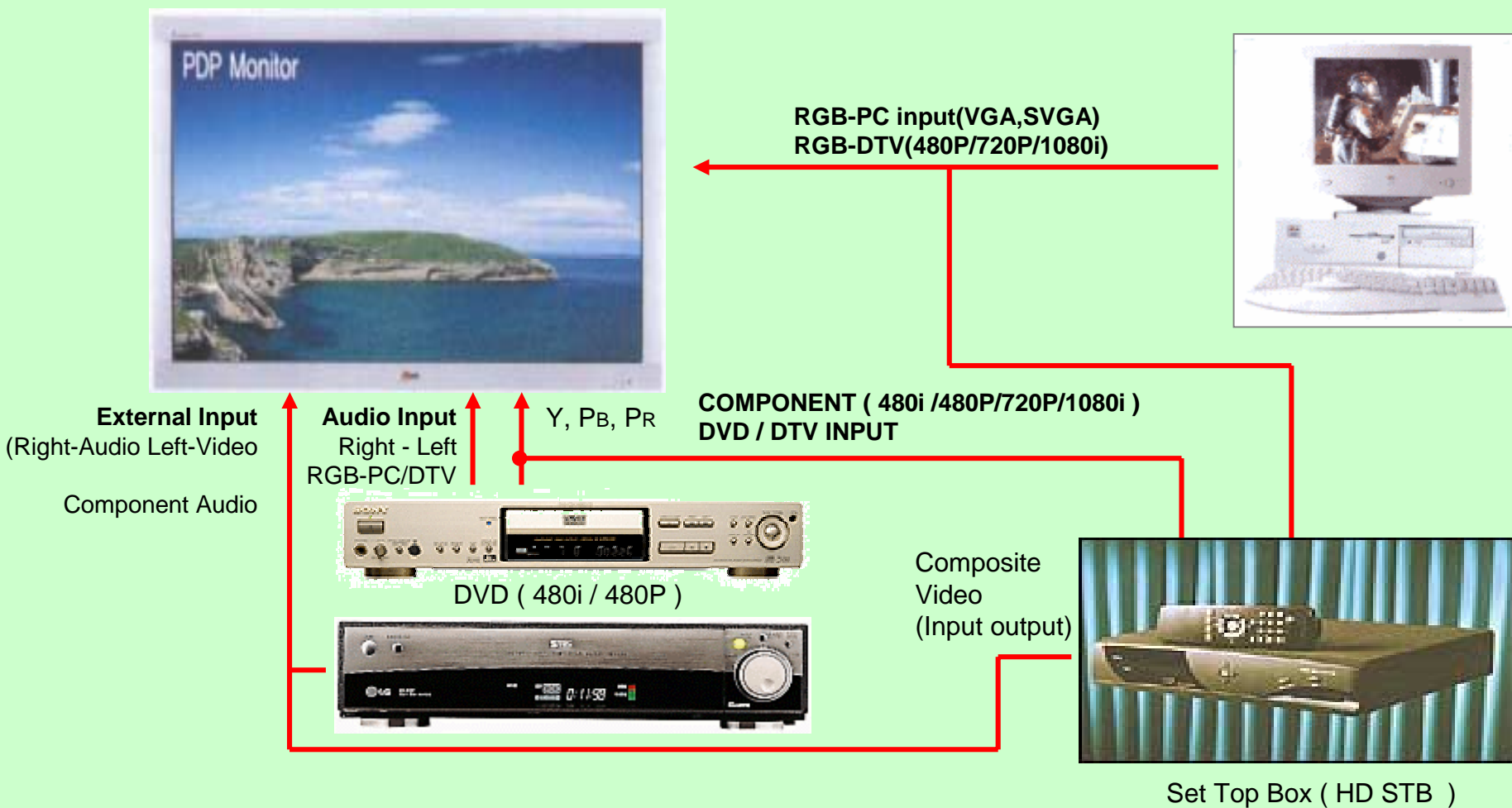


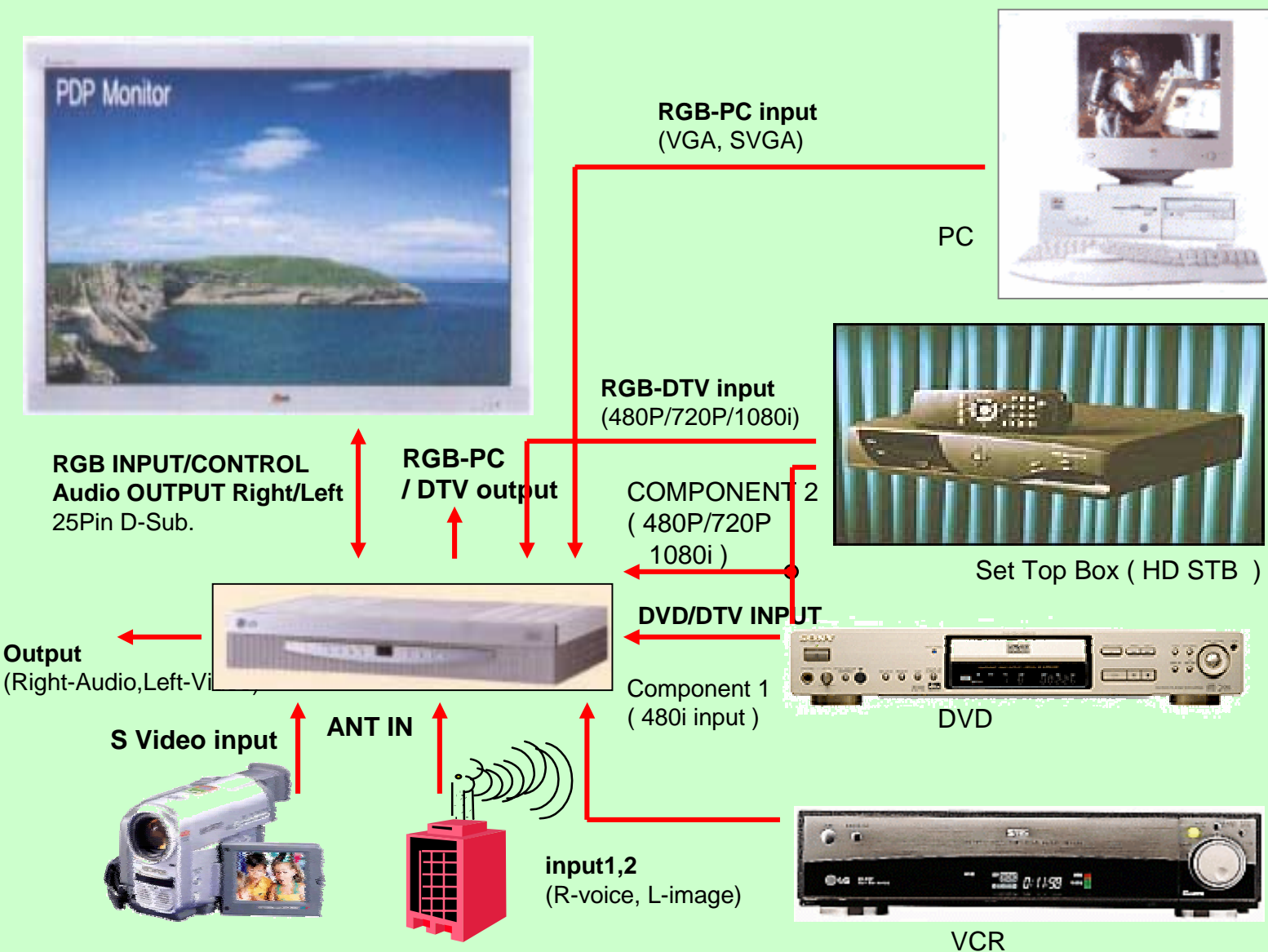
Public Display



Sports Center

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





(2) Accessories(Optional 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)

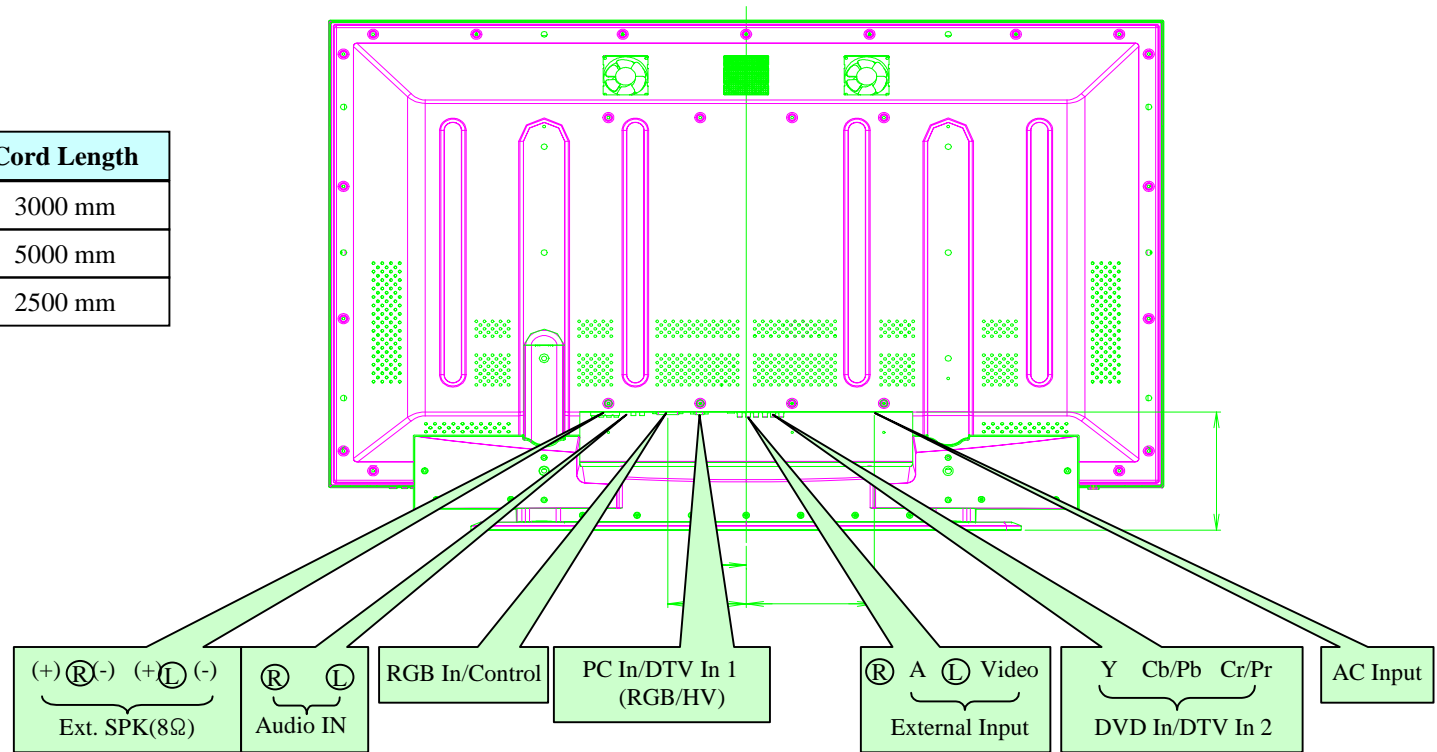
* There are Ceiling, Pole & Rack type as well as Above accessories(Refer to Catalogue)

	Description	Model Name
	PLASMA Monitor	MN-40PA10
	Desktop Stand	AP-40DA10
	Wall Mounting Bracket	AP-40WA10
	Tilt Wall Mounting Bracket	AP-40WA20M
	Floor Type Stand	AP-40FA10

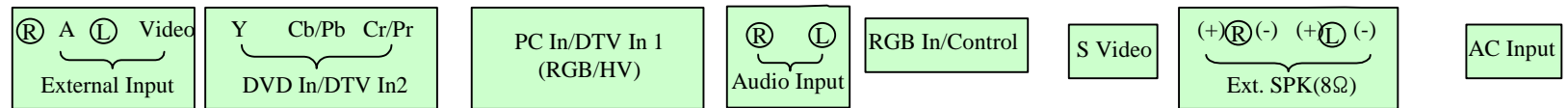
	Description	Model Name
	Ceiling Mounting Bracket	AP-40CA10
	Speaker	AP-40SA10
	Speaker Stand	AP-40SA10D
	Floor Type Speaker Stand	AP-40SA10F
	PDP Tuner	RN-BA10

(3) External Connection Terminals

Terminal	Cord Length
RGB IN/Control	3000 mm
External SPK	5000 mm
AC Input	2500 mm



1.40''/42''



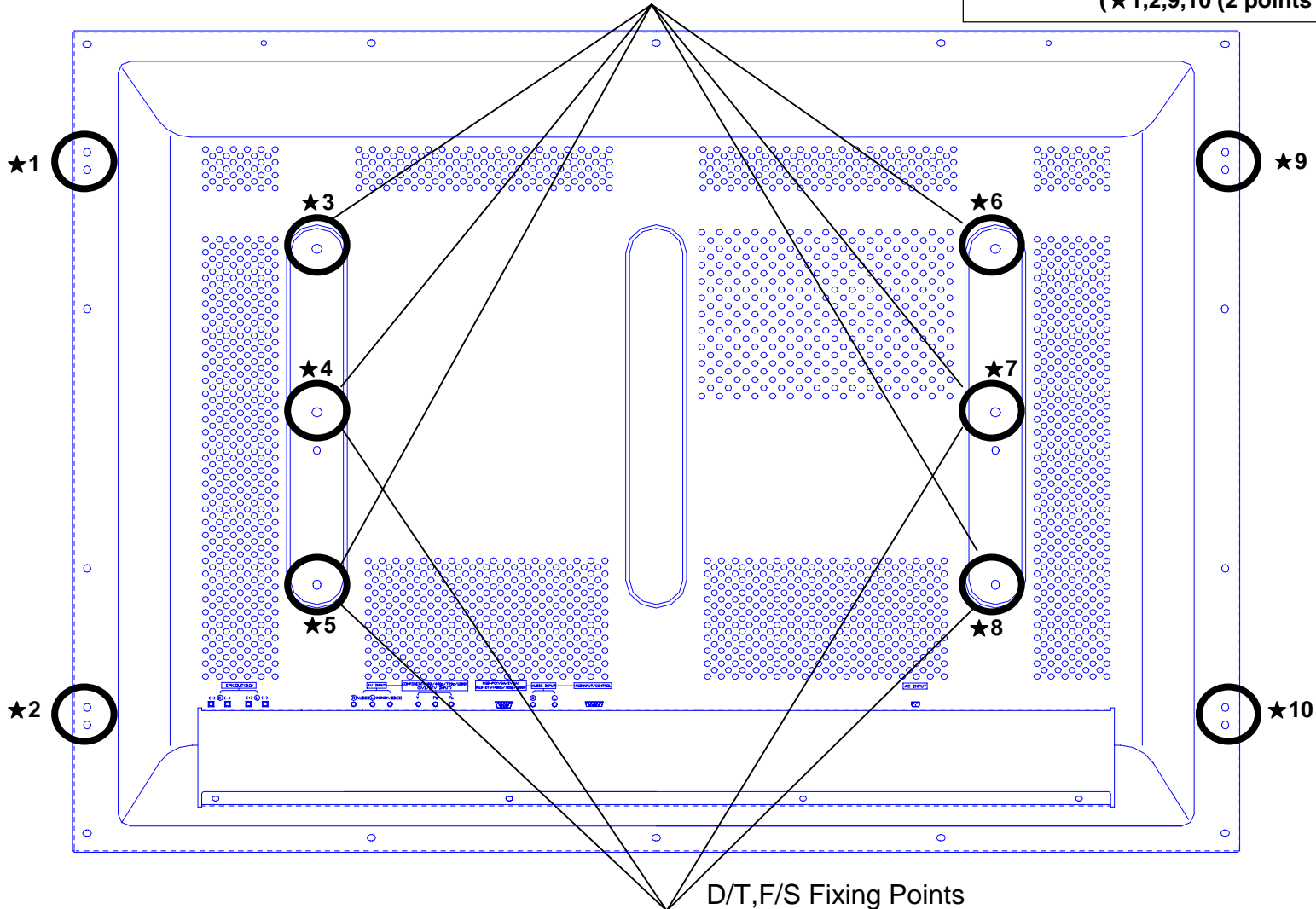
2. 60''

(4) Fixing Points

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

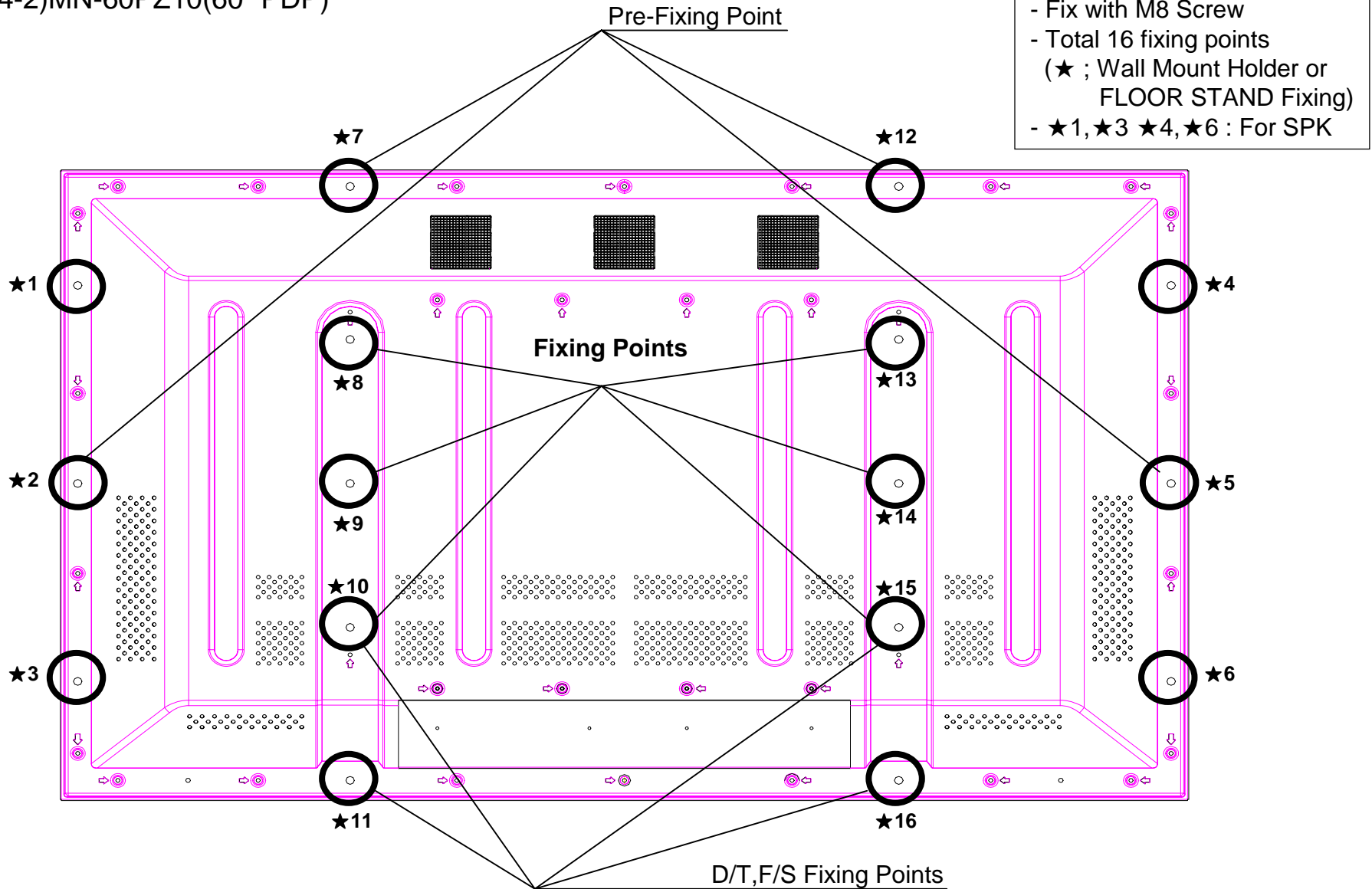
Wall Mount Fixing Points

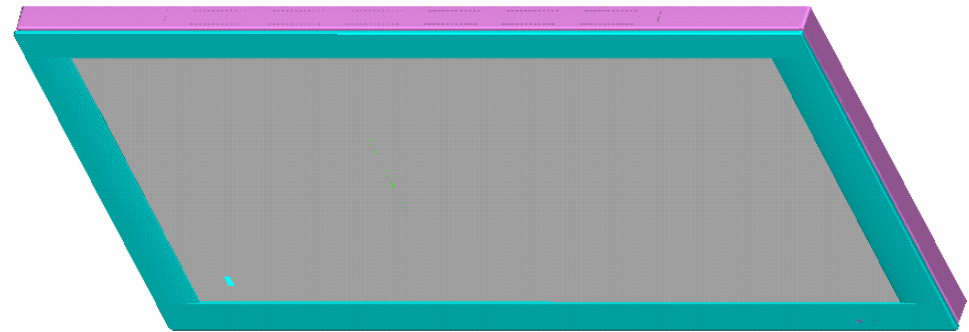
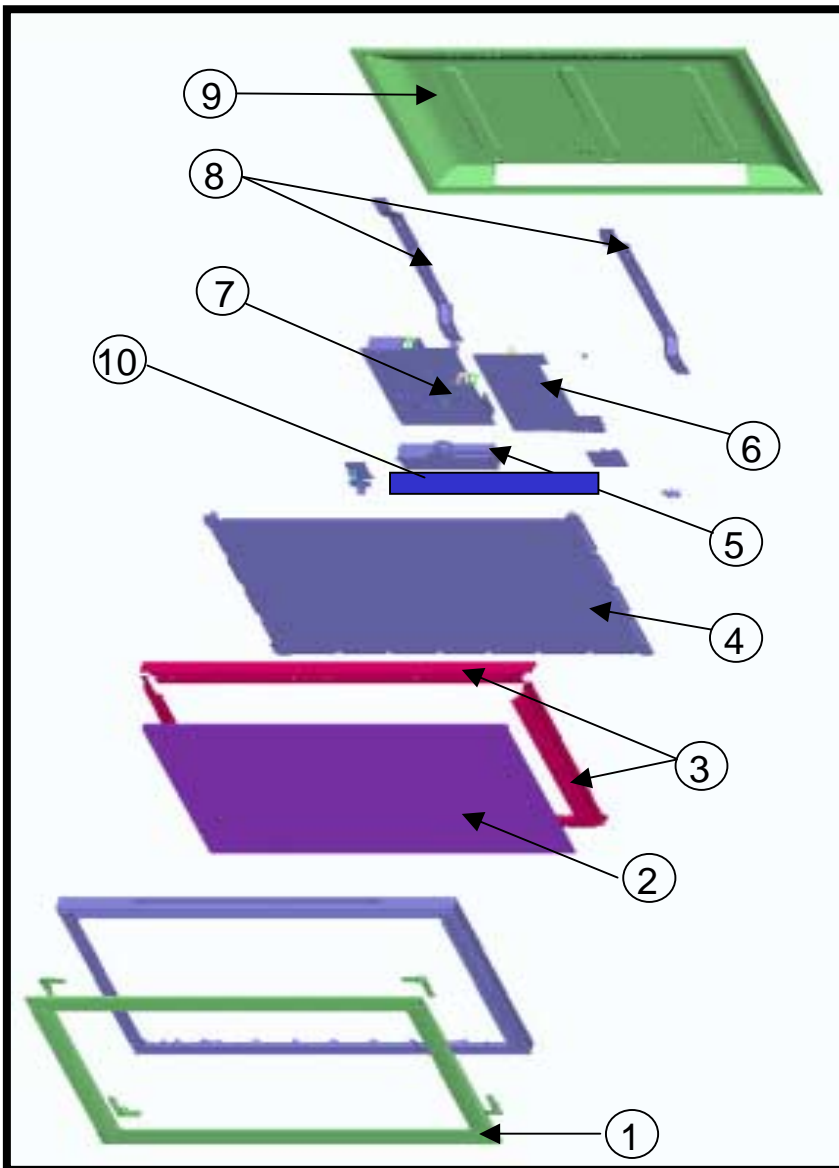
- Fixing Points : Fix with M5 screws
(★3,4,5,6,7,8 ; 6 points)
- SPK Fixing Points : Fix with 3 tapping screws
(★1,2,9,10 (2 points each); 8 Points)



D/T,F/S Fixing Points

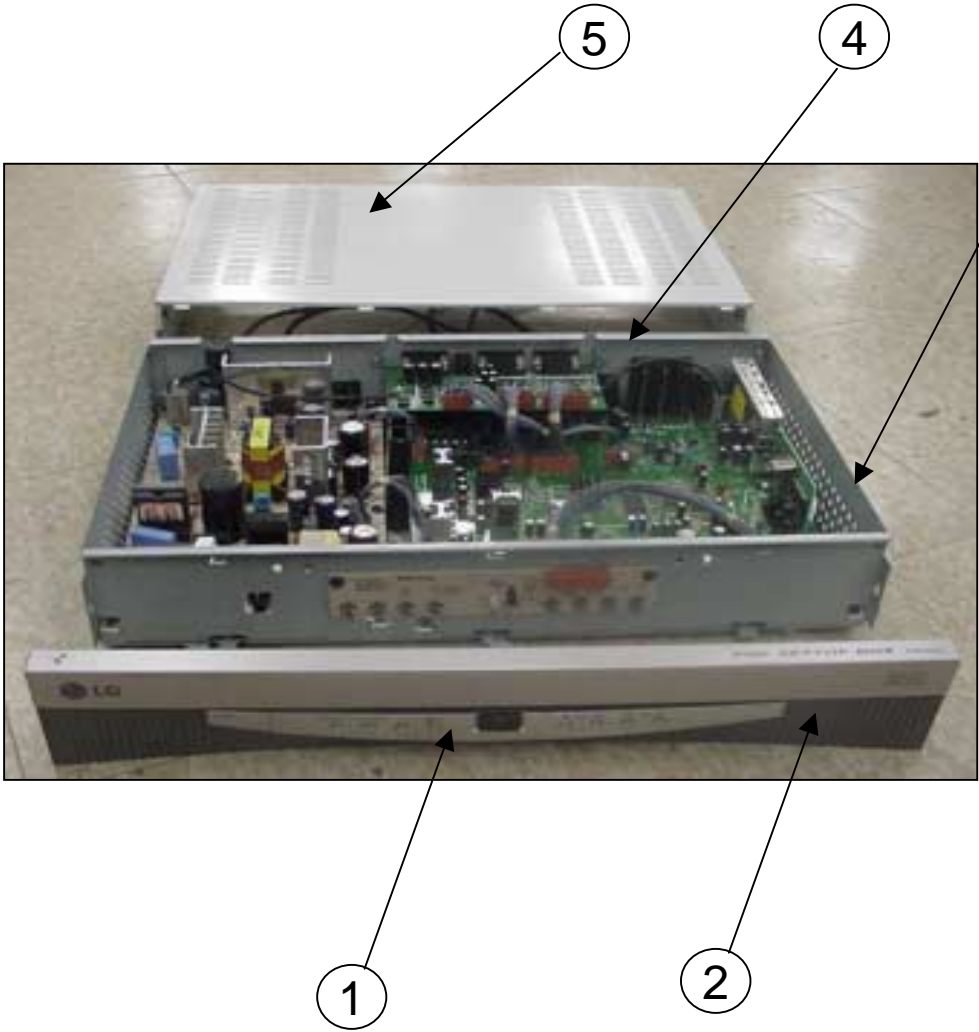
4-2)MN-60PZ10(60" PDP)



5-1) MONITOR PART

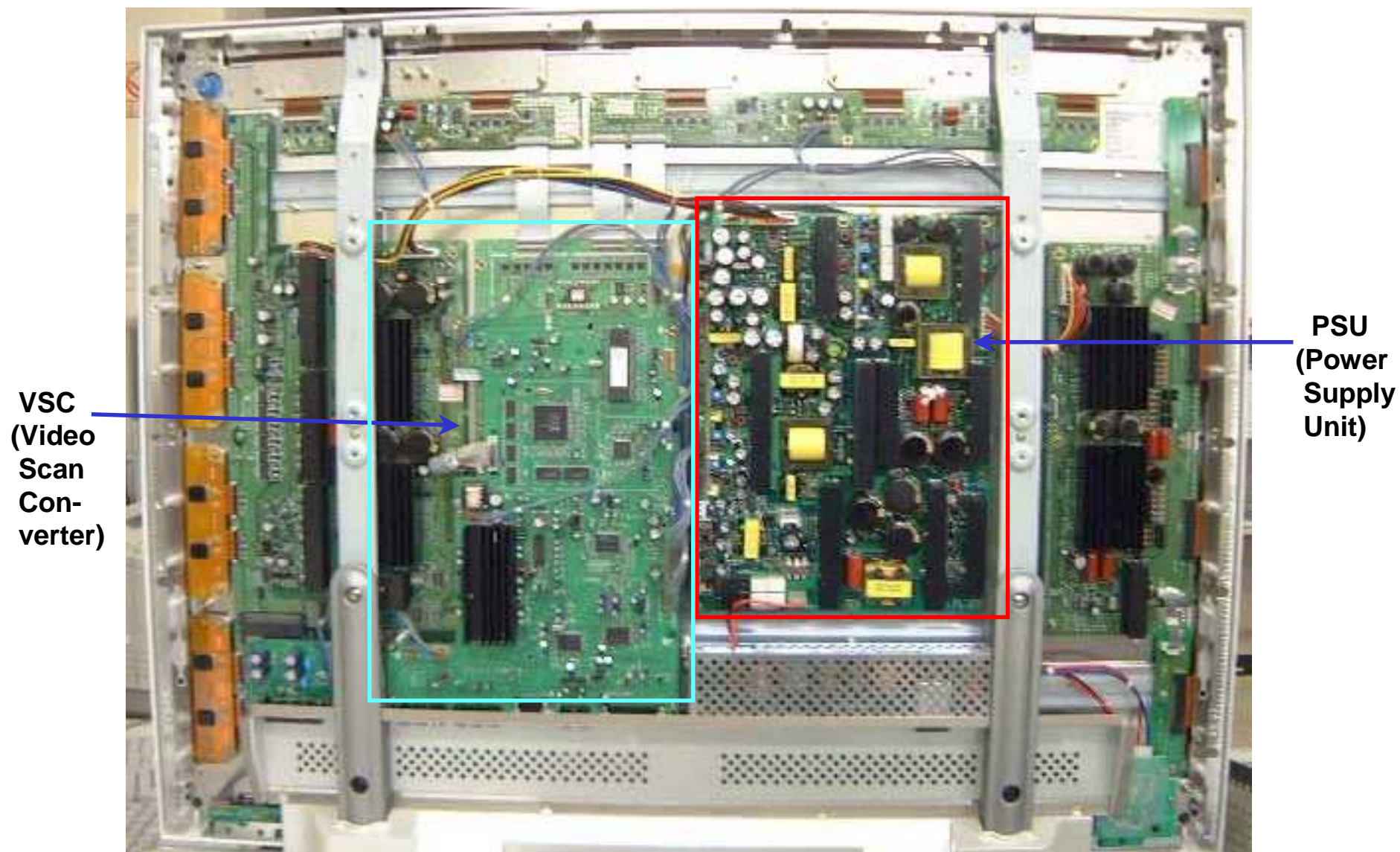
NO.	NAME	Part Number
①	Cabinet	3091V00288C
②	Filter	3790V00266B
③	Supporter, Filter	
④	Module Assy	6348Q-A002A
⑤	Line Filter	3501V00028A
⑥	PCB ASSY, VSC	6871VMM602B
⑦	PCB ASSY, POWER	3501V00027E
⑧	Supporter, Vertical	4980V00164B/C
⑨	Back Cover Assy	3809V00212C
⑩	Plate, Rear A/V	3301V00005A

5-2)SET TOP BOX ASSY

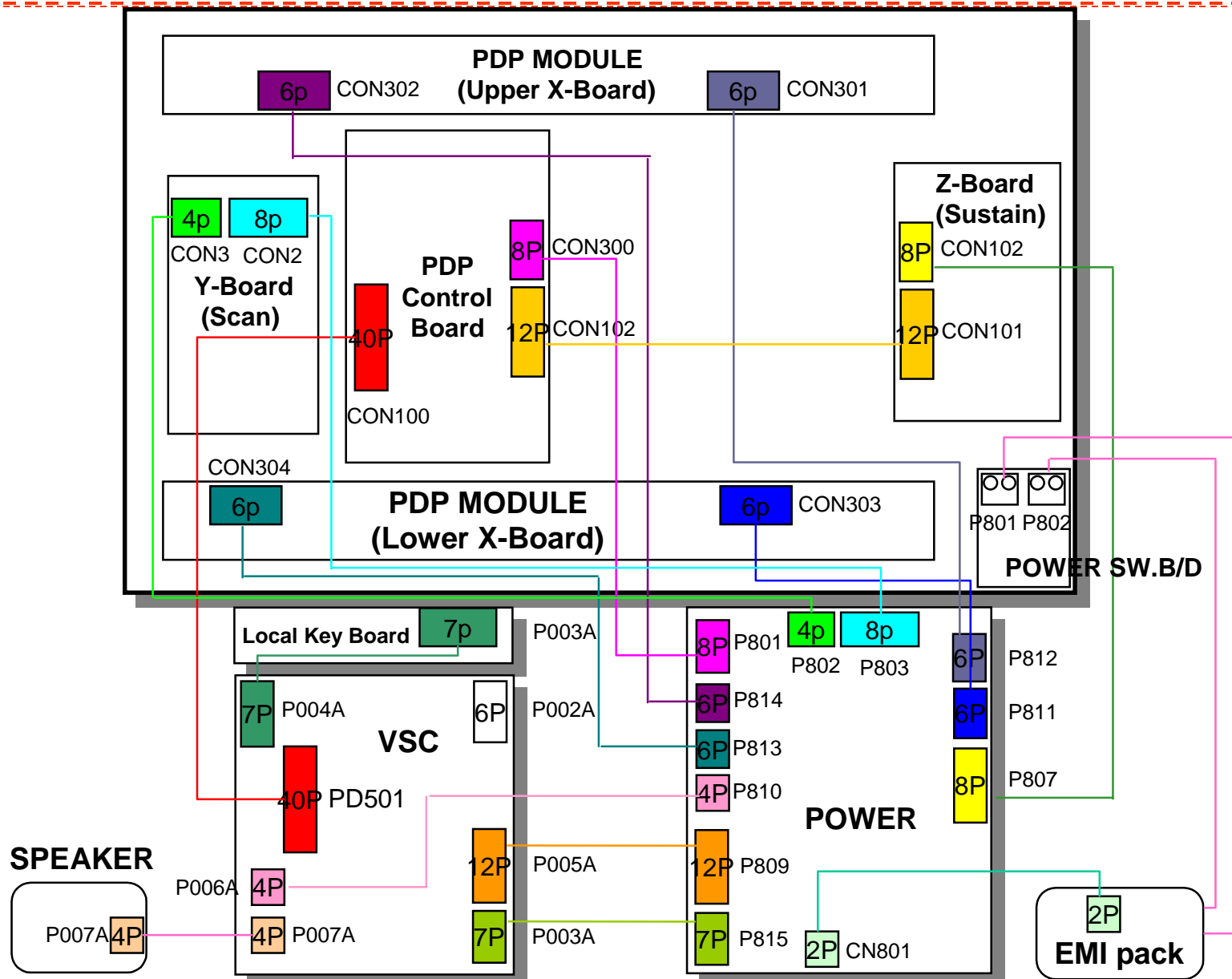


NO.	NAME	Material	Part Number
1	Panel,Control	ABS	3720V00080B
2	Panel, Front	HIPS	3720V00079A
3	Case, Bottom	SECC 1.0t	3110V00101B
4	Case, Rear	SECC 1.0t	3110V00111C
5	Case, Top	SECC 1.0t	3110V00102A

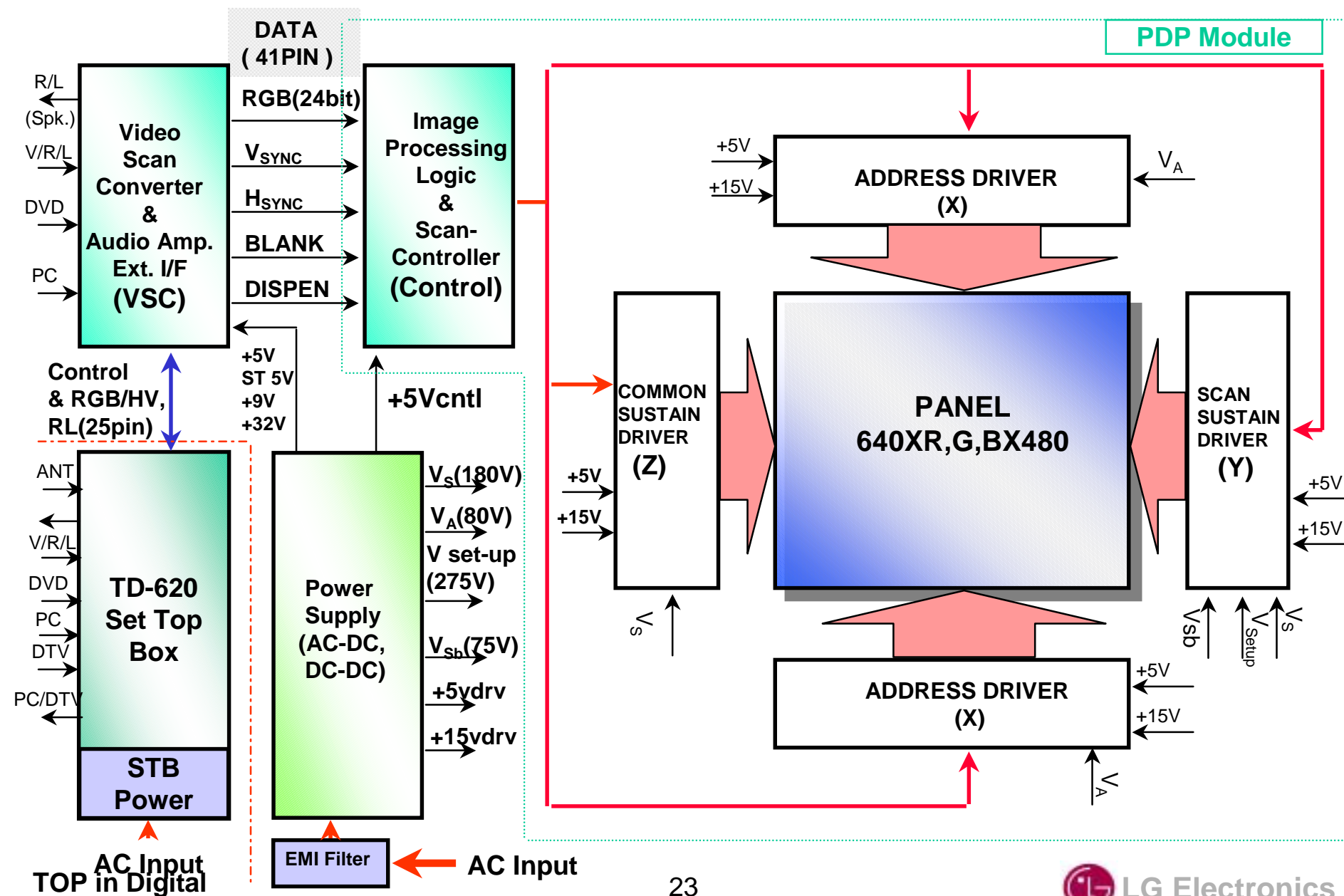
5-3) PSU & VSC Board

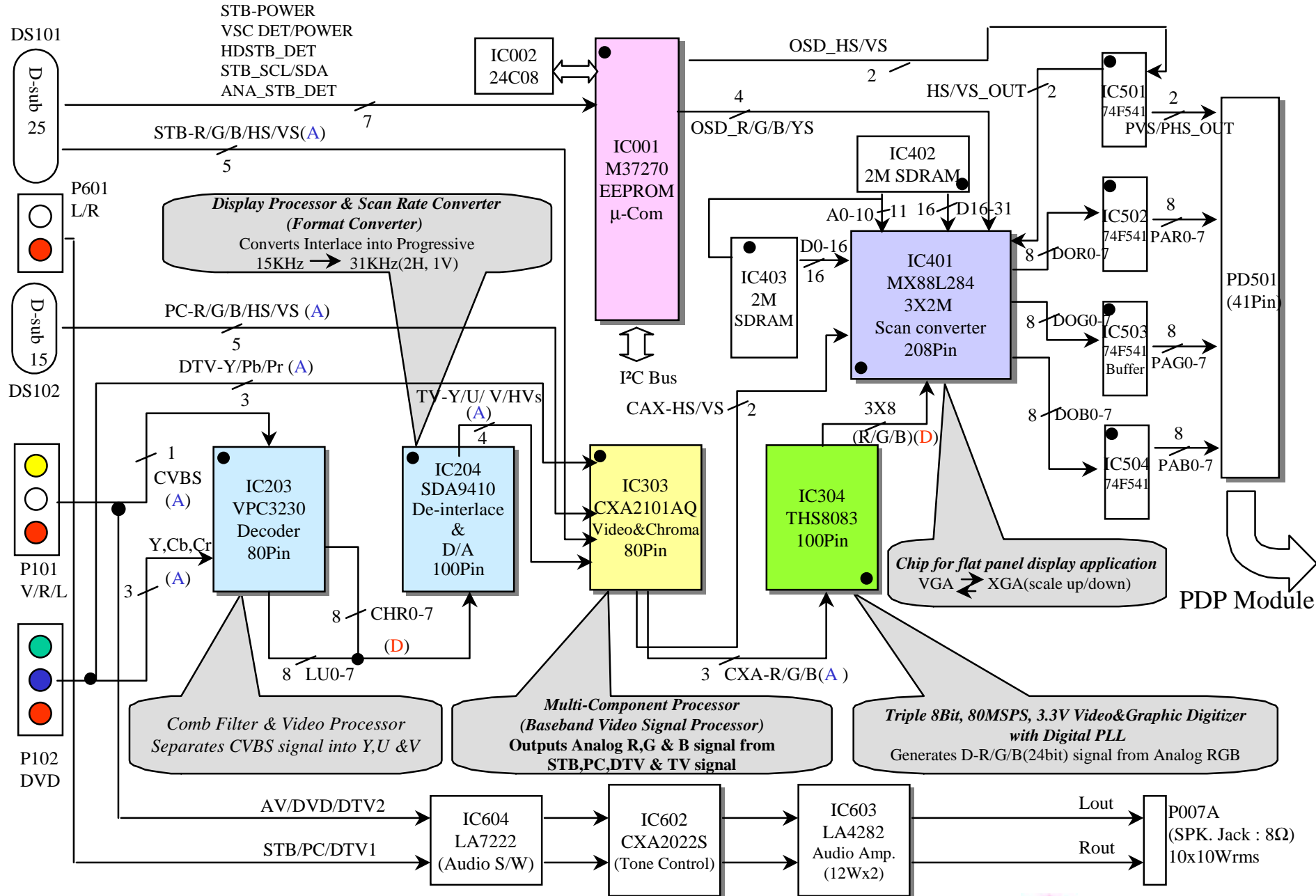


(6) Inter-Connection Guide

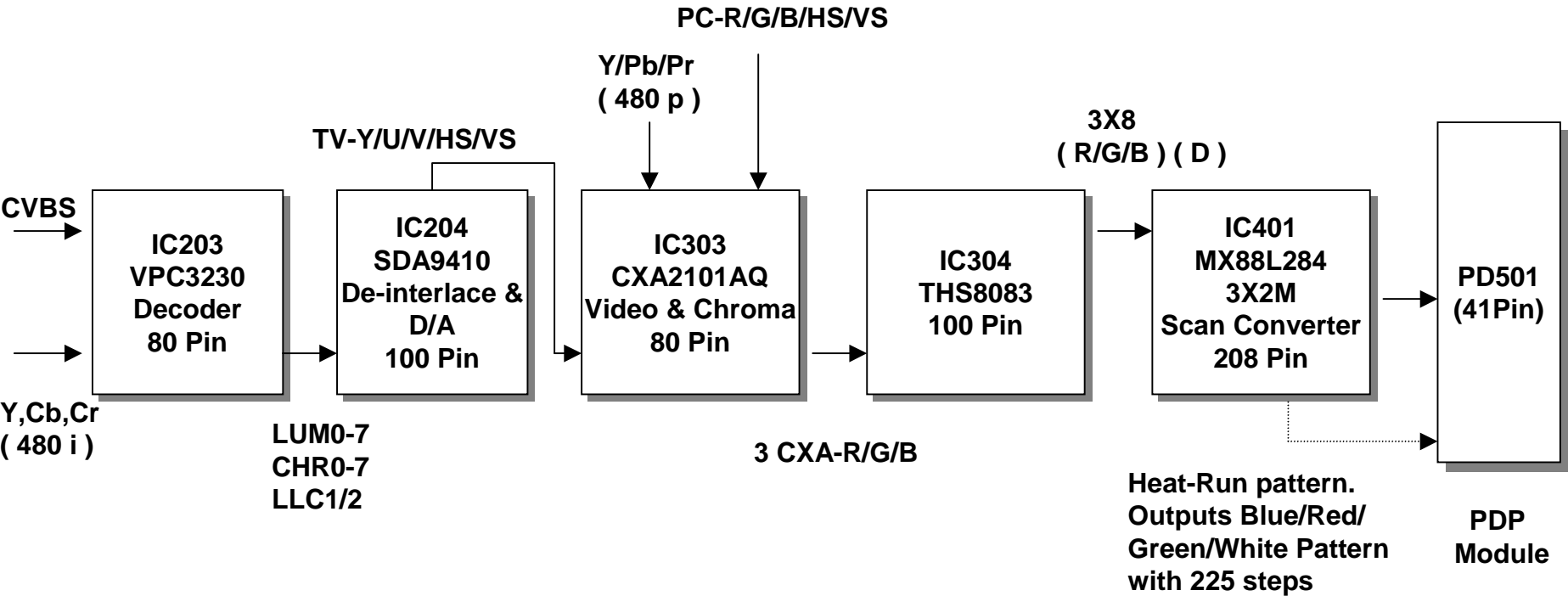


(7) Block Diagram

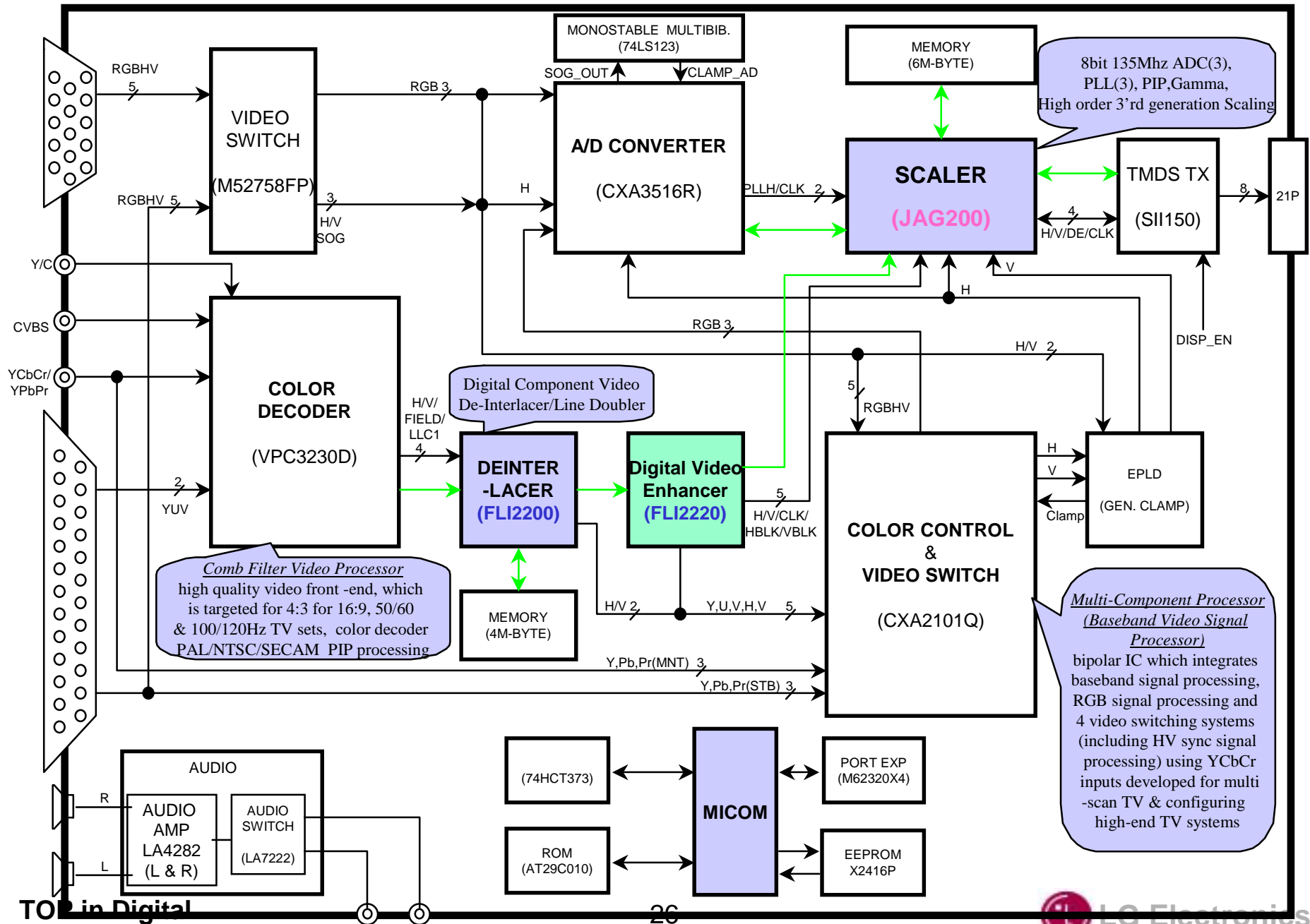




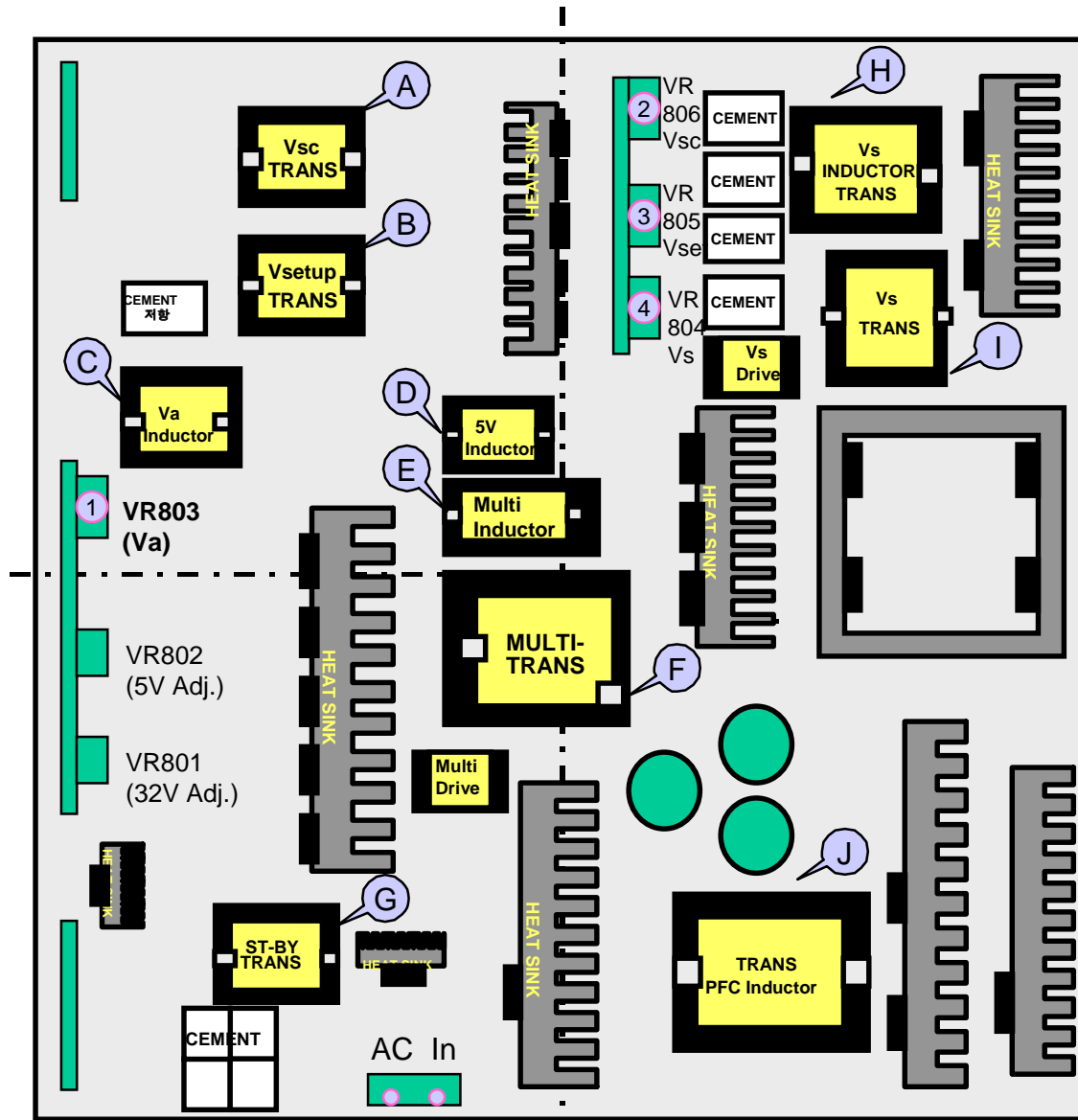
VSC Board Block



42"/60" New VSC Board



Power Supply Unit (40")

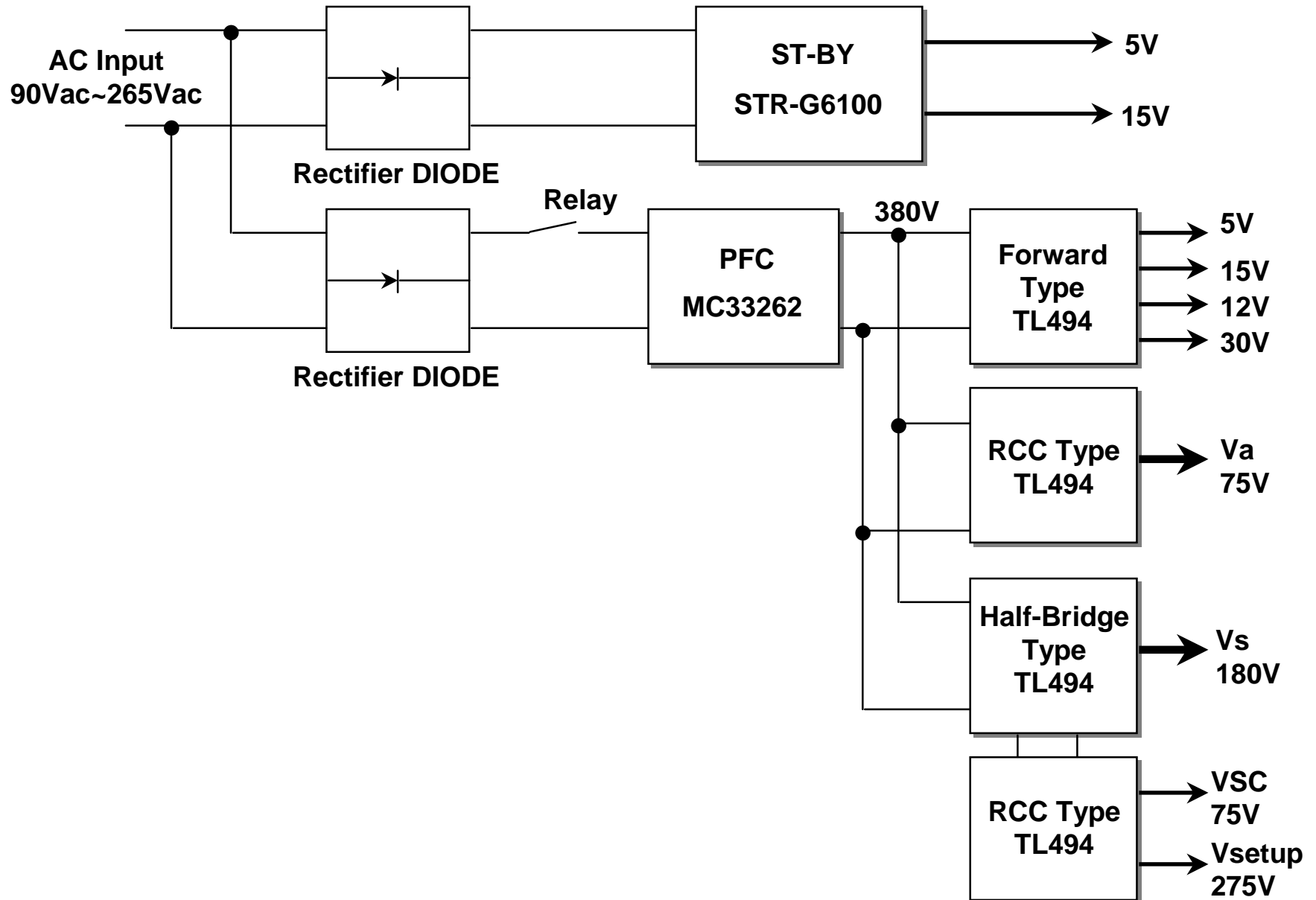


- A: Vsc(75V)Trans
- B: Vsetup(275V) Trans
- C: Va Inductor Trans
- D: 5V Inductor Trans
- E: Multi Inductor Trans
- F: Multi(5V/15V/12V/30V/Va)Trans
- G: St-By(5V/15V)Trans
- H: Vs Inductor Trans
- I : Vs(180V)Trans
- J: PFC Inductor Trans

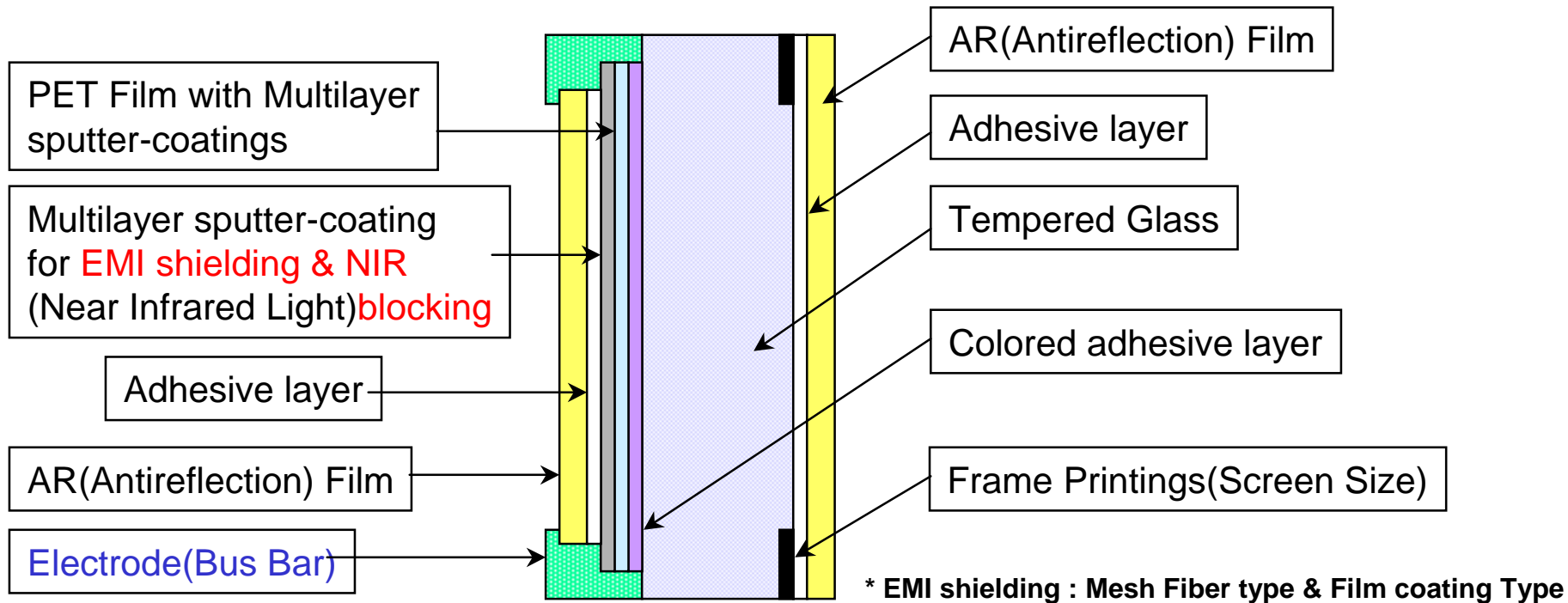
<Adjustment Point>

- VR802 : Va adjust(typ.70±5V)
- VR804 : Vs adjust(typ.180±5V)
- VR805 : Vsetup adjust(typ.275V)
- VR806 : Vsc adjust(typ.75V)

POWER BLOCK



(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 = 2.5~3.5W) @ 60% , FCC -B(sheet resistance = 1.1~1.5W) @ 45%
- Color Control : Color Temperature & Color Reproducibility control
- Reduce Surface Reflection
- Enhancement of Contrast
- Protection of PDP panel

(9) PDP Tuner(Set Top Box)

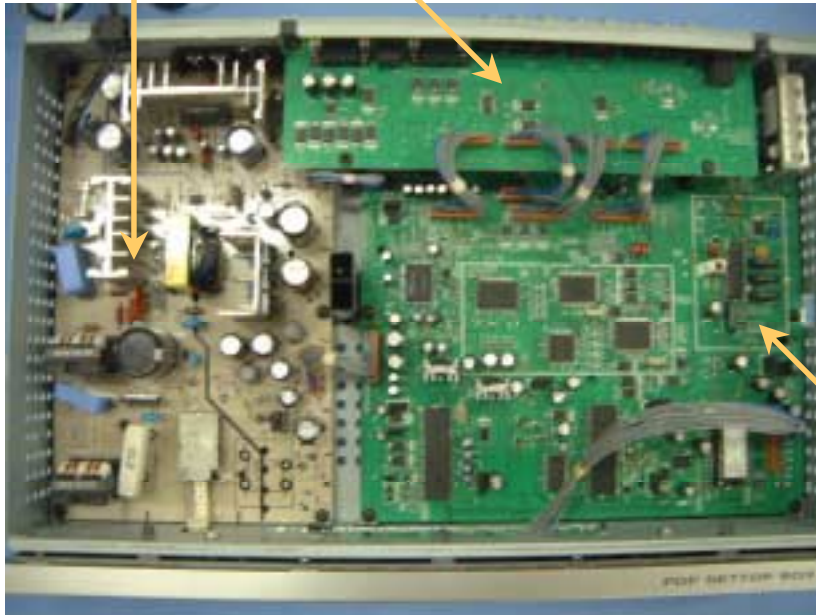


Top View

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

SMPS Board

Interface Board



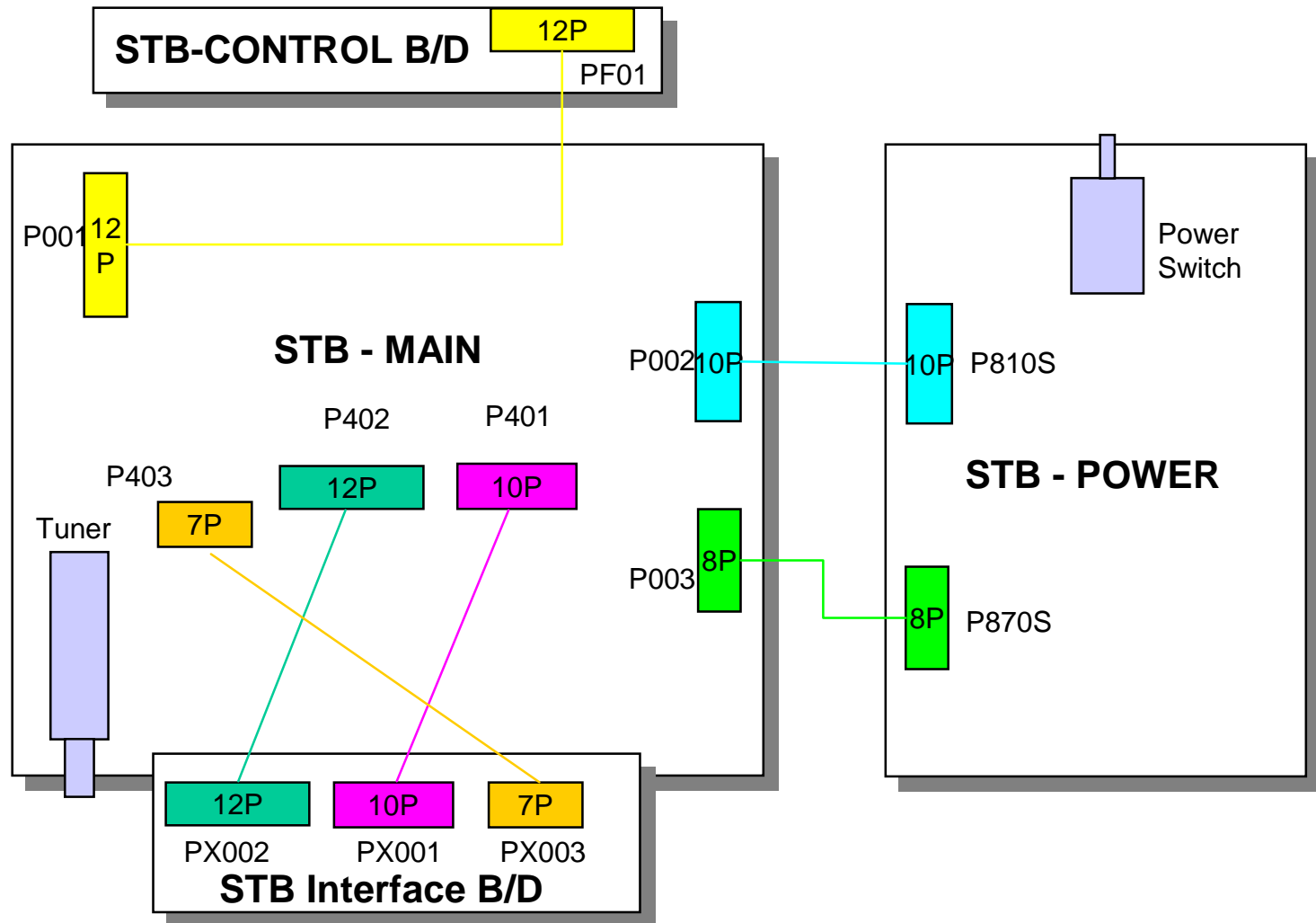
Inside



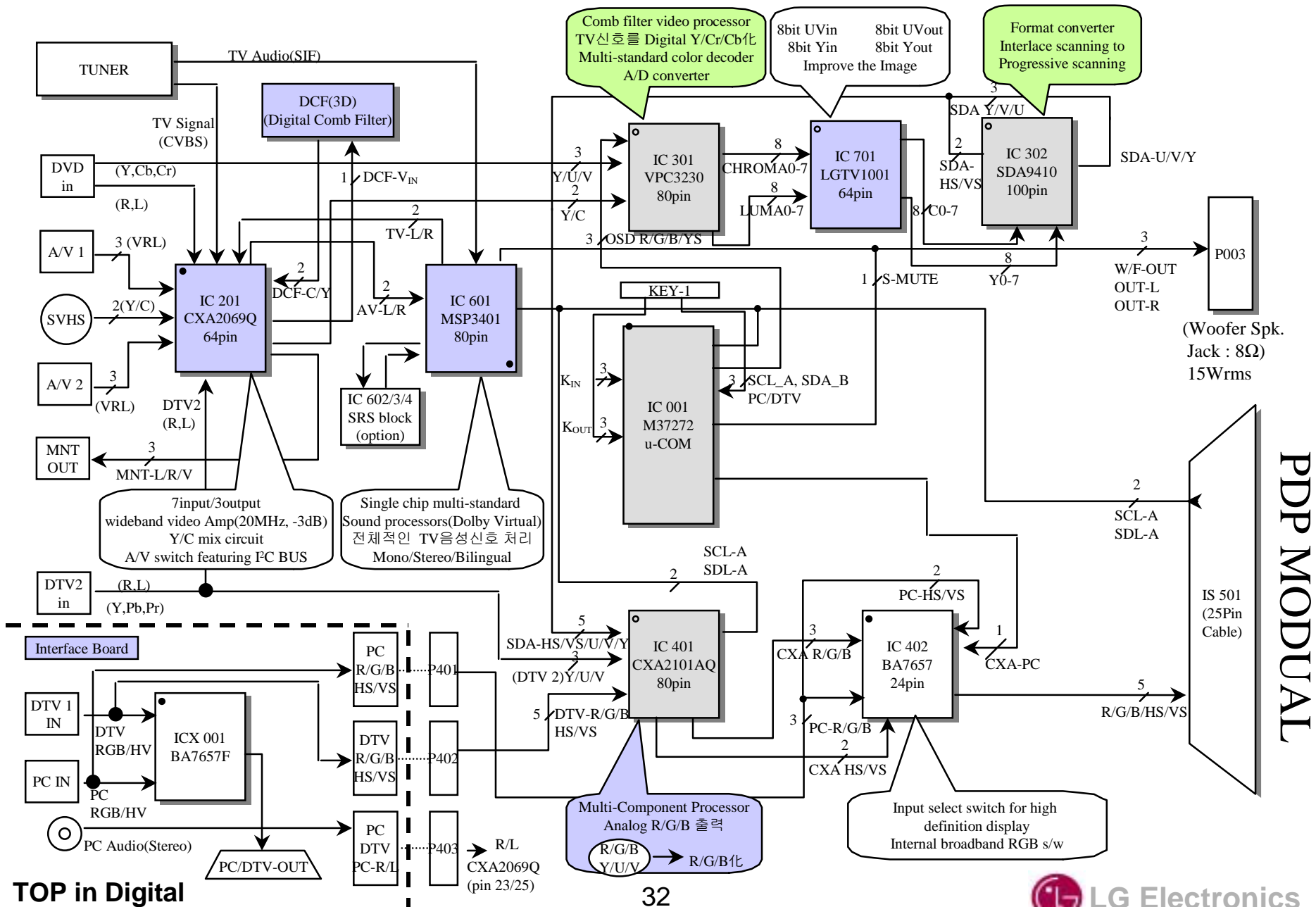
Back Panel(Signal Input)

Main Board

(10) RT-BA10(STB) Inter-Connection



(11) STB Block Diagram(1)



Parts	Function
Y-Board (Scan Driver)	Connected to Scan(Y) electrode and FPC to operate Scan and Sustain
Z-Board(Common Sustain Driver)	Connected to Sustain(Z) electrode and FPC to operate Sustain
X-Board (Address Driver)	Connected to lower address(X) electrode and FPC to operate Address
Control Board	Generates and distributes display data and driver timing of Video and Audio signal from external input to X,Y,Z Board.
DC/DC-2 Board	With input voltages-Vs,Va,Vcc, converts into Circuit login voltage(5V), Va,Vsc,Vs & Vsetup and distributes to X,Y,Z Board.
FPC(Flexible Plate Circuit)	Connect line to line with PCB and pattern of Panel
ACF (Asymmetric Conductive Fundamental)	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.
Heat Sink	Electrical parts are attached to absorb and radiate heat generated at Panel when operating.
COF (Chip On Film)	Unifying IC chip on the PCB and FPC, and it realizes simplified structure and miniaturization.

A. Definition

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

B. Specification

	A zone	B zone
Dark Dot	$N \leq 2$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0	$N \leq 4$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0
Bright Dot	$N \leq 2$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0	$N \leq 4$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0
Flashing Dot	$N \leq 2$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0	$N \leq 4$ [cell/scn] Neighboring 2 Cells ≤ 1 Neighboring over 3 Cells : 0
High Intensity Dot	$N \leq 0$ [cell/scn]	$N \leq 0$ [cell/scn]

Lift up the right and left of X-BOARD CONNECTOR.



Lift up X-BOARD CONNECTOR and separate COF CONNECTOR by pulling up.



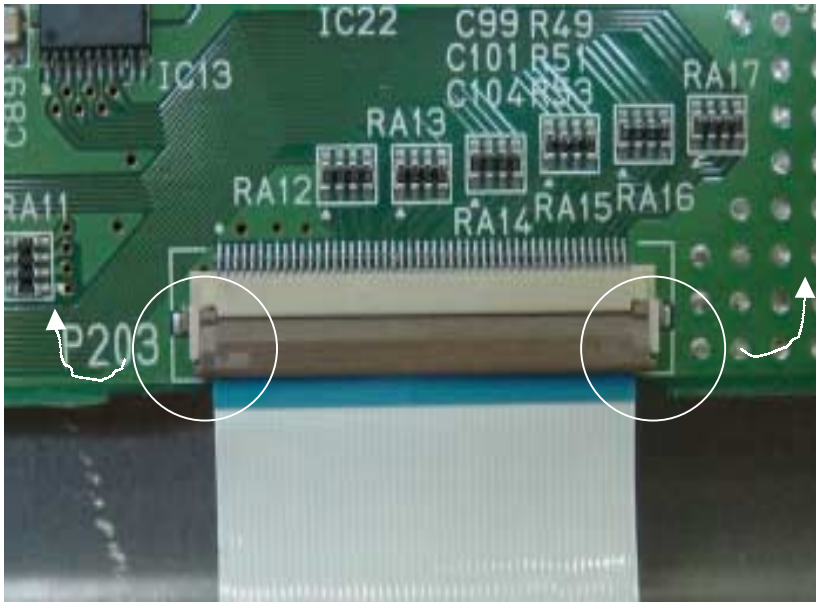
When you handle COF CONNECTOR, don't pressure. First release LOCK and separate.
If COF CONNECTOR is damaged, you should replace MODULE ASS'Y. So, be aware of this!!

COF Connector



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.

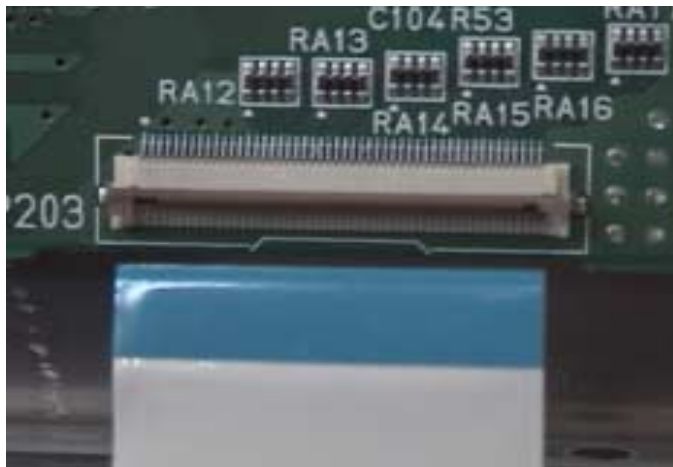


Lift up each edge of left/right.



Lifted condition

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

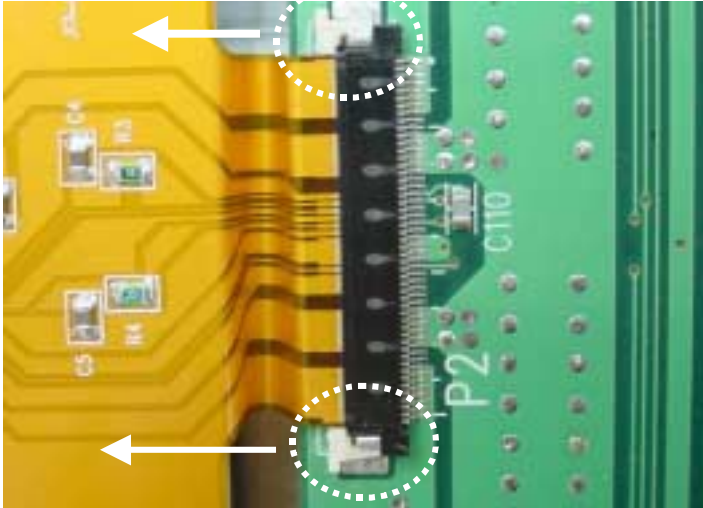


Warning

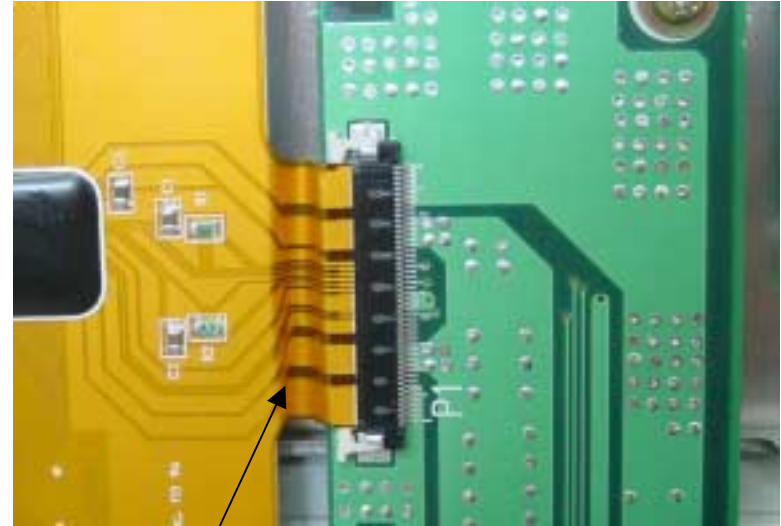
It's easy to separate it by releasing Connector Lock .

Do not pressure or it can be hurt.
When LOCK is hurt, replace a new X-BOARD

Pull the white LOCK as shown in arrow



Pull the white LOCK as shown in arrow.



Separate COF CONNECTOR by pulling in the left.

Warning

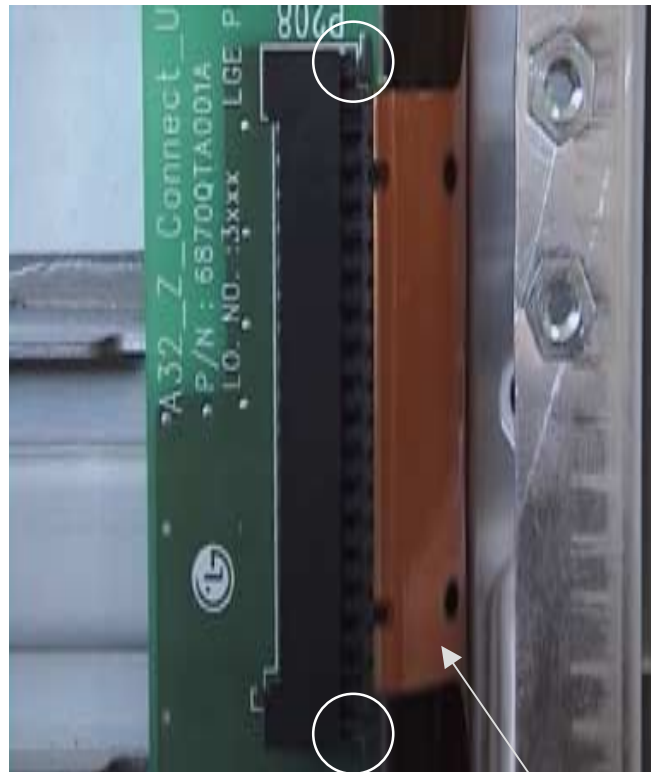
Be careful to handle LOCK and COF Connector. When LOCK part is damaged, you should replace a new Y-Board. In case of COF Connector, Module Assembly.



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

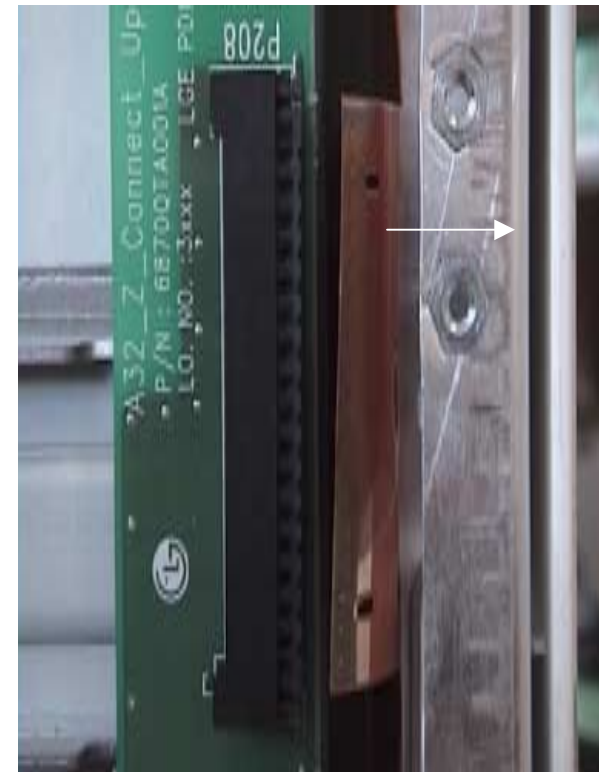
Warning

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



Condition in Lock part is pulled

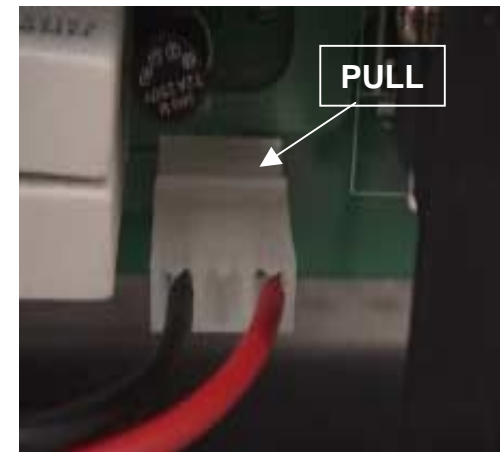
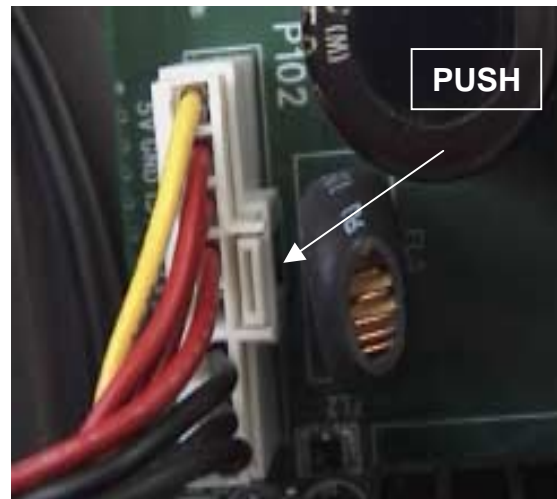
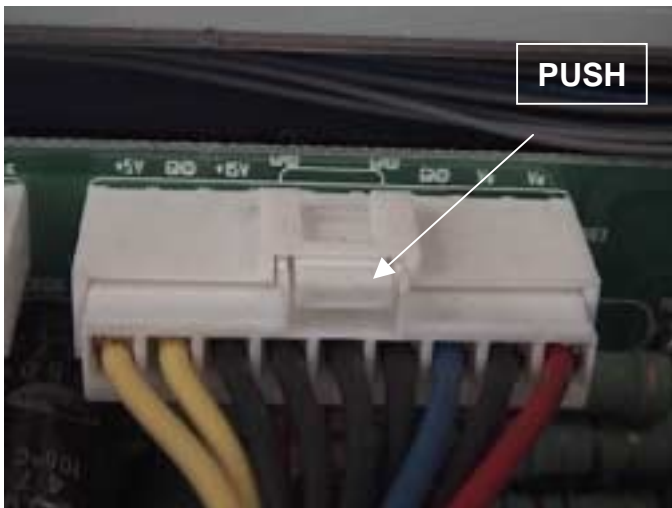
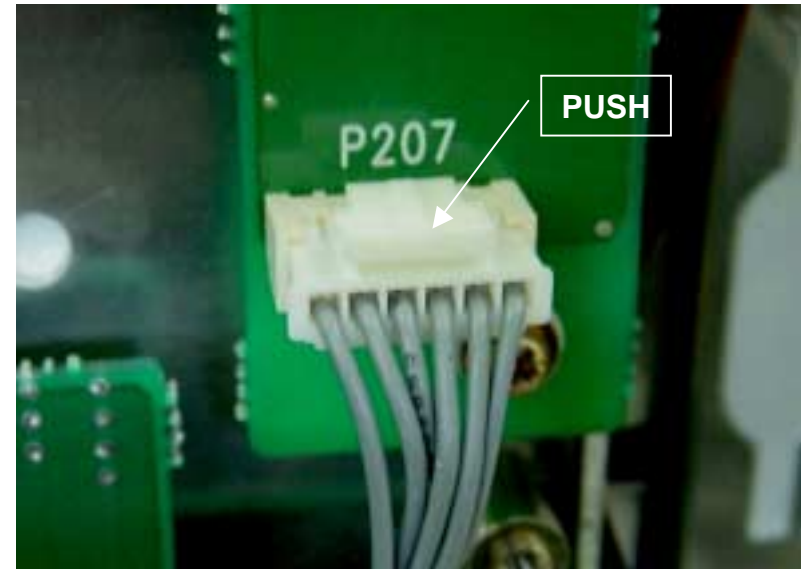
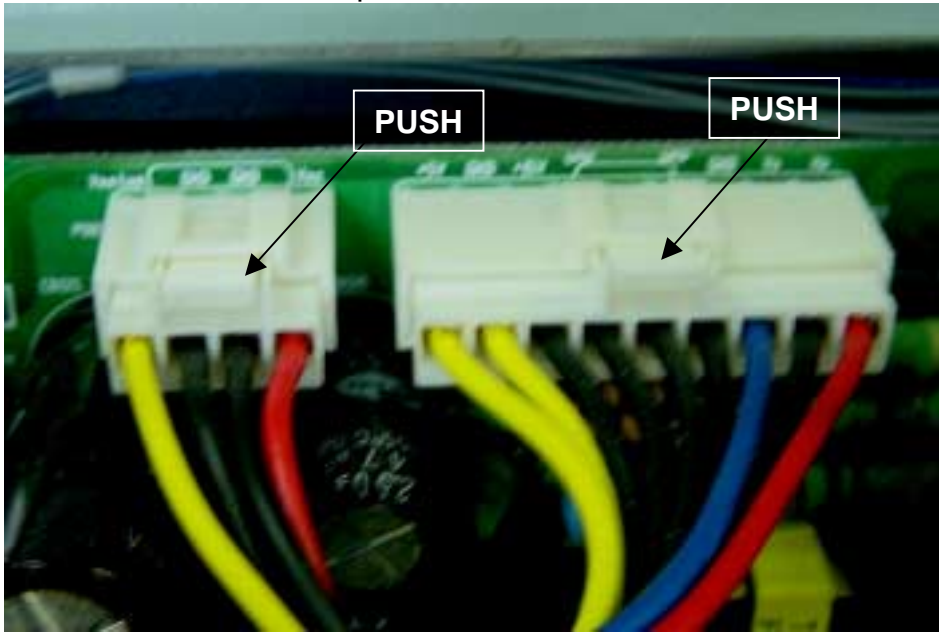
COF Connector



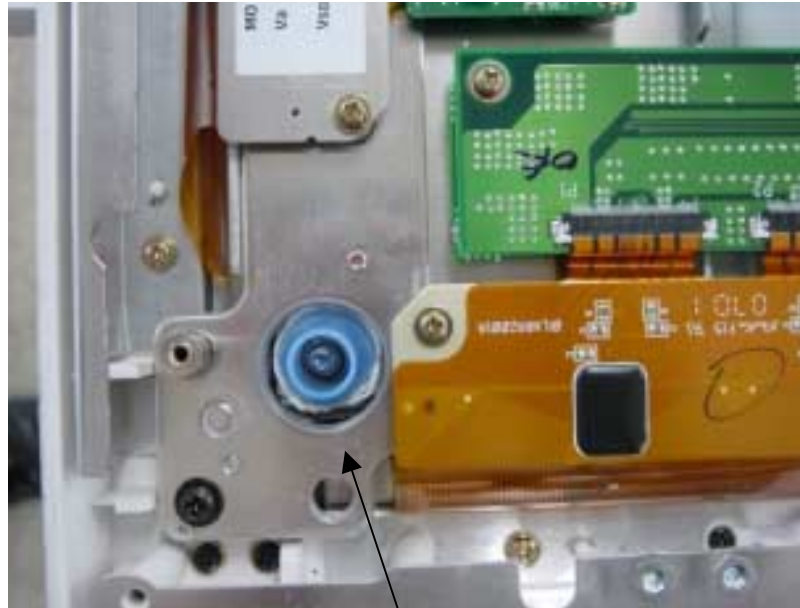
Pull COF Connector as shown in arrow.

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.

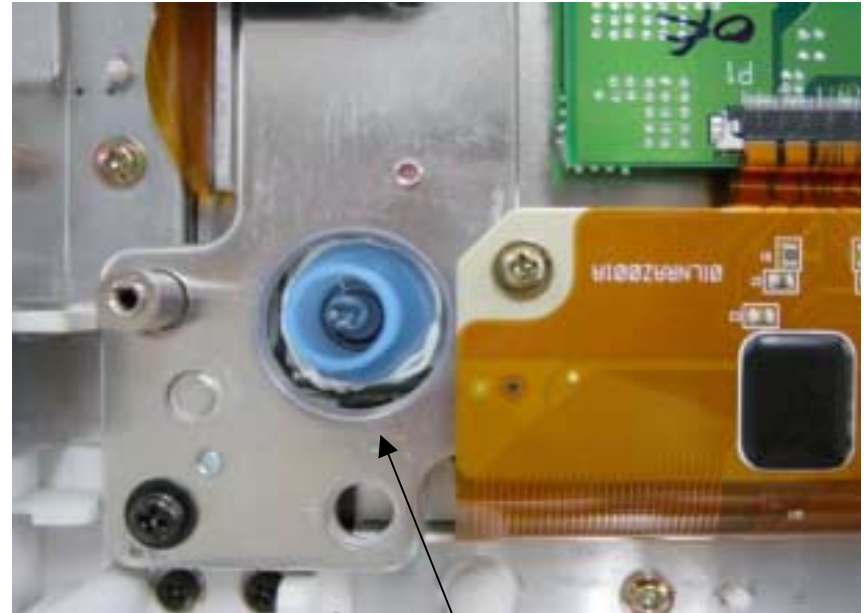
Push LOCK and pull out







Be sealed up after gas injection

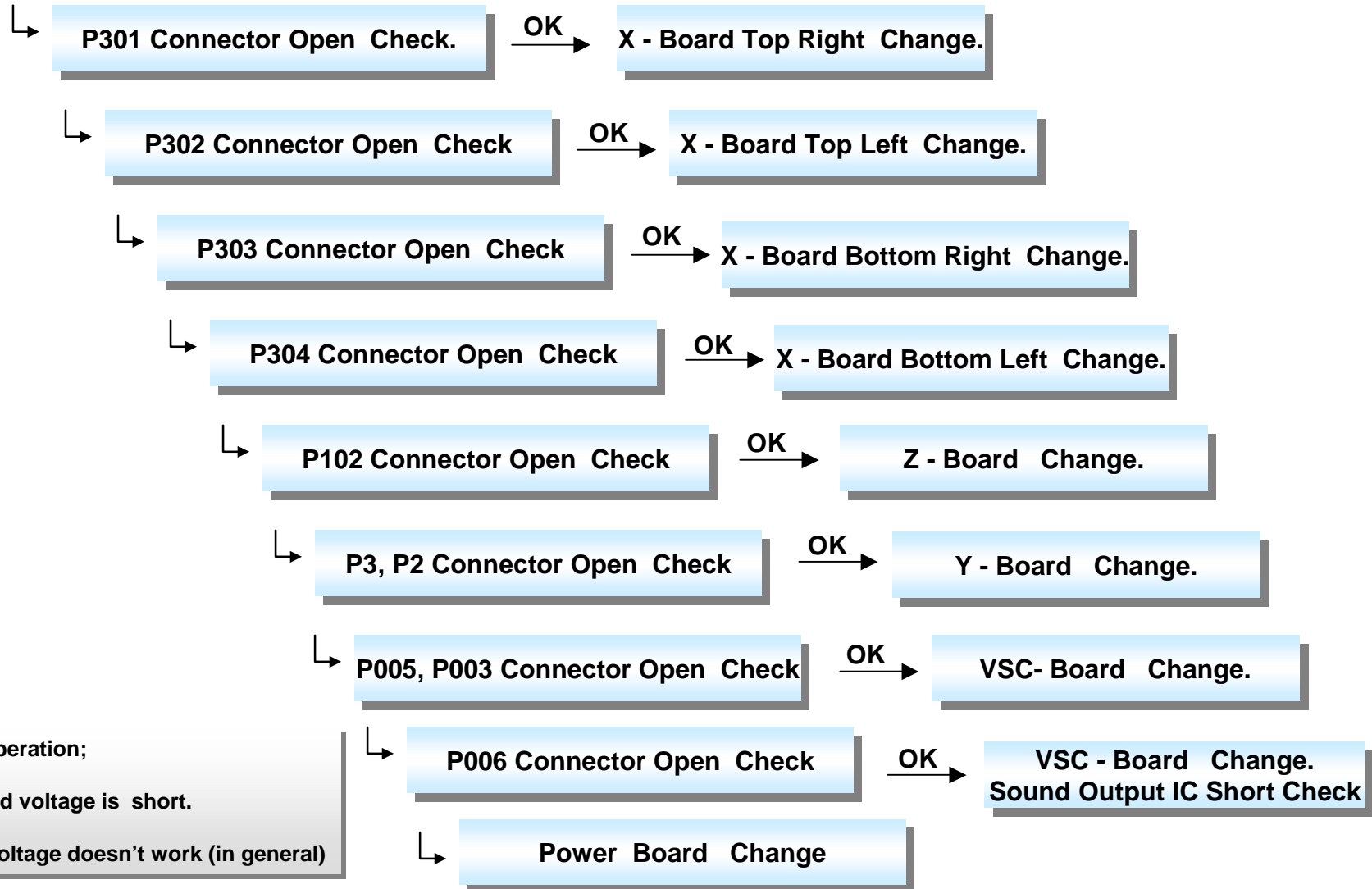


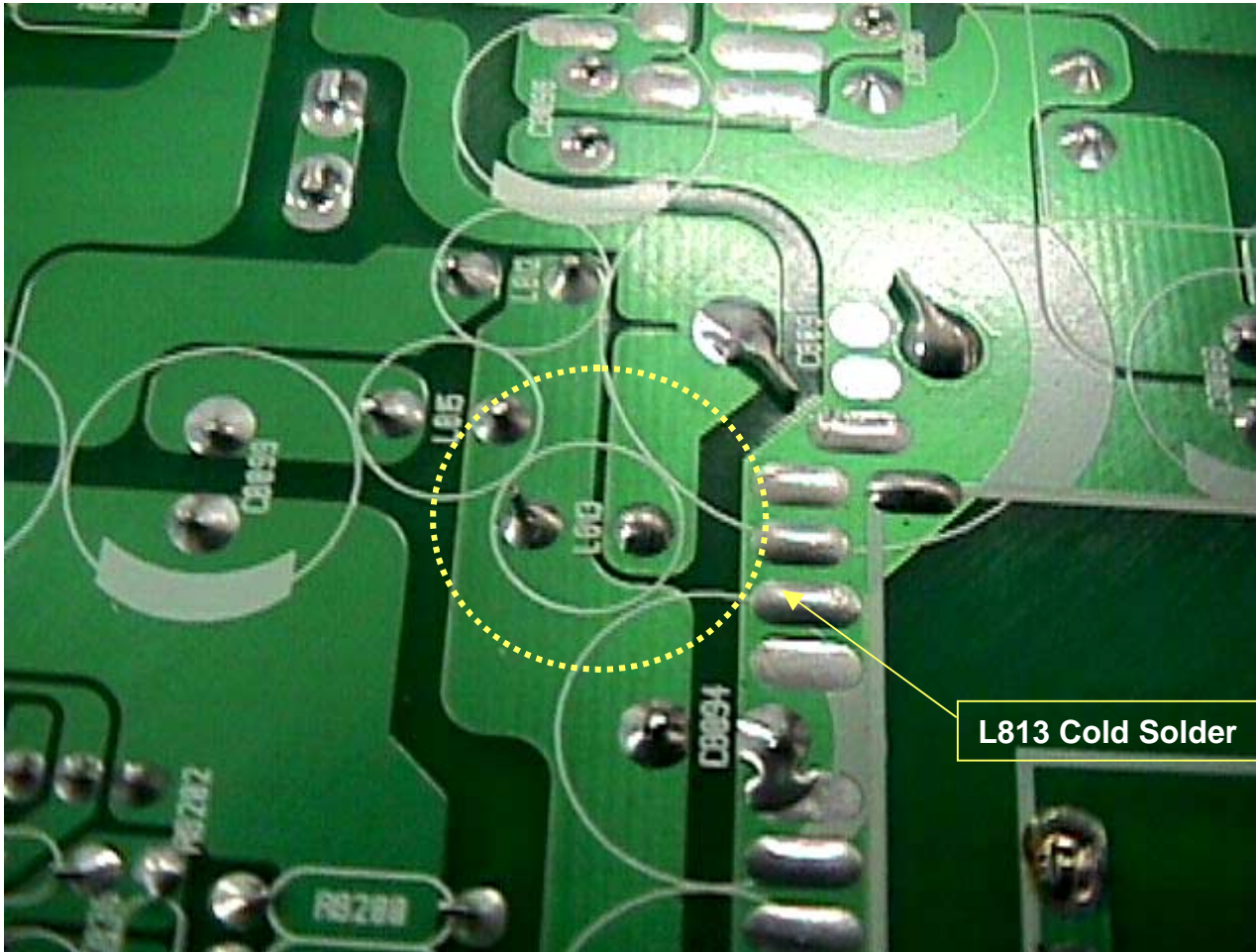
Be sealed up after gas injection



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)





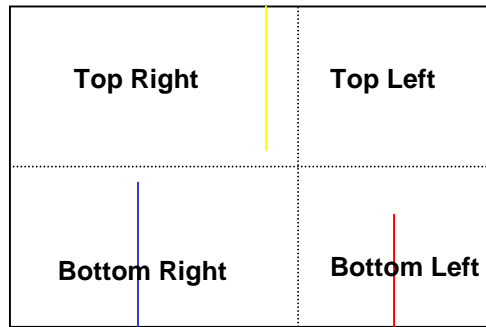
Symptom : As soon as the power on,
it's off in 2 - 3minutes.
(PROTECT operation)
Cause : No VS voltage
L813 Coil cold soldering.

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.



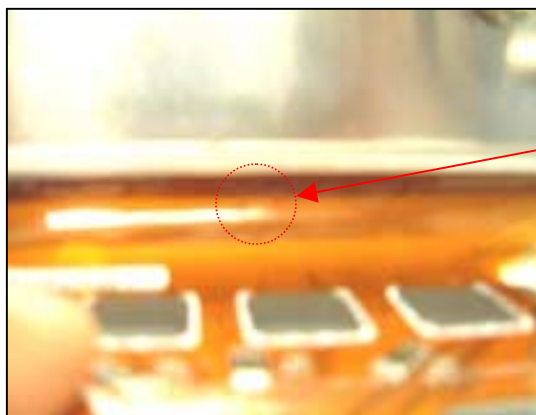
Press the ADJ KEY and check the position of add bar by changing WHITE or RED or BLUE or GREEN



MP-40PA10 uses 4 board 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 defect, check CONTROL.



Symptom : B color 1 Address line Open
Cause : Dented COF



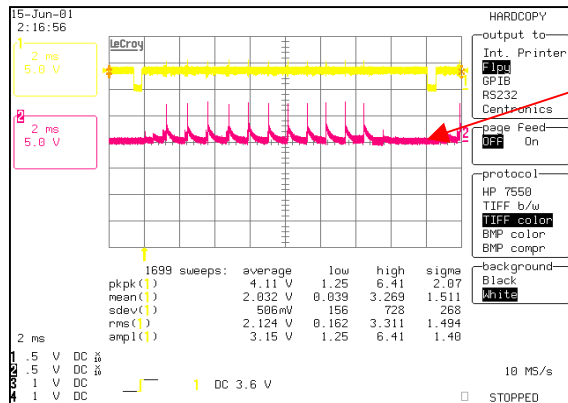
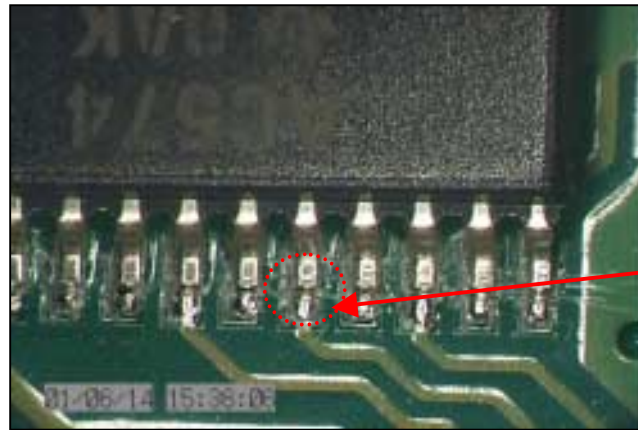
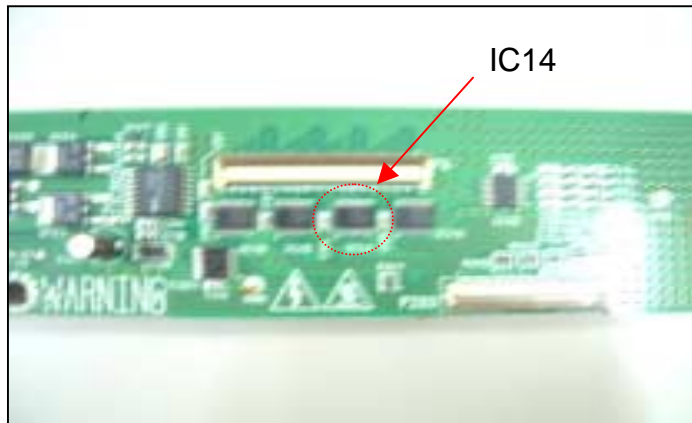
COF is dented



Symptom : Inferior R Address color

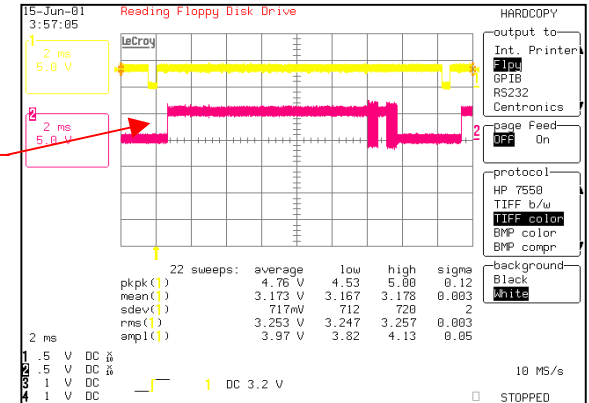
Cause : **Inferior DATA output by cold soldering 16 pin of IC14 in X-L-TOP**
(Normal waveform after tearing off IC Pin)

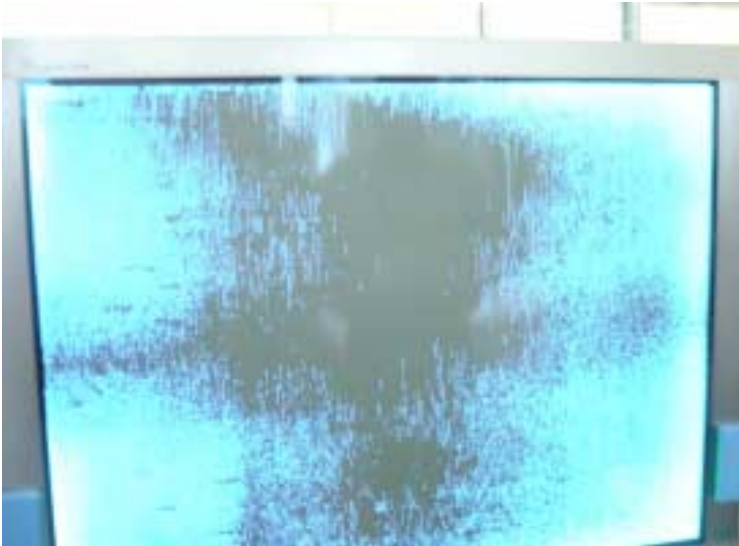

Countermeasure : Replace X-L-TOP board.






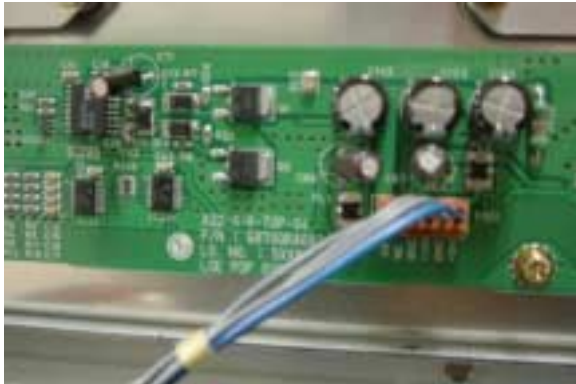
Abnormal waveform by cold soldering



Normal waveform after tearing off IC pin





Symptom	Causes	Countermeasure
 <p>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.</p>	<p>If 15V line voltage reduces below 14V, Mis-discharge occurs and power off because of protection circuit.</p>	<p>Replace PSU (Power Supply Unit) and defective X-Board.</p> <p>Defective X-Board</p> 
<div data-bbox="78 1032 277 1089">Check</div> <p>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.</p>		

Symptom	Cause	Countermeasure
 <p>The top left part of screen is broken (Top Right X-BOARD)</p>	<p>No 5V supply to Top right X-Board.</p>	<p>Connect 5V line</p>
<div data-bbox="78 936 277 993"> <p>Check</p> </div> <p>Check Top right X-BOARD 5V.(If 0V, it happens)</p> <p>Check 5V line from SMPS to X-BOARD.</p> 		

Symptom	Cause	Countermeasure
 <p>Pinkish screen in the top left. (Top right X-BOARD)</p>	<p>No Va(70V) supply to Top right X-Board.</p>	<p>Connect 70V line</p>
<div> <div>Check</div> <p>Check Top right X-BOARD Va(70V).(If 0V, it happens)</p> <p>Check 70V(Va) line from SMPS to X-BOARD.</p>  </div>		

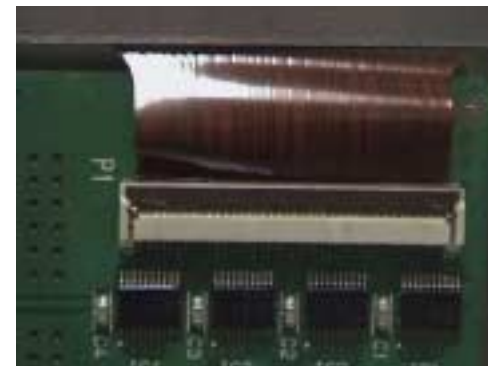
Symptom	Cause	Countermeasure
 <p>The 3/5 top left in the screen is blank (Top Right X-BOARD)</p>	<p>No 12V supply to Top right X-Board.</p> <p>No Va(70V) supply to Top right X-Board.</p>	<p>Connect 12V line</p> <p>Connect 70V line</p>
<div data-bbox="78 936 277 996">Check</div> <p>Check Top right X-BOARD 12V.(If 0V, it happens)</p> <p>Check Top right X-BOARD Va(70V).(If 0V, it happens)</p> <p>Check 12V & 70V(Va) line from SMPS to X-BOARD.</p>		


<u>Symptom</u>	<u>Cause</u>	<u>Countermeasure</u>
 <p><u>The 3/5 top right of the screen is blank.</u> <u>(Top left X-BOARD)</u></p>	<p><u>No 12V supply to Top left X-Board.</u></p> <p><u>No Va(70V) supply to Top left X-Board.</u></p>	<p><u>Connect 12V line</u></p> <p><u>Connect 70V line</u></p>
<div data-bbox="78 982 277 1043"> Check </div> <p><u>Check Top left X-BOARD 12V.(If 0V, it happens)</u></p> <p><u>Check Top left X-BOARD Va(70V).(If 0V, it happens)</u></p> <p><u>Check 12V & Va(70V) line from SMPS to X-BOARD.</u></p>		


Symptom	Cause	Countermeasure
 <p data-bbox="224 825 744 893">Pinkish screen in the 1/5 top right (Top left X-BOARD)</p>	<p data-bbox="963 315 1416 384">P1 COF connector on Top left X-Board is open.</p>	<p data-bbox="1563 322 1778 351">Reassemble it</p>


Check


Check the contact point and Locking of P1 on Top left X-BOARD.


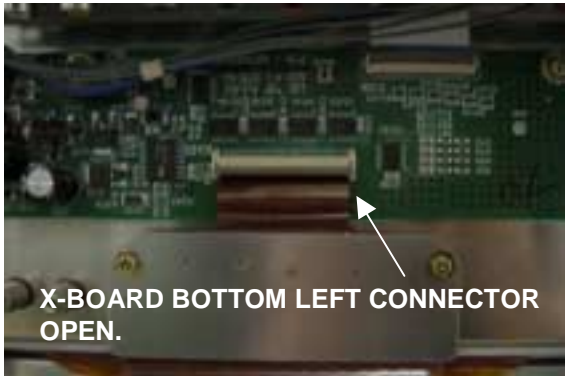


Symptom	Cause	Countermeasure
 <p>The 3/5 bottom left of screen is broken. (BOTTOM RIGHT X-BOARD)</p>	<p>No 5V supply to bottom right X-Board.</p>	<p>Connect 5V line</p>
<div data-bbox="78 1033 277 1090">Check</div> <p>Check Bottom right X-BOARD 5V.(If 0V, it happens)</p> <p>Check 5V line from SMPS to X-BOARD.</p>		



Symptom	Cause	Countermeasure
 <p>The 3/5 bottom left of the screen is Blank. (Bottom Right X-BOARD)</p>	<p>No 12V supply to bottom right X-Board.</p> <p>No Va(70V) supply to bottom right X-Board.</p>	<p>Connect 12V line</p>
<div data-bbox="78 1032 277 1089">Check</div> <p>Check Bottom right X-BOARD 12V.(If 0V, it happens)</p> <p>Check 12V line from SMPS to X-BOARD.</p>		

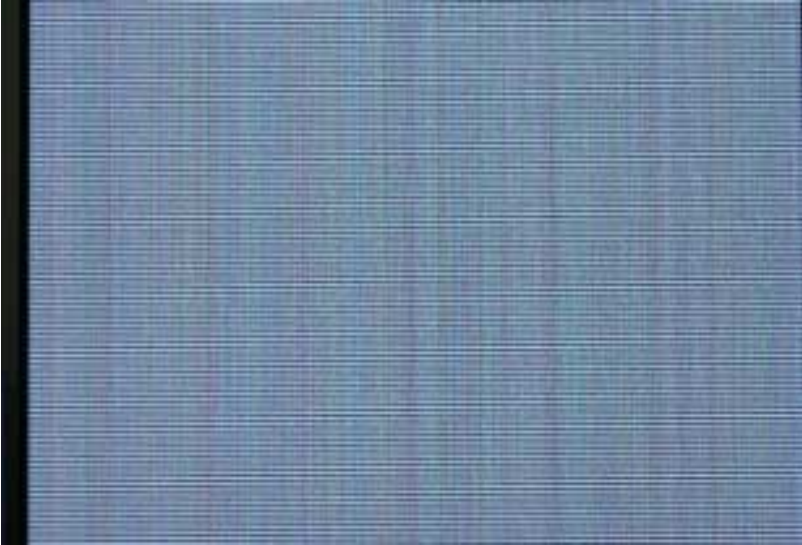
Symptom	Cause	Countermeasure
 <p>The 2/5 right of the screen is broken. (Bottom left X-BOARD)</p>	<p>No 5V supply to bottom left X-Board.</p>	<p>Connect 5V line</p>
<div>Check</div> <p>Check Bottom left X-BOARD 5V.(If 0V, it happens)</p> <p>Check 5V line from SMPS to X-BOARD.</p>		

Symptom	Cause	Countermeasure
 <p>The 2/5 right part of the screen is blank. (Bottom left X-BOARD)</p>	<p>No 12V supply to bottom left X-Board.</p>	<p>Connect 12V line</p>
<div data-bbox="78 1032 277 1089">Check</div> <p>Check Bottom left X-BOARD 12V.(If 0V, it happens)</p> <p>Check 12V line from SMPS to X-BOARD.</p>		

Symptom	Cause	Countermeasure
 <p>ADDRESS bar appears in the right bottom of the screen. (X-BOARD BOTTOM LEFT)</p>	<p>The connecting of X-Board bottom left connector is bad.</p>	<p>Reassemble it.</p>
<div data-bbox="78 953 277 1011">Check</div> <p>Check connecting of the connector of bottom left X-BOARD.</p> <p>Reassemble it.</p>		






Symptom	Cause	Countermeasure
 <p>Screen is divided in top and bottom, and vertical bar appears.</p>	<p>Connector(P13) is OPEN or Connecting condition is bad</p>	<p>Reassemble P13.</p>
<div> <div>Check</div> <p>P13 CONNECTOR contact point inferior CHECK.</p> <p>P13 CONNECTOR SIGNAL CHEK.</p> </div> <div>  </div>		


Symptom	Cause	Countermeasure
 <p>Screen is broken and has the vertical/horizontal bar.</p>	VSC Board Connector is Open.	Reassemble VSC Board Connector

Check

Check the connector connecting
Reassemble the Connector



Symptom	Cause	Countermeasure
<div></div> <p>The screen is bluish(Mosaic screen)</p>	Loose VSC Board Connector	Reassemble VSC BOARD Connector
<div><div>Check</div><p>Check the connection condition of the Connector. Reassemble the Connector.</p><div></div></div>		

Symptom	Cause	Countermeasure
<div data-bbox="93 219 873 762"></div> <p>The mosaic appears in the screen when it connects to VIDEO Input. (The sensibility of Y-signal is low.) When connected to Component Input, it is O.K.</p>	Bad IC203	Replace IC203(VPC3230D)

Check




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

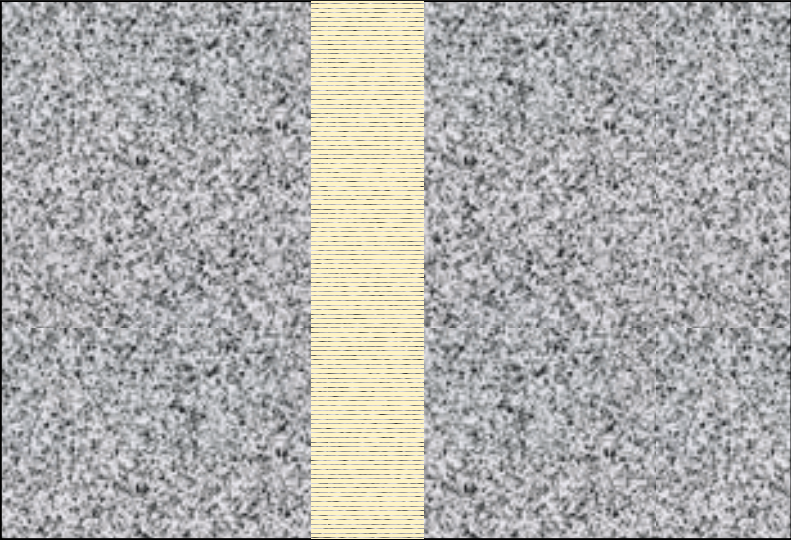
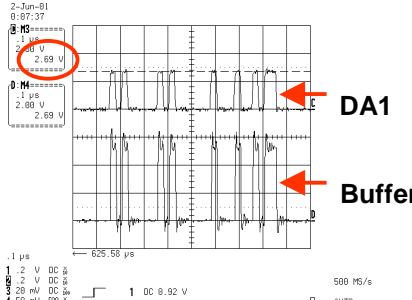
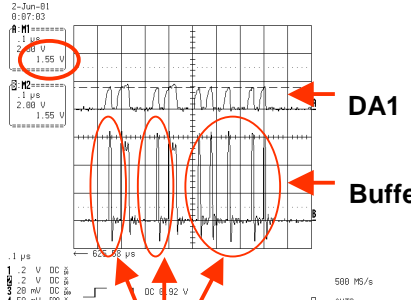
IC201
(VPC3230D)
Decoder IC





IC201(VPC3230D) Decoder is inferior

Symptom		Cause Countermeasure
<div><p>Abnormal</p></div> <div><p>Normal</p></div> <p>Noise with division of colors</p>		<p>Bad Connector connecting Control Board and VSC B/D.</p> <p>Change the Connector</p>
<div><div>Check</div><p>Contact point and signal condition of Connector Control Board and VSC Board.</p></div>		<div><p>Bad Connector</p></div>

Name	No signal Vertical Bar
Symptom	
	
Realization	
<p>When ASIC Chip(IC2 DA1 LGD4001) on Control Board gets high temperature, you can observe it (In normal temperature it's O.K.)</p>	
Cause and Countermeasure	
<p>1.Cause : Bad IC2 (DA1)</p> <ul style="list-style-type: none"> ▶ IC2 DA1(Data Arrange) No.162 Pin output is changing depending on the temperature. ⇒ abnormal X-B'd Buffer IC * Room temperature : 2.5V Output (Normal Pin = over 2.8V) * Heated : 1.5V Output(Normal Pin = 2.7V) <p>⇒ Bad IC2 (DA1)</p> <p>2. Countermeasure : Replace IC2</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="967 682 1389 1071"> <p>< Waveform of normal pin ></p> <p>- heated</p>  </div> <div data-bbox="1424 682 1856 1071"> <p>< Waveform of abnormal pin ></p> <p>- heated</p>  </div> </div> <div style="border: 2px solid red; padding: 10px; margin-top: 10px; text-align: center;"> <p>Buffer(74ACT541) waveform abnormally narrows. → In this case, it is impossible for Flip Flop(74AC574) on X B/D to read data.</p> </div>	

Name Add Open (Green 1 Line)

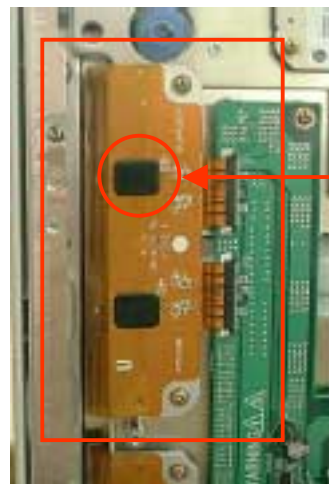
Symptom



Cause and Countermeasure

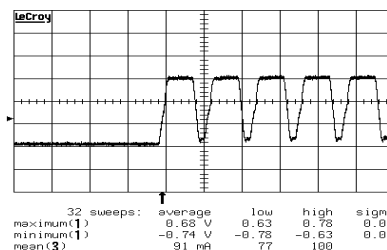
1.cause: Add. COF Drive IC inferior

COF 불량시 부품변경 가능한가?

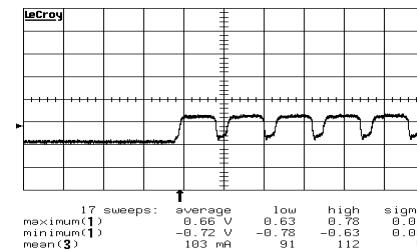


Add. COF Drive IC

Normal Line Data waveform




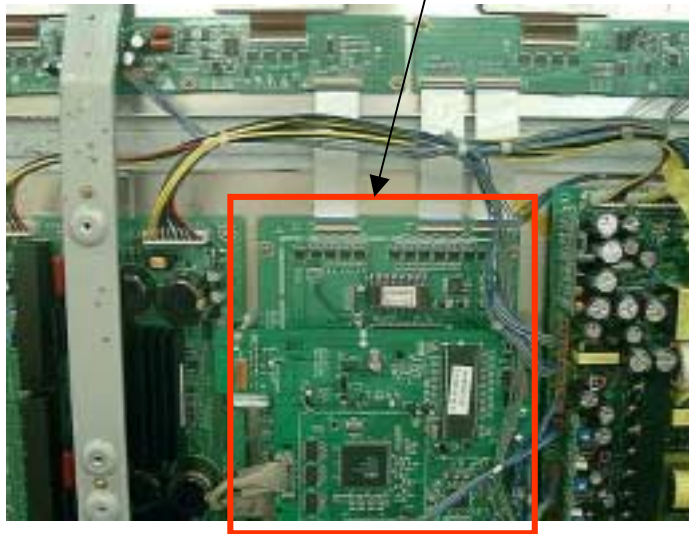
Open Line Data output waveform



► the output of inferior line less than that of the normal Line

Add. COF Drive IC inferior

► COF inspection검사기 : 24V Open check (normal 50V)

Name	Vertical bar when Power off/on(Mis-discharge)	
Symptom		Cause and Countermeasure
		<p>1.Cause : Control board malfunctions when Power off/on.</p> <p>2.Countermeasure: Change some parts on Control board.</p> <p>3.Changing parts : A32_CTRL_03 B/D (Marked on PCB)</p> <ul style="list-style-type: none">-.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		<p>Control board</p> 
<p>1.PDP Power on Mode external input (regardless of wire/wireless signal but it's easy to reenact in wireless signal)</p> <p>2. Remove Power Cord (Power's off)</p> <p>3.after about 20minutes, insert Power cord (automatically the Power's on and the vertical bar is shown as above)</p>		