# HAIER

# COLOR TELEVISION

# SERVICE MANUAL

# PART # TV-8888-35

HAIER AMERICA TRADING, LLC
www.haieramerica.com

# Service Manual

## 46EP14S SERIES

## PDP COLOUR TV

## Main feacture

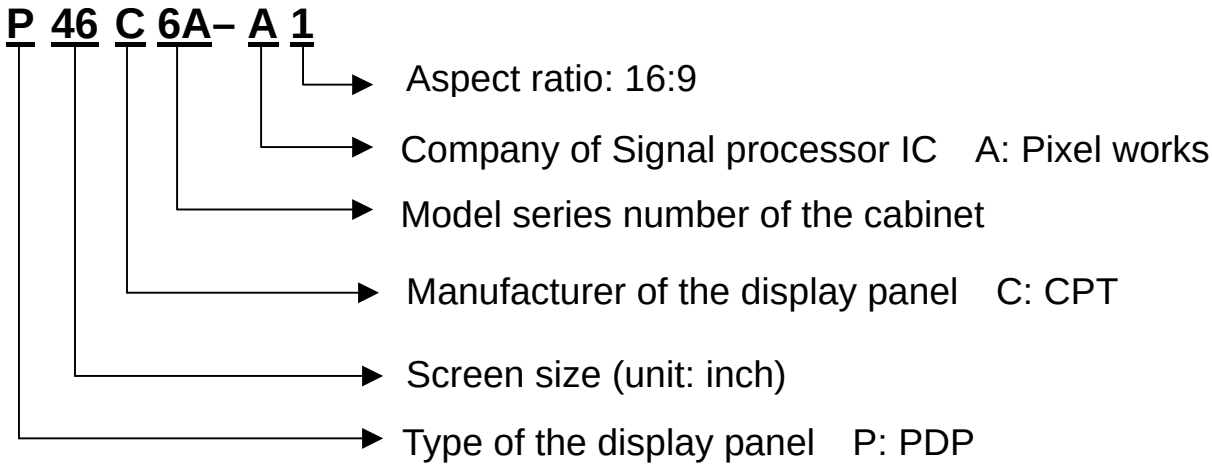
46 inch WXGA PDP Display Panel
DVI&PC Input Terminal (Including XGA&VGA)
PIP (Picture in Picture)
Multiple Signals Inputing
WOW Sound Processing System
Power Supply Managenent Function

# Haier Group

**NO: M-AM-US-P46C6A-A1-PW** **Edition:2004.2.30**

# 1.Contents

## 2.Product code illumination and Series Introduction



## 3.FEATURES

The 46” PDP provides quality image displays and is suitable for a variety of multimedia applications.

a. Available Input signals:
   - The standard PC module provides RGB (D-SUB15 PIN) and digital DVI input connectors, and a RS-232 communication connector (D-SUB 9 PIN MALE).
   - The Video module provides composite video (RCA), S-video (DIN4P) and component video (RCA) input connectors, and a composite video (BNC) output connector. It supports the quality input image of DVD and HDTV (480P/720P/1080i). The video module also provides two sets of stereo audio input connectors (RCA).
   - The product supports PC image resolutions up to XGA (1024 x 768) with a vertical frequency of 85HZ.

b. Power Management Function: The machine provides an automatic power control function.

c. Fan-free Design: The unit does not require any fans for ventilation, eliminating any bothersome noise that may be generated. It also lowers the power consumption of the unit.

d. Others:
   - PIP Function: Allowing user to video TV or video in PC module.
   - The product includes a set of build-in 2W+2W speakers, External 10W+10W speakers are also available.
   - The plasma unit provides high, medium and low color temperature adjustment options.

# 4.Safety measures and Attention

4.1. Observation and measures carefully：

When in repair service, should pay attention to these safety measures and the description
of the service menu.

4.2.Preparation:

The preparation for repair in a defective PDP is necessary, ex：stable working table, repair tools, measuring equipments, replace parts etc.

4.3.Pay attention to electrical shock:

Because the PDP is using the AC power source, and the power board contents high voltage, so to preventing the high voltage shock is necessary. Such as, using an isolated transformer, plastic glove, charged components should be discharged first. The high voltage is supplied to inferior components, so when repair the PDP should pay more attentions.

4.4.Using the specified components:

Some components provide fire-resist and endure high-voltage. So when replace these parts, should use the same characteristic components. So when replace a component should according to the BOM form for a assigned component.

4.5.Stable the components and recovery the wiring:

Some components are using isolated sleeve or adhesive tape to isolate from the electric board. Moreover the interior wiring should be arranged again to prevent the interference from given out heat components and high voltage components .So after repairing, should recover the same layout of the PDP.

4.6.Integrity of the electric circuit :

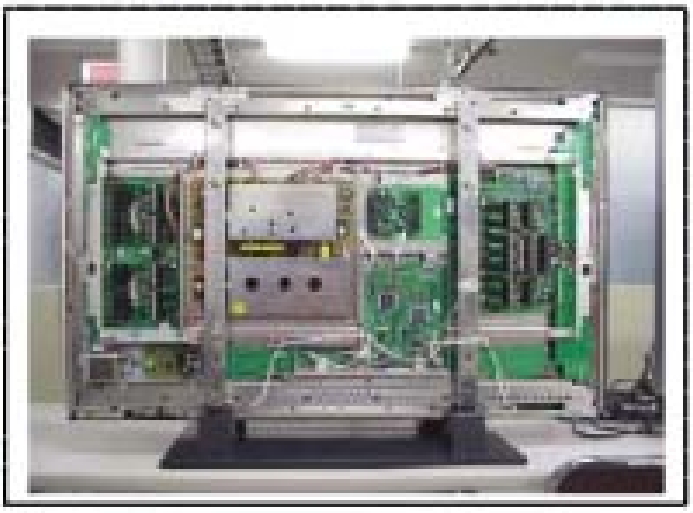
Use the specified components to replace the defective parts. Under any circumstance，do not try to modified the electric circuit .

4.7.Safety check after repairing：

After repairing, should check the screws and the wiring condition. Checking the quality of repairing components. The insulation test of the metal component, power cord to make sure the safety of repairing.

# 5. Photo of PDP taking apart:

## 5.1 Photos of taking apart:



## 5.2 Procedure:

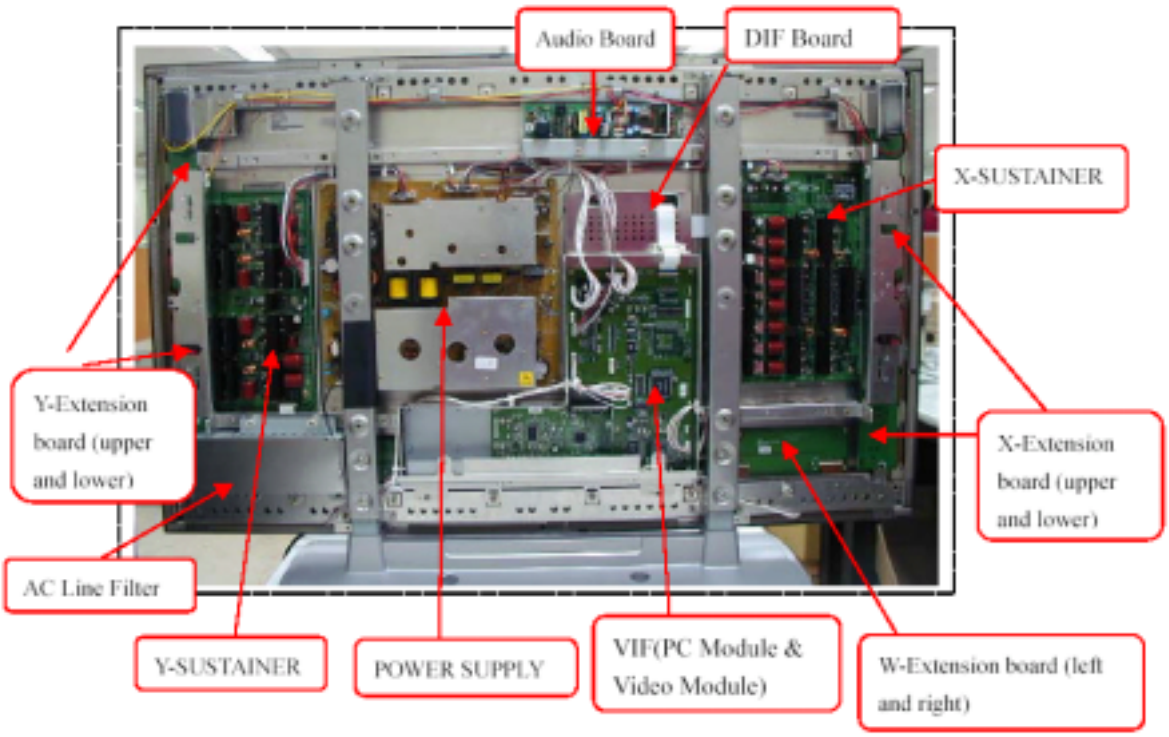
1. First put on the PDP on a stable working table and power off the PDP which is going to repair, then using a screwdriver to unfasten the screws which fasten the back cover.
2. after taking apart as Fig. 2 shown.

## 5.3 Note:

1.Make sure that the power is off before taking apart .
2.After taking apart , put the screws at a safe place to avoid losing
3.Taking apart and installing the back cover , be careful not to pull out the switch of AC power switch .

# 6. Introduction of PDP circuit board:

## 6.1 The introduction of circuit board at Back board:




## 6.2 Explanation：(Function / Characteristic)

a. POWER： (1).Input Voltage (AC 110V-240V、47Hz-63Hz)，Max. range 90V-265V.
(2).Providing electrical power to all the PCB.

b. VIF：Transfer S-video , Video , PC(D-sub& DVI) , HDTV signal to digital signal to the DIF board.

c. DIF：Dealing with the digital signal for output to panel.

d. X-Sustainer / Y-Sustainer：(1).Receiving the signal from DIF.
(2). Output scanning waveform.

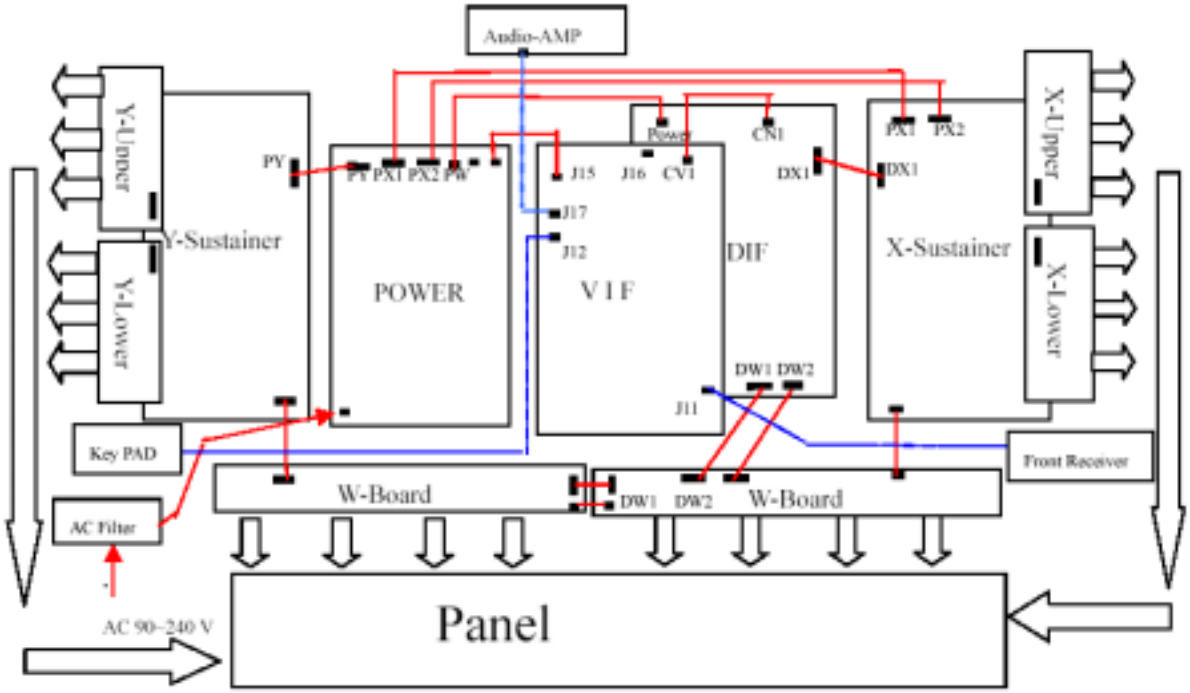
e. X / Y-Extension board: Receive signal from X / Y sustainer , output horizontal scanning waveform to the panel.

f. W-Extension board: Receive signal from DIF , output the vertical scanning waveform , addressing data.

g. Audio Board：Amplifying the audio signal to the internal or external speakers of which select.

h. AC Line Filter：AC power line filter。

### 6.3 The block diagram:




### 6.4 Function:

a. The input voltage AC 90 ~ 240 through line filter to the power board , after main switch is on then power board generate 5 volts to VIF board. The VIF board after receiving 5 volts then from CN connector send signal(5 volts) to power board .Power board generates 5 volts to DIF and VIF .When VIF receives the 5 volts ,then generates 5 volts to power board through CN connector(pin1 ,pin6) , and it means that DIF has received 5 volts already.

b. When power on(key-pad or receiver),the VIF send VCC_ON signal to power to start Vcc and Vf voltage through CN connector(pin2).

c. The VIF sends HV_ON signal to power board to start high voltage Vs , Vxg , Vw through CN connector(pin4).

d. At the same time the signal from VIF to DIF for signal processing , then through X / Y / W board to start the screen.

## 6.5 The definition of connector:

(1) PY POWER TO Y-SUSTAINER

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Name | GND | Vcc | GND | Vf | Vw | GND | GND | NC | Vs |
| Voltage | 0 | 5V | 0 | 15V | 65V | 0 | 0 | --- | 170V |

(2) PX1 POWER TO X-SUSTAINER

| Pin | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| Name | | GND | Vf | Vw | GND | GND | NC | Vs |
| Voltage | | 0 | 15V | 65V | 0 | 0 | --- | 170V |

(3) PX2 POWER TO X-SUSTAINER

| Pin | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Name | Vxg | NC | GND | GND | VAU |
| Voltage | -160V | --- | 0 | 0 | 15V |

(4) J12 PC1 TO KEY PAD

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Name | Power | Right | Left | Up | Down | Menu | Input | GND |

(5) J11 PC1 TO 接收板

| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Name | NC | Red-LED | Green-LED | GND | IR Receiver | 5V |

(6) J17 PC1 TO AUDIO AMP

| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Name | MUTE | L-OUT | GND | R-OUT | GND | SW-SPEAKER |

(7) J16 PC1 TO POWER

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | Std-5V | Low-on | NC | High-on | NC | GND | --- | Power loss | -- | GND |

(8) J15 PC1 TO POWER

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Name | 9V | 9V | GND | GND | Vcc 5V | Vcc 5V | GND | GND | Std-5V |

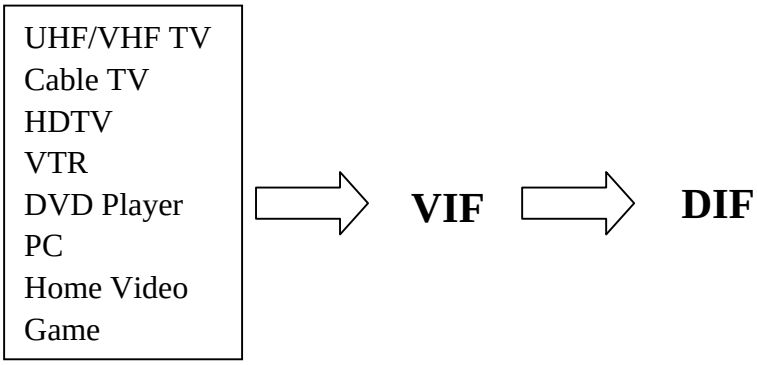
### 6.6 Detail Introduction of PDP circuit boards

## 6.6.1 VIF Board:

**a. Summary:**

General digital video signals include Vsync、Hsync、R(8Bit)、G(8Bit)、B(8Bit) and Data Enable (Blank);the VIF of PDP is making for processing these digital signal.
Because PDP belonging a high end product , so its application should include the functions of Monitor (analog VGA , digital DVI signal input). And for consumer's sake , the VIF should have the functions of video , like audio , composite , s-video , component signal processing.
Below is the explanation of VIF system:

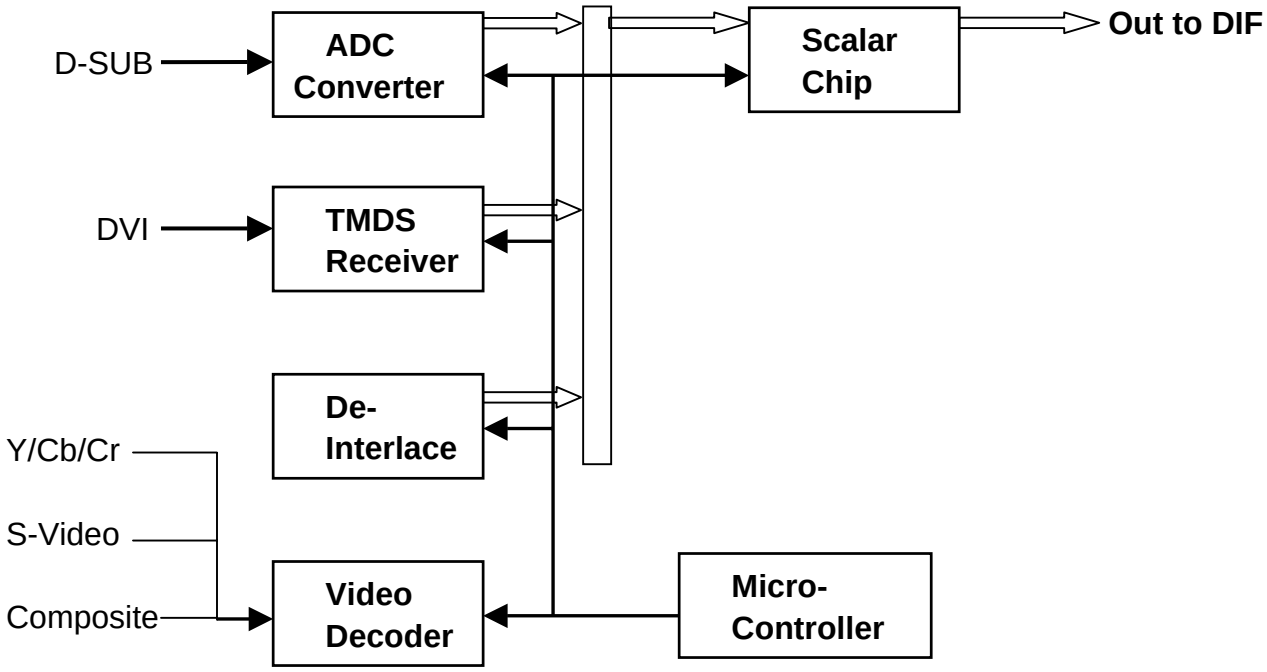
## b. The role of VIF：




Currently the video signal sources are video cassette recorder , DVD player , CATV , RF tuner , VGA card(PC). In order that all the video signal sources can be displayed on PDP , so we need a interface to transfer these signals to a specified signals for PDP to display , and this is the function of VIF(Video Interface).

## c. Basic framework of VIF board

For dealing with the signals of CVBS, S-video and Component, it requires a video decoder IC. And the output of video decoder will input to a de-interlace chip IC for a stable image quality. Because the TV system uses interlace scanning, it causes flickers on the screen . To improve this situation so we use a de-interlace chip IC. The ADC(Analog to Digital Converter) IC converts the analog RGB signal to digital RGB signal. The TMDS(Transition Minimized Differential Signaling) decoder IC transmits digital RGB signal. All the output of ICs' signal send to scalar IC. The relationship is shown as below, and make a brief explanation of the system.




c-1. ADC Converter*:AD9888*

The AD9888 is a complete 8 bit , 205 MSPS monolithic analog interface optimized for capturing RGB graphics signals. Its 205 MSPS encode rate capability and full-power analog bandwidth of 500 MHz supports resolutions up to UXGA(1600 x1200 @ 75 Hz).

c-2 TMDS Receiver: *SIL153BCT100*

The Sil153BCT100 receiver uses Panel Link Digital technology to support high resolution displays up to SXGA (25MHz~112MHz). The Sil153B receiver supports up to true color panels (24 bit/pixel, 16.7M colors) in 1 or 2 pixels/clock mode. In addition, the receiver data output is time staggered to reduce ground bounce that affects EMI.

c-3 VIDEO Decoder:*SAA7118E*

The SAA7118E decoder is a ADC too, but it can deal with the ordinary TV signals. The SAA7118E can input Composite (fig.A)、S-video (fig.B)、Component (fig.C) and its outputs are digital Y(Luminance) , C (Chromacity) signals. And also can adjust brightness, contrast, saturation, hue.

c-4 De-interlace:*SIL504CM208*

The Sil504 transfer interlacing signals to progressive signals. The advantage of progressive signals is that the scanning rate doubling to let the screen more stable and non-flickering. Besides, the sources of input may have 24 0r 30 or 25 frames per sec, so the de-interlaced chip shall tell from the differences and processing the signals. The basic principle of de-interlaced IC is combined the odd and even fields to a frame, and the processing needs a memory IC(SDRAM) to stock these signals for processing . For the improving the quality of image sake, more and more TVs or DVD players all have the functions of progressive scanning.

c-5 Image Processor chip:*PW171-20U(system on chip)*

◎ Scaling function :

The Image scalars provide high quality up and down image scaling. For the applications of VIF, the input signals could be VGA, SVGA, XGA formats, and its output fixed at 852 x 480 @60 HZ. For example , SVGA format:800 x 600 @75Hz , first scaling down : Horizontal 800 640、Vertical 600 480 , 75 frames / sec after frame rate conversion become 60 frames per sec. Then scaling up 640 852 , to accomplish the scaling function.

◎ Micro Processor Function :

This chip includes microprocessor (on-chip 80x86); selectable function and I/O interface control. With 3 groups of 8-bit programmable I/O, 1 group of RS-232 communication port, IR decoder, timer and a PWM generator

◎ OSD Function:

The on-screen-display (OSD) can be used for startup screens, menus , and scribble functions.

d. VIF (Video interface) :

d-1. When main switch is ON , the power board generates Vsby 5 volts to VIF board. The IC of microprocessor become standby status waiting for a startup signal from key-pad or receiver.

d-2 When a startup signal is detected then microprocessor sending a ON signal to the power board through CN connector , and the power board begins generating all voltage to PCB board(Vs, Vxg, Vw, Vf, Vdd, Vcc, 9volts) . At the same time VIF will generate background light and OSD menu as select. After searching a input source , then will display on the PDP screen , if there are audio signals , it will amplify and send to speakers through audio board.

d-3 If there are abnormal signals are detected(such as over voltage , over current , low voltage ..) , the power board will send abnormal detective signal to shut down all the system

## 6.6.2 DIF Board:

Function:

The video or pc signal is processed and send to DIF form VIF.There are gamma correction,basic white balance data,power loss control,and data translation function. When DIF board work normally the LED on the board should light.when you turn on the main power switch this LED should light a few seconds to inspect itself and then disappear.

### 6.6.3 X/Y Sustainer Board:

**Function:** Receive the signal from DIF.And output high voltage scan signal to panel.

### 6.6.4 Audio Amplifier Board:

**Function:**It comprises special swith mode power supply and audio amplifier and electronic swith for outer and inner speakers exchange.

It connects to 300V from main power supply on the module from socket CN5601.

M5502 connects to inner speakers by cable.

M5503 connects to outer speakers socket boards by cable.

M5501 connects to VIF and receives the R,L audio signal,MUTE,SWITCH control signal.

The inner output power is up to 4w.And the outer ouput power is up to 20w together on 4ohm impedance.

# 7.Abnormal Phenomena:

7.1 VIF board:

a. colour absence or colour step not good.
b. No sound from the speakers,but there was noise output.
c. Power supply is normal,there were OSD and backgroud light on the panel,but not picture.
d. Can not turn on the set(LEDs do not work ).
e. There are some strip disturbance in the picture.
f. Turn off automatically after the set works a few minutes.
g. Picture wobbles when input 1080i signal.

7.2 DIF board

a. picture abnormal.
b. Can not turn on the set(LEDs do not work ).

7.3 Power Supply:

a. no picture output.
b. Output voltage abnormal

7.4 X scan sustainer:

h. no picture.
i. Colour of the picture is not enough.
j. Picture abnormal such as picture flicker
k. Can not turn on the set(LEDs do not work )

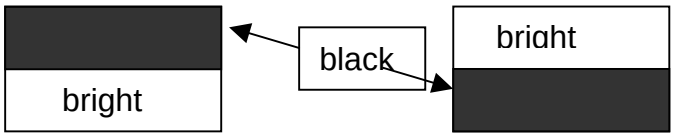
7.5.Y Bulk Sustainer:

a. Can not turn on the set. If disconnect the cable from power supply to Y sustainer the set works,but the picture is dark. It means that Y sustainer is abnormal.
b. Power output voltage is normal,but the picture is dark.
c. When the set works normally,the temperature of the compoenents on the sustainer boards is about 55.If the temperature is over 55 ℃ there may be some fault on there.

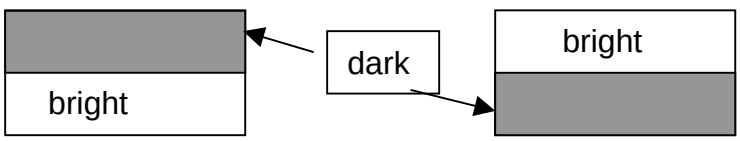
7.6 Audio Amplifier Board:

a. there is no sound or noise in the speakers.
b. Too much noise in the speakers.
c. Can not switch inner and outer speakers.

7.7 X Connecting Board(upper and lower parts)




7.8 Y Connecting Board(upper and lower parts)



## 8. Short Repair Show:

8.1 No picture and Red LED does not light, please make sure the main power swith on and to check the fuses on the power supply board and power filtering board.

8.2 Turn on the main power switch, the green LED lights. But there was no picture. Please check VIF or DIF or X sustainer or Y sustainer. You may exchange them one by one with good boards.

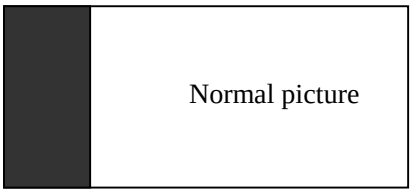
Replace VIF , then turn on the switch, remote the set. If there are OSD,there is some fault in the VIF.

8.3 If the picture is vague, please replace the Y-sustainer board.

8.4 The picture is separated into upper & lower parts, one part has picture, the other has no, and the picture is from left to right, please check the X connecter board and the X-sustainer board.

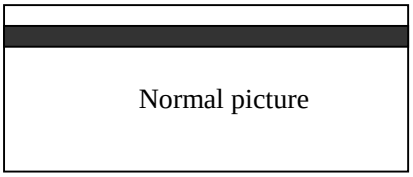
8.5 If the picture is vague or the picture of the upper or the lower part is dark, please check the Y connecter board and the Y-sustainer board.

8.6 Please check whether the corresponding W board and the connect cords are in good condition, otherwise , the module is iffy.



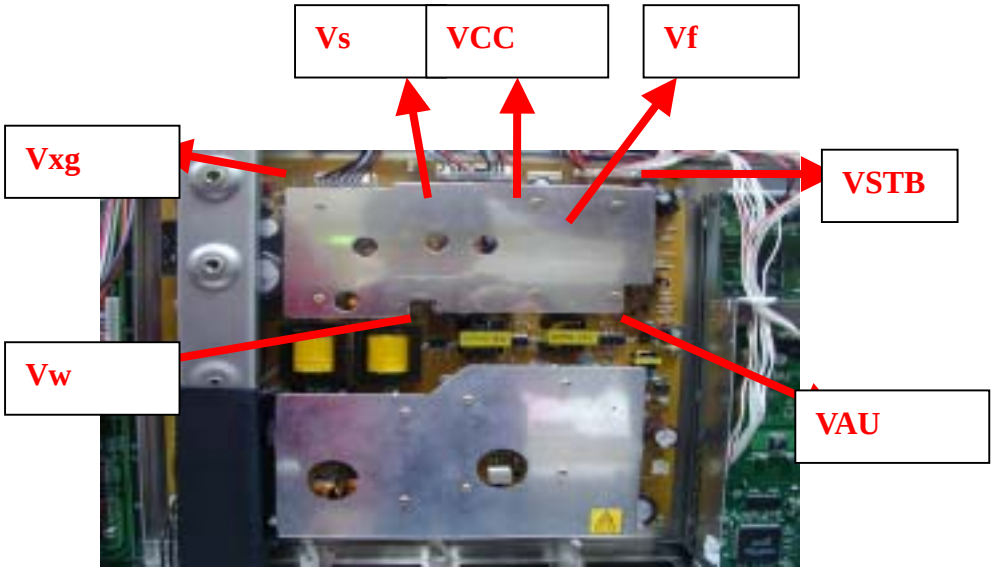

Dark vertical bar or strap

8.7 Please check whether the left (sight from the rear) Y connector board and the connect cords are in good condition, otherwise , the module is iffy.




Dark horizontal bar or

8.8 If the chroma of the white signal isn't uniform, please adjust the Vs 、VXG voltage according to the voltage data of the PDP module.




8.9 If many details of the picture are short of, or the pixels of the picture are not discontiguous, the Pixel works IC doesn't weld well, please replace the PC1 board.

8.10 Trouble of the DIF and the W connect cords or the connect jack.

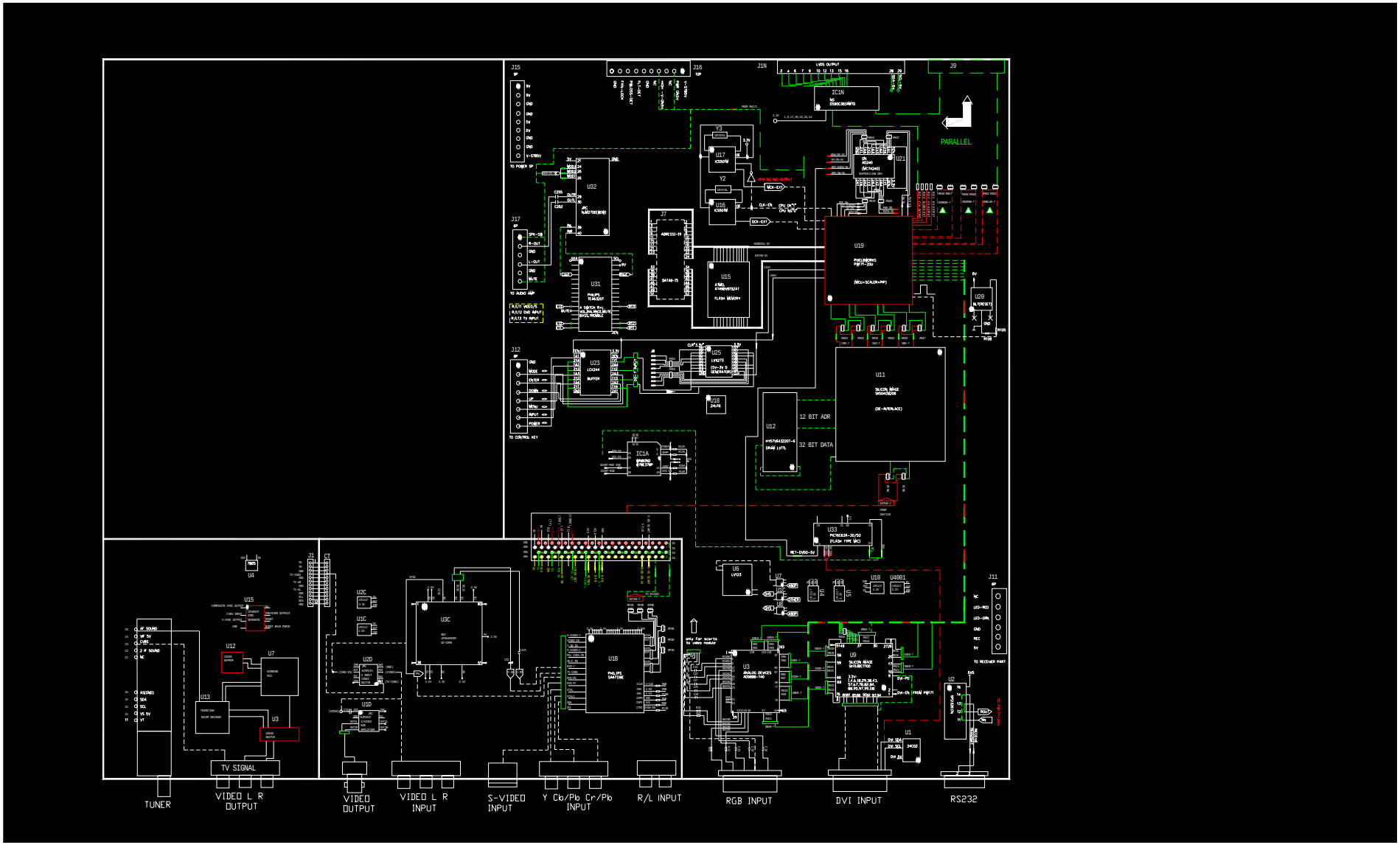
8.11 There are many dark 、flicking、bright dot defect or a single or multi pieces of line always appear in the screen, please replace the PDP module.

## 8.12 Inspection:

PDP SET inspection items after finishing repair :

| Item | Classified | Inspection item | Method | Remark |
|---|---|---|---|---|
| 1 | Appearance | Back cover screw shortage | Eye view | |
| 2 | Appearance | Screen Filter scratch | Eye view | |
| 3 | Appearance | Terminal loosing | Eye view | |
| 4 | Reliability | voltage / frequency variation | POWER SUPPLY | Optional |
| 5 | Reliability | Hi-pot test | Hi-pot tester | Optional |
| 6 | Reliability | AC-INLET hi-pot test | Hi-pot tester | Optional |
| 7 | Screen | Position /Width | Eye view | |
| 8 | Screen | H/V resolution / saturation | Eye view | |
| 9 | Screen | H/V stability | Eye view | |
| 10 | Screen | Hue / Color | Eye view | |
| 11 | OSD | AUDIO-Mute/ Balance | Eye view/remote | |
| 12 | OSD | INPUT-PC1 / HDTV / AV1 / AV2 | Eye view/remote | |
| 13 | OSD | VIDEO-Color Temp / Gamma | Eye view/remote | |
| 14 | OSD | VIDEO-Brightness / Contrast | Eye view/remote | |
| 15 | OSD | FUNCTION-Information / Default | Eye view/remote | |
| 16 | OSD | DISPLAY-Aspect Ratio / Zoom | Eye view/remote | |
| 17 | Signal/terminal | Factory default / key-pad function | Eye view | |
| 18 | Signal/terminal | PC TIMING/ TUNNER | Eye view | |
| 19 | Signal/terminal | D-sub / DVI | Eye view | |
| 20 | Signal/terminal | AV / S-video | Eye view | |
| 21 | Signal/terminal | VIDEO / Component / PC AUDIO | Eye view | |
| 22 | Signal/terminal | D-SUB/ DVI-I / RS-232 | Eye view | |
| 23 | characteristic | White balance(△x) / (△y) / (△Y) / contrast | CA-100 | |
| 24 | characteristic | Power consumption | Power meter | Optional |

## 9. Principle Flow-chart:



## 11. Repair Record:

### 11.1 Record sheet: For reference

| Item | Repair date | Defective description | Repair condition | Replace parts | Finished date | Signature |
|---|---|---|---|---|---|---|
| 1 | | | | | | |
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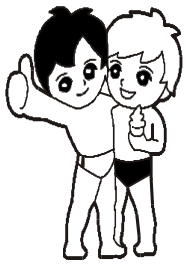
# Sincere Forever



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