Panasonic Services Company
National Training

TH-42PX20U/TH-50PX20U
TH-42PA20U/TH-37PA20U
Plasma Display Panel

GP6D Chassis
Update Information

⚠Warning

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Table of contents

Objective

The information provided in this document is designed to assist the technician in determining the defective printed circuit board. The troubleshooting flow charts, signal path charts and connector information should provide enough detail to the technician for the accurate repair of the product. Alignment and adjustment procedures are also included in this document.
The Block diagrams and the schematic drawings reference the model TH-42PHD5, TH-42PX20U and TH-42PA20U but the technology is consistent with any GPH5D and GP6D series Plasma display panels.

Model Line Up

TH-50PX20U
50-inch (127 cm) HD Version
2 Component Video Inputs
3 Composite Video Inputs
3 S-Video Inputs
1 HDMI input
Scalable PIP (1/4 to 1/16)
PC / SD Card Inputs
Integrated Speaker System
BBE sound
1080i / 480p capable
720p (PC input only)

TH-42PX20U
42-inch (106cm) HD Version
2 Component Video Inputs
3 Composite Video Inputs
3 S-Video Inputs
1 HDMI input
Scalable PIP (1/4 to 1/16)
PC / SD Card Inputs
Integrated Speaker System
BBE sound
1080i / 480p capable
720p (PC input only)

TH-42PA20U
42-inch (106 cm) SD Version
2 Component Video Inputs
3 Composite Video Inputs
3 S-Video Inputs
1 DVI input
Scalable PIP (1/4 to 1/16)
Integrated Speaker System
BBE sound
1080i / 480p capable

TH-37PA20U
37-inch (94cm) SD Version
2 Component Video Inputs
3 Composite Video Inputs
3 S-Video Inputs
1 DVI input
Scalable PIP (1/4 to 1/16)
Integrated Speaker System
BBE sound
1080i / 480p capable

Performance Comparison

SD Models

Chassis		GP5D		GP6DU
Panel Size		42	37	42
Pixels (H x V)		852 x 480p	852 x 480p	852 x 480p
Brightness (Set)	Peak (cd/m2)	370	370	370
Contrast	Dark	3000:1		**4000:1**
	150 lux	140:1	120:1	**160:1**
Gradation		1024 shades		**1536 shades**
Sharpness		Good		**Vivid**
Color Temp.		11000		11000
Power Consumption Maximum Standby Normal Standby Save On Power Off		 295W 2.8W 1.5W	 225W 2.8W 1.5W	 265W 1.5W 0.6W 0.4W

HD Models

Chassis		GPH5D		GPH6D	
Panel Size		50	42	50	42
Pixels (H x V)		1366 x 768p	1024 x 768p	1366 x 768p	1024 x 768p
Brightness (Set)	Peak (cd/m2)	260	250	**300**	**360**
Contrast	Dark	3000:1		**4000:1**	
	150 lux	90:1		**160:1**	
Gradation		1024 shades		**1536 shades**	
Sharpness		Good		**Vivid**	
Color Temp.		11000		11000	
Power Consumption Maximum Standby Normal Standby Save On Power Off		 495W 3.0W 1.7W	 225W 3.0W 1.7W	 445W 1.5W 0.6W 0.4W	 265W 1.5W 0.6W 0.4W

Specifications

SD Models

Model Number		TH-42PA20U/P
Chassis		GP6DU
Panel	Screen Size	SD type 42” 16 x 9 (920 x 518 mm)
	Number of Pixels	H 852 x 480 (VGA)
	Number of Dots	H 2556 x V 480
	Pixel Size	W 1.08 x H 1.08 mm
	Drive Method	AC Type Sub Field Drive System, Variable sub Field
Power Source		AC 120V 50 /60 Hz
Power Consumption		425W Standby (0.8W)
Applicable Signals		NTSC 525i (480i), 525p (480p), 625i (575i), 625p (575p), 750p (720p), 1125 (1080)/60i, 50i, 24p, 24sf VGA, SVGA, XGA, SXGA, UXGA
Contrast		4000:1
Dimensions (W x H x D)		1170 x 658 x 99 mm
Weight		77.2 lb (35.0 kg)

HD Models

Model Number		TH-42PX20U/P
Chassis		GPH6D
Panel	Screen Size	HD type 42” 16 x 9 (920 x 518 mm)
	Number of Pixels	H 1024 x 768 (VGA)
	Number of Dots	H 3072 x V 768
	Pixel Size	W 0.90 x H 0.645 mm
	Drive Method	AC Type Sub Field Drive System, Variable sub Field
Power Source		AC 120V 50 /60 Hz
Power Consumption		295W Standby (P. Save on) 1.8W, (P. Save Off) 0.8W Power Off 0.6W
Applicable Signals		NTSC 525i (480i), 525p (480p), 625i (575i), 625p (575p), 750p (720p), 1125 (1080)/60i, 50i, 24p, 24sf, 1250 (1080)/50i VGA, SVGA, XGA, SXGA, UXGA
Contrast		3000:1
Dimensions (W x H x D)		1020 x 610 x 89 mm
Weight		90.4 lb (41Kg)

New Features and Circuit Improvements

- Integrated NTSC Tuner
- 3/2 Pulldown circuit
- Plasma Contrast Auto Tracking System (C.A.T.S.)
- Picture-in-Picture

SD models

- **New Deep Black Front Glass Filter:** Improves Contrast Ratio in Lighting Environment by 15%
- **Super Real Gamma System:** Reproduces 1,536 shades of gradation (60Hz)
- **10-bit Digital Processing:** Reproduces 1,070-Million Colors
- **DVI Input**

HD models

- **New 5 Facet Asymmetrical Cell Structure Panel:** Improves Brightness Level by 45%

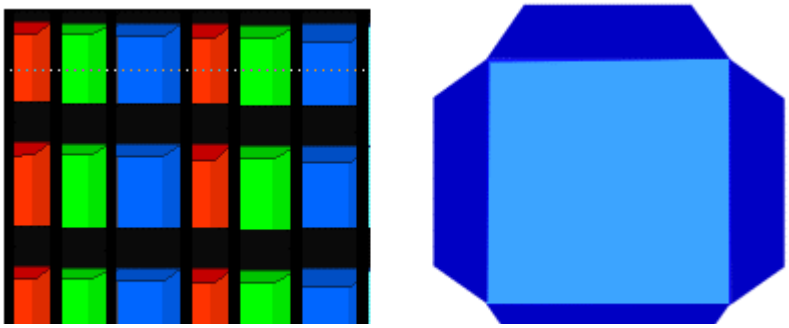


Figure 1

- **New Real Black Drive System:** Achieves greater than 4000:1 Contrast Ratio in Dark Environments
- **New Deep Black Front Glass Filter:** Improves Contrast Ratio in Lighting Environment by 80%
- **Super Real Gamma System:** Reproduces 1,536 shades of gradation
- **10-bit Digital Processing:** Reproduces 1,070 Million Colors
- **SD / PC Card Reader-** View images on screen from a digital camera
- **HDMI Input** with Analog Audio inputs

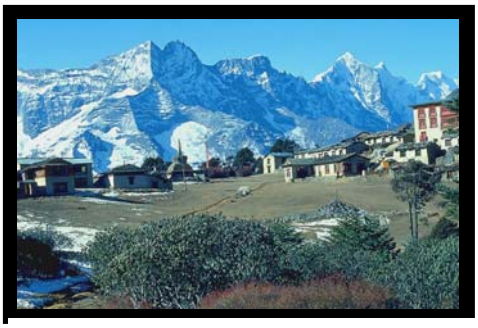
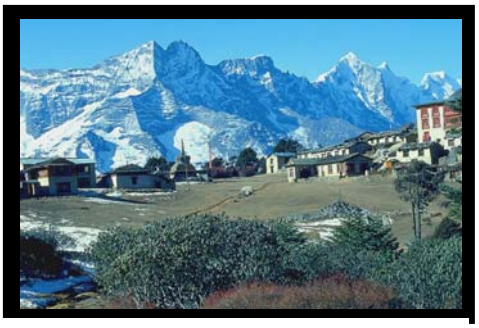
Single Scan (SD)	Dual Scan (HD)
	

Figure 2

•Simple and low cost circuit	•High performance •Higher brightness

42” SD PCB Board Layout Diagram

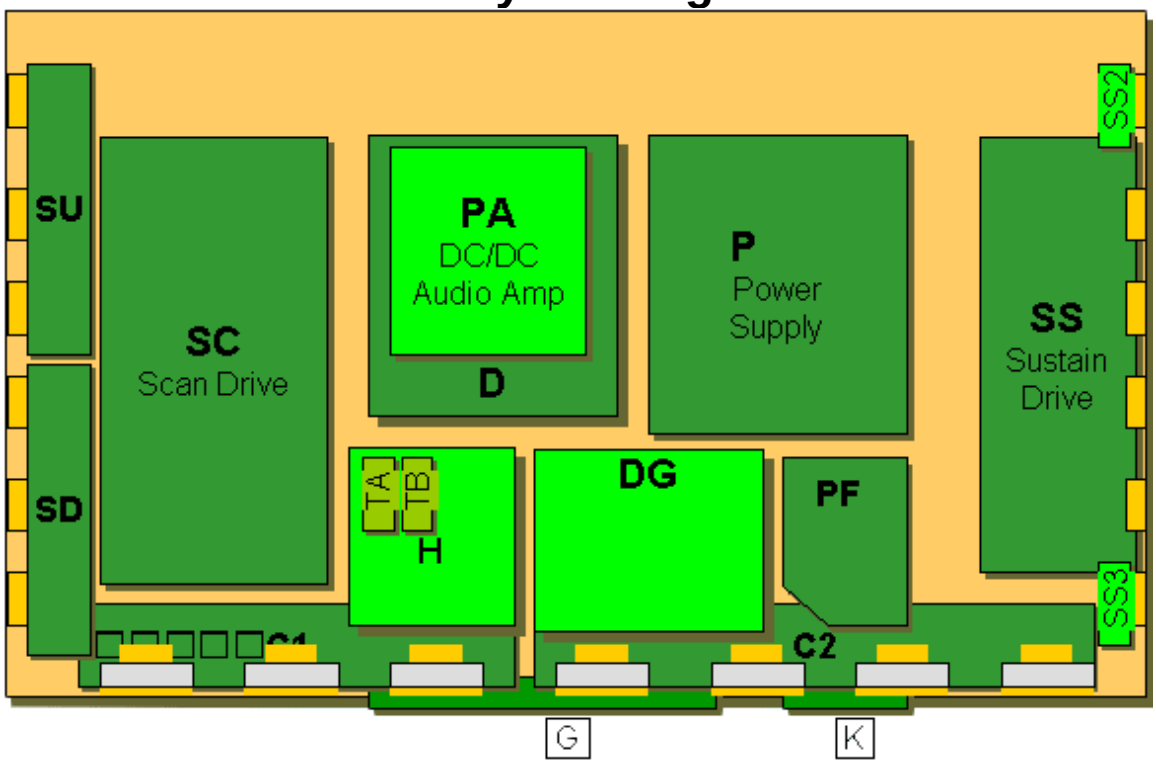


Figure 2

Printed Circuit Board Information Table

Board Name	Function
PF	Fuse and Line Filter Circuit
P	Power Supply Circuit
PA	DC/DC converter and Audio Amplifier Circuit
K	Remote, Light Receiver and Power LED Circuits
G	Front Switch, PC and Video Input Circuits
D	RGB Digital Processor, Format converter, Plasma AI, Discharge Control Circuits, Sub-Field Processor
SC	Scan Signal Drive Circuit
SU/SD	Scan Signal Output Driver (Upper and Down side)
SS	Sustain Signal Output Driver
SS2, SS3	Sustain Output Signal Extension Boards
C1	Data Pulse Connector for Right
C2	Data Pulse Connector for Left
TA	Tuner (main)
TB	Tuner (sub)
H	A/V Switching and Video Input Circuits
DG	Digital Core, MPU, RGB amp, and DVI Input Circuits

Board Comparison Chart

GP5 Chassis	GP6 Chassis	Board Function
C1	C1	Data Drive
C2	C2	Data Drive
D2	D	RGB Digital Processor, Format converter, Plasma AI, Discharge Control Circuits, Sub-Field Processor
D1	DG	Digital Core, MPU, RGB amp, and DVI Input Circuits
V1	G	Front Switch, PC and Video Input Circuits
HX and HZ Boards	H	A/V Switching and Video Input Circuits
P	P	Power Supply Circuit
Z	PA	DC/DC and Audio Circuits
F	PF	Fuse and Line Filter Circuit
SC	SC	Scan Signal Drive Circuit
SD	SD	Scan Signal Output Driver (Lower Section)
SS	SS	Sustain Signal Output Driver
SS2	SS2	Sustain Output Signal Upper Boards
SS3	SS3	Sustain Output Signal Lower Boards
SU	SU	Scan Signal Output Driver (Upper Section)
N/A	TA	Tuner (Main)
N/A	TB	Tuner (Sub)

Video Signal Block Diagram

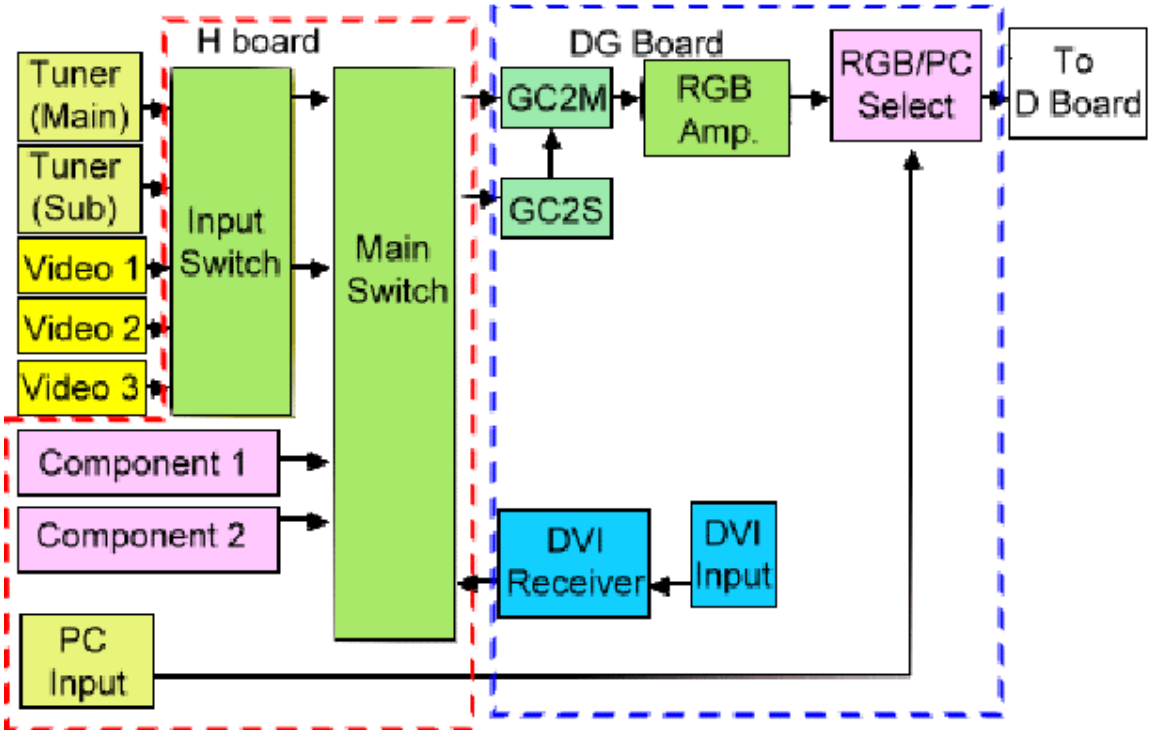


Figure 3

GP6 series plasma panels incorporate two NTSC tuners. The main tuner is used for primary picture operation. It provides a composite video and a multiplex audio output. The sub-tuner provides only a video output used for multi picture functions. The video outputs of the tuners are connected to the input switch IC on the H Board. The unit also contains three video inputs that are also connected to the input switch IC. The input switch IC selects one of the 5 video inputs for main picture operation and another for sub-picture operation. Selection is controlled by the MPU via the I^2C Bus (SDA & SCL). These two outputs are then connected to the main switch IC.

The panel also contains three component inputs and a DVI or HDMI input (depending upon the model) that are connected to the main switch. The DVI or HDMI input connector, connected to the DG Board, outputs the digital signal to the DVI or HDMI receiver where it undergoes serial to parallel conversion. The output of the receiver is then converted to a Y, Pb, and Pr component signals before being applied to the Main switch. The MPU selects one of the 8 inputs for main picture operation and another for sub-picture operation.

On the DG- Board, the global core IC (GC2M) converts the composite video signal of the main picture to RGB video signals. The GC2S IC processes the sub-picture information and combines it with the main picture. It performs

interlace to progressive scan conversion. The Global core IC also converts the horizontal frequency of all NTSC inputs to 31.468KHz. The output of the GC2M IC is RGB; it is applied to an external RGB amplifier.
IC001 is the TV Main CPU. It generates the On Screen Display (OSD) RGB signals, which also enters the RGB amplifier stage. A switching circuit combines the two sets of RGB signals for display on the screen. All NTSC, Component, and RGB picture adjustments such as picture, tint, color, brightness, etc. are performed inside this IC.

The RGB/PC select circuit switches between PC and all other inputs. The output of the switch is routed to the D Board.

Video Signal Path Explanation

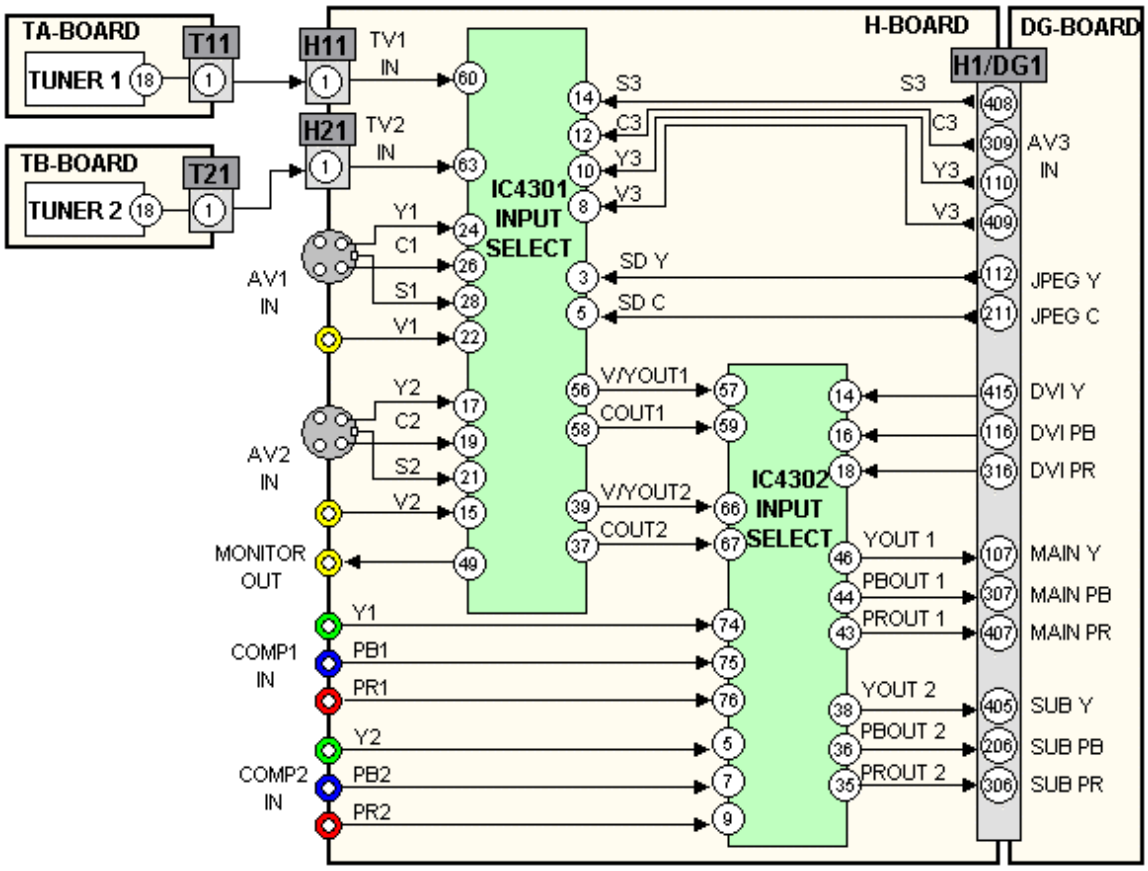


Figure 4

NTSC \ 480i Video Signal Path

The TH-42PA20U/P incorporates two NTSC tuners, allowing the simultaneous viewing of two signals. It is also equipped with three NTSC Video inputs and three NTSC S-Video inputs. Tuner-1 produces audio and video signals. Tuner-2 produces video only, as it is the video source intended for use in the “Picture in Picture” mode. Video signals produced by the main tuner (tuner-1) and sub tuner (tuner-2) are applied to the H-Board via pin 1 of the connector T11/H11 and pin 1 of the connector T21/H21. The signal applied to the AV3 video input, located at the bottom of the front panel, enters the G-Board and passes through to the DG-Board without alteration. It is then applied to the H Board.

IC4301 on the H-Board selects the main video source and sub video source from the NTSC inputs. The main Video or Luminance and chrominance signals are output via pins 56 and 58. The sub video signal is output via pins 39 and 37. Both

Main and Sub Video signals are amplified and applied to another video switching IC, IC4302.

The component video signals Y, Pb, and Pr are also input to IC4302 via the connectors located at the rear of the cabinet.
The DVI input connector, attached to the DG Board, supplies the DVI signal to the DVI receiver where it undergoes serial to parallel conversion. The output of the DVI receiver is converted to a Y, Pb, and Pr component signal and then applied to pins 14, 16, and 18 of IC4302 via pins 415, 116, and 316 of connector H1/DG1. IC4302 selects between NTSC, Component, and DVI video input signals. The selected signals can be in any of the three formats; Video, Y/C, or Y, Pb, Pr. The main signal is output via pins 43, 44, and 46 of IC4302. The signals are amplified and output to the DG-Board via pins 107, 307, and 407 of the connector H1/DG1. The Sub NTSC video signals are also amplified and output to the DG-Board via pins 405, 206, and 406 of the same connector.

DVI Input

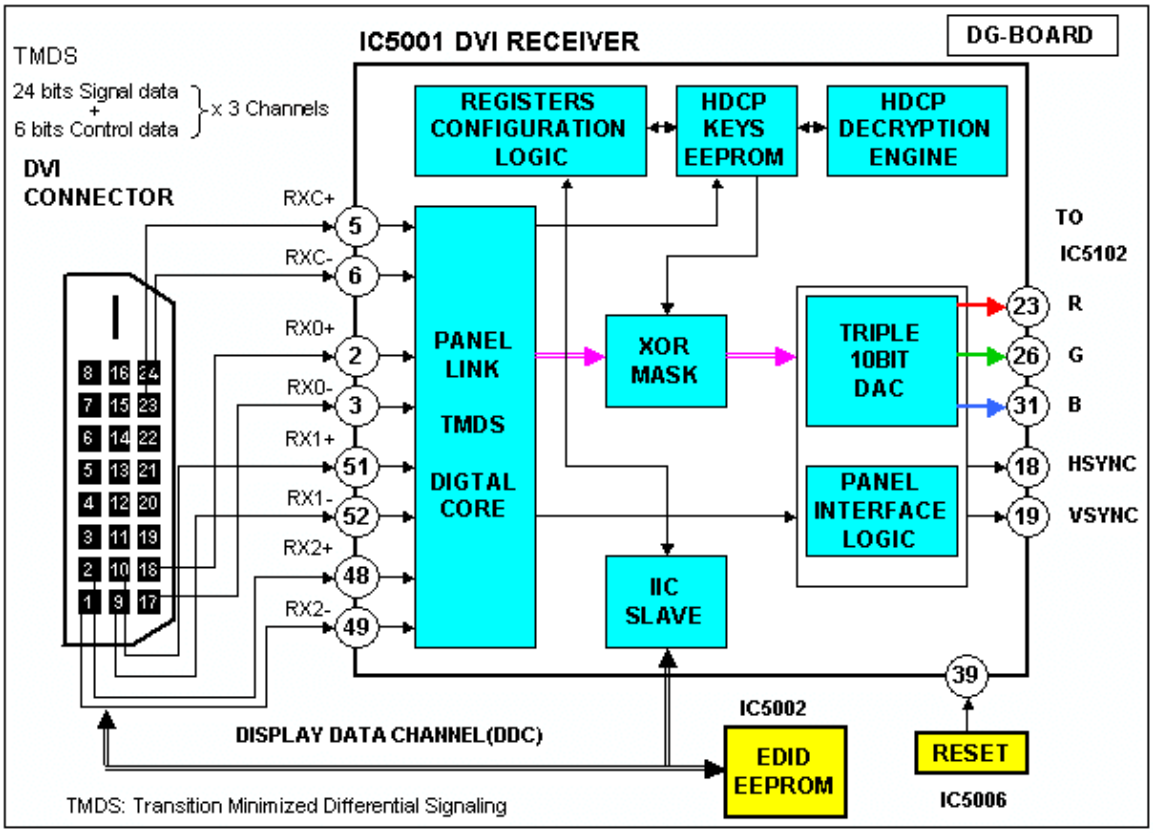


Figure 5

The DVI (Digital Visual Interface) input is a port designed to receive digital video from a set-top box, a DVD player, or other digital devices. IC5001 converts the digital video to parallel analog RGB video. The HDCP (High-bandwidth digital content protection) circuit monitors the DVI signal for copyright protection. The output of IC5001 is then applied to IC5102. The EDID EEPROM allows for external control of the picture from the DVI source.

DVI RGB to YUV Conversion

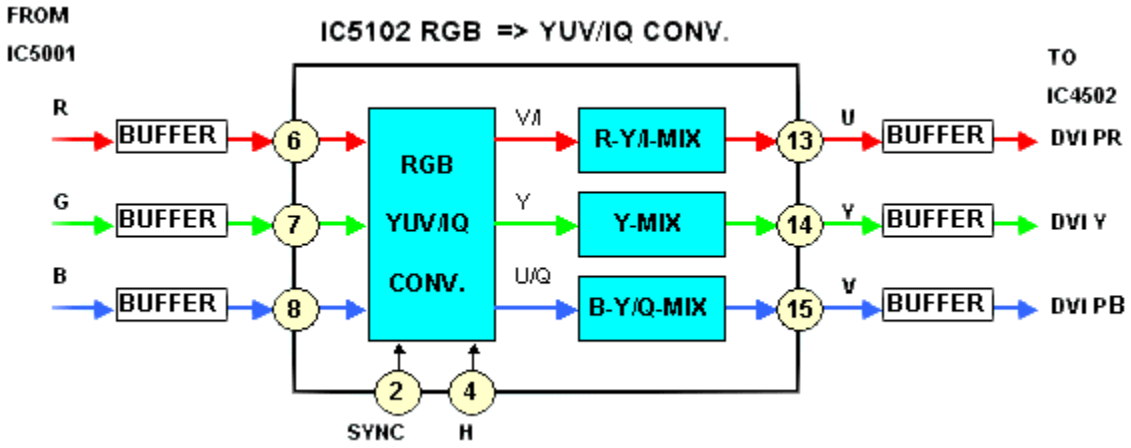


Figure 6

IC5102 is an RGB to YUV (Y, Pb, PR) converter. It uses the vertical and horizontal sync pulses of the DVI receiver to convert the analog RGB signal to Y, Pb, Pr component signal. The signal is now in the form of an ATSC signal format that can be processed like any other component signal. The output is sent to the Main switch IC4302 for selection.

Digital Processor

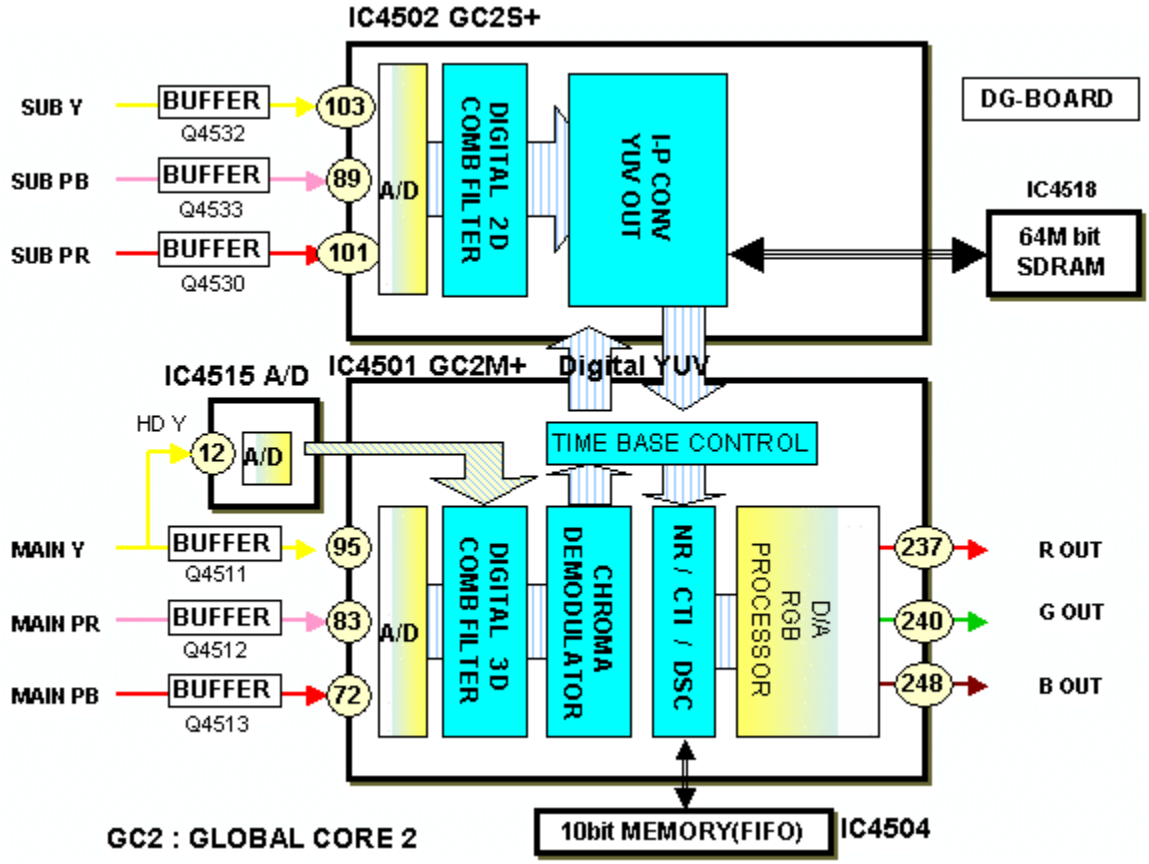


Figure 7

Main Picture

On the DG- Board, the main Y, Pb, Pr signals are converted to digital data by an analog to digital (A/D) converter circuit located inside the Global Core IC, IC4501. The comb filter in IC4501 converts the composite video signal of the main picture to Y and C separated video signals. S-Video, which is already Y/C separated, simply passes through the comb filter. The data is then applied to the Chroma demodulator circuit that separates the color signal into Pb and Pr data. If the incoming video is in the 480p and 1080i format, the main Y signal is converted to digital by IC4515 before being applied to IC4501. The A/D converter inside IC4501 converts the color signals to digital. The data of the color signals bypass the comb filter and Chroma demodulator circuits to join up with the luminance data.

IC4501 outputs the data to the global core IC, IC4502. IC4502 contains a line-doubling circuit that halves the horizontal line period, doubling the horizontal frequency to 31.468KHz. Using IC4518 as a temporary storage area, IC4502

then converts the digital signal scan format from interlaced to progressive before sending it back to IC4501. The NR/CTI/DSC circuit reduces noise and improves the picture quality. The 10 bit signals are then converted to analog R, G, and B component signals by IC4501, and applied to the RGB amplifier IC4512.

Sub Picture

On the DG- Board, an analog to digital (A/D) converter circuit, located inside the Sub Global Core IC4502, converts the sub Y, Pb, Pr signals to digital.
The data is then applied to a comb filter where luminance and chrominance are separated.

IC4502 processes the Sub video data for use in the PIP mode. In this mode, the main and sub video components are combined into one set of Y, Pb, and Pr component signals.

The line-doubler, located inside the IC, halves the horizontal line period, doubling the horizontal frequency to 31.468KHz. Using IC4518 as a temporary storage area, IC4502 then converts the digital signal scan format from interlaced to progressive before sending it back to IC4501. The NR/CTI/DSC circuit reduces noise and improves the picture quality. The 10 bit digital signal is then converted to analog R, G, and B component signals by IC4501, and applied to the RGB amplifier IC4512.

RGB Amplifier

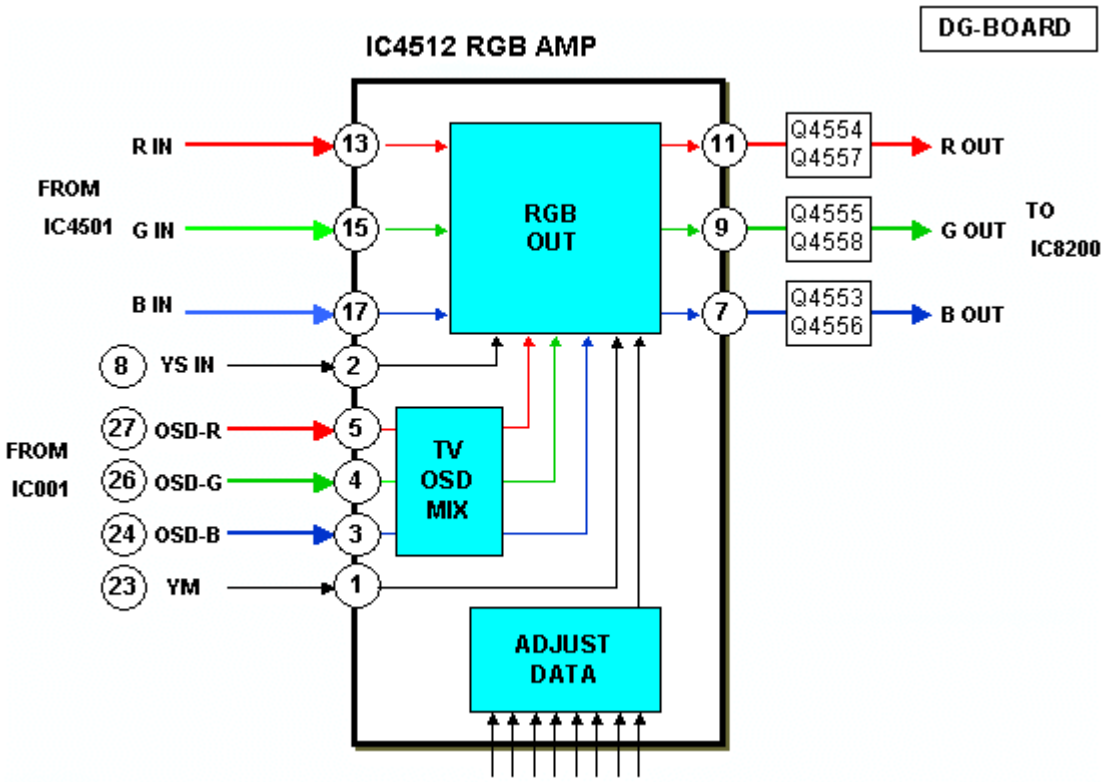


Figure 8

The RGB output of IC4501 and the OSD (On Screen Display) RGB output of the television MPU, IC001 enter the RGB amplifier IC4512. A switching circuit combines the two RGB signals for display on the screen. The Adjust Data section sets the RGB level, matching the required levels for the DG board. The output of IC4512 enters IC8200 of the DG-Board for selection between PC and all other inputs.

RGB/PC Select

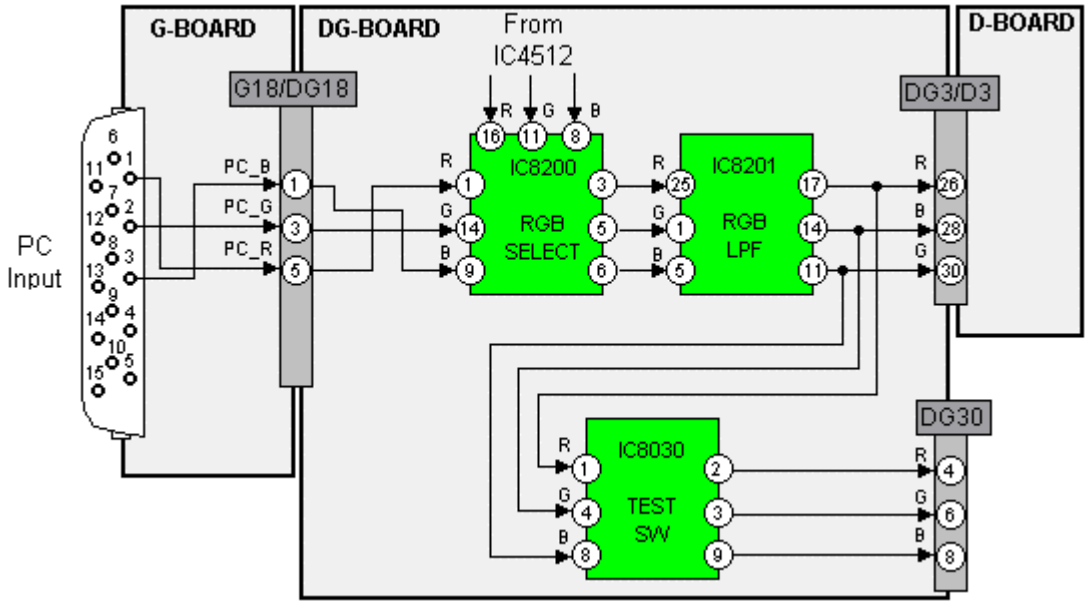


Figure 9

PC RGB Signals are input to the G Board located at the front of the unit. RGB signals from the PC input connector as well as standard RGB signals from the RGB amplifier, IC4512 enter IC8200 for selection. The selected output passes through the LPF circuit consisting of IC8201 to reduce bandwidth. The filtered output is applied to the D-Board via pins 26, 28, and 30 of the connector DG3/D3. The output of the switch, IC8030, is used at the manufacturing plant for testing purposes.

D Board Outline

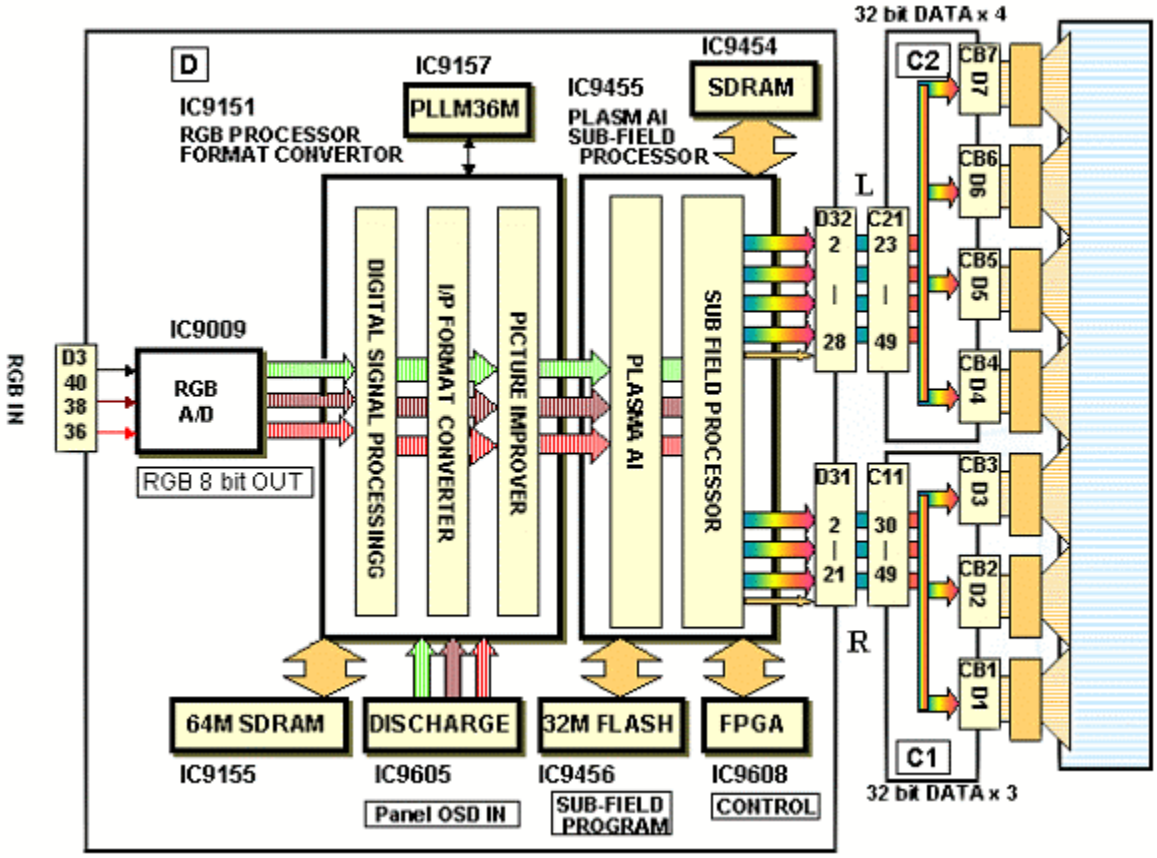


Figure 10

The D-board consists of the digital signal process circuitry. The analog RGB input is converted to digital by IC9009. The eight bit digital output enters IC9151 for processing.

The digital video data is converted to progressive scan and mixed with the OSD data. Adjustments such as white balance, contrast, and color drives are also corrected here.
IC9455 contains the Plasma AI (Adaptive brightness Intensifier) circuit that analyzes the video program level for the distribution of dark and bright components. The Plasma AI circuit converts the 8 bit signal data to 10 bit signal data. The Sub-field Processor is used to speed up the scanning process and control the number of sustain periods. This increases the brightness and improves the contrast ratio. It also creates the two channels of data that drive the C1 and C2 data output boards.

The D-board provides the scan, sustain, and data drive signals. The scan pulses are output to the SC board. The sustain pulses are output to the SS board. The data drive signals are output to the C1, and C2 boards. The C1 board drives the right portion of the panel; the C2 board drives the left portion.

Sync Signal Process

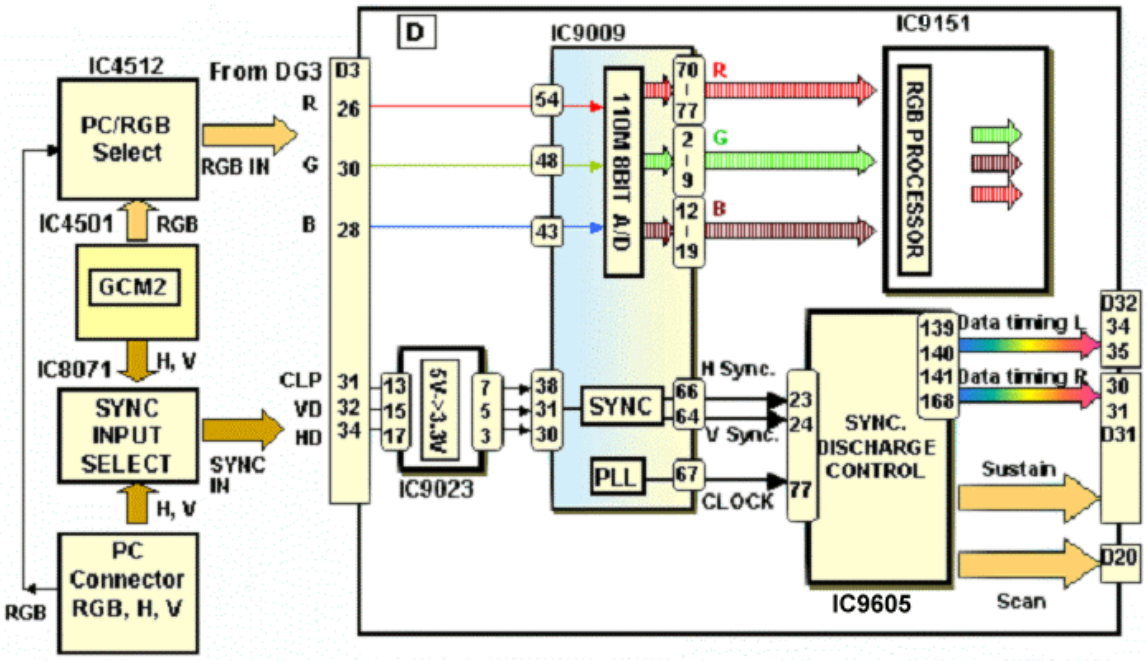


Figure 11

On the DG-Board, the sync signals retrieved from the input device enter the sync switch (IC8071). The selected sync signals are output to the D-Board via pins 31, 32, and 34 of connector DG3/D3. The sync signals then enter a level shifter IC, IC9023, to change the DC Level from 5 to 3.3 volts. The output signals of IC9023 enter IC9009 for conversion into digital pulses. IC9605, the Sync Processor and Discharge Control circuit, produces the Sustain control pulses, the Scan control pulses, and the data timing pulse for the data drive circuit boards.

SC Board Explanation

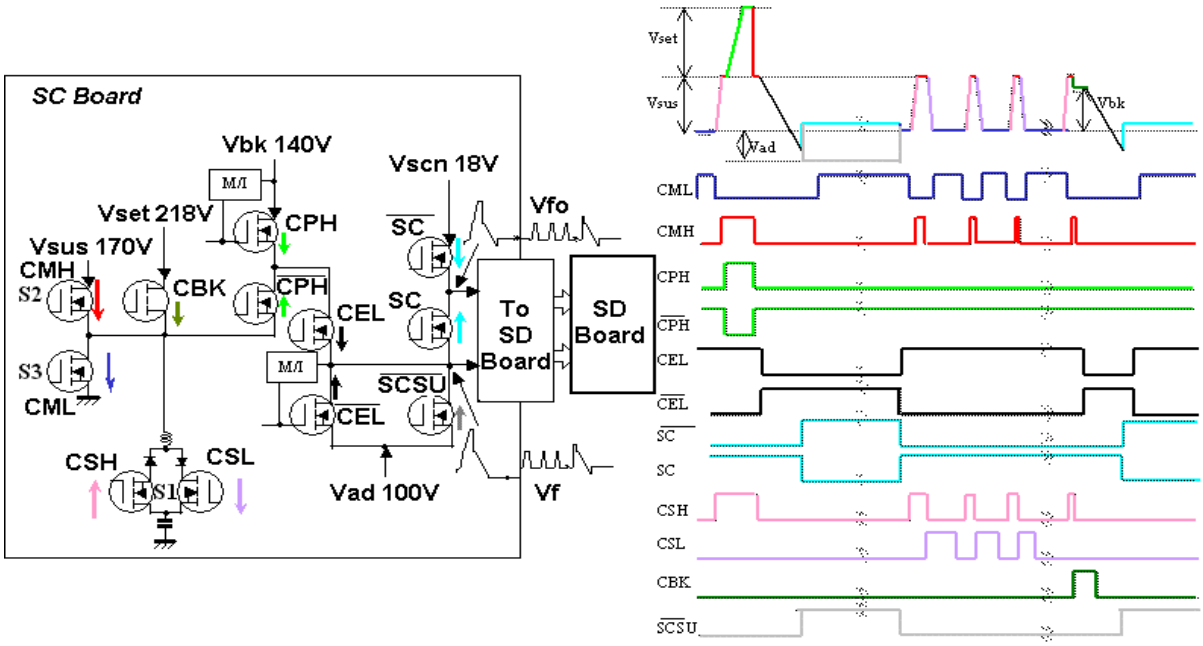


Figure 12

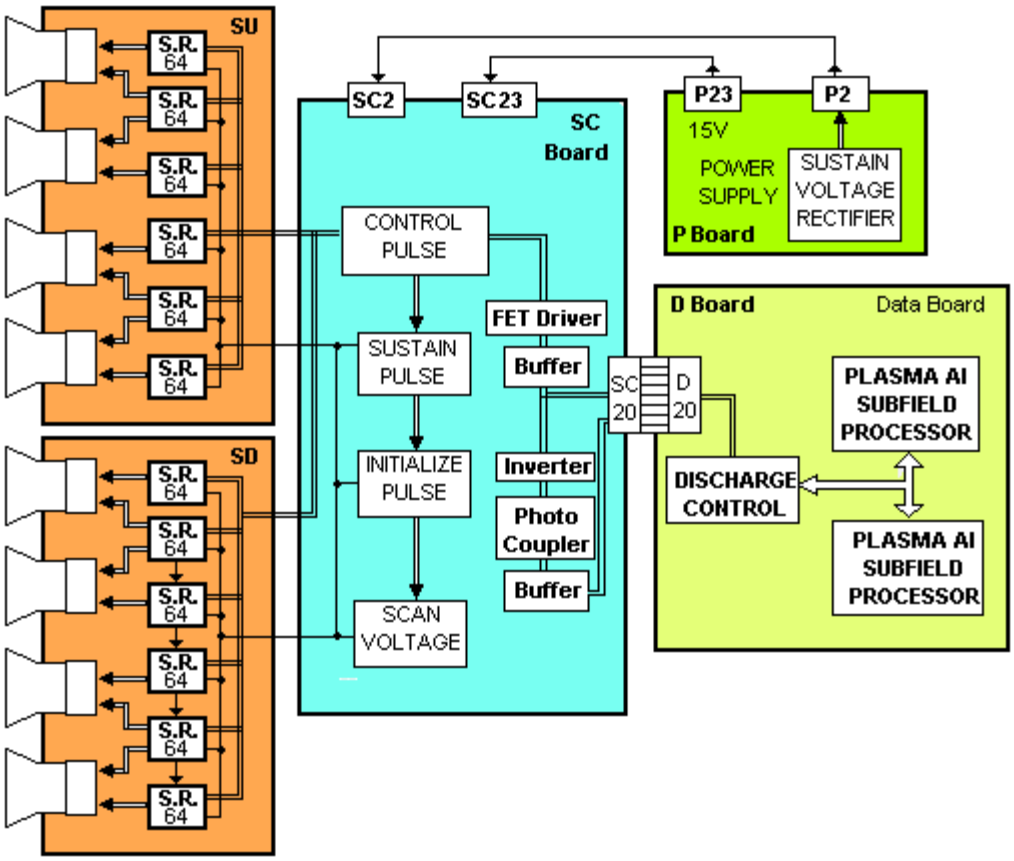


Figure 13

The SC Board consists of buffers and drivers used to generate the scan signals to the panel. The buffers provide isolation between the D board and the drivers. Connector SC20 provides the drive voltages (140V, 100V and 18V) as well as the trigger signals to switch the FET transistors. The D board switches the FETs on and off to create the distinctive scan signal. Each trigger signal switches a drive FET creating a portion of the waveform. For example, applying the CPH signal to the 140V FET creates the peak portion of the waveform, see figure 12.

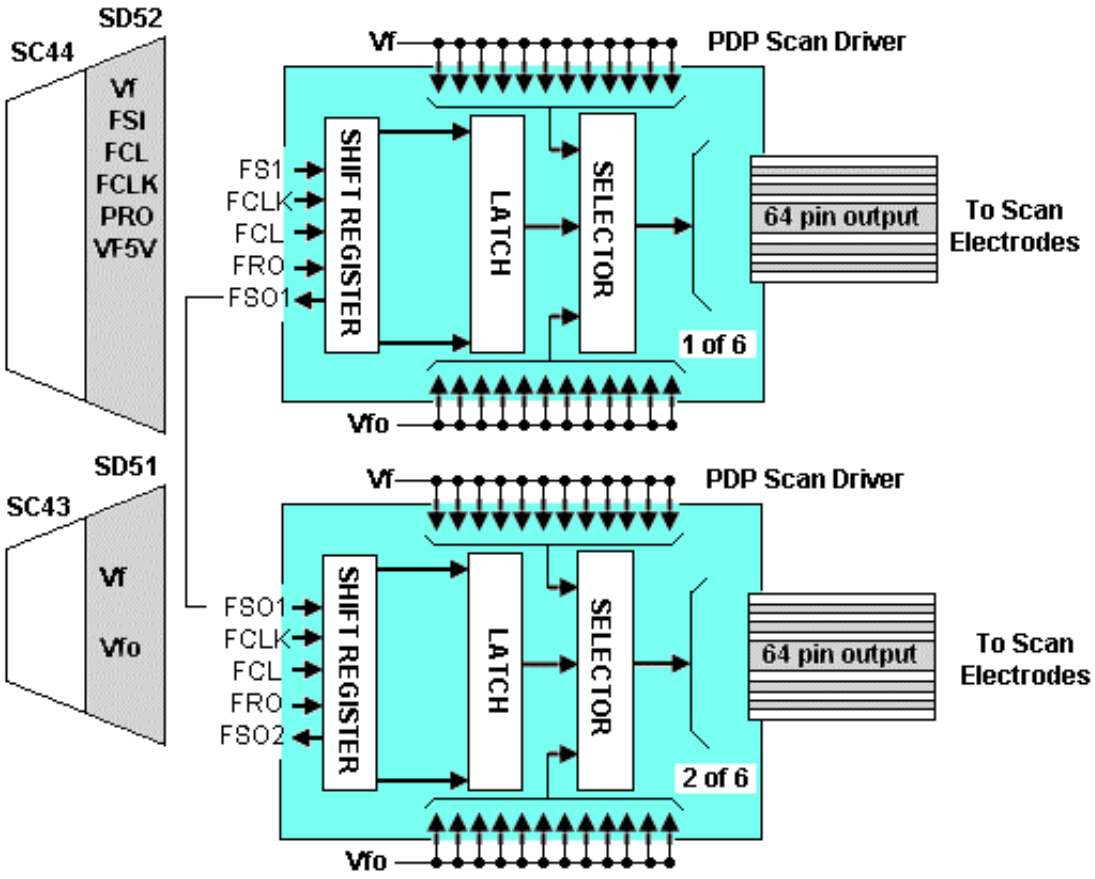


Figure 14

After the scan waveform is developed on the SC Board, it is applied to the SU and SD boards for de-multiplexing. The signal is input to a series of shift registers inside the PDP scan driver IC. Figure 14 shows an example of the de-multiplexing circuit. There are six driver ICs on the SU board and six on the SD board.

SS Board Explanation

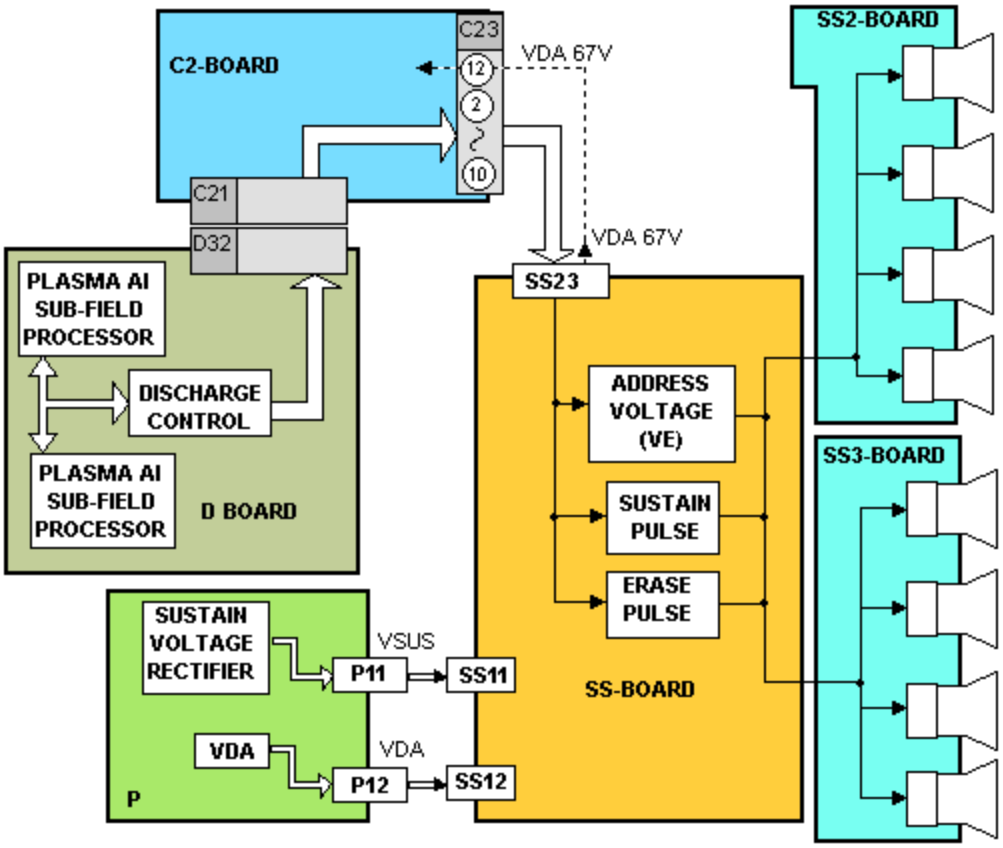


Figure 15

After the video signal is processed on the D board, the sustain and erase pulses are output to the SS board. The erase pulse is output at the beginning of each scan period. The pulse is applied to the SS2 and SS3 boards to remove the previous charge for the upper and lower sections of the display panel.
The sustain pulses are also developed on the D board and are applied after the scan periods.

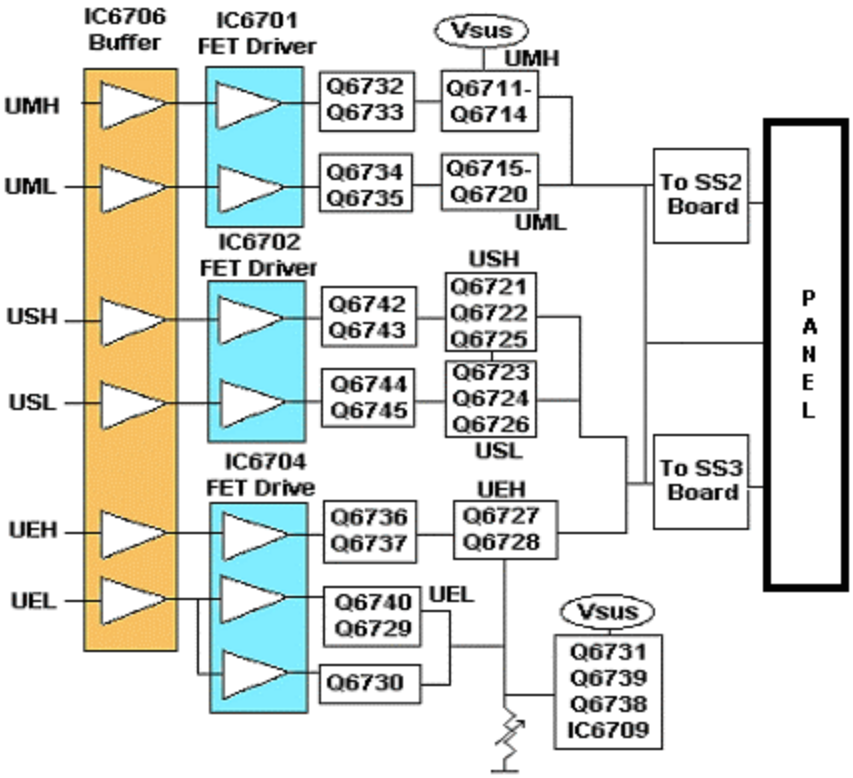

IC6706
Buffer
IC6701
FET Driver
Vsus
UMH
UMH
UML
Q6732
Q6733
Q6734
Q6735
Q6711-
Q6714
Q6715-
Q6720
UML
To SS2
Board
IC6702
FET Driver
USH
USL
USH
Q6742
Q6743
Q6744
Q6745
Q6721
Q6722
Q6725
Q6723
Q6724
Q6726
USL
P
A
N
E
L
IC6704
FET Drive
UEH
UEL
UEH
Q6736
Q6737
Q6740
Q6729
Q6730
Q6727
Q6728
UEL
To SS3
Board
Vsus
Q6731
Q6739
Q6738
IC6709

Figure 16

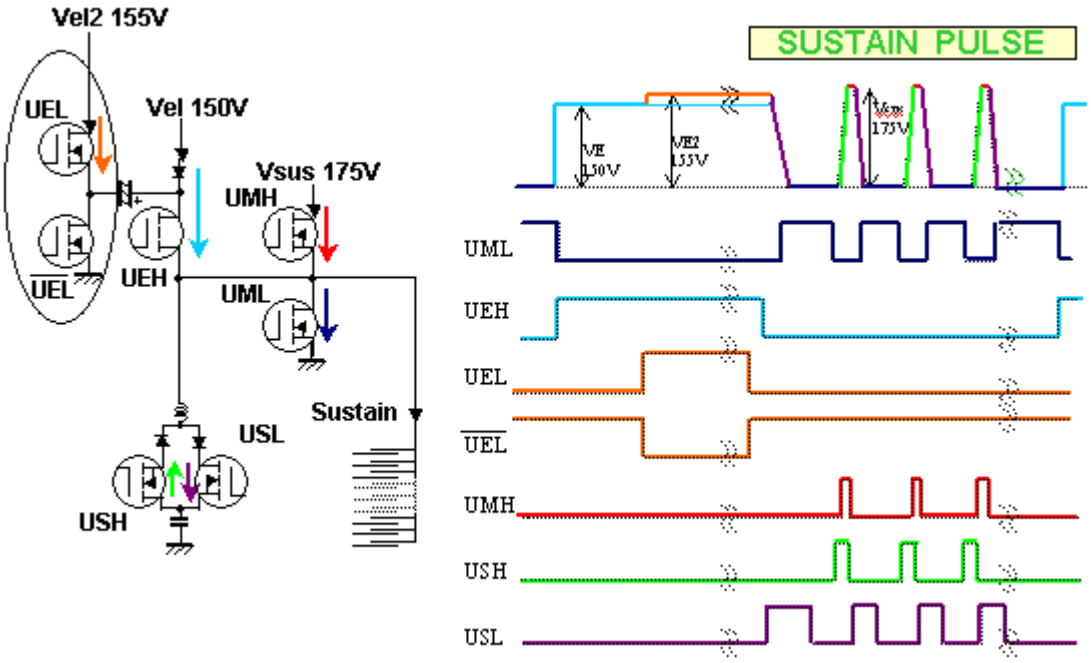


Figure 17

The Sustain pulse is developed using a similar circuit as the Scan Pulse. A series of specifically timed pulses are applied to FET drivers creating the distinctive sustain pulse. The drivers switch the voltages (150V, 155V and 175V) at selected intervals determined by the D board. The basic waveform remains constant but the exact number of sustain pulses is determined by the amount of luminance required, see figure 17.

Power Supplies (GP6D Chassis)

Standby power supply

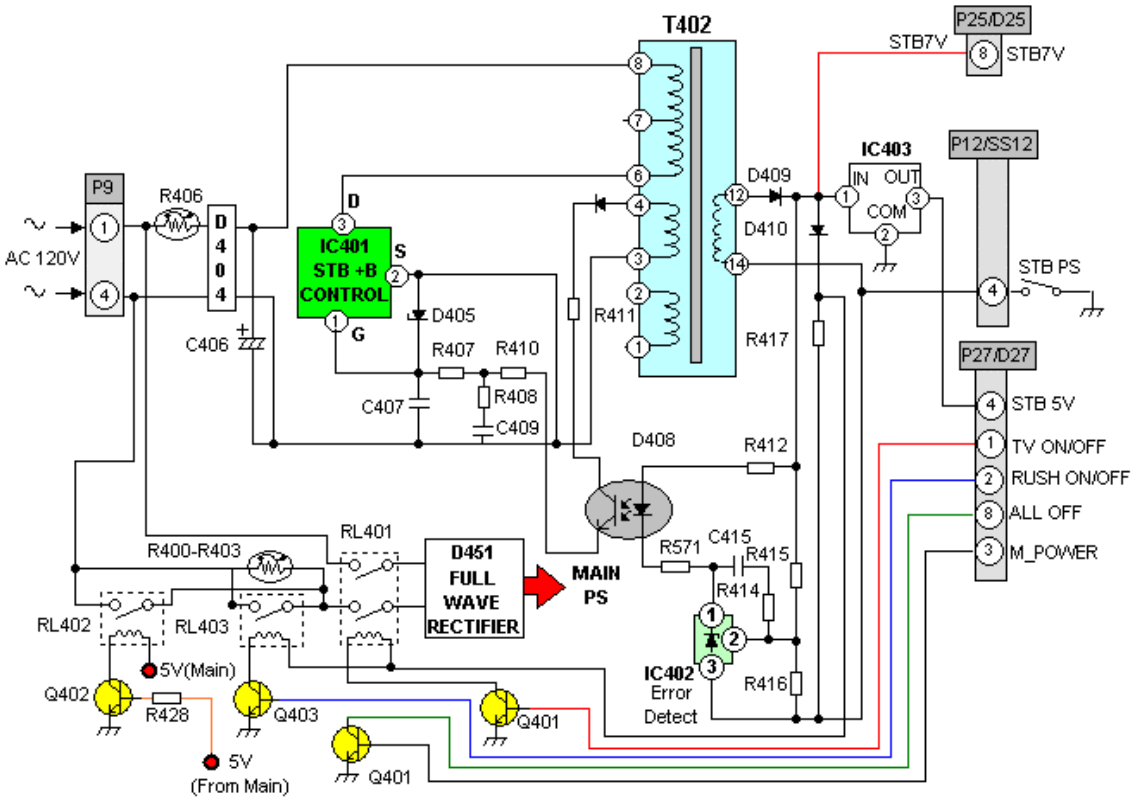


Figure 18

The standby power supply provides the necessary DC voltage for the system control Microprocessor, Reset circuit and the EEPROM. D404 rectifies the incoming AC Voltage and applies it to the transformer T402 and the standby B+ control circuit IC401. The output pulses of IC401 are then applied to the primary side of transformer T402. Diode D409 rectifies the AC output at pin 12 of the secondary of T402 to create the STB 7V for the system control circuit. IC403 regulates the 7V standby voltage to produce the STB5V for the D Board. This 7V standby voltage also passes through the diode D410 to enter the power relays RL401 and RL403. When the unit is turned on, transistor Q401 turns on to create the ground path for power relay RL401. Transistor Q417 provides the ground path for the In Rush Current relay RL403. IC 402 and the Opto-coupler D408 provide feedback to the STB control circuit for voltage regulation. After the main power supply goes into operation, the 5V source is applied to transistor Q402 to turn on the relay RL402.

VSUS High Voltage Source

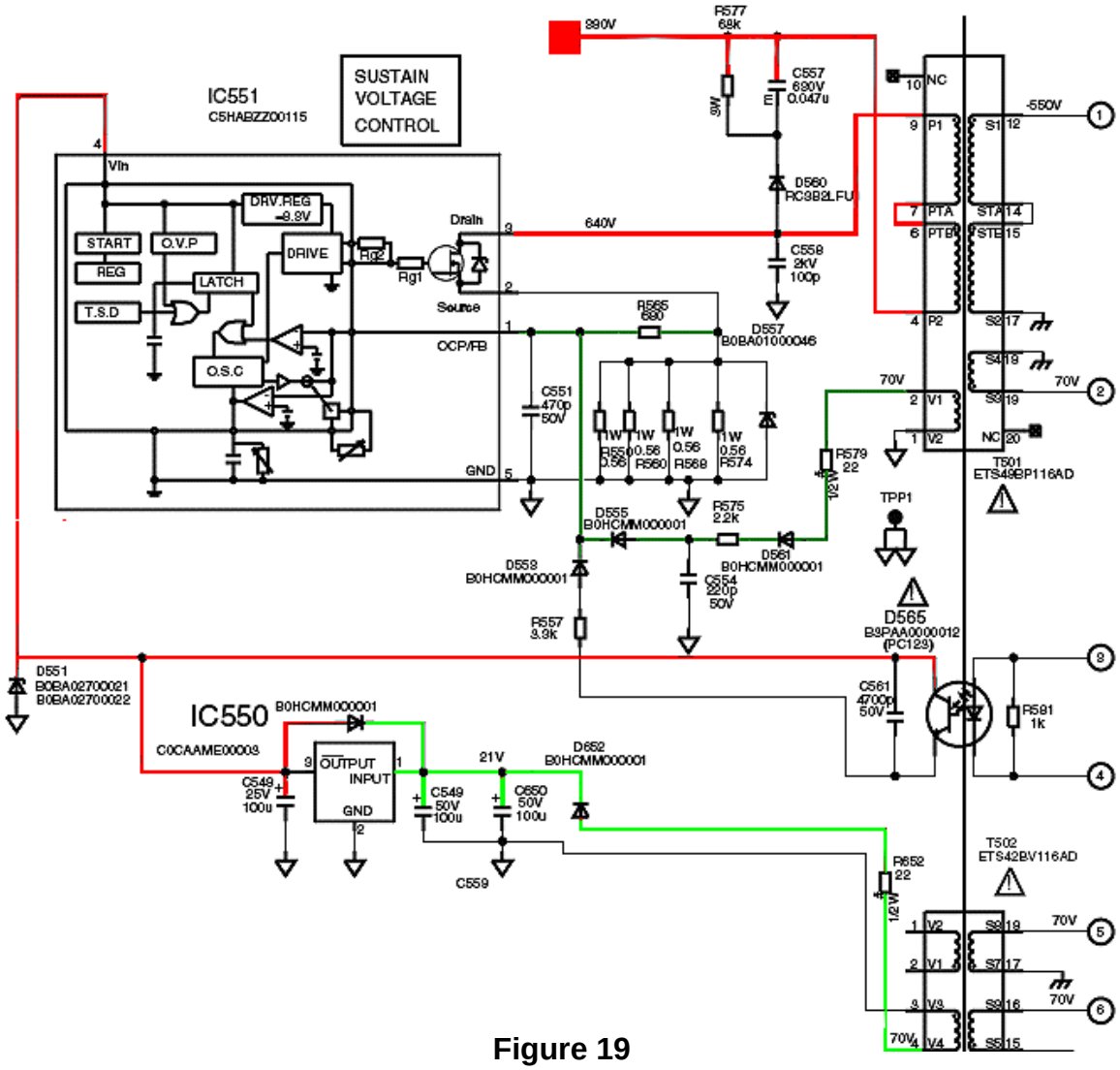


Figure 19

The P-Board contains the drive-voltage oscillator circuit that develops the Vsus voltage needed to operate the Scan and Sustain boards. Operation begins with the 18Vdc supply derived at the main power supply. AC voltage from pin 4 of the secondary of the transformer T502 is rectified filtered and applied to pin 1 of IC550. The regulated 15 volts output of the IC enters pin 4 of IC551 to serve as startup voltage and begin the oscillation of the IC. The regulated DC output of IC550 is also applied to the voltage feedback circuit consisting of the optical coupler D565 and Diode D553. The PWM output at pin 3 of IC551 is applied to the transformer's primary. As current passes through the transformer, magnetic field builds up in its core. The primary current passes through the transistor located inside the IC and the four source resistors R550, R560, R568, and R574. The voltage at the transistor's Source increases at a proportional rate to that of

the current increase. This voltage is applied to the non-inverting input of the op-Amp at pin 1 of IC551 for over current protection (OCP).
Pin 1 of the IC also monitors the status of the transformer. The network consisting of D555, D551, R575, and C554 rectifies and filters the AC voltage at pin 2 of the secondary of the transformer T501. The output voltage enters pin 1 of the IC for transformer sensing. Voltage regulation is achieved via the feedback network consisting of D565, D553, and R557.

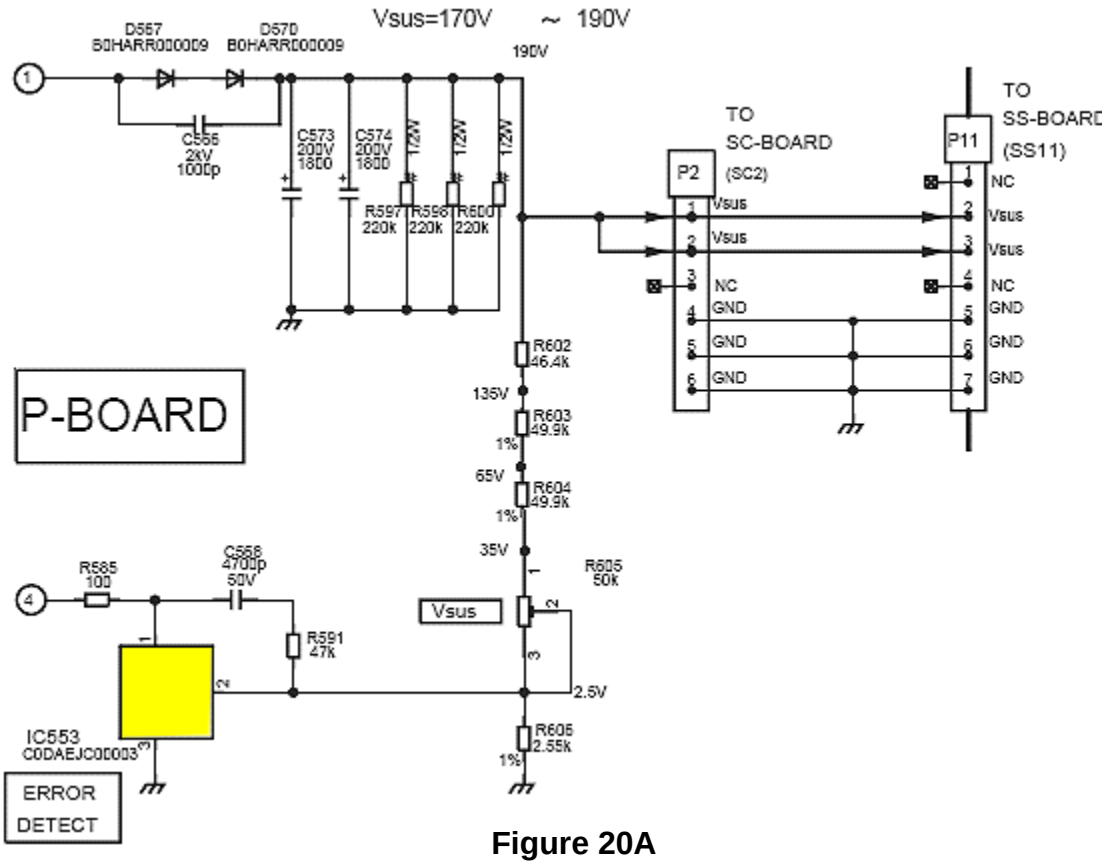


Figure 20A

The diodes D557and D560 rectify the AC output voltage at the secondary of the transformer T501. The network consisting of C573, C574, R597, R598 and R600 achieves filtering. This output voltage, labeled VSUS, is applied to the Scan and Sustain boards. Voltage regulation is achieved via the feedback circuit comprised of the resistors R602-R606 and the Error Detect IC, IC553. The resistor R605 is used to adjust the DC output of the circuit as indicated on the label located on the display panel.

Note: The voltage level of the Vsus output is not mentioned because it is different for each plasma display panel. This voltage level can be found on the panel information label located on the heat sink of the panel.

Main Power Supply

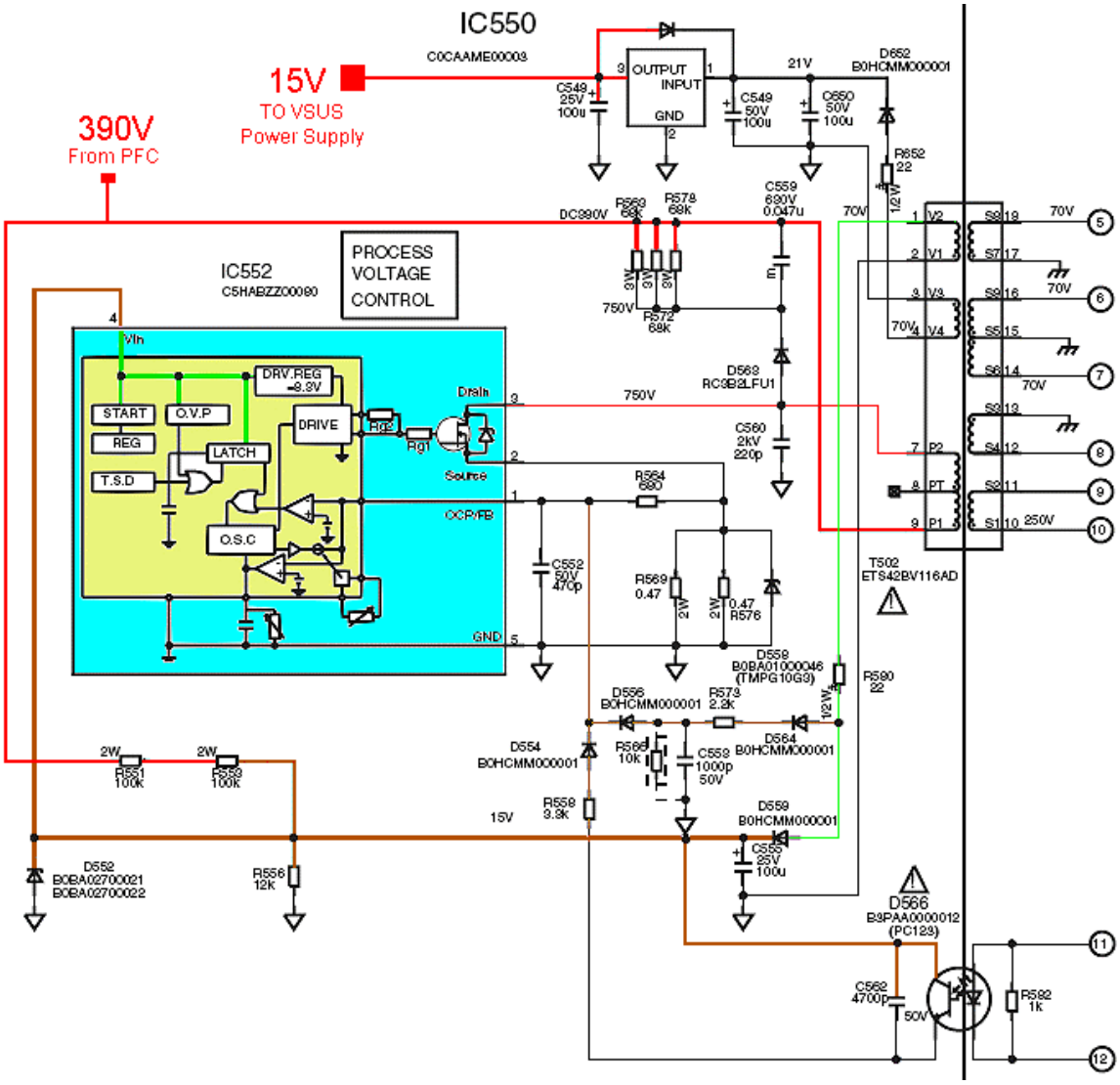


Figure 20b

Most of the DC voltages used throughout the unit are derived from this power supply. The voltage divider circuit consisting of resistors R551, R553 and R556 reduces the output of the PFC circuit to create the startup voltage. This voltage enters pin 4 of IC552 to begin the oscillation. The startup voltage is also applied to the voltage feedback circuit consisting of the optical coupler D566 and Diode D554. The PWM output at pin 3 of IC552 is applied to the primary of the transformer T502. As current passes through the transformer, magnetic field builds up in its core. The primary current passes through the transistor located inside the IC and the two source resistors R569, and R576. The voltage at the transistor's Source increases at a proportional rate to that of the current increase. This voltage is applied to the non-inverting input of the op-Amp at pin 1 of IC552 for over-current protection (OCP).

Pin 1 of the IC also monitors the status of the transformer. The network consisting of D564, D556, R573, and C553 rectifies and filters the AC voltage at pin 2 of the secondary of the transformer T501. The output voltage enters pin 1 of the IC for transformer sensing. Voltage regulation is achieved via the feedback network consisting of D566, D554, and R558.

VDA and other Voltage Sources

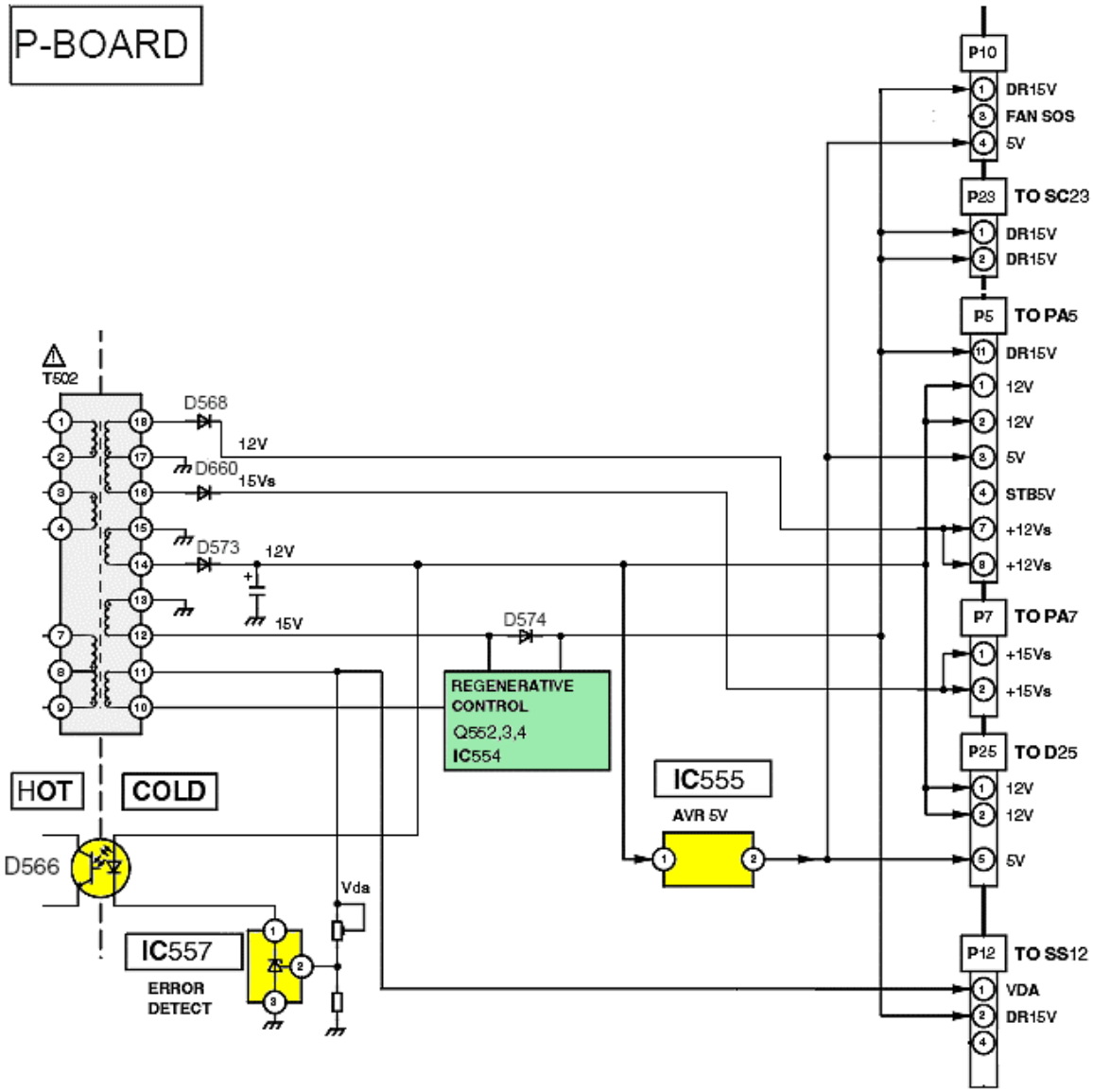


Figure 20c

The +12V source

The 20V source is primarily used in the A-Board. It is applied to a regulator IC, IC2304 to obtain a 9V output. The diode D568 converts the AC voltage supplied by the secondary windings of the transformer T502 to 12Vdc.

The +15V source

The 15V source is primarily used in the A-Board. It is applied to regulator IC7502 and IC7503 to obtain 9.2V and 5V output. The diode D560 rectifies the AC output of the secondary winding of the transformer T502 to 15Vdc.

The other +12V and +5V sources

The diode D573 rectifies the AC output of the secondary windings of the transformer T502 to 12Vdc. This voltage source is applied to the PA board and D board of the unit. The 12V source is connected to the anode of the D566This 12V source is also regulated by IC555 to create a 5V source that is used on the D board.

The DR15V source

The diode D574 converts the AC output of the secondary windings of the transformer T502 to DR15V. This voltage source is applied to the SC and SS boards for Scan and Sustain operations. The PA board and fan control circuit also uses the DR15 voltage source.

The VDA voltage source

Pin 11 of the secondary of the transformer supplies the VDA voltage for use on the SS Board. This voltage is tied to a regenerative (power save circuit) that rectifies the voltage as well as controls the output. It monitors and controls the current used by the SS Board to achieve lower power consumption. The VDA source is also connected to the voltage feedback circuit consisting of IC557 and the optical coupler D558. It is the voltage source that is monitored to control the voltage output of this power supply.

Protection Circuits

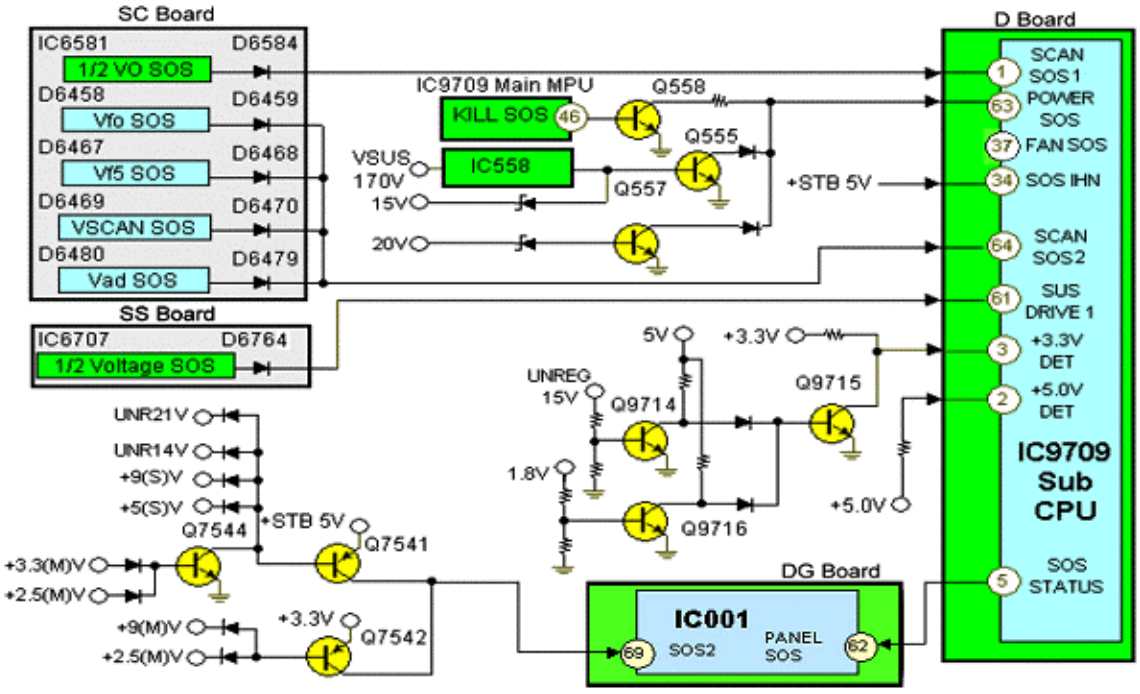


Figure 21

Protection circuits are incorporated in the unit to prevent the failure of a single circuit or component from creating catastrophic damage.

Transistor Q7541 monitors the UNR21V, UNR14V, +9(S)V, and +5(S)V line. If any of these supply lines develop a short circuit, transistor Q7541 goes into conduction and applies a high to pin 69 of the MPU, IC001, triggering an SOS condition.

Transistor Q7544 monitors the +3.3V, and +2.5V line. If any of these supply lines increase in voltage transistor Q7544 goes into conduction causing its collector to go low. As a result, Q7541 conducts and applies a high to pin 69 of the MPU, IC001, triggering an SOS condition.

The +9(M)V, and +2.5(M)V are also monitored for a drop in voltage. A decrease in any of these two supply lines forces the respective diode to conduct and trigger Q7542. A high is applied to pin 69 of the MPU, IC001, triggering an SOS condition.

The Unregulated 15V and 1.8V lines are monitored for a voltage decrease. Under normal conditions, the voltage drop derived from the voltage divider circuits at the base of Q9714 or Q9716 is enough to turn the transistor on. However should the voltage drop decrease, Q9716 or Q9714 respectively, turn off, allowing the 5 volts at their collectors to forward bias transistor Q9715. This effectively grounds pin 3 of the CPU triggering the shutdown condition.

The four ventilation fans are monitored to be sure they are operating properly. If one of the fans opens or increases resistance, the resulting current change is applied to pin 37 of the main CPU.

The Scan and Sustain voltages on the SC and SS boards are monitored in a similar manner. The +15V Line on the SS board is fed to a voltage divider and the result is compared to a reference voltage. The reference voltage is provided by a zener diode. If the output of the comparator goes high, a transistor turns on, effectively grounding the SOS line. The SC board uses a similar circuit.

Additionally the SS and SC boards contain LED indicators to alert the technician when a problem exists. The LED should be lit during normal operation, a dark LED indicates that a problem exists on that board.

Pin 63 of IC9709 monitors the 170 V, 15V, and 20V lines. If any of these supply lines develop a short circuit, the inline transistor goes out of conduction and applies a high to pin 63 of the Sub CPU, IC9709, triggering an SOS condition.

System Control Circuit

Panel Operations

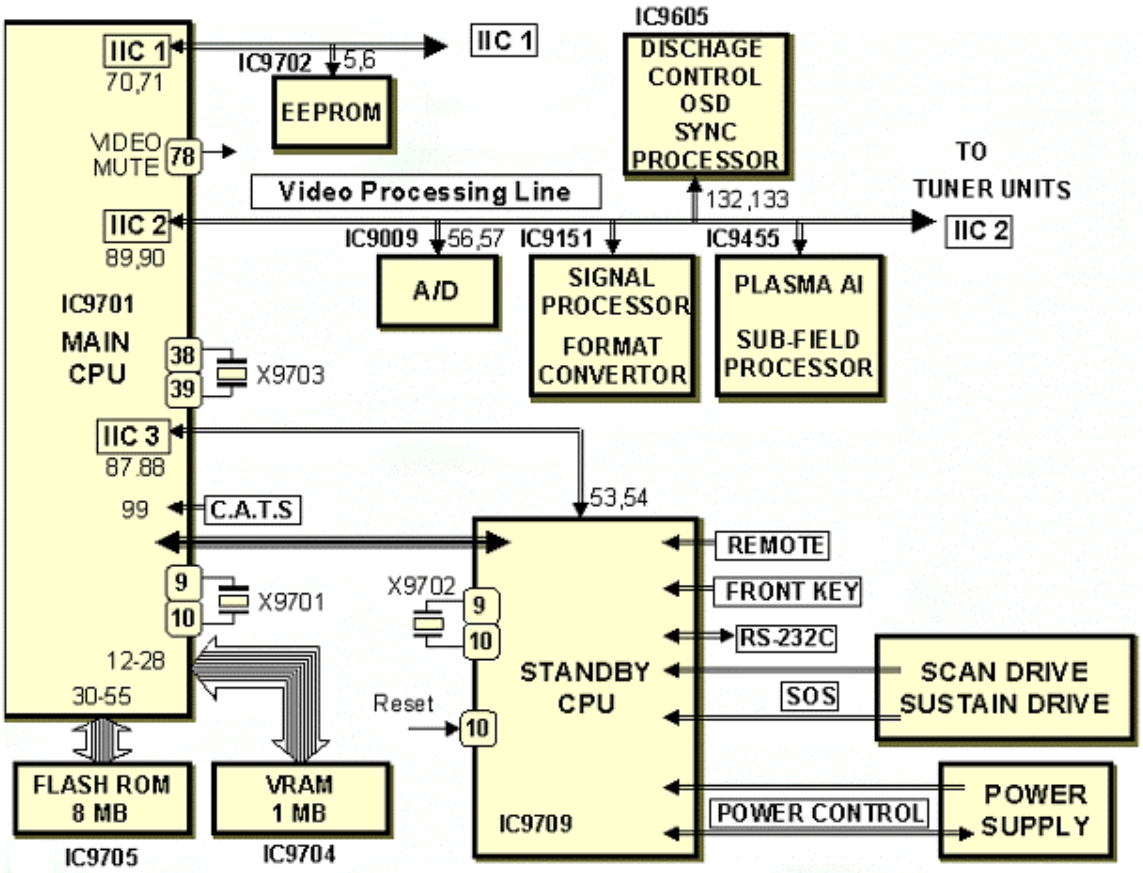


Figure 22

This main CPU, IC9701 uses three different I^2C bus lines to control peripheral devices. Bus line 1 controls the operation of the EEPROM. Programmable setting such as drive settings or white balance is stored in the EEPROM, IC9702. Bus line 2 controls the video processing, main tuner and the sub tuner. Examples of video processing include on-screen display, tint or contrast as well as many other picture adjustments. Bus line 3 reads the data from the Stand-by CPU for front panel and remote control operation. Additionally bus line 3 reads the condition of the SOS protection lines and transfers this information to the Main CPU.

In all cases, the Main CPU, is the master of the bus, all other devices are slaves. This means that all commands are generated from the Main CPU.

TV Operations

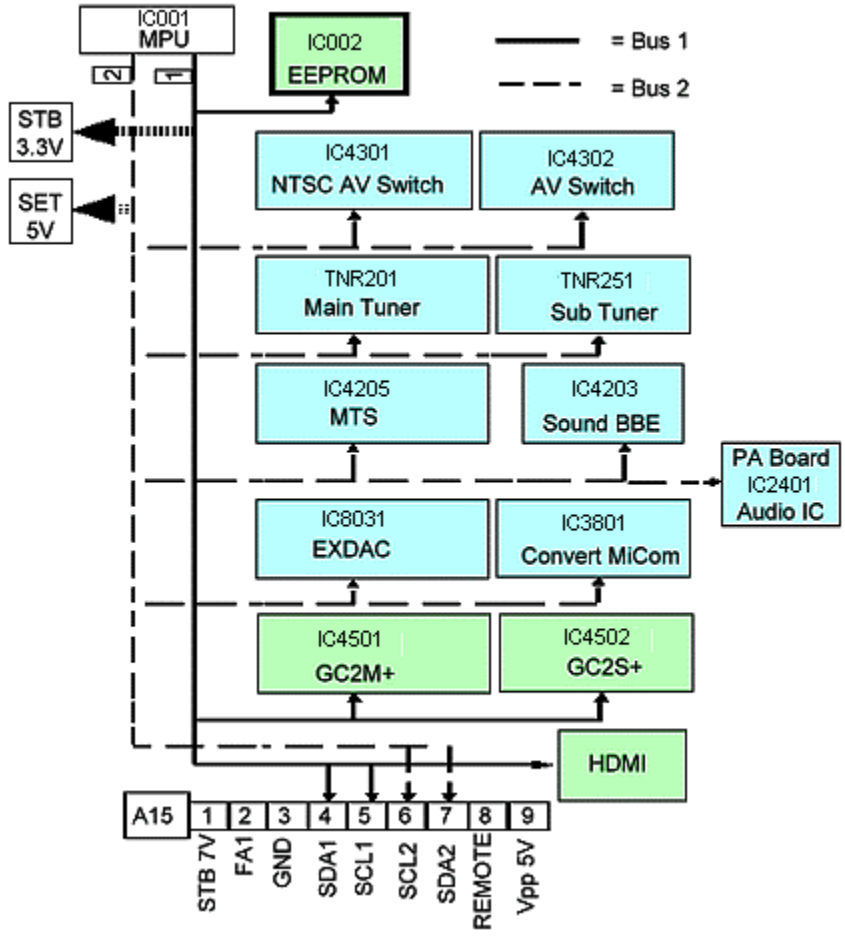


Figure 23

IC001 acts as the TV microprocessor, controlling the tuner, video and sound functions. Information such as channel mapping or customer preferences is stored in the EEPROM IC002. I^2C bus lines 1 and 2 are primarily responsible for video and audio operation. Figure 23 shows the connections to the Global core IC's, Tuners, AV switches, and input devices.

Diagnostic Procedures

In some cases, the front panel LED will flash a pattern indicating the circuit that has failed. Be sure to record the pattern displayed at start-up.

Number of LED Flashes	Failed Circuit(s)		Detection Point	Note	Suspected Board(s)
1	Main Micro power STB5V		IC9709 pin 34	Voltage too low	P Board
2	Scan Driver 1 Vf5 Vad	Vscan Vfo	IC9709 pin 64	Voltage too low	SC Board
3	3.3V S0S		IC9709 Pin 3		D Board
4	5V SOS P5V		IC9709 pin 2	Voltage down	P Board
5	Power SOS Vsus (170V) 15V 20V		IC9709 pin 63	Voltage down	P Board
6	Fan Stop		IC9709 pin 37		Fan
7	SCAN Driver 2 ½ Voltage (Energy Recover)		IC9709 pin 1	Load over Detect at IC6581	SC Board
9	SUS Driver ½ Voltage (Energy Recover)		IC9709 pin 61	Load over Detect at IC6705	SS Board
12	Tuner Power UNR21V UNR14V +2.5V(M) +9V(M)	+9V(S) +5V(S) +3.3V(M)	IC001 pin 69	Voltage down or over current	Tuners or PA Board or P Board

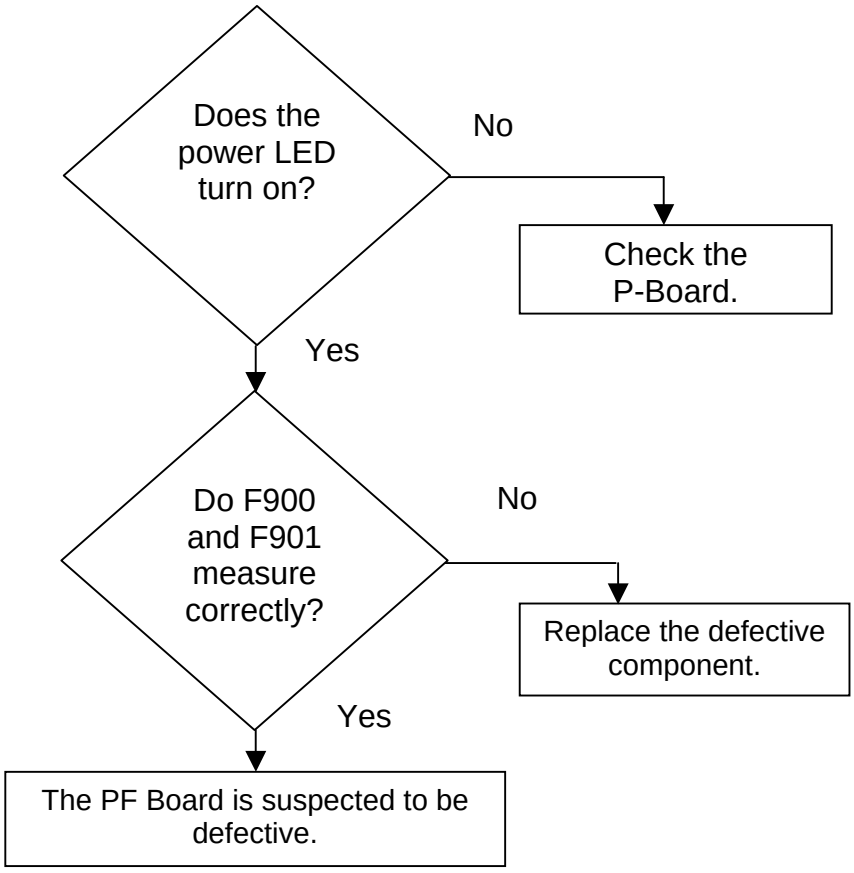
LED indicators on the SS and SC boards alert the technician when a problem exists. The LEDs should be lit during normal operation, a dark LED indicates that a problem exists on that board.

Diagnostic Flow Charts

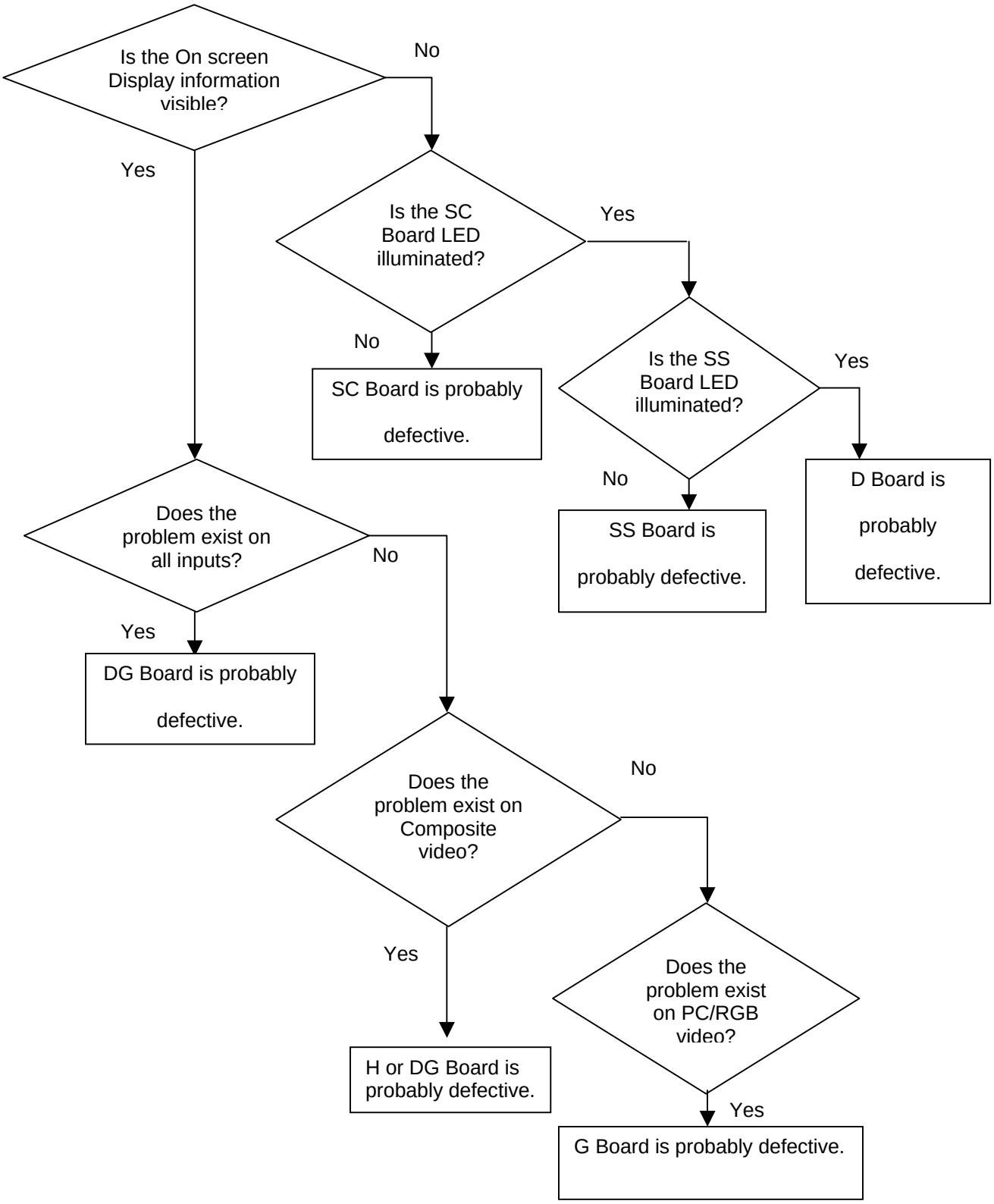
No Power

There are three states of “No Power” indication by the power LED:

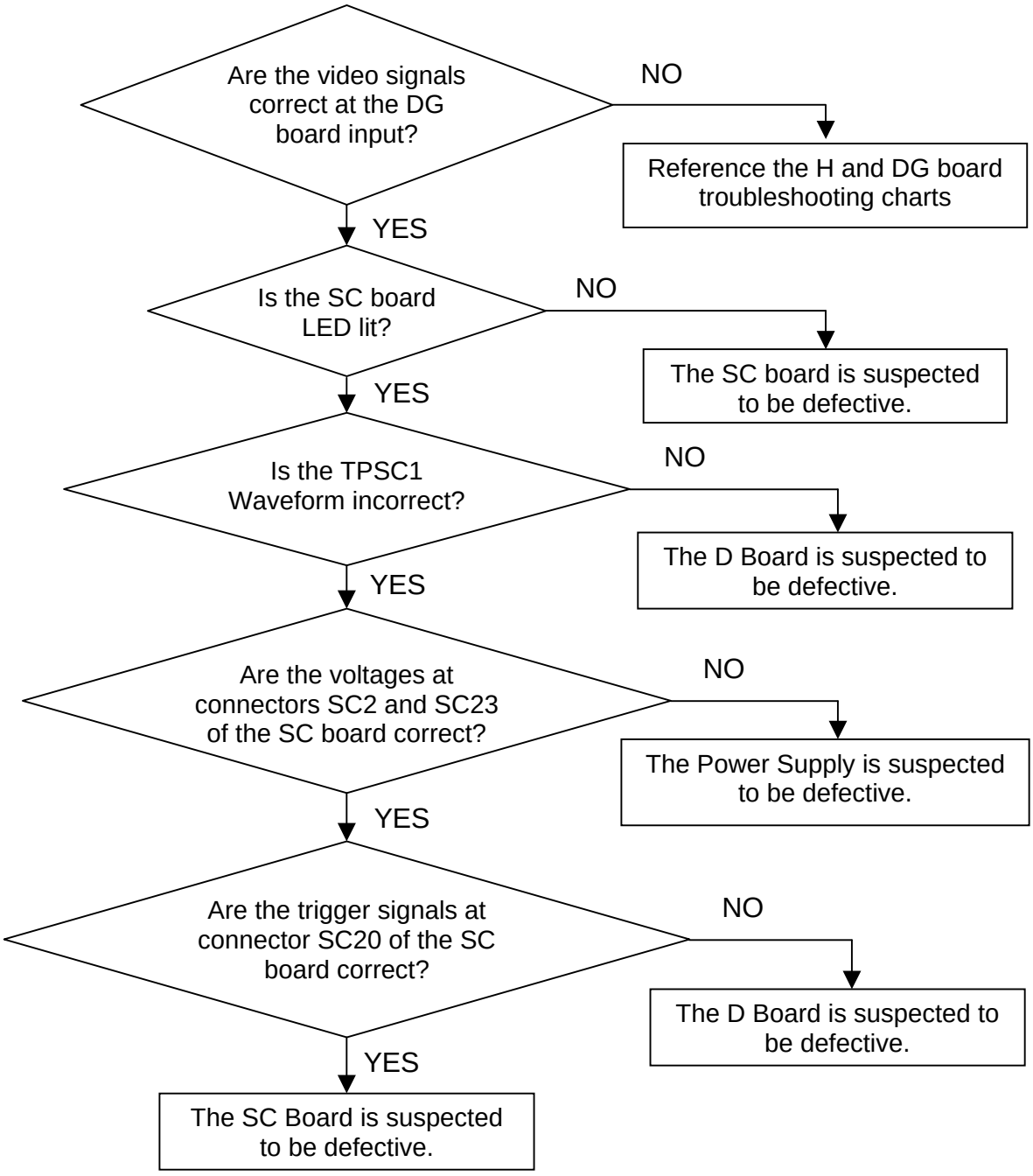
1. The power LED does not light up.
2. The power LED is green at power up. It then turns red a few seconds later and blinks on and off.
3. The power LED is red at power up and never changes state.



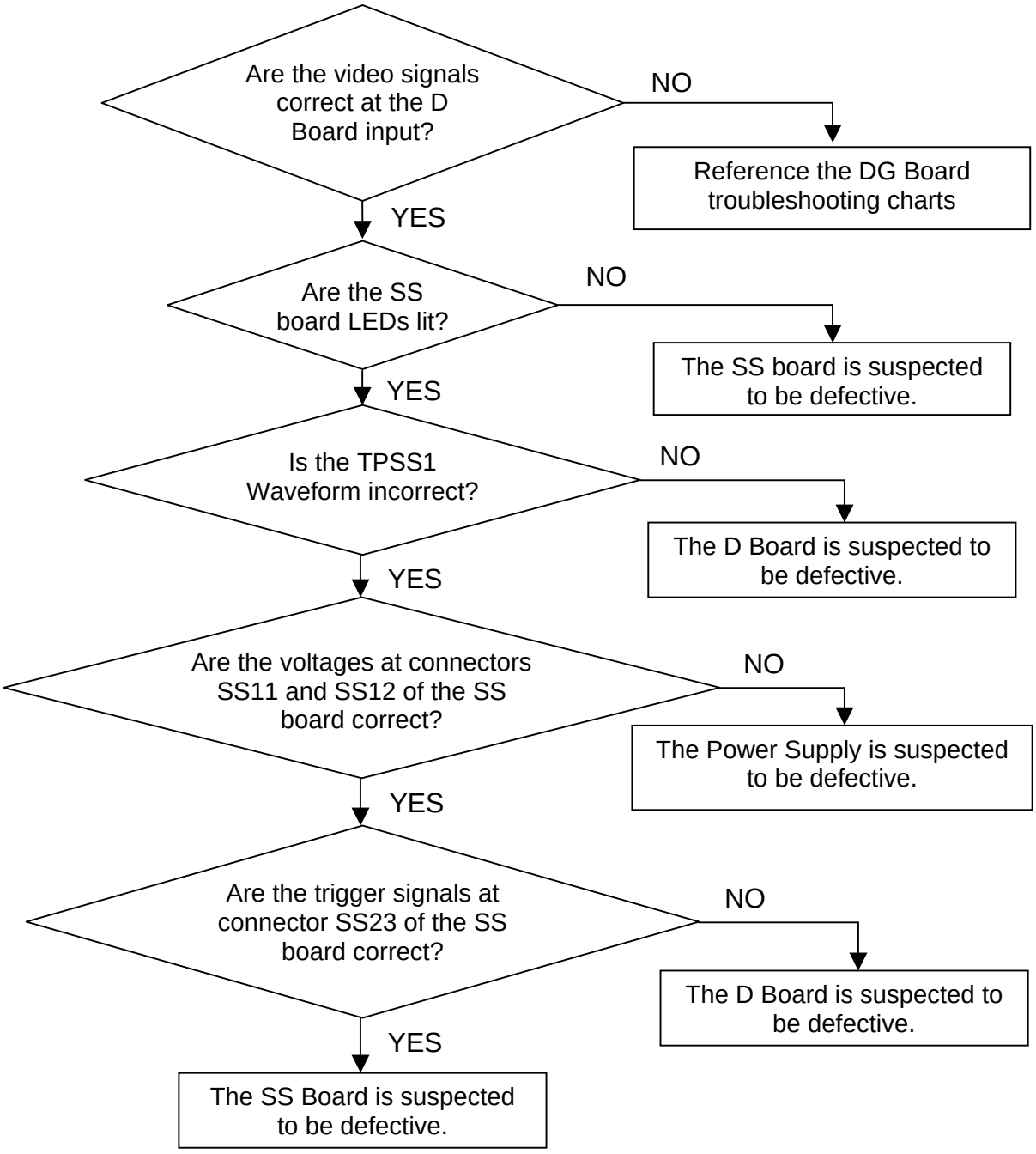
No Picture Flowchart 1



No picture Flowchart 2



Dark picture Flowchart



Local screen failure

The Plasma Display Panel unit may develop a failure, where the symptom is localized in a particular area of the screen. The figure below can help localize the circuit board that is most likely to be defective. In the example in figure 24, one of the two boards, C2 and D is likely to be the cause.

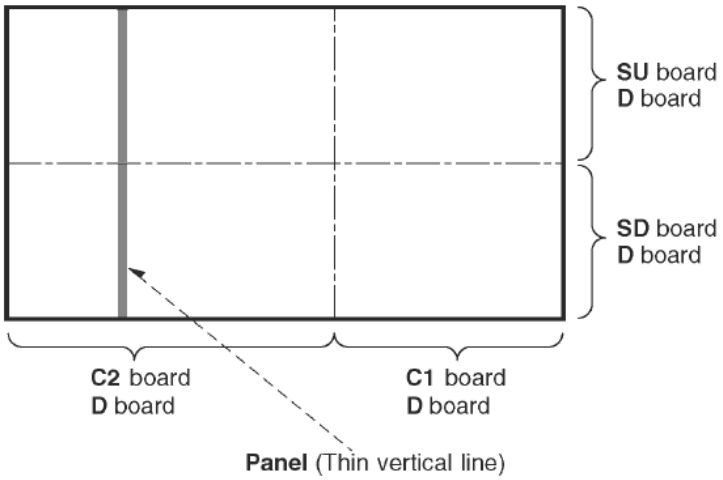


Figure 24

Service Hints

Symptom: No picture (black Screen)

- **Suggestion:** The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels of the screen.

  1. If the pixels are **totally dark**, the defect is most likely located in one of the following boards:

     a) SC-Board
     b) SU-Board
     c) SD-Board

Figure 25

1. Check the status of the LED located on the SC-Board; if the LED is dark, a malfunction of the SC-Board is suspected.
2. Listen to the buzz noise of the SC board; if the buzz noise is not present, a malfunction of the SC-Board is suspected.

- **Suggestions:** Check the Scan pulse waveform at TPSC1. (Use TPSS1 of the SS-board to trigger the oscilloscope.)
  Verify the input signals at connector SC2, SC23, and SC20.
  Verify that the signals of the clock and serial data lines from the D-board are present at connector SC20.

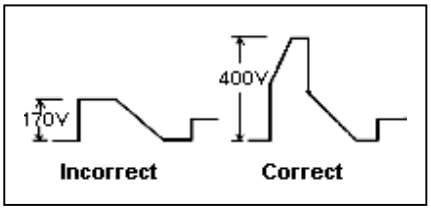


Figure 26

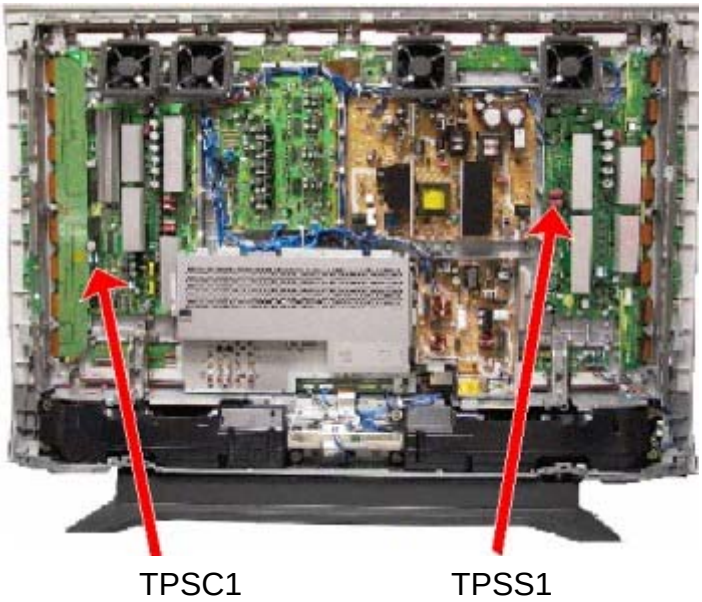
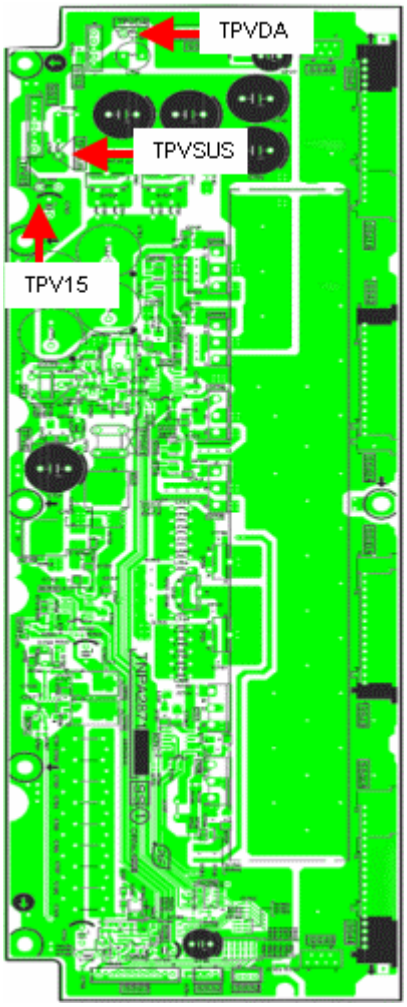


Figure 27

Symptom: No picture (black Screen)

Figure 28



SS Board

Figure 29

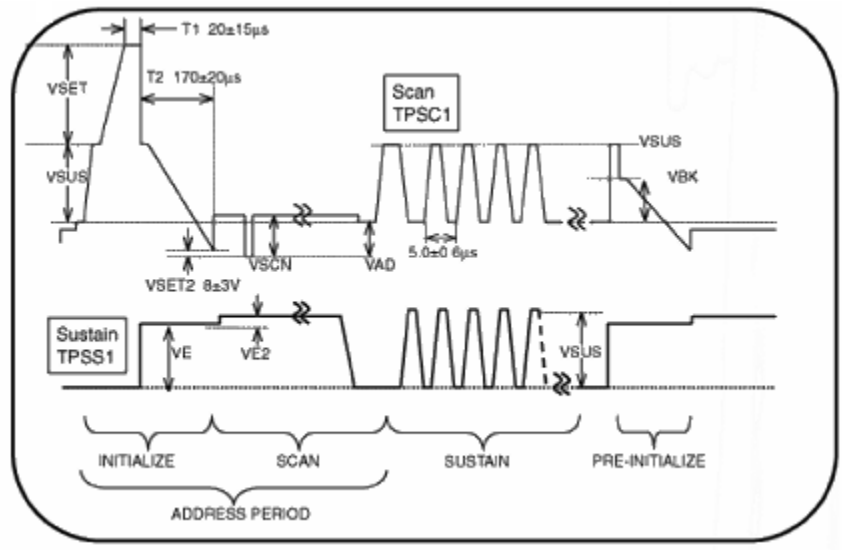
❖ **Suggestion:** The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels of the screen.

If the pixels are **faintly lit**, the defect is most likely located in one of the following boards:

A) SS-Board
B) SS2-Board
C) SS3-Board

1. Check the status of the LED located on the SS-Board; if the LED is dark, a malfunction of the SS-Board is suspected.
2. Listen to the buzz noise of the SS-board. If the buzz noise is not present, a malfunction of the SS-Board is suspected.
3. Verify the input signals at connector SS23.

❖ **Suggestions:**
Check the Scan pulse waveform at TPSC1 of the SC-Board. (Use TPSS1 of the SS-Board to trigger the oscilloscope.) Proceed to check the power sources at connector SS11, and SS12.



Verify that the clock and serial data lines from the D-board are present at connector SS23.

Figure 30

Symptom: Horizontal Black Bar (Completely dark)

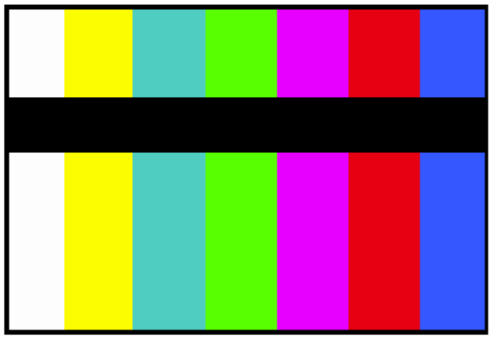


Figure 31

Note: The use of a **magnifying glass** can help localize the defective printed circuit board. Use the magnifying glass to take a close look at the pixels in the area of the black bar.

1 If the pixels are **totally dark**, the defect is most likely located in one of the following boards:
   a) SC Board
   b) SU Board (upper half of the screen only)
   c) SD Board (lower half of the screen only)

2. If the pixels are dimly lit, the defect is most likely located in one of the following boards:
   a) SS Board
   b) SS2 Board (upper half of the screen only)
   c) SS3 Board (lower half of the screen only)

Symptom: Vertical Black Bar

- **Suggestion:** Since the C2 board contains the serial to parallel converters for the picture data that drive this portion of the screen; the most likely cause for this defect can be localized to the C2-Board or the D-Board.

Figure 32

- **Symptom:** Vertical Black Bar

- **Suggestion:** Since the C1 board contains the serial to parallel converters for the picture data that drive this portion of the screen; the most likely cause for this defect can be localized to the C1-Board or the D-Board.

Figure 33

Symptom: No OSD but it has video.

- **Suggestion:** Check signal on the DG board.

Symptom: Burned image (pattern) is visible.

- **Suggestion:** Access the CAT mode and activate the scroll bar or run the set with a white raster for at least fifteen minutes.

Figure 34

Adjustments

If the power supply board is replaced the following adjustments are required.

+B Set-up

Item / Preparation

- Input a 100% white signal.
- Set the picture mode to **Normal** and the White Balance to **Normal**

- **Adjustments/Confirmation**

  Adjust and confirm the indicated test point below for the specified voltage.

Adjustment

Name	Test Point	Voltage	Potentiometer
Vsus	P11 pin 2	Vsus ± 1V	R605
Vda	P12 pin 1	67.0 ± 0.5V	R590

Confirmation

Name	Test point	Voltage
15V	P23 pin 1	15.4V ± 0.5V
15V	P7 pin 1	15.2V ± 0.5V
12V	P25 pin 1	11.8V ± 0.5V
Audio 12V	P5 pin 7	12.5V ± 0.8V
5V	P25 pin 5	5.1V± 0.3V
STB 5V	P27 pin 4	5.0V ± 0.3V
Fan 15V	P10 pin 1	15.4V ± 0.5V
Fan 5V	P10 pin 4	5.1V± 0.3V
PFC	C468 (+), C468 (-)	380V ± 15V

Driver Set-up

Item / Preparation

- Input an APL 100 % white signal.
- Set the picture controls to:
  Picture mode = **Normal**
  White Balance = **Cool**
  Aspect = **16:9**

Adjustments

To perform the following adjustments, please refer to the panel information label located on the heat sink of the panel. See Figure 35 for more information about the panel label.

Name	Test point	Voltage	Volume
Vsus	TPVSUS (SS-BOARD)	Vsus ± 1V*	R605 (P-BOARD)
Vbk	TPVBK (SC-BOARD)	155Vbk ± 5V	R6443 (SC-BOARD)
Ve	TPVE (SS-BOARD)	Ve ± 1V*	R6774 (SS-BOARD)
Vset	TPVSET (SC-BOARD)	218 V ± 6V	Verify Only
Vad	TPVAD (SC-BOARD)	-90 ± 1V	R6477 (SC-BOARD)
Vda	TPVDA (SS Board)	67V ± 1V	R590 (P-BOARD)
VSCN	TPVSCN (SC-BOARD)	Vad+118V ± 2V	Verify only

*** Refer to the panel label for the exact value**

Panel Label information

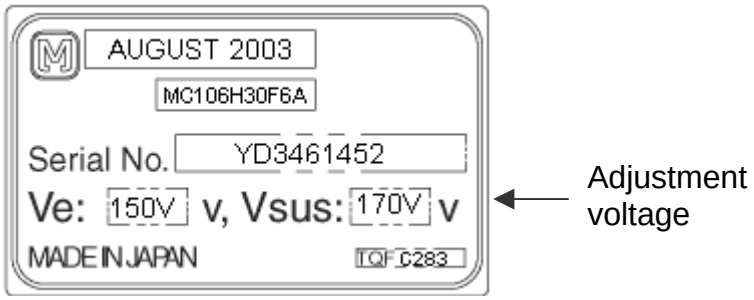


Figure 35

Initialization Pulse Adjust

Item / Preparation

- Input a Crosshatch signal.
- Set the picture mode to Normal, and White Balance to Normal

Adjustments

Adjust the indicated test point for the specified waveform. Use TPSS1 as the trigger source.

	Test point	Volume	Level
T1	TPSC1 (SC)	R6523 (SC-Board)	20 ± 15µ Sec
T2	TPSC1 (SC)	R6557 (SC-Board)	170 ± 20µ Sec

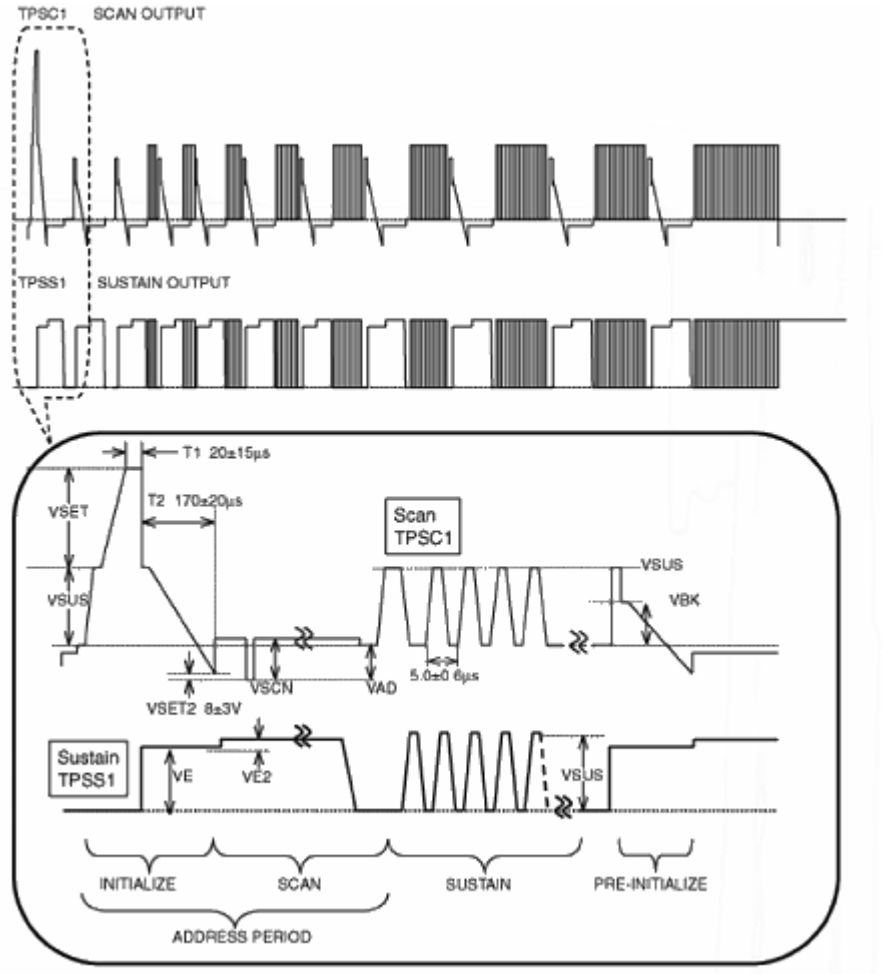


Figure 36

P.C.B. (Printed Circuit Board) exchange procedure

1. Caution

Wait 1 minute for the electrolytic capacitors to discharge before removing any PCB from the unit.

2. Quick adjustment after P.C.B. or Panel exchange

P.C.B.	Item	Volume	Test point	Voltage level
Panel	All items in this table			
P Board	Vsus	R605 (P-Board)	TPVsus (SS)	Vsus ± 1V*
	Vda	R590 (P)	TPVDA (SS Board)	67V ± 1V
SC Board	Vbk	R6443 (SC)	TPVBK (SC)	155V ± 5V*
	Vad	R6477 (SC)	TPVAD (SC)	-90V ± 1V*
	Vset	TPVSET (SC-BOARD)	218 V ± 6V	Verify Only
	VSCN	TPVSCN (SC-BOARD)	Vad+118V ± 2V	Verify only
SS Board	Ve	R6774 (SS)	TPVE (SS)	Ve ± 1V*
D, DG Board	White Balance, Pedestal and Sub brightness for NTSC, Pal, HD, PC and 625i signals			

*Refer to the Panel label for the exact value.

Adjustment Volume Locations

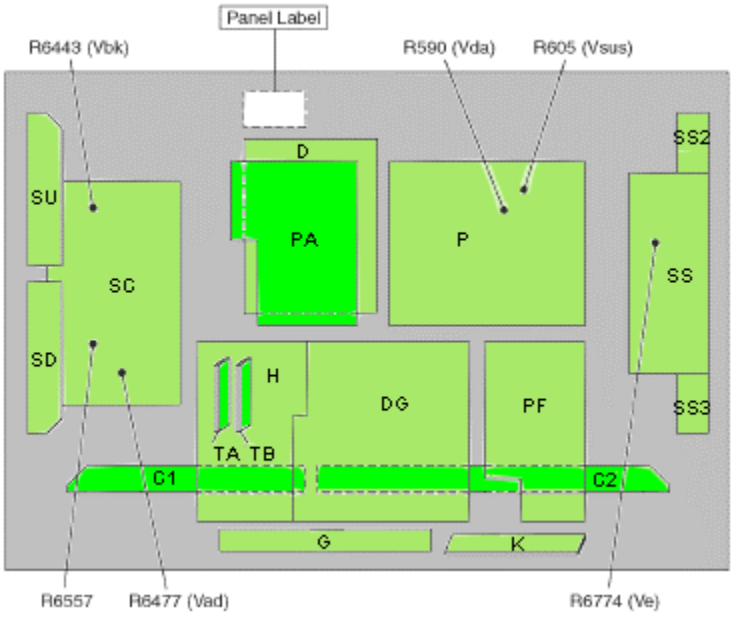


Figure 37

Test Point locations

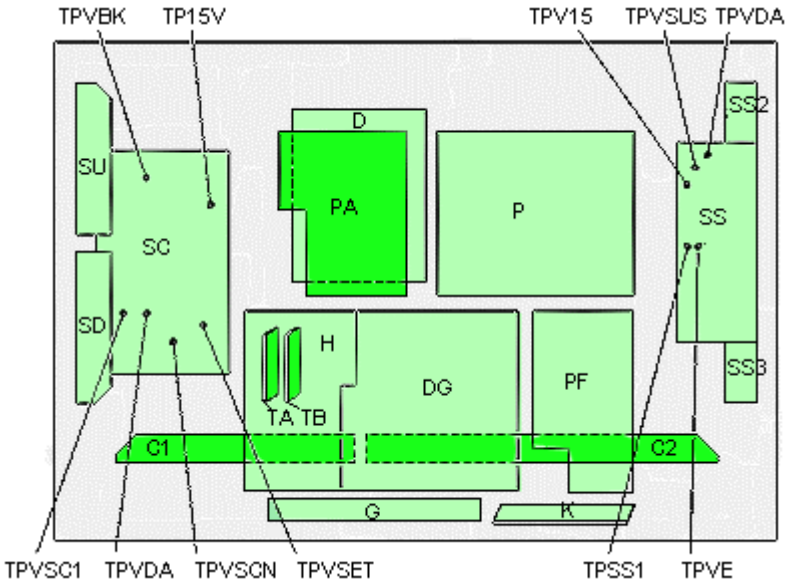


Figure 38

Serviceman mode (Electronic Controls)

This Plasma Display television uses the I²C Bus circuitry to control functions and replace many mechanical controls. Instead of adjusting mechanical controls individually, many of the control functions are now performed by using “On Screen Display Menu”. (The **Serviceman Adjustment Mode**.)

Note: It is suggested that the technician reads all the way through and understand the following procedure for Entering/Exiting the **Serviceman Adjustment Mode**.

Entry to Serviceman Mode:
When minor adjustments need to be done to the electronic controls, the method of entering the serviceman mode is as follows:

Using the Remote Control:

1. Select SET-UP icon and select CABLE mode.
2. Select TIMER icon and set SLEEP time for 30 Min.
3. Press “ACTION” twice to exit menus.
4. Tune to Channel 124.
5. Adjust VOLUME to minimum (0).
6. Press VOL down **on the receiver.** Red “CHK” appears in the upper left corner of the screen.
7. Select an active station.

Note: If more than 30 minutes are needed after the receiver is in the SERVICEMAN mode, setting the TIMER back to NO can disable the Sleep Timer.
Caution: Prolonged display of patterns **WILL** cause an after image retention into the panel.

The Plasma Display receiver is now in Serviceman Mode.

- Press Power on the Remote Control to display the Serviceman Adjustment Menu.
- Press Power again on the Remote Control to exit the Serviceman Adjustment Menu.

Figure 39

Exiting the Serviceman Mode:
Press the Power on the receiver (not the remote) until the receiver turns off.

The unit momentarily shuts off (for about 5 seconds); then comes back on tuned to channel 3 with a preset level of sound.

Important note: If the Action and Power buttons of the television are used to exit the Serviceman mode, any programmed channels, channels caption data, and some other user-defined settings will be erased.

Note: To access NTSC or HDTV adjustments, set the receiver's input to the appropriate mode (TV or HDTV).

CAT (computer aided test) Mode

CAT mode menu

CAT Panel sys8.1	Mode	Function	Access Button
IIC Mode	IIC	Service Alignment	Action
CD Mode	CD (Complete Diagnostics)	Software Version Information EEPROM Edit	Mute More than 5 seconds
SD Mode	SD (Status Display)	MTBF Parameter	Action
MS Mode	MS Mode	Not used	------
ID Mode	ID	Not used	------

How to access the CAT mode

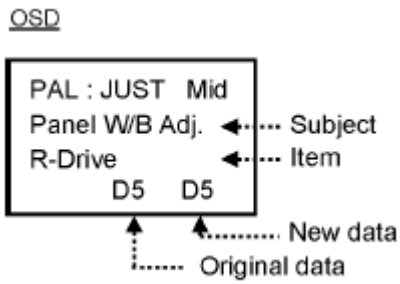
1. Enter the servicemen mode.
2. Select the OTHER (PSRVS).
3. Press the Action button on the remote.

To exit the **CAT** mode, access the **ID mode** and switch off the main power.

I²C Mode

Select the I²C mode by pressing the **Up/Down button** on the remote control from the front page of the CAT menu, and then press the **Action button** on the remote control.

Accessing the I²C mode?



1. Select the alignment subject by pressing **the 1 or 2 buttons** on the remote control.
2. Select the alignment item by pressing the **4 button** on the remote control.
3. Adjust the optimum setting by pressing **the Volume Up/Down buttons** on the remote control.

The data is memorized when you exit the I²C mode

Figure 40

To exit the I²C mode, press the **Recall** button on the remote control.

I²C Menu Structure

The values indicated in this flowchart are sampled data.

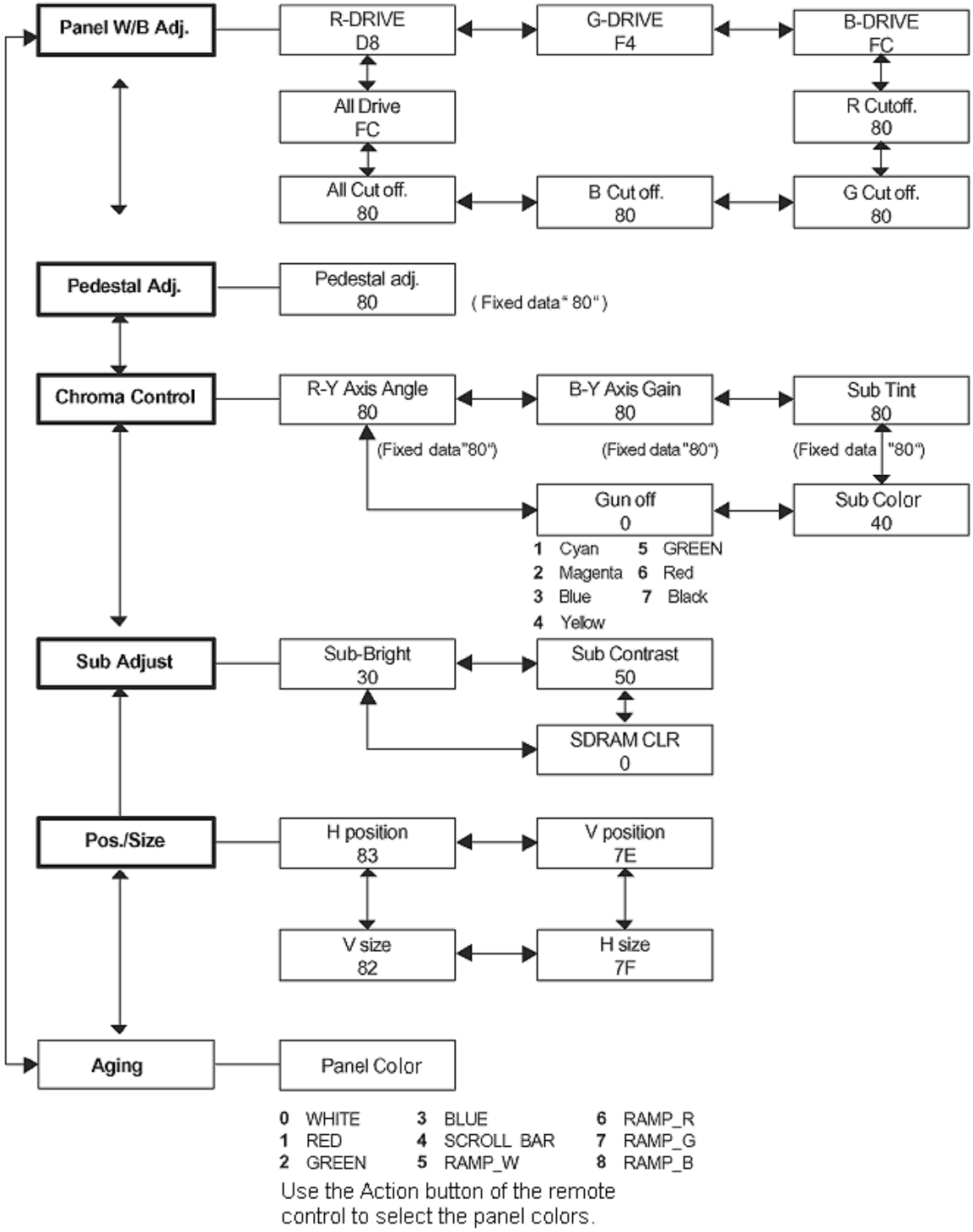
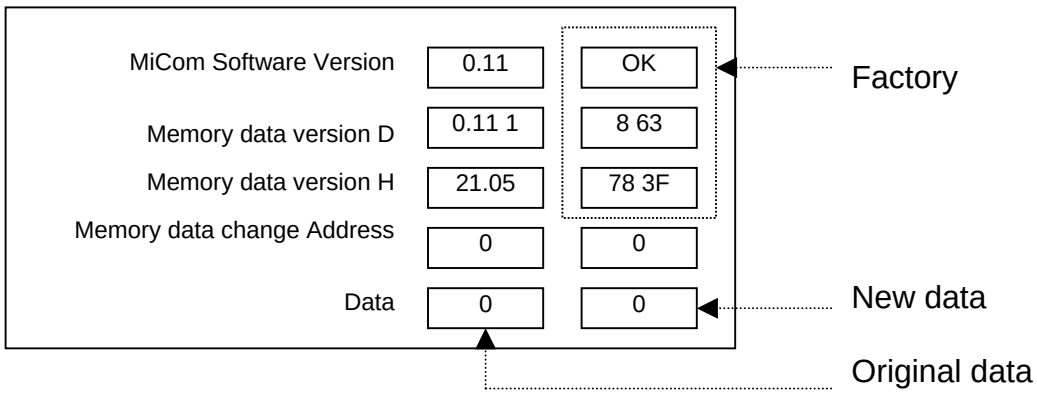


Figure 41

CD mode

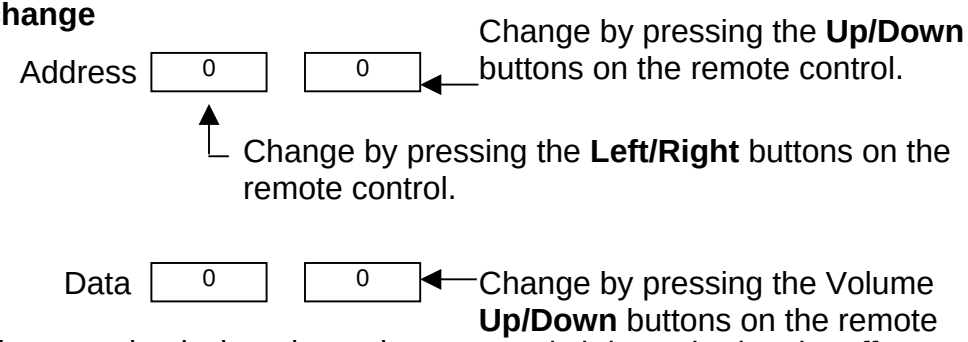
Select the CD mode from the front page of the CAT menu by pressing the **Up/Down** button on the remote control, and then press the **Mute** button on the remote control for more than 5 sec.

OSD



The software version of the EEPROM (IC9354) can be upgraded by:
1. Installing a new version IC
2. Loading the new version software from the loader tool, TZSC07036

Memory data change

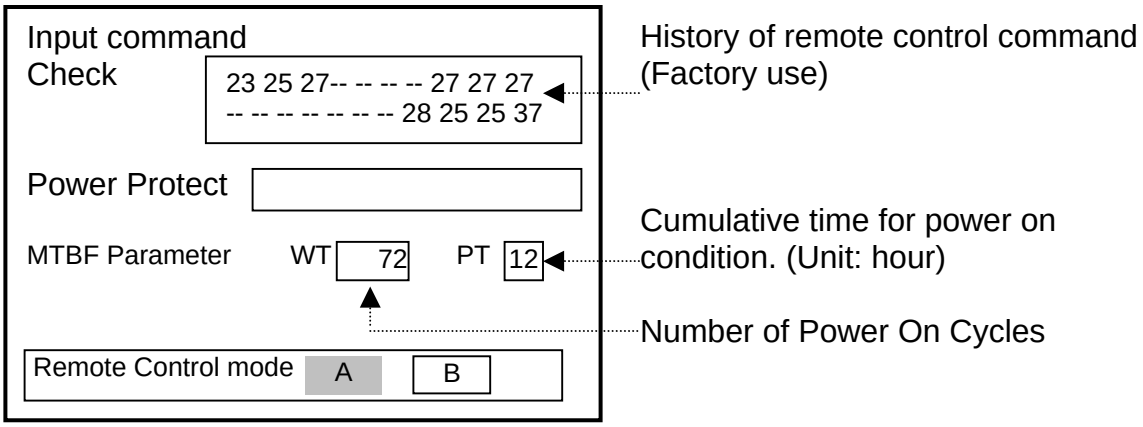


Note: The data is memorized when the main power switch is pushed to the off position.

SD Mode

Select the SD mode from the front page of the CAT mode by pressing the **Up/Down** button on the remote control, and then press the **Action** button on the remote control.

OSD



To exit the SD mode, press the **Action** button on the remote control.

Alignment Procedures

Pedestal Setting

Equipment required: RF Video Gray Scale Generator
Panel Settings; Picture = Normal, White Balance = Cool, Aspect Ratio = 16:9

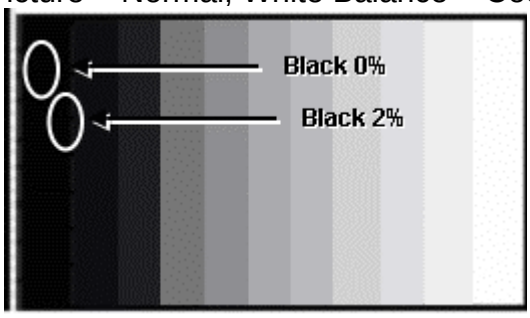
Pattern Display: 

Figure 42

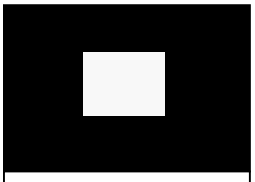
Step 1- Access the R, G and B cutoff settings and set them to “80”.
Step 2- Under the Chroma Control setting, Set Gun off to **"**5" (Only green pixels emitting).
Step 3- Access the RGB Sub Adjust, G Sub Bright setting and adjust G Sub bright so that green pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 4- Under the Chroma Control setting, Set Gun off to **"**3". (Only blue pixels emitting.)
Step 5- Access the RGB Sub Adjust, B Sub Bright setting and adjust B Sub bright so that blue pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 6- Under the Chroma Control setting, Set Gun off to **"**6". (Only red pixels emitting.)
Step 7- Access the RGB Sub Adjust, R Sub Bright setting and adjust R Sub bright so that Red pixel emission starts at black 2% area and no emission occurs in the black 0% area.
Step 8- Change input to PC / RGB signal. Repeat procedure (1 to 7) using PC input signal.

NTSC White Balance Adjustment

Equipment required: NTSC Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9

20 IRE Window pattern

Step 1- Using the Pattern generator; apply a 20 IRE Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.
Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.



80 IRE Window pattern

Step 6- Apply an 80 IRE window pattern signal to the Panel.
Step 7- Set the G Drive Setting value to E8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the light settings match the table below, adjust as necessary.

Table 1

Color Temperature	X	Y
Cool (High)	0.276	0.276
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

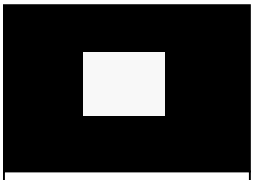
Step 12- Press the R button then the Picture button on the remote control. Change the color temperature to Normal. Press the R button again then the Action button to re-access the IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the R button then the Picture button on the remote control. Change the color temperature to Warm. Press the R button again then the Action button to re-access the IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

HD Panel White Balance Adjustment

Equipment required: 720p/1080i Pattern Generator, Colorimeter
Panel Settings; Picture = Standard, Color Temperature = Cool, Aspect Ratio = 16:9

Step 1- Using the Pattern generator; apply a 20 IRE Window pattern signal to the panel. Apply the color sensor to the panel and monitor the values.
Step 2- Adjust the Sub Bright Setting to 10 cd/m^2.
Step 3- Set the G Cutoff Setting Value to 80.
Step 4- Adjust the Red and Blue Cutoff settings to match the values in Table 1.
Step 5- Readjust the Sub Bright setting to 10 cd/m^2.
Step 6- Apply an 80 IRE window pattern signal to the Panel.
Step 7- Set the G Drive Setting value to E8.
Step 8- Adjust the Red and Blue Drive settings to match the values in Table 1.
Step 9- Reapply the 20 IRE pattern and 80 IRE patterns and verify that the drive and cutoff settings match the settings in Table 1, adjust as necessary.
Step 10- Adjust the All Drive Settings value to FC.
Step 11- Reapply the 20 IRE pattern and verify the light settings match the table below, adjust as necessary.

20 IRE Window pattern



80 IRE Window pattern

Table 1

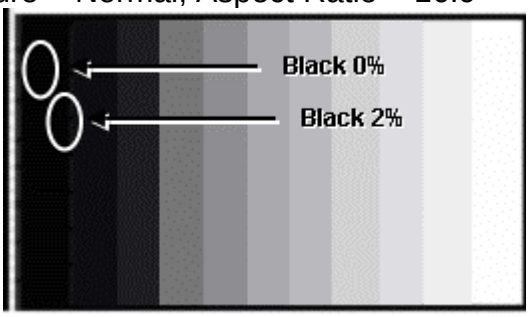
Color Temperature	X	Y
Cool (High)	0.276	0.276
Normal (Mid)	0.288	0.296
Warm (Low)	0.313	0.329

Step 12- Press the R button then the Picture button on the remote control. Change the color temperature to Normal. Press the R button again then the Action button to re-access the IIC mode.
Step 13- Repeat steps 2 to 11 for Normal Color Temperature.
Step 14- Press the R button then the Picture button on the remote control. Change the color temperature to Warm. Press the R button again then the Action button to re-access the IIC mode.
Step 15- Repeat steps 2 to 11 for Warm Temperature.
Step 16- Change the Color temperature to Cool Mode, then re-adjust the Sub bright value to “30”.

Sub Brightness Setting

Equipment required: NTSC grayscale pattern Generator
Panel Settings; Picture = Normal, Aspect Ratio = 16:9

Pattern Display:



Note: Adjust in a Dark room.
Step 1- Set the white balance to Cool.
Step 2- Access the All cutoff setting in service mode and adjust so that pixel emission starts in the 2% area and there is no emission in the 0% area.
Step 3- Write down all cut off data.
Step 4- Set the white balance settings to Normal.
Step 5- Adjust all the cut off values to the same data values of the Cool mode settings.
Step 6- Set the white balance settings to Warm.
Step 7- Adjust all the cut off values to the same data values of the Cool mode settings.
Step 8- Change the pattern to HD and apply it to the to the component input.
Step 9- Copy PAL all cutoff data to HD Mode.

Hotel Mode Operation

Hotel Mode restricts certain operation functions for use in hotels

Entry to Hotel Mode

1. Enter the Service Mode using the previously described method.
Note: Leave the set tuned to cable channel 124, changing the channel may inhibit access to the Hotel Mode EEPROM address.
2. Press the Power button on the remote control to display the service menu.

Figure 43

3. Press and hold the MUTE button on the remote control for a few seconds. The display will change from the standard serviceman mode setting to the EEPROM address / data display.

EEPROM Address / Data Display

4. Press the Channel Down button of the remote or receiver to select the EEPROM ADDRESS 1584.

5. Press the Volume Up button of the remote or receiver to set the data at EEPROM address to 01. Data 01 allows access to Hotel Mode, Data 00 inhibits access to and disables Hotel Mode.

6. Push the Power button of the receiver or the remote control to hide the Serviceman mode menu

7. Press and hold the Volume Down button of the receiver and press the TV/Video button of the remote control three times within two seconds to display the Hotel Setup menu.

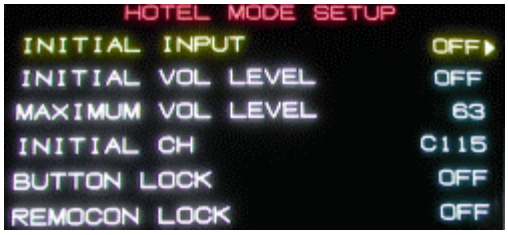


Figure 44

Item	Function	Options
INITIAL INPUT	The receiver automatically selects this input every time power is switched on.	OFF /TV /COMP1 /COMP2 /DIGITAL /VIDEO1 /VIDEO2 /VIDEO3 /PC /JPEG Off: gives priority to the last input in memory.
INITIAL VOL LEVEL	The receiver automatically selects this volume level every time power is switched on.	<Selection/Range>: OFF / 0 to 63 OFF: gives priority to the last volume Level in memory at power off The Initial Volume can be changed when the unit is in the Hotel Mode. However, priority is given to the last volume level in memory when Initial Volume is Off. **Note:** When the Initial Vol. is larger than the Maximum Vol. make the Initial Vol. and Maximum Vol. the same value.
MAXIMUM VOL LEVEL	Limits the maximum Volume level	<Range>: 0 to 63 The receiver allows the user to adjust the volume level up to the Maximum Vol. selected. **Note:** When the Initial Vol. is larger than the Maximum Vol. make the Initial Vol. and Maximum Vol. the same value.
INITIAL CH	The receiver automatically selects this channel every time power is switched on.	<Selection>: OFF / 0 to 69 for TV mode and C0 to C125 for cable mode OFF: gives priority to the last CH in memory at power off
BUTTON LOCK	The receiver automatically disables the selected front panel buttons of the receiver every time power is switched on.	<Selection>: OFF / ACTION / ALL OFF: No button restriction ACTION: restricts ACTION Button selection ALL: inhibits all button operations

REMOCON LOCK	The receiver automatically disables the selected keys of the remote control every time power is switched on.	<Selection>: OFF / ACTION OFF: No Restrictions Action: Action Button on the remote is inhibited

8. Push the Power button of the receiver or the remote control to hide the Serviceman mode menu

9. Press the Power button on the front panel to store the changes; the Hotel mode is now active.

Note: To return the unit to normal operation, use steps 1 through 5 to change the data at EEPROM address 1584 to 00, the Hotel mode is now disabled. All normal user functions are restored.

Service Contact Information

Panasonic Customer Call Center	**1-800-211-7262**
Tech Support Hotline	**PTV and Digital Products** **1-800-743-2335 (Authorized Service Centers only)** **All Other Products** **1-800-572-2672 Authorized Service Centers only (access code required)** **Fax 1-800-348-7315** **1-201-392-4207 Non–authorized (limited time access)**
Other Numbers	**1-800-833-9626 Parts Dept.** **1-800-458-5397 Musical Instruments** **1-201-392-4843 Telephone PBX Systems** **1-800-414-4408 Cellular Phones** **1-877-924-2473 Massage Loungers** **1-201-392-4281 Commercial MWO/Hotel Televisions**