SONY *Training Manual*

Plasma TV &
Grand Wega Projection TV

Models: KZ-32TS1U
KZ-41TS1U
KF-60DX100

KZ-32TS1U

KF-60DX100

Diagnostic Guides

Course: TVP-13

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KZ-32TS1U // KZ-42TS1U

KF-60DX100

Sony Plasma TV KZ-32TS1U/KZ-41TS1U Introduction

This training manual has been organized to provide a quick diagnosis of problems in Sony Plasma screen TV models KZ-32TS1U and KZ-41TS1U. The circuitry in these two TV sets is similar, but the boards and plasma panels are mounted differently.

Because the Plasma TV set is a new design concept, Chapter 1 will cover normal Plasma TV operation. The last chapter will cover plasma principles / concepts (only necessary for background information).

Repairs to these TV models involve identifying and replacing a circuit board, the plasma panel or other parts such as the fan or the on/off switch. This manual is divided into thirteen chapters:

Table of Contents

Chapter 1 - Normal Operation

Black top and bottom (letterbox) borders – Even though this TV has a wide 16x9 screen, it is still possible to receive a picture with top and bottom black bands. Movies are shot in many aspect ratios. The most common ratios are 4:3, 1.85:1 and 2.35:1. The picture displayed is dependent upon what aspect ratio the movie was shot in and how different it is from your TV screen's aspect ratio. Ref Figure 1-1 below:

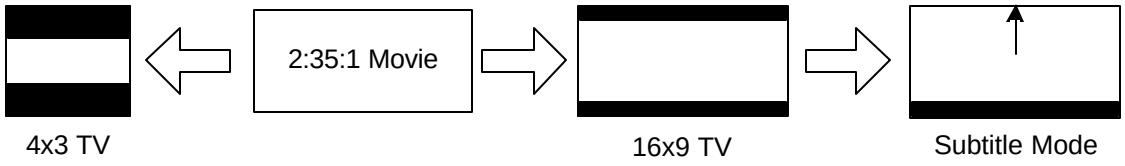


Figure 1-1 - Display of a 2:35:1 Aspect Ratio Movie

The 1.85:1 aspect ratio movie will display without the black bands on this 16x9 screen TV (16/9 = 1.77:1 aspect ratio) because their 1.85 and 1.77 aspect ratios are almost the same. The extra wide 2.35:1 aspect ratio movie camera is still used in the film industry (mostly overseas). It produces the black borders even on a 16x9 (1.77:1) TV screen. In this TV, you may choose the "Subtitle" screen mode from the menu to fill the top of the screen, leaving only a black band at the bottom for the subtitle.

Fan Noise – Once the TV is turned on, the fan starts. The fan itself makes no noise but air flowing through the TV does, especially when the TV is enclosed. This low level of air turbulence is normal. The Main CPU monitors the fan run voltage, rotation and ambient temperature of the power supply. This information is available to the user from the User Status menu as an OSD (on screen display OK or NG indication). Details such as the temperature are in the Service Mode (see Section 6).

Video Inversion to prevent border burn in – After a (undetermined) period of use, some plasma cells will not be as bright as others, causing an incorrect tint (because one of the red, green or blue plasma cells will darken, leaving the others bright). Burn in can be prevented from the user menu. From the Screen Saver menu, "Picture Inversion" may be selected to "clean" the screen (black becomes white and white becomes black momentarily), restoring normal brightness to the cells.

If this Inversion function were set for AUTOmatic, picture inversion would occur at a specified time every day if the TV were ON. This picture inversion may alarm a viewer that is not aware that this is normal for this TV.

Picture Shift / Picture Orbit – To reduce the possibility of a stationary image permanently "burnt" into the plasma screen phosphor, the picture can be set to automatically move in a circular "orbit" pattern. The menu's "picture orbit" can be set to small, medium or large orbit range and its cycle time can be 10, 30, 60 seconds or 5 minutes. Picture Orbit must be turned ON (normally OFF) if the user usually watches constant pattern images such as movies with borders, stock market scenes, etc.

Chapter 2 - Self-Diagnostics

Standby/Sleep Light

The front panel Standby LED blinks to indicate a fault. Refer to Figure 2-1. If the TV does not start up, the LED continually blinks to indicate a problem.

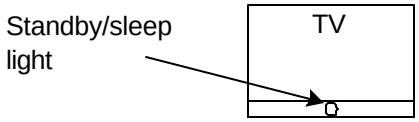


Figure 2-1

If the TV starts and shuts down, the LED will repeatedly blink to indicate the reason for shutdown or A/V muting. Table 2-1 shows the boards that can cause the Standby LED to blink continuously and Table 2-2 shows the boards that cause shutdown.

Table 2–1 - Causes of Continuously Blinking LED – No TV A/V (black screen)	
Cause	Suspect Board
EEPROM ID check error	B board
EEPROM read /write error	B board
Color Decoder IC error	B board
Panel will not initialize (start)	Plasma panel
Low B+ at start up	Plasma panel, power supply board

Table 2-2 - Cause of Standby LED Blinking in a Pattern - TV Shutdown		
Times Standby LED blinks	Cause	Suspected board
2 times	Plasma panel error	Plasma panel
3 times	Internal TV temperature at critical	Q board, Fan, or possibly B board
4 times	Digital 5Vdc output voltage excessive or too low.	Power Supply Output CN1/pin 9 / 10 B board is the load - CN101.
5 times	Digital 3.3Vdc output voltage excessive or too low.	Power Supply Output CN1/pin 5 / 6 B board is the load - CN101.
6 times	Analog 6Vdc output voltage excessive or too low.	Power Supply Output CN1/pin 13 / 14 B board is the load - CN101.

Chapter 3 - Board Selection by Defect

Table 3-1 shows the boards that could cause the symptoms listed. The most likely board is designated #**1**, second likely #**2**, etc. Two #1 means both boards have an equal probability. To resolve the conflict, testing is performed in the Standby/Power ON, Fan Drive, Video Flow circuit descriptions (Chapters 10-12) or the Plasma Panel picture defects (Chapter 4).

For isolation purposes, the TU (tuner board) may be unplugged and the TV will work, displaying video inputs.

Table 3-1 - Plasma TV model KZ-32TS1U / KZ42TS1U Board Selection by Defect

	Probable Circuit Board Failure					
Symptom	B*	H1	Power Supply**	Q	TU	Plasma Panel ***
Audio Problem – all inputs			**2**	**1**		
Audio Problem – TV channels (deselect SAP)			**2**		**1**	
Dark Screen – sound OK	**1**		**2**			**1**
Dark Picture – sound OK (deselect Power Save on the remote)	**1**					**1**
Dead Set - No relay click at plug in	**2**		**1**			**3**
Dead Set – Stby light OFF. No response to front panel pwr button. Plug-in relay click heard.	**3**	**2**	**1**	**4**		
Dead Set – Except for Stby light ON. No response to pwr button. Plug-in relay click heard.	**2**		**1**			**3**
Fan not cooling (front panel Standby indicator blinking.) See the TV menu and Fan block diagram in Section 7. Fan NG = No voltage to fan. Temp NG = Fan not working.	**3**		**2**	**1**		
Noise Bars across the screen (horizontal)	The rear metal shield must contact the conductive mesh on all four sides and be screwed to the center TV board assembly.					
Standby Indicator blinking 2 times			**2**			**1**
Standby Indicator blinking 3 times	**3**		**(2 = fan)**	**1**		
Standby Indicator blinking 4, 5 or 6 times	**2**		**1**			
Video Distortion – With composite and S video input only.	**2**			**1**		
Video Distortion – With component (Y, R-Y, B-Y) input only.	**2**			**1**		
Video Distortion – With both composite and component inputs. Try using the menu's "picture inversion" to "clean" the screen first.	**1**			**2**		**3**
Symptom	B *	H1	Power Supply	Q	TU	Plasma Panel **

*After B board replacement, adjustments for brightness and color balance are necessary. See Adjustments.

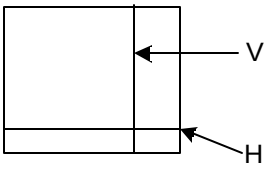
**The entire power supply board is listed in the service manual as "Switching Regulator". The 32" and 42" TV sets do not use the same Switching Regulator power supply and therefore have different part numbers.

***See Possible Plasma Panel defects for illustrations.

Chapter 4 - Plasma Panel Picture Defects

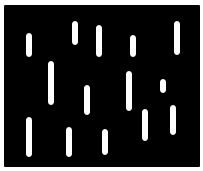
Board Location – Ref. Figure 4-1

a)



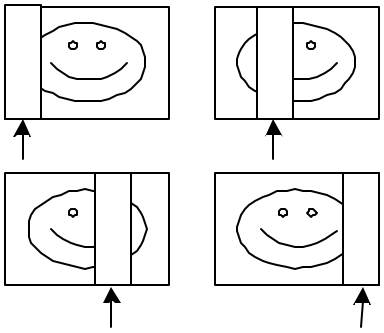
Vertical or Horizontal black / white line through the picture.

b)



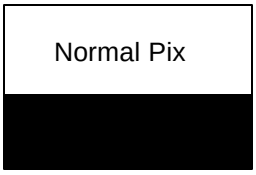
Colored rain in a black background.

c)



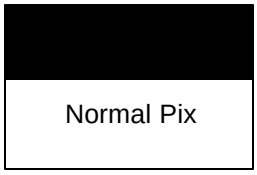
White Noise replaces 1/4 of the picture

d)



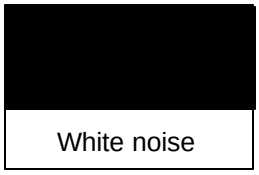
Black lower half

e)



Black upper half

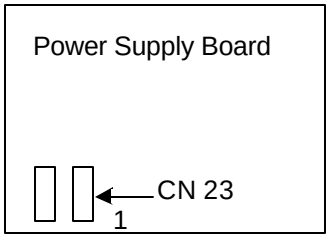
f)



Black top, bottom just white noise

g)

g) A Dark Screen with sound can be caused by the plasma panel or the TV circuitry. Measure the DC voltages and signal entering the plasma panel to determine which is defective.



13, 15 gray wires → CN 1 (1)

Dark screen?
Check DC and signal video levels at CN23 & CN 1.
<u>Normal Voltages with TV ON, any input</u>
CN23/pin 1 = 55Vdc
CN23/pin 3 = 5Vdc
CN23/pin 8-10 = 78Vdc (32") or 82Vdc (42")
CN1/pins 13 & 15 (gray wires) = 1Vp-p @ 30MHz
If these input voltages/signals are OK, the plasma panel is suspect. CN1 is on the plasma panel below the Power Supply board.

Chapter 5 - Board Location

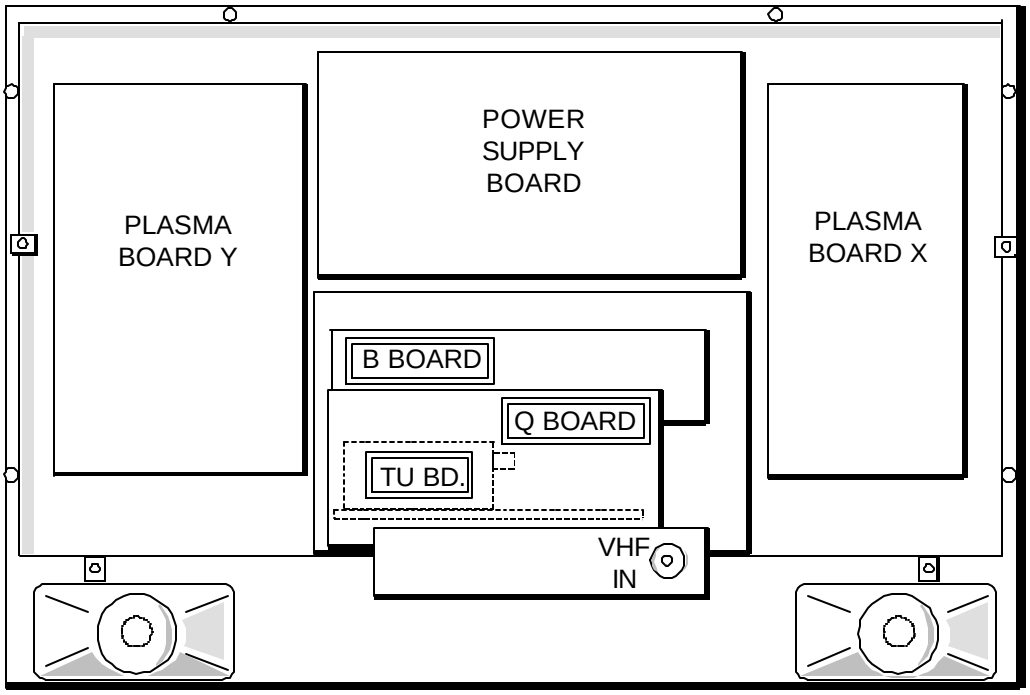


FIGURE 5-1 - BOARD LOCATION - KZ-32TS1U 8TVP13 1444 4/10/02

Chapter 6 - Service Mode

Service Mode Access

1. The TV must be in the Standby Mode as indicated by the front panel red light. Refer to Figure 6-1 for the location of the standby light. If this Standby light is OFF, plug the TV into AC, press the front panel Power button and then shut off the TV from the remote control. The Standby light should now be lit (red) while the TV is OFF.

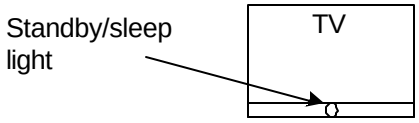


Figure 6-1

2. Using a Sony remote control aimed at the TV in the standby mode, quickly press: Display, 5, Volume +, Power ON **and MENU**. If the TV turned ON when 5 was pressed, you did not press the next Volume + button fast enough and will have to try again.

3. The following **new** service Mode menu shown in Figure 6-2 will appear above the user menu. Use the remote control joystick to move and change the data as before. Store data as in previous service modes, by pressing "Mute" and then "Enter".

Figure 6-2 - Service Mode Display

Service Mode Contents

Table 6-1 - Service Mode Contents	
Service Category	Contents
EEP ROM Initialize	See Figure 6-3 for a list of Initialize contents. Selecting a line (like "Common") reveals two options: OK or cancel. Selecting OK stores default data and causes the TV to reboot. You must press Menu when the TV turns back ON to return to the service mode. **Do not select OK** unless you have read what you are resetting to default levels. Whole Area - Resets the entire EPROM and requires a full TV alignment afterwards. The serial number, elapse operation time and diagnostic are erased. This is used when the TV is made. For service, you can individually reset EPROM contents: Common - Resets items that are not signal related, such as: language, Orbit, Diagnostic errors, serial number, color system and TV ON elapsed time. White Balance – Resets Low, Mid and High Temperatures to midgain in preparation for alignment after B board replacement. Prog. Gamma - Is not used. Tuner - Resets channels back to 2-13 and clears the Favorite channels. Prog. Preset - Erases user station names. Last Memory - Resets user video and audio preface settings. User Mem – Is not used Factory – Resets user settings to default except diagnostics and serial number. Tuner Micom- Same as Tuner.
Chroma Decoder	See Figure 6-4 for a content list. Preset contrast, sharpness, color and output levels as shown in Figure 6-4. The Hue for NTSC = 8, Y Delay = 8, and Cb/Cr Offset = 8. Sharp fo is the frequency the sharpness peaks. 0=2.5M, 1=3.2M, 2=4M, 3=off. Set to 3.
AD Converter	Adjust the brightness and hue for each input (video, component and RGB). Preset these levels after the B board is replaced and touch up. See adjustments for the procedure.
White Balance	White balance adjustments at low, middle and high brightness levels. Preset these levels after the B board is replaced and touch up. See adjustments for the procedure.
General	See Figure 6-5 for a content list. AGC Wide & Narrow - Data affects capturing stations during auto programming (wide = 14) and operation (Narrow = 13). Fan Status - Displays the temperature of the power supply and the voltage applied to the fan motor (8.6Vdc = slow). Vs / Va Setting - The main plasma panel voltages Vs and Va are set using Uvrs and Uvra. The 32" TV uses Uvrs = 82 and Uvra = 106. The 42" TV uses 93 and 128 respectively. Vs and Va needs adjustment if the logic board within the plasma panel is replaced.
Manual Control	See Figure 6-6 and 6-7. These are all preset to 00 except for: PDP =20.
Preset Edit	See Figure 6-8. This section presets the parameters for a new video input signal.

Service Status	See Figure 6-9. This section displays the status of the input signal, and TV condition. Signal/sync - Format, freq, and sync polarity of the input signal. Power Supply – Low voltage output of the power supply in voltage DC. Fan & Temp - The fan voltage and power supply temperature. Within this category is a No Ack Dev - Points to an IC that is not communicating with the Main Micro using a 4-digit defect code number. See No Acknowledge Device table 6-2. Warning Status – Shows completion of communications from the Main Micro (B board) to memory IC and to 15 others. Operation Time – Elapse TV ON time. Software & PLD version – Software in Main micro and Panel Micro.

Table 6–2 - Service Mode - Service Status under Fan and Temp, No Acknowledge Device

Defect Code	Suspected IC		Defect Code	Suspected IC
0001	Audio Processor (A board)		0002	Audio Switch (Q board)
0004	AV Switch IC (U board)		0008	V Chip (Q board)
0010	3D Comb filter IC (B board)		0020	Color Decoder (B board)
0040	Plasma Panel (PDP)		0080	Tuner (TU board)
0100	Auto Wide IC (B board)		0200	A/D Converter (B board)
0400	EPROM (M board)		0800	System IC (B board)
1000	V Chip (Q board)		2000	PLD (B board)
4000	Real Time Clock IC (B board)		8000	Scan Converter (B board)

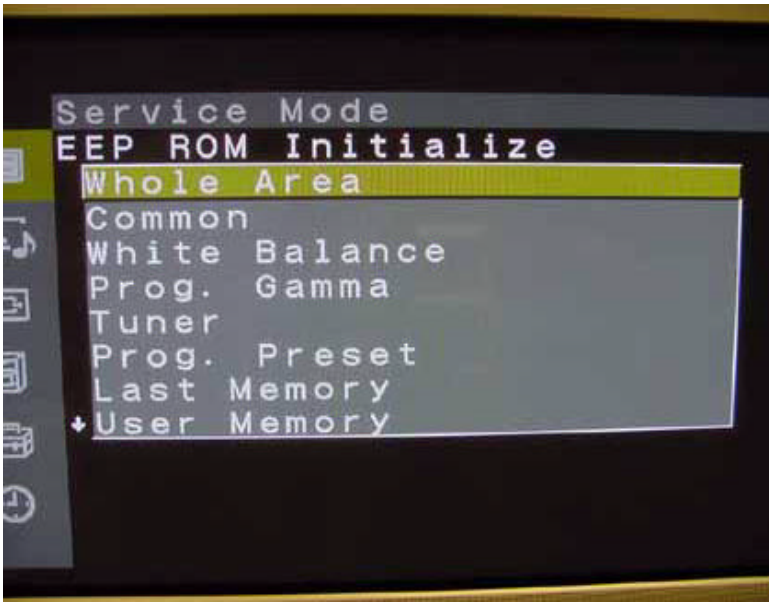


Figure 6-3 Service Mode - EEP ROM Initialize

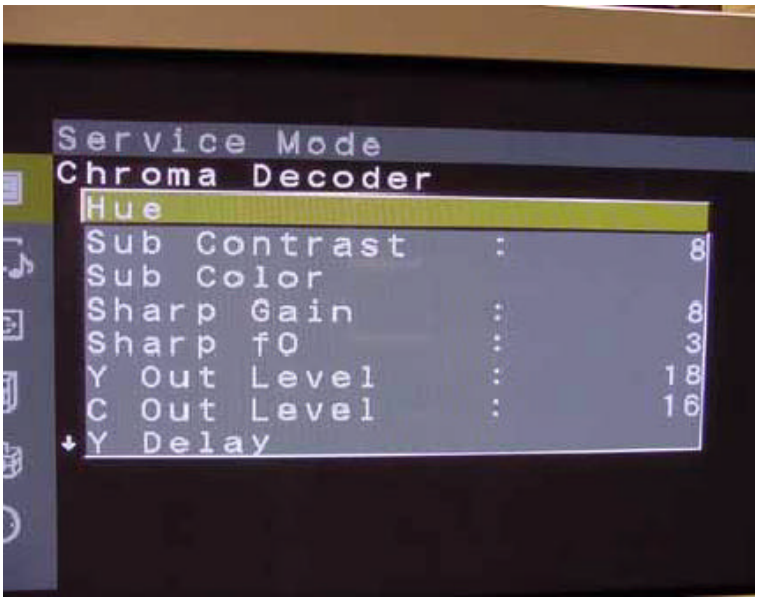


Figure 6-4 Service Mode – Chroma Decoder

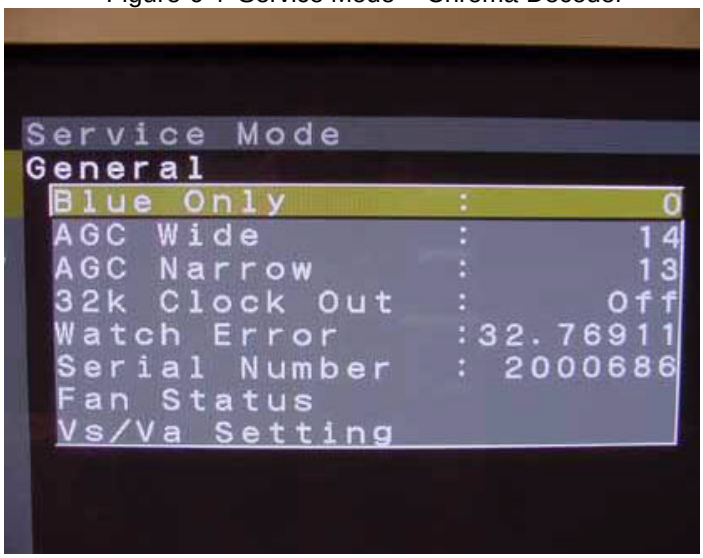


Figure 6-5 Service Mode –General

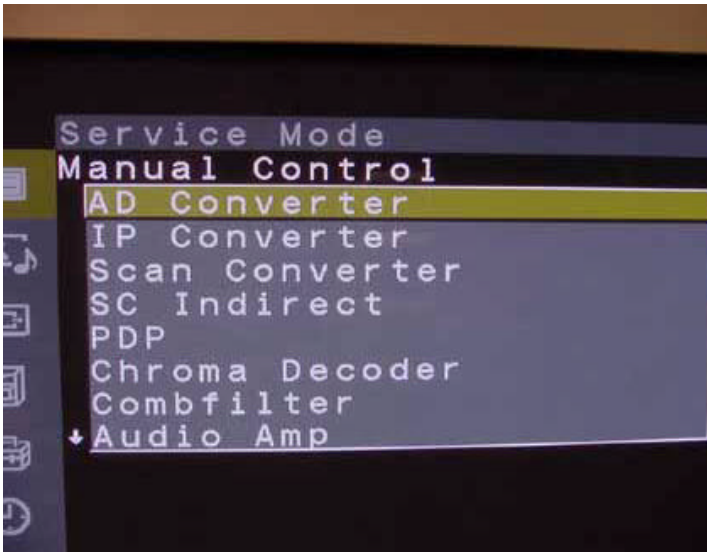


Figure 6-6 Service Mode – Manual Control 1/2

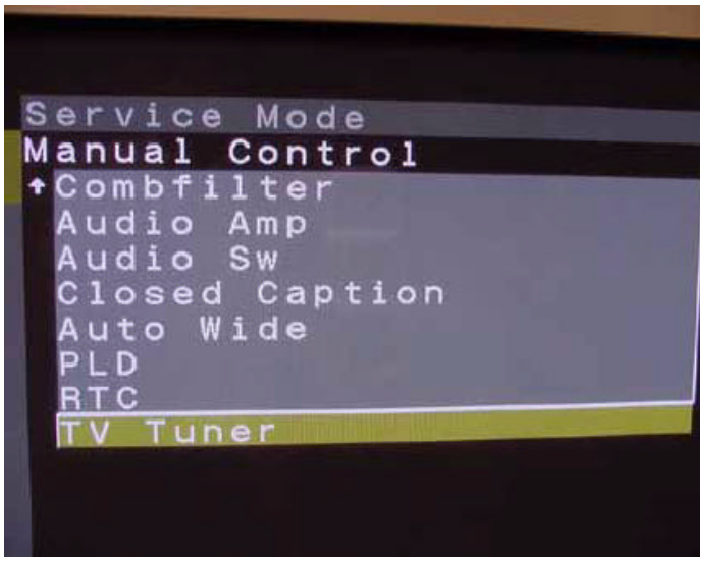


Figure 6-7 Service Mode – Manual Control 2/2

Figure 6-8 Service Mode –Preset Edit

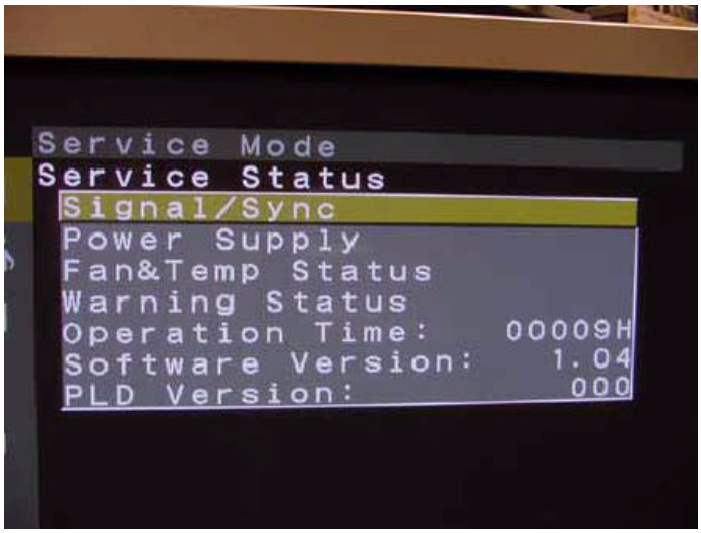


Figure 6-9 Service Mode –Service Status

Chapter 7 - Adjustments when the B Board is Replaced

If the B board is replaced, the A/D Converter levels and white balance need to be adjusted or the brightness and tint range will not be consistent when switching inputs. These settings are made from the service mode for each input (Tuner, Video and Component) type and the data is saved in a NVM IC on the TV's B board.

Service Mode Access

1. The TV must be in the Standby Mode as indicated by the front panel light. If this Standby light is OFF, plug the TV into AC, press the front panel Power button and then shut off the TV from the remote control. The Standby light should now be lit while the TV is OFF. Ref. Figure 7-1.

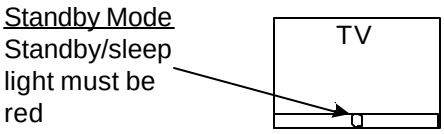


Figure 7-1

2. Using a Sony remote control aimed at the TV in the standby mode, press: Display, 5, Volume +, Power ON **and MENU,** quickly. If the TV turned ON when 5 was pressed, you did not press the next Volume + button fast enough and will have to try again.

3. The following **new** service Mode menu shown in figure 7-2 will appear above the normal user menu. Use the remote control joystick to move and change the data as before. Store the new data by pressing Mute, and then Enter, as before.

Figure 7-2 - Service Mode Display

A/D Converter Adjustments

White balance and brightness levels for the three types of video inputs are set in the AD Converter area of the service mode. All three types of video inputs (RGB, YUV and Video) are shown in Figure 7-3 and Table 7-1. Adjust each one by feeding the corresponding white input to the back of the TV or temporally preset them to these default values shown. Use the remote control joystick to select and change the data.

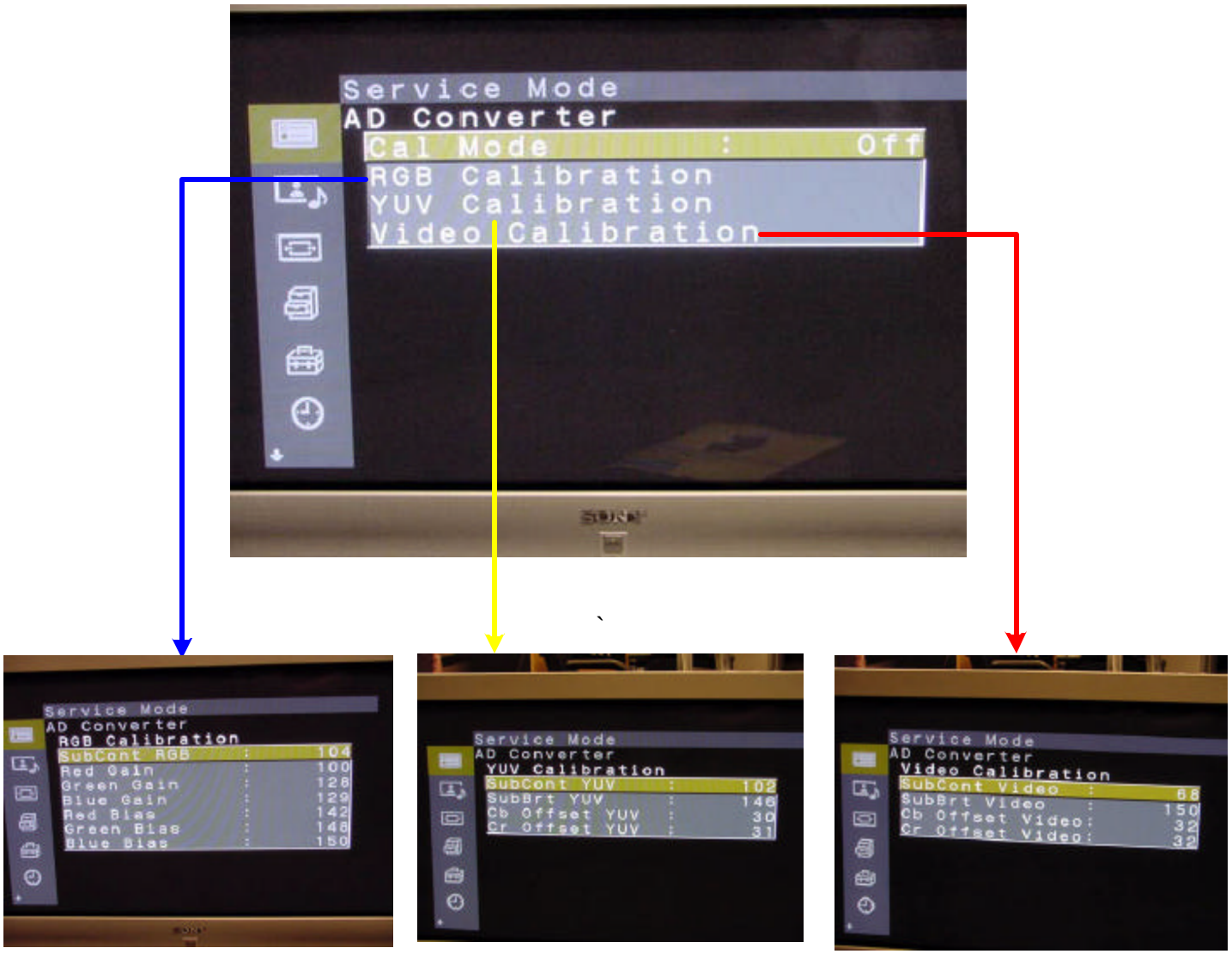


Figure 7-3 - A/D Converter Preset Default Levels

3/13/02

Table 7-1 A/D Converter (WB & Brightness) Default Levels								
RGB			YUV (Component Video)			Video (Composite Video)		
Item	32” Level	42” Level	Item	Level	42” Level	Item	Level	42” Level
Sub Cont RGB	104	110	SubCont YUV	102	106	SubCont Video	68	65
Red Gain	100	114	Sub Bri YUV	146	145	SubBrt Video	150	142
Green Gain	128	128	Cb Offset YUV	30	31	Cb Offset Video	32	34
Blue Gain	129	131	Cr Offset YUV	31	31	Cr Offset Video	32	34
Red Bias	142	139						
Green Bias	148	147						
Blue Bias	150	150						

White Balance

In the service mode, you will preset the RGB gain levels for the High, Middle and Low color temperatures, then check the white balance as brightness is increased from minimum to maximum. Figure 7-4 Shows the RGB levels for the 32" TV and Figure 7-5 shows the levels for the 42" TV. Use the remote control joystick to select and change the data (position of the x). Store the data by pressing “Mute” and then “Enter”.

Check the white balance as you increase the TV’s brightness level bar from low to middle to high screen brightness. The white areas of the picture should remain white even as the brightness is changed. If the white balance is off, return to the stop service mode and touch up the R, G or B adjustment level.

KZ32TS1U

Figure 7-4 shows the White Balance levels from a 32" Plasma TV.

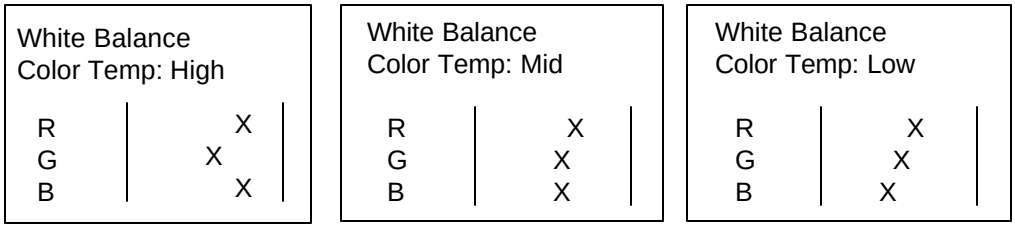


FIGURE 7-4 - WHITE BALANCE PRESET DEFAULT LEVELS - MODEL KZ-32TS1U

KZ-42TS1U

Figure 7-5 shows the White Balance levels from a 42" Plasma TV:

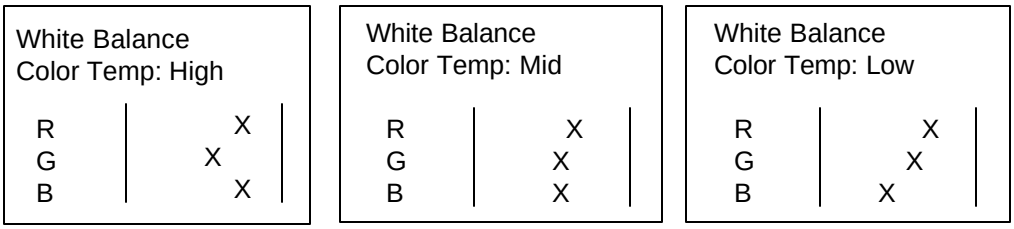


FIGURE 7-5 - WHITE BALANCE PRESET DEFAULT LEVELS - MODEL KZ-42TS1U

Chapter 8 - Plasma Panel Replacement - KZ-32TS1U

The KZ-32TS1U and the KZ-42TS1U are mechanically different and have separate procedures for removal of the Plasma Panel.

Handling Precautions

After removing the plasma panel from the TV, note that there are flex cables located at the bottom and both sides of the panel that are susceptible to damage.

So the flex cables are not damaged, only rest the plasma panel topside down as shown in figure 8-1.

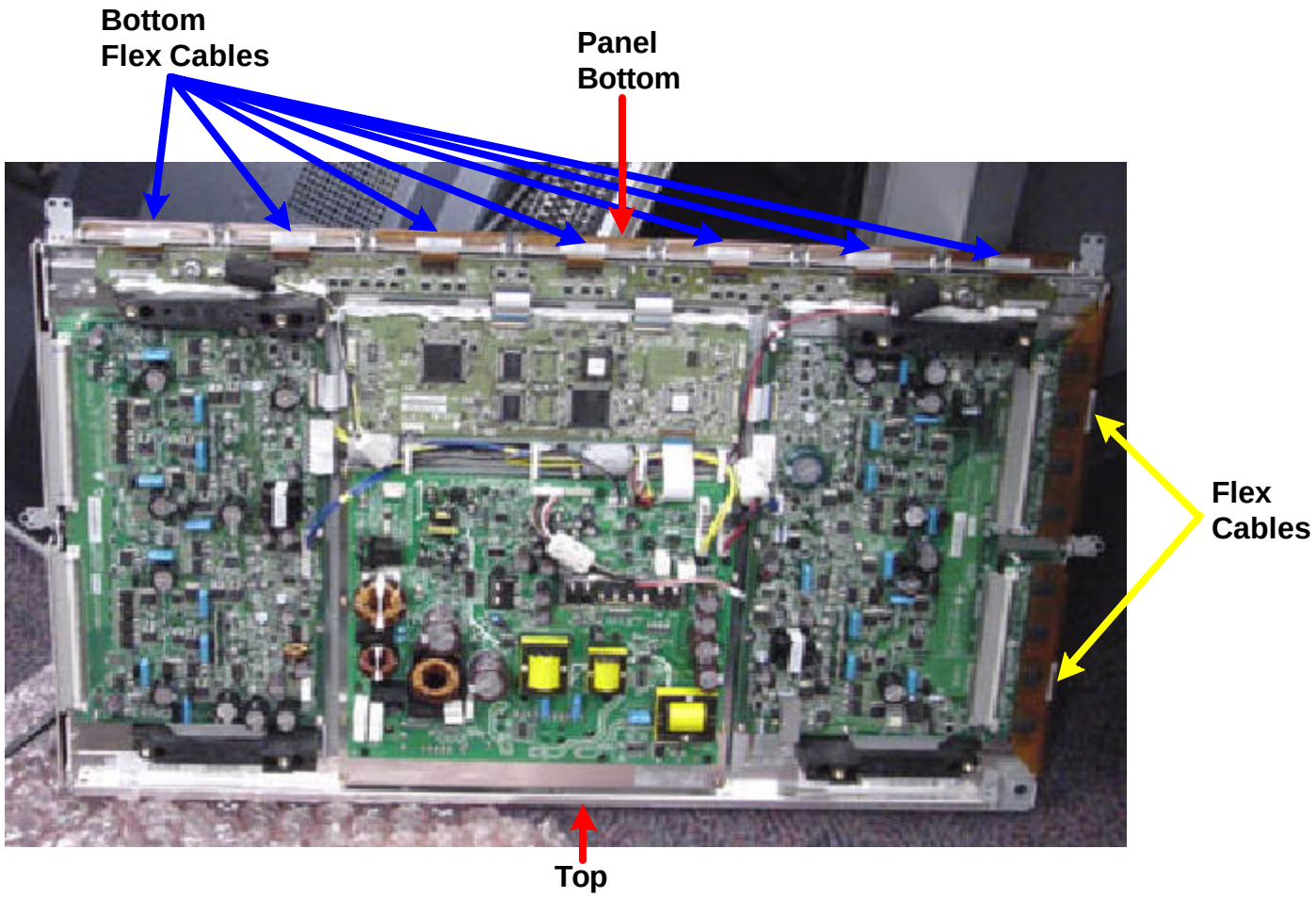


Figure 8-1 - Plasma Panel Standing Upside Down

Procedure – KZ32TS1U

In the steps to follow, you will remove the rear panel, the shield, the board assembly and both support rails to free the plasma screen that is connected to the front bezel.

Fan & Shield

- **Remove**

Figure 8-2 - Back Removed

a) Begin by removing the back panel to expose the shield, shown in figure 8-2.

b) Unplug the fan and remove the shield.

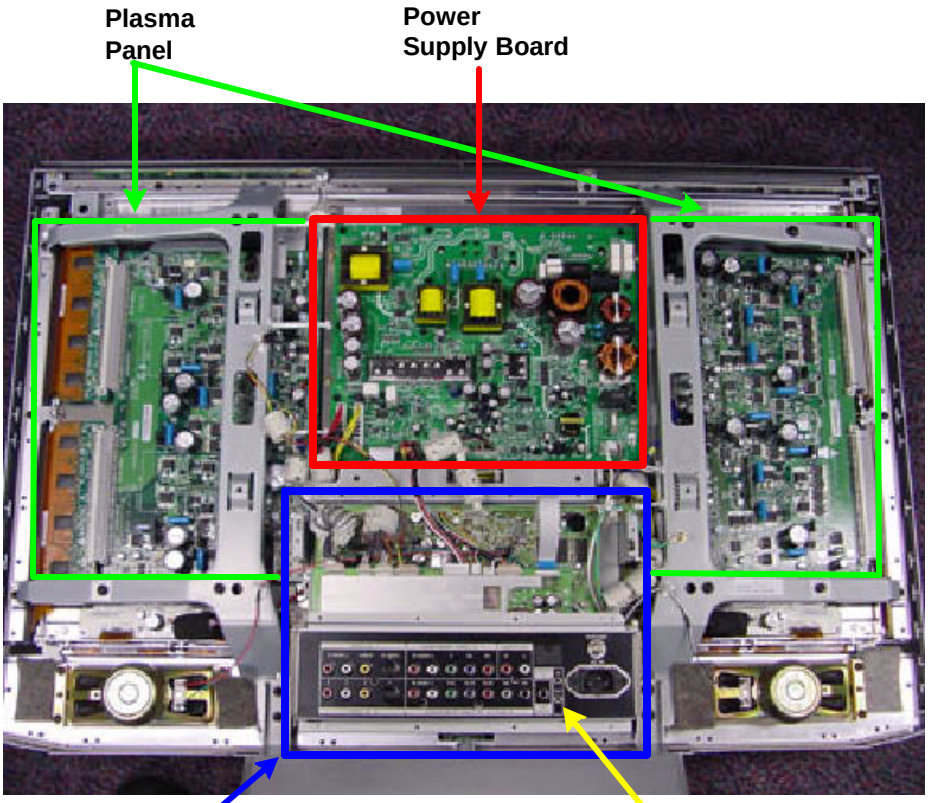


Figure 8-3 - Circuit Boards

The lower board assembly (behind the input jacks) must be removed because the plasma panel cannot be slid out from underneath it. There is a lip under the board assembly that prevents the panel from being slid sideways.

c) Remove the input connector cover (four screws + VHF input jack)

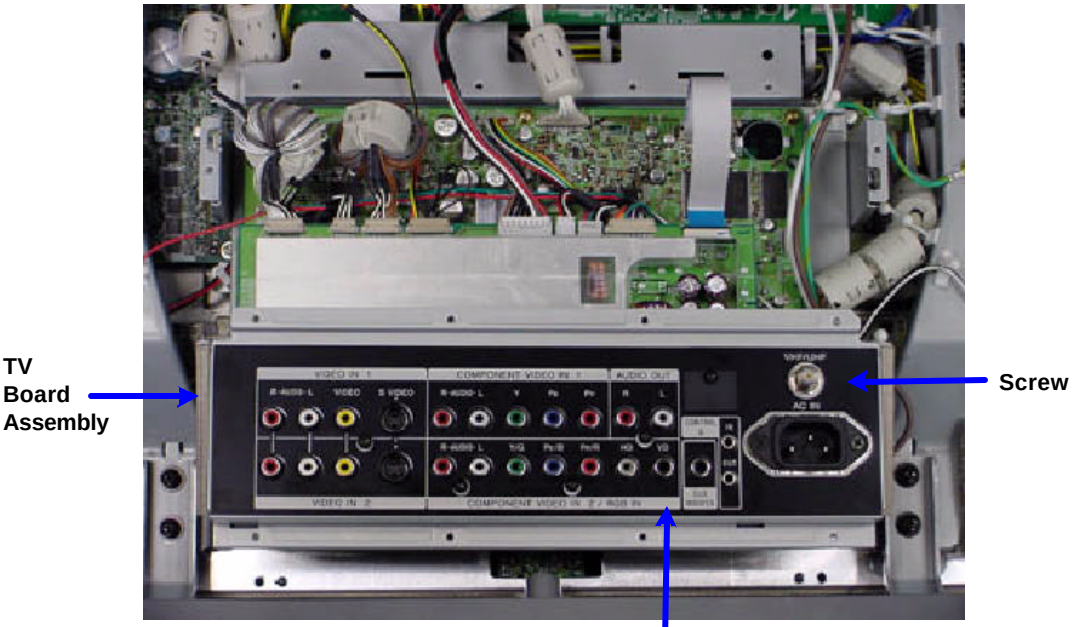


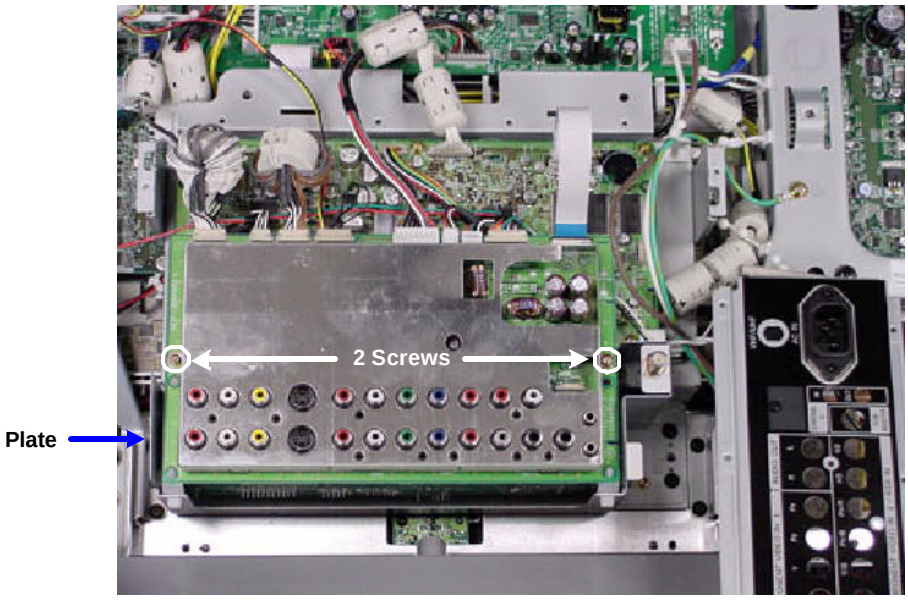
Figure 8-4 - Input Panel

The TV boards are in an assembly held in by four black screws. Two can be easily seen at the right in Figure 8-5. The left two are behind the plate. In the next three steps, you will lower the front Q board to remove all the screws and pull out the H1 board cable harness from the assembly.

d) Remove two screws holding the front Q board in the TV board assembly (see Figure 8-5). Fold it down.

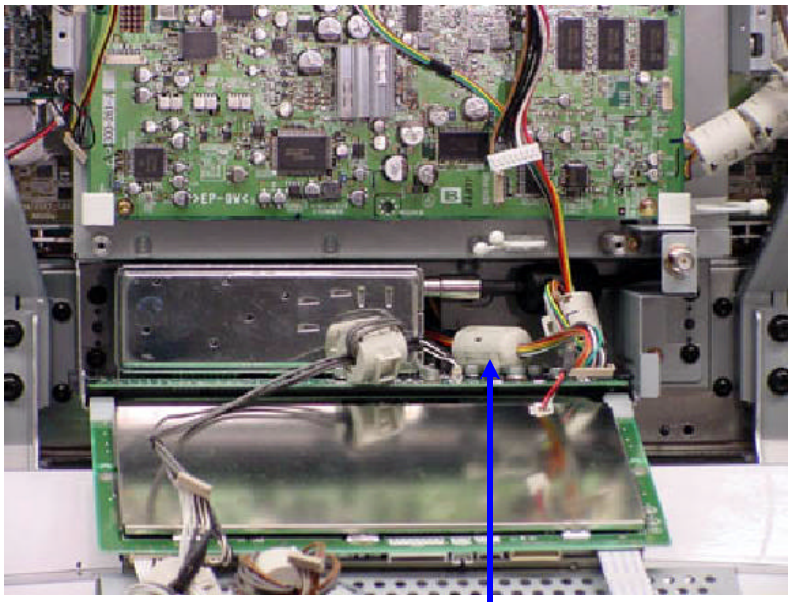
e) Remove the four black screws holding the TV board assembly. Gradually pull the assembly toward you.

f) Snake the H1 Board cable harness out the back to free the TV board assembly (see Figure 8-6).



Remove TV Board Assembly 1
- **Fold Down board**

Figure 8-5 - Remove TV Board Assembly 1



Remove the TV Board Assembly 2

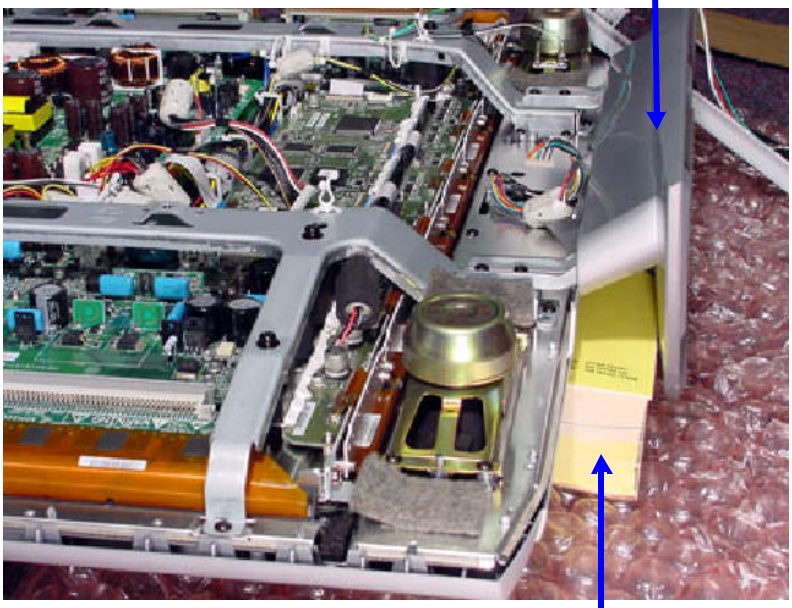
- **Snake the H1 board harness out the back hole**

H1 Board Cable Harness

Figure 8-6 - Remove TV Board Assembly 2

In the next two steps, the TV must be supported while face down and the base removed.

Phone Book(s)



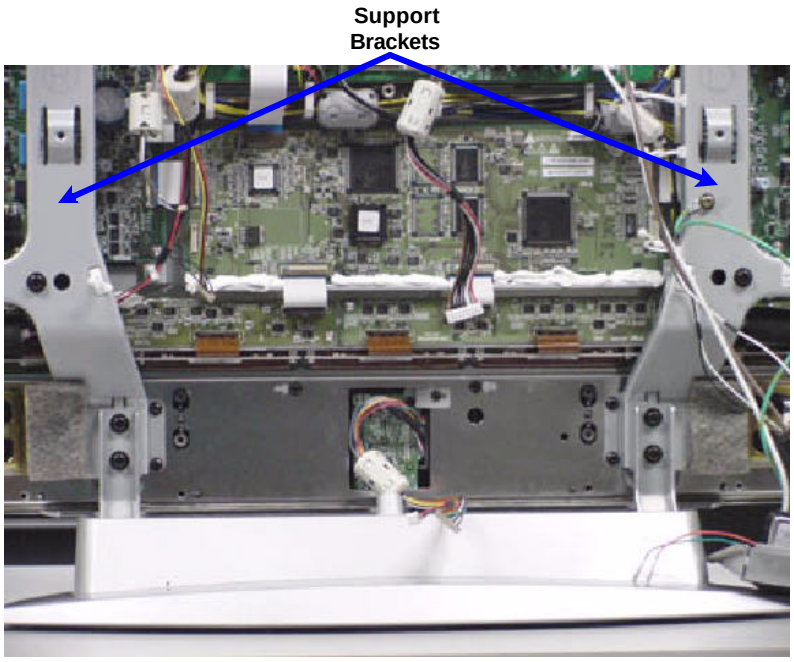
- **Insert Books**

Phone Book(s)

Figure 8-7 - Base Removal 1

g) Lay the TV face down on a clean soft cloth. Bubble wrap was used in these pictures because it was clean and soft.

h) Use books to lift the base off the floor.

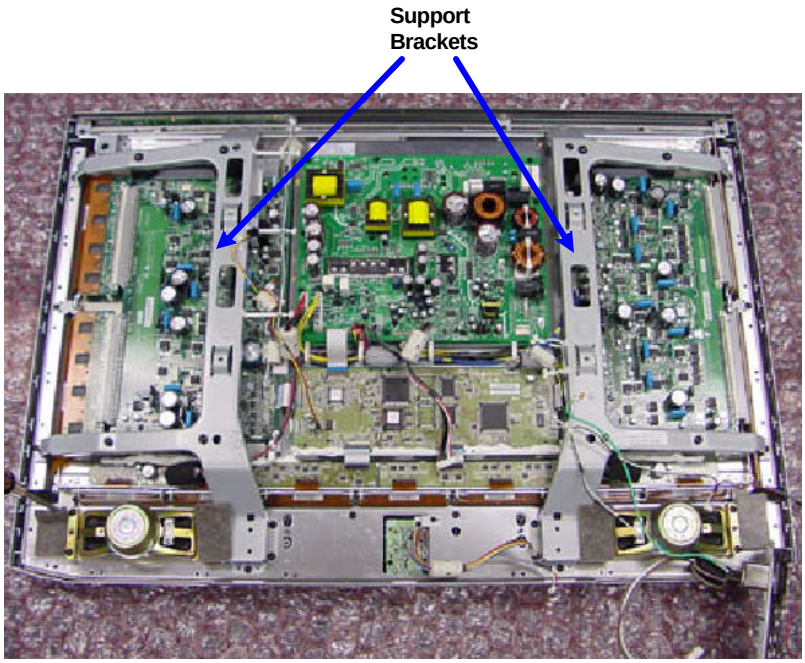


Top View

Figure 8-8 - Base Removal 1

i) Remove the base.

j) Lay the TV screen flat on the floor.



Bezel, P.S and Plasma Screen

- Remove bracket

Figure 8-9 - Base Removal 2

k) Remove the two support brackets.

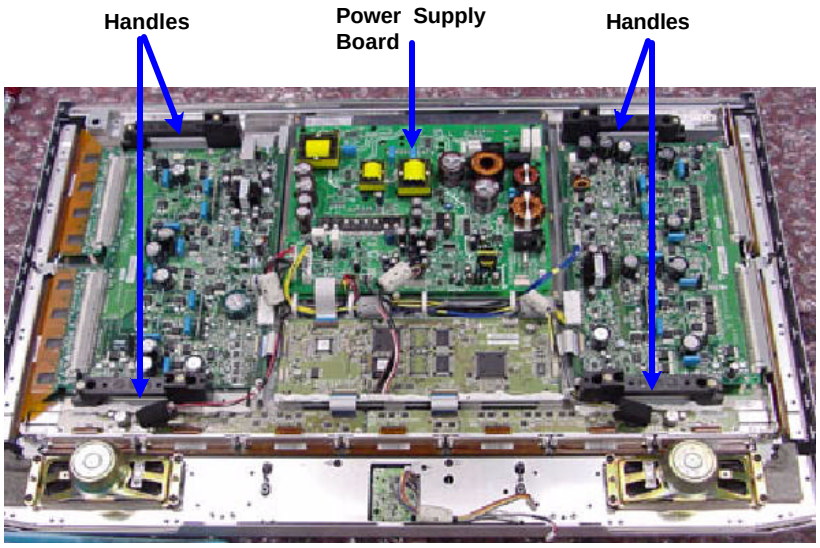


Figure 8-10 - Plasma Screen Handles

l) Finally, remove the plasma screen – use the four black handles to lift. Only place the top of the plasma screen down. The other three sides have vulnerable flex cables present.

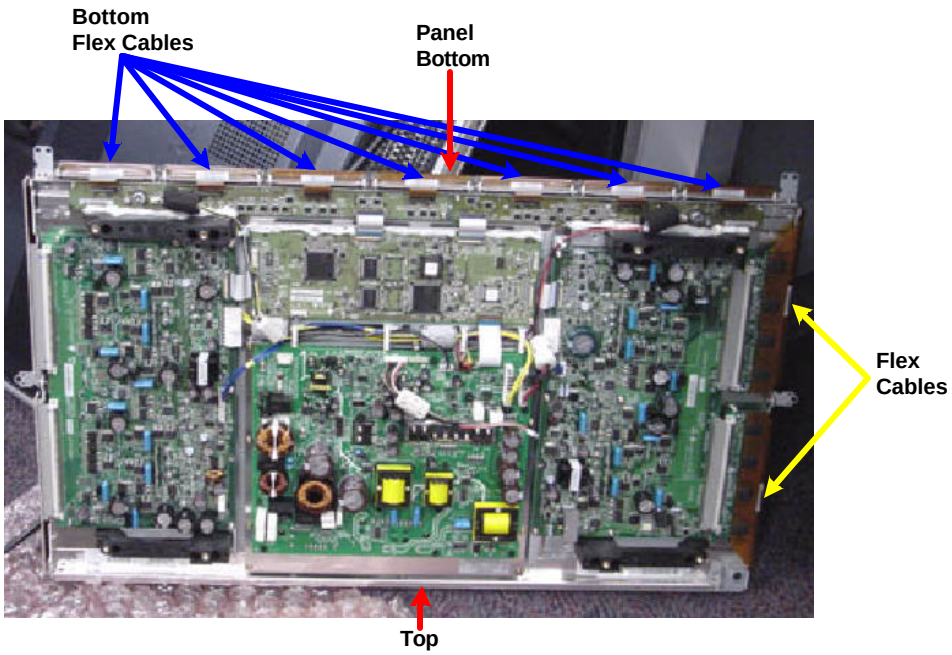


Figure 8-11 - Plasma Panel Standing Upside Down

m) Remove the power supply board (mounted on the larger metal heat sink).

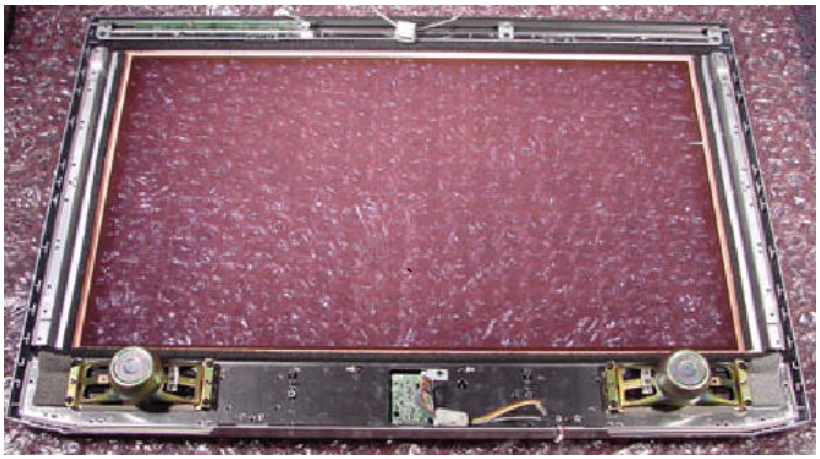


Figure 8-12 - Front Glass Screen

n) The inside of the TV screen is coated so do not clean or leave oil on it by touching it. The inside surface scratches easily. Clean the inside of the TV screen if there is film or fingerprints. Use the Sony p/n X-4034-197-1 soft cloth and diluted mild window cleaner if necessary. A 50% mix of water and window cleaner is OK. Do not use dishwashing detergent or soaps.

Reassembly

Assemble in the reverse order:

- Screw the power supply board onto the Plasma Panel (Figure 8-10).
- Position the Plasma Panel into bezel (Figure 8-10).
- Fasten left and right support brackets over the handles (Figure 8-9).
- Snake the H1 board cable harness into the TV board assembly rear and secure the assembly (Figures 8-6 & 8-8).
- Plug in the connectors. Make sure these test connectors on the B and Q boards are empty (Figure 8-13 shows the location of empty CN1003, CN1002, CN1201 and CN3008).

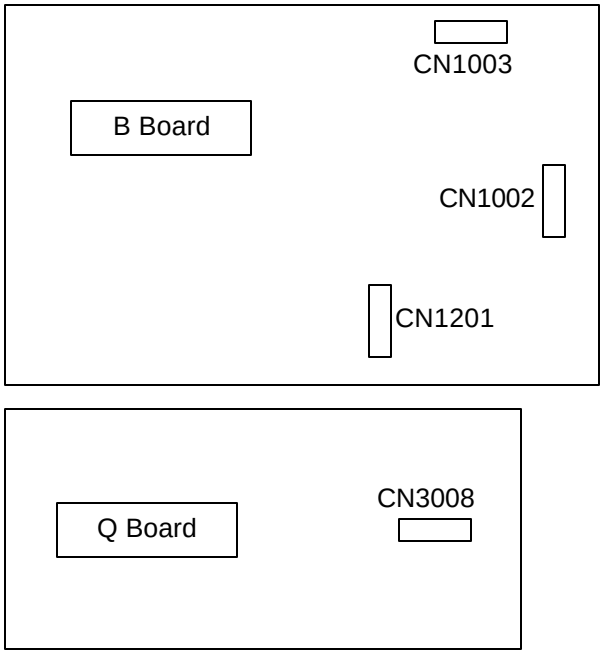


Figure 8-13 - Unused Test Connectors

- Mount the input connector cover that contains the AC socket (Figure 8-3).
- Test the TV by plugging in AC and a VHF signal. The TV will operate for at least 30 minutes without the fan connected. There will be horizontal noise bars of interference from the power supply when the rear shield is not installed.
- Install the TV shield and fan. **Make sure the shield makes contact to the conductive mesh on all four sides and the shield is screwed into the center TV board assembly or you will have interference on the TV stations.**

Fan & Shield

Figure 8-2

- Install the rear panel.

Chapter 9 - Plasma Panel Replacement - KZ-42TS1U

The KZ-32TS1U and the KZ-42TS1U are mechanically different and have separate procedures for the Plasma Panel removal.

Handling Precautions

- After removing the plasma panel from the TV, note that there are flex cables located at the bottom and both sides of the panel that are susceptible to damage. Only rest the plasma panel topside down so the cables are not damaged. The 32" Plasma panel is shown. The 42" is similar.

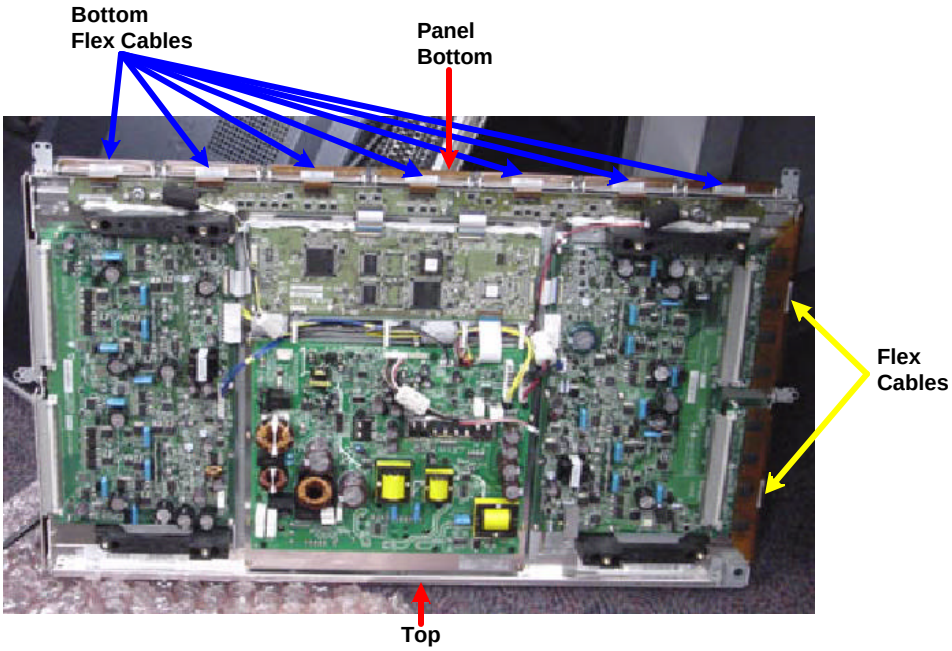


Figure 9-1 - Plasma Panel Standing Upside Down

Procedure:

In the following pictured steps, you will remove the rear circuit board assembly and the rear shield.

Before you can pull off the plasma panel:

a) Remove the back panel to expose the input circuit board assembly and shield.

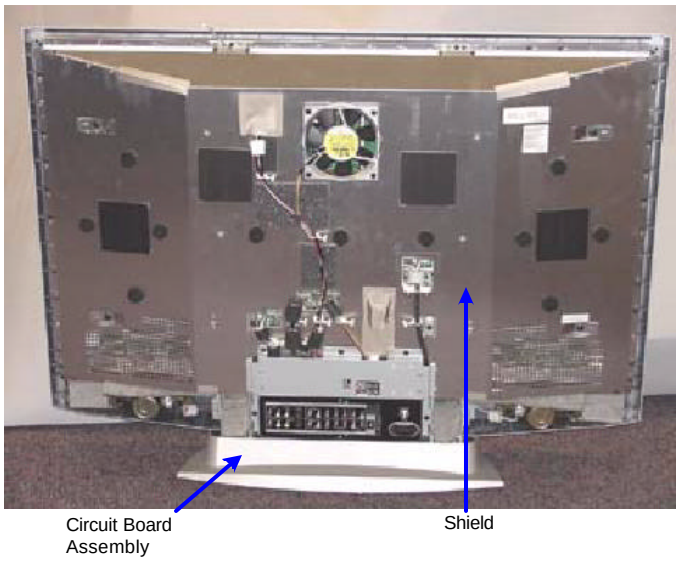


FIGURE 9-2 - BACK WIRES

b) Seven connectors must be removed. Three connectors have a catch that must be pulled or squeezed to separate the connector. The remaining four connectors are simply unplugged. Remove the conductive mesh tape that shields the ribbon connector and unplug the white ribbon cable (Figure 9-3) by pulling it straight out. Do not fold the ribbon cable.

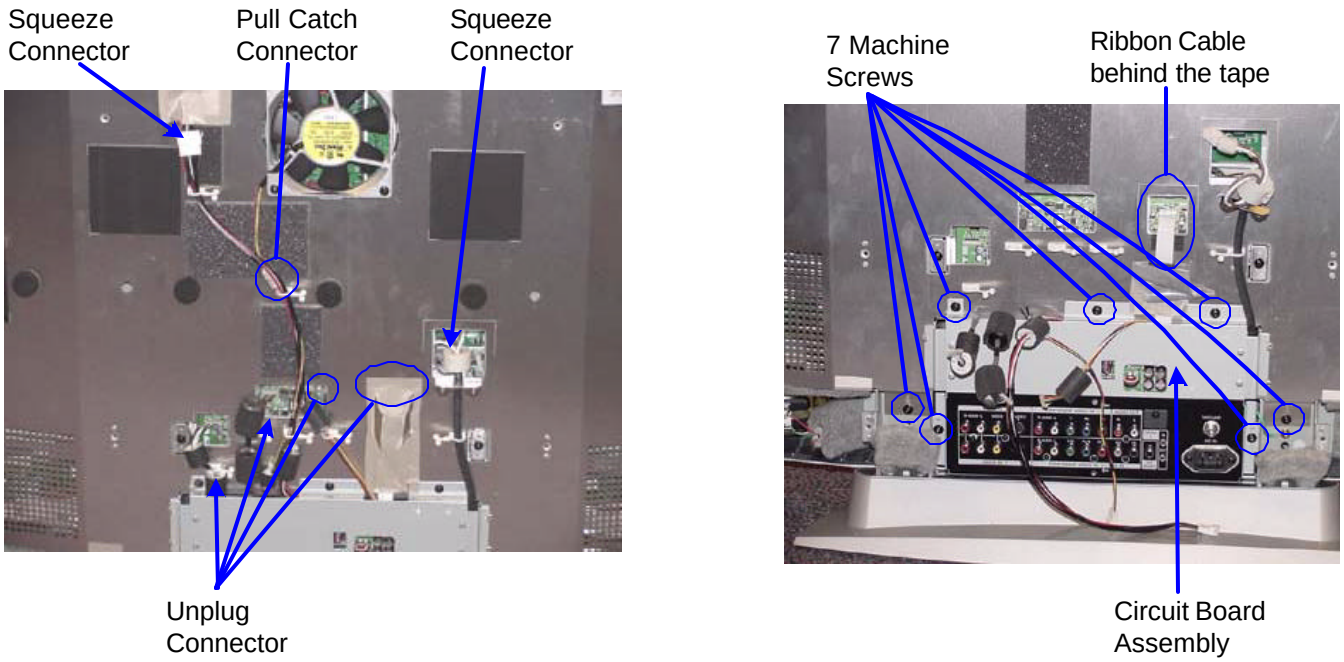


FIGURE 9-3 - REMOVE 7 CONNECTORS AND 7 SCREWS

c) Remove the seven machine screws around the circuit board assembly and pull off the assembly.

d) Remove the rear shield with the top decorative panel to expose the circuitry (Figure 9-4).

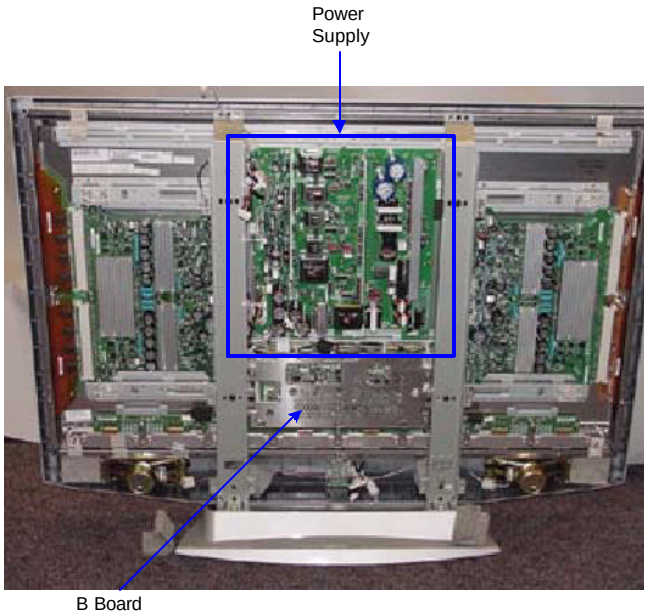


FIGURE 9-4 - REAR SHIELD REMOVED

e) Place the TV face down on some books so the TV is level.

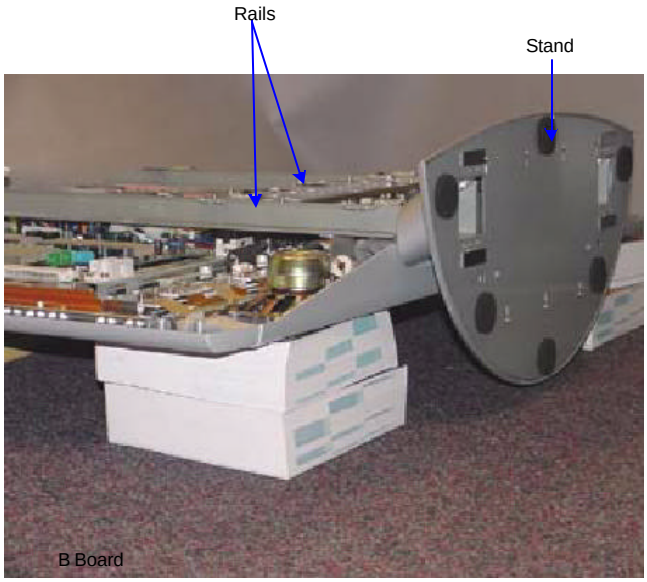


FIGURE 9-5 - LEVEL THE TV ON BOOKS

f) Remove the two rails with the center B board and TV stand.

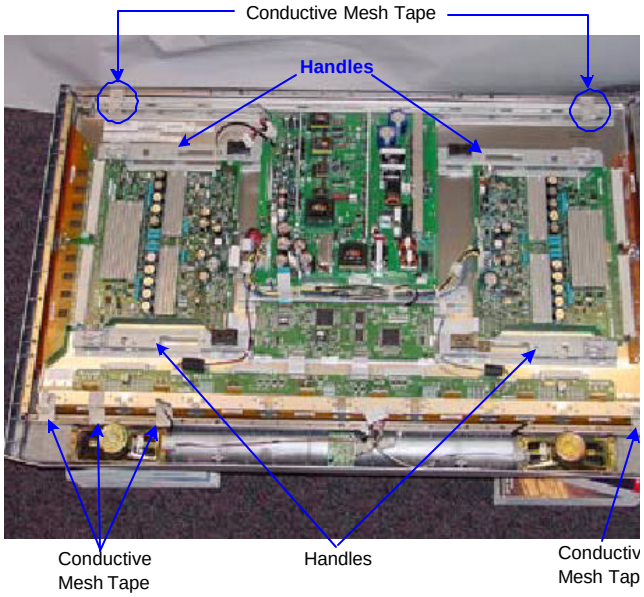


FIGURE 9-6 - RAILS AND STAND REMOVED

g) Mark the position of the conductive mesh tape around the plasma panel before removing them. They are necessary to prevent interference on the screen.

h) With a partner, lift the plasma screen off by the handles (Figure 9-6). PLACE THE PANEL UPSIDE DOWN ON THE FLOOR – SEE FIGURE 9-7. The power supply board must be removed from the panel if the panel is to be replaced. Only clean the inside of the screen with Sony cloth p/n X-4034-197-1.

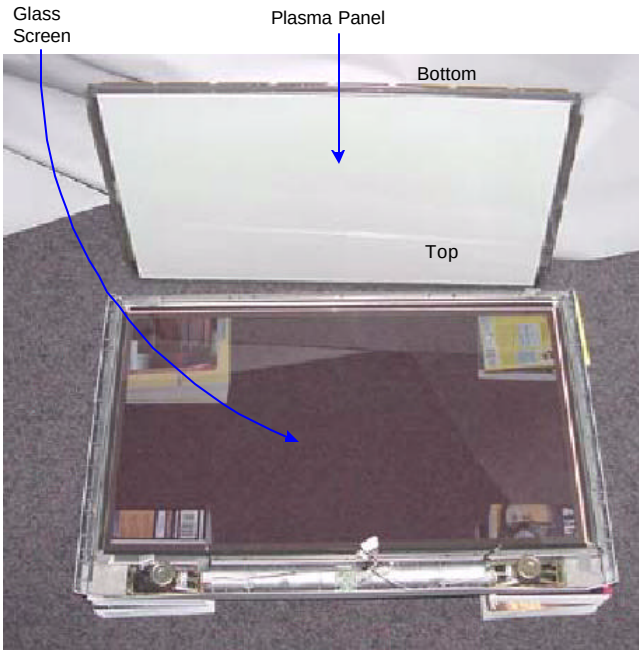


FIGURE 9-7 - SCREEN UPSIDE DOWN ON FLOOR

Reassembly

In the reverse order of removal:

- The inside of the TV screen is coated so do not clean or leave oil on it by touching it. The inside surface scratches easily. Clean the inside of the TV screen if there is film or fingerprints. Use the Sony p/n X-4034-197-1 soft cloth and diluted mild window cleaner if necessary. A 50% mix of water and window cleaner is OK. Do not use dishwashing detergent or soaps.
- Place the screen in the bezel.
- Mount the rails, B board and stand.
- Plug in four connectors from the B board into the plasma panel as shown in Figure 9-8. CN9004 next to connector 2 is not used. The fourth connector is under the B board.

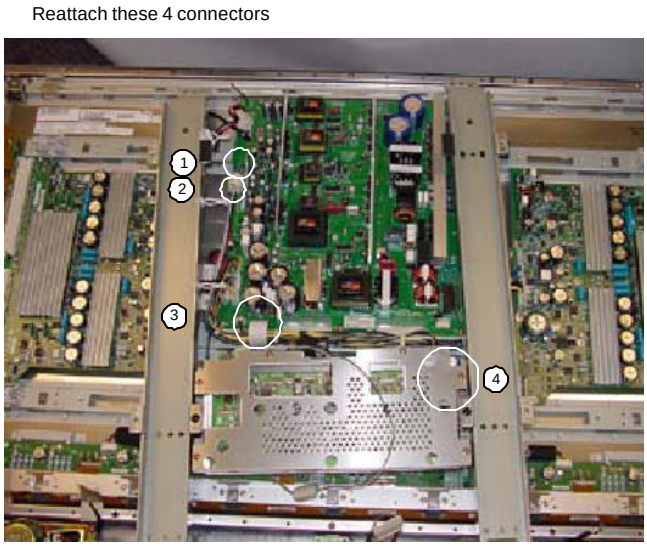


FIGURE 9-8 - ATTACH 4 CONNECTORS

- Attach the conductive mesh tape between the bezel and plasma panel (refer to Figure 9-6).
- If you want to test the TV before installing the shield, attach the rear circuit board assembly, plug it in and turn on the TV set. Without the rear shield in place, you will get horizontal lines of interference on the TV channels from the power supply. After testing, remove the rear circuit board assembly to install the shield.
- Install the rear shield with the decorative top control panel. Put the top ferrite assembly inside the shield or you will not be able to fasten the rear cover later on. Make sure the shield mates with the metal on all four sides to complete the shield.
- Attach the rear circuit board assembly.
- Replace the two conductive mesh tapes over the upper and lower holes in the rear shield (refer to Figure 9-2).
- Put the back cover in place

Chapter 10 - Standby Power / Power ON

Standby Power

Standby power is present when:

- The TV is plugged in.
- The front panel ON/OFF switch is latched in.
- The red standby light within the ON/OFF button is lit.

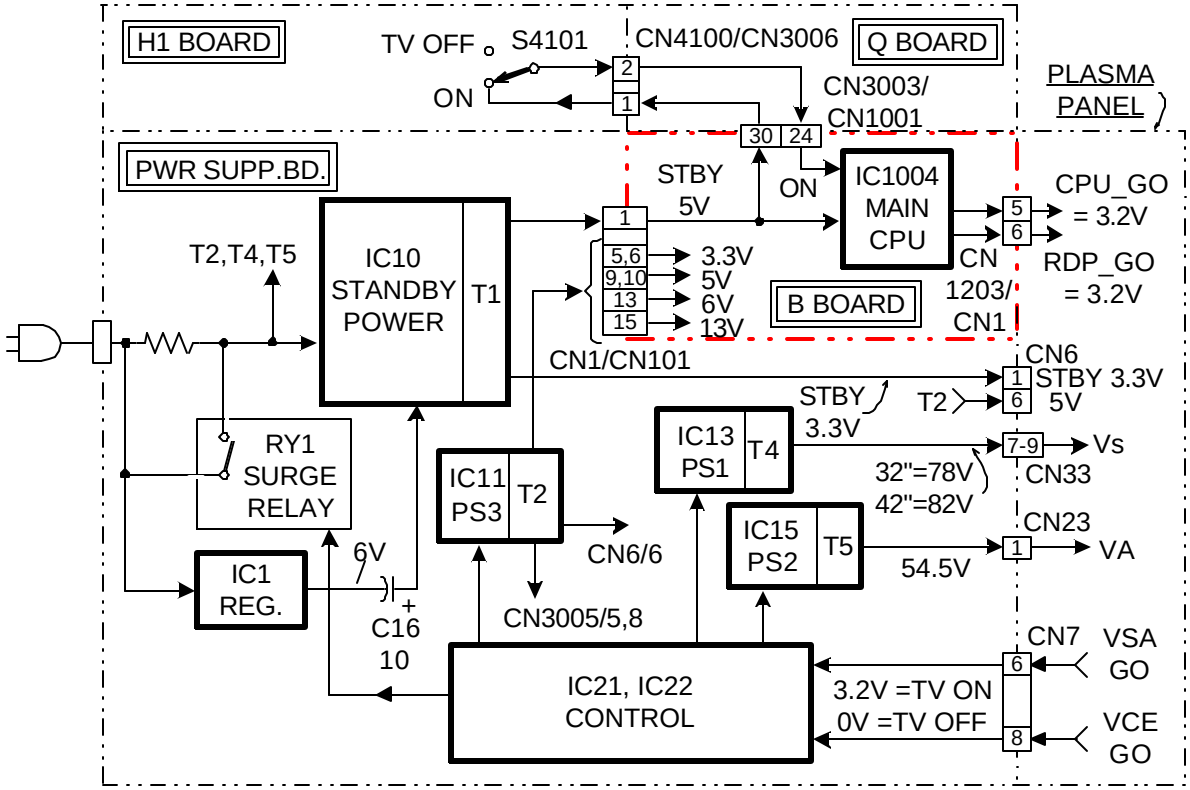


FIGURE 10-1 - POWER ON 1TVP13 1431 3/14/02

Circuit Operation

Refer to Figure 10-1. The standby power must be kick-started by a 6V pulse available when the TV is first plugged into AC. The 6V pulse comes from regulator IC1 and passes through C16 into the standby power supply circuit. Within the standby power supply is IC10 and T1. IC10 is an oscillator that starts and feeds small transformer T1. T1 outputs standby 5Vdc to the Micro CPU (B board) and standby 3.3Vdc to the plasma panel. Another T1 output (not shown) supplies voltage to the + end of C16 to keep the standby power supply ON after the kick-start pulse had decayed. Therefore, the standby power supply starts and runs as long as the TV is plugged into AC, regardless of the TV's Power ON switch position.

Power ON

Power ON can be initiated only after the front panel Power ON button has been pressed (S4101 closed on the Q board), causing the red Standby light beneath this button to light (standby 5Vdc present). See figure 10-1. This switch closure releases Micro CPU IC1004 (B board), permitting IC1004 to turn ON the TV.

Then the TV may be turned ON:

- From the front panel by pressing the channel + or – buttons.
- From the front panel by pressing the Power ON button twice.
- From the remote by pressing the channel + or – buttons, or the individual channel numbers.
- From the remote by pressing the Power ON button.

Circuit Operation

Once standby power is available to the Micro CPU IC1004 (B board), IC1004 can respond to either the channel buttons or power ON button to turn ON the TV. Two commands are output IC1004 to turn ON the Plasma panel. CPU_GO and RDP_GO both go high at CN1/pins 5 and 6.

The power ON path has to go through the plasma panel. After the panel has initialized, it will output two commands to turn ON the remainder of the power supply and energize the surge relay. These commands are VSA_GO and VCE_GO from CN 7/pins 6 and 8. When both of these two commands go HIGH, the power supply outputs the remainder of the voltages and the TV turns ON. Within the power supply board, three separate regulated supplies reside (PS1, PS2 and PS3). As shown in Figure 10-2. these power supplies feed output transformers T4, T5 and T2, respectively. T4 outputs the Vs (sustain driver) voltage and T5 outputs the Va (address driver) voltage for the plasma panel. The remainder of the TV voltages come from T2.

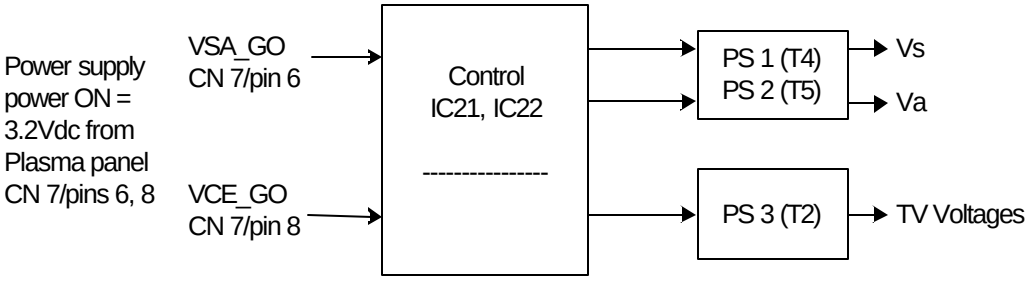


FIGURE 10-2 - POWER SUPPLY CONTROL CONCEPT

4/16/02

Chapter 11 - Fan Operation

The fan is turned on when the TV is powered ON and blows air out of the TV. The TV will only shutdown when the power supply (thermistor) reaches a critical temperature (set in the service mode), not if the fan stops.

Fan Operation

The fan runs at one of three speeds based upon the temperature of the power supply board. The power supply board temperature is monitored by a thermistor that feeds IC6 (not shown). The output voltage of this thermistor circuit at CN 1/pin 4 is a linear function of the temperature. 0 degrees C = 0Vdc. 100 degrees C = 4.7Vdc.

The Main CPU on the B board monitors the fan's rotation and run voltage. This fan status is available as an OK or NG indication in the user menu and service mode. In addition, the service mode displays the power supply temperature. If the power supply temperature reaches critical (92 degrees for the 32" TV or 80 degrees for the 42" TV), the Main CPU discontinues the CPU_GO and RDP_GO signals and the TV shuts down. After shutdown, the Standby light repeatedly blinks three times to indicate that high temperature was the cause of shutdown.

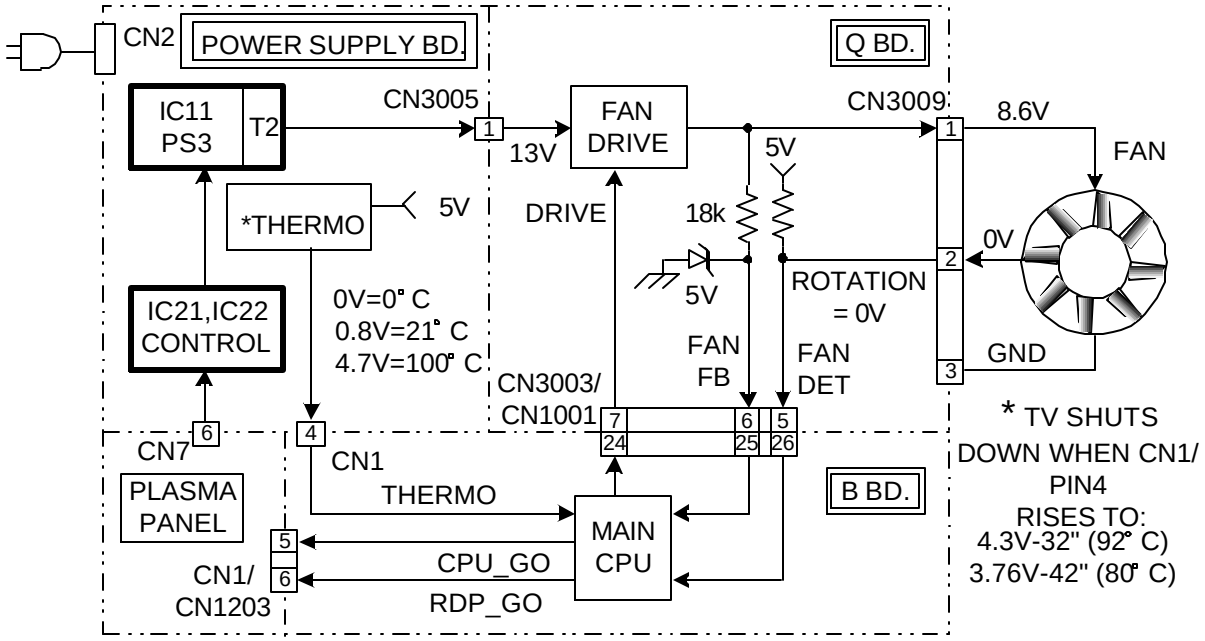


FIGURE 11-1 - FAN DRIVE 2TVP13 1432 4/16/02

Fan Drive Voltage

When the TV is turned ON, the Main CPU (B board) outputs 5Vdc (CN1001/pin 24) to the fan drive block at CN1001/pin 24. This allows the fan drive block (Q board) to output 12Vdc (connector CN3009/pin 1) to the run the fan at start up. A run voltage from 8 to 12Vdc will always be present as long as the TV is ON.

Fan Rotation Detection

Within the fan, a Hall device detects rotation and grounds the voltage at CN3009/pin 2. This LOW is applied to Main CPU and permits the temperature of the power supply board to adjust the Main CPU fan drive output voltage. Typically at start up, the fan drive voltage at CN1001/pin 24 drops from 5Vdc down to 1.5Vdc to produce 8.6Vdc at CN3009/pin 1 to run the fan at slow speed.

Troubleshooting No Fan Rotation

If the fan is unplugged or there is no fan rotation detected, Main CPU reacts by turning ON the Fan drive signal (CN1001/pin 24) to 5Vdc every two seconds (for a very short time; that may be difficult to detect except on a peak reading DVM). This results in 12-volt fan run voltages that appear at the fan terminals (CN3009/pin 1) every two seconds as long as the TV is ON.

Fan or Q board?

To determine if the fan, Q board or B board is causing NO fan rotation, turn ON the TV and:

1. Measure the voltage at the fan connector CN3009/pin 1 (red wire) with the fan connected (loaded).
2. Normal 12Vdc means the fan is bad. Replace the fan.
3. CN3009/pin 1= 0Vdc? You must inspect CN3005/pin 1 and CN1001/pin 24 at power ON.
   - CN3005/pin 1 on the power supply board normally = 13Vdc
   - CN1001/pin 24 on the B board normally = 5V pulse at power ON. The pulse can be read with a peak DVM.
4. Is CN3005/pin 1, 0Vdc? Replace the power supply board.
5. Is CN1001/pin 24 at 0Vdc or stays at 5Vdc at power ON?
   - 5Vdc at CN1001/pin 24 during power ON means the B board is OK so the Q board is bad.
   - 0Vdc at CN1001/pin 24 during power ON means the B board is bad. Replace the B board.

Testing the fan

The fan should be tested by applying voltage to it.

Voltage Test:

The fan starts running when 6Vdc is applied (0.1A). You can also quickly start it using a 9V battery. Apply the positive voltage to the red wire and negative to the blue wire.

Resistance Test:

A resistance check will only show you that a fan is not shorted. Resistance readings will not tell you if the fan will run with voltage applied. Applying the ohmmeter positive leads produces these high resistances. Reversing the leads permits you to read a diode in the Hall device.

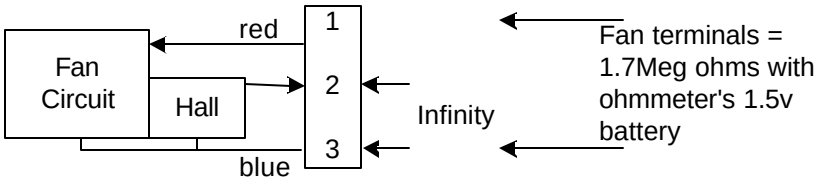


FIGURE 11-2 - FAN RESISTANCE TESTS

Chapter 12 - Video Signal Flow

The video signal processing is performed on three boards (TU, Q and B) and the plasma panel as shown in Figure 12-1. The composite video or component video is selected in the B board. The OSD is inserted into the video path (not shown) later on in the B board signal chain. The output of the B board is digital video and applied to the plasma panel. The video switching control for ICs on the TU, Q and B boards come from the Main CPU, which is also on the B board.

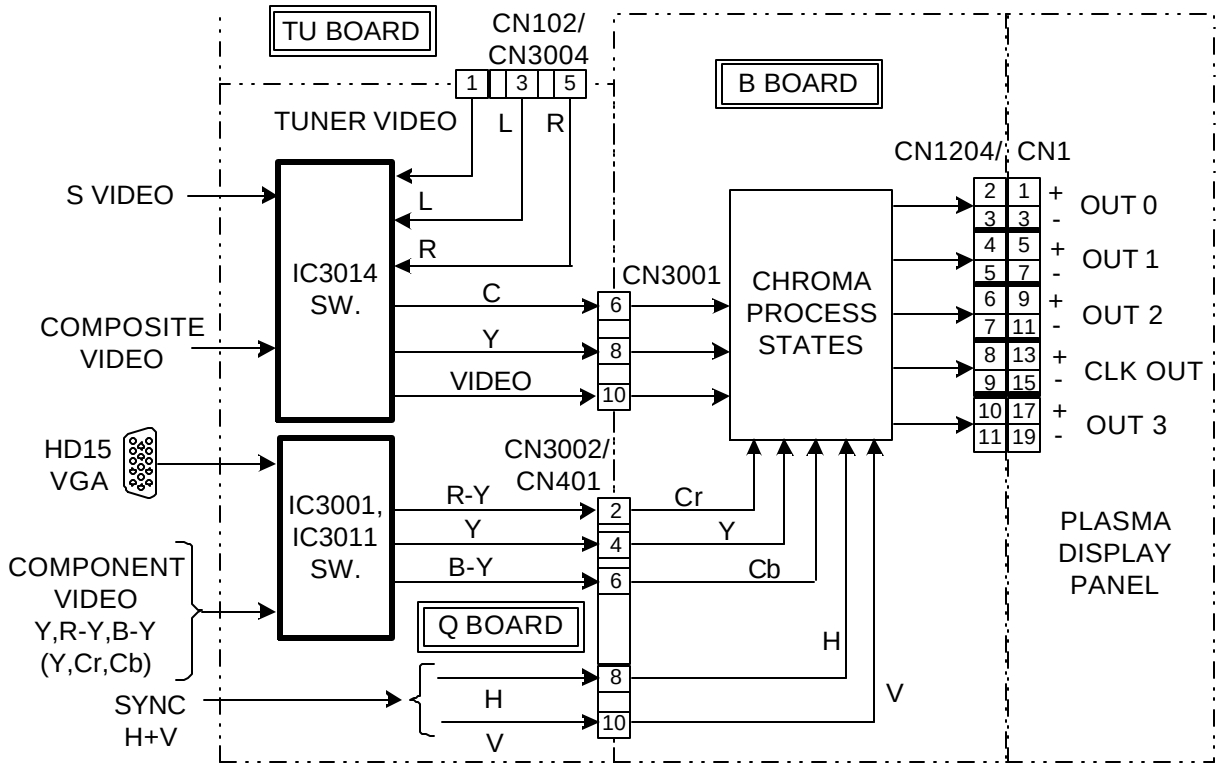


FIGURE 12-1 - VIDEO SIGNAL FLOW 3TVP13 1433 4/12/02

Signal Levels

The tuner signal levels (Table 12-1) were taken with an NTSC generator set to channel 3. The S video levels (Table 12-2) were taken using a DVD player. The component signal levels (Y, R-Y, B-Y in Table 12-3) were also taken using a DVD player.

Table 12–1- Tuner Input		
Signal Name	Location	Signal Level
Tuner Video (generator channel 3)	CN3004/pin 1	1.2Vp-p
Video	CN3001/pin 10	1.2Vp-p

Table 12–2 - S Video Input		
S Video Signal Name	Location	Signal Level
Y	CN3001/pin 8	1.2Vp-p
C	CN3001/pin 6	0.6Vp-p

Table 12-3 - Component Video Input		
Signal Name	Location	Signal Level
Y	CN3002/pin 4	1.0p-p
R-Y	CN3002/pin 2	0.8Vp-p
B-Y	CN3002/pin 6	0.4p-p

Table 12-4 - Digital Video Signal Output to Plasma Panel				
Signal Name	From B Board	To Plasma Panel	Wire Color	Signal Level *
Out 0 +/-	CN1204/pin 2, 3.	CN 1/pin 1, 3.	Orange	0.7Vp-p
Out 1 +/-	CN1204/pin 4, 5.	CN 1/pin 5, 7.	Yellow	0.7Vp-p
Out 2 +/-	CN1204/pin 6, 7.	CN 1/pin 9, 11.	Pink	0.7Vp-p
CLK Out +/-	CN1204/pin 8, 9.	CN 1/pin 13, 15.	Gray	0.7Vp-p
Out 3 +/-	CN1204/pin 10, 11.	CN 1/pin 17, 19.	White	0.7Vp-p
* The main digital signal level is shown, but there are ten spikes of power supply noise in the body of the waveshape that are not shown, bringing the signal level to 6Vp-p. The noise is also present on the TV screen when the rear shield is not installed.				

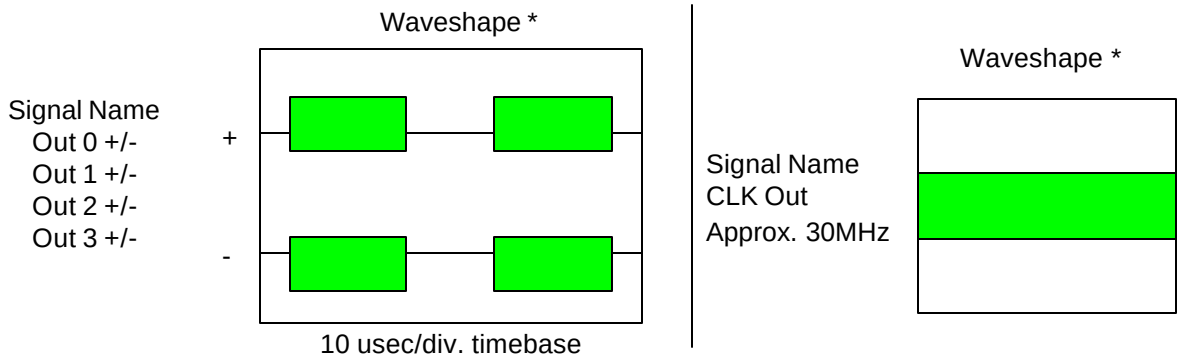


FIGURE 12-2 - DIGITAL VIDEO OUTPUT WAVESHAPES TO THE PLASMA PANEL

Location of Digital Input Connector CN 1 on the Plasma Panel

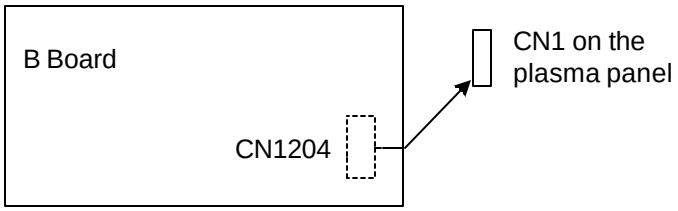


FIGURE 12-3 - LOCATION OF DIGITAL VIDEO SIGNAL CONNECTOR CN1

Digital Video Signal to Plasma Panel

Video signals Out 0 – 3 are digital video signals applied to the plasma video panel. Out 0 is the LSB (Least Significant Bit) and Out 3 is the MSB (Most Significant Bit). The digital video signal is accompanied by a clock signal for timing.

- Missing Clock signals (CLK Out) produce a dark screen (no picture) with normal sound.
- Missing LSB signals Out 0 or Out 1 produce a picture without detail as shown in figure 12-4.

FIGURE 12-4 - TV Picture missing Out 0 or Out 1 LSB Picture Detail.

TV Picture missing “Out 0 or Out 1 LSB” picture detail. Splotches appear on faces or areas where there should be detailed lines.

Chapter 13 -What is Flat Screen Plasma Technology?

The flat panel plasma display is the latest display technology and offers the following TV / monitor features:

- Bright screen light, easily viewable in any environment
- High resolution for excellent image quality
- Large, flat screen sizes
- Wide viewing angle
- Light weight

Flat screen plasma panels consist of cells that produce light. Three such cells of red, green and blue light form a cluster known as a pixel. The brightness of the individual cell determines the color of the pixel. The number of pixels on the screen is determined by the size of the screen. There are typically thousands of pixels on a screen and there are three cells for each pixel.

Theory of Operation

Cell Operation

Each plasma cell functions much like a neon gas discharge tube or neon bulb. The bulb consists of two electrodes in a tubular glass envelope filled with neon gas. When a voltage of approximately 65-70V (for a neon bulb) is applied, the gas ionizes (resistance drops) and passes electricity. During ionization, an orange glow around the negative (-) electrode is produced. Both electrodes appear to glow if AC is applied. Varying the current that is allowed to flow (by changing the external series resistance) through the bulb controls the brightness.

Cell Structure

Refer to Figure 13-1 for the plasma cell structure. In a plasma cell, plasma replaces the neon gas in the tube. Plasma is a collection of charged particles containing an equal number of + ions and electrons with properties similar to gas, except they are conductive and affected by magnetic fields. When the Scan and Sustain electrode (mounted on the glass faceplate) voltage reaches the electrical arc potential, the cell's predominate neon and xenon contents emit UV light. The UV light is converted to visible light by the red, green or blue phosphor of that cell.

The data (also called index or address) electrode produces an induced electrical feedback signal to adjust cell timing. The triad combination of one red, one green and one blue cell produces one pixel.

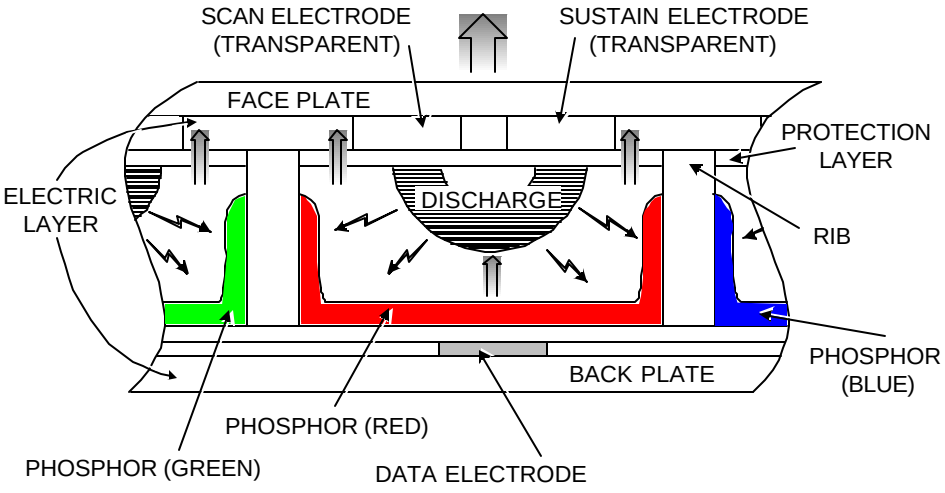


FIGURE 13-1 - PLASMA CELL STRUCTURE 4TVP13 1435 4/15/02

Cell Intensity/Screen Brightness

The intensity of the cell is determined not by how bright it glows but by how often it fires within a field or frame. The more times it fires, the brighter the cell seems (but actually they fire at full intensity each time). The number of times it fires is based upon the phosphor persistence and is usually a maximum of eight times per frame.

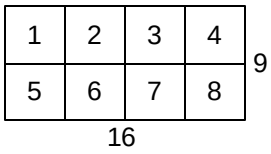


FIGURE 13-2
SONY 16 X 9 PLASMA
PANEL SEGMENTS

Cell Selection and Screen Layout

Within each panel, the individual cells to be fired are selected based upon the horizontal and vertical grid similar to a multiplication table.

The screen is divided into eight panels as shown in Figure 13-2.

Sony KF- 60DX100 Introduction

This portion of the training manual has been organized to enable you to quickly diagnose problems in the Grand Wega 60" Projection TV model KF-60DX100. This Hi-Scan, 16x9 aspect ratio, LCD TV has a high brightness, long life backlight that is user replaceable. Repairs involve determining which circuit board is defective, access to the board and alignment afterwards.

This portion of the training manual is divided into 14 sections:

Table of Contents	
Chapters	Contents
15. Normal Operation	This LCD Projector has a lamp and no convergence.
16. Self Diagnostics	Look here for details when the Standby LED blinks.
17. Board Selection by Defect	Listing of possible defects and related boards by probability.
18. Board Location	Picture of the boards in the TV.
19. Adjustments	Video adjustments when changing the BB, BC or M board. No convergence adjustments.
20. Service Mode	Access and new contents.
21. Determining if the Optical Unit is OK.	Symptoms are: Shutdown, white or black screen or missing color.
22. Optical Unit Removal	Pictured steps.
23. Screen / Mirror Replacement	The entire top of the TV is replaced as an assembly.
24. Troubleshooting – TV Shutdown	Dead set and Shutdown flow charts.
25. Power ON Circuit Description	Standby circuit description and power ON sequence.
26. Fan Control Description	Fan Drive Signal, Rotation Detection and Troubleshooting
27. Lamp Control Circuit Description	Operation, Operation Time, Removal and Troubleshooting.
28. Video Process	Block Diagram of the Video flow showing CCD & OSD entry points. Troubleshooting charts and tables for shutdown, dark screen, white screen or video distortion.

Chapter 15 - Normal Operation

Satellite reception shows picture squares – The compression of satellite conveyed ("Dish") video signals results in pictures that show small squares larger than the detail the TV is capable of producing. This problem is compounded by the DRC circuit, which cannot enhance the picture detail by analyzing the picture's larger squares and making improvements.

When high compression is used, the DRC circuit cannot properly analyze the picture. To ensure that the DRC circuit does not add more noise; the TV menu has a MILD picture mode (i.e. VIVID, STANDARD, MOVIE & MILD) that bypasses the DRC operation. The MILD mode can be used on any noisy program.

Lamp Life – Estimated lamp life is about 6000 hours, P/N = XL2000U (A-1601-753-A). The lamp life will be shortened if the lamp is repeatedly started or run at elevated temperatures.

Lamp Warm Up – The backlight lamp is similar to a fluorescent tube but has a two level brightness and delay circuit to prolong life. At turn ON, the lamp gradually increases to the first level of low very brightness. Three seconds later, a lamp relay (on the lamp board) will click to move to toward the second brightness level. After the lamp relay clicks, the lamp will take a minute to gradually reach almost full brightness.

Lamp Remains ON – Although the audio and video is muted immediately at turn OFF, the TV remains on for five seconds afterwards. During these five seconds, the lamp steps to a lower brightness while the fans continue to cool. The lamp that remains ON when the TV is muted is only noticeable if the room is dark.

Delayed TV ON - If the TV is turned OFF and back ON within five seconds before the lamp goes off, the TV will come back ON (unmute). However, if the TV is turned ON after the lamp has turned OFF, the TV remains audio and video muted for 30 seconds. This allows time for the lamp to cool off before being turned back on. Turning a lamp on and off quickly shortens its life.

No Convergence Adjustments – The positioning of the three colored LCD panels is performed at the factory. Since there are not three beams to converge, convergence is a matter of positioning the three LCD panels with minor adjustments at the factory. If there are geometric distortions, check the cabinet for shifted mirror, front lens and cabinet deformation (weights added to the cabinet) before suspecting the optical unit assembly that contain the LCD panels.

Chapter 16 - Self-Diagnostics

The front panel Lamp LED flashes continuously when the lamp reaches end of life and fails to ignite.

The front panel Standby LED blinks to indicate a more serious fault. If the TV starts and shuts down, the LED will repeatedly blink a number of times to indicate the reason for shutdown. The boards that can cause TV shutdown are listed in Table 16-1.

Table 16-1 - Self-Diagnosis

Standby LED blinks	Cause	Suspected board
3 times	Lamp cover door is not closed. (See Lamp Control diagram)	Lamp cover switch not shorted (T board).
4 times	Fan rotation is not detected. (See Fan Control diagram)	A board (fan control), G Bd (Power supply) or M Bd. (control).
5 times	Power Block board cannot turn on the lamp.	Power Block board or the Lamp.
6 times	Low or missing 5Vdc.	G board or a load on the 5V line (any board). If the problem is not on the G board, unplug each board, then power ON the TV to see if 5Vdc appears at CN1604/pin 1. Remove the BB board first.
9 times	L/R Audio Output speaker line monitored for 0Vdc.	G board (power supply) or A board (audio output). Check ±15Vdc fuses PS1601, & 1602 on G board.

This self-diagnostic information is also stored in memory and viewable on the TV screen. It is accessed by aiming the remote at the TV and pressing the following buttons: Display, 5, Vol -, Power. Half of the list above will be shown on the TV screen. Moving the joystick left or right permits you to see the remaining self-diagnostic categories. The number of times the failure has occurred is displayed to the right of the intermittent problem. Clearing this memory requires you to exit this program by shutting off the TV, entering the regular service mode (Display, 5, vol +, Power), and pressing 8, Enter.

Chapter 17 - Board Selection by Defect

This table shows the boards that could cause the symptoms listed. The most likely board is designated #1, the second likely #2, etc.

Table 17-1 Symptoms and Related Circuit Board							
	Probable board failure						
Symptom	A	BB (Video)	BC (Video)	C (optical unit)	G (PS)	Lamp Driver	M (Micro)
Audio Problem	1				2 – ck fuses PS1601-2		
Dark Screen sound OK	3	2	1	4	*See "Determining if the optical unit is OK" for quick tests.		
Dead Set – no relays heard					1 also ck for open BiMetal fuse under rear fan.		
Dead Set – relays click	See Standby indicator blinks						
Stby LED blinks 3 times							1 – Ck lamp cover Sw; 2- M Bd.
Stby LED blinks 4 times	1-Fan, 2-A Bd.						3
Stby LED blinks 5 times						1	2
Stby LED blinks 6 times	3	2	5	4	1		6
Stby LED blinks 9 times	2				1 – ck fuses PS1601-2		
Video Distortion – Tuner & composite Video		2	1				
Video Distortion – component video		1					
Video Distortion – all inputs		1		2			
Symptom	A	BB	BC	C (optical unit)	G	Lamp Driver	M

Chapter 18 - Board Locations

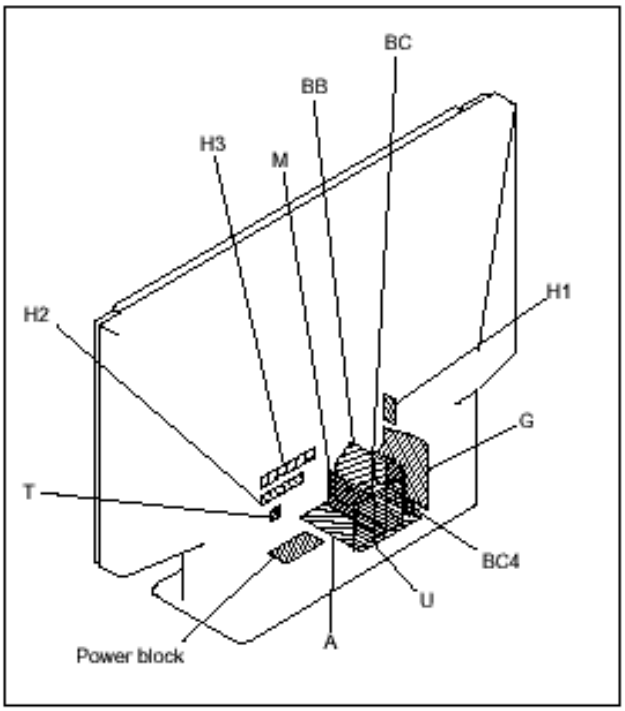


FIGURE 18-1 - BOARD LOCATIONS

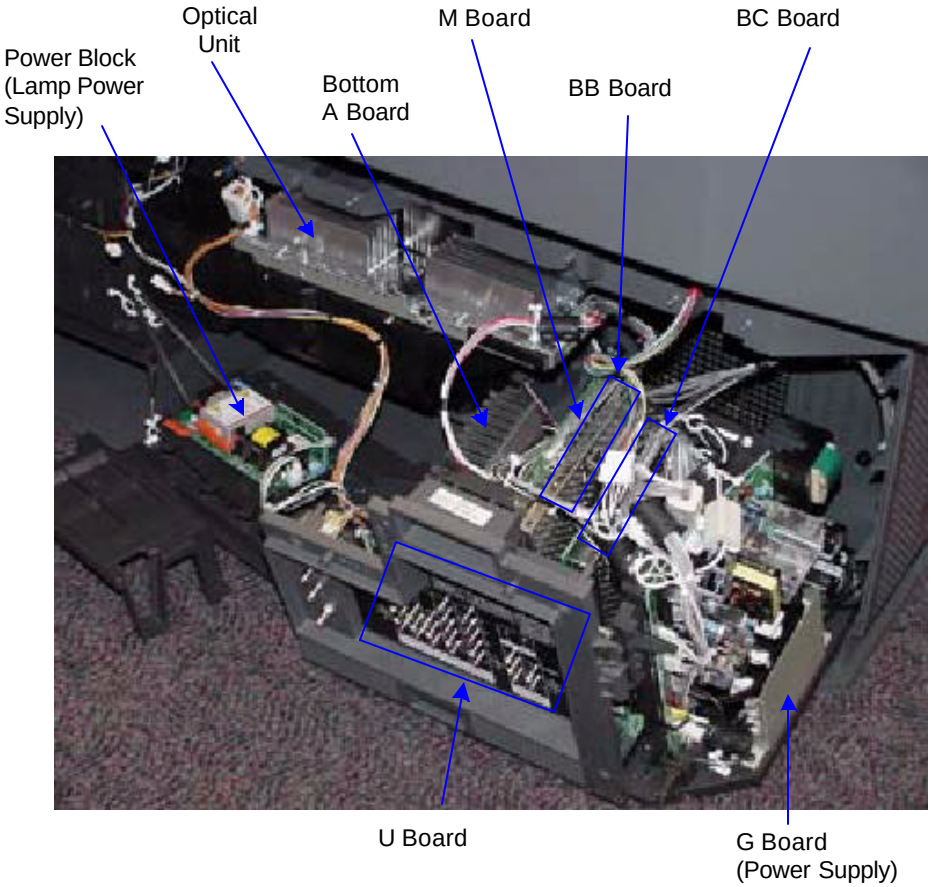


FIGURE 18-2 -BOARD LOCATION

Chapter 19 - Adjustments

White Balance / Brightness

The service manual shows a series of white balance and brightness level adjustments for the TV, Twin, Video inputs and component inputs. They can be touched up when changing the BB and BC boards and must be adjusted when replacing the M board.

Geometric Distortion

There are no adjustments for geometric distortion. That is adjusted in the preassembled optical unit. If there is geometric distortion, inspect the mirror (top) area of the TV for damage.

Convergence

Convergence is not adjusted in this set. The LCD panels are positioned at the factory for convergence. Figure 19-1 shows a crosshatch pattern. If convergence is off, the top mirror assembly and the optical unit where the LCD panels are located are both suspect. If the misconvergence is on one side of the screen accompanied by geometric distortion, the mirror may have broken from their mounts. In this case, reinstall the mirror or replace the entire upper assembly (mirror, screen, bezel and speakers as one assembly. P/N = A-1603-167-A.

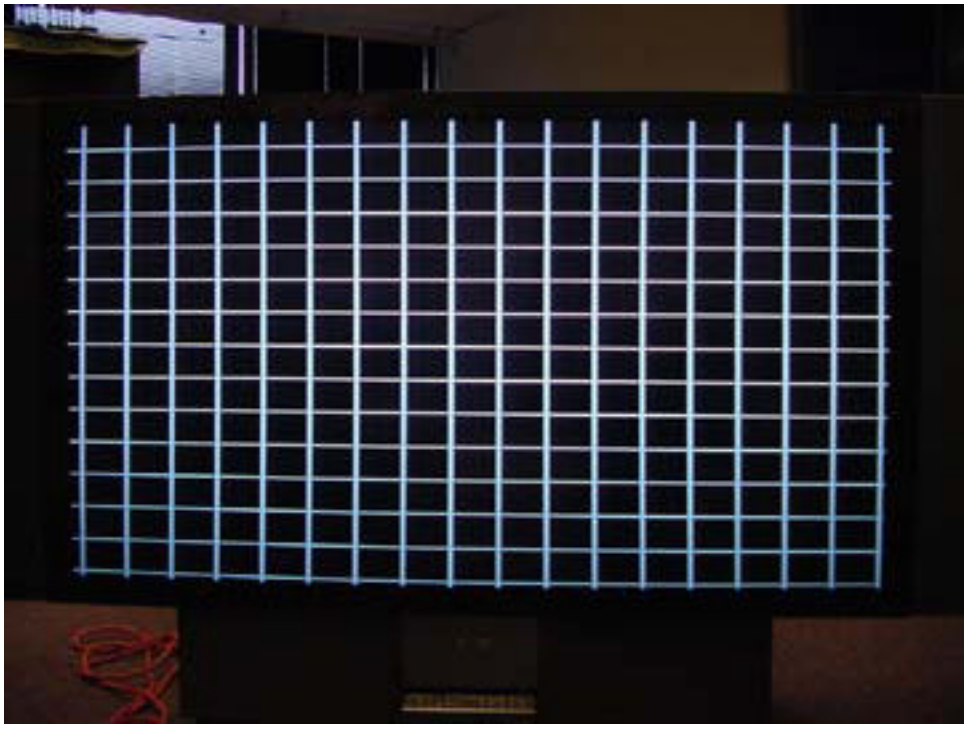


Figure 19-1 - Typical Crosshatch using an External Generator

Table 19-1 - Adjustments after Board Replacement		
Board Replaced	Adjustment	Service Manual page
Light Box (Optical Unit)	1. Screen Center Adjustment to center the picture. 2. Vertical Stripe Adjustments – There are alternate even and odd rows of dots across the screen (L-R). Adj. the even dots to the same brightness as the odd dots. First adj. red dots with a Red field, then Green and finally Blue. You must be at the screen to see the even vs. odd dots.	Section 3-5, page 43 Section 3-3, page 42
A board	Picture Adjustments (RF, video and component inputs are adjusted for consistent white level and color).	Section 3-2, page 39
BB board	Same as above.	Section 3-2, page 39
BC board	Same as above except component video levels need not be adjusted.	Section 3-2, page 39
M board	Same as for the A or BB boards unless the NVM IC9002 is transplanted to the new M board.	Section 3-2, page 39

Chapter 20 - Service Mode

Access: Conventional – From the remote press Display, 5, Vol +, Power ON. Category selection = buttons 2 (up) and 5 (down). Item selection = buttons 1 & 4. Data change = 3 & 6. Store data = Mute, Enter.

New: The details of New Category "Option E" for lamp information and fan control are clarified and is shown in Table 20-1

Table 20-1 - Contents of Service Mode Option E

Item number	Name	Description	Typical Data
0	Lamp Time	Lamp operating time in hours. Hours shown when data is changed to 1. Reset when data 0 is stored (mute, enter).	0
1	Lamp Off	Lamp time after TV turns OFF. 0=0sec. 1=5 seconds.	1
2	Fan Off	Fan time after TV turns OFF. 0 = 0 mins. 1 = 2 mins.	0
3	Fan 1 RPM 1	LCD Fan speed - TV ON. 3 speeds. 0 = slow	2
4	Fan 1 RPM 2	LCD Fan speed after TV is OFF. 3 speeds	2
5	Fan 2 RPM 1	Lamp Fan speed – TV ON. 3 speeds. 0 = slow	1
6	Fan 2 RPM 2	Lamp Fan speed – TV OFF. 3 speeds	1
11	P CTL Sht 1	LCD video position. Correction 1 after hours	10
12	P CTL Sht 2	LCD video position. Correction 2 after hours	60

Chapter 21 - Determining if the Optical Unit is OK

The optical unit can fail, producing:

- TV Shut down by loading down the power supply.
- White or black screen.
- Missing a color.

If the TV shuts down (probably without a Standby LED fault indication), the optical unit can be unplugged and the TV powered up to see if the TV remains ON. Normally, when all four cables to the optical unit are removed, the TV will display a no picture bright white screen with sound (OK). If only the RGB signal input cable at CN5005 were unplugged, the screen would be ¼ bright, sound OK.

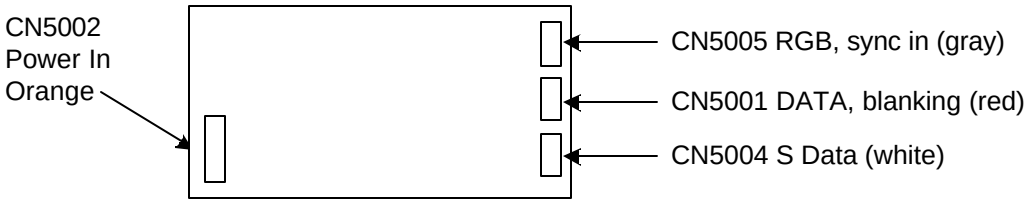


FIGURE 21-1 - OPTICAL UNIT CONNECTORS (TOP VIEW)

White or Dark Screen - In a conventional TV, a loss of signal results in a white screen. This is also true in this LCD projection TV. However, if the screen is dark with normal sound, the LCD optical unit or the previous circuit board may be bad. On the other hand, a dark screen without sound indicates video and audio muting by the Main Micro. This is because of either: a communications problem with another IC, a fan defect, a lamp circuit defect, or an audio output failure which may also cause TV shutdown but not a video failure.

If the screen is white, there may be no input to the optical unit. Check for loss of input voltage at CN5002 and RGB input signal at CN5005. If the input voltages and signals are present, the optical unit is suspect.

Table 21-1 - Optical Unit Input Voltages and Signal Levels (color bar input)

Input Voltage (from G board)	Level		Input Signal (from BB board)	Level
CN5002/pin 1 (white)	- 7Vdc		CN5005/pin 1 (Blue signal)	2.5Vp-p
CN5002/pin 3,4 (orange)	5Vdc		CN5005/pin 3 (Green signal)	2.0Vp-p
CN5002/pin 7,8 (orange)	3.3Vdc		CN5005/pin 5 (Red signal)	2.4Vp-p
CN5002/pin 11 (orange)	15Vdc		CN5005/pin 7 (Vert sync)	5Vp-p
			CN5005/pin 9 (Horiz sync)	5Vp-p

If the screen is black, the optical unit or BB board may be bad.

Determine which one by unplugging the CN5002 power connector to the optical unit. If the screen becomes white, the BB board is bad. A white screen is normal if the optical unit loses power (it passes all the backlight). If the screen remains black, the optical unit is bad.

If the screen is missing a color, the RGB signals entering the optical unit (CN5005) have to be verified before accusing the optical unit of the failure. The signal levels are given in Table 21-1.

Chapter 22 - Optical Unit Removal

The optical unit contains the video output portion of the TV in one assembly with three colored LCD panels and the C board. The optical unit is held in with just two screws, but the TV board assembly and the power block board must be pulled out to access these screws. The optical unit is replaced as an assembly.

Procedure

a) Remove the lower back panel and the three support brackets (Figure 22-1)

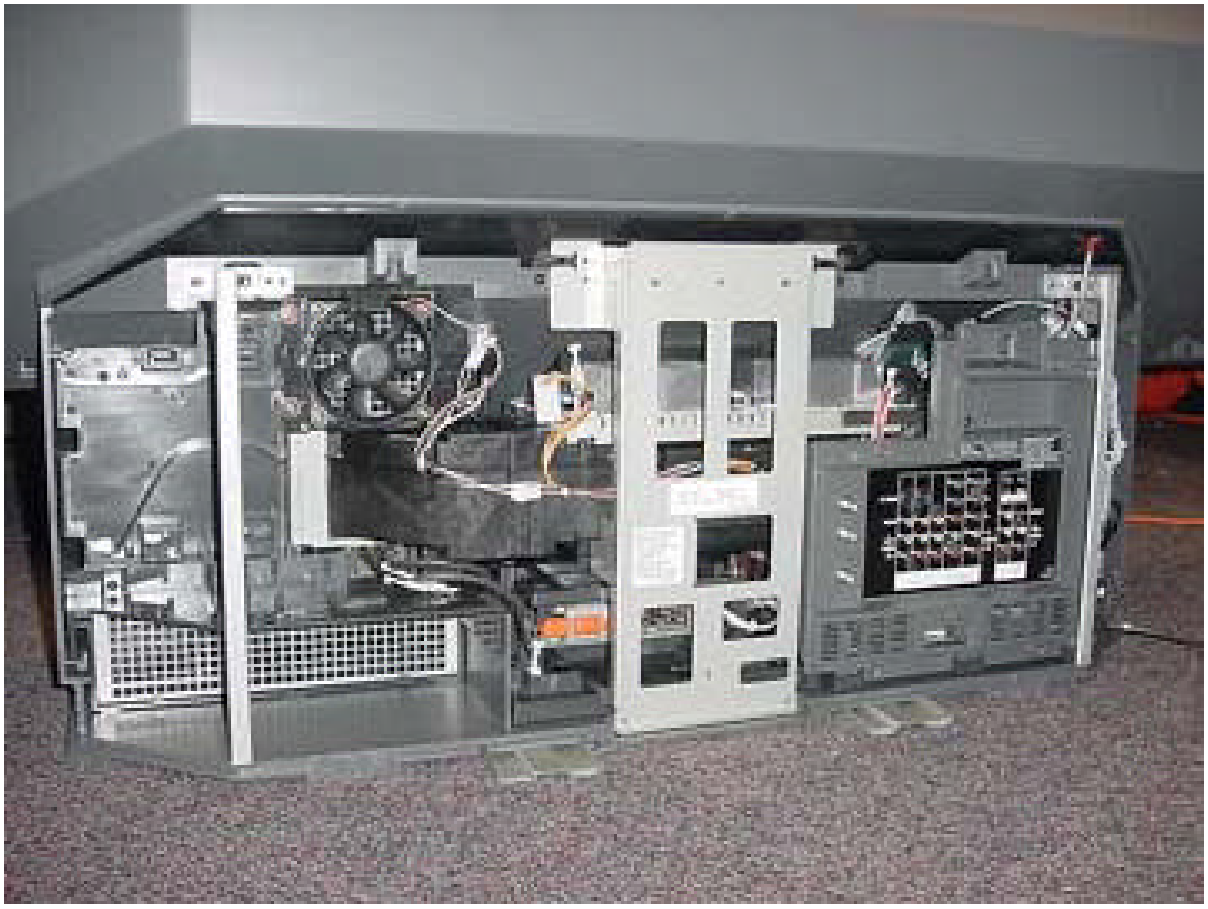


FIGURE 22-1 - THREE SUPPORT BRACKETS

b) Lift the TV board assembly up and outward (Figure 22 -2)

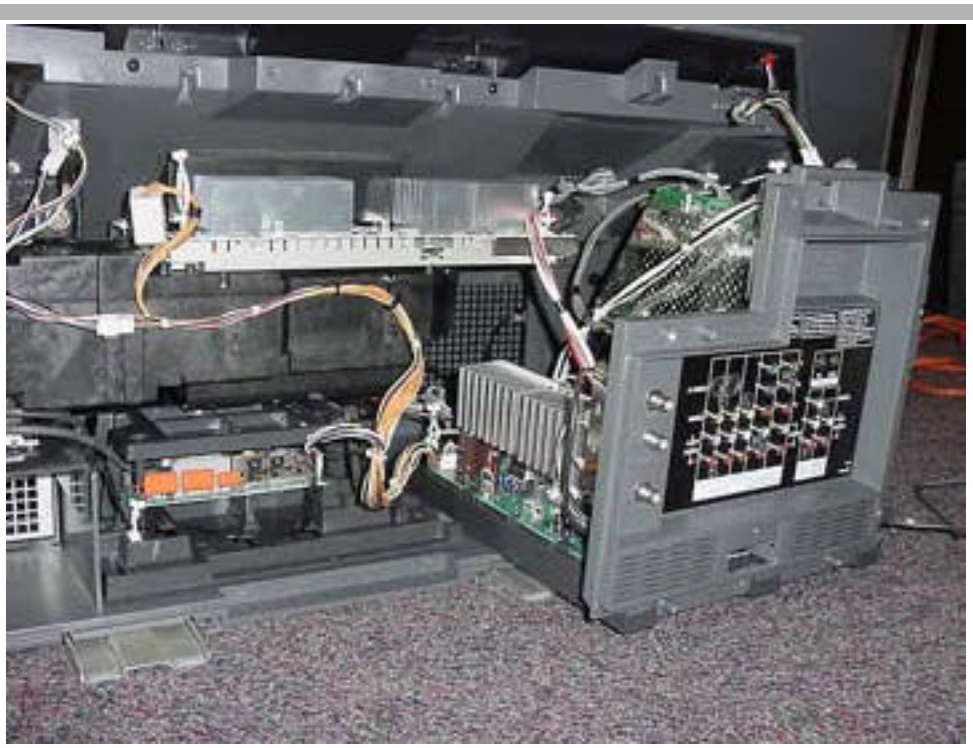


FIGURE 22-2 - TV BOARD ASSEMBLY SLIDES OUTWARDS

c) Remove the two screws holding the lamp socket (Figure 22-3). The power block HV wires are not long enough to permit the power block to swing out of the way.

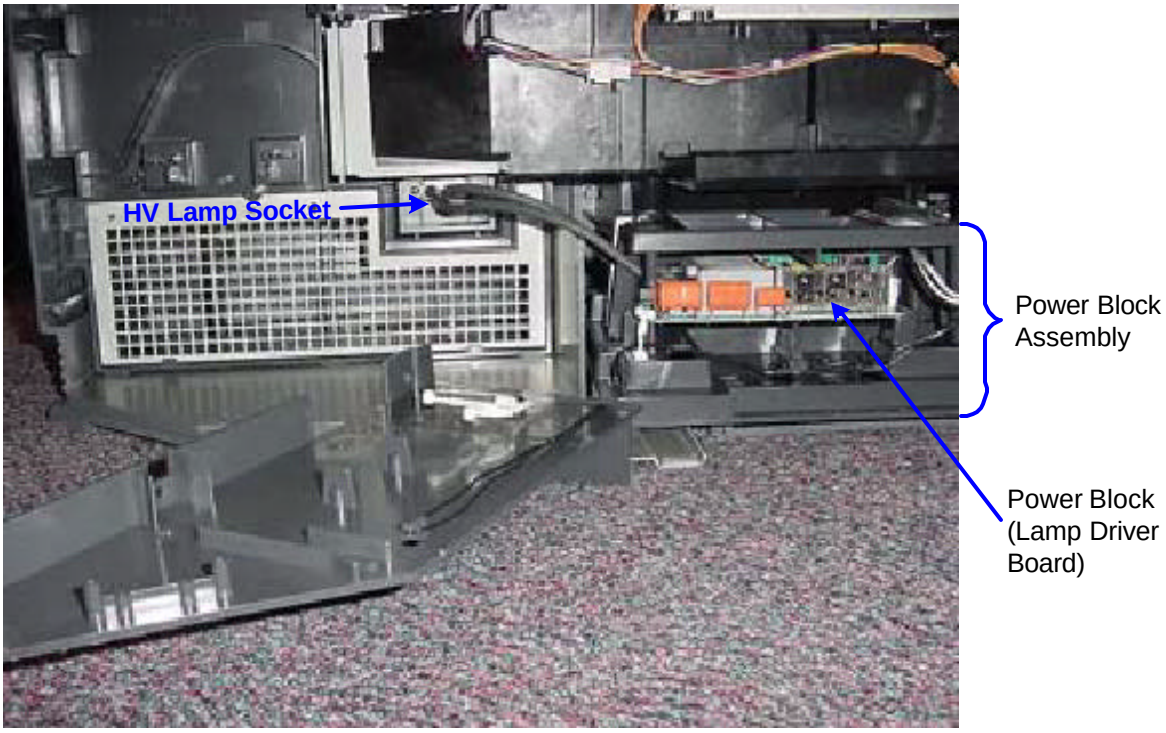


FIGURE 22-3 - REMOVE TWO HV LAMPSOCKET SCREWS

d) Lift the Lamp board assembly up and outward (figure 22-4)

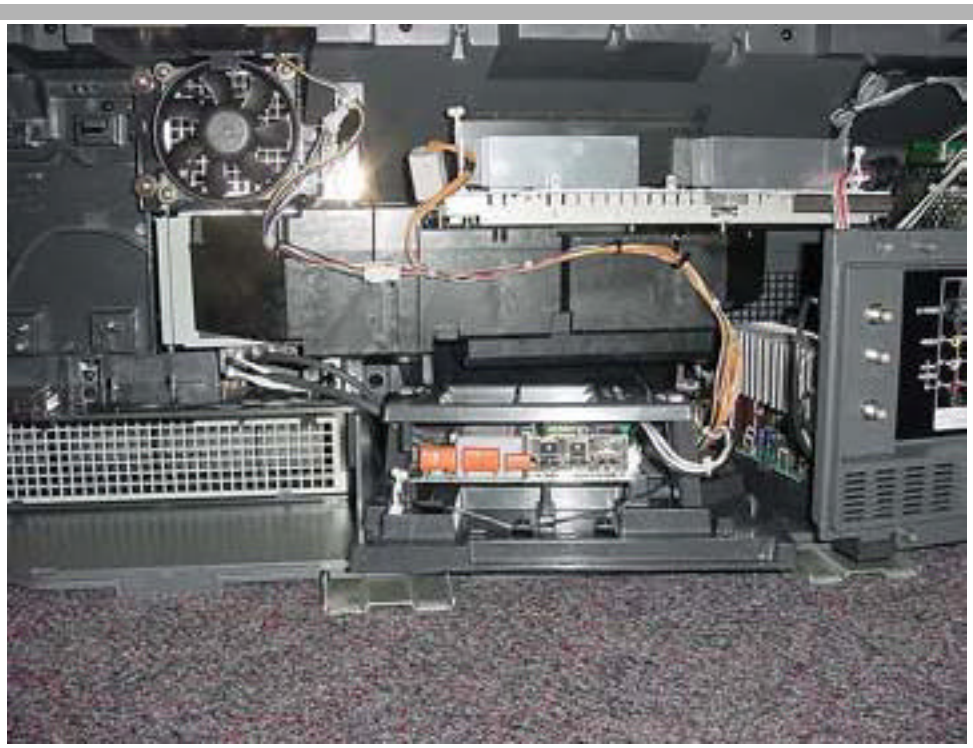


FIGURE 22-4 - POWER BLOCK UP AND OUT

e) Loosen the two screws under the optical unit (Figure 22-5). The screws are part of the optical unit.

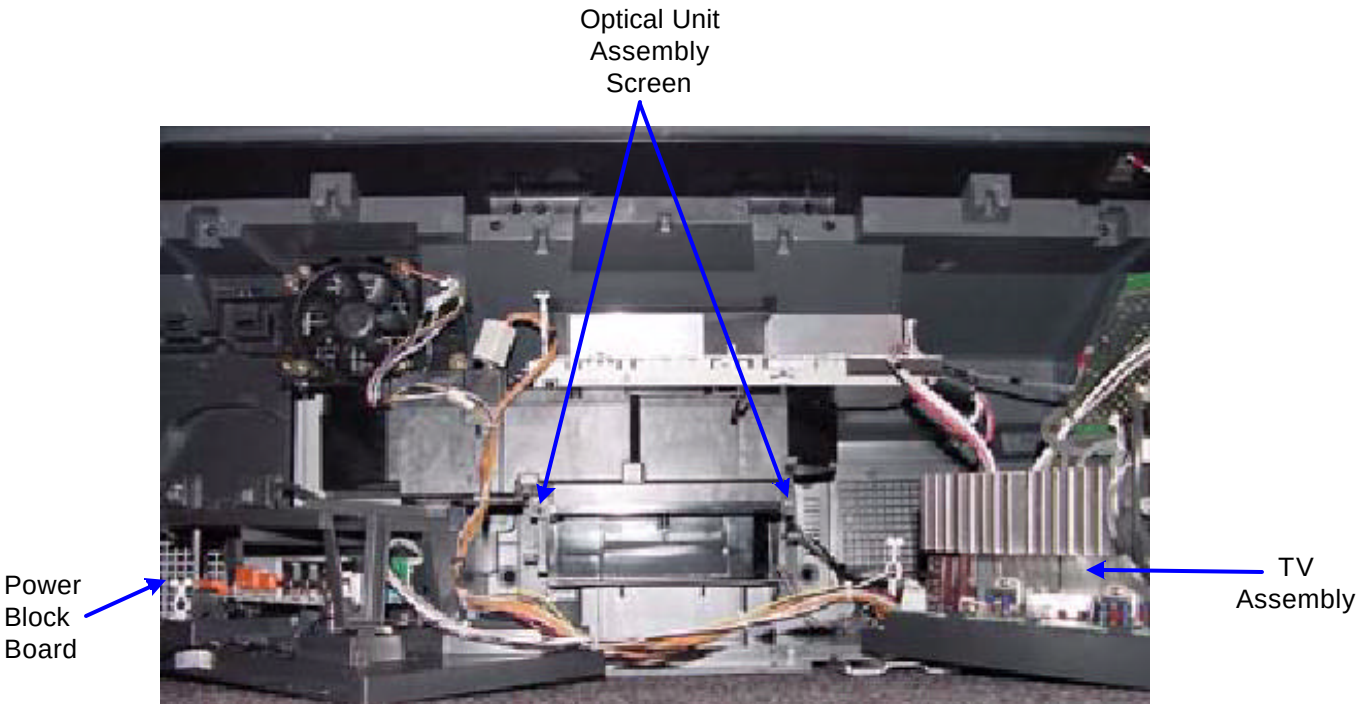


FIGURE 22-5 - OPTICAL UNIT SCREWS EXPOSED

f) Slide out the optical unit.

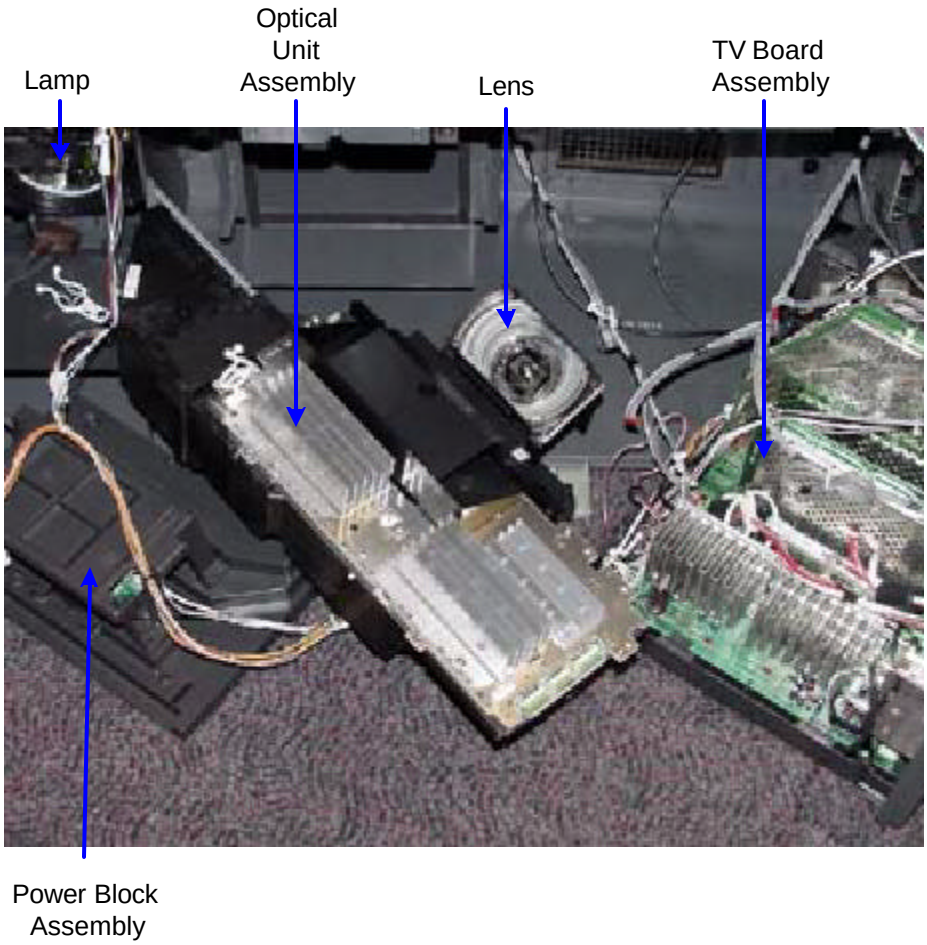


FIGURE 22-6 - OPTICAL UNIT ASSEMBLY

g) Dust the optical unit lens with a soft cloth before installing. Specks of dirt are magnified, so clean it carefully.

Chapter 23 - Screen / Mirror Replacement

The entire top of the projection TV is replaced as an assembly containing the screen, mirror and speakers.

Procedure

a. Remove the back (lower) panel.

b. From the back, remove the center support bracket.

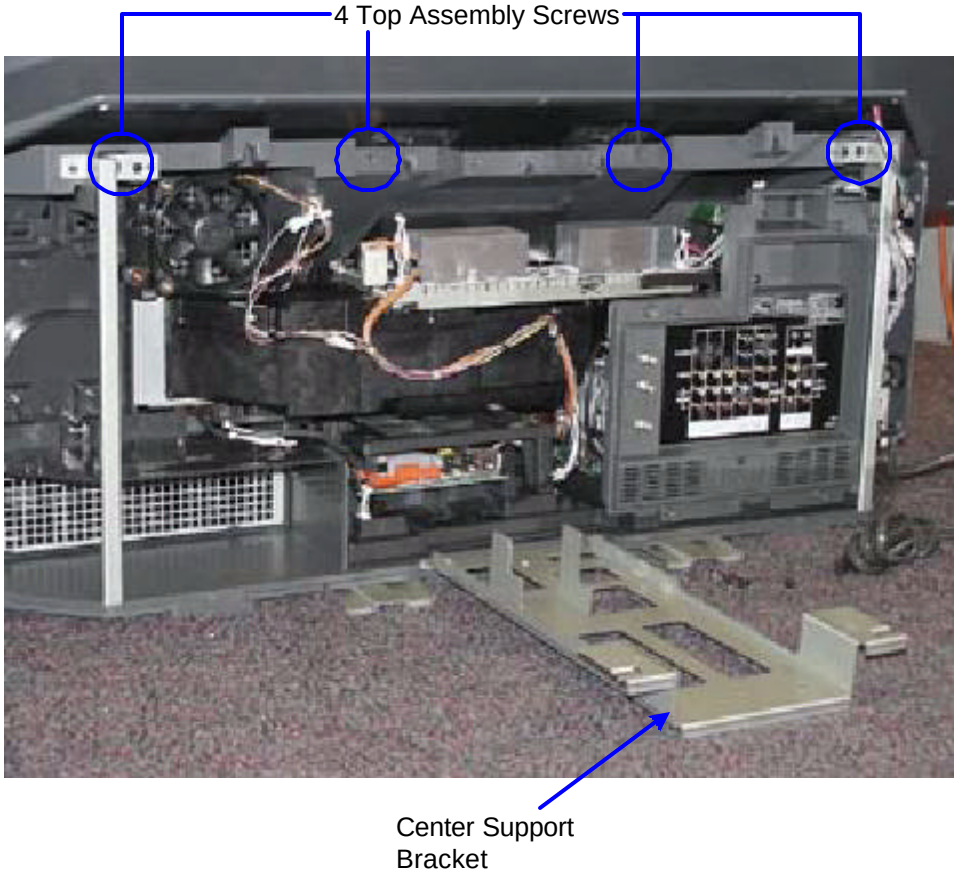


FIGURE 23-1 - REMOVE THE REAR CENTER SUPPORT BRACKET AND SCREWS

c. Also from the back, remove the four screws securing the top assembly to the lower electronics (Figure 23-1).

d. Refer to Figure 23-2. From the front of the TV, pull the two side panels off to expose the control panel screws.

e. Remove the top two screws of the control panel and loosen the remaining four by ½ inch. Tilt the control panel forward as shown in Figure 23-2.

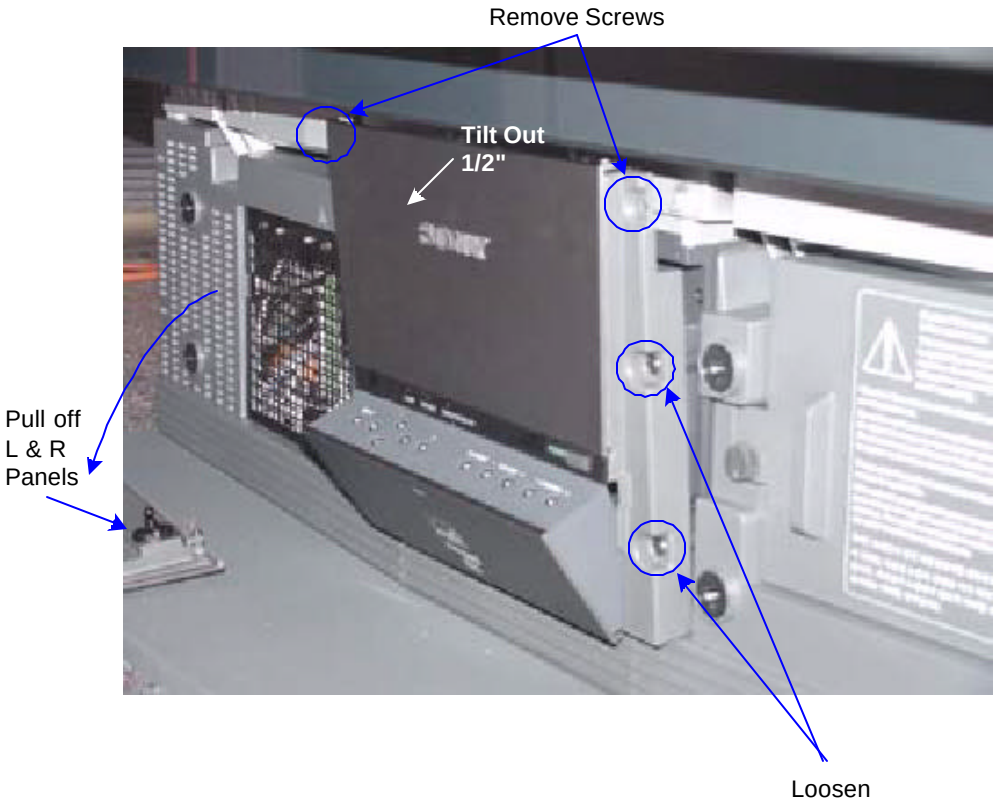


FIGURE 23-2 - PULL OFF THE FRONT SIDE PANELS & LOOSEN CONTROL PANEL

f. From the front, remove the remaining four screws (Figure 23-3).

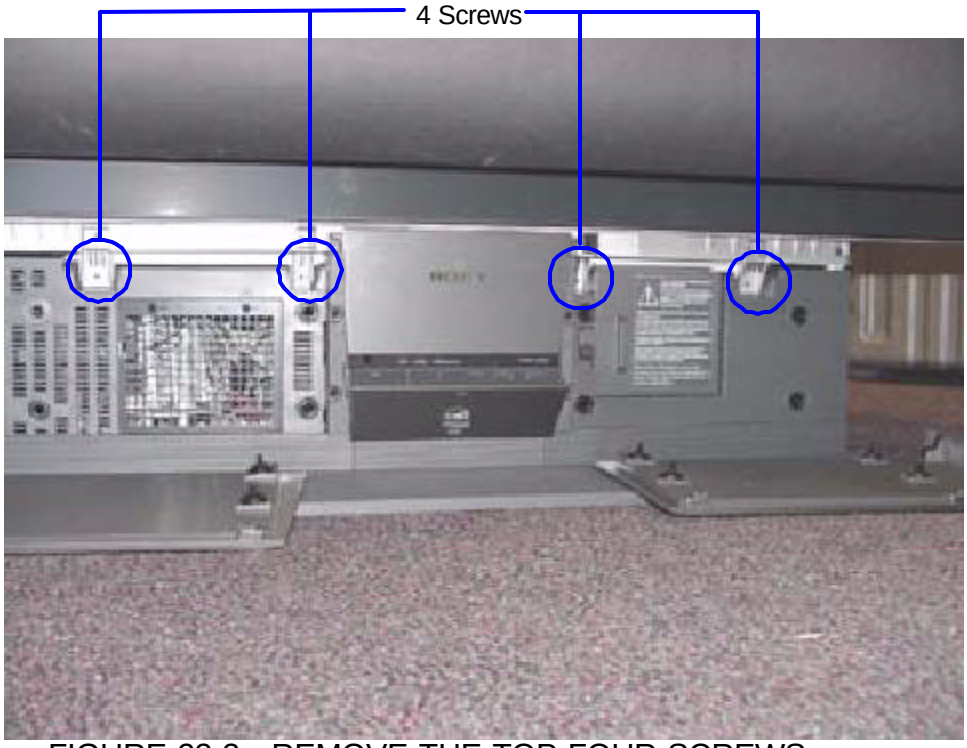


FIGURE 23-3 - REMOVE THE TOP FOUR SCREWS

g. With the help of another person, lift the top assembly off. Do not leave the glass mirror in the top assembly exposed to dust and children. Clean the lens with a soft cloth (Figure 23-4) before installing the top assembly.

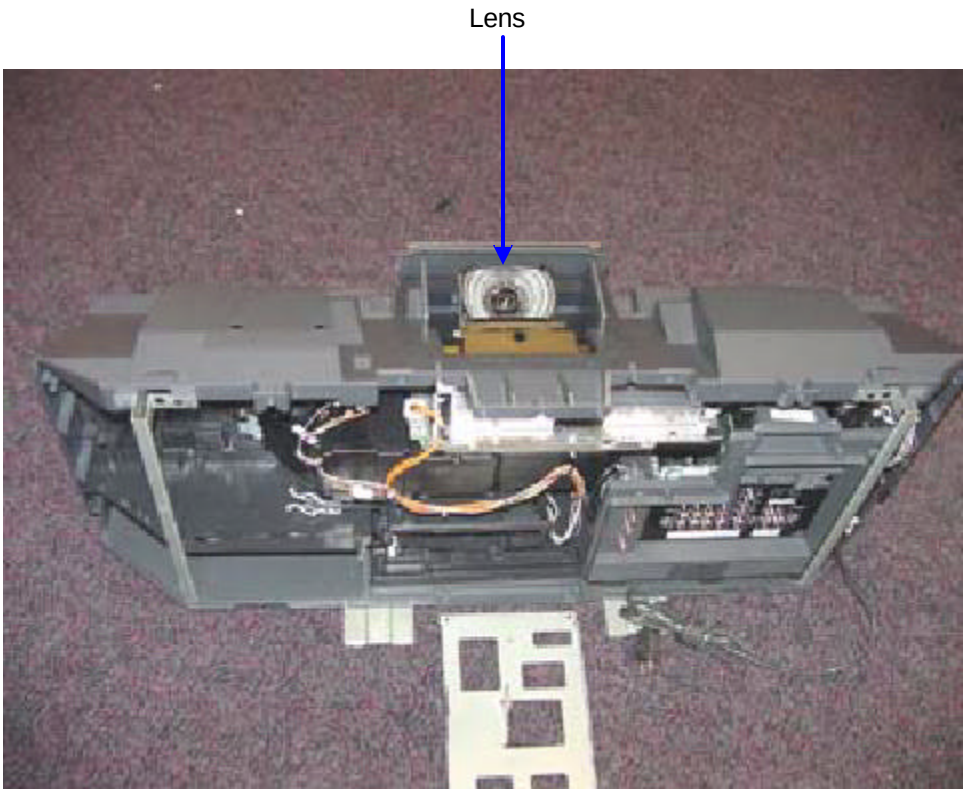


FIGURE 23-4 - BOTTOM TV BASE

Chapter 24 - Troubleshooting - TV Shutdown

The TV can be disabled because of: open bimetal fuse, fan not working, lamp not working, short on the 5Vdc line and an imbalance in either audio output stage.

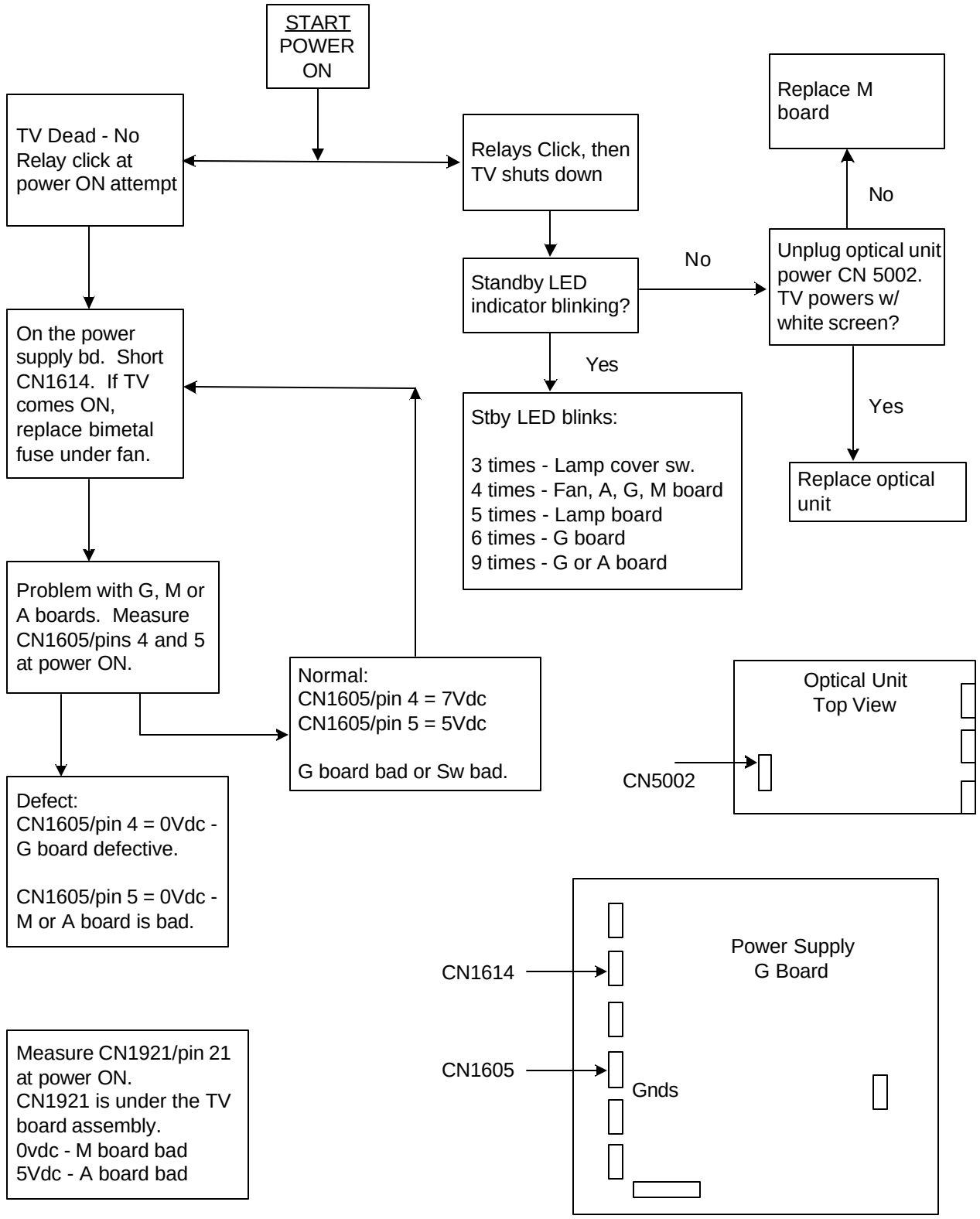


FIGURE 24-1 - TV DEAD / SHUTS DOWN FLOWCHART

Chapter 25 - Power Supply

The Standby power supply circuit and power ON sequence is simple and easy to figure out by looking at the simplified Figure 11-1. The only outstanding servicing precaution you must make note of is the over voltage zener diode on the A board at CN1901/pin 3 in Figure 25-1. If it shorts, it will load down the standby 5Vdc and the TV will not respond to a power ON command (dead TV set).

Standby Power Supply

The standby power supply is located on the G board with the main power supply. Standby voltage is output when the TV is plugged into AC. Standby 7Vdc is output CN1605/pin 4 into the bottom A board where it is regulated down to 5Vdc and passed onto the Main Micro on the M board (via CN1921/pin 16).

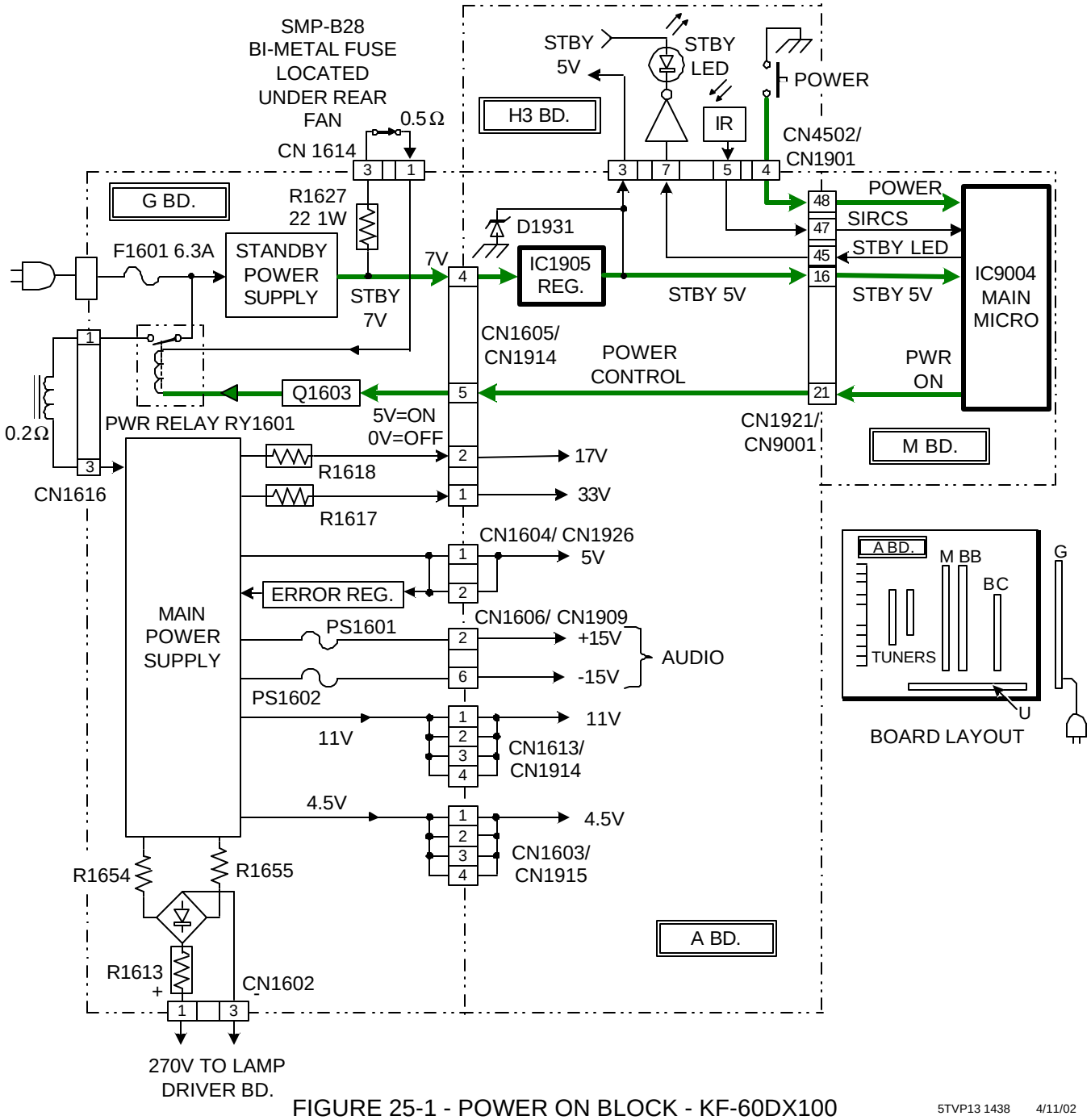


FIGURE 25-1 - POWER ON BLOCK - KF-60DX100

5TVP13 1438 4/11/02

Power ON sequence

After the Main Micro IC9004 (M board) receives standby power (CN1921/pin 16), IC9004 can respond to the power ON command from either the remote (IR) or the switch on the front panel H3 board. The TV power ON steps are:

1. The front panel power ON button is pressed. CN1921/pin 48 goes LOW (0Vdc – see Figure 25-2 for the location of CN1921/CN9001).
2. Main Micro IC9004 outputs a HIGH (5Vdc) to energize the power relay. CN1921/pin 21 goes to 5Vdc.
3. This 5Vdc passes through the A board into the power supply (G) board at CN1605/pin 5 = 5Vdc.
4. If the Bi-metal fuse under the lamp fan 2 is closed (CN1614/pin 1 & 3 connected), then the power ON command into CN1605/pin 5 = 5Vdc can energize the power relay RY1601 on the A board.
5. Within the G board, power relay RY1601 contacts close, passing AC to the Main power supply. The Main power supply outputs various voltages to power the TV.
6. Only the ±15 voltages (CN1606/pin 2, 6) that go to the audio output stage are fused. Fusible resistors are in the 33Vdc and 17Vdc outputs at CN1605/pin 1, 2.

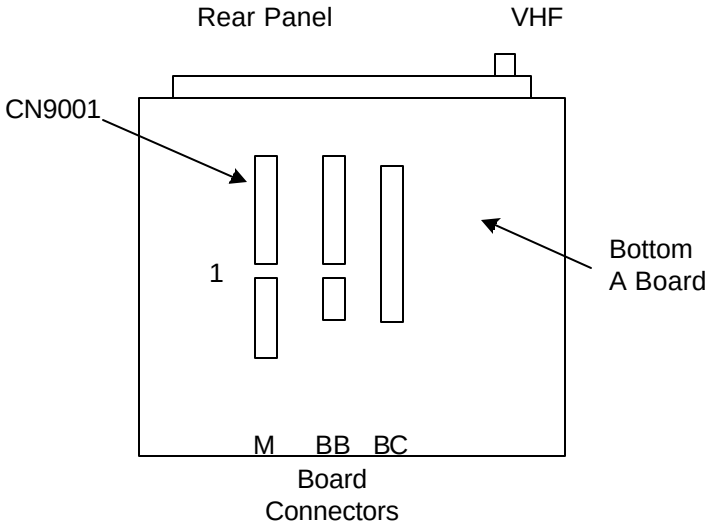


FIGURE 25-2 - TV BOARD ASSEMBLY
BOTTOM VIEW OF A BOARD

Chapter 26 - Fan Control - KF-60DX100

This Sony Grand Wega LCD Projection TV has two fans that start when the TV is turned ON and stop five seconds after the TV is turned OFF. Fan 2 is located at the rear and is visible as soon as the rear panel is removed. It cools the lamp block/assembly underneath it. Fan 1 is hidden under the LCD Optical assembly / light box.

Both fans contain Hall effect devices and circuitry that monitor fan rotation. If the Main Micro (M board) detects no rotation from either fan, the TV shuts down within five seconds.

In addition to this protection, if the temperature of the lamp assembly reaches a critical level, the TV will also turn OFF. A replaceable Bi-Metal fuse located under fan 2 (lamp cooling) will open if the lamp assembly gets excessively hot.

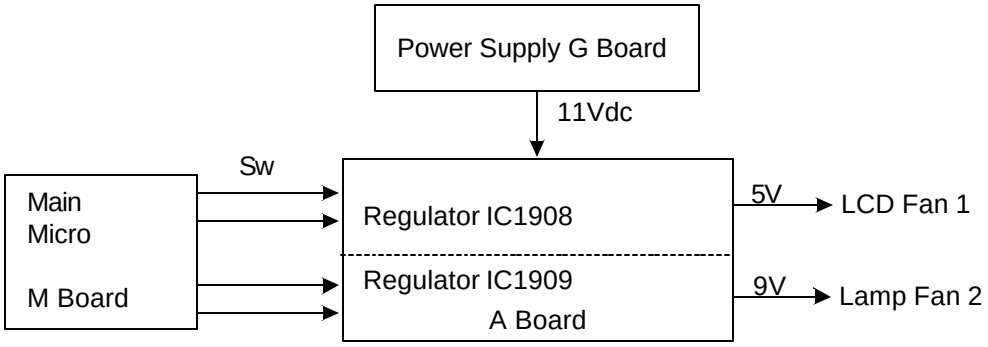


FIGURE 26-1 - FAN CONTROL BLOCK 4/16/02

Fan Drive

Refer to Figure 26-1. The power supply board's 11Vdc (CN1613/pin 1-4) source powers both fans. In-between the power supply and fan is the A board. On the A board is regulator IC1908 that provides switched 5Vdc to the LCD fan 1 and IC1909 to provide switched 9Vdc to the Lamp fan 2.

Table 26-1 Fan Control

LCD Fan 1 = ON		Lamp Fan 2 = ON	
A Board Connector	Voltage	A Board Connector	Voltage
CN1920/pin 20	0Vdc	CN1920/pin 18	0Vdc
CN1920/pin 21	0Vdc	CN1920/pin 19	5Vdc
CN1920/pin 22	5Vdc	CN1920/pin 22	5Vdc
CN1914/pin 1, 2, 3, or 4.	11Vdc (supply)	CN1914/pin 1, 2, 3, or 4.	11Vdc (supply)

Five voltages from CN1920 are input the A Board, along with the supply voltage at CN1914 (11Vdc). When these voltages are input, the A Board will output 5V and 9V to power their respective fans.

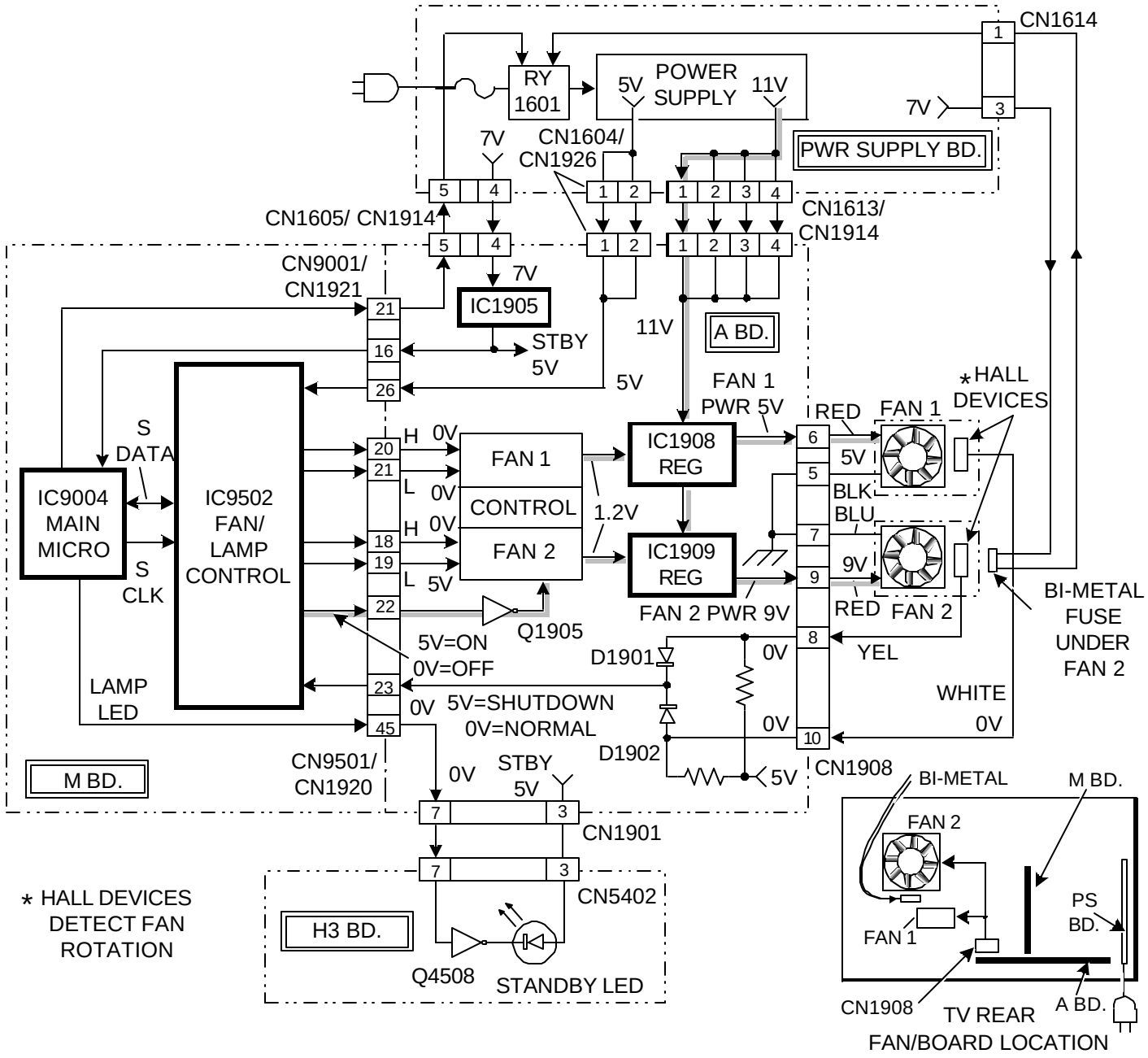


FIGURE 26-2 - FAN CONTROL - KF-60DX100 7TVP13 1442 4/16/02

Fan Rotation Detection

When drive voltage to the fan is present, the fan rotation detector output will ground out the 5Vdc input at CN1908/pins 8 & 10. This ground (0Vdc) keeps the Main Micro from turning OFF the TV.

If either fan stops rotating, CN1908/pins 8 or 10 will rise to 5Vdc. This 5Vdc is detected by Min Micro IC9004 (CN9020/pin 45 *) and IC9004 shuts off the TV in five seconds.

* CN9020 can be accessed from under the A board. Tilt the TV board assembly up and locate the marked pin.

Troubleshooting

If the backlight does not start and the TV shuts down with the Standby LED blinking four times, one or both of the two fans has stopped. The suspected boards are: A board (fan regulators), G board (power supply) and M board (fan control).

Procedure

1. At power ON, measure fan voltage from the power supply at CN1613/any pin = 11Vdc to the A board. No voltage? Replace the A board.
2. At the A board or the fan connector (see the fan wire colors in Figure 26-2), measure the fan's drive voltage at CN1908/pin 6 and 9 (5Vdc and 9Vdc respectively) at power ON. If both voltages are present, the fans should be rotating. Replace the fan if there is voltage but no rotation.
3. With the fan rotating, there should be 0Vdc at CN1908/pin 8 and 10. If either is 5Vdc, replace the corresponding fan (see Figure 26-2). At this time, fan 1 is part of the light box (optical assembly) and not available separately.
4. There should be 0Vdc entering and leaving the A board going to the M board at CN1920/pin 23. This connector is accessible from under the bottom A board. Tilt the TV board assembly package up and locate the connector under the M board. If this A board output voltage is 5Vdc (not the same as input), replace the A board. If CN1920/pin 23 is 0Vdc, replace the M board.

Chapter 27 - Grand Wega Lamp Control

DANGER: There is High Voltage at very High Current, dangerous enough to cause **Death On Contact**. Keep away from the Power Block and lamp socket when the TV is turned ON (see Figure 27-3). Follow the repair procedure closely and be aware that the **HV periodically turns ON automatically.**

This Lamp Control document is divided into these four major sections:

1. Lamp Operation
- Gas Discharge Tube Concept
- Lamp Starting Sequence
- New HV Detector Circuit

2. Lamp On Time Display
- Lamp On Time Reset

3. Power Block Location & Removal

4. Troubleshooting:
- Defect – Unreliable backlight starting
- Defect – No backlight repair procedure
- Defect – No backlight repair flow chart

1. Lamp Operation

Gas Discharge Tube Concept

This LCD TV screen display panel is similar to most computer laptop displays because they both have a colored LCD panel and backlight. To produce an image on the screen, the LCD panel's colored cells will either allow or block light from the backlight. In this TV, the source of light is a long life gas discharge tube (lamp). The gas discharge tube is similar to a fluorescent tube in operation and testing. The tube's two terminals (that are used for the light discharge) measure open circuit (infinity resistance).

The gas discharge tube requires a high voltage to start but once started (lamp current is detected), the applied voltage is reduced across its terminals. Not only is the applied voltage reduced when current is drawn (Power Block relay clicks), but the voltage across the tube / lamp drops because the tube's resistance has dropped at ignition like a fluorescent tube. The Power Block voltage reduction relay clicks one second after the lamp ignites. The phosphor that coats the tube takes about one minute to glow at a uniform level, near maximum brightness.

Lamp Starting Sequence

The lamp is instructed to turn ON when the TV turns ON. The Micro (B board) signals the Power Block to generate 25kV necessary to start the Lamp. Refer to Figure 27-1 when following this lamp ON sequence:

1. When Main Micro IC9004 receives a power ON command (0Vdc at A board's CN1901/pin 4), the Main Micro informs Lamp Control IC9502 via serial data.
2. Lamp/Fan IC9502 checks to see if the fan is rotating before turning ON the lamp.
3. The Lamp Control IC9502 in turn outputs a HIGH (5Vdc) which passes through the A board (CN1908/pin 1) to turn on the Lamp Driver Board.
4. The Power Block Board generates an initial 25kV at low current to start the gas discharge tube. The lamp ignites.
5. Once the tube starts, the increased current is detected and the Power Block:
   - Increases the lamp current (internal to the Power Block) so the lamp can go to maximum brightness
   - Grounds the PRT line (protect line at CN1908/pin 3) so the Main Micro knows the lamp is working.
6. The Main Micro (M board) can now unmute the audio and video because the fan and lamp are both working.
7. The lamp reaches almost full screen brightness in one minute.

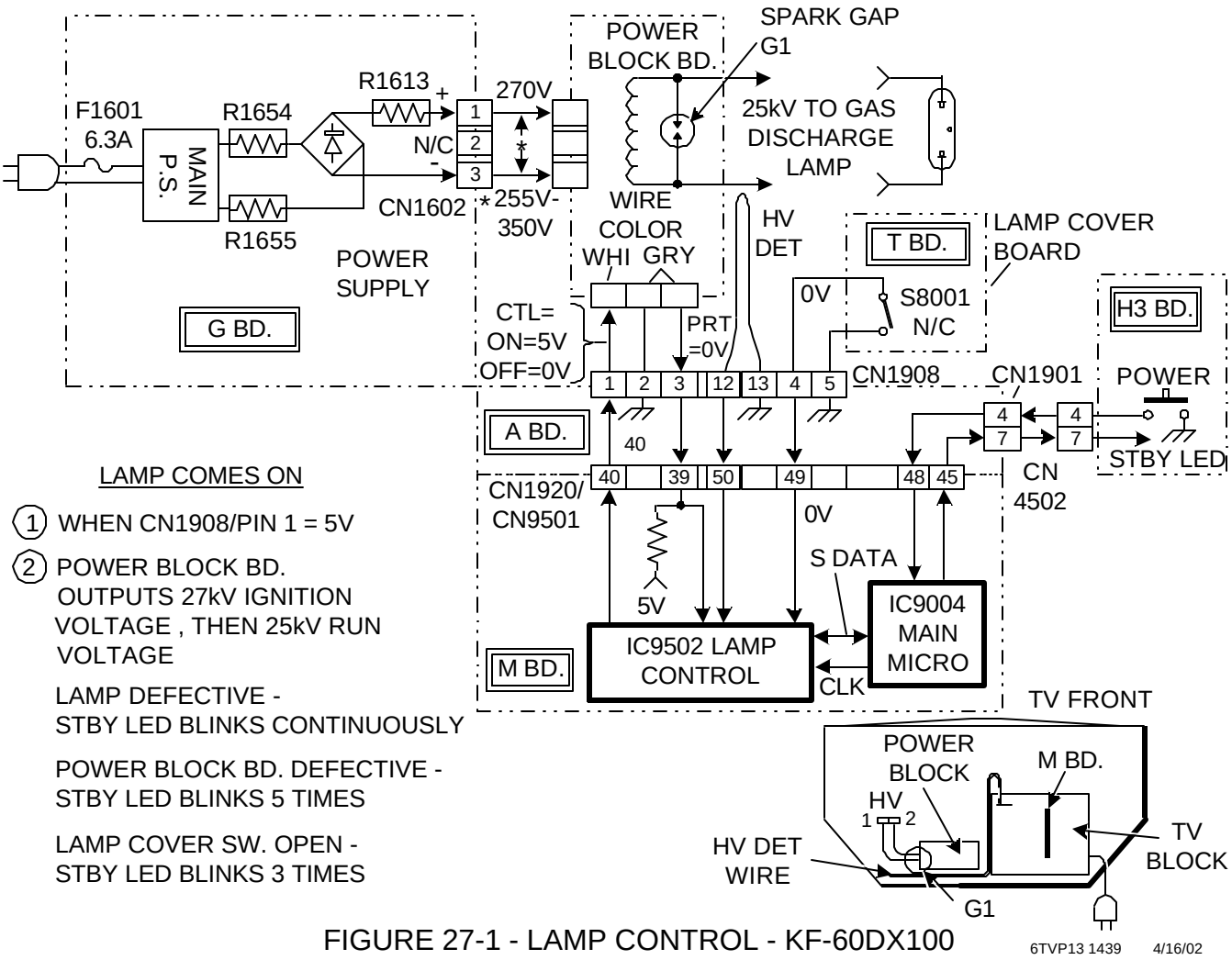


FIGURE 27-1 - LAMP CONTROL - KF-60DX100

New HV Detector Circuit

The purpose of the HV Detector circuit (on the M board) is to identify the cause of no backlight. The front panels LEDs use this information. The LAMP LED blinks continuously if the lamp is defective or the Standby LED will blink five times if the HV or control circuitry is bad. Refer to Figure 27-1 for the following HV detector circuit description:

Normal Operation - At power ON, Main Micro IC9004 instructs Lamp Control IC9502 (both on M board) to output a HIGH at Ctl (A board, CN1908/pin 1). This HIGH is applied to the Power Block to start the 25kV necessary for the lamp ignition. If the lamp starts to draw current, the Power Block closes the relay to reduce lamp voltage and grounds the PRT line (CN1908/pin 3 or the end gray wire on the Power Block).

The PRT (protect) line is a signal to tell the Main Micro the lamp is drawing current (working). When LOW (0Vdc), the Main Micro in turn unmutes the A/V lines and a picture with sound appears (all within 20 seconds after turn ON).

Defect - The LAMP LED blinks continuously - The main Micro looks at the PRT signal (CN1908/pin 3) and the antenna signal to determine if the lamp or Power Block is defective (Table 27-1). When HV appears without a load (bad bulb), arcing in the spark gap on the Power Block creates RF that is picked up by the nearby antenna wire. This RF signal is brought back to the A board at CN1908/pin 12. The RF signal only passes through the A board to get to the M board (CN9501/pin 50) where it is rectified. On the M board, a DC voltage developed after the RF signal is rectified indicates the presence of HV (normal Power Block operation). If there is HV and no current draw, the conclusion is that the lamp is bad so the Main Micro continuously blinks the front panel LAMP LED.

Table 27-1 - How the Main Micro Determines if the Lamp or Circuitry is Bad		
Condition	PRT (Protect) CN1908/pin 3	Visual Arcing at G1/ RF at CN1908/pin 12
Normal	Low (0Vdc)	None
Lamp LED blinks Continuously (HV OK. Lamp bad)	High (5Vdc)	Yes at power ON and repeats every 5 seconds later until TV shutdown (3 mins.).
Standby LED blinks 5 times (No HV, Power Block, PS fuses, or M board bad)	High (5Vdc)	None

Defect – The Standby LED blinks five times – At power ON when the Power block is instructed to turn ON (HIGH @ white wire to Power Block / CN1908/pin 1), but no current is drawn (HIGH at end gray wire / CN1908/pin 3), the lamp or the Power Block is defective. To determine which is defective, the antenna signal (explained in the last paragraph) is used by the Main Micro only when the PRT line (CN1908/pin 3) remains HIGH (no lamp current).

During this defect, PRT = HIGH forces the Main Micro IC9004 to request information about the presence of HV via serial data from Lamp Control IC1952. If RF (HV) is not detected, the Main Micro keeps the audio and video muted, blinks the Standby LED blink five times and shuts down the TV in three minutes.

HV antenna positioning

After repairs, reposition the black HV antenna near one of the HV leads as shown in Figure 27-2. If it is not positioned as shown, the LAMP LED will NOT flash during a lamp defect.

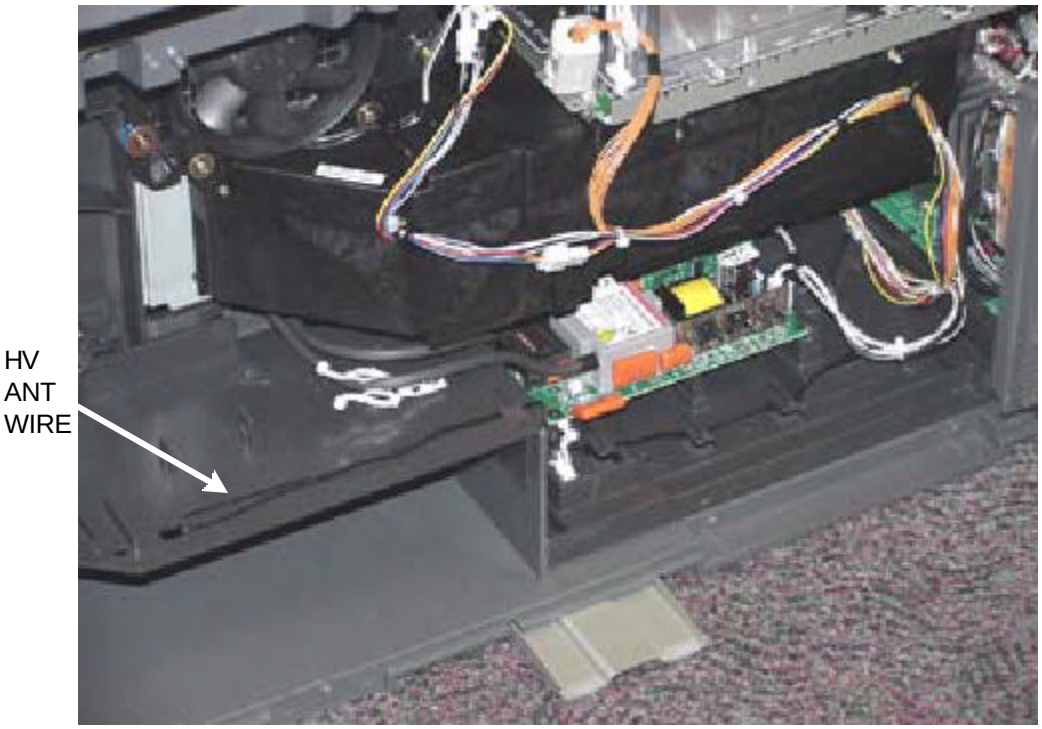


FIGURE 27-2 - HV ANTENNA POSITION

2. Lamp ON Time Display

The time the lamp is ON in hours is stored in the service mode within the “Option-E” category.

1. Enter the service mode (remote = Display, 5, Vol +. Power ON).
2. Use the 5 button to locate the Option-E category. Button 5 moves up to Option E from the bottom of the list.
3. Change this first “Lamp Time” item data from 0 to 1 using the 3 button.
4. The lamp time is displayed on the screen in hours.

Lamp On Time Reset

5. To reset the time, follow the procedure above, return to step 3 (“Lamp Time” item) but change the data to “0” and press MUTE, then Enter. The hours will reset to 000.

3. Power Block Location & Removal

From the back of the TV set, the Power Block is located at the bottom center. Figure 27-3 shows the Power Block (right) and its HV wires terminated at the lamp socket (left).

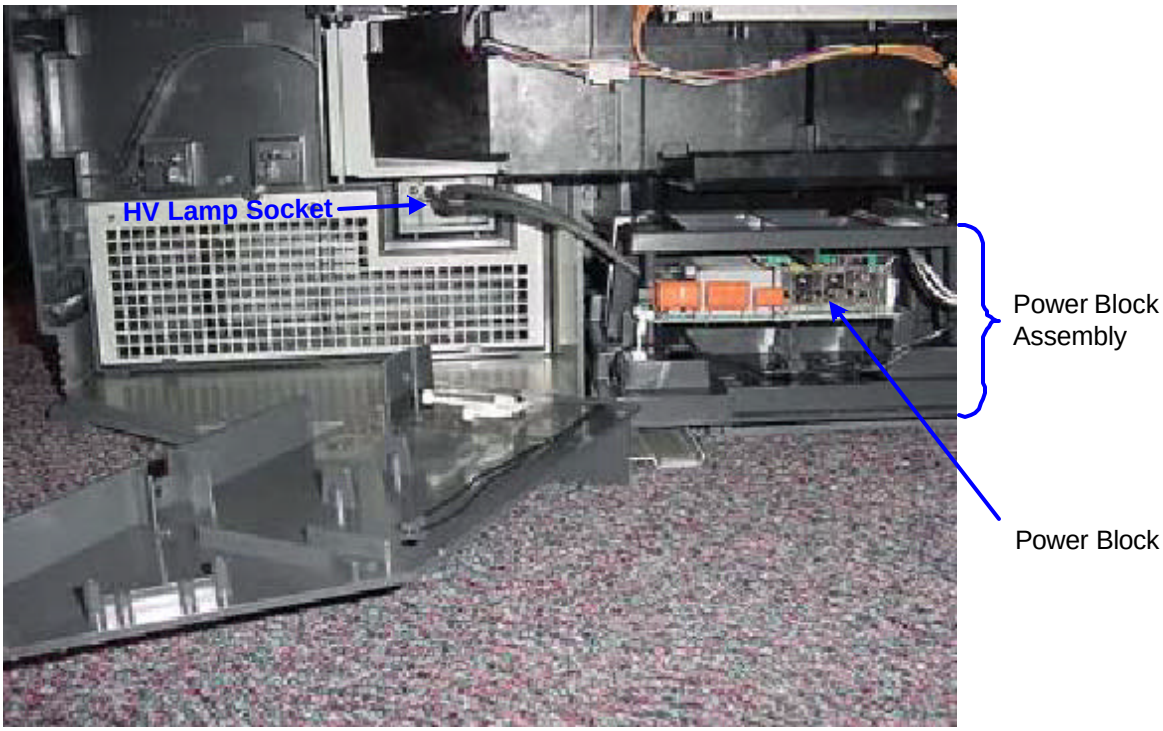


FIGURE 27-3 - HV LAMP CONNECTOR

The Power Block assembly and HV connector is one assembly and must be removed together.

1. Remove the two screws from the HV socket as shown in Figure 27-3.
2. Lift the Power Block (as an assembly) up and outward (see Figure 27-4).
3. Remove the top and bottom covers and unplug the two board connectors (not shown).

FIGURE 27-4 - COMPLETE POWER BLOCK ASSEMBLY

4. Troubleshooting

Defect – Unreliable backlight starting

As the gas discharge tube reaches the end of life, the most common symptom is unreliable starting at power ON, especially when the lamp is cold. Replace the lamp.

Defect - No backlight repair procedure

The lamp will not turn ON because of a defective:

- Lamp
- Power block board (no HV)
- Control engine (M board – no turn ON signal).
- Fusible resistor(s) on the power supply G board.

Concept: When the backlight bulb / lamp reaches the end of life and does not ignite, the internal resistance across its two terminals remain high (open circuit). This causes the HV to climb to 25kV and arc across the spark gap device (G1) on the Powre block (proving the Power Block and controlling M board are working). The HV arcing makes an audible frying sound and light is visible. The HV arcing lasts two seconds, stops for five seconds and repeats until the TV shuts down in three minutes.

Troubleshooting procedure: If the Power Block arcs, the bulb is either defective or not plugged in. No arcing? Measure the HV control signal input to the white wire of the 3-wire connector on top of the Power Block. If this CTL input voltage is correct at 5Vdc at TV turn ON (within two seconds), the Powr Block or power supply board fuses are bad. If CTL is 0Vdc at turn ON, the controlling M board is bad or one of the Fans is not rotating (no fan causes no lamp ON and shutdown). See the Fan Control Fan Troubleshooting in Chapter 26 or just check the self-diagnostic Chapter 16.

Defect – No backlight repair flow chart:

The following flow chart will help you quickly ID the problem board, but you must be careful. High Voltage at a very High Current is present (not like a TV's FBT where there is low current).

Be aware that if the backlight does not start at power ON, the lamp HV circuitry is repeatedly instructed to try to turn ON for two seconds and again five seconds later until the TV shuts down. Therefore you must keep away from the HV when the TV is plugged into AC. To use this flow chart, you will need a DVM to determine which board is defective.

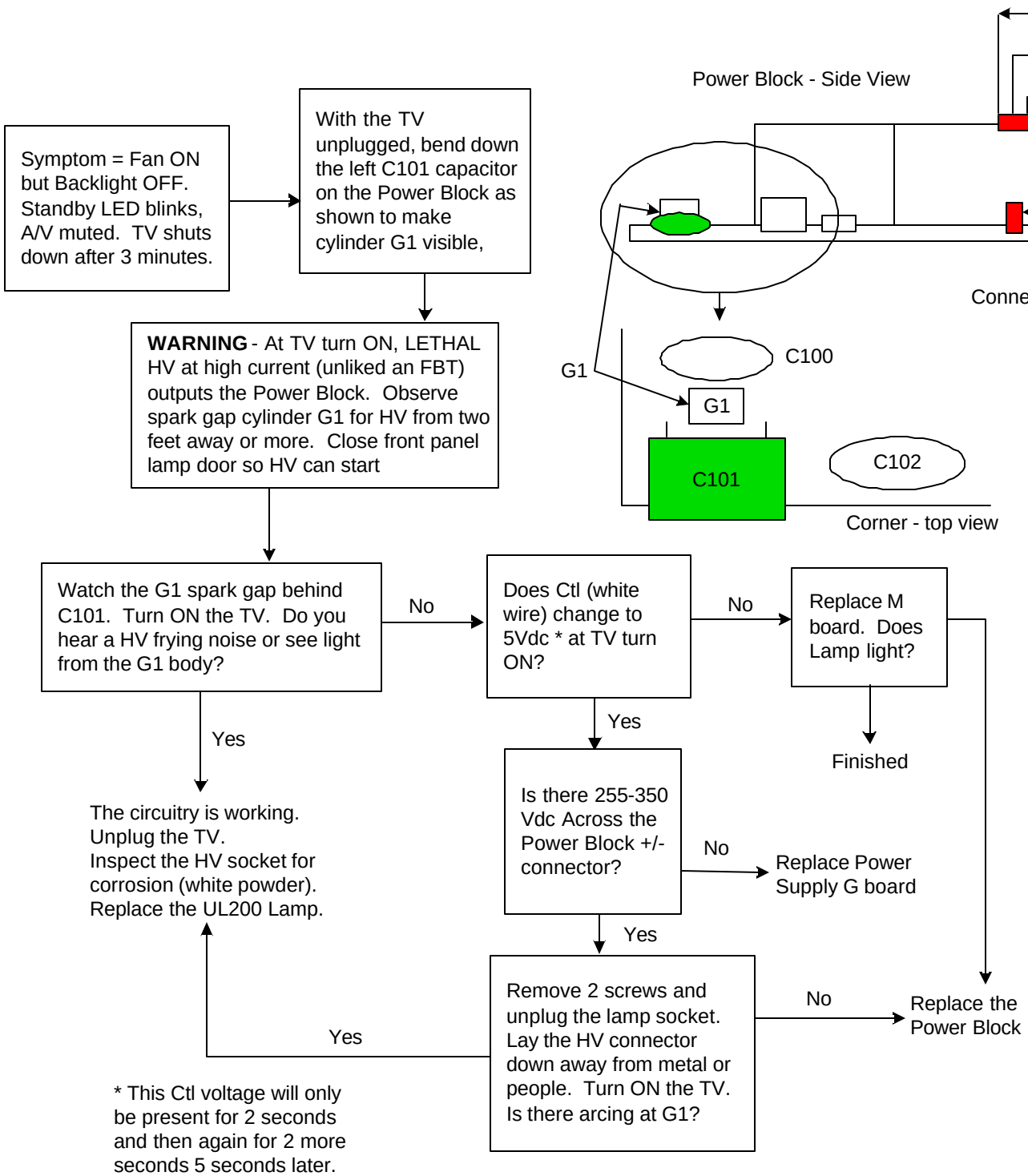


FIGURE 27-5 - DEFLECT - BACKLIGHT DOES NOT LIGHT 4/16/02

Chapter 28 - Video Process

Video Signal Flow

The video signal flow is shown in Figure 28-1. The video signal is input the U board, through the BC and BB boards to the final C board within the sealed optical unit optical assembly. The A board is an interconnect board that passes the video signal from one board to another and performs the initial TV tuner function. Table 28-1 explains the function of each board and their inputs/outputs.

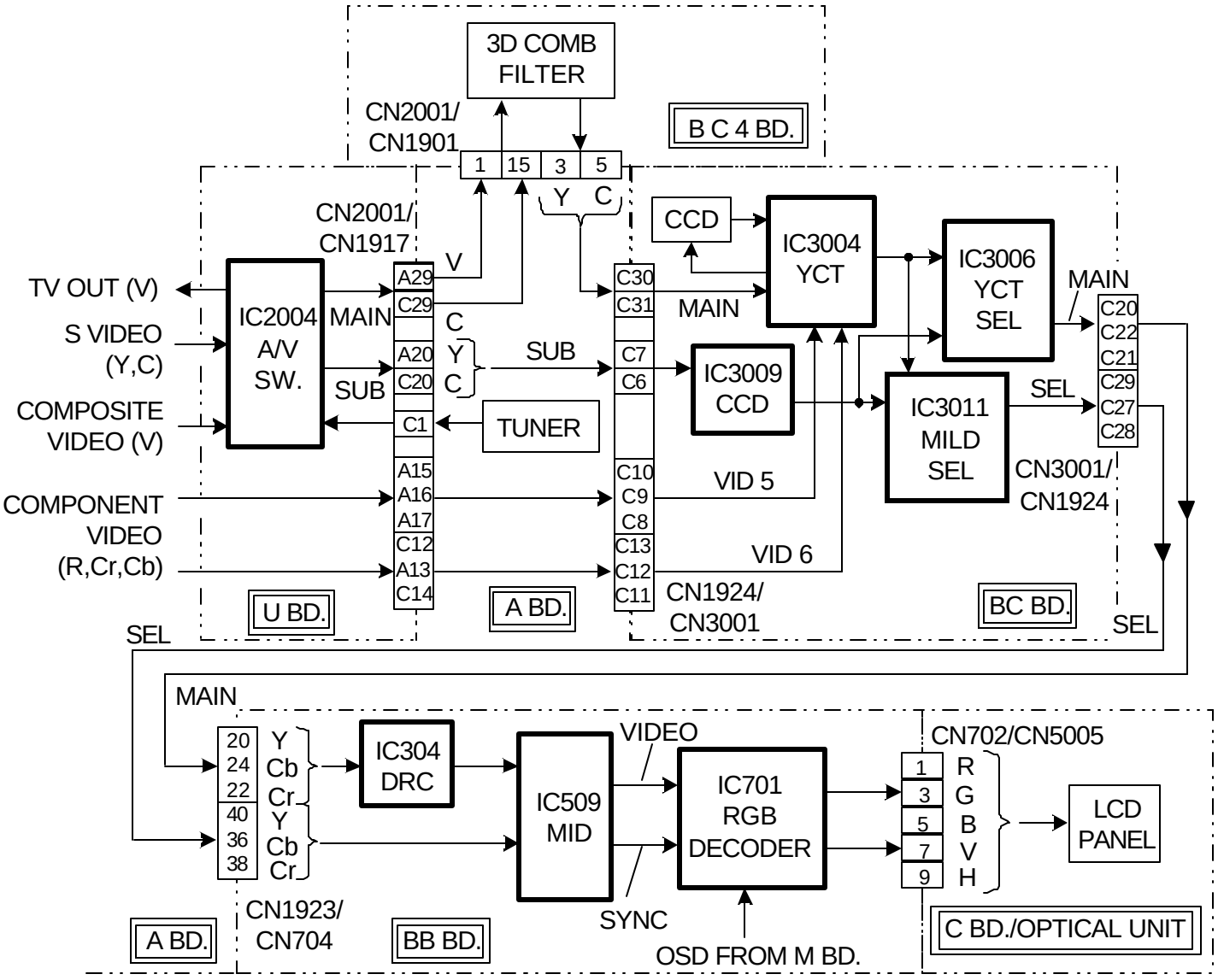


FIGURE 28-1 - VIDEO PROCESS - KF60DX100 9TVP131447 4/15/02

Table 28-1 - Video Circuit Board Inputs / Outputs			
Board	Input(s)	Board Function	Output(s)
U	• TV Tuner, S Video • Composite Video • Component video inputs.	• NTSC Input switching • Component video pass-through.	• TV Output to rear panel, • Composite S video to BC4 bd. • Component video to BC Bd.
A	• VHF antenna	• TV tuner and control • Interconnecting video boards	Various
BC4	• Composite Video (V) or S video (Y & C)	Comb filter separates the Y & C from the composite V (video) signal.	• Separate Y & C Outputs for the BC Bd.
BC	• S Video (Y & C) • Component video inputs.	• Creates a Main and Sub picture video path • Channels video into the Main (DRC) & Sub picture video paths.	• Main picture component video • Sub picture component video
BB	• Main picture component video • Sub picture component video	• Switches picture location when NTSC video is input. • Adds User Menu into the video path.	• RGB and Sync Output to the (LCD) light box assembly.
C	• RGB and Sync input	Independent RGB processing into separate RGB LCD panels.	• Display outputs onto mirror.

Troubleshooting

Video symptoms can be classified into three groups:

- White Screen – Video path open on any video signal board.
- Black Screen - BB board or optical unit are suspect.
- Video Screen Distortion – Narrow down by checking the features.

In a conventional TV, a loss of video signal results in a white screen with normal TV sound. This is also true in this LCD projection TV. However, if the screen is dark with normal sound, either the LCD optical unit or the previous BB circuit board may be bad.

On the other hand, a dark screen without sound indicates both video and audio muting and not a problem in the video chain. Muting is caused by: 1) the Main Micro because of: a communications problem with another IC; 2) a fan defect; 3) a lamp circuit defect; or 4) an audio output failure, which will also cause TV shutdown. Muting the A/V is not a video failure. A video failure does not affect the sound.

White Screen

If the screen is white, there may be no input to the light box. Press the Menu button. If an OSD menu appears, the optical unit is good and the previous stages are bad (BC or BB board). If no OSD, use Table 28-2 and a DVM to verify these inputs to the optical unit before changing it. Measure the input voltage at CN5002 and verify RGB input signal at CN5005. If the input voltages and signals are both present, the optical unit is suspect.

Table 28-2 – Optical Unit Input Voltages and Signal Levels (color bar input)				
Input Voltage (from G board)	Level		Input Signal (from BB board)	Level
CN5002/pin 1 (white)	- 7Vdc		CN5005/pin 1 (Blue signal)	2.5Vp-p
CN5002/pin 3,4 (orange)	5Vdc		CN5005/pin 3 (Green signal)	2.0Vp-p
CN5002/pin 7,8 (orange)	3.3Vdc		CN5005/pin 5 (Red signal)	2.4Vp-p
CN5002/pin 11 (orange)	15Vdc		CN5005/pin 7 (Vert sync)	5Vp-p
			CN5005/pin 9 (Horiz sync)	5Vp-p

Black Screen

If the screen is black, the optical unit or BB board may be bad. First, see if the Menu feature functions. Press the Menu button on the remote control. If the screen displays the OSD menu, the optical unit assembly is working and the BB board is suspect.

If there is still no display, remove the input power to the optical unit by unplugging the power connector CN5002 (see Figure 28-2). If the screen becomes white, the BB board is bad. A white screen is normal if the optical unit loses power (the optical unit passes all the backlight). If the screen remains black, the optical unit is bad.

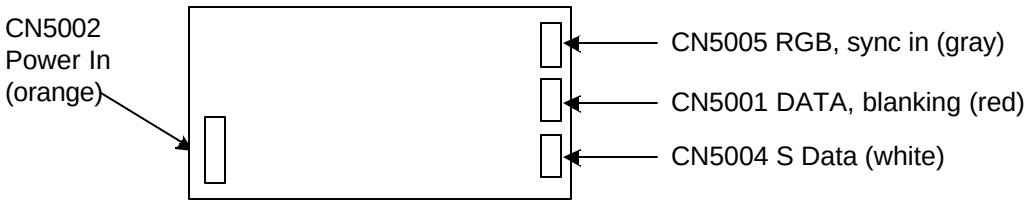


FIGURE 28-2 - OPTICAL UNIT CONNECTORS (TOP VIEW)

Video Screen Distortion

Distortion, defects or interference can enter the video chain at any of its five boards used in the video processing chain. You can use some features to help determine where the video problem is. The features most helpful in isolation are: the On Screen Display (OSD) menu, the MILD picture mode, activity in Video 5/6 inputs and the Twin View Mode.

On Screen Display to Check the Optical Unit

You can use the On Screen Display Menu to check the circuitry after the BB board. If the screen displays no (black or white) picture or a distorted picture, press the Menu button on the remote control. If the screen displays the OSD menu undistorted, the optical unit assembly is working (along with the OSD circuit in the later stages of the BB board where the OSD circuit is). See Figure 14-1. If the OSD Menu is present, this also means the BB and BC boards are the primary suspects causing the video distortion.

Video Problem that does not appear in the MILD Picture Mode

When watching an NTSC program from the tuner or video 1-4 inputs, this video signal passes through the DRC and MID circuits on the BB board. By selecting the MILD picture setting, this video signal is diverted around the DRC stage.

Therefore, if the NTSC video problem does not appear when selecting the MILD mode, the problem is on the BB board in the DRC circuit.

Video Problem Only with a single input or feature

Table 28-3 lists a feature and/or input that has a picture distortion and the corresponding board that is most likely responsible for the problem. For example, if a video problem only appeared while watching a TV station but not in a video input, the most likely cause is shown by the #1 under the A board column (A board defect). The # 2 under the U board column indicates a lesser possibility that the A/V selector IC is defective on the U board, a second board choice. The remaining boards that process the other input signals are not suspect because the problem does not appear with another input.

Table 28-3 - Board causing a Video Problem

Video Problem appears only with	U board	BC board	BC4 board	BB board	Optical Unit Assembly	A board
TV Tuner	2					1
Video input 1-4	1	3	2			
S Video 1-3	1	2				
Video 5, 6 (Component Video)		1		1		
TV Out	1					
Any input including the OSD.				2	1	
Mild Menu setting *				1		
CCD	2	1				
OSD				1		
Twin Picture		1		1		

* The “Mild” Menu video selection (Vivid/Standard/Movie/Mild) routes the signal around the Digital Reality Creation Circuitry, feeding it directly into the MID IC. Noisy NTSC input signals can fool the DRC circuit into introducing false picture improvements, adding to the noise, making the MILD mode useful with noisy signals.

Using Twin View Mode to Locate the Video Problem

Twin View Signal Path Concept

This TV has the ability to display two pictures side by side on the same screen. In the “Twin View” picture mode (Figure 28-3), both main and sub signal paths are used to produce the dual picture. The difference in the two paths is that the main path contains the DRC picture enhancement circuit (left picture). Both main and sub picture paths arrive at the MID circuit (BB board) to be assembled into a single picture. The rules for this Twin View video processing are:

1. The DRC circuit can only be used for a 480i (NTSC) input signal.
2. The DRC picture will always be the larger picture.
3. When both NTSC pictures are the same size, the LEFT picture will be the DRC picture (using the main signal path).
4. When there is a High Definition (HD) picture input (video 5 or 6), the RIGHT picture will be the DRC picture.
5. The RIGHT picture CANNOT select a HD (video 5 or 6) input.

Video switching in both the BC and BB boards will ensure these rules are followed. Figure 28-3 shows the displayed signals with different inputs.

Two NTSC (480i) pictures displayed

Left = High Definition (480p, 720p, 1080i) & Right = NTSC (480i)

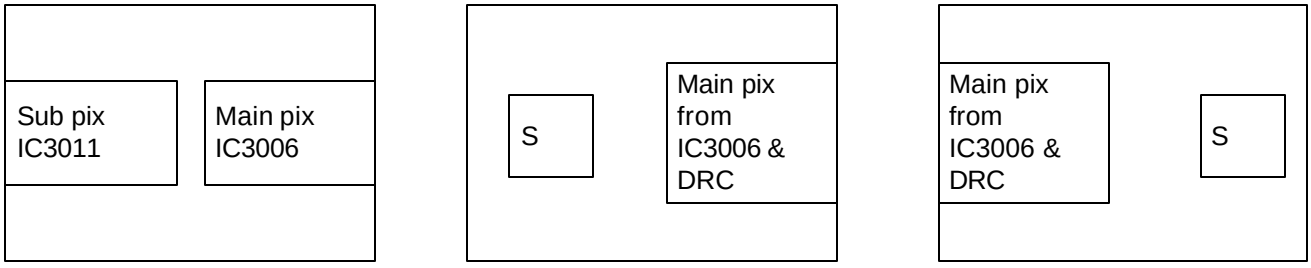
FIGURE 28-3 - VARIOUS TWN PICTURE DISPLAYS WITH NTSC AND/OR HIGH DEFINITION (HD) SIGNALS. (HD INPUT FROM VIDEO 5 OR 6)

Two 480i (NTSC) Pictures Input

Refer to Figure 28-4, which indicates where the larger picture's signal comes from. When either both pictures are the same size (Figure 28-4a) OR if the LEFT picture is the larger picture (Figure 28-4b), the DRC circuit (BB board) is used to improve the quality of the 480i (NTSC) signal. The main picture from IC3006 (BC board) is positioned on the LEFT side (by the MID circuit on the BB board).

When the picture on the LEFT becomes the larger (Figure 28-4c), the Main and Sub input signals switch (BC board) and the MID process (IC509, BB board) also switches the picture position. This double signal crossing allows the channels to be at the same place on the screen (but the signal paths are different). This switching is done to ensure the high-quality DRC signal is employed by the larger picture.

As the user increases the picture size from smaller to larger, a slight delay occurs when the right picture just begins to enlarge. This allows both the SEL switch ICs (BC board) and the MID circuit (BB board) to switch positions. The picture freezes for a moment until both switches have been made, and then the picture frame continues to increase in size.



a b c

FIGURE 28-4 - TWIN PICTURE MODE, ANALOG INPUTS

One 480i (NTSC) Picture Input and

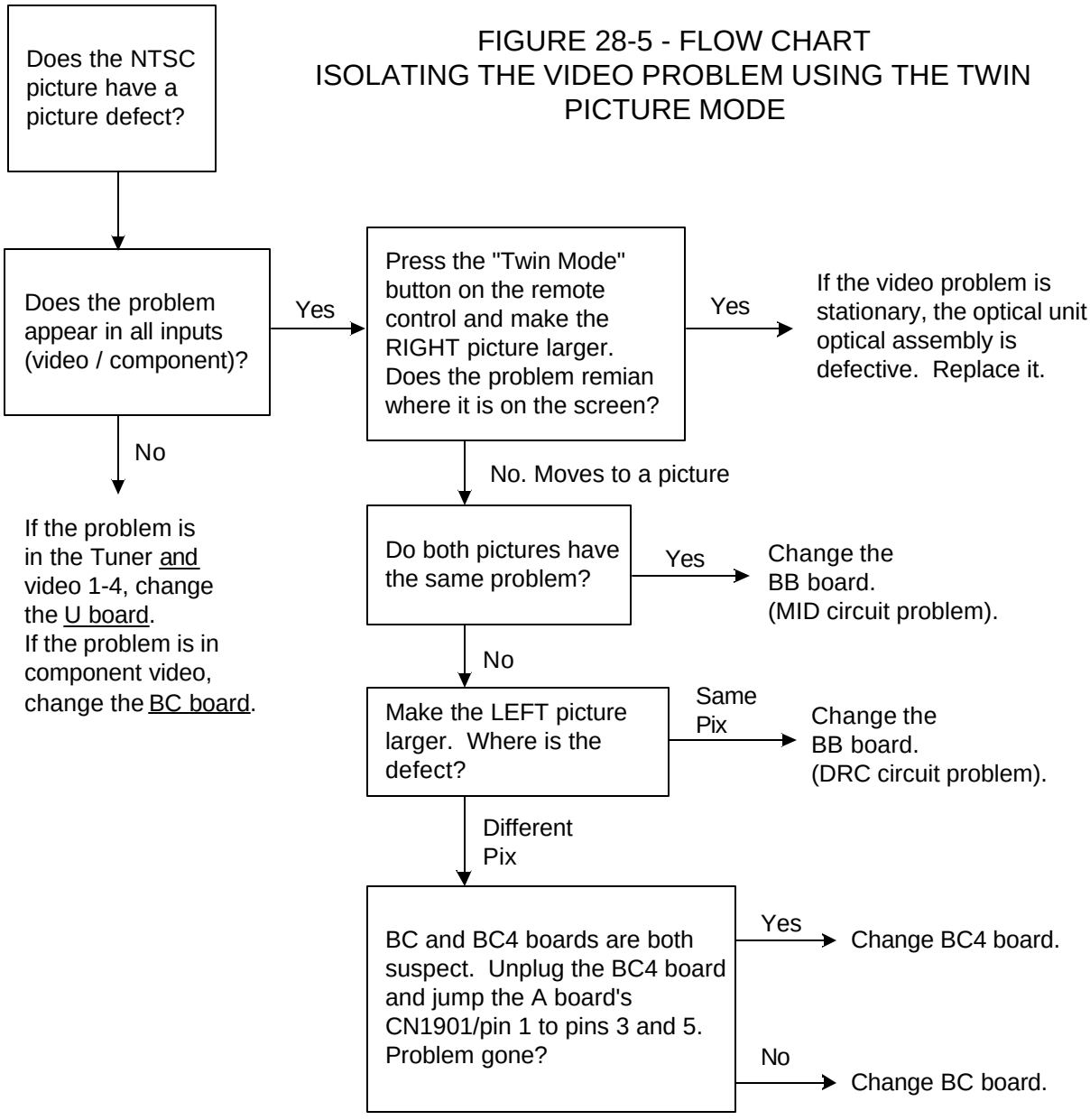
One HD (480p/720p/1080i) Picture Input

When one twin view picture contains a HD signal, that HD picture always takes the SUB signal lower path (Figure 28-1) into the MID IC509 and appears on the LEFT side of the screen.

Conclusion / Troubleshooting

What does all this mean? How can we use this video path switching to determine which board contains the video problem? Refer to the flowchart in Figure 28-5 to determine if the problem is in the A, U, BC, BC4, BB board or the optical unit optical assembly just by noting where the video problem moves as you increase the picture size in the Twin View Mode.

FIGURE 28-5 - FLOW CHART
ISOLATING THE VIDEO PROBLEM USING THE TWIN PICTURE MODE



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