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VAXstation 4000 3D Graphics Options

Option Guide

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About This Guide

This guide is intended for users who install and maintain PV61G-BA or PV61G-AA 3D graphics options in a VAXstation 4000 Model 60.

Structure of this Guide

This guide contains three chapters, two appendices, and an index.

- Chapter 1 tells you how to prepare the system for installing either of the 3D graphics options.
- Chapter 2 tells you how to install and remove a 3D graphics option.
- Chapter 3 tells you how to restore, start, and test the system.
- Appendix A lists option hardware specifications.
- Appendix B lists associated documents.
- The index refers you to the page containing specific topics and keywords.

Conventions

The following conventions are used in this guide:

Convention	Meaning
Warning	Warnings provide information to prevent personal injury. Read these carefully.
Caution	Cautions provide information to prevent damage to equipment or software. Read these carefully.
Notes	Notes provide general information about the current topic.
❶	Circled numbers in text refer to circled numbers in associated figures.

1

Overview and System Preparation

For the VAXstation 4000 Model 60, the 3D graphics options are the PV61G-BA 8-plane option and the PV61G-AA 24-plane option. Both are three-dimensional color graphics and continuous-tone imaging (3D/CTI) options. Both options are described in Chapter 2.

1.1 Adding Options

You can choose one of two ways to add a 3D graphics option to your system. You can either add the option yourself or you can have a Digital Services representative add it for you. If you choose to add the option yourself, note the following:

- At the time of writing, the PV61G-BA 8-plane and PV61G-AA 24-plane 3D graphics options are compatible with the following monitors:

  VR320
  VRT16
  VRT19

  For currently compatible monitors, consult your Digital sales representative.

- The installation can take up to an hour.
- The instructions in this guide assume you are familiar with the VAXstation 4000 Model 60 and the following displays:
  - System power-up messages.
  - SHOW CONFIG console command and associated configuration display.
  - TEST 100 console command for running the system exerciser and associated system exerciser display.

- Improper option installation can lead to module failure. VAXstation 4000 Model 60 warranties may not cover such a failure.

1.2 Preparing Your System

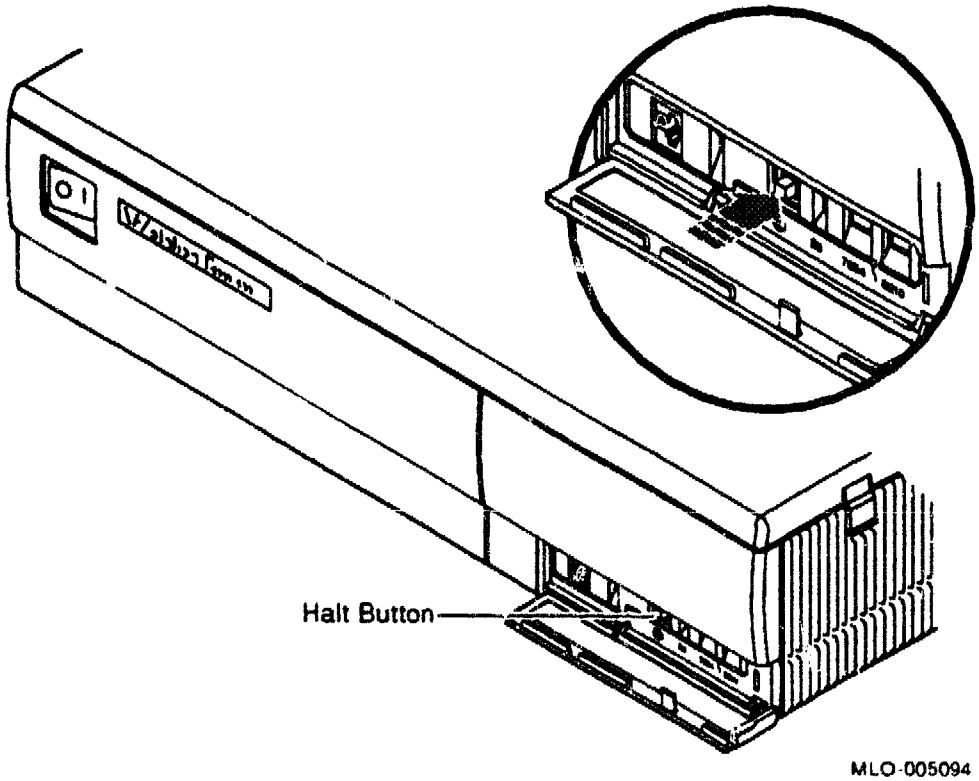
Shut down the system as follows:

1 Shutdown the operating system.

Note *See the operating system documentation for shutdown procedures. If the system is part of a networked work group, notify group members before turning off, halting, or restarting the system.*

2 Put your system into console mode by pressing the Halt button on the front of the system unit (behind the door on the lower right). Figure 1–1 shows the Halt button. The console mode prompt (>>>) is displayed when you halt the system.

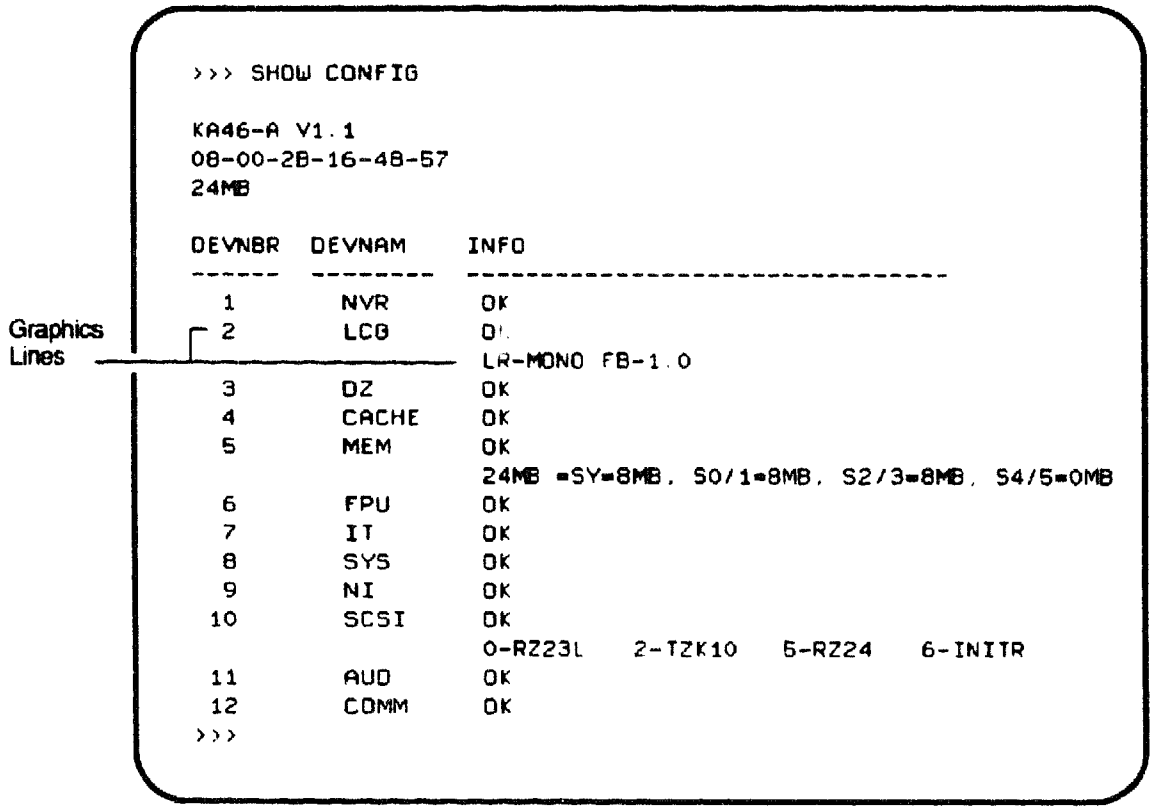
Figure 1–1 Halt Button



3 Before you add the option, you should review your system configuration and record the information for reference. After adding the option, you can compare the initial and current configurations to help verify the presence and operation of system devices and components.

To review your system configuration, use the SHOW CONFIG command. It displays the presence and status of the devices and components installed in your system. Figure 1–2 shows a typical configuration display. (The console commands and displays are described in more detail in the *VAXstation 4000 Model 60 Owner's and System Installation Guide*.)

Figure 1–2 Initial SHOW CONFIG Command Display



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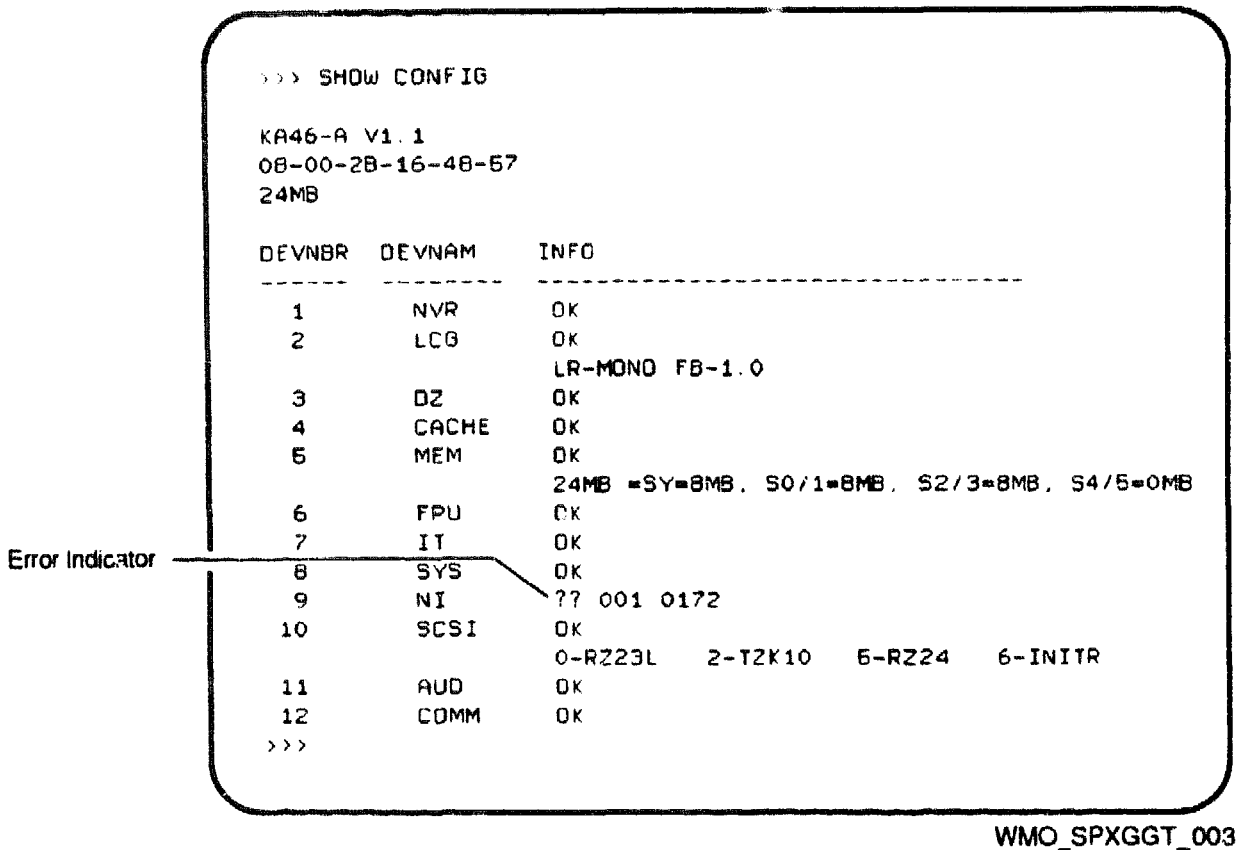
You should see the message OK next to each device name. Two question marks (??) are the error indicator, as shown in Figure 1–3. If you see any errors, see your *VAXstation 4000 Model 60 Owner's and System Installation Guide*. If you do not see any errors, proceed with the following steps.

Figure 1-3 Initial SHOW CONFIG Command Error Display



4 Turn the system unit off (0).

5 Turn all expansion boxes off (0).

6 Turn all peripheral devices (such as printers and modems) off (0).

7 Turn the monitor off (0).

Note *If you have trouble identifying any of the following cords, cables, or connections, see your VAXstation 4000 Model 60 Owner's and System Installation Guide.*

Warning *Internal voltage remains for a short while after the monitor is turned off. To avoid minor injury, wait several minutes before disconnecting the monitor power cord from the system unit.*

8 Disconnect the monitor power cord from the system unit.

9 Disconnect the system power cord from the power receptacle.

10 Disconnect and remove the monitor video cable from the system unit.

Warning *The monitor is heavy and you may need help from another person to lift it.*

11 Remove the monitor from the top of the system unit and set it aside.

12 Make sure that the system unit is on a flat and level surface.

See Figure 1–4.

Warning *Before you remove the system unit cover, wait at least five minutes after turning off system unit power. The power supply capacitors will safely discharge during this time.*

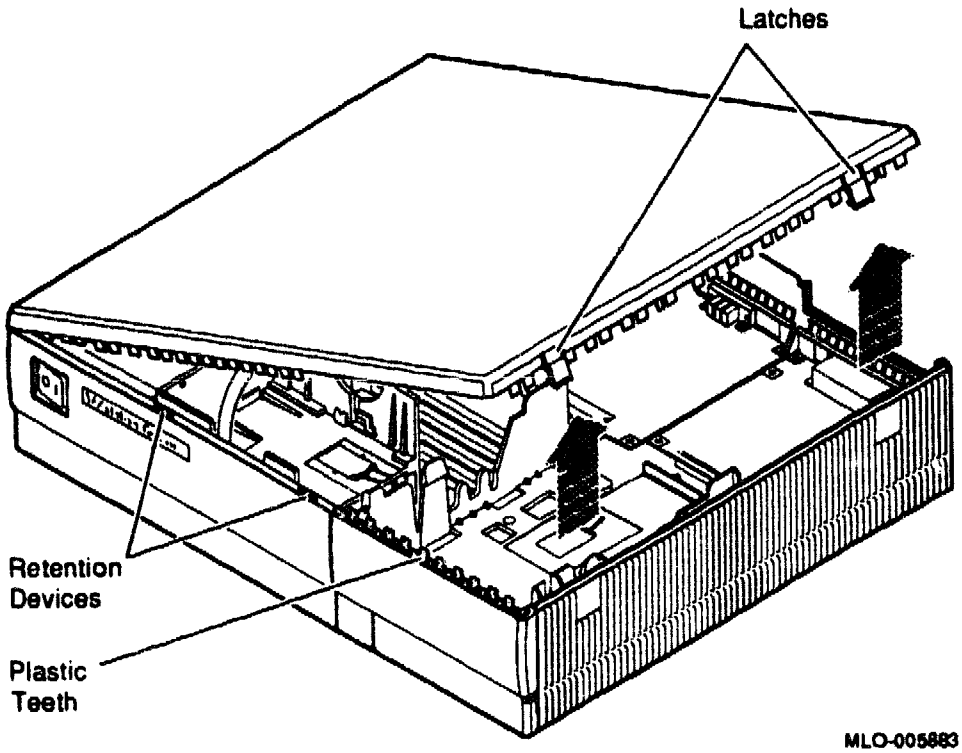
Note *When removing the system unit cover, you will have to pull with enough force to release the retention devices on the front and rear edges of the cover. Pulling forcefully will not break the cover.*

Warning *When removing the system unit cover, do not touch the plastic teeth on the top edge of the bezel. Also, do not touch the metal shielding under the front edge of the cover.*

Caution *To avoid damage from static discharge, as soon as you remove the cover, and each time before touching anything inside the system unit, touch the space marked TOUCH HERE on the top of the power supply.*

13 Remove the system cover by carefully releasing the latches on the side of the cover, then pulling the cover up and away, as shown in Figure 1–4.

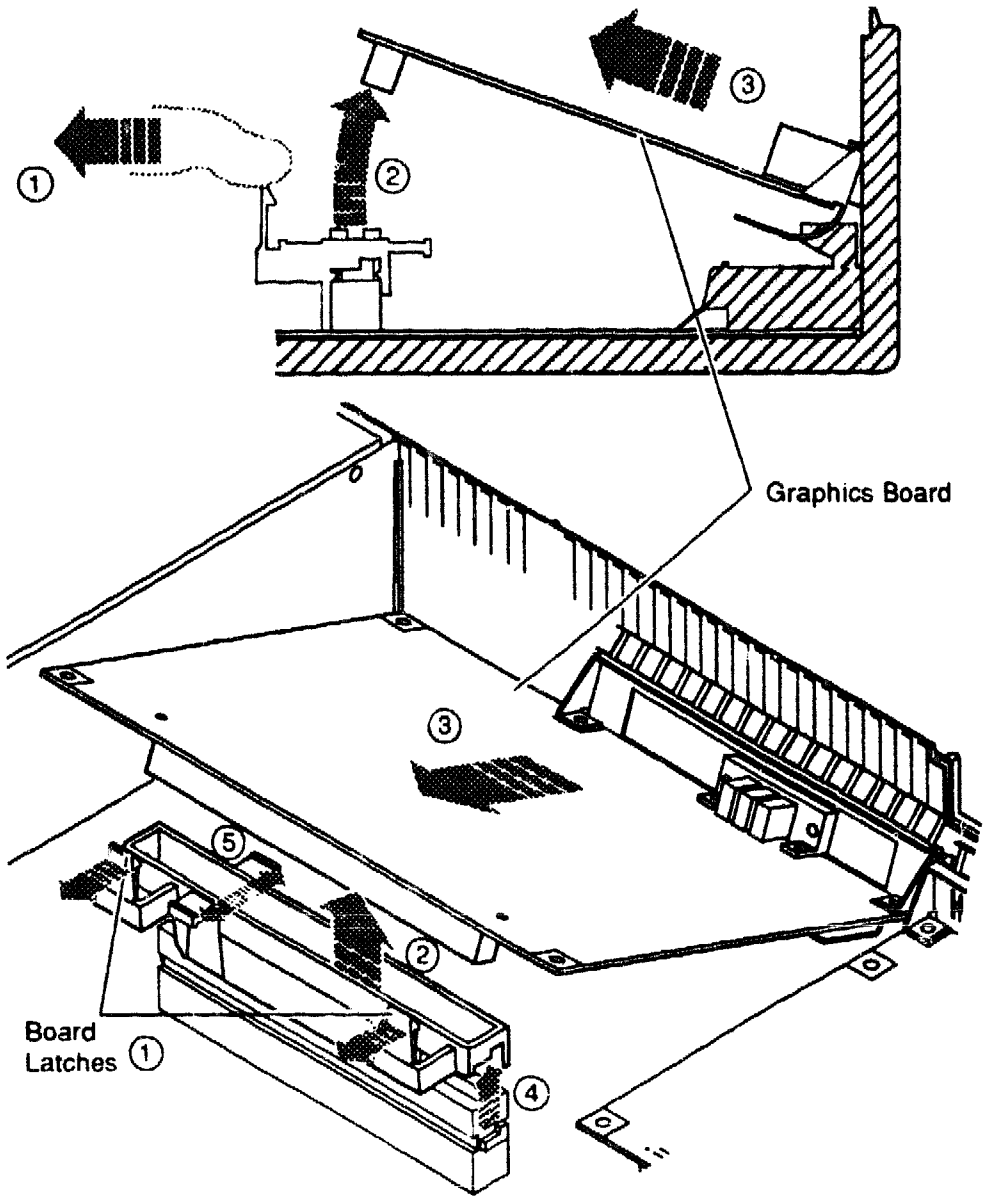
Figure 1–4 Removing the System Unit Cover



1.2.1 Removing the 2D Graphics Module

See Figure 1–5.

Figure 1-5 Removing the Existing Graphics Board



1 Release the board latches ❶ and lift the module free of the system module connector ❷.

2 Remove the board from the system box ❸.

3 Remove the existing plastic board latch assembly ❶. The board latch is snapped in place on the system module connector. Use the horizontal tabs ❺ to spread the sides of the board latch away from the connector and lift it off.

2

Adding a 3D Graphics Option

This chapter tells you how to install (and remove) either the PV61G-BA 8-plane (Section 2.1) or the PV61G-AA 24-plane (Section 2.3) 3D graphics option.

Note *The 3D graphics options are not compatible with all monitors (see Section 1.1). Before installing a 3D graphics option, you should consider the monitor requirements. Consult your Digital sales representative and your monitor documentation for more information.*

2.1 Installing the PV61G-BA 8-Plane Option

The PV61G-BA 8-plane option includes the following (the modules and connector bracket are pre-assembled):

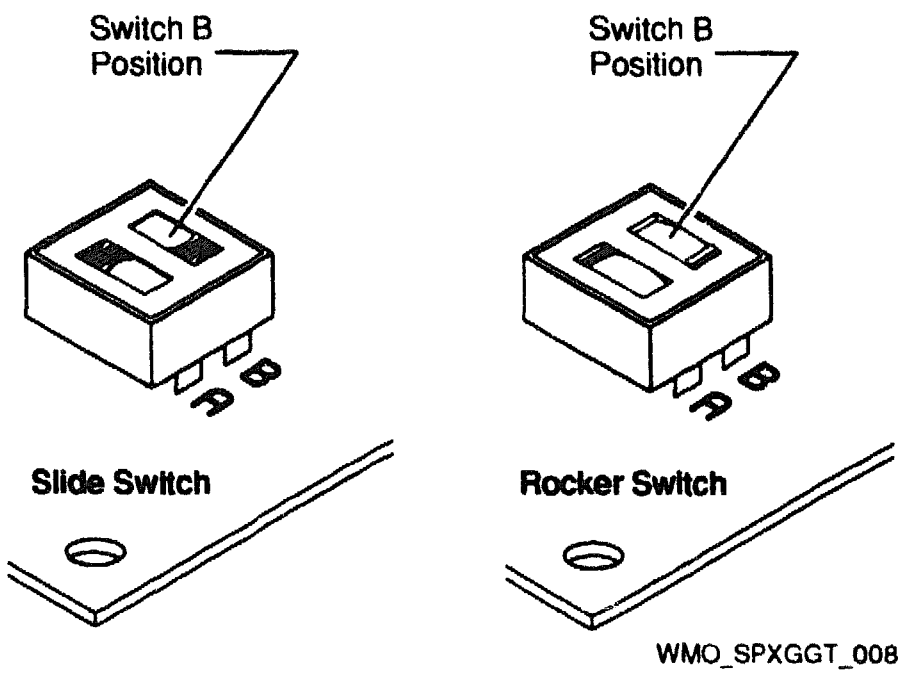
- One graphics subsystem processor module
- One 8-plane frame buffer module
- Two 2-Mbyte single inline memory modules (SIMMs)
- Video connector bracket (attached to graphics subsystem processor module)
- Radio frequency interference (RFI) gasket
- Board latch

2.1.1 Check Switch B Setting

Before installing the PV61G-BA, make sure that switch B of the two-switch package on the frame buffer module is in the position shown in Figure 2–1. The switch may be a slide switch or rocker switch, as shown.

The switch package is located as shown in Figure 2–3. The switch labels A and B are on the module. Ignore any switch identifiers on the switch package. If you must reset switch B, use a small stylus, such as a ball-point pen, to set the switch to the correct position. Switch A is not used and can be in either position.

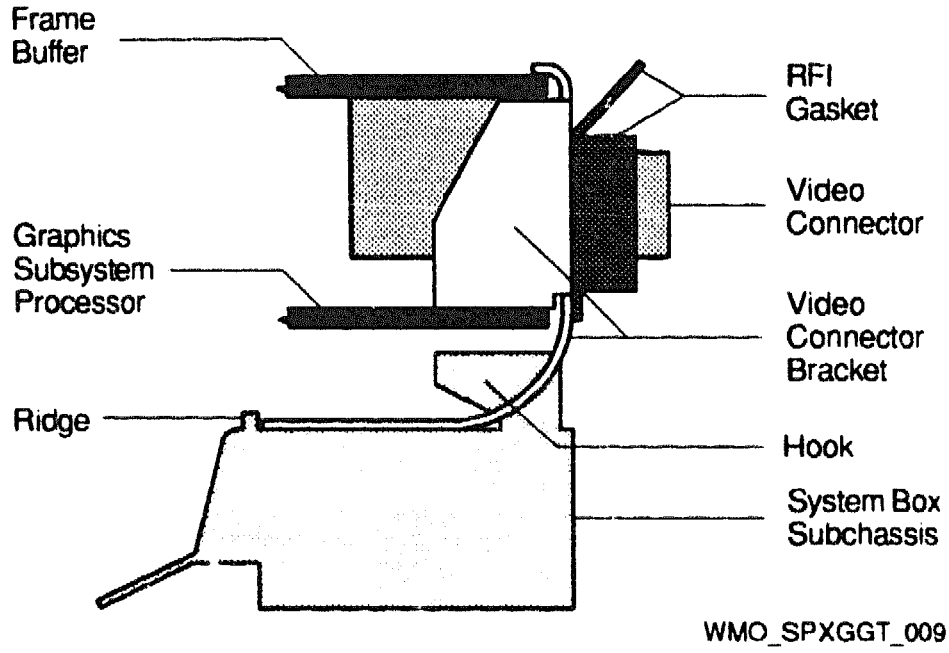
Figure 2–1 Switch B Position



2.1.2 Install the RFI Gasket

See Figure 2–2. Press the RFI gasket over the video connector on the graphics subsystem processor module. The angled top and sides of the gasket face away from the connector bracket. This compresses the gasket between the connector and system box when the option is installed.

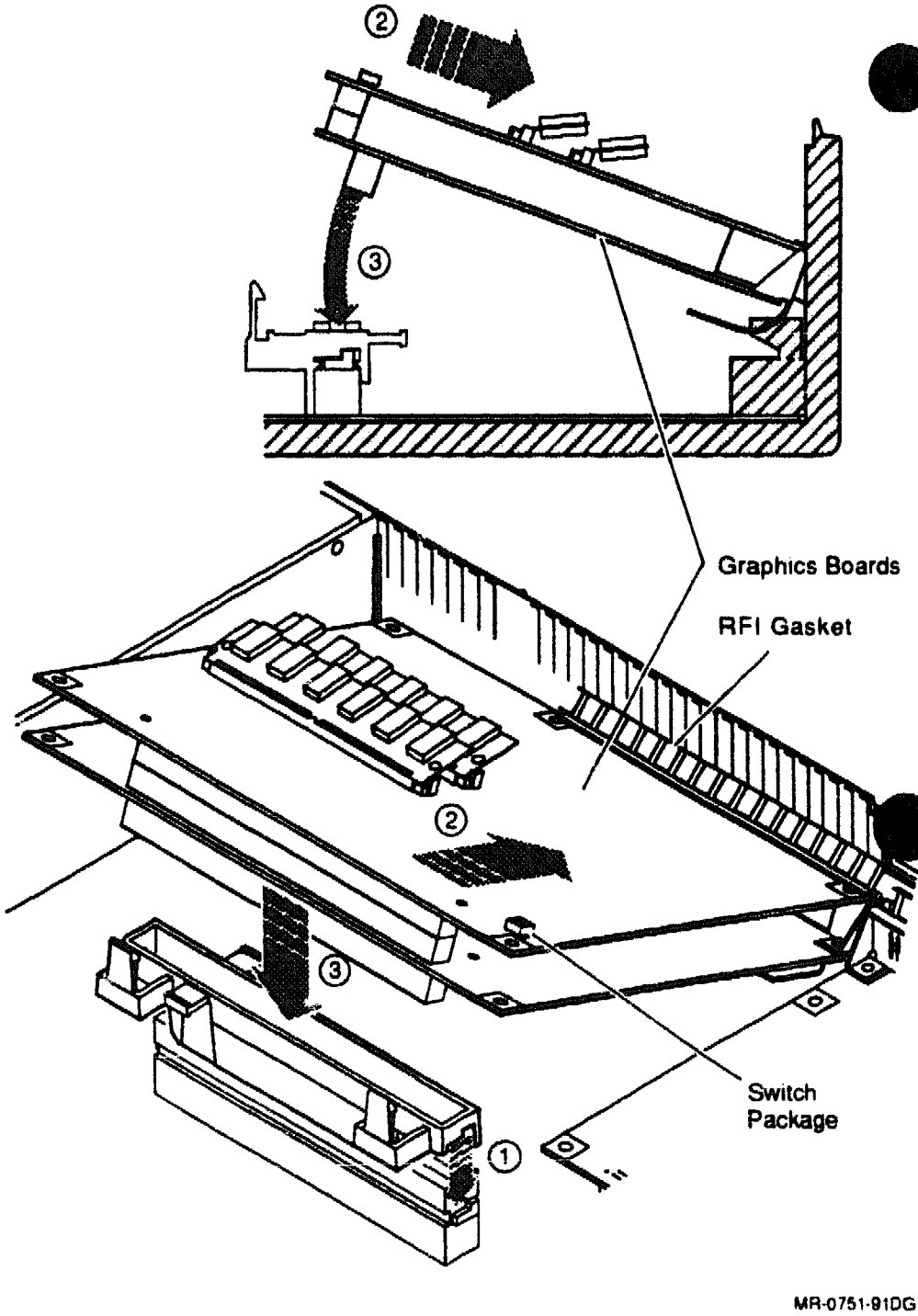
Figure 2–2 Installation Details



2.1.3 Install the 8-Plane 3D Graphics Option

See Figure 2–3.

Figure 2-3 Installing the PV61G-BA 8-Plane Option



1 Snap the new board latch ❶ in place over the system module connector.

2 Carefully tilt the assembly into position ❷. The two hooks on the system box subchassis slip through the square holes in the lower curve of the connector bracket. The bottom surface of the connector bracket sits on the subchassis, held in place by the hooks and the square ridge on the subchassis. Figure 2–2 is a detailed side view.

3 With the assembly in position, align the graphics subsystem processor and system module inter-module connectors. Mate the connectors by pressing down on the frame buffer module above the inter-module connectors ❸. The board latches should snap into place to secure the 3D graphics option assembly.

2.2 Removing the PV61G-BA 8-Plane Option

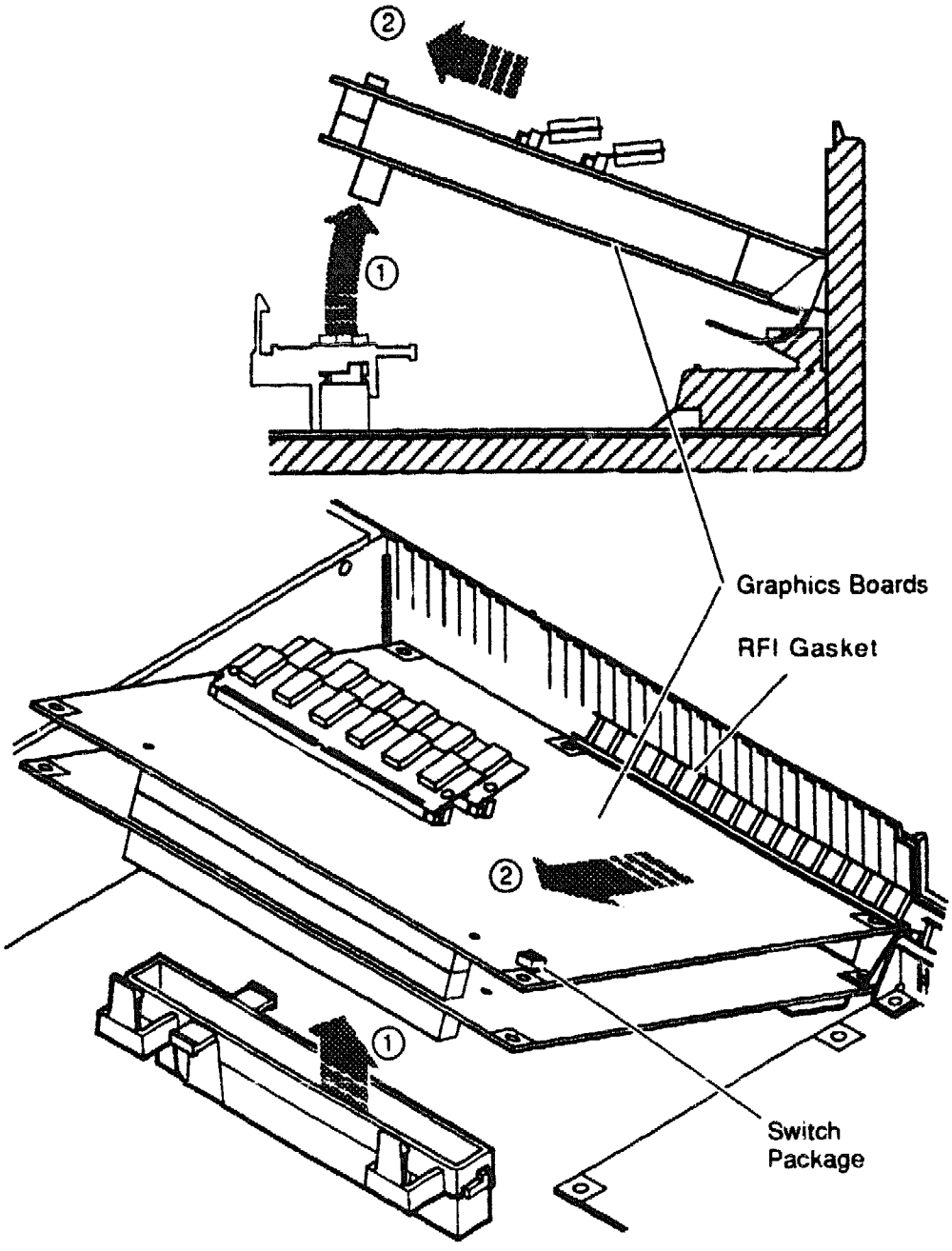
See Figure 2–4. To remove the PV61G-BA:

1 Turn off system power, move the monitor, and open the system unit cover as described in Section 1.2.

2 Release the board latches ❶.

3 Lift the option assembly free of the system module connector and remove it from the system box ❷.

Figure 2–4 Removing the PV61G-BA 8-Plane Option



2.3 Installing the PV61G-AA 24-Plane Option

The PV61G-AA 24-plane option includes the following (the modules, connector bracket, and tail bracket are pre-assembled):

- One graphics subsystem processor module
- One 24-plane frame buffer module
- Plastic module clip (attached to graphics subsystem processor and frame buffer modules)
- Video connector bracket (attached to graphics subsystem processor module)
- Frame buffer module tail bracket (attached to the frame buffer module)
- Radio frequency interference (RFI) gasket
- Board latch

2.3.1 Install the RFI Gasket

See Figure 2–2. Press the RFI gasket over the video connector on the graphics subsystem processor module. The angled top and sides of the gasket face away from the connector bracket. This compresses the gasket between the connector and system box when the option is installed.

2.3.2 Install the 24-Plane 3D Graphics Option

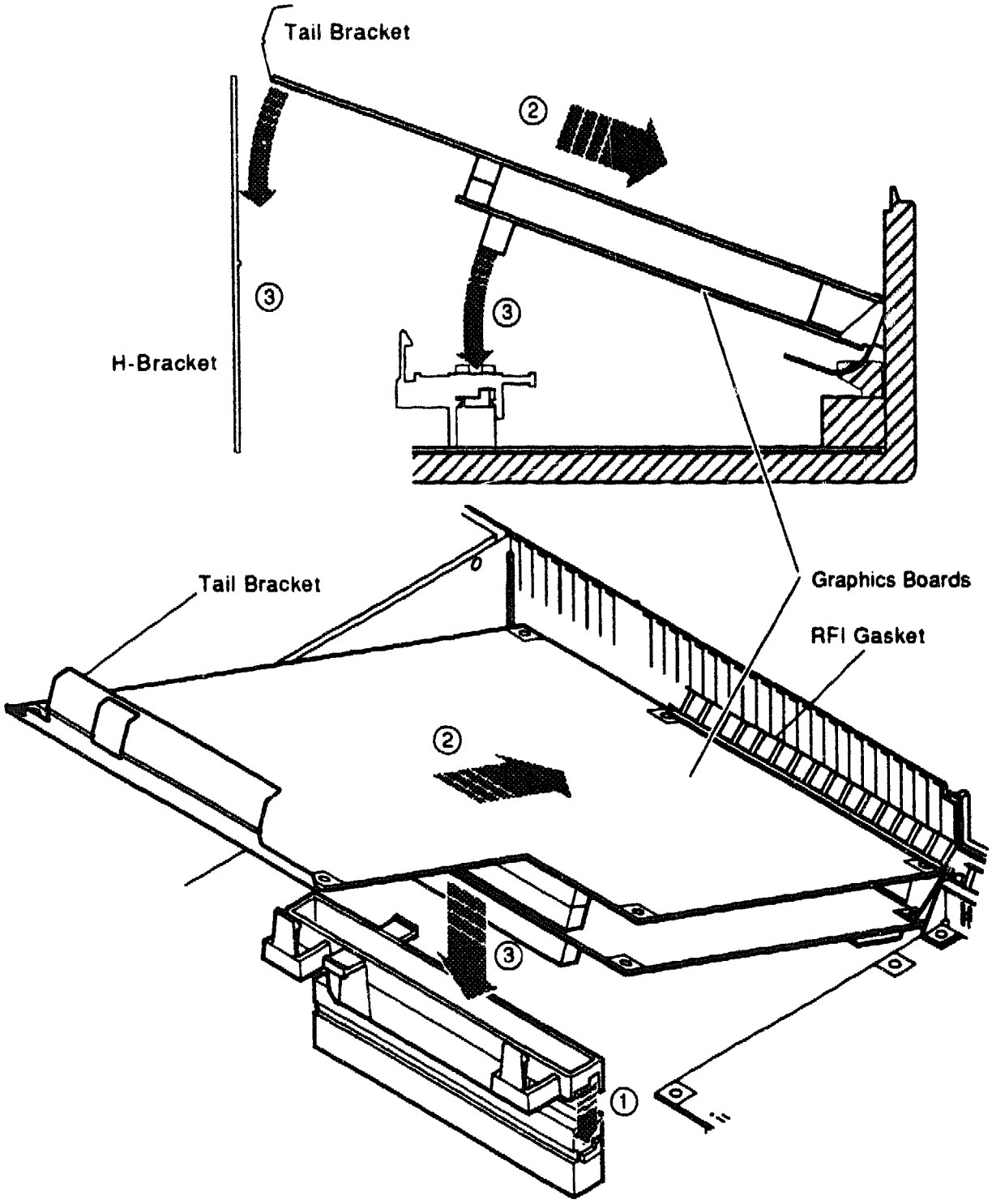
See Figure 2–5.

1 Snap the new board latch in place over the system module connector ❶.

2 Carefully tilt the assembly into position ❷. The two hooks on the system box subchassis slip through the square holes in the lower curve of the connector bracket. The bottom surface of the connector bracket sits on the subchassis, held in place by the hooks and the square ridge on the subchassis. Figure 2–2 is a detailed side view.

3 With the assembly is position, align the graphics subsystem processor and system module inter-module connectors. Mate the connectors by pressing down on the frame buffer module above the inter-module connectors ❸. The board latches should snap into place and the frame buffer module tail bracket should snap over the ridge on the disk drive H-bracket to secure the 3D graphics option assembly.

Figure 2-5 Installing the PV61G-AA 24-Plane Option



2.4 Removing the PV61G-AA 24-Plane Option

The shape and size of the 24-plane frame buffer module prohibits removing the PV61G-AA as an assembly. See Figure 2–6 and remove the components as follows:

1 Turn off system power, move the monitor, and open the system unit cover as described in Section 1.2.

2 Remove the plastic clip (not shown) that holds the graphics subsystem processor module to the frame buffer module.

3 Lift the frame buffer tail bracket to free it from the ridge on the disk drive H-bracket ❶.

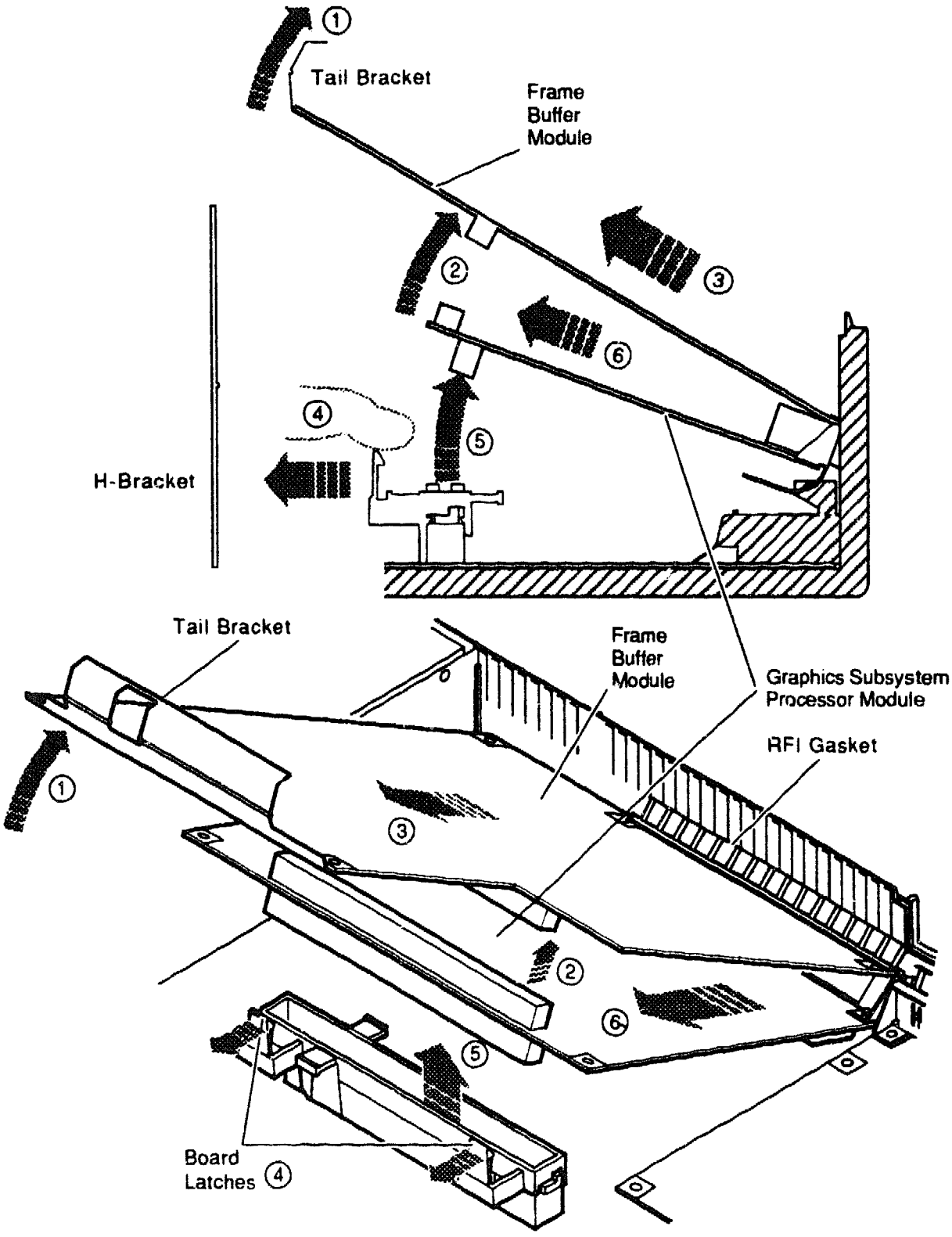
4 Gently work the frame buffer loose from the graphics subsystem processor inter-module connectors ❷. The graphics subsystem processor module remains connected to the system module.

5 Pull the frame buffer free of the RFI gasket ❸. The gasket will remain in place, held by the video connector bracket on the graphics subsystem processor module.

6 Release the board latches ❹ and lift the graphics subsystem processor module free of the system module connector ❺.

7 Remove the graphics subsystem processor module from the system box ❻.

Figure 2–6 Removing the PV61G-AA 24-Plane Option



3

Restoring the System

This chapter tells you how to restore your system after you have installed a 3D graphics option. It describes how to close the system unit, restart and test the system, and handle problems.

3.1 Closing the System Unit

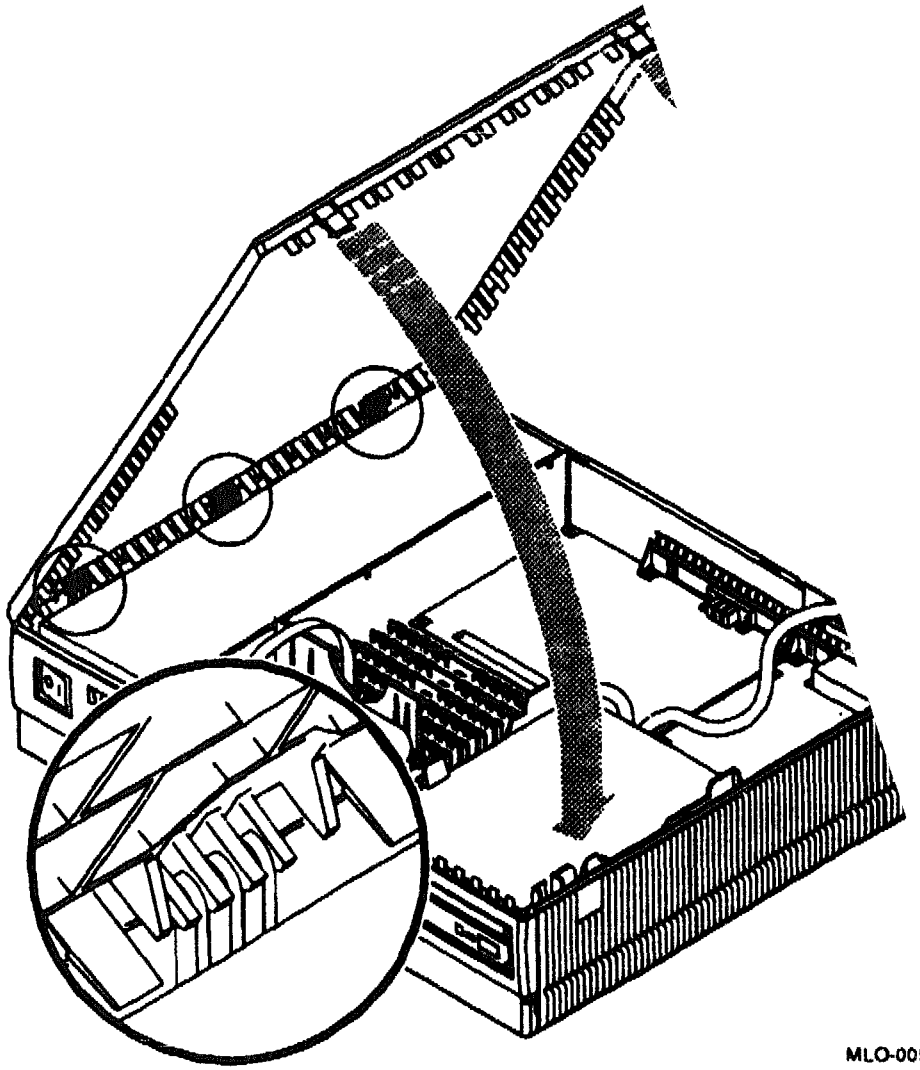
Warning *Failure to replace the system cover before turning on the system is a potential fire hazard.*

Warning *When replacing the system unit cover, do not touch the plastic teeth on the top edge of the removable media bezel or the blank bezel.*

1. See Figure 3–1. Mesh the teeth on the cover with the teeth on the side of the system unit. Then lower the cover until the cover latches click into the depressions on the side of the system unit. Press firmly on the front and rear edges of the cover until you hear a click from each.
2. Replace the monitor on top of the system unit.

Warning *The monitor is heavy and you may need the help of another person to lift it.*

Figure 3–1 Replacing the System Unit



3.2 Restarting the System

Caution *The video connector on the new 3D graphics option is mounted* ***upside down*** *with respect to the video connector on existing 2D graphics modules. The monitor video cable has a tendency to develop a "set" in the position in which it was originally installed. It is possible to force the cable over the connector in the inverted position. When connecting the cable to the new 3D graphics option, be sure the connector is correctly oriented.*

1 Reconnect the monitor video cable.

2 Reconnect the monitor power cord to the system unit.

3 Reconnect the system unit power cord to the power receptacle.

4 To start your system, turn the equipment on (|) in the following order:

   a Expansion boxes

   b Printer and modem

   c Monitor.

   d System unit

5 If there is no display or the display is unintelligible, see Section 3.4.1.

6 If a graphics error message is displayed, see Section 3.3.1.

3.3 Testing the System

When power is applied, the system automatically runs self test. You should do additional testing with the SHOW CONFIG console command followed by the TEST 100 (system exerciser) console command. The following sections describe these tests.

3.3.1 Automatic Self Test Error Messages

Figure 3–2 shows an automatic self test display with a graphics error message. The Field Replaceable Unit (FRU) is the failing 3D graphics option module. The FRUs and numbers are listed in Table 3–1. The error number is the decimal number of the test that the 3D graphics option failed. The error numbers and test descriptions are listed in Table 3–2.

You can display additional error information with the SHOW ERROR console command as described in Section 3.3.1.1.

To correct the problem indicated by a graphics error message, see Section 3.4.2.

If automatic self test displays any other error or status messages, see your *VAXstation 4000 Model 60 Owner's and System Installation Guide*.

Figure 3–2 Self Test Display with Error Message

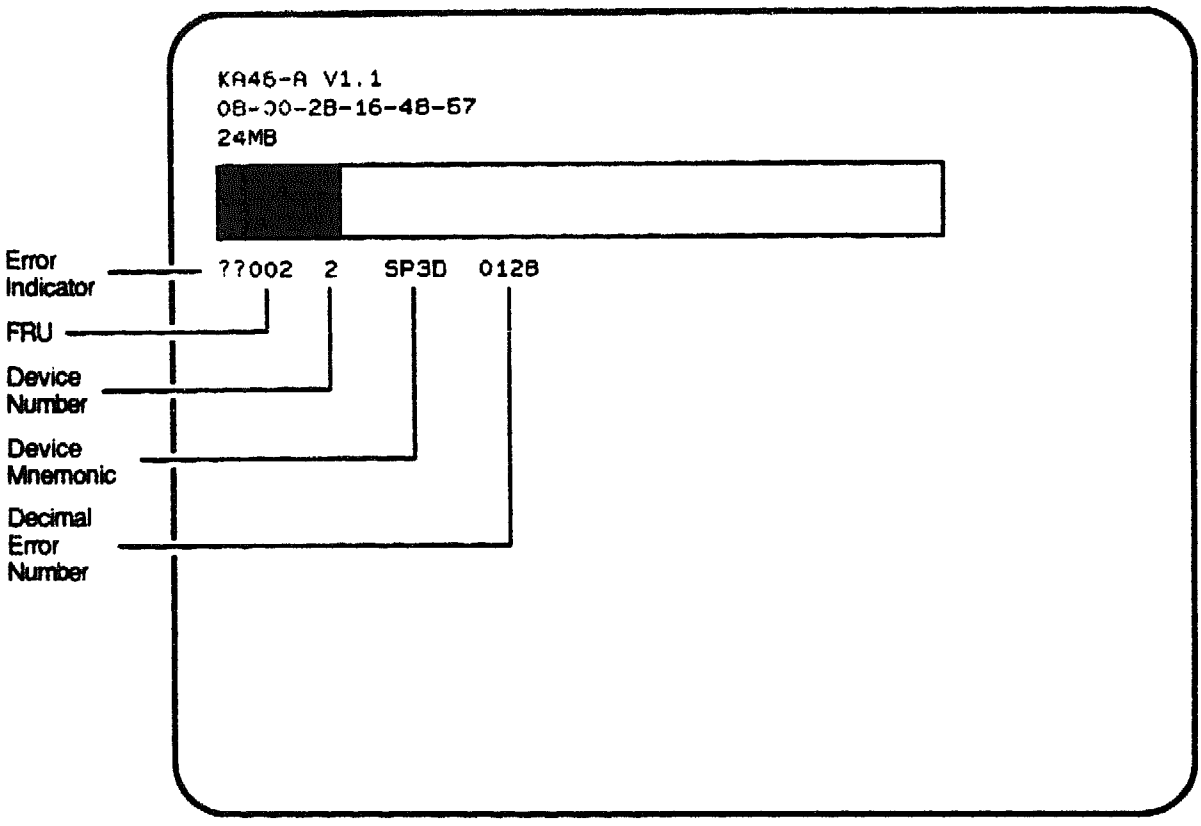


Table 3–1 Field Replaceable Units

FRU Number	FRU Description
0	No failure
1	Graphics subsystem processor module
2	Frame buffer module
3	Graphics subsystem processor module or frame buffer module
4	Single inline memory module (SIMM) 1
8	SIMM 2

Table 3–2 Error Numbers

Error Number dec/hex	Test Description
0016/0010h[1]	JChip Register Test
0032/0020h	SRAM Test
0048/0030h	FIFO Register Test
0064/0040h	FIFO Auto Increment Location Test
0080/0050h	FIFO Auto Increment Buffer Test
0096/0060h	i860 Doorbell Test
0112/0070h	Brooktree Register Test
0128/0080h	Scanproc Register Test
0144/0090h	ScanProc SRAM Test
0160/00A0h	i860 ScanProc Register Test
0176/00B0h	VRAM Test
0192/00C0h	Scanproc Basic Rectangle Test
0208/00D0h	Scanproc Clip Rectangle Test
0224/00E0h	Scanproc Fill Rectangle Mask Test
0242/00F0h	Scanproc Draw Logical Ops Test
0256/0100h	Scanproc Copy Rectangle Test
0272/0110h	Scanproc Copy Rectangle Logical Ops Test
0288/0120h	Scanproc Copy Rectangle Mask Test
0304/0130h	ScanProc Copy Stipple Test
0320/0140h	ScanProc Copy Opaque Test
0336/0150h	ScanProc Stream Write Test
0352/0160h	FIFO Transfer Test
0368/0170h	ScanProc External Write Test
0384/0180h	ScanProc Stream Read Test
0400/0190h	LCG DMA Test
0416/01A0h	LCG OTF Test
0432/01B0h	DMA Stream Test
0448/01C0h	OTF Stream Test
0464/01D0h	Auto Increment Location Stream Test
0480/01E0h	Command FIFO OTF Stream Test
0496/01F0h	Command FIFO External Stream Test
0512/0200h	Brooktree Plane Walk Test
0528/0210h	Brooktree Output Signature Test
0544/0220h	Brooktree Off Screen Test
0560/0230h	Brooktree Input Signature Test
0576/0240h	Brooktree Cursor Window Test
0592/0250h	JCHIP Window Test
0608/0260h	Brooktree Analog Compare Test
0624/0270h	Set/Clear Interrupt Test

[1] h=hexadecimal

3.3.1.1 SHOW ERROR Command When self test (Section 3.3.1) or the SHOW CONFIG command (Section 3.3.2) displays an error message, you can display additional error information by executing the SHOW ERROR console command. Figure 3–3 shows the additional error information displayed for an error. The information is interpreted as follows:

- The error line is similar to the initial error information; however, in this display the error number is a hexadecimal number.
- The failing block is the functional block where the error was detected. The hexadecimal block numbers and descriptions are listed in Table 3–3.
- The failing test corresponds to the error number in the initial error line. It is the number of the test that the 3D graphics option failed. The test numbers and descriptions are listed in Table 3–2.
- The error number identifies the specific test function that failed.
- The six 8-digit fields are used (or not) according to specific test and error reporting requirements. As shown in Figure 3–3, most of the diagnostic tests use the first three fields for expected data, actual data, and an address.

Figure 3–3 SHOW ERROR Command Display

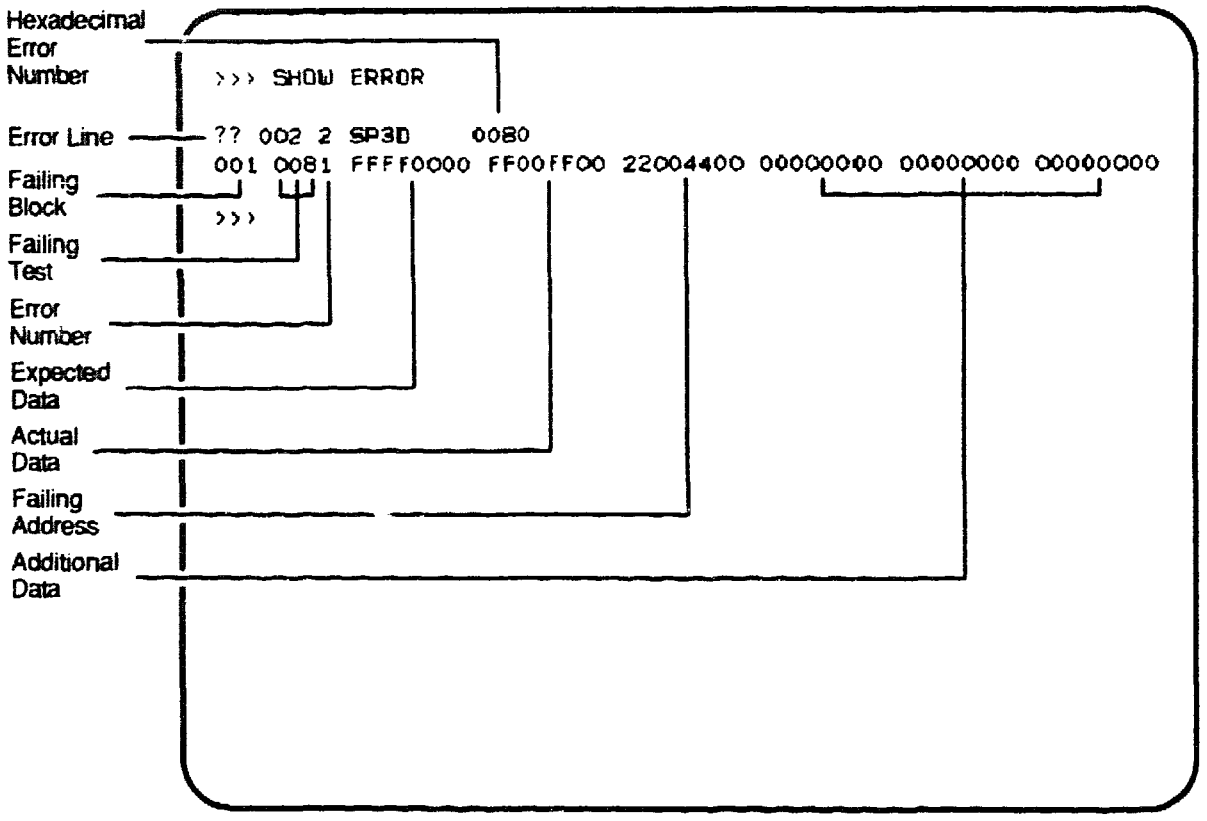


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Table 3–3 Failing Block

Block Number	Functional Block
001	ScanProc
002	VRAM
003	SIMM1
004	SIMM2
005	JChip
006	i860
007	Cursor Generator 0
008	Cursor Generator 1
009	SRAM
00A	VDAC

3.3.2 Show System Configuration

1 If the console mode prompt is not displayed, put your system into console mode by pressing the Halt button on the front of the system unit (Figure 1–1).

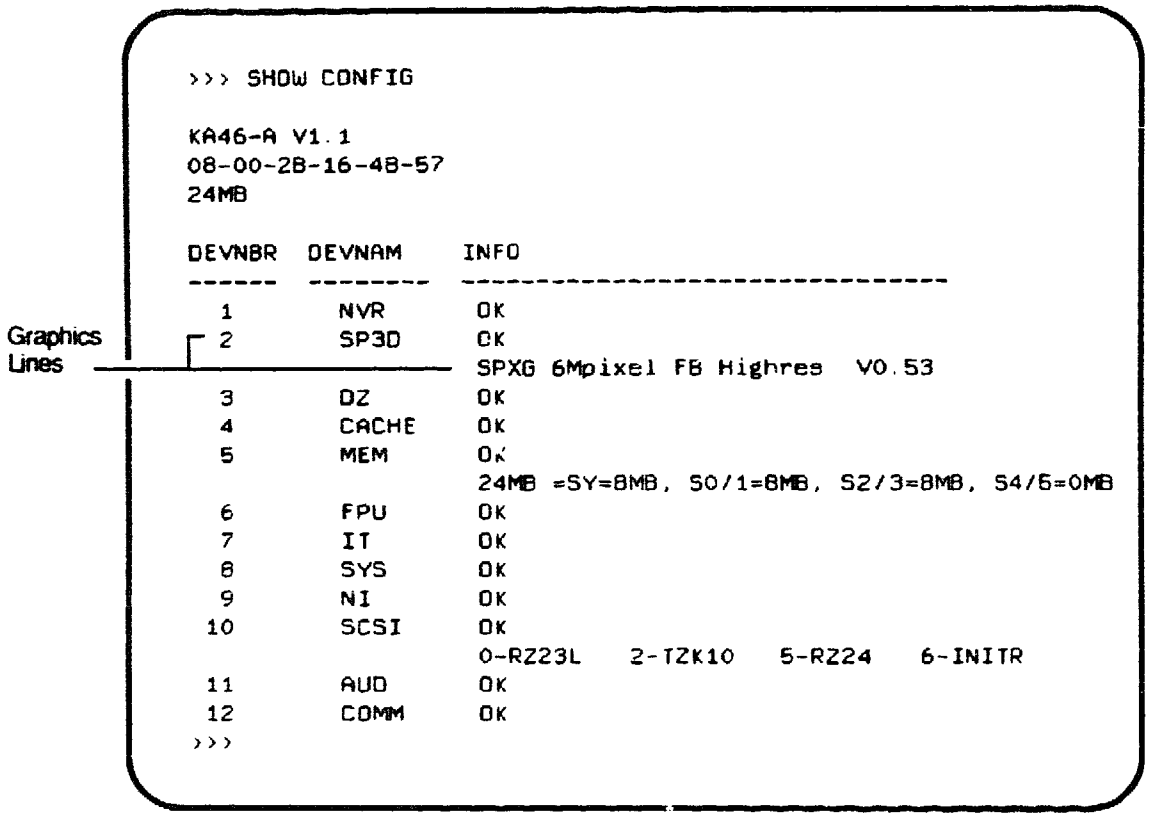
2 Display the current system configuration using the SHOW CONFIG command (Figure 3–4). Compare the current configuration display with the configuration information you recorded when preparing your system for the 3D graphics option installation. You should see the 3D graphics option listed on the graphics line in place of the graphics option you removed.

Note *Figure 3–4 shows the graphics line for the PV61G-BA 8-plane option. The graphics line for the PV61G-AA 24-plane option is similar, but "SPXGT" replaces "SPXG".*

3 If you see any error messages on the graphics line, see Section 3.3.2.1.

If an error message is displayed for any other system device or component, see your *VAXstation 4000 Model 60 Owner's and System Installation Guide.*

Figure 3–4 Current SHOW CONFIG Command Display



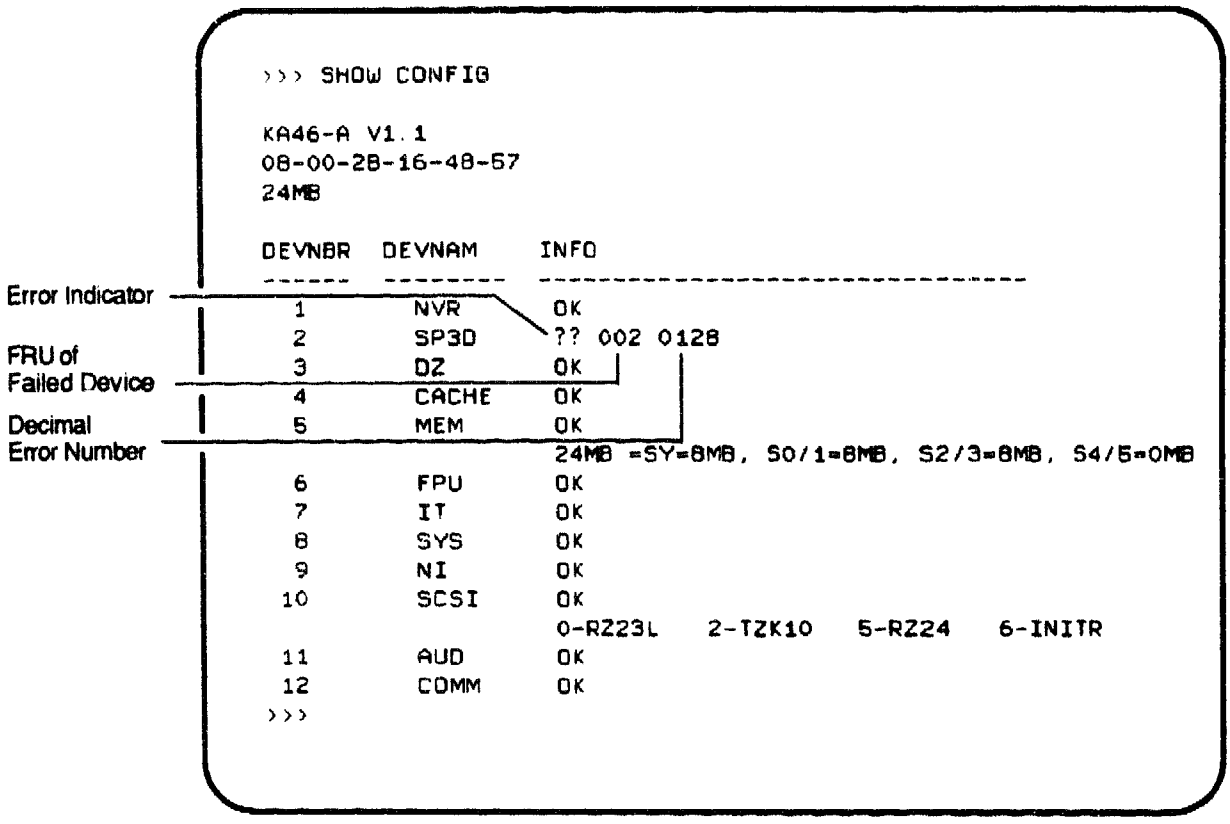
WMO_SPXGGT_012

3.3.2.1 SHOW CONFIG Error Messages Figure 3–5 shows a SHOW CONFIG display with a graphics error message. The FRU is the failing 3D graphics option module. The FRUs and numbers are listed in Table 3–1. The error number is the number of the test that the 3D graphics option failed. The error numbers and test descriptions are listed in Table 3–2.

You can display additional error information with the SHOW ERROR console command, as described in Section 3.3.1.1.

To correct the problem indicated by a graphics error message, see Section 3.4.2.

Figure 3–5 Current SHOW CONFIG Command Error Display



WMO_SPXGGT_017

3.3.3 Run the System Exerciser (TEST 100)

1 If the console mode prompt is not displayed, put your system into console mode by pressing the Halt button on the front of the system unit (Figure 1–1).

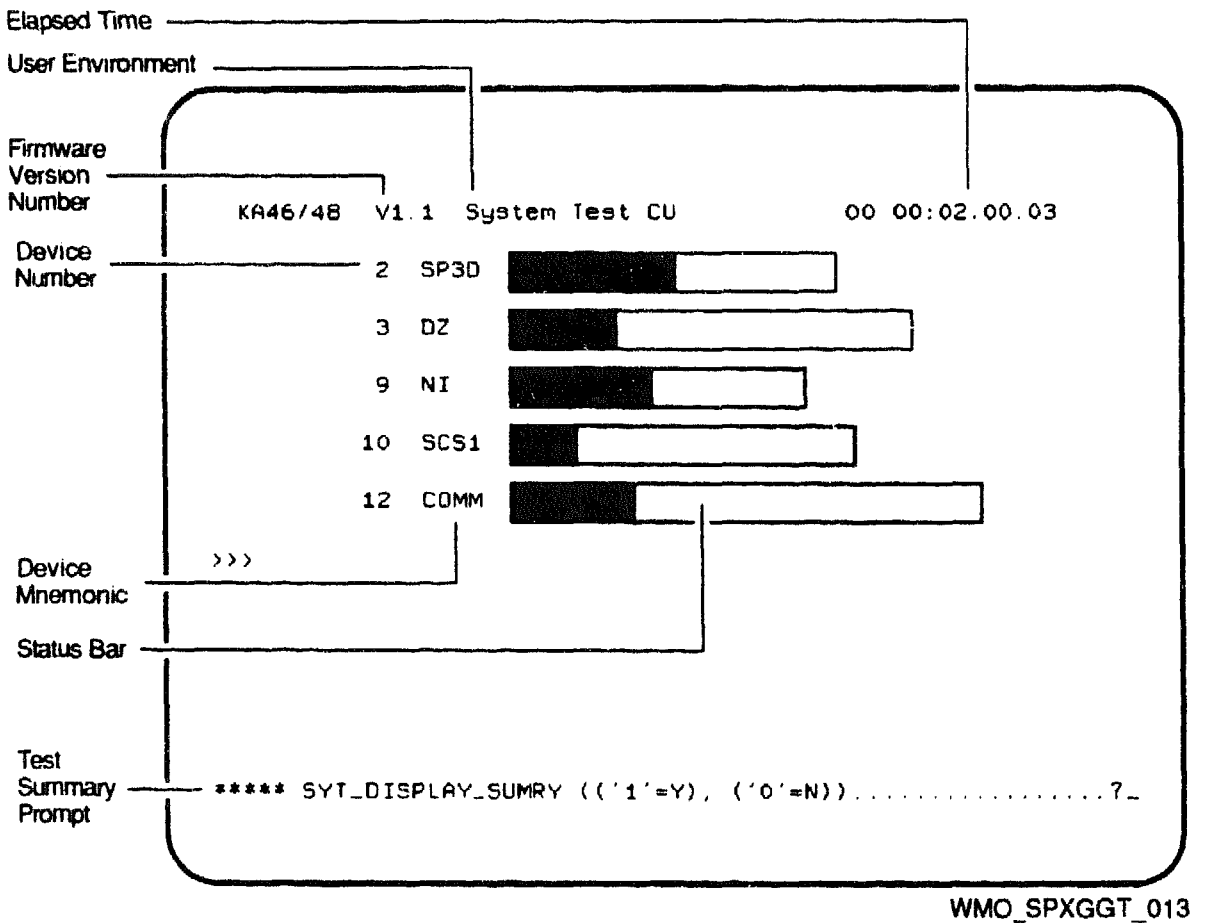
2 Use the TEST 100 command to run the system exerciser and verify that the system devices and components are interacting correctly.

Note *The 2D graphics and 3D graphics system exerciser displays are significantly different.*

When the TEST 100 command is executed with one of the 3D graphics options installed, the first display consists of gray-shaded diagonal bars drawn continuously between the four sides of the screen. The dynamic diagonal bar display continues to fill the screen for approximately 30 seconds. The screen is then cleared and the device status display begins. Figure 3–6 shows a typical normal device status display.

The "checkerboard" pattern no longer appears at the bottom of the system exerciser display as shown in your *VAXstation 4000 Model 60 Owner's and System Installation Guide*. That pattern was generated by the 2D graphics module you removed.

Figure 3–6 System Exerciser Device Status Display



3 If a 3D graphics option (SP3D) error message is displayed, see Section 3.3.3.1.

If an error message is displayed for any other system device or component, see your *VAXstation 4000 Model 60 Owner's and System Installation Guide*.

3.3.3.1 System Exerciser Error Messages

Figure 3–7 shows a system exerciser display with a 3D graphics option error. The FRUs and numbers are listed in Table 3–1. The hexadecimal error codes are listed and described in Table 3–4.

You can display additional information if you type 1 (yes) in response to the test summary prompt (see Section 3.3.4). If you type 0 (no) in response to the test summary prompt, the system halts, displays a halt message, and returns you to the console prompt; for example:

```
?06 HLT INST
   PC=00000F09  PSL=00000000

>>>
```

To correct the problem indicated by a graphics error message, see Section 3.4.2.

Figure 3–7 System Exerciser Device Status Error Display

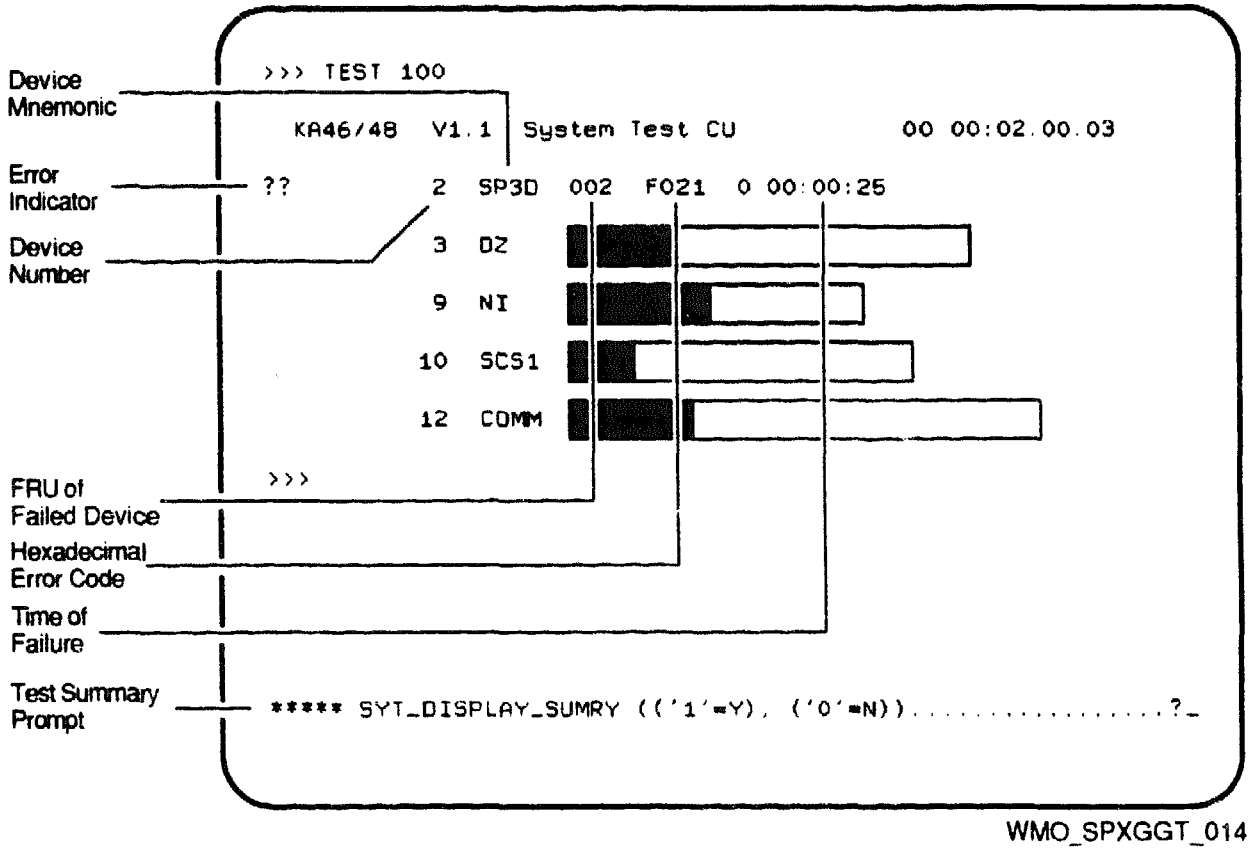


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Table 3–4 System Exerciser Error Codes

Error Code	Error Description
F000 through F012	Memory allocation failure
F00C	WST initialization failure
F020	Frame buffer checksum failure
F021	Pixel group A signature analysis failure
F022	Pixel group B signature analysis failure
F023	Pixel group C signature analysis failure
F024	Pixel group D signature analysis failure

3.3.4 Test Summary Information

Figure 3–8 shows the additional information you can display about a system exerciser error if you answer 1 (yes) to the test summary prompt.

Figure 3–8 Test Summary Display

```
********** FST EXT_ERRPT    2SP3D       0 00:00:27 **********

   SP3D error summary -         Pass count =

   ------------------------------------------------------------
   error code      0000F021
   ------------------------------------------------------------
   Frame Buffer checksum

       expected = D7DAFF0F        actual = D7DAFF0F
   ------------------------------------------------------------
   Brooktree Signature Collection

   signature error count     00000004
   A pixel group   expected sig =   07BFCC actual =   5A31B5
   B pixel group   expected sig =   E81E61 actual =   E81E61
   C pixel group   expected sig =   AA698B actual =   6F9687
   D pixel group   expected sig =   BC0C72 actual =   BC0C72
   ------------------------------------------------------------


********** SYSTST_NXT_SCR (('1'=Y), '0'=N))................?_
```

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3.4 Handling Problems

Problems with the PV61G-BA or PV61G-AA 3D graphics options can appear as display problems, such as no display or an unintelligible display, or error messages.

3.4.1 Display Problems

If there is no display after 2 minutes, the display is not synchronized, or the display is otherwise unintelligible:

- Check the diagnostic lights. Table 3–5 shows the light patterns for possible 3D graphics option problems. See your *VAXstation 4000 Model 60 Owner's and System Installation Guide* for more information about these lights.
- Make sure that all cables and cords are properly connected and that the monitor video cable is correctly oriented.
- Make sure that the monitor power switch is on (|).
- Adjust the monitor brightness and contrast controls.

- Turn off system power as described in Section 1.2.

  1 Make sure the alternate console switch is off (down). See your *VAXstation 4000 Model 60 Owner's and System Installation Guide* for more information about this switch.

  2 Check the monitor fuse. See your monitor manual for fuse replacement instructions.

  3 Move the monitor and open the system unit cover as described in Section 1.2.

  4 Make sure that all the modules are correctly seated.

  5 Close the system unit and restart the system as described in Sections 3.1 and 3.2.

If you continue to have 3D graphics option display problems, contact your Digital Services representative.

Table 3–5 Diagnostic Light Patterns

Pattern[1]	3D Graphics Option Problem
oo●o oo○●	The JChip/SRAM functional area tests failed.
oo●o oo●o	The i860/RAMDAC/ScanProc/Frame Buffer functional area tests failed.
oo●o oo●●	The ScanProc drawing operations functional tests failed.
oo●o o●oo	The stream transfers functional tests failed.
oo●o o●o●	The OTF and normal DMA functional tests failed.
oo●o o●●o	The RAMDAC operations functional tests failed.
oo●o o●●●	The interrupt functional test failed.

[1] o = off. ● = on.

3.4.2 Error Messages

If a graphics error message is displayed:

1 Write down the error information.

2 Turn off system power, move the monitor, and open the system unit cover as described in Section 1.2.

3 Make sure that all the modules are correctly seated.

4 Close the system unit and restart the system as described in Sections 3.1 and 3.2.

If the graphics error message reappears, contact your Digital Services representative.

A

Hardware Specifications

This appendix lists environmental specifications for the PV61G-BA 8-plane and PV61G-AA 24-plane graphics options.

Table A–1 PV61G-BA and PV61G-AA Specifications

Operating Conditions	
Temperature Range	15°C to 32°C (59°F to 90°F)
Temperature Change Rate	11°C/hr (52°F/hr) maximum
Relative Humidity	20%-80% noncondensing
Altitude	2400 m (8000 ft)
Maximum Wet Bulb Temperature	28°C (82°F)
Minimum Dew Point	2°C (36°F)
Nonoperating Conditions	
Temperature Range	-40°C to 66°C (-40°F to 151°F)
Relative Humidity	95% @ 66°C (151°F) (may condense)
Altitude	4900 m (16,000 ft)
Maximum Wet Bulb Temperature	28°C (82°F)
Minimum Dew Point	2°C (36°F)
Storage Conditions	
Temperature Range	5°C to 50°C (41°F to 122°F)
Relative Humidity	10%-95% noncondensing
Altitude	0 to 2400 m (0 to 8000 ft)
Maximum Wet Bulb Temperature	32°C (90°F)
Minimum Dew Point	2°C (36°F)

B

Associated Documents

The following documents are available on compact disc (Bookreader) and in printed form. All of the following documents are not available in every country. Check with your Digital sales representative for availability.

Title	Order Number[1]
VAXstation 4000 Model 60 Owner's and System Installation Guide	EK-PMARI-OM
VAXstation 4000 Model 60 Options Installation Guide	EK-PMARI-IG

[1]Printed form order number

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