

Graphics Support Services Software Version 4.8 for Microsoft Windows NT

Installation and User Guide for Alpha Systems

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This manual explains how to install Graphics Support Services Software Version 4.8 on Alpha systems running the Microsoft® Windows NT™ Version 4.0 operating system. This document also discusses how to maximize the performance of OpenGL® applications running on Matrox® Millennium II™ and PowerStorm graphics devices.

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Preface

This document describes how to perform the following operations on a DIGITAL or Compaq Alpha system running the Microsoft Windows NT operating system:

- Install Graphics Support Services Software Version 4.8.
- Set the screen resolution and refresh rate, manage buffer swap, and identify the display driver version.
- Use OpenGL for programming applications to obtain the best performance.

Keep this document with your distribution kit. You will need it if you reinstall Graphics Support Services Software for any reason.

Audience

This document is for customers installing Graphics Support Services Software and engineers developing programs using OpenGL on Microsoft Windows NT. You should have a basic understanding of Windows NT before attempting to install this product.

Organization

This document is organized into chapters according to graphics display drivers:

- Chapter 1 includes installation and postinstallation information for the PowerStorm 4D10T/ELSA GLoria Synergy device drivers for Windows NT Version 4.0.
- Chapter 2 includes installation and postinstallation information for the PowerStorm 4D30T device drivers for Windows NT Version 4.0.
- Chapter 3 includes installation and postinstallation information for the PowerStorm 3D30/4D20, PowerStorm 4D40T/50T/51T/60T device drivers for Windows NT Version 4.0.

- Chapter 4 includes installation and postinstallation procedures for the Matrox Millennium II device drivers for Windows NT Version 4.0.

For More Information

For more information, refer to the following:

- DIGITAL *PowerStorm 4D10T Windows NT Installation Guide* (order number EK-4D10W-IG)
- *ELSA GLoria Synergy Installation Guide* (order number EK-COMGS-IG)
- DIGITAL *PowerStorm 4D30T Graphics Option Installation Guide* (order number EK-PBXGD-IN)
- DIGITAL *PowerStorm 3D30/4D20 PBXGB-AA/CA PCI Graphics Options Owner's Guide* (order number EK-PCIGR-OG)
- DIGITAL *PowerStorm 4D40T/50T/51T/60T PCI Graphics Options Owner's Guide* (order number EK-CEYES-OG)
- DIGITAL *Using OpenGL* manual (order number AA-QMZH*-TK)
- Microsoft Windows NT online help

Conventions

The following conventions are used in this manual:

Convention	File Name
PowerStorm devices	Collective term for referring to the PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D10T, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D51T, and PowerStorm 4D60T graphics devices throughout Chapter 2, the <i>Other PowerStorm Devices</i> chapter. Note: The PowerStorm 4D10T and PowerStorm 4D30T information is contained in separate chapters (Chapter 1 and Chapter 2).
PowerStorm 3D30/4D20	Collective term for referring to the PowerStorm 3D30 and PowerStorm 4D20 graphics devices.
PowerStorm 4D40T/50T/51T/60T	Collective term for referring to the PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D51T, and PowerStorm 4D60T graphics devices.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

The Graphics Support Services Software is a set of graphics display drivers compatible with Microsoft Windows NT. This chapter describes the installation and postinstallation procedures for PowerStorm 4D10T and ELSA GLoria Synergy graphics options on Windows NT Version 4.0, on Digital Personal Workstation and Compaq Professional Workstation systems.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Alpha manual
- Graphics Support Services Software for Intel manual
- “Break-the-seal” license
- CD-ROM containing the following software for Alpha support:
 - ◇ **PowerStorm 4D10T driver**—2D drivers and 3D drivers (the optimized OpenGL driver supported by Compaq) in the \alpha\pbxgk\pbxgk-a\nt40 directory on your CD-ROM device. (See Table 1-1.)
 - ◇ **ELSA GLoria Synergy driver**—2D drivers and 3D drivers (the optimized OpenGL driver supported by Compaq) in the \alpha\pbxgk\pbxgk-b\nt40 directory on your CD-ROM device. (See Table 1-1.)

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

Table 1–1: PowerStorm 4D10T/ELSA GLoria Synergy Components on the CD–ROM

Component Description	File Name
GDI display driver	<i>P2-d.dll</i>
Kernel mode miniport driver	<i>P2-v.sys</i>
OpenGL driver—client-side file only	<i>P2icd.dll</i> <i>P2mcd32.dll</i> <i>P2mcdsrv32.dll</i> <i>P2apc.dll</i>
Configuration application	<i>Ntpanel.dll</i> <i>Ntpanel.hlp</i>
Release Notes, which can be read using the <i>Notepad</i> application in Windows NT. You access this application by selecting the <i>Program Manager</i> icon, the <i>Accessories</i> program icon, and the <i>Notepad</i> icon.	<i>readme.txt</i>

System Requirements and Supported and Warranted Configurations

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Pack3 (SP3) or later version supported on system

Table 1–2 lists the supported systems.

Table 1–2: Supported and Warranted System Configurations

System	Graphics Accelerators Supported
Digital Personal Workstation 433a, Digital Personal Workstation 500a, Digital Personal Workstation 600a, Digital Personal Workstation 433a (enhanced), Digital Personal Workstation 500a (enhanced), Digital Personal Workstation 600a (enhanced), Digital Ultimate Workstation 533a [†]	PowerStorm 4D10T [†]
Digital Personal Workstation 433a (enhanced), Digital Personal Workstation 500a (enhanced), Digital Personal Workstation 600a (enhanced), Compaq Professional Workstation XP1000	ELSA GLoria Synergy (SN–PBXGK–BB)
Digital Personal Workstation 433a (enhanced), Digital Personal Workstation 500a (enhanced), Digital Personal Workstation 600a (enhanced)	ELSA GLoria Synergy (SN–PBXGK–BC)

[†] Requires Digital Personal Workstation 433a/500a/600a/433a (enhanced)/500a (enhanced)/600a (enhanced) AlphaBIOS Rev 5.64 or higher.

Installation Procedure

The installation of Graphics Support Services Software is divided into two parts; the parts you must execute depend on the type of installation you are performing:

- **If you are installing a new version of, or upgrading, Microsoft Windows NT,** you must perform Parts 1 and 2.
- **If you are upgrading your Graphics Support Services Software display drivers,** you need only perform Part 2.

Caution

If you are performing Part 2 **only** and are installing a new board, you must install the board **at the end of the Part 2 procedure** (in step 17). If you are performing a new installation or upgrade of Windows NT, you must first perform the procedure described in “Part 1: New Installation or Upgrade of Windows NT Only,” page 1–4.

The two parts of the installation are described in the following sections.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

Part 1: New Installation or Upgrade of Windows NT Only

Before installing Graphics Support Services Software during a Windows NT upgrade or new installation, you must have already installed a PowerStorm 4D10T/ELSA GLoria Synergy board. You can then install Windows NT as described in the Windows NT documentation.

During Windows NT installation, a hardware and software component list is displayed, like the one shown here:

Computer: Digital Personal Workstation 433a

Display: VGA Compatible

Keyboard: XT, AT, or Enhanced Keyboard (83-104 keys)

Keyboard Layout: US

Pointing Device: Mouse Port Mouse

No Changes: The above list matches my computer.

When you have completed the Windows NT installation, **go to Part 2.**

Part 2: Upgrade of Graphics Support Services Software Drivers

Regardless of the display driver you are installing or the type of installation you are performing, you must install the Graphics Support Services Software drivers. In this part, you install the 2D drivers and 3D drivers (the optimized OpenGL supported by Compaq) from the CD-ROM provided with this package.

The Graphics Support Services Software drivers are installed as follows:

1. Boot your system and log into Windows NT if you have not already done so.
2. From the desktop, choose *My Computer*.
3. From My Computer, choose *Control Panel*.
4. From Control Panel, choose *Display*.
5. From the Display Properties dialog box, choose the *Settings* tab.
6. From the Settings dialog box, choose the *Display Type* button to see the driver and adapter (board) information.
7. From the Display Type dialog box, choose *Change*.
8. From the Change Display dialog box, choose *Have Disk*.
9. In the Install from Disk dialog box, you are prompted to insert the manufacturer's installation disk into the selected drive. Insert the CD-ROM provided with your PowerStorm 4D10T or ELSA GLoria Synergy.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

10. Enter the path of the PowerStorm 4D10T or ELSA GLoria Synergy driver and choose *OK*.

The path is of the following format, where *dev:* is the drive name (for example, *E:* for the E drive):

dev:\alpha\pbxgk\pbxgk-a\nt40 (PowerStorm 4D10T)
or *dev:\alpha\pbxgk\pbxgk-b\nt40* (ELSA GLoria Synergy)

11. In the Change Display dialog box, the driver whose path you just defined is displayed. Confirm this choice by choosing *OK*.

The driver name displayed is as follows:

PowerStorm 4D10T

12. When the message displays stating that this is a third party driver, confirm by choosing *Yes*.
A status box displays reflecting the progress of the driver installation.
13. When the files have been copied to your hard disk, a dialog box indicating that the driver was successfully installed is displayed. Choose *OK* and remove the CD-ROM from the drive.
14. Choose *Close* to close the Display Type dialog box.
15. Choose *Close* to close the Display application.
16. When a message displays stating that you must restart your computer to use the new display driver, choose *No*.
17. Shut down your system by choosing *Shut Down* from the Start menu, and turn off the power to your system so you can install the PowerStorm 4D10T/ELSA GLoria Synergy board. Then reboot your system to access the new display driver.

After your system reboots, a message appears, indicating that the default screen resolution and refresh rate are being used. For information on changing these values, refer to “Changing the Screen Resolution and Refresh Rate,” page 1–9.

Enabling and Using Multihead on PowerStorm 4D10T/ELSA GLoria Synergy Devices

The PowerStorm 4D10T/ELSA GLoria Synergy driver supports multihead on Alpha platforms. This section describes the supported configurations, how to enable multihead, recommendations on use of multihead, and known restrictions. This section also describes 3D hardware acceleration in multihead configurations, recommendations on how to use it, and known restrictions.

What Is Multihead?

The Windows NT 4.0 graphics interface, GDI, does not handle the use of multiple graphics boards. It is left as a task for the display drivers to adapt a customized setup that creates a virtual window spanning multiple screens, with each screen connected to its own graphics board. This is commonly known as multihead (also known as multimonitor).

The PowerStorm 4D10T/ELSA GLoria Synergy driver contains the necessary code to support multihead configurations. The driver can accelerate GDI calls (2D multihead). In the current implementation, only homogeneous multihead is supported. Homogeneous multihead refers to support of configurations containing identical devices. For example, multihead will function correctly in a system containing multiple 8 MB PowerStorm 4D10Ts or ELSA GLoria Synergy; however, it will not function correctly in a system containing a mixture of 4 MB and 8 MB PowerStorm 4D10Ts, or in a system containing a PowerStorm 4D30T, and a PowerStorm 4D10T or ELSA GLoria Synergy.

Note

Combining PowerStorm 4D10T and ELSA GLoria Synergy cards is *not* supported.

Supported Configurations for 2D Multihead

The different configurations supported for 2D multihead on Alpha platforms are as follows:

- The Digital Personal Workstation series line of systems (433a, 500a, 600a, 433a (enhanced), 500a (enhanced), 600a (enhanced)) that use the PowerStorm 4D10T or ELSA GLoria Synergy can support 2D multihead, up to three 8 MB PowerStorm 4D10T or ELSA GLoria Synergy cards.
- The Compaq Professional Workstation XP1000 that uses the ELSA GLoria Synergy can support 2D multihead, up to three heads.

How to Enable 2D Multihead

This section assumes that you have a working system with one PowerStorm 4D10T or ELSA GLoria Synergy.

To enable multihead:

1. Shut down the system and turn off the power.
2. Disable VGA on all PowerStorm 4D10T or ELSA GLoria Synergy boards except the one that will be the VGA console. The multihead system should contain only one PowerStorm 4D10T or ELSA GLoria Synergy board with VGA enabled.

Note

Refer to your system reference guide for any slot restrictions.

3. Plug in all the boards into the system. Connect the monitors to all the boards.
4. Turn on the power to the system, then to the monitors.

The monitor connected to the PowerStorm 4D10T/ELSA GLoria Synergy board with VGA enabled will display the boot process. It is very likely that once the system boots into graphics mode, the login box will be on a different monitor. It is very important to turn the power on to all monitors and make sure they are connected properly to their respective boards.

On login, go to the Display Properties dialog box (either by right-clicking your mouse on the desktop or by choosing it from the Control Panel). Select the settings you want and modify the resolution. You will be able to select resolutions that span multiple screens. Select a suitable resolution for your system configuration and apply the change after testing it.

At this point, the different monitors should reveal parts of a large desktop. You should be able to run 2D applications, move them from one window to another, and maximize the application windows to cover the different monitors.

If on login you are unable to modify the resolution to cover multiple monitors, check the following:

- Are all the PowerStorm 4D10T/ELSA GLoria Synergy boards plugged in properly?
- Is VGA disabled on all but one PowerStorm 4D10T/ELSA GLoria Synergy?

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

3D Hardware Acceleration in Multihead Configurations

With the introduction of PowerStorm 4D10T Version 2.0 drivers, 3D multihead is now supported in certain configurations. 3D multihead refers to hardware acceleration of OpenGL in multihead configurations. Prior to Version 2.0, applications using OpenGL API would work but would use the Microsoft OpenGL Software Path, thus resulting in slow performance. With the current implementation, applications using OpenGL API would go through hardware acceleration as long as the following is true:

- Hardware acceleration is supported for that visual mode (for example, 1024x768 @ 16-bit color @ 60 Hz).
- The application window size is less than the screen size (for example, 1024x768).

Applications can be dragged from one monitor screen to another without loss in performance.

Supported Configurations for 3D Multihead

The different configurations supported for 3D multihead on Alpha platforms are as follows:

- The Digital Personal Workstation series line of systems (433a, 500a, 600a, 433a (enhanced), 500a (enhanced), 600a (enhanced)) that use the PowerStorm 4D10T can support 3D multihead, up to two 8 MB PowerStorm 4D10Ts.
- The Digital Personal Workstation series line of systems (433a (enhanced), 500a (enhanced), 600a (enhanced)); and the Compaq Professional Workstation XP1000 that use the ELSA GLoria Synergy can support singlehead 3D only.

Known Restrictions for 3D Multihead

Maximizing the OpenGL application window to cover multiple monitor screens will force the application to use Microsoft OpenGL Software Path. Resizing the application would still force the application to use the Software Path. Exiting from the application and running it again will enable hardware acceleration.

OpenGL Acceleration

OpenGL functionality is available with the OpenGL display driver provided on the Microsoft Windows NT CD-ROM. In addition to this generic OpenGL driver, you have access to an optimized OpenGL display driver from Compaq, in the *p2icd.dll* file. This driver maximizes the performance of applications that are written with OpenGL, and supports OpenGL Version 1.1 and the OpenGL Utility Library (GLU) Version 1.2.

The *p2icd.dll* file is located in the *%SystemRoot%\system32* directory, where “*%SystemRoot%*” is the environment variable defining the path of the system root directory; for example, *D:\winnt40*. For more information on using the Compaq OpenGL drivers with the PowerStorm 4D10T/ELSA GLoria Synergy device, refer to the section, “Using OpenGL,” page 1–13.

Hardware Summary

The PowerStorm 4D10T or ELSA GLoria Synergy graphics board is a PCI local bus device. This board is used with the PowerStorm 4D10T or ELSA GLoria Synergy driver to generate high-resolution, two- and three-dimensional color graphics. Table 1–3 lists information about this graphics device.

Table 1–3: PowerStorm 4D10T/ELSA GLoria Synergy PCI Device

<i>Designation</i>	<i>Order Number</i>	<i>Memory</i>
PowerStorm 4D10T	SN-PBXGK-AA	4 MB
	SN-PBXGK-AB	8 MB
ELSA GLoria Synergy	SN-PBXGK-BB	8 MB
	SN-PBXGK-BC	8 MB

After Installation

After you have installed the PowerStorm 4D10T or ELSA GLoria Synergy driver, you may need to change the screen resolution and refresh rate, change the display settings, or identify the display driver version for troubleshooting purposes. The following sections describe how to perform these tasks.

Changing the Screen Resolution and Refresh Rate

After installing the PowerStorm 4D10T or ELSA GLoria Synergy board, you can change the screen resolution and refresh rate, collectively referred to as the *display mode*. Before changing the display mode, you should verify that your monitor can handle the new values (see your hardware monitor documentation). Then perform the following steps:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From the Display Properties dialog box, choose the *Settings* tab.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

5. From the Settings dialog box, click on the arrows in the *Desktop Area* to change the screen resolution.

To change the refresh rate, choose one of the options in *Refresh Frequency*. (You also can change the resolution and refresh rate by choosing *List All Modes* and the desired mode, and then choosing *OK*.) If the refresh rate selected is not supported by the resolution you chose, the resolution will automatically change to the nearest value supported by that refresh rate, or the refresh rate will change to support the resolution.

6. Choose *Test* to verify that the settings work correctly. A test pattern will be displayed on your monitor for about 5 seconds.
7. You will now see the question “Did you see the test bitmap properly?”. If you are satisfied with the video display, choose *Yes*.

Choose *OK* to change the settings.

8. You may have to adjust your monitor to align the new resolution to the monitor. This is typically done by using the controls on the front or side of the monitor.

4 MB and 8 MB Resolutions, Color Depth, and Refresh Rates

The following tables provide the PowerStorm 4D10T/ELSA GLoria Synergy 4 MB and 8 MB resolutions, color depth, and refresh rates for singlehead configurations.

Table 1–4: 4 MB Resolutions, Color Depth, and Refresh Rates for Single Head Configurations

Color Depth				Resolution	Refresh
256	32768	65536	True Color		
Y	Y	Y	Y	640x480	60
Y	Y	Y	Y	640x480	75
Y	Y	Y	Y	640x480	85
Y	Y	Y	Y	800x600	60
Y	Y	Y	Y	800x600	75
Y	Y	Y	Y	800x600	85
Y	Y	Y	Y	1024x768	60
Y	Y	Y	Y	1024x768	75
Y	Y	Y	Y	1024x768	85
Y	Y	Y	Y	1152x870	60
Y	Y	Y	Y	1152x870	75
Y	Y	Y	Y	1152x870	85
Y	Y	Y	NA	1280x1024	60
Y	Y	Y	NA	1280x1024	75
Y	Y	Y	NA	1280x1024	85
Y	NA	NA	NA	1600x1200	60
Y	NA	NA	NA	1600x1200	75

Note

Resolution expands horizontally when adding another head. For example, 640x480 single head expands to 1280x480 dual head.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

Table 1–5: 8 MB Resolutions, Color Depth, and Refresh Rates for Single Head Configurations

Color Depth				Resolution	Refresh
256	32768	65536	True Color		
Y	Y	Y	Y	640x480	60
Y	Y	Y	Y	640x480	75
Y	Y	Y	Y	640x480	85
Y	Y	Y	Y	800x600	60
Y	Y	Y	Y	800x600	75
Y	Y	Y	Y	800x600	85
Y	Y	Y	Y	1024x768	60
Y	Y	Y	Y	1024x768	75
Y	Y	Y	Y	1024x768	85
Y	Y	Y	Y	1152x870	60
Y	Y	Y	Y	1152x870	75
Y	Y	Y	Y	1152x870	85
Y	Y	Y	NA	1280x1024	60
Y	Y	Y	NA	1280x1024	75
Y	Y	Y	NA	1280x1024	85
Y	NA	NA	NA	1600x1200	60
Y	NA	NA	NA	1600x1200	75
Y	NA	NA	NA	1600x1200	85

Using the Display Application

Use the following procedure to change the display settings on the PowerStorm 4D10T/ELSA GLoria Synergy device:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From Display, select *4D10T Settings*.

Compaq recommends that you use the default settings.

Identifying the Display Driver Version

If you encounter a problem with the PowerStorm 4D10T/ELSA GLoria Synergy driver, you can report it to Compaq. When reporting a problem, you must include the version of the driver with your description of the problem.

To identify the version of the display driver, follow these steps:

1. Select *Start*, *Programs*, and *Windows NT Explorer* to view the files currently installed on your machine.
2. To ensure that all files are listed, select *View*, *Options*, and the *View* tab, and verify that the *Show all Files* box is selected. Choose *OK*.
3. Locate the *P2-d.dll* file in the list.
This file is found in the `%SystemRoot%\system32` directory.
4. Click once on the file name to highlight it.
5. From the File Menu, choose *Properties*.
6. In the Properties dialog box, choose the *Version* tab.

The Version dialog box displays driver information, including the version and date.

Using OpenGL

This section describes the PowerStorm 4D10T/ELSA GLoria Synergy OpenGL display driver, which is designed to optimize OpenGL performance on the DIGITAL Intel Personal Workstations. This section includes the following topic:

- Using OpenGL Applications, for users running applications developed with OpenGL

For a more comprehensive discussion of the OpenGL interface, refer to the DIGITAL *Using OpenGL* manual, and the Microsoft Windows NT OpenGL documentation included in the Microsoft Windows NT Version 4.0 Software Developer's Kit (SDK).

Using OpenGL Applications

In addition to a generic OpenGL display driver, Windows NT OpenGL includes a mechanism by which OpenGL rendering can be performed by vendor-supplied display drivers. Compaq provides such an OpenGL display driver in the Graphics Support Services Software product. This driver takes advantage of hardware features that improve rendering performance and quality, and is used with the Compaq PowerStorm 4D10T or ELSA GLoria Synergy graphics device.

Installation and Postinstallation on PowerStorm 4D10T/ELSA GLoria Synergy Devices

When an application requests a pixel format, Windows NT OpenGL will satisfy the request with the pixel format that best fits the description. This pixel format can be one of the following:

- A hardware pixel format, supported by the PowerStorm 4D10T/ELSA GLoria Synergy OpenGL driver
- A software pixel format, supported by the generic Windows NT OpenGL driver

Installation and Postinstallation on PowerStorm 4D30T Devices

The Graphics Support Services Software is a set of graphics display drivers compatible with Microsoft Windows NT. This chapter describes the installation and postinstallation procedures for PowerStorm 4D30T devices on Windows NT Version 4.0. These drivers provide OpenGL support and enable you to run the PowerStorm 4D30T graphics device.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Alpha manual
- Graphics Support Services Software for Intel manual
- “Break-the-seal” license
- CD-ROM containing the following software for Alpha support:
 - ◇ **PowerStorm 4D30T driver**—2D drivers and 3D drivers (the Compaq accelerated OpenGL support) in the `\alpha\pbxgd\nt40` directory on your CD-ROM device. (See Table 2-1.)

Installation and Postinstallation on PowerStorm 4D30T Devices

Table 2–1: PowerStorm 4D30T Components on the CD–ROM

Component Description	File Name
GDI display driver	<i>pbxgd.dll</i>
Kernel mode miniport driver	<i>pbxgd.sys</i>
OpenGL driver—client-side file only	<i>pbxgdogl.dll</i>
Configuration application	<i>pbxgdtab.dll</i>
Release Notes, which can be read using the <i>Notepad</i> application in Windows NT. You access this application by selecting the <i>Program Manager</i> icon, the <i>Accessories</i> program icon, and the <i>Notepad</i> icon.	<i>Readme.txt</i>

System Requirements and Supported and Warranted Configurations

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Pack3 (SP3) or later version supported on system

Table 2–2 lists the supported systems.

Table 2–2: Supported and Warranted System Configurations

System	Graphics Accelerators Supported
Digital Personal Workstation 433a, Digital Personal Workstation 500a, Digital Personal Workstation 600a, Digital Personal Workstation 433a (enhanced), Digital Personal Workstation 500a (enhanced), Digital Personal Workstation 600a (enhanced)	PowerStorm 4D30T†

† Requires Digital Personal Workstation 433a/500a/600a/433a (enhanced)/500a (enhanced)/600a (enhanced) AlphaBIOS Rev 5.64 or higher.

Minimum Revision Level Required

Minimum revision level of system module for Digital Personal Workstation 433a/500a/600a is required. For more information, please refer to the cover letter included with the PowerStorm 4D30T module, or contact your Compaq support organization.

Installation Procedure

The installation of Graphics Support Services Software is divided into two parts; the parts you must execute depend on the type of installation you are performing:

- **If you are installing a new version of, or upgrading, Microsoft Windows NT**, you must perform Parts 1 and 2.
- **If you are upgrading your Graphics Support Services Software display drivers**, you need only perform Part 2.

Caution

If you are performing Part 2 **only** and are installing a new board, you must install the board **at the end of the Part 2 procedure** (in step 17). If you are performing a new installation or upgrade of Windows NT, you must first perform the procedure described in “Part 1: New Installation or Upgrade of Windows NT Only,” page 2–3.

The two parts of the installation are described in the following sections.

Part 1: New Installation or Upgrade of Windows NT Only

Before installing Graphics Support Services Software during a Windows NT upgrade or new installation, you must have already installed a PowerStorm 4D30T board. You can then install Windows NT as described in the Windows NT documentation.

During Windows NT installation, a hardware and software component list is displayed, like the one shown here:

Computer: Digital Personal Workstation 433a

Display: VGA Compatible

Keyboard: XT, AT, or Enhanced Keyboard (83-104 keys)

Keyboard Layout: US

Pointing Device: Mouse Port Mouse

No Changes: The above list matches my computer.

When you have completed the Windows NT installation, **go to Part 2**.

Part 2: Upgrade of Graphics Support Services Software Drivers

Regardless of the display driver you are installing or the type of installation you are performing, you must install the Graphics Support Services Software drivers. In this part, you install the 2D drivers and 3D drivers (the Compaq optimized OpenGL support) from the CD-ROM provided with this package.

Installation and Postinstallation on PowerStorm 4D30T Devices

The Graphics Support Services Software drivers are installed as follows:

1. Boot your system and log into Windows NT if you have not already done so.
2. From the desktop, choose *My Computer*.
3. From *My Computer*, choose *Control Panel*.
4. From *Control Panel*, choose *Display*.
5. From the *Display Properties* dialog box, choose the *Settings* tab.
6. From the *Settings* dialog box, choose the *Display Type* button to see the driver and adapter (board) information.
7. From the *Display Type* dialog box, choose *Change*.
8. From the *Change Display* dialog box, choose *Have Disk*.
9. In the *Install from Disk* dialog box, you are prompted to insert the manufacturer's installation disk into the selected drive. Insert the CD-ROM provided with your PowerStorm 4D30T.
10. Enter the path of the PowerStorm 4D30T driver and choose *OK*.

The path is of the following format, where *dev:* is the drive name (for example, *E:* for the E drive):

dev:\alpha\pbxgd\nt40

11. In the *Change Display* dialog box, the driver whose path you just defined is displayed. Confirm this choice by choosing *OK*.

The driver name displayed is:

DIGITAL PowerStorm 4D30T (PBXGD)

12. When the message displays stating that this is a third party driver, confirm by choosing *Yes*.

A status box displays reflecting the progress of the driver installation.

13. When the files have been copied to your hard disk, a dialog box indicating that the driver was successfully installed is displayed. Choose *OK* and remove the CD-ROM from the drive.
14. Choose *Close* to close the *Display Type* dialog box.
15. Choose *Close* to close the *Display* application.
16. When a message displays stating that you must restart your computer to use the new display driver, choose *No*.

Installation and Postinstallation on PowerStorm 4D30T Devices

17. Shut down your system by choosing *Shut Down* from the Start menu, and turn off the power to your system so you can install the PowerStorm 4D30T board. Then reboot your system to access the new display driver.

After your system reboots, a message displays indicating that the default screen resolution and refresh rate are being used. For information on changing these values, refer to “Changing the Screen Resolution and Refresh Rate,” page 2–6.

The installation is now complete.

OpenGL Acceleration

OpenGL functionality is available with the OpenGL display driver provided on the Microsoft Windows NT CD-ROM. In addition to this generic OpenGL driver, you have access to an optimized OpenGL display driver from Compaq, in the *pbxgdogl.dll* file. This driver maximizes the performance of applications that are written with OpenGL, and supports OpenGL Version 1.1 and the OpenGL Utility Library (GLU) Version 1.2.

The *pbxgdogl.dll* file is located in the `%SystemRoot%\system32` directory, where “`%SystemRoot%`” is the environment variable defining the path of the system root directory; for example, `D:\winnt40`. For more information on using the Compaq OpenGL drivers with the PowerStorm 4D30T device, refer to the section “Using OpenGL,” page 2–9.

Hardware Summary

The PowerStorm 4D30T graphics board is a PCI local bus device. This board is used with the PowerStorm 4D30T driver to generate high-resolution, two- and three-dimensional color graphics. Table 2–3 lists information about this graphics device.

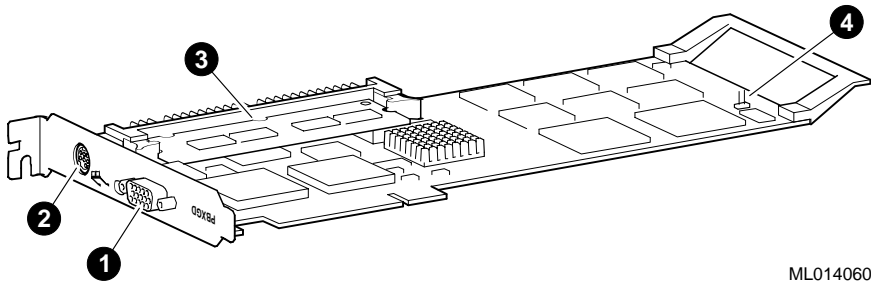
Table 2–3: PowerStorm 4D30T PCI Device

Designation	Order Number	Texture Memory	Memory
PowerStorm 4D30T	SN-PBXGD-AA	4 MB	15 MB
	SN-PBXGD-AB	16 MB	15 MB
	SN-PBXGD-GB	16 MB upgrade	

The only configuration supported is a singlehead configuration (one PowerStorm 4D30T device).

The PowerStorm 4D30T device is shown in Figure 2–1.

Figure 2–1: PowerStorm 4D30T Device



ML014060

The callouts in Figure 2–1 are defined in Table 2–4.

Table 2–4: PowerStorm 4D30T Device Features

Callout	Description
1	VGA connector
2	Stereo connector
3	4 MB or 16 MB texture memory
4	VGA enable/disable jumper (jumper installed = disable)

For information on installing the PowerStorm 4D30T board and setting the jumpers, refer to the *DIGITAL PowerStorm 4D30T Graphics Option Installation Guide*.

After Installation

After you have installed the PowerStorm 4D30T driver, you may need to change the screen resolution and refresh rate, manage buffer swap, or identify the display driver version for troubleshooting purposes. The following sections describe how to perform these tasks.

Changing the Screen Resolution and Refresh Rate

After installing the PowerStorm 4D30T board, you can change the screen resolution and refresh rate, collectively referred to as the *display mode*. Before changing the display mode, you should verify that your monitor can handle the new values (see your hardware monitor documentation). Then perform the following steps:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From the Display Properties dialog box, choose the *Settings* tab.

Installation and Postinstallation on PowerStorm 4D30T Devices

5. From the Settings dialog box, click on the arrows in the *Desktop Area* to change the screen resolution.

To change the refresh rate, choose one of the options in *Refresh Frequency*. (You can also change the resolution and refresh rate by choosing *List All Modes* and the desired mode, and then choosing *OK*.) If the refresh rate selected is not supported by the resolution you chose, the resolution will automatically change to the nearest value supported by that refresh rate, or the refresh rate will change to support the resolution.

6. Choose *Test* to verify that the settings work correctly. A test pattern will be displayed on your monitor for about 5 seconds.
7. You will now see the question “Did you see the test bitmap properly?”. If you are satisfied with the video display, choose *Yes*.

Choose *OK* to change the settings.

8. You may have to adjust your monitor to align the new resolution to the monitor. This is typically done by using the controls on the front or side of the monitor.

Managing Buffer Swap

In Windows NT Version 4.0, you can enable/disable the double-buffer synchronization. In most cases, double-buffer swaps are synchronized with vertical retrace to avoid visual “tearing” effects.

Tearing and flickering can occur for a combination of reasons:

- Many large triangles are being processed
- A large window is being used
- High resolution and refresh rate values are defined

Most applications do not experience visual tearing, and could take advantage of the higher frame rates and better performance available when no synchronization is used. Therefore, you should try using this mode.

If unwanted visual effects do occur, however, you should use the tear-free (sync with refresh) double-buffering mode, choosing the highest vertical refresh rate supported by your monitor at your chosen resolution (refer to “Changing the Screen Resolution and Refresh Rate,” page 2–6).

You can change the double-buffer synchronization mode using the display application.

This method is described in the section “Using the Display Application” on page 2–8.

Installation and Postinstallation on PowerStorm 4D30T Devices

Applying Gamma Correction

You can use the Display Application to apply gamma correction to the image produced by the PowerStorm 4D30T. Gamma correction allows you to fine-tune the relationship between the values generated in the frame buffer and the intensities displayed on your monitor. You can apply a gamma correction factor from 0.6 to 2.2. The default gamma correction value is 1.0, which passes values unchanged from the frame buffer to the output portion of the PowerStorm 4D30T.

Gamma correction can be applied using the method described in the section “Using the Display Application” on page 2–8.

Using the Display Application

To use the display application, follow these steps:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From Display, select *REALimage Settings*.
5. From REALimage Settings, choose *Gamma Correction*.
6. In the Gamma Correction dialog box, use the sliders to adjust the gamma value. Select the check box *Individual RGB controls* to individually adjust the gamma values for each channel. Choose *Apply* to update the driver with your changes.
7. Choose *OK* when you are finished, or *Cancel* to discard your most recent changes and return to the REALimage Settings.

Identifying the Display Driver Version

If you encounter a problem with the PowerStorm 4D30T driver, you can report it to Compaq. When reporting a problem, you must include the version of the driver with your description of the problem.

Identifying the Driver Version

To identify the version of the display driver, follow these steps:

1. Select *Start, Programs, and Windows NT Explorer* to view the files currently installed on your machine.
2. To ensure that all files are listed, select *View, Options*, and the *View* tab, and verify that the *Show all Files* box is selected. Choose *OK*.
3. Locate the *pbxgd.dll* file in the list.

This file is found in the `%SystemRoot%\system32` directory.

4. Click once on the filename to highlight it.
5. From the File Menu, choose *Properties*.
6. In the Properties dialog box, choose the *Version* tab.

The Version dialog box displays driver information, including the version and date.

Using OpenGL

This section describes the PowerStorm 4D30T OpenGL display driver, which is designed to optimize OpenGL performance on the DIGITAL Alpha Personal Workstations. This section includes the following topics:

- Using OpenGL Applications, for users running applications developed with OpenGL
- Developing OpenGL Applications, for users developing OpenGL applications

For a more comprehensive discussion of the OpenGL interface, refer to the DIGITAL *Using OpenGL* manual, and the Microsoft Windows NT OpenGL documentation included in the Microsoft Windows NT Version 4.0 Software Developer's Kit (SDK).

Using OpenGL Applications

In addition to a generic OpenGL display driver, Windows NT OpenGL includes a mechanism by which OpenGL rendering can be performed by vendor-supplied display drivers. Compaq provides such an OpenGL display driver in the Graphics Support Services Software product. This driver takes advantage of hardware features that improve rendering performance and quality, and is used with the Compaq PowerStorm 4D30T graphics device.

When an application requests a pixel format, Windows NT OpenGL will satisfy the request with the pixel format that best fits the description. This pixel format can be one of the following:

- A hardware pixel format, supported by the PowerStorm 4D30T OpenGL driver
- A software pixel format, supported by the generic Windows NT OpenGL driver

Developing OpenGL Applications

This section provides information for developing OpenGL applications that optimize the PowerStorm 4D30T graphics device.

Pixel Format Support

The PowerStorm 4D30T driver and device, in combination with Windows NT OpenGL, support a fully compliant implementation of OpenGL. Color index mode support is provided by the Windows NT generic OpenGL implementation, and thus is not hardware-accelerated.

Installation and Postinstallation on PowerStorm 4D30T Devices

On the PowerStorm 4D30T device, the display driver supports the pixel formats listed in Table 2-5.

Table 2-5: Supported Pixel Formats on PowerStorm 4D30T Device

Pixel Format	1	2	3	4
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	Yes	No	Yes	No
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Swap Layer Buffers	Yes	Yes	Yes	Yes
Support GDI	Yes	Yes	Yes	Yes
Support OpenGL	Yes	Yes	Yes	Yes
Support Overlays (*)	No	No	No	No
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	24	24	24	24
Red Bits	8	8	8	8
Red Shift	16	16	16	16
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	0	0	0	0
Alpha Bits	0	0	0	0
Alpha Shift	0	0	0	0
Accum Bits	48	48	48	48
Depth Bits	24	24	24	24
Stencil Bits (*)	0	0	4	4
Reserved	0	0	0	0
Auxiliary Buffers	0	0	0	0

* Overlay and stencil planes can be disabled using the Display Application.

Table 2–5: Supported Pixel Formats on PowerStorm 4D30T Device (Cont’d)

Pixel Format	5	6	7	8
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	Yes	No	Yes	No
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Swap Layer Buffers	Yes	Yes	Yes	Yes
Support GDI	Yes	Yes	Yes	Yes
Support OpenGL	Yes	Yes	Yes	Yes
Support Overlays (*)	Yes	Yes	Yes	Yes
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	24	24	24	24
Red Bits	8	8	8	8
Red Shift	16	16	16	16
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	0	0	0	0
Alpha Bits	0	0	0	0
Alpha Shift	0	0	0	0
Accum Bits	48	48	48	48
Depth Bits	24	24	24	24
Stencil Bits (*)	0	0	4	4
Reserved	1	1	1	1
Auxiliary Buffers	0	0	0	0

* Overlay and stencil planes can be disabled using the Display Application.

Installation and Postinstallation on PowerStorm 4D30T Devices

Performance Considerations

The PowerStorm 4D30T device cannot accelerate all OpenGL operations. In such cases, the Windows NT generic implementation is used to render the graphics. If you request an OpenGL operation that is not fully accelerated by the hardware, however, performance may suffer.

Although antialiasing of surfaces and points is not hardware-accelerated on a PowerStorm 4D30T device, texture mapping and blending operations **are** accelerated by this hardware. All of these operations, as well as operations for sending down multiple clip rectangles and drawing to partially obscured windows, may degrade performance.

Alpha Buffers

Alpha support for alpha buffering is no longer provided by the PowerStorm 4D30T device driver.

Few programs actually require a pixel format with an alpha buffer. The two operations that depend on the values stored in the alpha buffer are:

- *Storing alpha values so that they can be read later*

The application needs an alpha buffer if it must store alpha values for later retrieval by the **glReadPixels** function with one of the following formats:

- GL_ALPHA
- GL_RGBA
- GL_LUMINANCE_ALPHA

- *Blending, using a destination alpha value*

The application needs an alpha buffer if it calls the **glBlendFunc** function with one of the following values:

- DST_ALPHA
- ONE_MINUS_DST_ALPHA
- ONE_MINUS_DST_COLOR
- SRC_ALPHA_SATURATE

For all pixel formats supported by the PowerStorm 4D30T, **glReadPixels** returns 1.0 for all alpha values, and OpenGL uses 1.0 for all destination alpha values when computing blending factors.

Overlay Planes

The PowerStorm 4D30T device driver now provides hardware support for 8-bit double-buffered overlay planes. Some previous versions of this driver provided support for 2-bit double-buffered overlay planes. That support is no longer available. Note that for performance reasons, not all pixel formats support overlay planes. If you do not require overlay planes, selecting a pixel format without overlay support will ensure maximum performance. Overlay planes can be disabled for all pixel formats by using the Display Application.

Stencil Planes

The PowerStorm 4D30T device driver provides hardware support for 4-bit stencil planes. Note that for performance reasons, not all pixel formats support stencil planes. If you do not require stencil planes, selecting a pixel format without stencil planes will ensure maximum performance. Stencil planes can be disabled for all pixel formats by using the Display Application.

SoftImage Customizations

When using the PowerStorm 4D30T with Microsoft's SoftImage®, you should enable *SoftImage Customizations* using the Display Application. This will ensure maximum performance and compatibility with SoftImage. When SoftImage Customizations are enabled, overlay planes will be automatically enabled and stencil planes will be automatically disabled. If you wish to make changes to either of these settings, you must disable SoftImage Customizations. You can then enable and disable overlay and stencil planes normally.

Installation and Postinstallation on Other PowerStorm Devices

The Graphics Support Services Software is a set of graphics display drivers compatible with Microsoft Windows NT. This chapter describes the installation and postinstallation procedures for PowerStorm devices on Windows NT Version 4.0. The drivers provide OpenGL support and enable you to run the following:

- PowerStorm 3D30 and PowerStorm 4D20 graphics devices
- PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D51T, and PowerStorm 4D60T graphics devices
- Shared Desktop software.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Alpha manual
- Graphics Support Services Software for Intel manual
- “Break-the-seal” license
- CD-ROM containing the following software for Alpha support:
 - ◇ **PowerStorm 3D30/4D20 drivers** (all systems **except** for AlphaServer 8400[†] and Digital Ultimate Workstation 533a²)—2D and 3D drivers (the Compaq accelerated OpenGL support) in the directory `\alpha\tga\nt40` on your CD-ROM device. (See Table 3-1.)

[†] 440 MHz AlphaServer 8400 with 8 CPUs and 8 GB of memory.

Installation and Postinstallation on Other PowerStorm Devices

- ◇ **PowerStorm 3D30 drivers** (for AlphaServer 8400[†] **only**)—2D drivers in the directory `\alpha\tga\nt40_8x00` on your CD-ROM device. (See Table 3–1.)
- ◇ **PowerStorm 3D30/4D20 drivers** (for Digital Ultimate Workstation 533a² **only**)—2D and 3D drivers (the Compaq accelerated OpenGL support) in the directory `\alpha\tga\nt40_533a2` on your CD-ROM device. (See Table 3–1.)
- ◇ **PowerStorm 4D40T/50T/51T/60T drivers**—2D drivers and 3D drivers (the Compaq accelerated OpenGL support) in the `\alpha\pbxgi\nt40` directory on your CD-ROM device. (See Table 3–2.)
- ◇ **Shared Desktop Advanced Development Kit**—in the directory `\alpha\shared_desk\nt40` on your CD-ROM device. All information about using the Shared Desktop software can be found in this directory.

Table 3–1: PowerStorm 3D30/4D20 Components on the CD-ROM

Component Description	File Name
GDI display driver	<i>tga2.dll</i>
Kernel mode driver	<i>tga2.sys</i>
OpenGL driver, divided into two parts: <ul style="list-style-type: none">– server-side file– client-side file	<i>tgaglsrv.dll</i> <i>tgaglclt.dll</i>
Scripts that set the registry to enable/disable a feature used by 3D applications. See <i>relnotes.doc</i> for more information.	<i>Dis_gl_ccw.reg</i> <i>ena_gl_ccw.reg</i>
Release notes, and read-me-first. (<i>readme.1st</i> can be read by using the <i>WordPad</i> application. You access this application by selecting <i>Start, Programs, Accessories</i> , and <i>WordPad</i> , and then specifying the file with <i>File</i> and <i>Open</i> .)	<i>relnotes.doc</i> <i>readme.1st</i>

[†] 440 or 625 MHz AlphaServer 8400 with 8 CPUs and 8 GB of memory.

Table 3–2: PowerStorm 4D40T/50T/51T/60T Components on the CD–ROM

Component Description	File Name
GDI display driver	<i>pbxgivdd.dll</i>
Kernel mode miniport driver	<i>pbxgimp.sys</i>
Kernel mode DMA device driver	<i>pbxidma.sys</i>
OpenGL driver—client-side file only	<i>pbxgiocd.dll</i>
PBXGI Video Configuration application	<i>pbxgivca.cpl</i> <i>pbxgi0409.hlp</i>
Console synchronization application	<i>pbxgisnc.exe</i>
Microsoft Visual C Run–time Library Version 4.0, required to use the Video Configuration application	<i>msvert40.dll</i>
Configuration file containing video parameter and attribute definitions	<i>pbxgi.dat</i>
Screen saver	<i>pbxgi.scr</i>
Release notes, and read-me-first. (<i>readme.1st</i> can be read by using the <i>WordPad</i> application. You access this application by selecting <i>Start, Programs, Accessories</i> , and <i>WordPad</i> , and then specifying the file with <i>File</i> and <i>Open</i> .)	<i>relnotes.doc</i> <i>readme.1st</i>

System Requirements and Supported and Warranted Configurations

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Pack 3 (SP3) or later version supported on system

Table 3–3 lists the supported systems.

Installation and Postinstallation on Other PowerStorm Devices

Table 3–3: Supported and Warranted System Configurations

System	Graphics Accelerators Supported
Alpha XL 266	PowerStorm 4D20, PowerStorm 4D40T
Alpha XL 300, Alpha XL 333, Alpha XL 366, Alpha XL 433	PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D60T
Digital AlphaStation 250 4/266	PowerStorm 4D40T
Digital AlphaStation 255/233, Digital AlphaStation 255/300	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T
Digital AlphaStation 500/266	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D60T
Digital AlphaStation 500/333, Digital AlphaStation 500/400, Digital AlphaStation 500/500	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D60T
Digital AlphaStation 600 5/266, Digital AlphaStation 600 5/300, Digital AlphaStation 600 5/333	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D60T
Digital AlphaStation 600A 5/500	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D51T, PowerStorm 4D60T
Digital Personal Workstation 433a, Digital Personal Workstation 500a, Digital Personal Workstation 600a	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D40T, PowerStorm 4D50T, PowerStorm 4D51T†, PowerStorm 4D60T
Digital Personal Workstation 433a (enhanced), Digital Personal Workstation 500a (enhanced), Digital Personal Workstation 600a (enhanced)	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D50T, PowerStorm 4D51T†, Powerstorm 4D60T
Digital Ultimate Workstation 533a ²	PowerStorm 3D30, PowerStorm 4D20, PowerStorm 4D50T, PowerStorm 4D51T, Powerstorm 4D60T
Digital AlphaServer 4100 300 MHz‡	PowerStorm 4D51T
Digital AlphaServer 8400 440 MHz*	PowerStorm 3D30
Digital AlphaServer 8400 625 MHz*	PowerStorm 3D30
Compaq Professional Workstation XP1000	PowerStorm 4D51T

† Requires Digital Personal Workstation 433a/500a/600a/433a (enhanced)/500a (enhanced)/600a (enhanced) AlphaBIOS Rev 5.64 or higher.

‡ 300 MHz Digital AlphaServer 4100 with 4 CPUs and 2 GB of memory.

* 440 or 625 MHz Digital AlphaServer 8400 with 8 CPUs and 8 GB of memory.

Installation Procedure

The installation of Graphics Support Services Software is divided into two parts; the parts you must execute depend on the type of installation you are performing:

- **If you are installing a new version of, or upgrading, Microsoft Windows NT**, you must perform Parts 1 and 2.
- **If you are upgrading your Graphics Support Services Software display drivers**, you need only perform Part 2.

Caution

If you are performing Part 2 **only** and are installing a new board, you must install the board **at the end of the Part 2 procedure** (in step 17). If you are performing a new installation or upgrade of Windows NT, you must first perform the procedure described in “Part 1: New Installation or Upgrade of Windows NT Only,” page 3–5.

The two parts of the installation are described in the following sections.

Note

The installation procedure applies to the PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T devices. For information on installing the Shared Desktop software, refer to the *readme.txt* file in the `\alpha\shared_desk\nt40` directory.

Part 1: New Installation or Upgrade of Windows NT Only

Before installing Graphics Support Services Software during a Windows NT upgrade or new installation, you must have already installed a PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T board. You can then install Windows NT as described in the Windows NT documentation.

Installation and Postinstallation on Other PowerStorm Devices

During Windows NT installation, a hardware and software component list is displayed, like the one shown here for a PowerStorm 3D30/4D20 device:

Computer: Digital AlphaStation 200/400

Display: VGA Compatible

Keyboard: XT, AT, or Enhanced Keyboard (83-104 keys)

Keyboard Layout: US

Pointing Device: Mouse Port Mouse

No Changes: The above list matches my computer.

If you have installed a PowerStorm 3D30/4D20 board, you may also receive a message stating that a “CIRRUS compatible display adapter” was found on your machine. This message refers to the VGA support provided by the CIRRUS Logic chip and driver, not to the driver you are installing. Choose *OK* to confirm this message.

When you have completed the Windows NT installation, **go to Part 2.**

Part 2: Upgrade of Graphics Support Services Software Drivers

Regardless of the display driver you are installing or the type of installation you are performing, you must install the Graphics Support Services Software drivers. In this part, you install the 2D drivers and 3D drivers (the Compaq accelerated OpenGL support) from the CD-ROM provided with this package.

The Graphics Support Services Software drivers are installed as follows:

1. Boot your system and log into Windows NT if you have not already done so.
2. From the desktop, choose *My Computer*.
3. From My Computer, choose *Control Panel*.
4. From Control Panel, choose *Display*.
5. From the Display Properties dialog box, choose the *Settings* tab.
6. From the Settings dialog box, choose the *Display Type* button to see the driver and adapter (board) information.
7. From the Display Type dialog box, choose *Change*.
8. From the Change Display dialog box, choose *Have Disk*.
9. In the Install from Disk dialog box, you are prompted to insert the manufacturer’s installation disk into the selected drive. Insert the CD-ROM provided with your PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T board.

Installation and Postinstallation on Other PowerStorm Devices

10. Enter the path of the CD-ROM directory containing the appropriate display driver, and choose *OK*.

The path is one of the following, where “*dev:*” is the drive name (for example, *E:* for the E drive):

- For the PowerStorm 3D30/4D20 driver: *dev:\alpha\tga\nt40*
- For the PowerStorm 3D30/4D20 driver on an AlphaServer 8400:
dev:\alpha\tga\nt40_8X00
- For the PowerStorm 4D40T/50T/51T/60T driver: *dev:\alpha\pbxgi\nt40*
- If you are running a PowerStorm 4D40T/50T/60T and your system is not listed in Table 3–3, then the path is: *dev:\alpha\pbxgi\other*

11. In the Change Display dialog box, the driver whose path you just defined is displayed. Confirm this choice by choosing *OK*.

The driver name displayed is:

- from *dev:\alpha\tga\nt40*: *Digital PowerStorm 3D30/PowerStorm 4D20*
- from *dev:\alpha\tga\nt40_8X00*: *Digital PowerStorm 3D30/PowerStorm 4D20 on an AlphaServer 8400*
- from *dev:\alpha\pbxgi\nt40*: *Digital PowerStorm 4D40T/50T/51T/60T*
- from *dev:\alpha\pbxgi\other*: *Digital PowerStorm 4D40T/50T/60T*

12. When the message displays stating that this is a third party driver, confirm by choosing *Yes*.
13. When the files have been copied to your hard disk, a dialog box indicating that the driver was successfully installed is displayed. Choose *OK* and remove the CD-ROM from the drive.
14. Choose *Close* to close the Display Type dialog box.
15. Choose *Close* to close the Display application.
16. When a message displays stating that you must restart your computer to use the new display driver, choose *No*.
17. Shut down your system by choosing *Shut Down* from the Start menu, and turn off the power to your system so you can install the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T board, if not already installed. Then reboot your system to access the new display driver.

After your system reboots, a message displays indicating that the default screen resolution and refresh rate are being used. For information on changing these values, refer to “Changing the Screen Resolution and Refresh Rate,” page 3–13.

The installation is now complete.

Installation and Postinstallation on Other PowerStorm Devices

PowerStorm 4D51T Multihead Support

The latest PowerStorm 4D51T driver supports up to two PowerStorm 4D51T boards on the following platforms: Digital Personal Workstation 433a/500a/600a/433a (enhanced)/500a (enhanced)/600a (enhanced).

Enabling Multihead Support

This section assumes you have a working system with one PowerStorm 4D51T.

To enable multihead support:

1. Shut down the system and turn off the system power.
2. Insert the “Disable VGA” jumper on all PowerStorm 4D51T boards except the one that will be the VGA console. The multihead system should contain only one PowerStorm 4D51T board with VGA enabled. In a system with more than one board, this helps control on which board the boot screen is displayed.
3. Plug in the extra PowerStorm 4D51T board and turn on the system power.

After you plug in extra boards, the system will still come up with only one board active; it may be a different board than the one on which the boot messages appeared.

4. Once the system is booted and you have logged in, go to Display Properties (either by right-clicking your mouse on the desktop or from the Control Panel). Select display properties and hardware settings, and select how many screens you want to have active and how they are to be arranged. The options are horizontal, vertical, and 2x2. L-Shaped desktop arrangements are not supported in Windows NT 4.0. The number of screens you can select and the arrangements are dependent on how many PowerStorm 4D51T boards you have in your system.
5. Reboot your system for the changes in these settings to take effect. You may notice that the resolution reverts to VGA * number of screens, so a second visit to display properties/settings may be needed.

If you have more than one PowerStorm 4D51T board installed in your system, you may see warning messages when you reboot the system. Click OK to bypass these messages.

OpenGL Acceleration

OpenGL functionality is available with the OpenGL display driver provided on the Microsoft Windows NT CD-ROM. In addition to this generic OpenGL driver, you have access to an OpenGL display driver from Compaq. The Compaq OpenGL driver maximizes the performance of applications that are written with OpenGL and runs on Alpha systems with the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T graphics device installed.

Installation and Postinstallation on Other PowerStorm Devices

The Compaq OpenGL driver for PowerStorm 3D30/4D20, which supports OpenGL Version 1.0 and the OpenGL Utility Library (GLU) Version 1.2, comprises the files *tgaglsrv.dll* and *tgaglclt.dll*.

The Compaq OpenGL driver for PowerStorm 4D40T/50T/51T/60T, which supports OpenGL Version 1.1 and the OpenGL Utility Library (GLU) Version 1.2, comprises the file *pbxgiocd.dll*.

The OpenGL driver files are located in the *%SystemRoot%\system32* directory, where “*%SystemRoot%*” is the environment variable defining the path of the system root directory; for example, *D:\winnt40*. For more information on using the Compaq OpenGL drivers with the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T device, refer to “Using OpenGL,” page 3–20.

With PowerStorm 3D30/4D20 systems, if you wish to use the Windows NT OpenGL implementation instead of the Compaq OpenGL implementation, rename the *tgaglsrv.dll* and *tgaglclt.dll* files in the *%SystemRoot%\system32* directory. (Renaming the files rather than deleting them enables you to access the files again without having to reinstall the Graphics Support Services Software product.)

Hardware Summary

The PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T graphics boards are PCI local bus devices. These boards are used with the PowerStorm 3D30/4D20 or the PowerStorm 4D40T/50T/51T/60T driver to generate high-resolution, two- and three-dimensional color graphics. Table 3–4 lists information about these graphics devices.

Table 3–4: PowerStorm PCI Devices

<i>Designation</i>	<i>Order Number</i>	<i>Planes</i>	<i>Memory</i>
PowerStorm 3D30	PBXGB-AA / SN-PBXGB-AA	8	2 MB
PowerStorm 4D20	PBXGB-CA / SN-PBXGB-CA	24	16 MB
PowerStorm 4D40T	PBXGI-AA / SN-PBXGI-AA	24	16.6 MB†
PowerStorm 4D50T	PBXGI-AB / SN-PBXGI-AB	24	16.6 MB†
PowerStorm 4D51T	PBXGI-AD / SN-PBXGI-AD	24	16.6 MB†
PowerStorm 4D60T	PBXGI-AC / SN-PBXGI-AC	24	32 MB†

† Does not include texture memory.

Installation and Postinstallation on Other PowerStorm Devices

The configurations supported by these devices are:

- **PowerStorm 3D30/4D20 devices** — a singlehead configuration (one PowerStorm 3D30 or one PowerStorm 4D20 device)

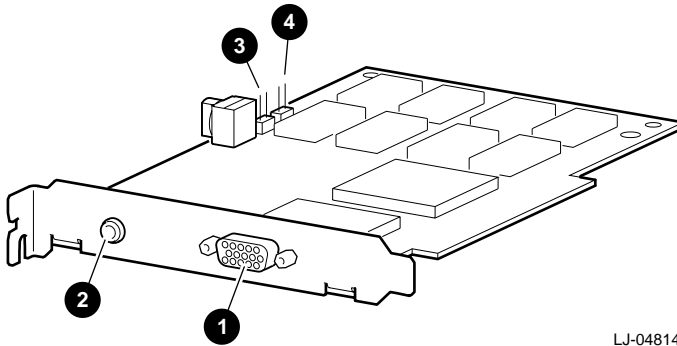
Note

On an AlphaServer 8400, the PowerStorm 3D30 device must be installed into slot 4 of the 0 to 11 slots on the PCI bus.

- **PowerStorm 4D40T/50T/60T devices** — a singlehead configuration (one PowerStorm 4D40T, one PowerStorm 4D50T, or one PowerStorm 4D60T device)
- **PowerStorm 4D51T** — a dualhead configuration (two PowerStorm 4D51T devices)

The PowerStorm 3D30 device is shown in Figure 3–1. The PowerStorm 4D20 device is an extended PCI device and is longer than the PowerStorm 3D30 device.

Figure 3–1: PowerStorm 3D30 Device



LJ-04814

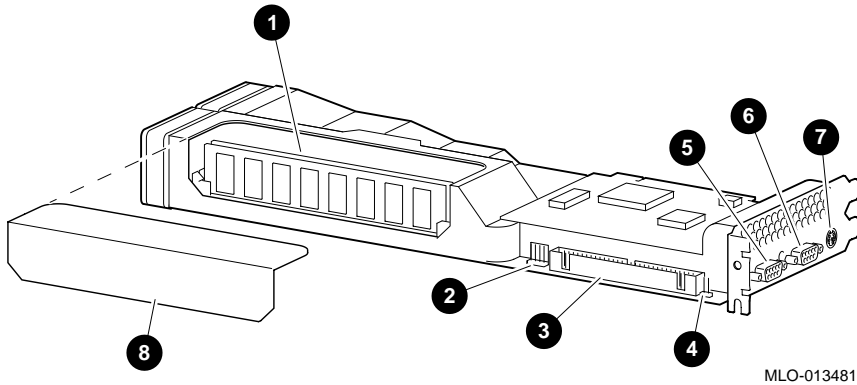
The callouts in Figure 3–1 are defined in Table 3–5.

Table 3–5: PowerStorm 3D30 and PowerStorm 4D20 Device Features

Callout	Description
1	Video cable port
2	Stereoscopic cable port
3	Alias jumper pins (to enable/disable aliasing)
4	VGA enable jumper pins (to enable/disable the use of the VGA chip)

The PowerStorm 4D60T device is shown in Figure 3–2.

Figure 3–2: PowerStorm 4D60T Device



The callouts in Figure 3–2 are defined in Table 3–6.

Table 3–6: PowerStorm 4D60T Device Features

Callout	Description
1	Texture memory
2	Not applicable
3	Video output connector
4	VGA enable/disable jumper pins (to enable/disable the use of the VGA chip)
5	VGA pass-through connector for separate VGA device (black)
6	Video cable connector to monitor (blue)
7	Stereo sync output connector
8	Texture memory access cover

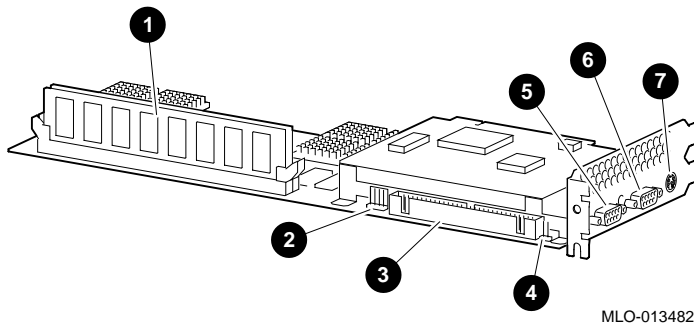
Note

For a PowerStorm 4D51T figure and device features summary, refer to the *PowerStorm 4D40T/50T/51T/60T PCI Graphics Options Owner's Guide*.

The PowerStorm 4D40T/50T devices are shown in Figure 3–3. Except for their part numbers, these two devices are visually identical.

Installation and Postinstallation on Other PowerStorm Devices

Figure 3–3: PowerStorm 4D40T/50T Devices



The callouts in Figure 3–3 are defined in Table 3–7.

Table 3–7: PowerStorm 4D40T/50T Device Features

Callout	Description
1	Texture memory
2	Not applicable
3	Video output connector
4	VGA enable/disable jumper pins (to enable/disable the use of the VGA chip)
5	VGA pass-through connector for separate VGA device (black)
6	Video cable connector to monitor (blue)
7	Stereo sync output connector

For information on installing PowerStorm 3D30/4D20 boards and setting the jumpers, refer to the *PowerStorm 3D30/4D20 PBXGB-AA/CA PCI Graphics Options Owner's Guide*.

For information on installing PowerStorm 4D40T/50T/51T/60T boards and setting the jumpers, refer to the *PowerStorm 4D40T/50T/51T/60T PCI Graphics Options Owner's Guide*.

After Installation

After you have installed the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T board, you may need to change the screen resolution and refresh rate, manage buffer swap, or identify the display driver version for troubleshooting purposes. The following sections describe how to perform these procedures.

Changing the Screen Resolution and Refresh Rate

After installing the PowerStorm 3D30/4D20, or PowerStorm 4D40T/50T/51T/60T board, you can change the screen resolution and refresh rate, collectively referred to as the *display mode*. Before changing the display mode, you should verify that your monitor can handle the new values (see your hardware monitor documentation). Then perform the following steps:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From the Display Properties dialog box, choose the *Settings* tab.
5. From the Settings dialog box, click on the arrows in the *Desktop Area* to change the screen resolution.

To change the refresh rate, choose one of the options in *Refresh Frequency*. (You can also change the resolution and refresh rate by choosing *List All Modes* and the desired mode, and then choosing *OK*.) If the refresh rate selected is not supported by the resolution you chose, the resolution will automatically change to the nearest value supported by that refresh rate, or the refresh rate will change to support the resolution.

6. Choose *Test* to verify that the settings work correctly. A test pattern will be displayed on your monitor for about 5 seconds.
7. You will now see the question "Did you see the test bitmap properly?". If you are satisfied with the video display, choose *Yes*.

Choose *OK* to change the settings.

8. You may have to adjust your monitor to align the new resolution to the monitor. This is typically done by using the controls on the front or side of the monitor.

Managing Buffer Swap on PowerStorm 4D40T/50T/51T/60T

In Windows NT Version 4.0, you have greater control over double-buffer synchronization. You can set double-buffer synchronization to one of the following three modes, listed in order of decreasing performance benefits:

- *No double-buffer synchronization*, where no attempt is made to avoid video tearing or flickering. This mode provides the highest level of performance.
- *Flicker-free double-buffer synchronization (the default)*, where a special hardware mode is used to avoid video flickering. Performance for most 3D applications will be better with this mode than with tear-free double-buffering; however, with some applications, you may see some video tearing. This mode yields performance close to that of fast double-buffering mode, but without the video flickering that sometimes occurs with fast mode.
- *Tear-free double-buffer synchronization*, where double-buffer swapping is synchronized with the vertical retrace of the monitor, to generate a flicker-free, tear-free display. This mode provides the best display results but the lowest level of performance.

Tearing and flickering can occur for a combination of reasons:

- Many large triangles are being processed
- A large window is being used
- High resolution and refresh rate values are defined

Most applications do not experience visual tearing, and could take advantage of the higher frame rates and better performance available when flicker-free or fast double-buffering mode is used. Therefore, you should try using one of these two modes.

If unwanted visual effects do occur, however, you should use the tear-free double-buffering mode, choosing the highest vertical refresh rate supported by your monitor at your chosen resolution (refer to “Changing the Screen Resolution and Refresh Rate” on page 3–13).

You can change the double-buffer synchronization mode using one of two methods:

- Using the *PBXGI Video Config* application
- Executing the *pbxgisnc* application in a console window

These methods are described in the following sections.

Using the *PBXGI Video Config* Application

To use the *PBXGI Video Config* application, perform the following steps:

1. From the desktop, choose *My Computer*.
2. From *My Computer*, choose *Control Panel*.
3. From *Control Panel*, choose *Display*.
4. From *Display*, select the *Hardware Settings* tab.
5. On the *Hardware Settings* tab, locate the *Preferences* section. From the *Display Buffer Synchronization* pull-down list, select the desired buffer synchronization type and choose *OK*. The choices are:
 - ◇ *Tear-Free Synchronization*
 - ◇ *Flicker-Free Synchronization*
 - ◇ *No Synchronization*

When you use the *PBXGI Video Config* application to set the double-buffer synchronization mode, this definition remains effective across reboots until changed. To set this mode temporarily, you should use the *pbxgisnc* application, as explained in “Using the *pbxgisnc* Application” on page 3–15.

Note

Although the *PBXGI Video Config* application also enables you to modify screen resolution and refresh rate, you should use the *Display* icon to modify these settings.

Using the *pbxgisnc* Application

To use the *pbxgisnc* application in a console window as follows:

- To disable all double-buffer synchronization, enter the command:
%SystemRoot%\system32\pbxgisnc 0
- To enable flicker-free double-buffer synchronization, enter the command:
%SystemRoot%\system32\pbxgisnc 1
- To enable tear-free double-buffer synchronization on vertical retrace, enter the command:
%SystemRoot%\system32\pbxgisnc 2

Installation and Postinstallation on Other PowerStorm Devices

When you execute *pbxgisnc* to set the double-buffer synchronization mode, this definition is effective only until the next reboot of your system. For the mode setting to be permanent, you should redefine the mode using the *PBXGI Video Config* application.

Using GIQ Compliant Lines on PowerStorm 4D40T/50T/51T/60T

With Graphics Support Services Software Version 4.8 on the PowerStorm 4D40T/50T/51T/60T devices, it is possible to produce lines that are compliant with Microsoft's GIQ line format. Lines drawn to Device Independent Bitmaps (DIB) also use this format.

When mixing lines drawn to DIB with lines drawn directly by the hardware, in certain writing modes (such as XOR), the lines would not contain the same pixels and the operation would not work as expected. Because the PowerStorm 4D40T/50T/51T/60T hardware does not precisely support the GIQ line drawing rules, the GIQ line drawing mode is significantly slower. As most applications do not mix DIB and regular drawing in this fashion, the default mode is **not** to have compliant lines to preserve performance. If you wish to enable GIQ compliant lines, you can do so either through the *PBXGI Video Config* application or through the *pbxgisnc* application in a console window.

Using the *PBXGI Video Config* Application to Set Line Compliance

To set line compliance using the *PBXGI Video Config* application, perform the following steps:

1. From the Desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, choose *Display*.
4. From Display, select the *Hardware Settings* tab.
5. Under the *Preferences* section of the Hardware Settings tab, select the *GIQ Compliant Lines* check box to enable compliant lines, or remove the selection to disable them.

Using the *pbxgisnc* Application to Set Line Compliance

To set line compliance using the *pbxgisnc* application, enter one of the following commands:

- To enable GIQ Compliant lines, enter the following command:
`%SystemRoot%\system32\pbxgisnc L`
- To enable Hardware Drawn lines (that is, disable GIQ Compliant Lines), enter the following command:
`%SystemRoot%\system32\pbxgisnc I`

Note: The parameter at the end of the previous command is lower case letter L, **not** number one (1).

Using Stereo Support on the PowerStorm 4D40T/50T/51T/60T Devices

Stereo viewing of images is now supported with Version 4.8 of the Graphics Support Services Software. Stereo viewing of images requires Stereo Viewing hardware. This consists of a PowerStorm 4D40T/50T/51T/60T graphics adapter and compatible MultiSync monitor, such as the DIGITAL VRC15, VRC17, or VRC21 series monitors. You also will need special stereo emitters and glasses. Both StereoGraphics and NuVision stereo hardware are supported by this implementation.

Note

The stereo connector on the back of the PowerStorm 4DT cards is different from the stereo connector on the back of other Compaq graphics adapters. Contact the manufacturer of your stereo hardware to obtain the proper cables to connect your stereo hardware to your PowerStorm 4DT card. The cable should match the mini-DIN connector on the back of the PowerStorm card.

Two forms of stereo are supported by the Windows NT driver:

- *Interlace stereo.* Interlace stereo works by running the left image in even traces and the right image in odd traces. This effectively yields stereo at half the set vertical refresh rate and with half the vertical resolution of the screen. For example, running in frame interlace mode on a 1280x1024 resolution at 72 Hz yields an effective 1280x512 at 36 Hz for stereo. This is **not** the preferred stereo method but is supplied to allow compatibility with less capable monitors.
- *Frame Sequential (or Frame Sequence) stereo.* This is the **preferred** form of stereo. In this form, the left image is presented on even frame numbers and the left eye in odd frame numbers. Thus at 1280x1024 at 72 Hz, an effective 1280x1024 at 36 Hz is yielded for stereo. (*Note:* Only the PowerStorm 4D60T is capable of this resolution.)

To set up to display stereo (given you have a stereo application), perform the following steps:

1. From the desktop, choose *My Computer*.
2. From My Computer, choose *Control Panel*.
3. From Control Panel, select *Display*.
4. In the Display applet, select the *Hardware Settings* tab (specific to PowerStorm 4D40T/50T/51T/60T drivers).
5. From the *Stereo Mode* pull-down list of the *Screen Display* box, select the mode you desire (*No Stereo*, *Interlace Stereo* or *Frame Sequence Stereo*). You will be informed that the changes made will not take effect until the machine is rebooted.

Caution

When the resolution switches, the driver attempts to maintain the current resolution and frequency. If you are not sure whether your monitor will support that video frequency setting, it is better to perform this change from a known safe video resolution, such as 640x480 at 60 Hz.

6. Reboot the machine.
7. Again choose the display applet (*Control Panel* → *Display*) and choose among the supported stereo resolutions. If this is the first time you have used a stereo mode, you will be asked to set a resolution. After doing so, turn on the stereo emitter, put on the stereo glasses, and run your application.

You should now be able to display stereo. There are **many** ergonomic considerations involved in choosing a frequency for stereo. These include but are not limited to:

- **Frequencies of other monitors WARNING:** With the glasses on and in the range of the emitter, other (nonstereo) screens may often show beat frequencies. This can cause eye strain, headaches and nausea. Do not look at other monitors without removing the stereo glasses or making sure the glasses are not still receiving from the emitter.
- **Frequencies of office lighting WARNING:** Most office environments use fluorescent lighting. These lights flicker at a rate dependent on the frequency of your countries electricity. If the effective stereo rate is less than this fundamental frequency (60 Hz in the U.S.A., 50 Hz in some of Europe), a beat flicker will be detected. This can cause eye strain, headaches and nausea. If at all possible, choose a frequency that results in a stereo frequency that is equal to or greater than your countries AC power frequency. (For example, in the U.S.A., a frequency of 120 Hz in Frame Sequential mode yields an effective frequency of 60 Hz in stereo, which is the same as the AC power frequency in the U.S.A.) If this is not possible, then chose the highest frequency available to you to lower the beat frequency between the lighting and the stereo goggles. If you experience problems, limit or discontinue the use of the stereo equipment.
- **Perceived motion CAUTION:** This is unrelated to the stereo refresh frequency, but is related to the use of stereo. Some individuals find that the use of stereo can lead to physical effects much like motion sickness. This is especially true if the image being viewed is fairly immersive (full screen, high resolution). Having the background lighting low can accentuate this problem. If you experience this problem, try increasing the background lighting, or limit or discontinue the use of the stereo equipment.

Once in a stereo mode (Interlace stereo or Frame Sequence stereo), you may freely change resolutions in that mode as long as no 3D applications are active. If a 3D application is active, you may need to reboot your system if the resolution change requires a change in the pixel depth used to support the mode. For the 4D60T resolutions, up to 1152x900 are supported in 128 pixel mode. This gives supported pixel formats as listed in Table 3–10. For resolutions up to the maximum of 1280x1024, the 4D60T operates in 100 pixel mode. This gives pixel formats as listed for the 4D40T/50T/51T in Table 3–11. For the 4D40T/50T/51T, the 128 pixel mode is used up to the maximum resolution of 800x600, thus pixel formats equivalent to the 4D60T are available, and no reboot would be required for a resolution change. Switching between stereo modes or to the mono mode does require a reboot.

Please note that the PowerStorm 4D40T/50T/51T/60T does not support DEC Stereo, but the more general standard OpenGL stereo. The Glut 3.0 and later Toolkit Stereo requests work properly for using the PowerStorm 4D40T/50T/51T/60T stereo capabilities.

Identifying the Display Driver Version

If you encounter a problem with the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T driver, you can report it to Compaq. When reporting a problem, you must include the version of the driver with your description of the problem.

The procedure in these section applies to the PowerStorm 4D40T/50T/51T/60T driver, but is identical to the procedure for the PowerStorm 3D30/4D20 drivers.

Identifying the Driver Version on Windows NT Version 4.0

To identify the version of the display driver on a Windows NT Version 4.0 system, follow these steps:

1. Select *Start, Programs, and Windows NT Explorer* to view the files currently installed on your machine.
2. To ensure that all files are listed, select *View, Options*, and the *View* tab, and verify that the *Show all Files* box is selected. Choose *OK*.
3. Locate the *pbxgivdd.dll* file in the list.

This file is typically found in the `%SystemRoot%\system32` directory. With the PowerStorm 3D30/4D20 driver, the file is called *tga2.dll*.

4. Click once on the file name to highlight it.
5. From the File Menu, choose *Properties*.
The Properties dialog box is displayed.
6. In the Version Information box, choose *Product Version*.

Installation and Postinstallation on Other PowerStorm Devices

Using OpenGL

This section describes the Compaq OpenGL display driver, which is designed to accelerate OpenGL performance on Alpha systems having the PowerStorm 3D30/4D20 or PowerStorm 4D40T/50T/51T/60T graphics device installed. This section includes the following topics:

- Using OpenGL Applications, for users running applications developed with OpenGL
- Developing OpenGL Applications, for users developing OpenGL applications

For a more comprehensive discussion of the OpenGL interface, refer to the *DIGITAL Using OpenGL* manual, and the Microsoft Windows NT OpenGL documentation included in the Microsoft Windows NT Version 4.0 Software Developer's Kit (SDK).

Using OpenGL Applications

This section discusses the available OpenGL display drivers and explains how to correct window decoration colors.

Loadable OpenGL Display Drivers

In addition to a generic OpenGL display driver, Windows NT OpenGL includes a mechanism by which OpenGL rendering can be performed by vendor-supplied display drivers. Compaq provides such OpenGL display drivers in the Graphics Support Services Software product. These drivers take advantage of hardware features that improve rendering performance and quality, and are used with the Compaq PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T graphics devices.

When an application requests a pixel format, Windows NT OpenGL will satisfy the request with the pixel format that best fits the description. This pixel format can be one of the following:

- A hardware pixel format, supported by the Compaq OpenGL driver
- A software pixel format, supported by the generic Windows NT OpenGL driver

Using OpenGL on PowerStorm 3D30 Devices

When a correctly written OpenGL application uses the PowerStorm 3D30 device, it installs new colors in all 256 entries of the hardware color map. As a result, the colors on the rest of the screen will change, particularly window decoration colors (those colors used for the window border, banner, and so on). This enables the PowerStorm 3D30 device to perform high-quality hardware dithering. In general, when the OpenGL window loses focus, the colors on the rest of the screen are restored.

Installation and Postinstallation on Other PowerStorm Devices

When a correctly written OpenGL application terminates, the system colors are usually restored. There are some abnormal termination conditions, however, in which the program is not given control so that it can restore system colors. In this case, window decoration colors may be incorrect even after the OpenGL application terminates. This is a current limitation of Microsoft Windows NT.

To return to the current window decoration colors:

1. Choose *My Computer*.
2. Choose *Control Panel*.
3. Choose *Display*.
4. In the Display Properties dialog box, choose the *Appearance* tab.
5. In the Appearance dialog box, select *Scheme*, reselect the currently selected color scheme, and choose *OK*.

Developing OpenGL Applications

This section provides information for developing OpenGL applications that optimize the PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T graphics devices.

Pixel Format Support

The PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T drivers and devices, in combination with Windows NT OpenGL, support a fully compliant implementation of OpenGL. Color index mode support is provided by the Windows NT generic OpenGL implementation, and thus is not hardware-accelerated.

On the PowerStorm 3D30 device, the display driver supports the pixel formats listed in Table 3–8.

Installation and Postinstallation on Other PowerStorm Devices

Table 3–8: Supported Pixel Formats on PowerStorm 3D30 Devices

Pixel Format	1	2	3	4
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	No	Yes	No	Yes
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Support GDI	Yes	No	Yes	No
Support OpenGL	Yes	Yes	Yes	Yes
Generic Format	No	No	No	No
Need Palette	Yes	Yes	Yes	Yes
Need System Palette	Yes	Yes	Yes	Yes
Color Bits	8	8	8	8
Red Bits	3	3	3	3
Red Shift	5	5	5	5
Green Bits	3	3	3	3
Green Shift	2	2	2	2
Blue Bits	2	2	2	2
Blue Shift	0	0	0	0
Alpha Bits	0	0	8	8
Accum Bits	64	64	64	64
Depth Bits	24	24	24	24
Stencil Bits	4	4	4	4
Auxiliary Buffers	0	0	0	0

Installation and Postinstallation on Other PowerStorm Devices

On the PowerStorm 4D20 devices, the display driver supports the pixel formats listed in Table 3–9.

Table 3–9: Supported Pixel Formats on PowerStorm 4D20 Devices

Pixel Format	1	2	3	4
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	No	Yes	No	Yes
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Support GDI	No	No	No	No
Support OpenGL	Yes	Yes	Yes	Yes
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	12	12	12	12
Red Bits	4	4	4	4
Red Shift	8	8	8	8
Green Bits	4	4	4	4
Green Shift	4	4	4	4
Blue Bits	4	4	4	4
Blue Shift	0	0	0	0
Alpha Bits	0	0	8	8
Accum Bits	64	64	64	64
Depth Bits	24	24	24	24
Stencil Bits	4	4	4	4
Auxiliary Buffers	0	0	0	0

Installation and Postinstallation on Other PowerStorm Devices

Table 3–9: Supported Pixel Formats on PowerStorm 4D20 Devices (Cont'd)

Pixel Format	5	6	7	8
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	No	Yes	No	Yes
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Support GDI	Yes	No	Yes	No
Support OpenGL	Yes	Yes	Yes	Yes
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	24	24	24	24
Red Bits	8	8	8	8
Red Shift	16	16	16	16
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	0	0	0	0
Alpha Bits	0	0	8	8
Accum Bits	64	64	64	64
Depth Bits	24	24	24	24
Stencil Bits	4	4	4	4
Auxiliary Buffers	0	0	0	0

The PowerStorm 4D40T/50T/51T/60T can operate in one of two modes: either 128 bit per pixel mode or 100 bit per pixel mode. Which mode is used depends on the frame buffer available on the card (16.6 MB for PowerStorm 4D40T/50T/51T or 32 MB for the PowerStorm 4D60T) and on the X and Y resolution requested.

For the PowerStorm 4D40T/50T/51T all (mono) resolutions with a 1280 X (horizontal) dimension are in 100 bit per pixel mode. All other resolutions for the 4D40T/50T/51T are in 128 bit per pixel mode.

For the PowerStorm 4D60T all (mono) resolutions except 1920x1280 are in 128 bit per pixel mode. The 1920x1280 resolution uses 100 bit per pixel mode.

Installation and Postinstallation on Other PowerStorm Devices

At 128 bits per pixel, the display driver supports the pixel formats listed in Table 3–10.

Table 3–10: Supported Pixel Formats on the PowerStorm 4D40T/50T/51T/60T Device at 128 Bits Per Pixel

Pixel Format	1	2	3	4
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	Yes	No	Yes	No
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Swap Layer Buffers	No	No	No	No
Support GDI	Yes	Yes	Yes	Yes
Support OpenGL	Yes	Yes	Yes	Yes
Support Overlays	No	No	No	No
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	32	32	32	32
Red Bits	8	8	8	8
Red Shift	0	0	0	0
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	16	16	16	16
Alpha Bits	0	0	8	8
Alpha Shift	24	24	24	24
Accum Bits	48	48	64	64
Depth Bits	32	32	32	32
Stencil Bits	8	8	8	8
Auxiliary Buffers	0	0	0	0

Installation and Postinstallation on Other PowerStorm Devices

Table 3–10: Supported Pixel Formats on the PowerStorm 4D40T/50T/51T/60T Device at 128 Bits Per Pixel (Cont'd)

Pixel Format	5	6	7	8
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	Yes	No	Yes	No
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Swap Layer Buffers	Yes	No	Yes	No
Support GDI	Yes	Yes	Yes	Yes
Support OpenGL	Yes	Yes	Yes	Yes
Support Overlays	Yes	Yes	Yes	Yes
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	32	32	32	32
Red Bits	8	8	8	8
Red Shift	0	0	0	0
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	16	16	16	16
Alpha Bits	0	0	8	8
Alpha Shift	0	0	24	24
Accum Bits	48	48	64	64
Depth Bits	32	32	32	32
Stencil Bits	8	8	8	8
Auxiliary Buffers	0	0	0	0

Installation and Postinstallation on Other PowerStorm Devices

On the PowerStorm 4D40T/50T/51T/60T devices at 100 bits per pixel, the display driver supports the pixel formats listed in Table 3–11.

Table 3–11: Supported Pixel Formats on PowerStorm 4D40T/50T/51T/60T Devices at 100 Bits Per Pixel

Pixel Format	1	2	3	4
Pixel Type	RGBA	RGBA	RGBA	RGBA
Double Buffered	Yes	No	Yes	No
Stereo	No	No	No	No
Draw to Window	Yes	Yes	Yes	Yes
Draw to Pixmap	No	No	No	No
Swap Layer Buffers	No	No	Yes	No
Support GDI	Yes	Yes	Yes	Yes
Support OpenGL	Yes	Yes	Yes	Yes
Support Overlays	No	No	Yes	Yes
Generic Format	No	No	No	No
Need Palette	No	No	No	No
Need System Palette	No	No	No	No
Color Bits	32	32	32	32
Red Bits	8	8	8	8
Red Shift	0	0	0	0
Green Bits	8	8	8	8
Green Shift	8	8	8	8
Blue Bits	8	8	8	8
Blue Shift	16	16	16	16
Alpha Bits	0	0	0	0
Alpha Shift	0	0	0	0
Accum Bits	48	48	48	48
Depth Bits	24	24	24	24
Stencil Bits	6	6	6	6
Auxiliary Buffers	0	0	0	0

Installation and Postinstallation on Other PowerStorm Devices

Performance Considerations

The PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T devices cannot accelerate all OpenGL operations. If you request an OpenGL operation that is not fully accelerated by the hardware, performance may suffer (depending on the combination of devices used). The PowerStorm 3D30/4D20 cannot accelerate the following OpenGL operations:

- Texture mapping
- Blending operations
- Antialiasing of surfaces and points

Also, applications that send down multiple clip rectangles or draw to partially obscured windows may reduce performance.

On PowerStorm 4D40T/50T/51T/60T devices, all of the operations discussed previously **are** hardware-accelerated except for antialiasing of surfaces and points; however, all these operations may degrade performance.

Alpha Buffers

The PowerStorm 3D30/4D20 and PowerStorm 4D40T/50T/51T/60T devices in 100 bit per pixel mode do not have hardware support for alpha buffering; therefore, rendering must go through a software path. If an alpha buffer has been allocated, the alpha component of each color is computed and written to the alpha buffer, even if you do not request any blending operations. As this is a time-consuming operation, you should only choose a pixel format with an alpha buffer when absolutely necessary.

The PowerStorm 4D40T/50T/51T/60T devices in 100 bit per pixel mode do provide hardware support for alpha buffering, which ensures rendering through a hardware path. When you select a pixel format that includes alpha planes, however, a reduction in performance occurs.

Few programs actually require a pixel format with an alpha buffer. The two operations that depend on the values stored in the alpha buffer are:

- *Storing alpha values so that they can be read later*

The application needs an alpha buffer if it must store alpha values for later retrieval by the **glReadPixels** function with one of the following formats:

- GL_ALPHA
- GL_RGBA
- GL_LUMINANCE_ALPHA

- *Blending, using a destination alpha value*

The application needs an alpha buffer if it calls the **glBlendFunc** function with one of the following values:

- DST_ALPHA
- ONE_MINUS_DST_ALPHA
- ONE_MINUS_DST_COLOR
- SRC_ALPHA_SATURATE

If the pixel format has no alpha buffer, **glReadPixels** returns 1.0 for all alpha values, and OpenGL uses 1.0 for all destination alpha values when computing blending factors.

Buffer Size

On PowerStorm 3D30/4D20 devices, there is a limited amount of video memory available for back buffers and depth (Z) buffers. The amount of video memory available for these purposes depends upon the screen resolution, as well as on how much video memory is used for icons and other types of bitmaps.

To improve performance, the OpenGL display driver attempts to allocate these buffers in video memory. If there is not enough space, then system memory is used and performance is reduced. This is not usually a problem on the PowerStorm 4D20 and PowerStorm 4D40T/50T/51T/60T devices, because of their large video memory capacity.

Programming PowerStorm 3D30 Devices

If you use the PowerStorm 3D30 device for OpenGL in RGB mode, you must pay special attention to the creation and realization of a compatible, logical palette. The logical palette must be defined so that all 256 colors of the PowerStorm 3D30 hardware color map are loaded with a 3x3x2 RGB color cube. The easiest way to do this is by using the *glaux* support library provided in the Microsoft Windows NT SDK and Microsoft Visual C++.

To learn how to use *glaux*, refer to the sample programs in the directory:

%Mstools%\samples\opengl\samples

To obtain the source files for *glaux*, refer to the directory:

%Mstools%\samples\opengl\glaux

Some of the *glaux* policies may not match the requirements of your application. For example, whenever the hardware color map is changed under *glaux*, the OpenGL window may be redrawn when it loses or regains focus. If redrawing the OpenGL window takes a lot of time, you may want to use a different redraw policy.

Installation and Postinstallation on Other PowerStorm Devices

If *glaux* does not satisfy your requirements, Compaq suggests using *glaux* as a model. In particular, if you are using a PowerStorm 3D30 device, you should note the manner in which *glaux* creates a logical palette and the window events that trigger a palette realization. The code for managing the palette is located in *tk.c*, the *glaux* source file. For additional information on these and other operations, refer to the Windows NT online documentation for OpenGL.

Installation and Postinstallation on Matrox Millennium II Devices

The Graphics Support Services Software is a set of graphics display drivers compatible with Microsoft Windows NT. This chapter describes the installation and postinstallation procedures for Matrox Millennium II devices on Windows NT Version 4.0. The drivers supporting Windows NT Version 4.0 provide OpenGL support and enable you to run Millennium II 4MB graphics devices.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Alpha manual
- Graphics Support Services Software for Intel manual
- “Break-the-seal” license
- CD-ROM containing the following software for Alpha support:
 - ◇ **Matrox Millennium II drivers**—2D drivers and 3D drivers (the Compaq accelerated OpenGL support) in the `\alpha\matrox\nt40` directory on your CD-ROM device. (See Table 4-1.)

Installation and Postinstallation on Matrox Millennium II Devices

Table 4–1: Matrox Millennium II Components on the CD–ROM

Component Description	File Name
GDI and OpenGL display driver	<i>amga.dll</i>
Kernel mode miniport driver	<i>amga_mil.sys</i>
Display Applet Property Sheet for Performance Tuning	<i>amga_set.dll</i>
Release notes, which can be read using the <i>Notepad</i> application	<i>readme.txt</i>

System Requirements and Supported and Warranted Configurations

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Pack 3 (SP3) or later version supported on system

Table 4–2 lists the supported systems.

Table 4–2: Supported and Warranted System Configurations

System	Graphics Accelerators Supported
Digital Personal Workstation 433a, Digital Personal Workstation 500a Digital Personal Workstation 600a	Matrox Millennium II

Installation Procedure

The installation of Graphics Support Services Software is divided into two parts; the parts you must execute depend on the type of installation you are performing:

- **If you are installing a new version of, or upgrading, Microsoft Windows NT,** you must perform Parts 1 and 2.
- **If you are upgrading your Graphics Support Services Software display drivers,** you need only perform Part 2.

The two parts of the installation are described in the following sections.

Part 1: New Installation or Upgrade of Windows NT Only

Before installing Graphics Support Services Software during a Windows NT upgrade or new installation, you must have already installed a Matrox Millennium or Matrox Millennium II board. You can then install Windows NT as described in the Windows NT documentation.

Installation and Postinstallation on Matrox Millennium II Devices

During Windows NT installation, a hardware and software component list is displayed, like the one shown here for a Matrox device:

Computer: Digital AlphaStation 200/400

Display: VGA Compatible

Keyboard: XT, AT, or Enhanced Keyboard (83-104 keys)

Keyboard Layout: US

Pointing Device: Mouse Port Mouse

No Changes: The above list matches my computer.

When you have completed the Windows NT installation, **go to Part 2.**

Part 2: Upgrade of Graphics Support Services Software Drivers

Regardless of the display driver you are installing or the type of installation you are performing, you must install the Graphics Support Services Software drivers. In this part, you install the 2D drivers and 3D drivers (the Compaq accelerated OpenGL support) from the CD-ROM provided with this package.

Caution

If you are performing Part 2 **only** and are installing a new board, you must install the board **at the end of this procedure** (in step 17). If you are performing a new installation or upgrade of Windows NT, you must first perform the procedure described in “Part 1: New Installation or Upgrade of Windows NT Only,” page 4-2.

The Graphics Support Services Software drivers are installed as follows:

1. Boot your system and log into Windows NT if you have not already done so.
2. From the desktop, choose *My Computer*.
3. From My Computer, choose *Control Panel*.
4. From Control Panel, choose *Display*.
5. From the Display Properties dialog box, choose the *Settings* tab.
6. From the Settings dialog box, choose the *Display Type* button to see the driver and adapter (board) information.
7. From the Display Type dialog box, choose *Change*.
8. From the Change Display dialog box, choose *Have Disk*.

Installation and Postinstallation on Matrox Millennium II Devices

9. In the Install from Disk dialog box, you are prompted to insert the manufacturer's installation disk into the selected drive. Insert the CD-ROM provided with your Matrox Millennium II board.
10. Enter the path of the CD-ROM directory containing the appropriate display driver, and choose *OK*.

For the Millennium II drivers, the directory path is the following, where *dev:* is the drive name (for example, *E:* for the E drive):

dev:\alpha\matrox\nt40

11. In the Change Display dialog box, the driver whose path you just defined is displayed. Confirm this choice by choosing *OK*.

The driver name displayed for Matrox Millennium II drivers, from *dev:\alpha\matrox\nt40*, is:

Matrox Millennium Video Accelerator

12. When the message displays stating that this is a third party driver, confirm by choosing *Yes*.
13. When the files have been copied to your hard disk, a dialog box indicating that the driver was successfully installed is displayed. Choose *OK* and remove the CD-ROM from the drive.
14. Choose *Close* to close the Display Type dialog box.
15. Choose *Close* to close the Display application.
16. When a message displays stating that you must restart your computer to use the new display driver, choose *Yes*.
17. Shut down your system so that you can install the Matrox Millennium or Matrox Millennium II board. Then reboot your system to access the new display driver.

Changing Display Settings

After your system reboots, a message displays indicating that the default screen resolution and refresh rate are being used. After installing the Millennium II board, you can change these and other display settings from the Display Properties window.

Note

Before changing the display mode, verify that your monitor can handle the new values (see your hardware monitor documentation).

Installation and Postinstallation on Matrox Millennium II Devices

To access the Display Properties window, right-click the Windows desktop background, then click the *Properties* menu item or click on the Display icon in the Control Panel window.

1. Click on the *List all modes* button and select one from the list of valid modes. Then click on *OK*.
2. Click on the *Test* button to verify that the settings work correctly. In the *Testing Mode* box, click on *OK* to view the mode change. A test pattern will be displayed on your monitor for about 5 seconds.. In response to the query, “*Did you see test bitmap properly?*” click on *Yes*. Click on the *Apply* button to confirm the change.

To adjust individual settings, select from the appropriate drop-down menu or adjust the appropriate slide-bar, and then test the mode change as described above.

Identifying the Display Driver Version

When reporting a problem, you need to include the version of the driver along with your description of the problem.

To identify the version of the display driver, follow these steps:

1. Select *Start* → *Programs* → *Windows NT Explorer* to view the files currently installed on your machine.
2. To ensure that all files are listed, select *View* → *Options* → *View* tab, and verify that the Show all Files box is selected. Click on *OK*.
3. Locate the *amga.dll* file in the list. This file is typically found in the *%SystemRoot%\system32* directory.
4. Click once on the file name to highlight it.
5. From the *File* Menu, choose *Properties*.
6. In the Properties dialog box, choose the *Version* tab.
The Version dialog box displays driver information, including the version and date.

OpenGL Acceleration

OpenGL functionality is available with the OpenGL display driver provided on the Microsoft Windows NT CD-ROM. In addition to this generic OpenGL driver, you have access to the accelerated OpenGL driver as a part of the Millennium II driver. OpenGL acceleration is provided using Mini Client Driver (MCD) architecture and is the default OpenGL acceleration upon installation of the Millennium II driver.