Graphics Support Services Software
Version 4.3 for Microsoft Windows NT

Installation and User Guide for Intel
Systems
Part Number: AA–R2KPE–TE

July 1997

This manual explains how to install Graphics Support Services Software Version 4.3 on DIGITAL Intel® systems running the Microsoft® Windows NT™ operating system. This document also discusses how to maximize the performance of OpenGL® applications running on the PowerStorm 4D40T and Millennium II graphics devices.


Operating System and Version: Microsoft Windows NT 3.51 or 4.0 with OpenGL

Software Version: Graphics Support Services Software Version 4.3

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Table of Contents

1 Installation and Postinstallation on PowerStorm 4D30T Devices (Prerelease Software)

Installing on Windows NT Version 4.0 .................................................................................. 1–1
  System Requirements and Supported and Warranted Configurations .................................. 1–2
  Installation Procedure ........................................................................................................... 1–2
    Part 1: New Installation or Upgrade of Windows NT Only ................................................ 1–3
    Part 2: Upgrade of Graphics Support Services Software Drivers ........................................ 1–3
  OpenGL Acceleration ......................................................................................................... 1–5
Hardware Summary .............................................................................................................. 1–5
After Installation .................................................................................................................. 1–6
  Changing the Screen Resolution and Refresh Rate ............................................................... 1–6
  Managing Buffer Swap ......................................................................................................... 1–7
    Using the Display Application ............................................................................................ 1–7
  Identifying the Display Driver Version ................................................................................. 1–8
    Identifying the Driver Version .......................................................................................... 1–8
Using OpenGL ..................................................................................................................... 1–8
  Using OpenGL Applications ............................................................................................... 1–8
Developing OpenGL Applications ......................................................................................... 1–9
    Pixel Format Support ........................................................................................................ 1–9
    Performance Considerations ............................................................................................. 1–11
    Alpha Buffers .................................................................................................................... 1–11

2 Installation and Postinstallation on PowerStorm 4D40T Devices

Installing on Windows NT Version 4.0 .................................................................................. 2–1
  System Requirements and Supported and Warranted Configurations
    (Windows NT 4.0) ............................................................................................................. 2–2
  Installation Procedure (Windows NT 4.0) ........................................................................... 2–3
3 Installation and Postinstallation on Matrox Millennium II Devices

Installing on Windows NT Version 4.0 .................................................................................. 3–1
System Requirements and Supported and Warranted Configurations
(Windows NT 4.0) .................................................................................................................. 3–2
Installation Procedure ......................................................................................................... 3–3
Installation Procedure One ................................................................................................. 3–3
Installation Procedure Two ................................................................................................. 3–4
Changing Display Settings .................................................................................................. 3–5
Monitor Setup ....................................................................................................................... 3–7
Identifying the Display Driver Version ................................................................................ 3–7
Figures

Figure 1–1: PowerStorm 4D30T Device .................................................................................. 1–5
Figure 2–1: PowerStorm 4D40T Device .............................................................................. 2–10
Figure 3–1: MGA NT PowerDisk Setup Screen .................................................................... 3–4

Tables

Table 1–1: PowerStorm 4D30T Components on the CD–ROM (Windows NT 4.0) ............ 1–2
Table 1–2: Supported and Warranted System Configurations ........................................ 1–2
Table 1–3: PowerStorm 4D30T PCI Device ...................................................................... 1–5
Table 1–4: PowerStorm 4D30T Device Features .............................................................. 1–6
Table 1–5: Supported Pixel Formats on PowerStorm 4D30T Device ................................. 1–10
Table 2–1: PowerStorm 4D40T Components on the CD–ROM (Windows NT 4.0) ........ 2–2
Table 2–2: Supported and Warranted System Configurations (Windows NT 4.0) .......... 2–3
Table 2–3: PowerStorm 4D40T Components on the CD–ROM (Windows NT 3.51) ...... 2–6
Table 2–4: Supported and Warranted System Configurations (Windows NT 3.51) ....... 2–7
Table 2–5: PowerStorm 4D40T PCI Device ..................................................................... 2–10
Table 2–6: PowerStorm 4D40T Device Features ............................................................ 2–10
Table 2–7: Supported Pixel Formats on PowerStorm 4D40T Device ............................... 2–16
Table 3–1: Matrox Millennium II Components on the CD–ROM .................................... 3–2
Table 3–2: Supported and Warranted System Configurations (Windows NT 4.0) .......... 3–2
Preface

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

- Install the DIGITAL Graphics Support Services Software Version 4.3
- 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 prereleased versions of the PowerStorm 4D30T device drivers for Windows NT Version 4.0.
- Chapter 2 includes installation and postinstallation information for the PowerStorm 4D40T device drivers for Windows NT Version 4.0 and Version 3.51.
- Chapter 3 includes installation and postinstallation information 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 4D30T Graphics Optios Installation Guide (order number EK–PBXGD–IN)
- DIGITAL PowerStorm 4D40T/50T/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
Installation and Postinstallation on PowerStorm 4D30T Devices (Prerelease Software)

DISCLAIMER

The PowerStorm 4D30T drivers are prereleased software. The most current versions of these drivers can be found at the following web site:

http://www.service.digital.com

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 Intel manual
- “Break-the-seal” license
- CD-ROM containing the following software for Intel support:
  - **PowerStorm 4D30T driver**—2D drivers and 3D drivers (the DIGITAL accelerated OpenGL support) in the \i386\pxgd\nt40 directory on your CD-ROM device. (See Table 1–1.)
Installation and Postinstallation on PowerStorm 4D30T Devices

Table 1–1: PowerStorm 4D30T Components on the CD–ROM (Windows NT 4.0)

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

System Requirements and Supported and Warranted Configurations

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Release 1 (SR1) for Digital Personal Workstation 266i; or latest version supported on system

Microsoft Windows NT Version 4.0, Service Pack 2 (SP2) for Digital Personal Workstation 266i²; or latest version supported on system

Table 1–2 lists the supported systems.

Table 1–2: Supported and Warranted System Configurations

<table>
<thead>
<tr>
<th>System</th>
<th>Graphics Accelerators Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Personal Workstation 266i, Digital Personal Workstation 266i²</td>
<td>PowerStorm 4D30T</td>
</tr>
</tbody>
</table>

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.
Installation and Postinstallation on PowerStorm 4D30T Devices

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 1–3.

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 266i
- **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 DIGITAL optimized 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 4D30T board.

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:\i386\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.

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 1–6.

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 DIGITAL, 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 DIGITAL OpenGL drivers with the PowerStorm 4D30T device, refer to the section "Using OpenGL," page 1–8.

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 1–3 lists information about this graphics device.

Table 1–3: PowerStorm 4D30T PCI Device

<table>
<thead>
<tr>
<th>Designation</th>
<th>Order Number</th>
<th>Texture Memory</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerStorm 4D30T</td>
<td>PBXGD-AA</td>
<td>4 MB</td>
<td>15 MB</td>
</tr>
<tr>
<td></td>
<td>PBXGD-AB</td>
<td>16 MB</td>
<td>15 MB</td>
</tr>
<tr>
<td></td>
<td>PBXGD-GB</td>
<td>16 MB upgrade</td>
<td></td>
</tr>
</tbody>
</table>

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

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

Figure 1–1: PowerStorm 4D30T Device

The callouts in Figure 1–1 are defined in Table 1–4.
Installation and Postinstallation on PowerStorm 4D30T Devices

Table 1–4: PowerStorm 4D30T Device Features

<table>
<thead>
<tr>
<th>Callout</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VGA connector</td>
</tr>
<tr>
<td>2</td>
<td>Stereo connector</td>
</tr>
<tr>
<td>3</td>
<td>4 MB or 16 MB texture memory</td>
</tr>
<tr>
<td>4</td>
<td>VGA enable/disable jumper (jumper installed = disable)</td>
</tr>
</tbody>
</table>

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.
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.
Installation and Postinstallation on PowerStorm 4D30T Devices

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 1–6).

You can change the double-buffer synchronization mode using the display application. This method is described in the following section.

Using the Display Application

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. In the REALimage section, select the check box Minimize Flicker (sync swap with retrace) to synchronize with the vertical refresh, or turn off the check box to disable it.

When you use the REALimage application to set the double-buffer synchronization mode, this definition remains effective across reboots until changed.
Installation and Postinstallation on PowerStorm 4D30T Devices

Identifying the Display Driver Version

If you encounter a problem with the PowerStorm 4D30T driver, you can report it to DIGITAL. 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 Intel 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. DIGITAL 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 DIGITAL 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.

On the PowerStorm 4D30T device, the display driver supports the pixel formats listed in Table 1-5.
### Table 1–5: Supported Pixel Formats on PowerStorm 4D30T Device

<table>
<thead>
<tr>
<th>Pixel Format</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pixel Type</td>
<td>RGBA</td>
<td>RGBA</td>
<td>RGBA</td>
<td>RGBA</td>
</tr>
<tr>
<td>Double Buffered</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Stereo</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Draw to Window</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Draw to Pixmap</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Swap Layer Buffers</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support GDI</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support OpenGL</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Support Overlays</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Generic Format</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Need Palette</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Need System Palette</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Color Bits</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Red Bits</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Red Shift</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Green Bits</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Green Shift</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Blue Bits</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Blue Shift</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alpha Bits</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Alpha Shift</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Accum Bits</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Depth Bits</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Stencil Bits (*)</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Reserved</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Auxiliary Buffers</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* You can only have 4-bit Stencil or 4-bit Overlay
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

The PowerStorm 4D30T device provides 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.
Installation and Postinstallation on PowerStorm 4D40T 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 4D40T devices on Windows NT Versions 4.0 and 3.51. The drivers supporting Windows NT Version 4.0 and Version 3.51 provide OpenGL support and enables you to run the PowerStorm 4D40T graphics device.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Intel manual
- Graphics Support Services Software for Alpha manual
- “Break-the-seal” license
- CD-ROM containing the following software for Intel support:

  - **PowerStorm 4D40T driver**—2D drivers and 3D drivers (the DIGITAL accelerated OpenGL support) in the \i386\pbxg\nt40 directory on your CD-ROM device. (See Table 2–1.)

  - **Shared Desktop Advanced Development Kit**—preliminary software enabling users to share information on their desktops. This kit is available under Windows NT Version 4.0 and Windows 95® (although Microsoft Windows 95 is not supported on DIGITAL systems), in the directory \i386\shared_desk\nt40 or \i386\shared_desk\win95, respectively, on your CD-ROM device. All information about using Shared Desktop can be found in these directories.
Table 2–1: PowerStorm 4D40T Components on the CD–ROM (Windows NT 4.0)

<table>
<thead>
<tr>
<th>Component Description</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDI display driver</td>
<td>glzd32.dll</td>
</tr>
<tr>
<td>Kernel mode miniport driver</td>
<td>glzmpd.sys</td>
</tr>
<tr>
<td>OpenGL driver—client-side file only</td>
<td>glzic.dll</td>
</tr>
<tr>
<td>Video Configuration application</td>
<td>glzdpp.dll</td>
</tr>
<tr>
<td></td>
<td>glz0409.dll</td>
</tr>
<tr>
<td></td>
<td>glz0409.hlp</td>
</tr>
<tr>
<td>Configuration file containing video parameter and attribute definitions</td>
<td>glzmtd.dat</td>
</tr>
<tr>
<td>Heidi device driver</td>
<td>glzihdd.hdi</td>
</tr>
<tr>
<td>Screen saver</td>
<td>estar.scr</td>
</tr>
<tr>
<td>Release Notes, which can be read using the Notepad application in Windows NT. You access this application by selecting the Program Manager icon, the Accessories program icon, and the Notepad icon.</td>
<td>readme.txt</td>
</tr>
</tbody>
</table>

System Requirements and Supported and Warranted Configurations (Windows NT 4.0)

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Release 1 (SR1) for Digital Personal Workstation 180i, 200i, 266i; or latest version supported on system

Microsoft Windows NT Version 4.0, Service Pack 2 (SP2) for Digital Personal Workstation 200i³, 266i³; or latest version supported on system

Table 2–2 lists the supported systems.
Table 2–2: Supported and Warranted System Configurations
(Windows NT 4.0)

<table>
<thead>
<tr>
<th>System</th>
<th>Graphics Accelerators Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Personal Workstation 180i,</td>
<td>PowerStorm 4D40T</td>
</tr>
<tr>
<td>Digital Personal Workstation 200i,</td>
<td></td>
</tr>
<tr>
<td>Digital Personal Workstation 200i²</td>
<td></td>
</tr>
<tr>
<td>Digital Personal Workstation 266i,</td>
<td></td>
</tr>
<tr>
<td>Digital Personal Workstation 266i²</td>
<td></td>
</tr>
</tbody>
</table>

For Shared Desktop, you can use either of the following operating systems:

Microsoft Windows NT Version 4.0, Service Release 1 (SR1) or latest version supported on system; or Microsoft Windows 95

Installation Procedure (Windows NT 4.0)

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 (Windows NT 4.0),” page 2–4.

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

Note

The installation procedure applies to the PowerStorm 4D40T device only. For information on installing the Shared Desktop software, refer to the readme.txt file in the \i386\shared_desk\nt40 or \i386\shared_desk\win95 directory.
Part 1: New Installation or Upgrade of Windows NT Only (Windows NT 4.0)

Before installing Graphics Support Services Software during a Windows NT upgrade or new installation, you must have already installed a PowerStorm 4D40T 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 200i
- 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 (Windows NT 4.0)

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 DIGITAL optimized 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 4D40T board.
10. Enter the path of the PowerStorm 4D40T 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:\i386\pbxg\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:

   Intergraph RealiZm Z13/Z25/V13/V25

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 4D40T 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 2–11.

   The installation is now complete.

OpenGL Acceleration (Windows NT 4.0)

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 DIGITAL, in the glzicd.dll file. This
driver maximizes the performance of applications that are written with OpenGL, and
Installation and Postinstallation on PowerStorm 4D40T Devices

The glzicd.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 DIGITAL OpenGL drivers with the PowerStorm 4D40T device, refer to the section “Using OpenGL,” page 2–15.

Installing on Windows NT Version 3.51

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Intel manual
- Graphics Support Services Software for Alpha manual
- “Break-the-seal” license
- CD-ROM containing the PowerStorm 4D40T drivers for Intel support. This software comprises 2D drivers and 3D drivers (with optimized OpenGL support) in the \i386\pbxg\nt351 directory on your CD-ROM device. (See Table 2–3.)

Table 2–3: PowerStorm 4D40T Components on the CD-ROM (Windows NT 3.51)

<table>
<thead>
<tr>
<th>Component Description</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDI display driver.</td>
<td>glzivdd.dll</td>
</tr>
<tr>
<td>Kernel mode miniport driver.</td>
<td>glzivdd.sys</td>
</tr>
<tr>
<td>Kernel mode DMA device driver.</td>
<td>glzidma.sys</td>
</tr>
<tr>
<td>OpenGL driver—client-side file only.</td>
<td>glziocd.dll</td>
</tr>
<tr>
<td>Video Configuration application.</td>
<td>ingrvca.exe</td>
</tr>
<tr>
<td></td>
<td>ingrvca.cpl</td>
</tr>
<tr>
<td></td>
<td>vca0409.dll</td>
</tr>
<tr>
<td></td>
<td>vca0409.hlp</td>
</tr>
<tr>
<td>Microsoft Visual C Run-time Library Version 2.0, required to use the Video Configuration application.</td>
<td>msvcr20.dll</td>
</tr>
<tr>
<td>Configuration file containing video parameter and attribute definitions.</td>
<td>vidgl.dat</td>
</tr>
<tr>
<td>Screen saver.</td>
<td>estar.scr</td>
</tr>
<tr>
<td>Release Notes, which can be read using the Notepad application in Windows NT. You access this application by selecting the Program Manager icon, the Accessories program icon, and the Notepad icon.</td>
<td>readme.txt</td>
</tr>
</tbody>
</table>
System Requirements and Supported and Warranted Configurations (Windows NT 3.51)

The operating system version required is:

Microsoft Windows NT Version 3.51, Service Pack 4 (SP4) or latest version supported on system

Table 2-4 lists the supported systems.

Table 2-4: Supported and Warranted System Configurations (Windows NT 3.51)

<table>
<thead>
<tr>
<th>System</th>
<th>Graphics Accelerators Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Personal Workstation 180i, Digital Personal Workstation 200i, Digital Personal Workstation 200i²</td>
<td>PowerStorm 4D40T</td>
</tr>
</tbody>
</table>

Installation Procedure on Windows NT Version 3.51

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 driver, 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 18). 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 (Windows NT 3.51),” page 2–7.

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

**Part 1: New Installation or Upgrade of Windows NT Only (Windows NT 3.51)**

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

When you have completed the Windows NT installation, **go to Part 2.**
Part 2: Upgrade of Graphics Support Services Software Driver (Windows NT 3.51)

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

The Graphics Support Services Software driver is installed as follows:

1. Boot your system and log in to Windows NT if you have not already done so.
2. From the desktop, choose Program Manager.
3. From Program Manager, choose Main.
4. From Main, choose Control Panel.
5. From Control Panel, choose Display.
6. From the Display Settings dialog box, choose Change Display Type to see a list of display options.
7. From the Display Type dialog box, choose Change to list the available display drivers.
8. From the Select Device dialog box, choose Other.
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 4D40T board.
10. Enter the path of the PowerStorm 4D40T 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:\i386\pbxg\nt351

11. The Select Device dialog box is displayed. Select the following display driver:

        Intergraph RealiZm Z13/Z25 Graphics Adapter

    If the VGA driver is the default driver, you must also select the Disable current driver check box (if it is not already selected). Then choose Install.

12. A dialog box stating that this operation will change your system configuration is displayed. Choose Yes to proceed.

13. If the desired driver already exists on your system, select New in the Windows NT Setup dialog box to obtain the most recent version of the driver.

14. From the Windows NT Setup dialog box, confirm the path (entered in step 10) for the desired display driver by choosing Continue.

    The Intergraph Video Config box displays.
15. To complete the installation, choose OK. If you wish to enable/disable buffer synchronization, however, you can do so now (refer to “Managing Buffer Swap,” page 2–12 for details) and choose OK.

Although the Intergraph Video Config box also enables you to modify screen resolution and refresh rate, you should use the Display icon to modify these settings once the installation is completed (refer to “Changing the Screen Resolution and Refresh Rate,” page 2–11).

16. When a dialog box indicating that the driver was successfully installed is displayed, choose OK to confirm.

The display driver files are now copied to your hard disk.

17. Remove the CD–ROM from the drive. If you wish to restart your system immediately, select Restart Now.

18. Shut down your system so that you can install the PowerStorm 4D40T board. Then reboot your system to access the new display driver.

The installation is complete.

**OpenGL Acceleration (Windows NT 3.51)**

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, in the *glziocd.dll* file. This driver maximizes the performance of applications that are written with OpenGL, and supports OpenGL Version 1.0 and the OpenGL Utility Library (GLU) Version 1.2.

The *glziocd.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:\winnt35. For more information on using the DIGITAL OpenGL driver with the PowerStorm 4D40T device, refer to the section “Using OpenGL,” page 2–15.
Hardware Summary

The PowerStorm 4D40T graphics board is a PCI local bus device. This board is used with the PowerStorm 4D40T driver to generate high-resolution, two- and three-dimensional color graphics. Table 2–5 lists information about this graphics device.

Table 2–5: PowerStorm 4D40T PCI Device

<table>
<thead>
<tr>
<th>Designation</th>
<th>Order Number</th>
<th>Planes</th>
<th>Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerStorm 4D40T</td>
<td>PBXGI-AA / SN-PBXGI-AA / SN-PBXGI-KA</td>
<td>24</td>
<td>16.6 MB†</td>
</tr>
</tbody>
</table>

† Does not include texture memory

In Windows NT Versions 4.0 and 3.51, the only configuration supported is a singlehead configuration (one PowerStorm 4D40T device).

The PowerStorm 4D40T device is shown in Figure 2–1.

Figure 2–1: PowerStorm 4D40T Device

The callouts in Figure 2–1 are defined in Table 2–6.

Table 2–6: PowerStorm 4D40T Device Features

<table>
<thead>
<tr>
<th>Callout</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Texture memory</td>
</tr>
<tr>
<td>2</td>
<td>Not applicable</td>
</tr>
<tr>
<td>3</td>
<td>Video output connector</td>
</tr>
<tr>
<td>4</td>
<td>VGA enable/disable jumper pins (to enable/disable the use of the VGA chip)</td>
</tr>
<tr>
<td>5</td>
<td>VGA pass-through connector for separate VGA device (black)</td>
</tr>
<tr>
<td>6</td>
<td>Video cable connector to monitor (blue)</td>
</tr>
<tr>
<td>7</td>
<td>Stereo sync output connector</td>
</tr>
</tbody>
</table>
Installation and Postinstallation on PowerStorm 4D40T Devices

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

After Installation

After you have installed the PowerStorm 4D40T 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 4D40T 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 steps as described for your operating system version.

**In Windows NT Version 4.0:**

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 five 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.
Installation and Postinstallation on PowerStorm 4D40T Devices

In Windows NT Version 3.51:

1. From Program Manager, choose Main.
2. From Main, choose Control Panel.
3. From Control Panel, choose Display.
4. From Display, 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.

5. Choose Test to verify that the settings work correctly. A test pattern will be displayed on your monitor for about five seconds.

6. You will now see the question "Did you see the test bitmap properly?". If you are satisfied with the video display, choose Yes.

7. Shut down and reboot your system.

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 3.51 and 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.

Regardless of the Windows NT version, 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 2–11).
You can change the double-buffer synchronization mode using the display application. This method is described in the following section.

**Using the Display Application**

The procedure for using display application depends on your Windows NT version, as illustrated in the following sections.

**In Windows NT Version 4.0:**

1. From the desktop, choose *My Computer.*
2. From My Computer, choose *Control Panel.*
3. From Control Panel, choose *Display.*
4. From Display, select *Settings.*
5. In the Preferences section, select the check box to turn on the *Synchronize Buffer Swap to Vertical Sync* to synchronize with the vertical refresh, or turn off the check box to disable it.

**In Windows NT Version 3.51:**

1. From the desktop, choose *Program Manager.*
2. From Program Manager, choose *Main.*
3. From Main, choose *Control Panel.*
4. From Control Panel, choose Intergraph *Video Config.*
5. From Intergraph Video Config, select *Preferences.*
6. When the Preferences dialog box appears, select the check box to turn on or off the *Synchronized Buffer Swap* mode and choose *OK.*

When you use the Intergraph *Video Config* application to set the double-buffer synchronization mode in either version of Windows NT, this definition remains effective across reboots until changed.

---

**Note**

Although the Intergraph *Video Config* application also enables you to modify screen resolution and refresh rate, you should use the *Display* icon to modify these settings.
Installation and Postinstallation on PowerStorm 4D40T Devices

**Identifying the Display Driver Version**

If you encounter a problem with the PowerStorm 4D40T driver, you can report it to DIGITAL. When reporting a problem, you must include the version of the driver with your description of the problem. The way in which you determine the version depends on the version of Windows NT you are using, as described in the following sections.

**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 *glzdd.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.

**Identifying the Driver Version on Windows NT Version 3.51**

To identify the version of the display driver on a Windows NT Version 3.51 system, follow these steps:

1. From the File Manager, locate the *glzivdd.dll* file.
   
   This file is found in the `%SystemRoot%\system32` directory.
2. Click once on the filename to highlight it.
3. From File Menu, choose *Properties*.
   
   File Manager then displays a dialog box.
4. In the Version Information box at the bottom of the display, choose *Product Version* from the list. The edit control box on the right will display a string containing the driver name, the date, and an optional class stamp.
Using OpenGL

This section describes the PowerStorm 4D40T OpenGL display driver, which is designed to optimize OpenGL performance on the DIGITAL Intel 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 3.51 or 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. DIGITAL 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 DIGITAL PowerStorm 4D40T 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 4D40T 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 4D40T graphics device.

Pixel Format Support

The PowerStorm 4D40T 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.

On the PowerStorm 4D40T device, the display driver supports the pixel formats listed in Table 2–7.
## Table 2–7: Supported Pixel Formats on PowerStorm 4D40T Device

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

## Performance Considerations

The PowerStorm 4D40T 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 4D40T 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.
Installation and Postinstallation on PowerStorm 4D40T Devices

Alpha Buffers

The PowerStorm 4D40T device provides 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.
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 enable you to run the Millennium II 4MB graphics device.

Installing on Windows NT Version 4.0

The Graphics Support Services Software package contains the following:

- Graphics Support Services Software for Intel manual
- Graphics Support Services Software for Alpha manual
- "Break-the-seal" license
- CD-ROM containing the following software for Intel support:
  ◊ Matrox Millennium II drivers—2D drivers and 3D drivers (the DIGITAL accelerated OpenGL support) in the \i386\matrox\ni40 directory on your CD-ROM device. (See Table 3–1.)
Table 3–1: Matrox Millennium II Components on the CD–ROM

<table>
<thead>
<tr>
<th>Component Description</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>GD1 and OpenGL display driver</td>
<td>mga64.dll</td>
</tr>
<tr>
<td>Kernel mode miniport driver</td>
<td>mga64.sys</td>
</tr>
<tr>
<td>Display Applet Property Sheet for Performance Tuning</td>
<td>m_gdesk.dll</td>
</tr>
<tr>
<td>Release Notes, which can be read using the Notepad application</td>
<td>readme.txt</td>
</tr>
</tbody>
</table>

System Requirements and Supported and Warranted Configurations (Windows NT 4.0)

The operating system version required is:

Microsoft Windows NT Version 4.0, Service Release 1 (SR1) for Digital Personal Workstation 180i, 200i, 266i; or latest version supported on system

Microsoft Windows NT Version 4.0, Service Pack 2 (SP2) for Digital Personal Workstation 200i 2, 266i 2; or latest version supported on system

Table 3–2 lists the supported systems.

Table 3–2: Supported and Warranted System Configurations (Windows NT 4.0)

<table>
<thead>
<tr>
<th>System</th>
<th>Graphics Accelerators Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Personal Workstation 180i, Digital Personal Workstation 200i, Digital Personal Workstation 200i 2, Digital Personal Workstation 266i, Digital Personal Workstation 266i 2</td>
<td>Matrox Millennium II</td>
</tr>
</tbody>
</table>
Installation and Postinstallation on Matrox Millennium II Devices

Installation Procedure

You can use either of the two installation procedures that follow to install the 2D drivers and 3D drivers from the CD–ROM provided with this package.

Installation Procedure One

1. Boot your system and log into Windows NT if you have not already done so.

2. Access the Display Properties dialog box in one of the following ways:
   • Right-click the Windows desktop background, then click the Properties menu item.
   • From the desktop, click on My Computer → Control Panel → Display.

3. From the Display Properties dialog box, choose the Settings tab.

4. From the Settings dialog box, click on the Display Type button to see the driver and adapter module information.

5. From the Display Type dialog box, click on the Change button.

6. From the Change Display dialog box, click on the Have Disk button. The CD–ROM drive should appear in the “Copy manufacturer’s files from:” box.

7. 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 Graphics Support Services Software package. Click on the OK button.

8. Select the Millennium II model from the list, and click on OK.

9. When the message stating that this is a third-party driver displays, click on Yes to proceed.

10. 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.

11. Choose Close to close the Display Type dialog box.

12. Choose Close to close the Display application.

13. A message displays stating that you must restart your computer to use the new display driver: choose Yes to shut down and put the changes into effect.

14. 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 Display Settings” later in this chapter.
15. Adjust your software monitor settings. If this is a first-time installation, you are in 640 x 480 display area resolution with 256 colors, which is supported by all VGA, Super VGA, and Multisync monitors. To adjust your software monitor settings for Windows NT Version 4.0, see “Changing Display Settings,” page 3–5.

**Installation Procedure Two**

1. Log into Windows NT if you have not already done so.

2. Insert the CD-ROM provided with the Graphics Support Services Software package into the CD-ROM drive.

3. From the Windows Explorer, select the CD-ROM drive and then the Setup.exe file. The MGA NT PowerDisk Setup screen, shown in Figure 3–1, is displayed.

**Figure 3–1: MGA NT PowerDisk Setup Screen**

Choose the installation type:

- For a standard installation, click *Typical*.
- To choose the specific software you want to install, click *Custom*.

The setup program loads the installation facility. Click on the *Next* button and review the installation messages; then click on the *Finish* button. Remove the CD-ROM from the drive.
4. When the message stating that this is a third-party driver displays, confirm by choosing Yes.

5. When the files have been copied to your hard disk, a dialog box indicating that the driver was successfully installed is displayed. Click on OK.

6. Choose Close to close the Display Type dialog box.

7. Choose Close to close the Display application.

8. A message displays stating that you must restart your computer to use the new display driver; choose Yes to put the changes into effect.

9. 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 the next section, "Changing Display Settings."

10. Adjust your software monitor settings. If this is a first-time installation, you are in 640 x 480 display area resolution with 256 colors, which is supported by all VGA, Super VGA, and Multisync monitors. To adjust your software monitor settings for Windows NT Version 4.0, see the next section, "Changing Display Settings."

**Changing Display Settings**

Display settings can be changed using either the *Settings* tab or the *MGA Settings* tab in the Display Properties window.

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**Note**

Once you click on the *MGA Settings* tab, the *Settings* tab is hidden until you reopen the Display Properties window.

---

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.

**Using the Settings 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. (Or, select No and repeat this step until your display is correctly displayed.) 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 in step 2.

**Using the MGA Settings Window:**
Click on the *MGA Settings* tab in the Display Properties window to access the following features:

1. Desktop mode—Select the desired icon to set up a proportional, horizontal, or vertical virtual desktop.
2. Display area—Use the slide bar to adjust the area dimensions.
3. Color palette, font size, and display scheme—Use the drop-down menus to adjust these property settings.
4. Advanced Settings—Click on the *Advanced* button to access the following features:
   - The Information property window to display MGA PowerDesk and display driver software version numbers and hardware graphics module summary information.
   - The Performance property window with settings for advanced driver performance settings:
     - 3D buffering
     - Texture mapping
     - Device bitmaps caching
     - Real-time pointer shape update
     - Automatic PCI bus retries
     - Write-Combining on Pentium Pro
     - Filtering when scaling
   - The MGA PowerDesk property window with settings for:
     - PixelTOUCH to zoom in and pan on your view area
     - CenterWINDOW to center open windows in your view area
     - MaxVIEW to maximize windows in your view area instead of your desktop
     - CenterPOPUP to have new windows pop up in the center of your current view area
Monitor Setup

To check your monitor settings, perform the following step:

1. Right-click the Windows desktop background, then click the Properties menu item → MGA Monitor tab.

   If you have a Plug-and-Play monitor, make sure the Plug-and-play (DDC) option button is selected. If so, the MGA display driver automatically uses the correct settings for your monitor. If not, click this option button, then click Apply.

   If you do not have a Play-and-Play monitor, select the MGA Monitor option button. Select the name of your monitor manufacturer from the list. Select your monitor model from the list.

   ---------------------------------------- Caution ----------------------------------------

   If incorrect software monitor settings are applied, some monitors can be permanently damaged. For more information, see your monitor manual.

----------------------------------------

Identifying the Display Driver Version

When reporting a problem with the drivers, you need to include the version number of the driver along with your description of the problem. To identify the version of the display driver, access the Information tab in the Advanced Display Properties window.