# HP VISUALIZE fx5 and fx10 Configuration Guide

**for Windows NT and Windows 2000**

# Notice

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# Contents

# Contents

# Preface

This guide describes how to configure your HP Visualize fx5 and fx10 Graphics Cards on Windows NT and Windows 2000 systems.

## Additional Information and Help

For more information on your graphics card and the accessories available with this product, you can visit the following pages on HP's web site:

- HP Visualize Personal Workstation product specifications:

  http://www.hp.com/go/visualize

- HP Visualize Personal Workstation and HP Visualize fx graphics card white papers:

  http://www.hp.com/go/visualize/support/library/literature.html

- Latest drivers, FAQs, and support information:

  http://www.hp.com/go/visualizesupport

## Electrostatic Discharge (ESD) Precautions

Electrostatic charges can damage the integrated circuits on printed circuit boards. To prevent such damage from occurring, observe the following precautions during board unpacking and installation:

- Stand on a static-free mat.

- Wear a static strap to ensure that any accumulated electrostatic charge is discharged from your body to ground.

- Create a common ground for the equipment you are working on by connecting the static-free mat, static strap, routing nodes, and peripheral units to that piece of equipment.

- Keep uninstalled printed circuit boards in their protective antistatic bags.

- Handle printed circuit boards by their edges, once you have removed them from their protective antistatic bags.

# Important Safety Information

**WARNING**

If you have any doubt that you can lift the HP Visualize Personal Workstation or display safely, do not try to move it without help.

For your safety, always connect the equipment to a grounded wall outlet. Always use a power cord with a properly grounded plug, such as the one provided with this equipment, or one in compliance with you national regulations. This HP Visualize Personal Workstation is disconnected from the power by removing the power cord from the power outlet. This means the Personal Workstation must be located close to a power outlet that is easily accessible.

For your safety, never remove the HP Visualize Personal Workstation's cover without first removing the power cord from the power outlet, and any connection to the telecommunications network. Always replace the cover on the Personal Workstation before switching it on.

To avoid electric shocks, do not open the power supply. There are no user-serviceable parts inside.

This HP Visualize Personal Workstation is a class 1 laser product. Do not attempt to make any adjustment to the laser units.

Before handling any HP Visualize fx Graphics Card, first wait until the board has cooled down completely. The graphics card can become very hot during use.

## Installation Notice

Products designated in the applicable Hewlett-Packard price list as customer-installable can be installed by computer-knowledgeable customers who carefully read and follow the instructions provided. Customers who elect to have the product installed by our field personnel are charged the applicable field installation charge, as covered under the standard terms and conditions. For more information, please contact your local sales representative.

## Revision History

The revision history for each edition of the manual is listed below:

| Edition. | Revision History |
| --- | --- |
| E0300. | First Printing |
| E0600. | Second Printing |

# 1 HP Visualize fx5 and fx10 Graphics Cards

This chapter contains information on how to configure, update and troubleshoot your HP Visualize fx$^5$ and fx$^{10}$ Graphics Cards.

# Overview

The HP Visualize fx$^5$ and fx$^{10}$ Graphics Cards are high-end OpenGL graphics cards that feature the latest high-performance 3D graphics technology. These OpenGL graphics cards accelerate your 3D graphics design and visualization and improve the quality of your graphics.

The HP Visualize fx graphics subsystem occupies the Advanced Graphics Port (AGP) slot in your Personal Workstation. It brings you:

- A world-class geometry engine, using dedicated floating-point processors based on PA-RISC technology. The fx$^5$ contains 3 full geometry pipelines; the fx$^{10}$ contains 6.
- 64MB SDRAM integrated frame buffer and texture memory.
- Full OpenGL 1.1 hardware features and extensions support.
- Hardware accelerated texture mapping.
- Hardware visibility testing (occlusion culling) and visibility statistics.
- Full screen anti-aliasing and hardware accumulation.
- Stereo vision support.
- Accelerated DirectDraw and Direct3D support.
- Video Overlay support.
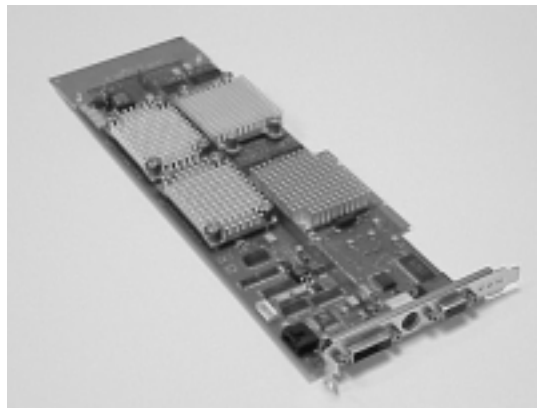
# The HP Visualize fx$^5$ and fx$^{10}$ Driver

A driver for the HP Visualize fx$^5$ and fx$^{10}$ Graphics Cards is preloaded on your Personal Workstation.

Should you need to reinstall or update the driver, the latest version is provided on the HP web site:

```
http://www.hp.com/go/visualizesupport
```

For more information refer to the next section "Updating the HP Visualize fx$^5$ and fx$^{10}$ Driver."

If you cannot access the Internet, you can find a backup copy of the HP Visualize fx$^5$ and fx$^{10}$ driver on the HP CD-ROM provided with your Personal Workstation. The version number of this driver may be different from the one preloaded on your Personal Workstation. However, HP recommends that you obtain the latest version from the web site, if possible.

# Updating the HP Visualize fx$^5$ and fx$^{10}$ Driver

HP updates the HP Visualize fx$^5$ and fx$^{10}$ driver as needed to incorporate feature and performance enhancements, or to fix problems found when running specific applications.

You can download the latest version of the HP Visualize fx$^5$ and fx$^{10}$ driver from HP's web site:

  `http://www.hp.com/go/visualizesupport`

After accessing the HP Visualize Support web site, select the HP Visualize P-Class or X-Class, and then go to the Drivers section.

**NOTE**    A README file is supplied with the driver. Please read it carefully as it provides instructions to install the driver. Moreover, the information contained in the README file supersedes any information contained in this manual.

To update the driver, follow these instructions:

1. Download the driver from HP's web site to a temporary folder on your hard disk. For example, `C:\TEMP\fxDRV\`

2. Run the executable file to decompress the contained files. You can do this by double-clicking on the file.

3. Follow the instructions provided in the README file that comes with the driver.

# Configuring the HP Visualize fx$^5$ and fx$^{10}$ Driver

You can configure the HP Visualize fx$^5$ and fx$^{10}$ driver using the Display Properties dialog box.

To display the Display Properties dialog box, click Start, point to Settings and click Control Panel. In the Control Panel, double-click on Display. On Windows 2000 systems, there are two extra steps: click on Settings and then click Advanced.

When the HP Visualize fx$^5$ and fx$^{10}$ driver is installed, the Display Properties dialog box contains five extra panels:

**About**

**Options**

**Administrator**

**Gamma Correction**

**Customize Video Formats**

Click "?" at the top of the dialog box for help and click the item on which you want more information.

To close the pop-up window, click inside it.

# The [hp] About Panel

The About panel (below) displays useful information, including the version of the driver, OpenGL version and extensions, and the amount of frame buffer memory and available texture memory.
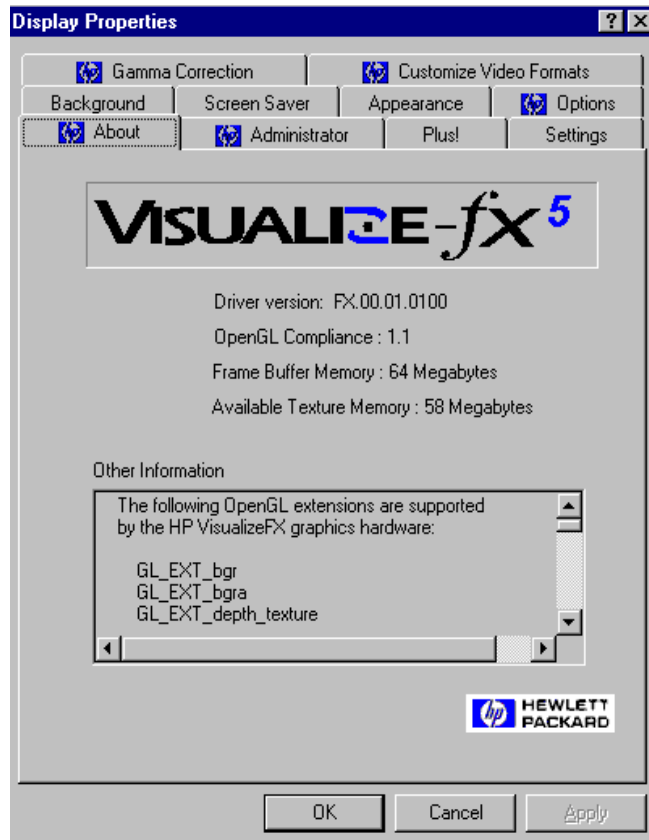
# The [hp] Options Panel

**Driver Basic Configuration**
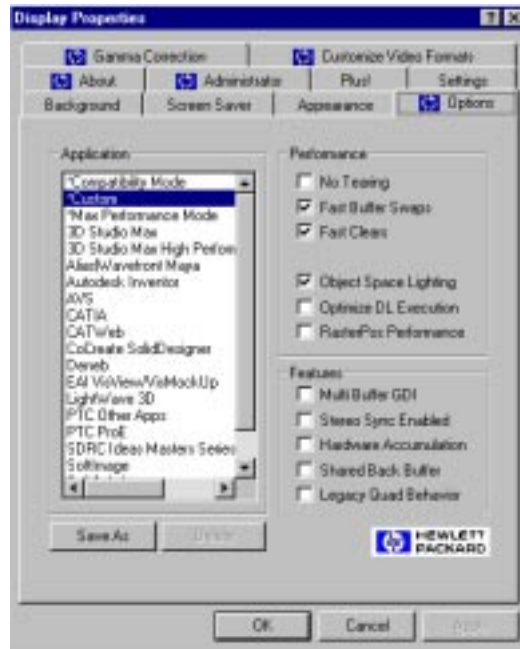


Configure the driver for the application you are using by selecting the application name in the Application group box (see above).

If your application is not listed, select **Compatibility Mode**.

You do not need to change any of the options in the Settings group box. When you select an application, options in the Settings group box are automatically configured for the selected application.

**Driver Advanced Configurations**

**Application Box**

**Table 1-1**

| Option | Description |
|---|---|
| Compatibility Mode* | The Compatibility Mode setting provides maximum compatibility for those applications that mix OpenGL and Windows GDI rendering in double-buffered windows, contrary to Microsoft specifications. If your application is not listed, choose this option. |
| Max Performance Mode* | The Max Performance Mode setting will provide the maximum graphics throughput. However, some applications may exhibit visual anomalies. |
| Custom* | The Custom setting becomes active when the user manually modifies one or more settings. For more information refer to "Creating Custom Driver Configurations" in a subsequent section. |
| Application Name | Select the application software you are using (for example, SoftImage, Solidworks). |

**NOTE**      Asterisked options above, cannot be deleted by anyone, including the system administrator.

**Performance Box**

**Table 1-2**

| Option | Description |
|---|---|
| No Tearing | No Tearing prevents the tearing effect seen when rendering in the middle of a vertical refresh. When this option is enabled, performance may be reduced because rendering waits for a vertical refresh to finish. This is especially true for large windows. |

**Table 1-2**

| Option | Description |
|---|---|
| Fast Buffer Swaps[a] | Fast Buffer Swaps take advantage of HP's multi-buffer hardware. The hardware has a physical front and back buffer that can be swapped very quickly. For compatibility with some applications, this option can be turned off, and the back buffer copied to the front buffer instead. |
| Fast Clears[a] | When enabled, this option speeds up OpenGL glClear() performance, whenever possible, under the following conditions:<br><br>• 24-bit RGB color mode (no destination alpha planes)<br><br>• Fast Buffer Swaps are enabled (SWAP_EXCHANGE)<br><br>• Stereo is disabled<br><br>• GL_SCISSOR_TEST is disabled |
| Object Space Lighting | By default, lighting is done in Object Coordinate (OC) space, when possible. In general, OC lighting gives the best overall performance. OC Lighting performs best when there are many (8 or more) vertices between changes to light definitions or to the modelview matrix. If your application frequently changes the modelview matrix or light definitions (using glLight()) OR frequently turns fogging or spherical-texture-coordinate generation on/off, it may be better to disable OC Lighting. When this option is disabled, lighting is done in Eye Coordinate (EC) space. Both lighting modes should have the same visual appearance. The difference is performance. |
| Optimize DL Execution | When checked, this enables faster performance of OpenGL geometry display list execution at the expense of reduced display list creation performance. |

**Table 1-2**

| Option | Description |
|---|---|
| RasterPos Performance | When checked, this enables much faster performance of glRasterPos*() and glPushAttrib() at the expense of immediate mode glColor*(), glNormal*() and glTexCoord*() performance. |

a. Windows 2000 only: When using the default Windows 2000 cursor, these options may cause problems between the cursor and OpenGL applications. If you wish to use these options, click Start, point to Settings and click Control Panel. In the Control Panel, double-click Mouse, click on the Pointers tab and disable Enable Pointer Shadow.

**Features Box**

**Table 1-3**

| Option | Description |
|---|---|
| Multi Buffer GDI | This option causes GDI (NT Graphics Device Interface) to draw to both the physical front and back buffers. This is useful for applications which use GDI to draw in an OpenGL window and the Fast Buffer Swaps option is enabled. This option must be disabled for 2D benchmarking purposes. |
| Stereo Sync Enabled | When this option is set, stereo timing is enabled on the video output port and stereo pixel formats are made available to applications. Note that stereo timing is only supported in True Color screen formats less than 1600×1200 in resolution. Additionally, the stereo effect is greatly enhanced at higher refresh rates, for example, 120 Hz. Finally, note that the stereo effect will only be visible when using appropriate stereographic glasses or headsets. |

**Table 1**-3

| Option | Description |
|---|---|
| Hardware Accumulation | This option enables a special hardware accelerated implementation of the accumulation buffer. It speeds up advanced features such as scene anti-aliasing and motion blur. There are some differences with hardware accumulation compared to the standard implementation of the accumulation buffer: <br><br> • Only 8 bits of resolution are provided per color component. <br><br> • The accumulation buffer contains only unsigned values. <br><br> • Accumulation results are automatically returned to the color buffer(s) with each GL_ACCUM operation. This has the implication that GL_RETURN is ignored. <br><br> • GL_ADD is ignored. <br><br> If these differences can be tolerated, the result should be much improved performance when using the accumulation buffer. |
| Shared Back Buffer | Enabling this feature sets OpenGL rendering to be clipped only to the window boundaries, ignoring any obscuring windows. This option should normally not be set, since it can cause unexpected interactions between OpenGL applications. It should only be set to improve the usage of the no Redraw on Window Expose option in 3D Studio MAX and Autocad 2000. |

**Table 1**-3

| Option | Description |
|--------|-------------|
| Legacy Quad Behavior | This option controls how the OpenGL driver handles concave and self-intersecting quadrilaterals. This option is OFF by default. All quads are broken down into triangles by simply splitting them between vertices 0 and 2. This is similar to the behavior of most graphics cards and is consistent with the OpenGL restriction that all polygons be convex. For compatibility with previous HP Visualize fx graphics cards, this option can be turned ON. This will enable extra logic to decompose concave and self-intersecting quads into the correct triangles. Note that even with this option enabled, non-planar quads are not guaranteed to be rendered correctly. |

## Creating Custom Driver Configurations

The Options panel allows you to create customized driver configurations for the HP Visualize fx graphics card. These configurations appear in the Application group box.

To create a customized profile:

1. Set the desired options in the Settings group box. This will select the **Custom** setting in the Application group box.

2. Click the **Save As** button to save the current configuration. You are prompted for a profile name.

3. Type a configuration name in the Save Configuration dialog box. This name will appear in the Application group box.

**Save As Button**

Allows you to save the current Custom configuration as a named user-specific configuration.

**Delete Button**

Allows you to delete a custom configuration.

## The [hp] Administration Panel

The Administration panel is only available if the user has system administrator privileges. From this panel, the system administrator can enable the user to access the Gamma Correction and Options panels and allow the user to change and save the HP Visualize fx Custom configuration.

## The [hp] Gamma Correction Panel

Gamma correction is used to correct non-linearity in the phosphor brightness of monitors. It can be used to improve the appearance of anti-aliased lines, shaded graphic images, or scanned photographic images that have not already been gamma corrected.

## The Settings Panel

Use the Settings panel to change the screen resolution, number of colors and refresh rate. Click List All Modes to view all combinations of colors, desktop area, and refresh frequency currently configured for the HP Visualize fx graphics card. If you select a mode, click Test to see if your choice is compatible with your monitor. On Windows 2000, you can use the Settings panel to change the screen resolution and number of colors. To change the refresh rate, click Advanced and then click on the Monitor tab. To find the List All Modes button, click Advanced from the Settings panel and then click on the Adapter tab.

You can display screen resolutions up to 1920×1200 in True Color, double-buffered mode.

# The ![hp] Customize Video Formats Panel

The Customize Video Formats tab allows you to manipulate the list of video formats reported to the system. You can create new formats, change the list of installed formats and even fine-tune predefined formats.



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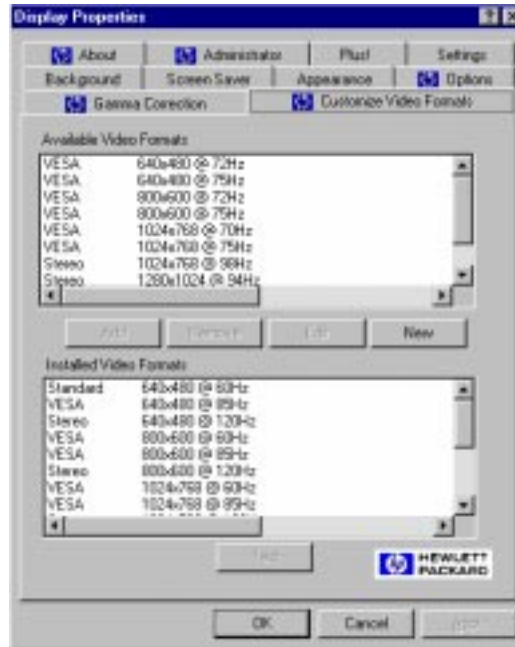
**NOTE**   The format names displayed in the left column are used to help identify the source of the timing information. "VESA" is a standard timing from the Video Electronic Standards Association. "Stereo" is a timing intended for use with stereo display. "Standard" is a PC standard video timing. "OEM" indicates non-standard timing defined by a display vendor.

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### Installed Video Formats

This window contains the list of the video formats that are currently "installed" on the system. These are the resolutions and refresh rates that are listed when pressing the **List All Models** button on the Settings

panel under **Display Properties**[1]. All video formats are available for True Color mode (32 bits per pixel) and 65536 color mode (16 bits per pixel).

When a format is selected in this panel, the **Test, Remove** and **Edit** buttons will be active. **Test** will temporarily switch the current video format to the selected video format. It is important to verify that a video format will work on your display device before selecting it as the video format in the Settings panel. The **Test** will automatically return to the current video format after a 15 second time-out.

The **Remove** button will remove the selected video format from the installed list and put it on the available list. This is necessary if you want to create a new video format with the same resolution and refresh rate as one of the predefined video formats but you need to modify the video timing parameters. You may also want to remove unused format to prevent them from being selected in the Settings panel.

The **Edit** button allows you to modify the selected video format. You can only change the dot-clock for predefined video formats, but you can modify any of the timing parameters for custom video formats.

**Available Video Formats**

This panel presents all the defined, but not installed, video formats available. For example, if you need to use the 70Hz 1024x768 format, first select it and then press the **Add** button. This transfers the format from the available list to the installed list. You can now test this format to verify that it works on your display. The format will now be available in the Settings panel.

You cannot remove any of the predefined video formats from the Available Video Formats list, but you can remove any of your own custom video formats.

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1. On Windows 2000: click on Advanced from the Settings panel and then click on the Adapter tab to find the List All Modes button.

**New Video Format**



Pressing the **New** button will bring up the New Video Format dialog. This will allow advanced users to create their own custom video timing. This functionality is intended for those who have new or unique display devices or video timing needs.

VESA has defined what is called the "General Timing Formula (GTF)." This formula takes three inputs: the width and height of the display and one of vertical refresh, horizontal refresh or pixel clock. From this information, the basic video timing information is generated. A device that supports the GTF should be able to display this format as long as it is within the device's capabilities. If not, the GTF gives a good starting point to further customize the timing information.

**NOTE**                          The dialog box will not allow a video format that
                                  exceeds the display capabilities of the graphics card.



Selecting the Custom mode and pressing the **Customize** button will bring
up the above dialog. This dialog allows you to exactly specify all the
necessary attributes of the video timing. The expected use of this dialog
is to enable you to take the video timing information provided by the
display vendor and use that information to generate a custom video
format. This gives immediate access to the various formats of the display
device.

# Stereo Vision

The stereo modes cause the display to alternate between the left and right images in successive refresh cycles (thus a 120 Hz refresh rate will display 60 left images and 60 right images per second). Stereo modes can be enabled in the Stereo Sync Enabled check box in the Options panel of Windows NT Display Properties. In addition, you must set the screen resolution and refresh rate to a stereo compatible format. In the Customize Video Formats panel, you can find a list of screen resolution/refresh rate combinations that are compatible for stereo display.

To view the stereo image, a suitable device is required. This must have a VESA 1.0P compatible Stereo connector. This device is usually a pair of liquid crystal glasses. The lenses alternate between left-lens transparent/right-lens opaque and left-lens opaque/right-lens transparent, at the same rate as the screen refresh rate, so that each image is only seen by the appropriate eye. The result is realistic depth perception.

# Troubleshooting

This section describes how to troubleshoot problems that may arise with your graphics subsystem. It also provides some tips on how to improve the graphics performance.

## Troubleshooting Video Problems

**PROBLEM: At boot time, the screen is blank and there are no error messages.**

**Table 1-4**

| Solution | Explanation |
|---|---|
| Check that the computer and display are turned on. (The power light should be illuminated.) | Useful routine checks, especially if you have just moved the computer. |
| Check the display's contrast and brightness settings. | |
| Make sure that all cables and power cords are plugged in. | |
| Make sure the power outlet is working. | |
| If possible, try another monitor and set of cables. | |
| Check the LCD screen of your Personal Workstation. If the LCD screen reports 'Error-No Video,' remove the HP Visualize fx graphics card, and re-insert it. Ensure that the graphics card is properly inserted in the AGP slot. | The card may not have been seated fully across the length of the AGP slot. |

**Table 1-4**

| Solution | Explanation |
|---|---|
| If the LCD screen does not report any error, try another graphics card, if available. Even if it is not an HP Visualize fx graphics card, the boot sequence should be displayed using the VGA standard driver. | If the boot sequence is displayed correctly using a replacement graphics card, your HP Visualize fx graphics card may be faulty. |

**PROBLEM: The computer boots in VGA, but the screen goes blank or is corrupted when switching to high-resolution mode.**

**Table 1-5**

| Solution | Explanation |
|---|---|
| Check that your monitor supports the HP Visualize fx graphics card resolution and refresh rate selected. If the monitor does not support the selected resolution, boot in VGA and then change your settings. | This problem may occur if you have just changed your monitor. |
| Run the diagnostics tool. | For more information on the diagnostics tool, see the section "Diagnostics Tool." |
| Check that you are using the correct video driver. The video driver version is displayed in the About panel. | You may have updated the HP Visualize fx driver with the wrong version. See the section "Updating The HP Visualize fx Driver." |

**PROBLEM: The computer boots correctly in VGA and Hi-resolution mode, but visual anomalies are observed using applications.**

**Table 1-6**

| Solution | Explanation |
|---|---|
| The driver may not be optimized for the application used. Open Display Properties, select the Options panel, and select the appropriate application. For more information, see the section "Driver Basic Configuration." | When an application setting is selected in the Options Panel, the driver settings are automatically configured for optimum performance and visual comfort for that application. |
| Check the HP web site for an updated driver version for your application.<br><br>http://www.hp.com/go/visualizesupport | HP frequently updates the HP Visualize fx driver to incorporate feature and performance enhancements, or to fix problems found when running specific applications. |

## Diagnostics Tool

Your preloaded software includes a diagnostics tool to test your HP Visualize fx graphics card. This tool is also available on the HP CD-ROM provided with your Personal Workstation and on the HP web site:

```
http://www.hp.com/go/visualizesupport
```

The diagnostics tests include an in-depth check of the graphics ASICS and frame buffer.

To run the diagnostics tool:

1. Click the Start button.

2. Point to Programs.

3.  Point to HP Diagnostics.

4.  Click on HP Visualize fx Diagnostics

## Troubleshooting Performance Problems

**PROBLEM:
Graphics
performance is
below
expectations**

**Table 1-7**

| Solution | Explanation |
|---|---|
| Check the HP web site for an updated driver version for your application.<br><br>http://www.hp.com/go/visualizesupport | HP frequently updates the HP Visualize fx driver to incorporate feature and performance enhancements, or to fix problems found when running specific applications. |
| The driver may not be optimized for the application used. Open Display Properties, select Options panel, and select the appropriate application. | When an application is selected, the driver settings are automatically configured for optimum performance and visual comfort for that application. |

# A    Regulatory Information

# Declaration of Conformity

according to ISO/IEC Guide 22 and EN 45014

**Manufacturer:**                     **Hewlett-Packard Co,**
**3404 E. Harmony Rd.**
**Fort Collins, CO 80528**
**U.S.A**

**Declares that the:**

| | |
|---|---|
| **Product Number:** | graphics cards |
| **Model Number:** | A1264A / A1265A / A1298A |
| **Product Options:** | all |

**Conforms to the following specifications:**

| | |
|---|---|
| **Safety:** | IEC 950:1991+A1+A2+A3 +A4 / EN 60950:1992+A1+A2+A3+A4 |
| | China GB4943-1995 |
| | Russia GOST R 50377-92 |
| **EMC:** | CISPR 11: 1997 / EN 55011: 1998 Class B |
| | CISPR 22: 1993+A1+A2 / EN 55022: 1994+A1+A2 Class B |
| | EN 50082-1:1992 |
| | **Also compliant with…** |
| | IEC 1000-3-2:1994 / EN 61000-3-2:1998 |
| | IEC 1000-4-2:1995+A1 / EN 61000-4-2:1999 - 4 kV CD, 8 kV AD |
| | IEC 1000-4-3:1995 / EN 61000-4-3:1996 - 10 V/m |
| | IEC 1000-4-4:1995 / EN 61000-4-4:1995 - 2 kV Signal, 4 kV Power Lines |
| | Australia/New Zealand AS/NZS 2064.1/2:1992, AS/NZS 3548:1995, and AS/NZS 4251.1:1994 |
| | China GB9254-1988 |
| | Japan VCCI Class B |
| | Russia GOST R 29216-94 |
| | Taiwan CNS13438 Class A |
| | US FCC Part 15, Class B |

**and is certified by:**

UL Listed to UL1950, 2nd edition
cUL Listed to CSA 22.2 No.950-M93
TÛV Certified to EN60950 2nd edition with A1+A2+A3+A4+A11
HP Fort Collins CCQD HTC

**Supplementary information:**

The product herewith complies with the requirements of the following Directives and carries the CE marking accordingly:
- the EMC directive 89/336/EEC, 92/31/EEC and 93/68/EEC
- the Low Voltage Directive 73/23/EEC and 93/68/EEC
This product was tested in a typical Hewlett Packard workstation configuration.
Fort Collins, CO, USA

For Compliance Information ONLY, contact:
European Contact: Your local Hewlett-Packard Sales and Service Office or Hewlett-Packard GmbH, Department HQ-TRE Standards Europe, Herrenberger Straße 130, D-71034 Böblingen (FAX: +49-7031-14-3143)

Americas Contact: Hewlett-Packard, Fort Collins Site Quality Manager, mail stop 64, 3404 E. Harmony Rd., Ft. Collins, CO 80528, USA

# FCC Class B Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules and the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.  If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

1. Reorient or relocate the receiving antenna.

2. Increase the separation between the equipment and receiver.

3. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

4. Consult the dealer or an experienced radio/TV technician for help.

Hewlett-Packard's FCC Compliance Tests were conducted with HP-supported peripheral devices and HP shielded cables, such as those you received with your system.  Changes or modifications not expressly approved by Hewlett-Packard could void the user's authority to operate the equipment.

Operation of this device is subject to the following conditions:

1. This device may not cause harmful interference.

2. This device must accept interference received, including interference that may cause undesired operation

Cables used with this device must be properly shielded to comply with the requirement of the FCC.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

## Notice for Canada

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la Class B est conforme à la norme NMB-003 du Canada.

## Notice for Taiwan

警告使用者：
這是甲類的資訊產品，在居住的
環境中使用時，可能會造成射頻
干擾，在這種情況下，使用者會
被要求採取某些適當的對策。

## Notice for Korea

사용시 안내문 (A급 기기)

이 기기는 업무용으로 전자파장해검정를 받은
기기이오니,만약 잘못 구입하셨을 때에는 구입
한 곳에서 비입무용으로 교환하시기 비랍니다.

## Notice for Japan (Class B)

は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）
ラスＢ情報技術装置です。この装置は、家庭環境で使用す
ていますが、この装置がラジオやテレビジョン受信機に近
と受信障害を引き起こすことがあります。
説明書に従って正しい取り扱いをして下さい。

# Hardware Warranty

This HP accessory is covered by a limited hardware warranty for a period of one year from the date of purchase by the original end-user. The type of service provided is return to an HP or repair-authorized reseller service-center.

At Hewlett-Packard's discretion, a defective accessory will be repaired or replaced by a new unit, either of the same type or of an equivalent model.

If this accessory is purchased and used together with an HP Visualize Personal Workstation, it will be covered by the warranty of this computer or workstation, under the same conditions of service and duration.

Please refer to the warranty statement provided with your HP Visualize Personal Workstation for warranty limitations, customer responsibilities, and other terms and conditions.

FOR CONSUMER TRANSACTIONS IN AUSTRALIA AND NEW ZEALAND: THE WARRANTY TERMS CONTAINED IN THIS STATEMENT, EXCEPT TO THE EXTENT LAWFULLY PERMITTED, DO NOT EXCLUDE, RESTRICT OR MODIFY AND ARE IN ADDITION TO THE MANDATORY STATUTORY RIGHTS APPLICABLE TO THE SALE OF THIS PRODUCT TO YOU.

Regulatory Information
**Hardware Warranty**