

***fx* Graphics Card Installation and Configuration Guide**

**HP VISUALIZE *fxe*, *fx*⁵ and *fx*¹⁰ Graphics
Family**



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Contents

1. Introduction

Related Documents	9
Prerequisites	11
Making Software and Device-Specific Changes	14
System Configuration	14
Special Considerations	14
Higher Resolution 3D on fxe (rev-B) Card	15
Checklist For Making Software Changes	16
General Hardware Installation Instructions	18
Supported Graphics Slot Configurations	20
B1000 and C3x00 Graphics Slots	20
B2000 Graphics Slots	21
J6x00 Graphics Slots	21
J5x00 and J7000 Graphics Slots	22
Fixing Common Installation Problems	23
Monitor Does Not Display	23
System's X-server or CDE Does Not Come Up or Recognize the Graphics Card ²⁴	

A. Monitor Timing

1280 x1924 75 Hz VESA	26
1024 x768 75 Hz VESA	27
1280 x1024 60 Hz Digital Flat Panel	28
1600 x1200 75 Hz VESA	29
1600 x 1024 76 Hz	30
1920 X 1200 60 Hz	31
1920 x 1080 68 Hz	32

Contents

1280 x 1024 100 Hz Stereo in a Window	33
1024 x 768 120 Hz Stereo in a Window	34
1280 x 1024 85 Hz VESA	35
1280 x 1024 75 Hz VESA	36
1024 x 768 85 Hz VESA	37
1024 x 768 85 Hz VESA	38

B. Regulatory Information

FCC	40
VCCI	41
Declaration of Conformity	42

1 Introduction

This manual covers the installation and configuration of the HP Visualize *fx* family of graphics cards (*fxe*, *fx*⁵, *fx*^{10a} and *fx*^{10b}) into HP Workstations released after September 1999. These workstations include the B1000, B2x00, C3x00, J5x00, J6x00 and J7000.

The HP A4982A Visualize *fxe* card is an entry level, 2D/3D graphics card with 18 Mbytes of SGRAM. It provides analog video only through a standard 15-pin miniature D-sub connector.

The A4982B version of the HP Visualize *fxe* card (above) has 24 Mbytes of SDRAM and features an available texture memory at 1280 x 1024 resolution of 9.5 Mbytes instead of the 3.5 Mbytes for the A4982A. *The two cards are fully pixel compatible.* Applications qualified to run on the rev-A card will run without difference on the rev-b card.

The extra memory provided by the A4982B card allows 1600x1200 and 1600x1024 resolutions previously only supported on 2D. Due to the change in memory type (from SGRAM to SDRAM) some applications may see some interactive windowing operations (for example moving opaque windows) run slightly slower. A new revision of the X server will minimize these problems. For HP-UX 10.20 users, get patch PHSS_23535 or its replacement; for HP-UX 11.x users, get PHSS_23546 or its replacement.

To take advantage of the increased resolution provided by the rev-b card, see page 15 for instructions.

NOTE

To determine which *fxe* card is in your Workstation, check the following file: `/opt/graphics/common/bin/graphinfo` - under CONFIGURATION INFORMATION, the line 'Total framebuffer memory' will show 24 Mbytes for the rev-b card and 18 Mbytes for the rev-a card. If you execute `/opt/graphics/common/bin/setmon -rv`, the newer card will show the HPA4982B product number.

The HP Visualize *fx⁵* 2D/3D graphics accelerator card is a mid-level graphics card. The *fx⁵* Pro features 64MB of SDRAM, a single geometry accelerator ASIC and a single ASIC for rastering and texturing.

The HP Visualize *fx^{10a}* 2D/3D graphics accelerator card is an high-end graphics card. The *fx^{10a}* Pro features dual geometry accelerator ASIC's, and a single rastering and texturing ASIC

The HP Visualize *fx^{10b}* 2D/3D graphics accelerator card is also an high-end graphics card. The *fx^{10b}* Pro features 128 Mbytes of DDR RAM, dual geometry accelerator ASIC's, and a single rastering and texturing ASIC. It replaces the *fx^{10a}* as of November 2000.

All *fx* family graphics cards require a PCI 2X interface to the HP-UX workstation backplane.

This manual also describes the basic prerequisites for installing HP Visualize *fx* graphics cards into the supported workstations. The table below lists the various graphics products covered by this manual, and their respective product numbers.

Table 1-1 **Supported Graphics Products**

Product Number	Product Description
A4982A	HP Visualize <i>fxe</i>
A4982B	HP Visualize <i>fxe</i> (rev-b)
A1262A	HP Visualize <i>fx</i> ⁵
A1299A	HP Visualize <i>fx</i> ^{10a}
A1299B	HP Visualize <i>fx</i> ^{10b}

Related Documents

See the following documents for more information on graphics and on your particular workstation.

- the *Owner's Guide* for your workstation
- *Common Desktop Environment User's Guide*
- *HP Visual User Environment User's Guide*
- *Using HP-UX*
- *Using the X Window System*
- *Graphics Administration Guide* found on the <http://www.hp.com/workstations/support> web site
- <http://www.hp.com/workstations> is the general website for workstation information
- <http://www.software.hp.com> is the software depot website for HP-UX

- <http://www.docs.hp.com> is the website for documents regarding **HP-UX systems**
- <http://www.hp.com/workstations/support> is the website for **software and firmware patches**

Prerequisites

To support the HP Visualize *fx* family of graphics cards, your workstation must meet the following prerequisites:

1. Your workstation must be running one of the following versions of the HP-UX operating system and have the appropriate Additional Core Enhancement (ACE) software bundle and Workstation Quality Pack installed:
 - HP-UX revision 10.20 with the ACE software bundle (December 1999 or later) and the B6825AA graphics bundle or
 - HP-UX revision 11.00 with the ACE software bundle (November 1999 or later) and the B6268 graphics bundle plus
 - an HP Visualize *fx* family graphics card installed.
2. To verify that the proper ACE software bundle is installed on your workstation:

At a command prompt, type:

```
/usr/sbin/swlist -l bundle | grep ACE
```

Scan the output for the following ACE software bundles:

- The HP-UX 10.20 B6193EA ACE software bundle with the description:

```
Workstation ACE for HP-UX 10.20 (December 1999)  
B6825AA Graphics Enablement Bundle
```

This line indicates that the December 1999 ACE software bundle and the B6825AA graphics bundle are installed.

- Or the HP-UX 11.00 B3782FA ACE software bundle with the description

```
Workstation ACE for HP-UX 11.00 (November 1999)  
B6268AA Graphics Technical Computing Environment
```

This line indicates that the November 1999 Workstation ACE software and the B6268AA graphics bundle are installed.

NOTE

Because the ACE software bundles are updated occasionally, the ACE

revision date that is listed in the output may be later than the one shown above. For example, if the ACE revision date listed for HP-UX 10.20 is later than December 1999, then the proper ACE software bundle is installed on your workstation for Visualize *fx* products.

If you are not running HP-UX, revision 10.20 or 11.0 with these ACE bundles or a later release, you need to update your software before installing your graphics card. Contact your designated service representative for information on receiving an update. The ACE software bundles and Quality Packs are also available for downloading from the <http://software.hp.com> website. The bundles will require approximately 133 Mb of disk space.

3. You must have an HP-supported monitor running at 75Hz with a 1280X1024 resolution, or a full multimode color monitor.

For *fxe*, *fx⁵* and *fx¹⁰* graphics cards, monitors with Enhanced Video Connector (EVC), D-Sub connectors or 5 BNC connectors (RGB, vertical sync, horizontal sync) will work. The HP Visualize *fx* family graphics card will not function with older HP monitor types that use a sync on green signal. This includes monitors such as the HP 1097A/B/ C/D, A2088A, and A2828A/B which only have 3 RGB connectors.

The *fxe* graphics card supports the following monitor resolutions:

Table 1-2 Visualize *fxe* Supported Resolutions

Width x Height	Frequency	Font	Description
1280x1024	75Hz	10x20	VESA
1024x768	75Hz	8x16	VESA
1600x1200	75Hz	10x20	VESA
1600x1024	76Hz	10x20	

The *fx⁵* and *fx¹⁰* graphics card supports the following monitor resolutions:

Table 1-3 Visualize *fx⁵* and *fx¹⁰* Supported Resolutions

Width x Height	Frequency	Font	Description
1280x1024	75Hz	10x20	VESA
1024x768	75Hz	8x16	VESA
1280x1024	60Hz	10x20	Digital Flat Panel
1600x1200	75Hz	10x20	VESA
1600x1024	76Hz	10x20	
1920x1200	60Hz	10x20	
1920x1080	68Hz	10x20	
1280x1024	100Hz	10x20	Stereo in a Window
1024x768	120Hz	8x16	Stereo in a Window
1280x1024	85Hz	10x20	VESA
1024x768	85 Hz	8x16	VESA

You may also need one of the following adapters to use on a monitor with Enhanced Video Connector (EVC):

Table 1-4 EVC Adapters

Product Number	Description
A4167A (for <i>fxe</i>)	EVC receptacle to 15-pin Miniature D-Sub Plug Adapter
A4168A	EVC Male to 15-Pin Miniature D-Sub Female Adapter

Making Software and Device-Specific Changes

System Configuration

For important information on configuring your system for your graphics option (for example, creating a device file with `mknod`), refer to your workstation and HP-UX documentation. If you are installing a multiple-display system and you will be using the Common Desktop Environment (CDE), you will need to refer to the *Common Desktop Environment User's Guide* for important configuration information. If you will be using HP VUE, see the *HP Visual User Environment User's Guide*.

If you are adding a new graphics card or moving a current one to a new slot location, you will need to reconfigure some HP-UX device files. Begin by deleting the old device files for the old card location and create new ones for the new slot location. Follow these steps in order for HP-UX to recognize the new card location or graphics card:

1. Place the new card in the new slot location and boot to HP-UX. It will not boot into CDE or VUE, but will allow you to login at the command line level as `root`.
2. Delete the old graphics card files as the super user by typing

```
rm /dev/crt*
```
3. Create the new device files by typing

```
insf -ev
```
4. Type `init 3` to finish booting to CDE or VUE.

Special Considerations

To make sure that your system has the most up-to-date core software, it is recommended that the most recent release of the Workstation Additional Core Enhancements (ACE) starting from December 1999 be installed. The graphics bundles containing the `fx5` and `fx10` drivers must also be installed; B6825A for HP-UX 10.20 ACE5 or B6268AA for HP-UX 11.X. In addition, if your applications are based on HP's implementation of OpenGL Runtime Libraries, it is highly recommended that you update these Libraries from the June 200 (or later) Application Release from the HP website.

If you do not have the CD-ROM's that contain the latest Workstation ACE release or HP's implementation of the OpenGL runtime libraries, you can download them from the Hewlett-Packard website using this URL:

`http://www.software.hp.com/`

For information on installing Workstation ACE and HP's implementation of the OpenGL runtime libraries, read the documents provided with those products or go to:

`http://www.hp.com/visualize/support`

Higher Resolution 3D on *fxe* (rev-B) Card

To take advantage of the higher resolution offered by the newer *fxe* (rev-B) card, make sure you have an up-to-date version of the 3D graphics libraries. For HP-UX 10.20 systems, you'll need patches PHSS_22595 - PHSS_22603 or their replacements. For HP-UX 11.x systems, you'll need patches PHSS_22604 - PHSS_22614 or their replacements.

The X server will create the needed visuals for the *fxe* (rev-b) card (not supported on the rev-a card). The new 3D capability is only accessible by choosing screen option "enableFxeGlx1600"

Example 1-1 Accessing *fxe* (rev-B) 3D capability

In your `/etc/X11/X0screens` file:

```
Screen /dev/crt
```

```
ScreenOptions
```

```
EnableFxeGlx1600
```

Checklist For Making Software Changes

1. Read this Entire Document

It contains information for product installation configuration.

2. Check the Available File System Space

Before installing this product, make sure there is enough available space in your file system in `/opt/graphics`. Your workstation needs at least 133 megabytes of available disk space for all file sets and patches.

3. Install the Latest Version of the Workstation ACE Software Bundle and Graphics Bundle

Once you have installed the December 1999 (or later) Workstation ACE bundle (B6825AA) for HP-UX 10.20 or November 1999 for HP-UX 11.X; plus the graphics bundle (B6268A), you will have all the necessary software to support the *fx* family product.

To install the ACE software or graphics bundle, execute the following command as root:

```
/usr/sbin/swinstall
```

Choose the ACE software or graphics bundle and select **Match What Target Has** in the **Actions** menu. Follow the standard procedure to load that software.

4. Install 3D Graphics Application Programming Interfaces (APIs)

If you are using or planning to use any of the following products, you must install what you need from the HP-UX Developer's CD, prior to installing the Texture Accelerator Kit software.

- Starbase Dev. Kit
- HP PEX lib Dev. Kit
- OpenGL Dev. Kit
- OpenGL Runtime

The OpenGL runtime libraries are available from the latest DART Release or by searching for OpenGL at the <http://www.software.hp.com> website

To determine whether these products are properly installed, try compiling and running an application on your system that uses one of the above Application Programming Interfaces (APIs).

- Check: `/var/adm/sw/swinstall.log`

Once you have completed the API installation process, look at the contents of the file `/var/adm/sw/swinstall.log`. This file identifies the filesets loaded, identifies the customize scripts that ran during the installation process, and includes informative messages. Error messages that resulted from attempts to write across an NFS mount point will appear in this file and may be ignored.

5. Verify that the Product Installation is Complete

An easy way to verify that your installation is complete, is to compile, link and run one of your existing Application Programming Interface (API) programs (that is, programs created using HP's implementation of OpenGL, Starbase, or HP PEX). If you do not have an existing program, then make sure that you install the demonstration filesets that comes with your API. When you or your system administrator have properly installed these filesets, one or more of the following demo directories will be created:

- `/opt/graphics/OpenGL/demos`
- `/opt/graphics/PEX5/demos`
- `/opt/graphics/Starbase/demos`

You can run any of the texture-mapping programs in these directories to verify that the installation is complete. When running the texture demos, notice the performance prior to installing the texture-memory hardware. You will see a noticeable performance improvement in textured rendering after your texture-memory hardware has been installed.

General Hardware Installation Instructions

NOTE

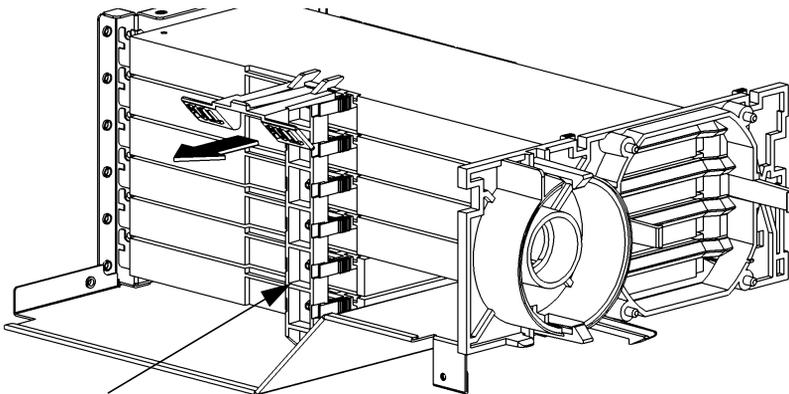
Before you install your graphics card, you must read the workstation documentation for important system configuration information.

CAUTION

Graphics boards are susceptible to electrostatic shock. When handling your graphics board, always wear a properly grounded wrist strap and handle the board carefully. Always unplug the AC power cord from the workstation before opening the cabinet and performing any installation inside the workstation

1. Per your workstation documentation, install the graphics board(s) into the appropriate slot(s) (see supported slot information in the Supported Graphics Slot Configurations section of this guide). Slide the board(s) into the appropriate slot(s), ensuring that you align Bulkhead Pin(s), Board Connector(s) and Board Guide Extender(s).

Note that you will need to have a PCI Extension Clip attached to the corresponding slot on the PCI Retainer for an HP Visualize graphics card. The location of the PCI Extension Clip is shown in the figure below. This Clip bridges the gap between the graphics card and the PCI Retainer.



PCI Extension Clip (shown w/ B2000 I/O Cards)

2. After installing your graphics hardware, before turning on your workstation, you must refer to your workstation documentation for information on defining the boot console and monitor type.
3. Refer to your workstation documentation for instructions on using SAM to verify your graphics configuration.
4. Plug the AC power cord into the workstation and power on the workstation.
5. Refer to your workstation documentation for instructions on using the HP-UX System Administration Manager (SAM) utility to verify your graphics configuration.

Supported Graphics Slot Configurations

See the figures below for supported graphics slot configurations, based on your workstation model.

B1000 and C3x00 Graphics Slots

PCI slot 1 64 bits wide/33Mhz

PCI slot 2 64 bits wide/66Mhz - Primary Graphics Slot

PCI slot 3 64 bits wide/33 Mhz

PCI slot 4 64 bits wide/33Mhz - Secondary Graphics Slot

PCI slot 5 32 bits wide/33Mhz

PCI slot 6 32 bits wide/33Mhz

Use the Primary Graphics Slot for the highest performance graphics card. Use the Secondary Graphics Slot for the second graphics card and then the remaining 64 bit wide slots for any additional supported graphics cards.

Supported B1000 and C3x00 Graphics Configurations:

- 4 Visualize EG cards or
- 4 Visualize fx or
- 1 Visualize fx^5 or
- 1 Visualize fx^{10}

B2000 Graphics Slots

PCI slot 1 64 bits wide/33Mhz - Secondary Graphics Slot

PCI slot 2 64 bits wide/33Mhz - Tertiary Graphics Slot

PCI slot 3 32 bits wide/33Mhz

PCI slot 4 32bits wide/33MHz

Use the Secondary Graphics Slot for the highest performance graphics card. Use the Tertiary Graphics Slot for the second graphics card

Supported B2000 Graphics Configurations:

- 1 Visualize fx^5 and built-in Visualize fxe or
- up to 3 Visualize fxe and built-in Visualize fxe

J6x00 Graphics Slots

PCI slot 1 64 bits wide/66Mhz

PCI slot 2 64 bits wide/66Mhz

PCI slot 3 64 bits wide/66Mhz

Supported J6000 Graphics Configurations:

- 1 Visualize fx^5 Pro
- 1 Visualize fx^{10} Pro

J5x00 and J7000 Graphics Slots

PCI slot 1 64 bits wide/33Mhz

PCI slot 2 64 bits wide/33Mhz - Tertiary Graphics Slot

PCI slot 3 64 bits wide/33Mhz

PCI slot 4 64 bits wide/66Mhz - Secondary Graphics Slot

PCI slot 5 64 bits wide/33Mhz

PCI slot 6 64 bits wide/33Mhz

PCI slot 7 64 bits wide/66Mhz - Primary Graphics Slot

PCI slot 8 64 bits wide/33Mhz

Use the Primary Graphics Slot for the highest performance graphics card. Use the Secondary Graphics Slot for the second graphics card and then the remaining slots for any additional supported graphics card. Do not use Slot 1 for any other I/O card except as a source of power.

Supported J5x00 and J7000 Graphics Configurations:

- 4 Visualize EG's or
- 4 Visualize fxe or
- 1 Visualize fx^5 or
- 1 Visualize fx^{10}

Fixing Common Installation Problems

This section describes how to fix some common problems you may encounter while installing the HP Visualize graphics card.

Note that there are several system utilities that you can use to display or set the graphics configuration for your workstation:

- `/opt/graphics/common/bin/graphinfo` allows you to display the current graphics configuration and the graphics drivers that are being used.
- `opt/graphics/common/bin/setmon` allows you to reconfigure the monitor type.
- The Display menu of the HP-UX System Administration Manager (SAM) utility allows you to configure the X-server and set the monitor type.
- `/opt/graphics/common/bin/setmon -V` will display the firmware revision of the graphics card.

Monitor Does Not Display

NOTE

Older monitors that have only 3 RGB connectors will not function with the HP Visualize *fxe* graphics card because these monitors have no sync input except by sync on green. For more information, see the Prerequisites section earlier in this manual.

If the monitor is not displaying on powering up, the system console may not yet recognize the new graphics card. Perform the following steps to reconfigure the system console so that it recognizes the new card:

1. Force the system to set the default console to a serial terminal on `com1` by disconnecting the keyboard from the system and recycling power.
2. Interrupt the boot up sequence and wait until the Boot Console Handler prompt is displayed, then move to the configuration menu by typing `co`.

3. Display what graphics cards the system console recognizes by typing:

```
mo graphics list
```

4. Select the monitor type by typing:

```
mo graphics(N) # type
```

where N = card slot, and # = monitor type

5. Set the console path to the graphics card by typing:

```
pa co graphics(N)
```

6. Reconnect the keyboard to the system and cycle the system's power. The system console should now display.

System's X-server or CDE Does Not Come Up or Recognize the Graphics Card

If the system's X-server or CDE will not come up or recognize the new graphics card, the HP-UX device files may not yet be set up. If you added a new graphics card or moved a current one to a new slot location, you may need to reconfigure some device files. Follow these steps in order for HP-UX to recognize the new graphics card or new card location:

1. Place the new card in the new slot location and boot to HP-UX. It will not boot into CDE or HP VUE, but it will allow you to login at the command line level as root.

2. Delete the old device files by typing:

```
rm /dev/crt*
```

3. Create the new device files by typing:

```
insf -ev
```

4. Finish booting to CDE or HP VUE by typing:

```
init 3
```

A **Monitor Timing**

This Appendix provides timing information for all monitors supported by the HP Visualize *fx* family of graphics cards.

1280 x1924 75 Hz VESA

Table A-1

Dot Clock	135.000 MHz	7.4074 ns
Horiz. Rate	79.9763 kHz	
Horiz. Period	12.5037 us	1688 pixels
Horiz. Active	9.4815 us	1280 pixels
Horiz. Blank	3.0222 us	408 pixels
Horiz. Front Porch	0.1185 us	16 pixels
Horiz. Sync. Width	1.0667 us	144 pixels (positive)
Horiz. Back Porch	1.8370 us	248 pixels
Vert. Rate	75.0247 Hz	
Vert. Period	13.3289 ms	1066 lines
Vert. Active	12.8038 ms	1024 lines
Vert. Blank	0.5252 ms	42 lines
Vert. Front Porch	0.0125 ms	1 line
Vert. Sync Width	0.0375 ms	3 lines (positive)
Vert. Back Porch	0.4751 ms	38 lines
Sync. Type	Digital Sync	H+ V+

1024 x768 75 Hz VESA

Table A-2

Dot Clock	78.750 MHz	12.6984 ns
Horiz. Rate	60.0229 kHz	
Horiz. Period	16.6603 us	1312 pixels
Horiz. Active	13.0032 us	1024 pixels
Horiz. Blank	3.6571 us	288 pixels
Horiz. Front Porch	0.2032 us	16 pixels
Horiz. Sync. Width	1.2190 us	96 pixels (positive)
Horiz. Back Porch	2.2349 us	176 pixels
Vert. Rate	75.0286 Hz	
Vert. Period	13.3283 ms	800 lines
Vert. Active	12.7951 ms	768 lines
Vert. Blank	0.5331 ms	32 lines
Vert. Front Porch	0.0167 ms	1 line
Vert. Sync Width	0.0500 ms	3 lines (positive)
Vert. Back Porch	0.4665 ms	28 lines
Sync. Type	Digital Sync	H+ V+

1280 x1024 60 Hz Digital Flat Panel

Table A-3

Dot Clock	108.000 MHz	9.2593 ns
Horiz. Rate	63.9810 kHz	
Horiz. Period	15.6296 us	1688 pixels
Horiz. Active	11.8519 us	1280 pixels
Horiz. Blank	3.7778 us	408 pixels
Horiz. Front Porch	0.4444 us	48 pixels
Horiz. Sync. Width	1.0370 us	112 pixels (positive)
Horiz. Back Porch	2.2963 us	248 pixels
Vert. Rate	60.0197 Hz	
Vert. Period	16.6612 ms	1066 lines
Vert. Active	16.0047 ms	1024 lines
Vert. Blank	0.6564 ms	42 lines
Vert. Front Porch	0.0156 ms	1 line
Vert. Sync Width	0.0469 ms	3 lines (positive)
Vert. Back Porch	0.5939 ms	38 lines
Sync. Type	Digital Sync	H+ V+

1600 x1200 75 Hz VESA

Table A-4

Dot Clock	202.500 MHz	4.9383 ns
Horiz. Rate	93.7500 kHz	
Horiz. Period	10.6667 us	2160 pixels
Horiz. Active	7.9012 us	1600 pixels
Horiz. Blank	2.7654 us	560 pixels
Horiz. Front Porch	0.3160 us	64 pixels
Horiz. Sync. Width	0.9481 us	192 pixels (positive)
Horiz. Back Porch	1.5012 us	304 pixels
Vert. Rate	75.0000 Hz	
Vert. Period	13.3333 ms	1250 lines
Vert. Active	12.8000 ms	1200 lines
Vert. Blank	0.5333 ms	50 lines
Vert. Front Porch	0.0107 ms	1 line
Vert. Sync Width	0.0320 ms	3 lines (positive)
Vert. Back Porch	0.4907 ms	46 lines
Sync. Type	Digital Sync	H+ V+

1600 x 1024 76 Hz

Table A-5

Dot Clock	170.100 MHz	5.8789 ns
Horiz. Rate	81.1546 kHz	
Horiz. Period	12.3222 us	2096 pixels
Horiz. Active	9.4062 us	1600 pixels
Horiz. Blank	2.9159 us	496 pixels
Horiz. Front Porch	0.1881 us	32 pixels
Horiz. Sync. Width	0.9406 us	160 pixels (negative)
Horiz. Back Porch	1.7872 us	304 pixels
Vert. Rate	75.8454 Hz	
Vert. Period	13.1847 ms	1070 lines
Vert. Active	12.6179 ms	1024 lines
Vert. Blank	0.5668 ms	46 lines
Vert. Front Porch	0.0370 ms	3 lines
Vert. Sync Width	0.0370 ms	3 lines (negative)
Vert. Back Porch	0.4929 ms	40 lines
Sync. Type	Digital Sync	H- V-

1920 X 1200 60 Hz

Table A-6

Dot Clock	4157.739 MHz	0.2405 ns
Horiz. Rate	1604.0660 kHz	
Horiz. Period	0.6234 us	2592pixels
Horiz. Active	0.4618 us	1920 pixels
Horiz. Blank	0.1616 us	672 pixels
Horiz. Front Porch	0.0308 us	128 pixels
Horiz. Sync. Width	0.0500 us	208 pixels (negative)
Horiz. Back Porch	0.0808 us	336 pixels
Vert. Rate	1291.5186 Hz	
Vert. Period	0.7743 ms	1242 lines
Vert. Active	0.7481 ms	1200 lines
Vert. Blank	0.0262 ms	42 lines
Vert. Front Porch	0.0006 ms	1 line
Vert. Sync Width	0.0019 ms	3 lines (negative)
Vert. Back Porch	0.0237 ms	38 lines
Sync. Type	Digital Sync	H- V-

1920 x 1080 68 Hz

Table A-7

Dot Clock	198.000 MHz	5.0505 ns
Horiz. Rate	76.3889 kHz	
Horiz. Period	13.0909 us	2592 pixels
Horiz. Active	9.6970 us	1920 pixels
Horiz. Blank	3.3939 us	672 pixels
Horiz. Front Porch	0.6465 us	128 pixels
Horiz. Sync. Width	1.0505 us	208 pixels (negative)
Horiz. Back Porch	1.6970 us	336 pixels
Vert. Rate	68.0222 Hz	
Vert. Period	14.7011 ms	1123 lines
Vert. Active	14.1382 ms	1080 lines
Vert. Blank	0.5629 ms	43 lines
Vert. Front Porch	0.0131 ms	1 line
Vert. Sync Width	0.0393 ms	3 lines (negative)
Vert. Back Porch	0.5105 ms	39 lines
Sync. Type	Digital Sync	H- V-

1280 x 1024 100 Hz Stereo in a Window

Table A-8

Dot Clock	190.929 MHz	5.2376 ns
Horiz. Rate	108.4821 kHz	
Horiz. Period	9.2181 us	1760 pixels
Horiz. Active	6.7041 us	1280 pixels
Horiz. Blank	2.5140 us	480 pixels
Horiz. Front Porch	0.5028 us	96 pixels
Horiz. Sync. Width	0.7542 us	144 pixels (negative)
Horiz. Back Porch	1.2570 us	240 pixels
Vert. Rate	99.9835 Hz	
Vert. Period	10.0016 ms	1085 lines
Vert. Active	9.4393 ms	1024 lines
Vert. Blank	0.5623 ms	61 lines
Vert. Front Porch	0.0092 ms	1 line
Vert. Sync Width	0.0277 ms	3 lines (positive)
Vert. Back Porch	0.5254 ms	57 lines
Sync. Type	Digital Sync	H+ V+

1024 x 768 120 Hz Stereo in a Window

Table A-9

Dot Clock	138.857 MHz	7.2016 ns
Horiz. Rate	98.6201 kHz	
Horiz. Period	10.1399 us	1408 pixels
Horiz. Active	7.3745 us	1024 pixels
Horiz. Blank	2.7654 us	384 pixels
Horiz. Front Porch	0.5761 us	80 pixels
Horiz. Sync. Width	0.8066 us	112 pixels (negative)
Horiz. Back Porch	1.3827 us	192 pixels
Vert. Rate	119.8300 Hz	
Vert. Period	8.3452 ms	823 lines
Vert. Active	7.7875 ms	768 lines
Vert. Blank	0.5577 ms	55 lines
Vert. Front Porch	0.0101 ms	1 line
Vert. Sync Width	0.0304 ms	3 lines (positive)
Vert. Back Porch	0.5171 ms	51 lines
Sync. Type	Digital Sync	H- V+

1280 x 1024 85 Hz VESA

Table A-10

Dot Clock	157.500 MHz	6.3492 ns
Horiz. Rate	91.1458 kHz	
Horiz. Period	10.9714 us	1728 pixels
Horiz. Active	8.1270 us	1280 pixels
Horiz. Blank	2.8444 us	448 pixels
Horiz. Front Porch	0.4063 us	64 pixels
Horiz. Sync. Width	1.0159 us	160 pixels (positive)
Horiz. Back Porch	1.4222 us	224 pixels
Vert. Rate	85.0241 Hz	
Vert. Period	11.7614 ms	1072 lines
Vert. Active	11.2347 ms	1024 lines
Vert. Blank	0.5266 ms	48 lines
Vert. Front Porch	0.0110 ms	1 line
Vert. Sync Width	0.0329 ms	3 lines (positive)
Vert. Back Porch	0.4827 ms	44 lines
Sync. Type	Digital Sync	H+ V+

1280 x 1024 75 Hz VESA

Table A-11

Dot Clock	135.000 MHz	7.4074 ns
Horiz. Rate	79.9763 kHz	
Horiz. Period	12.5037 us	1688 pixels
Horiz. Active	9.4815 us	1280 pixels
Horiz. Blank	3.0222 us	408 pixels
Horiz. Front Porch	0.1185 us	16 pixels
Horiz. Sync. Width	1.0667 us	144 pixels (positive)
Horiz. Back Porch	1.8370 us	248 pixels
Vert. Rate	75.0247 Hz	
Vert. Period	13.3289 ms	1066 lines
Vert. Active	12.8038 ms	1024 lines
Vert. Blank	0.5252 ms	42 lines
Vert. Front Porch	0.0125 ms	1 line
Vert. Sync Width	0.0375 ms	3 lines (positive)
Vert. Back Porch	0.4751 ms	38 lines
Sync. Type	Digital Sync	H+ V+

1024 x 768 85 Hz VESA

Table A-12

Dot Clock	94.500 MHz	10.5820 ns
Horiz. Rate	68.6773 kHz	
Horiz. Period	14.5608 us	1376 pixels
Horiz. Active	10.8360 us	1024 pixels
Horiz. Blank	3.7249 us	352 pixels
Horiz. Front Porch	0.5079 us	48 pixels
Horiz. Sync. Width	1.0159 us	96 pixels (positive)
Horiz. Back Porch	2.2011 us	208 pixels
Vert. Rate	84.9967 Hz	
Vert. Period	11.7652 ms	808 lines
Vert. Active	11.1827 ms	768 lines
Vert. Blank	0.5824 ms	40 lines
Vert. Front Porch	0.0146 ms	1 line
Vert. Sync Width	0.0437 ms	3 lines (positive)
Vert. Back Porch	0.5242 ms	36 lines
Sync. Type	Digital Sync	H+ V+

1024 x 768 85 Hz VESA

Table A-13

Dot Clock	78.750 MHz	12.6984 ns
Horiz. Rate	60.0229 kHz	
Horiz. Period	16.6603 us	1312 pixels
Horiz. Active	13.0032 us	1024 pixels
Horiz. Blank	3.6571 us	288 pixels
Horiz. Front Porch	0.2032 us	16 pixels
Horiz. Sync. Width	1.2190 us	96 pixels (positive)
Horiz. Back Porch	2.2349 us	176 pixels
Vert. Rate	75.0286 Hz	
Vert. Period	13.3283 ms	800 lines
Vert. Active	12.7951 ms	768 lines
Vert. Blank	0.5331 ms	32 lines
Vert. Front Porch	0.0167 ms	1 line
Vert. Sync Width	0.0500 ms	3 lines (positive)
Vert. Back Porch	0.4665 ms	28 lines
Sync. Type	Digital Sync	H+ V+

B **Regulatory Information**

This section provides the FCC Regulatory Statement and the HP Declaration of Conformity.

FCC

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:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Operation of this device is subject to the following conditions:

- This device may not cause harmful interference.
- 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.

WARNING

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

VCCI

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

Declaration of Conformity

according to ISO/IEC Guide 22 and EN 45014

Manufacturer: Hewlett-Packard Company
3404 East Harmony Road
Fort Collins, CO 80528 USA

Declares that the:

Product Name: HP VISUALIZE fxe, fx5 and fx10 Graphics Cards
Model Numbers: A4982A, A1262A, A1299A and A1299B
Product Cards: all

conforms to the following specifications:

Safety IEC 950:1991+A1+A2+A3+A4 / EN 60950:1992+A1+A2+A3+A4

EMC CISPR 22: 1995 / EN 55022: 1998 Class B

EN 50082-1:1992

IEC 1000-4-2: 1995 / EN 61000-4-2: 1995 - 4kV 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

US FCC Part 15, Level B

Japan VCCI, Class B

and is certified by: HP FC HTC TCOM report #99-40ES-021-I

TUV Certified to EN60950, Certificate# AL990824148018

Australia/New Zealand AS/NZS 3548:1995

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 and 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.

Original signed copy available on file:

Ruth Lutes, Site Quality Manager Fort Collins, CO, USA

For Compliance Information ONLY, contact:

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Americas Contact: Hewlett-Packard, Fort Collins Site Quality Manager, mail stop 46, 3404 E. Harmony Rd., Ft. Collins, CO 80525, USA