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

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



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Introduction

The HP Visualize *fxe* card is an entry level, 2D/3D graphics card (32-bit, 33 MHz) with 16 Mbytes of SGRAM. It provides analog video only through a standard 15-pin miniature D-sub connector.

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.

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> |
| A1262A | HP Visualize <i>fx⁵</i> |
| A1299A | HP Visualize <i>fx^{10a}</i> |
| A1299B | HP Visualize <i>fx^{10b}</i> |

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*
- <http://www.hp.com/visualize> 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/visualize/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 | |

Introduction
Prerequisites

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.

Introduction

Making Software and Device-Specific Changes

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`

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

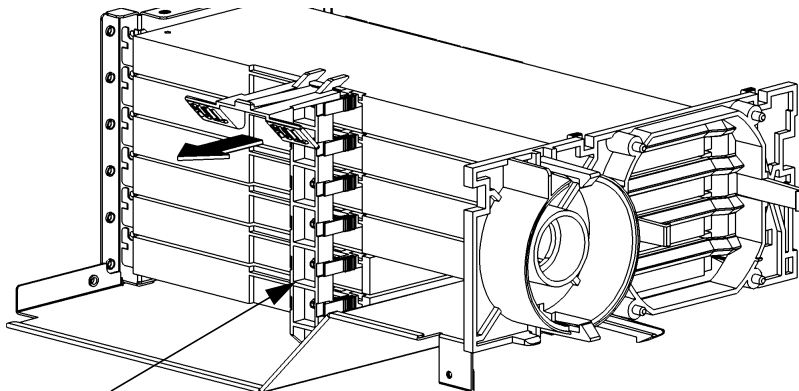
Before you install your graphics card, you must read the workstation documentation for important system configuration information.

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 *fxe* 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
```


Introduction
Fixing Common Installation Problems

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

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると受信障害を引き起こすことがあります。

取り扱い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:

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 46, 3404 E. Harmony Rd., Ft. Collins, CO 80525, USA



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