



Sun™ XVR-2500 Graphics Accelerator Installation and User's Guide

Sun Microsystems, Inc.
www.sun.com

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Declaration of Conformity

Compliance Model Number: **R500**
Product Family Name: **XVR-2500 Graphics Accelerator (X7295A)**

EMC

USA—FCC Class B

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+A2:1997

EN61000-3-2:2000 Pass

EN61000-3-3:1995 Pass

+A1:2000

IEC 61000-4-2 6 kV (Direct), 8 kV (Air)

IEC 61000-4-3 3 V/m 80-1000MHz, 10 V/m 800-960 MHz and 1400-2000 MHz

IEC 61000-4-4 1 kV AC and DC Power Lines, 0.5 kV Signal Lines

IEC 61000-4-5 2 kV AC Line-Gnd, 1 kV AC Line-Line and Outdoor Signal Lines, 0.5 kV Indoor Signal Lines > 10m

IEC 61000-4-6 3 V

IEC 61000-4-11 Pass

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EN61000-3-2:2000 Pass

EN61000-3-3:1995 +A1:2000 Pass

EN 55024:1998 +A1:2001 +A2:2003 Required Limits

IEC 61000-4-2 4 kV (Direct), 8 kV (Air)

IEC 61000-4-3 3 V/m

IEC 61000-4-4 1 kV AC and DC Power Lines, 0.5 kV Signal and DC Power Lines

IEC 61000-4-5 1 kV AC Line-Line and Outdoor Signal Lines, 2 kV AC Line-Gnd, 0.5 kV DC Power Lines

IEC 61000-4-6 3 V

IEC 61000-4-8 1 A/m

IEC 61000-4-11 Pass

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This equipment complies with the following requirements of the Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN 60950-1:2001, 1st Edition

IEC 60950:2000, 3rd Edition

Evaluated to all CB Countries

UL 60950-1:2003, 1st Edition, CSA C22.2 No. 60950-1-03 File: E204883-A11-UL-1

TÜV Rheinland Certificate No.

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Supplementary Information

This equipment was tested and complies with all the requirements for the CE Mark.

This equipment complies with the Restriction of Hazardous Substances (RoHS) directive 2002/95/EC.

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Preface

This guide describes how to install and configure the Sun™ XVR-2500 Graphics Accelerator for your Sun Ultra™ 45 workstation.

Before You Read This Document

This document is intended for experienced system administrators familiar with installing and configuring graphics boards in Sun computer systems.

How This Document Is Organized

[Chapter 1](#) provides an overview of the Sun XVR-2500 graphics accelerator.

[Chapter 2](#) describes how to install the software.

[Chapter 3](#) describes how to install the hardware.

[Chapter 4](#) describes how to modify the `Xservers` configuration file and how to use Xinerama.

[Chapter 5](#) provides information on using features, including multisample antialiasing.

[Appendix A](#) describes how to set the default console display.

[Appendix B](#) lists product software directories, packages, and patches.

[Appendix C](#) describes how to remove the product software.

[Appendix D](#) describes how to access the `DMCtool` to change screen resolutions.

[Appendix E](#) describes how to configure for stereo viewing.

[Appendix F](#) describes how to genlock two graphics accelerators for multiviewing.

[Appendix G](#) provides product specifications.

[Appendix H](#) lists the Sun OpenGL[®] for Solaris[™] graphics library extensions.

Using UNIX Commands

This document might not contain information about basic UNIX[®] commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris Operating System documentation, which is at:

<http://docs.sun.com>

Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Typographic Conventions

Typeface ¹	Meaning	Examples
<i>AaBbCc123</i>	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>% You have mail.</code>
AaBbCc123	What you type, when contrasted with on-screen computer output	<code>% su</code> Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

¹ The settings on your browser might differ from these settings.

Documentation, Support, and Training

Sun Function	URL	Description
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Sun XVR-2500 Graphics Accelerator Installation and User's Guide,
part number 817-7517-10

Overview

This chapter provides an overview of the Sun XVR-2500 graphics accelerator.

- [“Installation Kit” on page 1](#)
- [“Graphics Accelerator Overview” on page 2](#)
- [“Video Formats” on page 5](#)
- [“Installation Process” on page 7](#)
- [“Technical Support” on page 7](#)

Installation Kit

The installation kit for the Sun XVR-2500 graphics accelerator includes:

- Sun XVR-2500 graphics accelerator
- Sun XVR-2500 graphics accelerator software (CD-ROM)
- DVI-I to HD15 monitor adapter
- Internal multiview genlock ribbon cable
- Antistatic wrist strap
- *Sun XVR-2500 Graphics Accelerator Installation and User’s Guide*, this document

Graphics Accelerator Overview

The Sun XVR-2500 graphics accelerator is PCI-Express based. It provides high resolution and high performance PCI-Express 3D graphics. The Sun XVR-2500 graphics accelerator has 256 Mbytes of unified memory for video and OpenGL features. The Sun XVR-2500 graphics accelerator occupies one full-height, full-length PCI-Express slot.

[FIGURE 1-1](#) shows the Sun XVR-2500 graphics accelerator.

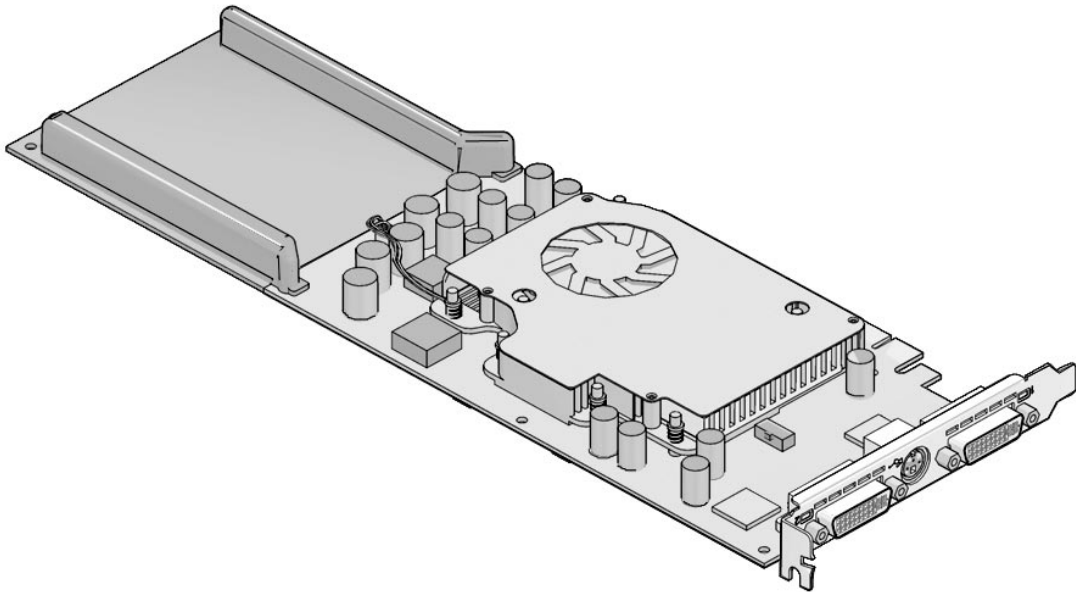


FIGURE 1-1 Sun XVR-2500 Graphics Accelerator

Features

- 256 Mbytes of unified memory for video memory, texture memory, Pbuffer, stencil, multisample, Z-buffer, accumulation buffer memory and display list memory
- 10-bit gamma correction
- Dual 1920 × 1200 screens supported from a single board
- Dual 1280 × 1024 stereo screen support
- Six programmable 36-bit vertex shaders supporting up to 1K instructions, subroutines, loops, and conditionals
- 48 programmable fragment shaders supporting up to 256K instructions, subroutines, loops, and predicates
- Programmable pixel shader
- Hardware cursor
- Stereoscopic viewing support (frame sequential)
- Display data channel (DDC) monitor support for communication
- Display power management signaling (DPMS) to enable monitor's power-saving mode
- High-speed, full-featured DMA over the PCI-Express bus
- Multiscreen support using multiple cards in a single workstation
- Multiview functionality for genlocking two graphics accelerators
- Stereo output
- Dual DVI-I video out

Additional Features

- Geometry acceleration
 - Model view matrix transformation of vertex and normal coordinates
 - Texture matrix transformation of texture coordinates
 - Perspective transformation
 - Viewport transformation
 - View volume clipping
- OpenGL operations (support Sun OpenGL 1.3 and OpenGL 1.5 for Solaris)
 - Multitexture and cube mapping
 - Points (2D, 3D, wide)
 - Vectors (2D and 3D lines and line strips; wide, stippled)
 - Polygons (triangles, triangle strips, quads, quad strips, polygons, point or line polygon mode)
 - Antialiased points, vectors, and polygons

- Scissoring
- Window clipping
- Masking
- Fogging (linear, exponential, exponential², user-defined)
- Texture mapping (point, bilinear, trilinear, multiple internal formats)
- Stencil operations
- Dithering
- Rich set of blending operations
- Fast window-mode double buffering
- Programmable vertex and fragment shaders (OpenGL 1.5 required)
- Extensive support of OpenGL
 - Imaging extensions such as pixel buffer, color table, and color matrix
 - Blend extensions such as blend color, blend minmax, and blend function separate
 - Texture extensions (edge clamp, border clamp, LOD (level-of-detail) clamp, generate mipmap)
 - Texture color table
 - Post-texturing specular reflection
 - Stencil operation wrap

Video Formats

TABLE 1-1 lists the Sun XVR-2500 graphics accelerator video formats. TABLE 1-1 also includes multisampling sizes for the applicable resolutions for single and dual screens (*spp* is samples per pixel). The heading “Dual Screen” refers to double-wide or double-high dual displays

TABLE 1-1 Sun XVR-2500 Graphics Accelerator Video Formats

Display Resolution	Vertical Refresh Rate (Hz)	Aspect Ratio Format	Sync Standard	Maximum Number of <i>spp</i> Single Screen	Maximum Number of <i>spp</i> Dual Screen
1920 × 1200	60, 75	16:10	Sun	8	-
1920 × 1080	60, 72	16:9	Sun	8	-
1600 × 1280	76	5:4	Sun	8	-
1600 × 1200	60, 75	4:3	VESA	8	-
1600 × 1200	60	4:3	Sun	8	-
1600 × 1024	60	4:3	Sun	16	-
1600 × 1000	66, 76	16:10	Sun	16	-
1440 × 900	76	16:10	Sun	16	-
1280 × 1024	96, 108, 112	5:4	Sun stereo	16	-
1280 × 1024	67, 76	5:4	Sun	16	-
1280 × 1024	60, 75, 85	5:4	VESA	16	-
1280 × 800	112	16:10	Sun stereo	16	4
1280 × 800	76	16:10	Sun	16	4
1280 × 768	56	5:3	Sun	16	4
1152 × 900	66, 76	5:4	Sun	16	4
1152 × 900	120	5:4	Sun stereo	16	4
1024 × 800	84	5:4	Sun	16	4
1024 × 768	77	4:3	Sun	16	8
1024 × 768	96	4:3	Sun stereo	16	4
1024 × 768	60, 70, 75	4:3	VESA	16	8
1024 × 692	100	4:3	Sun stereo	16	4

TABLE 1-1 Sun XVR-2500 Graphics Accelerator Video Formats (*Continued*)

Display Resolution	Vertical Refresh Rate (Hz)	Aspect Ratio Format	Sync Standard	Maximum Number of <i>spp</i> Single Screen	Maximum Number of <i>spp</i> Dual Screen
960 × 680	108, 112	7:5	Sun stereo	16	8
800 × 600	75	4:3	VESA	16	8
640 × 480	60, 72, 75	4:3	VESA	16	8

Note – Not all resolutions are supported by all displays (that is, monitors, projectors, and so on). Using resolutions that are not supported by the display might damage the display. Refer to your display manual for supported resolutions.

Listing Video Formats

- To list all graphics devices on your system, type:

```
host% fbconfig -list
```

- To list available resolutions for your display device, type:

```
host% fbconfig -dev kfb0 -res \?
```

Video Display Ports

The Sun XVR-2500 graphics accelerators provide two DVI video output ports. Each DVI video port supports both analog (DVI-A) and digital (DVI-D) video formats. Although the DVI port supports both analog and digital video formats, they cannot be used simultaneously from the individual DVI port.

Installation Process



Caution – The Sun XVR-2500 graphics accelerator are *not* hot-swappable.

1. Install the software ([Chapter 2](#)).
2. Shutdown the system.
3. Install the hardware ([Chapter 3](#)), repower the system, and reboot.
4. Modify the `Xservers` configuration file, if needed ([Chapter 4](#)).
5. Video format and other features are described in [Chapter 5](#) (optional).

Technical Support

For assistance and other information not found in this document concerning the Sun XVR-2500 graphics accelerator, see Support Services at:

<http://www.sun.com/support/>

For the latest software patches, go to <http://sunsolve.sun.com>

Installing the Software

This chapter provides Sun XVR-2500 graphics accelerator software installation information.

- [“Software Requirements”](#) on page 9
- [“Installing the Software”](#) on page 10
- [“Man Pages”](#) on page 13

Software Requirements

The Solaris 10 Operating System, or subsequent compatible version of the Solaris Operating System, is required on your SPARC[®] system before installing the Sun XVR-2500 graphics accelerator software:

- 3.5 Mbytes of available disk space for Sun XVR-2500 graphics accelerator Solaris system software
- 160 Mbytes for Sun OpenGL 1.5 for Solaris, 175 Mbytes of disk space for Sun OpenGL 1.3 for Solaris

See [Appendix B](#) for additional software information.

Installing the Software

Use the `install` utility on the CD-ROM to install the software. This utility installs necessary driver software and patches.

1. **Log in as superuser.**

2. **Insert the CD into the drive.**

- If the CD is already mounted, type the following and go to [Step 3](#):

```
# cd /cdrom/cdrom0
```

- If the CD is not already mounted, type:

```
# mount -F hsfs -O -o ro /dev/dsk/c0t6d0s0 /cdrom
# cd /cdrom
```

Note – The CD-ROM device might be different on your system. For example, `/dev/dsk/c0t2d0s2`.

3. **To install the software, type:**

```
# ./install
```

The following output varies depending on the configuration of the system:

```
Welcome to the Sun XVR-2500 Graphics Accelerator

Copyright 2005 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.

This program installs the software for the Sun XVR-2500
Graphics Accelerator.

Please select the version of Sun OpenGL to install:
1) Sun OpenGL 1.3
2) Sun OpenGL 1.5
3) Do not install Sun OpenGL
Enter a number: 2
```

The installation program checks if the graphics accelerator software is already installed. If already installed, the following is displayed:

```
*** Sun XVR-2500 Graphics Accelerator packages are already installed.
*** DCMTTool packages are already installed.
*** Sun OpenGL 200.1.5 packages are already installed.

*** All required software for Sun XVR-2500 Graphics Accelerator is
already installed - exiting.
```

4. Select the Sun OpenGL for Solaris version and press Return.

The following is displayed. For this example, option 2, Sun OpenGL 1.5 for Solaris, is selected on a Solaris 10 Operating System.

The following is displayed indicating the installation option selected:

```
This script is about to take the following actions:
- Install Sun XVR-2500 Graphics Accelerator software
- Install Sun XVR-2500 Graphics Accelerator patch(es) 120928-03
- Install DCMTTool
- Install Sun OpenGL 1.5
Press return to continue, or 'Q' to quit:
```

5. Press Return to begin installation.

When complete, the following is displayed:

Note – Depending on your system configuration, the actual output from the installation process might differ from what is shown below.

```
*** Installing Sun XVR-2500 Graphics Accelerator packages...
*** Installing patch 120928-03 for Solaris 10...
*** Installing DCMTTool packages...
*** Installing Sun OpenGL 1.5 packages...
*** Done. A log of this installation is at:
    /var/tmp/XVR-2500.install.2006.01.25
*** NOTE: The system should be rebooted as soon as possible to ensure
***      that the latest Sun XVR-2500 Graphics Accelerator software is in use.
```

6. Shut down the system after the software is installed:

```
# shutdown -i 5
```

See the `shutdown(1M)` and `boot(1M)` man pages for more details.

7. Go to [“Installing the Hardware” on page 15](#) for information on installing the hardware.

To remove the software, see [Appendix C](#).

Man Pages

The Sun XVR-2500 graphics accelerator man pages describe how you can query and set frame buffer attributes such as screen resolutions and visual configurations. You may also access the Display Configuration Management tool (`DCMtool`) for changing monitor screen resolutions ([Appendix D](#)).

Use the `fbconfig(1M)` man page for configuring all Sun graphics accelerators. `SUNWkfb_config(1M)` contains Sun XVR-2500 device-specific configuration information. To get a list of all devices on your system, type:

```
host% fbconfig -list
```

Use the `fbconfig -help` option to display the attributes and parameters information of the man page. To access the help page, type:

```
host% fbconfig -dev kfb0 -help
```

- To access the `fbconfig` man page, type:

```
host% man fbconfig
```

- To access the Sun XVR-2500 graphics accelerator man page, type:

```
host% man SUNWkfb_config
```


Installing the Hardware

This chapter provides Sun XVR-2500 graphics accelerator hardware installation information.

- “Before Installation” on page 15
- “System Configuration” on page 16
- “Installing the Hardware” on page 16
- “Monitor Cables” on page 17
- “Changing the Monitor Screen Resolutions” on page 17

Before Installation

Refer to your system platform documentation for proper procedures on how to shut down the system safely before installing or removing any internal boards, and how to reboot the system after installation. Access documentation at:

<http://www.sun.com/documentation>

System Configuration

The Sun XVR-2500 graphics accelerator consumes 75 watts of system power and occupies one PCI-Express slot.

You can configure the Sun Ultra 45 workstation with a maximum of two Sun XVR-2500 graphics accelerators.

To find the most recent information on system configurations, and additional specifications, go to:

<http://www.sun.com/desktop/products/graphics>

Installing the Hardware

Refer to the platform documentation provided with your Sun system for detailed instructions on installing Sun PCI-Express bus graphics boards:

Sun Ultra 45 Workstation Service and Diagnostics Manual (819-1892-10)

Access system hardware documentation at:

<http://www.sun.com/documentation>

After installing your graphics accelerator and securing your system enclosure:

1. **Connect the monitor cable (see “[Monitor Cables](#)” on page 17), power on the monitor, then power on the system and reboot (boot) for reconfiguration.**
2. **For multiple graphics boards, modify the `/etc/dt/config/Xservers` file.**

This file tells your system to run the X window system on each of the graphics boards listed in your `Xservers` file. If you remove graphics boards from your system, you also need to modify your `Xservers` file. See [Chapter 4](#), “Configuring Multiple Frame Buffers.”

Monitor Cables

Use the proper DVI-I monitor adapter cable that supports your monitor. The DVI-I to HD15 monitor adapter, Sun part number 530-3305, comes with the Sun graphics accelerator installation kit. You can also order the DVI-I to HD15 adapter through the Sun store (<http://store.sun.com>).

Changing the Monitor Screen Resolutions

Note – The monitor must be connected to the Sun XVR-2500 graphics accelerator and powered on for it to configure to the monitor resolution.

For most installations, the graphics accelerator device automatically configures itself to the screen resolution and refresh rate for the monitor. If a Sun monitor is connected to the graphics accelerator device, the monitor might have the wrong screen resolution. Use the `fbconfig` utility to change the screen resolution. (To change screen resolutions using the Display Configuration Management tool, `DCMtool`, see [Appendix D](#).)

`SUNWkfb_config` contains Sun XVR-2500 graphics accelerator device-specific configuration information.

- **To change the screen resolution using the `SUNWkfb_config` man page, type:**

```
% man SUNWkfb_config
```


Configuring Multiple Frame Buffers

This chapter describes procedures for setting up multiple frame buffers.

- “Configuring Multiple Frame Buffers Through the `Xservers` File” on page 19
- “Xinerama” on page 21

Configuring Multiple Frame Buffers Through the `Xservers` File

To run more than one frame buffer, modify the `/etc/dt/config/Xservers` file. The Sun XVR-2500 graphics accelerator device name is `kfb` (for example, `kfb0` and `kfb1` for two Sun XVR-2500 graphics accelerator devices). To modify the file:

1. **Become superuser and open the `/etc/dt/config/Xservers` file.**

```
# cd /etc/dt/config
# vi + Xservers
```

If the `/etc/dt/config/Xservers` file does not exist, create the `/etc/dt/config` directory and copy the `Xservers` file from `/usr/dt/config/Xservers` to `/etc/dt/config`.

```
# mkdir -p /etc/dt/config
# cp /usr/dt/config/Xservers /etc/dt/config
# cd /etc/dt/config
# vi + Xservers
```

2. Modify the `Xservers` file by adding the device locations for the applicable frame buffers being used.

To get a list of all devices on your system, type:

```
host% fbconfig -list
```

For example, enter the `Xservers` file content on a single line.

This example shows the `Xservers` configuration file modified for two Sun XVR-2500 graphics accelerators:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun -dev /dev/fbs/kfb0  
-dev /dev/fbs/kfb1
```

3. Log out, then log back in.

If you are editing the `Xservers` file after completing all the installation steps outlined in Chapter 1, [“Installation Process” on page 7](#), including the reconfiguration, reboot your system.

Xinerama

Xinerama is an X window system feature that enables multiscreen displays over a single logical screen. Xinerama is available in the Solaris 10 Operating System software and subsequent compatible releases for Sun graphics boards.

Refer to the proper `Xservers(1)` and `XSun(1)` man pages and `Xservers` documentation for further information.

Using Xinerama

When the window system is started in Xinerama mode, all windows can be seamlessly moved across screen boundaries, thus creating one large, super high-resolution, virtual display. With Sun OpenGL 1.3 and 1.5 for Solaris or subsequent compatible releases, this functionality is extended to OpenGL applications. No recompilation is necessary for a legacy application to work with Xinerama mode across multiple screens, even if the application was compiled with an older version of Sun OpenGL for Solaris.

1. **To enable Xinerama mode (single logical screen) on multiscreen displays, add `+xinerama` to the `Xsun` command line in the `/etc/dt/config/Xservers` file.**

As superuser, type:

```
# cd /etc/dt/config
# vi + Xservers
```

2. **Modify the `Xservers` file.**

Enter the `Xservers` file content on a single line:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun +xinerama
-dev /dev/fbs/kfb0 -dev /dev/fbs/kfb1
```

3. **Log out, then log back in.**

Restrictions When Using Xinerama

- Both screens must use the same Sun PCI-Express based graphics device.
- Both screens that the X window system thinks are side by side must have the same height.
- Both screens that the X window system thinks are above and below must have the same width.

Using Features

This chapter provides Sun XVR-2500 graphics accelerator feature information.

- [“Streaming Methods” on page 23](#)
 - [“Setting Up Streaming Methods” on page 24](#)
 - [“Multisampling” on page 27](#)
 - [“Checking Device Configuration” on page 29](#)
-

Streaming Methods

There are two methods described in this section for streaming video from which to choose with the Sun XVR-2500 graphics accelerator:

- Single video output on a single screen (default)
- Two video streams over one large frame buffer

The following section, [“Setting Up Streaming Methods” on page 24](#), describes how to set up these streaming methods.

When there are two Sun graphics accelerators in a system, they are numbered from 0 and by ones (0, 1, 2, 3, ...). For example, if two Sun XVR-2500 graphics accelerators are installed, device for the first graphics accelerator is `kfb0` and the second device would be `kfb1`.

Setting Up Streaming Methods

This section describes how to set up streaming methods for single and two monitor support.

Note – The default video output port (kfb0) is shown in [FIGURE 5-1](#). You can only display from the second video output port (upper) by using `doublewide` or `doublehigh` configurations. Devices `kfb0a` and `kfb0b` are not supported.

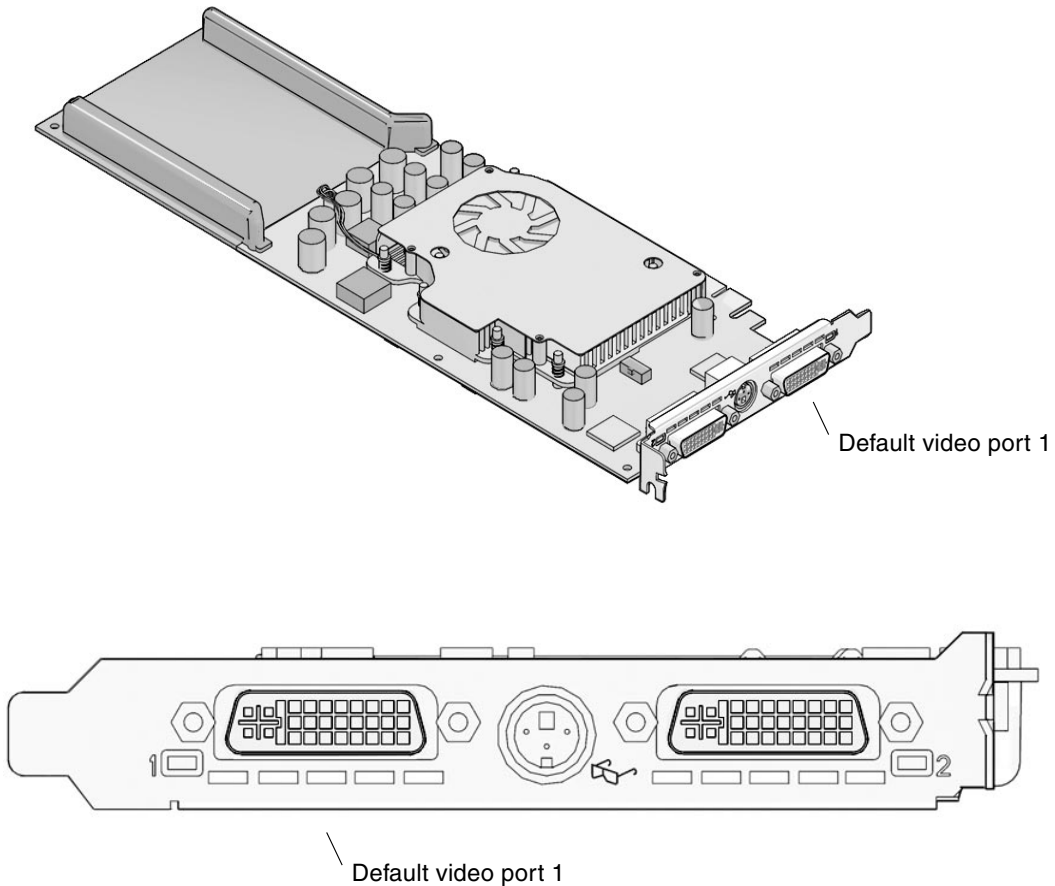


FIGURE 5-1 Default Video Port

Setting Up Single Video Output

This enables the first DVI-I port 1 output only. This is the default the system uses if no `fbconfig` commands have been given, or after `fbconfig -dev kfb0 -defaults`.

To set up single video output, do the following:

1. **If enabled, disable doublewide mode. Type:**

```
host% fbconfig -dev kfb0 -defaults
```

2. **Set the desired screen resolution.**

For the following example resolution, type:

```
host% fbconfig -dev kfb0 -res 1280x1024x75
```

To find all possible Sun graphics accelerator resolutions, type:

```
host% fbconfig -dev kfb0 -res \?
```

Setting Up Two Video Streams Over One Large Frame Buffer

This enables two monitor support without the use of Xinerama software. For example, one Sun XVR-2500 graphics accelerator can create one wide (or tall) frame buffer, displayed across two screens.

To set up two video streams over one frame buffer, do the following:

1. **Enable both streams, sharing a single frame buffer. Type:**

```
host% fbconfig -dev kfb0 -doublewide enable
```

- Use the `-doublehigh` option for displays that are set one above the other (rather than side-by-side as for the `-doublewide` option).

- Use the `-offset` option to adjust the position of the specified stream by the value specified.

```
-offset xval yval
```

This is only implemented in `-doublewide` and `-doublehigh` modes. For `-doublewide`, `xval` is used to position the rightmost stream. Negative is left (overlaps with the left stream). For `-doublehigh`, the `yval` is used to position the bottom stream. Negative is up (overlaps with top stream). The default is `[0, 0]`.

2. Set the desired screen resolution.

For example, type:

```
host% fbconfig -dev kfb0 -res 1280x1024x75
```

The following is an example of a full overlap for the 1280×1024 resolution, replicating one stream on two screens:

```
host% fbconfig -dev kfb0 -offset -1280 0 -doublewide enable
```

Multisampling

Multisample allocation occurs when the window system is started or restarted. The configuration `samples-per-pixel` parameter specifies the depth that is pre-allocated. [TABLE 5-1](#) describes the `fbconfig -multisample` options.

```
-multisample [ available | disable | forceon ]
```

TABLE 5-1 Multisample Options

Option	Description
<code>available</code>	Multisample is possible but is selected on a per application basis. A fixed numbers of samples is used per pixel.
<code>disable</code>	No multisample is possible. <code>disable</code> is the default.
<code>forceon</code>	Multisampling for all Sun OpenGL for Solaris windows. A fixed number of samples is used per pixel. (<code>force</code> is an acceptable abbreviation for this option.)

Sample Density

The `-samples` option specifies the number of samples per pixel to allocate when `multisample` is not set to `disable`. The available `-sample` sizes are 1, 4, 8, or 16. (The `-defaults` option sets sample density to 4.)

```
-samples [ 1 | 4 | 8 | 16 ]
```

The maximum sample size is 16 samples per pixel. Though the allowable choices are 1 to 16, a very high sample density can be allocated only at low resolution.

See [TABLE 1-1](#) in [Chapter 1](#) for a list of how many samples per pixel are supported at the various maximum 3D resolutions. The [TABLE 1-1](#) heading “Dual screen” refers to doublewide or doublehigh displays.

Disabling Multisampling

When you disable multisampling, no multisample rendering is possible. Only one sample per pixel is allocated, despite any `-samples` option value.

1. To disable multisampling, type:

```
host% fbconfig -dev kfb0 -multisample disable
```

2. Log out, then log back in.

Checking Device Configuration

Use `fbconfig` to check the X window system (`-propt`) and the Sun XVR-2500 graphics accelerator (`-prconf`) device configuration values.

The `fbconfig -propt` option displays the values of all options (for the specified device) saved in the `OWconfig` file. These are the values the X window system will use the next time it starts on that device:

```
# fbconfig -dev kfb1 -propt

--- Graphics Configuration for /dev/fbs/kfb1 ---

OWconfig: machine
Video Mode: SUNW_STD_1280x1024x76

Multisample Information:
    Multisample Mode: Disabled (multisample visuals will not be available)
    Samples Per Pixel: N/A (multisampling disabled)

Screen Information:
    DoubleWide: Disabled
    DoubleHigh: Disabled
    Output Configuration: Direct
    Offset/Overlap: [0, 0]

Visual Information:
    Default Visual: Non-Linear Normal Visual
    Gamma Correction: using gamma value 2.22
    Default Visual Depth (defdepth): 24
```

The `fbconfig -prconf` option displays the current Sun graphics device configuration. If certain values (for example, resolution and sample density) differ from those displayed in `-propt`, it is because those values have been configured since the X window system started.

```
# fbconfig -dev kfb1 -prconf

--- Hardware Configuration for /dev/fbs/kfb1 ---

Type: XVR-2500
PROM Information: @(#) xvr2500.fth 16.120 05/10/07

Monitor/Resolution Information:
    Current resolution setting: SUNW_STD_1280x1024x76

Framelock Configuration:
    Slave Mode: Disabled
```

Setting the Default Console Display

These instructions describe how to set the Sun XVR-2500 graphics accelerator as the default monitor console display.

Note – You can only use the DVI port 1 as the console output. See [FIGURE 5-1](#) and [Appendix G](#) for the location of DVI port 1.

1. At the ok prompt, type:

```
ok show-displays
```

Information similar to the text below is displayed:

```
a) /pci@1f,0/SUNW,XVR-100@3
b) /pci@1c,600000/pci@2/SUNW,XVR-2500@0
q) NO SELECTION
Enter Selection, q to quit: b
```

2. Select the graphics board you want to be the default console display.

In the preceding example, **b** signifies the Sun XVR-2500 graphics accelerator. Your selection is confirmed by the following output:

```
/pci@1c,600000/pci@2/SUNW,XVR-2500@0 has been selected.
Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y
    for creating devalias mydev for /pci@1c,600000/pci@2/SUNW,XVR-2500@
```

3. Using the Sun XVR-2500 graphics accelerator in this example, create an alias name for the Sun XVR-2500 device:

This step is optional for all systems. Creating the alias, however, simplifies future OpenBoot™ PROM commands.

a. Use `nvalias` to name the Sun XVR-2500 graphics accelerator device.

This example uses `mydev` as the device.

```
ok nvalias mydev (Control-Y)
```

Complete the line entry by pressing Control-Y on your keyboard (that is, press and hold Control and press the Y key) and then Return. The output displays as:

```
ok nvalias mydev /pci@1c,600000/pci@2/SUNW,XVR-2500@0
```

b. Verify the alias.

```
ok devalias  
mydev                /pci@1c,600000/pci@2/SUNW,XVR-2500@0  
screen               /pci@1c,600000/pci@2/SUNW,XVR-2500@0  
mouse                /pci@9,700000/usb@1,3/mouse@2  
keyboard             /pci@9,700000/usb@1,3/keyboard@1  
....
```

In the preceding output, both `mydev` and `screen` are mapped to `/pci@1c,600000/pci@2/SUNW,XVR-2500@0` and are therefore interchangeable alias names.

In this procedure example, you can now refer to `mydev` as the Sun XVR-2500 graphics accelerator device, as shown in the next step.

4. Set the selected device to be the default console display.

For example,

```
ok setenv output-device mydev  
output-device = mydev
```

Without Step 3 (creating an alias name), you need to type the entire device name precisely. In this example, you would need to enter the following:

```
ok setenv output-device /pci@1c,600000/pci@2/SUNW,XVR-2500@0  
output-device = /pci@1c,600000/pci@2/SUNW,XVR-2500@0
```

5. Reset the system using the new `output-device` as the console:

```
ok reset-all
```

6. Connect your monitor cable to the chosen device on your system back panel.

7. To set a resolution (for example, $1280 \times 1024 \times 60$), type:

```
ok setenv output-device mydev:r1280x1024x60  
output-device=mydev:r1280x1024x60
```

8. Reset the system:

```
ok reset-all
```


Software Information

This appendix lists the product software directories and packages.

- [“Software Directory Packages” on page 35](#)
- [“Sun OpenGL for Solaris Software” on page 37](#)

Software Directory Packages

TABLE B-1 CD-ROM Directory Package

Directory Name	Description
License	Binary Code License
Product/XVR-2500/	Software packages and patches
Docs/	Documentation
Copyright	English version of copyright
FR_Copyright	French version of copyright
install	Product installation script
uninstall	Product uninstall script
/Product/OpenGL/1.3/	Sun OpenGL 1.3 packages and patches
/Product/OpenGL/1.5/	Sun OpenGL 1.5 packages and patches
/Product/ExtraValue/	DCMtool packages
README	Listing of CD contents

Software Package Locations

The Sun XVR-2500 graphics accelerator Solaris 10 Operating System software packages are located at:

`/cdrom/cdrom0/Product/XVR-2500/Solaris_10/Packages`

If the CD is not already mounted, `/cdrom/Product/XVR-2500/` is the path.

Software Packages

TABLE B-2 Software Packages

Package Name	Description
SUNWkfb	System software/device driver
SUNWkfbcf	Configuration software
SUNWkfbmn	Manual page
SUNWkfbr	System software (root)
SUNWkfbw	Window system support

Note – Always check for the latest software patches at:
<http://sunsolve.sun.com>

Sun OpenGL for Solaris Software

The Sun XVR-2500 graphics accelerator is supported in Sun OpenGL versions 1.3 and 1.5 and subsequent compatible Sun OpenGL versions, for Solaris Operating Systems.

Software Package Locations

TABLE B-3 Location of Sun OpenGL for Solaris Software Packages

Sun OpenGL for Solaris Packages	Directory Location
Sun OpenGL 1.5 software	/cdrom/cdrom0/Product/OpenGL/1.5/Packages
Sun OpenGL 1.3 software	/cdrom/cdrom0/Product/OpenGL/1.3/Packages

Software Patch Locations

TABLE B-4 Location of Sun OpenGL for Solaris Software Patches

Sun OpenGL for Solaris Packages	Directory Location
Sun OpenGL 1.5 software	/cdrom/cdrom0/Product/OpenGL/1.5/Patches
Sun OpenGL 1.3 software	/cdrom/cdrom0/Product/OpenGL/1.3/Patches

Software Packages

TABLE B-5 Sun OpenGL 1.5 Packages

Package Name	Description
SUNWg1h	Sun OpenGL for Solaris Header Files
SUNWg1rt	Sun OpenGL for Solaris SPARC Runtime Libraries
SUNWg1doc	Sun OpenGL for Solaris Documentation and Man Pages

TABLE B-6 Sun OpenGL 1.3 Packages

Package Name	Description
SUNWg1doc	Sun OpenGL for Solaris Documentation and Man Pages
SUNWg1dp	Sun OpenGL for Solaris Device Pipeline Support
SUNWg1dpx	Sun OpenGL for Solaris 64-bit Device Pipeline Support
SUNWg1h	Sun OpenGL for Solaris Header Files
SUNWg1rt	Sun OpenGL for Solaris Runtime Libraries
SUNWg1rtu	Sun OpenGL for Solaris Platform Specific Runtime Libraries
SUNWg1rtx	Sun OpenGL for Solaris 64-bit Runtime Libraries
SUNWg1sr	Sun OpenGL for Solaris Runtime Generic Software
SUNWg1srx	Sun OpenGL for Solaris 64-bit Optimized SW Rasterizer
SUNWg1srz	Sun OpenGL for Solaris Optimized SW Rasterizer

Removing the Software

This appendix describes how to remove the product software.

1. Log in as superuser.

2. Insert the CD into the drive.

- If the drive is already mounted, type the following, and go to Step 4:

```
# cd /cdrom/cdrom0
```

- If the CD is not already mounted, type:

```
# mount -F hsfs -O -o ro /dev/dsk/c0t6d0s0 /cdrom
# cd /cdrom
```

3. To remove the software, become superuser and type:

```
# ./uninstall
```

The following list of options is displayed:

```
1) Remove Sun XVR-2500 Graphics Accelerator support
2) Remove Sun OpenGL
3) Remove DCMTool
4) Remove All (Sun XVR-2500 Graphics Accelerator, DCMTool, and Sun OpenGL)
5) Quit
Select an option:
```

4. Select Option 4 to remove all listed software packages.

The following text is displayed:

```
About to take the following actions:  
- Remove Sun XVR-2500 Graphics Accelerator support  
- Remove Sun OpenGL  
- Remove DCMTool  
Press 'Q' to quit, or press any other key to continue:
```

5. Press Return to start the removal process.

Once complete, the following is displayed and the program provides the location of a removal log:

```
*** Removing packages...  
*** Done. A log of this removal can be found at:  
    /var/tmp/XVR-2500.uninstall.2006.01.25
```

Display Configuration Management (DCMtool)

This appendix describes how to access the Display Configuration Management tool (DCMtool) for changing monitor screen resolutions.

DCMtool is available on the Sun XVR-2500 graphics accelerator CD-ROM in package SUNWdcm, located at:

```
/cdrom/cdrom0/Product/ExtraValue/
```

- **To change the screen resolution using DCMtool, type:**

```
% fbconfig -gui
```


Stereo Viewing

This appendix describes how to framelock two graphics accelerators for stereo viewing.

- [“Stereo” on page 43](#)
- [“Cabling for Stereo” on page 44](#)
- [“Configuring for Stereo” on page 46](#)

Stereo

Displays must be synchronized so that the left and right views can be seen correctly through one set of LCD stereo glasses. The means of synchronizing stereo displays using stereo glasses and stereo emitters is through the 3-pin stereo connector.

Cabling for Stereo

Cable the Sun graphics accelerators for stereo before configuring your system. (See [“Configuring for Stereo”](#) on page 46.)

1. Locate the stereo connector on the Sun XVR-2500 graphics accelerator I/O backplate on the rear of your system ([FIGURE E-1](#)).

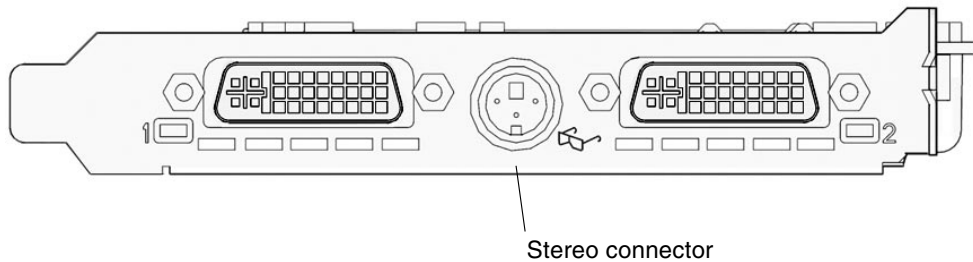


FIGURE E-1 Sun XVR-2500 Graphics Accelerator Stereo Connector

2. Connect the stereo glasses cable to the stereo connector ([FIGURE E-2](#)).

Note – The Sun XVR-2500 graphics accelerator can use both tethered and wireless stereo glasses. For wireless stereo glasses, connect the emitter connector to the Sun graphics accelerator stereo connector.

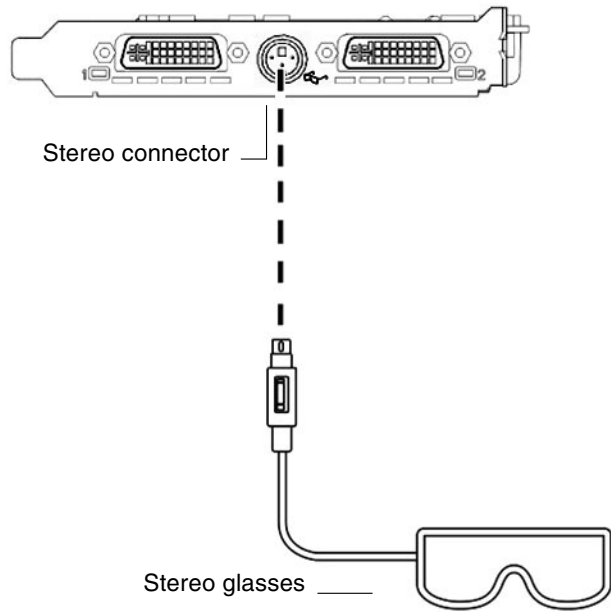


FIGURE E-2 Cabling for Stereo

Configuring for Stereo

1. **Change a resolution by using the `fbconfig` command.**

You must configure each board separately (that is, for `kfb0`, `kfb1`, and so on).
For example:

```
host% fbconfig -dev kfb0 -res SUNW_STEREO_1280x1024x96
```

2. **Log out of the X window system, and then log back in for the resolutions to take effect.**

Multiscreen Viewing

This appendix describes how to genlock two graphics accelerators for viewing multiscreen applications (multiview).

- [“Multiview” on page 47](#)
- [“Multiview Genlock Ribbon Cable” on page 48](#)
- [“Configuring for Multiview” on page 49](#)

Multiview

Multiview across two Sun XVR-2500 graphics accelerators is done by genlocking the two graphics boards. In a single Sun Ultra 45 workstation, genlocking allows the two graphics boards to display synchronous multiscreen applications. The graphics boards are synchronized using a multiview genlock ribbon cable by connecting the multiview connector of one graphics board to the multiview connector of the second graphics board.

Multiview Genlock Ribbon Cable

FIGURE F-1 shows the genlock ribbon cable connector pinout locations as you look at the connector end that plugs into the Sun XVR-2500 graphics accelerator multiview connector (FIGURE F-2). The internal multiview genlock ribbon cable is provided in the installation kit.

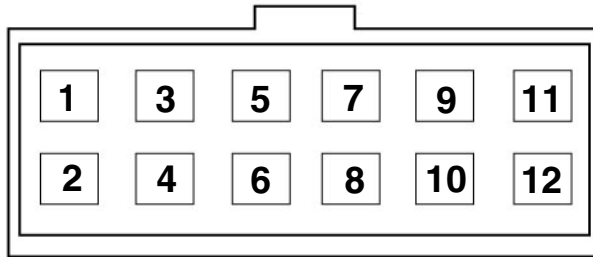


FIGURE F-1 Multiview Genlock Cable Connector

TABLE F-1 lists the genlock ribbon cable pinout descriptions used for multiviewing:

TABLE F-1 Multiview Genlock Ribbon Cable Pinout

Pin	Description
5	PIXALIGNOUT - Pixel Align Out
6	PIXALIGNIN - Pixel Align In
10	Ground
12	Ground

Configuring for Multiview

Multiview synchronization enables vertical retracing to occur simultaneously across each Sun XVR-2500 graphics accelerator in the system. This feature is typically used for stereo mode applications. Vertical retrace synchronization eliminates flicker between multiscreen displays.



Caution – Power off the system before connecting the genlock ribbon cable when configuring for multiview.

1. Connect the multiview genlock ribbon cable between both graphics boards.
 - a. Connect the top of the genlock ribbon cable to the multiview connector of the first graphics board (FIGURE F-2).
 - b. Connect the other end of the genlock ribbon cable to the multiview connector of the second graphics board (FIGURE F-2).

Note – You can only configure for multiview after logging into the workstation desktop. Multiview settings are not retained, therefore, you need to configure for multiview each time you log in.

2. Make sure that both Sun graphics accelerators are running identical video formats.
 - a. Check the resolution of each board by using the `fbconfig` command.

For example:

```
host% fbconfig -dev kfb0 -prconf
```

- b. Change a resolution by using the `fbconfig` command.

You must configure each board separately (that is, for `kfb0`, `kfb1`, and so on).

For example:

```
host% fbconfig -dev kfb0 -res SUNW_STEREO_1280x1024x96
host% fbconfig -dev kfb1 -res SUNW_STEREO_1280x1024x96
```

- c. Log out of the X window system, and then log back in for the resolutions to take effect.

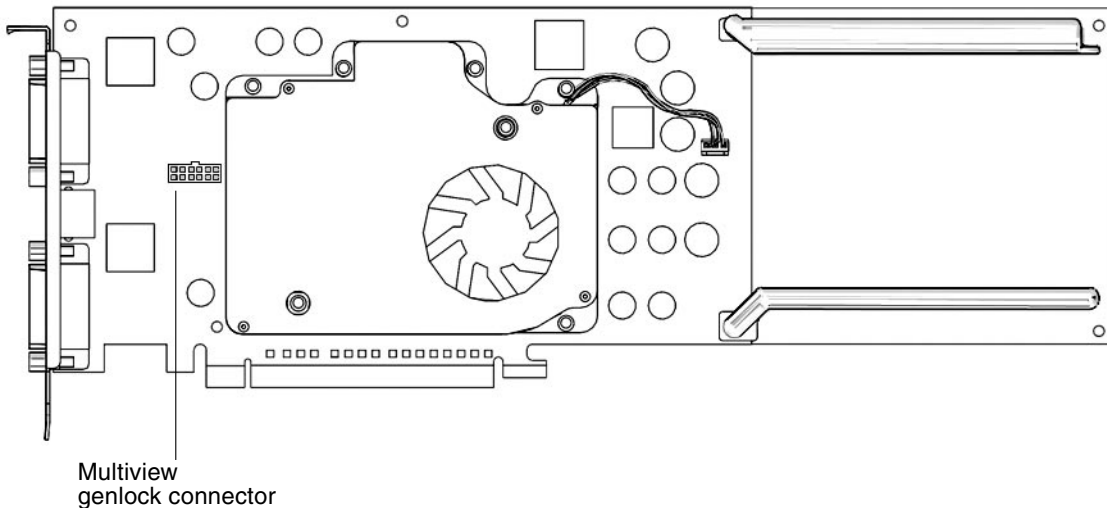


FIGURE F-2 Sun XVR-2500 Graphics Accelerator Multiview Connector

3. From any desktop command window, configure both graphics boards for multiview mode.

To do this, use the `fbconfig` command.

```
% fbconfig -dev kfb0 -slave multiview  
% fbconfig -dev kfb1 -slave multiview
```

Your system is now ready for synchronous multiscreen applications.

In order to reconfigure a graphics board from slave mode back to primary mode, do one of the following:

- Power cycle the system.
- Use the `fbconfig` command. For example:

```
% fbconfig -dev kfb1 -slave disable
```

Log out of the X window system, and then log back in for the configuration to take effect.

Specifications

This appendix provides product specifications.

- [“I/O Port Specifications” on page 51](#)
- [“DVI Video Connector” on page 52](#)
- [“Stereo Connector” on page 54](#)
- [“Power Requirements” on page 55f](#)

I/O Port Specifications

The external I/O ports are accessible through the I/O connectors on the Sun XVR-2500 graphics accelerator backplate ([FIGURE G-1](#)).

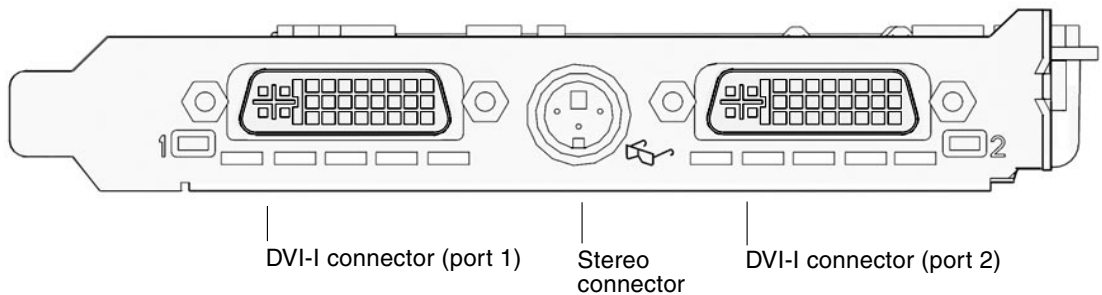


FIGURE G-1 Sun XVR-2500 Graphics Accelerator I/O Backplate

DVI Video Connector

FIGURE G-2 and TABLE G-1 shows the DVI connector and pinout signals for both the Sun XVR-2500 graphics accelerator pinout signals. The DVI video connector is a 30-pin connector and supports both analog and digital resolutions, but both cannot be used simultaneously from the individual DVI connector.

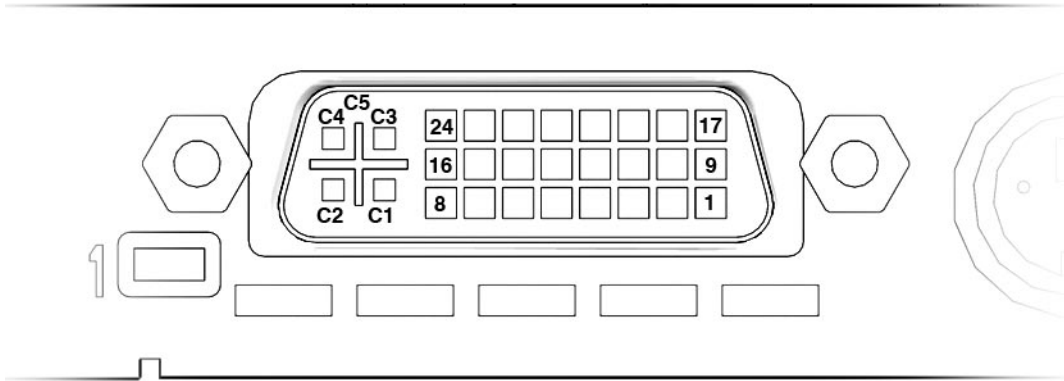


FIGURE G-2 DVI Video Connector

TABLE G-1 DVI Connector Pinout

Pin	Signals for Sun XVR-2500
1	TMDS Data2-
2	TMDS Data2+
3	TMDS Data2/4 Shield
4	No connect
5	No connect
6	DDC Clock (SCL)
7	DDC Bi-directional Data (SDA)
8	Analog vertical sync
9	TMDS Data1-

TABLE G-1 DVI Connector Pinout (*Continued*)

Pin	Signals for Sun XVR-2500
10	TMDS Data1+
11	TMDS Data1/3 Shield
12	No connect
13	No connect
14	+5V CD power
15	GND Return: +5V, Hsync, Vsync
16	Hot Plug Detect
17	TMDS Data0-
18	TMDS Data0+
19	TMDS Data0/5 shield
20	No connect
21	No connect
22	TMDS Clock shield
23	TMDS Clock+
24	TMDS Clock-
C1	Analog Red
C2	Analog Green
C3	Analog Blue
C4	Analog Horizontal Sync
C5	Analog GND Return: (analog R, G, B)

Stereo Connector

FIGURE G-3 and TABLE G-2 shows the 3-pin stereo connector and pinout signals.

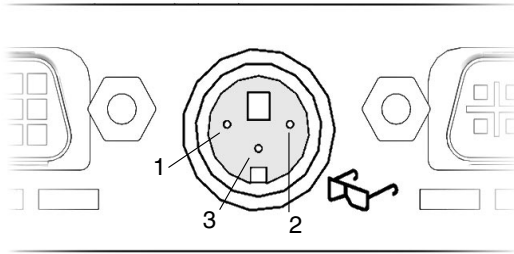


FIGURE G-3 Stereo 3-Pin Connector

TABLE G-2 Stereo 3-Pin Connector Pinout Descriptions

Pin	Signal
1	+5.0V
2	Ground
3	Stereo sync

Power Requirements

This graphics accelerator is for use with UL Listed ITE that have installation instructions detailing user installation of card cage accessories.

[TABLE G-3](#) lists the power consumption values.

TABLE G-3 Sun XVR-2500 Graphics Accelerator Power Consumption

Parameter	Specification	
Input voltage	3.3 v	12 v
Maximum current	3 A	5.1 A
Total power	71 W	

Graphics Library Extensions

This appendix lists the Sun OpenGL for Solaris graphics library extensions for the Sun XVR-2500 graphics accelerator. This product supports Sun OpenGL 1.3 and Sun OpenGL 1.5 for Solaris. For detailed information on using the following graphics library extensions, go to:

<http://www.opengl.org>

- “Sun OpenGL 1.3 for Solaris Extensions” on page 57
- “Sun OpenGL 1.5 for Solaris Extensions” on page 58

Sun OpenGL 1.3 for Solaris Extensions

The Sun XVR-2500 graphics accelerator supports the following Sun OpenGL 1.3 for Solaris extensions:

- GL_ARB_multisample
- GL_ARB_multitexture
- GL_ARB_shadow
- GL_ARB_texture_border_clamp
- GL_ARB_texture_compression – Texture compression extension
- GL_ARB_texture_cube_map – Cube map texture extension
- GL_ARB_texture_env_add
- GL_ARB_texture_env_combine
- GL_ARB_texture_env_crossbar
- GL_ARB_texture_env_dot3
- GL_ARB_texture_mirrored_repeat
- GL_ARB_transpose_matrix
- GL_ARB_transpose_matrix
- GL_EXT_bgra
- GL_EXT_blend_color
- GL_EXT_blend_func_separate – Separate blend function extension

- GL_EXT_blend_minmax
- GL_EXT_blend_subtract
- GL_EXT_convolution
- GL_EXT_histogram
- GL_EXT_multi_draw_arrays
- GL_EXT_rescale_normal
- GL_EXT_secondary_color
- GL_EXT_stencil_wrap
- GL_EXT_texture3D
- GL_EXT_texture_env_combine
- GL_EXT_texture_filter_anisotropic
- GL_EXT_texture_lod_bias
- GL_HP_occlusion_test
- GL_SGI_color_table
- GL_SGI_texture_color_table
- GL_SGIS_texture_border_clamp – Texture border clamp extension
- GL_SUN_blend_src_mult_dst_alpha – Defines two alpha blending factors: GL_SRC_ALPHA_MULT_ONE_MINUS_DST_ALPHA_SUN and GL_SRC_ALPHA_MULT_DST_ALPHA_SUN, used as the source RGB blending factors to perform Porter-Duff blending

Sun OpenGL 1.5 for Solaris Extensions

The Sun XVR-2500 graphics accelerator supports the following Sun OpenGL 1.5 for Solaris extensions:

- GL_ARB_depth_texture
- GL_ARB_fragment_program
- GL_ARB_multisample
- GL_ARB_multitexture
- GL_ARB_occlusion_query
- GL_ARB_point_parameters
- GL_ARB_shader_objects
- GL_ARB_shading_language_100
- GL_ARB_shadow
- GL_ARB_texture_border_clamp
- GL_ARB_texture_compression
- GL_ARB_texture_cube_map
- GL_ARB_texture_env_add
- GL_ARB_texture_env_combine
- GL_ARB_texture_env_crossbar
- GL_ARB_texture_env_dot3
- GL_ARB_texture_mirrored_repeat
- GL_ARB_transpose_matrix

- GL_ARB_vertex_program
- GL_ARB_vertex_shader
- GL_EXT_bgra
- GL_EXT_blend_color
- GL_EXT_blend_func_separate
- GL_EXT_blend_minmax
- GL_EXT_blend_subtract
- GL_EXT_convolution
- GL_EXT_convolution_border_modes
- GL_EXT_fog_coord
- GL_EXT_histogram
- GL_EXT_multi_draw_arrays
- GL_EXT_rescale_normal
- GL_EXT_secondary_color
- GL_EXT_shadow_funcs
- GL_EXT_stencil_wrap
- GL_EXT_texture3D
- GL_EXT_texture_env_combine
- GL_EXT_texture_filter_anisotropic
- GL_EXT_texture_lod_bias
- GL_HP_occlusion_test
- GL_SGIS_texture_border_clamp
- GL_SGI_color_table
- GL_SGI_texture_color_table

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