



Sun™ XVR-1000 Graphics Accelerator Installation and User's Guide

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Part No. 816-1330-11
June 2002, Revision A

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Preface

This guide describes how to install the Sun™ XVR-1000 graphics accelerator and associated software in a Sun system.

How This Book Is Organized

Chapter 1 provides an overview of the Sun XVR-1000 graphics accelerator product and includes the graphics board models, supported Sun systems, and supported screen resolutions.

Chapter 2 describes how to install and remove Sun XVR-1000 graphics accelerator software.

Chapter 3 provides Sun XVR-1000 graphics accelerator hardware installation information.

Chapter 4 provides information on using Sun XVR-1000 graphics accelerator features, including multistreams and dynamic multisample antialiasing.

Chapter 5 describes Sun XVR-1000 graphics accelerator frame locking.

Appendix A provides information on the Sun XVR-1000 graphics accelerator I/O ports and screen resolution matrix.

Appendix B provides information for setting up S-video (NTSC and PAL video formats) on the Sun XVR-1000 graphics accelerator.

Appendix C provides information on Xinerama.

Appendix D describes how to set the default console display.

Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	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. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su 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> .

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	#

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A broad selection of Sun system documentation is located at:

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Sun XVR-1000 Graphics Accelerator Overview

This chapter provides an overview of the Sun XVR-1000 graphics accelerator.

- “Installation Kit” on page 1
- “Sun XVR-1000 Graphics Accelerator Features” on page 2
- “System Configurations” on page 3
- “Screen Resolutions” on page 4
- “Using Sun XVR-1000 Graphics Accelerator With Other UPA Graphics Boards” on page 6
- “Window System Support and Supported Visuals” on page 7
- “Technical Support” on page 7

Installation Kit

The Sun XVR-1000 graphics accelerator installation kit includes:

- Sun XVR-1000 graphics accelerator
- Sun XVR-1000 graphics accelerator software (CD-ROM)
- Antistatic wrist strap
- *Sun XVR-1000 Graphics Accelerator Installation and User’s Guide*, this document

See Chapter 5, “Sun XVR-1000 Graphics Accelerator Frame Locking and Buffer Swap Synchronization,” to order a frame lock cable assembly, if required.

Sun XVR-1000 Graphics Accelerator Features

The Sun XVR-1000 graphics accelerator is an UltraSPARC™ port architecture (UPA) bus high-resolution, high-performance graphics frame buffer that provides 30-bit color and 3D acceleration. The graphics board has full hardware support for 2D and 3D texture mapping, as well as dynamic multisample antialiasing and an S-video port.

The Sun XVR-1000 graphics accelerator is supported on the following systems:

- Sun Ultra™ 60 system
- Sun Ultra 80 system
- Sun Blade™ 1000 system
- Sun Blade 2000 system

Features include:

- Up to 120 MHz UPA interface
- Resolution up to 1920 × 1200 × 75 at 30-bit color
- 72 Mbytes of 3DRAM64 frame buffer memory
- 256 Mbytes of texture memory
- 10-bit per color DAC located on the 13W3 and HD-15 connectors
- Stereo output
- Digital output from second head daughter board
- S-video output from main board
- Support for programmable video resolutions

FIGURE 1-1 shows the Sun XVR-1000 graphics accelerator.

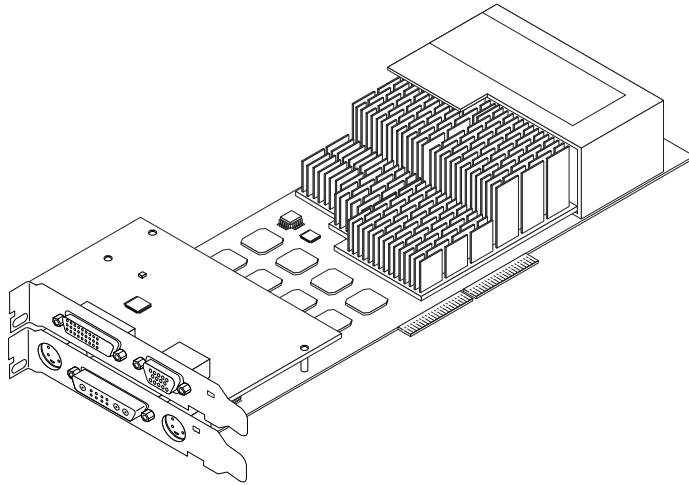


FIGURE 1-1 Sun XVR-1000 Graphics Accelerator

System Configurations

TABLE 1-1 shows the maximum number of Sun XVR-1000 graphics accelerators supported in Sun systems. See Chapter 5 for information on using multiple displays.

TABLE 1-1 Sun XVR-1000 Graphics Accelerators System Configurations

Sun System	Maximum Number of Devices Supported
Sun Ultra 60 system	1
Sun Ultra 80 system	2
Sun Blade 1000 system	2
Sun Blade 2000 system	2

Screen Resolutions

Sun XVR-1000 graphics accelerator supports full 30-bit 3D (double/z-buffered) graphics at all supported resolutions. TABLE 1-2 lists the supported screen resolutions for the Sun XVR-1000 graphics accelerator. To get a list of available resolutions for your display device, type `fbconfig -dev /dev/fbs/gfb0 -res \?` at the command line.

TABLE 1-2 Sun XVR-1000 Graphics Accelerator Screen Resolutions

Display resolution	Refresh rate (Hz)	Standard	Aspect format	13W3	S-Video	HD-15	DVI-D
1920 × 1200	60d	Sun	16:10	X		X	X
1920 × 1200	70, 75	Sun	16:10	X			
1920 × 1080	60d	Sun	16:9	X		X	X
1920 × 1080	72	Sun	16:9	X			
1792 × 1344	60, 75	VESA	4:3	X			
1600 × 1280	76	Sun	5:4	X			
1600 × 1200	60d	Sun	4:3	X		X	X
1600 × 1200	60, 75	VESA	4:3	X			
1600 × 1024	60	Sun	16:10	X		X	X
1600 × 1000	66, 76	Sun	16:10	X			
1440 × 900	76	Sun	16:10	X		X	X
1280 × 1024	96s, 112s	Sun stereo	5:4	X			
1280 × 1024	108s (digital only)	Sun stereo	5:4	X		X	X
1280 × 1024	60, 75, 85	VESA	5:4	X		X	X
1280 × 1024	67, 76	Sun	5:4	X		X	X
1280 × 800	112s	Sun stereo	16:10	X			
1280 × 800	76	Sun	16:10	X		X	X
1280 × 768	56	Sun	5:3	X		X	X
1152 × 900	120s	Sun stereo	5:4	X			
1152 × 900	66, 76	Sun	5:4	X		X	X
1024 × 800	84	Sun	4:3	X		X	X
1024 × 768	77	Sun	4:3	X		X	X

TABLE 1-2 Sun XVR-1000 Graphics Accelerator Screen Resolutions (*Continued*)

Display resolution	Refresh rate (Hz)	Standard	Aspect format	13W3	S-Video	HD-15	DVI-D
1024 × 768	60, 70, 75	VESA	4:3	X		X	X
960 × 680	108s, 112s	Sun stereo	14:10	X		X	
800 × 600	75	VESA	4:3	X			
768 × 575	50i	PAL (RGB)	4:3	X		X	
640 × 480	180fsc	Sun	4:3	X			
640 × 480	60, 72, 75	VESA	4:3	X		X	X
640 × 480	60i	NTSC (RGB)	4:3	X		X	
640 × 480	60i	NTSC (Comp)	4:3		X		
640 × 480	50i	PAL (Comp)	4:3		X		

Note – Resolutions with refresh rates marked “d” are only suitable for LCDs and other digital devices. These refresh rates have reduced blanking times which are unsuitable for CRTs and other analog devices.

Resolutions with refresh rates marked “fsc” are only used for special “field sequential color” displays.

Note – The Sun XVR-1000 graphics accelerator supports two streams of video information. Refer to “Screen Resolution Matrix” on page 51 for pairs of resolutions supported by both Stream A (13W3) and Stream B (HD-15, DVI-D, S-video).

Using Sun XVR-1000 Graphics Accelerator With Other UPA Graphics Boards

You can mix the Sun XVR-1000 graphics accelerator with other UPA frame buffers. TABLE 1-3 lists rules in using UPA slots.

- Sun XVR-1000 graphics accelerator and Sun Elite3D m6 requires a double-width UPA slot
- Sun Elite3D m3 and Sun Creator3D require single-width UPA slots

TABLE 1-3 Sun System UPA Bus Slots

System	UPA Slot Widths
Sun Ultra 60 system	1 single-width UPA plus 1 double width UPA slot
Sun Ultra 80 system	2 single- or double-width UPA slots
Sun Blade 1000 system	2 single- or double-width UPA slots
Sun Blade 2000 system	2 single- or double-width UPA slots

Note – Xinerama requires that all frame buffers be identical and are configured to the same resolution. (See Appendix C, “Xinerama.”)

Window System Support and Supported Visuals

The Sun XVR-1000 graphics accelerator models support 8-bit PseudoColor in the overlay as the X window system default.

The window system offers combinations of the common X visuals in the following:

- Single/double buffered
- Stereo/mono (dependent on the resolution selected)
- Standard and gamma corrected
- Stored alpha

The Sun XVR-1000 graphics accelerator supports the following visuals:

- 8-bit PseudoColor
- 8-bit StaticGray in the Red plane (10-bit internal)
- 8-bit PseudoColor in the Red plane (10-bit internal)
- 24-bit TrueColor (30-bit in the frame buffer)
- 24-bit DirectColor (30-bit in the frame buffer)
- 24-bit TrueColor with stored alpha in the overlay
- StaticGray and TrueColor with additional gamma corrected visuals

Technical Support

For assistance and other information not found in this document concerning the Sun XVR-1000 graphics accelerator, see Support Services at:

<http://www.sun.com/service/online/>

For the most up-to-date version of the installation guide, go to :

<http://www.sun.com>

Installing the Sun XVR-1000 Graphics Accelerator Software

This chapter provides Sun XVR-1000 graphics accelerator software installation information.

- “Software Requirements” on page 9
- “Sun XVR-1000 Graphics Accelerator Software Packages” on page 10
- “Patches for JumpStart Users” on page 12
- “Installing the Software” on page 13
- “Removing the Software” on page 16
- “Multiple Frame Buffer Configuration” on page 17
- “Man Pages” on page 19
- “Changing the Monitor Screen Resolution” on page 19

Software Requirements

The Solaris 8 10/01 operating environment or a subsequent compatible version of the operating environment is required on your system before installing the Sun XVR-1000 graphics accelerator software:

Note – If your system does not have the Solaris 8 10/01 operating environment installed, you must install it. Refer to the main Solaris installation manuals for this information.

Updated versions of Sun OpenGL® for Solaris are available at:

<http://www.sun.com/software/graphics/OpenGL/>

Note – The Sun XVR-1000 graphics accelerator software must be installed on the system before you can install the graphics board. If the software is not installed prior to installing the graphics board, the Sun XVR-1000 graphics accelerator will not be recognized by the system.

Sun XVR-1000 Graphics Accelerator Software Packages

Install the required software packages for your Solaris operating environment from the CD provided with your Sun XVR-1000 graphics accelerator installation kit.

TABLE 2-1 lists the Sun XVR-1000 graphics accelerator CD directories:

TABLE 2-1 Sun XVR-1000 Graphics Accelerator CD Directories

Directory name	Description
License	Binary Code License
XVR-1000/Solaris_8/Packages/	Solaris 8 graphics accelerator software packages
XVR-1000/Solaris_9/Packages/	Solaris 9 graphics accelerator software packages
Docs/	Sun XVR-1000 graphics accelerator documentation
Copyright	U.S. version of copyright
FR_Copyright	French version of copyright
Install/	Installation support files
install	Product installation script
remove	Product removal script
OpenGL/Packages/	OpenGL 1.2.3 packages

Software Package Locations

The Sun XVR-1000 graphics accelerator software packages are located in the directories listed in TABLE 2-2.

TABLE 2-2 Location of Sun XVR-1000 Graphics Accelerator Software Packages

Software packages	Directory location
Solaris 8 software	/cdrom/cdrom0/XVR-1000/Solaris_8/Packages
Solaris 9 software	/cdrom/cdrom0/XVR-1000/Solaris_9/Packages

Software Package Names

TABLE 2-3 lists the Sun XVR-1000 graphics accelerator software package names and descriptions.

TABLE 2-3 Sun XVR-1000 Graphics Accelerator Software Package Names

Package name	Description
SUNWgfb.u	Sun XVR-1000 graphics accelerator kernel device driver package
SUNWgfbx.u	Sun XVR-1000 graphics accelerator kernel device driver package (64-bit)
SUNWgfbcf	Sun XVR-1000 graphics accelerator configuration utility (SUNWgfb_config) and microcode (gfb.ucode)
SUNWgfbr	Sun XVR-1000 graphics accelerator system startup support
SUNWgfbw	X-server loadable module for Sun XVR-1000 graphics accelerator
SUNWvid	Monitor video timing information

Patches for JumpStart Users

If you are adding the Sun XVR-1000 graphics accelerator Solaris 8 operating environment packages to a JumpStart™ server, you *must* first add the following patches (located on the installation kit CD-ROM in `XVR-1000/Solaris_8/Patches`) in the following order:

1. 112334-01
2. 108528-13
3. 109888-16

If you are adding these packages to a Solaris 8 2/02 operating environment JumpStart image, only patch 109888-16 is required. No patches are required for the Solaris 9 operating environment. After you have applied the required patches, install the Sun XVR-1000 graphics accelerator packages in the following order:

1. `SUNWgfb.u`
2. `SUNWgfbx.u`
3. `SUNWgfbw`
4. `SUNWgfbr`
5. `SUNWgfbcf`

Installing the Software

Use the `install` utility on the CD-ROM to install the Sun XVR-1000 graphics accelerator software. This utility installs all necessary driver software and patches.

Note – Install the Sun XVR-1000 graphics accelerator software *before* installing the graphics board in your Sun system. If the software is not installed prior to installing the graphics board, the Sun XVR-1000 graphics accelerator will not be recognized by the system.

1. Log in as superuser.
2. Insert the Sun XVR-1000 graphics accelerator CD into the drive.
 - If the drive 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 Sun XVR-1000 graphics accelerator software, type:

```
# ./install
```

The following is displayed:

```
*** Checking if Sun XVR-1000 Graphics Accelerator support is already
installed...
*** Checking if Sun OpenGL is installed...

Select one of the following Sun OpenGL installation options:
1) Install Sun OpenGL 1.2.3
2) Do not install Sun OpenGL
Select an option:
```

The installation program checks if Sun XVR-1000 graphics accelerator software is already installed. If a version of graphics board software is installed, the program checks to determine the version.

4. Select Sun OpenGL 1.2.3 to install the product.

The following is displayed:

```
*** Checking if Sun OpenGL 1.2.3 support for Sun XVR-1000 Graphics
Accelerator is installed...

About to take the following actions:
- Install Sun XVR-1000 Graphics Accelerator support for Solaris 8
- Install Sun OpenGL 1.2.3

To cancel installation of this software, press 'q'.
Press any other key to begin installation:
```


5. Press any key and Return to start installation.

Once complete, the following is displayed and the program provides the location of an installation log file along with configuration and reboot instructions.

```
*** Installing Sun XVR-1000 Graphics Accelerator support for Solaris 8...
*** Installing Sun OpenGL 1.2.3 support for Sun XVR-1000 Graphics Accelerator...
*** Adding PlCL environment file for Sun Blade 1000...
*** Installation complete.
```

To remove this software, use the 'remove' script on this CDROM, or the following script:

```
/var/tmp/XVR-1000.remove
```

A log of this installation can be found at:

```
/var/tmp/XVR-1000.install.2000.09.27
```

To configure a Sun XVR-1000 Graphics Accelerator accelerator, use the fbconfig utility. See the fbconfig(1m) and SUNWgfb_config(1m) manual pages for more details.

*** IMPORTANT NOTE! ***

This system must be rebooted for the new software to take effect.

Shutdown the system using the shutdown command and then reboot the system using the 'boot -r' PROM command at the 'ok' prompt. See the shutdown(1M) and boot(1M) manual pages for more details.

6. For multiple graphics boards, modify the /etc/dt/config/Xservers file.

This file tells your system to run the X server on each of the frame buffers listed in your Xservers file.

If you remove graphics boards from your system, you also need to modify your Xservers file.

Go to "Multiple Frame Buffer Configuration" on page 17.

7. Shut down the system after the Sun XVR-1000 graphics accelerator software is installed:

```
# shutdown
```

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

8. Install the Sun XVR-1000 graphics accelerator hardware (see Chapter 3).

9. Boot your system at the `ok` prompt:

Halt (Stop-A) your system for the `ok` prompt.

```
ok boot -r
```

Removing the Software

1. Log in as superuser.

2. Insert the Sun XVR-1000 graphics accelerator CD into the drive.

3. Mount the CD-ROM drive.

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

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

- If the CD-ROM is not already mounted, type:

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

4. To remove the Sun XVR-1000 graphics accelerator software, become superuser and type:

```
# ./remove
```

The following list of options is displayed:

```
1) Remove Sun XVR-1000 support
2) Remove OpenGL
3) Remove All (Sun XVR-1000 Graphics Accelerator and OpenGL)
4) Quit
Select an option:
```

5. Select Option 3 to remove all listed software packages.

The following text is displayed:

```
About to take the following actions:
- Remove Sun XVR-1000 Graphics Accelerator support
- Remove OpenGL
Press 'q' to quit, or press any other key to continue:
```

6. Press any key and Return to start the removal process.

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

```
*** Removing packages...
*** Done. A log of this removal can be found at:
    /var/tmp/XVR-1000.remove.2000.09.27
```

Multiple Frame Buffer Configuration

To run more than one frame buffer, you must modify your `/etc/dt/config/Xservers` file. The Sun XVR-1000 graphics accelerator device is identified as `gfbx` (for example, `gfb0` and `gfb1` for two Sun XVR-1000 graphics accelerator devices). To do this:

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 file by adding the device locations for the applicable frame buffers being used. See the following examples:

- This example shows the `Xservers` configuration file modified for one Sun Creator board and one Sun XVR-1000 graphics accelerator:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun -dev /dev/fbs/ffb0  
-dev /dev/fbs/gfb0
```

- This example shows how to remove two Creator3D boards and add one Sun XVR-1000 graphics accelerator in the `Xservers` configuration file.
 - Old `Xservers` configuration file with two Creator3D boards:

```
:0 Local local_uid@console root /usr/openwin/bin/X -dev /dev/fb0 defdepth 24  
-dev /dev/fb1 defdepth 24
```

- New `Xservers` configuration file with one Sun XVR-1000 graphics accelerator:

```
:0 Local local_uid@console root /usr/openwin/bin/X -dev /dev/fb
```

Note that the `defdepth 24` was removed from the `Xservers` file so that the X server does not take performance away from applications.

3. Install the Sun XVR-1000 graphics accelerator hardware (see Chapter 3).

4. Boot your system at the `ok` prompt:

Halt (Stop-A) your system for the `ok` prompt.

```
ok boot -r
```

Changing the Monitor Screen Resolution

For most installations, the Sun XVR-1000 graphics accelerator device automatically configures itself to the proper screen resolution and refresh rate for your monitor. If it is not a Sun monitor, however, that is connected to the Sun XVR-1000 graphics accelerator device, the monitor might have the wrong screen resolution. To change the screen resolution, use the `fbconfig` utilities.

Man Pages

The Sun XVR-1000 graphics accelerator man pages describe how you can query and set frame buffer attributes such as screen resolutions and visual configurations.

Use the `fbconfig(1M)` man page for configuring all Sun graphics accelerators. `SUNWgfb_config(1M)` contains Sun XVR-1000 device-specific configuration information. `fbconfig` is included in the Solaris 8 and Solaris 9 operating environments. `SUNWgfb_config` is included in the Solaris 9 operating environment. For operating environments prior to the Solaris 9 operating environment, refer to the postscript file `SUNWgfb_config.ps` on the Sun XVR-1000 graphics accelerator CD.

Use the `help` option to display the attributes and parameters information of the man page.

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

```
# man fbconfig
```

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

```
# man SUNWgfb_config
```


Installing the Sun XVR-1000 Graphics Accelerator Hardware

This chapter provides Sun XVR-1000 graphics accelerator hardware installation information.

- “Before Installation” on page 21
- “Installing the Hardware” on page 22
- “Removing the Hardware” on page 23
- “System Configurations” on page 24

Before Installation

Refer to the *Solaris Handbook for Sun Peripherals* (806-6086-10) that corresponds to your operating environment. The handbook describes how to shut down the system safely before installing any internal boards and how to reboot the system after installation. A complete set of Solaris documentation is located at:

<http://docs.sun.com>

Refer to the following hardware documentation provided with your Sun system for instructions on installing Sun UPA bus graphics boards:

- *Sun Ultra 60 Service Manual*
- *Sun Ultra 80 Service Manual*
- *Sun Blade 1000 Service Manual*
- *Sun Blade 2000 Service Manual*

Installing the Hardware

1. Turn off the power to your system, disconnect cabling, and open the enclosure.
2. Position the Sun XVR-1000 graphics accelerator over the UPA bus connector slot.
3. Holding the two upper corners of the graphics board, carefully push the board straight down into the UPA bus connector until the board is fully seated (FIGURE 3-2).



Caution – When installing the Sun XVR-1000 graphics accelerator into your system UPA slot, *do not* touch the graphics board heatsinks. Only apply pressure to the graphics board as indicated by the arrows shown in FIGURE 3-1.

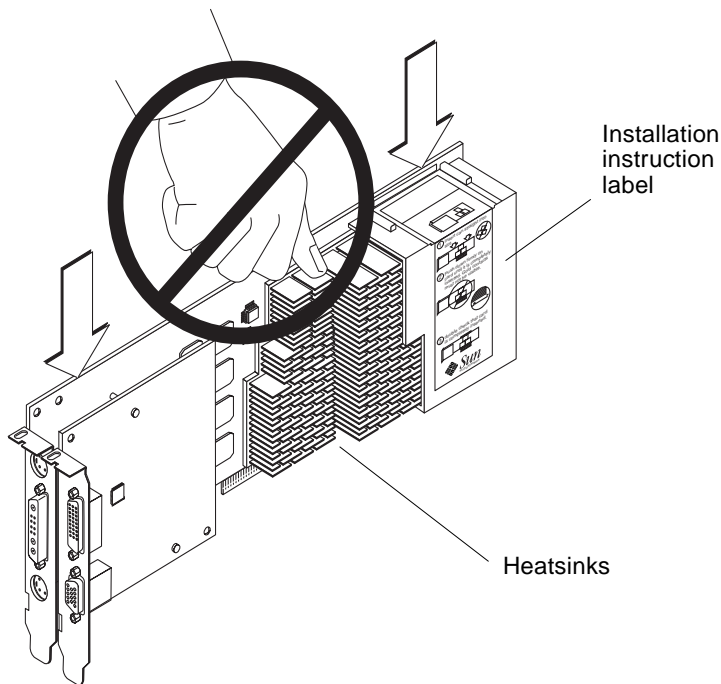


FIGURE 3-1 Installing the Sun XVR-1000 Graphics Accelerator

The Sun XVR-1000 graphics accelerator shroud also contains labeling with installation instructions. See FIGURE 3-1.

Removing the Hardware

1. Turn off the power to your system, disconnect cabling, and open the enclosure.
2. Remove the Sun XVR-1000 graphics accelerator by pulling on the ends and gently rocking the board until you remove the graphics board from the UPA slot (FIGURE 3-2).

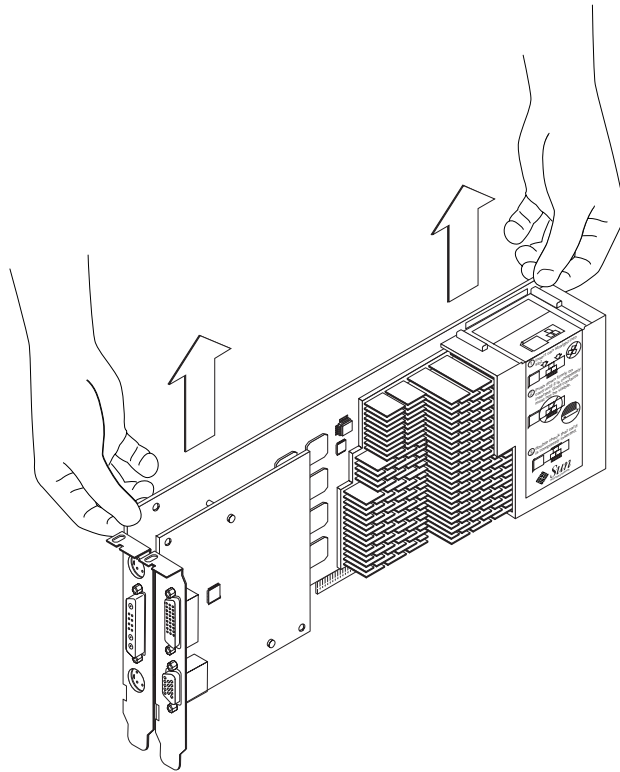


FIGURE 3-2 Removing the Sun XVR-1000 Graphics Accelerator

System Configurations

TABLE 3-1 shows possible Sun XVR-1000 graphics accelerator configurations in the supported Sun systems.

TABLE 3-1 Sun XVR-1000 Graphics Accelerator and System Hardware Configurations

Sun System	UPA Slots	Maximum Graphics Board Configuration
Sun Ultra 60 system (see Note below)	2	1
Sun Ultra 80 system	2	2
Sun Blade 1000 system	2	2
Sun Blade 2000 system	2	2

Note – Although the Sun Ultra 60 system has two UPA bus connector slots, the UPA slots are too close together to accommodate more than one Sun XVR-1000 graphics accelerator.

Using Sun XVR-1000 Graphics Accelerator Features

This chapter provides Sun XVR-1000 graphics accelerator feature information.

- “Sun XVR-1000 Graphics Accelerator Multistreaming” on page 25
- “Dynamic Multisample Antialiasing” on page 34

Sun XVR-1000 Graphics Accelerator Multistreaming

The Sun XVR-1000 graphics accelerator has two possible video streams which may drive one of four output ports (13W3, DVI-D, HD-15 and S-video). This section describes how to tell the configuration program “fbconfig” which stream to program and how to direct that stream output to the desired port.

When there are two Sun XVR-1000 graphics accelerators in the system, they are numbered from 0. TABLE 4-1 gives the device names to use. fbconfig allows the trailing component to serve as a shorthand, such as “gfb0” for “/dev/fbs/gfb0”.

TABLE 4-1 Sun XVR-1000 Graphics Accelerator Device Names

Device Name	Description
/dev/fbs/gfb0	Use explicitly for graphics board 1.
/dev/fbs/gfb1	Use explicitly for graphics board 2.

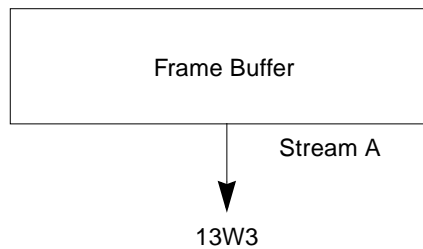
Multistream Options

There are four options from which to choose.

Option 1

In Option 1, only one output is active.

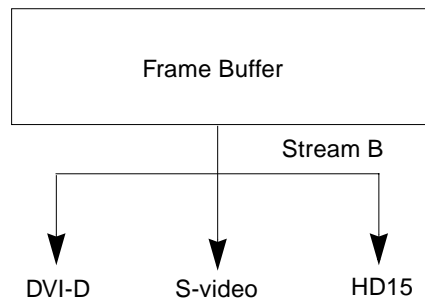
- Benefits — Maximum resolution 1920×1200
- Drawbacks — None



Option 2

In Option 2, only one output is active.

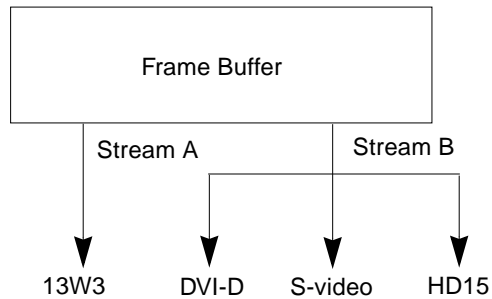
- Benefits — Maximum resolution 1920×1200
- Drawbacks — Not all resolutions are supported (see TABLE A-2).



Option 3

In Option 3, two outputs are active where one large frame buffer is displayed across both monitors.

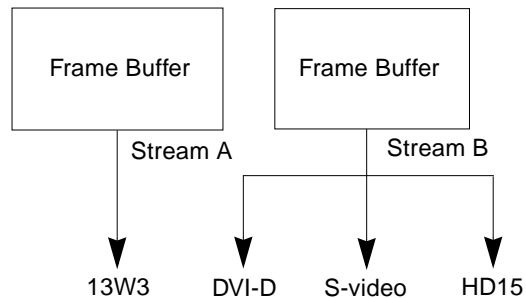
- **Benefits** — Two monitor support without the use of Xinerama software.
Can move windows between screens or a window across screens.
- **Drawbacks** — Maximum resolution of 1280×1024 on each monitor.
Both resolutions must be identical.



Option 4

In Option 4, two outputs are active and independent.

- **Benefits** — Two monitor support.
The resolutions need not be identical.
- **Drawbacks** — Cannot move windows between displays (no Xinerama mode).
Slowest mode of operation.



Setting Up Option 1 (Default)

This option enables the 13W3 port output only. This is the mode the system uses if no other `fbconfig` commands have been given.

Example

The following example returns the system to Option 1.

1. Disable doublewide mode. Type:

```
fbconfig -dev gfb0 -doublewide disable
```

2. Enable Stream A. Type:

```
fbconfig -dev gfb0 -active a
```

3. Select the desired screen resolution. Type:

```
fbconfig -dev gfb0 -res SUNW_STD_1280x1024x76
```

To find all possible Sun XVR-1000 graphics accelerator resolutions, type:

```
fbconfig -res \?
```

Setting Up Option 2

This option enables the DVI-D or HD-15 port output.

Example

The following example sets up this option.

1. Disable doublewide mode. Type:

```
fbconfig -dev gfb0 -doublewide disable
```

2. Enable Stream B. Type:

```
fbconfig -dev gfb0 -active b
```

3. Select either the DVI-D or HD-15 port. Type:

```
fbconfig -dev gfb0 -stream b -port dvid
```

or

```
fbconfig -dev gfb0 -stream b -port hd15
```

4. Select the desired screen resolution. Type:

```
fbconfig -dev gfb0 -res SUNW_STD_1280x1024x76
```

To find all possible Sun XVR-1000 graphics accelerator resolutions, type:

```
fbconfig -res \?
```

To set up the S-video port, see Appendix B.

Setting Up Option 3

This option enables two monitor support without the use of Xinerama software. This means that the Sun XVR-1000 graphics accelerator creates one wide frame buffer, displayed across two screens.

Example

The following example sets up this option.

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

```
fbconfig -dev gfb0 -doublewide enable
```

2. **Select either the DVI-D or HD-15 port for the second monitor screen. Type:**

```
fbconfig -dev gfb0 -stream b -port dvid
```

or

```
fbconfig -dev gfb0 -stream b -port hd15
```

3. **Select the desired screen resolution. Type:**

```
fbconfig -dev gfb0 -res SUNW_STD_1280x1024x76
```

To find all possible Sun XVR-1000 graphics accelerator resolutions, type:

```
fbconfig -res \?
```


Setting Up Option 4

This option allows independent resolution setting of each stream.

Note – Stream option 4 is not supported in Xinerama. X windows and Sun OpenGL for Solaris performance may be noticeably degraded in this mode. Many resources (for example, Color LUTs and WID entries) are managed independently and the two streams compete with each other.

Use stream option 3 whenever possible for a dual stream configuration.

Example

The following example sets up this option.

1. Select either the DVI-D or HD-15 port for the second monitor screen. Type:

```
fbconfig -dev gfb0 -stream b -port dvid
```

or

```
fbconfig -dev gfb0 -stream b -port hd15
```

2. Select an independent screen resolution for each frame buffer. Type:

```
fbconfig -dev gfb0a -res SUNW_STD_1280x1024x76  
fbconfig -dev gfb0b -res SUNW_STD_1152x900x66
```

3. To enable both streams, both devices `/dev/fbs/gfb0a` and `/dev/fbs/gfb0b` must appear in the `/etc/dt/config/Xservers` file.

For example:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun -dev  
/dev/fbs/gfb0a -dev /dev/fbs/gfb0b
```

To find all possible Sun XVR-1000 graphics accelerator resolutions, type:

```
fbconfig -res \?
```

See TABLE A-2 in Appendix A for all valid screen resolution combinations.

To set up the S-video port, see Appendix B.

Port Selection

Stream B allows three different ports to be selected.

- To route Stream B to the HD-15 connector on the daughter board, use this command:

```
# fbconfig -stream b -port hd15
```

- To route Stream B to the DVI-D connector on the daughter board, use this command:

```
# fbconfig -stream b -port dvid
```

- Selecting the S-video port Stream B is automatic when the following video resolutions are selected for Stream B:

- SUNW_NTSC_640x480x66
- SUNW_PAL_640x480x60

Note – For stream B to be active, it must be selected as described in the stream section (“Multistream Options” on page 26). You must turn on `doublewide` mode, or set the active stream to “b.”

Multicard Setup

To use three (or four) video streams (monitors), you need to use two graphics boards, and link those boards with Xinerama.

With three streams, one would be doublewide and one would be “normal.” For four streams, both would be doublewide. For example, for the steps to create the following monitor setup:

```
gfb0 (13W3) to monitor 1
gfb0 (HD15) to monitor 2
gfb1 (13W3) to monitor 3
```

1. Configure each Sun XVR-1000 graphics accelerator as follows:

```
# fbconfig -dev gfb0 -doublewide enable
# fbconfig -dev gfb0 -stream b -port hd15
# fbconfig -dev gfb1 -doublewide disable
# fbconfig -dev gfb1 -active a (likely already defaulted to this)
```

2. Link the two graphics boards together with Xinerama in the `Xservers` file, as shown:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun +xinerama
-dev /dev/fbs/gfb0 -dev /dev/fbs/gfb1
```

Dynamic Multisample Antialiasing

Multisampling (full-scene dynamic multisample antialiasing) removes the jagged edges on 3D data. An image is sampled at a higher resolution than the screen, typically four to 16 samples per pixel. This method yields improved images, but at the price of increased render time.

The Sun XVR-1000 graphics accelerator has 72 Mbytes of memory for the frame buffer so that the image can be multisampled at up to 16 samples per pixel in a single pass, depending on the resolution. The higher number of samples per pixel, the better the image quality but the longer the display time. Depending on the screen resolution (TABLE 4-3), the number of samples per pixel can be increased to improve image quality.

You can get better sample densities with dynamic mode if the window is smaller than the screen size.

Use a combination of the `fbconfig` command and/or environmental variables to invoke multisampling. You can enable multisample mode for a particular OpenGL application or for all OpenGL applications.

Enabling Multisampling for a Specific OpenGL Application

- 1. Set the multisample environmental variable.**

This enables multisampling for the current window:

```
# setenv ZFB_USE_MSE
```

- 2. For this example, set the maximum sample usage to four samples per pixel:**

```
# setenv ZFB_USE_MSE 4
```

3. Set the `ZFB_SHOW_DENSITY` environment to display sample density when an application is launched.

```
# setenv ZFB_SHOW_DENSITY
```

The output also shows value changes as the window is resized.

4. Launch your application.

The followings shows an example of setting the environments, launching the application, and its output.

```
# setenv ZFB_USE_MSB 4
# setenv ZFB_SHOW_DENSITY
# (run OpenGL application)
ogl_zfb: Auto multisample buffer mode
ogl_zfb: report sample density changes
multisample (s,b,p,tp,w,h):5,0,12,12,512,436
multisample (s,b,p,tp,w,h):8,0,12,12,426,350
```

Where: *s* = sample density, *b* = reserved, *p* = reserved, *tp* = reserved, *w* = window width, *h* = window height.

Note – In the above example, the window was resized from 512×436 to 426×350 .

Enabling Multisampling for All OpenGL Applications

1. Use `fbconfig` to enable all OpenGL application windows for dynamic multisampling.

```
# fbconfig -dev /dev/fbs/gfb0 -multisample auto dynamic -samples max
```

Note – When using the `auto` option switch, all OpenGL applications are multisampled. If you use the `enable` switch, only those that use the multisample APIs will be multisampled.

2. Log out, then log back in to restart the X-server for the changes to take effect.

This enables multisampling for all OpenGL applications. The maximum sample size is 16 samples per pixel. The sample size is automatically allocated based on available memory when each application is started or resized. This means that each application is at lower than 16 samples per pixel. You can set the sample to a smaller size so that the first application does not use up the most memory.

If you set the environmental variable `ZFB_SHOW_DENSITY` in each application window before you launch an application, the previously shown multisample information for that application is displayed.

TABLE 4-2 describes the `fbconfig -multisample` options.

```
-multisample
```

```
[enable | disable | auto] [static | dynamic]
```

TABLE 4-2 Multisample Option Descriptions

Option	Description
<code>disable</code>	No multisample is possible.
<code>enable</code>	Multisample is possible but is selected on a per application basis.
<code>auto</code>	All OpenGL applications are rendered using multisampling.
<code>static</code>	Multisample allocation occurs at startup/configuration load time. The configuration samples-per-pixel parameter specifies the depth that is pre-allocated.
<code>dynamic</code>	A buffer is allocated for each OpenGL task.

TABLE 4-3 lists how many samples per pixel are supported at various maximum 3D resolutions:

TABLE 4-3 Sun XVR-1000 Graphics Accelerator Multisampling Support

Maximum 3D resolution	Single display	Dual display	Stereo (112 Hz)
1920 × 1200			
1600 × 1200			
1600 × 1000	2		
1280 × 1024	2		2
1152 × 900	3		2
1024 × 768	5	2	4

TABLE 4-3 Sun XVR-1000 Graphics Accelerator Multisampling Support *(Continued)*

Maximum 3D resolution	Single display	Dual display	Stereo (112 Hz)
960 × 680	N/A		6
800 × 600	8	4	8
640 × 480	16	6	12

Note – TABLE 4-3 is for static mode multisampling but is applicable for dynamic mode if the application is running the whole screen size. You can get better sample densities with dynamic mode if the window is smaller than the screen size.

Sun XVR-1000 Graphics Accelerator Frame Locking and Buffer Swap Synchronization

This chapter describes Sun XVR-1000 graphics accelerator frame locking and buffer swap synchronization.

- “Sun XVR-1000 Graphics Accelerator Frame Lock System” on page 39
- “Buffer Swap Synchronization” on page 40
- “Creating a Multiscreen Application” on page 41
- “Configuring Sun XVR-1000 Graphics Accelerators for Frame Locking” on page 42
- “Frame Lock Cable Assembly” on page 44
- “Connecting the Frame Lock Cable Assembly” on page 46

Sun XVR-1000 Graphics Accelerator Frame Lock System

The frame lock synchronization feature enables vertical retracing to occur simultaneously on each Sun XVR-1000 graphics accelerator subsystem. The frame lock cable assembly is used to daisy-chain two or more Sun XVR-1000 graphics accelerator subsystems. Vertical retrace synchronization eliminates flicker between multiscreen displays. You can frame lock two or more Sun XVR-1000 graphics accelerator subsystems across two or more computer systems.

Frame locking is often necessary when running in stereo in a multihead environment. All the displays can be synchronized so that the left and right views can be seen correctly through one set of LCD stereo glasses.

When frame buffers are frame locked, you should make sure they are all running at the same video resolution and vertical retrace rate (see `fbconfig -help` for details). See “Configuring Sun XVR-1000 Graphics Accelerators for Frame Locking” on page 42.

To use the frame lock features, the frame lock cable assembly is required. See “Frame Lock Cable Assembly” on page 44 for installation.

To order the frame lock cable assembly, call Sun telesales at 1-800-786-0404 and request spare part number 530-2754. You can also order the frame lock cable assembly through the Sun store (<http://store.sun.com>) by ordering this part number under spare parts.

By default, two channels are *not* frame locked.

Buffer Swap Synchronization

Buffer swap synchronization enables a simultaneous swap of buffer memory contents on all Sun XVR-1000 graphics accelerator subsystems to maintain image quality and to enable continuity between scenes on all applicable displays. This feature, however, is not applicable across two or more systems. The display can be a monitor or a large wall screen image displayed by a projector. See “Creating a Multiscreen Application” on page 41 in this section for an example of creating a multiscreen application.

Note – if you frame lock multiple computer systems, only the frame lock feature will operate (that is, the Buffer Swap Synchronization feature is not available across multiple computer systems).

Creating a Multiscreen Application

The following is a programming example of how to create a Buffer Swap Synchronization (multiscreen) application.

Main program:

1. Create n full screen windows, one per screen.
2. Create n rendering threads and associate one thread per screen.
3. Create a master thread to synchronize rendering threads.
4. Execute main window system event loop.

Master Thread run method:

1. Do the following in a loop:
 - a. Notify all rendering threads to render a frame (possibly in response to an event).
 - b. Wait for all rendering threads to finish rendering.
 - c. Notify all rendering threads to swap buffers.
 - d. Wait for all rendering threads to finish swapping.

Render Thread(s) run method:

1. Create OpenGL context for this thread's window.
2. Make context current to this thread.
3. Initialize OpenGL context state.
4. Do the following in a loop:
 - a. Wait for master thread notification.
 - b. Render image to back buffer for this screen.
 - c. Notify master thread that this thread is done rendering.
 - d. Wait for master thread notification.
 - e. Swap buffers.
 - f. Notify master thread that this thread is done swapping.

Configuring Sun XVR-1000 Graphics Accelerators for Frame Locking

1. Designate a Sun XVR-1000 graphics accelerator as the master.

You may use the Sun XVR-1000 graphics accelerator that serves as the boot/console head for that system.

Refer to the `boot -r` man page for device location and device numbering information for how devices are numbered based on their physical location. For frame lock, you may select any device (that is, `gfb0`, `gfb1`, `gfb2`,...and so on) to be the master Sun XVR-1000 graphics accelerator device.

2. Make sure that each Sun XVR-1000 graphics accelerator installed has the same monitor resolution as the one in master mode.

a. Check the resolution of an Sun XVR-1000 graphics accelerator by using the `fbconfig` command.

For example:

```
# fbconfig -dev /dev/fbs/gfb0 -prconf
```

You must repeat this command for each Sun XVR-1000 graphics accelerator in the system or systems.

b. Change the resolution of a Sun XVR-1000 graphics accelerator using the `fbconfig` command.

If the resolution on each Sun XVR-1000 graphics accelerator is not the same, you must change it to match the Sun XVR-1000 graphics accelerator in master mode. You must configure each board separately (that is, for `gfb1`, `gfb2`, `gfb3`, and so on).

For example:

```
# fbconfig -dev /dev/fbs/gfb0 -active a -res 1280x1024x76
# fbconfig -dev /dev/fbs/gfb1 -active a -res 1280x1024x76
```

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

3. Set the master and slave graphics boards.

For example,

```
# fbconfig -dev /dev/fbs/gfb0 -master a -stream a -slave disable
# fbconfig -dev /dev/fbs/gfb1 -master input -stream a -slave enable external
```

You need to run these last two commands, setting each master and slave graphics board, each time you log into your X window system.

Note – The `-master` and `-slave` options are only implemented as immediate commands. They take effect when you run the `fbconfig` command, and are not saved when you exit the X window system. When you restart the X window system, all graphics boards and streams return to `-master a` and `-slave disable` modes.

4. Connect the frame lock cable to each Sun XVR-1000 graphics accelerator.

Make sure to first connect the frame lock cable master mode connector to the master Sun XVR-1000 graphics accelerator, `gfb0` in the above example. See the section “Frame Lock Cable Assembly” on page 44.

Your system is now ready for frame locking.

Frame Lock Cable Assembly

The frame lock cable assembly, FIGURE 5-1, is a Y-shaped cable assembly with three connectors. Use this assembly to daisy-chain multiple Sun XVR-1000 graphics accelerators within a computer system.

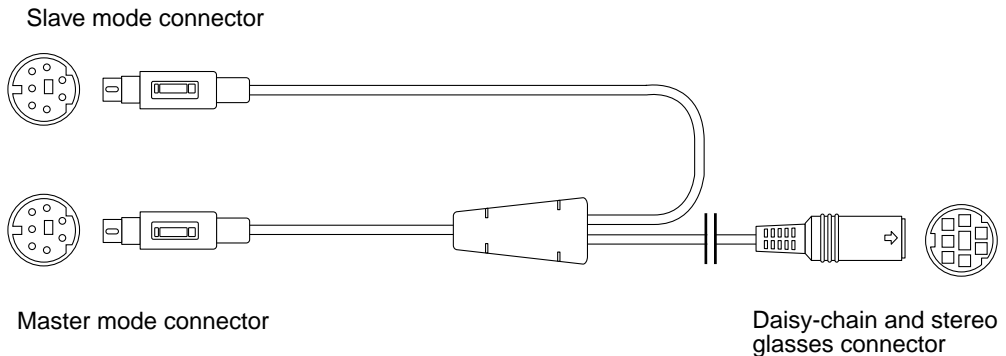


FIGURE 5-1 Frame Lock Cable Assembly

TABLE 5-1 Frame Lock Cable Connections

Frame Lock Connector	Description
Master connector (shortest male cable)	Connects into the stereo connector located on the Sun XVR-1000 graphics accelerator that is designated as the master device. Also plugs into the daisy-chain connector for slave Sun XVR-1000 graphics accelerators.
Slave connector (longest male cable)	Connects into the stereo connector located on the Sun XVR-1000 graphics accelerator that is designated as a slave device.
Daisy-chain/stereo glasses connector (female connector)	Can connect a pair of stereo glasses directly into this connector. Or the connector can be used to daisy-chain to other frame lock cables for slave Sun XVR-1000 graphics accelerator devices.

Note – There can only be one master Sun XVR-1000 graphics accelerator device. You must configure all other Sun XVR-1000 graphics accelerator devices as slaves. See the section “Configuring Sun XVR-1000 Graphics Accelerators for Frame Locking” on page 42.

Stereo Connector Pinout for Frame Lock

FIGURE 5-2 and TABLE 5-2 show the Sun XVR-1000 graphics accelerator stereo connector and pinout signals.

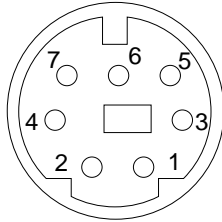


FIGURE 5-2 Sun XVR-1000 Graphics Accelerator Backplate Stereo Connector

TABLE 5-2 Sun XVR-1000 Graphics Accelerator Stereo Connector Pinout

Pin	Signal
1	DIN7_RETURN (signal ground)
2	No connect
3	3D_GLASSES_PWR +11V
4	FIELD
5	Slave FIELD_IN
6	DRAWING_L
7	No connect

Typical Cable Wiring Application

TABLE 5-3 shows a typical wiring schematic for a master Sun XVR-1000 graphics accelerator device and one or more slave Sun XVR-1000 graphics accelerator devices. You should wire the second to *n*th slave devices exactly as the “Slave Male DIN7” column in this table.

TABLE 5-3 Wiring Schematic for Frame Lock Cable Assembly

Master Male DIN7	Slave Male DIN7	Glasses Female DIN7
FIELD, pin 4-----	FIELD_IN, pin 5-----	FIELD, pin 4
DIN7_RETURN, pin 1-----	DIN7_RETURN, pin 1-----	DIN7_RETURN, pin 1
DRAWING_L, pin 6-----	DRAWING_L, pin 6-----	DRAWING_L, pin 6 (see note)
3D_GLASSES_PWR, pin 3-----		3D_GLASSES_PWR, pin 3

Note – Use the “Glasses” connector to daisy-chain multiple cables to additional slave Sun XVR-1000 graphics accelerator devices.

Connecting the Frame Lock Cable Assembly

1. Locate the master Sun XVR-1000 graphics accelerator I/O backplate on the rear of your system and connect the top of the frame lock cable assembly stereo connector.
2. Connect the slave cable connector to a slave Sun XVR-1000 graphics accelerator stereo connector.
3. Connect a second slave Sun XVR-1000 graphics accelerator, if applicable, or stereo glasses to the daisy-chain/stereo connector (FIGURE 5-3).

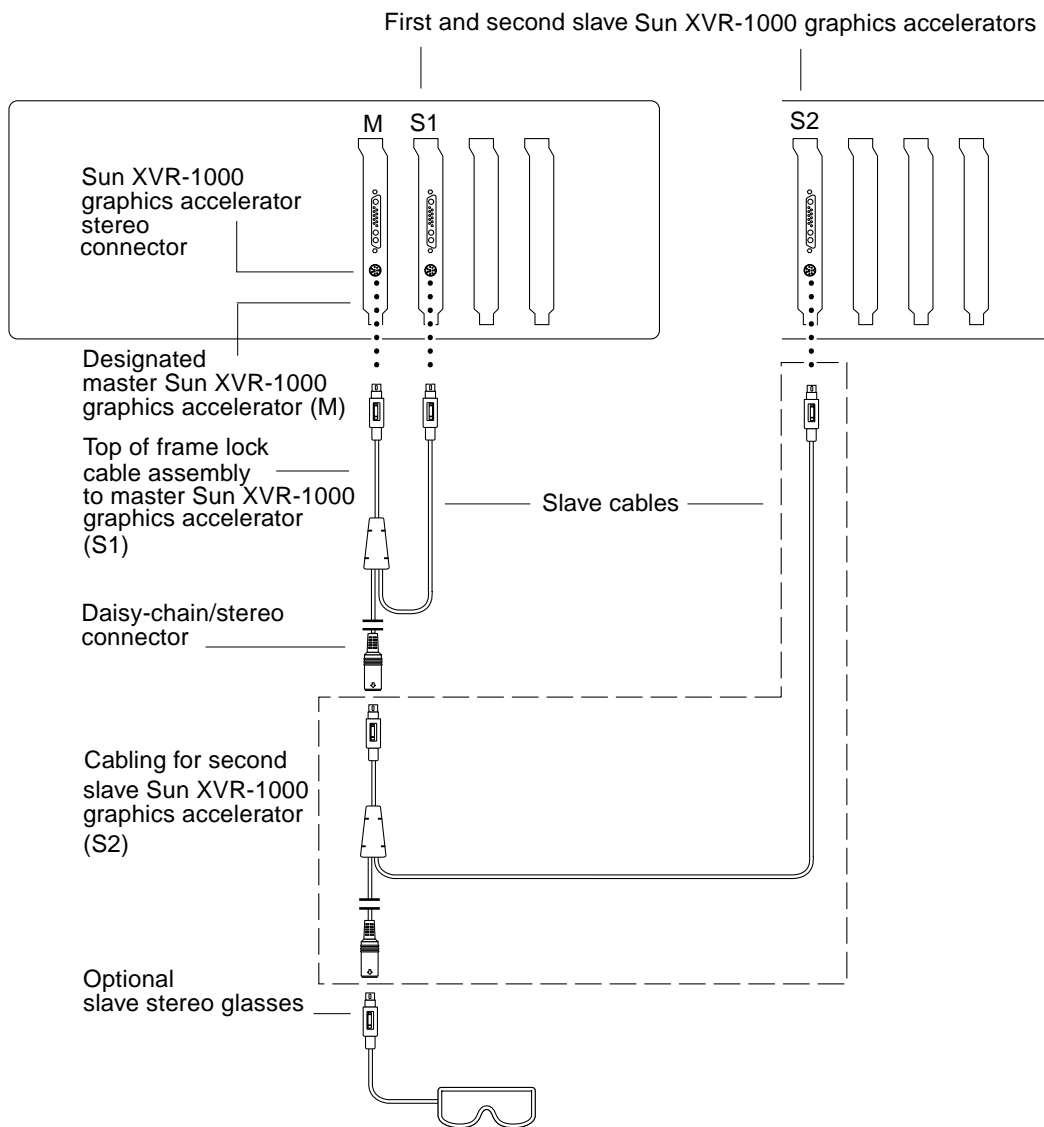


FIGURE 5-3 Sun XVR-1000 Graphics Accelerator and Frame Lock Cable Assembly

Sun XVR-1000 Graphics Accelerator Specifications

This appendix provides information on the Sun XVR-1000 graphics accelerator I/O ports and screen resolution matrix.

- “Sun XVR-1000 Graphics Accelerator I/O Ports” on page 49
- “Screen Resolution Matrix” on page 51

Sun XVR-1000 Graphics Accelerator I/O Ports

FIGURE A-1 shows the external I/O port connectors for the Sun XVR-1000 graphics accelerator.

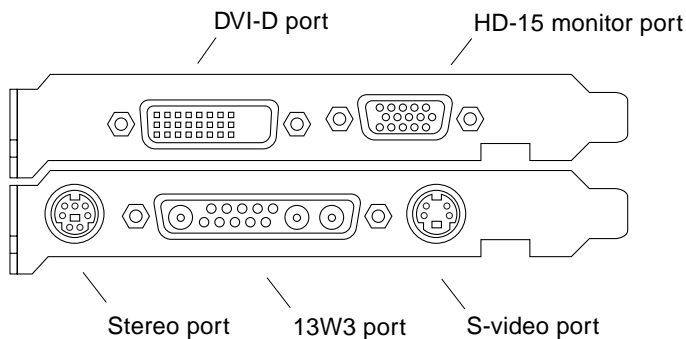


FIGURE A-1 Sun XVR-1000 Graphics Accelerator External I/O Port Connectors

The Sun XVR-1000 graphics accelerator provides a secondary video output stream from either a DVI-D or HD-15 connector. The primary video output is through a standard 13W3 connector. The secondary output is through one of the following:

- HD-15 video connector for analog displays
- DVI-D for digital input displays like flat panels
- S-video connector for video devices like TV monitors or recording devices

The 13W3, HD-15, and DVI-D connectors all provide a DDC2B link. A DDC2B link provides monitor query and control functions.

Note – If you are connecting a Sun XVR-1000 graphics accelerator HD-15 connector to a 13W3-based display, an HD-15 to 13W3 video adapter is required.

Main Board Stereo Connector Pinout

FIGURE A-1 and TABLE A-1 show the Sun XVR-1000 graphics accelerator stereo connector and pinout signals.

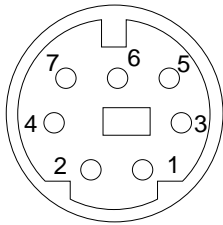


FIGURE A-2 Sun XVR-1000 Graphics Accelerator Backplate Stereo Connector

TABLE A-1 Sun XVR-1000 Graphics Accelerator Stereo Connector Pinout

Pin	Signal
1	DIN7_RETURN (signal ground)
2	No connect
3	3D_GLASSES_PWR +11V
4	FIELD

TABLE A-1 Sun XVR-1000 Graphics Accelerator Stereo Connector Pinout (*Continued*)

Pin	Signal
5	Slave FIELD_IN
6	DRAWING_L
7	No connect

Daughter Board DVI-D Port

The daughter board DVI-D port shares the same video source as the daughter board HD-15 and main board S-video ports. Only one of the main board S-video, daughter board HD-15, or daughter board DVI-D ports can be active at any time.

The Sun XVR-1000 graphics accelerator supports the same resolutions for the daughter board DVI-D port as for the daughter board HD-15 port.

When the main board 13W3 port is active at the same time as the DVI-D port, there are restrictions on the supported combinations of resolutions. See “Screen Resolution Matrix” on page 51.

Daughter Board HD-15 Port

The daughter board HD-15 port shares the same video source with the main board S-video and daughter board DVI-D ports. Only one of the main board S-video, daughter board HD-15, or daughter board DVI-D ports can be active at any time.

Screen Resolution Matrix

The Sun XVR-1000 graphics accelerator, with daughter board, supports two channels of frame buffer area. TABLE A-2 lists the pairs of resolution supported by both Channel 1 (main board 13W3 monitor port) and Channel 2 (daughter board HD-15 and DVI-D ports) frame buffer areas.

The first column of TABLE A-2 lists the Channel 1 supported resolutions. These resolution numbers correspond with the numbers representing the Channel 2 supported resolutions. A bullet indicates a combination of resolutions on Channel 1 and Channel 2 supported by the system.

Setting Up S-Video

This appendix provides information for setting up S-video (NTSC and PAL video formats) on the Sun XVR-1000 graphics accelerator.

- “S-Video Configuration Option 1” on page 53
- “S-Video Configuration Option 2” on page 54
- “Example for Using Two Sun XVR-1000 Graphics Accelerators” on page 56
- “Daughter Board Interactions” on page 57

Note – With S-video, you can cause the NTSC and PAL output to be a subwindow of the main (13W3 channel) video outputs. It also allows you to pan the subwindow within the full frame. No other secondary channel port (DVI-D or HD15) is available while using S-video.

S-Video Configuration Option 1

This option allows S-video on video data stream 2, displaying nothing on stream 1.

This setup dedicates all memory resources of the graphics board to the S-video port. This is required for the largest multisampling depth of 16 samples per pixel. Another board may be used if a large workspace is required for other purposes beyond the one 640 × 480 window.

Note – This procedure assumes that you are setting up the first board as `gfb0`. Substitute `gfb0` with `gfb1` for the second board.

1. Log in as superuser.
2. Set the resolution on the second stream.
 - For NTSC, type:

```
# fbconfig -dev /dev/fbs/gfb0 -res SUNW_NTSC_640x480x60
# fbconfig -dev /dev/fbs/gfb0 -active b -doublewide disable
```

- For PAL, type:

```
# fbconfig -dev /dev/fbs/gfb0 -res SUNW_PAL_640x480x50
# fbconfig -dev /dev/fbs/gfb0 -active b -doublewide disable
```

3. Log out to restart the Xserver and verify the configuration data.

S-Video Configuration Option 2

This option allows S-video on video data stream 2 and a normal screen on stream 1.

This setup shares the resources between the two streams. Multisample depth may be reduced.

1. Log in as superuser.
2. Set the resolution on the first (normal) stream. Type:

```
# fbconfig -dev /dev/fbs/gfb0a -res SUNW_STD_1280x1024x76
```

Note – This is *not* the same resolution that is used for the default subdevice (gfb0). This resolution needs to be set up independently in addition to gfb0.

Note – Any valid resolution can be used for gfb0a. The larger the resolution is, however, the less memory is available for multisampling.

3. Set the resolution on the second stream.

- For NTSC, type:

```
# fbconfig -dev /dev/fbs/gfb0b -res SUNW_NTSC_640x480x60
```

- For PAL, type:

```
# fbconfig -dev /dev/fbs/gfb0b -res SUNW_PAL_640x480x50
```

4. Add or change the `Xservers` file to include these devices.

You need to add device entries for `/dev/fbs/gfb0a` and `/dev/fbs/gfb0b` to the `/etc/dt/config/Xservers` file. If an entry for `/dev/fbs/gfb0` exists already, delete it and add the two described devices, `gfb0a` and `gfb0b`. All other devices should remain the same.

Note – Refer to the proper `Xservers(1)` man page and `Xservers` documentation for further information.

5. Log out to restart Xserver and verify the configuration data.

S-Video Configuration Option 3

This option allows the S-video port and Stream B to be set up to capture any subregion of Stream A after the window system is already running.

- Use the `svideotool` GUI application to set up and select this subregion:

```
% cd /opt/SUNWvidtools/bin/svideotool
```

Note – Stream B must not currently be in use for `svideotool` to be activated.

Example for Using Two Sun XVR-1000 Graphics Accelerators

In this example the first board (gfb0) is used for S-video exclusively and the second board (gfb1) is used normally.

1. Create the Xservers file:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun \  
-dev /dev/fbs/gfb1 -dev /dev/fbs/gfb0
```

2. Specify resolutions for each board:

```
# fbconfig -dev /dev/fbs/gfb1 -res SUNW_STD_1280x1024x76  
# fbconfig -dev /dev/fbs/gfb0 -res SUNW_NTSC_640x480x60  
# fbconfig -dev /dev/fbs/gfb0 -active b -doublewide disable
```

3. Check the configuration status of the gfb1 device:

```
# fbconfig -dev gfb1 -propt  
  
--- OpenWindows Configuration for /dev/fbs/gfb1 ---  
  
OWconfig: machine  
  
Video:  
    Resolution:      SUNW_STD_1280x1024x76  
    Port (a):        13W3  
    Port (b):        off  
  
Multisample:  
    Samples Per Pixel: 16  
    Allocation Model:  dynamic  
    Application Mode:  auto  
  
Screen:  
    Doublewide:      disable  
    Active Stream:   a  
    Offset/Overlap:  [0, 0]  
    Clearpixel Value: 255  
    Gamma Correction Value: 2.20
```

4. Check the configuration status of the `gfb0` device:

```
# fbconfig -dev gfb0 -propt
--- OpenWindows Configuration for /dev/fbs/gfb0 ---

OWconfig: machine

Video:
  Resolution:      SUNW_NTSC_640x480x60
  Port (a):        off
  Port (b):        svideo

Multisample:
  Samples Per Pixel: 16
  Allocation Model:  dynamic
  Application Mode:  auto

Screen:
  Doublewide:       disable
  Active Stream:    b
  Offset/Overlap:   [0, 0]
  Clearpixel Value: 255
  Gamma Correction Value: 2.20
```

The Video Mode `SUNW_NTSC_640x480x60` is used to initialize the resolution for stream 2 for NTSC.

Note – By default, the first board in `Xservers` is the monitor on the left, and then they are laid out left to right.

Daughter Board Interactions

If a daughter board is attached, video also might be visible on the HD-15 (VGA) or DVI-D connectors. This raw RGB signal is also going to the NTSC/PAL encoder. This signal is not meant to be used by normal monitors. The signal has an odd aspect ratio and synchronization signals.

Xinerama

Xinerama is an X windows feature available in Solaris 8 system software and subsequent compatible releases for Sun graphics boards including the Sun XVR-1000 graphics accelerator.

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 1.2.1 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.

To enable Xinerama mode (single logical screen) on multiscreen displays, add `+xinerama` to the `/usr/dt/config/Xservers` file. For example:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun +xinerama
-dev /dev/fb0 -dev /dev/fb1
```

You need to install Sun OpenGL for Solaris version 1.2.1 (or later release) in order to run your OpenGL-based applications seamlessly in multiscreen Xinerama mode; older releases of OpenGL render only to one screen in the display.

Setting the Default Console Display

The console device defaults to the Sun XVR-1000 graphics accelerator. If another frame buffer is installed, such as a PCI bus or UPA bus frame buffer, you may need to change the default console display.

To set the Sun XVR-1000 graphics accelerator as the default console display:

1. At the `ok` prompt, type:

```
ok show-displays
```

The output prompts you to select a display device. For example:

```
a) /SUNW,gfb@1d,0
b) /SUNW,ffb@1e,0
q) NO SELECTION
```

2. Select the Sun XVR-1000 graphics accelerator device to be the default console display.

In this example, select `a`, where `SUNW,gfb` is the Sun XVR-1000 graphics accelerator device and `1d` is the slot.

```
Enter Selection, q to quit: a

/SUNW,gfb@1d,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@1f,0/pci@5/SUNW,gfb@1d,0
```

3. Create an alias name for the Sun XVR-1000 graphics accelerator device.

The example output above shows `mydev` as the alias device name. See Step 8 for instructions on renaming the device alias.

```
ok nvalias mydev <Control-Y> <Return>
```

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

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

5. Store the alias name that you have created.

```
ok setenv use-nvramrc? true
```

6. Reset the output device environment.

```
ok reset
```

7. Rename an alias name for the Sun XVR-1000 graphics accelerator device (optional).

You can simplify future OpenBoot™ PROM commands by creating an alias for the Sun XVR-1000 graphics accelerator device. To do this,

a. Select the Sun XVR-1000 graphics accelerator device from the `show-displays` menu.

b. Name the device (this example names the device as `screen1`).

```
ok nvalias screen1 <Control-Y> <Return>
```

c. Store the name as the alias.

```
ok nvstore
```


d. Verify the alias.

```
ok devalias
```

The selected alias is displayed.

You can now refer to `screen1` for the Sun XVR-1000 graphics accelerator device.
For example:

```
ok setenv output-device screen1
```

8. Reset the output device environment.

```
ok reset
```

9. Connect your monitor cable to the Sun XVR-1000 graphics accelerator monitor connector on your system back panel (see FIGURE A-1).

