



Sun™ Expert3D-Lite Graphics Card Installation Guide

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Preface

This guide describes how to install the Sun™ Expert3D-Lite graphics accelerator and associated software in a Sun system.

How This Book Is Organized

Chapter 1 provides an overview of the Sun Expert3D-Lite product and lists the supported Sun systems.

Chapter 2 describes how to install the Sun Expert3D-Lite graphics card.

Chapter 3 describes how to install Sun Expert3D-Lite software.

Appendix A provides Sun Expert3D-Lite features, specifications, and multiview configuration.

Using UNIX Commands

This document does 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 2.x Handbook for SMCC Peripherals*
- AnswerBook2™ online documentation for the Solaris™ 2.x 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; command-line variable: replace with a real name or value.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be root to do this. To delete a file, type <code>rm filename</code> .

Shell Prompts

Shell	Prompt
C shell	%
C shell superuser	#
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

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Sun Expert3D-Lite Graphics Card Overview

The Sun Expert3D-Lite graphics accelerator (FIGURE 1-1) is a high-resolution, high-performance graphics frame buffer that provides hardware texture mapping.

This document provides Sun Expert3D-Lite graphics card installation instructions for the following Sun workstations:

- Sun Ultra™ 60 system
- Sun Ultra 80 system
- Sun Blade™ 100 system
- Sun Blade 1000 system

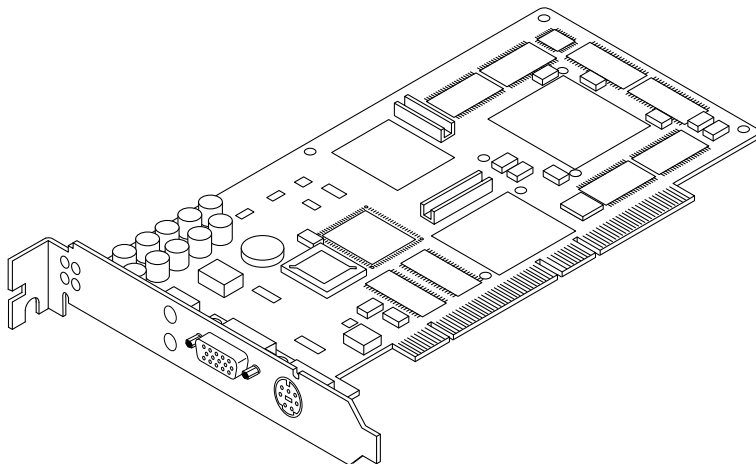


FIGURE 1-1 Sun Expert3D-Lite Graphics Accelerator

For assistance and other information not found in this document concerning the Sun Expert3D-Lite card, see SunServiceSM at <http://www.sun.com/service/online/>.

FIGURE 1-2 shows the Sun Expert3D-Lite graphics card external I/O ports. The Sun Expert3D-Lite I/O ports are described in Appendix A, “Sun Expert3D-Lite Graphics Card Features and Specifications.”

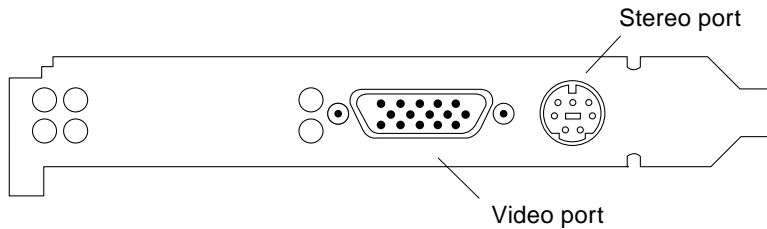


FIGURE 1-2 Sun Expert3D-Lite External I/O Port Connectors

Installation Kit

The Expert3D-Lite graphics card installation kit includes:

- Sun Expert3D-Lite graphics card
- Antistatic wrist strap
- Sun Expert3D-Lite software (CD-ROM)
- HD15 to 13W3 adaptor cable
- *Sun Expert3D-Lite Graphics Card Installation Guide*, this document

Updated versions of SunTM OpenGL[®] for SolarisTM and the latest graphics system software patches for the Sun Expert3D-Lite graphics card are available at:

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

Installing the Sun Expert3D-Lite Graphics Card

This chapter provides Sun Expert3D-Lite hardware installation information.

- “Installing the Sun Expert3D-Lite Card in an Ultra 60 System” on page 4
- “Installing the Sun Expert3D-Lite Card in an Ultra 80 System” on page 6
- “Installing the Sun Expert3D-Lite Card in a Sun Blade 100 System” on page 8
- “Installing the Sun Expert3D-Lite Card in a Sun Blade 1000 System” on page 9

Before Installation

Refer to the *Solaris Handbook for Sun Peripherals* that corresponds to your operating environment. The handbook describes how to shut down the system safely before installing any internal cards, and rebooting your system after installation.

Installing the Hardware

Refer to the hardware installation documentation provided with your Sun workstation for general instructions on accessing your system internal modules, and handling Sun PCI graphics cards.

Installing the Sun Expert3D-Lite Card in an Ultra 60 System

The Sun Expert3D-Lite graphics card connects into the 66-Mhz or 33-Mhz PCI connector on the Sun Ultra 60 motherboard. Best performance is achieved by putting the Sun Expert3D-Lite card into the Ultra 60 66-Mhz PCI slot. The Ultra 60 workstation can support up to four Sun Expert3D-Lite cards (one 66Mhz, three 33Mhz).

1. Shut down your workstation and remove the Ultra 60 enclosure.
2. Attach the antistatic wrist strap to your wrist and to the power supply.
3. Locate the Ultra 60 PCI 66-Mhz and 33-Mhz connectors (FIGURE 2-1).

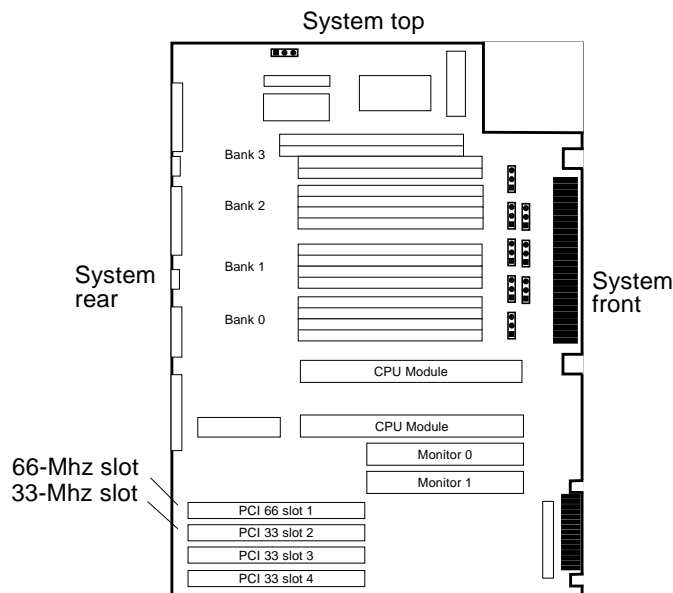


FIGURE 2-1 Ultra 60 PCI 66-Mhz and 33-Mhz Connector Locations

4. Using a No. 2 Phillips screwdriver, remove the screw that secures the PCI slot filler panel and remove the filler panel.
5. Install the Sun Expert3D-Lite graphics card.

- a. Position the Sun Expert3D-Lite card into the chassis (FIGURE 2-2).
- b. Guide the Sun Expert3D-Lite backplate bracket tab into the chassis back-panel opening; guide the opposite end of the card into the fan bracket card guide so that the card is aligned evenly with the motherboard slot.
- c. At the two upper corners of the Sun Expert3D-Lite card, push the card straight down into the slot until it is fully seated.
- d. Replace the Phillips screw securing the Sun Expert3D-Lite bracket tab to the system chassis.

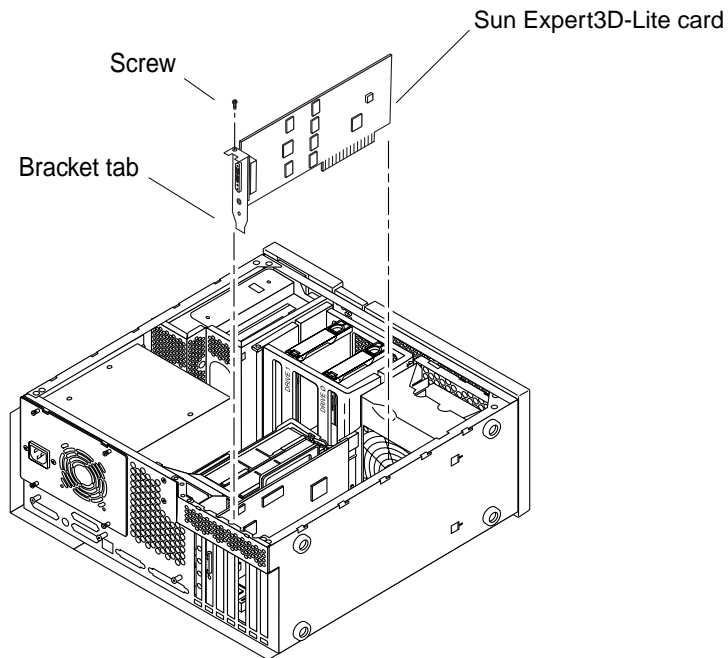


FIGURE 2-2 Installing Sun Expert3D-Lite Graphics Card in an Ultra 60 System

6. Replace the Ultra 60 enclosure and go to Chapter 3.

Installing the Sun Expert3D-Lite Card in an Ultra 80 System

The Sun Expert3D-Lite graphics card connects into the 66-Mhz or 33-Mhz PCI connector on the Sun Ultra 80 motherboard. Best performance is achieved by putting the Sun Expert3D-Lite card into the Ultra 80 66-Mhz PCI slot. The Ultra 80 workstation can support up to three Sun Expert3D-Lite cards (one 66Mhz, two 33Mhz).

1. Shut down your workstation and remove the Ultra 80 enclosure.
2. Attach the antistatic wrist strap to your wrist and power supply.
3. Locate the Ultra 80 PCI 66-Mhz and 33-Mhz connectors (FIGURE 2-3).

Note – You cannot use a Sun Expert3D-Lite in PCI 33Mhz slot 4 because of the UPAbus connector position.

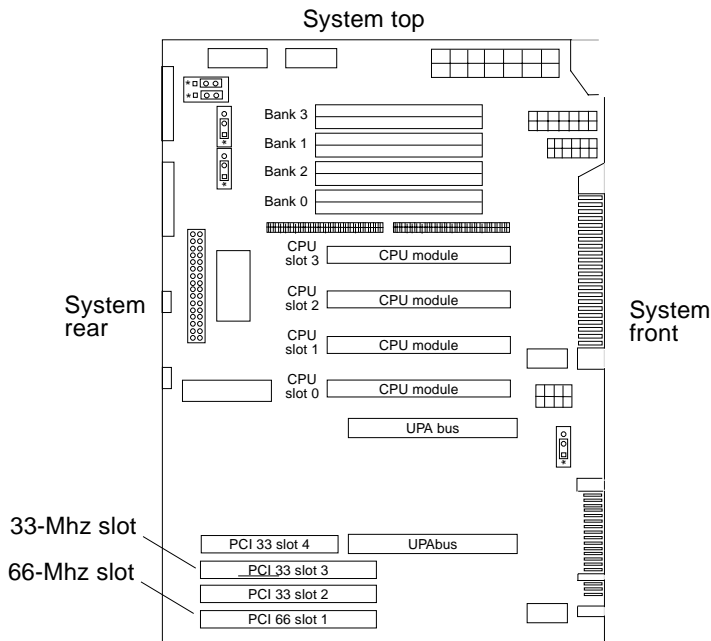


FIGURE 2-3 Ultra 80 PCI 66-Mhz and 33-Mhz Connector Locations

4. Using a No. 2 Phillips screwdriver, remove the screw that secures the PCI slot filler panel and remove the filler panel.
5. Install the Sun Expert3D-Lite graphics card.
 - a. Position the Sun Expert3D-Lite card into the chassis.
 - b. Lower the Sun Expert3D-Lite connector so that it touches its associated PCI card slot on the motherboard (FIGURE 2-4).
 - c. Guide the Sun Expert3D-Lite backplate bracket tab into the chassis back panel.
 - d. Holding the two upper corners of the Sun Expert3D-Lite card, push the card straight down into the slot until the card is fully seated.
 - e. Replace the Phillips screw securing the Sun Expert3D-Lite bracket tab to the system unit chassis.

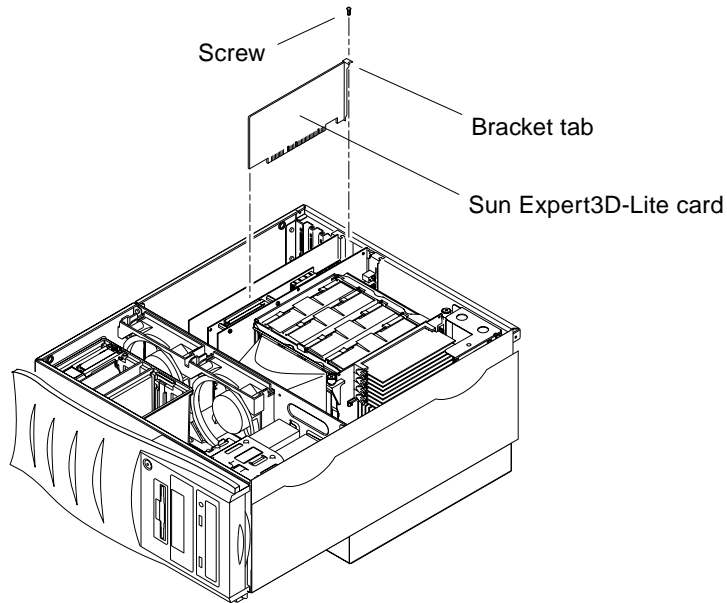


FIGURE 2-4 Installing Sun Expert3D-Lite Graphics Card in an Ultra 80 System

6. Replace the side access cover and go to Chapter 3.

Installing the Sun Expert3D-Lite Card in a Sun Blade 100 System

The Sun Expert3D-Lite graphics card connects into the 33-Mhz PCI connector on the Sun Blade 100 motherboard. The Sun Blade 100 system supports one Sun Expert3D-Lite card.

1. Shut down your system and attach the antistatic wrist strap.
2. Position the Sun Expert3D-Lite card into a Sun Blade 100 chassis PCI 33-Mhz connector (FIGURE 2-5).

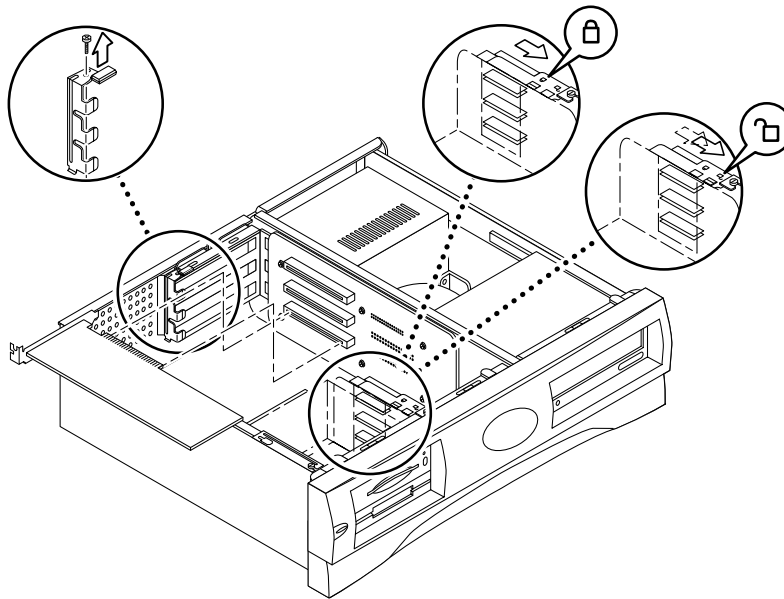


FIGURE 2-5 Installing Sun Expert3D-Lite Graphics Card in a Sun Blade 100 System

3. Insert the Sun Expert3D-Lite card connector so that it touches the associated riser board connector.

Note – The Sun Expert3D-Lite card bracket tab end must be inserted under the raised retaining tab on the back of the system chassis (FIGURE 2-5).

4. Guide the Sun Expert3D-Lite card bracket tab into the chassis back panel slot.

5. At the two corners of the card, push the card into the riser board connector until the card is fully seated.
6. Replace the Phillips screw securing the Sun Expert3D-Lite card bracket to the system chassis.

Installing the Sun Expert3D-Lite Card in a Sun Blade 1000 System

The Sun Expert3D-Lite graphics card connects into a 33-Mhz PCI connector on the Sun Blade 1000 motherboard. The 33-Mhz PCI connectors are the three slots located closest to the CPU module. The Sun Blade 1000 system supports up to three Sun Expert3D-Lite cards.

1. Shut down your system and attach the antistatic wrist strap.
2. Remove the Sun Blade 1000 access panel and lay the system on its side.
3. Position the Sun Expert3D-Lite card in the chassis (FIGURE 2-6).
4. Guide the card bracket tab into the chassis back-panel opening.
5. Holding the two upper corners of the Sun Expert3D-Lite card, push the card straight down into the connector until the card is fully seated.
6. Replace the Phillips screw securing the Sun Expert3D-Lite card bracket tab to the system chassis.

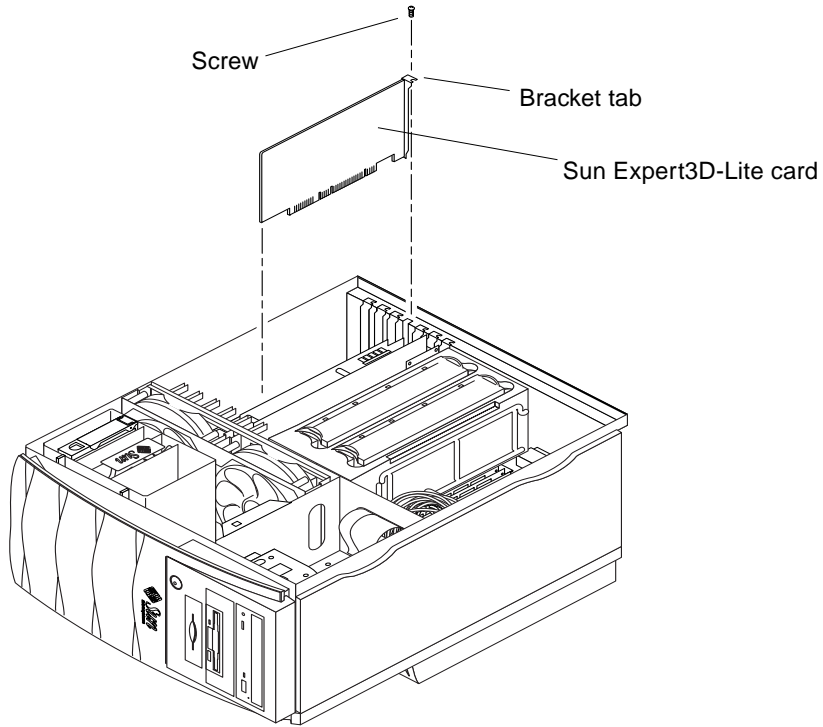


FIGURE 2-6 Installing Sun Expert3D-Lite Graphics Card in a Sun Blade 1000 System

7. Replace the side access cover and go to Chapter 3.

Installing the Sun Expert3D-Lite Software

This chapter provides the Sun Expert3D-Lite software installation information.

Software Requirements

- Solaris 2.6 Hardware: 3/99, Solaris 7 Hardware: 8/99, Solaris 8 or a subsequent compatible version of the operating environment
- OpenWindows™ Version 3.6, 3.6.1, and 3.6.2
- 1.5 Mbytes of available disk space for Sun Expert3D-Lite software
- 42-90 Mbytes of disk space for Sun OpenGL for Solaris (up to 90 Mbytes if 64-bit Sun OpenGL for Solaris is installed)

Note – If your system does not have the Solaris 2.6, Solaris 7, or Solaris 8 operating environment installed, you must install it. Use the text command version of `suninstall` to install the required Solaris operating environment. 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 – Sun Expert3D-Lite support is included in the Solaris 8 software. The Solaris 8 Sun Expert3D-Lite software on the CD-ROM contains enhancements and bug fixes that are not present in the Solaris 8 installation.

Sun Expert3D-Lite Software Package

Sun Expert3D-Lite uses Sun Expert3D software and is delivered unbundled on a CD-ROM provided with your installation kit.

Software Package Locations

TABLE 3-1 lists the directory locations of the Sun Expert3D-Lite software packages.

TABLE 3-1 Location of Sun Expert3D-Lite Software Packages

Expert3D-Lite Software Packages	Directory Location
Solaris 2.6 software	/cdrom/cdrom0/Expert3D/Solaris_2.6/Product/
Solaris 7 software	/cdrom/cdrom0/Expert3D/Solaris_7/Product/
Solaris 8 software	/cdrom/cdrom0/Expert3D/Solaris_8/Product/

Sun Expert3D-Lite Software Package Names

TABLE 3-2 lists the Sun Expert3D-Lite software package names and descriptions.

TABLE 3-2 Solaris 2.6, Solaris 7, and Solaris 8 Software Package Names

Package name	Description
SUNWifb.u	64-bit device driver for the PCI Bus Sun Expert3D (IFB) graphics accelerator
SUNWifbcf	Configuration utility for the PCI Bus Sun Expert3D (IFB) graphics accelerator
SUNWifbmn	Manual pages for the PCI Bus Sun Expert3D (IFB) graphics accelerator (not applicable to Solaris 8 operating environment)
SUNWifbr	Boot-time device initialization support for the PCI Bus Sun Expert3D (IFB) graphics accelerator
SUNWifbw	X server loadable module for the PCI Bus Sun Expert3D (IFB) graphics accelerator
SUNWifbx.u	64-bit device driver for the PCI Bus Sun Expert3D (IFB) graphics accelerator (Solaris 7 and Solaris 8 software only)

TABLE 3-2 Solaris 2.6, Solaris 7, and Solaris 8 Software Package Names (*Continued*)

Package name	Description
SUNWifbvt	SunVTS for Sun Expert3D (IFB)
SUNWifbvxx	64-bit SunVTS for Sun Expert3D (IFB)

Note – If SunVTS™ is installed in your system, the installation script adds Sun Expert3D-Lite to your system VTS framework.

Sun Expert3D-Lite Patches

TABLE 3-3 lists the patches for Sun Expert3D-Lite software packages.

TABLE 3-3 Sun Expert3D-Lite Patches

Solaris release	Patch
Solaris 2.6 software	108788-04
Solaris 7 software	108787-04
Solaris 8 software	108576-07

Sun OpenGL for Solaris Software

The Sun Expert3D graphics card is supported in Sun OpenGL Version 1.1.2 for Solaris, Sun OpenGL Version 1.2 for Solaris, and Sun OpenGL Version 1.2.1 for Solaris operating environments.

Software Package Locations

TABLE 3-4 lists the directory locations of the Sun OpenGL for Solaris software packages.

TABLE 3-4 Location of Sun OpenGL for Solaris Software Packages

Sun OpenGL for Solaris Software Packages	Directory Location
Sun OpenGL 1.1.2 for Solaris, Solaris 2.6 software	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_2.6/Product/
Sun OpenGL 1.1.2 for Solaris, Solaris 7 software	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_7/Product/
Sun OpenGL 1.1.2 for Solaris, Solaris 8 software	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_8/Product/
Sun OpenGL 1.2 for Solaris, Solaris 2.6, Solaris 7, and Solaris 8 software	/cdrom/cdrom0/OpenGL/1.2/Product/
Sun OpenGL 1.2.1 for Solaris, Solaris 2.6, Solaris 7, and Solaris 8 software	/cdrom/cdrom0/OpenGL/1.2.1/Product/

Sun OpenGL for Solaris Software Package Names

TABLE 3-5 lists the Sun OpenGL for Solaris software package names and descriptions.

TABLE 3-5 Sun OpenGL Version 1.2.1, 1.2, and 1.1.2 for Solaris Package Names for Solaris 2.6, Solaris 7, and Solaris 8 Software

Package name	Description
SUNWafbg1	Sun OpenGL for Solaris Elite3D support
SUNWafbgx	Sun OpenGL for Solaris 64-bit Elite3D support
SUNWffbg1	Sun OpenGL for Solaris Creator graphics (FFB) support
SUNWffbgx	Sun OpenGL for Solaris 64-bit Creator graphics (FFB) support
SUNWgldoc	Sun OpenGL for Solaris documentation and man pages
SUNWgleg	Sun OpenGL for Solaris utilities and example programs
SUNWglh	Sun OpenGL for Solaris header files
SUNWglrt	Sun OpenGL for Solaris Runtime Libraries
SUNWglrtu	Sun OpenGL for Solaris Platform Specific Runtime Libraries
SUNWglrtx	Sun OpenGL for Solaris 64-bit Runtime Libraries
SUNWifbg1	Sun OpenGL for Solaris Sun Expert3D graphics support

TABLE 3-5 Sun OpenGL Version 1.2.1, 1.2, and 1.1.2 for Solaris Package Names for Solaris 2.6, Solaris 7, and Solaris 8 Software (*Continued*)

Package name	Description
SUNWifbgx	Sun OpenGL for Solaris 64-bit Sun Expert3D graphics support
SUNWglshr	Sun OpenGL for Solaris Runtime Generic Software
SUNWglsrx	Sun OpenGL for Solaris 64-bit Optimized SW Rasterizer
SUNWglsrz	Sun OpenGL for Solaris Optimized SW Rasterizer

Sun OpenGL for Solaris Patches

TABLE 3-6 lists the Sun OpenGL Version 1.2.1 for Solaris patches required for Solaris 2.6, Solaris 7, and Solaris 8 operating environments.

TABLE 3-6 Sun OpenGL Version 1.2.1 for Solaris Patches

Solaris release	Patch	Directory Location
Solaris 2.6	109543-03	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_2.6/Patches
Solaris 2.6 (64-bit)	109544-03	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_2.6/Patches
Solaris 7	109543-01	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_7/Patches
Solaris 7 (64-bit)	109544-01	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_7/Patches
Solaris 8	109543-01	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_8/Patches
Solaris 8 (64-bit)	109544-01	/cdrom/cdrom0/OpenGL/1.2.1/Solaris_8/Patches

TABLE 3-7 lists the Sun OpenGL Version 1.2 for Solaris patches required for Solaris 2.6, Solaris 7, and Solaris 8 operating environments.

TABLE 3-7 Sun OpenGL Version 1.2 for Solaris Patches

Solaris Release	Patch	Directory Location
Solaris 2.6	108131-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_2.6/Patches
Solaris 2.6 (64-bit)	108132-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_2.6/Patches
Solaris 7	108131-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_7/Patches
Solaris 7 (64-bit)	108132-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_7/Patches
Solaris 8	108131-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_8/Patches
Solaris 8 (64-bit)	108132-10	/cdrom/cdrom0/OpenGL/1.2/Solaris_8/Patches

TABLE 3-8 lists the Sun OpenGL Version 1.1.2 for Solaris patches required for Solaris 2.6, Solaris 7, and Solaris 8 operating environments.

TABLE 3-8 Sun OpenGL Version 1.1.2 for Solaris Patches

Solaris Release	Patch	Directory Location
Solaris 2.6	106735-16	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_2.6/Patches
Solaris 7 (32-bit)	107104-11	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_7/Patches
Solaris 7 (64-bit)	107105-11	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_7/Patches
Solaris 8 (32-bit)	107104-11	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_8/Patches
Solaris 8 (64-bit)	107105-11	/cdrom/cdrom0/OpenGL/1.1.2/Solaris_8/Patches

The Sun Expert3D-Lite installation script installs these patches automatically, if required. You can manually install or remove these patches by using `installpatch` and `backoutpatch` for the Solaris 2.6 operating environment, or `patchadd` and `patchrm` for the Solaris 7 and Solaris 8 operating environments.

- To add a patch in the Solaris 2.6 operating environment, type:

```
# installpatch patchnumber
```

- To add a patch in the Solaris 7 and Solaris 8 operating environment, type:

```
# patchadd patchnumber
```

Installing Sun Expert3D-Lite Software

Install the Sun Expert3D-Lite software from the CD-ROM provided with your installation kit.

1. **After installing the Sun Expert3D-Lite card into your system, boot your system at the `ok` prompt:**

```
ok boot -r
```

2. **Log in as superuser.**
3. **Insert the CD-ROM into the drive.**

4. Mount the CD-ROM drive.

- If the drive is already mounted, type the following, and go to Step 5:

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

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

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

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

5. To install the software, as superuser, type:

```
# ./install
```

The following is displayed:

```
# ./install
*** Checking if Sun Expert3D support is already installed...
*** Checking if fbconfig is already installed...
*** Checking if Sun OpenGL is installed...

Select one of the following Sun OpenGL installation options:
1) Install Sun OpenGL 1.1.2
2) Install Sun OpenGL 1.2
3) Install Sun OpenGL 1.2.1
4) Do not install Sun OpenGL
Select an option:
```

The installation program checks if Sun Expert3D-Lite software is already installed. If a version of Sun Expert3D-Lite software is installed, the program checks to determine the version.

- If a version of Sun Expert3D-Lite software is already installed and it is lower than the version you are installing from the CD-ROM, then the program prompts you to confirm an upgrade to the latest release. It then installs the latest version.

- If the same version of Sun Expert3D-Lite software is already installed, the program checks that it is fully installed and displays the following:

```
# ./install
*** Checking if Sun Expert3D support is already installed...
*** Checking if fbconfig is already installed...
*** Checking if Sun OpenGL is installed...
*** Checking if Sun OpenGL 1.2 support for Sun Expert3D is installed...

All required software for Sun Expert3D and Sun OpenGL support is already
installed. No software will be installed at this time.
```

- If a higher version of Sun Expert3D-Lite software is already installed, the program does not select Sun Expert3D-Lite software installation.

The installation program also displays similar prompts when checking for fbconfig and Sun OpenGL for Solaris versions. If Sun OpenGL for Solaris 1.1.2 is fully installed on your system, the program checks for required patches. If no patches are found, the program installs the appropriate patches during the installation process.

6. Select the appropriate Sun OpenGL for Solaris version.

Option 2 is selected for this example:

```
*** Checking if Sun OpenGL 1.2 support for Sun Expert3D is installed...

About to take the following actions:
- Install Sun Expert3D support for Solaris 7
- Install fbconfig
- Install Sun OpenGL 1.2
- Install Sun OpenGL 1.2 support for Sun Expert3D

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

7. Press any key and Return to start installation.

Once complete, the following is displayed and the program provides a directory for locating a file log of the installation process. It also provides configuration and reboot instructions.

```
*** Installing Sun Expert3D support for Solaris 7...
*** Installing fbconfig...
*** Installing Sun OpenGL 1.2...
*** Installing Sun OpenGL 1.2 support for Sun Expert3D...
*** Installation complete.

To remove this software, use the 'remove' script on this CDROM, or
the following script:
    /var/tmp/expert3d.remove

A log of this installation can be found at:
    /var/tmp/expert3d.install.2000.09.27

To configure a Sun Expert3D accelerator, use the fbconfig
utility. See the fbconfig(1m) and SUNWifb_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.
```

8. Shut down the system after Sun Expert3D-Lite software is installed:

```
# shutdown
```

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

9. Reboot the system at the ok prompt to complete the installation:

```
ok boot -r
```

Removing Sun Expert3D-Lite Software

1. To remove Sun Expert3D-Lite software, become superuser and type:

```
# ./remove
```

The following list of options is displayed.

```
# ./remove
1) Remove Sun Expert3D support
2) Remove fbconfig
3) Remove OpenGL
4) Remove All (Sun Expert3D, fbconfig, and OpenGL)
5) Quit
Select an option:
```

2. Select 4 to remove all packages.

The following then is displayed:

```
About to take the following actions:
- Remove Sun Expert3D support
- Remove fbconfig
- Remove OpenGL
Press 'q' to quit, or press any other key to continue:
```

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

Once complete, the following is displayed and the program provides a directory for locating a log of the removal process:

```
*** Removing packages...
*** Done. A log of this removal can be found at:
    /var/tmp/expert3d.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 Expert3D device is identified as `ifbx` (for example, `ifb0` and `ifb1` for two Sun Expert3D devices). To do this:

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

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

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

The following example shows the `Xservers` configuration file modified for one Sun Creator card and two Sun Expert3D-Lite cards:

```
:0 Local local_uid@console root /usr/openwin/bin/Xsun :0 -dev /dev/fbs/ffb0
-dev /dev/fbs/ifb1 -dev /dev/fbs/ifb0 -nobanner
```

Sun Expert3D-Lite Default Console Display

To set the Sun Expert3D-Lite graphics card as the default monitor console display:

1. **At the `ok` prompt, type:**

```
ok show-displays
```

The following shows how to set the console device:

```
a) /pci@1f,0/SUNW,m64B@13
b) /pci@1f,0/pci@5/SUNW,Expert3D@1
q) NO SELECTION
Enter Selection, q to quit: b
/pci@1f,0/pci@5/SUNW,Expert3D@1 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,Expert3D@1
ok nvalias myscreen /pci@1f,0/pci@5/SUNW,Expert3D@1
ok setenv output-device myscreen
output-device =      myscreen
```

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

In this example, you would select b for the Sun Expert3D-Lite card.

3. Set the device you selected to be the console device.

```
ok setenv output-device <Control -Y> <ENTER>
```

4. Reset the output-device environment:

```
ok reset
```

5. Connect your monitor cable to the Sun Expert3D-Lite card on your system back panel.

6. Create an alias name for the Sun Expert3D-Lite device (optional):

You can simplify future OpenBoot™ PROM commands by creating an alias for the Sun Expert3D-Lite device. To do this,

a. Select the Sun Expert3D-Lite device from the show-displays menu.

b. Name the Sun Expert3D-Lite device (this example names the device as screen1).

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

c. Store the name as the alias.

```
ok nvstore
```

d. Verify the alias.

```
ok devaliases
```

The selected alias is then displayed.

You can now refer to `screen1` for the Sun Expert3D-Lite device. For example,

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

Sun Expert3D-Lite Man Pages

The Sun Expert3D-Lite man pages allows you to query frame buffer attributes such as screen resolutions and visual configurations.

The `fbconfig(1M)` man page is used for configuring Sun graphics accelerators. The `SUNwifb_config(1M)` man page contains Sun Expert3D-Lite device-specific configuration information.

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 `SUNwifb_config` man page, type:**

```
# man SUNwifb_config
```

Changing the Monitor Screen Resolution

For most installations, the Sun Expert3D-Lite automatically configures itself to the proper screen resolution and refresh rate for your monitor. However, if it is not a Sun monitor that is connected to the Sun Expert3D-Lite, the monitor may have the wrong screen resolution. To change the screen resolution, use the `fbconfig` and `SUNWifb_config` utilities.

Sun Expert3D-Lite Graphics Card Features and Specifications

This appendix provides features and specifications for the Sun Expert3D-Lite graphics accelerator. It also describes how to configure multiple Sun Expert3D-Lite cards in a single system.

Sun Expert3D-Lite Graphics Card Features

- Geometry acceleration
 - Model view matrix transformation of vertex and normal coordinates
 - Texture matrix transformation of texture coordinates
 - Full lighting calculations with up to 24 light sources
 - Up to six user clip planes
 - Perspective transformation
 - Viewport transformation
 - View volume clipping
 - Image processing

- OpenGL operations
 - Points (2D, 3D, wide)
 - Vectors (2D and 3D lines and line strips; wide, stippled)
 - Polygons (triangles, triangle strips, quads, quad strips, polygons, point/line polygon mode)
 - Antialiased points, vectors, and polygons
 - Image support (multiple formats, zoom, bilinear scaling, color matrix, color tables)
 - Alpha operations
 - 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 clears
 - Fast window-mode double buffering
 - Frame-sequential stereo support
- Extensive support of OpenGL extensions
 - Imaging extensions such as pixel buffer, color table, color matrix, and convolution
 - Blend extensions such as blend color, blend minmax, and blend function separate
 - Texture extensions (edge clamp, border clamp, LOD clamp, generate mipmap)
 - Texture color table
 - Post-texturing specular
 - Stencil operation wrap

Additional Sun Expert3D-Lite Features

- 8 Mbytes of SDRAM DirectBurst memory
- 16 Mbytes onboard SDRAM texture memory with full mipmapped trilinear interpolated texture processing
- 32 Mbytes of frame buffer SDRAM memory
- 10-bit gamma correction
- Hardware cursor
- Stereoscopic viewing support (interlaced or frame sequential)
- Display Data Channel (DDC) monitor support for bidirectional communication
- Display Power Management Signaling (DPMS) to enable monitor's power-saving mode
- High-speed, full-featured DMA over the PCI-64 bus
- Multiscreen support using multiple cards in a single workstation
- Two video lookup tables

Sun Expert3D-Lite Specifications

External I/O Ports

The external I/O ports are accessible through the I/O connectors on the Sun Expert3D-Lite card backplate (FIGURE A-1).

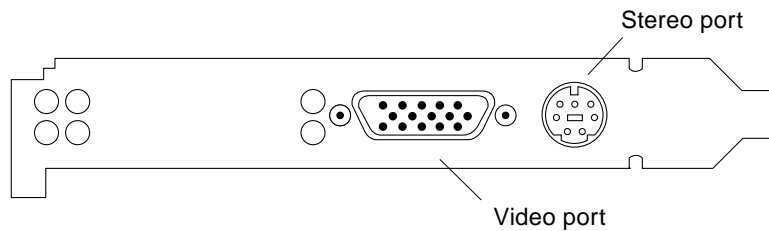


FIGURE A-1 Sun Expert3D-Lite Connectors

The Sun Expert3D-Lite graphics card has the following external I/O ports:

- Video output port
- Stereo output port

Video Output Port

The video output port is a HD15 15-pin connector that connects the workstation monitor.

TABLE A-1 Sun Expert3D-Lite HD15 Video Output Port

Pin	Signal
1	Red analog video
2	Green analog video
3	Blue analog video
4	Monitor ID Bit 2
5	Ground
6	Ground

TABLE A-1 Sun Expert3D-Lite HD15 Video Output Port (Continued)

Pin	Signal
7	Ground
8	Ground
9	+5V Supply
10	Ground
11	Monitor ID Bit 0
12	Monitor ID Bit 1, or DDC Bi-directional Data (SDA)
13	Horizontal/Composite Sync
14	Vertical Sync
15	Monitor ID Bit 3, or DDC Data Clock (SCL)

Stereo Output Port

FIGURE A-2 and TABLE A-2 shows the Sun Expert3D-Lite stereo connector and pinout signals.

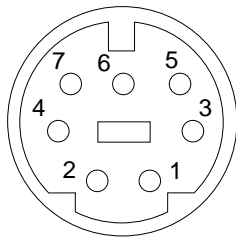


FIGURE A-2 Sun Expert3D-Lite 7-Pin DIN Female Stereo Connector

TABLE A-2 Sun Expert3D-Lite Stereo Output Port

Pin	Signal
1	Ground
2	5.0V (Fused, will supply up to 300mA, limited to 1.0A.)
3	12.0V (Fused, will supply up to 300mA, limited to 1.0A.)
5	Stereo sync
6	No connection
7	No connection

Sun Expert3D-Lite Screen Resolutions and Video Formats

TABLE A-3 lists the monitor screen resolutions and video formats supported by the Sun Expert3D-Lite graphics accelerator:

TABLE A-3 Sun Expert3D-Lite Monitor Screen Resolutions

Display resolution	Vertical refresh rate	Sync standard	Aspect ratio format
1920 x 1080	72 Hz	Sun	16:9
1600 x 1280	76 Hz	Sun	5:4
1600 x 1200	75 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10
1440 x 900	76 Hz	Sun	16:10
1280 x 800	112Hz	Sun-stereo	16:10
1280 x 800	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1152 x 900	112Hz	Sun-stereo	5:4
1152 x 900	66, 76 Hz	Sun	5:4
1024 x 800	84 Hz	Sun	5:4
1024 x 768	75 Hz	VESA	4:3
1024 x 768	60, 70, 77 Hz	Sun	4:3
960 x 680	108, 112 Hz	Sun-stereo	Sun-Stereo
768 x 575	50i Hz	PAL	PAL
640 x 480	60 Hz	VESA	4:3
640 x 480	60i Hz	NTSC	NTSC