

Sun™ Quad FastEthernet™ SBus Adapter Installation and User's Guide



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Sun Microsystems Computer Company

A Sun Microsystems, Inc. Business
2550 Garcia Avenue
Mountain View, CA 94043 USA
415 960-1300 fax 415 969-9131

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Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted-pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

FCC Class B Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

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Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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Preface

Sun Quad FastEthernet SBus Adapter Installation and User's Guide provides installation instructions for the Sun™ Quad FastEthernet™ SBus Adapter. This manual also describes how to install and configure the Sun QuadFastEthernet driver software.

These instructions are designed for a system administrator with networking experience.

How This Book Is Organized

Chapter 1, “Preparing for Installation,” describes the hardware and software features for the Sun Quad FastEthernet SBus Adapter.

Chapter 2, “Installing the Adapter,” tells you how to install the Sun Quad FastEthernet SBus Adapter into your system.

Chapter 3, “Installing the Sun QuadFastEthernet Driver Software,” describes how to install and configure the device driver software.

Appendix A, “Specifications,” lists the specifications for the Sun Quad FastEthernet SBus Adapter.

Appendix B, “Interface Signals,” lists the pin descriptions.

Appendix C, “Running Diagnostics Tests,” describes the diagnostic procedures for testing the Sun Quad FastEthernet SBus Adapter.

Related Documents

The following documents contain topics that relate to the information in the *Sun Quad FastEthernet SBus Adapter Installation and User's Guide*.

Title	Part Number
Your system installation or service manual	(System dependent)
<i>Solaris 2.x Handbook for SMCC Peripherals</i>	(Release dependent)
<i>SunVTS User's Guide</i>	(Release dependent)
<i>SunDiag User's Guide</i>	801-6621
<i>Platform Notes: The hme Fast Ethernet Device Driver</i>	802-5333
<i>OpenBoot 2.x Command Reference Manual</i>	802-3241
<i>OpenBoot 3.x Command Reference Manual</i>	802-3242

UNIX Commands

This document may not include specific software commands or procedures. Instead, it may name software tasks and refer you to operating system documentation or the handbook that was shipped with your new hardware.

The type of information that you might need to use references for includes:

- Shutting down the system
- Booting the system
- Configuring devices
- Other basic software procedures

See one or more of the following:

- *Solaris 2.x Handbook for SMCC Peripherals* contains Solaris™ 2.x software commands.
- On-line AnswerBook™ for the complete set of documentation supporting the Solaris 2.x software environment.
- Other software documentation that you received with your system.

Typographic Conventions

The following table describes the typographic changes used in this book.

Typeface or Symbol	Meaning	Example
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. machine_name% You have mail.
AaBbCc123	What you type, contrasted with on-screen computer output	machine_name% su Password:
<i>AaBbCc123</i>	Command-line placeholder: replace with a real name or value	To delete a file, type <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new words or terms, or words to be emphasized	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.

Shell Prompts

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

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

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Country	Telephone	Fax
United States	1-800-873-7869	1-800-944-0661
United Kingdom	0-800-89-88-88	0-800-89-88-87
France	05-90-61-57	05-90-61-58
Belgium	02-720-09-09	02-725-88-50
Luxembourg	32-2-720-09-09	32-2-725-88-50
Germany	01-30-81-61-91	01-30-81-61-92
The Netherlands	06-022-34-45	06-022-34-46
Sweden	020-79-57-26	020-79-57-27
Switzerland	155-19-26	155-19-27
Japan	0120-33-9096	0120-33-9097

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Preparing for Installation

The Sun Quad FastEthernet SBus Adapter contains four fully-buffered twisted-pair Ethernet ports (RJ-45), providing four switchable 10BASE-T/100BASE-TX channels, on a single-wide SBus adapter.

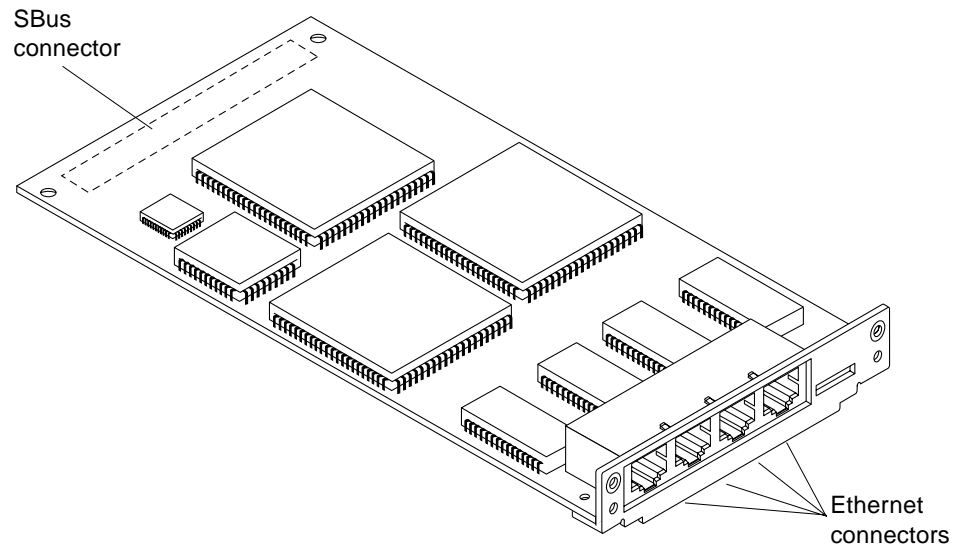


Figure 1-1 Sun Quad FastEthernet SBus Adapter

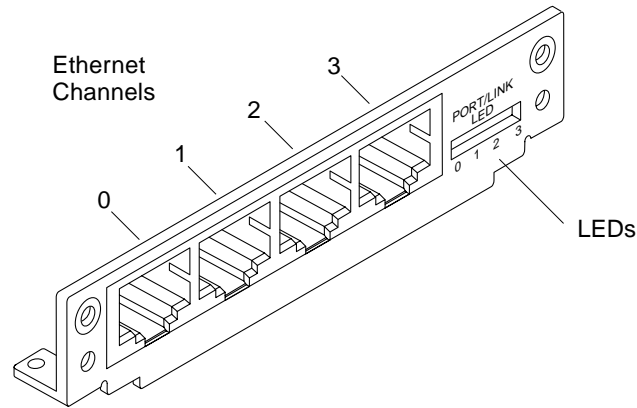


Figure 1-2 Sun Quad FastEthernet SBus Adapter Back Panel

Sun Quad FastEthernet SBus Adapter Features

This SBus adapter offers the following features:

- Fully complies with the following standards:
 - ANSI/IEEE std. 802.3 CSMA/CD physical layer specification
 - i. Four Switchable 10BASE-T/100BASE-TX Ethernet channels with auto negotiation. Conforms to IEEE 802.3u Ethernet standard
 - ii. Provides operations of up to 100 meters of twisted-pair without use of repeaters
 - SBus specification, Rev B.0
- Four independent Ethernet channels run at either 10 Mbps or 100 Mbps
- Supports full duplex trunking mode, which will be supported in a future software upgrade package
- Multiple IDs with local media access control (MAC) IP storage
- Full packet buffering for transmit and receive packets
64 Kbytes of memory for data
- Link integrity LED for each channel

Hardware and Software Requirements

Before installing the adapter, make sure your system meets the following hardware and software requirements:

Table 1-1 Hardware and Software Requirements

Supported Operating Environments	Solaris 2.4, 2.5, 2.5.1, 2.5.1 Hardware: 4/97 releases
Supported Systems	<p>Solaris 2.4 SPARCstation™ 5*, SPARCstation 10, SPARCstation 20, SPARCserver™ 1000/1000E, SPARCcenter™ 2000/2000E, SPARCserver 6x0MP</p> <p>Solaris 2.5, 2.5.1, 2.5.1 Hardware: 4/97 Sun™ Ultra™ systems, SPARCstation 5*, SPARCstation 10, SPARCstation 20, SPARCserver 1000/1000E, SPARCcenter 2000/2000E, SPARCserver 6x0MP</p>
OpenBoot™ PROM (OBP)	<p>Release 2.26 or later for SPARCserver 1000/1000E and SPARCcenter 2000/2000E systems</p> <p>Release 2.10 version 3 or later for SPARCserver 6x0MP systems</p> <p>Release 2.9 or later for all other supported systems</p>

*One SBus adapter maximum.

Note – The information above is up-to-date as of the printing of this manual. Visit Sun on the World Wide Web at <http://www.sun.com/> for the latest information.

Checking the OpenBoot PROM Revision Level

Table 1-1 lists the required OpenBoot PROM revision levels for all of the supported systems. You can use the OpenBoot command `.version` to display your system's OpenBoot PROM revision level.

▼ Displaying the OpenBoot PROM Revision Level

- ◆ **At the `ok` prompt, type `.version` to check your system's OpenBoot PROM revision level.**

```
ok .version
Release 2.26 Version 1203 created 96/04/19 09:44:48
```

Warning for SPARCserver 1000/1000E and SPARCcenter 2000/2000E Systems



Warning – If you are installing the Sun Quad FastEthernet SBus Adapter in a SPARCserver 1000/1000E or a SPARCcenter 2000/2000E system, your system's OpenBoot PROM must be release 2.26 or later. Release 2.26 is required on the master system board.

If you have installed the Sun Quad FastEthernet SBus Adapter into a SPARCserver 1000/1000E or a SPARCcenter 2000/2000E system and the system's OpenBoot PROM is not 2.26 or later, attempting to reboot the system with the `reboot`, `sync` ► `sync` ► `halt`, or `init 0` commands will cause a system reset and display following error message:

```
OA>. TEST FAILED - System Reconfiguration .....
OA>Swap to SBI Interrupt Status register caused trap
```

Contact your local service provider to order an upgrade kit if your SPARCserver 1000/1000E or SPARCcenter 2000/2000E OpenBoot PROM release is earlier than 2.26.

Installing the Adapter



This chapter tells you how to install the Sun Quad FastEthernet SBus Adapter in your system and how to verify that it has been installed correctly.

Checking for Other FastEthernet (hme) Devices

Earlier versions of the FastEthernet (hme) driver, which are bundled with the Solaris 2.5 and 2.5.1 operating environments, do not support the functionality of the Sun Quad FastEthernet SBus Adapter. Before proceeding with the hardware and software installation, check if your system already contains an hme device:

- ◆ **At the command line, use the `grep` command to search the `/etc/path_to_inst` file for hme devices.**

```
# grep hme /etc/path_to_inst
"/sbus@1f,0/SUNW,hme@e,8c00000" 0 "hme"
```

If you do not see any lines containing an hme device, you can safely install the adapter, as described in “Installing the Adapter” on page 7. Afterward, install the software as described in Chapter 3, “Installing the Sun QuadFastEthernet Driver Software.”

If you found an hme device on your system when using the `grep` command (like in the example above), complete the installation procedure described in the next section.

Installing the Adapter on a System with an hme Device

Before installing the Sun Quad FastEthernet SBus Adapter into the system with an hme device, you must remove all lines containing the hme device from the `/etc/path_to_inst` file.



Warning – If you do not remove these lines, the system will encounter problems when you reboot your system after the adapter installation.

- 1. As superuser (root), add write permissions to the `/etc/path_to_inst` file.**

```
# chmod 644 /etc/path_to_inst
```

- 2. Using a text editor, remove any line in the `/etc/path_to_inst` file that contains a reference to an hme device.**
Make sure that you save the file.
- 3. Install the Sun QuadFastEthernet Driver Software as “Installing the Software Drivers From the CD-ROM” on page 12.**

Note – *Do not* reboot the system prior to powering the system down to install the adapter.

- 4. Power down the system and install the adapter as described in “Installing the Adapter” on page 7.**
After you have installed the adapter, see Chapter 3 for information on how to configure the driver software.

Installing the Adapter

Note – Refer to your system installation or service manual for detailed instructions for the following tasks.

- 1. Power off your system, using the standard shut down procedures described in *Solaris 2.x Handbook for SMCC Peripherals*.**
The *Solaris 2.x Handbook for SMCC Peripherals* is shipped with the Solaris operating environment software and is available in the on-line AnswerBook™ documentation.
- 2. If you are replacing an SBus card with the Sun Quad FastEthernet SBus Adapter, remove the old card now.**
- 3. Install the Sun Quad FastEthernet SBus Adapter in the selected SBus slot.**
- 4. Connect Ethernet cables to the Sun Quad FastEthernet SBus Adapter and to an Ethernet network.**

Verifying the Installation

After you have installed the Sun Quad FastEthernet SBus Adapter, but *before* you boot your system, perform the following tasks to verify the installation. Refer to the *Solaris 2.x Handbook for SMCC Peripherals* manual or your Solaris documentation for the detailed instructions.

- 1. Power on the system, and when the banner appears, press the Stop-A keys to interrupt the boot process and to get to the `ok` prompt.**

2. Use the `show-devs` command to list the system devices.

You should see lines in the list of devices, similar to the example below, specific to the Sun Quad FastEthernet SBus Adapter:

```
ok show-devs
...
/sbus@1f,0/SUNW,hme@1,8c30000
/sbus@1f,0/SUNW,hme@1,8c20000
/sbus@1f,0/SUNW,hme@1,8c10000
/sbus@1f,0/SUNW,hme@1,8c00000
...
/sbus@1f,0/SUNW,hme@e,8c00000
...
```

The `SUNW,hme@1` entries identify the adapter's four Ethernet devices. In the example above, the `SUNW,hme@e` entry is the on-board Ethernet device on a Sun Ultra 1 system with an OpenBoot PROM, revision 3.x.

Note – In the example above, the number 1 following `SUNW,hme@` corresponds to the SBus slot in which the Sun Quad FastEthernet SBus Adapter resides.

If you do not see the devices listed, check that the adapter is properly seated and, if necessary, reinstall the adapter.

Diagnostics Testing

- For Sun Quad FastEthernet SBus Adapter diagnostics testing on systems running Solaris 2.4, see “Using the SunDiag System Exerciser” on page 37.
- For Sun Quad FastEthernet SBus Adapter diagnostics testing on systems running Solaris 2.5, 2.5.1, 2.5.1 Hardware: 4/97, refer to the *SunVTS User's Guide*.

Examining Network Activity

After you have installed the Sun Quad FastEthernet SBus Adapter, but *before booting the system*, verify the installation by examining the network interfaces with the OpenBoot PROM `watch-net-all` command.

Make sure that the interfaces are connected to an active network.

♦ **Examine network activity and incoming network packets by typing `watch-net-all` at the `ok` prompt.**

The `watch-net-all` command monitors network traffic on all network interfaces in the system. In the example below, the `watch-net-all` command tests all four of the adapter's interfaces, two of which are connected to a network.

```
ok watch-net-all
/sbus@1f,0/SUNW,hme@1,8c30000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@1f,0/SUNW,hme@1,8c20000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
..... (Press any key to continue.)

/sbus@1f,0/SUNW,hme@1,8c10000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@1f,0/SUNW,hme@1,8c00000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
..... (Press any key to continue.)
```

In addition to testing the adapter's interfaces, the `watch-net-all` command may also test other network devices on the system.

Note – The network speed is the same as the speed of the network that your system is connected. See the section “Forcing Network Speed Between 10 Mbps and 100 Mbps” on page 27 for more detailed information about speed selection.

Rebooting the System

After you have examined the network activity, perform a reconfiguration boot on your system so the operating environment can recognize the Sun Quad FastEthernet SBus Adapter.

♦ **Perform a reconfiguration boot on the system.**

```
ok boot -r
```

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

Installing the Sun QuadFastEthernet Driver Software

3 

This chapter describes how to install and configure the Sun QuadFastEthernet driver software.

Note – If you do not already have a FastEthernet (hme) device on your system, you will need to install the Sun Quad FastEthernet SBus Adapter in your system prior to performing the tasks in this chapter. See “Checking for Other FastEthernet (hme) Devices” on page 5 for more information.

Installing the Software Drivers From the CD-ROM

The *Sun QuadFastEthernet Driver Software 1.0* CD-ROM (704-5788-10) contains the software required by the Sun Quad FastEthernet SBus Adapter.

Mounting the CD-ROM

- 1. Become superuser (root).**
- 2. Insert the *Sun QuadFastEthernet Driver Software 1.0* CD into a CD-ROM drive that is connected to your system.**
 - If your system is running Volume Manager, it should automatically mount the CD to the `/cdrom/sun_quadfast_1_0` directory.
 - If your system is not running Volume Manager, mount the CD as follows:

```
# mkdir /cdrom
# mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom
```

Note - If the CD-ROM drive that you are using for software installation is attached to a remote machine, refer to your Solaris installation guide for remote CD-ROM access instructions.

Files and Directories on the CD-ROM

You will see the following files and directories in the /cdrom/sun_quadfast_1_0 directory or the /cdrom directory, depending on how you mounted the CD-ROM.

File or Directory	Contents
Copyright	U.S. Copyright file
FR_Copyright	French Copyright file
Sol_2.4	Contains the SUNWhmdl and SUNWhmdl_u software packages that run under the Solaris 2.4 operating environment
Sol_2.5	Contains the SUNWhmdl and SUNWhmdl_u software packages that run under the Solaris 2.5 operating environment
Sol_2.5.1	Contains the SUNWhmdl and SUNWhmdl_u software packages that run under the Solaris 2.5.1 and the Solaris 2.5.1 Hardware: 4/97 operating environments

Installing the Sun QuadFastEthernet Driver Software

1. Install the Sun QuadFastEthernet Driver Software.

- a. If your system is running the Solaris 2.4 operating environment, install the Solaris 2.4 packages.**
 - If your system is running Volume Manager, type:

```
# /usr/sbin/pkgadd -d /cdrom/sun_quadfast_1_0/Sol_2.4 SUNWhmdl SUNWhmdl_u
```

- If your system is not running Volume Manager, and you have mounted the CD-ROM using the mount command, type:

```
# /usr/sbin/pkgadd -d /cdrom/Sol_2.4 SUNWhmdl SUNWhmdl_u
```

b. If your system is running the Solaris 2.5 operating environment, install the Solaris 2.5 packages.

- If your system is running Volume Manager, type:

```
# /usr/sbin/pkgadd -d /cdrom/sun_quadfast_1_0/Sol_2.5 SUNWhmdl SUNWhmdl
```

- If your system is not running Volume Manager, and you have mounted the CD-ROM using the `mount` command, type:

```
# /usr/sbin/pkgadd -d /cdrom/Sol_2.5 SUNWhmdl SUNWhmdl
```

c. If your system is running the Solaris 2.5.1 or the 2.5.1 Hardware: 4/97 operating environment, install the Solaris 2.5.1 packages.

- If your system is running Volume Manager, type:

```
# /usr/sbin/pkgadd -d /cdrom/sun_quadfast_1_0/Sol_2.5.1 SUNWhmdl SUNWhmdl
```

- If your system is not running Volume Manager, and you have mounted the CD-ROM using the `mount` command, type:

```
# /usr/sbin/pkgadd -d /cdrom/Sol_2.5.1 SUNWhmdl SUNWhmdl
```

2. After the software has been installed, unmount and eject the CD-ROM as follows:

```
# cd /  
# umount /cdrom  
# eject cdrom
```

The final tasks of this procedure depend if you have already installed the Sun Quad FastEthernet SBus Adapter into your system:

◆ **If have not installed the adapter, install the adapter now.**

See “Installing the Adapter” on page 7 for installation instructions. Follow the instructions in the remainder of Chapter 2 to verify the adapter’s installation.

Note – *Do not* reboot the system prior to powering the system down to install the adapter.

◆ **If you have already installed the adapter, perform a reconfiguration boot on the system.**

Refer to the *Solaris 2.x Peripheral’s Handbook* for more information.

Performing a Net-Install of the Solaris Environment Over the hme Interface

▼ Updating the Solaris 2.4 Archive to Use the hme Interface

This section is *only* applicable if you are installing the Solaris 2.4 operating environment on a net-install client system *over* the QuadFastEthernet (hme) interface.

Note – The Solaris 2.4 CD-ROM cannot be used to perform a net-install (read only). Therefore, the Solaris 2.4 CD image archive is required to update certain QuadFastEthernet software files, because these drivers did not exist when the Solaris 2.4 operating environment was released.

1. Determine the directory where the CD image is located on the boot server.

For example, if the Solaris software is located within a directory named *DIR*, change to the root partition of the client being installed by typing:

```
# cd DIR/export/exec/kvm/<archive_of_arch>/etc
```

2. Search the `/etc/name_to_major` file for FastEthernet (hme) entries.

```
# grep hme /etc/name_to_major
hme 119
```

If your system already has a FastEthernet (hme) device installed on your system (for example, if your system contains a SunFastEthernet SBus Adapter 2.0), skip to Step 4.

3. If the `/etc/name_to_major` file does not contain a FastEthernet (hme) entry, add an entry for the Sun Quad FastEthernet SBus Adapter device (hme).

If the major device number for the last file entry is n then use $n+1$ for the hme channel major device number. As shown in the example below, if the last entry for the major device number is 108, use 109 for the hme device.

```
# llcl 107
# audiocs 108
# hme 109
```

4. Mount the *Sun QuadFastEthernet Driver Software 1.0 CD-ROM*.

See “Mounting the CD-ROM,” on page 12, for more information.

5. Copy the hme driver from the CD-ROM to the client’s root partition.

If you are running Volume Manager, you can copy the driver as follows:

```
# cp \
/cdrom/sun_quadfast_1_0/Sol_2.4/SUNWhmdl/reloc/kernel/drv/hme \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

If you are not running Volume Manager, and you have mounted the CD-ROM as described in “Mounting the CD-ROM” on page 12, copy the driver as follows:

```
# cp /cdrom/Sol_2.4/SUNWhmdl/reloc/kernel/drv/hme \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

6. Unmount and eject the CD-ROM as follows:

```
# cd /  
# umount /cdrom  
# eject cdrom
```

7. On the client system, perform the tasks listed in the section “Booting From the Network on Solaris 2.4 Systems” on page 23.

8. Complete the Solaris client installation.

Refer to your Solaris documentation for detailed instructions.

Note – After you have installed the Solaris operating environment, you must reinstall the Sun QuadFastEthernet Driver Software before rebooting.

9. Install the software drivers from the Sun QuadFastEthernet Driver Software CD-ROM that came with the Sun Quad FastEthernet SBus Adapter.

See “Installing the Software Drivers From the CD-ROM” on page 12 for more information.

10. Reboot the system.

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

▼ **Performing a Net-Install of the Solaris 2.5 or 2.5.1 Environments**

After installing the Solaris environment on your system, you must install the Sun QuadFastEthernet software drivers *before* you reboot the system. The FastEthernet (hme) driver that exists on the Solaris 2.5 and 2.5.1 operating environments does not support the Sun Quad FastEthernet SBus Adapter. Therefore, the system will fail to load and configure the correct software driver.

1. Complete the Solaris client installation.

Refer to your Solaris documentation for detailed instructions.

Note – After you have installed the Solaris operating environment, you must reinstall the Sun QuadFastEthernet Driver Software before rebooting.

- 2. Install the software drivers from the Sun QuadFastEthernet Driver Software CD-ROM that came with the Sun Quad FastEthernet SBus Adapter.**

See “Installing the Software Drivers From the CD-ROM” on page 12 for more information.

- 3. Reboot the system.**

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

Installing the Solaris Environment on a System with the Sun Quad FastEthernet SBus Adapter

After installing the Solaris environment on your system, you must install the Sun QuadFastEthernet software drivers *before* you reboot the system. The FastEthernet (hme) driver that exists on the Solaris 2.5 and 2.5.1 operating environments does not support the Sun Quad FastEthernet SBus Adapter. Therefore, the system will fail to load and configure the correct software driver.

- 1. Complete the Solaris client installation.**

Refer to your Solaris documentation for detailed instructions.

Note – After you have installed the Solaris operating environment, you must reinstall the Sun QuadFastEthernet Driver Software before rebooting.

- 2. Install the software drivers from the Sun QuadFastEthernet Driver Software CD-ROM that came with the Sun Quad FastEthernet SBus Adapter.**

See “Installing the Software Drivers From the CD-ROM” on page 12 for more information.

- 3. Reboot the system.**

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

Host File Configuration

After installing the Sun QuadFastEthernet driver software, you must create a `hostname.hme<num>` file for the adapter's Ethernet interfaces. You must also create both an IP address and a host name for its Ethernet interfaces in the `/etc/hosts` file.

To prepare your system for the Sun Quad FastEthernet SBus Adapter:

1. **At the command line, use the `grep` command to search the `/etc/path_to_inst` file for hme devices.**

```
# grep hme /etc/path_to_inst
"/sbus@1f,0/SUNW,hme@e,8c00000" 0 "hme"
"/sbus@1f,0/SUNW,hme@1,8c10000" 2 "hme"
"/sbus@1f,0/SUNW,hme@0,8c00000" 5 "hme"
"/sbus@1f,0/SUNW,hme@1,8c00000" 1 "hme"
"/sbus@1f,0/SUNW,hme@1,8c30000" 4 "hme"
"/sbus@1f,0/SUNW,hme@1,8c20000" 3 "hme"
```

In the example above, the `SUNW,hme@e` instance is the on-board FastEthernet device, the `SUNW,hme@0` instance is a FastEthernet adapter installed in SBus slot 0, and the four `SUNW,hme@1` instances are from a Sun Quad FastEthernet SBus Adapter installed in slot 1. For clarity, the instance numbers are bold.

2. **Create an `/etc/hostname.hme<num>` file, where `<num>` corresponds to the instance number of each interface you plan to use.**

If you wanted to use all of the adapter's interfaces in Step 1's example, you would need to create four files:

Filename	Instance Number	Adapter Ethernet Channel (See Figure 1-2 on page 2)
<code>/etc/hostname.hme1</code>	1	0
<code>/etc/hostname.hme2</code>	2	1
<code>/etc/hostname.hme3</code>	3	2
<code>/etc/hostname.hme4</code>	4	3

- Do not create `/etc/hostname.hme<num>` files for Sun Quad FastEthernet SBus Adapter channels you plan to leave unused.
- The `/etc/hostname.hme<num>` file must contain the hostname for the appropriate network interface.
- The host name should have an IP address and should be entered in the `/etc/hosts` file.
- The host name should be different from any other host name of any other interface, for example: `/etc/hostname.le0` and `/etc/hostname.hme0` cannot share the same host name.

Using the instance examples in Step 1, the following example shows the six `/etc/hostname.hme<num>` files required for a system called `zardoz` that has an onboard FastEthernet device (`zardoz`), a Sun Quad FastEthernet SBus Adapter (`zardoz-11`, `zardoz-12`, `zardoz-13`, and `zardoz-14`), and another FastEthernet SBus adapter (`zardoz-15`).

```
# cat /etc/hostname.hme0
zardoz
# cat /etc/hostname.hme1
zardoz-11
# cat /etc/hostname.hme2
zardoz-12
# cat /etc/hostname.hme3
zardoz-13
# cat /etc/hostname.hme4
zardoz-14
# cat /etc/hostname.hme5
zardoz-15
```

3. Create an appropriate entry in the `/etc/hosts` file for each active hme channel.

Using the example in Step 1, you will have:

```
# cat /etc/hosts
...
127.0.0.1    localhost
129.144.10.57 zardoz    loghost
129.144.11.83 zardoz-11
129.144.12.41 zardoz-12
129.144.13.67 zardoz-13
129.144.14.30 zardoz-14
129.144.14.56 zardoz-15
```


Booting the System

The following sections discuss various ways of booting a system containing the Sun Quad FastEthernet SBus Adapter. See the section that applies to your operating environment. Refer to the *Solaris 2.x Handbook for SMCC Peripherals* manual or your Solaris documentation if your operating environment is not detailed below.

Booting From the Network on Solaris 2.5 and 2.5.1 Systems

To use a Sun Quad FastEthernet SBus Adapter ethernet interface as the boot device for Solaris 2.5, 2.5.1, or 2.5.1 Hardware: 4/97 systems, perform the following tasks:

1. At the `ok` prompt type:

```
ok show-devs
```

The `show-devs` command lists the system devices. You should see the full path name of the `hme` devices, similar to the example below:

```
/sbus@1f,0/SUNW,hme@1,8c30000  
/sbus@1f,0/SUNW,hme@1,8c20000  
/sbus@1f,0/SUNW,hme@1,8c10000  
/sbus@1f,0/SUNW,hme@1,8c00000
```

Note – You need to select only one of these `hme` devices for booting.

2. At the `ok` prompt type:

```
ok boot (full path name of the hme device)
```

Booting a Diskless Client Running the Solaris 2.4 Operating Environment

In order to boot a diskless client with a local Sun Quad FastEthernet SBus Adapter interface (`hme`) on a Solaris 2.4 operating environment, the following tasks must be performed on the boot server.

1. Go to your client's root partition by typing the following:

```
# cd /export/root/<client name>/etc
```

2. Search the `/etc/name_to_major` file for FastEthernet (`hme`) entries.

```
# grep hme /etc/name_to_major
```

If your system already has a FastEthernet (`hme`) device installed on your system (for example, if your system contains a SunFastEthernet SBus Adapter 2.0), skip to Step 4.

3. If the `/etc/name_to_major` file does not contain a FastEthernet (`hme`) entry, add an entry for the Sun Quad FastEthernet SBus Adapter device (`hme`).

If the major device number for the last file entry is n , use $n+1$ for the `hme` channel major device number. As shown in the example below, if the last entry for the major device number is 108, use 109 for the `hme` device.

```
# llc1 107
# audiocs 108
# hme 109
```

4. Mount the Sun QuadFastEthernet Driver Software CD-ROM.

See “Mounting the CD-ROM,” on page 12 for more information.

5. Copy the hme driver from the CD-ROM to the client's root partition.

If you are running Volume Manager, you can copy the driver as follows:

```
# cp \  
/cdrom/sun_quadfast_1_0/Sol_2.4/SUNWhmdl/reloc/kernel/drv/hme \  
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

If you are not running Volume Manager, and you have mounted the CD-ROM as described in “Mounting the CD-ROM” on page 12, copy the driver as follows:

```
# cp /cdrom/Sol_2.4/SUNWhmdl/reloc/kernel/drv/hme \  
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

6. Unmount and eject the CD-ROM as follows:

```
# cd /  
# umount /cdrom  
# eject cdrom
```

7. Create a hostname.hme<num> file for the client in the /etc directory of the client's root partition.

See “Host File Configuration” on page 19 for more information.

Proceed to the next section, “Booting From the Network on Solaris 2.4 Systems” on page 23, for the client system.

Booting From the Network on Solaris 2.4 Systems

The device name of newer SBus cards for Solaris 2.5 is identified by a SUNW, prefix. If your system is running Solaris 2.4, it will not recognize these devices. Perform the following tasks to set up your system so the device driver can recognize the Sun Quad FastEthernet SBus Adapter.

1. At the ok prompt, type:

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

The `show-devs` command lists the system devices. You should see the full path name of the `hme` channels, similar to the example below:

```
/sbus@1f,0/SUNW,hme@1,8c30000
/sbus@1f,0/SUNW,hme@1,8c20000
/sbus@1f,0/SUNW,hme@1,8c10000
/sbus@1f,0/SUNW,hme@1,8c00000
```

2. Type:

```
ok nvedit
```

3. Type the following, spaces and quotation marks included, pressing the Return key at the end of all but the last line.

You should do the same procedure for other `hme` devices on your system (for example, if your system has a SunFastEthernet SBus Adapter 2.0).

```
0: probe-all install-console banner
1: cd <full path to channel 1>
2: " hme" nameprop
3: device-end
1: cd <full path to channel 2>
2: " hme" nameprop
3: device-end
1: cd <full path to channel 3>
2: " hme" nameprop
3: device-end
1: cd <full path to channel 4>
2: " hme" nameprop
3: device-end
```

4. Press the Control-C keys after typing the final `device-end`.

5. At the `ok` prompt, type:

```
ok nvstore  
ok reset-all
```

Your system will reset and the banner will appear.

6. Press the Stop-A keys to get to the `ok` prompt.

7. At the `ok` prompt, type `show-devs` to list your system devices and verify that the name property was changed correctly.

You should see the full path name of the `hme` device, *excluding* `SUNW`, prior to `hme`, similar to the example below:

```
/sbus@1f,0/hme@1,8c30000  
/sbus@1f,0/hme@1,8c20000  
/sbus@1f,0/hme@1,8c10000  
/sbus@1f,0/hme@1,8c00000
```

Note – You need to select only one of these `hme` devices for booting.

8. At the `ok` prompt, type:

```
ok boot (full path name of an hme device)
```

Post-Installation Procedures (Optional)

Perform the tasks in the following sections to verify and customize the performance of the Sun Quad FastEthernet SBus Adapter.

Configuring Driver Parameters

The `hme` device driver, which is loaded from the CD-ROM, controls the `SUNW,hme` Ethernet devices. The device driver automatically selects the link speed using the auto-negotiation protocol with the link partner. (See “Auto-Negotiation” on page 28.)

You can manually configure the `hme` device driver parameters to customize each `SUNW,hme` device in your system in one of three ways:

- Configure the `hme` driver parameters generally for all `SUNW,hme` devices in the system by entering the parameter variables in the `/etc/system` file.
- Set a parameter on a per-device basis by creating the `hme.conf` file in the `/kernel/drv` directory.
- Use the `ndd` utility to *temporarily* change a parameter. This change is lost when you reboot the system.
Refer to the *Platform Notes: The hme Fast Ethernet Device Driver* document for more information.

Increasing TCP/IP Performance

The TCP/IP performance of the Sun Quad FastEthernet SBus Adapter can be increased by changing the TCP high water mark to 64K. This can be done with the `ndd` utility as follows.

1. As superuser (root), type:

```
# ndd -set /dev/tcp tcp_xmit_hiwat 65535
# ndd -set /dev/tcp tcp_recv_hiwat 65535
# ndd -set /dev/tcp tcp_cwnd_max 65534
```

The changes take effect immediately and affect all the networking interfaces in the system.

Forcing Network Speed Between 10 Mbps and 100 Mbps

1. At the `ok` prompt, use the `show-devs` command to list the system devices. You should see the full path names of the `hme` devices, similar to the example below:

```
/sbus@1f,0/SUNW,hme@1,8c30000
/sbus@1f,0/SUNW,hme@1,8c20000
/sbus@1f,0/SUNW,hme@1,8c10000
/sbus@1f,0/SUNW,hme@1,8c00000
```

2. Type:

```
ok nvedit
```

3. Type the following, pressing the Return key at the end of line 0:

```
0: probe-all install-console banner
1: apply transfer-speed=10 (full path name of an hme device)
```

Note – If you already have commands in NRAM, append these lines to the end of the file.

4. Press the Control-C keys after typing (full path name of a `hme` device).

Note – In the above example, the speed is forced to 10 Mbps. To force the speed to 100 Mbps, replace 10 with 100.

Note – You will need to perform Steps 2 to 4 to set the network speed for each `hme` channel.

5. At the `ok` prompt type:

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

6. Reboot your system.

Refer to the *Platform Notes: The hme Fast Ethernet Device Driver* document for more information on the `hme` device driver and forcing network speed. This document is also available on the Solaris 2.5 and the Solaris 2.5.1 AnswerBook.

Auto-Negotiation

A key feature of the Sun Quad FastEthernet SBus Adapter is auto-negotiation. The *auto-negotiation* protocol, as specified by the 100BASE-T standard, automatically selects the operation mode (half-duplex or full-duplex), and the auto-sensing protocol selects the speed (10 Mbps or 100 Mbps) for the adapter.

The `hme` device driver operates the `SUNW,hme` devices by default in half-duplex mode only. If the adapter is connected to an Ethernet switch or hub that does not support auto-negotiation, the device driver will operate in half-duplex mode.

If the Sun Quad FastEthernet SBus Adapter is connected to a remote system or interface that is not capable of auto-negotiation, your system automatically selects the speed and half-duplex mode.

If the Sun Quad FastEthernet SBus Adapter is connected to a link partner with which the auto-negotiation protocol fails to operate successfully, you can configure the device to not use this protocol and force the driver to set up the link in the mode and speed of your choice.

Refer to the *Platform Notes: The hme Fast Ethernet Device Driver* document for more information on the `hme` device driver and auto-negotiation. This document is also available on the Solaris 2.5 and the Solaris 2.5.1 AnswerBook.

Sun Quad FastEthernet SBus Adapter's local-mac-address Property

The Sun Quad FastEthernet SBus Adapter's Ethernet FCode PROM contains Ethernet numbers that the software can use to identify the adapter.

After the OpenBoot™ PROM probes the adapter's FCode PROM, a `local-mac-address` property is created in the adapter's device node. The property's value corresponds to the Ethernet numbers that can be used with the adapter. The Sun Quad FastEthernet SBus Adapter will have four MAC (machine access code) addresses encoded in the FCode PROM.

The device driver, or any other adapter utility, can use this `local-mac-address` property for configuring the Ethernet interfaces.

Specifications



Physical Dimensions

Table A-1 Physical Dimensions

Dimension	Measurement
Length	5.776 in. (146.71 mm)
Width	3.3 in. (83.82 mm)
Weight	4.3 oz. (125g)

Power Requirements

Table A-2 Power Requirements

Specification	Measurement
Maximum Power Dissipation	14 Watts
Maximum Power Consumption	2.8 Amps @ 5V
Voltage Tolerance	5V +/- 5%
Ripple	Maximum 100 mV
Operational Current	5V, 2.0 Amps

Environmental Specifications

Table A-3 Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0 to 70°C (+32 to +131°F)	-40 to 75°C (-40 to +167°F)
Relative Humidity	5 to 85% non-condensing (40°C, wet bulb temperature)	0 to 95% non-condensing 40°C /hour
Altitude	-1000 to +15,000 ft.	-1000 to +50,000 ft.
Shock	5g, 1/2 sine wave, 11 msec	30g, 1/2 sine wave, 11 msec
Vibration, pk to pk displacement	0.005 in. max. (5 to 32 Hz)	0.1 in. max (5 to 17 Hz)
Vibration, peak acceleration	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)	1.0g (5 to 500 Hz) (Sweep Rate = 1 octave/min.)

Performance Specifications

Table A-4 Performance Specifications

Specification	Performance
Maximum Ethernet Transfer Rate	10/100 Mbps per channel
Host Interface	240-pin FPGA that handles SBus interface IEEE 1496 SBus master interface with support for 64-bit mode accesses IEEE 1496 SBus slave interface, at 32-bit mode only Runs at 16.67 MHz to 25 MHz on the SBus
Network Interface	100BASE-TX using Category 5 (data-grade) cable; 10BASE-T using Category 3 (voice-grade) cable or better Single UTP RJ-45 for both 10 and 100 Mbps per channel
Ethernet Version	Conforms to IEEE 802.3u
SBus Burst Sizes	16/32/64 bytes
SBus Parity	Yes
SBus Clock	25 MHz max., 16.67 MHz min.
Max SBus Burst Transfer Rate	29.6 (25 MHz), 19.7 (16.67 MHz) Mbytes/sec ¹
Steady State SBus Transfer Rate	5 Mbytes/sec ²
Max Ethernet Transfer Rate	1.25 Mbytes/sec per channel

Table A-4 Performance Specifications

SBus Data/Address Lines	D (31:0)/PA (18:0)
SBus Modes	Master/Slave
Capacitance per SBus Signal Line	≤ 20 pF
SBus Version	Rev B.0

¹ **Assumes 64 Byte Burst and 0 SBus Latency**

² **4 Channels Running At Max Ethernet Speed**

Interface Signals

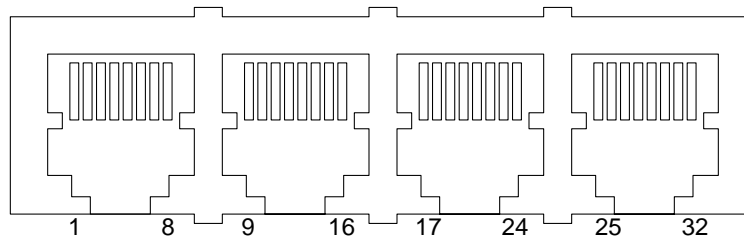


Figure B-1 32-Pin RJ-45 Connectors

Table B-1 Pin Descriptions for 32-Pin RJ-45 Connector: Channels 0 - 3

Description	CH0	CH1	CH2	CH3
TD+	1	9	17	25
TD-	2	10	18	26
RD+	3	11	19	27
Not Used	4	12	20	28
Not Used	5	13	21	29
RD-	6	14	22	30
Not Used	7	15	23	31
Not Used	8	16	24	32

Running Diagnostics Tests



This appendix describes how to test the Sun Quad FastEthernet SBus Adapter by creating a `.usertest` file for the SunDiag™ system exerciser. There is also a section describing how to test the adapter with its FCode PROM `selftest`.

Note – To test the Sun Quad FastEthernet SBus Adapter on systems running the Solaris 2.5, 2.5.1, or 2.5.1 Hardware: 4/97 operating environments, refer to the *SunVTS User's Guide* that shipped with your operating system. The SunVTS™ `nettest` diagnostic test automatically probes the network for hme devices, so creating a `.usertest` file is not needed.

Using the SunDiag System Exerciser

The SunDiag system exerciser is an on-line diagnostic application that runs hardware tests. It is used primarily with the OpenWindows software interface to enable you to quickly and easily set test parameters while running tests.

Note – The SunDiag software does not probe for Sun Quad FastEthernet SBus Adapter devices by default. For the software to acknowledge an `hme<num>` channel, the `.usertest` file must be edited (described in “Editing the `.usertest` File” on page 38) before bringing up the SunDiag exerciser.

Editing the .usertest File

1. **Log into the system as root (superuser) and change directories to the SunDiag bin directory:**

```
zardoz# cd /opt/SUNWdiag/bin
```

2. **Using a text editor, add the following line to the .usertest file.**

```
hme0, nettest, IF=hme0 v
```

Note – The format for .usertest entries is *test label, test name, and command-line arguments*.

The example given is for a single hme0 interface; for multiple channels add an additional line for each channel using hme1, hme2, etc.

Because testing the Sun Quad FastEthernet SBus Adapter is user defined, default options are not displayed in SunDiag interface. Test options for an hme<num> channel can be defined in the .usertest file using the command nettest. Type the command nettest without arguments for a list of options, for example:

```
zardoz# nettest
Usage: nettest [TARGET=h1+h2...] [IF=interface] {TEST=0..7}
N=nopkts} {P=pattern} [T=seconds]
```

SunDiag Main Window

To start the SunDiag exerciser, change directories to the SunDiag bin directory (/opt/SUNWdiag/bin) and then type sundiag. After you type the sundiag command, the main SunDiag window is displayed on your screen (see Figure B-1). This window is the primary interface for running the SunDiag system exerciser. Refer to the *SunDiag User's Guide*, which was shipped with the Solaris 2.4 operating environment, for more information about using this window.

The SunDiag main window is divided into four small windows:

- The system status window at the upper-left of the screen displays the status of the tests.
- The performance monitor panel in the upper-middle of the screen displays the performance statistics for the system that is under test.
- The control panel is located at the right. The panel includes buttons, exclusive choice, toggle, and pop-up menus that allow you to select test parameters and options.
- The console window at the bottom-left displays test messages, and allows you, as a superuser, to use operating system commands.

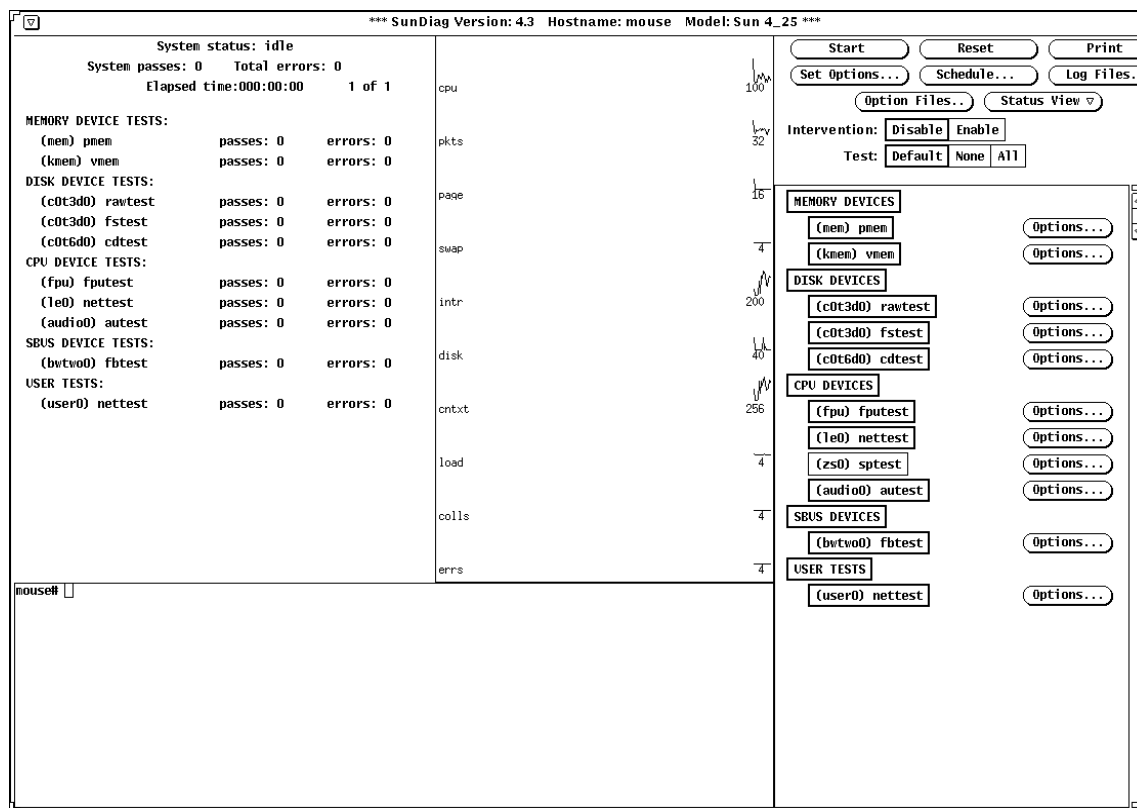


Figure B-1 SunDiag Main Window

Starting the Test

- 1. Review the information in the control panel, which identifies the devices that are available for testing.**

Click on the device that you want to test — in this case (*USER 0*) `nettest`. Your selection is confirmed with the display of a highlighted box next to the device name.

- 2. Click on the Start button.**
- 3. Watch the console window for messages.**
- 4. To interrupt a test or to stop after a test is completed, click on the Stop button.**

If no problems are identified during the testing, the Sun Quad FastEthernet SBus Adapter is ready for operation in your system. Click the Quit button to exit the SunDiag exerciser.

Using the OpenBoot PROM FCode Selftest

The following tests are available to help identify problems with the Sun Quad FastEthernet SBus Adapter if the system does not boot.

You can invoke the FCode `selftest` diagnostics by using the OpenBoot user interface `test` or `test-all` commands. If you encounter an error while running diagnostics, appropriate messages will be displayed. Refer to the appropriate *OpenBoot Command Reference Manual* for more information on the `test` and `test-all` commands.

Selftest exercises most functionality sub-section by sub-section and ensures the following:

- Isolates faulty field replaceable units (FRUs)
- Checks, with a high confidence, that no hardware fault exists on No Trouble Found (NTF)
- Checks connectivity during adapter card installation
- Verifies that all components are functional

▼ Running the Ethernet FCode Selftest Diagnostic

To run the ethernet diagnostics, you must first bring the system to a stop at the OpenBoot prompt after issuing a reset. If you do not reset the system, the diagnostic tests may cause the system to hang.

For more information about the OpenBoot commands in this section, refer to the appropriate *OpenBoot Command Reference* manual.

1. Shut down the system.

Use the standard shut down procedures described in *Solaris 2.x Handbook for SMCC Peripherals*.

2. At the ok prompt, set the auto-boot? configuration variable to false.

```
ok setenv autoboot? false
```

3. Reset the system.

```
ok reset-all
```

4. Type show-devs to display the list of devices.

You should see lines in the list of devices, similar to the example below, specific to the Sun Quad FastEthernet SBus Adapter:

```
ok show-devs
. . .
/sbus@1f,0/SUNW,hme@1,8c30000
/sbus@1f,0/SUNW,hme@1,8c20000
/sbus@1f,0/SUNW,hme@1,8c10000
/sbus@1f,0/SUNW,hme@1,8c00000
. . .
```

In this example, the SUNW,hme@1 entries identify the device paths to the four Ethernet channels.

5. Type the following to put the OpenBoot PROM into diagnostic mode:

```
ok setenv diag-switch? true
```

6. Type the following to run the selftest using the `test` command on one of the adapters four Ethernet channels:

```
ok test <device path>
```

The following tests are run when the `test` command is executed:

- hme register
- MAC internal loopback
- External loopback
- 100 Mbps PHY loopback
- 10 Mbps PHY loopback

If the test passes, you will see these messages:

```
Internal loopback test -- succeeded
Transceiver check -- Using onboard transceiver -- Link up
passed
```

If the channel is not connected to a network, you will see the following error messages:

```
Internal loopback test -- succeeded
Transceiver check -- Using onboard transceiver -- Link down
Autonegotiation timeout
Check Cable or contact system administrator
Failed
selftest failed. return code = -1
```

Note – To test other channels of the adapter, you will need to execute the `test` command separately on each channel.

7. After testing the adapter, type the following to return the OpenBoot PROM to standard operating mode:

```
ok setenv diag-switch? false
```

8. Set the `auto-boot?` configuration parameter to true.

```
ok setenv autoboot? true
```

9. Reset and reboot the system.

```
ok reset-all
```


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3. Were the illustrations clear? Yes No

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