# Sun™ FastEthernet™ PCI Adapter Installation and User's Guide

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# Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Department of Communications (DOC) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

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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 A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**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.

### DOC Class A Notice - Avis DOC, Classe A

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

### DOC Class B Notice - Avis DOC, Classe B

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

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

## VCCI 基準について

### 第一種VCCI 基準について

第一種VCCIの表示があるワークステーションおよびオプション製品は、第一種情報装置です。これらの製品には、下記の項目が該当します。

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# Declaration of Conformity

**Compliance ID:** **FRESH-LITE**

**Product Name:** **SUN FE PCI**

This product has been tested and complies with the following EMC and Safety standards:

## EMC

### FCC Class B — USA

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.

### EC — Europe

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

| | | |
|---|---|---|
| EN55022 / CISPR22 (1985) | | Class B |
| EN50082-1 | IEC801-2 (1991) | 4 kV (direct), 8 kV (air) |
| | IEC801-3 (1984) | 3 V/m |
| | IEC801-4 (1988) | 1.0 kV power lines, 0.5 kV signal lines |
| EN61000-3-2/IEC1000-3-2 (1994) | | Pass |

## Safety

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

• EN60950/IEC950 (1993)

## Supplementary Information

This product was tested and complies with all the requirements for the CE Mark when connected to a Sun workstation or server.


/ S / _____  _____  / S / _____  _____
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# Contents

# Preface

This manual describes how to install and confgure your Sun™ FastEthernet™ PCI Adapter.

The procedures in this manual assume that you are a system or network administrator experienced in installing similar hardware in a Solaris™ operating environment.

# How This Book Is Organized

The document is organized as follows:

**Chapter 1, "Product Overview,"** describes the hardware and software requirements of the Sun FastEthernet PCI Adapter as well as the adapter features.

**Chapter 2, "Installing the Sun FastEthernet PCI Adapter,"** tells you how to install the Sun FastEthernet PCI Adapter into your system.

**Chapter 3, "Using the Sun FastEthernet PCI Adapter,"** explains how to verify that the adapter is functioning properly and how to customize its performance.

**Appendix A, "Using the selftest Diagnostics,"** describes how to use the FCode `selftest` to verify the functionality of the adapter.

**Appendix B, "Interface Signals,"** lists the PCI adapter's pin characteristics.

**Appendix C, "Specifications,"** lists the hardware specifications.

# 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.
- Online 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.login file.<br>Use ls -a to list all files.<br>machine_name%<br>You have mail. |
| **AaBbCc123** | What you type, contrasted with on-screen computer output | machine_name% **su**<br>Password: |
| *AaBbCc123* | Command-line placeholder: replace with a real name or value | To delete a file, type rm *filename*. |
| *AaBbCc123* | Book titles, new words or terms, or words to be emphasized | Read Chapter 6 in the *User's Guide*.<br>These are called *class* options.<br>You *must* 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 | `#` |

# Related Documents

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

| Title | Part Number |
|---|---|
| *Solaris 2.x Handbook for SMCC Peripherals* | 801-5488 |
| *SunVTS 2.0 User's Guide* | 802-5331 |
| *Platform Notes: The hme Fast Ethernet Device Driver* | 802-5333 |
| *OpenBoot 3.x Command Reference Manual* | 802-5837 |

# Ordering Sun Documents

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| Country | Telephone | Fax |
| --- | --- | --- |
| Belgium | 02-720-09-09 | 02-725-88-50 |
| Canada | 1-800-873-7869 | 1-800-944-0661 |
| France | 0800-90-61-57 | 0800-90-61-58 |
| Germany | 01-30-81-61-91 | 01-30-81-61-92 |
| Holland | 06-022-34-45 | 06-022-34-46 |
| Japan | 0120-33-9096 | 0120-33-9097 |
| Luxembourg | 32-2-720-09-09 | 32-2-725-88-50 |
| Sweden | 020-79-57-26 | 020-79-57-27 |
| Switzerland | 0800-55-19-26 | 0800-55-19-27 |
| United Kingdom | 0800-89-88-88 | 0800-89-88-87 |
| United States | 1-800-873-7869 | 1-800-944-0661 |

**World Wide Web:** `http://www.sun.com/sunexpress/`

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If a card is not available, you can email or fax your comments to us. Please include the part number of your document in the subject line of your email or fax message.

- Email: `smcc-docs@sun.com`
- Fax:    SMCC Document Feedback
         1-415-786-6443

# Product Overview

The Sun FastEthernet PCI Adapter offers 10 Mbps and 100 Mbps Ethernet
networking with both an RJ-45 and a media independent interface (MII) connector.
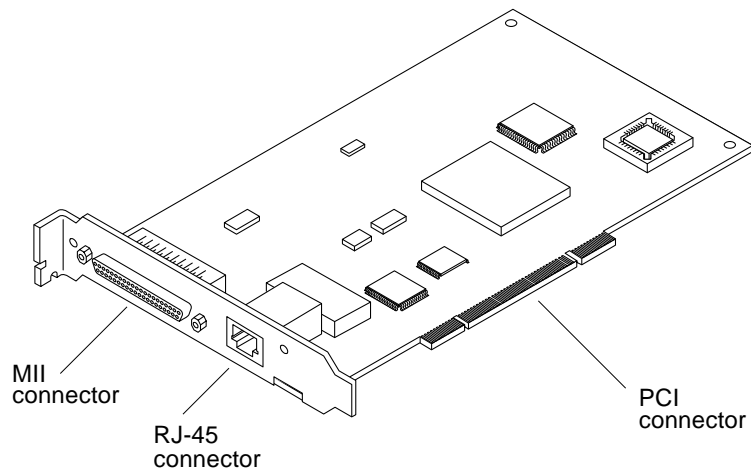


**FIGURE 1-1**   Sun FastEthernet PCI Adapter

# Hardware and Software Requirements

Before using the Sun FastEthernet PCI Adapter, make sure your system meets the following hardware and software requirements:

**TABLE 1-1**    Hardware and Software Requirements

| Hardware and Software | Requirements |
| --- | --- |
| Hardware requirements | Sun™ systems with an available PCI slot |
| Software requirements | Solaris 2.5.1 Hardware: 4/97 and later Solaris releases |
| Firmware | OpenBoot™ PROM version 3.0 or greater |
| External transceivers | Sun MII-AUI transceiver: order number X467A. IEEE 802.3u compliant third-party transceivers that support speeds of 10 or 100 Mbps and allow connection to fiber and Category 3, 4 and 5 UTP cable, depending on the type of MII transceiver. |

# Media Independent Interface (MII) Connector

The MII on the Sun FastEthernet PCI Adapter enables connection to external FastEthernet transceivers, thereby allowing compatibility with different wiring types. By default, the driver selects the MII connection. See TABLE 1-1 for compatibility standards.

Prior to proceeding, you should decide which network connection to use: either the RJ-45 or the MII, *but not both*. See "External Transceivers" on page 16, or your external transceiver documentation, for more detailed information.

# Features

Following is a list of the Sun FastEthernet PCI Adapter features:

## *PCI Ethernet Interface*

- 32-bit PCI up to 33 MHz
- 32-bit target access to internal registers
- 8- , 16-, or 32-bit target access to configuration registers
- 32-bit master data transfers
- Two DMA channels with 2 Kbyte FIFOs
- Unique IEEE MAC address stored on board

## *MII Interface*

- MII complies with IEEE 802.3u standard
- Connects to TX, T4, FX, AUI and all supporting transceivers
- Rate of 2.5 MHz for 10 Mbps and 25 MHz for 100 Mbps

## *Network Interface*

- 10BASE-T and 100BASE-TX interfaces with auto-negotiation half-duplex and full-duplex capabilities

## *PCI*

- PCI Local Bus, Rev 2.1 compliant
- 32-bit PCI up to 33 MHz
- Universal add-in (3.3V and 5V signaling)
- One 64K x 8 OpenBoot PROM

# Installing the Sun FastEthernet PCI Adapter

This chapter describes procedures for installing the adapter in your system.

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

## ▼ To Install the Adapter

1. **Power off your system and open the system unit.**

2. **Attach the adhesive copper strip of the wrist strap to the metal casing of the power supply. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

3. **Holding the PCI adapter by the edges, unpack and place it on an antistatic surface.**

4. **Remove the PCI filler panel from the slot in which you want to insert the Sun FastEthernet PCI Adapter.**

5. **Holding the PCI adapter by the edges, align the adapter edge connector with the PCI slot. Slide the adapter face plate into the small slot at the end of the PCI opening.**

6. **Applying even pressure at both corners of the adapter, push the PCI adapter until it is firmly seated in the slot.**

**Caution –** Do not use excesive force when installing the adapter into the PCI slot. You may damage the adapter's PCI connector. If the adapter does not seat properly when you apply even pressure, remove the adapter and carefully reinstall it again.

7. **If necessary, reinstall the PCI filler panel in the unused PCI opening.**

8. **Detach the wrist strap and close the system unit.**

---

**Note –** See the next chapter to complete the software configuration and additional setup procedures.

---

# Using the Sun FastEthernet PCI Adapter

This chapter tells you how to verify that the adapter is functioning properly and how to optimize its performance.

## Verifying the Installation

*Before booting the system*, verify the installation by performing the tasks that follow. Refer to the *Solaris Handbook for SMCC Peripherals* manual or your Solaris documentation for the detailed instructions.

### ▼ To Verify the Installation

1. **Power on the system.**

2. **When the banner is displayed, press the Stop-A keys to interrupt the boot process and to get to the** ok **prompt.**

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

You should see output, similiar the following example, displayed on your screen.

```
ok show-devs
/SUNW,ffb@1e,0
/SUNW,UltraSPARC-II@0,0
/counter-timer@1f,1c00
/pci@1f,2000
/pci@1f,4000
/virtual-memory
/memory@0,60000000
/aliases
/options
/openprom
/chosen
/packages
/pci@1f,4000/SUNW,hme@4,1
/pci@1f,4000/pci108e,1000@4
/pci@1f,4000/pci@2
/pci@1f,4000/scsi@3
/pci@1f,4000/network@1,1
/pci@1f,4000/ebus@1
/pci@1f,4000/scsi@3/tape
/pci@1f,4000/scsi@3/disk
```

- `SUNW,hme` identifies the Sun FastEthernet PCI Adapter Ethernet device.
- `network` identifies the motherboard network interface.

If these devices are not listed, check that the adapter is properly seated and reinstall the adapter, if necessary.

## Diagnostics Testing

For Sun FastEthernet PCI Adapter diagnostic testing, see **Appendix A, "Using the selftest Diagnostics,"** and refer to the *SunVTS User's Guide.*

# Auto-Negotiation

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

The link speed and modes supported by the Sun FastEthernet PCI Adapter are listed as follows in decreasing order of priority:

- 100 Mbps, full-duplex
- 100 Mbps, half-duplex
- 10 Mbps, full-duplex
- 10 Mbps, half-duplex

When the system is booted, the Sun FastEthernet PCI Adapter advertises these capabilities to the Link Partner at the other end of the link (a hub, switch, or another network interface card (NIC) in a host system). If the Link Partner also supports auto-negotiation, it will advertise its capabilities over the link. The common highest priority mode supported by both sides is selected automatically for the link operation.

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

If the Sun FastEthernet PCI Adapter is connected to a Link Partner in which auto-negotiation protocol is not operational, 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 in the Solaris AnswerBook.

# Monitoring Network Activity

Perform the following task to verify that the system recognizes the Ethernet connection. Make sure that you are connected to an active network.

● **To monitor network activity or incoming network packets, type the following at the** ok **promp:**

```
ok apply watch-net <full path name of the hme interface>
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.
.........................................
```

**Note –** In the example above, *<full path name of the* hme *interface>* is the full path name of the hme interface. Use the show-devs command at the ok prompt to display the full path name of the hme device.

# 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 FastEthernet PCI Adapter.

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

```
ok boot -r
```

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

# Configuring Host Files

After installing the Sun FastEthernet PCI Adapter, you must create a hostname.hme<*num*> file for its Ethernet interface. You must also assign an IP address and a hostname for its Ethernet interface in the /etc/hosts file.

Your system motherboard Ethernet interface (network) uses the hme driver as well, with an interface identified as hme0. (The number 0 following hme represents the *first* instance of the interface.)

You may see the interface(s) represented in the /etc/path_to_inst file.

## ▼ To Prepare Your System for the Sun FastEthernet PCI Adapter

1. **Create an** /etc/hostname.hme1 **file.**

   The number 1 following hme represents the *second* instance of the hme device. Use the hme2 extension for a second FastEthernet adapter, and so on.

   - Do not create /etc/hostname.hme<*num*> files for the Sun FastEthernet PCI Adapter channels you do not plan to use. The /etc/hostname.hme<*num*> file must contain the hostname for the appropriate network interface.

   - The hostname should have an IP address and should be entered in the /etc/hosts file.

   - The hostname should be different from any other hostname of any other interface, for example: /etc/hostname.hme0 and /etc/hostname.hme1 cannot share the same hostname.

   - The following is an example of the /etc/hostname.hme<*num*> files required for a machine called zardoz that will be known as zardoz and zardoz-1 on the networks connected to the hme0 and hme1 Ethernet interfaces.

   ```
   zardoz # cat /etc/hostname.hme0
   zardoz
   zardoz # cat /etc/hostname.hme1
   zardoz-1
   ```

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

Using the example in Step 1, you will have:

```
zardoz # cat /etc/hosts
...
127.0.0.1     localhost
129.144.10.57 zardoz    loghost
129.144.11.83 zardoz-1
```

# Booting from the Network

You can use the Sun FastEthernet PCI Adapter interface as the boot device for your system.

## ▼ To Boot from the Network

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` device, similar to this example:

```
/pci@1f,2000/SUNW,hme@1,1
```

2. **Type:**

```
ok boot /pci@1f,2000/SUNW,hme@1,1
```

# Post-Installation Procedures (Optional)

Perform the tasks in the following sections to customize the performance of the Sun FastEthernet PCI Adapter.

## Configuring Driver Parameters

The `hme` device driver controls the `SUNW,hme` Ethernet device. The device driver automatically selects the link speed using the auto-negotiation protocol with the link partner. (See "Auto-Negotiation" on page 9.)

You can manually configure the `hme` device driver parameters to customize each `SUNW,hme` device in your system in 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(1M)` 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 on configuring driver parameters. This document is also available on the Solaris AnswerBook.

## Increasing TCP/IP Performance

You can increase the TCP/IP performance of the Sun FastEthernet PCI Adapter by changing the TCP highwater mark to 64K. This can be done with the `ndd(1M)` utility as shown in the following procedure.

## ▼ To Increase TCP/IP Performance

● **As superuser, 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 will take effect immediately and affect all system networking interfaces.

# Forcing Network Speed Between 10 Mbps and 100 Mbps

## ▼ To Force Network Speed Between 10 Mbps and 100 Mbps

1. **At the** ok **prompt, use the** show-devs **command to list the system devices.**

   The full path name of the hme device, similar to this example, is displayed:

```
/pci@1f,2000/SUNW,hme@1,1
```

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 the hme device>
```

4. **Press the Control-C keys after typing** *<full path name of the 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.

---

5. **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 AnswerBook.

## Sun FastEthernet PCI Adapter's `local-mac-address` Property

The network interface of the Sun FastEthernet PCI Adapter is assigned a unique MAC (Media Access Control) address, which represents the 48-bit ethernet address for the channel. The OpenBoot™ firmware reports this MAC address via the local-mac-address property in the device nodes corresponding to the network interfaces.

A system is not obligated to use this assigned MAC address if it has a system-wide MAC address. In such cases, the system-wide MAC address applies to all network interfaces on the system.

The device driver, or any other adapter utility, can use the network device's MAC address (local-mac-address) while configuring it. In future Solaris releases, you will be able to use the channel's MAC address when booting over the network.

The mac-address property of the network device specifies the network address (system-wide or local-mac-address) used for booting the system. To start using the MAC addresses assigned to the network interface of the Sun FastEthernet PCI Adapter, set the NVRAM configuration variable local-mac-address? to true.

```
ok setenv local-mac-address? true
```

# External Transceivers

Some external transceivers support multiple link capabilities, such as 100BASE-T4, 100BASE-TX, and 10BASE-T, but not auto-negotiation. In this case, the driver attempts to bring-up the link in the highest priority capability in the following descending order of priority:

- 100BASE-T4
- 100BASE-TX
- 10BASE-T

To bring-up your external transceiver in a lower priority capability, you must configure the driver parameters to force the link to the desired mode.

Refer to your external transceiver documentation or the *Platform Notes: The hme Fast Ethernet Device Driver* document for more information on forcing the link mode.

When using an external transceiver with the Sun FastEthernet PCI Adapter, your system may not report the speed at which the link is operating, either 10 or 100 Mbps.

# Using the `selftest` Diagnostics

The following tests are available to help identify problems when the system containing the Sun FastEthernet PCI Adapter does not boot.

The FCode `selftest` is added to the device tree during the probing phase of the OpenBoot PROM start-up sequence. 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 the diagnostics, appropriate messages will be displayed. Refer to the *OpenBoot 3.x Command Reference Manual* for more information on the `test` and `test-all` commands.

`selftest` exercises most functionality of the adapter sub-section by sub-section and checks for the following conditions:

- Isolates faulty 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

# Ethernet FCode `selftest` Diagnostic

● **Type the following to run** `selftest` **using the** `test` **command:**

```
ok setenv diag-switch? true
ok test <device-path>
Hme register test -- succeeded.
Internal loopback test -- succeeded.
Transceiver check -- Using Onboard Transceiver - Link Up.
passed
Doing more loopback tests -- passed
ok
```
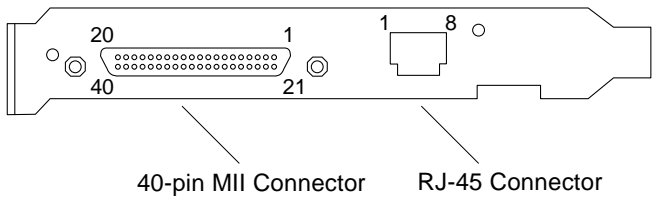
The following tests are run when the `test` command is executed:

■ `hme` register
■ MAC Internal Loopback
■ 100 Mbps PHY Loopback
■ 100 Mbps TP Loopback
■ 10 Mbps XCVR Loopback

# Interface Signals

This appendix lists the interface signals of the Sun FastEthernet PCI Adapter's connectors.

# Sun FastEthernet PCI Adapter Connectors



**FIGURE B-1**   Sun FastEthernet PCI Adapter Connectors

# MII Connector Signals

**TABLE B-1**    MII Connector Signals

| Pin | Signal | | Pin | Signal |
| --- | --- | --- | --- | --- |
| 1 | +5V | | 21 | +5V |
| 2 | MDIO | | 22 | GND |
| 3 | MDC | | 23 | GND |
| 4 | RXD<3> | | 24 | GND |
| 5 | RXD<2> | | 25 | GND |
| 6 | RXD<1> | | 26 | GND |
| 7 | RXD<0> | | 27 | GND |
| 8 | RX_DV | | 28 | GND |
| 9 | RX_CLK | | 29 | GND |
| 10 | RX_ER | | 30 | GND |
| 11 | TX_ER | | 31 | GND |
| 12 | TX_CLK | | 32 | GND |
| 13 | TX_EN | | 33 | GND |
| 14 | TXD<0> | | 34 | GND |
| 15 | TXD<1> | | 35 | GND |
| 16 | TXD<2> | | 36 | GND |
| 17 | TXD<3> | | 37 | GND |
| 18 | COL | | 38 | GND |
| 19 | CRS | | 39 | GND |
| 20 | +5V | | 40 | +5V |

# RJ-45 Connector Signals

**TABLE B-2**     RJ-45 Connector Signals

| Pin | Signal |
| --- | --- |
| 1 | Transmit+ |
| 2 | Transmit- |
| 3 | Receive+ |
| 4 | No Connection |
| 5 | No Connection |
| 6 | Receive- |
| 7 | No Connection |
| 8 | No Connection |

# Specifications

## Physical Characteristics

**TABLE C-1**    Physical Characteristics

| Dimension | Measurement |
| --- | --- |
| Length (with bracket) | 7.395 in (186.06 mm) |
| Width (with bracket) | 4.759 in (120.88 mm) |
| Height (not including PCB): | |
|   Primary component side | 0.570 in. (14.48 mm) |
|   Back side | 0.105 in. (2.67 mm) |
| Weight | 0.28 lb (127 g) |

# Power Requirements

**TABLE C-2**    Power Requirements

| Specification | Measurement |
|---|---|
| Maximum power consumption | 15 Watts |
| Voltage | 5V +/- 5% |
| Ripple | Maximum 100 mV |

# Performance Specifications

**TABLE C-3**    Performance Specifications

| Feature | Specification |
|---|---|
| PCI clock | 33 MHz max. |
| PCI data burst transfer rate | 132 MB/sec. |
| PCI data/Address lines | AD31-0 |
| PCI modes | Master/slave |
| MII | 25 MHz rate for 100 Mbps; 2.5 MHz rate for 10 Mbps<br>Conforms to IEEE 802.3u<br>Connects to TX, FX, AUI or any other<br>MII-compatible external transceivers |
| 100BASE-TX transfer rate | <= 100 Mbps (in each direction for full duplex) |
| 10BASE-T transfer rate | <= 10 Mbps (in each direction for full duplex) |

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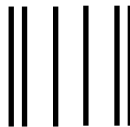
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