

DIGITAL Fast EtherWORKS PCI 10/100

Installation

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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.

Any changes or modifications made to this equipment may void the user's authority to operate this equipment.

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/TV technician for help

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Contents

Before You Start	ix
1 Introduction	
Features	1-2
Connectors and LEDs	1-4
2 Hardware Installation	
System Requirements	2-1
Installing the Adapter	2-2
Connecting to the Network	2-4
Connecting UTP Cables	2-4
Connecting Fiber-Optic Cable	2-6
Optional Remote Boot ROM	2-8
Installing the Remote Boot ROM	2-8
3 Configuration and EZWORKS Installation and Diagnostics	
Adapter Configuration	3-1
EZWORKS Installation Utility	3-2
Running the EZWORKS Installation Utility	3-3
Diagnostics	3-5
Running Diagnostics	3-6
Configuring the Remote Boot ROM	3-8
EZWORKS Command Line Switches	3-10
Command Line Switch Format	3-11

Exiting the EZWORKS Installation Utility	3-12
4 Software Information	
Device Driver Information	4-1
Network Management Information	4-2
Mac OS Information	4-2
Obtaining the Latest DIGITAL Fast EtherWORKS PCI 10/100 Driver Files	4-3
A Problem Solving	
Fault Isolation By Symptom	A-1
Diagnostic Test Errors	A-3
B General Information	
Physical Description	B-1
Functional Components	B-1
LEDs	B-2
Interrupt Request (IRQ) Lines	B-2
Electrical Parameters	B-3
Operating Environment	B-4
Connector Pin Assignments	B-5
Cabling Requirements	B-7
Connecting Cables for the DE500 10/100 Adapters	B-7
Connecting Cables for the 100Base-FA Adapter ...	B-8
Other DIGITAL Network Products	B-9
C PCI BIOS Setup Utility	

D Fast Ethernet Technology

Introduction	D-1
Advantages of Fast Ethernet	D-2
High Performance	D-2
Standards-Based Technology	D-2
Cost-Effective Migration	D-3
Vendor Support	D-4
Summary	D-4

Figures

1	Fast EtherWORKS PCI 10/100 Kit (DE500-BA)	xi
2	Fast EtherWORKS PCI 10/100 Kit (DE500-FA)	xii
3	Fast EtherWORKS PCI 10/100 Kit (DE500-AA)	xiii
4	Fast EtherWORKS PCI 10/100 Kit (DE500-XA)	xiv
1-1	DE500 10/100 Connector and LEDs	1-4
2-1	Removing the PCI Slot Cover	2-2
2-2	Installing the Fast EtherWORKS PCI 10/100 Adapter	2-3
2-3	Connecting the DE500 10/100 Adapter to an Ethernet Network	2-5
2-4	Connecting the DE500-FA Adapter to an Ethernet Network	2-7
2-5	Installing the Remote Boot ROM	2-9
3-1	EZWORKS Installation Utility Menu	3-3
3-2	EtherWORKS PCI Diagnostics Menu	3-6
3-3	Remote Boot ROM Menu	3-8
B-1	8-Pin MJ Connector (Front View)	B-5
B-2	Straight-Through and Crossover Pin Assignments	B-5

Tables

1-1	Fast EtherWORKS PCI 10/100 Adapter Models	1-1
1-2	Descriptions of the DE500 10/100 Connector and LEDs	1-5
1-3	Descriptions of the DE500-FA Connector and LEDs	1-6
3-1	General Adapter and NetWare Command Line Switches	3-11
3-2	Remote Boot ROM Command Line Switches	3-12
A-1	Fault Isolation By Symptom	A-1
A-2	Diagnostic Test Error Codes	A-3
B-1	LED States	B-2
B-2	Electrical Parameters	B-3
B-3	Operating Environment	B-4
B-4	Connector Pin Assignments	B-6
B-5	Other Products	B-9
C-1	Fast EtherWORKS PCI 10/100 Option Settings	C-2

Before You Start

The DIGITAL Fast EtherWORKS PCI 10/100 (DE500) adapter is a host processor-independent network interface card (NIC) designed for the peripheral component interconnect (PCI) bus.

This guide describes:

- The main features of the Fast EtherWORKS PCI 10/100 adapter models
- The adapter connectors and LEDs
- How to install the adapter in your computer
- Where to find device driver information
- Problems that you could encounter when installing the adapter and possible solutions

Conventions

This guide uses the following conventions:

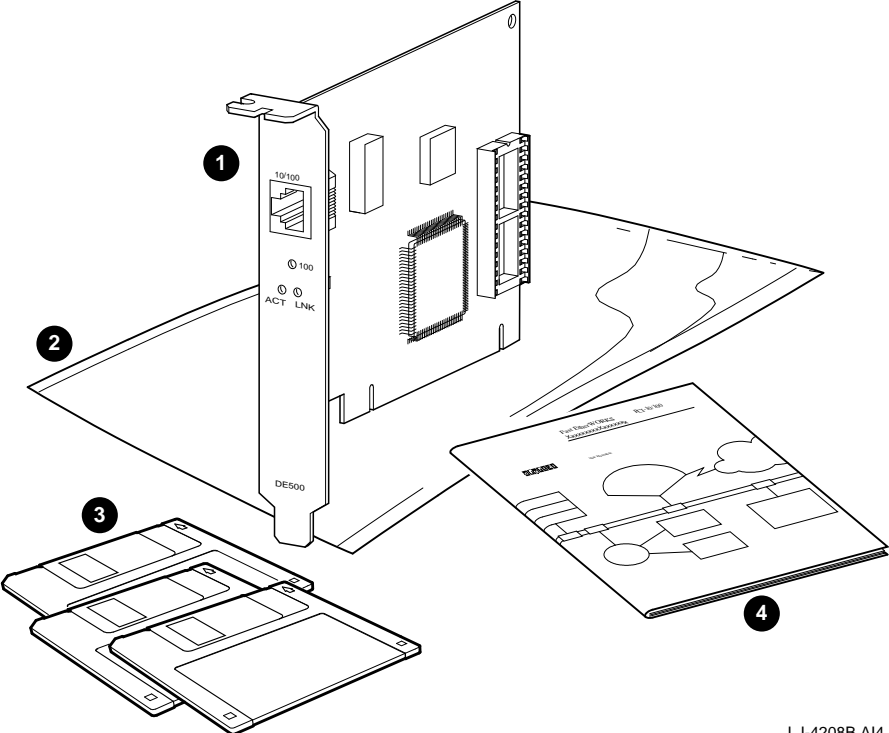
Convention	Description
PN	Part number.
❶	A number in a black circle in text refers to the corresponding number in an accompanying illustration.
<code>Enter</code>	A word in a box indicates a particular keyboard key. For example, <code>Enter</code> indicates the Enter key.
<i>variables</i>	In command descriptions, italic type indicates a variable that you supply. In text, it emphasizes a term or indicates a book title.
This type	Text in monospace type indicates text that you enter or text that the system displays.

Fast EtherWORKS PCI 10/100 Kit Contents

The product kit includes the items shown in Figure 1, Figure 2, Figure 3, or Figure 4, depending on the model you have. Verify that you have the following components before proceeding:

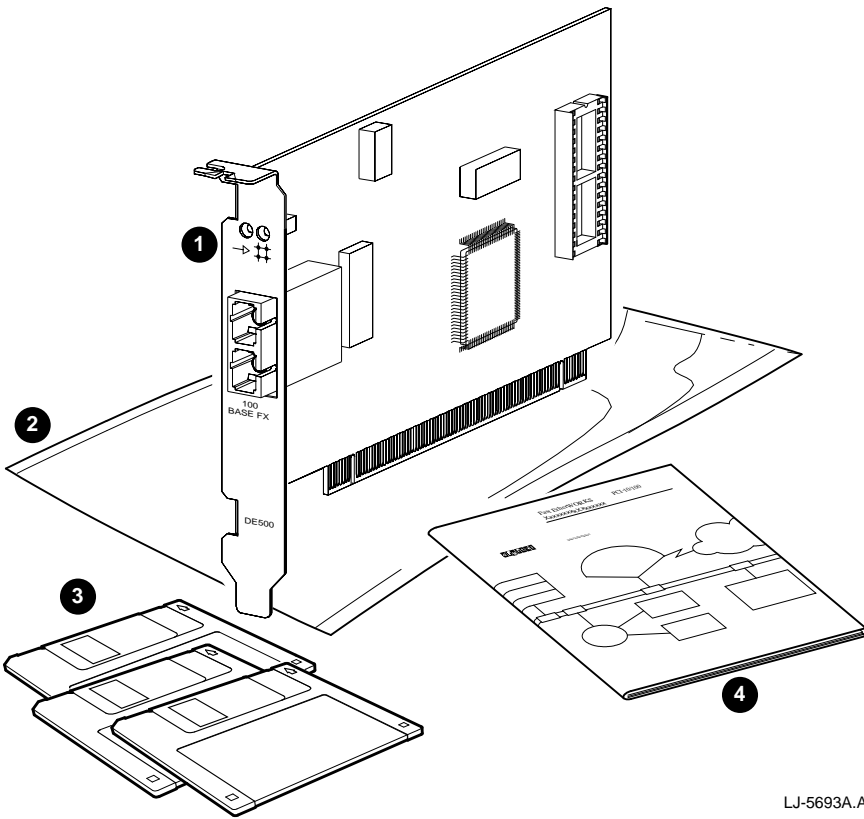
- The Fast EtherWORKS PCI 10/100 adapter ❶ (packaged inside an antistatic bag ❷)
- Three 3½-inch diskettes ❸
- This installation guide ❹

Figure 1 Fast EtherWORKS PCI 10/100 Kit (DE500-BA)



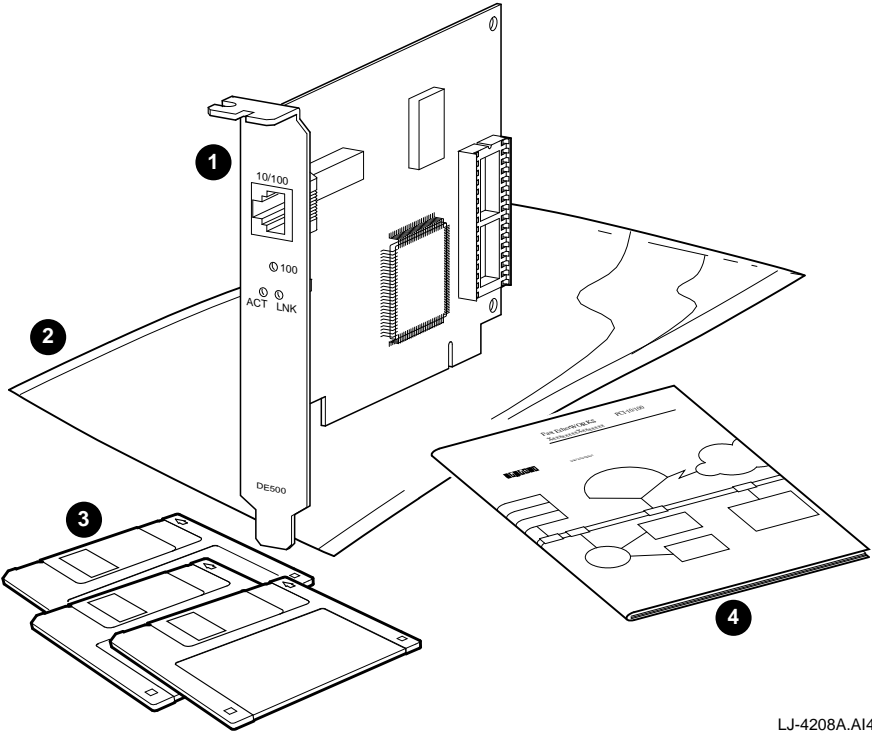
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Figure 2 Fast EtherWORKS PCI 10/100 Kit (DE500-FA)



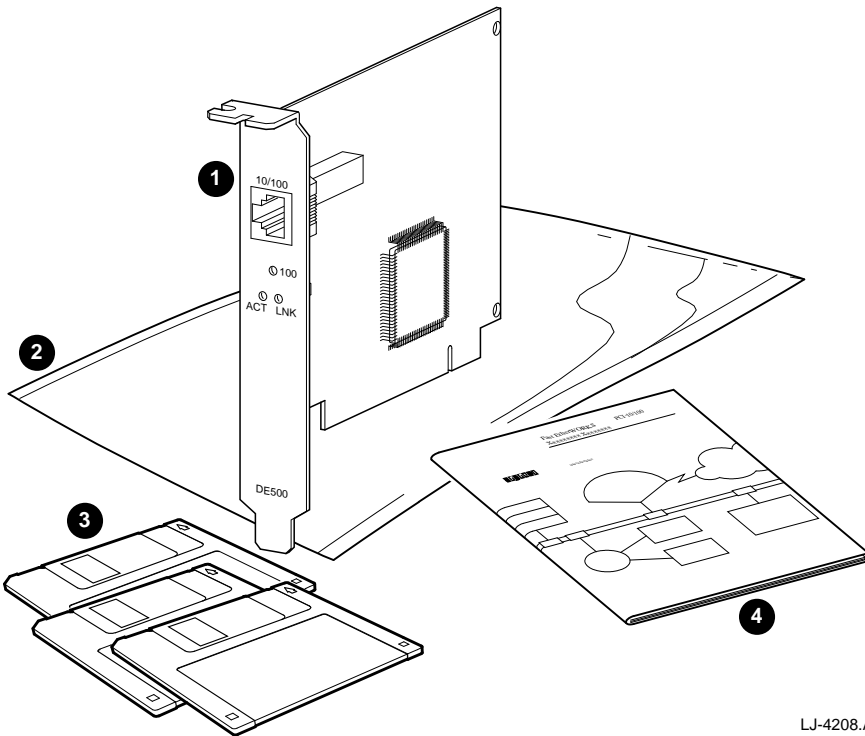
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Figure 3 Fast EtherWORKS PCI 10/100 Kit (DE500-AA)



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Figure 4 Fast EtherWORKS PCI 10/100 Kit (DE500-XA)



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Related Documents

Additional information relative to the Fast EtherWORKS PCI 10/100 adapter and networks can be found in the following documents:

- *OPEN DECconnect Applications Guide*
(PN EC-G5854-42)
Provides information to help plan and install networking systems based on Digital Equipment Corporation's OPEN DECconnect System and networking products.
- *Network Product Guide*
(PN EC-G4343-42)
Provides comprehensive information about Digital Equipment Corporation's hardware and software networking solutions.

Safety Statements

Any warning or caution that appears in this guide is defined as follows:

Warning	Contains information to prevent personal injury.
Caution	Contains information to prevent damage to equipment.
Vorsicht	Enthält Informationen, die beachtet werden müssen, um den Benutzer vor Schaden zu bewahren.
Achtung	Enthält Informationen, die beachtet werden müssen, um die Geräte vor Schaden zu bewahren.
Danger	Signale les informations destinées à prévenir les accidents corporels.
Attention	Signale les informations destinées à prévenir la détérioration du matériel.
Aviso	Contiene información para evitar daños personales.
Precaución	Contiene información para evitar daños al equipo.

The cautions and warnings you must observe for the hardware described in this guide are listed in English, German, French, and Spanish as follows:

CAUTION	Static electricity can damage modules and electronic components. DIGITAL recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules.
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ACHTUNG	Module und elektronische Komponenten können durch elektrostatische Entladungen beschädigt werden. Benutzen Sie immer eine antistatische Gelenkmanschette und eine geerdete Arbeitsunterlage, wenn Sie am offenen Gerät arbeiten.
ATTENTION	Les charges excessives d'électricité statique peuvent endommager les modules et les composants électroniques. DIGITAL conseille l'utilisation d'un bracelet de masse et d'un plan de travail mis à la terre lors de la manipulation des modules.
PRECAUCIÓN	La electricidad estática puede dañar los componentes electrónicos y los módulos. DIGITAL recomienda que se utilicen cintas de pasadores y superficies de trabajo conectadas a tierra al trabajar con cualquier módulo.
WARNING	Some fiber-optic equipment can emit laser light that can injure your eyes. Never look into an optical fiber or connector port. Always assume the cable is connected to a light source.
VORSICHT	Schauen Sie niemals direkt in ein Glasfaserkabel oder einen Glasfaseranschluß. Die Laserstrahlen in faser-optischen Geräten können Augenverletzungen verursachen.
DANGER	Certains équipements utilisant les fibres optiques peuvent émettre des rayonnement laser dangereux pour les yeux. Ne vous avisez jamais de regarder par l'extrémité d'une fibre optique ou dans l'ouverture d'un connecteur. Considérez toujours que le câble est relié à une source lumineuse.
AVISO	Algunos equipos de fibra óptica pueden emitir luz láser que daña los ojos. No se debe mirar en una puerta de conector o fibra óptica. Siempre se debe suponer que el cable está conectado a la luz.

CAUTION	When adding any option module to your computer, verify that the combined power (wattage) required for all modules in your computer does not exceed the power supply rating. Check your computer documentation for this information.
ACHTUNG	Wenn Sie Zusatzmodule in Ihren Computer einbauen, darf die gemeinsame Leistung (in Watt) aller eingebauten Module die Nennleistung nicht überschreiten. Weitere Informationen finden Sie in der Dokumentation zu Ihrem Computer.
ATTENTION	Si vous ajoutez des options à votre système, assurez-vous que le nombre de watts total n'excede pas la puissance nominale du bloc d'alimentation. Reportez-vous à la documentation de votre système pour obtenir plus d'information.
PRECAUCIÓN	Al añadir cualquier modulo de opciones al ordenador, es preciso comprobar que la potencia combinada (vatios) necesaria para todos los modulos del ordenador no sobrepasa las condiciones normales del suministro de energía. Consúltense estos datos en la documentación del ordenador.

How to Order Additional Documentation

To order additional documentation, use the following information:

To Order	Contact
By Telephone	USA (except Alaska, New Hampshire, and Hawaii): 1-800-DIGITAL (1-800-344-4825) Alaska, New Hampshire, and Hawaii: 1-603-884-660 Canada: 1-800-267-6215
Electronically (USA only)	Dial 1-800-DEC-DEMO (For assistance, call 1-800-DIGITAL.)
By Mail (USA and Puerto Rico)	Digital Equipment Corporation P.O. Box CS2008 Nashua, New Hampshire 03061 (Place prepaid orders from Puerto Rico with the local DIGITAL subsidiary: 809-754-7575.)
By Mail (Canada)	Digital Equipment of Canada LTD. 940 Belfast Road Ottawa, Ontario, Canada K1G 4C2 Attn.: A&SG Business Manager
Internationally	Digital Equipment Corporation Attn.: A&SG Business Manager c/o local DIGITAL subsidiary or approved distributor
Internally	U.S. Software Supply Business (SSB) Digital Equipment Corporation 8 Cotton Road Nashua, New Hampshire 03063

1

Introduction

This chapter describes the DIGITAL Fast EtherWORKS PCI 10/100 adapter (DE500) and briefly summarizes its features. This chapter also describes the adapter connectors and LEDs.

The DE500 is a single-slot, variable-height short card with a direct interface to the 32-bit PCI local bus. Reference to the DE500 adapter includes all models (-BA, -FA, -AA, and -XA) unless otherwise noted. For example, the DE500 UTP models (-BA, -AA, and -XA) are referred to as the DE500 10/100 adapters; the fiber-optic model is referred to as the DE500-FA.

Table 1-1 describes the adapter models available from Digital Equipment Corporation.

Table 1-1 Fast EtherWORKS PCI 10/100 Adapter Models

Model	Description
DE500-BA DE500-AA DE500-XA	These 10BaseT or 100BaseTX dual-speed adapters use a single 8-pin MJ connector for either a 10 Mb/s or a 100 Mb/s twisted-pair IEEE 802.3 Ethernet network connection.
DE500-FA	This 100BaseFX adapter uses a duplex SC connector for a 100 Mb/s fiber-optic IEEE 802.3 or 802.3u Ethernet connection.

After you install the adapter and device driver in your computer, you can use various network software products to integrate the computer into a local area network (LAN) environment.

Features

The main features of the DE500 are as follows:

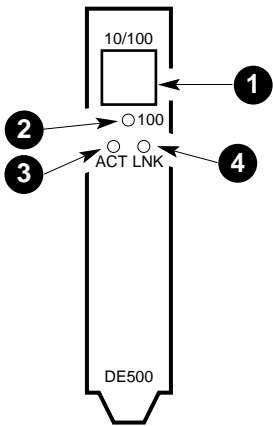
- High performance bus master, 32-bit direct memory access (DMA) architecture.
- Easy installation on DOS-based systems using the EZWORKS Installation utility.
- Automatic and complete installation of NetWare Client VLM using the EZWORKS Installation utility.
- Supports IEEE 802.3u autonegotiation function (DE500-BA and DE500-AA); supports IEEE 802.3 autosensing function (DE500-XA).
- Supports optional boot ROM (FLASH or OTP) up to 128K bytes (all models except the DE500-XA).
- DIGITAL-designed VLSI Ethernet chip to support high data transfer rates for optimal network performance. The DE500-BA and DE500-FA use the DECchip 21143; the DE500-AA uses the DECchip 21140A; and the DE500-XA uses the DECchip 21140.
- SNMP manageable under SCO OpenServer, Windows NT, and NetWare network operating systems.
- Allows multiple options to be installed in a host system.

- Single 8-pin MJ connector for 100-ohm screened twisted-pair (ScTP) or unshielded twisted-pair (UTP) cable (DE500 10/100 models). Duplex SC connector for multimode fiber-optic cable (DE500-FA model).
- Supports half- and full-duplex mode of operation.
- Supports software-controlled power saving mode.
- External and internal loopback capability.
- Plug-and-play one-step driver installation and configuration.
- Powerful parallel cut-through architecture and other patented features maximize data throughput and minimize CPU utilization.
- PCI revision 2.1 compliance (backward compatible with Version 2.0).
- FCC Class B, CISPR-22 Class B, VCCI Class II, CE Mark, and C-TICK compliance.
- Lifetime warranty with return of the warranty registration card to DIGITAL.

Connectors and LEDs

Figure 1-1 shows the DE500 10/100 adapter connector and LEDs. Table 1-2 describes these components. Table 1-3 describes the DE500-FA components.

Figure 1-1 DE500 10/100 Connector and LEDs



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Table 1–2 Descriptions of the DE500 10/100 Connector and LEDs

Reference	Component	Description
❶	8-pin MJ connector	This 10/100 Mb/s twisted-pair network connector requires either UTP Category 3, 4, or 5 cable for 10 Mb/s connection, or UTP Category 5 cable for 100 Mb/s connection. The pin assignments are the same for 10BaseT and 100BaseTX connections.
❷	100 Mb/s status LED	This LED lights amber when 100 Mb/s mode is selected. The LED does not light when 10 Mb/s mode is selected.
❸	Activity status LED	This LED lights amber in either 10 or 100 Mb/s mode when a receive (RX) packet that passed the address filtering is being received, or a transmission (TX) is in process.
❹	Link status LED	This LED lights green in either 10 or 100 Mb/s mode to indicate connection to an active network. This LED does not light when the link is in a failed state, or when the adapter is not connected to an active network.

Table 1–3 Descriptions of the DE500-FA Connector and LEDs

Component	Description
SC connector	This duplex 100 Mb/s multimode optics connector requires fiber-optic cable.
Activity status LED	This LED lights amber in 100 Mb/s mode when a receive (RX) packet that passed the address filtering is being received, or a transmission (TX) is in process.
Link status LED	This LED lights green in 100 Mb/s mode to indicate connection to an active network. This LED does not light when the link is in a failed state, or when the adapter is not connected to an active network.

2

Hardware Installation

This chapter describes how to install the DIGITAL Fast EtherWORKS PCI 10/100 adapter in a PCI bus master-compatible computer and how to connect it to the network.

System Requirements

To install the DE500 adapter, you need the following:

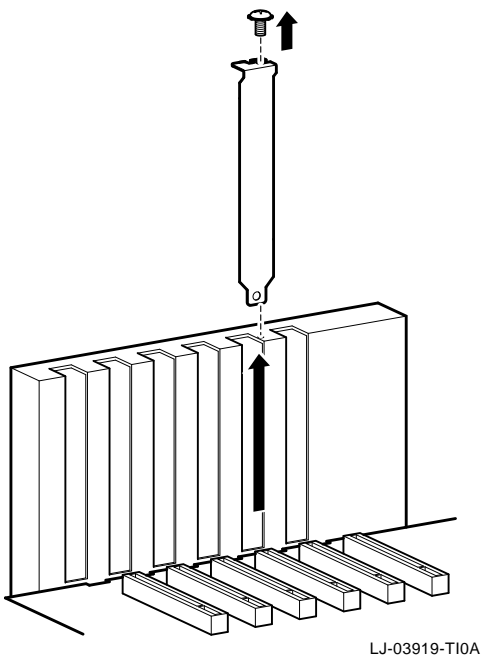
- An available PCI bus master expansion slot
- A system that is compliant with the PCI revision specification, Version 2.1 (backward compatible with Version 2.0)
- A 3½-inch diskette drive for device driver and system management software loading
- UTP or ScTP cable for the DE500 10/100 models; multimode fiber-optic cable for the DE500-FA. (See the Cabling Requirements section in Appendix B for more information about cabling.)

Installing the Adapter

To install the DE500 adapter in your computer, use the following procedure:

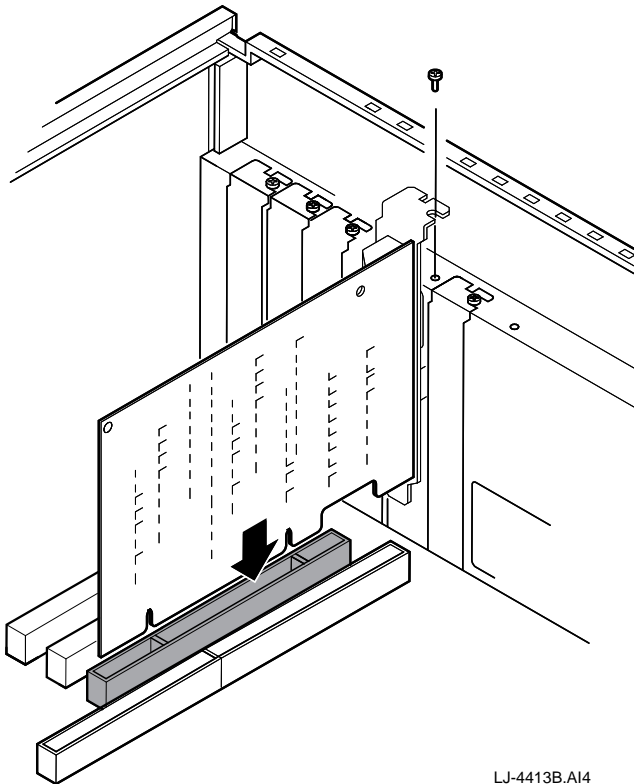
1. Unplug the computer and disconnect all cables that are connected to the main system unit.
2. Remove any diskettes from the computer diskette drives.
3. Remove the computer cover.
4. Unscrew and remove the option slot cover from the PCI bus master slot that you plan to use (see Figure 2-1).

Figure 2-1 Removing the PCI Slot Cover



5. Install the boot ROM (optional) in the ROM socket on the adapter (see the Installing the Remote Boot ROM section for installation information, if necessary).
6. Insert the adapter into the slot, then replace the screw to secure the adapter (see Figure 2-2).
7. Replace the computer cover, reconnect the cables, then power up your system.

Figure 2-2 Installing the Fast EtherWORKS PCI 10/100 Adapter



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Connecting to the Network

This section describes how to connect the Category 5 UTP cables to the DE500 10/100 adapters and the multimode fiber-optic cable to the DE500-FA adapter.

Connecting UTP Cables

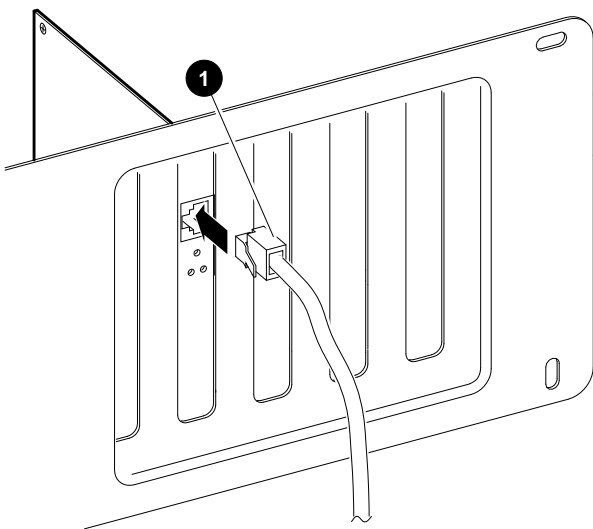
The DE500 10/100 adapters use an on-board transceiver with UTP cable to connect to the network.

To connect these adapters to the network, use the following procedure:

1. Attach the UTP cable (❶, Figure 2–3) to the 8-pin MJ connector on your adapter.
2. Attach the connector on the other end of your UTP cable to the other device.
 - To establish a valid 100 Mb/s connection, connect a 100-ohm UTP or ScTP Category 5 cable point-to-point, or to a 100BaseTX hub or repeater.
 - To establish a valid 10 Mb/s connection, connect a 100-ohm UTP or ScTP Category 3, 4, or 5 cable point-to-point, or to a 10BaseT hub or repeater.

Refer to the Cabling Requirements section in Appendix B for further cabling information. Refer to Figure B–1 and Figure B–2 for connector pin assignments.

Figure 2-3 Connecting the DE500 10/100 Adapter to an Ethernet Network



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Note

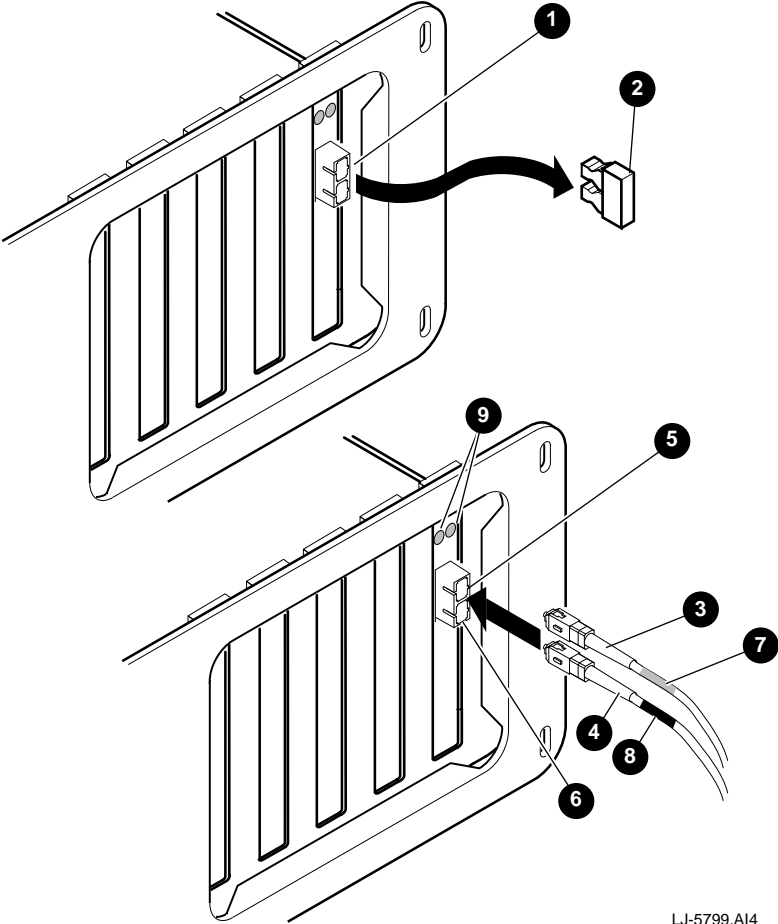
For autosensing and autonegotiation to report a speed, be sure you connect the adapter to the network before loading any device drivers.

Connecting Fiber-Optic Cable

To connect the DE500-FA adapter to the network, use the following procedure:

1. Remove the dust cap **②** from the SC connector **①** (see Figure 2-4).
2. Attach the connectors at one end of the cable (**③**, **④**) to the duplex SC connector ports (**⑤**, **⑥**) on your adapter. Note the color coding of the band (**⑦**, **⑧**) that attaches to the top (transmit) side of the SC connector.
3. Attach both connectors at the other end of the cable to the other device. Make sure that the connector noted in step 2 is attached to the bottom (receive) side of the port on the other device.
4. Observe the adapter LEDs **⑨**. The link LED should be a steady green to indicate connection to an active network.

Figure 2-4 Connecting the DE500-FA Adapter to an Ethernet Network



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Optional Remote Boot ROM

The DE500 adapter (with the exception of the DE500-XA model) will soon support the following remote boot ROMs. Check the adapter Web site for availability. (See Chapter 4 for Web information.)

- 28-pin remote boot ROM
- 32-pin upgradable FLASH remote boot ROM

When you install a remote boot ROM on a DE500 adapter, the remote boot ROM enables your computer to perform a remote boot using a variety of selectable protocols.

Installing the Remote Boot ROM

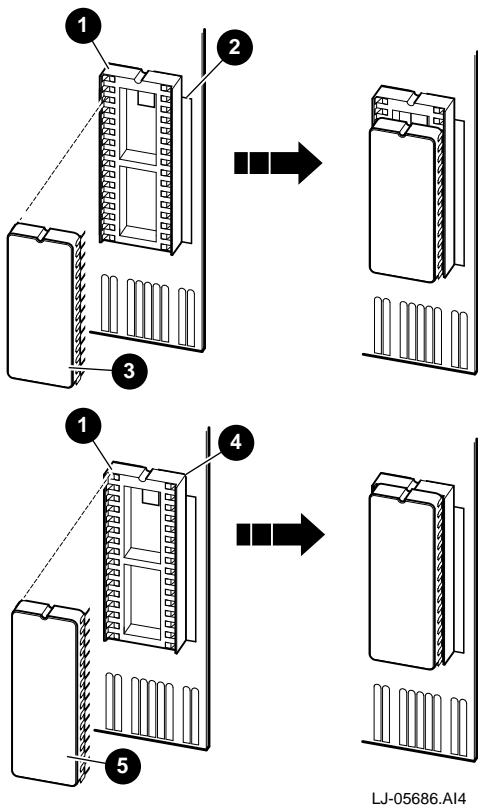
To install the remote boot ROM, use the following procedure:

1. Place the adapter on a flat surface.
2. Align the ROM with the corresponding outline on the 32-pin ROM socket ❶ (see Figure 2-5):
 - a. Align the 28-pin ROM ❸ with the socket's smaller silk-screen outline ❷.
 - b. Align the 32-pin ROM ❹ with the socket's larger silk-screen outline ❸, or align the notch in the ROM with the notch in the ROM socket.

Caution

Static electricity can damage modules and electronic components. DIGITAL recommends using a grounded antistatic wrist strap and a grounded work surface when handling any modules or components.

Figure 2-5 Installing the Remote Boot ROM



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3. Align the pins on the ROM with the holes in the ROM socket, then insert the pins in their correct holes, taking care not to bend any pins during the process. Press firmly on the ROM to make a solid contact. (See the Configuring the Remote Boot ROM section in Chapter 3 for ROM configuration information.)

3

Configuration and EZWORKS Installation and Diagnostics

This chapter provides information about adapter and ROM configuration, and how to use the EZWORKS Installation utility for software installation and diagnostics.

Adapter Configuration

In most systems, the DIGITAL Fast EtherWORKS PCI 10/100 adapter is automatically configured by the system. This occurs when the computer is powered up after the adapter is installed. Use your system's console commands or BIOS Setup utility only if you need to change the computer settings.

Note

Refer to your computer and/or operating system documentation for instructions on how to use your system's BIOS Setup utility. Refer to Appendix C for PCI BIOS Setup information.

EZWORKS Installation Utility

The EZWORKS Installation utility is a DOS-based program that is located on the DOS-based driver distribution diskette. This utility can be run on the following:

- From the DOS prompt on a DOS-based system
- From the File Manager or DOS box on Microsoft Windows, Windows for Workgroups, and Windows 95 network operating systems
- From a DOS box under an OS/2 network operating system

The EZWORKS Installation utility cannot be run on a Windows NT network operating system or computers based on CPUs other than Intel i86 compatible systems.

EZWORKS menu bar options and pop-up menus provide the following:

- Information about the DIGITAL Fast EtherWORKS PCI 10/100 adapter (for example, the adapter's current settings)
- Capability to configure and install your system's NetWare ODI client
- Capability to use command line switches to configure the adapter and to display adapter information
- Information about other PCI adapters installed in your system
- Device driver installation instructions
- Capability to run diagnostic tests
- Capability to detect MS-DOS startup menu items

Note

When you click on any box on the EZWORKS Installation utility menu, the information box, located at the bottom of the menu, displays information about that selection.

Running the EZWORKS Installation Utility

To run the EZWORKS Installation utility:

1. Insert the distribution diskette into drive A, then change your directory to A:.
2. At the DOS prompt, enter Setup to start the EZWORKS Installation utility and display the main menu (shown in Figure 3-1).

Figure 3-1 EZWORKS Installation Utility Menu

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If your system has a DOS startup menu on startup, you can select a specific menu item in which to place the startup command for the currently selected network operating system (NOS). Otherwise, the selected NOS startup command is placed at the bottom of your AUTOEXEC.BAT file.

If you do not wish the utility to add any commands to your AUTOEXEC.BAT file, click on the Modify AUTOEXEC.BAT option to turn it off.

3. Click on the Install button to install and configure the selected network operating system, including drivers.

Note

The EZWORKS Installation utility is automatically ready to install and configure your system as a NetWare ODI client. Once the information box indicates that the NetWare ODI client installation is complete, reboot your system to connect to your NetWare server.

4. Click on the Help box to display device driver installation instructions for the selected network operating system.
5. Click on the information boxes, located at the bottom of the menu, for explanations of the adapter's settings.

Note

If multiple adapters are installed in your system, a Multiple cards detected button will be displayed. Click on the button for information about additional DIGITAL 10/100 adapters installed in your system. To change the settings, refer to Appendix C.

6. Click on the Tools option menu items to display PCI bus information, run diagnostic tests on your adapter, and configure an installed remote boot ROM.
7. Click on the Help option menu items to display an explanation of the utility, how to obtain the latest device drivers, and the version number of the utility (from the About menu item).

Diagnostics

As previously mentioned, diagnostics for the DE500 adapter are run from the EZWORKS Installation utility. It is recommended that you run diagnostics after initial installation to ensure that the adapter is set up to meet your system requirements and to verify the adapter's functionality.

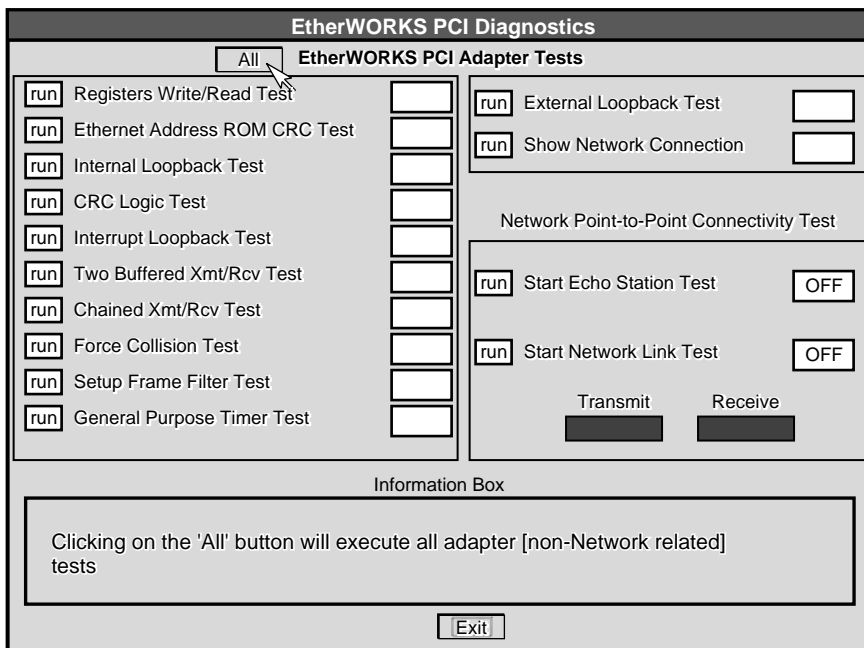
If the DE500 adapter is active (when a network device driver is loaded), diagnostics will not run. If necessary, comment out the command that loads the device driver in the CONFIG.SYS or other files, then cold boot the computer to deactivate the adapter. For Windows 95 users, perform a shutdown, then restart the computer in MS-DOS mode.

Running Diagnostics

To run diagnostics:

1. Click on the Diagnostics menu item from the Tools option (Figure 3-1) to display the EtherWORKS PCI Diagnostics menu (Figure 3-2).

Figure 3-2 EtherWORKS PCI Diagnostics Menu



LJ-4453.A14

2. Click on the All button to run all non-network diagnostic tests.
3. Click on individual tests to run any network or adapter diagnostic test.

When diagnostics are complete, the box located to the right of the test will indicate whether the test passed or failed. If the test fails, an error message will appear in the information box. See Table A-2 for diagnostic test error messages and the recommended corrective action.

4. The Show Network Connection Test can be used to determine if the adapter is physically connected to your Ethernet network.
5. The Network Point-to-Point Connectivity Test can be used to verify a network connection between two Fast Ethernet adapters. Click on the run button next to the Start Echo Station Test to activate the adapter to loopback packets with the Ethernet address of 00-11-11-11-11-11. Press **[Esc]** if you wish to end the test.
Click on the run button next to the Start Network Link Test on another system. This will start the adapter transmitting packets to the system that is presently the Echo Station. Press **[Esc]** to end the test. If the packets are successfully echoed back to the Network Link Station, they will be tabulated in the Transmit and Receive boxes.

Configuring the Remote Boot ROM

Once you have installed a remote boot ROM on your adapter and installed the adapter in your system, use the following procedure to configure the ROM:

1. Click on the Remote Boot ROM menu item from the Tools option to display the Remote Boot ROM Menu (see Figure 3–3). If a remote boot ROM is not installed in your system, or is installed incorrectly, an error message will appear.

Figure 3–3 Remote Boot ROM Menu

Remote Boot ROM Menu

ROM Version: V2.0

Current Setting: Enabled

SET Remote Boot ROM Enabled or Disabled

SET Period of time the Remote Boot ROM will try to boot before timing out and booting locally: 2.5 Minutes

SET Remote Boot ROM Protocol: RPL

WRITE Update Remote Boot FLASH ROM software

RUN ROM Diagnostics

SET ROMShield ON

SET Config Menu OFF

Information Box

Use this option to select whether the Remote Boot ROM is Enabled or Disabled. The setting appears in the box to the right.

EXIT and save settings QUIT

LJ-4590B.A14

Command line parameters can be used as an alternative method to configure your remote boot ROM. For example:

```
A>Setup/remote=enable/protocol=RPL
```

See the EZWORKS Command Line Switches section in this chapter for further information.

2. Select the desired options:

- Enable the remote boot ROM to establish a remote boot session when the computer is powered up.
- Select the period of time to attempt a remote boot before a local boot occurs (MOP only). The default time is 2.5 minutes.
- Select the appropriate remote boot protocol to be used to establish a remote boot session.
 - a. Use the MOP protocol in PATHWORKS Version 4.1x environments.
 - b. Use the NetWare *xxxx* protocol in Novell NetWare environments. The *xxxx* stands for the corresponding frame type configured on the NetWare server performing the remote boot.
 - c. Use the TCP/IP protocol in BOOTP remote boot environments.
 - d. Use the RPL protocol (the default) in PATHWORKS Version 5.x, Microsoft LAN Manager Version 2.2, Microsoft Windows NT Advanced Server Version 3.5x, and IBM LAN Server Version 3.x, Version 4.0 environments.

- If you have a FLASH ROM version of the remote boot ROM, click on the WRITE button if you wish to update the ROM software.
- Run diagnostics to check the integrity of the remote boot ROM.
- Click on the ROMShield button to turn ON/OFF the antivirus function before a remote boot session is established. The default setting is ON.
- Click on the Config Menu button to turn ON/OFF the ability to change the remote boot settings before a remote boot session is established. When the Initializing DIGITAL... message appears, press CTL/ALT/B to enter the Config Menu. The default setting is OFF.

3. Save your changes by selecting the Exit and save settings option.

EZWORKS Command Line Switches

The EZWORKS Installation utility supports command line switches. These switches perform EZWORKS functions when a single DIGITAL PCI adapter is installed in your computer. The format for command line switches is not case sensitive; however, all switch fields must be entered without spaces before or after the equal sign (=) and without truncating switch names. (Refer to the following section for the correct command line format.)

Command Line Switch Format

Table 3-1 and Table 3-2 list and describe the available EZWORKS command line switches. For further information, see the EZWORKS.TXT file located in the /INSTALL directory on the distribution diskette.

Table 3-1 General Adapter and NetWare Command Line Switches

Switch	Description
/help or /?	When these switches are included in the command line, EZWORKS displays help information about the command line switches.
/nodisplay	Turns off screen display except for /?, /help, /status, and any error messages.
/novell	Performs a full NetWare DOS Client installation. Use the /frametype command to override the IEEE 802.2 default frame type.
/status	Displays current DIGITAL PCI adapter configuration.

Table 3–2 Remote Boot ROM Command Line Switches

Switch	Description
/autoupdateflash	Only updates an installed FLASH ROM if the current version of the FLASH _{xxx} .BIN file is later than the version of the currently installed FLASH ROM.
/cfg=(enable, disable)	Allows you to enable or disable the configuration screen for the remote boot ROM. The adapter's default setting is OFF.
/protocol=(mop,rpl...)	Modifies the remote boot protocol to the value you specify. The valid values are MOP, RPL, TCPIP, NETWARE_802_2, NETWARE_802_3, and NETWARE_ETHERNET_II. The adapter's default setting is RPL.
/remote=(enable, disable)	Allows you to change your adapter's remote boot setting to Enable or Disable according to the value you specify. The adapter's default setting is Disabled.
/rs=(enable, disable)	Allows you to enable or disable the ROMShield antivirus protection. The adapter's default setting is ON.
/timeout=(30secs, 2_5mins)	Selects the period of time the adapter will attempt a remote boot before a local boot occurs (MOP only). The adapter's default setting is 2.5 minutes.
/updateflash	Allows you to write/update an installed remote boot FLASH ROM using the flash450.bin file.

Exiting the EZWORKS Installation Utility

To exit the EZWORKS Installation utility and return to the DOS prompt, use either the File option from the menu bar, or press the **Esc** key.

4

Software Information

This chapter describes the installation and network management information contained on the DIGITAL Fast EtherWORKS PCI 10/100 kit's diskettes.

Device Driver Information

The distribution diskette's \README.TXT file, located in the diskette's root directory, contains a list of the supported device drivers and the directory structures for the supported operating environments.

The diskette contains additional README.TXT files within the directory structures for each supported operating environment. The information in these files pertains to the specific device driver or operating environment corresponding to the subdirectory where they are found.

Network Management Information

The network management diskette contains the NICWORKS local management application. NICWORKS is a graphical tool that allows you to view adapter performance statistics in real time.

The \README.TXT file, located in the network management diskette's root directory, contains a list of additional supported network management software and the directory structure for the supported operating environments.

The network management diskette contains additional README.TXT files within the directory structures for each supported operating environment. The information in these files pertain to the specific network management software or operating environment corresponding to the subdirectory where they are found.

Mac OS Information

The Mac OS distribution diskette is a 1.44 MB Macintosh-formatted diskette containing the software that supports the Apple Mac OS operating system. The \README file, located in the diskette's root directory, contains a list of the supported device drivers, installation instructions, and a list of the included utilities.

Obtaining the Latest DIGITAL Fast EtherWORKS PCI 10/100 Driver Files

The device driver software diskette included in your DIGITAL Fast EtherWORKS PCI 10/100 kit can become outdated as operating system software evolves. The latest versions of the driver files can be found on the Internet, CompuServe, World Wide Web, and the Network Product Business Bulletin Board Service (NPB BBS) by using the following procedures:

- **Internet:**

1. Perform an anonymous ftp connection to `ftp.digital.com`. Your login name is `anonymous`.
2. Enter your password. (Use your Internet electronic mail address as your password.)
3. Using uppercase and lowercase letters (as shown), change your directory to either of the following:

```
cd /pub/DEC/adapters/ethernet/de500/release  
cd /pub/DEC/adapters/ethernet/de500/interim
```

4. Select image mode before extracting binary (non-ASCII) files:

```
ftp> i
```

5. Retrieve a driver file, as in the following example:

```
ftp> get driver.ZIP
```

6. Enter `quit` to exit ftp.

7. Use the `-d` option to extract subdirectories and files:

```
C:\> pkunzip -d driver.ZIP
```

- **CompuServe:**

1. Enter !Go decpci to select the DECPCI forum and enter the LAN Controllers library.
2. Select the *Browse* option to scroll through the library titles.
3. Click on the DE500 title, then press to display the description of the DE500.
4. Select the *Retrieve* option to copy the file to your system.

For information on how to obtain a CompuServe account in the U.S., call 1-800-848-8990.

- **World Wide Web:**

Enter the following universal resource locator (URL) to access the DIGITAL adapter home page on the World Wide Web:

<http://ftp.digital.com/pub/DEC/adapters/home.html>

- **Network Product Business Bulletin Board Service (NPB BBS):**

- Using a modem (parameters 9600, 8, n, 1), connect to the NPB Bulletin Board Service in the U.S. by dialing 508-486-5777.
- Using a modem, connect to the PC Business Unit Bulletin Board Service (PCBU BBS) in Europe by dialing (33) 92 96 03 12, then select networks product/area 23.

Follow the menu-driven instructions on your screen to download the driver files.

A

Problem Solving

This appendix describes problems that you could encounter when installing the DIGITAL Fast EtherWORKS PCI 10/100 adapter and suggests possible causes and solutions.

Fault Isolation By Symptom

Table A-1 describes how to isolate faults by the symptoms that occur.

Table A-1 Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system is on, but there is no display or response from the keyboard.	The monitor is either not on or not connected to the video board.	Be sure the monitor cable is firmly connected to the video board. Set the monitor's power switch to ON.
	The Fast Ethernet adapter is not seated securely.	Turn your system off, reseal the adapter, then turn your system on again (see Chapter 2).
	The network cable is loose.	Secure the cable.

(continued on next page)

Table A-1 (Cont.) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system is on, but there is no display or response from the keyboard.	The adapter is preventing your system from operating correctly.	Disconnect the cable from the adapter. Turn your system off, reseal the adapter, then turn your system on again. If the problem persists, contact your system administrator or authorized DIGITAL distributor.
	A conflict exists with another adapter in the system: The IRQ settings are incorrect.	Check the adapter's settings in the EZWORKS Installation utility. Use the BIOS Setup utility, if available, to change any settings.
	The PCI slot containing the adapter is not enabled or not enabled for bus mastering.	Use the BIOS Setup utility to enable the PCI slot.

Diagnostic Test Errors

Table A-2 describes the Fast EtherWORKS PCI 10/100 adapter diagnostic test error messages and the recommended corrective actions for each group of messages.

Table A-2 Diagnostic Test Error Codes

Error Message	Recommended Actions
Registers Read/Write error Ethernet Address ROM CRC error	Ensure that the Fast Ethernet adapter is seated securely in a PCI bus slot, or try another available PCI bus slot. Ensure that the adapter was installed correctly during BIOS Setup: the PCI slot is enabled, an IRQ number is assigned, and bus mastering is enabled. (See Appendix C for more information.) ¹
Internal Loopback error Interrupt Loopback error	IRQ conflict (when two adapters have been assigned the same interrupt line), or the PCI slot was not enabled. Check the adapter's settings in the EZWORKS Installation utility. Use the BIOS Setup utility, if available, to change any settings. ¹
CRC Logic error	This message indicates network-related test failures. If the driver was installed before running diagnostics, power down your system, then start again. ¹
Two Buffered Xmt/Rcv error Chained Xmt/Rcv error Force Collision error Setup Frame Filter error	These messages indicate network-related test failures. If the driver was installed before running diagnostics, power down your system, then start again. ¹

¹If the problem persists, the adapter could be defective. Depending on where you purchased the adapter, contact either your authorized DIGITAL distributor or DIGITAL Technical Support.

(continued on next page)

Table A–2 (Cont.) Diagnostic Test Error Codes

Error Message	Recommended Actions
General Purpose Timer error External Loopback error	IRQ conflict (when two adapters want to use the same interrupt line), or the PCI slot was not enabled. Check the adapter's settings in the EZWORKS Installation utility. Use the BIOS Setup utility to change any settings. ¹
Echo Station error Network Link error	Confirm that the internal and external loopback tests passed. Ensure that the media port is selected correctly and the cable is connected correctly.
Memory allocation error	This message indicates insufficient memory for diagnostics; release some memory. If the problem persists, contact your system administrator.
Unable to find DIGITAL network card error	Ensure that the Fast Ethernet adapter is seated securely in a PCI bus slot, or try another available PCI bus slot. Ensure that the PCI adapter was installed correctly during BIOS Setup: the PCI slot is enabled, an IRQ number is assigned, and bus mastering is enabled. (See Appendix C for more information.) ¹
Network is active error	Unload the driver or cold boot your system to deactivate the adapter.

¹If the problem persists, the adapter could be defective. Depending on where you purchased the adapter, contact either your authorized DIGITAL distributor or DIGITAL Technical Support.

Note

The last three error messages are network-related. These messages appear in the EZWORKS Installation utility Diagnostics information box.

B

General Information

This appendix provides general system specifications and cabling requirements for the DIGITAL Fast EtherWORKS PCI 10/100 adapter.

Physical Description

The Fast EtherWORKS PCI 10/100 adapter is a variable-height short card that uses the 32-bit PCI bus connector. The adapter measures 95.3 mm (3.75 inches) by 129 mm (5.1 inches), and is constructed using four-layer circuit board technology with two signal layers and two power/ground layers.

Functional Components

The major functional components of the Fast EtherWORKS PCI 10/100 adapter are as follows:

- Single 8-pin MJ connector that operates at either 10 Mb/s or 100 Mb/s (DE500 10/100 models)
- Duplex SC connector (DE500-FA model)
- DECchip 21143 (DE500-BA and DE500-FA), DECchip 21140A (DE500-AA), and DECchip 21140 (DE500-XA)
- LEDs that indicate speed (for DE500 10/100 models), transmit and receive network activity, and link status
- Remote boot ROM socket (for all models except the DE500-XA)

LEDs

The LEDs are used to indicate the status of the adapter and its connector. These LEDs are visible on the adapter's front panel (at the back of your system). During diagnostics, the Fast EtherWORKS PCI 10/100 adapter's Activity LED blinks once, then remains on. Once the network software and device driver(s) are loaded, the LEDs reflect status.

Table B-1 describes the Fast EtherWORKS PCI 10/100 adapter LEDs.

Table B-1 LED States

LED	Color	Description
100 Mb/s status	Amber	This LED lights when 100 Mb/s mode is selected and does not light when 10 Mb/s mode is selected (DE500 10/100 models).
Activity status	Amber	This LED lights in 10 and 100 Mb/s modes when there is transmit or receive network activity.
Link status	Green	This LED lights in 10 and 100 Mb/s modes to indicate a good network connection; it does not light when the link is in a failed state.

Interrupt Request (IRQ) Lines

The IRQ lines can be set to any valid IRQ.

Electrical Parameters

Table B-2 shows the electrical parameters for the Fast EtherWORKS PCI 10/100 adapter.

Table B-2 Electrical Parameters

Cable Type	Power Maximum	DC Amps (+5.0 V) Maximum
UTP (DE500-BA)	2.92 W	0.58 A
UTP (DE500-AA and DE500-XA)	3.75 W	0.75 A
Multimode fiber-optic	3.5 W	700 mA

Caution

When adding adapters to your computer, verify that the combined power (wattage) required for the adapters in your computer does not exceed the power supply rating. Refer to your computer documentation for this information.

Operating Environment

Table B-3 lists the recommended operating environment specifications for the Fast EtherWORKS PCI 10/100 adapter.

Table B-3 Operating Environment

Condition	Value
Operating temperature (at sea level)	10°C - 40°C (50°F - 104°F)
Relative humidity	10% to 90% (noncondensing)
Radiated emissions	FCC Class B CISPR 22 Class B VDE Class B VCCI Class 2 CE Mark C-TICK

Connector Pin Assignments

The Fast EtherWORKS PCI 10/100 adapter's 10BaseT and 100BaseTX twisted-pair network connector pins are shown in Figure B-1 and Figure B-2 and explained in Table B-4.

Figure B-1 8-Pin MJ Connector (Front View)

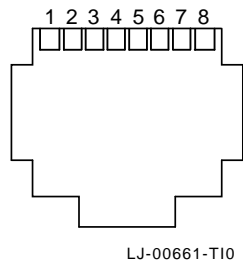


Figure B-2 Straight-Through and Crossover Pin Assignments

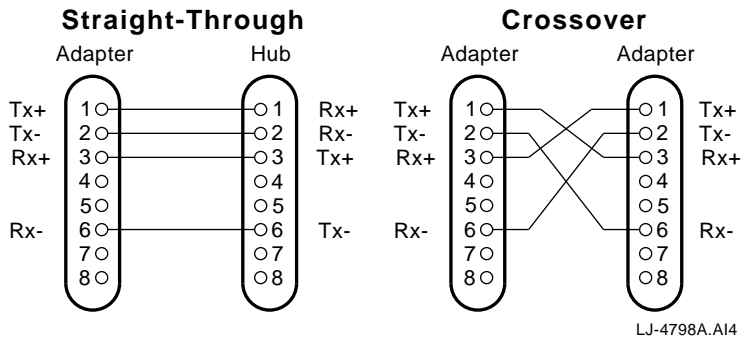


Table B-4 Connector Pin Assignments

Pin Number	Signal Name
1	Transmit +
2	Transmit -
3	Receive +
4	NC (no connection)
5	NC (no connection)
6	Receive -
7	NC (no connection)
8	NC (no connection)

Cabling Requirements

Use one of the following cable types, or its equivalent, to connect the Fast EtherWORKS PCI 10/100 adapter to the network.

Connecting Cables for the DE500 10/100 Adapters

The maximum length of 10BaseT and 100BaseTX cables supported by Ethernet networks is 100 meters of UTP cable for 10/100 Mb/s speeds. The *xx* denotes cable length in meters for each of the following DIGITAL part numbers:

Note

For existing installations, Category 3 ScTP or UTP cable can be used at 10 Mb/s.

- **BN25G-xx** — Category 5 100-ohm unshielded twisted-pair (UTP) office cable to connect a Fast EtherWORKS PCI 10/100 adapter to an office wall plate.
- **BN26M-xx** — Category 5 100-ohm screened twisted-pair (ScTP) office cable to connect a Fast EtherWORKS PCI 10/100 adapter to a shielded office wall plate.
- **BN24Q-xx** — Category 5 100-ohm unshielded twisted-pair office cable (UTP) with crossover (8-conductor, 4-twisted pair) to connect a Fast EtherWORKS PCI adapter at 10/100 Mb/s to another Fast EtherWORKS PCI adapter at 10/100 Mb/s (DTE to DTE).
- **BN28Q-xx** — Category 5 100-ohm screened twisted-pair (ScTP) office cable with crossover (8-conductor, 4-twisted pair) to connect a Fast EtherWORKS PCI adapter at 10/100 Mb/s to another Fast EtherWORKS PCI adapter at 10/100 Mb/s (DTE to DTE).

Connecting Cables for the 100Base-FA Adapter

The following DIGITAL series of 100BaseFX fiber-optic cable is supported for DE500-FA connections:

- **BN34A** — ST to SC multimode dual fiber-optic cable designed with two ST connectors on one end and two SC push-pull connectors on the other end to connect a Fast EtherWORKS PCI 10/100 adapter (DE500-FA) to an office wall plate or another active device. The connectors at each end of the cable have a red and black boot to identify the transmit and receive signal path.
- **BN34B** — SC to SC multimode dual fiber-optic cable designed with SC connectors on both ends to connect a Fast EtherWORKS PCI 10/100 adapter (DE500-FA) to an office wall plate or another active device. The connectors at each end of the cable have a red and black boot to identify the transmit and receive signal path.

Refer to the *OPEN DECconnect Applications Guide* (PN EC-G5854-42) for more information about network configuration, planning, and cabling.

Other DIGITAL Network Products

The Fast EtherWORKS PCI 10/100 adapter is part of a complete family of low-cost network adapters, switches, and boot ROMs developed by Digital Equipment Corporation. Other products are listed in Table B-5.

Table B-5 Other Products

Product	Order Number	Description
EtherWORKS Switch 8T/TX	DEL8X-AA (U.S., Japan, Canada power cord)	Provides eight 10/100 Mb/s 8-pin MJ ports and one daisy-chain port to connect to a subnetwork or directly to a PC, server, or workstation.
EtherWORKS Switch 6T/2TX	DEL6X-AA (U.S., Japan, Canada power cord)	Provides five 10 Mb/s 8-pin MJ ports and one 10 Mb/s combination port to connect to a PC, server, or workstation, and two 8-pin 100 Mb/s Fast Ethernet ports for connection to a backbone or server.
EtherWORKS Switch 2T/TX	DEL2X-AA (U.S., Japan, Canada power cord)	Provides two 10/100 Mb/s 8-pin MJ ports to connect to a subnetwork or directly to a PC, server, or workstation.
EtherWORKS Hub 8TX Repeater	DELXR-AA (U.S., Japan, Canada power cord)	Provides eight 100 Mb/s 8-pin MJ ports to connect to a PC or workstation, and one daisy-chain port to connect to another compatible repeater.

(continued on next page)

Table B-5 (Cont.) Other Products

Product	Order Number	Description
EtherWORKS ISA PnP 10	DE305-AA (U.S., Japan, Canada power cord)	Provides twisted-pair, thickwire AUI, and ThinWire BNC connectors that support industry standard Plug and Play technology. Also provides the 1Step utility program to configure and diagnose your network.
EtherWORKS Turbo PCI 10 Adapter	DE450-CA, DE450-TA	Provides capability to integrate PCI-compatible systems using twisted-pair, AUI, or ThinWire cables to 10 Mb/s Ethernet networks.
EtherWORKS 3 Turbo Adapter	DE204, DE205	Provides capability to integrate ISA/EISA-compatible systems using twisted-pair, AUI, or ThinWire cables to 10 Mb/s Ethernet networks.
EtherWORKS PCMCIA Turbo Adapter	DEPCM-AA, DEPCM-BA	Provides a credit card sized adapter link for laptop and notebook PCs to a 10 Mb/s Ethernet networks.
DEC FDDIcontroller /PCI Adapter	DEFPA-*B	Provides direct connection of industry-standard computers with a PCI I/O bus to 100 Mb/s FDDI networks. The single-mode fiber (SMF) versions of the DEFPA (-SB, -WB, -FB, and -HB) are also available.

(continued on next page)

Table B-5 (Cont.) Other Products

Product	Order Number	Description
DEC FDDIcontroller /EISA Adapter	DEFEA-*A	Provides direct connection of industry standard computers with EISA I/O bus to 100 Mb/s FDDI networks. The single-mode fiber (SMF) versions of the DEFEA (-SB, -WB, -FB, and -HB) are also available.
DE45x-AR Remote Boot ROM	DE45D-AR, DE45F-AR	The DE45D enables you to perform a remote boot using MOP or RPL protocols when installed on an EtherWORKS Turbo PCI 10 (DE450) adapter. The FLASH version (DE45F) uses MOP, RPL, NetWare, and BOOTP protocols.
DE20M-AR Remote Boot ROM	DE20M-AR	Enables you to perform a remote boot using MOP or RPL protocols when installed on an EtherWORKS 3 Turbo adapter.

To order these products, contact an Authorized DIGITAL Distributor or DIGITAL sales representative. For more information, call 800-457-8211 in the U.S. and Canada, 508-692-2562 in other locations, or your local sales office.

C

PCI BIOS Setup Utility

Some earlier PCI systems contain a PCI BIOS Setup utility that enables you to select and permanently store information about the computer's hardware and software in the battery-backed memory of the CMOS RAM. This information is used each time the computer is booted and can be changed each time you run the Setup utility.

When you invoke the BIOS Setup utility, perform the following steps for each PCI slot that contains a Fast EtherWORKS 10/100 adapter:

1. Enable the PCI slot.
2. Assign an IRQ number.
3. Enable bus mastering.

Table C-1 lists typical PCI option settings and the requirements for the Fast EtherWORKS PCI 10/100 adapter. On later PCI plug-and-play systems, the PCI BIOS automatically configures the adapter, so there is no user action needed.

Table C-1 Fast EtherWORKS PCI 10/100 Option Settings

This setting . . .	Allows you to . . .	Fast EtherWORKS PCI 10/100 Requirements
Enable/disable device	Enable or disable each PCI slot.	PCI slot must be enabled.
IRQ	Set an IRQ default for each PCI slot (none or any valid IRQ).	Any valid nonconflicting IRQ.
Enable master	Enable bus mastering on a PCI slot.	PCI slot must be enabled for bus mastering. ¹
Latency timer	Set the PCI latency timer (in PCI clocks) for each PCI device.	All settings supported.

¹Some PCI computers have a slot that does not support bus mastering. Make sure that the Fast EtherWORKS 10/100 adapter is installed in a PCI slot that has bus mastering capabilities.

Note

Check the device driver README files to make sure the drivers you install support shared interrupts.

D

Fast Ethernet Technology

Introduction

The increased performance and capacity of personal computers along with the availability of cost-effective, high-resolution peripherals have fueled the development of high-performance, data-intensive applications such as graphical user interfaces, computer-aided engineering, computer-aided training, groupware, image processing, document management, network resource libraries, and multi-media.

The effective utilization of these new, high-performance systems at the desktop demands new low-cost, high-performance LAN interface technologies. The computer LAN industry has responded with several new technologies to address price, bandwidth, and availability. These include:

- FDDI (shared and switched, with/without full duplex)
- Fast Ethernet (100BaseTX/FX/T4–shared and switched access, with/without full duplex)
- ATM
- 100VG-AnyLan

Of all of these technologies, Fast Ethernet (100BaseT), is a technology that can be integrated into current 10BaseT LANs and allow them to scale easily to 100 Mb/s. Fast Ethernet provides higher bandwidth without a major change in infrastructure and will be supported on every major platform, delivering an excellent business solution to the increasing requirements for bandwidth on the LAN.

Advantages of Fast Ethernet

The key advantages of the Fast Ethernet are as follows:

- High performance
- Standards-based technology
- Cost-effective migration
- Vendor support

High Performance

One of the compelling reasons to choose Fast Ethernet for work groups is the ability to handle both the aggregate demands of multiple LAN users and the peak traffic created by today's high-performance PCs and sophisticated bandwidth-intensive applications. When high burst rates are key, Fast Ethernet is the right work group solution.

Standards-Based Technology

The standard for Fast Ethernet technology is being set by the Institute of Electrical and Electronics Engineers (IEEE) 802.3 Committee, the same committee that developed the original Ethernet standard. This technology is designed to be the most direct and simple evolutionary extension of 10BaseT Ethernet. The key to its simplicity is Fast Ethernet's use of proven Carrier Sense Multiple Access /Collision Detection (CSMA/CD) protocol, defined in the Ethernet Media Access Control (MAC) layer.

The 100BaseT MAC is a scaled up version of the MAC used in 10 Mb/s Ethernet. In other words, 100BaseT is conventional Ethernet, only faster. It has the same reliable, robust, and economical technology that users rely on today.

Additionally, both technologies can be offered with shared or switched Ethernet connections. Shared environments provide a total of 10 or 100 Mb/s to all stations attached to a hub. They are ideal for a medium size work group with occasional peak bandwidth demands. Shared Ethernet delivers the bandwidth at very low cost.

Cost-Effective Migration

The seamless compatibility between 10BaseT and 100BaseTX allows easy migration to high-speed connects. Migration is simple and economical in many important areas:

- **LAN cabling** — 100BaseT media specifications (100BaseTX, 100BaseFX, and 100BaseT4), enable Fast Ethernet to run on the most common Ethernet wiring including Categories 3, 4, and 5 unshielded twisted-pair (UTP), 100-ohm screened (ScTP) twisted-pair, and fiber.
- **Administrative expertise** — Managers can rely on familiar network analysis tools and procedures in 100BaseT environments. Administrative information translates easily from 10 Mb/s Ethernet to Fast Ethernet networks, which means minimal retraining of MIS support staff. Administrators as well as system integrators already know the technology, cabling, protocols, and software used in 100BaseT networks.
- **Management software** — Fast Ethernet LANs can be managed with existing Simple Network Management Protocol (SNMP) management application software and today's Ethernet management information bases (MIBs).
- **Software support** — Application and networking software will function unchanged on 100BaseT LANs.
- **Flexible migration** — Automatic speed selection where adapters can run at either 10 or 100 Mb/s on existing wire ensures nondisruptive transition to Fast Ethernet. Similarly, 10/100 Mb/s Ethernet switching hubs will enable smooth migration to Fast Ethernet in the wiring closet.

Vendor Support

Fast Ethernet enjoys the support of the largest number of network adapters, network systems, and systems' vendors. The extensive multivendor support will ensure the development of a wide range of interoperable products at very competitive prices. The result: Fast Ethernet will offer the lowest price of all 100 Mb/s technologies for migrating 10 Mb/s Ethernet to higher bandwidth.

Summary

Although not all users require 100 Mb/s network performance to the desktop today, many LAN intensive applications already push the limits of existing 10 Mb/s LANs, and can benefit from 100 Mb/s technology now. Emerging data-intensive applications and technologies (such as multimedia, groupware, imaging, and client-server databases) will soon make 100 Mb/s networking a critical part of most LANs. Meanwhile, as network servers become more powerful, they are being relocated from local connections to the data center, where they need 100 Mb/s high-speed connections to the network backbone to provide cost-effective, centralized performance.