digital™

DEC EtherWORKS *EISA* Owner's Manual

EK-DE422-OM. B01

Digital Equipment Corporation

FCC ID: AO9-DE422

FCC NOTICE: This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) this device may not cause harmful interference, and (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.

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:

– Re-orient 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

The use of unshielded Ethernet cables on ThinWire ports with this equipment is prohibited due to non-compliance with FCC regulations for a Class B computing device pursuant to Part 15 of FCC Rules.

BENUTZERHINWEIS: Das DEC EtherWORKS EISA-Modul in Verbindung mit EISA Personalcomputersystemem entsprechen den Funkentstöranforderungen der DBP-Verfugung 523/69 und VDE0871 Grenzwertklasse B.

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Preface

The DEC EtherWORKS *EISA* board is a personal computer option module that enables you to integrate various EISA compatible personal computers into a network, using either ThinWire or Twisted-Pair Ethernet cables.

This manual shows you how to install and configure the *EISA* board. You should be able to prepare an EISA compatible personal computer and an *EISA* board for use on a network. This manual describes how to change the board configuration for use with ThinWire or Twisted-Pair Ethernet networks.

You do not have to know a lot about computers to install the *EISA* board. You need to understand the basic concepts and uses of Ethernet networks, and be familiar with personal computers. For more information about compatibility of the board with your computer, see your system administrator.

This manual is organized as follows:

- Chapter 1 contains information about board configuration.
- Chapter 2 contains installation instructions.
- Chapter 3 contains problem solving information.
- Appendix A provides information about hardware and software features.
- Appendix B provides cabling requirements.

This document uses the following conventions:

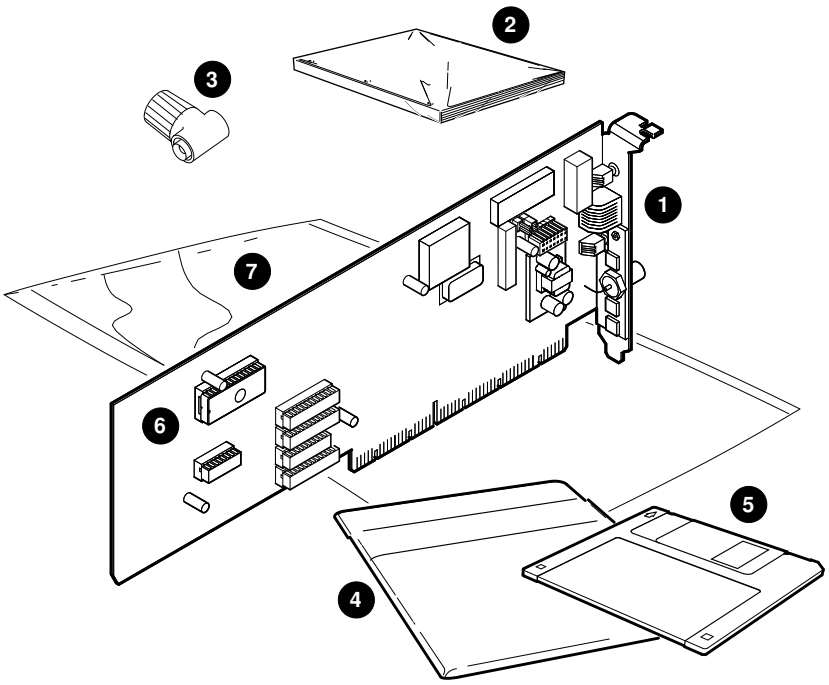
Convention	Meaning
NOTE	Provides general information.
PN	Part Number.
❶	A number in a black circle in text refers to the corresponding number in an accompanying illustration.
Alt	A word in a box indicates a key. For example, Alt means to press the Alt (on some keyboards the "Compose Character") key.
MB1, MB2, MB3	On a three button mouse, MB1 indicates the left mouse button, MB2 indicates the middle mouse button, and MB3 indicates the right mouse button.

Product Kit Contents

Before you install the *EISA* board, verify that you have the following components, shown in Figure 1.

- The DEC EtherWORKS *EISA* Board ❶, packaged in an anti-static bag ❼
- Owner's manual ❷
- BNC T-Connector ❸
- Installation diskette (5¼ inch) ❹
- Installation micro-diskette (3½ inch) ❺
- ROM ❻

Figure 1 Product Kit (PN DE422-SA)



CAUTION

Static electricity can damage printed circuit boards and chips. It is strongly recommended that you use a grounded wrist strap and grounded work-surface-to-earth ground when working with these components.

1
Configuration

1.1 Introduction

The DEC EtherWORKS *EISA* board has a Configuration Utility you must run before installing the board. This utility allows you to configure the board so it will operate without interference from the other boards in your computer.

This chapter describes how to run the Configuration Utility using the installation diskette included in the product kit. Before you begin, make a copy of the diskette as a backup.

NOTE

It is possible to install the board before you run the Configuration Utility, but you receive a system error on the terminal screen when you boot your system. (See Chapter 2 for the installation procedure, if you wish to install the board first.)

1.2 The Configuration Utility

The *EISA* board settings (called *default* settings) are already configured to correspond to the needs of most users. If they do not meet your needs, you must use the on-line Configuration Utility to change them. Figure 1–1 shows an overview of the system configuration.

1.2.1 Accessing the Utility

To access the Configuration Utility, use this next procedure.

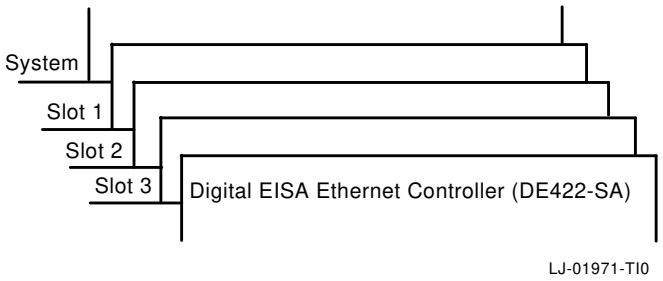
1. Load the diskette that contains the *EISA* system configuration (!DEC4220.CFG) software, and copy the .CFG file to the directory that contains all the configuration files in the system.
2. Set the system to the drive being used.
3. Type `SD` at the prompt.

   This command displays the Set Up menu.
4. Select the `Basic Configuration` option from the Setup menu using either MB1 or the keyboard arrow keys.
5. Select the slot, using either MB1 or the keyboard arrow keys, where you plan to place the board.

   The configuration menu for your board should now appear.
6. Choose to either keep the default settings, or to change them, as described in Section 1.4.
7. Exit the Configuration Utility by typing ~~ | Alt | S |.

   If you select **Save** at the prompt, you save the settings you have changed. They remain the same unless you re-enter the Configuration Utility and change them.

Figure 1–1 System Configuration Overview



1.3 Menu Choices

Using the Configuration Menu, you can choose to set the *EISA* board to specific settings for:

- Network interface
- Network interrupt
- I/O memory address
- Network controller buffer
- Remote boot
- Remote boot time-out

If you do not know the settings for the other boards check with your system administrator for a list of the settings.

If you configure the board to the correct setting, and a conflict occurs, you need to change the setting on the board. This is described in Section 1.4.

NOTE

If the board is set to use a setting that another installed board uses, your computer or other boards may not operate correctly when you boot the system.

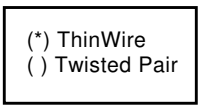
1.4 Changing Settings

This section describes how to change the settings on the *EISA* board using the Configuration Menu.

1.4.1 Network Interface

If the network interface selection is changed, then the Network Select jumper on J1 **must** be changed manually.

Figure 1–2 Network Interface



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1.4.2 Network Interrupt

You use the Configuration Utility to select an interrupt request line (IRQ). The board uses one IRQ line for the network interface (NI). By default, this is set to IRQ5. IRQ9, IRQ10, and IRQ11 are also available. The Configuration Utility displays an error if you try to set the IRQ to that of an existing board.

Figure 1–3 Network Interrupt

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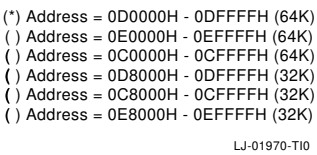
1.4.3 Network Controller Buffer

You use the Configuration Utility to set the memory buffer address range and size. There are two selectable buffer modes.

- 64 KB
- 32 KB

By default, the memory address range is set to 64-KB mode (Figure 1–4).

Figure 1–4 Network Controller Memory Size Assignment

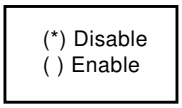


Only one board can be set to use a given memory address range. Check the documentation supplied with your personal computer and other boards to determine memory address requirements. If other boards in your computer use memory ranges that conflict with one of these ranges, select a range that is not used.

1.4.4 Remote Boot

This menu choice determines whether the remote boot feature is enabled or disabled. By default, remote boot is disabled.

Figure 1–5 Remote Boot Enable/Disable



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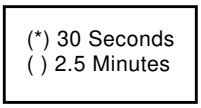
1.4.5 Remote Boot Time-out

This menu selection controls the time-out period for trying to enable a remote boot operation. By default, this is set to 30 seconds.

Figure 1–6 Remote Boot Time-Out



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1.5 Default Settings

The *EISA* board software is preconfigured to work in most installations. The default settings are summarized in Table 1–1.

Table 1–1 Default Settings

Menu	Default Setting
Network Interface	ThinWire
Network Interrupt	IRQ5
Network Controller Buffer	Address = 0D0000H - 0DFFFFH (64K)
Remote Boot	Disabled
Remote Boot Time-out	30-seconds

2
Installation

2.1 Introduction

This chapter describes how to install the DEC EtherWORKS *EISA* board into an EISA compatible personal computer. The only tool you need is a screwdriver. Before you begin, run the Configuration Utility as described in Chapter 1. If you have not run the Configuration Utility you receive an error message when you boot your system.

2.2 Preparing Your Computer System

Use the following procedure to prepare your personal computer. The illustrations in this manual show a compatible personal computer.

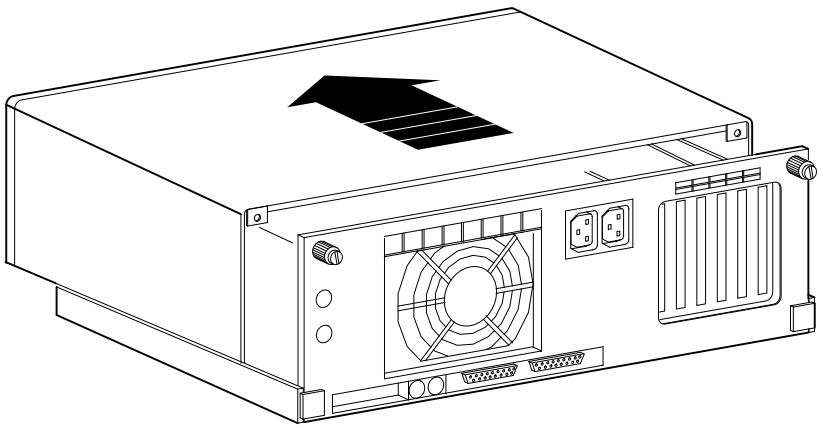
CAUTION

Static electricity can damage printed circuit boards and chips. It is strongly recommended that you use a grounded wrist strap and grounded work-surface-to-earth ground when working with these components.

1. Remove any diskettes from the diskette drives.
2. Set all power switches to O (off).
3. Unplug the power cord from the wall socket, then disconnect the cord from the rear of the system unit.

4. Unplug the keyboard connector from the rear of the system unit.
5. Disconnect any option cables and the monitor cable from the rear of the system unit.
6. Remove the screws from the rear of the system unit (Figure 2–1).
7. Slide the cover toward the front of the system unit until the cover is free.

Figure 2–1 Removing the System Unit Cover



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2.3 Selecting the Network Interface

The *EISA* board has a *shunting plug* (❶, Figure 2–2) on the J1 connector that lets you determine how the board interfaces with the network—either ThinWire or Twisted-Pair Ethernet networks. The board has the setting preselected for the ThinWire Ethernet network.

You may need to change the shunting plug setting before you install the board in your computer.

Table 2–1 summarizes the settings and Figure 2–2 shows the settings for the shunting plug.

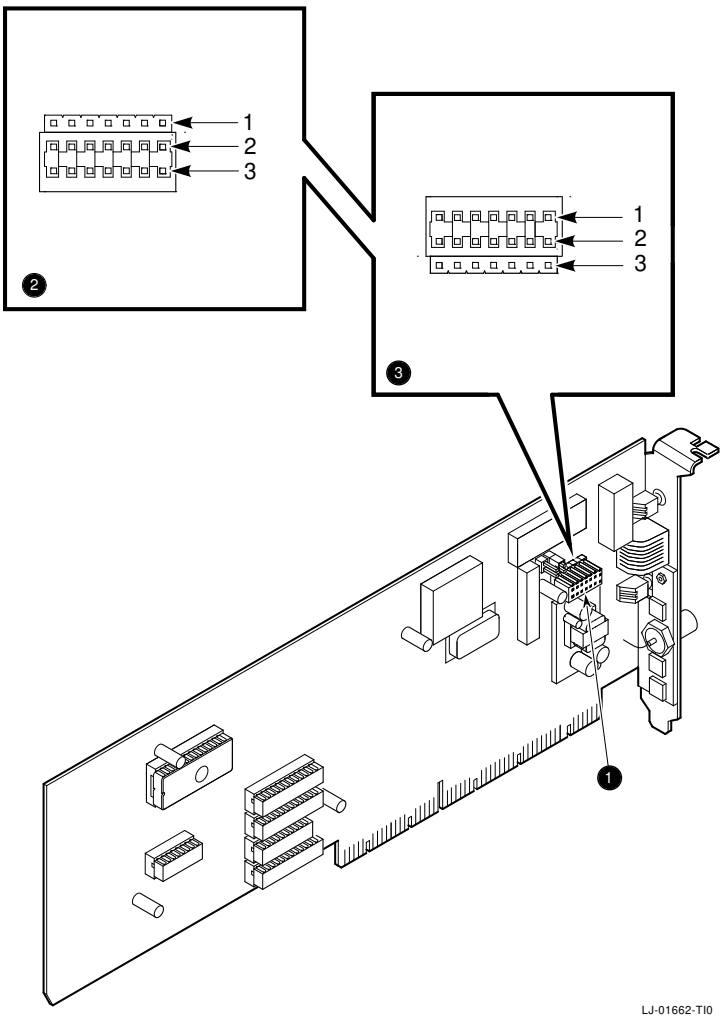
Table 2–1 Shunting Plug Settings

If you Want To ...	Then ...
Connect to a ThinWire Ethernet network ❷	Leave the shunting plug in the position connecting pin rows 2 and 3 (*default setting*).
Connect to a Twisted-Pair Ethernet network ❸	Move the shunting plug to connect pin rows 1 and 2.

CAUTION

Static electricity can damage printed circuit boards and chips. It is strongly recommended that you use a grounded wrist strap and grounded work-surface-to-earth ground when working with these components.

Figure 2–2 Selecting the Network Interface



2.4 Installing the *EISA* board

Use this next procedure to install the board.

1. Prepare your PC as described in Section 2.2.
2. Remove the option slot cover from the slot you plan to use (Figure 2–3). Be sure to use the slot cover that you specified while running the Configuration Utility in Chapter 1.

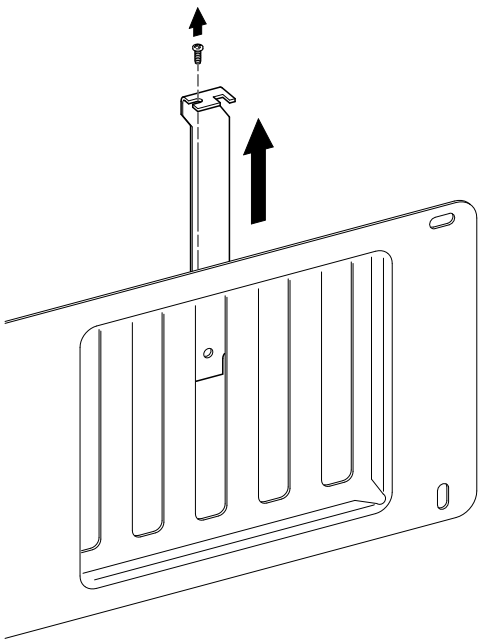
   Slide the slot cover out by removing the screws on the rear insert panel.

CAUTION

For safe operation, be sure there are no missing slot covers when you complete the installation.

Static electricity can damage printed circuit boards and chips. It is strongly recommended that you use a grounded wrist strap and grounded work-surface-to-earth ground when working with these components.

Figure 2–3 Removing the Slot Cover



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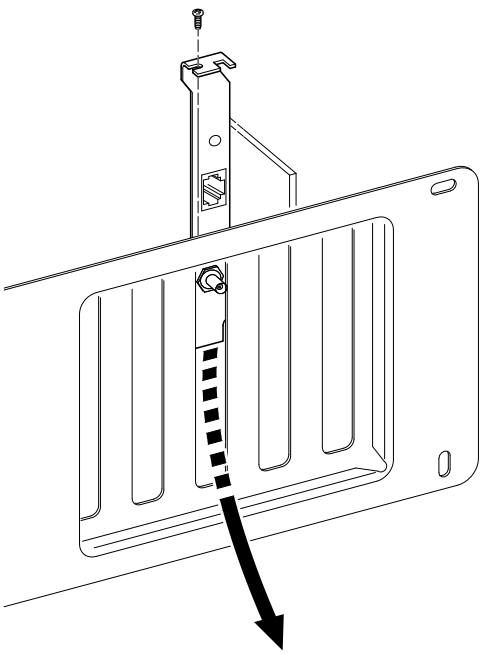
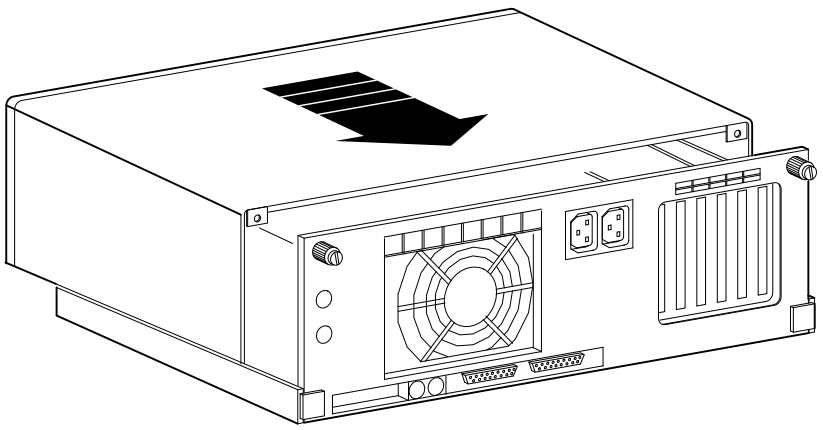
3. Place the board into the option slot (Figure 2–4).
4. Firmly press the board into place until it is securely seated.
5. Replace the screw on the slot cover.

Figure 2–4 Installing the Board



6. Replace the system unit cover (Figure 2–5).
   a. Slide the cover toward the rear of the system unit.
   b. Replace the screws at the rear of the system unit.

Figure 2–5 Replacing the Cover



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7. Reconnect all cables and connectors.
   a. Plug the keyboard connector into the rear of the system unit.
   b. Connect any option cables and the monitor cable to the rear of the system unit.
   c. Connect the power cord to the rear of the system unit, then plug the other end into the wall socket.

2.5 Running the Power Up Self-Test

If the *EISA* board contains a diagnostic ROM, a power up self-test runs automatically each time the computer is turned on or reset. There is no on-screen prompt or other information on the screen if the test runs correctly.

If an error code, such as DE422 88H, displays on the screen during the restart process, a self-test error has occurred. Note the error code and refer to Section 3.3.

NOTE

The amber LED on the module comes on during the self-test.

2.6 Connecting to a Network

Depending on how you configured the *EISA* board in Chapter 1, use one of the following procedures to connect your system to the network.

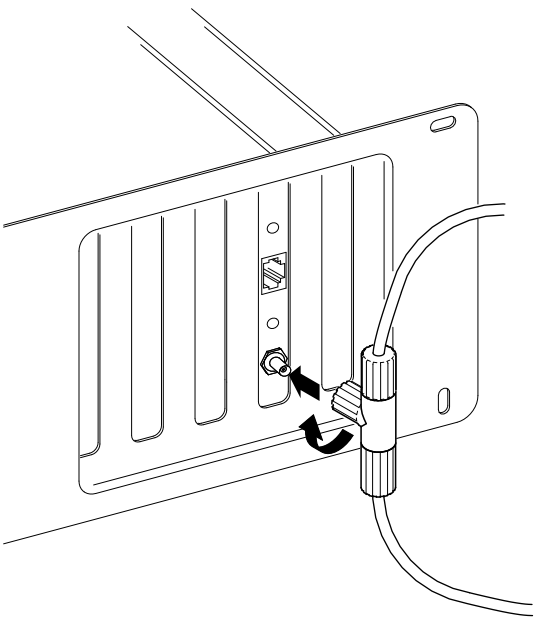
2.6.1 Connecting the Board to ThinWire Ethernet

1. Plug the ThinWire cable into the ThinWire Ethernet connector.
2. Push the Ethernet connector onto the BNC connector on the bottom of the board mounting bracket, then twist the Ethernet connector, locking it into place.

NOTE

When ThinWire is selected, the amber LED on the module comes on when the board detects Ethernet traffic.

Figure 2–6 Connecting To ThinWire Ethernet



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2.6.2 Connecting the Board to Twisted-Pair Ethernet

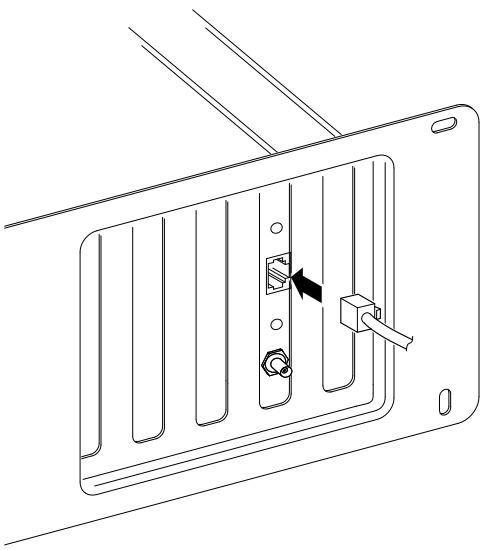
1. Plug the Twisted-Pair cable into the Twisted-Pair Ethernet socket (Figure 2–7).

   Push the Twisted-Pair cable connector into the connector on the board's mounting bracket until it clicks, locking it into place (Figure 2–7).

NOTE

When Twisted-Pair is selected, the green LED on the module comes one when the board detects link integrity or Ethernet traffic.

Figure 2–7 Connecting To Twisted-Pair Ethernet



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2.7 Installing the Software

Read the files named "README.TXT" and "RELEASE.NOT" on the installation diskette. These files contain the instructions for loading the *EISA* software drivers, release notes that you could find helpful for the installation, and how to configure your system.

3
Problem Solving

This chapter describes problems you could encounter with the DEC EtherWORKS *EISA* board and suggests possible causes and solutions.

3.1 Fault Isolation By Symptom

Table 3–1 describes how to isolate faults by the symptoms that are occurring.

Table 3–1 Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system is on, but there is no display.	The monitor is not on or it is not connected to the video board.	Be sure the monitor cable is firmly connected to the video board. Set the monitor power switch to ON.
	The board is not seated firmly.	Remove and reinsert the board **firmly** into the option slot (Section 2.3).

Table 3–1 (Continued) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
	The memory address setting is incorrect or is causing a conflict with another board.	Check the Configuration Utility set up. An address range conflict could exist between the board and another installed board.
	The board is preventing the computer from operating correctly.	Disconnect the ThinWire cable or the Twisted-Pair cable from the board. Turn the computer off then on again. If the problem persists, contact your system administrator or authorized service representative.
The system is on, but nothing happens. The green LED is on for longer than 30 seconds. The keyboard does not respond.	The board is preventing the CPU from operating correctly.	Disconnect the ThinWire cable or the Twisted-Pair cable from the board, then turn the computer off then on again.
	The memory address setting is incorrect or is causing a conflict with another board.	Check the Configuration Utility set up. An address range conflict could exist between the board and another installed board. If the problem persists, contact your system administrator or authorized service representative.

Table 3–1 (Continued) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system does not boot from the diskette.	The system diskette could be corrupted.	Check the Configuration Utility set up. See your system administrator for a bootable system diskette.
The system does not remote boot.	The board is not configured for remote boot.	Check the Configuration Utility set up.
	The default remote boot time out could be insufficient for a busy network.	Check the Configuration Utility set up.
	The Ethernet address is not registered for this address node.	Register the board. If the problem persists, contact your system administrator.
The system is on, but the network does not start. The green LED is off.	The network interface or remote boot is set incorrectly.	Check the shunting plug for the correct setting.
	The network cables are loose.	Check and secure all cables.
	A conflict exists with another board in the system:	
	• The IRQ settings are incorrect.	Check the Configuration Utility set up.

Table 3–1 (Continued) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
	• The I/O address or the memory address range is incorrect.	Check the Configuration Utility set up.
	The Ethernet address is not registered for this address node.	Register this board. If the problem persists, contact your system administrator.
The system is on and displays DE422 and a self-test code during system startup.	A possible problem exists with the board.	See Table 3–4. Press the F1 key to continue. Replace or reinsert the board and try starting the system again.
	The I/O address or the memory address range is set incorrectly, or is causing a conflict with another installed board.	Check the Configuration Utility set up. An address range conflict could exist between the board and another installed board.
	The error code could be a system error code.	See your system owner's manual for additional information. If the problem persists, contact your system administrator.

3.2 *EISA* Board LED Activity

The *EISA* board has two light emitting diodes (LEDs) that indicate operating status of the board. The next two tables describe the different states of the LEDs and their indications.

Table 3–2 Amber LED Activity

Activity	Cause	User Action
On for 20 seconds, then off	Normal during self-test.	None.
Stays on after 20 seconds	A fault has occurred and an error number displays on the screen.	See Table 3–4.

Table 3–3 Green LED Activity

Activity	Cause	User Action
On	Indicates that the link integrity signal is present.	None
Blinking	Normal. Indicates that the link integrity is correct and the Twisted-Pair RCV DATA line is receiving data.	None
Off	There is no receive data packet activity nor any link integrity signal.	If a problem exists receiving data, see Table 3–4 for other symptoms and recommended action. Verify that the repeater and the board are operating correctly and that the cabling is correct.

3.3 Recovering From Self-Test Errors

Self-test errors can occur at system startup. Table 3–4 lists the *EISA* board self-test error codes, their possible cause, and recommended action. To recover from some errors, try pressing the F1 function key to resume system operation.

NOTE

Although the board detects an error and is not operating, you can still use your personal computer.

Table 3–4 Self-Test Error Codes

Error	Description	Recommended Action
80H	Memory access conflict	Check the Configuration Utility set up for a conflict with another board.
81H	Data path error	Check the Configuration Utility set up for a conflict with another board. If the problem continues, call your Digital authorized service representative.
82H	Address test conflict	Check the Configuration Utility set up for a conflict with another board.
83H	RAM test conflict	Check the Configuration Utility set up for a conflict with another board.
84H	Ethernet ROM CRC error	Check the Configuration Utility set up for a conflict with another board. If the problems continues call your Digital authorized service representative.
85H	NI_CSR error	Call your Digital authorized service representative.
86H	LANCE internal register error	Check the Configuration Utility setup.

Table 3–4 (Continued) Self-Test Error Codes

Error	Description	Recommended Action
87H	LANCE initialization error	Call your Digital authorized service representative.
88H	LANCE interrupt error	Check the Configuration Utility set up.
89H	NI_CSR mask test error	Call your Digital authorized service representative.
8AH	LANCE internal loopback error	Call your Digital authorized service representative.
8BH	LANCE collision error	Call your Digital authorized service representative.
8CH	LANCE CRC error	Call your Digital authorized service representative.
8DH	Swap RAM test error	Call your Digital authorized service representative.
8EH	Shadow RAM enable error	Call your Digital authorized service representative.
8FH	Multiple IRQ error	Check the Configuration Utility set up for a conflict with another board. If the problem continues, call your Digital authorized service representative.
90H	Cannot distinguish card type	Call your Digital authorized service representative.
91H	Hi MEM test error	Call your Digital authorized service representative.

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A
General Information

A.1 Introduction

The DEC EtherWORKS *EISA* board lets you integrate compatible personal computers into a network. After installing an *EISA* board, you can use various network software products to integrate the computer into a network.

You can connect the board to either a Twisted-Pair network or a ThinWire network. You cannot, however, connect the board to both kinds of networks at the same time.

A.2 Physical Description

The board is an EISA form-factor printed circuit board that uses the full 32-bit bus data path interface.

The board measures 11.05 cm (4.42 in) x 30 cm (12 in), and is constructed using four-layer circuit card technology with two signal layers, two power/ground layers, and 6/10-mil circuit etch.

A.2.1 Functional Components

The major functional components on the board are:

- EISA bus interface and support registers
- Ethernet network protocol controller (LANCE)
- 10BaseT Twisted Pair Ethernet (RJ45 connector) network interface
- 10Base2 ThinWire Ethernet (coax) network interface
- 32-bit wide 128 KB Network buffer RAM
- Diagnostics and network remote boot firmware ROM (optional)
- Ethernet address ROM

A.2.2 LEDs

There are two light emitting diodes (LEDs) on the mounting bracket that display the operating status of the board. The amber LED comes on during power-up testing and stays on if the test discovers a fault. The green LED, when on, indicates normal network activity. Chapter 3 contains additional information about the LEDs.

A.2.3 Environmental Requirements

The environmental (temperature and humidity) requirements for the board are the same as for your personal computer.

A.3 System Specifications

Table A–1 lists the system specifications of the *EISA* board.

Table A–1 System Specifications

Memory Buffer Size	**Memory Addressing Range**[1]
64 KB	0D0000H—0DFFFFH 0E0000H—0EFFFFH 0C0000H—0CFFFFH
32 KB	0D8000H—0DFFFFH 0C8000H—0CFFFFH 0E8000H—0EFFFFH
I/O Address Assignments	
I/O	0ZC00-0ZC0F[2] 0ZC80-0ZC84[2]
Interrupt Request	**Available Selections**
Interrupt request (IRQ) line	IRQ5 (default), IRQ9, IRQ10, IRQ11
Power Requirements:	**Twisted-Pair: 12 watts (maximum)** **ThinWire: 15.6 watts (maximum)**
DC Amps @ +5V: 2.4 A (maximum)	
DC Amps @ +12V: 0.30 A (maximum)	
Bus Loads: 1 FTTL	
PC Operating Environment	
Temperature (at sea level)	15° - 32° C (59° - 90° F)

[1]Some PCs do not support the E0000 - EFFFF or E8000 - EFFFF address ranges; check your PC manual for this information.

[2]The "Z" indicates the number of the slot.

Table A–1 (Continued) System Specifications

PC Operating Environment	
Relative humidity	8% to 80% (non-condensing)
Radiated emissions	FCC Class B VDE Class B

CAUTION

When adding any boards to your computer, verify that the combined power (wattage) required for all boards in your computer does not exceed the power supply rating. Check your PC documentation for this information.

B
Cable Specifications

B.1 Cabling Requirements

Make sure you have a cable to connect the DEC EtherWORKS *EISA* board as planned. You need to consider the following types of cable connections:

- Twisted-Pair cable—such as PN BN24F, BN25G, or BN26K.
  - — BN24F - Unshielded Twisted-Pair office cable with crossover (4-conductor, 2-twisted pair) to connect a DE422 to another DE422, or a DE422 to an office plate from a DECrepeater 350.
  - — BN25G or BN26K - Point-to-point unshielded Twisted-Pair patch cable to connect a DE422 to an office plate from a DECrepeater 90T.
- ThinWire cable—such as PN BNE4G-02, and a ThinWire T-Connector such as H8223-00/CDA, and a ThinWire terminator such as H8225-00/CDA, to connect the DE422 to the office wall plate or to DECrepeater 90C.

For configuration planning, refer to the *DECconnect System Planning and Configuration Guide* (PN EK-DECSY-CG).

B.1.1 Unshielded Twisted-Pair Cable Requirements

Requirement	Description
Wire specification	22-24 gauge wire, solid copper
Cable supported	DECconnect Twisted-Pair data cable, AT&T Type C or D, IBM Type 3, or Northern Telecom 4 pair unshielded Twisted-Pair cable
Cable length	90 m (296 ft) typical maximum from wiring closet or Satellite Equipment Room to office.
DC Resistance per conductor, maximum	.094 Ω/m (28.6Ω/1000 ft)
Impedance at 5 MHz	100Ω

B.1.2 Card Connector Pinning (RJ45)

If you are using your *EISA* board to connect 10BaseT Twisted-Pair networks, the connector has the following pin signals. (See Figure B–1).

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)
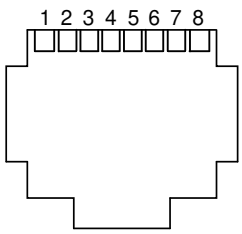
Figure B–1 RJ45 Connector (Front View)