FCC ID: AO9-DE210

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.

This device complies with Part 15 of 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.

BENUTZERHINWEIS: Das DEC EtherWORKS *MC*-Modul in Verbindung mit IBM PS/2 Personalcomputersystemem entsprechen den Funkentstöranforderungen der DBP-Verfugung 523/69 und VDE0871 Grenzwertklasse B.

This document was prepared using VAX DOCUMENT, Version 2.0.

DEC EtherWORKS *MC*

Owner's Manual

Order Number: EK-DE210-OM. D01

Digital Equipment Corporation
maynard, massachusetts

Fourth Edition, September 1992

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

© Digital Equipment Corporation 1990, 1991, 1992.

All Rights Reserved.
Printed in Taiwan

The following are trademarks of Digital Equipment Corporation: DEC EtherWORKS, ThinWire, and the Digital logo.

IBM and PS/2 are registered trademarks of International Business Machines, Inc.
AT&T is a registered trademark of American Telephone & Telegraph Company.

This document was prepared using VAX DOCUMENT, Version 2.0.

Contents

Preface vii

1 Installing and Configuring

1.1 Introduction 1–1
1.2 Preparing Your IBM PS/2 System 1–2
1.3 Selecting the Network Interface 1–4
1.4 Installing the *MC* Board 1–6
1.5 Configuring the *MC* Board 1–11
1.5.1 Configuring Board Settings 1–11
1.6 Connecting to a Network 1–12
1.6.1 Connecting to ThinWire Ethernet 1–12
1.6.2 Connecting to ThickWire Ethernet 1–14
1.7 Installing the Software 1–15

2 Problem Solving

2.1 Introduction 2–1
2.2 Fault Isolation By Symptom 2–2
2.3 Recovering From Self-Test Errors 2–5

A General Information

A.1 Introduction A–1
A.1.1 Physical Description A–2
A.1.2 Functional Components A–2
A.1.3 Specifications A–2

B Installing an Option ROM

B.1 Introduction B–1
B.2 ROM Installation Procedure B–2

C Cable Specifications

C.1 Cabling Requirements C–1
C.1.1 Unshielded Twisted-Pair Cable Requirements C–2
C.1.2 Card Connector Pinning (RJ45) C–2

Figures

1 Product Kit (PN DE210-AB) ix
1–1 Removing the System Unit Cover 1–3
1–2 Selecting the Network Interface 1–5
1–3 Removing Option Slot Cover 1–7
1–4 Installing the DEC EtherWORKS *MC* Board 1–8
1–5 Replacing the Screws and Cover 1–10
1–6 Connecting To a ThinWire Ethernet Network 1–13
1–7 Connecting To a ThickWire Ethernet Network 1–14
B–1 DEC EtherWORKS *MC* ROM Installation B–3
C–1 RJ45 Connector (Front View) C–3

Tables

1–1	Decision Table for Moving the Shunt Connector	1–4
2–1	Fault Isolation By Symptom	2–2
2–2	DEC EtherWORKS *MC* Self-Test Codes	2–5
A–1	System Specifications	A–2

Preface

The DEC EtherWORKS *MC* board is a communications option for IBM PS/2 personal computers that have a Micro Channel bus.

This manual describes how to install and configure the *MC* board. The installation diskette has an automatic configuration feature to help you with the installation.

Using this manual, you should be able to prepare an IBM PS/2 personal computer and an *MC* board for use on a Digital network. This manual describes how to change the board configuration for use with ThinWire or ThickWire Ethernet networks. To install the board, you need to understand the basic concepts and uses of Ethernet networks, and be familiar with personal computers.

For more information about the IBM PS/2, see the technical reference manual or similar documentation for your system.

This manual is organized as follows:

- Chapter 1 explains how to install and configure the board.
- Chapter 2 contains problem solving information.
- Appendix A provides the hardware and software specifications.
- Appendix B explains the ROM installation procedure.
- Appendix C provides the cabling requirements.

This document uses the following conventions:

Convention	Meaning
Caution	Provides information to prevent damage to equipment.
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.

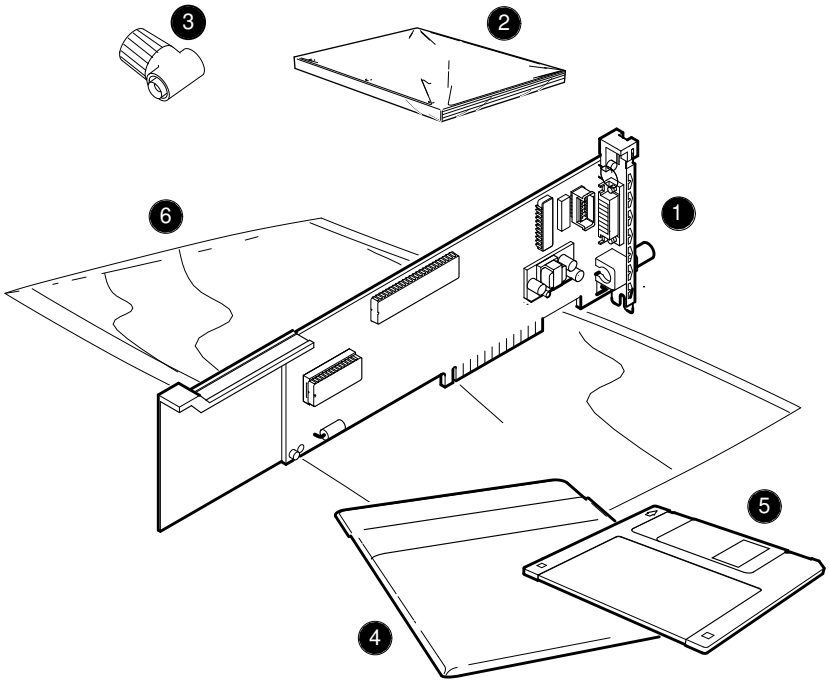
Before you install the board, be sure you have the following components, shown in Figure 1.

- The DEC EtherWORKS *MC* Board ❶ packaged in an anti-static bag ❻
- *DEC EtherWORKS MC Owner's Manual* ❷
- T-Connector ❸
- Installation diskette (5¼ inch) ❹
- Installation micro-diskette (3½ inch) ❺

Note

If your board does not have a ROM ❼ in the location shown in Figure 1, refer to Appendix B.

Figure 1 Product Kit (PN DE210-AB)



Caution

Static electricity can damage printed circuit boards and chips. A grounded wrist strap and grounded work-surface-to-earth ground must be used when handling these components.

1

Installing and Configuring

1.1 Introduction

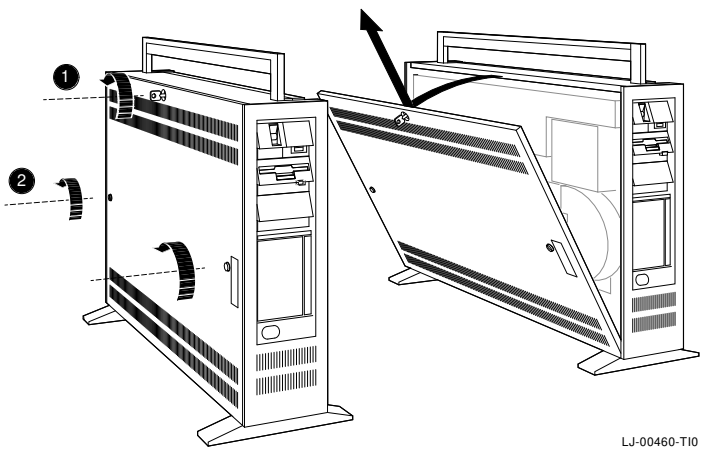
This chapter describes how to install and configure the DEC EtherWORKS *MC* board in your personal computer. Before you begin, you should make a copy of the diskette you need to use from the DEC EtherWORKS *MC* kit.

1.2 Preparing Your IBM PS/2 System

Prepare your IBM PS/2 system before installing the *MC* board and other network integration kit components (Figure 1–1). The following illustrations show an IBM PS/2 Model 80. For other personal computers, you can use the same procedure with only minor modifications.

1. Remove any diskette(s) from the diskette drive(s).
2. Set all power switches to 0 (off).
3. Unplug the power cord from the wall socket, then disconnect all cables from the rear of the system unit.
4. If the cover is locked, use the key ❶ to unlock it.
5. Loosen the two large screws ❷ from the side of the system unit.
6. Pull the cover away from the system unit and lift it out of the grooves on the pedestal.

Figure 1–1 Removing the System Unit Cover



1.3 Selecting the Network Interface

The *MC* board has a *shunt connector* ❶ (Figure 1–2) that lets you determine how the IBM PS/2 computer interfaces with the network—either a ThinWire or ThickWire network. The connector should be preselected for ThinWire Ethernet networks.

You may need to change the setting before you install it in an IBM PS/2 computer. The shunt connector, J3, has a 3-pin jumper arrangement.

Table 1–1 summarizes the settings and Figure 1–2 shows the settings.

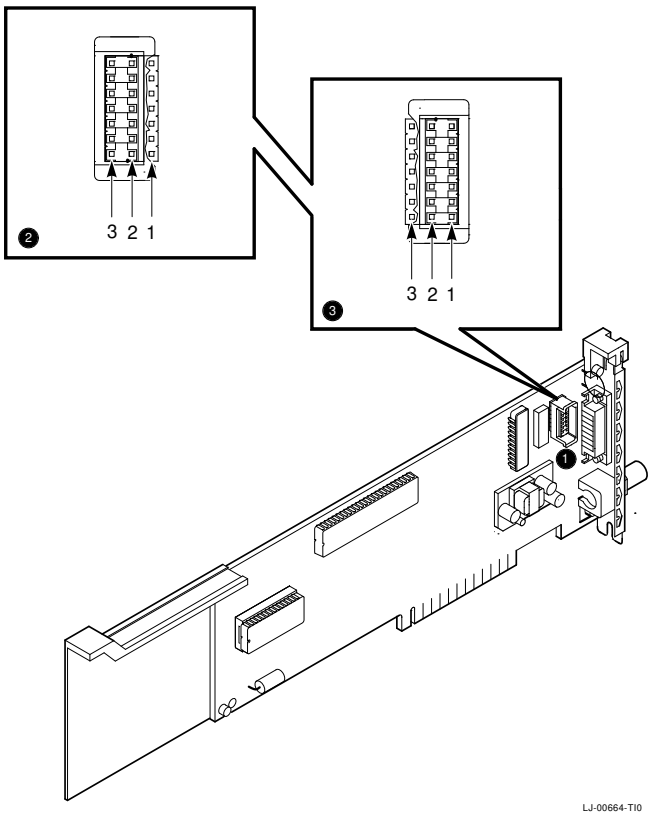
Table 1–1 Decision Table for Moving the Shunt Connector

IF You Want To...	Then...
Connect to a ThinWire Ethernet network ❷	Move the shunt connector away from the mounting bracket, thus connecting pin columns 2 and 3 (*default setting*).
Connect to a ThickWire Ethernet network ❸	Move the shunt connector towards the mounting bracket to connect pin columns 1 and 2.

Caution

Static electricity can damage printed circuit boards and chips. A grounded wrist strap and grounded work-surface-to-earth ground should be used when handling these components.

Figure 1–2 Selecting the Network Interface



1.4 Installing the *MC* Board

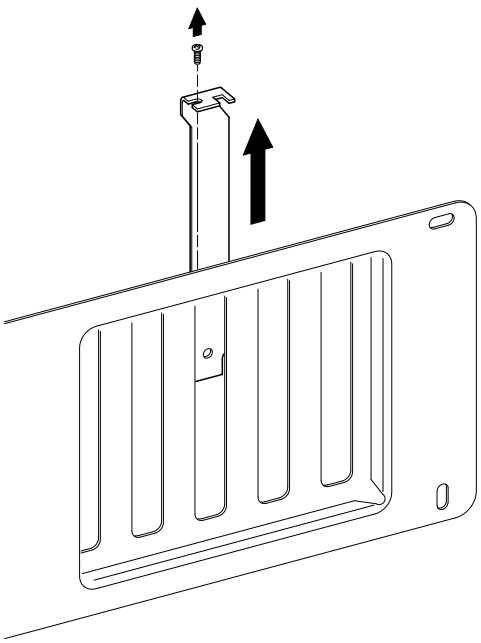
Use this next procedure to install the board.

1. Prepare your IBM PS/2 as described in Section 1.2
2. Remove only the option slot cover from the slot you plan to use.

   Loosen the thumbscrew from the option slot (Figure 1–3) and then remove the slot cover.
3. Place the board in the option slot (Figure 1–4).

   Tip the board inward toward the rear of the system unit to allow the BNC connector on the mounting bracket to clear the opening in the rear of the system unit.

Figure 1–3 Removing Option Slot Cover



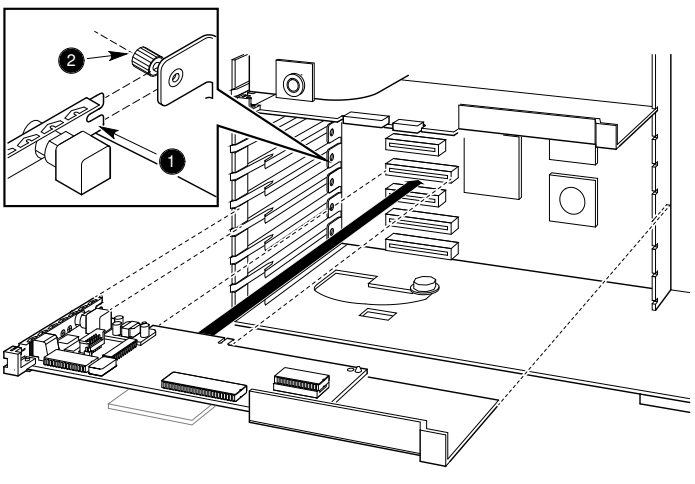
LJ-00462-TI0

4. Firmly press the board into place until the tabs ❶ (Figure 1–4) align behind the thumbscrew.
5. Tighten the thumbscrew ❷ (Figure 1–4) while holding the option slot in place.

Caution

For safe system operation, be sure there are no open slots remaining when you complete the installation.

Figure 1–4 Installing the DEC EtherWORKS *MC* Board



6. Replace the system unit cover.

   Align the tabs at the bottom of the cover with the slots in the pedestal ❶ (Figure 1–5). Push the cover into place and tighten the two screws.

7. Reconnect all cables and connectors.

   a. Plug the keyboard connector into the rear of the system unit.

   b. Connect the keyboard and monitor cables, and any option cables.

   c. Connect the power cable to the rear of the system unit then plug the other end into the wall outlet.

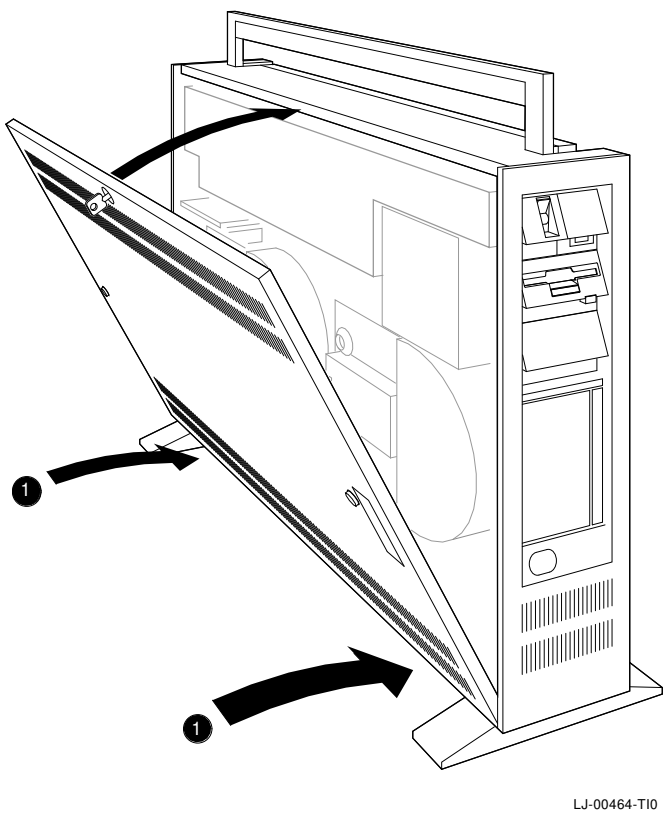
8. Turn on the power to the monitor and the system.

If the startup test runs successfully, then the board has already been configured and the computer continues the normal startup process. If the board has **not** been configured, the system displays the size of memory in kilobytes and the number 165 in the upper-left corner of the screen:

```
xxxx KB
165
```

If your system displays this information, continue with Section 1.5 to configure the IBM PS/2 for the board. If this does not display, go to Section 1.6.

Figure 1–5 Replacing the Screws and Cover



1.5 Configuring the *MC* Board

Before using the board, you must configure it for use with the IBM PS/2 computer. This is done using the adapter description file (ADF).

The ADF provides default settings for the following five board features. These features can be modified, the first three of which are set by the automatic configuration software.

Interrupt Line
Memory Address
I/O Address
Remote Boot Enable
Remote Boot Timeout Count

1.5.1 Configuring Board Settings

After you install the board, configure it using the following procedure:

1. Insert the backup version of the System Reference diskette into drive A.
2. Turn power to the system on. In the upper-right corner of the screen different memory amounts flash in sequence.
3. At the prompt to run automatic configuration, enter no.
4. Select the following choices from the menu:
   a. Copy Diskette
   b. Set Configuration
   c. Run Automatic Configuration

      If the automatic configuration detects a conflict with another board in your computer, select Change Configuration, then perform a manual configuration.
5. Restart the system by simultaneously pressing Ctrl Alt Del.

Note

If an error code, such as DE210 89, appears on the screen during the restart process, a self-test error has occurred. Refer to Section 2.2.

1.6 Connecting to a Network

Depending on how you configured the board in Section 1.3, use one of the following procedures to connect your system to the network.

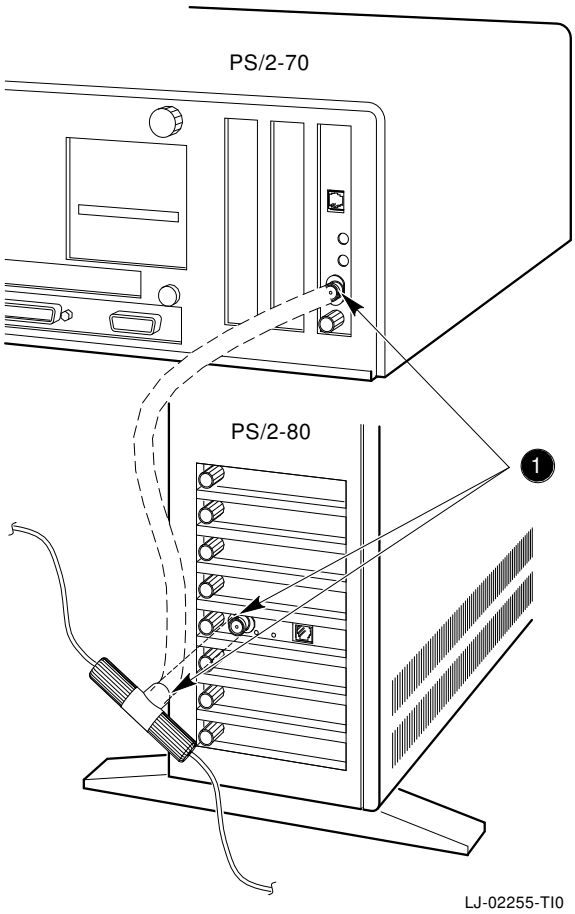
1.6.1 Connecting to ThinWire Ethernet

To connect your system to ThinWire Ethernet, push the T-Connector onto the ThinWire Ethernet connector.

Push the connector nut of the T-Connector ❶ (Figure 1–6) onto the BNC connector on the mounting bracket, then turn the connector nut clockwise until it locks into place.

See your system administrator for more information if needed.

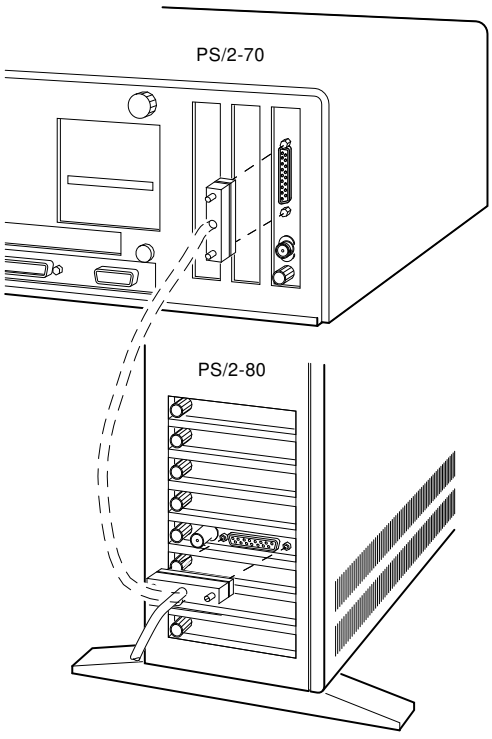
Figure 1–6 Connecting To a ThinWire Ethernet Network



1.6.2 Connecting to ThickWire Ethernet

To connect your system to ThickWire Ethernet, connect the transceiver cable ❶ (Figure 1–7) to the ThickWire Ethernet connector.

Figure 1–7 Connecting To a ThickWire Ethernet Network



1.7 Installing the Software

Read the files named "README.TXT" and "RELEASE.NOT" on the installation diskette. These files contain the instructions for loading the *MC* software drivers onto your system.

2
Problem Solving

2.1 Introduction

This chapter describes possible problems you may encounter with the *MC* board and suggests possible causes and solutions.

2.2 Fault Isolation By Symptom

Table 2–1 describes how to isolate faults by the symptoms that are occurring.

Table 2–1 Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system is on, but there is no display.	The monitor is not on or is not connected to the video board.	Ensure that 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 in the computer. (Section 1.4.)
	The board is preventing the computer from operating correctly.	Disconnect the transceiver cable or the ThinWire T-connector from the BNC connector. Turn the computer off then on again. If the problem persists, contact your system administrator or authorized service representative.
The system does not boot from the diskette.	The system diskette may be corrupted.	See your system administrator for a bootable system diskette.

(continued on next page)

Table 2–1 (Cont.) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system does not remote boot.	Remote Boot Disable is set.	Set Remote Boot Enable using the System Configuration Utility. If the problem persists, contact your system administrator.
The system is on, but the network does not start.	The network interface or remote boot is set incorrectly.	Check the shunt connector setting.
	The network cables are loose.	Check and secure all cables.
	A conflict exists with another option in the system.	Run the System Configuration Utility to check for any conflict. See your system administrator for more information if needed.
The system is on and the screen displays a self-test code during system startup.	A possible problem exists with the DEC EtherWORKS *MC* board.	See the codes in Table 2–2.

(continued on next page)

Table 2–1 (Cont.) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system cannot return to network operation after leaving an application program.	You may be using a program written or compiled in Version 1.0 BASIC (IBM BASIC Version 1.0, Interpreter or Compiler, GW-BASIC Version 1.0).	Do not use these versions of the program. Recompile the program using Version 2.0 or later of BASIC, or contact your software vendor for an updated version of the program.

2.3 Recovering From Self-Test Errors

Self-test errors can occur at system startup. Table 2–2 lists the *MC* board self-test codes, their description, and recommended action. If a problem persists, call your Digital authorized service representative.

Note

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

Table 2–2 DEC EtherWORKS *MC* Self-Test Codes

Code	Description	Recommended Action
80	Memory access conflict	Run the System Configuration utility to check for any memory address conflicts.
81	Data path error	Run the System Configuration utility to check for any memory address conflicts.
82	Address test conflict	Run the System Configuration utility to check for any memory address conflicts.
83	RAM tests conflict	Run the System Configuration utility to check for any memory address conflicts.
84	Ethernet ROM CRC error	Run the System Configuration utility to check for any I/O address conflicts.
85	NI_CSR Error	Call your Digital authorized service representative.
86	LANCE I/O address conflict	Run the System Configuration utility to check for any conflicts.

(continued on next page)

Table 2–2 (Cont.) DEC EtherWORKS *MC* Self-Test Codes

Code	Description	Recommended Action
87	LANCE Initialization error	Call your Digital authorized service representative.
88	LANCE Interrupt request (IRQ) conflict	Run the System Configuration utility to check for any interrupt conflicts.
89	NI_CSR Mask test error	Call your Digital authorized service representative.
90	POS Register verification	Replace the board.
8A	LANCE Internal loopback error	Call your Digital authorized service representative.
8B	LANCE Collision error	Call your Digital authorized service representative.
8C	LANCE CRC Error	Call your Digital authorized service representative.
8D	Swap RAM error	Call your Digital authorized service representative.
8E	Shadow RAM enable error	Call your Digital authorized service representative.
8F	Configuration error	Run the System Configuration utility to check for any conflicts. Also, check parameter settings for your network to make sure that they match the configuration on the board.

A

General Information

A.1 Introduction

The *MC* board lets you integrate IBM PS/2 computers that have a Micro Channel bus architecture into a network. When you have installed the board, you can use network software products to integrate the computer into a network.

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

A.1.1 Physical Description

The board is a three-quarter length, IBM PS/2 form factor printed circuit board that uses a 16-bit bus connector.

A.1.2 Functional Components

The major functional blocks on the board are as follows:

- Ethernet network protocol controller (LANCE)
- ThinWire (BNC connector) network interface
- Ethernet (DB-15S connector) network interface
- Network buffer RAM - 64 KB
- Diagnostics and remote-boot ROM - 16 KB
- Ethernet hardware address ROM
- Programmable option select circuitry

A.1.3 Specifications

Table A–1 lists the board's hardware specifications.

Table A–1 System Specifications

Interrupt Vector Assignments	Available Selections
Network interface controller	IRQ5, IRQ9, IRQ10, IRQ11
I/O Address Assignments	**Available Selections**
	2C00—2C0F
	2C10—2C1F
	2C20—2C2F
	2C30—2C3F

(continued on next page)

Table A–1 (Cont.) System Specifications

Memory Address Assignments	Available Selections
64 KB	C0000—CFFFF
	D0000—DFFFF
	E0000—EFFFF[1]
32 KB	C8000—CFFFF
	D8000—DFFFF
	E8000—EFFFF[1]
16 KB	C0000 — C3FFF
	C1000 — C4FFF
	C2000 — C5FFF
	C3000 — C6FFF
	C4000 — C7FFF
	C5000 — C8FFF
	C6000 — C9FFF
	C7000 — CAFFF
	C8000 — CBFFF
	C9000 — CCFFF
	CA000 — CDFFF
	CB000 — CEFFF
	CC000 — CFFFF
	D0000 — D3FFF
	D1000 — D4FFF
	D2000 — D5FFF
	D3000 — D6FFF

[1]E0000 range is not available on IBM PS/2 systems.

(continued on next page)

Table A–1 (Cont.) System Specifications

Memory Address Assignments	Available Selections
	D4000 — D7FFF
	D5000 — D8FFF
	D6000 — D9FFF
	D7000 — DAFFF
	D8000 — DBFFF
	D9000 — DCFFF
	DA000 — DDFFF
	DB000 — DEFFF
	DC000 — DFFFF
	E0000 — E3FFF
	E1000 — E4FFF
	E2000 — E5FFF
	E3000 — E6FFF
	E4000 — E7FFF
	E5000 — E8FFF
	E6000 — E9FFF
	E7000 — EAFFF
	E8000 — EBFFF
	E9000 — ECFFF
	EA000 — EDFFF
	EB000 — EEFFF
	EC000 — EFFFF

(continued on next page)

Table A–1 (Cont.) System Specifications

Power Requirements	Wattage
ThickWire: DC Amps @ +5V: 1.5 A (max.)	13.5 (max)
ThinWire: DC Amps @ +12V: 0.34 A (max.)	11.5 watts (max.)
0.5 A (max.) to power external transceiver, DEC AUI (H4000).	
Operating Environment	
Temperature (at sea level) (59° - 90° F)	15° - 32° C
Relative humidity	8% to 80% (non-condensing)
Radiated emissions	FCC Class B VDE Class B

B

Installing an Option ROM

B.1 Introduction

The ROM chip is optional on the *MC* board and is not required for correct operation. If you purchased the board from Digital (PN DE210-AB), then the board already has the option ROM installed.

Caution

Static electricity can damage printed circuit boards and chips. A grounded wrist strap and grounded work-surface-to-earth ground must be used when handling these components.

If your configuration requires that the ROM chip be installed, use the following procedure to install it.

B.2 ROM Installation Procedure

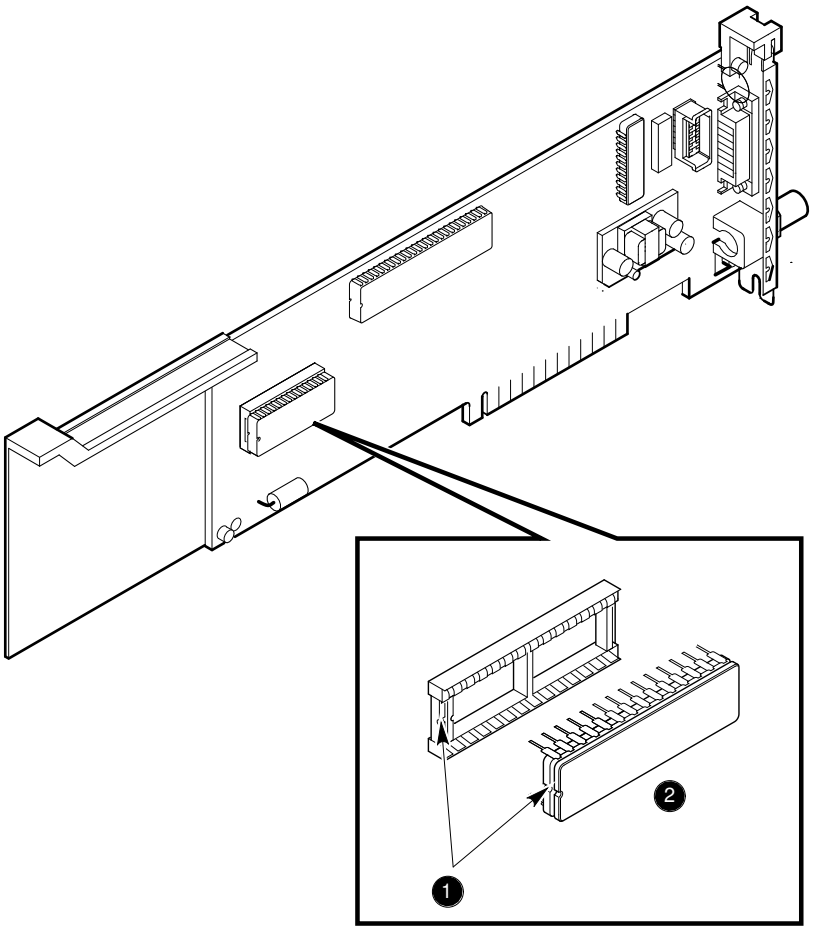
Refer to Figure B–1 when installing the ROM chip.

Caution

Improper insertion of the ROM chip can damage the board.

1. Note the location of the notch ❶ on the silk screen surrounding the ROM socket.
2. Be sure that the notch on the ROM ❷ aligns with the notch on the silk screen and the socket.
3. Align the pins on the chip and press from side to side until the chip is fully seated.

Figure B–1 DEC EtherWORKS *MC* ROM Installation



LJ-00665-TI0

C

Cable Specifications

C.1 Cabling Requirements

Make sure you have a cable to connect the *MC* 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 DE210 to another DE210, or a DE210 to an office plate from a DECrepeater 350.
  - BN25G or BN26K - Point-to-point unshielded Twisted-Pair patch cable to connect a DE210 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 DE210 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).

C.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

C.1.2 Card Connector Pinning (RJ45)

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

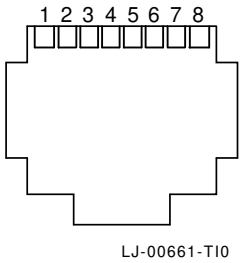



Figure C–1 RJ45 Connector (Front View)