FCC ID: AO9-DE201

FCC NOTICE: 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.

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 the 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 ThickWire 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 Turbo/TP-Modul in Verbindung mit IBM PS/2 Personalcomputersystemem entsprechen den Funkentstöranforderungen der DBP-Verfugung 523/69 und VDE0871 Grenzwertklasse A.

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DEC EtherWORKS™ *Turbo/TP* Ethernet Controller

User Information

Order Number: EK-DE201-OM. D01

January 1993

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Preface

Overview

The DEC EtherWORKS *Turbo/TP* Ethernet Controller is a personal computer bus adapter board that lets you integrate various IBM/AT or compatible personal computers into a network using either IEEE 10BaseT[1] Twisted-Pair network cabling or ThickWire Ethernet cabling.

The board can use twisted-pair telephone conductor lines (four-wire, full-duplex cables) for transmission of Ethernet signals. This method allows you to use standard building wiring served from a telephone /data wiring closet.

This manual describes how to install and configure the board and how to prepare your personal computer and the board for use on a network.

You do not have to know a lot about computers to install the *Turbo/TP* board. You need to understand the basic concepts and uses of Ethernet networks, and be familiar with personal computers.

[1] Designed to comply with the IEEE 802.3 10BaseT standard.

Product Kit

You need the following components from the product kit, shown in Figure 1. The final product may vary slightly from the illustration.

- The DEC EtherWORKS *Turbo/TP* board ❶ (packaged in an anti-static bag) ❷
- User information manual ❸
- Installation diskette (5¼ inch) ❹
- Installation micro-diskette (3½ inch) ❺

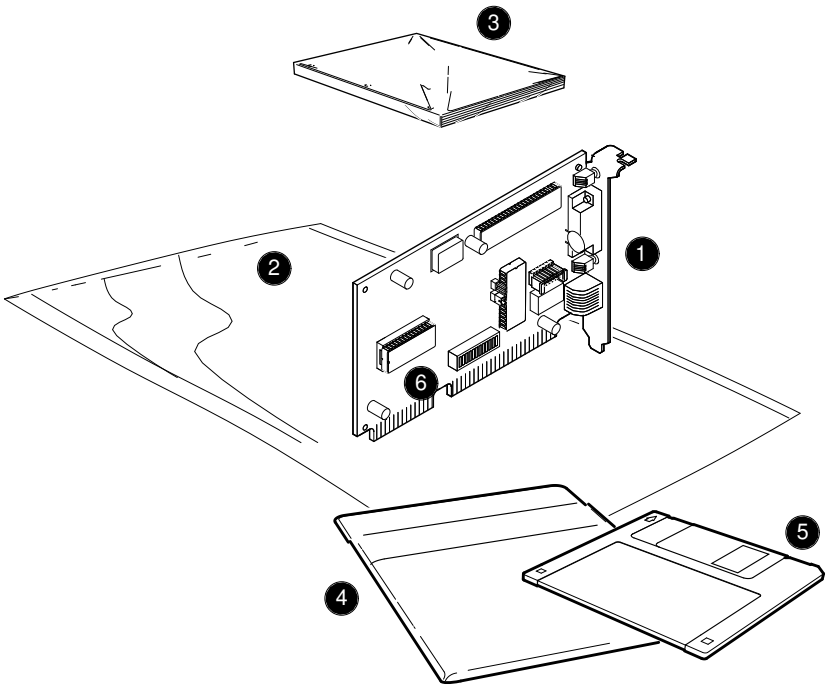
The installation diskettes contain the software data link. Use the appropriate size disk for your computer.

You also need the appropriate transceiver cable. Refer to Appendix C for information about cable requirements and constraints.

Note

If your *Turbo/TP* board does not have a ROM chip as shown in ❻ Figure 1, refer to Appendix B.

Figure 1 *Turbo/TP* Product Kit (PN DE201)



Caution

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

Manual Organization

This manual is organized as follows:

- Chapter 1 contains installation instructions.
- Chapter 2 contains information about board configuration.
- Chapter 3 contains problem solving information.
- Appendix A provides information about hardware and software features.
- Appendix B provides the ROM installation procedure.
- Appendix C provides cable specifications.

Conventions

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.

1
Installation

1.1 Introduction

This chapter describes how to install the *Turbo/TP* board in an IBM/AT or compatible personal computer. The tools you need are a Phillips screwdriver and a small flat-head screwdriver. Before you begin, make a copy of the diskette you need from the product kit.

1.2 Preparing Your Computer System

Perform the following steps to prepare your personal computer. The following illustrations show an IBM PC personal computer. For other personal computers, you can use the same procedure with only minor modifications.

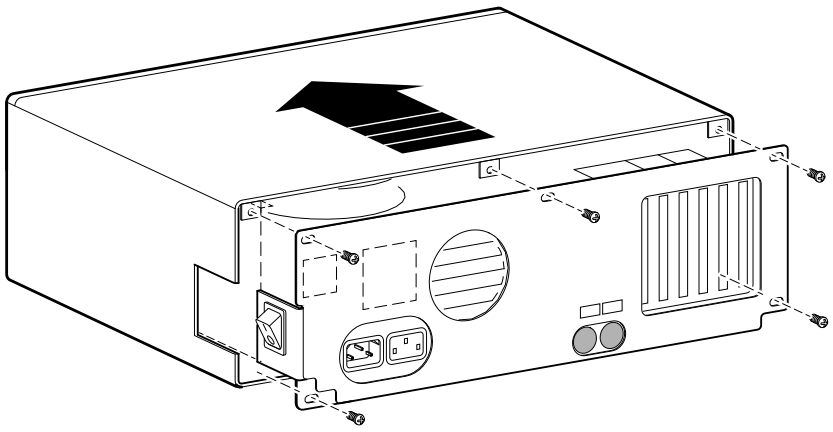
1. Remove any diskette from the diskette drive.
2. Set all power switches to O (off).
3. Unplug the keyboard connector from the rear of the system unit.
4. Disconnect any cables from the rear of the system unit.

Note

Be sure to take note of where the cables are connected.

5. Unplug the power cord from the wall socket, then disconnect the cord from the rear of the system unit.
6. Remove the screws from the rear of the system unit (Figure 1–1).
7. Slide the cover toward the front of the system unit until the cover is free.

Figure 1–1 Removing the Screws and System Unit Cover



LJ-00583-TI0

Note

The *Turbo/TP* board has a switch pack set to correspond to most customers' needs (*default settings*). If the settings do not meet your needs, you can change them (see Chapter 2).

Note

If the board is set to use an interrupt request line, base memory address, or I/O address that another option board uses, your computer or other boards may not operate correctly when you start the system. To test the board with the default settings, you may need to remove other option boards from the computer.

1.3 Selecting the Network Interface

The *Turbo/TP* board has a *shunt connector* ❶ (Figure 1–2) that lets you determine how the board interfaces with the network—either 10BaseT Twisted-Pair or ThickWire Ethernet networks. The board is shipped with the shunt connector set for use with 10BaseT Twisted-Pair network cabling.

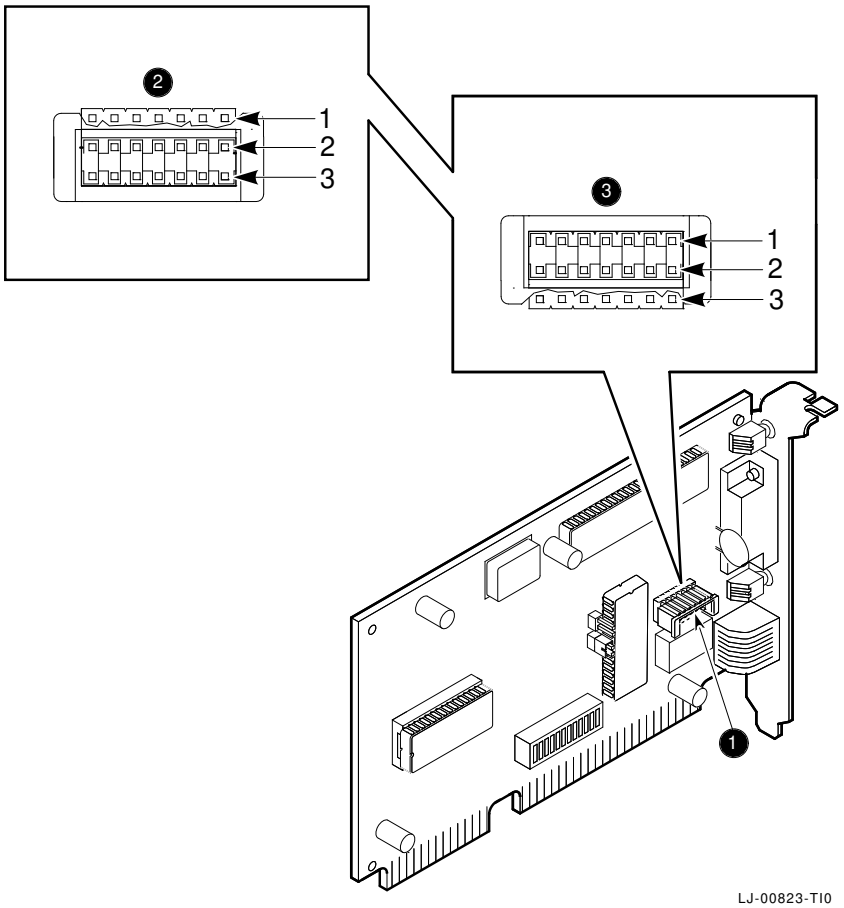
You may need to move the shunt connector on the board before you install it in your computer.

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

Table 1–1 Shunt Connector Settings

If You Want To ...	Then ...
Connect to a 10BaseT Twisted-Pair network ❷	Leave the shunt connector in the lower position. The arrows on the board should point to the TWISTED PR position, exposing pin row 1 (*default setting*).
Connect to a ThickWire Ethernet network ❸	Move the shunt connector so the arrows on the board point to the THICKWIRE position, exposing pin row 3.

Figure 1–2 Network Interface Settings



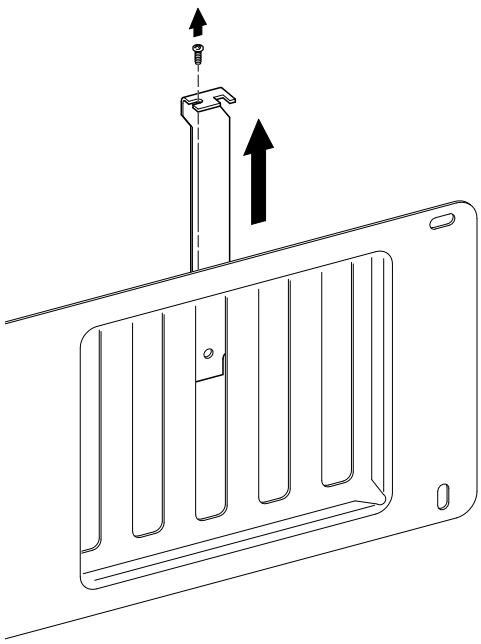
1.4 Installing the Board

After preparing your personal computer, you are ready to install the *Turbo/TP* board. Use the following steps for the installation process:

1. Remove the option slot cover from the slot you plan to use.

   Remove the screw from an available 16-bit option slot on the rear panel insert. Save the screw for later use.

Figure 1–3 Removing the Slot Cover



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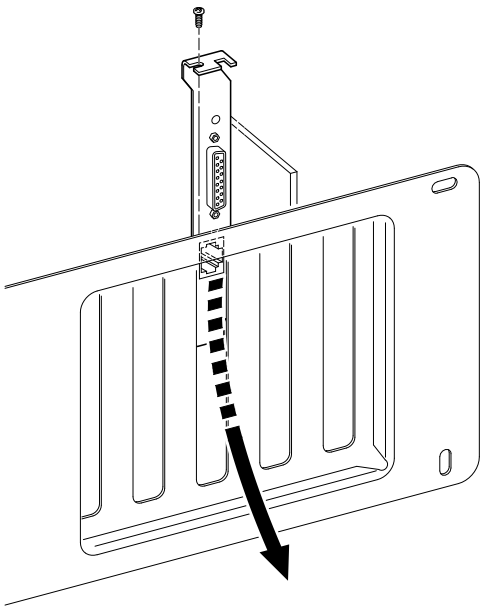
2. Place the *Turbo/TP* board in the option slot (Figure 1–4).
3. Firmly press the board into place until it is securely seated.
4. Replace the screw on the slot cover.

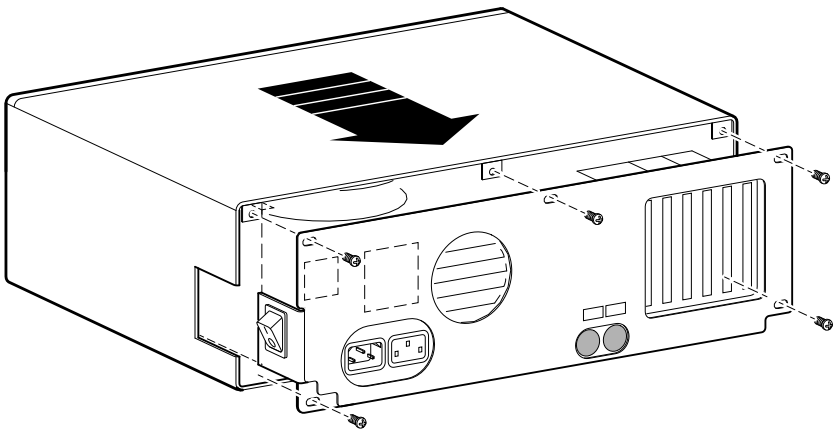
Figure 1–4 Installing the *Turbo/TP* Board



LJ-00662-TI0

5. Replace the system unit cover.
   a. Slide the cover toward the rear of the system unit.
   b. Replace the screws (Figure 1–5) at the rear of the system unit.

Figure 1–5 Replacing the Screws and the Cover



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6. Plug the keyboard connector into the rear of the system unit.
7. Reconnect any cables to the rear of the system unit.
8. Connect the power cord to the rear of the system unit, then plug the other end into the wall socket.

1.5 Running the Power Up Self-Test

A power up self-test automatically runs each time the computer is turned on or reset.

If an error code, such as DE201 88, appears on the screen during the restart process, a self-test error has occurred. Note the self-test code and refer to Section 3.3.

1.6 Connecting to a Network

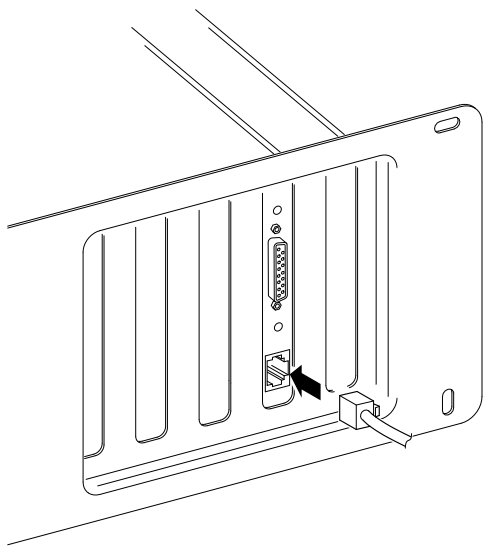
Depending on how you configured the *Turbo/TP* board in Section 1.3, use one of the following procedures to connect your system to the network.

1.6.1 Connecting to 10BaseT Twisted-Pair Ethernet

Push the twisted-pair cable connector into the socket on the *Turbo/TP* board until it clicks, locking it into place (Figure 1–6).

See your system administrator if you need more information.

Figure 1–6 Connecting to a 10BaseT Twisted-Pair Network

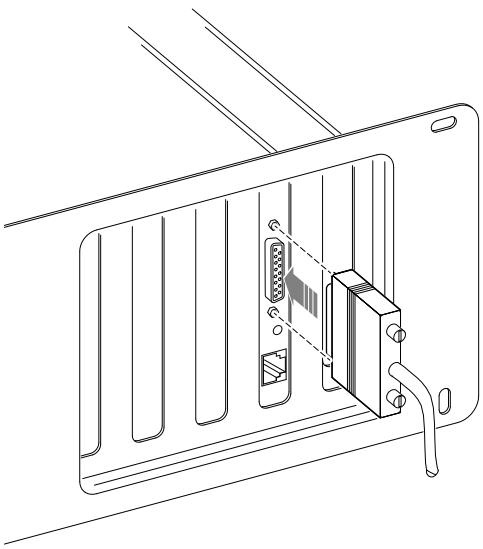


LJ-00588-TI0

1.6.2 Connecting to ThickWire Ethernet

Connect the transceiver cable to the ThickWire Ethernet connector (Figure 1–7).

Figure 1–7 Connecting To a ThickWire Ethernet Network



LJ-02354-TI0

Caution

For safe operation, be sure all option slot covers are in place when you complete the installation.

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 *Turbo/TP* software drivers, release notes that you could find helpful for your installation, and how to configure your system.

2
Configuration

2.1 Introduction

The *Turbo/TP* board switch pack has 12 switches that enable the board to operate in a configuration without interference from the other boards in your computer. This chapter describes how to change the settings on the switch pack.

If you have many options in your system, you may have to change the interrupt request (IRQ) line, the I/O address setting, or the memory address setting on the *Turbo/TP* board to create a compatible operating set.

2.2 Default Settings

The *Turbo/TP* board is shipped with the switches preselected (*default settings*) to work in most installations. Table 2–1 lists the default settings.

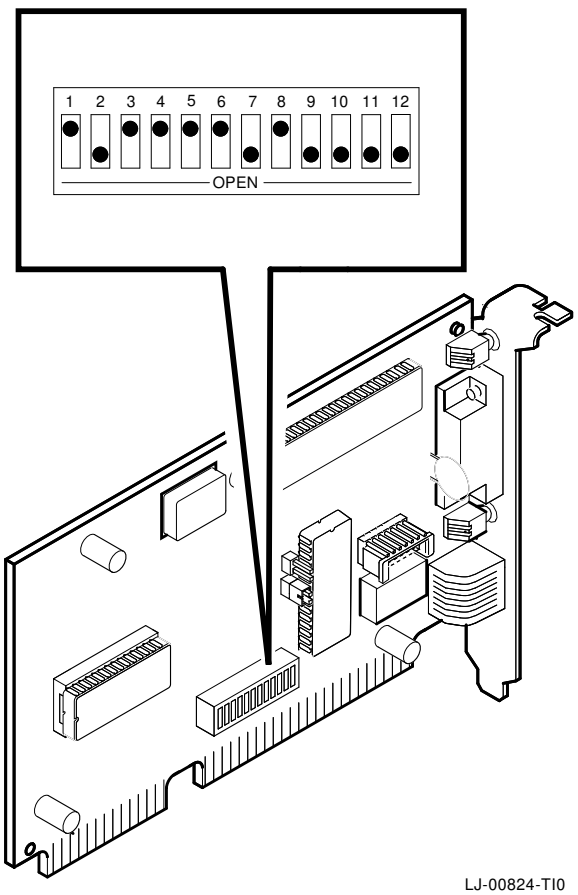
Table 2–1 Switch Pack Default Settings

Switch	Position	Function	Default
SW1 SW2	ON OFF	Sets the memory address range.	Sets the memory address range to D0000 - DFFFF (hex).
SW3 SW4	ON ON	Selects the buffer memory size.	Enables 64 KB memory size.
SW5	ON	Sets the I/O address.	I/O starting address is set to 300 (hex).
SW6	ON	Enables or disables remote boot feature.[1]	Remote boot disabled.
SW7	OFF	Sets the timeout period for the remote boot attempt. [1]	Sets a 30 second timeout period.
SW8	ON	Enables IRQ5	IRQ5 enabled
SW9 SW10 SW11 SW12	OFF OFF OFF OFF	Enables IRQ9 Enables IRQ10 Enables IRQ11 Enables IRQ12	IRQ9 disabled IRQ10 disabled IRQ11 disabled IRQ12 disabled

[1]This feature requires that a remote boot ROM chip be installed. See Appendix B for more information.

The default settings are illustrated in Figure 2–1.

Figure 2–1 Switch Pack Default Settings



2.3 Check the Other Boards

You can set only one board in the computer to use a specific interrupt request line, I/O address, or memory address. If you do not know the settings for the other boards:

- Ask your system administrator for a list of the settings.
- Check the board documentation for the possible settings.
- Inspect the boards to determine the actual settings.

If you find that a conflict exists, you can change the appropriate setting on the *Turbo/TP* board, as described in following sections. The switches being described are highlighted in the illustrations.

2.4 Memory Addressing Range and Size Selection (SW1 - SW4)

Switches SW1 and SW2 select the memory addressing range, and SW3 and SW4 select the size of the system memory space the *Turbo /TP* board uses. Table 2–2 lists six possible memory addressing ranges and the switch settings that select them.

Only one board can be set to use a given memory addressing range. Check the documentation supplied with your personal computer and other boards to determine memory address requirements. If the other boards in your computer use memory addressing ranges that conflict with one of these ranges, select a range that is unused.

Table 2–2 Switch Settings and Memory Addressing Ranges

Buffer Size	SW1	SW2	SW3	SW4	Memory Addressing Range
64 KB	ON	ON	ON	ON	C0000—CFFFF
	ON	OFF	ON	ON	D0000—DFFFF (*default setting*)
	OFF	ON	ON	ON	E0000—EFFFF[1]
32 KB	ON	ON	OFF	OFF	C8000—CFFFF
	ON	OFF	OFF	OFF	D8000—DFFFF
	OFF	ON	OFF	OFF	E8000—EFFFF[1]

[1]Some PCs do not support the E0000 - EFFFF or E8000 - EFFFF address ranges. Check your personal computer manual for this information.

Note

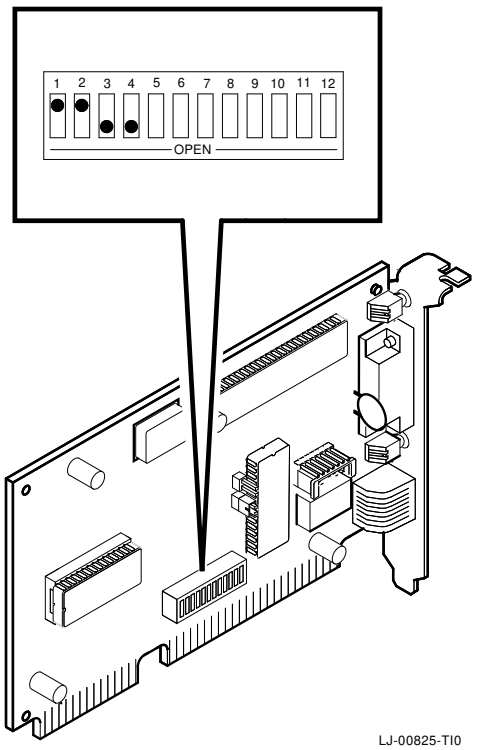
Setting both SW1 and SW2 to the OFF position is an illegal configuration and may prevent the computer from working correctly.

The *Turbo/TP* board works best when the entire 64 KB of network buffer memory is enabled for its operation. Some boards and system configurations do not permit the allocation of this amount of memory. Network performance is slower when you select 32 KB, but you can use the *Turbo/TP* board in configurations where address space is at a premium.

Example:

Figure 2–2 shows the settings for SW1 through SW4 that select a buffer size of 32 KB in the C8000 - CFFFF (hex) system memory addressing range.

Figure 2–2 Setting Memory Range C8000-CFFFF for 32 KB

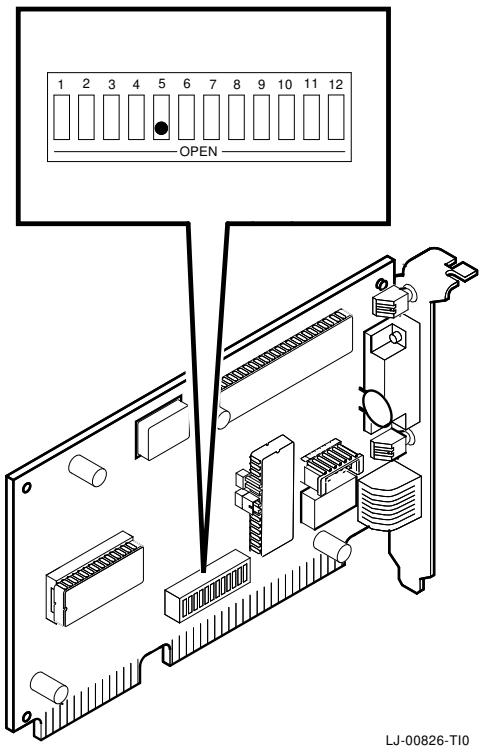


2.5 I/O Address Selection (SW5)

The *Turbo/TP* board uses one of two I/O address ranges (primary or secondary) to communicate with the CPU. Only one board in the computer can be set to use a given I/O address range.

- Switch SW5 set to ON selects the primary I/O address range (300 - 30F; *default setting*).
- Switch SW5 set to OFF selects the secondary I/O address range (200 - 20F) (Figure 2–3).

Figure 2–3 Switch Selecting I/O Address 200 - 20F (hex)



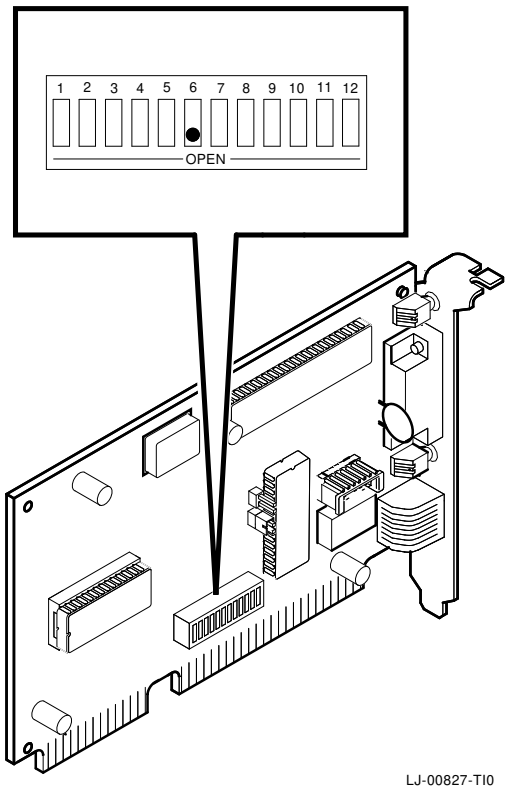
2.6 Remote Boot Selection (SW6)

Switch SW6 determines whether the remote boot feature is enabled or disabled.[1]

- Switch SW6 set to ON disables remote boot (*default setting*).
- Switch SW6 set to OFF enables remote boot (Figure 2–4).

[1] This feature requires that a remote boot ROM chip be installed. See Appendix B for more information.

Figure 2–4 Switch Enabling Remote Boot

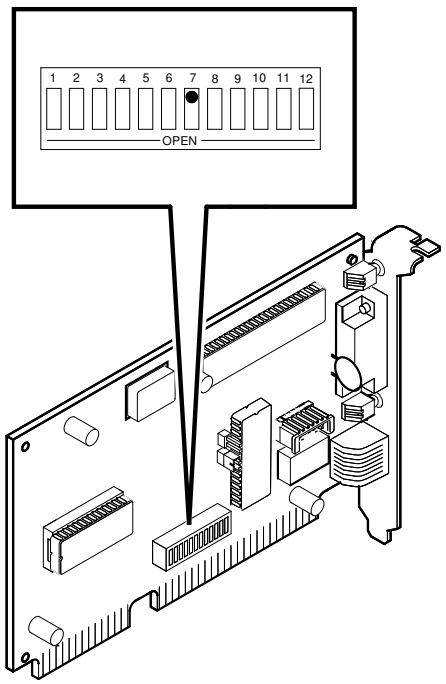


2.7 Remote Boot Period Selection (SW7)

Switch SW7 controls the time period for trying to enable a remote boot operation.

- Switch SW7 set to OFF sets the remote boot timeout to 30 seconds (*default setting*).
- Switch SW7 set to ON sets the remote boot timeout to 150 seconds.

Figure 2–5 Switch Selecting 150 Seconds for Remote Boot



2.8 Interrupt Request Line Selection (SW8 - SW12)

You can use switches SW8 through SW12 to select an interrupt request line (IRQ). The *Turbo/TP* board uses one IRQ line for the network interface (NI). Table 2–3 lists switches and the interrupt request lines enabled.

Table 2–3 Interrupt Request Line Switch Selection

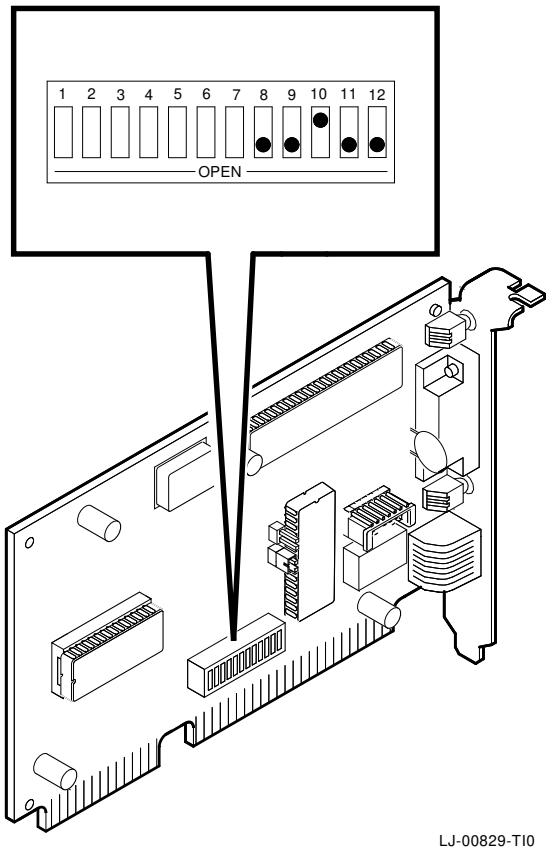
Switch	Interrupt Request Line
SW8	IRQ5 *(default setting)*
SW9	IRQ9
SW10	IRQ10
SW11	IRQ11
SW12	IRQ15

Only one switch should be set to the ON position. By default, SW8 is set to the ON position, selecting IRQ5.

Example:

> To select IRQ10 as the interrupt request line, set switch SW10 to the ON position and set switches SW8, SW9, SW11, and SW12 to the OFF position (Figure 2–6).

Figure 2–6 Switch SW10 Selecting IRQ10



3
Problem Solving

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

3.1 Fault Isolation By Symptom

Table 3–1 lists problems that you might encounter, the possible cause, and the recommended corrective action.

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 *Turbo/TP* board is not seated firmly in the option slot.	Remove and reinsert the board **firmly** in the option slot (Chapter 1).
	The I/O or memory address is set wrong or is causing a conflict with another module.	Reset switch settings for SW1 - SW5 if necessary.

(continued on next page)

cancelh

Table 3–1 (Cont.) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
	The *Turbo/TP* board is preventing the computer from operating correctly.	Disconnect the transceiver 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 *Turbo/TP* board amber LED is on longer than 30 seconds and the keyboard does not respond.	The board is preventing the computer from operating correctly.	Disconnect the transceiver cable or the twisted-pair cable from the board. Turn the computer off then on again.
	The I/O or memory address is set wrong or is causing a conflict with another board.	Reset switch settings for SW1 - SW5 if necessary. If the problem persists, contact your system administrator or authorized service representative.
The system does not boot from the diskette.	Switch SW6 is in the OFF position.	Set switch SW6 to the ON position.
	The system diskette may be corrupted.	See your system administrator for a bootable system diskette.

(continued on next page)

Table 3–1 (Cont.) Fault Isolation By Symptom

Symptom	Possible Cause	Recommended Action
The system does not remote boot.	Switch SW6 is in the ON position, disabling remote boot.	Set switch SW6 to the OFF position.
	A 30-second remote boot timeout may not be long enough for a busy network.	Set switch SW7 to the ON position enabling a timeout of 150 seconds.
	The Ethernet address is not registered for this address node.	Re-register this module. If the problem persists, contact your system administrator.
The system is on, but the network does not start. The green LED is not on.	The network interface or remote boot is set incorrectly.	Reset the shunt connector setting if necessary.
	Network cables are loose.	Secure all cables.
	A conflict may exist with another board in the system:	
	• IRQ switches are set wrong.	Reset switch settings SW8 - SW12 if necessary (Chapter 2).
	• I/O address or memory address range is set incorrectly.	Reset switch settings SW1 - SW5 if necessary (Chapter 2).
	The Ethernet address is not registered for this address node.	Re-register this module. If the problem persists, contact your system administrator.

(continued on next page)

Table 3–1 (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.
The system is on and displays DE201 and a self-test code during system start-up.	A possible problem exists with the *Turbo/TP* board.	See Table 3–2. Press the F1 key to continue. Replace or remove then reinsert the board and try starting the system again.
	The I/O or memory address is set wrong or is causing a conflict with another module.	Reset switch settings for SW1 - SW5 if necessary. An address range conflict could exist between the *Turbo/TP* board and another option board.
	The error code may be an IBM error code.	See your IBM owner's manual for additional information. If the problem persists, contact your system administrator.

3.2 LED Activity

There are two light emitting diodes (LEDs) on the *Turbo/TP* board mounting bracket that indicate the operating status of the board. The following table describes the different states of the LEDs.

LED Activity	Meaning	User Action
The amber LED stays on for 20 seconds, then goes off.	This is normal during the self-test.	None
The amber LED stays on after 20 seconds.	A fault has occurred. An error number should appear on the screen.	See Table 3–2, self-test error codes.
The green LED is blinking.	This is normal and indicates that the data link is correct and confirms reception of data on the RCV DATA line.	None
The green LED is off.	There is no receive data packet activity.	If the problem exists while receiving data, see Table 3–1 for other symptoms and recommended action.

cancelh

3.3 Recovering From Self-Test Errors

Self-test errors can occur at system startup. Table 3–2 lists the *Turbo/TP* board self-test error codes, the possible cause, and a recommended action. To recover from some errors, you can try pressing the F1 function key to resume system operation.

Note

Although the *Turbo/TP* board detects an error and may not operate properly, you can still use your personal computer.

Table 3–2 Self-Test Error Codes

Error	Description	Recommended Action
80	A memory access conflict exists.	Switch settings for SW1 - SW5 may conflict with another installed board. Reset if necessary.
81	A data path error exists.	Switch settings for SW1 - SW5 may conflict with another installed board. Reset if necessary. If the problem persists, call your Digital authorized service representative.
82	There is an address test conflict.	Switch settings for SW1 - SW5 may conflict with another board. Reset if necessary.
83	There is a RAM test conflict.	Switch settings for SW1 - SW5 may conflict with another board. Reset if necessary.

(continued on next page)

Table 3–2 (Cont.) Self-Test Error Codes

Error	Description	Recommended Action
84	An Ethernet ROM CRC error exists.	Switch setting for SW5 may conflict with another board. Reset if necessary. If the problem continues, call your Digital authorized service representative.
85	An NI_CSR error exists.	Call your Digital authorized service representative.
86	There is a LANCE I/O address conflict.	Reset switch setting for SW5 if necessary.
87	A LANCE initialization error exists.	Call your Digital authorized service representative.
88	There is a LANCE IRQ conflict.	Reset switch settings for SW8 - SW12 if necessary.
89	An NI_CSR mask test error exists.	Call your Digital authorized service representative.
8A	A LANCE internal loopback error exists.	Call your Digital authorized service representative.
8B	A LANCE collision error exists.	Call your Digital authorized service representative.
8C	A LANCE CRC error exists.	Call your Digital authorized service representative.
8D	A Shadow RAM error exists.	Call your Digital authorized service representative.
8E	A Shadow RAM enable error exists.	Call your Digital authorized service representative.
8F	A configuration error exists.	Check switch settings for SW8 - SW12 to verify that only one switch is in the ON position. Also, check the parameter settings for your network to verify that they match the board configuration.

A

General Information

A.1 Introduction

The *Turbo/TP* board lets you integrate IBM/AT compatible computers into a network. After installing a *Turbo/TP* board, you can use various network software products to integrate the computer into a network.

You can install the board in any IBM/AT or a computer that has an IBM/AT compatible bus.

You can connect the *Turbo/TP* board to either a 10BaseT Twisted-Pair network or a ThickWire Ethernet network. You cannot, however, connect the board to both kinds of networks at the same time.

A.2 Physical Description

The *Turbo/TP* board is a half-length IBM/AT form-factor board that uses the full 16-bit bus connector.

The board measures 17.2 cm x 10.8 cm (6.75 in x 4.25 in).

A.2.1 Functional Components

The major functional components of the *Turbo/TP* board are as follows:

- Ethernet network protocol controller (LANCE)
- Unshielded twisted-pair (RJ45 connector) network interface
- Standard Ethernet ThickWire (DB-15S connector) network interface

- Diagnostics and remote-boot ROM - 16 KB (optional)
- Network buffer RAM - 64 KB
- Ethernet hardware address ROM

A.2.2 LED

There are two light emitting diodes (LEDs) on the mounting bracket that indicate the operating status of the *Turbo/TP* board. The amber LED comes on during power-up testing and stays on if the test discovers a fault. When the green LED is on it indicates normal network activity. Chapter 3 contains additional information on the LEDs.

A.2.3 Environmental Requirements

The environmental (temperature and humidity) requirements for the *Turbo/TP* board are the same as for your IBM/AT personal computer.

A.3 System Specifications

The *Turbo/TP* board operates correctly at an I/O channel bus speed of 6 MHz or 8 MHz. Table A–1 lists the system specifications of the board.

Table A–1 System Specifications

Memory Buffer Size	Memory Addressing Ranges
64 KB	C0000—CFFFF D0000—DFFFF E0000— EFFFF[1]
32 KB	C8000—CFFFF D8000—DFFFF E8000— EFFFF[1]

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

(continued on next page)

Table A–1 (Cont.) System Specifications

I/O Memory Assignments	
I/O	200—20F 300—30F

Network Interface	Selections
Interrupt request (IRQ) lines	IRQ5, IRQ9, IRQ10, IRQ11, IRQ15

Power Requirements:	Twisted-Pair: 10.5 w (maximum) ThickWire: 16.5 w (maximum)
DC Amps @ +5V: 2.1 A (maximum)	
DC Amps @ +12V: 0.5 A (maximum) to power external transceiver, DEC AUI (H4000 or equivalent)	
Bus Loads: 2 LSTTL	

Operating Environment	
Temperature (at sea level)	15° - 32° C (59° - 90° F)
Relative humidity	8% to 80% (non-condensing)
Radiated emissions	FCC Class B VDE Class B

Caution

When adding any option board 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 personal computer documentation for this information.

B

Installing an Option ROM Chip

B.1 Introduction

The ROM chip is optional on the *Turbo/TP* board and is not required for correct operation. If you purchased your board from Digital (PN DE201-AB), then the ROM chip is already installed.

Caution

Static electricity can damage printed circuit boards and chips. It is strongly recommended that a grounded wrist strap and grounded work-surface-to-earth ground 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

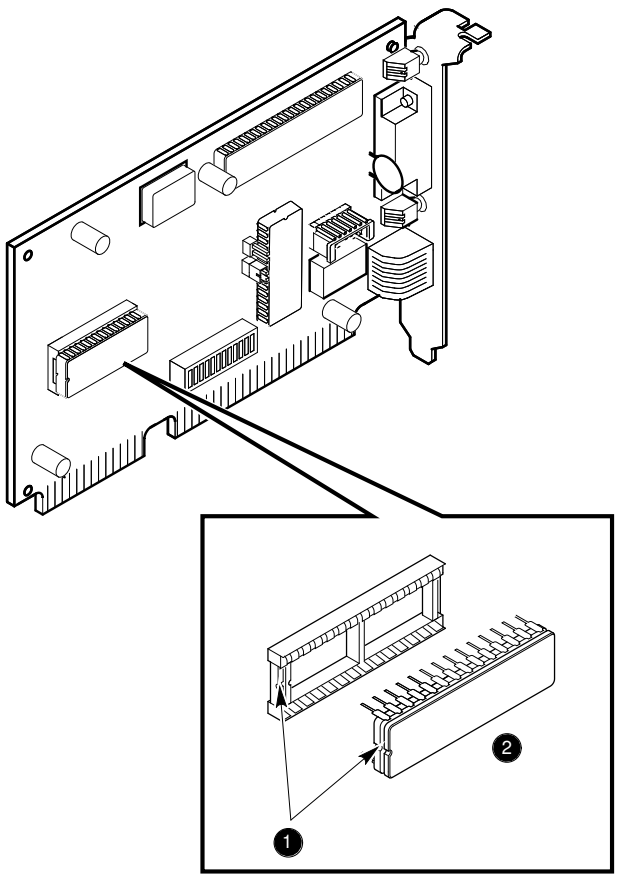
Refer to Figure B–1 to install the ROM chip.

Caution

Incorrect 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 *Turbo/TP* ROM Installation



LJ-00830-TI0

C
Cable Specifications

C.1 Cabling Requirements

Make sure you have a cable to connect the *Turbo/TP* board as planned. You need to consider either of the following types of cable connections:

- Unshielded Twisted-Pair cable— such as PN BN24F or PN BN26K, as many as 100 m (328 ft). Refer to Section C.1.1 and Section C.1.2 for more information.
  - BN24F - Office cable with crossover for unshielded twisted pair, (4-conductor, 2-twisted pair) to connect a workstation or personal computer to an office wall plate or to a DECrepeater 350.
  - BN26K - Point-to-point patch cable (8-conductor, 4-twisted pair) to connect DECrepeater to building wiring (wall plate or patch field).
- ThickWire transceiver cable—such as PN BNE4G-02, as many as 50 m (164 ft) maximum if going directly to a transceiver, or 45 m (148 ft) total maximum if connected to a DELNI.

For configuration planning, refer to the *DECconnect System Planning and Configuration Guide* (PN EK-DECSY-CG). The *Turbo/TP* board configuration guidelines are the same as the DEMPR, except for cable length. Also, daisy chaining is not permitted.

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 (SER) to office.
DC Resistance per conductor, maximum	.094 Ω/m (28.6Ω/1000 ft)
Impedance at 5 MHz	100Ω

C.1.2 Unshielded Cable Environmental Constraints

Constraint	Description
In the US: FCC regulations	The use of unshielded Ethernet cables for the ThickWire AUI port connection to this equipment is prohibited due to noncompliance with FCC regulations for a Class B computing device, pursuant to Subpart J of 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 can not cause harmful interference. 2. This device must accept interference received, including interference that can cause undesired operation.
Signals	No other signals should be used in the same cable sheath; for example, voice and data cannot be run within the same sheath.
Noise	Unshielded twisted-pair cable must be at least .3 m (1 ft) from any type of high voltage power device or electrical noise source.

C.1.3 Shielded Twisted-Pair Cable Constraints

Your *Turbo/TP* board is packaged with a country-specific cable (either PN BN26L or PN BN26N with cross-over) for countries that require a shielded twisted-pair cable.

C.1.4 Card Connector Pinning (RJ45)

If you are using your *Turbo/TP* 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 +
6	Receive -
8	Shielded Ground (Requires W1 installed)

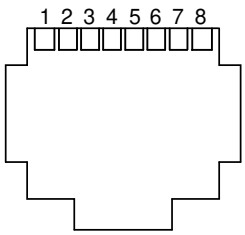



Figure C–1 RJ45 Connector (Front View)