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USER INSTALLATION GUIDE

EtherCard PLUS10T/A™

High Performance Micro Channel 10BASET Compatible LAN Adapter for Twisted Pair Networks

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Ethernet 10BaseT User Guide

High Performance
Ethernet Network Adapter Board
For 10BaseT Twisted-Pair Wiring
Micro Channel Bus-Compatible

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This product has been verified to comply with the limits for a Class A computing device pursuant to subpart J of Part 15 of FCC rules. This does not guarantee that interference will not occur in individual installations. The manufacturer is not responsible for any television, radio, or other interference caused by unauthorized modifications of this product.

If interference problems do occur, please consult the system equipment owner's manual for suggestions. Some of these suggestions include relocation of the computer system away from the television or radio or placing the computer AC power connection on a different circuit or outlet.

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Table of Contents

Introduction

The 10BaseT-compatible Ethernet adapter board is designed for IBM PS/2 and other Micro Channel-compatible computers. The adapter connects to a local area network (LAN) using either standard Ethernet cable or 10BaseT twisted-pair wire with telephone-type modular plugs.

In a network, the adapter will interoperate with most other Ethernet adapters that comply with the IEEE 802.3 (10Base2, 10BaseT, and 10Base5) Ethernet standards.

Using This Manual

This user installation guide provides information on setting up and installing the Ethernet Micro Channel adapter board for 10BaseT twisted-pair wiring. You can save time by reading these instructions **before** installing the adapter board. Information is provided to help you avoid some common problems such as hardware conflicts and interconnecting cable that is incorrectly wired. A "Troubleshooting" section is provided to help resolve problems. Network cable information is provided in the "Network Cable and Components" Appendix.

Adapter Features

- Micro Channel-compatible.
- 10BaseT twisted-pair and AUI Ethernet network ports.
- High performance LAN controller device.
- Dual-ported 16 Kbyte random access memory (RAM) buffer.
- No direct memory access channels (DMA) required.
- On-board, non-volatile memory and programmable option selection feature replaces most jumpers to simplify installation.
- Socket provided for an optional read only memory (ROM) device. A boot ROM may be used in this socket.
- The adapter automatically determines whether to use the RJ-45 or AUI network connector based on which cable the user connects. No jumper changes are required if the cable is changed.
- "Link status" and "polarity correction" LED indicators are provided adjacent to the twisted-pair modular network port. When the computer power is on, the link status LED is lit if a normal connection exists between the adapter board and a concentrator. The polarity correction LED is lit if the twisted- pair wiring polarity on the receive pair is not reversed. If the polarity is reversed, the adapter automatically corrects the reversal and functions normally.

Driver Diskettes

The driver diskettes contain a readme.doc file, software driver programs, and a hardware diagnostic program for this and other LAN adapters. Refer to the readme.doc file for a listing of network operating systems that are supported by the adapter and for information on installing the software driver programs. The diagnostic program on the diskettes is used to check the adapter and network cabling when installation and configuration is complete.

Network Environment

The adapter board is designed for use in a 10 Mbps 10BaseT twisted-pair wire network environment. This type of network has the same data throughput as a standard, coaxial-cabled, Ethernet LAN but uses unshielded telephone-type cables. The 10 Mbps twisted-pair wire network uses any 10BaseT compatible concentrator.

The adapter board can be used to do the following:

- Set up a twisted-pair network using telephone-type wire.
- Add computers using 10BaseT twisted-pair cable to an Ethernet network.
- Operate as an Ethernet LAN adapter board in a standard Ethernet network.

Concentrators

When used with twisted-pair cable, the adapter must connect to a concentrator. This results in a star-wired network with the concentrator at the center of the star. The adapter is compatible with 10BaseT concentrators from a variety of vendors.

The adapter is also compatible with the AT&T and Hewlett Packard "StarLAN 10" twisted-pair signalling method. StarLAN 10 concentrators that are not 10BaseT-based are compatible with this adapter by simply changing a jumper on the adapter. For more information, refer to "W21 - Link Integrity Test" and "Using StarLAN 10 Concentrators."

Installation and Setup

This section contains the information needed to configure the adapter board and your computer system for operation. First, verify and/or change the LAN adapter board configuration. Next, follow the steps to prepare for the system configuration. Finally, install the LAN adapter board and configure the system.

Adapter Board Preparation

The following paragraphs provide information on preparing the LAN adapter board for installation. **Do not install the LAN adapter board yet.**

The adapter board provides the following hardware configuration options:

- A device socket: provided for installing an optional ROM, such as a boot ROM.
- ROM size selection: 16, 32, or 64 Kbytes (jumper options.)

Factory Jumper Settings

The adapter board is preset at the factory and ready to install in your computer. Before installing the board, verify the factory jumper settings as shown in Figure 1. If the settings are correct and no other hardware configuration changes are necessary, go to the section titled "LED Indicators". If the settings do not match the configuration shown in Figure 1 or if you intend to reconfigure the adapter board, continue on to the next section.

NOTE

Always handle the adapter board by its edges.

If you have an Ethernet 10BaseT adapter that has an additional jumper labelled W20 "Polarity Correction"' please **leave this jumper in the factory installed on position (as labeled on the board).**

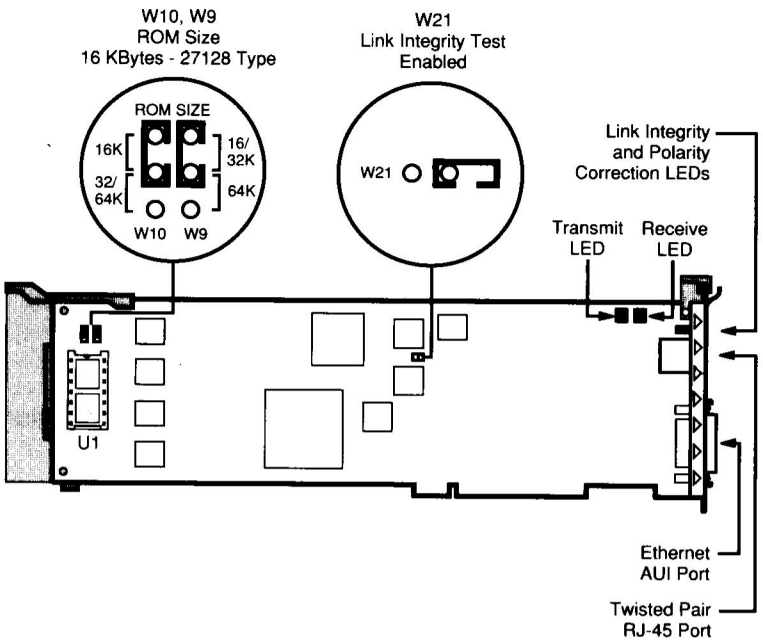


Figure 1. Factory Jumper Settings

W21 - Link Integrity Test

With this jumper (see Figure 1) removed, which is the normal setting, link integrity test pulses are transmitted and received according to the 10BaseT standard. If this jumper is installed, the link integrity test is NOT performed (no link test pulses are generated, and received link test pulses are ignored). The twisted-pair port (RJ-45) is enabled and the AUI port is disabled.

The adapter board will operate correctly when used in "StarLAN 10" networks without Link Integrity such as those by AT&T and Hewlett Packard, even though "StarLAN 10" without Link Integrity is not fully 10BaseT compatible. To operate the LAN adapter in this mode, the link integrity test function **must** be disabled (jumper installed).

NOTE

A conflict will occur if this jumper is installed when the AUI port is in use.

Enable Link Integrity Test	W21	FACTORY SETTING
Disable Link Integrity Test	W21	

LED Indicators

There are four LED indicators on the adapter bracket and adapter as shown in Figure 2. These have the following functions:

P - Polarity Correction LED (Green)
This indicator is on when the twisted-pair received signal polarity is correct and the link is valid (the "L" indicator is on). If this indicator is off when "L" is on, the adapter will still operate properly, but the received signal polarity is reversed.

L - Link Integrity LED (Green)
This indicator is on when the twisted-pair link is valid (10BaseT Link Test Pass mode) or when jumper W21 (Link Integrity Test) is installed. It indicates that the RJ-45 port is being used instead of the AUI port.

T - Transmit LED (Yellow)
This indicator flashes to show when the adapter is transmitting.

R - Receive LED (Green)
This indicator flashes to show when the adapter is receiving. It also flashes when transmit data from the adapter is looped back to the receiver by the on-board twisted-pair transceiver or by an external transceiver connected to the AUI port.

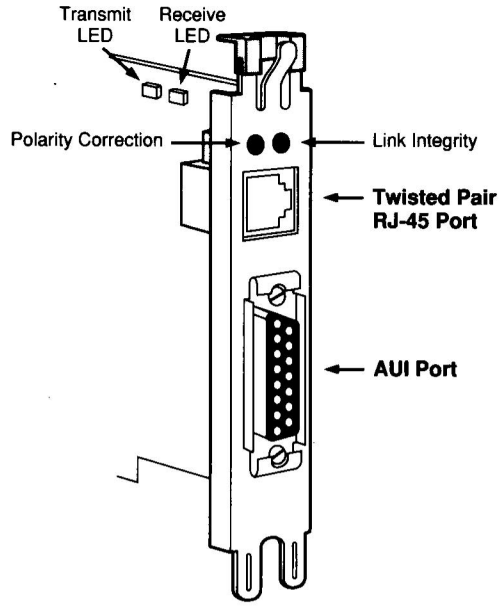


Figure 2. Location of LED Indicators on Adapter

Memory Space Requirements

The adapter board can occupy as much as 80 Kbytes of computer memory space with its 16 Kbytes of shared RAM buffer and a 64 Kbyte ROM installed. Both the shared RAM and ROM device are located in the memory range C0000 to E0000 (hex).

Note that there is a maximum of 128 Kbytes of total available RAM for all option boards installed in a computer. This memory space is allocated in the range C0000 to DFFFF (hex). If, for example, two adapter boards are installed in a computer and each is set to use 16 Kbytes of shared RAM and each includes a 16-Kbyte ROM device, 64 Kbytes of RAM is available for other option boards.

When configuring the adapter board using the configuration program on the *Reference Diskette* that came with your operating system, any memory space conflict will be indicated. A non-

conflicting value must then be specified so that the adapter will work properly.

System Unit Configuration

Each time an option board is installed or removed, the PS/2 Micro Channel system unit must be configured using the *Reference Diskette*. The configuration program on the *Reference Diskette* has two modes of operation: Automatic configuration and manual configuration.

In the automatic mode, the configuration program uses the LAN adapter board options provided on the driver diskette to automatically select parameters that do not conflict with those used by any other board installed in the system. The automatic mode is the fastest way to configure the system. However, in some situations a manual configuration is required, such as when a boot ROM or multiple LAN adapter boards are installed.

In the manual mode, the configuration program displays the LAN adapter board options provided on the driver diskette and allows you to select parameter values one at a time. If you choose a value that conflicts with that used by another board, or a value previously chosen, the conflict will be noted and you must select another parameter from a list provided by the configuration program.

The manual mode must be used if a ROM is installed on the LAN adapter board or if multiple LAN adapters are installed. The ROM can only be enabled using the manual mode because "ROM disabled" is the default value used in the automatic mode. Most network software, including NetWare, requires that each LAN adapter board have a unique interrupt request (IRQ) channel if more than one adapter board is installed in a computer.

The automatic mode of the *Reference Diskette* configuration program, however, allows adapter boards to share IRQ channels. No configuration conflict will be indicated when an IRQ channel is assigned to more than one adapter board. Therefore, you must perform a manual configuration and select unique IRQ channels when more than one LAN adapter board is installed.

The configuration program allows you to change the following parameters:

- I/O base address
- Interrupt request (IRQ) channel
- Shared RAM base address
- BIOS ROM enable, base address and size (16, 32, or 64 Kbytes)

Hardware Configuration

You need the following items to setup the system for LAN adapter board operation:

- The master *Reference Diskette* provided with the system (or a backup copy).
- The driver diskette provided with the LAN adapter board.
- A blank high-density diskette and label.

If you already have a backup copy of the *Reference Diskette*, skip to Step 2.

1. Back up the master *Reference Diskette* by performing the following:
   - With system power **OFF**, insert the master *Reference Diskette* into drive A.
   - Turn the system power **ON**. The *Reference Diskette* program will boot.
   - When the *Reference Diskette* title screen appears, press **<ENTER>**. The Main Menu will be displayed.
   - Select **Backup the Reference Diskette** from the menu. Follow the instructions on the screen. You will need a blank high-density (HD) diskette. When the backup operation is finished, a "copy complete" message will appear. Press **<ENTER>** and the Main Menu will be displayed.
   - Store the master *Reference Diskette* in a safe place. Label the copy **Reference Diskette-Copy** and insert it in drive A.
2. Copy the @6FC2.ADF file from the driver diskette provided with the LAN adapter board onto the **Reference Diskette-Copy** by performing the following:

   NOTE

   If you skipped to this step, boot the **Reference Diskette-Copy** by inserting it into drive A and turning the system power **ON**. When the title screen appears, press **<ENTER>** to display the Main Menu.

   - Select **Copy an Option Diskette** from the menu and follow the instructions on the screen. When prompted, use the diskette, provided with the LAN adapter board, for the "option diskette" referred to in the instructions.
   - Press **<ENTER>** when the operation is complete. The Main Menu will be displayed.
   - Do not restart the computer. Remove the **Reference Diskette-Copy** from drive A.
   - Press **<ESC>** to exit the configuration program.
   - Turn the system power **OFF.**
3. If you did not prepare the LAN adapter board for installation, refer to the section in this guide titled "Adapter Board Preparation" and do so now. Refer to your computer system documentation in the section that describes how to install options for instructions on inserting the LAN adapter into the system. The LAN adapter board may be installed in any unoccupied expansion slot.
4. Configure the system for LAN adapter board operation by performing the following:
   - Insert the **Reference Diskette-Copy** (that has the @6FC2.ADF file from the diskette) into drive A.

- Turn the system power **ON**. The number "165" will be displayed momentarily, then the title screen will appear.
- Press **<ENTER>** and an error message will be displayed. The message indicates that you have changed the system configuration by installing the LAN adapter board. The message prompts you to type **Y** if you want to perform an automatic configuration.
- If you type **N**, an automatic configuration does not occur and the program will allow you to perform a manual configuration. Instructions for automatic and manual configurations are in the following sections.

NOTE

Select manual configuration if a boot ROM is installed or if multiple LAN adapter boards are installed.

Automatic Configuration

- Type **Y** to perform the automatic configuration. When automatic configuration is complete, a message is displayed.
- Remove the **Reference Diskette-Copy** from drive A and store it in a safe place. If your operating system is not installed on a hard disk drive, insert a bootable system diskette in drive A.
- Follow the screen instructions for restarting the computer or turn the computer power OFF and back ON again. Go to the section titled "Completing the Installation" in this *User Installation Guide.*

Manual Configuration

- Type **N** if a ROM or multiple LAN adapter boards are installed, or if you want to perform a manual configuration. The Main Menu will appear.
- Select **Set Configuration** from the menu. The Set Configuration menu will be displayed.

- Select **Change Configuration** from the menu. The screen will display the configuration parameters that can be changed.
- Using the "arrow" keys, move down the display to the slot indicating the appropriate LAN adapter board (**8003W/A**). Stop at the first parameter listed for that slot.
- If an asterisk appears next to the parameter and "conflict" is displayed at the top of the screen, you must select an optional value for that parameter. Use the **<F5>** and **<F6>** keys to select a parameter value that does not cause the conflict message to appear. Move down to each parameter, selecting an optional parameter value whenever a conflict is indicated.

NOTE

The Change Configuration program does not indicate a conflict when two or more boards are set to the same IRQ channel. Nevertheless, you must select unique and dedicated IRQ channels for each LAN adapter board. Refer to Appendix A for more information on installing a ROM.

- The default value for the "BIOS ROM Space" parameter is "BIOS ROM Disabled". If a ROM device is installed on the LAN adapter board, press **<F6>** to enable the ROM and select a base address appropriate for the size of the ROM device you installed. The memory space occupied by the ROM must not cause a conflict with the shared RAM space, another option board with a BIOS ROM, or software.

5. Save the manual configuration parameters by performing the following:
   - Press **<F10>** to save the parameters. When the "Save Configuration Complete" message appears, press **<ENTER>** to continue.
   - Press **<ESC>** to exit the Change Configuration menu. The Set Configuration menu will be displayed.

- Press **<ESC>** to exit the Set Configuration menu.
- Remove the **Reference Diskette-Copy** from drive A and store it in a safe place. If your operating system is not installed on a hard disk drive, insert a bootable system diskette in drive A.
- Follow the screen instructions for restarting the computer or turn the computer power OFF and back ON again.

Completing the Installation

You are ready to interconnect the LAN adapter board to the network and install your network software package.

Network Interconnection

10BaseT twisted-pair and other Ethernet cable-type networks have different characteristics which are related to the cable used for each network type. The following sections explain the various types of interconnections.

10BaseT Twisted-Pair Cabling

A network using unshielded twisted-pair wire for connecting computers has the following characteristics:

- Maximum length of all connecting cables between a computer and concentrator is 100 meters (330 feet).
- Up to 1024 computers (nodes) can be supported on the network.
- Can use economical 10BaseT, IBM Type 3, or AT&T PDS cable.
- Stations connect to the network through a concentrator.
- Automatic verification of Link Integrity.
- Standard eight-pin modular jack, the same as is used with StarLAN and ISDN.

10BaseT Twisted-Pair Port

The twisted-pair network port on this adapter board is a modular, RJ-45 eight-pin socket (Figure 3). Each end of the twisted-pair

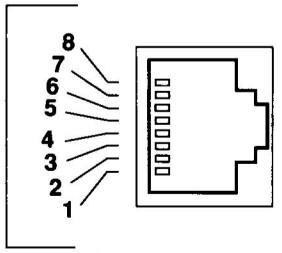


Figure 3. Board View of Female Modular Socket Pin Locations

network interface cable has a mating, RJ-45-type, eight-pin modular plug. Pin assignments are;

Pin	Assignment
1	Output (Transmit) Data (+)
2	Output (Transmit) Data (-)
3	Input (Receive) Data (+)
4	Reserved
5	Reserved
6	Input (Receive) Data (-)
7	Reserved
8	Reserved

10BaseT Twisted-Pair Interconnection

This section guides you through the installation of a computer in a 10BaseT twisted-pair network. You will need the following items for interconnecting the network computers:

- A twisted-pair interface cable for the computer:
- A local concentrator for interconnecting computers or a wall jack wired for 10BaseT twisted-pair cable that leads to a concentrator in a wiring closet.

Insert the modular plug at one end of the interface cable into the RJ-45 twisted-pair wire network port at the rear of the computer.

Attach the other end of the interface cable to an input port of a 10BaseT-compatible concentrator.

Link status

When the computer has been connected to a concentrator port and both systems are powered on, you can verify the connection by observing the green link integrity LED indicator provided above the twisted-pair network port on the adapter board. Refer to the *"LED Indicators"* section. When a valid connection exists, the link status LEDs on the adapter board and at the concentrator are lit. If the LEDs are not lit, and the computer and

concentrator are powered on, check the modular plug connection at the adapter board and at the concentrator and all wiring.

Using Existing Phone Cable

Existing telephone wiring in your building can be used for network connection if the wiring meets minimum standards and wall jacks are wired correctly. Before starting the installation, verify that any twisted-pair wire used for network connection meets the requirements described in Appendix B.

Existing telephone wiring may consist of a separate 8-conductor, twisted-pair cable routed to each wall jack, or it may consist of dozens of twisted-pair conductors in a cable bundle. If a cable bundle is used, the conductors for each phone line have been separated from the bundle and attached to the wall jack.

In either case, **the arrangement of twisted-pairs at the wall jack in a typical telephone installation is usually not acceptable for network signal transmissions. Network signals on pair 1 must be to wall jack pins 1 and 2 while network signals on pair 2 must be to wall jack pins 3 and 6.**

To determine which conductors are twisted together, record the wire colors for each pair and note the pin to which each wire is attached. For example, an eight-conductor cable may have the following color and wire-pair configuration:

Pair	Function	Color Code	Wall Pin
1	Network Signals	Orange/White Band	2
1	Network Signals	White/Orange Band	1
2	Network Signals	Green/White Band	6
2	Network Signals	White/Green Band	3
3	Telephone	Blue/White Band	4
3	Telephone	White/Blue Band	5
4	Telephone	Gray	8
4	Telephone	Orange	9

Network interconnections are usually made in a wiring closet. You must be able to identify and separate the conductors which are carrying network signals from the conductors that are used for telephone operation. The color code and wire-pair arrangement of telephone cable will vary from one manufacturer to another.

Interface cable wiring

The twisted-pair interface cable provided has an eight-pin modular plug at each end that mates with the twisted-pair network port on the LAN adapter board and with an RJ-45 modular wall jack. If you are making your own interface cables to use as dedicated network wiring, or as extension cables, see Figures 4 and 5 for wiring information.

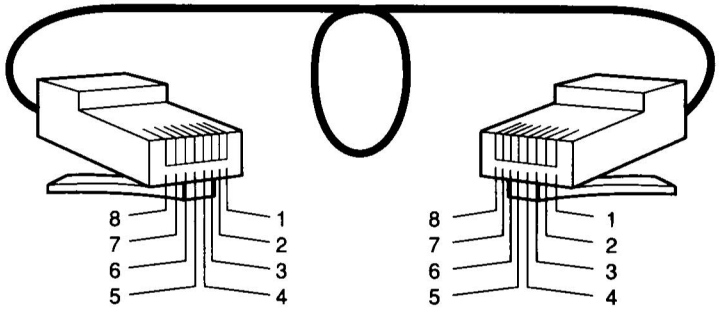


Figure 4. Eight-Conductor Interface Cable

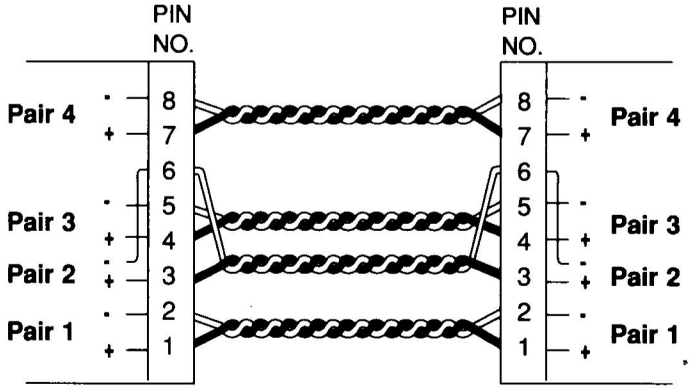


Figure 5. Interface Cable Wiring

Wiring closet termination

If you are using the existing wiring in your building, concentrators are typically mounted inside the wiring closet, where the telephone conductors are terminated at a wiring panel. A segment of twisted-pair wire is attached to the conductors from each network computer at the termination panel and plugged into a concentrator port. Refer to the notes you made to identify the conductors used for network signals.

If you are installing new network cable, the wire pairs for each computer may be attached directly to an RJ-45 plug and connected to a concentrator port. The wire pairs may also be terminated at a wiring panel (or other termination device) and then connected to a 10BaseT concentrator port through a twisted-pair wire segment that has an RJ-45 plug at one end. (See Figure 6.) Connect each set of twisted-pair wires to a concentrator port in the same manner.

Most concentrator manufacturers provide a means for connecting concentrators in a daisy chain fashion. Refer to the concentrator's installation guide for specific information.

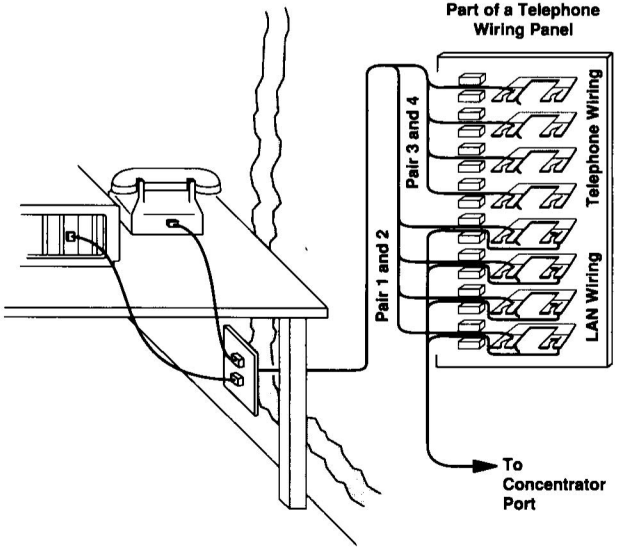


Figure 6. Wiring Panel Termination

Using StarLAN 10 Concentrators

AT&T and Hewlett Packard StarLAN 10 compatible adapters operate over StarLAN-type wiring and use 10 Mbps Ethernet speeds and protocols, but original StarLAN 10 products did not provide the Link Integrity feature required by the 10BaseT standard. Your Ethernet 10BaseT adapter can operate with existing StarLAN 10 products that do not have Link Integrity providing that you disable the Link Integrity Test function on the adapter via jumper W21. Refer to the "Factory Jumper Settings" section for more information on setting the jumper.

Standard Ethernet Network Port

The AUI port allows you to attach a standard Ethernet AUI drop-cable to the adapter board. (Refer to Appendix B for additional details on an AUI port.) The adapter board will operate on an Ethernet network by attaching an AUI drop-cable to the AUI port and to a trunk coaxial cable through a standard Ethernet transceiver.

NOTE

A standard Ethernet 50 Ohm terminator is required at each end of the coaxial cable.

The adapter board's standard Ethernet port can also be used for operation with other types of cabling such as fiber-optic. For example, you can attach an existing AUI drop-cable to the AUI port on the LAN adapter board and attach any standard transceiver to the other end of the drop-cable. The transceiver provides a connection to the desired cable type.

NOTE

The adapter automatically determines whether to use the RJ-45 or AUI network connector based on which cable you connect.

Ethernet Coaxial Cabling

A standard Ethernet network, using these adapter boards and thick coaxial cable, has the following characteristics:

- Maximum cable segment length (between repeaters) is 500 meters.
- Total network span (with fiber-optic repeaters) is 2500 meters.
- Minimum cable segment length is one meter.
- Up to 1024 LAN stations can be supported on the network.
- Up to 100 LAN stations can be attached per segment.
- Uses rugged, heavily insulated (thick) coaxial interconnection cable.
- Connects to Thin Ethernet segments through repeaters or bridges.

Ethernet Interconnection

The following paragraphs guide you through a typical Ethernet installation. (See Figure 7.)

You will need the following items for interconnecting your computers:

- Standard (thick) Ethernet cable (up to 500-meter segments).
- An AUI drop-cable for each computer (50 meters in length, maximum).
- An MAU transceiver/connector for each cable connection.
- A signal repeater for each additional 500-meter cable segment (if any).
- Two 50-Ohm coaxial cable terminators for each segment.
- Hand tools appropriate for the MAU and cable-tap kit used.

Starting with the first computer to be connected, attach an AUI drop-cable to the AUI network port on the adapter board. A sliding latch is provided on the AUI connector port that locks the cable to the connector. The latch is purposely tight so use a

small blade screwdriver to move the latch onto the locking posts. Make sure the posts are aligned correctly and the connector is pushed in all the way.

Attach a standard Ethernet transceiver at a marked location on the Ethernet cable. (Ethernet cables are marked at 2.5 meter intervals.) Several types of cable tap kits are available; follow the instructions provided with the cable tap kit you are using. Attach the AUI drop cable to the standard Ethernet transceiver and lock the sliding latch to hold the connector in place.

Attach all of the computers and segments to the main or "spine" Ethernet cable in similar fashion. Use a signal repeater to attach each additional cable segment or "rib" (500 meters each, maximum). Attach a 50 Ohm cable terminator at each end of every cable segment.

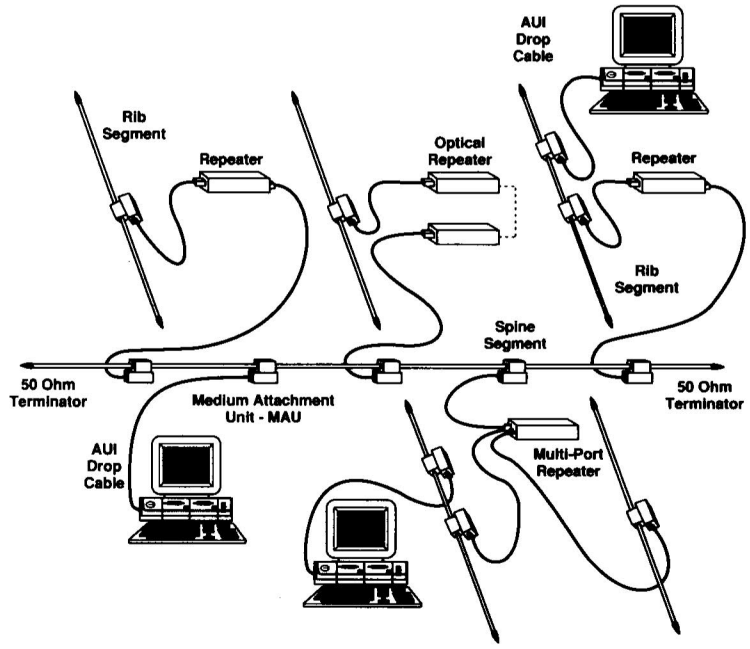


Figure 7. Example Ethernet Installation

Diagnostic Test Program

A diagnostic program is provided on the driver diskette that you received with the LAN adapter board. Refer to the readme.doc file on the disk for an explanation of the operation of the diagnostic program. Use the test program to verify correct installation in every computer that contains one of these LAN adapter boards. Perform the diagnostic test **before** installing your network software.

Appendix A
Installation Options

ROM Installation

A device socket is provided on the adapter for installing an optional ROM device. For example, if a boot ROM device is installed at U1, the computer will load the disk operating system software through the adapter board. ROM devices are available from your dealer. Refer to Table A-1 for ROM size options.

NOTE

Before handling the ROM device, discharge static electricity from your body by touching the metal cabinet of an electrical product that is plugged into a three-prong grounded outlet.

Hold the ROM device without touching its pins, oriented as shown in Figure A-1. Gently insert the device into the socket, making sure that the notch in the ROM device and all pins are positioned over the socket openings. Gently move the device from side to side as you seat the pins. Verify that all pins are fully seated in the socket.

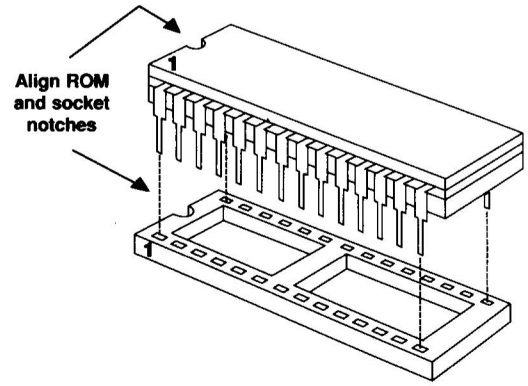


Figure A-1. Installing the ROM Device

ROM Size Selection - W9, W10

The adapter board with boot ROM socket is preset at the factory to use a 16 Kbyte ROM device. The size of the ROM is defined using jumpers at W9 and W10.

To verify the size (in Kbytes) of the ROM device you installed, check the documentation that accompanies the device. The ROM size used can be 16, 32, or 64 Kbytes. If you need to select a ROM size other than the 16 Kbyte factory setting, configure the jumpers at W9 and W10 for the desired ROM size as shown in Table A-1.

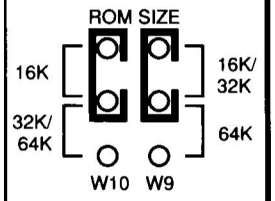
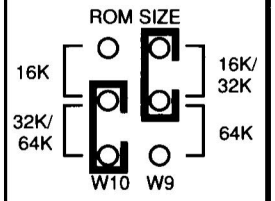
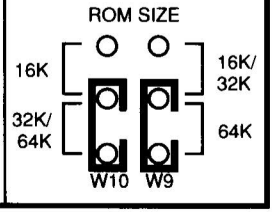
ROM Size	ROM Type	W10, W9
16 Kbytes	27128	 FACTORY SETTING
32 Kbytes	27256	
64 Kbytes	27512	

Table A-1. ROM Size Options - W9, W10

Appendix B
Network Cable and Components

Use the information in this section to ensure that the cable and connecting hardware meet the requirements of the IEEE standard. The components specified in this section, as well as precut and preassembled cables, are available from your dealer. The components and manufacturers listed are for reference purposes only; equivalent components may be used.

Ethernet Network Components

LAN adapter - A LAN adapter is the interface between the computer and the network cable. The Ethernet 10BaseT adapter has two types of network ports. The RJ-45 port is used in conjunction with an unshielded twisted-pair 10BaseT Ethernet network connection. The AUI port is used for connecting an MAU to an Ethernet network using thick cable or any Ethernet medium.

Media attachment unit (MAU) transceiver - An MAU is an external transceiver used to connect AUI drop-cables to thick Ethernet coaxial cable. MAUs are also available for connection to thin Ethernet, twisted-pair, and fiber-optic cable.

Repeater - A repeater is used to connect cable segments together. A repeater retimes and transmits data signals as they pass from one segment to another. Single port and multi-port repeaters are available for coaxial, fiber optic, or twisted-pair cable.

Concentrator - A multi-port repeater for twisted-pair networks as described above.

10BaseT Twisted-Pair Cable

- Unshielded, twisted-wire pairs (2 pairs)
- 22, 24, or 26 gauge
- Characteristic impedance at 10 MHz: 85 to 110 ohms
- Maximum attenuation at 10 MHz: 11.5 dB/100 meters
- Maximum attentuation at 5 MHz: 7.2 dB/100 meters

Recommended Cable (or equivalent):

AT&T D-inside wire (DIW and PDS)

4-pair/non-plenum . . . . . DIW 4/24 W1000

4-pair/plenum . . . . . C-plenum 4 R1000

25-pair/non-plenum . . . . . DIW 25/24 R1000

25-pair/plenum . . . . . C-plenum 25 R1000

IBM Type 3

6-pair twisted . . . . . Belden - 9566

2-pair twisted . . . . . Belden - 9562

4-pair twisted . . . . . Data Set Cable Company - 2404

NOTE

Telephone-type cable commonly known as "silver satin" is **NOT ACCEPTABLE**. Silver satin cable is flat in shape and typically has a silver vinyl jacket. Use of silver satin cable can cause a false data collision on the network.

- RJ-45 modular plugs: Molex 90075-0037, or equivalent
- Crimper tool: Molex 11-01-0026, or equivalent
- RJ-45 modular wall socket: Molex 95015-0003, or equivalent

Thick Ethernet Cable and Components

Thick Ethernet cable - Ethernet trunk coaxial cable: Solid tinned-copper conductors, 2.5 meter tap-in markings, 50 Ohm nominal impedance, with N-type coaxial connectors. The Belden part numbers for cable only are 9880 and 89880 (plenum rated).

AUI drop-cable - The interface cable between the LAN adapter and an MAU attached to the trunk coaxial cable or other Ethernet medium. The drop-cable has a 15-pin AUI connector at each end and may be up to 50 meters in length. The Belden part numbers for drop cable only are 9901 and 89901 (plenum rated).

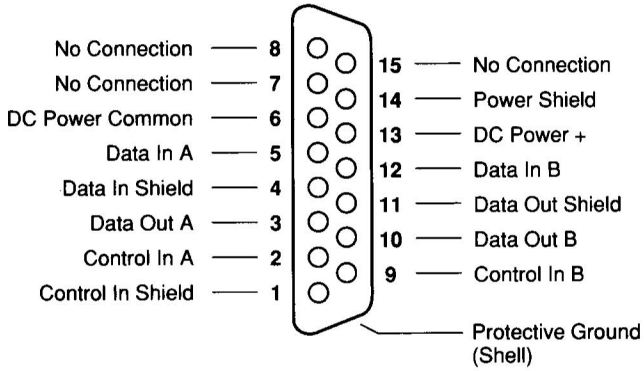


Figure B-1. Male AUI Connector Pin Functions

DB-15 AUI connector - Used at each end of the AUI drop-cable. Anixter part numbers are 081424 (female, solder type), 080867 (slide lock), 081425 (male, solder type), 080868 (locking post).

Figure B-1 shows the pin locations for the male connector. Note that the pin locations for the female connector are the mirror image of this.

If the +12 volt power source at pin 13 of the AUI connector has been shorted to ground, a thermistor type fuse will open the circuit and remove the voltage from pin 13. It requires approximately one hour from the time the short circuit is removed for the thermistor to restore the +12 volts to pin 13.

Cable terminator - A terminating resistor with 50 Ohm nominal impedance must be installed at each end of every trunk coaxial cable segment. A thick Ethernet terminator has an N-type coaxial connector. Anixter part number is 080870.

Appendix C
Troubleshooting

General

If the LAN adapter is not functioning, follow the steps below to verify correct installation.

1. Verify that the network cable is securely attached to either the RJ-45 or AUI network port.
2. Check the cable connection to the network. In a 10BaseT Ethernet network, check the concentrator that is connected to the computer and verify that it is ON and is 10BaseT compatible. The link integrity LEDs should be lit at both ends. In a thick Ethernet network, check the drop-cable connection at the MAU transceiver.
3. In coaxial cable networks, verify that 50 Ohm cable terminators are installed as required. Terminators must be 50 Ohm impedance (within 2%) or errors may occur. Terminators are installed at the open end of every cable segment.
4. Make sure that the interconnecting cables meet IEEE standard requirements. Refer to Appendix B for recommended cable.
5. If the adapter is attached to a network using the AUI connector, a short to ground on the +12 volt pin (pin 13) in the cable will cause a thermistor to shut off power to the connector. It requires approximately one hour from the time the short circuit is removed for the thermistor to restore the +12 volts to pin 13 of the AUI connector.
6. In cold climates, allow five minutes of warm-up time for the computer temperature to stabilize.
7. Make sure that you correctly configured your system for the LAN adapter board using the program on the *Reference Diskette*.
8. Make sure that you copied any required software drivers from the driver diskette as instructed in the documentation included with your network software. Verify that you modified

the software driver to reflect the actual configuration used by the adapter.

9. If more than one LAN adapter is installed in your computer, make sure you selected a different IRQ channel for each one.

10. Verify that the network software is loaded correctly.

11. If a ROM device is installed on the adapter, verify that the correct ROM size is selected at W9 and W10. Verify that the ROM device is correct for the type of computer system and network software you are using. Make sure that every pin on the ROM device is seated firmly in the socket.

12. Make sure that the adapter board is completely seated in the computer's expansion slot.

13. Verify that no cables inside the computer were pulled loose when you installed the adapter.

Technical Assistance

You can get assistance for installing your LAN hardware and software by calling your dealer. Before calling for technical help, be prepared to supply the following information:

1. Computer system manufacturer and model, BIOS manufacturer, BIOS date, BIOS version, CPU type, system clock speed, bus speed, memory size, monitor type (color, monochrome, high resolution, etc.) and printer type (serial or parallel).

2. 10BaseT concentrator manufacturer and model.

3. DOS version, network software manufacturer and version, software driver version, software driver file size and date.

4. Applications software name, manufacturer, version, and date.

5. Contents of the AUTOEXEC.BAT and CONFIG.SYS files in the root directory of the computer(s) having problems.

6. Error codes or messages displayed by diagnostic programs, network operating system, and applications software.

7. The type and length of interconnecting cable used. Please be specific.

8. Types of LAN adapters used in the network. The configuration parameters (I/O address, IRQ channel, RAM size and base address, ROM size and base address) of the LAN adapter(s) having problems.

9. Other option boards and functions installed in the computer and their configuration parameters (I/O address, IRQ channel, RAM size and base address, ROM size and base address). Possible option boards include: graphics adapters, mouse controllers, floppy controllers, extended memory boards, tape controllers, modems, other LAN adapters, and printer controllers.

Appendix D
Specifications

General

Hardware compatibility: . . IBM PS/2 Models 50, 60, 70, 80, and other Micro Channel systems.

Software compatibility: . . . . . NetWare, 3Com 3+, IBM OS/2 Extended Edition. Microsoft LAN Manager both DOS and OS/2 including 3Com 3+ Open, DECnet/PCSA, NETBIOS, UNIX, and many others

Standards supported: . . . . . IEEE 802.3 10BaseT and 10Base5, Ethernet Version 2

I/O base address: . . . . . 200 to 3E0 (hex)

Interrupt request channel: IRQ3, 4, 10, 15

RAM buffer size: . . . . . 16 Kbytes

RAM buffer base address: . . . . . C0000 to DE000 (hex)

ROM size options: . . . . . 16, 32, 64 Kbytes

ROM base address: . . . . . C0000 to DC000 (hex)

Electrical

Power (adapter only): . . . . . 5 VDC, 1.6 Amps, max. +12 VDC, 0.1 Amps, max.

Power (external transceiver): . . . . . +12 VDC, 0.5 Amps, max.

Environmental

Operating temperature (ambient): . . . . . 0°C/32°F to 55°C/131°F

Storage temperature: . . . . . -20°C/-4°F to 70°C/158°F

Environmental (Continued)

Operating humidity: . . . . . .10% to 90% (non-condensing)

Storage humidity: . . . . . .5% to 95% (non-condensing)

Physical

Height (without bracket): . . . . . .3.475 inches

Length (without bracket): . . . . . .11.50 inches

NOTE

These specifications are subject to change without notice.

System Configuration Chart

For future reference, record the configuration parameters for each board in your computer in the spaces provided below. Write the name of the option board, the expansion slot it occupies, IRQ and DMA channels, and memory space reserved for the board. For information on option boards that are already installed in your computer, consult the user instructions provided with them, or ask your dealer for assistance.

Recommended Adapter Settings:

Board	DMA	IRQ	I/O Address	Memory Base Address	
LAN Board	N/A	3	280 (hex)	D0000 (RAM) D8000 (ROM)	Slot #

Board	DMA	IRQ	I/O Address	Memory Base Address	
					Slot #
					Slot #
					Slot #
					Slot #
					Slot #
					Slot #
					Slot #

Western Digital
Communications Products

Service and Return Information

If you are having a problem with your Western Digital local area network hardware product, review the "Troubleshooting" instructions in the *User Installation Guide* (if applicable) or contact your dealer for assistance.

If the problem remains unresolved, call Western Digital Technical Support at the following number: **(714) 757-3950**. Phones are answered from 8:00 a.m to 5:00 p.m. Pacific Time, Monday through Friday.

Western Digital strongly advises that you contact Technical Support before returning any product for service.

If it is necessary to return the product to Western Digital, do the following:

- After receiving an RMA (return authorization request) number from your dealer or WD representative, pack the product in its original shipping carton. If the original packing material is not available, use anti-static packaging. Use padded packaging material if anti-static packaging is not available.
- Make sure the RMA number is clearly marked on the box.
- Enclose a copy of the original invoice or receipt as proof of purchase if the product is within its one-year warranty period.
- Enclose a cashier's check or money order for $75.00 (U.S.) if the product is beyond the one-year warranty period.

PROCESSING CHARGES		
Product Point of Purchase	**Product in Warranty with Valid Defect**	**Product Out of Warranty**
Domestic	No Charge	$75.00
International	No Charge and Duty	$75.00

Notes: Western Digital reserves the right to replace any product returned for service. Allow 30 days for return of product.

The disassembly of any product voids its warranty.

Ship the product needing service, freight prepaid, to Service 1 or to the WD service location designated by your dealer or WD representative at the time you obtain your RMA number.

Western Digital Corporation
Service 1
15345 Barranca Parkway, Dock B
Irvine, CA 92718
USA

1-800-832-4778