**INSTALLATION GUIDE for
F3019, F3059, F3069, F3079,
F7019, F7059, F7069, and F7079
FDDI ADAPTERS**

Desktop Network Interface Products

C A B L E T R O N   S Y S T E M S ,   I N C.

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SAFETY INFORMATION

CLASS 1 LASER TRANSCEIVERS

The F3079 and F7079 are Class 1 Laser Products

**CLASS 1
LASER PRODUCT**
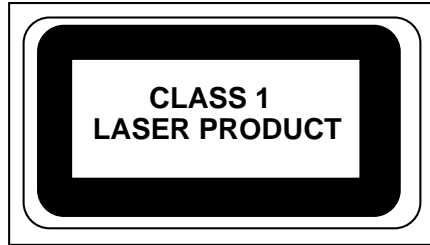
The F3079 and F7079 adapters use Class 1 Laser transceivers. Read the following safety information before installing or operating these adapters.

The Class 1 laser transceivers use an optical feedback loop to maintain Class 1 operation limits. This control loop eliminates the need for maintenance checks or adjustments. The output is factory set, and does not allow any user adjustment. Class 1 Laser transceivers comply with the following safety standards:

• 21 CFR 1040.10 and 1040.11 U.S. Department of Health and Human Services (FDA).

• IEC Publication 825 (International Electrotechnical Commission).

• CENELEC EN 60825 (European Committee for Electrotechnical Standardization).

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SAFETY INFORMATION

CLASS 1 LASER TRANSCEIVERS

Laser Radiation and Connectors

When the connector is in place, all laser radiation remains within the fiber. The maximum amount of radiant power exiting the fiber (under normal conditions) is -12.6 dBm or 55×10^{-6} watts.

Removing the optical connector from the transceiver allows laser radiation to emit directly from the optical port. The maximum radiance from the optical port (under worst case conditions) is 0.8 W cm^{-2} or $8 \times 10^3 \text{ W m}^2$ sr-1.

Do not use optical instruments to view the laser output. The use of optical instruments to view laser output increases eye hazard. When viewing the output optical port, power must be removed from the network adapter.

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CHAPTER 1

INTRODUCTION

The Cabletron Systems Installation Guide for F3019, F3059, F3069, F3079, and F7019, F7059, F7069, and F7079 FDDI Adapters is a simple installation and reference guide for the Cabletron Systems Micro Channel and EISA architecture compatible FDDI network adapters. The FDDI network adapters connect your Micro Channel or EISA Bus compatible computer to a dual ring Fiber Distributed Data Interface network employing Multimode Fiber, Single Mode Fiber, or 100 Megabit FDDI Over Copper technologies.

You should read through this manual to gain a full understanding of the capabilities of the Cabletron Systems FDDI network adapters.

1.1   USING THIS MANUAL

This manual is structured so that you can follow sequential chapters as you install and test the Cabletron FDDI network adapters.

Chapter 1, **Introduction**, discusses the capabilities of the Cabletron Systems FDDI network adapters. A Technology Overview explains briefly the technology of transmission of FDDI Over Copper twisted pair wire.

Chapter 2, **Installing the Adapters**, contains instructions for installing the network adapters in a Micro Channel or EISA Bus compatible computer.

Chapter 3, **Network Connections**, provides instructions for connecting the network adapter to the FDDI network.

Appendix A, **FDDI Media Specifications**, lists the specifications for Multimode Fiber cable, Single Mode Fiber cable, and FDDI Over Copper twisted pair media.

1.2 GETTING HELP

If you need additional support related to the network adapters, or if you have any questions, comments, or suggestions concerning this manual, contact Cabletron Systems Technical Support. Before calling Cabletron Technical Support, please have the following information available for use by the Cabletron Technical Support personnel who will assist you.

- The network adapter type and Serial Number (i.e., F3069 or F7069, 1234567).

- The software version that appears on the front of the installer diskette(s).

- Your computer name and model number.

- The operating system and version number that you are using (i.e., MS-DOS Version 5.0, OS/2 Version 2.0, etc.).

- The make and model of any other add-in cards in your system and the version number of any associated software.

You can contact Cabletron Systems Technical Support by:

Phone: (603) 332-9400

FAX: (603) 337-2444 Specify Document No. 1101 (listing of latest driver releases, sample configurations, and key-words)

BBS: 603-335-3358 (4 lines available)

Cabletron Technical Support can also be reached over the Internet by sending email to: **support@ctron.com**. Network drivers are also available for anonymous FTP download from **ctron.com at IP address (134.141.197.25)**. CompuServe subscribers can contact Cabletron Technical Support through the Cabletron Forum by entering:

GO CTRON at any **!** prompt.

1.3   FDDI ADAPTER FEATURES

This section outlines the features of the FDDI network adapters. Adapters with a model number beginning with F30 are Micro Channel compatible adapters. Adapters with a model number beginning with F70 are EISA architecture compatible adapters. Table 1-1, below shows the FDDI adapter types and variations.

Table 1-1. Adapter Types and Media

Adapter Type	Bus Interface	Media
F3019	Micro Channel	FDDI Over Copper (unshielded twisted pair)
F3059	Micro Channel	FDDI Over Copper (shielded twisted pair)
F3069	Micro Channel	FDDI (Multimode Fiber)
F3079	Micro Channel	FDDI (Single Mode Fiber)
Adapter Type	**Bus Interface**	**Media**
F7019	EISA Bus	FDDI Over Copper (unshielded twisted pair)
F7059	EISA Bus	FDDI Over Copper (shielded twisted pair)
F7069	EISA Bus	FDDI (Multimode Fiber)
F7079	EISA Bus	FDDI (Single Mode Fiber)

1.3.1   Connectivity

F3019
The Cabletron Systems F3019 FDDI adapter connects your Micro Channel compatible computer to an FDDI Over Copper 100 Megabit unshielded twisted pair network.

F3059
The Cabletron Systems F3059 FDDI adapter has the same characteristics as the F3019 above, except that it is configured for shielded twisted pair cable.

F7019

The Cabletron Systems F7019 FDDI adapter connects your EISA Bus compatible computer to an FDDI Over Copper 100 Megabit unshielded twisted pair network.

F7059

The Cabletron Systems F7059 FDDI adapter has the same characteristics as the F7019 above, except that it is configured for shielded twisted pair cable.

F3069

The Cabletron Systems F3069 FDDI adapter connects your Micro Channel Bus compatible computer to an ANSI Standard X3T9.5 Fiber Distributed Data Interface network.

F7069

The Cabletron Systems F7069 FDDI adapter connects your EISA Bus compatible computer to an ANSI Standard X3T9.5 Multimode Fiber Distributed Data Interface network.

F3079

The Cabletron Systems F3079 FDDI adapter connects your Micro Channel compatible computer to an ANSI Standard Single Mode Fiber Distributed Data Interface network.

F7079

The Cabletron Systems F7079 FDDI adapter connects your EISA Bus compatible computer to an ANSI Standard Single Mode Fiber Distributed Data Interface network.

The F3069, F3079, F7069, and F7079 adapters use industry standard Type S dual fiber FDDI connectors.

The F3019 , F3059, F7019, and F7059 FDDI Over Copper adapters use the industry standard RJ-45 connectors (for unshielded and shielded twisted pair wire). All of the adapters can be configured as Single Attached Stations (SAS), or Dual Attach Stations (DAS), as defined in the ANSI X3T9.5 specification.

1.3.2   Software

Software drivers for various operating systems are supplied by Cabletron on floppy diskette media. The drivers support industry standard ANSI X3T9.5 FDDI Protocol. The **Network Software Installation Guide**, which accompanies the Cabletron software diskette, explains how to run diagnostics, and load and configure the various network drivers supplied by Cabletron.

1.3.3   Statistics

Statistics can be gathered for the network adapter either from the computer the adapter is installed in, or from another workstation utilizing Cabletron Systems' Remote LANVIEW® for Windows, Remote LANVIEW for SunNet Manager®, or SPECTRUM®.

Through this software, you can gather statistics on the adapter's activity on the FDDI network. For further information on gathering network adapter statistics from another workstation, refer to the appropriate network management manual.

1.3.4   LANVIEW® LEDs

The FDDI network adapters incorporate Cabletron's LANVIEW® LEDs. LANVIEW LEDs indicate receive and transmit data, show the status of the FDDI link, and indicate adapter error conditions.

The LEDs help you diagnose problems, such as a failure to establish a link between the adapter and an active FDDI device at the other end of the network segment.

1.3.5   Technical Specifications

- System Interface   (All F30xx Models) Fully compatible
                            with all computers that support 32-bit
                            MicroChannel Bus architecture.

                            (All F70xx Models) Fully compatible
                            with all computers that support the
                            EISA (Extended Industry Standard
                            Architecture) Bus.

- FDDI Hardware   Motorola FDDI Chipset.

- Data Transfer   32-bit bus master, supports burst
                            mode transfers on compatible
                            machines.

- Buffer Memory   One megabyte.

- LED Indicators   Processor LED (Red) - flash rate
                            indicates processor status

                                1 flash/sec for 30 sec - Processor OK
                                steady red - Adapter Failure

                            Transmit (Green) FDDI Output

                            Receive (Yellow) FDDI Input

                            Link Status (Bicolor LED)

                                Red - No Connection
                                Green - Link Valid
                                Unlit - Signal Detect, No Link

- Diagnostics   Power-on diagnostics provide
                            functional tests of adapter hardware at
                            power up. Status reported by LEDs
                            described above.

- Station Mgmt   On-board RAM memory is downloaded with new version of SMT microcode when driver loads.

- Processor   Motorola 68ec020 CPU.

- Cable Length   (Multimode Fiber) 2km (1.2 miles) between stations using 62.5/125 µm graded index fiber cable.

  (Single Mode Fiber) 40km (24 miles) between stations using 8.7 µm/125 µm graded index fiber cable.

  (FDDI Over Copper) 100 meters using shielded or unshielded twisted pair cable.

- Netwk Interface Multimode -, Single Mode - Fiber, Type S, FDDI Media Interface Connector. Connectors are keyed for Single Attached Station. Dual Attach Station (Dual Homing configuration) implemented through a "daughter board" connection.

  FDDI Over Copper - uses industry standard RJ-45 twisted pair connectors. The Dual Attach Station (Dual Homing configuration) is implemented through the use of a "daughter board."

1.4   TECHNOLOGY OVERVIEW

1.4.1   100 Megabit/Second FDDI Over Copper

The migration of FDDI fiber optic technology to twisted pair copper wire began with the desire to utilize inexpensive, and previously installed twisted pair cable as a replacement for more expensive vendor-specific media.

There are many benefits to be gained from operating FDDI technology on twisted pair cable: increased bandwidth, elimination of rewiring costs, reduced cost of new installations, and simpler and less expensive transceivers.

In pursuit of these goals, Cabletron Systems is participating in the standards process with the American National Standards Institute (ANSI), creating a draft standard for the transmission of 100 Mb/s FDDI data over twisted pair copper wire. The new standards, Twisted Pair - Physical Media Dependent (**TP-PMD**) and Shielded Twisted Pair - Physical Media Dependent (**STP-PMD**) define the minimum performance requirements for both shielded and unshielded twisted pair cable. The guidelines for the new standard are set forth below:

- Transmit distance of 100 meters for both UTP and STP cable.

- The same Bit Error Rate as FDDI over fiber cable (2×10^{-1}).

- FCC Class A (commercial) certification.

- European EN55022 Class A (commercial) certification.

- UTP - Category 5 cable (as specified in EIA/TIA TSB-36).

- STP - Type 1, individually and overall shielded, 150 ohm cable.

Some vendors are manufacturing STP-only products based on an earlier proposal rejected by ANSI (the "Green Book Proposal").

These products are proprietary and non-standard, and ANSI does not recognize or support them.

The ANSI EIA/TIA 586 document was completed in 1991 and laid the foundation for cable plants supporting data rates of 100 Megabits per second. This document specifies that MultiMode fiber be installed for vertical riser applications and horizontal distances greater than 100 meters.

Category 5 UTP cable is specified for desktop wiring distances up to 100 meters and data rates up to 100 Mb/s. Two Technical System Bulletins (TSB) were issued by EIA/TIA after ANSI EIA/TIA 586. TSB-36 classifies UTP cables into categories 3, 4, and 5, and provides characteristic and performance values at particular data rates. TS8-40 classifies connector hardware (punch-down blocks, patch panels, wall jacks, etc.) into categories 3, 4, and 5, and also provides characteristic and performance values at particular data rates.

Anyone considering installing a new cable plant should consult all three documents. They are available through your local EIA publications office - call (202) 457-4963.

Cabletron Systems is committed to delivering FDDI products in strict conformance with the ANSI standards and Cabletron's Integrated Network Architecture (INA).

CHAPTER 2

INSTALLING THE ADAPTERS

This chapter contains instructions for preparing and installing your Cabletron Systems FDDI network adapter into your computer. The next chapter, **Network Connections**, provides instructions for connecting the adapters to an FDDI network.

2.1   HARDWARE REQUIREMENTS

The F30XX family of FDDI network adapters is designed for any computer that supports IBM 32-bit Micro Channel (MCA) Bus architecture. The F70XX family of FDDI network adapters is designed for any computer that supports the Extended Industry Standard (EISA) Bus Architecture.

Installation of the Cabletron FDDI network adapters is simple and straightforward. The network adapters are software configurable; they have no jumpers or switches.

2.2   UNPACKING THE ADAPTERS

The FDDI network adapter and software are shipped separately. The hardware package should contain one box with an FDDI network adapter and this manual. The shrink-wrapped software package contains a **Network Software Installation Guide**, the software diskette, and the license agreement.

To unpack the adapter and the software, carefully remove the adapter from the box. Leave the adapter in the conductive pouch until you are ready to install it. Open the shrink-wrapped package when you are ready to install the software. Be sure to read the licensing agreement included in the shrink-wrapped package. Contact Cabletron Systems Technical Support immediately if any discrepancy in materials exists.

2.3   PREPARING THE ADAPTERS

The FDDI network adapters do not have any jumpers or switches to set. Each type of FDDI adapter is shipped with its own unique configuration file that is used by either the Micro Channel or EISA system configuration programs to set the card's parameters for communication between the computer and the FDDI network.

> ⚠ **CAUTION**
>
> *The network adapters are sensitive to static discharges. Hold the adapter by the top of the metal bracket and the opposite top corner. Avoid contact with the computer bus edge connector or any of the adapter's components. Failure to observe all static discharge precautions could result in damage to the adapter.*

2.4   INSTALLING THE ADAPTERS

The following sections contain brief installation procedures. Refer to the user's manual that came with your computer for more detailed information on installing adapters in Micro Channel and EISA Bus architectures.
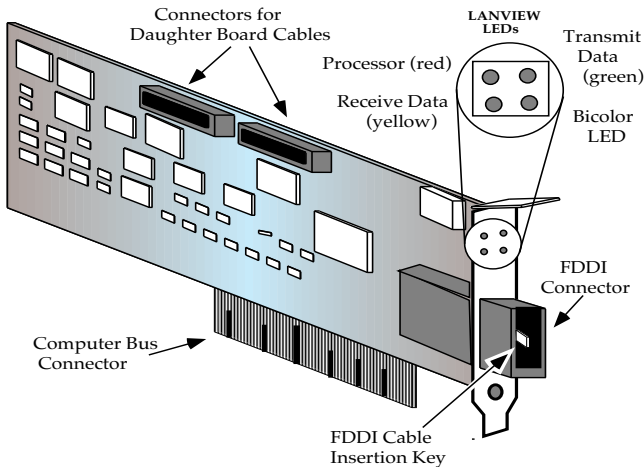
Figure 2-1. Nomenclature, F30XX and F70XX Model Adapters

The F30XX and F70XX models are a family of FDDI adapters that are identical in all respects (see Figure 2-1, Nomenclature, F30XX and F70XX Model Adapters) except for the computer bus interface and the computer configuration procedures.

2.4.1 Installing the F30XX Model Adapters

To install an F30XX model FDDI adapter in your computer follow these instructions:

• Turn off the power to the PC and peripherals and disconnect all power cords and cables.

• Remove the computer cover and select the slot your adapter will be installed in. The F30XX adapter can occupy any unused Micro Channel style 32-bit expansion slot.

• If you have not already done so, remove the adapter from its protective pouch, and visually inspect it.
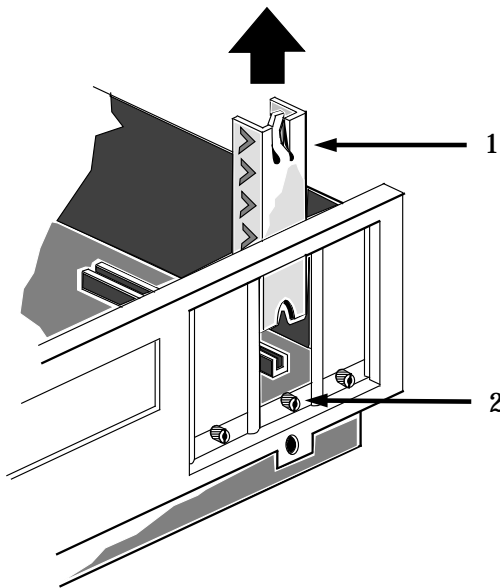
Figure 2-2. Backplate Detail

- Remove the protective backplate (1) from the selected slot, as shown in Figure 2-2. Loosen the thumbscrew (2) holding the backplate (1) in place over the selected slot, and slide the backplate out of the slot.
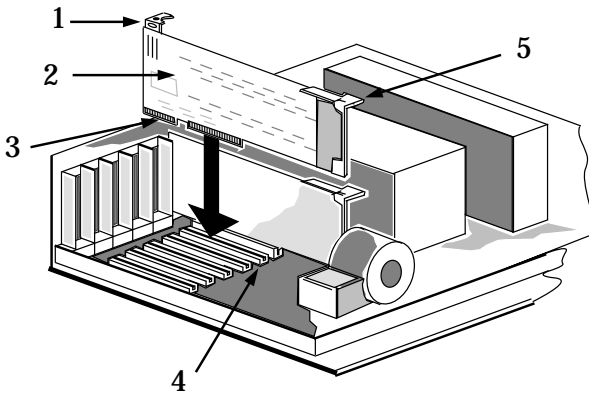

Figure 2-3. Installing the F3069 Adapter

- Orient the adapter (2, Figure 2-3) so the computer bus edge connector (3) is pointed down, and the FDDI port faces out the back of the computer as shown.

- Align the adapter so the computer bus edge connector is lined up with the expansion slot (4, Figure 2-3).

- Slide the adapter into the guide slots and firmly press, but do not force, the adapter into the expansion slot. In most Micro Channel machines, the plastic clips on the F30XX Micro Channel adapter (1, 5, Figure 2-3) will snap into place as the adapter is inserted into the expansion slot.

- Tighten the thumbscrew on the rear panel bracket of the computer. Replace the computer cover, reconnect all cables, and power up the computer.

2.4.2   Copying the ADF File

After you have installed an F30XX model adapter into your Micro Channel computer, you must copy the Cabletron Adapter Description File (ADF) onto a backup copy of the Micro Channel computer's Reference Diskette. The ADF file is supplied with your Cabletron software.

The ADF file provides Programmable Option Select Parameters for the System Configuration Utility used in Micro Channel machines. If necessary, you can change the adapter parameters during this procedure.

IMPORTANT: *Be sure to use a backup copy of the Reference Diskette when you perform the following procedure.*

To configure the ADF:

• Copy the ADF file @0070.ADF from the Cabletron software diskette to the IBM Reference Diskette copy.

• Follow the instructions in your computer user's manual to access the system Setup utility. In your system Setup Menu, find the entry that lets you update the system configuration files.

• When asked, insert the IBM Reference Diskette copy.

• Answer **YES** to: **Automatically configure the system?** After configuration is complete, exit the configuration utility and reboot the computer.

• After power up, the computer should recognize the F30XX adapter; the heartbeat pulse of one flash per second should be visible (**for a period of thirty seconds**) on the Processor LED (see Section 2.5, LANVIEW LEDs).

2.4.3   Installing the F70XX Model Adapters

The F30XX and F70XX models are a family of FDDI adapters that are identical in all respects (see Figure 2-1, Nomenclature, F30XX and F70XX Model Adapters) except the computer bus interface, and the computer configuration procedure.

IMPORTANT: Some EISA Bus compatible computers do not support Bus Master adapters in all slots. To determine where an available Bus Master slot is located (before you install an F70XX model FDDI adapter), run the EISA configuration program that came with your computer; it will indicate the location of available Bus Master slots.

To install the F70XX model FDDI adapter in your computer, use the procedure that follows:

*   From the Cabletron software diskette, copy the EISA configuration file **!CSI06090.CFG** onto a copy of your system configuration diskette.

*   Using your computer's EISA configuration program, follow the instructions in your computer user's manual for installing a new adapter.

*   When prompted, select the Bus Master slot that you wish to install the adapter in. Follow the instructions in your computer user's manual for configuring the adapter's parameters (interrupt level, and Boot PROM size and Base Address, if applicable).

*IMPORTANT: Be sure to **Save the Settings** after configuration.*

*   Exit the configuration utility. When you are asked to do so by the configuration utility, power down the computer.

*   Remove the configuration diskette. Following instructions in your computer user's manual, install the F70XX adapter in the Bus Master slot you selected.

• Power up the computer. The computer should recognize the
  F70XX adapter at this time; the heartbeat pulse of one flash per
  second should be visible (**for a period of thirty seconds**) on the
  Processor LED. (See Section 2.5, LANVIEW LEDs, which
  follows.)

2.5   LANVIEW LEDS

The FDDI network adapters incorporate Cabletron Systems' built-
in LANVIEW® visual diagnostic and status monitoring LEDs. The
LANVIEW LEDs (shown in Figure 2-4) are more effective than a
network monitor, because network troubleshooting personnel can
quickly scan the LEDs to diagnose network problems and
determine which network segment is faulty.

Processor
(red)

Transmit Data
(green)

Receive Data
(yellow)

Bicolor LED

No Connection - (red)
Signal Detect - off
Link - (green)
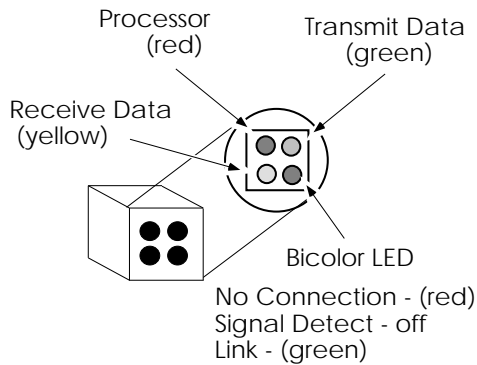
Figure 2-4. LANVIEW LEDs

2.5.1   Using LANVIEW LEDs

The FDDI network adapters employ four LANVIEW LEDs. The functions of these LEDs are explained below:

Processor LED (red)
The F30XX and F70XX model FDDI adapters use an on-board Motorola 68ec020 CPU. The Processor LED flashes at different rates to indicate on-board processor conditions.

- When the Processor LED flashes at a rate of one flash per second (the "heartbeat") it indicates that the processor is functioning normally. **Note that the heartbeat is not continuous - the heartbeat will only be displayed for a period of thirty seconds after power up.**

- When the Processor LED is on continuously (not flashing), it indicates adapter failure. Reload the network driver to cause the SMT code to be updated. If the continuous indication persists, contact Cabletron Technical Support.

Receive Data (yellow)
The Receive Data LED illuminates to indicate that packets are being received from the FDDI network.

Transmit Data (green)
The Transmit Data LED illuminates when packets are being transmitted by the FDDI adapter onto the FDDI network.

Bicolor LED
This LED indicates one of three possible FDDI link conditions.

- Illuminates in red to indicate **No Connection** to the FDDI network. Check all connections to the FDDI link.

- Remains unlit to indicate **Signal Detect** (a signal is being received from the FDDI network, but the adapter is unable to establish a link with another FDDI device).

If you are unable to establish a link with the FDDI network, try connecting this cable segment to a working FDDI station. Run the diagnostic Loopback test with a loopback connector to check the adapter.

• Illuminates in green to indicate that **Link** has been established with another FDDI device in the FDDI network.

2.6 LOADING NETWORK SOFTWARE

You must install the proper network software in order to use your PC, with the FDDI adapter, to communicate on the FDDI network. Network operating system software drivers are supplied on the Cabletron software diskette(s) that accompanied the adapter.

The drivers are grouped in subdirectories that contain readme files to explain recent changes in procedure, etc. The **Network Software Installation Guide**, included with the Cabletron software diskette(s), contains detailed instructions for installing network drivers.

2.7 TROUBLESHOOTING CHECKLIST FOR ADAPTERS

• Make sure the adapter is installed and properly seated in the computer's expansion slot.

• If the adapter does not initialize, verify that the bus slot is operational by swapping the adapter with an adapter that you know is functioning.

• The interrupt, or I/O address parameters could be conflicting with another adapter. Use a program like "Check It" or "PC Tools" to determine the settings in use by other adapters.

• Verify that the FDDI cable is correctly attached and terminated.

- If a connection to a server or a host cannot be maintained, check the cable first with a test set. After verifying the cable, check the device that you are trying to communicate with. Verify that you can contact it, or that other clients can contact it.

CHAPTER 3

NETWORK CONNECTIONS

If you are not familiar with the characteristics of FDDI networks, you should review the hardware, network, and environmental requirements outlined in the ANSI X3T9.5 FDDI Network Specification. All conditions, guidelines, specifications and requirements included in the ANSI X3T9.5 specification must be met to ensure satisfactory performance of the FDDI adapter. Failure to follow these guidelines could also result in unsatisfactory network performance.

3.1 OPTICAL FIBER CONNECTIONS

The F30XX and F70XX FDDI adapters can be configured as a Single Attach Station (SAS), or a Dual Attach Station (DAS), as defined in the ANSI X3T9.5 specification. Dual Attach Station configuration is implemented by the use of a "daughter" board. Instructions for installing the daughter board are provided in this chapter.

The FDDI adapter connects to the FDDI ring via a type S FDDI connector located on the rear-facing bracket of the adapter. Remove the protective cover from the duplex shroud end of the FDDI cable segment. If the fibers need to be cleaned, use a fiber optic cleaning kit.

To connect the adapter to an optical fiber FDDI network segment, insert the duplex connector into the FDDI cable receptacle at the back of the adapter. Observe the slotted key in the center of the receptacle, and the matching key on the duplex connector (see Figure 3-1). Slide the duplex shroud into the receptacle until the latches on the sides of the shroud click into place.
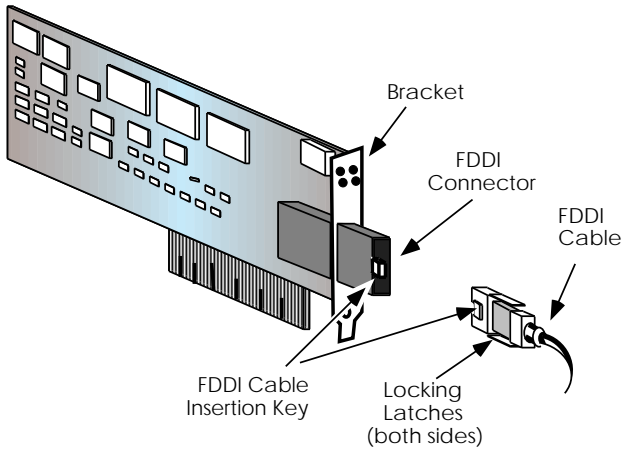
Figure 3-1. Connecting a Fiber Optic Cable

3.1.1   Twisted Pair FDDI Connections

The RJ-45 pinout configuration for Unshielded Twisted Pair (UTP) and Shielded Twisted Pair (STP) Physical Layer Medium Dependent (PMD) ports is shown below.
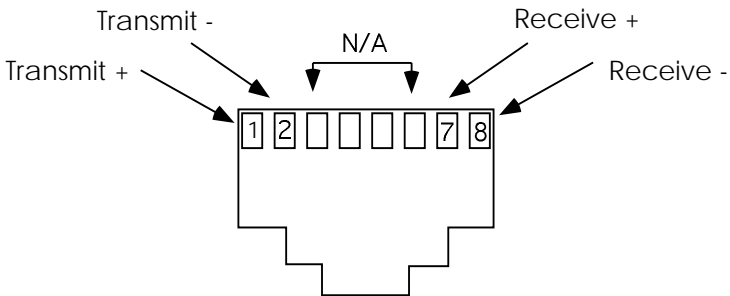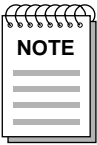

Figure 3-2. RJ-45 TP-PMD Port Pinouts

> **NOTE**
>
> *When connecting two twisted pair ports together (e.g., an M type port on an FDCMIM-24 to an F7069 FDDI network adapter), a transmit and receive cross-over must occur between the two devices (i.e., within the cable).*

3.2   CHECKING NETWORK CONNECTIONS

Observe the condition of the LANVIEW LEDs on the FDDI adapter rear bracket before and after connecting the adapter to the FDDI network.

The **Bicolor** LED should illuminate green after the adapter is connected to the FDDI network, indicating that a link has been established between the adapter and another device on the FDDI network.

If the Bicolor LED does not illuminate, it indicates that an FDDI signal is being received but Link has not been established. If the bicolor LED illuminates in red, there is **NO Connection** to the FDDI network.

If you cannot establish a link to the FDDI network, recheck your FDDI cable connections, and observe the red **Processor** LED on the adapter. If this LED is illuminated continuously, there is a processor failure. Reload the network driver which will automatically download the SMT management microcode. If this condition persists, call Cabletron Technical Support.

3.2.1   Network Requirements/Specifications

When connecting segments to the adapter, the network requirements outlined in the ANSI X3T9.5 specification must be met. Failure to follow these guidelines can result in degradation of network performance.

3.2.2 FDDI Station Configurations

The following terminology is explained in more detail in ANSI
X3T9.5. There are four valid FDDI station configurations:

- **SAS** - Single Attach Station

- **DAS** - Dual Attach Station

- **DAC** - Dual Attach Concentrator

- **SAC** - Single Attach Concentrator

FDDI devices are physically attached to the ring using fixed
shroud duplex (FSD) media interface connectors. Four connectors
are defined in the X3T9.5 FDDI Standard Physical Layer, (the PMD,
Physical Media Dependent, standard). They provide proper
alignment of the trunk fibers for each of the valid configurations.

FDDI RECEPTACLES
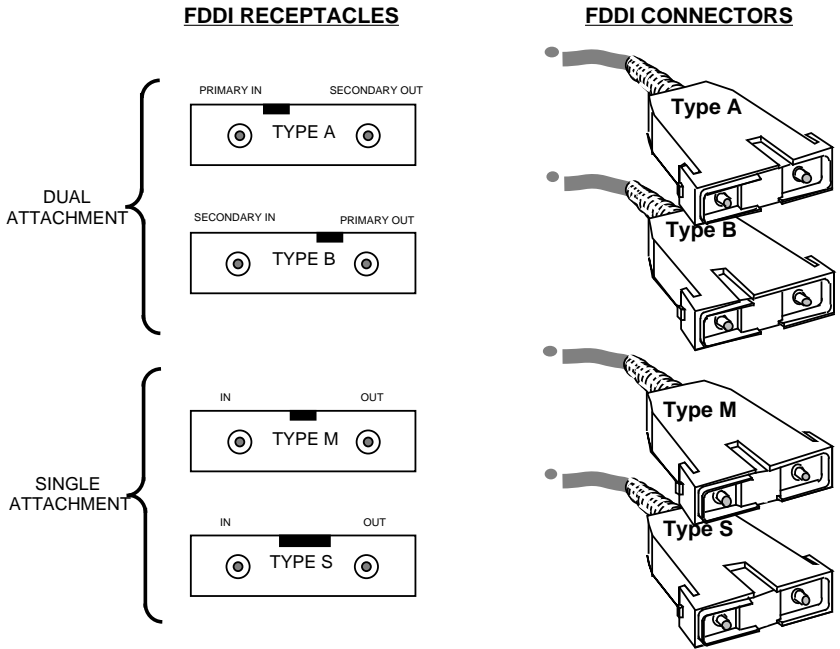
FDDI CONNECTORS

Figure 3-3. FDDI Connector Types

Types A, B, and M are precision connectors, mechanically keyed to assure proper connections to Primary-In and Primary-Out fibers. Types A and B provide dual attachment to the primary and secondary data paths of the main ring. Type M is used for single attachment stations, at the workstation end of the SAS lobe.

The type S connector has a wide, centrally located keyway and is considered a non-precision connector for use at the station end of an SAS lobe cable. Figure 3-3, FDDI Connector Types, shows the configurations of the four types of media interface connectors.

For a more detailed description of FDDI network characteristics and configurations, please read the ANSI X3T9.5 specification.

3.3 IMPLEMENTING A DUAL ATTACH STATION

The Dual Attach Station configuration is implemented by installing a "daughter board." The daughter board plugs into a slot adjacent to the F30/F70XX FDDI adapter and connects to the FDDI adapter by a pair of ribbon cables. The daughter board provides the additional FDDI connectors and ancillary circuitry for Dual Attach Station operation.

The daughter board obtains its power from the bus slot it is plugged into. Figures 3-4 and 3-5, provide instructions for installing the daughter board and connecting the daughter board to the FDDI adapter.
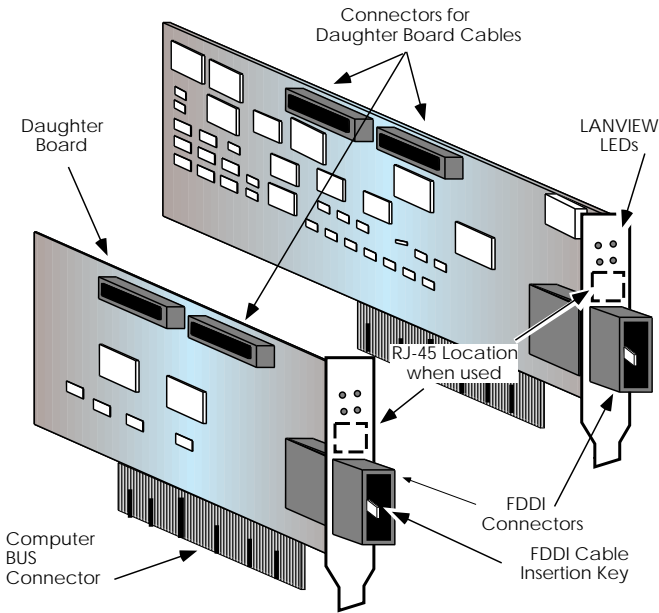
Figure 3-4. Installing a Daughter Board

3.3.1   Installing a Daughter Board

To install a daughter board, follow the instructions outlined below:

•   Turn off the power to the computer and peripherals, and disconnect all power cords and cables.

•   Remove the computer cover and select a slot for the daughter board, adjacent to the slot occupied by the FDDI adapter. We recommend the slot immediately to the left of the FDDI adapter as viewed from the rear (bracket) of the adapter.

•   If you have not done so, remove the daughter board from its protective pouch, and visually inspect it.

•   Refer to the installation procedures for the FDDI adapters in Chapter 2, Section 2.4.1, Installing the F30XX Model Adapters, and Section 2.4.3, Installing the F70XX Model Adapters. Install the daughter board as you would the respective model adapter, in a slot adjacent to the adapter.

•   Connect the daughter board to the FDDI adapter. Plug the interconnecting ribbon cables into the FDDI adapter and daughter board connectors as shown in Figure 3-5, on the next page. Observe the polarized keying of the cable and connectors.
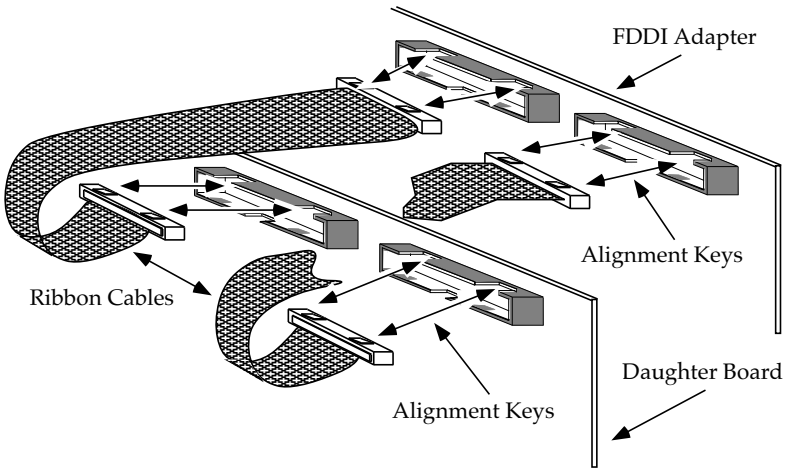
Figure 3-5. Connecting a Daughter Board

• Secure the daughter board bracket to the computer frame.
  Replace the computer covers, reconnect all cables and power
  up the computer.

• Connect the FDDI cables to adapter and daughter board
  according to the FDDI ring configuration. Consult the ANSI
  X3T9.5 specification for a description of Dual Attach Station
  FDDI ring topology.

• After connecting the adapter and daughter board to the FDDI
  ring, observe the LANVIEW LEDs (see Section 2.5) to
  determine the status of the adapter and the FDDI ring.

APPENDIX A

FDDI MEDIA SPECIFICATIONS

A.1 MULTIMODE FIBER OPTICS

- Cable - The Multimode fiber optic link segments should consist of either 50/125 µm, 62.5 µm, or 100/140 µm fiber optic cabling.

- Attenuation - Cable must be tested with a fiber optic attenuation test set adjusted for an 850 nm wave length. This test verifies that the signal loss in the cable is acceptable.

  Attenuation limits for various Multimode cable types are listed below:

  - 3.0 dB or less for a 50/125 µm fiber cable segment.

  - 16.0 dB or less for a 62.5/125 µm fiber cable segment.

  - 19.0 dB or less for a 100/140 µm fiber cable segment.

- Fiber Optic Budget -The fiber optic budget and total network propagation delay should be calculated before fiber runs are incorporated in any network design. Fiber optic budget is the combination of optical loss of the fiber optic cable, in-line splices, and fiber optic connectors. Propagation delay is the time it takes a packet to travel from the sending device to the receiving device.

- Length - The maximum Multimode fiber optic cable length is 2 km (6558 feet), if system budgets are met. However, IEEE 802.3 FOIRL (Fiber Optic Inter-Repeater Link) specifications specify a maximum of 1 km (3279 feet).

A.2 MULTIMODE FIBER OPTIC INTERFACE

Table A-1. Multimode Fiber Optic Interface

Parameter	Typical Value	Worst Case	Worst Case Budget	Typical Budget
Receive Sensitivity:	-30.5 dBm	-28.0 dBm	—	—
Peak Input Power:	-7.6 dBm	-8.2 dBm	—	—
Transmitter Power:				
50/125 µm fiber:	-13.0 dBm	-15.0 dBm	13.0 dB	17.5 dB
62.5/125 µm fiber:	-10.0 dBm	-12.0 dBm	16.0 dB	20.5 dB
100/140 µm fiber:	-7.0 dBm	-9.0 dBm	19.0 dB	23.5 dB
Error Rate:	Better than 10^{-10} bit error rate.			

A.3   SINGLE MODE FIBER OPTICS

Cable - The Single Mode fiber optic link segments should consist of 8.7/125 μm duplex single mode fiber optic cabling. Acceptable cable types must adhere to the following specifications, as set forth in the FDDI X3T9.5 specification:

Table A-2. Single Mode Fiber Optics

Single Mode Fiber	Specification
Core Diameter	8.7 μm +/- 0.5 μm
Cladding Diameter	127.0 μm maximum 123.0 μm minimum
Cable Attenuation	≤ 0.5 dB/km typical
Cable Length	40 km (24 miles, station to station)
Max Total Length	100 km (62 miles) - Dual Ring 200 km (124 miles) - wrapped
Optical Wavelength	1305 nanometers typical
Spectral Width	15 nanometers maximum
Optical Risetime	2 nanoseconds
Optical Falltime	2 nanoseconds
Transmitter Output	-14 dBm maximum
Receiver Input	-14 dBm maximum, -33 dBm minimum

A.3.1 Twisted Pair for FDDI Over Copper

Twisted pair cable for use in FDDI Over Copper transmission is specified in EIA/TIA TSB-36/TSB-40. Table A-3, below, lists these cable specifications.

Table A-3. Twisted Pair Specifications for FDDI Over Copper

Cable/Connector	Category 5
Maximum Total Cable Length	100 km (62 miles) - Dual Ring 200 km (124 miles) - wrapped
Maximum Twisted Pair Length Between Adjacent Nodes	100 meters (328.1 feet)

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