

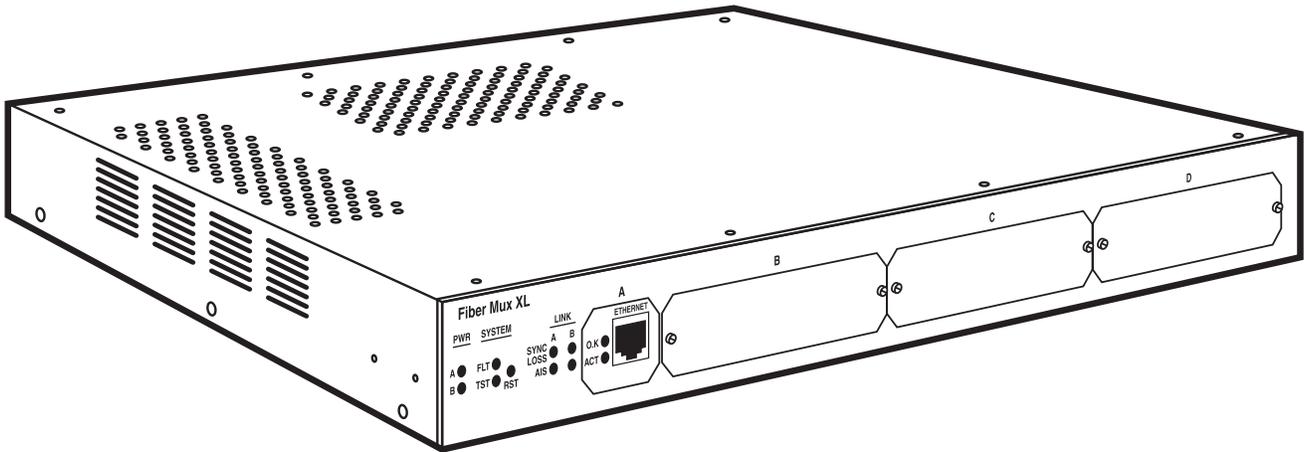


MT1060A
MT1060A-DC
MT1060A-E1
MT1060A-E1-DC
MT1061-85

MAY 2003
MT1062-13
MT1063-4T1
MT1064-4E1
MT1064-4E1-UB
MT1065-FETH
RM1060

T1 Fiber Mux XL

E1 Fiber Mux XL



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AND
INDUSTRY CANADA
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This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

The T1 and E1 Fiber Muxes XL conform to the following standards or other normative documents:

EMC: EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

EMC: EN 50082-1 (1992): Electromagnetic compatibility–Generic immunity standards for residential, commercial, and light industry.

Safety: EN 60950/A4 (1996): Safety of information technology equipment, including electrical business equipment.

Supplementary Information: This product complies with the requirements of EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC. The product was tested in a typical configuration.

Safety Warning

Always observe standard safety precautions during installation, operation, and maintenance of this project. Only qualified and authorized service personnel should carry out adjustment, maintenance, or repairs to this instrument. No adjustment, maintenance, or repairs should be performed by the operator or user.

Laser Warnings

This product may be equipped with a laser diode. In such a case, the laser warning symbol will be attached near the optical transmitter. Please observe the following precautions:

- **Do not attempt to adjust the laser drive current.**
- **Do not use broken or unterminated fiberoptic cables/connectors or stare at the laser beam.**
- **Using optical equipment with this product will increase the risk of injury to the eyes.**
- **Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.**

ATTENTION

The laser beam is invisible!

Telecommunications Safety

The safety status of each of the ports on the T1 and E1 Fiber Muxes XL is declared according to EN 41003 and is detailed below.

<u>Ports</u>	<u>Safety Status</u>
LAN, ALARM	SELV: Circuit operating with Safety Extra-Low Voltage.
T1	TNV-1: Circuit whose normal operating voltage is within the limits of SELV, on which overvoltages from Telecommunications Networks are possible.
E1, LAN, E3	SELV: Circuit operating with Safety Extra-Low Voltage.

NOTE

The T1 ports are not intended for connection outside the building. This equipment is meant for indoor use.

CAUTION

To reduce the risk of fire, use only No. 26 AWG or larger (0.4-mm diameter maximum) wire telecommunication line cords.

WARNING per EN 55022

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

TRADEMARKS USED IN THIS MANUAL

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1. Specifications

General

Speed (Maximum): MT1060A, MT1060A-DC: T1: 1.544 Mbps; Fixed Ethernet Port: 10 Mbps; Control Port: 115.2 kbps;

MT1060A-E1, MT1060A-E1-DC: E1: 2.048 Mbps; Fixed Ethernet Port: 10 Mbps; Control Port: 115.2 kbps;
MT1063-4T1: 1.544 Mbps;

MT1064-4E1, MT1064-4E1-UB: 2.048 Mbps;

MT1065-FETH: 10/100 Mbps, half- or full duplex

Connectors: MT1060A, MT1060A-DC, MT1060A-E1, MT1060A-E1-DC: Fixed Ethernet Port: (1) RJ-45;
Control Port: (1) DB25 F; Alarm: (1) DB9 F;

MT1061-85, MT1062-13: (1) pair ST[®];

MT1063-4T1, MT1064-4E1: (4) RJ-48 C;

MT1064-4E1-UB: (8) mini BNC F;

MT1065-FETH: (1) RJ-45

Operating Environment: Temperature: 32 to 113°F (0 to 45°C); Humidity: Up to 90% noncondensing

Line Code: MT1060A, MT1060A-DC: B8ZS; MT1060A-E1, MT1060A-E1-DC: HDB3

Line Impedance: MT1063-4T1: 100 ohms; MT1064-4E1: 120 ohms balanced RJ-48C; MT1064-4E1-UB: 75 ohms unbalanced coax

Power: MT1060A, MT1060A-E1: 90- to 260-VAC, 47- to 63-Hz redundant power supply;

MT1060A-E1, MT1060A-E1-DC: -48-VDC redundant power supply, requires a -36 to -72-VDC power source

Size: MT1060A, MT1060A-DC, MT1060A-E1, MT1060A-E1-DC, RM1060: 1.75"H (1U) x 17"W x 10.5"D (4.4 x 43.2 x 26.7 cm);

MT1061-85, MT1062-13: 0.8"H x 2.25"W x 3.75"D (2 x 5.7 x 9.5 cm);

MT1063-4T1, MT1064-4E1, MT1064-4E1-UB, MT1065-FETH: 1"H x 3.5"W x 4.25"D (2.5 x 8.9 x 10.8 cm)

Weight: MT1060A, MT1060A-DC, MT1060A-E1, MT1060A-E1-DC, RM1060: 5 lb. (2.3 kg);

MT1061-85, MT1062-13, MT1063-4T1, MT1064-4E1, MT1064-4E1-UB, MT1065-FETH: 1 oz. (28 g)

Fiber Modules

Distance (Maximum): MT1061-85: 1.6 mi. (2.6 km); MT1062-13: 24.9 mi. (40.1 km)

Fiber Type: MT1061-85: 62.5-/125- μ m multimode; MT1062-13: 9-/125- μ m single-mode

Wavelength: MT1061-85: 850 nm; MT1062-13: 1300 nm

Power Coupled into Fiber: MT1061-85: -18 dBm; MT1062-13: -12 dBm

Receiver Sensitivity: MT1061-85: -28 dBm; MT1062-13: -31 dBm

Transmitter Type: MT1061-85: LED; MT1062-13: Laser

2. Introduction

2.1 Overview

The T1 Fiber Mux XL is a multiplexor that combines Ethernet, Fast Ethernet, high-speed (call Technical Support for this option), and T1 channels into a data stream transmitted over fiber optic cables. A pair of T1 Fiber Muxes XL offers simple, low-cost connectivity at distances up to 40 km (24.9 miles).

The E1 version consolidates E1, Ethernet, Fast Ethernet, HSSI (if you're interested in this option, please call Technical Support), and high-speed data channels into an E3 data stream via fiber optic or coaxial cables. Two E1 Fiber Muxes XL can be placed up to 40 km (24.9 miles) apart.

The muxes are modular, so you can configure them to suit your application. Start with a pair of T1 or E1 base units with dual AC or DC power supplies. Add one of two fiber modules for your fiber link; you can also add a Fast Ethernet module. Finish with your choice of T1 and E1 modules.

Table 2-1. Available models.

Part Number	Name	Description
Base Unit (You'll need one of these for each end of the T1 or E1 link.)		
MT1060A	T1 Base Unit	T1 base unit with dual AC power supplies.
MT1060A-DC	T1 Base Unit	T1 base unit with dual DC power supplies.
MT1060A-E1	E1 Base Unit	E1 base unit with dual AC power supplies.
MT1060A-E1-DC	E1 Base Unit	E1 base unit with dual DC power supplies.
Modules (You'll need at least one fiber module and one or more T1 or E1 modules. You can also add a Fast Ethernet module.)		
MT1061-85	Fiber Module, 850-nm	Fiber module with 850-nm wavelength, 62.5-/125- μ m multimode fiber type, and an LED transmitter.
MT1062-13	Fiber Module, 1300-nm	Fiber module with 1300-nm wavelength, 9-/125- μ m single-mode fiber type, and a laser transmitter.
MT1063-4T1	T1 Module, 4-Channel	4-channel T1 module.
MT1064-4E1	E1 Module, 4-Channel, Balanced	4-channel E1 module with balanced interface.
MT1064-4E1-UB	E1 Module, 4-Channel, Unbalanced	4-channel E1 module with unbalanced interface.
MT1065-FETH	Fast Ethernet Module	Fast Ethernet module for connection to 10/100-Mbps Ethernet.
Optional Rackmount Kit		
RM1060	T1/E1 Fiber Mux XL Rackmount Kit	Everything you need to mount the mux in a rack.

T1 AND E1 FIBER MUXES XL

2.1.1 OPTIONS

Link Interface Modules

Choose between two fiber optic link modules (see Table 2-2). Both modules have two ST connectors.

Table 2-2. Link interface options.

Part Number	Wavelength (nm)	Fiber Type (µm)	Transmitter Type	Transmitter Power (dBm)	Receiver Sensitivity (dBm)	Maximum Transmission Range (km/miles)
MT1061-85	850	62.5/125 multimode	LED	-18	-28	2.5/1.6
MT1062-13	1300	9/125 single mode	Laser	-12	-31	40/24.9

Power Supply Options

Choose from 90- to 260-VAC or -48 VDC redundant power supplies in the base unit.

Channel Modules

The T1 and E1 Fiber Muxes XL support various channel modules as detailed in Table 2-3.

Table 2-3. Channel modules.

Part Number	Port Type	Speed	Number of Ports	Port Connector
Standard Fast Ethernet Modules (use with T1 or E1)				
MT1065-FETH	10/100BASE-T Fast Ethernet	10/100 Mbps	1	RJ-45
Standard T1 Modules (can only be installed in the T1 Base Unit)				
MT1063-4T1	T1 balanced (twisted pairs)	1.544 Mbps	4	RJ-45
Standard E1 Modules (can only be installed in the E1 Base Unit)				
MT1064-4E1	E1 balanced (twisted pairs)	2.048 Mbps	4	RJ-45
MT1064-4E1-UB	E1 unbalanced (coax)	2.048 Mbps	4	Mini BNC F
Special-Order T1 Modules (High-Speed)*				
Special order	V.35	1.544 Mbps	4	SCSI 26-pin
Special order	RS-530	1.544 Mbps	4	SCSI 26-pin
Special order	X.21	1.544 Mbps	4	SCSI 26-pin

*Call Technical Support at 724-746-5500 for details on special-order modules.

2.1.2 APPLICATIONS

The T1 Fiber Mux XL multiplexes channels connected to different transmission environments, Ethernet LAN, and T1 channels, therefore improving the use of fiber optic links. A typical application is shown in Figure 2-1.

If you need to multiplex channels connected to different transmission environments, E1, Ethernet LANs, Fast Ethernet LANs, and high-speed channels, use the E1 Fiber Mux XL. An application example is not shown.

T1 or E1 Fiber Mux XL in a Point-to-Point Application

In Figure 2-1, a company campus line or a line leased from the local operator links two T1 or E1 Fiber Muxes XL located several hundreds of meters to several tens of kilometers away from each other. A backup link ensures uninterrupted data flow between the two sites. The mux at each site is connected to Ethernet LANs and T1 or E1 access equipment (such as PBXs and T1 or E1 multiplexors). The distance limitations on the LAN deployment area are efficiently removed while maintaining the full and half-duplex transmission modes.

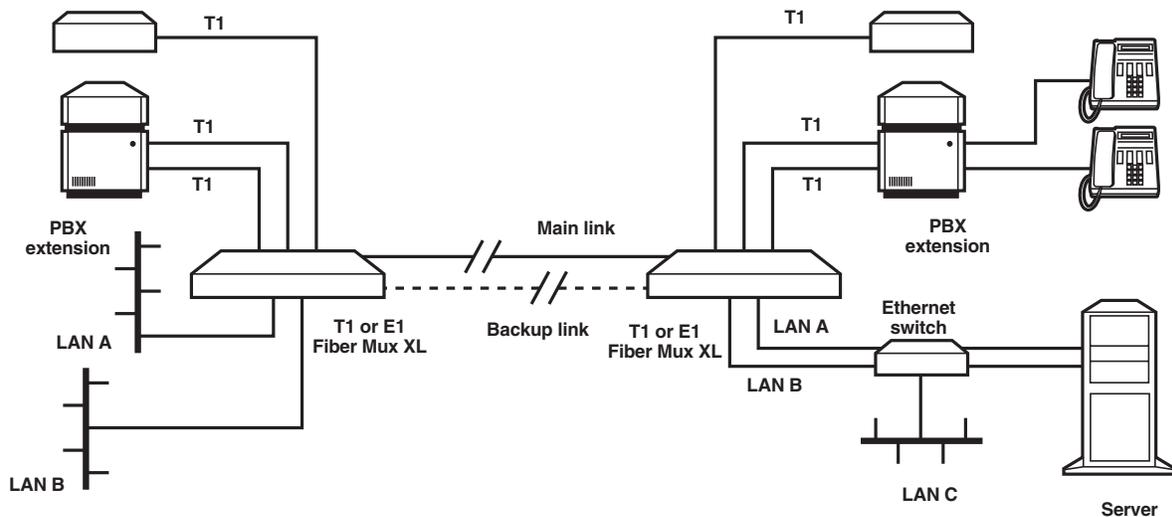


Figure 2-1. T1 or E1 Fiber Mux XL in a point-to-point application.

T1 AND E1 FIBER MUXES XL

2.1.3 FEATURES

- Compact, 1.75"H (1U) multiplexor that fits in a 19-inch rack.
- T1 Fiber Mux XL combines one 10BASE-T Ethernet channel, one Fast Ethernet, and up to four T1 channels into a single fiber optic link.
- Choose from 850-nm multimode or 1300-nm single-mode fiber optic transmission.
- Select dual 90- to 260-VAC or -48-VDC power supplies.
- Using the E1 Mux, you can integrate multiple E1, Ethernet, and Fast Ethernet data links over a single fiber at a range up to 110 km (68.4 miles).
- Link redundancy (an optional backup link) enables coupling of any combination of fiber modules to the link.
- Muxes work in internal (Int Clk) or loopback timing (Rcv Clk).
- Setup, monitoring, and diagnostics can be configured using an ASCII terminal, Telnet, or an SNMP management station. System diagnostics are monitored and managed using status and alarm panel indications, alarm dry contacts, and external management tools.

2.2 What the Package Includes

For the T1 or E1 Fiber Mux XL Base Unit:

- (1) T1 or E1 base unit with redundant power supplies (90 to 260 VAC or -48 VDC)
- (2) Power cables, 110 or 220 VAC (AC models only)
- (2) 48V plugs (-48-VDC models only)
- (1) RS-232 cable
- This users' manual

For the Fiber, T1, E1, or Fast Ethernet Modules:

- (1) Module
- This users' manual

For the Rackmount Kit:

- (2) Brackets
- (4) Screws
- (4) Lockwashers
- This users' manual

If anything is missing or damaged, please contact Black Box immediately at 724-746-5500.

2.3 Physical Description

T1 and Ethernet/Fast Ethernet connectors are located on the T1 Fiber Mux XL's front panel. E1 and Ethernet/Fast Ethernet connectors are located on the E1 Fiber Mux XL's front panel. LEDs indicate power and status for system and link.

The muxes' rear panels contain connectors for power, management, alarm, and fiber optics.

For additional details on the front and rear panels, refer to **Section 3.4**.

2.4 Functional Description

2.4.1 FIBER OPTIC LINK INTERFACE (MT1061-85 AND MT1062-13)

The T1 or E1 Fiber Mux XL base unit can be ordered with a fiber optic link interface (fiber module). The MT1061-85 interface extends the transmission range for T1 or E1 to 2.6 km (1.6 miles), and the MT1062-13 extends the range to 40 km (24.9 miles). Both enhance the transmission security and achieve immunity against electrical interference.

The fiber optic interface complies with the ITU-T Rec. G.956. It also applies a proprietary signaling format to the NRZ 34-Mbps data stream. In the upstream direction, the data stream modulates the beam emitted by the optical device, which is either a LED or a laser diode. In the downstream direction, the data stream is recovered from the current changes in a diode sensitive to the received optical beam.

Two fiber modules are available (MT1061-85 and MT1062-13), and they're described in Table 2-2. It shows the module options for wavelength, fiber type, transmitter type, transmitter power, receiver sensitivity, and maximum transmission range. Front-panel LEDs on the modules indicate loss-of-signal frame and AIS on the fiber link.

2.4.2 LINK REDUNDANCY

An additional link interface (identical to the first) can be ordered for backup. The link interfaces are implemented by interchangeable link modules plugged into two dedicated slots at the rear of the mux. Front-panel LEDs provide AIS and signal loss (SYNC LOSS) indications on the link.

T1 AND E1 FIBER MUXES XL

When two link modules are installed in LINK A (MAIN) and LINK B (BACKUP), the mux's redundancy mechanism will:

- Automatically switch to the backup link interface in case of signal or sync loss on the main link. If the redundancy mode is set to AUTOMATIC, under signal loss, the main link (equipment and/or line) resumes transmission after it has recovered. Under sync loss, the backup link continues transmission until it receives a sync loss/signal loss.
- Force transmission via the MAIN link using a software management tool for maintenance purposes if the redundancy mode is set to OFF.

When the redundancy mode is set to MANUAL and the main link is disconnected or fails, the backup link is forced into an active state. The main link will not resume transmission as long as the redundancy mode is set to MANUAL.

In addition, any of the mux's fiber optic links can be configured as the main link.

2.4.3 CHANNEL INTERFACE CHARACTERISTICS

The mux's modular design supports one fixed 10BASE-T Ethernet port and up to three additional plug-in modules. The additional module types are specified in Table 2-3.

The T1 interface complies with the ITU-T Rec. G.703. Line coding is B8ZS. A pair of LEDs monitor loss-of-signal and AIS on each T1 receive line.

The E1 interfaces, both balanced and unbalanced, comply with the ITU-T Rec. G.703. Line coding is HDB3 or AMI. Balanced transmit levels are nominally $\pm 3V$ for balanced termination and $\pm 2.37V$ for unbalanced termination. A pair of LEDs monitor loss-of-signal and AIS on each E1 receive line.

2.4.4 MANAGEMENT REQUIREMENTS

The T1 or E1 Fiber Mux XL operates locally using onboard switches and jumpers to configure the operation modes and front-panel LEDs to monitor system failure and tests (loop connections). Alarms are monitored using the dry contacts of the mux's alarm relays on a dedicated D-type connector.

An ITU-T V.24/EIA RS-232 port enables monitoring and tests using an ASCII supervision terminal.

The management interface also includes an SNMP agent that enables SNMP management of the mux using the Ethernet protocol. The SNMP management capability enables fully graphical, user-friendly management using proprietary network management stations and management by other SNMP-based management systems.

You can also manage the mux remotely using the Telnet communication protocol (which uses TCP/IP communication) without the SNMP service. Telnet support enables a remote IP host to control the mux's operation using functions identical to those provided by a supervision terminal. The Telnet management function can be protected by the manager password feature.

NOTE

When using Telnet for management, the Software Downloading option is not operational.

2.4.5 TIMING

The muxes can work with an internally generated clock (internal oscillator).

Loopback timing (Rcv Clk) can be used in those systems that require a one-source clock.

2.4.6 POWER REQUIREMENTS

The mux can be connected to a 115-VAC or 220-VAC mains or to a battery source supplying -48 VDC.

A second power supply ensures continuous operation in case of power supply failure. When the two supplies are turned ON, they share the power consumption of the unit. If one of the power supplies fails, the other provides full power consumption.

3. Installation

3.1 Introduction

The T1 or E1 Fiber Mux XL base unit and the modules you ordered are packaged separately.

After installing the base unit and the modules, refer to **Chapter 4** for system operating instructions. If a problem arises, refer to **Chapter 6** for troubleshooting and diagnostics instructions.

WARNING

Neither the operator nor the user should set switches or jumpers, replace cards and cables, or repair the mux components. Only a skilled technician who is aware of the hazards involved should perform these tasks.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

3.2 Site Requirements and Prerequisites

Install AC-powered T1 or E1 Fiber Muxes XL within 5 ft. (1.5 m) of an easily accessible grounded AC outlet capable of furnishing a supply voltage in the range of 90 to 260 VAC.

DC-powered T1 or E1 Fiber Muxes XL require a -36 VDC to -72 VDC power source. Verify that the input voltage at the end of the power cable is within the above limits.

Allow at least 36" (91.4 cm) of clearance at the front of the mux so you can access it. Allow at least 4" (10.2 cm) of rear clearance for interface cable connections.

When planning the routing of fiber optic cables, avoid sharp bends. The bending radius should always exceed 1.2" (3 cm).

The mux's ambient operating temperature is between 32 and 113°F (0 to 45°C), at a relative humidity of up to 90%, noncondensing.

3.3 Setup

3.3.1 IDENTIFYING MODULES

Figures 3-1 and 3-2 show the muxes' modular construction. Use these figures to identify where to install the modules you ordered.

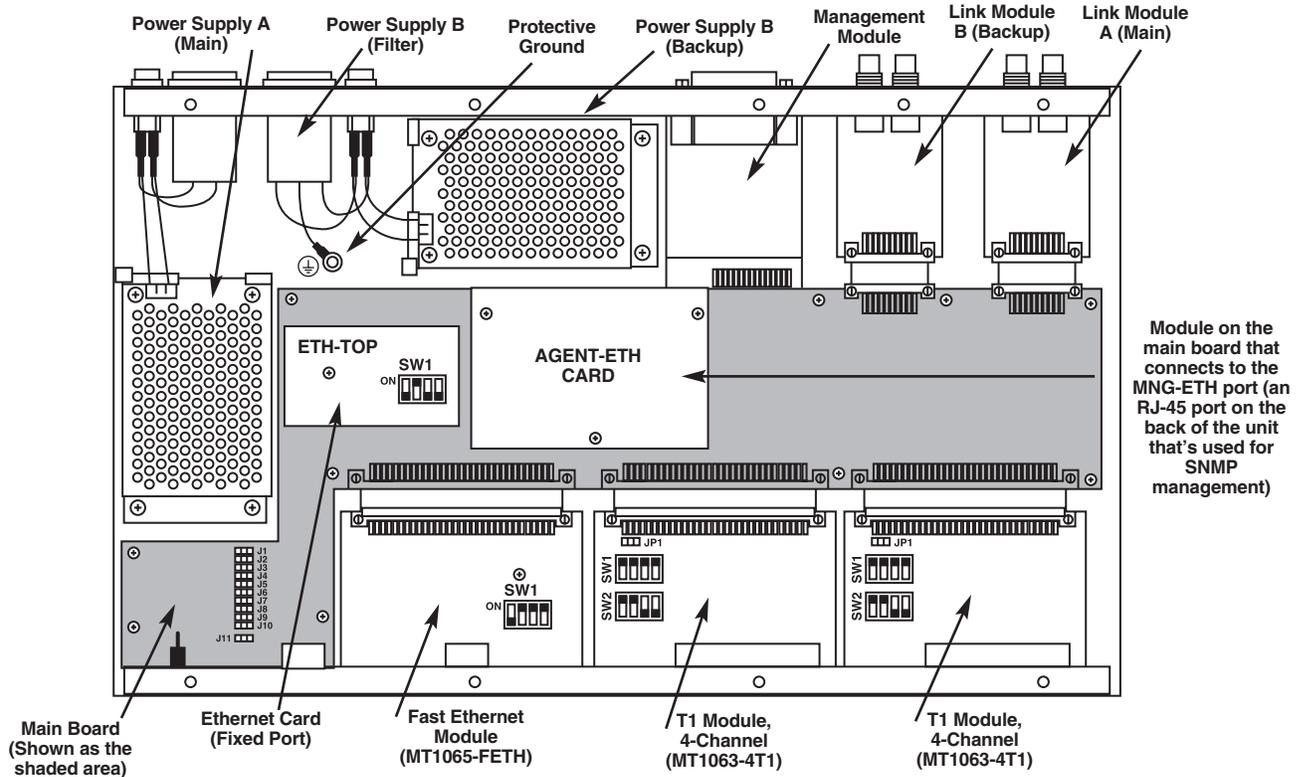


Figure 3-1. Module location in the T1 Fiber Mux XL Base Unit with Link backup module installed.

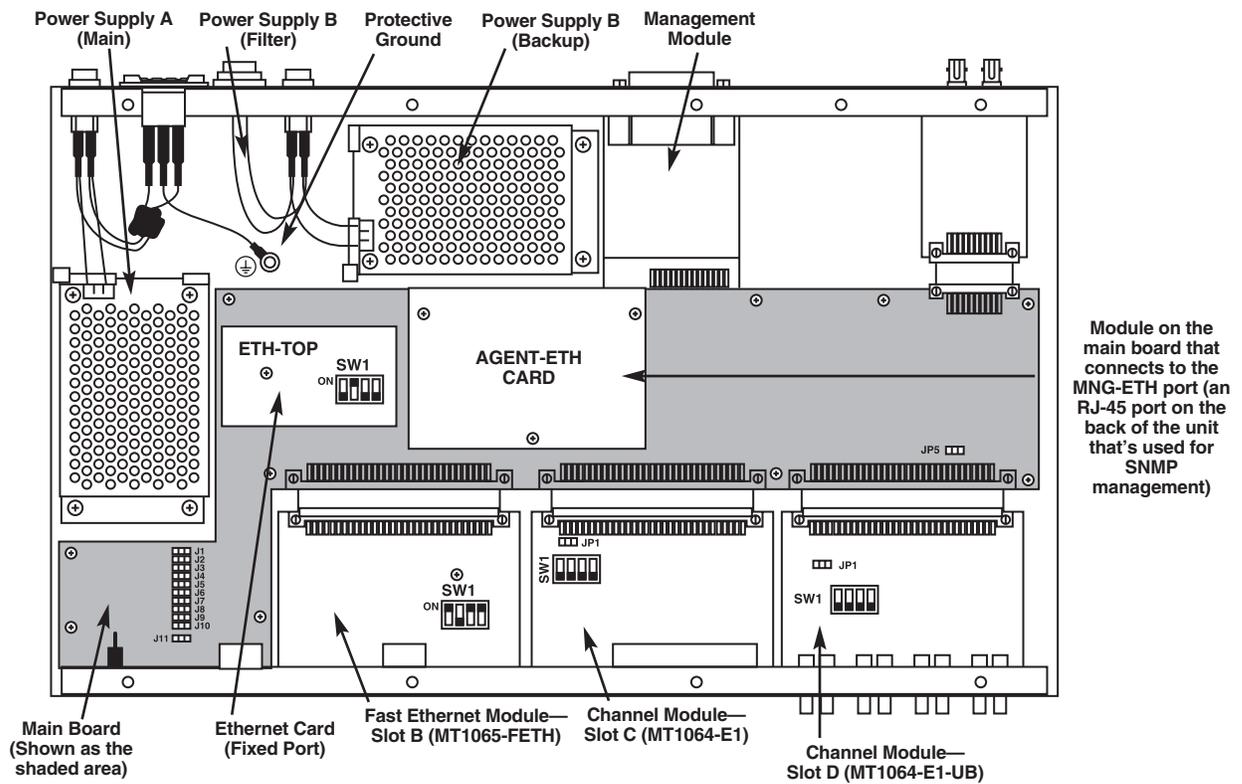


Figure 3-2. Module location in the E1 Fiber Mux XL Base Unit.

T1 AND E1 FIBER MUXES XL

To remove the base unit from its case:

1. Unscrew the three captive screws on each side of the unit and the eight captive screws on the top.
2. Remove the base unit's top cover.
3. Note where to install the optional modules that you ordered. Refer to Tables 3-1 and 3-2.

Table 3-1. The T1 Fiber Mux XL modules.

Product Code	Module	Fixed/ Optional	Location	Used to Provide
On each T1 product	Main board	Fixed	See shaded areas in Figure 3-1	T1 Fiber Mux XL controls the functions of the Fixed Ethernet port. Operation modes of the fixed Ethernet port (see ETH-TOP card in Figure 3-1). SNMP management via an RJ-45 port on the back of the unit (see AGENT-ETH card in Figure 3-1).
	Ethernet card	Fixed	Front, slot A	Ethernet port connection.
MT1065-FETH	Fast Ethernet module	Optional	Front, slots B, C, D	Ethernet/Fast Ethernet port connection.
MT1063-4T1	4-channel T1, balanced	Optional	Front, slots B, C, D	ITU-T G.703 interface for four T1 balanced ports.
MT1061-85	Fiber optic link (850-nm)	Fixed (LINK A)/ Optional (LINK B)	Rear, LINK A and B	Fiber optic interface to the link. A is the main link and B is the backup link.
MT1062-13	Fiber optic link (1300-nm)	Fixed (LINK A)/ Optional (LINK B)	Rear, LINK A and B	Fiber optic interface to the link. A is the main link and B is the backup link.
Special order (call for details)	High speed	Optional	Front, slots B, C, D	V.35, RS-530, or X.21 interface ports.
Included in base unit	Power supply, PWR-A	Fixed	Rear	T1 Fiber Mux XL supply voltages.
Included in base unit	Power supply, PWR-B	Fixed	Rear	Power supply redundancy or power consumption sharing.

Table 3-2. The E1 Fiber Mux XL modules.

Product Code	Module	Fixed/ Optional	Location	Used to Provide
On each E1 product	Main board	Fixed	See shaded areas in Figure 3-2.	E1 Fiber Mux XL controls the functions of the Fixed Ethernet port. Operation modes of the fixed Ethernet port (see ETH-TOP card in Figure 3-2). SNMP management via an RJ-45 port on the back of the unit (see AGENT-ETH card in Figure 3-2).
	Ethernet card	Fixed	Front, slot A	Ethernet port connection.
MT1065-FETH	Fast Ethernet module	Optional	Front, slots B, C, D	Fast Ethernet port connection.
MT1064-4E1	4-channel E1, balanced	Optional	Front, slots B, C, D	ITU-T G.703 interface for four E1 balanced ports.
MT1064-4E1-UB	4-channel E1, unbalanced	Optional	Front, slots B, C, D	ITU-T G.703 interface for four E1 unbalanced ports.
MT1061-85	Fiber optic link (850-nm)	Fixed (LINK A)/ Optional (LINK B)	Rear, LINK A and B	Fiber optic interface to the link. A is the main link and B is the backup link.
MT1062-13	Fiber optic link (1300-nm)	Fixed (LINK A)/ Optional (LINK B)	Rear, LINK A and B	Fiber optic interface to the link. A is the main link and B is the backup link.
Special order (call for details)	High speed	Optional	Front, slots B, C, D	V.35, RS-530, or X.21 interface ports.
Included in base unit	Power supply, PWR-A	Fixed	Rear	E1 Fiber Mux XL supply voltages.
Included in base unit	Power supply, PWR-B	Fixed	Rear	Power supply redundancy or power consumption sharing.

3.3.2 SETTING INTERNAL JUMPERS AND SWITCHES

Before setting the switches and jumpers, you must initialize the mux. To initialize the mux after power up, press the reset pushbutton. The pushbutton can be reached from the front (see Figures 4-1 and 4-2 and Table 4-1) with a screwdriver.

The T1 or E1 Fiber Mux XL internal jumpers and switches are located on its board. Figure 3-2 shows the settings of the mux and its modules' switches and jumpers. Figure 3-3 shows the settings of the various modules' jumpers. The internal settings are listed in Table 3-3.

To reach the internal switches and jumpers:

1. Disconnect all cables connected to the mux.
2. Unscrew the two captive screws on each side of the unit and the eight captive screws on the top.
3. Remove the mux's cover.
4. Set the switches and jumpers of the installed modules as specified in the rest of this section.

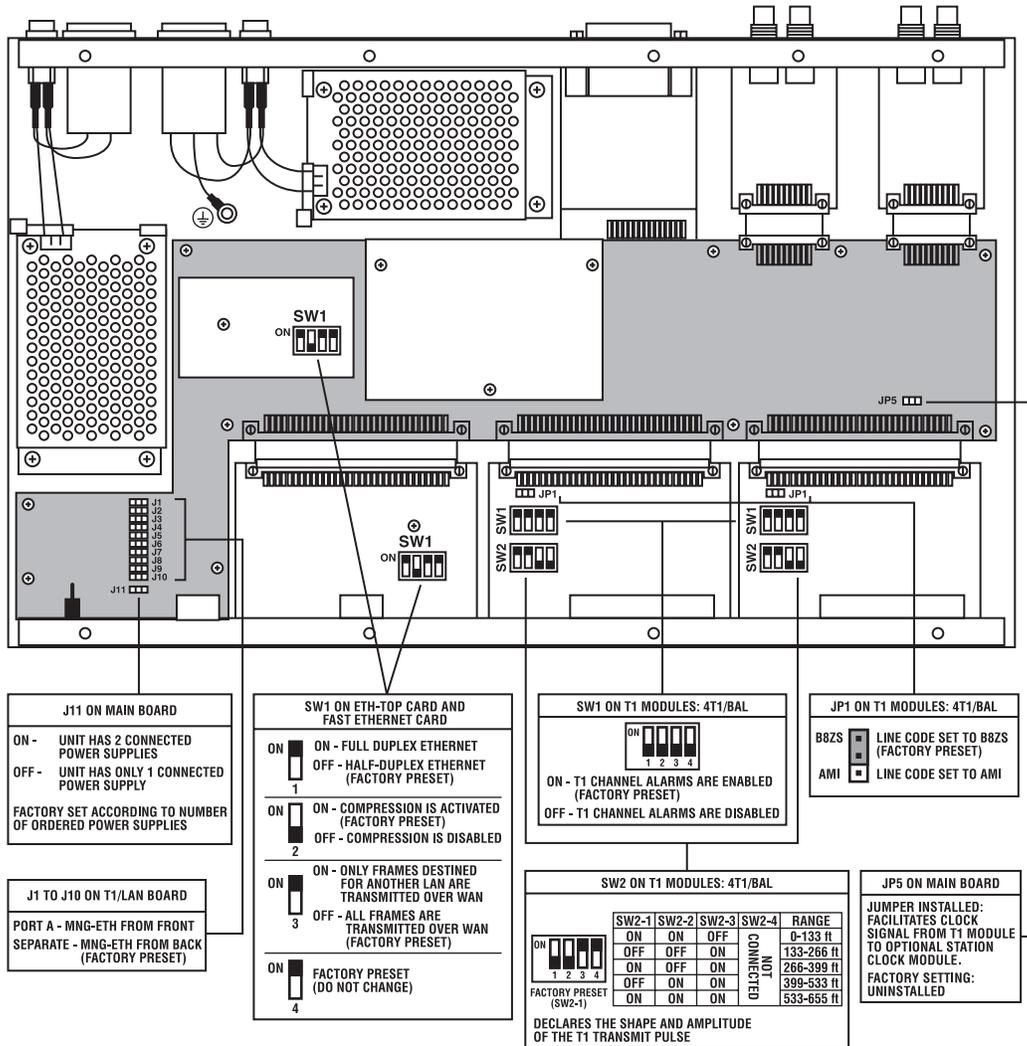


Figure 3-3. Setting the T1 Fiber Mux XL switches and jumpers.

T1 AND E1 FIBER MUXES XL

Table 3-3. Internal settings for the T1 Fiber Mux XL.

Identification of Internal Setting	Function	Settings	Factory Setting
Main Board			
J1 through J10	The fixed Ethernet port is available from the front or rear panel.	Port A – The fixed Ethernet port is only available from the front panel in half duplex, and it operates as a 10BASE-T Ethernet port.	Separate
		Separate – The fixed Ethernet port is available from the rear panel in half duplex. The fixed Ethernet port on the front panel operates as a 10BASE-T Ethernet port and is available in half or full duplex.	
J11	Setting the mux to work with one or two power supplies.	ON – The mux uses two power supplies.	ON
		OFF – When the unit uses only one power supply.	
JP5	To facilitate clock from the T1 module to the station clock module (or for external clock).	Jumper installed	Jumper uninstalled
		Jumper uninstalled	
ETH-TOP Card and Fast Ethernet Card			
SW1	The ETH-TOP card mounted on the main board supports the T1 Fiber Mux's fixed Ethernet port. A similar switch mounted on the Fast Ethernet module installed in slots B, C, and D supports the optional 10/100 Ethernet ports (up to three).		
SW1-1	Determines the transmission mode of the Ethernet ports in slots B, C, and D, and in the fixed Ethernet port.	ON – Full duplex OFF – Half duplex (If J1 through J10 are set to Port A, the working mode of the fixed Ethernet port must be half duplex only.)	OFF

Table 3-3 (continued). Internal settings for the T1 Fiber Mux XL.

Identification of Internal Setting	Function	Settings	Factory Setting
ETH-TOP Card and Fast Ethernet Card (continued)			
SW1-2	Enables and disables data throughput compression.	ON – Enable	ON
		OFF – Disable	
SW1-3	Determines whether all frames are transmitted over the WAN or only those that are destined for another LAN. If this switch is set to ON, the software selects the filtering mode.	ON – Filtered	OFF
		OFF – Not filtered	
SW1-4	Not currently used. It should be set to ON.	ON	ON
		OFF	
T1 Channel Modules			
SW1-1 through SW1-4	On the T1 modules, these switches are used to enable T1 interface alarms to the T1 Fiber Mux XL system control.	ON – Alarms enabled	ON
		OFF – Alarms disabled	
SW2-1 through SW2-3	ON the T1 modules, these switches are used to set the line length equalizer that determines the shape and amplitude of the transmit pulse.	ON, ON, OFF = 0 to 133 ft. OFF, OFF, ON = 133 to 266 ft. ON, OFF, ON = 266 to 399 ft. OFF, ON, ON = 399 to 533 ft. ON, ON, ON = 533 to 655 ft.	ON, ON, OFF (0 to 133 ft.)
JP1	Determines the line code implemented by the T1 interface	B8ZS – Line code set to B8ZS	B8ZS
		AMI – Line code set to AMI	

T1 AND E1 FIBER MUXES XL

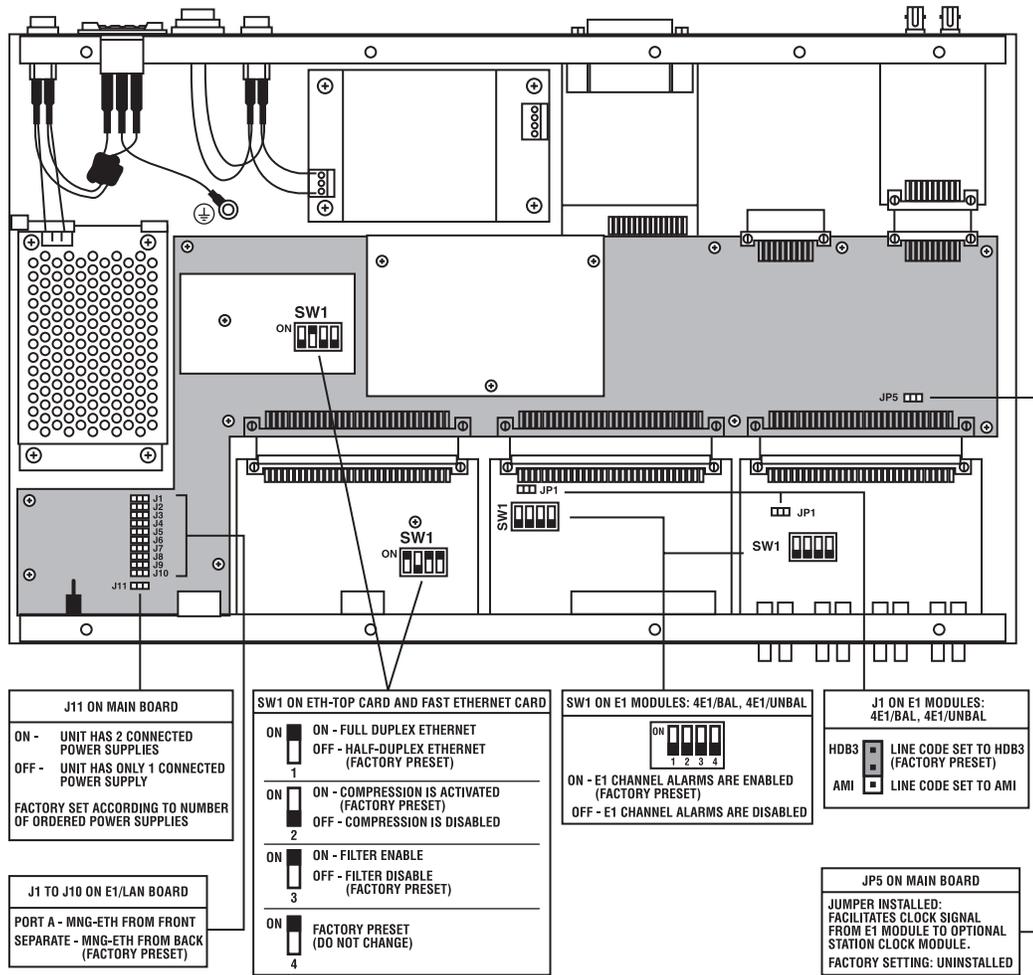


Figure 3-4. Setting the E1 Fiber Mux XL switches and jumpers.

Table 3-4. Internal settings of the E1 Fiber Mux XL.

Identification of Internal Setting	Function	Settings	Factory Setting
Main Board			
J1 through J10	The fixed Ethernet port is available from the front or rear panel.	Port A – The fixed Ethernet port is only available from the front panel in half duplex, and it operates as a 10BASE-T Ethernet port.	Separate
		Separate – The fixed Ethernet port is available from the rear panel in half duplex. The fixed Ethernet port on the front panel operates as a 10BASE-T Ethernet port and is available in half or full duplex.	
J11	Sets the mux to work with one or two power supplies.	ON – The mux uses two power supplies.	ON
		OFF – The mux uses only one power supply.	
JP5	To facilitate clock from the last E1 channel of the module in slot D to the station clock module (should be connected only if the optional station clock module is installed).	Jumper installed	Jumper uninstalled
		Jumper uninstalled	
ETH-TOP Card and Fast Ethernet Card			
SW1	The fixed Ethernet card mounted on the main board supports the 10BASE-T fixed Ethernet port of the E1 Fiber Mux XL. A similar switch mounted on the Fast Ethernet module installed in slots B, C, and D supports the optional 10/100 Ethernet ports (up to three).		

T1 AND E1 FIBER MUXES XL

Table 3-4 (continued). Internal settings for the E1 Fiber Mux XL.

Identification of Internal Setting	Function	Settings	Factory Setting
ETH-TOP Card and Fast Ethernet Card (continued)			
SW1-1	Determines the transmission mode of the Ethernet ports in slots B, C, and D, and in the fixed Ethernet port.	ON – Full duplex OFF – Half duplex (If J1 through J10 are set to Port A, the working mode of the fixed Ethernet port must be half duplex only.)	OFF
SW1-2	Enables and disables data throughput compression	ON – Enable OFF – Disable	ON
SW1-3	Determines whether all frames are transmitted over the WAN or only those that are destined for another LAN. If this switch is set to ON, the software selects the filtering mode.	ON – Filtered OFF – Not filtered	OFF
SW1-4	Not currently used. It should be set to ON.	ON OFF	ON
High-Speed Module (not pictured)			
JP1	Select timing mode for channels 1 and 2.	LBT – Loopback timing INT – Internal timing EXT – External timing	INT
JP2	Select timing mode for channels 3 and 4.	LBT – Loopback timing INT – Internal timing EXT – External timing	INT

3.4 Interfaces and Connections

The Ethernet, Fast Ethernet, T1, and E1 channel connectors are located in slots A through D on the mux's front panel. Slot A is dedicated to the fixed Ethernet port. Slots B through D are allocated to Ethernet/Fast Ethernet, T1, and E1 ports (see Figures 3-5 and 3-6). Except for the fixed Ethernet port, the front-panel connections depend on the type of channel module installed as indicated in Table 3-5.

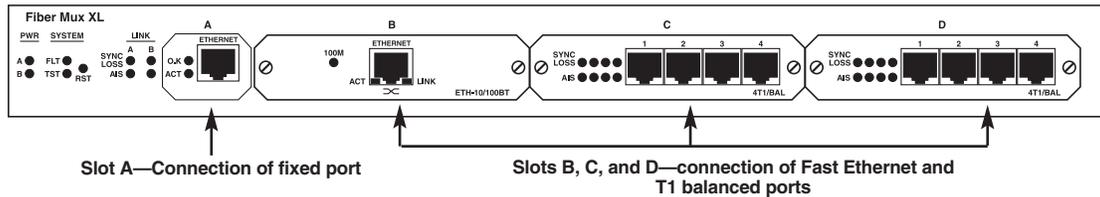


Figure 3-5. Front-panel connections of Fast Ethernet port and T1 balanced channels.

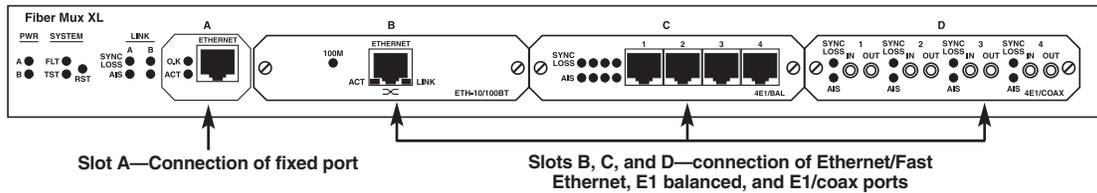


Figure 3-6. Front-panel connections of Fast Ethernet port and E1 balanced and E1/coax channels.

WARNING—ELECTRICAL SHOCK HAZARD!

Only qualified and authorized service personnel should access the inside of the equipment.

Before disconnecting the mux from its cables, verify that the remote unit is turned OFF. Disconnect the mux from the power line and from all the cables before removing the cover.

Dangerous high voltages are present inside the mux when it is connected to power! Moreover, under external fault conditions, dangerous high voltages may appear on the lines connected to the mux.

Capacitors inside the instruments may still be charged even after the mux has been disconnected from the supply source.

Avoid, as much as possible, any setting or repair of the open unit under voltage. When this is inevitable, only a skilled technician who is aware of the hazard involved should do this.

The T1 or E1 Fiber Mux XL contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components. Before moving jumpers, touch the mux's frame.

T1 AND E1 FIBER MUXES XL

Table 3-5. Connectors.

Slot	Module	Connector	Used to Connect
T1			
A	None	RJ-45	The fixed 10BASE-T Ethernet port to a LAN.
B, C, D	MT1065-FETH	RJ-45	Up to three additional 10/100-Mbps Ethernet ports to LANs.
B, C, D	MT1063-4T1	(4) RJ-45	Four T1 balanced channels.
E1			
A	None	RJ-45	The fixed 10BASE-T Ethernet port to a LAN.
B, C, D	MT1065-FETH	RJ-45	Up to three additional 10/100-Mbps Ethernet ports to LANs.
B, C, D	MT1064-4E1	(4) RJ-45	Four balanced E1 channels.
B, C, D	MT1064-4E1-UB	(8) Mini coax	Four unbalanced E1 channels.

The muxes' rear panel (see Figures 3-7 and 3-8) contains the power, management, alarm, and link connectors as described in Table 3-6.

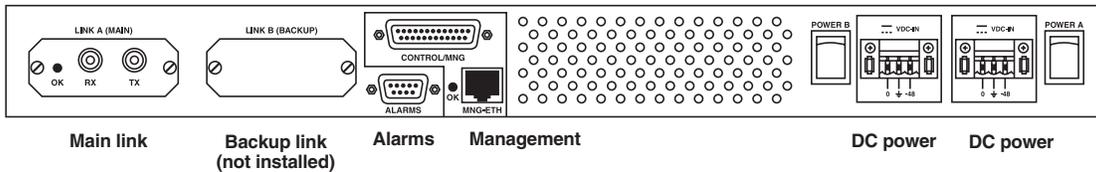


Figure 3-7. T1 Fiber Mux XL rear-panel connections with dual link and dual DC power supplies.

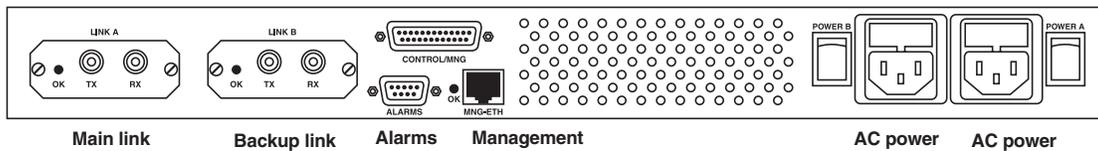


Figure 3-8. E1 Fiber Mux XL rear-panel connections with dual link, dual AC power supplies, and a backup link installed.

Table 3-6. Management, Alarm, and Link Connectors.

Connector	Type	Used to Connect
Power B	Standard 3-pin (DC) or 3-prong (AC) plug	Redundant power source (DC or AC plug), when the redundant power supply option is selected.
Power A	Standard 3-pin or 3-prong plug	Main power source (DC or AC plug).
CONTROL/MNG*	DB25 female	RS-232 ASCII terminal.
MNG-ETH*	RJ-45	MNG-ETH entrance.
Alarms	DB9 female	Mux dry contacts of two alarm relays (major and minor) to a remote monitoring site.
Link A, TX/RX	ST	Main fiber optic link.
Link B, TX/RX	ST	Redundant (backup) fiber optic link.

*For descriptions of the CONTROL/MNG and MNG-ETH connectors, see **Section 3.4.4**.

For the connectors' pin assignments, refer to the **Appendix**.

3.4.1 SLOT CONNECTIONS

The T1 or E1 Fiber Mux XL has four groups of interface ports (A through D) on its front panel.

Slot A is a fixed 10BASE-T Ethernet port with an RJ-45 connector. The other groups of interface ports should be prepared according to the modules you ordered (see Table 2-1). Any combination of 10/100BASE-T Ethernet, T1 balanced or E1 balanced or unbalanced, and Fast Ethernet modules can be installed in slots B through D. A vacant slot should be covered with a blank panel.

For T1 lines, the maximum allowable line length between the T1 ports and the user's equipment is 655 ft. (199.6 m) according to ANSI T1.102. The cable type and length should be selected accordingly. The length of a standard UTP cable to a 10BASE-T Ethernet or 10/100BASE-T station is 328 ft. (100 m).

Table 3-7. Cable to interface connections.

Interface	Connector Type	Description
G.703 balanced	RJ-45	Channel numbers 1 to 4 for the MT1063-4T1 or MT1064-4E1 modules.
G.703 unbalanced	BNC mini coax	MT1064-4E1-UB.
Ethernet/Fast Ethernet	RJ-45	Physical connection.

3.4.2 FIBER OPTIC LINK CONNECTIONS**WARNING**

Eye damage may be caused by a broken or non-terminated fiber optic cable or connector if the laser beam is viewed directly or with improper optical instruments.

One or two (main and backup) link interfaces are provided, depending on what you ordered. In normal operation, a module must be installed in the main link.

For the properties and specifications of the optical link interfaces, refer to Table 2-2.

NOTE

While link redundancy is OFF, we recommend not installing the backup link. This way you won't receive a major alarm indication while the backup link is in sync loss.

Connect each fiber optic link interface (main and backup) in accordance with the optical interface installed for that link.

Avoid sharply bending the optical cables. The minimum bending radius should be 1.2 inches (3 cm).

To clean the optical connectors, use an approved solvent. Dry the connectors thoroughly using optical tissue.

Connect the receive cable to the optical RX connector and the transmit cable to the optical TX connector.

3.4.3 ALARM CONNECTION

The alarm cable is terminated with a DB9 male connector on the mux side. The maximum rating of the alarm relay contacts for planning the monitoring means and cabling is 1 amp, 60 VDC, and 30 VAC.

The dry contacts of the T1 or E1 Fiber Mux XL alarm relays (major and minor) are connected to a remote monitoring site via the rear-panel Alarm connector (see Figure 3-7).

3.4.4 MANAGEMENT CONNECTIONS

The T1 or E1 Fiber Mux XL can be managed via a V.24/RS-232 terminal (CONTROL/MNG port, a DB25 connector) or via the Ethernet port (MNG-ETH port, an RJ-45 connector). When managed via a V.24/RS-232 terminal, the connection cable to the V.24/RS-232 interface on the mux's rear panel should be terminated with a DB25 male connector. The nominal length of the cable for a data rate of 19.2 kbps is 50 ft. (15.2 m). When managing via the Ethernet port, the connection cable to the MNG-ETH interface on the mux's rear panel (see Figures 3-7 and 3-8) should be terminated with an RJ-45 connector. Connect the management cable to the required management port. The options available are shown in Table 3-8.

Table 3-8. Management port options.

Interface	Connector Type	Maximum Cable Length
CONTROL/MNG (RS-232)	DB25	50 ft. (15.2 m) for a data rate of 19.2 kbps
Ethernet (Port A, fixed)	RJ-45	328 ft. (100 m) for a UTP cable, Type 3
MNG-ETH	RJ-45	328 ft. (100 m) for a UTP cable, Type 3

3.4.5 POWER CONNECTION

The T1 or E1 Fiber Mux XL chassis ground is connected to the protective ground (middle) pin of the power connectors. (This applies to both the AC and DC versions.)

WARNING

You may get shocked! Intentionally disconnecting the protective ground is prohibited because this may expose personnel to electrical shock hazards.

WARNING

Before switching on or connecting any cable, the protective ground terminal (see Figure 3-1) must be connected to the protective ground connector of the power cord. The power plug should only be inserted in a socket outlet that has a protective ground contact. **DO NOT** use an extension cord (power cable) without a protective conductor (grounding)!

For AC or DC power connections, refer to Section 3.2.

4. Operation

4.1 Controls

4.1.1 FRONT-PANEL CONTROLS

The T1 Fiber Mux XL's front panel is shown in Figure 4-1. Table 4-1 lists the front-panel LED and connector functions. Figure 4-2 shows the E1 Fiber Mux XL's front panel. The numbers in the first column of Table 4-1 correspond to the numbers in Figures 4-1 and 4-2.

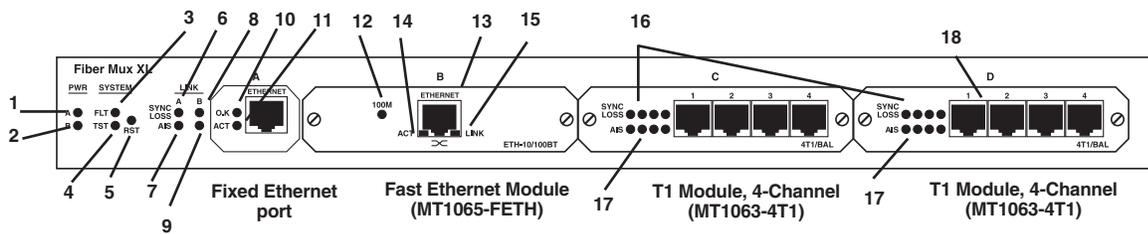


Figure 4-1. T1 Fiber Mux XL front panel.

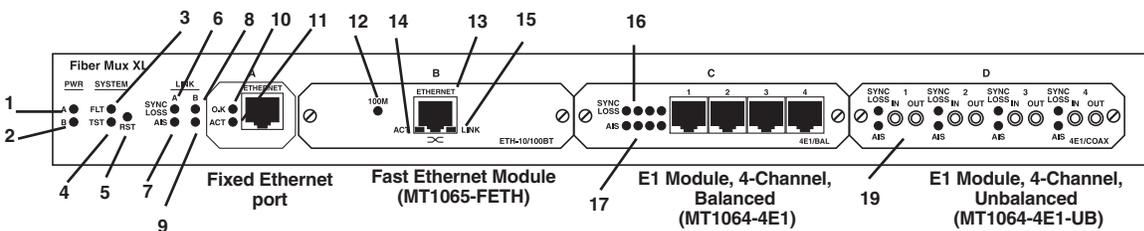


Figure 4-2. E1 Fiber Mux XL front panel.

Table 4-1. T1 or E1 Fiber Mux XL front-panel controls and indicators.

No.	Name	Control	State	Function
1	PWR A	Indicator	OFF	Indicates that the main power supply is not powered.
			ON (green)	Indicates that the main power supply is ON and operates normally.
			ON (red)	Indicates that a malfunction has been detected in the main power supply or it is not powered. If the backup power supply is installed, the T1 or E1 Fiber Mux XL may continue operating normally.
2	PWR B	Indicator	OFF	Indicates that the backup power supply is not installed.
			ON (green)	Indicates that the backup power supply is ON and operates normally.
			ON (red)	Indicates that a malfunction has been detected in the backup power supply or it is not powered. In this case, the T1 or E1 Fiber Mux XL may continue operating normally using the main power supply.
3	SYSTEM FLT	Indicator	ON (red)	Indicates a control system fault or a failure detected during the startup self-test.
4	SYSTEM TST	Indicator	ON (yellow)	Indicates that the system is on TEST. Startup self-test or loop test.
5	SYSTEM RST	Pushbutton	Pressed	Resets the T1 or E1 Fiber Mux XL; use a screwdriver to press in the button.
6	LINK A SYNC LOSS	Indicator	ON (red)	Indicates that a loss-of-signal or loss-of-frame has been detected on the main link.
			Flashing (red)	Indicates that the link is not active (the signal is received from link B).
7	LINK A AIS	Indicator	ON (yellow)	Indicates that an alarm indication signaling has been detected on the link.
8	LINK B SYNC LOSS	Indicator	ON (red)	Indicates that a loss-of-signal has been detected on the backup link.
9	LINK B AIS	Indicator	ON (yellow)	Indicates that an alarm indication signaling has been detected on the backup link.
10	OK	Indicator	ON (green)	Indicates link integrity on the Ethernet port.
11	ACT	Indicator	Flashing (yellow)	Indicates LAN traffic on the Ethernet/Fast Ethernet port.

T1 AND E1 FIBER MUXES XL

Table 4-1 (continued). T1 or E1 Fiber Mux XL front-panel controls and indicators.

No.	Name	Control	State	Function
12	B/C/D 100M	Indicator	ON (green)	Indicates speed of 100 Mbps on the Fast Ethernet port.
13	A/B/C/D ETHERNET	Connector		Connects the T1 or E1 Fiber Mux XL Ethernet port to a LAN.
14	B/C/D ACT	Indicator	Flashing (yellow)	Indicates Ethernet port traffic.
15	B/C/D LINK	Indicator	ON (green)	Indicates link integrity on the Fast Ethernet port.
16	B/C/D SYNC LOSS	4 Indicators per module	ON (red)	Indicates that a loss-of-signal has been detected on one of the channels on the T1 or E1 interface module installed in slot B, C, or D.
17	B/C/D AIS	4 Indicators per module	ON (yellow)	Indicates that an alarm indication signaling has been detected on a T1 or E1 port.
18	B/C/D	4 Connectors		Connects a T1 or E1 port on the T1 or E1 module installed in slot B, C, or D to the T1 or E1 network.
19	B, C, D	Connector		Connects an unbalanced E1 interface to the E1 network.

4.1.2 REAR-PANEL CONTROLS

The mux's rear panel provides link, alarm, management, and power connections and the status indications associated with these connections (see Figure 4-3). Table 4-2 lists the functions of the connectors and switches. The numbers in the first column of Table 4-2 correspond to the numbers in Figure 4-3.

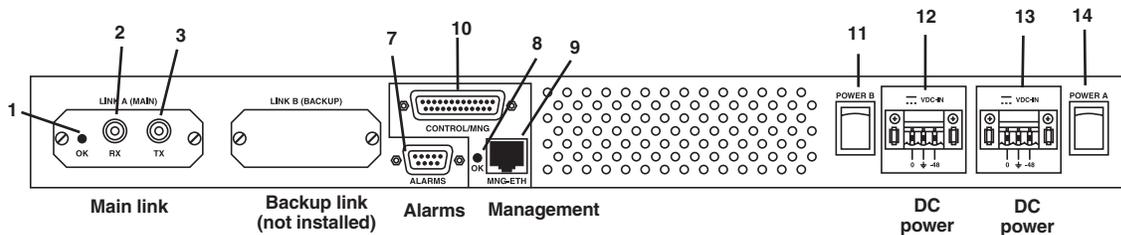


Figure 4-3. T1 or E1 Fiber Mux XL rear panel.

Table 4-2. T1 or E1 Fiber Mux XL rear-panel controls.

No.	Name	Control	State	Function
1	LINK A OK	Indicator	ON (green)	Indicates that the received signal from link A is detected.
2	LINK A (MAIN) RX	Connector		Connects the input cable of the main link to the main link module.
3	LINK A (MAIN) TX	Connector		Connects the output cable of the main link to the main link module.
4 (not shown)	LINK B OK	Indicator	ON (green)	Indicates that the received signal from link B is detected.
5 (not shown)	LINK B (BACKUP) RX	Connector		Connects the input cable of the backup link to the backup link module.
6 (not shown)	LINK B (BACKUP) TX	Connector		Connects the output cable of the backup link to the backup link module.
7	ALARMS	Connector		Connects the dry contacts of the major and minor alarm relays to a remote monitoring site.
8	MNG-ETH OK	Indicator	ON (green)	Indicates link integrity on the Ethernet port.
9	MNG-ETH	Connector		Connects the Ethernet port to the Management port.
10	CONTROL/ MNG	Connector		Connects the V.24/RS-232 management port to an ASCII terminal.
11	POWER B	Switch	0	Turns OFF the backup power supply. The mux is powered by the main power supply only.
			1	Turns ON the T1 or E1 Fiber Mux XL backup power supply; when set to this position, the switch lights in red.
12	POWER B	Connector		Connects the T1 or E1 Fiber Mux XL to the AC mains or to the backup DC power source.
13	POWER A	Connector		Connects the T1 or E1 Fiber Mux XL to the AC mains or to the main DC power source.

Table 4-2 (continued). T1 or E1 Fiber Mux XL rear-panel controls.

No.	Name	Control	State	Function
14	POWER A	Switch	0	Turns OFF the main power supply. The T1 or E1 Fiber Mux XL is powered by the backup power supply only.
			1	Turns ON the T1 or E1 Fiber Mux XL main power supply; when set to this position, the switch lights in red.

4.2 Operating Instructions

4.2.1 POWER ON

1. Set at least one of the two rear Power switches to On.
2. To achieve power supply redundancy, turn On both Power switches.
3. The front-panel PWR A and PWR B indicators light green, indicating that the mux's power consumption is shared between the two supplies.

NOTE

For the first operation and before the synchronization of two muxes, set the link redundancy (via menus, see Section 5.4) in the same configuration for both units. In addition, set the timing (see Section 5.4) for both units in a valid configuration (only one mux can be set in loopback timing mode because the other one needs to provide internal clock).

During normal operation, the LED indications shown in Table 4-1 should appear.

4.2.2 REDUNDANCY FUNCTIONS

The redundant power supply and the redundant link module ensure the T1 or E1 Fiber Mux XL operation even when one of these critical modules fails.

Link Redundancy

When the redundant link is installed (backup module and Link A) and the link redundancy is set to AUTOMATIC from the terminal or SNMP, the mux starts using the main link. It will automatically switch to the backup link when the main link fails (signal loss/sync loss). The LINK A/B SYNC LOSS LED on the front panel indicates the deactivated link. If the failure is due to signal loss, the T1 or E1 Fiber Mux XL will switch back to the main link when the signal is recovered in the main link. If the failure is due to sync loss, the backup link becomes the active link until signal loss/sync loss occurs on the backup link.

When the redundant link is installed and the management link redundancy is MANUAL, the T1 or E1 Fiber Mux XL starts using the main link. It will automatically switch to the backup link when the main link fails (signal loss/sync loss). The LINK A/B SYNC LOSS LED on the front panel indicates the deactivated link. The backup link remains active even when the main link recovers. Switching back to the main link is performed by setting the link-redundancy to AUTOMATIC from the terminal or by turning the system OFF and then ON.

When the management link redundancy is OFF, the redundancy function is not available.

Power Supply Redundancy

In the redundant power supply mode, both supplies share the T1 or E1 Fiber Mux XL power consumption. If one of the power supply modules fails, the entire power consumption is automatically drawn from a single power supply. In this case, the respective PWR LED on the front panel indicates the active power supply.

All changes made to the terminal or SNMP in link redundancy mode at the local site automatically affect the remote site.

4.2.3 POWER OFF

Set the T1 or E1 Fiber Mux XL rear power switch (switches) to Off.

5. Supervisory Port Software Configuration

5.1 Introduction

The T1 or E1 Fiber Mux XL parameters can be configured from a supervisory terminal connected to the mux's CONTROL/MNG connector. This is DB25 port located on the rear of the mux (see Figure 4-3) that connects to a dumb terminal or the COM port of a PC.

Remote management is also possible using the Telnet communication protocol through the mux's MNG-ETH connector. This is an RJ-45 port also located on the rear of the mux (see Figure 4-3). It connects via an RJ-45 cable to an SNMP management terminal.

See **Section 3.4.4** and Figures 3-1, 3-2, 3-7, and 3-8 for more information about the CONTROL/MNG and MNG-ETH connectors.

NOTE

All of the example screens shown in this chapter are for different hardware/software situations that are available.

5.2 Accessing and Exiting the Supervisory Terminal

To access the supervisory terminal for configuration:

1. Connect an ASCII ANSI terminal or a PC capable of emulating an ASCII ANSI terminal to the mux's rear-panel DB25 connector labeled CONTROL/MNG. (For the DB25 connector pinout, refer to Table A-4.)
2. Set the terminal communication parameters to 19,200 baud, 8 bits per character, one stop bit, and no parity bit.

The T1 or E1 Fiber Mux XL automatically detects and adapts itself to terminal baud rates of 9600, 19,200, 38,400, 57,600, and 115,200 bps only.

3. Turn the ANSI terminal or PC on and immediately press **Enter** four or more times. If the correct baud rate was detected, dots will start to appear on the terminal screen. If the incorrect baud rate was detected, garbled data will appear.
4. Press the period (".") key once to set the parity and complete the detection. This baud setting will be saved in non-volatile RAM.

If the auto-detection fails, the baud rate of the mux's management port is the last baud rate that was written in the non-volatile RAM.

5. If a PC is used, run a terminal emulation program.
6. Reset the T1 or E1 Fiber Mux XL or turn it ON.

The T1 or E1 Fiber Mux XL Main menu appears (see Figure 5-1).

```
MAIN MENU

OPTIMUX - XLT1 or XLE1

*****

SW version X.X
HW Revision X

1.   Local device
2.   Remote device

Enter your choice:
```

Figure 5-1. Main menu.

7. Type **1** for the Local Device menu or **2** for the Remote Device menu. The T1 or E1 Fiber Mux XL Local Device (see Figure 5-2) or Remote Device screen appears.

NOTES

- a) **All of the following screens for the local device and the remote device are the same, with the following exceptions: Software Download, SNMP Parameters, and parts of the interface configuration screens that aren't available for the remote device.**
- b) **The top left corner of each screen indicates whether it applies to a local device or a remote device.**
- c) **When working with the remote device, all changes take effect within 120 seconds. For the local device, the changes take effect immediately.**

```
LOCAL DEVICE

LOCAL OPTIMUX MENU
-----

0.   Exit
1.   Device Information
2.   Interface
3.   Software Download (not available in Telnet)
4.   SNMP Parameters
5.   Reset
6.   Change password

Enter your choice:
```

Figure 5-2. Local T1 or E1 Fiber Mux XL menu.

To exit the supervisory terminal, type **0**.

5.3 Changing Parameter Settings

The configurable parameters can be changed using a series of menus and submenus (see Figure 5-3).

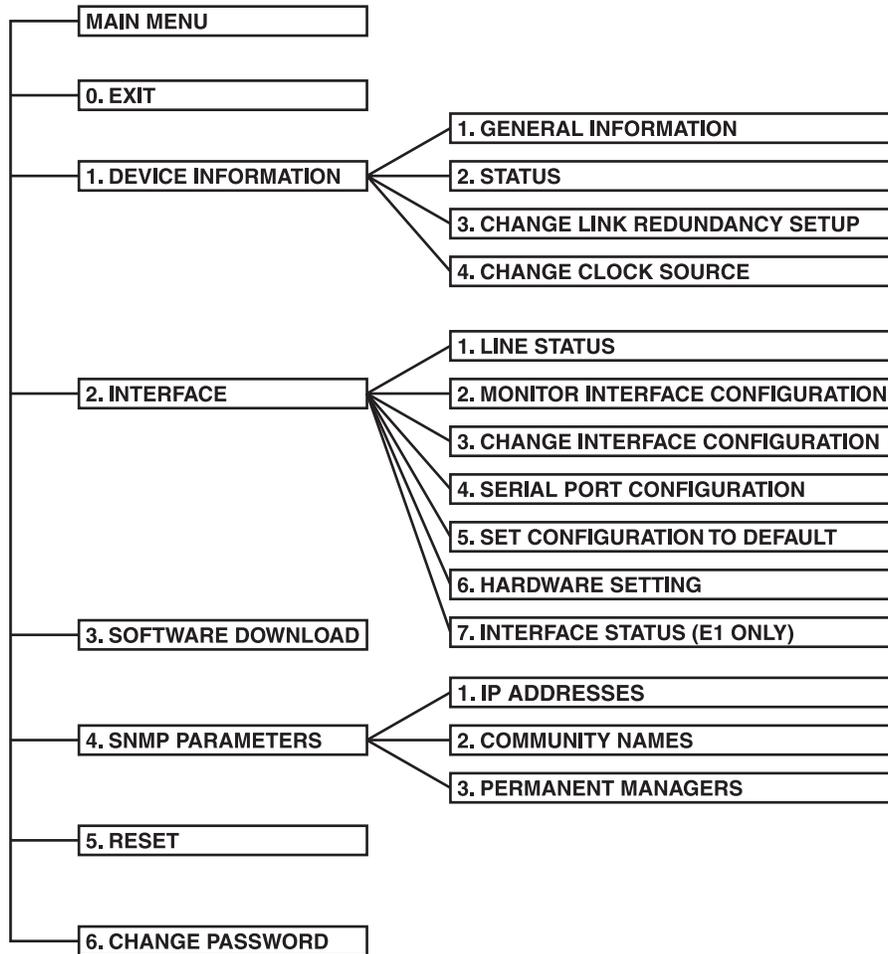


Figure 5-3. Software configuration menu map.

To set a parameter in a menu:

1. Type the number of the parameter you want to change.
2. Enter the new parameter value according to the prompt message that appears on the screen.
3. If you want to leave the current value, press the number on the menu that corresponds to it.
4. To exit to the previous screen, type **0** in any screen.

Each configuration screen contains the following parameter information: name, current value, when the option is selected, and the applicable value(s).

5.4 Device Information

To access the device information, type **1** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The Device Information Menu screen appears (see Figure 5-4).

```
LOCAL DEVICE

      DEVICE INFORMATION MENU
      _____

0.   Exit
1.   General Information
2.   Status
3.   Change Link Redundancy Setup
4.   Change Clock Source

Enter your choice:
```

Figure 5-4. Device Information Menu screen.

5.4.1 VIEWING THE T1 AND E1 VERSIONS

To view the hardware and software revisions, type **1** in the Device Information Menu (see Figure 5-4). The General Information screen appears (see Figure 5-5).

```
LOCAL DEVICE

      GENERAL INFORMATION
      _____

Hardware revision    X
Software version     SW Version X.X
Management channel   Through module A

0. Exit

Enter your choice:
```

Figure 5-5. General Information screen.

T1 AND E1 FIBER MUXES XL

The Management channel shows one of the following states:

Through module A indicates that the MNG-ETH port is set to Port A.

Separate port (back panel) indicates that the MNG-ETH port is set to Separate.

5.4.2 VIEWING THE T1 AND E1 COMPONENT STATUS

To view the status of the functional blocks, type **2** in the Device Information Menu screen (see Figure 5-4). The Status Information screen appears (see Figure 5-6).

LOCAL DEVICE	
STATUS INFORMATION	
<hr/>	
Power supply 1	FAULT
Power supply 2	OK
Active Link	MAIN
Link Redundancy	MANUAL
Clock Source	INTERNAL
0. Exit	
Enter your choice:	

Figure 5-6. Status Information screen.

The applicable states for power supplies are shown in Table 5-1.

Table 5-1. Power supply states.

State	Indicates
Not present	Power supply is not mounted. This indication applies only to power supply # 2 (backup).
OK	Power supply is ON and functions properly.
FAULT	Power supply failure was detected.

5.4.3 SETTING LINK REDUNDANCY

To change the link redundancy setting:

1. Type **3** in the Device Information Menu screen (see Figure 5-4). The Change Link Redundancy screen appears (see Figure 5-7).

```
LOCAL DEVICE

      CHANGE LINK REDUNDANCY
      _____

0.   Exit.
1.   Redundancy status   AVAILABLE
2.   Redundancy setup   MANUAL

Enter your choice:
```

Figure 5-7. Change Link Redundancy screen.

2. Type **2** to enter the redundancy setup.
3. Type **1** for AUTOMATIC, **2** for MANUAL, **3** for OFF, or press **Esc** to cancel your choice.
4. To exit to the screen, type **0**.

NOTES

- a) If the redundancy status is “NOT AVAILABLE,” change the status to “AVAILABLE.”
- b) When in normal operation, the link redundancy setting must be changed only after the system has been operating and synchronized for 120 seconds on the same link.
- c) Changes to the link redundancy mode take affect up to 120 seconds after being made.
- d) Before synchronizing two T1 or E1 Fiber Muxes XL, the link redundancy mode of both units must be the same.

5.4.4 CHANGING THE CLOCK SOURCE

To change the clock source, type **4** in the Device Information Menu screen (see Figure 5-4). The Clock screen appears (see Figure 5-8).

```
LOCAL DEVICE
      CLOCK
      _____

0.   Exit
1.   Change clock source: INTERNAL
2.   Reset to default configuration

Enter your choice:
```

Figure 5-8. Clock screen.

To view and change the clock source:

1. Type **1** to enter the change clock source option.
2. Type **1** for Loopback Timing (RCV clk), **2** for Internal (INT clk), or **0** to cancel your choice.

To reset to the default clock configuration (INT):

1. Type **2** to perform the reset to default configuration option.
2. To confirm the action, type **reset**.
3. Type **0** to exit the Clock screen.

NOTE

Loopback timing is not available at both the remote and local device at the same time.

5.5 T1 and E1 Interfaces

To view the interface information, type **2** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The Interface Menu screen appears (see Figure 5-9).

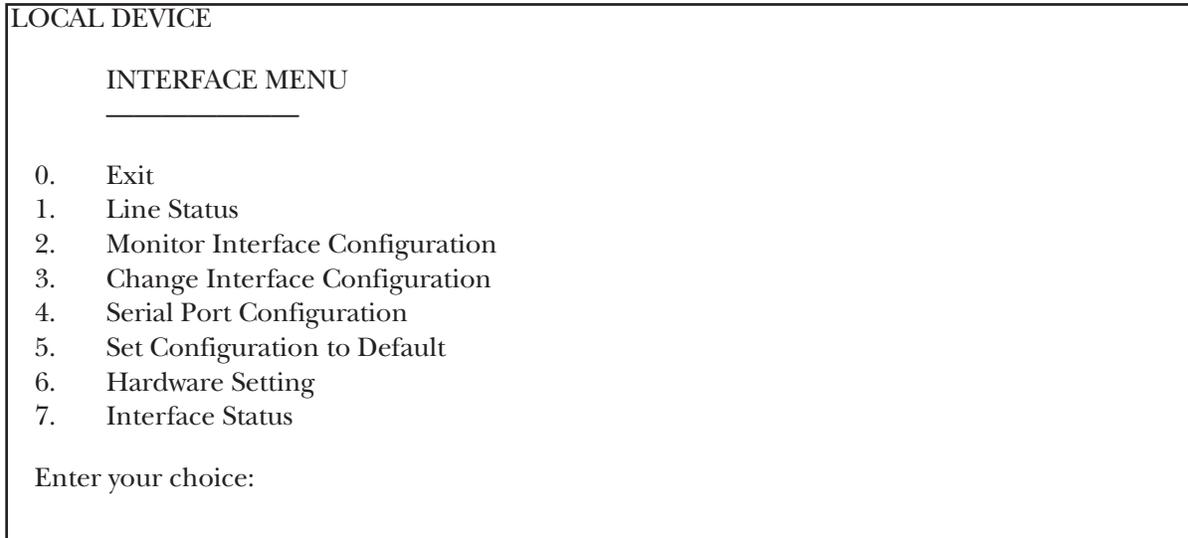


Figure 5-9. Interface Menu screen.

5.5.1 VIEWING STATUS OF TRANSMISSION INTERFACES

To view the status of the T1, Ethernet, Fast Ethernet, and fiber optic interfaces, type **1** in the Interface Menu screen (see Figure 5-9). The Line Status screen appears (see Figure 5-10).

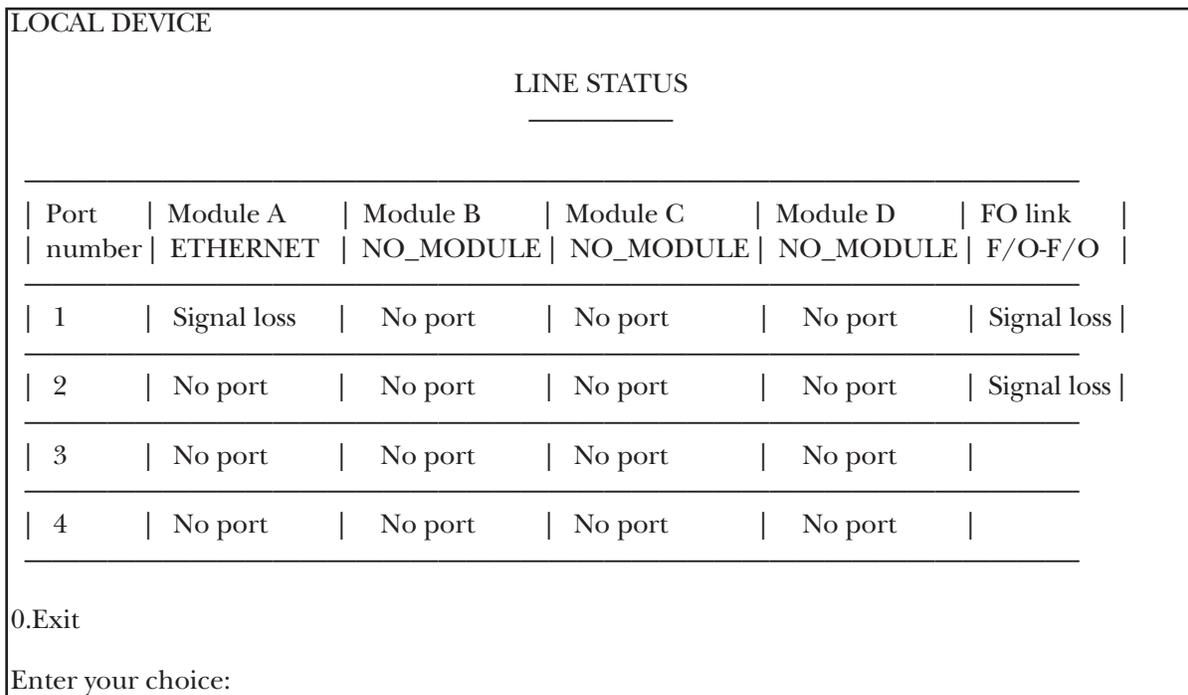


Figure 5-10. Line Status screen.

T1 AND E1 FIBER MUXES XL

To view the status of the E1, Ethernet, Fast Ethernet, and E3 interfaces, type **1** in the Interface Menu screen (see Figure 5-9). The Line Status screen appears (see Figure 5-11).

LOCAL DEVICE						
LINE STATUS						
Port number	Module A ETHERNET	Module B 4E1_UTP	Module C NO_MODULE	Module D NO_MODULE	E3 link F/O-	
1	Signal loss	Signal loss	N/A	N/A	OK	
2	No port	Signal loss	AIS	No port	No port	
3	No port	Signal loss	OK	No port		
4	No port	Signal loss	No port	No port		

0.Exit
Enter your choice:

Figure 5-11. Line Status screen.

The interface ports are characterized by the states described in Table 5-2.

Table 5-2. Interface ports.

State	Indicates
No port	The interface module associated with the specific port is not installed <i>or</i> the port number is irrelevant for a certain type of interface module. For example, only a single port is associated with an Ethernet interface module.
OK	The signal is detected at the input of a T1, E1, or fiber optic port <i>or</i> , for an Ethernet port, link integrity pulse is detected on the receive pair.
Signal loss	No signal is detected at the input of a T1, E1, or fiber optic port <i>or</i> , for an Ethernet port, link integrity pulse is not detected on the receive pair.
AIS	An Alarm Indication Signal was detected at the input of a T1 or E1 port <i>or</i> on the fiber optic link.
N/A	Not relevant.

The first row in the table in the Line Status screen (Figure 5-11) specifies the type of module installed in the T1 or E1 Fiber Mux XL slot. For example, 4E1_UTP in slot B specifies a 4-port balanced E1 module.

5.5.2 VIEWING CONFIGURATION OF MONITOR INTERFACE

To view the configuration of the monitor interface, type **2** in the Interface Menu screen (see Figure 5-9). The Monitor Interface Configuration screen appears (see Figure 5-12).

LOCAL DEVICE					
MONITOR INTERFACE CONFIGURATION					
Port number	Module A ETHERNET	Module B NO_MODULE	Module C NO_MODULE	Module D NO_MODULE	FO link F/O- F/O
1	Filter en	No port	No port	No port	No loop
2	No port	No port	No port	No port	No loop
3	No port	No port	No port	No port	
4	No port	No port	No port	No port	

0.Exit
Enter your choice:

Figure 5-12. Line Status screen.

The channels and fiber optic settings can be set from the terminal (see **Section 5.5.3**). The applicable channels and fiber optic or E3 interface states are described in Table 5-3.

Table 5-3. T1, E1, and fiber optic interface states.

State	Indicates
Filter en	Filter Enabled. If SW1-3 on the ETH-TOP card is set to On, the status of the interface remains filter enabled regardless of the changes made by the supervisory software. To change the status to filter disabled, SW1-3 must be set to Off.
No port	No port is installed.
No loop	No loop is set.
Local loop	A local loop is set. A T1 or E1 local loop applies to all ports of a T1 or E1 module (see Chapter 6 for details).
Remote loop	A remote loop is set. A T1 or E1 remote loop applies to a single port of a T1 or E1 module (see Chapter 6 for details). Remote loop on a fiber optic or E3 link is not available.

The Ethernet port is set from a DIP switch (not via software). The applicable settings are described in Table 5-4.

Table 5-4. Ethernet setting.

Setting	Indicates
Half duplex	Ethernet port operates in half duplex.
Full duplex	Ethernet port operates in full duplex.

5.5.3 CHANGING THE CONFIGURATION OF THE INTERFACE

To change the configuration of the monitor interface:

1. Type **3** in the Interface Menu screen (see Figure 5-9). The Change Interface Configuration screen appears (see Figure 5-13).

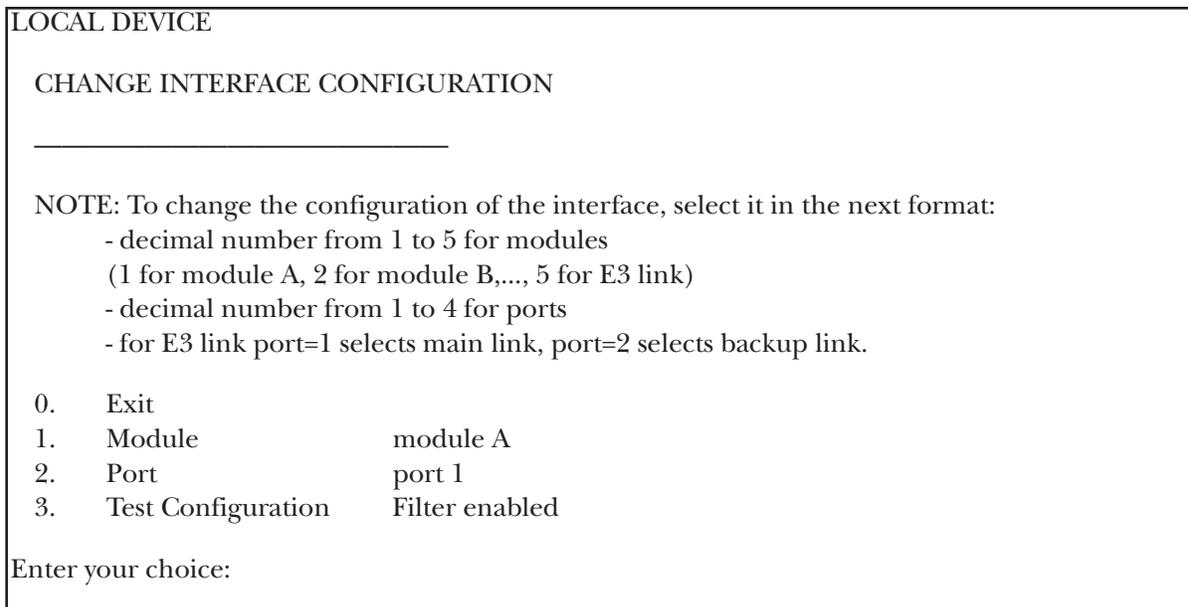


Figure 5-13. Change Interface Configuration screen.

2. Type **1** to change a module.
3. Type **1** for module A, **2** for module B, **3** for module C, **4** for module D, or **5** for an E3 link.
4. Type **2** to change ports
5. Type **1** for port 1, **2** for port 2, **3** for port 3, or **4** for port 4.

NOTE

For the E3 link, port 1 selects the main link; port 2 selects the backup link.

6. Type **3** to set the test configuration. Pressing **3** will toggle between Filter enabled and Filter disabled.

The fields needed in order to configure an interface are shown in Table 5-5.

Table 5-5. Fields in the Change Interface Configuration screen.

Field	Specifies	Modules	Values
Module	Interface module and fiber optic link	All	1 to 5
Port	Interface channel	4T1/BAL	1 to 4
		4E1/BAL, 4E1/UNBAL	1 to 4
		Fast Ethernet	1
Test Configuration	Current port configuration	4T1/BAL, 4E1/BAL, 4E1/UNBAL	Normal, Local loop, Remote loop
		FO LINK	Normal, Local loop
		E3 LINK	No loop, Local loop

For a Fast Ethernet module:

1. Type **3** in the Interface Menu screen (see Figure 5-9). The Change Interface screen appears (see Figure 5-14).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Enter your choice:

Figure 5-14. Change Interface Configuration (Fast Ethernet interface) screen.

2. Type **1** to change a module.
3. Set the module slot to correspond to the slot of the Fast Ethernet module by typing **1** for module slot A, **2** for module slot B, **3** for module slot C, **4** for module slot D, or **5** for an E3 link.
4. Type **2** to set the back pressure.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-15).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1-for 'Back pressure Enable' 2-for 'Back pressure Disable',
ESC to cancel

Figure 5-15. Change Interface Configuration (back pressure) screen.

5. Type **1** to enable back pressure or **2** to disable back pressure.
6. Type **3** to set the port operation mode.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-16).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:
- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1-for 'Full duplex' 2-for 'Half duplex', ESC to cancel

Figure 5-16. Change Interface Configuration (port operation mode) screen.

6. Type **1** to set operation to full duplex or **2** to set operation to half duplex.
7. Type **4** to set the auto-negotiation function.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-17).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B, ..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1-for 'Auto-negotiation Disable' 2-for 'Auto-negotiation Enable',
ESC to cancel

Figure 5-17. Change Interface Configuration (auto-negotiation) screen.

8. Type **1** to disable auto-negotiation or **2** to enable auto-negotiation.
9. Type **5** to set multicast blocking.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-18).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B, ..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1—for 'Multicast blocking Enable' 2—for 'Multicast blocking Disable',
ESC to cancel

Figure 5-18. Change Interface Configuration (multicast blocking) screen.

10. Type **1** to enable multicast blocking or **2** to disable multicast blocking.
11. Type **6** to set broadcast blocking.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-19).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1-for 'Broadcast blocking Enable' 2-for 'Broadcast blocking Disable',
ESC to cancel

Figure 5-19. Change Interface Configuration (broadcast blocking) screen.

12. Type **1** to enable broadcast blocking or **2** to disable broadcast blocking.
13. Type **7** to set the speed.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-20).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:
- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Choose 1 – for 10 Mbps, 2 – for 100 Mbps, ESC – for cancel

Figure 5-20. Change Interface Configuration (speed) screen.

14. Type **1** to set the module speed to 10 Mbps or **2** to set the module speed to 100 Mbps.
15. Type **8** to reset to default settings.

The Change Interface Configuration screen changes and appears as follows (see Figure 5-21).

LOCAL DEVICE

CHANGE INTERFACE CONFIGURATION

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 5 for modules,
(1 for module A, 2 for module B,..., 5 for E3 link)

0.	Exit	
1.	Module	module B
2.	Back Pressure	Disable
3.	Half/Full duplex	N/A
4.	Auto-negotiation	Enable
5.	Multicast blocking	Disable
6.	Broadcast blocking	Disable
7.	Speed	N/A
8.	Reset	

Type 'reset' to confirm reset to default setting, ESC – cancel

Figure 5-21. Change Interface Configuration (reset) screen.

16. Type **reset** to reset the module back to its default settings.

5.5.4 CHANGING THE CONFIGURATION OF THE SERIAL PORT

To change the configuration of the serial port:

1. Type **4** in the Interface Menu screen (see Figure 5-9). The Serial Port Configuration screen appears (see Figure 5-22).

```
LOCAL DEVICE
      SERIAL PORT CONFIGURATION
      _____
0.   Exit
1.   Baud rate      38400 baud
2.   Parity         NO
Enter your choice:
```

Figure 5-22. Serial Port Configuration screen.

2. Type **1** to set the baud rate
3. Type **4** for 9600, **6** for 19,200, **7** for 38,400, **8** for 57,600, or **9** for 115,200 bps.
4. Type **2** to set the parity
5. Type **0** for no parity, **1** for even, or **2** for odd.
6. Type **reset** to confirm the action.
7. Type **0** to exit the Serial Port Configuration screen.

5.5.5 RESETTING TO THE DEFAULT CONFIGURATION

To reset all T1 and fiber optic interfaces to “Normal” operation:

1. Type **5** in the Interface Menu screen (see Figure 5-9). The Set Configuration to Default screen appears (see Figure 5-23).

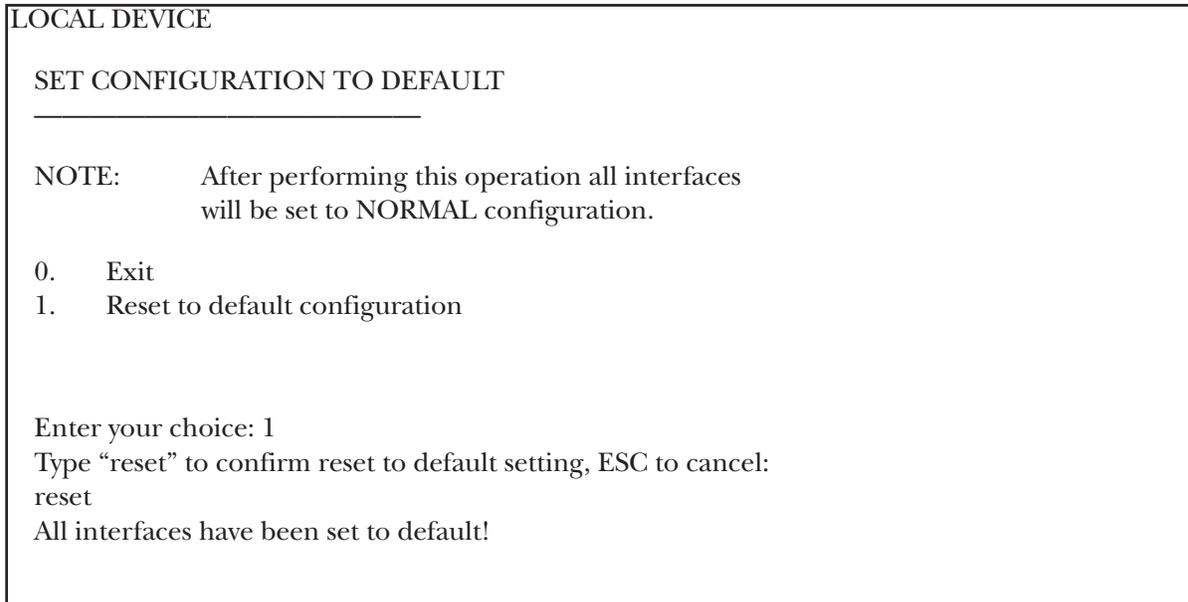


Figure 5-23. Set Configuration to Default screen.

2. Type **1** to perform the reset to default configuration option.
3. Type **reset** to confirm or press **ESC** to cancel your choice.
4. Type **0** to exit the Set Configuration to Default screen.

To reset all channel and E3 interfaces to the default configuration, type **5** in the Interface Menu screen (see Figure 5-9). The Set Configuration to Default screen appears (see Figure 5-24).

```
LOCAL DEVICE

SET CONFIGURATION TO DEFAULT
-----

INTERFACE          DEFAULT PARAMETERS
E1                 No Loop
E3                 No Loop; Redundancy-Auto; Main Link-Link A
ETH (N/A in XL16) Filter-Enable
FAST ETH (N/A in XL16) Auto negotiation-On; Back Pressure-Dis.;
                    Multicast Blocking-Dis.; Broadcast Blocking-Dis.

NOTE:      After performing this operation all interfaces
           will be set to NORMAL configuration.

0.  Exit
1.  Reset to default configuration

Enter your choice: 1
Type "reset" to confirm reset to default setting, ESC to cancel:
reset
All interfaces have been set to default!
```

Figure 5-24. Set Configuration to Default screen.

1. Type **1** to reset the local device to the default configuration.
2. Type **reset** to confirm the action.
3. Type **0** to exit.

T1 AND E1 FIBER MUXES XL

5.5.6 VIEWING HARDWARE SETTING

To view the hardware setting, type **6** in the Interface Menu screen (see Figure 5-9). The Hardware Setting screen appears (see Figure 5-25). Type **0** to exit this screen.

LOCAL DEVICE							
HARDWARE SETTING							
Module	Type	Coding/Duplex	Channel Alarm				
			CH1	CH2	CH3	CH4	
A	ETHERNET	Half duplex	NA	NA	NA	NA	
B	FAST-ETH	Auto-negotiation	NA	NA	NA	NA	
C	4E1	AMI	OFF	OFF	OFF	OFF	
D	NO_MODULE						

0.Exit

Enter your choice:

Figure 5-25. Hardware Setting screen.

Table 5-6 presents the range of possible values for the hardware settings.

Table 5-6. Hardware settings.

Type of Module	Values	
	Coding/Duplex	Channel Alarm
Fast Ethernet	1. Auto-negotiation	N/A
	2. Half duplex	N/A
	3. Full duplex	N/A
T1	1. B8ZS	1. ON
	2. AMI	2. OFF
E1	1. HDB3	1. ON
	2. AMI	2. OFF

5.5.7 VIEWING INTERFACE STATUS

To view the interface status, type **7** in the Interface Menu screen (see Figure 5-9). The Interface Status screen appears (see Figure 5-26).

LOCAL DEVICE

INTERFACE STATUS

NOTE: To change the configuration of the interface, select it in the next format:

- decimal number from 1 to 4 for modules,
(1 for module A, 2 for module B, ...)
- decimal number from 1 to 4 for ports

0. Exit
 1. Module module B
 2. Port port 1

Status

Link Integrity	Good link integrity
Speed	10 Mbps
Timing	N/A
Hardware Revision	Revision X
Software Revision	N/A

Enter your choice:

Figure 5-26. Interface Status Menu for the Fast Ethernet module.

1. Type **1** to change a module. Then type a number from 1 to 4 to view the interface status of a module. For example, type **1** for module A, **2** for module B, **3** for module C, or **4** for module D.
2. Type **2** to change ports. Then type a number from 1 to 4 to view the interface status of port 1, 2, 3, or 4.
3. Type **0** to exit.

5.6 The Software Download

To download software:

1. Type **3** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The Software Downloading screen appears (see Figure 5-27).



Figure 5-27. Software Downloading menu.

2. Type **1** to download new software.
3. Type **flash** (in lower case only) when asked for the password.
4. Press **Enter**. The T1 or E1 Fiber Mux XL resets itself and erases the flash memory.
5. Start the communication software. A popup screen appears.
6. Select the XMODEM protocol.
7. Enter the name and path of the software distribution file to be downloaded.
8. Press **Enter**. The new software version is loaded to the flash memory.
9. Reset the mux by either turning it OFF and then ON or by pressing the RST pushbutton on the mux's front panel.

NOTES

- a) **Software download is not available for the remote device.**
- b) **The downloading speed is determined by the baud rate set during the serial port configuration stage. To change the baud rate, refer to Section 5.5.4.**
- c) **When using Telnet for management, the Software Downloading option is not operational.**

5.7 The T1 or E1 Fiber Mux XL SNMP Parameters

To modify the SNMP parameters, type **4** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The SNMP Parameters screen appears (see Figure 5-28).

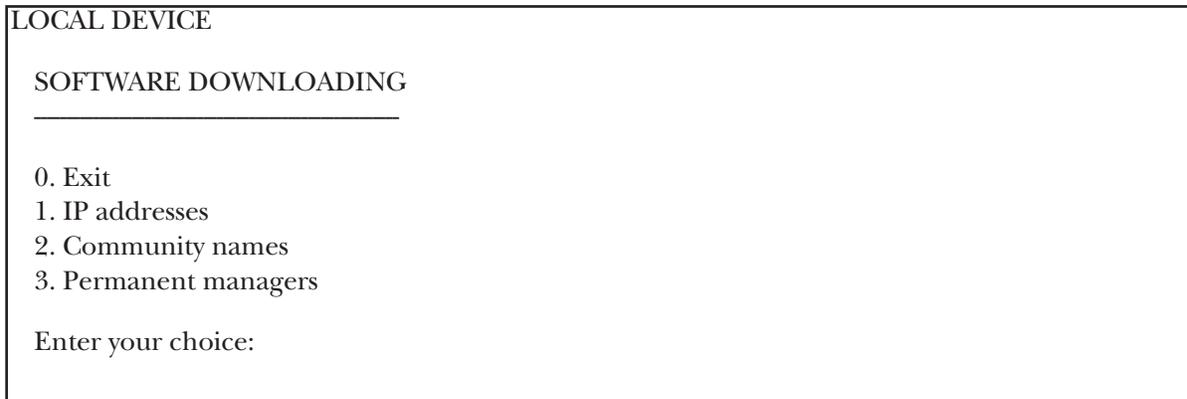


Figure 5-28. SNMP Parameters screen.

The SNMP Parameters Menu is not available for the remote device.

5.7.1 VIEWING IP ADDRESSES

To view the IP addresses:

1. Type **1** in the SNMP Parameters screen (see Figure 5-28). The IP Addresses Menu screen appears (see Figure 5-29).

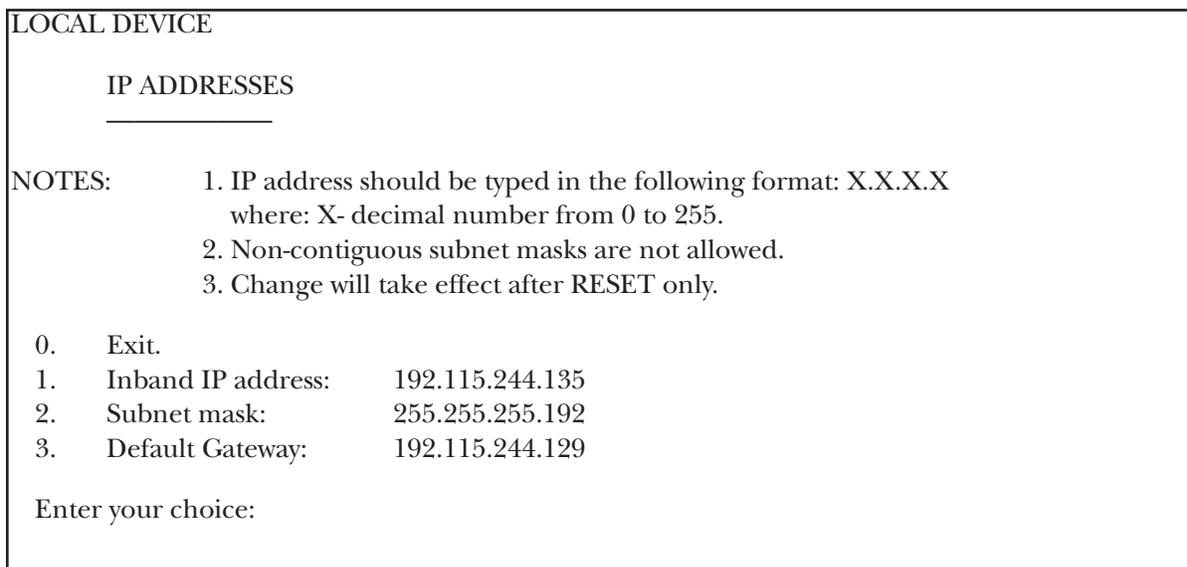


Figure 5-29. IP Addresses Menu screen.

2. Type **1** to enter an inband IP address.
3. Type **2** to enter a subnet mask.

4. Type **3** to set a default gateway.
5. Type **0** to exit the IP Addresses Menu screen.

NOTE

- a) Any change to an IP address must be confirmed by responding to the following prompt: “Data has been changed, do you want to save it (Y/N)?”
- b) For changes to take effect, the mux must be reset.

5.7.2 VIEWING COMMUNITY NAMES

To view the community names:

1. Type **2** in the SNMP Parameters screen (see Figure 5-28). The Community Names screen appears (see Figure 5-30).

```
LOCAL DEVICE
      COMMUNITY NAMES
      _____
NOTE:      Change will take effect after RESET only.
0.      Exit.
1.      View & change Trap community name: public
2.      View & change Read-only community names: public
3.      View & change Read-write community names: 1
Enter your choice:
```

Figure 5-30. Community Names screen.

2. Type **1** to view and modify a Trap community name.
3. Type **2** to view and modify a Read-only community name.
4. Type **3** to view and modify a Read-write community name.
5. Type **0** to exit the Community Names screen.

NOTES

- a) Any change to a Community Name must be confirmed by responding to the following prompt: “Data has been changed, do you want to save it (Y/N)?”
- b) For changes to take effect, the mux must be reset.

5.7.3 VIEWING PERMANENT MANAGERS

To specify the permanent managers:

1. Type **3** in the SNMP Parameters screen (see Figure 5-28). The Permanent Managers screen appears (see Figure 5-31).

LOCAL DEVICE	
PERMANENT MANAGERS	
Manager Number	IP
1.	255.0.0.0
2.	192.115.72.35
3.	255.255.0.0
4.	255.255.255.0
5.	192.115.0.0
0.	Exit
1.	Choose manager number
2.	Enter permanent manager IP

Enter your choice:

Figure 5-31. Permanent Managers screen.

The permanent manager IP address should be typed in an *X.X.X.X* format where *X* is a decimal number from 0 to 255.

2. Type **1** to select a manager number.
3. Type the number of the row that you want to modify (**1–5**).
4. The selected manager number row appears highlighted on the screen.
5. Type **2** to enter or change a permanent manager IP address.
6. Type **reset** to confirm the action.
7. Type **0** to exit the Permanent Managers screen.

NOTES

- a) Any change in the Permanent Managers screen must be confirmed by responding to the following prompt: “Data has been changed, do you want to save it (Y/N)?”
- b) For changes to take effect, the mux must be reset.

5.8 Reset

To restart the system, type **5** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The Restart Menu screen appears (see Figure 5-32).



```
LOCAL DEVICE
RESTART MENU
-----
0. Exit
1. IP addresses
2. Restart system
Enter your choice:
```

Figure 5-32. Restart Menu screen.

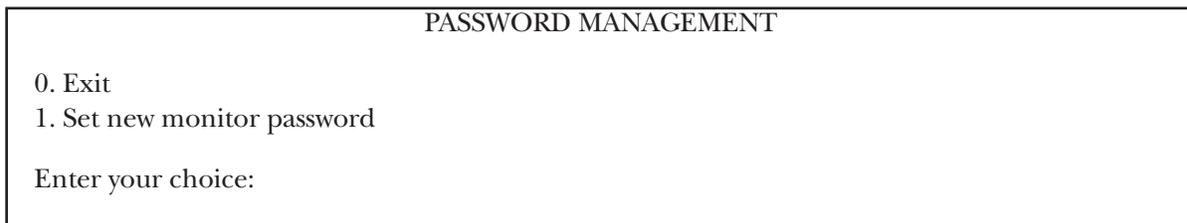
Press **2** to restart the system, press **1** to restart IP addresses, or press **0** to exit.

The Restart Menu is not available for the remote device.

5.9 Setting the Telnet Password

To set the Telnet password:

1. Type **6** in the T1 or E1 Fiber Mux XL Local Device screen (see Figure 5-2). The Password Management screen appears (see Figure 5-33).



```
PASSWORD MANAGEMENT
0. Exit
1. Set new monitor password
Enter your choice:
```

Figure 5-33. Password Management screen.

2. Type **1** to set the password.
3. Type the manager password, “**optimux1**” (not case sensitive).
4. Type the new password (must be 8 characters long).
5. Verify the new password by retyping the password.

NOTE

The password has now been set and saved. The manager password is always valid in terminal connection, but it cannot be used to connect to Telnet.

6. Troubleshooting and Diagnostics

6.1 Loop Connections

The T1 or E1 Fiber Mux XL supports loop connections necessary for isolating a failure to a particular component of the transmission system. The loop connections are set using a management tool connected to one of the management ports on the rear of the mux.

The available T1 or E1 Fiber Mux XL loop connections are shown in Figure 6-1, and the diagnostic loops are described in Table 6-1.

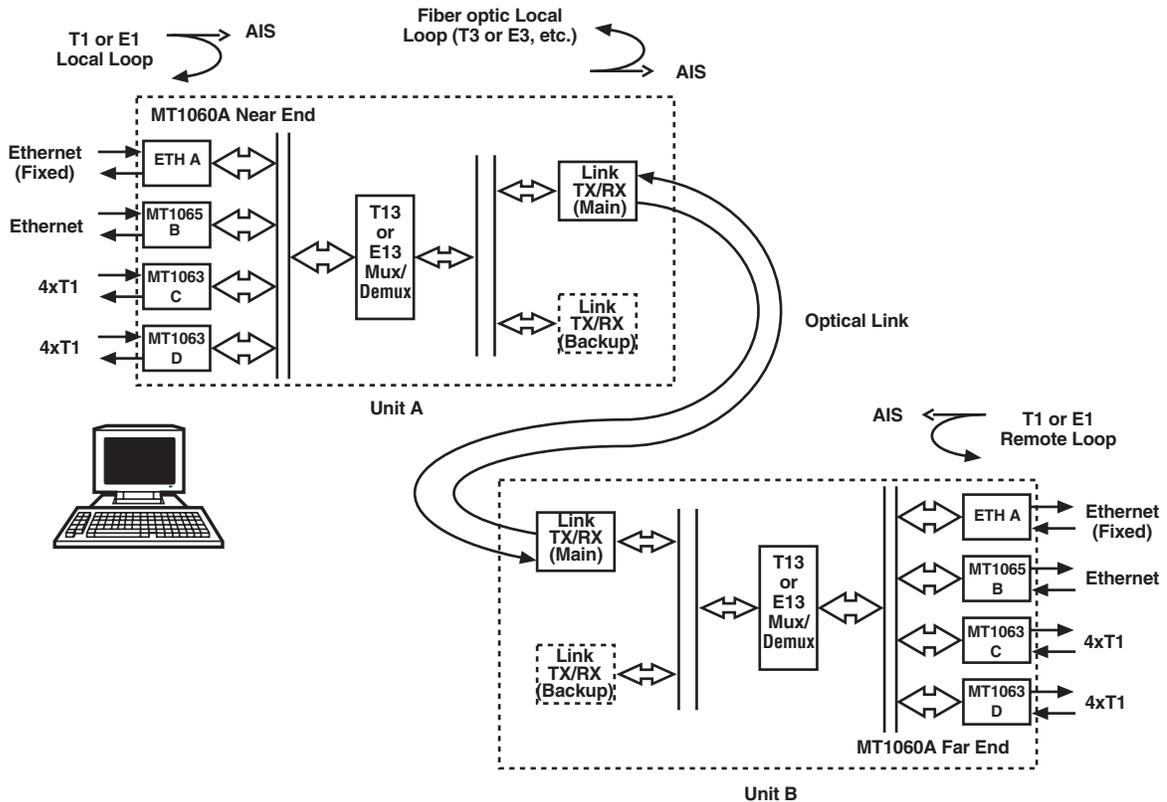


Figure 6-1. T1 or E1 Fiber Mux XL loops.

NOTE

The muxes labeled T13 or E13 in Figure 6-1 refer to the total number of ports multiplexed. If you use three 4-port T1 muxes (12 ports) plus the fixed Ethernet port (1 port), the total number of ports multiplexed is 13.

Table 6-1. Diagnostic loops.

Loop	Function
T1 or E1 local	An incoming T1 or E1 signal is looped back to the T1 or E1 line. AIS is injected toward the T13 or E13 mux. T1 or E1 local loop is set for all the ports belonging to a particular T1 or E1 channel module.
Fiber optic local	The outgoing fiber optic signal is looped back toward the T1 or E1 and Ethernet ports. AIS is injected in the outgoing fiber optic signal toward the link and propagated to the T1 or E1 signals in the remote T1 or E1 Fiber Mux XL.
T1 or E1 remote	The received T1 or E1 signal is looped back toward the link. AIS is injected in the T1 or E1 signal toward the T1 or E1 line. The T1 or E1 remote loop is set separately for each port belonging to a particular T1 or E1 channel module.

NOTE

Before setting the fiber optic local loop, set the clock source to INT and set the link redundancy to OFF.

T1 or E1 loops can be made the same way on Unit B. Just connect the terminal to Unit A while choosing the remote option from the Terminal Main Menu.

6.2 Troubleshooting Instructions

In case a problem arises, check the displayed indications and refer to Table 4-1. If that doesn't solve the problem, see Table 6-2.

Table 6-2. Troubleshooting chart.

Problem	Probable Cause	Corrective Measures
T1 or E1 Fiber Mux XL is “dead.”	No power	<ol style="list-style-type: none"> 1. Check that both ends of the power cable are properly connected. 2. If the T1 or E1 Fiber Mux XL is powered from DC, check the polarity of the power connections.
	Blown fuse	<ol style="list-style-type: none"> 1. Disconnect the power cable from both ends. 2. Replace the fuse with another fuse of the same rating.
	Defective mux	Replace the T1 or E1 Fiber Mux XL.
One of the PWR LEDs is red.	Power connection	Check the connection of the power cable.
	Blown fuse	Replace the fuse with another fuse of the same rating.
	Defective power supply	If the PWR LED is still red, have the T1 or E1 Fiber Mux XL repaired as soon as possible.
The LINK SYNC LOSS LED is ON.	Defective mux	<ol style="list-style-type: none"> 1. Set the clock source to INT. 2. Loop the link connection with a short fiber. 3. If the LED is still ON, replace the link. 4. If the LED is still ON and replacing the link doesn’t work, have the T1 or E1 Fiber Mux XL repaired.
	External problem	Check the link connections. Use loopback connections to isolate the faulty unit (see Section 6.1).
The LINK AIS LED is ON.	External problem	The remote equipment connected to the mux’s fiber optic link sends an AIS sequence. Check the remote equipment.
	Defective mux	<ol style="list-style-type: none"> 1. Set the clock source to INT. 2. Loop the link connection with a short fiber/coax cable. 3. If the LED is still ON, have the T1 or E1 Fiber Mux XL repaired.

Table 6-2 (continued). Troubleshooting chart.

Problem	Probable Cause	Corrective Measures
All the units connected to a local T1 or E1 Fiber Mux XL do not receive the remote equipment.	External problem	<ol style="list-style-type: none"> 1. Activate the fiber optic local loop on the mux. 2. Make sure all SYNC LOSS and AIS indicators turn OFF. Do the products connected to the local channels receive their own transmissions? 3. If the indicators turn OFF, the problem is external. Troubleshoot the remote unit and the fiber optic transmission path.
	Defective mux	Replace the T1 or E1 Fiber Mux XL.
Only one of the units connected to a local T1 or E1 Fiber Mux XL is connected to the remote equipment.	Connection problem	Check the equipment connected to the local channel.
	External problem	<ol style="list-style-type: none"> 1. Activate the port local loop on the mux. 2. Check that any previously lit alarm indicators related to the channel turn OFF. 3. If the indicators turn OFF, the problem is external. Check the remote equipment.
	Defective mux	Replace the T1 or E1 Fiber Mux XL.
SYSTEM FLT indicator is ON.	Defective mux	Replace the T1 or E1 Fiber Mux XL.

6.3 Calling Black Box

If you determine that your T1 or E1 Fiber Mux XL is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

6.4 Shipping and Packaging

If you need to transport or ship your T1 or E1 Fiber Mux XL:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the T1 or E1 Fiber Mux XL for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.

Appendix. Interface Specifications

A.1 T1 and E1 Connectors

There are RJ-45 connectors for each T1 or E1 channel on the T1 and balanced E1 modules. The RJ-45's pin assignment is shown in Table A-1.

Table A-1. T1 or E1 RJ-45 connector pin assignment.

Pin	Designation	Function	Direction
1	RD(T)	Receive Data (Tip)	Input
2	RD(R)	Receive Data (Ring)	Input
3	FG	Frame Ground	—
4	TD(R)	Transmit Data (Ring)	Output
5	TD(T)	Transmit Data (Tip)	Output
6	FG	Frame Ground	—
7, 8	—	Not connected	—

The unbalanced E1 module uses a pair of mini coax connectors for each E1 channel.

A.2 Ethernet and Fast Ethernet Connectors

One Ethernet RJ-45 connector is mounted on each of the modules indicated in Table A-2.

Table A-2. RJ-45 connector location.

Module	Use
Main Board	Fixed Ethernet port at the front
MT1065-FETH	Modular Fast Ethernet port in slot B, C, or D
Management	MNG-ETH port (used for SNMP management) on the mux's back panel

The Ethernet RJ-45 connector's pin assignment is shown below.

Table A-3. Ethernet RJ-45 connector pin assignment.

Pin	Designation	Function	Direction
1	RX+	Receive – positive lead	Input
2	RX-	Receive – negative lead	Input
3	TX+	Transmit – positive lead	Output
6	TX-	Transmit – negative lead	Output
4, 5, 7, 8	—	Not connected	—

A.3 Alarm Connector

The T1 or E1 Fiber Mux XL alarm connector is a DB9 female connector which includes three contacts for each of the alarm relays. Figure A-1 shows the pin functions. The relay positions are shown in the non-energized (alarm active) state.

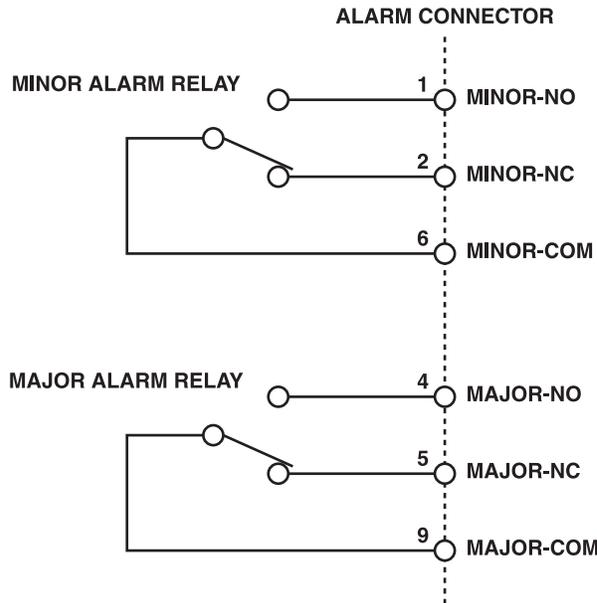


Figure A-1. Alarm connector wiring.

NOTE

In Figure A-1, NO indicates normally open, NC indicates normally closed, and COM indicates COMMON.

A.4 Control Connector

A.4.1 CONNECTOR PIN ASSIGNMENT

The optional RS-232 control port has a standard ITU-T V.24 DTE interface. The physical interface is a DB25 female connector (labeled CONTROL/MNG; see Figure 4-3 and **Section 3.4.4**). This port is used to connect an RS-232 terminal or COM port of a PC to the mux for management. The pin assignment is shown in Table A-4.

T1 AND E1 FIBER MUXES XL

Table A-4. ITU-T V.24 CONTROL/MNG connector pin assignment.

Pin	Designation	Function	V.24 Circuit	Direction
1	CHAS	Frame Ground	112	—
2	TD	Transmit Data	103	Output
3	RD	Receive Data	104	Input
4	RTS	Request To Send	105	Output
5	CTS	Clear To Send (Not connected)	106	Input
6, 9–19, 21–25	—	Not connected	—	—
7	SG	Signal Ground	102	—
8	CD	Carrier Detect (Not connected)	109	Input
20	DTR	Data Terminal Ready	108.1	Output

A.4.2 CABLE CONNECTION

If you don't want to connect the T1 or E1 Fiber Mux XL to an ASCII terminal through a modem, use a standard null-modem cable. You can also prepare a cable according to the diagram shown in Figure A-2.

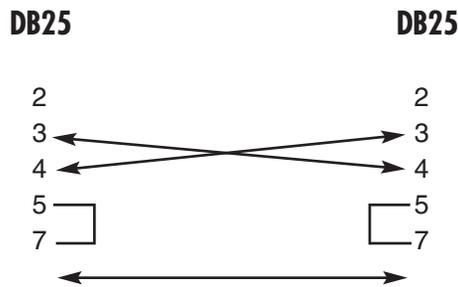


Figure A-2. Control cable wiring.

A.5 Power Connectors

The power connector used for AC powering is a standard square 3-prong female connector.

The power connector used for DC powering is a terminal block connector (see Figure A-3).

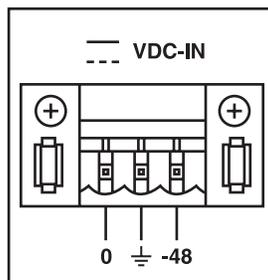


Figure A-3. DC connections.

A.6 DC Power Supply Connection—Terminal Block Connector

NOTE

Ignore this section if the mux is AC powered.

The DC power supply has a plastic 3-pin VDC-IN power input connector. It's located on the mux's rear panel. A mating terminal block connector plug is supplied with the power supply for attaching your power supply cable.

NOTE

Prepare all connections to the terminal block plug before inserting it into the mux's VDC-IN connector.

A.6.1 PREPARING AND CONNECTING THE TERMINAL BLOCK PLUG

1. Strip the power supply wires' insulation according to the dimensions shown in Figure A-4.

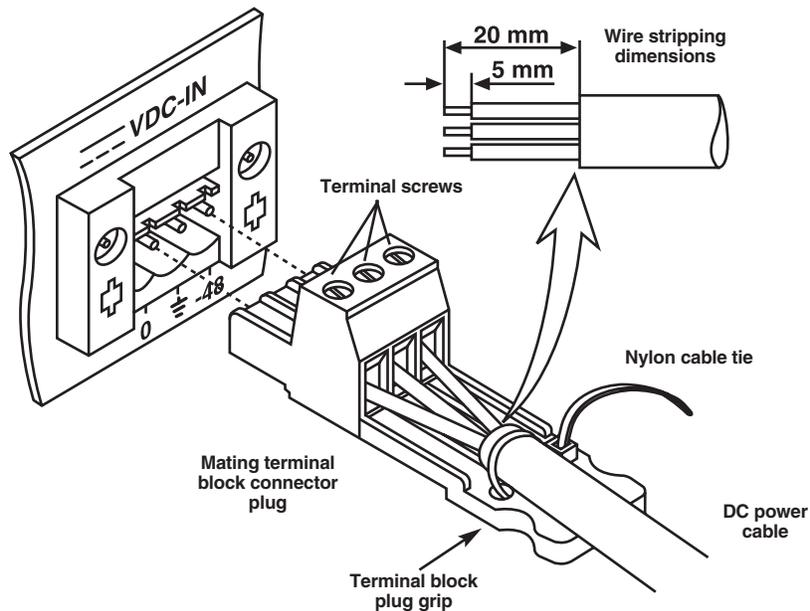


Figure A-4. Terminal block plug.

2. Place each wire lead into the appropriate terminal block plug terminal according to the voltage polarity mapping shown in Figure A-5. (If a terminal is not already open, loosen its screw.) Afterwards, tighten the three terminal screws.

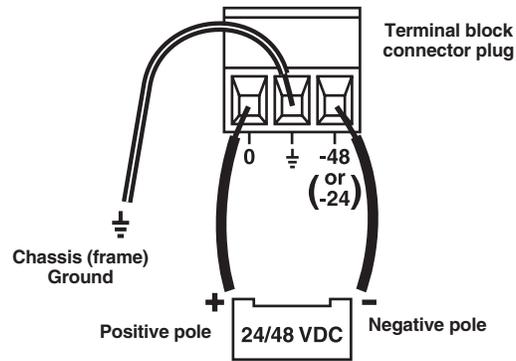


Figure A-5. Voltage polarity mapping.

3. Pull a nylon cable tie around the power supply cable to secure it firmly to the terminal block plug grip. (Pass the tie through the holes on the grip.)
4. Isolate the exposed terminal screws/wire leads (using a plastic sleeve or insulating tape) to prevent the possibility of a short circuit.
5. Connect the assembled power supply cable to the mux by inserting the terminal block plug into the mux's VDC-IN connector until it snaps into place.

A.6.2 DC POWER SUPPLY WIRE VOLTAGE POLARITY

Refer to Figure A-5 for proper mapping of the power supply wire leads to the terminal block plug's three terminals.

WARNING

Reversing the wire voltage polarity can cause damage to the mux.

Always connect a ground (earth) wire to the terminal block plug's chassis (frame) ground terminal. Connecting the mux without a protective ground or interruption of the grounding (for example, by using an extension power cord without a grounding conductor) can harm the mux or the equipment connected to it.



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