

BLACK BOX Catalogue Ltd

The Source for Connectivity



MTU310XE

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E3 Access Multiplexer with SNMP User Guide

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Quality Management System

Warning

The E3 Access Multiplexer with SNMP complies with FCC Part 15 of the Federal Communications Commission (FCC) Rules concerning radio frequency emissions for Class A computing devices. The following section is required by the FCC.

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In accordance with FCC Part 15 section 15.21, changes or modifications made by the buyer that are not expressly approved by BLACK BOX Ltd could void the buyer's authority to operate this equipment.

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This Class A digital device meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet Appareil numerique de la classe A respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.





NOTE: As per the Voluntary Control Council for Interference by Information Technology Equipment (VCCI), the E3 Access Multiplexer with SNMP complies with VCCI Class 1 ITE. This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas. Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

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Regulatory Compliance

IEC950/UL1950 3rd Edition

EN50082-1 and EN60950

EN55022 Level B

89/336/EEC

92/31/EEC

93/68/EEC

73/23/EEC

ACA

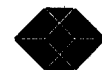






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E3 Access Multiplexer with SNMP



Introduction

The E3 Access Multiplexer with SNMP provides an economical means of extending high-capacity data systems onto wide area public or private E3 networks. Supporting a number of interface types including High Speed Serial Interface (HSSI) and V.35, the E3 Access Multiplexer connects to bridges, routers, front-end processors, and channel extenders.

It can function as an E3 Data Service Unit (DSU) or E3 feeder multiplexer. The E3 Access Multiplexer interfaces up to three DTE boards (ports) to one E3 facility, and can be accessed locally or remotely via a dial-up modem or through the E3 line itself in a "modemless" configuration (Figure 1-1).



Figure 1-1 E3 Access Multiplexer with SNMP Front Panel

E3 Access Multiplexer Components

The E3 Access Multiplexer system contains the following components:

An E3 main board—The main board houses the network and control circuitry.

From one to three DTE boards—Two types of DTE boards are supported: a high-speed DTE board (HSDB) and a V.35 DTE board (HVDB). Each of these interface modules has one DTE port.

A front panel—The front panel consists of a 16-character vacuum fluorescent display, a 4-key keypad, and various LEDs. This panel can be used to provision the unit, run diagnostic tests, or gain access to performance statistics.

Built-in power supplies—The power supplies have a range of 120 VAC to 240 VAC or -48 VDC nominal.

E3 Access Multiplexer Features

The E3 Access Multiplexer offers the following features:

- Easy local installation and configuration using an ANSI (VT-100) compatible terminal
- Remote control through a Hayes-compatible modem or in-band serial link
- Point-to-point connectivity
- Clear Channel and framing formats



E3 Access Multiplexer with SNMP

- User-selectable bandwidth in increments from 358 kbps up to 34.189 Mbps
- Front panel LEDs
- HSSI or V.35 electrical interface to the DTE on industry standard connectors
- Local or remote control management
- Daisy-chaining of serial data ports on co-located units
- Alarm reporting capability
- Downloadable code
- SNMP MIB II support. In addition to supporting RFC 1157, 1213 and 1407, a device-specific enterprise MIB is also available

How the E3 Access Multiplexer Works

The E3 Access Multiplexer allows you to configure the data rate of each payload signal. The E3 bandwidth can be broken up into 95 timeslots of 358 kbps each. For example, you can select a data rate of 21.1 (59 x 358 kbps) Mbps for a particular DTE data interface module. The data rate and routing information is sent to the E3 main board where a database of all associated connections is maintained.

The E3 main board uses this information to direct the appropriate segment of E3 bandwidth to the appropriate data interface module. It also controls incoming data flow from the data interface modules and controls access to the data bus.

Signal Flow from the E3 Interface to the DTE Board

The E3 receive signal is first terminated at the E3 main board BNC connector. Once recovered, the payload data is written into a buffer where demultiplexing occurs.

The DTE payload data is written from the backplane into buffers on the receiving module. There it is processed into the appropriate format and data rate. The resulting signal is routed back to the data interface connector where it exits the system.

Signal Flow from the Data Interface to the E3 Interface

The signal flow described below uses a HSSI interface to an HSDB as an example, but it is the same for all the DTE boards supported.

The data signal first terminates on the HSDB interface connector. The signal is then routed to the HSDB, where the signal is recovered for further processing. Once recovered the data is written to and stored in a buffer until it is accessed by the E3 main board.

The E3 main board accesses the HSDB module by asserting the HSDB address onto the address bus and initiating a read command. Once accessed, the HSSI data is read onto the data bus and written into a buffer on the E3 main board. The E3 main board then multiplexes the HSSI data with other data inputs, if any, to be transported by the E3 Access Multiplexer. The composite signal is then processed for E3 transmission and sent to the E3MB network connector where it exits the system.



Installation

The following table prioritizes the tasks you will need to perform to successfully install the E3 Access Multiplexer. Refer to the pages noted for detailed instructions of each task:

Table 2-1 Installation Steps

Installation Step	Page Number
Preparing for the Installation	2-1
About Mounting the Unit in a Rack	2-2
Installing the E3 Access Multiplexer with AC Power	2-4
Connecting the E3 Access Multiplexer to an E3 Network	2-6
Connecting the E3 Access Multiplexer to a DTE	2-6
Connecting the E3 Access Multiplexer to an External Clock Source	2-7
Connecting an ASCII Terminal	3-1

When you complete these steps, you are ready to configure the E3 Access Multiplexer. For more information on configuring, refer to Chapter 3, "Configuration."

Preparing for the Installation

Before you begin the installation, you need to:

1. **Unpack and inspect the E3 Access Multiplexer for damage that may have occurred during shipment. Wipe off the exterior with a soft cloth, if necessary.**
2. **Save all packing slips and documents included with the unit. Save the shipping cartons and packing materials until you have completed the installation and verified the operation.**
3. **Make sure that you have received all the items ordered. Your shipment should consist of the following:**
 - E3 Access Multiplexer
 - Cables ordered for your network environment
 - One power cord
 - This manual
4. **Fill out and mail the registration card.**

Do not proceed with this installation if any voltage is present between the send and receive pairs of the network interface. You can ask the serving telephone company to temporarily disconnect the simplex power for the installation.



E3 Access Multiplexer with SNMP

Required Equipment

Make sure you have the following equipment ready:

Table 2-2 Required Equipment

Equipment	Function
Screwdriver and rack screws	For mounting and miscellaneous functions
VT-100 ANSI terminal (or compatible)	To perform the initial unit configuration
RS-232 straight-through cable with DE-9 connectors	To connect the unit to the terminal, SNMP station or modem
DTE cables:	To connect each card to the DTE driver:
25-twisted-pair cable with 50-pin plug connectors	To connect the unit to a HSSI-compatible DTE device
V.35-compatible, shielded cable with DB-25 plug connector on the E3 Access Multiplexer end	To connect the unit to a V.35-compatible DTE device
E3 cables: 75Ω coax RG59	To connect the E3 network to the BNC network connectors on the back panel

For more information about cable and connector pinout assignments, see Appendix B.

About Your Power Supply

You can order either an AC or DC power supply.

- AC power—Each unit comes with a power cord.
- DC power—A terminal strip is provided on the E3 Access Multiplexer's rear panel for power from a -48 VDC power source. Of the eight screws on the terminal strip, the two far right screws (as you're facing the rear panel) are for DC power.



CAUTION: The E3 Access Multiplexer is designed to operate with negative power supply. Be sure to connect the positive terminal to ground.

About Grounding

Ground the E3 Access Multiplexer using a cable connected to a screw terminal on the E3 Access Multiplexer rear panel. For information about grounding cables, see Appendix A.

Make sure your E3 network cable or remote system connects the E3 network shield to a ground.

About Mounting the Unit in a Rack

The E3 Access Multiplexer can be front or mid-mounted in a 19-inch or 23-inch rack.



E3 Access Multiplexer with SNMP

Allow about two inches of space between units on the rack.

Front-mounting the Unit in a 19-inch Rack

To front-mount the E3 Access Multiplexer in a 19-inch rack:

Mount the unit in a 19-inch rack using four rack mounting screws, two on each side as shown in Figure 2-1.

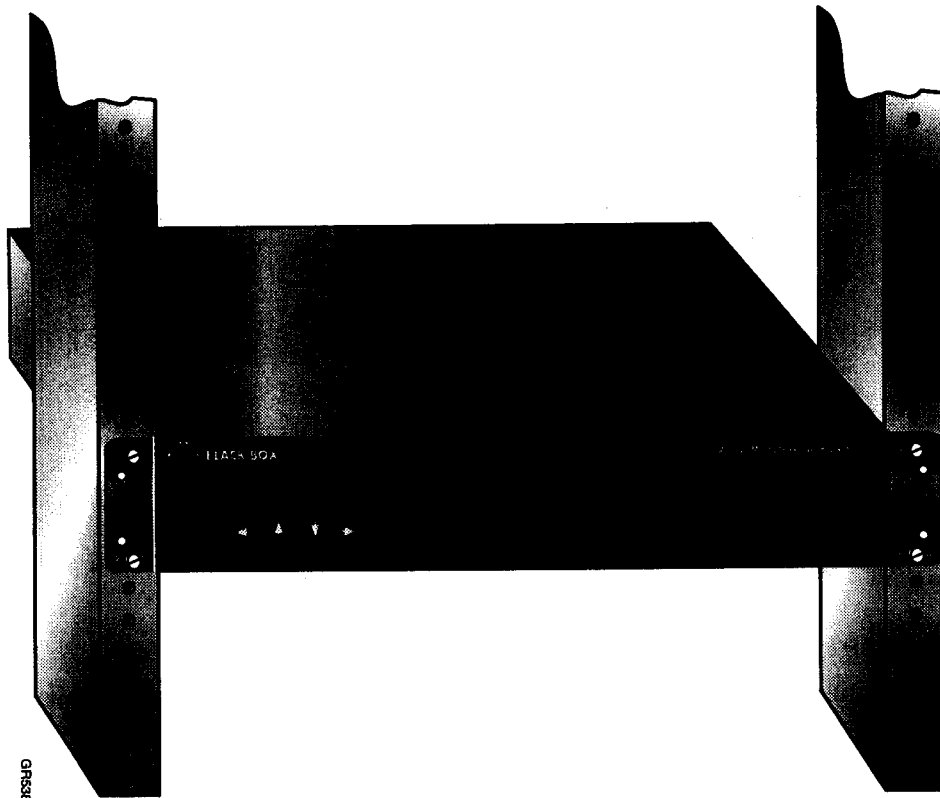


Figure 2-1 E3 Access Multiplexer Front Mounted in a 19-inch Rack

Front-mounting in a 23-inch Rack

To front-mount the unit in a 23-inch rack:

- ▼ Remove the ears from the unit and reattach them so that the wider sections of the ears face front. Attach the unit to the rack.

Mid-mounting the E3 Access Multiplexer

To mid-mount the unit in a 19-inch rack:



E3 Access Multiplexer with SNMP

- ▼ Remove the ears and attach them to the unit's middle holes. Attach the unit to the rack.

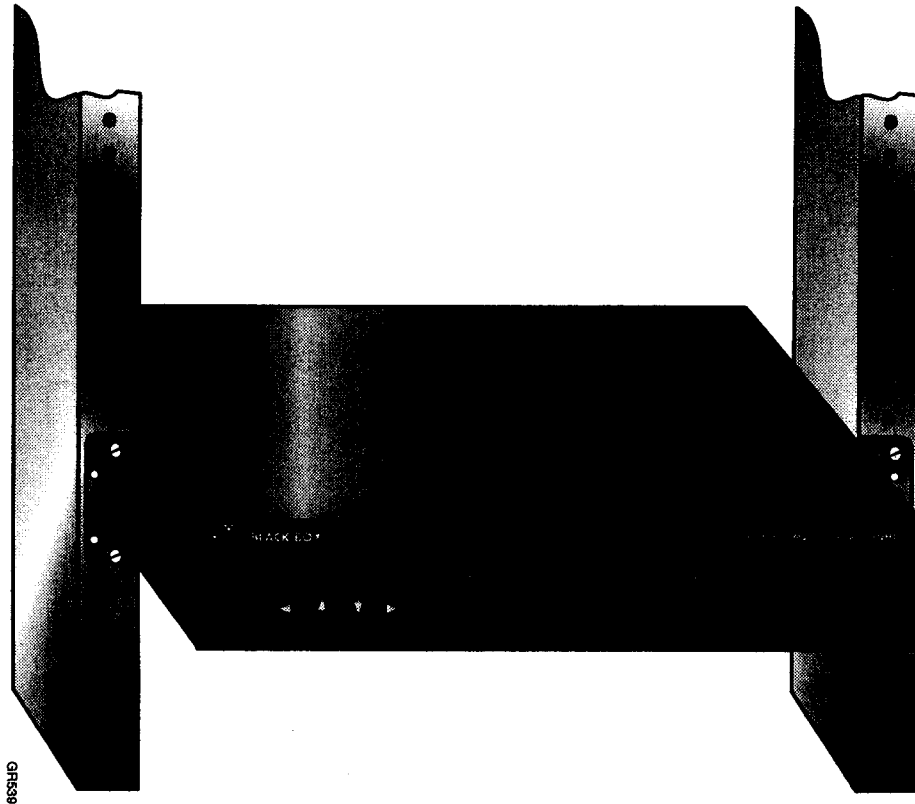


Figure 2-2 E3 Access Multiplexer Mid-mounted in a 19-inch Rack

Installing the E3 Access Multiplexer with AC Power

To mechanically install the E3 Access Multiplexer when using AC power, perform the following steps:

1. Mount the E3 Access Multiplexer on a flat surface or in a rack.
2. Ground the E3 Access Multiplexer by connecting a grounding cable to the screw terminal identified by the symbol (\cong) on the rear panel's terminal block.
3. Connect the AC power cord to the AC power socket on the rear panel of the E3 Access Multiplexer, and plug the other end into the nearest AC outlet.



NOTE: An AC power cord is provided with every E3 Access Multiplexer that has an AC power supply.



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Installing the E3 Access Multiplexer with DC Power

When using DC power, you will need the following:

- A tray cable which must be UL recognized 14 AWG, 3 conductors, copper strand
- Electrical power and control cable type TC, 600 V 90°C. (Alpha Wire Company No. 45443 is an example.)

Figure 2-3 on page 2-5 shows the terminal block on the rear panel. To mechanically install the E3 Access Multiplexer when using DC power, perform the following steps:

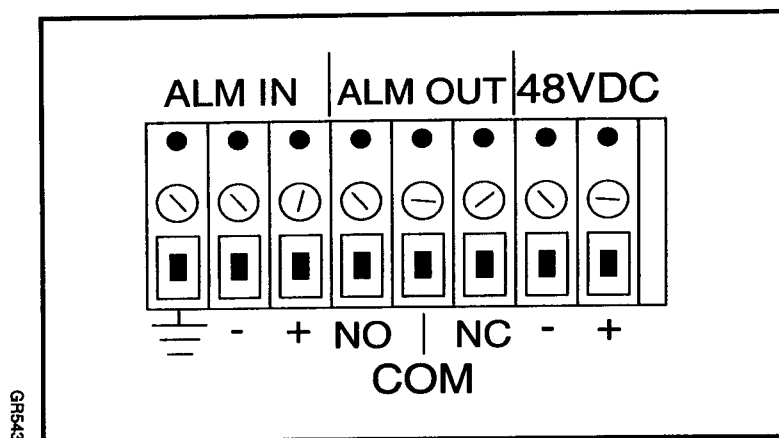


Figure 2-3 Terminal Block on Rear Panel

1. Place the E3 Access Multiplexer on a flat surface or in a rack.
2. Before you connect the E3 Access Multiplexer to the centralized DC power source, strip two inches of jacket material off the tray cable and ½ inch of insulation off each wire.
3. Connect the -48 VDC wire to the - terminal (on the rear panel's terminal block, (Figure 2-3) using a small flat screw driver (⅛-inch blade) fasten the wire.
4. Connect the ground (+) wire to the + terminal in the same way.



NOTE: The unit is designed to operate with negative voltage; therefore, you must connect the positive terminal to ground.

5. Connect the frame ground (≡) terminal to the local earth ground, if required.
6. To minimize disturbance to the wires through casual contact, secure a tray cable near the rack frame using multiple cable ties. Use at least four cable ties, a minimum of four inches apart. The first tie should be within six inches of the terminal block.



E3 Access Multiplexer with SNMP

7. Connect the E3 Access Multiplexer to a DC power source.



WARNING: Damage to the E3 Access Multiplexer may result if power is connected improperly.

Do not operate the E3 Access Multiplexer without a ground connection to the ground stud!

The E3 Access Multiplexer automatically runs a self-test at power up, during which the front panel displays a self-test message. Payload service resumes upon completion of the self-test and the front panel displays the following default message:

EFS 00.0 PERCENT

Connecting the E3 Access Multiplexer to an E3 Network

You will need a WECO 728A cable, its equivalent, or a cable provided by BLACK BOX to connect the E3 Access Multiplexer to the E3 network.

The E3 Access Multiplexer has two BNC E3 network connectors located on its rear panel (labeled RCV and XMT in Figure 2-4).

To connect the E3 Access Multiplexer to a E3 network:

- ▼ Connect one end of the network cable to the E3 Access Multiplexer's BNC connectors, and the other end to the standard patch panel BNC connection.

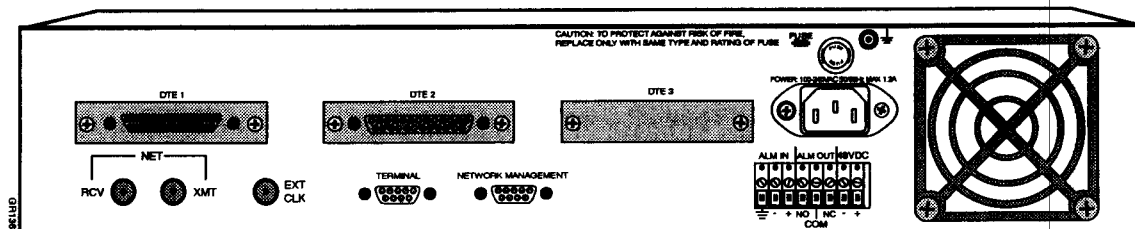


Figure 2-4 E3 Access Multiplexer Rear Panel

Connecting the E3 Access Multiplexer to a DTE

The E3 Access Multiplexer provides three DTE interface connectors on its rear panel (Figure 2-4). The unit can be ordered with any combination of the following interface connectors (up to three):

- 50-pin SCSI socket for a HSSI compatible DTE device
- DB-25 socket for a V.35 compatible DTE device

To connect the E3 Access Multiplexer to a HSSI-compatible DTE:

Use a 50-pin twisted pair SCSI-type cable with an overall foil/braid shield. The cable must have a plug connector at the E3 Access Multiplexer end.



E3 Access Multiplexer with SNMP

- ▼ Connect one end of the DTE cable to the E3 Access Multiplexer's 50-pin SCSI socket, and connect the other end to the DTE equipment.

To connect the E3 Access Multiplexer to a V.35-compatible DTE:

Use a shielded cable with DB-25 plug connectors on one end and V.35 (M-34) on the other end.

- ▼ Connect one end of the DTE cable to the E3 Access Multiplexer DB-25 socket, and connect the other end to the DTE equipment.

Connecting the E3 Access Multiplexer to an External Clock Source

To provide clocking to the E3 Access Multiplexer from an external source, connect the appropriate cable to the BNC socket provided on the rear panel of the E3 Access Multiplexer.



NOTE: You will need to use a WECO 728-compatible RG59 cable.

For more information about external clock specifications, refer to "External Clock Specifications" on page A-1 in Appendix A.



E3 Access Multiplexer with SNMP



E3 Access Multiplexer with SNMP

Configuration

To configure an E3 Access Multiplexer with SNMP, you can use the terminal interface by connecting an ASCII terminal to the E3 Access Multiplexer with SNMP's Terminal port.

This chapter describes how to connect the terminal and how to configure the E3 Access Multiplexer with SNMP E3 Access Multiplexer from a terminal.

Required Information

Before you configure the unit, we suggest you collect the DSU/CSU IP address and IP subnet mask. You will need these to establish a telnet connection to the DSU/CSU from a remote terminal and enable SNMP network management.

Keeping a Record

We suggest you keep a written record of each unit's configuration. For a copy of the configuration worksheet, see "Configuration Worksheet" on page A-9.

Telnet

The Telnet server does not have an inherent locking mechanism. The unit can be modified via:

- Local terminal login
- Remote terminal login
- SNMP
- Two Telnet sessions to the local unit
- Front panel

You can open a E3 Access Multiplexer with SNMP Telnet session from any TCP/IP-based workstation to obtain instant access to alarm and performance information, unit configuration, and extensive test capabilities through an easy-to-use, menu-driven interface. Telnet access is enabled via the network management port on the E3 Access Multiplexer with SNMP. Telnet requires a SLIP connection via a terminal server, router auxiliary port, or the BLACK BOX Management Access Processor (MAP).

The E3 Access Multiplexer with SNMP supports up to two simultaneous Telnet sessions. Therefore, one user cannot eliminate the Telnet session of another user. The Telnet timeout default is five minutes; valid configuration values are OFF, 3, 5, 10, and 30 minutes.

Connecting an ASCII Terminal

You can connect the terminal to the Terminal port either directly, or through a daisy-chained or dial-up modem connection.

Before you connect the terminal, you need to make sure that the bit rate, parity bit, word length and stop bit settings on the terminal or modem match the E3 Access Multiplexer with SNMP settings.



E3 Access Multiplexer with SNMP

Checking the Default Settings

The default settings are as follows:

- baud rate—9600
- parity bit—none
- word length—8
- stop bits—2

If these settings are not the same, reconfigure the E3 Access Multiplexer with SNMP's default settings using the front panel controls. For more information on the front panel, see Chapter 6, "Using the Front Panel Interface."

Connecting a Terminal to a Serial (Terminal) Port

The E3 Access Multiplexer with SNMP has two 9-pin serial port sockets on its rear panel, labeled Terminal and Network Management. These are provided for connection to the ASCII terminal or SNMP workstation.



NOTE: To enable daisy-chaining ensure that pin 8 is disconnected at the terminal end of the cable.

Regarding Distance: If the serial port baud rate is 9600 bps, place the terminal within 50 feet of the port. You may increase the distance if you reduce the baud rate.

To connect a terminal to the terminal port socket on the E3 Access Multiplexer with SNMP rear panel:



E3 Access Multiplexer with SNMP

- ▼ Using the DE-9 RS-232 straight-through ribbon cable, attach the 9-pin plug connector into the E3 Access Multiplexer with SNMP DE-9 socket and the other end into the terminal's connector. Figure 3-1 shows the terminal and network management ports on the rear panel.

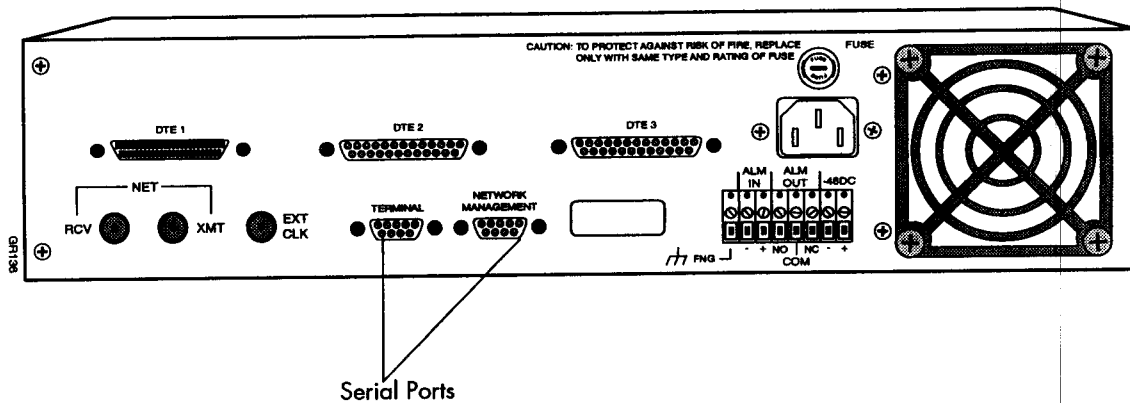


Figure 3-1 Terminal and Network Management Ports

Connecting the Terminal Port through a Modem

To connect the Terminal port of the E3 Access Multiplexer with SNMP through a modem, you need a straight DB-25 to DE-9 modem cable.



NOTE: BLACK BOX can provide 9-pin to 25-pin adapters, as well as null-modem adapters if they are required.

To connect a modem to the Terminal port:

1. Make sure the connection is a straight DB-25 to DE-9 modem cable.
2. Make sure the E3 Access Multiplexer with SNMP's baud rate, parity bit, and stop bit settings match the modem's.
If they do not, change the settings on the E3 Access Multiplexer with SNMP using the front panel controls.
3. Using the null DB-25 to DE-9 RS-232 straight cable, connect the modem to the appropriate DE-9 connector on the E3 Access Multiplexer with SNMP's rear panel. (Figure 3-1.)
4. Connect the modem to the phone line and the terminal or SNMP workstation.

Connecting Multiple Units in a Daisy-chain

You can connect up to twelve E3 Access Multiplexer with SNMP units in a daisy-chain, for centralized network monitoring and management capabilities.



E3 Access Multiplexer with SNMP

To daisy-chain E3 Access Multiplexer with SNMP units, use a cable with DE-9 connectors (available from BLACK BOX).

Connect multiple E3 Access Multiplexer with SNMP units in a daisy-chain:

1. Using a cable with DE-9 connectors, connect the cable's DE-9 connector to the terminal (or modem if at a remote site).

Ribbon-type cables can be ordered from BLACK BOX by the following part numbers:

Table 3-1 Part Numbers for Cables

To daisy chain:	Order Part No.
Four units	BLACK BOX 154-00051-01
Eight units	BLACK BOX 154-00052-01
Twelve units	BLACK BOX 154-00053-01

2. Connect the cable's DE-9 plug connector to the terminal port socket on each E3 Access Multiplexer with SNMP (Figure 3-1).
3. To multidrop the network management port, connect the cable's DE-9 plug connector to the network management port socket on each E3 Access Multiplexer with SNMP. Plug the socket end of the DE-9 cable to your NMS workstation.

The connection between your E3 Access Multiplexer with SNMP and your NMS workstation must be a SLIP connection.

For detailed instructions on installing SNMP systems, refer to the separate installation guides for these products.



NOTE: When units are daisy-chained together, the units must be operating in Multidrop Mode. For more information about Multidrop Mode, see "Configuring the E3 Access Multiplexer with SNMP" on page 3-9. Each unit should be given a unique node number.



E3 Access Multiplexer with SNMP

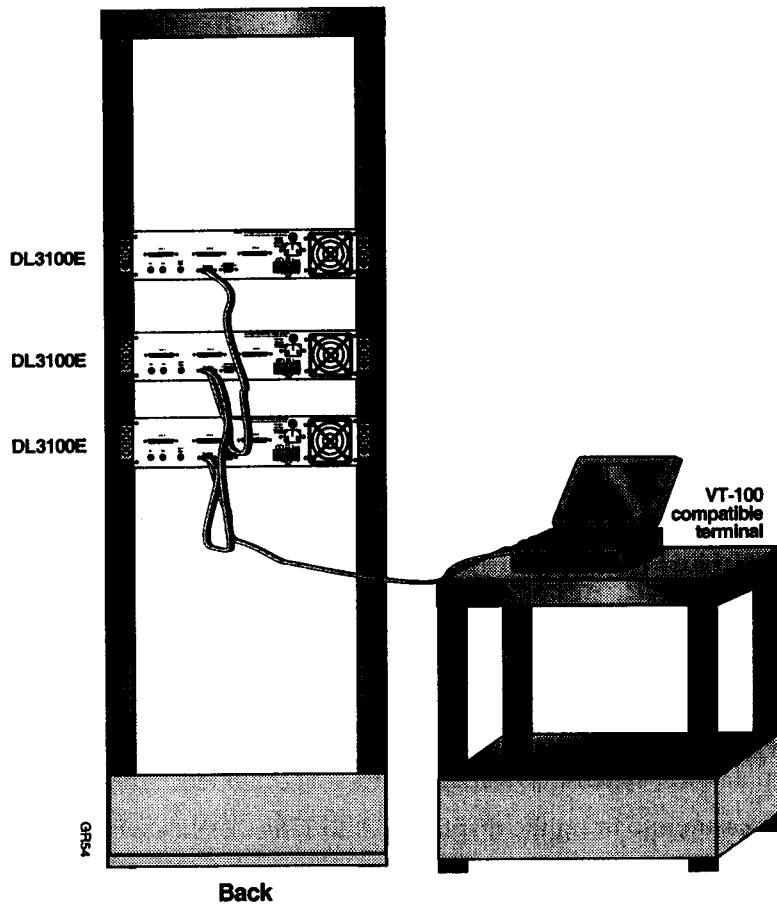


Figure 3-2 Daisy-chained E3 Access Multiplexer with SNMP units

Logging on to the E3 Access Multiplexer with SNMP

To log on to the E3 Access Multiplexer with SNMP:

1. If you know the node number, skip to step 3.
2. If you do not know the node number, press **Ctrl-X** five times to display a roll call of all node numbers.
3. Type **Ctrl-X** one time.
4. Type the pound sign (#).
5. Type the node number and press **Return**.

You will see the prompt:

User name:



E3 Access Multiplexer with SNMP

6. Enter a valid user name. If a user name has not been configured, press **Enter** to bypass this field.

The following prompt appears:

Password:

7. Enter a valid password. If a password has not been configured, press **Enter** to bypass this field.

The Node/E3MB Main Menu appears. (Figure 3-3.)

If it does not appear, you may have an incorrect node number, a bad connection on the comm port or a bad comm port configuration.

8. To log on to another E3 Access Multiplexer with SNMP on the same daisy chain, press **Ctrl-X**, then type the pound sign (#) followed by the node number. Press **Return**.

To log off all units, press **Ctrl-X** and press **Return**.

Using the Terminal Interface

The E3 Access Multiplexer with SNMP terminal interface contains a number of menus which you use to configure, monitor and manage the E3 Access Multiplexer with SNMP.

When you log on, the Node/E3MB Main Menu appears.

To select a submenu, move the highlight bar through the menu screen using the up and down arrows. When the desired menu is highlighted, press **Return**.

Press **Escape** to bring the display back to Select Device when in the main menus, and back to Exit when in the execution menus.

To exit any menu and return to the Node/E3MB Main Menu, select Exit and press **Return**.

Selecting a Device

Before performing any activities, you must first select a device. You can select a device from any of the main menus.

To select a device from a main menu:

1. Move the highlight bar to the Select Device field and press **Return**.

The highlight bar will then move to the Selected Device Address field in the status bar.

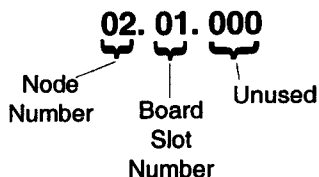
2. Enter the device address and press **Return**.

A device address is a seven-digit identifier that designates the physical location of a device within the unit. It contains three fields delimited by periods. The example below defines each field.

This example shows the address of the board in slot 1 of node number 2.



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NOTE: To view a list of the slot numbers for each device in the unit, select Option Slots from the Node/E3MB Main Menu.

To change an existing address, backspace over it to delete it, and type the address of the device you wish to access. (A valid node number can range from 0 to 9,999.)

When selecting a Node/E3MB, you only need to enter the first field of the device address.

When selecting an HSDB or HVDB, enter the device address as shown in Step 2 on page 3-6. There are three board slots (numbers one through three) that correspond to DTE boards one, two, and three.

Setting a Parameter in a Menu

To set the value of a parameter and confirm or cancel your action:

1. Move to the value using the up and down arrows.
2. Press the Space Bar to cycle through the available options, stop at the desired option, and press Return.
Or, when appropriate, type the required value.
3. You must select Confirm to confirm your action (or select Exit to take no action).



E3 Access Multiplexer with SNMP

The Terminal Interface Screen

Figure 3-3 describes the general layout of the terminal interface screens, using the Node/E3MB Main Menu as an example.

```
Status 00/00/00 00:00:00      1.02.000 HUDB    < 83 >
Module Restarted
Status 00/00/00 00:00:00      1.00.000 E3MB    < 28 >
Idle Signal Detected
BLACK: 000: NTU:1000 REL 6 01 00 NODE    1 LOTS    07/16/93 06 12:14
SELECTED DEVICE ADDRESS: 1 00 000 NAME LOTS TYPE: NODE

NODE/E3MB MAIN MENU
Select Device
BACKUP Database
Option Slots
Event History
Remote Node Map
Node Configuration
SNMP Configuration
Software Download
Delete Entire Node Configuration
Remote Node Terminal Access
E3MB Configuration
E3 Bandwidth & Connections
E3MB Alarms & Status
E3MB Statistics
E3MB Tests
```

Figure 3-3 Node/E3MB Main Menu

Node/E3MB Main Menu Selections

The Node/E3MB Main Menu offers the following selections:

- **Select Device**
(Default—Local node address)
Allows you to move to the main menu of the remote node or any DTE board.
Enter the address of the device you wish to access.
- **Backup Database**
Lets you manually backup the database to EEPROM.
- **Option Slots**
Lets you see which DTE boards occupy which DTE slots on the E3 Main Board.
- **Event History**
Displays the E3 Access Multiplexer with SNMP's event history and lets you reset alarms.
- **Remote Node Map**
Displays the numbers of the remote nodes and the status of the link (up or down).



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- **Node Configuration**
Lets you configure certain parameters of the E3 Access Multiplexer with SNMP.
- **SNMP Configuration**
Lets you configure the E3 Access Multiplexer with SNMP to communicate with an SNMP Management System.
- **Delete Entire Node Configuration**
Lets you delete the node's configuration and return to the factory default settings.
- **Remote Node Terminal Access**
Lets you access the remote E3 Access Multiplexer with SNMP from the local terminal session.
- **E3MB Configuration**
Lets you configure certain parameters on the E3MB.
- **E3 Bandwidth and Connections**
A read-only field that displays bandwidth and connections on the E3MB.
- **E3MB Alarms and Status**
Displays current alarm and status reports for the E3MB and DS3 signal.
- **E3MB Statistics**
Displays current performance statistics of the E3MB and lets you clear the counters.
- **E3MB Tests**
Lets you perform diagnostic loopbacks.

This chapter describes the Configuration menus.

Configuring the E3 Access Multiplexer with SNMP

To configure a E3 Access Multiplexer with SNMP, set the:

- Basic node parameters in the Node Configuration Menu.
- E3MB parameters in the E3MB Configuration Menu.
- HSDB or HVDB Configuration in the HSDB/HVDB Configuration and Connections Menu.
- SNMP parameters in the SNMP Configuration Menu (for SNMP management capability).

To open the individual configuration menus, use the up and down arrows to select the configuration menu name from the Node/E3MB Main Menu and press **Return**.

Configuring the Node

You use the Node Configuration Menu to configure the basic parameters of the E3 Access Multiplexer with SNMP.



E3 Access Multiplexer with SNMP

```

Idled 07/16/98 06:15:41 1.00.000 E3MB (< 11)
  Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB (< 28)
  Idle Signal Detected
BLACK BOX: NTU3100E REL 6 01.00 NODE 1:LOIS 07/16/98 06:17:02
SELECTED DEVICE ADDRESS 1 00 000 NAME LOIS TYPE NODE

NODE CONFIGURATION MENU

  Exit

Unit Configuration
Login Configuration
  
```

Figure 3-4 Node Configuration Menu

```

Major 01/11/96 00:53:20 2.01.000 HSDB (< 8)
  Module Missing
Status 01/11/96 00:53:20 2.00.000 E3MB (< 28)
  Idle Signal Detected
BLACK BOX: NTU3100E REL 7 00.00 NODE 2: 01/11/96 00:57:44 NJ
SELECTED DEVICE ADDRESS: 2 00 000 NAME TYPE NODE

UNIT CONFIGURATION  Exit Confirm

DATE: 01/11/96
TIME: 00:56:27

AUTOGROW: On PERMIT SELECT DEVICE ACCESS FROM REMOTE: Yes
AUTOMATIC BACKUP: After every database change.
FRONT PANEL: On MODEL NAME : DIGITAL LINK DL3100E
NODE NUMBER: 2 SOFT SERIAL #: XXXX XXXX XXXX
HARDWARE REVISION: B MIB REVISION : 1.01 Jan. 01 1998
SOFTWARE REVISION: 7.00.00 (RAM)

TERMINAL BAUD RATE: 9600
TERMINAL *BITS AND PARITY: 8 bits, No parity
TERMINAL STOP BITS: 1 bit
TERMINAL XON/XOFF: Disabled
TERMINAL MULTIDROP: Enabled
  
```

Figure 3-5 Unit Configuration Menu





NOTE: To save your changes, you must select Confirm. Select Exit to take no action.

Unit Configuration Menu Parameters

The Unit Configuration Menu parameters are:

- **DATE**

Enter a valid date using the format MM/DD/YY.

mm 1-12 month

dd 1-31 date

yy 0-99 year

Example: 5/28/2 yields 05/28/02

- **TIME**

Enter a valid time with the format hh:mm:ss.

hh 0-23 hours

mm 0-59 minutes

ss 0-59 seconds

Example: 8:4:39 yields 08:04:39

- **Autogrow—On or Off (Default—On)**

When this feature is on, physically inserting a module into a slot will cause the unit to automatically recognize the module, and the module to appear in the Option Slots Menu.

- **Permit Select Device from Remote**

Permits or denies a remote user access to the local E3 Access Multiplexer by setting this parameter to **Yes** or **No** through the **Select Device** menu option.

When **No** is selected, remote terminal access requires you to login to the remote machine and supply a password.



E3 Access Multiplexer with SNMP

- Automatic Backup—15 seconds, 30 seconds, one minute, or five minutes after a database change; after every database change; Off. (You must select Confirm to save your change). (Default—five minutes after a database change)



NOTE: You can also back up the database manually with the Backup Database command in the Node/E3MB Main Menu. (See "Backing Up the Database" on page 4-18 in Chapter 4, "Monitoring and Managing.")

Select the amount of time when the database, if modified, is automatically backed up to the EEPROM.

- Front Panel—On or Off (Default—On)

Lets you configure or run tests using the front panel display buttons.

- Model Name

A read-only field that is set at the factory.

- Node Number—1 to 9,999 (Default—0)

Enter a number between 1 and 9,999 to assign a unique number to each E3 Access Multiplexer with SNMP.



NOTE: Each unit must be set to a different number, to allow remote communication and daisy chaining of multiple units. If the remote unit is set to the same number as the local unit you will not be able to access the remote unit.

Do not assign a blank number! This causes the unit to be always logged on and it cannot be logged out until it is assigned a number. You are not able to log on to another E3 Access Multiplexer with SNMP if its node number is blank.

- Soft Serial #

A read-only field that specifies a preset number from the factory.

- Hardware Revision

Set by the factory and cannot be changed. Allows the user to view the hardware revision level to be used when troubleshooting the unit.

- MIB Revision

Current revision of MIB. Set by the factory and cannot be changed.

- Software Revision

Identifies the software in the unit. Cannot be changed.

- Terminal Baud Rate—300, 600, 1200, 2400, 4800, 9600, 19200, 38400 (Default—9600)

Select a baud rate to match the baud rate on the connected terminal or modem.



E3 Access Multiplexer with SNMP

- Terminal #Bits and Parity—7 or 8 bits; Odd, Even, or None (Default—8 bits; None)
Select the number of bits and parity to match the number of bits and parity on the connected terminal or modem.
- Terminal Stop Bits—1, 1.5, or 2 bits (Default—2 bits)
Select the stop bits to match the stop bits on the connected terminal or modem.
- Terminal XON/XOFF—Enabled or Disabled (Default—Enabled)
Enabled—Enables a software flow control feature which causes the DTE device to stop sending data when the terminal's buffers are full. You can resume the flow of data, by pressing any key and stop it by pressing **Ctrl-S**.
Disabled—Set to Disabled when your terminal or network management station does not support XON/XOFF.
- Terminal Multidrop—Enabled or Disabled (Default—Enabled)
Enabled—If the terminal is connected to more than one E3 Access Multiplexer with SNMP unit, this must be set to Enabled. It enables you to daisy-chain and monitor up to 12 E3 Access Multiplexer with SNMPs for centralized network management.

Login Configuration

The Login Configuration Menu lets you add users, set the login passwords, set the access type, and activate automatic logout.

To open the menu, select Login Configuration in the Node Config Menu and press **Return**.

```
Idle 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idle
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX INTU31000 REL 6.01 00 NODE 1 LOIS 07/16/98 06:15:51
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: NODE

LOGIN CONFIGURATION Exit Confirm

  USER IDENTIFICATION  PASSWORD  ACCESS TYPE(S)
1)                               Full access
2)                               No access
3)                               No access
4)                               No access
5)                               No access
6)                               No access
7)                               No access
8)                               No access

TERMINAL AUTOMATIC LOGOUT: Off. (Must use Logout to return to login prompt).
TELNET AUTOMATIC LOGOUT: 5 minutes after no keyboard activity.
```

Figure 3-6 Login Configuration Menu



E3 Access Multiplexer with SNMP

When you log on to a E3 Access Multiplexer with SNMP for the first time you are User 1 with full access privileges.

You can add seven additional users. Each user can have a password. The default for the User Identification field and Password field is empty. Just press **Return** at the prompts. The fields are case sensitive.

Login Configuration Parameters

Before you set any parameter in the Login Configuration Menu, heed these warnings!



WARNING: Be sure to give at least one user full access rights.

If no user has full access rights or if you don't know the password to log on, no one can access the E3 Access Multiplexer with SNMP.

Call BLACK BOX Technical Support.

The Login Configuration parameters are as follows:

- User Identification and Password (text string)
Enter an alphanumeric text string for each (max—16 characters). Both are case sensitive.
- Access Types:
 - a. Display Only—View only rights; the user cannot make changes or initiate tests.
 - b. Maintenance—User can initiate tests, clear the Events History Log and clear statistics.
 - c. Provision—User can configure the E3 Access Multiplexer with SNMP (with the exception of SNMP configuration and software download).
 - d. Provision & Maintenance—User has Provision and Maintenance rights.
 - e. Full Access—User can view all menus and perform all functions.
 - f. No Access—User has no access, no rights.



NOTE: The default is User 1: Full Access, others: No Access

When you attempt to do something for which you have no rights, the system informs you:

Access denied - your account does not have this PRIVILEGE.

- Terminal Automatic Logout:—OFF, 3, 5, 10, 30 minutes after no keyboard activity (Default—OFF)
- Telnet Automatic Logout:—OFF, 3, 5, 10, 30 minutes after no keyboard activity (Default—5 minutes after no keyboard activity)



E3 Access Multiplexer with SNMP

Configuring the E3MB

You use the E3MB Configuration Menu to configure the E3 Main Board.

To open the E3MB Configuration Menu, select E3MB Configuration from the Node/E3MB Main Menu and press **Return**.

Figure 3-7 shows an example of the E3MB Configuration Menu.

```
Idled 07/16/98 06:15:41      1.00.000 E3MB      ( 11)
  Loss Of Signal Idled
Status 07/16/98 06:15:41    1.00.000 E3MB      ( 28)
  Idle Signal Detected
DIGITAL LINK QUALITY REL 6.01.00 NODE 1 LOIS      07/16/98 06:20:21
SELECTED DEVICE ADDRESS: 1.00.000 NAME LOIS      TYPE: NODE

E3MB CONFIGURATION      Exit Confirm
DEVICE NAME:            LOIS
SERVICE:               In-Service
HARDWARE REV:          A
NATIONAL BIT:          1
TRANSMIT CLOCK:        Internal
CURRENT TRANSMIT CLOCK: Internal
FRAMING FORMAT:        Clear Channel

ALARM THRESHOLDS      MAJOR      MINOR
BIPOLAR VIOLATIONS    1 x 10- 6    1 x 10- 8
FRAME ERRORS          1 x 10- 6    1 x 10- 8
```

Figure 3-7 E3MB Configuration Menu

E3MB Configuration Menu Parameters

The E3MB Configuration Menu allows you to set the following parameters:

- Device Name

Enter an alphanumeric name of up to 20 characters (numbers, letters, and spaces are acceptable).

- Service—In Service or Out of Service (Default—In Service).

Allows you to place the E3 Access Multiplexer with SNMP in or out of service. When the device is Out of Service, alarm reporting functions are disabled. This feature affects alarms only.

- Hardware Rev

This is a view-only field. The hardware rev is set at the factory and cannot be changed.



E3 Access Multiplexer with SNMP

- National Bit

Allows the user to set the National BIT to one, zero, or DL depending on what is required by the telephone company being used. Move the cursor to the National BIT field and press the Space Bar to cycle through the options. Press **Enter**.



NOTE: For remote unit access, use the DL setting and Clear Channel Mode. If unit is in Standard MUX mode, the remote unit will be accessible independent of the National Bit setting.

- Transmit Clock—Internal, Network and External (Default—Internal).

Designates the E3 Transmit Main Clock source.

Internal—Causes the internal timing source of the E3 Access Multiplexer with SNMP to generate the DS3 transmit timing. The receive timing is always recovered from the incoming DS3 signal.

Network—Allows the recovered receive timing to clock the transmit signal (loop).

External—Allows a customer-supplied External 2.048 MHz clock source to provide the DS3 clock. An External Clock BNC is provided on the back of the E3 Access Multiplexer with SNMP for this purpose.



NOTE: If the configured clock signal is lost, the unit will fall back to one of the other two clock options. When the configured clock becomes available again, the device will revert to the configured clock type.

- Current Transmit Clock—Internal, Network, and External

Read-only field. Indicates the current clock source. This field could be different from the Transmit Clock field if clock fallback occurs.

- Framing Format—Standard Mux or Clear Channel (Default—Standard Mux)

Standard Mux—BLACK BOX regular multiplexing framing.

Clear Channel—Clear Channel mode framing. An operating mode that allows you to use bits 13 through 16 in the E3 frame for payload data transfer extending the bandwidth to 34.189 Mbps. In Clear Channel mode, the entire E3 bandwidth is assigned to a single HSSI port. If the port is not assigned, the unit will use the first HSSI port installed. Assignment of partial bandwidth, and multiplexing the bandwidth among multiple ports is not supported in this mode.



E3 Access Multiplexer with SNMP

- E3MB Alarm Thresholds—Bipolar Violations and Frame Errors

Lets you set the major and minor E3MB Alarm Thresholds.

You can change either the mantissa or the exponent of any of these thresholds. As you cursor down or to the right or left, the highlight bar will select only those elements in each threshold that are configurable. To change a mantissa or exponent, select it and type in the new value.



NOTE: Though the P-Bit and C-Bit Parity Error thresholds can be set through this screen, they are independent of the C-Bit and P-Bit parameters which activate the PAR LED on the E3 Access Multiplexer with SNMP. These are always set at 10-6.

If you set different thresholds for these parameters, it is possible to get two sets of C-Bit or P-Bit alarms. The **PAR LED** on the faceplate may activate (due to the Bellcore requirements), while simultaneously, alarms are generated (due to the customer set thresholds).

Configuring the HSDB and the HVDB

The HSDB and HVDB Main Menus contain a number of submenus that you use to configure, monitor, and manage the HSDB and HVDB settings.

To access the HSDB or HVDB Main Menu, select the HSDB or HVDB device from the Node/E3MB Main Menu.

Figure 3-8 shows an example of the HSDB Main Menu. The HVDB Main Menu looks exactly like the HSDB except for the title.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX MULTIDIG REL 5.01.00 NODE 1 LOTS 07/16/98 06:22:11
SELECTED DEVICE ADDRESS: 1.01.000 NAME TYPE: HSDB

HSDB MAIN MENU
Select Device
Configuration & Connections
Alarms & Status
Statistics
Tests
```

Figure 3-8 HSDB/HVDB Main Menu

HSDB and HVDB Main Menu Parameters

The HSDB and HVDB Main Menus allow you to do the following:



E3 Access Multiplexer with SNMP

- **Select Device**
Lets you access any other main menu of any other board.
- **Configuration & Connections**
Lets you configure the HSDB and HVDB settings. Because the parameters for the two types of DTE boards are different, a different Configuration & Connections Menu appears for each type of board.
- **Alarms and Status**
Provides current alarm and status reports for the HSDB or HVDB board.
- **Statistics**
Provides current performance statistics for the HSDB or HVDB module and allows you to reset the counters.
- **Tests**
Lets you perform the DTE/Network loopback simultaneously.

Configuring the HSDB

You use the HSDB Configuration and Connections Menu to configure the HSDB board. To access the HSDB Configuration and Connections Menu, select the HSDB device from any main menu. Next select Configuration & Connections from the HSDB Main Menu and press **Return**.

Figure 3-9 shows an example of the HSDB Configuration and Connections Menu.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: RTU:1000 REL 6 01.00 NODE 1:LOTS 07/16/98 06:23:30
SELECTED DEVICE ADDRESS: 1 01 000 NAME: TYPE: HSDB

HSDB CONFIGURATION AND CONNECTIONS  [Exit] Confirm

MODULE SERVICE:      In-Service
HARDWARE REV:       J
MODULE NAME:
DATA RATE:          34.0 Mbps
E3 TIMESLOTS:       95
CLOCK MODE:         Normal
CONNECTION:         1.00.001
DTE LOSS DETECTION: None
CA OPTIONS:         Assert
```

Figure 3-9 HSDB Configuration and Connections Menu



E3 Access Multiplexer with SNMP

HSDB Configuration and Connections Menu Parameters

The HSDB Configuration and Connections Menu parameters are as follows:

- **Module Service—In Service or Out of Service (Default—In Service).**
Allows you to place the HSDB in or out of service.
- **Hardware Rev**
This is a view-only field. The hardware rev is set at the factory and cannot be changed.
- **Module Name**
Enter an alphanumeric name of up to 20 characters (numbers, letters, and spaces are acceptable).
- **Data Rate**
This is a view-only field. The Data Rate changes automatically to correspond to the number of E3 slots selected (one timeslot is equal to approximately 358 kbps).
- **E3 Timeslots**
Lets you allocate a certain number of E3 Timeslots (0 - 95) on the main board to this particular HSDB.

Enter the number of timeslots corresponding to the desired data rate (approximately 358 kbps per timeslot).

There are a total of 95 timeslots available for DTE allocation. These timeslots will be shared by any modules physically connected to the E3MB.

In the Clear Channel mode, all timeslots are assigned to the HSSI HSDB card in the DTE port by providing a data rate of 34.189 Mbps to that port.
- **Clock Mode—Normal and Divided Clock (Default—Normal)**
The normal clock always runs in a bursty, or gapped mode at 50.2 MHz.

Divided clock is provided for devices that cannot run at normal clock rate. This option causes the 50.2 MHz clock to divide repeatedly until it gets close to the actual DTE data rate. This applies to data rates up to 25 Mbps. Above 25 Mbps, the burst clock rate will be 44.736MHz.
- **Connection**
The connection address automatically displays when bandwidth has been allocated to it.
- **DTE Loss Detection—None or TA (Default—None)**
When the DTE loss detection is None, the DTE loss feature is disabled. When TA (Terminal Available) is asserted, the DTE device is up. When TA is not asserted, the E3 Access Multiplexer with SNMP assumes the DTE device is down and cuts the RT clock to the DTE.



E3 Access Multiplex

- CA Options—Auto, Assert, or Deassert (Default—Auto)
- CA LED—Indicates that CA LED is on.
- CA LED—Indicates that CA LED is off.

Configuring the HVDB

You use the HVDB Configuration and Connections Menu to configure the HVDB. To access the HVDB Configuration and Connections Menu, select the HVDB Configuration and Connections Menu from the HVDB Main Menu. Next select Configuration & Connections from the HVDB Main Menu. Figure 3-10 shows an example of the HVDB Configuration and Connections Menu.

```

Idle 07/16/98 06:1
Loss Of Signal I
Status 07/16/98 06:1
Idle Signal Det
BLACK BOX MODULES
SELECTED DEVICE ADDR

HVDB CONFIGURATION &
CONNECTIONS

MODULE SERVICE: In-S
HARDWARE REV: F
MODULE NAME:

CTS CONTROL:  Asser
DATA RATE:    0.8
E3 TIMESLOTS: 0
TD CLOCK:    SCTE
CONNECTION:
    
```

Figure 3-1

HVDB Configuration and Connections Menu Parameters

- Module Service—In Service or Out of Service (Default—In Service). Allows you to place the HVDB in or out of service.
- Hardware Revision—Hardware Revision. This is a view-only field. The hardware rev is set at the factory and cannot be changed.

Working with SNMP

- CA Options—Auto, Assert, or Deassert (Default—Auto)
- CA LED—Indicates that CA LED is on.
- CA LED—Indicates that CA LED is off.

HVDB Configuration and Connections Menu Parameters

You use the HVDB Configuration and Connections Menu to configure the HVDB. To access the HVDB Configuration and Connections Menu, select the HVDB Configuration and Connections Menu from the HVDB Main Menu. Next select Configuration & Connections from the HVDB Main Menu. Figure 3-10 shows an example of the HVDB Configuration and Connections Menu.

```

5:41 1.00.000 E3MB < 11>
Idle 07/16/98 06:1
Status 07/16/98 06:1
Idle Signal Det
BLACK BOX MODULES
SELECTED DEVICE ADDR

HVDB CONFIGURATION &
CONNECTIONS

MODULE SERVICE: In-S
HARDWARE REV: F
MODULE NAME:

CTS CONTROL:  Asser
DATA RATE:    0.8
E3 TIMESLOTS: 0
TD CLOCK:    SCTE
CONNECTION:
    
```

Figure 3-10 HVDB Configuration and Connections Menu

HVDB Configuration and Connections Menu Parameters

- Module Service—In Service or Out of Service (Default—In Service). Allows you to place the HVDB in or out of service.
- Hardware Revision—Hardware Revision. This is a view-only field. The hardware rev is set at the factory and cannot be changed.



E3 Access Multiplexer with SNMP

- **Module Name**
Enter an alphanumeric name of up to 20 characters (numbers, letters, and spaces are acceptable).
- **CTS Control—Assert CTS or Auto CTS (Default—Assert CTS)**
Assert CTS—When this feature is enabled the CTS (clear to send) signal is always sent to the DTE regardless of the status of the RTS signal.
Auto CTS—Select this mode to activate CTS when RTS is active and either a loop is in progress or the DTE is connected to the E3.
- **Data Rate**
This is a view-only field. The Data Rate changes automatically to correspond to the number of E3 slots selected (one timeslot is equal to exactly 358 kbps).
- **E3 Timeslots**
Lets you allocate a certain number of E3 Timeslots on the main board to this particular HVDB.
Enter the number of timeslots corresponding to the desired data rate (exactly 358 kbps per timeslot).
There are a total of 95 timeslots available for DTE allocation in the Standard Mux Mode. These timeslots will be shared by any modules physically connected to the E3MB.
- **TD Clock—Options are +SCT, -SCT, or SCTE**
Lets you determine whether the transmit clock is to be received from the DTE SCTE leads or from the E3 Access Multiplexer with SNMP. It also lets you set the clock to normal or inverted.
SCT—Select SCT as the clock from the DCE signal, if your DTE device does not support the SCTE signal.
SCTE—Select SCTE as the smooth clock if your DTE device supports the SCTE signal.
NORMAL —Selects the standard transmit and receive V.35 clock mode.
INVERT —Selects the inverted transmit and receive V.35 clock mode.
- **Connection**
The connection address automatically displays when bandwidth has been allocated to it.

Configuring for SNMP Management

You use the SNMP Configuration Menu to configure the E3 Access Multiplexer with SNMP for SNMP network management capability.



E3 Access Multiplexer with SNMP

Once each unit has been assigned an IP address, you can connect an SNMP management station to the E3 Access Multiplexer with SNMP NMS Network Manager (RS-232) port. The E3 Access Multiplexer with SNMP uses the SLIP protocol to communicate with the SNMP management station.

To access the SNMP Configuration Menu, select SNMP Configuration from the Node/E3MB Main Menu.

Figure 3-11 shows an example of the SNMP Configuration Menu.

```
Idled 07/16/98 06:15:41      1.00.000 E3MB      < 11>
  Loss Of Signal Idled
Status 07/16/98 06:15:41    1.00.000 E3MB      < 20>
  Idle Signal Detected
BLACK BOX: RTU:1010:0 REL 5 01 00 NODE 1 L010 07/16/98 06:14:10
SELECTED DEVICE ADDRESS 1 00 000 NAME L010 TYPE E3MB

SNMP CONFIGURATION      Exit Confirm

NODE IP ADDRESS:        0.000.000.000
NODE IP SUBNET MASK:    0.000.000.000
TRAP IP ADDRESS:        0.000.000.000

READ COMMUNITY STRING:  public
WRITE COMMUNITY STRING: public
TRAP COMMUNITY STRING:  public

SNMP BAUD RATE:         9600
SNMP *BITS AND PARITY:  8 bits, No parity
SNMP STOP BITS:         2 bits
```

Figure 3-11 SNMP Configuration Menu

SNMP Configuration Menu Parameters

The SNMP Configuration Menu parameters are:

- Node IP Address

Enter the IP address of the node in the SNMP network. The SNMP management program uses this address to access information from the card.

- Node IP Subnet Mask

Enter the subnet mask of the node in the SNMP network. The mask indicates which bits in the IP address identify the physical network.

- Trap IP Address

Enter the IP address of the SNMP workstation that will receive trap event messages from the E3 Access Multiplexer with SNMP.

- Read Community String (text string) (Default — public)

Enter an alphanumeric text string (max—32 characters) that identifies a portion of the SNMP network that can read messages from the node.



E3 Access Multiplexer with SNMP

- **Write Community String** (text string) (Default — public)
Enter an alphanumeric text string (max—32 characters) that identifies a portion of the SNMP network that can write messages to the node.
- **Trap Community String** (text string) (Default — public)
Enter an alphanumeric text string (max—32 characters) that identifies a portion of the SNMP network that can receive TRAP messages from the node.
- **SNMP Baud Rate**—300, 600, 1200, 2400, 4800, 9600, 19200, and 38400 (Default—9600)
Select the SNMP workstation's baud rate.
- **SNMP #Bits and Parity**—8 bits; No parity, Even parity, or Odd Parity (Default—8 bits; No parity)
Select the SNMP workstation's number of bits and parity.
- **SNMP Stop Bits**—1 bit, 1.5 bits, or 2 bits (Default—2 bits)
Select the SNMP workstation's stop bits.



E3 Access Multiplexer with SNMP



Monitoring and Managing

When you log on to a E3 Access Multiplexer , the Node/E3MB Main Menu appears on the terminal screen.

Figure 4-1 shows an example of the Node/E3MB Main Menu.

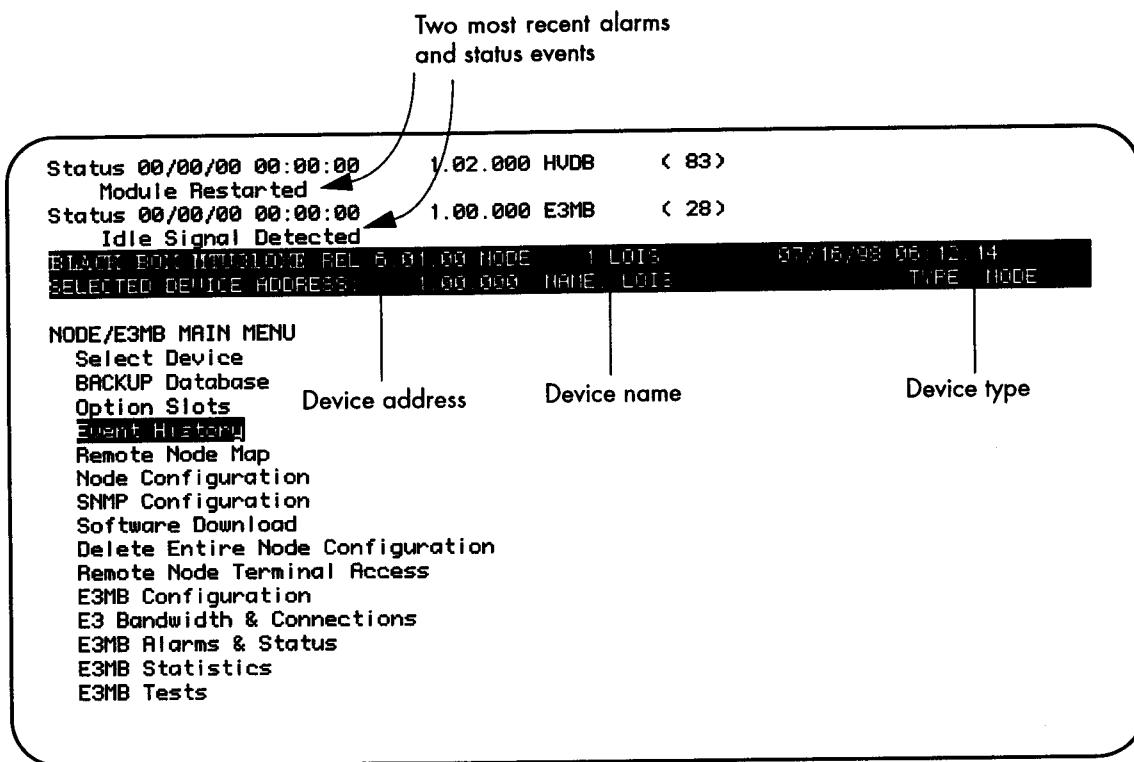


Figure 4-1 Node/E3 Main Menu

To monitor and manage the E3 Access Multiplexer , you access and use the following menus from the Node/E3MB Main Menu:

- Remote Node Map Menu
- Current E3 Alarms & Status Menu
- Current HSDB/HVDB Alarms & Status Menu
- Current E3MB Statistics Menu
- Current HSDB/HVDB Statistics Menu
- Event History Menu
- E3MB Bandwidth & Connections Menu



E3 Access Multiplexer with SNMP

Managing the E3 Access Multiplexer also includes performing certain system utility functions, such as:

- Backing up the database
- Downloading software
- Deleting the node configuration

In this chapter you will learn how to manage and monitor the E3 Access Multiplexer using these menus and utilities.

You also use the LEDs on the E3 Access Multiplexer front panel to monitor and manage the system. The LEDs alert you to possible problems and provide a quick indication of unit and DTE status. For more information on LEDs, see Appendix A.

Accessing the Remote Node Terminal

You can access the remote node terminal interface by the following steps:

1. **Select the Remote Node Terminal Access from the Node/E3MB Main Menu.**
2. **In the Remote Node Terminal Access Menu, enter the remote node number, and press Return.**

You will be prompted to confirm.

3. **Select Confirm and press Return.**

When the remote unit is accessed, its name and address appear in the second line of the title bar of the Node/E3MB Main Menu (Figure 4-2).



NOTE: If you would like to enable a Login and password request prior to allowing access to the remote machine, you will need to set the Permit Select Device From Remote parameter, in the Node Configuration menu, to **No**.



E3 Access Multiplexer with SNMP

```

Local Unit Node
Number
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: HUB31013E REL 6 01.00 NODE 1:LOIS 07/16/98 06:45:47
SELECTED DEVICE ADDRESS: 31.00.000 NAME: Paul TYPE: E3MB

NODE/E3MB MAIN MENU
Select Device
BACKUP Database
Option Slots
Event History
Remote Node Map
Node Configuration
SNMP Configuration
Software Download
Delete Entire Node Configuration
Remote Node Terminal Access
E3MB Configuration
E3 Bandwidth & Connections
E3MB Alarms & Status
E3MB Statistics
E3MB Tests
  
```

Remote Node Address Remote Node Name

Figure 4-2 Remote Node Terminal Accessed

Viewing the Status of the E3 Link

You use the Remote Node Map menu to view the status of the E3 link. This is a view-only screen that displays the remote node address, the device type, and the status of the link (up or down).

In Clear Channel mode, the Remote Link Status will be Up if the remote unit's National Bit is set to DL. The local unit's National Bit must also be set to Up in order to connect to the remote unit.

To access the Remote Node Map (Figure 4-3), select it from the Node/E3MB Main Menu.



E3 Access Multiplexer with SNMP

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: MTD31000 REL 8.01.00 NODE 1-LOIS 07/16/98 06:44:46
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: E3MB

REMOTE NODE MAP Exit Repeat
LOCAL TYPE REMOTE LINK STATUS
1.00.000 E3MB 31.00.000 Up
```

Figure 4-3 Remote Node Map

Monitoring Alarms and Status

To monitor E3 Access Multiplexer alarms and status, you'll use the following submenus:

- Current E3MB Alarms and Status Menu
- Current HSDB Alarms and Status Items Menu
- Current HVDB Alarms and Status Items Menu

Monitoring Network Alarms and Status

The Current E3MB Alarms and Status Menu allows you to view the status of the E3 network.



NOTE: This is a view-only screen; you cannot make changes to it.

To access the Current E3MB Alarms and Status Menu, select E3MB Alarms and Status from the Node/E3MB Main Menu and press **Return**. The Current E3MB Alarms and Status Menu (Figure 4-4) will appear listing the type of each event defined by severity (status, major, minor, or idled).



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```

Idle 07/16/98 06:15:41 1.00.000 E3MB < 11 >
Loss Of Signal Idle
Status 07/16/98 06:15:41 1.00.000 E3MB < 28 >
Idle Signal Detected
BLACK BOX: MTT310/3 REL 5.01.00 NODE 1 LOIS 07/16/98 06:15:51
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: E3MB

CURRENT E3MB ALARMS AND STATUS      Exit Repeat Page 1

Severity Description
Status Idle Signal Detected
    
```

Figure 4-4 Current E3MB Alarms and Status Menu

To view additional pages with this same set of performance data, use the up and down arrows to scroll through the pages.

To update the Current E3MB Alarms and Status Menu, select Repeat and press **Return**.

Table 4-1 shows the E3MB alarm and status conditions.

Table 4-1 E3MB Alarm and Status Conditions

Message	Severity	Description
"No active alarm or status items."	Status	The E3 Access Multiplexer unit is operating correctly.
Battery Failed or Disabled	Minor	The battery is dead.
Loss of Signal	Status	The E3 Access Multiplexer unit detected loss of receive signal (LOS) on the E3 interface.
Out of Frame	Status	The E3 Access Multiplexer unit detected an out-of-frame (OOF) occurrence on the E3 interface.
AIS Alarm	Status	An alarm indication signal (AIS) has been received.
DTE Loopback	Status	Loopback has been activated to the DTE (payload) side of the DSU.
Network Loopback	Status	Loopback has been activated to the network E3 side of the DSU.
Red Alarm	Major	This is a logical OR of the LOS and OOF alarm. It is True if either of LOS or OOF is True. This alarm also illuminates the red LED.
Yellow Alarm	Major	This alarm is True if the yellow alarm signal is received indicating failure on a remote device servicing the E3 data stream. This alarm also illuminates the yellow LED.



E3 Access Multiplexer with SNMP

Table 4-1 E3MB Alarm and Status Conditions (Continued)

Message	Severity	Description
Idle Signal Detected	Status	The Idle signal is being received.
Failed Signal State Declared	Status	Ten consecutive seconds have been Severely Errored Seconds.
BPV Minor Threshold Exceeded	Minor	The number of Bipolar Violations (BPVs) has exceeded the configured minor threshold value. A bipolar violation event is any bipolar violation on the E3 line which is not part of the normal B3ZS line coding.
BPV Major Threshold Exceeded	Major	The number Bipolar violations (BPVs) has exceeded the configured major threshold value.
FE Minor Threshold Exceeded	Minor	The Frame Bit Error (FBE) count has exceeded the configured minor threshold value. An event is any frame bit that is in error.
FE Major Threshold Exceeded	Major	The Frame Bit Error (FBE) count has exceeded the configured major threshold value.
RAM Test Failed	Minor	The RAM test failed during E3 Access Multiplexer initialization.
ROM Checksum Failed	Minor	The ROM checksum failed during E3 Access Multiplexer initialization.
Processor Restart	Status	The E3 Access Multiplexer unit has been reset.
External Alarm Input Active	Status	External alarm input relay is active.
Excessive Temperature	Minor	The temperature sensor indicates the E3 Access Multiplexer chassis is "too hot." This could be caused by a failure of the cooling fan, blockage of cooling vents, or poor site selection when the unit was installed.

Monitoring HSDB and HVDB Alarms and Status

You use the Current HSDB Alarms & Status Items Menu and the Current HVDB Alarms & Status Items Menu to view HSDB and HVDB alarm and status items.



NOTE: These are view-only screens; you cannot make changes to them.

To access these screens, you must first select the HSDB or HVDB device from any main menu. Then, from the HSDB or HVDB Main Menu, select Alarms & Status and press **Return**. Examples of both Alarms & Status menus are shown in Figure 4-5 and Figure 4-6.



E3 Access Multiplexer with SNMP

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
  Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
  Idle Signal Detected
BLANK: E3MB: HSS1:000:000:REL:6:01:00:MODE:1:LOIS:07/16/98:06:14:40
SELECTED DEVICE ADDRESS: 1.01.000 NAME: TYPE: H50B

CURRENT HSDB ALARMS AND STATUS ITEMS Exit Repeat

MODULE MISSING: False
MODULE FAILURE: False

LOOPBACK REQUESTS:
  USER: Off
  DTE(DTE): Off

CONTROL LEADS:
  CA: On
  TA: Off
  LA: Off
  LB: Off
```

Figure 4-5 Current HSDB Alarms and Status Menu

Current HSDB Alarms and Status Items

The Current HSDB Alarms and Status Items Menu parameters are as follows:

- **Module Missing—True or False**
True indicates that there is no HSSI interface installed.
False indicates that there is a HSSI interface installed.
- **Module Failure—True or False**
True indicates that the HSSI interface is not functioning properly.
False indicates that the HSSI interface is functioning properly.
- **Loopback Requests:**
 - **User—On or Off**
On indicates that a loopback test was requested by the user.
 - **DTE (DTE)—On or Off**
On indicates that a loopback test was requested by the DTE providing the LA or LB signal on the interface.
- **CA (data Communications equipment Available)**
On indicates that the E3 Access Multiplexer DSU is prepared to send and receive data.
- **TA (data Terminal equipment Available)**
On indicates that the DTE is prepared to send and receive data.



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- LA (Loopback Circuit A)

This signal is provided to the E3 Access Multiplexer from the DTE.
On indicates that the DTE is requesting a loopback.

- LB (Loopback Circuit B)

This signal is provided to the E3 Access Multiplexer from the DTE.
On indicates that the DTE is requesting a loopback.

The LA and LB signals combine to provide one of three diagnostic loopback modes:

LB=0, LA=0 no loopback

LB=1, LA=1 local DTE loopback

LB=0, LA=1 local line loopback

LB=1, LA=0 remote line loopback

A 1 indicates activation of the signal, and a 0 indicates deactivation of the signal.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: HTUS1003E FEL 6 01 00 NODE 1 LOIS 07/16/98 06:31:29
SELECTED DEVICE ADDRESS: 1 00 000 NAME: TYPE: HVDB
CURRENT HVDB ALARMS AND STATUS ITEMS Exit Repeat
MODULE MISSING: False
MODULE FAILURE: False
LOOPBACK REQUESTS:
  USER: Off
  DTE<LT+RTS>: Off
  DTE<LT>: Off
CONTROL LEADS:
  CTS: On
  DSR: On
  RLSD: Off
  DTR: Off
  LT: Off
  RTS: Off
```

Figure 4-6 Current HVDB Alarms and Status Items Menu

Current HVDB Alarms and Status Items

The Current HVDB Alarms and Status Items Menu parameters are:



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- **Module Missing**—True or False
True indicates that there is no V.35 interface installed.
False indicates that there is a V.35 interface installed.
- **Module Failure**—True or False
True indicates that the V.35 interface is not functioning properly.
False indicates that the V.35 interface is functioning properly.
- **Loopback Requests**
 - User**—On or Off
On indicates that a loopback test was requested by the user.
 - DTE (LT+RTS)**—On or Off
On indicates that the customer equipment (DTE) has requested a loopback test when both RTS and LT are On.
 - DTE (LT)**—On or Off
On indicates that the customer equipment (DTE) has requested test mode, and is the DTE providing the LT and DTR signal without RTS.
This test enables the DTE loopback circuit without the DTE being ready to send data.
 - CTS (Clear to Send)**—On or Off
On indicates that the E3 Access Multiplexer is ready to accept data from the DTE.
 - DSR (Data Set Ready)**—On or Off
On indicates that the E3 Access Multiplexer is ready to accept data from the DTE.
 - RLSD (Receive Line Signal Detector)**—On or Off
On indicates:
 - The receive data is reliable
 - The E3 data is in frame sync
 - The E3 Access Multiplexer is receiving good framing information
 - DTR (Data Terminal Ready)**—On or Off
On indicates that the DTE is ready to accept data.
 - LT (Local Test)**—On or Off
On indicates that the DTE is requesting local loopback or test mode at the E3 Access Multiplexer interface.
 - RTS (Request to Send)**—On or Off
On indicates that the DTE is ready to send data.



E3 Access Multiplexer with SNMP

Monitoring Statistics

To monitor E3 Access Multiplexer statistics, you'll use the following submenus:

- Current E3MB Statistics Menu
- Current HSDB Statistics Menu
- Current HVDB Statistics Menu

Monitoring Network Statistics

The Current E3MB Statistics Menu allows you to view the network statistics, as well as clear the menu display and reset the counters.

Two separate screens display both current and cumulative data. Current data is defined as the number of errors occurring in the current 15-minute interval. Cumulative data is defined as the number of errors occurring over the past 24 hours, in 15-minute intervals (including the current interval).



NOTE: If the counters have been reset in the past 24 hours, the display will only show occurrences since the last reset.

To access the Current E3MB Statistics Menu, select E3MB Statistics from the Node/E3MB Main Menu. Examples of the two Current E3MB Statistics Menu screens are shown in Figure 4-7 on page 4-10 and Figure 4-8 on page 4-11.

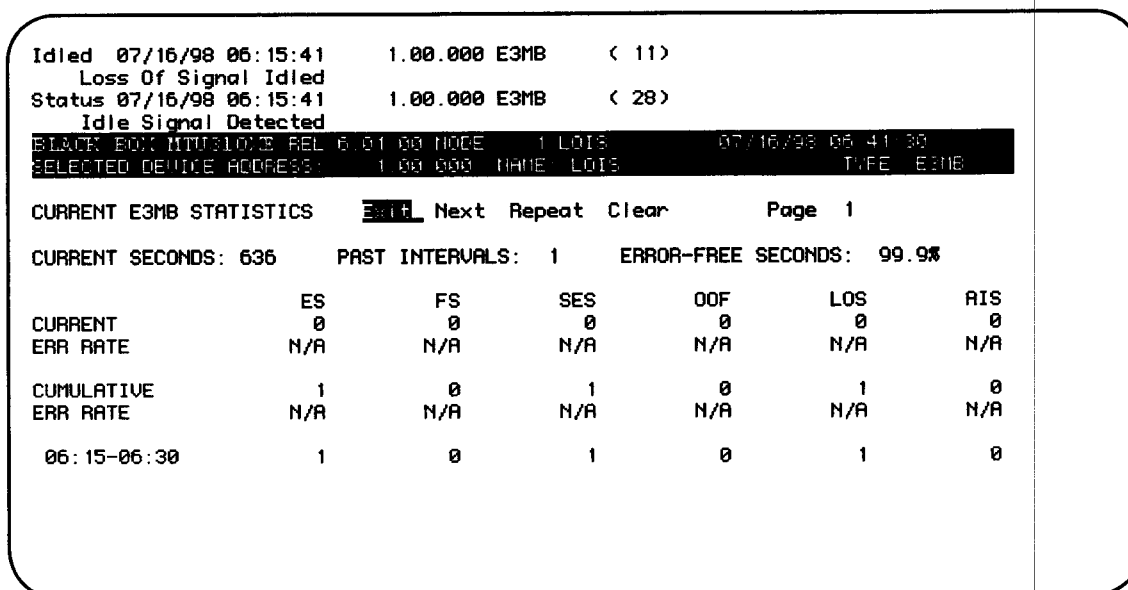


Figure 4-7 Current E3MB Statistics Menu - Page 1

To view additional pages with this same set of performance data, use the up and down arrows (as appropriate) to scroll through the pages.



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To view a different set of statistics, select Next and press **Return**. Use the down arrow to scroll through additional pages with the same set of statistics.

```

Idled 07/16/98 06:15:41      1.00.000 E3MB      < 11>
  Loss Of Signal Idled
Status 07/16/98 06:15:41    1.00.000 E3MB      < 28>
  Idle Signal Detected
BLACK BOX: MTU:1024 REL 6.01.00 NODE 1:LOIS 07/16/98 06:42:30
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: E3MB

CURRENT E3MB STATISTICS      Exit  Next Repeat Clear      Page 1
CURRENT SECONDS: 687      PAST INTERVALS: 1      ERROR-FREE SECONDS: 99.9%

CURRENT          BPV          FE          ES-L          ES-P
ERR RATE         0 x 10-0    0 x 10-0    N/A           N/A
CUMULATIVE
ERR RATE         0 x 10-0    0 x 10-0    N/A           N/A
06:15-06:30     0           0           1             0
  
```

Figure 4-8 Current E3MB Statistics Menu - (continued)

E3MB Statistics Parameters

The E3MB Statistics parameters are as follows:

- ES (Errored Seconds)

An Errored Second is the number of seconds containing at least one P-bit parity or other errors such as CP-bit or AIS. An OOF is not included in errored seconds (ES).

- FS (Failed Seconds)

A Failed Second is the number of seconds after the occurrence of ten consecutive Severely Errored Seconds (SESs)

- SES (Severely Errored Second)

A Severely Errored Second is a second containing 44 or more AIS or OOF events.

- OOF (Out Of Frame)

An Out Of Frame Second is the number of seconds that the signal has been out of frame.

- LOS (Loss of Signal)

A Loss Of Signal is the number of seconds in which there has been at least one (LOS) event.

- AIS (Alarm Indication Signal)

An Alarm Indication Signal is the number of seconds in which an alarm condition exists in the network.



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- BPV (Bipolar Violations)

A Bipolar Violation is the occurrence of two consecutive 1 bits of the same polarity, or an excessive zero (EXZ) event.

- FE (Framing Error)

A Framing Bit Error (also known as FE) is the occurrence of an error in the F- or M-bit position of the E3 frame.

- ES-L (Errored Seconds-Line)

This is the number of seconds containing at least one BPV or EXZ.

- ES-P (Errored Seconds-Parity)

This is the number of seconds containing at least one P-bit parity or CP-bit parity error.

Monitoring HSDB and HVDB Statistics

The Current HSDB Statistics and the Current HVDB Statistics Menus allow you to view the current HSDB and HVDB performance statistics. From these menus you can clear the menu display and reset the counters.

Two separate screens display both current and cumulative data. Current data is defined as the number of errors occurring in the current 15-minute interval. Cumulative data is defined as the number of errors occurring over the past 96 hours, in 15-minute intervals (including the current interval).



NOTE: If the counters have been reset in the past 24 hours, the display will only show those occurrences since the last reset.

To access the Current HSDB Statistics Menu, select the HSDB device from any of the main menus. Then select Statistics from the HSDB Main Menu. Follow the same procedure for the HVDB device.

The Current HSDB and Current HVDB Statistics Menus look exactly the same except for the menu name. Figure 4-9 shows an example of the Current HSDB Statistics Menu.



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```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX INTERRUPT REL 6 01 00 NODE 1 LOIS 07/16/98 06:25:33
SELECTED DEVICE ADDRESS: 1 01 000 NAME: TYPE: HSDB

CURRENT HSDB MODULE STATISTICS Exit Repeat Clear Page 1
CURRENT SECONDS: 584 PAST INTERVALS: 0 ERROR-FREE SECONDS: 100.0%

CURRENT PARLOC PARMAN FIFO CONTROL
ERR RATE 0 0 0 0
N/A N/A N/A N/A

CUMULATIVE 0 0 0 0
ERR RATE N/A N/A N/A N/A
```

Figure 4-9 Current HSDB Statistics Menu

To view additional pages with this same set of performance data, use the up and down arrows (as appropriate) to scroll through the pages.

To update the Current HSDB and HVDB Statistics menus, select Repeat and press **Return**.

HSDB and HVDB Statistics Parameters



NOTE: For HSDB and HVDB statistics, current data represents the current 15-minute interval. Cumulative data is defined as the number of errors occurring over the past 24 hours, in 15-minute intervals (including the current interval).

The HSDB and HVDB Statistics parameters are as follows:

- Parloc

DTE Parity Lock (Parloc) is the number of seconds during which a parity error was detected on traffic from the E3MB to the DTE board.

- Parmain

DTE Parity Main (Parmain) is the number of seconds during which a parity error was detected on traffic from the DTE board to the network.

- FIFO

FIFO is the number of times the First-In First-Out memory has locked up during the current interval and in the last 24 hours.

- Control

Control is the number of times that the DTE board has failed to respond correctly to a message from the controller processor.



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Displaying the Event History

You use the Event History Menu to review and clear the alarm and status history of the E3 Access Multiplexer and all its boards.

To open the menu, select Event History from the Node/E3MB Main Menu and press **Return**.

To clear the event history report in the Event History Menu, select Clear History and press **Return**.

Use the up and down arrows to cursor through additional pages of the Event History report.

Figure 4-10 shows an example of the Event History screen.

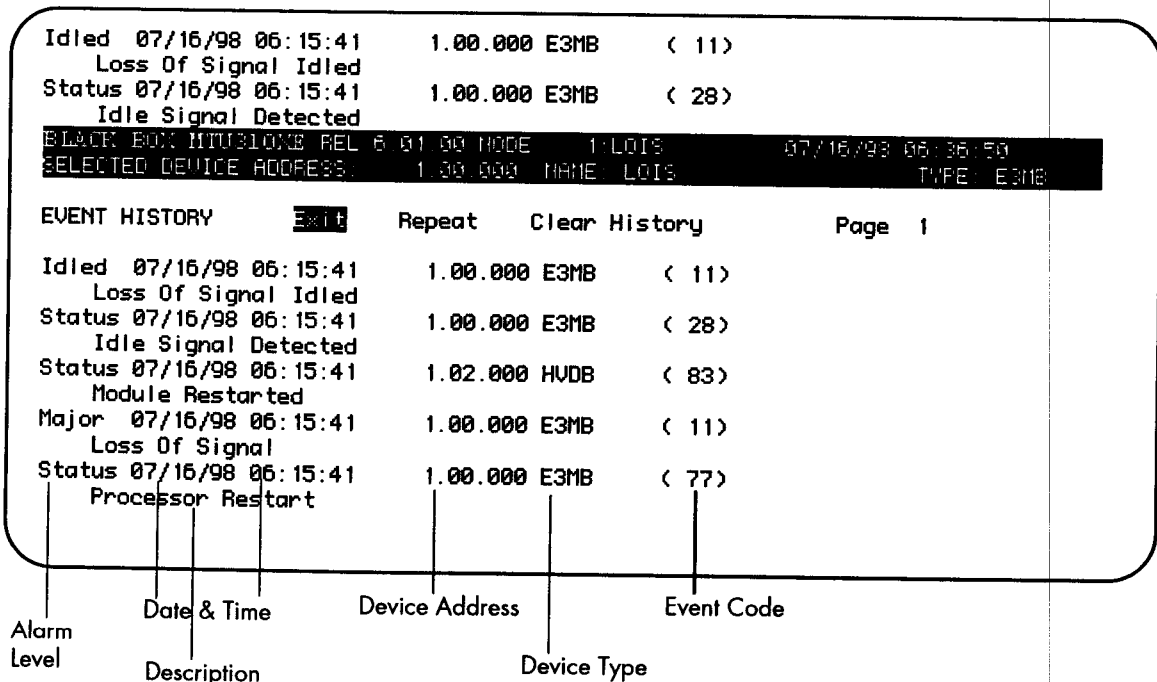


Figure 4-10 Event History Screen

Event History Menu Parameters

The Event History Menu parameters are as follows:

- Alarm Level
 - Major—Affects service
 - Minor—Requires attention, but is not yet affecting service
 - Idled—Alarm condition has expired



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Status—No affect on service

- Date & Time

Date and time of the occurrence or expiration of the alarm/state.

- Device

The address (node address) and type (E3MB, HSDB, HVDB) of the device reporting the status and alarm condition.

- Event Code

Number designation for type of alarm or status condition.

- Description

Describes the event.

Monitoring E3MB Bandwidth and Connections

The E3MB Bandwidth & Connections Menu displays the amount of bandwidth allocated to each DTE board, as well as the total bandwidth currently in use.



NOTE: This is a view-only menu. You cannot allocate bandwidth using this menu. To allocate bandwidth, select E3 Timeslots from the HSDB/HVDB Configuration and Connections Menu. For information on bandwidth, see "Configuring the HSDB and the HVDB" on page 3-17 in Chapter 3, "Configuration."

To access the E3MB Bandwidth & Connections Menu (Figure 4-11), select E3 Bandwidth & Connections from the Node/E3MB Main Menu and press **Return**.

```
Idled 07/16/98 06:15:41      1.00.000 E3MB    < 11>
  Loss Of Signal Idled
Status 07/16/98 06:15:41    1.00.000 E3MB    < 28>
  Idle Signal Detected
BLACK BOX MTU3103E REL 6.01.00 NODE 1 LOIS 07/16/98 06:37:47
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: E3MB

E3MB BANDWIDTH & CONNECTIONS      Exit Page 1
BANDWIDTH USAGE: 100.0%
CHAN *TS  EQUIV  STATE  CONNECTION
1 95 34.0 Mbps Allocated 1.01.000
```

Figure 4-11 E3MB Bandwidth & Connections Menu

Using the System Utilities

In this section you will learn to perform the following system utilities:

- Delete the entire node configuration



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- Download software
- Backup the database

Each of these utilities is accessible from the Node/E3MB Main Menu.

Downloading Software

The Software Download command is used to upgrade the software on the local E3 Access Multiplexer. To access this function, select Software Download from the Node/E3MB Main Menu.

Before you download software, make sure you have the following:

- An IBM PC (or compatible) with hard disk drive—for its MS DOS binary file reading capability.
- A terminal emulation program with a VT-100 or ANSI emulation and Xmodem or Kermit binary transfer capability. Example—Procomm, Mirror, or Xtalk.
- An RS-232 “straight-thru” connection between PC and E3 Access Multiplexer —Does not require a null modem since the DE-9 (terminal) connector is pinned-out as a DCE device on the E3 Access Multiplexer. DE-9 to DB-25 adaptors may be required, depending on the type of connectors on the serial port of the PC.

We also recommend that you:

- Disable XON/XOFF flow control from the Node Configuration Menu.
- Disable Multidrop Mode from the Node Configuration Menu.

Figure 4-12 shows an example of the Software Download Menu.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: HTU3100E REL 6.01.00 NODE 1 LOIS 07/16/98 06:39:08
SELECTED DEVICE ADDRESS: 1.00.000 NAME: LOIS TYPE: E3MB
DOWNLOAD NEW SOFTWARE Exit Confirm
DOWNLOAD PROTOCOL: None
```

Figure 4-12 Software Download Menu

To download new software:

1. Copy the software file onto the PC hard drive.
2. Execute the emulation program on the PC and set it up to match the E3 Access Multiplexer comm port settings.



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3. To begin downloading, you must be logged on to the selected E3 Access Multiplexer .

Select Software Download from the Node/E3MB Main Menu.

4. To select the download mode, highlight the Download Protocol field and use the Space Bar to cycle through the options.

The options are Binary image with Kermit, Binary image with Xmodem, Motorola S-Records with ASCII Transfer, and None.

A message appears reminding you that you must confirm the change.

5. Select Confirm and press Return.

6. Start the download from the emulation program.

This can take up to 20 minutes at a 9600 baud rate. When it is completed, the E3 Access Multiplexer automatically reboots.

You may need to perform this operation again if any communications errors are encountered.

Deleting the Entire Node Configuration

You can perform three tasks from the Delete Entire Node Configuration Menu:

- Delete RAM Code and Revert to ROM Code

This operation deletes any software downloaded to the unit. The unit reverts to the initial software it received at the factory.



NOTE: The E3 Access Multiplexer configuration may be lost during this operation.

- Restart Node Software

This operation is equivalent to turning the power on and off. The last saved database remains unchanged.

- Reset Entire Node Database to Factory Defaults

This operation resets the unit's database to its original factory settings.



WARNING: Perform the Delete Entire Node Configuration task with great caution. It may interrupt service and adversely affect service.

To perform any of these tasks:

1. In the Desired Action field, cycle through the three tasks using the Space Bar.

The system sends you a warning message:

DO YOU REALLY WANT TO DO THIS? PLEASE CONFIRM:



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2. If you are sure you want to do this, select Confirm (or select Exit to cancel).

Figure 4-13 shows Reset Entire Node Database to Factory Defaults selected in the Delete Entire Unit Configuration Menu.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: MITSUBISHI REL 6.01.00 NODE 1 LOIS 07/16/98 06:39:55
SELECTED DEVICE ADDRESS: 1.00.000 NAME LOIS TYPE E3MB

DELETE ENTIRE NODE CONFIGURATION Exit

DESIRED ACTION: None

DO YOU REALLY WANT TO DO THIS? PLEASE CONFIRM:

Confirm
```

Figure 4-13 Delete Entire Node Configuration Menu

Backing Up the Database

To manually backup the database to the EEPROM, select Backup Database from the Node/E3MB Main Menu and press **Return**. The following message will display indicating that the backup is complete:

Database backed up to EEPROM.

To cause the E3 Access Multiplexer to perform automatic backups after each confirmed change, select an Automatic Backup option in the Node Configuration Menu. For more information, see "Configuring the Node" on page 3-9 in Chapter 3, "Configuration."



Diagnosing and Troubleshooting

The E3 Access Multiplexer performs a self-test upon power-up.

During the self-test, messages will appear in the front-panel display in the order listed below:

```
MTU310XE SR.XXX.XX (where xxx.xx is the software revision level)
NODE STATUS OK
EFS 99.9 PERCENT
```

When the percent of Error Free Seconds (EFS) displays, the E3 Access Multiplexer activates its top level menu loop and the unit is ready for operation.

If an error is detected during the self-test, the unit will momentarily display an error message, followed by the default display (EFS XX.XX percent).

The possible error messages:

```
CTRLBUS FAIL
CTRLBUS ERROR
RAM FAILURE
ROM CHKSUM FAIL
NODE RESET
DATABASE RESET
POWERSUPPLY ERR
FAN FAILURE
BATTERY FAILURE
RT CLOCK ERROR
EXTERNAL ALARM
```

Running Diagnostic Tests

To verify that your connections and E3 lines are functioning properly, you can run the following basic diagnostic tests. Each of these tests can be initiated from either the terminal interface menus or the front panel:

- E3MB Network Loopback
- E3MB DTE Loopback
- HSDB DTE/Network Loopback
- HVDB DTE/Network Loopback



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NOTE: The E3 Access Multiplexer supports HSSI local and remote E3 loopbacks initiated through DTE control of LA and LB leads on the HSDB. These leads can be activated using an external test set, or through the HSSI router.

You do not need to inform the telephone company that you are running these tests. However, if the tests reveal a problem with telephone company service or with the E3 Access Multiplexer, you should inform the telephone company that the DTE equipment or the E3 Access Multiplexer must be removed from service.

Running Tests Using the Terminal Interface

This section gives procedures for running diagnostics using the terminal interface.

Testing the E3MB DTE/Network Interface

The E3MB features built-in diagnostics which include DTE and network loopback tests. You initiate, verify and cancel these tests through the E3MB Tests Menu.

To access this menu, select E3MB Tests from the Node/E3MB Main Menu and press **Return**.

Figure 5-1 shows an example of the E3MB Tests Menu.

```
Idled 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idled
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLKCR: E00: MTU3100B REL 6 01.00 NODE 1-LOIS 07/16/98 06:40:47
SELECTED DEVICE ADDRESS 1 00 000 NAME LOIS TYPE E3MB
E3MB TESTS EXIT Confirm
Network Loopback: Off
DTE Loopback: Off
```

Figure 5-1 E3MB Tests Menu



CAUTION: Running a loopback test will interrupt traffic to the E3 Access Multiplexer.

To initiate a loopback:



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- ▼ From the E3MB Tests Menu, select DTE or Network Loopback, use the space bar to toggle to On. With On in the display, select Confirm and press Return.

To cancel a test that is running

- ▼ From the E3MB Tests Menu, select DTE or Network Loopback, use the spacebar to toggle to Off. With Off in the display, select Confirm and press Return.



NOTE: The unit will not allow both the DTE Loopback and the Network Loopback to be on at the same time.

Network Loopback

The Network Loopback verifies the operation of the network, by looping the data received from the network back towards the network. The data is regenerated prior to being looped back; however, no additional processing of the data is performed by the E3 Access Multiplexer. This minimizes any impact that the E3 Access Multiplexer might have on the data so that network problems can be isolated.

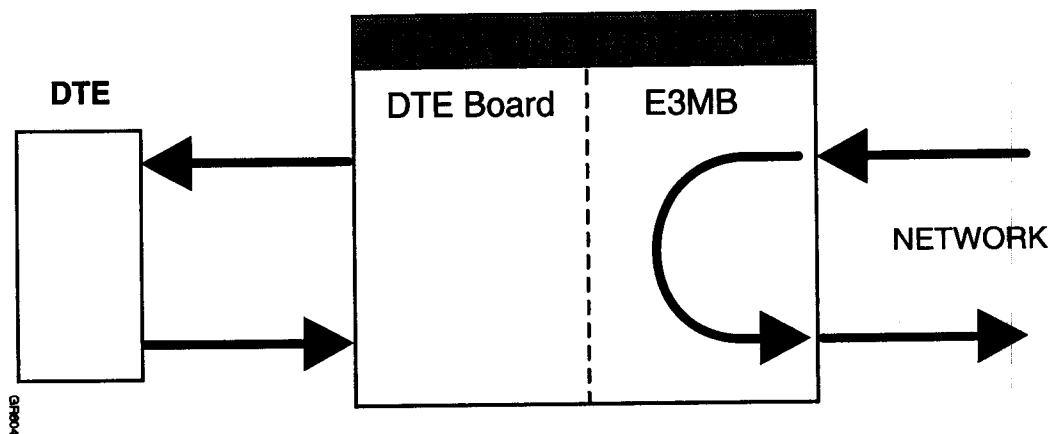


Figure 5-2 E3MB Network Loopback

DTE Loopback

The DTE Loopback on the E3MB verifies the operation of the signal path from the DTE equipment, through the E3 framer, and back to the DTE connectors.

Running this test loops the network transmit signal to the E3 Access Multiplexer's network receive circuitry. If everything is working properly, the DTE equipment will receive the same signal that it transmitted. The E3 network transmitter continues to transmit towards the network as long as the unit is in DTE loopback.



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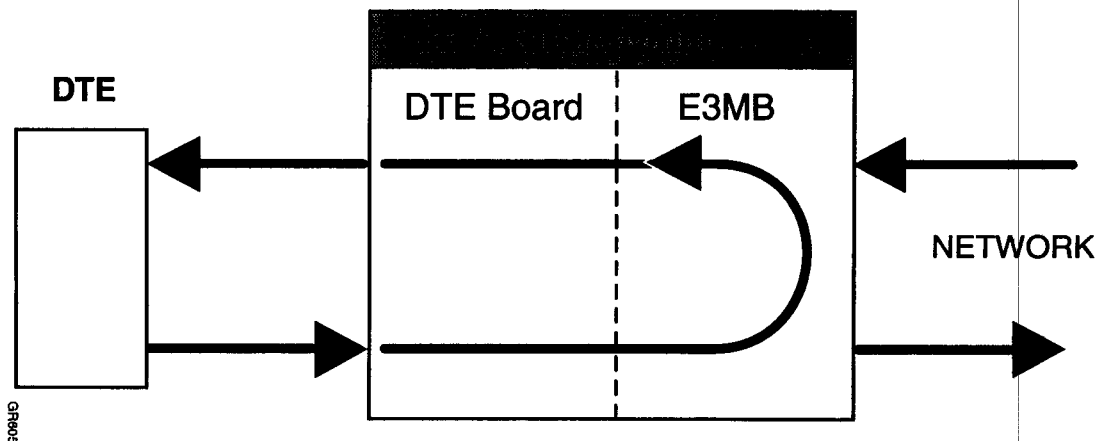


Figure 5-3 E3MB DTE Loopback

Testing the HSDB/HVDB DTE/Network Interface

The HSDB and HVDB feature a bi-directional DTE/Network Loopback diagnostic test.

You use the HSDB or HVDB Tests Menu to initiate this loopback.

To access these menus the HSDB or HVDB must be the selected device. From the HSDB/HVDB Main Menu select Tests and press **Return**.

The HSDB and HVDB Test Menus are exactly the same, except for the menu name.

Figure 5-4 shows an example of the HVDB Tests Menu.

```

Idle 07/16/98 06:15:41 1.00.000 E3MB < 11>
Loss Of Signal Idle
Status 07/16/98 06:15:41 1.00.000 E3MB < 28>
Idle Signal Detected
BLACK BOX: MUX1000E REL 5.01.00 MODE 1:LOIS 07/16/98 05:32:34
SELECTED DEVICE ADDRESS: 1 02 000 NAME TYPE HVDB

HVDB TESTS Exit Confirm
DTE/Network Loopback Off
    
```

Figure 5-4 HVDB Tests Menu

NET/DTE Loopback

The NET/DTE loopback is a bi-directional loopback that loops the received DTE signal back to the DTE, and the signal from the E3MB back towards the E3MB. This loopback verifies operation of the following:



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- The DTE and associated cabling
- The DTE Board
- The link between the DTE board and the E3MB

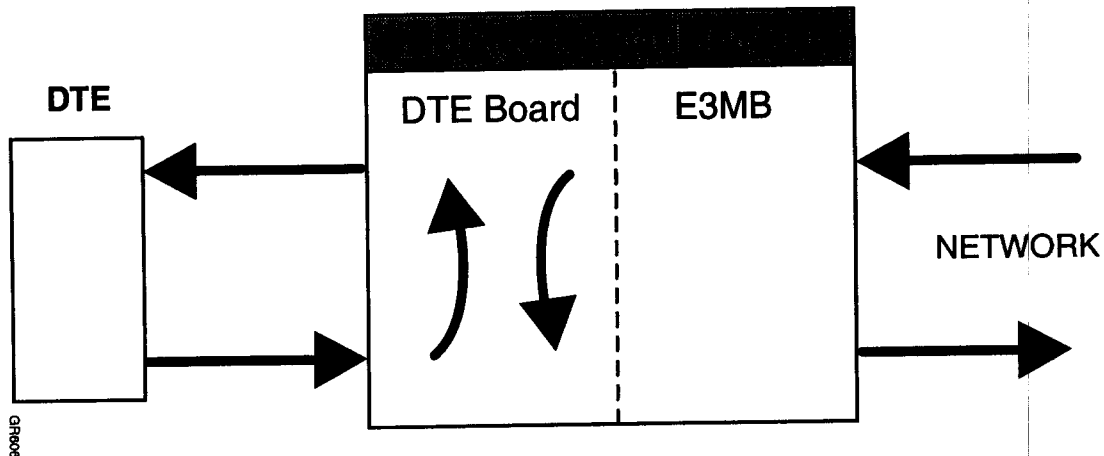


Figure 5-5 DTE/Network Loopback

NOTE: The NET/DTE Loopback is performed on a single DTE at a time: HSDB/HVDB 1, 2, or 3.

To initiate a test:

- ▼ Select DTE/Network Loopback and use the space bar to toggle to On. With On in the display, select Confirm and press Return.

To cancel a test that is running:

- ▼ Select DTE/Network Loopback and use the space bar to toggle to Off. With Off in the display, select Confirm and press Return.

Running Tests from the Front Panel

The front panel Test menu is broken down into three submenus:

- Network Tests Menu
- HSDB/HVDB (1, 2, or 3) Tests Menu

For more information on running tests from the front panel, refer to "Using the Test Menu" on page 6-17 in Chapter 6, "Using the Front Panel Interface."



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To access the Test Menu, continue pressing the down arrow from the Main Menu (EFS XX.XX PERCENT) until Test appears in the display, and press Enter. Use the up and down arrows to toggle through the submenus.



NOTE: Pressing the up and down arrows simultaneously terminates all tests or loopbacks.

Running Network Tests

You use the Network Tests Menu to run network loopback tests and DTE loopback tests from the front panel. To access the Network Tests Menu, press **ENTR** from the Test Menu. Press the down arrow until Network Tests appears in the display and press **ENTR**. Toggle between the two tests.

To initiate a network loopback from the front panel, press **ENTR** when Net Loopback appears in the display.



NOTE: Whenever a loopback is in operation, a plus sign (+) will appear in the display after the name of the loopback, and the front panel **TEST LED** will light red.

To end the loopback, press **ENTR** again while still in the Net Loopback Menu.



NOTE: You can cancel a test or loopback from any place in any menu by pressing the up and down arrows simultaneously. However, this will cancel all tests and loopbacks currently in progress.

DTE Loopback

To initiate a DTE loopback from the front panel, press **ENTR** when DTE Loopback appears in the display.

To end the loopback, press **ENTR** again while still in the DTE Loopback Menu.

Running HSDB/HVDB Tests

You can also run an HSDB/HVDB Net/DTE Loopback from the front panel. To select the desired HSDB/HVDB on which to run the loopback, press **ENTR** when TESTS appears in the display. Cycle through the Test menus, using the up or down arrows, until the desired HSDB or HVDB (1, 2, or 3) appears in the display.

To run a Net/DTE Loopback from the front panel, press **ENTR** from the HSDB/HVDB (1, 2, or 3) Tests menu, when Net/DTE Loopback appears in the display.

To end the loopback, press **ENTR** again while still in the Net/DTE Loopback Menu.

Running a Lamp Test

To verify that all the front panel LED lamps are working, you can run a Lamp Test.



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To run a Lamp Test, press the **STAT** and **ENTR** buttons simultaneously. All the LEDs on the front panel should light.

If any LEDs do not light, call BLACK BOX's Technical Support at (0118) 931 2233.

For a description of front panel LEDs, see Appendix A.

Troubleshooting the E3 Access Multiplexer

This section describes problems you may encounter on the E3 Access Multiplexer and suggests ways you can troubleshoot them.

E3 Access Multiplexer Problems

Table 5-1 is a list of problems with suggested solutions.

Table 5-1 Troubleshooting Guide

Problem	Solution
The E3 Access Multiplexer with SNMP does not power up.	<p>If the MTU310XE is AC powered, make sure it is plugged into a live AC outlet. If it is DC powered, make sure the respective DC leads are not crossed.</p> <p>Check all fuses for opens and replace as needed. If the MTU310XE blows fuses continuously, call BLACK BOX Technical Support.</p>
You cannot communicate with the remote MTU310XE.	<p>Verify that the local and remote units have unique node IDs.</p> <p>Make sure your E3 port LEDs are solid green, indicating that the circuits are up and running.</p> <p>Make sure both units are in Multidrop mode.</p>
The TEST LED on the MTU310XE is constantly on.	<p>Make sure no tests are being initiated and check the Test display from a terminal.</p> <p>If a test is running, end it by selecting the test and setting it to Off in the E3MB, HSDB or HVDB Tests Menus.</p> <p>Make sure the DTE device or the E3 carrier is not sending loop up and loop down codes.</p>
The E3 port LEDs on the MTU310XE never illuminate.	<p>Make sure the E3 cable from your service provider is connected to the MTU310XE.</p> <p>Set the MTU310XE transmit clock to Internal. Remove the E3 cable from the affected E3 port and hardloop the MTU310XE on the transmit side by connecting the transmit and receive connectors.</p>
The E3 LEDs on the MTU310XE are constantly red.	<p>Check the E3 port configuration to make sure the framing and applications data link are what the carrier is providing.</p> <p>Check each MTU310XE for excessive errors.</p> <p>Check the E3 cabling or inside wiring for possible problems.</p> <p>Perform the hardloop procedure on the affected E3 port to verify that the E3 port is functioning properly.</p>



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Table 5-1 Troubleshooting Guide (Continued)

Problem	Solution
The DTE port LEDs on the MTU310XE do not illuminate.	<p>Make sure that the correct E3 cable is connected to the correct E3 port.</p> <p>If the connected DTE device does not support the RTS or DTR LEDs, configure the MTU310XE CTS Control to Assert CTS.</p>
The E3 Alarm LEDs on the MTU310XE do not clear.	Alarm thresholds may have been exceeded for the 15-minute or 24-hour periods. If other thresholds have not been exceeded, the MTU310XE automatically clears these alarms after the period has passed.
The connected DTE device shows intermittent errors.	Run a DTE/NET loopback to verify the physical connection between the local DTE device and the MTU310XE.
If errors are reported during this loopback, check the DTE cable.	Make sure the DTE device supports the DTE port clocking option.
	Use SCTE clocking for the DTE device if the application is using V.35.
	Make sure the DTE device can handle the set DTE clocking speed.
The E3 ports on the MTU310XE cannot be put into network loopback from the carrier.	Make sure the carrier is sending a standard FEAC loop-up code to the E3 port.
The DTE/Network loopback does not work towards the locally connected DTE device.	Make sure the DTE device can run to a DCE in loopback.
	If configured for SCTE, the DTE device must be able to recognize an inverted clock. If it does not, set the clocking to SCT.
The E3 Access Multiplexer has timing and synchronization problems.	Make sure the timing source is set properly. To use the internal timing source of the E3MB to generate the E3 transmit timing, set the clock source to Internal. To use the recovered receive timing to clock the transmit signal, set the clock source to Network. To provide clocking from a customer-supplied external 2.088 MHz clock, set the clock source to External. Make sure the proper E3 cables are plugged into the corresponding ports on the MTU310XE.
You cannot access the E3 Access Multiplexer E3 Mux from a terminal.	The terminal must be running a VT-100 or compatible terminal emulation program.
	Make sure you are using a straight through cable with pin 8 CTS cut at the terminal end.
	Make sure the comm port parameters match the terminal's and the MTU310XE has a unique ID. If the MTU310XE is in a daisy-chain, you can display a roll call of all unit numbers by pressing Ctrl-X five times.



Using the Front Panel Interface

The front panel interface lets you:

- View and change the E3 Access Multiplexer configuration from the Configuration Menu.
- Run diagnostic tests on the E3 Access Multiplexer from the Test Menu.
- View the status of the Node, Network and HSDB or HVDB from the Display Menu.

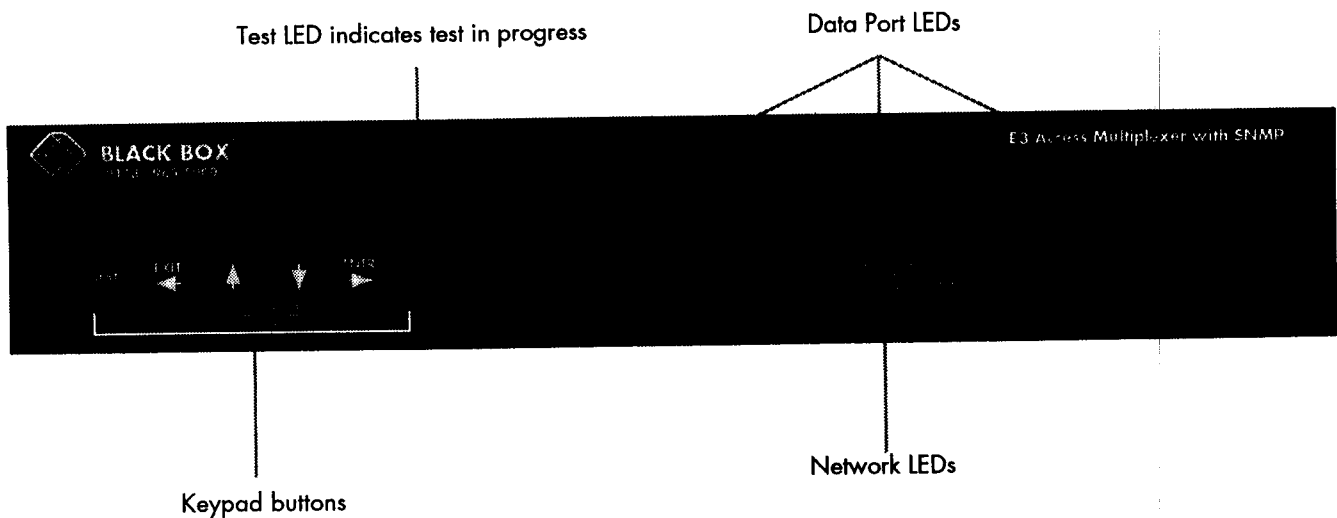


Figure 6-1 E3 Access Multiplexer Front Panel LEDs and Buttons

You will find the front panel interface easy to use if you are an experienced user. If you are not, the best way to learn the system's contents and organization is by using the terminal interface. The terminal interface displays the system in full menus, as opposed to the front panel interface which displays only one line item at a time.



NOTE: Because the front panel is limited in its capability, you will most likely use the front panel only when a terminal is not readily available. However, sometimes you will find it easier to use the front panel interface to perform a task rather than connect a terminal to perform the task from the terminal interface.

What You Cannot Do from the Front Panel Interface

The front panel interface does not allow you to:

- Set alarm conditions and thresholds



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- Configure for SNMP
- Perform management functions
- Perform most system utilities
- Login configuration

You must use the terminal interface to perform these functions.

The Front Panel

The front panel interface consists of a 16-character fluorescent display and a five-button keypad. The interface displays one line of information at a time. You use the keypad to interact with the front panel interface.

Figure 6-2 shows the E3 Access Multiplexer front panel interface.

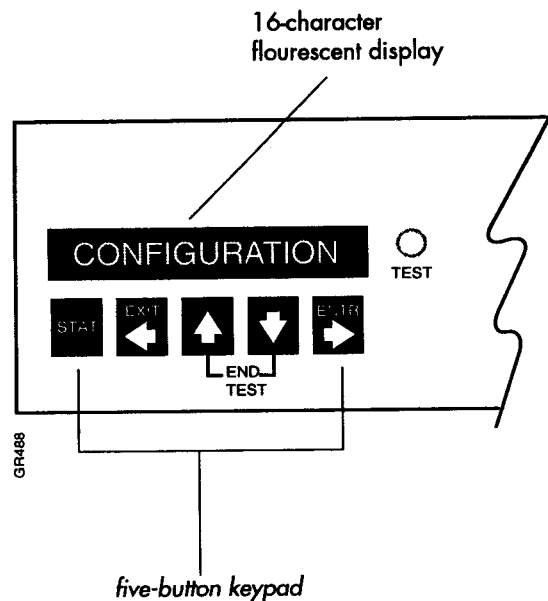


Figure 6-2 Front Panel Interface

The front panel interface can be disabled only from the terminal interface, using the Node Configuration Menu.

Front Panel Keys

You can perform the following functions using the front panel keys at the appropriate time:



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To cycle through the available options, use the up or down arrows.



To move down one menu level, press **ENTR**.

To move up one menu level, press **EXIT**.

To open a menu, press **ENTR**.

You can edit by performing the following functions:

To activate edit mode, press **ENTR**.

To execute a change in the configuration, press **ENTR**.

To exit without executing a change, press **EXIT**.

Throughout this chapter you will see examples of how these keys are used.

Some menu items are more complex than others and require a good understanding of the E3 Access Multiplexer.

How to Navigate the Front Panel Interface

The front panel interface is organized into three main menus which are at the top level of a hierarchical structure shown below,

Each menu may contain submenus which in turn may contain submenus. To open a menu, you display the menu using the up and down arrows, then press **ENTR**.

The Menus

You see one menu item at a time in the 16-character fluorescent display. On power up, the default EFS XX.XX PERCENT reading appears in the display.

Pressing the down arrow once allows you to select the remote unit.

As you continue to press the down arrow you will see the top level of the main menu structure.



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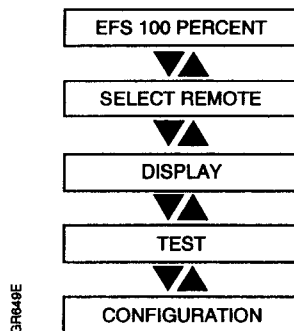


Figure 6-3 Top Level Menus

Pressing **ENTR** at any of the top level menus allows you to see that menu's submenu options.

For example, when you open the Configuration Menu, you see Backup Database, a submenu.

To see another submenu, you select it using the up or down arrow and press **ENTR**. Figure 6-4 presents a hierarchical representation of the Configuration submenus. Your unit will have a similar layout, but the lowest level, HSDB1 CONFIG, may differ as it is dependent on which card(s) are installed in your unit.

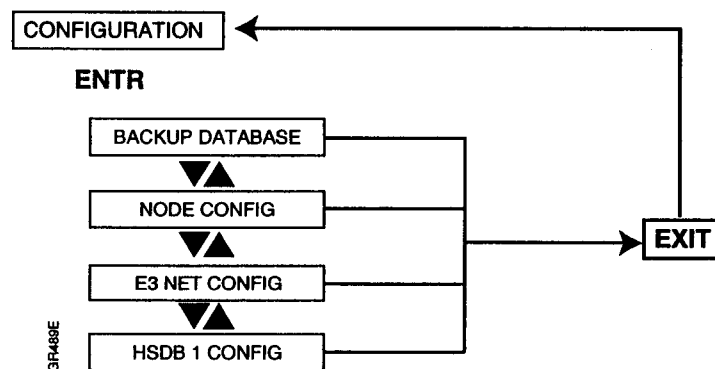


Figure 6-4 Configuration Menu

Editing a Parameter

To modify a parameter such as the unit ID:

1. Open the Configuration Menu.

Toggle through the submenus until the Node Config Menu appears.



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2. Press **ENTR** to open this menu and **ENTR** again to activate edit mode (the first ID character starts to blink).

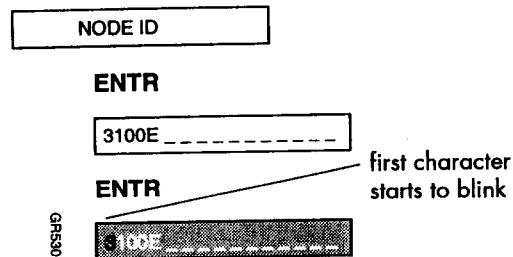


Figure 6-5 Edit Mode

3. Edit the ID one character at a time.

Use the right (**ENTR**) and left arrows (**EXIT**) to move to the character you wish to change. Use the up and down arrows to cycle through the list of alphanumeric characters.

If you do not wish to edit a character, press **ENTR** to move to the next character position.

4. To exit the edit mode once you have completed all the desired changes, move the cursor to the next underlined space () and press **ENTR**. Then press **EXIT** to exit the parameter.

or

wait for the display to return to its default state,

or

press **EXIT** to exit without executing any changes.

Preparing for the Initial Configuration

Before you start an initial configuration, you need to have the required information ready and establish a method of record keeping.

Required Information

Before you configure the unit, we suggest you collect the following information:

- ▼ Framing and line code requirements as specified in the work order from your service provider

Keeping a Record

We suggest you keep a written record of each unit's configuration. For a copy of the configuration worksheet, see "Configuration Worksheet" on page A-9 in Appendix A.



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Selecting the Remote or Local Unit

The Select Local/Remote command works like a toggle switch—you switch between the local and remote unit's front panel interface to monitor one or the other.

At the Select Local/Remote display, press **ENTR**. The display will begin blinking. Press **ENTR** again to switch.

When the remote unit is selected, the letter R will precede all the menu displays.

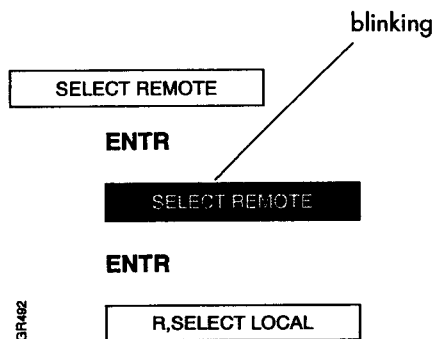


Figure 6-6 Selecting the Remote Unit

Configuring the E3 Access Multiplexer

You use the Configuration Menu to configure various parameters of the unit, the network and the DTE boards. The Configuration Menu consists of three submenus: the Node Config, E3 Net Config and HSDB/HVDB (1, 2, 3) Config Menus.



NOTE: The Backup Database function is also found under the Configuration Menu.

To open the Configuration Menu, use the up or down arrows to move to the Menu and press **ENTR**.

The Backup Database submenu appears.

To see another submenu, you select it using the up or down arrow and press **ENTR**. Figure 6-7 presents a hierarchical representation of the Configuration submenus. Your unit will have a similar layout, but the lowest level, HSDB1 CONFIG, may differ as it is dependent on which card(s) are installed in your unit.



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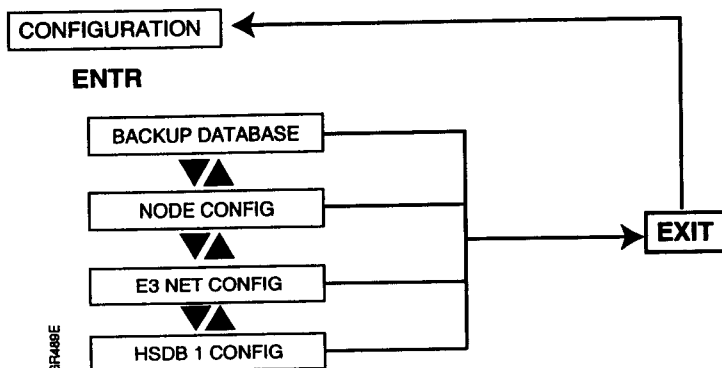


Figure 6-7 Configuration Submenus

The Node Configuration Submenu

The items in the Node Config Menu are shown below.

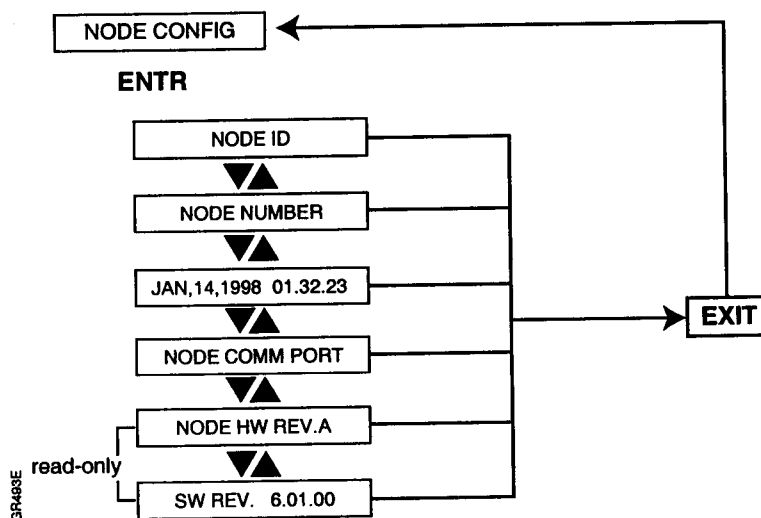


Figure 6-8 Node Configuration Menu

Use the up and down arrows to move from item to item. To activate edit mode, press ENTR.

Node Configuration Menu Parameters

The Node Config Menu parameters are as follows:



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- Node ID, node number, date and time

Edit each item one character at a time. To move to the next character, press **ENTR**.

- Node Comm Port submenu

You can display and modify the comm port settings from the front panel Comm Port submenu.

The Serial Port Parameters

The serial port parameters are:

- Baud Rate
- Parity
- Data Bits (Terminal # Bits)
- Stop Bits
- Use XON/XOFF
- Multidrop Mode (Terminal Multidrop)



NOTE: Parameters shown in parenthesis are the names of the equivalent parameters in the terminal interface.

The front panel displays one parameter and its current value.

To view and modify the comm port settings, follow the procedure in the example below.

1. From the Configuration menu, press **ENTR** and then the down arrow to access the Node Config menu.

2. Press **ENTR** to open the Node Config menu.

The Node ID parameter appears.

3. Press **ENTR** again to view the ID.

An example of an ID is 3100DSM_-----.

4. To edit the ID, follow the procedure given in "Editing a Parameter" on page 6-4.

5. Enter the Node Comm Port submenu using the down arrow to select it and press **ENTR**.

The following message appears:

```
BAUD RATE 9600
```

6. Press **ENTR** to activate edit mode.

The following message blinks:

```
BAUD RATE 9600
```



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7. Cycle through the available baud rate options using the up or down arrows and press **ENTR** to select an option, or press **EXIT** to exit without executing the baud rate change.
8. To move to the next comm port parameter, press the up or down arrow.
Edit the remaining comm port parameters as previously discussed.

The E3 Net Configuration Menu

The Net Config Menu contains the following items:

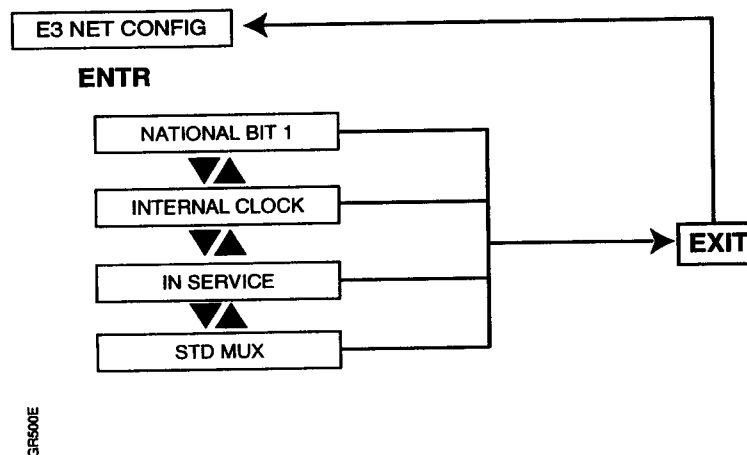


Figure 6-9 E3 Net Configuration Menu



NOTE: Framing is only available on units that support Clear Channel.

For more information about these items, refer to "Configuring the E3MB" on page 3-15 in Chapter 3, "Configuration."

Configuring the Data Ports

You use the HSDB (1, 2, or 3) Config and/or the HVDB (1, 2, or 3) Config Menus to configure your data ports. Refer to "Configuring the HSDB and the HVDB" on page 3-17 in Chapter 3, "Configuration" for a description of the parameters.

Configuring the HSDB

Follow these steps to configure the HSDB:



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1. From the Configuration menu, press **ENTR** and open HSDB (1, 2, or 3) CONFIG using the up or down arrows. Press **ENTR**.

The following message appears:

```
DTE  FREQ  xx.x MB
```

2. To activate edit mode, press **ENTR** again.

The following message starts to blink:

```
DTE  FREQ  xx.x MB
```

To take no action and move to the next item, press **EXIT**.

Press the up or down arrows to cycle through the available options and press **ENTR** to select an option.

3. Press the down arrow to move to the next parameter, Use Divided/Full Clock.
4. Press **ENTR** to activate edit mode.

The display starts to blink.

(Or press **EXIT** to take no action and move to the next item)

Press the up or down arrows to select either Full Clock or Divided Clock and press **ENTR** to confirm the option selected.

5. Use the same method to configure the other parameters in the HSDB Menu for this data port. Repeat for any other HSDB data ports.

HSDB Configuration Menu Parameters

The following is a list of HSDB Config Menu parameters:

- DTE rate
Lets you select DTE rates in increments of 358 kbps ranging from 358 kbps to 34 Mbps.
- Clock
Lets you select either Full Clock or Divided Clock.
- Service
Lets you place the HSDB In Service or Out of Service.
- Delete DTE
Prohibits the data board from recognizing the DTE.
For more information regarding these parameters, refer to "Configuring the HSDB" on page 3-18 in Chapter 3, "Configuration."
- HSDB hardware revision
States the hardware revision.
- DTE loss detection
Lets you select either None or TA.



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- CA options
Lets you select Auto, Assert, or Deassert.

Configuring the HVDB

Follow these steps to configure the HVDB:

1. From the Configuration Menu, press **ENTR** and open HVDB 1, 2, or 3 **CONFIG** using the up or down arrows. Press **ENTR**.

The following message appears:

```
DTE FREQ xx.x MB
```

2. To activate edit mode, press **ENTR**.

The following message starts to blink:

```
DTE FREQ xx.x MB
```

To take no action and move to the next item, press **EXIT**.

Press the up or down arrows to cycle through the available options and press **ENTR** to select an option.

3. Press the down arrow to move to the next parameter, **In/Out Service**.
4. Press **ENTR** to activate edit mode.

The display starts to blink.

To take no action and move to the next item, press **EXIT**.

Press the up or down arrow to select either In/Out Service and press **ENTR** to confirm the option selected.

5. Use the same method to configure the other parameters in the HVDB Menu for this data port. Repeat for any other HVDB data ports.

HVDB Configuration Menu Parameters

The following is a list of the HVDB Config Menu parameters:

- DTE rate
Lets you select DTE rates in increments of 358 kbps ranging from 358 kbps to 34 Mbps.
- Service
Lets you place the HSDB In Service or Out of Service.
- CTS
Lets you assert Clear To Send (Assert CTS) so that it is always sent to the DTE in response to an RTS.
- TD
Lets you determine whether the transmit clock is to be received from the DTE leads or from the E3 Access Multiplexer.



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- Clock
Lets you set the TD clock to normal or inverted.
- Delete DTE
Prohibits the data board from recognizing the DTE.
- HVDB hardware revision
States the hardware revision.

For more information regarding these parameters, refer to "Configuring the HVDB" on page 3-20 in Chapter 3, "Configuration."

Displaying Status and Statistics

You use the Display Menu to monitor network status, node status, and statistics for the network and HSDB/HVDB.

The data in the Display Menu is a subset of the parameters that are available on the terminal interface.

You can monitor both the local and remote units from the front panel Display Menu.

Monitoring the Local and Remote Units

The parameters in the Display Menu are:

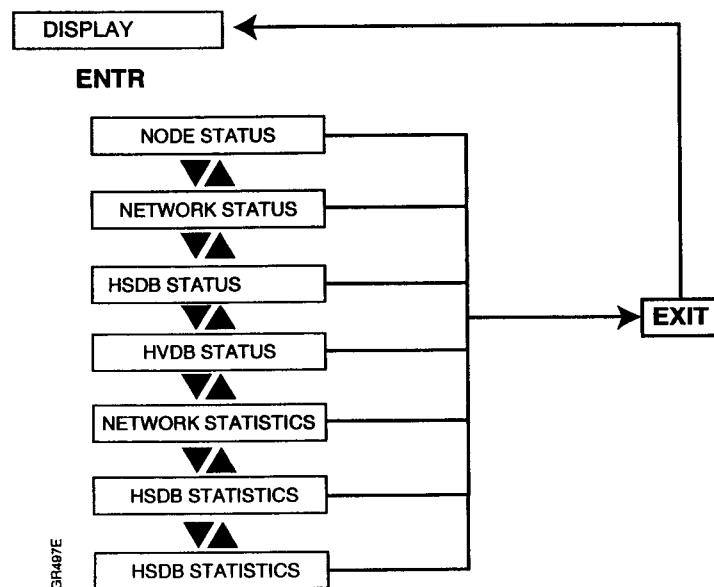


Figure 6-10 Display Menu





NOTE: Your display menu may differ from the one displayed in Figure 6-10. The submenus are dependent on the number and type of cards installed in your unit.

Monitoring the Node Status

You use the Node Status menu to reveal the status of the remote or local unit.

The message "NODE STATUS OK" will appear if the unit is operating properly.

To view the status, press **ENTR** from the Node Status Menu.

If one or more errors are detected, the display will show one or more of the following error messages:

CTRLBUS FAIL
CTRLBUS ERROR
RAM FAILURE
ROM CHKSUM FAIL
UNIT RESET
DATABASE RESET
POWERSUPPLY ERR
FAN FAILURE
BATTERY FAILURE
RT CLOCK ERROR
EXTERNAL ALARM

Use the up and down arrows to view additional messages.

Monitoring the Network Status

You use the Network Status Menu to view the status of the E3 network.

The message "NET STATUS OK" will appear if the E3 network is operating properly.

To view the network status, press **ENTR** from the Network Status Menu.

If one or more errors are detected, the display will show one or more of the error messages defined in "Monitoring Network Alarms and Status" on page 4-4 in Chapter 4, "Monitoring and Managing."

Monitoring HSDB/HVDB (1, 2, 3) Status

You use the HSDB and HVDB Status Menus to view the status of the existing DTEs.

The message "DTE STATUS OK" will appear if the DTE is functioning properly.



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To view a DTE's status, press **ENTR** from the corresponding (1, 2, or 3) HSDB or HVDB Status Menu.

If one or more errors are detected, the display will show one or more of the error messages defined in "Monitoring HSDB and HVDB Alarms and Status" on page 4-6 in Chapter 4, "Monitoring and Managing."

Monitoring Network Statistics

You use the Network Statistics Menu to view and clear the E3 network performance statistics.

The parameters that you can view from the Network Statistics Menu are shown next.

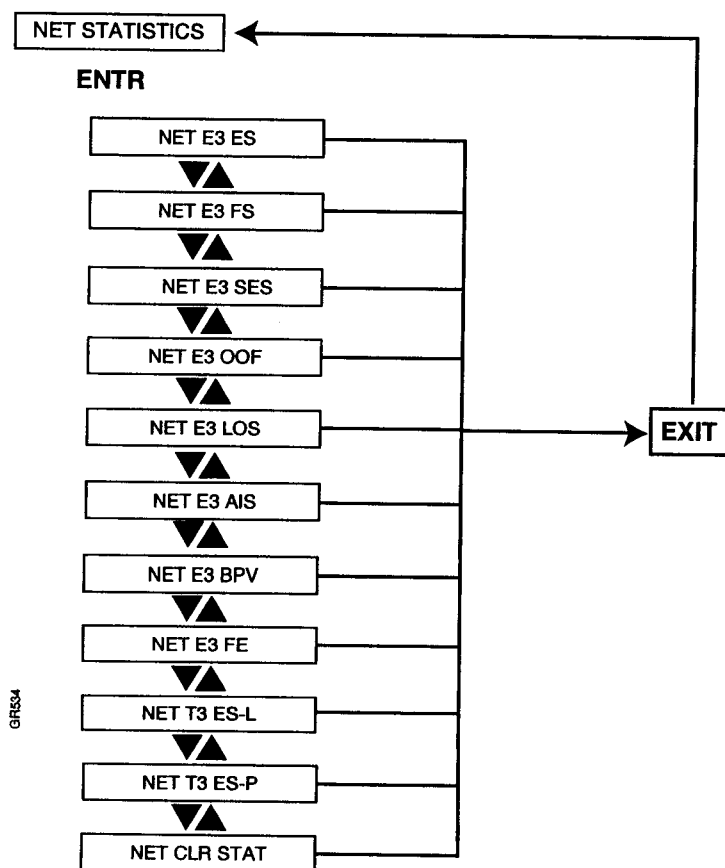


Figure 6-11 Network Statistics Menu

For each of these parameters (with the exception of CLR NET STAT) you can view the following set of performance statistics.

To view these statistics, press **ENTR** at the appropriate parameter and use the up and down arrows to scroll through the performance statistics.



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- SEC 491 VALID.96
Counts the seconds and number of valid intervals (maximum of 96) in the past 24 hours.
- CUR345
Counts the number of errors in the current interval for that performance register.
- TOTL.679
Counts the number of seconds in error or the number of errors for that performance statistic over the past 24 hours, or since the registers were last cleared.
- (1 - 96) =900
Counts the number of seconds in error and the number of errors for that performance statistic during the most recent 15-minute interval.
For example:
34 = 42
The number to the left of the display signifies the 15-minute interval represented (1 to 96). The number to the right is the number of errors (maximum of 900) occurring during that period.
Continue to press the down arrow to view subsequent intervals.

Clearing Network Statistics

The NET CLR STAT is the last entry in the Net Statistics Menu. You use NET CLR STAT to clear all network statistics.

To clear all the network statistics, press **ENTR** at the NET CLR STAT display. To confirm the action, press **ENTR** again when the display is blinking, or press **EXIT** to take no action.

For more information about network statistics, see "Monitoring Network Statistics" on page 4-10 in Chapter 4, "Monitoring and Managing."

Monitoring HSDB/HVDB Statistics

You use the HSDB or HVDB (1, 2, or 3) Statistics Menus to view and clear the DTE performance statistics.

The illustration below shows the parameters that you can view from the HSDB/HVDB (1, 2, or 3) Statistics Menu, using an HSDB DTE. However, the parameters are the same for HBDV devices.



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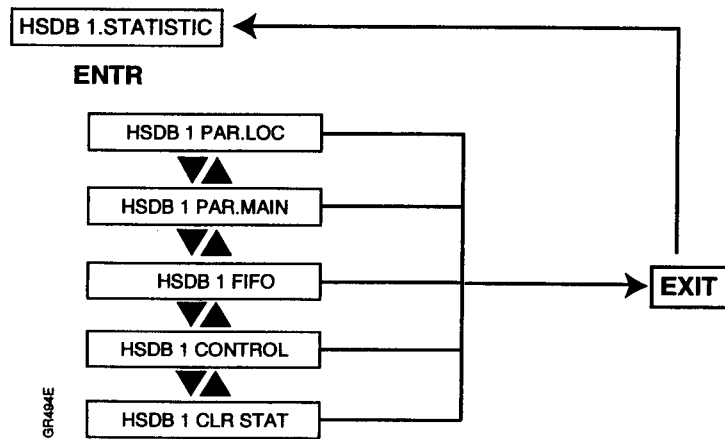


Figure 6-12 Statistics Menu

For each of these parameters (with the exception of CLR HSDB/HVDB/STAT) you can view the following set of performance statistics.

To view these statistics, press **ENTR** at the appropriate parameter, and use the up and down arrows to scroll through the performance statistics:

- SEC 491 VALID.96

Counts the seconds and number of valid intervals (maximum of 96) in the past 24 hours.

- CUR345

Counts the number of errors in the current interval for that performance register.

- TOTL.9679

Counts the number of seconds in error or the number of errors for that performance statistic over the past 24 hours, or since the registers were last cleared.

- (1 - 96) =900

Counts the number of seconds in error and the number of errors (maximum of 900) for that performance statistic during the most recent 15-minute interval.

For example:

- 34 = 42

The number to the left of the display signifies the 15-minute interval represented (1 to 96). The number to the right is the number of errors occurring during that period.

Continue to press the down arrow to view subsequent intervals.



E3 Access Multiplexer with SNMP

Clearing HSDB/HVDB Statistics

HSDB/HVDB CLR STAT is the last entry in the HSDB/HVDB Statistics menu. You use HSDB/HVDB CLR STAT to clear all DTE statistics.

To clear all the DTE statistics, press **ENTR** at the HSDB/HVDB CLR STAT display. To confirm the action, press **ENTR** again when the display is blinking, or press **EXIT** to take no action.

For more information about HSDB/HVDB statistics, see "Monitoring HSDB and HVDB Statistics" on page 4-12 in Chapter 4, "Monitoring and Managing."

Using the Test Menu

You can perform network loopbacks and DTE loopbacks on the local E3 Access Multiplexer from the front panel Test Menu.

Only the Network Loopback test can be run on the remote unit from the Test Menu.

The following illustration shows the types of tests that you can perform from the front panel Test Menu.

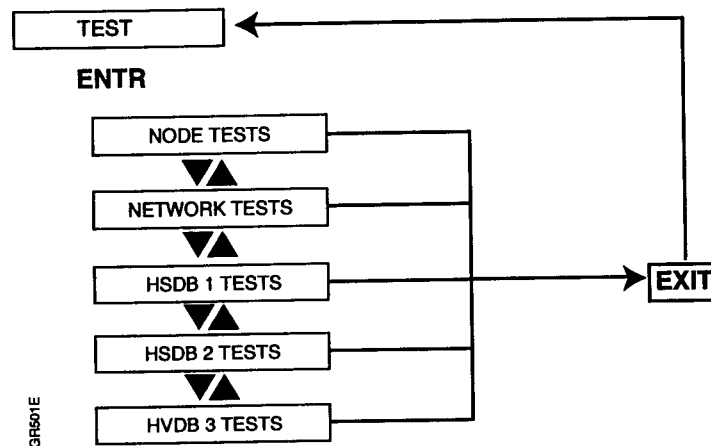


Figure 6-13 Test Menu

You can perform the following tests from the front panel:

Network Tests

- Net Loopback
- DTE Loopback

HSDB/HVDB Tests

- Net/DTE Loopback

Starting and Ending a Test

You can run only one test at a time. To run another test, you must terminate the first.



E3 Access Multiplexer with SNMP

1. To start a test, open the Test Menu and select the test from one of the submenus.

The test continues running until you end it.

2. To end the test, press **ENTR**.

The name of the terminated test appears in the Test Menu.



NOTE: You can cancel a test at any time from any place in any menu by pressing the up and down arrows simultaneously. However, this will cancel all tests currently in progress.

During a Test

During a test, you will observe the following:

- The **TEST** LED on the front panel turns red, reminding you that the E3 Access Multiplexer is out of service during the test.
- The name of the current test appears in the display with a plus sign (+) to the right of it.
- You can open the Monitor or Configuration Menu to view performance information or change a configuration while a test is in progress.



Technical Specifications

E3 Network Port Interface

Table A-1 lists the network port interfaces for the MTU310XE.

Table A-1 E3 Network Port Interface

Item	Description
E3 Line Rate	34.368 Mbps \pm 20 ppm
Line Code	HDB3
Framing Format	Standard Mux or Clear Channel
Signal Level	G.703
Pulse Shape	G.703
Impedance	75 Ω unbalanced, resistive
System Timing	Network, internal, or external

External Clock Specifications

Table A-2 lists information for the external clock.

Table A-2 External Clock Specifications

Item	Description
Input impedance	75 Ω
Input voltage	+5 V Square Wave TTL Clock Signal
Input signal	Unipolar, unbalanced
Input frequency	2.048 MHz \pm 20 ppm
Connector type	BNC or DIN

Data Interface

Table A-3 lists the data interfaces.

Table A-3 Data Interfaces

Item	Description
Interface types	Up to three V.35 or HSSI ports



E3 Access Multiplexer with SNMP

Table A-3 Data Interfaces (Continued)

Item	Description
Data rates:	
Standard Mux	Up to 34.010 Mbps in multiples of 358 kbps
Clear Channel	34.0995 Mbps



NOTE: V.35 is limited to 10 Mbps.

Interface Connectors

Table A-4 lists the interface connectors for the MTU310XE.

Table A-4 Interface Connectors

Item	Description
HSSI Interface	
Connector	50-pin Amplitite
Data Rates:	
Standard Mux	To 34.010 Mbps in increments of 358 kbps
Clear Channel	34.0995 Mbps
V.35 Interface	
Connector	DB-25 connector
Data Rate	To 10 Mbps in increments of 358 kbps
Local/Remote Port	
Electrical	RS232C compatible
Connector	DE-9
Other Connectors	
Alarm Inputs & Outputs	Terminal Block
Network	BNC or DIN



E3 Access Multiplexer with SNMP

Terminal Port (ASCII)

Table A-5 lists the terminal ports for ASCII.

Table A-5 Communication Port (ASCII)

Item	Description
Baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
Parity	Odd, Even, or None
Data bits	7 or 8
Stop bits	1, 1.5, or 2
Local terminal XON/XOFF	Enable or Disable
Connector	DE-9 socket
Protocol	ANSI (VT-100) terminals
Multi-drop	Up to 12 E3 Access Multiplex systems
Remote access	Modem

NMS Port (SNMP)

Table A-6 lists the NMS port parameters for SNMP.

Table A-6 Communication Port (SNMP)

Item	Description
Baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
Parity	Odd, Even, or None
Data bits	8
Stop bits	1, 1.5, or 2
SNMP XON/XOFF	Enable or Disable
Connector	DE-9 socket
Protocol	SNMP (UDP/IP) over SLIP

Diagnostics

Table A-7 lists the diagnostic tests and test indicators.

Table A-7 Diagnostics

Item	Description
Loopbacks	Local and remote DTE/Network
LEDs (network)	INS, ALM, RED, YEL, BLU, BPV, PAR
LEDs (per DTE port)	INS, TEST, TD, RD, TA/RTS, CA/CTS, DTR



E3 Access Multiplexer with SNMP

Power

The power requirements are:

220 VAC 0.25 A maximum (accepts 110 VAC to 230 VAC, 47 Hz to 63 Hz)

-48 VDC, 1.2 A maximum (-42 VDC to -72 VDC)

250 V, 1.6 A (fuse rating)

Mechanical

Table A-8 lists the mechanical information.

Table A-8 Mechanical Information

Item	Description
Dimensions	2 RU, 43.2 cm (17 in) W x 29.2 cm (11.5 in) D x 7.7 cm (3 in) H
Mounting	Rack mounted in a 48.3 cm (19 in) or 58.4 cm (23 in) rack, desktop or stackable

Environmental

Table A-9 discusses environmental information.

Table A-9 Environmental Information

Item	Description
Operating temperature	0°C to 50°C
Storage temperature	-35° to +85°C
Relative humidity	0% to 95% noncondensing
Altitude	-61 m (-200 ft) to 3048 m (10,000 ft)

Downloadable Software

New features and functionality can be added on line to the E3 Access Multiplex using the E3 Access Multiplex built-in communications port.

Alarms

The alarms on the MTU310XE are:

- Common Alarm Indicator LEDs
- Common Visual Alarm Contact through a DE-9 connector
- Common Audible Alarm Contact through a DE-9 connector
- Common External Alarm Input through a DE-9 connector



E3 Access Multiplexer with SNMP

Table A-10 lists the alarms.

Table A-10 Alarms

Item	Description
Relay contacts	Form C (normally open or normally closed) Contact rating 2 A at 30 VDC
Alarm input	Optoisolator (loop current activated) Activation current: .1mA minimum Maximum voltage: 70 VDC

Alarm Types

Table A-11 states the alarm types on the MTU310XE.

Table A-11 Alarm Types

Carrier	Alarm Type
E3 Network Port	NET Carrier Loss Alarm
	NET Sync Loss Alarm
	NET AIS Received Alarm
	NET Yellow Received Alarm
	BPV, FE Threshold Alarm
Data Port	RTS Loss Alarm
	DTR Loss Alarm

Equipment Grounding Conductor

The equipment grounding conductor should be installed as part of the circuit supplying the system and should not be smaller in size than the ungrounded branch-circuit supply conductors.

A bare, covered, or insulated grounding conductor is acceptable. An individually covered or insulated conductor should have a green (or a green with one or more yellow stripes) continuous outer finish.

The attachment-plug receptacle in the vicinity of the system should be of a grounding type and the conductor serving the receptacle should be connected to ground at the service equipment.



E3 Access Multiplexer with SNMP

Front Panel LEDs and Connectors

Figure A-1 shows the E3 Access Multiplex front panel LEDs, buttons, and connectors.

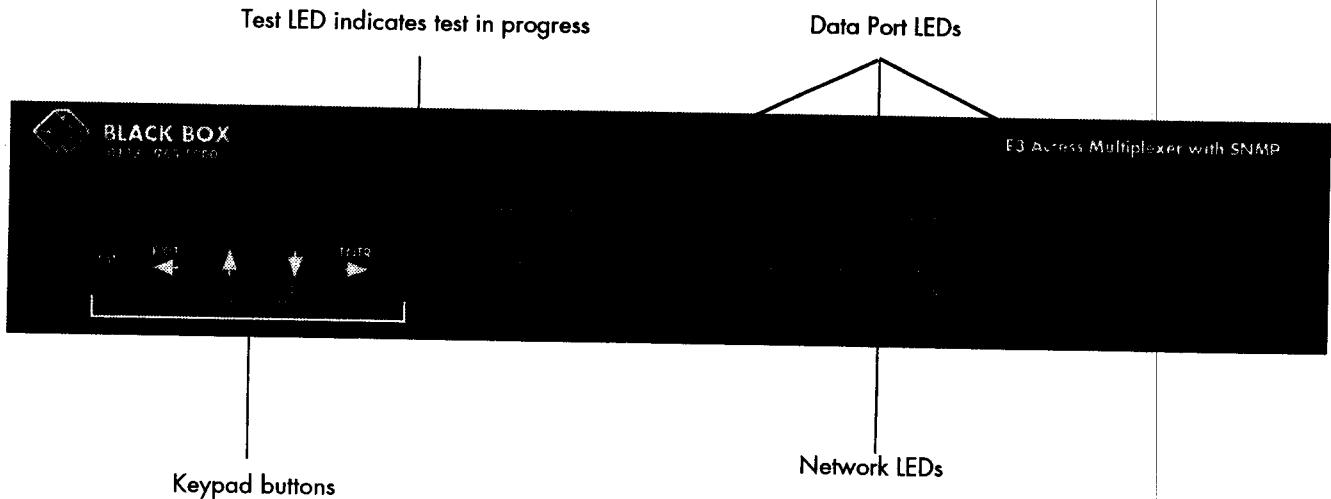


Figure A-1 E3 Access Multiplex Front Panel LEDs and Buttons

Table A-12 defines the LEDs, buttons, and connectors found on the E3 Access Multiplex front panel. For more information about the front panel operation, refer to Chapter 6, "Using the Front Panel Interface."



E3 Access Multiplexer with SNMP

Table A-12 Front Panel LEDs, Buttons and Connectors

	LED/Button	Status	Significance/Function
E3 Main Board	TEST	Red	Loopback or test is in progress
	INS	Green Amber Red	Module is in service and functioning normally Module is operating normally but is out of service Module failure
	ALM	Red	Network is in an alarm state
	OOF	Red	Loss of signal or out-of-frame conditions on receive E3 signal
	YEL	Red	Far-end E3 Access Multiplex or other remote equipment is in red alarm
	AIS	Red	AIS received denoting an upstream failure
	BPV	Flashing	Bipolar violations detected on the receive E3 signal
	PAR	Red	C-Bit or P-Bit parity errors detected on receive E3 signal
HSDB/HVDB Boards	INS	Green Amber Red	Module is in service and functioning normally Module is operating normally but is out of service Module failure
	TEST	Red	A bi-directional DTE/Network loopback is in progress
	TD	Flashing	Data is being transmitted to the DTE
	RD	Flashing	Data is being received from the DTE
	TA/RTS	Green	Data interface equipment is available and functioning normally
	CA/CTS	Amber	Carrier equipment is available and functioning normally
Buttons	STAT		Indicates the location of the user in the hierarchical menu structure
	EXIT (LEFT ARROW)		Used to cancel operations or to exit to a higher level menu
	UP ARROW		Used to view the previous item or option in the same menu
	DOWN ARROW		Used to view the next item or option in the same menu
	ENTR (RIGHT ARROW)		Used to enter a submenu or to change a configuration option



E3 Access Multiplexer with SNMP

Factory Default Configuration

Unit Configuration

Node Number	0	Autogrow	On
Date & Time	Not Assigned	Front Panel	On
Automatic Backup	5 minutes		
Permit Select Device from Remote	Yes		
Terminal Baud Rate	9600		
Terminal #Bits & Parity	8 bits, No parity		
Terminal Stop Bits	2 bits		
Terminal XON/XOFF	Enabled		
Terminal Multidrop	Enabled		

Login Configuration

Terminal Automatic Logout	Off		
Telnet Automatic Logout	5 minutes after no keyboard activity		

E3MB Configuration

Device Name	Not Assigned	Transmit Clock	Internal
Service	In-Service	National Bit	1
Framing Format	Standard Mux		
Hardware Rev (read only)			

E3MB Alarm Thresholds

	Major	Minor
Bipolar Violations	1 x 10 ⁻⁶	1 x 10 ⁻⁶
Frame Errors	1 x 10 ⁻⁶	1 x 10 ⁻⁶

Data Port Configuration - HSDB

Module Service	In-Service
Hardware Rev.	(read-only)
Module Name	Not assigned

Data Port Configuration - HVDB

CTS Control	Assert
TD Clock	SCTE Normal
Data Rate	0.0-34.0 Mbps



E3 Access Multiplexer with SNMP

Data Rate	Normal MUX – 34.010 Mbps Clear Channel – 34.0995 Mbps	E3 Timeslots	0-95
E3 Timeslots	0-95	Module Service	In-Service
Clock Mode	Normal	DTE Loss Detection	None
		CA Options	Auto

SNMP Configuration

Node IP Address	0.0.0.0	Read Community String	Public
Trap IP Address	0.0.0.0	Trap Community String	Public
Write Community String	Public	SNMP #Bits and Parity	8 bits No Parity
SNMP Baud Rate	9600	SNMP Stop Bits	2 bits
Node IP Subnet Mask	0.0.0.0		

Serial Port and Terminal Configuration

Multidrop	Enabled
Serial Port	9600, 8, no parity, 2 stop bits
Serial Port XON/XOFF	Enabled

Configuration Worksheet

Use this worksheet to keep a written record of your configuration.

Unit Configuration

Date & Time	_____	Software Rev	_____
Autogrow	_____	Terminal Baud Rate	_____
Automatic Backup	_____	Terminal #Bits & Parity	_____
Front Panel	_____	Terminal Stop Bits	_____
Permit Select Device from Remote	_____	Terminal XON/XOFF	_____
Hardware Rev	_____	Terminal Multidrop	_____

E3MB Configuration

Device Name	_____	National Bit	_____
Service	_____	Transmit Clock	_____



E3 Access Multiplexer with SNMP

Hardware Rev _____

E3MB Alarm Thresholds **Major** **Minor**

Bipolar Violations _____

Frame Errors _____

Data Port Configuration - HSDB

Data Port Configuration - HVDB

Module Service _____

Hardware Rev. _____

Module Name _____

Data Rate _____

E3 Timeslots _____

Clock Mode _____

SNMP Configuration

Node IP Address _____

Node IP Subnet Mask _____

Trap IP Address _____

Read Community String _____

Write Community String _____

COMM Port and Terminal Configuration

Connection _____

Timeout when Logged on _____

Timeout when not Logged on _____

Comm Port _____

Comm Port DCD _____

Comm Port XON/XOFF _____

Trap Community String _____

SNMP Baud Rate _____

SNMP #Bits and Parity _____

SNMP Stop Bits _____

Terminal Mode _____

Phone Number 2 _____

Phone Number 1 _____

Normal User Password _____

Superuser Password _____



E3 Access Multiplexer with SNMP

- Replacement Fuse (1.6 A, 250 V, 5x20 mm), part number 498-00027-01

To remove the old fuse, use a straight-edged screwdriver to turn the fuse clockwise, until the notches line up. Remove the old fuse and replace it with the new one.

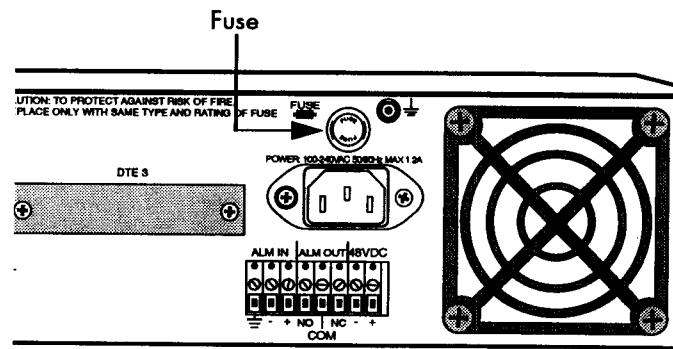


Figure B-2 Fuse



E3 Access Multiplexer with SNMP

Maintenance

Maintaining your E3 Access Multiplexer with SNMP is simple. There are only two user-serviceable parts to be concerned with: the fan filter, and the fuse.

Maintaining the Fan Filter

On an annual basis, you will need to inspect the fan filter to see if it needs to be cleaned or replaced.



NOTE: BLACK BOX recommends that you turn the device off and unplug it from the power source prior to changing the fuse or the filter.

Removing the Fan Filter

To remove the fan filter, you first need to remove the fan clip. No tools are required as the fan clip snaps in and out. Use your fingernail or a paper clip to pry the fan clip out of its housing.

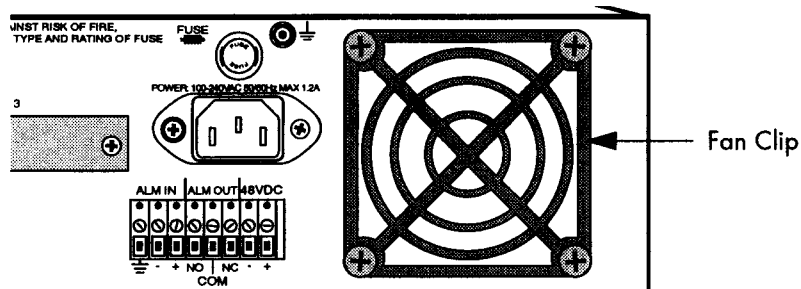


Figure B-1 Fan Clip

You can now remove the fan filter.

Cleaning the Fan Filter

After removing the fan filter, wash it under running water. Do not use soap or detergent on the fan filter.

Make sure the fan filter is completely dry before reinstalling it. Replace the fan filter and snap the fan clip back into place.

If the fan filter or the fan clip are damaged, contact BLACK BOX for a replacement.

- Fan Clip and Filter, part number 231-00002-01

Replacing the Fuse

If you need to replace the device's fuse, call BLACK BOX and order a new fuse.



E3 Access Multiplexer with SNMP

50-Pin HSSI Data Port Connector Pin Assignments

The pin assignments for the 50-pin HSSI Connector pin assignments are listed below in Table C-2.

Table C-2 50-pin HSSI Connector Pin Assignments

Pin No. + Side	Pin No. - Side	Pin Name	Signal Name	Signal
1	26	SC	Signal Ground	
2	27	RT	Receive Timing	To DTE
3	28	CA	DCE Available	To DTE
4	29	RD	Receive Data	To DTE
5	30		Reserved	To DTE
6	31	ST	Send Timing	To DTE
7	32	SG	Signal Ground	NA
8	33	TA	DTE Available	From DTE
9	34	TT	Terminal Timing	From DTE
10	35	LA	Loopback Circuit A	From DTE
11	36	SD	Send Data	From DTE
12	37	LB	Loopback Circuit B	From DTE
13	38	SG	Signal Ground	NA
14-18	39-43		5 ancillary to DTE	From DTE
19	44		Signal Ground	NA
20-23	45-48		5 ancillary from DCE	To DTE
24	49	TM	Test Mode	To DTE
25	50	SG	Signal Ground	NA

Table C-3 DE-9 Serial Port Connector Pin Assignments

Pin No.	Signal Name	Direction
2	SD-Send Data	From E3 Access Multiplex to terminal
7	RTS-Request to Send	From terminal to DSU
3	RD-Receive Data	From terminal to DSU
8*	CTS-Clear to Send	I/O to all DSUs only
5	SG-Signal Ground	Bi-directional

*CTS is used by the E3 Access Multiplex as a collision avoidance line. This line should not be connected at the CRT terminal end of the Multidrop Serial Port cable.



E3 Access Multiplexer with SNMP

Connector and Pin Assignments

This appendix covers connector and pin assignments for the E3 Access Multiplex.

V.35, DB-25 to M-34 Pin Assignments

Table C-1 lists the pin assignments for the V.35, DB-25 to M-34 DTE connector.

Table C-1 V.35, DB-25 to M-34 Pin Assignments

Pin No.	Pin Name	Signal Name	Signal	M-34
2	SCT A	Serial Clock XMT A	To DTE	Y
15	SCT B	Serial Clock XMT B	To DTE	AA
6	SCTE A	Serial Clock XMT A	From DTE	U
19	SCTE B	Serial Clock XMT B	From DTE	W
14	SD A	Send Data A	From DTE	P
1	SD B	Send Data B	From DTE	S
17	SCR A	Serial Clock Receive	To DTE	V
5	SCR B	Serial Clock Receive B	To DTE	X
4	RD A	Receive Data A	To DTE	R
16	RD B	Receive Data B	To DTE	T
20	DSR	Data Set Ready	To DTE	E
8	DTR	Data Terminal Ready	From DTE	H
7	RSLD	Receive Line Signal Detector	To DTE	F
9	RTS	Request to Send	From DTE	C
22	CTS	Clear to Send	To DTE	D
23	LT	Local Test	From DTE	K
		Frame Ground		A
18		Signal Ground		B



Glossary

ABAM

A designation for 22 gauge, 100 ohm, plastic insulated, twisted pair Western Electric cable normally used in central offices.

AIS (Alarm Indication Signal)

An unframed sequence of All Ones normally sent by a DSU/CSU that cannot maintain the required pulse density in AMI mode or sent by a CSU that has a loss of signal condition on its data port. The signal is sent to maintain continuity of transmission and to notify the far-end that a transmission fault exists on the line. Same as Blue Alarm.

alternate loop code

Used to invert loop codes from U.S. standard code; inverts zeros to ones and ones to zeros.

AMI (Alternate Mark Inversion)

A line code in which the signal carrying the binary value alternates between positive and negative polarities but equal in amplitude, and in which binary zeros are represented by signal elements that have zero amplitude.

ANSI (American National Standards Institute)

Coordinates the development of U.S. voluntary national standards in both the private and public sectors. Standards pertain to programming languages, EDI, telecommunications and physical properties of diskettes, cartridges and magnetic tapes.

ASCII (American Standard Code for Information Interchange)

The standard and predominant seven-bit (eight bits with parity) character code used for data communications and data processing.

asynchronous transmission

Transmission not related to a specific frequency, or to the timing of the transmission facility.

attenuation

Reduction or loss of signal strength, measured in decibels; opposite of gain.

B

B8ZS (Binary 8 Zero Substitution)

A technique used to accommodate the ones density requirements of T1 transmission.

bandwidth

The data-carrying capacity of a transmission medium, usually measured in Hertz (Hz), which equals cycles per second.

baud

A measurement of the signaling speed of a data transmission device.

BER

See bit error rate.



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BES (Bursty Errored Seconds)

Occurs when a second has 320 or more CRC violations. (ESF format only)

bipolar

The predominant signaling method used for digital transmission services, such as DDS and T1, in which the signal carrying the binary value successively alternates between positive and negative polarities. One values are represented by the signal amplitude at either polarity, while zero values "spaces" are at zero amplitude.

bit error

Occurs when the value of an encoded bit is changed in transmission, and interpreted incorrectly by the receiver.

Bit Error Rate (BER)

The percentage of received bits that are in error, relative to a specific amount of bits received; usually expressed as a number referenced to a power of 10.

bps

Bits per second; the basic unit of measure for serial data transmission capacity; Kbits (kilobits) for thousands of bits per second; Mbitps (megabits) for millions of bits per second, and Gbits (gigabits) for billions of bits per second.

Blue Alarm

An unframed sequence of All Ones normally sent by a DSU/CSU that cannot maintain the required pulse density in AMI mode or sent by a CSU that has a loss of signal condition on its data port. The signal is sent to maintain continuity of transmission and to notify the far-end that a transmission fault exists on the line. Same as Alarm Indication Signal (AIS).

broadband

Services or interfaces that operate above the T1 data rate, typically at NxT1, T3, SONET, or ATM speeds.

BPV (Bipolar Violation)

Occurs when the ones bit is not represented with the opposite signal of the previous ones bit.

C

CCITT

Comite Consultatif International Telegraphique et Telephonique (Consultative Committee on International Telegraph and Telephone).

This group has recently been renamed the Telecommunications Standardization Sector (TSS). They have also been replaced by the International Telecommunications Union (ITU-T) as the world's leading telecommunications standards organization, which defines the technical standards for all internationally controlled aspects of analog and digital communications.

central office (CO)

The phone company switching facility or center; usually a Class 5 end office, at which subscribers' local loops terminate.

channel

A physical or logical path allowing the transmission of information; the path connecting a data source and receiver.



E3 Access Multiplexer with SNMP

circuit

Generally referring to a transmission medium connecting two or more electronic devices.

clear channel

A characteristic of a transmission path or digital circuit in which the full bandwidth is available to the user. The phone company does not use any portion of the bandwidth for framing or control bits.

clock

An oscillator-generated signal providing a timing reference for a transmission link; used to control timing functions such as sampling interval, signaling rate and duration of signal elements.

code conversion

The process of changing the bit grouping for a character in one code into the corresponding bit grouping for the character in another.

CMI (Control Mode Idle)

The process of changing the grouping for a character in one code into the corresponding bit grouping for the character in another.

communications port (COMM Port)

The electrical interface between a unit and the operator's terminal. Operator commands and responses can be communicated through the Comm Port.

connector

A physical interface, such as DA-15 or RS-232-C, typically with plug or socket components.

CPE (Customer Premises Equipment)

Equipment that interfaces the telephone network and physically resides at the user's location.

CRC (Cyclic Redundancy Check)

An error checking scheme used to check the received data. The CRC bits within the framing are calculated using the contents of the frame. The calculation is performed again when the frame is received and the CRC values are compared. If they do not match, the frame is considered bad and the CRC statistic is incremental. Performance checking is done by both the carrier and the customer without causing any interference with the T-1 traffic.

CSU (Channel Service Unit)

The CPE used to terminate a digital circuit at the customer site. The CSU performs certain line-conditioning functions, ensures network compliance to FCC rules and responds to loopback commands. It ensures proper ones density in the bit stream and performs bipolar violation correction. The DSU and CSU are often in the same unit.

CTS (Clear to Send)

A signal issued by the DSU to indicate it is connected to the digital network and is ready to accept data.

CV (Code Violation)

Any code violation.

D



E3 Access Multiplexer with SNMP

D4

Framing format for T1 transmission that places 12 T1 frames into a superframe. In ESF (a newer framing format) frames consist of 24 bits instead of the previous standard 12 bits as in D4 format.

DACS (Digital Access Cross-Connect System)

A digital switching device for routing and switching T1 lines and DS-0 portions of lines among multiple T1 ports. DACS performs all the functions of a normal switch, except that connections are typically set up in advance of a call, not together with a call, as in most, normal low-bandwidth communications systems (e.g. voice-band voice and data). A DACS is in essence a manual T1 switch.

data link

Any serial data communication transmission path, generally between two adjacent nodes or devices and without any intermediate switching nodes.

data link layer

In the OSI model, the network processing entity that establishes, maintains and releases data link connections between adjacent elements in the network.

DCE (Data Communications Equipment)

Equipment that is either a part of the network, an access point to the network, a network node, or equipment at which a network circuit terminates.

dial-up

Describing the process of, or the equipment or facilities involved in, establishing a temporary connection via the switched telephone network.

digital loopback

A technique for testing the digital processing circuitry of a communications device; may be initiated locally or remotely via a telecommunications circuit. The device being tested returns a received test message, the results of which are compared to the original message.

DS-0 (Digital Signal Level 0)

A 64kbit/s standard digital telecommunications signal or channel.

DS-1 (Digital Signal Level 1)

The 1.544Mbit/s digital signal carried on a T1 facility.

DS-3 (Digital Signal Level 3)

The 44.736Mbit/s digital signal carried on a T3 facility.

DSU/CSU (Data Service Unit/Channel Service Units)

The pair of communications devices that connect an in-house line to an external digital circuit. At the customer's end of the telephone connection, the DSU/CSU takes data from terminals and computers, encodes it, and transmits it down the link. At the receive end, another DSU/CSU equalizes the received signal, filters it, and decodes it for interpretation by the end-user.

DSU (Data Service Unit)

A device designed to connect a DTE to a digital phone line. The DSU transmits and receives the signal and provides buffering and flow control. The DSU and CSU are often in the same unit. Also called a Digital Service Unit.



E3 Access Multiplexer with SNMP

DSR (Data Set Ready)

A data port signal.

DSU Loopback

A DSU loopback is intended to include as much of the customer data communications circuitry in the looped-back path as possible. The signal passes from the remote unit into the local unit as far as the DSU. This test loops the received network signal back to the network.

DSX-1 (Digital Signal Cross Connect Level 1)

Parameters set used when DS-1 signals are cross connected.

DTE (Data Terminal Equipment)

Terminal equipment connected to the DSU and used for communication over digital networks. May be a terminal, computer, printer or multiplexer.

DTE loopback

An EIA-232-D signal which indicates that the DTE is ready for operation.

DTR (Data Terminal Ready)

Signal from DTE to DSU/CSU.

E

EER (Excessive Error Rate)

Determined by counting the number of T1/T3 code violations during a time interval.

EFS (Error Free Seconds)

Occurs when a second is free of CRC-6 violations or Out of Frame (OOF) events or one or more BPV or OOF events.

EIA (Electronic Industries Association)

An organization which sets data communication industry standards.

encoding/decoding

The process of reformatting information into a format suitable for transmission, and then recovering it after transmission.

equalization

The spacing and operation of amplifiers so that the gain provided by the amplifier, per transmission frequency, coincides with the signal loss at the same frequency; circuitry that compensates for the differences in attenuation at different frequencies.

ES (Errored Second)

Occurs when a second has one or more OOF events or CRC violations or with one or more BPV or OOF events.

ESF (Extended Superframe Format)

A T1 framing standard used in Wide Area Networks (WANs). With this format 24 frames, instead of the 12 frames in D4 are grouped together. ESF provides frame synchronization, cyclic redundancy checking and data link bits in overhead. It allows error information to be stored and retrieved easily, facilitating network performance monitoring and maintenance.

F



E3 Access Multiplexer with SNMP

failed signal state

Occurs when ten consecutive severely errored seconds are detected.

far end

The unit or units remote from the user.

FE (Framing Errors)

Occurs when the end of a frame is not detected where it should be.

FDL (Facility Data Link)

A four Kbps data channel provided by 12 of the 24 ESF framing bits. It is used by the carrier to request reports, clear error counters and activate loop backs.

FG (Frame Ground)

It reduces stray electrical fields, prevents outside electrical interference, drains off current induced by lightning and provides for safety of personnel. Frame ground is usually connected to an external ground such as the ground pin of an AC power plug.

fractional bandwidth DTE loopback

A loopback test that loops back the signal at the network interface. See also **loopback**.

Fractional T1

A service that provides less than full T1 capacity (one or more 64 Kbps channels are provided).

frame

A group of bits sent serially over a communications channel. The basic data transmission unit employed with bit oriented protocols.

frame relay

A high-speed packet switching protocol used for wide area networks (WANs); faster than traditional X.25 networks, because it was designed for today's reliable circuits and performs less rigorous error detection. Frame relay networks use bandwidth only when there is traffic to send. Frame relay does not support voice.

framing

A technique which separates incoming bits into identifiable groups to enable the receiving device to recognize and reconstruct them.

frequency

The number of repetitions per unit time of a complete waveform. The number of complete cycles per unit of time, usually expressed in Hz.

full bandwidth DTE loopback

A loopback test that loops back the signal at the multiplexer. See also **loopback**.

H

HDLC (High Level Data Link Control)

Bit-oriented, data-link control protocol; any related control of data links by specified series of bits, rather than by control characters.

I



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IP address

A unique, 32-bit identifier for a TCP/IP host on a network. IP addresses are normally printed in dotted decimal form, such as 0.0.0.0, and each number may have a value of 0-255.

ITU

International Telecommunications Union. An organization established by the United Nations with the objective of setting telecommunications standards and allocating frequencies to various uses.

ITU-T

A sub-group of the ITU. -T = Telecommunications Standardization Sector. This group has replaced CCITT as the world's leading telecommunications standards organization.

L

LBO (Line Build Out)

An adjustable value used to tune the attenuation between the DSU/CSU card and the last repeater on the T1 circuit.

LED (Light Emitting Diode)

A device that accepts electrical signals and converts the energy to a light signal.

LOF (Loss of Frame)

Occurs when a received digital signal loses frame synchronization.

LOFC (Loss of Frame Count)

A count of declared Loss of Frame events (ESF framing only).

loopback

A diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. This allows a technician (or built-in diagnostic circuit) to compare the returned signal with the transmitted signal and get some sense of what's wrong.

LOS (Loss of Signal)

Occurs when an input signal is detected as all zeros for 176 consecutive bit times.

loss

A reduction in signal strength, expressed in decibels.

LSC (Loopback Select Code)

An indicator describing a DSU loopback characteristic. LSC is a minimum of 35 LSC bytes of S11101F1 with secondary channel.

LT (Local Test)

A data port signal to DSU/CSU.

M

mask

Refer to subnet mask.



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MIB (Management Information Base)

A structure that defines what is obtainable from a network device and what can be controlled. It has a directory listing the logical names of all information resources residing in the network and pertinent to the network's management. It is used to describe network management variables.

multiplexer

Any device that allows two or more users to share a common physical transmission medium. Employed in pairs, where each device performs both multiplexing of the multiple user inputs and demultiplexing of the channel back into the separate user data streams.

multiplexing

The combining of multiple data channels onto a single transmission medium. Typically, data streams are interleaved on a bit or byte basis (time division) or separated by different carrier frequencies (frequency division).

multidrop

A communications arrangement where multiple devices share a common transmission channel, though only one may transmit at a time.

N

NEBS

Network Equipment Building Systems requirement. A standard issued by Bellcore that spells out central office standards for grounding, cabling and power.

network

An interconnection of computer systems, terminals, or data communications facilities.

NI (Network Interface)

The point of demarcation between the customer premises and the carrier's network, usually drawn at the network connector on the rear panel of the Digital Link access device.

NRZ (Non-Return to Zero)

A binary encoding and transmission scheme where "ones" and "zeros" are represented by opposite, and alternating, high and low voltages where there is no return to zero-voltage between encoded bit.

NRZI (Non-Return to Zero Inverted)

A binary encoding technique that inverts the signal on a "one" and leaves the signal unchanged for a "zero," where a change in voltage state signals a "one" bit and the absence of a change denotes a "zero" bit value.

O

OOS (Out of Service)

A digital network trouble signal.

OOFF (Out of Frame)

An error checking scheme. An OOF occurs when two out of four consecutive framing bits are in error.

P



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parity bit	An additional, non-informational bit appended to a group of bits indicating that the number of "ones" in the bits group is odd or even.
parity check	A process of error checking using the parity bit.
polarity	Any condition where there are two opposing charges, such as positive and negative.
port	The physical point of access into a computer, network or other electronic device.
protocol	A formal set of rules governing the format, timing, sequencing and error control of exchanged messages on a data network.



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R

RD (Receive Data)

A data port signal.

receiver

The receiver synchronizes the framing pattern, separates the frame bits from the payload data and monitors for frame errors in 64 kbps mode. It achieves frame synchronization within 5 milliseconds.

repeater

Equipment that receives a pulse train, amplifies it, retimes it, and then reconstructs the signal for retransmission.

return to zero

Method of transmitting binary information such that, after each encode bit, voltage returns to the zero level.

RI (Ring Indicator)

A data port signal.

RJ-48S

An 8-position keyed jack used to connect services that are covered under FCC Part 68 Rules, such as public switched digital service (PSDS), switched 56, 19.2 Kbps service, 64 Kbps service, and synchronous digital data with secondary channel.

RLSD (Receive Line Signal Detect)

A data port signal.

RS-232

A TIA/EIA standard for serial transmission.

RS-232-C

An EIA specified physical interface, with associated electrical signaling, between data circuit terminating equipment (DCE) and data terminating equipment (DTE).

RS-449

A common 37-position interface for data terminal equipment and data circuit terminating equipment employing serial binary data interchange. It is a balanced interface, based on unipolar digital signals, depending more on current flow than voltage, therefore supports greater distances than the RS-232 interface.

RTS (Request to Send)

A signal sent by DTE to DSU/CSU indicating DTE has data ready to transmit.

S

SCR (Serial Clock Receive)

A unipolar clock from the DCE signal. A data port signal.

SCT (Serial Clock Transmit)

A unipolar clock from the DCE signal. A data port signal.



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SCTE (Serial Clock Transmit Echo)

The clock signal is echoed from the DTE for the purpose of timing incoming data on long cable runs.

scrambler

A device or software program that encodes data for encryption. It distorts a voice or data conversation so that only another like device can figure out the content of the message.

SD (Send Data)

A signal from DTE to DSU/CSU. SD is a status signal indicated by a flickering light on the modem, which means the local unit is sending data to a remote unit.

secondary channel

A subchannel derived from the main channel. It does not carry data messages and is used for diagnostic or supervisory purposes.

serial transmission

A sequential transmission of bits constituting an entity of data over a data circuit.

SES (Severely Errored Second)

A second during which 320 or more CRC violations or OOF events have occurred (ESF framing only).

SG (Signal Ground)

A signal from DTE to DSU/CSU. SG establishes a common reference level for the voltages of all other signals.

simplex current

One way transmission used by Telco to provide power to repeaters.

SLIP (Serial Line IP)

A TCP/IP protocol that allows IP packets to be transmitted over a serial link, such as a dial-up or private telephone line.

SMDS (Switched Multimegabit Data Service)

A fast-packet technology based on the connection-less data networking capability described in the IEEE 802.6 specification. The data format for SMDS is "cell oriented." SMDS does not support voice.

SNMP (Simple Network Management Protocol)

A widely-used network monitoring and control protocol. Data is passed from SNMP agents (hardware and/or software processes reporting activity in each network device, hub, router, bridge, etc.) to the workstation console used to oversee the network. The agents return information contained in a MIB (Management Information Base), which is a structure that defines what is obtainable from the device and what can be controlled.

stop bit

The last transmitted element in each character, which permits the receiver to come to an idle condition before accepting another character.

subnet mask

A binary pattern that is matched up with the IP address to turn part of the host IP address field into a filter for subnets.



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synchronous transmission

Data communications in which characters or bits are sent at a fixed rate and the transmitting and receiving devices are synchronized.

T

T1

A digital carrier facility used to transmit a DS1 formatted digital signal at 1.544 Mbps. T1 normally can handle 24 voice conversations, each one digitized at 64kbps. But, with more advanced digital voice encoding techniques, it can handle more voice channels. T1 is a standard for digital transmission in North America. T1 lines are used for connecting networks across remote distances.

T3

A digital carrier facility used to transmit a DS3 formatted digital signal at 44.736 Mbps.

T-Carrier

A time-division, multiplexed digital transmission facility, usually operating at an aggregate data rate of 1.544 Mbps.

telnet

A remote terminal application that enables the user to log on to a remote computer on the same IP network. The user can work from the PC as if it were a terminal attached by a hard-wired line to the remote computer. The application uses the *Telnet* Internet protocol.

transmitter

In 64K mode, the transmitter inserts the frame bit, with a fixed pattern of 101100.

trap

A mechanism by which a device automatically sends an alarm for certain network events to a management station. The management station can initiate a polling sequence to the device to determine the cause of the problem.

U

UAS (Unavailable Seconds)

Number of seconds elapsed after 10 consecutive SES events are received (ESF framing only).

V

V.35

A CCITT standard for the trunk interface between a network access device and a packet network. It defines signaling for data rates greater than 19.2 Kbps.

V.52

Terminal emulation standard. CCITT standard (1976) for various loopback tests that can be incorporated into modems for testing the telephone circuit and isolating transmission problems. Operating modes include local and remote digital loopback and local and remote analog loopback.

V.54

A CCITT standard for loop test devices in modems. It defines local and remote loopbacks.



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MicroMux SP-8 E2 to HSSI interface converter

Product code MTU9002 Issue 1, 28.07.98

User Manual

Product description

The function of the product is to convert from an E2 8Mb signal to HSSI. The most common application is expected to be where the product is used between a router with a native HSSI interface and an E2 digital communications circuit. The E2 interface is presented on the SP-8 as a pair of female BNC connectors, the HSSI interface complies to the HSSI standard and is presented on a HSSI 50 way connector. This initial version is un-managed. The product is housed in a metal enclosure and complies with all UK legislation. The product is mains powered via an IEC-style connector.

Clocking modes

There are two clocking modes, slave and master. A switch is used to enable / disable master clock mode.

Loop back modes

There are two loop back control signals on the HSSI, LA and LB (operated by a switch on the rear panel of the unit.).

LEDs

There are four LEDs:

Red = Power

Green = Network O.K. i.e. receiving good input.

Amber = Clock Master

Amber = Manual Loop Back

Switches

This product has a bank of eight switches. The following are used:

One = Clock Master enable/disable

Four = Manual Loop Back enable/disable

Intallation / setting up.

Cable connections

Connect the 75 Ohm coax cables from the E2 link to the MicroMux's pair of BNC connectors (on the rear panel), taking care to match up the transmit (Tx) and Receive (Rx) ports correctly.

Connect the HSSI cable from the device to be attached to the MicroMux SP-8 to the 50-way HSSI connector on the rear panel of the MicroMux.

Connect the mains lead to the IEC connector on the rear panel – the red power LED should alight.

Switch settings

Move switch 1 to the On (down) position if the MicroMux is to operate in Clock Master mode.

All other switches should be set to the Off (up) position for normal operation.

LEDs

The green network LED will flash until the link is stable – then it will remain on, indicating that the link to the E2 service is good.

The amber Clock Master LED will be alight if the unit has been set in Clock Master mode (ie switch 1 on.) If the unit is set in Clock Slave mode (switch 1 off), the LED will not be alight.

The amber Loopback LED will only be alight if switch 4 is on ie during diagnostic work when the unit is set in manual loopback mode.

MicroMux is a trademark of Market Vision

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