MX2800

M13 Multiplexer
User Manual

4204290L1	AC Non-Redundant Version with Modem
4204290L2	AC Redundant Version with Modem
4204290L3	DC Non-Redundant Version with Modem
4204290L4	DC Redundant Version with Modem
4204290L5	AC Non-Redundant Version
4204290L6	AC Redundant Version
4204290L7	DC Non-Redundant Version
4204290L8	DC Redundant Version
1200291L1	Breakout Panel
4175043L2	Battery Backup
1200657L2	Battery Backup Adapter Cable
1200287L1	Amp to Punch-Down Cable 25 ft.
1200287L5	Amp to Punch-Down Cable 50 ft.
1200287L7	Amp to Punch-Down Cable 100 ft.
1200291L5	BNC patch panel
1200466L1	Fan Faceplate

61200290L1-1F
May 2002

Trademark Information

OpenView is a trademark of Hewlett-Packard Company.
Spectrum is a registered trademark of Cabletron.

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FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of FCC rules. On the bottom of the equipment housing is a label showing the FCC registration number and ringer equivalence number (REN). If requested, provide this information to the telephone company.
2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.
3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment. Advance notification and the opportunity to maintain uninterrupted service are given.
4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected or it is certain the equipment is not malfunctioning.
5. This unit contains no user-serviceable parts.
6. An FCC compliant telephone cord with a modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.
7. The following information may be required when applying to the local telephone company for a dial-up line for the V.34 modem:

Service Type	REN	FIC	USOC
Loop Start	1.6B / 0.8A	02LS2	RJ-11C

8. The REN is useful in determining the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices should not exceed five. To be certain of the number of devices you may connect to your line as determined by the REN, call your telephone company to determine the maximum REN for your calling area.
9. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. Contact your state public utility commission or corporation commission for information.

Federal Communications Commission
Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio frequencies. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.

WARNING

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

Canadian Emissions Requirements

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled “Digital Apparatus,” ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: “Appareils Numeriques,” NMB-003 edictee par le ministre des Communications.

Canadian Equipment Limitations

Notice: The Canadian Industry and Science Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above limitations may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should contract the appropriate electric inspection authority, or an electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100.

Warranty and Customer Service

ADTRAN will replace or repair this product within ten (10) years from the date of shipment if it does not meet its published specifications or fails while in service. (See *ADTRAN U.S. and Canada Carrier Networks Equipment Warranty,* document 60000087-10).

Contact Customer And Product Service (CAPS) prior to returning equipment to ADTRAN.

For service, CAPS requests, or further information, contact one of the following numbers:

ADTRAN Sales

Pricing/Availability
(800) 827-0807

ADTRAN Technical Support

Presales Applications/Postsales Technical Assistance
(800) 726-8663

Standard hours: Monday-Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for Repair/Upgrade
(256) 963-8722

Repair and Return Address

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville Alabama 35806-2807

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Chapter 1 Introduction

PRODUCT OVERVIEW

The MX2800 is an M13 multiplexer that consolidates T1 and E1 signals into a T3 circuit. This unit provides a cost-effective, versatile tool for combining independent T1s, E1s, or a combination of the two over the same T3 circuit.

The MX2800 houses two hot-swappable controller cards which provide 1:1 redundancy for the T1 and T3 signals as well as the T3 connections.

Embedded SNMP (simple network management protocol) and TELNET are available through the modem port using SLIP/PPP or through the 10BaseT ethernet port. Using the Management Information Base II (MIB II), RFC 1407 standards, and an ADTRAN enterprise MIB, the MX2800 can be configured, monitored, and diagnosed with standard SNMP network management programs such as Hewlett Packard's HP OpenView™ and Cabletron's Spectrum™. In addition, the SysLog Host Daemon allows remote monitoring, collecting, and logging of MX2800 events in realtime. This information can be useful during installation setups and/or troubleshooting.

Complete configuration, loopbacks, and performance monitoring are available through SNMP, TELNET, or a VT-100 terminal interface. This connection can be made via ethernet, a local EIA-232 link, or through the built-in V.34 modem (see the note at the end of this section on page 1-2). The modem can dial-out a "cry for help"

for units located in unmanned facilities. The MX2800 is designed for either desktop use or for installation in a 19-inch or 23-inch rack.

The major features of the MX2800 are as follows:

- Built-in 1:1 redundancy
- Hot-swappable controller cards
- Independent, dual-load sharing, redundant power supplies
- Embedded SNMP and TELNET management through 10BaseT ethernet or SLIP / PPP dialup
- Detailed performance monitoring for local and remote units
- Simplified configuration through the VT100 terminal menu structure
- Integrated V.34 modem for dial-up and dial-out access (see the following note)
- Capable of backhauling multiple service types (T1 / E1)
- AC or DC power
- -48V or 24V power supplies available
- External DS3 clock option
- M13 and C-bit signaling support
- NEBS Level 3 compliant
- Standard 10-year warranty

Information regarding the built-in modem applies to the following list of part numbers: 4202290L1, L2, L3, and L4.

Controller Card 1:1 Redundancy

The MX2800 supports two hot-swappable controller cards which provide 1:1 redundancy for the T1 and T3 signals as well as the T3 connections. With two cards installed, the MX2800 can recover from circuit or network failure, depending on the configuration. See *Circuit and Network Redundancy* on page 7-1 for more information.

T3 OVERVIEW

A T3 provides the same bandwidth as 28 T1s. Typically, leasing a T3 line costs the same as eight to ten T1s. Using the MX2800, a single T3 can provide internet connectivity and voice (local and long distance) to individual sites across up to 28 individual DSX-1s. T3 is also extremely cost effective for backhauling local and long distance voice.

SNMP

The MX2800's embedded SNMP feature allows the unit to be accessed and controlled by a network manager through the 10BaseT local area network (LAN) port. The MX2800 supports the MIB-II standard, RFC 1213, and the ADTRAN Enterprise Specific MIB.

MIB files are available from ADTRAN in the support section of the ADTRAN Web page at ***www.adtran.com****.*

The term SNMP broadly refers to the message protocols used to exchange information between the network management system (NMS) and the managed devices, as well as to the structure of device management databases. SNMP has three basic components, the network manager, the agent, and the MIB.

Network Manager

The network manager is a set of control programs that collect, control, and present data pertinent to the operation of the network devices. These programs reside on a network management station.

Agent

The agent is a control program that resides in every network device. This program responds to queries and commands from the network manager, returns requested information or invokes configuration changes initiated by the manager, and sends unsolicited traps to the manager.

MIB
A MIB is an industry standard presentation of all status and configuration parameters supported by a network device.

TELNET

TELNET provides a password-protected, remote login facility to the MX2800 that allows a remote user to control the MX2800 through the terminal menus. Only one TELNET menu session may be active at a time.

TL1

Transaction Language 1 (TL1) is an ASCII based language that supports both command-response and autonomous (NE) message generation. Commonly, TL1 is used over a X.25 packet network but is completely independent of any physical layer protocols. For the MX2800, TL1 is implemented as a TELNET session running over either Ethernet or PPP. Currently, up to eight TL1 TELNET connections can be active at a time.

AVAILABLE OPTIONS

The following optional equipment is available for use with the MX2800. Contact your local distributor or the ADTRAN sales department for more information (see end of manual for phone number).

Breakout Panel (P/N 1200291L1)

The optional breakout panel connects to the MX2800 and provides 28 RJ connectors for the individual T1s/E1s. Shipment includes two six-foot, 64-pin to 64-pin Amp cables which allow direct cabling to the MX2800 (see *Connecting the Breakout Panel* on page 2-5 for more information).

E1 Patch Panel (P/N 1200291L5)

The optional E1 patch panel (see Figure 1-1) connects to the MX2800 and provides 28 pairs of BNC connectors for E1 deployment (21 used for E1 deployment). Shipment includes two six-foot, 64-pin to 64-pin amphenol cables which allow direct cabling to the MX2800 (see *Connecting the E1 Patch Panel* on page 2-6 for more information).

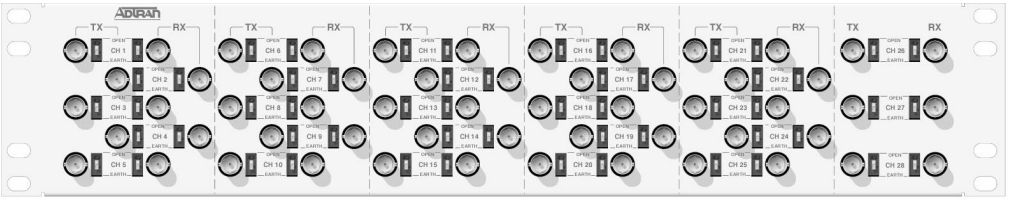


Figure 1-1. E1 Patch Panel

Battery Backup (P/N 4175043L2)

The battery backup system provides power backup in the event of power loss. This system includes the battery, an AC battery charger, and an alarm cable.

Fan Faceplate (P/N 1200466L1)

The MX2800 Fan Faceplate provides the means for additional heat dissipation. This allows multiple units to be stacked directly on top of each other. The fan faceplate replaces the original faceplate, and it is for use with the 1202289L1, 1202289L2, and 1202289L3 power supplies. Figure 1-2 shows how the fan faceplate is installed on the chassis.

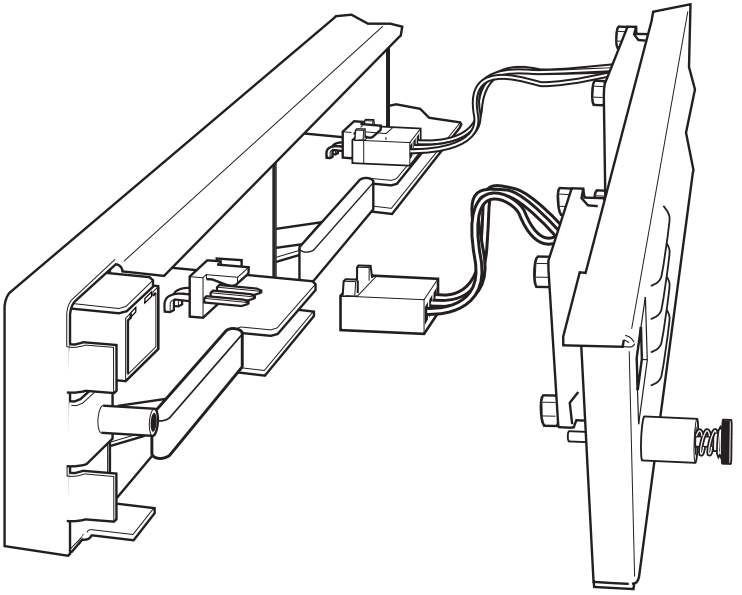


Figure 1-2. Installing Fan Faceplate

Chapter 2 Installation and Operation

UNPACK, INSPECT, POWER UP

Receiving Inspection

Carefully inspect the MX2800 for any damage that might have occurred in shipment. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Technical Support (see the end of this manual for phone numbers). Keep the original shipping container to use for future shipment or verification of damage during shipment.

ADTRAN Shipments Include

The following items are included in ADTRAN shipments of the MX2800.

- MX2800 unit
- DC or AC power supply (two power supplies come with the Redundant versions)
- Controller card (two cards come with the Redundant versions)
- 8-pin to 6-pin modular cable (Modem version only)
- 8-pin to 8-pin modular cable
- 8-pin modular to DB-9 female connector
- Two 4-position terminal lug connectors
- 3-position terminal lug connector
- Six-foot AC power cord (AC Versions only)
- Mounting ears and screws for 19-inch or 23-inch rack installation
- User manual or CD containing the User Manual

The ADTRAN MX2800 MIB is available in the support section of the ADTRAN Web page at ***www.adtran.com****.*

Power Up

The AC version of the MX2800 is provided with a six-foot power cord, terminated by a three-prong plug which connects to a grounded 120 VAC power receptacle.

Power to the AC version of the MX2800 must be provided from a grounded 120 VAC, 60 Hz receptacle.

The DC version of the MX2800 is provided with two 4-position modular terminal lug connectors. These connectors make it easier to perform initial wiring and to connect and disconnect DC power when replacing rackmount units.

It is recommended that a 3 amp fuse be used in the fuse and alarm panel that feeds the MX2800.

For more detailed information on power connections, refer to Chapter 8, *Power Loss Recovery*.

Once the modular connector is wired, push it firmly into one of the rear panel **POWER** connectors. Figure 2-1 and Table 2-1 on page 2-3 illustrate the DC power connector and give definitions for the four connector symbols.

The chassis should be connected to an earth ground using the ground stud located between the AC and DC power sources on the rear panel.

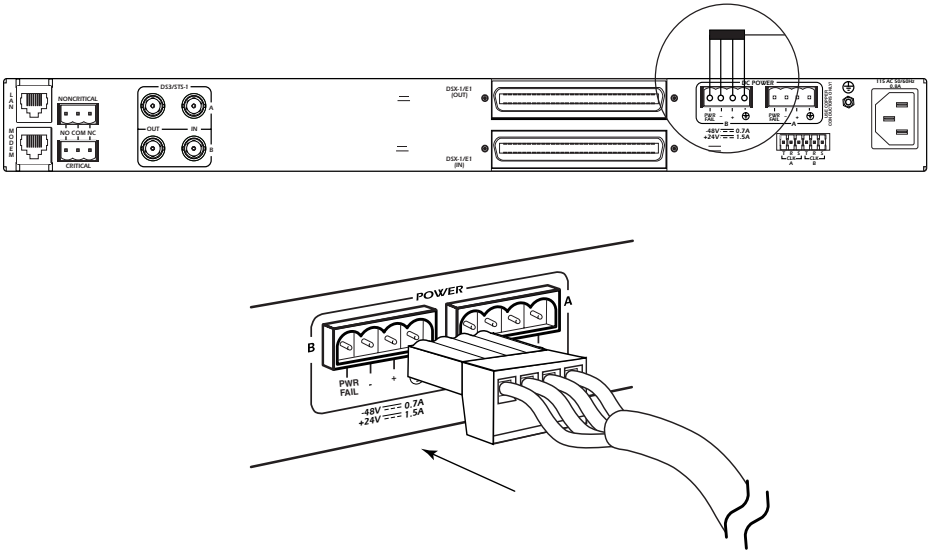


Figure 2-1. DC Power Connector

Table 2-1. DC Connector Symbol Definitions

Symbol	Definition
PWR FAIL	Battery backup connection. If AC fails, a trap is sent to alert user when connected to the 4175043L2 battery backup system or equivalent
-	Negative side of DC power source (usually -48V)
RET	Positive side of DC power source (usually ground)
⏚	Frame Ground

The following UL requirements must be met during installation of the MX2800 DC version:

1. Disconnect all power sources prior to servicing (unit may use multiple power sources).
2. Input: Minimum 48 VDC, 0.8 A
   Minimum 120 VAC, 0.32 A
3. Connect to a reliably grounded -48 VDC source which is electrically isolated from the AC source. (Use 24 VDC source with 1202289L3).
4. The branch circuit overcurrent protection shall be a fuse or circuit breaker rated minimum 48 VDC, maximum 20 A.
5. A readily accessible disconnect device, that is suitably approved and rated, shall be incorporated in the field wiring.
6. The chassis should be connected to an earth ground using the ground stud located between the AC and DC power sources on the rear panel.
7. The unit shall be installed in accordance with the requirements of NEC NFPA 70.
8. The unit shall be installed in accordance with Articles 400 and 364.8 of the National Electrical Code NFPA 70 when installed outside of a Restricted Access Location (i.e. Central Office, behind a locked door, service personnel area only).
9. Care should be taken to not upset the stability of the equipment rack after installation is complete.

Use copper conductors only for DC Power and Ground Connection.

RACKMOUNT INSTALLATION

The MX2800 can be mounted into a standard 19-inch or 23-inch equipment rack. Follow these steps to mount your unit into a rack:

1. Install the mounting flanges on each side of the MX2800 at one of the three available positions.

Be sure to install the flanges with the screws provided.

2. After the flanges have been installed, position the MX2800 at the correct location within the rack and secure the mounting flanges to the mounting rails of the rack.
3. Make all network, DTE, and power connections to the rear of the unit. See *Power Up* on page 2-2 for more information on making the DC power connection.
4. Using the 8-position modular to DB-9 female connector and the 8-position modular to 8-position modular cable, connect a VT100 terminal device to the **CRAFT** port on the front panel of the unit.

Two MX2800s may be stacked with no spacing between units. ADTRAN recommends 1U (1.75") of separation above and below the two stacked units. This spacing allows the unit to dissipate heat. The design of the MX2800 uses the chassis to distribute heat generated by the unit's internal cards. This design allows the unit to operate without a cooling fan, which increases the overall reliability of the unit.

Connecting the Breakout Panel

The optional breakout panel (P / N 1200291L1) connects to the MX2800 via the **IN** and **OUT** Champ connectors located on the back of the unit, and provides 28 RJ connectors for the individual T1s / E1s. Shipment includes two six-foot, 64-pin to 64-pin Amp cables which allow direct cabling to the MX2800. Connect the breakout panel's **IN** Champ connector to the MX2800's **IN** Champ connector

and the breakout panel's **OUT** Champ connector to the MX2800's **OUT** Champ connector (see Figure 2-2).

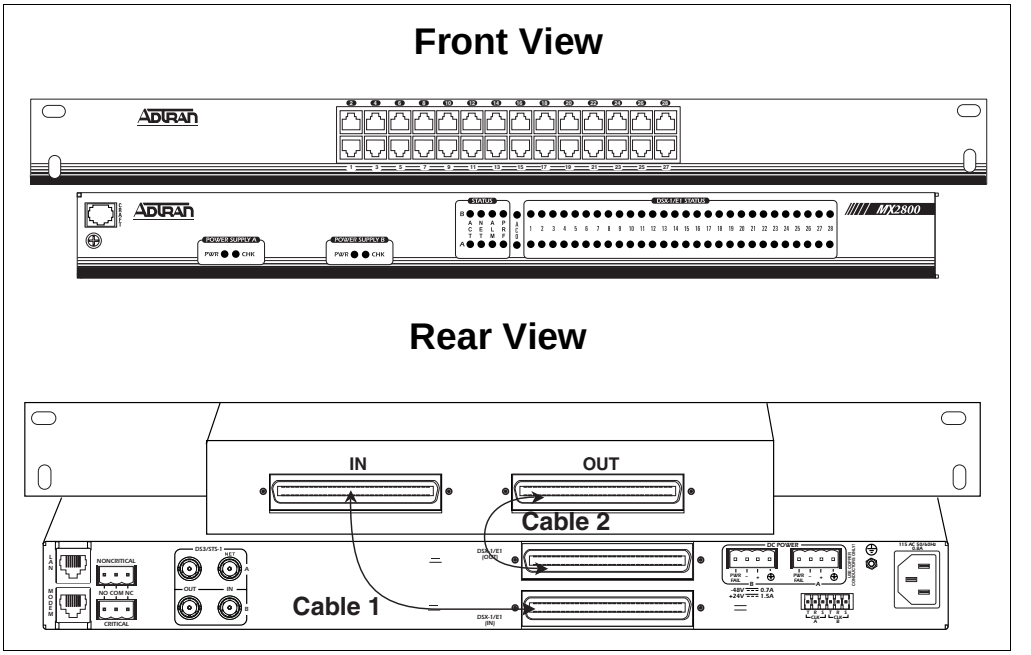


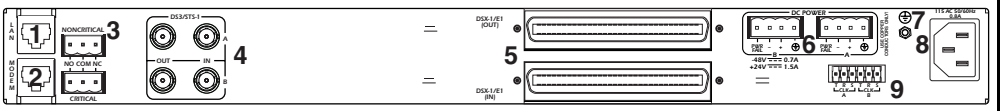
Figure 2-2. The Breakout Panel

Connecting the E1 Patch Panel

The optional E1 patch panel (P / N 1200291L5) connects to the MX2800 via the **TX** and **RX** Champ connectors located on the back of the unit, and provides 28 pairs of BNC connectors for the individual T1 / E1s. Shipment includes two six-foot, 64-pin to 64-pin amphenol cables which allow direct cabling to the MX2800. Connect the E1 patch panel's **TX** Champ connector to the MX2800's **IN** Champ connector and the E1 patch panel's **RX** Champ connector to the MX2800's **OUT** Champ connector.

REAR PANEL

The MX2800 rear panel is equipped with a LAN port, a modem port, two alarm output terminal blocks, an external clock interface, two sets of DS3 in / out jacks, two Amphenol (Amp) connectors, DC / AC power connections, and wire wrap pins for external connection of BITS clock (STS-1). Figure 2-3 illustrates the rear panel and identifies its equipment. Descriptions for these items follow the figure. Pin assignments are given in *Pinouts* on page B-1.



#	Item	Function
1	LAN	10BaseT LAN connection
2	Modem	Telephone line connection for internal V.34 modem (see note on page 2-8)
3	Noncritical/Critical	Connections for external audible/visible alarms
4	DS3/STS-1	T3 service connections for controller cards A and B
5	DSX-1/E1	64-pin Amp connectors for T1/E1s
6	Power	DC power connection
7	⏚	Ground stud
8	115 VAC 50/60Hz	AC power connection
9	BITS Clock	Wire-wrap pins for external connection of BITS clocks

Figure 2-3. MX2800 Rear View

LAN Port

The **LAN** port is an 8-pin modular connector that provides a 10BaseT ethernet LAN interface. This **LAN** interface is used for SNMP and TELNET control.

Connect the LAN port to intra-building wiring only.

Modem Port

The **MODEM** port is an 8-pin modular jack that provides a telephone line (POTS) connection for the internal V.34 modem.

The MX2800 can be configured as a dial-in host and also as a dial-out-on-Trap device (meaning the unit dials out to a specified host to report error conditions).

Information regarding the built-in modem applies to the following list of numbers: 4202290L1, L2, L3, and L4.

Noncritical and Critical Alarm Connectors

The alarm connectors connect to the three contacts of a Form C type relay on the main board of the MX2800. This relay is activated any time the MX2800 detects an alarm condition on the T3 network interface. Both **NC** (normally closed) and **NO** (normally open) contacts are provided.

Connect alarms to one of the three-position modular terminal lug connectors (provided). These connectors make it easier to perform initial wiring and to connect and disconnect alarms when replacing rackmount units. Once a modular connector is wired, push it firmly into the rear panel **NONCRITICAL** or **CRITICAL** connector.

The alarm functions can be enabled or disabled through the **ALARM RELAYS** section of the **CONFIGURATION** menu (see the section *Alarm Relays* on page 3-18).

DSX-3 Interfaces

The DSX-3 network interfaces are full-duplex circuits provided by four BNC coaxial cable connections (two for each controller card). The receive data from the network is connected to the RX (**IN**) connectors, while the transmit data from the MX2800 is connected to the TX (**OUT**) connectors.

DSX-3 interfaces must be connected using coaxial cables that have the shields grounded at both ends.

DSX-1/E1 Interfaces

The DSX-1/E1 interfaces are 64-pin Amp connectors. These interfaces provide Tx and Rx connections between the unit and equipment such as wire-wrap patch panels, punch-down panels, or breakout panels.

Connect the DSX-1/E1 interfaces to intra-building wiring only.

Power Connection

The DC and AC power connections are described earlier in this chapter on page 2-2.

FRONT PANEL

The MX2800 faceplate is shown in Figure 2-4. Descriptions of each part of the front panel follow.

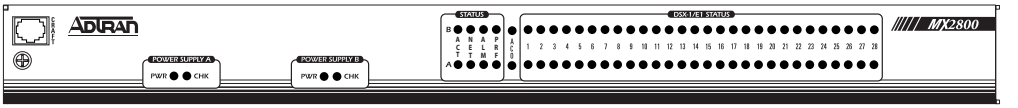


Figure 2-4. MX2800 Front Panel

Craft Port

The **CRAFT** port, an 8-pin modular jack, provides connection to a VT100 EIA-232 compatible interface (using the supplied 8-pin modular to DB-9 female connector and the 8-pin to 8-pin modular cable).

Establishing Terminal Connection

> NOTE
>
> *A Telnet menu session has priority over a terminal menu session through the craft port. If a terminal menu session is active when a Telnet menu session is initiated, the terminal menu session will be disabled while the Telnet menu session is active.*

To connect the MX2800 to a VT100 terminal, follow this procedure:

1. Configure the VT100 terminal for 9600, 19200, 38400, or 57600 baud, 8-bit characters, no parity, and one stop bit (*xxxx*, 8N1).
2. Using the ADTRAN-provided terminal interface cable adapter, connect the DTE port of a terminal to the 8-pin modular jack labeled **CRAFT** on the MX2800 front panel.
3. Initialize the terminal session.
4. Press **Enter** repeatedly until the username prompt appears.
5. Enter the username. The factory default username is **adtran**. The password prompt appears. See Figure 2-5.
6. Enter the password. The factory default password is **adtran**. The **MAIN** menu appears. See Figure 2-5.
7. Make selections by entering the number corresponding to the chosen parameter. Press **ESC** on the keyboard to return to the previous screen. End a terminal session by selecting **LOGOUT** from the **MAIN** menu or by pressing **Ctrl-C** at any time.

> NOTE
>
> *A new Telnet session may take priority over an existing one if a username and password are provided that have ADMIN privileges.*

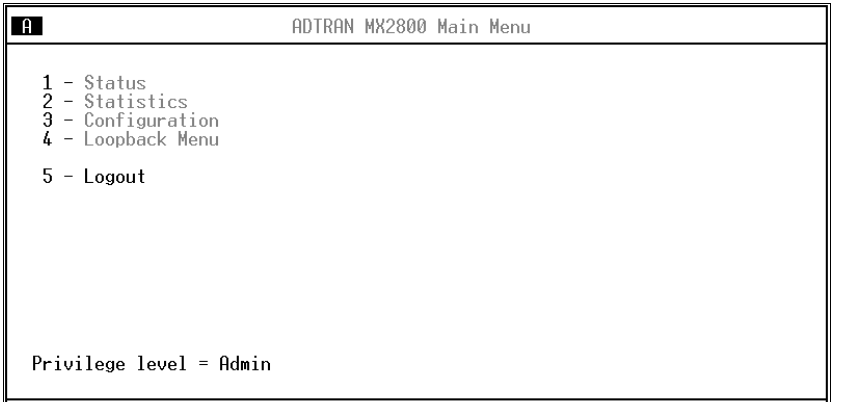


Figure 2-5. Terminal Main Menu

NOTE

The letter displayed in the upper left-hand corner of the terminal menu indicates which controller card is active (A or B).

Navigating Within the Menus

Navigate within the MX2800 terminal menus using the following procedures:

If you want to...	Press...
select an item	the number corresponding to your choice, and then press the **Enter** key
scroll left and right within the same screen	the left and right arrow keys. Additional screens are available when **<** or **>** is displayed in the top portion of the menu
return to the previous menu	the **ESC** key
end the terminal session	**Ctrl-C**
refresh the display	**Ctrl-R**
scroll up and down within the same screen	the up and down arrow keys. Additional screens are available when ∧ or ∨ is displayed in the top portion of the menu.

The MX2800 **MAIN** menu consists of the following sections:

Status
Provides information on the current state of the DS3, power supplies, system, DS2s, and T1/E1 lines. See the chapter *Status* on page 4-1 for more detailed information.

Statistics
Provides detailed statistical information (both current and historical) for the DS3, DS2s, and T1/E1 lines. See the chapter *Statistics* on page 5-1 for more detailed information.

Configuration
Sets DS3 network, T1/E1, and system management parameters. See the chapter *Configuration* on page 3-1 for more detailed information.

Loopbacks
Performs loopback tests over the DS3, DS2s, or T1/E1 lines. See the chapter *Loopbacks* on page 6-1 for more detailed information.

Logout
The **LOGOUT** selection ends the terminal session and logs out of the system. A valid username and password are required before a new session can begin. The unit will also log out of a terminal session automatically if the session remains inactive for a certain period of time. For more information, see the section *Terminal Timeout* on page 3-31.

Privilege Level
The privilege level of the currently active terminal session is displayed in this field.

ACO Buttons

The **ACO** (alarm cut off) buttons allow you to turn off an active audible alarm. The buttons are recessed, so you must use a pen or other pointed instrument to press them. Once you have used an **ACO** button to deactivate an alarm, it remains disabled until the condition has cleared.

Alarms can also be turned off remotely by using a selection found in the **STATUS** menu. See the section *Acknowledge Alarms (ACO)* on page 4-8 for more information.

LED Descriptions

The MX2800 has LED status indicators for the power supplies, the DS3 state, the controller cards, and the individual T1s/E1s. These LEDs are identified as follows:

Power Supply A/B

The **PWR** LED is active when the unit is on and receiving full power. The **CHK** LED is active when the power supply is failing or is providing low power and needs to be checked.

Status LEDs

The **STATUS** LEDs apply to the two controller cards. The LEDs provided are **ACT** (active), **DS3**, **ALM** (alarm), and **PRF** (performance). Different conditions are indicated by the state of the LED (it remains solid, blinks, or alternates colors). The condition descriptions vary depending on whether the LED represents the active controller card or the controller card on standby. The following tables provide LED definitions for the active cards (see Table 2-2) and T1/E1 cards (see Table 2-3).

Table 2-2. LED Conditions for Active Cards

	LED State	Card Condition
ACT	green solid	Normal (All OK)
	green/amber alternating	Normal + Console Open
	red solid	Self Test Failed
	amber solid	Software Update in Progress
	red/amber alternating	Self Test Failed + Console Open
	red blinking	Card Failure

Table 2-2. LED Conditions for Active Cards (Continued)

	LED State	Card Condition
NET	green solid	Normal (All OK)
	red blinking	LOS
	red solid	AIS, LOF, RAI, Idle Alarms
	amber solid	In Test (Local)
	amber blinking	In Test (Remote)
	red/amber alternating	In Test + Alarms
ALM	green solid	Normal (No Alarm)
	red blinking	Critical Alarm
	red solid	Non-Critical Alarm
	amber blinking	Critical Alarm Suppressed (**ACO** button was pushed)
	amber solid	Non-Critical Alarm Suppressed (**ACO** button was pushed)
PRF	green solid	Normal (All OK)
	red flash (once per event)	Single/Burst CV
	red blinking	Continuous Code Violations
	red solid	XCV Threshold Exceeded (see *XCV Threshold* on page 3-5)

The PRF (performance) LED refers to the DS3 only.

Table 2-3. LED Conditions for Standby Cards

	LED State	Card Condition
ACT	green blinking	Normal (All OK)
	amber solid	Software Update in Progress
	red blinking	Self Test Failed
NET	off	Normal (All OK)
	red blinking	DS3 Failure
ALM	off	Normal (No Alarm)
PRF	off	Normal (All OK)

T1/E1 Status LEDs

These LEDs apply to each individual T1 or E1. Different conditions are indicated by the state of the LED (its color and whether it flashes, alternates color, or is on solid). The condition descriptions vary depending on whether the LEDs represent T1s or E1s of the active controller card or the controller card on standby. Table 2-4 provides LED definitions for the active and standby cards.

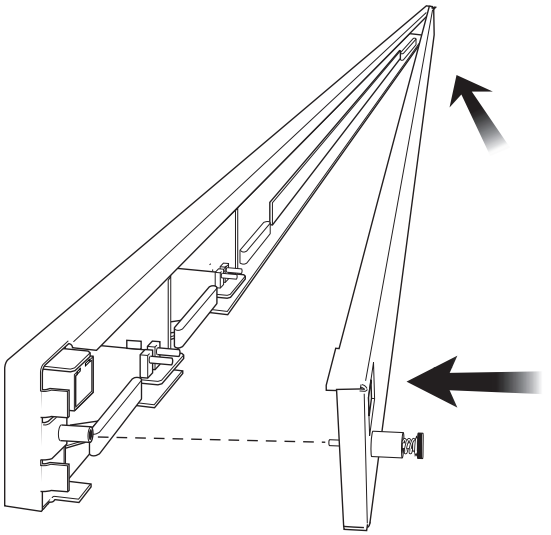
Table 2-4. T1/E1 LED Conditions

	LED State	T1/E1 Condition
Active Card	green solid	Normal (All OK)
	off	Disabled
	red blinking	LOS
	red flash (once per event)	Single/Burst CV
	red solid	XCV Threshold Exceeded (see *XCV Threshold* on page 3-12) or AIS
	amber solid	In Test (Local)
	green/amber alternating	In Test (Remote)
	red/amber alternating	In Test + Alarm
Standby Card	off	Normal (All OK) *or* N/A (in the case of E1 configuration)
	red blinking	T1/E1 Failure

Replacing or Installing Cards

The MX2800 is designed with hot-swappable controller cards and power supplies. Should you need to replace or install a controller card or power supply, you will need to remove the front cover of the MX2800 with a phillip's head screwdriver. Once the front of the MX2800 has been removed, the power supply and controller card slots will be visible. The two power supplies are located at the left of the chassis and the controller cards are stacked on the right side of the chassis. To remove a card, use the locking lever(s) for the card you are removing to pull the backplane connector away from the backplane. Once, the backplane connector has disconnected, carefully pull the card straight out of the chassis. To replace or install a card, simply line up the card with the guide grooves and carefully insert the card into the chassis until the backplane connector reaches the backplane. Finally, use the locking levers to seat the card all the way into the slot of the chassis. Once all cards have been replaced or installed, replace the front cover of the MX2800. Figure 2-6 shows how to remove and replace the front cover.

Figure 2-6. Replacing or Installing Cards



Chapter 3 Configuration

To configure the MX2800, use a 10BaseT ethernet connection, a SLIP / PPP modem port, or a VT100 terminal. Figure 3-1 shows the main configuration terminal menu, and Figure 3-2 on page 3-2 shows the **CONFIGURATION** menu tree.

A Telnet menu session has priority over a terminal menu session through the craft port. If a terminal menu session is active when a Telnet menu session is initiated, the terminal menu session will be disabled while the Telnet menu session is active.

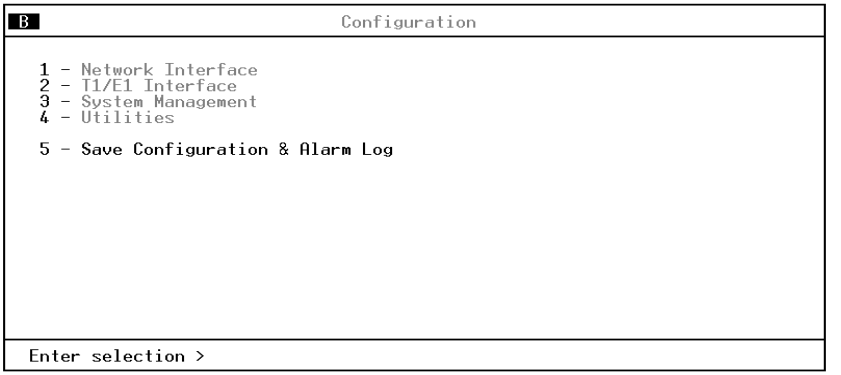


Figure 3-1. Configuration Main Menu

Detailed descriptions of the menu selections are given in the following sections which are divided by the five submenus: **NETWORK INTERFACE** (page 3-3), **T1/E1 INTERFACE** (page 3-7), **SYSTEM MANAGEMENT** (page 3-13), **UTILITIES** (page 3-35), and **SAVE CONFIGURATION & ALARM LOG** (page 3-41).

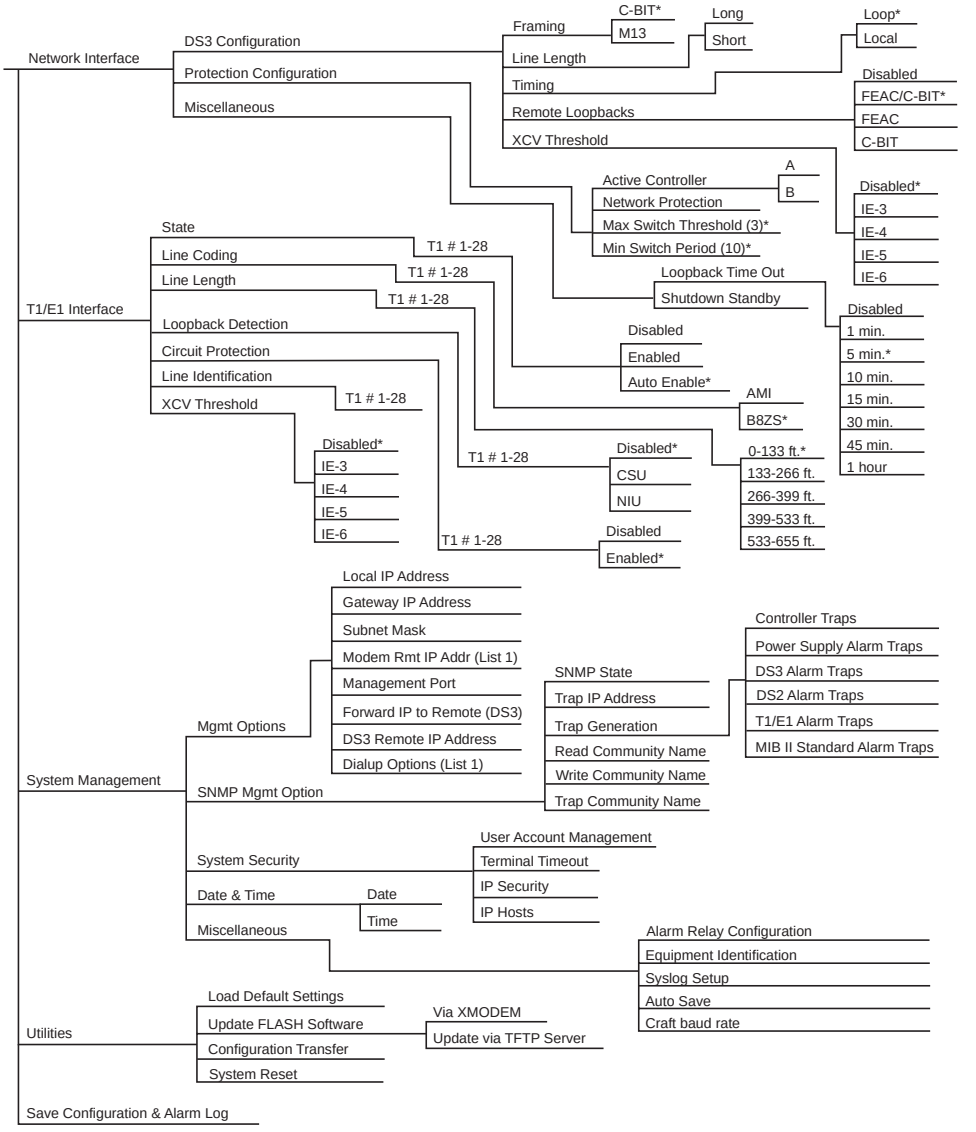


Figure 3-2. Configuration Menu Tree

NETWORK INTERFACE

Select **NETWORK INTERFACE** to access the network configuration parameters (see Figure 3-3). Configure the MX2800 network settings to match the DS3 signal received from the service provider.

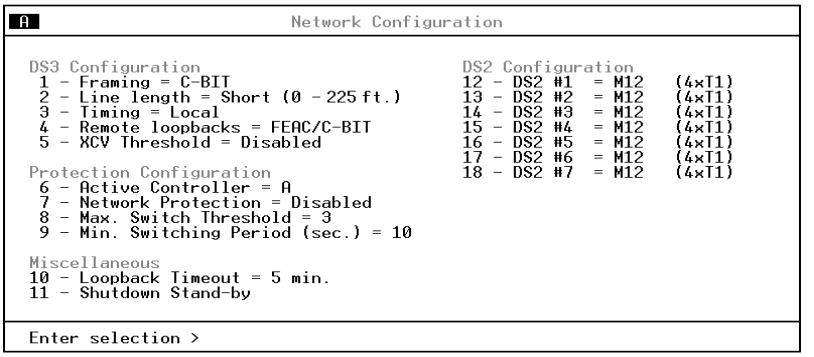


Figure 3-3. Network Configuration Menu

DS3 Configuration

Use the **DS3 CONFIGURATION** selections to configure the DS3 network settings to match your application. Descriptions of these settings follow:

Framing

Set the framing format to match the format of the receive signal at the network interface. The MX2800 supports **C-BIT** and **M13** framing formats.

M13 may not be selected when IP Forwarding is Active.

Line Length

Set the line length to reflect the physical length of the DS3 network line. Set to **LONG** if the cabling distance exceeds 225 feet; set to **SHORT** if the distance is less than 225 feet.

First and second generation DS3 controller cards (P/N 1200288Lx and P/N 1202288Lx) will use **LONG** *for cabling distances exceeding 50 feet and* **SHORT** *for cabling distances less than 50 feet.*

Timing

When the MX2800 is connected to a network that provides timing, configure the MX2800 for **LOOP** timing to derive timing from the network. If the MX2800 is the master timing source for the circuit, configure the MX2800 to **LOCAL**. In applications where two MX2800s are connected back-to-back with an un-channelized DS3, configure one MX2800 to **LOOP** and one MX2800 to **LOCAL**.

Remote Loopbacks

Select **FEAC/C-BIT** to allow the MX2800 to respond to remote loopback requests received over either the DS3 Far End Alarm and Control (FEAC) channel and / or DS2-level C bits. This mode is valid in both C-BIT or M13 framing formats. Select **FEAC** to allow the MX2800 to respond only to remote loopback requests received over the DS3 FEAC channel. This mode is only valid when using C-BIT framing. In this mode, DS2 C bit loopbacks will be ignored. Select **C-BIT** to allow the MX2800 to respond only to remote loopback requests received over DS2 C bits. This mode is available when operating in either C-BIT or M13 framing. In this mode, FEAC loopbacks received when operating in C-BIT framing will be ignored. Select **DISABLED** to ignore all out-of-band loopback requests (FEAC and DS2 C-BIT). When **DISABLED** is selected, the MX2800 will still respond to individual T1 inband CSU / NIU loopbacks if so configured in the T1 / E1 Loopback Detection menu.

FEAC/C-BIT *may be chosen via menus in either C-BIT or M13 framing modes, however there is no FEAC channel when framing is set to M13. Therefore, no DS3 far end alarms or loopback requests via the FEAC will be valid when the MX2800 is configured for M13.*

XCV Threshold

The **XCV** (excessive code violations) **THRESHOLD** sets a limit on CVs accepted by the unit before it switches controller cards. If set to **DISABLED**, code violations will not cause the unit to switch controller cards. The threshold limits are described in the following chart:

Setting	The unit switches controller cards if...
$1E^{-3}$	more than one out of every 1,000 bits received on the DS3 contains a code violation.
$1E^{-4}$	more than one out of every 10,000 bits received on the DS3 contains a code violation.
$1E^{-5}$	more than one out of every 100,000 bits received on the DS3 contains a code violation.
$1E^{-6}$	more than one out of every 1,000,000 bits received on the DS3 contains a code violation.

Protection Configuration

The MX2800 houses two controller cards for 1:1 protection against hardware failure. The two cards can also provide network protection, supporting two T3 circuits simultaneously. The selections in this menu allow you to customize the unit's protection setup:

Active Controller

This field displays **A** or **B**, indicating the active controller card. This setting can be used to force the controller cards to switch. For example, if controller card **A** is active and you select **B**, a switch-over occurs immediately.

Network Protection

Enable or disable the unit's ability to automatically route information to the backup T3 in the event of a primary T3 failure. With **NETWORK PROTECTION** set to **ENABLED**, all information is automatically routed to the backup T3 in the event that the primary

T3 fails. When **NETWORK PROTECTION** is set to **DISABLED**, the stand-by controller will be used to protect against failures of the circuitry on the active controller.

When choosing a setting for **NETWORK PROTECTION**, *there are many cabling and network provisioning issues to consider. Refer to the chapter Circuit and Network Redundancy on page 7-1 for configuration examples of the different modes of protection.*

Max. Switch Threshold

The value entered in this field determines the number of times per hour the unit is allowed to switch between controller cards. If, in an hour, the cards switch more than the **MAX SWITCH THRESHOLD**, the unit issues a trap (see page 3-22) and stops switching cards for the next 24 hours. The default setting is **3** times an hour. This count may be cleared by clearing **PROTECTION SWITCH** alarm counts (see page 5-12).

Min. Switching Period

After the unit switches controller cards, the number of seconds entered in this field must pass before another card switch will be allowed. The default setting is **10** seconds.

Miscellaneous

Loopback Timeout

Sets the loopback timeout to **DISABLED**, **1 MIN.**, **5 MIN.**, **10 MIN.**, **15 MIN.**, **30 MIN.**, **45 MIN.** or **1 HR.**

DS2 Configuration

The MX2800 can individually frame each of the seven DS2 streams in M12 (four T1s) or G.747 (three E1s) format. When set to **M12 (4xT1)**, the four T1s for the selected group are framed per ANSI T1.107. When set to **G.747 (3xE1)**, the first three T1/E1 ports of the selected group are framed per CCITT G.747 into the DS3 stream. The fourth T1/E1 port of the selected group is not available in this mode. Any combination of **M12 (4xT1)** and **G.747 (3xE1)** is allowed.

T1/E1 INTERFACE

The **T1/E1 INTERFACE** menu (shown in Figure 3-4 on page 3-7) allows you to activate / deactivate individual T1s and E1s and to set their line coding, length, loopback detection, circuit protection, and line ID string. The T1 / E1 code violation threshold is also configured through this menu. Configuration selections are described in the sections following Figure 3-4.

A DS2 can be divided into either three E1s or four T1s. Therefore, when dealing with an E1 configuration, some of the fields in the **T1/E1 INTERFACE** *menus do not apply (and therefore display* **N/A***).*

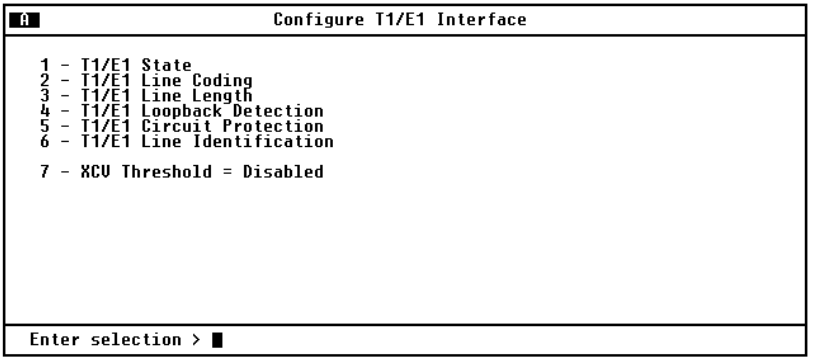


Figure 3-4. T1/E1 Interface Menu

T1/E1 State

Set T1 / E1 lines to **DISABLED, ENABLED, OR AUTO ENABLE.** In Auto Enable, the unit automatically detects when a T1 / E1 is connected and enables that T1 / E1 line. (See Figure 3-5).

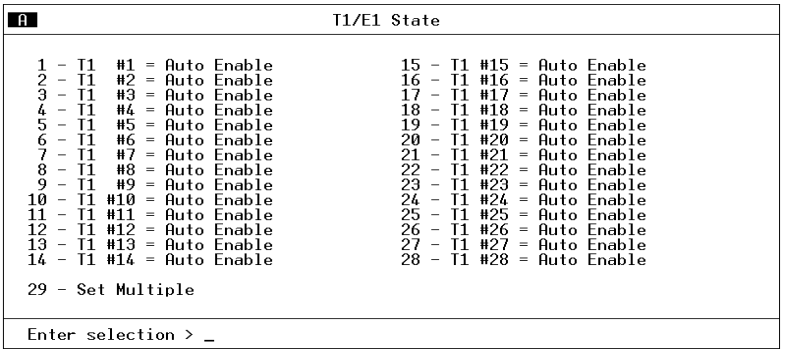


Figure 3-5. T1/E1 State Menu

Set Multiple

Use **SET MULTIPLE** (see Figure 3-6 on page 3-8) to enable or disable a contiguous group or all of the T1/E1s at one time. To enable or disable all T1/E1s, set **FIRST** to **1** and **LAST** to **28**. Enter **APPLY SETTINGS** before leaving the menu. To enable or disable only some of the T1/E1s, set **FIRST** and **LAST** to correspond to the lines you want to enable or disable. Enter **APPLY SETTINGS**. You can now either leave the menu or continue to enter new **FIRST** and **LAST** numbers for other lines. Remember to apply the settings following each change.

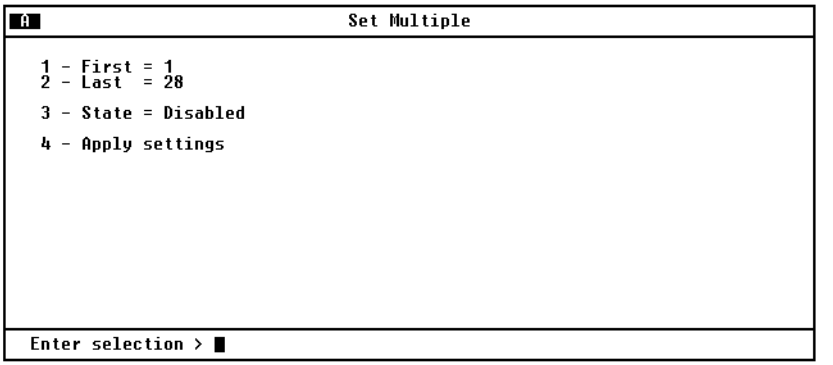


Figure 3-6. Set Multiple Menu

T1/E1 Line Coding

Set the line code for each individual T1/E1 interface to match the connected device (see Figure 3-7). The choices available for T1 are **AMI** and **B8ZS**. The choices available for E1 are **AMI** and **HDB3**. Select **SET MULTIPLE** to set a contiguous group or all of the T1s (or E1s) to the same value at the same time. See *Set Multiple* on page 3-8 for a description of the **SET MULTIPLE** option, entering the line code for each line.

```
A                          T1/E1 Line Coding

  1 - T1  #1 = B8ZS              15 - T1 #15 = B8ZS
  2 - T1  #2 = B8ZS              16 - T1 #16 = B8ZS
  3 - T1  #3 = B8ZS              17 - T1 #17 = B8ZS
  4 - T1  #4 = B8ZS              18 - T1 #18 = B8ZS
  5 - T1  #5 = B8ZS              19 - T1 #19 = B8ZS
  6 - T1  #6 = B8ZS              20 - T1 #20 = B8ZS
  7 - T1  #7 = B8ZS              21 - T1 #21 = B8ZS
  8 - T1  #8 = B8ZS              22 - T1 #22 = B8ZS
  9 - T1  #9 = B8ZS              23 - T1 #23 = B8ZS
 10 - T1 #10 = B8ZS              24 - T1 #24 = B8ZS
 11 - T1 #11 = B8ZS              25 - T1 #25 = B8ZS
 12 - T1 #12 = B8ZS              26 - T1 #26 = B8ZS
 13 - T1 #13 = B8ZS              27 - T1 #27 = B8ZS
 14 - T1 #14 = B8ZS              28 - T1 #28 = B8ZS

 29 - Set Multiple

Enter selection >
```

Figure 3-7. T1/E1 Line Coding Menu

T1/E1 Line Length

Set the line length for each T1 interface according to the distance from the MX2800 to your DTE device (see Figure 3-8). The E1 **LINE LENGTH** is not selectable and remains at **0-6 dB** loss. Select **SET MULTIPLE** to configure the line length for a contiguous group or all of the T1s to the same length at the same time. See *Set Multiple* on page 3-8 for a description of the **SET MULTIPLE** option, entering the line length for each line.

```
A                              T1/E1 Line Length

 1 - T1  #1 = 0-133 ft.              15 - T1 #15 = 0-133 ft.
 2 - T1  #2 = 0-133 ft.              16 - T1 #16 = 0-133 ft.
 3 - T1  #3 = 0-133 ft.              17 - T1 #17 = 0-133 ft.
 4 - T1  #4 = 0-133 ft.              18 - T1 #18 = 0-133 ft.
 5 - T1  #5 = 0-133 ft.              19 - T1 #19 = 0-133 ft.
 6 - T1  #6 = 0-133 ft.              20 - T1 #20 = 0-133 ft.
 7 - T1  #7 = 0-133 ft.              21 - T1 #21 = 0-133 ft.
 8 - T1  #8 = 0-133 ft.              22 - T1 #22 = 0-133 ft.
 9 - T1  #9 = 0-133 ft.              23 - T1 #23 = 0-133 ft.
10 - T1 #10 = 0-133 ft.              24 - T1 #24 = 0-133 ft.
11 - T1 #11 = 0-133 ft.              25 - T1 #25 = 0-133 ft.
12 - T1 #12 = 0-133 ft.              26 - T1 #26 = 0-133 ft.
13 - T1 #13 = 0-133 ft.              27 - T1 #27 = 0-133 ft.
14 - T1 #14 = 0-133 ft.              28 - T1 #28 = 0-133 ft.

29 - Set Multiple

Enter selection >
```

Figure 3-8. T1/E1 Line Length Menu

T1/E1 Loopback Detection

Choose which T1/E1 lines will respond to CSU or NIU loopback requests coming from the network (see Figure 3-9 on page 3-10). Set to **CSU** or **NIU** if you want the T1/E1 to respond to that type of request. Set to **DISABLE** if you want the T1/E1 to ignore the request. Select **SET MULTIPLE** to set a contiguous group or all of the T1/E1s to the same value at the same time. See *Set Multiple* on page 3-8 for a description of the **SET MULTIPLE** option, entering either **DISABLED**, **CSU**, or **NIU**. Not available in E1 mode.

```
A                          T1/E1 Loopback Detection

 1 - T1  #1 = CSU                    15 - T1 #15 = CSU
 2 - T1  #2 = CSU                    16 - T1 #16 = CSU
 3 - T1  #3 = CSU                    17 - T1 #17 = CSU
 4 - T1  #4 = CSU                    18 - T1 #18 = CSU
 5 - T1  #5 = CSU                    19 - T1 #19 = CSU
 6 - T1  #6 = CSU                    20 - T1 #20 = CSU
 7 - T1  #7 = CSU                    21 - T1 #21 = CSU
 8 - T1  #8 = CSU                    22 - T1 #22 = CSU
 9 - T1  #9 = CSU                    23 - T1 #23 = CSU
10 - T1 #10 = CSU                    24 - T1 #24 = CSU
11 - T1 #11 = CSU                    25 - T1 #25 = CSU
12 - T1 #12 = CSU                    26 - T1 #26 = CSU
13 - T1 #13 = CSU                    27 - T1 #27 = CSU
14 - T1 #14 = CSU                    28 - T1 #28 = CSU

29 - Set Multiple

Enter selection > _
```

Figure 3-9. Loopback Detection Menu

T1/E1 Circuit Protection

T1/E1 Circuit Protection determines which circuit will be allowed to initiate a protection switch if a failure in the circuitry for that channel is detected (see Figure 3-10 on page 3-11). If a T1/E1 is set to **DISABLED**, then the failure of the circuitry of that one channel will not cause a protection switch. If set to **ENABLED**, then the failure of a channel *could* cause a protection switch to occur (depending on the **PROTECTION THRESHOLD** setting in this menu).

The **PROTECTION THRESHOLD** setting determines how many of the **ENABLED** lines must fail before a card switch occurs. If you want the failure of a single protected (enabled) line to cause a card switch, set the **PROTECTION THRESHOLD** to **1**. Choices include **1** through **28**.

Select **SET MULTIPLE** to set a contiguous group or all of the T1/E1s to the same value at the same time. See *Set Multiple* on page 3-8 for a description of the **SET MULTIPLE** selection, entering **ENABLED** or **DISABLED**.

```
A                          T1/E1 Circuit Protection

  1 - T1  #1 = Enabled                15 - T1 #15 = Enabled
  2 - T1  #2 = Enabled                16 - T1 #16 = Enabled
  3 - T1  #3 = Enabled                17 - T1 #17 = Enabled
  4 - T1  #4 = Enabled                18 - T1 #18 = Enabled
  5 - T1  #5 = Enabled                19 - T1 #19 = Enabled
  6 - T1  #6 = Enabled                20 - T1 #20 = Enabled
  7 - T1  #7 = Enabled                21 - T1 #21 = Enabled
  8 - T1  #8 = Enabled                22 - T1 #22 = Enabled
  9 - T1  #9 = Enabled                23 - T1 #23 = Enabled
 10 - T1 #10 = Enabled                24 - T1 #24 = Enabled
 11 - T1 #11 = Enabled                25 - T1 #25 = Enabled
 12 - T1 #12 = Enabled                26 - T1 #26 = Enabled
 13 - T1 #13 = Enabled                27 - T1 #27 = Enabled
 14 - T1 #14 = Enabled                28 - T1 #28 = Enabled

 29 - Set Multiple                    30 - Protection Threshold (1-28) = 1

 Enter selection >
```

Figure 3-10. Circuit Protection Menu

T1/E1 Line Identification

Enter user-configurable text strings to name the individual T1/E1 lines (see Figure 3-11). This field will accept up to 18 alpha-numeric characters, including spaces and special characters (such as an underbar).

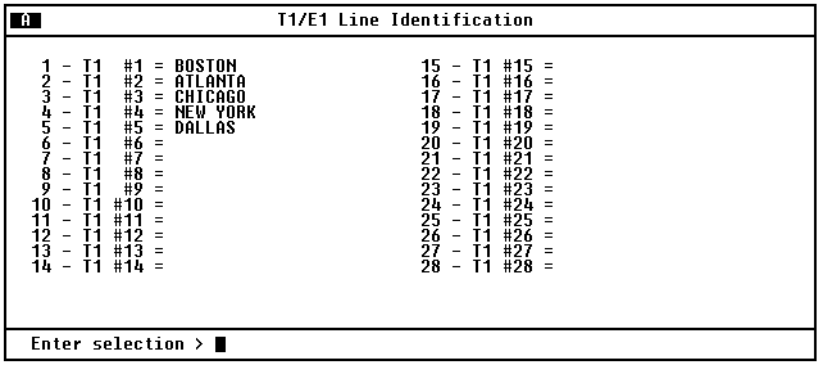


Figure 3-11. Line Identification Menu

XCV Threshold

Set a limit on code violations (CVs) accepted by the unit over an individual T1/E1 line before it switches controller cards. If set to **DISABLED**, code violations will not cause the unit to switch controller cards. The threshold limits are described in the following chart:

Setting	The unit switches controller cards if...
$1E^{-3}$	more than one out of every 1,000 bits received on a T1/E1 line contains a code violation.
$1E^{-4}$	more than one out of every 10,000 bits received on a T1/E1 line contains a code violation.
$1E^{-5}$	more than one out of every 100,000 bits received on a T1/E1 line contains a code violation.
$1E^{-6}$	more than one out of every 1,000,000 bits received on a T1/E1 line contains a code violation.

SYSTEM MANAGEMENT

Configure the MX2800 for management through SNMP, TELNET, or a VT100 interface (see Figure 3-12). Embedded SNMP and TELNET are available via a SLIP / PPP modem port or 10BaseT ethernet interface. This menu also includes options used to customize your unit's alarm and trap generation, security setup, and equipment identification.

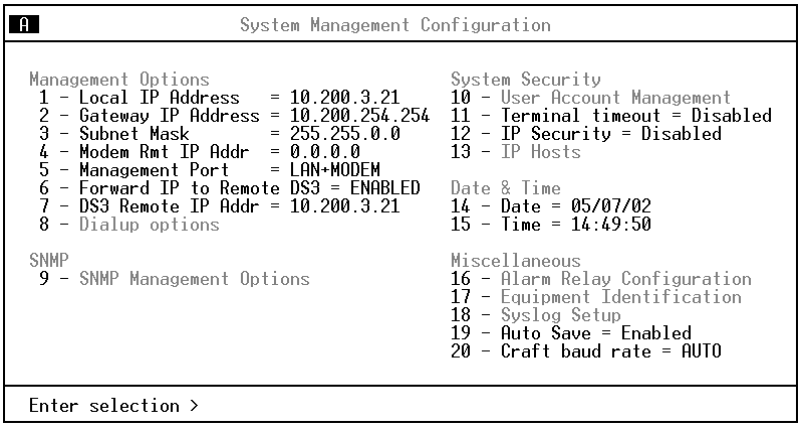


Figure 3-12. System Management Configuration Menu

WARNING

Configuration changes to **LOCAL IP ADDRESS**, **GATEWAY IP ADDRESS**, **SUBNET MASK**, **MANAGEMENT PORT**, **MODEM MODE**, **MODEM BAUD RATE**, *and* **IP HOSTS** *will not be implemented unless all TELNET sessions are closed. Changes made while TELNET sessions are active will invoke a warning message on the console*

NOTE

If the unit is not equipped with an internal modem, **DIALUP OPTIONS** *will not be available.*

Management Options

Local IP Address

Enter the MX2800 IP address. This IP address applies to the LAN or modem port (when configured for PPP or SLIP). This address is available from your network administrator.

Gateway IP Address

Enter the gateway IP address of the MX2800. This address is necessary only if the MX2800 and the network manager are connected through a gateway node. If an IP packet is to be sent to a different network, the unit sends it to the gateway.

Subnet Mask

Enter the subnet mask of the MX2800. This address is available from your network administrator.

Modem Remote IP Address

Enter the IP address of a server that accesses the MX2800 via a modem over PPP or SLIP. This option is available only if the Management Port is set to "LAN + MODEM" or "DS3 + MODEM".

Management Port

Assign the management port as either LAN, Modem, LAN+Modem, DS3, or DS3+Modem. The Modem setting applies only to units equipped with an internal modem.

Forward IP to Remote DS3

Enable or Disable the IP forwarding feature that allows IP access to a remote MX2800 across the DS3 channel. With this feature, the "far-end" MX2800 appears as if it is on the same LAN as the "near-end" MX2800 to which it is connected. To access any IP related feature on the far-end unit, simply address packets to the IP address of the far-end unit.

If the near-end and far-end MX2800s are currently on the same LAN, it is important to configure the far-end MX2800 **MANAGEMENT PORT** *option for "DS3" or "DS3 + MODEM" before enabling* **FORWARD IP TO REMOTE DS3** *on the near-end unit. This will prevent multiple MAC addresses being associated with the same IP address in your networks ARP tables.*

The DS3 must be up and running error-free and using C-Bit framing (this feature will not work with M13 framing). The **MANAGEMENT PORT** *option for the near-end unit (one connected to the Ethernet LAN) must be set to either "LAN" or "LAN + MODEM". A valid* **IP ADDRESS**, **SUBNET MASK**, *and* **DEFAULT GATEWAY** *must be entered for the near-end unit.*

DS3 Remote IP Address

If **FORWARD IP TO REMOTE DS3** is Enabled, set the **DS3 REMOTE IP ADDRESS** to a valid IP address on the same subnet as the near-end unit. All packets that are sent to this IP address will be forwarded across the DS3 channel to the far-end unit.

The **IP ADDRESS** *of the remote unit must be the same as the one that is entered for the* **DS3 REMOTE IP ADDRESS** *in the near-end unit's menus. The* **MANAGEMENT PORT** *option for the far-end unit must also be set to "DS3" or "DS3+MODEM" to be managed remotely over the DS3. The* **SUBNET MASK** *and* **DEFAULT GATEWAY** *do not need to be set in the far-end unit's menus. The* **DS3 REMOTE IP ADDRESS** *must be on the same subnet as the* **LOCAL IP ADDRESS**.

Dialup Options

Configure the dialup capabilities of the MX2800 (see Figure 3-13). These options apply only to units equipped with an internal modem.

```
A                          Dialup Options

  1 - Primary Phone Number =                  Last Modem Response = OK
  2 - Secondary Phone Number =
  3 - Init String = ATZ
  4 - Dial String = ATDT

  5 - Maximum redial attempts = 10
  6 - Idle timeout = 10
  7 - Connection timeout (> 20 sec) = 60
  8 - Pause between calls = 3

  9 - Dialout on trap = Disabled
 10 - Answer on ring = Enabled
 11 - Modem Mode = VT-100
 12 - Modem Baud Rate = 38400
 13 - Hangup


 Enter selection >
```

Figure 3-13. Dialup Options Menu

Primary and Secondary Phone Numbers

When the MX2800 dials out to send a trap, it first dials the **PRIMARY PHONE NUMBER**. If the call is unsuccessful, it tries the **SECONDARY PHONE NUMBER**. Attempts between the two numbers continue until

a call is established and the trap is reported (or until each number's maximum for redial attempts is reached; see *Maximum Redial Attempts* below).

Initializing String

The AT command entered in this field is used to initialize the modem. Normally, this field should be left at the default setting (ATZ).

Dial String

The AT command entered in this field causes the modem to dial out. Normally, this field should be left at the default setting (ATDT).

Maximum Redial Attempts

The MX2800 attempts to establish a call the number of times entered in this field. If a successful call is not established after the final attempt, the MX2800 discards the trap messages.

Idle Timeout

After establishing a call and sending trap messages, the MX2800 remains online for the amount of seconds entered in this field. If the field is set to 0, the unit hangs up as soon as the trap is sent.

Connection Timeout

The MX2800 waits for a connection the amount of seconds entered in this field. Timing begins as soon as the dial command is issued. This field must be set for greater than 20 seconds.

Pause Between Calls

The MX2800 waits between redial attempts the number of seconds entered in this field.

Dialout On Trap

Enable or disable the MX2800's ability to dial out to report traps. **MODEM MODE** configured for **VT-100** reports error conditions in plain ASCII with the following information:

- The Unit ID value programmed in the **EQUIPMENT IDENTIFICATION** portion of the **SYSTEM MANAGEMENT** screen (see *System Management* on page 3-13)
- A trap code indicating the error condition

- A text description of the fault
- The date and time when the error was logged

When **MODEM MODE** is configured for **PPP** or **SLIP**, the MX2800 logs into the PPP/SLIP host and reports the error conditions to the hosts designated under **TRAP IP ADDRESSES** (see *Trap IP Addresses* on page 3-22).

Answer on Ring

Enable or disable the MX2800's ability to accept incoming calls. If enabled, incoming calls are automatically answered by the MX2800, allowing you to remotely perform management functions.

Modem Mode

Select the **Modem** port function for your application (**VT-100**, **PPP**, or **SLIP**). The **Modem** port, located on the rear panel of the MX2800, provides a telephone line (POTS) for connection to the internal V.34 modem. This setting applies only if the **MANAGEMENT PORT** (see *Management Port* on page 3-14) is set to **MODEM**.

Modem Baud Rate

Set the maximum operating speed of the Modem port (1200, 2400, 4800, 9600, 19200, and 38400 bps).

Hangup

Selecting this option forces the MX2800 to end an established call.

Last Modem Response

This status field displays the last modem response to the MX2800. Possible responses include **OK**, **CONNECT**, **BUSY**, **ERROR**, **NO DIALTONE**, and **NO CARRIER**.

Alarm Relays

Alarm Relay Configuration

Enables audible and visible alarms for specific error conditions (see Figure 3-14). The following charts describe the alarm conditions found in this menu. Conditions marked in the charts with an asterisk (*) sound the critical alarm when enabled. All other conditions sound the non-critical alarm.

```
A                        Alarm Relay Configuration

DS3 Alarms                                DS2 Alarms
 1 - LOS = Disabled                       14 - LOF = Disabled
 2 - LOF = Disabled                       15 - AIS = Disabled
 3 - AIS = Disabled                       16 - RAI = Disabled
 4 - RAI = Disabled
 5 - TLOS = Disabled                      T1/E1 Alarms
 6 - XCV = Disabled                       17 - LOS = Disabled
                                          18 - CAIS = Disabled
Power Supply Alarms                       19 - LAIS = Disabled
 7 - Malfunction     = Disabled           20 - XCV = Disabled
 8 - Power Low       = Disabled
 9 - Power Fail      = Disabled           System Alarms
10 - Bat. Backup Act = Disabled           21 - Controller A Fail = Disabled
11 - Battery Low     = Disabled           22 - Controller B Fail = Disabled
12 - Temp High       = Disabled           23 - Protection Switch = Disabled
13 - Temp Critical   = Disabled

Enter selection >
```

Figure 3-14. Alarm Relay Configuration Menu

DS3 Alarms

Alarm	Description
RAI*	The unit is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero.
AIS*	The unit is receiving an AIS (blue) alarm condition from the network. AIS alarms occur when consecutive 1010s are received in the information bits. This indicates that there is a transmission fault located either at or upstream from the transmitting terminal.
LOS*	The unit has lost the network Rx signal.
LOF*	The unit detects a framing loss from the network.
XCV	The controller card is receiving excessive code violations, exceeding the threshold set by the user (see *XCV Threshold* on page 3-5).
TLOS*	Controller Card transmitter has failed

* *Sounds critical alarm*

DS2 Alarms

Alarm	Description
RAI	The unit is receiving an RAI (yellow) alarm from the network across a DS2. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero.
AIS	The unit is receiving unframed all ones across a DS2.
LOF	The unit detects a framing loss from the network across a DS2.

System Alarms

Alarm	Description
Controller Card Fail*	Controller Card has failed. *Note: This is a critical alarm only when Inactive Card is not installed or is not working.*
Protection Switch*	All data has been routed from the primary card to the stand-by card.
Communication Fail	the controller cards can no longer communicate with each other

** Sounds critical alarm*

T1/E1 Alarms

T1/E1 alarms are cleared when the T1/E1 is disabled or set to **AUTO ENABLE** *after receiving an alarm.*

Alarm	Description
LOS	The unit has lost the receive signal on a T1/E1.
XCV	The controller card is receiving excessive code violations, exceeding the threshold set by the user (see *XCV Threshold* on page 3-12).
CAIS (carrier side AIS)	The T1 is receiving all ones from the DS3 side of the network.
LAIS (loop side AIS)	The T1 is receiving all ones from the DSX-1 interface.

Power Supply Alarms

Alarm	Description
Malfunction	Power supply card is no longer working. The unit has switched to the backup power supply or battery backup.
Power Low	Power supply's output level is abnormally low.
Power Fail	Power supply card's input power is lost.
Bat. Backup Act	Battery charger has lost its AC source and is now running out of the battery backup.
Battery Low	Battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation.
Temperature High	Power supply card temperature is above normal.
Temperature Critical	Power supply card temperature is so high that it may suffer damage.

SNMP Management Options

SNMP State

Use this menu item to Enable or Disable SNMP for the MX2800. When disabled, the MX2800 ignores all incoming SNMP packets and does not transmit SNMP packets.

Trap IP Addresses

Enter up to five IP addresses of SNMP managers to which the MX2800 sends traps.

Trap Generation

Use this menu (see Figure 3-15) to designate which error conditions will cause the unit to send trap messages.

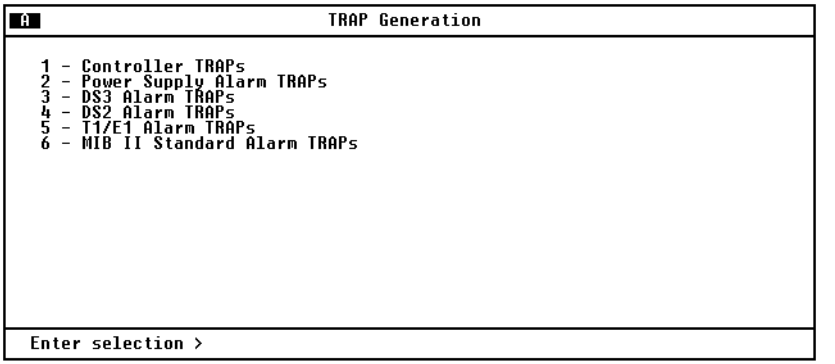


Figure 3-15. Trap Generation Menu

Controller Traps

Trap	If enabled, the unit issues a trap when...
Protection Switch	the controller cards switch
Card Removed	a controller card has been removed
Card Failure	a controller card has failed
Communication Fail	the controller cards can no longer communicate with each other
Max Switches	the **MAX SWITCH THRESHOLD** is reached. See page 3-6

Power Supply Alarm Traps

Trap	If enabled, the unit issues a trap when...
Card Removed	the power supply card has been removed
Malfunction	the power supply card is no longer working and the unit has switched to the backup power supply or battery backup
Card Failure	the power supply card has failed
Power Low	the power supply's output level is abnormally low
Bat. Backup Act	Battery charger has lost its AC source and is now running out of the battery backup
Battery Low	the battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation
Temperature High	the power supply card is getting too hot
Temperature Critical	the power supply card temperature is so high that it may suffer damage

DS3 Alarm Traps (Near-End Active and Standby Cards)

Trap	If enabled, the unit issues a trap when...
LOS	the controller card has lost the network Rx signal
OOF	the controller card detects a framing loss from the network
AIS	the controller card is receiving an AIS (blue) alarm condition from the network. AIS alarms occur when consecutive 1010s are received in the information bits. This indicates that there is a transmission fault located either at or upstream from the transmitting terminal
RAI	the controller card is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero
IDLE	the controller card detects an idle sequence from the network. Service is immediately available for use
TX LOS	the controller card's transmitter has failed
XCV	The controller card is receiving excessive code violations, exceeding the threshold set by the user (see *XCV Threshold* on page 3-5)
In/Out Test	the DS3 is going in and out of test (applies to the Active controller card only)

DS3 Alarm Traps (Far-End Active Cards)

Trap	If enabled, the unit issues a trap when...
LOS	the remote unit's active controller card has lost the network Rx signal
OOF	the remote unit's active controller card detects a framing loss from the network
AIS	the remote unit's active controller card is receiving an AIS (blue) alarm condition from the network
RAI	the remote unit's active controller card is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero
IDLE	the remote unit's active controller card detects an idle sequence from the network. Service is immediately available for use
DS3 Eqpt Fail SA	the remote unit's active controller card is receiving a service-affecting equipment failure message from the network
DS3 Eqpt Fail NSA	the remote unit's active controller card is receiving a non-service-affecting equipment failure message from the network
Comn Eqpt Fail NSA	the remote unit's active controller card is receiving a common equipment failure message from the network

DS2 Alarm Traps

Trap	If enabled, the unit issues a trap when...
OOF	the DS2 detects a framing loss from the network
AIS	the DS2 is receiving an AIS (blue) alarm condition from the network. AIS alarms occur when the unit is receiving unframed all ones
RAI	the DS2 is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bit is set to zero

T1/E1 Alarm Traps

Trap	If enabled, the unit issues a trap when...
Local T1/E1 Alarms	
LOS	the unit has lost the Rx signal on a T1/E1
CAIS (carrier side AIS)	the T1 is receiving all ones from the DS3 side of the network
LAIS (loop side AIS)	the T1 is receiving all ones from the DSX-1 interface
XCV	the unit is receiving excessive code violations across a T1/E1, exceeding the configured threshold (see *XCV Threshold* on page 3-12)
T1/E1 Failure	a T1/E1 has failed
In/Out Test	a T1/E1 is going in or out of test

Far-End Alarms (only available in C-Bit Parity mode)	
Multiple DS1 LOS	the far-end equipment has lost multiple T1/E1 lines
Single DS1 LOS	the far-end equipment has lost a single T1/E1
DS1 Eqpt Fail SA	a service-affecting equipment failure is being reported by the far-end
DS1 Eqpt Fail NSA	a non-service-affecting equipment failure is being reported by the far-end

MIB II Standard Alarm Traps

Trap	**If enabled, the unit issues a trap when...**
Cold Start	the unit is first powered up
Link Up	the DS3 is up with no alarms
Link Down	the DS3 is in alarm
Authentication Failure	an attempt has been made by an unauthorized user to access the unit

Read Community Name

Enter the authentication strings used for SNMP management. Match the MX2800 to the SNMP manager for read privileges.

Write Community Name

Enter the authentication strings used for SNMP management. Match the MX2800 to the SNMP manager for write privileges.

Trap Community Name

Enter the identification string used for trap management. This string accompanies all traps transmitted by the MX2800.

System Security

User Account Management

Enter up to 15 user accounts. Each user account is assigned a username, password, and privilege level. Usernames and passwords are not case sensitive but must be12 characters or less. Each user account is assigned a privilege level to provide the option of limiting a user's access to the MX2800. The four privilege levels are listed below:

Guest

A read-only privilege level. A user with this privilege level can view almost all menu items on the console interface menus and can perform a limited number of TL1 commands, none of which can alter the product's configuration.

Interface

A write-access privilege level in which a user may configure items related to the network interface and T1/E1 interface, but may not initiate loopbacks and view and/or alter several system-level items such as LAN configurables, etc.

Test

A write-access privilege level in which a user may configure the network interface and T1/E1 interface and may initiate loopbacks, but may not view and/or alter several system-level items such as LAN configurables, etc.

Admin

The user may view and/or alter all menu items. Only a user with an Admin user account may alter the User Account Management information.

User accounts provide access to the MX2800 for console interface sessions and TL1 sessions..

The **LOAD DEFAULT SETTINGS** *menu item that is located on the Configuration/Utilities menu will reset the User Account Management table back to the factory default account* **adtran/adtran/admin**.

Table 3-1. User Account Privileges

Console Menu Item:	Privilege level(s) under which a user may alter (and in some cases, view) this item:			
	Guest	Interface	Test	Admin
Status menu				
Acknowledge alarms		X	X	X
Statistics menus				
Clear statistics (for all Statistics menus)		X	X	X
Reset alarm log		X	X	X
Configuration – Network Interface menu				
DS3 framing mode		X	X	X
DS3 line length		X	X	X
DS3 timing		X	X	X
DS3 loopback detection		X	X	X
DS3 XCV threshold		X	X	X
Active controller		X	X	X
Network protection		X	X	X
DS3 max switch threshold		X	X	X
DS3 min switching period		X	X	X
Loopback timeout		X	X	X
Shutdown stand-by controller		X	X	X
Reset stand-by controller		X	X	X
DS2 #1-7 mode (T1 or E1)		X	X	X
Configuration – T1/E1 Interface menu				
T1/E1 state		X	X	X
T1/E1 line coding		X	X	X
T1/E1 line length		X	X	X
T1/E1 loopback detection		X	X	X

“X” denotes item is supported by privilege level

Console Menu Item:	Privilege level(s) under which a user may alter (and in some cases, view) this item:			
	Guest	Interface	Test	Admin
T1/E1 circuit protection		X	X	X
T1/E1 protection threshold		X	X	X
T1/E1 line identification		X	X	X
T1/E1 XCV threshold		X	X	X
Configuration – System Management menu				
Local IP address				X
Gateway IP address				X
Subnet mask				X
Modem remote IP address (controller with modem)				X
Management port				X
Forward IP to remote DS3				X
DS3 remote IP address				X
Dial-up options menu (controller with modem)				X
SNMP Management Options menu				X
User Account Management menu				X
Terminal timeout				X
IP security				X
IP hosts				X
Date				X
Time				X
Alarm Relay Configuration menu				X

“X” denotes item is supported by privilege level

Console Menu Item:	Privilege level(s) under which a user may alter (and in some cases, view) this item:			
	Guest	Interface	Test	Admin
Equipment ID menu				X
Syslog Setup menu				X
Save-on-logout		X	X	X
Craft baud rate		X	X	X
Configuration – Utilities menu				
Load default settings				X
Update flash software				X
Configuration transfer				X
System reset				X
Loopback menu				
T1/E1 loopbacks			X	X
DS2 loopbacks			X	X
DS3 loopbacks			X	X
Reset all tests			X	X
Clear BERR			X	X
Save Configuration & Alarm Log	X	X	X	X
Logout	X	X	X	X

"X" denotes item is supported by privilege level

Terminal Timeout

Set the amount of time the terminal or TELNET session remains inactive before automatically closing the session, requiring the user to log in again. The options include **DISABLED**, **1 MIN.**, **5 MIN.**, **15 MIN.**, **60 MIN.**, or **1 DAY**.

IP Security

Enable or disable the **IP SECURITY** option. If **ENABLED**, the unit accepts management commands and TELNET sessions from the IP addresses entered into the **IP HOSTS** fields.

IP Hosts

Enter up to 16 IP addresses of management stations from which the unit should accept management commands. These addresses are only applicable if **IP SECURITY** is **ENABLED** (see previous paragraph).

Date & Time

Enter date and time information. Enter the month, date, and year separated by forward slashes (02 / 23 / 00). Enter the time in military time separated by colons (13:15:25).

Miscellaneous

Equipment Identification

These fields allow you to store information that identifies the unit (see Figure 3-16 on page 3-32). Information provided for the far-end is read-only. Local information is read / write from this menu.

```
A                    Equipment Identification

 1 - Unit ID =

Local Information
 2 - Facility ID Code = N/A
 3 - Location ID Code = N/A
 4 - Frame ID Code = N/A
 5 - Unit Code = N/A
 6 - Equipment Code = N/A

Far-End Information
     Facility ID Code = N/A
     Location ID Code = N/A
     Frame ID Code = N/A
     Unit Code = N/A
     Equipment Code = N/A


Enter selection >
```

Figure 3-16. Equipment Identification Menu

Unit ID

Provides a user-configurable text string for the name of the MX2800. This name can help you distinguish between different installations. You can enter up to 32 alpha-numeric characters in

this field, including spaces and special characters (such as an underbar). This information is locally stored and displayed in the upper right-hand corner of the MX2800 terminal screens.

Facility ID/Location ID/Frame ID/Unit and Equipment Codes

These fields provide user-configurable text strings to identify the MX2800 over the network. The **LOCATION ID CODE**, **FRAME ID CODE**, and **EQUIPMENT CODE** fields support up to ten alpha-numeric characters each. The **FACILITY ID CODE** supports 38 characters and the **UNIT CODE** supports 6 characters. This information is transmitted over the DS3 on the equipment ID channel.

Syslog Setup

Selections include **TRANSMISSION**, **HOST IP ADDRESS**, **SEVERITY LEVEL**, and **HOST FACILITY**.

Transmission

Enables or disables the transmission of log events to the external Syslog server. You must first define the host IP address.

Host IP Address

Specifies the IP address of the external server that is running the Syslog host daemon.

Severity Level

Specifies the lowest level of severity that causes messages to be logged to the Syslog server. The levels are listed in Table 3-2, in order of decreasing severity. Any message at or above a selected severity level will be logged if a transmission is enabled.

Table 3-2. Syslog Severity Levels

Level	Description
Emergency	The system is unusable.
Alert	An action must be taken immediately.
Critical	Shows critical conditions.
Error	Shows error conditions.
Warning	Shows warning conditions.
Notice	Shows normal, but significant, conditions.
Info	Shows informational messages.
Debug	Shows a debug-level message.

Host Facility

Specifies the facility destination of log events. Facilities are located on the host and are managed by the Syslog host daemon running on either a UNIX machine or a PC. Options include Local 0-7.

Auto Save

Enable this function to save the configuration every five minutes and when you logout. Disable if you do not want to save the configuration. The configuration may be saved manually from the **CONFIGURATION** Main Menu.

UTILITIES

The **UTILITIES** menu (see Figure 3-17) allows you to view MX2800 system information for both controller cards (including self-test results), revert to default configuration settings, flash-load a new version of software, transfer configuration information to and from a TFTP server, and reset the system. Possible results for the self-test are listed in the chart following Figure 3-17.

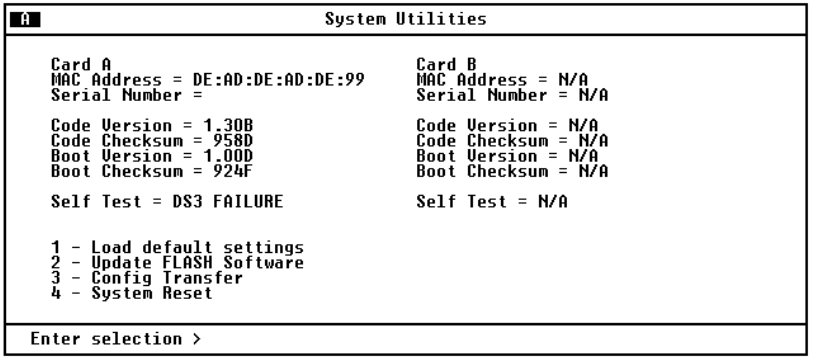


Figure 3-17. System Utilities Menu

Table 3-3. Self-Test Results

If the self test results are...	Then...
PASS	the self-test was successful and the unit is ready to use.
BAD RAM DATA BAD RAM ADDRESS BAD CODE CHECKSUM BAD BOOT SECTOR IOX PROGRAM FAILURE AFE PROGRAM FAILURE MODEM FAILURE ETHERNET FAILURE DS3 FAILURE DSX FAILURE	contact ADTRAN Technical Support. See the inside back cover of this manual for more information.

If the self test results are...	Then...
CONFIGURATION CORRUPT	select **SAVE CONFIGURATION** from the main **CONFIGURATION** menu. If condition persists, contact ADTRAN Technical Support.

Loading Default Settings

WARNING

Loading the default settings will set the T1/E1 state of all DS1 ports to **AUTO ENABLE**. *The* **USER ACCOUNT MANAGEMENT** *table is also reset to default.*

Select **LOAD DEFAULT SETTINGS** from the **UTILITIES** menu. Once the settings have been successfully retrieved, **Command Accepted** will appear at the bottom of the screen.

NOTE

The IP Address, Default Gateway, and subnet mask will not be reset when default settings are loaded.

Updating Software

Select **UPDATE FLASH SOFTWARE** from the **UTILITIES** menu to update software using either XMODEM protocol or Trivial File Transfer Protocol (TFTP).

NOTE

Before beginning update of FLASH software, disable the **AUTO SAVE** *feature of the MX2800. From the* **CONFIGURATION** *menu, choose* **SYSTEM C**, *then select* **OPTION 19** *until* **AUTO SAVE** *is set to* **DISABLE**.

Update Via XMODEM

Updating the FLASH Software via XMODEM requires that a VT100 terminal menu session be active through the unit's craft port. To update the software via XMODEM, follow the steps below:

1. From the MX2800 Main Menu, select **CONFIGURATION**, select **UTILITIES**, select **UPDATE FLASH SOFTWARE**, select **UPDATE VIA XMODEM**.
2. Once it has been determined where the new binary file is located, select **START** to begin the transfer.
3. Once Start has been selected, start the XMODEM transfer from the terminal menu program that is being used by selecting or typing the file path for the location of the new binary file. See appropriate documentation for your terminal emulator to begin XMODEM transfer.
4. After selecting the binary file, the XMODEM transfer will begin. If you wish to cancel a transfer in progress, press **Ctrl-x** three times. The **ACT LED** on the active card is solid amber for the duration of XMODEM transfer. The **ACT LED** on the stand-by card is blinking green.
5. If updating a unit with redundant controller cards, the active controller will begin uploading the new code to the stand-by controller after the XMODEM transfer has completed and the unit has successfully loaded and programmed the new software into its **FLASH** memory. If the unit does not have redundant controller cards, go to step 7.
6. While the stand-by card is having code uploaded, the **ACT LED** on the stand-by card will be solid amber. After the code has finished uploading to the stand-by card, the card will reset itself and begin running the new code.

WARNING

*The stand-by card must remain in place until the upload process is complete and the **ACT LED** is no longer solid amber and returns to blinking green. Removing the stand-by card during the uploading process will corrupt the software.*

7. The system must be manually reset after downloading new software for the active controller card to begin running the new code. From the **UTILITIES** menu, select **SYSTEM RESET**, and then

select either **IMMEDIATE RESET** to immediately reset the system or **SCHEDULE RESET TIME** to set a time for the system to reset. Once the system has been reset, the new software will be running.

*This function is available only when updating the software through the **CRAFT** port.*

Update via TFTP Server

Updating the FLASH Software via TFTP Server requires that the IP address and file name of file to be downloaded is known. To update the software via TFTP, follow the steps below:

1. Select **UPDATE VIA TFTP SERVER** from the **UTILITIES** menu. A new menu displays allowing you to enter the IP address and file name of the file you want to download to the unit. Once this information in entered, select **START/STOP TRANSFER**.
2. After selecting the binary file, the TFTP transfer will begin. If you wish to cancel a transfer in progress, press **Ctrl-x** three times. The **ACT LED** on the active card is solid amber for the duration of TFTP transfer. The **ACT LED** on the stand-by card is blinking green.
3. If updating a unit with redundant controller cards, the active controller will begin uploading the new code to the stand-by controller after the XMODEM transfer has completed and the unit has successfully loaded and programmed the new software into its FLASH memory. If the unit does not have redundant controller cards, go to step 5.
4. While the stand-by card is having code uploaded, the **ACT LED** on the stand-by card will be solid amber. After the code has finished uploading to the stand-by card, the card will reset itself and begin running the new code.

WARNING

The stand-by card must remain in place until the upload process is complete and the **ACT LED** *is no longer solid amber. Removing the stand-by card during the uploading process will corrupt the software.*

5. The system must be manually reset after downloading new software for the active controller card to begin running the new code. From the **Utilities** menu, select **SYSTEM RESET**, and then select either **IMMEDIATE RESET** to immediately reset the system or **SCHEDULE RESET TIME** to set a time for the system to reset. Once the system has been reset, the new software will be running.

.

Configuration Transfer

Select **CONFIG TRANSFER** from the **UTILITIES** menu to transfer files to and from a TFTP server. The **CONFIG TRANSFER** option also lets you save the MX2800 configuration as a backup file, so you can use the same configuration with multiple MX2800 units. Only one configuration transfer session (upload or download) can be active at a time.

Before using **CONFIG TRANSFER**, *the MX2800 should have a valid IP address, subnet mask, and default gateway (if required), and should be connected to an Ethernet network.*

Saving to a TFTP Server

To save current configuration information to a TFTP server, follow the steps listed below.

1. Set the **SERVER IP ADDRESS** field to the IP address of the machine running the TFTP server program.

   If you are using the ADTRAN TFTP server, the IP address displays in the **SERVER IP ADDRESS** field. For other TFTP servers, please refer to the appropriate documentation.

2. Change the TFTP Server Filename to a unique filename. This will be the name of the configuration file saved to the remote server.

Some TFTP servers constrain the format of the filename depending on the operating system of the server. For example, a TFTP server running on a PC under Windows 3.1 may only permit 8.3 format filenames (8 characters, period, and three extension characters).

3. Select **SAVE CONFIG REMOTELY**.

Retrieving from a TFTP Server

To retrieve current configuration information from a TFTP server, follow the steps listed below.

1. Set the **SERVER IP ADDRESS** field to the IP address of the machine running the TFTP server program.

   If you are using the ADTRAN TFTP server, the IP address displays in the **SERVER IP ADDRESS** field. For other TFTP servers, please refer to the appropriate documentation.

2. Change the TFTP **SERVER FILE NAME** to a unique filename. Include the complete path. This will be the name of the configuration file retrieved from the remote server.

WARNING *Configuration changes will not be implemented until all Telnet sessions are closed. Loading a new configuration may disrupt data traffic.*

3. Select **LOAD AND USE CONFIG**.

Resetting the System

The system must be manually reset after downloading new software. When the unit has successfully loaded and programmed the new software into its FLASH memory, it will begin uploading the code to the stand-by controller. This will be indicated on the menu and the ACT LED on the stand-by card will display solid yellow.

WARNING *The stand-by card must remain in place until the process is complete and the ACT LED is no longer solid yellow. Removing the stand-by card during the uploading process will corrupt the software.*

Once the upload is complete, the stand-by card will self-reset and begin running the new code. However, the active card does not reset automatically. The unit must be reset through the **IMMEDIATE RESET** or **SCHEDULE RESET TIME** functions.

SAVE CONFIGURATION & ALARM LOG

Commits the current configuration changes and alarm log to nonvolatile memory. If this option is not selected after making changes to the configuration, the unit reverts to its previous configuration when powered down.

Chapter 4 Status

View MX2800 status information by selecting **1-STATUS** from the **MAIN** menu (see Figure 4-1). The information for the DS3, DS2s, T1/E1 lines, power supplies, and controller cards is provided.

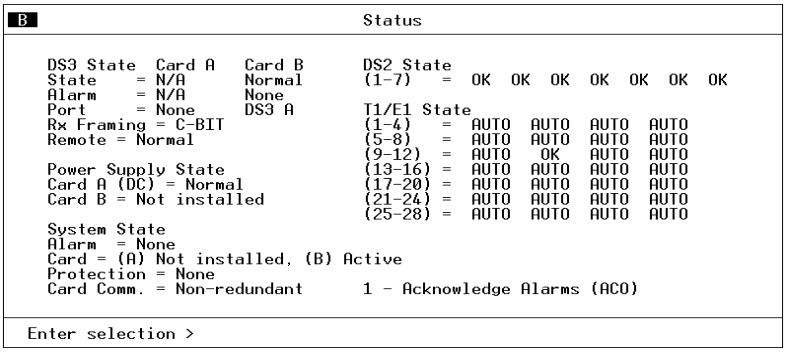


Figure 4-1. Status Menu

DS3 STATE

Displays the current state of the DS3. The following sections describe the DS3 status fields in detail.

Rx Framing

Shows the network framing type (C-bit or M13).

State

Displays the current condition of the network. Possible conditions are listed in the following chart:

Condition	Description
Normal	The MX2800 is ready to pass data.
Alarm	The unit is currently receiving an alarm indication. Alarm types are discussed in the following section, *Alarm*.
In Test	The unit is currently in test mode. See *Loopbacks* on page 6-1 for information on the test type.

Alarm

This field displays the current alarm condition of the MX2800. Possible conditions are given in the following chart:

Condition	Description
Normal	No alarms are currently being received.
RAI (remote alarm indication)	The unit is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero.
LOS (loss of signal)	The unit has lost the Rx signal.
AIS (alarm indication signal)	The unit is receiving an AIS (blue) alarm condition from the network. AIS alarms occur when consecutive 1010s are received in the information bits. This indicates that there is a transmission fault located either at or upstream from the transmitting terminal.
LOF (loss of framing)	The unit detects a framing loss from the network.

Condition	Description
Excessive CV	The unit is receiving excessive code violations from the network, exceeding the threshold set by the user (see *XCV Threshold* on page 3-5).
TLOS (Tx loss of signal)	The transmitter has failed.
Idle	The unit detects an idle sequence from the network. Service is immediately available for use.

Remote

This field indicates the current state of the remote MX2800 (available with C-Bit framing only). Possible conditions are given in the following chart:

Condition	Description
Normal	The far-end MX2800 is not reporting any conditions.
RAI (remote alarm indication)	The far-end unit is receiving an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero.
LOS (loss of signal)	The far-end unit has lost the Rx signal.
AIS (alarm indication signal)	The far-end unit is receiving an AIS (blue) alarm condition from the network. AIS alarms occur when consecutive 1010s are received in the information bits. This indicates that there is a transmission fault located either at or upstream from the transmitting terminal.
LOF (loss of framing)	The far-end unit detects a framing loss from the network.
Idle	The far-end unit detects an idle sequence from the network.

Condition	Description
DS3 Eqpt Fail (SA)	The far-end unit or network is reporting a service-affecting DS3 equipment failure.
DS3 Eqpt Fail (NSA)	The far-end unit or network is reporting a non-service-affecting DS3 equipment failure.
Common Eqpt Fail (NSA)	The far-end unit or network is reporting a non-service-affecting common equipment failure.
Multiple DS1 LOS	The far-end unit is experiencing a loss of signal on multiple DS1s.
Single DS1 LOS	The far-end unit is experiencing a loss of signal on a single DS1.
DS1 Eqpt Fail (SA)	The far-end unit is experiencing a service-affecting DS1 equipment failure.
DS1 Eqpt Fail (NSA)	The far-end unit is experiencing a non-service-affecting DS1 equipment failure.
Unknown	The unit is unable to discern the status of the far-end unit. (Normal state for M13 framing.)

POWER SUPPLY STATE

This field indicates which types of power supplies are installed (AC or DC) in Card A and Card B and gives their current state:

Condition	Description
Normal	The power supply is fully operational.
Error	The controller card cannot communicate with the power supply.
Power Low	The power supply's output level is abnormally low.
Power Fail	The power supply's input power is lost.
Charger Fail	The battery backup charger has failed or has lost its AC connection.

Battery Low	The battery backup has reached a critical energy point at which it may be unable to supply the unit with sufficient power to maintain operation.
Temp High	The power supply card temperature is abnormally high.
Temp Critical	The power supply card temperature is so high that it will soon shut off completely.

SYSTEM STATE

These fields display information regarding the two controller cards. The following sections describe the system state fields in detail.

Alarm

This field displays what type (if any) of system alarm is currently recognized by the unit. The condition is displayed until it clears up, with the exception of the **SWITCHED** condition (which is cleared manually) and the **EXCESSIVE SWITCHES** (which is cleared when **PROTECTION SWITCH** alarms counts are cleared, see page 5-12) .

To clear the **SWITCHED** condition, select **ACKNOWLEDGE ALARMS (ACO)** or push the **ACO** button on the front panel. See the sections *ACO Buttons* on page 2-12 and *Acknowledge Alarms (ACO)* on page 4-8 for more information. Possible alarm types are listed in the following chart:

Condition	Description
Supply Failure	A power supply card has failed.
Card Failure	A controller card is not passing data.
Excessive Switches	The **MAX SWITCHING THRESHOLD** has been exceeded. See *Max. Switch Threshold* on page 3-6.
Switched	A card switch has occurred.

Card A/Card B

These fields display the current state of the two controller cards. Possible states for the controller cards are listed in the following chart:

Condition	Description
Not Installed	No controller card is installed in this slot.
Stand By	The controller card is ready to pass data, but is currently acting as a backup card.
Active	The controller card is acting as the primary card.
Failure	The controller card has failed and needs to be replaced.

Protection

This field lists the type of protection mode currently active. Possible states are listed in the following chart:

Condition	Description
Network	Both controller cards are installed and everything is healthy. The unit is in full Network Protection Mode.
Circuit	Unit is in Circuit Protection Mode and everything is healthy, *or* unit is in Network Protection Mode and a failure on the network has occurred.
None	One controller card is installed, *or* the unit is in Circuit Protection Mode and the secondary card has failed.

For more information on the different types of Protection Modes, see the chapter Circuit and Network Redundancy on page 7-1.

Card Comm

This field displays the current state of the communication link between the two controller cards. **OK** indicates that the cards are communicating; **FAILURE** indicates that the cards are not able to communicate with each other. If there is only one card installed, **NON-REDUNDANT** is displayed.

DS2 STATE

This field displays the current state of each of the seven DS2s. Possible states are listed in the following chart:

Condition	Description
OK	The DS2 is not receiving alarms.
LOF	The unit detects framing loss across the DS2.
RAI	The unit is receiving an RAI (yellow) alarm across the DS2. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bit is set to zero.
AIS	The unit is receiving an AIS (blue) alarm condition from the network across the DS2. AIS alarms occur when the unit receives unframed all ones.

T1/E1 STATE

The field displays the current state of the individual T1s or E1s. Possible states are listed in the following chart:

Condition	Description
OK	The T1/E1 is ready to pass data.
LOS	The unit has lost the Rx signal on the T1/E1.
XCV	The unit is receiving excessive code violations across the T1/E1, exceeding the configured threshold (see *XCV Threshold* on page 3-5).

Condition	Description
TST	The T1/E1 is currently in test mode.
HOT	The T1/E1 transceiver temperature is too high.
LAIS (loop side AIS)	The T1 is receiving all ones from the DSX-1 interface.
CAIS (carrier side AIS)	The T1 is receiving all ones from the DS3 side of the network.

A DS2 can be divided into either three E1s or four T1s. Therefore, when dealing with an E1 configuration, some of the fields in the **T1/E1 STATE** *menus do not apply (and display nothing).*

ACKNOWLEDGE ALARMS (ACO)

This selection allows you to remotely turn off an active alarm. It is the software equivalent of the **ACO** button (described in the section *ACO Buttons* on page 2-12).

Chapter 5 Statistics

VIEWING STATISTICAL INFORMATION

Select **2-STATISTICS** from the **MAIN** menu to access **STATISTICS** menus (see Figure 5-1). Alarm information and performance parameters are available for both the near and far ends of the network. Information is also given for the individual DS2s and T1/E1 lines.

Statistical information is given in screens based on the following time periods: the current 15-minute interval, a 24-hour history (divided into 96 15-minute intervals), and the totals for the previous 24 hours. Also, a cumulative alarm count is given. This count continues indefinitely until reset by the user.

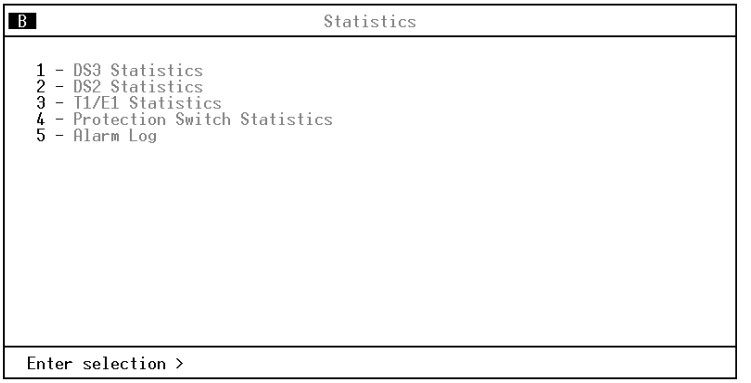


Figure 5-1. Main Local Statistics Menu Screen

DS3 Statistics

This menu provides submenus for alarm history and performance parameters (see Figure 5-2).

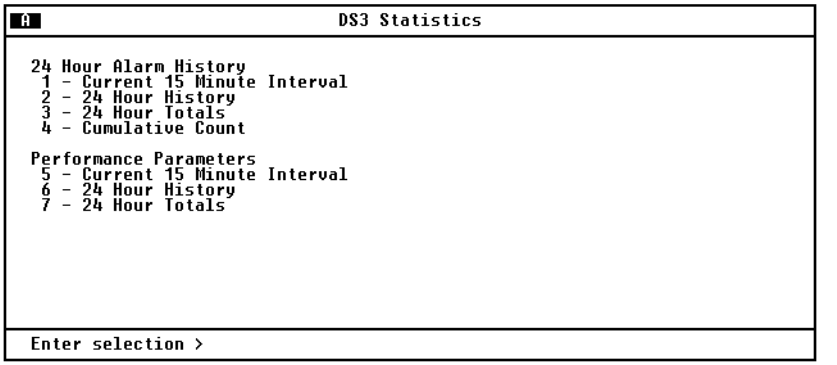


Figure 5-2. DS3 Statistics Menu

24 Hour Alarm History

The MX2800 keeps track of alarms for both the near and far ends of the network. View alarm history information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period (if any) since the last reset. The cumulative alarm count continues indefinitely until **CLEAR ALL DS3 ALARM COUNTS** is selected. See Figure 5-3 and Figure 5-4 on page 5-4 for examples of alarm screens.

The following alarm counts are provided in this menu:

Condition	Description
LOS	Number of times the unit has lost the receive signal.
LOF	Number of times the unit has detected a loss of framing from the network.
AIS	Number of times the unit has received an AIS (blue) alarm condition from the network. AIS alarms occur when consecutive 1010s are received in the information bits. This indicates that there is a transmission fault located either at or upstream from the transmitting terminal.
RAI	Number of times the unit has received an RAI (yellow) alarm from the network. This alarm is a signal sent back toward the source of a failed transmit circuit. The X-bits (X1 and X2) are set to zero.
IDLE	Number of times the unit has detected an idle sequence from the network.

The count given reflects the number of times the alarm or state has occurred (rather than the number of seconds the alarm was active).

```
A                          Current 15 Minute Interval

Near-End LOS          0
Near-End LOF          0
Near-End AIS          0
Near-End RAI          0
Near-End IDLE         0

Far-End LOS           0
Far-End LOF           0
Far-End AIS           0
Far-End IDLE          0

 1 - Clear ALL DS3 alarm counts

Enter selection >
```

Figure 5-3. DS3 Current Alarm Count Screen

```
A                                24 Hour History                          >

Interval starting   09:45    09:30    09:15    09:00    08:45    08:30

Near-End LOS            0        0        0        0        0        0
Near-End LOF            0        0        0        0        0        0
Near-End AIS            0        0        0        0        0        0
Near-End RAI            0        0        0        0        0        0
Near-End IDLE           0        0        0        0        0        0

Far-End LOS             0        0        0        0        0        0
Far-End LOF             0        0        0        0        0        0
Far-End AIS             0        0        0        0        0        0
Far-End IDLE            0        0        0        0        0        0

 1 - Clear ALL DS3 alarm counts

Enter selection >
```

Figure 5-4. DS3 24-Hour Alarm History Screen

When a > or < symbol appears in an upper corner of the screen, you can use the arrow keys on your keyboard to scroll right or left to view additional information. See the upper right-hand corner of Figure 5-4.

Performance Parameters

View performance parameter information for the network in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the

24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals. See Figure 5-5, Figure 5-6, and Figure 5-7 on page 5-6 for examples of the performance parameter screens.

Descriptions of the fields in each screen follows.

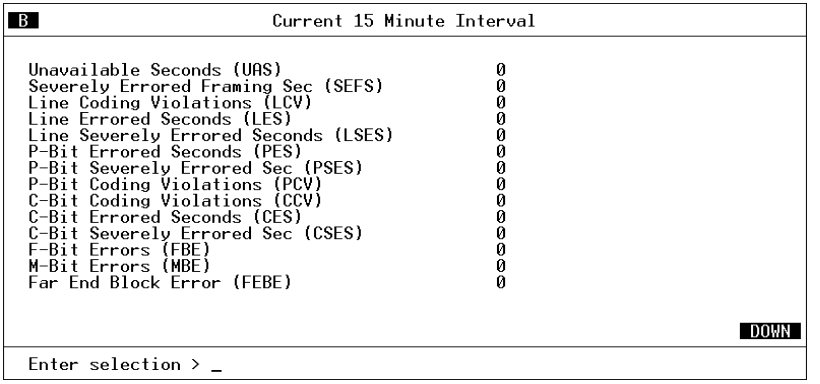


Figure 5-5. DS3 Performance Parameters (Current 15 Minutes)

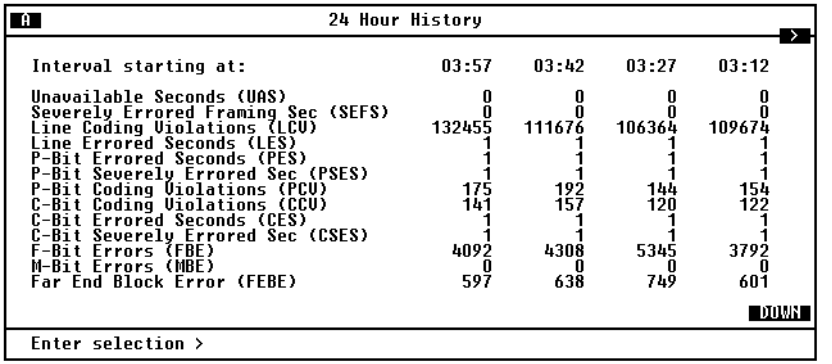


Figure 5-6. DS3 Performance Parameters (24 Hour History)

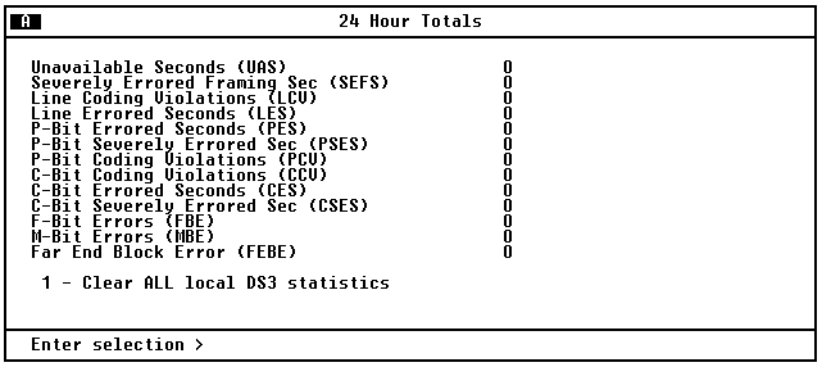


Figure 5-7. DS3 Performance Parameters (Totals)

Interval starting at:

Time that the 15-minute interval began. This field is only displayed in the 24-hour history screen, which gives information for the previous 24 hours divided into 15-minute intervals (shown in Figure 5-6 on page 5-6).

Unavailable Seconds (UAS)

Time in seconds that the network port has been unavailable for data delivery. This means that the T3 link is down or in test, or that the signaling state is down.

Severely Errored Framing Seconds (SEFS)
Number of seconds with one or more out-of-frame defects or a detected incoming AIS.

Line Coding Violations (LCV)
Number of BPVs (bipolar violations) and EXZs (excessive zeros) that have occurred.

Line Errored Seconds (LES)
Number of seconds in which one or more CVs or one or more LOS (loss of signal) defects occurred.

P-Bit Errored Seconds (PES)
Number of seconds with one or more PCVs (P-bit coding violations), one or more out-of-frame defects, or a detected incoming AIS. This count is not incremented when UASs (unavailable seconds) are counted.

P-Bit Severely Errored Seconds (PSES)
Number of seconds with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This count is not incremented when UASs are counted.

P-Bit Coding Violations (PCV)
Number of coding violation (CV) error events that have occurred.

C-Bit Coding Violations (CCV)
In C-bit parity mode, this is a count of coding violations reported via the C-bits or the number of C-bit parity errors that have occurred.

C-Bit Errored Seconds (CES)
Number of seconds with one or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This count is not incremented when UASs are counted.

C-Bit Severely Errored Seconds (CSES)
Number of seconds with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This count is not incremented when UASs are counted.

F-Bit Errors (FBE)
Number of times an F-bit framing error has occurred.

M-Bit Errors (MBE)
Number of times an M-bit framing error has occurred.

Far End Block Errors (FEBE)
Number of times the far-end unit has received a C-parity or framing error.

Clear All Local DS3 Statistics/Refresh All Remote Statistics
Clears or refreshes all current information. These selections affect all statistical information (not just the displayed screen). When viewing the 24-hour history screen, press the down arrow key to access this selection.

DS2 Statistics

24 Hour Alarm History

The MX2800 keeps track of RAI, OOF, and AIS alarms for each of the seven DS2s. View alarm history information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period (if any) since the last reset. The cumulative alarm count continues indefinitely until **CLEAR ALL DS2 ALARM COUNTS** is selected. When viewing the 24-hour history menus, use the up and down arrow keys to view all three alarm counts (RAI, OOF, and AIS). See Figure 5-8 and Figure 5-9.

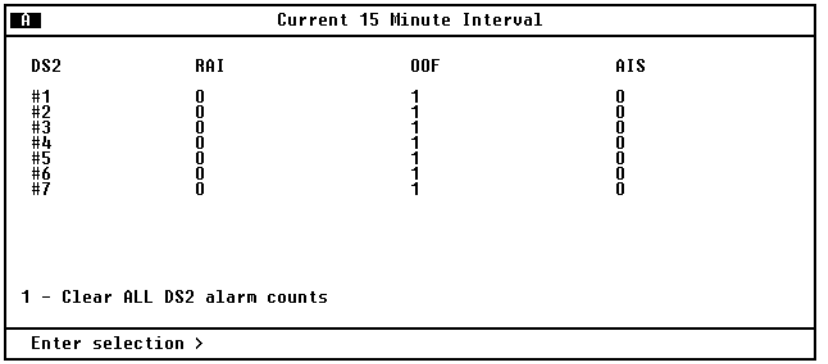


Figure 5-8. DS2 Statistics (Current 15 Minutes)

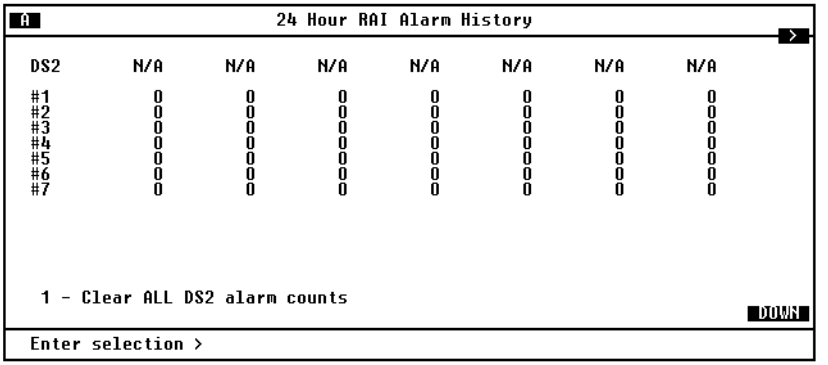


Figure 5-9. DS2 RAI 24-Hour Alarm History

Performance Parameters

The performance parameters screen displays a count of parity bit errors and frame bit errors for the seven DS2s. View this information in any of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals; use the up and down arrow keys to scroll between the **PBERR** (parity bit error) and **FBERR** (frame bit error) menus. See Figure 5-10 and Figure 5-11.

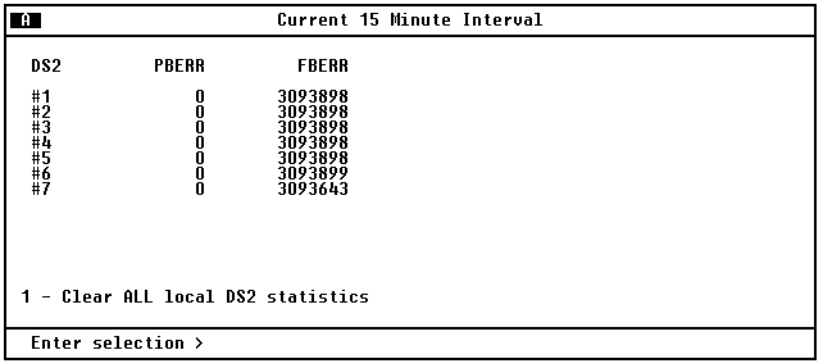


Figure 5-10. DS2 Performance Parameters (Current 15 Minutes)

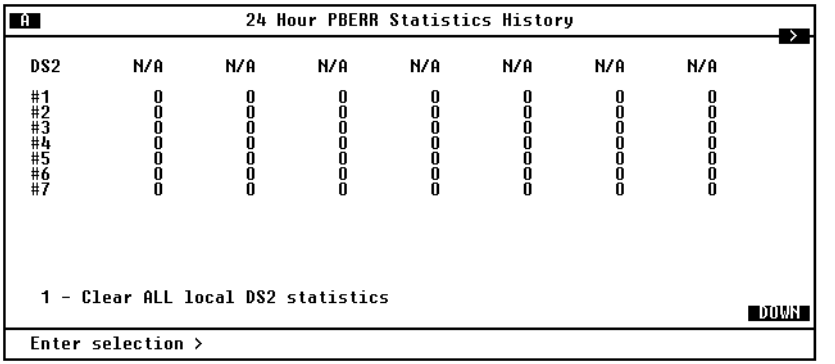


Figure 5-11. DS2 PBERR 24-Hour Alarm History

T1/E1 Statistics

The MX2800 keeps track of **LOSS OF SIGNAL ALARMS**, **BIPOLAR VIOLATION COUNTS**, **AIS LOOP ALARMS**, and **AIS CARRIER ALARMS** for each of the T1s and E1s (see Figure 5-12). View this information in one of the three time period selections, or view a cumulative alarm count. Information in these fields is for the given time period (if any) since the last reset. The cumulative alarm count continues indefinitely until **CLEAR ALL T1/E1 ALARM COUNTS**, located in each field, is selected.

Performance parameters that are documented for the T1s and E1s are **ERRORED SECONDS**, **SEVERELY ERRORED SECONDS**, **SEVERELY ERRORED FRAMING SECONDS**, **UNAVAILABLE SECONDS**, and **DEGRADED MINUTES**. The current interval, past 24-hours in 15-minute intervals, and 24-hour totals for each of these may be viewed.

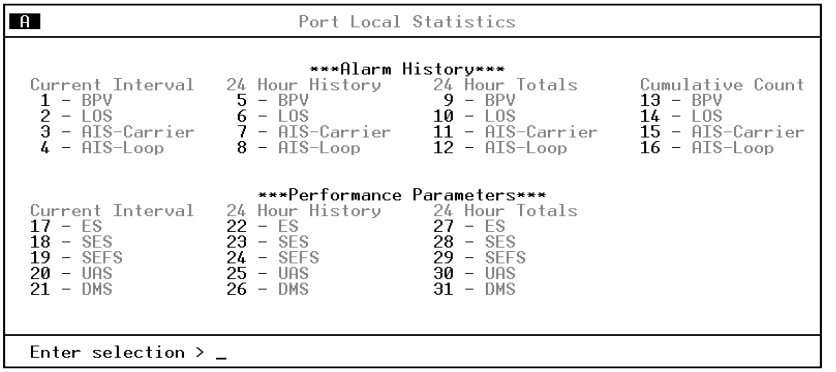


Figure 5-12. T1/E1 Statistics Menu

PROTECTION SWITCH STATISTICS

This menu provides statistics regarding protection switches. The number of protection switches that occur within the particular time period will be listed. (See *Figure 5-13*.)

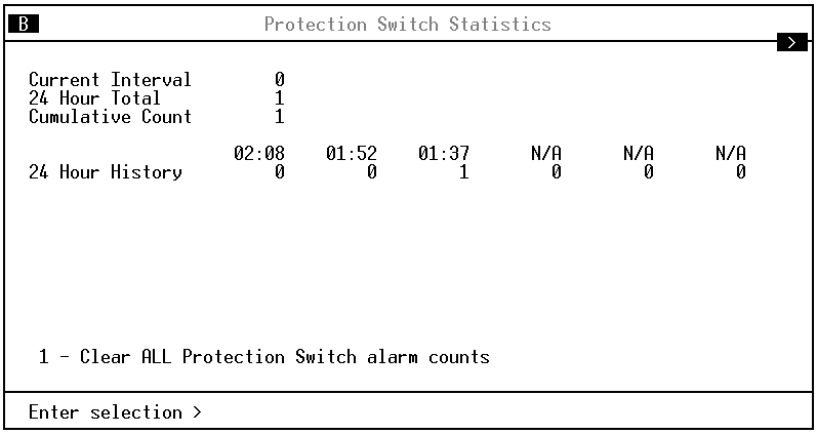


Figure 5-13. Protection Switch Statistics Menu

Performance Parameters

View performance parameter information for the network in one of the three time period selections. Information in these fields is for the given time period since the last reset. When viewing the 24-hour history statistics screen, use the left and right arrow keys to scroll through all 96 15-minute intervals. Clearing protection switch alarm counts will clear the **EXCESSIVE SWITCH STATE** if active.

Alarm Log

This menu provides a list of the last 200 alarms that have occurred on the MX2800. When the alarm log becomes full, new alarms replace the oldest alarms in a first-in, first-out sequence.

The alarm log is periodically stored in non-volatile memory. Once every minute, if an alarm has been recorded or if the alarm log has been reset since the last time it was saved, then the alarm log and

system configuration are saved to non-volatile memory. Both the alarm log and system configuration may be saved manually when the user executes the **SAVE CONFIGURATION & ALARM LOG** menu function in the **CONFIGURATION** menu. Each time the system powers up, the alarm log is retrieved from non-volatile memory.

A **RESET ALARM LOG** function is accessible from the alarm log menu. This option clears the alarm log (See Figure 5-14.)

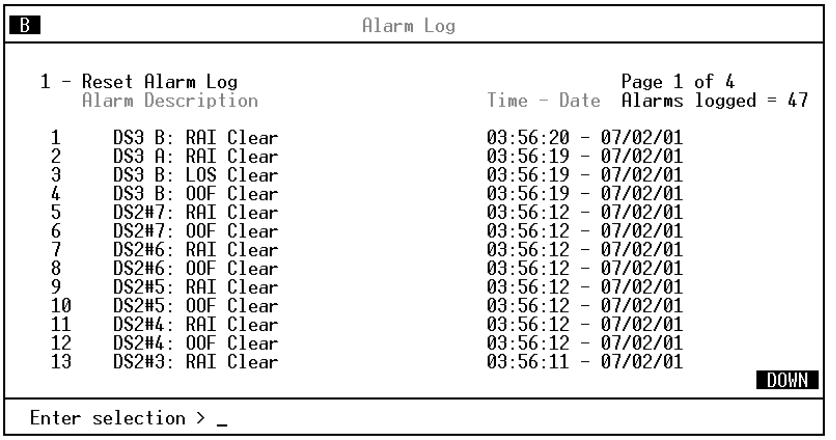


Figure 5-14. Alarm Log

Chapter 6 Loopbacks

The **LOOPBACK** menu allows you to initiate loopback tests from the MX2800. Figure 6-1 shows the main **LOOPBACK** menu. From this menu, select **T1/E1**, **DS3**, or **DS2 LOOPBACKS**. Once this selection is made, a second menu appears displaying the types of tests available.

Descriptions and testing diagrams of the loopback tests are provided in the following portions of this chapter:


```
B                          Loopback Menu

T1/E1 Loopbacks          T1/E1 Loopbacks       DS3/DS2 Loopbacks
 1 - Data Mode           15 - Data Mode        29 - DS3 = Data Mode
 2 - Data Mode           16 - Data Mode
 3 - Data Mode           17 - Data Mode        30 - DS2 #1 = Data Mode
 4 - Data Mode           18 - Data Mode        31 - DS2 #2 = Data Mode
 5 - Data Mode           19 - Data Mode        32 - DS2 #3 = Data Mode
 6 - Data Mode           20 - Data Mode        33 - DS2 #4 = Data Mode
 7 - Data Mode           21 - Data Mode        34 - DS2 #5 = Data Mode
 8 - Data Mode           22 - Data Mode        35 - DS2 #6 = Data Mode
 9 - Data Mode           23 - Data Mode        36 - DS2 #7 = Data Mode
10 - Data Mode           24 - Data Mode
11 - Data Mode           25 - Data Mode        37 - Reset ALL tests
12 - Data Mode           26 - Data Mode
13 - Data Mode           27 - Data Mode
14 - Data Mode           28 - Data Mode

Enter selection >
```

Figure 6-1. Loopback Main Menu

T1/E1 LOOPBACKS

After you select the number that corresponds with the line you want to test, the menu in Figure 6-2 appears. The sections following the figure provide descriptions and illustrations of the testing options. Select **1-DATA MODE** to end a test in progress.

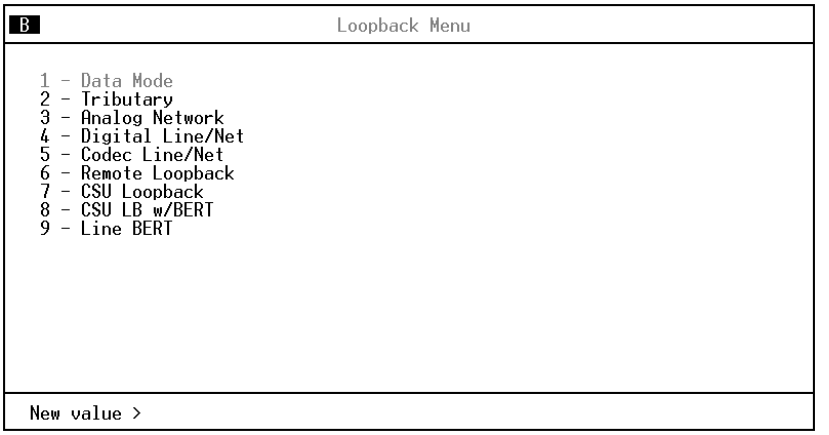


Figure 6-2. T1/E1 Loopback Menu

Tributary

A **TRIBUTARY** loopback loops the selected T1/E1 back to the network (DS3). The T1/E1 is de-multiplexed through the M23 and M12/G.747 de-multiplexers, looped back, and multiplexed back up through the M12/G.747 and M23 multiplexers. During this loopback, all network receive data is passed to the DSX-1/E1 transmitters, but all data received by the DSX-1/E1 loop side is ignored and substituted with the network data. See Figure 6-3 on page 6-3 for an illustration of this test.

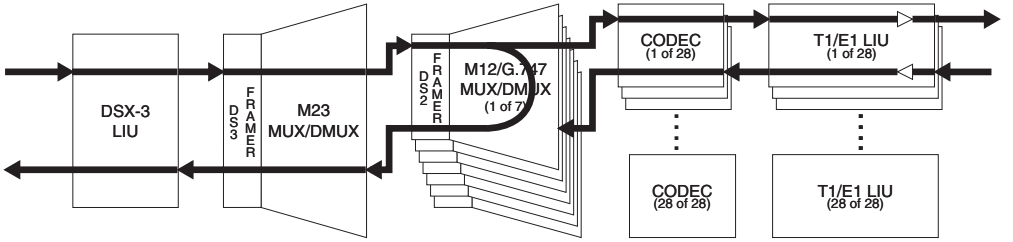


Figure 6-3. Tributary Loopback Test

Analog Network

An **ANALOG NETWORK** loopback test loops the selected T1/E1 back to the network (DS3). The T1/E1 is completely de-multiplexed, looped back at the T1/E1 line interface unit (LIU), through the LIU drivers and receivers, and multiplexed back onto the DS3 network stream. See Figure 6-4 for an illustration of this test.

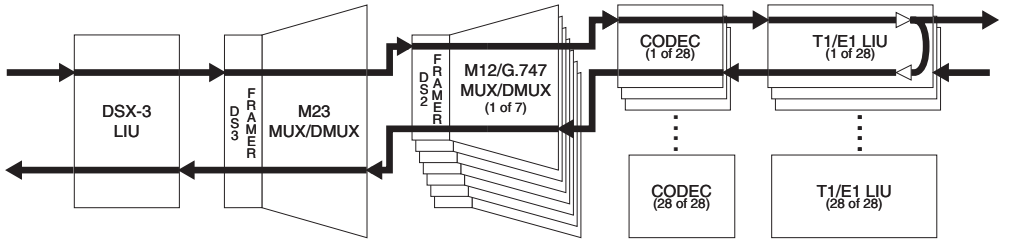


Figure 6-4. Analog Network Loopback

Digital Line/Net

A **DIGITAL LINE/NET** loopback performs a loopback of the selected T1/E1 in both the network and local loop directions. Both loopbacks occur at the T1/E1 LIU. The network side loopback occurs at the edge of the LIU while the T1/E1 loop side loopback occurs deep into the LIU through the receiver, receive equalizer, transmit jitter attenuator, and finally, through the T1/E1 transmit drivers. See Figure 6-5 on page 6-4 for an illustration of this test.

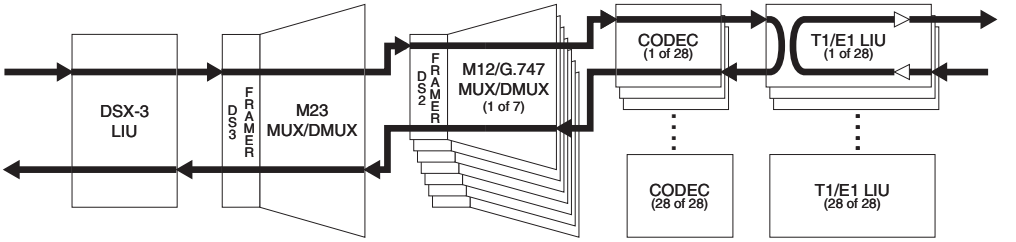


Figure 6-5. Digital Line/Network Loopback

Codec Line/Net

A **CODEC LINE/NET** loopback performs a loopback of the selected T1/E1 in both the network and local loop directions. Both loopbacks occur at the T1/E1 codec. Both the network and the local loop side of the loopback are executed at the edge of the codec, completely testing the M13 mux and the T1/E1 LIU. See Figure 6-6 for an illustration of this test.

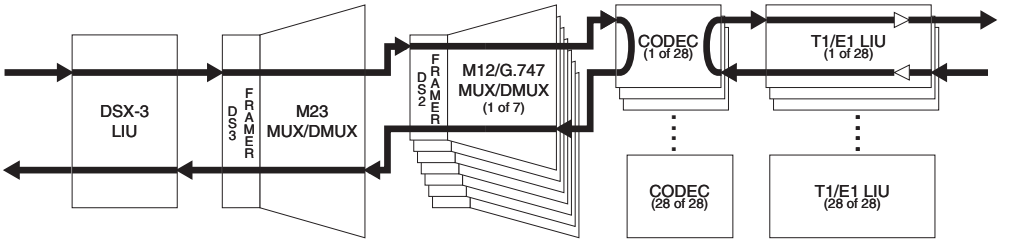


Figure 6-6. Codec Loopback

Remote Loopback

A **REMOTE LOOPBACK** performs a loopback of the selected T1/E1 on the far-end M13 multiplexer. If an MX2800 is located at the far end, an **ANALOG NETWORK LOOPBACK** is executed when a **REMOTE LOOPBACK** is engaged. This loopback is only available when the DS3 is configured for C-bit parity framing since it requires the availability of the far-end alarm and control (FEAC) channel. See ANSI T1.107.

CSU Loopback

A **CSU LOOPBACK** enables the MX2800 to generate a CSU loop-up pattern (00001…) towards the T1 CSU attached to the selected T1 line for six seconds. After six seconds have elapsed, the pattern will cease and incoming network traffic will be passed through to the CSU device. If the CSU device responded to the CSU loop-up pattern, it will return all data back towards the network. A loop-down pattern (001001….) will be generated towards the CSU for six seconds when **DATA MODE** is selected.

When in **CSU LOOPBACK**, *only the* **DATA MODE** *for the T1 under test may be selected. Selecting any other option will result in an error message being displayed.*

CSU Loopback w/BERT

A **CSU LOOPBACK W/BERT** enables the MX2800 to test the local T1 loop to the CSU using the standard QRSS pseudorandom bit sequence. When **CSU LOOPBACK W/BERT** is selected, the MX2800 will initiate a CSU loopback towards the CSU attached to the selected T1 line similar to the **CSU LOOPBACK** test above. Six seconds after starting the CSU loop-up pattern, the MX2800 will cease sending the CSU loop-up pattern and begin sending an unframed QRSS pattern towards the CSU. If the CSU device responded to the CSU loop-up pattern, the MX2800 will check the incoming pattern for errors. Additional menu items will appear to show the state of pattern synchronization, error count, and a clear error count option (see Figure 6-7 on page 6-6). Selecting **DATA MODE** will cease the transmission of the QRSS pattern and start transmission of a loop-down pattern as previously described.

When in **CSU LOOPBACK W/BERT**, *only the* **DATA MODE** *for the T1 under test may be selected. Selecting any other option will result in an error message being displayed.*

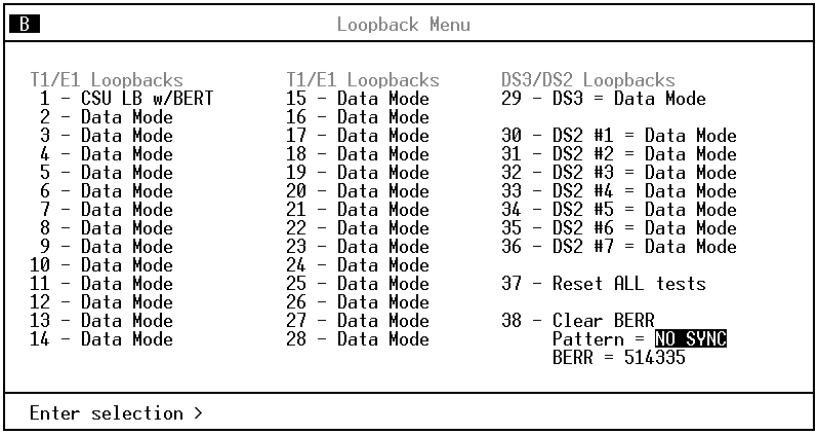


Figure 6-7. Loopback Menu with BERT Selected

Line BERT

A **LINE BERT** enables the MX2800 to perform a "head-to-head" **BERT** test towards the CSU. Selecting **LINE BERT** will replace all incoming network traffic for the selected T1 with an *unframed* QRSS pattern towards the CSU. When **LINE BERT** is selected, additional menu items will appear to show the state of pattern synchronization, cumulative error count, and a clear error count option. Selecting **DATA MODE** will cease QRSS pattern generation and substitution of the incoming data stream.

When in **LINE BERT** *mode, only the* **DATA MODE** *option for the T1 under test may be selected. Selecting any other option will result in an error message being displayed.*

Only one T1 port may engage a **CSU LOOPBACK**, **CSU LOOPBACK W/ BERT**, *or a* **LINE BERT**. *If a* **CSU LOOPBACK**, **CSU LOOPBACK W/ BERT**, *or a* **LINE BERT** *is already active at the time a new* **CSU LOOPBACK**, **CSU LOOPBACK W/BERT**, *or* **LINE BERT** *is selected, the former test will be terminated and the latter test will be engaged.*

DS3 LOOPBACKS

After you select **DS3 LOOPBACK**, the menu in Figure 6-8 appears. The sections following the figure provide descriptions and illustrations of the testing options. Select **1=DATA MODE** to end a test in progress.

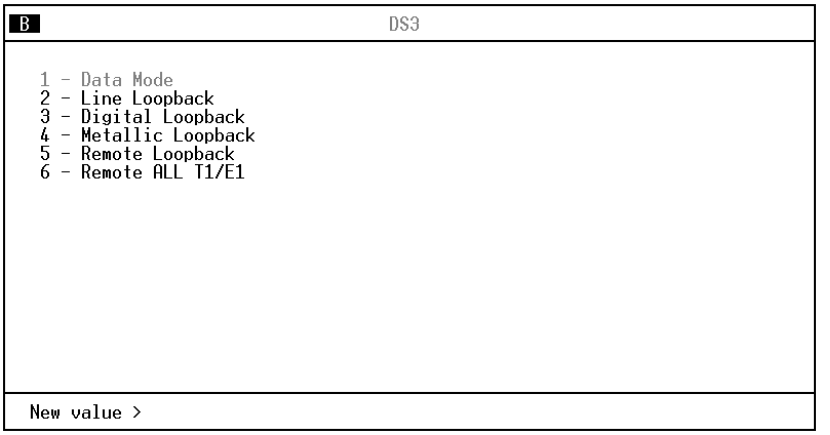


Figure 6-8. DS3 Loopback Menu

WARNING

If IP forwarding is enabled, a user should not perform a DS3 Loopback from the menus of the far-end (non-LAN end) MX2800. The communication link is over the DS3. If a loopback is performed, communication will be lost with the far-end MX2800. If this happens and a loopback timeout is not active, the user must cycle power to the far-end MX2800 to cancel the loopback and regain access to the shelf.

Line Loopback

LINE LOOPBACK performs a loop of the DS3 back to the network. This loopback occurs just prior to the DS3 framer and B3ZS decoder, but it makes full use of the DS3 LIU in both receive and transmit directions; therefore, any coding violations received by the

DS3 will be inserted back into the network without modification. See Figure 6-9 on page 6-8 for an illustration of this test.

> *If a* **LINE LOOPBACK** *is active when the MX2800 is operating in the* **LOCAL** *timing mode, the timing source for the DS3 is effectively removed from the circuit. Therefore, it is up to the test equipment or network to provide DS3 timing into the circuit for the duration of the test.*

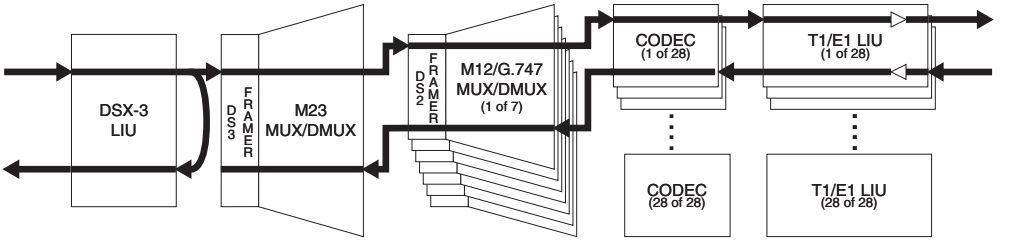


Figure 6-9. Line Loopback Test

Digital Loopback

A **DIGITAL LOOPBACK** loops the entire DS3 back to the local loop side. The end effect of this test is a loopback of all T1/E1s after being fully multiplexed and de-multiplexed to and from a DS3. The incoming DS3 data is ignored and the outgoing DS3 stream is substituted in its place just prior to exiting the DS3 framer. This test is illustrated in Figure 6-10.

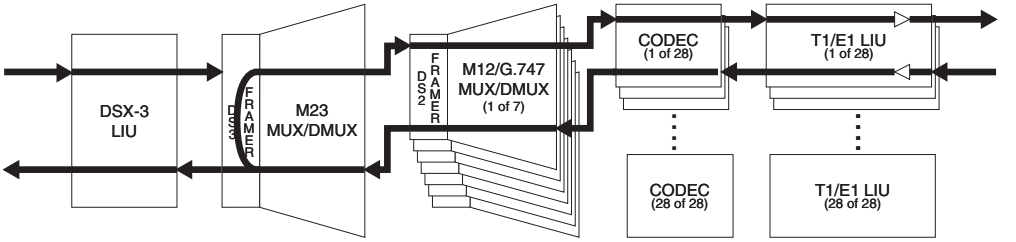


Figure 6-10. Digital Loopback

Metallic Loopback

A **METALLIC LOOPBACK** test loops the entire DS3 back to the local loop side. The end effect of this test is a loopback of all

T1/E1s after being fully multiplexed and de-multiplexed to and from a DS3, and passed through both directions of the DS3 LIU. During this test, the incoming DS3 is disconnected from the DS3 receiver and the outgoing DS3 signal is substituted in its place. See Figure 6-11 on page 6-9 for an illustration of this test.

> NOTE
>
> *The* **DS3 LINE LENGTH** *should be set to* **SHORT** *before performing this loopback.*

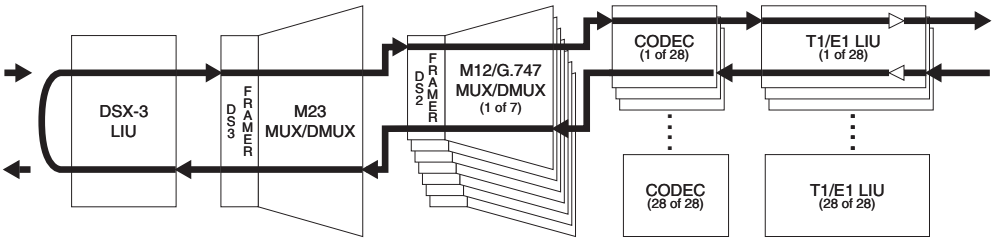


Figure 6-11. Metallic Loopback Test

Remote Loopback

A **REMOTE LOOPBACK** performs a loopback on the far-end M13 multiplexer. This loopback is only available when the DS3 is configured for C-bit parity framing since it requires the availability of the FEAC channel (see ANSI T1.107)..

> NOTE
>
> *Local timing must be selected before initiating this loopback. It may be returned (if needed) after loopback has been cancelled.*

Remote all T1/E1

A **REMOTE ALL T1/E1** loopback performs a loopback of all T1/E1 channels on the far-end M13 multiplexer. If an MX2800 is located at the far end, an **ANALOG LOOPBACK** is executed on all active

channels simultaneously. The form of this loopback code sent to the far-end will depend on the framing mode being used. When in C-Bit parity mode, the MX2800 will send loopback commands over the FEAC channel. When operating in M13 framing mode, the MX2800 will send C-Bit loopbacks at the DS2 level.

DS2 LOOPBACKS

After you select the number that corresponds with the DS2 you want to test, the menu in Figure 6-12 appears. The section following the figure provides a description and an illustration of the DS2 **NETWORK** loopback testing option. Select the appropriate DS2 **1-DATA MODE** to end a test in progress.

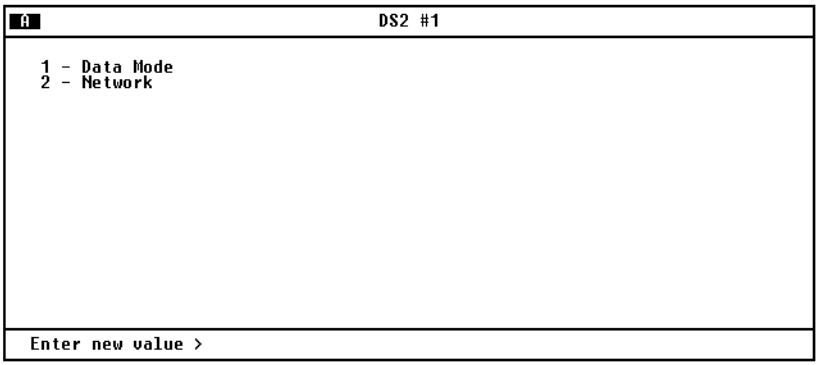


Figure 6-12. DS2 Loopback Menu

DS2 Network

A **DS2 NETWORK** loopback test loops the selected DS2 back to the network (DS3) prior to being passed through the M12/G.747 de-multiplexer. All T1/E1s attached to that DS2 will receive data normally, but all data inserted into the T1/E1s attached to the selected DS2 will be ignored and replaced by the incoming DS2 network data. This test is illustrated in Figure 6-13.

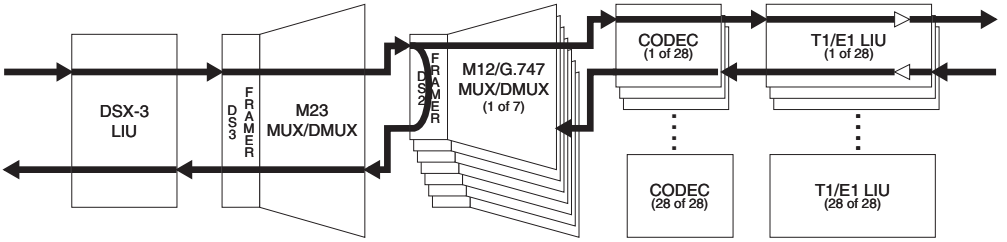


Figure 6-13. DS2 Network Loopback Test

Chapter 7 Circuit and Network Redundancy

The MX2800 provides backup measures of protection for both circuit and network failure. The following sections describe the three possible modes of operation:

- *Non-Redundant Mode*, which offers no backup protection, is described on page 7-2.
- *Circuit Failure Recovery Mode*, which offers backup protection in the event of controller card failure, is described on page 7-3.
- *Circuit and Network Failure Recovery Mode*, which offers a complete backup system for both card and network failure, is described on page 7-4.

The descriptions given include illustrations and suggested configuration settings. Please note that the settings may need modification based on your network configuration.

NON-REDUNDANT MODE

In Non-Redundant Mode, the MX2800 houses only one controller card and only one network connection is available. There is no failure protection. In the event of a failure, an alarm is initiated and the front panel LEDs reflect the condition. See Figure 7-1 for an illustration.

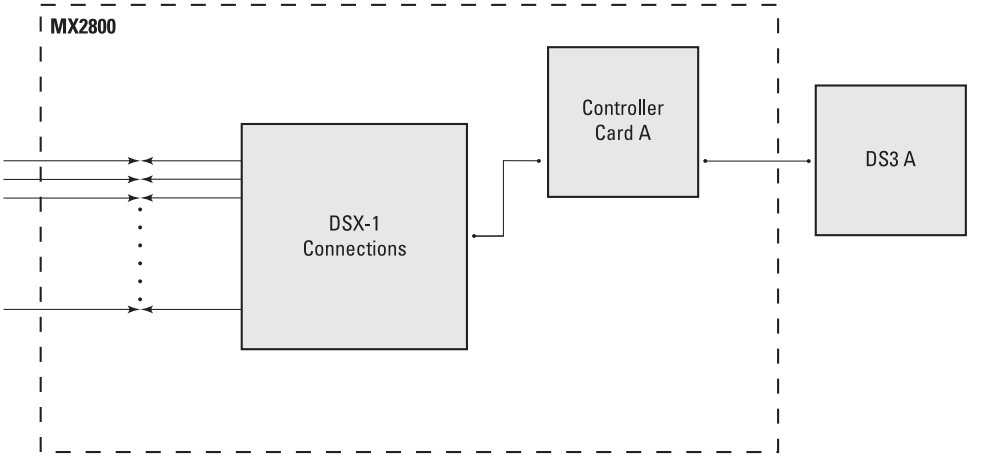


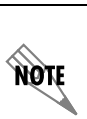
Figure 7-1. Non-Redundant Mode

*In this mode, the DS3 must be connected to the **IN** and **OUT** jacks for **DS3 A**.*

CIRCUIT FAILURE RECOVERY MODE

In Circuit Failure Recovery Mode, two controller cards are installed and a single DS3 line is coming in (see Figure 7-2). In this mode, the MX2800 can continue operating in the event of a controller card failure. When both cards are healthy, the primary card actively processes data while the secondary card stands by ready to take over if the first fails. The secondary card continuously monitors the line and remains framed to the incoming signal.

See Table 7-1 on page 7-4 for a list of this mode's configuration requirements.



During a card switch, service interruption is experienced on both the DS3 and the DSX1 connections. However, since the secondary controller card remains framed to the incoming signal at all times, it is a minimal interruption.

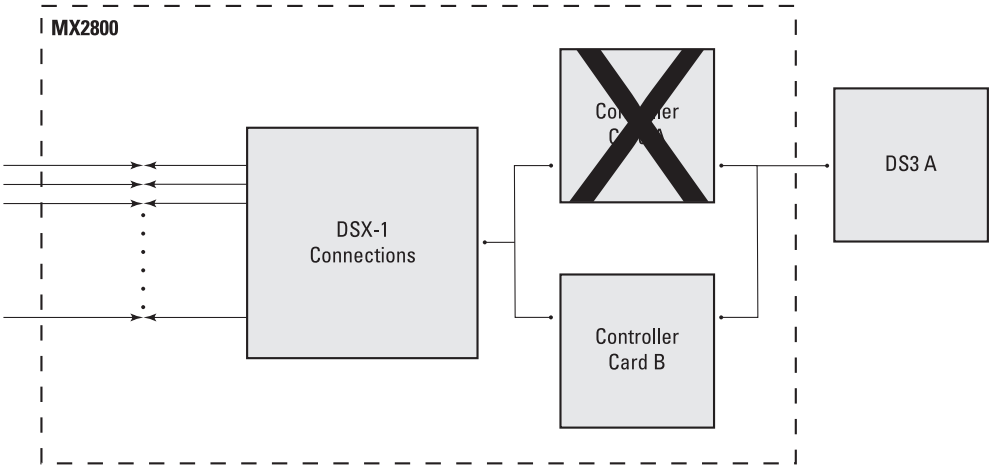


Figure 7-2. Circuit Failure Recovery Mode

Table 7-1. Configuration Requirements for Circuit Recovery

Selection Path	Recommended Setting
Config > Network Interface > XCV Threshold	1E-3 (see the following note)
Config > Network Interface > Network Protection	Disabled
Config > Network Interface > Max. Switch Threshold	3
Config > Network Interface > Min. Switching Period	10 seconds
Config > T1/E1 Interface > T1/E1 Circuit Protection	Enable all or select the T1/E1s that redundant switching should occur on.
Config > T1/E1 Interface > XCV Threshold	1E-3 (see the following note)

The XCV Threshold settings are based on the error rates considered acceptable on the DS3 or DS1 before switching.

CIRCUIT AND NETWORK FAILURE RECOVERY MODE

In this mode, two controller cards are installed and connected to two individual DS3 lines. This is, of course, the most complete mode of redundancy. In this mode, the primary controller card is connected to the primary DS3 line and the secondary controller card is connected to the secondary DS3 line. The primary card and line actively transmit data, while the other card and line stand by ready to take over if the first card and line fail. For example, if Card A fails, then control switches to Card B and DS3 B.

A feature of the MX2800 is its ability to internally re-route the network connection if a controller card and the *opposite* network connection fail. For example, in the illustration given in Figure 7-3, failed **DS3 A** is connected to healthy **CARD A**; and healthy **DS3 B** is connected to failed **CARD B**. In a case like this, the MX2800 is able to automatically re-route **DS3 B** to **CARD A**.

The configuration requirements for this mode are the same as the ones given for Circuit Failure Recovery Mode (see Table 7-1 on page 7-4) *except* for the **NETWORK PROTECTION** setting, which must be set to **ENABLE**.

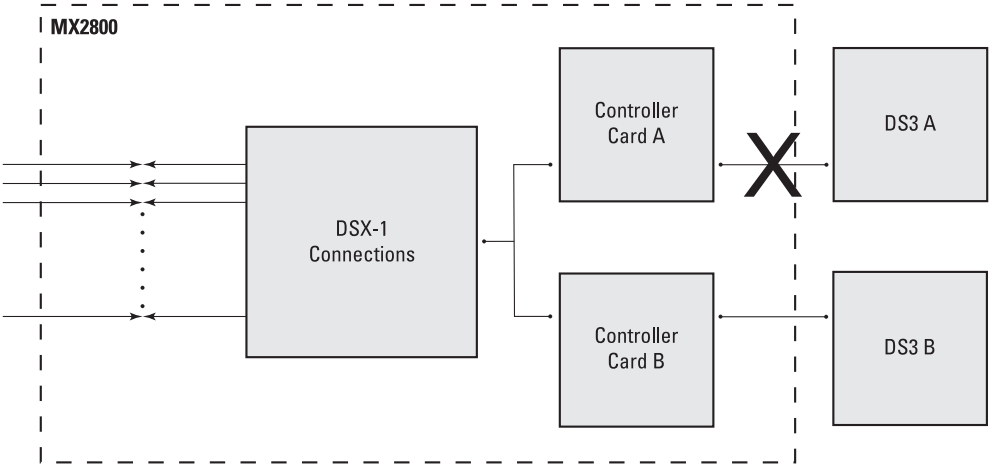


Figure 7-3. Circuit and Network Failure Recovery Mode

Chapter 8 Power Loss Recovery

The MX2800 provides backup measures of protection for both power supply and power source failure. The following sections describe the possible modes of operation:

- *Non-Redundant Power Mode*, which offers no backup protection, is described on page 8-2.
- *Power Supply Recovery Mode*, which offers backup protection in the event of power supply card failure, is described on page 8-3.
- *Power Supply and Source Recovery Mode*, which offers a backup system for both card and source failure, is described on page 8-4.
- *Battery Backup Mode*, which offers battery backup in the event of a power outage, is described on page 8-5.

NON-REDUNDANT POWER MODE

In Non-Redundant Power Mode, the MX2800 houses only one power supply card and only one power source is available. There is no power failure protection. If a power supply card fails, then the unit is down until the card is repaired or replaced. See Figure 8-1 for an illustration.

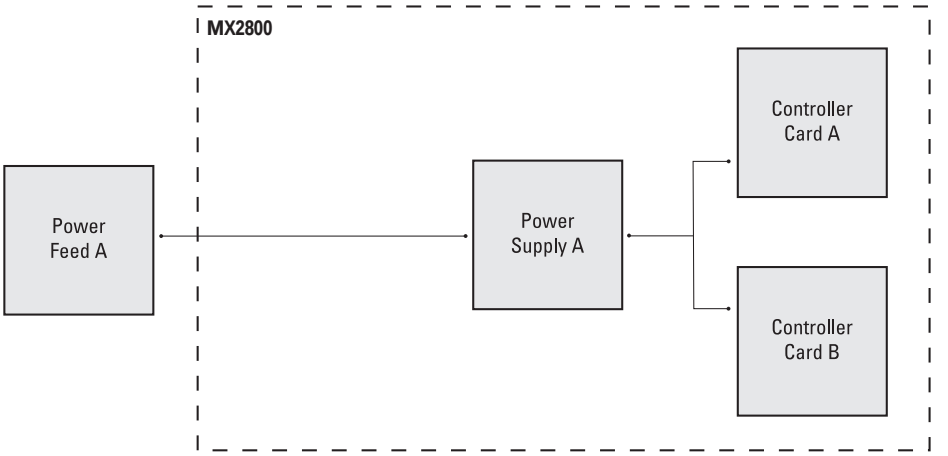


Figure 8-1. Non-Redundant Power Mode

Power supplies are hot-swappable.

POWER SUPPLY RECOVERY MODE

In Power Supply Recovery Mode, two power supply cards are installed and connected to a single power source (see Figure 8-2). In this mode, the MX2800 can continue operation in the event of a power supply failure, without interrupting service. The power supplies are load sharing, so either power supply can provide power for the entire unit.

> **NOTE** *When the unit is configured with dual internal AC power supplies, then this is the only power protection mode available.*

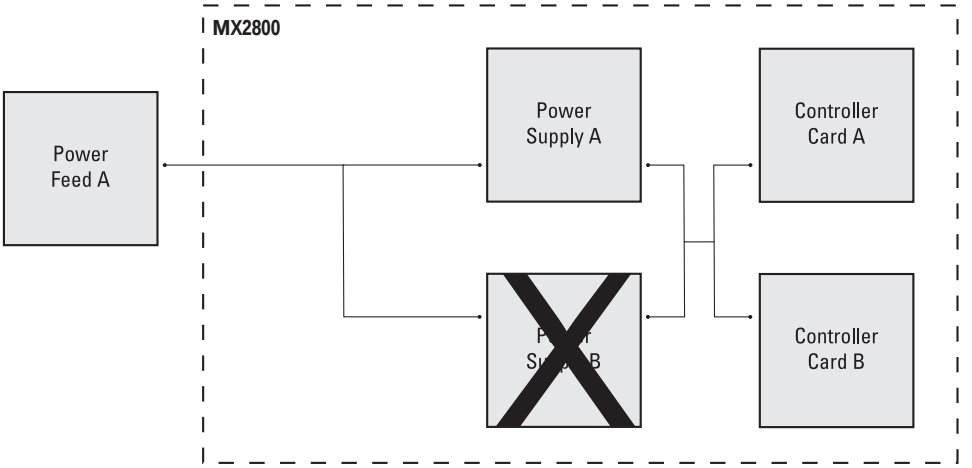


Figure 8-2. Power Supply Failure Recovery Mode

POWER SUPPLY AND SOURCE RECOVERY MODE

In this mode, two power supply cards are installed and are connected to two individual power sources. The MX2800 handles any combination of power source or power supply failure.

Much like the backup design for the controller cards, the MX2800 is able to internally re-route the power source if a power supply card and the *opposite* power source fail. For example, in the illustration given in Figure 8-3, failed **POWER SOURCE A** is connected to healthy **CARD A** and healthy **POWER SOURCE B** is connected to failed **CARD B**. In a case like this, the MX2800 automatically connects **POWER SOURCE B** to **CARD A.**

This configuration is only available with DC power supplies.

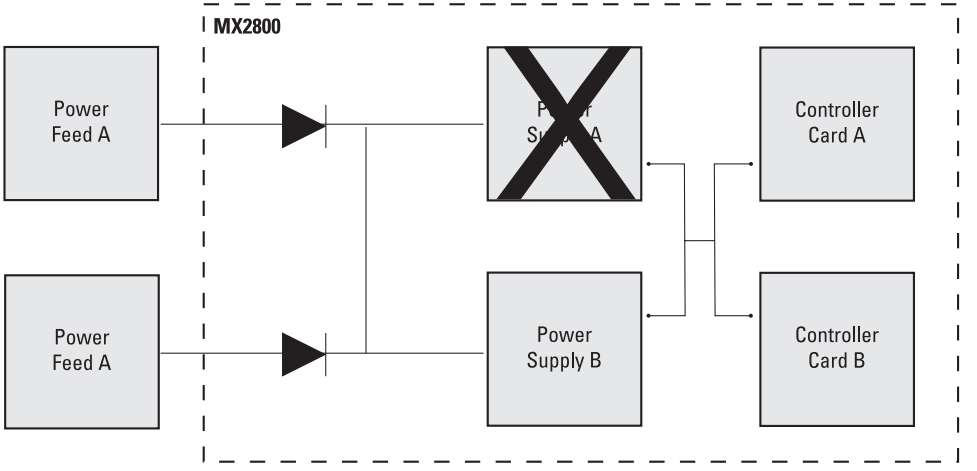


Figure 8-3. Power Supply and Source Failure Recovery Mode

BATTERY BACKUP MODE

With the installation of the ADTRAN Power Supply/Battery Charger (PS/BC) and backup battery pack, the MX2800 is able to continue operation without service interruption in the event of a power outage. This PS/BC (P/N 4175043L2) provides -48 VDC to the MX2800. It receives 115 VAC through a standard plug and wall socket.

The PS/BC maintains the battery at peak charge (-48 V) at all times. If AC power is lost, the unit automatically transfers power to the battery without interrupting service. When AC power returns, the unit switches back to AC power and recharges the battery. For installation instructions, refer to the guide provided with the PS/BC. See Figure 8-4 for an illustration of this setup.

NOTE

The MX2800 can operate on a fully-charged battery for four hours without recharging.

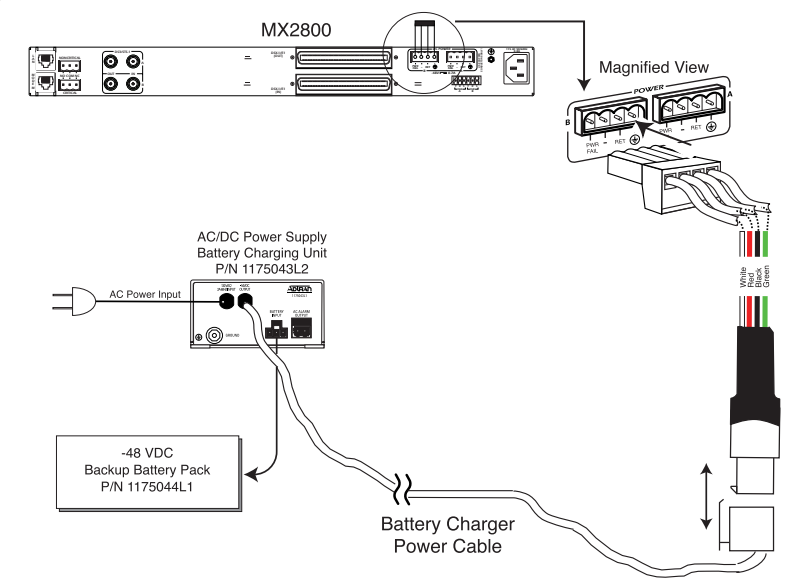


Figure 8-4. Battery Backup System

Chapter 9 Transaction Language 1 (TL1)

INTRODUCTION

Transaction Language 1 (TL1) is a BELLCORE standard used in the input and output messages that pass between Operations Systems (OS) and Network Elements (NE) in telecommunication networks. It was developed to standardize equipment surveillance and memory administration, and to test with a common format.

This release of TL1 primarily supports the interactive and autonomous retrieval of system events as part of a valid TL1 session.

OVERVIEW

TL1 is an ASCII based language that supports both command-response and autonomous (NE) message generation. Commonly, TL1 is used over a X.25 packet network but is completely independent of any physical layer protocols. For the MX2800, TL1 is implemented as a TELNET session or “Raw TCP” session running over either Ethernet or PPP.

In order to initiate a TL1 session successfully, the unit must be properly configured for an Ethernet (LAN) or PPP connection. A valid IP address, gateway address, and a valid subnet mask are required (see Chapter 3. Configuration - *System Management* on page 3-13.) User authentication is also required. An account must be setup before initiating a TL1 session.

An account may be setup via the VT100 menus (Configuration / System Management / User Account Management.) An account includes a username, password, and privileges. The privileges include ADMIN, GUEST, INTERFACE, TEST, and DISABLED (see Table 9-1). ADMIN privileges allow the user to use all supported commands. TEST privileges allow the user to use all supported commands with the exception of modifying the user account information, configuring alarm relays, and setting the MX2800 date and time. INTERFACE privileges allow the user to use all supported commands with the exception of modifying the user account information, setting the MX2800 date and time, configuring alarm relays, and operating loopbacks. GUEST privileges only allow the user to activate the TL1 session, cancel a TL1 session, and retrieve specific system information.

Table 9-1. TL1 Account Privileges

TL1 Command	Guest	Interface	Test	Admin
ACT-USER	X	X	X	X
ALW-MSG-rr	X	X	X	X
CANC-USER	X	X	X	X
DLT-USER-SECU				X
ED-USER-SEC				X
ED-rr (related to loopbacks)			X	X
ED-rr (configuring alarm relays)				X
ED-rr (all remaining)		X	X	X
ENT-USER-SECU				X
INH-MSG-rr	X	X	X	X
OPR-LPBK			X	X
REPT-STAT	X	X	X	X
RLS-LPBK			X	X
RTRV-ALM-rr	X	X	X	X
RTRV-COND-rr	X	X	X	X
RTRV-HDR	X	X	X	X
RTRV-rr	X	X	X	X
RTRV-SYS	X	X	X	X
RTRV-USER-SECU				X
RTRV-VER	X	X	X	X
SET-DAT				X

"X" denotes item is supported by privilege level

To bring up a TL1 TELNET connection (up to eight may be active), a TELNET client is used to request a connection on (TCP) port 3116 (port 2024 is used for "raw" TCP socket access.) Once the TELNET connection is established, it is necessary to initiate a TL1 session. Establishing a TL1 session involves successful user authentication. Until a TL1 session is established, all commands other than those used to initiate or terminate a session will be denied (autonomous messaging is also disabled.) For information on using the Act-User command to initiate a TL1 session, see the section *TL1 Commands* on page 9-6.

TL1 MESSAGES

As stated earlier, TL1 messages are either part of a command-response exchange or are generated autonomously.

The general format for a TL1 command is as follows:

<VERB>[-<MOD1>[-<MOD2>]]:[<TID>]:[<AID>]:[<CTAG>]:[GB](:<PARAMx>(,<PARAMx>)*)*;

Refer to *TL1 Commands* on page 9-6 for a list of TL1 commands supported by the MX2800.

TL1 Responses

There are three types of TL1 responses:

- Acknowledgment messages
- Output Response messages
- Autonomous messages

Acknowledgment Messages

Acknowledgment messages are brief output messages generated in response to received TL1 commands. The MX2800 currently supports two types of acknowledgment messages: In Progress (IP) and All Right (OK).

In Progress

The IP acknowledgment message is usually generated as an interim response message to indicate that a message has been received and

that the command is being executed. IP messages have the following general format:

```
IP <CTAG><CR><LF>
<
```

All Right

The OK acknowledgment message indicates that a command has been received and that the required action was initiated and completed. This message has the following general format:

```
OK <CTAG><CR><LF>
<
```

Output Response Messages

Output Response messages are generated in response to received commands and have the following general format:

```
<CR><LF><LF>
     <SID> <YR>-<MO>-<DAY> <HR>:<MIN>:<SEC><CR><LF>
M    <CTAG> <COMPLETION CODE><CR><LF>
     (<UNQUOTED LINE>|<QUOTED LINE>|<COMMENT><CR><LF>)*
(;|>)
```

For the MX2800, the **COMPLETION CODE** field will contain one of the following values:

- COMPLD - Successful execution of the received command
- DENY - Denial of the received command

When the received command is denied, the line in the message following the **COMPLETION CODE** line will contain a 4-letter error code. See the section *TL1 Error Codes* on page 9-17 for a discussion of possible MX2800 error codes.

The MX2800 specifically uses “quoted line(s)” in the response message of successfully executed **RTRV-ALM** commands. The quoted line format is as follows:

```
<AID>:<NTFCNCDE>,<CONDTYPE>,<SRVEFF>,<OCRDAT>,<OCRTM>,<LOCN>...
```

The **NTFCNCDE** field will contain one of the following values:

- MN - Minor
- MJ - Major
- CR - Critical

Refer to the condition types listed in Table 9-3 on page 9-13 (*MX2800 Alarm Events*) for possible MX2800 **CONDTYPE** codes.

Autonomous Messages

The Autonomous message is sent from the NE to the OS and is not associated with any explicit input message. The MX2800 uses this message to exclusively report alarmed and non-alarmed events. An autonomous message has the following general format:

```
<CR><LF><LF>
    <SID> <YR>-<MO>-<DAY> <HR>:<MIN>:<SEC><CR><LF>
<ALARM CODE> <ATAG> <VERB>[ <MOD1>[ <MOD2>]]<CR><LF>
(<UNQUOTED LINE>|<QUOTED LINE>|<COMMENT><CR><LF>)+
(;|>)
```

Possible values for the **ALARM CODE** field include:

- *C - Critical Alarm
- ** - Major Alarm
- * - Minor Alarm
- A - Non-alarm
- NULL - (blank)

The MX2800 specifically uses “quoted line(s)” in **REPT-ALM** and **REPT-EVT** autonomous messages. The **REPT-ALM** message has the following quoted line format:

```
<AID>:<NTFCNCDE>,<CONDTYPE>,<SRVEFF>,<OCRDAT>,<OCRTM>,<LOCN>...
```

The **NTFCNCDE** field will contain one of the following values:

- CL - Alarm Cleared
- TC - Transient Condition
- MN - Minor
- MJ - Major
- CR - Critical

The **REPT-EVT** message has the following quoted line format:

<AID>:<CONDTYPE>,<CONDEFF>,<OCRDAT>,<OCRTM>,<LOCN>...

The **CONDEFF** field will contain one of the following values:

- CL - Standing Condition Cleared
- SC - Standing Condition Raised
- TC - Transient Condition

For possible **CONDTYPE** codes for both **REPT-ALM** and **REPT-EVT** quoted lines, refer to the condition types listed in Table 9-3 on page 9-13 and Table 9-4 on page 9-16, respectively.

See the section *TL1 Autonomous Messages* on page 9-13 for a list of autonomous messages currently supported by the MX2800.

TL1 COMMANDS

As stated in *TL1 Messages* on page 9-3, the general format for a TL1 command is:

<VERB>[-<MOD1>[-<MOD2>]]:[<TID>]:[<AID>]:[<CTAG>]:[GB](:<PARAMx>(,<PARAMx>)*)*;

Areas of concentration for TL1 support in the MX2800 include session initiation, session termination, and system event reporting. Table 9-2 lists the commands currently supported by the MX2800.

The Target ID (TID) is the same as the unit's Unit ID (See VT100 menus: Configuration/System Management/Equipment Identification.)

Table 9-2. TL1 Commands

ACT-USER::<username>:::<password>;	
Description	Initiates a TL1 session
TID*	Target ID

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

AID	Username (must be present in User Account Management table)
CTAG*	Transaction Number (integer)
PARAM1	Password for associated username
ALW-MSG-{EQPT|rr|ALL};	
Description	Allows the transmission of the requested autonomous alarm(s)
MOD2	Specifies what entity type to allow: EQPT... General Equipment Unit rr ..... Facility or Circuit (i.e. T1, T2, T3) ALL ..... All entity types
TID*	Target ID
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to allow: MN..... minor MJ..... major CR ..... critical ALL.....all notification codes
CANC-USER;	
Description	Terminates a TL1 session
TID*	Target ID
AID*	Username (must be present in User Account Management table)
CTAG*	Transaction Number (integer)
ED-USER-SECU::<username>:::,<password>,,<privileges>;	
Description	Edits the requested TL1 User Account Management table account
TID*	Target ID
AID	Username

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

CTAG*	Transaction Number (integer)
PARAM2	User's new password
PARAM4	User's new privileges: 0..... disabled 1..... guest 2..... interface 4..... test 8..... admin
ENT-USER-SECU::<username>:::<password>,,<privileges>;	
Description	Adds the requested user to the User Account Management table
TID*	Target ID
AID	Username
CTAG*	Transaction Number (integer)
PARAM1	User's password
PARAM3	User's privileges: 0..... disabled 1..... guest 2..... interface 4..... test 8..... admin
DLT-USER-SECU::<username>;	
Description	Removes the requested user from the User Account Management table
TID*	Target ID
AID	Username (must be present in User Account Management table)
CTAG*	Transaction Number (integer)
INH-MSG-{EQPT|rr|ALL};	
Description	Inhibits the transmission of the requested autonomous alarm(s)

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

MOD2	Specifies what entity type to inhibit: EQPT... General Equipment Unit rr ..... Facility or Circuit (i.e. T1, T2, T3) ALL ..... All entity types
TID*	Target ID
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to inhibit: MN..... minor MJ..... major CR ..... critical ALL.....all notification codes
RTRV-HDR;	
Description	Replies with a normal "COMPLD" response
TID*	Target ID
CTAG*	Transaction Number (integer)
RTRV-SYS;	
Description	Retrieves the system type
TID*	Target ID
CTAG*	Transaction Number (integer)
RTRV-VER;	
Description	Retrieves the software version
TID*	Target ID
CTAG*	Transaction Number (integer)
RTRV-USER-SECU;	
Description	Retrieves the current list of users from the User Account Management table
TID*	Target ID
CTAG*	Transaction Number (integer)

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

RTRV-ALM-{EQPT|rr|ALL};	
Description	Retrieves the requested alarm status
MOD2	Specifies what entity type to query: EQPT ... General Equipment Unit rr ..... Facility or Circuit (i.e. T1, T2, T3) ALL ..... All entity types
TID*	Target ID
AID*	Identifies the component to which the desired alarm pertains. Identifiers are integers and are dependent on the entity specified in "MOD2" as follows: for EQPT: 401 ... Generic 402 ... Control Card A 403 ... Control Card B 404 ... Power Supply A 405 ... Power Supply B ALL... all EQPT identifiers (default selection) for T1: 101 ... DS1#1 102 ... DS1#2 . 128 ... DS1#28 ALL... all DS1 circuits (default selection) for T2: 201 ... DS2#1 202 ... DS2#2 . 207 ... DS2#7 ALL... all DS2 circuits (default selection) for T3: 301 ... DS3#1 302 ....DS3 (Control Card A) 303 ....DS3 (Control Card B) ALL... all DS3 circuits (default selection) for ALL: x ..... specific identifier (e.g. "1", "28",etc.,) ALL... all identifiers (default selection)

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to query: MN..... minor MJ..... major CR ..... critical
RTRV-COND-{EQPT|rr|ALL};	
Description	Retrieves the requested condition
MOD2	Specifies what entity type to query: EQPT... General Equipment Unit rr ..... Facility or Circuit (i.e. T1, VT1, STS1) ALL ..... All entity types
TID*	Target ID

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

AID*	Identifies the component to which the desired alarm pertains. Identifiers are integers and are dependent on the entity specified in "MOD2" as follows: for EQPT: 401 ... Generic 402 ... Control Card A 403 ... Control Card B 404 ... Power Supply A 405 ... Power Supply B ALL... all EQPT identifiers (default selection) for T1: 101 ... DS1#1 102 ... DS1#2 . 128 ... DS1#28 ALL... all DS1 circuits (default selection) for T2: 201 ... DS2#1 202 ... DS2#2 . 207 ... DS2#7 ALL... all DS2 circuits (default selection) for T3: 301 ... DS3#1 302 ....DS3 (Control Card A) 303 ....DS3 (Control Card B) ALL... all DS3 circuits (default selection) for ALL: x ..... specific identifier (e.g. "1", "28",etc.,) ALL... all identifiers (default selection)
CTAG*	Transaction Number (integer)
PARAM1*	Specifies what notification code to query: SC..... standing condition

** An asterisk indicates optional command blocks.*

Table 9-2. TL1 Commands (Continued)

SET-DAT:::::<YY-MM-DD>,<HH-MM-SS>;	
Description	Sets the date and time
PARAM1	Date in YY-MM-DD format
PARAM2	Time in HH-MM-SS format

** An asterisk indicates optional command blocks.*

TL1 Autonomous Messages

Autonomous messages provide a mechanism for real time reporting of system events. Although most events reported are alarms, some events are only informational. The **VERB**, **MOD1**, and **MOD2** parameters of the message indicate what type of event has occurred.

*The default setting for autonomous message reporting is **OFF**.*

REPT-ALM indicates an alarm event. Table 9-3 lists possible autonomous messages for alarm events.

Table 9-3. MX2800 Alarm Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM T1	101-128	MN	ACTLPBK	SA	NEND	DS1 In-test
	101-128	MJ	LOS	SA	NEND	Loss Of Signal
	101-128	MJ	FACTERM	NSA	NEND	T1 Failure
REPT ALM T2	201-207	MJ	OOF	SA	NEND	T2 Out Of Frame
	201-207	MJ	RAI	SA	FEND	T2 Remote Alarm Indication

Table 9-3. MX2800 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM T3	301	MN	TSA	SA	NEND	DS3 In-test
	301	MN	EXT-DS3	SA	FEND	FEND DS3 Equipment Failure
	301	MN	LOS	SA	FEND	FEND DS3 Loss of Signal
	301	MN	OOF	SA	FEND	FEND DS3 Out Of Frame
	301	MN	AIS	SA	FEND	FEND DS3 Alarm Indication Signal
	301	MN	ISD	SA	FEND	FEND DS3 Idle
	301	MN	EXT-DS3	NSA	FEND	FEND DS3 Equipment Failure
	301	MN	EXT	NSA	FEND	FEND Common Equipment Failure
	301	MN	LOS-M	SA	FEND	FEND Multiple DS1 Loss Of Signal
	301	MN	EXT-DS1	SA	FEND	FEND DS1 Equipment Failure SA
	301	MN	LOS-S	SA	FEND	FEND Single DS1 Loss Of Signal
	301	MN	EXT-DS1	NSA	FEND	FEND DS1 Equipment Failure NSA
	302 (Ctrl A)	CR	LOS	SA	NEND	DS3 Loss Of Signal
	303 (Ctrl B)					
	302 (Ctrl A)	CR	OOF	SA	NEND	DS3 Out of Framel
	303 (Ctrl B)					
	302 (Ctrl A)	MJ	RAI	SA	FEND	DS3 Remote Alarm Indicationl
	303 (Ctrl B)					
	302 (Ctrl A)	MN	ISD	SA	FEND	DS3 Idle
	303 (Ctrl B)					

Table 9-3. MX2800 Alarm Events (Continued)

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT ALM EQPT	401 (General)	MN	CTNEQPT	NSA	NEND	Controller Communication Failure
	402 (Ctrl A)	MN	CTNEQPT	NSA	NEND	Controller Card Failure
	403 (Ctrl B)					
	402 (Ctrl A)	CR	TRMT	SA	NEND	DS3 Transmit Loss Of Signal
	403 (Ctrl B)					
	404 (PS A)	MN	PWR	NSA	NEND	Power Supply Failure
	405 (PS B)					
	404 (PS A)	MN	MISC	NSA	NEND	Power Supply Communication Failure
	405 (PS B)					
	404 (PS A)	MN	PWR-5	NSA	NEND	Power Supply Low
	405 (PS B)					
	404 (PS A)	MN	BATDSCHRG	NSA	NEND	Power Supply Charger Fail
	405 (PS B)					
	404 (PS A)	MJ	LWBATVG	NSA	NEND	Power Supply Battery Low
	405 (PS B)					
	404 (PS A)	MN	HITEMP	NSA	NEND	Power Supply Temp High
	405 (PS B)					
	404 (PS A)	MJ	HITEMP	NSA	NEND	Power Supply Temp Critical
	405 (PS B)					
	404 (PS A)	MN	CLFAN	NSA	NEND	Power Supply Fan Failure
	405 (PS B)					

REPT-EVT indicates an informational event. Table 9-4 lists possible autonomous messages for informational events.

Table 9-4. MX2800 Informational Events

	AID	Notification Code	Condition Type	Service Affecting	Location	Description
REPT EVT T1	101-128	EVT	BPV	NSA	NEND	Bipolar Violation
	101-128	EVT	AIS	NSA	FEND	T1 Line AIS (LAIS)
	101-128	EVT	AISUONES	NSA	FEND	T1 Carrier AIS (CAIS)
REPT EVT T2	201-207	EVT	AIS	NSA	FEND	T2 AIS
REPT EVT T3	302 (CTRL A)	EVT	AIS	NSA	FEND	DS3 Alarm Indication Signal
	303 (CTRL B)					
	302 (CTRL A)	EVT	BPV	NSA	NEND	Excessive DS3 Bipolar Violation
	303 (CTRL B)					
REPT EVT EQPT	402 (CTRL A)	EVT	WKSWPR	NSA	NEND	Protection Switch
	401 (General)	EVT	ESW	NSA	NEND	Excessive Protection Switch
	402 (CTRL A)	EVT	PROTNA	NSA	NEND	Controller Card Removed
	403 (CTRL B)					
	402 (CTRL A)	EVT	NORMAL	NSA	NEND	Controller Card Inserted
	403 (CTRL B)					
	402 (CTRL A)	EVT	NORMAL	NSA	NEND	Power Supply Card Inserted
	403 (CTRL B)					
	402 (CTRL A)	EVT	PROTNA	NSA	NEND	Power Supply Card Removed
	403 (CTRL B)					

TL1 ERROR CODES

When the MX2800 denies a received TL1 command, the Output Response message has an associated 4-letter error code indicating the reason for denial. Table 9-5 lists possible error codes.

Table 9-5. TL1 Error Codes

Error Code	Description
ICNV	Input, Command Not Valid
IITA	Input, Invalid Target Identifier
IPNV	Input, Parameter Not Valid
PLNA	Privilege, Login Not Active
IIAC	Input, Invalid Access Identifier
SRDF	Status, Requested Operation Failed
SSRE	Status, System Resources Exceeded

TL1 Editing

TL1 editing commands allow the MX2800 to be provisioned through a TL1 session rather than through the menu system that is accessed using a VT100 terminal emulator. TL1 user account information must be provisioned through the a console menu session or TL1 session. Once a TL1 session has been initiated using the ACT-USER command described earlier in this chapter, the TL1 editing commands may be used. The standard format for an edit command is as follows:

ED-rr::<aid>:<ctag>:::<keyword>=<value>

- rr is T1, T2, T3, or EQPT
- <aid> is the Access Identifier
- <ctag> is a 1 to 6 character correlation tag (echoed in response)
- <keyword> is one of the entries from the following data dictionaries
- <value> is one of the enumerated types in the data dictionaries, an integer, or Y / N depending on the TYPE.

<aid> and <ctag> are optional parameters. The placemarker (:) must remain in place. The default <aid> is ALL and the default <ctag> is 1.

TL1 Editing Examples:

ED-T1::106:1:::LBO=133TO266; (this would edit line build out for T1 #6 to be 133 to 266)

ED-T2::205:2:::DS2CFGMODE=T1; (this would configure T2 #5 for T1 mode versus E1)

ED-T3::300:3:::DS3MAXNUMSW=3; (this would set maximum number of switches for controller cards to 3)

ED-EQPT::400:4:::PSTEMPCRITRLY=Y; (this would enable the alarm relay for power supply temperature critical)

To view the value of a parameter, a retrieve (RTRV) command is used. The standard format for the RTRV command is as follows:

RTRV-rr::<aid>:<ctag>:::<keyword>;

- rr is T1, T2, T3, or EQPT
- <aid> is the Access Identifier
- <ctag> is a 1 to 6 character correlation tag (echoed in response)
- <keyword> is one of the entries from the following data dictionaries

<aid> and <ctag> are optional parameters. The placemarker (:) must remain in place. The default <aid> is ALL and the default <ctag> is 1.

TL1 RTRV examples:

RTRV-R1::109:4; (this would return the values for all parameters related to T1 #9)

If no parameter is specified, all valid parameters related to the <aid> will be retreived.

RTRV-T1::106:1:::LBO; (this would return the value of line build out for T1 #6)

RTRV-T2::205:2:::DS2CFGMODE; (this would return the configuration mode of T2 #5)

RTRV-T3::300:3:::DS3MAXNUMSW; (this would return the setting for the maximum number of switches for controller cards)

RTRV-EQPT::400:5:::PSTEMPCRITRLY; (this would return the status of the alarm relay for power supply temperature critical)

Data Dictionaries:

The data dictionaries that follow are to be used while performing TL1 editing or retrieve commands. Each data dictionary contains four columns. The first column "KEYWORD" gives the values to be placed in the <keyword> portion of the edit command. The second column "TYPE" describes the type of <value> that is required to be entered in the edit command. ENUM requires a text and/or number string to be entered as the <value>. Y/N requires a "Y" or "N" representing "yes" or "no" to be entered as the <value>. INT requires that an integer be entered as the <value>. The third column "DOMAIN" describes valid entries that may be entered into the <value> portion of the edit command. The fourth column "DESCRIPTION" explains what each edit or retrieve command does.

The following data dictionary (Table 9-6) contains entries that are used to edit or retrieve options for the DS3 portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be "T3" and the <aid> value should be one of the following:

300 - All DS3 Circuits
301 - DS3 #1
302 - DS3 Control Card A
303 - DS3 Control Card B

Table 9-6. TL1 Editing Data Dictionary for DS3

Keyword	Type	Domain	Description
ACTIVECONTROLLER	ENUM	One of the following: • A • B	Selects which controller card is active.
CARDSWRLY	Y/N	Y or [N]	Identifies status of System Protection Switch alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

Table 9-6. TL1 Editing Data Dictionary for DS3 (Continued)

Keyword	Type	Domain	Description
DIAGDS3	ENUM	One of the following: • DATAMODE • LINELPBK • DIGLPBK • METLPBK • REMLPBK • ALLT1	Enables the selected DS3 Loopback.
DS3AISRLY	Y/N	Y or [N]	Identifies status of DS3 AIS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS3CVTHRS	ENUM	One of the following: • Disable • 1E3 • 1E4 • 1E5 • 1E6	Indicates a limit on the number of code violations accepted by the unit over the DS3 before the unit switches controller cards. • 1E3 - 1 out of every 1,000 bits contains a CV • 1E4 - 1 out of every 10,000 bits contains a CV • 1E5 - 1 out of every 100,000 bits contains a CV • 1E6 - 1 out of every 1,000,000 bits contains a CV
DS3LOFRLY	Y/N	Y or [N]	Identifies status of DS3 LOF alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS3LOSRLY	Y/N	Y or [N]	Identifies status of DS3 LOS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS3MAXNUMSW	INT	0, 1, 2, ..., N	Maximum number of times per hour the unit is allowed to switch between controller cards. If number is exceeded the unit will issue a trap.
DS3MINSWPERIOD	INT	0, 1, 2, ..., N	Number of seconds that must pass after a protection switch before another protection switch will be allowed.

Table 9-6. TL1 Editing Data Dictionary for DS3 (Continued)

Keyword	Type	Domain	Description
DS3PROT	Y/N	Y or [N]	Identifies status of DS3 protection switching. • Yes (Y) - enables DS3 protection switching • No (N) - disables DS3 protection switching
DS3RAIRLY	Y/N	Y or [N]	Identifies status of DS3 RAI alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS3TLOSRLY	Y/N	Y or [N]	Identifies status of DS3 TLOS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS3XCVRLY	Y/N	Y or [N]	Identifies status of DS3 XCV alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
FMT	ENUM	One of the following: • CBIT • M13	Sets framing format to match the format of the receive signal at the network interface.
LINELEN	ENUM	One of the following: • LONG • SHORT	Identifies Network DS3 line length. • LONG - exceeds 225 feet. • SHORT - less than 225 feet.
RMTLPBK	ENUM	One of the following: • DISABLE • EITHER • FEAC • CBIT	Indicates whether the unit will respond to remote loopbacks over FEAC, CBIT, EITHER, or if remote loopbacks are disabled.
SYSCARDARLY	Y/N	Y or [N]	Identifies status of System Controller Card A alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
SYSCARDBRLY	Y/N	Y or [N]	Identifies status of System Controller Card B alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
SYSCARDCOMMRLY	Y/N	Y or [N]	Identifies status of System Communication Fail alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

Table 9-6. TL1 Editing Data Dictionary for DS3 (Continued)

Keyword	Type	Domain	Description
SYSCARDRLY	Y/N	Y or [N]	Identifies status of System Controller Card alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
TMG	ENUM	One of the following: • LPD • INT	Identifies timing supply for the DS3. LPD - loop timed. • LPD - loop timed • INT - internal timing source

The following data dictionary (Table 9-7) contains entries that are used to edit or retrieve options for the DS2 portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be "T2" and the <aid> value should be one of the following:

201 - DS2#1
202 - DS2#2
.
.
207 - DS2#7

Table 9-7. TL1 Editing Data Dictionary for DS2

Keyword	Type	Domain	Description
DIAGDS2TESTSTATE	ENUM	One of the following: • DATAMODE • NETWORK	Identifies DS2 Diagnostic Loopback. NETWORK selects the available loopback. DATAMODE ends a test in progress.
DS2AISRLY	Y/N	Y or [N]	Identifies status of DS2 AIS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DS2CFGMODE	ENUM	One of the following: • T1 • E1	Identifies DS2 Configuration. • T1sets DS2 configuration to M12 (4xT1). • E1 sets DS2 configuration to G.747 (3xE1).
DS2LOFRLY	Y/N	Y or [N]	Identifies status of DS2 LOF alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

Table 9-7. TL1 Editing Data Dictionary for DS2 (Continued)

Keyword	Type	Domain	Description
DS2RAIRLY	Y/N	Y or [N	Identifies status of DS2 RAI alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

The following data dictionary (Table) contains entries that are used to edit or retrieve options for the DSX portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be "T1" and the <aid> value should be one of the following:

101 - DS1#1
102 - DS1#2
.
.
128 - DS1#28

Table 9-8. TL1 Editing Data Dictionary for DS1

Keyword	Type	Domain	Description
DIAGDSXTESTSTATE	ENUM	One of the following: • DATAMODE • TRIBUTARY • ANALOGNET • DIGNET • CODEC • REMLPBK • CSULPBK • CSUBERT • LINEBERT	Identifies DSX Diagnostic Loopbacks. Choose an available loopback. DATAMODE ends a test in progress.
DSXCAISRLY	Y/N	Y or [N]	Identifies status of DSX CAIS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DSXCFGLINESWPROT	ENUM	One of the following: • DISABLE • ENABLE • UNAVAIL	

Table 9-8. TL1 Editing Data Dictionary for DS1 (Continued)

Keyword	Type	Domain	Description
DSXCFGSTATE	ENUM	One of the following: • DISABLE • ENABLE • UNAVAIL • AUTO	Identifies state of T1/E1 as Disabled, Enabled, Unavailable, or Auto Enable.
DSXCVTHRS	ENUM	One of the following: • Disable • 1E3 • 1E4 • 1E5 • 1E6	Indicates a limit on the number of code violations accepted by the unit over a single T1/E1 before the unit switches controller cards. • 1E3 - 1 out of every 1,000 bits on a single T1/E1 contains a CV • 1E4 - 1 out of every 10,000 bits on a single T1/E1 contains a CV • 1E5 - 1 out of every 100,000 bits on a single T1/E1 contains a CV • 1E6 - 1 out of every 1,000,000 bits on a single T1/E1 contains a CV
DSXLAISRLY	Y/N	Y or [N]	Identifies status of DSX LAIS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DSXLBKDETECTION	ENUM	One of the following: • DISABLE • CSU • NIU • UNAVAIL	Identifies for each T1/E1 interface whether the T1/E1 will respond to loopback requests.
DSXLOSRLY	Y/N	Y or [N]	Identifies status of DSX LOS alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
DSXPROTTHRS	INT	1-28	Number of Enabled lines that must fail before a protection switch occurs
DSXXCVRLY	Y/N	Y or [N]	Identifies status of DSX XCV alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

Table 9-8. TL1 Editing Data Dictionary for DS1 (Continued)

Keyword	Type	Domain	Description
LBO	ENUM	One of the following: • 0TO133 • 133TO266 • 266TO399 • 399TO533 • 533TO655 • MINUS7R5 • E10TO3000 • UNAVAIL	Identifies the line length for each T1 interface according to the distance from the MX2800 to the DTE device. • 0TO133, 133TO266, 266TO399, 399TO533, 533TO655 - distance in feet • MINUS7R5 - -7.5dB length • E10TO3000 - setting for E1 • UNAVAIL - unavailable
LINECDE	ENUM	One of the following: • AMI • B8ZS • E1AMI • E1HDB3 • UNAVAIL	Identifies line code for T1/E1s to match connected devices.

The following data dictionary (Table) contains entries that are used to edit or retrieve options for the equipment portion of the MX2800. When performing TL1 edit commands from this table, the value of rr should be "EQPT" and the <aid> value should be one of the following:

400 - All EQPT identifiers
401 - Generic
402 - Control Card A
403 - Control Card B
404 - Power Supply A
405 - Power Supply B

Table 9-9. TL1 Editing Data Dictionary for EQPT

Keyword	Type	Domain	Description
DIAGBERTCLEARCOUNT	Y/N	Y or [N]	Clears BERT Count.
DIAGBERTCOUNT	INT	0, 1, 2, ..., N	Error Count.
DIAGBERTSYNC	ENUM	One of the following: • NOSYNC • SYNC	Identifies state of Pattern Synchronization.

Table 9-9. TL1 Editing Data Dictionary for EQPT (Continued)

Keyword	Type	Domain	Description
DIAGLPBKTIMEOUT	ENUM	One of the following: • DISABLE • 1-MIN • 5-MINL • 10-MIN • 15-MIN • 30-MIN • 45-MIN • 1-HR	Identifies the amount of time before a Diagnostic Loopback will timeout.
DIAGRESET	Y/N	Y or [N]	Resets Diagnostic Loopbacks.
PSBATTERYLOWRLY	Y/N	Y or [N]	Identifies status of Power Supply Battery Low alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSCHARGERFAILRLY	Y/N	Y or [N]	Identifies status of Power Supply Charger Fail alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSFANFAILRLY	Y/N	Y or [N]	Identifies status of Power Supply Fan Fail alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSMALFNCRLY	Y/N	Y or [N]	Identifies status of Power Supply Malfunction alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSPOWERFAILRLY	Y/N	Y or [N]	Identifies status of Power Supply Power Fail alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSPOWERLOWRLY	Y/N	Y or [N]	Identifies status of Power Supply Power Low alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSTEMPCRITRLY	Y/N	Y or [N]	Identifies line code for Power Supply Temperature Critical alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm
PSTEMPHIGHRLY	Y/N	Y or [N]	Identifies line code for Power Supply Temperature High alarm relay. • Yes (Y) - enables alarm • No (N) - disables alarm

TL1 Loopback Commands:

The OPR-LPBK and RLS-LPBK commands are provided as an alternative to ED commands as a way to perform loopbacks through TL1. The general format for these commands is as follows:

OPR-LPBK-{T1 | T2 | T3}:<tid>:<aid>:<ctag>:<locn>,,,<lpbktype>;

RLS-LPBK-{T1 | T2 | T3}:<tid>:<aid>:<ctag>:<locn>,,,<lpbktype>;

The following table will describe each of the DS3 loopbacks that can be initiated or released with these commands.

Table 9-10. DS3 TL1 Loopback Commands

Verb	MOD2	<aid>	<locn>	<lpbktype>	Description
OPR	T3	3xy	NEND	LINE	Initiates the DS3 Line Loopback
RLS	T3	3xy	NEND	LINE	Releases the DS3 Line Loopback
OPR	T3	3xy	NEND	DIGLPBK	Initiates the DS3 Digital Loopback
RLS	T3	3xy	NEND	DIGLPBK	Releases the DS3 Digital Loopback
OPR	T3	3xy	NEND	TERMINAL	Initiates the DS3 Metallic Loopback
RLS	T3	3xy	NEND	TERMINAL	Releases the DS3 Metallic Loopback
OPR	T3	3xy	FEND	LINE	Initiates the DS3 Remote Loopback
RLS	T3	3xy	FEND	LINE	Releases the DS3 Remote LoopbacK
OPR	T3	3xy	FEND	ALLT1	Initiates the DS3 All T1/E1 Loopback
RLS	T3	3xy	FEND	ALLT1	Releases the DS3 All T1/E1 Loopback
RLS	T3	3xy			Releases any active DS3 Loopback

For the above DS3 related commands, xy may be 00 through 03.

The following table will describe each of the DS2 loopbacks that can be initiated or released with these commands.

Table 9-11. DS2 TL1 Loopback Commands

Verb	MOD2	<aid>	<locn>	<lpbktype>	Description
OPR	T2	2xy	NEND	NETWORK	Initiates the DS2 Network Loopback
RLS	T2	2xy	NEND	NETWORK	Releases the DS2 Network Loopback
RLS	T2	2xy			Releases any active DS2 Loopback

NOTE

For the above DS2 related commands, xy may be 01 through 07 (corresponding to the desired DS2 channel.)

The following table will describe each of the DS1 loopbacks that can be initiated or released with these commands.

Table 9-12. DS1 TL1 Loopback Commands

Verb	MOD2	<aid>	<locn>	<lpbktype>	Description
OPR	T1	1xy	NEND	NETWORK	Initiates the DS1 Tributary Loopback
RLS	T1	1xy	NEND	NETWORK	Releases the DS1 Tributary Loopback
OPR	T1	1xy	NEND	TERMINAL	Initiates the DS1 Analog Loopback
RLS	T1	1xy	NEND	TERMINAL	Releases the DS1 Analog Loopback
OPR	T1	1xy	NEND	DIGNET	Initiates the DS1 Digital Line/Net Loopback
RLS	T1	1xy	NEND	DIGNET	Releases the DS1 Digital Line/Net Loopback
OPR	T1	1xy	NEND	CODEC	Initiates the DS1 Codec Line/Net Loopback
RLS	T1	1xy	NEND	CODEC	Releases the DS1 Codec Line/Net Loopback
OPR	T1	1xy	FEND	DS1FEAC	Initiates the DS1 Remote Loopback
RLS	T1	1xy	FEND	DS1FEAC	Releases the DS1 Remote Loopback
OPR	T1	1xy	FEND	CSULPBK	Initiates the DS1 CSU Loopback
RLS	T1	1xy	FEND	CSULPBK	Releases the DS1 CSU Loopback
OPR	T1	1xy	FEND	CSUBERT	Initiates the DS1 CSU Loopback w/BERT
RLS	T1	1xy	FEND	CSUBERT	Releases the DS1 CSU Loopback w/BERT
RLS					Releases any active DS1 Loopback

NOTE

For the above DS1 related commands, xy may be 01 through 28 (corresponding to the desired DS1 channel).

Appendix A Acceptance Test Procedure

OVERVIEW

This appendix describes the procedures to be used in performing acceptance testing of the Total Access MX2800 M13 Multiplexer. It is assumed that the MX2800 has already been installed, powered-up, and cabled to the DSX-1 and DSX-3 cross connects, according to the specifications described in the MX2800 User Manual and local operating company practices.

The MX28000 is an M13 multiplexer used to consolidate 28 DS1 circuits on to a DS3 circuit. The unit can be equipped in various ways. The first step will be to take an inventory of which options are installed. This will determine what tests can be performed. In general, this document will address the following areas:

- Configuring the unit for the test
- Testing of all 28 DS1 circuits to insure that they pass data error free
- Verification that alarms are generated and passed to external alarm systems
- Testing of system redundancy, including power supplies and controller cards
- Restoring the unit to the desired configuration
- Completing the ATP checklist

VERIFICATION OF INSTALLED OPTIONS

For TELCO use, the installed options determine the level of redundancy the unit supports. There may be one or two Power Supply cards, and one or two Controller cards present. To see what is installed, remove the front panel by loosening the Phillips screw on the left side, and hinging the front panel off to the right. The power supply cards are the smaller cards on the left side, and the controller cards are the large cards towards the center. Visually note which cards are installed, record in the table below, and replace the front panel.

Power Supply A (far left slot) installed?	
Power Supply B (next slot to right) installed?	
Controller A (lower controller card) installed?	
Controller B (upper controller card) installed?	

This information will be used during the Redundancy tests later in this document.

CONFIGURING THE UNIT FOR TEST

Before the desired tests can be performed, a minimal amount of configuration must be done on the MX2800. It is necessary to gain access to the provisioning menus through the Craft Port, then set the desired parameters for the DS1 ports, the DS3 port, and the alarm conditions. The following paragraphs will step through the process.

Accessing the Craft Port

The MX2800 is shipped with a flat silver-satin cable that plugs into “Craft” jack on the front panel, and a DB-9 adapter that allows the silver-satin cable to plug into the COMM port on laptop computer. Make these connections, and start up a terminal emulation program on the laptop (i.e. Procomm, Crosstalk, HyperTerminal, etc) set to VT100 emulation, and a character format of 9600, N, 8, 1.

Press the <**ENTER**> key several times, and a "Username" prompt should appear. The default factory username is **adtran**. A "Password" prompt appears after the username is entered. The default factory password is **adtran**. After the password is accepted, the **TOTAL ACCESS MX2800 MAIN MENU** should appear. This is the menu from which all other functionality is accessed, and will be used in subsequent steps.

For help in navigating the menu screens, or if difficulty is encountered, please refer to the *Craft Port* section of Chapter 2 (Installation and Operation) for more details.

Provisioning the DS3 Port

In order for the MX2800 to pass data completely through the unit, both the DS3 and DS1 ports need to be setup. The provisioning of the DS3 port will be done in this section, and the provisioning of the DS1 ports will be covered in the following section.

From the **MAIN MENU**, select **#3 – CONFIGURATION**, then select **NETWORK INTERFACE**. **The NETWORK CONFIGURATION** screen should appear. Set each of the options on this screen as follows:

DS3 Configuration

- Framing = C-Bit
- Line Length = (Use 0-225 ft. or 225-450 ft., depending on the distance to the DS3 Cross connect bay)
- Timing = Local
- Remote Loopbacks = FEAC / C-Bit
- XCV Threshold = Disabled

Protection Configuration

- Active Controller = A
- Network Protection = Disabled
- Max Switch Threshold = 3
- Min. Switching Period (sec.) = 10

Miscellaneous

- Loopback Timeout = 5 min.

DS2 Configuration

- DS2 #1 = M12(4xT1)
- DS2 #2 = M12(4xT1)
- DS2 #3 = M12(4xT1)
- DS2 #4 = M12(4xT1)
- DS2 #5 = M12(4xT1)
- DS2 #6 = M12(4xT1)
- DS2 #7 = M12(4xT1)

For more information on any of the above options, please refer to the *Network Interface* section of Chapter 3 (Configuration) in the MX2800 User Manual.

Press the <**ESC**> key to get back to the main **CONFIGURATION MENU**.

Provisioning the DS1 Ports

From the main **CONFIGURATION** menu screen, select T1/E1 Interface. The **CONFIGURE T1/E1 INTERFACE** menu should be visible. Since there are 28 ports to configure, and all of them need to be set identically, the "**SET MULTIPLE**" provisioning feature of the MX2800 will be used extensively during this step.

Select #1 – T1/E1 State, then select #29 Set Multiple. Set First = 1, Last = 28, State = ENABLED, then Apply Settings. Press <**ESC**> twice to return to the **CONFIGURE T1/E1 INTERFACE** menu.

Select #2 – T1/E1 Line Coding, then select #29 Set Multiple. Set First = 1, Last = 28, Line Coding = B8ZS/HDB3, then Apply Settings. Press <**ESC**> twice to return to the **CONFIGURE T1/E1 INTERFACE** menu.

Select #3 – T1/E1 Line length, then select #29 Set Multiple. Set First = 1, Last = 28, Line length = 0-133ft. , then Apply Settings. Hit <**ESC**> twice to return to the Configure T1/E1 Interface menu.

Select #4 – T1/E1Loopback Detection, then select #29 Set Multiple. Set First = 1, Last = 28, Loopback Detection = Disabled, then Apply Settings. Press <**ESC**> twice to return to the Configure T1/E1 Interface menu.

Select #5 – T1 / Circuit Protection, then select #29 Set Multiple. Set First = 1 and Last = 28. Set Circuit Protection = Enabled, then apply settings. Press **<ESC>** once and select #30 Protection Threshold. Enter a value of 1 and press **<ESC>** once to return to the **CONFIGURE T1/E1 INTERFACE** menu.

Select #7 –XCV Threshold, then select disabled.

Press the <**ESC**> key to get back to the main **CONFIGURATION MENU**.

Alarm Relay Configuration

Although there are numerous alarm configuration options available on the MX2800, our interest here is only to have the ability to generate one CRITICAL and one NON-CRITICAL alarm. This will allow us to test that the two sets of alarm contacts are operating and wired correctly, and bringing the appropriate alarm indications back to the Central Office alarm panel.

From the main **CONFIGURATION** menu, select #3 **SYSTEM MANAGEMENT**. From this menu, select Alarm Relay Configuration.

Select #1 LOS = Enabled (This will generate a CRITICAL alarm when the DS3 port sees a Loss of Signal condition.).

Select #13 LOS = Enabled (This will generate a NON-CRITICAL alarm when one of the DS1 ports sees a Loss of Signal condition). Press **<ESC>** two times to return to the **CONFIGURATION** menu.

Select #5 - **SAVE CONFIG**. "Config Saved," will appear at the bottom of the screen. Then press **<ESC>** to return to the main menu.

VERIFICATION OF DATA THROUGHPUT

Now that the essential provisioning has been entered into the MX2800, we can proceed with the actual acceptance testing of the unit. The first test is to verify that the MX2800 will pass traffic between the DS1 port(s) and the DS3 port. Three different methods of testing are presented, and one of the three is selected based on what test equipment is available. The methods are presented in order of preference. All of the tests are performed at the DSX-1 and DSX-3 Cross-connect bays so that not only the MX2800 circuitry is tested, but the Central Office cabling as well.

DS1 Daisy-chain to DS3 (Hard) Loopback (Method #1)

This is the most desirable of the alternative tests, since it effectively loads all 28 ports of the MX2800 up with traffic at the same time.

Equipment Required: 1 - DS1 Test set capable of running a BERT test
28 – Mini-Bantam test cords
1 – DS3 DSX test cord

1. At the DSX-3 cross-connect, use a test cord to loop the DS3 from the MX2800 back on itself.
2. At the DSX-1 cross-connect, insert the TX output of the DS1 test set into the INPUT of the first DS1 channel of the MX2800.
3. At the DSX-1 cross-connect, install a Bantam test cord from the OUTPUT of the first DS1 channel to the INPUT of the second DS1 channel. Then connect a second Bantam test cord from the OUTPUT of the second DS1 channel to the INPUT of the third DS1 channel. Repeat this procedure for all 28 DS1 channels.
4. Connect the OUTPUT of the 28^{th} DS1 channel to the RX input of the DS1 test set.
5. Set the test set options for ESF/B8ZS and run a standard BERT test per operating company practices.
6. All alarms should clear, and the BERT test should run error free.
7. Leave this test setup in place, as it will be used during the redundancy testing in the Controller Card Redundancy section later in this appendix.

If problems are encountered, referring to Chapter 4 (*Status*) and Chapter 5 (*Statistics*) in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

DS1 to DS3 “Head to Head” Test (Method #2)

This test tests one DS1 channel at a time, using a DS1 test set at the DSX-1 cross-connect, and a DS3 test set at the DSX-3 cross connect.

Equipment Required: 1 – DS1 Test Set capable of running a BERT test
1 – DS3 Test Set capable of accessing and running a BERT on a single DS1

1. At the DSX-3 cross-connect bay, connect the DS3 test set to the DS3 coming from the MX2800. Configure the DS3 test set for C-bit Framing, and the appropriate LBO. Configure the DS3 test set to drop out DS1 #1 and to run a BERT on it in ESF / B8ZS mode.
2. At the DSX-1 cross-connect bay, connect the DS1 test set to the first DS1 channel of the MX2800. Configure the test set for the same BERT pattern as the DS3 test set is sending.
3. The DS1 #1 LED will turn solid green. All other unterminated DS1 port LEDs will be red. Data will pass error free between the DS3 test set and the DS1 test set.
4. Repeat for DS1 channels 2-28 by moving the DSX-1 test cables, and reconfiguring the DS3 test set to drop out the appropriate DS1 channel under test. Ensure that the LED for the DS1 under test turns green.
5. Leave this test set-up in place, as it will be used during the redundancy testing in the Controller Card Redundancy section later in this appendix.

If problems are encountered, referring to Chapter 4 (*Status*) and Chapter 5 (*Statistics*) in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

DS1 to DS3 (Hard) Loopback (Method #3)

This test requires minimal test equipment, and only tests one DS1 at a time.

Equipment Required: 1 – DS1 Test Set capable of running a BERT test
1 – DS3 DSX Test Cord

1. At the DSX-3 cross-connect bay, use a test cord to loop the DS3 from the MX2800 back on itself.
2. At the DSX-1 cross-connect bay, insert the TX output of the DS1 test set to the DS1 INPUT of the first channel of the MX2800. Connect the RX input of the test set to the OUTPUT of the first DS1 channel of the MX2800.
3. Set the DS1 test set for ESF / B8ZS and the desired BERT pattern.

4. The DS1 #1 LED will turn solid green. All other unterminated DS1 port LEDs will be red. Data will pass error free.
5. Repeat the above procedure for DS1 channels 2-28. Ensure that the LED for the DS1 under test turns green.
6. Leave this test set-up in place, as it will be used during the redundancy testing in the Controller Card Redundancy section later in this appendix.

If problems are encountered, referring to Chapter 4 (*Status*) and Chapter 5 (*Statistics*) in the MX2800 User Manual can help in troubleshooting and isolating where the problem lies.

VERIFICATION OF ALARMS

The MX2800 has two sets of alarm relay contacts available for connection to external alarm systems. They are located on the back panel, and are designated as CRITICAL and NON-CRITICAL (the Critical / Major / Minor, and Audible / Visual nomenclature is not used on the MX2800 product). The CRITICAL alarm is activated when the DS3 port experiences a Loss of Signal (LOS) event. The NON-CRITICAL alarm is activated when one of the 28 DS1 ports experiences a Loss of Signal event. Normally OPEN and Normally CLOSED contacts are available for each of the two relay outputs.

The tests are described below:

CRITICAL Alarm Relay Test

This test will actuate the CRITICAL alarm relay contacts of the back panel of the MX2800.

1. Ensure that the DS3 is not in alarm. The easiest way to do this is to install a hard loopback of the DS3 towards the MX2800 using a test cord at the DS3 DSX cross-connect bay. With the loopback in place, all alarms should clear on the DS3 port. (Use the STATUS LED's on the front panel to determine the state of the DS3 port. Refer to Chapter 2 (Installation and Operation) for the meanings of the LED states)
2. Remove the loopback from the DS3, and insure that no other DS3 signal is entering the MX2800 through the DSX-3 Cross-connect bay (i.e. another upstream MUX).

3. The MX2800 should go into CRITICAL alarm, thus closing the relay contacts and sending the alarm to the Central Office alarm monitoring equipment.
4. Verify that the alarm is being properly reported.

NON-CRITICAL Alarm Relay Test

This test will actuate the NON-CRITICAL alarm relay contacts on the back of the MX2800.

1. Ensure that the DS3 is not in alarm. The easiest way to do this is to install a hard loopback of the DS3 towards the MX2800 using a test cord at the DS3 DSX cross-connect bay. With the loopback in place, all alarms should clear on the DS3 port. (Use the STATUS LED's on the front panel to determine the state of the DS3 port. Refer to Chapter 2 (*Installation and Operation*) for the meanings of the LED states).
2. Ensure that the 28 DS1's are out of alarm. The easiest way to accomplish this is as follows: At the DSX-1 cross-connect, insert the TX output of the DS1 test set into the INPUT of the first DS1 channel of the MX2800. Install a Bantam test cord from the OUTPUT of the first DS1 channel to the INPUT of the second DS1 channel. Then connect a second Bantam test cord from the OUTPUT of the second DS1 channel to the INPUT of the third DS1 channel. Repeat this procedure for all 28 DS1 channels.

   Connect the OUTPUT of the 28^{th} DS1 channel to the RX input of the DS1 test set. Set the test set options for ESF/B8ZS and run a standard BERT test per operating company practices.
3. At this point, nothing should be in alarm. Remove any one of the Bantam cords from the DSX bay. This will cause a DS1 LOS alarm, which will result in the actuation of the NON-CRITICAL alarm relay.
4. Verify that the alarm is being properly reported to the Central Office alarm monitoring equipment.

VERIFICATION OF SYSTEM REDUNDANCY

This section will address the redundancy features of the MX2800. The MX2800 supports redundancy of both the power supply and controller cards. The information gathered in the *Verification of Installed Options* section that pertains to how this particular MX2800 installation is equipped will be useful in determining what can and cannot be tested. The following sections describe the tests for various configurations.

Power Supply Redundancy

When installed in a bay, the MX2800 can be wired to have either one or two –48VDC power feeds (A and B). In addition, the MX2800 chassis can be equipped with either one or two power supply cards. Test scenarios for the two most common configurations can be found below:

Dual Power Feed, Single Power Supply Card

When the MX2800 is equipped with only a single power supply card, there is no protection against a failure of the card itself. However the single power supply card is capable of utilizing the A and B power feeds to protect against a failure in one of the power sources feeding the shelf. To verify that the MX2800 is properly utilizing the A and B power feeds, the following procedure is suggested:

1. With the MX2800 installed and operating normally, go to the fuse panel at the top of the bay, and remove the fuse corresponding to the “A” power feed for the MX2800 shelf. This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “B” power feed.
2. Reinsert the fuse for the “A” power feed.
3. Remove the fuse corresponding to the “B” power feed for the MX2800 shelf. There should be no effect on the operation of the shelf, as the MX2800 is now operating on the “B” power feed.
4. Reinsert the fuse for the “B” power feed.

Dual Power Feed, Dual Power Supply Cards

When the MX2800 is equipped with two power supply cards, the shelf is protected against a failure of either of the power supply cards, as well as a failure in one of the power sources feeding the shelf. Use the following procedure to demonstrate the operation of this fully redundant configuration:

1. With the MX2800 installed and operating normally, open the front panel and remove the “A” power supply card (the one on the left). This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “B” power supply.
2. Go to the fuse panel at the top of the bay and remove the fuse corresponding to the “A” power feed. This should have no effect on the operation of the shelf, as the “B” power supply is now running on the “B” power feed.
3. Reinsert the fuse for the “A” power feed.
4. Remove the fuse corresponding to the “B” power feed to the shelf. This should have no effect on the operation of the shelf, as the “B” power supply is now operating on the “A” power feed.
5. Reinsert the fuse for the “B” power feed.
6. Reinsert the “A” power supply into the MX2800 chassis.
7. Remove the “B” power supply card (the one on the right). This should have no effect on the operation of the shelf, as the MX2800 is now operating on the “A” power supply.
8. Go to the fuse panel at the top of the bay and remove the fuse corresponding to the “A” power feed. This should have no effect on the operation of the shelf, as the “A” power supply is now running on the “B” power feed.
9. Reinsert the fuse for the “A” power feed.
10. Remove the fuse corresponding to the “B” power feed to the shelf. This should have no effect on the operation of the shelf, as the “A” power supply is now operating on the “A” power feed.
11. Reinsert the fuse for the “B” power feed.
12. Reinsert the “B” power supply into the MX2800 chassis.
13. Reinstall the front panel on the MX2800

Controller Card Redundancy

The MX2800 can be equipped with either one or two controller cards. The controller card contains all of the MX2800's critical circuits (DS1 interfaces, DS3 interfaces, host controller, etc). If the MX2800 is equipped with only one controller card, there is no failure protection. If a failure occurs, an alarm is initiated and the front panel LEDs reflect the condition.

If the MX2800 is equipped with two controller cards, all data traffic is protected, and can be switched over to the opposite controller card in the event of a card failure. The following procedure will demonstrate the functionality of a controller switchover:

1. Using the BERT set-up that should still be in place after completing the tests in *Verification of Data Throughput* section, insure that the system is still passing data error-free.
2. Log into the MX2800 (if necessary) using the laptop, and hit <ESC> a few times to get back to the Main Menu screen. From there, select #3 – Configuration, then #1 – Network Interface, then #6 – Active Controller.
3. This will show which controller (A or B) is currently active. If the A controller is active, select controller B as the active controller. This will force a switch to the B controller, which is acting as a hot-standby. (If the B controller is the active controller, force a switch to the A controller).
4. Data traffic will be interrupted momentarily during the switch, but should settle down and become error free again on the new controller card.
5. The active controller can be left as either A or B. Both cards are identical.

RESTORATION OF DEFAULT SETTINGS

The Total Access MX2800 may be restored to the default settings by following the procedure below.

1. Log into the MX2800 (if necessary) using the laptop, and hit <ESC> a few times to get back to the Main Menu screen. From there, select #3 – Configuration, then #4 – Utilities, then #1 – Load Default Settings
2. Once the settings have been retrieved, **Command Accepted** will appear at the bottom of the screen.

CUSTOMER TRAFFIC TURNUP

After the previous tests are completed successfully and the default settings restored, the MX2800 can be considered ready for customer traffic. Refer to Chapter 3 (*Configuration*) in the MX2800 User Manual for details on the various configuration options and features.

CHECKLIST/SIGN-OFF

Use the table below to check and initial the completion of the Acceptance Test Procedure steps.

Acceptance Test Procedure Steps	Completed (Initial)
Verification of Installed Options	
Configuring the Unit for test	
Accessing the Craft Port	
Provisioning the DS3 Port	
Provisioning the DS1 Ports	
Alarm Relay Configuration	
Verification of Data Throughput (complete one of three)	
DS1 Daisy-chain to DS3 (hard) Loopback	
DS1 to DS3 “Head to Head” Test	
DS1 to DS3 (hard) Loopback	
Verification of Alarms	
CRITICAL Alarm Relay Test	
NON-CRITICAL Alarm Relay Test	
Power Supply Redundancy (complete one of two)	
Dual Power Feed, Single Power Supply Card	
Dual Power Feed, Dual Power Supply Cards	
Controller Card Redundancy Test	
Restoration of Default Settings	
Customer Traffic Turnup	

Appendix B Pinouts

The following tables give the pin assignments for the connectors located on the MX2800. For more information on these connectors, see the chapter *Installation and Operation* on page 2-1.

Table B-1. Craft Port Pin Assignments

RJ Pin#	DB-9	Function	Direction
1	5	GND	
2	7	RTS	I
3	3	TD	I
4	6	DSR	O
5	2	RD	O
6	8	CTS*	O
7	4	DTR	I
8	1	DCD	O
-	9	not used	-

** Used for hardware flow control.*

Table B-2. LAN Port Pin Assignments

Pin	Name	Description
1	TD+	The positive signal for the TD differential pair. This signal contains the serial output data stream transmitted onto the network.
2	TD-	The negative signal for the TD differential pair (pins 1 and 2).
3	RD+	The positive signal for the RD differential pair. This signal contains the serial input data stream received from the network.
4, 5	N/A	not used
6	RD-	The negative signal for the RD differential pair (pins 3 and 6).
7, 8	N/A	not used

Table B-3. Modem Port Pin Assignments

Pin	Description
1, 2, 3	not used
4	Tip
5	Ring
6, 7, 8	not used

The modem port pin assignments only apply to units equipped with an internal modem (4200290L1, L2, L3, and L4).

Table B-4. Amp Pin Assignments

Pin	Function		Pin
1	RING 1	TIP 1	33
2	RING 2	TIP 2	34
3	RING 3	TIP 3	35
4	RING 4	TIP 4	36
5	RING 5	TIP 5	37
6	RING 6	TIP 6	38
7	RING 7	TIP 7	39
8	RING 8	TIP 8	40
9	RING 9	TIP 9	41
10	RING 10	TIP 10	42
11	RING 11	TIP 11	43
12	RING 12	TIP 12	44
13	RING 13	TIP 13	45
14	RING 14	TIP 14	46
15	RING 15	TIP 15	47
16	RING 16	TIP 16	48
17	RING 17	TIP 17	49
18	RING 18	TIP 18	50
19	RING 19	TIP 19	51
20	RING 20	TIP 20	52
21	RING 21	TIP 21	53
22	RING 22	TIP 22	54
23	RING 23	TIP 23	55
24	RING 24	TIP 24	56
25	RING 25	TIP 25	57
26	RING 26	TIP 26	58
27	RING 27	TIP 27	59
28	RING 28	TIP 28	60
29			61
30			62
31			63
32	FGND	FGND	64

Table B-4 applies to both the **IN** *and* **OUT DSX1/E1** *Amp connectors.*

Appendix C Specifications Summary

SPECIFICATIONS AND FEATURES

This section describes the standard specifications and features incorporated in the MX2800.

DSX-3 Network Interface

Channelized DS3
Line length: short (less than 225 feet) and long (greater than 225 feet)
Framing format: M13 and C-bit parity
Line rate: 44.736 Mbps
Line interface: dual 75-ohm BNC coax female connectors

DSX-1 Interface(s)

Line length: 0-655 feet
Line rate: 1.544 Mbps
Line code: AMI or B8ZS
Line interface(s): two 64-pin Amp connectors

Clocking

Network: receive from DS3 network
Local: internally generated
External: recieve from T1/E1 port or BITS clock from wire-wrap pins on back of chassis

Loopbacks

DS3 Network
ANSI T1.107 compatible loopbacks

Line loopbacks

DS2 Interfaces
DS2 network loopbacks

DSX-1 Interfaces
Local and network loopbacks

Management

VT100 Terminal Interface
RJ-48, EIA-232 compatible, female DB-9 adapter provided

Integrated Modem Interface (4204290L1, L2, L3, and L4)
Dial-up access for VT100, SNMP, or TELNET
Dial out “cry for help”

SNMP/TELNET
Integrated 10BaseT ethernet
MIB II (RFC 1213), RFC 1215 and RFC 1407 compliant.
ADTRAN Enterprise MIB for extended monitoring and control / configuration

Alarms

External alarm contacts for critical and noncritical alarms
Normally open (NO) and normally closed (NC) pinout
Front panel alarm cutoff switch

Agency Approvals

FCC Part 15, Class A, Part 68
Industry Canada CS03
UL and CUL
NEBs level 3

Environment

Operating: -40 °C to +65 °C (-40°F to 149°F)
Storage: -40 °C to +85 °C (-40°F to 185°F)
Relative Humidity: Up to 95%, non-condensing

Power

AC version: 120 VAC, 27 W
DC version: -48 VDC, 27 W
DC version: +24 VDC, 27 W

Physical

Dimensions: 7.86“D x 17.0“W x 1.7“H
Weight: 5.5 lbs. (redundant); 4.5 lbs. (non-redundant)

Appendix D Acronyms/Abbreviations

ACO ..... alarm cut off

ACT ..... active

AIS ..... alarm indication signal

ALM ..... alarm

AMI ..... alternate mark inversion

Amp ..... amphenol

ANSI ..... American National Standards Institute

async ..... asynchronous

BERT ..... bit error rate test

bps ..... bits per second

BPV ..... bipolar violation

CA ..... communications equipment available

CAIS ..... carrier side alarm indication signal

CCITT ..... Consultive Committee for International Telephony and Telegraphy

CCV ..... C-bit coding violation

CD ..... carrier detect

CES ..... C-bit errored seconds

CO ..... central office

CPE ..... customer premise equipment

CRC ..... cyclic redundancy check

CS ..... clear to send

CSES..... C-bit severely errored seconds
CSU ..... channel service unit
CTS..... clear to send
CV..... coding violation
dB..... decibel
DBU..... dial backup
DCD ..... data carrier detect
DCE ..... data communications equipment
DDS..... digital data service
DLCI..... data link connection identifier
DS1 ..... digital signal level one
DS3 ..... digital signal level three
DSR ..... data set ready
DSU ..... data service unit
DSX-1 ..... digital signal cross connect, level 1
DTE ..... data terminal equipment
DTR..... data terminal ready
ES..... errored seconds
Eq..... equipment
Eqpt..... equipment
EXZ ..... excessive zeros
FBE..... F-bit errors
FCC..... Federal Communications Commission
FDL..... facility datalink
FEAC ..... far-end alarm and control
FEBE..... far end block error
HSSI..... high-speed serial interface
IP..... internet protocol
KA..... keep alive

LAIS ..... loop side alarm indication signal
LAN ..... local area network
LCV ..... line coding violation
LED ..... light emitting diode
LES ..... line errored seconds
LIU ..... line interface unit
LL ..... local loopback
LOF ..... loss of framing
LOS ..... loss of signal
MBE ..... M-bit errors
Mbps ..... megabits per second
MIB ..... management information base
ms ..... millisecond
NC ..... normally closed
NI ..... network interface
NMS ..... network management system
NO ..... normally open
NRZ ..... non-return to zero
NSA ..... non service affecting
OCU ..... office channel unit
OOF ..... out of frame
OOS ..... out of service
PCV ..... P-bit coding violation
PES ..... P-bit errored seconds
POP ..... point of presence
PPP ..... point-to-point protocol
PRF ..... performance
PSES ..... P-bit severely errored seconds
PSTN ..... public switched telephone network

PVC ..... permanent virtual circuit
RD..... receive data
RDL ..... remote digital loopback
RL..... remote loopback
RMA..... return material authorization
RS..... request to send
RTS ..... request to send
Rx..... receive
SA ..... service affecting
SEFS ..... severely errored framing seconds
SES..... severely errored seconds
SLIP..... serial line internet protocol
SNMP..... simple network management protocol
SONET..... synchronous optical network
SR..... data set ready
SW56 ..... switched 56
sync..... synchronous
TA ..... terminal equipment available
TD ..... transmit data
TDM..... time division multiplexing
TM ..... test mode
TR ..... data terminal ready
Tx..... transmit
UAS ..... unavailable seconds
WAN..... wide area network
XCV ..... excessive coding violations

Appendix E Glossary

10BaseT

Ethernet connector which implements the IEEE standard on 24-gauge, unshielded twisted-pair wiring.

AMI

Alternate mark inversion. A bipolar line-coding format in T1 transmission systems whereby successive ones are alternately inverted.

ANSI

American National Standards Institute. A non-profit organization that coordinates voluntary standards activities in the United States.

asynchronous

A method of data transmission which allows characters to be sent at irregular intervals by preceding each character with a start bit, followed by a stop bit.

bandwidth

The bandwidth determines the rate at which information can be sent through a channel (the greater the bandwidth, the more information that can be sent in a given amount of time).

baud rate

A measure of transmission speed over an analog phone line. Baud rate measures the shortest signaling elements per second in the analog signal that a modem sends over an analog phone line. Does not necessarily equal the bit rate.

BERT

Bit error rate test. A test that uses any of a number of stress patterns to test T3, T1, FT1, and DDS circuits.

bipolar
A signal containing both positive and negative amplitude components.

bipolar violation
See *BPV*.

bit
A binary digit representing a signal, wave, or state as either a one or a zero. A bit is the smallest unit of information a computer can process.

bit error
The receipt of an encoded bit that differs from what was sent by the transmitter.

bit rate
The speed at which bits are transmitted, usually expressed in bits per second (bps).

bps
Bits per second. The number of bits passing a specific point per second. Examples of common rates are kbps (one thousand bits per second) and Mbps (one million bits per second). T3 operates at 44.736 Mbps.

BPV
Bipolar violation. A violation in the alternate mark inversion (AMI) line code for which consecutive 1s are represented by pulses of opposite polarity. BPVs that are not intentional (B8ZS) are counted as errors. Could also be the presence of two consecutive 1 bits of the same polarity on the T-carrier line.

bridge
A data communications device that connects two or more networks and forwards packets between them.

byte
Generally, an 8-bit quantity of information. This term is used mainly in referring to parallel data transfer, semiconductor capacity, and data storage.

carrier
The provider of the telecommunication services to the customer site. Carriers can be local telephone companies, regional telephone companies, or any interexchange carrier such as AT&T, Sprint, or MCI.

C-bit

An overhead bit in the DS3 string not used for framing, parity, or alarm indication.

CCITT

Consultive Committee for International Telephony and Telegraphy. A standards organization that devises and proposes recommendations for international communications. See also *ANSI*.

CD

Carrier detect. A signal generated by a modem or DSU/CSU indicating the presence of a carrier signal on a communications link.

channel

A transmission path between two or more termination points; also called a circuit, facility, line, link, or path.

channel bank

Equipment in a telephone central office or customer premises that performs multiplexing of lower speed digital channels into a higher speed composite channel. The channel bank also detects and transmits signaling information for each channel, thereby transmitting framing information so that time slots allocated to each channel can be identified by the receiver.

channel service unit

See *CSU*.

clocking

An oscillator-generated signal that provides a timing reference for a transmission link. A clock provides signals used in a transmission system to control the timing of certain functions. The clock has two functions: (1) to generate periodic signals for synchronization, and (2) to provide a time base.

CPE

Customer premises equipment. All telecommunications terminal equipment located on the customer premises, including telephone sets, private branch exchanges (PBXs), data terminals, and customer-owned, coin-operated telephones.

craft port

The electrical interface between the MX2800 and the control terminal. The control terminal is used to communicate commands to the unit.

CSU

Channel service unit. A device used to connect a digital phone line coming in from the phone company to either a multiplexer, channel bank, or directly to another device producing a digital signal; for example, a digital PBX, a PC, or data communications device. A CSU performs certain line-conditioning and equalization functions, and responds to loopback commands sent from the central office. A CSU also regenerates digital signals. It monitors them for problems and provides a way of testing the digital circuit.

CTS

Clear to send. A signal on the DTE interface indicating that the DCE is clear to send data.

data communications equipment

See *DCE*.

data service unit

See *DSU*.

dB

Decibel. A unit of measure of signal strength; usually the relation between a transmitted signal and a standard signal source.

DCE

Data communications equipment. Device that provides all the functions required for connection to telephone company lines and for converting signals between telephone lines and DTE. Also see *DTE*.

DDS

Digital data service. A private line digital service for transmitting data end-to-end at speeds of 2.4, 4.8, 9.6, and 56 kbps (and in some cases 19.2, 38.4, or 64 kbps). The systems can use central hub offices for obtaining test access, bridging legs of multi-point circuits, and cross connecting equipment. DDS is offered on an inter-LATA (local access and transport area) basis by AT&T and on an intra-LATA basis by the Bell operating companies.

delay

The amount of time by which a signal is delayed. A round-trip transmission delay measurement helps detect possible causes of protocol timeouts.

DLCI

Datalink communications identifier. A unique number assigned to a PVC endpoint in a frame relay network. Identifies a particular PVC endpoint within a user's access channel in a frame relay network and has local significance only to that channel.

DS1

Digital signal level one. Twenty-four DS0 channels make up one DS1 (total bandwidth is 1.544 Mbps).

DS3

Digital signal level three. Equivalent of 28 DS1s and 672 DS0s (total bandwidth is 44.736 Mbps).

DSU

Data service unit. A device designed to transmit and receive digital data on digital transmission facilities.

DTE

Data terminal equipment. The end-user terminal or computer that plugs into the termination point (DCE) of a communications circuit. The main difference between the DCE and the DTE is that pins two and three are reversed.

E1

Transmission rates of 2.048 Mbps are available on T1 communication lines. See also *T1*.

end device

The ultimate source or destination of data flowing through a network (sometimes referred to as DTE).

end user

Subscriber who uses (rather than provides) telecommunications services.

ES

Errored seconds. A second with one or more coding violations (CVs).

ethernet
Transmission protocol for packet-switching LANs.

facilities
The equipment used by carriers to provide communication services.

far end
The distant end to that being considered. Not the end where testing is being carried out.

FCC
Federal Communications Commission. The U.S. federal agency responsible for regulating interstate and international communications by radio, TV, wire, satellite, and cable.

FDL
Facility datalink. FDL bits provide overhead communication between the terminal equipment in ESF framing.

gateway
A device which enables information to be exchanged between two dissimilar systems or networks.

host computer
The primary or controlling computer in a multiple computer operation.

idle code
In a T3 circuit, an idle code consists of a sequence of 1100 over the entire payload bandwidth.

in-band
Signaling (dialing, loopbacks, management, configuration, etc.) over the same channel used for data.

IP
Internet protocol. A protocol which provides for transmitting blocks of data between hosts identified by fixed-length addresses.

LAN

Local area network. A privately owned network that offers high-speed communications channels to connect information processing equipment in a limited geographic area.

local loopback (LL)

A type of test used to verify the operation of the local terminal equipment, the CSU, and the connection between the two. The signal from the DTE is looped back by the CSU and is sent back to the DTE.

loopback

The technique for testing the processing circuitry of a communications device. May be initiated locally or remotely via a telecommunications circuit. Device being tested will echo back received test data. The results are compared with the original data.

LOS

Loss of signal. Defined as a line state in which no pulses are received for 175 bit positions.

M13

DS1 / DS3 multiplexer that combines up to 28 DS1 channels into one DS3 channel. Uses two-stage, bit synchronous TDM.

Mbps

Megabits per second (one million bits per second).

MIB

Management information base. A database of network management information used by SNMP.

modem

Acronym for modulator / demodulator. Equipment that converts digital signals to and from analog signals. Used to send digital signals over analog phone lines.

monitor

To watch or listen to a signal non-intrusively.

multi-point circuit

A single communications circuit that has more than two terminations.

NC

Normally closed. Relay switch contacts that remain closed when inactive.

near end

The unit on-site.

NI

Network interface. The demarcation point between the CPE and the PSTN.

NO

Normally open. Relay switch contacts that remain open when inactive.

NRZ

Non return to zero. A mode in which the digital level is low for a 0 bit and high for a 1 bit, and does not return to zero between successive 1 bits.

out-of-band

Signaling that is separated from the channel carrying information (voice, data, video, etc.). Typically the separation is accomplished by a filter. The signaling includes dialing and other supervisory signals.

point-to-point

Type of communications link that connects a single device to another single device, such as a remote terminal to a host computer.

POP

Point of presence. Physical place within a LATA (local access and transport area) where a long distance carrier or a cellular provider interfaces with the network of the local exchange carrier (LEC). A POP is usually a building serving as the point of termination which houses switches and transmission equipment.

protocol

A set of rules controlling the orderly exchange of information between stations in data communications networks or systems.

PSTN

Public switched telephone network. Usually refers to the world wide voice telephone network available for public use.

red alarm

Unframed all ones signal (keep alive signal). A red alarm is declared on detection of LOS or OOF not caused by an alarm indication signal (AIS) that persists for more than two seconds.

remote configuration

A feature designed into ADTRAN products that allows remote units to be configured from a local unit or a VT 100 compatible terminal.

router

A device that supports communications between networks. Routers are similar to bridges, with the exception that routers provide more functionality (such as finding the best route between networks and providing network management capabilities).

service

The provision of telecommunications to customers by a common carrier, administration, or private operating agency using voice, data, and / or video technologies.

service provider

A company that delivers or sells a telecom service.

SES

Severely errored seconds. A second in which more than 320 code violations (CVs) occurred or an OOF condition occurred.

signaling

Communication between switches to set up and terminate calls.

SNMP

Simple network management protocol. A control and reporting scheme widely used to manage devices from different vendors. SNMP operates on top of the Internet protocol.

SONET

Synchronous optical network. A standard format for transporting a wide range of digital telecommunications services over optical fiber. SONET is characterized by standard line rates, optical interfaces, and signal formats.

SR

Data set ready. A signal on the DTE interface that indicates if a connection exists and if the devices are ready to start handshaking control signals so communications can begin.

synchronous

Communications in which the timing is achieved by sharing a single clock. Each end of the transmission synchronizes itself with the use of clocks and information sent along with the transmitted data.

T1

Transmission rates of 1.544 Mbps are available on T1 communication lines. Also referred to as digital signal level 1 (DS-1). See also *E1*.

T3

Transmission rates of 44.736 Mbps are available on T3 communication lines. Also referred to as digital signal level 3 (DS-3).

TDM

Time division multiplexing. A technique for transmitting two or more signals at the same time over a single communication medium. This is accomplished by allocating channels to the bandwidth for specific increments of time.

Telnet

The standard TCP/IP remote login protocol specified in RFC-854.

transceiver

A combination of transmitter and receiver providing both output and input interfaces within a single device.

transmission

The signaling of data over telecommunications channels.

V.35

A standard for trunk interface between a network access device and a packet network that defines signaling for data rates greater than 19.2 kbps.

VT 100

A non-intelligent terminal or terminal emulation mode used for asynchronous communications. Used to configure the MX2800.

WAN

Wide area network. A communications network serving geographically separate areas. A WAN typically extends a LAN outside the building to link to other LANs over telephone lines.

yellow alarm

A T3 yellow alarm is an indication sent back toward the source of a failed transmit circuit in a DS3 two-way transmission path. The X-bits (X1 and X2) are set to zero.

Appendix F MX2800 TL1 Commands Quick Reference - DS3

NETWORK INTERFACE

DS3 Configuration

Framing (FMT)

CBIT

ED-T3::3xx:x:::FMT=CBIT;

M13

ED-T3::3xx:x:::FMT=M13;

Line Length (LINELEN)

Long

ED-T3::3xx:x:::LINELEN=LONG;

Short

ED-T3::3xx:x:::LINELEN=SHORT;

Timing (TMG)

Loop Timed

ED-T3::3xx:x:::TMG=LPD;

Internal Timing Source

ED-T3::3xx:x:::TMG=INT;

Remote Loopbacks (RMTLPBK)

Disable

ED-T3::3xx:x:::RMTLPBK=DISABLE;

Either FEAC or CBIT

ED-T3::3xx:x:::RMTLPBK=EITHER;

FEAC

ED-T3::3xx:x:::RMTLPBK=FEAC;

CBIT

ED-T3::3xx:x:::RMTLPBK=CBIT;

XCV Threshold (DS3CVTHRS)

Disable

ED-T3::3xx:x:::DS3CVTHRS=DISABLE;

1 out of every 1,000 bits contain CV

ED-T3::3xx:x:::DS3CVTHRS=1E3;

1 out of every 10,000 bits contain CV

ED-T3::3xx:x:::DS3CVTHRS=1E4;

1 out of every 100,000 bits contain CV

ED-T3::3xx:x:::DS3CVTHRS=1E5;

1 out of every 1,000,000 bits contain CV

ED-T3::3xx:x:::DS3CVTHRS=1E6;

Protection Configuration

Active Controller (ACTIVECONTROLLER)

A

ED-T3::3xx:x:::ACTIVECONTROLLER=A;

B

ED-T3::3xx:x:::ACTIVECONTROLLER=B;

Network Protection (DS3PROT)

Yes

ED-T3::3xx:x:::DS3PROT=Y;

No

ED-T3::3xx:x:::DS3PROT=N;

Max Switch Threshold (DS3MAXNUMSW)

Integer number of times per hour unit is allowed to switch between controller cards

ED-T3::3xx:x:::DS3MAXNUMSW=x;

Min Switch Period (DS3MINSWPERIOD)

Integer number of seconds that must pass after protection switch before another switch allowed

ED-T3::3xx:x:::DS3MINSWPERIOD=x;

DS2 INTERFACE

DS2 Configuration (DS2CFGMODE)

T1

ED-T2::2xx:x:::DS2CFGMODE=T1;

E1

ED-T2::2xx:x:::DS2CFGMODE=E1;

T1/E1 INTERFACE

Line Build Out (LBO)

0 to 133 Feet

ED-T1::1xx:x:::LBO=0TO133;

133 to 266 Feet

ED-T1::1xx:x:::LBO=133TO266;

266 to 399 Feet

ED-T1::1xx:x:::LBO=266TO399;

399 to 533 Feet

ED-T1::1xx:x:::LBO=399TO533;

533 to 655 Feet

ED-T1::1xx:x:::LBO=533TO655;

E1 0 to 3000 Feet

ED-T1::1xx:x:::LBO=E10TO3000;

Unavailable

ED-T1::1xx:x:::LBO=UNAVAIL;

Line Switch Protection (DSXCFGLINESWPROT)

Disable

ED-T1::1xx:x:::DSXCFGLINESWPROT=DISABLE;

Enable

ED-T1::1xx:x:::DSXCFGLINESWPROT=ENABLE;

Unavailable

ED-T1::1xx:x:::DSXCFGLINESWPROT=UNAVAIL;

State (DSXCFGSTATE)

Disable

ED-T1::1xx:x:::DSXCFGSTATE=DISABLE;

Enable

ED-T1::1xx:x:::DSXCFGSTATE=ENABLE;

Unavailable

ED-T1::1xx:x:::DSXCFGSTATE=UNAVAIL;

Auto Enable

ED-T1::1xx:x:::DSXCFGSTATE=AUTO;

Line Coding (LINECDE)

AMI

ED-T1::1xx:x:::LINECDE=AMI;

B8ZS

ED-T1::1xx:x:::LINECDE=B8ZS;

E1 AMI

ED-T1::1xx:x:::LINECDE=E1AMI;

E1 HDB3

ED-T1::1xx:x:::LINECDE=E1HDB3;

Unavailable

ED-T1::1xx:x:::LINECDE=UNAVAIL;

Loopback Detection (DSXLBKDETECTION)

Disable

ED-T1::1xx:x:::DSXLBKDETECTION=DISABLE;

CSU

ED-T1::1xx:x:::DSXLBKDETECTION=CSU;

NIU

ED-T1::1xx:x:::DSXLBKDETECTION=NIU;

Unavailable

ED-T1::1xx:x:::DSXLBKDETECTION=UNAVAIL;

Circuit Protection (DSXPROTTHRS)

Enter value of 1-28
ED-T1::1xx:x:::DSXPROTTHRS=x;

XCV Threshold (DSXCVTHRS)

Disable
ED-T1::1xx:x:::DSXCVTHRS=DISABLE;
1 out of every 1,000 bits contain CV
ED-T1::1xx:x:::DSXCVTHRS=1E3;

1 out of every 10,000 bits contain CV
ED-T1::1xx:x:::DSXCVTHRS=1E4;

1 out of every 100,000 bits contain CV
ED-T1::1xx:x:::DSXCVTHRS=1E5;

1 out of every 1,000,000 bits contain CV
ED-T1::1xx:x:::DSXCVTHRS=1E6;

DATE AND TIME

Date and Time

Enter a new value for Date (YY-MM-DD) and Time (HH-MM-SS)
SET-DAT:::x::yy-mm-dd,hh-mm-ss;

MISCELLANEOUS

DS3 Alarm Relays

Alarm Relay Configuration

The following Keywords are used to enable / disable various DS3 relay alarms. The keywords will be listed and an example given. A value of "Y" will enable the relay. A value of "N" will disable the relay.

The Keywords are the following:

CARDSWRLY
DS3AISRLY
DS3LOFRLY
DS3LOSRLY
DS3RAIRLY
DS3TLOSRLY
DS3XCVRLY
SYSCARDARLY
SYSCARDBRLY
SYSCARDCOMMRLY
SYSCARDRLY

An example to enable the relay

ED-T3::3xx:x:::CARDSWRLY=Y;

An example to disable the relay

ED-T3::3xx:x:::CARDSWRLY=N;

DS2 Alarm Relays

Alarm Relay Configuration

The following Keywords are used to enable / disable various DS2 relay alarms. The keywords will be listed and an example given. A value of "Y" will enable the relay. A value of "N" will disable the relay.

The Keywords are the following:
DS2AISRLY
DS2LOSRLY
DS2RAIRLY

An example to enable the relay

ED-T2::2xx:x:::DS2AISRLY=Y;

An example to disable the relay

ED-T2::2xx:x:::DS2AISRLY=N;

DSX Alarm Relays

Alarm Relay Configuration

The following Keywords are used to enable / disable various DSX relay alarms. The keywords will be listed and an example given. A value of "Y" will enable the relay. A value of "N" will disable the relay.

The Keywords are the following:
DSXCAISRLY
DSXLAISRLY
DSXLOSRLY
DSXXCVRLY

An example to enable the relay

ED-T1::1xx:x:::DSXCAISRLY=Y;

An example to disable the relay

ED-T1::1xx:x:::DSXCAISRLY=N;

EQPT Alarm Relays

Alarm Relay Configuration

The following Keywords are used to enable / disable various EQPT relay alarms. The keywords will be listed and an example given. A value of "Y" will enable the relay. A value of "N" will disable the relay.

The Keywords are the following:

PSBATTERYLOWRLY
PSCHARGERFAILRLY

PSFANFAILRLY
PSMALFNCRLY
PSPOWERFAILRLY
PSPOWERLOWRLY
PSTEMPCRITRLY
PSTEMPHIGHRLY

An example to enable the relay

ED-EQPT::4xx:x:::PSBATTERYLOWRLY=Y;

An example to disable the relay

ED-EQPT::4xx:x:::PSBATTERYLOWRLY=N;

LOOPBACKS

The following DS3, DS2, and DSX (T1/E1) loopbacks may be performed using the standard edit commands or the loopback specific release (RLS-LPBK) and operate (OPR-LPBK) commands.

DS3

DS3 Loopbacks

DS3 - Data Mode

ED-T3::3xy:z:::DIAGDS3=DATAMODE;

RLS-LPBK-T3::3xy:z;
RLS-LPBK-T3::3xy:z::NEND,,,LINE;
RLS-LPBK-T3::3xy:z::NEND,,,DIGLPBK;
RLS-LPBK-T3::3xy:z::NEND,,,TERMINAL;
RLS-LPBK-T3::3xy:z::FEND,,,LINE;
RLS-LPBK-T3::3xy:z::FEND,,,ALLT1;

Each of the above commands releases any DS3 loopback in effect

DS3 - Line Loopback

ED-T3::3xy:z:::DIAGDS3=LINELPBK;
OPR-LPBK-T3::3xy:z::NEND,,,LINE;

DS3 - Digital Loopback

ED-T3::3xy:z:::DIAGDS3=DIGLPBK;
OPR-LPBK-T3::3xy:z::NEND,,,DIGLPBK;

DS3 - Metallic Loopback

ED-T3::3xy:z:::DIAGDS3=METLPBK;
OPR-LPBK-T3::3xy:z::NEND,,,TERMINAL;

DS3 - Remote Loopback

ED-T3::3xy:z:::DIAGDS3=REMLPBK;
OPR-LPBK-T3::3xy:z::FEND,,,LINE;

DS3 - Remote All T1/E1 Loopback

ED-T3::3xy:z:::DIAGDS3=ALLT1;
OPR-LPBK-T3::3xy:z::FEND,,,ALLT1;

For the above DS3-related commands, xy may be 00 through 03; z may be up to six ASCII characters.

DS2

DS2 Loopbacks

DS2 - Data Mode

ED-T2::2xy:z:::DIAGDS2TESTSTATE=DATAMODE;

RLS-LPBK-T2::2xy:z;
RLS-LPBK-T2::2xy:z::NEND,,,NETWORK;

Each of the above commands releases any loopback in effect for the specified DS2.

DS2 - Network Loopback

ED-T2::2xy:z:::DIAGDS2TESTSTATE=NETWORK;
OPR-LPBK-T2::2xy:z::NEND,,,NETWORK;

For the above DS2-related commands, xy may be 01 through 07 (corresponding to the desired DS2 channel); z may be up to six ASCII characters.

DSX (T1/E1)

T1/E1 Loopbacks

DS1 - Data Mode

ED-T1::1xy:z:::DIAGDSXTESTSTATE=DATAMODE;

RLS-LPBK-T1::1xy:z;
RLS-LPBK-T1::1xy:z::NEND,,,NETWORK;
RLS-LPBK-T1::1xy:z::NEND,,,TERMINAL;
RLS-LPBK-T1::1xy:z::NEND,,,DIGNET;
RLS-LPBK-T1::1xy:z::NEND,,,CODEC;
RLS-LPBK-T1::1xy:z::FEND,,,DS1FEAC;
RLS-LPBK-T1::1xy:z::FEND,,,CSULPBK;
RLS-LPBK-T1::1xy:z::FEND,,,CSUBERT;

Each of the above commands releases any loopback in effect for the specified DS1.

DS1 - Tributary Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=TRIBUTARY;
OPR-LPBK-T1::1xy:z::NEND,,,NETWORK;

DS1 - Analog Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=ANALOGNET;
OPR-LPBK-T1::1xy:z::NEND,,,TERMINAL;

DS1 - Digital Line / Net Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=DIGNET;
OPR-LPBK-T1::1xy:z::NEND,,,DIGNET;

DS1 - Codec Line / Net Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=CODEC;
OPR-LPBK-T1::1xy:z::NEND,,,CODEC;

DS1 - Remote Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=REMLPBK;
OPR-LPBK-T1::1xy:z::FEND,,,DS1FEAC;

DS1 - CSU Loopback

ED-T1::1xy:z:::DIAGDSXTESTSTATE=CSULPBK;
OPR-LPBK-T1::1xy:z::FEND,,,CSULPBK;

DS1 - CSU Loopback w / BERT

ED-T1::1xy:z:::DIAGDSXTESTSTATE=CSUBERT;
OPR-LPBK-T1::1xy:z::FEND,,,CSUBERT;

For the above DS1-related commands, xy may be 01 through 28 (corresponding to the desired DS1 channel); z may be up to six ASCII characters.

Equipment

Diagnostic BERT Clear Count (DIAGBERTCLEARCOUNT)

Clear Count

ED-EQPT::4xx:x:::DIAGBERTCLEARCOUNT=Y;

Loopback Timeout (DIAGLPBKTIMEOUT)

Disable

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=DISABLE;

1-Minute

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=1-MIN;

5-Minutes

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=5-MIN;

10-Minutes

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=10-MIN;

15-Minutes

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=15-MIN;

30-Minutes

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=30-MIN;

45-Minutes

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=45-MIN;

1-Hour

ED-EQPT::4xx:x:::DIAGLPBKTIMEOUT=1-HR;

Reset All Tests (DIAGRESET)

Reset

ED-EQPT::4xx:x:::DIAGRESET=Y;

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