WorldDSL^{TM} Exchange Office Management Unit
EMU-830 User Manual

Document Number: LTPE-UM-3159-02

ADC

REVISION HISTORY

The Revision History provides a summary of any changes in this manual. Please make sure you are using the latest revision of this manual.

Revision	Release Date	Revisions Made
01	September 30, 2004	Initial release.
02	September 25, 2006	Technical update for L4A/L6A.

This manual is available online at ADC's website (www.adc.com/documentationlibrary/) or you can order copies of the manual by contacting your sales representative. Please ask for document LTPE-UM-3159-02.

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ABOUT THIS MANUAL

INTRODUCTION

This manual contains information on the ADC® WorldDSL™ EMU-830 (hereafter referred to as the "EMU-830"). An Exchange Office Management Unit (EMU) is installed in a WorldDSL Exchange Office Management Shelf (EMS). The EMU provides alarm, fault, configuration, and performance management of HDSL and G.SHDSL circuits deployed from a WorldDSL shelf.

ORGANIZATION

This manual includes the following chapters:

Chapter	Description
Chapter 1: Overview	Summarizes the features and functionality provided with the EMU-830 management unit.
Chapter 2: Installation	Provides procedures for installing the EMU-830 unit.
Chapter 3: Menu Navigation and Multishelf Configuration	Describes how to navigate management unit screens and configure shelf, alarm, performance, and system settings.
Appendix A: Specifications	Summarizes alarm, power, and card compatibility requirements for the EMU-830.
Appendix B: Product Support	Provides information on how to contact the ADC Technical Support group.
Glossary	Defines abbreviations and acronyms for the ADC WorldDSL product family.

INTENDED AUDIENCE

This manual is intended for anyone needing to install, operate, and maintain an ADC WorldDSL EMU-830.

CONVENTIONS

The following style conventions and terminology are used throughout this guide.

Element	Meaning
Bold font	Text that you must input exactly as shown (e.g., type **1** for card 1), menu buttons (e.g., **ACCEPT SHELF OPTIONS**) or menu screen options (e.g., **ALARMS** screen) that you must select
Italic font	Variables that you must determine before inputting the correct value (e.g., *Password*)
Monospace font	References to screen prompts (e.g., Invalid Password...Try Again:.)

Reader Alert	Meaning
	Alerts you to supplementary information
IMPORTANT ⚠	Alerts you to supplementary information that is essential to the completion of a task

Reader Alert	Meaning
ATTENTION	Alerts you to possible equipment damage from electrostatic discharge
CAUTION	Alerts you to possible data loss, service-affecting procedures, or other similar type problems
WARNING	Alerts you that failure to take or avoid a specific action might result in hardware damage or loss of service
DANGER	Alerts you that failure to take or avoid a specific action might result in personal harm

EU COMPLIANCE

This product has been CE marked in accordance with the requirements of European Directive 73/23/EEC; the following mentioned product is in conformity with Low Voltage Directive 73/23/EEC in order to comply with the requirements in the Council Directive 73/23/EEC relating to electrical equipment designed for use within certain voltage limits and the Amendment Directive 93/68/EEC.

For safety evaluation of the compliance with this Directive 73/23/EEC, these standards were applied:
IEC 60950:1999, EN 60950:2000.

INSPECTING YOUR SHIPMENT

Upon receipt of the equipment:

- Unpack each container and visually inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC as described in Appendix B: "Product Support" on page B-1. If you must store the equipment for a prolonged period, store the equipment in its original container.

OVERVIEW

The EMU-830 provides management for HDSL and G.SHDSL circuits using either of the following methods:

- One or more shelves of HDSL or G.SHDSL circuits can be managed by connecting a management terminal (or PC with terminal emulation software) to the EMU-830 of one shelf. The management terminal (or PC) can be connected to the EMU-830 either directly (or through modems over a dial-up network). When two or more shelves are present, the Ethernet ports of each shelf can be interconnected to form a Local Area Network (LAN). This method of management is referred to as Multishelf Terminal Access Option (Multishelf TAO).

- One or more shelves of HDSL or G.SHDSL circuits can be managed over a LAN using the Simple Network Management Protocol (SNMP). SNMP can access a shelf through its 10BASE-T Ethernet port or through its Serial Line Interface Port (SLIP) over dial-up modem connections. These methods of management are referred to as SNMP through LAN and SNMP through SLIP. The StarGazer application can be used to manage WorldDSL shelves with the EMU-830 using SNMP through LAN.

- Management of a single shelf or multshelf TAO using Telnet.

The EMU-830 List 4A and List 6A are CE marked.

NEW FEATURES

New features in this release include management of new V11 WD92xGx line cards.

> **Note:** DSL is used throughout the remaining pages of this document when referring to both HDSL and G.SHDSL.

STANDARD FEATURES

Standard features of the EMU-830 include:

- Support of Multishelf TAO
- Support of Point-to-Multipoint (PTM) application mode (HDSL)
- Support of Single-Pair application, Two Pair, 1+1 Application Modes (WD92xGx)
- Support of Telnet access for TAO over Ethernet or SLIP port
- Doubler support for two-pair line units (HDSL)
- Support of rate-selectable HDSL line and desktop units
- Universal Termination Units (UTUs) supported as a Line Termination Unit (LTU) or Network Termination Unit (NTU) through SNMP (HDSL and G.SHDSL 1-pair)
- WorldDSL WD92xGx G.SHDSL 2-pair line cards (G.703, Nx64K, Ethernet) configurable as STU-C or STU-R
- User programmable baud rates for SLIP port
- Chassis slots & DSL loops identified in alarm reports
- Configuration changes automatically saved in NVRAM
- Automatic log out after 20 minutes of keyboard inactivity
- Backup timing circuit for external shelf clock on EMU-830 List 6A
- Firmware download protocol (TFTP, XModem)
- Traps Generation

FRONT PANEL

Figure 1-1 and Table 1-1 identify and describe the front-panel components of the EMU-830 Lists 4A and 6A.
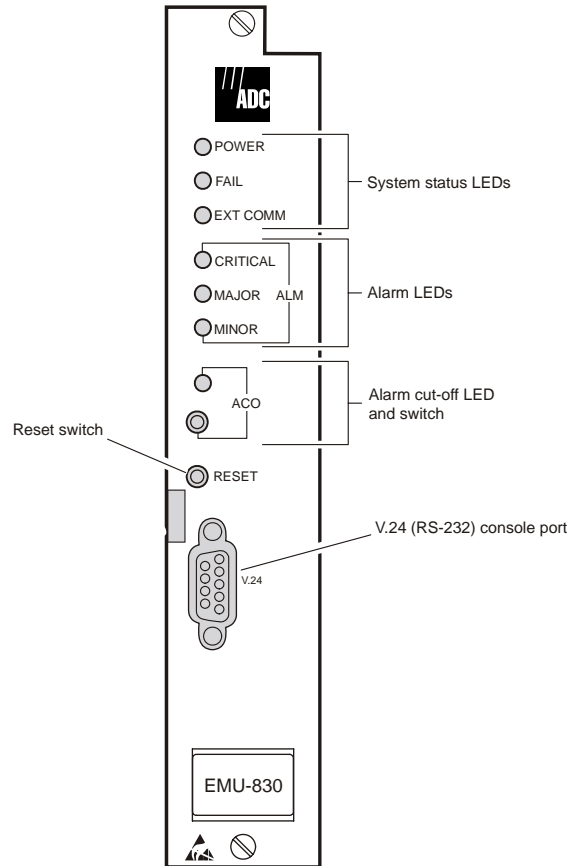
Figure 1-1. EMU-830 Front Panel

Table 1-1. EMU-830 List 4A and 6A Front Panel Components

Name	Mode	Function
System Status LEDs:		
Power	Green	Indicates power to the EMU-830.
Fail	Red	Indicates system failure. [a]
EXT Comm	Green	Indicates when data is being transmitted from the EMU-830 console port to a management station.
Alarm LEDs:		
Critical ALM	Red	Indicates a critical alarm condition.
Major ALM	Yellow	Indicates a major alarm condition.
Minor ALM	Yellow	Indicates a minor alarm condition.
Alarm Cut-off LED and Switch:		
ACO LED	Green	Indicates the Alarm Cut-Off (ACO) was activated.
ACO switch	On/Off	Activates ACO from the front panel if an alarm is active.

Name	Mode	Function
Reset switch		Resets the EMU-830 hardware.
V.24 (RS-232) console port		Provides access to EMU console menus either by local terminal connected to console port via serial cable or by remote terminal connected to console port via modems. Also supports autonomous dial-out reporting of alarms to management station.

a. It is normal for the Fail LED to illuminate briefly when power is applied to the EMU-830.

MAJOR COMPONENTS

Major components of the EMU-830 management unit include:

- 68302 processor
- 2 MB Flash RAM program memory
- Ethernet 10BASE-T port
- Asynchronous Serial Line Internet Protocol (SLIP) port (RS-232/RS-485)
- Front panel V.24 (RS-232) console port
- Audible and visual relays for critical, major, and minor alarms
- Backup timing circuit for external shelf clock (EMU-830 List 6A only)

The EMU-830 Flash RAM program memory permits firmware upgrades through TFTP or Xmodem downloads (see "BOOTP and TFTP Protocols" on page 1-9 and "Xmodem Protocol" on page 1-9).

Note: A total or partial failure of the EMU-830 affects only the centralized management capabilities of the system, it does not affect the DSL circuits deployed in the shelf. In case of EMU-830 failure, the HDSL cards can be managed directly from their front panel V.24 Craft port. To use the local management RS-232 interface of an HDSL card it is necessary to remove the EMU-830 from the shelf. To manage a G.SHDSL card using an RS-232 interface, it is not required to remove the EMU-830 from the shelf.

MULTISHELF TAO

Multishelf TAO is supported through the EMU-830 front panel V.24 console port and provides an asynchronous, maintenance terminal, auto-baud interface where you can:

- Monitor all shelf and DSL circuit alarms through a single common screen
- Communicate to a selected shelf and DSL card using the standard line unit console menus
- Set up network configuration parameters and SNMP parameters
- Configure the common equipment and shelf-wide alarms

Figure 1-2 on page 1-4 illustrates local management of a single shelf using TAO. The shelf communicates with the local terminal (or PC) through the EMU-830 V.24 console port. Figure 1-3 on page 1-4 illustrates remote management of multiple shelves at two sites using Multishelf TAO. Up to 32 shelves at each site are connected over a LAN. The IP address and subnet mask are configured to place all shelves at one site on the same subnet. Each multishelf network communicates with the common network management station over the dial-up Public Switched Telephone Network (PSTN).

Multishelf TAO is also supported using Telnet to 10BaseT port of an EMU-830.
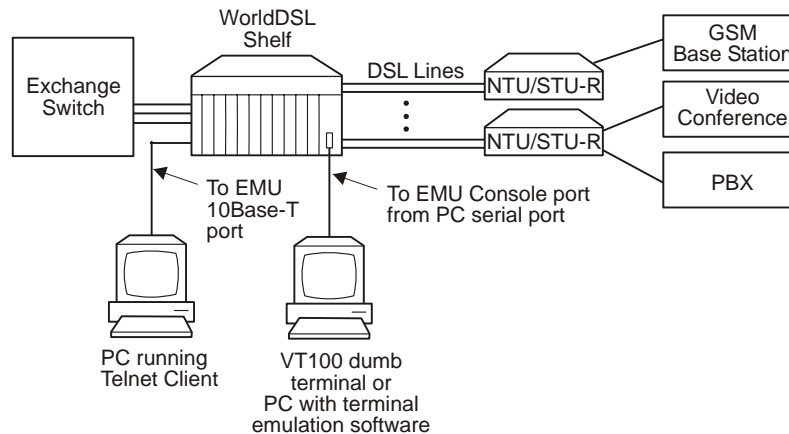
Figure 1-2. Local Management of a Single Shelf Using RS-232/Telnet
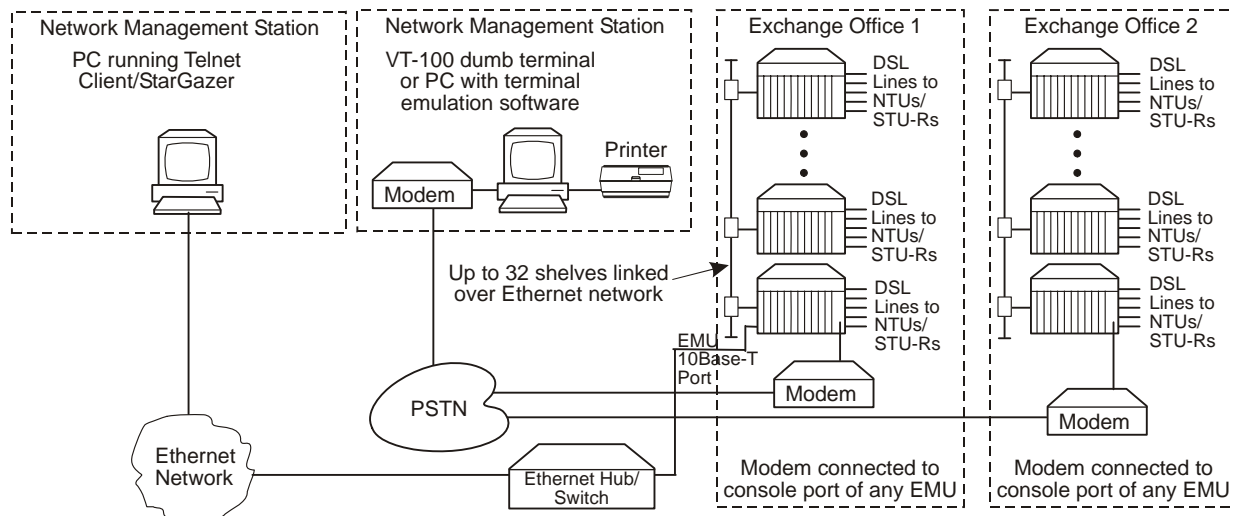
Figure 1-3. Remote Management of Multiple Shelves at Two Sites Using Multishelf TAO

The Multishelf TAO firmware allows the DSL circuits in a single shelf or a network of shelves to be managed from a single point-of-access (the EMU-830 console port of one shelf or using a Telnet session to one EMU-830). The alarm status for each shelf in a multishelf network can be viewed on a single Network screen (Figure 1-4 on page 1-5), and the alarm status of each DSL circuit in a selected shelf can be viewed on a single Main Menu screen (Figure 1-5 on page 1-5). Each EMU-830 constantly monitors the DSL cards in its shelf for alarm conditions and automatically updates the alarm status.

From the TAO Network screen (Figure 1-4 on page 1-5), you can access any shelf in the network and then, from the Main Menu screen (Figure 1-5 on page 1-5), log into any DSL card installed in the shelf. Logging into an DSL card provides access to that card's maintenance menus and is equivalent to connecting a terminal directly to the Craft port on the HDSL card.

Note: HDSL cards cannot be directly managed from their front-panel craft port when the EMU-830 is installed in the shelf. G.SHDSL (UTU-91x and WD92xGx) cards can be managed from their front-panel craft port when the EMU-830 is installed in the shelf. Telnet can also be used to manage multiple EMU-830s using multishelf TAO in the same logical IP network.

```
                    WorldDSL Series EMU-830 Management Unit
 Login     Upload     Quit


           Shelf ID              Alarm Status   Shelf ID         Alarm Status
          ------------------------------------------------------------------------
       1  Shelf #5                    MAJ    17                        -
       2  >Shelf #28                   -     18                        -
       3                               -     19                        -
       4                               -     20                        -
       5                               -     21                        -
       6                               -     22                        -
       7                               -     23                        -
       8                               -     24                        -
       9                               -     25                        -
      10                               -     26                        -
      11                               -     27                        -
      12                               -     28                        -
      13                               -     29                        -
      14                               -     30                        -
      15                               -     31                        -
      16                               -     32                        -
          ------------------------------------------------------------------------
```

Figure 1-4. Multishelf TAO Network Screen

```
                   WorldDSL Series EMU-830 Management Unit
 Main      Config      Inventory     Quit
  SHELF STATUS FOR:   ADC                    (Alarm Status: CRT, MAJ, MIN)

  Shelf Alarms     HDSL/G.SHDSL Line Unit Status (most severe alarm is shown)
  ------------     ----------------------------------------------------------
  EXT CLOCK          1  LOS    5  -      9  LOS   13 -
                     2  LOS    6  LOS   10  LOS   14 LOC
                     3  -      7  LOC   11  LOS   15 -
                     4  LOS    8  LOS   12  N     16 LOS

              -: Normal        D: Alarms disabled    N: NTU/STU_R
              /: Not occupied  X: Not manageable     *: Both loops
              a: PSW active    f: PSW fail           u: PSW not supported
  ------------------------------------------------------------------------
   1) Login to HDSL/G.SHDSL circuit
   2) Enable/Disable alarm reporting of HDSL/G.SHDSL  circuit

   ENTER SELECTION: █


 SHELF ID: ADC            : 22/08/2006 : 10:13 : EMU :   SYS STATE: Alarm
```

Figure 1-5. Multishelf TAO Main Menu Screen

A multishelf network is created by connecting the local area network (LAN) to the 10BASE-T Ethernet connector available on a shelf. Each shelf must have an EMU-830 management unit installed. A VT100 terminal (or PC) is connected either locally or remotely (through modems), or through Telnet access to the console port of one EMU in the network. The shelf containing this EMU is called the local shelf. The local shelf coordinates communication with all other shelves in the network, which are called the remote shelves.

It is not necessary for you to explicitly identify each shelf in the network, as the local shelf automatically discovers them. You must, however, pre-configure the EMU in each shelf with a unique IP address and subnet mask to place all the shelves on the same subnet.

Note: Shelf networks cannot be connected through a router because the local shelf uses UDP-broadcast messages as a mechanism to automatically discover other shelves in the network, and routers generally filter these broadcasts. For connecting multiple devices, use an Ethernet hub or switch instead.

In a remotely managed configuration, an external modem must be connected to the EMU-830 front panel V.24 (RS-232) console port. If enabled, alarm conditions cause ASCII messages to be transmitted autonomously over the dial-up network. These messages can be displayed on a monitor or sent directly to a printer. This provides the network operator immediate notification of problems. The operator can then initiate a remote TAO session with the local shelf to further diagnose and correct the problem.

The EMU-830 and the DSL card firmware can be easily upgraded using the Upload utility from the TAO Main menu. This utility uses TFTP and Xmodem protocols.

A proprietary software download protocol permits firmware to be downloaded to any unit (EMU or DSL line card) in a multishelf TAO network. This protocol is supported by a special ADC application program that can run on a PC. The PC connects to the front panel RS-232 V.24 console port of one of the EMUs in the network.

Note: The Multishelf TAO firmware and SNMP agent are factory loaded on all EMU-830 management units.

SNMP

SNMP (Simple Network Management Protocol) is an application layer protocol of the Internet suite of protocols, commonly referred to as TCP/IP (after the two core protocols—Transmission Control Protocol and Internet Protocol), and is designed to be an "open" (non-proprietary) network management technology capable of managing internetworking equipment from multiple vendors. SNMP is formally specified in a series of related RFC (Request For Comment) documents from the Internet Engineering Task Force (IETF). The WorldDSL EMU-830 implements SNMP version 1. Communications standards supported in Version 1 of the SNMP standard include IP, User Datagram Protocol (UDP), Internet Control Message Protocol (ICMP), and Address Resolution Protocol (ARP). Two other protocols, Boot Protocol (BOOTP) and Trivial File Transfer Protocol (TFTP), are also included to support IP address management and download of EMU-830 code over the network.

In an SNMP managed network, each WorldDSL shelf is considered a managed node and contains an SNMP software agent that resides in the EMU-830. The software agent provides the operating kernel, SNMP protocols, transport protocols, and management information. Multiple shelves, each of which deploy up to 16 DSL links, can be centrally managed from a single SNMP-based Network Management Station. Each DSL link consists of an LTU/STU-C unit installed in the shelf, a remote NTU/STU-R unit, and possibly one or two mid-span doublers. Doublers are currently supported only with HDSL (e.g., LTU-804, UTU-804) line cards. A link is managed as one DSL system by SNMP.

SNMP access is provided over two types of interfaces:

- **SNMP through LAN.** An interface using an Ethernet port (10BASE-T) on the WorldDSL shelf that supports UDP over IP.
- **SNMP through SLIP.** An out-of-band (or dial-up) serial interface using the RS-232/RS-485 configurable SLIP port on the WorldDSL shelf, which supports IP over a SLIP at a maximum 19.2k baud rate.

The network of WorldDSL shelves can be managed by one or more SNMP management stations at the same time over either of the SNMP interfaces. Management can be performed through the 10BASE-T Ethernet port and the RS-232/RS-485 SLIP port simultaneously. StarGazer manages WorldDSL shelves using SNMP through LAN.

shows a network of WorldDSL shelves managed by SNMP through LAN and SNMP through SLIP.

STU-C and STU-R terminology is used with the G.SHDSL WD92xGx line cards.
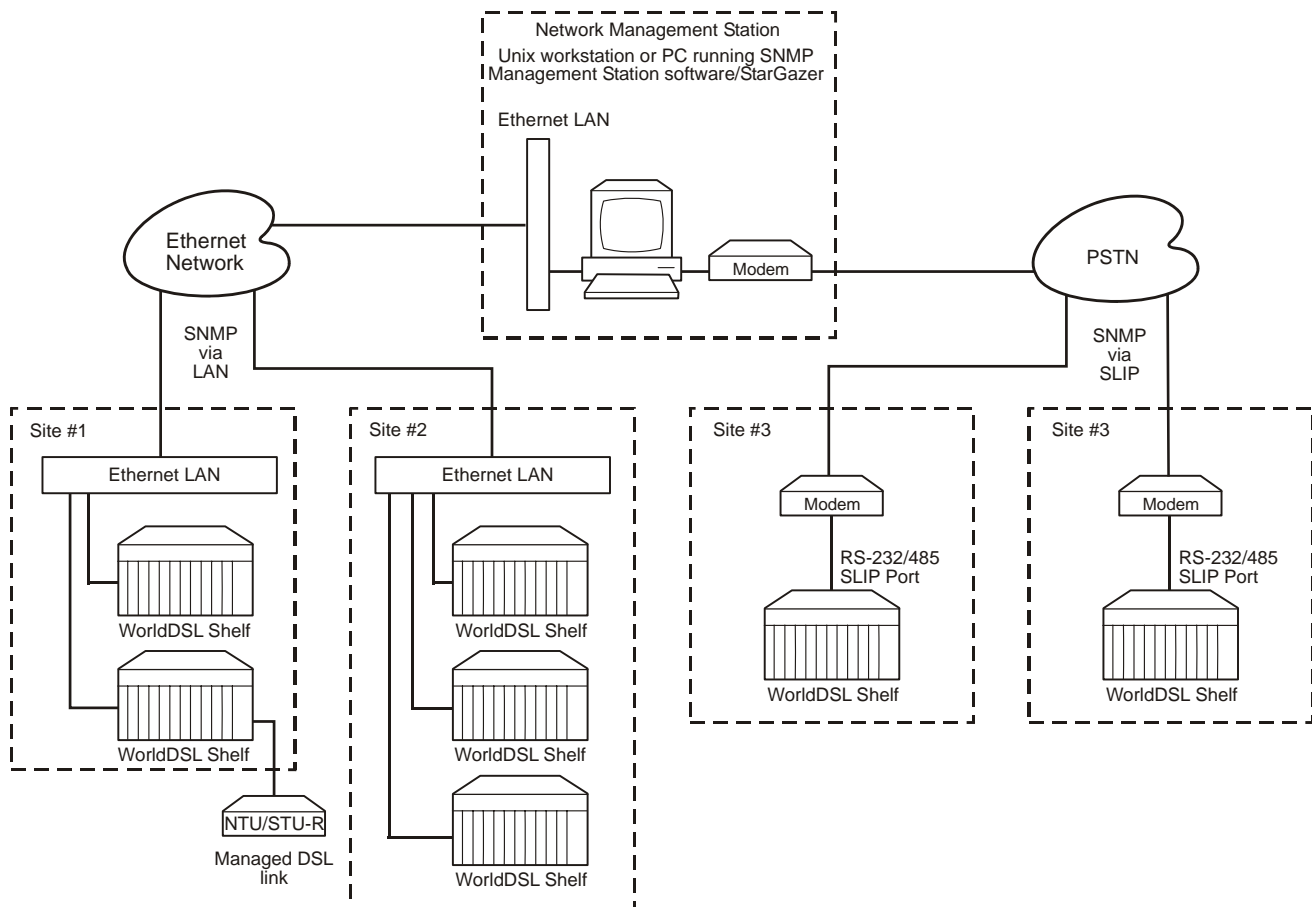
Figure 1-6. WorldDSL Shelves Managed by SNMP through LAN and SNMP through SLIP

SNMP MANAGEMENT INFORMATION BASE

Simple Network Manage Protocol (SNMP) specifies how to send information between a network management station and managed devices on a network. Managed devices run a program called an agent. The agent interprets SNMP requests and responds to them. The management station communicates with the agents in the managed devices to:

- set configurations
- read configurations
- read status parameters

Management Information Bases (MIBs) define these configurations and status parameters. The Internet Engineering Task Force (IETF) specifies standard MIBs for certain types of devices, ensuring any generic SNMP application can manage them. Other vendor-specific MIBs such as those used by ADC, define the configuration, status, trap, and performance parameters unique to the WorldDSL product line.

The EMU-830 performs as a proxy agent when managing line units. Each managed device has configuration, status, and statistical information that defines its functionality and operation capabilities.

There are a total of six MIB files that define the SNMP management interface of the ADC WorldDSL product. These files should be copied into the Network Manager Client MIB Subdirectory. Once copied onto the desired drive they can be easily accessed by the Network Manager's MIB compiler. The six MIB files are named as follows:

!

These MIB files must be used with the management unit software release.

- **RFC 1213 MIB II**. The Internet-standard MIB for network management of TCP/IP-based internets. It defines objects common to all devices that support SNMP. This includes objects related to generic configuration such as the device's name (sysName), objects related to the transport protocols (IP, TCP, ICMP, etc.), and a description of the chassis' interface ports (data ports as well as HDSL ports).
- **pgmibhd.mib** (Common MIB). An enterprise MIB (that is, unique to ADC products) that defines the top-level branch structure for all ADC products including the WorldDSL product line.
- **pgetsi.mib** (ETSI Interface MIB). Enterprise MIB containing management objects for the shelf common equipment (chassis and EMU-830) and DSL circuit elements (LTUs/STU-Cs, NTUs/STU-Rs, doublers), excluding DSL performance related objects which are contained in the DSL MIB. Examples include the EMU-830 LED status (emuLedStatus), an LTU/STU-C V.35 port data rate (ltuDataPrtTimeSlots), and PTM managed items.
- **pghdsl.mib** (DSL MIB). Enterprise MIB containing objects related to the performance of the DSL links, such as 15-minute and 24-hour performance history.
- **pgagtmib.mib** (SNMP Agent MIB). MIB containing management objects to control and configure the operation of the IP and SNMP parameters. Examples include the EMU IP address, boot and image mode, and trap receiver setup.
- **pgetsitr.mib** (ETSI SNMP Trap MIB). MIB containing a subset of the RFC 1215 common traps as well as ADC enterprise traps (see "Traps" below for details).

TRAPS

Traps are autonomous, interrupt-driven messages sent from a managed node (shelf) to a management station to indicate the occurrence of an extraordinary event (such as alarms or a link going down) or a configuration change (such as changes in alarm severity settings, circuit IDs, or loopback modes). When an event occurs, the shelf sends a trap to the management station, which polls the shelf to determine the nature of the event. Circuit Name is also included in the trap.

A managed node (shelf) can be configured to send traps to up to three trap receivers (that is, management stations). The WorldDSL traps are listed in Table 1-2.

Table 1-2. WorldDSL Traps

Traps	Definition
Cold Start	MIB II standard trap indicating that the EMU-830 has come on-line.
Authentication failure	MIB II standard trap indicating that the agent received an SNMP message with an improper community string. For example, an SNMP-managed device assigned to the community "ETSI" receives a message for a device in the "HGIS" community.
Link up/link down	MIB II standard trap indicating a loss of signal condition at one of the transmission interfaces (E1 or DSL).
DSL circuit alarm	ADC enterprise trap sent at the occurrence of an alarm condition on an DSL circuit if that alarm is of a greater severity than any existing alarms on the same circuit. Separate trap messages are sent for each DSL circuit in the shelf.

Traps	Definition
Power supply failure	Enterprise trap that indicates the failure of a -48 V shelf power supply input.
Multiple DSL loops down	Enterprise trap used to indicate when the programmable threshold of the number of downed DSL loops in the shelf has been exceeded.
System configuration change	Enterprise trap that signals when a change has occurred in the physical configuration of the system, such as the insertion or removal of LTUs/STU-Cs.
Line unit configuration change	Enterprise trap that signals when a change has occurred in the configuration of a line unit (includes alarm severity settings, circuit IDs, and loopback modes).

BOOTP AND TFTP PROTOCOLS

BOOTP is a UDP/IP-based protocol that allows the EMU-830 to configure itself dynamically without supervision. BOOTP provides a means for the EMU-830 to learn its protocol configuration, including:

- Local IP address and subnet mask
- Boot Server IP address
- Name of image file to be loaded into memory and executed
- Default router addresses

The BOOTP and TFTP protocols included with the EMU agent software facilitate these methods of software loading and network configuration.

The EMU can be configured to learn its protocol configuration at reset from the network (by sending a BOOTP broadcast message that is recognized by the BOOTP server) or from the NVRAM on the EMU. BOOTP provides a simple means of unit configuration. It also allows the network administrator to dynamically allocate the IP address for the EMU.

The EMU can also be configured to know where it should get its operational code (image file): either from the BOOTP server using TFTP or from the flash RAM on the EMU. This allows the EMU to always download the most recent image file at power-on or reset, and it lets the network administrator keep the image file in a single location for use by all the WorldDSL shelves.

XMODEM PROTOCOL

The Xmodem protocol permits software to be downloaded to any EMU or line unit (local or remote) from a PC connected to the EMU front panel V.24 (RS-232) console port.

Associated Upload menus and screens allow selection of any shelf in the network and the EMU or any line unit in the shelf as the upload target.

The EMU and each line unit is reset and runs the new code following the software download.

Do not abort the download procedure when an XModem transfer is in progress.

ALARMS

The EMU-830 constantly monitors each of the DSL cards for alarm conditions. When so configured, the EMU-830 provides autonomous dial-out reporting of alarms to remote management stations and printers (see "Autonomous Dial-out Alarm Reporting" on page 1-10). The EMU-830 List 6A monitors the external 2 MHz clock supplied to the shelf (see "External Shelf Clock Backup Circuit" on page 1-11).

The alarm status is reported in several ways: alarm LEDs, alarm relays, terminal screens, SNMP traps, and dial-out reporting. DSL card alarms can be specified as major, minor, or disabled. Shelf alarms can be specified as major, minor, critical, or disabled. A major alarm is asserted when an alarm condition occurs in a card or shelf that is specified as major. A minor alarm is asserted when an alarm condition occurs in an DSL card or shelf that is specified as minor. Only shelf alarms can be classified as critical. A critical alarm is asserted when any shelf alarm occurs that is specified as critical. Use the TAO Main menu to login to an DSL circuit to configure the DSL card alarms (see "Config Menu" on page 3-8).

Six alarm relays are provided for use with external alarm indicators such as lights or buzzers. Each relay is a form C type which provides three contacts: Common, Normally Open, and Normally Closed. An alarm relay diagram is shown in Figure 1-7.
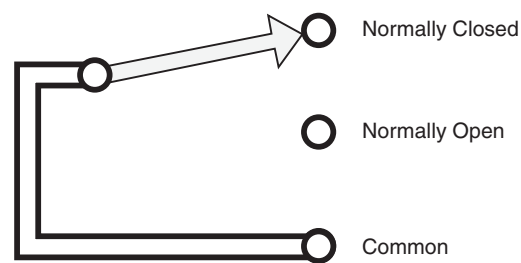
Figure 1-7. EMU-830 Alarm Relay Diagram

The six alarm relays are:

1. Critical Visual
2. Critical Audible
3. Major Visual
4. Major Audible
5. Minor Visual
6. Minor Audible

Additionally, a System ID relay is activated when any minor, major, or critical alarm is active in the shelf.

The Critical Visual and Critical Audible alarm relays and the System ID relay operate in the fail-safe mode. That is, when power is lost to the EMU-830, the Common contact connects to the Normally Open contact.

The ACO (Alarm Cut-Off) function is used to retire active alarms by resetting the minor, major, and critical alarm relays (both visual and audible). The Shelf Alarms menu (page C-16) can be used to program which alarm relays will and will not be retired when ACO is engaged. ACO can be activated by pressing the front panel ACO switch or by connecting the external ACO input (pin 25 of the Alarm connector on a shelf) to ground. ACO is deactivated when there are no alarms or when a new alarm occurs.

AUTONOMOUS DIAL-OUT ALARM REPORTING

When connected through a modem to a dedicated telephone line, the EMU-830 can dial-out to a remote management station or printer to autonomously report DSL card and shelf alarms. For the EMU-830 to perform this function, you must first configure the EMU *Modem Parameters*, set the severity of the *Shelf Alarms*, and enable the *Remote Alarm Reporting* option (see page C-14 through page C-17).

EXTERNAL SHELF CLOCK BACKUP CIRCUIT

The EMU-830 List 6A includes a backup circuit for the 2.048 MHz external shelf clock. This circuit will continue to provide a 2.048 MHz clock to the DSL cards in the event the 2.048 MHz external shelf clock is lost. The software reports the status of this circuit and allows the user to set the severity of the alarm generated when the clock is lost. A block diagram of the clock backup circuit is shown in .

Under normal operation the external shelf clock and the backup circuit synchronize their respective clocks through the EMUs phase-locked loop (PLL) device. In the event the external shelf clock is lost, the oscillator in the backup circuit will continue to supply the 2.048 MHz clock. A Loss of External Clock alarm is reported to the management station.
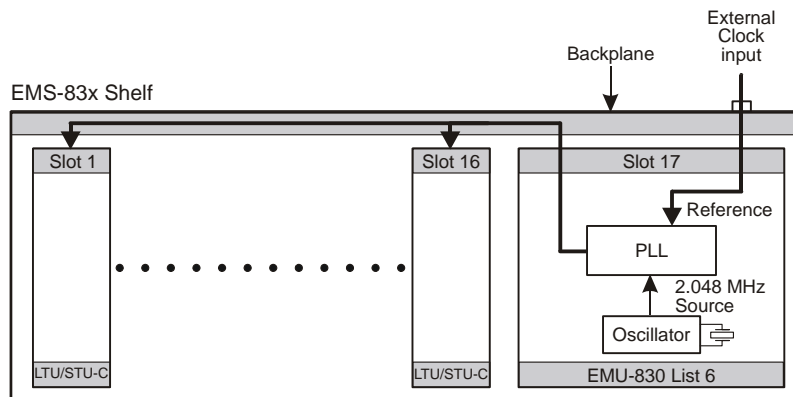
Figure 1-8. External Shelf Clock and EMU-830 List 6A Backup Circuit

INSTALLATION

This section describes the procedures for installing the EMU-830.

Note: Each shelf in a Multishelf TAO network must have an EMU-830 management unit installed. Inserting and removing the EMU-830 from a shelf will not affect the operation of the DSL cards installed in the shelf.
An EMU-830 failure will not affect the operation of the DSL cards installed in the shelf.

EMU JUMPER SETTINGS

EMU-830s are jumper configurable for an RS-232 or RS-485 SLIP port interface. EMUs have an RS-232 factory setting.

If you use the SLIP port to manage a shelf or shelves, you must configure the SLIP port interface before installing the EMU-830. Do one of the following:
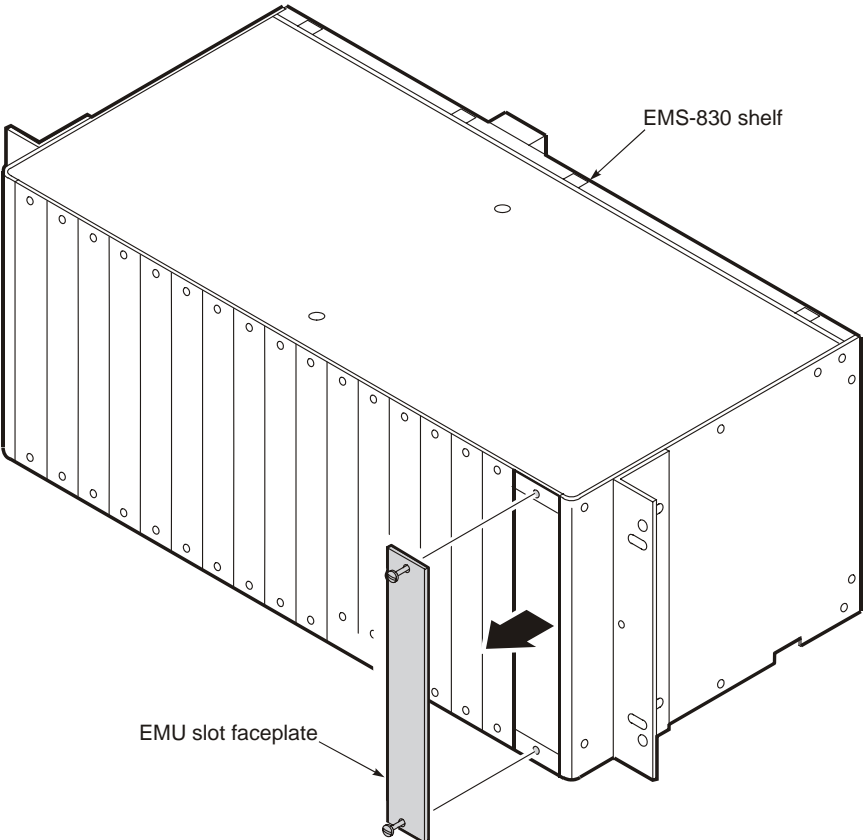
- For an RS-232 SLIP port interface, install the jumper on two-pin header connector P6 (Figure 2-1). This is the factory default setting. Set the SLIP port baud rate as instructed in "Configure SNMP Operation Over SLIP" on page 3-10.
- For an RS-485 SLIP port interface, remove the jumper from two-pin header connector P6 (Figure 2-1). Set the SLIP port baud rate as instructed in "Configure SNMP Operation Over SLIP" on page 3-10.
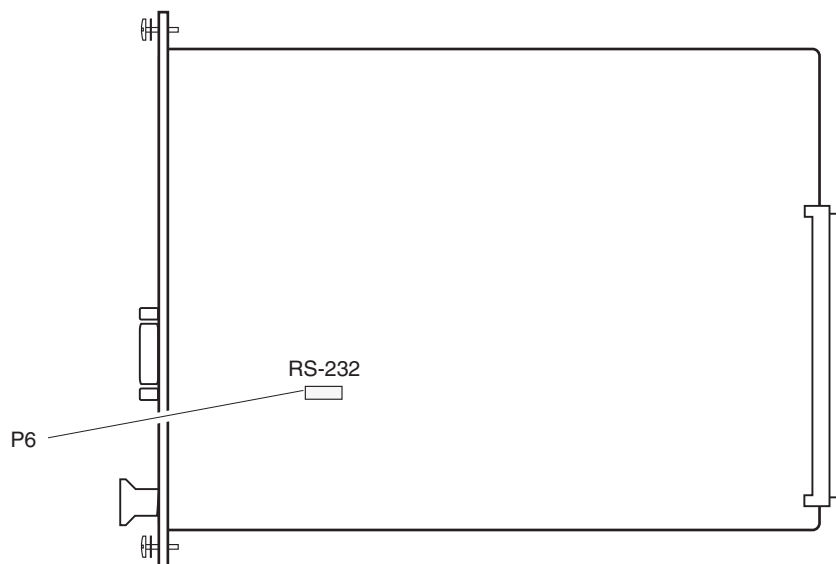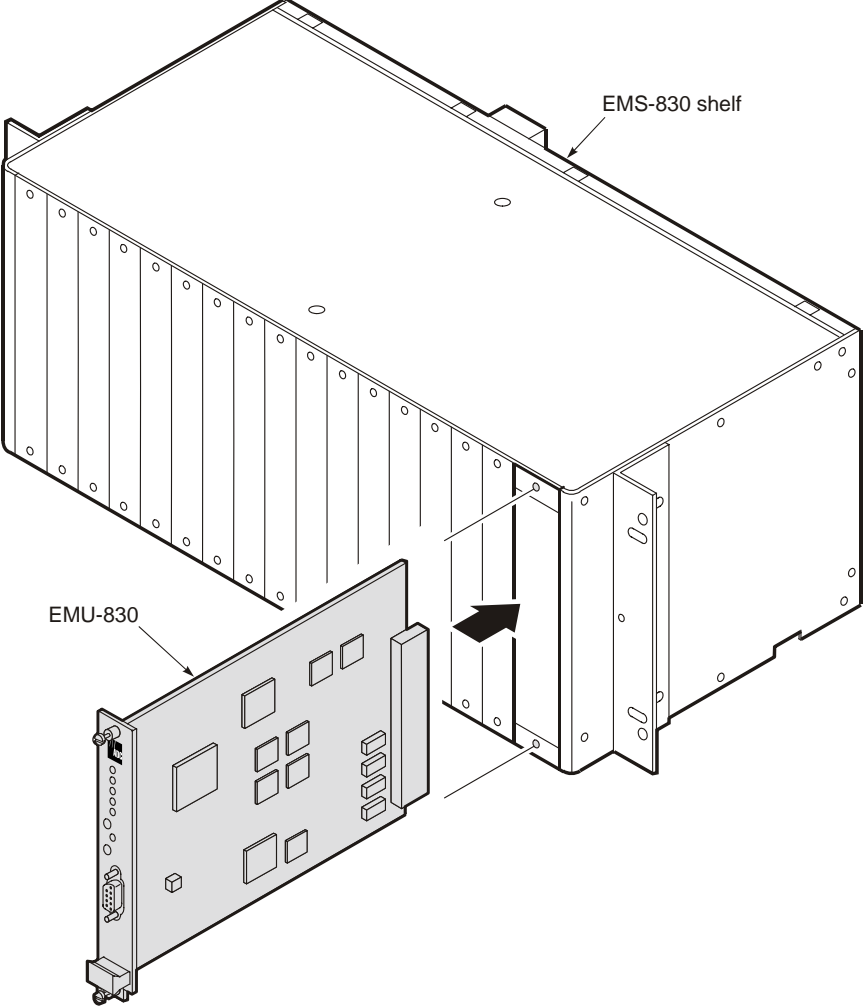
Figure 2-1. Location of the SLIP Header Connector P6 on the EMU-830

EMU INSTALLATION

Install the EMU-830 in an EMS-830 as follows:

Step	Action
1	Use a flat-blade screwdriver to loosen the two screws holding the EMU slot faceplate (Slot 17) in place, then remove the slot faceplate (Figure 2-2).

EMS-830 shelf

EMU slot faceplate

Figure 2-2. Removing the EMU-Slot Faceplate from EMS-830

Step	Action
2	Align the EMU-830 card with the card guides at the top and bottom edges of Slot 17, then push the card in until the EMU-830 front panel is flush with the front of the shelf (Figure 2-3). The connector positions in slots 1 through 16 prevent the EMU-830 from being installed in the wrong slot. EMS-830 shelf EMU-830 **Figure 2-3. Installing the EMU-830 into Slot 17 of EMS-830**
3	Tighten the two captive retaining screws on the front of the EMU-830 card.

MULTISHELF CABLE CONNECTIONS

Note: Multishelf networks cannot be connected through a router because the local shelf uses UDP-broadcast messages as a mechanism to automatically discover other shelves in the network, and routers generally filter these broadcasts. A multishelf network is limited to 32 shelves.

To connect the shelves using the 10BASE-T Ethernet connectors (Figure 2-4):

Step	Action
1	Plug an RJ-45 cable into the 10BASE-T connector at the rear of each shelf.
2	Plug the other end of the RJ-45 cables into the hub/switch connecting the shelves.

Note: The length of each RJ-45 cable cannot exceed 100 meters (328 feet).
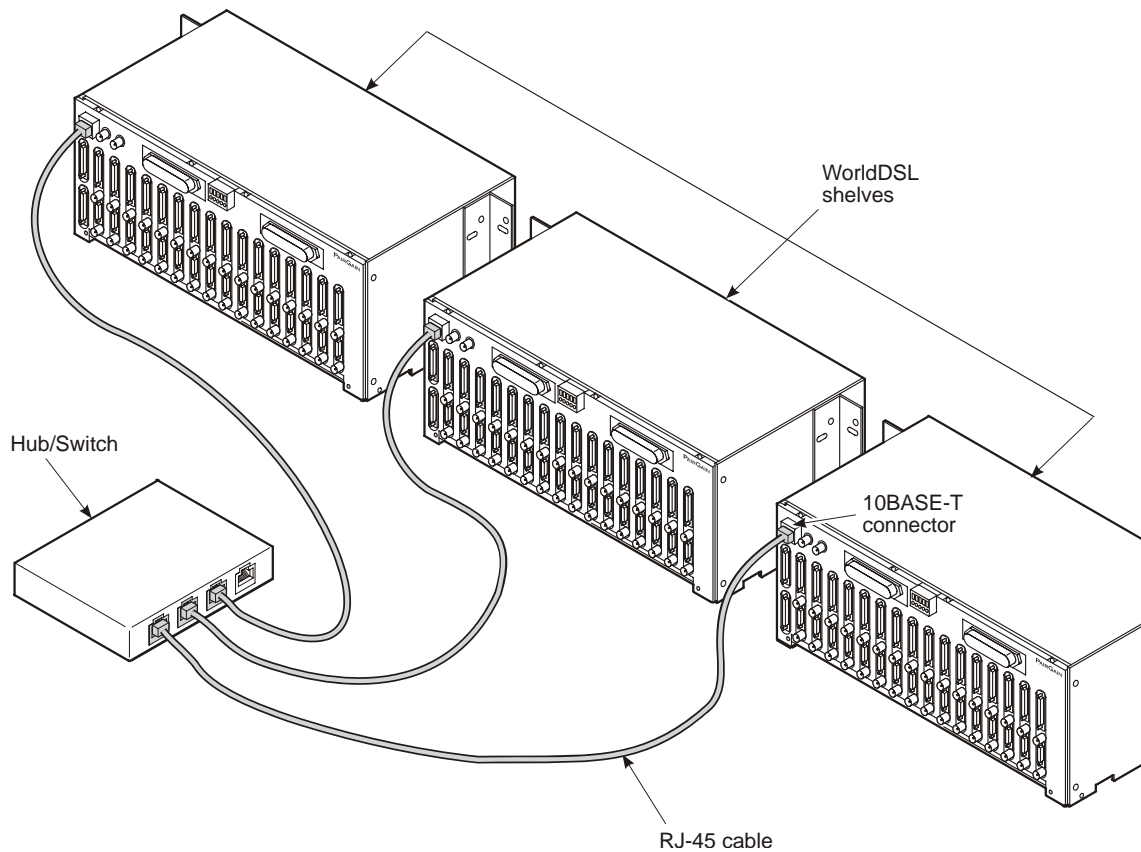
Figure 2-4. 10BASE-T Multishelf Cable Connections

LOCAL TERMINAL CONNECTIONS

The console port of the EMU-830 in the local shelf can be connected directly to a VT100 terminal (or PC). Once connected, you can use the terminal (or PC) to access the EMU-830 console menus. The console menus allow you to configure each EMU and DSL circuit in a multishelf network, monitor and test system performance, and display the inventory of installed DSL units.
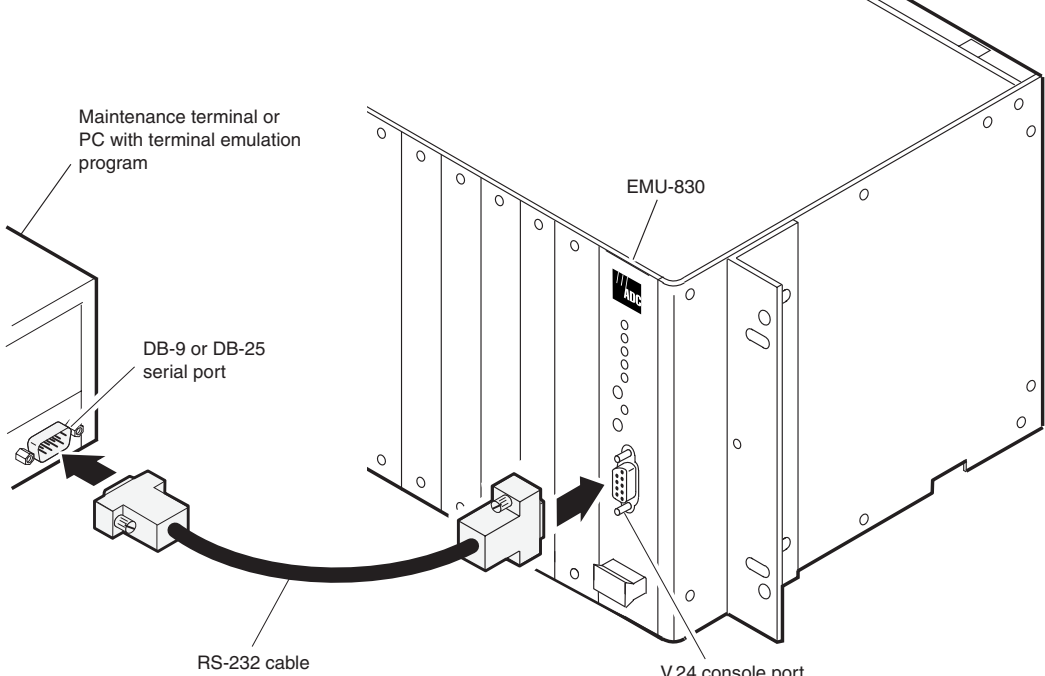
The EMU-830 console port in the local shelf can be connected to the DB-9 or DB-25 serial port of a maintenance terminal or PC. The EMU-830 console port pinouts and the required connections to a DB-9 or DB-25 serial port are shown in Figure 2-5.

Note: For security purposes, if at any time during a TAO session the EMU-830 DTR input signal is lost, the session automatically terminates.
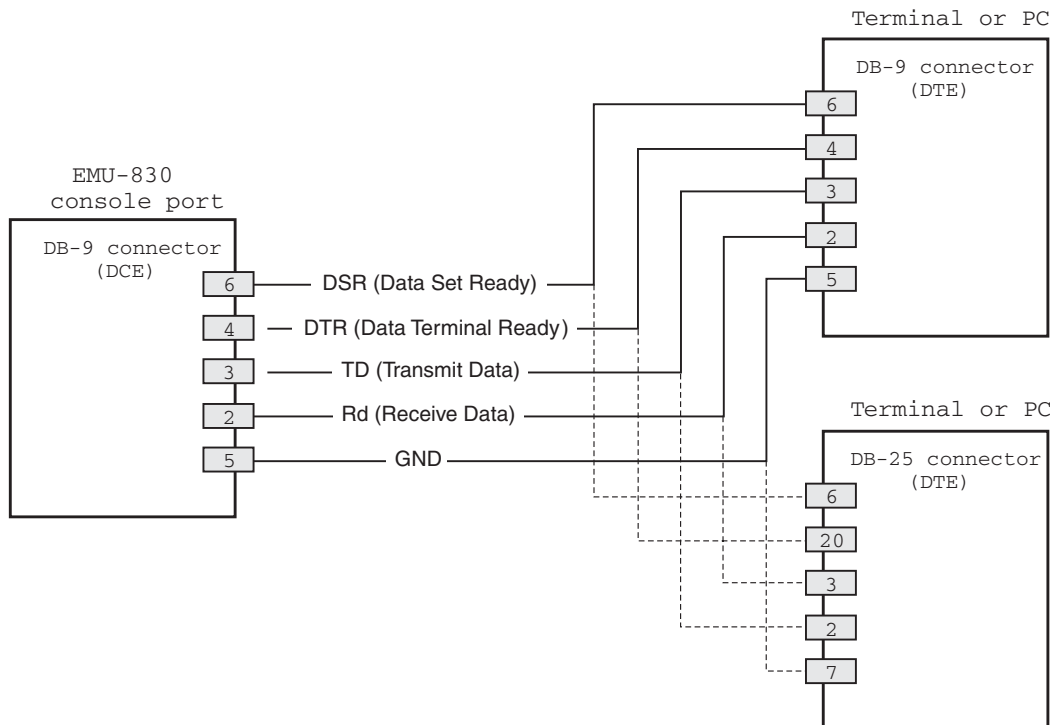
Figure 2-5. EMU-830 Console Port Pinouts to DB-9 or DB-25 Connector

Step	Action
1	Connect a serial cable from the DB-9 or DB-25 serial port on the maintenance terminal or PC to the V.24 (RS-232) console port on the EMU front panel (Figure 2-6). **Figure 2-6. Connecting a Maintenance Terminal or PC to the EMU-830 Console Port**
2	Configure the maintenance terminal (or PC) for the following communication settings: • 1200 to 19200 baud (19200 baud is recommended) • No parity • 8 data bits • 1 stop bit • Flow Control to *None* • VT100 Emulation, or ANSI if VT100 is not available • If your terminal supports a modem initialization string, it should be cleared

Note: If using a PC with the Microsoft Windows terminal emulation program, you must deselect both the Show Scroll Bars option and the Use Function, Arrow, and Ctrl Keys for Windows option in the Terminal Preferences menu (choose **Settings | Terminal Preferences** to access the Terminal Preferences menu).

REMOTE TERMINAL AND LOCAL SHELF MODEM CONNECTIONS

Remote management of one or more Multishelf TAO sites over a telephone network requires the connection of a modem to the remote management station and to the EMU residing in the local shelf of each site. Once connected, the remote management station can access the console menus of one or more multishelf networks to configure, monitor, and test their EMU and DSL circuits. The local shelf can autonomously report alarms to the management station through the modem attached to its EMU.

Management Station Internal Modem

An internal modem card provides an RJ-11 jack at the back panel of the management station. If the management station has an internal modem, plug your phone-line connector into the RJ-11 jack and turn on the management station. Set up the internal modem for 19,200 baud. If you experience problems, refer to your modem or management station user manual.

Management Station External Modem

An external modem requires a serial cable, an external power source, and an unused serial port on the back of the management station.

To connect an external modem to your management station serial port:

Step	Action
1	Plug a serial cable into an available serial port on the back of the management station, using a 9-to-25 pin converter or gender changer if necessary.
2	Plug the other end of the cable into the serial port on the back of the modem.
3	At the back of the modem, plug the telephone line into the RJ-11 port labeled "LINE" or "TELCO".
4	Plug the modem into an external power source and turn it on, then turn on the management station.
5	Verify that the modem is responding to commands from the management station. Use a communications program to send an AT command to the modem. The modem responds with the string "OK" if operation is successful.
6	Configure the shelf modem for remote alarm reporting as instructed in "Remote Alarm Reporting" on page 3-17.
7	If you experience problems refer to the modem or management station user manual.
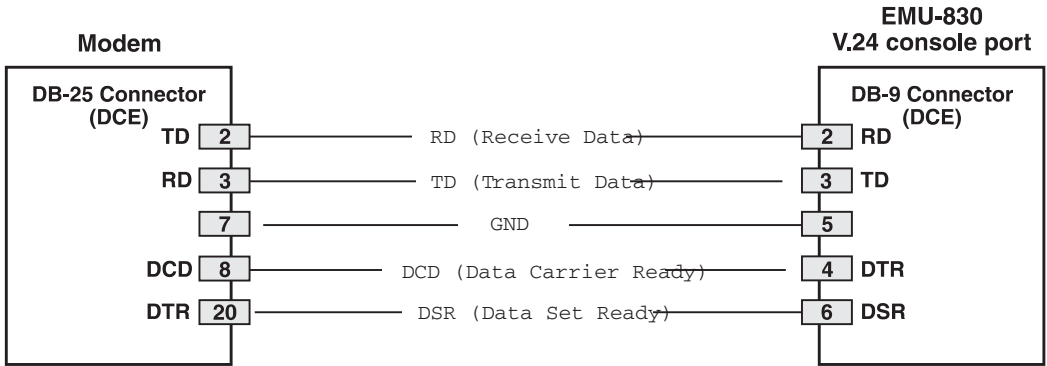
Local Shelf Modem for Multishelf TAO

The local shelf in a remotely managed Multishelf TAO network uses an external modem connected to its EMU console port. The modem, however, must be programmed with a PC before it can be connected to the EMU (the EMU residing in the shelf cannot control a modem as a PC can).

Note: The shelf modem can be attached to the EMU in any shelf. The shelf with the modem attached is the "local" shelf. If managing a shelf through its SLIP port, see "Shelf Modem for SLIP Operation" on page 2-9.

Step	Action
1	Connect the shelf modem to the PC and verify that it is in working condition as described in the preceding section, "Management Station External Modem."
2	Use a communications program to send the following initialization string to the modem: `AT&F` This string resets the modem to its original factory configuration and clears any previous programming that can conflict with the communication between the modem and the EMU.
3	Send the following configuration string to the modem: `ATE0Q1S0=1&K0Y0&W0` This string configures the modem to operate properly with the EMU. The commands in this configuration string are as follows: AT The command prefix indicating an AT command E0 Do not echo input characters Q1 Do not return result codes S0=1 Answer the phone after the first ring &K0 Disable flow control Y0 Use profile 0 as the power-up configuration &W0 Store current configuration as profile 0 **Note:** The shelf modem does not respond with an "OK" when you enter the above string. This string disables all response codes and echo capability in the modem. The response codes are not used by the EMU. When the modem is properly configured, the Auto Answer (AA) lamp on the modem panel lights, indicating that the modem is waiting for the phone to ring to answer an incoming call from the management station PC.

Step	Action
4	Connect a serial cable (with pinouts as specified below) to the EMU console port connector (DB-9F) of the local shelf. **IMPORTANT** ⚠️ *The modem-to-EMU serial cable must have the connector pinouts shown in Figure 2-7 to function correctly.* **Figure 2-7. Modem to EMU Serial Cable Pinouts**
5	Plug the other end of the cable into the serial port on the back of the modem.
6	At the back of the modem, plug a dedicated telephone line into the RJ-11 port labeled LINE or TELCO.
7	Plug the modem into an external power source and turn it on.
8	Configure the EMU modem parameters for remote alarm reporting as instructed in "Modem Parameters (Configure and Test Dial-out Alarm Reporting)" on page 3-14.

SHELF MODEM FOR SLIP OPERATION
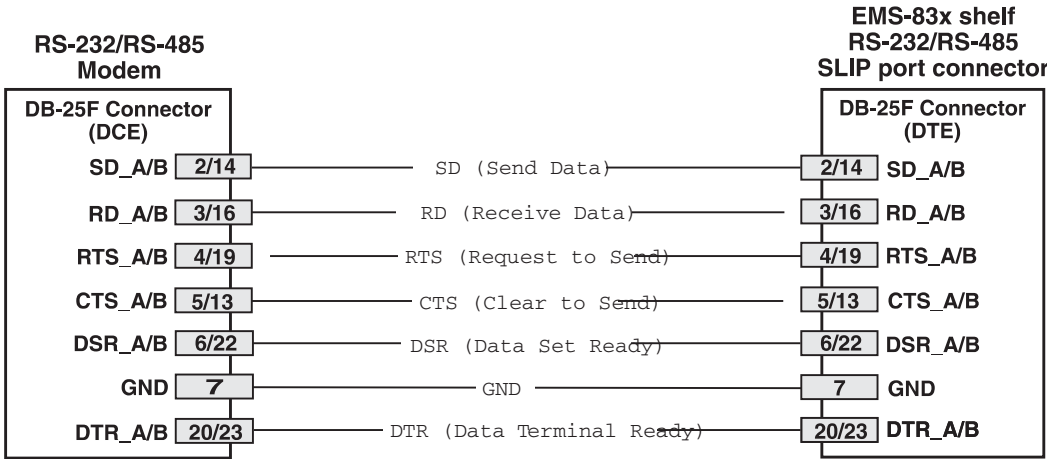
One or more shelves can be remotely managed by connecting an external modem to the RS-232/RS-485 SLIP port. However, when managed through the SLIP port, each shelf must be assigned a unique IP address (only one shelf is accessed with each dial-up connection). Figure 1-6 on page 1-7 show WorldDSL shelves managed by SNMP through SLIP.

Note: See "EMU Jumper Settings" on page 2-1 for RS-232/RS-485 SLIP port configuration.
This procedure requires the use of a 25-wire straight-through cable, with a male DB-25 connector on each end of the cable (see Figure 2-8 on page 2-10).

To connect an external modem to the RS-232/RS-485 SLIP port:

Step	Action
1	Connect one end of the 25-wire cable to the RS-232/RS-485 (SLIP) connector on the EMS shelf.
2	Connect the other end of the cable to a standard modem.
3	If the modem has configuration switches or jumpers, set the switches or jumpers for factory default operation. Refer to the modem user manual for more information.
4	At the back of the modem, plug a dedicated telephone line into the RJ-11 port labeled LINE or TELCO.
5	Plug the modem into an external power source and turn it on.

Step	Action
6	Configure the EMU for SNMP operation over SLIP (see "Configure SNMP Operation Over SLIP" on page 3-10).
7	Configure the EMU modem parameters for remote alarm reporting. Refer to "Modem Parameters (Configure and Test Dial-out Alarm Reporting)" on page 3-14 for details. **Figure 2-8. Modem to SLIP Port Cable Pinouts**

MENU NAVIGATION AND MULTISHELF CONFIGURATION

CONSOLE MENU NAVIGATION

Single keystrokes are used to make menu selections and, where applicable, select available options. Use the keys described in Table 3-1 to navigate through the console menus, menu items, and screens:

Table 3-1. Console Menu Navigation Keys

Press this Key	To Perform this Function
Alphanumeric keys	Select and execute an underlined or highlighted menu item. Also used for typing in text fields.
↑ and ↓ keys	Pull down a menu from the Menu bar, or select (highlight) a menu item.
TAB key	Same as ↓ key.
← and → keys	Traverse the Menu bar, except when in a text entry field.
SPACEBAR	Activates Autobaud feature and toggles the menu item settings (for example, toggles from Enabled to Disabled).
ESC key	Exits the current screen and returns to the previous screen. Selection changes made on the current screen are discarded. Pressing ESC in a text field cancels the text entry and restores the old value.
ENTER	Submits all selection changes on the current screen and makes them effective in the system. Also used to toggle menu item settings.

Note: The shelf with the ">" symbol (for example, >Shelf #28) is the local shelf connected to the management station. Other shelves (without the > symbol) are remote shelves connected through an Ethernet subnet.

CONSOLE MENU OPTIONS

See Table 3-2 on page 3-2 for a listing of screens, menus, and menu items you can select from the Network and Main Menu screens.

Table 3-2. Logon, Network, and Main Menu Screen Selections

Screens and Selections	Displays and Functions
Logon Password screen	Displays date and time and Password text box (Figure 3-1 on page 3-3.)
<Password> or ENTER	Displays Network screen
Network screen (Figure 3-2 on page 3-4)	Displays shelf ID and alarm status for all shelves in the network
Login	Displays Main menu screen for selected shelf (Figure 3-3 on page 3-5)
Upload	Displays Upload menu to upload image files (Figure 3-19 on page 3-25)
Quit	Log off the system
Main menu screen (Figure 3-3 on page 3-5)	Displays alarm status for selected shelf
Main	Login to selected DSL circuit (page 3-5)
	Enable/disable DSL circuit alarm reporting (page 3-5)
Config	Displays Config menu to set any of the following:
	Network parameters (page 3-8)
	SNMP parameters (page 3-11 - see also page 3-10)
	Modem parameters (page 3-14)
	Shelf alarms (page 3-16)
	Date and time (page 3-17)
	Password (page 3-18)
	Shelf ID (page 3-19)
	Terminal display quality (page 3-20)
	Factory defaults (page 3-21)
	Reset management unit (page 3-22)
Inventory	Display information about the EMU including serial number, date of manufacture, and firmware particulars (page 3-22).
Quit	Go back to Network screen

MULTISHELF CONFIGURATION

The sections that follow contain instructions on how to access the EMU-830 console menus to configure and monitor each EMU and DSL circuit in a multishelf network.

> **Note:** Multishelf TAO has two main screens, the Network screen and the Main menu screen. Logging on displays the Network screen (Figure 3-2 on page 3-4); selecting a shelf in the Network screen displays the Main menu screen (Figure 3-3 on page 3-5); typing the letter **Q** returns to the Network screen; typing the letter **Q** in the Network screen quits the application. The Multishelf TAO screens illustrated in this practice were displayed by the Windows 3.1 Terminal emulation utility.

Logging On

To log on to the EMU console menus:

Step	Action
1	Press the **SPACEBAR** several times to activate the Autobaud feature. Supported baud rates are 1200, 2400, 4800, 9600, and 19200 (recommended). The Logon screen dialog box is displayed (Figure 3-1). **Figure 3-1. Logon Screen Dialog Box**
2	Press **ENTER**. The Network screen is displayed (see Figure 3-2 on page 3-4). **Note:** The factory-default password is **ENTER**. If you establish a different password, you must type the new password in the Logon screen dialog box on a subsequent log on. If the system does not respond, verify that the Hardware Flow Control of the VT-100 terminal (or PCs terminal emulation utility) is *OFF*. If the password is forgotten, please contact ADC customer service.

Network Screen

Note: The shelf with the > symbol (for example, >Shelf #28 in Figure 3-2) is the local shelf connected to the management station PC. Other shelves without the > symbol are remote shelves connected to the local shelf through an Ethernet subnet.

The Network screen (Figure 3-2) includes the Login command, Upload menu, and Quit command. The Upload menu provides the mechanism to upload image files to local or remote line units or to local or remote EMUs for system management. See "Managing Firmware Through the Upload Menu" on page 3-24 to use this command. The Quit command provides a logout from the Network screen.

The Network screen also includes the Shelf ID field and the Alarm Status field. The Shelf ID field initially shows Shelf 1 for all shelves in this subnet until the shelf ID is configured for each shelf (see "Set Shelf ID" on page 3-19 for configuring the Shelf ID). The Alarm Status field shows the active alarm status of each shelf in this multishelf network.

```
                     WorldDSL Series EMU-830 Management Unit
     Login     Upload     Quit


             Shelf ID              Alarm Status    Shelf ID            Alarm Status
          ------------------------------------------------------------------------------
       1   Shelf #5               MAJ     17                                 -
       2  >Shelf #28               -      18                                 -
       3                           -      19                                 -
       4                           -      20                                 -
       5                           -      21                                 -
       6                           -      22                                 -
       7                           -      23                                 -
       8                           -      24                                 -
       9                           -      25                                 -
      10                           -      26                                 -
      11                           -      27                                 -
      12                           -      28                                 -
      13                           -      29                                 -
      14                           -      30                                 -
      15                           -      31                                 -
      16                           -      32                                 -
          ------------------------------------------------------------------------------
```

Figure 3-2. Network Screen

Logging in to the Main menu

To log in to the Main menu:

Step	Action
1	In the Network screen, select a shelf from 1 to 32 for which you want to view EMU or Line Unit configuration. Use the ↑ and ↓ arrow keys.
2	Type the letter **L** (or press **ENTER**). The Main menu screen for the selected shelf is displayed (see Figure 3-3 on page 3-5).

Main Menu

Use the ← arrow key to select Main, then press **ENTER** to display the Main menu screen (Figure 3-3 on page 3-5). The Main menu screen shows the alarm status for a selected shelf and its DSL cards. It also allows you to log into the console menu for any card in the shelf and to disable the card's alarm reporting functions.

```
              WorldDSL Series EMU-830 Management Unit
    Main      Config      Inventory     Quit

    SHELF STATUS FOR:   ADC                   (Alarm Status: CRT, MAJ, MIN)

    Shelf Alarms      HDSL/G.SHDSL Line Unit Status (most severe alarm is shown)
    -----------      --------------------------------------------------------
    EXT CLOCK         1  LOS     5  -       9  LOS      13  -
                      2  LOS     6  LOS    10  LOS      14  LOC
                      3  -       7  LOC    11  LOS      15  -
                      4  LOS     8  LOS    12  N        16  LOS

              -: Normal          D: Alarms disabled   N: NTU/STU_R
              /: Not occupied    X: Not manageable    *: Both loops
              a: PSW active      f: PSW fail          u: PSW not supported
    -----------------------------------------------------------------------
    1) Login to HDSL/G.SHDSL circuit
    2) Enable/Disable alarm reporting of HDSL/G.SHDSL  circuit

    ENTER SELECTION: █

SHELF ID: ADC              ¦ 22/08/2006 ¦ 10:13 ¦ EMU ¦  SYS STATE: Alarm
```

Figure 3-3. Main Menu Screen

Shelf Alarms

The state of shelf and DSL alarms is continuously updated in the Main Menu screen. There are two possible shelf alarms, both of which can be classified as Minor, Major, Critical, or Disabled:

- Power Supply Failure (POWER A or POWER B). This is a loss of -48 Vdc power at input A or B on the rear of the shelf.
- DSL alarm (HDSL LINKS). This alarm indicates when a programmable number of DSL loops in the shelf are down. A loop is considered to be one copper pair. A shelf containing 16 DSL cards has either 16 loops (single-pair) or 32 loops (two-pair). If the signal at the application interface of a one- or two-pair HDSL card is lost, both HDSL loops in that circuit are considered down.

HDSL/G.SHDSL Line Unit Status

The HDSL Line Unit Status field displays the status for each of 16 circuits that can be managed by the EMU-830. For each circuit, the most severe active alarm is displayed. For each slot, the basic status of the circuit is displayed. The status conditions for each slot are described in Table 3-3 on page 3-6. Table 3-4 on page 3-6 lists the DSL circuit alarms in order of severity.

Logging in to an HDSL/G.SHDSL Circuit

Logging into the console menu of an DSL card from this screen is equivalent to connecting a VT100 terminal or PC directly to the card's craft port. It permits you to change configurations, monitor performance, and test circuits of DSL cards from the management station. See "Logging into DSL Circuits" on page 3-7.

DSL/G.SHDSL Alarm Reporting

The Main menu screen also allows you to disable an DSL card's alarm reporting functions. You can then access the card's console menu without sending false alarms to the management station. See "Enabling or Disabling Alarm Reporting" on page 3-8.

Table 3-3. DSL Line Unit Status Conditions

State	Indicator	Description
Normal	–	The circuit has no active alarms. This can be because one or more of the circuit's alarms are disabled from being reported at the DSL card.
Not Occupied	/	No unit is installed in the slot, or the unit is not recognized.
Alarms Disabled	D	Alarm reporting has been disabled for this circuit at the EMU-830. This can be changed using selection 2 from the Main menu.
Not Manageable	X	The DSL card in the slot does not support centralized management by the EMU-830.
NTU/STU-R	N	The DSL card in the slot is an NTU/STU-R card. Alarms for a circuit with an NTU/STU-R card residing in the managed shelf are not reported on this screen. You can, however, login to the NTU/STU-R card using selection 1 from the Main menu to view the alarm status.
Both loops	*	The indicated alarm involves both loops.
Alarm	Alarm abbreviation	The most severe active alarm in the circuit is shown.

Table 3-4. DSL Circuit Alarms in Order of Severity

Priority	Name	Description	Card Type
1	PFO PFO1 PFO2	Power feed open on both loops Power feed open on loop 1 Power feed open on loop 2	HDSL
2	PFS PFS1 PFS2	Power feed short on both loops Power feed short on loop 1 Power feed short on loop 2	HDSL
3	LOSW LOSW1 LOSW2	Loss Of Synch Word on both loops Loss Of Synch Word on loop 1 Loss Of Synch Word on loop 2	HDSL G.SHDSL
4	LOS	Loss of Signal on any G.703 interface	HDSL G.SHDSL
5	LOC	Loss of clock (sourced from External clock, or Nx64K data port)	HDSL UTU-91X
5	LEC LDC	Loss of External clock alarm Loss of Nx64K data port clock alarm	WD92xGx
6	MAL MAL1 MAL2	Below margin threshold both loops Below margin threshold on loop 1 Below margin threshold on loop 2	HDSL G.SHDSL
7	LAL LAL1 LAL2	Loop Attenuation alarm both loops Loop Attenuation alarm loop 1 Loop Attenuation alarm loop 2	HDSL G.SHDSL
8	ESAL ESAL1 ESAL2	Errored Second alarm both loops Errored Second alarm on loop 1 Errored Second alarm on loop 2	HDSL G.SHDSL

9	AIS	Alarm Indication signal on any G.703 interface	HDSL G.SHDSL
10	LFA	Loss of Frame alarm on any G.703 interface	HDSL G.SHDSL
11	RAI	Remote Alarm Indication on any G.703 interface	HDSL G.SHDSL

Logging into DSL Circuits

To log into the console menu for an DSL card:

Step	Action
1	In the Main menu screen (Figure 3-3 on page 3-5), type the number **1** in the *ENTER SELECTION* field and press **ENTER**. The *Enter line unit number* field is displayed.
2	Enter a line unit number and press **ENTER**. The HDSL card console menus display. See the line unit technical practice for details on console menu usage.
3	To exit the HDSL console menus and return to the TAO Main menu screen, press **CTRL+X** or select **Quit** from the menu (if running HDSL unit firmware version 3.10).

Note: The V.24 Craft port is disabled on all HDSL cards when an EMU-830 is installed in the shelf. An HDSL card craft port can be used directly if the EMU-830 is removed from the shelf. The V.24 Craft Port is enabled on all G.SHDSL line cards.

Enabling or Disabling Alarm Reporting

To enable or disable alarm reporting for DSL circuits:

Step	Action
1	In the Main menu screen (Figure 3-3 on page 3-5), type the number **1** in the *ENTER SELECTION* field and press **ENTER**. The *Enter line unit number* field displays the current line unit selection and *Enable* or *Disable* setting.
2	Enter a line unit number, then use the ↑ arrow key to select the current *Enable* or *Disable* setting.
3	Use the **SPACEBAR** to select *Enable* or *Disable*.
4	Press **ENTER** to confirm settings.

Config Menu

In the Main menu screen, use the → arrow key to select **Config**; then press **C** to display the items in the Config menu (Figure 3-4). Provisioning of all shelf parameters is conducted from the Config menu. Each menu item is described in the paragraphs that follow.


```
                    WorldDSL Series EMU-830 Management Unit
      Main    Config      Inventory     Quit
              Network Parameters
              SNMP Parameters
              Modem Parameters
              Shelf Alarm, ACO
              Remote Alarm Reporting (Ena)
              Date and Time
              Password
              Set Shelf ID
              Terminal Settings
              Set to Factory Defaults
              Reset Management Unit




      *SHELF ID: Shelf #5      | 07/06/02 | 07:54 | EMU |    SYS STATE: Alarm
```
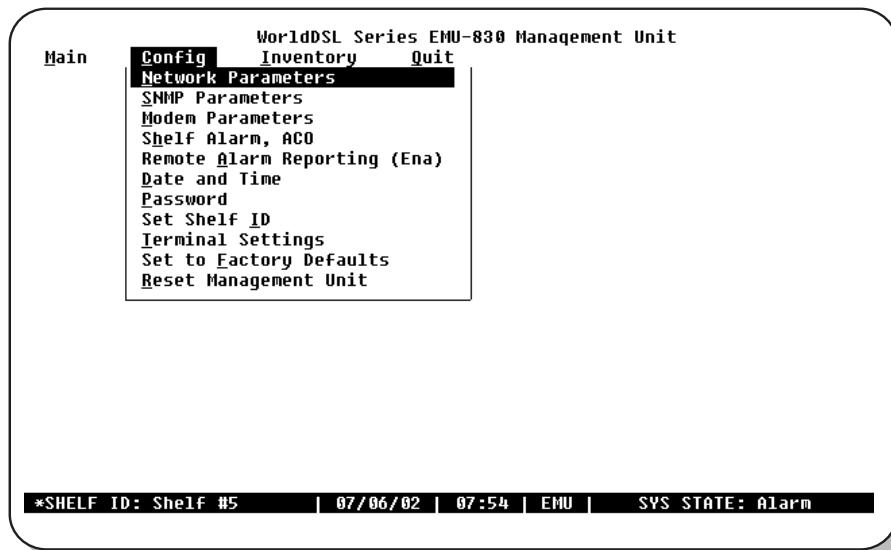
Figure 3-4. Config Menu

Network Parameters Menu

In the Config menu, press **N** to display the Network Parameters menu (Figure 3-5 on page 3-9). This menu is used to identify and change the EMU network parameters. The Network Parameters menu options are listed in Table 3-5 on page 3-10.
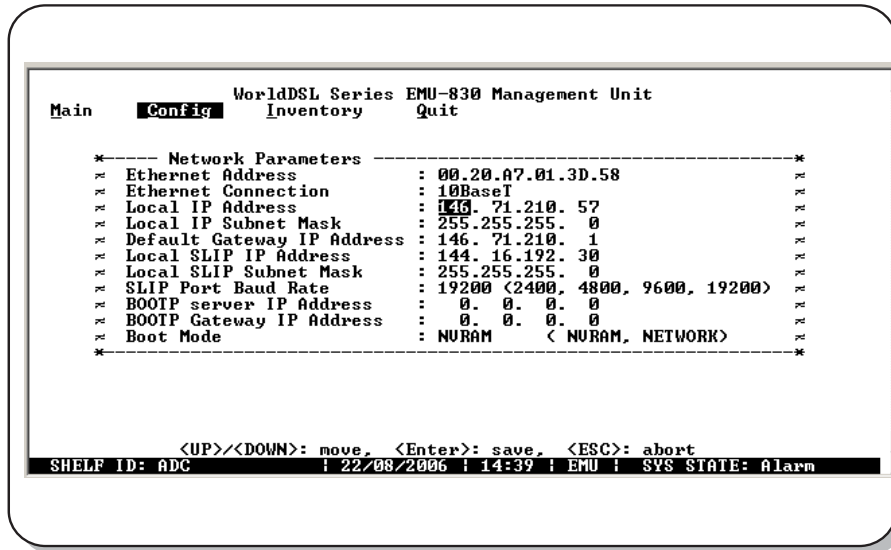
Figure 3-5. Network Parameters Menu

Note: The network parameters for each EMU must be configured individually. Once configured, each shelf reports its status and alarms to the local shelf (the shelf with its EMU connected to the VT100 or PC, either directly or by modem).

The Ethernet Address parameter is read-only and cannot be changed by the user. When changes are made to the network parameters, the EMU console will prompt to reset to apply the changes.

Consult your network administrator to obtain the required IP addresses.

Configure Network Parameters for Multishelf TAO and SNMP

To configure the EMU-830 for Multishelf TAO and basic SNMP operation (if used) over Ethernet LAN:

Step	Action
1	In the Network Parameters menu (Figure 3-5 on page 3-9), the Ethernet Connection type is 10BASE-T.
2	Enter values for the Local IP Address, Local IP Subnet Mask, and, if the management station and EMU are on different subnets, the Default Gateway IP Address (see Table 3-5 on page 3-10). Ensure that you use values to place all shelves in the multishelf TAO on the same subnet.
3	In the SNMP Parameters menu (Figure 3-6 on page 3-11), configure at least one trap receiver (ignore this step if you are not using SNMP). Enter the appropriate values for the Trap (management station) IP Address and Trap Community string, then toggle the Trap Validation field to *Valid* (see Table 3-6 on page 3-12).
4	Press **ENTER** to confirm all network settings.
5	Follow the EMU console prompt to reset the EMU.

Configure SNMP Operation Over SLIP

To configure the EMU-830 for basic SNMP operation over SLIP:

Step	Action
1	In the Network Parameters menu (Figure 3-5 on page 3-9), enter the Local SLIP IP Address (see Table 3-5 on page 3-10).
2	Enter the Local SLIP Subnet Mask.
3	Use the **SPACEBAR** to select the SLIP Port Baud Rate.
4	Press **ENTER** to confirm all network settings.
5	Follow the EMU console prompt to reset the EMU.

Configure EMU Autoconfiguration through BOOTP

To use BOOTP capability of the EMU-830 (see Table 3-5):

Step	Action
1	In the Network Parameters menu, enter the BOOTP Server IP Address.
2	Enter the BOOTP Gateway IP Address.
3	Toggle the Boot Mode from *NVRAM* to *Network*.
4	Press **ENTER** to confirm all network settings.
5	Follow the EMU console prompt to reset the EMU.

Table 3-5. Network Parameters

Option	Function
Ethernet Address	Reflects the hardware Ethernet (MAC) address for the EMU-830. This field cannot be changed.
Ethernet Connection	The Ethernet connection type is 10BASE-T. This field cannot be changed.
Local IP Address	Must be configured for the EMU-830 Ethernet port to respond to the local management station. *192.168.0.1* is the default setting using Telnet or SNMP.
Local IP Subnet Mask	Allows the EMU-830 to determine if a host (TFTP server, SNMP management station, or trap receiver) is on the same local subnet. If it is, the EMU-830 can communicate directly with the host; if it is not, messages must be sent through a default router. *255.255.255.0* is the default setting
Default Gateway IP Address	Enter the IP address of the default gateway the EMU-830 will use if the EMU-830 and the host are not on the same network. *0.0.0.0* is the default setting.
Local SLIP IP Address	Must be configured for the EMU-830 SLIP port to respond to the local management station. *0.0.0.0* is the default setting, which means SLIP port is not used.

Option	Function
Local SLIP Subnet Mask	Allows the EMU-830 to determine if a host (TFTP server, SNMP management station, or trap receiver) is on the same local subnet. If it is, the EMU-830 can communicate directly with the host; if it is not, messages must be sent through a default router. *0.0.0.0* is the default setting.
SLIP Port Baud Rate	Select the SLIP Port baud rate by toggling to the desired rate (maximum 19200 bps).
BOOTP Server IP Address	Enter the IP address for the BOOTP server to which the EMU-830 is connected. 0.0.0.0 is the default setting. This information is only required if using the BOOTP protocol.
BOOTP Gateway IP Address	Enter the IP address for the gateway for the BOOTP server. 0.0.0.0 is the default setting. This information is only required if using the BOOTP protocol and the BOOTP server is connected through a gateway.
Boot Mode	Select the Boot Mode by toggling between *NVRAM* (the default) or *NETWORK*. BootP/TFTP Server can be used for uploading software using the Network.

SNMP Parameters Menu

In the Config menu, press **S** to display the SNMP Parameters menu (Figure 3-6). This menu is used to configure the EMU-830 for operation with SNMP (ignore this section if you are not using SNMP). The SNMP Parameters menu options are listed in Table 3-6 on page 3-12.

```
                    WorldDSL Series EMU-830 Management Unit
     Main      Config      Inventory      Quit

            ┌──── SNMP Parameters ────┐
            Read-only Community String  : public
            Read-Write Community String : private
            Trap 1 IP Address           :   0.  0.  0.  0
            Trap 1 Community String     :
            Trap 1 Validation           : Invalid    (Valid,Invalid)
            Trap 2 IP Address           :   0.  0.  0.  0
            Trap 2 Community String     :
            Trap 2 Validation           : Invalid    (Valid,Invalid)
            Trap 3 IP address           :   0.  0.  0.  0
            Trap 3 Community String     :
            Trap 3 Validation           : Invalid    (Valid,Invalid)

            System Location             :
            System Name                 :
            System Contact              :


              <UP>/<DOWN>: move,  <Enter>: save,  <ESC>: abort
     *SHELF ID: Shelf #5     | 07/06/02 | 08:12 | EMU |    SYS STATE: Alarm
```

Figure 3-6. SNMP Parameters Menu

Configure SNMP Community Strings

The community string parameters are required to read and write SNMP objects.

In the SNMP Parameters menu (Figure 3-6 on page 3-11), configure the Read-only and Read-Write Community String parameters in accordance with Table 3-6.

Configure SNMP Trap Receivers

The SNMP Parameters menu allows you to configure up to three SNMP trap receivers (management stations) to which all EMU-830 trap messages will be sent.

To configure an SNMP trap receiver:

Step	Action
1	In the SNMP Parameters menu (Figure 3-6 on page 3-11), enter the Trap 1 IP Address (see Table 3-6).
2	Enter the Trap 1 Community String.
3	Toggle the Trap 1 Validation field to *Valid*.
4	Repeat steps 1 through 3 for each trap receiver to be configured.

Configure System Identification

Three options are provided at the bottom of the SNMP Parameters menu to identify each system and the system contact. These options are System Location, System Name, and System Contact (see Table 3-6).

The System Location is the physical location of the system (such as, Building 1, Corporate Office, Main Street, etc.). System Name is the name you assign to the system (such as, Net 3, CircuitMon, Shelfwatch, etc.). System Contact is the name, title and/or phone number of the person to contact at the system location.

To configure system identification:

Step	Action
1	In the SNMP Parameters menu (Figure 3-6 on page 3-11), enter the System Location (32 characters maximum).
2	In the System Name field, enter a name for the system (32 characters maximum).
3	In the System Contact field, enter the name, title, and/or phone number of the person to contact at the system location (32 characters maximum).
4	Press **ENTER** to confirm settings and return to the top of the Config menu.

Table 3-6. SNMP Parameters Menu

Option	Function
Read-only Community String	Enter a community string. SNMP uses the community string for set and get requests. To read an SNMP object, the community string settings on both ends of the system must match.
Read-write Community String	Enter a community string. SNMP uses the community string for set and get requests. To write an SNMP object, the community string settings on both ends of the system must match.
Trap 1 IP Address	Enter the IP address to which the trap is sent. *0.0.0.0* is the default setting.

Option	Function
Trap 1 Community String	Enter a community string. It must match the SNMP Comm Name string for traps. SNMP uses the community string for set and get requests.
Trap 1 Validation	Select the trap status by toggling between *Valid* (the default) or *Invalid*. Valid enables the trap, invalid disables it.
Trap 2 IP Address	Enter the IP address to which the trap is sent. *0.0.0.0* is the default setting.
Trap 2 Community String	Enter a community string. It must match the SNMP Comm Name string for traps. SNMP uses the community string for set and get requests.
Trap 2 Validation	Select the trap status by toggling between *Valid* (the default) or *Invalid*. Valid enables the trap, invalid disables it.
Trap 3 IP Address	Enter the IP address to which the trap is sent. *0.0.0.0* is the default setting.
Trap 3 Community String	Enter a community string. It must match the SNMP Comm Name string for traps. SNMP uses the community string for set and get requests.
Trap 3 Validation	Select the trap status by toggling between *Valid* (the default) or *Invalid*. Valid enables the trap, invalid disables it.
System Location	Field where you enter the physical location of the system.
System Name	Field where you assign a name to the system.
System Contact	Field where you list the name, title, or phone number of the system operator or administrator.

Modem Parameters (Configure and Test Dial-out Alarm Reporting)

In the Config menu, press **M** to display the Modem Parameters menu (Figure 3-7). This menu is used to configure the EMUs modem parameters for autonomous dial-out reporting of alarms to a remote management station or printer.

```
                    WorldDSL Series EMU-830 Management Unit
        Main      Config     Inventory      Quit


                ┌── Modem Parameters ──────────────────────
                │
                │   Data Bits    :8     (7, 8)
                │   Parity Bit   :NONE  (NONE, ODD, EVEN)
                │   Stop Bit     :1     (1, 2)
                │   Baud Rate    :19200 (1200, 2400, 4800, 9600, 19200)
                │   Phone Number :
                │   Init String  :ATE1Q0
                │
                └───────────────────────────────────────────




                    <UP>/<DOWN>: move,  <Enter>: save,  <ESC>: abort
        SHELF ID: Shelf #1      | 07/06/02 | 06:03 | EMU |     SYS STATE: Alarm
```

Figure 3-7. Modem Parameters Menu

Note: Connect and configure the shelf modem as instructed in "Remote Terminal and Local Shelf Modem Connections" on page 2-7.

Step	Action
1	Navigate the menu using the ↑ and ↓ arrow keys on the keyboard.
2	Use the **SPACEBAR** to toggle the *Data Bits* field to "7" or "8" (to match modem at remote management station).
3	Toggle the *Parity Bit* field to "NONE," "ODD," or "EVEN" (to match modem at remote management station).
4	Toggle the *Stop Bit* field to "1" or "2" (to match modem at remote management station).
5	Toggle the *Baud Rate* field to the appropriate setting (to match modem at remote management station).
6	In the *Phone Number* field, enter the phone number of the modem at the remote management station. **Note:** The *Phone Number* field must be preceded by "atdt" for tone dialing or "atdp" for pulse dialing. The *Init String* field displays "ATE1Q0." This is the default Hayes compatible modem initialization string. If you need to change this initialization string, consult your modem user manual or call the ADC Technical Assistance Center at the number listed on page B-1.
7	Press **ENTER** to confirm settings and return to the top of the Config menu.

Step	Action
8	Test the EMU's dial-out alarm reporting as follows: a. Configure the shelf alarms as instructed on page 3-16. b. If necessary, select the Remote Alarm Reporting menu item and press **ENTER** to change the setting from disable (*Dis*) to enable (*Ena*). See Figure 3-8. IMPORTANT ⚠️ ***The following steps require that you momentarily disconnect an DSL Tip or Ring lead and then a G.703 interface cable to test remote alarm reporting. Take steps to ensure that a customer's service is not interrupted.*** 📝 **Note:** The following alarm reporting screens are examples and do not represent the alarms displayed in all tests. c. Disconnect and re-connect an DSL Tip or Ring lead from a shelf. The shelf modem dials the management station, which displays the following alarms on its monitor: The alarm reporting screen in Figure 3-8 shows that a loss of sync word occurred on both loops (LOSW*) followed by a loss of sync word on Loop 1 only (LOSW1) and Loop 2 returning to normal operation (that is, nothing displayed for Loop 2). d. Disconnect and re-connect a G.703 interface cable from a shelf. The shelf modem dials the management station, which displays the following alarms on its monitor: The alarm reporting screen in Figure 3-9 on page 3-16 shows that a loss of signal (LOS*), power feed open (PFO*), and loss of sync word (LOSW*) occurred on both loops.

```
RING

CONNECT 19200/ARQ

03-JUN-02, 12:15:20, WorldDSL Alarm Report
Shelf #5, Slot  6 -
    LOSW*, MAJOR ALARM
    LOSW1, MAJOR ALARM

NO CARRIER
```

Figure 3-8. LOSW* and LOSW1 Alarm Reporting Screen

```
RING

CONNECT 19200/ARQ

03-JUN-02, 12:15:56, WorldDSL Alarm Report
Shelf #5, Slot 12 -
    LOS*, MINOR ALARM
    PFO*, MINOR ALARM
    LOSW*, MAJOR ALARM

NO CARRIER
```

Figure 3-9. LOS*, PFO* and LOSW* Alarm Reporting Screen

Shelf Alarms Menu

In the Config menu, press **H** to display the Shelf Alarms menu (Figure 3-10). This menu allows you to enable, disable, and set the severity of the loss of shelf power, HDSL/G.SHDSL lines down, and loss of external clock alarm.

The Config menu also allows you to configure how each of the alarm relays respond to an ACO (Alarm Cut-Off). The ACO can be activated from the EMU-830 front panel pushbutton or by connecting to ground the EXT (external) ACO pin on the EMS-83x shelf's alarm connector. Selecting Enable *(ENA)* causes the associated alarm relay to be retired (common contact connected to normally closed contact) when an ACO is received.

```
                   WorldDSL Series EMU-830 Management Unit
     Main      Config      Inventory      Quit

          ┌──── Shelf Alarms─────────────────────────────────────────┐
          │                                                          │
          │   Loss of power on one 48V supply :  MAJ      (DIS,MIN,MAJ,CRT)
          │   HDSL alarm if 10 lines down      :  DIS      (DIS,MIN,MAJ,CRT)
          │   Loss of External Clock           :  CRT      (DIS,MIN,MAJ,CRT)
          │                                                          │
          │   ---- ACO Retirement of Alarm Relays -----------------------
          │                     Audible    Visual
          │   Critical           DIS        ENA
          │   Major              DIS        ENA
          │   Minor             [DIS]       ENA
          │                                                          │
          │   ENA: When ACO engaged, the selected alarm relays will be retired
          │   DIS: When ACO engaged, the selected alarm relays will not be retired
          │                                                          │
          └──────────────────────────────────────────────────────────┘


      <UP>/<DOWN>: move,  <SPACE>: toggle, <Enter>: save,  <ESC>: abort
    ▐ SHELF ID: Shelf 106    | 07/06/02 | 19:09  | EMU |  SYS STATE: Alarm ▌
```

Figure 3-10. Shelf Alarms Menu

Note: To select the *Shelf Alarms* menu for a different shelf, press **ESC** and then **Q** to return to the Network screen, select a shelf with the ↑ and ↓ arrow keys, and press **L** to open the Main menu screen for that shelf. Press **C** and then **H** to display the *Shelf Alarms* menu for the selected shelf.

To configure the shelf alarms:

Step	Action
1	Navigate the menu using the ↑ and ↓ arrow keys on the keyboard.
2	In the *Loss of power on one 48V supply* field, use the **SPACEBAR** to select *DIS* (disabled), *MIN* (minimum), *MAJ* (major), or *CRT* (critical).
3	In the *HDSL alarm if 3 lines down* field, use the **SPACEBAR** to select *DIS* (disabled), *MIN* (minimum), *MAJ* (major), or *CRT* (critical).
4	In the *Loss of External Clock* field (on EMU-830 List 6A only), use the **SPACEBAR** to select *DIS* (disabled), *MIN* (minimum), *MAJ* (major), or *CRT* (critical).
5	In the *ACO Retirement of Alarm Relays* field, use the **SPACEBAR** to select *DIS* (disabled) or *ENA* (enabled) for the *Audible* and *Visual* fields of the *Critical, Major,* and *Minor* alarm relays.
6	Press **ENTER** to confirm settings and return to the top of the Config menu.

Remote Alarm Reporting

This Config menu option (Figure 3-11) must be enabled when your system is configured for autonomous dial-out reporting of alarms to a remote management station or printer. If necessary, select the *Remote Alarm Reporting* menu item and press **ENTER** to change the setting from disabled *(Dis)* to enabled *(Ena)*.


```
                WorldDSL Series EMU-830 Management Unit
    Main    Config    Inventory    Quit
            Network Parameters
            SNMP Parameters
            Modem Parameters
            Shelf Alarm, ACO
            Remote Alarm Reporting (Dis)
            Date and Time
            Password
            Set Shelf ID
            Terminal Settings
            Set to Factory Defaults
            Reset Management Unit




    *SHELF ID: Shelf #5    | 07/06/02 | 07:54 | EMU |    SYS STATE: Alarm
```
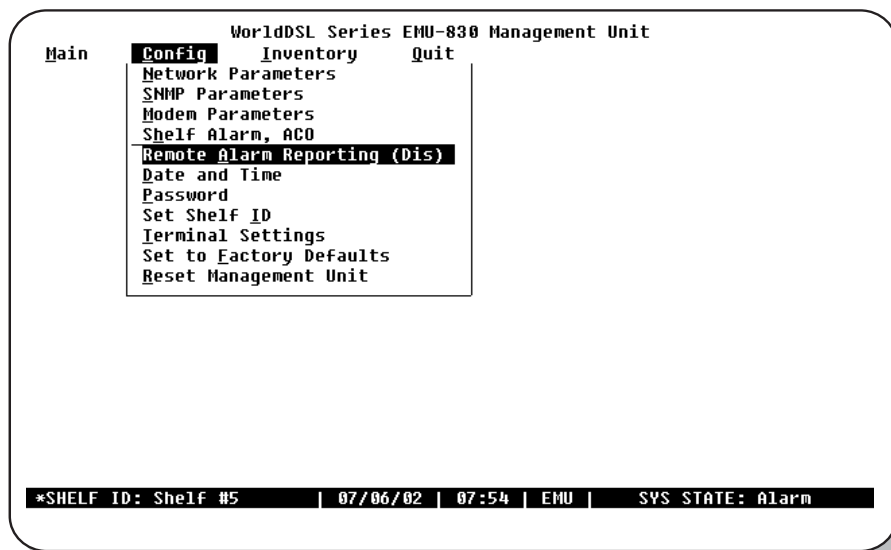
Figure 3-11. Remote Alarm Reporting Menu Item

Set Date and Time

Use the → arrow key to select **Config**, then press **D** to display the Set Date/Time dialog box (Figure 3-12 on page 3-18). This dialog box allows you to enter the current Date and Time so the displayed alarm reporting information is correct.

The Date format is DD/MM/YYYY (day/month/year). The Time format is HH:MM:SS (hour:minute:second) and displays as a 24-hour clock (01:00:00 through 24:59:59).

Note: Setting the EMU's date and time automatically sets the date and time for all HDSL/G.SHDSL cards in the shelf.

To set the date and time:

Step	Action
1	Use the ↑ and ↓ arrow keys to select the *DD/MM/YYYY* and *HH:MM:SS* fields. Enter the current date and time in the respective fields.
2	Press **ENTER** to confirm settings and return to the top of the Config menu.

Figure 3-12. Set Date/Time Dialog Box

Change Password

In the Config menu, press **P** to display the Change Password dialog box (Figure 3-13 on page 3-19). This dialog box is used to select or change your password. You can use the letters A through Z (case sensitive), numbers 0 through 9, spaces, and any keyboard symbol.

To select or change your password:

Step	Action
1	Do one of the following: a. If you do not have a password, press **ENTER**. b. Type your old password and press **ENTER**.
2	When the second password screen is displayed, type the new password (20 characters maximum), then press **ENTER**.
3	When the next password screen appears, re-enter the new password (exactly as originally entered), then press **ENTER**.

```
                    WorldDSL Series EMU-830 Management Unit
      Main      Config      Inventory      Quit


                        ──── Change Password ────────────
                     Enter Old Password: ▐███████████████
                     │                                    │
                     │                                    │
                     └────────────────────────────────────┘










                        <Enter>: accept,   <ESC>: abort
          ▐ SHELF ID: Shelf #28      │ 07/06/02 │ 17:25 │ EMU │    SYS STATE: Normal ▌
```
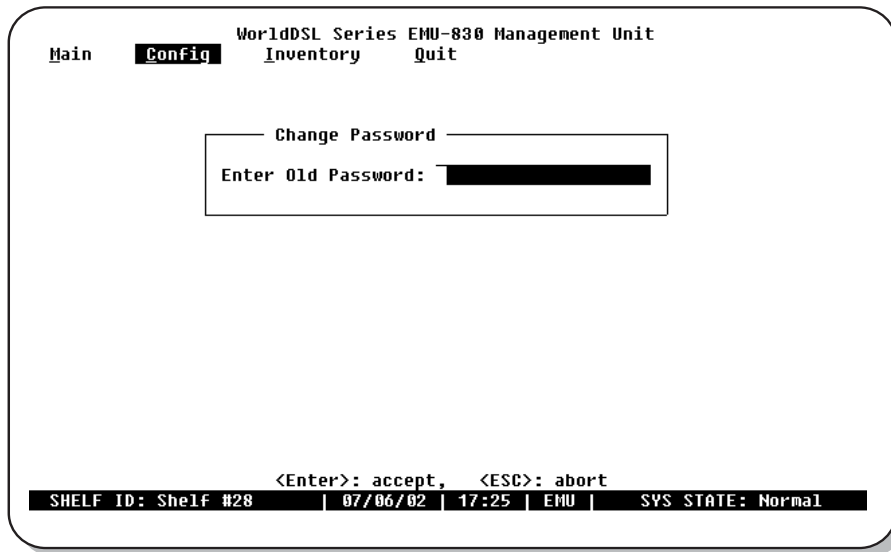
Figure 3-13. Change Password Dialog Box

Set Shelf ID

In the Config menu, press **I** to display the Set Shelf ID dialog box (). This dialog box allows you to enter the shelf ID for each management unit. You can use the letters A through Z (case sensitive), numbers 0 through 9, spaces, and any symbol.

```
                    WorldDSL Series EMU-830 Management Unit
      Main      Config      Inventory      Quit






                          ─────Set Shelf ID─────
                     ┌─────────────────────────────────────┐
                     │ Enter Shelf ID: ▐Shelf #28 ████████  │
                     │                                      │
                     └─────────────────────────────────────┘







          ▐ SHELF ID: Shelf #28      │ 07/06/02 │ 17:27 │ EMU │    SYS STATE: Normal ▌
```
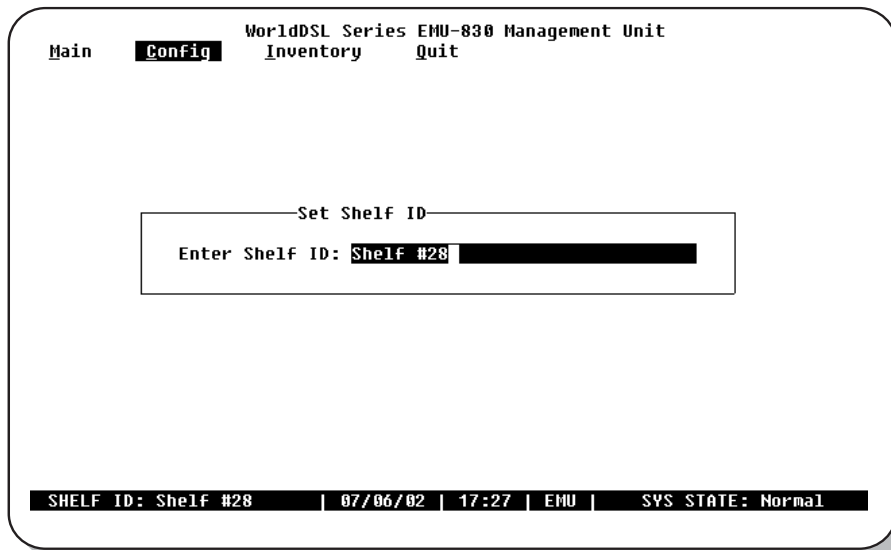
Figure 3-14. Set Shelf ID Dialog Box

To set the shelf ID:

Step	Action
1	In the Enter Shelf ID field, type the Shelf ID (32 characters maximum) and press **ENTER**.
2	Press any key to return to the top of the Config menu.
3	Reset the EMU as instructed on page 3-22.

Terminal Settings

In the Config menu, press **T** to display the Terminal Settings menu (Figure 3-15). This menu is used to specify a terminal setting that displays the best horizontal and vertical lines on your monitor.
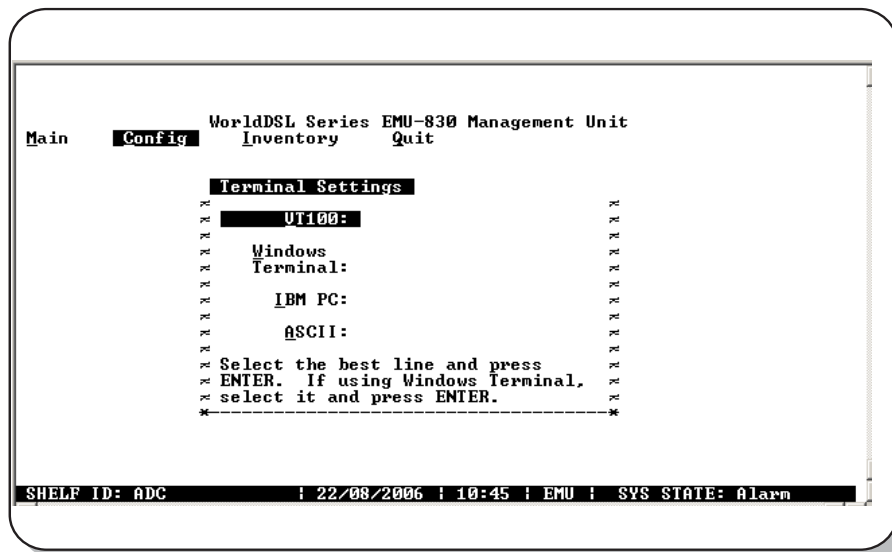
Figure 3-15. Terminal Settings Menu

To specify a terminal setting, do one of the following:

Step	Action
1	If you are not using a Windows terminal, select a menu item with the best horizontal line, then press **ENTER**. For example, "_ _ _ _ _" versus "_____", where "_____" is the best.
2	If you are using a Windows terminal, select the *Windows Terminal* menu item, then press **ENTER**.

Set to Factory Defaults

In the Config menu, press **F** to display the "restore to factory defaults" warning prompt (Figure 3-16).


```
                    WorldDSL Series EMU-830 Management Unit
      Main      Config      Inventory      Quit




          ┌─── Warning ──────────────────────────────────────┐
          │                                                  │
          │  Do you really want to restore to factory defaults (Y/N) ?  │
          │                                                  │
          └──────────────────────────────────────────────────┘




     SHELF ID: Shelf #28    | 07/06/02 | 17:32 | EMU |   SYS STATE: Normal
```
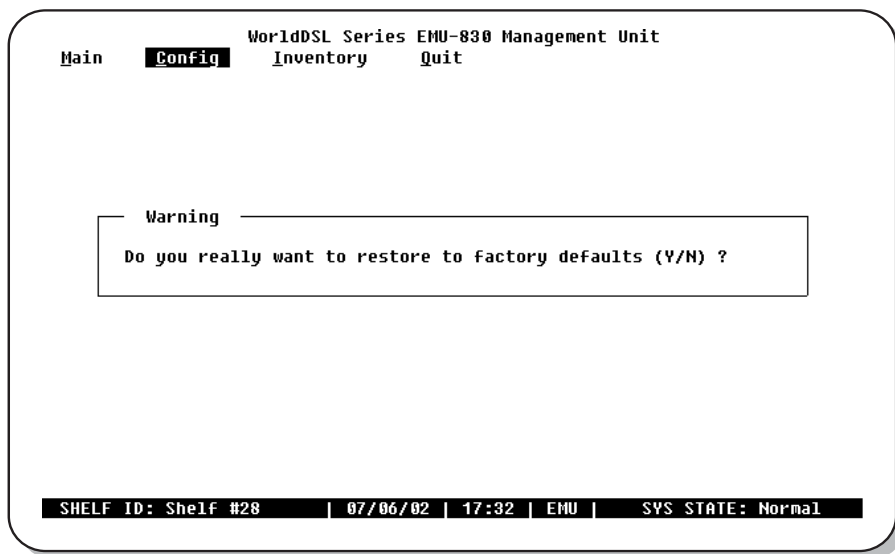
Figure 3-16. Restore To Factory Defaults Warning Prompt

IMPORTANT

⚠ *Pressing Y in this screen resets the EMU-830 to factory default settings, which erases any special configuration settings you have specified.*

Note: Resetting the EMU to factory defaults will reset the EMU and log you off from the EMU console menu and requires that you log on again on to regain access. All alarm reporting information is lost.

Do one of the following:

- Press **Y** (yes) to reset the EMU to factory default settings (then log on to the EMU console menu if you wish to make configuration changes).
- Press **N** (no) to retain your special configuration settings.

Reset EMU

In the Config menu, press **R** to display the "reset EMU" warning prompt (Figure 3-17).

```
                    WorldDSL Series EMU-830 Management Unit
         Main     Config      Inventory      Quit




                  ┌─ Warning ─────────────────────────────┐
                  │                                        │
                  │  Do you really want to reset EMU (Y/N) ?│
                  │                                        │
                  └────────────────────────────────────────┘




         ▐ SHELF ID: Shelf #28    | 07/06/02 | 17:33 | EMU |   SYS STATE: Normal ▌
```
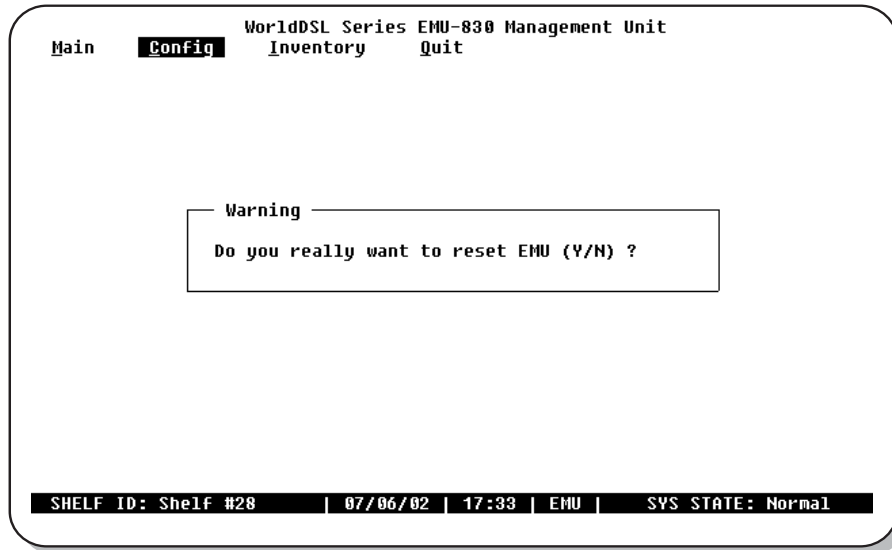
Figure 3-17. Reset EMU Warning Prompt

IMPORTANT

⚠ *If you reset the EMU-830, all alarm reporting information is lost.*

📝 **Note:** Resetting the EMU will log you off from the EMU console menu and requires that you log on again on to regain access.

Do one of the following:

- Press **Y** (yes) to reset the EMU (then log on to the EMU console menu if you wish to make configuration changes).
- Press **N** (no) to return to the Config menu.

Inventory Information Screen

Use the → arrow key to select Inventory, then press **ENTER** to display the Inventory Information screen (see Figure 3-18 on page 3-23). This is read-only screen providing information about the EMU-830. The data included in the Inventory Information screen is listed in Table 3-7 on page 3-23.

```
                    WorldDSL Series EMU-830 Management Unit
     Main     Config    Inventory    Quit


          *---- Inventory Information --------------------------*
          ≈                                                     ≈
          ≈     Product Type               EMU-830              ≈
          ≈     List Number                6                    ≈
          ≈     Hardware Revision          -                    ≈
          ≈     Serial Number              220397122            ≈
          ≈     Manufacture Date (DD/MM/YY) 12/03/05            ≈
          ≈     Software Part Number                            ≈
          ≈     Checksum                   13DB                 ≈
          ≈     Software Revision          V05.01.00U           ≈
          ≈     Software Date              JUL 20 2006           ≈
          ≈                                                     ≈
          *-----------------------------------------------------*



                     Press any key to continue ...
     SHELF ID: ADC              ¦ 22/08/2006 ¦ 10:46 ¦ EMU ¦  SYS STATE: Alarm
```

Figure 3-18. Inventory Information Screen

Table 3-7. Data in Inventory Information Screen

Field	Description
Product Type	Displays the EMU model number.
List Number	Displays the EMU list number, which identifies the version of the unit.
Hardware Revision	Displays the EMU hardware revision number
Serial Number	Displays the unique serial number of the EMU for inventory and service tracking.
Manufacture Date	Displays the date the EMU was manufactured.
Software Part Number	Displays the ADC part number of the firmware.
Checksum	Displays the checksum of the EMU proms.
Software Revision	Displays the currently installed firmware version level of the EMU.
Software Date	Displays the date that the firmware was released.

MANAGING FIRMWARE THROUGH THE UPLOAD MENU

The Upload menu provides the mechanism to upload image files to local or remote line units or EMUs.

Upload to a Local or Remote Line Unit

To upad to a local or remote line unit:

Step	Action
1	If viewing the Main menu screen (Figure 3-3 on page 3-5), press **ESC** and type **Q** to return to the Network screen (Figure 3-2 on page 3-4).
2	In the Network screen, use the ↑ and ↓ arrow keys to select the local shelf or a remote shelf. **Note:** The shelf with the ">" symbol (for example, >Shelf #28) is the local shelf connected to the management station PC. Other shelves (without the > symbol) are remote shelves connected to the local shelf through Ethernet.
3	Type the letter **U**. The Upload menu is displayed (Figure 3-19 on page 3-25).
4	From the Upload menu, select *Upload Line Unit*. The Upload to Line Unit dialog box is displayed (Figure 3-20 on page 3-25).
5	In the Enter Line Unit: field, type the slot number of the line unit to be uploaded.
6	Use the ↑ and ↓ arrow keys to select the Line Unit Type field, press the **SPACEBAR** to select the line unit type. The available line unit types are listed in Table 3-8 on page 3-25.
7	When you are ready to upload to the line unit, press **ENTER**. The Xmodem transfer message is displayed (Figure 3-21 on page 3-26).
8	Go to the new firmware file (for example, sys.img).
9	From the Terminal utility Settings menu, select *Binary Transfers,* then select *XMODEM*.
10	From the Terminal utility Transfers menu, select *Send Binary File* (**do not select** *Send Text File*).
11	Enter the file path and name, then click **OK** to begin the upload to the local or remote line unit: If uploading to a line unit on a remote shelf, the TAO Multishelf message is displayed, followed by the Remote line unit uploading message. If uploading to a line unit on a local shelf, the Local line unit uploading message is displayed (Figure 3-22 on page 3-26).

Do not abort the download procedure when an XModem transfer is in progress.

```
              WorldDSL Series EMU-830 Management Unit
Login    Upload    Quit
       | Upload EMU        |
       | Upload Line Unit  |
       S+------------------+larm Status    Shelf ID        Alarm Status
       ---------------------------------------------------------------------
         1   Shelf # 27              MAJ   17                       -
         2  >Shelf # 28             MAJ   18                       -
         3                            -   19                       -
         4                            -   20                       -
         5                            -   21                       -
         6                            -   22                       -
         7                            -   23                       -
         8                            -   24                       -
         9                            -   25                       -
        10                            -   26                       -
        11                            -   27                       -
        12                            -   28                       -
        13                            -   29                       -
        14                            -   30                       -
        15                            -   31                       -
        16                            -   32                       -
```
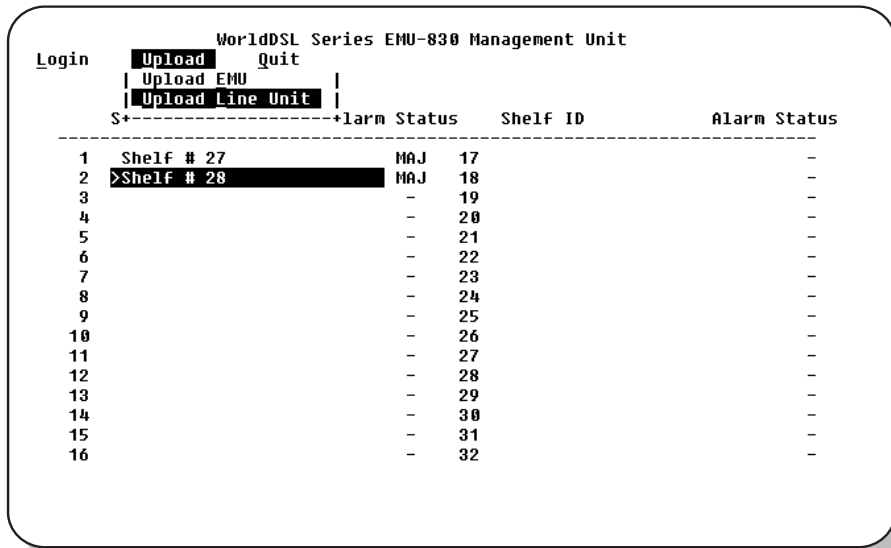
Figure 3-19. Upload Line Unit Menu Item

```
               WorldDSL Series EMU-830 Management Unit
Login    Upload    Quit
       *------- Upload to Line Unit ---------------------------------------*
       *                                                                    *
       *  Shelf ID: ADC                                                     *
       *  ----------------------------------------------------------------  *
       *  1:  LTU/STU-C    5:  LTU/STU-C    9:  LTU/STU-C   13:  LTU/STU-C   *
       *  2:  LTU/STU-C    6:  LTU/STU-C   10:  LTU/STU-C   14:  LTU/STU-C   *
       *  3:  LTU/STU-C    7:  LTU/STU-C   11:  LTU/STU-C   15:  LTU/STU-C   *
       *  4:  LTU/STU-C    8:  LTU/STU-C   12:  NTU/STU-R   16:  LTU/STU-C   *
       *  ----------------------------------------------------------------  *
       *  Enter Line Unit: 1                                                *
       *  Line Unit Type : LOCAL                                            *
       *                                                                    *
       *--------------------------------------------------------------------*

                          Press ESC to exit
```
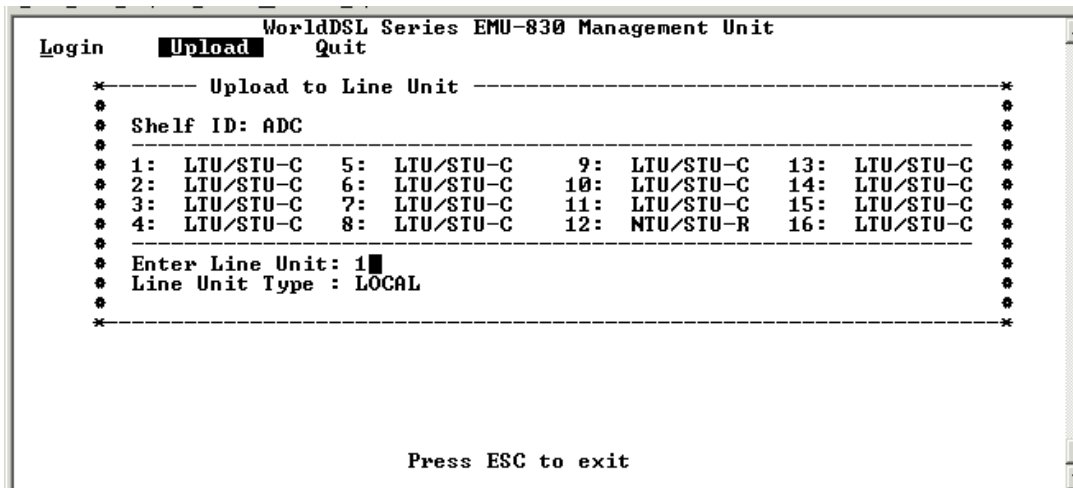
Figure 3-20. Upload to Line Unit Dialog Box

Table 3-8. Line Unit Uploads

Line Unit Type	Local Unit	Target Unit
Local	LTU/STU-C or NTU/STU-R	Local LTU/STU-C or NTU/STU-R
LTU/STU-C	LTU/STU-C	Local LTU/STU-C
LTU/STU-C	NTU/STU-R	Remote LTU/STU-C
NTU/STU-R	LTU/STU-C	Remote NTU/STU-R
NTU/STU-R	NTU/STU-R	Local NTU/STU-R
REG1/Loop 1	LTU/STU-C or NTU/STU-R	Regenerator #1
REG2/Loop 1	LTU/STU-C or NTU/STU-R	Regenerator #2

```
                    WorldDSL Series EMU-830 Management Unit
    Login      Upload      Quit




                                                    -


                        ┌────────────────────────────────────┐
                        │                                    │
                        │  Start your Xmodem transfer ...    │
                        │                                    │
                        └────────────────────────────────────┘
```
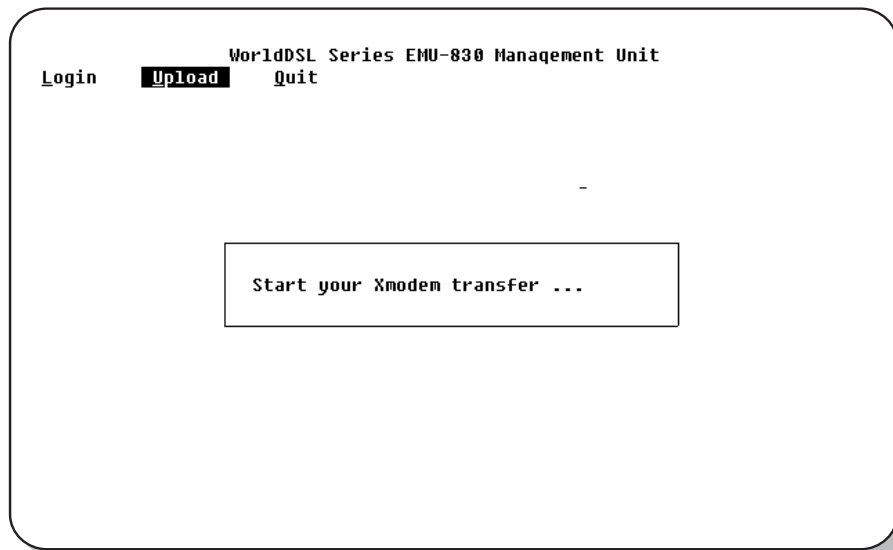
Figure 3-21. Xmodem Transfer Message

```
                    WorldDSL Series EMU-830 Management Unit
    Login      Upload      Quit




            ┌─ Local LU Uploading ──────────────────────────┐
            │                                               │
            │   Uploading to the line unit.  Please wait ...│
            │                                               │
            └───────────────────────────────────────────────┘
```

Figure 3-22. Local Line Unit Uploading Message

Upload Local EMU

To upload to the local EMU:

Note: If using the Xmodem protocol to upload the local EMU directly from your management station, copy the firmware file to your management station hard disk before proceeding. This greatly reduces the time required for the upload process.

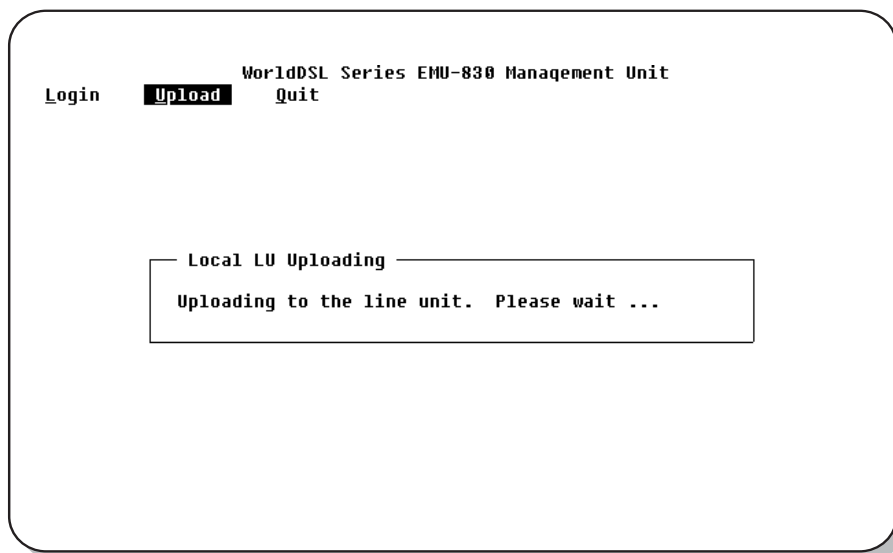| Step	Action
1	In the Network screen (Figure 3-2 on page 3-4), select the local shelf. That is, the shelf with the ">" symbol. For example, >Shelf # 28.
2	Type the letter **U**. The Upload menu is displayed (Figure 3-23 on page 3-28).
3	From the Upload menu, select *Upload EMU*. The Upload to Local EMU dialog box is displayed (Figure 3-24 on page 3-28).
4	Press the **SPACEBAR** to select *Xmodem* or *TFTP* file transfers. (Select *TFTP* if uploading the local EMU from a TFTP server through Ethernet LAN; select *Xmodem* if uploading the local EMU from your management station through a cable connected to the local EMU console port.)
5	Do one of the following: a. If using TFTP Server: 1. Enter the server's IP address and the upload file name (for example, sys.img). 2. Press **ENTER**. The TFTP Upload EMU prompt is displayed (Figure 3-25 on page 3-29). 3. Press **Y** to upload the local EMU. b. If using Xmodem: **IMPORTANT** ⚠️ *Be sure that the firmware file has been copied to hard disk or that the CD-ROM with the file is available and ready for use. Xmodem erases the EMU flash memory upon execution of step 2 below and thereafter must receive the image file upload to resume normal EMU operation.* 1. Press **ENTER**. The Xmodem Upload EMU prompt is displayed (Figure 3-26 on page 3-29). 2. Press **Y**. The Boot Loader prompt is displayed (Figure 3-27 on page 3-30). 3. If uploading from CD-ROM, insert the CD-ROM into your management station's CD-ROM drive. 4. From the Terminal utility Settings menu, select *Binary Transfers*, then select *XMODEM*. 5. From the Terminal utilities Transfers menu, select *Send Binary File* (**do not select *Send Text File***). 6. Enter the file path and name, then click **OK** to begin the upload.

```
                    WorldDSL Series EMU-830 Management Unit
  Login    Upload     Quit
           Upload EMU
           Upload Line Unit
        S               larm Status    Shelf ID           Alarm Status
  --------------------------------------------------------------------------------
       1   Shelf # 27          MIN   17                          -
       2  >Shelf # 28          MAJ   18                          -
       3                        -    19                          -
       4                        -    20                          -
       5                        -    21                          -
       6                        -    22                          -
       7                        -    23                          -
       8                        -    24                          -
       9                        -    25                          -
      10                        -    26                          -
      11                        -    27                          -
      12                        -    28                          -
      13                        -    29                          -
      14                        -    30                          -
      15                        -    31                          -
      16                        -    32                          -
```

Figure 3-23. Upload EMU Menu Item

```
                    WorldDSL Series EMU-830 Management Unit
  Login     Upload     Quit


        ┌──── Upload to Local EMU ───────────────────────────┐
        │                                                     │
   Transfer Protocol      : Xmodem   (Xmodem, TFTP)           │
   TFTP Server's IP Address:   0.  0.  0.  0                   │
   File: emu.img                                               │
                                                               │
   Note: when Xmodem protocol is selected, TFTP Server's IP Address and
         File are ignored
        │                                                     │
        └─────────────────────────────────────────────────────┘




                    <Enter>: accept,   <ESC>: abort
```

Figure 3-24. Upload to Local EMU Dialog Box

```
                      WorldDSL Series EMU-830 Management Unit
   Login        Upload      Quit




              ┌─ TFTP Upload EMU ──────────────────────────────┐
              │                                                  │
              │   Upload EMU will reset it.  Upload now (Y/N)?   │
              │                                                  │
              └──────────────────────────────────────────────────┘
```
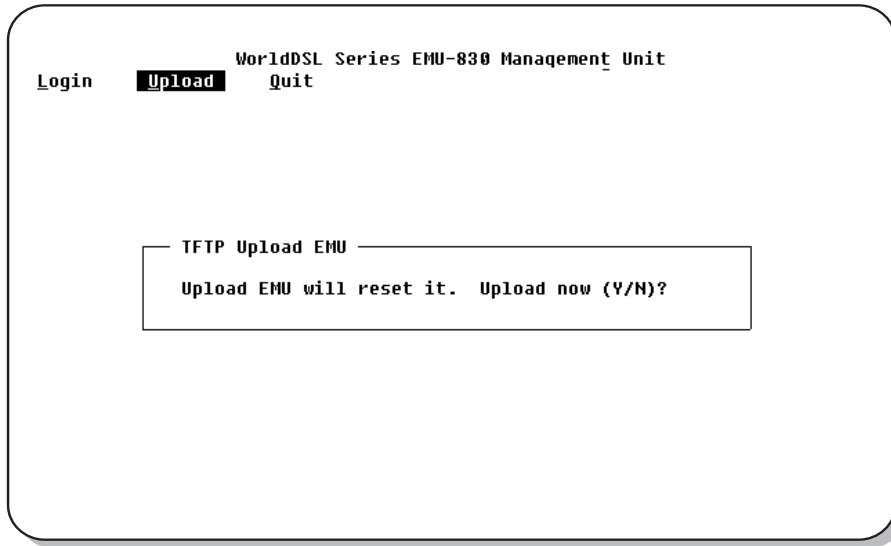
Figure 3-25. TFTP Upload EMU Prompt

```
                      WorldDSL Series EMU-830 Management Unit
   Login        Upload      Quit




              ┌─ Xmodem Upload EMU ────────────────────────────┐
              │                                                  │
              │   Upload EMU will reset it.  Upload now (Y/N)?   │
              │                                                  │
              └──────────────────────────────────────────────────┘
```
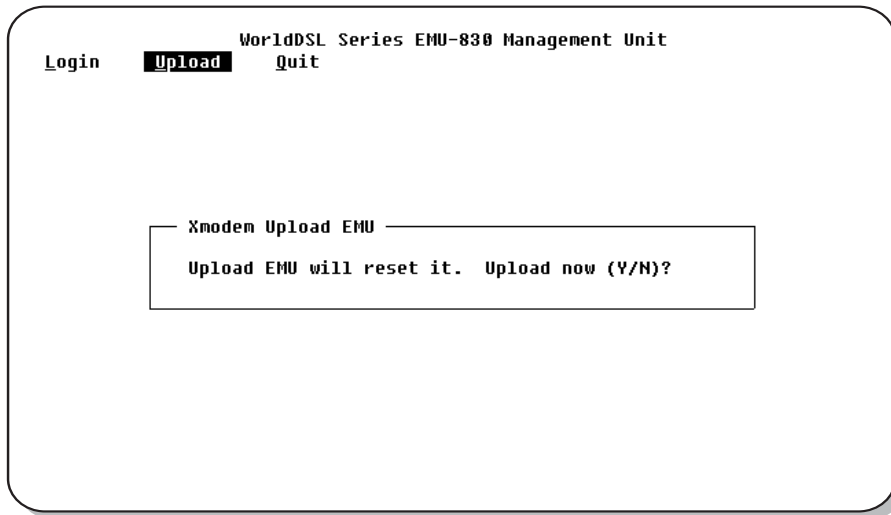
Figure 3-26. Xmodem Upload EMU Prompt

```
ADC Telecommunications, Inc. Boot Loader Ver 1.1
 Ready to receive file, start your XMODEM transfer now
CCCCCCC
```
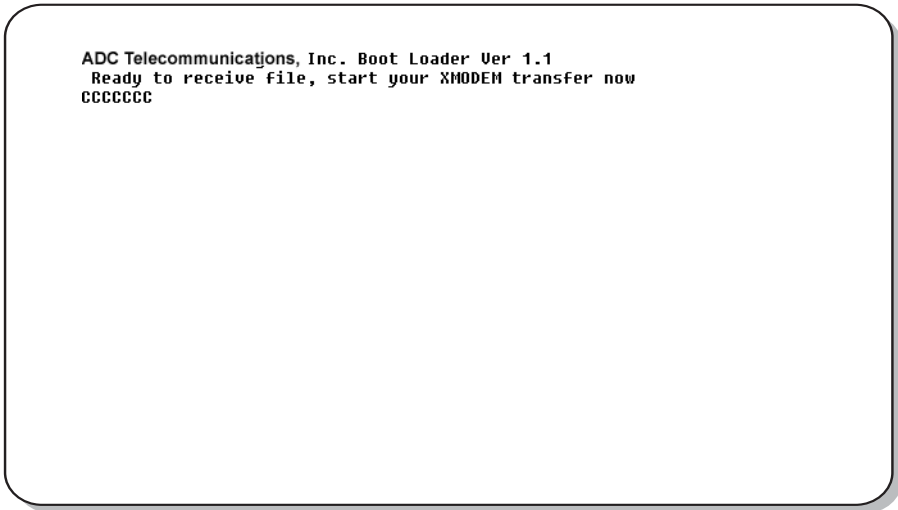
Figure 3-27. Boot Loader Prompt

Upload Remote EMU

After uploading the local EMU, its firmware image can be uploaded to the remote EMUs (the use of files is not required). To upload to a remote EMU:
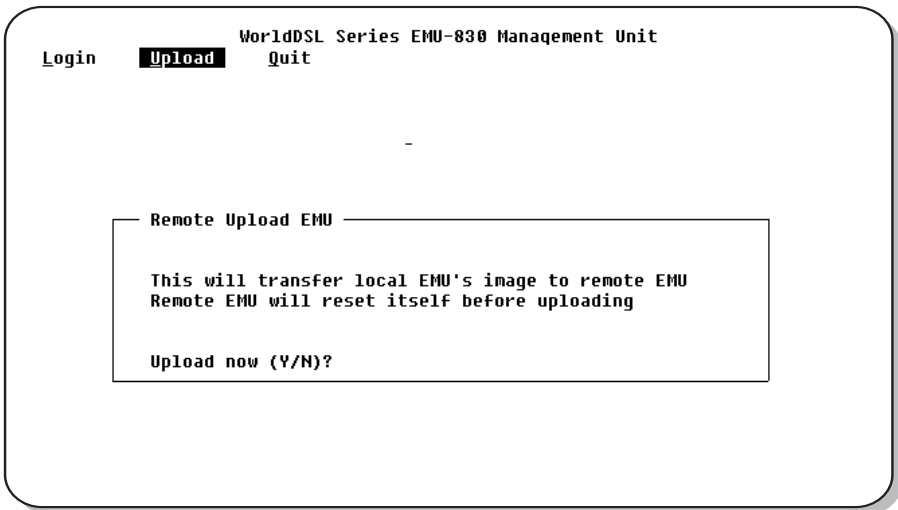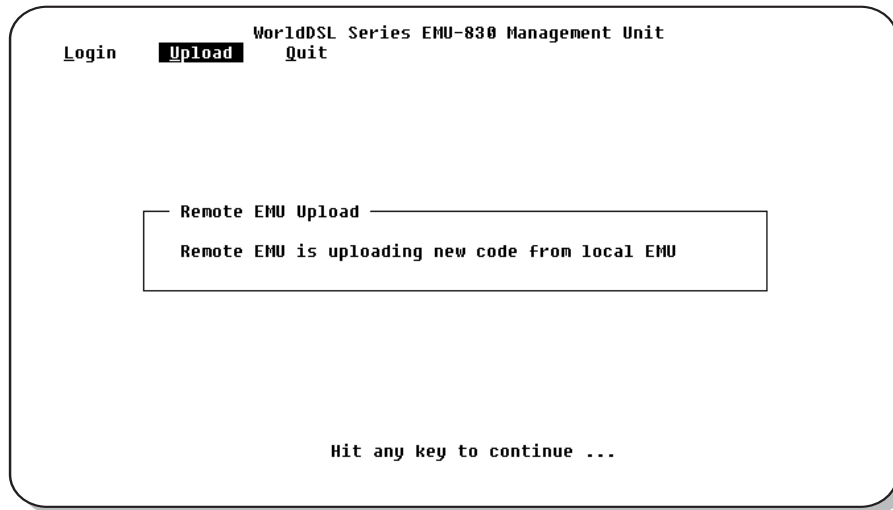
Step	Action
1	In the Network screen (Figure 3-2 on page 3-4), select a remote shelf. That is, a shelf without the ">" symbol. For example, Shelf # 27.
2	Type the letter **U**. The Upload menu is displayed (Figure 3-19 on page 3-25).
3	From the Upload menu, select *Upload EMU*. The Remote Upload EMU dialog is displayed (Figure 3-28).
4	Press **Y** to upload the remote EMU. The Remote EMU Upload message is displayed (Figure 3-29 on page 3-31).
5	Press any key to return to the Network screen (Figure 3-2 on page 3-4).

```
              WorldDSL Series EMU-830 Management Unit
Login      Upload     Quit



                          _


      ┌─ Remote Upload EMU ──────────────────────────┐
      │                                              │
      │   This will transfer local EMU's image to remote EMU
      │   Remote EMU will reset itself before uploading
      │
      │   Upload now (Y/N)?
      └──────────────────────────────────────────────┘
```

Figure 3-28. Remote Upload EMU Dialog

```
                    WorldDSL Series EMU-830 Management Unit
     Login     Upload      Quit




          ┌─ Remote EMU Upload ──────────────────────────┐
          │                                              │
          │  Remote EMU is uploading new code from local EMU │
          │                                              │
          └──────────────────────────────────────────────┘




                    Hit any key to continue ...
```

Figure 3-29. Remote EMU Upload Message

SPECIFICATIONS

ALARMS

Relays	6 form C relays: critical visual, critical audible, major visual, major audible, minor visual, minor audible.
Maximum switching power	30 W
Maximum switching current	1 A
Surge voltage withstand	1500 V
Shelf alarms	Power input failure, programmable number of HDSL loops in the shelf are down, loss of external clock (EMU-830 List 6A only)
LEDs	Critical, Major, Minor alarm

POWER REQUIREMENTS

Consumption	7.5 W

ENVIRONMENTAL

Operating Temperature	0 °C to +50 °C
Humidity	Up to 95% non condensing

REGULATORY APPROVALS

Safety	EN 60950
EMC/EMI	EN300 386-2

COMPATIBILITY

The EMU-830 is compatible with HDSL, G.SHDLS cards, desktop units, doublers (regenerators), and exchange office management shelves in the WorldDSL product line. Universal Termination Units (UTUs) can be configured as LTUs or NTUs. WD92xGx can be configured as STU-Cs or STU-Rs. Typically the LTU/STU-C DSL cards are installed in the management shelf and the NTU/STU-R DSL cards are deployed at the remote site. You can, however, use either an LTU/STU-C or NTU/STU-R DSL card in a shelf as the EMU-830 allows terminal access to both types of DSL cards when installed in a shelf. Alarm management, however, is only performed on LTU/STU-C cards and their attached circuit elements.

The following is an abbreviated list of EMU-compatible WorldDSL products.

- Shelves: All EMS-83x List 2
- HDSL Cards: All LTU-80x List x, UTU-80x Lx
- Universal Termination Units: All UTU-9xx
- Integrated Desktop Units: All ETU-8xx and ETU-9xx
- Doublers (regenerators): All EDU-840 List x
- G.SHDSL Cards: WD92xGx line cards

Appendix B

PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales support and training for all of its products. Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center.

Sales Assistance: 800.366.3891	Quotation Proposals, Ordering and Delivery General, and Product Information
Systems Integration: 800.366.3891	Complete Solutions (from concept to installation), Network Design and Integration Testing, System Turn-Up and Testing, Network Monitoring (upstream or downstream), Power Monitoring and Remote Surveillance, Service/Maintenance Agreements, and Systems Operation
ADC Technical Assistance Center: 800.366.3891 **Email: wsd.support@adc.com**	Technical Information, System/Network Configuration, Product Specification and Application, Training (product-specific), Installation and Operation Assistance, and Troubleshooting and Repair/Field Assistance
Online Technical Support:	www.adc.com/Knowledge_Base/index.jsp
Online Technical Publications:	www.adc.com/documentationlibrary/ technicalpublications/
Product Return Department: 800.366.3891 **Email: repair.return@adc.com**	ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

GLOSSARY

A
AIS – Alarm Indication Signal

ALM – Alarm

ANSI – American National Standards Institute

AWG – American Wire Gage

B
BER – Bit Error Rate

C
C – Centigrade

COM – Communication

CRC – Cyclic Redundancy Check

CTS – Clear To Send

D
D15F – D-type 15-pin Female Connector

D25F – D-type 25-pin Female Connector

D9F – D-type 9-pin Female Connector

dB – Decibel

DCE – Data Communications Equipment

Det – Detector

dnl – Download

DS0 – Digital Service, Level 0 (64 kbps)

DSR – Data Set Ready

DTE – Data Terminal Equipment

DTR – Data Terminal Ready

E
EMC – Electromagnetic Compliance

EMI – Electromagnetic Interference

EMS – Exchange Office Management Shelf

EMU – Exchange Office Management Unit

ES – Errored Second

ETR – ETSI Technical Report

ETSI – European Telecommunications Standards Institute

ETU – ETSI Termination Unit

EXT – External G.SHDSL Clock

H
H/W – Hardware

HDSL – High-bit-rate Digital Subscriber Line

Hz – Hertz

I/F – Interface

ID – Identification

INT – Internal

K

kbps – kilobytes per second

km – kilometers

L

LED – Light Emitting Diode

LL – Local Loopback

LDC – Loss of Data Port (Nx64k) Clock

LEC – Loss of External Clock

LOC – Loss of Clock

LOSW – Loss of Sync Word

LPBK – Loopback

LTU – Line Termination Unit

M

M34F – M-type 34-pin Female Connector

MAR – Margin

Mbps – Megabits per second

MHz – Megahertz

mm – millimeter

N

NC – Normally Closed

NO – Normally Open

NTU – Network Termination Unit

NVRAM – Non-volatile Random Access Memory

Nx64k – Number (N) of 64 kbps DS0 time slots mapped to a data port.

O

Op – Operation

PFO – Power Feed Open

PFS – Power Feed Short

ppm – pulse per minute

PRBS – Pseudorandom Bit Sequence

R

RAM – Random Access Memory

REM – Remote

RL – Remote Loopback

RLSD – Received Line Signal Detector

RTS – Ready to Send

S

SD – Transmit Data

SLIP – Serial Line Internet Protocol

ST – Send Timing

STU-C – SHDSL Terminating Unit for the CO

STU-R – SHDSL Terminating Unit for the RT

S/W – Software

T

TM – Test Mode

TT – Terminal Timing

U

UAS – Unavailable Seconds

UTU – Universal Termination Unit

V

V – Volts

Vdc – Volts direct current

VT100 – A terminal-emulation system

W

W – Watts

Certification and Warranty

FCC Class A Compliance

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 communications. 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.

Limited Warranty

Product warranty is determined by your service agreement. Refer to the *ADC Warranty/Software Handbook* for additional information, or contact your sales representative or Customer Service for details.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by ADC voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

Safety Standards Compliance

This equipment has been tested and verified to comply with the applicable sections of the following safety standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational Standard, UL-60950 3rd Edition/CSA1459 C22.2 No. 60950-00: Safety of Information Technology Equipment

For technical assistance, refer to .

WorldDSLTM Exchange Office Management Unit
EMU-830 User Manual

Document Number: LTPE-UM-3159-02

1381662

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