Solo Select E1 DSU

DL087E, DL2187E

User's Guide

Part 098-01928-01 Rev. A
February 2000

DIGITAL LINK Net Access Solutions

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Products Manufactured Under
An ISO 9001 Certified
Quality Management System

YEAR 2000 COMPLIANCE

Digital Link warrants that products offered as generally available for sale and shipped on or after February 1, 1999 will meet "Year 2000 compliant" requirements. In addition, software released in and after 1998 meets the Year 2000 compliance criteria. For more information on Year 2000 compliance, see our web site information at *www.dl.com* and click on the Year 2000 compliance icon.

FCC COMPLIANCE

The equipment also complies with Part 68 of the FCC Rules. You will find the label located on the bottom of the enclosure. This label contains the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your telephone company.

Incidence of harm: If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Rights of the telephone company: Your telephone company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

Malfunction of the equipment: In the event this equipment should fail to operate properly, disconnect the unit from the telephone line. Try using another FCC approved telephone in the same telephone jack. If the trouble does not persist and appears to be with this unit, disconnect the unit from the telephone line and discontinue use of the unit until it is repaired. Please note that the telephone company may ask that you disconnect this equipment from the telephone network until the problem has been corrected or until you're sure that the equipment is not malfunctioning.

WARNING: The Solo Select E1 DSU complies with FCC Part 15 of the Federal Communications Commission (FCC) Rules concerning radio frequency emissions for Class A computing devices. The following section is required by the FCC.

CAUTION: In accordance with FCC Part 15 section 15.21, changes or modifications made by the buyer that are not expressly approved by Digital Link Corporation could void the buyer's authority to operate this equipment. 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.

INTERNATIONAL COMPLIANCE

Industry Canada

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

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

VCCI

NOTE: As per the Voluntary Control Council for Interference by Information Technology Equipment (VCCI), the Solo Select E1 DSU complies with VCCI Class 1 ITE. This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Information Technology Equipment aimed at preventing radio interference in commercial and/or industrial areas. Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers, etc. Read the instructions for correct handling.

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取扱説明書に従って正しい取り扱いをして下さい。

SAFETY

- UL 1950, 3rd Edition
- CAN/CSA C22.2 No. 950-95

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Preface

AUDIENCE

This *Solo Select E1 DSU User's Guide* is intended for network professionals who want instructions for installing and configuring their digital service unit.

An abbreviated set of instructions is provided in the *Solo Select E1 DSU Quick Start Guide*, part number 098-01928-10. A bound copy was included with your device. For additional copies of either guide, you may download a copy from our Web site at *www.dl.com* and click on LIBRARY. If you wish to receive an additional hardcopy of the Quick Start Guide, please send us an e-mail at *support@dl.com* or send a FAX to 408-273-6507. Include:

•Part number •Your Name •Company •Address •Telephone Number

and we will ship the guide to you.

ORGANIZATION

Chapter 1, *"Product Overview,"* provides a description of the features of the Solo Select E1 DSU, and its placement in a Wide Area Network.

Chapter 2, *"Installation,"* provides a description of the Solo Select, the components you should have received in your shipping carton, and the hardware requirements for setting up the Solo Select in your network.

Chapter 3, *"Terminal Setup,"* provides instructions on connecting your device to a terminal, logging on to the device, and establishing access rights.

Chapter 4, *"Data Network Configuration,"* explains how to navigate the terminal screens and configure your device to work with your network.

Chapter 5, *"Management Configuration,"* explains Ethernet, SLIP, in-band management, and SNMP configuration requirements.

Chapter 6, *"Monitoring and Management,"* describes how to monitor and manage the Solo Select module.

Chapter 7, *"Service Level Agreement,"* desbribes how to monitor the Solo Select to assure that your Service Level Agreement requirements are met.

Chapter 8, *"Local Management Interface Conditioning,"* provides instructions on the use of LMI conditioning to maintain communication with the Solo Select in the event of a router or network failure.

Chapter 9, *"Alarms,"* describes alarm conditions and their display. This chapter also provides alarm configuration parameters.

Chapter 10, *"Diagnostics,"* describes the E1 and in-band tests that can be used to verify the operation of the device and its associated cabling and equipment.

Chapter 11, *"Troubleshooting,"* provides solutions to specific problems.

Appendix A, *"Specifications,"* provides regulatory compliance information, as well as the electrical, physical, and networking characteristics.

Appendix B, *"Cables and Connector Pin Assignments,"* details connector and pin assignments.

Appendix C, *"Feature Keying,"* provides instructions on changing the intelligence level and adding features.

Appendix D, *"RMON-2 and Top Talkers,"* provides instructions on the option of collecting RMON-2 data.

Appendix E, *"Software Download,"* explains software upgrades through TFTP and Xmodem protocols.

Appendix F, *"Menus,"* provides examples of all software menus.

Appendix G, *"MIB Parameters,"* provides a table MIB Objects and relates them to the associated terminal user interface screens.

CONVENTIONS

This section describes the conventions used to delineate specific types of information throughout Digital Link user guides.

Symbols

Symbols denote text that requires special attention. The information contained alongside a symbol corresponds to one of four levels of severity:

NOTE: Follow guidelines in this, or the previous, paragraph to use the Digital Link product more effectively.

CAUTION: Follow guidelines in this, or the previous, paragraph to avoid equipment damage or faulty application.

WARNING: Follow the instructions in this, or the previous, paragraph to avoid personal injury.

ELECTRO-STATIC DISCHARGE — CAUTION: Follow the instructions in this, or the previous, paragraph to avoid the discharge of static electricity, and subsequent damage to the equipment.

Typography

Digital Link manuals delineate the names of files, commands, and actions by using the fonts and typefaces described in the following table:

Typeface or Symbol	Purpose	Example
`Courier Font` AaBbCc123	The names of commands, files, and directories, as well as on-screen computer output.	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% You have mail.`
`Courier Font, Bold` **AaBbCc123**	The input you provide, as contrasted with on-screen computer output.	`machine_name%` **`su`**
	Keystrokes that you must provide to use the application.	Press **`Ctrl-L`** to refresh the screen.
Palatino Font, Italic *AaBbCc123*	Command-line placeholder that you replace with a real name or value.	To delete a file, type **`rm`** *filename*
	Book titles, new words or terms, or words that need to be emphasized.	Refer to Chapter 6 in the *User Guide.* These are called *class* options. You *must* be logged in as root to access this directory.

Typeface or Symbol	Purpose	Example
▼ Zapf Dingbats Font	Symbol that denotes a single-step procedure or task. Procedures requiring more than one task are numbered.	
Palatino Font, Bold Blue, Underscore AaBbCc123	Hyperlinks in the table of contents. When viewing the Portable Document Format (PDF) version of the user guide, you can click on one of these to jump directly to the selected subject matter.	
Palatino Font, Blue AaBbCc123 or AaBbCc123	Hyperlinks throughout general text.	
Helvetica Bold	Denotes actual markings on front or back panels.	Attach the cable to the **TERMINAL** port

DIGITAL LINK TECHNICAL SUPPORT

If you should experience difficulty with the setup and / or operation of your Digital Link equipment, the Digital Link Technical Support staff can assist you at any time.

Telephone	**(408) 745-4200**
FAX	**(408) 745-4240**
Email	**support@dl.com**
Internet	**www.dl.com**

RETURNING A UNIT

Use the following procedure if you need to return a unit for service or repair,

1. **Contact the Digital Link Customer Service Department at (408) 745-4200, or via e-mail at era@dl.com, or fax a request to (408) 745-4240 to obtain an ERA (Equipment Return Authorization) number.**
2. **Package the unit carefully and, before sealing the shipping carton, include any information you can provide about the problems you are currently experiencing with the unit.**
3. **Attach an address label to the shipping carton. Be sure to include the ERA number:**

Customer Service Department
Digital Link
217 Humboldt Court
Sunnyvale, CA 94089
ERA # _____

SEND US YOUR COMMENTS

Please let us know if this user guide meets your requirements.

Does the manual answer your questions?

Is the manual thorough?

Is the manual easy to use: can you find the information you need?

Is anything missing from the manual?

What would you like to see in the manual?

Digital Link Technical Publications	
FAX	**(408) 745-6250**
Email	**techpubs@dl.com**

All suggestions and comments are appreciated.

1 Product Overview

PRODUCT OVERVIEW

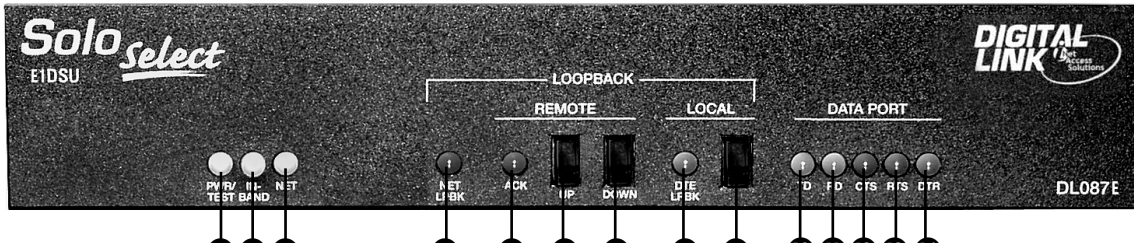
The Solo Select E1 DSU, Figure 1-1, is a multi-port, SNMP-manageable, intelligent access unit. It monitors the entire WAN protocol stack and provides a complete solution for Frame Relay management and Service Level Agreement (SLA) reporting.

Available as a standalone unit or as a chassis-based module for the Ensemble WAN Access System, the Solo Select E1 DSU provides a cost-efficient demarcation between your LAN and public Frame Relay or IP wide-area networks.

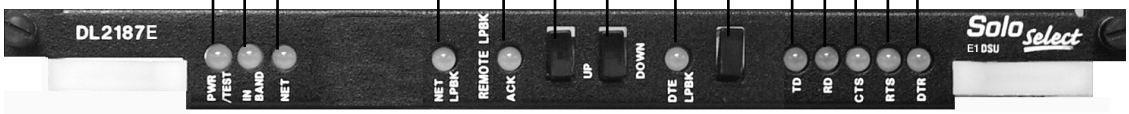
The front-panel LEDs are shown in Figure 1-2.

Figure 1-1 DL087E Solo Select E1 DSU (Standalone Version)

DL087



DL2187



1. Power / Test LED
2. In-band LED
3. NET LED
4. Net Loopback Test LED
5. Remote Loopback Test Acknowledge LED
6. Remote Loopback Test UP Button
7. Remote Loopback Test DOWN Button
8. DTE Loopback Test LED
9. NET / DTE Loopback Test Button
10. Transmit Data LED
11. Receive Data LED
12. Clear To Send LED
13. Request To Send LED
14. Data Terminal Ready LED

Figure 1-2 Solo Select E1 DSU LEDs and Buttons

I-NET MANAGMENT SUITE

Digital Link's i-Net Management Suite is a powerful, comprehensive service-level management solution for both enterprises and service providers. Carriers and enterprises, large and small, will find the i-Net Management Suite's FRF.13 standards-compliant monitoring and reporting capabilities ideal for ensuring WAN Service Level Agreements (SLAs). The i-Net Management Suite also allows RMON standards-based performance monitoring, reducing network operation costs by managing network traffic more efficiently. Likewise, device configuration is quick and easy, adding to the productivity of the enterprise IT department or carrier Network Operations Center (NOC). The i-Net Management Suite's sophisticated alarm management system rapidly isolates problems, helping the IT or NOC manager correct network problems with the click of a mouse, rather than with expensive IT resources. Device configuration is easy, quick, and cost effective. Also, the i-Net Management Suite is ideal for proactively monitoring and understanding network-wide trends to anticipate potential problems and plan for growth. In short, Digital Link's i-Net Management Suite can improve productivity and reduce costs for enterprise IT managers, and help carriers provide innovative new service offerings.

Today, the growing i-NET Management Suite is composed of WANview™ Network Management System, the Solo Select line of intelligent DSUs, and web-based ChoiceView Network Monitor.

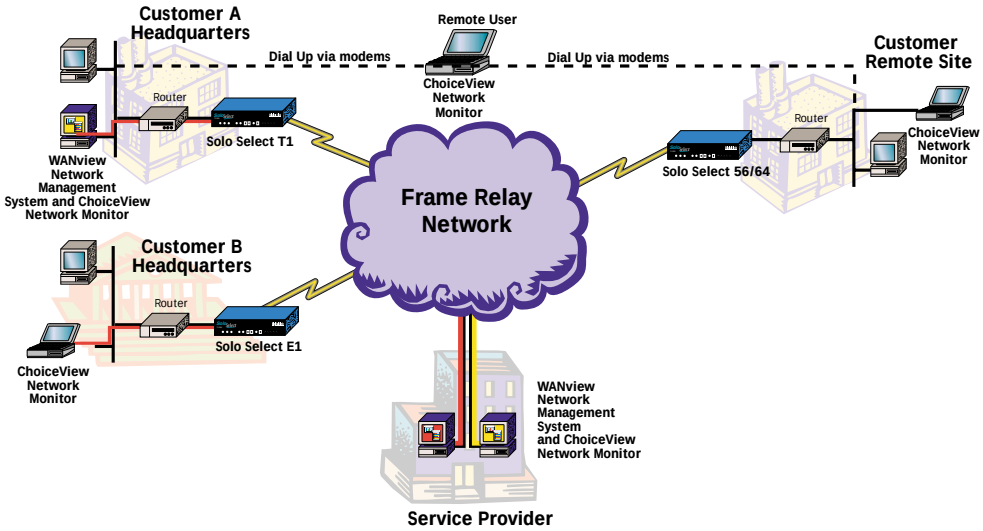


Figure 1-3 i-Net Management Suite

Feature Keying Provides Scalable Intelligence Levels

With the Solo Select E1 DSU, you can select various feature sets–or *intelligence levels*–based on your network management and budget requirements.

Feature keying (entering a 10-digit code) provides a simple and cost effective means of adding features and additional reporting capabilities to your enterprise. New features are added without the need for a service call, or the need to download additonal software.

Table 1-1 presents the enhancements available at each intelligence level.

Table 1-1 Intelligence Levels

Intelligence Level	In-band Management	DLCI Support	Integrated Performance Monitoring (IPM)	Service Level Agreement	RMON-2
Basic	Yes	N/A	No	No	N/A
Level 2 (L2)	Yes	32	Yes	Yes	Optional
Level 3 (L3)	Yes	96	Yes	Yes	Optional

MONITORING THE ENTIRE WAN PROTOCOL STACK

With the Solo Select E1 DSU and its optional components, you can now monitor the entire WAN protocol stack. Higher level protocols can be monitored using RMON-2. Frame Relay can be monitored using RMON-1 and Service Level Agreement functions, and the physical layer can be monitored using diagnostic capabilities as outlined in RFC 1406.

Monitoring Higher Protocol Layers

You can order a Level 2 or Level 3 DSU with RMON-2 capabilities, or use the Feature Keying function of the Solo Select E1 DSU to enable RMON-2 capabilities in your device. With RMON-2, you can identify the Top Talkers (256 greatest bandwidth users), and drill down to the Top Applications to see which applications are using the most bandwidth. Table 1-2 lists the RMON tables supported in RMON-1 and RMON-2.

Table 1-2 RMON Tables

RMON-1 (Provided with Level 2 & 3)	RMON-2 (Option for Level 2 & 3)
History	Protocol Directory
Events	Network Layer Host
Statistics	Protocol Distribution
Alarms	Application Layer Host

To take advantage of the Solo Select E1 DSU's RMON-2 capabilities, Digital Link has created an application, ChoiceView, that allows you to display RMON-2 data in real-time, graphical, and tabular formats.

Monitoring Frame Relay

When enabled with Integrated Performance Monitoring, your Solo Select E1 DSU functions as an embedded WAN probe that allows you to evaluate traffic and troubleshoot congestion points, from one end of the network to the other. The Solo Select E1 DSU is capable of tracking either 32 (Level 2) or 96 (Level 3) Data Link Connection Identifiers (DLCIs).

Using four standards-based RMON-1 tables (Table 1-2 on page 1-5), IPM monitors and collects data on Frame Relay congestion, network availability, and network throughput.

Service Level Agreements

Service Level Agreement (SLA) reporting, based on FRF.13 standards, allows you to monitor and confirm Frame Relay network performance. The SLA implementation provides measurements for:

- Frame Delivery Ratio (FDR)
- Data Delivery Ratio (DDR)
- Frame Transfer Delay (FTD)
- Service Availability

Monitoring the Physical Layer

In accordance with the parameters established in RFC 1406, the Solo Select E1 DSU allows you to communicate with the device without having to assign it an IP address. Advanced diagnostic capabilities, such as BERT testing, detail report generation, and summary report generation provide both micro and macro views.

LMI Conditioning

LMI conditioning utilizes a maintenance DLCI and a management DLCI. LMI conditioning allows both the enterprise and carrier network operations centers to communicate with the Solo Select DSU in the event of failure. It pinpoints faults and determines whether they are router-related (LAN side) or network-related (WAN side). In addition, LMI conditioning maintains logical network connections when a failure occurs–a process called “LMI spoofing”–which speeds up troubleshooting.

Additional Features

In addition to the IPM and LMI Conditioning features, the Solo Select offers the following:

- In-band management
- Link-based testing
- Delay monitoring
- Non-disruptive downloadable code for easy upgrades
- Year 2000 compliance
- Ethernet management interface (built-in feature of the stand-alone models; available via a MAP for the modules)
- Event log
- Modem connection
- Autodiscovery of remote endpoint

The Solo Select E1 DSU includes a software-configurable DTE interface to accommodate EIA-530, X.21 or V.35 connections. The bandwidth allocation feature (Timeslot Allocation) lets you configure the unit for speeds ranging from 64 kbps to 2.048 Mbps. The Solo Select E1 DSU supports the industry-

standard telnet and SNMP protocols for remote management, and also features a device-specific enterprise MIB, which lets you configure the device remotely, as shown in Figure 1-4.

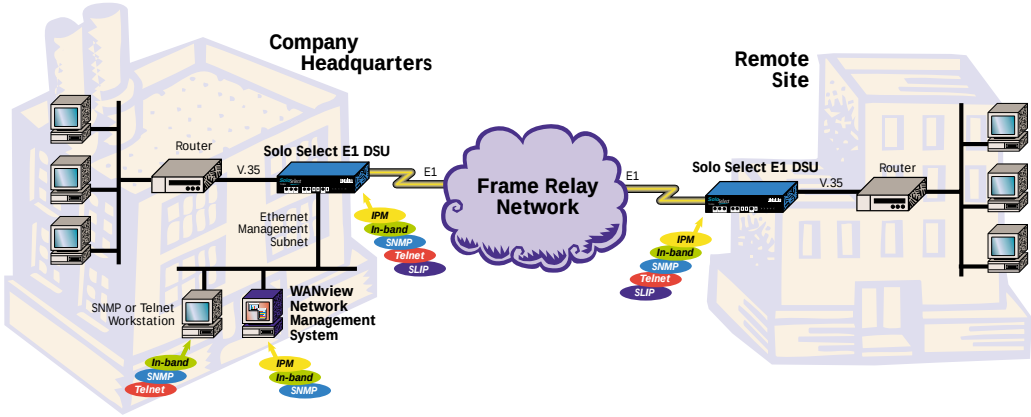


Figure 1-4 Solo Select E1 DSU WAN Configuration.

2 Installation

Unpacking and Checking Equipment

Before you begin the installation, you need to:

- Unpack and inspect the Solo Select for damage that may have occurred during shipment
- Save all enclosed packing slips, documents, shipping cartons, and packing materials until you have completed the installation and verified the unit's operation

Package Contents

Make sure that you have received all the items ordered.

- DL2187E Solo Select E1 DSU module or DL087E Solo Select E1 DSU standalone
- Warranty card
- Ferrite beads (2)
- A Quick Start Guide or the WAN Ensemble Shelf Installation Guide

Before You Install

Table 2-1 presents a list of the cables that are necessary to install your device. If you don't have the correct cables, they may be ordered by calling Digital Link at 408-745-6200 and asking for Inside Sales, or you may order from the Digital Link Online Store on our web site: *www.dl.com*.

Table 2-1 Cables For Installation *(1 of 2)*

Cable	Description	Digital Link Model Numbers
Data Port Cable[1]	V.35, DB-25 plug to M-34 plug, 10 ft (3.0 m)	DL1300-10
	V.35, DB-25 plug to M-34 socket, 1 ft (0.3 m)	DL1301-01
	V.35, DB-25 plug to M-34 socket, 10 ft (3.0 m)	DL1301-10
	RS-449, DB-25 plug to DC-37 socket, 10 ft (3.0 m)	DL1303-10
	X.21, DB-25 plug to DA-15 plug, 10 ft (3.0 m)	DL1310-10
	X.21, DB-25 plug to DA-15 socket, 10 ft (3.0 m)	DL1311-10

Table 2-1 Cables For Installation *(2 of 2)*

Cable	Description	Digital Link Model Numbers
COMM Port Cable	DE-9 plug to DE-9 socket, 2 connections DE-9 plug to DE-9 socket, 4 connections DE-9 plug to DE-9 socket, 8 connections	DL1081 DL1082 DL1083
Network Cable	DA-15 plug to DA-15 plug 7 ft (2.0 m) DA-15 plug to DA-15 socket -- 7 ft (2.0 m) 75-ohm coaxial network cable, 10 ft (3.0 m)[2]	DL1007 DL1016 DL1405-10

1. If you need to connect a router directly to your Solo Select E1 DSU, you can purchase an RS-530-compatible cable from the router vendor. Maximum suggested cable length is 14 meters.
2. Two cables required for BNC networks.

Cable Requirements

To connect the Solo Select to a device, the cable you use depends on the unit's operating mode (DCE or DTE) and its interface (V.35 or RS-449 EIA 530). Table 2-2 lists cable requirements and restrictions.

Table 2-2 Cable Requirements

Mode / Interface	Use
DCE mode	Use a DTE cable. For most applications, the customer equipment operates as a DTE. The Solo Select's default operating mode is DCE. For more information, refer to "Mode" in Table 4-4 on page 4-11.
DTE mode	Use a DCE cable. In some instances, as in tail circuit applications, the customer equipment operates as a DCE. For these applications, set the operating mode as DTE. For more information, refer to "Mode" in Table 4-4 on page 4-11.
V.35 interface	Use the cable's M-34 connector to connect to the DTE device and the DB-25 connector to connect to the Solo Select. For more information, refer to "Format" in Table 4-4 on page 4-11.
X.21 interface	Use the cable's DC-37 connector to connect to the DTE device and the DB-25 connector to connect to the Solo Select. For more information, refer to "Format" in Table 4-4 on page 4-11.
Distance	Maximum distance between DTE and Solo Select is 30.4 m (100 ft).

EQUIPMENT MODEL NUMBERS

The Digital Link model numbers related to the Solo Select are listed in Appendix A, *"Specifications."*

SITE REQUIREMENTS

Install the Solo Select in accordance with the National Electric Code, ANSI/NFPA 70, Articles 110-16, 110-17, and 110-18. This code defines an access area such as a dedicated equipment room or closet that is clean, well-ventilated, and free of environmental extremes. Allow .5 - 1.0 m (2-3 feet) of clearance around the unit for access during installation.

The operating environment of the Solo Select is shown in Table 2-2.

Table 2-3 Site Environmental Requirements

Item	Specification
Operating Temperature	0°C to 50°C (32°F to 122°F) ambient
Storage Temperature	-20°C to +60°C (-4°F to 140°F)
Relative Humidity	0% to 95% noncondensing
Maximum Altitude	4.6 km (15,000 ft)

Voltages as high as 200 VDC may exist at the telephone company's E1 interface in the form of simplex power. These voltages are hazardous and can cause death or severe injury! Do not proceed with this installation if any voltage is present between the send and receive pairs of the network interface. You can ask the serving telephone company to temporarily disconnect the simplex power during installation.

The setup and installation of either the Solo Select E1 DSU module or standalone is separated in this chapter.

- If you have a Solo Select E1 DSU module (DL2187E), refer to "Installation — Solo Select E1 DSU Module (DL2187E)" on page 2-4.
- If you have a Solo Select E1 DSU standalone (DL087E), refer to "Installation — Solo Select E1 DSU Standalone (DL087E)" on page 2-7.

INSTALLATION — SOLO SELECT E1 DSU MODULE (DL2187E)

The following procedures outline the steps necessary to install the Solo Select E1 DSU module into an Ensemble WAN Shelf and attach it to a terminal.

Terminal Setup

You can configure your Solo Select E1 DSU through a terminal or by using the DIP switches (Figure 2-1 on page 2-5). To set up the device for terminal configuration, switch 12 of DIP switch bank S2, should be UP (ON). This is the default position.

NOTE: Ensure that DIP switch 12 is in the UP position *before* you slide the module into the shelf (Figure 2-1).

The COMM Port factory default settings on your device are defined as:

- Baud Rate — 9600
- Parity Bit — none
- Word Length — 8
- Stop Bits — 2

Make sure that your terminal software is set to work with these paramaters. In addition, the following parameters should be set:

- Hardware Flow Control—none
- Terminal Emulation—VT-100

Figure 2-1 shows the default DIP switch settings in bold. You can change these settings on the unit if they do not match the settings for your terminal, modem, or Management Access Processor (MAP). For example, you may change the baud rate to the maximum baud rate supported by your MAP or the serial controller.

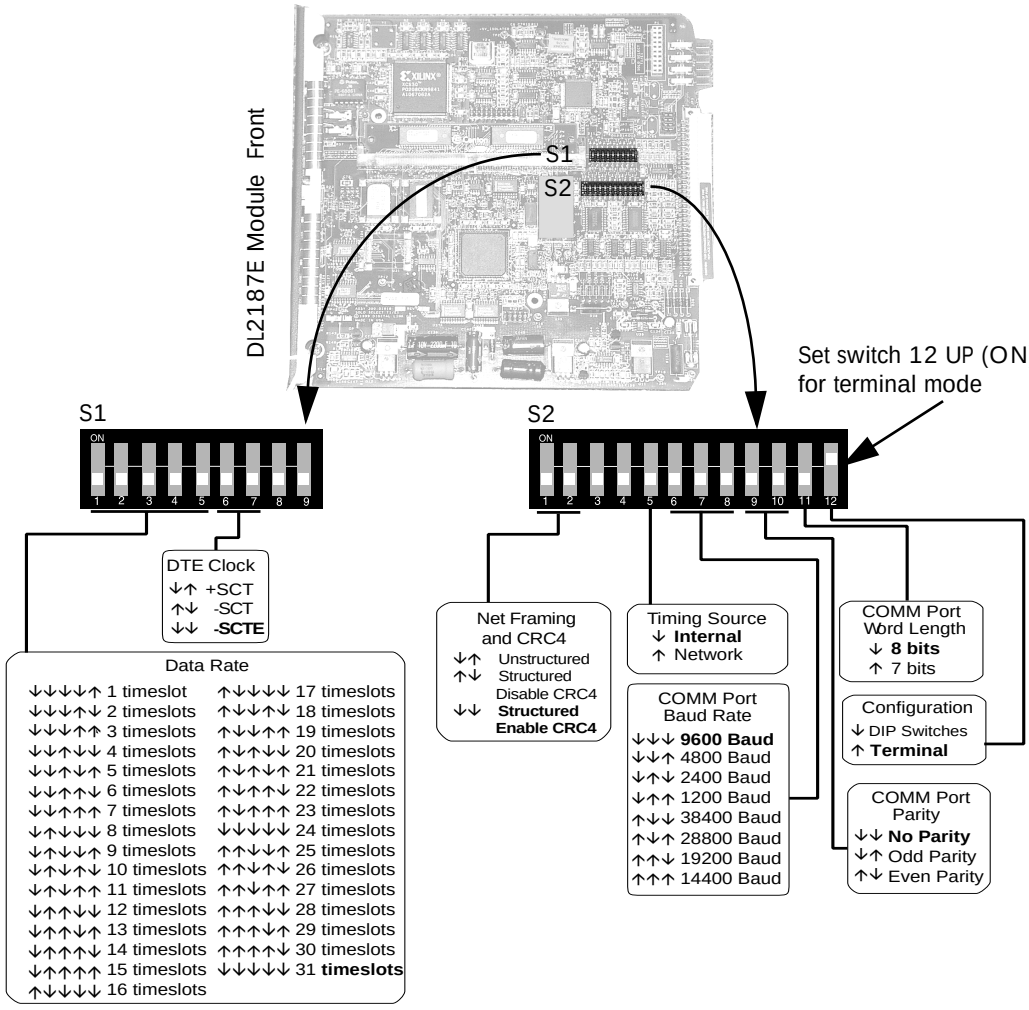


Figure 2-1 Module (DL2187E) DIP Switches

Installing the Module

The following procedure outlines the steps necessary to install the module in an Ensemble WAN Access System.

For more information on powering and setting up your Ensemble WAN Access System, refer to the *Ensemble WAN Shelf Installation Guide*, (098-01905-02).

CAUTION: INSTALLING DC POWER TO AN ENSEMBLE WAN SHELF

- Connect your Ensemble directly to either: (1) the DC power supply system earthing electrode conductor or (2) to a bonding jumper from an earthing terminal bar or bus to which the DC supply system earthing electrode is connected.
- Your Solo Select E1 DSU must be placed in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the earthed conductor of the same DC supply circuit and the earthing conductor, and also the point of earthing of the DC system. The DC system should not be earthed elsewhere.
- Place your DC power supply in the same premises as your shelf.
- Do not place any switching or disconnecting devices in the earthed circuit conductor between the DC source and point of connection of the earthing electrode conductor.

To install the Solo Select E1 DSU module, complete the following steps:

1. **Slide the Solo Select E1 DSU module (LEDs facing you) into any full-size slot of the Ensemble shelf, except the CONT slot. See Figure 2-2.**

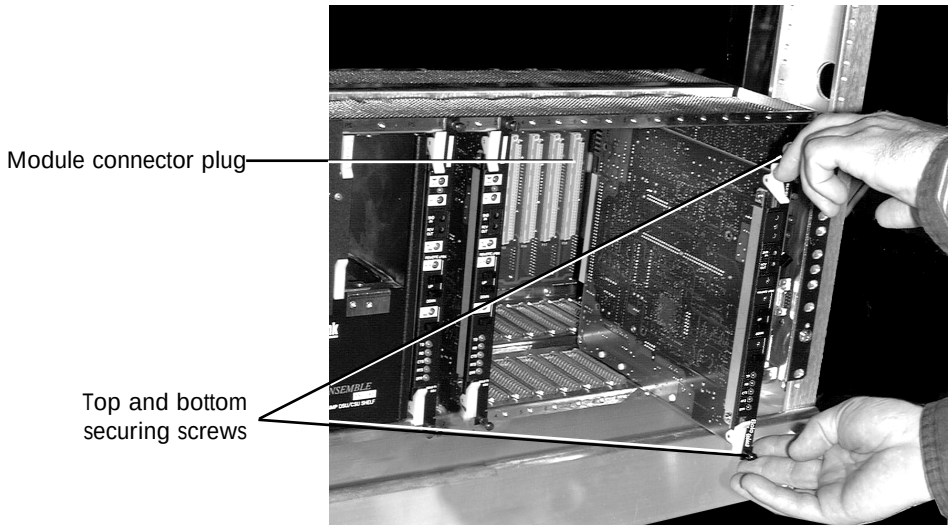


Figure 2-2 Inserting the Solo Select E1 DSU Module

2. **Gently push the module all the way in so that its connectors plug into the back of the shelf and are firmly in place. If power to the Ensemble WAN Access System is on, the lights on the front panel should go through a start-up sequence.**

3. **Screw in the securing screws at the top and bottom of the module. The white plastic ejectors (Figure 2-2) should snap into place.**

4. **To remove the module, unscrew the securing screws at the top and bottom of the module, and unclip the white plastic ejectors to unseat the module.**

INSTALLATION — SOLO SELECT E1 DSU STANDALONE (DL087E)

The following procedures outline the steps necessary to install the Solo Select E1 DSU standalone, power the device, and attach it to a terminal.

Terminal Setup

You can configure your Solo Select E1 DSU through a terminal or by the DIP switches (Figure 2-3 on page 2-9). To set up the device for terminal configuration, switch 12 of DIP switch bank S2, should be UP (ON).

The COMM Port factory default settings on your device are defined as:

- Baud Rate — 9600
- Parity Bit — none
- Word Length — 8
- Stop Bits — 2

Make sure that your terminal software is set to work with these paramaters. In addition, the following parameters should be set:

- Hardware Flow Control—none
- Terminal Emulation—VT-100

Figure 2-3 on page 2-9 shows the default DIP switch settings in bold. You can change these settings on the unit if they do not match the settings for your terminal, or modem.

Solo Select E1 Standalone Back Panel

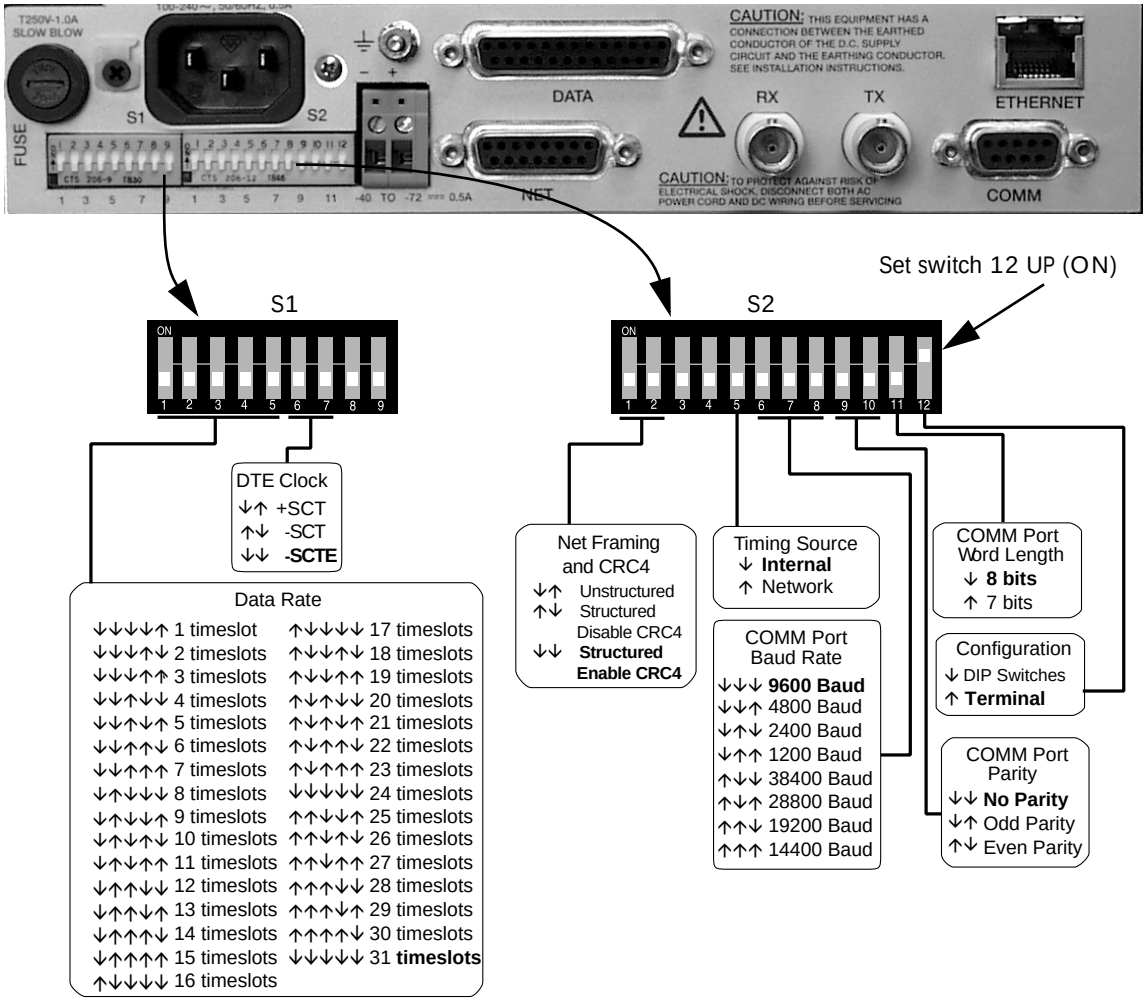


Figure 2-3 Standalone (DL087E) DIP Switches

Installing the Standalone

The Solo Select E1 DSU should be installed on a flat, stable surface or mounted on a tray.

To install the Solo Select E1 DSU on a flat surface:

1. **Remove the covering from the four stick-on rubber pads and attach them to the bottom of the unit.**
2. **Place the unit on a flat, stable surface.**

   You may stack other units on top of the Solo Select E1 DSU.

To mount the Solo Select E1 DSU on a tray, follow these steps and refer to Figure 2-4:

1. **Place the Solo Select E1 DSU on the tray, aligning its bottom holes with the tray holes.**
2. **Attach the Solo Select E1 DSU to the tray using the screws provided.**
3. **Attach the mounting tray (DL1135-3) to a 19-inch rack.**

   The tray is wide enough to hold two mounted Solo Select E1 DSUs side-by-side.

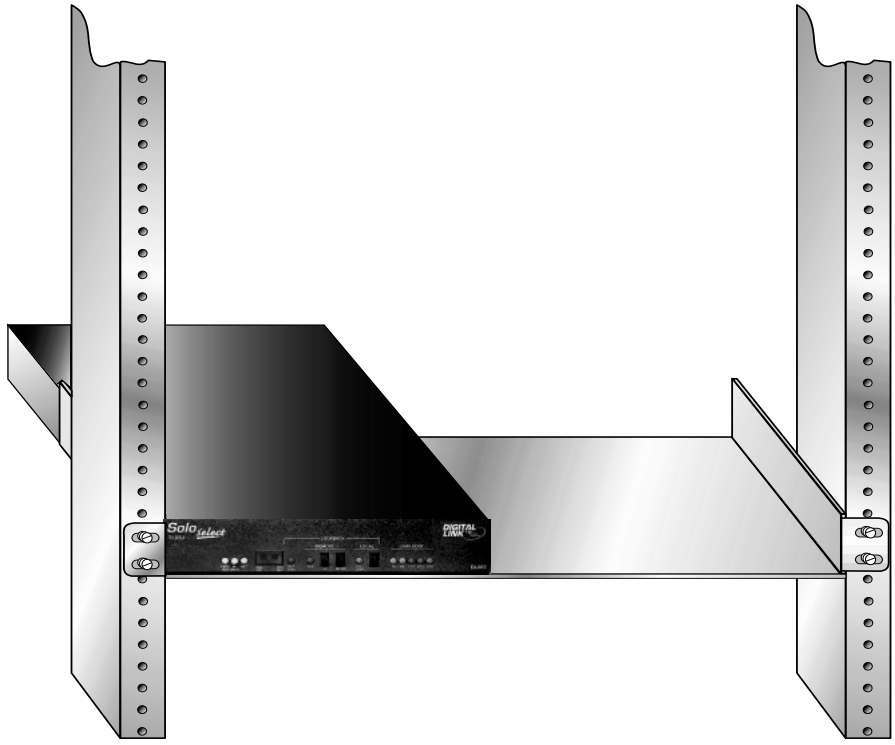


Figure 2-4 Solo Select E1 DSU Mounted in a Tray

Installation Using AC Power

When using the Solo Select E1 DSU with AC power, it is necessary to use one of the supplied ferrite beads (Figure 2-5) to ensure that your DSU meets CISPR22 emission requirements.

▼ **Snap one ferrite bead (500-00022-01) onto the AC power cord within 10 centimeters (3.9 inches) of the unit.**

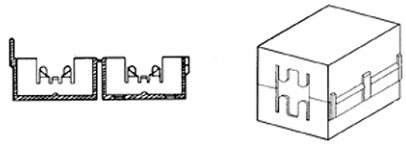


Figure 2-5 Ferrite Bead for AC Power Cord

To install the Solo Select E1 DSU using AC power, follow the step below and refer to Figure 2-6:

▼ **Insert the power cable into the power receptacle on the Solo Select E1 DSU rear panel. Connect the other end to the AC outlet.**

The LEDs on the front panel flash as the Solo Select E1 DSU automatically runs the Self Test at power up. The **PWR/TEST LED** blinks yellow and then turns green when the test is successful. If the test fails, the LED turns red for 10 seconds and then green.

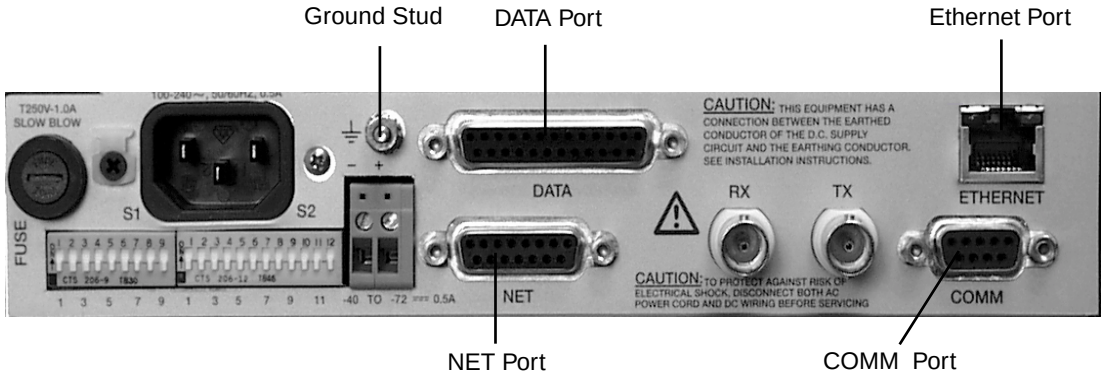


Figure 2-6 Back Panel View–Connectors and Ground Stud

Installation Using DC Power

You must install the Solo Select E1 DSU for safety in a restricted access area such as a dedicated equipment room or closet that is clean, well-ventilated, and free of adverse environmental conditions. Allow two to three feet of clearance around the Solo Select E1 DSU to give you access to the unit during the installation.

WARNING: Use caution when connecting to DC power. If you connect the unit improperly, you may damage it.

Installation must be in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.

You need a tray cable that is UL recognized 14 AWG, 3 conductors, copper strand wire, electrical power and control cable, type TC: tray cable, 600 V 90°C. Alpha Wire Company No. 45443 is an example.

To connect the Solo Select E1 DSU to DC power:

1. **Place the unit on a flat surface or tray.**
2. **Make sure the DC power source is off.**
3. **Before you connect the unit to the centralized DC power source, strip 2 inches of jacket material off the tray cable and ½ inch of insulation off each wire.**
4. **Connect the -48 V wire to the negative (-) terminal using a small flat screwdriver to fasten the wire.**
5. **Connect the ground wire to the positive (+) terminal using the same method.**

   The unit is designed to operate with negative voltage; therefore, the positive terminal is connected to ground.
6. **Connect a third wire to the ground stud near the terminal block using a ¼-inch wrench and fastening torque of 5 inch-pounds.**
7. **To minimize disturbance to the wires through casual contact, secure the tray cable near the rack frame using multiple cable ties.**

   Use at least four cable ties, a minimum of 4 inches apart. The first tie should be within 6 inches of the terminal block. (A cable tie mount is provided as shown in Figure 2-7.)

8. **Connect the Solo Select E1 DSU to a DC power source.**

   The LEDs on the front panel flash as the unit automatically runs the Self Test at power up. The **PWR/TEST LED** blinks yellow and then turns green when the test is successful. If the test fails, the LED remains red for 10 seconds and then turns green.

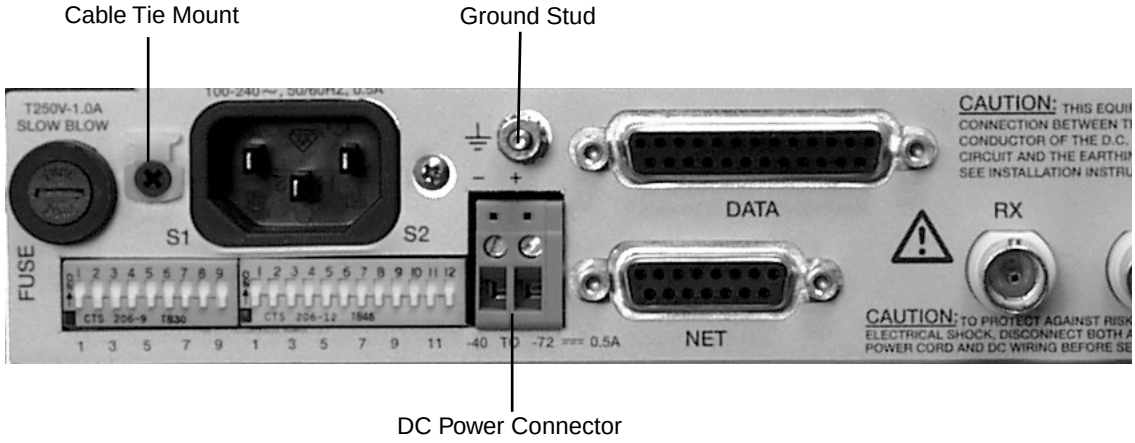


Figure 2-7 Connecting DC Power

Grounding the Standalone for DC Operation

Connect the Solo Select E1 DSU to ground using a grounding cable connected to the ground stud on the back panel (Figure 2-7).

3 Terminal Setup

TERMINAL MODE

Before you can configure your Solo Select E1 DSU, you will need to access the unit through the COMM Port. This chapter covers:

- Attaching the Solo Select to your terminal
- Using Hyperterm to log on to the Solo Select
- Configuring access rights

ATTACHING TO A TERMINAL

The Solo Select E1 DSU module (DL2187E) can be attached via the COMM Port or CRAFT Port to the serial port of a Server, computer, or terminal. If you are not using a MAP or a Control card, you will need to attach your Solo Select using the COMM2 Port on the rear of the shelf.

The Solo Select E1 DSU standalone (DL087E) can be attached to a terminal using the COMM Port. The following sections outline the various procedures.

MAP or Control Card Method (DL2187E)

1. **Connect a DE-9 to DE-9 COMM Port cable from the CRAFT connector on the MAP/Control card in your rack to the COMM Port on your terminal.**

   To communicate from an ASCII terminal to your module, use the CRAFT Port connector on the MAP / Control card in your shelf (refer to Figure 3-1). The CRAFT connector enables you to temporarily access the Ensemble Shelf system without disconnecting the COMM Port connection in the rear of the shelf.

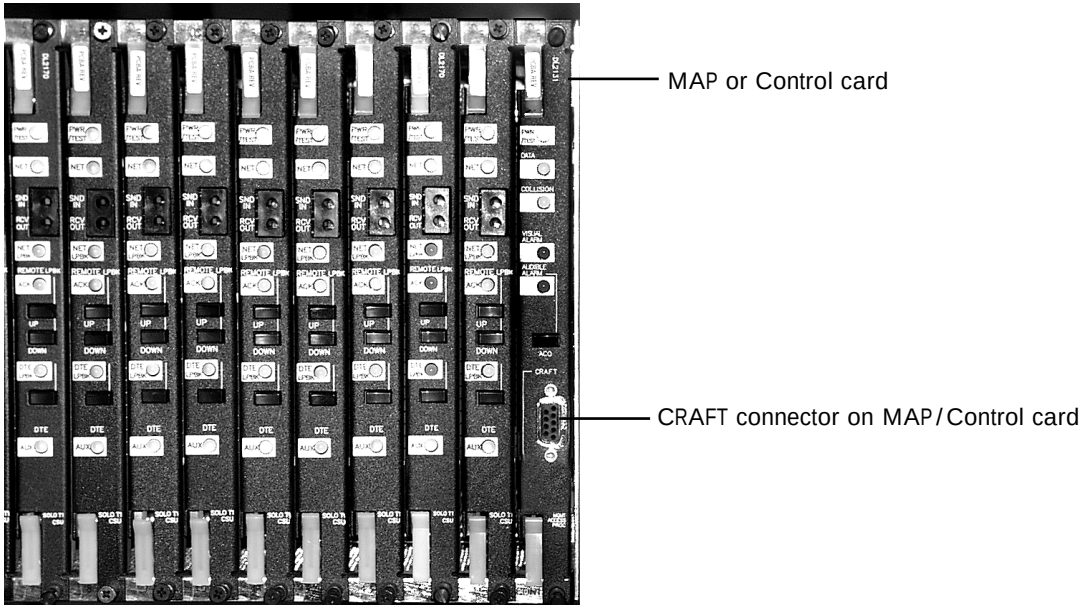


Figure 3-1 CRAFT Connector on Ensemble Shelf MAP Card

COMM2 Method (DL2187E)

If you are not using a Control card or a MAP, you can connect your Solo Select module to a terminal using the COMM2 Port.

1. **To attach your Solo Select to an ASCII terminal, use a COMM Port cable, DE-9 to DE-9, straight (DL108X). Attach the plug end of the cable to the COMM2 Port connector on your shelf in your rack and the plug end to the COMM Port on the back of your computer terminal.**

Figure 3-2 COMM2 Connector on Ensemble Shelf

2. **The CRAFT connector on the front of the MAP or Control card enables you to temporarily access the Ensemble Shelf system without disconnecting the COMM Port connection in the rear. Refer to Figure 3-1.**

COMM Port Method (DL087E)

If you are using the standalone model, you can connect your Solo Select using the COMM Port on the back panel.

▼ **Connect a DE-9 to DE-9 COMM Port cable from the COMM Port on the Solo Select E1 DSU to the COMM Port on your terminal.**

To communicate from an ASCII terminal to your standalone, use the COMM Port connector on the back panel of your Solo Select E1 DSU (Figure 3-3).

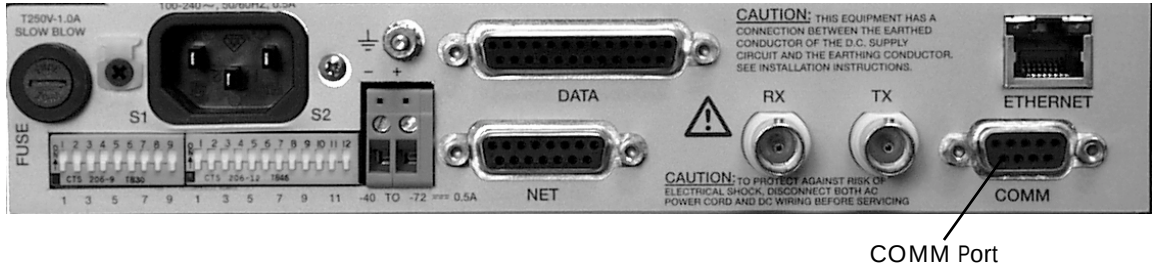


Figure 3-3 COMM Port on Solo Select E1 DSU

USING TERMINAL SOFTWARE

Once you have attached the Solo Select to a terminal using one of the methods described above, you will need to use terminal emulation software to communicate with, and configure the device. You may use Hyperterm Windows, or the terminal emulation software of your choice. If using Hyperterm Windows, follow the instructions outlined below to set up the program.

Hyperterm Windows Setup

Hypterterm is a Windows 95 terminal emulation program that can be used to log on to the unit.

1. **Run Hypertrm.exe.**

   The screen prompts you to name the file.

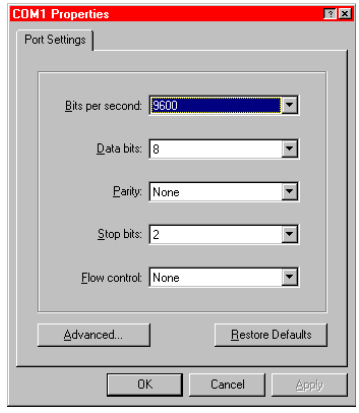
2. **Type a file name and press RETURN.**

The Properties dialog box appears.

3. **Select `Direct to COM1` from the `Connect Using` drop-down list box.**

4. **Click `Ok`.**

   The COM1 Properties dialog box appears.



Refer to Table 3-1 on page 3-6 for the correct settings for the COM1 Properties dialog box.

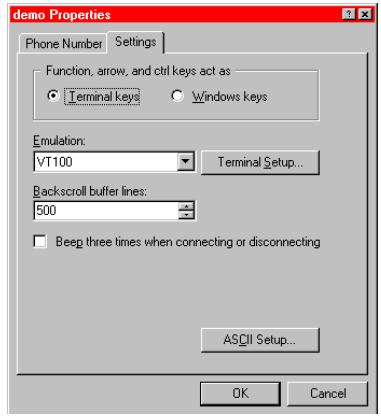
Table 3-1 Port Settings

Setting	Value
Bits per second	9600
Data bits	8
Parity	None
Stop bits	2
Flow control	None

5. **Press OK.**

   The Properties dialog box reappears.

6. **Click Settings.**



   Be sure that Emulation is set at VT-100 and Backscroll buffer lines are set at 500.

7. **Press OK.**

   You are now ready to log on to the terminal

Logging On from a Terminal

To log on to the unit, you must first obtain the unit ID of the device. The unit ID is printed on a small sticker on the back of a module (DL2187E), or on the back or bottom of a standalone (DL087E). The default ID is always a 6-character alphanumeric string that identifies the DSU/CSU.

If you wish to display or verify the unit ID, press **Ctrl-x** five times to display all cards in the shelf.

To log on to the Solo Select:

1. **Press Ctrl-x, type the unit ID, and press Return.**

   If passwords are enabled, the system prompts for a password.

   ```
   Now you need a password to log on:
   ```

NOTE: Systems with blank IDs are always logged on and cannot be logged off until a unit ID is assigned. For information on assigning an ID, refer to "Setting the Unit ID" on page 4-4.

NOTE: Factory default units have no password assigned. If you are logging in for the first time, you will not need to enter a password. Press return at the prompt and Menu 1, Main Status will appear.

For more information on Superuser/normal user's rights, and assigning passwords, refer to "Configuring Access Rights" on page 3-9.

2. **Type the Superuser or normal user password and press Return**

   (For more information on normal and Superuser rights, see "Configuring Access Rights" on page 3-9).

   Menu-1, Main Status, appears.

   If this menu does not appear, you may have an incorrect ID, a faulty connection on the COMM Port, or an incorrect COMM Port configuration.

3. **Refer to Table 3-2 for Solo Select messages during logon.**

Table 3-2 Login Prompts

System Messages	Action	Condition on Solo
The Terminal User Interface is already in use	Please enter the Superuser password (refer to "Assigning User Passwords" on page 3-10) to force the other user to log off or press **Ctrl-x** and try again later.	Normal user logged on via Telnet.

Table 3-2 Login Prompts

System Messages	Action	Condition on Solo
Superuser is already logged into the Terminal User Interface. Try again later.	Press **Ctrl-x** and try again later.	Superuser logged on.

NOTE: The system forces you off after the fifth unsuccessful attempt to log on.

You now need to configure your Solo Select for several parameters. Refer to Chapter 4, *"Data Network Configuration."*

Logging Off from a Terminal

▼ **To log off, press Ctrl-x.**

The terminal stops responding to your keystrokes when you are logged off.

CONFIGURING ACCESS RIGHTS

You can create two access levels to the Solo Select terminal interface—Superuser access rights and normal user access rights—by entering unique Superuser and normal user passwords in Menu 8C, as shown in Figure 3-4.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-8 Alarm                        14:00:32
                  8C. Miscellaneous Management Configuration

                                      Local:
                                      ------------
Connection                                  Direct
Timeout When Logged On                    Unlimited
Timeout When Not Logged On                Unlimited
Phone Number 1
Phone Number 2
Normal User Password                            *
Superuser Password                              *
COMM   DCD                                Disabled
       XON/XOFF                           Disabled
DLC IBC Link Loss Alarm                    Enabled
Dial Out Time Interval                     0 Min.
Inband Link Loss Alarm                    Disabled
Inband CRC Error Threshold                Disabled
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection               Arrow Keys-move the selection
```

Figure 3-4 Menu 8C Miscellaneous Management Configuration

Assigning User Passwords

Since two access methods are available (using a terminal connected to the COMM Port or a Telnet connection from a remote terminal), a number of different scenarios can occur.

A “no passwords” situation gives any user logging on Superuser access rights. If this user sets one password, both passwords become the same, known only to this user. The result is one unknown user gaining exclusive control of the terminal interface.

If you set only one password, both passwords become the same. A “both passwords same” situation gives any user logging on with a password Superuser rights. As Superuser, this user can gain exclusive control of the terminal interface.

NOTE: You must set both passwords to prevent the above situations. Specify unique Superuser and Normal User passwords in Menu-8C. Menu-8C fields and options are defined in Table F-16 on page F-59.

4 Data Network Configuration

Before You Begin

For complete control over all of the Solo Select E1 DSU configuration parameters, you must use the terminal interface. This chapter describes how to configure the Solo Select from a terminal. To perform the initial configuration from an ASCII terminal to a DL2187E module, connect the terminal to COMM2 on the Ensemble Shelf or the CRAFT Port on the Control Card or MAP, and log on. If you are using a DL087E standalone, you will need to connect the terminal to the COMM Port. For detailed instruction, refer to "Attaching to a Terminal" on page 3-1.

You may partially configure the unit using the DIP switches. When your Solo Select E1 DSU arrives, switch 12 of the S2 DIP switch bank is in the UP position. This default condition puts the Solo Select in Terminal mode so that you can configure the Solo Select from a terminal. In terminal mode, only the COMM port DIP switch settings are used.

If you would like to configure the main features of the Solo Select using the DIP switches, set switch 12 of DIP switch bank S2 to the DOWN position. In DIP switch mode, the terminal settings will change to reflect the DIP switch settings.

NOTE: Using the DIP switches does not allow access to all configuration options. You must also use the Maintenance and Management DLCIs to telnet to the device, or the terminal interface.

Terminal Interface Navigation

To use the terminal interface, be sure that DIP switch 12 is UP. The terminal interface contains a number of menus which are used to configure, monitor, and manage the Solo Select.

- To navigate the fields in the menus, use the arrow keys on your keypad.
- To select a menu, press the menu number as indicated at the bottom of the menu screen.
- To change a parameter, use the spacebar to toggle through available options within the parameter, and press **Return** to select it.

Setting a Menu Parameter

Use the following procedure to select a parameter, set it, and confirm your action:

NOTE: You can also use the **u** (up), **d** (down), **r** (right), and **l** (left) keys in place of the arrow keys.

1. **Move the cursor to a field using the arrow keys, and press Return to activate edit mode.**
2. **Cycle through the available options using the up and down arrow keys. Stop at the desired option, and press Return to select it, or where appropriate, type the required value.**
3. **Type y to confirm your action when prompted.**

NOTE: In some cases, the Structured menus differ from the Unstructured menus.

OVERVIEW OF THE CONFIGURATION

The Solo Select E1 DSU is operational when you install it. To be able to manage it, you need to configure the unit for its specific network environment. To configure the Solo Select, set the parameters given in Table 4-1.

Table 4-1 DSU Configuration Parameters *(1 of 2)*

Parameters	Menu
Unit ID, Date, Time, and E1 Network	Menu-4, Main Configuration. Refer to "Overview of the Configuration" on page 4-3 for more information.
Data Port	Menu-5, Data Port Configuration. Refer to "Configuring the Data Port" on page 4-10 for more information.
Timeslot Allocations	Menu-6, Timeslot Allocations. Refer to "Configuring Timeslot Allocations" on page 4-11 for more information.

Table 4-1 DSU Configuration Parameters *(2 of 2)*

Parameters	Menu
SNMP	Menu-0B, SNMP Configuration (if required). Refer to Chapter 5, *"Management Configuration"* for more information.
Alarm conditions, thresholds, and passwords	Menu-8C, Miscellaneous Management. Refer to Chapter 9, *"Alarms"* for more information.

NOTE: In this manual we show Terminal User Interface screens for a single Solo Select E1 DSU Device. If there is another Solo Select E1 DSU at the other end of a point-to-point connection, it will be discovered and show up on the screen as the remote device. Here is a sample screen of a report that references a remote device.

```
SW Ver 0.18b   MIB Ver 1.11   Digital Link Solo Select E1 DSU               11/11/98
HW Ver 1       Slot  # 6            Menu-3 Reports                           08:49:14
                          3E. Carrier Registers, 4 day detail
                         Local:    A6                          Remote:    A5
Local  Interval          ------------                          -------------
Start        ES     UAS     SES     BES    LOFC   CSS      ES     UAS     SES     BES    LOFC   CSS
08:24         0       0       0       0       0     0       0       0       0       0       0     0
08:09         0       0       0       0       0     0       0       0       0       0       0     0
07:54         0       0       0       0       0     0       0       0       0       0       0     0
07:39         0       0       0       0       0     0       0       0       0       0       0     0
07:24         0       0       0       0       0     0       0       0       0       0       0     0
07:09         0       0       0       0       0     0       0       0       0       0       0     0
06:54         0       0       0       0       0     0       0       0       0       0       0     0
06:39         0       0       0       0       0     0       0       0       0       0       0     0
06:24         0       0       0       0       0     0       0       0       0       0       0     0
06:09         0       0       0       0       0     0       0       0       0       0       0     0
05:54         0       0       0       0       0     0       0       0       0       0       0     0
05:39         0       0       0       0       0     0       0       0       0       0       0     0
                                    Page   1 of 32
-------------------------------------------------------------------------------------------------
0-IP Config.       1-Main Status       2-Data Status    3-Reports       4-Main Config.
5-Data Config.     6-Timeslot Config.  7-Feature Keys   8-Alarm         9-Diagnostics

Up/Down Arrow Keys-scroll the registers
```

SETTING ID, DATE, TIME, FRAMING, AND NETWORK TIMING

Use Menu-4, Main Configuration, to set the unit ID, date, time, and framing, on each Solo Select, as illustrated in Figure 4-1, and described in the following sections.

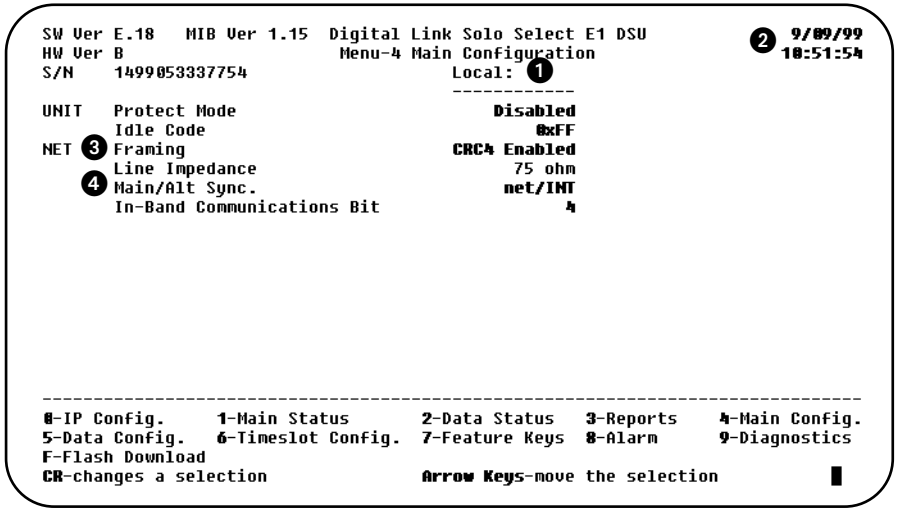


Figure 4-1 Menu-4 Main Configuration

In Unstructured E1 mode, remote unit information and In-band Communications bit parameters are not shown.

Setting the Unit ID

Your Solo Select E1 DSU comes factory configured with a unique Digital Link Unit ID. Each device in your network must have a unique Unit ID. You may use the preconfigured Unit ID, or follow the instructions below to change the Unit ID.

1. **Open Menu-4, Main Configuration.**
2. **Using the arrow keys, move the cursor to** `Local` **1, and press** `Return` **to select the field.**

   A prompt appears at the bottom of the screen:

   ```
   Please Enter an ID [6 characters maximum]:
   ```

3. **Type the Unit ID and press `Return`.**

   Do ***not*** leave this field blank; this will cause the unit to always be logged on. If you have several cards in your Ensemble shelf, make sure that you do not select an ID that has already been assigned to another device.

   The new ID appears in the Local or Remote field.

   The following message appears:

   ```
   Do you really want to change the Configuration [Y/N]?
   ```

4. **Type `y` to confirm, or `n` to cancel changes.**

Setting Date and Time

1. **Use the arrow keys to move to the `date` or `time` ❷ field. Press `Return` to select the field.**

2. **Enter the date or time as indicated by the prompt, and press `Return`.**

   Example: The date field uses a double-digit month/day/year format, and entering **`2/22/97`** yields `02/22/97` and **`22:4:6`** yields `22:04:06` (The clock is a 24-hour clock.)

   The following message appears:

   ```
   Do you really want to change the Configuration [Y/N]?
   ```

3. **Type `y` to confirm, or `n` to cancel changes.**

Setting NET Framing

NOTE: Use the settings below as a logical guide; if you experience difficulty, your telecommunications provider can provide you with specific framing and master clock settings for your installation.

1. **Move the cursor to `Framing` ❸.**

2. **Press `Return` to select the field.**

3. **Select `CRC4 Enabled`, `CRC4 Disabled`, or `Unstructured`, depending on your carrier's instructions. The default is CRC4 Enabled.**

   The following message appears:

   ```
   Do you really want to change the Configuration [Y/N]?
   ```

4. **Type `y` to confirm, or `n` to cancel changes.**

Setting NET Timing

1. **Use the arrow keys to move the cursor to** `Main/Alt Sync` ❺**, and set it to `Net` if timing is derived from the E1 connection, or `INT` if the timing is derived from the internal oscillator in the DSU. The default is INT, but in most cases, Frame Relay networks are Net.**

NOTE: When using Frame Relay, the switch often provides the timing. In this case, the DSU should be set to Net.

The following message appears:

```
Do you really want to change the Configuration [Y/N]?
```

2. **Type `y` to confirm, or `n` to cancel changes.**

CONNECTING TO THE DTE DEVICE AND E1 NETWORK

Before you connect the Solo Select between the DTE device and E1 network, make sure you obtain the correct cables and have calculated the distances.

DTE Cable Connection

The type of DTE cable you use to connect the Solo Select unit to the DTE device depends on the unit's operating mode (DCE or DTE) and its interface (V.35 or X.21). For information on selecting the correct cable for your needs, see "Before You Install" on page 2-1.

For most applications, the customer equipment operates as a DTE; therefore, set the Data Port mode to DCE in Menu-5, illustrated in Figure 4-2 on page 4-10. In some instances, as in tail circuit applications, the customer equipment operates as a DCE; therefore, set the Data Port to

DTE. For additional information, refer to Table 4-4 on page 4-11; look for "Mode" and "Format". The proper cable to use for each mode and interface is given in Table 4-2.

For cable part numbers, refer to Appendix A, *"Specifications."*

Table 4-2 Connecting the DTE Cable

DSU/CSU unit	Use
In DCE mode	DTE cable
In DTE mode	DCE cable
V.35 interface	Use cable's M-34 connector to connect to DTE and the DB-25 connector to connect to the Solo Select
X.21 interface	Use the cable's DA-25 connector to connect to unit, and DA-15 end to connect to DTE
Distance	Maximum distance between DTE and Solo Select—15 m (50 ft)

FireBERD Compatibility with M-34 Connector

When you connect a FireBERD test set to a V.35 module using a DTE cable not supplied by Digital Link, make sure the following pins are not connected on the cable's M-34 end:

BB, Z, EE, CC

These pins are reserved for special functions in FireBERD test sets.

EIA-530 Applications

For EIA-530 applications, use an EIA-530 DTE cable and set the format to V.35 using Menu-5, Data Port Configuration (Figure 4-2 on page 4-10).

Network Interface Cable Connection

For the network interface cable, we recommend you use a standard E1 cable, a twisted-pair cable with 75 or 120 ohm impedance (based on the device purchased), commonly referred to as T-Screen or ABAM (or its equivalent). The Solo Select is designed to operate with this cable.

The E1 cable's send and receive pairs are shielded separately to minimize cross-talk.

Connecting to the DTE Device and the Network

To connect the Solo Select to the DTE device and the network, follow these steps:

Module:

1. **Connect the DTE cable to the Ensemble shelf's DB-25 socket connector (labeled D1-D15) to the DTE device.**

2. **Connect the network interface cable to the DA-15 socket connector (labeled N1-N15) on the back panel and to the network cable.**

Standalone:

1. **Connect the DTE cable to the DB-25 socket connector on the back of the standalone device, and to the DTE device.**

2. **Connect the network interface cable to the DA-15 socket or the BNC connector on the back panel of the device.**

The **NET LED** on the front panel illuminates green. The **TD** and **RD** should be green, while **RTS, CTS**, and **DTR** should be amber. If other colors illuminate, refer to Chapter 11, *"Troubleshooting,"* for more information.

CONFIGURING THE E1 NETWORK PARAMETERS

Configure the following E1 network parameter for the Solo Select. Refer to your service provider work order for framing, timing, and line code information.

To configure a parameter:

1. **Select the parameter.**

Use the arrows and press **Return** to place the menu in edit mode (highlighted and blinking). Cycle through the available options using the up or down arrows.

2. **Set the parameters given in Table 4-3 for the Solo Select (local and remote).**

Table 4-3 Solo Select Parameters

Local / Remote	Parameter: Definition / Settings	Default
UNIT	**Protect Mode** - Enabled or Disabled; Enabled - Protect mode prevents you from running tests from the front panel.	Disabled
	Idle Code- 0 to 0xFF	OxFF
NETWORK	**Framing** - CRC4 Enabled, CRC4 Disabled, or Unstructured	CRC4 Enabled
	Main / Alt Sync - Int, NET, ext[1544], and data01 (DTE). Select the E1 network transmitter's clock source. First specify the Main clock source value, then the Alternate. (Each clock source has the same options.) Type **y** to confirm each action. • NET: Select this option if the network is the clock source. If it is not, set to Int at one E1 end, and NET at the other end. • ext[2048]: Select this option if you are using an external clock source with a shelf. • data01: Select this option if the DTE is the clock source.	NET / Int
	In-band Communications Bit - 4,5,6,7,8, or Disabled	4

Configuring the Data Port

To configure the Data Port and set the parameters for the local and remote units, use Menu-5, Data Configuration, illustrated in Figure 4-2.

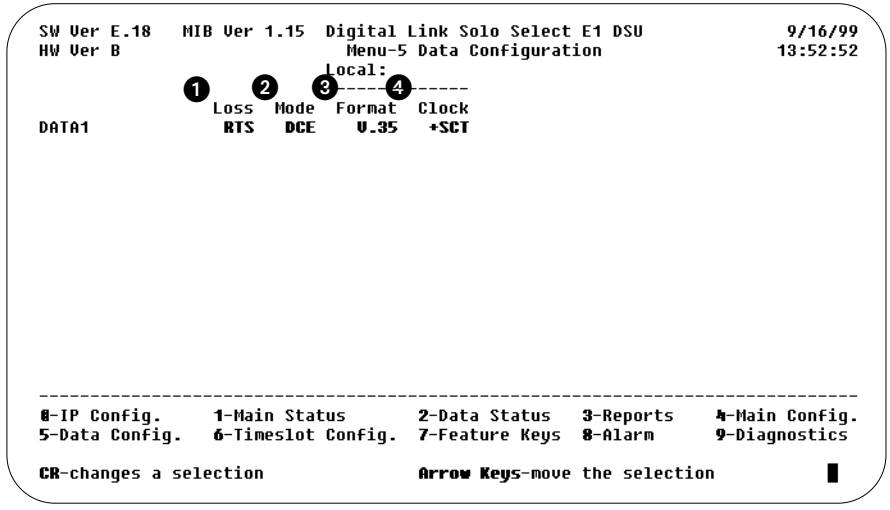


Figure 4-2 Menu-5 Data Configuration

1. **Set the** Loss ❶ **to** RTS, DTR **or** None**, to set the criteria for detection of loss of signal.**
2. **Set the** Mode ❷ **of the DATA port to either DTE or DCE.**
3. **Set the** Format ❸ **to V.35 or X.21.**

4. **Set the** `clock` ❹ **to +SCT, -SCT, or SCTE.**

   For DTE timing, select +SCT or (inverted) -SCT. Select inverted SCT (-SCT) or SCTE to correct delays in clocking due to cable length.

   When the DATA Port is a DTE port, SCTE is the only DATA Port timing option.

Table 4-4 Data Port Field Options and Definitions

Field-Option Definition		Defaults
❶ **Loss**	DTR (Data Terminal Ready), RTS (Request to Send) or NONE. Select the criteria for detecting loss of signal on the Data Port. None disables loss detection. Unit disregards DTE-DCE handshaking. The unit's data port physical interface will appear active. Setting Loss to None will force a high CTS signal on unit. RTS or DTR causes the signal to function as an indicator that the data port, or the DTE (router), has been dropped.	RTS
❷ **Mode**	DTE or DCE Select the DTE or DCE Port option. This allows the Data Port to be configured as a DTE or a DCE. Each configuration requires a different cable.	DCE
❸ **Format**	V.35 or X.21 Select V.35 or X.21 operation. You can operate in X.21, V.35 or other formats by using different cables. For V.35 or X.21 applications, set to X.21 and use an V.35 or X.21 DTE cable.	V.35
❹ **Clock**	+SCT, -SCT, or SCTE. Select SCT, a unipolar clock generated by the DCE for DTE timing. You can invert the clock (-SCT) or not (+SCT). SCT inversion (-SCT) and SCTE are used to correct delays in clocking due to cable length.	+SCT

Configuring Timeslot Allocations

Allocate timeslots for bandwidth on each Data Port in Menu-6, Timeslot Configuration (Figure 4-3).

NOTE: This option does not occur when Framing is set to Unstructured on Menu 4.

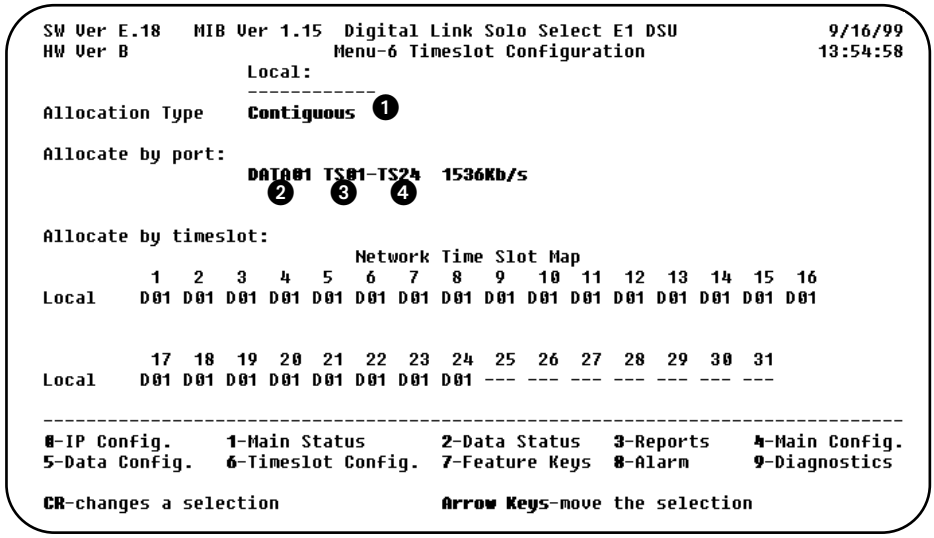


Figure 4-3 Menu-6 Timeslot Configuration

Two Timeslot Allocation Methods

Two methods are available for allocating timeslots—Contiguous or Manual. Select the desired method from the Allocation Type field as shown in Table 4-5.

Table 4-5 Timeslot Allocation Methods

Method	Description / Procedure
Contiguous	Allows easy configuration of contiguous timeslots.
Manual	Move to a timeslot one at a time, and assign Data Port 1 to it. This method allows any arbitrary timeslot allocation.

Allocating Contiguous Timeslots

To configure contiguous timeslots (adjacent to one another, a range, xx to yy), select Menu-6, Timeslot Configuration (Figure 4-3 on page 4-12), and follow the steps outlined below.

1. **For most applications, keep the Allocation Type** `Contiguous` **❶.**
2. **If your application is Fractional E1, set the Start/Stop timeslots (❸ and ❹) as provided by your carrier.**

3. **Using the arrow keys, move the cursor to the timeslot port ❷, and press `Return` to select it. The port should read `Data01`. If the port parameter reads `Idle`, press the `Spacebar` until `Data01` appears, and press `Return`.**

4. **Using the arrow keys, move the cursor to the starting timeslot ❸, and press `Return` to select this option.**

5. **Type in the starting timeslot, and press `Return`. The cursor has now moved to the ending timeslot ❹, highlighting it.**

6. **Enter the ending timeslot, and press `Return`.**

   The following message appears:

   ```
   Do you really want to change the Configuration [Y/N]?
   ```

7. **Type `y` to confirm, or `n` to cancel changes.**

Allocating Timeslots Manually

To manually allocate timeslots to a specific Data Port, move to the timeslot and specify the port. You must set the other timeslots to Idle.

Follow the procedure described in the example below, and refer to Menu-6 as shown in Figure 4-3 on page 4-12.

You want to allocate timeslots 3, 7, 9, 14, and 15 to Data Port 1. Your plan is to specify Port 1 for these timeslots and I for IDLE for all other timeslots.

To select Manual:

1. **Move to `Allocation Type` ❶ using the up or down arrow keys, and press `Return` to activate edit mode.**

2. **Cycle through the options using the up or down arrow keys.**

3. **To select Manual, press `Return`, and then press `y` to confirm.**

To configure timeslot 1 as IDLE:

1. **Move to timeslot 1 using the arrow keys.**

2. **Press `Return` to activate edit mode.**

   The system prompts you:

   ```
   Type the UP or DOWN arrows to change the selection, or type
   a port number (NN or I for IDLE):
   ```

3. **Press `L` and `y` for Local in response to the prompt:**

```
Do you want to change the local unit, the remote unit, or
both (L, R, or B)?
```

4. **Use the same method to configure the other slots to IDLE.**

To configure timeslots 3, 7, 9, 13, and 15 for Data Port 1:

1. **Move to the specific timeslot using the arrow keys, and press `Return` to activate edit mode.**

   You are prompted to enter the up or down arrows to change the selection, or type a port number (NN or I for IDLE):

2. **Press `1` for `DATA PORT 1`, then press `Return` and `y`.**

```
DATA01 Fragmented 320 kBps
```

NOTE: Timeslot configuration can be verified by timeslot map D01=Dataport 1.

5 Management Configuration

IPM Configuration

To set up your device for performance monitoring, you must first configure several parameters through the terminal interface screens. To conduct a full performance monitoring, your device must be configured for:

- IP In-band Management/Monitoring, In-band Traffic Type, and IP address assignments. Refer to "IP Configuration—Menu 0A" on page 5-1
- Performance Monitoring. Refer to "Performance Monitoring Configuration" on page 5-4
- SNMP management capability. Refer to "SNMP Configuration" on page 5-9

IP Configuration—Menu 0A

When you receive your device, in-band management and in-band management is enabled. The following instructions walk you through setting (or insuring) that the parameters are correct for enabling your device to pass data to your network management station in-band.

1. **From Menu-0, IP Configuration (Figure 5-1), select A, `Interface Configuration` ❶.**

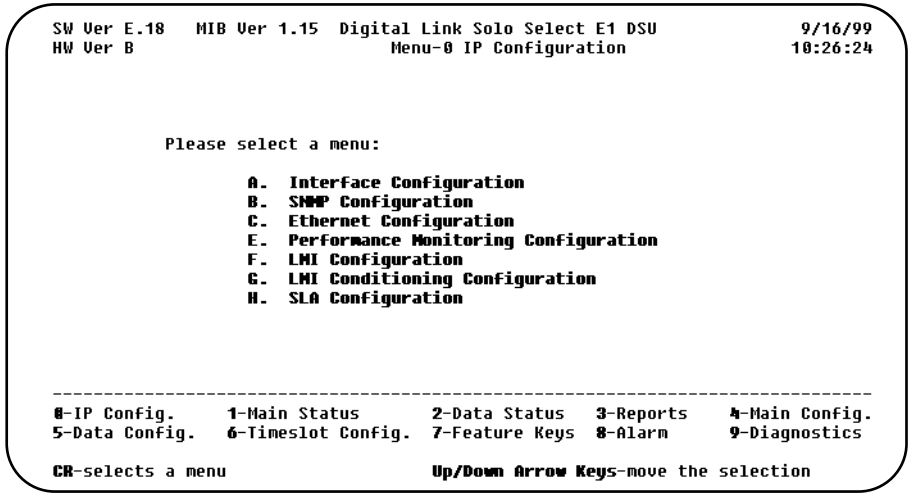


Figure 5-1 Menu-0 IP Configuration

Menu-0A, Interface Configuration, appears (Figure 5-2).

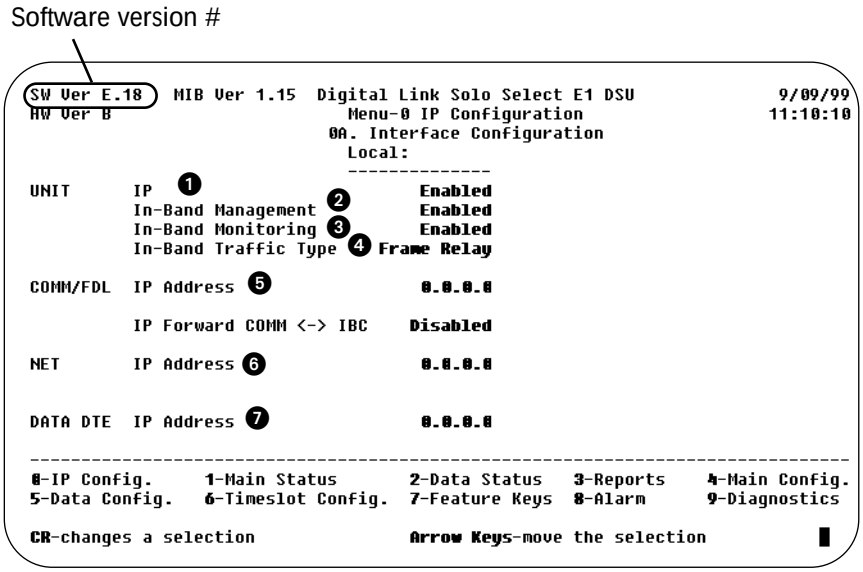


Figure 5-2 Menu-0A Interface Configuration

2. Move cursor to IP ❶ and select Enabled (default).

3. **Move cursor to** In-band Management ❷ **and select** **Enabled** **(default).**
4. **Move the cursor to** In-band Monitoring ❸ **and select** **Enabled** **(default).**
5. **Move cursor to** In-band Traffic type ❹ **and choose the type of traffic you run–**`Frame Relay` **or** `Cisco HDLC`**.**

NOTE: Cisco HDLC is only used with point-to-point applications.

6. **Move cursor to the IP address blocks and type in the IP addresses for** COMM/FDL ❺**,** NET ❻**, and** DATA DTE ❼**.**

NOTE: If Maintenance and Management DLCIs are used (LMI Conditioning), then it is not necessary to set NET and DATA DTE IP addresses.

It may also be necessary to set the IP address on the network management station that will be receiving traps. To set the network management system's IP address, see "SNMP Configuration" on page 5-9.

NOTE: Cisco HDLC does not use Data Link Connection Identifiers (DLCIs). If the In-band Traffic Type is set to Cisco HDLC, the device ignores the data in Menu-0E Performance Monitoring Configuration.

With IPM (in-band monitoring enabled), the device adds the Performance Monitoring Configuration option to Menu-0 (Figure 5-1 on page 5-2).

Performance Monitoring Configuration

Menu-0E, the Performance Monitoring Configuration screen (Figure 5-3), allows you to edit the DLCIs to be monitored.

1. **From the IP Configuration screen, (Figure 5-1), choose** `E`, `Performance Monitoring Configuration` ❷**.**

   Menu 0E Performance Monitoring Configuration appears (Figure 5-3).

   DLCIs have been discovered if LMI has been configured. If LMI has not been configured, DLCIs must be entered manually.

2. **Set all** `DLCI` **numbers** ❶**, if necessary, and** `CIR` ❷ **rates.**

3. **Set the** `DELAY THRESHOLD` ❸**.**

   Values entered here are in milliseconds. To change a DLCI's status to Deleted, enter a value of 0.

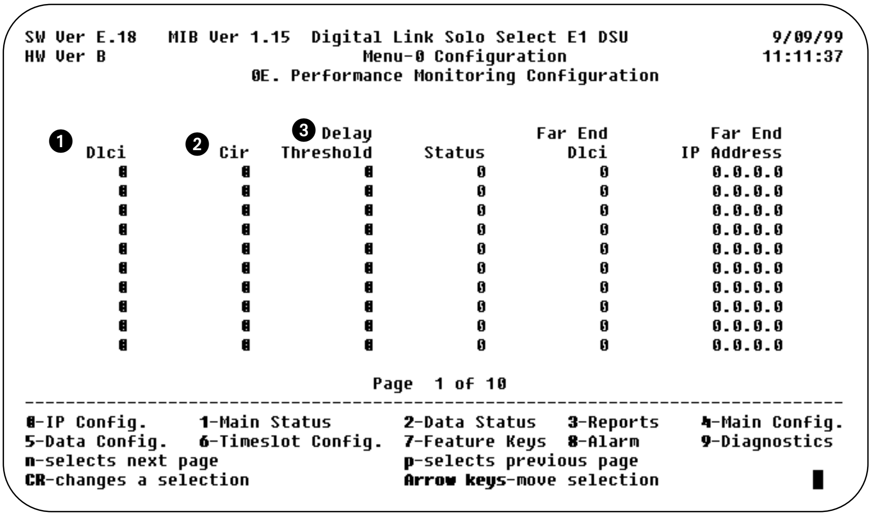


Figure 5-3 Menu-0E Performance Monitoring Configuration

The screen in the example is page 1 of 10. On this screen are 10 rows of Data Link Connection Identifier (DLCI) configurations. Depending on the model in use, you can manage up to 32 or 96 DLCIs.

NOTE: If you change information in Menu-0E Performance Monitoring Configuration (LMI only), and you are using WANview, you will have to close down and relaunch the screen for the DLCI to be accepted.

Setting CIR

When the traffic type is Frame Relay, management information is available on the line. The device automatically detects the type of management information that is being provided. The three possible types are presented in Table 5-1.

Table 5-1 Management Information Types

Management Information Type	Document
LMI Revision 1	T1S1 Standards-based Frame Relay Specifications with Common Enhancements
Annex-A	ITU Q.933
Annex-D	ANSI T1.617

To use IPM, the In-band Monitoring parameter (Menu-0A, Interface Configuration) must be enabled. Set traffic type to the type of traffic on the link

LMI Revision 1

LMI Revision 1 contains DLCI and CIR information.

NOTE: WANview Network Management System will automatically update itself to reflect your changes.

Annex-A or Annex-D

Annex-A or Annex-D contain only DLCI information.

If the LMI type is not LMI, it is either Annex-A or Annex-D, and you will need to manually configure the CIRs using Menu-0E, Performance Monitoring Configuration.

To configure CIRs:

1. **Go to Menu-0E, Performance Monitoring Configuration (Figure 5-3 on page 5-4).**
2. **Highlight the CIR to change.**
3. **Press the `Return` key to initiate the change.**

   The device requests the new data.
4. **Type in the CIR in bps, and press the `Return` key.**

   The device requests confirmation.
5. **Type `y` to accept the CIR.**

   Type any other key to cancel this operation.

DLCIs will be discovered, but you may enter them manually:

1. **Go to Menu-0E, Performance Monitoring Configuration (Figure 5-3 on page 5-4).**
2. **Highlight the DLCI to change.**
3. **Press the `Return` key to initiate the change.**

   The device requests the new data.
4. **Type in the DLCI and press the `Return` key.**

   The device requests confirmation.
5. **Type `y` to accept the DLCI.**

   Type any other key to cancel this operation.

SLIP CONFIGURATION

SLIP (Serial Line Interface Protocol) is a TCP/IP protocol that allows IP packets to be transmitted over a serial link, such as a dial up phone line.

Interface Configuration

You may use the Interface Configuration menu to set IP addresses, and enable in-band and SLIP connection features on the Solo Select.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/09/99
HW Ver B                      Menu-0 IP Configuration                11:10:10
                            0A. Interface Configuration
                              Local:
                              --------------
UNIT       IP                          Enabled
           In-Band Management          Enabled
           In-Band Monitoring          Enabled
           In-Band Traffic Type    Frame Relay

COMM/FDL   IP Address                  0.0.0.0

           IP Forward COMM <-> IBC     Disabled

NET        IP Address                  0.0.0.0


DATA DTE   IP Address                  0.0.0.0

-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection               Arrow Keys-move the selection
```

Figure 5-4 Menu-0A Interface Configuration

Menu-0A parameters are defined in Table 5-2.

Table 5-2 Interface Configuration Parameters

Primary Parameter	Parameter - Options	Definition	Default
UNIT	IP	Enables/disables the Solo Select's management via IP (Telnet, ping, SNMP).	Disabled
	In-band Management	Enables or disables in-band management of the Solo Select.	Disabled
	In-band Monitoring	Enables or disables in-band monitoring of the Solo Select.	Enabled
	In-band Traffic Type	Can be set to Frame relay or Cisco HDLC.	Frame Relay

Table 5-2 Interface Configuration Parameters

Primary Parameter	Parameter - Options	Definition	Default
COMM/FDL	IP Address	The IP Address for the Solo Select COMM Port or FDL in standard IP form (nnn.nnn.nnn.nnn).	0.0.0.0
	IP Forward COMM <-> IBC	Enables or disables for Forward Over IBC feature of the Solo Select. **Note:** This feature will not function in Unstructured mode.	Disabled
NET	IP Address	The IP address that is responded to for in-band traffic received from the NET (E1 line).	0.0.0.0
DATA/DTE	IP Address	The IP address that is responded to for in-band traffic received from the DTE (serial line).	0.0.0.0

IN-BAND MANAGEMENT

In-band management is an easy way to manage the Solo Select network devices through the data path. There is no need for external hardware (such as a serial cable), terminal server, Ethernet hub port, or router AUX Port connection to manage the unit. Because there is no need for additional DLCI resources, the in-band management feature lowers the operational, setup, and maintenance costs of the Solo Select.

Logging on from a Telnet Connection

To log on from a Telnet connection, use a terminal or terminal emulation program to access the unit directly.

To log on to the unit user interface using a Telnet connection:

1. **Enter the Telnet command and the Solo Select IP address.**

   Example of system response: MAUI is unit ID

   ```
   Current ID is Maui
   MAUI password:
   ```

2. **Enter the Normal User or Super User password.**

NOTE: If your Solo Select is set for dial-up mode, that is, using a modem and directly dialing through a standard telephone connection, it is recommended that you DO NOT use a Telnet session to access the unit.

SNMP CONFIGURATION

SNMP (Simple Network Management Protocol) is the Internet standard protocol for managing nodes on an IP network. SNMP uses a Management Information Base (MIB) to query or set parameters.

Configuring for SNMP

To configure the Solo Select E1 DSU for SNMP management capability, use Menu-0B, SNMP Configuration. The contents of this menu change depending on the in-band management mode of operation (Figure 5-5).

In order to complete the configuration, you will need to assign the IP address for the output port of the IPM-enabled device and the NMS that will receive the trap messages.

When the Solo Select E1 DSU sends an SNMP trap to report an alarm, the device must know the NMS IP address as well as the DLCI so that the frame is delivered to the correct remote location. Since the device can report alarms on up to three NMSs, you need to specify up to three pair of IP and DLCI addresses. If you want alarms reported to just one or two NMSs, then you specify only those IP address/DLCI pairs. The exception occurs when you are communicating with the device via the ethernet management port or the COMM port. In this case, you do not need to assign a DLCI.

The get, set, and trap community strings function as passwords, and prevent other SNMP management stations from gaining access to the Solo Select E1 DSU. Use Menu-0B, SNMP Configuration, to set traps (Figure 5-5)

Configure each unit for SNMP management functionality using the SNMP Configuration menu as illustrated in Figure 5-5 on page 5-10. To access this screen, select Menu 0, then select option B, SNMP Configuration.

The SNMP Configuration fields are defined in Table 5-3 on page 5-11.

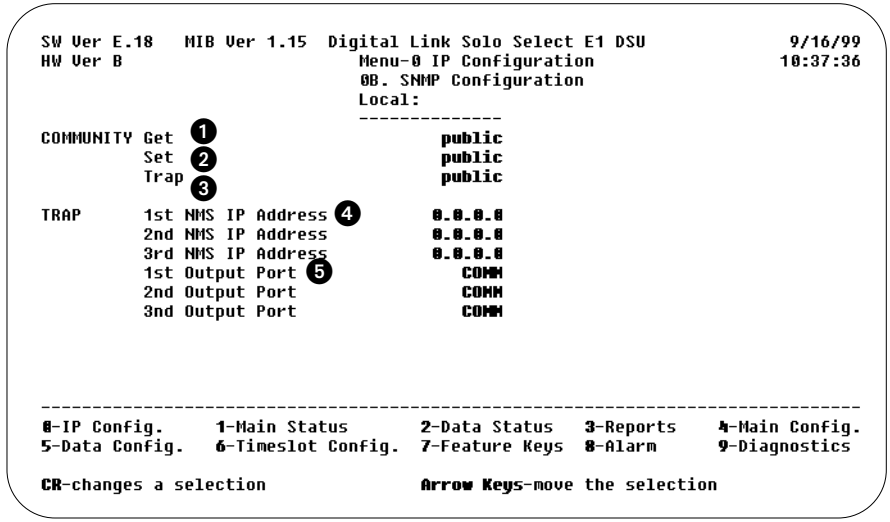


Figure 5-5 Menu-0B SNMP Configuration

1. **GET ❶ Enter an alphanumeric text string (`public` is default) with maximum of 32 characters. Make sure the string matches NMS community workstation string.**

   The Solo Select E1 DSU SNMP agent uses this text string to check GET requests for the SNMP configuration from the NMS.

2. **SET ❷ Enter an alphanumeric text string (max—32 characters).**

   The Solo Select E1 DSU SNMP agent uses this text string to check GET requests for the SNMP configuration from the NMS.

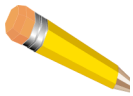
3. **TRAP ❸ Enter an alphanumeric text string (maximum—32 characters).**

   The Solo Select E1 DSU SNMP agent uses this text string to send trap responses for the SNMP configuration from the NMS.

4. **TRAP NMS IP ADDRESS ❹ Enter the IP address of the Network Management Station (NMS) that will receive trap messages from the Solo Select E1 DSU SNMP agent.**

NOTE: When using LMI Conditioning, the DTE port DLCI should be the same as the Management DLCI, and the Net port DLCI should be the same as the Maintenance DLCI.

5. **TRAP OUTPUT PORT ❺ Select the port (Ethernet, COMM, DTE, or NET) that the Solo Select E1 DSU SNMP agent uses to send TRAP messages to the NMS.**



NOTE: When in-band is disabled, the Solo Select E1 DSU sends traps only through the COMM Port or Ethernet port (Trap Output Port must be set to COMM or Ethernet). For traps to be sent in this mode to the three NMSs, set the three trap output ports and trap IP addresses.

Table 5-3 Menu-0B SNMP Configuration Parameters *(1 of 2)*

Parameter	Parameter-Options	Definition	Default
COMMUNITY	Get (text string)	Enter an alphanumeric text string (max—32 characters). The Solo Select SNMP agent uses this text string to check GET requests for the SNMP configuration from the SNMP management station.	public
	Set (text string)	Enter an alphanumeric text string (max—32 characters). The Solo Select SNMP agent uses this text string to check SET requests from the SNMP management station to set the SNMP configuration.	public
	Trap (text string)	Enter an alphanumeric text string (max—32 characters) which the Solo Select SNMP agent inserts in SNMP traps that it sends to the SNMP stations.	public
TRAP	1st NMS IP Address 2nd NMS IP Address 3rd NMS IP Address **Note:** If all three TRAP NMS IP addresses are set, the Solo Select sends a trap to all three network management servers.	nnn.nnn.nnn.nnn, where nnn is 0-255 Enter the IP address of the first Network Management Station. The Solo Select sends trap messages to this server.	0.0.0.0

Table 5-3 Menu-0B SNMP Configuration Parameters *(2 of 2)*

Parameter	Parameter-Options	Definition	Default
	1st Output Port 2nd Output Port 3rd Output Port	COMM, IBC, DTE, NET, ENET Select the first Solo Select NMS port to which traps are sent. If set for IBC, the unit will send traps over IBC to the remote unit using a proprietary Digital Link protocol, which you can enable in Menu-4. If set for DTE or Net, the unit will ask you for a DLCI number, which identifies the circuit used for all traps generated by the Solo Select. Available only if in-band is enabled.	COMM

NOTE: When in-band is disabled, the Solo Select E1 DSU sends traps only through the COMM Port or Ethernet Management Interface (Trap Output Port must be set to COMM or Ethernet). For traps to be sent in this mode to the three network management stations, set the three trap output ports and trap IP addresses.

When using a shelf, you will need to select COMM to send traps through the Ethernet port of the MAP.

USING THE ETHERNET MANAGEMENT INTERFACE

The Solo Select E1 DSU standalone includes an Ethernet Management Interface (Figure 5-6). This interface allows you to connect the Solo Select E1 DSU directly into the network using an RJ-48 connector, for simultaneous Telnet, TFTP, or SNMP management without using a MAP.

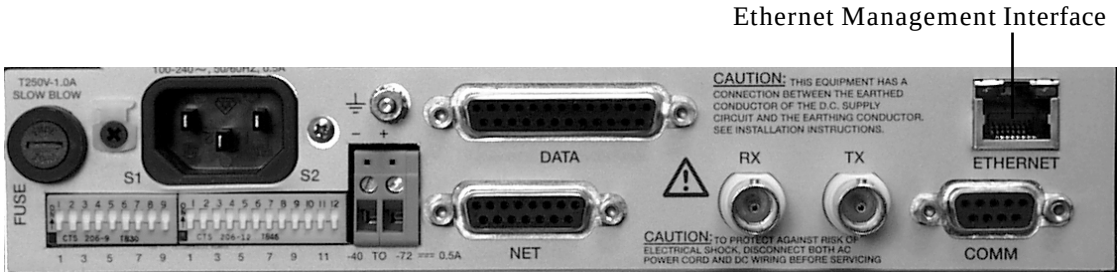


Figure 5-6 Ethernet Management Interface

In order to manage your system via the Ethernet Management Interface, you must first enable IP, and set the IP address via the terminal on Menu-0A.

NOTE: If the IP address is not configured, or set to a value of zero, the Ethernet interface is disabled.

Configuring the Ethernet Management Interface

Use Menu-0C, Ethernet Configuration (Figure 5-7), to configure your Ethernet Management Interface.

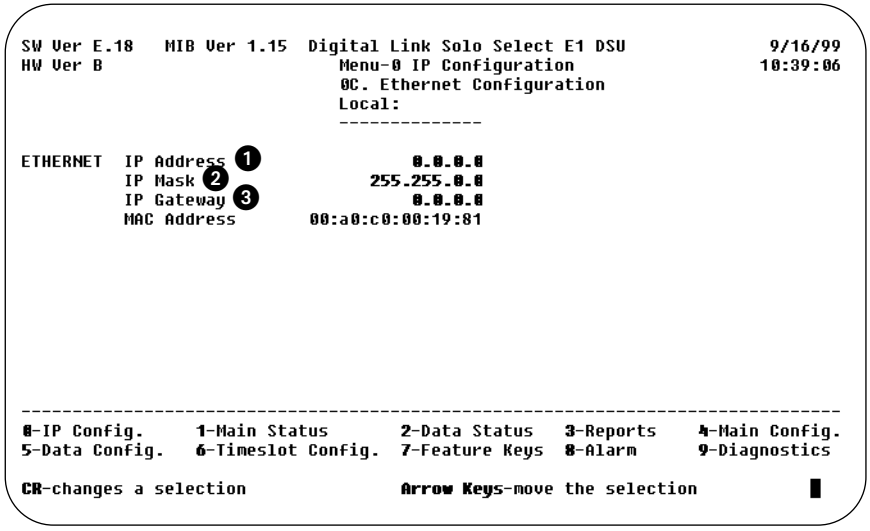


Figure 5-7 Menu-0C Ethernet Configuration

Setting the Ethernet IP Address

1. **Select the** `IP Address` **field ❶. Press** `Enter`**.**

   The IP address becomes highlighted and the following message appears at the bottom of the screen:

   `Please enter an IP Address [aaa.bbb.ccc.ddd]`

2. **Type the IP Address used by the Ethernet network to connect to the LAN. Press** `Enter`

NOTE: The default Ethernet address is 0.0.0.0 and disables Ethernet. When assigning an Ethernet address, make sure you use a unique IP address. You can not use the same address that is being used for NET, DTE, or COMM port.

Setting the Ethernet IP Mask

1. **Select the** `IP Mask` ❷ **field. Press** `Enter`**.**

   The IP address becomes highlighted and the following message appears at the bottom of the screen:

   ```
   Please enter an IP Address [aaa.bbb.ccc.ddd]
   ```

2. **Type the 32-bit subnet mask which is the part of the IP address shared by all devices on the same network.**

3. **Type a new IP Mask and press** `Enter`**.**

   The default value is 255.255.255.255.

Setting the Ethernet IP Gateway

1. **Select the** `IP Gateway` ❸ **field. Press** `Enter`**.**

   The IP address becomes highlighted and the following message appears at the bottom of the screen:

   ```
   Please enter an IP Address [aaa.bbb.ccc.ddd]
   ```

NOTE: The gateway is a router or device through which other networks are accessed. It is required if a Network Management Stations (NMS) is not on the same network as the Solo Select E1 DSU. You can only enter an IP address that is on the same Ethernet segment as the Solo Select E1 DSU. If the NMS is not on one of the Solo Select E1 DSU's subnets (SLIP or Ethernet), it must be accessible through the IP Gateway.

2. **Type in a new IP Gateway and press** `Enter`**.**

NOTE: The default IP Gateway is 0.0.0.0.

6 Monitoring and Management

MONITORING AND MANAGEMENT

The Solo Select E1 DSU collects and displays performance data as well as additional data useful for network troubleshooting. The Solo Select monitors the E1 line continuously and displays all collected data on the terminal screen.

This chapter describes how to monitor the unit status, display performance reports, and configure alarm conditions.

Monitor and manage the unit from a terminal, remote terminal Telnet connection, or an SNMP management station. In addition, you can monitor and manage the Solo Select through a Telnet connection or an SNMP network management station through the DTE or NET Port if in–band management is enabled.

The terminal interface has menus which enable you to:

- Display or modify the unit configuration in Menu-4, Main Configuration. For more information, refer to “Overview of the Configuration” on page 4-3.
- Configure alarm conditions, passwords, and modem connection in Menu-8A, Alarm Configuration. For more information, refer to “Configuring Alarm Conditions” on page 9-1.
- Monitor the status of the unit and the Data Port in Menu-2, Data Port Status. For more information, refer to “Menu-2 Data Status” on page 6-19.
- Monitor the Solo Select performance database in Menu-3, Performance Reports. For more information, refer to “Displaying Performance Reports” on page 6-3.
- Diagnostic tests for local and remote units. For more information, refer to Chapter 10, *“Diagnostics”*

Terminal Interface Access Methods

Below is a brief review of how to access your Solo Select for monitoring your unit for running tests.

- Super User versus normal user access rights. For more information, refer to “Configuring Access Rights” on page 3-9.
- Logging on from a terminal. For more information, refer to “Logging On from a Terminal” on page 3-6.
- Logging off. For more information, refer to “Logging On from a Terminal” on page 3-8.
- Logging on from a Telnet connection. For more information, refer to “Logging on from a Telnet Connection” on page 5-8.

IPM

Your Solo Select E1 DSU contains Integrated Performance Monitoring (IPM) software. IPM allows you to evaluate Frame Relay congestion and provides information on network availability and throughput based on Data Link Connection Identifiers (DLCIs).

With IPM, you can monitor for errors such as Forward Explicit Congestion Notification (FECN), Backward Explicit Congestion Notification (BECN), Discard Eligibility (DE), and Cyclic Redundancy Check (CRC). Network management information is accessible through several methods including in-band, SNMP, Telnet, and terminal interfaces.

IPM provides four standards-based RMON tables: statistics, history, alarms, and events. And with the optional RMON-2 capabilities, you will have access to the Protocol Directory, Protocol Distribution, the Network Layer Host Table, and the Application Layer Host Table. These groups give you the ability to identify the areas of greatest bandwidth use in your networks and to drill down even further to the associated applications. Identifying these “Top Talkers” and “Top Applications” will give you greater control over where and when your resources are expended.

Another optional extra, Service Level Agreement, allows you to ensure that you are getting the level of service contracted for. Using FRF.13 industry standard measures for Frame Delivery Ratio, Data Delivery Ratio, Frame Transfer

Additionally, IPM tracks changes in Committed Information Rate (CIR) performance and identifies points of congestion in real time for all WAN links. Used in conjunction with WANview Network Management System or ChoiceView Network Monitor, IPM information can be shown in easy-to-read charts and graphs.

To configure for IPM, select Menu-0A to enable in-band management and set the traffic type.

Monitoring Performance

Each Solo Select collects and displays performance data as well as additional parameters to help you troubleshoot problems. Additionally, overall link utilization is also reported in Menu-3, Performance Reports, (refer to Figure 6-1 on page 6-3) for the last 96 intervals of 15 minutes each.

To manage and monitor the Solo Select, use Menu-3, Reports, to display the unit's performance reports, which are described further in this chapter.

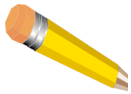
Displaying Performance Reports

Depending on how you have configured your device and which feature keys are installed, you will be presented with several types of performance reports. For example, if you've purchased the SLA feature key, and in-band management is enabled, Menu-3, Reports would look like the example in Figure 6-1.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                          Menu-3 Reports                   12:58:27

          Please select a report:

                  A.  Carrier Register Reports
                  B.  User Register Reports
                  C.  Inband Reports
                  E.  SLA Reports
                  M.  Delay Monitoring Report
                  Z.  Event Log Report

--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-selects a report                  Up/Down Arrow Keys-move the selection
```

Figure 6-1 Menu-3 Reports

To select a report, type the corresponding letter or use the up and down arrow keys to move through the menu and press **Return** to select the report.



NOTE: The maximum error count displayed in the performance reports is 65,535. The actual value may be higher.

Table 6-1 provides a comprehensive list of events and descriptions used in the Performance Reports.

Table 6-1 Menu-3 Performance Report Events

Event	Description
Unavailable Signal State	This state is declared at the onset of ten consecutive SESs.
Current Interval Timer	Displays the amount of time in a current interval.
Errored Seconds (ES)	The number of seconds with one or more frame errors or CRC-4 errors.
Unavailable Seconds (UAS)	The total number of unavailable seconds. Unavailable seconds are triggered when 10 consecutive SES events are received.
Severely Errored Seconds (SES)	A second during which an OOF is registered, or 832 or more path code violations.
Background Block Error (BBE)	The number of Background Block Errors.
Loss of Frame Count (LOF)	The number of times Loss of Frame is declared. A Loss of Frame occurs when an OOF defect is detected.
Controlled Slip Seconds (CSS)	The number of seconds in an interval in which a controlled slip occurred.
Total Valid Intervals	The number of valid 15-minute intervals.
Cyclic Redundancy Check (CRC)	The number of CRC errors.
Code Violations (CV)	The number of Code Violations.
Frame Alignment Signal Error (FE)	This error is counted when the framer detects an error in the frame alignment signal, timeslot 0.

Carrier Registers, Current Interval

The Solo Select E1 DSU displays performance data for the most current 15-minute interval. Menu-3AA, shown in Figure 6-2, illustrates an example of the Carrier Registers, Current Interval.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                          Menu-3 Reports                       13:01:46
                    3AA. Carrier Registers, Current Interval

                         Local:
                         ------------
  Unavailable Signal State          No


  Current Interval Timer           102

  Errored Seconds (ES)               0
  Unavailable Seconds (UAS)          0
  Severely Errored Seconds (SES)     0
  Background Block Error (BBE)       0
  Loss Of Frame Count (LOF)          0
  Controlled Slip Seconds (CSS)      0


--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
```

Figure 6-2 Menu-3AA Carrier Registers, Current Interval

Carrier Registers, Total Over 24 Hours

Menu-3B, Carrier Registers, Total Over 24 Hours displays performance data for the last 24-hour period. Figure 6-3 illustrates an example of the Carrier Registers, Total Over 24 Hours.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                          Menu-3 Reports                     13:03:18
                   3AB. Carrier Registers, total over 24 hours


                         Local:
                         ------------
  Errored Seconds (ES)                0
  Unavailable Seconds (UAS)           0
  Severely Errored Seconds (SES)      0
  Background Block Error (BBE)        0
  Loss Of Frame Count (LOF)           0
  Controlled Slip Seconds (CSS)       0

  Total Valid Intervals              96




--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
```

Figure 6-3 Menu-3AB Carrier Registers, Total Over 24 Hours

Carrier Registers, 24 Hour Detail

Performance data for the last 24 hours is shown in Menu-3AC, Carrier Registers, 24 Hour Detail, (Figure 6-4). Data is organized and displayed in 96 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:04:30
                    3AC. Carrier Registers, 24 hour detail
                   Local:
Local Interval      ------------
Start        ES  UAS  SES     BBE  LOF  CSS
12:45         0    0    0       0    0    0
12:30         0    0    0       0    0    0
12:15         0    0    0       0    0    0
12:00         0    0    0       0    0    0
11:45         0    0    0       0    0    0
11:30         0    0    0       0    0    0
11:15         0    0    0       0    0    0
11:00         0    0    0       0    0    0
10:45         0    0    0       0    0    0
10:30         0    0    0       0    0    0
10:15         0    0    0       0    0    0
10:00         0    0    0       0    0    0
                                Page 1 of 8
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                                 
```

Figure 6-4 Menu-3AC Carrier Registers, 24 Hour Detail

Carrier Registers, 4 Day Detail

Figure 6-5 shows an example of the first page of the Carrier Registers, 4 Day Detail screen. This report shows up to 32 screens of information.

When a counter is not available from the remote communication method selected, it is represented on the report with either blanks or dashes (-).

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:06:04
                      3AE. Carrier Registers, 4 day detail
                                Local:
Local Interval                  --------------
Start         ES   UAS   SES     BBE   LOF   CSS
12:45          0     0     0       0     0     0
12:30          0     0     0       0     0     0
12:15          0     0     0       0     0     0
12:00          0     0     0       0     0     0
11:45          0     0     0       0     0     0
11:30          0     0     0       0     0     0
11:15          0     0     0       0     0     0
11:00          0     0     0       0     0     0
10:45          0     0     0       0     0     0
10:30          0     0     0       0     0     0
10:15          0     0     0       0     0     0
10:00          0     0     0       0     0     0
                               Page  1 of 32
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                                 ▮
```

Figure 6-5 Menu-3AE Carrier Registers, 4 Day Detail

Carrier Registers, 14 Day Summary

Figure 6-6 shows an example of the first page of the Carrier Registers, 14 Day Summary screen. This report contains up to two screens of information.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:07:34
                    3AF. Carrier Registers, 14 day summary

                              Local:
                              --------------

              ES  UAS  SES     BBE  LOF  CSS
Day  -1        0    0    0       0    0    0
Day  -2        0    0    0       0    0    0
Day  -3        0    0    0       0    0    0
Day  -4        0    0    0       0    0    0
Day  -5        0    0    0       0    0    0
Day  -6        0    0    0       0    0    0
Day  -7        0    0    0       0    0    0


                                  Page 1 of 2
-------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                                 
```

Figure 6-6 Menu-3AF Carrier Registers, 14 Day Summary.

User Registers, 24 Hour Detail

Performance data of the user registers for the last 24 hours is shown in Menu-3BB, User Registers, 24 Hour Detail, shown in Figure 6-7, and defined in Table 6-2 on page 6-9.

You can clear the registers shown in this display.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                         Menu-3 Reports                   13:11:52
                          3BB. User Registers, 24 hour detail
                Local:
Interval        ------------
Start         ES     US     CRC      CV      FE
12:45          0      0       0       0       0
12:30          0      0       0       0       0
12:15          0      0       0       0       0
12:00          0      0       0       0       0
11:45          0      0       0       0       0
11:30          0      0       0       0       0
11:15          0      0       0       0       0
11:00          0      0       0       0       0
10:45          0      0       0       0       0
10:30          0      0       0       0       0
10:15          0      0       0       0       0
10:00          0      0       0       0       0
                                  Page 1 of 8
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                C-clears the registers
```

Figure 6-7 Menu-3BB User Registers, 24 Hour Detail

User Registers, 4 Day Detail

Figure 6-8 shows an example of the first page of Menu-3BC, User Registers, 4 Day Detail screen. This report contains up to 32 screens of information.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                      13:14:48
                      3BC. User Registers, 4 day detail
                        Local:
Local Interval          ------------
Start        ES    US     CRC      CV      FE
12:45         0     0       0       0       0
12:30         0     0       0       0       0
12:15         0     0       0       0       0
12:00         0     0       0       0       0
11:45         0     0       0       0       0
11:30         0     0       0       0       0
11:15         0     0       0       0       0
11:00         0     0       0       0       0
10:45         0     0       0       0       0
10:30         0     0       0       0       0
10:15         0     0       0       0       0
10:00         0     0       0       0       0
                                Page  1 of 32
-------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers              C-clears the registers
```

Figure 6-8 Menu-3BC User Registers, 4 Day Detail

User Registers, 14 Day Summary

Figure 6-9 shows an example of the first page of the User Registers, 14 Day Summary screen. This report contains up to two screens of information.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                      13:15:53
                      3BE. User Registers, 14 day summary
                    Local:
                    ------------


             ES    US    CRC     CV     FE
Day  -1       0     0      0      0      0
Day  -2       0     0      0      0      0
Day  -3       0     0      0      0      0
Day  -4       0     0      0      0      0
Day  -5       0     0      0      0      0
Day  -6       0     0      0      0      0
Day  -7       0     0      0      0      0


                                Page 1 of 2
--------------------------------------------------------------------------------
8-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers              C-clears the registers
```

Figure 6-9 Menu-3BE User Registers, 14 Day Summary

Event Log

The Event Log feature is accessed through Menu-3Z. When you access the Event Log, the information in Figure 6-10 is shown. The field descriptions for the Event Log are in Table 6-2 on page 6-14.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                          Menu-3 Reports                   13:50:33
                                  3Z. Event Log

(1) Log  Local   (2) Module  All          (3) Event  0. All Events

(4) Seq. No. (5) Status  Module (6)          Description (7)          (8) Time/Date
-----------  ------  ------ ---------------------------------  -----------------
         14  start   Net     Loss of Signal                     12:44:15  9/02/99
         13  start   DATA01  Loss of Signal                     12:44:15  9/02/99
         12  start   Unit    No Clock                           12:44:15  9/02/99
         11  action  Unit    Unit Power On                      12:44:15  9/02/99
         10  end     Unit    Power Outage                       12:44:15  9/02/99
          9  start   Unit    Power Outage                       12:42:59  9/02/99
          8  start   Net     Loss of Signal                     14:01:50  7/28/99
          7  start   DATA01  Loss of Signal                     14:01:50  7/28/99
          6  start   Unit    No Clock                           14:01:50  7/28/99
          5  action  Unit    Unit Power On                      14:01:50  7/28/99
                   Page  1 of  2          14 out of  14 selected
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status      2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config. 7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the log                  C-clears the log
```

Figure 6-10 Menu-3Z Event Log

Table 6-2 Event Log Parameters and Descriptions *(1 of 2)*

	Parameter	Description	Default
❶	**Log**	Local or Remote Select for either Local or Remote event log	Local
❷	**Module**	Unit, DTE (FULLBW), Network, Fr-Rel, System, All This field allows the display of any of the above status changes. When Unit is selected, the following status changes will be shown as events: Unit Power On Self Test DTE Loopback (fraction) Net Loopback (FULL) PLD Loopback (fraction) LP UP remote (fraction) LP DN remote (fraction) Send User 1 (fraction) Send User 2 (fraction) Send 1:1 (fraction) Send 1:2 (fraction) Send 1:4 (fraction) Send 1:7 (fraction) Send 3:24 (fraction) Send QRW (fraction) Send All 1s (fraction) Send All 0s (fraction No Clock Lamp Test Smart Jack Reset Send Keep Alive Send Yellow Alarm Controlled Slip Inject a Pattern Error Clear Pattern Error Counter Clear Event Log Clear Current Carrier Registers Clear Carrier Archives Clear Carrier ESF Error Events Clear Current User Registers Clear User Archives Clear User CRC Errors Clear User BPV Errors Clear User OOF Errors Clear All User Error Counters Clear 24 Hour User Registers Back To Factory Config When DTE is selected, the following status changes will be shown as events: Loss of Signal Local Test	All

Table 6-2 Event Log Parameters and Descriptions *(2 of 2)*

	Parameter	Description	Default
	Module (cont.)	When Network is selected, the following status changes will be shown as events: Loss of Signal Loss of Frame Blue Alarm Received Yellow Alarm Received Set Code Received Reset Code Received BPV Threshold Exceeded CRC Threshold Exceeded OOF Threshold Exceeded When Frame Relay is selected, the following status changes will be shown as events: Loss of Signal Loss of Frame Blue Alarm Received Yellow Alarm Received When System is selected, the following status changes will be shown as events: External Alarm Power Supply Failure Controller Card Missing Remote Responds to DLC FDL When All is selected, all of the preceding status changes will be shown as events.	
❸	**Event**	This field allows a particular type of event to be displayed. Enter an event index or use the Up/Down keys to scroll through the event options. While selecting the event, the event description text changes with the index. The event description text is displayed under the Description column in the Event Log menu. If the Event field is left blank, the Event filter parameter is disabled.	0, All
❹	**Seq. No.**	This value uniquely identifies an event in a certain unit. This field is read-only.	
❺	**Status**	Identifies the condition of the event described in the description field. This field is read-only.	
❻	**Module**	Identifies the module type. This field is read-only.	
❼	**Description**	Identifies the status change/event. This field is read-only.	
❽	**Time/Date**	Identifies the time the status change/event was logged.	

DELAY MONITORING

The delay monitoring feature in the Solo Select E1 DSU provides network delay measurement beyond the link between the Solo Select and any device on the network. Digital Link measures delay by using a ping protocol. As part of the pattern generation and packet sequencing, delay measurement will use the ping packet to timestamp and obtain round-trip delays to specific IP addresses. This method can measure the delay to any device that implements the TCP/IP protocol, not just to Digital Link units. The traffic added to support the measurement is minimal, and the user can configure traffic frequency. The length of the ping packet can allow delay measurements in different frame sizes. A user who is concerned about bandwidth taken away by the measure can configure the test for a single short ping every few minutes where the test bandwidth penalty is virtually non-existent.

The link-based testing and delay monitoring features allow network managers to test network links, as well as quantify the network delay, and are especially useful during network installation and trouble isolation. Both features provide the benefit of circuit level testing across the network.

Menu-9C , (Table 10-6 on page 10-24) is the menu where you can configure the Solo Select for delay monitoring. The results of the test are displayed in Menu-3M (refer to "Menu-3M and Menu-9C—Delay Monitoring" on page 10-23 .

MONITORING STATUS

You can monitor the status of the Solo Select unit from Menu-1, Main Status, (Figure 6-11 on page 6-17) and the status of the single data port from Menu-2, Data Status (Figure 6-12 on page 6-20).

Transmit and receive directions are monitored separately by the unit. The overall link utilization is reported in Menu-1, Main Status, and the report is updated once per second in each direction.

Menu-1 Main Status

Example of Menu-1, Main Status, is illustrated in Figure 6-11.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                      Menu-1 Main Status                     11:23:50
                               Local:
                               --------------
Unit Status                          No Clock

Network Status                  Loss of Signal
                               Inband No Flags

DATA DTE Status                 Loss Of Signal


Error Free Seconds                      100.0%
Errored Seconds Ratio                     0.0%
Severely Errored Seconds Ratio            0.0%
Background Block Error Ratio              0.0%
Inband Net CRC Errors                        0
Inband DTE CRC Errors                        0
Inband Rx/Tx BW Util.                0.0%/0.0%
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

C-clears the counters
```

Figure 6-11 Menu-1 Main Status

To clear error counters:

1. **To clear the error statistics counters, press C.**

   You are prompted whether you want to clear Local or Remote counters (L/R).

2. **Press L to clear Local or, if remote is shown, press R to clear Remote.**

   The following message appears:

   `Do you really want to clear the local/remote error counters (Y/N)`

3. **Press y to confirm, or press any other key to take no action.**

   Any status related to the remote counters may take up to a minute to clear.

Menu-1 Main Status Fields

All fields in Menu-1 are read-only.

Unit Status

The Unit Status provided in Table 6-3 indicates if the Solo Select is operating normally or if any special conditions exit.

Table 6-3 Unit Status

Indication	Description
Normal	No abnormal conditions exist.
Self Test	Unit is running self test.
DTE Lpbk (data01)	Unit is in DTE loopback.
Net Lpbk (full)	Unit is in network loopback.
PLD Lpbk (data01)	Unit is in payload loopback.
Send User 1 (data01)	Unit is sending User 1 pattern.
Send User 2 (data01)	Unit is sending User 2 pattern.
Send 1:1 (data01)	Unit is sending alternate 1s and 0s pattern.
Send 1:2 (data01)	Unit is sending standard loopdown remote code continuously.
Send 1:4 (data01)	Unit is sending standard loopup remote code continuously.
Send 1:7 (data01)	Unit is sending 1:7 pattern.
Send 3:24 (data01)	Unit is sending 3:24 pattern.
Send QRW (data01)	Unit is sending QRW code.
Send All 1s (data01)	Unit is sending all ones signal.
Send All 0s (data01)	Unit is sending all zeros signal.
LP UP Remote (data01)	Unit is sending loopdown code to remote unit for 15 seconds.
LP DN Remote (data01)	Unit is sending loopup code to remote unit for 15 seconds.
No Clock	Main Clock source has failed.
Lamp Test	Unit is undergoing Lamp Test.
Sending UA1	UA1 Alarm
Send RAI Alarm	Unit is sending RAI Alarm.
Excessive Zeros	Minimum E1 pulse density not being met.
Controller Card Missing	Controller card is not in shelf.
Power Supply Failure	If one of the shelf power supplies is missing, you will get this message.

Network Status

The Network Status field may contain any of the indications presented in Table 6-4. This field presents information on the condition of the received E1 signal.

Table 6-4 Network Status

Indication	Description
Normal operation	No abnormal conditions exist.
Loss of Signal	Network signal is missing.
Loss of Frame	Network frame is missing.
UA1 Alarm Received	UA1 received.
RAI Alarm Received	Unit has received RAI Alarm.
Set Code Received	Unit has received set code.
Reset Code Received	Unit has received reset code.
Excessive CV Errors	Unit has exceeded CV threshold.
Excessive CRC Errors	Unit has exceeded CRC threshold.
Excessive FE Errors	Unit has exceeded FE threshold

Menu-2 Data Status

Menu-2, Data Status, (refer to Figure 6-12) shows the current status of the local Solo Select's single data port and the remote unit's data port(s).

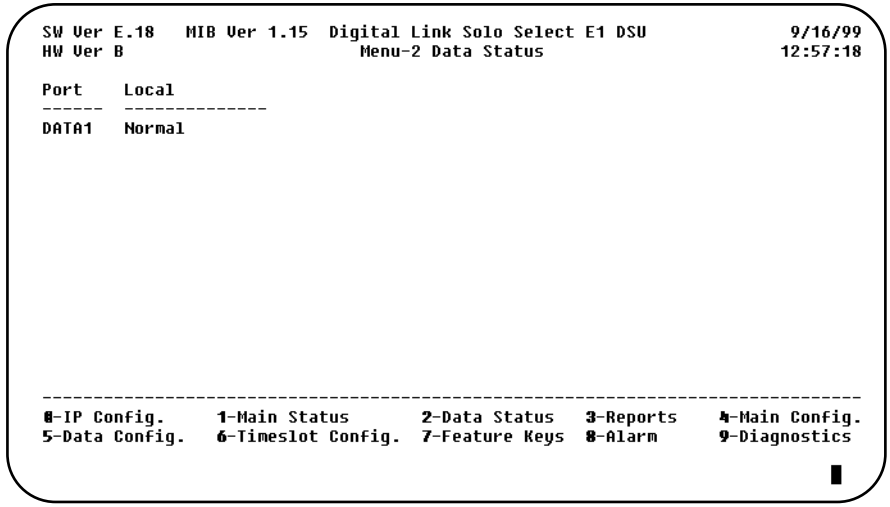


Figure 6-12 Menu-2 Data Status

Menu-2, Data Status, listed in Table 6-5 indicates any abnormal conditions present on the received DATA DTE signal on the Data Port.

Table 6-5 Data Status

Indication	Description
Normal	No abnormal conditions exist.
Loss of Signal	Loss of DTR or RTS DTE lines, user defined.
Local Test	A DTE Port has activated a local test.

Data DTE Status Parameters

Data Port #—Local Test, Signal Loss, Normal indicate the port status. The field is blank if the local or remote system does not have a port in this position.

IN–BAND MANAGEMENT

The Solo Select in–band management feature provides an easy way to manage Solo Select network devices through the data path. This feature eliminates the need for external hardware (i.e., serial cable), terminal server, Ethernet hub port, or router AUX port connection to manage the unit. In–band management also eliminates the need for additional DLCI

resources, lowers operational, set-up, and maintenance costs, and addresses each port with its own IP address, so they are easily identifiable and manageable.

In-band Network Registers, 24 Hour Detail

On an in-band enabled system, Menu-3CB shows the performance data collected over the last 24 hours. Menu-3CB is shown in Figure 6-13, and the field definitions are shown in Table 6-6.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                         Menu-3 Reports                       13:19:27
                  3CB. Inband Network Registers, 24 hour detail
                Local:
Interval        ------------
Start       CRC    RxPkt  Rx %   TxPkt  Tx %
13:00         0        0   0.0        0   0.0
12:45         0        0   0.0        0   0.0
12:30         0        0   0.0        0   0.0
12:15         0        0   0.0        0   0.0
12:00         0        0   0.0        0   0.0
11:45         0        0   0.0        0   0.0
11:30         0        0   0.0        0   0.0
11:15         0        0   0.0        0   0.0
11:00         0        0   0.0        0   0.0
10:45         0        0   0.0        0   0.0
10:30         0        0   0.0        0   0.0
10:15         0        0   0.0        0   0.0
                               Page 1 of 8
-------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                C-clears the registers
```

Figure 6-13 Menu-3CB In-band Network Registers, 24 Hour Detail

Table 6-6 Menu-3K Field Definitions

Field	Definition
CRC	Number of packets received with CRC errors per interval.
RxPkt	Number of received packets per interval.
Rx%	Bandwidth utilization in the received direction per interval.
TxPkt	Number of packets sent out per interval.
Tx%	Bandwidth utilization in the transmit direction during interval.

In-band Communications

In-band Communications works by reading information from the remote end using a proprietary protocol. When you select this mode, both sides must be set to IBC mode, and the remote node must be another Digital Link Solo Select.

In addition, this mode lets you set and change the remote configuration.

The information for this mode exactly reflects the information in the remote node with a short time delay.

7 Service Level Agreement

The Solo Select E1 DSU complies with the Frame Relay Forum's "Service Level Definitions Implementation Agreement, FRF.13, August 1998". This agreement provides information transfer parameters that may be used in establishing or maintaining a Service Level Agreement (SLA) between Frame Relay service providers and their customers. Further, these parameters may be used to:

- Compare Frame Relay service providers
- Assess the quality of specific Frame Relay service offerings
- Enforce contractual commitments

If you purchased a Level 2 or Level 3 Solo Select E1 DSU, then the SLA feature has already been enabled. If you purchased a basic Solo Select E1 DSU, you will need to use Feature Keying to enable SLA. See Appendix C, *"Feature Keying"* for information on adding capabilities to your device.

SLA Measurements

The Solo Select E1 DSU implements all of the measurements specified in FRF.13. These measurements are maintained in the Solo Select E1 DSU SLA database, and are viewed using either the terminal interface, or WANview™.

The following measurements are collected:

- Frame Delivery Ratio (FDR)
- Data Delivery Ratio (DDR)
- Frame Transfer Delay
- Service Availability

NOTE: In order to used the SLA feature of the Solo Select E1 DSU, you must have an SLA-enabled device at both ends.

Frame Delivery Ratio (FDR)

This measurement is collected for each PVC and provides a report on the effectiveness of the network in transporting a Frame Relay load. The ratio represents load delivery in a single direction, for a single PVC.

The Frame Delivery Ratio (FDR) represents load delivery both within and in excess of the Committed Information Rate (CIR).

$$FDR = \frac{(FramesDelivered_c + FramesDelivered_e)}{(FramesOffered_c + FramesOffered_e)} = \frac{FramesDelivered_{c+e}}{FramesOffered_{c+e}}$$

Where:

FramesDelivered$_c$	Successfully delivered frames within the CIR.
FramesDelivered$_e$	Successfully delivered frames in excess of the CIR.
FramesDelivered$_{c+e}$	Successfully delivered frames; both within and in excess of the CIR.
FramesOffered$_c$	Attempted frame transmission within the CIR.
FramesOffered$_e$	Attempted frame transmission in excess of the CIR.
FramesOfferedc+e	Total attempted frame transmission; both within and in excess of the CIR.

Within the CIR

Frame Delivery Ratio$_c$ is a delivery ratio for the portion of the load within the Committed Information Rate (CIR).

$$FDR_c = \frac{FramesDelivered_c}{FramesOffered_c}$$

In Excess of the CIR

Frame Delivery Ratio$_e$ is a delivery ratio for the portion of the load in excess of the Committed Information Rate (CIR).

$$FDR_e = \frac{FramesDelivered_e}{FramesOffered_e}$$

Data Delivery Ratio (DDR)

This measurement represents the network's effectiveness in transporting offered data (payload, without address field or Frame Check Sequence) in a single direction on a single virtual connection–a ratio of successful payload octets received (DataDelivered) to attempted payload octets transmitted (DataOffered).

$$DDR = \frac{DataDelivered_c + DataDelivered_e}{(DataOffered_c + DataOffered_e)} = \frac{DataDelivered_{c+e}}{DataOffered_{c+e}}$$

Where:

DataDelivered$_c$	Successfully delivered data payload octets within the CIR.
DataDelivered$_e$	Successfully delivered data payload octets in excess of the CIR.
DataDelivered$_{c+e}$	Successfully delivered data payload octets; both within and in excess of the CIR.
DataOffered$_c$	Attempted data payload octet transmission within the CIR.
DataOffered$_e$	Attempted data payload octet transmission in excess of the CIR.
DataOffered$_{c+e}$	Attempted data payload octet transmission; both within and in excess of the CIR.

Within the CIR

Data Delivery Ratio$_c$ is a delivery ratio for the portion of the load within the Committed Information Rate (CIR).

$$DDR_c = \frac{DataDelivered_c}{DataOffered_c}$$

In Excess of the CIR

Data Delivery Ratio$_e$ is a delivery ratio for the portion of the load in excess of the Committed Information Rate (CIR).

$$DDR_e = \frac{DataDelivered_e}{DataOffered_e}$$

Frame Transfer Delay

This measurement represents the time required to transport Frame Relay data through the network. This figure represents the difference in milliseconds between the time a frame exits a source and the time the same frame enters its destination. It is also refered to as Round Trip Delay (RTD).

RTD = (RL - TL) - (TR - RR) = FTD

Where:

TL, TR — TL = Transmit Local; TR = Tramsmit Remote. The time, in milliseconds, when a frame left the source (i.e. frame exit event).

RL, RR — RL = Receive Local; RR = Receive Remote. The time, in milliseconds, when a frame arrives at it's destination (i.e. frame entry event).

Service Availability

The Solo Select E1 DSU collects data on two types of outages: Included and Excluded. FRF.13 defines these outages as Fault and Excluded outages.

Included, or Fault outages are unscheduled interruptions in service, while Excluded outages are scheduled maintenance outages, and those that are beyond the control of the carrier.

An outage is declared when any of the following occur:

- The PVC is inactive or deleted as derived from LMI full status messages.
- The E1 trunk is unavailable, for example, UAS as defined by AT&T TR54016.

Service Availability is affected by two type of outages:

Fault Outages or Included Outages	Result from faults in the network and are tracked by the service availability parameters.
Excluded Outages	Scheduled maintenance as well as incidents beyond the control of the network.

Service Availability can be described using the following formulas:

- Frame Relay Virtual Connection Availability

$$FRVCA = \frac{IntervalTime - ExcludedOutageTime - OutageTime}{IntervalTime - ExcludedOutageTime} \times 100$$

- Frame Relay Mean Time to Repair for Virtual Connection when OutageCount>0

$$FRMTTR = \frac{OutageTime}{OutageCount}$$

- Frame Relay Mean Time Between Service Outages for Virtual Connection When OutageCount=0

$$FRMTTR = 0$$

- Frame Relay Mean Time Between Service Outages for Virtual Connection When OutageCount>0

$$FRMTBSO = \frac{IntervalTime - ExcludedOutageTime - OutageTime}{OutageCount}$$

- Frame Relay Mean Time Between Service Outages for Virtual Connection When OutageCount=0

$$FRMTBSO = 0$$

Where:

IntervalTime	Period that availability is measured (minutes).
OutageTime	Aggregate time of all fault outages that occur during the measurement period.
ExcludedOutageTime	Aggregate time of all excluded outages that occur during the measurement period.
OutageCount	Count of all fault outages that occur during the measurement period.

SLA CONFIGURATION

Once your device has been enabled to collect SLA data, you will need to configure specific parameters. This may be done from a terminal user interface, or through network management software such as WANview.

When using a terminal user interface, use Menu-0H, SLA Configuration (Figure 7-1) to set your parameters.

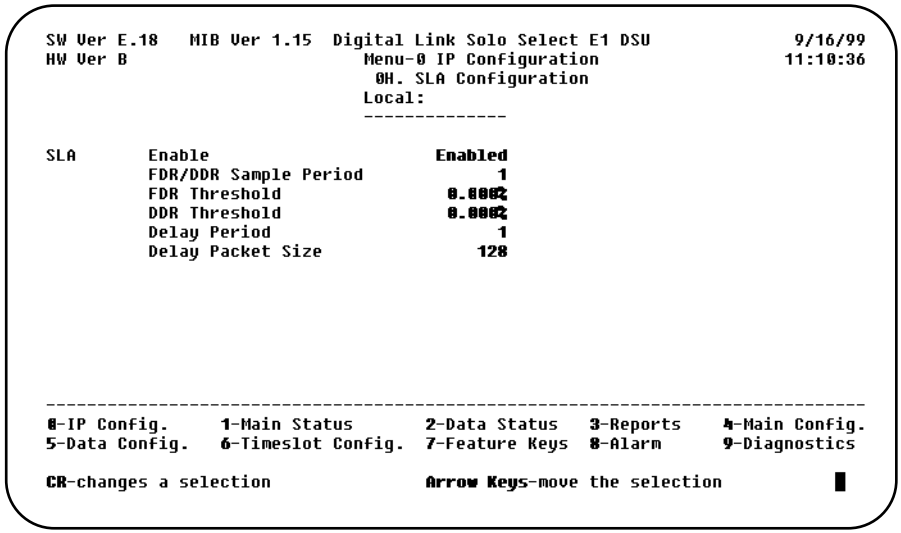


Figure 7-1 Menu-0H SLA Configuration

To configure your device for SLA, use Table 7-1 as an aid in setting the fields.

Table 7-1 SLA Configuration Options - Menu 0H *(1 of 2)*

Parameter (Default)	Options
SLA Enable (Enabled)	To collect SLA data, this field must be Enabled.
FDR/DDR Sample Period (1)	Set the sampling period between 1 minute and 255 minutes. The time period represents the time interval between requests to the far end of the PVC.
FDR Threshold (0%)	Set this threshold between 0% and 100%. 0% means this feature is disabled. Configurable to one thousandth of a percent (for example, 99.999%). When the FDR falls below this threshold: • An event is sent to the Event Log • A trap will be sent to the NMS (if configured) • An Alarm message will be displayed on the Terminal User Interface.

Table 7-1 SLA Configuration Options - Menu 0H *(2 of 2)*

Parameter (Default)	Options
DDR Threshold (0%)	Set this threshold between 0% and 100%. 0% means that this feature is disabled. Configurable to one thousandth of a percent (for example, 99.999%). When the DDR falls below this threshold: • An event is sent to the Event Log • A trap will be sent to the NMS (if configured) • An Alarm message will be displayed on the Terminal User Interface.
Delay Period (1)	Set the Delay Period between 1 minute and 255 minutes. This figure represents the approximate time interval between delay measurements on each PVC.
Delay Packet Size (128)	Set the Delay Packet Size between 50 bytes and 1500 bytes. This figure represents the size of Request and Response packets used to measure delay.

SLA REPORTS

Once you have configured your Solo Select E1 DSU to collect SLA data, you will need a means of displaying it. Using the Terminal User Interface, you will have access to much of the collected data. For graphical representation, and user configurability, you will want to use an NMS such as WANview Network Management System. WANview provides the tools to generate custom reports and present the outcome in tabular or graphic format.

The Terminal User Interface includes the following report options:

- DLCI Outage Report
- Frame Transfer Delay Report
- Local Transmit Data Delivery Report
- Local Receive Data Delivery Report
- Local Transmit Frame Delivery Report
- Local Receive Frame Delivery Report

To view a report, select **SLA Reports** from Menu-3, Reports.

DLCI Outages

The DLCI Outages report (Figure 7-2) provides information on the type, number, and duration of outages on a per DLCI basis. As per the specification laid out in FRF.13, outages are defined as either Fault (Outages) or Excluded.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                          Menu-3E SLA Reports                13:22:01
                                  3EA. Dlci Outages


       Outage          Included Outage           Excluded Outage
Dlci    State       Count           Time       Count           Time
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---

                                  Page  1 of 10
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

n-selects next page                 p-selects previous page
```

Figure 7-2 Menu-3EA DLCI Outages

Table 7-2 provides explaination of the data reported in the DLCI Outages report.

Table 7-2 DLCI Outages Report Definitions *(1 of 2)*

Parameter	Definition
DLCI	Identifies the DLCI.
Outage State	Outage State may be Included, Excluded, or None.

Table 7-2 DLCI Outages Report Definitions *(2 of 2)*

Parameter	Definition
Included Outage	These columns present data collected on unscheduled service outages. The Count column provides the number of Included outages on the DLCI since the last reset. The Time column provides the number of unscheduled minutes the DLCI was down.
Excluded Outage	These columns present data collected on outages that are scheduled or unavoidable. These outages include down time scheduled for maintenance, and down time attributable to acts of nature such as flood. The Count column provides the number of Excluded outages on the DLCI since the last reset. The Time column provides the number of minutes the DLCI was down due to an Excluded outage.

Frame Transfer Delays

Menu-3EB, Frame Transfer Delays (Figure 7-3) provides information on the number of threshold violations per DLCI.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                        Menu-3E SLA Reports                     13:23:45
                              3EB. Frame Transfer Delays

          Last                                                Maximum Delay
        Sample    Threshold       Total      Average          Last n Minutes
Dlci      Time   Violations     Samples        Delay        15        30        60
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---

Displaying Totals                  Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page                 ▮
```

Figure 7-3 Menu-3EB Frame Transfer Delays

Table 7-3 provides explaination of the data reported in the Frame Transfer Delays report.

Table 7-3 Frame Transfer Delays Report Definitions

Parameter	Definition
DLCI	Identifies the DLCI.
Last Sample Time	The time of the most recent sample.
Threshold Violations	The number of times the delay threshold has been exceeded.
Total Samples	The number of samples that have been taken.
Average Delay	Average Delay is calculated by taking the sum of the total delay and dividing it by the number of samples collected.
Maximum Delay, Last n Samples	This column is subdivided into three columns. Here you will find the single longest delay during the last 15 samples, 30 samples, and 60 samples.

Local Transmit Data Delivery Report

Menu-3EC, Local Transmit Data Delivery Report (Figure 7-4) provides information on the network's (per DLCI) effectiveness in transporting data. It also provides the DDR for data delivered within CIR, and data delivered in excess of CIR.

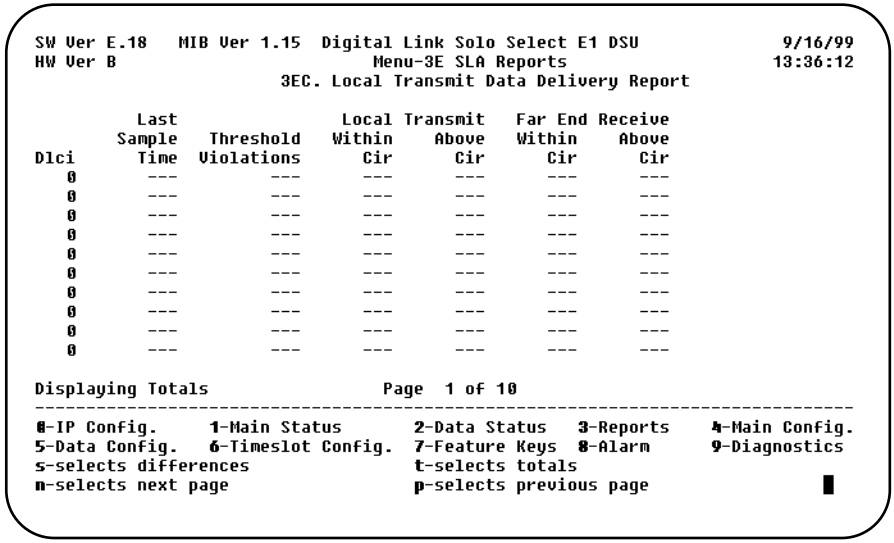


Figure 7-4 Menu-3EC Local Transmit Data Delivery Report

Table 7-4 provides explaination of the data reported in the Local Transmit Data Delivery report.

Table 7-4 Local Transmit Data Delivery Report Definitions

Parameter	Definition
DLCI	Indentifies the DLCI.
Last Sample Time	The time of the most recent sample.
Threshold Violations	The number of times the DDR threshold has been exceeded.
Local Transmit Within CIR	The number of bytes transmitted within CIR.
Local Transmit Above CIR	The number of bytes transmitted above CIR.
Far End Within CIR	The number of bytes received at the far end within CIR.
Receive Above CIR	The number of bytes received at the far end in excess of CIR.

Menu-3EC has two modes of operation. The default mode, Totals, provides a cumulative total since the last reset. To access this mode, press **t** on your keyboard.

To access Differences mode, press **s** on the keyboard. When you select Differences mode, the Solo Select defines a new point in time to use as a reference zero point. As new data is added to the counters, it appears in Menu-3EC. All data collected prior to pressing s, is no longer displayed.

Differences mode adds two additional columns to the display: Within CIR Ratio and Above CIR Ratio. These columns provide ratios of the the number of bytes transmitted to the number of bytes received. These ratios refer only to data collected since you pressed the s key to enter Differences mode.

To return to Totals mode, press **t**, and the view will again present a cumulative total of all data collected since the last reset.

Local Receive Data Delivery Report

Menu-3EE, Local Receive Data Delivery Report (Figure 7-5) provides information on the network's (per DLCI) effectiveness in receiving data. It also provides the DDR for data received within CIR, and data received in excess of CIR.

```
SW Ver E.18    MIB Ver 1.15   Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                           Menu-3E SLA Reports                     13:37:48
                              3EE. Local Receive Data Delivery Report

          Last                     Local  Receive   Far End  Transmit
        Sample    Threshold       Within    Above    Within     Above
Dlci      Time   Violations          Cir      Cir       Cir       Cir
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---
   0       ---          ---          ---      ---       ---       ---

Displaying Totals                  Page   1 of 10
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports      4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm        9-Diagnostics
s-selects differences                 t-selects totals
n-selects next page                   p-selects previous page
```

Figure 7-5 Menu-3EE Local Receive Data Delivery Report

Table 7-5 provides explaination of the data reported in the Local Receive Data Delivery report.

Table 7-5 Local Receive Data Delivery Report Definitions

Parameter	Definition
DLCI	Indentifies the DLCI.
Last Sample Time	The time of the most recent sample.
Threshold Violations	The number of times the DDR threshold has been exceeded.
Local Receive Within CIR	Number of bytes received within CIR.
Local Receive Above CIR	Number of bytes received in excess of CIR.
Far End Transmit Within CIR	Number of bytes transmitted within CIR from the far end.
Far End Transmit Above CIR	Number of bytes transmitted in excess of CIR from the far end.

Menu-3EE has two modes of operation. The default mode, Totals, provides a cumulative total since the last reset. To access this mode, press **t** on your keyboard.

To access Differences mode, press **s** on the keyboard. When you select Differences mode, the Solo Select defines a new point in time to use as a reference zero point. As new data is added to the counters, it appears in Menu-3EE. All data collected prior to pressing s, is no longer displayed.

Differences mode adds two additional columns to the display: Within CIR Ratio and Above CIR Ratio. These columns provide ratios of the the number of bytes transmitted to the number of bytes received. These ratios refer only to data collected since you pressed the s key to enter Differences mode.

To return to Totals mode, press **t**, and the view will again present a cumulative total of all data collected since the last reset.

Local Transmit Frame Delivery Report

Menu-3EF, Local Transmit Frame Delivery Report (Figure 7-6) provides a view of how effective the network has been at packet transmission.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                        Menu-3E SLA Reports                   13:39:13
                      3EF. Local Transmit Frame Delivery Report

          Last                 Local Transmit   Far End Receive
        Sample   Threshold    Within    Above   Within    Above
Dlci      Time  Violations       Cir      Cir      Cir      Cir
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm      9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page
```

Figure 7-6 Menu-3EF Local Transmit Frame Delivery Report

Table 7-6 provides explaination of the data reported in the Local Transmit Frame Delivery report.

Table 7-6 Local Transmit Frame Delivery Report

Parameter	Definition
DLCI	Indentifies the DLCI.
Last Sample Time	The time of the most recent sample.
Threshold Violations	The number of times the FDR threshold has been exceeded.
Local Transmit Within CIR	The number of frames transmitted within CIR.
Local Transmit Above CIR	The number of frames transmitted in excess of CIR.

Table 7-6 Local Transmit Frame Delivery Report

Parameter	Definition
Far End Receive Within CIR	The number of frames within CIR received at the far end.
Far End Receive Above CIR	The number of frames in excess of CIR received at the far end.

Menu-3EF has two modes of operation. The default mode, Totals, provides a cumulative total since the last reset. To access this mode, press **t** on your keyboard.

To access Differences mode, press **s** on the keyboard. When you select Differences mode, the Solo Select defines a new point in time to use as a reference zero point. As new data is added to the counters, it appears in Menu-3EF. All data collected prior to pressing s, is no longer displayed.

Differences mode adds two additional columns to the display: Within CIR Ratio and Above CIR Ratio. These columns provide ratios of the the number of frames transmitted to the number of frames received. These ratios refer only to data collected since you pressed the s key to enter Differences mode.

To return to Totals mode, press **t**, and the view will again present a cumulative total of all data collected since the last reset.

Local Receive Frame Delivery Report

Menu-3EG, Local Receive Frame Delivery Report (Figure 7-7) provides a view of how effective the network has been at packet receipt.

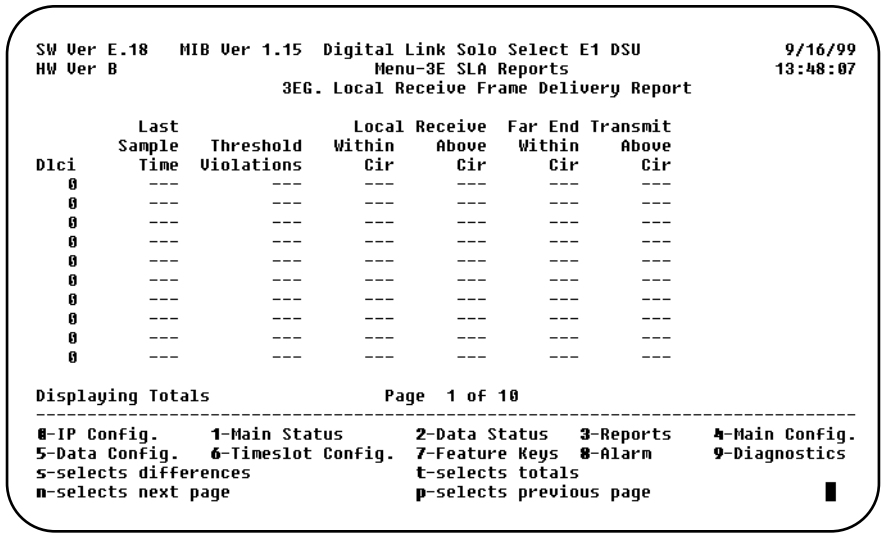


Figure 7-7 Menu-3EG Local Receive Frame Delivery Report

Table 7-7 provides explaination of the data reported in the Local Receive Frame Delivery report.

Table 7-7 Local Receive Frame Delivery Report Definitions

Parameter	Definition
DLCI	Indentifies the DLCI.
Last Sample Time	The time of the most recent sample.
Threshold Violations	The number of times the FDR threshold has been exceeded.
Local Receive Within CIR	The number of frames within CIR received on the local device.
Local Receive Above CIR	The number of frames in excess of CIR received on the local device.
Far End Transmit Within CIR	The number of frames within CIR transmitted from the far end device.
Far End Transmit Above CIR	The number of frames in excess of CIR transmitted from the far end device.

Auto-Discovery of Remote DLCIs

If you have Solo Select devices at both ends of your network, your Solo Select E1 DSU will discover the DLCI and IP address of the Solo Select E1 DSU at the far end of the PVC and displays the information on Menu-0E.

8 Local Management Interface Conditioning

LMI CONDITIONING

Local Management Interface (LMI) Conditioning allows both the enterprise and carrier network operations centers to communicate with the Solo Select E1 DSU in the event of failure. Using the Maintenance and Management DLCIs, you can communicate with the Solo Select E1 DSU without having to assign it an IP address.

LMI Conditioning allows you to pinpoint faults and determine whether they are router-related (LAN side) or network-related (WAN side). Maintenance and Management DLCIs allow for full-time management, even in the event of a network or router failure.

In the event of a network or router failure, LMI Conditioning keeps the PVC connection alive (LMI spoofing) to speed up troubleshooting and repair.

LMI

There are three widely used versions of the LMI protocol:

- ANSI T1.617 Annex D
- ITU Q.933 Annex A
- FRF LMI Rev 1.0

For our use, we will refer to them as Annex D, Annex A, and FRF 1.0 respectively.

For PVCs, there are two valid message types:

- STATUS ENQUIRY

  STATUS ENQUIRYs are used to request information on PVCs and their associated DLCIs. These enquirys can be used to ask the receiving LMI-enabled device about all of the PVCs it knows about. Annex D also supports enquirys about individual DLCIs.

- STATUS

  STATUS messages are the replies to Status Enquiries.

Maintenance and Management DLCIs

In order to use the Solo Select E1 DSU's LMI Conditioning features, you will need to provision Maintenance and Management DLCIs (Figure 8-1). These DLCIs, specific to Digital Link' implementation of LMI, allow you to maintain connectivity with your Solo Select E1 DSU.

The Maintenance DLCI provides a connection between the Solo Select E1 DSU and the Frame Relay network, while the Management DLCI provides a connection between the router and the Solo Select E1 DSU.

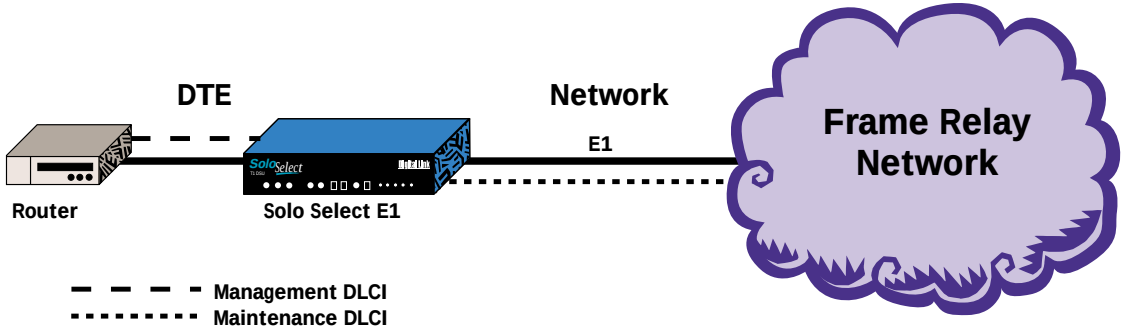


Figure 8-1 LMI DLCIs

The router will not be aware of the Maintenance DLCI. When the DSU receives a full status enquiry from the router, the DSU replies with information on all of the DLCIs except the Maintenance DLCI–the DSU replaces all information about the Maintenance DLCI with Management DLCI information. If the E1 is down, all configured PVCs will be shown as inactive except the Management DLCI, which allows connection to the DSU from the DTE side. The router will not delete the PVCs from its table–it just knows that they aren't active.

Communicating with the Solo Select E1 DSU, via telnet or SNMP messages, does not require that the Solo Select E1 DSU be assigned an IP address when you use the Management or Maintenance DLCI.

Heartbeat

Heartbeats are STATUS ENQUIRY messages with the message type field set to "Link Integrity Verification Only". It functions as a handshake between the two that verifies the life of the connection. This message is only used to check the availability of the In-Channel Signaling Link (DLCI 0). If the response to the Link Integrity Verification Message is not received within the elapsed polling interval for a sufficient number of cycles (causing an error event, N2 or N392), the user equipment should stop transmission of frames on all PVCs of the bearer channel.

Our implementation of LMI utilizes two specific types of STATUS ENQUIRIES:

1. Link Integrity Verification messages send a status message. The only information this message requests is whether or not the link is alive.

2. Full Status messages request the same information as Link Integrity Verification messages, but also check status of the associated DLCIs.

LMI Spoofing

LMI spoofing occurs when your router, DTE device, or network goes down. The Solo Select E1 DSU intercepts this message, then emulates, or spoofs the faulty device, sending the LMI STATUS message for it.

Without LMI spoofing, once the error threshold is reached, frame transmission is halted and the network shuts down your PVCs. This makes it difficult to discover where the problem is, and time is lost while you work to re-establish your PVC connections.

With the Solo Select E1 DSU and its LMI Conditioning feature, you can avoid network shutdowns and PVC connection loss. When the error threshold is reached, the Solo Select E1 DSU begins emulating the at-fault device, providing the expected STATUS messages for it. The network is fooled into thinking that the device is still alive, so the PVC connections are maintained. This process is referred to as LMI spoofing.

LMI Configuration

In order to use LMI Conditioning and LMI spoofing, you must configure your Solo Select E1 DSU. To configure your system for LMI Conditioning, use Menu-0F (Figure 8-2).

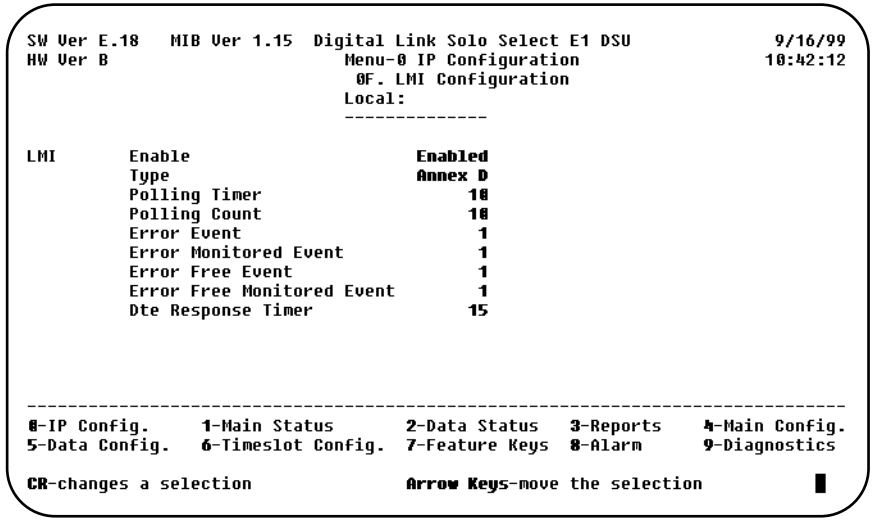


Figure 8-2 Menu-0F LMI Configuration

The LMI configuration options are presented in Table 8-1.

Table 8-1 Menu-0F LMI Configuration Options *(1 of 2)*

Parameter (Default)	Options
LMI Enable (Enabled)	Enable or Disable LMI Conditioning
Type (Annex D)	Set this parameter to Annex D, Annex A, or FRF 1.0.
Polling Timer (10)	Set the value to a number between 5 and 30 seconds, in increments of 5. This parameter sets the interval between Status Enquiry Messages. The value corresponds to T391 standards.
Polling Count (6)	Set the count between 1 and 10. This parameter sets the number of polling cycles for Status Enquiry Messages before the unit generates the Full Status request.
Error Event (1)	Set this value to an integer between 1 and 10. The value represents the number of errors that can occur on the LMI link in LMI Error Monitored Events before reporting that the interface is down. Applies to the Network and DTE port. This value must be equal to, or less than, the value assigned for Error Monitored Event.

Table 8-1 Menu-0F LMI Configuration Options *(2 of 2)*

Parameter (Default)	Options
Error Monitored Event (1)	Set this value to an integer between 1 and 10. This parameter sets the number of events that are used with the LMI Error Event to define the error ratio that is used to report that the LMI link is down.
Error Free Event (1)	Set this value to an integer between 1 and 10. This parameter sets the number of error-free messages that must be received in LMI Error Free Monitored Events prior to declaring an interface is up. This value must be equal to, or less than, the value assigned for Error Free Monitored Event.
Error Free Monitored Event (1)	Set this value to an integer between 1 and 10. The parameter sets the number of events that are used with the LMI Error Free Event to define the error ratio that is used to report that the LMI link is up.
DTE Response Timer (15)	Set this value to an integer between 5 and 30, in increments of 5. This parameter sets the number of seconds that must elapse without receiving a Status Enquiry from the router, to establish the router is down.

LMI Conditioning Configuration

To set up LMI spoofing and Management and Maintenance DLCIs, use Menu-0G, LMI Conditioning Configuration (Figure 8-3).

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                       Menu-0 IP Configuration                 10:43:41
                            0G. LMI Conditioning Configuration
                                Local:
                                --------------

LMI       Status                  DTE Lmi Down
                                  NET Lmi Down
          Spoofing Status         Spoofing DTE
                                  Spoofing NET

          DTE Spoofing                 Enabled
          NET Spoofing                 Enabled

          Management Dlci Enable      Disabled
          Management Dlci                  989
          Maintenance Dlci                 998

          Unit Location                    CPE
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection               Arrow Keys-move the selection
```

Figure 8-3 Menu-0G LMI Conditioning Configuration

To configure your device for LMI spoofing, use Table 8-2 as an aid in setting the fields.

Table 8-2 Menu-0G Options

Parameter (Default)	Options
DTE Spoofing (Enabled)	Set to Enabled or Disabled. If enabled, DTE spoofing will occur automatically.
NET Spoofing (Enabled)	Set to Enabled or Disabled. If enabled, NET spoofing will occur automatically.
Management DLCI Enable (Disabled)	Set to Enabled or Disabled. This parameter, when enabled, specifies that Management DLCI is to be used.
Management DLCI (989)	Set to a number between 16 and 991. This is the number of the Management DLCI and it must not be the same as the number used for the Maintenance DLCI.
Maintenance DLCI (990)	Set to a number between 16 and 991. This is the number of the Maintenance DLCI and it must not be the same as the number used for the Management DLCI.
Unit Location (CPE)	CPE (Customer Premise equipment) or CO (Carrier Office). If the Unit Location is CPE, then Status Enquiry messages are received via the DTE port and Status Reponses are received via the Net port (Figure 8-4). If the Unit Location is CO, then Status Enquiry messages are received via the Net port and Status Responses are received via the DTE port (Figure 8-4).

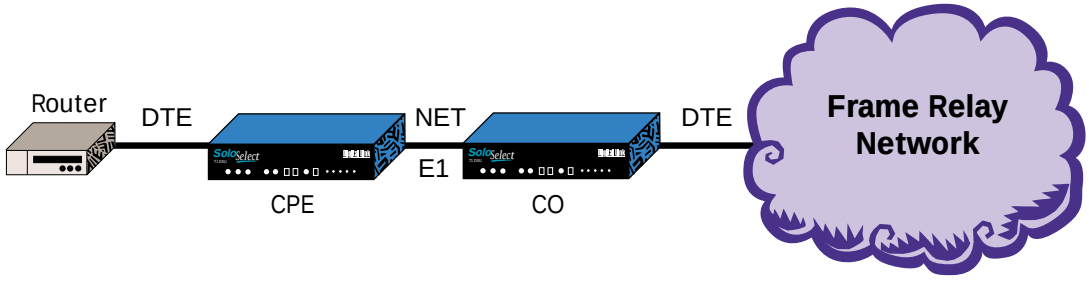


Figure 8-4 Unit Location

9 Alarms

This chapter discusses alarm conditions and how these conditions are displayed.

CONFIGURING ALARM CONDITIONS

When the Solo Select detects an alarm condition, the unit reports the condition to the terminal.

Depending on your network management environment, the unit may also send alarm messages or SNMP trap messages.

Set alarm conditions in Menu-8A, Alarm Configuration, illustrated in Figure 9-2 on page 9-4.

The Solo Select reports alarm conditions to the device connected to its COMM Port (such as a terminal, printer, or modem). If IP is enabled, SNMP traps are sent as configured in Menu-0B, Configuration; otherwise, the connection indicated in Menu-8C identifies the origin of the alarms reported.

If a modem is connected, the unit causes the modem to dial out (if in Menu 8C, Connection is set to Modem; valid telephone numbers are set in Phone Number 1 or Phone Number 2; in Menu-8A, Alarm, alarms are Enabled and Block all Alarms is set to No).

NOTE: If IP is enabled, only SNMP traps are sent.

How Alarms Reports Are Displayed

Alarms are displayed on a terminal at the bottom of the screen when the terminal is connected to the COMM Port and you are logged on: Example—a carrier loss condition on the Data Port will be given at the bottom of the screen, as follows:

```
--Local  ID: Oahu  Data1 Carrier Loss Start: 07:17:37 Feb.22,
1997--
```

The alarm includes the unit ID, local or remote, type of alarm, start or end of alarm condition, date, and time. The alarm information remains on the screen either until a new alarm occurs or until you select a new screen.

When no alarm is present, a dotted line (similar in appearance to the one below) is shown:

When you are not logged on, the alarm appears as a single line showing the unit ID, local or remote alarm, type of alarm, start or end of alarm, and the time stamp, if IP is disabled.

In SNMP mode, the system sends the alarm as an SNMP trap to the SNMP manager which displays it on the SNMP console.

Menu-8 Alarm

Menu-8, Alarm (Figure 9-1 on page 9-3), provides access to three sub-menus:

- Alarm Configuration (“Menu-8A Alarm Configuration” on page 9-4)
- External Alarms-modules only (“Menu-8B External Alarms (Module Only)” on page 9-6)
- Miscellaneous Management Configuration (“Menu-8C Miscellaneous Management Configuration” on page 9-7)
- Modem Initialization Strings (“Menu-8E Modem Initialization Strings” on page 9-9)

Select the corresponding option to view and configure parameters for alarm configuration, external alarm configuration, for miscellaneous management configuration, and modem initialization strings.

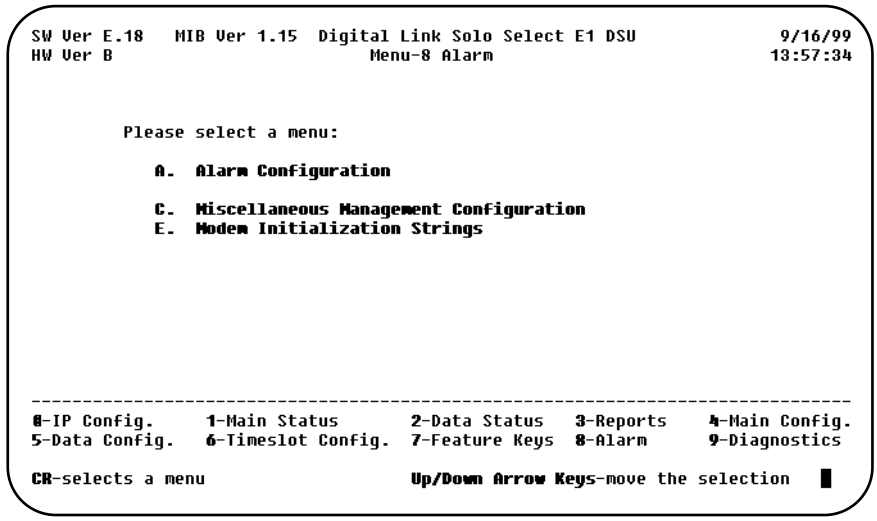


Figure 9-1 Menu-8 Alarm

NOTE: When using the Solo Select E1 module, Menu-8 Alarm includes another option: B. External Alarms.

Menu-8A Alarm Configuration

When you select **Alarm Configuration**, Menu 8A, appears. Parameters and options for Menu-8A, Alarm Configuration, are illustrated in Figure 9-2 and defined in Table 9-1.

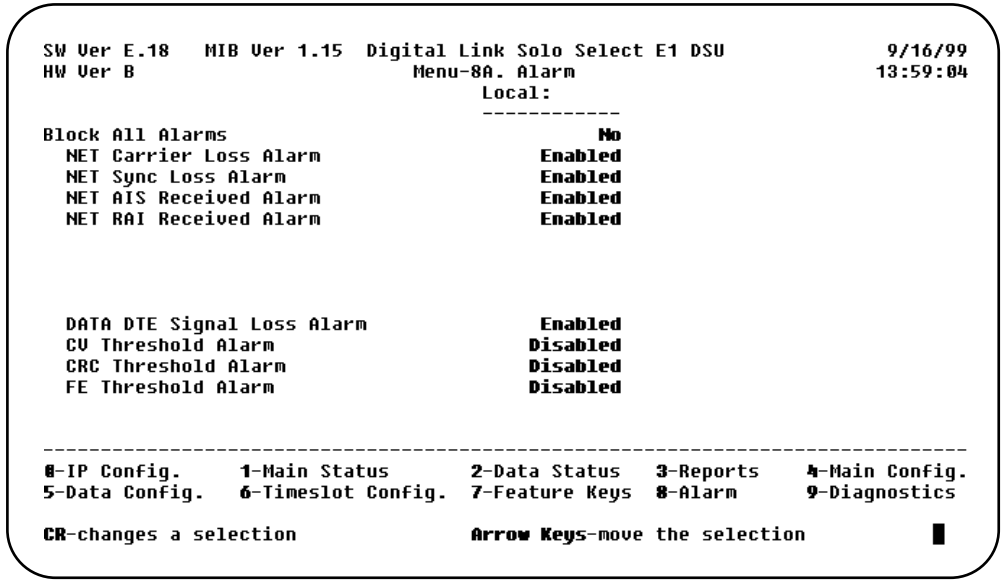


Figure 9-2 Menu-8A Alarm

Table 9-1 Menu-8A Field Definitions *(1 of 2)*

Field	Definition	Default
Block All Alarms	Yes, No Yes - Blocks the reporting of all alarms. No - Enables the Solo Select to report alarms.	No
NET Carrier Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a network carrier Loss of Signal is detected on the network. Disabled - Disables the alarm.	Enabled
NET Sync Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when loss-of-frame is detected on the network. Disabled - Disables the alarm.	Enabled

Table 9-1 Menu-8A Field Definitions *(2 of 2)*

Field	Definition	Default
NET AIS Received Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a Network AIS (Alarm Indication Signal) is detected. Disabled - Disables the alarm.	Enabled
NET RAI Received Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a Network RAI Alarm is detected. Disabled - Disables the alarm.	Enabled
DATA DTE Signal Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a DATA DTE Signal Loss is detected. The loss is defined in Menu-5. Disabled- Disables the alarm.	Enabled
CV Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{B}. Valid values are between 2 x 10^{-8} and 6 x 10^{-3}. Example: 5 x 10^{-4} When the BPVs exceed this threshold, an alarm is generated.	Disabled
CRC Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{-B}. Valid values are between 5 x 10^{-5} and 1 x 10^{-0}. Example: 3 x 10^{-4} When the CRCs exceed this threshold, the alarm is generated.	Disabled
FE Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{-B}. Valid values are between 3 x 10^{-6} and 7 x 10^{-2} Example: 7 x 10^{-4} If the FEs exceed the set threshold, the alarm is started.	Disabled

Menu-8B External Alarms (Module Only)

When using a Solo Select E1 module, Menu-8 will have an additional option: Menu-8B, External Alarms (Figure 9-3).

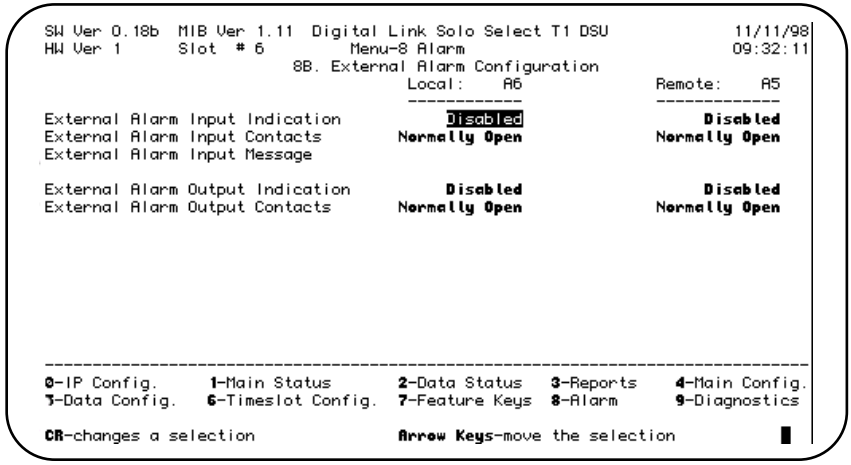


Figure 9-3 Menu-8B External Alarms

Table 9-2 Menu-8B External Alarms Fields

Field	Definition	Default
External Alarm Input Indication	Enable or Disable	Disabled
External Alarm Input Contacts	Normally Open or Normally Closed	Normally Open
External Alarm Input Message	User-defined message up to 20 characters in length	N/A
External Alarm Output Indication	Enable or Disable	Disabled
External Alarm Output Contacts	Normally Open or Normally Closed	Normally Open

Menu-8C Miscellaneous Management Configuration

When you select **Miscellaneous Management**, Menu-8C appears. Parameters and options for Menu-8C Alarm are illustrated in Figure 9-4 and defined in Table 9-3.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-8 Alarm                        14:00:32
                8C. Miscellaneous Management Configuration

                                      Local:
                                      ------------
Connection                                  Direct
Timeout When Logged On                    Unlimited
Timeout When Not Logged On                Unlimited
Phone Number 1
Phone Number 2
Normal User Password                           *
Superuser Password                             *
COMM   DCD                                Disabled
       XON/XOFF                           Disabled
DLC IBC Link Loss Alarm                    Enabled
Dial Out Time Interval                     0 Min.
Inband Link Loss Alarm                    Disabled
Inband CRC Error Threshold                Disabled
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status      2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection              Arrow Keys-move the selection
```

Figure 9-4 Menu-8C Miscellaneous Management Configuration

Table 9-3 Menu-8C Miscellaneous Management Fields *(1 of 2)*

Field Definitions	Default
Connection—In-band Communication, Modem, Direct Select the type of connection you are using: In-band Communication—Enables in-band communications. Modem—Enables a modem connection to the Solo Select. Direct—Enables a direct terminal connection to the Solo Select.	Direct
Timeout When Logged On—1 Min, 10 Min, 30 Min, Unlimited Applies only when you are logged on. This is the time span after which, if it does not detect activity, the system warns that you will be logged off in 30 seconds.	10 min

Table 9-3 Menu-8C Miscellaneous Management Fields *(2 of 2)*

Field Definitions	Default
Timeout When Not Logged On—1 Min, 10 Min, 30 Min, Unlimited Applies only when a terminal is connected through a modem and you are not logged on. This is the time span after which the modem disconnects the phone line if no activity is detected.	Unlimited
Phone Number 1 Enter a Hayes-compatible modem dial string (20 char. maximum); for example, "atdt555-1212." The modem dials out using the first telephone number, then automatically tries the second telephone number if the first does not respond.	User-defined
Phone Number 2 Enter a Hayes-compatible modem dial string (20 char. maximum); for example, "atdt555-1212."	User-defined
Normal User Password—(text string) Enter the login password for the Normal User (20 char. maximum).	User-defined
Super User Password—(text string) Enter the login password for the Super User (20 char. maximum).	User-defined
COMM DCD—Enabled or Disabled Enabled—The Solo Select uses the modem's Data Carrier Detect (DCD) signal to provide more robust modem operation. Disabled—Use Disabled if your null modem does not pass the Data Carrier Detect signal.	Disabled
COMM XON/XOFF—Disabled, XOFF until ANY, XOFF until XON XOFF until ANY—Ctrl-S stops data flow from unit; any key resumes data flow. XOFF until XON—Ctrl-S stops data flow from unit; Ctrl-Q resumes flow. Disabled—XON/XOFF feature disabled.	Disabled
DLC IBC Link Loss Alarm—Enabled or Disabled The FDL link specific to Digital Link. When the connection is disrupted, an alarm is sent.	Enabled
Dial Out Time Interval—Dial out time interval is the minimum amount of time the Solo Select waits between dial outs to the host computer.	0 Min.
In-band Link Loss Alarm—Enabled or Disabled Enabled—When loss of HDLC frames or idle characters occurs, an alarm is generated. Disabled—The alarm is disabled.	Disabled
In-band CRC Error Threshold—Enable or Disabled Enabled—The valid range is 4×10^{-7} to 9×10^{-1}. Disabled—No alarm is generated if threshold rate of errors is high.	Disabled

Menu-8E Modem Initialization Strings

When you select **Modem Initialization Strings**, Menu 8E appears (Figure 9-5).

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-8 Alarm                      14:02:00
                      8E. Modem Initialization Strings

 Local
     String 1  ATE0V0Z0
     String 2  ATV0E0Q0F1C1S0=1S2=43S3=13S4=10S7=30S12=50&C1&D0

--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
F-default modem strings
CR-changes a selection               Up/Down Arrow Keys-move the selection
```

Figure 9-5 Menu-8E Modem Initialization Strings

Each unit can have a maximum of two modem initialization strings. The first string (`String 1`) can be equal to or less than 20 characters, and the second string (`String 2`) can be equal to or less than 60 characters.

To initiate a modem connection:

1. **The unit sends +++, followed by the first modem initialization string.**
2. **The unit then waits for a response from the modem to guard against the possibility of losing the characters immediately after the modem resets.**
3. **After receiving the modem response, the unit sends the second initialization string (if this string is programmed). The Solo Select assumes that the modem always sends a response; therefore, *do not* program the modem *not* to send a response.**
4. **If the modem reset command is used, it is recommended that you program everything up to the reset command as the first modem initialization string.**

5. **Program the remaining commands as the second modem initialization string.**

10 Diagnostics

The Solo Select offers extensive diagnostic capabilities for local and remote analysis. These include fixed test patterns and two user-programmable 24-bit test patterns. In addition to front panel LEDs, the Solo Select features more than a dozen user-settable parameters and performance thresholds for remote alarm reporting.

You may run diagnostic tests by the following methods:

- **Terminal Screen Diagnostics** – refer to "Performing Diagnostics from Terminal Screen Menus" on page 10-13
- **Front Panel Operations** – refer to "Performing Tests from the Front Panel" on page 10-5
- **Telnet** – refer to "Performing Diagnostics From Telnet" on page 10-17

You can also run diagnostics through **SNMP**.

Required Tools and Equipment

Obtain the following tools and equipment when performing the procedure(s) to isolate the Solo Select from the network:

- A standard E1 test set, such as a Interceptor 147 or equivalent.
- A DA-15 plug connector with two patch cords for connecting to the E1 test set.
- Terminate the patch cords on pins 3 and 11 for the receive pair, on pins 1 and 9 for the transmit pair.
- In lieu of this test set, a E1 loopback plug for isolating the Solo Select.
- A standard data test set, such as a FireBERD 6000 with a V.35/X.21 interface and cables.
- Hand tools for attaching and removing cables.

If you do not have any test equipment, you may still run local and remote loop tests, and test pattern generation.

FRONT PANEL STATUS LEDS

The Solo Select front panel (refer to Figure 10-1) display LEDs can help you diagnose certain problems with your E1 unit. For a complete list of LED display definitions, refer to "Front Panel LEDs and Buttons" on page A-7.

Power, In-band, and NET LEDs

Figure 10-1 and Table 10-1 define the LEDs used for diagnostics.

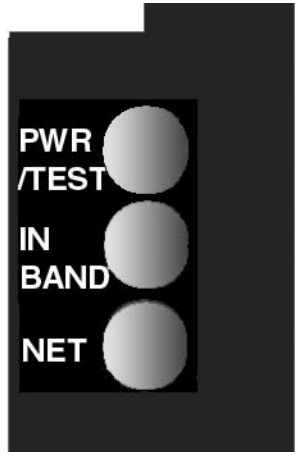


Figure 10-1 Front Panel Displays for Solo Select

Table 10-1 Front Panel Display Indicators *(1 of 2)*

LED Name	Indicator	Meaning
PWR/TEST LED	Solid green	Power is on.
	Off	Power is off.
	Solid yellow	Test is running.
	Blinking yellow	Self Test running.
	Red	Self Test failed or alarm is present.

Table 10-1 Front Panel Display Indicators *(2 of 2)*

LED Name	Indicator	Meaning
In-band LED	Off	Unit is not in in-band management mode.
	Solid red	Unit is in in-band management mode but there are no packets and no HDLC flags received from the network.
	Solid yellow	Unit is in in-band management mode but there is no In-band activity detected on the signal received from the network; only HDLC flags are detected.
	Solid green	Unit is in in-band mode and in-band packets are detected from the network.
	Green, blinking red	Unit is detecting errors in the in-band packets from the network.
NET LED	Solid green	E1 network operation normal.
	Off	Loss of network signal.
	Solid red	Loss of frame.
	Alternating red/green	CV, FE, or CRC error received.
	Solid yellow	RAI or AIS alarm received.

Status LEDs

The Select front panel shows the status lights, as shown in Figure 10-2 and explained in Table 10-2.

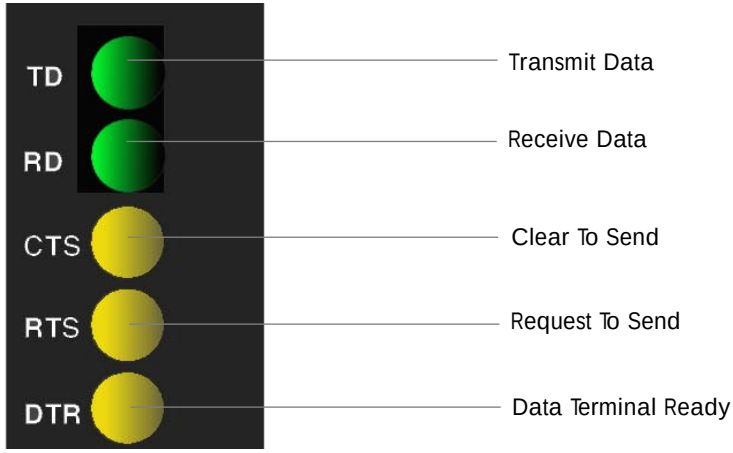


Figure 10-2 Status LEDs

Table 10-2 Status LED Indicators

LED Name	Indicator	Meaning
TD	Solid green	Pulses from DTE being detected.
	Off	No pulses from DTE detected.
RD	Solid green	Pulses to DTE being detected.
	Off	No pulses to DTE detected.
CTS	Yellow	Clear to send signal to DTE is active.
	Off	Clear to send removed.
RTS	Yellow	Request to send signal from DTE is active. The ON condition causes the DCE to assume the data channel transmit mode.
	Off	Request to send signal removed. OFF causes the DCE to assume the data channel non-transmit mode, when all data transferred have been terminated.
DTR	Yellow	Data terminal ready from DTE is active. The ON condition, indicating the DTE is ready to operate.
	Off	Data terminal ready from DTE is inactive.

PERFORMING TESTS FROM THE FRONT PANEL

From the front panel, you can perform the Loop Up Remote, Loop Down Remote, and DTE/NET Loopback tests (Figure 10-3 on page 10-6).

- Loop Up Remote and Loop Down Remote—Press the appropriate button.
- NET/DTE Loopback—Press **DTE/LPBK** to start or stop the NET/DTE Loopback test.

The **PWR/TEST LED** turns yellow when the test is running—Press **DTE LPBK** again to end the test.

Self Test

The Self Test checks the system's electronic components and performs a signal path check of transmit and receive directions simulating a 4000-ft E1 line.

The possible messages are `RUNNING SELF TEST`, `SELF TEST PASSED`, or `ERROR <N>`, for which an indicator is returned, as described below in Table 10-3.

Table 10-3 Self Test Indicators

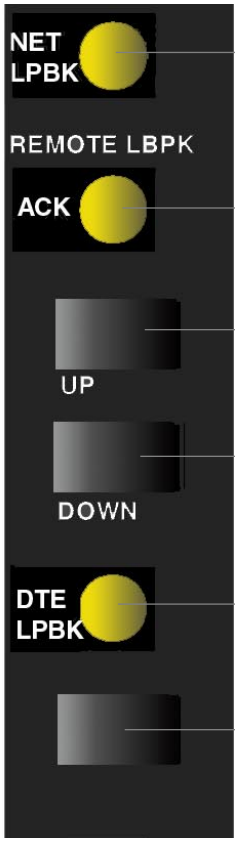
Indicators	Description
0	CRC of flash copy of executing code failed.
1	CRC of ram copy of executing code failed.
2	CRC of flash boot code failed.
3	CRC of flash factory loader failed.
4	Pattern test failed.
5	Flash write test failed.

Loopback Tests

Performing a loopback test enables you to isolate sections of the Solo Select to determine if it is defective. The problem is normally in the network.

NOTE: No test is 100% complete and a small portion of the network will remain untested. Your unit allows one active loopback at a time.

Figure 10-3 shows the Solo Select front panel controls indicating loopback tests.



LED lit indicates a NET Loopback on E1 has been initiated via the user interface, front panel, or through a loopback code.

LED blinks to acknowledge receipt of loopback code from a remote end.

Button used to initiate remote loop up command to far end.

Button used to initiate remote loop down command.

LED lit indicates DTE loopback test in progress.

Button used to either turn ON or OFF the NET/DTE loopback test.

Figure 10-3 Solo Select Front Panel

The following sections describe in detail each of the loopback tests you can perform from the front panel of your Solo Select. Each of the figures indicate which LEDs are activated by both the local and remote Solo Select modules.

NOTE: The Solo Select E1 uses proprietary remote loopback activation and deactivation controls.

Loop DTE Test

The Loop DTE test, illustrated in Figure 10-4, verifies the operation of the Solo Select and the associated DTE cabling and equipment.

The DTE full bandwidth loopback loops the E1 network transmit signal through a simulated 4,000-foot line to the Solo Select network receive circuitry. The DTE equipment should receive the same signal that it transmitted.

NOTE: You can perform the Loop DTE only if the DTE is equipped with a feature to send and detect a test pattern.

You do not need to notify the phone company before you perform this test. However, you should inform them if the test results indicate a phone company problem, or require the Solo Select to be removed from service.

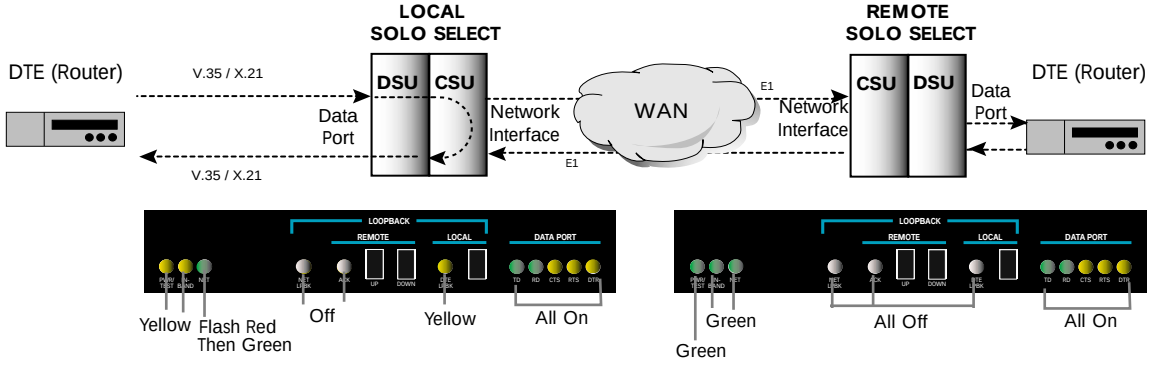


Figure 10-4 Loop DTE Test

Loop NET Test

The Loop NET test, illustrated in Figure 10-5, verifies the operation of the E1 network and is available only on full bandwidth.

This test loops the data received from the E1 network back to the network. The data is regenerated before it is looped back; however, the unit does not perform additional processing of the data. This minimizes the impact of the unit during the test so that network problems can be isolated.

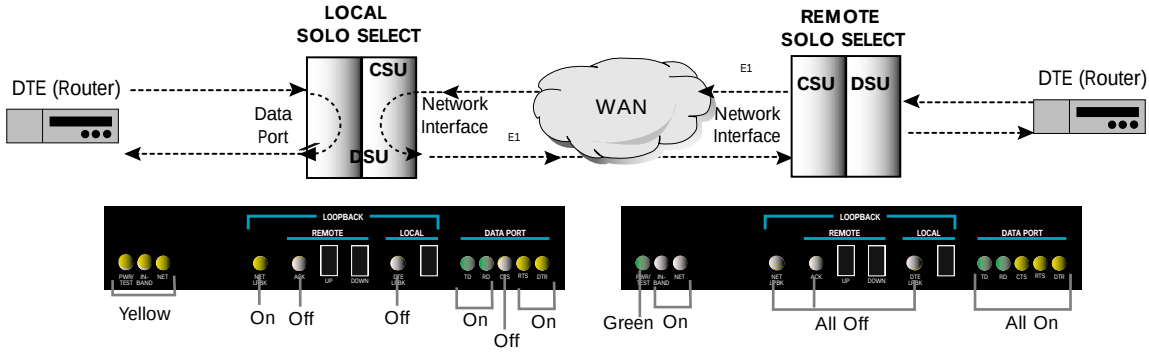


Figure 10-5 Loop NET Test

Loop Payload Test

The Loop Payload test, illustrated in Figure 10-6, verifies proper operation of the unit and the E1 network.

This test loops the payload data received from the E1 network back toward the network. Before it is looped back, the data is regenerated and a new framing pattern is inserted. Thus, the proper E1 framing of the Solo Select and network can be verified.

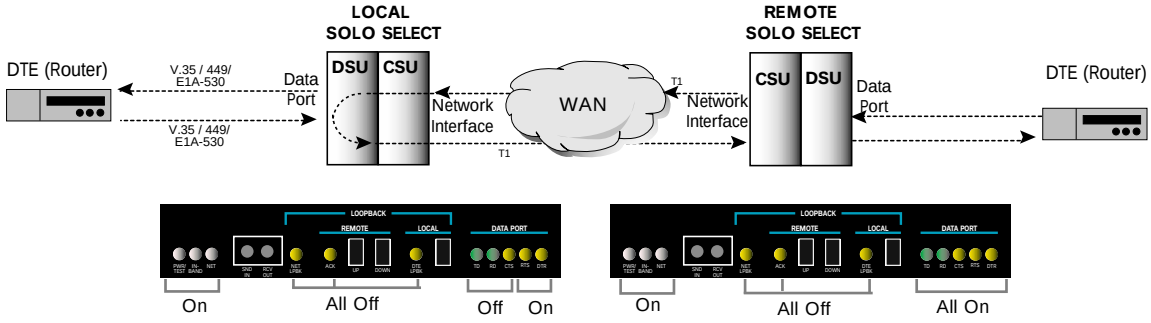


Figure 10-6 Loop Payload Test

The individual channel Loop Payload loops a selected fraction of the E1 signal toward the network. In this mode, the selected data is corrected for CV, CRC and framing errors, and the IBC is regenerated before the data is looped back to the network. Receive and transmit clocks and data are suppressed toward the V.35 port on the DTE channels. Payload service to ports not in loopback is not affected.

Loop Up Remote and Loop Down Remote Tests

The Loop Up / Down Remote test, illustrated in Figure 10-7 on page 10-10, places the remote unit into Network Loopback using Digital Link propietary codes. Once in Network Loopback, test patterns can be sent to verify the Bit Error Rate (BER) performance of the bi-directional E1 network signal. To place the remote unit into network loopback, the local Solo Select continuously transmits the loop up code to the remote unit. If the remote unit does not go into network loopback within 15 seconds, a failure is declared and the Solo Select stops sending the loop up code.

The loop code and network parameters for the local and remote units must match.

Use the Loop Down Remote test to terminate the remote loopback. This test can be used no matter how the remote unit was put into loopback.

Perform the Loop Up Remote and Loop Down Remote tests from the front panel, user interface or SNMP

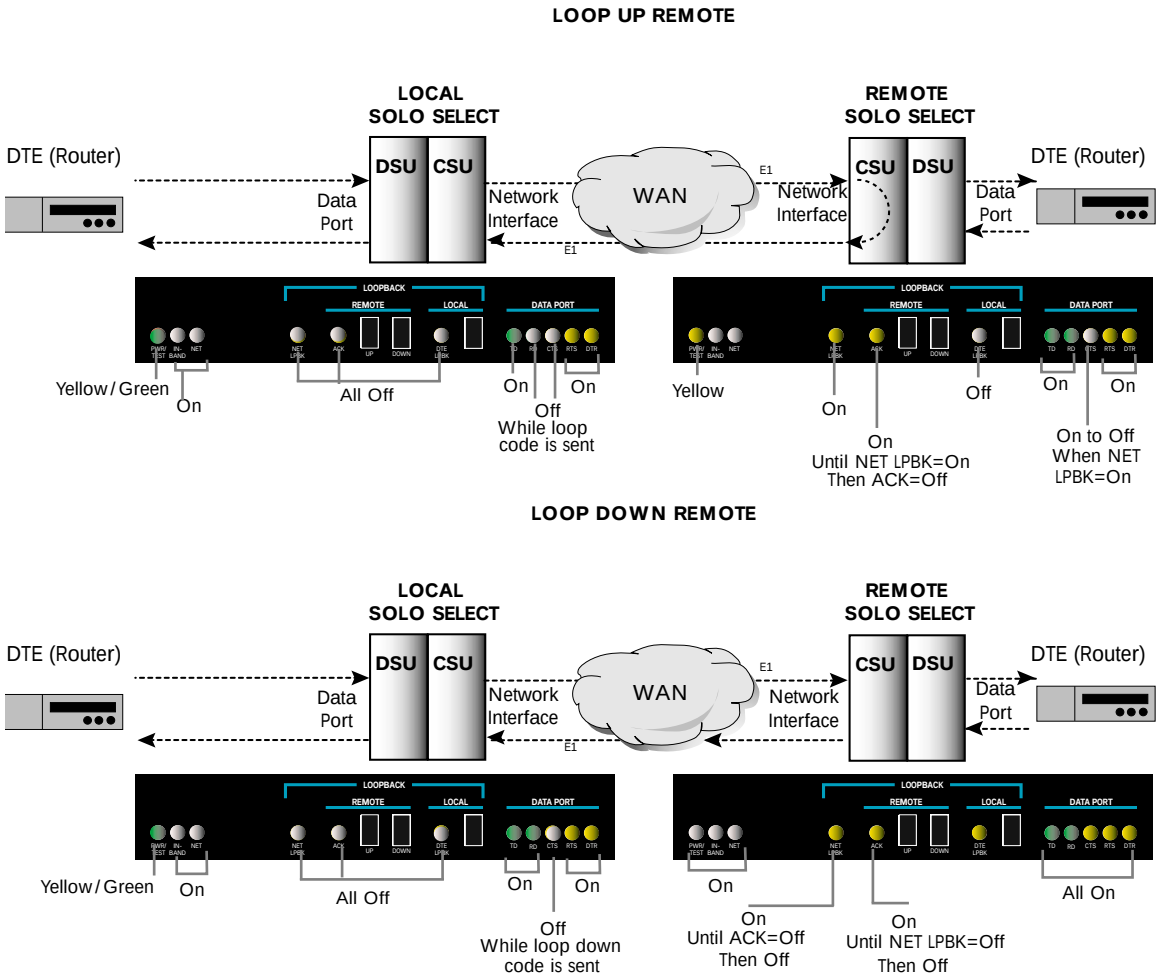


Figure 10-7 Loop Up / Down Remote Test

NOTE: The full bandwidth loop up code puts the remote Solo Select in a full bandwidth ***network*** loopback. The fractional loop up code places the Solo Select in a fractional (per individual port) ***payload*** loopback.

NET/DTE Loopback Test

The NET/DTE Loopback test, illustrated in Figure 10-8, allows the unit to simultaneously go into NET and DTE interface loopbacks. This test simultaneously loops the signal received by the network back to the network transmitter after regeneration. The DTE-received signal is sent back to the DTE transmitter after passing through the minimal amount of circuitry. The network received signal is passed through most of the circuitry.

Initiated from Menu-9, when this test is selected, the Unit Status field in Menu-1 displays `LoopDTE & NET`. When the test is running, both the **DTE** and **NET** LEDs are illuminated. The unit can also be placed in this loopback test by pressing the **DTE/LPBK** button on the front panel.

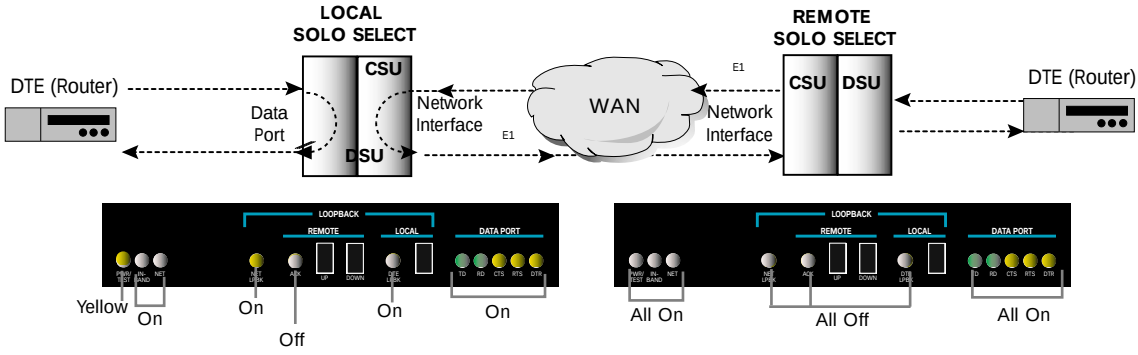


Figure 10-8 NET/DTE Loopback Test

Pattern Tests

QRW Pattern Test

Use the Quasi-Random Word (QRW) test to measure Bit Error Rates on the E1 network. The Solo Select sends a QRW pattern into the network and monitors the received E1 network signal for QRW bit errors. QRW is a good approximation of actual user data. It is also known in the industry as Quasi Random Signal State (QRSS).

This test also looks for bit errors in both E1 circuit directions when the remote system is looped up. In this case, the system transmits the QRW to the E1 network; the remote system loops it back to the Solo Select which monitors the signal for errors.

You can also use the QRW code to isolate a E1 network problem to a specific transmission direction. In this case, both E1 transmission directions are monitored when the local and the remote system transmit QRW (the remote is not put into loopback).

This test is available on a full bandwidth and on the fraction assigned to Data Port 1.

Other Pattern Tests

Other pattern tests types are listed and described in Table 10-4.

Table 10-4 Send Test Types Descriptions

Send Test Type	Pattern Test Description
1:7 Pattern	Stresses the timing recovery circuits of repeaters and other intermediate equipment.
3:24 Pattern	Tests for ones density (consecutive zeros) tolerance.
1:1	Sends alternate ones and zeros—used to test for bridge taps.
All Ones	Used for signal power measurements.
All Zeros	Used for verification of HDB3 coding of the E1 facility.
1:4 (or Alternate)	The 1:4 code is the standard loopup remote code. Typically, it is used when the loopup remote test fails to place the remote system into loopback. You can determine if the failure is an intermittent or a hard failure by continuously sending the 1:4 code, and monitoring the network status to see if the pattern is being received. The selections are available on the full bandwidth and on the fraction assigned to Data Port 1. The full bandwidth code places the remote system into full network loopback. When used on Data Port 1, the code places the corresponding remote port into Loop Payload. **Note**: If the Loop Up Remote test fails to place the remote system into loopback, check that the Loop Code and Network Framing parameters are the same at each end of the link.
1:2	The 1:2 code is the standard loop down remote code. Use it when the Loop Down Remote test fails to terminate the remote loopback. You can determine if the failure is an intermittent or hard failure by continuously sending the 1:2 and monitoring the network status to see if the pattern is being received. The selections are available on the full bandwidth and on the fraction assigned to Data Port 1. The full bandwidth code takes the remote system out of full network loopback. When used on Data Port 1, the code takes the corresponding remote port out of Loop Payload.

User 1 / User 2 Patterns Test

These two user programmable (up to 24 characters) patterns enable you to generate a test pattern rather than use pre-programmed patterns or live traffic.

Lamp Test

Use this test to verify the LEDs. During the test, all LEDs on the front panel illuminate.

PERFORMING DIAGNOSTICS FROM TERMINAL SCREEN MENUS

Menu-9 Diagnostics

Menu-9, Diagnostics, provides access to diagnostic testing screens and monitoring configuration screens.

You can run several tests from your system's internal diagnostics, shown in Menu-9, Diagnostics, (Figure 10-9):

- Menu 9A — Physical Layer Diagnostics
- Menu 9B — Link Layer Diagnostics
- Menu 9C — Delay Monitoring Configuration

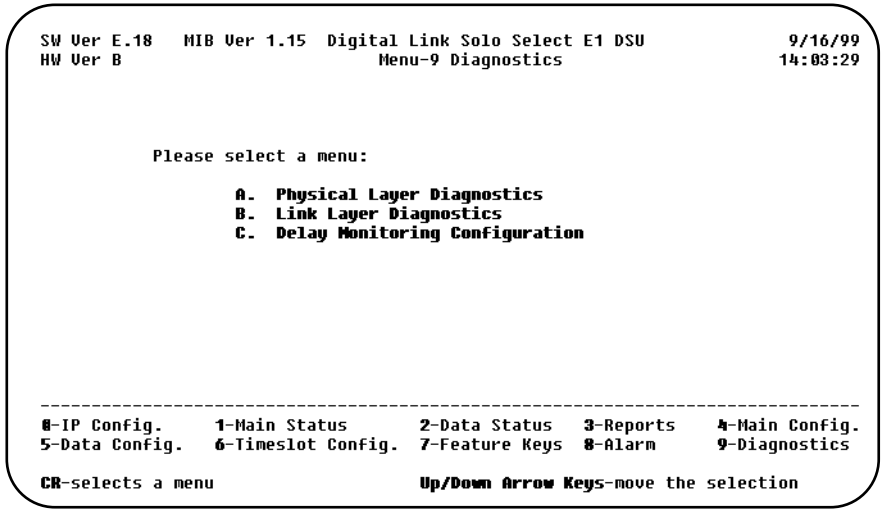


Figure 10-9 Menu-9 Diagnostics

Menu-9A Physical Layer Diagnostics

This section describes the Menu-9A parameters and tests. See Figure 10-10.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                         Menu-9 Diagnostics                 14:04:27
                           9A. Physical Layer Diagnostics
                               Local:
                               --------------
Current Test                             Idle
Pattern Test                             Idle
Pattern Error Counter
CRC4 Errors                                 0
Code Violations                             0
Frame Error Events                          0
Last Self Test Result          Self Test Passed

Next Test (Fraction)                1. Self Test
Next Test Length                       Unlimited
Full Bandwidth Loop Code               Standard
Fractional Loop Code                   Standard
USER1 Pattern          00110011001100110011001100110011
USER2 Pattern          00010001000100010001000100010001
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
S-starts a test  I-injects a pattern error          CR-changes a selection
E-ends a test    C-clears pattern error counter     Arrow keys-move selection
```

Figure 10-10 Menu-9A Physical Layer Diagnostics

To verify connections and the E1 line, run the following seven basic diagnostic and pattern tests from Menu-9A, Physical Layer Diagnostics:

- Loop DTE test
- Loop NET test
- Loop Payload test
- Loop Up Remote test
- Loop Down Remote test
- DTE/NET Loopback test
- Various Pattern tests

You can run the DTE NET Loopback, Loop Up Remote, and Loop Down Remote tests from the front panel, as shown in Figure 10-3 on page 10-6.

Performing a Test from Menu-9A Physical Layer Diagnostics

To run a test from Menu-9A, Physical Layer Diagnostics:

1. **Select the test in the Test field and set the Test length, Full Bandwidth Loop Code, Fractional Loop Code and USER1 and USER2 Pattern fields.**
2. **Follow the screen prompts.**

Test results are shown in the upper portion of the screen.

In the example, Self Test is highlighted as the test selected.

The selections for fractions on which the test is performed are Full Bandwidth and DATA01. Fraction is ignored with the Self Test, Network Loopback, or Lamp test.

The Inject A Pattern Error option (to inject a single-bit error) is available only when the unit is sending a test pattern.

Menu-9A Physical Layer Diagnostics Field Definitions

The parameters and options in the user-selectable portion of Menu-9A, Physical Layer Diagnostics, are defined in Table 10-5.

Table 10-5 Menu-9A Physical Layer Diagnostic Fields *(1 of 3)*

Field	Definition - Option	Default
Choosing a test by number	You may type in a number to start a test, instead of using the arrow keys. For instance, if you type in “3” you will select the Net Lpbk test. To start the test, press “5”.	
Current Test	Displays the test currently running. If no test is selected, the field reads Idle.	Idle
Pattern Test	Displays “Locked Seconds.” If no pattern test is running, the test reads “Idle.” When a pattern test is started, it will read “Searching” if the current pattern test is locked. The “Locked Seconds” is a 16-bit counter saturating at 65536. The counter resets to 0 of the current pattern is unlocked. The counter label will change to “Relocked Seconds” if the current pattern is unlocked and then relocked. Options: Idle, Searching, Locked, Relocked	Idle
Pattern Error Counter	The number of pattern errors occuring during the current test.	0
CRC4 Errors	The number of CRC4 errors.	0

Table 10-5 Menu-9A Physical Layer Diagnostic Fields *(2 of 3)*

Field	Definition - Option	Default
Code Violations	The number of Code Violations occuring during the current test.	0
Frame Error Event	A count of the Frame Error events.	0
Last Self Test Result	The result of the last test performed. Read-only. Options: Self Test Passed Error nn (0 to 5)	Self test passed
Next Test (Fraction)	The next test to run is set in this field. Options: 1. Self Test 2. DTE Lpbk (FULL) 3. NET Lpbk 4. PLD Lpbk (FULL) 5. LP UP Remote (FULL) 6. LP DN Remote (FULL) 7. Send QRW (FULL) 8. Send 1:7 (FULL) 9. Send 3:24 (FULL) 10. Send 1:1 (FULL) 11. Send all 1s (FULL) 12. Send all 0s (FULL) 13. Send 1:2 (FULL) 14. Send 1:4 (FULL) 15. Send User 1 (FULL) 16. Send User 2 (FULL) 19. Lamp Test 20.Lamp DTE and NET	Self Test
Next Test Length	The length of the next test is set in this field. 15 min, 1 min, 60 min, Unlimited With the Self Test, Loop Up Remote and Loop Down Remote, this parameter does not apply.	Unlimited
Full Bandwidth Loopcode	The Loopcode to use in the next test is set in this field Options: Standard, Alternate, Disabled. **NOTE:** When all 31 timeslots are being used, do not use the same option (Standard, Alternate) for both Full Bandwidth Loopcode and Fractional Loopcode.	Standard
Fractional Loopcode	The Loopcode to use in the next test is set in this field. Options: Standard, Alternate, Disabled, T1.403 Annex B.	Alternate

Table 10-5 Menu-9A Physical Layer Diagnostic Fields *(3 of 3)*

Field	Definition - Option	Default
User Patterns	Enter any sequence of 1s and 0s, between 1 and 24 characters in length.	

PERFORMING DIAGNOSTICS FROM TELNET

NOTE: Performing a test can cut off existing Telnet connections on the DTE and the NET Port. Since certain tests can cut off Telnet connections, only a subset of tests can be selected when the user logs onto the Solo Select by Telnet through the DTE or NET Ports.

Certain tests prevent the Telnet session from being disrupted when you Telnet into the unit. Tests that can be run through a Telnet connection are listed in Table 10-6.

Table 10-6 Tests Allowed Through Telnet Connection *(1 of 2)*

Test	COMM	DTE	NET
Self Test	Yes	Yes	Yes
Loop DTE	Yes	Yes	No
Loop Net	Yes	Yes	No
Loop Payload	Yes	No	No
Loop Up Remote	Yes	Yes	No
Loop Down Remote	Yes	Yes	No
QRW Pattern	Yes	No	No
1:7 Pattern	Yes	No	No
3:24 Pattern	Yes	No	No
1:1 Pattern	Yes	No	No
All 1s Pattern	Yes	No	No
All 0s Pattern	Yes	No	No
1:2 Pattern	Yes	No	No
1:4 Pattern	Yes	No	No
User 1 Pattern	Yes	No	No
User 2 Pattern	Yes	No	No

Table 10-6 Tests Allowed Through Telnet Connection *(2 of 2)*

Test	COMM	DTE	NET
Smart Jack Set	Yes	Yes	Yes
Smart Jack Reset	Yes	Yes	Yes
Lamp Test	Yes	Yes	Yes
Loop DTE and Net	Yes	Yes	No

NOTE: You do not need to notify the telephone company that you are running the tests. However, if the tests reveal a problem with telephone company service or with the Solo Select, you should inform the telephone company that the DTE equipment or the Solo Select must be removed from service.

When performing a test, you can:

- Initiate loopbacks and tests on the full bandwidth or on the Data Port fraction
- Set programmable test patterns

Test patterns do not follow the Frame Relay protocol. When a test is run that affects the Frame Relay circuit, in--band management is temporarily disabled. Test patterns are normally used in private Frame Relay networks and in point-to-point networks, not public Frame Relay networks which are not typically point-to-point.

Link Layer Diagnostics and Delay Monitoring

When installing or maintaining wide area connections, you must verify the end-to-end operation of the WAN links. With dedicated E1 lines, verify the WAN links by placing the Solo Select on one end of the line in a loopback test and initiating the transmission of a pattern test from the other end. The pattern is received and monitored to detect transmission errors. Refer to Figure 10-11.

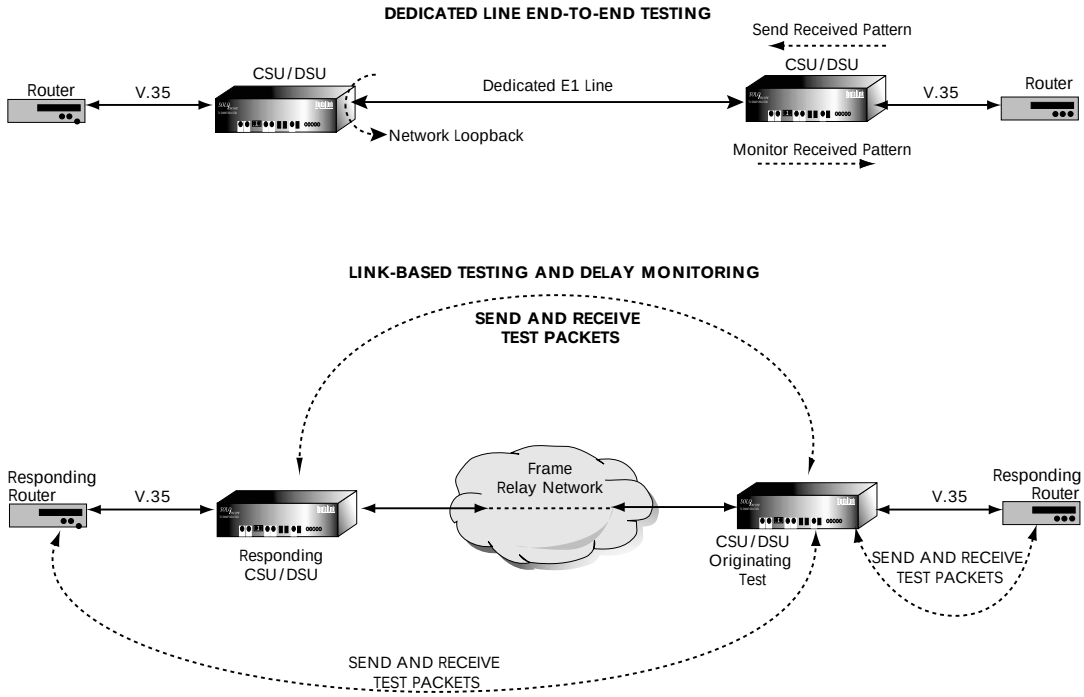


Figure 10-11 End-To-End Testing vs. Link Layer Diagnostics

When a wide area connection is not dedicated but a shared Frame Relay network you can not use the physical layer tests as the Frame Relay network can not pass bit-based test patterns without Frame Relay encapsulation.

Link-based Testing for Public Packet Networks

The link-based testing feature qualifies and tests frame relay and HDLC-based networks non-intrusively. Using the ICMP ping packet, the unit adds pattern generation and packet sequencing that allows single-ended and collaborative testing. This lets the user test his network from one end to the other using any TCP/IP-based test equipment. Link-based testing encapsulates a BERT pattern inside an ICMP message that the remote Solo Select reflects. The packet can then be directed to test the network, DTE, or management port. Patterns supported include 511, 2047, all 1s, all 0s, and alternating 1s and 0s.

Delay Monitoring for TCP/IP

The delay monitoring feature provides network delay measurement beyond the link between the Solo Select and any IP-addressable device on the network. Digital Link measures delay by using ping packets, which timestamp and obtain round-trip delays to specific IP addresses. The traffic added to support the measurement is minimal, and the user can configure the frequency. The length of the ping packet can allow delay measurements at different frame sizes. A user who is concerned about bandwidth taken away by the measurement can configure the test for a single, short ping every few minutes, making the test bandwidth penalty virtually non-existent.

The link-based testing and delay monitoring features allow network managers to test links and quantify delays, and are especially useful during network installation and trouble isolation. Both features provide the benefit of circuit-level testing across the network.

Non-Disruptive Testing

The Link Layer Diagnostics and Delay Monitoring are non-disruptive to normal traffic. Unlike hard loopback tests that effect the E1 line, Link Layer Diagnostics do not take the line out of service.

Depending on the link speed and the test specified, Link Layer Diagnostics uses some of the bandwidth that would otherwise be available for payload. This bandwidth reduction is negligible if the test is specified with short and infrequent packets.

On point-to-point networks using Frame Relay or Cisco HDLC protocols, Link Layer Diagnostics do not disrupt payload traffic.

Menu-9B—Link Layer Diagnostics

Link Layer Diagnostics uses an encapsulated Bit Error Rate Test (BERT) pattern inside ping messages and reflects the BERT pattern from the remote unit. Refer to Figure 10-12.

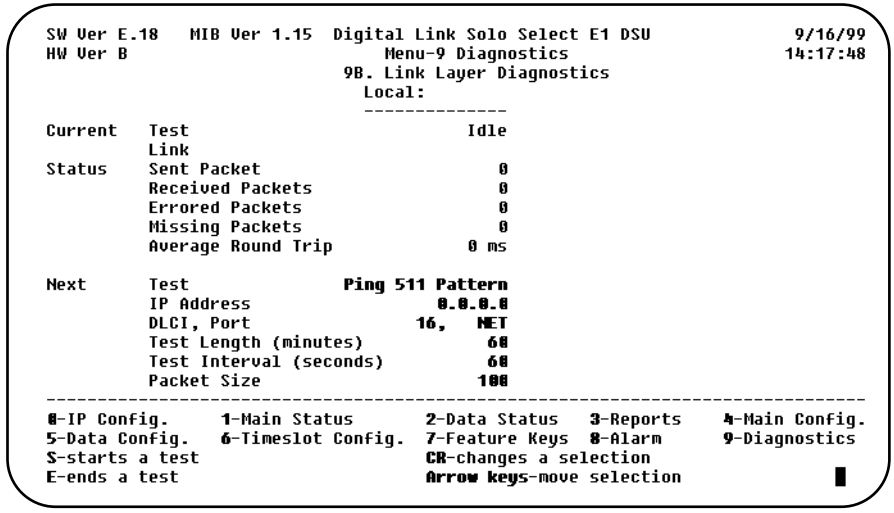


Figure 10-12 Menu-9B Link Layer Diagnostics.

To perform Link Layer Diagnostics:

1. **Select a pattern test.**
2. **Select the IP address of the equipment to send the PING message.**

   Select the local or remote router, or the remote Solo Select.
3. **Select a Port.**

   Ports are DTE, NET, Ethernet, and COMM.
4. **Select the DLCI (for NET or DTE).**

   If you are testing Cisco HDLC, skip this step.

NOTE: DLCIs are not available when the system is set for Cisco HDLC.

5. **Select the test packets length.**

   From the minimum to the maximum allowed packet length in Frame Relay (0 byte to 1500 bytes).

6. **Select the duration of the test:**

   The length of the test can be smaller than the time between two ping messages as specified in the previous step. If it is, only one ping is sent.

7. **Press S to start the test**

   The Solo Select begins sending ping messages at the specified intervals.

Press the **E** key to terminate the test at any time.

The Frame Relay switch discards frames containing bit errors. The results of this test are:

- Count of the number of packets sent
- Number of good packets received
- Number of errored packets
- Number of missing packets
- Average round trip delay

Testing Cisco HDLC

Link Layer Diagnostics are for networks that have been provisioned for use with the Cisco HDLC protocol. Unlike Frame Relay networks, there are no DLCIs to configure, so when working with Cisco HDLC, sections pertaining to DLCIs have been eliminated.

Menu-3M and Menu-9C—Delay Monitoring

Delay Monitoring continuously pings up to four remote locations at a user-specified rate. The pings average and maximum response times are displayed on the Terminal User Interface under Menu-3M (Figure 10-13) and are also available using SNMP.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:49:20
                    3M. Delay Monitoring Registers, lifetime
                                Local:
                                --------------
                                  Packets
              Avg     Max   Lost     Bad    Sent
Link 1          0       0      0       0       0
Link 2          0       0      0       0       0
Link 3          0       0      0       0       0
Link 4          0       0      0       0       0


Link 1     Last Cleared     9/02/99  12:44:16
Link 2     Last Cleared     9/02/99  12:44:16
Link 3     Last Cleared     9/02/99  12:44:16
Link 4     Last Cleared     9/02/99  12:44:16


-------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

C-clears the registers                                                 ▌
```

Figure 10-13 Menu-3M Delay Monitoring Registers, Lifetime

Delay Monitoring functions are similar to Link Layer Diagnostics, Menu-9B, except Delay Monitoring allows you to test four different destinations simultaneously. Delay Monitoring Configuration, Menu-9C, is shown in Figure 10-14. The statistics in Table 10-7 are reported for each destination address.

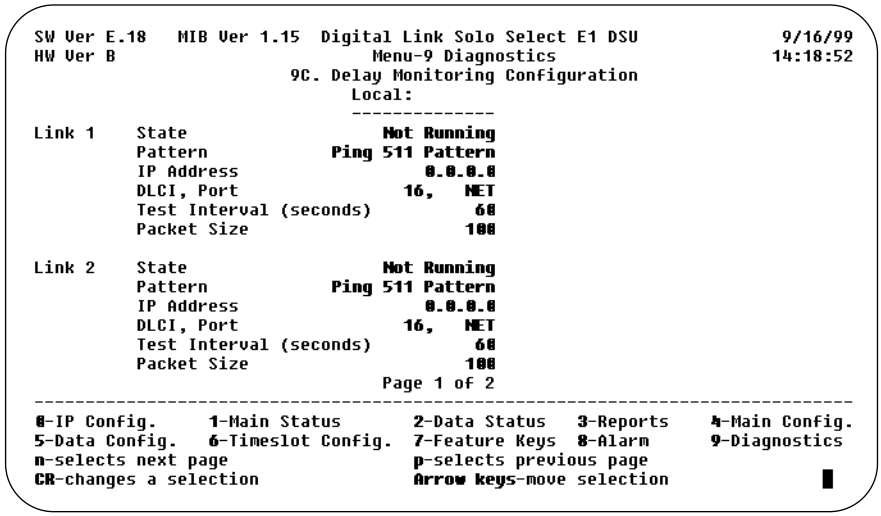


Figure 10-14 Menu-9C Delay Monitoring Configuration

Table 10-7 Menu-3M Delay Monitoring Reports

Display — Detail	Default
Avg The average ping response time (in milliseconds).	0
Max The maximum ping response time (in milliseconds).	0
Lost The number of lost packets (Response packets not received prior to the expiration of the ping interval).	0
Bad Number of Bad Packets (Packets having errors in the payload).	0
% The percentage of Errored Packets.	0.0

You can specify up to four ping destinations for Delay Monitoring. Press **P** to page up, or **N** to page down. This will display links 1 and 2, or 3 and 4. The parameters shown in Table 10-8 are configured for each destination:

Table 10-8 Menu-9C Delay Monitoring Configuration Fields

Field — Definition	Default
State Enables or disables Delay Monitoring on the link.	Not Running (disabled)
Pattern - 511, 2047, Alternate1, All 1s, All 0s Lists the test patterns in the ping packet.	Ping 511 Pattern
IP Address The IP address of the other link unit.	0.0.0.0
DLCI, Port The DLCI and Port on which the test is to be run. Port options: NET, DTE, COMM, Ethernet **NOTE:** The DLCI is not available when using Cisco HDLC.	16, NET
Test Interval The interval size in seconds between transmission of test packets.	60
Packet Size The size of the test packets.	100

INTEGRATED PERFORMANCE MONITORING (IPM)

Configuration allowing Integrated Performance Monitoring is performed in Menu-0E, Performance Monitoring Configuration (Figure 10-15). This configuration is required for IPM. The fields in Menu-0E are defined in Table 10-9.

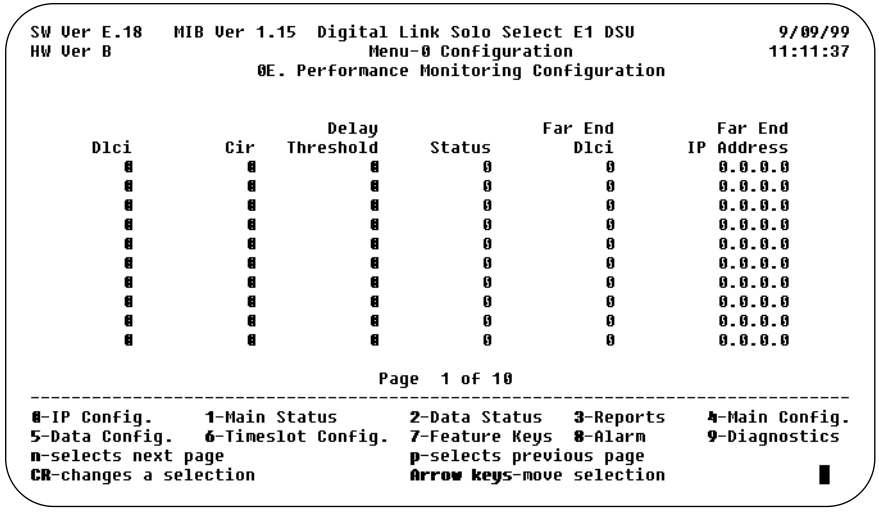


Figure 10-15 Menu-0E Performance Monitoring Configuration

The performance monitoring parameters are not sorted by DLCI. Entering a DLCI of 0 deletes the entry and puts DELETE in the status field

For more information on the Integrated Performance Monitoring feature of the Solo Select, please refer to the Integrated Performance Monitoring User's Guide, (098-00950-50), available from the Digital Link website: *www.dl.com*.

Table 10-9 Menu-0E Parameters

Parameter	Default
DLCI—The identifier for the virtual circuit	0
CIR—The committed information rate for the virtual circuit	0
Delay Threshold—The amount of delay that will trigger an event	0
Status—The status of the DLCI; active, inactive, or deleted	0
Far End DLCI—The identifier for the virtual circuit at the far end	0
Far End IP Address—The IP address at the far end of the virtual circuit	

11 Troubleshooting

TROUBLESHOOTING THE UNIT

This section describes problems you may encounter and provides suggested methods to troubleshoot and resolve the problems.

UNIT PROBLEMS

A list of possible problems is given in Table 11-1, along with suggested solutions for each.

Table 11-1 Unit Problems *(1 of 5)*

Symptom	Probable Cause	Solution
The Solo Select does not power up.	• Shelf not plugged in. • Loose power connector. • PDU (Power Distributor Unit) isn't powered up/on. • Blown fuse on Solo Select. • Reversed power leads from DC supply (standalone).	• Make sure the shelf is plugged into a live AC outlet, if the unit is AC powered. If the shelf is DC powered, make sure the respective DC leads are not crossed. • Check to assure that all fuses are operational; replace as needed. If the problem persists, call Digital Link Technical Support for assistance.

Table 11-1 Unit Problems *(2 of 5)*

Symptom	Probable Cause	Solution
The Solo Select system does not dial out when an alarm occurs.	• Miscellaneous configuration on Alarm Menu-8C. • Modem strings 8E not correct. • Wrong cable. • No modem attached.	• Make sure the connection between the COMM Port and the modem is a crossover (null) modem connection. • A DCE Port is represented the same way as the modem port. • Make sure Connection is set to Modem and two valid telephone numbers are set in Phone Number 1 and Phone Number 2 in Menu-8C. • Make sure Block all Alarms is set to No in Menu-8A and the occurring alarm is set to Enabled. • If the above solutions do not correct the problem, call Digital Link Technical Support for assistance.
Current user initiated tests terminate themselves without user intervention.	• Misconfiguration for Menu-9A Timeout.	• Make sure the system is set to run the test for an unlimited amount of time. • Test length options are 15 min., 1 min., 60 min., Unlimited. With Self Test, Loop Up Remote and Loop Down Remote, Unlimited does not apply. • If the above step does not correct the problem, call Digital Link Technical Support for assistance.

Table 11-1 Unit Problems *(3 of 5)*

Symptom	Probable Cause	Solution
The system cannot be put into network loopback from the remote unit.	• Unit does not recognize Loop command being sent. • Loopback detect is disabled on unit. • Circuit is down or in Loop towards remote unit.	• Make sure the remote unit is sending the correct loop code. • Make sure the system is set to receive the same standard or alternate code as the remote unit. • Using your E1 test set, send a loop up code into the system. If the system still does not loop up, call Digital Link Technical Support for assistance.
The system cannot be put into payload loopback from the network.	• Framing protocol choice. • Wrong timeslots used for test signal.	• Make sure the system is set for T1.403 Annex B fractional loopback code, if the network is sending T1.403 Annex B to loop it up. • Make sure the payload portion you are attempting to loop up has assigned bandwidth. • If the Solo Select still does not loop up, use your E1 test set to inject a fractional loopback signal into the payload you wish to loop up. • If the above steps fail, call Digital Link Technical Support for assistance.
No LEDs are illuminated.		• Test the LEDs by running a lamp test from Menu-9 Diagnostics. • Make sure that the shelf is getting power.
After power-up, the menu clock no longer shows the correct time or date.	• Time not set.	• Set the time in Menu-4. • If the time is still incorrect, call Technical Support.

Table 11-1 Unit Problems *(4 of 5)*

Symptom	Probable Cause	Solution
No response from any unit on the communication network.	• Bad cable. • Wrong baud rate. • Hung terminal. Restart terminal session.	• Make sure that Pin 8, CTS, is not connected at the ASCII terminal end of the COMM Port cable. • Standard Digital Link COMM Port cables do not have this connection at the ASCII terminal end. Some ASCII terminals will activate the CTS line, and thus interfere with the Solo Select collision avoidance. • Get a null modem adapter to cross pins 2 and 3 (transmit and receive) on the terminal. • The COMM Port cable is connected to an inactive or faulty port on the terminal, or the terminal is faulty. • Replace the COMM Port cable if it is faulty. • Make sure the COMM Port parameters match the terminal's parameters.
No response from some units on the network.	• Mismatch baud rate. • Break in cable.	• Make sure the Solo Select is powered up. • Make sure the unit ID is correct. • Swap the connector positions with a unit that has no problem communicating with the terminal, to find out if a portion of the COMM Port cable is faulty. • Make sure the COMM Port parameters match the terminal's parameters.
Invalid data is received from one or all units on the network.	• Baud rate configuration. • EMI. • Two units with the same ID.	• Make sure the COMM Port parameters (on the problem units) match the terminal's parameters. • Verify that none of the units are missing an ID and that no two units have the same unit ID.

Table 11-1 Unit Problems *(5 of 5)*

Symptom	Probable Cause	Solution
Some invalid data is received mixed in with a mostly good menu display.	• Refresh screen image. • 1 or more units are missing at ID, or two units have the same ID.	• To refresh screen, press **Ctrl-L.** • Reduce the baud rate on the units and terminal if you are using the maximum (38400 baud) for communicating with a very large number of units. • If the cable from the network to the terminal exceeds the 15 m (50 ft.) maximum, fix the length. • Verify that none of the units are missing an ID and that no two units have the same unit ID.

NETWORK PROBLEMS

Table 11-2 Network Problems *(1 of 4)*

Symptom	Probable Cause	Solution
No IBC communication with remote system.	• Config. unstructured E1	• Make sure the Solo Select is configured for structured communications. IBC communications do not exist in unstructured E1. • Make sure you do not have DACS frames from your network carrier between your two ends. If a DACS frame is placed in your E1 circuit, you will not have IBC communcation (regardless of your framing format.) • If the above solutions do not resolve the problem, call Digital Link Technical Support for assistance.

Table 11-2 Network Problems *(2 of 4)*

Symptom	Probable Cause	Solution
The unit experiences a loss of signal or a loss of frame on the Network Port.	• Equipment Failure	• Test E1. • Apply hardware loop to front of unit.
The NET LED does not illuminate.	• No incoming signal. • Bad LED.	• Run a lamp test from Menu-9, Diagnostics to make sure the LEDs are working. • Make sure the E1 line from your service provider is connected to the DA-15 female connector on the back of the Solo Select DSU. • Remove the E1 line from the back of the Solo Select and place the E1 test set in its place. Connect the transmit of the E1 test set to the receive of the network plug (pins 3 and 11, 3—tip, 11—ring). If the NET LED changes to any color, i.e., green or red, contact your service provider for assistance with cutting over the E1 line. • Place the E1 loopback plug on the network connector on the back of the Solo Select. If it then changes color, troubleshoot your test setup. • If the NET LED never lights, call Digital Link Technical Support for assistance.

Table 11-2 Network Problems *(3 of 4)*

Symptom	Probable Cause	Solution
The NET LED is constantly red.	• Constant out-of-sync or out-of-frame on E1. • Misframe/FE. • Carrier has problem. • Configuration doesn't match framing.	• Make sure the E1 line framing format matches the Solo Select's framing format. • Check the Solo Select for excessive errors. • In CRC4-Enabled mode, check for CRC and CV; in CRC4-Disabled mode, check for CVs only. If excessive errors appear, place your E1 test set or your loopback plug on the DA-15 or BNC socket on the back of the system to see if the errors stop. • If they do, contact your service provider for assistance. • If the errors do not stop, call Digital Link Technical Support for assistance.
The NET LED remains constant amber/yellow.	• Incoming RAI or UAI.	• Check to see if the Solo Select is receiving a RAI alarm or an AIS alarm. • Make sure the remote/far end system is receiving a proper E1 signal. If it is not, it will be generating a RAI alarm towards your equipment. • If the system is still receiving a RAI alarm, place the E1 test set or the E1 loopback plug on the DA-15 or BNC socket on the back of the Solo Select. If the RAI alarm stops, contact your service provider for assistance. • If, after all above steps have been satisfied, your Solo Select still shows a yellow **NET** LED, call Digital Link Technical Support for assistance.

Table 11-2 Network Problems *(4 of 4)*

Symptom	Probable Cause	Solution
The NET LED flickers intermittently between red, amber and green.	• Receiving errors on NET Port (CV, CRC, FE, etc).	• Make sure the timing source is properly configured. Timing should be set to NETWORK if the network is the source. • If it is not the source, timing should be set to INTERNAL at one E1 end, and NETWORK at the other end. • If you're not sure that the network is the source, contact the network provider and discuss your circuit order. The provider will tell you if the E1 network is the source. • If the timing source is properly configured and the NET LED continues to flicker between red, amber and green, isolate the system with the E1 test set to see if the problem clears. • Place the E1 test set into the proper timing mode (provide timing or recover timing). You cannot use the loopback plug in this application since it would require us to provide timing and would not allow us to see if we can recover timing from a valid E1 source. • If the NET LED continues to flicker, call Digital Link Technical Support for assistance.

DTE PROBLEMS

Table 11-3 DTE Problems *(1 of 2)*

Symptom	Probable Cause	Solution
The Data Port TD/RD LEDs do not illuminate.	• No timeslots assigned to port. • Bad LEDs • No data being sent/received (DTR or Net down). • DTE is sending or receiving all zeros.	• Make sure the DTE cable is plugged into the appropriate connector on the back of the shelf. • Check the timeslot allocation to make sure bandwidth is allocated to the specific Data Port. • Run a lamp test from Menu-9, Diagnostics, to make sure the LEDs are working. • Make sure the DTE devices connected physically to the units are sending data to each other. The serial line will not transmit data or receive data if it is shut down. • If you have eliminated the above as a cause, place your data test set on the problem port. If the TD/RD LEDs do not light, call Digital Link Technical Support for assistance.

Table 11-3 DTE Problems *(2 of 2)*

Symptom	Probable Cause	Solution
The Data Port RTS/DTR/CTS do not illuminate.	• No communication with DTE. • Bad cable.	• If your system does not support the RTS or DTR protocol, set the port DTE loss to None (default—RTS) in the Data DTE Configuration menu. • The CTS LED should light and remain lit. • RTS and DTR are signals sent from the DTE device connected to the Data Port. • Run a lamp test from Menu-9, Diagnostics, to make sure the LEDs are working. • If the CTS LED still does not illuminate, call Digital Link Technical Support for assistance.
The DTE device shows intermittent errors.	• E1 Net error. • Wrong DTE protocols. • Bad DTE cable-poorly shielded cables- (EMI). • Timing configuration “slips.”	• You may have a timing error. • If you are timing the system from the DTE device, set the Data Port as the source of the timing signal. You need a special DTE cable to enable you to configure the system as a DTE device. The cable you use depends on your application (V.35 or X.21). • If the cable and the timing are correct, place a data test set at both ends of the E1 line in place of the DTE devices to see if the errors continue. • If the errors persist, call Digital Link Technical Support for assistance.

IPM Problems

Table 11-4 IPM Problems

Symptom	Probable Cause	Solution
The Solo Select In-band LED does not illuminate.	• Bad LED. • In-band has not been selected.	• Make sure the In-band Management mode is enabled. • Make sure the unit is in-band capable. • Run a lamp test from Menu-9 Diagnostics to make sure the LEDs are working. If the NET LED never lights, call Digital Link Technical Support for assistance.
The Solo Select In-band LED is constantly red. The unit is in In-band Management mode, but no packets or HDLC flags have been received from the network.		• Make sure the line from your service provider is connected to the Solo Select DA-15 or BNC socket connector. • Remove the line from the Solo Select and place a loopback plug on the network connector on the back of the Solo Select. Connect the DTE Port with test equipment that can generate HDLC (7E) flags. If the In-band LED changes to amber, troubleshoot your test setup. If the In-band LED on the Solo Select remains red, call Digital Link Technical Support for assistance.

A Specifications

Solo Select Equipment Model Numbers

Table A-1 gives the model numbers of the equipment available for purchase from Digital Link.

Table A-1 Solo Select Model Numbers *(1 of 2)*

Model Number	Description
Solo Select E1 DSU	
DL087E-075b DL2187E-075b	75-ohm network connector, Feature Keying, LMI Conditioning, and in-band management.
DL087E-120d DL2187E-120d	120-ohm network connector, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L2-075b DL2187E-L2-075b	75-ohm network connector with IPM (32 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L2-120d DL2187E-L2-120d	120-ohm network connector with IPM (32 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L3-075b DL2187E-L3-075b	75-ohm network connector with IPM (96 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L3-120d DL2187E-L3-120d	120-ohm network connector with IPM (96 DLCIs) with FRF.13 SLA, Fearuter Keying, LMI Coditioning, and in-band management.
DL087E-L2-075b with RMON-2 DL2187E-L2-075b with RMON-2	RMON 2 and IPM (32 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L2-120d with RMON-2 DL2187E-L2-120d with RMON-2	RMON 2 and IPM (32 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L3-075b with RMON-2 DL2187E-L3-075b with RMON-2	RMON 1 & 2 based performance monitoring (96 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DL087E-L3-120d with RMON-2 DL2187E-L3-120d with RMON-2	RMON 1 & 2 based performance monitoring (96 DLCIs) with FRF.13 SLA, Feature Keying, LMI Conditioning, and in-band management.
DTE Cables	**Cable to customer equipment**
DL1300--10	V.35, DB-25 plug to M-34 plug, 10 ft (3.0 m)
DL1301-01	V.35, DB-25 plug to M-34 socket, 1 ft (0.3 m)
DL1301-10	V.35, DB-25 plug to M-34 socket, 10 ft (3.0 m)

Table A-1 Solo Select Model Numbers *(2 of 2)*

Model Number	Description
DL1303-10	RS-449, DB-25 plug to DC-37 socket, 10 ft (3.0 m)
DL1310-10	X.21, DB-25 plug to DA-15 plug, 10 ft (3.0 m)
DL1311-10	X.21, DB-25 plug to DA-15 socket, 10 ft (3.0 m)
Network Cable	
DL1007	DA-15 plug to DA-15 plug, 7 ft (2.0 m)
DL1016	DA-15 plug to DA-15 socket, 7 ft (2.0 m)
DL1405-10	75-ohm coaxial network cable, 10 ft (3.0 m)[1]
Communications Cable	**Cable to terminal**
DL1081	DE-9 plug to DE-9 socket, 2 connections
DL1082	DE-9 plug to DE-9 socket, 4 connections
DL1083	DE-9 plug to DE-9 socket, 8 connections
Accessory Options	
DL1135-3	Rack-mount tray (mounts up to two units in 19-inch rack)

1. Two cables required for BNC networks.

TECHNICAL SPECIFICATIONS

Performance

Item	Rating
Maximum Packet Length	• 65535 bytes (for payload traffic) • 1536 bytes (for SNMP management) • 4096 bytes (for Frame Relay packets)
Maximum Packet Rate	11000 packets/sec duplex. Solo Select E1 DSU will discard packets over this amount

Network Interfaces

Item	Rating
Transmit bit rate	2.048 Mbps ± 50 ppm
Receive bit rate	2.048 Mbps ± 50 ppm
Line code	HDB3
Framing	ITU-TS G.704/CTR 12
Pulse shape	ITU-TS G.703/CTR 12
Jitter	ITU-TS G.823/CTR 12
Output level	ITU-TS G.703/CTR 12
Input level	0 to -26 dB
Impedance	75 ohm (BNC) unbalanced or 120 ohm (DA-15) balanced

Data Interfaces

Item	Specification
Interface types	V.35, X.21
Data rates	N x 64 kbps (N=1-32)
Line code	Normal only
Clocking options	SCTE, SCT, inverted SCT
System timing	Internal, Network, DATA port, External
Mode	DTE or DCE

Power Options

DL087E

Item	Specification
AC Power	Universal Power Supply 100 VAC to 240 VAC, 50/60 Hz, 0.5 A
DC Power	-48 VDC to -72 VDC, 0.5 A Through two-position Phoenix connector
Power Consumption	9 W maximum

DL2187E

Item	Specification
AC Power (Two Independent Power Supplies)	85 VAC to 132 VAC (110 V countries) at 60 Hz 170 VAC to 264 VAC (220 V countries) at 50 Hz
DC Power (Two independent source inputs)	–24 V to -60 V (-48 V nominal)
Power Consumption	9 W maximum per DSU card

Dimensions, Weight, and Connectors

Item	Specification
Dimensions (DL087E)	8.75 in Width (22.2 cm) x 1.75 in Height (4.4 cm) x 12 in Depth (30.4 cm)
Weight (DL087E)	6.5 lb (3.0 kg)
Network Connector	DA-15 socket or BNC
Data Port Connector	DB-25 socket
COMM Port Connector	DE-9 socket
Ethernet Management Interface (DL087E)	RJ-45 modular jack

Environmental

Item	Specification
Operating Temperature	0°C to 50°C (32°F to 122°F) ambient
Storage Temperature	-20°C to +60°C (-4°F to 140°F)
Relative Humidity	0% to 95% noncondensing
Maximum Altitude	15,000 ft (4.6 km)

Reliability

MTBF 12 years minimum

Regulatory

Aplicable European harmonized standards:

- 89/336/EEC
- 92/31/EEC
- 93/68/EEC
- 73/23/EEC
- 98/13/EC

Diagnostics

Item	Diagnostics And Tests
Loopbacks	E1 Network, E1 payload, DTE, Fractional E1 payload, Fractional DTE, NET/DTE
E1 Loopback Control	T1 set/reset codes, ANSI T1.403 Annex B
Test Patterns	1:1, 1:2, 1:4, 1:7, 3:24, QRW, all 0s, all 1s, two user-programmable 24-bit patterns, bit error injection
Network (E1) alarms	NET Carrier Loss NET Sync Loss NET AIS Reveived NET RAI Received CRC, CV, FE Threshold
DATA Ports	RTS Loss Alarm DTR Loss Alarm
Link-based test	Frame Relay and HDLC
Integrated Performance Monitoring	RMON-compliant monitoring for Frame Relay links: • Statistics • Events • Alarms • History

FRONT PANEL LEDS AND BUTTONS

The LEDs on the Solo Select E1 DSU front panel show the status of the DATA Port, Network Port, and diagnostic tests.

Figure A-1 shows the Solo Select E1 DSU front panel. Table A-2 describes the function of these buttons and LEDs.

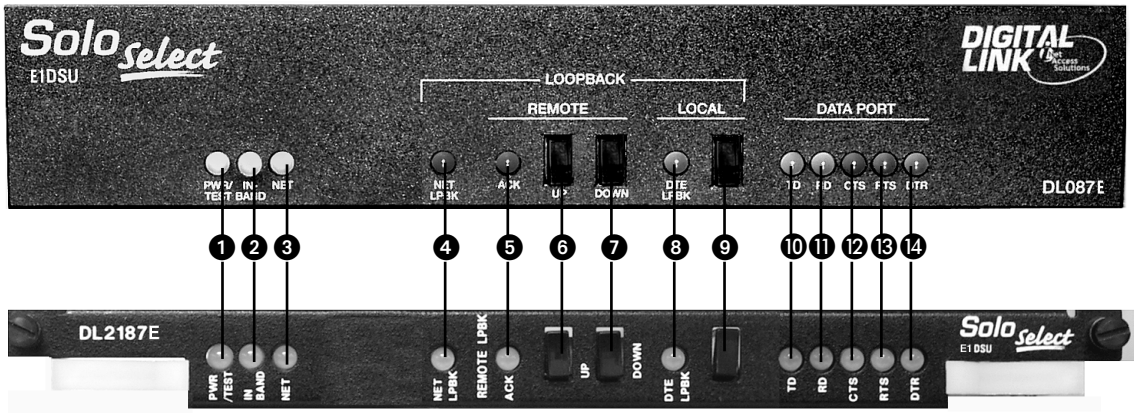


Figure A-1 Solo Select E1 DSU LEDs

Table A-2 Front Panel LEDs, Buttons, and Connectors *(1 of 2)*

LED/Button	State	Description
❶ PWR/TEST LED	Solid green	Power is on
	Off	Power is off
	Solid yellow	Test is running
	Blinking yellow	Self Test running
	Red	Self Test failed or alarm condition exists
	Alternating green/red	Software download in process

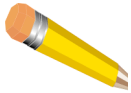
Table A-2 Front Panel LEDs, Buttons, and Connectors *(2 of 2)*

LED/Button	State	Description
❷ IN-BAND LED	Off	Unit is not in in-band Management mode
	Solid red	Unit is in in-band Management mode but there are no packets and no HDLC flags received from the network
	Solid yellow	Unit is in in-band Management mode but there is no in-band activity detected on the signal received from the network; only HDLC flags are detected
	Solid green	Unit is in in-band mode and in-band packets are detected from the network
	Green, blinking red	Unit is detecting errors in the in-band packets from the network
❸ NET LED	Solid green Off Solid red Alternating red/green Solid yellow	E1 network operation normal Loss of network signal Loss of frame CV, FE or CRC received RAI or AIS alarm received
❹ NET LPBK LED	Solid yellow	Net Loopback test running
❺ REMOTE LPBK ACK LED	Solid yellow	Loop Up/Loop Down codes received
❻ REMOTE LPBK UP button	N/A	Press to run Remote Loop Up test
❼ REMOTE LPBK DWN button	N/A	Press to run Remote Loop Down test after running Remote Loop Up test
❽ DTE LPBK LED	Solid yellow	DTE Loopback test is running
❾ DTE LPBK button	Blinking yellow	DTE Loopback test activated by DTE
	N/A	Press button to run NET/DTE Loopback test
❿ TD	Green	Pulses from DTE being detected
⓫ RD	Green	Pulses to DTE being detected
⓬ CTS	Yellow	Clear to send signal from unit to DTE is active
⓭ RTS	Yellow	Ready to send signal from DTE to unit is active
⓮ DTR	Yellow	Data terminal ready signal from DTE is active

DIP SWITCH SETTINGS

The S1 DIP switch bank determines the bandwidth allocation and DTE clock

The S2 DIP switch bank determines the unit's frame format, timing source, COMM Port baud rate, COMM Port parity and COMM Port word length settings.



NOTE: When DIP switch S2-12 is UP, the terminal interface settings override the DIP switch settings.

Table A-3 lists the COMM Port parameter options.

Table A-3 COMM Port Settings

Parameter	Options
Baud rate	1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400
Parity	Even, Odd or None
Word length	7 or 8
Stop bits	2

Figure A-2 presents the DSU / CSU DIP switch settings. Factory defaults are shown in bold.

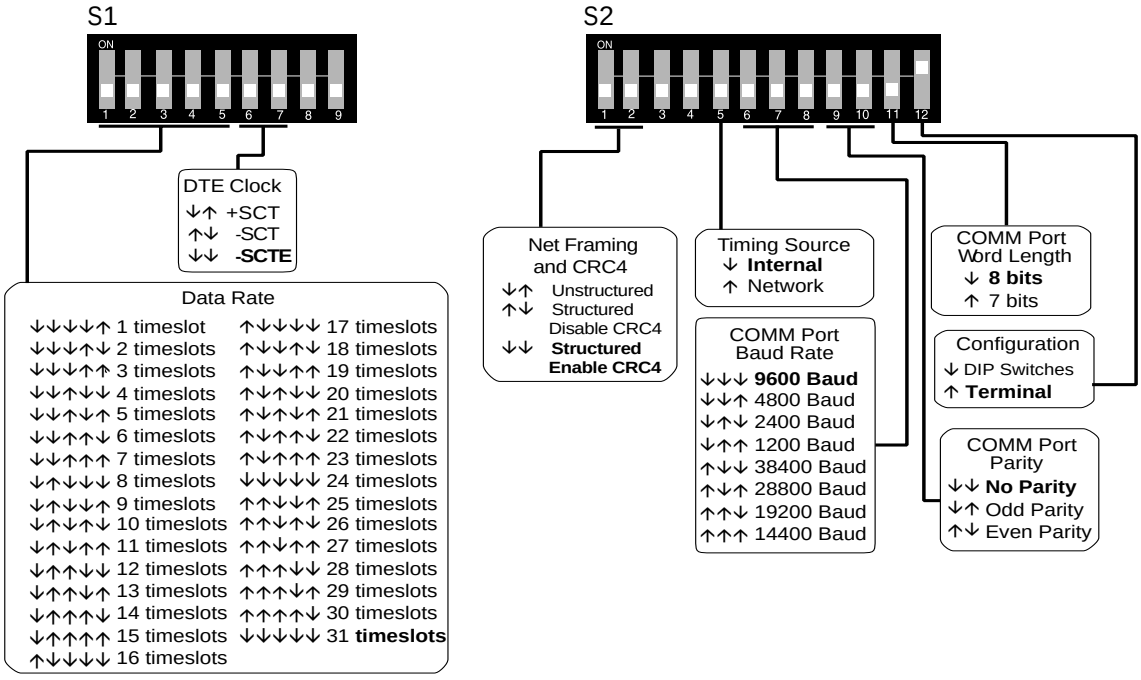


Figure A-2 Instructions for Setting DIP Switches

NOTE: A down arrow indicates that you should flip the switch to the off position. An up arrow indicates that you should flip the switch to the on position.

FACTORY DEFAULT CONFIGURATION

The factory default settings are listed in Table A-4.

Table A-4 Default Configuration *(1 of 3)*

Configuration	Factory Default Settings
Unit Configuration	
Unit ID	Unique ID assigned
Protect Mode	Disabled
In-band Management	Enabled
IPM	Enabled
Network Configuration	
Net Framing & CRC4	CRC4
Main Sync Source	Network
Alternate Sync Source	Internal
In-band Communications	4
Data Port Configuration	
Code	Normal
Loss	RTS
Mode	DCE
Format	V.35
Clock	+SCT
Timeslot Allocation	
Allocation Type	Contiguous (All bandwidth allocated to DATA01)
Diagnostic Configuration	
User Pattern 1	001100110011001100110011
User Pattern 2	000100010001000100010001
Alarm Configuration	
Block All Alarms	No
Net Carrier Loss Alarm	Enabled
Net AIS received Alarm (UA1)	Enabled
Loss of Signal from data port	Enabled
CRC Threshold Alarm	Disabled
Net Sync Loss Alarm	Enabled
Net RAI Received Alarm	Enabled
CV Threshold Alarm	Disabled
FE Threshold Alarm	Disabled

Table A-4 Default Configuration *(2 of 3)*

Configuration	Factory Default Settings
LMI Configuration	
LMI Enable	Enabled
LMI Type	Annex D
Polling Timer	10
Polling Count	10
Error Event	1
Error Monitored Event	1
Error Free Event	1
Error Free Monitored Event	1
DTE Response Timer	15
LMI Conditioning Configuration	
DTE Spoofing	Enabled
NET Spoofing	Enabled
Management DLCI Enable	Disabled
Management DLCI	989
Maintenance DLCI	990
Unit Location	(CPE)
SLA Configuration	
SLA Enable	Enabled
FDR/DDR Sample Period	1
FDR Threshold	0%
DDR Threshold	0%
Delay Period	1
Delay Packet Size	128
SNMP Configuration	
IP Address	0.0.0.0
1st NMS Address	0.0.0.0
1st Output Port	COMM
2nd NMS Address	0.0.0.0
2nd Output Port	COMM
3rd NMS Address	0.0.0.0
3rd Output Port	COMM
Get Community String	public
Set Community String	public
Trap Community String	public

Table A-4 Default Configuration *(3 of 3)*

Configuration	Factory Default Settings
COMM Port and Terminal Configuration	
Connection	Direct
Timeout when Logged on	Unlimited
Timeout when not Logged on	Unlimited
COMM Port (switch setting)	9600, 8, no parity, 2 stop bits
COMM Port DCD	Disabled
COMM Port XON/XOFF	Disabled
Terminal Mode	Enabled
Phone Number 1	Not Assigned
Phone Number 2	Not Assigned
Normal User Password	Not Assigned
Superuser Password	Not Assigned
Modem String Configuration	
Modem String 1	ATE0V0Z0
Modem String 2	ATV0E0Q0F1C1S0=43S3=13S4=10S7=30S12=50&C1&D0

CONFIGURATION WORKSHEET

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

Unit Configuration	
Unit ID	
Protect Mode	
Network Configuration	
Framing	
Main Synch. Source	
In-band Comm. Bit	
Line Impedance	
Alternate Synch. Source	
Data Port Configuration	
Loss	
Mode	
Format	
Clock	
Timeslot Allocation	
Allocation Type	
All Bandwidth Allocated to	
Diagnostic Configuration	
User Pattern 1	
User Pattern 2	
Alarm Configuration	
Block All Alarms	
CRC Threshold Alarm	
CV Threshold Alarm	
Net Carrier Loss Alarm	
Net AIS Received Alarm	
Loss of Signal from Data Port	
FE Threshold Alarm	

Net Sync Loss Alarm	
Net RAI Received Alarm	
SNMP Configuration	
IP Address	
1st NMS Address	
1st Output Port	
2nd NMS Address	
2nd Output Port	
3rd NMS Address	
3rd Output Port	
Get Community String	
Set Community String	
TRAP Community String	
Foward over IBC	
COMM Port and Terminal Configuration	
Connection	
Timeout when Logged on	
Timeout when not Logged on	
COMM Port	
COMM Port DCD	
Terminal Mode	
Phone Number 2	
Phone Number 1	
Normal User Password	
Superuser Password	
COMM Port XON/XOFF (read-only)	
Modem String Configuration	
String 1	

String 2	
Ethernet Configuration	
IP	
Subnet Mask	
Gateway	

B Cables and Connector Pin Assignments

E1 Network Pin Assignments

The Solo Select E1 DSU comes with both BNC connectors and a DA-15 pin connector. The pin assignments for the DA-15 network interface connector are listed in Table B-1.

Table B-1 Network Interface Pin Assignments

Pin	Signal
1	Send toward Network Tip (T1)
9	Send toward Network Ring (R1)
2	Frame Ground
3	Receive from Network Tip (T)
11	Receive from Network Ring (R)
4	Frame Ground
5, 6, 7, 8, 10, 12,13,14,15	NC

Channel 1 Data Cable Pin Assignments

The pin assignments for the V.35, M-34 to DB-25 DTE cable are listed in Table B-2.

Table B-2 V.35, M-34 to DB-25 DTE Cable Pin Assignments *(1 of 2)*

M-34	DB-25	Signal Name	Signal
T	16	RD B	To DTE
R	3	RD A	To DTE
S	14	SD B	From DTE
P	2	SD A	From DTE
E	6	DSR	To DTE
H	20	DTR	From DTE
K	25	Local Test	From DTE

Table B-2 V.35, M-34 to DB-25 DTE Cable Pin Assignments *(2 of 2)*

M-34	DB-25	Signal Name	Signal
B	7	Signal Ground	NA
D	5	CTS	To DTE
F	8	RLSD	To DTE
V	17	SCR A	To DTE
X	9	SCR B	To DTE
Y	15	SCT A	To DTE
AA	12	SCT B	To DTE
U	24	SCTE A	From DTE
W	11	SCTE B	From DTE
C	4	RTS	From DTE
A	NC	Frame Ground	NA

DB-25 to DC-37 Data Port Cable Pin Assignments

The pin assignments for the DB-25 to DC-37 Data Port cable are listed in Table B-3.

Table B-3 DB-25 to DC-37 Data Port Cable Pin Assignments *(1 of 2)*

DC-37	DB-25	Signal Name	Signal
17	24	TT A	From DTE
35	11	TT B	From DTE
7	4	RS A	From DTE
25	19	RS B	From DTE
6	3	RD A	To DTE
24	16	RD B	To DTE
4	2	SD A	From DTE
22	14	SD B	From DTE
11	6	DM A	To DTE
29	22	DM B	To DTE
9	5	CS A	To DTE
27	13	CS B	To DTE

Table B-3 DB-25 to DC-37 Data Port Cable Pin Assignments *(2 of 2)*

DC-37	DB-25	Signal Name	Signal
12	20	TR A	To DCE
30	23	TR B	To DCE
13	8	RR A	To DTE
31	10	RR B	To DTE
8	17	RT A	To DTE
26	9	RT B	To DTE
5	15	SCT A	To DTE
23	12	SCT B	To DTE
19	7	Signal Ground	NA
1	NC	Frame Ground	From DTE
18	25	TM	To DTE

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

The pin assignments for the V.35, M-34 to DB-25 DCE cable are listed in Table B-4.

Table B-4 V.35, M-34 to DB-25 DCE Cable Pin Assignments *(1 of 2)*

M-34	DB-25	Signal Name	Signal
S	16	Receive Data B	
P	3	Receive Data A	
T	14	Send Data B	
R	2	Send Data A	
H	6	Data Set Ready	
E	20	Data Term	
C	8	Ready	
W	9	Rx Line Sgnl Det	
U	17	Serial Clk Rx B	
V	24	Serial Clk Rx A	
X	11	Serial Clk Tx A	
F	4	Serial Clk Tx B	

Table B-4 V.35, M-34 to DB-25 DCE Cable Pin Assignments *(2 of 2)*

M-34	DB-25	Signal Name	Signal
B	7	Request To Send	
NC	NC		
NC	1		

RS-449, DC-37 to DB-25 DCE Cable Pin Assignments

Table B-5 describes the RS-449, DC-37 to DB-25 DCE cable pin assignments.

Table B-5 RS-449, DC-37 to DB-25 DCE Cable Pin Assignments

DC-37	DB-25
8	24
26	11
13	4
31	19
22	16
4	3
24	14
6	2
12	6
30	22
29	23
11	20
25	10
7	8
35	9
17	17
19	7
NC	1

COMMUNICATION PORT PIN ASSIGNMENTS

Table B-6 describes the COMM Port (DE-9) pin assignments.

Table B-6 Communication Port Pin Assignments

DE-9 Pins	Signal	Description
2	SD	Send Data (from Solo Select to terminal)
3	RD	Receive Data (from terminal to DSU)
8[1]	CTS	Clear To Send (I/O to all DSUs only)
5	SG	Signal Ground (bi-directional)
1	DCD	Carrier Detect

1. CTS is used by the Solo Select as a collision avoidance line. This line should not be connected at the CRT terminal end of the COMM Port cable.

DE-9 to DB-25 Adapter Pin Assignments

Digital Link can provide a DE-9 to DB-25 adapter for the Digital Link DE-9 COMM Port ribbon cable. The pinout assignments for the adapter are listed in Table B-7.

Table B-7 DE-9 to DB-25 Adapter Pinouts

DE-9	DB-25
3	2
2	3
7	4
8	5
6	6
5	7
1	8
9	23
4	21

C

Feature Keying

USING FEATURE KEYING

The Solo Select E1 DSU has been designed as a scalable network solution. Feature Keying makes it easy to upgrade your system software, adding additional features and functionality as needed. Using Feature Keying, you no longer need to add hardware, download software, or request a service call. As your requirements change, additional features can be unlocked with a 10-digit key purchased from Digital Link.

Menu-7, Features, provides a simple interface for adding or disabling:

- In-band Management capabilities (standard feature on all units).
- Integrated Performance Monitoring with support for either 32 or 96. DLCIs and Service Level Agreement reporting functions.
- RMON-2 capabilities.

Adding Features

To add any of the above features:

1. **Contact Digital Link and purchase a Key for the feature(s) you desire. You will need to provide your Solo Select E1 DSU serial number.**
2. **Select Menu-7, Features (Figure C-1).**

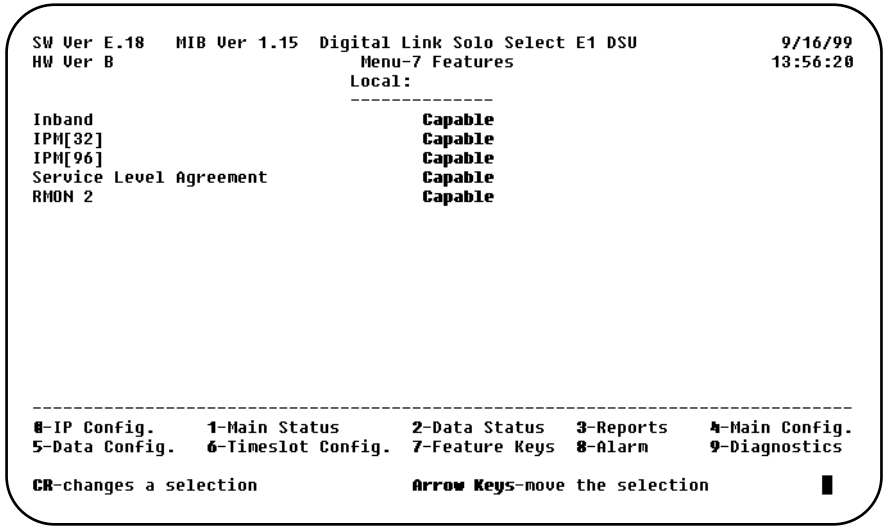


Figure C-1 Menu-7 Features

3. **Move the cursor to the feature you want to add.**
4. **Press the `Return` key.**

   The selected feature blinks.
5. **Press the `UP/DOWN` arrow keys to cycle through your options (Capable or Not Capable).**
6. **Press `Return` when the desired option is on screen.**

   At the bottom of the screen, the following message appears:

   `Please enter the key for the selected feature:`
7. **Type the 10-digit Key supplied by Digital Link.**
8. **Press `Return` to accept your changes.**
9. **Repeat steps 1 - 8 if additional features need to be added.**

Disabling Features

If, at any time, you would like to disable a feature, follow the same procedure used to enable it. When you reach Step 6, select `Not Capable`. When prompted to enter the key, use the Disable key provided by Digital Link when the feature was purchased.

D RMON-2 and Top Talkers

RMON-2

RMON-2, available as an optional add-on (see Appendix C, *"Feature Keying"*), provides additional SNMP reporting capabilities and the ability to identify the top bandwidth users.

When using RMON-2 with the Solo Select E1 DSU, the following RMON-2 groups are available:

- Protocol Directory
- Protocol Distribution
- Network Layer Host Table
- Application Layer Host Table

Protocol Directory

The RMON-2 Protocol Directory lists the protocols that the Solo Select E1 DSU (agent) is monitoring on the network. The Solo Select E1 DSU is capable of monitoring up to 16 protocols at a time. The default configuration includes the following protocols:

- IP
- ICMP
- UDP
- TCP
- FTP Control
- FTP Data
- Telnet
- SMTP (e-mail)
- DNS
- HTTP
- NETBIOS Name Service
- NETBIOS Datagram Service
- NETBIOS Session Service
- SNMP
- SNMP Trap
- Lotus Notes

The Solo Select E1 DSU uses the limited extensibility feature as defined in RFC 2021.

- The protocol directory can process up to 16 protocols
- Each protocol must be a “child protocol” of IP, UDP, or TCP

Using the limited extensibility feature, you can monitor any protocol that rides directly on top of IP, UDP or TCP. You may define a particular value to be recognized in the demultiplexing field of the parent protocol.

NOTE: Changes will be stored in volatile memory and not remembered after the unit has been reset or powered off.

Protocol Distribution

The Protocol Distribution group allows the Solo Select E1 DSU to discern how much traffic is being used by a specific protocol. When viewing this data in Choice View, you will be able to determine which protocols are the biggest users of the network’s bandwidth. This feature is referred to as Application Top Talkers.

Network Layer and Application Layer Host Tables

RMON-2 and the Solo Select E1 DSU allows you to discern which IP addresses are contributing the most traffic to your network, and further, to drill down and find out which applications on these addresses are generating the most activity. Identifying these Top Talkers gives you increased control over your network and bandwidth usage.

The Network Layer Host Table (nlHostTable) provides information on the 256 busiest IP addresses, while the Application Layer Host Table (alHostTable) lists how much traffic a particular IP address is sending using a particular protocol. When an IP address has been identified as one of the Top Talkers, periodically reading the alHostTable with Choice View, will reveal which application on that IP address is using the most bandwidth.

The table has been implemented so that:

- There is one hlHostControlTable entry configured at boot time. Only one entry can exist at a time. It can be set to monitor the entire E1 (default), or to monitor a specific DLCI.
- The hlHostControlNIMaxDesiredEntries is set to 256. The Solo Select E1 DSU builds a table to monitor the activity of 256 IP addresses across all DLCIs.
- The hlHostControlAIMaxDesiredEntries is set to 16. You can monitor 16 protocols at a time.

NOTE: If more than 256 IP addresses are detected on the network, the Solo Select E1 DSU replaces the least seen entry with the new entry in the nlHostTable.

E Software Download

Download Overview

The Download feature enables you to upgrade software, and includes the following capabilities:

- Separates the downloading operation from switching to new software, where these operations can be performed at separate times. You can program a time at which the unit can be initialized with the new code.
- The unit stores two images of executable code. You can switch between the two images.
- Enables downloading of the new software while the unit is operational and passing data. The code can be downloaded through:
    - Xmodem via the terminal user interface using an asynchronous connection.
    - TFTP from a network management station to the unit via SLIP using an asynchronous connection or through NET or DTE Ports in-band.
    - TFTP from a network management station to the unit via SLIP across the FDL.
    - TFTP via Ethernet.

Using the Download Utility

Use the Download Utility menu, accessed through Menu-4, Main Configuration, to download software updates. You may use the Xmodem protocol or TFTP. When switching from one executable image to another, the operational software in the unit is restarted, which results in a temporary service interruption lasting from one to two minutes.

During the download sequence, the Power/Test LED will blink alternating red and green.

Setting Up for Xmodem

To download new software:

1. **Insert the new software diskette in the drive of the PC.**
2. **From Menu-4 Main Configuration, type F (as instructed in the menu for FLASH Download) to start the download session.**
3. **Menu 4F (Software Download Menu) will appear**
4. **Select the Protocol (Xmodem or TFTP) to Xmodem under** `Protocol`**.**
5. **Press A to start the download.**

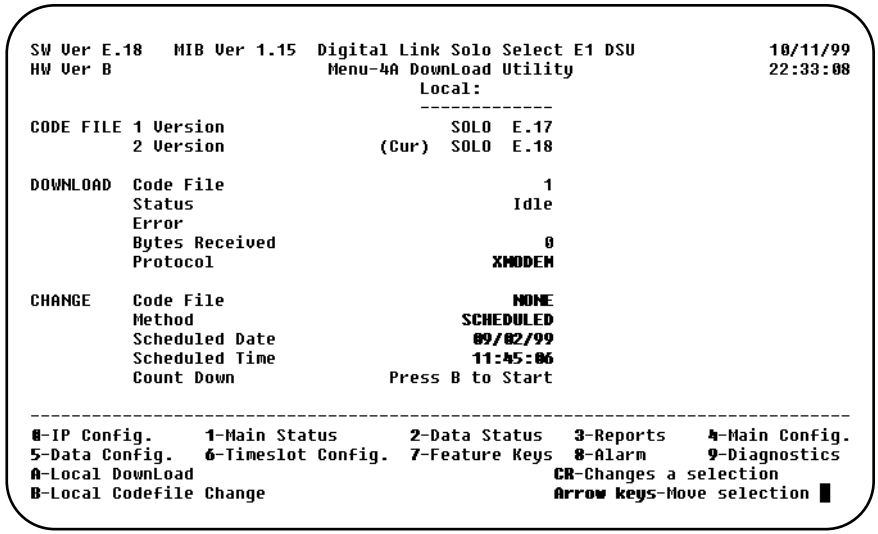


Figure E-1 Menu-4F Software Download

The parameter groups for the Download Utility are given in Table E-1.

Table E-1 Download Utility Groups *(1 of 2)*

Group	Field	Description
CODE FILE	1 Version	Version of the operational software residing in Code-File 1. This field reads “Absent” if there is no operational software stored in this code-file or if the operational software is corrupted.
	2 Version	Version of the operational software residing in Code-File 2. This field reads “Absent” if there is no operational software stored in this code-file or if the operational software is corrupted.

Table E-1 Download Utility Groups *(2 of 2)*

Group	Field	Description
DOWNLOAD	Code File	The Code-File that will receive the downloaded operational-code, and that is currently not operational.
	Status	Shows the status of the download, and is either Idle, Start, In Progress, Verifying, Success, or error. This field is updated after an Xmodem download to the local unit. If the status is "Error", then a number associated with the failure indicates the specific problem.
	Error	Indicates a specific problem during download.
	Bytes Received	Shows the number of bytes received during the download. This field is updated after an Xmodem download to the local unit.
	Protocol	Protocol used for the download. Choices are Xmodem and TFTP.
CHANGE	Code File	Code-File to be switched over when the scheduled time is reached. Choices are NONE, 1, and 2. NONE indicates that no change is desired, and can be used to cancel a scheduled change.
	Method	Either SCHEDULE or NOW. NOW indicates that the change occurs immediately, and SCHEDULE indicates that the change occurs when the actual time reaches the scheduled time.
	Scheduled Date	Expressed in DD/MM/YY (day, month, and year) at which the switch-over will occur.
	Scheduled Time	Expressed in HH:MM:SS (hours, minutes, seconds) at which the switch-over will occur. The device uses a 24-hour clock.
	Count Down	Shows the time interval HH:MM:SS (hours, minutes, seconds) for the switch-over to occur after it has been initiated. If the switch-over has not been initiated, then it shows "Press 2 To Start" or "Press 4 To Start" for the local unit and the remote unit, respectively.

The menu and download options for the Download Utility are given in Table E-2.

Table E-2 Menu and Download Options

Menu	Description
4-Return to Menu 4	Returns to Menu-4 Main Configuration.
A-Local Download	Triggers the download to the local unit.
B-Local Code-File Change	Triggers the change of Code-File in the local unit.

Setting Up for TFTP

Use these steps to set up for TFTP for the Solo Select E1 DSU:

1. **Assign the unit an IP address and IP mask using Menu-0.**
2. **Enable the SNMP using Menu-0.**
3. **Set the download protocol in the Download utility to TFTP.**
4. **Set "Forward Over FDL" in Menu-0 to Enabled for the local unit only.**
5. **Set "Connection" in Menu-8C, Miscellaneous Management Configuration, to FDL for the remote unit only.**
6. **Press 3 in the Download Utility menu.**
7. **Start TFTP for the Network Management System, and indicate binary mode.**

Abnormal Termination

The following list summarizes scenarios during which the downloading process may fail:

- Software load is corrupted.
- Transmission errors.
- Failure of the downloading computer, the modem (if one is used), the connection between the downloading computer and the unit or a failure of the unit, which also includes a power failure.
- User aborted the download process.
- Time-out built into the Xmodem or TFTP protocols.

Typically, abnormal termination of the download process leaves the Code File in a non-usable state. In this case, the Download Utility will indicate that the Code File is unavailable.

Error Indicators

If the download utility fails, an error indicator appears in the Download Utility menu. Depending on the error indicator listed below in Table E-3, you can take the following action or at least be apprised of the condition:

Table E-3 Download Utility Error Indicators *(1 of 2)*

Error Type	Error Indicator	Description (Message)
General	1	Software error. Note the specific error information, and call Digital Link Technical Support.
	2	Load Received is corrupted.
	3	Load Received has invalid embedded length.
	4	Load Received is invalid for this unit.
Hardware	5	Flash-ROM Not Supported.
	6	Flash-ROM With Protected Sector.
	7	Flash-ROM Failed To Erase.
	8	Flash-ROM Failed To Program.
Xmodem	9	Xmodem Abort Received.
	10	Xmodem Data Timeout.
	11	Xmodem Invalid Sequence.
	12	Xmodem Unexpected Data.

Table E-3 Download Utility Error Indicators *(2 of 2)*

Error Type	Error Indicator	Description (Message)
	13	Xmodem Packet Timeout.
	14	Xmodem Packet Corrupted.
	15	Xmodem Failed to Acknowledge.
	16	Xmodem Reserved.
	17	Xmodem Reserved.
	18	Xmodem Reserved.
TFTP	19	TFTP Error Packet Received
	20	TFTP Invalid Mode.
	21	TFTP Invalid Opcode.
	22	TFTP Unexpected Opcode Sequence.
	23	TFTP Invalid Packet Length.
	24	TFTP Invalid Data Packet Sequence.
	25	TFTP Request Timeout.
	26	TFTP Data Packet Timeout.
	27	TFTP Failed to Acknowledge.

Download Aborted by User

You may abort the Xmodem downloading process by pressing **Ctrl-x**.

To perform the downloading abort, instruct the terminal emulator program to abort the Xmodem download process and return to terminal mode. The specific procedure depends on the terminal emulator program being used. The recovery is the same as explained under Abnormal Termination.

With TFTP, the procedure to discontinue the TFTP session depends on the TFTP setup. Again, the recovery is the same as explained under Abnormal Termination.

F Menus

This appendix lists all of the Solo Select E1 DSU Menus and their descriptions.

Figure F-1 Solo Select E1 DSU Menus *(1 of 3)*

Menu Number	Name	Description
0	IP Configuration	Selection menu for Interface, SNMP Configuration, and DLCI table.
0A	Interface Configuration	IP and In-band Configuration Settings.
0B	SNMP Configuration	SNMP Traps and Communications Settings.
0C	Ethernet Configuration	IP Address, IP Mask, and IP Gateway (standalone only).
0E	Performance Monitoring Configuration	Performance Monitoring Configuration Settings.
0F	LMI Configuration	Enable LMI and set polling and error parameters.
0G	LMI Conditioning Configuration	Enable spoofing and management status.
0H	SLA Configuration	Enable SLA and set SLA parameters.
1	Main Status	Connection and Error Status. General status for Net, DTE, and unit status.
2	Data Status	Data Port Status. Valuable for remote multiple DTE ports.
3	Reports	Reports Main Menu.
3A	Carrier Reports	Carrier Reports submenu.
3AA	Carrier Registers, Current Interval	Real-time statistics for current interval.
3AB	Carrier Registers, Total Over 24 Hours	Net statistics in for last 24 hours. Summary.
3AC	Carrier Registers, 24 Hour Detail	Net statistics for last 24 hours in 15-minute intervals.
3AE	Carrier Registers, 4 Day Detail	Net statistics in 384 15-minute intervals.
3AF	Carrier Registers, 14 Day Summary	Net statistics for last 4 days. Summary.
3B	User Reports	User Reports submenu.
3BA	User Registers, Current Interval & Lifetime	Net statistics for the current interval and lifetime summary.
3BB	User Registers, 24 Hour Detail	Net statistics in 96 15-minute intervals.

Figure F-1 Solo Select E1 DSU Menus *(2 of 3)*

Menu Number	Name	Description
3BC	User Registers, 4 Day Detail	Net statistics in 384 15-minute intervals.
3BE	User Registers, 14 Day Summary	Net statistics for last 4 days. Summary.
3C	In-band Reports	Inband Reports submenu.
3CA	In-band DTE Registers, 24 Hour Detail	Frame Relay activity on DTE port. 96 15-minute intervals.
3CB	Inband Network Registers, 24 Hour Detail	96 15-minute registers for Cisco HDLC or Frame Relay statistics.
3E	SLA Reports	SLA Reports menu.
3EA	DLCI Outages Report	Per DLCI Outage report. Includes excluded outages.
3EB	Frame Transfer Delays	Per DLCI report on delays.
3EC	Local Transmit Data Delivery Report	Per DLCI report on delivered packets.
3EE	Local Receive Data Delivery Report	Per DLCI report on received packets.
3EF	Local Transmit Frame Delivery Report	Per DLCI report on delivered Frames.
3EG	Local Receive Frame Delivery Report	Per DLCI report on received frames.
3M	Delay Monitoring Registers, Lifetime	Test results from Menu-9C
3Z	Event Log	Alarm History log.
4	Main Configuration	Network configuration menu (frame/timing).
4F	Download Utility Screen	Software download options.
5	Data Configuration	DTE/DCE configuration menu (serial port protocol, LOS conditions, hand shaking, DTE docking).
6	Timeslot Configuration	E1 DSU channel assignment.
7	Features	Feature Keying allows you to enable or disable key features.
8	Alarm	Alarm Selection Menu.
8A	Alarm Configuration	Allows user to enable/disable alarms and to set alarm thresholds.
8C	Miscellaneous Management Configuration	Dial out, passwords, alarm port settings.
8E	Modem Initialization Strings	Setting menu for modem initialization strings.
9	Diagnostics	Testing selection menu.

Figure F-1 Solo Select E1 DSU Menus *(3 of 3)*

Menu Number	Name	Description
9A	Physical Layer Diagnostics	E1 Net testing by patterns, loop, selecting loop codes on/off.
9B	Link Layer Diagnostics	Menu for In-band testing.
9C	Delay Monitoring Configuration	Configuration for Delay Monitoring. Results are displayed in Menu-3M.

MENU-0 CONFIGURATION

Menu-0 is the selection menu for Interface and SNMP configuration, as shown in Figure F-2.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-0 IP Configuration             10:26:24



          Please select a menu:

                  A.  Interface Configuration
                  B.  SNMP Configuration
                  C.  Ethernet Configuration
                  E.  Performance Monitoring Configuration
                  F.  LMI Configuration
                  G.  LMI Conditioning Configuration
                  H.  SLA Configuration



--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-selects a menu                    Up/Down Arrow Keys-move the selection
```

Figure F-2 Menu-0 Configuration

MENU-0A INTERFACE CONFIGURATION

Menu-0A, shown in Figure F-3, is the menu to use for IP and In-band configuration settings. The parameters are defined in Table F-1.

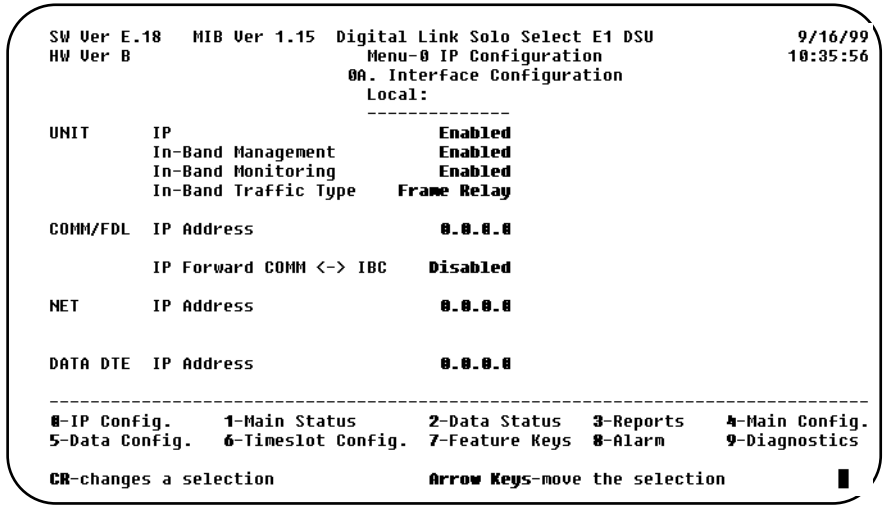


Figure F-3 Menu-0A Interface Configuration

Table F-1 Interface Configuration Parameters *(1 of 2)*

Primary Parameter	Parameter - Options	Definition	Default
UNIT	IP	Enables/disables the Solo Select's management via IP (Telnet, ping, SNMP).	Disabled
	In-band Management	Enables or disables in-band management of the Solo Select.	Disabled
	In-band Monitoring	Enables or disables in-band monitoring of the Solo Select.	Enabled
	In-band Traffic Type	Can be set to Frame relay or Cisco HDLC.	Frame Relay

Table F-1 Interface Configuration Parameters *(2 of 2)*

Primary Parameter	Parameter - Options	Definition	Default
COMM/FDL	IP Address	The IP Address for the Solo Select COMM Port or FDL in standard IP form (nnn.nnn.nnn.nnn).	0.0.0.0
	IP Forward COMM <-> IBC	Enables or disables for Forward Over IBC feature of the Solo Select. **Note:** This feature will not function in Unstructured mode.	Disabled
NET	IP Address	The IP address that is responded to for in-band traffic received from the NET (E1 line).	0.0.0.0
DATA/DTE	IP Address	The IP address that is responded to for in-band traffic received from the DTE (serial line).	0.0.0.0

MENU-0B SNMP CONFIGURATION

Menu-0B, shown in Figure F-4, is the menu which shows the SNMP traps and communication settings. The parameters are defined in Table F-2.

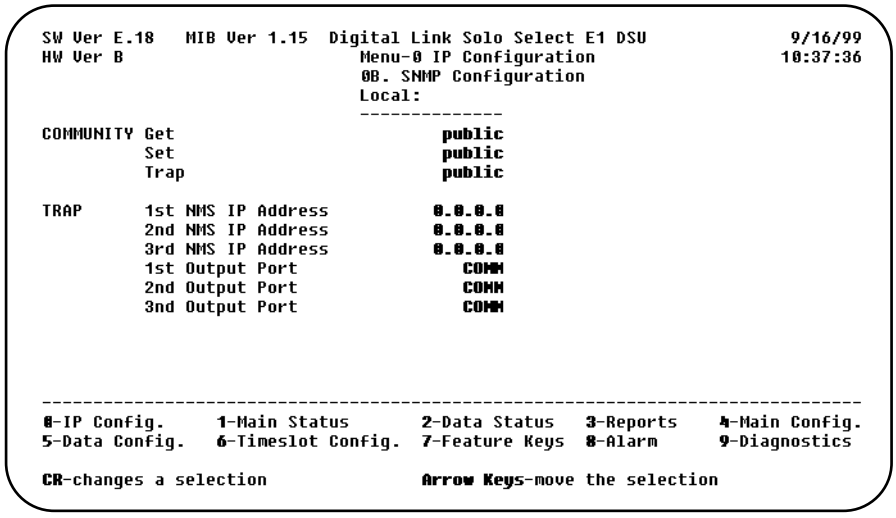


Figure F-4 Menu-0B SNMP Configuration

Table F-2 Menu-0B Parameters *(1 of 2)*

Primary Parameters	Parameter—Options; Definition	Default
COMMUNITY	**Get** (text string) Enter an alphanumeric text string (max—32 characters). The Solo Select SNMP agent uses this text string to check GET requests for the SNMP configuration from the SNMP management station.	public
	Set (text string) Enter an alphanumeric text string (max—32 characters). The Solo Select SNMP agent uses this text string to check SET requests from the SNMP management station to set the SNMP configuration.	public
	Trap (text string) Enter an alphanumeric text string (max—32 characters) which the Solo Select SNMP agent inserts in SNMP traps it sends to the SNMP management stations.	public

Table F-2 Menu-0B Parameters *(2 of 2)*

Primary Parameters	Parameter—Options; Definition	Default
TRAP	**1st NMS IP Address**—nnn.nnn.nnn.nnn Enter the IP address of the first Network Management Server. The Solo Select sends trap messages to this server.	0.0.0.0
	2nd NMS IP Address—nnn.nnn.nnn.nnn nnn = 0 through 255 Enter the IP address of the second Network Management Server. The Solo Select sends trap messages to this server.	0.0.0.0
	3rd NMS IP Address—nnn.nnn.nnn.nnn Enter the IP address of the third Network Management Server. The Solo Select sends trap messages to this server. **Note:** If all three trap NMS IP addresses are set, the Solo Select sends a trap to all three network management servers.	0.0.0.0
	1st DLCI Output Port—COMM, IBC, DTE, NET, Ethernet Selects the DLCI (if applicable) and port over which the Solo Select can send a trap to the 1st NMS IP address.	COMM
	2nd DLCI Output Port—COMM, IBC, DTE, NET, Ethernet Selects the DLCI (if applicable) and port over which the Solo Select can send a trap to the 1st NMS IP address.	COMM
	3rd DLCI Output Port—COMM, IBC, DTE, NET, Ethernet Selects the DLCI (if applicable) and port over which the Solo Select can send a trap to the 1st NMS IP address.	COMM

MENU-0C ETHERNET CONFIGURATION

The Ethernet Configuration menu (Figure F-5) allows you to set the IP addresses that will be used in the management of the Solo Select via the Ethernet Management Interface. This screen is only available on standalone models.

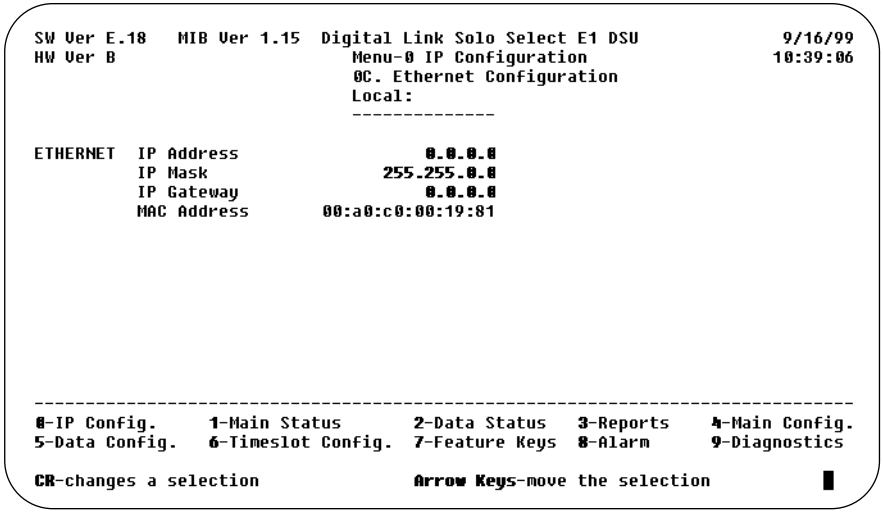


Figure F-5 Menu-0C Ethernet Configuration

Table F-3 Menu-0C Parameters

Parameter	Default
IP Address–The IP address used by the Ethernet network to connect to the LAN.	0.0.0.0
IP Mask–32-bit subnet mask shared by all devices on the same network.	0.0.0.0
IP Gateway–A router or deice through which other networks are accessed.	0.0.0.0

Menu-0E Performance Monitoring Configuration

Configuration allowing Integrated Performance Monitoring is performed in Menu-0E, shown in Figure F-6. The parameters are defined in Table F-4.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU             9/16/99
HW Ver B                         Menu-0 Configuration                   10:40:46
                      0E. Performance Monitoring Configuration


                              Delay                 Far End          Far End
      Dlci          Cir   Threshold      Status        Dlci       IP Address
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0
         0            0           0           0           0          0.0.0.0

                                Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status        2-Data Status  3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.   7-Feature Keys 8-Alarm       9-Diagnostics
n-selects next page                   p-selects previous page
CR-changes a selection                Arrow keys-move selection               █
```

Figure F-6 Menu-0E Performance Monitoring Configuration

Table F-4 Menu-0E Parameters *(1 of 2)*

Parameter	Default
DLCI - The identifier for a virtual circuit. DLCIs will be autodiscovered if LMI is configured. If LMI is not configured, then the DLCIs must be entered manaully. To change a DLCI's status to deleted, enter a zero for the DLCI number. If LMI is enabled, and the DLCI still exists, it will be discovered again and its status returned to active.	0
CIR - The Committed Information Rate. If LMI Revision 1 is being used, this will be discovered; otherwise, you will need to enter this for each DLCI.	0

Table F-4 Menu-0E Parameters *(2 of 2)*

Parameter	Default
Delay Threshold - The range is 0 to 64000 milliseconds. When the reound trip delay over the PVC exceeds this value: • An event will be registered in the Event Log • A trap will be sent to the NMS (if configured) • An alarm message will be displayed on the termainal user interface.	0

MENU-0F LMI CONFIGURATION

Menu-0F, as shown in Figure F-7, allows you to configure your device for LMI. Parameters and default settings for Menu-0F are presented in Table F-5.

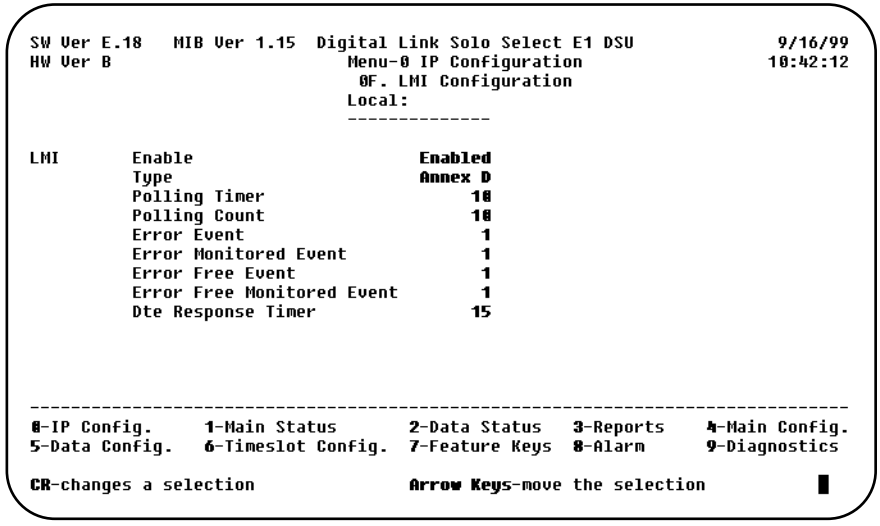


Figure F-7 Menu-0F LMI Configuration

NOTE: In order to collect SLA data, you must have a Solo Select device at both ends.

Table F-5 Menu-0F Parameters *(1 of 2)*

Parameter	Default
Enable - Use this option to enable or disable LMI Conditioning	Enabled
Type - Select between Annex A, Annex D, and LMI Revision 1 (FRF 1.0)	Annex D
Polling Timer - Set the value to a number between 5 and 30 seconds, in increments of 5. This parameter sets the interval between Link Integrity Verification Messages. The value corresponds to T391 standards.	10
Polling Count - Set the count to an integer between 1 and 255. This paremeter sets the number of polling cyclees for Link Integrity Verification before the unit generates the Full Status request.	6

Table F-5 Menu-0F Parameters *(2 of 2)*

Parameter	Default
Error Event - Set this value to an integer between 1 and 10. The value represents the number of errors that can occur on the LMI link in LMI Error Monitored Events before reporting that the interface is down. Applies to the Network and DTE port.	1
Error Monitored Event - Set this value to an integer between 1 and 10. This parameter sets the number of events that are used with the LMI Error Event to define the error ratio that is used to report that the LMI link is down.	1
Error Free Event - Set this value to an integer between 1 and 10. This parameter sets the number of error-free messages that must be received in LMI Error Free Monitored Events prior to declaring an interface is up.	1
Error Free Monitored Event - Set this value to an integer between 1 and 10. This parameter sets the number of events that are used with the LMI Error Free Event to define the error ratio that is used to report that the LMI link is up.	1
DTE Response Timer - Set this value to an integer between 5 and 30, in increments of 5. This parameter sets the number of seconds between the sending of a STATUS ENQUIRY and the receipt of a response. Applies to the DTE.	15

MENU-0G LMI CONDITIONING CONFIGURATION

Menu-0G provides LMI status information as well as allowing your to set spoofing, and enable Management and Maintenance DLCIs.

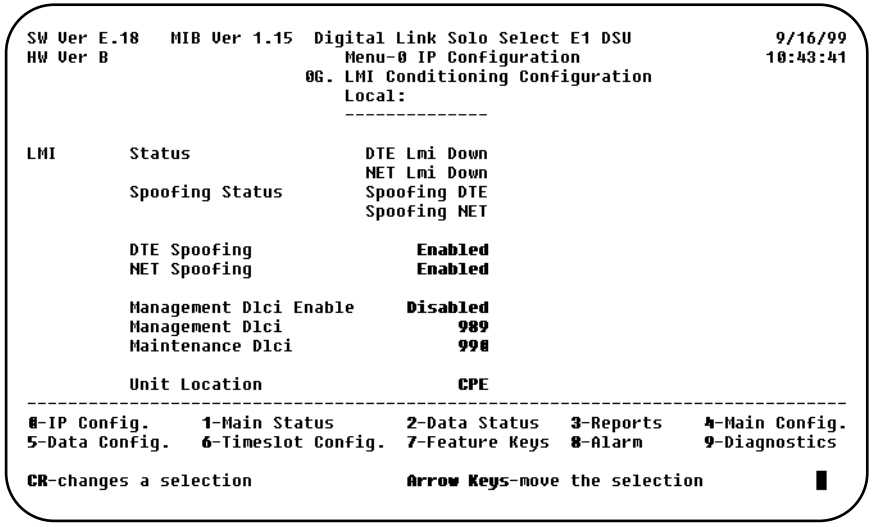


Figure F-8 Menu-0G LMI Conditioning Configuration

Table F-6 Menu-0G Parameters *(1 of 2)*

Parameter	Default
DTE Spoofing - Set to Enabled or Disabled. If enabled, spoofing will occur automatically.	Enabled
NET Spoofing - Set to Enabled or Disabled. If enabled, spoofing will occur automatically.	Enabled
Management DLCI Enable - Set to Enabled or Disabled. This parameter, when enabled, specifies that the Management DLCI is to be used.	Disabled
Management DLCI - Set to a number between 16 and 991. This is the number of the Management DLCI and it must not be the same as the number used for the Maintenance DLCI.	989
Maintenance DLCI - Set to a number between 16 and 991. This is the number of the Maintenance DLCI and it must not be the same as the number used for the Management DLCI.	990

Table F-6 Menu-0G Parameters *(2 of 2)*

Parameter	Default
Unit Location - CPE (Customer Premise equipment) or CO (Carrier Office). If the Unit Location is CPE, then Status Enquiry messages are received via the DTE port and Status Reponses are received via the Net port. If the Unit Location is CO, then Status Enquiry messages are received via the Net port and Status Responses are received via the DTE port.	CPE

MENU-0H SLA CONFIGURATION

Menu-0H, Figure F-9, allows you to configure your device to collect SLA data. Menu-0H parameters are presented in Table F-7.

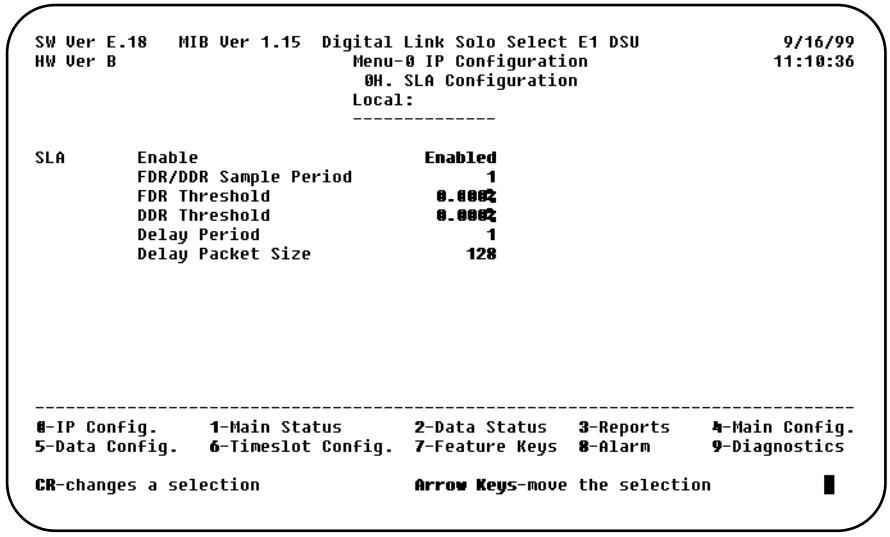


Figure F-9 Menu-0H SLA Configuration

Table F-7 Menu-0H Parameters

Parameter	Default
Enable - To collect SLA data, this field must be enabled	Enabled
FDR/DDR Sample Period - Set the sampling period between 1 minute and 255 minutes. The time period represents the time interval between requests to the far end of the PVC.	1
FDR Threshold - Set this threshold between 0% and 100%. 0% means this feature is disabled. Configurable to one thousandth of a percent (for example, 99.999%). When the FDR falls below this threshold: • An event is sent to the Event Log • A trap will be sent to the NMS (if configured) • An alarm message will be displayed on the Terminal User Interface.	0%

Table F-7 Menu-0H Parameters

Parameter	Default
DDR Threshold - Set this threshold between 0% and 100%. 0% means that this feature is disabled. Configurable to one thousandth of a percent (for example, 99.999%). When the DDR falls below this threshold: • An event is sent to the Event Log • A trap will be sent to the NMS (if configured) • An alarm message will be displayed on the Terminal User Interface	0%
Delay Period - Set the Delay Period between 1 minute and 255 minutes. This figure represents the time interval between delay measurements on each PVC.	1
Delay Packet Size - Set the Delay Packet Size between 50 bytes and 1500 bytes. This figure represents the size of Request and REsponse packets used to measure delay.	128

MENU-1 MAIN STATUS

The main status menu, shown in Figure F-10, shows the connection and error status of the unit.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                      Menu-1 Main Status                   11:23:50
                               Local:
                               --------------
Unit Status                          No Clock

Network Status                  Loss of Signal
                               Inband No Flags

DATA DTE Status                 Loss Of Signal


Error Free Seconds                     100.0%
Errored Seconds Ratio                    0.0%
Severely Errored Seconds Ratio           0.0%
Background Block Error Ratio             0.0%
Inband Net CRC Errors                       0
Inband DTE CRC Errors                       0
Inband Rx/Tx BW Util.                0.0%/0.0%
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

C-clears the counters
```

Figure F-10 Menu-1 Main Status

MENU-2 DATA STATUS

Menu-2 Data Status, shown in Figure F-11, illustrates the current status of the local Solo Select's single data port and the remote unit's data port(s).

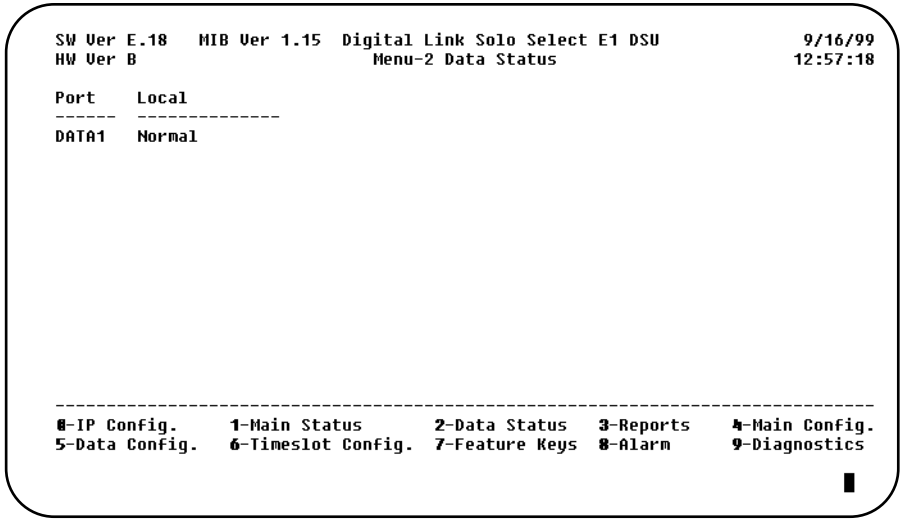


Figure F-11 Menu-2 Data Status

MENU-3 REPORTS

Menu-3 is a selection menu for report categories. Menu-3 is shown in Figure F-12.

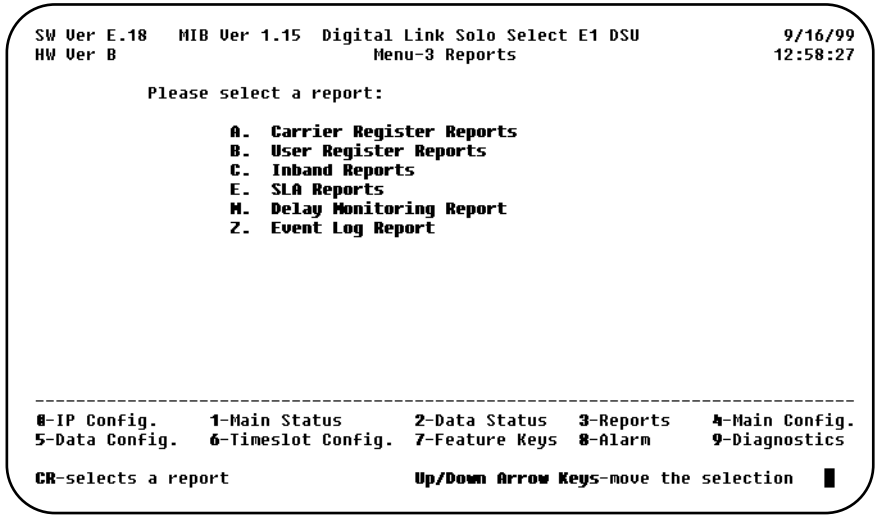


Figure F-12 Menu-3 Reports

MENU-3A CARRIER REPORTS

Menu-3A is the carrier registers report submenu. Menu-3A is shown in Figure F-13.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3A Carrier Reports             12:59:48

          Please select a report:

                  A.  Carrier Registers, current interval
                  B.  Carrier Registers, total over 24 hours
                  C.  Carrier Registers, 24 hour detail
                  E.  Carrier Registers,  4 day detail
                  F.  Carrier Registers, 14 day summary

--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-selects a report                 Up/Down Arrow Keys-move the selection
```

Figure F-13 Menu-3A Carrier Registers, Current Interval

MENU-3AA CARRIER REGISTERS, CURRENT INTERVAL

Menu-3AA, Figure F-14, is the carrier register report for the current interval.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                         Menu-3 Reports                      13:01:46
                    3AA. Carrier Registers, Current Interval

                         Local:
                         ------------
  Unavailable Signal State          No


  Current Interval Timer           102

  Errored Seconds (ES)               0
  Unavailable Seconds (UAS)          0
  Severely Errored Seconds (SES)     0
  Background Block Error (BBE)       0
  Loss Of Frame Count (LOF)          0
  Controlled Slip Seconds (CSS)      0


--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
```

Figure F-14 Menu-3AA Carrier Registers, Current Interval

MENU-3AB CARRIER REGISTERS, TOTAL OVER 24 HOURS

Menu-3AB is the carrier registers report summary for the last 24 hours.

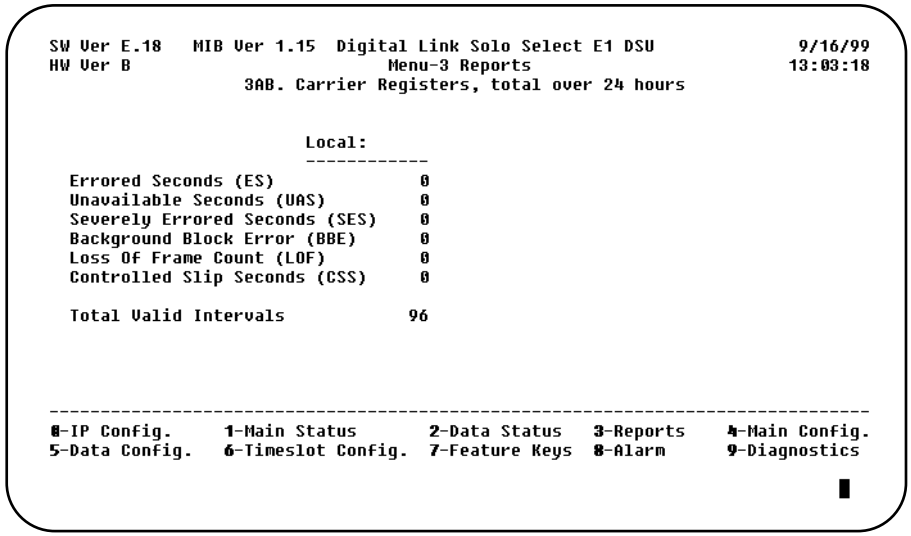


Figure F-15 Menu-3AB Carrier Registers, Total Over 24 Hours

MENU-3AC CARRIER REGISTERS, 24 HOUR DETAIL

Menu-3AC presents carrier registers in 96 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                          Menu-3 Reports                       13:04:30
                      3AC. Carrier Registers, 24 hour detail
                     Local:
Local Interval       ------------
Start          ES  UAS  SES     BBE  LOF  CSS
12:45           0    0    0       0    0    0
12:30           0    0    0       0    0    0
12:15           0    0    0       0    0    0
12:00           0    0    0       0    0    0
11:45           0    0    0       0    0    0
11:30           0    0    0       0    0    0
11:15           0    0    0       0    0    0
11:00           0    0    0       0    0    0
10:45           0    0    0       0    0    0
10:30           0    0    0       0    0    0
10:15           0    0    0       0    0    0
10:00           0    0    0       0    0    0
                                 Page 1 of 8
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                                        
```

Figure F-16 Menu-3AC Carrier Registers, 24 Hour Detail

MENU-3AE CARRIER REGISTERS, 4 DAY DETAIL

Menu-3AE, Figure F-17, presents carrier registers in 384 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                              Menu-3 Reports                     13:06:04
                      3AE. Carrier Registers, 4 day detail
                             Local:
Local Interval               --------------
Start         ES   UAS  SES     BBE  LOF  CSS
12:45          0    0    0       0    0    0
12:30          0    0    0       0    0    0
12:15          0    0    0       0    0    0
12:00          0    0    0       0    0    0
11:45          0    0    0       0    0    0
11:30          0    0    0       0    0    0
11:15          0    0    0       0    0    0
11:00          0    0    0       0    0    0
10:45          0    0    0       0    0    0
10:30          0    0    0       0    0    0
10:15          0    0    0       0    0    0
10:00          0    0    0       0    0    0
                                 Page  1 of 32
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status    3-Reports      4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys   8-Alarm        9-Diagnostics

Up/Down Arrow Keys-scroll the registers
```

Figure F-17 Menu-3AE Carrier Registers, 4 Day Detail

MENU-3AF CARRIER REGISTERS, 14 DAY SUMMAY

Menu-3AF, Figure F-18, presents a 14-day carrier register summary.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:07:34
                    3AF. Carrier Registers, 14 day summary

                              Local:
                              --------------

              ES  UAS  SES     BBE  LOF  CSS
Day  -1        0    0    0       0    0    0
Day  -2        0    0    0       0    0    0
Day  -3        0    0    0       0    0    0
Day  -4        0    0    0       0    0    0
Day  -5        0    0    0       0    0    0
Day  -6        0    0    0       0    0    0
Day  -7        0    0    0       0    0    0


                                 Page 1 of 2
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                                        
```

Figure F-18 Menu-3AF Carrier Registers, 14 Day Summary

MENU-3B USER REPORTS

Menu-3B, Figure F-19, presents a submenu of user register reports.

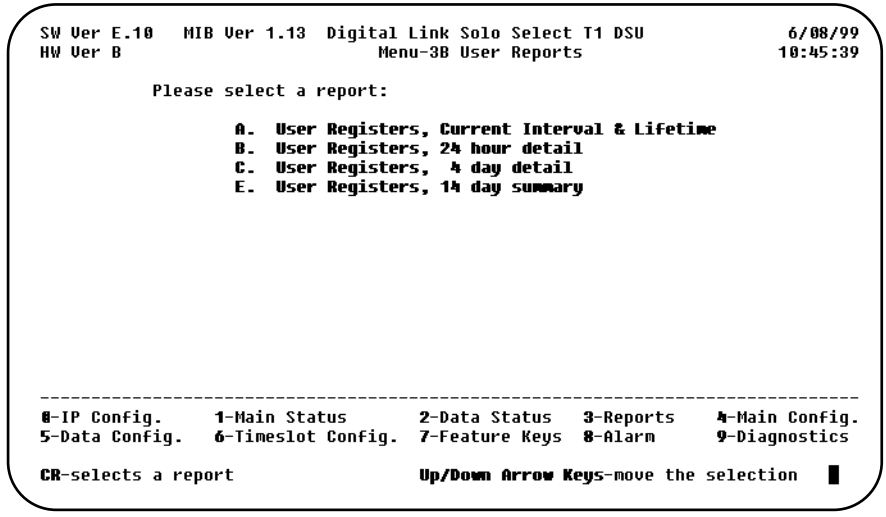


Figure F-19 Menu-3B User Reports

MENU-3BA USER REGISTERS, CURRENT INTERVAL & LIFETIME

Menu-3BA, Figure F-20, presents user registers for the current interval, and also provides a lifetime counter.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                          Menu-3 Reports                       13:10:25
                3BA. User Registers, Current Interval & Lifetime
                                  Local:
                                  --------------
Current Interval
          Timer                                621
          Errored Seconds (ES)                   0
          Unavailable Seconds (UAS)              0
          CRC Errors (CRC)                       0
          Code Violations (CV)                   0
          Frame Error Events (FE)                0

Lifetime Totals
          CRC Errors (CRC)                       0
          Code Violations (CV)                   0
          Frame Error Events (FE)                0


--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
C-clears the current interval registers
D-clears the lifetime totals registers                                        ▮
```

Figure F-20 Menu-3BA User Registers, Current Interval & Lifetime

MENU-3BB USER REGISTERS, 24 HOUR DETAIL

Menu-3BB, Figure F-21, provides detail on user registers for the last 24 hours.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                          Menu-3 Reports                   13:11:52
                      3BB. User Registers, 24 hour detail
               Local:
Interval       ------------
Start        ES     US     CRC      CV      FE
12:45         0      0       0       0       0
12:30         0      0       0       0       0
12:15         0      0       0       0       0
12:00         0      0       0       0       0
11:45         0      0       0       0       0
11:30         0      0       0       0       0
11:15         0      0       0       0       0
11:00         0      0       0       0       0
10:45         0      0       0       0       0
10:30         0      0       0       0       0
10:15         0      0       0       0       0
10:00         0      0       0       0       0
                                  Page 1 of 8
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                C-clears the registers
```

Figure F-21 Menu-3BB User Registers, 24 Hour Detail

MENU-3BC USER REGISTERS, 4 DAY DETAIL

Menu-3BC, Figure F-22, presents user registers in 384 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                          Menu-3 Reports                     13:14:48
                        3BC. User Registers, 4 day detail
                     Local:
Local Interval       ------------
Start        ES     US     CRC      CV      FE
12:45         0      0       0       0       0
12:30         0      0       0       0       0
12:15         0      0       0       0       0
12:00         0      0       0       0       0
11:45         0      0       0       0       0
11:30         0      0       0       0       0
11:15         0      0       0       0       0
11:00         0      0       0       0       0
10:45         0      0       0       0       0
10:30         0      0       0       0       0
10:15         0      0       0       0       0
10:00         0      0       0       0       0
                                  Page  1 of 32
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers              C-clears the registers
```

Figure F-22 Menu-3BC User Registers, 4 Day Detail

MENU-3BE USER REGISTERS, 14 DAY SUMMARY

Menu-3BE, presents user registers for the last 14 days.

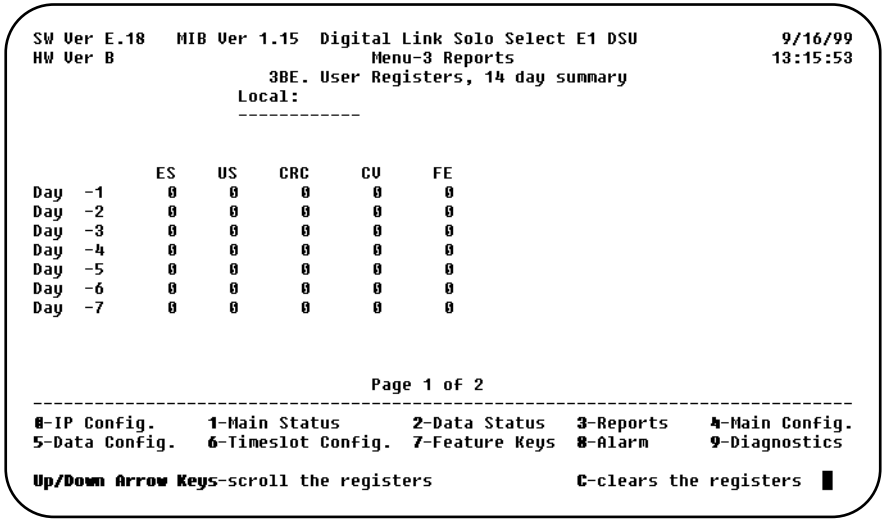


Figure F-23 Menu-3BE User Registers, 14 Day Summary

MENU-3C IN-BAND REPORTS

Menu-3C, Figure F-24, presents the Inband Reports submenu.

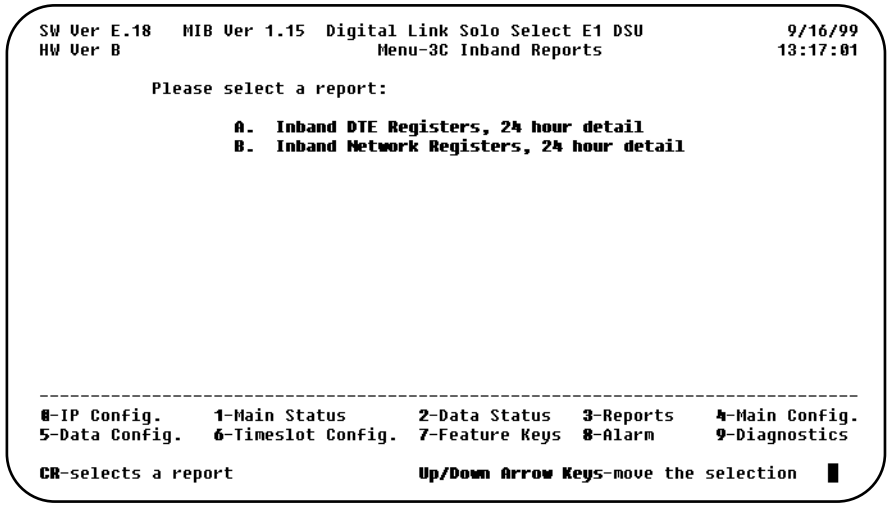


Figure F-24 Menu-3C In-band Reports

MENU-3CA IN-BAND DTE REGISTERS, 24 HOUR DETAIL

Menu-3CA, Figure F-25, presents the inband DTE register information in 96 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                        Menu-3 Reports                     13:18:25
              3CA. Inband DTE Registers, 24 hour detail
             Local:
Interval     ------------
Start      CRC   RxPkt  Rx %   TxPkt  Tx %
13:00        0       0   0.0       0   0.0
12:45        0       0   0.0       0   0.0
12:30        0       0   0.0       0   0.0
12:15        0       0   0.0       0   0.0
12:00        0       0   0.0       0   0.0
11:45        0       0   0.0       0   0.0
11:30        0       0   0.0       0   0.0
11:15        0       0   0.0       0   0.0
11:00        0       0   0.0       0   0.0
10:45        0       0   0.0       0   0.0
10:30        0       0   0.0       0   0.0
10:15        0       0   0.0       0   0.0
                              Page 1 of 8
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers              C-clears the registers
```

Figure F-25 Menu-3CA In-band DTE Registers, 24 Hour Detail

MENU-3CB IN-BAND NETWORK REGISTERS

Menu-3CB, Figure F-26, reports the net statistics for 14 days, in 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                          Menu-3 Reports                     13:19:27
                  3CB. Inband Network Registers, 24 hour detail
                Local:
Interval        ------------
Start       CRC    RxPkt  Rx %    TxPkt  Tx %
13:00         0        0   0.0        0   0.0
12:45         0        0   0.0        0   0.0
12:30         0        0   0.0        0   0.0
12:15         0        0   0.0        0   0.0
12:00         0        0   0.0        0   0.0
11:45         0        0   0.0        0   0.0
11:30         0        0   0.0        0   0.0
11:15         0        0   0.0        0   0.0
11:00         0        0   0.0        0   0.0
10:45         0        0   0.0        0   0.0
10:30         0        0   0.0        0   0.0
10:15         0        0   0.0        0   0.0
                                  Page 1 of 8
--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

Up/Down Arrow Keys-scroll the registers                C-clears the registers
```

Figure F-26 Menu-3CB In-band Network Registers

MENU-3E SLA REPORTS

Menu-3E, Figure F-27, presents the SLA Reports submenu.

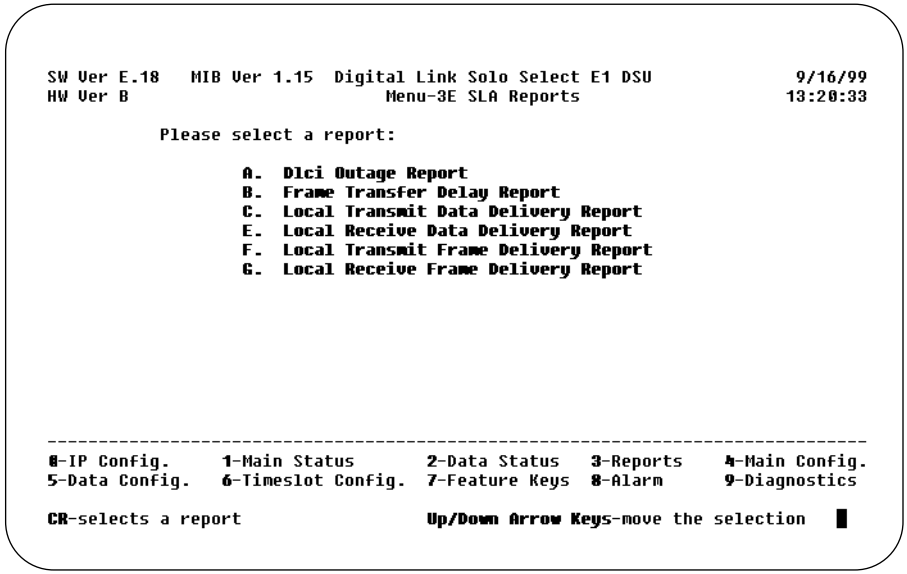


Figure F-27 Menu-3E SLA Reports

MENU-3EA DLCI OUTAGES REPORT

Menu-3EA, Figure F-28, presents the DLCI Outages in 96 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                          Menu-3E SLA Reports                13:22:01
                                  3EA. Dlci Outages


       Outage          Included Outage           Excluded Outage
Dlci    State       Count           Time       Count           Time
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---
   0      ---         ---            ---         ---            ---

                                  Page  1 of 10
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

n-selects next page                 p-selects previous page
```

Figure F-28 Menu-3EA DLCI Outages Report

MENU-3EB FRAME TRANSFER DELAYS

Menu-3EB, Figure F-29, presents the last four days of frame transfer delay measurements, in 15-minute intervals.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                         Menu-3E SLA Reports                 13:23:45
                              3EB. Frame Transfer Delays

          Last                                                 Maximum Delay
        Sample    Threshold       Total      Average          Last n Minutes
Dlci      Time   Violations     Samples        Delay        15        30        60
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---
   0       ---          ---         ---          ---       ---       ---       ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm      9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page
```

Figure F-29 Menu-3EB Frame Transfer Delays

MENU-3EC LOCAL TRANSMIT DATA DELIVERY REPORT

Menu-3EC, Figure F-30, presents transmit data for the local device.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                        Menu-3E SLA Reports                   13:36:12
                      3EC. Local Transmit Data Delivery Report

          Last                  Local Transmit   Far End Receive
        Sample   Threshold    Within    Above   Within    Above
Dlci      Time  Violations       Cir      Cir      Cir      Cir
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page                 ▌
```

Figure F-30 Menu-3EC Local Transmit Data Delivery Report

MENU-3EE LOCAL RECEIVE DATA DELIVERY REPORT

Menu-3EE, Figure F-31, displays delivery information for the local device.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                         Menu-3E SLA Reports                 13:37:48
                      3EE. Local Receive Data Delivery Report

          Last                  Local Receive  Far End Transmit
        Sample   Threshold    Within    Above   Within    Above
Dlci      Time  Violations       Cir      Cir      Cir      Cir
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---
   0       ---         ---      ---      ---      ---      ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page
```

Figure F-31 Menu-3EE Local Receive Data Delivery Report

MENU-3EF LOCAL TRANSMIT FRAME DELIVERY REPORT

Menu-3EF, Figure F-32, displays frame delivery information on the local device.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                        Menu-3E SLA Reports                    13:39:13
                        3EF. Local Transmit Frame Delivery Report

          Last                  Local Transmit   Far End Receive
        Sample   Threshold     Within    Above    Within    Above
Dlci      Time  Violations       Cir      Cir       Cir       Cir
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---
   0       ---         ---       ---      ---       ---       ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page                 
```

Figure F-32 Menu-3EF Local Transmit Frame Delivery Report

MENU-3EG LOCAL RECEIVE FRAME DELIVERY REPORT

Menu-3EG, Figure F-33, presents frame delivery receipt information for the local device.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU            9/16/99
HW Ver B                        Menu-3E SLA Reports                   13:48:07
                      3EG. Local Receive Frame Delivery Report

          Last                  Local Receive  Far End Transmit
        Sample   Threshold    Within    Above   Within    Above
Dlci      Time  Violations       Cir      Cir      Cir      Cir
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---
   0       ---         ---       ---      ---      ---      ---

Displaying Totals                 Page  1 of 10
--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
s-selects differences                t-selects totals
n-selects next page                  p-selects previous page                 
```

Figure F-33 Menu-3EG Local Receive Frame Delivery Report

MENU-3M DELAY MONITORING REGISTERS, LIFETIME

Menu-3M,Figure F-34, presents collected data on delay monitoring.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                         Menu-3 Reports                        13:49:20
                    3M. Delay Monitoring Registers, lifetime
                              Local:
                              --------------
                                Packets
                Avg     Max   Lost     Bad    Sent
Link 1            0       0      0       0       0
Link 2            0       0      0       0       0
Link 3            0       0      0       0       0
Link 4            0       0      0       0       0


Link 1     Last Cleared      9/02/99  12:44:16
Link 2     Last Cleared      9/02/99  12:44:16
Link 3     Last Cleared      9/02/99  12:44:16
Link 4     Last Cleared      9/02/99  12:44:16


--------------------------------------------------------------------------------
0-IP Config.      1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.    6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

C-clears the registers                                                 
```

Figure F-34 Menu-3M Delay Monitorying Registers, Lifetime

MENU-3Z EVENT LOGS

Menu-3Z, shown in Figure F-35, displays the alarm history text log for the unit. Table F-8 defines its parameters.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                          Menu-3 Reports                       13:50:33
                                  3Z. Event Log

Log  Local      Module  All            Event  0. All Events

Seq. No.    Status  Module            Description                 Time/Date
----------  ------  ------  --------------------------------  -----------------
        14  start   Net     Loss of Signal                    12:44:15  9/02/99
        13  start   DATA01  Loss of Signal                    12:44:15  9/02/99
        12  start   Unit    No Clock                          12:44:15  9/02/99
        11  action  Unit    Unit Power On                     12:44:15  9/02/99
        10  end     Unit    Power Outage                      12:44:15  9/02/99
         9  start   Unit    Power Outage                      12:42:59  9/02/99
         8  start   Net     Loss of Signal                    14:01:50  7/28/99
         7  start   DATA01  Loss of Signal                    14:01:50  7/28/99
         6  start   Unit    No Clock                          14:01:50  7/28/99
         5  action  Unit    Unit Power On                     14:01:50  7/28/99
                 Page  1 of  2          14 out of  14 selected
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports    4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm      9-Diagnostics

Up/Down Arrow Keys-scroll the log                  C-clears the log
```

Figure F-35 Menu-3Z Event Log

Table F-8 Event Log Parameters and Descriptions *(1 of 3)*

Parameter	Description	Default
Log	Local or Remote Select for either Local or Remote event log	Local

Table F-8 Event Log Parameters and Descriptions *(2 of 3)*

Parameter	Description	Default
Module	Unit, DTE (FULLBW), Network, Fr-Rel, System, All This field allows the display of any of the above status changes. When Unit is selected, the following status changes will be logged as events: Unit Power On Self Test DTE Loopback (fraction) Net Loopback (FULL) PLD Loopback (fraction) LP UP remote (fraction) LP DN remote (fraction) Send User 1 (fraction) Send User 2 (fraction) Send 1:1 (fraction) Send 1:2 (fraction) Send 1:4 (fraction) Send 1:7 (fraction) Send 3:24 (fraction) Send QRW (fraction) Send All 1s (fraction) Send All 0s (fraction No Clock When DTE is selected, the following status changes will be logged as events: Loss of Signal Local Test	All

Table F-8 Event Log Parameters and Descriptions *(3 of 3)*

Parameter	Description	Default
Module (cont.)	When Network is selected, the following status changes will be logged as events: Loss of Signal Loss of Frame Blue Alarm Received Yellow Alarm Received Set Code Received When AUX is selected, the following status changes will be logged as events: Loss of Signal Loss of Frame Blue Alarm Received Yellow Alarm Received When System is selected, the following status changes will be logged as events: External Alarm Power Supply Failure Controller Card Missing Remote Responds to DLC FDL When All is selected, all of the preceding status changes will be logged as events.	
Event	This field allows a particular type of event to be displayed. Enter an event index or use the Up/Down keys to scroll through the event options. While selecting the event, the event description text changes with the index. The event description text is displayed under the Description column in the Event Log menu. If the Event field is left blank, the Event filter parameter is disabled.	0, All
Seq. No.	This value uniquely identifies an event in a certain unit. This field is read-only.	
Status	Identifies the condition of the event described in the description field. This field is read-only.	
Module	Identifies the module type. This field is read-only.	
Description	Identifies the status change/event. This field is read-only.	
Time/Date	Identifies the time the status change/event was logged.	

MENU-4 MAIN CONFIGURATION

Menu-4, shown in Figure F-36, is the network configuration menu for framing, coding, and timing. Table F-9 defines its parameters.

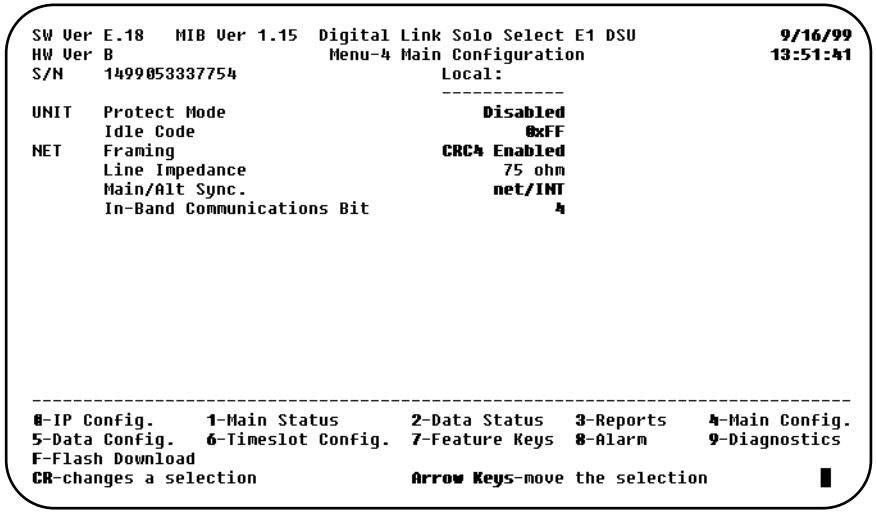


Figure F-36 Menu-4 Main Configuration

Table F-9 Solo Select Parameters *(1 of 2)*

Local / Remote	Parameter: Definition / Settings	Default
UNIT	**Protect Mode** - Enabled or Disabled; Enabled - Protect mode prevents you from running tests from the front panel.	Disabled
	Idle Code - 0 to 0xFF	OxFF
NETWORK	**Framing** - CRC4 Enabled, CRC4 Disabled, or Unstructured	CRC4 Enabled

Table F-9 Solo Select Parameters *(2 of 2)*

Local / Remote	Parameter: Definition / Settings	Default
	Main / Alt Sync - Int, NET, ext[1544], and data01 (DTE). Select the E1 network transmitter's clock source. First specify the Main clock source value, then the Alternate. (Each clock source has the same options.) Type **y** to confirm each action. • NET: Select this option if the network is the clock source. If it is not, set to Int at one E1 end, and NET at the other end. • ext[1544]: Select this option if you are using an external clock source. • data01: Select this option if the DTE is the clock source.	NET / Int
	In-band Communications Bit - 4,5,6,7,8, or Disabled	4

MENU-4F SOFTWARE DOWNLOAD

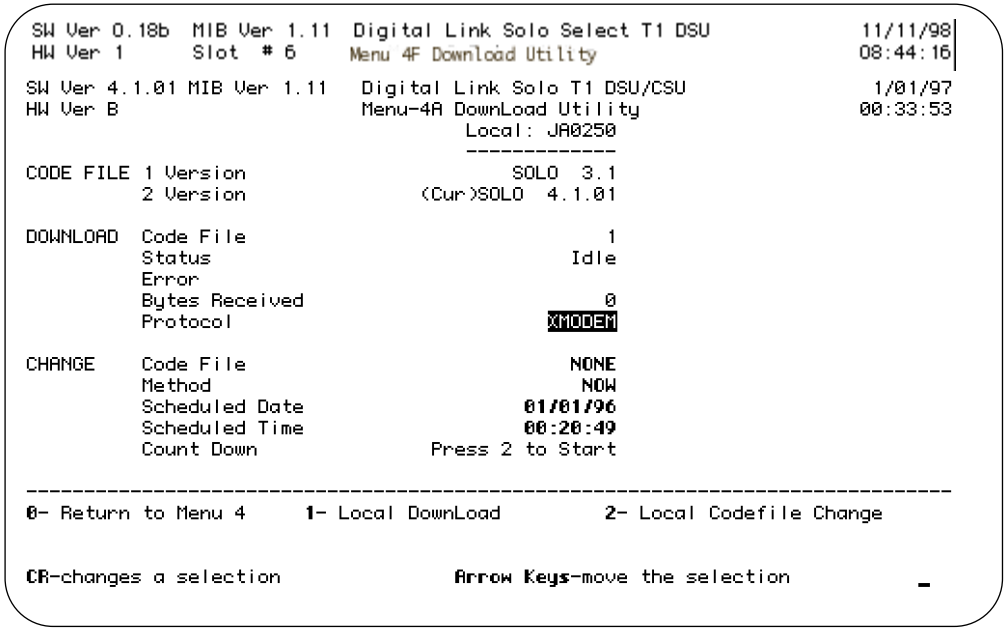


Figure F-37 Menu 4F Software Download

The parameter groups for the Download Utility are given in Table F-10.

Table F-10 Download Utility Groups *(1 of 2)*

Group	Field	Description
CODE FILE	1 Version	Version of the operational software residing in Code-File 1. This field reads “Absent” if there is no operational software stored in this code-file or if the operational software is corrupted.
	2 Version	Version of the operational software residing in Code-File 2. This field reads “Absent” if there is no operational software stored in this code-file or if the operational software is corrupted.

Table F-10 Download Utility Groups *(2 of 2)*

Group	Field	Description
DOWNLOAD	Code File	The Code-File that will receive the downloaded operational-code, and that is currently not operational.
	Status	Shows the status of the download, and is either Idle, Start, In Progress, Verifying, Success, or error. This field is updated after an Xmodem download to the local unit. If the status is "Error", then a number associated with the failure indicates the specific problem.
	Error	Indicates a specific problem during download.
	Bytes Received	Shows the number of bytes received during the download. This field is updated after an Xmodem download to the local unit.
	Protocol	Protocol used for the download. Choices are Xmodem and TFTP.
CHANGE	Code File	Code-File to be switched over when the scheduled time is reached. Choices are NONE, 1, and 2. NONE indicates that no change is desired, and can be used to cancel a scheduled change.
	Method	Either SCHEDULE or NOW. NOW indicates that the change occurs immediately, and SCHEDULE indicates that the change occurs when the actual time reaches the scheduled time.
	Scheduled Date	Expressed in DD/MM/YY (day, month, and year) at which the switch-over will occur.
	Scheduled Time	Expressed in HH:MM:SS (hours, minutes, seconds) at which the switch-over will occur.
	Count Down	Shows the time interval HH:MM:SS (hours, minutes, seconds) for the switch-over to occur after it has been initiated. If the switch-over has not been initiated, then it shows "Press 2 To Start" or "Press 4 To Start" for the local unit and the remote unit, respectively.

The menu and download options for the Download Utility are given in Table F-11.

Table F-11 Menu and Download Options

Menu	Description
4-Return to Menu 4	Returns to Menu-4 Main Configuration.
A-Local Download	Triggers the download to the local unit.
B-Local Code-File Change	Triggers the change of Code-File in the local unit.

MENU-5 DATA CONFIGURATION

Menu-5 is the DTE/DCE configuration menu. Menu-5 is shown in Figure F-38.

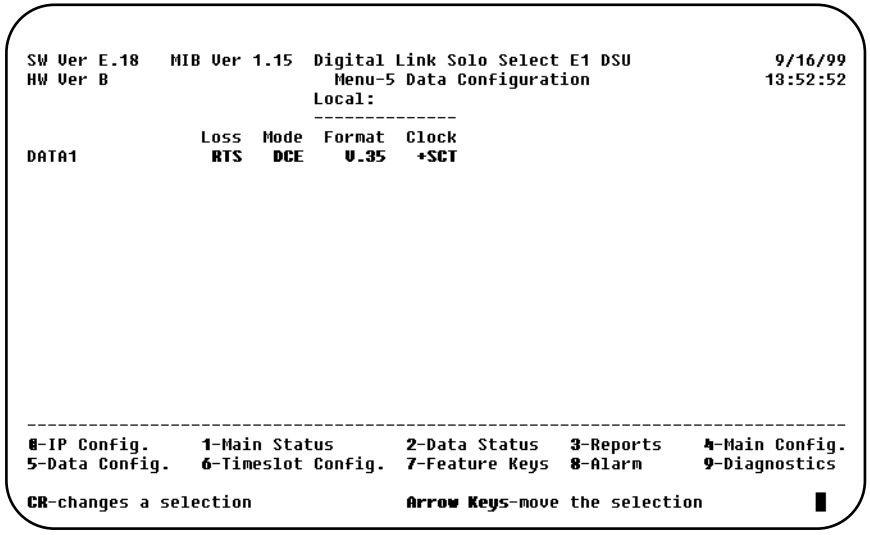


Figure F-38 Menu-5 Data Configuration

Table F-12 presents the parameters for Menu-5.

Table F-12 Data Port Field Options and Definitions *(1 of 2)*

Field-Option Definition		Defaults
Loss	DTR (Data Terminal Ready), RTS (Request to Send) or NONE. Select the criteria for detecting loss of signal on the Data Port. None disables loss detection. Unit disregards DTE-DCE handshaking. The unit's data port physical interface will appear active. Setting Loss to None will force a high CTS signal on unit. RTS or DTR causes the signal to function as an indicator that the data port, or the DTE (router), has been dropped.	RTS
Mode	DTE or DCE Select the DTE or DCE Port option. This allows the Data Port to be configured as a DTE or a DCE. Each configuration requires a different cable.	DCE

Table F-12 Data Port Field Options and Definitions *(2 of 2)*

Field-Option Definition		Defaults
Format	V.35 or X.21 Select V.35 or X.21 operation. You can operate in X.21, V.35 or other formats by using different cables. For V.35 or X.21 applications, set to X.21 and use an V.35 or X.21 DTE cable.	V.35
Clock	+SCT, -SCT, or SCTE. Select SCT, a unipolar clock generated by the DCE for DTE timing. You can invert the clock (-SCT) or not (+SCT). SCT inversion (-SCT) and SCTE are used to correct delays in clocking due to cable length.	+SCT

MENU-6 TIMESLOT CONFIGURATION

Allocate the Solo Select's channel assignments in Menu-6, Timeslot Configuration Menu, shown below in Figure F-39.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU              9/16/99
HW Ver B                  Menu-6 Timeslot Configuration                13:54:58
                  Local:
                  ------------
Allocation Type   Contiguous

Allocate by port:
                  DATA01 TS01-TS24  1536Kb/s


Allocate by timeslot:
                              Network Time Slot Map
          1   2   3   4   5   6   7   8   9   10  11  12  13  14  15  16
Local    D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01 D01


          17  18  19  20  21  22  23  24  25  26  27  28  29  30  31
Local    D01 D01 D01 D01 D01 D01 D01 D01 --- --- --- --- --- --- ---

-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection               Arrow Keys-move the selection
```

Figure F-39 Menu-6 Timeslot Configuration

Table F-13 presents the options for Menu-6.

Table F-13 Menu-6 Timeslot Configuration Options

Parameter	Default
Allocation Type – Select Contiguous or Manual.	Contiguous
Allocate by Port – Select DATA01.	DATA01

MENU-7 FEATURES

Menu-7, shown in Figure F-40, displays what features the unit is capable of performing.

```
SW Ver E.10   MIB Ver 1.13  Digital Link Solo Select T1 DSU          6/08/99
HW Ver B                        Menu-7 Features                     12:50:54
                               Local:  D37754
                               --------------

Inband                                Capable
IPM[32]                               Capable
IPM[96]                               Capable
Service Level Agreement           Not Capable
RMON 2                            Not Capable

--------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics

CR-changes a selection               Arrow Keys-move the selection
```

Figure F-40 Menu-7 Features

Table F-14 presents options for Menu-7.

Table F-14 Menu-7 Features Options

Parameter	Default
Inband – All Solo Select devices are inband capable.	Capable
IPM [32] – Enables support for 32 DLCIs	N/A
IPM [96] – Enables support for 96 DLCIs	N/A
Service Level Agreement – Enables support for Service Level Agreement reporting. FRF.13 compliant.	N/A
RMON 2 – Enables RMON 2 collection ability.	N/A

MENU-8 ALARM

Menu-8, shown in Figure F-41, is the alarm selection menu.

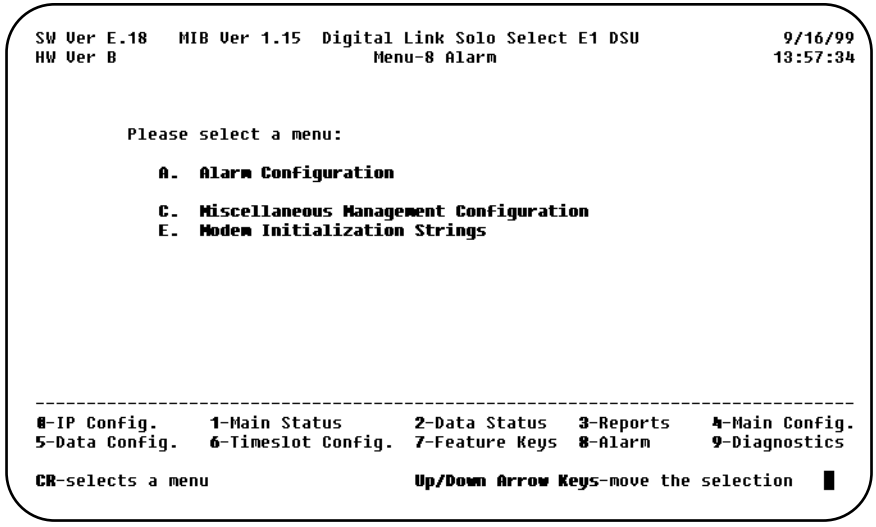


Figure F-41 Menu-8 Alarm

NOTE: When using the Solo Select E1 module, Menu-8 Alarm includes another option: B. External Alarms.

MENU-8A ALARM CONFIGURATION

Menu-8A allows the user to enable / disable alarms and to set alarm thresholds. Figure F-42 displays this menu, and Table F-15 defines its parameters.

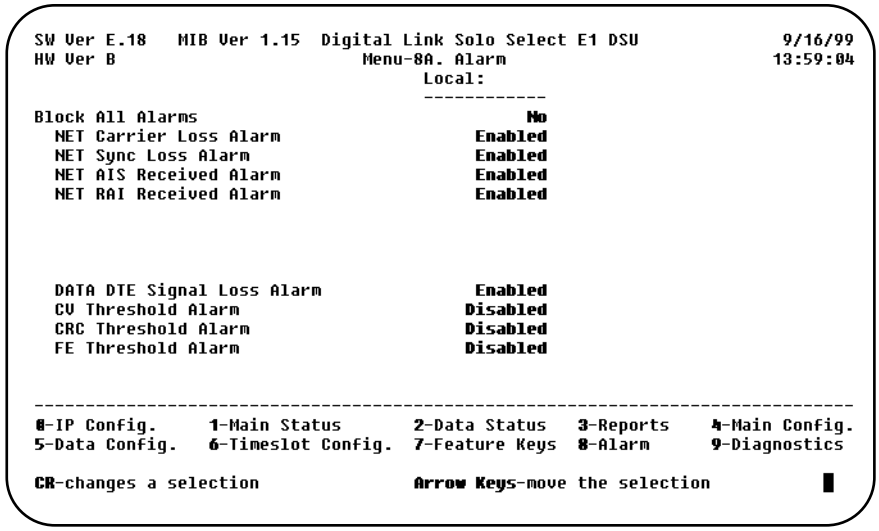


Figure F-42 Menu-8A Alarm Configuration

Table F-15 Menu-8A Field Definitions *(1 of 2)*

Field	Definition	Default
Block All Alarms	Yes, No Yes - Blocks the reporting of all alarms. No - Enables the Solo Select to report alarms.	No
Carrier Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a network carrier Loss of Signal is detected on the network. Disabled - Disables the alarm.	Enabled
Sync Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when loss-of-frame is detected on the network. Disabled - Disables the alarm.	Enabled
AIS Received Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a Network AIS (Alarm Indication Signal) is detected. Disabled - Disables the alarm.	Enabled

Table F-15 Menu-8A Field Definitions *(2 of 2)*

Field	Definition	Default
RAI Received Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a Network RAI Alarm is detected. Disabled - Disables the alarm.	Enabled
DATA DTE Signal Loss Alarm	Enabled, Disabled Enabled - The Solo Select generates an alarm when a DATA DTE Signal Loss is detected. The loss is defined in Menu-5. Disabled- Disables the alarm.	Enabled
CV Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{B}. Valid values are between 2 x 10^{-8} and 6 x 10^{-3}. Example: 5 x 10^{-4} When the BPVs exceed this threshold, an alarm is generated.	Disabled
CV Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{-B}. Valid values are between 5 x 10^{-5} and 1 x 10^{-0}. Example: 3 x 10^{-4} When the CRCs exceed this threshold, the alarm is generated.	Disabled
FE Threshold Alarm	A x 10^{-B} Set A and B in A x 10^{-B}. Valid values are between 3 x 10^{-6} and 7 x 10^{-2} Example: 7 x 10^{-4} If the FEs exceed the set threshold, the alarm is started.	Disabled

MENU-8B EXTERNAL ALARM CONFIGURATION (MODULE ONLY)

Menu-8B allows the user to enable/disable external alarms. Figure F-43 displays this menu, and Table F-15 defines its parameters.

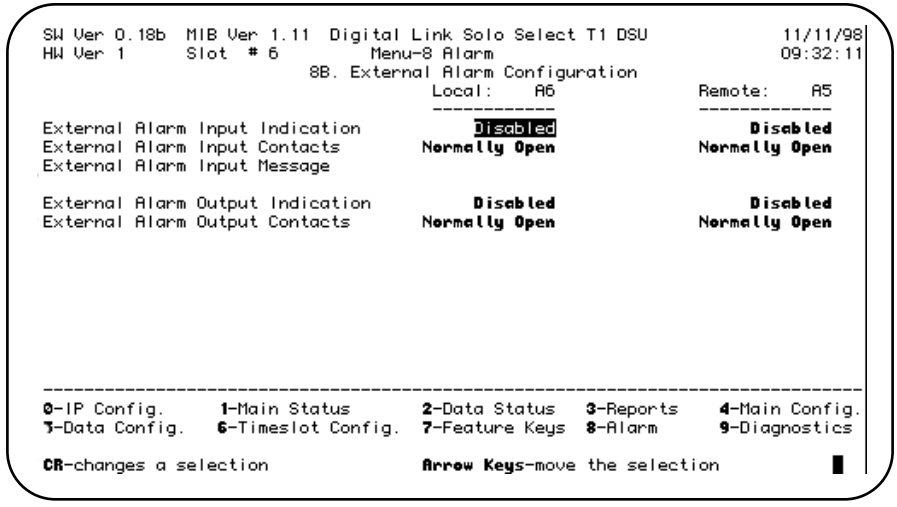


Figure F-43 Menu-8B External Alarms Configuration

Table 11-5

Field	Definition	Default
External Alarm Input Indication	Toggle allows you to enable or disable external alarm input indicatiors.	Disabled
External Alarm Input Contacts	Toggles between Normally Open and Normally Closed.	Normally Open
External Alarm Input Message	User-defined message. Can be up to 20 characters in length.	N/A
External Alarm Output Indication	Toggle allows you to enable or disable external alarm output indicatiors.	Disabled
External Alarm Output Contacts	Toggles between Normally Open and Normally Closed.	Normally Closed

MENU-8C MISCELLANEOUS MANAGEMENT CONFIGURATION

Menu-8C, Figure F-44, is where you configure miscellaneous alarms. The fields are defined in Table F-16.

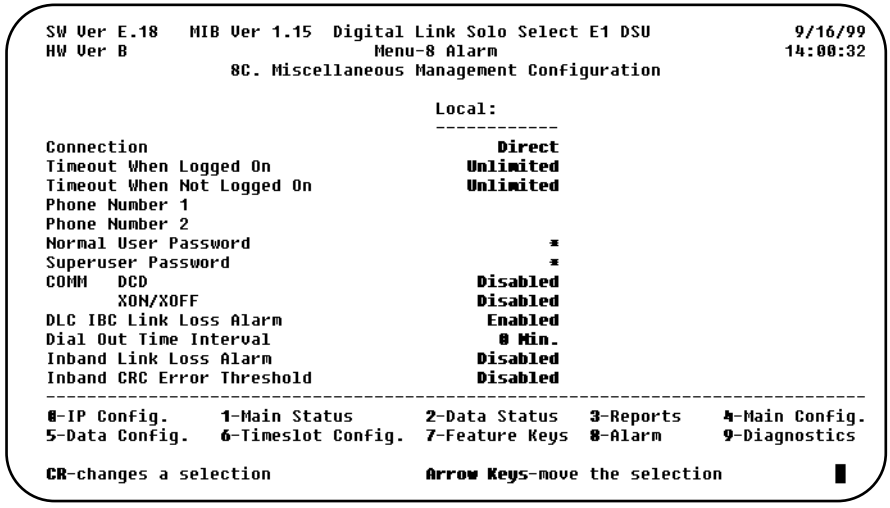


Figure F-44 Menu-8C Miscellaneous Management Configuration

Table F-16 Menu-8C Miscellaneous Management Parameters *(1 of 2)*

Parameter—Options; Definition	Default
Connection—In-band Communications, Modem, Direct Select the type of connection you are using. IBC mode only, enables a connection to the remote unit. Modem—Enables a modem connection to the Solo Select. Direct—Enables a direct terminal connection to the Solo Select.	Direct
Timeout When Logged On—1 Min, 10 Min, 30 Min, Unlimited Applies only when you are logged on. This is the time span after which, if it does not detect activity, the system warns that you will be logged off in 30 seconds.	10 Min
Timeout When Not Logged On—1 Min, 10 Min, 30 Min, Unlimited Applies only when a terminal is connected through a modem and you are not logged on.This is the time span after which the modem disconnects the phone line if no activity is detected.	Unlimited

Table F-16 Menu-8C Miscellaneous Management Parameters *(2 of 2)*

Parameter—Options; Definition	Default
Phone Number 1 Enter a Hayes-compatible modem dial string (20 char. maximum); for example, “atdt555-1212”. The modem dials out using the first telephone number, then automatically tries the second telephone number if the first does not respond.	User-defined
Phone Number 2 Enter a Hayes-compatible modem dial string (20 char. maximum); for example, “atdt555-1212”.	User-defined
Normal User Password—(text string) Enter the login password for the Normal User (20 char. maximum).	User-defined
Super User Password—(text string) Enter the login password for the Super User (20 char. maximum).	User-defined
COMM DCD—Enabled or Disabled Enabled—The Solo Select uses the modem’s Data Carrier Detect (DCD) signal to provide more robust modem operation. Disabled—Use Disabled if your null modem does not pass the Data Carrier Detect signal.	Disabled
COMM XON/XOFF—Disabled, XOFF until ANY, XOFF until XON XOFF until ANY—Ctrl-S stops data flow from unit, any key resumes data flow. XOFF until XON—Ctrl-S stops data flow from unit, Ctrl-Q resumes flow. Disabled—XON/XOFF feature disabled	Disabled
DLC IBC Link Loss Alarm—Enabled or Disabled The IBC link specific to Digital Link. When the connection is disrupted, an alarm is sent.	Enabled
Dial Out Time Interval—Dial out time interval is the minimum amount of time the Solo Select waits between dial outs to the host computer.	0 Min.
In-band Link Loss Alarm—Enabled or Disabled Enabled—When loss of HDLC frames or idle characters occurs, an alarm is generated. Disabled—The alarm is disabled	Disabled
In-band CRC Error Threshold—Enable or Disabled Enabled—The valid range for this is 4×10^{-7} to 9×10^{-1}. Disabled—No alarm is generated if threshold rate of errors is high.	Disabled

MENU-8E MODEM INITIALIZATION STRINGS

Menu-8E , Figure F-45, allows you to set modem initialization strings.

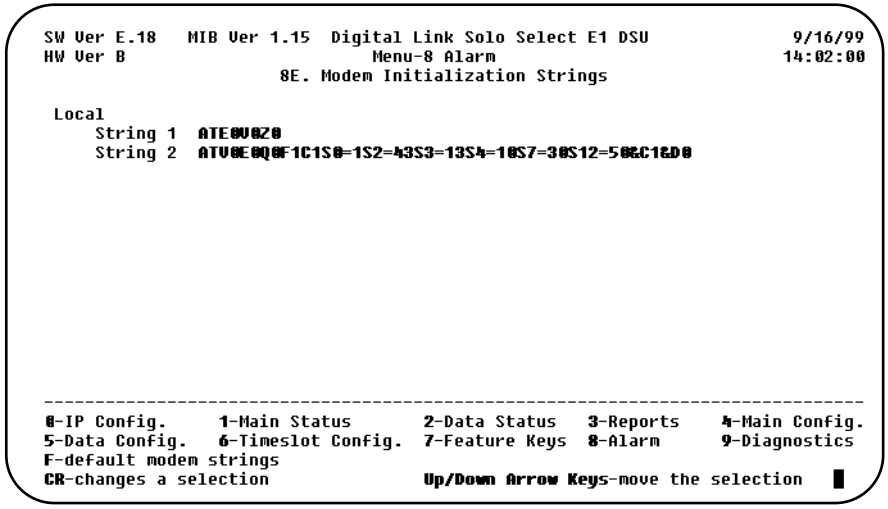


Figure F-45 Menu-8E Modem Initialization Strings

Table F-17 presents the options for Menu-8E.

Table F-17 Menu-8E Modem Initialization Strings Options

Parameter	Default
String 1 – Modem initialization string can be up to 20 characters.	N/A
String 2 – Modem initialization string can be up to 60 characters.	N/A

MENU-9 DIAGNOSTICS

Menu-9, Figure F-46, is the selection menu for testing.

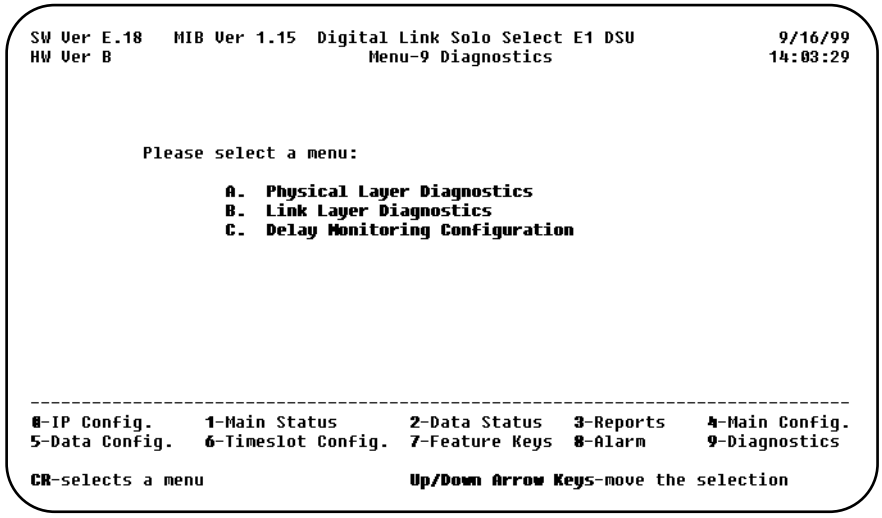


Figure F-46 Menu-9 Diagnostics

MENU-9A PHYSICAL LAYER DIAGNOSTICS

Menu-9A offers E1 testing by patterns, loop, selecting loop codes on/off. Menu-9A is shown below in Figure F-47. The parameters for Menu-9A are defined in Table F-18.

```
SW Ver E.18   MIB Ver 1.15  Digital Link Solo Select E1 DSU          9/16/99
HW Ver B                         Menu-9 Diagnostics                14:04:27
                           9A. Physical Layer Diagnostics
                               Local:
                               --------------
Current Test                             Idle
Pattern Test                             Idle
Pattern Error Counter
CRC4 Errors                                 0
Code Violations                             0
Frame Error Events                          0
Last Self Test Result          Self Test Passed

Next Test (Fraction)                1. Self Test
Next Test Length                       Unlimited
Full Bandwidth Loop Code                Standard
Fractional Loop Code                    Standard
USER1 Pattern          00110011001100110011001100110011
USER2 Pattern          00010001000100010001000100010001
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
S-starts a test  I-injects a pattern error           CR-changes a selection
E-ends a test    C-clears pattern error counter      Arrow keys-move selection
```

Figure F-47 Menu-9A Physical Layer Diagnostics

Table F-18 Menu-9A Physical Layer Diagnostic Fields *(1 of 3)*

Field	Definition - Option	Default
Choosing a test by number	You may type in a number to start a test, instead of using the arrow keys. For instance, if you type in “3” you will select the Net Lpbk test. To start the test, press “5”.	
Current Test	Displays the test currently running. If no test is selected, the field reads Idle.	Idle
Pattern Test	Displays “Locked Seconds.” If no pattern test is running, the test reads “Idle.” When a pattern test is started, it will read “Searching” if the current pattern test is locked. The “Locked Seconds” is a 16-bit counter saturating at 65536. The counter resets to 0 of the current pattern is unlocked. The counter label will change to “Relocked Seconds” if the current pattern is unlocked and then relocked. Options: Idle, Searching, Locked, Relocked	Idle
Pattern Error Counter	The number of pattern errors occuring during the current test.	0

Table F-18 Menu-9A Physical Layer Diagnostic Fields *(2 of 3)*

Field	Definition - Option	Default
Code Violations	The number of Code Violations occuring during the current test.	0
Frame Error Event	A count of the Frame Error events.	0
Last Self Test Result	The result of the last test performed. Read-only. Options: Self Test Passed Error nn (0 to 5)	Self test passed
Next Test (Fraction)	The next test to run is set in this field. Options: 1. Self Test 2. DTE Lpbk (FULL) 3. NET Lpbk 4. PLD Lpbk (FULL) 5. LP UP Remote (FULL) 6. LP DN Remote (FULL) 7. Send QRW (FULL) 8. Send 1:7 (FULL) 9. Send 3:24 (FULL) 10. Send 1:1 (FULL) 11. Send all 1s (FULL) 12. Send all 0s (FULL) 13. Send 1:2 (FULL) 14. Send 1:4 (FULL) 15. Send User 1 (FULL) 16. Send User 2 (FULL) 19. Lamp Test 20.Lamp DTE and NET	Self Test
Next Test Length	The length of the next test is set in this field. 15 min, 1 min, 60 min, Unlimited With the Self Test, Loop Up Remote and Loop Down Remote, this parameter does not apply.	Unlimited
Full Loopcode	The Loopcode to use in the next test is set in this field Options: Standard, Alternate, Disabled. **NOTE:** When all 31 timeslots are being used, do not use the same option (Standard, Alternate) for both Full Bandwidth Loopcode and Fractional Loopcode.	Standard

Table F-18 Menu-9A Physical Layer Diagnostic Fields *(3 of 3)*

Field	Definition - Option	Default
Fractional Loopcode	The Loopcode to use in the next test is set in this field. Options: Standard, Alternate, Disabled, T1.403 Annex B.	Alternate
User Patterns	Enter any sequence of 1s and 0s, between 1 and 24 characters in length.	

MENU-9B LINK LAYER DIAGNOSTICS

Menu-9B initiates in-band tests for the unit. Menu-9B is shown in Figure F-48, and its parameters are defined in Table F-19.

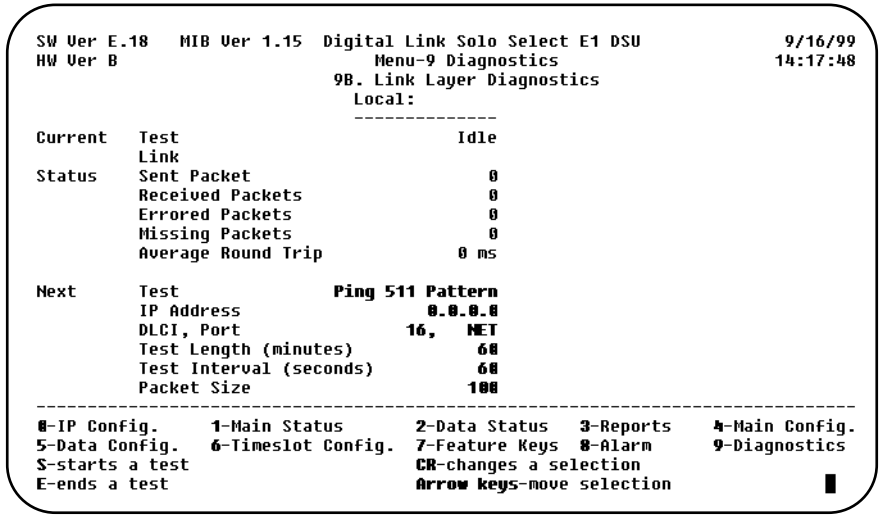


Figure F-48 Menu-9B Link Layer Diagnostics

Table F-19 Menu 9B Link Layer Diagnostics Options *(1 of 3)*

Type	Parameter — Definition	Default
Current	**Test** — The test that is currently running. Display only.	Idle
	Link — The IP address, DLCI (Frame Relay only) and Port on which the test is currently running. Display only.	Empty

Table F-19 Menu 9B Link Layer Diagnostics Options *(2 of 3)*

Type	Parameter — Definition	Default
Status	**Sent Packet** — The number of packets sent in the current test. Display only.	0
	Received Packets — The number of packets received in the current test. Display only.	0
	Errored Packets — The number of packets containing errors sent in the current test. Display only.	0
	Missing Packets — The number of packets that were lost in the current test. Display only.	0
	Average Round Trip — The average length of the round trip from local to remote in the current test. Display only.	0

Table F-19 Menu 9B Link Layer Diagnostics Options *(3 of 3)*

Type	Parameter — Definition	Default
Next	**Test** — Selects the type of test to run next. Options: Ping 511 Ping 1023 Ping 2047 Ping 1:1 Ping All 1s Ping All 0s	Ping 511 pattern
	IP Address — nnn.nnn.nnn.nnn The IP address on which the test is to be run.	0.0.0.0
	DLCI, Port — The DLCI and Port out which the test is to be run. The DLCI specified must be between 0 and 8388607. The port can be NET, DTE, ENET, and COMM. **NOTE:** DLCI numbers are only valid when Frame Relay is being used.	16,NET 0
	Test Length — The number of minutes the test is to last. Selecting a length of zero will choose unlimited duration.	0
	Test Interval — The number of seconds between test packets.	100
	Packet Size — The size of the packet sent in the test.	

NOTE: These parameters are not maintained across resets.

MENU-9C DELAY MONITORING CONFIGURATION

Menu-9C, shown below in Figure F-49, configures delay monitoring. Its results are displayed in Menu 3-M. Table F-20 defines its parameters.

These parameters are maintained across resets.

```
SW Ver E.10   MIB Ver 1.13  Digital Link Solo Select T1 DSU          6/08/99
HW Ver B                        Menu-9 Diagnostics                  13:55:35
                          9C. Delay Monitoring Configuration
                                Local:  D37754
                                --------------
Link 1    State                      Not Running
          Pattern               Ping 511 Pattern
          IP Address                  0.0.0.0
          Port                            NET
          Test Interval (seconds)          60
          Packet Size                     100

Link 2    State                      Not Running
          Pattern               Ping 511 Pattern
          IP Address                  0.0.0.0
          Port                            NET
          Test Interval (seconds)          60
          Packet Size                     100
                                   Page 1 of 2
-------------------------------------------------------------------------------
0-IP Config.     1-Main Status       2-Data Status   3-Reports     4-Main Config.
5-Data Config.   6-Timeslot Config.  7-Feature Keys  8-Alarm       9-Diagnostics
n-selects next page                  p-selects previous page
CR-changes a selection               Arrow keys-move selection
```

Figure F-49 Menu-9C Delay Monitoring Configuration

Table F-20 Menu-9C Delay Monitoring Configuration

Parameter-Definition	Default
State Enables or disables Delay Monitoring on the link.	Not Running (disabled)
Pattern The test pattern in the ping packet.	Ping 511 Pattern
DLCI, Port The DLCI and Port on which the test is to be run. Port options: NET, DTE, Ethernet, and COMM.	16, NET
Test Interval The interval size in seconds between transmission of test packets	60
Packet Size The size of the test packets.	100

NOTE: For status information on this test, see Menu-3M.

G MIB Parameters

This chapter presents the MIB objects for the Solo Select line of T1/E1 intelligent devices and the Terminal User Interface (TUI) menu where the MIB variable can be viewed or altered. Following the MIB object table, is a table that lists the supported traps (Table G-2).

Table G-1 Unit Configuration Group *(1 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitModelType	vxEncore 1 dl100Encore 2 dl1200 3 dl2400 4 dl600 5 dl600Encore 6 ensembleEncore 7 soloEncore 8 soloE1Encore 9 ensembleE1Encore 10 soloT1CSU 11 ensembleT1CSU 12 soloSelectT1Module 13 soloSelectE1Module 14 soloSelectT1 15 soloSelectE1 16	An integer that identifies the unit model type. Read-only.	All
dlcUnitHwRev	DisplayString (Size: 1 through 4)	The ASCII code of the hardware revision number. Read-only.	All
dlcUnitHwOptions	An integer between 0 and 1023, inclusive. realTimeClock 1 netPortT1 2 netPortE1 4 auxPortT1 8 auxPortE1 16 otherNetT1 32 otherNetE1 64 reserved1 128 reserved2 256 reserved3 512	A bit map that represents the sum of all the values that correspond to installed options. Read-only. netPortT1 and netPortE1 are mutually exclusive. auxPortT1 and auxPortE1 are mutually exclusive–both are FALSE when there is no AUX port present.	All
dlcUnitSwRev	DisplayString (Size: 1 through 4)	ASCII code of the software revision number. Read-only.	All
dlcUnitDataPorts	An integer between 1 and 32, inclusive.	Number of data ports installed. Read-only.	5
dlcUnitRam	Integer	Amount of usable RAM (KBytes). Read-only.	N/A

Table G-1 Unit Configuration Group *(2 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitRom	Integer	Amount of usable ROM (KBytes). Read-only.	N/A
dlcUnitFlash	Integer	Amount of Flash ROM (KBytes). If the value is 0, the downloadable code option is not installed. Read-only.	N/A
dlcUnitSlotNum	An integer between 0 and 16, inclusive.	Slot number the unit is in. If this is a standalone unit, this object will return a 0. Read-only.	All
dlcUnitMibRev	DisplayString (Size: 1 through 4)	ASCII code of the MIB revision number. Read-only.	All
dlcUnitFeatures	Integer inband 1 ipm32 2 ipm96 4 rmon2 8 sla 16 reserved2 32 reserved3 64 reserved4 128 reserved5 256 reserved6 512 reserved7 1024 reserved8 2048	Feature configuration. The value returned is a bit mask of which feature key is on/capable when the corresponding bit is 1. Read-only	7
dlcUnitConfig	DisplayString (SIZE: 1 through 6)	A unique name that globally identifies the unit. The Unit ID may contain uppercase letters (A–Z) and the digits 1–9. The first digit of the Unit ID can not be a letter. Read-write.	All
dlcUnitProtectMode	Boolean True (1) False (2)	When True, the unit configuration can not be changed from the front panel and tests can not be initiated or terminated. Read-write.	4
dlcUnitYellowEnable	Boolean True (1) False (2)	T1 Only. When False, yellow alarm conditions are ignored and the unit will never transmit a Yellow Alarm signal on a Dsx1 port. Read-write.	8

Table G-1 Unit Configuration Group *(3 of 34)*

MIB Object	Syntax			Description	TUI
dlcUnitNetPassFdl	PortId			Indicates which Dsx1 DTE port's FDL is connected to the mainNet FDL when this unit has no traffic of its own. Meaningful values are aux, otherNet, and noPort. Read-write.	N/A
	mainNet (1)	aux (2)	otherNet (3)		
	reserved1 (4)	reserved2 (5)	reserved3 (6)		
	ethPort (7)	commPort (8)	int-clock (9)		
	ext-clock (10)	data1 (11)	data2 (12)		
	data3 (13)	data4 (14)	data5 (15)		
	data6 (16)	data7 (17)	data8 (18)		
	data9 (19)	data10 (20)	data11 (21)		
	data12 (22)	data13 (23)	data14 (24)		
	data15 (25)	data16 (26)	data17 (27)		
	data18 (28)	data19 (29)	data20 (30)		
	data21 (31)	data22 (32)	data23 (33)		
	data24 (34)	data25 (35)	data26 (36)		
	data27 (37)	data28 (38)	data29 (39)		
	data30 (40)	data31 (41)	data32 (42)		
	noPort (43)				

Table G-1 Unit Configuration Group *(4 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitMainClockSource	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Primary transmit timing source. Read-write.	4
dlcAltClockSource	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Alternate transmit timing source. It is used when the primary source is not available. Read-write.	4

Table G-1 Unit Configuration Group *(5 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitExtClockRate	An integer between 56 and 2,048, inclusive.	Signal arriving at the BNC connector. Value is in KHz (n*56 or n*64 or 155). Read-write.	4
dlcUnitFullBandwidthLoopCode	LoopCodeType= standard 1 alternate 2 v54 3 reserved1 4 reserved2 5 reserved3 6 disable 7	Determines the loop codes we transmit for the Full Bandwidth Loop Up Remote and Loop Down Remote tests. Also determines the code we respond to when it is received on the NET port. Read-write.	9A
dlcUnitFractionalLoopCode	LoopCodeType= standard 1 alternate 2 v54 3 reserved1 4 reserved2 5 reserved3 6 disable 7	The loop code transmitted for the Fractional Loop Up Remote and Loop Down Remote tests. Also identifies the code we respond to when it is received on fractional bandwidth. Read-write.	9A
dlcUnitTestLength	Valid values are: unlimited 0 1 minute 1 15 minutes 15 60 minutes 60	Time interval that determines when test should be automatically terminated. Read-write.	9B
dlcUnitUserPattern1	DisplayString (Size: 0 through 24)	Sequence of zeros and ones that represent the first of two user patterns. The first character repesents the first bit in the sequence. Read-write.	9A
dlcUnitUserPattern2	DisplayString (Size: 0 through 24)	Sequence of zeros and ones that represent the second of two user patterns. The first character repesents the first bit in the sequence. Read-write.	9A
dlcUnitBlockAllAlarms	Boolean True (1) False (2)	When TRUE, the unit will not send traps. Read-write.	8A

Table G-1 Unit Configuration Group *(6 of 34)*

MIB Object	Syntax	Description	TUI
dlcDsx1TrapEnableTable	dlcDsx1TrapPortId PortId dlcDsx1BpvThreshold Trap Integer dlcDsx1OofThresholdTrap Integer dlcDsx1CrcThresholdTrap Integer dlcDsx1LossOfSignalTrapEnable Boolean dlcDsx1LossOfSyncTrapEnable Boolean dlcDsx1ReceiveAIStrapEnable Boolean dlcDsx1ReceiveYellowAlarmTrapEnable Boolean dlcDsx1ReceiveRemoteAlarmTrapEnable Boolean dlcPSfailureTrapEnable Boolean dlcDsx1CntlCrdMissingTrapEnable Boolean dlcDsx1FdlLinkTrapEnable Boolean dlcDsx1IbCrcThresholdTrap Integer dlcDsx1InbandLinkTrapEnable Boolean	An entry in the Dsx1 Trap Enable table. Not accessable.	8A
dlcDsx1TrapPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies port. Read-only.	0B

Table G-1 Unit Configuration Group *(7 of 34)*

MIB Object	Syntax	Description	TUI
dlcDsx1BpvThresholdTrap	Integer between 0 and 99, inclusive.	Bipolar violation error rate. The unit sends a trap to the SNMP manager. The threshold is of the form M x 10 ^ -E where M is a mantissa and E the exponent. Both are single digit values. M and E are represented in this value as one number: (M) x 10 + (E) For example, the threshold 7x10^-3 BPVs/minute is encoded as the integer 73. A value of 0 disables the trap altogether. Valid values for dlcDsx1BpvThresholdTrap are: 13-17, 23-28, 33-38, 43-48, 53-58, 63-68, 74-78, 84-88, 94-98.	8A
dlcDsx1OofThresholdTrap	Integer between 0 and 99, inclusive.	Out of Frame Error Rate threshold as OOF errors per minute. A value of 0 disables the trap. Read-write. Valid values: 12-15, 22-25, 32-36, 42-46, 52-56, 62-66, 72-76, 83-86, 93-96.	8A
dlcDsx1CrcThresholdTrap	Integer between 0 and 99, inclusive.	CRC-6 Error Rate threshold in units of CRC errors per minute. Read-write.	8A
dlcDsx1LossOfSignalTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon loss of network signal (LOS) on a Dsx1 port. Read-write.	8A
dlcDsx1LossOfSyncTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon loss of network framing (LOF) on a Dsx1 port.	8A
dlcDsx1ReceiveAIStrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of AIS (Blue Alarm Signal) on a Dsx1 port. Read-write.	8A

Table G-1 Unit Configuration Group *(8 of 34)*

MIB Object	Syntax	Description	TUI
dlcDsx1ReceiveYellowAlarmTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of Yellow Alarm Signal on a Dsx1 port. Read-write.	8A
dlcDsx1ReceiveRemoteAlarmTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of Remote Alarm Indicator on an E1 Dsxl port. Read-write.	8A
dlcDsx1PSfailureTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon a power supply failure. Read-write. Shelf only.	8A
dlcDsx1CntlCrdMissingTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of a missing controller card. Read-write. Shelf only.	8A
dlcDsx1FdlLinkTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection that the remote unit is not responding to DLC FDL messages. Read-write.	8C
dlcDsx1IbCrcThresholdTrap	An integer between 0 and 99, inclusive.	The In-band CRC Error Rate threshold in units of CRC errors per minute. The value is encoded the same as dlcDsx1BpvThresholdTrap. A value of 0 disables the trap altogether.	8C
dlcDsx1InbandLinkTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of the in-band link. Read-write.	8C
dlcUnitDataDteLossTrapEnableTable	dlcDataLossPortId PortId dlcDataLossEnable Boolean	An entry in the Data DTE Loss Trap Enable table. Not accessible.	

Table G-1 Unit Configuration Group *(9 of 34)*

MIB Object	Syntax	Description	TUI
dlcDataLossPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies this port. Read-only.	
dlcDataLossEnable	Boolean True (1) False (2)	Enables or disables this trap. Read-write	8A
dlcUnitExternalAlarmInputTrapEnable	Boolean True (1) False (2)	Enables or disables a trap upon detection of an alarm condition on the External Alarm Input. Shelf only.	8B
dlcUnitExternalAlarmInputContacts	Integer normallyOpen 1 normallyClosed 2	When set to normallyOpen, an alarm is declared when the contacts close. Shelf only.	8B
dlcUnitExternalAlarmInputMessage	DisplayString size of 0 through 20, inclusive.	Charter string describes what is going on when an alarm on the External Alarm Input is detected. Read-write. Shelf only.	8B
dlcUnitExternalAlarmOutputContacts	Integer normallyOpen 1 normallyClosed 2	When set to normallyOpen, the contacts close when an enabled alarm occurs. Read-write. Shelf only.	8B

Table G-1 Unit Configuration Group *(10 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitExternalAlarmOutputTrapEnable	Boolean True (1) False (2)	Enables or disables the external alarm output contacts. Read-write. Shelf only.	8B
dlcUnitDsx1ConfigTable	dlcDsx1ConfigPortId PortId dlcDsx1Framing Integer dlcDsx1LineCode Integer dlcDsx1LineMatching Integer dlcDsx1DacsMode Boolean dlcDsx1UseDlcFdlProtocol Boolean dlcDsx1UseAnsiProtocol Boolean dlcDsx1Bit7Stuffing Boolean dlcDsx1InBandBit Integer	Identifies port. Read-only.	4A
dlcDsx1ConfigPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies this port. Valid values: mainNet, aux, otherNet Read-only.	

Table G-1 Unit Configuration Group *(11 of 34)*

MIB Object	Syntax	Description	TUI
dlcDsx1Framing	Integer esfFraming 1 d4Framing 2 crc4Enabled 3 crc4Disabled 4 unstructured 5	Dsx1 framing type: For T1, it can be either D4 or ESF. For E1 it can be Unstructured. When in this mode, the E1 line behaves as if it is a 2048 Bps pipe with no framing information. Read-write.	4
dlcDsx1LineCode	Integer b8zsCode 1 amiCode 2 hdb3Code 3	Dsx1 line code type AMI or B8ZS. E1 lines are always HDB3. Read-write	4
dlcDsx1LineMatching	Integer buildOut0 1 buildOut7p5 2 buildOut15 3 length0 4 length133 5 length266 6 length399 7 length533 8 ohms75 9 ohms120 10	Dsx1 line build out or equalization: T1 NET port–LBO is 0s -7.5, or -15dB. T1 AUX port–EQ is 0 to 533 feet. All E1 ports–impedance is 75 or 120 ohms. Read-write.	4
dlcDsx1DacsMode	Boolean True (1) False (2)	If DACS mode is in effect for this port, the value is True. Read-write.	N/A
dlcDsx1UseDlcFdlProtocol	Boolean True (1) False (2)	If DLC FDL protocol is enabled, the value is True. Read-write.	4
dlcDsx1UseAnsiProtocol	Boolean True (1) False (2)	If ANSI Dsx1.403 is enabled over the FDL, then this value is True. Read-write.	4
dlcDsx1Bit7Stuffing	Boolean True (1) False (2)	If bit 7 stuffing is enabled for a T1 AUX port to enable pulse desnity protection, this value is True. Read-write.	4

Table G-1 Unit Configuration Group *(12 of 34)*

MIB Object	Syntax	Description	TUI
dlcDsx1InBandBit	An integer between 1 and 8, inclusive.	Identifies which bit in timeslot 1 of an E1 link is being used to pass message traffic. Read-write.	4
dlcDataDteConfigTable	dlcDataConfigPortId PortId dlcDataConfigEncoding Integer dlcDataConfigLoss Integer dlcDataConfigMode Integer dlcDataConfigFormat Integer dlcDataConfigTransmitTiming Integer	Entry in the data DTE configuration table. Not accessible.	5
dlcDataConfigPortId	PortID= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies the port. Read only.	5
dlcDataConfigEncoding	Integer normal 1 hdlc 2 deferred 3 forced 4	Data DTE encoding type. Read-write.	5
dlcDataConfigLoss	Integer never 1 rtsLoss 2 dtrLoss 3 dataDependentLoss 4	Criterion to declare a loss of data DTE. Read-write.	5

Table G-1 Unit Configuration Group *(13 of 34)*

MIB Object	Syntax	Description	TUI
dlcDataConfigMode	Integer dteMode 1 dceMode 2	In dteMode, the unit is the DTE and the external equipment is the DCE. Read-write.	5
dlcDataConfigFormat	Integer v35 1 rs449 2	Select between V.35 or RS-449 mode. Read-write.	5
dlcDataConfigTransmitTiming	Integer scte 1 sct 2 sctInverted 3	The Data DTE transmit timing source. Read-write.	5
dlcMuxConfigTable	dlcMuxConfigBusId Integer dlcMuxConfigSlotNumber Integer dlcMuxConfigPortId PortId	Entry in the timeslot map.	
dlcMuxConfigBusId	Integer primary 1 secondary 2	Identifies which muxBus the timeslot is on.	
dlcMuxConfigSlotNumber	An integer between 1 and 31, inclusive.	Identifies the timeslot. Read-only.	6
dlcMuxConfigPortId	PortId=	Identifies the port that receives data from the indicated muxBus during this timeslot. Read-write.	
	mainNet (1) aux (2) otherNet (3)		
	reserved1 (4) reserved2 (5) reserved3 (6)		
	ethPort (7) commPort (8) int-clock (9)		
	ext-clock (10) data1 (11) data2 (12)		
	data3 (13) data4 (14) data5 (15)		
	data6 (16) data7 (17) data8 (18)		
	data9 (19) data10 (20) data11 (21)		
	data12 (22) data13 (23) data14 (24)		
	data15 (25) data16 (26) data17 (27)		
	data18 (28) data19 (29) data20 (30)		
	data21 (31) data22 (32) data23 (33)		
	data24 (34) data25 (35) data26 (36)		
	data27 (37) data28 (38) data29 (39)		
	data30 (40) data31 (41) data32 (42)		
	noPort (43)		

Table G-1 Unit Configuration Group *(14 of 34)*

MIB Object	Syntax	Description	TUI
dlcSnmpUnitIpAddr	IpAddress	IP address assigned to the unit. Read-write.	0A
dlcSnmpUnitNetMask	IpAddress	Net mask that is being used. Read-write.	N/A
dlcSnmpTrapAddr1	IpAddress	IP address of the management station where traps are sent. Read-write.	0B
dlcSnmpTrapAddr2	IpAddress	IP address of the management station where traps are sent. Read-write.	0B
dlcSnmpTrapAddr3	IpAddress	IP address of the management station where traps are sent. Read-write.	0B
dlcSnmpTrapDlci1	Gauge	First of three DLCIs used when sending trap PDUs. Read-write.	0B
dlcSnmpTrapDlci2	Gauge	Second of three DLCIs used when sending trap PDUs. Read-write.	0B
dlcSnmpTrapDlci3	Gauge	Third of three DLCIs used when sending trap PDUs. Read-write.	0B
dlcSnmpTrapDirection1	Integer commDirection 1 netDirection 2 dteDirection 3 fdlDirection 4 ethDirection 5	First of three ports where trap PDUs are sent. Read-write.	0B
dlcSnmpTrapDirection2	Integer commDirection 1 netDirection 2 dteDirection 3 fdlDirection 4 ethDirection 5	Second of three ports where trap PDUs are sent. Read-write.	0B
dlcSnmpTrapDirection3	Integer commDirection 1 netDirection 2 dteDirection 3 fdlDirection 4 ethDirection 5	Third of three ports where TRAP PDUs are sent. Read-write.	0B
dlcSnmpTrapDirection	Integer commDirection 1 ibcDirection 2	Specifies where unit sends trap PDUs. Read-write.	0B
dlcSnmpEthernetIpAddr	IpAddress	IP address of the Ethernet port. Read-write.	0C

Table G-1 Unit Configuration Group *(15 of 34)*

MIB Object	Syntax	Description	TUI
dlcSnmpEthernetIpMask	IpAddress	Subnet mask of the Ethernet port. Read-write.	0C
dlcSnmpEthernetGatewayAddr	IpAddress	Gateway address of the Ethernet port. Read-write.	0C
dlcSnmpEthernetMacAddr	MacAddress	MAC address of the Ethernet port. Read only.	0C
dlcUnitTimeYear	Date integer which falls between 1992 and 2037, inclusive.	Unit's notation of current year. Read-write.	All
dlcUnitTimeMonth	Integer that maps to the month. 1 through 12 inclusive.	Unit's notation of current month. Read-write.	All
dlcUnitTimeDay	Date integer which falls between 1 and 31, inclusive.	Unit's notation of the current day. Read-write.	All
dlcUnitTimeHour	Time integer which falls between 0 and 23, inclusive.	Unit's notation of the current hour. Read-write.	All
dlcUnitTimeMinute	Time integer which falls between 0 and 59, inclusive.	Unit's notation of the current minute. Read-write.	All
dlcUnitTimeSecond	Time integer which falls between 0 and 59, inclusive.	Unit's notation of the current second.	All
dlcUnitSerialNum	DisplayString (Size: 0 through 20)	ID that uniquely and globally identifies the unit. A serial number must consist of printable ASCII characters 0x20..0x7E. Read-only.	4
dlcModemPhoneNum1	DisplayString (Size: 0 through 20)	First phone number to try when the unit needs to set up a modem connection. Read-write.	8C
dlcModemPhoneNum2	DisplayString (Size: 0 through 20)	Second phone number to try when the unit needs to set up a modem connection. Read-write.	8C
dlcModemInitString1	DisplayString (Size: 1 through 20)	First group of commands used to initialize the modem. Read-write.	8E
dlcModemInitString2	DisplayString (Size: 1 through 60)	Second group of commands used to initialize the modem. Read-write.	8E
dlcUnitInbandMode	Integer noInband 1 frameRelay 2 ciscoHDLC 3	Type of traffic expected on the link for in-band management and IPM. Read-only.	0A

Table G-1 Unit Configuration Group *(16 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitCurrentStatus	UnitStatusItem= normal 1 noClock 2 testInProgress 4 sendKeepAlive 8 sendYellowAlarm 16 reserved1 32 reserved2 64 reserved3 128 reserved4 256 reserved5 512	Displays unit status. Read-only.	1
dlcUnitErrorFreeSeconds	Gauge	Percent of error free seconds over the last 24 hours. Read-only.	1
dlcUnitLastSelfTestResult	Integer between 0 and 123, inclusive. A bitmap, the sum of : Selftest passed 0 ROM checksum failure 1 RAM test failure 2 EEPROM CRC failure 4 DTE test failure 8 Pattern loss during test 16 FLASH checksum failure 32 reserved 64 reserved 128 reserved 256 reserved 512	Result of the last self test. A result of 0 means that no errors occurred.	9A
dlcPortStatusTable	dlcPortStatusId PortId dlcPortStatus PortStatusItem dlcPortStatusNetRxBwUtilization Gauge dlcPortStatusNetTxBwUtilization Gauge		

Table G-1 Unit Configuration Group *(17 of 34)*

MIB Object	Syntax	Description	TUI
dlcPortStatusId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies which port (NET, AUX, Data, DTE, etc.) the status entry is describing. Read-only.	
dlcPortStatus	PortStatusItem= normal 1 lossOfSignal 2 lossOfSync 3 yellowAlarmDetected 4 blueAlarmDetected 5 setCodeReceived 6 resetCodeReceived 7 excessiveErrorRate 8 localTest 9 eBitReceived 10 reserved1 11 reserved2 12 reserved3 13 reserved4 14	Actual status value for the port. Read-only	1
dlcPortStatusNetRxBwUtilization	Gauge	Percent of net receive bandwidth utilization over the last 60 seconds. The number is multiplied by 10 and converted to an integer. For example, 94.2 is encoded as 942.	1

Table G-1 Unit Configuration Group *(18 of 34)*

MIB Object	Syntax	Description	TUI
dlcPortStatusNetTxBwUtilization	Gauge	Percent of net receive bandwidth utilization over the last 60 seconds. The number is multiplied by 10 and converted to an integer. For example, 94.2% is encoded as 942.	1
dlcAlarmTable	dlcAlarmPort dlcAlarmType	Entry in the alarm table. Not-accessible.	
dlcAlarmPort	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies which port (NET, AUX, Data DTE, etc.) this alarm relates to. Read-only.	

Table G-1 Unit Configuration Group *(19 of 34)*

MIB Object	Syntax	Description	TUI
dlcAlarmType	AlarmType= lostSignal 1 lostSync 2 detectedYellow 3 detectedAIS 4 detectedExternalAlarm 5 exceededBpvThreshold 6 exceededOofThreshold 7 exceededCrcThreshold 8 remoteAlarmBitSet 9 detectedPSfailure 10 detectedCntlCardMissing 11 lostDlcFdlLink 12 exceededIbCrcThreshold 13 lostDlcInbandLink 14 lmiSpoofing 15	Alarm outstanding against this port. Read-only.	
dlcUnitErrorSecondsRatio	Gauge	Percent of error seconds over the last 24 hours. This number is multiplied by 10 and converted to an integer. For example, 94.2% is encoded as 942. Read-only.	1
dlcUnitSeverelyErroredSecondsRatio	Gauge	Percent of severely errored seconds over the last 24 hours. The number is multiplied by 10 and converted to an integer. For example, 94.2% is encoded as 942.	1
dlcUnitBackgroundBlockErrorRatio	Gauge	Percent of background block errors over the last 24 hours.	1
DlcUserArchiveValidTable	dlcValidPortId PortId dlcValidIntervals Integer	An entry in the user archive valid-intervals table.	

Table G-1 Unit Configuration Group *(20 of 34)*

MIB Object	Syntax	Description	TUI
dlcValidPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Port (NET or otherNet) being described. Read-only.	
dlcValidIntervals	1 through 96, inclusive.	Number of valid intervals in the user's error register database for this port. A zero clears the entire archive for this port.	3AB
dlcUserLifetimeTable	dlcLifetimePortId PortId dlcLifetimeES Gauge dlcLifetimeUAS Gauge dlcLifetimeCrcErrors Gauge dlcLifetimeBpvErrors Gauge dlcLifetimeOofErrors Gauge dlcLifetimeIbCrcErrors Gauge		

Table G-1 Unit Configuration Group *(21 of 34)*

MIB Object	Syntax	Description	TUI
dlcLifetimePortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies the port as NET or otherNet. Read-only.	
dlcLifetimeES	Gauge	Cumulative count of Errored Seconds (ES) detected on this network port. Read-write.	N/A
dlcLifetimeUAS	Gauge	Cumulative count of Unavailable Seconds (UAS) detected on this network port. Read-write.	N/A
dlcLifetimeCrcErrors	Gauge	Cumulative count of the CRC errors detected on this network port. Read-write.	3BA
dlcLifetimeBpvErrors	Gauge	Cumulative count of the Code Violation errors (BPVs) detected on this network port. Read-write.	3BA

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MIB Object	Syntax	Description	TUI
dlcLifetimeOofErrors	Gauge	Cumulative count of Out-Of-Frame (OOF) errors on ESF T1 ports. For D4 T1 ports, this represents the cumulative number of Framing Errors (FEs). Available only on the network port. Read-write.	3BA
dlcLifetimeIbCrcErrors	Gauge	Cumulative count of FCS errors detected on this network port. Read-write.	1
dlcUserCurrentTable	dlcCurrentPortId PortId dlcCurrentES Counter dlcCurrentUAS Counter dlcCurrentCrcErrors Counter dlcCurrentBpvErrors Counter dlcCurrentOofErrors Counter dlcCurrentTimeElapsed Integer dlcCurrentIbCrcErrors Counter		
dlcCurrentPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies which port, NET or otherNet, this entry relates to. Read-only.	

Table G-1 Unit Configuration Group *(23 of 34)*

MIB Object	Syntax	Description	TUI
dlcCurrentES	Counter	Errored Seconds (ES) in the interval. Read-only	3BA 1
dlcCurrentUAS	Counter	Unavailable Seconds (UAS) in the interval. Read-only.	3BA 1
dlcCurrentCrcErrors	Counter	CRC errors in the interval. Read-only.	3BA 1
dlcCurrentBpvErrors	Counter	Code Violation (BPV) errors in the interval. Read-only.	3BA 1
dlcCurrentOofErrors	Counter	OOF or Framing Errors (FE) in the interval.	3BA 1
dlcCurrentTimeElapsed	Interger between 0 and 899 inclusive.	Number of seconds since the beginning of the current error-measurement period. Available only for the network port. Read-only.	1
dlcCurrentIbCrcErrors	Counter	FCS errors in the interval.	1
dlcUserArchiveTable	dlcArchivePortId PortId dlcArchiveInterval Integer dlcArchiveES Counter dlcArchiveUAS Counter dlcArchiveCrcErrors Counter dlcArchiveBpvErrors Counter dlcArchiveOofErrors Counter dlcArchiveIbCrcErrors Counter dlcArchiveNetRxBwUtilization Gauge dlcArchiveNetRxPackets Counter dlcArchiveNetTxBwUtilization Gauge dlcArchiveNetTxPackets Counter		

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MIB Object	Syntax	Description	TUI
dlcArchivePortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Identifies which port, NET or otherNet, this entry relates to. Read-only.	
dlcArchiveInterval	Integer between 1 and 96, inclusive.	Indentifies the interval that the secondaryArchiveEntry describes. A value of 1 indicates the most recent interval.	
dlcArchiveES	Counter	Errored Seconds (ES) in the interval.	3BC
dlcArchiveUAS	Counter	Unavailable Seconds (UAS) in the interval. Read-only.	3BC
dlcArchiveCrcErrors	Counter	CRC errors in the interval. Read-only.	3BC
dlcArchiveBpvErrors	Counter	Code Violations (BPVs) in the interval. Read-only.	3BC
dlcArchiveOofErrors	Counter	OOF or Framing errors in the interval. Read-only.	3BC
dlcArchiveIbCrcErrors	Counter	FCS errors in the interval. Read-only.	3BC
dlcArchiveNetRxBwUtilization	Gauge	Net Rx Bandwidth Utilization in the interval. Read-only.	3CB

Table G-1 Unit Configuration Group *(25 of 34)*

MIB Object	Syntax	Description	TUI
dlcArchiveNetRxPackets	Counter	Net Rx Packets in the interval. Read-only.	3CB
dlcArchiveNetTxBwUtilization	Gauge	Net Tx Bandwidth Utilization in the interval. Read-only.	3CB
dlcArchiveNetTxPackets	Counter	Net Tx Packets in the interval. Read-only.	3CB
dlcUnitTestTable	dlcUnitTestPortId PortId dlcUnitTestType TestType dlcUnitTestPatternStatus Integer dlcUnitTestPatternErrors Gauge dlcUnitTestSentPackets Gauge dlcUnitTestReceivedPackets Gauge dlcUnitTestErroredPackets Gauge dlcUnitTestMissingPackets Gauge dlcUnitTestAverageRoundTrip Gauge dlcUnitTestMaximumRoundTrip Gauge		
dlcUnitTestPortId	PortId= mainNet (1) aux (2) otherNet (3) reserved1 (4) reserved2 (5) reserved3 (6) ethPort (7) commPort (8) int-clock (9) ext-clock (10) data1 (11) data2 (12) data3 (13) data4 (14) data5 (15) data6 (16) data7 (17) data8 (18) data9 (19) data10 (20) data11 (21) data12 (22) data13 (23) data14 (24) data15 (25) data16 (26) data17 (27) data18 (28) data19 (29) data20 (30) data21 (31) data22 (32) data23 (33) data24 (34) data25 (35) data26 (36) data27 (37) data28 (38) data29 (39) data30 (40) data31 (41) data32 (42) noPort (43)	Port that a test might be running on. By convention, self-test and all full bandwidth tests (loopback, patterns, etc.) are assigned to the netPort. E1 units in unstructured mode can only perform full-loopback tests. Read-only.	

Table G-1 Unit Configuration Group *(26 of 34)*

MIB Object	Syntax	Description	TUI
dlcUnitTestType	TestType= noTest 1 selfTest 2 netLoopback 3 payloadLoopback 4 dteLoopback 5 loopUpRemote 6 loopDownRemote 7 sendQrwPattern 8 sendlin8Pattern 9 sendlin1Pattern 10 sendlin3Pattern 11 sendlin5Pattern 12 send2in3Pattern 14 send4in5Pattern 15 send3in24Pattern 16 sendAllOnePattern 17 sendAllZeroPattern 18 sendUser1Pattern 19 sendUser2Pattern 20 sendSmartJackSet 21 sendSmartJackReset 22 sendAPatternError 23 dteNetLoopback24 24 reserved1 25 reserved2 26 reserved3 27 reserved4 28 reserved5 29 reserved6 30 lampTest 31	Identifies test running on the port. The following tests, in the matrix below, are equivalent and represent the test names used with SNMP, on the terminal user's interface (TUI), and from the front panel. SNMP / Terminal UI / Front Panel 1 in 8 / 1:7 / 1:7 3 in 24 / 3:24 / 3.24 1 in 1 / 1:1 / 1:1 AllOne / All 1 / 1s AllZero / All 0 / 0s lin3 / 1:2 / 1:2 lin5 / 1:4 / 1:4	9A
dlcUnitTestPatternStatus	Integer search 1 locked 2 overflow 3 off 4 lockedAfterLoss 5	The current state of the Pattern Test module. Read-only.	9A
dlcUntiTestPatternErrors	Gauge	Cumulative count of errors detected by the Pattern Generator/Detector. Can be read and written to zero. Read-write.	9A
dlcLinkTestSentPackets	Gauge	Number of packets sent for the currently running link-based test. Read-only.	9B
dlcLinkTestReceivedPackets	Gauge	Number of 'good' packets received for the currently running link-based test. Read-only.	9B

Table G-1 Unit Configuration Group *(27 of 34)*

MIB Object	Syntax	Description	TUI
dlcLinkTestErroredPackets	Gauge	Number of "errored" packets received for the currently running link-based test. Read-only.	9B
dlcLinkTestMissingPackets	Gauge	Number of missing packets for the currently running link-based test. Read-only.	9B
dlcLinkTestAverageRoundTrip	Gauge	Average round trip time in milliseconds for the currently running link-based test. Read-only.	9B
dlcLinkTestMaximumRoundTrip	Gauge	Maximum round trip time in milliseconds for the currently running link based test. Read-only.	N/A
dlcUnitDialOutTimeInterval	An integer between 0 and 255, inclusive.	Dialout time interval.	8C
dlcAlarmSignal	FramedUnframed= framed 1 unframed 2	Framed/unframed AUX alarm signal option. Read-write.	4
dlcUnitIdleCode	An integer between 0 and 255, inclusive.	Idle code that is sent on unassigned time slots. Read-write.	4
dlcRemoteCommunicationsMode	RemoteCommunicationsMode= none 1 digital-link 2 att-TR54016 3 ansi-T1-403 4	Framed/unframed AUX alarm signal option. Read-write.	4
dlcLinkTestState	Integer disabled 1 enabled 2 running 3 idle 4	Status configuration of link-based test. Use disable (1) or enable (2) to stop or start a test. Running (3) and idle (4) are returned values.	9B
dlcLinkTestAddress	IpAddress	Address for the next link-based test to run. Read-write.	9B
dlcLinkTestDlci	An integer between 0 and 1,203, inclusive.	The Frame Relay DLCI for the next link-based test to run. This value is used when the unit is in frameRelayInbandMode only, and if the next link-based test is not down on the commPort. Read-write.	9B

Table G-1 Unit Configuration Group *(28 of 34)*

MIB Object	Syntax	Description	TUI
dlcLinkTestPort	Integer comm 1 net 2 dte 3 eth 4	Port to run the next link-based test on. Read-write.	9B
dlcLinkTestLength	Integer	Time length of the next test to run measured in minutes. Read-write.	9B
dlcLinkTestInterval	Integer.	Repetition interval (in seconds) between packets for the next link-based test. Read-write.	9B
dlcLinkTestPacketSize	An integer between 1 and 3,600, inclusive.	Repetition interval in seconds between packets for the next link-based test. Read-write.	9B
dlcLinkTestPattern	Integer ping511 1 ping2047 2 ping1-0 3 ping-all-1 4 ping-all-0 5	Test pattern for the next link-based test. Read-write.	9B
dlcUnitInbandConfig	Boolean True (1) False (2)	When True, in-band management is enabled. Read-only.	0A
dlcUnitInbandTrafficType	Integer frameRelay 1 ciscoHdlc 2	Type of traffic expected on the link for in-band management and IPM. Read-only.	0A
dlcUnitPerformanceMonitoring	Boolean True (1) False (2)	When True, integrated performance monitoring is enabled. Read-write.	0A
dlcUnitPvcAutoDiscovery	Boolean True (1) False (2)	When True, automatic discovery of DLCIs is enabled. Read-write.	N/A
dlcDelayMonitorConfigTable	dlcDelayMonitorConfigIndex Integer dlcDelayMonitorState Integer dlcDelayMonitorTargetAddress IpAddress dlcDelayMonitorDlci Integer dlcDelayMonitorPort Integer dlcDelayMonitorInterval Integer dlcDelayMonitorPacketSize Integer dlcDelayMonitorPattern Integer	Entry in the dlcDelayMonitorConfigEntry.	9C

Table G-1 Unit Configuration Group *(29 of 34)*

MIB Object	Syntax	Description	TUI
dlcDelayMonitorConfigIndex	An integer between 1 and 4, inclusive.	Identifies the delay monitor test in the configuration table. Read-only.	9C
dlcDelayMonitorState	disabled 1 enabled 2 running 3 idle 4	Specifies the status configuration of the delay monitor. Value can be set to disable (1) or enable (2). Values running (3) and idle (4) represent status of the test. Read-write.	9C
dlcDelayMonitorTargetAddress	IpAddress	IP address for the next delay monitor to run. Read-write.	9C
dlcDelayMonitorDlci	An integer between 0 and 1,023 inclusive.	Frame Relay DLCI for the next delay monitor to run. This value is used when the unit is in FrameRelay mode. Read-write.	9C
dlcDelayMonitorPort	comm 1 net 2 dte 3 eth 4	The port to run the next delay monitor. Read-write.	9C
dlcDelayMonitorInterval	An integer between 1 and 3,600, inclusive.	The repitition interval in seconds between packets for the next delay monitor to run. Read-write.	9C
dlcDelayMonitorPacketSize	An integer between 0 and 1,500, inclusive.	Packet size for the next delay monitor. Read-write.	9C
dlcDelayMonitorPattern	ping511 1 ping2047 2 ping1-0 3 ping-all-1 4 ping-all-0 5	Test pattern for the next delay monitor. Read-write.	9C
dlcDelayMonitorStatusEntry	dlcDelayMonitorStatusIndex Integer dlcDelayMonitorSentPackets Gauge dlcDelayMonitorSentPackets Gauge dlcDelayMonitorReceivedPackets Gauge dlcDelayMonitorErroredPackets Gauge dlcDelayMonitorMissingPackets Gauge dlcDelayMonitorAverageRoundTrip Gauge dlcDelayMonitorMaximumRoundTrip Gauge		3M
dlcDelayMonitorStatusIndex	An integer between 1 and 4, inclusive.	Identifies which Delay Monitor test in the configuration table. Read-write.	3M

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MIB Object	Syntax	Description	TUI
dlcDelayMonitorSentPackets	Gauge	Sent packets for the currently running delay monitor test. Read-only.	3M
dlcDelayMonitorReceivedPackets	Gauge	Number of good received packets for the currently running delay monitor test. Read-only.	N/A
dlcDelayMonitorErroredPackets	Gauge	Number of errored received packets for the currently running delay monitor test. Read-only.	3M
dlcDelayMonitorMissingPackets	Gauge	Number of missing packets for the currently running delay monitor test. Read-only.	3M
dlcDelayMonitorMaximumRoundTrip	Gauge	Maximum round trip time in milliseconds for the currently running delay monitor test. Read-only.	3M
dlcDelayMonitorAverageRoundTrip	Gauge	Average round trip time in milliseconds for the currently running delay monitor test. Read-only.	3M
dlcDLCItableTable	dlcDLCInumber Integer dlcDTECIR Integer dlcNETCIR Integer dlcDLCIstatus Integer		0E
dlcDLCInumber	An integer between 1 and 1,023, inclusive.	The DLCI number. Read-only.	0E
dlcDTECIR	Integer	The DLCI's DTE Committed Information Rate (CIR). Read-only.	0E
dlcNETCIR	Integer	The DLCI's NET Committed Information Rate (CIR). Read-only.	0E
dlcDLCIstatus	enabled 1 disabled 2 active 3 inactive 4	Represents the status of the entry. When read, it returns the status of the row. This entry is also used to add or delete an entry. Setting to enabled (1) will add a new entry while setting to disabled (2) will delete the entry. Read-write.	0E

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MIB Object	Syntax	Description	TUI
dlcUtilTable	dlcUtilDLCINumber Integer dlcUtilEncodedValue Octet string dlcUtilTimestamp Counter dlcUtilLessThan20 Counter dlcUtil20-40 Counter dlcUtil40-60 Counter dlcUtil60-80 Counter dlcUtil80-100 Counter dlcUtilMoreThan100 Counter		
dlcUtilDLCINumber	Integer	The DLCI number of the untilization statistics of this entry/row. Read-only.	
dlcUtilEncodedValue	Octet string	Value of the complete table row. The goal is to increase the efficiency of retrieving the table. Each object value in this table (counters) is represented by 4 bytes of data. Read-only.	
dlcUtilTimestamp	Counter	Identifies timestamp when this entry was last updated. Read-only.	
dlcUtilLessThan20	Counter	Number of times utilization is less than 20% of Committed Information Rate (CIR). Read-only.	
dlcUtil20-40	Counter	Number of times utilization is between 20% and 40% of Committed Information Rate (CIR). Read-only.	
dlcUtil40-60	Counter	Number of times utilization is beetween 40% and 60% of Committed Information Rate (CIR). Read-only.	
dlcUtil60-80	Counter	Number of times utilization is between 60% and 80% of Committed Information Rate (CIR). Read-only.	
dlcUtil80-100	Counter	Number of times utilization is between 80% and 100% of Committed Information Rate (CIR). Read-only.	
dlcUtilMoreThan100	Counter	Number of times utilization is more than 100% of Committed Information Rate (CIR). Read-only.	

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MIB Object	Syntax	Description	TUI
dlcLMIEnable	enabled 1 disabled 2	Specifies whether to enable or disable LMI. Read-write.	0F
dlcMaintenanceDLCI	An integer between 16 and 991, inclusive.	Specifies the number of the maintenance DLCI. This number must not be the same as the management DLCI. The default is 990. Read-write.	0G
dlcManagementDLCI	An integer between 16 and 991, inclusive.	Specifies the number of the management DLCI. This number must not be the same the maintenance DLCI. The default is 989. Read-write.	0G
dlciManagementDLCIEnable	enabled 1 disabled 2	Specifies whether to enable or disable the Management DLCI. Read-write.	0G
dlcSpoofingProtocolType	frf1-0 1 annex-d 2 annex-a 3	If spoofing is enabled, this objet defines which LMI message type to spoof. The possible choices are: FRF 1.0, Annex A (ITU Q.933), or Annex D (ANSI T1.617). Read-write.	0F
dlcDTESpoofingEnable	enabled 1 disabled 2	When enabled, LMI spoofing to the DTE port is done atutomatically. Read-write.	0G
dlcNetSpoofingEnable	enabled 1 disabled 2	When enabled, LMI spoofing to the network port is done automatically. Read-write.	0G
dlcLinkIntegrityVerificationPollingTimer	An integer between 5 and 30, in increments of 5. The default is 10 (seconds).	Interval in seconds between Link Integrity Verification Messages. This is know as T391 in the standards. Read-write.	0F
dlcFullStatusPollingCounter	An integer between 1 and 255, inclusive. Default is 10.	Value corresponds to N391 in the ITU and ANSI standards. It is the number of polling cycles of the type before the unit generates the fll status request. Read-write.	0F

Table G-1 Unit Configuration Group *(33 of 34)*

MIB Object	Syntax	Description	TUI
dlcLMIErrorEvent	An integer between 1 and 10, inclusive.	Configures the parameter which sets the number of events can occur on the LMI link in LMI Error Monitored Events before reporting an interface is down. This value is used in the same manner as the N393 parameter (N2) in the standards. Read-write.	0F
dlcLMIErroMonitorEvent	An integer between 1 and 10, inclusive.	Configures parameter which sets the number of events that are used with the LMI Error Event to define the error ratio that is used to report when the LMI link is down. Applies to the DTE and Network ports. This value is used in the same manner as the N393 parameter (N3) in the standards. Read-write.	0F
dlcLMIErrorFreeEvent	An integer between 1 and 10, inclusive. Default is 1.	Configures the parameter which sets the number of error-free messages that must be received in LMI Error Free Monitored Events prior to declaring an interface is up. Applies to the DTE and Network ports. For network spoofing, this is the number of error-free events that will cause the DSU to believe the network is back up and running and to stop spoofing. This is used in the same manner as the N392 parameter (N2) in the standards. Read-write.	0F
dlcLMIErrorFreeMonitorEvent	An integer between 1 and 10, inclusive.	Configures parameter which sets the number of events that are used with the LMI Error Free Event to define the error ratio that is used to report that the LMI link is up. Applies to the DTE and Network ports. Used in the same manner as the N393 parameter (N3) in the standards. Read-write.	0F

Table G-1 Unit Configuration Group *(34 of 34)*

MIB Object	Syntax	Description	TUI
dlcDTEResponseTimer	An integer between 5 and 30. Increments of 5. Default is 15.	Configures parameter which sets the number of seconds between the sending of a status enquiry message and the receipt of a response. Applies to the DTE port. This value is similar in nature to the T392 (T2) parameter in the standards. Read-write.	0F
dlcLMIUnitLocation	cpe 1 co 2	Configures where the unit is locates so that LMI spoofing can be done properly. If cpe (1) is selected, it means that the unit is located on the customer premise. If co (2) is selected, it means the unit is located in the central office. Read-write.	0G
dlcSpoofingStatus	normal 1 dte-spoofing 2 net-spoofing 3 dte-and-net-spoofing 4	Configures automatic LMI spoofing to the router. If the status is 'true', LMI spoofing will occur automatically, whereas a value of 'false' means that LMI spoofing has been disabled. Read-only.	0G
dlcDTEInterfaceLMIStatus	unknown 1 lmi-up 2 lmi-down 3	Indicates the LMI status of the DTE interface. Read-only.	0G
dlcNetInterfaceLMIStatus	unknown 1 lmi-up 2 lmi-down 3	Indicates the LMI status of the Net interface. Read-only.	0G

TRAPS

Table G-2 Traps

Trap	Variables	Description
startTest	dlcUnitTestPortId, dlcUnitTestType	Trap sent upon iniitiation of a new test condition.
endTest	dlcUnitTestPortId, dlcUnitTestType	Trap sent upon the termination of a test condition.
startAlarm	dlcAlarmPort, dlcAlarmType	Indicates the beginning of a new alarm condition.
endAlarm	dlcAlarmPort, dlcAlarmType	Indicates the end of an alarm condition.

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