

# PremNet™ T1/E1 I/O Module

## Installation and Operation

PND850027-1/A 12/97

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# About This Manual

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## Manual Description

The *PremNet T1/E1 I/O Module Installation and Operation Manual* provides information you need to properly configure, test, and manage T1/E1 I/O Modules installed in your PremNet 5000 or PremNet Branch network. This manual has been written with the assumption that you are familiar with basic data communications principles.

The manual is composed of the following sections:

- **Chapter 1 - Overview** provides an introduction to the T1/E1 I/O Module.
- **Chapter 2 - Applications** provides examples of PremNet T1/E1 I/O Module applications.
- **Chapter 3 - Installation and Configuration** outlines the steps you must take to install T1/E1 I/O module into a PremNet chassis and establish a virtual connection.
- **Chapter 4 - T1/E1 I/O Module Command Menu** describes the options available to manage, configure, and test the T1/E1 I/O Module.

## Terminology and Conventions

The following conventions are implemented throughout this manual to aid you in determining what messages are being displayed by the asynchronous terminal versus what you, as an operator, have to input.

Text displayed by the terminal is shown in System non-bold type:

Login

Keyboard characters in brackets may indicate that you must press a special keyboard key such as [ENTER] or [CTRL].

Characters that must be input by you exactly as indicated are shown in System boldface type:

**Y**

For further information on the PremNet Broadband Access System, refer to the following manuals:

- *PremNet Broadband Access System Installation and Operation Manual* for information about how to install and configure the PremNet 5000 and PremNet Branch chassis.
- *PremNet System Multi-Ring Network Configuration Manual* for information about multi-ring networks.

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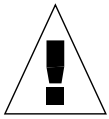
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## Important Safety Instructions

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines.
5. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electrical shock from lightning.
6. Do not use the telephone to report a gas leak in the vicinity of the leak.



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**Caution:** To ensure compliance with government regulations, do not install or operate this product until you have read the information contained in Appendix B.

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# Chapter 1

## Overview

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### IMPORTANT INFORMATION

C.F.R. 47, Chapter 1, Part 68 rules for direct connection to the telephone network govern the T1 interface(s) of this product and state that:

Network connection of this product can ONLY be made through a "Totally Protected" Channel Service Unit (CSU), providing billing protection and encoded analog content protection. A "totally protected" CSU is identified by the FCC Part 68 function code of "DD" and utilizes the Service Order Code (SOC) of 6.OY.

CSUs that are identified by the FCC Part 68 function code of "DE" and utilize Service Order Codes 6.OFF or 6.ON do not provide billing protection nor encoded analog content protection and, therefore, are not suitable for connecting non-registered T1 interfaces to the telephone network.

The FCC Part 68 function code is part of the CSU's FCC Part 68 Registration Number (i.e., ABC123-12345-DD-N).

---

## Introduction

T1 and E1 are used to differentiate between the North American and European hierarchical voice/data transmission systems used in the digital telephone network. The specific electrical interfaces and parametric requirements within these hierarchical systems are defined in Bellcore and CCITT documents and are referred to as DS1, DS1A, and E1 (G.703 coax) in this chapter.

This chapter discusses three I/O modules that differ from each other only by the Premnet Bus Bandwidth that is supported and the physical interface, as described in Table 1-1. Each T1/E1 I/O module requires two timeslots. Figure 1-1 shows the DS1, DS1A, and the E1 modules.

<b>Product Number</b>	<b>Type</b>	<b>BUS Timeslots</b>
850027	DS1	20 timeslots
850028	DS1A	20 timeslots
850054	E1	20 timeslots
850134	DS1	30 timeslots
850135	DS1A	30 timeslots
850136	E1	30 timeslots

There are two versions of the PremNet system: the PremNet 5000 supports up to eight interface modules and the PremNet Branch supports up to three.

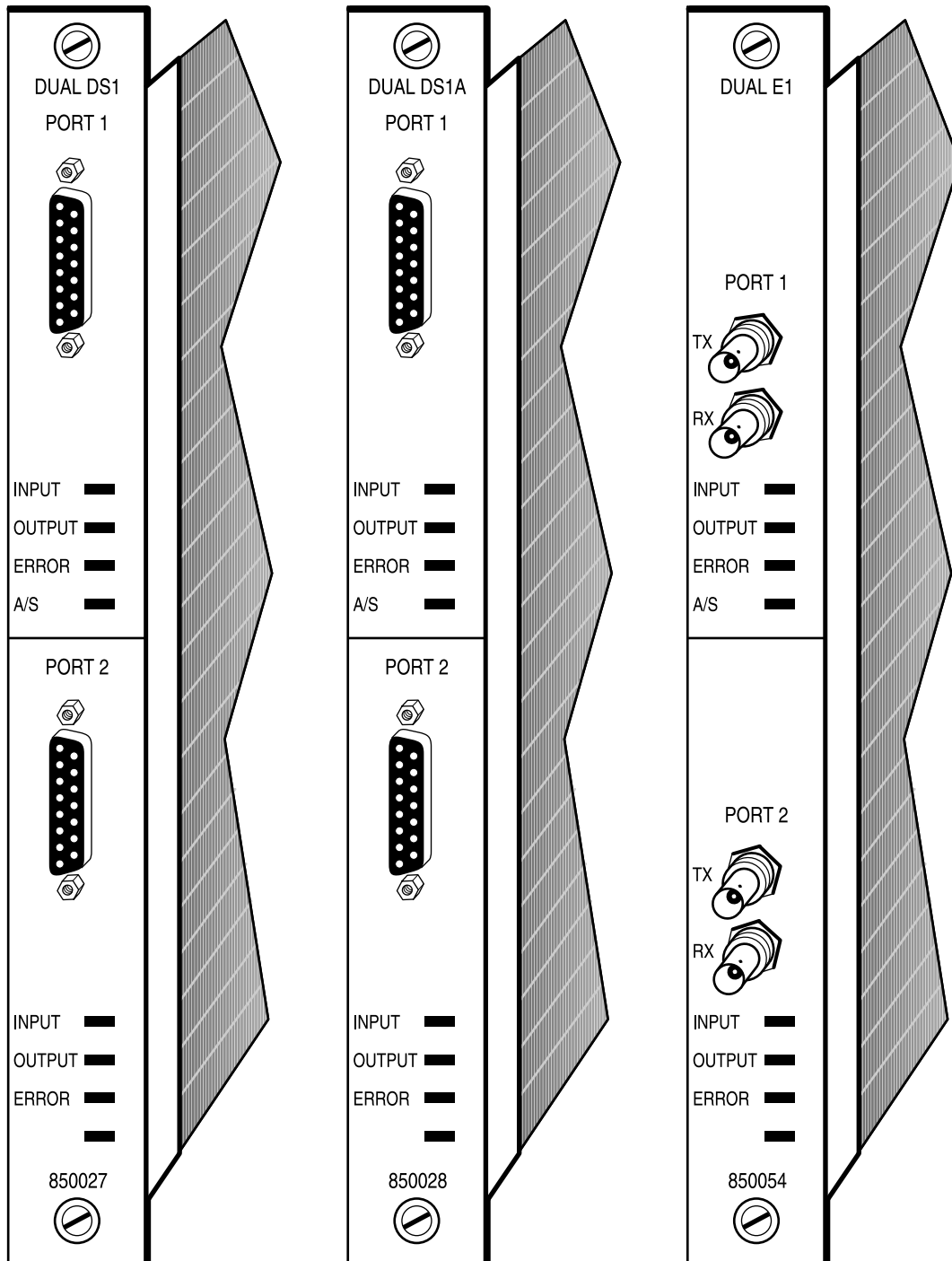


Figure 1-1. DS1, DS1A, and E1 I/O Modules

**Table 1-1. T1/E1 I/O Module Options**

Product #	Type	Speed	Connector	Z (ohm)	Cable
850027 & 850134	DS1	1.544 Mbps	DB-15 Female	100 ohm	Twisted pair
850028 & 850135	DS1A	2.048 Mbps	DB-15 Female	120 ohm	Twisted pair
850054 & 850136	E1	2.048 Mbps	Dual BNC	75 ohm	Coax

All of the modules listed in Table 1-1 provide a generic *point-to-point* transport interface for telephony-type bipolar signals commonly occurring at specific points in the network (for example, digital signal cross-connects or equipment terminations). These signals are usually generated and terminated by voice or data multiplexing equipment such as Channel Banks and Digital Radio equipment.

The main purpose of the T1/E1 modules is to transport data to a similar module in another PremNet node. These modules are *not* intended to be used for speed conversion between different protocols (e.g., 1.544 Mbps to 2.048 Mbps). However, it is possible to convert between dissimilar *physical* interfaces, such as DS1A twisted pair (2.048 Mbps) to E1 G.703 coax (2.048 Mbps).

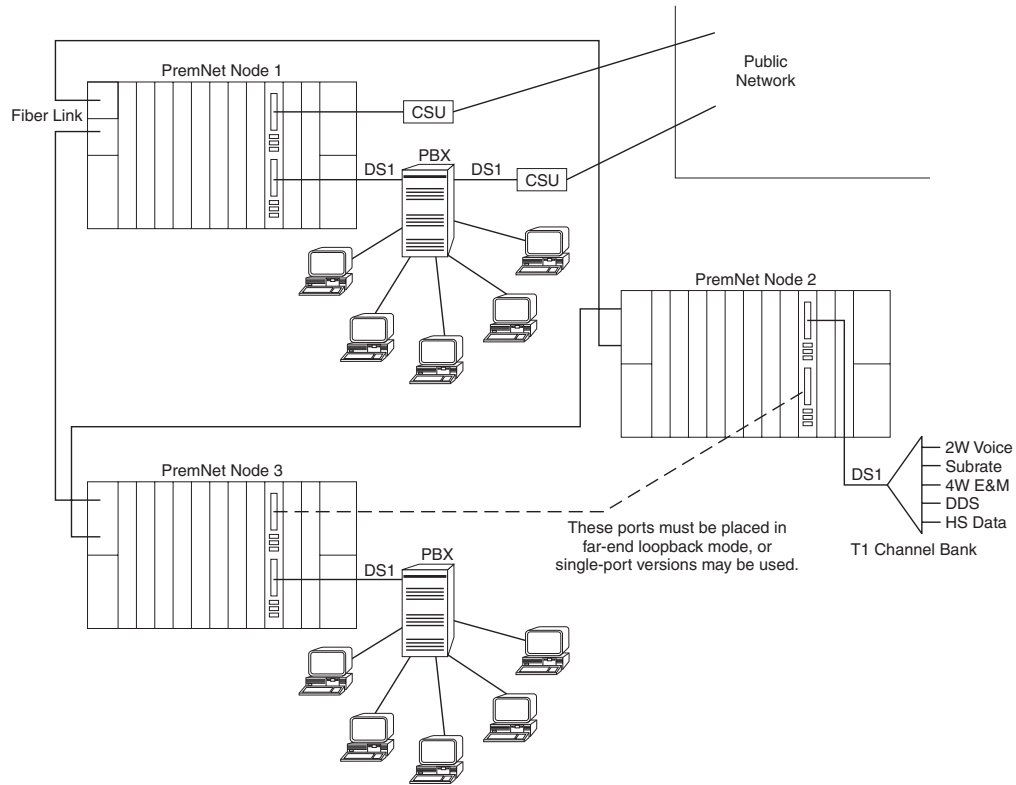
The T1/E1 modules provide transparent transmission through the PremNet network. These modules transport and reproduce at the far end the same signal that entered the near end, regardless of bipolar violations or error content of the original data. The T1/E1 modules make no provision for error correction or the uncontrolled insertion of "ones" to satisfy ones-density requirements of downstream equipment. The modules are, therefore, compatible with certain protocols, such as B8ZS.

---

**Note:** If the standby fiber link is activated because the active link fails, the T1/E1 module generates an unspecified number of bipolar violations. To correct the problem, place a Channel Service Unit (CSU) between the PremNet node and the customer's equipment.

---

You can assign the ports on the T1/E1 modules to different destinations in the PremNet network. Figure 1-2 shows a typical application of the product.



**Figure 1-2. Typical DS1 Application**

## LED Display

The LED status indicators for the T1/E1 I/O modules are on the front panel of the PremNet node. Each module has three LED indicators. Table 1-2 lists the panel LEDs, along with a brief description.

**Table 1-2. T1/E1 I/O Module Panel LED Meanings**

<b>LED</b>	<b>Meaning</b>
Alarm	The module is in alarm condition.
Stdby	Standby. The module has not been assigned a timeslot.
Active	The link timeslot connection assigned.

The faceplate of the module also provides LED status indicators for each port, as described in Table 1-3.

**Table 1-3. T1/E1 I/O Module Faceplate Status LEDs**

<b>LED</b>	<b>Meaning</b>
Input (green)	Indicates detection/presence of bipolar input signal for transport towards far end.
Output (green)	Indicates presence of bipolar output signal received from far end.
Error (red)	Indicates detection of bipolar signal violations in the selected input or output port.
AIS (yellow)	Forced all-ones pattern (Alarm Indication Signal) at near-end receive port.

---

**Note:** Input and output LEDs flash continuously when the port is in loopback mode.

---

## Module Connections

The physical connection to the DS1 or the DS1A I/O module is a DB-15 connector. The physical connections to the E1 I/O module are two BNC coax connectors. The coax ports on the faceplate of the E1 module are labeled TX and RX. The pin assignments for the DB-15 connector are described in Table 1-4.

**Table 1-4. DB-15 Connector Pinouts**

Pin	Signal	Signal-Direction
1	Transmit Data Tip	Input port for data to be transmitted to far end RX port.
9	Transmit Data Ring	
4	Shield Ground	
3	Receive Data Tip	Output port for data received from far-end TX port.
11	Receive Data Ring	
2	Shield Ground	

The maximum cable length allowed between the DS1 device and the DS1 I/O module is 655 feet. To ensure that the correct signal pulse shape is provided at the terminating equipment, you must select the proper Line Build-Out (LBO) signal (depending on the type and length of the cable) using the **Pulse shape setup (LBO)** option. This option is described in Pulse shape setup (P), later in this chapter.

---

**Note:** This manual does not address problems associated with interconnection between this module and to outside plant cabling exposed to potentially hazardous voltages resulting from lightning surges or AC-induction. This module is intended for DS1 applications and therefore provides no level of protection against such uncontrollable and externally induced conditions.

---

The remainder of this chapter discusses the 2-port DS1 I/O module, the most common of the three interface types.

## T1/E1 Module Specifications

The following interface specifications enable you to determine the compatibility of the T1/E1 I/O modules with the external devices to be connected to them.

### Nominal Port Impedance

The nominal port impedance for the T1/E1 modules is

- DS1 100 ohm  $\pm 5\%$  (twisted pair)
- DS1A 120 ohm  $\pm 5\%$  (twisted pair)
- E1 G.703 75 ohm  $\pm 5\%$  (coax)

## Line Rate Tolerance

The attached device determines the timing. The T1/E1 I/O modules are capable of accepting a rate deviation of  $\pm 130$  ppm. The line rates for the T1/E1 I/O modules are

- DS1 1.544 Mbps
- DS1A 2.048 Mbps
- E1 G.703 2.048 Mbps

## Pulse Amplitude and Shape

Detailed illustrations relating to pulse shape are available in published standards documents. For DS1 signals, see Bellcore TR-TSY-000499, Figures 9-1 and 9-2. For DS1A and E1 signals, see CCITT G.703, paragraph 6. The nominal pulse amplitude for the T1/E1 modules is:

- DS1  $6 \pm 0.6$  Vpp
- DS1A  $6 \pm 0.6$  Vpp
- E1 G.703  $4.75 \pm 0.48$  Vpp

For DS1 and DS1A modules, line-build-out (LBO) equalization is provided for standard cable lengths to achieve the required pulse shape at the terminating point.

## Input Signal Sensitivity

The transmit (TX) port provides error-free performance for signals as low as 1.6 Vpp. Loss of signal threshold is approximately 0.6 Vpp.

## Jitter Performance

The TX port tolerates 0.4 unit-intervals of jitter from 10 kHz to 100 kHz and 300 unit-intervals from 10 Hz and below. The T1/E1 modules comply with the jitter requirements published in Bellcore TR-TSY-000499.

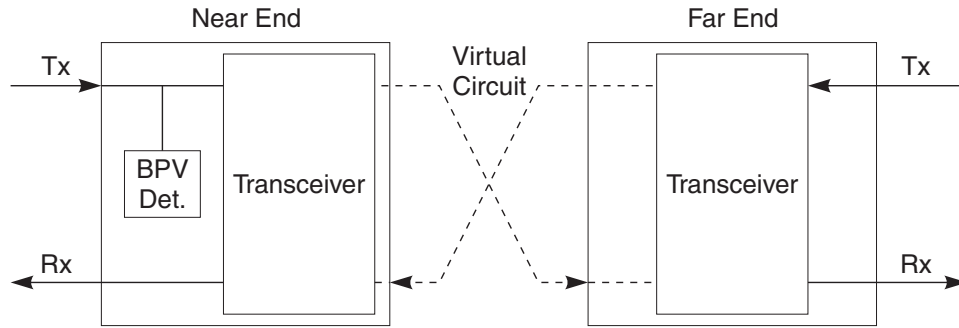
## Configuration and Diagnostic Features

The T1/E1 I/O modules provide the configuration and diagnostic features, listed in Table 1-5.

**Table 1-5. T1/E1 Configuration and Diagnostic Features**

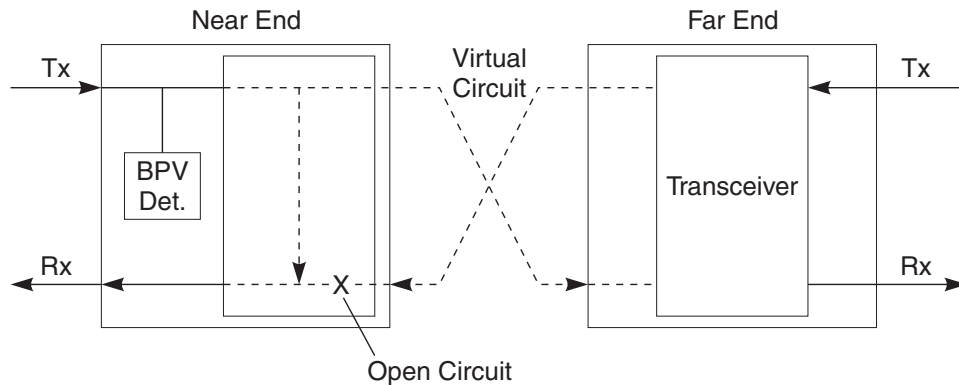
<b>Feature/Mode</b>	<b>Description</b>
Remote Loopback	Tests the near-end and far-end ports. The near-end TX port sends a signal to the far-end receive (RX) port, and the far-end TX port loops the signal back to the near-end RX port.
Local Loopback	Tests the near-end ports. The near-end TX port sends a signal to the near-end RX port. The signal is also sent to the far-end RX port.
Self-Test	Tests the receive signal for errors. The near-end TX port sends an "all-ones" pattern to the far-end RX port. The far-end TX port loops the signal back to the near-end RX port.
Alarm Indication Signal (AIS)	Indicates a loss of signal at the far-end TX port. If a signal loss is detected, an "all-ones" signal is forced out the near-end RX port.
Error Monitoring	Monitors either the RX or TX port, enabling you to isolate the source of errors.
Pulse Shape (Line Build-Out)	Selects the appropriate receive output signal pulse shape for the cable type and length. (This feature is not required for the E1 coax version.)

The following figures show the various loopback and test modes described in Table 1-5. Figure 1-3 shows the normal operating condition for point-to-point transport of DS1 signals between two modules in the system. You can configure the bipolar violation (BPV) detector to monitor either the TX (default) or the RX port.



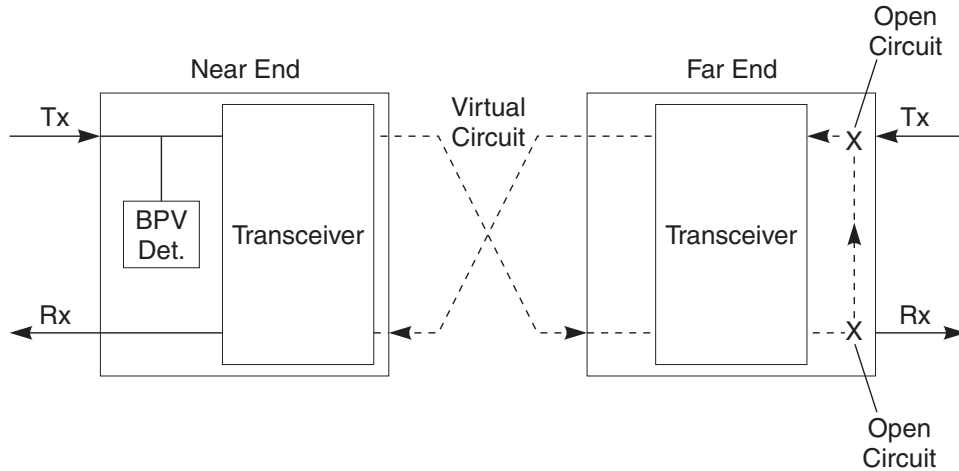
**Figure 1-3. Normal Point-to-Point Transport Mode**

Figure 1-4 shows the near-end module in local loopback mode. TX data is looped locally to appear at the local RX output. The TX data is also transported to appear at the far-end RX output port.



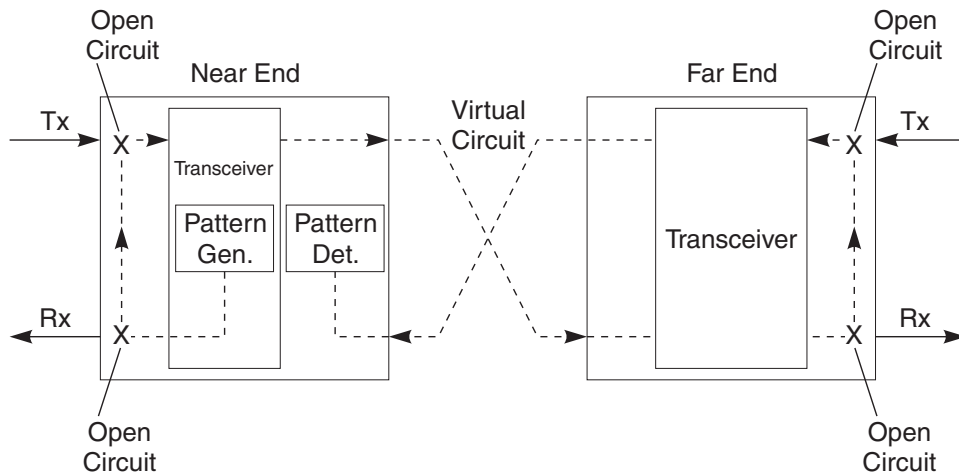
**Figure 1-4. Near-End Module in Local Loopback Mode**

Figure 1-5 shows the far-end module in remote loopback mode. The far-end received bipolar signal is looped through relay contacts and transmitted back to the near end. The customer equipment interface at the far end is physically disconnected.



**Figure 1-5. Far-End Module in Remote Loopback Mode**

Figure 1-6 shows the self-test mode invoked from the near-end module. The transceiver in the near-end module generates a bipolar test pattern which is looped through relay contacts to the near-end TX port for transport towards the far-end module. At the far-end module, the received bipolar output is looped through relay contacts to be retransmitted back towards the near end. The near-end received signal is analyzed by pattern-detection circuitry for error detection. The customer equipment interfaces at both the near and far ends of the system are physically disconnected during this test.



**Figure 1-6. Self-Test Mode Invoked from Near-End Module**

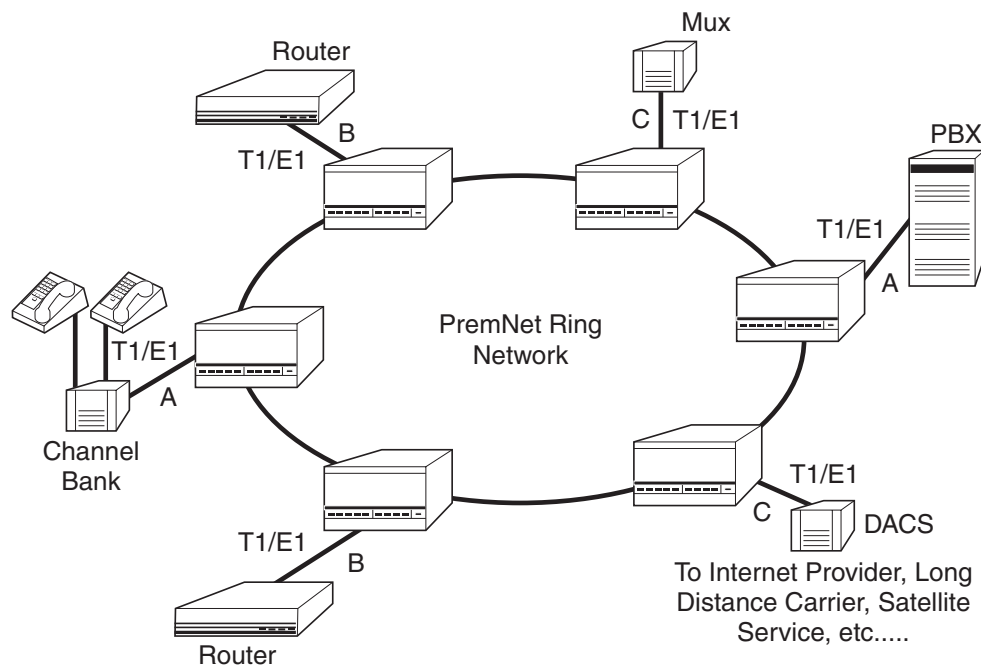


# Chapter 2

## Applications

### Transparent Transport Across the PremNet Backbone

The PremNet T1/E1 interface modules provide transparent transport across the PremNet backbone. Each differs from the others only in its data rate and physical interface. All three versions (DS1, DS1A, and E1) provide a generic point-to-point transport interface for balanced, twisted-pair, bipolar digital telephony signals commonly occurring at specific points in the network — for example, digital signal cross-connects or equipment terminations. These signals are generated and terminated by voice or data multiplexing equipment such as channel banks and digital radio equipment.



**Figure 2-1. T1/E1 Data Across the PremNet Broadband Access Backbone**

### PABX to PABX Trunking

Linking multiple PABXs over extended distances is easily accomplished using the T1 or E1 modules. Up to 48 (with T1) or 62 (with E1) PCM voice channels can be transported over the PremNet backbone using one module (two time slots).



# Chapter 3

## Installation and Configuration

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### Introduction

This section outlines the steps you must take to install T1/E1 I/O Modules into a PremNet chassis and establish a virtual connection.

Configure the I/O modules using an asynchronous terminal connected to the RS-232 port of the Network Management Module (NMM) or the Enhanced Network Management Module (ENMM) in the desired chassis. You can also configure the modules using the Milgo CMS 400 SNMP management station. See the *CMS™ 400 SNMP PremNet 5000 Manager User's Guide* for specific information.

The T1/E1 I/O Modules can reside in any chassis. When a control function is required, the module with the lowest node number is assigned as the primary control module. Unless otherwise noted, all options discussed in this manual are accessed through the (S) Select interface module option in the Node Command Menu viewed on the terminal.

### Preventing Electrostatic Discharge (ESD)

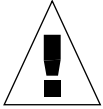
Before you install or remove parts of the PremNet system, you must be electrically grounded to prevent electrostatic discharge (ESD) damage to the modules.

To electrically ground yourself, complete the following steps:

1. Plug the power cord from the PremNet chassis into an appropriate power source.
2. Place an ESD wrist strap on your wrist.
3. Attach the end of the ESD wrist strap to exposed metal on the chassis or insert the banana connector at the end of the wrist strap into the jack labeled **CHASSIS GND** located on the lower-right of the chassis.
4. Follow the instructions included with the wrist strap.

## Installing and Removing Modules

This section describes how to install and remove modules from the PremNet chassis. You do not need to power-down the node. Plug-in modules are secured in the PremNet chassis by spring-loaded screws located on the modules' front panels. The screws on the modules must be fastened securely to prevent electrostatic discharge (ESD).



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**Caution:** Before you physically remove a module from a PremNet chassis, always delete the module's virtual-circuit connection through the Connection configuration (C) option on the Node Command Menu. Also, make sure the module is in "standby mode" (Yellow LED on).

---

The PremNet 5000 chassis contains eight slots for the placement of I/O modules. The slots are numbered 1 through 8, left to right, as viewed from the front. The PremNet Branch contains three slots, numbered 1 through 3. You can install the I/O modules in any I/O slot in any node. Modules in different nodes communicating with each other do not have to reside in the same physical slot in all nodes.

### Installing I/O Modules

To install an I/O module, complete the following steps:

1. Make sure you are electrically grounded (see ESD section).
2. Remove the module from its anti-static material.
3. Grasp the module bracket, and slide the module into a slot on the front of the PremNet chassis. Make sure the module is inserted into the plastic card guides at the top and bottom of the chassis.
4. Gently push the module in until it plugs into the connector on the backplane.

---

**Note:** The module will go into alarm condition (Red LED on) for approximately 2 minutes before going into standby (Yellow LED on).

---

5. Fasten the module to the front of the chassis by tightening the spring-loaded screws located at the top and bottom of the module bracket.

## Removing I/O Modules

To remove a module, complete the following steps:

1. Make sure the module is not connected in a virtual circuit, and it is in standby mode (Yellow LED on).
2. Loosen the two spring-loaded screws on the module bracket until they turn freely.
3. Grasp the screws and slide the module out of the chassis.
4. Place the module back into its anti-static material.

## Configuration

Complete the following steps every time you add a new T1/E1 I/O module to an active ring. All options are selected from the appropriate Module Command Menu unless otherwise noted. Refer to the module-specific Module Command Menu for details.

From the Module Command Menu:

- Select View Configuration (V) to see how the module is configured before making changes to the settings.
- Select Port Select (P) to configure each port of the module.
- Select Reset counts (R) to reset the EFS and error counters.

When the new I/O module is installed, configured, and tested; select Configuration (C) from the Node Command Menu to create the necessary connections.



# Chapter 4

## T1/E1 I/O Module Command Menu

---

### Introduction

This chapter describes the options available from the T1/E1 I/O Module Command Menu viewed on any asynchronous terminal. The terminal is connected to the RS-232 port of the Network Management Module (NMM) or the Enhanced Network Management Module (ENMM) in the desired node.

### Accessing the Module Command Menu

---

**Note:** The T1/E1 Module Command Menu is identical for all T1/E1 modules. The only exceptions are the module types which display in the top left corner of the screen, and the prompts, which display in the bottom left corner of the screen. DS1 2-Port Module Command Menus are used as the examples in this document unless otherwise noted.

---

To access the DS1 2-Port Module Command Menu:

1. Type **S** at the prompt in the Node Command Menu.
2. Enter the slot number of the DS1 I/O module you want to configure and press [ENTER]. The system displays the DS1 2-Port Module Command Menu, as shown in Figure 4-1.

Refer to the *PremNet Broadband Access System Installation and Operation Manual* for information about accessing and using the Node Command Menu.

DS1 2-Port	Module Command Menu
(A) Alarm Display	(H) Help
(M) Monitor Status	(P) Port select
(Q) Log off	(R) Reset counts
(V) View configuration	(X) Exit
(?) or (/) Command menu	(#) Interface module select

01,04:DS1 2-Port>

**Figure 4-1. DS1 2-Port Module Command Menu**

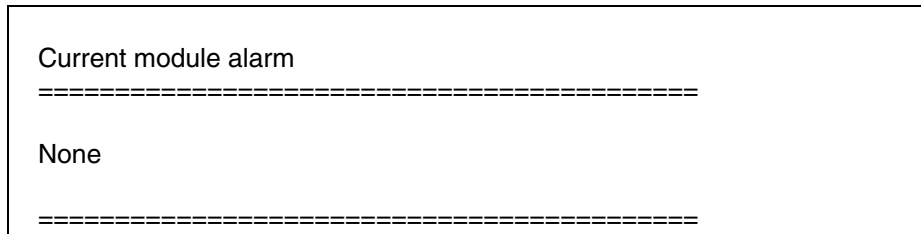
The prompt 01,04:DS1 2-Port > indicates:

- 01 is the node number
- 04 is the slot number
- DS1 2-Port is the module type.

## Alarm display (A)

In Figure 4-1, selecting the Alarm display option enables you to view specific alarm information about the module. To display alarms:

Type **A** at the DS1 2-Port prompt and press [ENTER]. The system displays a screen similar to Figure 4-2.



**Figure 4-2. DS1 2-Port Module Alarm Display Screen**

### Alarm Messages

The following list contains possible DS1 alarm messages, their corresponding code numbers, and recommended solutions to the alarm conditions they represent.

---

**Note:** For more information about code numbers, refer to Appendix C in the *PremNet Broadband Access System Installation and Operation Manual*.

---

Alarm	Code	Explanation	Solution
Port 1 BPVE/sec limit exceeded	Code 1	The bipolar violations-per-second limit is exceeded for port 1.	Verify node alarm conditions by using the Alarm display option from the Node Command Menu. If the module is causing the problem, replace the module.
Port 2 BPVE/sec limit exceeded	Code 2	The bipolar violations-per-second limit is exceeded for port 2.	Verify node alarm conditions by using the Alarm display option from the Node Command Menu. If the module is causing the problem, replace the module.

Alarm	Code	Explanation	Solution
Backplane parity error	Code 4	The T1/E1 module is receiving corrupted data from the PremNet access system.	Verify node alarm conditions by using the Alarm display option from the Node Command Menu. If the module is causing the problem, replace the module.

## Help (H)

In Figure 4-1, the Help option enables you to display a brief description of any of the options available from the DS1 2-Port Module Command Menu. To select the Help option:

1. Type **H** at the DS1 2-Port prompt and press [RETURN]. The system prompts you to enter the letter of the option for which you want help.
2. Type a letter or press [ENTER] to display the options and their corresponding letters.

## Monitor status (M)

In Figure 4-1, the Monitor status option enables you to monitor bipolar violation errors (BPVE) relative to real time and display the calculated error-free seconds (EFS) and elapsed time (ET) since the last reset. To access this option:

Type **M** at the DS1 2-Port prompt and press [ENTER]. The system displays a screen, similar to the one shown in Figure 4-3, that automatically scrolls up one line every second.

DS1 - 2 Port Port 1			Port 2			
Module	ET	EFS	BPVE	EFS	BPVE	Time
*	3156	3151	71	3156	0	14:20:31
*	3157	3152	71	3157	0	14:20:32
*	3158	3153	71	3158	0	14:20:33
*	3159	3154	71	3159	0	14:20:34
*	3160	3155	71	3160	0	14:20:35

**Figure 4-3. DS1 2-Port Module Monitor Status Screen**

In Figure 4-3, the asterisks (\*) are replaced with X's if the module is in alarm mode. The information in Figure 4-3 is interpreted as follows:

- 3,160 seconds have elapsed since the EFS and error counters shown in Figure 4-2 were reset.
- During the elapsed time, 71 bipolar violation errors have occurred on port 1.
- 3,155 error-free seconds have passed since the last errors occurred on port 1.
- No errors have been detected on port 2, and 3,160 error-free seconds have passed since the last reset.
- The current time is 14:20:35.

---

**Note:** The BPVE detector normally monitors the TX (input) port unless you configure it differently with the Monitor TX/RX option from the DS1 2-Port Port Command Menu.

---

You can calculate the bit error rate (BER) using the following formula:

$$\frac{\text{\# of errors (BPVE)}}{(\text{EFS}) (1.544 \times 10^6)}$$

For the sample screen shown in Figure 4-3, the formula is:

$$\frac{71}{(3155) (1.544 \times 10^6)} = 1.458 \times 10^{-9} \text{ BER}$$

## Port select (P)

In Figure 4-1, the Port select option lets you configure, monitor, and test each DS1 port on the module. To access this option:

Type **P** at the DS1 2-Port prompt, type the desired port number, and press [ENTER]. As a result, you see DS1 2-Port Port Command Menu in Figure 4-5. Refer to “DS1 2-Port Port Command Menu” later in this chapter for detailed information about each option available in that menu.

## Log off (Q)

In Figure 4-1, to log off the system:

Type **Q** at the DS1 2-Port prompt and press [ENTER]. The system displays the date and time you logged off the system.

## Reset counts (R)

In Figure 4-1, the Reset counts option enables you to reset the EFS and error counters described in "Monitor status", earlier in this chapter. To select this option,

1. Type **R** and press [ENTER]. The system displays the following prompt:

ARE YOU SURE? (Y/N)

2. Enter **Y**, to clear the counters, or enter **N** if you do not want the counters to be cleared.

## View configuration (V)

In Figure 4-1, the View configuration option displays the current hardware and software revisions of the module. To select this option:

1. Type **V** at the DS1 2-Port prompt and press [ENTER]. A screen similar to Figure 4-4 appears.

```
=====
Serial number: MPA1234
Software version: 01
Hardware version: X1
Module is in STANDBY without Alarms

Current setup:
Port 1: Standby
Port 2: Standby

Maximum BPVE/sec port 1: 48 @ 00:00:00 01-JAN-1993
Maximum BPVE/sec port 2: 48 @ 00:02:05 01-JAN-1993

Counters last reset @ 00:00:00 01-JAN-1993
=====
01,04:DS1 2-Port >
```

**Figure 4-4. DS1 2-Port Module View Configuration Screen**

2. Type [ESC] to return to the Port Command Menu.

### **Exit (X)**

In Figure 4-1, to return to the Node Command Menu, type **X** at the DS1 2-Port prompt and press [ENTER].

### **Command menu (?) or (/)**

In Figure 4-1, to display the options on the DS1 2-Port Module Command Menu, type **?** or **/** at the DS1 2-Port prompt.

### **Interface module select (#)**

In Figure 4-1, to select another I/O module to configure or view:

1. Type **#** at the DS1 2-Port prompt and press [ENTER]. The system prompts you to enter the I/O slot number of the module you want to access.
2. Type the I/O slot number and press [ENTER]. The Module Command Menu for the selected module appears.

## DS1 2-Port Port Command Menu

This section discusses each option available on the DS1 2-Port Port Command Menu, shown in Figure 4-5. You invoke this menu by choosing (P) Port select from the Module Command Menu in Figure 4-1.

In the Port Command Menu, every option you choose executes, then redisplay the Port Command Menu prompt so that you can choose another option.

DS1 2-Port Port Command Menu	
=====	
(A) Set Alarm level	(B) Select AMI/B8ZS
(H) Help	(L) Loopback setup
(M) Monitor TX/RX	(O) On LOS TX all ones
(P) Pulse shape setup (LBO)	(Q) Log off
(S) Self test port	(V) View configuration
(X) Exit	(?) or (/) Command menu
(#) Port select	
01,04:DS1 2-Port,1>	

**Figure 4-5. DS1 2-Port Port Command Menu**

The prompt 01,04:DS1 2-Port,1> indicates:

- 01 is the node number
- 04 is the slot number
- DS1 2-Port is the module type
- 1 is the port number

### Set Alarm level (A)

In Figure 4-5, the Set Alarm level option lets you select the number of bipolar violation errors per second (BPVE/sec) that can occur before an alarm is generated. To select this option:

1. Type **A** and press [ENTER] at the DS1 2-Port,1> prompt. The system displays the current alarm threshold and prompts you to enter a new alarm threshold:

Current alarm threshold> =32000 BPVE/sec

Enter new alarm threshold (1-32000 BPVE/sec): 10000

2. Type a value between 1 and 32000, inclusive, and press [ENTER]. The system displays the new alarm threshold you just entered:

New alarm threshold >= 10000 BPVE/sec

---

**Note:** The maximum count allowed is 31,000. If you set the alarm threshold to 32,000, no alarm is generated.

---

## Select AMI/B8ZS (B)

In Figure 4-5, the Select AMI/B8ZS option enables you to select either AMI or B8ZS code for the bipolar violation error detector (BPVE) on the port. The code you select must match the type of bipolar signal being transported. If it does not match, alarms are generated. If you select this option improperly, you will not *effect* the actual signal. To access this option:

1. Type **B** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the current setup and prompts you to change it:

Current setup: Using AMI code

Using B8ZS Code? (Y/N): Y

2. Type **Y** or **N** and press [ENTER].
  - a. If you type **Y**, the system changes the setup and displays your selection:

New setup: Using B8ZS code

- b. If you type **N**, the system does not change the setup.

## Help (H)

In Figure 4-5, the Help option enables you to view a brief description of any of the options on the DS1 2-Port Command Menu. To access the Help option:

1. Type **H** at the DS1 2-Port,1> prompt and press [ENTER]. The system prompts you to enter the letter of the option for which you want help.
2. Type a letter or press [ENTER] to display the options and their corresponding letters.

## Loopback setup (L)

In Figure 4-5, the Loopback setup option enables you set the loopback mode. To select this option:

1. Type **L** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the current loopback setup and prompts you to change it, as shown in Figure 4-6.

```
Current setup: Normal
Loopback mode table:
(1) Normal
(2) Local Loopback
(3) Remote Loopback
(4) Transmit all ones
enter selection:
```

**Figure 4-6. Loopback Mode Selection Menu**

2. Type the number of the loopback mode you want and press [ENTER]. The system displays the setup you selected:

New setup: Local looped

Table 4-1 lists the loopback modes, along with brief descriptions.

**Table 4-1. Loopback Mode Descriptions**

Loopback Mode	Description
Normal	Removes any <i>loopback</i> or <i>transmit-all-ones</i> conditions that have been invoked.
Local loopback	Loops TX (input) data locally to appear at the local RX (output) port on the connector. When you invoke this option, the input and output LEDs on the T1/E1 module flash continuously.
Remote loopback	<p>Places the selected port in remote loopback so that it returns data to the far end port. When you select remote loopback, the input and output LEDs on the T1/E1 module flash continuously.</p> <hr/> <p><b>Note:</b> The far-end module must be accessed through the management screens at the far-end PremNet node.</p>
Transmit all ones	Forces a continuous “all-ones” to appear at the near-end RX (output) port.

## Monitor TX/RX (M)

In Figure 4-5, the Monitor TX/RX option enables you to choose the signal (TX or RX) that you want to monitor. You use this option to diagnose the source of bipolar violation (BPV) errors. The detector defaults to the TX (input) port unless you change it to the RX (output) port. To select this option:

1. Type **M** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the current setup and prompts you to change it:

Current setup: Monitoring data OUTPUT

Monitoring data INPUT? (Y/N): Y

2. Type **Y** or **N** and press [ENTER].
  - a. If you type **Y**, the system displays:

New setup: Monitoring data INPUT
  - b. If you type **N**, the system does not change the setup.

## On LOS TX all ones (O)

In Figure 4-5, the On LOS TX all ones option enables you to select whether you want to present "all ones" at the RX (output) port when a loss of signal (LOS) from the far end occurs. (LOS is represented by reception of 193 consecutive "zeros" from the far end.) To use this option:

1. Type **O** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the current setup and prompts you to change it:

Current setup: Set to do nothing on far end LOS  
Set to transmit all ones on far end LOS? (Y/N): Y
2. Type **Y** or **N** and press [ENTER].
  - a. If you type **Y**, the system changes the setup and displays your selection.

New setup: Set to transmit all ones on far end LOS
  - b. If you type **N**, the system does not change the setup.

When the RX port sends out an "all-ones" signal (commonly referred to as an *alarm indication signal* [AIS]), the AIS (yellow) LED on the module faceplate lights.

## Pulse shape setup (LBO) (P)

In Figure 4-5, the Pulse shape setup (LBO) option applies only to the DS1 and DS1A I/O modules, and does not appear as a menu selection for the G.703 I/O module. This option enables you to select the proper RX (output) signal pulse shape (commonly referred to as *line-build-out* [LBO]) to match the changes in the length of the twisted-pair cable that connects the external DS1 or DS1A device to the T1/E1 I/O module. To select this option:

1. Type **P** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the current setup and prompts you to change it, as shown in Figure 4-7.

Current setup:	Line length 266-399 ft.
Pulse shape table:	
(1) Line length	0-133 ft.
(2) Line length	133-266 ft.
(3) Line length	266-399 ft.
(4) Line length	399-533 ft.
(5) Line length	533-655 ft.
Enter selection:	

**Figure 4-7. Pulse Shape Selection Menu**

2. Type the number that corresponds to the range you want and press [ENTER]. The system displays the setup you selected:

New setup: line length 266-399 ft.

## Log off (Q)

In Figure 4-5, to log off the system:

Type **Q** at the DS1 2-Port,1> prompt. Press [ENTER] to display the PremNet Introduction screen.

## Self test port (S)

In Figure 4-5, the Self test port option enables you to perform a complete self-test on the established TX and RX circuit paths for the near-end and far-end modules. During the self-test, the AIS LED is lit and the input and output LEDs on the module faceplate flash.

---

**Note:** Before you execute this option, make sure that the far-end port is in remote loopback. For instructions, see Loopback setup, earlier in this chapter.

---

To access the Self test port option:

1. Type **S** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays the following message and prompt:

Far end port must be in REMOTE LOOPBACK for test.

Test port? (Y/N)

2. Type **Y** or **N** and press [ENTER].

- a. If you type **Y**, the system begins running the test. The self-test takes about seven seconds. A pattern is generated at the near end and is sent to the far end where it is looped back to the near end and analyzed for error content. When the test is complete, the system displays the test results. For example:

```
Testing port.....test passed
```

```
There were no data errors and 0 BPV errors
```

- b. If you type **N**, the system does not run the test.

## View configuration (V)

In Figure 4-5, the View configuration option displays the configuration of the selected port. To access this option:

Type **V** at the DS1 2-Port,1> prompt and press [ENTER]. The system displays a screen similar to Figure 4-8.

```

=====
Current setup:

Port 1:  Input-   Inactive
         Output - Active

Transmitting ones
Set to transmit all ones on far end LOS
Monitoring data INPUT
LBO set to line length  0-133 ft.
Using B8ZS code

Alarm on BPVE/sec >= 1000
Maximum BPVE/sec port 1: 84 @ 00:2:57 01-JAN-1993
=====

```

**Figure 4-8. View Configuration Screen**

The View Configuration screen contains the following information:

- There is no bipolar input signal, but there is an active RX output as a result of AIS (all ones) being generated.
- The bipolar violation error detector is monitoring the input port and is expecting to see a B8ZS coded signal.
- The RX (output) pulse shape (LBO) is set to the shortest line length.

- The alarm threshold detector is set so that if 1000 or more bipolar violations occur in any one-second period, an alarm is generated.
- The alarm threshold was exceeded at 00:02:57 on January 1, 1993 and 84 bipolar violation errors occurred in a one-second period.

## Exit (X)

In Figure 4-5, to close the current menu and return to the next menu level:

Type **X** at the DS1 2-Port,1> prompt and press [ENTER].

## Command menu (?) or (/)

In Figure 4-5, to display the options in the DS1 2-Port Port Command Menu:

Type **?** or **/** at the DS1 2-Port,1> prompt.

## Port select (#)

In Figure 4-5, the Port select option enables you to choose another port on the module to configure or monitor. To select this option:

1. Type **#** at the DS1 2-Port,1> prompt and press [ENTER]. The system prompts you to enter the number of the port you want to configure or monitor.
2. Type the desired port number and press [ENTER]. The DS1 2-Port Port Command Menu for that port is displayed.

# Appendix A

## Technical Specifications

---

T1/E1			
	DS1	DS1A (E1)	E1
<b>Part Number</b>	PN 850027 PN 850134	PN 850028 PN 850135	PN 850054 PN 850136
<b>Speed/Line Rate Tolerance</b>	1.544 Mbps	2.048 Mbps	2.048 Mbps
<b>Ports/Connectors</b>	(2) DB-15 Female	(2) DB-15 Female	(2) Dual BNC
<b>Signal Interface</b>	Balanced 100Ω (±5%) twisted pair	Balanced 120Ω (±5%) twisted pair	Balanced 75Ω (±5%) coax
<b>Pulse Amplitude and Shape</b>	6 ± 0.6 Vpp	6 ± 0.6 Vpp	4.75 ± 0.48 Vpp
<b>Format</b>	All versions are protocol-transparent, ensuring line code compatibility (AMI, B8ZS, HDB3, etc.).		
<b>Bandwidth/Time Slot Requirements</b>	Two PremNet time slots are assigned to each card; one time slot is used for each DS1, DS1A, or E1 point-to-point virtual circuit.		
<b>Configuration Maximums</b>	8 modules per node, 16 nodes per PremNet "ring"; total of 128 modules per PremNet ring.		
<b>Network Management</b>	All versions are managed via the standard PremNet integrated system, SNMP-compliant network management, or the Milgo Management System.		
<b>Environmental</b>	Operating temperature	32° to 122° F (0° to 50° C)	
	Storage temperature	-40° to 158° F (-40° to 70° C)	
	Humidity	95% noncondensing	
<b>Power Requirements</b>	800mA at 5V = 4 Watts		



# Appendix B

## Regulatory Information

---

### FCC Part 15: Radio/Television Interference

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.

Changes or modifications to this equipment not expressly approved by Milgo Solutions can void the user's authority to operate this equipment.

For FCC CFR 47 Part 15 compliance, Milgo-specified shielded interconnecting cables or their equivalent must be used. See the installation instructions in this manual for Milgo part numbers for these cables.

### Special Notice

The instructions in this manual involving actions with the device and requiring a tool\* for access, must be performed only by qualified service personnel.

- \* A tool is defined as any implement used to facilitate a mechanical operation, such as operating a fastener or similar fixing device.

---

Chaque fois que le manuel d'instructions recommande d'utiliser un outil\* pour effectuer une opération à l'intérieur du dispositif, cette opération doit absolument être confiée à un personnel de service qualifié.

- \* Un outil est défini tout dispositif utilisé pour faciliter une opération mécanique, p.ex., le fonctionnement d'un organe de fixation ou autre dispositif semblable.

### Notice to Canadian Users

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

---

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le règlement sur le brouillage Radioélectrique édicté par le Industrie Canada.

Do not perform internal service or adjustment to the equipment unless another person, capable of rendering first aid and resuscitation, is present.

Do not substitute parts or perform any unauthorized modification to the equipment. Return the equipment to a Milgo Solutions Sales and Service Office for service and repair to ensure that the safety features are maintained.



**CAUTION**

Two power cords provided. Disconnect both power cords prior to servicing.



**VORSICHT**

Zwei Netzkabel vorhanden. Vor Öffnen des Gehäuses beide Netzkabel ziehen.



**CAUTION**

This system contains electrostatic sensitive devices.



**VORSICHT**

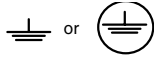
Dieses System enthaelt empfindliche Bauteile!  
Achtung fuer Elektrostatischer Aufladung!

## Safety Symbols

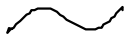
The following safety symbols are used on the equipment:



Indicates that the user should refer to the instruction manual in order to protect against damage to the equipment.



Indicates that the equipment must be connected to ground before operating.



Indicates alternating current power (power line).

## Non-Connection Declaration

Equipment which can be connected to the public communications network but is not meant for this purpose (in accordance with article 2, guideline 91/263/EEC) must be provided with the following EC-marking (in accordance with article 11, section 4, guideline 91/263/EEC). See Figure 1.



**Figure 1. EC-Marking for Pseudo-Telecommunication Peripherals**

---

**Note:** Do not connect the PremNet 5000 or the PremNet Branch Broadband Multiplexer system to the public telecommunications network.

---

The connection of such equipment to a public telecommunications network in a Community Member State is in violation of the national law implementing Directive 91/263/ECC on the approximation of the laws of that Members States concerning telecommunications terminal equipment, including the mutual recognition of their conformity.

## Laser Light Warning!

The following warnings relate to modules that utilize Laser Diode Transmitters:

**DANGER**  
LASER LIGHT - AVOID DIRECT EYE EXPOSURE.

**CAUTION**  
LASER LIGHT - DO NOT STARE INTO BEAM.

**DANGER**  
LASER LIGHT EMITTED FROM THIS MODULE  
AVOID EXPOSURE.

**CAUTION**  
USE OF CONTROLS OR ADJUSTMENTS OR  
PERFORMANCE OF PROCEDURES OTHER THAN  
THOSE SPECIFIED HEREIN MAY RESULT IN  
HAZARDOUS RADIATION EXPOSURE.

**CAUTION**  
THE USE OF OPTICAL INSTRUMENTS WITH THIS  
PRODUCT WILL INCREASE EYE HAZARD.

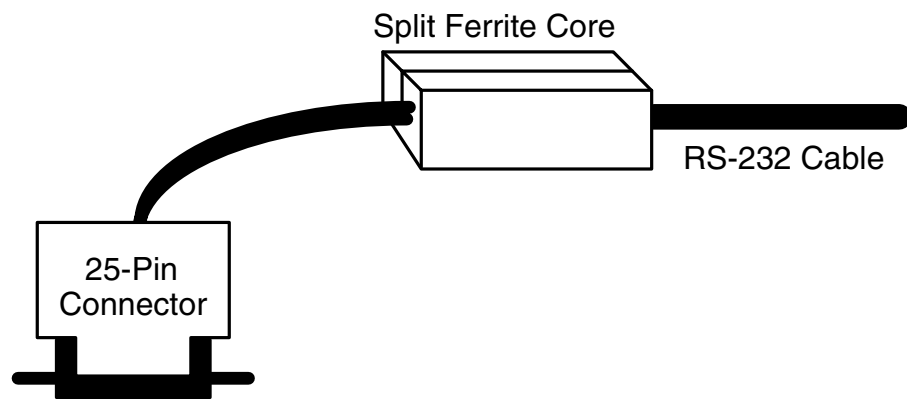
CLASS 1 LASER PRODUCT

## Cable Installation Requirements

To meet FCC Part 15J requirements, you must perform the following steps before you can use your PremNet system.

When you connect a non-shielded RS-232 cable to a PremNet Network Management Module (NMM), a split ferrite core (Part No. 3C144-03SC) must be installed on the RS-232 cable. To install a split ferrite core on the cable, follow these steps:

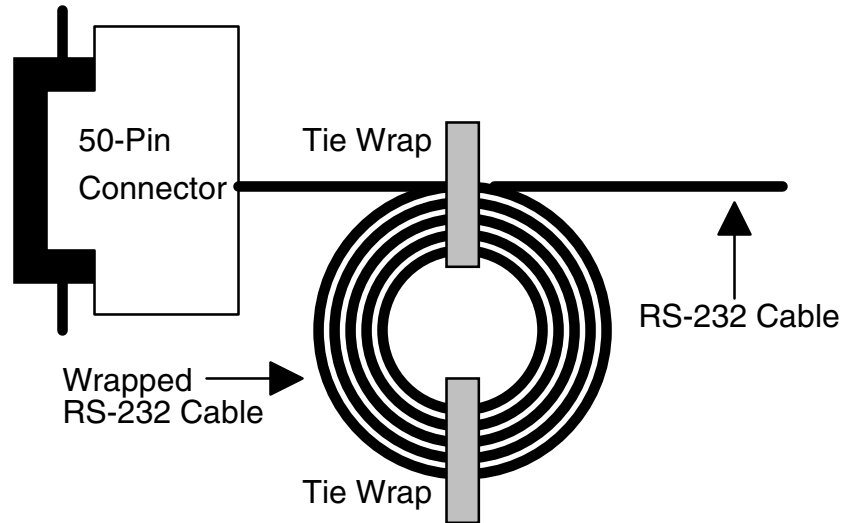
1. Open the split ferrite core.
2. Place the RS-232 cable in one of the grooves on the split ferrite core. Make sure that the split ferrite core is as close as possible to the 25-pin connector that connects to the NMM.
3. Close the split ferrite core around the RS-232 cable, as shown in Figure 2.



**Figure 2. Split Ferrite Core Around RS-232 Cable**

Milgo Solutions recommends that you use an RS-232 shielded cable with the PremNet RS-232 4-Port I/O Module.

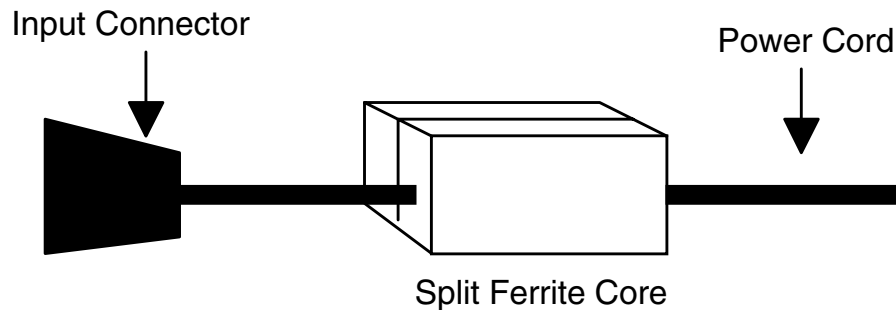
When you connect an RS-232 cable to a PremNet RS-232 32-port I/O module, the RS-232 cable must be wrapped three times, with a 2-inch diameter (approximate). Secure the cable with tie wraps as close to the I/O module as possible (see Figure 3).



**Figure 3. RS-232 Cable with Tie Wraps**

When you connect a power cord to the 850007 or 850013 PremNet AC-power supply module, you must install a split ferrite core (Part No. 3C144-04SC) on the power cord. To install a split ferrite core, follow these steps:

1. Open the split ferrite core.
2. Place the cable in one of the grooves on the split ferrite core. Make sure that the split ferrite core is as close as possible to the input connector that connects to the AC-power supply.
3. Close the split ferrite core around the power cord, as shown in Figure 4.



**Figure 4. Split Ferrite Core Around Power Cord**

---

**Note:** The 850014 and 850079 AC-power supply module does not require that you install a split ferrite core around the power cord.

---

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---

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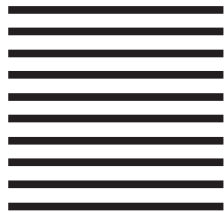
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