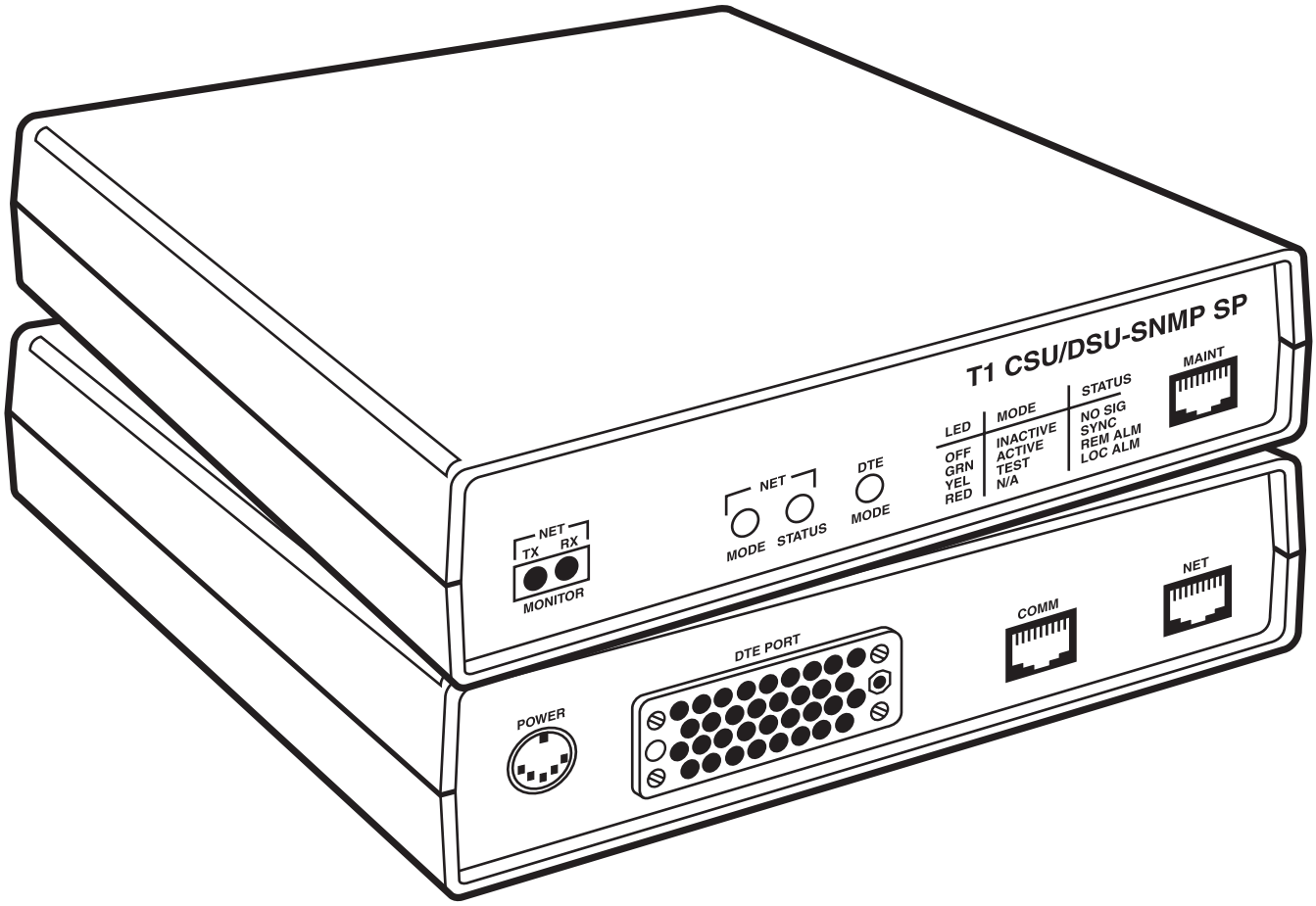
BLACK BOX®
NETWORK SERVICES

DECEMBER 2001
MT172A

T1 CSU/DSU-SNMP-SP



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Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
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Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

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

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

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Cisco® is a registered trademark of Cisco Systems.

VT100™ is a trademark of Compaq Corporation.

Windows® is a registered trademark of Microsoft Corporation.

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FCC REQUIREMENTS FOR

TELEPHONE-LINE EQUIPMENT

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.

2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.

3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.

4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.

5. If the telephone company requests information on what equipment is connected to their lines, inform them of:

   a. The telephone number that this unit is connected to.

   b. The ringer equivalence number.

   c. The USOC jack required: RJ-11C.

   d. The FCC registration number.

   Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

CERTIFICATION NOTICE FOR EQUIPMENT USED IN CANADA

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

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

Repairs to certified equipment should be made by an authorized maintenance facility—in this case, Black Box. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

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

CAUTION

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

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

INSTRUCCIONES DE SEGURIDAD (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
    - A: El cable de poder o el contacto ha sido dañado; u
    - B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    - C: El aparato ha sido expuesto a la lluvia; o
    - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    - E: El aparato ha sido tirado o su cubierta ha sido dañada.

**Affidavit for the connection of Customer Premises Equipment (CPE)
to 1.544 Mbps and/or Subrate Digital Services (SDS)**

For work to be performed in the certified territory of:

TELCO's Name_____

State of:_____ County of:_____

I,_____ _____
(Name) (Business Address)

Representing:_____

Being duly sworn, state:

I have responsibility for the operation and maintenance of the terminal equipment to be connected in 1.544 Mbps and/or _____Subrate Digital Services. The terminal equipment to be connected complies with Part 68 of the Commission's rules except for the encoded analog content and billing protection specifications.

With respect to encoded analog content and billing protection:

I attest that all operations associated with the establishment, maintenance, and adjustment of the digital CPE with respect to encoded analog content and encoded billing information which is intended to be decoded within the telecommunications network. The encoded analog and billing protection is factory set and is not under the control of the customer.

I attest that the operator(s)/maintenance(s) of the digital CPE responsible for the establishment, maintenance, and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully completing one of the following.

a) A training course provided by the manufacturer/grantee of the equipment used to encode analog signals, or

b) A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee for the equipment used to encode analog signals, or

c) An independent training course (i.e. trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals, or

d) In lieu of the preceding training requirements, the operator(s)/maintainer(s) is (are) under control of a supervisor trained in accordance with _____ above.

I agree to provide _____ with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.

Signature: _____ Subscribed and Sworn to before me

Title: _____ this ____ day of _____, _____.

Date: _____ Notary Public

My commission expires: _____

Contents

Chapter **Page**

1. Specifications

DS0 Mapping Capability: Network source port to DTE destination data port

SNMP Interface: Physical interface: RJ-48C COMM port (female); SLIP implementation supported; MIB II (RFC 1213) supported; Enterprise MIB extension (register number 466 supporting): traps, additional objects, comprehensive config/diagnostics and T1 performance monitoring

Control and Monitoring: VT100™ compatible ASCII terminal (MAINT port); SNMP management (COMM port in SLIP mode); TELNET (COMM port with TELNET enabled); Network mode and status LEDs; DTE mode LED; Network aggregate Tx/Rx monitor Bantam jacks

Performance Monitoring: MSF events, CRC6 events, Error events, Out of frame seconds, Errored seconds*, Controlled slips, Severely errored seconds*, Failed seconds*, Bipolar violations*, Burst errored seconds

*Saved as historical data in 96 (24 hours) sets of 15-minute intervals.

Diagnostics: Network Line loopback, Network Payload loopback, Network Aggregate loopback, Network Remote CSU loopback, Network Remote DSU loopback, DTE Bi-directional Payload loopback, Bit Error Rate Test (BERT) patterns (511 or QRSS)

Network Interface: Recommended cable: 100-ohm shielded twisted pair (STP); Line rate: 1.544 Mbps ±50 bps; Line encoding format: AMI or B8ZS; Framing format: D4 or ESF (ANSI T1.403 or AT&T® PUB. 54016); Pulse characteristics: AT&T 62411 compliant; Output amplitude: 2.4 to 3.3 V peak or 4.8 to 6.6 V peak-to-peak; Receiver sensitivity: 0 to -26 dB; Line Built Out (CSU): 0 dB, -7.5 dB, -15 dB; Line distance: CSU mode: 0 to 6000 ft. (0 to 1828 m) with 22 AWG STP, DSX mode: 0 to 655 ft. (0 to 200 m)

Physical Interface: RJ-48C (female)

Density Monitoring: ANSI 12.5%: 1 of 16, 1 of 64, or None

Clocking Modes: Master (timing supplied from an internal crystal); Network (timing recovered from the network)

DTE Data Interface: Channel density: Clear channel or Bit 7 stuffing; Transmit timing: Loop 1 (external) or Loop 2 (internal); Transmit clocking: Normal or Inverted; Transmit data: Normal or Inverted; Application support: V.35; Physical connector: 34-pin M Block (female); Data rates (where *n* equals 1–24 available DS0s);

Clear Channel Rates (*n* x 64 kbps): 8, 16, 24, 32, 40, 48, 56, 112, 168, 224, 280, 336, 392, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536 kbps

Bit 7 Stuffing Rates (*n* x 56 kbps): 8, 16, 24, 32, 40, 48, 56, 112, 168, 224, 280,336, 392, 448, 504, 560, 616, 672, 728, 784, 896, 952, 1008, 1064, 1120, 1176, 1232, 1288, 1344 kbps

Alarms: BPV, Carrier, Sync, Red, Yellow, AIS, Fail signal state

Compatibility: T1 support: AT&T Pub 62411, 54019A, and 54016; ESF support: AT&T Pub 54016, ANSI T1.403

Temperature Tolerance: Operating: 32 to 122°F (0 to 50°C)

Relative Humidity: Up to 95% noncondensing

Operating Altitude: Up to 10,000 ft. (3048 m)

Power: Range (power supplied externally): 110 to 230 VAC at 60/50 Hz; Dissipation: 6 watts (typical)

Size: 1.9"H x 7.7"W x 10.5"D (4.8 x 19.6 x 26.7 cm)

Weight: 3 lb. (1.4 kg)

2. Introduction

2.1 Overview

The T1 CSU/DSU-SNMP-SP is a high-speed T1 and Fractional T1 (FT1) CSU/DSU format processor capable of being managed from an attached ASCII terminal or via the built-in SNMP (Simple Network Management Protocol) agent communicating through an asynchronous RS-232 port supporting SLIP (Serial Link Internet Protocol). See Figure 2-1.

The T1 CSU/DSU-SNMP-SP provides continuous network and DTE signal monitoring. This monitoring results in a pro-active approach to the detection of network degradation. When degradation is detected, a series of resident diagnostic loopbacks and a BERT (Bit Error Rate Test) pattern (511 or QRSS) is available to quickly and accurately troubleshoot the unit and its associated network.

Functional features of the T1 CSU/DSU-SNMP-SP are listed below:

- Single DTE port (34-pin M block) CSU/DSU for T1 and Fractional T1 (FT1) applications.
- User interface managed through an attached VT100 compatible ASCII terminal/modem or TELNET.
- SNMP management capability via an on-board integral SNMP agent support Management Information Base (MIB) GETs, SETs, and TRAPs.
- MAINT port user interface access password protection.
- Software selectable Line Build Out (LBO) dB settings (0 dB, -7.5 dB, or -15 dB).
- Compatible with carrier service offerings and standards-based T1 equipment.
- On-board V.54 compliant diagnostic loopbacks, QRSS and 511 test patterns.
- Performance monitoring and register storage available on the network circuit (D4 or ESF).
- Auto DS0 connections based on DTE line rate.
- Random DS0 bandwidth assignment (connection) between the network and DTE interface port.
- Alarm reporting of red, yellow, and failed signal states.

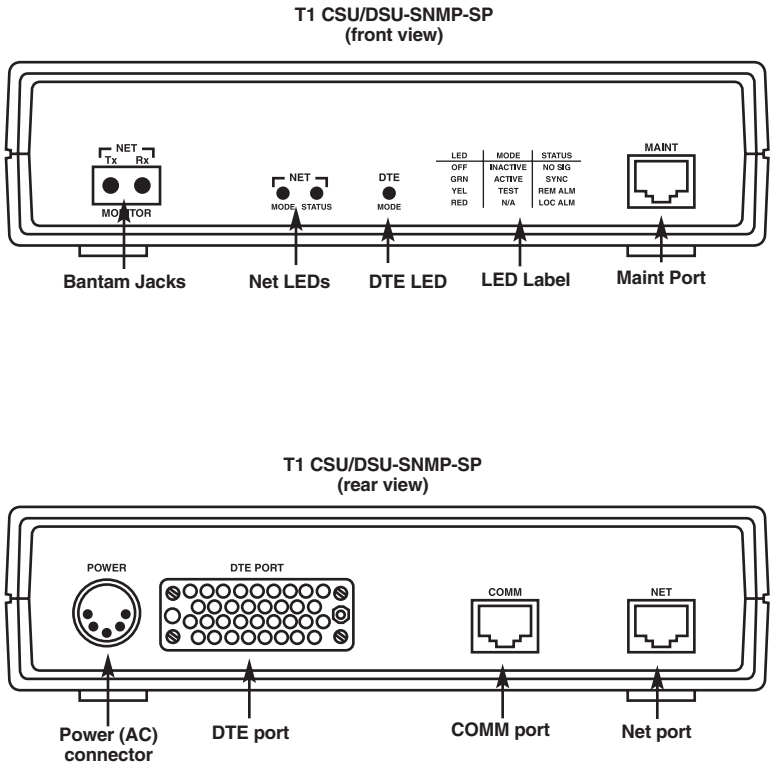


Figure 2-1. T1 CSU/DSU-SNMP-SP.

2.2 Controls and Indicators

The various controls and indicators associated with the T1 CSU/DSU-SNMP-SP are described in the following subsections.

2.2.1 Network Bantam Jacks

The two network Bantam jacks, located on the front of the unit, provide access to the network aggregate for monitoring. See Figure 2-1.

NOTE

Using the network bantam jacks will not interrupt aggregate application data.

These jacks are described below:

- The TX Monitor jack monitors the aggregate signal transmitted to the T1 network.
- The RX Monitor jack monitors the aggregate signal received from the T1 network.

2.2.2 Network LEDs

The two tri-color NET (Network) LEDs, located on the front of the unit, provide a visual status of network conditions. The information conveyed by the NET LEDs is described in Table 2-1.

NOTE

An abbreviated form of Table 2-1 is illustrated on a label located between the unit's front-panel DTE LED and the MAINT port. See Figure 2-1. The information contained on this label applies equally to all front-panel LEDs.

Table 2-1. NET LED information.

LED Name	LED Color	Description
Mode	Off	Inactive.
	Green	Active—bandwidth assigned. Condition normal.
	Yellow	Test mode.
Status	Off	Network bandwidth is not assigned.
	Green	Receiving frame sync.
	Yellow	Yellow alarm condition detected (receiving frame sync).
	Red	Red alarm condition declared (receive signal is present).
	Alternating Off/Red	Red alarm condition declared (receive signal is not present—network bandwidth is assigned).
	Alternating Green/Red	Severely errored seconds condition is declared (receiving frame sync).
	Alternating Yellow/Red	Red alarm condition declared (receiving all ones). Alarm Indication Signal (AIS)/Carrier Failure Alarm (CFA).

2.2.3 DTE LED

The single tri-color DTE LED, located on the front of the unit, provides a visual status of DTE conditions. The information conveyed by the DTE LED is described in Table 2-2.

Table 2-2. DTE LED information.

LED Name	LED Color	Description
Mode	Off	Inactive—no bandwidth assigned.
	Green	Active—bandwidth assigned.
	Yellow	Test mode.

2.2.4 Maint Interface

The MAINT (Maintenance) interface port, located on the front of the unit, is designed as a DCE interface and provides for the electrical transmission/receipt of serial RS-232 asynchronous digital information. See Figure 2-1.

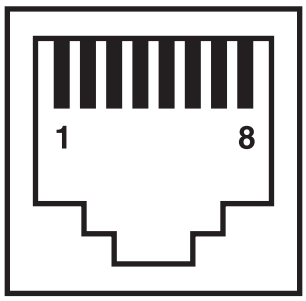
The fixed settings for the MAINT interface port are:

- 9600 baud

- 8 data bits
- no parity
- 1 stop bit
- flow control off

Cable attachment to this interface is physically made through an 8-pin RJ-48 connector. The pinouts for this female interface connector are illustrated in Figure 2-2.

PIN	DESCRIPTION
1	CLEAR TO SEND (CTS)
2	DATA CARRIER DETECT (DCD)
3	RECEIVE DATA (RD)
4	DATA TERMINAL READY (DTR)
5	TRANSMIT DATA (TD)
6	DIGITAL GROUND
7	DATA SET READY (DSR)
8	REQUEST TO SEND (RTS)



MAINT CONNECTOR
(FEMALE)

Figure 2-2. MAINT (RJ-48) pinouts.

The MAINT interface port supports the user interface mode of operation. In this mode, the T1 CSU/DSU-SNMP-SP is directly cabled, through the MAINT interface port, to a VT100 compatible ASCII terminal (or an attached modem). Features such as programming (configuring), performance/alarm monitoring, and execution of diagnostics are locally controlled from the ASCII terminal.

NOTE

If your T1 CSU/DSU-SNMP-SP is connected to a PC operating under Windows® in terminal emulation mode instead of using a dedicated ASCII terminal, make sure that you have de-selected the option "Use Function, Arrow, and Ctrl Keys for Windows" located under the Terminal Preferences. This action allows these keys to be used in Terminal Emulation mode.

In addition to programming and performance information, a change in the unit's operational status is conveyed to the VT100 compatible ASCII terminal through message prompts. These prompts indicate the presence of an alarm and/or test condition but will not describe the type.

- To determine the type of alarm condition, access the unit's Performance registers. Refer to **Chapter 4**.
- To determine the type of test condition, access the unit's Diagnostic registers. Refer to **Chapter 4**.

NOTE

Alarm and test message prompts are only generated when a change occurs in the unit's operational status. These prompts will not be generated if the operational change pre-existed before the T1 CSU/DSU-SNMP-SP was connected to an ASCII terminal.

2.2.5 Power Connector

The T1 CSU/DSU-SNMP-SP is designed to accept regulated DC voltages from an external AC power supply (shipped with your unit). The input to this external supply is either 115 VAC or 115/220 VAC and plugs directly into your on-site power source receptacle. The output of this power supply is a 5-pin DIN male plug carrying voltages of +5 VDC, +12 VDC, and -12 VDC (only the +5 VDC voltage is used). The 5-pin DIN plug connects directly to your unit's rear power connector (female). See Figure 2-3.

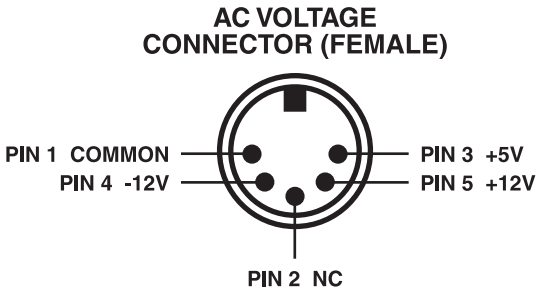


Figure 2-3. Power connector pinouts.

2.2.6 DTE Interface

The DTE interface port, located on the rear of the unit, is designed to provide for the electrical transmission/reception of serial digital information. See Figure 2-1.

This port is designed as a DCE interface and supports DTE operations using a straight-through cable or DCE operations using a crossover cable.

To program (configure) the DTE port, or to connect (map) network aggregate DS0s to this port, refer to **Chapter 4**.

Several cabling configurations exist for this interface port. These configurations are based on the type of mechanical (physical) connector used on the user's DTE. For detailed information about the various configurations, cables, and cable pinouts, refer to the **Appendix**.

This port physically consists of a 34-pin M Block connector that may be programmed (configured) to support V.35 applications. The pinouts for this female interface connector are illustrated in Figure 2-4.

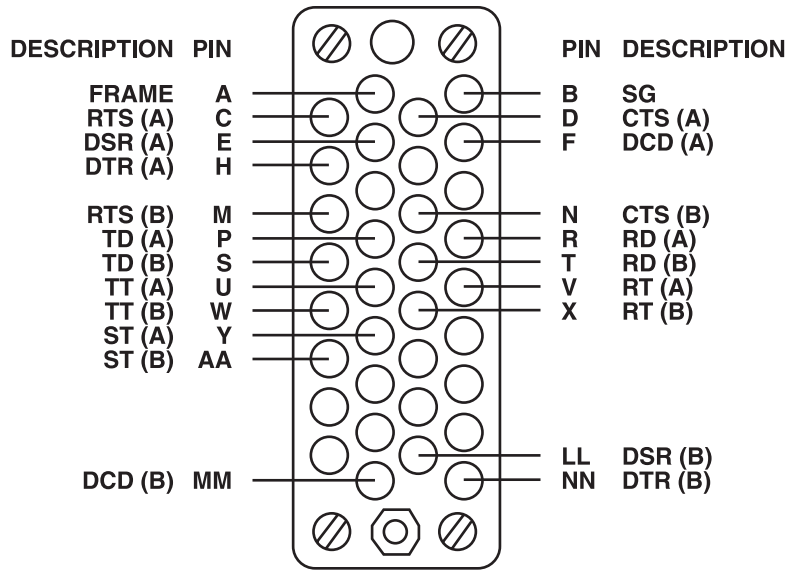


Figure 2-4. DTE Port (M Block) pinouts.

2.2.7 COMM Interface

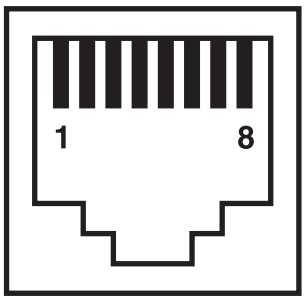
The COMM (Communication) interface port, located on the rear of the unit, is designed as a DCE interface and provides for the electrical transmission/receipt of serial RS-232 asynchronous digital information.

The fixed settings for the COMM interface port are:

- 19,200 baud
- 8 data bits
- no parity
- 1 stop bit
- flow control off

Connect cables to this interface via an 8-pin RJ-48 connector. The pinouts for this female connector are illustrated in Figure 2-5.

PIN	DESCRIPTION
1	CLEAR TO SEND (CTS)
2	DATA CARRIER DETECT (DCD)
3	RECEIVE DATA (RD)
4	DATA TERMINAL READY (DTR)
5	TRANSMIT DATA (TD)
6	DIGITAL GROUND
7	DATA SET READY (DSR)
8	REQUEST TO SEND (RTS)



COMM CONNECTOR
(FEMALE)

Figure 2-5. COMM (RJ-48) pinouts.

The COMM interface port supports the Serial Link Internet Protocol (SLIP) mode of operation. The SLIP protocol provided by this mode allows the T1 CSU/DSU-SNMP-SP and an attached LAN router/adapter to communicate. The SNMP agent (resident on-board the T1 CSU/DSU-SNMP-SP) is then able to communicate through the router/adapter to an SNMP management platform. The SNMP manager uses a private Enterprise MIB to remotely control such T1 CSU/DSU-SNMP-SP features as programming (configuring), performance/alarm monitoring, and execution of diagnostics.

The T1 CSU/DSU-SNMP-SP also supports the TELNET terminal protocol. TELNET allows a remote user to establish a connection through the COMM port to the local user interface resident on-board the T1 CSU/DSU-SNMP-SP and remotely control such features as programming (configuring), performance/alarm monitoring, and execution of diagnostics.

In addition to programming and performance information, a change in the unit's operational status is conveyed to the SNMP manager through traps. These traps indicate the presence of an alarm and/or test condition but will not describe the type.

- To determine the type of alarm condition, access the unit's Performance registers. Refer to **Chapter 4**.
- To determine the type of test condition, access the unit's Diagnostic registers. Refer to **Chapter 4**.

NOTE

Alarm and test message prompts/traps are only generated when a change occurs in the unit's operational status. These prompts/traps will not be generated if the operational change pre-existed before the T1 CSU/DSU-SNMP-SP was either connected to an ASCII terminal or place under SNMP management control.

2.2.8 NET Interface

The NET (Network) interface port, located on the rear of the unit, provides for the transmission/receipt of the T1 aggregate. See Figure 2-1.

To program (configure) the network port, or to connect (map) network aggregate DS0s from this port, refer to **Chapter 4**.

Several cabling configurations exist for this interface port. For detailed information about the various configurations, cables, and cable pinouts, refer to the **Appendix**.

The NET port physically consists of an 8-pin RJ-48 connector which may be programmed (configured) to support various aggregate applications. The pinouts for the female NET interface connector are illustrated in Figure 2-6.

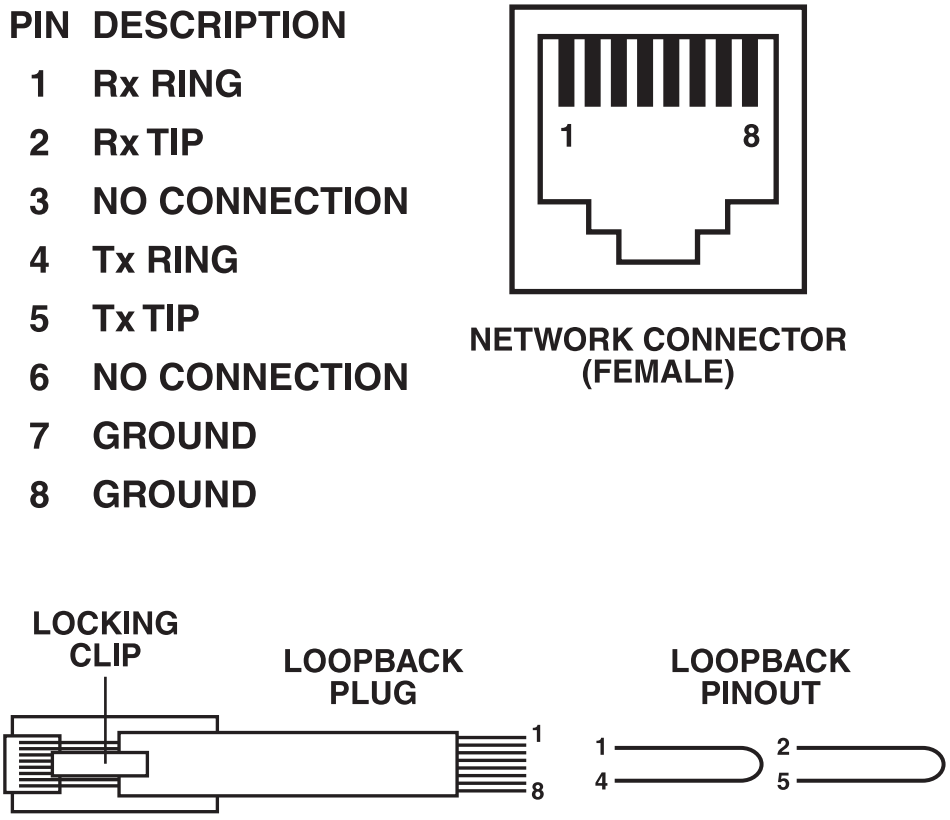


Figure 2-6. NET (RJ-48) pinout.

An RJ-48 loopback plug or cable (not provided) can be plugged into the NET interface connector. This loopback plug, when plugged in during troubleshooting, may be used to isolate and test the interface port and T1 CSU/DSU-SNMP-SP unit by placing its port signals into a loopback state. The pinouts for this loopback plug (cable) are illustrated in Figure 2-6.

3. Installation

3.1 Introduction

This chapter contains information that will enable you to successfully review site preparation, unpack, power up, program (configure), and cable the T1 CSU/DSU-SNMP-SP.

3.2 Preparing the Site

Power—The T1 CSU/DSU-SNMP-SP is designed to accept regulated DC voltages from an external 115 VAC or 115/220 VAC power supply (shipped with your unit). The input to this external supply is obtained from an on-site power source receptacle; its output is a 5-pin DIN male plug carrying voltages of +5 VDC, +12 VDC, and -12 VDC (only the +5 VDC voltage is used). The 5-pin DIN plug connects directly to your unit's rear power connector (female). Refer to **Chapter 2** for detailed information on power connector pinouts.

Environmental—The T1 CSU/DSU-SNMP-SP is designed to operate effectively under a wide range of environmental conditions. These conditions are listed in **Chapter 1**.

CAUTION

To ensure that environmental factors do not impact the operational performance of your unit, do not exceed recommended operating ranges.

To maintain adequate airflow, make sure that none of the ventilation openings in your unit's housing are blocked when it is placed into its operating position.

3.3 T1 Network Considerations

A few of the general T1 network considerations you should be familiar with or have accomplished before the T1 CSU/DSU-SNMP-SP is installed are listed below.

- Consult your network designer to determine specifications for your T1 line. Your local carrier will have configured the T1 line based on your requirements.
- T1 network specifications include such parameters as encoding methods (AMI or B8ZS) and framing (D4 or ESF). This information will be used when configuring your T1 CSU/DSU-SNMP-SP.
- The T1 line should be of the Local (non-powered) or "DRY" scheme variety.
- The T1 line should be thoroughly tested end-to-end before your T1 CSU/DSU-SNMP-SP is connected.
- We recommend that you install lightning protection equipment, used to discharge electrical surges, on the T1 line to protect local equipment.
- Make sure that the wiring and installation of network support equipment, such as the Smart Jack, has been completed.

3.4 Unpacking and Inspection

The T1 CSU/DSU-SNMP-SP is shipped in a carton designed to ensure that it arrives at your location safely and undamaged.

To unpack and inspect the T1 CSU/DSU-SNMP-SP, complete the following:

1. Carefully remove all packing material from the carton. The carton should contain:
   - T1 CSU/DSU-SNMP-SP
   - External AC power supply
   - This users' manual
2. Inspect the carton items for damage that may have occurred during shipment. If any damage is noted or if items are missing from the carton, contact Black Box at 724-746-5500.

NOTE

Keep the packaging material and carton in case you need to ship or store the unit.

3.5 Installing the T1 CSU/DSU-SNMP-SP

To install the T1 CSU/DSU-SNMP-SP CSU/DSU:

1. Cable a VT100 compatible ASCII terminal to the interface port labeled MAINT. This port is located on the front of the T1 CSU/DSU-SNMP-SP. Refer to the **Appendix** for cabling information. For additional information about the MAINT port, refer to **Chapter 2**.

NOTE

The T1 CSU/DSU-SNMP-SP must be configured locally through an attached VT100 ASCII terminal before connecting the unit to a network for SNMP operational management control.

2. Cable the on-site T1 Network Interface Unit (smart jack) to the T1 CSU/DSU-SNMP-SP interface port labeled NET. This port is located on the rear of the T1 CSU/DSU-SNMP-SP. Refer to the **Appendix** for cabling information. For additional information about the DTE port, refer to **Chapter 2**.
3. Cable the Customer Premise Equipment (CPE) to the T1 CSU/DSU-SNMP-SP port labeled DTE. This port is located on the rear of the T1 CSU/DSU-SNMP-SP. Refer to the **Appendix** for cabling information. For additional information about the DTE port, refer to **Section 2.2.6**.
4. Do you want to cable your T1 CSU/DSU-SNMP-SP to a LAN router or adapter for SNMP and/or TELNET management?

   If yes, cable the router or LAN adapter to the T1 CSU/DSU-SNMP-SP port labeled COMM. This port is located on the rear of the T1 CSU/DSU-SNMP-SP. Refer to the **Appendix** for cabling information. For additional information about the COMM port, refer to **Chapter 2**. Continue this installation procedure from Step 5.

   If no, continue this installation procedure from Step 5.
5. Cable the external AC power supply to the T1 CSU/DSU-SNMP-SP by completing the following sub-steps.
   a. Plug the male end of the external power supply (shipped with your T1 CSU/DSU-SNMP-SP) into an on-site power receptacle or power strip. See Figure 3-1.

b. Plug the keyed 5-pin DIN end of the external power supply into the connector labeled POWER. This connection is located on the rear of the T1 CSU/DSU-SNMP-SP. For additional power connector information, refer to **Chapter 2**.

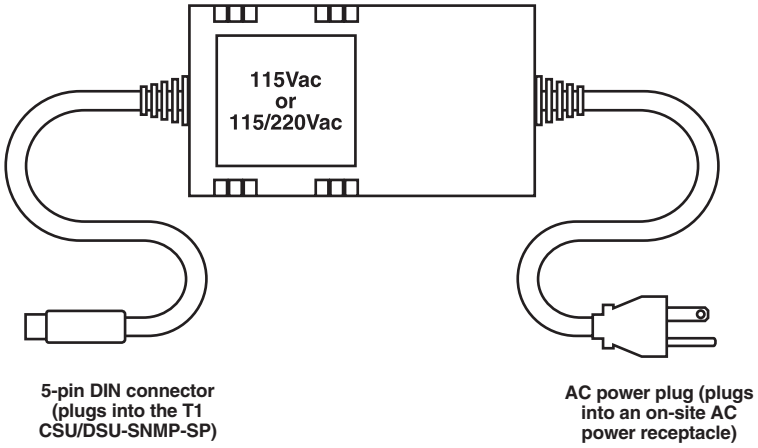


Figure 3-1. Cabling the external AC power supply.

6. Observe the ASCII terminal screen and make sure that the T1 CSU/DSU-SNMP-SP passes its power-up self-test. The initialization and power-up self-tests are listed below.

```
Initialization
LED TEST
        YELLOW . . . . . . . . . . . . . . . . . . . . . . DONE
        RED  . . . . . . . . . . . . . . . . . . . . . . . DONE
        GREEN  . . . . . . . . . . . . . . . . . . . . . . DONE
        OFF  . . . . . . . . . . . . . . . . . . . . . . . OFF
  ROM TEST. . . . . . . . . . . . . . . . . . . . . . . . PASS
  RAM TEST. . . . . . . . . . . . . . . . . . . . . . . . PASS
  RAM INITIALIZATION. . . . . . . . . . . . . . . . . . . PASS
  NVRAM CHECKSUM. . . . . . . . . . . . . . . . . . . . . PASS
  SOFTWARE REVISION . . . . . . . . . . . . . . . . . . . x.x.x
SYSTEM WILL AUTOMATICALLY START IN 10 SECONDS
  PRESS AND HOLD 'P' TO PAUSE STARTUP*
  PRESS AND HOLD 'D' TO RESET NVRAM**
  PRESS AND HOLD 'C' TO CONTINUE STARTUP***
SECONDS TO STARTUP . . . . . . . . . . . . . . . . . . . (decrement from 10)
```

*Holding down the P key will pause the startup. Releasing the P key will continue the power-up self-tests from the point that the pause was invoked.

**Holding down the D key will cause the unit to clear its NVRAM, remove all DS0 mapped connections, and default to its original factory settings. Release the key after the unit begins to re-initialize.

***Holding down the C key will cause the unit to suspend the remainder of its 10-second countdown and proceed immediately to the top-level main menu screen.

Successful completion of the power-up self tests is indicated by the following screen message:

```
T1 CSU/DSU-SNMP-SP
VERSION x.xx

Top of Menu
-----------------------------------------------
```

If the correct power-up message appears, configure (program), using your ASCII terminal, the T1 CSU/DSU-SNMP-SP to satisfy your application, network, and management requirements. Refer to **Chapter 4**.

If the correct power-up message fails to appear, the possible problem/solution could be:

- The ASCII terminal is not configured correctly.

  The fixed settings for the MAINT interface port are:

  9600 baud

  8 data bits

  no parity

  1 stop bit

  flow control off

NOTE

If your T1 CSU/DSU-SNMP-SP is connected to a PC operating under Windows in terminal emulation mode instead of using a dedicated ASCII terminal, make sure that you have de-selected the option "Use Function, Arrow, and Ctrl Keys for Windows" located under Terminal Preferences. This action allows these keys to be used while in Terminal Emulation mode.

- The T1 CSU/DSU-SNMP-SP is experiencing an internal failure. Re-initialize the unit.

  a. Disconnect the AC power plug from the rear of the T1 CSU/DSU-SNMP-SP.

  b. Wait approximately 15 seconds and then re-connect the power plug.

  c. Press and hold the D key to force the unit to clear its NVRAM and default to factory settings. Release the D key after the unit begins to re-initialize again.

If the ASCII terminal once again fails to display the correct message(s), refer to **Chapter 5**. If you are still not able to establish communications with the T1 CSU/DSU-SNMP-SP through your ASCII terminal after reading **Chapter 5**, contact Black Box Technical Support at 724-746-5500.

4. Operation

4.1 Introduction

This chapter contains information that will help you successfully configure (program) the T1 CSU/DSU-SNMP-SP CSU/DSU to satisfy your network/application requirements and to monitor system performance.

The T1 CSU/DSU-SNMP-SP is capable of being configured to accommodate a wide range of network and DTE applications:

- locally through a VT100 compatible ASCII terminal via the MAINT port configured for User Interface mode.
- remotely through a dial-up modem via the MAINT port configured for User Interface mode.
- remotely through TELNET or SNMP via the COMM port configured for SLIP mode.

All configuration and DS0 connection information is stored in Non-Volatile Random Access Memory (NVRAM). Once the unit is programmed (configured), its attached ASCII terminal cable may be removed from the MAINT port without loss of configurations. If input power is lost and then re-applied, the unit will automatically restart and program itself to the last NVRAM-stored configuration.

4.2 Configuration Worksheet

The T1 CSU/DSU-SNMP-SP ships with factory-default settings. These settings may then be modified to match specific network and application requirements.

The configuration worksheet on the next few pages will facilitate configuring your unit. You will reference the information that you record on this worksheet during programming. Make copies of this worksheet for future application programming.

Factory-default settings and the configuration worksheet appear on the following two pages.

Factory-Default Settings

Network Configuration

Timing:	Master_____	Network_x_		
Framing:	D4_____	ESF (ANSI)_____	ESF (54016)_x_	
Line Coding:	AMI___	B8ZS_x_		
Interface:	CSU_x_	DSX___		
Density Monitoring:	ANSI 12.5%_____	1 of 16_____	1 of 64_____	None_x_
LBO Setting:	0 dB_x_	-7.5 dB_____	-15 dB_____	

DTE Configuration

Line Rate:	_1536_kbps	
Channel Density:	Clear Channel_x_	Bit 7 Stuffing_____
Starting DS0:	DS0 #_1_	
Timing:	Loop 1___	Loop 2_x_
Clock Mode:	Normal_x_	Inverted___
Data Mode:	Normal_x_	Inverted___
Interface:	V.35_x_	

Password Mode	Enable_____	Disable_x_
TELNET Mode	Enable_x_	Disable___

SLIP Configuration

Max Packet Size:	1006
Node IP Address:	000.000.000.000
Network Mask:	000.000.000.000
Peer IP Address:	000.000.000.000

SNMP Agent Configuration

Community Name - GET	Authentication name:	public	
Community Name - SET	Authentication name:	private	
SNMP Manager IP Address	Manager IP Address:	000.000.000.000	
Contact Name	Local Equipment Contact Name:	no name	
Local Unit Name	Unit IP Address Circuit ID:	no name	
Node Location	Location of the T1 CSU/DSU-SNMP-SP:		no location
Authorization Trap:	Enabled_x_	Disabled_____	

Configuration Worksheet

Network Configuration

Timing:	Master_____	Network_____		
Framing:	D4____	ESF (ANSI)____	ESF (54016)	
Line Coding:	AMI_____	B8ZS_____		
Interface:	CSU_____	DSX_____		
Density Monitoring:	ANSI 12.5%_____	1 of 16_____	1 of 64_____	None___
LBO Setting:	0 dB_x_	-7.5 dB_____	-15 dB_____	

DTE Configuration

Line Rate:	_____ kbps	
Channel Density:	Clear Channel _x_	Bit 7 Stuffing_____
Starting DS0:	DS0 #_____	
Timing:	Loop 1 _____	Loop 2_x_
Clock Mode:	Normal_____	Inverted_____
Data Mode:	Normal_____	Inverted_____
Interface:	V.35_____	RS-449_____

Password Mode	Enable_____	Disable_____
TELNET Mode	Enable_____	Disable_____

SLIP Configuration

Max Packet Size:	_____
Node IP Address:	_____
Network Mask:	_____
Peer IP Address:	_____

SNMP Agent Configuration

Community Name - GET	Authentication Name:	_____
Community Name - SET	Authentication Name:	_____
SNMP Manager IP Address	Manager IP Address:	_____
Contact Name	Local Equipment Contact Name:	_____
Local Unit Name	Unit IP Address Circuit ID:	_____
Node Location	Location of the T1 CSU/DSU-SNMP-SP:	
_____		
Authorization Trap:	Enabled_____	Disabled_____

4.3 User Interface Overview

You can access the T1 CSU/DSU-SNMP-SP user interface through the MAINT port. This interface contains on-board programming menu trees that allow you to quickly edit or change the parameter settings of the various interface ports located on the T1 CSU/DSU-SNMP-SP.

The T1 CSU/DSU-SNMP-SP user interface may be password protected. When enabled, password protection prevents unauthorized users from managing or controlling the unit via the MAINT port and user interface.

NOTE

The T1 CSU/DSU-SNMP-SP ships with password protection disabled.

The user interface selection bar (selected items are either underlined or highlighted) acts as a scroller or "pointer" and:

- is moved horizontally through the various menu selections and parameter settings using the ASCII terminal's Left or Right arrow keys. These arrow keys are also used occasionally to increment or decrement specific menu data field values (for example, the line rate of the DTE interface).
- is moved vertically through the various user interface menus using either the up or down arrow keys or the Enter key. You can also use the Enter key to activate (enable) the operation specified by the selected menu item.

User Interface menu items may also have quick keys. Quick keys are highlighted or underlined letters (part of the menu item name), that when typed, allow the selection bar to choose the menu item corresponding to the quick key.

NOTES

Pressing the Ctrl and T key sequence will return you to the top-level menu screen, but this action will also cancel all changes (unless an update was first performed) made during the programming operation.

Pressing the Ctrl and R key sequence will refresh the displayed screen.

Access to the User Interface programming menu trees is made through an attached VT100 compatible ASCII terminal connected to the MAINT port (located on the front of the T1 CSU/DSU-SNMP-SP). For additional information about the MAINT interface port, refer to **Chapter 2**.

The first screen displayed after initial power-up is the main User Interface screen. This display screen, through which all programming/control operations are performed, has been divided into three areas: the Menu area, the Multi-function Display area, and the Status area. From this screen you will use a combination of arrow keys and the Enter key, located on your terminal, to move through the various sub-menus and branches.

These areas are described in the User Interface screen overview example shown in Figure 4-1.

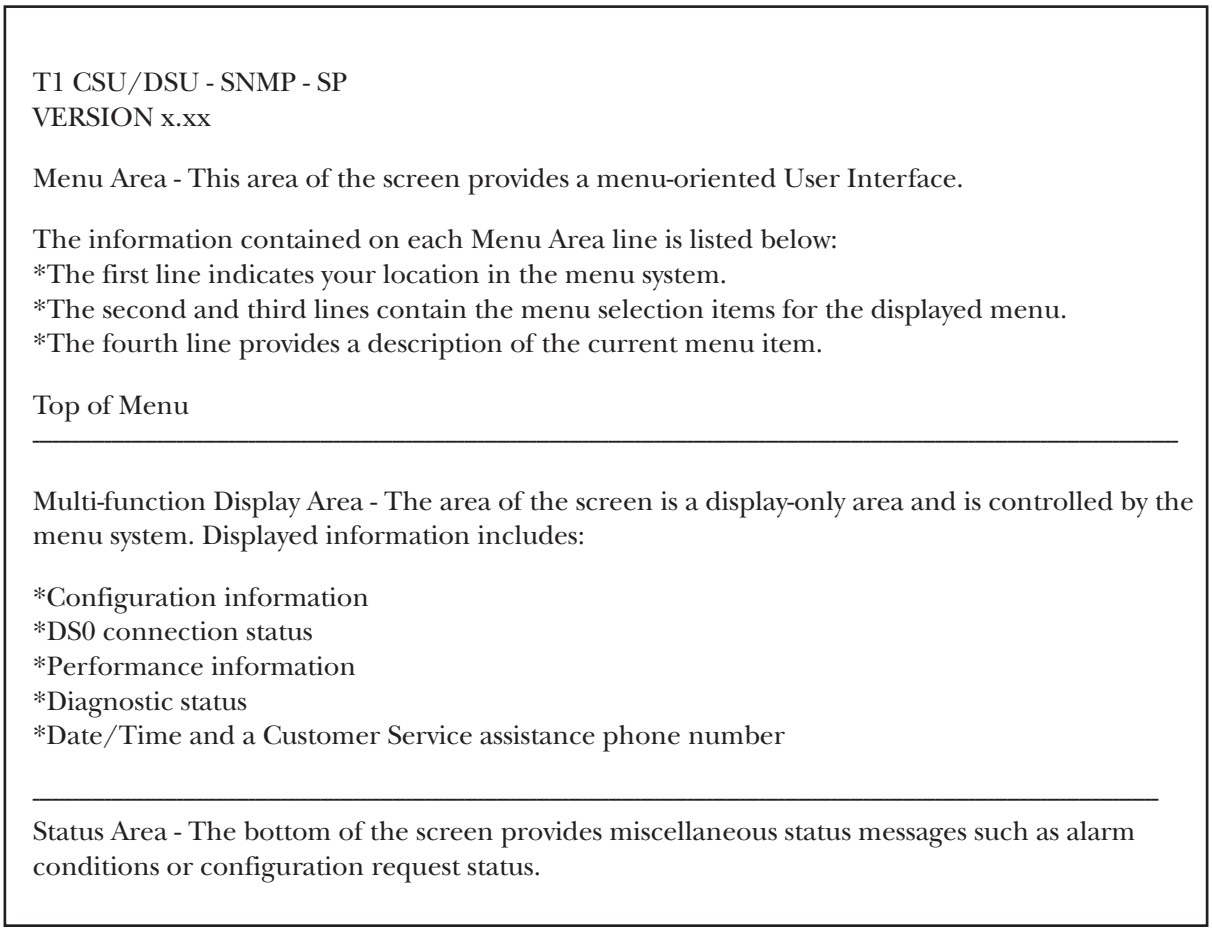


Figure 4-1. User interface screen overview.

The menus are set up with a top down tree structure. An overview of the menu trees is provided in the following paragraphs.

- SYSTEM CNFG allows you to view (read only) or edit (read/write capability) the configurations associated with the network and DTE ports.
- CONNECTIONS allows you to assign (map) bandwidth between the DTE application and the network aggregate on a DS0-by-DS0 basis. Disconnecting and viewing current DS0 bandwidth connections are also supported.
- PERFORMANCE allows you to view (read-only) or clear the performance registers associated with network and DSX error events and alarms. The information contained in these registers assist you in determining problem areas associated with the network or local equipment and in taking appropriate corrective action.
- DIAGNOSTICS allows you to execute diagnostic loopbacks and Bit Error Rate Tests (BERT), which are used to isolate and troubleshoot equipment and/or data lines.
- MISC allows you to perform such miscellaneous operations as setting the time and date, changing the password protection mode or password, editing (read/write capability) the COMM port Slip configuration, changing the TELNET mode, re-initializing the unit, or viewing the firmware revision level of the unit and technical support phone number.

- SNMP allows you to edit (read/write capability) configuration parameters associated with the SNMP agent, display SNMP statistics, and perform "pinging" operations.

The information contained in the remainder of this chapter is divided into "task-oriented" sections describing specific operations supported by these six programming menu trees.

4.4 Viewing System Configurations

The VIEW sub-menu tree available through the User Interface menu SYSTEM CNFG allows you to view (read only) the network or DTE configurations.

Before viewing any configuration, review **Section 4.3** for general programming and keyboard information.

To view a system configuration, reference the menu tree shown in Figure 4-3, and complete the following steps:

1. From the Main System Menu, move the selection bar to SYSTEM CNFG and press **Enter**.
2. From the SYSTEM CNFG sub-menu, move the selection bar to VIEW and press **Enter**.
3. From the VIEW sub-menu, move the selection bar to the menu item that matches the configuration you want to view. Press **Enter**.

If you selected the NETWORK configuration, a menu screen similar to the one below will be displayed.

```
Configuration Menu
NETWORK                    DTE

Network Parameters
_____________________________________________________________________

                        Viewing Configuration Buffer

TYPE =                  NETWORK
TIMING =                MASTER
FRAMING =               ESF - ANSI
LINE CODING =           B8ZS
INTERFACE =             CSU
DENSITY MON =           NONE
LBO SETTING =           0 dB
DS0s ALLOCATED =        1

_____________________________________________________________________
```

Figure 4-2. Network configuration screen.

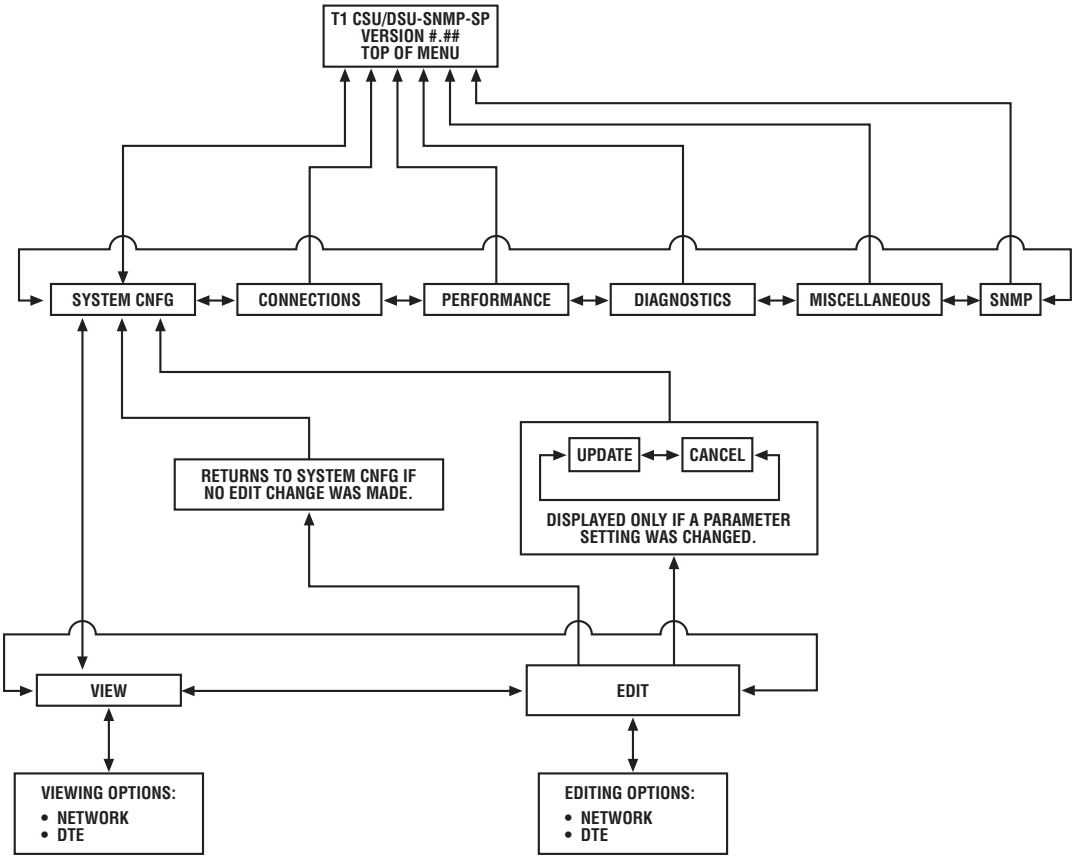


Figure 4-3. System configuration menu tree.

If you selected the DTE configuration, a menu screen similar to the one below will be displayed.

Configuration Menu

DTE Parameters

Viewing Configuration Buffer

TYPE =	DTE
INTERFACE =	V.35
DTE LINE RATE =	56 kbps
CHAN DENSITY =	CLEAR CHANNEL
DS0s REQUIRED =	1
DS0s ALLOCATED =	1
STARTING DS0 =	1
DTE TIMING =	LOOP 2
DTE CLOCK MODE =	NORMAL
DTE DATA MODE =	NORMAL

Figure 4-4. DTE configuration menu.

This completes the procedure for viewing system configurations.

4.5 Editing System Configurations

The EDIT sub-menu tree, available through the User Interface menu SYSTEM CNFG, allows you to edit (read and write) the network or DTE configurations. Parameter settings that have been previously selected as part of the unit's online configuration will appear **highlighted** or underlined (depending on your ASCII terminal).

Before editing any configuration, review **Section 4.3** for general programming and keyboard information.

CAUTION

When online configurations are updated, application data may be disrupted. Notify all users before performing such operations.

To edit a system configuration, see the menu tree in Figure 4-3, and complete the following steps:

1. From the Main System Menu, move the selection bar to SYSTEM CNFG and press **Enter**.
2. From the SYSTEM CNFG, move the selection bar to EDIT and press **Enter**.
3. From the EDIT sub-menu, move the selection bar to the menu item that matches the configuration you want to modify. Press **Enter**.

If you selected the NETWORK configuration, a menu screen similar to the one below will be displayed.

```
Network Config
TIMING                  FRAMING     LINE CODING INTERFACE
MONITOR DENSITY         LB0
_____________________________________________________________________

                        Editing Configuration Buffer

TYPE =                  NETWORK
TIMING =                MASTER
FRAMING =               ESF - ANSI
LINE CODING =           B8ZS
INTERFACE =             CSU
DENSITY MON =           NONE
LBO SETTING =           0 dB
DS0s ALLOCATED =        1

_____________________________________________________________________
```

Figure 4-5. Editing configuration buffer screen.

If you selected the DTE configuration, a menu screen similar to the following will be displayed.

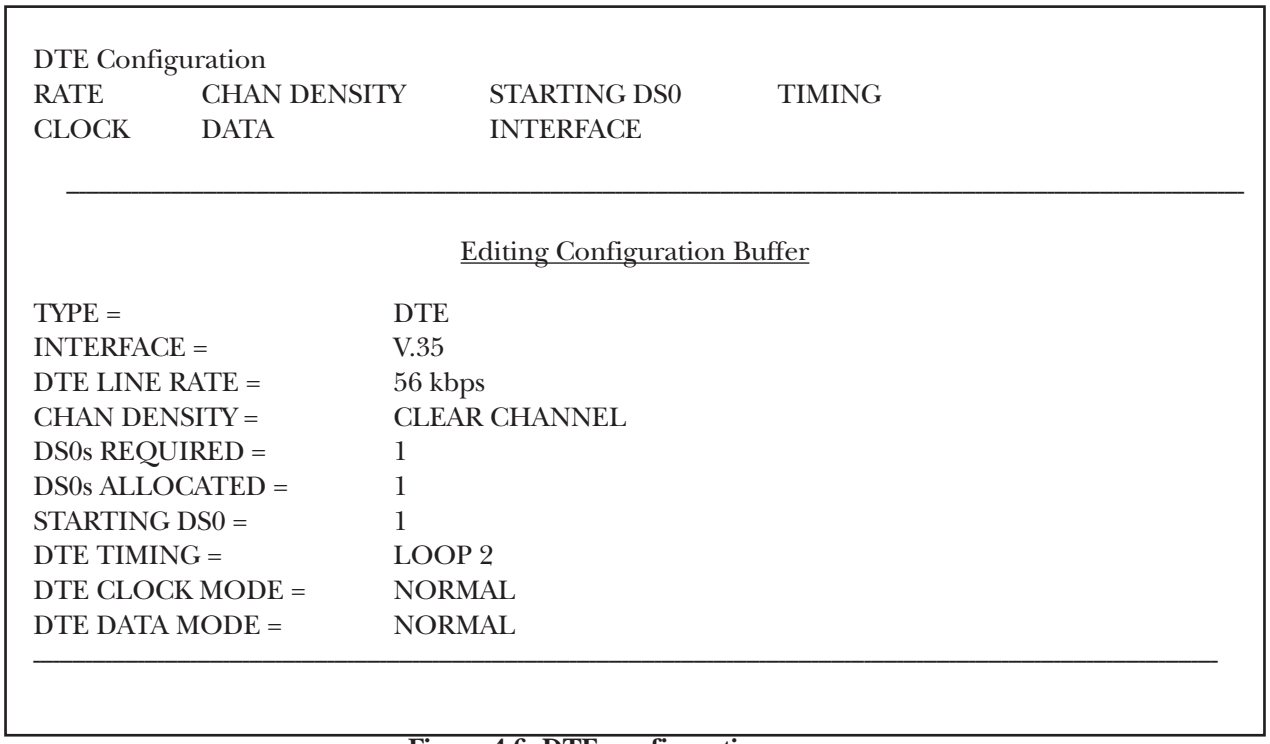


Figure 4-6. DTE configuration screen.

4. To modify the configuration you have selected, complete the following sub-steps.

- Actual edit changes are made in the configuration buffer. The contents of this buffer are then placed on-line when an UPDATE operation is performed.
- For future reference, it may be helpful to write down the current parameter settings.

a. From the configuration sub-menu (chosen during Step 3), move the selection bar to the menu item that matches the parameter you want to modify. Press **Enter**.

b. From the parameter sub-menu, move the selection bar to the parameter setting you want to include in your modified configuration. Press **Enter**.

This action places your selection into the configuration buffer and refreshes the User Interface screen display with the new setting.

For descriptions of the various parameter settings, refer to the applicable table listed below.

- Table 4-1, Network parameter options
- Table 4-2, DTE parameter options

c. Press the Up arrow key one time. This action returns you to the configuration sub-menu chosen during Step 3.

If you want to modify additional parameters, repeat sub-steps a through c.

If all modifications have been made, continue the editing procedure from Step 5.

5. Press the Up arrow key three times. This action displays the configuration update screen.

If you want to update the on-line configuration with the modified settings stored in the configuration buffer, move the selection bar to UPDATE and press **Enter**.

If you want to cancel changes made to the configuration buffer, move the selection bar to CANCEL and press **Enter**.

This completes the procedure for editing system configurations.

Table 4-1. Network parameter options.

Parameter Name	Parameter Settings	Comments
Timing	1. Master 2. Network	1. Internal crystal timing. 2. Recovered network timing.
Framing	1. D4 2. ESF - ANSI 3. ESF - 54016	1. Standard Super Frame format. 2. ANSI style ESF. 3. AT&T style ESF.
Line Coding	1. AMI 2. B8ZS	1. No line coding density protection. 2. Line coding density protection. Density monitoring should be set to NONE.
Interface	1. CSU 2. DSX	1. Drive length of up to 6000 ft. 2. Drive length of up to 655 ft.
Monitor Density	1. ANSI 12.5% 2. 1 of 16 3. 1 of 64 4. NONE	Enforce density monitoring of: 1. at least 24 ones to each 192-bit sliding group. 2. at least a single “1” in each 16-bit sliding group. 3. at least a single “1” in each 64-bit sliding group. 4. density monitoring disabled.
LBO	1. 0 dB 2. -7.5 dB 3. -15 dB	Regulates the transmitted dB line level strength. Normally set according to T1 carrier requirements.

Table 4-2. DTE parameter options.

Parameter Name	Parameter Settings	Comments
Rate	Variable (n x 56 kbps or n x 64 kbps rates)	Refer to Chapter 1 for a listing of available data rates.
Channel Density	1. Clear Channel 2. Bit 7 Stuffing	1. The full bandwidth is used. 2. Each 8th bit is forced high.
Starting DS0	DS0 1 through 24 (See Comments)	Bandwidth is automatically assigned using this DS0 setting as the starting DS0. Default is DS0 1.
Timing	1. Loop 1 2. Loop 2	1. Timing looped from the DTE. 2. Timing supplied internally.
Clock	1. Normal 2. Inverted	1. Clock signal remains normal. 2. Clock signal is inverted (180° phase shift).
Data	1. Normal 2. Inverted	1. Data signal remains normal. 2. Data signal is inverted for network transfer.
Interface	V.35	V.35 applications.

4.6 Assigning DS0 Bandwidth (Automatically)

The auto DS0 connection feature allows the T1 CSU/DSU-SNMP-SP to automatically assign DS0 bandwidth (based on DTE line rate and density). The parameter associated with this feature is STARTING DS0 and is configured (Read and Write) through the EDIT and DTE sub-menu trees. These trees are located under the top-level menu SYSTEM CNFG.

NOTE

If the STARTING DS0 is not specified, the system will default this value to DS0 1.

Information related to the auto DS0 connection feature is presented below:

- DTE line rate and density should be configured first before specifying a starting DS0. If the bandwidth required to support the desired DTE line rate and density will not "fit" from the starting DS0 specified, the system will cause the starting DS0 to default to 1.
- The auto DS0 connection feature will not allow individual DS0s to be manually disconnected. If bandwidth must be disconnected, all DS0 connections must be broken. To re-assign bandwidth, you may either manually make DS0 connections from the Connection Setup menu or you may change the DTE rate, starting DS0, or density, from the DTE Configuration menu. A change in any of these parameters will cause auto connect to automatically assign DS0 bandwidth.
- If either DTE line rate, density, or starting DS0 configuration parameters are altered, the system will disconnect existing DS0 connections and automatically modify the connection map or scheme to accommodate the new bandwidth configuration and re-connect.
- The T1 CSU/DSU-SNMP-SP will automatically connect DS0 bandwidth at start-up based on previous configured bandwidth and line density during a unit reset. Note that if the unit's NVRAM is defaulted during start-up, DS0 bandwidth will still be automatically assigned, but this assignment will be based on NVRAM default values and not necessarily the unit's previous configuration.
- The auto DS0 connection feature in the T1 CSU/DSU-SNMP-SP SNMP MIB has been duplicated in the DTE Configuration table. This allows the user to view the standard DTE configuration parameters (for example, timing, data, clock, etc.) along with the modified auto connection variables (rate, channel density, starting DS0, connection status, and auto connection update).

  You can modify the rate, channel density, and starting DS0 and perform GET to verify that they are correct. If the values are correct, you will SET the auto connect update value. If the values were invalid, no configuration or connection changes will be made.

  The auto connection status will indicate that the update failed. Unlike the T1 CSU/DSU-SNMP-SP User Interface, the SNMP MIB will not default to a new starting DS0 if either rate or channel density is modified.

4.7 Assigning DS0 Bandwidth (Manually)

The CONNECT sub-menu tree available through the User Interface menu CONNECTIONS allows you the flexibility of manually mapping or assigning individual or group DS0s between the network and DTE interface ports. These connections "tailor" the number of DS0s used to meet application bandwidth requirements.

Before connecting any DS0, review **Section 4.3** for general programming and keyboard information.

CAUTION

Disrupting application data will occur when the on-line connection configuration is updated with newly assigned DS0 connections. Make sure that all users are notified before performing such mapping operations.

Before manually connecting DS0s, make sure that all previous DS0 connections have been disconnected. To disconnect previous DS0s, refer to Section 4.8.

Make sure that DTE application bandwidth and density have been previously assigned before manually mapping (connecting) DS0s.

Once source DS0s are assigned (connected) they cannot be re-assigned in any other mapping scheme until they have first been disconnected. The system will not allow you to assign actively connected DS0s.

Actual DS0 connections are made in the connection buffer. The contents of this buffer are then placed online when a UPDATE operation is performed.

For future reference, write down all existing and newly assigned DS0 connections.

To assign DS0s, see the menu tree in Figure 4-8 and complete the following steps:

1. From the Main System Menu, move the selection bar to CONNECTIONS and press **Enter**.
2. From the CONNECTIONS sub-menu, move the selection bar to CONNECTION and press **Enter**. A User Interface menu screen similar to the one shown in Figure 4-7 will be displayed.

Connection Setup
SRC PORT: N SRC DS0: _____ DEST PORT: D DEST DS0: NA
CONN TYPE: D

Network Connections

NETWORK DS0	PORT	DS0	TYPE	NETWORK DS0	PORT	DS0	TYPE
1	DTE	1	DATA	13			
2	DTE	2	DATA	14			
3	DTE	3	DATA	15			
4	DTE	4	DATA	16			
5	DTE	5	DATA	17			
6				18			
7				19			
8				20			
9				21			
10				22			
11				23			
12				24			

Figure 4-7. Connection setup screen.

The multi-function display area or the Connection Setup screen defaults to reflect the current network DS0 connection scheme. The menu area of this screen contains five connection fields. These fields are described in the following paragraphs.

- Source Port (SRC PORT)—This is a pre-defined field on the T1 CSU/DSU-SNMP-SP. The port that will supply source DS0(s) used during the connection operation is network. The system has assigned this field with the letter N (Network).

- Source DS0 (SRC DS0)—The DS0(s) entered into this field provide the bandwidth for DTE applications. Numbers typed into this field may represent single DS0s (for example, 5), a range of DS0s (for example, 3 to 5), non-contiguous DS0s (for example, 3, 5, 7), or you may allow the system to automatically assign the required bandwidth (based on the DTE line rate) by entering the first DS0 number and then a plus (+) sign. For example, if the DTE interface is configured for a line rate of 960 kbps (clear channel), entering 5+ in the SRC DS0 field causes the system to automatically assign 15 contiguous DS0s starting with DS05. If the *n*+ option is used, the system will never use a value <*n*. In addition, the system must find enough unassigned DS0s to accommodate total DTE bandwidth or the *n*+ connection fails.

NOTE

A sufficient number of DS0s must be assigned that matches total DTE bandwidth before the system will allow you to update your connections.

- Destination Port (DEST PORT)—This is a pre-defined field on the T1 CSU/DSU-SNMP-SP. The destination port for all DS0(s) specified in the SRC DS0 field is DTE. The system has assigned this field with the letter D (DTE).

- Destination DS0 (DEST DS0)—This is a pre-defined field on the T1 CSU/DSU-SNMP-SP. Source network DS0 numbers are automatically assigned to match destination DTE DS0 numbers on a DS0-to-DS0 basis (for example, source port DS05 is mapped to destination port DS05). The system has assigned this field with the letters NA (Not Applicable). Note that the connections buffer will not display destination DS0s.
- Connection Type (CONN TYPE)—This is a pre-defined field on the T1 CSU/DSU-SNMP-SP. The type of information carried by any network DS0 specified in the SRC DS0 field will always be data. The T1 CSU/DSU-SNMP-SP doesn't support PBX applications. The system has assigned this field with the letter D (Data).

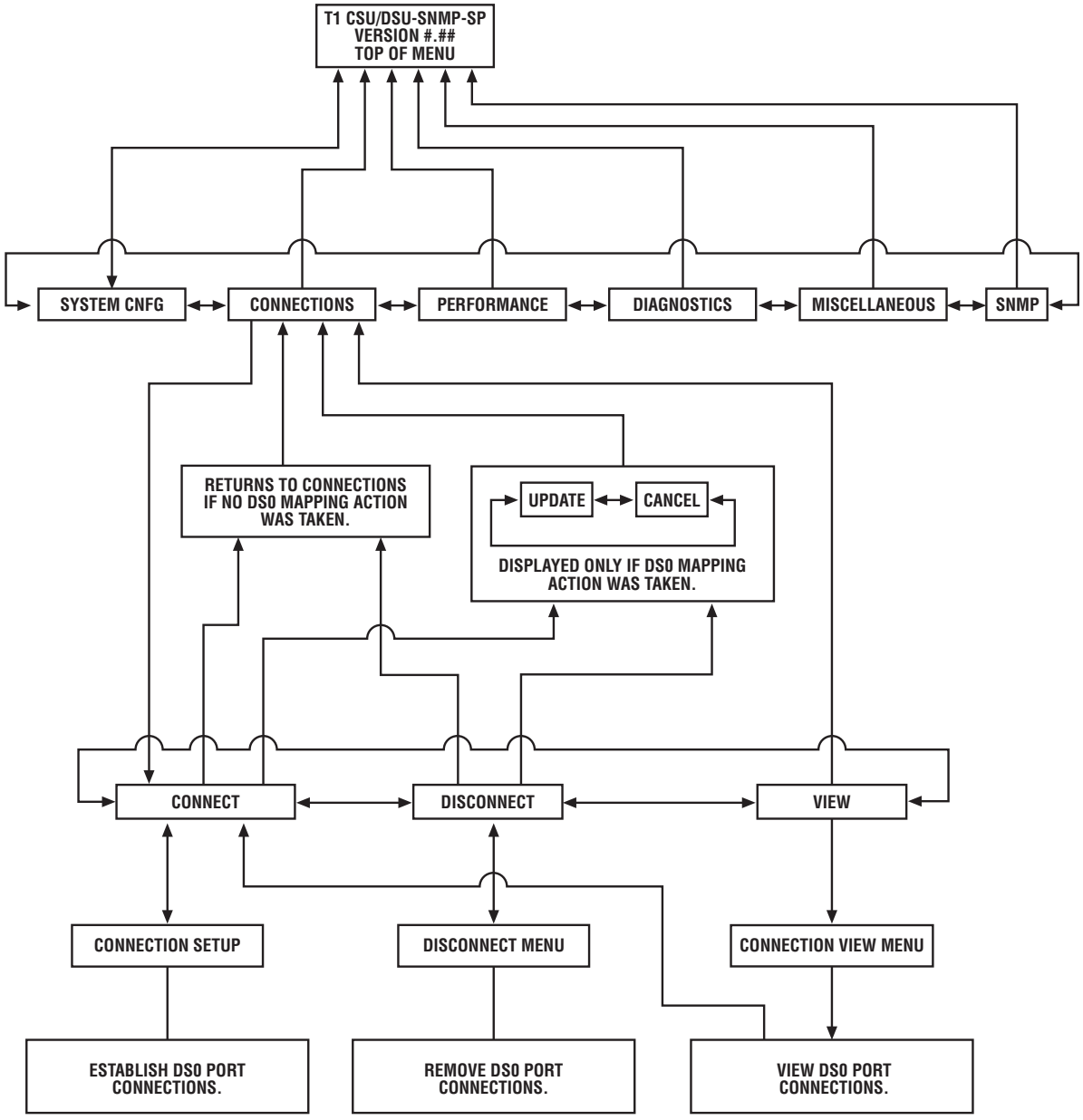


Figure 4-8. Connections menu tree.

3. From the SRC DS0 field, type the DS0 number(s) that will accommodate the bandwidth configured for the DTE port. Press **Enter**. This action:

- places the source bandwidth (DS0 identifiers) into the connection buffer.
- refreshes the screen with the specified source DS0(s).
- automatically re-positions the selection bar to the beginning of the SRC DS0 field.

NOTES

If you attempted to connect a DS0 that was previously assigned, the message "DS0 already in use" will be displayed in the Status area of the User Interface screen.

If you want to make additional DS0 connections, repeat step 3. If all connections have been made, continue the mapping procedure from step 4.

4. Press the up arrow key two times. This action displays the connection update screen.

   If you want to update the on-line connection configuration with the modified settings stored in the connection buffer, move the selection bar to UPDATE and press **Enter**.

   A successful update is indicated by the message "Connection Completed" displayed in the Status area of the User Interface screen.

   If you want to cancel changes made to the connection buffer, move the selection bar to CANCEL and press **Enter**.

This completes the procedure for connecting (mapping) DS0s between the network and the DTE port.

4.8 Disconnecting Mapped DS0s

The DISCONNECT sub-menu tree available through the User Interface menu CONNECTIONS allows you to remove any mapped DS0 connection between the network and the DTE interface port.

Before disconnecting any DS0, review **Section 4.3** for general programming and keyboard information.

CAUTION

When the on-line connection configuration is updated with re-mapped DS0 connections, application data will be disrupted. Notify all users before performing such mapping operations.

Actual DS0 disconnects are made in the connection buffer. The contents of this buffer are then placed on-line when an UPDATE operation is performed.

For future reference, write down all existing and newly assigned DS0 connections.

To remove DS0 connection assignments, see the menu tree illustrated in Figure 4-8 and complete the following steps:

1. From the Main System Menu, move the selection bar to CONNECTIONS and press **Enter**.
2. From the CONNECTIONS sub-menu, move the selection bar to DISCONNECT and press **Enter**.

A User Interface menu screen similar to the one below will be displayed.

```
Disconnect Menu
SRC PORT: N          SRC DS0: _________

_____________________________________________________________________________

                              Network Connections

NETWORK DS0     PORT  DS0   TYPE   NETWORK     DS0     PORT  DS0     TYPE

_____________________________________________________________________________

1               DTE   1     DATA   13
2               DTE   2     DATA   14
3               DTE   3     DATA   15
4               DTE   4     DATA   16
5               DTE   5     DATA   17
6                             DATA   18
7                             DATA   19
8                             DATA   20
9                             DATA   21
10                            DATA   22
11                            DATA   23
12                            DATA   24

_____________________________________________________________________________
```

Figure 4-9. Disconnect menu.

The multi-function display area of the Disconnect Menu screen defaults to reflect the current network DS0 connection scheme. The menu area of this screen contains two disconnect fields. These fields are described in the following paragraphs.

- Source Port (SRC PORT)—This is a pre-defined field on the T1 CSU/DSU-SNMP-SP. The port that will supply source DS0(s) used during the disconnect operation is network. The system has assigned this field with the letter N (Network).
- Source DS0 (SRC DS0)—The DS0(s) entered into this field match those DS0(s) previously assigned either during the connect operation or through the auto connection feature. Numbers typed into this field may represent single DS0s (for example, 5), a range of DS0s (for example, 3 to 5), non-contiguous DS0s (for example 3, 5, 7), or you may allow the system to automatically disconnect bandwidth (contiguous DS0s) by entering the first DS0 number and then a plus (+) sign. For example, if the DTE interface is configured with 15 contiguous DS0s starting with DS0 1, entering a 1 followed by a plus sign (+) will cause the system to automatically remove (disconnect) all 15 DS0 assignments.

  If the *n*+ option is used, the system will never use a value <*n* when seeking DS0s to disconnect. Only assigned DS0s equal to *n* and above can be disconnected.

NOTE

All network DS0 connections must be disconnected before the system will allow you to successfully complete the operation and update the on-line connection configuration.

3. From the SRC DS0 field, type the DS0 number(s) that you want to remove from the connection scheme. Press **Enter**. This action:

- places the source port bandwidth (DS0 identifiers) into the disconnect buffer.
- refreshes the screen. Specified DS0 number(s) should be shown removed from the scheme.
- automatically re-positions the selection bar to the beginning of the SRC DS0 field.

If you want to disconnect additional mapped DS0 connections, repeat step 3. If all disconnects have been made, continue the disconnect procedure from Step 4.

4. Press the up arrow key two times. This action displays the connection update screen.

   If you want to update the on-line connection configuration with the modified settings stored in the disconnect buffer, move the selection bar to UPDATE and press **Enter**.

   A successful update is indicated by the message "Connection Completed" displayed in the Status area of the User Interface screen.

   If you wish to cancel changes made to the disconnect buffer, move the selection bar to CANCEL and press **Enter**.

This completes the procedure for removing DS0 connections between the network and the DTE port.

4.9 Viewing Connection Schemes

The VIEW sub-menu tree available through the User Interface menu CONNECTIONS allows you to view (read only) the DS0 connection scheme associated with the T1 CSU/DSU-SNMP-SP.

Before viewing any DS0 connection scheme, review **Section 4.3** for general programming and keyboard information.

To view port DS0 connection schemes, see the menu tree illustrated in Figure 4-8 and complete the following steps:

1. From the Main System Menu, move the selection bar to CONNECTIONS and press **Enter**.
2. From the CONNECTIONS sub-menu, move the selection bar to VIEW and press **Enter**.
3. From the VIEW sub-menu, move the selection bar to the menu item that matches the port whose DS0 connection scheme you want to view. Press **Enter**.

A User Interface menu screen similar to the one on the next page will be displayed.

Connection View Menu
NETWORK DTE

Network Connections

NETWORK	DS0	PORT	DS0	TYPE	NETWORK	DS0	PORT	DS0	TYPE
1		DTE	1	DATA	13				
2		DTE	2	DATA	14				
3		DTE	3	DATA	15				
4		DTE	4	DATA	16				
5		DTE	5	DATA	17				
6					18				
7					19				
8					20				
9					21				
10					22				
11					23				
12					24				

Figure 4-10. Connection view menu.

To view additional connection schemes, repeat step 3.

This completes the procedure for viewing the DS0 connection scheme.

4.10 Viewing Performance Registers

The VIEW sub-menu tree available through the User Interface menu PERFORMANCE allows you to view local or carrier maintained network performance registers.

These registers monitor the performance of the network in fifteen-minute increments and maintain a 24-hour history of performance monitoring information.

Before viewing performance registers, review **Section 4.3** for general programming and keyboard information.

NOTE

Sub-menu item(s) that end in -SERVICE are performance registers maintained by the carrier. The system allows you to view (read-only) these registers.

To view performance registers, see the menu tree in Figure 4-12 and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to VIEW and press **Enter**.
3. From the VIEW sub-menu, move the selection bar to the menu item that matches the set of performance registers you wish to view. Press **Enter**.

   A User Interface menu screen similar to the one below will be displayed. Refer to Table 4-3 for a description of each performance register.

Performance Menu
NETWORK-USER NETWORK-SERVICE

Network-User Performance

	Cur. Interval	24 Hr. Total	Cur. Interval time: 316
MSF Events	Max	0	
CRC6 Events	0	0	
Error Events	393	0	
OOFS	1	0	
ES	0	0	
BES	0	0	
CSS	0	0	
SES	0	0	
FS	215	0	
BPV	0	0	

BPV Alarm	OFF	Red Alarm	OFF
Carrier Alarm	OFF	Yellow Alarm	OFF
Sync Alarm	OFF	AIS Alarm	OFF
		Fail Sig. St.	OFF

Figure 4-11. Performance menu.

To view additional performance registers, repeat step 3.

This completes the procedure for viewing network performance registers.

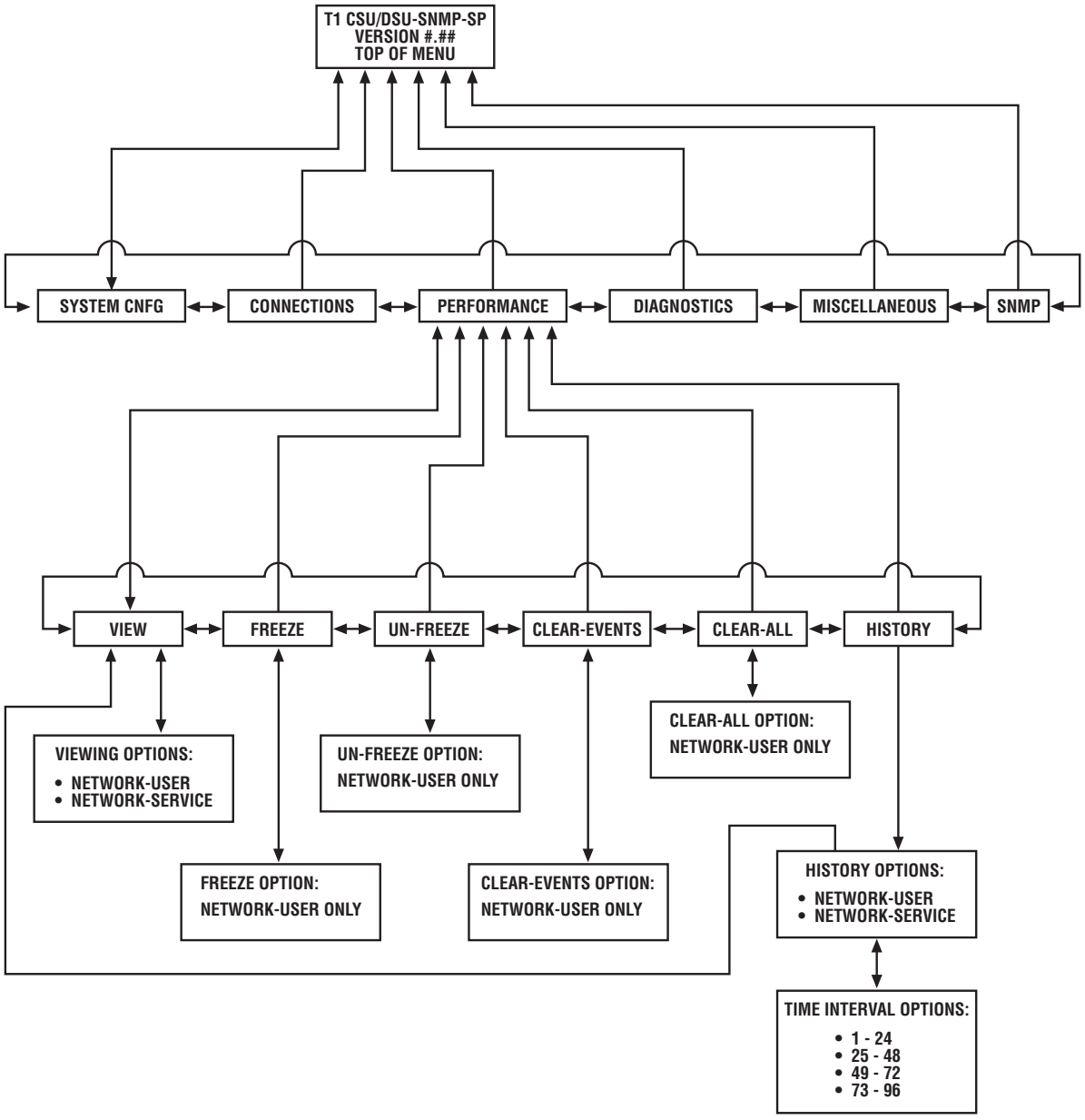


Figure 4-12. Performance menu tree.

Table 4-3. Performance registers.

Register Name	Description
Missed Super Frames (MSF) Events	This is the count of the number of super frames missed. This can be as much as 333/second for ESF framing and 666/second for D4 framing.
CRC 6 Events	Occurs when CRC 6 summation, generated by the local device and based on the incoming DS1 signal, does not match the CRC 6 field contained in the DS1 signal from the network. Valid only when in ESF framing format.
Error Events	When D4 is selected, this is the same as OOFS. When ESF is selected, contains sum of CRC 6 errors, OOFS events, and Controlled Slipped Seconds (CSS).
Out of Frame Seconds (OOFS)	This condition exists when two out of any four consecutive frame bits received from the network are incorrect.
D4 Error Event	Occurs when a superframe contains an out-of-frame event. Available only when in D4 framing format.
Errored Seconds (ES)	A second with one or more ESF/D4 errored events. These may be called CRC 6 error events or OOFS events.
Bursty Errored Seconds (BES)	A second with greater than 1 and less than 320 CRC 6 errors.
Controlled Slip Seconds (CSS)	A second when at least one timing slip second condition occurs.
Severely Errored Seconds (SES)	A second with greater than or equal to 320 CRC 6 errors or any number of OOFS events.
Failed Seconds (FS)	A count of 1-second intervals during which transmission has degraded to such a degree that service is considered unavailable.
Bipolar Variation (BPV)	Indicates the presence, in the DS1 signal, of two consecutive bits with the same polarity (violation of alternate mark inversion).
Current Interval	Provides counts of seconds and events that occur in the current 15-minute interval. Resets at the end of the 900-second time interval.
24-hr. Total	Provides a count of events that occurred in the past 96 time intervals contained within the module history map.
Total	Provides a count of events that occurred in the past 24-hour cycle. Clears when the user clears all registers.

Table 4-3 (continued). Performance registers.

Register Name	Description
BPV Alarm	Condition where at least one bipolar violation has occurred in the last second.
Carrier Alarm	Condition where the port has lost the carrier from the T1 source.
Sync Alarm	Condition where the port is experiencing an out-of-frame condition.
Red Alarm	Condition where the port has been out of frame for at least 2 seconds.
Yellow Alarm	Condition where the port is detecting an Alarm Indication Signal (AIS) sent from the T1 source. This means that the remote unit is in Red alarm.
AIS Alarm	Condition where the port is detecting an Alarm Indication Signal (AIS) sent from the T1 source. This is an unframed all ones pattern.
Failed Signal State	Declared after a sequence of 10 consecutive severely errored seconds. Return to service is declared after receipt of 10 consecutive seconds without a severely errored second.

4.11 Freezing Performance Registers

The FREEZE sub-menu tree available through the User Interface menu PERFORMANCE allows you to prevent network performance registers from being updated.

While the performance registers are "frozen," interval timers will continue to run. At the end of the current 15-minute interval, history registers will be updated with values obtained before the freeze was executed, and then the contents of the performance registers will clear (reset to zero) normally. Subsequent history registers, for the duration of the freeze condition, will be updated with the zero contents of the performance registers.

Before freezing performance registers, review **Section 4-3** for general programming and keyboard information.

To freeze performance registers, see the menu tree in Figure 4-13 and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to FREEZE and press **Enter**.
3. From the FREEZE sub-menu, move the selection bar to NETWORK–USER and press **Enter**.

Refer to Table 4-3 for a description of each performance register.

A User Interface menu screen similar to the one below will be displayed. Note the screen message DATA FROZEN displayed above the Interval Time.

Performance Menu
NETWORK-USER

	Network-User Performance		DATA FROZEN
	Cur. Interval	24 Hr. Total	Cur. Interval time: 316
MSF Events	Max	0	
CRC6 Events	0	0	
Error Events	0	0	
OOFS	1	0	
ES	0	0	
BES	0	0	
CSS	0	0	
SES	0	0	
FS	0	0	
BPV	0	0	

BPV Alarm	OFF	Red Alarm	OFF
Carrier Alarm	OFF	Yellow Alarm	OFF
Sync Alarm	OFF	AIS Alarm	OFF
		Fail Sig. St.	OFF

Figure 4-13. Freeze performance menu.

This completes the procedure for freezing network performance registers.

4.12 Unfreezing Performance Registers

The UN-FREEZE sub-menu tree available through the User Interface menu PERFORMANCE allows you to "un-freeze" network performance registers and resume normal monitoring and register updates.

Before unfreezing performance registers, review **Section 4.3** for general programming and keyboard information.

To unfreeze performance registers, see the menu tree in Figure 4-14 and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to UN-FREEZE and press **Enter**.
3. From the UN-FREEZE sub-menu, move the selection bar to NETWORK–USER and press **Enter**. Refer to Table 4-3 for a description of each performance register.

A User Interface menu screen similar to the one below will be displayed. Note that the screen message DATA FROZEN previously displayed while the registers were frozen, has cleared.

Performance Menu
NETWORK-USER

Network-User Performance

	Cur. Interval	24 Hr. Total	Cur. Interval time: 316
MSF Events	Max	0	
CRC6 Events	0	0	
Error Events	0	0	
OOFS	1	0	
ES	0	0	
BES	0	0	
CSS	0	0	
SES	0	0	
FS	0	0	
BPV	0	0	

BPV Alarm	OFF	Red Alarm	OFF
Carrier Alarm	OFF	Yellow Alarm	OFF
Sync Alarm	OFF	AIS Alarm	OFF
		Fail Sig. St.	OFF

Figure 4-14. Unfreeze performance registers.

This completes the procedure for unfreezing network performance registers.

4.13 Clearing Event Performance Registers

The CLEAR–EVENTS sub-menu tree available through the User Interface menu PERFORMANCE allows you to clear (reset to zero) the MSF, CFC6, and Error events network performance registers. Clearing these registers has no effect on the interval timers. Normal performance updating is not interrupted.

Before clearing performance event registers, review **Section 4.3** for general programming and keyboard information.

To clear performance event registers, see the menu tree in Figure 4-12, and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to CLEAR–EVENTS and press **Enter**.
3. From the CLEAR–EVENTS sub-menu, move the selection bar to NETWORK–USER and press **Enter**.

   Refer to Table 4-3 for a description of each performance register.

   A User Interface menu screen similar to the one below will be displayed. Note that the MSF, CRCs, and Error registers have been reset to zero.

Performance Menu
NETWORK-USER

Network-User Performance

	Cur. Interval	24 Hr. Total	Cur. Interval time: 316
MSF Events	0	0	
CRC6 Events	0	0	
Error Events	0	0	
OOFS	1	0	
ES	0	0	
BES	0	0	
CSS	0	0	
SES	0	0	
FS	0	0	
BPV	0	0	

BPV Alarm	OFF	Red Alarm	OFF
Carrier Alarm	OFF	Yellow Alarm	OFF
Sync Alarm	OFF	AIS Alarm	OFF
		Fail Sig. St.	OFF

Figure 4-15. Network user performance.

This completes the procedure for clearing network event performance registers.

4.14 Clearing All Performance Registers

The CLEAR–ALL sub-menu tree available through the User Interface menu PERFORMANCE allows you to clear (reset to zero) all network performance registers. Clearing these registers also resets the interval timer. Normal performance updating is not interrupted.

Before clearing performance registers, review **Section 4.3** for general programming and keyboard information.

To clear performance registers, see the menu tree in Figure 4-12, and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to CLEAR–ALL and press **Enter**.
3. From the CLEAR–ALL sub-menu, move the selection bar to NETWORK–USER and press **Enter**.

Refer to Table 4-3 for a description of each performance register.

A User Interface menu screen similar to the one on the next page will be displayed. Note that all performance registers and the interval timer have been reset to zero.

Performance Menu
NETWORK-USER

Network-User Performance

	Cur. Interval	24 Hr. Total	Cur. Interval time: 0
MSF Events	Max	0	
CRC6 Events	0	0	
Error Events	0	0	
OOFS	0	0	
ES	0	0	
BES	0	0	
CSS	0	0	
SES	0	0	
FS	0	0	
BPV	0	0	

BPV Alarm	OFF	Red Alarm	OFF
Carrier Alarm	OFF	Yellow Alarm	OFF
Sync Alarm	OFF	AIS Alarm	OFF
		Fail Sig. St.	OFF

Figure 4-16. Network user performance.

This completes the procedure for clearing all network performance registers.

4.15 Viewing Performance History Registers

The HISTORY sub-menu tree available through the User Interface menu PERFORMANCE allows you to view local or carrier maintained network performance history registers. These history registers are divided into four groups: 1–24, 25–48, 49–72, and 73–96. Each group can be independently viewed and represents 24 fifteen-minute time intervals.

NOTE

Sub-menu item(s) that end in –SERVICE are performance registers maintained by the carrier. The system allows you to view (read-only) these registers.

Before viewing history registers, review **Section 4.3** for general programming and keyboard information.

To view performance history registers, see the menu tree in Figure 4-12, and complete the following steps:

1. From the Main System Menu, move the selection bar to PERFORMANCE and press **Enter**.
2. From the PERFORMANCE sub-menu, move the selection bar to HISTORY and press **Enter**.

3. From the HISTORY sub-menu, move the selection bar to the menu item that matches the set of network performance registers you want to view. Press **Enter**.
4. From the performance registers sub-menu chosen from Step 3, move the selection bar to the menu item that matches the time interval group you want to view. Press **Enter**.

Refer to Table 4-3 for a description of each performance register.

A User Interface menu screen similar to the one below will be displayed.

Performance Menu
1–24 25–48 49–72 73-96

Network-User Performance History

INTV	ES	SES	FS	BPV	INTV	ES	SES	FS	BPV
1	0	0	0	0	13	0	0	0	0
2	0	0	0	0	14	0	0	0	0
3	0	0	0	0	15	0	0	0	0
4	0	0	0	0	16	0	0	0	0
5	0	0	0	0	17	0	0	0	0
6	0	0	0	0	18	0	0	0	0
7	0	0	0	0	19	0	0	0	0
8	0	0	0	0	20	0	0	0	0
9	0	0	0	0	21	0	0	0	0
10	0	0	0	0	22	0	0	0	0
11	0	0	0	0	23	0	0	0	0
12	0	0	0	0	24	0	0	0	0

Figure 4-17. Performance menu.

To view additional time interval groups, repeat Step 4.

To view additional performance history registers, repeat Steps 3 and 4.

This completes the procedure for viewing network history performance registers.

4.16 Diagnostics

The DIAGNOSTICS menu tree allows you to activate diagnostic loopbacks and either a 511 or QRSS network bit test pattern. These diagnostic loopbacks and BERT are used to isolate equipment fault and/or T1 line problems.

NOTE

Reference Chapter 5 for detailed information about the DIAGNOSTICS menu tree and activating individual diagnostic loopbacks and bit tests.

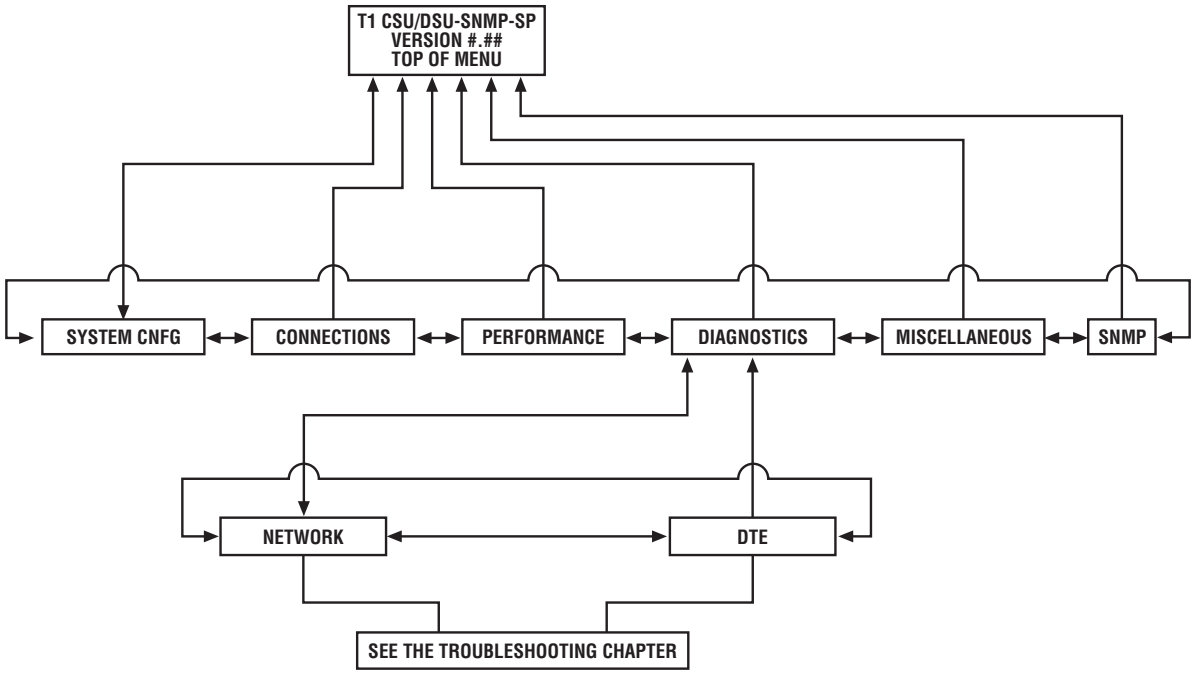


Figure 4-18. Diagnostic menu tree.

4.17 Setting the Time of Day

The TIME sub-menu tree available through the User Interface menu MISC allows you to change the current time of day. This time is displayed in a 24-hour military (HH:MM:SS) format. Programmed changes made to the time of day take effect immediately. Setting the correct time ensures that all message reports and alarms contain the proper time stamp.

Before changing the time, review **Section 4.3** for general programming and keyboard information.

To change the time, see the menu tree in Figure 4-18 and complete the following steps:

1. From the Main System Menu, move the selection bar to MISC and press **Enter**.
2. From the MISC sub-menu, move the selection bar to TIME and press **Enter**.

A User Interface menu screen similar to the following will be displayed.

```
Time Set

___:___:___

Enter HH:MM:SS in Military Format
_____________________________________________________________________________

Enter          HH:MM:SS      Date     07-18-99
```

Figure 4-19. Setting the time.

3. From the Time Set data field, type in a six-digit time using the 24-hour military format. Press **Enter**.

   Separate the hour from the minutes and the minutes from the seconds with a colon (:). For example, if the time is 2:45 p.m., then type into this field the character string of 14:45:00.

This completes the procedure for changing the current time of day.

4.18 Setting the Date

The DATE sub-menu tree available through the User Interface menu MISC allows you to change the current day, month, and year. Programmed changes made to the date take effect immediately. Setting the correct date ensures that all message reports and alarms contain the proper date stamp.

Before changing the date, review **Section 4.3** for general programming and keyboard information.

To change the date, reference the menu tree illustrated in Figure 4-21 and complete the following steps:

1. From the Main System Menu, move the selection bar to MISC and press **Enter**.
2. From the MISC sub-menu, move the selection bar to DATE and press **Enter**.

A User Interface menu screen similar to the one below will be displayed.

```
Date Set

___:___:___

Enter          MM:DD:YY
_____________________________________________________________________________

Time           10:00:25      Date     07-18-99
```

Figure 4-20. Setting the date.

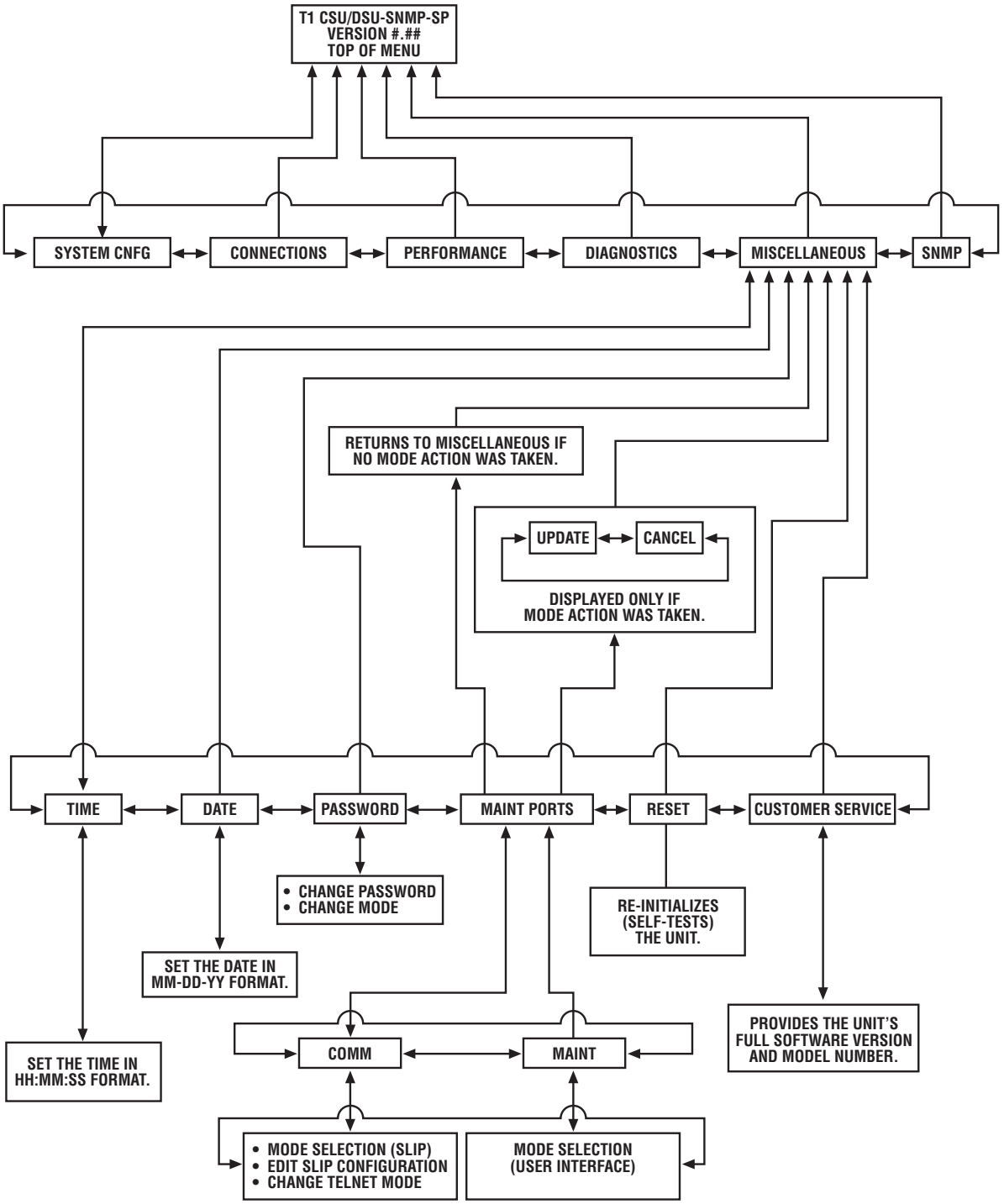


Figure 4-21. Miscellaneous menu tree.

3. From the Date Set data field, type in a six-digit date. Press **Enter**.

   Separate the month from the day and the day from the year with a hyphen (-). For example, if the date is the 9th of June 2000, then type into this field the character string of 06-09-00.

   This completes the procedure for changing the current time of day.

4.19 Changing the Login Password

The PASSWORD sub-menu tree available through the User Interface menu MISC allows you to change the current User Interface login password.

The T1 CSU/DSU-SNMP-SP CSU/DSU ships with a default login password of MT172A (upper case, all capitals).

NOTES

Before changing your login password, make sure that password protection mode has been enabled and you have logged onto the system using a valid login password.

Programmed changes made to the password take effect immediately.

Password protection mode (when enabled) prohibits unauthorized users from controlling or managing the T1 CSU/DSU-SNMP-SP CSU/DSU through the MAINT port and the User Interface. This level of security has no effect on SNMP or TELNET operations. By default, your T1 CSU/DSU-SNMP-SP ships with the password mode disabled.

If password protection has been enabled, the Enter Password screen will appear immediately following the unit power-up self-tests. To clear this screen and access the User Interface, enter a valid login password.

The Enter Password screen will not appear again (after a successful login) until either the unit power cycles or you type the CTRL L key sequence.

The CTRL L key sequence automatically locks up the User Interface and displays the Enter Password screen. Scrolling up from the Top of Menu User Interface screen will not cause the Enter Password screen to appear.

Before changing the login password, review **Section 4.3** for general programming and keyboard information.

To change the login password, see the menu tree in Figure 4-21, and complete the following steps:

1. From the Main System Menu, move the selection bar to MISCELLANEOUS and press **Enter**.

   A User Interface menu screen similar to the on the next page will be displayed. This screen displays the current mode setting for password protection. If the password protection mode is disabled, refer to **Section 4.20** and change the mode to Enable.

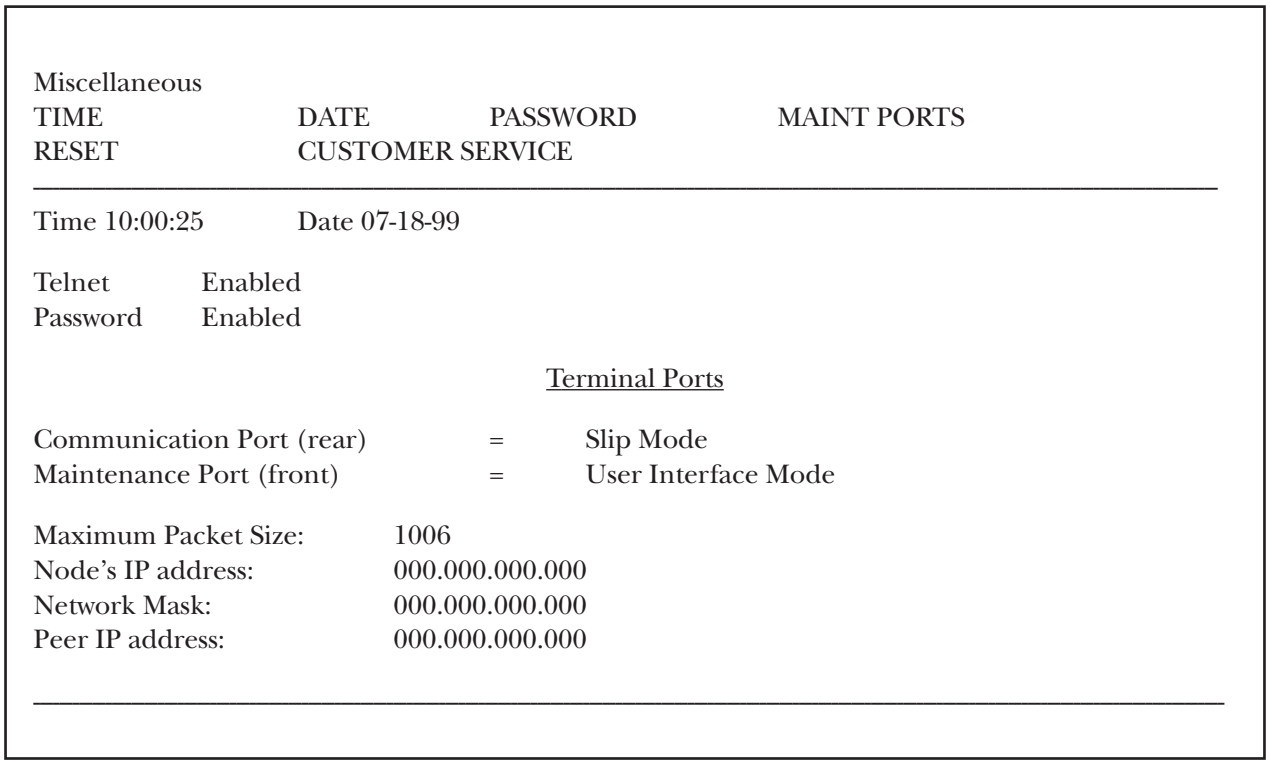


Figure 4-22. Terminal ports screen.

2. From the MISCELLANEOUS sub-menu, move the selection bar to PASSWORD and press **Enter**.

3. From the PASSWORD sub-menu, move the selection bar to CHANGE–PASSWORD and press **Enter**.

4. Type the old login password into the PSW= field. This is the key sequence you used during your last system login. Press **Enter**.

   If the typed password and the actual password match, the system will display an Enter New Password field.

   If a mismatch occurs between the type password and the actual password, the system returns you to the screen displayed during Step 3.

NOTE

For security reasons, the system substitutes an X for each typed password character.

5. Type a new login password key sequence (maximum of 8 alphanumeric characters) into the PSW= field. Press **Enter**. This action displays a Repeat New Password field.

6. Type the same login password key sequence you entered during Step 5 into the PSW= field.

   If the typed password and the password entered during Step 5 match, the system will return you to the screen displayed during Step 3.

   If a mismatch occurs between the typed password and the password entered during Step 5, the system will display the Enter New Password field once again. Repeat Steps 5 and 6 until the new password change has been completed.

This completes the procedure for changing the login password.

4.20 Enabling/Disabling Password Protection

The PASSWORD sub-menu tree available through the User Interface menu MISC allows you to enable or disable the password protection mode.

Password protection mode (when enabled) prohibits unauthorized users from controlling or managing the T1 CSU/DSU-SNMP-SP CSU/DSU through the MAINT port and the User Interface. This level of security has no effect on SNMP or TELNET operations. By default, your T1 CSU/DSU-SNMP-SP ships with password mode disabled.

If password protection has been enabled, the Enter Password screen will appear immediately following the unit power-up self-tests. This screen will not appear again, after a successful logon, until either the unit power cycles or you type the CTRL L key sequence.

The CTRL L key sequence automatically locks up the User Interface and displays the Enter Password screen. Scrolling up from the Top of Menu User Interface screen will not cause the Enter Password screen to appear.

NOTE

Programmed changes made to the password mode take effect immediately.

Before changing the password mode, review **Section 4.3** for general programming and keyboard information.

To enable/disable the password protection mode, see the menu tree in Figure 4-21, and complete the following steps:

1. From the Main System Menu, move the selection bar to MISCELLANEOUS and press **Enter**.

   A User Interface menu screen similar to the following will be displayed. This screen displays the current mode setting for password protection.

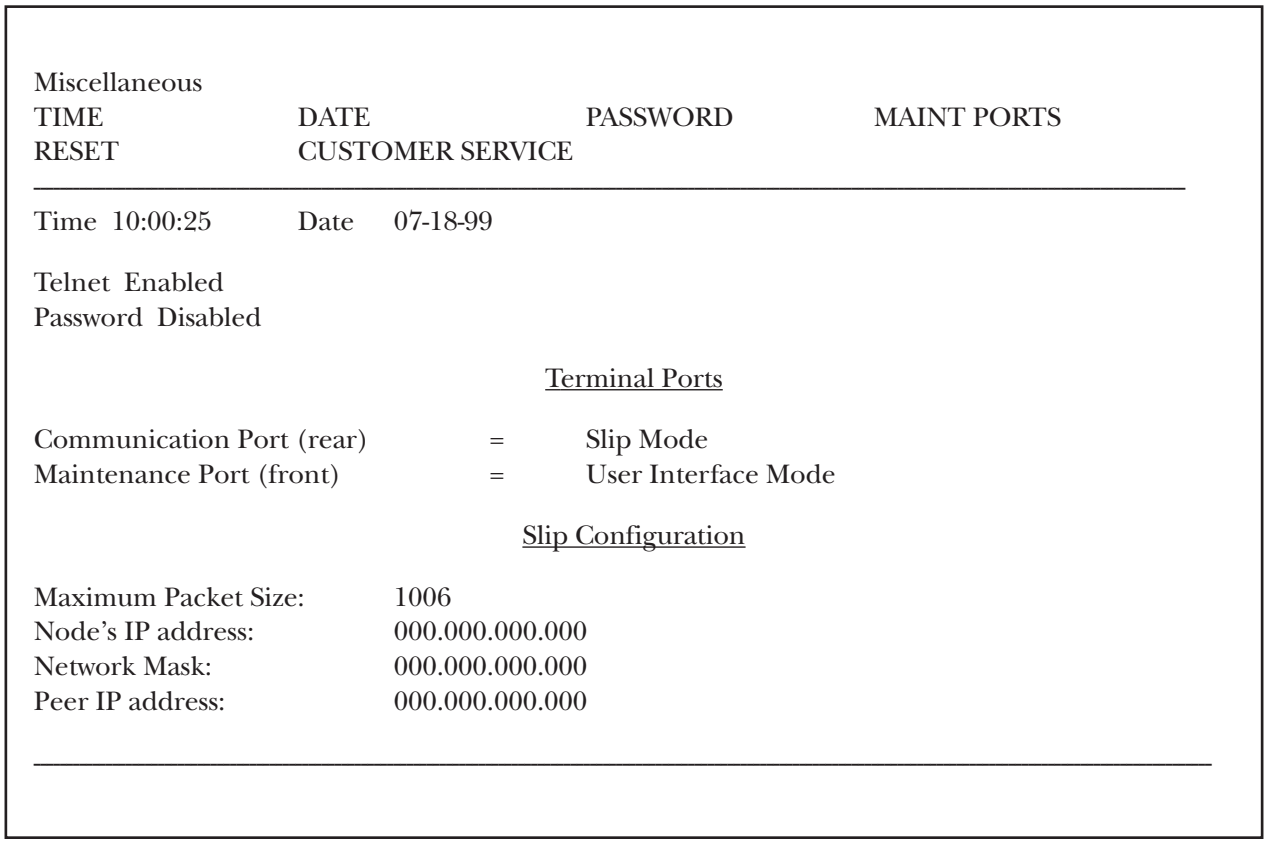


Figure 4-23. Miscellaneous sub-menu, password option.

2. From the MISCELLANEOUS sub-menu, move the selection bar to PASSWORD and press **Enter**.
3. From the PASSWORD sub-menu, move the selection bar to PASSWORD–MODE and press **Enter**.
4. From the PASSWORD–MODE sub-menu (chosen during Step 3), move the selection bar to the menu item (Enable or Disable) that matches the mode you want password protection to assume. Press **Enter**. This action modifies the password mode and refreshes the User Interface screen display with the new mode.

This completes the procedure for changing the TELNET mode.

4.21 Editing the SLIP Configuration

The SLIP sub-menu tree available through the User Interface menu MISCELLANEOUS allows you to edit (read and write) parameter settings associated with the designated SLIP port (COMM interface).

Parameter settings that have been previously selected as part of the unit's on-line Slip configuration will appear highlighted or underlined (depending on your ASCII terminal).

CAUTION

Updating on-line configurations may disrupt application data. Notify all users before performing such operations.

Before editing the SLIP port configuration, review **Section 4.3** for general programming and keyboard information.

To modify the SLIP port configuration, see the menu tree in Figure 4-21 and complete the following steps:

1. From the Main System Menu, move the selection bar to MISCELLANEOUS and press **Enter**.

   A User Interface menu screen similar to the one below will be displayed. This screen displays the current mode setting for the COMM and MAINT ports.

```
Miscellaneous
TIME        DATE                          PASSWORD          MAINT PORTS
RESET       CUSTOMER SERVICE
_____________________________________________________________________

Time  10:00:25        Date 07-18-99

Telnet      Enabled
Password    Disabled

                                  Terminal Ports

Communication Port (rear)   =     Slip Mode
Maintenance Port (front)    =     User Interface Mode

                                  Slip Configuration

Maximum Packet Size:        1006
Node's IP address:          000.000.000.000
Network Mask:               000.000.000.000
Peer IP address:            000.000.000.000

_____________________________________________________________________
```

Figure 4-24. Miscellaneous sub-menu.

2. From the MISCELLANEOUS sub-menu, move the selection bar to MAINT PORTS and press **Enter**.
3. From the MAINT PORTS sub-menu, move the selection bar to COMM and press **Enter**.
4. From the COMM sub-menu, move the selection bar to SLIP and press **Enter**.
5. To modify the Slip configuration, complete the following sub-steps.

NOTES

You can make actual edit changes in the configuration buffer. The contents of this buffer are then placed on-line when an UPDATE operation is performed.

Write down the current Slip configuration settings for future reference.

   a. From the SLIP sub-menu (chosen during Step 4), move the selection bar to the menu item that matches the configuration parameter you wish to modify. Press **Enter**.

The User Interface will display a field associated with the selected parameter. For descriptions of the various parameter settings, refer to Table 4-5.

b. From the parameter sub-menu entry field, type in the new setting you want to include in the modified configuration. Press **Enter**.

This action places your selection into the configuration buffer and refreshes the User Interface screen display with the new setting.

c. Press the Up arrow key one time. This returns you to the configuration sub-menu chosen during Step 4. If you want to modify additional parameters, repeat sub-steps a through c. If all configuration modifications have been made, continue the editing procedure from Step 6.

6. Press the Up arrow key three times. This action displays the configuration update screen.

If you want to update the on-line SLIP settings(s) stored in the edit buffer, move the selection bar to DISCARD and press **Enter**.

NOTE

Because SLIP is a point-to-point protocol, setting a "proper" subnet mask is not required. The factory default of 000.000.000.000 will allow communications with all IP addresses. This allows you to use the subnet mask as a means of securing (protecting) the T1 CSU/DSU-SNMP-SP by allowing communication only with IP addresses whose IP address matches the value entered in the SLIP menu parameters NODE IP ADDR to the network level set in this subnet address.

This completes the procedure for modifying the SLIP configuration.

Table 4-4. SLIP parameter options.

Parameter Name	Parameter Settings
NODE IP ADDR	Type in the IP address of the local unit.
NETWORK MASK	Type in the network mask used for sub-netting.
PEER IP ADDR	Type in the IP address of the peer device attached to the slip interface port.
MAX MTU	Type in the Maximum Transmission Unit (MTU) packet size supported by the SLIP interface port.

4.22 TELNET Overview

The T1 CSU/DSU-SNMP-SP CSU/DSU may be remotely configured and managed through a terminal protocol called TELNET. TELNET allows a remote user to establish a network connection to the local User Interface resident on-board the T1 CSU/DSU-SNMP-SP, through the COMM interface port, and remotely control such features as programming (configuring), performance/alarm monitoring, and execution of diagnostics.

The TELNET MODE sub-menu tree available through the User Interface menu MISC allows you to enable or disable remote TELNET access. By default, your T1 CSU/DSU-SNMP-SP ships with Telnet mode enabled.

CAUTION

When updating on-line configurations, application data may be disrupted. Notify all users before performing such operations.

General information about the local User Interface during a TELNET session includes:

- At the start of a TELNET session, the first screen to appear is the Enter Password screen. This screen will appear whether or not password protection has been enabled through the User Interface. After entering a valid password, the User Interface Top of Menu screen will appear.
- The User Interface is not available for "local" use during a TELNET session. If the User Interface is locally accessed during a TELNET session, a banner will be displayed that informs you that the interface has been taken over by the TELNET session. Although not available for local control, the User Interface can still be used to monitor the TELNET session.
- At the end of a TELNET session, you must log out by typing the key sequence of CTRL O. If no TELNET activity is detected for 15 minutes, you will automatically be logged out from the TELNET session. The T1 CSU/DSU-SNMP-SP can support only a single TELNET session at a time.

Before changing the TELNET mode, review **Section 4.3** for general programming and keyboard information.

To enable/disable the TELNET mode, see to the menu tree in Figure 4-21, and complete the following steps:

1. From the Main System Menu, move the selection bar to MISCELLANEOUS and press **Enter**.

   A User Interface menu screen similar to the one on the next page will be displayed. This screen displays the current mode setting for TELNET.

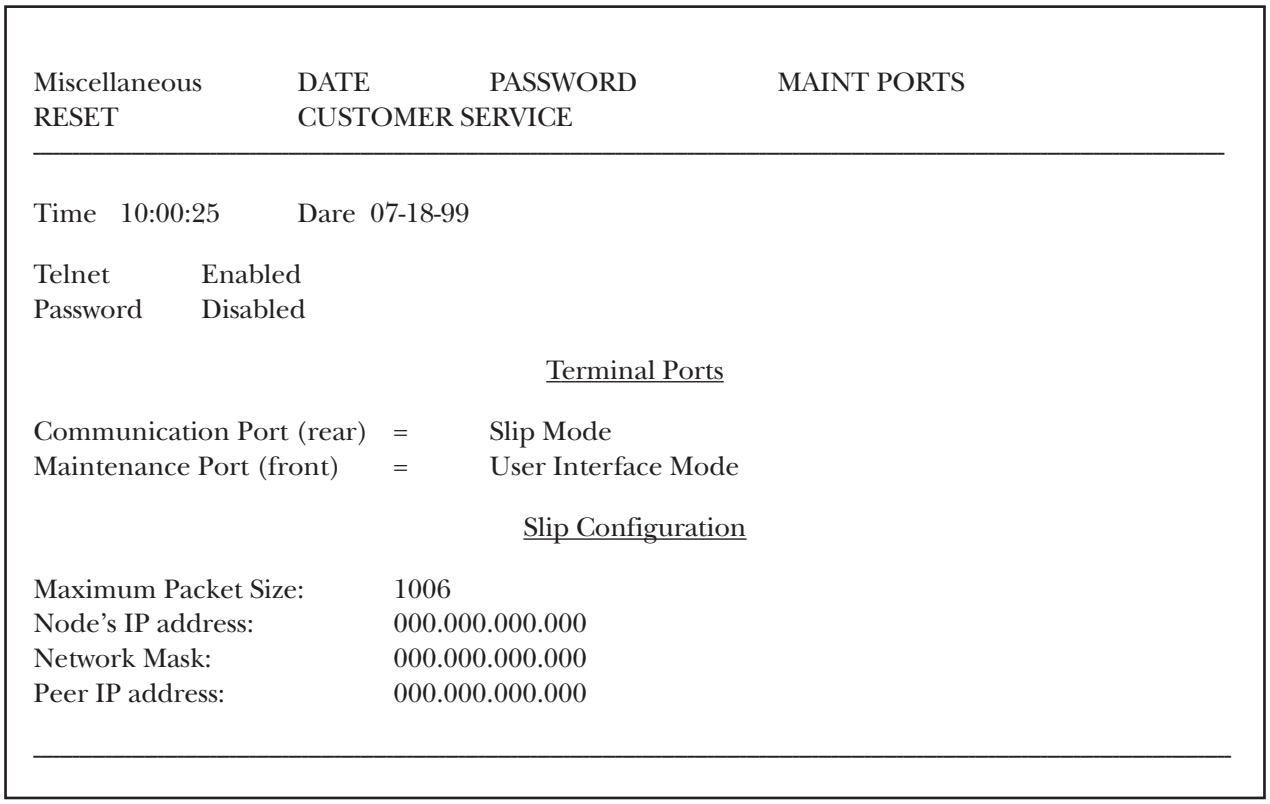


Figure 4-25. Miscellaneous sub-menu, maint ports option.

2. From the MISCELLANEOUS sub-menu, move the selection bar to MAINT PORTS and press **Enter**.
3. From the COMM sub-menu, move the selection bar to TELNET MODE and press **Enter**.
4. From the TELNET MODE sub-menu (chosen during Step 3), move the selection bar to the menu item (Enable or Disable) that matches the mode you want TELNET to assume. Press **Enter**. This modifies the TELNET mode and refreshes the User Interface screen display with the new mode.

This completes the procedure for changing the TELNET mode.

4.23 Resetting the T1 CSU/DSU-SNMP-SP

The RESET sub-menu tree available through the User Interface menu MISC allows you to re-initialize your T1 CSU/DSU-SNMP-SP using the configurations stored in the non-volatile random access memory (NVRAM).

Before resetting your T1 CSU/DSU-SNMP-SP, review **Section 4.3** for general programming and keyboard information.

To reset the T1 CSU/DSU-SNMP-SP, see the menu tree in Figure 4-21, and complete the following steps:

1. From the Main System Menu, move the selection bar to MISC and press **Enter**.
2. From the MISC sub-menu, move the selection bar to RESET and press **Enter**. A successful reset returns you to the Top of System screen.

NOTE

For information on the T1 CSU/DSU-SNMP-SP, power up self-tests and initialization, refer to Chapter 3.

This completes the procedure for resetting the T1 CSU/DSU-SNMP-SP.

4.24 Viewing Customer Service Information

The CUSTOMER SERVICE sub-menu tree available through the User Interface menu MISC allows you to view such pre-stored customer service information as model number and software revision level.

Before viewing customer service information, see the menu tree in Figure 4-21, and complete the following steps:

1. From the Main System Menu, move the selection bar to MISC and press **Enter**.
2. From the MISC sub-menu, move the selection bar to CUSTOMER SERVICE and press **Enter**.

A User Interface screen similar to the one below will be displayed.

Customer Service
VERSION x.xx.xx

Model number: T1 CSU/DSU-SNMP-SP

Figure 4-26. Customer service screen.

This completes the procedure for viewing customer service information.

4.25 Editing the SNMP Agent Configuration

The CONFIGURATION sub-menu tree available through the User Interface menu SNMP allows you to edit (read and write) parameter settings associated with the integral SNMP agent. Programmed changes made to the SNMP configuration will take effect immediately.

Before editing the SNMP agent configuration, review **Section 4.3** for general programming and keyboard information.

To modify the SNMP agent configuration, see the menu tree in Figure 4-21**,** and complete the following steps.

1. From the Main System Menu, move the selection bar to SNMP and press **Enter**.
2. From the SNMP sub-menu, move the selection bar to CONFIGURATION and press **Enter**.
3. From the CONFIGURATION sub-menu, move the selection bar to the menu item that matches the configuration parameter you want to modify. Press **Enter**.

Refer to Table 4-5 for descriptions of the SNMP AGENT sub-menu parameters.

NOTE

Write down the current parameter settings for future reference.

4. From the parameter sub-menu entry field, type in the new setting you want to include in the modified configuration. Press **Enter**. Note that if you are editing the TRAP authentication, you must select a parameter setting (enable or disable) from the displayed sub-menu and press **Enter**.

   This action modifies the SNMP configuration and refreshes the User Interface screen display with the new setting.

5. Press the Up arrow key one time. This action returns you to the CONFIGURATION sub-menu chosen during Step 2. If you want to modify additional parameters, repeat Steps 3 through 5.

This completes the procedure for modifying the SNMP agent configuration.

Table 4-5. SNMP parameter options.

Parameter Name	Parameter Settings	Commands
COMMUNITY NAME—GET	Enter GET name field	Type in the community name that will authenticate SNMP GET requests. The default name is public.
COMMUNITY NAME—SET	Enter SET name field	Type in the community name that will authenticate SNMP SET requests. The default name is private.
MNGR IP ADDR	Enter MNGR address field	Type in the IP address of the SNMP manager. Traps will be sent to this manager.
CONTACT NAME	Enter MIB2 contact name field	Type in the name of the person responsible for correcting problems with the local equipment.
UNIT NAME	Enter MIB2 name	Type in the name of the local T1 CSU/DSU-SNMP-SP.
LOCATION	Enter MIB2 location	Type in the physical location of the local unit.
TRAP AUTH	1. Auth-enabled	1. Enables TRAP reporting of authentication violations to the SNMP manager.
	2. Auth-disabled	2. Disables TRAP reporting of authentication violations to the SNMP manager.

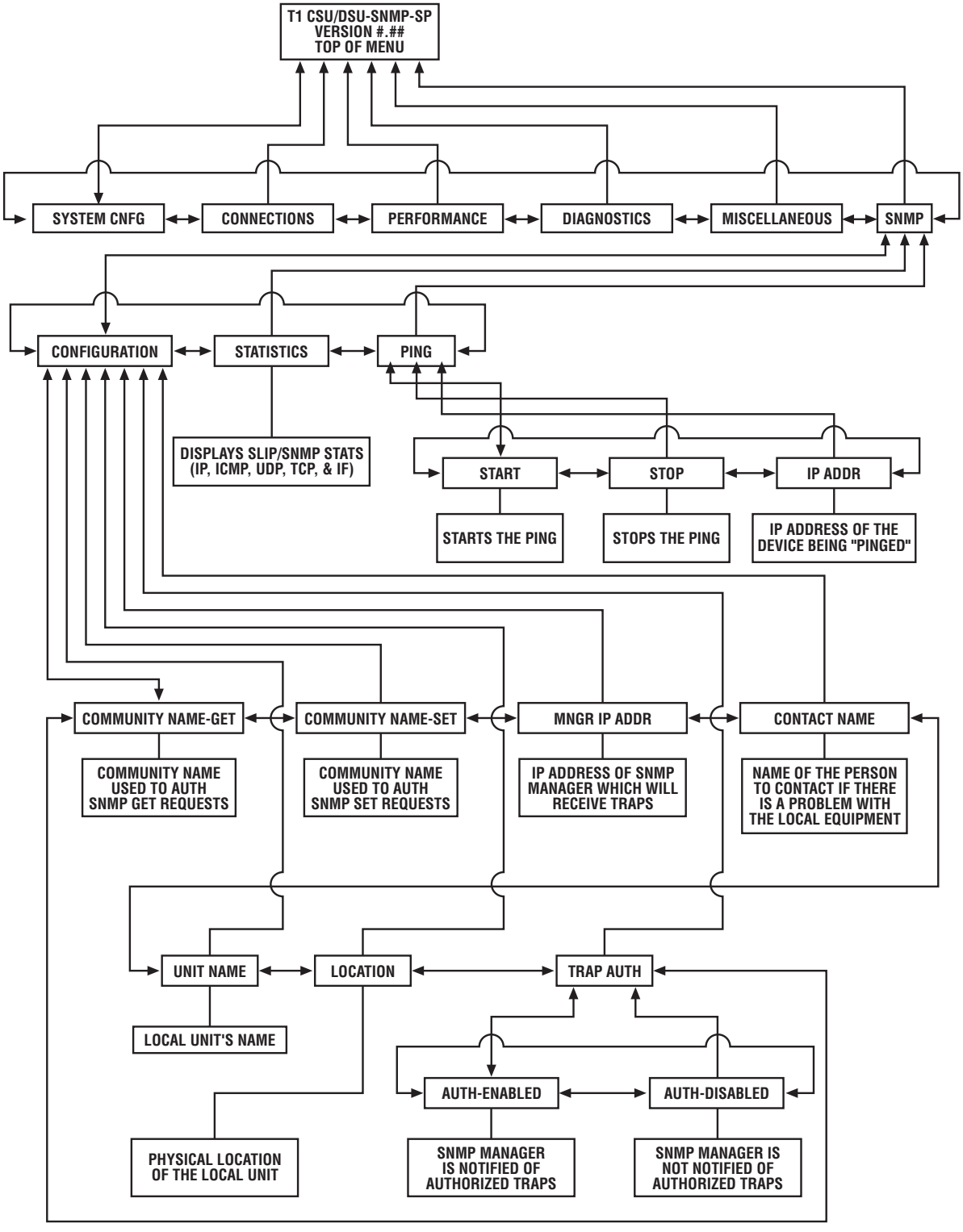


Figure 4-27. SNMP menu tree.

4.26 Activating a Ping

The PING sub-menu tree available through the User Interface menu SNMP provides you with the ability to conduct "Pings" through the SLIP interface port (COMM port) using IP addresses to identify target devices. The ability to ping allows you to generate ping messages used to isolate problems with routing tables elsewhere in your network.

The T1 CSU/DSU-SNMP-SP supports the standard ICMP Ping utility, and based on this utility, the unit is able to receive, process, and echo Ping messages generated by other LAN equipment without intervention from either the user or the T1 CSU/DSU-SNMP-SP.

NOTE

Pings generated and/or received are not disruptive to application operations.

Before activating a Ping, review **Section 4.3** for general programming and keyboard information.

To activate a Ping, see the menu tree in Figure 4-27 and complete the following steps.

1. From the Main System Menu, move the selection bar to SNMP and press **Enter**.
2. From the SNMP sub-menu, move the selection bar to PING and press **Enter**.
3. From the PING sub-menu, move the selection bar to IP ADDR and press **Enter**.
4. From the IP ADDR sub-menu, type the IP of the device being "Pinged" into the Address to PING field and press **Enter**. Press the Up arrow key one time.
5. From the PING sub-menu, move the selection bar to START and press Enter. To stop a Ping, move the selection bar to STOP and press **Enter**.

A User Interface menu screen similar to the one on the next page will be displayed. This screen displays statistical information associated with the activated ping.

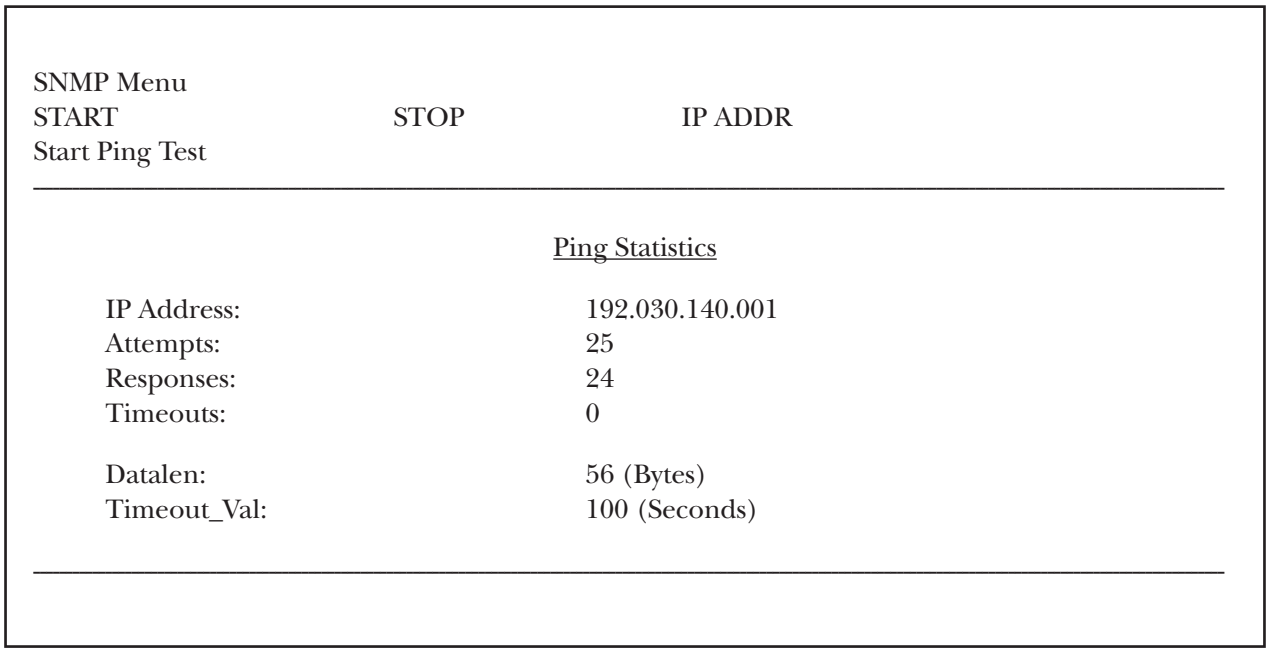


Figure 4-28. SNMP menu, start ping test option.

This completes the procedure for activating a Ping.

4.27 Displaying SLIP/SNMP Statistical Information

The STATISTICS sub-menu tree available through the User Interface menu SNMP provides you with the ability to display statistical information associated with the SLIP and SNMP. This information includes IP, ICMP, UDP, TCP, and IP.

A description of each SLIP/SNMP statistic is contained in Table 4-6**.**

NOTE

Displaying SLIP/SNMP statistical information will not disrupt application operations.

Before displaying statistical information, review **Section 4.3** for general programming and keyboard information.

To display statistics, see the menu tree in Figure 4-27 and complete the following steps.

1. From the Main System Menu, move the selection bar to SNMP and press **Enter**.
2. From the SNMP sub-menu, move the selection bar to STATISTICS and press **Enter**.

A User Interface screen similar to the following will be displayed.

SNMP Menu
CONFIGURATION STATISTICS PING

Slip Statistics

IP STATS				ICMP STATE			
InRecv	0	OutRqst	4	InMsgs	0	OutMsgs	0
InHdErr	0	OutDscr	0	InErrs	0	OutErrs	0
InAdErr	0	OutNoRt	0	InDstUn	0	OutDstU	0
InPrUnk	0			InTimEx	0	OutPPrb	0
InDscrd	0			InPPrbs	0	OutRdct	0
InDlvrs	0			InRdrct	0	OutEcho	0
				InEchos	0	OutEcRp	0
				InEcRp1	0		

UDP STATS				TCP STATS			
InDtgrm	0	OutDgrm	4	ActOpen	0	InSegs	0
No Ports	0			PsvOpen	0	OutSegs	0
				AttFail	0		
				CurEstb	0		

IP STATS

InOcts	0	InErrs	0	Out Octs	316	OprStat	1

Figure 4-29. SNMP menu.

Table 4-6. Statistical Performance Registers

Register Name	Variables	Descriptions
Internet Protocol (IP)	1. InRecv 2. InHdErr 3. InAdErr 4. InPrUnk 5. InDscrd 6. InDivrs 7. OutRqst 8. OutDscr 9. OutNoRt	1. Input diagrams (packets) received from interfaces. 2. Drops the format errors. 3. Drops due to invalid addresses. 4. IP datagrams discarded due to unknown protocol. 5. Input datagrams discarded with no problems. 6. Datagrams delivered to IP user protocols. 7. Datagrams supplied by IP user protocols. 8. Outbound datagrams discarded. 9. IP datagrams dropped due to no routes.
Internet Control Message Protocol (ICMP)	1. InMsgs 2. InErrs 3. InDstUn 4. InTimEx 5. InPPrbs 6. InRdrct 7. InEchos 8. InEcRpl 9. OutMsgs 10. OutErrs 11. OutDstU 12. OutPPrb 13. OutRdct 14. OutEcho 15. OutEcRp	1. ICMP messages received. 2. ICMP messages with format errors. 3. ICMP Destination Unreachable messages received. 4. ICMP Time Exceeded messages received. 5. ICMP Parameter Problem messages received. 6. ICMP Redirect messages received. 7. ICMP Echo (request) messages received. 8. ICMP Echo Reply messages received. 9. ICMP messages this entity sent. 10. ICMP messages not sent due to ICMP problems. 11. ICMP Destination Unreachable messages sent. 12. ICMP Parameter Problem messages sent. 13. ICMP Redirect messages sent. 14. ICMP Echo (request) messages sent. 15. ICMP Echo Reply messages sent.
User Datagram Protocol (UDP)	1. InDtgrm 2. NoPorts 3. OutDgrm	1. UDP datagrams delivered to UDP users. 2. UDP datagrams received for unknown ports. 3. UDP datagrams sent from this entity.
Transmission Control Protocol (TCP)	1. ActOpen 2. PsvOpen 3. AttFail 4. CurEstb 5. In Segs 6. OutSegs	1. Number of direct transitions to SYN-SENT state from the closed state. 2. Number of direct transitions to SYN-RCVD state from the LISTEN state. 3. Number of failed TCP connection settings. 4. Number of current TCP connections. 5. Number of TCP segments received. 6. Number of TCP segments sent.
Interface (IF)	1. InOcts 2. InErrs 3. OutOcts 4. OprStat	1. Number of octets received by the Network Interface (NI). 2. Number of error packets received by the NI. 3. Number of octets transmitted by the NI. 4. Operational status of the NI.

5. Troubleshooting

5.1 Introduction

This chapter contains information that will enable you to successfully identify symptoms associated with your equipment or the network, and to perform the corrective actions necessary to return your system to full operation.

5.2 Troubleshooting Overview

Restoring your system to full operation after a fault condition has occurred requires troubleshooting in a systematic and logical manner. You will find that this approach has been incorporated into the troubleshooting information contained in this chapter.

Evaluating the problem is the first step in troubleshooting. Evaluation includes the following routines:

- Checking system messages and LEDs. Use all available system messages and LED indicators to help evaluate the problem area.
- Gathering information about the problem. Collect as much system information (for example, configuration information, operator action) as possible before starting any troubleshooting routine.

5.3 Troubleshooting a Power Problem

There are only a few power-related items associates with the T1 CSU/DSU-SNMP-SP that you may check at this field level. Among these items is the external AC power and your on-site power source.

To isolate and correct a power problem, refer to Table 5-1 and match the power-related symptom you are experiencing to its corrective action.

Table 5-1. Power symptoms and corrective actions.

Symptom	Corrective Action
No indication of power	1. Verify that all power-related connectors and plugs are firmly seated in their respective receptacles. 2. Power cycle the unit by reseating its power connector. 3. Verify that the on-site power source matches the requirements of the unit. 4. Verify that correct voltages are being supplied to the unit. See Figures 5-1 and 5-2. 5. Replace the CSU/DSU unit.

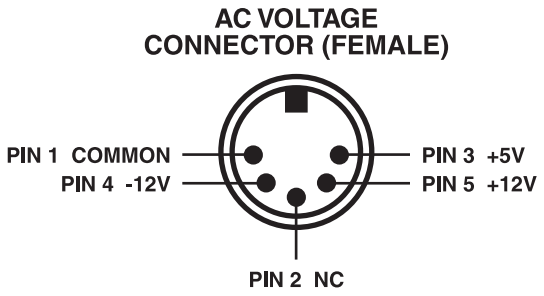


Figure 5-1. Power connector pinouts.

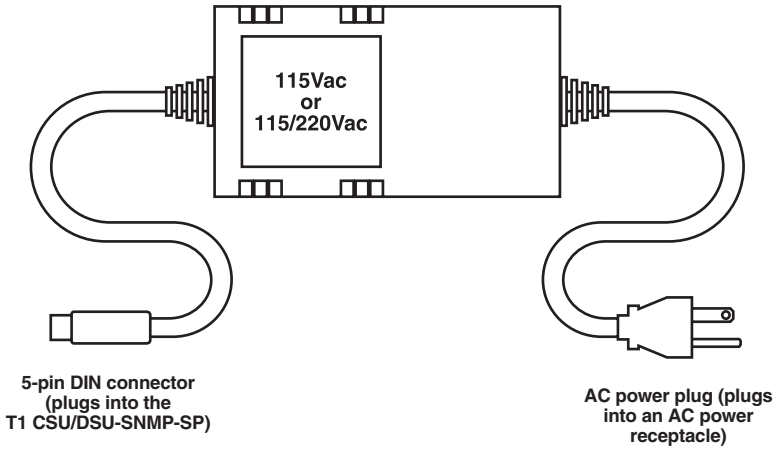


Figure 5-2. External AC power supply.

5.4 Troubleshooting a Terminal Problem

As previously discussed, the T1 CSU/DSU-SNMP-SP is initially programmed (configured) through an attached VT100 compatible ASCII terminal using the unit's resident User Interface. Communication problems associated with this terminal range from loss of power to cabling and port interface symptoms.

To isolate and correct a problem associated with the ASCII terminal, refer to Table 5-2 and match the terminal-related symptom to its list of possible corrective actions. These sections should be completed in the order in which they are listed.

Table 5-2. ASCII terminal symptoms and corrective actions.

Symptom	Corrective Action
No indication of power	1. Verify that all power-related connectors and plugs are firmly seated in their respective receptacles. 2. Power cycle the terminal by reseating its power connector. 3. Verify that the on-site power source matches the power requirements of the terminal. 4. Substitute another VT100 compatible ASCII terminal.
Attached terminal cannot communicate, appears "locked up," or displays illegibly	1. Reseat the terminal cable attached to the MAINT port. 2. Verify that the terminal settings match the MAINT port's settings. The MAINT port's fixed settings are: 9600 baud, no parity, flow control OFF, 8 data bits, 1 stop bit. 3. Verify cable connections/pinouts. Refer to the Appendix. 4. Power cycle the terminal. 5. Power cycle the T1 CSU/DSU-SNMP-SP by reseating its power connector. 6. Re-initialize the T1 CSU/DSU-SNMP-SP using factory default settings. Refer to **Section 4.23**. 7. Replace the CSU/DSU unit.

5.5 Troubleshooting a Network or DTE Problem

Troubleshooting a network or DTE port interface problem involves collecting as much information about the problem as possible and performing preliminary corrective actions.

Some of the information you should collect include:

- LED conditions that may indicate a problem with any of the interface ports (Network or DTE), local T1 CSU/DSU-SNMP-SP, T1 line, or the remote unit. Refer to **Chapter 2** for descriptions of the LEDs located on the front of the T1 CSU/DSU-SNMP-SP.

NOTE

The front-panel NET MODE LED may occasionally light yellow as the result of TELCO network testing. Contact your carrier if you are not conducting network diagnostics and this LED condition exists.

- Alarm conditions associated with any attached DTE equipment.
- Alarm or error conditions present in the performance registers. Determine the type of alarm and/or error condition and the number of occurrences.
- Verifying if the problem or condition is related to a specific time of day or other common factors (for example, changes in electrical loads such as the activation of air-conditioning equipment).

Some of the corrective actions you should perform include:

- Using the resident diagnostic loopbacks and bit tests (511 and/or QRSS) to isolate data paths associated with the problem. Refer to the procedure sections contained in this chapter that describe how to run the various loopbacks and bit tests.
- Confirming that the configuration settings for both the local and the remote unit are correct. Refer to **Chapter 4**.
- Verifying equipment cable types and their connections/pinouts. Refer to the cabling information contained in the **Appendix**.

If you have not been able to resolve your network or DTE port problem(s) after completing the preliminary actions described in this chapter, call Black Box Technical Support at 724-746-5500.

5.6 Using a Network Loopback Plug

The network loopback plug is a very effective tool in determining if your T1 CSU/DSU-SNMP-SP unit can acquire and maintain synchronization with the T1 line. By inserting this RJ-48 plug into the network interface port, all circuitry, including the interface port, is placed into a loopback condition. This section will loop the network aggregate back to the unit. If all circuits are properly operating, the unit should acquire and maintain synchronization. This plug is not shipped with your unit but may be constructed.

To construct your own loopback plug, refer to the network interface port and loopback plug pinouts contained in **Section 2.2.8**.

5.7 Activating a Network Loopback

The LOOPBACKS sub-menu tree, available through the User Interface menu DIAGNOSTICS, allows you to activate a series of five network diagnostic loopbacks designed to test and isolate specific portions of the local T1 CSU/DSU-SNMP-SP, the remote unit, and the T1 line.

Before activating any diagnostic network loopback, review **Section 4.3** for general programming and keyboard information.

CAUTION

The diagnostic loopbacks described in this section will disrupt application operations. Notify all T1 CSU/DSU-SNMP-SP subscribers before conducting diagnostic testing.

To activate a network diagnostic loopback, see the menu tree in Figure 5-5, and complete the following steps.

1. From the Main System Menu, move the selection bar to DIAGNOSTICS and press **Enter**.
2. From the DIAGNOSTICS sub-menu, move the selection bar to NETWORK and press **Enter**.

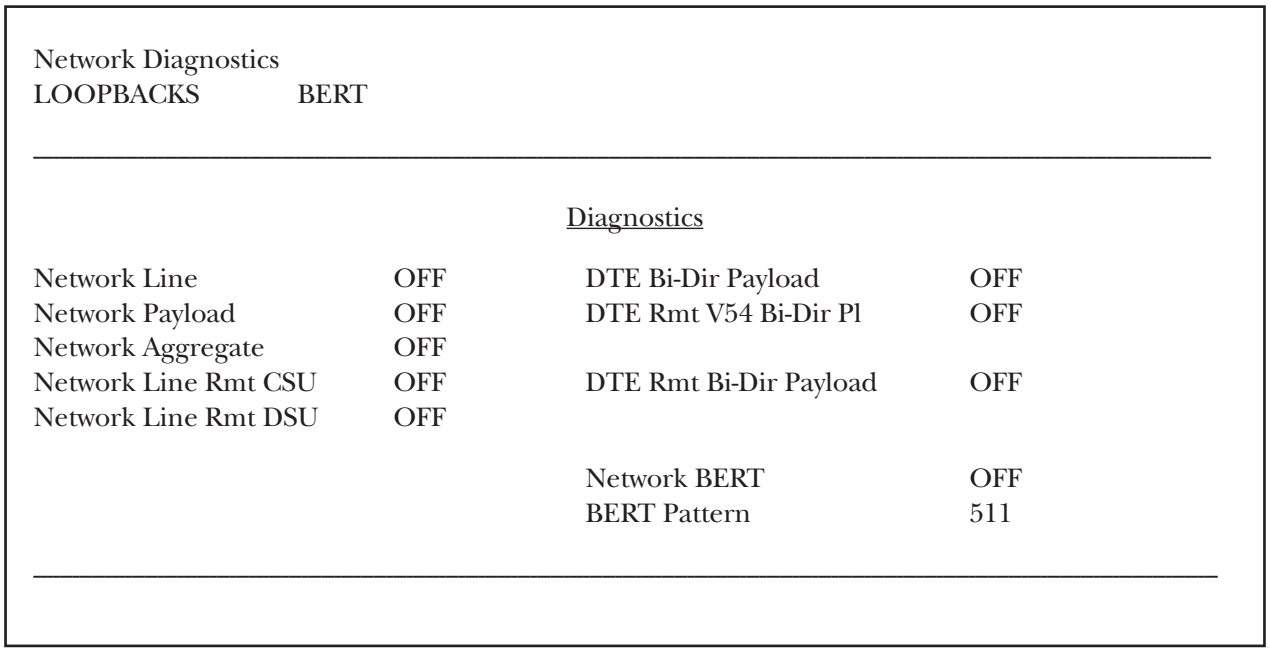


Figure 5-3. Network diagnostics menu, loopbacks option.

3. From the NETWORK sub-menu, move the selection bar to LOOPBACKS and press **Enter**.

NOTE

Refer to Section 5.10 for descriptions and test results of each diagnostic loopback.

4. From the LOOPBACKS sub-menu, move the selection bar to the menu item that matches the diagnostic loopback you want to activate. Press **Enter**.

5. From the sub-menu of the loopback chosen during Step 4, move the selection bar to ENABLE and press **Enter**.

NOTE

To de-activate a diagnostic loopback, move the selection bar to DISABLE and press Enter.

5.8 Activating a Network BERT

The BERT sub-menu tree available through the User Interface menu DIAGNOSTICS allows you to generate either a 511 or QRSS bit pattern designed to test and isolate specific portions of the local T1 CSU/DSU-SNMP-SP, the remote unit, and the T1 line.

Before activating a network BERT, review **Section 4.3** for general programming and keyboard information.

CAUTION

The diagnostic bit tests described in this section are all disruptive to application operations. Notify T1 CSU/DSU-SNMP-SP subscribers before conducting any bit testing.

To activate a network diagnostic bit test, see the menu tree in Figure 5-5 and complete the following steps.

1. From the Main System Menu, move the selection bar to DIAGNOSTICS and press Enter.
2. From the DIAGNOSTICS sub-menu, move the selection bar to NETWORK and press Enter.

This action causes a User Interface screen similar to the one below to be displayed.

```
Network Diagnostics
LOOPBACKS                BERT

_____________________________________________________________________

                                   Diagnostics

Network Line             OFF     DTE Bi-Dir Payload          OFF
Network Payload          OFF     DTE Rmt V54 Bi-Dir Pl       OFF
Network Aggregate        OFF
Network Line Rmt CSU     OFF     DTE Rmt Bi-Dir Payload      OFF
Network Line Rmt DSU     OFF
                                 Network BERT                OFF
                                 BERT Pattern                511

_____________________________________________________________________
```

Figure 5-4. Network diagnostics menu, BERT option.

3. From the NETWORK sub-menu, move the selection bar to BERT and press **Enter**. This action causes the User Interface to display the four BERT menu options. Each of these menu options are described below.
   - Bandwidth—When selected, provides two choices of DS0 testing: FULL (all 24 DS0s), or DTE (tests only those DS0s used by the DTE port.
   - Pattern—When selected, provides two choices of BERT patterns: 511 or QRSS.
   - Reset—When enabled, resets the test generator.
   - Error Insert—When enabled, inserts a single error into the bit pattern stream.

NOTE

Refer to Section 5.12 for descriptions and test results of the diagnostic BERT.

4. From the BERT sub-menu, move the selection bar to PATTERN and press **Enter**.
5. From the PATTERN sub-menu, move the selection bar to the type of bit test pattern you want to generate. Press **Enter**.
6. From the test pattern sub-menu, move the selection bar to ENABLE and press **Enter**. Press the Up arrow key two times. This action returns you to the sub-menu from Step 3.
7. From the BERT sub-menu, move the selection bar to BANDWIDTH and press Enter.

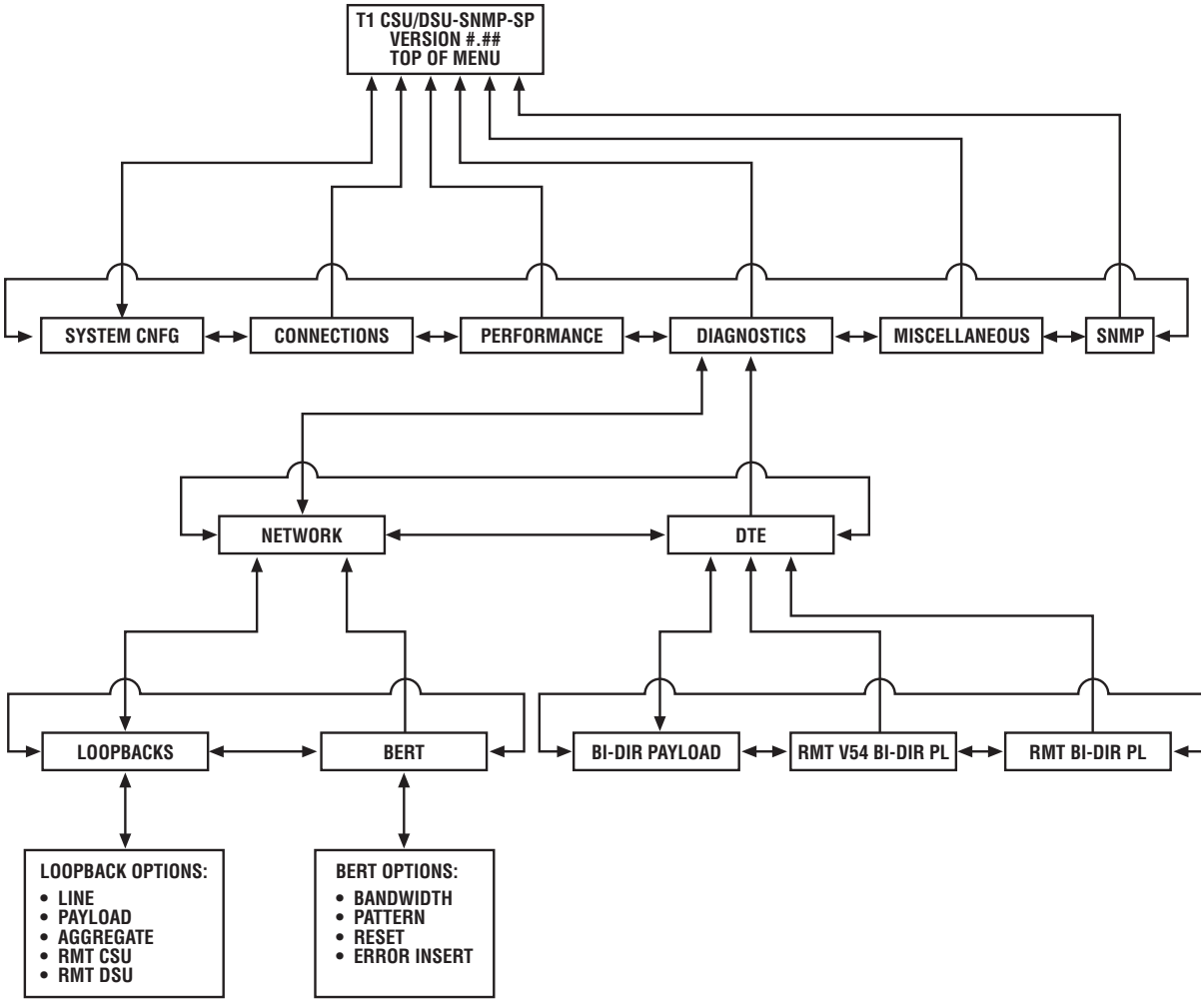


Figure 5-5. Diagnostics menu tree (Network/BERT/DTE diagnostics).

8. From the BANDWIDTH sub-menu, move the selection bar to the menu item that specifies the amount of DS0 bandwidth you want the BERT to test. Press **Enter**.

9. From the sub-menu of the DS0 bandwidth chosen during Step 8, move the selection bar to ENABLE and press Enter.

This action activates the network BERT and causes the User Interface to display additional BERT status lines similar to the following:

```
Network BERT          FULL NTWK BW or Alloc. DTE BW
BERT Pattern          511 of QRSS
BERT State            IN SYNC
Bit Errors            0
Elapsed Sec.          3
BER                   0 x 10-9
```

NOTE

To deactivate the BERT, move the selection bar to DISABLE and press Enter.

This completes the procedure for activating a network BERT.

5.9 Activating a DTE Loopback

The DTE sub-menu tree, available through the User Interface menu DIAGNOSTICS, allows you to activate a series of three DTE diagnostic loopbacks designed to test and isolate specific portions of the local T1 CSU/DSU-SNMP-SP, the remote unit, and the T1 line.

Before activating any diagnostic DTE loopback, review **Section 4.3** for general programming and keyboard information.

CAUTION

The diagnostic loopbacks described in this section are all disruptive to application operations. Notify T1 CSU/DSU-SNMP-SP before conducting diagnostic testing.

To activate a DTE diagnostic loopback, see the menu tree in Figure 5-5 and complete the following steps.

1. From the Main System Menu, move the selection bar to DIAGNOSTICS and press **Enter**.
2. From the DIAGNOSTICS sub-menu, move the selection bar to DTE and press **Enter**. This causes a User Interface screen similar to the one below to be displayed.

```
Connection View Menu
NETWORK                 DTE

_____________________________________________________________________

DTE Diag.
BI-DIR PAYLOAD    RMT V54 BI-DIR PL          RMT BI-DIR PL

_____________________________________________________________________

Network Line              OFF       DTE Bi-Dir Payload        OFF
Network Payload           OFF       DTE Rmt V54 Bi-Dir Pl     OFF
Network Aggregate         OFF
Network Line Rmt CSU      OFF       DTE Rmt Bi-Dir Payload    OFF
Network Line Rmt DSU      OFF
                                    Network BERT              OFF
                                    BERT Pattern              511
_____________________________________________________________________
```

Figure 5-6. DTE submenu.

3. From the DTE sub-menu, move the selection bar to the menu item that matches the diagnostic loopback you want to activate. Press **Enter**.

NOTE

Refer to Section 5-11 for descriptions and test results of each diagnostic loopback.

4. From the sub-menu of the loopback chosen during Step 3, move the selection bar to ENABLE and press **Enter**.

NOTE

To de-activate a diagnostic loopback, move the selection bar to DISABLE and press the Enter key.

This completes the procedure for activating a DTE diagnostic loopback.

5.10 Network Loopback Descriptions

The various network diagnostic loopbacks resident onboard the T1 CSU/DSU-SNMP-SP are described in the following paragraphs.

5.10.1 Line Loopback

This test places a loopback on the local front-end circuitry in the direction of the network. The local signal path (receive only) between the network and the DTE port is maintained. If the local unit is in Master timing, then it will default to Network timing for the duration of the loop. When activated, the screen-displayed loopback status will change to ON and NET MODE LED will light yellow.

If the remote CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- Local unit's front-end circuitry
- T1 line (carrier)
- remote unit and its CPE/Test equipment

A diagram of the Line Loopback is illustrated in Figure 5-7.

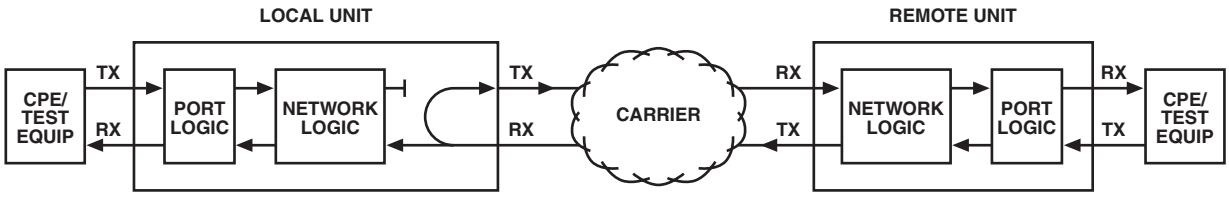


Figure 5-7. Line loopback.

5.10.2 Payload Loopback

This test places a loopback on the local network logic in the direction of the network. The local signal path (transmit and receive) between the network and the DTE port is not maintained. The CPE/Test equipment will receive steady ones generated locally. When activated, the screen-displayed loopback status will change to ON and the NET MODE LED will light yellow.

If the remote CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's network logic
- local unit's front-end circuitry
- T1 line (carrier)
- remote unit and its CPE/Test equipment

A diagram of the Payload Loopback is illustrated in Figure 5-8.

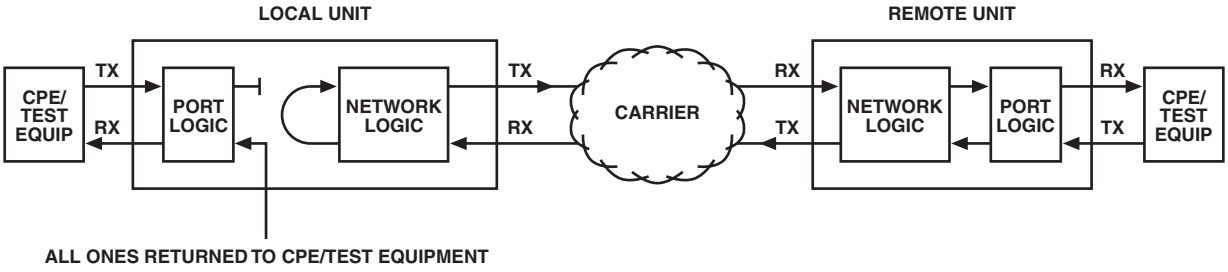


Figure 5-8. Payload loopback.

5.10.3 Aggregate Loopback

This test places a loopback on the local front-end circuitry in the direction of the DTE interface. The local signal path (transmit only) between the DTE port and the network is maintained. If the local unit is in Network timing, then it will default to Master timing for the duration of the loop. When activated, the screen-displayed loopback status will change to ON and the NET MODE LED will light yellow.

If the local CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's internal circuitry
- local unit's CPE/Test equipment

A diagram of the Aggregate Loopback is shown in Figure 5-9.

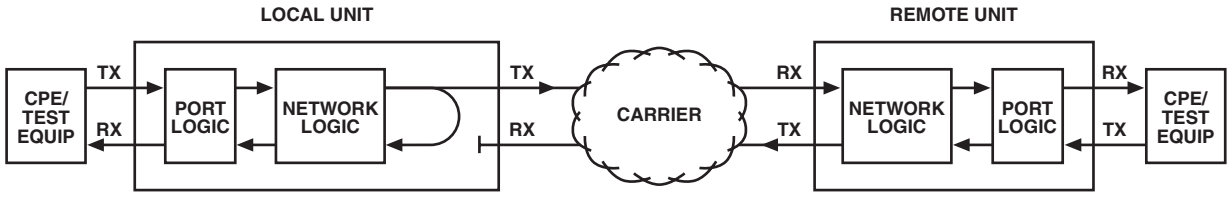


Figure 5-9. Aggregate loopback.

5.10.4 Remote CSU Loopback

This test places a loopback on the remote CSU in the direction of the network. The remote signal path (receive only) between the network and the DTE port is maintained. When activated, the screen-displayed loopback status will change to ON and the NET MODE LED will light yellow.

If the remote unit is operating in DSX-1 mode, its external CSU will respond to the loopback request. A diagram of the Remote CSU Loopback is illustrated in Figure 5-10.

If the remote unit is operating in CSU mode, its internal CSU will respond to the loopback request. A diagram of the Remote CSU Loopback is illustrated in Figure 5-11.

If the local CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's internal circuitry
- local unit's CPE/Test equipment
- T1 line (carrier)
- remote CSU

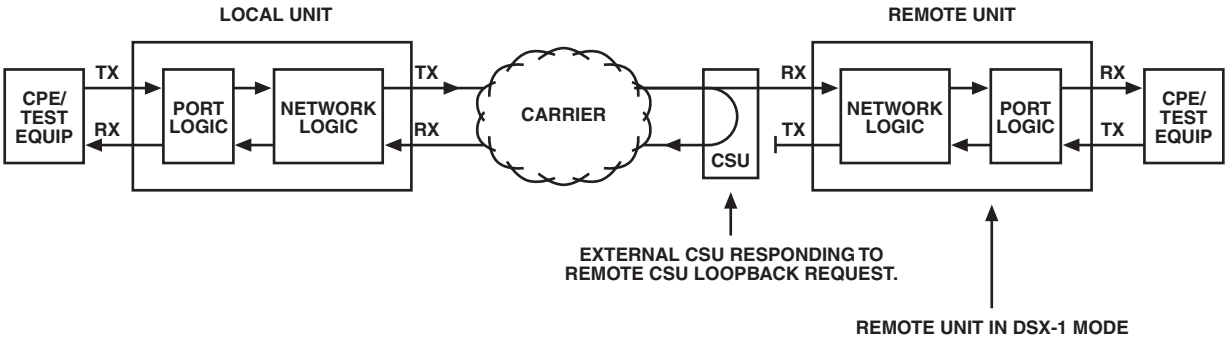


Figure 5-10. Remote CSU loopback (remote unit in DSX-1 mode).

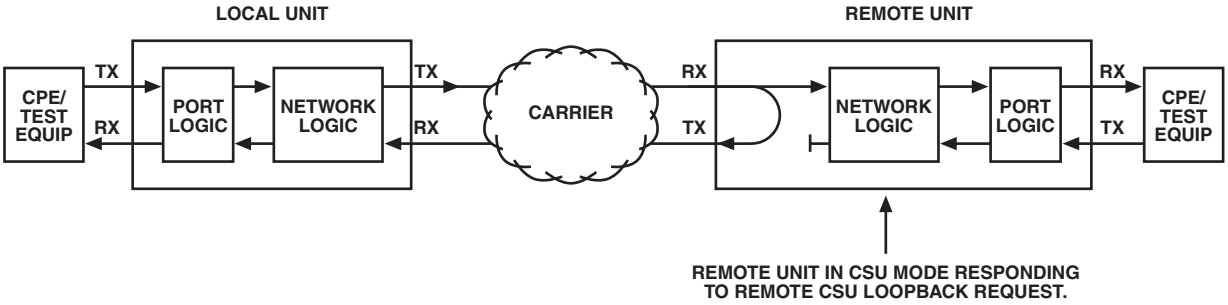


Figure 5-11. Remote CSU loopback (remote unit in CSU mode).

5.10.5 Remote DSU Loopback

This test places a loopback on the remote DSU in the direction of the network. The remote signal path (receive only) between the network and the DTE port is maintained. When activated, the screen-displayed loopback status will change to ON and the NET MODE LED will light yellow.

If the local CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's internal circuitry
- local unit's CPE/Test equipment
- T1 line (carrier)
- remote DSU

A diagram of this Remote DSU loopback is illustrated in Figure 5-12.

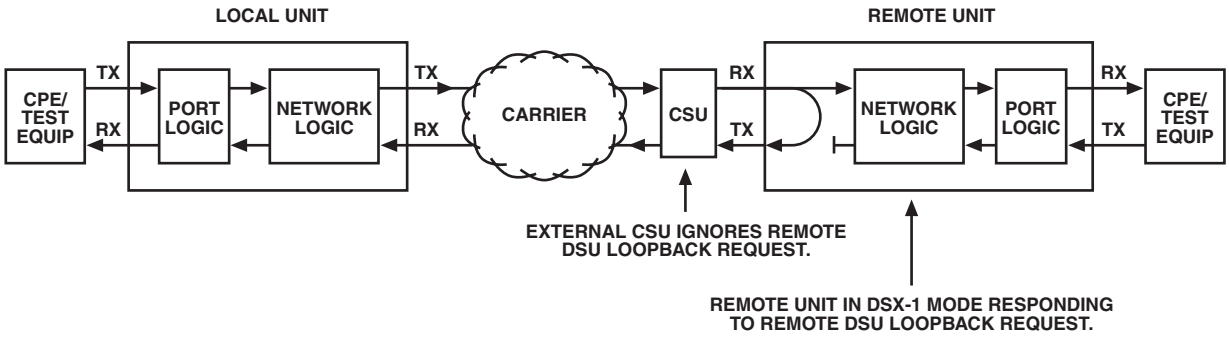


Figure 5-12. Remote DSU loopback.

5.11 DTE Loopback Descriptions

The various DTE diagnostic loopbacks resident onboard the T1 CSU/DSU-SNMP-SP are described in the following paragraphs.

5.11.1 Bi-Directional Payload Loopback

This test places loopbacks on the local DTE interface port in the direction of the CPE/Test equipment and on the port logic circuitry in the direction of the network. The local signal path (transmit and receive) between the network and the DTE port is not maintained. When activated, the screen-displayed loopback status will change to ON and the DTE MODE LED will light yellow.

If the remote CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- remote unit's internal circuitry
- remote unit's CPE/Test equipment
- T1 line (carrier)
- local unit's network and port logic

A diagram of this bi-directional Payload Loopback is illustrated in Figure 5-13.

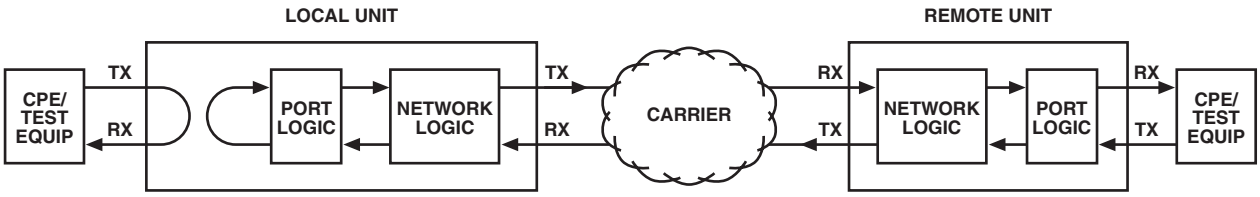


Figure 5-13. Bi-directional payload loopback.

5.11.2 Remote V.54 Bi-Directional Payload Loopback

This test places loopbacks on the remote DTE interface port in the direction of the CPE/Test equipment and on the port logic circuitry in the direction of the network. The remote signal path (transmit and receive) between the network and the DTE port is not maintained. When activated, the screen-displayed loopback status will change to ON and the DTE MODE LED will light yellow.

If the local CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's internal circuitry
- local unit's CPE/Test equipment
- T1 line (carrier)
- remote unit's network and port logic

NOTE

The only difference between the Remote V.54 Bi-directional loopback and the Remote Bi-directional loopback is how they are established. The V.54 loopback uses an industry-standard loop-up command, and the Proprietary loopback uses a proprietary loop-up command.

A diagram of this Remote V.54 Bi-directional Payload loopback is shown in Figure 5-14.

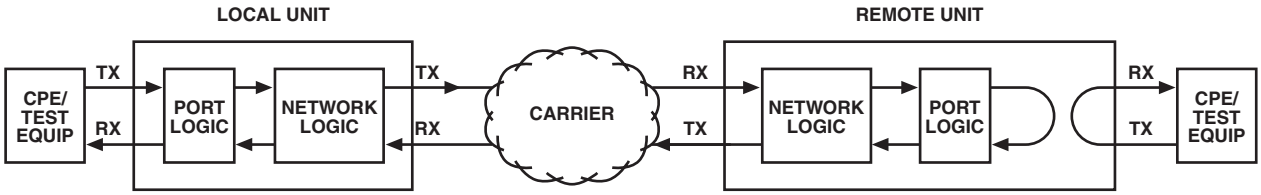


Figure 5-14. Remote V54 bi-directional payload loopback.

5.11.3 Remote Bi-Directional Payload Loopback

This test places loopbacks on the remote DTE interface port in the direction of the CPE/Test equipment and on the port logic circuitry in the direction of the network. The remote signal path (transmit and receive) between the network and the DTE port is not maintained. When activated, the screen displayed loopback status will change to ON and the DTE MODE LED will light yellow.

If the local CPE/Test equipment is able to successfully transmit and receive across the loop, then the following areas are operating correctly:

- local unit's internal circuitry
- local unit's CPE/Test equipment
- T1 line (carrier)
- remote unit's network and port logic

NOTE

The only difference between the remote bi-directional loopback and the remote V.54 bi-directional loopback is how they are established. The V.54 loopback uses an industry-standard loop-up command, and the remote bi-directional loopback uses a proprietary loop-up command.

A diagram of the remote bi-directional payload loopback is shown in Figure 5-15.

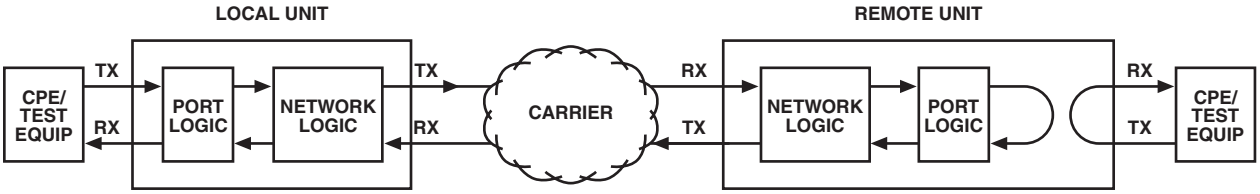


Figure 5-15. Remote bi-directional payload loopback.

5.12 Bit Error Rate Test (BERT)

This diagnostic operation places a bit test pattern (511 or QRSS) onto the network. The test pattern may be applied to all 24 DS0s or to only those DS0(s) used by the DTE interface port. The local receive signal path between the network and DTE port is maintained.

When activated, the screen-displayed BERT status will change to ON and the network port's NET MODE LED will light yellow. The user interface will display the following statistical BERT information: BERT synchronization (receiving the returned test pattern), number of bit errors, number of elapsed seconds, and the estimated Bit Error Rate (BER).

A diagram of the BERT is shown in Figure 5-16.

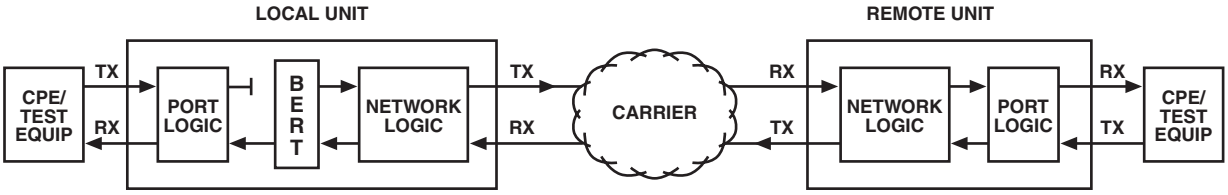


Figure 5-16. Bit error rate tests (BERT).

Appendix. Cabling and Connector Pinouts

A.1 Introduction

This appendix contains some of the general rules/considerations you should be familiar with before cabling the T1 CSU/DSU-SNMP-SP CSU/DSU. Additional information includes common cable configurations and pinouts.

- We recommend that you use only 100-ohm 22AWG individually shielded twisted pair cables. These types of cables provide protection from electromagnetic interference (EMI) and crosstalk.
- We recommend that you use only shielded RJ-48 cables terminated to shielded modular jacks to prevent EMI and crosstalk.
- Do not exceed the DTE cabling distances as recommended by the cable's manufacturer. Doing so may result in signal attenuation.
- Make sure that all cable connectors (plug, screw, or clip) are correctly aligned and installed. Misalignment or improperly installed connectors may result in pin, connector, or cable damage.
- Determine if straight-through or crossover cables are required.

After reviewing the previous cabling rules/considerations, refer to the rest of this appendix to meet your cabling requirements.

A.2 Cabling Configurations

Some of the more common cabling configurations are illustrated in Figures A-1 through A-3.

- Figure A-1 illustrates network and DTE cabling configurations.
- Figure A-2 illustrates SLIP port cabling configurations.
- Figure A-3 illustrates ASCII terminal and dialup modem cabling configurations.

Refer to **Chapter 2** for descriptions and pinouts for each of the interface ports located on the T1 CSU/DSU-SNMP-SP. Refer to **Section A.3** for pinout information for the cables illustrated in this section.

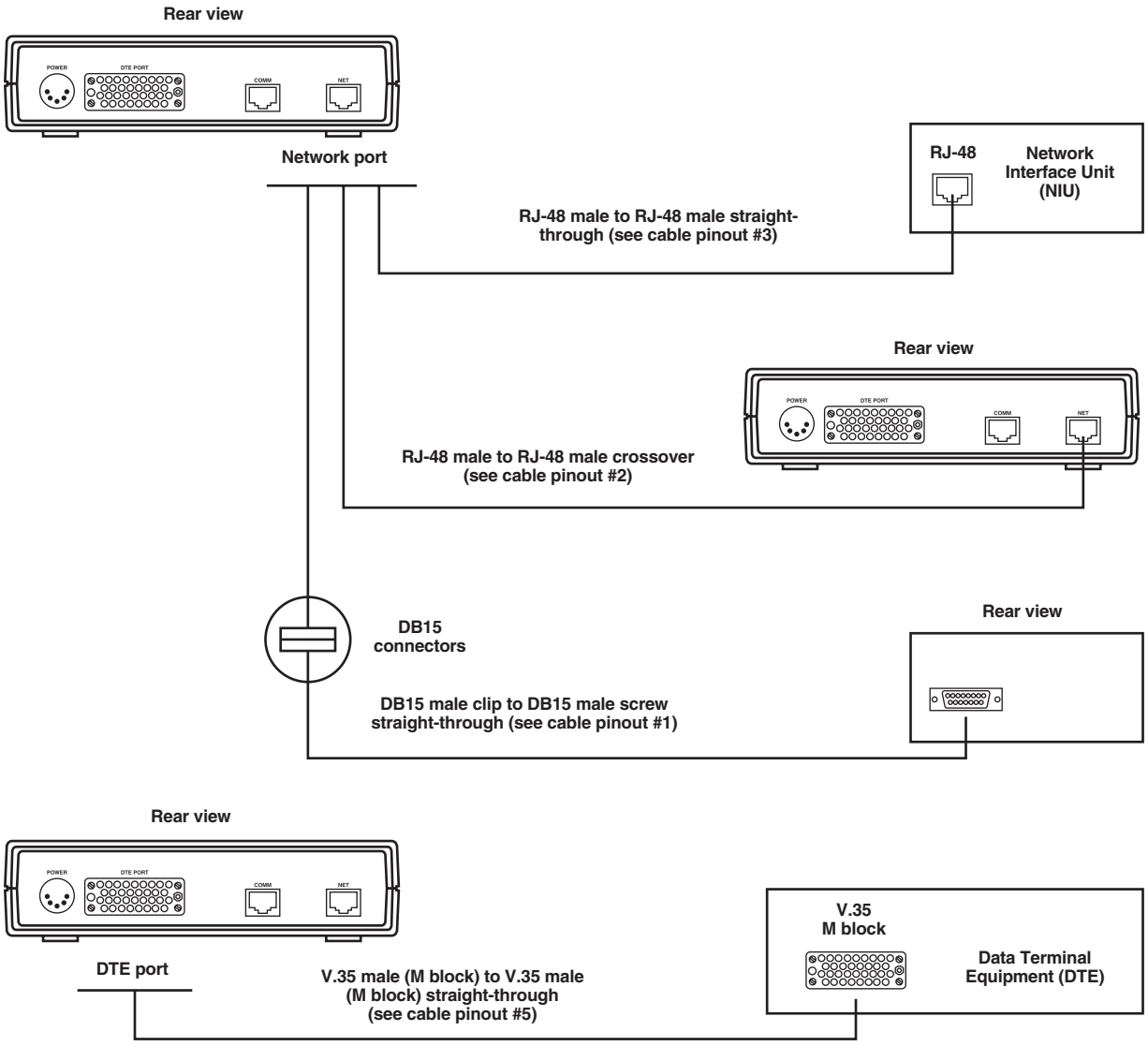


Figure A-1. Common network and DTE cabling configurations.

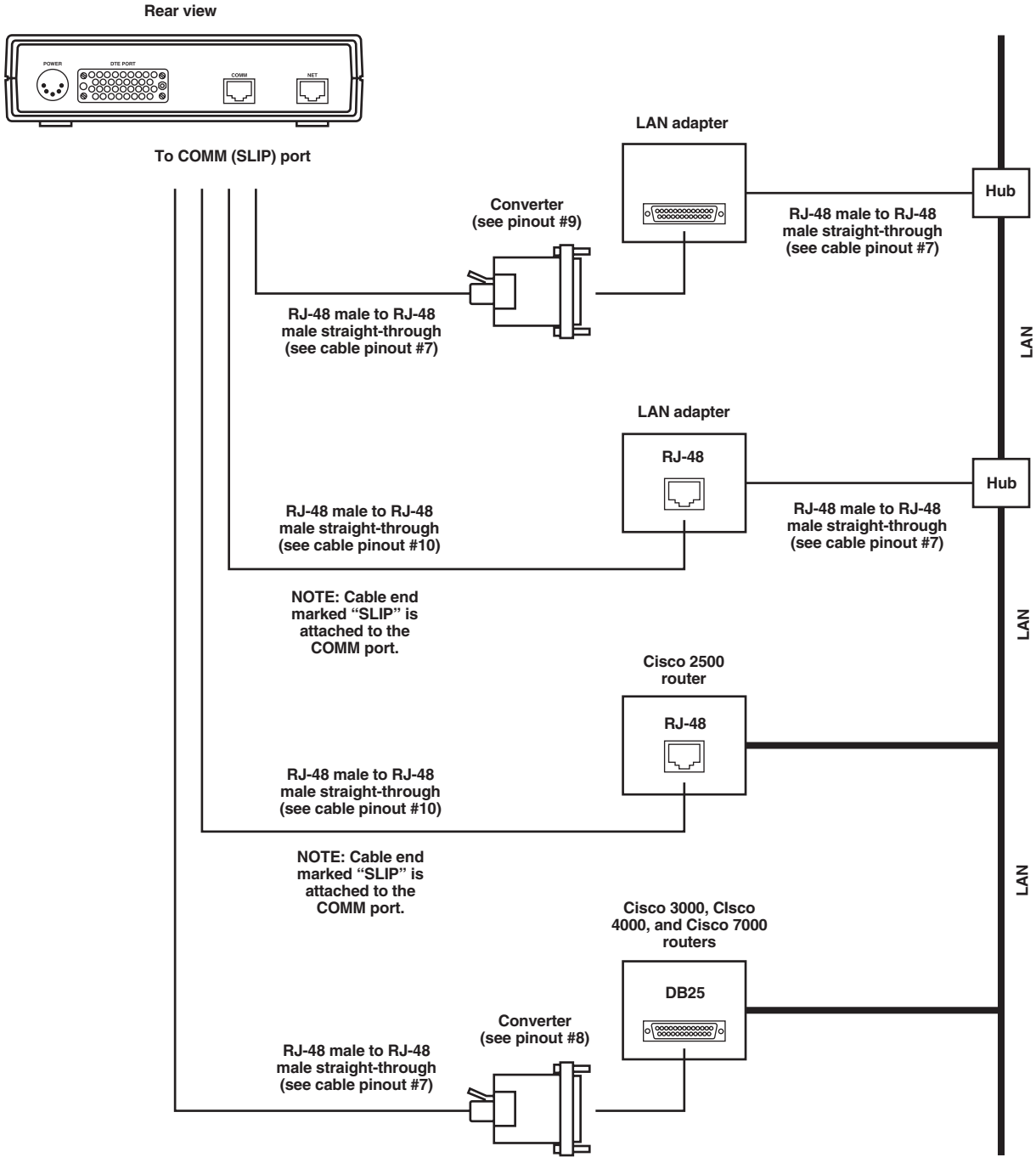


Figure A-2. Common SLIP port cabling configurations.

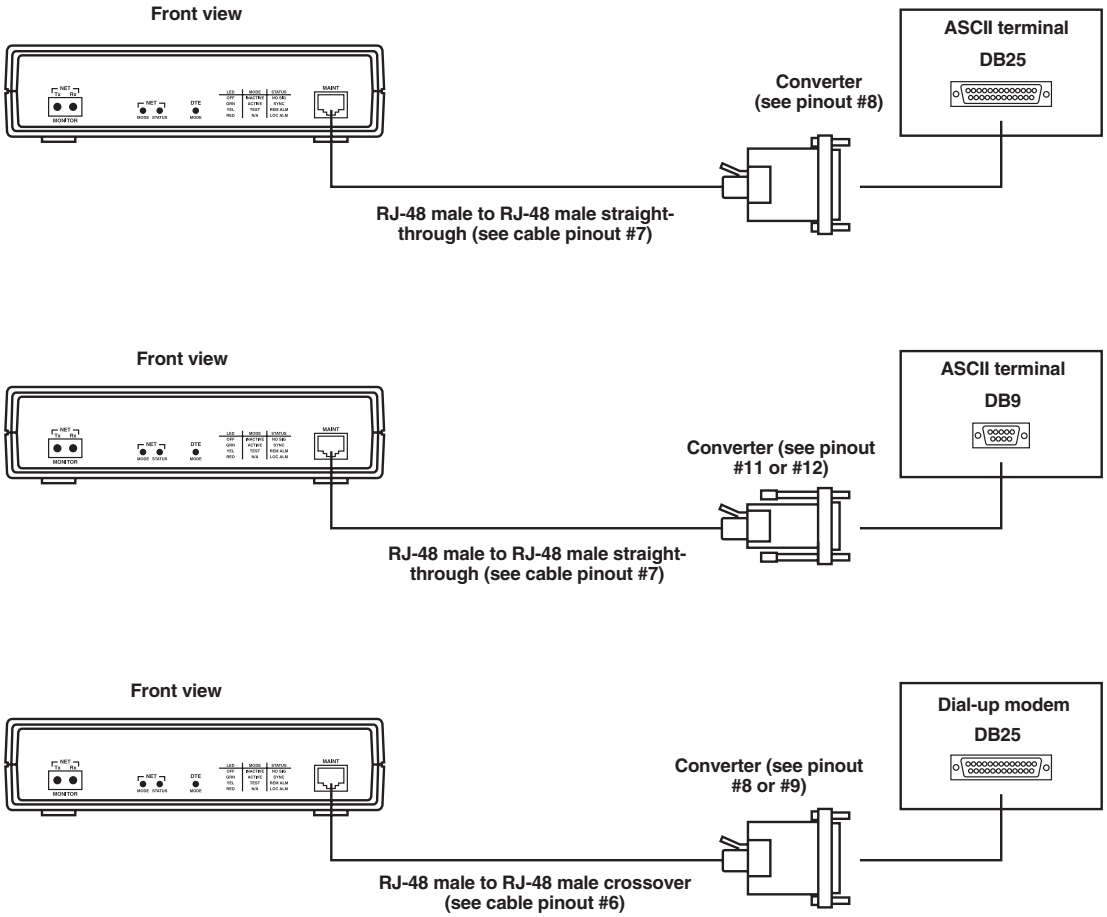


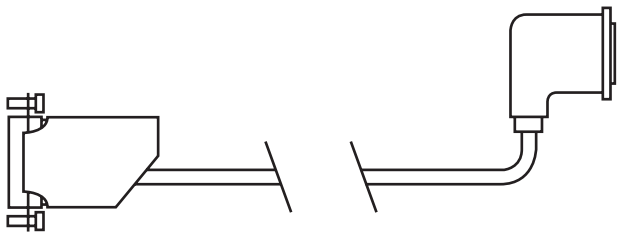
Figure A-3. Common ASCII terminal/dialup modem cabling configurations.

A.3 Common Cable Pinouts

Pinouts for the common cables uses on the T1 CSU/DSU-SNMP-SP are illustrated (twelve pinouts are pictured). Call Black Box Technical Support at 724-746-5500 for cable part numbers.

NOTE

Cable pinouts not illustrated are not supported by the T1 CSU/DSU-SNMP-SP.



Cable pinout #1.

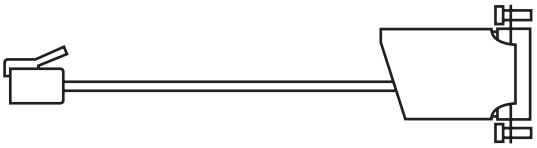
A End (Male) DB15 Clip		B End (Male) DB15 Screw	
Pin	**Signal**	**Pin**	**Signal**
1	TX Tip	1	TX Tip
9	TX Ring	9	TX Ring
3	RX Tip	3	RX Tip
11	RX Ring	11	RX Ring
7	GND	7	GND
8	GND	8	GND

Cable pinout #2.

A End (Male) RJ-48		B End (Male) RJ-48	
Pin	**Signal**	**Pin**	**Signal**
1	RX Ring	4	TX Ring
2	RX Tip	5	TX Tip
4	TX Ring	1	RX Ring
5	TX Tip	2	RX Tip
7	GND	7	GND
8	GND	8	GND

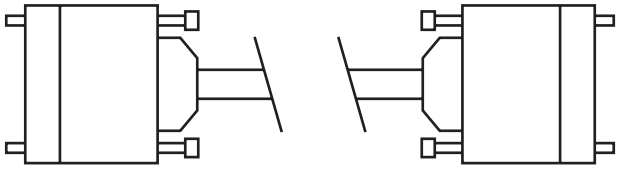
Cable pinout #3.

A End (Male) RJ-48		B End (Male) RJ-48	
Pin	**Signal**	**Pin**	**Signal**
1	RX Ring	1	RX Ring
2	RX Tip	2	RX Tip
4	TX Ring	4	TX Ring
5	TX Tip	5	TX Tip
7	GND	7	GND
8	GND	8	GND



Cable pinout #4.

A End (Male) RJ-48		B End (Male) DB15	
Pin	**Signal**	**Pin**	**Signal**
1	TX Tip	5	TX Tip
2	GND	8	GND
3	RX Tip	2	RX Tip
7	GND	7	GND
8	GND	3	GND
9	TX Ring	4	TX Ring
11	RX Ring	1	RX Ring



Cable pinout #5.

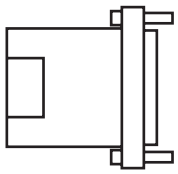
A End (Male) M Block V.35		B End (Male) M Block V.35	
Pin	**Signal**	**Pin**	**Signal**
A	Frame	A	Frame
B	SG	B	SG
C	RTS(A)	C	RTS(A)
D	CTS(A)	D	CTS(A)
E	DSR(A)	E	DSR(A)
F	DCD(A)	F	DCD(A)
H	DTR(A)	H	DTR(A)
M	RTS(B)	M	RTS(B)
N	CTS(B)	N	CTS(B)
P	TD(A)	P	TD(A)
R	RD(A)	R	RD(A)
S	TD(B)	S	TD(B)
T	RD(B)	T	RD(B)
U	TT(A)	U	TT(A)
V	ST(A)	V	ST(A)
W	RT(A)	W	RT(A)
X	RT(B)	X	RT(B)
Y	ST(A)	Y	ST(A)
AA	ST(B)	Y	ST(B)
LL	DSR(B)	LL	DSR(B)
MM	DCD(B)	MM	DCD(B)
NN	DTR(B)	NN	DTR(B)

Cable pinout #6.

A End (Male) RJ-48		B End (Male) RJ-48	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	8	RTS
3	RD	5	TD
4	DTR	7	DSR
5	TD	3	RD
6	GND	6	GND
7	DSR	4	DTR
8	RTS	1	CTS

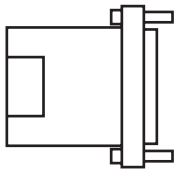
Cable pinout #7.

A End (Male) RJ-48		B End (Male) RJ-48	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	1	CTS
2	DCD	2	DCD
3	RD	3	RD
4	DTR	4	DTR
5	TD	5	TD
6	GND	6	GND
7	DSR	7	DSR
8	RTS	8	RTS



Converter pinout #8.

A End (Female) RJ-48		B End (Female) DB25	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	5	CTS
2	DCD	8	DCD
3	RD	3	RD
4	DTR	20	DTR
5	TD	2	TD
6	GND	7	GND
7	DSR	6	DSR
8	RTS	4	RTS

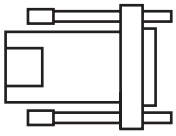


Converter pinout #9.

A End (Female) RJ-48		B End (Male) DB25	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	5	CTS
2	DCD	8	DCD
3	RD	3	RD
4	DTR	20	DTR
5	TD	2	TD
6	GND	7	GND
7	DSR	6	DSR
8	RTS	4	RTS

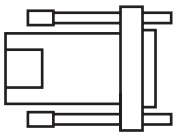
Cable pinout #10.

A End (Male) RJ-48		B End (Male) RJ-48	
Pin	**Signal**	**Pin**	**Signal**
3	RD	6	RD
5	TD	3	TD
6	GND	4 and 5	GND



Converter pinout #11.

A End (Female) RJ-48		B End (Male) DB9	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	8	CTS
2	DCD	1	DCD
3	RD	2	RD
4	DTR	4	DTR
5	TD	3	TD
6	GND	5	GND
7	DSR	6	DSR
8	RTS	7	RTS



Cable pinout #12.

A End (Female) RJ-48		B End (Female) DB9	
Pin	**Signal**	**Pin**	**Signal**
1	CTS	8	CTS
2	DCD	1	DCD
3	RD	2	RD
4	DTR	4	DTR
5	TD	3	TD
6	GND	5	GND
7	DSR	6	DSR
8	RTS	7	RTS

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