

**MODEL 916x/926x  
T1 ACCESS MUX  
TECHNICAL REFERENCE**

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## EMI Warnings

### **WARNING:**

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

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Paradyne.

### **WARNING:**

To Users of Digital Apparatus in Canada:

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

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

## Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.
2. All installation and service must be performed by qualified service personnel, as opening or removing covers may expose dangerous voltage points or other risks.
3. This product is intended to be used with a 3-wire grounding type plug – a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.  

Prior to installation, use an outlet tester or a voltmeter to check the ac receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem.

If a 3-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

The rear I/O panel has provision for a permanently connected protective earthing (grounding) conductor. Connect a 6-14 AWG conductor to this solderless lug connector, identified by the protective earth symbol.
4. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered. Always install the housings in a vertical, upright position to allow for proper cooling.
5. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
6. General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer. Use a minimum 26 AWG line cord for network connections.
7. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.
8. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.
9. Filler panels are provided with the housings to cover unused slots. You *must* install filler panels on the unused slots to avoid possible injury from electrical shock and to maintain compliance with FCC rules.
10. In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:
  - Never install telephone wiring during a lightning storm.
  - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
  - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
  - Use caution when installing or modifying telephone lines.
  - Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
  - Do not use the telephone to report a gas leak in the vicinity of the leak.

## Government Requirements

Certain governments require that instructions pertaining to connection to the telephone network be included in the installation and operation manual. Specific instructions are listed in the following sections.

### United States

#### Notice to Users of the Telephone Network

This equipment complies with Part 68 of the FCC rules. On the equipment is a label or silk screened text that contains, among other information, the FCC registration number for this equipment. If requested, please provide this information to your telephone company.

If your T1 equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC.

Your telephone company may make changes in facilities, equipment, operations, or procedures that could affect the proper operation of your equipment. If so, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

No repairs may be performed by the user. Should you experience difficulty with this equipment, refer to the *Warranty, Sales and Service Information* section on page A.

Make the T1 network connection using a Universal Service Order Code (USOC) type RJ48C jack for single-line installations and type RJ48H jack for multiline installations. Specify both the Service Order Code 6.0N, as well as the proper Facility Interface Code, to the telephone company when ordering the T1 line. The T1 equipment can be configured to support any of the framing format and line signaling techniques shown in the table below. The T1 equipment's configuration must correspond to the T1 line's parameters.

#### Facility Interface Codes

Code	Description
04DU9-BN	1.544 Mbps superframe format (SF) without line power
04DU9-DN	1.544 Mbps SF and B8ZS without line power
04DU9-1KN	1.544 Mbps ANSI ESF without line power
04DU-1SN	1.544 Mbps ANSI ESF and B8ZS without line power

The Federal Communication's Commission (FCC) requires that the end user (person responsible for operation and maintenance of the equipment) file an affidavit with the local exchange carrier when connecting unprotected Customer Premises Equipment (CPE) to the public T1 network. The T1 equipment is considered an unprotected CPE because the analog through transmission gain paths, associated with the voice cards, are user adjustable. This affidavit is required whenever digital terminal equipment without encoded analog content and billing protection is used to transmit digital signals containing encoded analog content which is intended for eventual conversion into voice-band analog signals and retransmitted on the network. This affidavit shall affirm that either no encoded analog content or billing information is being transmitted or that the output of the device meets Part 68 encoded analog content or billing protection specifications. An affidavit form has been provided for your convenience.

**⚠ WARNING:**

**In order to maintain compliance with Part 68, FCC Rules and Industry Canada's CS-03 Specification, the transmit gain settings associated with the E&M, FXO and FXS Voice APMs must be set to ensure that:**

- **The absolute signal power of the encoded analog signals, other than live voice and network control signaling, will not exceed –12 dBm when averaged over any 3-second interval.**
- **For network control signals (such as DTMF), the level will not exceed –3 dBm.**

**The E&M, FXO and FXS voice lines are to be connected to locally attached equipment only. Under no circumstances should voice lines be used on exposed (outside) plant lines.**

After the telephone company has installed the requested service and jack, you can connect the equipment to the network. An FCC-compliant telephone cord and modular plug are provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack that is Part 68 compliant.

## **Canada**

### **Notice to Users of the Canadian Telephone Network**

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. 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 coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request 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 Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

If your equipment is in need of repair, refer to the procedures described in the *Warranty, Sales and Service Information* section on page A.

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# About This Guide

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## Document Purpose and Intended Audience

This manual contains information needed to properly set up, configure and verify operation of the 916x/926x T1 Access Mux. It is designed for system designers, engineers, system administrators, and operators.

## Document Summary

Section	Description
Chapter 1	<i>About the T1 Access Mux.</i> Provides an overview of the components and features of the T1 access unit.
Chapter 2	<i>Management and Control.</i> Contains the steps you need to provide management connectivity to the T1 access unit.
Chapter 3	<i>Applications.</i> Shows some typical T1 access unit applications.
Chapter 4	<i>User Interface.</i> Describes the async terminal interface.
Chapter 5	<i>Setting Up.</i> Describes how to configure the T1 access unit for operation in your network.
Chapter 6	<i>Security.</i> Describes how to administer security, including log-in procedures, and limiting user interface, telnet, and SNMP access.
Chapter 7	<i>Displaying System Information.</i> Describes how to display information about your system.
Chapter 8	<i>Operation and Maintenance.</i> Provides information for startup and monitoring, dialing out to send SNMP traps, maintaining call directories, hot swapping APMs, downloading, upgrading, and resetting the T1 access unit.
Chapter 9	<i>Troubleshooting.</i> Explains troubleshooting and test procedures of the T1 access unit.

<b>Section</b>	<b>Description</b>
Appendix A	<i>Menus and Configuration Worksheets.</i> Contains a graphical representation of the system configuration options and worksheets for you to record your selections.
Appendix B	<i>IP Addressing.</i> Provides guidelines for selecting an IP addressing scheme.
Appendix C	<i>SNMP Traps.</i> Lists SNMP traps.
Appendix D	<i>SNMP Cross-Reference.</i> Provides a cross-reference of SNMP MIB objects and user interface commands.
Appendix E	<i>Cables, Connectors, and Pin Assignments.</i> Describes cables to be used with the T1 access unit, as well as their connectors and pin assignments.
Appendix F	<i>Technical Specifications.</i>
Appendix G	<i>Equipment List.</i> Lists related equipment.
Glossary	Defines acronyms and terms used in this document.
Index	Lists key terms, acronyms, concepts, and sections in alphabetical order.

## Conventions Used

<b>Convention</b>	<b>Indicates</b>
<i>Italic</i>	Variable information (e.g., slot <i>s</i> , indicating slot number 01, 02, etc.).
<i>Menu selection sequence:</i>	The selections to be made from a menu or selections from within a menu before performing a procedural step (e.g., <i>Main Menu</i> → <i>Status</i> → <i>System and Test Status</i> ).
Brackets [ ]	Multiple selection choices (e.g., [ <i>Current Configuration/</i> <i>Customer Configuration 1/</i> <i>Customer Configuration 2</i> ]).



## Product-Related Documents

<b>Document Number</b>	<b>Document Title</b>
9000-A2-GN14	<i>2-Slot and 5-Slot Housing Wall Mounting Kit Installation Instructions</i>
9000-A2-GN15	<i>2-Slot Housing Installation Instructions</i>
9000-A2-GN16	<i>5-Slot Housing with AC Power Supply Installation Instructions</i>
9000-A2-GN17	<i>5-Slot Housing and FrameSaver 9000 Series Access Carrier AC Power Supply Installation Instructions</i>
9000-A2-GN1A	<i>2-Slot Power Supply Installation Instructions</i>
9000-A2-GN1B	<i>DC Power Supply for 5-Slot Housing Installation Instructions</i>
9000-A2-GN1C	<i>5-Slot Housing with DC Power Supply Installation Instructions</i>
9000-A2-GN1D	<i>9000 Series Access Carrier Installation Instructions</i>
9000-A2-GX42	<i>Affidavit Requirements for Connection to Digital Service</i>
9109-A2-GN10	<i>9109 Sync Data Application Module (APM) Installation Instructions</i>
9109-A2-GN11	<i>9109 E&amp;M Analog Voice Application Module (APM) Installation Instructions</i>
9109-A2-GN12	<i>9109 FXS Analog Voice Application Module (APM) Installation Instructions</i>
9109-A2-GN13	<i>9109 Dual DSX Application Module (APM) Installation Instructions</i>
9109-A2-GN14	<i>9109 FXO Analog Voice Application Module (APM) Installation Instructions</i>
9109-A2-GN15	<i>9109 OCU-DP Application Module (APM) Installation Instructions</i>
9161-A2-GK41	<i>916x T1 Access Mux Software Release 1 to Release 2 Upgrade Instructions</i>
9161-A2-GK43	<i>9161/9261 T1 Network Access Module (NAM) Upgrade Instructions</i>
9161-A2-GL10	<i>916x/926x T1 Access Mux Quick Reference</i>
9161-A2-GN10	<i>9161 Single T1 Network Access Module (NAM) Installation Instructions</i>
9261-A2-GN10	<i>9261 Dual T1 Network Access Module (NAM) Installation Instructions</i>
9261-A2-GZ10	<i>9161 Single T1 Network Access Module (NAM) to 9261 Dual T1 NAM Upgrade Instructions</i>

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## Reference Documents

CSA-22.2 No. 950

CSA 108-M1983

FCC Part 15

UL 1950

*Management Information Base for Network Management of TCP/IP-Based Internets: MIBII.* RFC 1213, March 1991

*Definitions of Managed Objects for the DS1 and E1 Interface Types.* RFC 1406, January 1993

*Evolution of the Interfaces Group of MIB II.* RFC 1573, January 1994

*Definitions of Managed Objects for RS-232-like Hardware Devices.* RFC 1659, July 1994

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# About the T1 Access Mux

# 1

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## Overview

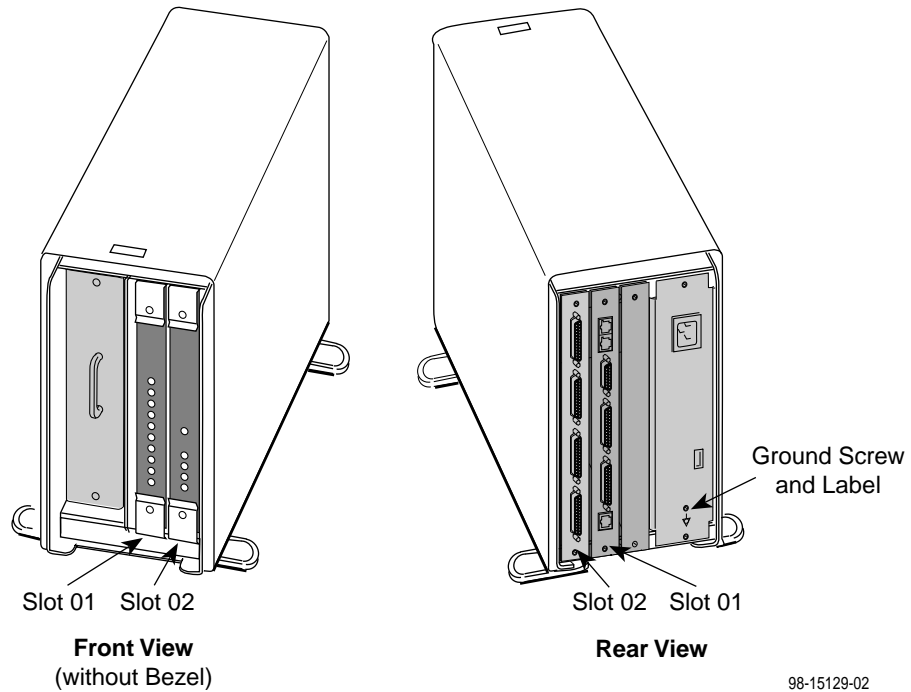
The T1 Access Mux is the interface between your customer premises equipment and a T1 network. The 916x/926x product line supports the following T1 Access Mux configurations:

- 9161 Single T1 NAM or 9261 Dual T1 NAM in a 2-slot housing
- 9161 Single T1 NAM or 9261 Dual T1 NAM in a 5-slot housing
- 9161 Single T1 NAM or 9261 Dual T1 NAM in a 9000 Series Access Carrier

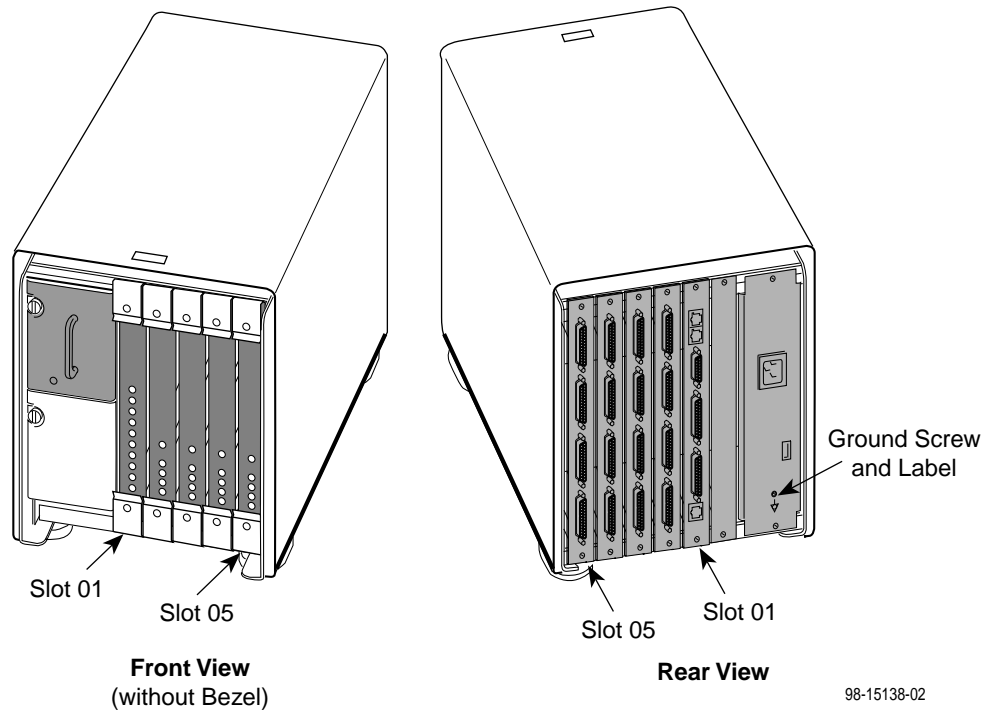
All configurations are referred to as the T1 access unit in this document.

## Components

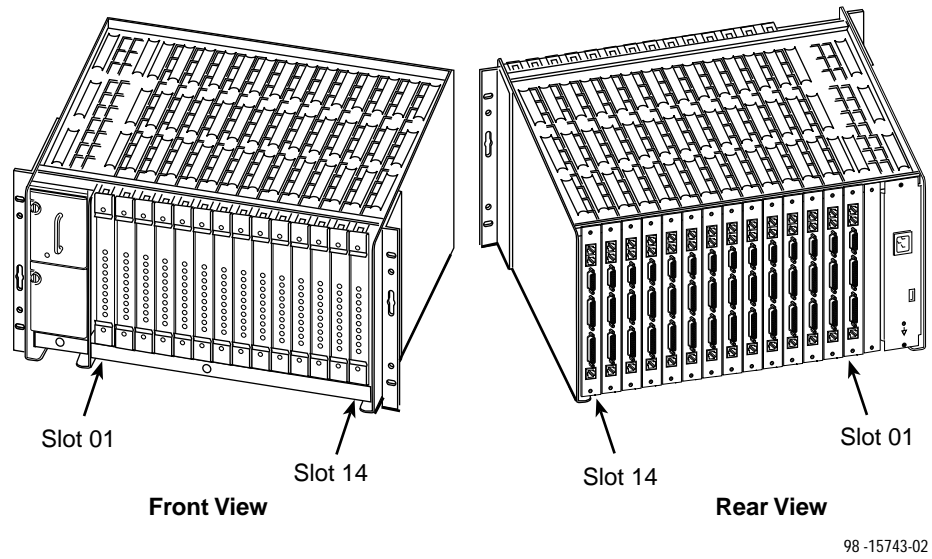
The T1 access unit consists of either a 9161 or 9261 Network Access Module (NAM) installed in a two-slot or five-slot chassis, along with optional Sync Data, DSX, or voice Application Modules (APMs) for particular applications. Up to 14 NAMs can also be installed in the 14-slot access carrier.



### Fully Loaded 2-Slot Housing



**Fully Loaded 5-Slot Housing**



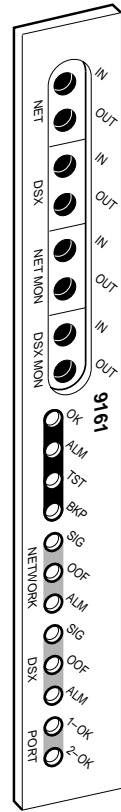
**Fully Loaded Access Carrier**

The 9161 Single T1 NAM is equipped with:

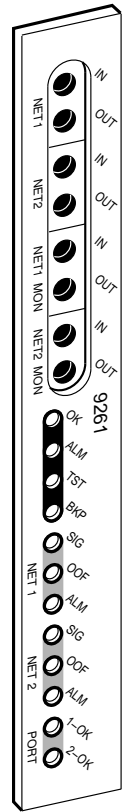
- One T1 network interface
- One DSX-1 drop and insert port
- Two DTE interface ports

The 9261 Dual T1 NAM is equipped with:

- Two T1 network interfaces
- Two DTE interface ports



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There are six APM types:

- The Synchronous Data APM, which supports:
  - Four ports, each supporting EIA-530A, V.35, RS449, or V.11/X.21
  - Rates of Nx56 or Nx64
  - Standard RS232-like (RFC 1659) MIB
  - Enterprise MIB for testing, statistics, and some configuration functions

See the *9109 Sync Data Application Module (APM) Installation Instructions* for more information.

- The Dual DSX APM, which supports:
  - Two DSX-1 drop and insert ports

See the *9109 Dual DSX Application Module (APM) Installation Instructions* for more information.

- The E&M Voice APM, which supports:
  - E&M Type I, II, IV, or V circuits
  - $\mu$ -law PCM coding of analog voice line
  - Enterprise MIB for testing and some configuration functions

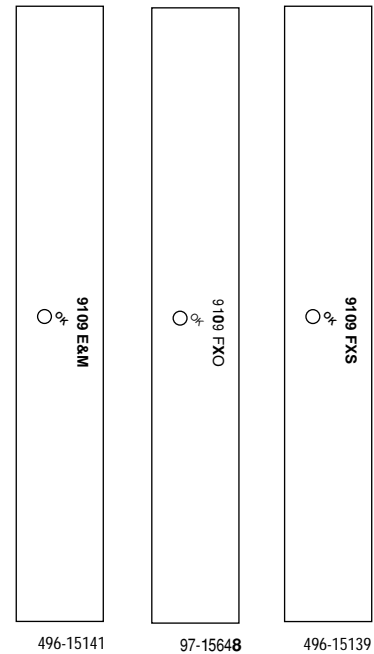
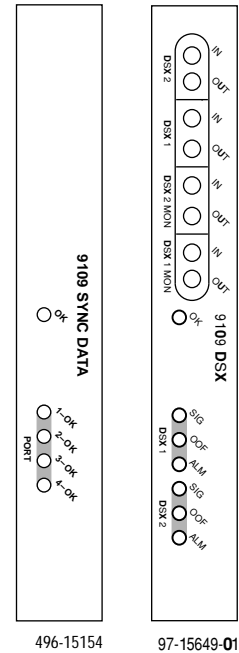
See the *9109 E&M Analog Voice Application Module (APM) Installation Instructions* for more information.

- The FXO Voice APM, which supports:
  - FXO circuits
  - $\mu$ -law PCM coding of analog voice line
  - Enterprise MIB for testing and some configuration functions

See the *9109 FXO Analog Voice Application Module (APM) Installation Instructions* for more information.

- The FXS Voice APM, which supports:
  - FXS circuits
  - $\mu$ -law PCM coding of analog voice line
  - Enterprise MIB for testing and some configuration functions

See the *9109 FXS Analog Voice Application Module (APM) Installation Instructions* for more information.



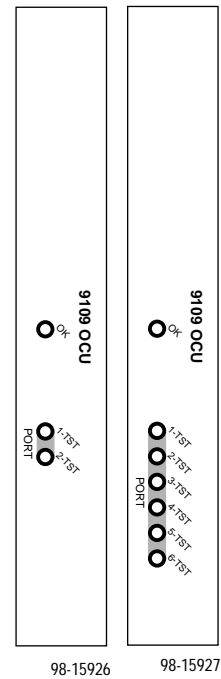
- The OCU-DP APM, which supports:
  - Either two or six ports
  - Speeds of 56 kbps and 64 kbps, as well as 4-wire Switched 56
  - Enterprise MIB for testing and some configuration functions

See the *9109 OCU-DP Application Module (APM) Installation Instructions* for more information.

**NOTE:**

The following NAM I/O versions are required to use the OCU-DP APM:

- SINGLE T1 NAM (870-3389-8000) for the 9161 Single T1 NAM
- DUAL T1 NAM (870-2585-8000) for the 9261 Dual T1 NAM



## Features

The T1 access unit offers the following features:

- **Upgradability.** There are three housings to select from: 2-slot, 5-slot and 14-slot access carrier. You can start with a 2-slot housing, and move your NAM and APM to a 5-slot housing at a later time. Only NAMs may be used in a 14-slot housing.
  - The 2-slot housing holds one NAM and APM pair.
  - The 5-slot housing holds one NAM and up to four APMs, allowing expansion capability as your network needs grow.
  - As you need additional DTE or voice ports for your network applications, you can add APMs.
- **Modular Design.** Any NAM or APM can be physically removed from one housing and moved to another.



- **Hot Swapping.** Provides the ability to insert and remove APMs without powering-down the housing, and without having to reconfigure the cards each time they are moved.

The APM configurations travel with the NAM. When an APM is inserted or removed, the NAM senses that an APM has been inserted or removed, and can automatically make the appropriate changes to screens, configuration options, and MIB objects.

  - When an APM is inserted in a previously unassigned slot, the T1 access unit configures the APM using the factory default configuration.
  - When the same type of APM is inserted into a previously assigned slot, the T1 access unit uses the configuration for the APM that previously occupied the slot; the APM does not have to be reconfigured.
  - When another type of APM is inserted into a previously assigned slot, an alarm and trap are generated for the slot. If accepted, the factory default configuration is loaded for the new APM type; if rejected, the new APM is ignored and the previous configuration is retained.
- The NAM can be removed without powering down the unit; however, all system functionality is lost. When a NAM is removed and inserted into another housing, it applies the NAM's configurations from the previous housing to the current housing.
  - If the NAM is moved from a 2-slot housing to a 5-slot housing, the operator can use the configuration of the APM in slot 02 of the previous housing. APMs in slots 03 – 05 will be configured with the factory default settings.
  - If the NAM is moved from a 5-slot housing to a 2-slot housing, the factory default configuration options are loaded.
  - If the NAM is moved from a 2-slot or a 5-slot housing to a 14-slot housing, the factory default configuration options are loaded.
- **Multiple User Interfaces.** Provides multiple means for configuring, operating, managing, and monitoring the unit.
  - *Menu-Driven User Interface.* Provides an easy to use, menu-driven interface for configuring and managing the T1 access unit locally or remotely.

Access to the user interface can be through an async terminal (or other VT100-compatible terminal), PC emulation, modem, or a Telnet session.
  - *LED (Light-Emitting Diode) Monitoring.* Provides LEDs on the circuit card faceplates that indicate the status of the card's operation.
- **Network Management Capability.**
  - *SNMP (Simple Network Management Protocol) Management.* Provides network management via an external SNMP management system using industry-standard and Paradyne-specific MIB (Management Information Base) objects.

- **Multiple Management Paths.** Provides multiple methods for sending/receiving management data.
  - *Embedded Data Link (EDL).* Provides a path for management data over a performance channel between two nodes. The performance channel uses 8 Kbps of bandwidth, and is embedded in the synchronous data channel. If you choose this method, you must have a Sync Data port.
  - *Direct Data Link (DDL).* Provides a path between two nodes over the T1/FT1 link itself, embedding the management data in the T1 bundle. The management data always uses 1 DS0 (64 Kbps).
  - *Facility Data Link (FDL).* Provides the management path over the FDL of the DS1 extended superframe (ESF). Using this method does not use any customer data bandwidth, but requires end-to-end connectivity. If you select this method, you may need to work with your service provider to ensure that ESF framing is used and the required FDL management path exists end-to-end.
  - *COM Port.* Provides a physical path over the communications port/interface for local user interface access or network IP connectivity data management.
- **IP Connectivity.** Supports connectivity within an IP network for up to 300 IP host and/or network routes. Using the four management paths described above, provides IP routing for SNMP, Telnet, and file transfer protocol (FTP) messages connectivity without requiring direct connections.
- **DSX-1 Drop and Insert port(s)** allows DTEs/PBXs that support the DS1 signal format to share the T1 network with other high-speed equipment. One DSX-1 port is provided on the 9161 T1 NAM. The DSX APM (for use with the 9261 T1 NAM) provides two drop/insert ports.
- **Alarm and Fault Condition Indication.** Provides the capability of attaching a terminal or printer to display/print alarm messages.

Alarms or traps that are generated include: power supply, loss of signal, out of frame, alarm indication signal, excessive error rate, primary and secondary clock failure, yellow alarm signal received, misconfiguration, and APM failure.

- **Extensive Testing Capability.** Provides the capability to maintain the T1 access unit and diagnose device and network problems via:
  - *Menu-Driven User Interface.* Accessed using an async (or other VT100-compatible) terminal, PC emulation, or Telnet, provides T1 network, DSX-1, sync data port, voice port, and device (lamp) tests.  
*Loopbacks* that can be selected for an interface include: line, payload, repeater, remote line, DTE, DTE payload (V.54 loop 3), data channel, remote data channel (V.54 loop 2 or FT1), V.54, digital, and analog.  
*Pattern Tests* that can be selected for an interface include: QRSS, all zeros, all ones, 1-in-8 (T1 interface only), 3-in-24 (T1 interface only), 63, 511, 2047,  $2^{15}-1$ ,  $2^{20}-1$ , and 2-byte (user defined).  
*Tone and signal tests* can also be selected for voice APMs.
  - *SNMP MIB Object Test Commands.* Supports the same testing capability as the user interface. Paradyne MIBs can be downloaded from our World Wide Web site. See page A of this manual for our World Wide Web site address.
  - *Test Jacks.* Located on the T1 access unit's faceplate, support using external test equipment to perform break-in testing and monitoring of the T1 network and DSX-1 interfaces. Remove the housing's bezel to access these jacks.
- **Extensive Monitoring Capability.** Provides status information to help you keep track of and evaluate the unit's and network's operation via:
  - *Status Branch.* Provides system and test status, voice card status for all eight ports for each card, channel status for all DS0 assignments for all time slots of the T1 network interface, channel status for all DS0 assignments for all time slots of the DSX-1 interface, and all port assignments for each voice and data port of both the NAM and APM cards.
  - *Front Panel.* Provides test jacks to monitor the unit's T1 network and DSX-1 interfaces, and LEDs to monitor the unit and its interfaces.  
*Test jacks.* Accessed by removing the housing's bezel, provide T1 network and DSX-1 monitoring.  
*LEDs.* Visible without removing the bezel, provide unit and interface monitoring that includes T1 network and DSX-1 interface received signal status, as well as synchronous data port statuses.

- **Extensive Statistics Gathering.** Provides a complete view of the network's and each data port's performance through the statistical data collected from those interfaces to assist in determining the duration of a condition or event.
  - A total of 96 intervals (24 hours) of user and Telco statistical data is kept, seven per screen page, over a 24 hour period, in 15-minute intervals.
  - A total of 32 intervals (8 hours) of Synchronous Data Port statistical data is kept, over an 8 hour period, in 15-minute intervals.
  - Quick and easy access to any of the 96 sets of statistics is provided by selecting a specific interval or occurrence timeframe. (Specifying an occurrence timeframe is useful when you know about what time a specific event occurred.)
  - You can select a set of statistics to display at the following times: following an event, preceding an event, immediately preceding and following an event, or only those statistics that occurred at or after the event that is the specified interval or time.
  - Statistics collected measure or count the following: errored, unavailable, severely errored, and bursty errored seconds, as well as controlled slip seconds and loss-of-frame counts. In addition, yellow alarm, loss of signal, excessive error rate, frame-synchronization bit error, and line-code violation counts are kept for each 15-minute interval.
  - The worst interval for each statistic is provided as an additional aid in selecting statistical information surrounding trouble spots.
- **Configuration Upload/Download and Software Download Capability.** Provides quick, cost-effective software upgrades, and quick transfer of configuration options to and from nodes using a standard file transfer protocol (FTP).
- **Security.** Provides multiple levels of security, which prevents unauthorized access to the unit.

Security can be controlled by:

  - Disabling any form of access to the unit.
  - Requiring logins (login ID/password/access level combinations), with three access levels to select from: read-only, limited-access, and full-access.
  - Enabling SNMP management, and specifying a community name and access level Read or Read/Write.
  - Enabling SNMP management, and specifying the IP addresses of only selected NMSs.
- **Redundant power supply.** Redundant load sharing supply (both AC and DC versions available) for the 5-slot housing and the access carrier. Protects the system from a service outage if one power supply fails.
- **Wall-Mount Bracket.** Allows one 5-slot, or up to two 2-slot housings to be mounted on a wall.

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# Management and Control

# 2

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## Overview

This chapter provides the steps needed to provide management connectivity to the T1 access unit. You need to select and configure:

- A method of local management connectivity for T1 access units.
- A method for end-to-end management connectivity across the network.

See Appendix B, *IP Addressing* for an IP addressing scheme that fits the local and end-to-end management connectivity methods.

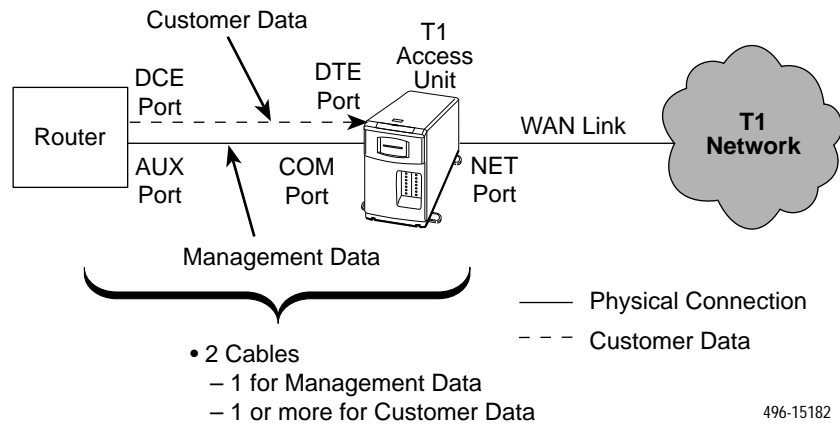
## Configuring Local Management Control

When managing the T1 access unit locally, you can establish a management link in one of two ways. You can:

- Create a management link directly connected through the COM port.
- Connect through an external device (modem, LAN adapter, etc.) to the COM port.

## Creating a Management Link Through the COM Port

When the COM port is configured as the IP management link (Net Link), the user interface is also accessible via Telnet. Although not shown in the illustration below, a LAN adapter can be connected to the COM port to provide Ethernet or Token Ring connectivity, or an async terminal (or other VT100-compatible) interface can be directly connected to the COM port, as well.



The configuration options below show what should be configured for a management link. These configuration options are configured from the user interface based upon the Port Type selected, Asynchronous or Synchronous.

Menu selection sequence:

*Main Menu* → *Configuration* → *User Interface* → *Communication Port*

### Port Use Set to Net Link and Port Type Set to Asynchronous

- Data Rate (Kbps)
- Character Length
- Parity
- Stop Bits
- Ignore Control Leads

### Port Use Set to Net Link and Port Type Set to Synchronous

- Clock
- Data Rate (Kbps)

See Table 5-10, **Communication Port Options**, in Chapter 5, *Setting Up*.

When the communication (COM) port is configured as the IP management link, the async terminal interface is accessible through Telnet.

When this is the case, you also need to enable Telnet session configuration options.

Menu selection sequence:

*Main Menu*→*Configuration*→*User Interface*→*Telnet/FTP Session*

You must also have an IP address and a subnet mask assigned.

Menu selection sequence:

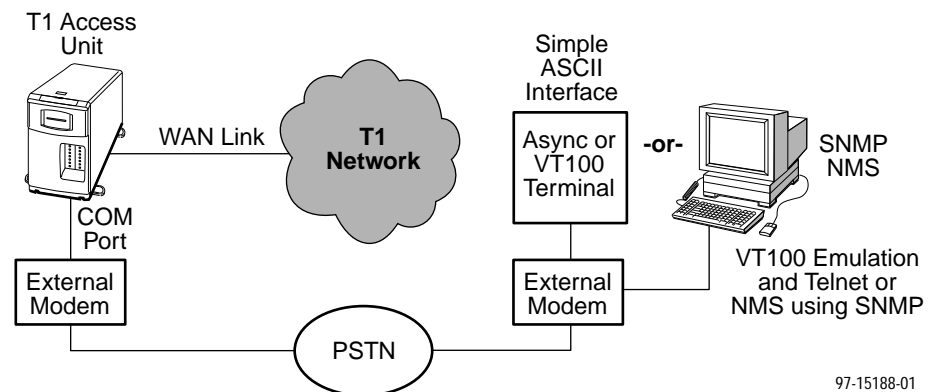
*Main Menu*→*Configuration*→*Management and Communication*

See Table 5-12, **Telnet/FTP Session Options**, in Chapter 5, *Setting Up*.

In addition, if you want to access the configuration files (upload, download), or download new firmware files to the T1 access unit, you must set the FTP Session configuration option to Enable.

### Configuring an External Device (Connected to the COM Port)

The T1 access unit can be managed remotely by connecting an external device like a modem or PAD (packet assembly/disassembly) facility to the COM port.



Using this out-of-band example, configure call processing using the following pertinent configuration options, configured from the user interface.

Menu selection sequence:

*Main Menu*→*Configuration*→*User Interface*→*External Device (COM Port)*

- External Device Commands
- Dial-In Access
- Port Usage

See Table 5-11, **External Device (COM Port) Options**, in Chapter 5, *Setting Up*.

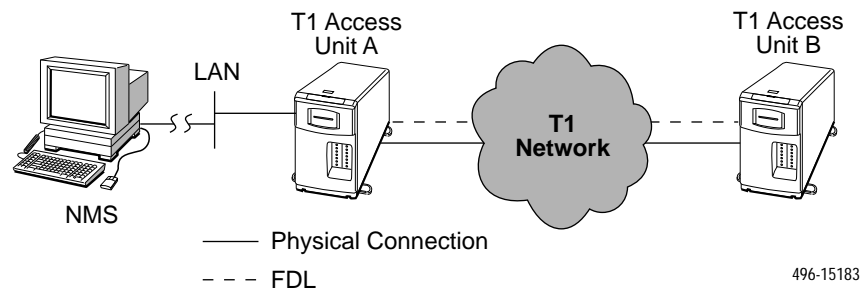
## Configuring End-to-End Management Control

When managing the T1 access unit remotely, you can establish a management link across the network in one of three ways. You can:

- Use the Facility Data Link (FDL) for a point-to-point ESF T1 link.
- Use an Embedded Data Link (EDL) associated with a Sync Data port.
- Use a Direct Data Link (DDL).

### Management Control Using the ESF FDL

You can configure the T1 access unit to use FDL as a management link if available for a point-to-point, ESF T1 link, where FDL is end-to-end.



As shown in the example, in-band management is accomplished through the FDL between the two T1 access units. Management data for T1 Access Unit B goes to T1 Access Unit A, which then routes it into the FDL between the units. This example assumes that the NMS (or Host) that is attempting to access T1 Access Unit B is attached (using SLIP or PPP) via the COM port on T1 Access Unit A.

Set the Management Link configuration option to FDL.

Menu selection sequence:

*Main Menu* → *Configuration* → *Network Interface*

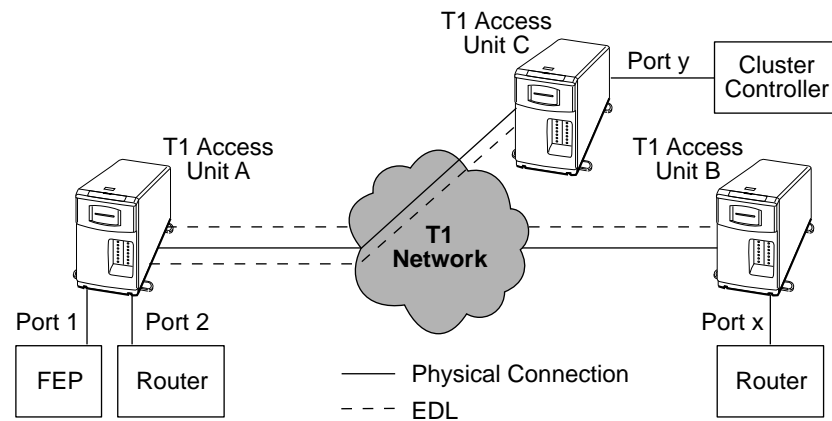


## Management Control Using an EDL

In the configuration below, the T1 access unit's management data is multiplexed with customer data by taking 8 Kbps of the allocated data on a port to use as the EDL.

There is one configured EDL through the network to each unit:

- A shared circuit for management and customer data



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# Applications

# 3

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## Overview

This chapter provides information about the following applications:

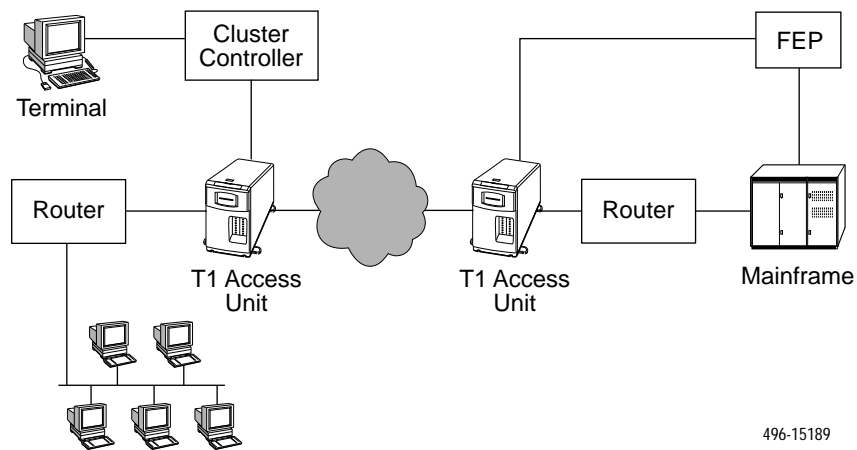
- T1 Access Unit with High Speed Data
- T1 Access Unit with High Speed Data and E&M
- T1 Access Unit with High Speed Data and APL
- T1 Access Unit with High Speed Data, FXS and E&M
- T1 Access Unit with High Speed Data and Drop & Insert
- Channel Bank Replacement and Additions
- Off Premises Extension (OPX)
- Direct Inward Dial (DID)
- Video Conferencing
- Consolidated T1 Access of DDS Circuits

## T1 Access Unit with High Speed Data

This application supports two ports of high speed data. The following diagram depicts a router and a mainframe.

The data moving through the FEP and the cluster controller is heritage data that is not available on the LAN. Because the T1 access unit includes two data ports, the router-based data can easily be added to the network without disrupting the existing network operations.

The data rates available to the two applications can be easily changed. This allows the router connection to increase in speed. It also allows the FEP-based data to reduce its data rate as the amount of data transmitted on this route declines naturally over time.



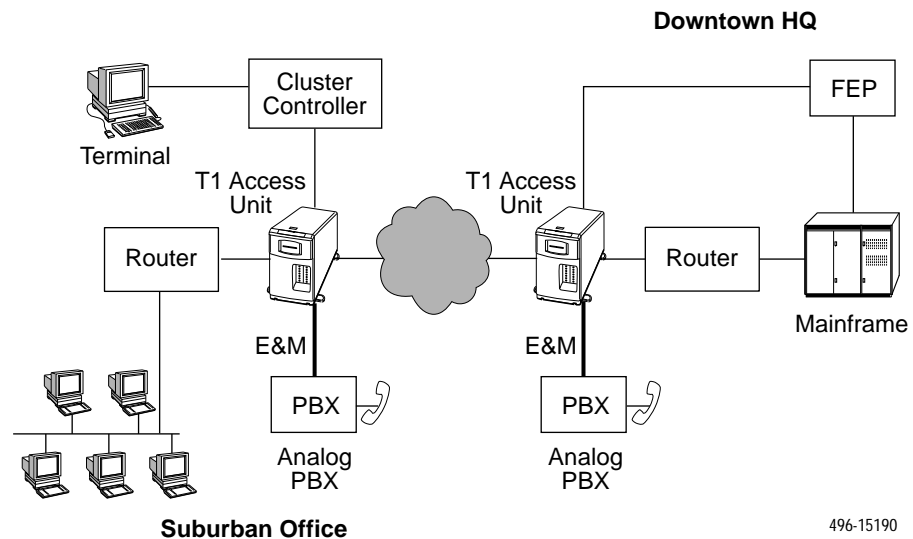
**T1 Access Unit with High Speed Data**

## T1 Access Unit with High Speed Data and E&M

Analog PBXs (shown in the following diagram) typically communicate on trunk lines (lines between switches) with a type of communications protocol called E&M.

The T1 access unit fully supports this application. The T1 access unit supports up to three 8-port E&M APMs. In the example shown in the diagram, eight time slots could be assigned to the voice ports, two time slots to the FEP-Cluster controller link, and up to 14 time slots to the router link. This provides the following:

- **Voice** – Eight telephone calls
- **FEP-CC** – 128 kbps
- **Router** – 896 kbps



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### T1 Access Unit with High Speed Data and E&M

## T1 Access Unit with High Speed Data and APL

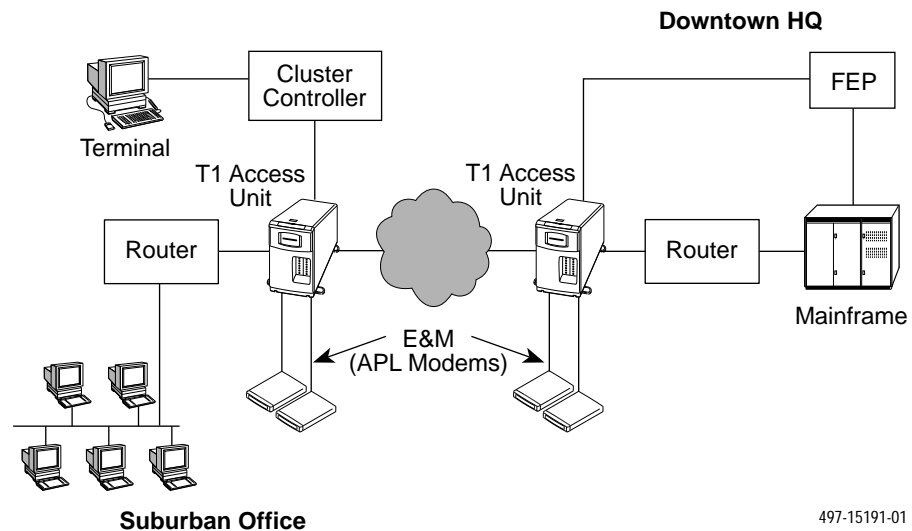
In the example shown in the following diagram, E&M analog voice APMs are used to transport analog private line (APL) modem traffic instead of voice traffic.

In some parts of the country digital circuits are hard to obtain, and many applications do not require the higher speeds of digital circuits. This application allows customers to use existing modems while reducing the cost of using them by eliminating access lines.

The T1 access unit supports up to three 8-port E&M APMs. A typical application consists of:

- **Modem Lines** – Eight lines
- **FEP-CC** – 128 kbps
- **Router** – 896 kbps

E&M is used to transport the analog information, and no E&M signaling is involved. In fact, the E&M signaling leads are disconnected in this application (the operating mode is set to Transmit Only). See Chapter 4, *Setting Up*, for more information on configuring voice ports.

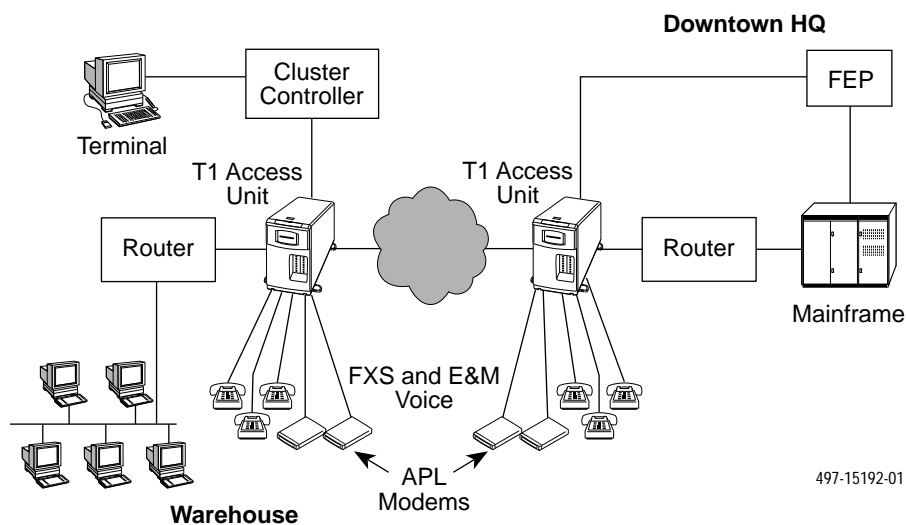


**T1 Access Unit with High Speed Data and APL**

## T1 Access Unit with High Speed Data, FXS and E&M

In the example shown in the following diagram, data and regular voice traffic are transported by the T1 access unit and the APL modem. E&M-type voice (in Transmit mode only) is being used to transport the APL modem traffic, while FXS is employed to transmit regular voice traffic.

Another variation of this application would have the lines connected to the telephones terminate at a switch in the cloud, where they could be connected to any other telephone in the world.

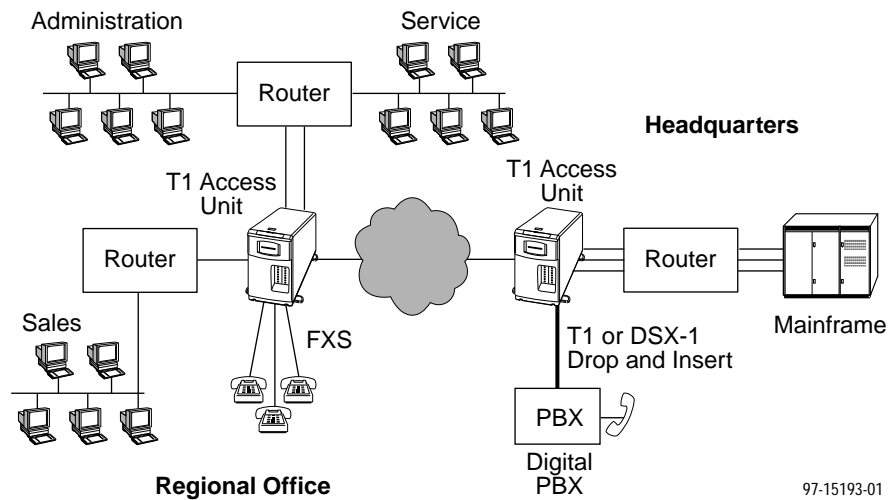


**T1 Access Unit with High Speed Data FXS and E&M (Transmit Only Mode)**

## T1 Access Unit with High Speed Data and Drop & Insert

In the example shown in the following diagram, voice and data are mixed. The Drop and Insert feature of the T1 access unit allows voice information to be sent from a remote site to a large site that contains a digital PBX. People at the distant end can make calls.

Multiple routers and data lines require adding a Sync Data APM to the T1 access unit, because more than two data ports are needed.



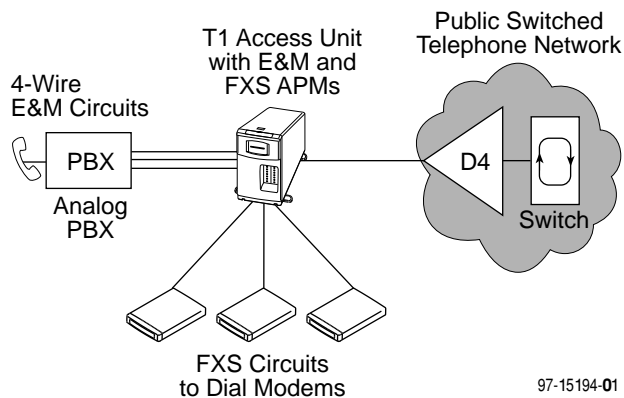
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**T1 Access Unit with High Speed Data and Drop & Insert**



## Channel Bank Replacement and Additions

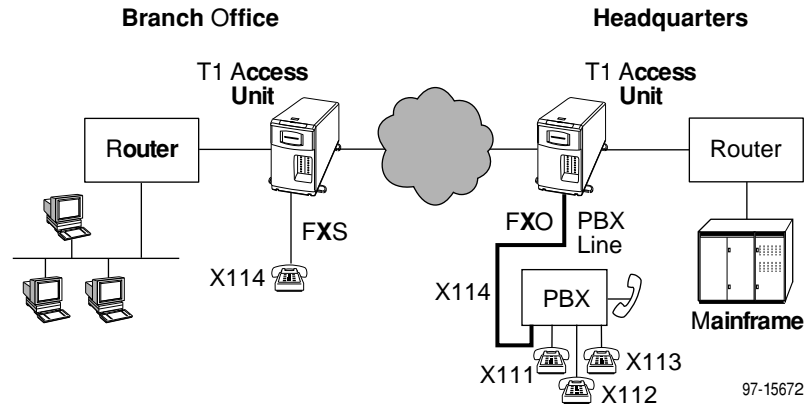
In the example shown in the following diagram, the T1 access unit is a replacement for a channel bank. The T1 access unit is more than just a replacement for a channel bank. It can do many things that a channel bank cannot do. A channel bank has no data ports, it passes data as if it comes from external modems or DSUs. The T1 access unit provides both data and voice ports. A channel bank is a “dumb” device, and therefore cannot be managed from a remote site, while the T1 access unit can be managed via SNMP.



### Channel Bank Replacement

## Off-Premises Extension (OPX)

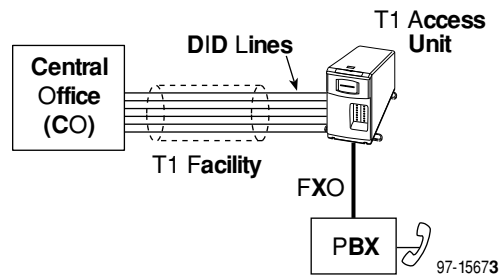
The configuration shown in the following diagram permits a branch location to access the PBX line as if it were locally connected. Likewise, the branch office phones appear as if they are locally connected. A call between the two sites does not result in any long distance charges.



**Off-Premises Extension**

## Direct Inward Dial (DID)

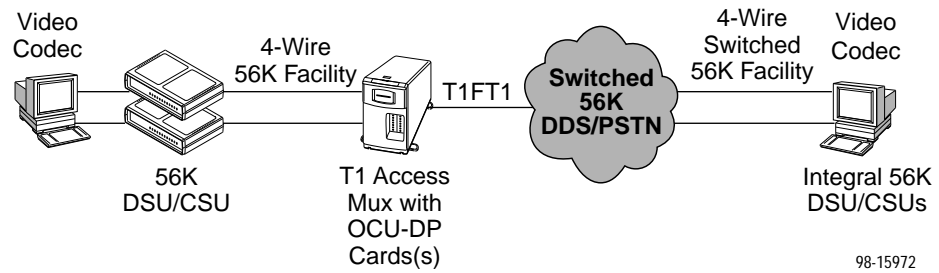
The configuration shown in the following diagram allows an incoming call to dial to an extension from the PBX, without going through the main switchboard.



**Direct Inward Dial**

## Video Conferencing

The OCU-DP APM supports Switched 56 video as shown in the following example. Here, an external video codec is connected to OCU-DP ports using external Switched 56K DSU/CSUs. This connection can be up to 18,000 feet. The OCU-DP APM converts the 56K digital format from the line side into a digital DS0 format. This DS0 format contains the 56K of data plus the necessary signaling information required to set up the call to the far-end video equipment.



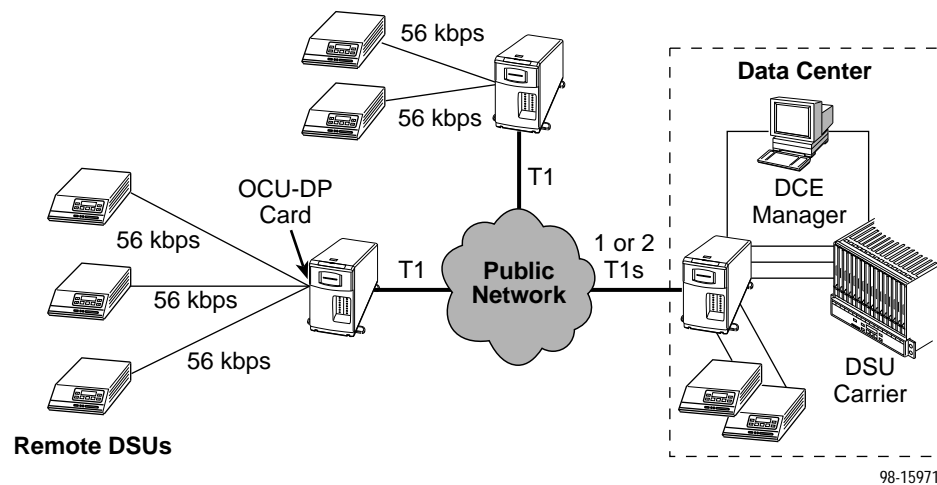
### Video Conferencing

## Consolidated T1 Access of DDS Circuits

The following example illustrates how to use the OCU-DP APM to reduce facility costs associated with point-to-point 56/64K connections by consolidating these lines into a single T1 facility. The T1 Access Muxes shown in this application could also be used to support both voice and high-speed data.

Typically, T1 Access Muxes are placed at concentration points where a single T1 line is less costly than multiple (typically four or five) 56K lines. If DSUs are left at both ends of the circuit, proprietary DSU Network Management Systems can be used. Or, circuits associated with remote DSUs can be terminated directly on a Sync Data APM at the Data Center to eliminate Data Center DSUs.

The OCU-DP APM does not support subrate DDS rates. Subrate applications can be supported by installing a Paradyne 3610 or similar device configured for 56/64K line speed.



### Consolidated T1 Access of DDS Circuits

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# User Interface

# 4

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## Introduction

The T1 access unit uses menu-driven asynchronous (async) terminal interface menus and screens. Along with the LED status indicators on the front panel, the menu-driven interface provides feedback and status on the:

- T1 access unit
- DSX-1 and Network T1 interfaces
- Synchronous data ports
- Voice ports

## Async Terminal User Interface Access

You can access the user interface:

- Locally through a direct connection to the communications port via an async terminal (or other VT100-compatible terminal) or PC emulation.
- Remotely through a Telnet session, although only one user interface session may be active at one time.

## Network Management

Manage the T1 access unit via an SNMP management system connected to the communications port or through a remote in-band connection.

## Menu Hierarchy

The menu hierarchy represents the organization of the system's menus and screens. Refer to the enclosed *Quick Reference* for a pictorial view of the menu hierarchy.

## Main Menu Screen

Access to all of the T1 access unit's tasks begins at the Main Menu screen, which has four menus or branches.

The login's access level appears at the top of the screen unless no security has been set up. Menu branches are filtered based on effective security level, which is the lower of the Session Access Level (Telnet/FTP Session options) and the Login ID access level (Administer Logins under the Control branch).

Select . . .	To . . .	Security Level
Status	View diagnostic tests, voice interfaces, cross connections, statistics, and T1 access unit identity information.	1, 2, 3
Test	Select, monitor, and cancel test for the system's interfaces.	1, 2
Configuration	Display and edit the configuration options.	1, 2, 3
Control	Control the user interface for call setup, device naming, date and time, login administration, and system alarm relay cut-off (for the 5-slot housing). Also, initiate a power-on reset of the system.	1

## Screen Field Types

Three types of screen fields are available on the async terminal.

Use screen field . . .	To . . .
Menu selection	Display a list of available functions for user selection.
Input	Add or change information on a screen. <ul style="list-style-type: none"><li>▪ <u>Underlines</u> in the field value or selection indicate an input or edit field.</li></ul>
Display	Display configuration information and results from performance and system-specific tests. <ul style="list-style-type: none"><li>▪ No underlines in the field value or selection indicate a display-only field.</li></ul>

## What Affects Screen Displays

What appears on the screens depends on:

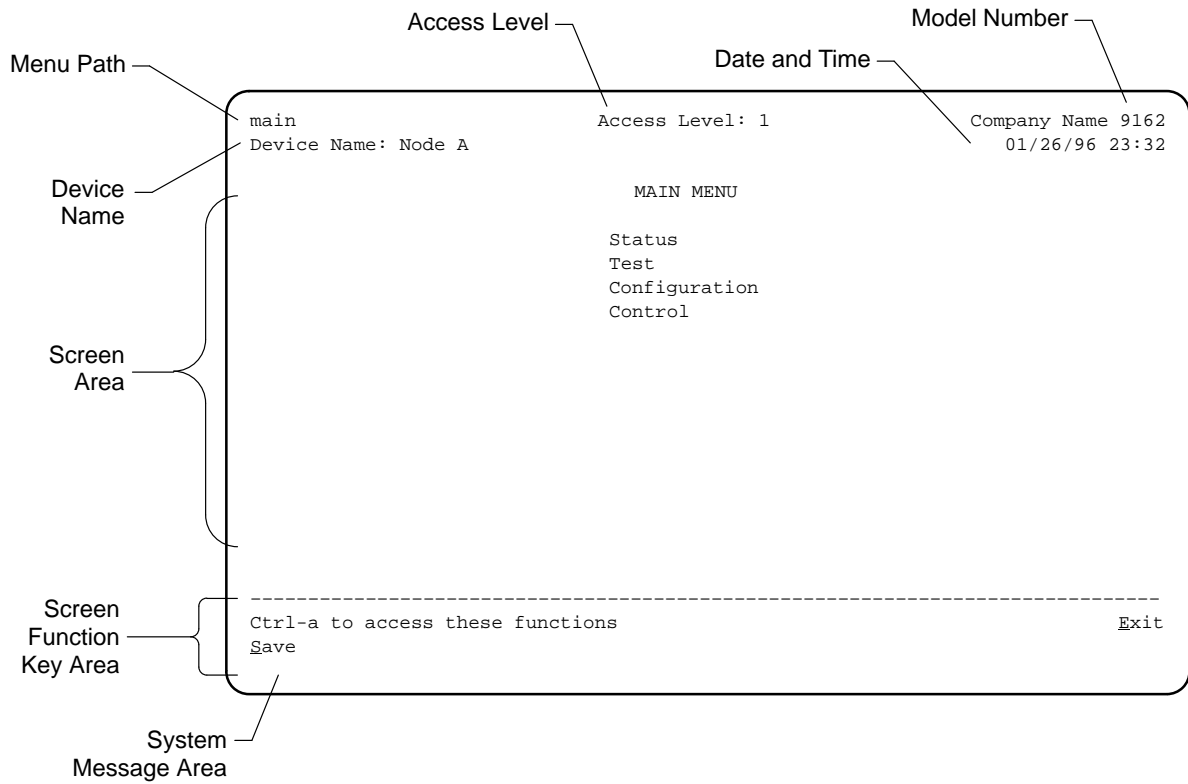
- **Current configuration** – How your T1 access unit is currently configured.
- **Security access level** – The security level set by the system administrator for each user.
- **Data selection criteria** – What you entered in previous fields or screens.

## Screen Work Areas

There are two user work areas:

- **Screen area** – Where you input information into fields.
- **Screen function key area** – Where you perform specific screen functions.

Following is a sample async terminal interface screen.



Screen Format	Description
Menu path	Menu selections made to reach the current screen.
Device name	Customer-assigned identification of the system.
Access level	Currently assigned security access level.
Company Name	Vendor company name.
Model number xxxx	The T1 access unit's model number: <ul style="list-style-type: none"> <li>■ 9162 – 9161 Single T1 NAM in 2-slot housing</li> <li>■ 9165 – 9161 Single T1 NAM in 5-slot housing</li> <li>■ 9262 – 9261 Dual T1 NAM in 2-slot housing</li> <li>■ 9265 – 9261 Dual T1 NAM in 5-slot housing</li> <li>■ 9161 – 9161 Single T1 NAM in 14-slot housing</li> <li>■ 9261 – 9261 Dual T1 NAM in 14-slot housing</li> </ul>
Date and Time	Date and Time kept locally by the system (24-hour clock).
Screen area	Selection, display, and input fields for monitoring and maintaining the system.
Screen function keys	Specific functions that can be performed on the screen.
System messages and field values	System-related information, valid values for input fields, and System Health and Status messages.



## Navigating the Screens

You can navigate the screens by:

- Using keyboard keys
- Switching between the two screen work areas
- Using screen function keys

### Keyboard Keys

Use the following keyboard keys to navigate within the screens.

To . . .	Press . . .
Move cursor between the screen area and the screen function keys area	Ctrl-a
Return to the previous screen	Esc
Move cursor to the next field	Right Arrow (on same screen row), or Tab (on any screen row)
Move cursor to the previous field	Left Arrow (on same screen row), or Ctrl-k
Move cursor one position to the left. If the cursor is at the beginning of a field, Backspace has no effect.	Backspace
Move cursor to the first character of the previous field (backtab)	Ctrl-k
Display the next valid value for the field	Spacebar
Delete character that the cursor is on	Delete (Del)
Move cursor up one field within a column on the same screen	Up Arrow or Ctrl-u
Move cursor down one field within a column on the same screen	Down Arrow or Ctrl-d
Move cursor one character to the right if in edit mode	Right Arrow or Ctrl-f
Move cursor one character to the left if in edit mode	Left Arrow or Ctrl-b
Redraw the screen display, clearing information typed in but not yet entered	Ctrl-l
Accept entry or display valid options on the last row of the screen when pressed before entering data or after entering invalid data	Return (Enter)

## Screen Function Keys

All screen function keys (located in the lower part of the screen) operate the same way (upper- or lowercase) throughout the screens.

These keys use the following conventions:

Select . . .	For the screen function . . .	And press Return to . . .
M or m	<u>M</u> ainMenu	Return to the Main Menu screen.
E or e	<u>E</u> xit	Terminate the async terminal session.
N or n	<u>N</u> ew	Enter new data.
O or o	<u>M</u> odify	Modify existing data.
L or l	<u>D</u> elete	Delete data.
S or s	<u>S</u> ave	Save information.
R or r	<u>R</u> efresh	Update screen with current information.
C or c	<u>C</u> lrStats	Clear network performance statistics and refresh the screen.
U or u	<u>Pg</u> Up	Display the previous page.
D or d	<u>Pg</u> Dn	Display the next page.

## Selecting from a Menu

You select from a menu to get subsequent menus or screens so you can perform desired tasks.

### ► Procedure

To make a menu selection:

1. Tab or press an arrow key to position the cursor on a menu selection. Each menu selection is highlighted as you press the key to move the cursor from position to position.
2. Press Return. The selected menu or screen appears.
3. Continue Steps 1 and 2 until you reach the screen you want.

Refer to the *Quick Reference* to guide you through menu selections.

## Selecting a Field

Once you have reached the desired menu or screen, select a field to view, change, or issue a command. Select a field from within a menu in the same way you select from a menu – press the Tab or right arrow key.

### *Example:*

Selecting Control from the Main Menu, selecting Administer Logins, then entering or changing security information.

## Making Input Selections

You can enter information into a field in one of several ways. Once the field is selected, you can:

- Manually type in (enter) the field value or command.

### *Example:*

Entering *abc* as a user's Login ID on the Administer Logins screen (from the Control menu/branch).

- Type in (enter) the first letter(s) of a field value or command, using the character matching feature.

### *Example:*

When configuring an FXS voice port's operating mode with the Operating Mode configuration option/field selected (values FXS, FXSDN, FXSDN/WINK, PLAR and DPO), entering *f* or *F* displays the first value starting with *f* – FXS. In this example, entering *fxsd* or *FXSD* would display FXSDN as the selection.

- Switch from the screen area to the screen function area and select or enter the designated screen function key. See *Switching Between Screen Work Areas* for an example.
- Press the spacebar to make the next valid choice.

## Switching Between Screen Work Areas

Use Ctrl-a to switch between the two screen work areas to perform all screen functions.

### ► Procedure

1. Press Ctrl-a to switch from the screen area to the screen function key area.
2. Select either the function's designated (underlined) character or Tab to the desired function key.

*Example:*

Enter e or E to Exit.

3. Press Return. The function is performed.
4. To return to the screen area, press Ctrl-a again.

## Accessing the User Interface

T1 access unit connectivity can be established via a directly-connected terminal.

However, if for some reason you cannot access the user interface, do one of the following:

- **Reset COM Port** – Allows you to reset the configuration options related to COM port usage. This also causes a device reset, where the T1 access unit performs a Device Self-Test. No security-related configuration options are changed.
- **Reload Factory Defaults** – Allows you to reload the Default Factory Configuration, resetting all of the configuration and control settings. This method is also useful when the user's password(s) have been forgotten. Selecting this method also causes a device reset.

### ► Procedure

To reset COM port settings:

1. Attach the async terminal to the COM port.
2. At the async terminal, configure the terminal to operate at 19.2 kbps, using character length of 8 bits, with one stop-bit, and no parity.
3. Ensure that any hardware or software flow control is disabled.
4. Reset the T1 access unit, then immediately and repeatedly press Return at a rate of at least 1 press per second until the System Paused screen appears.
5. Tab to the desired method, and enter yes (or y) for the selected prompt.

If entering yes to prompt . . .	Then . . .
Reset COM Port usage	<ul style="list-style-type: none"><li>■ Port Type is set to Terminal.</li><li>■ Data Rate (Kbps) is set to 19.2.</li><li>■ Character Length is set to 8.</li><li>■ Stop Bits is set to 1.</li><li>■ Parity is set to None.</li><li>■ External Device Commands is set to Disable.</li></ul>
Reload Factory Defaults	All factory-loaded configuration and control settings contained in the Default Factory configuration area are loaded.

If no (or n) is entered, or if no selection is made within 30 seconds, the T1 access unit returns to the condition of operation it was in when the system pause was initiated, with the COM port settings returning to their configured states.

If you chose yes, the T1 access unit resets itself, going through a Device Self-Test. Connectivity is restored and the Main Menu screen appears.



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# Setting Up

# 5

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## Considerations When Setting Up

When setting up the system, you need to:

- Arrange for T1 service.
- Plan your channel map. See *Assigning Cross Connections* on page 5-36 for more information.
- Choose a management configuration. Decide how you want to manage the system:
  - Locally through the T1 access unit's communications (COM) port either directly or remotely through a modem.
  - Through an asynchronous terminal interface or Telnet session, or through an SNMP NMS.
- Determine whether you want alarms generated and how you would like the system to communicate alarm information to an ASCII terminal/printer or a management system. *Configuring for Alarms and Traps* on page 5-64 tells you how to set alarms.
- Determine whether you want traps generated and how you would like the system to communicate trap information to an ASCII terminal/printer or a management system. *Setting Up for SNMP Management* on page 5-70 tells you how to set SNMP traps.
- If you are managing the system using an SNMP NMS or Telnet, select an IP addressing scheme.

## Selecting a Management Interface

Select one of the following management interfaces:

- Asynchronous terminal interface – Over the T1 access unit's COM port for local configuration and control when the system does not include an NMS.

An asynchronous terminal interface is also required for initial setup that enables external management.

- Telnet access to an asynchronous terminal interface – Over the T1 access unit's COM port, through the ESF Facility Data Link (FDL), via an associated EDL (EDL) or Direct Data Link (DDL).
- SNMP – SNMP manager(s) using the SNMP protocol to configure and control the unit using standard MIBs and enterprise-specific MIB extensions.

## Logins

Refer to Chapter 6, *Security*, to learn how to create and delete logins.



## Adding System Identity Information

Use the Device Name screen to identify this system, and to change or display the general name, location, and contact for the system.

### ► Procedure

1. Follow this menu selection sequence:

*Main Menu → Control → Device Name*

2. Use the Tab key to move the cursor to the field where you want to add or change information.

#### **NOTE:**

To clear existing information, place the cursor in the Clear field and press Return.

<b>If the selection is . . .</b>	<b>Enter the . . .</b>
Device Name	Unique name for device identification of up to 20 characters.
System Name	SNMP system name; can be up to 255 characters.
System Location	Your system's physical location; can be up to 255 characters.
System Contact	Name and how to contact the person responsible for this system; can be up to 255 characters.

3. To save changes, select Save and press Return.

When Save is complete, Command Complete appears in the message area at the bottom of the screen.

## Setting Date and Time

Use the Date & Time screen to set the date and time for the system.

### ► Procedure

1. Follow this menu selection sequence:

*Main Menu → Control → Date & Time*

2. Use the Tab key to move the cursor to the field where you want to add or change information.

#### **NOTE:**

To clear existing information, move the cursor to the Clear field and press Return.

<b>If the selection is . . .</b>	<b>Enter the . . .</b>
Date (mm/dd/yy)	Date in the format mm/dd/yy or mm-dd-yy.
Time (hh:mm)	Time (24-hour clock) in the format hh:mm.

3. To save changes, select Save and press Return.

When Save is complete, Command Complete appears in the message area at the bottom of the screen.

## Configuring the T1 Access Unit

Your system comes preconfigured with factory default settings as noted in the configuration option tables in this chapter, as well as on the Quick Reference. If you need to display or change these settings, use the system's Configuration branch.

To change configuration option settings you must perform the following tasks:

- Access and display configuration option settings
- Change configuration option settings
- Save configurations option settings to a configuration option area

#### **NOTE:**

Only Security Access Level 1 users can change configuration options. Security Access Level 2 and 3 users can just view configuration options.

## Recommended Order of Configuration

The menu tree is organized in the recommended order of configuration. See Appendix A, *Menus and Configuration Worksheets*, for a graphical view of the system layout. Use the worksheets to keep track of the configuration option settings.

## Configuration Option Areas

The T1 access unit offers four configuration option storage areas:

Configuration Option Area	Description
Current Configuration	The T1 access unit's set of currently active configuration options.
Customer Configuration 1	The first of two alternate sets of configurations that can be set up by the customer and stored for future use.
Customer Configuration 2	The second of two alternate sets of configurations that can be set up by the customer and stored for future use.
Default Factory Configuration	<p>A read-only configuration area containing the factory default configuration options.</p> <p>You can load and edit the default factory configuration settings, but you can only save those changes to the Current, Customer 1, and Customer 2 configuration option areas.</p> <p>The Current, Customer 1, and Customer 2 configuration option areas are identical to the Default Factory Configuration until modified by the customer.</p>

## Accessing and Displaying Configuration Options

To access and display the configuration options, you must first load (copy) the applicable configuration option set into the edit area.

### NOTE:

If your T1 access unit is operating at any speed other than the default (19.2 kbps) and you attempt to load factory default configuration options, you could lose your communication link.

### ► Procedure

- Follow this menu selection sequence:  
*Main Menu → Configuration*
- The Load Configuration From screen appears. Select the configuration option area you want to load and press Return. The selected configuration option set is loaded into the configuration edit area and the Configuration Edit/Display screen appears.

## Changing Configuration Options

Once the Configuration is loaded, use the Configuration Edit/Display screen to display, change, and save a configuration in one of the configuration areas.

### ► Procedure

1. From the Configuration Edit/Display screen, select the configuration option set you want to view or make changes to and press Return.
2. Select the configuration options applicable to your network, and make appropriate changes to the setting(s).
3. Repeat Steps 1 and 2 until all changes are complete.

## Saving Configuration Options

When all changes to the configuration options are complete, use the Save function key to save configuration option changes to either the Current, Customer 1, or Customer 2 configuration areas.

### ► Procedure

1. Press Ctrl-a to switch to the screen function key area.
2. Select the Save function key from any of the Configuration branch screens and press Return. The Save Configuration To screen appears.
3. Select the configuration option area where you want to save the changes to and press Return.

When Save is complete, Command Complete appears in the message area at the bottom of the screen.

### **NOTE:**

If you changed configuration options and try to exit the Configuration branch without saving those changes, a Save Configuration screen appears requiring a Yes or No response to saving the changes.

<b>If you select . . .</b>	<b>Then the . . .</b>
No	Main Menu screen appears. Changes are not saved.
Yes	Save Configuration To screen appears. Choose a configuration option area to save to (e.g., Customer Configuration 1).

## Configuring T1 and DSX-1 Interfaces

You can configure the following interfaces:

- Network Interface
- DSX-1 Interface (if applicable)

### Configuring the Network Interface

Use the Network Interface Options screen to configure the network interface on the T1 NAM (see [Table 5-1](#)).

*Configuration Edit/Display → Network*

If you have a 9261 Dual T1 NAM, select the desired Network interface, **1** (default) or **2**, in the NETWORK field. For the 9161 Single T1 NAM, this field is read-only and always displays a 1.

**Table 5-1. Network Interface Options (1 of 7)**

Interface Status
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b> for Network interface 1 <b>Enable</b> for Network interface 2
Specifies whether the interface selected in the Network field is available for use. <ul style="list-style-type: none"> <li>■ Interface Status is read-only if Network is set to 1 (first interface on the 9261 Dual T1 NAM, or the interface on the 9161 Single T1 NAM).</li> </ul> <p><b>Enable</b> – The interface is available.</p> <p><b>Disable</b> – The interface is not available for use. When the interface is disabled, any existing cross-connect assignments for this interface will be cleared, no alarms or traps for this interface will be generated, no configuration options will be displayed, and all LEDs associated with this interface will remain off. If you attempt to disable the Network 2 interface for which cross connections exist, the message <b>This action will clear all Network n Cross Connections. Are You Sure? No</b> appears. If you select:</p> <p><b>No</b> – The operation is cancelled.</p> <p><b>Yes</b> – The following occurs:</p> <ul style="list-style-type: none"> <li>■ All existing cross-connect assignments for this interface are cleared.</li> <li>■ Alarms or traps associated with this interface are not generated.</li> <li>■ LEDs associated with this interface are held in an “off” state.</li> </ul>
Line Framing Format
Possible Settings: <b>D4, ESF</b> Default Setting: <b>ESF</b>
Specifies the framing format for transmitted and received signals on the T1 network interface. <p><b>D4</b> – Uses D4 framing format.</p> <p><b>ESF</b> – Uses Extended Superframe (ESF) framing format.</p>

**Table 5-1. Network Interface Options (2 of 7)**

<b>Line Coding Format</b>
Possible Settings: <b>AMI, B8ZS</b> Default Setting: <b>B8ZS</b>
Specifies the line coding format for the network interface. <b>AMI</b> – Uses Alternate Mark Inversion (AMI) line coding format. <b>B8ZS</b> – Uses Bipolar 8 Zero Suppression (B8ZS) line coding format.
<b>Line Build Out (LBO)</b>
Possible Settings: <b>0.0, -7.5, -15, -22.5</b> Default Setting: <b>0.0</b>
Specifies the line build out for the signal transmitted to the network. <b>0.0, -7.5, -15, -22.5</b> – Specifies line build out in dB.
<b>Bit Stuffing</b>
Possible Settings: <b>62411, Part68, Disable</b> Default Setting: <b>62411</b>
Determines the type of bit insertion to provide ones density requirements for data transmitted to the network. <ul style="list-style-type: none"> <li>▪ Bit Stuffing does not appear if Line Coding Format is set to B8ZS.</li> </ul> <b>62411</b> – Inserts a one in the data after 15 consecutive zeros are received or the density of ones falls below 12.5%. This setting complies with AT&T TR 62411. <b>Part68</b> – Inserts a one in the data if 80 consecutive zeros are received or the density of ones falls below 12.5%. <b>Disable</b> – Does not enforce ones density on the data sent to the network.
<b>Network Initiated LLB</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Allows the initiation and termination of the line loopback (LLB) to be controlled by the receipt of LLB-Actuate and LLB-Release commands from the network. <b>Enable</b> – LLB is controlled by LLB-Actuate and LLB-Release commands. Receiving a LLB-Actuate command causes the NAM to enter a line loopback (provided an LLB can be performed in the T1 access unit's current state). Receiving a LLB-Release command terminates the LLB. <b>Disable</b> – The T1 access unit ignores the LLB-Actuate and LLB-Release commands. NOTE: When disabled, the NAM is not in compliance with ANSIT1.403 or AT&T TR 62411.

**Table 5-1. Network Interface Options (3 of 7)**

<b>Network Initiated PLB</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Allows the initiation and termination of the payload loopback (PLB) to be controlled by the receipt of PLB-Actuate and PLB-Release commands from the network. <ul style="list-style-type: none"> <li>■ Network Initiated PLB only appears if Line Framing Format is set to ESF.</li> </ul> <p><b>Enable</b> – PLB is controlled by PLB-Actuate and PLB-Release commands. Receiving a PLB-Actuate command causes the T1 access unit to enter a payload loopback (provided a PLB can be performed in the NAM's current state). Receiving a PLB-Release command terminates the PLB.</p> <p><b>Disable</b> – The T1 access unit ignores the PLB-Actuate and PLB-Release commands.</p> <p>NOTE: When disabled, the unit is not in compliance with ANSIT1.403 or AT&amp;T TR 54016.</p>
<b>Transmit Timing</b>
Possible Settings: <b>System, Network</b> Default Setting: <b>System</b>
Allows transmit timing to be selected from either the system master clock source or from the currently selected network interface. <ul style="list-style-type: none"> <li>■ Transmit Timing only appears for the 9261 Dual T1 NAM.</li> </ul> <p><b>System</b> – Transmit timing is derived from the current system clock source (set using System Options, see Table 5-9).</p> <p><b>Network</b> – Transmit timing is derived from this interface.</p> <p>NOTE: When Network is configured, the clock must be synchronized to the system clock source.</p>
<b>ANSI Performance Report Messages</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether ANSI T1.403 compliance performance report messages (PRMs) are generated and sent to the network over the ESF FDL every second. <ul style="list-style-type: none"> <li>■ ANSI Performance Report Messages only appears if Line Framing Format is set to ESF.</li> </ul> <p><b>Enable</b> – Generates and sends PRMs.</p> <p><b>Disable</b> – Does not generate and send PRMs.</p>

**Table 5-1. Network Interface Options (4 of 7)**

<b>Management Link</b>
Possible Settings: <b>Disable, FDL, DDL</b> Default Setting: <b>Disable</b>
Specifies the network management link.  NOTES: <ul style="list-style-type: none"> <li>– If both FDL and DDL are not available selections, the configuration option is set to Disable and cannot be edited.</li> <li>– If Management Link for the local T1 access unit is set to FDL or DDL, configure the remote T1 access unit with the same settings.</li> </ul> <p><b>Disable</b> – Does not use the management link.</p> <p><b>FDL</b> – Uses FDL as the management link. FDL allows IP management traffic to flow over the 4 kbps data link provided by the FDL. FDL requires an end-to-end FDL connection and cannot be terminated within the network.</p> <ul style="list-style-type: none"> <li>■ FDL does not appear if:               <ul style="list-style-type: none"> <li>– Line Framing Format is set to D4.</li> <li>– EDL on any synchronous data port is set to Enable.</li> </ul> </li> </ul> <p><b>DDL</b> – Uses DDL as the management link.</p> <ul style="list-style-type: none"> <li>■ DDL does not appear if all network time slots are assigned.</li> </ul>
<b>IP Address</b>
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the internet protocol address for the management link. <ul style="list-style-type: none"> <li>■ IP Address only appears if Management Link is set to FDL or DDL.</li> </ul> <p><b>000.000.000.000 – 223.255.255.255</b> – The IP address for the management link which you can view or edit. The first digit (i.e., xxx.255.255.255) cannot be 0 or 127, or greater than 223. However, 000.000.000.000 is valid, representing a null address.</p> <p><b>Clear</b> – Resets the IP address and fills the address with zeros.</p>
<b>Subnet Mask</b>
Possible Settings: <b>000.000.000.000 – 255.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the subnet mask for the management link. <ul style="list-style-type: none"> <li>■ Subnet Mask only appears if Management Link is set to FDL or DDL.</li> </ul> <p><b>000.000.000.000 – 255.255.255.255</b> – The subnet mask for the management link which you can view or edit.</p> <p><b>Clear</b> – Resets the node subnet mask and fills the address with zeros (i.e., 000.000.000.000). When the subnet mask is all zeros, the IP protocol creates a default subnet mask based on the class of the IP address: Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000.</p>



**Table 5-1. Network Interface Options (5 of 7)**

<b>Routing Information Protocol</b>
Possible Settings: <b>None, Proprietary</b> Default Setting: <b>Proprietary</b>
Specifies whether routing information protocol (RIP) is used for routing of management information between NAMs. <ul style="list-style-type: none"> <li>■ Routing Information Protocol only appears if Management Link is set to FDL or DDL.</li> </ul> <p><b>None</b> – No routing protocol is used. Use this setting when the device at the other end of the management link cannot accept routing information.</p> <p><b>Proprietary</b> – A proprietary variant of RIP version 1 is used to communicate routing information between NAMs to enable the routing of IP traffic.</p>
<b>Network Time Slot</b>
Possible Settings: <b>01 – 24</b> Default Setting: <b>lowest available time slot</b>
Specifies the time slot for the DDL management link. <ul style="list-style-type: none"> <li>■ Network Time Slot only appears if Management Link is set to DDL.</li> </ul> <p>NOTE: If Management Link is not set to DDL, the assigned time slot will be set to unassigned.</p> <p><b>01 – 24</b> – Valid settings consist of any unassigned time slot within the 01 – 24 range.</p>
<b>Circuit Identifier</b>
Possible Settings: <b>Text Field, Clear</b> Default Setting: <b>blank</b>
Identifies the transmission vendor's circuit information for the purpose of facilitating troubleshooting. <p><b>Text Field</b> – Edit or display circuit identifier information (maximum 255 characters).</p> <p><b>Clear</b> – Removes the circuit identifier information.</p>
<b>Loss of Signal (LOS) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when a loss of signal condition is detected on the network interface. <p><b>Enable</b> – Generates an ASCII alarm message.</p> <p><b>Disable</b> – Does not generate an ASCII alarm message.</p>
<b>Out of Frame (OOF) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm is generated when an out-of-frame condition is detected on the network interface. <p><b>Enable</b> – Generates an alarm message.</p> <p><b>Disable</b> – Does not generate an ASCII alarm message.</p>

**Table 5-1. Network Interface Options (6 of 7)**

<b>Alarm Indication Signal (AIS) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when an alarm indication signal condition is detected on the network interface.  <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.
<b>Yellow Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when a yellow alarm condition is detected on the network interface.  <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.
<b>Excessive Error Rate (EER) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when an excessive error rate condition is detected on the network interface. <ul style="list-style-type: none"> <li>▪ Excessive Error Rate only appears if Line Framing Format is set to ESF.</li> </ul> <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.

**Table 5-1. Network Interface Options (7 of 7)**

<b>Excessive Error Rate Threshold</b>
Possible Settings: <b>10E-4, 10E-5, 10E-6, 10E-7, 10E-8, 10E-9</b> Default Setting: <b>10E-4</b>
<p>Sets the error rate threshold that determines when an excessive error rate (EER) condition is declared. The excessive error rate is determined by the ratio of the number of CRC6 errors to the total number of bits received over a set period of time.</p> <ul style="list-style-type: none"> <li>■ Excessive Error Rate Threshold only appears if Line Framing Format is set to ESF.</li> </ul> <p><b>10E-4</b> – Declares an EER if more than 1,535 CRC6 errors are detected in a 10-second period. Clears when fewer than 1,536 CRC6 errors are detected within the same time period.</p> <p><b>10E-5</b> – Declares an EER if more than 921 CRC6 errors are detected in a 60-second period or a <math>10^{-4}</math> condition occurs. Clears when fewer than 922 CRC6 errors are detected within the same time period.</p> <p><b>10E-6</b> – Declares an EER if more than 92 CRC6 errors are detected in a 60-second period or a <math>10^{-5}</math> or <math>10^{-4}</math> condition occurs. Clears when fewer than 93 CRC6 errors are detected within the same time period.</p> <p><b>10E-7</b> – Declares an EER if more than 9 CRC6 errors are detected in a 60-second period or a <math>10^{-6}</math>, or <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 10 CRC6 errors are detected within the same time period.</p> <p><b>10E-8</b> – Declares an EER if more than 41 CRC6 errors are detected in three 15-minute intervals or a <math>10^{-7}</math>, <math>10^{-6}</math>, <math>10^{-5}</math>, <math>10^{-4}</math> condition occurs. Clears when fewer than 42 CRC6 errors are detected within the same time period.</p> <p><b>10E-9</b> – Declares an EER if more than 4 CRC6 errors are detected in three 15-minute intervals or a <math>10^{-8}</math>, <math>10^{-7}</math>, <math>10^{-6}</math>, <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 5 CRC6 errors are detected within the same time period.</p>

## Configuring the DSX-1 Interface

Use the DSX-1 Interface Options screen to configure the DSX-1 interface on the T1 NAM (see [Table 5-2](#)).

*Configuration Edit/Display → DSX-1*

### NOTE:

If the DSX-1 interface is disabled, Disable appears on the screen. No other options are shown.

If you are using a Dual DSX APM, enter the port number of the desired DSX-1 interface in the PORT field. For the DSX port on the 9161 Single T1 NAM, a 1 is displayed and is read-only.

**Table 5-2. DSX-1 Interface Options (1 of 3)**

<b>Interface Status</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines if the DSX-1 interface is provided by the port. <b>Enable</b> – The DSX-1 interface port transmits and receives data. <b>Disable</b> – The DSX-1 interface port does not transmit or receive data. If time slots are assigned to the DSX-1 interface when an attempt is made to disable this configuration option, the message <b>This action will clear all DSX-1 Cross Connections. Are You Sure? No</b> appears. If you select: <b>No</b> – The operation is cancelled. <b>Yes</b> – The following occurs: <ul style="list-style-type: none"> <li>■ All existing DSX-1 interface cross-connect assignments are cleared.</li> <li>■ Alarms or traps associated with the DSX-1 interface are not generated.</li> <li>■ LEDs associated with the DSX-1 interface are held in an “off” state.</li> </ul>
<b>Line Framing Format</b>
Possible Settings: <b>D4, ESF</b> Default Setting: <b>ESF</b>
Specifies the framing format for transmitted and received signals on the DSX-1 interface. <b>D4</b> – Uses D4 framing format. <b>ESF</b> – Uses Extended Superframe (ESF) framing format.
<b>Line Coding Format</b>
Possible Settings: <b>AMI, B8ZS</b> Default Setting: <b>B8ZS</b>
Specifies the line coding format for the DSX-1 interface. <b>AMI</b> – Uses Alternate Mark Inversion (AMI) line coding format. <b>B8ZS</b> – Uses Bipolar 8 Zero Suppression (B8ZS) line coding format.

**Table 5-2. DSX-1 Interface Options (2 of 3)**

<b>Line Equalization</b>
Possible Settings: <b>0–133, 133–266, 266–399, 399–533, 533–655</b> Default Setting: <b>0–133</b>
Permits a standard DSX signal to be delivered over a distance of up to 655 feet. <b>0–133</b> – Equalization on the DSX-1 side allows up to 133 feet of cable between the NAM and the DTE. <b>133–266</b> – Equalization on the DSX-1 side allows up to 266 feet of cable between the NAM and the DTE. <b>266–399</b> – Equalization on the DSX-1 side allows up to 399 feet of cable between the NAM and the DTE. <b>399–533</b> – Equalization on the DSX-1 side allows up to 533 feet of cable between the NAM and the DTE. <b>533–655</b> – Equalization on the DSX-1 side allows up to 655 feet of cable between the NAM and the DTE.
<b>Send All Ones on DSX-1 Failure</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether action is taken when a valid signal cannot be recovered for the DSX-1 (LOS, continuous OOF, or AIS). <b>Enable</b> – Sends all ones on the DS0 channels allocated to the DSX-1 interface in the event of an LOS, AIS, or continuous OOS condition on the DSX-1 interface. <b>Disable</b> – No action is taken when a signal fails on the DSX-1 interface. The data received is passed through the network interface channels unchanged.
<b>Loss of Signal (LOS) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when a loss of signal condition is detected on the DSX-1 interface. <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.
<b>Out of Frame (OOF) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when an out-of-frame condition is detected on the DSX-1 interface. <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.

**Table 5-2. DSX-1 Interface Options (3 of 3)**

<b>Alarm Indication Signal (AIS)</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when an alarm indication signal condition is detected on the DSX-1 interface.  <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.
<b>Yellow Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm message is generated when a yellow alarm condition is detected on the DSX-1 interface.  <b>Enable</b> – Generates an ASCII alarm message. <b>Disable</b> – Does not generate an ASCII alarm message.

## Configuring Ports

Configure the following ports on the T1 NAM and any APMs that are installed in your system.

- Sync Data ports on the T1 NAM or the Sync Data APM
- Voice ports on the FXS, FXO and E&M APMs

Once you have a port configured, you can copy that configuration to other ports of the same type (see *Copying Port Configurations* on page 5-35).

### Configuring Sync Data Ports

Use the Synchronous Data Port Options to configure the synchronous data port(s) on the T1 NAM or on any Sync Data APM associated with the NAM (see *Table 5-3*).

*Configuration Edit/Display → Sync Data Ports*

#### **NOTE:**

If the selected Synchronous Data Port is disabled, Disable appears on the screen. No other options are shown.

The Synchronous Data Port Options screen appears for Port 1 of the first slot containing a Sync Data APM. If desired, enter the slot and port number of another sync data port.

**Table 5-3. Synchronous Data Port Options (1 of 7)**

<b>Port Status</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether the synchronous data port is being used and can be configured. <ul style="list-style-type: none"> <li>■ Synchronous data port options do not appear if Port Status is set to Disable.</li> </ul> <b>Enable</b> – The port is active, and can be used to transmit and receive data. <b>Disable</b> – The port is not active. When the port is disabled, the following will occur: <ul style="list-style-type: none"> <li>■ No alarms or traps configured for the port will be generated.</li> <li>■ LED for the port will be held in an Off state.</li> <li>■ Existing cross-connect assignments associated with the port will be cleared. The message <b>This action will clear any Cross Connections for the Port. Are You Sure? No</b> appears. If you select:               <ul style="list-style-type: none"> <li><b>No</b> – The operation is cancelled. (Pressing either the Esc or Ctrl-a key acts as a No.)</li> <li><b>Yes</b> – Port status is disabled.</li> </ul> </li> </ul>
<b>Port Type</b>
Possible Settings: <b>E530, V.35, RS449, X.21</b> Default Setting: <b>E530</b>
Selects the synchronous data port type for the data port. <p><b>E530</b> – The port is an EIA-530A-compatible DCE. An EIA-530-compatible DTE can be directly connected to the DB25 connector.</p> <p><b>V.35</b> – The port is a V.35-compatible DCE. A V.35-compatible DTE can be connected to the DB25 connector by using an MS34-to-DB25 adapter cable.</p> <p><b>RS449</b> – The port is an RS449-compatible DCE. An RS449-compatible DTE can be connected to the DB25 connector by using DB37-to-DB25 adapter cable.</p> <p><b>X.21</b> – The port is a V.11/X.21-compatible DCE. A V.11/X.21-compatible DTE can be connected to the DB25 connector by using a DB15-to-DB25 adapter cable.</p>
<b>Port Base Rate</b>
Possible Settings: <b>Nx64, Nx56</b> Default Setting: <b>Nx64</b>
Specifies the base rate for the synchronous data port. The data rate for the port is a multiple (from 1 to 24) of the base rate specified by this configuration option. <p><b>Nx64</b> – The base rate for the port is 64 kbps. The data rate available for the port is Nx64, where N is the number of channels to which the port is cross-connected (1–24).</p> <p><b>Nx56</b> – The base rate for the port is 56 kbps. The data rate available for the port is Nx56, where N is a number between 1 and 24.</p>

**Table 5-3. Synchronous Data Port Options (2 of 7)**

<b>Transmit Clock Source</b>
Possible Settings: <b>Internal, External</b> Default Setting: <b>Internal</b>
Determines whether the transmitted data is clocked by the synchronous data port internal clock, or by the clock supplied by the DTE connected to the synchronous data port.  <b>Internal</b> – The DCE clocks transmitted data, and uses the interchange circuit DB (CCITT 114) – Transmit Signal Element Timing (TXC) (DCE source) for timing the incoming transmitted data.  <b>External</b> – The DTE externally provides the clock for the transmitted data, and the synchronous data port uses the interchange circuit DA (CCITT 113) – Transmit Signal Element Timing (XTXC) (DTE source) for timing the incoming transmitted data.  NOTE: When external clock is used, it must be synchronized to the same clock source as the system.
<b>Invert Transmit Clock</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether the clock supplied by the DCE on interchange circuit DB (CCITT 114) – Transmit Signal Element Timing (DCE Source) TXC is phase inverted with respect to interchange circuit BA (CCITT 103) – Transmitted Data (TD). Use this configuration option when long cable lengths between the NAM and the DTE are causing data errors.  <b>Enable</b> – Phase inverts the TXC clock on the DCE.  <b>Disable</b> – Does not phase invert the TXC clock on the DCE.
<b>Invert Transmit and Received Data</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether the transmitted and received data for the synchronous data port is logically inverted before being transmitted or after being received from the network. Use this configuration option for applications where data is being transported using HDLC protocol, whereby inverting the data ensures that the ones density requirements for the network are met.  <b>Enable</b> – Inverts the transmitted and received data for the port.  <b>Disable</b> – Does not invert the transmitted and received data for the port.



**Table 5-3. Synchronous Data Port Options (3 of 7)**

<b>Send All Ones on Data Port Not Ready</b>
Possible Settings: <b>Disable, DTR, RTS, Both</b> Default Setting: <b>Both</b>
<p>Specifies the conditions on the synchronous data port that determine when valid data is not being sent from the DTE. When this condition is detected, all ones are sent to the network on the DS0 channels allocated to the port.</p> <p><b>Disable</b> – Interchange circuits from the DTE are not monitored. Data sent from the DTE is always sent to the network for the port.</p> <p><b>DTR</b> – Monitors DTE Ready (DTR) to determine when valid data is sent from the DTE. When DTR is off, all ones are sent to the network.</p> <ul style="list-style-type: none"> <li>▪ DTR does not appear if Port Type is set to X.21.</li> </ul> <p><b>RTS</b> – Monitors Request to Send (RTS) to determine when valid data is sent from the DTE. When RTS is off, all ones are sent to the network.</p> <p><b>Both</b> – Monitors both DTR and RTS to determine when valid data is sent from the DTE. If either DTR or RTS is off, all ones are sent to the network.</p> <ul style="list-style-type: none"> <li>▪ Both does not appear if Port Type is set to X.21.</li> </ul>
<b>Action on Network Yellow Alarm</b>
Possible Settings: <b>None, Halt</b> Default Setting: <b>Halt</b>
<p>Specifies the action to take on the synchronous data port when a yellow alarm is received on the network interface. (A yellow alarm indicates a problem with the signal being transmitted to the network.)</p> <p><b>None</b> – No action taken when a yellow alarm is received.</p> <p><b>Halt</b> – Halts the transmission of data received on the synchronous data port and all ones are sent on circuit BB (ITU 104) – Receive Data (RD) and circuit CB (ITU 106) – Clear-to-Send (CTS) is deasserted to the port when a yellow alarm is received.</p>
<b>Network Initiated Data Channel Loopback (DCLB)</b>
Possible Settings: <b>Disable, V.54, FT1, Both</b> Default Setting: <b>Disable</b>
<p>Allows the initiation and termination of the data channel loopback (V.54 loop 2) to be controlled by the receipt of a DCLB-actuate and DCLB-release sequence (either V.54, or FT1 [ANSI] compliant sequences) from the network or far end unit. When this configuration is enabled (V.54, FT1, or Both), receiving a DCLB-actuate sequence on a particular port causes the NAM to initiate a DCLB on that port (provided that a DCLB can be performed based on the current state of the port and NAM). Receiving a DCLB-release sequence terminates the DCLB.</p> <p><b>Disable</b> – Ignores the DCLB-actuate and DCLB-release for the port.</p> <p><b>V.54</b> – DCLB-actuate and DCLB-release sequences that comply with the V.54 standard for “inter-DCE signaling for point-to-point circuits” are recognized and will control the initiation and termination of a DCLB (V.54 Loop 2) for the port.</p> <p><b>FT1</b> – DCLB-actuate and DCLB-release sequences that comply with either the ANSI.403, Annex B standard for “in-band signaling for fractional T1 (FT1) channel loopbacks” are recognized and will control the initiation and termination of a DCLB for the port.</p> <p><b>Both</b> – DCLB-actuate and DCLB-release sequences that comply with either the ANSI or V.54 standard are recognized and will control the initiation and termination of a DCLB for the port.</p>

**Table 5-3. Synchronous Data Port Options (4 of 7)**

<b>Port (DTE) Initiated Loopbacks</b>
Possible Settings: <b>Disable, DTPLB, DCLB, Both</b> Default Setting: <b>Disable</b>
<p>Allows the initiation and termination of a local Data Payload Loopback (DTPLB) or a remote Data Channel Loopback (DCLB) to be controlled by the DTE for the synchronous data port.</p> <p><b>Disable</b> – The DTE attached to the port does not control the Local DTPLB and remote DCLBs.</p> <p><b>DTPLB</b> – The DTE attached to the port may control the DTPLB for the port. The loopback is controlled by the interchange circuit LL (CCITT 141) – Local Loopback as specified by V.54. The port remains in DTPLB loopback as long as interchange circuit remains on.</p> <p><b>DCLB</b> – The DTE attached to the port may control the DCLB for the connected remote port. The loopback is controlled by the interchange circuit RL (CCITT 140) – Remote Loopback as specified by V.54.</p> <p>NOTE: The remote equipment must support in-band V.54 loopback.</p> <p><b>Both</b> – The DTE attached to the port may control both the local DTPLB and remote DCLBs.</p>
<b>Embedded Data Link</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
<p>Specifies whether the Embedded Data Link (EDL) is enabled for the synchronous data port. When the EDL is enabled, 8 kbps of the total bandwidth allocated for the port are not available to the synchronous data port. For example, if the port rate is 256 kbps (4 DS0 channels allocated) and the EDL is enabled, then only 248 kbps are available to the port. The EDL provides detection of frame synchronization, CRC of the data stream (excluding the 8 kbps EDL), and a 4 kbps inband data link between the local and remote units. The 4 kbps in-band data link can be used for performance report messages (PRMs) and as a management link for IP traffic.</p> <ul style="list-style-type: none"> <li>■ EDL does not appear if Management Link is set to FDL.</li> </ul> <p><b>Enable</b> – EDL is enabled for the port.</p> <p>NOTE: EDL must be enabled for both the local port and associated remote port.</p> <p><b>Disable</b> – EDL is disabled for the port.</p>
<b>EDL Management Link</b>
Possible Settings: <b>Disable, Enable</b> Default Setting: <b>Disable</b>
<p>Specifies whether the EDL management link is enabled for IP traffic on the synchronous data port.</p> <ul style="list-style-type: none"> <li>■ EDL Management Link does not appear if:               <ul style="list-style-type: none"> <li>– EDL is set to Disable.</li> <li>– Management Link is set to FDL.</li> </ul> </li> </ul> <p><b>Enable</b> – EDL management link is enabled for IP traffic flow over the 4 kbps in-band data link provided by the EDL.</p> <p><b>Disable</b> – EDL management link is disabled for IP traffic.</p>

Table 5-3. Synchronous Data Port Options (5 of 7)

IP Address
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the internet protocol address needed to access the EDL. <ul style="list-style-type: none"> <li>■ IP Address does not appear if EDL Management Link is set to Disable.</li> </ul> <b>000.000.000.000 – 223.255.255.255</b> – Enter the IP address for the EDL. The first digit (i.e., xxx.255.255.255) cannot be 0 or 127, or greater than 223. However, 000.000.000.000 is valid, representing a null address. <b>Clear</b> – Clears the IP address and fills the address with zeros (i.e., 000.000.000.000).
Subnet Mask
Possible Settings: <b>000.000.000.000 – 255.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the subnet mask for the EDL. <ul style="list-style-type: none"> <li>■ Subnet Mask does not appear if EDL Management Link is set to Disable.</li> </ul> <b>000.000.000.000 – 255.255.255.255</b> – Enter the subnet mask for the EDL. Subnet Mask is based on the class of the IP address: Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000. <b>Clear</b> – Clears the subnet mask and fills the field with zeros (i.e., 000.000.000.000).
Routing Information Protocol
Possible Settings: <b>None, Proprietary</b> Default Setting: <b>Proprietary</b>
Specifies which routing information protocol (RIP) is used to enable routing of management between devices. <ul style="list-style-type: none"> <li>■ Routing Information Protocol does not appear if:               <ul style="list-style-type: none"> <li>– EDL is set to Disable.</li> <li>– EDL Management Link is set to Disable.</li> <li>– Management Link is set to FDL.</li> </ul> </li> </ul> <b>None</b> – Does not use routing information protocol. Use this setting when the device at the other end of the management link cannot accept routing information. <b>Proprietary</b> – Uses a proprietary variant of RIP version 1 to communicate routing information between devices.

**Table 5-3. Synchronous Data Port Options (6 of 7)**

<b>Near-End Performance Statistics</b>
Possible Settings: <b>Disable, Maintain, Send, Both</b> Default Setting: <b>Disable</b>
Specifies whether the T1 access unit maintains near-end performance statistics and sends Performance Report Messages (PRMs) for the synchronous data port. <ul style="list-style-type: none"> <li>■ Near-End Performance Statistics does not appear if:               <ul style="list-style-type: none"> <li>– EDL is set to Disable.</li> <li>– Management Link is set to FDL.</li> </ul> </li> </ul> <p>NOTE: If the local T1 access unit is configured to send near-end performance statistics, then the remote T1 access unit must be configured to maintain far-end performance statistics.</p> <p><b>Disable</b> – Does not maintain near-end performance statistics or send PRMs.</p> <p><b>Maintain</b> – Maintain near-end performance statistics for the port.</p> <p><b>Send</b> – Send PRMs over the port's EDL every second. Each PRM contains the performance statistics for the previous 4 seconds.</p> <p><b>Both</b> – Maintain near-end performance statistics and send PRMs over the port's EDL.</p>
<b>Far-End Performance Statistics</b>
Possible Settings: <b>Disable, Maintain</b> Default Setting: <b>Disable</b>
Specifies whether the T1 access unit maintains far-end performance statistics and sends Performance Report Messages (PRMs) for the synchronous data port. <ul style="list-style-type: none"> <li>■ Far-End Performance Statistics does not appear if:               <ul style="list-style-type: none"> <li>– EDL is set to Disable.</li> <li>– Management Link is set to FDL.</li> </ul> </li> </ul> <p>NOTE: If the local T1 access unit is configured to maintain far-end performance statistics, then the remote T1 access unit must be configured to send near-end performance statistics.</p> <p><b>Disable</b> – Does not monitor the port's EDL for PRMs or maintain far-end performance statistics.</p> <p><b>Maintain</b> – Monitors the port's EDL for PRMs and maintains far-end performance statistics.</p>
<b>Out of Frame (OOF) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Out of Frame (OOF). Specifies whether an alarm is generated when an out-of-frame condition is detected on the synchronous data port. <ul style="list-style-type: none"> <li>■ Out of Frame does not appear if:               <ul style="list-style-type: none"> <li>– Embedded Data Link is set to Disable.</li> <li>– Management Link is set to FDL on the Network Interface Options screen (see Table 5-1).</li> </ul> </li> </ul> <p><b>Enable</b> – Generates an alarm.</p> <p><b>Disable</b> – Does not generate an alarm.</p>

**Table 5-3. Synchronous Data Port Options (7 of 7)**

<b>Excessive Error Rate (EER) Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an alarm is generated when an excessive error rate condition is detected on the synchronous data port. <ul style="list-style-type: none"> <li>■ Excessive Error Rate does not appear if:               <ul style="list-style-type: none"> <li>– Embedded Data Link is set to Disable.</li> <li>– Management Link is set to FDL on the Network Interface Options screen (see Table 5-1).</li> </ul> </li> </ul> <p><b>Enable</b> – Generates an alarm.</p> <p><b>Disable</b> – Does not generate an alarm.</p>
<b>Excessive Error Rate Threshold</b>
Possible Settings: <b>10E-4, 10E-5, 10E-6, 10E-7, 10E-8, 10E-9</b> Default Setting: <b>10E-4</b>
Sets the error rate threshold that determines when an excessive error rate (EER) condition is declared for a synchronous data port. The EER is determined by the ratio of the number of CRC5 errors to the total number of bits received over a set period of time. <ul style="list-style-type: none"> <li>■ Excessive Error Rate Threshold does not appear if:               <ul style="list-style-type: none"> <li>– Excessive Error Rate is set to Disable.</li> <li>– Embedded Data Link is set to Disable.</li> <li>– Management Link is set to FDL on the Network Interface Options screen (see Table 5-1).</li> <li>– Both Near-End and Far-End Performance Statistics are set to Disable.</li> </ul> </li> </ul> <p><b>10E-4</b> – Declares an EER if more than 1,535 CRC5 errors are detected in a 10-second period. Clears when fewer than 1,536 CRC5 errors are detected within the same time period.</p> <p><b>10E-5</b> – Declares an EER if more than 921 CRC5 errors are detected in a 60-second period or a <math>10^{-4}</math> condition occurs. Clears when fewer than 922 CRC5 errors are detected within the same time period.</p> <p><b>10E-6</b> – Declares an EER if more than 92 CRC5 errors are detected in a 60-second period or a <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 93 CRC5 errors are detected within the same time period.</p> <p><b>10E-7</b> – Declares an EER if more than 9 CRC5 errors are detected in a 60-second period or a <math>10^{-6}</math>, <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 10 CRC5 errors are detected within the same time period.</p> <p><b>10E-8</b> – Declares an EER if more than 41 CRC5 errors are detected in three 15-minute intervals or a <math>10^{-7}</math>, <math>10^{-6}</math>, <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 42 CRC5 errors are detected within the same time period.</p> <p><b>10E-9</b> – Declares an EER if more than 4 CRC5 errors are detected in three 15-minute intervals or a <math>10^{-8}</math>, <math>10^{-7}</math>, <math>10^{-6}</math>, <math>10^{-5}</math>, or <math>10^{-4}</math> condition occurs. Clears when fewer than 5 CRC5 errors are detected within the same time period.</p>

## Configuring Voice Ports

Use the E&M (Table 5-4), FXO (Table 5-5), and FXS (Table 5-6) Voice Options to configure the voice port on the voice APM in the selected slot.

*Configuration Edit/Display → Voice Ports*

The Voice Port Options screen appears for Port 1 of the first slot containing a voice APM (either FXS, FXO or E&M). The displayed fields differ, depending on the type of voice APM in the selected slot.

### For E&M Voice Ports:

**Table 5-4. E&M Voice – Slot *ss* Port *p* Options (1 of 2)**

Port Status
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether the E&M voice port is in use, and can be configured and assigned to a time slot on the T1 or DSX-1 interface in order to transmit and receive voice frequency signals. <ul style="list-style-type: none"> <li>■ E&amp;M Voice options do not appear if Port Status is set to Disable.</li> </ul> <p><b>Enable</b> – The port is active, and can be configured and assigned to a timeslot.</p> <p><b>Disable</b> – The port is not active, cannot be configured, and does not take up a time slot.</p> <ul style="list-style-type: none"> <li>■ No alarms or traps configured for the port will be generated.</li> <li>■ Existing cross-connect assignments associated with the port will be cleared. The message <b>This action will clear any Cross Connections for the Port. Are You Sure? No</b> appears. If you select: <ul style="list-style-type: none"> <li><b>No</b> – The operation is cancelled. (Pressing either the Esc or Ctrl-a key acts as a No.)</li> <li><b>Yes</b> – Port status is disabled and any cross connections are cleared.</li> </ul> </li> </ul>
Operating Mode
Possible Settings: <b>E&amp;M, Transmit Only</b> Default Setting: <b>E&amp;M</b>
Selects the operating mode for the E&M voice port. <ul style="list-style-type: none"> <li>■ Operating Mode only appears if Port Status is set to Enable.</li> </ul> <p><b>E&amp;M</b> – Enables normal earth and magnetic (E&amp;M) mode.</p> <p><b>Transmit Only</b> – Enables the mode used to support 4-wire private-line modems that do not require E&amp;M signaling.</p>

**Table 5-4. E&M Voice – Slot *ss* Port *p* Options (2 of 2)**

<b>Rx Gain (dB)</b>
Possible Settings: <b>-17.0, -16.5, -16.0, -15.5, -15.0 ..., 0.0, ..., +6.5, +7.0, +7.5</b> Default Setting: <b>0.0</b>
<p>Determines the receive path analog signal amplification on the E&amp;M voice port in decibels. This is the gain (increased signal level) or attenuation (decreased signal level) applied to the signal before it is presented to the user's analog equipment.</p> <p>The range differs depending on the T1 NAM and E&amp;M software revision, and the hardware revision. Go to <i>Main Menu</i> → <i>Status</i> → <i>Identity</i> → <i>System &amp; NAM</i> to view the revision levels.</p> <ul style="list-style-type: none"> <li>■ Rx Gain (dB) only appears if Port Status is set to Enable.</li> </ul> <p><b>-17.0 to +7.5</b> – Increases or decreases the signal level. The more positive the number, the greater the signal level.</p>
<b>Tx Attenuation (dB)</b>
Possible Settings: <b>-17.0, -16.5, -16.0, -15.5, -15.0 ..., 0.0, ..., +6.5, +7.0, +7.5</b> Default Setting: <b>0.0</b>
<p>Determines the amount of attenuation, in dB, that the E&amp;M voice receive port applies to the analog signal presented by the user's analog equipment transmit port. Positive TX Attenuation settings reduce the level of the encoded analog signals sent towards the telephone network, and negative settings will introduce gain. The proper setting of this strap is crucial to ensuring compliance with Part 68, FCC Rules and Industry Canada's CS-03 Specification.</p> <p>The range differs depending on the T1 NAM and E&amp;M software revision, and the hardware revision. Go to <i>Main Menu</i> → <i>Status</i> → <i>Identity</i> → <i>System &amp; NAM</i> to view the revision levels.</p> <ul style="list-style-type: none"> <li>■ Tx Attenuation (dB) only appears if Port Status is set to Enable.</li> </ul> <p><b>-17.0 to +7.5</b> – Increases or decreases the signal level. The more positive the number, the greater the signal level.</p>
<b>Trunk Cond in CGA</b>
Possible Settings: <b>Busy, Idle</b> Default Setting: <b>Busy</b>
<p>Determines the trunk condition or state that the port is forced into as a result of the Carrier Group Alarm (CGA).</p> <ul style="list-style-type: none"> <li>■ Trunk Cond in CGA only appears if Port Status is set to Enable.</li> </ul> <p><b>Busy</b> – Forces the port to Busy during a CGA.</p> <p><b>Idle</b> – Forces the port to Idle during a CGA.</p>

**For FXO Voice Ports:****Table 5-5. FXO Voice – Slot *ss* Port *p* Options (1 of 3)**

<b>Port Status</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
<p>Specifies whether the FXO voice port is in use, and can be configured and assigned to a time slot on the T1 or DSX interface in order to transmit and receive voice frequency signals.</p> <ul style="list-style-type: none"> <li>■ FXO Voice options do not appear if Port Status is set to Disable.</li> </ul> <p><b>Enable</b> – The port is active, and can be configured and assigned to a timeslot.</p> <p><b>Disable</b> – The port is not active, cannot be configured, and does not take up a time slot.</p> <ul style="list-style-type: none"> <li>■ No alarms or traps configured for the port will be generated.</li> <li>■ Existing cross-connect assignments associated with the port will be cleared. The message <b>This action will clear any Cross Connections for the Port. Are You Sure? No</b> appears. If you select:               <ul style="list-style-type: none"> <li><b>No</b> – The operation is cancelled. (Pressing either the Esc or Ctrl-a key acts as a No.)</li> <li><b>Yes</b> – Port status is disabled and any cross connections are cleared.</li> </ul> </li> </ul>
<b>Operating Mode</b>
Possible Settings: <b>FXO, FXODN, FXODN/WINK, DPT</b> Default Setting: <b>FXO</b>
<p>Selects the operating mode for the FXO voice port.</p> <ul style="list-style-type: none"> <li>■ Operating Mode only appears if Port Status is set to Enable.</li> </ul> <p><b>FXO</b> – Enables the Foreign Exchange Office (FXO) mode, supporting a bidirectional connection to a PBX phone line. This mode uses 4-state signaling (A&amp;B).</p> <p><b>FXODN</b> – Enables Foreign Exchange Office Software-Defined Network (FXODN) mode for operation on software-defined networks. This mode is used by Class 4 switches and uses 2-state signaling (A=B).</p> <p><b>FXODN/WINK</b> – Enables the mode FXODN with WINK which is similar to FXODN, but in addition provides an indication toward the network interface when the attached analog equipment is ready to receive signaling information. This consists of detecting an off-hook signal from the network interface, which initiates a configurable “wink delay” followed by a configurable off-hook signal back to the network interface.</p> <p><b>DPT</b> – The Dial Pulse Terminating (DPT) mode is similar to FXO, except for supporting in-coming, one-way trunks to a PBX (direct inward dialing) or key system.</p>



**Table 5-5. FXO Voice – Slot *ss* Port *p* Options (2 of 3)**

<b>Signaling Type</b>
Possible Settings: <b>Loop-Start, Loop-Start/Fwd Disc, Ground-Start</b> Default Setting: <b>Loop-Start</b>
Determines the type of signaling for the FXO voice port. <ul style="list-style-type: none"> <li>■ Signaling Type only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is not set to DPT.</li> </ul> </li> </ul> <p><b>Loop-Start</b> – Enables the signaling used for basic telephone service stations, simple PBX trunks, or key systems.</p> <p><b>Loop-Start/Fwd Disc</b> – Enables the signaling used for automated answering equipment.</p> <p><b>Ground-Start</b> – Enables the signaling used for two-way PBX trunks. Helps to prevent “glaring”, i.e., call collision.</p>
<b>Terminating Impedance (ohms)</b>
Possible Settings: <b>600, 900</b> Default Setting: <b>600</b>
Determines the terminating impedance (in ohms) for the port. <ul style="list-style-type: none"> <li>■ Terminating Impedance only appears if Port Status is set to Enable.</li> </ul> <p><b>600</b> – The terminating impedance is 600 ohms.</p> <p><b>900</b> – The terminating impedance is 900 ohms.</p>
<b>Wink Delay (10 ms)</b>
Possible Settings: <b>1 – 99</b> Default Setting: <b>15</b>
Determines the amount of delay before the wink signal is generated towards the network, and when an off-hook signal from the CO is detected in increments of 10 milliseconds. <ul style="list-style-type: none"> <li>■ Wink Delay only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is set to FXODN/WINK or DPT.</li> </ul> </li> </ul> <p><b>10 to 990</b> – The valid range is from 10 to 990 ms, in 10 ms increments. The settings are numbers between 1 and 99, representing such increments. The default is 15, for a wink delay of 150 ms.</p>
<b>Wink Duration (10 ms)</b>
Possible Settings: <b>1 – 99</b> Default Setting: <b>20</b>
Determines the duration of the wink signal generated towards the network when an off-hook signal for the CO is detected and after the wink delay has elapsed in increments of 10 milliseconds. <ul style="list-style-type: none"> <li>■ Wink Duration only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is set to FXODN/WINK or DPT.</li> </ul> </li> </ul> <p><b>10 to 990 ms</b> – The valid range is from 10 to 990 ms, in 10 ms increments. The settings are numbers between 1 and 99, representing such increments. The default is 20, for a wink duration of 200 ms.</p>

**Table 5-5. FXO Voice – Slot *ss* Port *p* Options (3 of 3)**

<b>Rx Gain (dB)</b>
Possible Settings: <b>-10.00, -9.5, -9.0, -8.5, ..., 0.0, +0.5, +1.0, +1.5, +2.0</b> Default Setting: <b>0.0</b>
Determines the receive path analog signal amplification, or gain, on the FXO voice port in decibels. This is the gain (increased signal level) or attenuation (decreased signal level) applied to the signal. <ul style="list-style-type: none"> <li>▪ Rx Gain (dB) only appears if Port Status is set to Enable.</li> </ul> <b>-10.00 to +2.0</b> – Increases or decreases the signal level. The more positive the number, the greater the signal level.
<b>Tx Attenuation (dB)</b>
Possible Settings: <b>-10.00, -9.5, -9.0, -8.5, ..., 0.0, ..., +4.0, +4.5, +5.0</b> Default Setting: <b>0.0</b>
Determines the amount of attenuation, in dB, that the FXO voice port applies to the analog signal presented by the user's analog equipment. Positive TX Attenuation settings reduce the level of the encoded analog signals sent towards the telephone network and negative settings introduce gain. When connecting permissive mode modems and fax machines, a setting of +3 dB should result in a compliant, encoded analog of less than -12 dBm. The proper setting of this strap is crucial to ensuring compliance with Part 68, FCC Rules and Industry Canada's CS-03 Specification. <ul style="list-style-type: none"> <li>▪ Tx Attenuation (dB) only appears if Port Status is set to Enable.</li> </ul> <b>-10.00 to +5.0</b> – Increases or decreases the signal level. The more negative the number, the greater the signal level (opposite of Rx Gain settings).
<b>Trunk Cond in CGA</b>
Possible Settings: <b>Busy, Idle</b> Default Setting: <b>Busy</b>
Determines the trunk condition or state that the port is forced into as a result of the Carrier Group Alarm (CGA). <ul style="list-style-type: none"> <li>▪ Trunk Cond in CGA only appears if Port Status is set to Enable.</li> </ul> <b>Busy</b> – Forces the port to Busy during the Carrier Group Alarm. <b>Idle</b> – Forces the port to Idle during the Carrier Group Alarm.

**For FXS Voice Ports:****Table 5-6. FXS Voice – Slot *ss* Port *p* Options (1 of 4)**

<b>Port Status</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
<p>Specifies whether the FXS voice port is in use, and can be configured and assigned to a time slot on the T1 or DSX-1 interface in order to transmit and receive voice frequency signals.</p> <ul style="list-style-type: none"> <li>■ FXS Voice options do not appear if Port Status is set to Disable.</li> </ul> <p><b>Enable</b> – The port is active, and can be configured and assigned to a timeslot.</p> <p><b>Disable</b> – The port is not active, cannot be configured, and does not take up a time slot.</p> <ul style="list-style-type: none"> <li>■ No alarms or traps configured for the port will be generated.</li> <li>■ Existing cross-connect assignments associated with the port will be cleared. The message <b>This action will clear any Cross Connections for the Port. Are You Sure? No</b> appears. If you select:               <ul style="list-style-type: none"> <li><b>No</b> – The operation is cancelled. (Pressing either the Esc or Ctrl-a key acts as a No.)</li> <li><b>Yes</b> – Port status is disabled and any cross connections are cleared.</li> </ul> </li> </ul>
<b>Operating Mode</b>
Possible Settings: <b>FXS, FXSDN, FXSDN/WINK, PLAR, DPO</b> Default Setting: <b>FXS</b>
<p>Selects the operating mode for the FXS voice port.</p> <ul style="list-style-type: none"> <li>■ Operating Mode only appears if Port Status is set to Enable.</li> </ul> <p><b>FXS</b> – Enables the Foreign Exchange Station (FXS) mode, supporting a bidirectional connection to a telephone device, PBX, or key system trunk. This mode uses 4-state signaling (A&amp;B).</p> <p><b>FXSDN</b> – Enables Foreign Exchange Station Software-Defined Network (FXSDN) mode for operation on software-defined networks. This mode is used by Class 4 switches and uses 2-state signaling (A=B).</p> <p><b>FXSDN/WINK</b> – Enables the mode FXSDN with WINK which is similar to FXSDN, but in addition provides an indication to the central office (CO) when the station equipment is ready to receive signaling information. This consists of detecting an off-hook signal from the CO, which initiates a configurable “wink delay” followed by a configurable off-hook signal back to the CO.</p> <p><b>PLAR</b> – Private Line Automatic Ring-down (PLAR) allows “hotline” point-to-point dedicated connection of two phones. When one phone goes off-hook, the other phone starts ringing.</p> <p><b>DPO</b> – The Dial Pulse Originating (DPO) mode is similar to FXS, except for supporting out-going, one-way trunks from a PBX (direct outward dialing) or key system, or station instrument. No ringing is provided in this mode.</p>

**Table 5-6. FXS Voice – Slot *ss* Port *p* Options (2 of 4)**

<b>Signaling Type</b>
Possible Settings: <b>Loop-Start, Loop-Start/Fwd Disc, Ground-Start, Ground-Start-Immediate, Ground-Start-Automatic, d3, d4</b> Default Setting: <b>Loop-Start</b>
Determines the type of signaling for the FXS voice port. <ul style="list-style-type: none"> <li>■ Signaling Type only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is not set to DPO.</li> </ul> </li> </ul> <p><b>Loop-Start</b> – Enables the signaling used for basic telephone service stations, simple PBX trunks, or key systems. Loop Start only appears if Operating Mode is set to FXS, FXSDN, or FXSDN/WINK.</p> <p><b>Loop-Start/Fwd Disc</b> – Enables the signaling used for automated answering equipment. This selection only appears if Operating Mode is set to FXS, FXSDN, or FXSDN/WINK.</p> <p><b>Ground-Start</b> – Enables the signaling used for two-way PBX trunks. Helps to prevent “glaring”, i.e., call collision. This selection only appears if Operating Mode is set to FXS, FXSDN, or FXSDN/WINK.</p> <p><b>Ground-Start-Immediate</b> – Enables the signaling used for fast response time to the PBX or station. This selection only appears if Operating Mode is set to FXS.</p> <p><b>Ground-Start-Automatic</b> – Enables the signaling used for fast response time to the central office. This selection only appears if Operating Mode is set to FXS.</p> <p><b>d3</b> – The APM meets the pre-1988 specifications for PLAR circuits. This selection only appears if Operating Mode is set to PLAR.</p> <p><b>d4</b> – The APM meets the post-1988 specifications for PLAR circuits. This selection only appears if Operating Mode is set to PLAR.</p>
<b>Terminating Impedance (ohms)</b>
Possible Settings: <b>600, 900</b> Default Setting: <b>600</b>
Determines the terminating impedance (in ohms) for the port. <ul style="list-style-type: none"> <li>■ Terminating Impedance only appears if Port Status is set to Enable.</li> </ul> <p><b>600</b> – The terminating impedance is 600 ohms.</p> <p><b>900</b> – The terminating impedance is 900 ohms.</p>
<b>Wink Delay (10 ms)</b>
Possible Settings: <b>1 – 99</b> Default Setting: <b>15</b>
Determines the amount of delay before the wink signal is generated towards the network, and when an off-hook signal from the CO is detected in increments of 10 milliseconds. <ul style="list-style-type: none"> <li>■ Wink Delay only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is set to FXSDN/WINK.</li> </ul> </li> </ul> <p><b>10 to 990</b> – The valid range is from 10 to 990 ms, in 10 ms increments. The settings are numbers between 1 and 99, representing such increments. The default is 15, for a wink delay of 150 ms.</p>

**Table 5-6. FXS Voice – Slot *ss* Port *p* Options (3 of 4)**

<b>Wink Duration (10 ms)</b>
Possible Settings: <b>1 – 99</b> Default Setting: <b>20</b>
Determines the duration of the wink signal generated towards the network when an off-hook signal for the CO is detected and after the wink delay has elapsed in increments of 10 milliseconds. <ul style="list-style-type: none"> <li>■ Wink Duration only appears if:               <ul style="list-style-type: none"> <li>– Port Status is set to Enable.</li> <li>– Operating Mode is set to FXSDN/WINK.</li> </ul> </li> </ul> <b>10 to 990 ms</b> – The valid range is from 10 to 990 ms, in 10 ms increments. The settings are numbers between 1 and 99, representing such increments. The default is 20, for a wink duration of 200 ms.
<b>Rx Gain (dB)</b>
Possible Settings: <b>–10.00, –9.5, –9.0, –8.5, ..., 0.0, +0.5, +1.0, +1.5, +2.0</b> Default Setting: <b>0.0</b>
Determines the receive path analog signal amplification, or gain, on the FXS voice port in decibels. This is the gain (increased signal level) or attenuation (decreased signal level) applied to the signal. <ul style="list-style-type: none"> <li>■ Rx Gain (dB) only appears if Port Status is set to Enable.</li> </ul> <b>–10.00 to +2.0</b> – Increases or decreases the signal level. The more positive the number, the greater the signal level.
<b>Tx Attenuation (dB)</b>
Possible Settings: <b>–10.00, –9.5, –9.0, –8.5, ..., 0.0, ..., +4.0, +4.5, +5.0</b> Default Setting: <b>0.0</b>
Determines the amount of attenuation, in dB, that the FXS voice port applies to the analog signal presented by the user's analog equipment. Positive TX Attenuation settings reduce the level of the encoded analog signals sent towards the telephone network and negative settings introduce gain. When connecting permissive mode modems and fax machines, a setting of +3 dB should result in a compliant, encoded analog of less than –12 dBm. The proper setting of this strap is crucial to ensuring compliance with Part 68, FCC Rules and Industry Canada's CS-03 Specification. <ul style="list-style-type: none"> <li>■ Tx Attenuation (dB) only appears if Port Status is set to Enable.</li> </ul> <b>–10.00 to +5.0</b> – Increases or decreases the signal level. The more negative the number, the greater the signal level (opposite of Rx Gain settings).
<b>Ring-Back Tone</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Allows generation of an audible tone toward the network in response to an incoming call request, normally referred to as a ring-back. This feature is invoked only when the central office (CO) does not provide it, as with a Class 4 ESS switch. This tone indicates to the calling party that the called line has been reached and ringing has started. Use the ring-back tone when you have a PLAR application. <ul style="list-style-type: none"> <li>■ Ring-Back Tone only appears if Port Status is set to Enable.</li> </ul> <b>Enable</b> – Generates a ring-back tone toward the network in response to an incoming call request. <b>Disable</b> – Does not generate a ring-back tone toward the network in response to an incoming call request.

**Table 5-6. FXS Voice – Slot *ss* Port *p* Options (4 of 4)**

<b>Trunk Cond in CGA</b>
Possible Settings: <b>Busy, Idle</b> Default Setting: <b>Busy</b>
Determines the trunk condition or state that the port is forced into as a result of the Carrier Group Alarm (CGA). <ul style="list-style-type: none"> <li>■ Trunk Cond in CGA only appears if Port Status is set to Enable.</li> </ul> <p><b>Busy</b> – Forces the port to Busy during the Carrier Group Alarm.</p> <p><b>Idle</b> – Forces the port to Idle during the Carrier Group Alarm.</p>

## Configuring OCU-DP Ports

Use the OCU-DP Options (Table 5-7) to configure the ports (either two or six) on the OCU-DP APM in the selected slot.

*Configuration Edit/Display → OCU-DP Ports*

The OCU-DP Options screen appears for Port 1 of the first slot containing an OCU-DP APM.

**Table 5-7. OCU-DP Options – Slot *ss* Port *p* Options (1 of 3)**

<b>Port Status</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether the OCU-DP port is in use, and can be configured and used to transmit and receive data. <ul style="list-style-type: none"> <li>■ OCU-DP options do not appear if Port Status is set to Disable.</li> </ul> <p><b>Enable</b> – The port is active, and can be configured used to</p> <p><b>Disable</b> – The port is not active, cannot be configured, and cannot transmit/receive data.</p> <ul style="list-style-type: none"> <li>■ No alarms or traps configured for the port will be generated.</li> <li>■ Existing cross-connect assignments associated with the port will be cleared. The message <b>This action will clear any Cross Connections for the Port. Are You Sure? <u>No</u></b> appears. If you select: <ul style="list-style-type: none"> <li><b>No</b> – The operation is cancelled. (Pressing either the Esc or Ctrl-a key acts as a No.)</li> <li><b>Yes</b> – Port status is disabled and any cross connections are cleared.</li> </ul> </li> </ul>

**Table 5-7. OCU-DP Options – Slot *ss* Port *p* Options (2 of 3)**

<b>Port Rate</b>
Possible Settings: <b>56K, 64KCC, Switched_56</b> Default Setting: <b>56K</b>
Selects the rate for the port. <ul style="list-style-type: none"> <li>▪ Port Rate only appears if Port Status is set to Enable.</li> </ul> <p><b>56K</b> – The setting for 56 kbps.</p> <p><b>64KCC</b> – The setting for 64 kbps Clear Channel.</p> <p><b>Switched_56</b> – The rate for 4-wire Switched 56.</p>
<b>Loopback Detection</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether the the T1 access unit will detect loopback activation codes coming from the network. <ul style="list-style-type: none"> <li>▪ Loopback Detection only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – Loopback code detection is enabled.</p> <p><b>Disable</b> – Loopback code detection is disabled.</p>
<b>Loss of Signal Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether an ASCII alarm will be generated when a Loss of Signal condition is detected. <ul style="list-style-type: none"> <li>▪ Loss of Signal Alarm only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – An alarm is generated when a Loss of Signal condition is detected on the interface.</p> <p><b>Disable</b> – Alarms are not generated for a Loss of Signal condition.</p>
<b>Abnormal Station Code Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether an ASCII alarm will be generated when an Abnormal Station code is received from the network. <ul style="list-style-type: none"> <li>▪ Abnormal Station Code Alarm only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – An alarm is generated when an Abnormal Station Code is received from the network.</p> <p><b>Disable</b> – Alarms are not generated when an Abnormal Station Code is received.</p>

**Table 5-7. OCU-DP Options – Slot *ss* Port *p* Options (3 of 3)**

<b>64KCC Loop OOF Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether an ASCII alarm will be generated when a 64KCC Loop Out of Frame (OOF) condition is detected. <ul style="list-style-type: none"> <li>▪ A 64KCC Loop Out of Frame (OOF) Alarm only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – An alarm is generated when a 64KCC Loop Out of Frame condition is detected on the interface.</p> <p><b>Disable</b> – Alarms are not generated for a 64KCC Loop Out of Frame condition.</p>
<b>DDS Network Failure Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether an ASCII alarm will be generated when a DDS Network Failure code is received from the network. <ul style="list-style-type: none"> <li>▪ DDS Network Failure Alarm only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – An alarm is generated when a DDS Network Failure code is received from the network.</p> <p><b>Disable</b> – Alarms are not generated for a DDS Network Failure.</p>
<b>Loss of Loop Timing Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether an ASCII alarm will be generated when a Loss of Loop Timing condition is received from the network. <ul style="list-style-type: none"> <li>▪ Loss of Loop Timing Alarm only appears if Port Status is set to Enable.</li> </ul> <p><b>Enable</b> – An alarm is generated when a Loss of Loop Timing condition is detected on the interface.</p> <p><b>Disable</b> – Alarms are not generated for a Loss of Loop Timing condition.</p>



## Copying Port Configurations

Copy Ports provides an easy way to configure similar ports. Only enabled ports may be copied. They may be copied to either enabled or disabled ports.

### ► Procedure

1. Follow this menu selection sequence:  
*Configuration Edit/Display → Copy Ports*
2. The Copy Ports screen appears. Select the desired slot number to copy configuration options from. Upon entering the screen, the slot number of the T1 NAM is displayed. Use the spacebar to cycle through the slots. You can also type in the desired slot number.
3. Select the desired port number to copy configuration options from. Use the spacebar to cycle through the ports available on the card in the selected slot. Only slots matching the type shown in the From: field are displayed. You can also type in the desired slot number.
4. Repeat Steps 2 and 3 to select the slot and port to copy configuration options to.
5. Press Enter to begin the copy process.

If the . . .	Then the . . .
Copy To slot and Copy To port are set to a specific slot and port number	Copy To slot and port configuration options are replaced by the Copy From slot and port configurations options.
Copy To slot is set to a specific number and the Copy To port is set to All	Configuration options of all ports on the Copy To slot are replaced by the Copy From slot and port configuration options.
Copy To slot is set to All the Copy To port is set to a specific number	Configuration options of the Copy To port of all slots containing the same type of port (Voice E&M, Voice FXO, Voice FXS, Sync Data, or OCU-DP) as on the Copy From slot are replaced by the Copy From slot and port configuration options.
Copy To slot and the Copy To port are both set to All	Configuration options of all ports of all slots containing the same type of port (Voice E&M, Voice FXS, Sync Data, or OCU-DP) as on the Copy From slot are replaced by the Copy From slot and port configuration options.

6. Select **Perform Copy Then Increment** if you want to automatically change the values to the next higher port of the same type. If the last port of the highest slot was specified, the value will change to Port 1 of the lowest slot containing the same port type.

## Assigning Cross Connections

The system allows you to assign data paths between the various interfaces to share the T1 network. Assuming that both the Network and DSX-1 interfaces are enabled and that at least one voice port APM is installed, you can make the following cross connections:

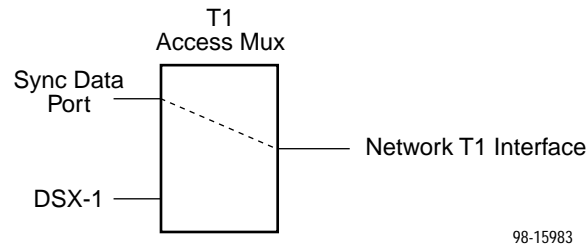
- Assign DSX-1 time slots to the Network interface
- Assign Network 2 interface timeslots to the Network 1 interface
- Assign voice ports to DSX-1 or Network interface timeslots
- Assign Sync Data ports to DSX-1 or Network interface timeslots, or to another Sync Data port
- Assign OCU-DP data ports to DSX-1 or Network interface timeslots

You can also clear cross-connection assignments.

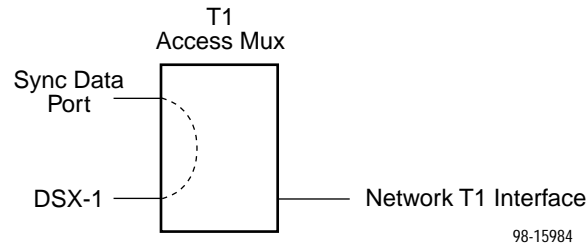
### **NOTE:**

Although it is not required, it is suggested that you progress through each screen in order, from top to bottom.

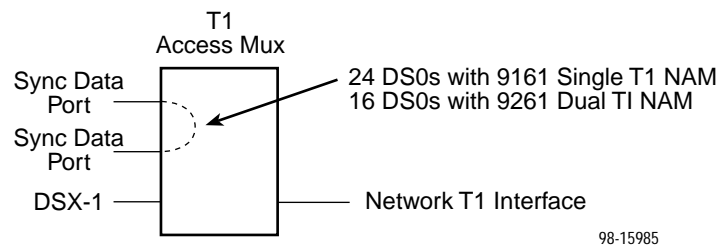
The following figures illustrate various cross-connection assignments.



**Assigning Sync Data Ports to Network Interface Timeslots**

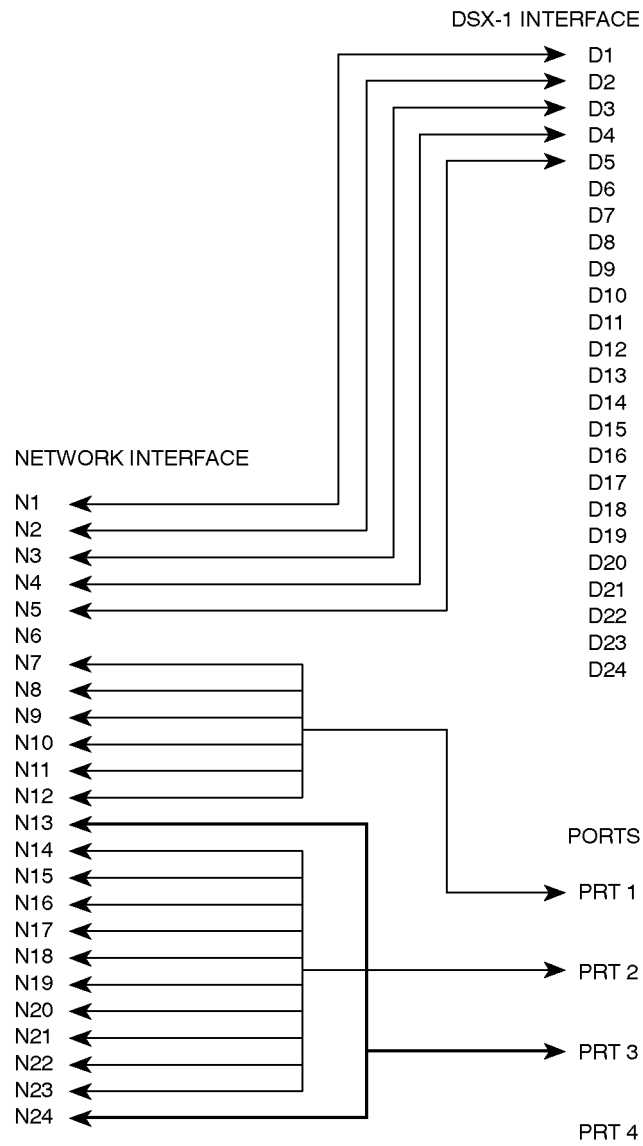


**Assigning Sync Data Ports to DSX-1 or Network Interface Timeslots (9161 Single T1 NAM Only)**



**Assigning Sync Data Ports to DSX-1 Timeslots or to Another Sync Data Port**

Use the worksheets in Appendix A and the following procedures to assign cross connections.



493-14340

**Example Channel Allocation**

## Assigning DSX-1 Timeslots to the Network Interface

DSX-1 timeslots are assigned by channel allocation, where you specify individual timeslots. The DSX-1 interface must be enabled to assign DSX-1 timeslots to the Network interface.

Value	Meaning
Nxx	The lower field represents timeslot xx of the selected Network interface.
Assigned	The timeslot is already assigned to something other than a DSX-1 timeslot, so it is unavailable. Assigned timeslots cannot be modified from this screen.
Available	The timeslot is currently unassigned.
Dss-p/yy	Timeslot yy of DSX-1 interface p in slot ss is assigned to the Network timeslot identified right above it (Nxx).

Timeslot assignment rules:

- Valid Network timeslots are either labeled as **Available**, or contain a DSX-1 timeslot assignment
- Valid DSX-1 timeslots are those that are unassigned, and the currently assigned timeslot
- Order of display is as follows:
  - **Available** is the first selection
  - Then, from lowest DSX-1 interface to the highest DSX-1 interface
  - Then lowest available timeslot number to the highest available timeslot number

For example, if the cursor is on a field with the **Available** value under assigned timeslot Nxx, pressing the Spacebar causes this field's values to cycle through all valid DSX-1 timeslots, starting with Dss-p/yy, assuming it is unassigned. If Dss-p/yy is already assigned, the next valid timeslot in the order described above is displayed.

**► Procedure**

1. Follow this menu selection sequence:  
*Configuration Edit/Display → Cross Connect → DSX-1 to Network Assignments*
2. The DSX-1 to Network Assignments screen appears. This screen contains a matrix of the current cross-connect status of all time slots on the Network interface.
3. If you are using the 9261 Dual T1 NAM, you must choose which Network interface to use. Enter **1** or **2** in the NETWORK field.
4. Move the cursor to the next editable timeslot (underlined). Use the spacebar or type in the desired timeslot to display the desired timeslot assignment.
5. Repeat Step 3 until all desired timeslots are assigned. Select Save to save the assignments, or press ESC to save and return to the Cross Connect menu.

**DSX-1 Signaling Assignments and Trunk Conditioning**

The second page of the DSX-1 to Network 1/2 Assignments screen enables you to define the signaling assignments and trunk conditioning for each timeslot on the DSX-1 interface. You can specify whether robbed bit signaling information is being passed within a given DS0, and the value of the signaling bits that will be transmitted for that DS0 to the other cross-connected T1 interface if a Carrier Group Alarm (CGA) occurs on a T1 interface.

Only those DSX-1-to-Network assignments from page 1 are displayed on this page, from left to right and top to bottom in ascending order, by network and timeslot.

When a CGA condition (LOS, OOF or AIS) is declared for a T1 interface, the signaling bits being transmitted to the other T1 interface for the DS0 are forced to idle for two seconds (except for user-defined patterns which are transmitted immediately). This drops any call in progress. The signaling bits are then forced to the selected state (Busy or Idle), and remain in this state until the CGA condition clears. At this point, the received signaling bits from the T1 interface which formerly had the CGA condition are passed through to the other T1 interface.

**NOTE:**

Trunk conditioning will only occur on DS0s that are cross-connected to another T1 interface. All other DS0s remain unaffected by trunk conditioning.

Enter one of the values shown in [Table 5-8](#) in each of the fields on both the Network side and the DSX-1 side. Although you can choose any value for the DSX-1 side, the default value displayed is based on a typical setting that would be used with the corresponding Network side value. Typical pairs of values are shown in the table below. If you change the setting of **None** to anything else, the DSX side value is changed to the corresponding default value.

**Table 5-8. Signaling and Trunk Conditioning Values (1 of 2)**

<b>Network Side Value</b>	<b>Meaning</b>	<b>DSX-1 Side Default Value</b>
None	No signaling used on this DS0. Use this setting if there is no voice signaling information being passed on this DS0 (clear channel).	None
RBS (default)	Robbed Bit Signaling is used on this DS0, but no trunk conditioning. Signaling bits will be passed to the T1 interface to which this DS0 is cross-connected when this T1 interface is not in CGA, but the signaling bits will be all ones when CGA is present.	RBS
The following values will configure the cross-connect for RBS, as well as perform the trunk conditioning indicated when a CGA condition occurs. Although the ABCD signaling bits for each setting are described, only AB bits are transmitted when the cross-connected T1 interface is using D4 framing.		
E&M-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an E&M interface (ABCD = 0000).	E&M idle
E&M-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an E&M interface (ABCD = 1111).	E&M busy
FXOg-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXO Ground-Start interface (ABCD = 1111).	FXSg-idle
FXOg-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXO Ground-Start interface (ABCD = 0101).	FXSg-busy
FXOI-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXO Loop-Start interface (ABCD = 0101).	FXSI-idle
FXOI-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXO Loop-Start interface (ABCD = 0101).	FXSI-busy
FXSg-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXS Ground-Start interface (ABCD = 0101).	FXOg-idle
FXSg-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXS Ground-Start interface (ABCD = 1111).	FXOg-busy
FXSI-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXS Loop-Start interface (ABCD = 0101).	FXOI-idle
FXSI-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXS Loop-Start interface (ABCD = 1111).	FXOI-busy

**Table 5-8. Signaling and Trunk Conditioning Values (2 of 2)**

<b>Network Side Value</b>	<b>Meaning</b>	<b>DSX-1 Side Default Value</b>
FXOD-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXODN interface (ABCD = 0000).	FXSD-idle
FXOD-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXODN interface (ABCD = 1111).	FXSD-busy
FXSD-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for an FXSDN interface (ABCD = 0000).	FXOD-idle
FXSD-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an FXSDN interface (ABCD = 1111).	FXOD-busy
PLAR3idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for a PLAR D3 interface (ABCD = 0000).	PLAR3idle
PLAR3busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an PLAR D3 interface (ABCD = 1111).	PLAR3busy
PLAR4idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for a PLAR D4 interface (ABCD = 1111).	PLAR4idle
PLAR4busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for an PLAR D4 interface (ABCD = 0000).	PLAR4busy
DPO-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for a DPO interface (ABCD = 0000).	DPT-idle
DPO-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for a DPO interface (ABCD = 1111).	DPT-busy
DPT-idle	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the idle state for a DPT interface (ABCD = 0000).	DPO-idle
DPT-busy	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent the busy state for a DPT interface (ABCD = 1111).	DPO-busy
USER-xxxx	The signaling bits transmitted to the cross-connected T1 interface during a CGA represent a user-defined pattern of ABCD = xxxx.	USER-xxxx <sup>1</sup>
<sup>1</sup> xxxx is the same value on both the Network and the DSX-1 sides.		



## Assigning Network 2 Timeslots to Network 1 Interface Timeslots

If you are using a 9261 Dual T1 NAM, you can assign Network 2 interface timeslots to Network 1 interface timeslots.

### ► Procedure

1. Follow this menu selection sequence:  
*Configuration Edit/Display* → *Cross Connect* → *Network to Network Assignments*
2. The Network to Network Assignments screen appears. This screen contains a matrix of the current cross-connect status of all time slots on the Network 1 interface.
3. Move the cursor to the next editable timeslot (underlined). Use the spacebar or type in the desired timeslot to display the desired timeslot assignment.
4. Repeat Step 3 until all desired timeslots are assigned. Select Save to save the assignments, or press ESC to save and return to the Cross Connect menu.

## Network to Network Signaling Assignments and Trunk Conditioning

The second page of the Network to Network Assignments screen enables you to define the signaling assignments and trunk conditioning for each timeslot on the Network 1 interface.

Only those Network-to-Network assignments from page 1 are displayed on this page, from left to right and top to bottom in ascending order, by network timeslot.

See *DSX-1 Signaling Assignments and Trunk Conditioning* on page 5-40 for more information.

Enter one of the values shown in Table 5-8 in each of the fields on both the Network 1 side and the Network 2 side. Although you can choose any value for the Network 2 side (except **None**), the default value displayed is based on a typical setting that would be used with the corresponding Network 1 side value. Typical pairs of values are shown in Table 5-8, with the Network 1 side on the left side of the table and the Network 2 side on the right side of the table. If you change the setting of **None** to anything else, the Network 2 side value is changed to the corresponding default value.

## Assigning Voice Ports to DSX-1 or Network Interface Timeslots

Use the Voice Port Assignments screen to view the status of all DS0 assignments on the Network or DSX-1 interface. You can also use this screen to assign voice ports to selected timeslots.

### NOTE:

You can assign voice ports to the DSX-1 interface on the 9161 Single T1 NAM. Voice port assignments on the Dual DSX APM are not supported.

### ► Procedure

1. Follow this menu selection sequence:  
*Configuration Edit/Display → Cross Connect → Voice Port Assignment*
2. The Cross Connect menu appears. Select Voice Port Assignment and press Return. The Voice Port Assignments screen appears.
3. Enter **Net1**, **Net2**, or **DSX01-1** into the Assign To field to assign voice ports to the Network 1, Network 2, or DSX-1 interface, respectively.
4. Move the cursor to the next editable timeslot (underlined). Use the spacebar or type in the desired slot and port. Repeat this step until all desired timeslots are assigned.
5. Select Save to save the assignments, or press ESC to save and return to the Cross Connect menu.

## Assigning Sync Data Ports

Use the Sync Data Port Assignments screen to view the status of

- All DS0 assignments on the Network interface
- All DS0 assignments on the DSX-1 interface
- A port-to-port assignment

You can also use this screen to assign synchronous data ports to

- Network interface timeslots
- DSX-1 interface timeslots

### NOTE:

You can assign sync data ports to the DSX-1 interface on the 9161 Single T1 NAM. Sync data port assignments on the Dual DSX APM are not supported.

- Another synchronous data port

### NOTE:

Only one port-to-port assignment is allowed, with a maximum of 24 DS0s for 9161 Single T1 NAM, 16 DS0s for 9261 Dual T1 NAM.

## ► Procedure

1. Follow this menu selection sequence:

*Configuration Edit/Display* → *Cross Connect* → *Sync Data Port Assignment*

2. The Sync Data Port Assignments screen appears. Enter one of the following into the Assign To field:

If you want to assign to . . .	Then enter . . .
Network interface timeslots	Net1 or Net2
DSX-1 interface timeslots on the 9161 Single T1 NAM	DSX01-1
Another Sync Data port	Port

3. Enter the number of DS0s to allocate.
4. Enter one of the following into the Assign By field:

Enter . . .	To . . .
Channel	Assign ports individually. However, a Sync Data port can be assigned to multiple timeslots which do not have to be contiguous. As you assign multiple timeslots to a port, the data port rate increases by the Port Base Rate defined on the Synchronous Data Port Options screen (see <i>Configuring Sync Data Ports</i> on page 5-16).
Block	Assign a block of contiguous channels by specifying the number of DS0s. The number of DS0s is limited to the largest contiguous block of timeslots, and only starting timeslots that have enough contiguous timeslots following will be selectable.
ACAMI	Assign a block of contiguous channels as in the Block method, except that the number of channels assigned is twice the number of DS0s to allocate. Every other timeslot is filled with all ones to maintain ones density on the interface.

5. Move the cursor to the next editable timeslot (underlined). Use the spacebar or type in the desired slot and port. Repeat this step until all desired timeslots are assigned.
6. Select Save to save the assignments, or press ESC to save and return to the Cross Connect menu.

## Assigning OCU-DP Data Ports

Use the OCU-DP Port Assignments screen to view the status of:

- All DS0 assignments on the Network interface
- All DS0 assignments on the DSX-1 interface

You can also use this screen to assign OCU-DP data ports to:

- Network interface timeslots
- DSX-1 interface timeslots

### NOTES:

You can assign OCU-DP ports to the DSX-1 interface on the 9161 Single T1 NAM. OCU-DP port assignments on the Dual DSX APM are not supported.

### ► Procedure

1. Follow this menu selection sequence:

*Configuration Edit/Display → Cross Connect → OCU-DP Port Assignment*

2. The OCU-DP Port Assignments screen appears. Enter one of the following into the Assign To field:

If you want to assign to . . .	Then enter . . .
Network interface timeslots	Net1 or Net2
DSX-1 interface timeslots on the 9161 Single T1 NAM	DSX01-1

3. Move the cursor to the next editable timeslot (underlined). Use the spacebar or type in the desired slot and port. Repeat this step until all desired timeslots are assigned.
4. Select Save to save the assignments, or press ESC to save and return to the Cross Connect menu.

## Clearing Port Assignments

Clearing port assignments sets the selected timeslots to unassigned. You can clear all port assignments for:

- This device
- A specified slot
- A specified interface

### ► Procedure

1. Follow this menu selection sequence:

*Configuration Edit/Display → Cross Connect → Clear Assignments*

2. Select one of the following:

To clear . . .	Then select . . .
All assignments for the DSX-1 time slots, Network time slots, voice ports, and Sync Data ports	Clear All
All assignments for the Network 1 Interface time slots	Clear Network 1 Interface Time Slots
All assignments for the Network 2 Interface time slots	Clear Network 2 Interface Time Slots
All assignments for the DSX01-1 time slots on a 9161 Single T1 NAM	Clear DSX01-1 Time Slots
Assignments for the synchronous data ports on the NAM in slot <i>ss</i>	Clear Slot <i>ss</i> – NAM Sync Data Ports
All assignments for the DSX-1 interface 1 time slots in slot <i>ss</i>	Clear DSX <i>ss</i> -1 Interface Time Slots
All assignments for the DSX-1 interface 2 time slots in slot <i>ss</i>	Clear DSX <i>ss</i> -2 Interface Time Slots
Assignments for timeslots or ports on the APM in slot <i>ss</i>	Clear Slot <i>ss</i> – <i>xxxxx</i> where <i>xxxxx</i> = name or type of APM

## Setting System Options

Use the System Options screen (see [Table 5-9](#)) to set the:

- Generation of yellow alarm signals
- User-initiated test timeout
- Clock Source (primary, secondary, external clock rate)
- Generation of primary/secondary clock failure ASCII alarm messages

Use the following menu selection sequence:

*Configuration Edit/Display → System Options*

**Table 5-9. System Options (1 of 4)**

<b>Generate Yellow Alarm Signals</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether the T1 access unit generates yellow alarm signals on the network and DSX-1 Drop/Insert T1 interfaces. The yellow alarm signal is generated in accordance with AT&T Pub TR 62411 when a continuous LOS/OOF condition (red Carrier Failure Alarm (CFA) or AIS signal (Blue CFA)) is detected. <ul style="list-style-type: none"> <li>■ Generate Yellow Alarm Signals does not appear if:               <ul style="list-style-type: none"> <li>– DSX-1 Interface on the 9161 Single T1 NAM is set to Disable or,</li> <li>– 9261 Dual T1 NAM is installed</li> </ul> </li> </ul> <p><b>Enable</b> – The T1 access unit generates yellow alarm signals.</p> <p><b>Disable</b> – The T1 access unit does not generate yellow alarm signals.</p> <p>NOTE: When this configuration option is disabled, the DTE equipment connected to the DSX-1 interface is responsible for generation of the yellow alarm signal for CFAs on the network T1.</p>
<b>Test Timeout</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether or not user-initiated loopback and pattern tests have a duration after which they are terminated. This option does not pertain to a DTE-initiated loopback. <p><b>Enable</b> – User-initiated loopback and pattern tests have a timeout. This setting is recommended when the T1 access unit is managed remotely through an in-band data stream such as EDL, FDL, or DDL. If the T1 access unit is accidentally commanded to execute a test on the interface providing the management access, control can be regained after the timeout expires, terminating the test.</p> <p><b>Disable</b> – Loopback and pattern tests must be manually terminated.</p>

Table 5-9. System Options (2 of 4)

Test Duration (min)
Possible Settings: <b>1 – 120</b> Default Setting: <b>10</b>
Specifies the duration of the user-initiated loopback or pattern tests. <ul style="list-style-type: none"> <li>■ Test Duration (min) only appears if Test Timeout is set to Enable.</li> </ul> <b>1 to 120</b> – Timeout values in minutes.
Primary Clock Source
Possible Settings: <b>Net1, Net2, DSXss-p, Internal, External, Sync Data</b> Default Setting: <b>Net1</b>
The source selected for this configuration option provides all of the timing within the T1 access unit and the clocks for all of the external interfaces. Failure of the clock specified by this configuration option results in automatic fallback to the Secondary Clock Source configuration option setting. Only one APM clock source can be selected for either primary or secondary clock. <p style="margin-left: 40px;">NOTE: For the Primary and Secondary Clock Source options, only Sync Data and Internal can be selected for both options. All other selections must have different settings (e.g., if Primary Clock Source is set to Net1, Secondary Clock Source cannot be set to Net1).</p> <p><b>Net1</b> – The primary clock for the unit is derived from the Network 1 T1 interface.</p> <p><b>Net2</b> – The primary clock for the unit is derived from the Network 2 T1 interface.</p> <p><b>DSXss-p</b> – The primary clock for the unit is derived from the DSX-T1 interface, where <i>ss</i> is the slot number and <i>p</i> is the port number. This selection is only available if a DSX-1 interface is enabled.</p> <p><b>Internal</b> – The primary clock for the unit is the internal clock.</p> <p><b>External</b> – The primary clock for the unit is the external clock (XTXC) provided through one of the synchronous data ports (specified in the Port options). Only a disabled port can be selected, and the port cannot be used for data. This selection only appears if at least one synchronous data port is disabled.</p> <p><b>Sync Data</b> – The primary clock for the unit is derived from the XTXC signal of a synchronous data port (specified in the Port configuration options). Only an enabled port can be selected. This selection only appears if at least one synchronous data port is enabled.</p> <p style="margin-left: 40px;">NOTE: If an EDL for the port is enabled, the external device must provide a clock 8 kbps less than the expected data port rate. For example, if 64 kbps is the selected port rate, the external clock source should supply a 56 kbps clock signal.</p>
Port (for Primary Clock Source)
Possible Settings: <b>SssPp</b> Default Setting: <b>the first available port</b>
Selects a slot and a port number for the Primary Clock Source. <ul style="list-style-type: none"> <li>■ Port only appears if Primary Clock Source is set to Sync Data or External.</li> </ul> <p><b>SssPp</b> – Where <i>ss</i> is the slot number and <i>p</i> is the port number for the Primary Clock Source.</p>

**Table 5-9. System Options (3 of 4)**

<b>Secondary Clock Source</b>
Possible Settings: <b>Net1, Net2, DSX<math>ss-p</math>, Internal, External, Sync Data</b> Default Setting: <b>Internal</b>
<p>Provides a secondary clock source when the primary clock source fails. The source selected for this configuration option provides all of the timing within the unit and the clocks for all of the external interfaces. Only one APM clock source can be selected as the clock source for either primary or secondary clock. The clock source will switch back to primary when the primary clock source returns and is stable for 10 seconds. If the secondary clock source fails, the clock source will switch to internal. The clock source will switch back to primary when the primary clock source returns and is stable for 10 seconds.</p> <p><b>NOTE:</b> For the Primary and Secondary Clock Source options, only Sync Data and Internal can be selected for both options. All other selections must have different settings (e.g., if Primary Clock Source is set to Net1, Secondary Clock Source cannot be set to Net1).</p> <p><b>Net1</b> – The secondary clock for the unit is derived from the Network 1 T1 interface.</p> <p><b>Net2</b> – The secondary clock for the unit is derived from the Network 2 T1 interface.</p> <p><b>DSX<math>ss-p</math></b> – The secondary clock for the unit is derived from the DSX-1 interface, where <math>ss</math> is the slot number and <math>p</math> is the port number. This selection is only available if a DSX-1 interface is enabled.</p> <p><b>Internal</b> – The secondary clock for the unit is the internal clock.</p> <p><b>External</b> – The secondary clock for the unit is the external clock (XTXC) provided through one of the synchronous data ports (specified in the Port configuration option). Only a disabled port can be selected and the port cannot be used for data. This selection only appears if at least one synchronous data port is disabled.</p> <p><b>Sync Data</b> – The secondary clock for the unit is derived from the XTXC signal of a synchronous data port (specified in the Port configuration options). Only an enabled port can be selected. This selection only appears if at least one synchronous data port is enabled.</p> <p><b>NOTE:</b> If an EDL for the port is enabled, the external device must provide a clock 8 kbps less than the expected data port rate. For example, if 64 kbps is the selected port rate, the external clock source should supply a 56 kbps clock signal.</p>
<b>Port (for Secondary Clock Source)</b>
Possible Settings: <b>S<math>ss</math>P<math>p</math></b> Default Setting: <b>the first available port</b>
<p>Selects a slot and a port number for the Secondary Clock Source.</p> <ul style="list-style-type: none"> <li>■ Port only appears if Secondary Clock Source is set to Sync Data or External.</li> </ul> <p><b>S<math>ss</math>P<math>p</math></b> – Where <math>ss</math> is the slot number and <math>p</math> is the port number for the Secondary Clock Source.</p>



**Table 5-9. System Options (4 of 4)**

<b>External Clock Rate (KHz)</b>
Possible Settings: <b>8, 1544, 2048</b> Default Setting: <b>1544</b>
Determines the clock rate when a clock source is configured for an external clock in kilohertz. <ul style="list-style-type: none"> <li>▪ External Clock Rate only appears if Primary or Secondary Clock Source is set to External.</li> </ul> <p><b>8</b> – The external clock rate is 8 KHz.</p> <p><b>1544</b> – The external clock rate is 1544 KHz.</p> <p><b>2048</b> – The external clock rate is 2048 KHz.</p>
<b>Primary Clock Failure Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an ASCII alarm message is generated when a Primary Clock Failure is detected. <p><b>Enable</b> – Generates an ASCII alarm message.</p> <p><b>Disable</b> – Does not generate an ASCII alarm message.</p>
<b>Secondary Clock Failure Alarm</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Specifies whether an ASCII alarm message is generated when a Secondary Clock Failure is detected. <p><b>Enable</b> – Generates an ASCII alarm message.</p> <p><b>Disable</b> – Does not generate an ASCII alarm message.</p>

## Setting User Interface Options

Use the User Interface options to set up:

- The Communication Port
- Support an external device connected to the Communication Port
- Support a Telnet or FTP session through an interconnected IP network

### Setting Up the Communication Port

Use the Communication Port Options screen (see [Table 5-10](#)) to configure the COM port for one of the following functions:

- ASCII terminal interface
- Network communication link to an IP network or IP device
- Alarm port for sending ASCII alarm messages

This screen differs depending upon whether the COM port is configured for synchronous or asynchronous operation.

*Configuration Edit/Display → User Interface → Communication Port Options*

**Table 5-10. Communication Port Options (1 of 5)**

Port Use
Possible Settings: <b>Terminal, Net Link, Alarm</b> Default Setting: <b>Terminal</b>
Assigns a specific use to the communication (COM) port. <b>Terminal</b> – The COM port is the asynchronous terminal interface port. NOTES: <ul style="list-style-type: none"> <li>– ASCII alarm messages may also be supported when the asynchronous terminal interface is not in use.</li> <li>– If the Default Network Destination is set to COM (see <a href="#">Table 5-14</a>) and you change Port Use to Terminal or Alarm, the Default Network Destination is forced to None.</li> </ul> <b>Net Link</b> – The COM port is the network communication link to the IP network or IP device port. CAUTION: If Net Link is used with an external modem attached to the COM port, be aware of the potential security risk of unwanted access to the NMS, or to other devices on the LAN to which the access device has routing table entries for subnet or host routes. <b>Alarm</b> – The COM port is the ASCII alarm message port.

**Table 5-10. Communication Port Options (2 of 5)**

<b>Port Type</b>
Possible Settings: <b>Asynchronous, Synchronous</b> Default Setting: <b>Asynchronous</b>
Specifies whether the port transmits synchronous or asynchronous data. <b>Asynchronous</b> – The port uses asynchronous communication. <b>Synchronous</b> – The port uses synchronous communication. Synchronous is only valid when Port Use is set to Net Link.
<b>Clock Source</b>
Possible Settings: <b>Internal, External</b> Default Setting: <b>Internal</b>
Specifies whether the port uses internal or external clocking when the COM port is set for synchronous transmission. For synchronous operation, the COM port is always defined as a DCE. This configuration option reverses the direction of the clock (TXC, and RXC) interchange circuits and allows the COM port to accept clocking from an external device. Connection to another DCE requires the use of a crossover cable. <ul style="list-style-type: none"> <li>■ Clock Source does not appear if Port Type is set to Asynchronous.</li> </ul> <b>Internal</b> – The COM port uses internal clocking. <b>External</b> – The COM port uses external clocking.
<b>Data Rate (Kbps)</b>
Possible Settings: <b>9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 115.2</b> Default Setting: <b>19.2</b>
Specifies the bits per second rate for the COM port. <ul style="list-style-type: none"> <li>■ Data Rate (Kbps) does not appear if:               <ul style="list-style-type: none"> <li>– Port Type is set to Synchronous and,</li> <li>– Clock Source is set to External.</li> </ul> </li> </ul> <b>9.6</b> – Sets the COM port rate to 9600 bps. <b>14.4</b> – Sets the COM port rate to 14,400 bps. <b>19.2</b> – Sets the COM port rate to 19,200 bps. <b>28.8</b> – Sets the COM port rate to 28,800 bps. (Running above 28.8 may cause problems on older PCs.) <b>38.4</b> – Sets the COM port rate to 38,400 bps. CAUTION: The following speeds (57.6 and 115.2 Kbps) are intended to be used for FTP file transfers only. If you configure one of these rates, be sure to use the standard 14' COM port cable or an equivalent short, low capacitance cable. <b>57.6</b> – Sets the COM port rate to 57,600 bps. <b>115.2</b> – Sets the COM port rate to 115,200 bps.

**Table 5-10. Communication Port Options (3 of 5)**

<b>Character Length</b>
Possible Settings: <b>7, 8</b> Default Setting: <b>8</b>
Specifies the number of bits needed to represent one character. The character length must be set to 8 bits when using the communication port as the network communication link. <ul style="list-style-type: none"> <li>■ Character length defaults to 8 and cannot be changed if Port Use is set to Net Link and Port Type is set to Asynchronous.</li> </ul> <b>7</b> – Sets the character length to seven bits. <b>8</b> – Sets the character length to eight bits. You must use this setting if using the COM port as the network communication link.
<b>Parity</b>
Possible Settings: <b>None, Even, Odd</b> Default Setting: <b>None</b>
Provides a method of checking the accuracy of binary numbers for the COM port. <p><b>None</b> – Provides no Parity.</p> <p><b>Even</b> – Makes the sum of all 1 bits in the character and its corresponding parity bit always even.</p> <p><b>Odd</b> – Makes the sum of all 1 bits in the character and its corresponding parity bit always odd.</p>
<b>Stop Bits</b>
Possible Settings: <b>1, 1.5, 2</b> Default Setting: <b>1</b>
Determines the number of stop bits used for the COM port. <p><b>1</b> – Provides one stop bit.</p> <p><b>1.5</b> – Provides one and a half stop bits.</p> <p><b>2</b> – Provides two stop bits.</p>
<b>Ignore Control Leads</b>
Possible Settings: <b>Disable, DTR</b> Default Setting: <b>Disable</b>
Specifies whether Data Terminal Ready (DTR) is used. <p><b>Disable</b> – Treats control leads as standard operation.</p> <p><b>DTR</b> – Ignores DTR. This may be necessary when connecting to some PAD (Packet Assembly and Disassembly) devices.</p>

**Table 5-10. Communication Port Options (4 of 5)**

<b>Login Required</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether a user ID and password is required in order to log on to the asynchronous terminal interface on the COM port. <ul style="list-style-type: none"> <li>■ Login Required does not appear if Port Use is set to Net Link or Alarms.</li> </ul> <p><b>Enable</b> – Requires a user ID and password to access the asynchronous terminal interface.</p> <p><b>Disable</b> – Does not require a user ID and password to access the asynchronous terminal interface.</p>
<b>Port Access Level</b>
Possible Settings: <b>Level 1, Level 2, Level 3</b> Default Setting: <b>Level 1</b>
Specifies level of user access privilege for the asynchronous terminal interface. <ul style="list-style-type: none"> <li>■ Port Access Level does not appear if Port Use is set to Net Link or Alarms.</li> </ul> <p><b>Level-1</b> – Allows full access and control of the device, including monitoring, diagnostics, and configuration. The user can add, change, and display configuration options, save, and perform device testing.</p> <p><b>Level-2</b> – Allows limited access and control of the device. The user can monitor and perform diagnostics, display status and configuration options information.</p> <p><b>Level-3</b> – Allows limited access with monitoring control only. The user can monitor and display status and configuration screens only.</p>
<b>Inactivity Timeout</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether a user session is disconnected after a specified time of inactivity (no keyboard activity). <ul style="list-style-type: none"> <li>■ Inactivity Timeout does not appear if Port Use is set to Net Link or Alarms.</li> </ul> <p>NOTE: Changing this setting does not affect the current session; it changes all subsequent sessions.</p> <p><b>Enable</b> – Disconnects user session after the specified time of inactivity.</p> <p><b>Disable</b> – Does not disconnect user session.</p>
<b>Disconnect Time (Minutes)</b>
Possible Settings: <b>1 – 60</b> Default Setting: <b>5</b>
Determines the amount of lapsed time before disconnecting a user session in minutes. <ul style="list-style-type: none"> <li>■ Disconnect Time (Minutes) does not appear if: <ul style="list-style-type: none"> <li>– Port Use is set to Net Link or Alarms.</li> <li>– Inactivity Time is set to Disable.</li> </ul> </li> </ul> <p><b>1 – 60</b> – Set the time from 1 to 60 minutes.</p>

**Table 5-10. Communication Port Options (5 of 5)**

<b>RIP</b>
Possible Settings: <b>None, Proprietary</b> Default Setting: <b>None</b>
Specifies which routing information protocol (RIP) is used to enable routing of management between devices. <ul style="list-style-type: none"><li>■ RIP only appears if Port Use is set to Net Link.</li></ul> <p>NOTE: Changing this setting does not affect the current session; it changes all subsequent sessions.</p> <p><b>None</b> – No routing is used. Use this setting when the device at the other end of the management link is not a Paradyne device.</p> <p><b>Proprietary</b> – A proprietary variant of RIP version 1 is used to communicate routing information between devices to enable routing of IP traffic.</p>

## Setting Up the Communication Port to Support an External Device

### NOTE:

To detect when the external device connection has been lost, the communication port's DTR lead should be connected to the external device's DSR lead using a standard EIA-232 crossover cable (the communication port's DTR lead is monitored for loss of connection). The external device must be configured to drop DSR when a disconnect occurs, and to ignore DTR.

Use the External Device Options screen (see [Table 5-11](#)) to set up the COM port to support an external device such as a modem or a PAD. These options control call processing for an external device.

*Configuration Edit/Display → User Interface → External Device*

**Table 5-11. External Device (COM Port) Options (1 of 3)**

External Device Commands
Possible Settings: <b>Disable, AT, Other</b> Default Setting: <b>Disable</b>
Specifies the external device commands to be sent out from the COM port to control the device.  NOTE: The Carrier Detect (CD) lead detects loss of the external device, therefore the external device must not force CD on.  <b>Disable</b> – Commands are not sent out from the communication port.  NOTE: You <i>must</i> use this setting if you have an async terminal connected to the COM port.  <b>AT</b> – AT commands are sent out from the COM port. All AT command strings end with a carriage return (hex 0x0D) and a line feed (hex 0x0A).  <b>Other</b> – Commands configured by the user are sent out from the COM port.  CAUTION: You must <i>not</i> use this setting if you have an async terminal connected to the COM port.  NOTE: Connect Prefix, Connect Indication String, Escape Sequence, Escape Sequence Delay, and Disconnect String options will only be used when the setting is Other. Refer to the <a href="#">Control Characters table</a> on page 5-60.
Dial-In Access
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Controls whether external devices can dial-in to the T1 access unit through the communication port (based on the Communication Use configuration option setting).  <b>Enable</b> – Answers incoming calls and establishes connection to the remote terminal or IP address.  <b>Disable</b> – Does not answer incoming calls. Refer to the <a href="#">Control Characters table</a> on page 5-60.

**Table 5-11. External Device (COM Port) Options (2 of 3)**

<b>Connect Prefix</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>Clear</b>
Specifies the Connect Prefix to dial the directory telephone number. Only used by the T1 access unit when External Device Commands is set to Other.  <b>ASCII Text Field</b> – Changes the Connect Prefix (maximum 20 characters). Refer to the <a href="#">Control Characters table</a> .  <b>Clear</b> – Clears the connect prefix. No connect prefix is used. Refer to the <a href="#">Control Characters table</a> on page 5-60. <ul style="list-style-type: none"> <li>■ Connect Prefix only appears if External Device Commands is set to Other.</li> </ul>
<b>Connect Indication String</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>Clear</b>
Specifies the connect indication string and determines whether a connection (alarms or traps have been dialed out) is established through the COM port. The T1 access unit searches the COM port's receive data stream for the Connect Indication String. If not received within 1 minute, the connection times out. Only used by the T1 access unit when External Device Commands is set to Other.  <b>ASCII Text Field</b> – Adds to or changes the Connection Indication String (maximum 20 characters). Refer to the <a href="#">Control Characters table</a> on page 5-60.  <b>Clear</b> – Clears the connect prefix. The COM port's receive data stream is not searched, and the Carrier Detect (CD) lead is used to determine that a connection has been established. <ul style="list-style-type: none"> <li>■ Connect Indication String only appears if External Device Commands is set to Other.</li> </ul>
<b>Escape Sequence</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>Clear</b>
Specifies the COM port's escape sequence used to switch an external device to command mode before commanding the external device to disconnect. Only used by the T1 access unit when External Device Commands is set to Other.  <b>ASCII Text Field</b> – Changes the Escape Sequence (maximum 20 characters).  <b>Clear</b> – Clears and sets the Escape Sequence. No Escape Sequence is sent out. <ul style="list-style-type: none"> <li>■ Escape Sequence only appears if External Device Commands is set to Other.</li> </ul>
<b>Escape Sequence Delay (Sec)</b>
Possible Settings: <b>None, 0.2, 0.4, 0.6, 0.8, 1.0</b> Default Setting: <b>None</b>
Specifies the delay before sending the first character of the escape sequence and the delay after the last character of the escape in seconds. During the delay, no data is sent from the communication port. Only used by the T1 access unit when External Device Commands is set to Other.  <b>None</b> – No communication port escape delay.  <b>x.x</b> – The delay (0.2, 0.4, 0.6, 0.8, 1.0) used during the COM port's escape sequence. This delay must be configured for a delay greater than or equal to the escape guard time required by the external device. <ul style="list-style-type: none"> <li>■ Escape Sequence Delay only appears if External Device Commands is set to Other.</li> </ul>



**Table 5-11. External Device (COM Port) Options (3 of 3)**

<b>Disconnect String</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>Clear</b>
Specifies the command used to disconnect an external device. Only used by the T1 access unit when External Device Commands is set to Other. <b>ASCII Text Field</b> – Adds to or changes the Disconnect String (maximum 20 characters). Refer to the <a href="#">Control Characters table on page 5-60</a> . <b>Clear</b> – Clears and sets the Disconnect String. <ul style="list-style-type: none"><li>■ Disconnect String only appears if External Device Commands is set to Other.</li></ul>

<b>Control Characters</b>		
<b>Sequence</b>	<b>ASCII</b>	<b>Hex</b>
^A or ^a	SOH	0x01
^B or ^b	STX	0x02
^C or ^c	ETX	0x03
^D or ^d	EOT	0x04
^E or ^e	ENQ	0x05
^F or ^f	ACK	0x06
^G or ^g	BEL	0x07
^H or ^h	BS	0x08
^I or ^i	HT	0x09
^J or ^j	LF or NL	0x0A
^K or ^k	VT	0x0B
^L or ^l	FF or NP	0x0C
^M or ^m	CR	0x0D
^N or ^n	SO	0x0E
^O or ^o	SI	0x0F
^P or ^p	DLE	0x10
^Q or ^q	DC1	0x11
^R or ^r	DC2	0x12
^S or ^s	DC3	0x13
^T or ^t	DC4	0x14
^U or ^u	NAK	0x15
^V or ^v	SYN	0x16
^W or ^w	ETB	0x17
^X or ^x	CAN	0x18
^Y or ^y	EM	0x19
^Z or ^z	SUB	0x1A
^{ or ^[	ESC	0x1B
^\ or ^	FS	0x1C
^] or ^}	GS	0x1D
^^ or ^~	RS	0x1E
^_	US	0x1F

## Setting Up to Support a Telnet or FTP Session

Use the Telnet/FTP Session Options screen to allow a Telnet or FTP session through an interconnected IP network. These options also set up security for the Telnet or FTP session (see Table 5-12). Only one Telnet session can be active at any one time.

### ► Procedure

1. Set the Node IP Address, Node Subnet Mask, Default Network Destination, and the Communication Protocol Port Link (see Table 5-14). Follow this menu selection sequence:

*Configuration Edit/Display → Management and Communication → Communication Protocol*

2. Set the Telnet/FTP configuration options (see Table 5-12). Follow this menu selection sequence:

*Configuration Edit/Display → User Interface → Telnet Session*

3. The Telnet/FTP Session Options screen appears. Enter the desired setting in each selected field.

4. Set the Port Use configuration option to Net Link (see Table 5-10). Follow this menu selection sequence:

*Configuration Edit/Display → User Interface → Communication Port*

Or, set the Management Link configuration option to FDL or DDL, and set the IP address (see Table 5-12). Follow this menu selection sequence:

*Configuration Edit/Display → Network Interface Options*

Or, set the Embedded Data Link configuration option to Enable for the Synchronous Data Port, and set the IP address (see Table 5-3). Follow this menu selection sequence:

*Configuration Edit/Display → Synchronous Data Port Options*

**Table 5-12. Telnet/FTP Session Options (1 of 2)**

<b>Telnet Session</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether the unit responds to a Telnet session request from a Telnet client on an interconnected IP network.  <b>Enable</b> – Allows Telnet sessions between the unit and Telnet client. <b>Disable</b> – Telnet sessions are not allowed.
<b>Telnet Login Required</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Specifies whether a user ID and password is required to sign on the async terminal interface through a Telnet session. If required, the login used is the same login used for an async terminal interface session.  <b>Enable</b> – Requires a user ID and password to sign on a Telnet session. <b>Disable</b> – Does not require a user ID and password to sign on a Telnet session.
<b>Session Access Level</b>
Possible Settings: <b>Level-1, Level-2, Level-3</b> Default Setting: <b>Level-1</b>
Specifies the highest access level allowed during a Telnet session. Effective access level is the lower of either your personal or Telnet session access levels.  <b>Level-1</b> – Allows Telnet access by users with Login ID access levels of 1, 2, and 3, with the capability to view system information, change configuration options, and run tests. This is the highest access level allowed. Use this setting when downloading files. <b>Level-2</b> – Allows Telnet access by users with Login ID access levels of 1, 2, and 3, with the capability to view system information and run tests only; they cannot change configuration options. <b>Level-3</b> – Allows Telnet access by users with Login ID access levels of 1, 2, and 3, with the capability to view system information only; they cannot change configuration options or run tests.
<b>Inactivity Timeout</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether a Telnet session is disconnected after a specified period of keyboard inactivity.  NOTE: Changing this setting does not affect the current session; it changes all subsequent sessions.  <b>Enable</b> – Terminates Telnet session after the specified time of inactivity. <b>Disable</b> – Does not terminate Telnet session during inactivity.
<b>Disconnect Time (Minutes)</b>
Possible Settings: <b>1 – 60</b> Default Setting: <b>5</b>
Determines the amount of keyboard inactive time before disconnecting. <ul style="list-style-type: none"> <li>■ Disconnect Time (Minutes) does not appear if Inactivity Timeout is set to Disable.</li> </ul> <b>1 – 60</b> – Sets the time from 1 to 60 minutes.

**Table 5-12. Telnet/FTP Session Options (2 of 2)**

<b>FTP Session</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether the T1 access unit responds as a server to an FTP session request from an FTP client on an interconnected IP network. Must be enabled when downloading files.  <b>Enable</b> – Allows an FTP session between the T1 access unit and an FTP client. <b>Disable</b> – Does not allow an FTP session.
<b>FTP Login Required</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether a user ID and password is required for an FTP session. If required, the login used is the same login used for an async terminal interface session.  <b>Enable</b> – User is prompted for a user ID and password for an FTP session. <b>Disable</b> – User is not prompted for a user ID and password for an FTP session.

## Configuring for Alarms and Traps

Use the Alarm options screen (see [Table 5-13](#)) to control when and how alarm and trap conditions are automatically initiated by the system.

*Configuration Edit/Display → Alarm*

**Table 5-13. Alarm Options (1 of 3)**

<b>ASCII Alarm Message</b>
Possible Settings: <b>Com Port, Disable</b> Default Setting: <b>Disable</b>
Controls the generation and routing of alarm messages to an ASCII terminal or printer attached to the COM port (either local or remote via an external device).  <b>Com Port</b> – Generates and sends alarm messages to COM port when the Port Use option is set to Alarm (see Table 5-10).  <b>Disable</b> – Does not generate alarm messages.
<b>Alarm &amp; Trap Dial Out</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Controls whether alarm or SNMP trap messages initiate a call if a connection on the COM port's external device has not already been established. If the call is incomplete and the Call Retry configuration option is set to Enable, the alarm or SNMP trap message is held until the call completes or the maximum retry count is exceeded. If more than one alarm message is received while waiting for a call retry, only the highest priority alarm message received is held; all previous messages are discarded. When the port is configured as a network communication link, up to 10 SNMP messages are held (queued) at the interface.  <b>Enable</b> – Automatically calls the phone number contained in the Alarm directory.  <b>Disable</b> – Holds (queues) SNMP trap messages sent to the COM port external device if the COM port external device was not previously established. Does not hold alarm messages.
<b>Trap Disconnect</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Enable</b>
Determines whether the COM port external device connection is disconnected after sending an SNMP trap message. This configuration option only applies to COM port external device connections initiated as a result of sending the SNMP trap message.  <b>Enable</b> – Disconnects the COM port external device call after sending an SNMP trap message.  <b>Disable</b> – Does not disconnect the COM port external device call after sending an SNMP trap message and holds the line until it is disconnected manually or by the remote modem. This enables the NMS to poll the NAM for more information after receiving the SNMP traps.

**Table 5-13. Alarm Options (2 of 3)**

<b>Call Retry</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Controls whether an incomplete call (busy, no answer, etc.) from the alarm or SNMP trap to the COM port's external device is retried. Attempts the call up to 5 times per alarm or SNMP trap message.  <b>Enable</b> – Retries incomplete calls with a delay as specified by the Dial-Out Delay Time configuration option between call attempts.  <b>Disable</b> – Does not retry an incomplete call.
<b>Dial-Out Delay Time (Min)</b>
Possible Settings: <b>1 – 10</b> Default Setting: <b>5</b>
Specifies the number of minutes to wait between successive dial-out alarms and SNMP trap messages and call retry attempts in minutes.  <b>1 – 10</b> – The number of minutes to delay between calls.
<b>Alternate Dial-Out Directory</b>
Possible Settings: <b>None, 1 – 5</b> Default Setting: <b>None</b>
Specifies whether an incomplete call (busy, or no answer, etc.) from the alarm or SNMP trap to the COM port's external device is retried using an alternate telephone number. Attempts the call up to 5 times per alarm or SNMP trap message.  <b>None</b> – Alternate alarm dial out is not performed.  <b>1 – 5</b> – Specifies the call directory containing the telephone number to call in the event that a call cannot be completed to the phone number contained in the Alarm directory.

**Table 5-13. Alarm Options (3 of 3)**

<b>System Alarm Relay</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
<p>Specifies whether an alarm condition for the T1 access unit will activate the system alarm relay. The alarm relay is deactivated when the condition causing the alarm is corrected. If more than one alarm condition is present, the alarm relay remains active until all alarm conditions are cleared for that T1 access unit. You can also deactivate an alarm via the System Alarm Relay Cut-Off selection from the Control menu.</p> <ul style="list-style-type: none"> <li>■ System Alarm Relay only appears if the NAM is installed in a 5-slot housing or access carrier.</li> </ul> <p>Alarm conditions are:</p> <ul style="list-style-type: none"> <li>■ Power supply/fan tray alarm.</li> <li>■ Continuous Loss of Signal (LOS) condition at either the Network or DSX-1 interface, or on any OCU-DP port.</li> <li>■ Continuous Out of Frame (OOF) condition at either the Network or DSX-1 interface.</li> <li>■ Yellow alarm on either the Network or DSX-1 interface.</li> <li>■ Continuous Out of Frame (OOF) condition at any synchronous data port that has the EDL set to Enable.</li> <li>■ Alarm Indication Signal (AIS) received at either the Network or DSX-1 interface.</li> <li>■ Excessive Error Rate (EER) detected at the Network interface.</li> <li>■ Excessive Error Rate (EER) detected at any synchronous data port that has Embedded Data Link set to Enable (see Table 5-3).</li> <li>■ Primary or Secondary Clock Failure.</li> <li>■ Failure of an APM.</li> <li>■ An APM is inserted that does not match the configuration.</li> <li>■ Abnormal Station Code on any OCU-DP port.</li> <li>■ DDS Network Failure on any OCU-DP port.</li> <li>■ Loss of Loop Timing on any OCU-DP port.</li> </ul> <p><b>Enable</b> – Activates alarm conditions on the system alarm relay when an alarm condition occurs.</p> <p><b>Disable</b> – Does not activate alarm conditions on the system alarm relay when an alarm condition occurs.</p>



## Setting Management and Communication Options

Use the Management and Communication Options to set up:

- Communication Protocol
- General SNMP Management
- SNMP NMS Security
- SNMP Traps
- Telnet/FTP

### Setting Communication Protocol

Use the Communication Protocol Options (see [Table 5-14](#)) to specify what is needed to support the IP communication network.

*Configuration Edit/Display* → *Management and Communication* → *Communication Protocol*

#### NOTE:

Be sure to choose an operational link for the default. Should the default link become disabled, unrouteable data will be discarded.

**Table 5-14. Communication Protocol Options (1 of 3)**

Node IP Address
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the IP address needed to access the node. Since this IP address is not bound to a particular port, it can be used for remote access via a logical management link.  <b>000.000.000.000 – 223.255.255.255</b> – Shows the IP address for the node, which you can view or edit. The first digit (i.e., xxx.255.255.255) cannot be 0 or 127, or greater than 223. However, 000 is valid, representing a null address.  <b>Clear</b> – Clears the Node IP address and fills the address with zeros (i.e., 000.000.000.000).
Node Subnet Mask
Possible Settings: <b>000.000.000.000 – 255.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Node Subnet Mask. Specifies the subnet mask needed to access the node. Since this subnet mask is not bound to a particular port, it can be used for remote access via a logical management link.  <b>000.000.000.000 – 255.255.255.255</b> – Shows the subnet mask for the node, which you can view or edit.  <b>Clear</b> – Clears the node subnet mask and fills the address with zeros. When the node subnet mask is all zeros (i.e., 000.000.000.000), the IP protocol creates a default subnet mask based on the class of the IP address: Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000.

**Table 5-14. Communication Protocol Options (2 of 3)**

<b>Default Network Destination</b>
Possible Settings: <b>None, COM, FDL1, FDL2, DDL, EDL<math>ss-p</math></b> Default Setting: <b>None</b>
<p>Specifies where the default network is connected.</p> <ul style="list-style-type: none"> <li>■ Default Network Destination is forced to None if:               <ul style="list-style-type: none"> <li>– Default Network Destination is set to FDL1, FDL2 or DDL and Network Interface is set to Disable on the Network Interface Options screen (see <a href="#">Table 5-1</a>).</li> <li>– Management Link on the Network Interface Options screen is changed to a value inconsistent with the value of Network Interface Destination.</li> <li>– Default Network Destination is set to COM and COM Port Use is set to Terminal or Alarms on the Communication Port Options screen (see <a href="#">Table 5-10</a>).</li> <li>– Default Network Destination is set to EDL<math>ss-p</math> and EDL Management Link is set to Disable on the Synchronous Data Port Options screen for Port <math>p</math> of Slot <math>ss</math> (see <a href="#">Table 5-3</a>).</li> </ul> </li> </ul> <p><b>None</b> – No default network destination. Data that cannot be routed is discarded.</p> <p><b>COM</b> – The communication port is the default network destination. This selection only appears if Port Use is set to Net Link on the Communication Port Options screen (see <a href="#">Table 5-10</a>).</p> <p><b>FDL1</b> – The FDL is the default network destination on Network Interface 1. This selection only appears if Management Link is set to FDL on the Network Interface 1 Options screen (see <a href="#">Table 5-1</a>).</p> <p><b>FDL2</b> – The FDL is the default network destination on Network Interface 2. This selection only appears if Management Link is set to FDL on the Network Interface 2 Options screen (see <a href="#">Table 5-1</a>).</p> <p><b>DDL</b> – The DDL is the default network destination. This selection only appears if Management Link is set to DDL on the Network Interface Options screen (see <a href="#">Table 5-1</a>).</p> <p><b>EDL<math>ss-p</math></b> – The EDL-<math>ss-p</math> port (where <math>ss</math> is the slot number of the NAM or the synchronous data APM belonging to the ports, and <math>p</math> is the number of the port). This selection only appears if EDL Management Link is set to Enable on the Synchronous Data Port Options screen (see <a href="#">Table 5-3</a>) for port <math>p</math> of slot <math>ss</math>.</p>
<b>Communication Port IP Address</b>
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
<p>Specifies the IP address needed to access the unit when the COM port is configured as a network communication link. The IP address is only in effect when the Communication Port Use configuration option is set to Net Link (see <a href="#">Table 5-10</a>).</p> <p><b>000.000.000.000 – 223.255.255.255</b> – Shows the communication port IP address, which you can view or edit. The first digit (i.e., <math>xxx.255.255.255</math>) cannot be 0 or 127, or greater than 223. However, 000 is valid, representing a null address.</p> <p><b>Clear</b> – Clears the IP address for the communication port and fills the address with zeros (i.e., 000.000.000.000).</p>

**Table 5-14. Communication Protocol Options (3 of 3)**

<b>Communication Port Subnet Mask</b>
Possible Settings: <b>000.000.000.000 – 255.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the subnet mask needed to access the unit when the port is configured as a network communication link. The subnet mask is only in effect when the Communication Port Use configuration option is set to Net Link (see Table 5-10).  <b>000.000.000.000 – 255.255.255.255</b> – Shows the subnet mask for the node, which you can view or edit.  <b>Clear</b> – Clears the subnet mask for the communication port and fills the address with zeros. When the node subnet mask is all zeros (i.e., 000.000.000.000), the IP protocol creates a default subnet mask based on the class of the IP address: Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000.
<b>Communication Port Link Protocol</b>
Possible Settings: <b>PPP, SLIP</b> Default Setting: <b>PPP</b>
Specifies the link layer protocol to use when the communication port is configured as a network communication link.  <b>PPP</b> – Point-to-Point Protocol. <b>SLIP</b> – Serial Line IP Protocol. <ul style="list-style-type: none"> <li>▪ This protocol is only in effect when the Communication Port Use configuration option is set to Net Link (see Table 5-10).</li> </ul>
<b>Alternate Communication Port IP Address</b>
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the alternate IP address for the communication port. The Alternate IP Address is used when a call attempt does not complete on the primary alarm/trap telephone number contained in the Alarm directory and the alternate dial-out directory is used to try another telephone number.  <b>000.000.000.000 – 223.255.255.255</b> – Shows the communication port IP address, which you can view or edit. The first digit (i.e., xxx.255.255.255) cannot be 0 or 127, or greater than 223. However, 000 is valid, representing a null address.  <b>Clear</b> – Clears the alternate IP address for the communication port and fills the address with zeros (i.e., 000.000.000.000).
<b>Alternate Communication Port Subnet Mask</b>
Possible Settings: <b>000.000.000.000 – 255.255.255.255, clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the alternate subnet mask needed for the communication port. The alternate subnet mask is used when a call attempt does not complete on the primary alarm/trap telephone number contained in the Alarm directory and the alternate dial-out directory is used to try another telephone number.  <b>000.000.000.000 – 255.255.255.255</b> – View or edit the alternate subnet mask for the node.  <b>Clear</b> – Clears the alternate subnet mask for the communication port and fills the address with zeros (i.e., 000.000.000.000). When the alternate subnet mask is all zeros, the IP protocol creates a default subnet mask based on the class of the IP address: Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000.

## Setting Up for SNMP Management

Use the General SNMP Management Options (see [Table 5-15](#)) to specify what is needed to allow the system to be managed as an SNMP agent by an NMS supporting the SNMP protocol.

*Configuration Edit/Display → Management and Communication → General SNMP Management*

**Table 5-15. General SNMP Management Options (1 of 2)**

<b>SNMP Management</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether SNMP can be used for management of the T1 access unit. <b>Enable</b> – The T1 access unit can be managed as an SNMP agent by an SNMP compatible NMS. <b>Disable</b> – The T1 access unit will not respond to SNMP messages or send SNMP traps.
<b>Community Name 1</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>[public] in ASCII text entry</b>
Specifies the first of two names that are allowed to access the objects in the unit's Management Information Base (MIB). The community name must be supplied by an external SNMP manager whenever that manager tries to access an object in the MIB. <b>ASCII Text Field</b> – Adds to or changes the Community 1 name (maximum 255 characters). <b>Clear</b> – Clears the Community Name 1 field.
<b>Name 1 Access</b>
Possible Settings: <b>Read, Read/Write</b> Default Setting: <b>Read</b>
Specifies the type of access allowed for community name 1. This is the type of access allowed for external SNMP managers accessing objects in the MIB using the Community Name 1 configuration option. <b>Read</b> – Allows read-only access to the objects in the MIB for the NAM when using the Community Name 1 configuration option. This includes all objects specified as either read-only or read/write in the MIB RFCs. <b>Read/Write</b> – Allows read and write access to the objects in the MIB for the NAM when using the Community Name 1 configuration option. Allows access for all objects specified as read/write in the MIB RFCs. However, access for all read-only objects is specified as read-only.

**Table 5-15. General SNMP Management Options (2 of 2)**

<b>Community Name 2</b>
Possible Settings: <b>ASCII text entry, Clear</b> Default Setting: <b>blank</b>
Specifies the second of two names that are allowed to access the objects in the unit's Management Information Base (MIB). The community name must be supplied by an external SNMP manager whenever the manager tries to access an object in the MIB. <b>ASCII Text Field</b> – Add or change the community 2 name (maximum 255 characters). <b>Clear</b> – Clears the Community Name 2 field.
<b>Name 2 Access</b>
Possible Settings: <b>Read, Read/Write</b> Default Setting: <b>Read</b>
Specifies the type of access allowed for Community Name 2. This is the type of access allowed for external SNMP managers accessing objects in the MIB using the Community Name 2 configuration option. <b>Read</b> – Allows read-only access to the objects in the MIB for the NAM when using the Community Name 2 configuration option. This includes all objects specified as either read-only or read/write in the MIB RFCs. <b>Read/Write</b> – Allows read and write access to the objects in the MIB for the NAM when using the Community Name 2 configuration option. Allows access for all objects specified as read/write in the MIB RFCs. However, access for all read-only objects is specified as read-only.

## Setting Up SNMP NMS Security

Use the SNMP NMS Security Options (see [Table 5-16](#)) to specify whether a security check is performed on the IP address of SNMP management systems attempting to access the node.

*Configuration Edit/Display → Management and Communication → SNMP NMS Security*

**Table 5-16. SNMP NMS Security Options (1 of 2)**

<b>NMS IP Validation</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines whether security checks are performed on the IP address of SNMP management systems attempting to access the node. Allows access only if IP address of the sending manager is listed on the SNMP NMS Security Options screen.  <b>Enable</b> – Performs security checks. <b>Disable</b> – Does not perform security checks.
<b>Number of Managers</b>
Possible Settings: <b>1 – 10</b> Default Setting: <b>1</b>
Specifies the number of SNMP management systems that are authorized to send SNMP messages to the T1 access unit. An IP address must be configured for each management system allowed to send messages. Configure the IP addresses in the NMS <i>n</i> IP Address configuration option.  <b>1 – 10</b> – Specifies the number of managers allowed to send SNMP messages.
<b>NMS <i>n</i> IP Address</b>
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the IP address that identifies the SNMP manager(s) authorized to send SNMP messages. If an SNMP message is received from the NMS whose IP address does not match an address contained in this field, access is denied and an authenticationFailure trap is generated. If a match is found, the type of access (read-only or read/write) is determined by the corresponding access level.  <b>000.000.000.000 – 223.255.255.255</b> – Adds or changes the NMS IP address. The first digit (i.e., xxx.255.255.255) cannot be 127; 127 is a reserved number.  <b>Clear</b> – Clears the NMS IP address and fills the address with zeros (i.e., 000.000.000.000).

**Table 5-16. SNMP NMS Security Options (2 of 2)**

<b>Access Level</b>
Possible Settings: <b>Read, Read/Write</b> Default Setting: <b>Read</b>
<p>Specifies the access allowed for an authorized NMS when IP address validation is performed. If the IP address for the NMS sending an SNMP message is on the list of allowed managers, this configuration option determines the type of access allowed for that manager.</p> <p><b>Read</b> – Read-only access to the objects in the MIB for the T1 access unit. This includes all objects specified as either read-only or read/write in the MIB RFCs.</p> <p><b>Read/Write</b> – Read and write access to the objects in the MIB for the T1 access unit. Allows write access for all objects specified as read/write in the MIB RFCs. However, access for all read-only objects is specified as read-only.</p>

## Setting Up for SNMP Traps

Use the SNMP Traps Options (see [Table 5-17](#)) to specify the information needed to support SNMP traps. Use the SNMP Trap Options screen to configure the necessary configuration options needed to support the SNMP traps.

*Configuration Edit/Display → Management and Communication → SNMP Traps*

To configure the T1 access unit for SNMP traps you must set:

- The number of SNMP managers that are to receive SNMP traps from the T1 access unit.
- An IP address for each SNMP manager specified.
- The type of SNMP traps to be sent from the T1 access unit.

### NOTE:

Be sure to choose an operational link for the default. Should the default link become disabled, unrouteable traps will be discarded.

To . . .	Set the configuration option . . .
Enable sending of SNMP trap messages	SNMP Traps to Enable.
Specify the number of SNMP managers that will receive SNMP trap messages from the T1 access unit	Number of SNMP Managers to the desired number (maximum of 6) of SNMP managers to receive SNMP traps.
Specify an IP address for each SNMP manager specified in the Number of SNMP Managers configuration option	NMS <i>n</i> IP Address to the IP address that identifies each SNMP manager(s) indicated in the Number of SNMP Managers configuration option.
Specify the network destination for the Trap Manager	Destination to one of the following: Default COM FDL EDL (slot and port number)
Select the type of SNMP trap messages to be sent from the T1 access unit	<ul style="list-style-type: none"> <li>■ General Traps to enable or disable warmStart and authenticationFailure traps.</li> <li>■ Enterprise Specific Traps to enable or disable enterpriseSpecific traps.</li> <li>■ Link Traps to enable or disable linkDown and linkUp traps.</li> <li>■ Link Traps Interfaces to specify which interfaces will generate linkDown, linkUp and enterpriseSpecific traps.</li> </ul>



**Table 5-17. SNMP Trap Options (1 of 3)**

<b>SNMP Traps</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines if SNMP trap messages are sent to the currently configured trap manager(s).  <b>Enable</b> – Sends trap messages. <b>Disable</b> – Does not send trap messages.
<b>Number of Trap Managers</b>
Possible Settings: <b>1 – 6</b> Default Setting: <b>1</b>
Specifies the number of SNMP management systems to receive SNMP trap messages from the NAM. An NMS IP Address must be configured in the NMS <i>n</i> IP Address configuration option for each trap manager to receive trap messages.  <b>1 – 6</b> – Specifies the number of trap managers.
<b>NMS <i>n</i> IP Address</b>
Possible Settings: <b>000.000.000.000 – 223.255.255.255, Clear</b> Default Setting: <b>000.000.000.000</b>
Specifies the IP address that identifies the SNMP manager(s) to receive SNMP traps. <ul style="list-style-type: none"> <li>■ NMS <i>n</i> IP Address appears for each trap manager specified in the Number of Trap Managers configuration option.</li> </ul> <b>000.000.000.000 – 223.255.255.255</b> – Adds to or changes the IP address for the trap manager. The first digit (i.e., xxx.255.255.255) cannot be 0 or 127, or greater than 223. However, 000 is valid, representing a null address.  <b>Clear</b> – Clears the IP address and fills the address with zeros (i.e., 000.000.000.000).

**Table 5-17. SNMP Trap Options (2 of 3)**

<b>Destination</b>
Possible Settings: <b>Default, COM, FDL1, FDL2, DDL, EDLss-p</b> Default Setting: <b>Default</b>
Specifies the network destination for the Trap Manager number configuration option. <ul style="list-style-type: none"> <li>■ Destination appears for each trap manager specified in the Number of Trap Managers configuration option.</li> </ul> <p><b>Default</b> – Uses the default network.</p> <p><b>COM</b> – Uses the communication port as the network destination. This selection only appears if the Communication Port Use configuration option is set to Net Link.</p> <p><b>FDL1</b> – Uses FDL as the network destination on Network Interface 1. This selection only appears if the Management Link configuration option is set to FDL for the network interface (see Table 5-1).</p> <p><b>FDL2</b> – Uses FDL as the network destination on Network Interface 2. This selection only appears if the Management Link configuration option is set to FDL for the network interface (see Table 5-1).</p> <p><b>DDL</b> – Uses DDL as the network destination. This selection only appears if the management link configuration option is set to DDL for the Network interface (see Table 5-1).</p> <p><b>EDLss-p</b> – Uses EDL as the network destination for the synchronous port in slot <i>ss</i>, port <i>p</i>.</p> <ul style="list-style-type: none"> <li>■ This selection only appears if the EDL Management Link configuration option is set to Enable for the given slot and port (see Table 5-3).</li> </ul> <p><b>NOTE:</b> If the selected network destination link is disabled, the SNMP traps are discarded. Ensure that an operational link is selected as the default route, or change the default route if the link becomes nonoperational.</p>
<b>General Traps</b>
Possible Settings: <b>Disable, Warm, AuthFail, Both</b> Default Setting: <b>Both</b>
Determines if SNMP trap messages for warmStart and/or authenticationFailure events are sent to the currently configured trap manager(s). <p><b>Disable</b> – Does not send trap messages for warmStart or AuthenticationFailure events.</p> <p><b>Warm</b> – Sends trap messages for warmStart events.</p> <p><b>AuthFail</b> – Sends trap messages for authenticationFailure events.</p> <p><b>Both</b> – Sends trap messages for both warmStart and AuthenticationFailure events.</p>
<b>Enterprise Specific Traps</b>
Possible Settings: <b>Enable, Disable</b> Default Setting: <b>Disable</b>
Determines if trap messages for enterpriseSpecific events are sent to the currently configured trap manager(s). <p><b>Enable</b> – Sends trap messages for enterpriseSpecific events.</p> <p><b>Disable</b> – Does not send trap messages for enterpriseSpecific events.</p>

**Table 5-17. SNMP Trap Options (3 of 3)**

<b>Link Traps</b>
Possible Settings: <b>Disable, Up, Down, Both</b> Default Setting: <b>Both</b>
<p>Determines whether SNMP linkDown or linkUp traps are sent to the currently configured trap manager(s). A linkDown trap indicates that the T1 access unit recognizes a failure in one of the communication interfaces. A linkUp trap indicates that the unit recognizes one of its communication interfaces is active. Use the Link Traps Interface configuration option to specify which interface will monitor linkUp and linkDown traps messages.</p> <p><b>Disable</b> – Does not send linkDown or linkUp trap messages.</p> <p><b>Up</b> – Sends SNMP trap messages for linkUp events.</p> <p><b>Down</b> – Sends SNMP trap messages for linkDown events.</p> <p><b>Both</b> – Sends SNMP trap messages for linkUp and linkDown events.</p>
<b>Link Traps Interfaces</b>
Possible Settings: <b>Network, DSX-1, T1s, Ports, All</b> Default Setting: <b>All</b>
<p>Specifies which interface monitors and generates linkUp, linkDown, and enterpriseSpecific trap messages.</p> <p>NOTE: These traps are supported on the T1 interfaces, synchronous data ports, and OCU ports only. They are not supported for the voice ports or communication port.</p> <p><b>Network</b> – Generates trap messages for linkUp, linkDown, and enterpriseSpecific events on the T1 interface.</p> <p><b>DSX-1</b> – Generates trap messages for linkUp, linkDown, and enterpriseSpecific events on the DSX-1 interfaces.</p> <p><b>T1s</b> – Generates trap messages for linkUp, linkDown, and enterpriseSpecific events on both the T1 Network and DSX-1 interfaces.</p> <p><b>Ports</b> – Generates trap messages for linkUp, linkDown and enterpriseSpecific events on the synchronous data ports and OCU ports.</p> <p><b>All</b> – Generate SNMP trap messages for linkUp and enterpriseSpecific events on the synchronous data ports, the OCU ports, the T1 network interface, and the DSX-1 interface.</p>

## Setting Up and Placing a Call

Configure your external device. Then, use the Call Setup screen to:

- Look up the desired telephone number
- Dial a call
- Disconnect a call

### ► Procedure

1. Follow this menu selection sequence:

*Main → Control → Call Setup*

2. The Control menu appears. Select Call Setup and press Return.
3. The Call Setup screen appears. Enter the number of the directory containing the desired telephone number in the Directory Number field. The telephone number appears in the Directory Phone Number field. See *Displaying Directory Numbers* and *Changing Directory Numbers* in Chapter 9, *Troubleshooting and Maintenance*, for information about the call directory.
4. Select Dial and press the Enter key to initiate dialing.
5. To end the call, select Disconnect and press the Enter key.

## Limiting Access

The T1 access unit provides several methods of security by limiting user access through the following user interfaces:

- Async Terminal Interface
- Telnet
- External Devices
- SNMP

## Limiting Async Terminal Direct Access

The access unit provides the following methods for limiting async terminal direct access on the communication (COM) port.

- Disabling the async terminal direct connection.
- Requiring a user login ID and password.
- Assigning an access level to the port.

The Communication Port Options screen provides the configuration options to limit async terminal access on the COM port.

## ► Procedure

To limit COM port async terminal access:

1. Follow this menu selection sequence:

*Main Menu → Configuration*

2. Select the desired configuration area and press Return.

*Load Configuration From → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

3. Follow this menu selection sequence, pressing Return after each selection:

*Configuration Edit/Display → User Interface → Communication Port*

The Communication Port Options screen appears.

4. Select and set the following configuration options, as appropriate.

To . . .	Set the configuration option . . .
Disable an async terminal interface direct connection	Port Use to Alarms.
Require a user's login ID and password to access the COM port	Login Required to Enable. NOTE: User login ID and password combinations must be defined. Refer to <i>Creating a Login</i> on page 6-8.
Limit the effective access level to Level 2 <sup>1</sup> or lower	Port Access Level to Level-2.
Limit the effective access level to Level 3 <sup>1</sup>	Port Access Level to Level-3.
<sup>1</sup> Make sure you have at least one login with Level 1 security set. The effective access level of the session is the lower of either the level set to access the port (COM port or Telnet), or the login access level.	

### NOTE:

See *Restoring Access to the User Interface* in Chapter 8, *Operation and Maintenance*, should you inadvertently be locked out.

5. Press Ctrl-a to switch to the screen function key area.
6. To save changes, select Save and press Return.
7. Select the configuration area where you want to save the changes to and press Return.

*Save Configuration To → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

When Save is complete, Command Complete appears at the bottom of the screen.

Refer to Chapter 5, *Setting Up*, for more information about Communication Port configuration options.

## Limiting Telnet Access

The T1 access unit provides the following methods for limiting access through a Telnet session:

- Disabling Telnet access completely.
- Requiring a user login ID and password.
- Assigning an access level for the port.

### ► Procedure

To limit access through a Telnet Session:

1. Follow this menu selection sequence:  
*Main Menu → Configuration*
2. Select the desired configuration area and press Return.  
*Load Configuration From → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*
3. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display → User Interface → Telnet/FTP Session*  
The Telnet/FTP Session Options screen appears.
4. Select and set the following configuration options, as appropriate.

To . . .	Set the configuration option . . .
Disable Telnet	Telnet Session to Disable.
Require a user's login ID and password	Telnet Login Required to Enable. NOTE: User login ID and password combinations must be defined. Refer to <i>Creating a Login</i> on page 6-8.
Assign an access level for all Telnet sessions	Session Access Level to Level-1, Level-2, or Level-3.

5. Press Ctrl-a to switch to the screen function key area.
6. To save changes, select Save and press Return.
7. Select the configuration area where you want to save the changes to and press Return.  
*Save Configuration To → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*  
When Save is complete, Command Complete appears at the bottom of the screen.

## Controlling External Device Access

The T1 access unit allows you to control whether dial-in access for an external device (modem) is allowed on the communication port. To connect to an external device,

- Use the appropriate cable to attach to the COM port as defined in Appendix E, *Cables, Connectors, and Pin Assignments*.
- Set the modem for DTR Disconnect using the AT command AT\D2.

Use the External Device Options screen to set the necessary configuration options that allow dial-in access through the COM port.

### ► Procedure

To control dial-in access:

1. Follow this menu selection sequence:  
*Main Menu → Configuration*
2. Select the desired configuration area and press Return.  
*Load Configuration From → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*
3. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display → User Interface → External Device  
(Com Port)*  
The External Device Options screen appears.
4. Select a setting for the Dial-In Access configuration option.

To . . .	Set the Dial-In Access configuration option to . . .
Enable dial-in access	Enable.
Disable dial-in access	Disable.

### NOTE:

The data that you enter determines which options display and their order.

5. Press Ctrl-a to switch to the screen function key area.
6. To save changes, select Save and press Return.
7. Select the configuration area where you want to save the changes to and press Return.

*Save Configuration To → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

When Save is complete, Command Complete appears at the bottom of the screen.



See *Limiting Async Terminal Direct Access* on page 6-1 if you want to limit access to the dial-in session.

Refer to *Setting Up the Communication Port to Support an External Device* in Chapter 5, *Setting Up*, for more information.

## Controlling SNMP Access

The T1 access unit supports SNMP Version 1, which only provides limited security through the use of community names. There are three methods for limiting SNMP access:

- Disabling SNMP access.
- Assigning SNMP community names and access levels.
- Assigning IP addresses of NMSs that can access the unit.

### Disabling SNMP Access

The General SNMP Options screen provides the configuration option to disable SNMP access to the unit. When this configuration option is disabled, the access unit will not respond to any SNMP messages and will not send SNMP traps.

#### ► Procedure

To disable SNMP access:

1. Follow this menu selection sequence:  
*Main Menu → Configuration*
2. Select the desired configuration area and press Return.  
*Load Configuration From → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*
3. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display → Management and  
Communication → General SNMP Management*  
The General SNMP Management Options screen appears.
4. Set the SNMP Management configuration option to Disable; Disable is the factory default setting.
5. Press Ctrl-a to switch to the screen function key area.
6. To save changes, select Save and press Return.
7. Select the configuration area where you want to save the changes to and press Return.  
*Save Configuration To → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

When Save is complete, Command Complete appears at the bottom of the screen.

Refer to *Setting Up for SNMP Management* in Chapter 5, *Setting Up*, for more information about SNMP configuration options.

## Assigning SNMP Community Names and Access Levels

The General SNMP Options screen provides the configuration options that allow the T1 access unit to be managed by an SNMP manager supporting the SNMP protocol. Use this screen to:

- Assign the SNMP community names that are allowed to access the unit's Management Information Base (MIB).
- Specify the type of access allowed for each SNMP community name.

### NOTE:

Community names are case-sensitive.

### ► Procedure

To assign SNMP community names and access levels:

1. Follow this menu selection sequence:  
*Main Menu → Configuration*
2. Select the desired configuration area and press Return.  
*Load Configuration From → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*
3. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display → Management and  
Communication → General SNMP Management*  
The General SNMP Management Options screen appears.
4. Select and set the following configuration options, as appropriate.

To . . .	Set the configuration option . . .
Enable SNMP management for the access unit	SNMP Management to Enable.
Assign SNMP community names	Community Name 1 and Community Name 2 to a community name text up to 255 characters in length.
Assign the type of access allowed for the SNMP community names	Name 1 Access and Name 2 Access to Read or Read/Write.

5. Press Ctrl-a to switch to the screen function key area.
6. To save changes, select Save and press Return.
7. Select the configuration area where you want to save the changes to and press Return.

*Save Configuration To* → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]

When Save is complete, Command Complete appears at the bottom of the screen.

Refer to *Setting Up for SNMP Management* in Chapter 5, *Setting Up*, for more information about SNMP configuration options.

## Limiting SNMP Access Through IP Addresses

The access unit provides an additional level of security by:

- Limiting the IP addresses of the NMSs that can access the unit.
- Performing validation checks on the IP address of SNMP management systems attempting to access the unit.
- Specifying the access allowed for the authorized NMS when IP address validation is performed.

The SNMP NMS Security Options screen provides the configuration options that determine whether security checking is performed on the IP address of SNMP management systems attempting to communicate with the unit.

Make sure that the SNMP Management configuration option is set to Enable.

Menu selection sequence:

*Main Menu* → *Configuration* → Desired configuration area →  
*Management and Communication* → *General SNMP Management* →  
*SNMP Management* → *Enable*

### ► Procedure

To limit SNMP access through IP addresses:

1. Follow this menu selection sequence:  
*Main Menu* → *Configuration*
2. Select the desired configuration area and press Return.  
*Load Configuration From* → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]
3. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display* → *Management and Communication* →  
*SNMP NMS Security*

The SNMP NMS Security Options screen appears.

4. Select and set the following configuration options, as appropriate.

To . . .	Set the configuration option . . .
Enable IP address checking	NMS IP Validation to Enable.
Specify the number (between 1 and 10) of SNMP management systems that are authorized to send SNMP messages to the access unit	Number of Managers to the desired number.
Specify the IP address(es) that identifies the SNMP manager(s) authorized to send SNMP messages to the access unit	NMS <i>n</i> IP Address to the appropriate IP address.
Specify the access allowed for an authorized NMS when IP address validates is performed	Access Type to Read or Read/Write.

5. Press Ctrl-a to switch to the screen function key area.  
 6. To save changes, select Save and press Return.  
 7. Select the configuration area where you want to save the changes to and press Return.

*Save Configuration To → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

When Save is complete, Command Complete appears at the bottom of the screen.

Refer to *Setting Up for SNMP Management* in Chapter 5, *Setting Up*, for more information about SNMP configuration options.

## Creating a Login

A login ID and password is required if security is enabled.\* You can define up to six logins (login ID/password combinations). Each login must be unique and have a specified access level.

### ► Procedure

To create a login:

1. Follow this menu selection sequence:  
*Main Menu → Control → Admin Login*
2. Press Ctrl-a to switch to the screen function key area.
3. Select New and press Return.
4. Enter login ID, password, and security level information.

\* Security is enabled by the configuration options Login Required for the Communication Port, and Telnet Login Required or FTP Login Required for a Telnet/FTP Session.

In the field . . .	Enter the . . .
Login ID	ID of 1 to 10 characters.
Password	Password from 1 to 10 characters.
Re-enter Password	Password again to verify that you entered the correct password into the device.
Access Level	Access level: 1, 2, or 3.

5. Press Ctrl-a to switch to the screen function key area.
6. To save login information, select Save and press Return.

When Save is complete, Command Complete appears in the message area at the bottom of the screen. The cursor is repositioned at the Login ID field, ready for another entry.

Refer to Chapter 5, *Setting Up*, for more information about security and login configuration options.

## Deleting a Login

A login record can be deleted.

### NOTE:

To change a login, delete the current login and create a new one.

### ► Procedure

To delete a login record:

1. Follow this menu selection sequence:  
*Main Menu* → *Control* → *Admin Login*
2. Press Ctrl-a to switch to the screen function key area.
3. Select PgUp or PgDn and press Return to page through login pages/records until you find the one to be deleted.
4. Once the correct record is displayed, select Delete and press Return.
5. To save the deletion, select Save and press Return.

When the deletion is complete, Command Complete appears in the message area at the bottom of the screen. The number of login pages/records reflects one less record, and the record following the deleted record appears.

*Example:*

Page 2 of 4 is changed to Page 2 of 3.



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# Displaying System Information

# 7

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## Displaying System and NAM Identity Information

Use the System & NAM Identity screen to display identification information about the system and T1 NAM. This information is useful if you are purchasing additional or replacement units and/or making firmware upgrades. Use the following menu sequence to display System and NAM identity information.

*Main Menu → Status → Identity → System & NAM*

<b>View this field . . .</b>	<b>To find the . . .</b>
System Name	System name configured for the unit.
System Contact	Contact person for the unit.
System Location	System location of the unit.
Model Number	NAM's 4-digit model number (9161 or 9261).
Serial Number	NAM's 7-digit serial number.
Software Revision	NAM's software version.
Hardware Revision	NAM's hardware version.

The above information is entered using the following menu sequence.

*Main Menu → Control → Device Name*

## Displaying APM Identity Information

Use the APM Identity screen to display identification information about a particular APM. This information is useful if you are purchasing additional or replacement APMs.

### ► Procedure

1. Follow this menu sequence to display the APM Identity Slot screen.

*Main Menu → Status → Identity → APM*

2. Press the spacebar to cycle through the set of slots consisting of the NAM and all APMs associated with it. The slot order sequence consists of the slot assignment for the APMs in order from lowest (02) to highest (05 for 5-slot housing) slot number.

The following information is available for viewing. Use the right and left arrow keys to scroll additional text into view.

View this field . . .	To find the . . .
APM Type <sup>1</sup>	APM type (Sync Data, DSX-1, E&M Voice, FXS Voice, FXO Voice, OCU (2) or OCU (6)).
Serial Number	APM's 7-digit serial number.
Software Revision	APM's software version level (6-digit) of the installed firmware. The software revision will be the same as the NAM software revision if the APM has no processor/code of its own.
Hardware Revision	APM's hardware revision level (7-digit) of the main circuit card assembly (CCA).
<sup>1</sup> The APM Type field can also display: Empty – If the APM slot is empty and was not previously configured. Unsupport – If an unrecognized APM is installed. Misconfig – If a misconfiguration condition occurs. Refer to <i>ASCII Alarm Messages</i> in Chapter 9, <i>Troubleshooting</i> . Failed – The APM was removed from the slot, or the APM is not operational.	

## Displaying System and Test Status

Use the System and Test Status screen to display information concerning:

- System Health and Status
- Self-Test results
- Status of tests currently running



Chapter 7, *Maintenance and Troubleshooting*, contains a list of all status messages and recommended action for you to take. Use the following menu sequence to display system and test status information.

*Main Menu → Status → System and Test Status*

## Displaying Voice APM Status

Use the Voice APM Status screen to display information concerning voice cards that you have installed in your system.

### ► Procedure

1. Follow this menu sequence to display the Voice APM Status screen.

*Main Menu → Status → Voice Status*

2. Enter the slot number of the desired voice APM in the SLOT field. The Voice Port Status screen differs, depending on whether you are accessing an E&M, FXO or FXS Voice APM.

View this field . . .	To find the . . .
<b>For the E&amp;M Voice APM</b>	
Port Status	Status of the port.
Assigned To	Interface the port is assigned to.
Operating Mode	Operating mode of the voice port that was configured using the Operating Mode configuration option on the Voice Ports screen. See the <i>Technical Reference</i> for configuration information.
Signaling Type	Type of signaling used by the voice port that was configured using the switches on the E&M APM. See the <i>9109 E&amp;M Analog Voice Application Module (APM) Installation Instructions</i> for more information.
Call Progress	Current condition of the port.
TX ABCD bits	Current value of the ABCD bits that are being transmitted to the T1 interface.
RX ABCD bits	Current value of the ABCD bits that are being received from the T1 interface.
E-Lead State	Current status of the E-lead (On or Off).
M-Lead State	Current status of the M-lead (On or Off).
Trunk Cond CGA	Displays the status of trunk conditioning (On for CGA, Off for no CGA).

View this field . . .	To find the . . .
<b>For the FXO Voice APM</b>	
Port Status	Status of the port.
Assigned To	Interface the port is assigned to.
Operating Mode	Operating mode of the voice port that was configured using the Operating Mode configuration option on the Voice Ports screen. See the <i>Technical Reference</i> for configuration information.
Signaling Type	Type of signaling used by the voice port that was configured using the Signaling Type configuration option on the Voice Ports screen. See the <i>Technical Reference</i> for configuration information.
Call Progress	Current condition of the port.
TX ABCD bits	Current value of the ABCD signaling bits that are being transmitted to the T1 interface.
RX ABCD bits	Current value of the ABCD signaling bits that are being received from the T1 interface.
T-R Control	Current status of the tip and ring leads: <ul style="list-style-type: none"> <li>■ Loop. Tip and Ring are connected together.</li> <li>■ Rgnd. Ring lead is attached to ground.</li> <li>■ Open. Ring lead is not connected to either the Tip lead or the ground.</li> <li>■ Lpgnd. Tip and Ring are connected together, and are connected to ground.</li> </ul>

View this field . . .	To find the . . .
<b>For the FXO Voice APM (Cont'd)</b>	
T-R Receive	<p>Status of what the attached device is doing with the Tip and Ring leads of the FXO port.</p> <ul style="list-style-type: none"> <li>■ RbTo. Attached device has battery applied to the Ring lead and the Tip lead is opened</li> <li>■ RbTg. Attached device has battery applied to the Ring lead and the Tip lead is grounded</li> <li>■ TbRg. Attached device has battery applied to the Tip lead and the Ring lead is grounded</li> <li>■ Ring. Attached device is applying Ringing voltage between Tip and Ring</li> <li>■ ToRo. Attached device has both Tip and Ring leads open.</li> <li>■ TgRo. Attached device has the Tip lead grounded and the Ring lead open.</li> <li>■ TgR*. Attached device has the Tip lead grounded and the Ring lead state is unknown.</li> <li>■ ToR*. Attached device has the Tip lead open and the Ring lead state is unknown.</li> <li>■ RoT*. Attached device has the Ring lead open and the Tip lead state is unknown.</li> </ul>
Trunk Cond CGA	Displays the status of trunk conditioning (On during CGA, Off for no CGA).

View this field . . .	To find the . . .
<b>For the FXS Voice APM</b>	
Port Status	Status of the port.
Assigned To	Interface the port is assigned to.
Operating Mode	Operating mode of the voice port that was configured using the Operating Mode configuration option on the Voice Ports screen. See the <i>Technical Reference</i> for configuration information.
Signaling Type	Type of signaling used by the voice port that was configured using the Signaling Type configuration option on the Voice Ports screen. See the <i>Technical Reference</i> for configuration information.
Call Progress	Current condition of the port.
TX ABCD bits	Current value of the ABCD signaling bits that are being transmitted to the T1 interface.
RX ABCD bits	Current value of the ABCD signaling bits that are being received from the T1 interface.
T-R Control	Current status of the tip and ring leads: <ul style="list-style-type: none"> <li>■ RbTo. A –48 Vdc battery is applied to the Ring lead and the Tip lead is opened</li> <li>■ RbTg. A –48 Vdc battery is applied to the Ring lead and the Tip lead is grounded</li> <li>■ TbRg. A –48 Vdc battery is applied to the Tip lead and the Ring lead is grounded</li> <li>■ Ring. Ringing voltage is applied between Tip and Ring</li> </ul>
T-R Receive	Status of what the attached device is doing with the Tip and Ring leads of the FXS port. <ul style="list-style-type: none"> <li>■ Loop. Tip and Ring are connected together</li> <li>■ Rgnd. Ring lead is grounded by attached device</li> <li>■ Open. Ring lead is not connected to either the Tip lead or the ground</li> </ul>
Trunk Cond CGA	Displays the status of trunk conditioning (On for CGA, Off for no CGA).

## Displaying Cross Connect Status

Slot assignments are made using the Cross Connect configuration option. See *Assigning Cross Connections* in Chapter 5, *Setting Up*, for making time slot assignments. Use the Cross Connect Status screen to display time slot assignments for:

- Network Channels
- DSX-1 Channels
- Ports

## Displaying Network Channels

Use the Network Channel Display screen to display DS0 assignments for each DS0 on the network interface. This screen also provides information on the slot assignment for each NAM or APM type.

Use the following menu sequence to display network channel information.

*Main Menu → Status → Cross Connect Status → Network Channel Display*

Select the desired network interface: 1 for Network 1, 2 for Network 2 (only the Model 926x provides Network 2).

The Network Channel Display screen displays 24 two-field entries in three rows. Together, each two-field entry defines the assignment for one Network interface time slot. The top field represents the time slot of the Network Interface. The bottom field represents the cross connect status of the associated (top field) network time slot.

The following information is available for viewing.

The Network Time Slot Fields (top) . . .	Indicates . . .
N01 to N24	The Network Interface time slot (01 to 24).

The Cross Connect Status Field (bottom) . . .	Indicates . . .
Unassgn	The time slot is unassigned.
SssPp	The voice or sync data port (p) of slot (ss) is assigned to the Network Interface time slot (01 to 24).
Netn/yy	Network n (1 or 2) time slot yy is assigned to the Network Interface time slot (01 to 24), using Clear Channel.
Netn/yyr	Network n (1 or 2) time slot yy is assigned to the Network Interface time slot (01 to 24), using Robbed Bit Signaling (r).

<b>The Cross Connect Status Field (bottom) . . .</b>	<b>Indicates . . .</b>
<i>Dss-p/yy</i>	The DSX-1 on slot <i>ss</i> , port <i>p</i> , time slot <i>yy</i> is assigned to the Network Interface time slot (01 to 24).
<i>Dss-p/yyr</i>	The DSX-1 on slot <i>ss</i> , port <i>p</i> , time slot <i>yy</i> is assigned to the Network Interface time slot (01 to 24), using Robbed Bit Signaling ( <i>r</i> ).
RsvdAPM	The time slot is assigned to an APM which is either: <ul style="list-style-type: none"> <li>■ failed,</li> <li>■ removed or not installed, or</li> <li>■ has been replaced by an APM type that is not compatible with the configuration.</li> </ul>
DDL	The time slot is reserved for a management path using Direct Data Link (DDL).

**Slot Assignment information.** NAM or APM physical slot assignment information appears below the time slot fields.

The following information is available for viewing.

<b>Physical Slot . . .</b>	<b>Identifies the assigned card type . . .</b>
01 to 14 (based on model)	<b>T1 NAM</b> – T1 NAM. <b>Empty</b> – The slot is empty.
02 to 05 (based on model)	<b>Sync Data</b> – 4-port synchronous data APM. <b>DSX-1</b> – 2-port Dual DSX APM. <b>E&amp;M Voice</b> – 8-port E&M Voice APM. <b>FXO Voice</b> – 8-port FXO Voice APM. <b>FXS Voice</b> – 8-port FXS Voice APM. <b>OCU (2)</b> – 2-port OCU-DP APM. <b>OCU (6)</b> – 6-port OCU-DP APM. <b>Empty</b> – The slot is empty. <b>Misconfig</b> – The slot contains a misconfigured APM. <b>Unsupport</b> – The slot contains an unrecognized APM. <b>Failed</b> – The slot contained an APM that has been removed or is no longer operational.

## Displaying DSX-1 Channels

Use the Network Channel Display screen to display all of the DS0 assignments for each DS0 on the DSX-1 interface. This screen also provides information on the slot assignment for each NAM or APM type.

Use the following menu sequence to display DSX-1 channel information.

*Main Menu → Status → Cross Connect Status → DSX-1 Channel Display*

Select the desired DSX-1 slot and port.

### NOTE:

The DSX-1 Channel screen will not appear if the Interface Status field on the DSX-1 Interface Option screen is set to Disable.

The DSX-1 Channel Display screen displays 24 two-field entries in three rows. Together, each two-field entry defines the assignment for one DSX-1 interface time slot. The top field represents the time slot of the DSX-1 Interface. The bottom field represents the cross-connect status of the associated (top field) DSX-1 time slot.

The following information is available for viewing.

The DSX-1 Time Slot Fields (top) . . .	Indicate . . .
D01 to D24	The DSX-1 Interface time slot (01 to 24).

The Cross Connect Status Field (bottom) . . .	Indicates the . . .
blank	Time slot is unassigned.
SssPp	Voice or sync data port ( <i>p</i> ) of slot ( <i>ss</i> ) is assigned to DSX-1 time slot (01 to 24).
Netnyy	Network Interface <i>n</i> (1 or 2), time slot ( <i>yy</i> ) is assigned to DSX-1 time slot (01 to 24), using Clear Channel.
Netnyr	Network Interface <i>n</i> (1 or 2), time slot ( <i>yy</i> ) is assigned to DSX-1 time slot (01 to 24), using Robbed Bit Signaling ( <i>r</i> ).
RsvdAPM	Time slot is assigned to an APM which is either: <ul style="list-style-type: none"> <li>■ failed,</li> <li>■ removed or not installed, or</li> <li>■ has been replaced by an APM type that is not compatible with the configuration.</li> </ul>

**Slot Assignment information.** NAM or APM physical slot assignment information appears below the DSX-1 interface time slot fields.

The following information is available for viewing.

Physical Slot . . .	Identifies the assigned card type . . .
01 to 14 (based on model)	<p><b>T1 NAM</b> – T1 NAM.</p> <p><b>Empty</b> – The slot is empty.</p>
02 to 05 (based on model)	<p><b>Sync Data</b> – 4-port synchronous data APM.</p> <p><b>DSX-1</b> – 2-port Dual DSX APM.</p> <p><b>E&amp;M Voice</b> – 8-port E&amp;M Voice APM.</p> <p><b>FXO Voice</b> – 8-port FXO Voice APM.</p> <p><b>FXS Voice</b> – 8-port FXS Voice APM.</p> <p><b>OCU (2)</b> – 2-port OCU-DP APM.</p> <p><b>OCU (6)</b> – 6-port OCU-DP APM.</p> <p><b>Empty</b> – The slot is empty.</p> <p><b>Misconfig</b> – The slot contains a misconfigured APM.</p> <p><b>Unsupport</b> – The slot contains an unrecognized APM.</p> <p><b>Failed</b> – The slot contained an APM that has been removed or is no longer operational.</p>



## Displaying Port Assignments

Use the Port Assignments Display screen to display port assignment information for each voice and data port on the NAM and APMs.

Use the following menu sequence to display port assignment information.

*Main Menu → Status → Cross Connect Status → Port Assignment Display*

The following information is available for viewing.

View this field . . .	To find the . . .
Slot	Slot number.
Type	Type of NAM or APM occupying the slot. Possible values are: <b>T1 NAM</b> – T1 NAM. <b>Sync Data</b> – 4-port synchronous data APM. <b>DSX-1</b> – 2-port DSX APM. <b>E&amp;M Voice</b> – 8-port E&M APM. <b>FXO Voice</b> – 8-port FXO Voice APM. <b>FXS Voice</b> – 8-port FXS Voice APM. <b>OCU (2)</b> – 2-port OCU-DP APM. <b>OCU (6)</b> – 6-port OCU-DP APM. <b>Empty</b> – The slot is empty. <b>Misconfig</b> – The slot contains a misconfigured APM. <b>Unsupport</b> – The slot contains an unrecognized APM. <b>Failed</b> – The slot contained an APM that has been removed or is no longer operational.
Assignment	Port assignment. Possible values are: <b>Blank</b> – slot is empty or port does not exist on the NAM or the APM. <b>Disable</b> – The port is disabled. <b>Unassgn</b> – The port is unassigned. <b>Netn</b> – The port is assigned to the Network Interface 1 or 2. <b>DSXss-p</b> – The port is assigned to the DSX-1 interface in slot <i>ss</i> (always 01), port <i>p</i> on a clear channel time slot. Ports cannot be cross-connected to the DSX APM. <b>SssPp</b> – The port-to-port assignment of the slot ( <i>ss</i> ) and sync data port ( <i>p</i> ) shown in this field.

## Displaying Device Name and SNMP System Identification Information

Use the Device Name screen to display the name of the device, SNMP system name, location, and contact name for the device.

Use the following menu sequence to display device name and SNMP system identification information.

*Main Menu → Control → Device Name*

The following information is available for viewing.

View this field . . .	To find the administratively-assigned. . .
Device Name	Name of the device for device identification.
System Name	Name for this SNMP-managed node.
System Location	Physical location of this SNMP-managed node.
System Contact	System contact person for this SNMP node.

## Viewing Network and Sync Data Performance Statistics

Use the Network Performance Statistics screen to display a complete view of the performance of the network interface and the port interface over the previous 24-hour period. Use the Sync Data Performance Statistics screen to display a complete view of the performance of the network interface and the port interface over the previous 8-hour period. Statistics are defined in *AT&T Technical Reference (TR) 54016*.

### What Statistics Can Be Collected?

You can collect the following metrics:

- **Errored Seconds (ES)** – Any second with one or more ESF Error events.
- **Unavailable Seconds (UAS)** – Any second in which service is unavailable.
- **Severely Errored Seconds (SES)** – Any second with 320 or more CRC errors or one or more Out Of Frame (OOF) events.
- **Bursty Errored Seconds (BES)** – Any second with more than one but less than 320 CRC errors.
- **Controlled Slip Seconds (CSS)** – Any second with one or more controlled slips (a replication or deletion of a DS1 frame by the receiving device). This is collected for network performance statistics only.

- **Loss of Frame Count (LOFC)** – The number of Loss of Frame conditions.
- **Complete** – Indicates whether or not the 15 minutes worth of far-end statistics contain 900 seconds worth of statistics. Bad T1 network conditions or a loopback test can prevent far-end statistics from reaching the T1 access unit. If one or more seconds of far-end performance statistics are missing, then this field displays No. Otherwise, Yes is displayed. This field appears on the Sync Data Performance Statistics screen only.

## Network Performance Statistics

For the network performance statistics, these metrics are kept for each 15-minute interval over the past 24-hour period. A Telco set and a user set are kept for each metric. The user set is a copy of the Telco set, but the user set can be cleared.

In addition to the metrics kept for the network interface, the value of the Status Event Register is kept for each 15-minute interval (user count only). The system records the occurrence of the following events in the Status column:

- Yellow Alarm (Y)
- Loss of Signal (L)
- Excessive Error Rate (E)
- Frame Synchronization Bit Error (F)
- Line Code Violation (V)
- None

### NOTE:

Network performance statistics are only available for those interfaces using ESF framing. Verify that the Line Framing Format field on the Network Interface screen is set to ESF.

To help you in selecting trouble spots, a Worst Interval is displayed on Line 18. The Worst Interval contains the largest number of seconds for either ES, UAS, SES, BES, or CSS, or the greatest Loss of Frame Count (LOFC). If more than one interval contains the same worst value, then the oldest interval is displayed.

## Sync Data Performance Statistics

For the sync data performance statistics, these metrics are kept for each 15-minute interval over the past 8-hour period. Both near-end and far-end statistics are kept.

To help you in selecting trouble spots, a Worst Interval is displayed on Line 18 for both near-end and far-end values. The Worst Interval contains the largest number of seconds for either ES, UAS, SES, BES, or the greatest LOFC. If more than one interval contains the same worst value, then the oldest interval is displayed.

## Displaying Performance Statistics

Use the following menu sequence to display network performance statistics.

*Main Menu → Status → Performance Statistics → Network*

For Network statistics, you must select the Network Interface (1 or 2) for which you want to display statistics. Only the Model 926x provides Network 2.

Use the following menu sequence to display sync data performance statistics.

*Main Menu → Status → Performance Statistics → Sync Data Port*

For Sync Data statistics, you must select the desired slot and port for which to collect statistics.

## Selecting Performance Statistics Intervals for Display

Only seven intervals appear on the screen at any one time. You can choose which intervals to display on your screen by entering:

- Interval Number, or
- Time

### **NOTE:**

Interval 01 is the interval occurring just prior to the current one; Interval 02 is 2 intervals prior to the current one, etc.

To select intervals . . .	You must enter an interval or time on . . .
Occurring on and after a selected interval or time	Line 16. The display will include the selected interval plus the 6 intervals recorded after it.
Occurring on and before a selected interval or time	Line 10. The display will include the selected interval plus the 6 intervals recorded before it.
Bracketing a selected interval or time	Line 13. The display will include the selected interval plus the 3 intervals recorded before it and the 3 intervals recorded after it.

**Example of Network Performance Statistics Screen**

```

main/status/performance/network                                     9162
Device Name: Node A                                             01/26/96 23:32
                                NETWORK 1 PERFORMANCE STATISTICS
Current Interval Timer                                           ESF Error Events
Telco=124  User = 124                                           Telco = 15  User = 12

---ES--  --UAS--  --SES--  --BES--  --CSS--  -LOFC--  -Status-
      Time  Tel Usr  Tel Usr  Tel Usr  Tel Usr  Tel Usr  Tel Usr  (User)
Line 10 --- Current: 10:37  0  0  0  0  0  0  0  0  0  0  0  0  Y
          Int 01: 10:35  0  0  0  0  0  0  0  0  0  0  0  0  none
          Int 02: 10:20  0  0  0  0  0  0  0  0  0  0  0  0  none
          Int 03: 10:05  0  0  0  0  0  0  0  0  0  0  0  0  none
Line 13 --- Int 04: 09:50  0  0  0  0  0  0  0  0  0  0  0  0  none
          Int 05: 09:35  0  0  0  0  0  0  0  0  0  0  0  0  none
          Int 06: 09:20  0  0  0  0  0  0  0  0  0  0  0  0  none
Line 16 --- Int 07: 09:05  0  0  0  0  0  0  0  0  0  0  0  0  none

Line 18 --- Worst Interval: 24 24  14 14  14 14  09 09  18 16  44 44
Tel Tot(valid 96): 00010  00000  00000  00000  002  003
Usr Tot(valid 96): 00010  00000  00000  00000  002  003
-----
Ctrl-a to access these functions, ESC for previous menu      MainMenu  Exit
Refresh  PgDn  PgUp  ClrStats
    
```

**Example of Sync Data Performance Statistics Screen**

```

main/status/performance/port                                     9162
Device Name: Node A                                             01/26/96 23:32
                                SYNC DATA PORT PERFORMANCE STATISTICS
Current Interval Timer                                           Error Events
Near=32  Far=120          Slot 03 Data Port 4          Near=3  Far=10

---ES--  --UAS--  --SES--  --BES--  --LOFC--  -Complete-
      Near Far  Near Far  Near Far  Near Far  Near Far  Far
Line 10 --- Current: 10:37  0  0  0  0  0  0  0  0  0  0  no
          Int 01: 10:35  0  0  0  0  0  0  0  0  0  0  yes
          Int 02: 10:20  0  0  0  0  0  0  0  0  0  0  yes
          Int 03: 10:05  0  0  0  0  0  0  0  0  0  0  yes
Line 13 --- Int 04: 09:50  0  0  0  0  0  0  0  0  0  0  yes
          Int 05: 09:35  0  0  0  0  0  0  0  0  0  0  yes
          Int 06: 09:20  0  0  0  0  0  0  0  0  0  0  yes
Line 16 --- Int 07: 09:05  0  0  0  0  0  0  0  0  0  0  yes

Line 18 --- Worst Interval: 28 09  14 18  18 18  24 24  10 10
Near Tot(valid 32): 00010  00009  00004  00000  000  no
Far Tot(valid 32): 00010  00009  00004  00000  000  no
-----
Ctrl-a to access these functions, ESC for previous menu      MainMenu  Exit
Refresh  PgDn  PgUp  ClrNear  ClrFar
    
```

## Clearing Performance Statistics

Use the following menu sequence to clear performance statistics.

*Main Menu → Status → Clear Statistics*

You can also use the ClrStats function at the bottom of the Performance Statistics screen.

To clear all . . .	Select . . .
User performance registers, including network and ports statistics	All
User performance registers for the selected Network Interface	Network 1 or Network 2 (only the Model 926x provides Network 2)
Performance registers for all Sync Data ports	All Sync Data Ports

### NOTE:

You can only clear User statistics. Telco statistics cannot be cleared.

## Status Information

Select system and test status information from the Status menu:

*Main Menu → Status → System and Test Status*

## System Status Messages

These messages, listed in alphabetical order, appear in the messages area at the bottom of the screens (see Table 7-1).

**Table 7-1. System Status Messages (1 of 2)**

Message	What It Indicates	What To Do
Already Active	The selected test is currently running.	1. Allow test to continue. 2. Stop the test.
Command Complete	A system command (save, clear, abort) completed normally.	No action needed.
Connection Refused	User interface is in use. This will only appear during initiation of a Telnet session.	Wait and try again.

**Table 7-1. System Status Messages (2 of 2)**

Message	What It Indicates	What To Do
Please Wait	Command takes longer than 5 seconds.	<ol style="list-style-type: none"> <li>1. Wait until message clears.</li> <li>2. If the message does not clear within 2 minutes, reset the device.</li> </ol>
User Interface Already in Use	<p>Access to the user interface via Telnet is in use; access to the interface is denied.</p> <p>IP address and login of the user currently accessing the interface are also provided.</p>	<ol style="list-style-type: none"> <li>1. Wait and try again.</li> <li>2. Contact IP address user and request that they log off.</li> </ol>
User Interface Idle	Previously active session is now closed/ended, and access via the COM port is now available.	Log onto the access unit.
	Session has ended due to timeout.	Normal condition; no action needed.

## System Health and Test Status Messages

The System and Test Status screen (Path: *main*→*status*→*system*→*test status*) displays the following types of messages:

- **Health and Status** – Displays Health and status information in priority order (highest to lowest).
- **Self-Test Results** – Displays the results of the power-up self-test diagnostics.
- **Test Status** – Indicates which tests are currently active.

### Health and Status Messages

These messages appear in the first column of the System and Test Status screen in priority (highest to lowest) order, as shown in Table 7-2.

Clear device failure messages from the System Health and Status screen using the following menu selection sequence:

*Main Menu* → *Control* → *Clear Device Fail*

**Table 7-2. Health and Status Messages (1 of 5)**

Message	What It Indicates	What To Do
System Operational	This message appears when there are no status messages to report.	No action needed.
Power Supply Alarm	A power supply or fan tray problem is detected on the system.	<ol style="list-style-type: none"> <li>1. Check that the power supply or fan tray is mounted correctly in the housing.</li> <li>2. Contact your service representative.</li> </ol>
LOS at Network <i>n</i>	<p>A Loss of Signal (LOS) condition is detected on Network Interface 1 or 2. Clears when the ratio of ones to zeros received is greater than or equal to 12.5%.</p> <ol style="list-style-type: none"> <li>1. Network cable problem.</li> <li>2. No signal is being transmitted at the far-end T1 access unit.</li> <li>3. T1 facility problem.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the network cable is securely attached at both ends.</li> <li>2. Check far-end T1 access unit status.</li> <li>3. Contact your network provider.</li> </ol>
LOS at DSX <i>ss-p</i>	<p>A Loss of Signal (LOS) condition is detected on the DSX-1 interface in slot <i>ss</i>, port <i>p</i>. Clears when the ratio of ones to zeros received is greater than or equal to 12.5%.</p> <ol style="list-style-type: none"> <li>1. DSX-1 cable problem.</li> <li>2. No signal being transmitted from the DTE.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the DSX-1 cable is securely attached at both ends.</li> <li>2. Check the DTE status.</li> </ol>
OOF at Network <i>n</i>	<p>An Out of Frame (OOF) condition is detected on Network Interface 1 or 2.</p> <ol style="list-style-type: none"> <li>1. Incompatible framing format between the network and the T1 access unit.</li> <li>2. Network cabling problem.</li> <li>3. T1 facility problem.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the framing format for the network interface is correct.</li> <li>2. Check that the network cable is securely attached at both ends.</li> <li>3. Contact your network provider.</li> </ol>



**Table 7-2. Health and Status Messages (2 of 5)**

Message	What It Indicates	What To Do
OOF at DSX $ss-p$	An Out of Frame (OOF) condition is detected on the DSX-1 interface in slot $ss$ , port $p$ .  1. Incompatible framing format between the DTE and the T1 access unit.  2. DSX-1 cabling problem.	1. Check that the framing format for the DSX-1 (DTE) interface is correct.  2. Check that the DSX-1 cable is securely attached at both ends.
AIS at Network $n$	An Alarm Indication Signal (AIS) is received by Network Interface 1 or 2. AIS is an unframed, all ones signal.  1. Upstream T1 access unit is transmitting AIS (keep-alive signal).  2. The network is transmitting an AIS.	1. Check status of upstream T1 access unit(s).  2. Report problem to carrier.
AIS at DSX $ss-p$	An Alarm Indication Signal (AIS) is received by the DSX-1 interface in slot $ss$ , port $p$ . AIS is an unframed, all ones signal.	Check the DTE attached to the DSX-1 interface.
EER at Network $n$	The error rate of the received network signal exceeds the currently configured threshold. This condition only occurs if Network Interface 1 or 2 is configured for ESF framing. This condition clears when the error rate falls below the threshold value.	Contact network provider.
Yellow at Network $n$	A yellow alarm signal is received on Network Interface 1 or 2.  1. Network cable problem.  2. Far-end T1 access unit has lost framing sync on the T1 line.  3. T1 facility problem.	1. Check that your network cable is securely attached at both ends.  2. Check the status of the far-end device.  3. Contact your network provider.

**Table 7-2. Health and Status Messages (3 of 5)**

Message	What It Indicates	What To Do
Yellow at DSX $ss-p$	A yellow alarm signal is received on the DSX-1 interface in slot $ss$ , port $p$ . DTE has detected an LOS or OOF condition.	<ol style="list-style-type: none"> <li>1. Check that the DSX-1 cable is securely attached at both ends.</li> <li>2. Check the status of the attached equipment.</li> </ol>
APM Card Failed, Slot $ss$	The NAM detects an APM failure for the identified slot. <sup>1</sup>	<ol style="list-style-type: none"> <li>1. Check if APM is removed from the slot.</li> <li>2. Remove, then reinstall the APM.</li> <li>3. Contact your service representative.</li> </ol>
OOF(EDL), Slot $ss$ Port $p$	<p>An Out of Frame (OOF) condition is detected for the identified slot and port.<sup>1</sup> This condition occurs when any two of five consecutive frame synchronizing bits received from the remote unit are incorrect. This condition clears when a reframe occurs.</p> <ol style="list-style-type: none"> <li>1. Cabling problem.</li> <li>2. T1 facility problem.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check that the far end is configured for EDL.</li> <li>2. Contact your network provider.</li> </ol>
EER, Slot $ss$ Port $p$	An Excessive Error Rate (EER) condition is detected for the identified slot and port. <sup>1</sup>	Contact network provider.
Loss of Signal, Slot $ss$ Port $p$	A Loss of Signal (LOS) condition has been detected on the identified OCU-DP interface. An LOS is declared when a signal has been absent on the local loop for more than two consecutive seconds.	<ol style="list-style-type: none"> <li>1. Check that the DSU is powered up.</li> <li>2. Check the cable.</li> </ol>
Abnormal Station Code, Slot $ss$ Port $p$	An Abnormal Station Code is being received from the network DS0 for the identified OCU-DP interface. This condition indicates that the far-end DSU is disconnected or powered-off.	<ol style="list-style-type: none"> <li>1. Check the that the far-end DSU is operational.</li> <li>2. Check the cable to the far-end DSU.</li> </ol>
<sup>1</sup> $ss$ represents physical slots.		

**Table 7-2. Health and Status Messages (4 of 5)**

Message	What It Indicates	What To Do
64KCC Loop OOF, Slot <i>ss</i> Port <i>p</i>	An Out of Frame (OOF) condition has been detected for the identified OCU-DP interface.	<ol style="list-style-type: none"> <li>1. Check the that DSU is configured for the correct speed.</li> <li>2. Check the cable to ensure that the pairs are not crossed.</li> </ol>
DDS Net Failure, Slot <i>ss</i> Port <i>p</i> , <i>cccccc</i>	The identified OCU-DP interface is receiving a DDS network code of <i>cccccc</i> from the network. This is a 6-bit code representing bits 2–7 of the DS0 code defined in AT&T PUB 62310. The least significant bit is to the left.	Contact the DDS service provider.
Loss of Loop Timing, Slot <i>ss</i> Port <i>p</i> , <i>cccccc</i>	The identified OCU-DP interface cannot recover timing from the received signal on the local loop. This typically occurs when the CPE CSU/DSU is misconfigured for the wrong rate (e.g., 19.2 kbps) when the OCU-DP is configured for 56K or Switched 56 operation.	Check that the CPE CSU/DSU rate matches the OCU-DP rate.
Primary Clock Failed	A failure of the primary clock source configured for the NAM is detected and the secondary clock is providing the timing for the NAM. This condition clears when the configured primary clock is restored.	<ol style="list-style-type: none"> <li>1. If the primary clock was derived from the network, contact the network provider.</li> <li>2. Check the clock source connector.</li> </ol>
Secondary Clock Failed	A failure of the secondary clock source configured for the NAM is detected and the internal clock is providing the timing for the NAM. The clock source will not automatically switch from internal until the primary clock source returns.	<ol style="list-style-type: none"> <li>1. If the secondary clock was derived from the network, contact the network provider.</li> <li>2. Check the clock source connector.</li> </ol>
Network Com Link Down	The network communication link is down for the COM port. This condition occurs only when the COM port is configured for Net Link and communications between the management system and the T1 access unit is not currently possible for the port.	<ol style="list-style-type: none"> <li>1. Check that the Port Use configuration option is properly set (see the <i>Technical Reference</i> for configuration option information).</li> <li>2. Check cables.</li> </ol>

**Table 7-2. Health and Status Messages (5 of 5)**

Message	What It Indicates	What To Do
Device Fail yyyyyyyy	The operating software detects an internal error. (yyyyyyy represents an eight-digit hexadecimal failure code for use by service personnel) This condition clears after a reset of the unit.	Contact your service representative.
Module MisConfig, Slot ss	The APM in slot xx is not the one specified in the NAM's configuration table. <sup>1, 2</sup>	<ol style="list-style-type: none"> <li>1. Replace the APM with the type of APM specified by the configuration table.</li> <li>2. Change the current configuration to reflect the type of APM in the slot. To do this, edit the configuration, accept the APM, then save the configuration.</li> </ol>
Module Unsupported, Slot ss	<p>The NAM does not recognize the APM.<sup>1, 2</sup></p> <p>A Dual DSX APM has been installed in a Model 916x T1 Access Unit.</p>	<ol style="list-style-type: none"> <li>1. Check that an E&amp;M Voice APM, FXS Voice APM, FXO Voice APM, Dual DSX APM, or Sync Data APM is installed in Slot ss.<sup>1</sup></li> <li>2. For Model 926x T1 Access Mux, check that there is not more than one DSX APM installed (only one is supported).</li> <li>3. Re-download the NAM software if new APMs are supported in later releases.</li> <li>4. Replace the APM.</li> <li>5. Contact your service representative.</li> </ol> <p>Remove the Dual DSX APM.</p>
<p><sup>1</sup> ss represents physical slots.  <sup>2</sup> Does not apply to the access carrier.</p>		

**Self-Test Results Messages**

All self-test results messages appear in the middle column of the System and Test Status screen (see Table 7-3).

**Table 7-3. Self-Test Results Messages**

Message	What It Indicates	What To Do
CPU Fail	The CPU failed internal testing.	<ol style="list-style-type: none"> <li>1. Reset the unit and try again.</li> <li>2. Call your service representative for assistance.</li> <li>3. Return the unit to the factory.</li> </ol>
NAM Fail	One or more of the NAM's integrated circuit chips failed internal device level testing.	<ol style="list-style-type: none"> <li>1. Reset the unit and try again.</li> <li>2. Call your service representative for assistance.</li> <li>3. Return the unit to the factory.</li> </ol>
Network $n$ T1 Fail	The NAM failed to internally loop data on the selected Network T1 circuit.	<ol style="list-style-type: none"> <li>1. Reset the unit and try again.</li> <li>2. Call your service representative for assistance.</li> <li>3. Return the unit to the factory.</li> </ol>
DSX $ss-p$ T1 Fail	The NAM failed to internally loop data on the selected DSX-1 circuit.	<ol style="list-style-type: none"> <li>1. Reset the unit and try again.</li> <li>2. Call your service representative for assistance.</li> <li>3. Return the unit to the factory.</li> </ol>
Memory Fail	The unit failed memory verification.	<ol style="list-style-type: none"> <li>1. Reset the unit and try again.</li> <li>2. Call your service representative for assistance.</li> <li>3. Return the unit to the factory.</li> </ol>
Failure xxxxxxxx	An internal failure occurred. (xxxxxxx represents an eight-digit hexadecimal failure code for use by service personnel.)	Record the failure code and contact your service representative.
Passed	No problems were found during power-up.	No action needed; no problems were found during power-up or reset.

## Test Status Messages

The right-most column of the System and Test Status screen display the tests that are currently active on the card (NAM or APM) (see Table 7-4).

**Table 7-4. Test Status Messages (1 of 2)**

Message	What It Indicates
No Test Active	No tests are currently running.
Network $n$ LLB Test Active	A network Line Loopback (LLB) test is active on specified Network interface ( $n$ ).
DSX $ss-p$ LLB Test Active	A DSX-1 Line Loopback (LLB) test is active on slot $ss$ , port $p$ .
Network $n$ PLB Test Active	A network Payload Loopback (PLB) test is active on specified Network interface ( $n$ ).
DSX $ss-p$ PLB Test Active	A DSX-1 Payload Loopback (PLB) test is active on slot $ss$ , port $p$ .
Network $n$ RLB Test Active	A network Repeater Loopback (RLB) test is active on specified network interface ( $n$ ).
DSX $ss-p$ RLB Test Active	A DSX-1 Repeater Loopback (RLB) test is active on slot $ss$ , port $p$ .
DCLB, Slot $ss$ Port $p$	A Data Channel Loopback (DCLB) test is active on slot $ss$ , port $p$ .
DTLB, Slot $ss$ Port $p$	A Data Terminal Loopback (DTLB) test is active on slot $ss$ , port $p$ .
DTPLB, Slot $ss$ Port $p$	A Data Terminal Payload Loopback (DTPLB) test is active on slot $ss$ , port $p$ .
Latching OCU LB, Slot $ss$ Port $p$	A Latching OCU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
Non-Latching OCU LB, Slot $ss$ Port $p$	A Nonlatching OCU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
Latching CSU LB, Slot $ss$ Port $p$	A Latching CSU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
Non-Latching CSU LB, Slot $ss$ Port $p$	A Nonlatching CSU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
Latching DSU LB, Slot $ss$ Port $p$	A Latching DSU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
Non-Latching DSU LB, Slot $ss$ Port $p$	A Nonlatching DSU Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
OCU Line LB, Slot $ss$ Port $p$	An OCU Line Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .
OCU Data LB, Slot $ss$ Port $p$	An OCU Data Loopback test is on the OCU-DP interface in slot $ss$ , port $p$ .

**Table 7-4. Test Status Messages (2 of 2)**

<b>Message</b>	<b>What It Indicates</b>
OCU DS-0 LB, Slot <i>ss</i> Port <i>p</i>	An DS0 Loopback test is on the OCU-DP interface in slot <i>ss</i> , port <i>p</i> .
Voice DLB, Slot <i>ss</i> Port <i>p</i>	A voice Digital Loopback (DLB) test is active on slot <i>ss</i> , port <i>p</i> .
Voice ALB, Slot <i>ss</i> Port <i>p</i>	A voice Analog Loopback (ALB) is active on slot <i>ss</i> , port <i>p</i> .
Voice LLB, Slot <i>ss</i> Port <i>p</i>	A voice Line Loopback (LLB) test is active on slot <i>ss</i> , port <i>p</i> .
Voice DRS, Slot <i>ss</i> Port <i>p</i>	A voice Digital Reference (DRS) test is active on slot <i>ss</i> , port <i>p</i> .
Voice Quiet, Slot <i>ss</i> Port <i>p</i>	A voice quiet tone test is active on slot <i>ss</i> , port <i>p</i> .
Forced Signal, Slot <i>ss</i> Port <i>p</i>	A forced signaling test is active on slot <i>ss</i> , port <i>p</i> .
<i>Pttn</i> Active, [Network <i>n</i> ]	A <i>pttn</i> test (test patterns for Network 1 or Network 2 ) is active on Network <i>n</i> .
<i>Pttn</i> Active, [DSX <i>ss-p</i> ]	A <i>pttn</i> test (test patterns for the DSX-1 interface in slot <i>ss</i> , port <i>p</i> ) is active.
<i>Pttn</i> Active, [Slot <i>ss</i> Port <i>p</i> ]	A <i>pttn</i> test (test patterns for Sync Data port) is active on slot <i>ss</i> , port <i>p</i> .
Mon <i>Pttn</i> , [Network <i>n</i> ]	A Monitor <i>pttn</i> (test patterns for the Network 1 or Network 2) is active on Network <i>n</i> .
Mon <i>Pttn</i> , [DSX <i>ss-p</i> ]	A Monitor <i>pttn</i> (test patterns for the DSX-1 interface in slot <i>ss</i> , port <i>p</i> ) is active.
Mon <i>Pttn</i> , [Slot <i>ss</i> Port <i>p</i> ]	A Monitor <i>pttn</i> (test patterns for the Sync Data port) is active on slot <i>ss</i> , port <i>p</i> .
Lamp Test Active	The Lamp Test is active, causing all LEDs on the T1 NAM and APMs to blink.





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# Operation and Maintenance

# 8

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## Startup

If security requiring logins has been set up, follow the instructions in *Logging In* below. Otherwise, follow the instructions in *Starting a Session* on page 8-2.

## Logging In

When there is no contention for the user interface and a login is required, you are presented with the Login screen. Up to 10 characters can be entered in the Login ID and Password fields. Valid characters include the following:

- 0 through 9
- a through z
- A through Z

### ► Procedure

To log in:

1. Enter your assigned login ID, and press Return.
2. Enter your password, and press Return.

An asterisk (\*) appears in the field for each character entered.

<b>If the Login ID/Password combination is . . .</b>	<b>Then the . . .</b>
Valid	Main Menu appears. Begin your session.
Invalid	<p>Message <b>Invalid Password</b> is displayed on line 24, and the Login screen is redisplayed.</p> <p>If an invalid Login ID/Password combination is entered 3 consecutive times,</p> <ul style="list-style-type: none"> <li>– The current Telnet session is closed.</li> <li>– The User Interface Idle screen appears with a directly-connected terminal.</li> <li>– An external modem is disconnected.</li> <li>– An SNMP trap will be generated, if so configured.</li> </ul> <p>Access is denied. See your system administrator to verify your login (Login ID/Password combination).</p>

## Logging Out

When a login is required and a timeout occurs, you are automatically logged out. You will be prompted for your login next time you try to use the interface.

You can also end a session using the screen function area of the user interface.

### ► Procedure

To log out:

1. Press Ctrl-a to switch from the screen area to the screen function key area.
2. Select Exit by entering e or E and pressing Return. The session is ended.

## Starting a Session

Depending on how your T1 access unit is configured, you can start a session using one of the following methods:

- Dialing in through an external modem to the COM port.
- Direct connection over the COM port.
- Telnet session over the COM port.
- Telnet session through an in-band management channel through the T1 network.

► **Procedure**

Upon beginning a session, the User Interface Idle screen is displayed. To activate:

1. Press Return.
2. One of the following occurs:

<b>If . . .</b>	<b>Then . . .</b>	<b>What to do now?</b>
Security is disabled	The Main Menu screen appears.	Begin your session.
Security is enabled	You are prompted for a login ID and password.	Enter your ID and password. If <b>Invalid Password</b> appears, see <i>System Error Messages</i> in Chapter 9, <i>Troubleshooting</i> .
You are attempting to access through Telnet and the user interface is currently in session	The message <b>Connection refused:</b> appears. (T1 access unit allows only one connection at a time.)	Wait and try again.
You are attempting direct access through the COM port and the user interface is currently in session via an in-band Telnet session	The message <b>User Interface Already In Use</b> appears with the active user's IP address.	See <i>System Status Messages</i> in Chapter 7, <i>Displaying System Information</i> .
The T1 access unit has the Communication Port and Login Required configuration options enabled and there is no contention for the user interface	The Login screen appears.	Enter your ID and password. If <b>Invalid Password</b> appears, see <i>System Error Messages</i> in Chapter 9, <i>Troubleshooting</i> .

## Ending a Session

Use the Exit function key from any screen to terminate the session.

### ► Procedure

To end a session:

1. Press Ctrl-a to go to the screen function key area.
2. Select Exit and press Return.

If connected through . . .	Then the . . .
Direct connection via the COM port	Idle screen appears.
Telnet or some other modem connection	Connection is dropped and the screen is cleared.

3. If ending a configuration editing session, the Save Configuration screen appears with the **Save Changes?** prompt.

If you select . . .	Then the . . .
No	Session is terminated without the configuration option changes being saved.
Yes	Save Configuration To screen appears. Select a configuration option area to save your changes to (Current, Customer 1, or Customer 2), and press Return.  Configuration option changes are saved and the session is terminated.

## Supported SNMP Traps

A trap is an unsolicited message that is sent from the T1 access unit to the SNMP trap manager when the T1 access unit detects certain prespecified conditions. These traps enable the SNMP manager to gauge the state of the network.

The T1 access unit supports the following traps:

- warm-start
- authentication-failure
- enterprise-specific (those specific to T1 access unit)
- link-up
- link-down

Refer to Appendix D, *SNMP Cross-Reference*, for more information on traps.

## Dialing Out and Sending SNMP Traps

You can control whether generated SNMP trap messages will initiate a call if a connection on the COM port external device has not already been established. Use the Alarms Options screen to enable the T1 access unit's automatic call initiation (dial out) on the COM port external device to send an SNMP trap message.

### ► Procedure

1. Assign SNMP Trap Managers. See *Setting Up SNMP NMS Security* in Chapter 5, *Setting Up*.
2. Select desired SNMP traps.  
*Main Menu → Configuration → Management and Communication → SNMP Traps*
3. Configure the phone directories for dialing out alarms via the *Control → COM Port Call Setup* branch. Set up the A directory as the primary alarm directory. You can also set up an alternate directory; refer to *Displaying Directory Numbers* on page 8-6 and *Changing Directory Numbers* on page 8-7.
4. Specify the IP address(es) of the NMS to send traps to when dialing out. Use the *Configuration → Management and Communication → SNMP NMS Security* branch; refer to Appendix C, *SNMP Traps*.
5. Enable the Call Retry and Alarm & Trap Dial-Out configuration options to hold the call if it cannot be completed. The call is held until completed, or the maximum retry count (maximum 5) has been exceeded. You can also set the delay time and specify an alternate directory, if desired.

Follow this menu selection sequence to display the Load Configuration From screen:

*Main Menu → Configuration → [Current Configuration/  
Customer Configuration 1/Customer Configuration 2]*

6. Follow this menu selection sequence, pressing Return after each selection:  
*Configuration Edit/Display → Alarm*  
 The Alarm Options screen appears.
7. Select and set the following configuration options, as appropriate.

To . . .	Set the configuration option . . .
Automatically initiate a call (dial out)	Alarm & Trap Dial-Out to Enable.
Retry the call if the call cannot be completed	<ul style="list-style-type: none"> <li>■ Call Retry to Enable</li> <li>■ Dial-Out Delay Time to the desired number of minutes</li> <li>■ Alternate Dial-Out Directory to the desired directory</li> </ul>
Specify whether to disconnect immediately after dialing out traps, or to allow a manual disconnect to occur. (A connection remains until manually disconnected.)	Trap Disconnect to Enable.

8. Press Ctrl-a to switch to the screen function key area.
9. To save changes, select Save and press Return.
10. Select the configuration area where you want to save the changes to and press Return.  
 When Save is complete, Command Complete appears at the bottom of the screen.

## Maintaining COM Port Directories

Two Control menu selections are dedicated to dialing a remote device for management:

Select . . .	To . . .
COM Port Call Setup	Select a phone directory and view its phone number, or to initiate and terminate external modem connections over the FrameSaver unit's COM port. Used for management.
COM Port Call Directories	Change the phone number contained in a selected directory when using an external modem.

### Displaying Directory Numbers

Use the COM Port Call Setup screen to display the telephone number of the remote device.

*Main Menu → Control → COM Port Call Setup*

## Changing Directory Numbers

Use the COM Port Call Directories screen to change the phone number contained in a selected directory. The T1 access unit ships with all directory phone numbers blank.

### ► Procedure

To change directory phone numbers:

1. Use the following menu selection sequence:  
*Main Menu → Control → COM Port Call Directories*
2. To select the directory to be changed, press the number of the desired directory (1 through 5, or A for Alarm) and press Return. The phone number for that directory appears.
3. Review or change the phone number. Enter a number of up to 40 characters. Make sure only valid characters are entered when changing the phone number. Valid characters:
  - Numbers 0–9
  - Lowercase letters a–z
  - Uppercase letters A–Z
  - Space ( ) character
  - ASCII symbols with the exception of the caret (^)
  - Control sequence using the caret (^)
4. Press Ctrl-a to switch to the screen function key area.
5. To save changes, select Save and press Return.  
When Save is complete, Command Complete appears at the bottom of the screen.

## Changing Device Name

Use the Device Name screen to change the

- Device Name
- System Name
- System Location
- System Contact

Use any ASCII characters. Your entry in each field will overwrite existing information. Use Clear to erase all characters in the current field.

*Main Menu → Control → Device Name*

## Hot Swapping of APMs

The T1 access unit allows you to insert and remove APM cards and their matching I/O cards without powering down the unit or interrupting data on the network or on other APMs. The T1 access unit automatically recognizes when an APM is inserted or removed, and can display the configuration option settings and MIB objects applicable to the APM that was inserted or removed.

**NOTE:**

You do not have access to screens and configuration options that are not valid for the given configuration, nor can you preconfigure or predelete a configuration for an APM prior to inserting it in the housing. To see configuration options for an inserted APM, you must exit the configuration screen, then reenter it.

### APM Insertion

Insertion of an APM into a housing occurs under one of the following three conditions.

If the slot previously . . .	Then . . .
Was unassigned	The configuration options for this new APM will be set to factory defaults and will be accessible from the MIB and the async terminal.
Contained the same type of APM	The existing configuration options will be used and will be accessible from the MIB and the async terminal.
Contained a different type of APM	<p>The system will generate a Module Misconfiguration alarm and trap for the selected slot. The screens and field choices applicable to this APM will not be displayed until you accept the APM upon loading or saving a configuration, or via an enterprise MIB. When you accept the new APM, the previous APM's configuration is deleted, the new APM's configuration options are set to factory defaults, and the screens and field choices applicable to the new APM will be displayed.</p> <p>If you reject the APM, the configuration options for the previous APM can be edited, but all other configuration options and screens will not display fields or choices or MIB objects applicable to either the previous or the current APM.</p>



## APM Removal

When you remove an APM from its slot, you can still edit the applicable configuration options. If you are displaying a Status or Test screen when you remove an APM,

- The message **APM Removed** will display after the screen is refreshed and all fields relating to the APM will be cleared.
- Only the ESC (Previous menu), Main Menu, and Exit virtual functions will be available when no other valid slots are available to select.
- MIB objects applicable to the removed APM, and attempts to do a get or set of those objects will display the message **No Such Name**.

## NAM Removal

Although you can safely remove the T1 NAM from the housing with power on, the T1 access unit does not support hot swapping of the T1 NAM. All APM configurations travel with the NAM.

## Downloading Software

The access unit is capable of accepting a software download from a PC through its COM port to support a file transfer or software upgrade. The Download feature is used only by your service representative to update your access unit.

## File Transfer

The T1 access unit supports a standard File Transfer Protocol (FTP) server over Transmission Control Protocol (TCP) to allow you to transfer configuration and program files to/from a T1 access unit node. A complete binary image of the configuration can be copied to a host to provide a backup. The T1 access unit must be configured to support FTP sessions.

Initiate an FTP session to a T1 access unit node in the same way as you would initiate an FTP to any other IP-addressable device.

Be aware of the following rules when doing a file transfer:

- You must have Access Level 1 permission to use the put command.
- You cannot put a file to the factory.cfg file under the system directory.
- You can only put a NAM program file (nam1\_ctl.ocd, nam2\_low.ocd, or nam3\_hi.ocd) to a T1 access unit. It cannot be uploaded from a node to a host.
- You must change to the /system directory.
- Before putting a download file, you must use the **bin** binary command to place the data connection in Binary mode.

► **Procedure**

To initiate an FTP session:

1. Start the FTP client program on your host. For example, on a Unix host, type **ftp**, followed by the IP address of the T1 access unit.
2. If a login and password are required (see *Creating a Login* in Chapter 6, *Security*), you are prompted to enter them here. The FTP prompt appears.
3. The starting directory is the root directory (/). The following are available in the /system directory: nam1\_ctl.ocd, nam2\_low.ocd, nam3\_hi.ocd, current.cfg, factory.cfg, cust1.cfg, cust2.cfg. Use the standard FTP commands during the FTP session, as well as the following remote FTP commands.

Command	Definition
cd <i>directory</i>	Change the current directory on the access unit to <i>directory</i> .
dir [ <i>directory</i> ] or ls-1	Print a listing of the directory contents in the <i>directory</i> directory. If no directory is specified, the current one is used.
get <i>file1</i> [ <i>file2</i> ]	Copy a file from the remote directory of the T1 access unit node to the local directory on the host.
remotehelp [ <i>command</i> ]	Print the meaning of the command. If no argument is given, a list of all known commands is printed.
ls [ <i>directory</i> ]	Print an abbreviated list of the directory contents in the specified directory. If no directory is specified, the current one is used.
put <i>file1</i> [ <i>file2</i> ]	Copy <i>file1</i> from a local directory on the host to <i>file 2</i> in the current directory of the T1 access unit.
recv <i>file1</i> [ <i>file 2</i> ]	Same as a get.
send <i>file1</i> [ <i>file 2</i> ]	Same as a put.
pwd	Print the name of the current directory of the T1 access unit.

## Performing an Upgrade

If you need to upgrade the NAM program code, you must transfer the following files in the order specified by using the put command:

1. NAM control file (nam1\_ctl.ocd)
2. NAM Program-Low Bank (nam2\_low.ocd)
3. NAM Program-Hi Bank (nam3\_hi.ocd)

These files must all be the same version (from the same revision level) for a successful download.

**► Procedure**

To perform a download:

1. Initiate an FTP session to the device that you are upgrading.
2. Type **bin** to enter binary mode.
3. Type **cd system** to change to the system directory.
4. Type **put nam1\_ctl.ocd** to perform a put to the nam1\_ctl.ocd to start the download. If the control file is valid, the message **nam1\_ctl.ocd: File Transfer Complete** displays, the write permission will be set on the nam1\_low.ocd, and the device will reset and enter Minimum mode. The Alarm LED will light and the OK LED will blink to indicate that the device has entered Minimum mode.
5. Reestablish an FTP session to the device. Type **open <IP address>**.
6. Type **bin** to enter binary mode.
7. Type **cd system** to change to the system directory.
8. Type **put nam2\_low.ocd** to perform a put to the nam2\_low.ocd to start the download. If a valid nam2\_low.ocd (that is, it has the revision level as nam1\_ctl.ocd) is successfully put and has the proper checksum, then the message **nam2\_low.ocd: File Transfer Complete** displays, the file is loaded into system memory, the write permission will be set on the nam3\_hi.ocd, the system performs a memory bank switch, a reset/reinitialization occurs, and the system will stay in Minimum mode.
9. Reestablish an FTP session to the device. Type **open <IP address>**.
10. Type **bin** to enter binary mode.
11. Type **cd system** to change to the system directory.
12. Type **put nam3\_hi.ocd** to perform a put to the nam3\_hi.ocd to start the download. If a valid nam3\_hi.ocd (that is, it has the revision level as the nam1\_ctl.ocd and nam2\_low.ocd files) is successfully put and has the proper checksum, then the message **nam3\_hi.ocd: File Transfer Complete** displays, the file is loaded into system memory, the write permission will be removed for both the nam2\_low.ocd and the nam3\_hi.ocd files, the system performs a reset/reinitialization, and the system will be in Normal mode and operating from the new program load. The download has successfully completed.

## Backing Up Your Configuration

You may choose to back up your configuration files in case recovery is needed. The following configuration files correspond to the configuration areas in your T1 access unit.

Configuration File	Configuration Area
current.cfg	Current
cust1.cfg	Customer 1
cust2.cfg	Customer 2
factory.cfg <sup>1</sup>	Factory
<sup>1</sup> You cannot put to this file since it is read-only	

### NOTE:

If you maintain a backup copy of your configuration files, you should upload a new backup copy of your configuration from the T1 access unit after you upgrade to a new release of software.

#### ► Procedure

To copy configuration files from the T1 access unit:

1. Initiate an FTP session to the device that you are backing up.
2. Type **bin** to enter binary mode.
3. Type **cd system** to change to the system directory.
4. Type **get <filename>** to perform a get of the desired file(s).
5. Type **quit** to exit the FTP session.

#### ► Procedure

To restore configuration files to the T1 access unit:

1. Initiate an FTP session to the device that you are backing up.
2. Type **bin** to enter binary mode.
3. Type **cd system** to change to the system directory.
4. Type **put <filename>** to perform a get of the desired file(s).
5. Type **quit** to exit the FTP session.

## Resetting the T1 Access Unit

You can reset the T1 access unit in four ways:

- Reset it from the Control menu to perform a self test
- Cycle the power to perform a self test
- Reset the configuration options to reestablish connectivity with the user interface
- Set the MIB from NMS

### Resetting the T1 Access Unit from the Control Menu

Use this procedure to initiate a power-on selftest of the unit. This procedure also resets the T1 access unit.

#### ► Procedure

To reset the T1 access unit from the Control menu:

1. Follow this menu selection sequence:  
*Main Menu → Control → Reset Device*
2. Select Yes. The T1 access unit reinitializes itself, performing a Device Self-Test.

### Restoring Access to the User Interface

Misconfiguring the T1 access unit could render the user interface inaccessible, leaving it in a state where a session cannot be started via the COM port or a Telnet session. If this occurs, T1 access unit connectivity can be restored via a directly-connected terminal.

Two methods can be used to restore access to the user interface:

- **Reset COM Port** – Allows you to reset the configuration options related to COM port usage. This also causes a device reset, where the T1 access unit performs a Device Self-Test. No security-related configuration options are changed.
- **Reload Factory Defaults** – Allows you to reload the Default Factory Configuration, resetting all of the configuration and control settings. This method is also useful when the user's password(s) have been forgotten. Selecting this method also causes a device reset. Reload destroys the current configuration.

► **Procedure**

To reset COM port settings:

1. Attach the async terminal to the COM port.
2. At the async terminal, configure the terminal to operate at 19.2 kbps, using character length of 8 bits, with one stop-bit, and no parity.
3. Ensure that any hardware or software flow control is disabled.
4. Reset the T1 access unit, then immediately and repeatedly press Return at a rate of at least 1 press per second until the System Paused screen appears. (See *Resetting the T1 Access Unit from the Control Menu* to reset the unit.)
5. Tab to the desired method, and enter yes (or y) for the selected prompt.

If entering yes to prompt . . .	Then . . .
Reset COM Port usage	<ul style="list-style-type: none"> <li>■ Port Type is set to Terminal.</li> <li>■ Data Rate (Kbps) is set to 19.2.</li> <li>■ Character Length is set to 8.</li> <li>■ Stop Bits is set to 1.</li> <li>■ Parity is set to None.</li> <li>■ External Device Commands is set to Disable.</li> </ul>
Reload Factory Defaults	All factory-loaded configuration and control settings contained in the Default Factory configuration area are loaded.

If **no** (or **n**) is entered, or if no selection is made within 30 seconds, the T1 access unit returns to the condition of operation it was in when the system pause was initiated, with the COM port settings returning to their configured states.

If you choose yes, the T1 access unit resets itself, going through a Device Self-Test. Connectivity is restored and the Main Menu screen appears.

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# Troubleshooting

# 9

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## What Are the Troubleshooting Features?

The T1 access unit is designed to provide you with many years of trouble-free service. If a communication problem occurs, however, refer to the information in this chapter for possible solutions.

The T1 access unit can:

- Detect and report faults
- Perform diagnostic tests

Use the test jacks on the front panel of the Single and Dual T1 NAM, and the DSX APM to help isolate problems.

Statistics are also collected to help you determine how long a problem has existed. See Chapter 7, *Displaying System Information*, for information on statistics.

These features ensure that your T1 access unit is giving you optimum performance in your network.

## How Do I Know There Is a Problem?

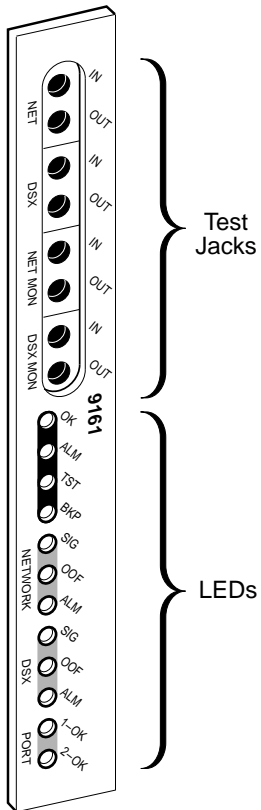
The T1 access unit offers three major mechanisms that alert you to possible problems:

- LEDs
- Alarms
- SNMP Traps

If monitoring the system, the System and Test Status screen can also indicate that there is a problem.

*Main Menu → Status → System and Test Status*

## T1 NAM LEDs



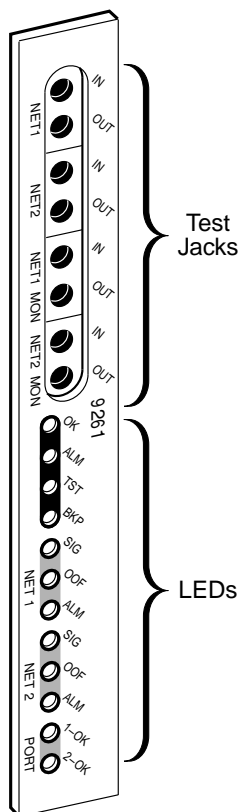
496-15051

### General Status LEDs

Label	Indication	Color	What It Means
OK	Power and Operational Status	Green	ON – NAM has power and is operational. OFF – NAM is in a power-up self-test, or there is a failure. CYCLING – The unit is in Minimum mode. Requires an FTP download.
ALM	System Failure/ Self-Test	Red	ON – NAM has just been reset, or an error or fault has been detected. OFF – No failures have been detected.
TST	Test Mode	Yellow	ON – Loopback or test pattern in progress, initiated locally, remotely, or from the network. OFF – No tests are active.
BKP	Backup	Yellow	Not supported in this release. Remains off except during a Lamp Test.



**Network and DSX Interface LEDs**



97-15647

Label	Indication	Color	What It Means
SIG	Signal	Green	<p>ON – A recoverable signal is present on the Network/DSX interface.</p> <p>OFF – The signal cannot be recovered from the Network/DSX interface. An LOS condition exists.</p>
OOF	Out of Frame	Yellow	<p>ON – At least one OOF was detected during the sampling period.</p> <p>OFF – No OOFs were detected during the sampling period.</p>
ALM	Alarm	Yellow	<p>ON – An alarm condition is present on the Network/DSX interface.</p> <p>Current alarm conditions:</p> <ul style="list-style-type: none"> <li>■ Loss of Signal (LOS)</li> <li>■ Loss of Frame (LOF)</li> <li>■ Excessive Error Rate (EER)</li> <li>■ Yellow</li> <li>■ Alarm Indication Signal (AIS)</li> </ul> <p>OFF – No alarm condition is present on the Network/DSX interface.</p>

**Port 1 and Port 2 LEDs**

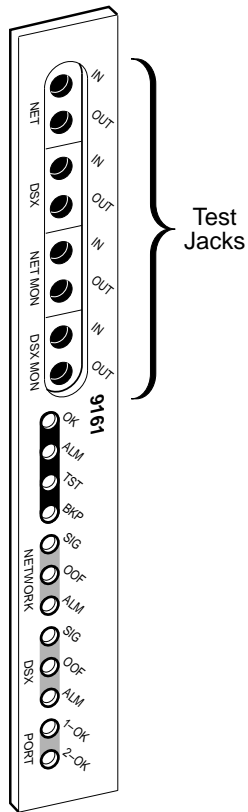
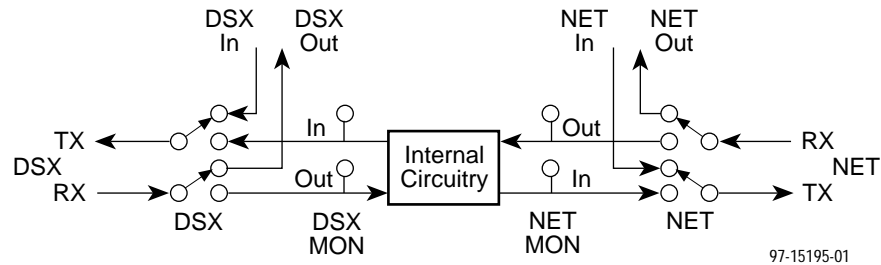
Label	Indication	Color	What It Means
1-OK 2-OK	Operational Status	Green	<p>ON – The interchange circuits for the port are in the correct state to transmit and receive data.</p> <p>OFF – The port is idle. Occurs if the port is disabled, if an EDL Out of Frame or EER condition is present, if a DCLB is active, or if the port is configured to monitor DTR and/or RTS and the lead(s) is not asserted.</p>

## T1 NAM Test Jack Functions

The T1 NAM has four sets of test jacks located on the upper section of the faceplate. Four nonintrusive access points are also provided.

See *Test Jacks* on page 9-8 for more information on the test jacks.

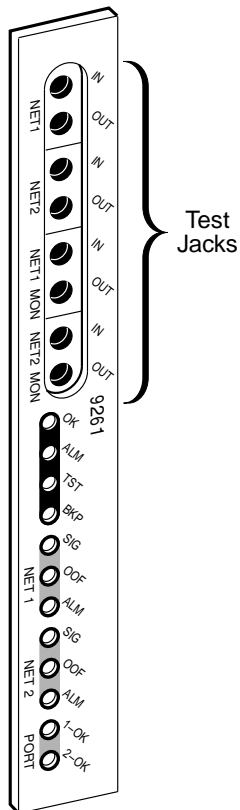
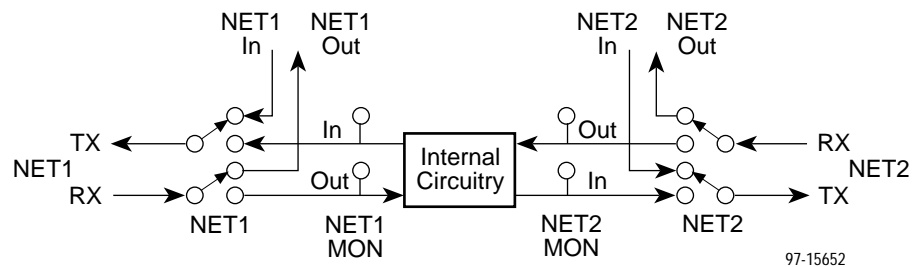
### 9161 Single T1 NAM Test Jack Functions



Test Jack Name	Function
DSX IN	An intrusive test jack that allows a signal to be inserted towards the equipment attached to the DSX-1 interface by external test equipment.
DSX OUT	An intrusive test jack that interrupts the signal coming from the equipment attached to the DSX-1 interface and allows it to be terminated by external test equipment.
DSX MON IN (DSX Monitor In)	A monitor jack that nonintrusively monitors the signal going into the terminal equipment (DTE).
DSX MON OUT (DSX Monitor Out)	A monitor jack that nonintrusively monitors the signal coming out of the terminal equipment (DTE).
NET IN (Network In)	An intrusive test jack that allows insertion of a signal toward the network by external test equipment.
NET OUT (Network Out)	An intrusive test jack that interrupts the signal coming from the network and allows it to be terminated by external test equipment.
NET MON IN (Network Monitor In)	A monitor jack that nonintrusively monitors the transmitted signal going into the network. This is a composite of the channels allocated to the network.
NET MON OUT (Network Monitor Out)	A monitor jack that nonintrusively monitors the received signal coming out of the network. This is a composite of the channels allocated to the network.

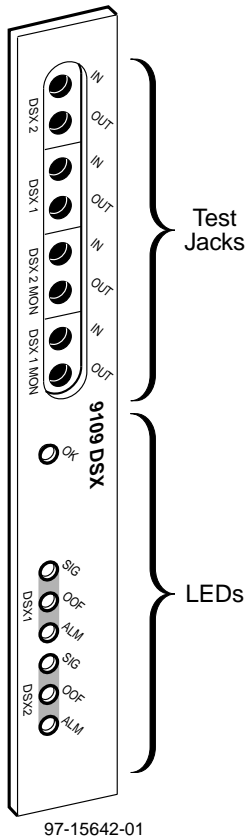
## 9261 Dual T1 NAM Test Jack Functions

The T1 NAM has four sets of test jacks located on the upper section of the faceplate. Four nonintrusive access points are also provided.



Test Jack Name	Function
NET1 IN (Network 1 In)	An intrusive test jack that allows a signal to be inserted towards the Network 1 interface by external test equipment.
NET1 OUT (Network 1 Out)	An intrusive test jack that interrupts the signal coming from the Network 1 interface and allows it to be terminated by external test equipment.
NET1 MON IN (Network 1 Monitor In)	A monitor jack that nonintrusively monitors the signal going into the network (a composite of all channels allocated to the Network 1 interface).
NET1 MON OUT (Network 1 Monitor Out)	A monitor jack that nonintrusively monitors the received signal coming out of the network (a composite of all channels allocated to the Network 1 interface).
NET2 IN (Network 2 In)	An intrusive test jack that allows insertion of a signal toward equipment attached to the Network 2 interface by external test equipment.
NET2 OUT (Network 2 Out)	An intrusive test jack that interrupts the signal coming from equipment attached to the Network 2 interface and allows it to be terminated by external test equipment.
NET2 MON IN (Network 2 Monitor In)	A monitor jack that nonintrusively monitors the signal going into the equipment attached to the Network 2 interface.
NET2 MON OUT (Network 2 Monitor Out)	A monitor jack that nonintrusively monitors the signal coming out of the equipment attached to the Network 2 interface.

## Dual DSX APM LEDs



### DSX 1 and DSX 2 Interface LEDs

Label	Indication	Color	What It Means
SIG	Signal	Green	ON – A recoverable signal is present on the DSX1/DSX2 interface. OFF – The signal cannot be recovered from the DSX1/DSX2 interface. An LOS condition exists.
OOF	Out of Frame	Yellow	ON – At least one OOF was detected during the sampling period. OFF – No OOFs were detected during the sampling period.
ALM	Alarm	Yellow	ON – An alarm condition is present on the DSX1/DSX2 interface. Current alarm conditions: <ul style="list-style-type: none"> <li>■ Loss of Signal (LOS)</li> <li>■ Loss of Frame (LOF)</li> <li>■ Excessive Error Rate (EER)</li> <li>■ Yellow</li> <li>■ Alarm Indication Signal (AIS)</li> </ul> OFF – No alarm condition is present on the DSX1/DSX2 interface.

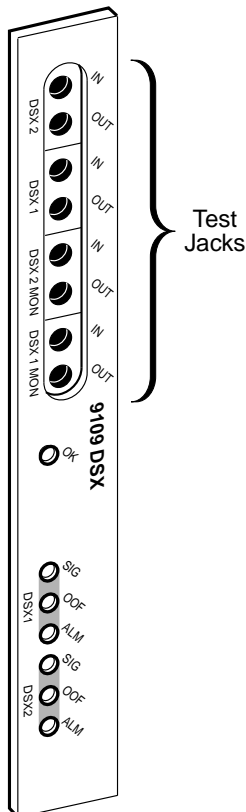
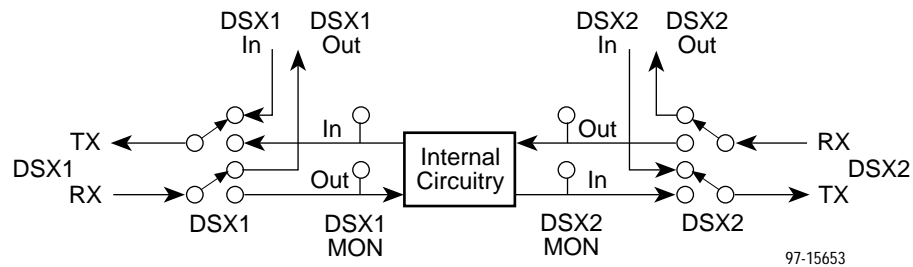
### General Status LED

Label	Indication	Color	What It Means
OK	Power and Operational Status	Green	ON – The APM has power and is operational. OFF – The APM is in a local self-test, or there is a failure.

### 9109 Dual DSX APM Test Jack Functions

The Dual DSX APM test jacks are used for:

- Accessing and testing towards the DSX 1 port
- Accessing and testing towards the DSX 2 port



Test Jack Name	Function
DSX1 IN	An intrusive test jack that allows a signal to be inserted towards the equipment attached to the DSX1 interface by external test equipment.
DSX1 OUT	An intrusive test jack that interrupts the signal coming from the equipment attached to the DSX1 interface and allows it to be terminated by external test equipment.
DSX1 MON IN (DSX1 Monitor In)	A monitor jack that nonintrusively monitors the transmitted signal going into the network (a composite of all channels allocated to the DSX1 interface).
DSX1 MON OUT (DSX1 Monitor Out)	A monitor jack that nonintrusively monitors the received signal coming out of the network (a composite of all channels allocated to the DSX1 interface).
DSX2 IN	An intrusive test jack that allows insertion of a signal toward the equipment attached to the DSX2 interface by external test equipment.
DSX2 OUT	An intrusive test jack that interrupts the signal coming from the equipment attached to the DSX2 interface by external test equipment.
DSX2 MON IN (DSX2 Monitor In)	A monitor jack that nonintrusively monitors the signal going into the equipment attached to the DSX2 interface.
DSX2 MON OUT (DSX2 Monitor Out)	A monitor jack that nonintrusively monitors the signal coming out of the equipment attached to the DSX2 interface.

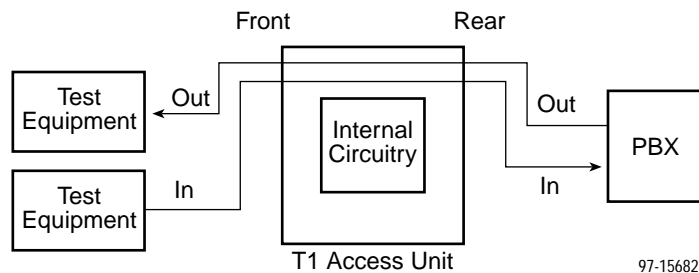
See *Test Jacks* on page 9-8 for more information on the test jacks.

## Test Jacks

This card . . .	Provides these test jacks . . .	And provides these test access points . . .
9161 Single T1 NAM	<ul style="list-style-type: none"> <li>■ Network In</li> <li>■ Network Out</li> <li>■ DSX In</li> <li>■ DSX Out</li> </ul>	<ul style="list-style-type: none"> <li>■ Network Monitor In</li> <li>■ Network Monitor Out</li> <li>■ DSX Monitor In</li> <li>■ DSX Monitor Out</li> </ul>
9261 Dual T1 NAM	<ul style="list-style-type: none"> <li>■ Network 1 In</li> <li>■ Network 1 Out</li> <li>■ Network 2 In</li> <li>■ Network 2 Out</li> </ul>	<ul style="list-style-type: none"> <li>■ Network 1 Monitor In</li> <li>■ Network 1 Monitor Out</li> <li>■ Network 2 Monitor In</li> <li>■ Network 2 Monitor Out</li> </ul>
9109 Dual DSX APM	<ul style="list-style-type: none"> <li>■ DSX 1 In</li> <li>■ DSX 1 Out</li> <li>■ DSX 2 In</li> <li>■ DSX 2 Out</li> </ul>	<ul style="list-style-type: none"> <li>■ DSX 1 Monitor In</li> <li>■ DSX 1 Monitor Out</li> <li>■ DSX 2 Monitor In</li> <li>■ DSX 2 Monitor Out</li> </ul>

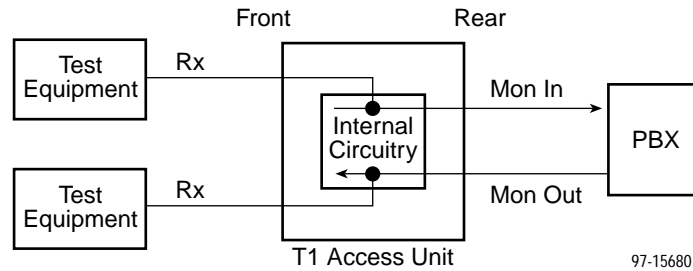
The following figure is an example of using these test jacks:

- DSX OUT to allow test equipment to terminate the signal coming from equipment (e.g., a PBX) attached to the DSX port on the rear of the T1 access unit.
- DSX IN to allow test equipment to provide a signal to equipment (e.g., a PBX) attached to the DSX port on the rear of the T1 access unit.



The following figure is an example of using the monitor test jacks:

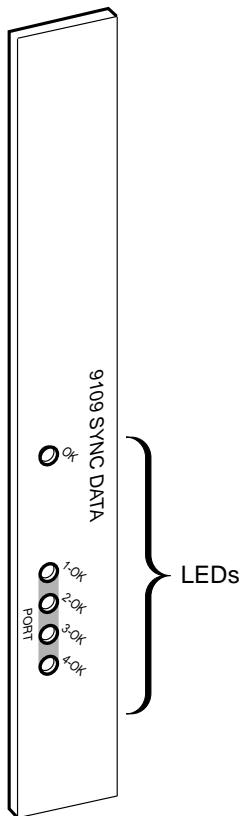
- DSX MON IN to allow test equipment to nonintrusively monitor the signal being sent from the T1 access unit to equipment (e.g., a PBX) attached to the DSX port on the rear of the T1 access unit.
- DSX MON OUT to allow test equipment to nonintrusively monitor the signal being sent equipment (e.g., a PBX) attached to the DSX port on the rear of the T1 access unit.



97-15680

## Sync Data APM Front Panel LEDs

The Sync Data APM has five LED status indicators.



97-15679

### General Status LED

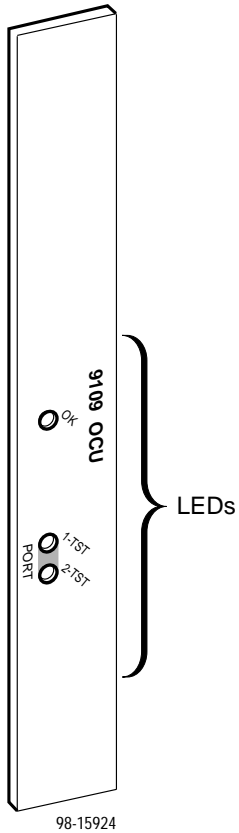
Label	Indication	Color	What It Means
OK	Power and Operational Status	Green	ON – APM has power and is operational. OFF – APM is in a local self-test, or there is a failure.

### Port 1, Port 2, Port 3, and Port 4 LEDs

Label	Indication	Color	What It Means
1-OK 2-OK 3-OK 4-OK	Operational Status	Green	ON – The interchange circuits for the port are in the correct state to transmit and receive data. OFF – The port is idle. Occurs if the port is disabled, if an EDL Out of Frame or EER condition is present, if a DCLB is active, or if the port is configured to monitor DTR and/or RTS and the lead(s) is not asserted.

## OCU-DP APM Front Panel LEDs

The 2-port OCU-DP APM has three LED status indicators. The 6-port OCU-DP APM has seven LEDs.

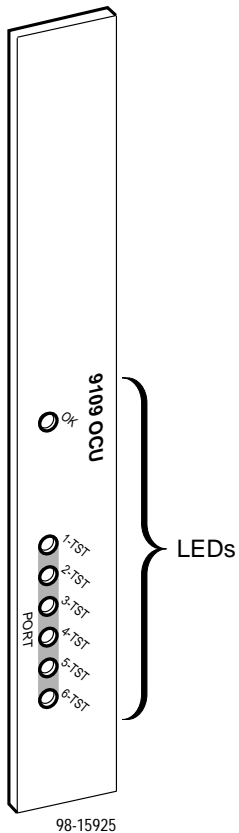


### General Status LED

Label	Indication	Color	What It Means
OK	Power and Operational Status	Green	ON – APM has power and is operational. OFF – APM is in a local self-test, or there is a failure.

### Port (1 to 6) LEDs

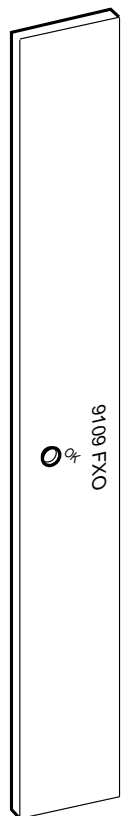
Label	Indication	Color	What It Means
1-TST 2-TST 3-TST 4-TST 5-TST 6-TST	Operational Status	Yellow	ON – A test is in progress. OFF – No test is active on the port, including all test pattern generation, and any loopback that may be active on the local loop or the OCU-DP APM.





## Voice APM Front Panel LED

The E&M, FXO, and FXS Analog Voice APMs each have 1 LED status indicator.



### General Status LED

Label	Indication	Color	What It Means
OK	Power and Operational Status	Green	ON – APM has power and is operational. OFF – APM is in a local self-test, or there is a failure.

## System Alarm Relay

The 5-slot housing and the access carrier provide an alarm system relay that you can configure to activate when an alarm condition is present. To use the system alarm relay, you must:

- See the 5-slot housing or access carrier installation instructions for information on how to connect the alarm relay connector.
- Set the following configuration option:  
*Main Menu → Configuration Edit/Display → Alarm Options → System Alarm Relay → Enable*
- Ensure that the System Alarm Relay Cut-off under the Control branch is not selected. This menu selection turns off the system alarm relay.

## Alarms

The T1 access unit monitors alarm conditions occurring on either the:

- Network interface
- DSX-1 interface, or
- Sync data ports

You select the ASCII alarms that you wish to receive for each interface on the T1 access unit via the Network Interface configuration option screen.

### Viewing Alarm Messages

You can view alarm messages via the:

- Health and Status screen
- Messages on Line 24 of the user interface screen
- Printout from your ASCII terminal printer

## ASCII Alarm Messages

The following messages are sent to an ASCII terminal or printer attached to the communication port (either locally or remotely via an external device).

### CAUTION:

**You should be sure to clear alarms as they occur by correcting the condition that caused the alarm. Additional alarms will not be reported until the previous alarm is cleared. Therefore, if you do not clear an alarm, a serious outage could occur and you will be unaware of it, unless you are monitoring the unit via the user interface or SNMP.**

- When set, an alarm is sent at the start of an alarm condition.
- If more than one alarm condition exists, only the highest priority alarm will be sent. View Health and Status for all conditions.
- An Alarm Cleared message is sent when the alarm condition no longer exists.

Table 9-1 lists the alarm messages and corresponding clear messages in alphabetical order. Priority order is identified. Each alarm message contains:

- Date and time (*month/day/year hours:minutes:seconds*) that the condition occurred or was cleared.
- The user-configured device name.
- Alarm description.
- An identification of the affected interface (when applicable).

**Table 9-1. ASCII Alarm Messages (1 of 5)**

Message	What It Indicates	What To Do	Priority
<p><i>month/day/year hours:minutes:seconds</i> – An Abnormal Station Code has been received at the OCU-DP port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year hours:minutes:seconds</i> – Alarm Cleared for Abnormal Station Code at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p>	<p>An Abnormal Station Code from the network DS0 is detected on the specified OCU-DP port</p> <p>Alarm condition no longer exists.</p>	<p>1. Check that the far-end DSU is operational.</p> <p>2. Check the far-end cable to the DSU.</p> <p>No action needed.</p>	17
<p><i>month/day/year hours:minutes:seconds</i> – Alarm Indication Signal (AIS) received at the Network 1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year hours:minutes:seconds</i> – Alarm Cleared for Alarm Indication Signal (AIS) at the Network 1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p>	<p>An Alarm Indication Signal condition is detected on the specified Network or DSX-1 interface.</p> <p>Alarm condition no longer exists.</p>	<p>Check the status of the far-end unit. If necessary, contact network provider for Network interface.</p> <p>Check the DTE attached to the DSX-1 interface.</p> <p>No action needed.</p>	6 (Net) 7 (DSX-1)
<p><i>month/day/year hours:minutes:seconds</i> – An APM Card Failure has been detected for slot <i>ss</i>.</p> <p><i>month/day/year hours:minutes:seconds</i> – Alarm Cleared for an APM Card Failure for slot <i>ss</i>.</p>	<p>An APM card failure is detected for the identified slot.</p> <p>Alarm condition no longer exists.</p>	<p>1. Check that the APM card is seated properly.</p> <p>2. Contact your service representative.</p> <p>No action needed.</p>	11

**Table 9-1. ASCII Alarm Messages (2 of 5)**

Message	What It Indicates	What To Do	Priority
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Continuous Loss Of Signal (LOS) condition detected at the Network 1/Network 2 Interface or at DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Loss Of Signal (LOS) condition at the Network 1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p>	<p>LOS condition detected.</p> <p>Alarm condition no longer exists.</p>	<p>1. Check the cable to the Network/DSX-1 interface.</p> <p>2. Contact network provider.</p> <p>No action needed.</p>	<p>2 (Net) 3 (DSX-1)</p>
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Continuous Out Of Frame (OOF) detected at the Network 1/Network 2 Interface or at DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Out of Frame (OOF) condition at the Network 1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p>	<p>An out-of-frame condition is detected at the specified Network or DSX-1 interface.</p> <p>Alarm condition no longer exists.</p>	<p>1. Ensure that the line framing format configuration option setting matches the setting of the equipment (DSX-1) or network (Net).</p> <p>2. Contact network provider.</p> <p>No action needed.</p>	<p>4 (Net) 5 (DSX-1)</p>
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Continuous Out of Frame (OOF) condition at synchronous data port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Out Of Frame (OOF) condition at synchronous data port in slot <i>ss</i> port <i>p</i>.</p>	<p>A continuous out-of-frame condition occurred on the synchronous data port for the identified slot and port.</p> <p>Alarm condition no longer exists.</p>	<p>1. Ensure that EDL is enabled on the far-end port. Refer to the <i>Technical Reference</i> for setting configuration options.</p> <p>2. There is a network problem with the fractional portion of the link carrying this port's data. Contact network provider.</p> <p>No action needed.</p>	<p>13</p>

**Table 9-1. ASCII Alarm Messages (3 of 5)**

Message	What It Indicates	What To Do	Priority
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – A DDS Network Failure code has been received at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for a DDS Network Failure code at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p>	<p>A DDS network failure is being detected on the specified OCU-DP port.</p> <p>Alarm condition no longer exists.</p>	<p>Contact the DDS service provider.</p> <p>No action needed.</p>	19
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – An Excessive Error Rate (EER) has been detected at the Network 1/ Network 2 Interface.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Excessive Error Rate (EER) at the Network 1/Network 2 Interface.</p>	<p>An Excessive Error Rate condition is detected on the network interface.</p> <p>Alarm condition no longer exists.</p>	<p>Contact network provider.</p> <p>No action needed.</p>	12
<p><i>month/day/year</i> <i>hours/minutes/seconds</i> – An Excessive Error Rate (EER) has been detected at synchronous data port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Excessive Error Rate (EER) at synchronous data port in slot <i>ss</i> port <i>p</i>.</p>	<p>An excessive error rate occurred on the synchronous data port for the identified slot and port.</p> <p>Alarm condition no longer exists.</p>	<p>There is a network problem with the fractional portion of the link carrying this port's data. Contact network provider.</p> <p>No action needed.</p>	14
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – A Loss of Loop Timing has been detected at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Loss of Loop Timing at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p>	<p>The specified OCU-DP port cannot recover timing from the received signal on the local loop.</p> <p>Alarm condition no longer exists.</p>	<p>Check that the CPE CSU/DSU rate matches the OCU-DP rate.</p> <p>No action needed.</p>	20

**Table 9-1. ASCII Alarm Messages (4 of 5)**

Message	What It Indicates	What To Do	Priority
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – A Loss Of Signal (LOS) has been detected at the OCU-DP port in slot <i>ss</i> port <i>p</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for a Loss Of Signal (LOS) at OCU-DP port in slot <i>ss</i> port <i>p</i>.</p>	<p>LOS condition detected.</p> <p>Alarm condition no longer exists.</p>	<p>1. Check the cable to the OCU-DP port.</p> <p>2. Contact network provider.</p> <p>No action needed.</p>	16
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – A Module Misconfiguration condition was detected for slot <i>ss</i>.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for the Module Misconfiguration for slot <i>ss</i>.</p>	<p>The identified slot previously contained a different type of APM.</p> <p>Alarm condition no longer exists.</p>	<p>Ensure that the APM installed is the correct type. If it is not, install the correct APM type. The card needs to be accepted. Refer to the <i>Technical Reference</i> for additional information, if necessary.</p> <p>No action needed.</p>	8
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Power Supply Alarm condition detect.</p> <p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Power Alarm condition.</p>	<p>A power supply or fan tray problem is detected on the system.</p> <p>Alarm condition no longer exists.</p>	<p>1. Check that the power supply or fan tray is mounted correctly in the housing.</p> <p>2. Contact your service representative.</p> <p>No action needed.</p>	1
<p><i>month/day/year</i> <i>hours:minutes:seconds</i> – Yellow alarm signal received at the Network 1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i>.</p>	<p>A Yellow alarm signal is detected on the specified Network or DSX-1 interface.</p>	<p>1. Check the Network and/or DSX-1 cable.</p> <p>2. Contact network provider for Network interface problem. Check equipment for DSX-1 interface problem.</p>	9 (Net) 10 (DSX-1)

**Table 9-1. ASCII Alarm Messages (5 of 5)**

Message	What It Indicates	What To Do	Priority
<i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for Yellow alarm signal at the Network1/Network 2 Interface or at the DSX-1 Interface in slot <i>ss</i> port <i>p</i> .	Alarm condition no longer exists.	No action needed.	
<i>month/day/year</i> <i>hours:minutes:seconds</i> – A Primary Clock Source Failure has occurred.	The primary clock source has failed. The system is operating from the secondary clock source.	1. If the primary clock was derived from the network, contact the network provider.  2. Check the clock source. Contact your service representative.	22
<i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for a Primary Source Failure.	Alarm condition no longer exists.	No action needed.	
<i>month/day/year</i> <i>hours:minutes:seconds</i> – A Secondary Clock Source Failure has occurred.	The secondary clock source has failed. The system is operating from the internal clock.	1. If the secondary clock was derived from the network, contact the network provider.  2. Check the clock source. Contact your service representative.	21
<i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for a Secondary Source Failure.	Alarm condition no longer exists.	No action needed.	
<i>month/day/year</i> <i>hours:minutes:seconds</i> – A 64KCC Loop Out of Frame has been detected at OCU-DP port in slot <i>ss</i> port <i>p</i> .	A continuous out-of-frame condition occurred on the OCU-DP port for the identified slot and port.	There is a network problem with the fractional portion of the link carrying this port's data. Contact network provider.	18
<i>month/day/year</i> <i>hours:minutes:seconds</i> – Alarm Cleared for a 64KCC Loop Out Of Frame at OCU-DP port in slot <i>ss</i> port <i>p</i> .	Alarm condition no longer exists.	No action needed.	

## System Error Messages

These messages, listed in alphabetical order, appear in the messages area at the bottom of the screens (see Table 9-2).

**Table 9-2. System Error Messages**

Message	What It Indicates	What To Do
Invalid Character (x) <sup>1</sup>	An invalid character has been entered.	Reenter information using valid characters.
Invalid – Already Active	Test was already in progress when it was selected.	No action needed.
Invalid Password	Login is required and an incorrect password was entered; access is denied.	<ol style="list-style-type: none"> <li>1. Try again.</li> <li>2. Contact your system administrator to verify your password.</li> </ol>
Invalid Test Combination	A conflicting loopback or pattern test was in progress when Start was selected to start another test, or was active on the same or another interface when Start was selected.	<ol style="list-style-type: none"> <li>1. Wait until other test ends and message clears.</li> <li>2. Stop the test from the same screen the test was started from.</li> <li>3. Cancel all tests from the Test screen (Path: <b>main/test</b>).</li> </ol>
Limit of six Login IDs reached	An attempt to enter a new login ID exceeds the six login/password combinations limit.	<ol style="list-style-type: none"> <li>1. Delete another login/password combination.</li> <li>2. Reenter the new login ID.</li> </ol>
Minimum Mode	Appears if the T1 access unit fails the memory test during a power-up self-test.	Use FTP to download software again. Call your service representative.
No Security Records to Delete	Delete was selected from the Administer Login screen, and no security records exist.	<ol style="list-style-type: none"> <li>1. No action needed.</li> <li>2. Enter a security record.</li> </ol>
Password Matching Error – Re-enter Password	Password entered in the Reenter Password field of the Administer Logins screen does not match what was entered in the Password field.	<ol style="list-style-type: none"> <li>1. Try again.</li> <li>2. Contact your system administrator to verify your password.</li> </ol>
<sup>1</sup> x is the character not being accepted.		



## Automatic Dialing Out When an Alarm Occurs

You can control whether generated alarm messages will initiate a call if a connection on the COM port external device has not already been established.

To dial out when an alarm occurs you must:

- Connect the modem to the COM port using the appropriate cable.
- Select the ASCII alarms to receive for each interface.
- Configure the phone directory to use for Dial Out Alarms.
- Enable Alarm & Trap Dial Out.
- Enable Call Retry, if desired.

### ► Procedure

To enable the desired ASCII alarms for each interface:

1. Follow this menu selection sequence to display the Load Configuration From screen:

*Main Menu → Configuration*

2. Select the desired configuration area and press Return. The Configuration Edit/Display screen appears.
3. Select the ASCII alarms to enable for the interface.

To enable . . .	Set the configuration option(s) . . .
T1 alarms	Configuration → Network
DSX-1 alarms	Configuration → DSX-1
Sync Data Ports alarms	Configuration → Sync Data Ports
OCU-DP Ports alarms	Configuration → OCU-DP Ports

4. Configure the phone directory to use for dialing out alarms (see *Displaying Directory Numbers* and *Changing Directory Numbers* in Chapter 8, *Operation and Maintenance*).
5. Select Alarm from the Configuration Edit/Display menu and press Return. The Alarms Options screen appears.

To . . .	Set the configuration option . . .
Automatically initiate a call (dial out)	Alarm & Trap Dial-Out to Enable.
Retry the call if the call cannot be completed	Call Retry to Enable.
Enable ASCII alarms	Configuration → Alarm

6. Press Ctrl-a to switch to the screen function key area.
7. To save changes, select Save and press Return. The Save Configuration To screen appears.
8. Select the configuration area where you want to save the changes to and press Return. When Save is complete, Command Complete appears at the bottom of the screen.

## Manual Dialing Out When an Alarm Occurs

Configure the external device connected to the access unit's COM port. Then, use the COM Port Call Setup screen to:

- Select the desired telephone number.
- Dial a call.
- Disconnect a call.

### ► Procedure

1. Follow this menu selection sequence:  
*Main Menu → Control → COM Port Call Setup*
2. Enter the desired directory number, or press the spacebar to cycle through the numbers that have been set up in the directory. The telephone number appears in the Directory Phone Number field.  
*See [Displaying Directory Numbers and Changing Directory Numbers](#) in Chapter 8, *Operation and Maintenance*, for information about the call directory.*
3. Select Dial and press the Enter key to initiate dialing.
4. To end the call, select Disconnect and press the Enter key.

## Tests Available

The Test menu allows you to run loopbacks and test patterns on the T1 access unit, and to test the front panel LEDs. It is available to users with a security access level of 1 or 2. Use the test menu to access the following tests.

To access the . . .	Select . . .
Network (1 or 2) Interface tests: Line Loopback Payload Loopback Repeater Loopback Remote Line Loopback Pattern Tests QRSS All-zeroes All-ones 1-in-8 3-in-24 63 511 2047 2 <sup>15</sup> .1 2 <sup>20</sup> .1 user-defined	Network Tests
DSX-1 Interface tests: Line Loopback Payload Loopback Repeater Loopback Pattern tests QRSS All-zeroes All-ones 1-in-8 3-in-24 63 511 2047 2 <sup>15</sup> .1 2 <sup>20</sup> .1 user-defined	DSX-1 Tests
Sync Data Port tests DTE Loopback DTE Payload Loopback Data Channel Loopback Remote Loopbacks V.54 FT1 Pattern tests QRSS All-zeroes All-ones 63 511 2047 2 <sup>15</sup> .1 2 <sup>20</sup> .1 user-defined	Sync Data Port Tests

To access the . . .	Select . . .
Voice Port tests Digital Loopback Analog Loopback Line Loopback Test tones DRS Quiet Force Signaling Monitor Signaling	Voice Port Tests
OCU-DP tests Local Loopback Latching Loopback Nonlatching Loopback OCU Loopback DS-0 Payload Loopback Line Loopback Data Loopback Remote Loopback Latching LB Nonlatching LB Pattern tests All-zeroes All-ones 63 511 2047	OCU-DP Tests
Lamp test	Device Tests

## Interface Tests

The interface tests run on the T1 access unit's Network (1 or 2) or DSX-1 interfaces.

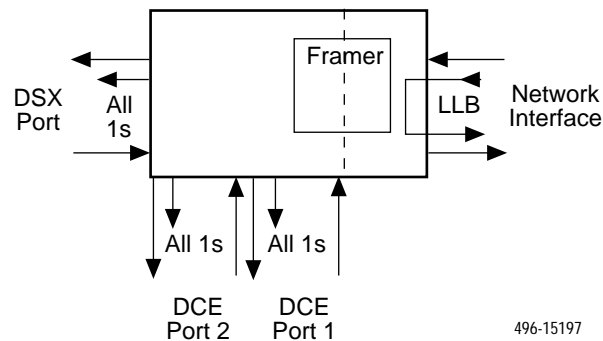
### ► Procedure

To start and stop a Line, Payload or Repeater Loopback test:

1. Follow this menu selection sequence to display the Tests screen:  
*Main Menu → Test → [Network Tests/DSX-1 Tests]*
2. For Network tests, select the desired Network interface (1 for 9161 NAM, 1 or 2 for 9261 NAM).  
 For DSX-1 tests, enter the slot and port number of the desired DSX-1 interface.
3. Highlight Start under Command in the selected test's row. Then, press Return to start the test. This field now displays the word Stop.
4. View the length of time that the test has been running in the Result column.
5. Highlight Stop under Command in the selected test's row. Then, press Return to stop the test. This field now displays the word Start.

## Line Loopback

The Line Loopback (LLB) loops the information received on the Network or DSX-1 interface back to the source of the loopback. When used with a pattern test at the remote node, LLB determines whether the problem is with the sending device or the T1 facility.



The following tests cannot be running when a line loopback test is initiated:

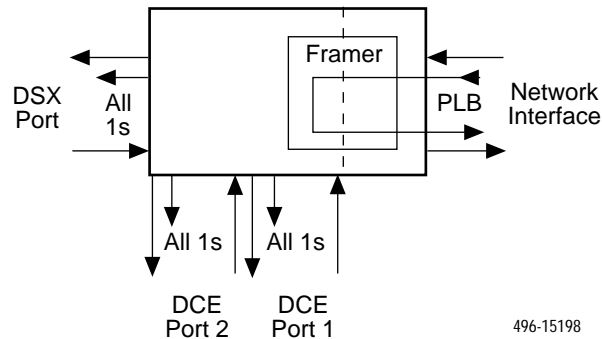
- Payload loopback on this Network or DSX-1 interface
- Send Pattern Test on this Network or DSX-1 interface or any data port assigned to this interface
- Send Remote Line Loopback on this Network or DSX-1 interface
- Send V.54 or Send FT1 Loopback on any port assigned to this Network or DSX-1 interface
- Data Channel Loopback on any data port assigned to this Network or DSX-1 interface

### CAUTION:

**Line Loopback may affect the operation of the FDL, DDL, or EDL. Any IP data being sent while this test is active will be disrupted. Also, any performance statistics being sent over the EDL will be disrupted.**

## Payload Loopback

The Payload Loopback (PLB) loops the information received on the Network or DSX-1 interface back to the network after it has passed through the receive and transmit framing section of the device. Use PLB for determining whether the problem is with the T1 facility or in the circuitry of the remote device.



The following tests cannot be running when a payload loopback test is initiated:

- Line Loopback or Repeater Loopback on the same Network or DSX-1 interface
- Send Pattern Test on the same Network or DSX-1 interface or any data port assigned to this interface
- Send Remote Line Loopback on the same Network or DSX-1 interface
- Send V.54 or Send FT1 Loopback on any data port assigned to this Network or DSX-1 interface
- Data Channel Loopback on any data port assigned to the same Network or DSX-1 interface

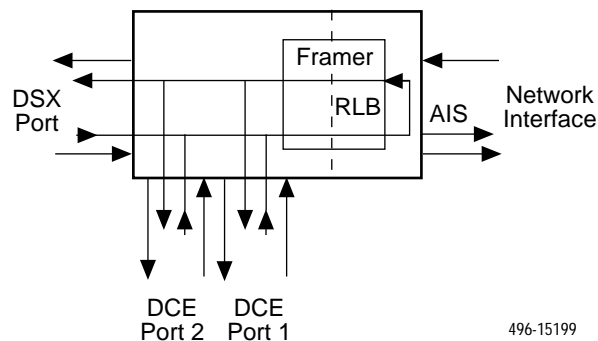
### CAUTION:

**Payload Loopback may affect the operation of the FDL, DDL, or EDL. Any IP data being sent while this test is active will be disrupted. Also, any performance statistics being sent over the EDL will be disrupted.**

## Repeater Loopback

The Repeater Loopback (RLB) loops the information to be sent over the Network or DSX-1 interface back to the device. The RLB loops the entire data stream, which includes data on the interface, as well as the synchronous data ports. Use RLB to ensure that all of the data is correct up to the point where it is sent out over the interface.

- This helps to indicate that the T1 access unit is operational.
- An attached device or test equipment should generate and monitor data to be looped back.



The T1 NAM will not respond to any messages from the network during this test.

The following tests cannot be running when a repeater loopback test is initiated:

- Payload Loopback on this Network or DSX-1 interface
- All loopbacks on any other T1 interface (DSX-1 or Network) with DS0s assigned to this interface
- Send Pattern Test on this Network or DSX-1 interface or any data port assigned to this interface
- Send Remote Line Loopback on this Network or DSX-1 interface
- Send V.54 or Send FT1 Loopback on any data port assigned to this Network or DSX-1 interface
- Data Channel Loopback on any data port assigned to this Network or DSX-1 interface

### CAUTION:

**Repeater Loopback may affect the operation of the FDL, DDL, or EDL. Any IP data being sent while this test is active will be disrupted. Also, any performance statistics being sent over the EDL will be disrupted.**

## Remote Loopbacks

The remote loopback up codes (which put a remote device in loopback mode) and down codes (which take a remote device out of loopback mode) are in-band codes that allow remote control of a device.

- Network loopbacks are defined in AT&T TR 62411.
- The LLB up code invokes a line loopback in the remote unit while the LLB down code terminates the line loopback in the remote unit.

The following tests cannot be running when a remote loopback test is initiated:

- All loopbacks on this Network or DSX-1 interface
- Send Pattern Test on this interface or any data port assigned to this interface
- Send Remote Line Loopback on this interface
- Send V.54 or Send FT1 Loopback on any data port assigned to this interface
- Data Channel Loopback on any data port assigned to this interface

### ► Procedure

To start and stop a Remote Loopback:

1. Follow this menu selection sequence:  
*Main Menu → Test → Network Tests*
2. Select the desired Network interface (1 for 9161 NAM, 1 or 2 for 9261 NAM).
3. Select the code Up or Down in the Send Line Loopback field.
4. Highlight Send under Command in the Send Line Loopback row. Then, press Return to start the test. The code will be sent for 10 seconds.



## Sending and Monitoring Pattern Tests

The pattern tests enable a T1 access unit either to send or monitor a known bit pattern. These tests generate industry-standard bit patterns that can be used to determine whether information is being correctly transmitted across a circuit.

### ► Procedure

To send/monitor a Pattern Test:

1. Follow this menu selection sequence to display the Tests screen:  
*Main Menu → Test → [Network Tests/DSX-1 Tests]*
2. For Network tests, select the desired Network interface (1 for 9161 Single T1 NAM, 1 or 2 for 9261 Dual T1 NAM).  
For DSX-1 tests, enter the slot and port number of the desired DSX-1 interface.
3. Select the desired pattern in the Send field. If you are sending/monitoring a user-defined pattern, enter the desired 2-byte hexadecimal value in the field next to Send. When sending a pattern, the Inject ERR function key appears. Use Inject ERR if you want to inject a bit error in the transmitted bit pattern.
4. Highlight Send under Command in the row to send a pattern, or Start to monitor a pattern. Then, press Return to start the test.
5. View the length of time that the test has been running in the Results column. An error count is also displayed. When monitoring a pattern, the ResetMon virtual function key appears. ResetMon resets the error count to zero.
6. Highlight Stop under Command in the Send or Monitor row. Then, press Return to stop the test.
7. View the length of time that the test has been running in the Result column.

The following tests cannot be running when a Send Pattern test is initiated:

- All loopbacks on the same interface
- Send Pattern Test on the same interface or any data port assigned to that interface
- Send Remote Line Loopback on the same interface
- Send V.54 or Send FT1 Loopback on any data port assigned to this interface
- Data Channel Loopback on any data port assigned to the same interface

## Data Port Tests

Data port tests are available to run on any of the synchronous DTE interfaces on the T1 NAM and the Sync Data APM.

- Data port loopbacks are defined in ITU V.54 and ANSI T1 403.
- The Send V.54 Up/Down and FT1 Up/Down perform a similar function to LLB Up and LLB Down, but are only sent on the DS0s associated with a particular data port and will control the remote operation of the Data Channel Loopback (a Sync Data Port test).
- DTE Payload Loopback on the same port

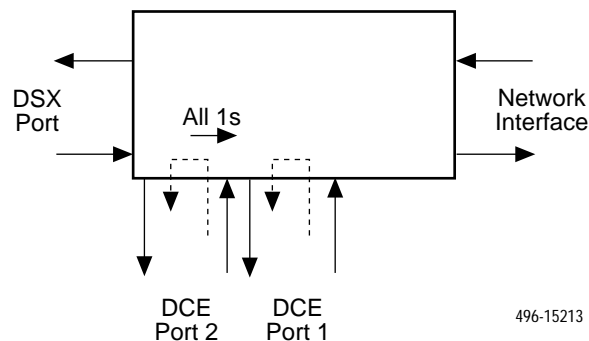
### ► Procedure

To start and stop a data port loopback test:

1. Follow this menu selection sequence:  
*Main Menu → Test → Sync Data Port Tests*
2. Enter the desired slot and port number.
3. Highlight Start under Command in the selected test's row to send a test. Then, press Return to start the test.
4. View the length of time that the test has been running in the Results column.
5. Highlight Stop under Command to stop the test.

## DTE Loopback (DTLB)

The DTE Loopback (DTLB) performs the same function on the DTE interface that the LLB does on the Network or DSX-1 interface. Use DTLB for isolating problems on the DTE interface. An attached device or test equipment must generate data to be looped back.



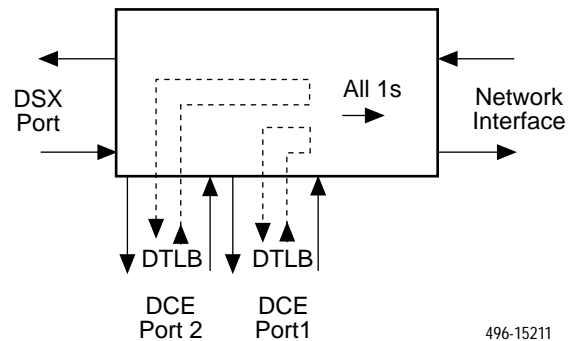
496-15213

The following test cannot be running when a DTLB test is initiated:

- DTE Payload Loopback on the same port

## DTE Payload Loopback (DTPLB)

The DTE Payload Loopback (DTPLB) loops the information received on the Network or DSX-1 interface back to the network after it has passed through the port circuitry. Use DTPLB for isolating problems on the DTE line. An attached device or test equipment must generate and monitor data to be looped back.



### CAUTION:

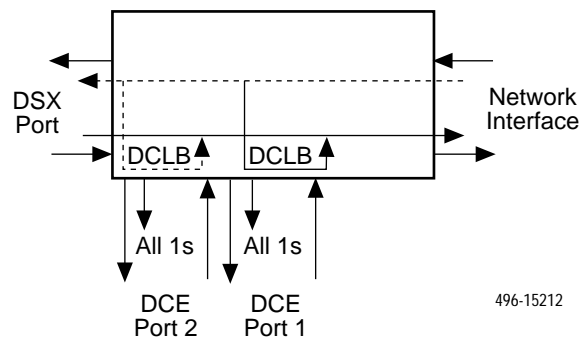
**The Abort All Test selection from the Tests screen or the system test timeout (set via the Test Timeout configuration option on the System Options branch of the menu tree) will not interrupt a DTE Loopback test that has been initiated by an attached device since the Local Loopback lead will still be asserted.**

The following tests cannot be running when a DTPLB test is initiated:

- DTE Loopback, Data Channel Loopback, or Send Pattern Test on the same port

## Data Channel Loopback (DCLB)

The Data Channel Loopback (DCLB) loops the data for a particular synchronous data port back to the interface after the information has passed all the way through the device (i.e., just before it is sent to the Customer Premises Equipment). Use DCLB to verify the end-to-end integrity of a circuit for a particular port.



496-15212

The following tests cannot be running when a DCLB test is initiated:

- A Line Loopback, Payload Repeater Loopback or Send Pattern Test on the same interface
- Send Pattern Test or DTE Payload Loopback on the same port

## V. 54 Remote Loopback

The V.54 remote loopback commands a device to go into the data channel loopback on the associated port.

### ► Procedure

To send a V.54 Remote Loopback:

1. Follow this menu selection sequence:  
*Main Menu → Test → Sync Data Port Tests*
2. Enter the desired slot and port number.
3. Select the code Up or Down in the Send V.54 Loopback field.
4. Highlight Send under Command in the Send V.54 Loopback row. Then, press Return to start the test. The code will be sent for up to 10 seconds, or until an acknowledgement is received from the remote end.
5. View the length of time that the test has been running in the Results column.
6. Send the Down code to stop the remote loopback.

The following tests cannot be running when a V.54 test is initiated:

- A Send Pattern Test, Send Remote Line Loopback, Payload Loopback, or Repeater Loopback on the interface to which the port is assigned
- DTE Payload Loopback, Send Pattern Test, or Send FT1 Loopback on the same port

## Remote FT1 Data Channel Loopback

The Remote FT1 Data Channel Loopback commands a remote device to go into Data Channel Loopback on associated port.

### ► Procedure

To send a Remote FT1 Data Channel Loopback:

1. Follow this menu selection sequence:  
*Main Menu → Test → Sync Data Port Tests*
2. Enter the desired slot and port number.
3. Select the code Up or Down in the Send FT1 Loopback field.
4. Highlight Send under Command in the Send Ft1 Loopback row. Then, press Return to start the test. The code will be sent for up to 10 seconds, or until an acknowledgement is received from the remote end.
5. View the length of time that the test has been running in the Results column.

The following tests cannot be running when a V.54 test is initiated:

- A Send Pattern Test, Send Remote Line Loopback, Payload Loopback, or Repeater Loopback on the interface to which the port is assigned
- DTE Payload Loopback, Send Pattern Test, or Send V.54 Loopback on the same port

## Sending and Monitoring Pattern Tests

The pattern tests enable a T1 access unit either to send or monitor a known bit pattern.

- These tests generate industry-standard bit patterns that can be used to determine whether information is being correctly transmitted across a circuit.
- These industry-standard and user-defined patterns can be sent by the Network (1 or 2) and DSX-1 interfaces, as well as the Sync Data ports (toward the Network or DSX-1 interface) and the OCU-DP ports.

### ► Procedure

To send/monitor a Pattern Test:

1. Follow this menu selection sequence to display the Tests screen:  
*Main Menu → Test → Sync Data Port Tests*
2. Select the desired slot and port numbers.
3. Select the desired pattern in the Send field. If you are sending/monitoring a user-defined pattern, enter the the desired 2-byte hexadecimal value in the field next to Send. When sending a pattern, the Inject ERR function key appears. Use Inject ERR if you want to inject a bit error in the transmitted bit pattern.
4. Highlight Send under Command in the row to send a pattern, or Start to monitor a pattern. Then, press Return to start the test.
5. View the length of time that the test has been running in the Results column. An error count is also displayed. When monitoring a pattern, the ResetMon virtual function key appears. ResetMon resets the error count to zero.
6. Highlight Stop under Command in the Send or Monitor row. Then, press Return to stop the test.

## Voice Port Tests

Voice port tests are available to run on voice ports for any installed and enabled APM.

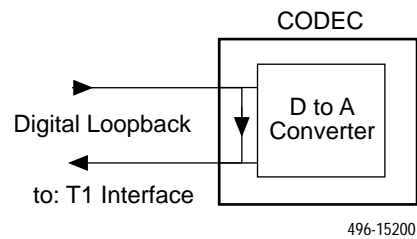
### ► Procedure

To start and stop a voice port loopback:

1. Follow this menu selection sequence:  
*Main Menu → Test → Voice Port Tests*
2. Enter the desired slot and port number.
3. Highlight Start under Command in the row to send a test. Then, press Return to start the test.
4. View the length of time that the test has been running in the Results column.
5. Highlight Stop under Command to stop the test.

## Digital Loopbacks

A Digital Loopback loops the digital voice signal received from the T1 interface back to the same interface, just before reaching the D-to-A converter on the voice port.

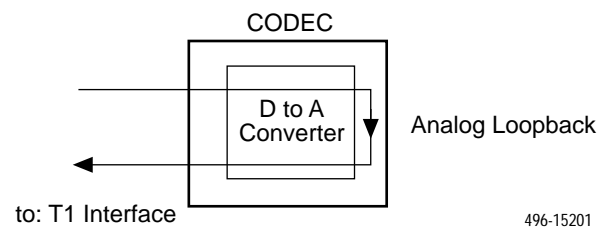


The following tests cannot be running when a digital loopback test is initiated:

- Analog Loopback, DRS or Quiet Test Tone on the same port

## Analog Loopbacks

An Analog Loopback loops the analog voice signal received from the T1 interface back to the same interface, after passing through the Digital-to-Analog converter and Analog-to-Digital converter on the voice port.

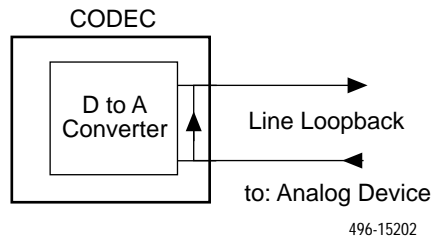


The following tests cannot be running when an Analog Loopback test is initiated:

- DRS or Quiet Test Tone, or Digital or Line Loopback on the same port

## Line Loopbacks

This test is only available for a voice port belonging to an E&M APM. A Line Loopback loops the analog voice signal received from the analog line/device connected to the port back to the same line/device, before passing through the A to D converter on the voice port.



The following tests cannot be running when a Line Loopback is initiated:

- DRS or Quiet Test Tone, or Analog Loopback on the same port

## Test Tones

The following test tones are available to send to interface or to the user:

- **DRS** – Digital Reference Signal, a 1004 Hz, 0.0 dBm tone.
- **Quiet** – No signal is sent.

### ► Procedure

To start and stop a Test Tone:

1. Follow this menu selection sequence:  
*Main Menu → Test → Voice Port Tests*
2. Enter the desired slot and port number.
3. Highlight either Send \_\_\_ to T1 Interface or Send \_\_\_ to User and select either Quiet or DRS for each field.
4. Highlight Start under Command in the row to send a test. Then, press Return to start the test.
5. View the length of time that the test has been running in the Results column.
6. Highlight Stop under Command to stop the test.

The following tests cannot be running when a Test Tone is initiated:

- Any loopbacks on the same port
- Another type of test tone (other than the one currently running) on the same interface







### ► Procedure

To force signaling:

1. Follow this menu selection sequence:  
*Main Menu → Test → Voice Port Tests*
2. Enter the desired slot and port number.
3. Press PgDn to go to page 2.
4. Enter the desired setting for each field.
5. Highlight Start under Command in the row to send a test. Then, press Return to start the test.
6. View the length of time that the test has been running in the Results column.
7. Highlight Stop under Command to stop the test.

### ► Procedure

To monitor signaling:

1. Follow this menu selection sequence:  
*Main Menu → Test → Voice Port Tests*
2. Enter the desired slot and port number.
3. Press PgDn to go to page 2.
4. Look at the values displayed under the Monitor Signaling portion of the screen.

## OCU-DP Tests

The OCU-DP tests run on the OCU-DP APM's ports. The procedure to send a Latching loopback differs from the procedure to start/stop other loopbacks. Both procedures are described below.

### Sending a Latching Loopback

#### ► Procedure

To send a Latching Loopback:

1. Follow this menu selection sequence:  
*Main Menu → Test → [OCU-DP Tests]*
2. Enter the loopback type:
  - For Local: CSU or DSU
  - For Remote: CSU, DSU, or OCU
3. Select the code Up or Down.
4. Highlight Send in the Command row. Then, press Return to start the test. The code will be sent for up to 10 seconds, or until an acknowledgement is received.
5. View the length of time that the test has been running in the Results column.
6. Send the Down code to stop the loopback.

## Starting/Stopping Other Loopbacks

### ► Procedure

To start and stop loopback tests:

1. Follow this menu selection sequence to display the Tests screen:  
*Main Menu → Test → [OCU-DP Tests]*
2. For Nonlatching loopbacks, select the desired loopback type (CSU or DSU).
3. Highlight Start under Command in the selected test's row. Then, press Return to start the test. This field now displays the word Stop.
4. View the length of time that the test has been running in the Result column.
5. Highlight Stop under Command in the selected test's row. Then, press Return to stop the test. This field now displays the word Start.

## OCU-DP Local Loopback Tests

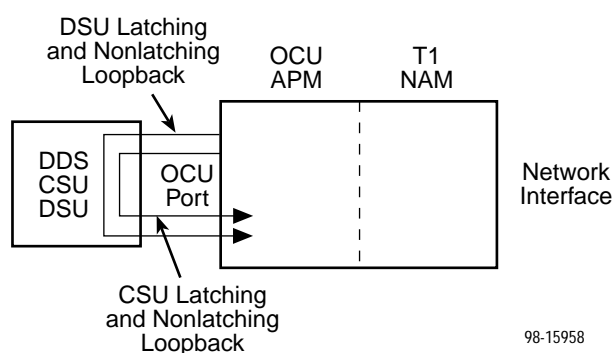
The following local loopback tests are available for the OCU-DP APM:

- Latching Loopback – applicable only to the 64 Clear Channel DDS (64KCC) rate
- Nonlatching Loopback – applicable only to the DDS rate of 56K
- OCU Loopback
- DS-0 Loopback
- Line Loopback
- Data Loopback

## DDS CSU/DSU Latching/Nonlatching Loopback

The Latching/Nonlatching Loopback sends the selected loopback sequence to the CPE attached to the port.

This loopback	Allows testing of a local loop between the selected port and the CPE running at . . .	Loopback types	Direction
Latching	64K Clear Channel	CSU or DSU	up or down
Nonlatching	56K	CSU or DSU	–

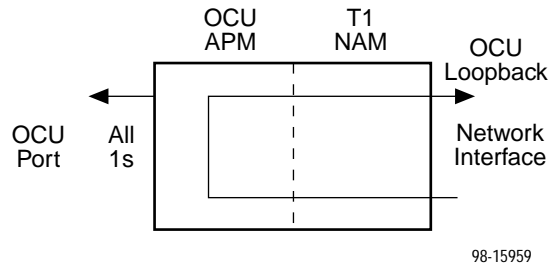


The following tests are the only tests allowed to run at the same time as a Latching/Nonlatching Loopback. No other tests can be running when a Latching/Nonlatching Loopback test is initiated:

- Send Pattern/Monitor Pattern Test on any data port assigned to this interface

## OCU Loopback

The OCU Loopback loops the data received from the T1 interface for the selected port back to the T1 interface.

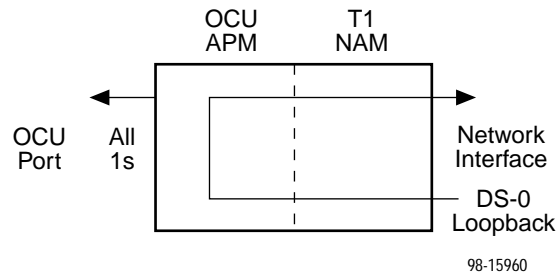


The following test is the only test allowed to run at the same time as an OCU Loopback. No other tests can be running when an OCU Loopback test is initiated:

- Line Loopback

## DS-0 Loopback

The DS-0 Loopback loops the data received from the T1 interface for the selected port back to the T1 interface.

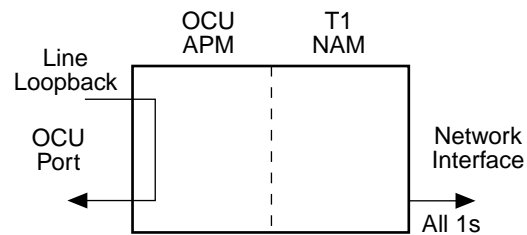


The following test is the only test allowed to run at the same time as an DS-0 Loopback. No other tests can be running when a DS-0 Loopback test is initiated:

- Line Loopback

## Line Loopback

The Line Loopback tests the local loop between the OCU port and the attached CPE. The loopback occurs on the APM near the local loop interface, toward the local loop.



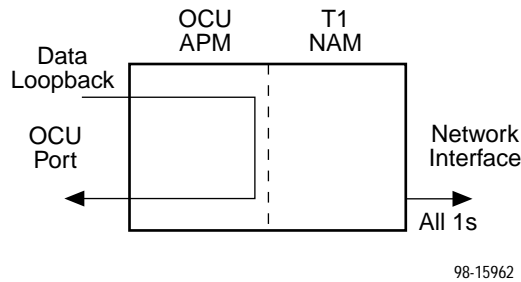
98-15961

The following tests are the only tests allowed to run at the same time as a Line Loopback. No other tests can be running when a Line Loopback test is initiated:

- OCU Loopback
- DS-0 Loopback
- Line Loopback on the cross-connected T1 interface
- Payload Loopback on the cross-connected T1 interface

## Data Loopback

The Data Loopback tests the APM circuitry and the local loop connecting the port to the CPE. The loopback occurs on the APM near the backplane connection, toward the local loop.



The following tests are the only tests allowed to run at the same time as a Data Loopback. No other tests can be running when a Data Loopback test is initiated:

- Line Loopback on the cross-connected T1 interface
- Payload Loopback on the cross-connected T1 interface

## OCU-DP Remote Loopback Tests

The following remote loopback tests are available for the OCU-DP APM:

- Latching Loopback – applicable only to the 64 Clear Channel DDS (64KCC) rate
- Nonlatching Loopback – applicable only to the DDS rates of 56K and Switched 56

## Device Tests

The T1 access unit supports a Lamp test at the device level. Use this test to determine whether all LEDs are lighting and functioning properly. All LEDs light at the same time every 1/2 seconds during execution of the Lamp test. When you stop the Lamp test, the LEDs are restored to their normal condition. If the Test Timeout configuration option is enabled and a Test Duration is set, the Lamp test stops when the test duration expires. The Lamp test is not disruptive to data.



## Test Timeout

A Test Timeout feature is available to automatically terminate a test (as opposed to manually terminating a test) after it has been running a specified period of time.

To use this feature, enable the Test Timeout configuration option under the System Options branch of the menu tree, and set a duration for the test to run in the Test Duration (min) configuration option (see Table 5-9, [System Options](#) in Chapter 5, *Setting Up*).

## Starting and Stopping a Test

Use this procedure to start and/or abort specific tests. To abort all active tests on all interfaces, see [Aborting All Tests](#) on page 9-44.

When the status of a test is . . .	The only command available is . . .
Inactive	Start
Active	Stop

You start or stop an individual test using the same general procedure. For more specific instructions, see the individual test descriptions in this chapter.

### ► Procedure

To start or stop a test:

1. Follow this menu selection sequence:  
*Main Menu → Test*
2. Select a test screen for an interface and press Return. The selected test screen appears, with the cursor positioned in the Command column of the first line (available test).  
Start or Stop appears in the Command column, and Active or Inactive appears in the Status column, based upon the test's current status for that interface.
3. Select the test you want to start or stop and press Return. The selected test for the interface changes from Stop to Start, or from Start to Stop, also changing the status of the test.
4. Press Return again to start or stop the test.

## Aborting All Tests

Use the Abort All Tests selection from the Test menu to abort all tests running on all interfaces, with exception to Network- or DTE-initiated loopbacks. To abort individual tests that are active, see *Starting and Stopping a Test* on page 9-43.

### ► Procedure

To abort all tests on all interfaces:

1. Follow this menu selection sequence:

*Main Menu → Test*

2. Select Abort All Tests and press Return.

Command Complete appears when all tests on all interfaces have been terminated.

#### **NOTE:**

Abort All Tests does not interrupt DTE-initiated loopbacks.

## Determining Test Status and Results

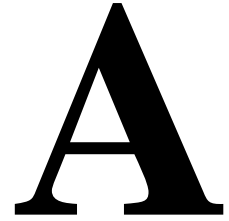
Current test status and results are available on the:

- Test screen from where you execute the test
- System and Test Status screen
- NMS
- Test LED

For more information on interpreting results and messages, see Chapter 7, *Displaying System Information*.

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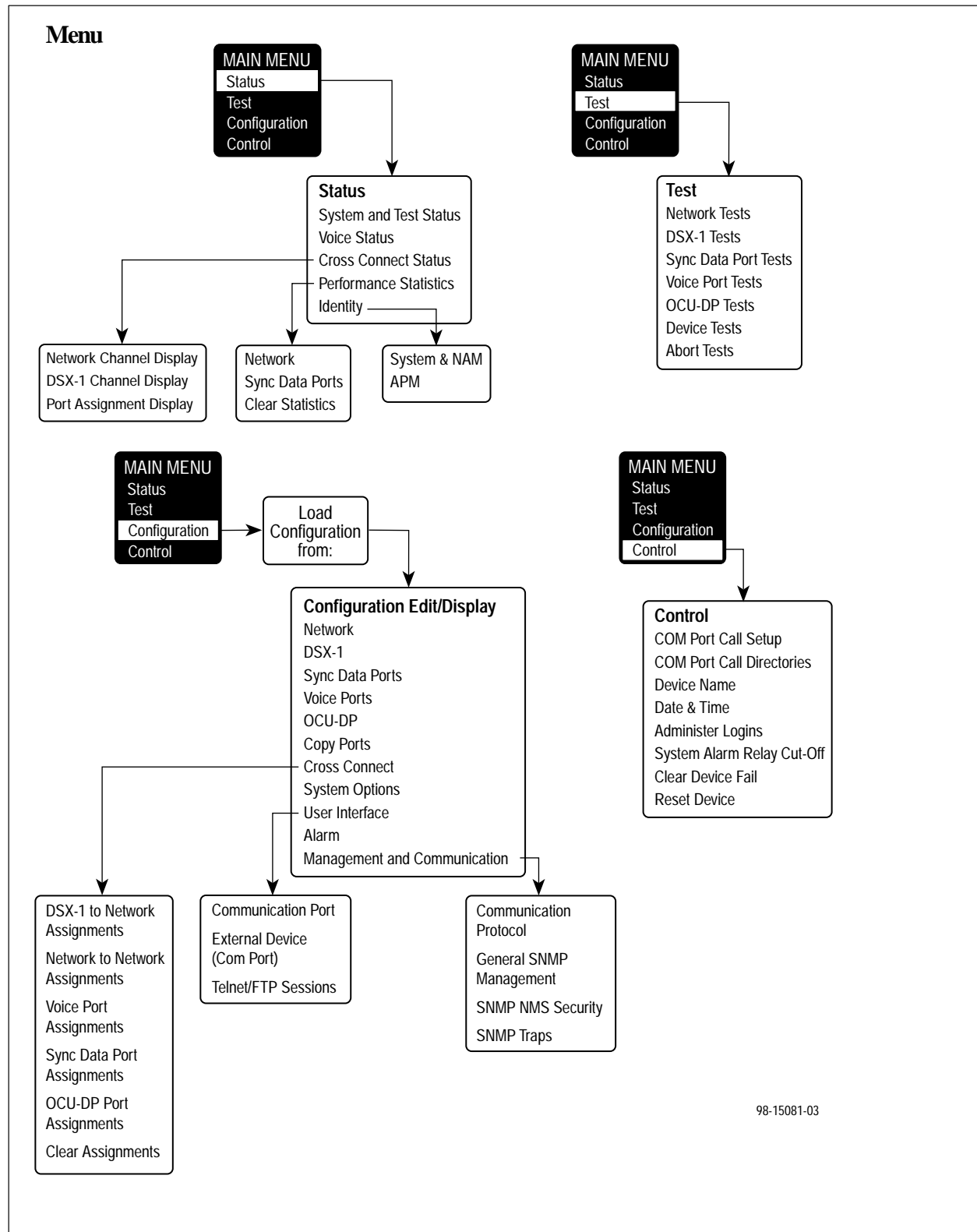
# Menus and Configuration Worksheets



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## Menus

The following menus give you a graphical representation of the system options that appear on the async terminal screens. Not all options are available, but are filtered depending on what other options have been selected.



## Recording Configurations

It is recommended that you keep a record of each T1 access unit's configuration, which can also be used when configuring the T1 access unit. For additional information about configurations, refer to Chapter 5, *Setting Up*.

### ► Procedure

1. Photocopy or print the worksheets included in this appendix. Make as many copies of each table as needed.
2. Write the T1 access unit's Device Name on each photocopied or printed page.
3. Write in or circle the settings that are different from the default setting.

Do this for each of the alternate configurations stored in Customer Configuration 1 and 2, as well. Store these records for reference, as needed.

Device Name: \_\_\_\_\_

Network		See Table 5-1
Configuration Option	Settings	<i>Default in <b>[Bold]</b></i>
Interface Status <sup>1</sup>	Enable, <b>[Disable]</b>	
Line Framing Format	D4, <b>[ESF]</b>	
Line Coding Format	AMI, <b>[B8ZS]</b>	
Line Build Out (LBO)	<b>[0.0]</b> , -7.5, -15, -22.5	
Bit Stuffing	<b>[62411]</b> , Part68, Disable	
Network Initiated LLB	<b>[Enable]</b> , Disable	
Network Initiated PLB	<b>[Enable]</b> , Disable	
Transmit Timing <sup>2</sup>	<b>[System]</b> , Network	
ANSI Performance Report Messages	Enable, <b>[Disable]</b>	
Management Link	<b>[Disable]</b> , FDL, DDL	
IP Address <sup>3</sup>	<b>[000.000.000.000]</b> – 223.255.255.255, Clear	
Subnet Mask	<b>[000.000.000.000]</b> – 255.255.255.255, Clear	
Routing Information Protocol	None, <b>[Proprietary]</b>	
Network Time Slot	01–24 <b>[lowest available time slot]</b>	
Circuit Identifier	Text field	
Loss of Signal (LOS) Alarm	<b>[Enable]</b> , Disable	
Out of Frame (OOF) Alarm	<b>[Enable]</b> , Disable	
Alarm Indication Signal (AIS) Alarm	<b>[Enable]</b> , Disable	
Yellow Alarm	<b>[Enable]</b> , Disable	
Excessive Error Rate (EER) Alarm	<b>[Enable]</b> , Disable	
Excessive Error Rate Threshold	<b>[10E-4]</b> , 10E-5, 10E-6, 10E-7, 10E-8, 10E-9	
<sup>1</sup> Read-only when Network is set to 1. <sup>2</sup> This first byte cannot be set to 0 nor 127. However, the null address of 0.0.0 is valid after performing a Clear. <sup>3</sup> Only shown when 9261 Dual T1 NAM is being used.		

Device Name: \_\_\_\_\_

DSX-1		See Table 5-2
Configuration Option	Settings	<i>Default in [Bold]</i>
Slot <i>ss</i>	916x: 01 9262: 02 9265: 02, 03, 04, 05	
Port <i>p</i>	916x: 1 926x: 1, 2	
Interface Status	Enable, [ <b>Disable</b> ]	
Line Framing Format	D4, [ <b>ESF</b> ]	
Line Coding Format	AMI, [ <b>B8ZS</b> ]	
Line Equalization	[ <b>0-133</b> ], 133-266, 266-399, 399-533, 533-655	
Send All Ones on DSX-1 Failure	[ <b>Enable</b> ], Disable	
Loss of Signal (LOS) Alarm	[ <b>Enable</b> ], Disable	
Out of Frame (OOF) Alarm	[ <b>Enable</b> ], Disable	
Alarm Indication Signal (AIS)	[ <b>Enable</b> ], Disable	
Yellow Alarm	[ <b>Enable</b> ], Disable	

Device Name: \_\_\_\_\_

Sync Data Ports		See Table 5-3
Configuration Option	Settings	<i>Default in [Bold]</i>
Slot <i>ss</i>	916x: 01 9x62: 01, 02 9x65: 01, 02, 03, 04, 05	
Port <i>p</i>	T1 NAM: 1, 2 Sync Data APM: 1, 2, 3, 4	
Port Status	Enable, <b>[Disable]</b>	
Port Type	<b>[E530]</b> , V.35, RS449, X.21	
Port Base Rate	<b>[Nx64]</b> , Nx56	
Transmit Clock Source	<b>[Internal]</b> , External	
Invert Transmit Clock	Enable, <b>[Disable]</b>	
Invert Transmit and Received Data	Enable, <b>[Disable]</b>	
Send All Ones on Data Port Not Ready	Disable, DTR, RTS, <b>[Both]</b>	
Action on Network Yellow Alarm	None, <b>[Halt]</b>	
Network Initiated Data Channel Loopback (DCLB)	<b>[Disable]</b> , V.54, FT1, Both	
Port (DTE) Initiated Loopbacks	<b>[Disable]</b> , DTPLB, DCLB, Both	
Embedded Data Link	Enable, <b>[Disable]</b>	
EDL Management Link	Enable, <b>[Disable]</b>	
IP Address <sup>1</sup>	<b>[000.000.000.000]</b> – 223.255.255.255, Clear	
Subnet Mask	<b>[000.000.000.000]</b> – 255.255.255.255, Clear	
Routing Information Protocol	None, <b>[Proprietary]</b>	
Near-End Performance Statistics	<b>[Disable]</b> , Maintain, Send, Both	
Far-End Performance Statistics	<b>[Disable]</b> , Maintain	
Out of Frame (OOF) Alarm	<b>[Enable]</b> , Disable	
Excessive Error Rate (EER) Alarm	<b>[Enable]</b> , Disable	
Excessive Error Rate Threshold	<b>[10E-4]</b> , 10E-5, 10E-6, 10E-7, 10E-8, 10E-9	
<sup>1</sup> The first byte cannot be set to 0 nor 127. However, the null address of 0.0.0.0 is valid after performing a Clear.		



Device Name: \_\_\_\_\_

<b>Voice Ports</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
<b>E&amp;M Voice</b>	<b>See Table 5-4</b>
Slot <i>ss</i>	2-slot: 02 5-slot: 02, 03, 04, 05
Port <i>p</i>	1, 2, 3, 4, 5, 6, 7, 8
Port Status	Enable, <b>[Disable]</b>
Operating Mode	<b>[E&amp;M]</b> , Transmit Only
Rx Gain (dB)	-17.0, -16.5, -16.0, -15.5, -15.0, ..., <b>[0.0]</b> , ..., +6.5, +7.0, +7.5
Tx Attenuation (dB)	-17.0, -16.5, -16.0, -15.5, -15.0, ..., <b>[0.0]</b> , ..., +6.5, +7.0, +7.5
Trunk Cond in CGA	<b>[Busy]</b> , Idle

Device Name: \_\_\_\_\_

<b>Voice Ports</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
<b>FXO Voice</b>	<b>See Table 5-5</b>
Slot <i>ss</i>	2-slot: 02 5-slot: 02, 03, 04, 05
Port <i>p</i>	1, 2, 3, 4, 5, 6, 7, 8
Port Status	Enable, <b>[Disable]</b>
Operating Mode	<b>[FXO]</b> , FXODN, FXODN/WINK, DPT
Signaling Type	<b>[Loop-Start]</b> , Loop-Start/Fwd Disc, Ground-Start
Terminating Impedance (ohms)	<b>[600]</b> , 900
Wink Delay (10 ms)	1 – 99 <b>[15]</b>
Wink Duration (10 ms)	1 – 99 <b>[20]</b>
Rx Gain (dB)	–10.00, –9.5, –9.0, –8.5, ..., <b>[0.0]</b> , +0.5, +1.0, +1.5, +2.0
Tx Attenuation (dB)	–10.00, –9.5, –9.0, –8.5, ..., <b>[0.0]</b> , ..., +4.0, +4.5, +5.0
Trunk Cond in CGA	<b>[Busy]</b> , Idle

<b>Voice Ports</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
<b>FXS Voice</b>	<b>See Table 5-6</b>
Slot <i>ss</i>	2-slot: 02 5-slot: 02, 03, 04, 05
Port <i>p</i>	1, 2, 3, 4, 5, 6, 7, 8
Port Status	Enable, <b>[Disable]</b>
Operating Mode	<b>[FXS]</b> , FXSDN, FXSDN/WINK, PLAR, DPO
Signaling Type	<b>[Loop-Start]</b> , Loop-Start/Fwd Disc, Ground-Start, Ground-Start-Immediate, Ground-Start-Automatic, d3, d4
Terminating Impedance (ohms)	<b>[600]</b> , 900
Wink Delay (10 ms)	1 – 99 <b>[15]</b>
Wink Duration (10 ms)	1 – 99 <b>[20]</b>
Rx Gain (dB)	–10.00, –9.5, –9.0, –8.5, ..., <b>[0.0]</b> , +0.5, +1.0, +1.5, +2.0
Tx Attenuation (dB)	–10.00, –9.5, –9.0, –8.5, ..., <b>[0.0]</b> , ..., +4.0, +4.5, +5.0
Ring-Back Tone	Enable, <b>[Disable]</b>
Trunk Cond in CGA	<b>[Busy]</b> , Idle

Device Name: \_\_\_\_\_

<b>OCU-DP Ports</b>		<b>See Table 5-7</b>
<b>Configuration Option</b>	<b>Settings</b>	<i>Default in <b>[Bold]</b></i>
Slot <i>ss</i>	9x62: 02 9x65: 02, 03, 04, 05	
Port <i>p</i>	2-port: 1, 2 6-port: 1, 2, 3, 4, 5, 6	
Port Status	Enable, <b>[Disable]</b>	
Port Rate	<b>[56K]</b> , 64KCC, Switched_56	
Loopback Detection	<b>[Enable]</b> , Disable	
Loss of Signal Alarm	<b>[Enable]</b> , Disable	
Abnormal Station Code Alarm	<b>[Enable]</b> , Disable	
64KCC Loop OOF Alarm	<b>[Enable]</b> , Disable	
DDS Network Failure Alarm	<b>[Enable]</b> , Disable	
Loss of Loop Timing Alarm	<b>[Enable]</b> , Disable	

Device Name: \_\_\_\_\_

<b>Copy Ports</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
From: Slot <i>ss</i>	2-Slot: 01, 02 5-Slot: 01, 02, 03, 04, 05
From: Port <i>p</i>	T1 NAM: 1, 2 Sync Data APM: 1, 2, 3, 4 Voice APM: 1, 2, 3, 4, 5, 6, 7, 8 OCU-DP (2-port): 1, 2 OCU-DP (6-port): 1, 2, 3, 4, 5, 6
Type	T1 NAM, Sync Data, FXS Voice, FXO Voice, E&M Voice, OCU-DP
To: Slot <i>ss</i>	2-Slot: All, 01, 02 5-Slot: All, 01, 02, 03, 04, 05 <b>[lowest numbered slot containing the same port type]</b>
To: Port <i>p</i>	All, 1, 2, 3, 4, 5, 6, 7, 8
Perform Copy	n/a
Perform Copy Then Increment	n/a

<b>System Options</b>	
<b>See Table 5-9</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
Generate Yellow Alarm Signals	<b>[Enable]</b> , Disable
Test Timeout	<b>[Enable]</b> , Disable
Test Duration (min)	1 – 120 <b>[10]</b>
Primary Clock Source	<b>[Net1]</b> , Net2, DSX $_{ss-p}$ , Internal, External, Sync Data
Port (for Primary Clock Source)	S $_{ss}$ P $_{p}$ <b>[the first available port]</b>
Secondary Clock Source	Net1, Net2, DSX $_{ss-p}$ , <b>[Internal]</b> , External, Sync Data
Port (for Secondary Clock Source)	S $_{ss}$ P $_{p}$ <b>[the first available port]</b>
External Clock Rate (KHz)	8, <b>[1544]</b> , 2048
Primary Clock Failure Alarm	<b>[Enable]</b> , Disable
Secondary Clock Failure Alarm	<b>[Enable]</b> , Disable

Device Name: \_\_\_\_\_

<b>User Interface</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in [Bold]</i>
<b>Communication Port</b>	
	<b>See Table 5-10</b>
Port Use	[Terminal], Net Link, Alarm
Port Type	[Asynchronous], Synchronous
RIP <sup>1</sup>	[None], Proprietary
<b>Port Type – Synchronous</b>	
Clock Source	[Internal], External
Data Rate (Kbps) <sup>2</sup>	9.6, 14.4, [19.2], 28.8, 38.4, 57.6, 115.2
<b>Port Type – Asynchronous</b>	
Data Rate (Kbps)	9.6, 14.4, [19.2], 28.8, 38.4, 57.6, 115.2
Character Length <sup>3</sup>	7, [8]
Parity <sup>3</sup>	[None], Even, Odd
Stop Bits <sup>3</sup>	[1], 1.5, 2
Ignore Control Leads <sup>3</sup>	[Disable], DTR
Login Required <sup>4</sup>	Enable, [Disable]
Port Access Level <sup>4</sup>	[Level-1], Level-2, Level-3
Inactivity Timeout <sup>4</sup>	Enable, [Disable]
Disconnect Time (Minutes) <sup>4,5</sup>	1 – 60 [5]
<b>External Device (COM Port)</b>	
	<b>See Table 5-11</b>
External Device Commands	[Disable], AT, Other
Dial-In Access <sup>6</sup>	Enable, [Disable]
Connect Prefix <sup>7</sup>	ASCII text entry, Clear
Connect Indication String <sup>7</sup>	ASCII text entry, Clear
Escape Sequence <sup>7</sup>	ASCII text entry, Clear
Escape Sequence Delay (Sec) <sup>7</sup>	[None], 0.2, 0.4, 0.6, 0.8, 1.0
Disconnect String <sup>7</sup>	ASCII text entry, Clear
<p><sup>1</sup> Only shown when Port Use is set to Net Link.  <sup>2</sup> Only shown when Clock Source is set to Internal.  <sup>3</sup> Only shown when Port Type is set to Asynchronous.  <sup>4</sup> Only shown when Port Use is set to Terminal.  <sup>5</sup> Only shown when Inactivity Timeout is set to Enable.  <sup>6</sup> Only shown when External Device Commands is set to Other or AT.  <sup>7</sup> Only shown when External Device Commands is set to Other.</p>	

Device Name: \_\_\_\_\_

<b>User Interface (Cont'd)</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
<b>Telnet/FTP Sessions</b>	<b>See Table 5-12</b>
Telnet Session	Enable, <b>[Disable]</b>
Telnet Login Required	Enable, <b>[Disable]</b>
Session Access Level	<b>[Level-1]</b> , Level-2, Level-3
Inactivity Timeout	Enable, <b>[Disable]</b>
Disconnect Time (Minutes)	1 – 60 <b>[5]</b>
FTP Session	Enable, <b>[Disable]</b>
FTP Login Required	Enable, <b>[Disable]</b>

<b>Alarm</b>	
<b>See Table 5-13</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>[Bold]</b></i>
ASCII Alarm Messages	Com Port, <b>[Disable]</b>
Alarm & Trap Dial Out	Enable, <b>[Disable]</b>
Trap Disconnect	<b>[Enable]</b> , Disable
Call Retry	Enable, <b>[Disable]</b>
Dial-Out Delay Time (Min)	1 – 10 <b>[5]</b>
Alternate Dial-Out Directory	<b>[None]</b> , 1 – 5
System Alarm Relay	Enable, <b>[Disable]</b>

Device Name: \_\_\_\_\_

<b>Management and Communication</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in [Bold]</i>
<b>Communication Protocol</b>	<b>See Table 5-14</b>
Node IP Address <sup>1</sup>	[ <b>000.000.000.000</b> ] – 223.255.255.255, Clear
Node Subnet Mask	[ <b>000.000.000.000</b> ] – 255.255.255.255, Clear
Default Network Destination	[ <b>None</b> ], COM, FDL1, FDL2, DDL, EDL <sub>ss-p</sub>
Communication Port IP Address <sup>1</sup>	[ <b>000.000.000.000</b> ] – 223.255.255.255, Clear
Communication Port Subnet Mask	[ <b>000.000.000.000</b> ] – 255.255.255.255, Clear
Communication Port Link Protocol	[ <b>PPP</b> ], SLIP
Alternate Communication Port IP Address <sup>1</sup>	[ <b>000.000.000.000</b> ] – 223.255.255.255, Clear
Alternate Communication Port Subnet Mask	[ <b>000.000.000.000</b> ] – 255.255.255.255, Clear
<b>General SNMP Management</b>	<b>See Table 5-15</b>
SNMP Management	Enable, [ <b>Disable</b> ]
Community Name 1	ASCII text entry [ <b>Public</b> ], Clear
Name 1 Access	[ <b>Read</b> ], Read/Write
Community Name 2	ASCII text entry, [ <b>Clear</b> ]
Name 2 Access	[ <b>Read</b> ], Read/Write
<b>SNMP NMS Security</b>	<b>See Table 5-16</b>
NMS IP Validation	Enable, [ <b>Disable</b> ]
Number of Managers	[1] – 10 [1]
NMS <i>n</i> IP Address <sup>1</sup>	[ <b>000.000.000.000</b> ] – 223.255.255.255, Clear
Access Level	[ <b>Read</b> ], Read/Write
<b>SNMP Traps</b>	<b>See Table 5-17</b>
SNMP Traps	Enable, [ <b>Disable</b> ]
Number of Trap Managers	[1] – 6 [1]
NMS <i>n</i> IP Address <sup>1</sup>	[ <b>000.000.000.000</b> ] – 223.255.255.255, Clear
Destination	[ <b>Default</b> ], COM, FDL1, FDL2, DDL, EDL <sub>ss-p</sub>
General Traps	Disable, Warm, AuthFail, [ <b>Both</b> ]
Enterprise Specific Traps	Enable, [ <b>Disable</b> ]
Link Traps	Disable, Up, Down, [ <b>Both</b> ]
Link Traps Interfaces	Network, DSX-1, T1s, Ports, [ <b>All</b> ]
<sup>1</sup> The first byte cannot be set to 0 nor 127. However, the null address of 0.0.0.0 is valid after performing a Clear.	



## Channel Assignments Worksheets

Use the following worksheets to record cross connection assignments. See *Assigning Cross Connections* in Chapter 5, *Setting Up*, for more information.

Network T1 Interface \_\_\_\_ Channel Worksheet

Network ____ Channel	Allocation	Signaling and Trunk Conditioning
N1		
N2		
N3		
N4		
N5		
N6		
N7		
N8		
N9		
N10		
N11		
N12		
N13		
N14		
N15		
N16		
N17		
N18		
N19		
N20		
N21		
N22		
N23		
N24		

**DSX-1 T1 Interface \_\_\_ Channel Worksheet**

<b>DSX ___ Channel</b>	<b>Allocation</b>	<b>DSX-1 Signaling and Trunk Conditioning</b>
D1		
D2		
D3		
D4		
D5		
D6		
D7		
D8		
D9		
D10		
D11		
D12		
D13		
D14		
D15		
D16		
D17		
D18		
D19		
D20		
D21		
D22		
D23		
D24		



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# IP Addressing

# B

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## Selecting an IP Addressing Scheme

You can select from many IP addressing schemes to provide SNMP NMS, Telnet, or FTP connectivity. When selecting a scheme, keep the following in mind:

- Because connection to remote devices is through different interfaces (for EDL), it may be necessary to assign IP addresses and subnet masks to each EDL individually.
- Avoid multiple EDL connections between the same two devices to prevent routing loops.
- Assign IP addresses on a per-interface or T1 access unit basis.
- Although routing information is automatically passed between interconnected T1 access units from the network side, make sure to set a route to the subnet(s) in the NMS's or local router's routing table.

The gateway to subnet(s) is through the T1 access unit connected to:

- The LAN (using a LAN adapter), or
  - To a router's, terminal server's, or NMS's direct PPP (point-to-point protocol) or SLIP (link-layer protocol for IP traffic) serial connection.
- Each T1 unit's routing table supports a maximum of 300 routes, even though a single route is all that is needed to reach every device on a subnet.
  - Have a default route set only for devices directly connected to the NMS's COM port.
  - Allow any legal host address for a given subnet; the address choice within the subnet is not important to the unit, but should be selected in conjunction with all IP addressing for the subnet.
  - For a point-to-point ESF T1 link, use the FDL to connect to the remote site.
  - For a fractional T1 network, use EDL(s) to connect to each remote site (when at least one data port is configured at that site).

- For a fractional T1 network when a data port is not configured (in the case of voice only), a single DDL can be used to connect to a remote site.

**NOTE:**

When dealing with IP addressing, your Information Systems (IS) department needs to be involved since they typically dictate the IP addressing scheme used in an organization.

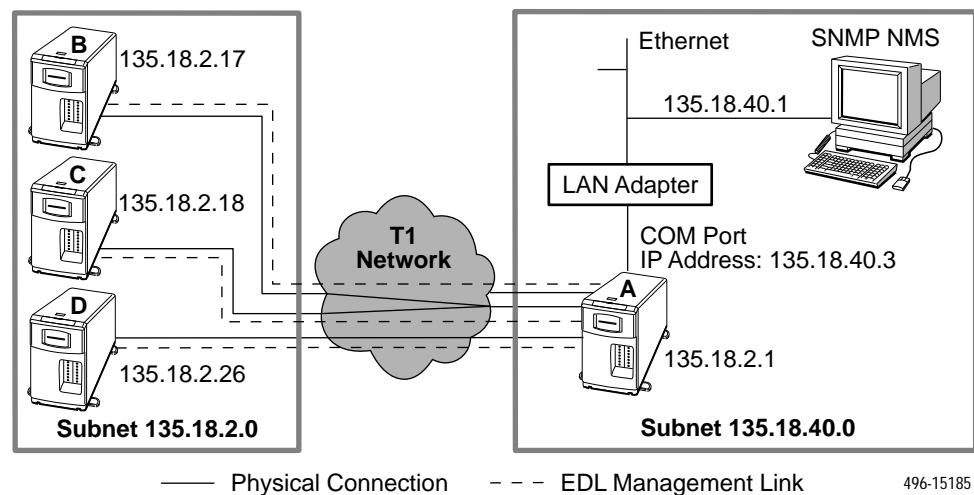
## IP Addressing Scheme Examples

The following examples describe some typical network scenarios; they are not the only scenarios that can be used. The subnet mask shown for each T1 access unit is 255.255.255.0.

### Direct Management Links to Remote T1 Access Units

In this example, T1 Access Unit A is connected to:

- The NMS at the central site
- Each remote T1 access unit through a management link (multiple EDLs)

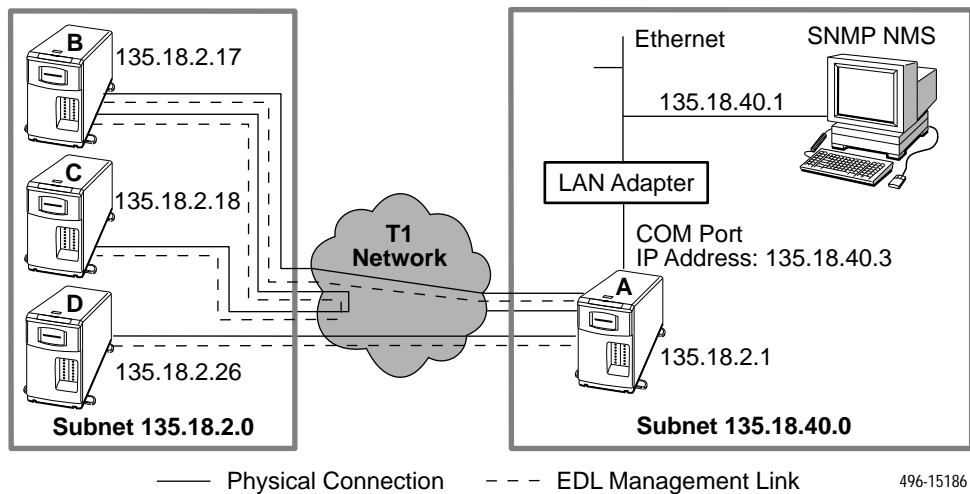


## Routing to Remote T1 Access Units on the Same Subnet

In this example, T1 Access Unit A is connected to:

- The NMS at the central site
- Remote T1 access units through EDL management links

The illustration shows two management EDL management links at the central site, with T1 Access Units B and C connected through one EDL management link.





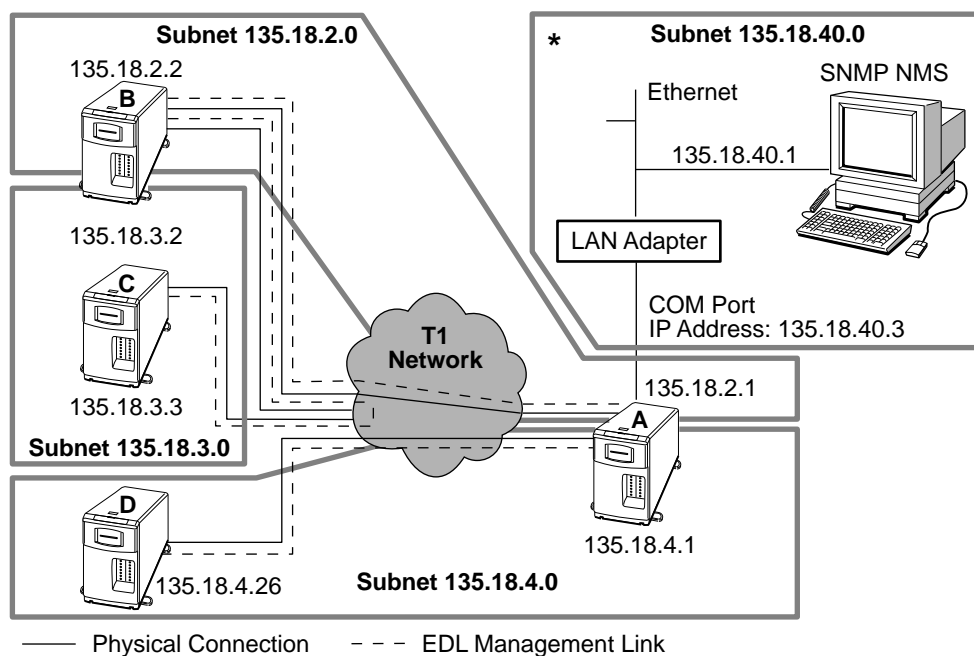
## Routing to Remote Access Units Using Different Subnets

In this example, T1 Access Unit A is connected to:

- The NMS at the central site
- Two remote T1 access units through EDL management links

The illustration shows two EDL management links, with T1 Access Units B and C connected through one EDL management link. By configuring a different IP address and subnet for each management link:

- T1 Access Units B and C share a subnet: 135.18.3.0
- T1 Access Units A and B share a different subnet: 135.18.2.0
- T1 Access Units A and D share yet another subnet: 135.18.4.0



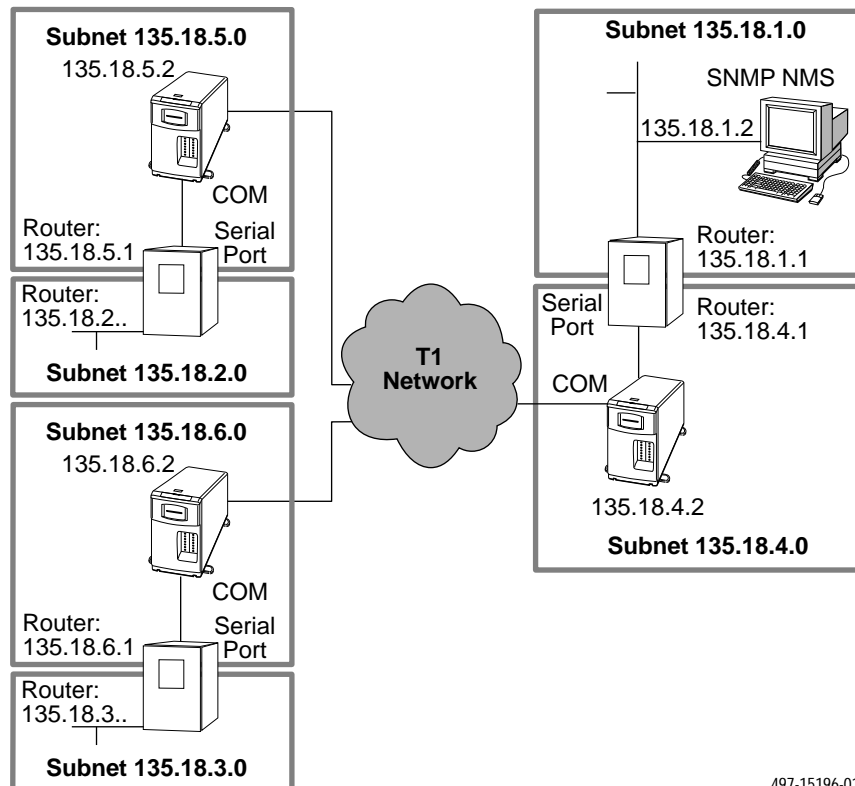
- \* This subnet connection can be to any of the following:
- SNMP NMS via the COM Port
  - LAN adapter via the COM Port
  - Terminal server via the COM Port

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## Routing to Remote T1 Access Units Using Routers

In the following example, each T1 access unit receives its management traffic through a connection from the COM port to the serial port of a router. In this case, the units do not route data among themselves, but rely on the IP routers to route management traffic for the remote T1 access units using data streams configured between the routers.

Each T1 Access Unit is configured to be on its own subnet, having a subnet mask of FF.FF.FF.00. This subnet is independent of the subnet on the LAN supported by the local router.



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## Assigning IP Addresses and Subnet Masks

Once you select an IP scheme, assign an address (or addresses) to the T1 access unit.

<b>If using . . .</b>	<b>Then . . .</b>
COM port as a management interface	Assign the COM port address and net mask.  Menu selection sequence: <i>Main Menu</i> → <i>Configuration</i> → <i>Management &amp; Communication</i> → <i>Communication Protocol</i>
COM port connected to an external modem	Configure using an alternate IP address.  Menu selection sequence: <i>Main Menu</i> → <i>Configuration</i> → <i>Management &amp; Communication</i> → <i>Communication Protocol</i>
FDL, DDL, or EDL management links	Assign IP addresses and net masks to each management link.  Menu selection sequences: <i>Main Menu</i> → <i>Configuration</i> → <i>Network (for FDL and DDL)</i>  <i>Main Menu</i> → <i>Configuration</i> → <i>Sync Data Ports (for EDL)</i>



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# SNMP Traps

# C

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This section describes the T1 access unit's compliance with SNMP format standards and with its special operational trap features. The T1 access unit supports the following user interface traps, along with several enterprise-specific traps:

- warmStart
- authenticationFailure
- linkUp
- linkDown

These traps are listed in alphabetical order within each table.

## Trap: warmStart

Trap	What It Indicates	Possible Cause
warmStart	T1 access unit has just reinitialized and stabilized itself.	<ul style="list-style-type: none"><li>■ Reset command sent.</li><li>■ Power disruption.</li></ul>

## Trap: authenticationFailure

Trap	What It Indicates	Possible Cause
authenticationFailure	Access to the T1 access unit was attempted and failed.	<ul style="list-style-type: none"> <li>■ SNMP protocol message not properly authenticated.</li> <li>■ Three unsuccessful attempts were made to enter a correct login/password combination.</li> <li>■ IP address security is enabled, and a message was received from SNMP Manager whose address was not on the list of approved managers.</li> </ul>

## Traps: linkUp and linkDown

Trap	What It Indicates	Possible Cause
linkDown	The link is down.	A failure in one of the communication interfaces has occurred.
linkUp	The link is operational.	One of the failed communication interfaces is up and operational.

The interfaces that support these traps and conditions that define linkUp and linkDown for each interface:

Interface	linkUp/Down Variable-Bindings	Possible Cause
PHYSICAL SUBLAYER – Represented by the entry in the MIB II Interfaces Table.		
Network and DSX-1 interfaces (Supported by the DS1 MIB.)	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> <li>■ dsx1LineStatus (RFC 1406)</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>linkDown</b> – One or more alarm conditions are active on the interface. Alarm conditions include: <ul style="list-style-type: none"> <li>– Loss of Signal (LOS)</li> <li>– Out of Frame (OOF)</li> <li>– Alarm Indication Signal (AIS)</li> <li>– Excessive Error Rate (EER)</li> <li>– Yellow Alarm</li> </ul> </li> <li>■ <b>linkUp</b> – No alarms on the interface.</li> </ul>

<b>Interface</b>	<b>linkUp/Down Variable-Bindings</b>	<b>Possible Cause</b>
Synchronous Data Ports (Supported by the media-specific RS232-Like MIB.)	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>linkDown</b> – One or more alarm conditions are active on the port. Alarm conditions include: <ul style="list-style-type: none"> <li>– DTR Off<sup>1</sup></li> <li>– RTS Off<sup>1</sup></li> <li>– Out of Frame (OOF) for the Embedded Data Link (EDL)<sup>2</sup></li> <li>– Excessive Error Rate for the Embedded Data Link (EDL)<sup>2</sup></li> </ul> </li> <li>■ <b>linkUp</b> – No alarms on the port.</li> </ul>
OCU Ports (Represented by an entry in the MIB-II interfaces table.)	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> </ul>	<ul style="list-style-type: none"> <li>■ <b>linkDown</b> – One or more alarm conditions are active on the interface. Alarm conditions include: <ul style="list-style-type: none"> <li>– Loss of Signal</li> <li>– Abnormal Station Code</li> <li>– 64KCC Loop OOF</li> <li>– DDS Net Failure<sup>3</sup></li> <li>– Loss of Loop Timing</li> </ul> </li> <li>■ <b>linkUp</b> – No alarms on the port.</li> </ul>
<p><sup>1</sup> The DTR alarm condition will only generate a linkUp/linkDown trap if the DTE supports the DTR lead state (Send All Ones on Data Port Not Ready configuration option on the <i>Main Menu</i> → <i>Configuration</i> → <i>Sync Data Ports</i> branch).</p> <p><sup>2</sup> The OOF and EER alarm condition will only generate a linkUp/linkDown trap if the EDL is enabled on that port (Embedded Data Link configuration option on the <i>Main Menu</i> → <i>Configuration</i> → <i>Sync Data Ports</i> branch).</p> <p><sup>3</sup> xxxxxx is the failure code</p>		

## Traps: Enterprise-Specific

These traps indicate that an enterprise-specific event has occurred. Supported enterprise-specific traps include the following, listed in alphabetical order:

Trap	What It Indicates	Possible Cause
enterpriseAPMFailed(9)	The APM cannot be detected.	The APM has failed or has been removed.
enterpriseAPMFailedClear (109)	The APM failure has cleared.	The APM failure has cleared.
enterpriseConfigChange(6)	Configuration has been changed via the user interface or an SNMP Manager after 60 seconds has elapsed without another change.	Configuration has been changed via the user interface or an SNMP Manager.
enterpriseDeviceFail(3)	An internal device failure.	Operating software has detected an internal device failure.
enterpriseModuleMisConfig (8)	A module misconfiguration has been detected.	An APM is installed in a slot that previously contained another type of APM.
enterpriseModuleMisConfigClear(108)	A module misconfiguration error condition has been cleared.	The operating software no longer detects a misconfiguration.
enterprisePowerSupply(7)	The power supply output voltage has dropped below the tolerance level.	Power supply problem.
enterprisePowerSupplyClear(107)	The power supply output voltage alarm condition has cleared.	The power supply output voltage alarm condition has cleared.
enterprisePrimaryClockFail(1)	A failure of the device's currently configured primary clock source.	Operating software has detected that the primary clock source has failed.
enterprisePrimaryClockFailClear(101)	The failure of the device's currently configured primary clock source has cleared.	Operating software has detected that the primary clock source is now operational again.
enterpriseSecondaryClockFail(4)	A failure of the device's currently configured secondary clock source.	Operating software has detected that the secondary clock source has failed.
enterpriseSecondaryClockFailClear(104)	The failure of the device's currently configured secondary clock source has cleared.	Operating software has detected that the secondary clock source is now operational again.
enterpriseSelfTestFail(2)	A hardware failure.	Unit has completed (re)initialization and a hardware failure was detected.
enterpriseTestStart(5)	A test is running.	At least one test has been started on an interface.
enterpriseTestStop(105)	All tests have been halted.	All tests have been halted on an interface.



The tests that support these traps and conditions that define enterpriseTestStart and enterpriseTestStop for each interface:

<b>Interface</b>	<b>enterpriseTestStart/Stop Variable-Bindings</b>	<b>For These Tests</b>
Network and DSX-1 T1 Interfaces	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> </ul>	<ul style="list-style-type: none"> <li>■ All</li> </ul>
	<ul style="list-style-type: none"> <li>■ dsx1SendCode (RFC 1406)</li> </ul>	<ul style="list-style-type: none"> <li>■ Remote Line Loopback</li> <li>■ Send 511 pattern</li> <li>■ Send 3 in 24</li> <li>■ Send QRSS</li> </ul>
	<ul style="list-style-type: none"> <li>■ dsx1LoopbackConfig (RFC 1406)</li> </ul>	<ul style="list-style-type: none"> <li>■ Line Loopback</li> <li>■ Payload Loopback</li> </ul>
	<ul style="list-style-type: none"> <li>■ devDS1TestType (devDS1Config.mib)</li> </ul>	<ul style="list-style-type: none"> <li>■ Repeater Loopback</li> <li>■ Send All Zeroes</li> <li>■ Send All Ones</li> <li>■ Send 1-in-8</li> <li>■ Send 63</li> <li>■ Send 2047</li> <li>■ Send <math>2^{15} - 1</math></li> <li>■ Send <math>2^{20} - 1</math></li> <li>■ Send user-defined pattern</li> <li>■ All Monitor patterns</li> </ul>
Synchronous Data Ports	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> <li>■ devSyncPortTestType (devDataPortConfig.mib)</li> </ul>	<ul style="list-style-type: none"> <li>■ DTE Loopback</li> <li>■ DTE Payload Loopback</li> <li>■ Data Channel Loopback</li> <li>■ Send V.54 Loopback</li> <li>■ Send FT1 Loopback</li> <li>■ Send pattern tests</li> <li>■ Monitor pattern tests</li> </ul>

<b>Interface</b>	<b>enterpriseTestStart/Stop Variable-Bindings</b>	<b>For These Tests</b>
OCU Ports	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> <li>■ devOcuTestType (devOcu.mib)</li> </ul>	<ul style="list-style-type: none"> <li>■ Latching CSU and DSU Loopbacks</li> <li>■ Nonlatching CSU and DSU Loopbacks</li> <li>■ OCU Loopback</li> <li>■ DS-0 Loopback</li> <li>■ Line Loopback</li> <li>■ Data Loopback</li> <li>■ Remote Latching CSU, DSU and OCU Loopbacks</li> <li>■ Remote Nonlatching CSU, DSU and OCU Loopbacks</li> <li>■ Send pattern tests</li> <li>■ Monitor pattern tests</li> </ul>
Voice Ports	<ul style="list-style-type: none"> <li>■ ifIndex (RFC 1573)</li> <li>■ ifAdminStatus (RFC 1573)</li> <li>■ ifOperStatus (RFC 1573)</li> <li>■ ifType (RFC 1573)</li> <li>■ devVoiceTestType (devVoice.mib)</li> </ul>	<ul style="list-style-type: none"> <li>■ Digital Loopback</li> <li>■ Analog Loopback</li> <li>■ Line Loopback</li> <li>■ Send DRS tone to T1 interface and user</li> <li>■ Send quiet tone to T1 interface and user</li> <li>■ Monitor pattern tests</li> </ul>

# SNMP Cross-Reference

# D

This appendix provides a correlation between how a function is performed or status is displayed on the user interface and how the same function is accomplished using access to the SNMP database (Table D-1). SNMP objects are displayed in **bold** type while values for SNMP objects are displayed in *italics*.

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (1 of 16)**

User Interface Command	SNMP MIB Object
<b>STATUS</b>	
main/status/system Health & Status:  Power Supply Alarm LOS at Net/DSX-1 OOF at Net/DSX-1 AIS at Net/DSX-1 EER at Net Yellow at Net/DSX-1 APM Card Failed Module MisConfig Module Unsupported OOF (EDL) Out of Sync, Slot xx Group <i>g</i> EER (EDL) Loss of Signal, <i>ss-p</i> Abnormal Station Code, <i>ss-p</i> 64KCC Loop OOF, <i>ss-p</i> DDS Net Failure <i>xxxxxx</i> , <i>ss-p</i> Loss of Loop Timing, <i>ss-p</i> Primary Clock Failed Secondary Clock Failed Network Com Link Down Device Fail	Read:  <b>devHealthAndStatus</b> <i>dsx1LossOfSignal</i> from <b>dsx1LineStatus</b> for interface <i>dsx1LossOfFrame</i> from <b>dsx1LineStatus</b> for interface <i>dsx1RcvAIS</i> from <b>dsx1LineStatus</b> for interface <i>dsx1OtherFailure</i> from <b>dsx1LineStatus</b> for interface <i>dsx1RcvFarEndLOF</i> from <b>dsx1LineStatus</b> for interface <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <b>devHealthAndStatus</b> <i>down</i> from <b>ifOperStatus</b> for the COM port interface <b>devHealthAndStatus</b>
main/status/system Self-Test Results: All Self-Test Results	Read: <b>devSelfTestResults</b>

Table D-1. SNMP MIB to User Interface Command Cross-Reference (2 of 16)

User Interface Command	SNMP MIB Object
main/status/system Test Status:  Net/DSX-1 LLB Test Active Net/DSX-1 PLB Test Active Net/DSX-1 RLB Test Active DCLB, Slot xx Port <i>n</i> DTLB, Slot xx Port <i>n</i> DTPLB, Slot xx Port <i>n</i> Non-Latching OCU LB, <i>ss-p</i> Latching OCU LB, <i>ss-p</i> Non-Latching CSU LB, <i>ss-p</i> Latching CSU LB, <i>ss-p</i> Non-Latching DSU LB, <i>ss-p</i> Latching DSU LB, <i>ss-p</i> OCU Line LB, <i>ss-p</i> OCU Data LB, <i>ss-p</i> OCU DS-0 LB, <i>ss-p</i> Voice DLB, Slot xx Port <i>n</i> Voice ALB, Slot xx Port <i>n</i> Voice LLB, Slot xx Port <i>n</i> Voice DRS, Slot xx Port <i>n</i>  Voice Quiet, Slot xx Port <i>n</i>  Forced Signal, Slot xx Port  <i>Pttn</i> Act, Network/DSX-1 Mon <i>Pttn</i> , Network/DSX-1 <i>Pttn</i> Act, Slot xx Port <i>n</i> (sync port) Mon <i>Pttn</i> , Slot xx Port <i>n</i> (sync port) <i>Pttn</i> Act, Slot xx Port <i>n</i> (OCU port) Mon <i>Pttn</i> , Slot xx Port <i>n</i> (OCU port) Lamp Test Active	Read:  <i>dsx1LineLoop</i> from <b>dsx1LoopbackConfig</b> for interface <i>dsx1PayloadLoop</i> from <b>dsx1LoopbackConfig</b> for interface <b>devDS1TestControl</b> and <i>rlb</i> test for interface <b>devSyncPortTestControl</b> and <i>dclb</i> test for interface <b>devSyncPortTestControl</b> and <i>dtlb</i> test for interface <b>devSyncPortTestControl</b> and <i>plb</i> test for interface <b>devOcuTestControl</b> and <i>locOCULB</i> test for interface <b>devOcuTestControl</b> and <i>locOCULB</i> test for interface <b>devOcuTestControl</b> and <i>locNonLatchingCSULB</i> test for interface <b>devOcuTestControl</b> and <i>locLatchingCSULB</i> test for interface <b>devOcuTestControl</b> and <i>locNonLatchingDSULB</i> test for interface <b>devOcuTestControl</b> and <i>locLatchingCSULB</i> test for interface <b>devOcuTestControl</b> and <i>locLineLB</i> test for interface <b>devOcuTestControl</b> and <i>locDataLB</i> test for interface <b>devOcuTestControl</b> and <i>locDS0LB</i> test for interface <b>devVoiceTestAction</b> and <i>digitalLoopback</i> test for interface <b>devVoiceTestAction</b> and <i>analogLoopback</i> test for interface <b>devVoiceTestAction</b> and <i>lineLoopback</i> test for interface <b>devVoiceTestAction</b> and <i>userDRSTone</i> or <i>networkDRSTone</i> for interface <b>devVoiceTestAction</b> and <i>userQuietTone</i> or <i>networkQuietTone</i> for interface <b>devVoiceTestAction</b> and <i>testRXBits</i> , <i>testTXBits</i> , <i>testTRLeads</i> , or <i>testELeads</i> for interface <b>devDS1TestControl</b> and <i>send[Pttn]</i> for interface <b>devDS1TestControl</b> and <i>mon[Pttn]</i> for interface <b>devSyncDataTestControl</b> and <i>send[Pttn]</i> for interface <b>devSyncDataTestControl</b> and <i>mon[Pttn]</i> for interface <b>devOcuTestControl</b> and <i>send[Pttn]</i> for interface <b>devOcuTestControl</b> and <i>mon[Pttn]</i> for interface <b>devControlTestStatus</b>
main/status/voice:  Call Progress Trunk Condition CGA	Fully supported by MIB objects (see test/port (voice) and config/voice_port. devVoiceStatusCallProgState devVoiceStatusTrunkCondInCGA
main/status/cross_connect:	fully supported by <b>devCrossConnect</b>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (3 of 16)**

User Interface Command	SNMP MIB Object
<p>main/status/performance/network</p> <p>Telco Current:</p> <ul style="list-style-type: none"> <li>Current Interval Timer</li> <li>ESF Error Events</li> <li>ES</li> <li>UAS</li> <li>SES</li> <li>BES</li> <li>CSS</li> <li>LOFC</li> </ul> <p>Telco Intervals:</p> <ul style="list-style-type: none"> <li>ES</li> <li>UAS</li> <li>SES</li> <li>BES</li> <li>CSS</li> <li>LOFC</li> </ul>	<p>For the network interface, Read value in:</p> <p><b>dsx1TimeElapsed</b>  <b>dsx1TelcoCurrentEvent</b>  <b>dsx1CurrentES</b>  <b>dsx1CurrentUAS</b>  <b>dsx1CurrentSES</b>  <b>dsx1CurrentBES</b>  <b>dsx1CurrentCSS</b>  <b>dsx1CurrentLOFC</b></p> <p>Select interval number with <b>dsx1IntervalNumber</b>, Read value in:</p> <p><b>dsx1IntervalES</b>  <b>dsx1IntervalUAS</b>  <b>dsx1IntervalSES</b>  <b>dsx1IntervalBES</b>  <b>dsx1IntervalCSS</b></p> <p>Select interval number with <b>devTelcoIntervalNumber</b>, then  Read value in: <b>devTelcoIntervalLOFC</b></p>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (4 of 16)**

User Interface Command	SNMP MIB Object
<p>main/status/performance/network (cont'd)</p> <p>Telco 24 Hour Totals: Valid Intervals ES UAS SES BES CSS LOFC</p> <p>User Current: Current Interval Timer ESF Error Events ES UAS SES BES CSS LOFC Status</p> <p>User Intervals:  ES UAS SES BES CSS LOFC Status</p> <p>User 24 Hour Totals: Valid Intervals ES UAS SES BES CSS LOFC</p> <p>User Clear Statistics:</p>	<p>For the network interface, Read value in: <b>dsx1ValidIntervals</b> <b>dsx1TotalES</b> <b>dsx1TotalUAS</b> <b>dsx1TotalSES</b> <b>dsx1TotalBES</b> <b>dsx1TotalCSS</b> <b>devTelcoTotalLOFC</b></p> <p>For the network interface, Read value in: <b>devUserCurrentTimer</b> <b>devUserCurrentEvent</b> <b>devUserCurrentESS</b> <b>devUserCurrentUASs</b> <b>devUserCurrentSESS</b> <b>devUserCurrentBESS</b> <b>devUserCurrentCSSs</b> <b>devUserCurrentLOFC</b> <b>devUserCurrentStEvt</b></p> <p>Select interval number with <b>devUserIntervalNumber</b>, then Read value in: <b>devUserIntervalESS</b> <b>devUserIntervalUASs</b> <b>devUserIntervalSESS</b> <b>devUserIntervalBESS</b> <b>devUserIntervalCSSs</b> <b>devUserIntervalLOFC</b> <b>devUserIntervalStEvt</b></p> <p><b>devUserValidIntervals</b> <b>devUserTotalESS</b> <b>devUserTotalUASs</b> <b>devUserTotalSESS</b> <b>devUserTotalBESS</b> <b>devUserTotalCSSs</b> <b>devUserTotalLOFC</b></p> <p>For the network interface, Set <b>devClrUserReg</b> to <i>clear</i>.</p>

Table D-1. SNMP MIB to User Interface Command Cross-Reference (5 of 16)

User Interface Command	SNMP MIB Object
main/status/performance/port	
Near-End Current: Current Interval Timer Error Events Counter ES UAS SES BES LOFC	For the port, Read value in: <b>devEDLCurrentTimer</b> <b>devEDLCurrentEvent</b> <b>devEDLCurrentESs</b> <b>devEDLCurrentUASs</b> <b>devEDLCurrentSESSs</b> <b>devEDLCurrentBESSs</b> <b>devEDLCurrentLOFC</b>
Near-End Intervals:  ES UAS SES BES LOFC	Select interval number with <b>devEDLIntervalNumber</b> , then Read value in: <b>devEDLIntervalESs</b> <b>devEDLIntervalUASs</b> <b>devEDLIntervalSESSs</b> <b>devEDLIntervalBESSs</b> <b>devEDLIntervalLOFC</b>
Near-End 8 Hour Totals: Valid Intervals ES UAS SES BES LOFC	For the port, Read value in: <b>devEDLTotalValidIntervals</b> <b>devEDLTotalESs</b> <b>devEDLTotalUASs</b> <b>devEDLTotalSESSs</b> <b>devEDLTotalBESSs</b> <b>devEDLTotalLOFC</b>
Near-End Clear Statistics:	For the port, Set <b>devEDLClrRegWhichRegs</b> to <i>nearRegisters</i> and <b>devEDLClrRegAction</b> to <i>clear</i> .
Far-End Current: Current Interval Timer Error Events Counter ES UAS SES BES LOFC	For the port, Read value in: <b>devEDLFarEndCurrentTimer</b> <b>devEDLFarEndCurrentEvent</b> <b>devEDLFarEndCurrentESs</b> <b>devEDLFarEndCurrentUASs</b> <b>devEDLFarEndCurrentSESSs</b> <b>devEDLFarEndCurrentBESSs</b> <b>devEDLFarEndCurrentLOFC</b>
Far-End Intervals:  ES UAS SES BES LOFC Complete	Select interval number with <b>devDataPortIntervalNumber</b> , then Read value in: <b>devEDLFarEndIntervalESs</b> <b>devEDLFarEndIntervalUASs</b> <b>devEDLFarEndIntervalSESSs</b> <b>devEDLFarEndIntervalBESSs</b> <b>devEDLFarEndIntervalLOFC</b> <b>devEDLFarEndIntervalCmpl</b>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (6 of 16)**

User Interface Command	SNMP MIB Object
main/status/performance/port (cont'd)  Far-End 8 Hour Totals: Valid Intervals ES UAS SES BES LOFC Complete  Far-End Clear Statistics:	For the port, Read value in: <b>devEDLFarEndTotalValidIntervals</b> <b>devEDLFarEndTotalIEss</b> <b>devEDLFarEndTotalUASs</b> <b>devEDLFarEndTotalSEss</b> <b>devEDLFarEndTotalBESs</b> <b>devEDLFarEndTotalLOFC</b> <b>devEDLFarEndTotalCmpl</b>  For the port, Set <b>devEDLClrRegWhichRegs</b> to <i>farRegisters</i> and <b>devEDLClrRegAction</b> to <i>clear</i> .
main/status/performance/clear_statistics: Network  All Synchronous Data Ports	Set: <b>devUserClrReg</b>  Set <b>devEDLClrRegWhichRegs</b> to <i>nearRegisters</i> and <i>farRegisters</i> and <b>devEDLClrRegsAction</b> to <i>clear</i> .
main/status/identity: Serial Number Model Number Software Revision Hardware Revision System Name System Contact System Location APM Type	Read: <b>sysDescr</b> object from the System group <b>sysDescr</b> object from the System group <b>sysDescr</b> object from the System group <b>sysDescr</b> object from the System group <b>sysName</b> object from the System group <b>sysContact</b> object from the System group <b>sysLocation</b> object from the System group <b>ifDescr</b> object for the interface



Table D-1. SNMP MIB to User Interface Command Cross-Reference (7 of 16)

User Interface Command	SNMP MIB Object
<b>TEST</b>	
main/test/network and /dsx	Set:
Start Line Loopback Stop Line Loopback	<b>dsx1LoopbackConfig</b> to <i>dsx1LineLoop</i> for the interface <b>dsx1LoopbackConfig</b> to <i>dsx1NoLoop</i> for the interface
Start Payload Loopback Stop Payload Loopback	<b>dsx1LoopbackConfig</b> to <i>dsx1PayloadLoop</i> for the interface <b>dsx1LoopbackConfig</b> to <i>dsx1NoLoop</i> for the interface
Start Repeater Loopback Stop Repeater Loopback	<b>devDS1TestControl</b> for <i>rlb</i> on the interface <b>devDS1TestControl</b> for <i>rlb</i> to <i>idle</i> on the interface
Send Line Loopback Up Send Line Loopback Down	<b>dsx1SendCode</b> to <i>dsx1SendLineCode</i> for the network interface <b>dsx1SendCode</b> to <i>dsx1SendResetCode</i> for the network interface
Start Send QRSS Pattern Stop Send QRSS Pattern	<b>dsx1SendCode</b> to <i>dsx1SendQRS</i> for the interface <b>dsx1SendCode</b> to <i>dsx1SendResetCode</i> for the interface
Start Send All Zeros Pattern Stop Send All Zeros Pattern	<b>devDS1TestControl</b> for <i>sendZeros</i> on the interface <b>devDS1TestControl</b> for <i>sendZeros</i> to <i>idle</i> on the interface
Start Send All Ones Pattern Stop Send All Ones Pattern	<b>devDS1TestControl</b> for <i>sendOnes</i> on the interface <b>devDS1TestControl</b> for <i>sendOnes</i> to <i>idle</i> on the interface
Start Send 1 in 8 Pattern Stop Send 1 in 8 Pattern	<b>devDS1TestControl</b> for <i>send1in8</i> on the interface <b>devDS1TestControl</b> for <i>send1in8</i> to <i>idle</i> on the interface
Start Send 3 in 24 Pattern Stop Send 3 in 24 Pattern	<b>dsx1SendCode</b> to <i>dsx1Send3in24Pattern</i> for the interface <b>dsx1SendCode</b> to <i>dsx1SendNoCode</i> for the interface
Start Send 63 Pattern Stop Send 63 Pattern	<b>devDS1TestControl</b> for <i>send63</i> on the interface <b>devDS1TestControl</b> for <i>send63</i> to <i>idle</i> on the interface
Start Send 511 Pattern Stop Send 511 Pattern	<b>dsx1SendCode</b> to <i>dsx1Send511Pattern</i> for the interface <b>dsx1SendCode</b> to <i>dsx1SendNoCode</i> for the interface
Start Send 2047 Pattern Stop Send 2047 Pattern	<b>devDS1TestControl</b> for <i>send2047</i> on the interface <b>devDS1TestControl</b> for <i>send2047</i> to <i>idle</i> on the interface
Start Send 2 <sup>15</sup> -1 Pattern Stop Send 2 <sup>15</sup> -1 Pattern	<b>devDS1TestControl</b> for <i>send2E15</i> on the interface <b>devDS1TestControl</b> for <i>send2E15</i> to <i>idle</i> on the interface
Start Send 2 <sup>20</sup> -1 Pattern Stop Send 2 <sup>20</sup> -1 Pattern	<b>devDS1TestControl</b> for <i>send2E20</i> on the interface <b>devDS1TestControl</b> for <i>send2E20</i> to <i>idle</i> on the interface
Start Send User-Defined Pattern	<b>devDS1TestControl</b> for <i>sendUserDefined</i> on the interface and <b>devDS1TestArgument</b> to the 2-byte pattern value
Stop User-Defined Pattern	<b>devDS1TestControl</b> for <i>sendUserDefined</i> to <i>idle</i> on the interface

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (8 of 16)**

User Interface Command	SNMP MIB Object
main/test/network and /dsx (cont'd)	Set:
Start Monitor QRSS Pattern Stop Monitor QRSS Pattern	<b>devDS1TestControl</b> for <i>monQRSS</i> on the interface <b>devDS1TestControl</b> for <i>monQRSS</i> to <i>idle</i> on the interface
Start Monitor All Zeros Pattern Stop Monitor All Zeros Pattern	<b>devDS1TestControl</b> for <i>monZeros</i> on the interface <b>devDS1TestControl</b> for <i>monZeros</i> to <i>idle</i> on the interface
Start Monitor All Ones Pattern Stop Monitor All Ones Pattern	<b>devDS1TestControl</b> for <i>monOnes</i> on the interface <b>devDS1TestControl</b> for <i>monOnes</i> to <i>idle</i> on the interface
Start Monitor 1 in 8 Pattern Stop Monitor 1 in 8 Pattern	<b>devDS1TestControl</b> for <i>mon1in8</i> on the interface <b>devDS1TestControl</b> for <i>mon1in8</i> to <i>idle</i> on the interface
Start Monitor 3 in 24 Pattern Stop Monitor 3 in 24 Pattern	<b>devDS1TestControl</b> for <i>mon3in24</i> on the interface <b>devDS1TestControl</b> for <i>mon3in24</i> to <i>idle</i> on the interface
Start Monitor 63 Pattern Stop Monitor 63 Pattern	<b>devDS1TestControl</b> for <i>mon63</i> on the interface <b>devDS1TestControl</b> for <i>mon63</i> to <i>idle</i> on the interface
Start Monitor 511 Pattern Stop Monitor 511 Pattern	<b>devDS1TestControl</b> for <i>mon511</i> on the interface <b>devDS1TestControl</b> for <i>mon511</i> to <i>idle</i> on the interface
Start Monitor 2047 Pattern Stop Monitor 2047 Pattern	<b>devDS1TestControl</b> for <i>mon2047</i> on the interface <b>devDS1TestControl</b> for <i>mon2047</i> to <i>idle</i> on the interface
Start Monitor 2 <sup>15</sup> -1 Pattern Stop Monitor 2 <sup>15</sup> -1 Pattern	<b>devDS1TestControl</b> for <i>mon2E15</i> on the interface <b>devDS1TestControl</b> for <i>mon2E15</i> to <i>idle</i> on the interface
Start Monitor 2 <sup>20</sup> -1 Pattern Stop Monitor 2 <sup>20</sup> -1 Pattern	<b>devDS1TestControl</b> for <i>mon2E20</i> on the interface <b>devDS1TestControl</b> for <i>mon2E20</i> to <i>idle</i> on the interface
Start Monitor User-Defined Pattern Stop Monitor User-Defined Pattern	<b>devDS1TestControl</b> for <i>monUserDefined</i> on the interface and <b>devDS1TestArgument</b> to the 2-byte pattern value <b>devDS1TestControl</b> for <i>monUserDefined</i> to <i>idle</i> on the interface
Inject Error Clear Monitor Error	<b>devDS1SendControlInjectErr</b> to <i>inject</i> <b>devDS1MonResultErrorCount</b> to <i>clear</i>
Number of Errors Monitored Number of Errors Injected	Read value in: <b>devDS1MonResultErrorCount</b> <b>devDS1SendControlErrorCount</b>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (9 of 16)**

User Interface Command	SNMP MIB Object
main/test/port (sync data):	Set:
Start DTE Loopback	<b>devSyncPortTestControl</b> for <i>dtlb</i> on the interface
Stop DTE Loopback	<b>devSyncPortTestControl</b> for <i>dtlb</i> to <i>idle</i> on the interface
Start DTE Payload Loopback	<b>devSyncPortTestControl</b> for <i>plb</i> on the interface
Stop DTE Payload Loopback	<b>devSyncPortTestControl</b> for <i>plb</i> to <i>idle</i> on the interface
Start Data Channel Loopback	<b>devSyncPortTestControl</b> for <i>dclb</i> on the interface
Stop Data Channel Loopback	<b>devSyncPortTestControl</b> for <i>dclb</i> to <i>idle</i> on the interface
Send V.54 Loopback Up	<b>devSyncPortTestControl</b> to <i>v54dn</i> on the interface
Send V.54 Loopback Down	<b>devSyncPortTestControl</b> for <i>v54dn</i> to <i>idle</i> on the interface
Send FT1 Loopback Up	<b>devSyncPortTestControl</b> for <i>ftlup</i> on the interface
Send FT1 Loopback Down	<b>devSyncPortTestControl</b> for <i>ftlup</i> to <i>idle</i> on the interface
Start Send QRSS Pattern	<b>devSyncPortTestControl</b> for <i>sendQRSS</i> on the interface
Stop Send QRSS Pattern	<b>devSyncPortTestControl</b> for <i>sendQRSS</i> to <i>idle</i> on the interface
Start Send All Zeros Pattern	<b>devSyncPortTestControl</b> for <i>sendZeros</i> on the interface
Stop Send All Zeros Pattern	<b>devSyncPortTestControl</b> for <i>sendZeros</i> to <i>idle</i> on the interface
Start Send All Ones Pattern	<b>devSyncPortTestControl</b> for <i>sendOnes</i> on the interface
Stop Send All Ones Pattern	<b>devSyncPortTestControl</b> for <i>sendOnes</i> to <i>idle</i> on the interface
Start Send 63 Pattern	<b>devSyncPortTestControl</b> for <i>send63</i> on the interface
Stop Send 63 Pattern	<b>devSyncPortTestControl</b> for <i>send63</i> to <i>idle</i> on the interface
Start Send 511 Pattern	<b>devSyncPortTestControl</b> for <i>send511</i> on the interface
Stop Send 511 Pattern	<b>devSyncPortTestControl</b> for <i>send511</i> to <i>idle</i> on the interface
Start Send 2047 Pattern	<b>devSyncPortTestControl</b> for <i>send2047</i> on the interface
Stop Send 2047 Pattern	<b>devSyncPortTestControl</b> for <i>send2047</i> to <i>idle</i> on the interface
Start Send 2 <sup>15</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>send2E15</i> on the interface
Stop Send 2 <sup>15</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>send2E15</i> to <i>idle</i> on the interface
Start Send 2 <sup>20</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>send2E20</i> on the interface
Stop Send 2 <sup>20</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>send2E20</i> to <i>idle</i> on the interface
Start Send User-Defined Pattern	<b>devSyncPortTestControl</b> for <i>sendUserDefined</i> on the interface and
Stop Send User-Defined Pattern	<b>devSyncPortTestArgument</b> to the 2-byte pattern value <b>devSyncPortTestControl</b> for <i>sendUserDefined</i> to <i>idle</i> on the interface

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (10 of 16)**

User Interface Command	SNMP MIB Object
main/test/port (sync data): (cont'd)	Set:
Start Monitor QRSS Pattern	<b>devSyncPortTestControl</b> for <i>monQRSS</i> on the interface
Stop Monitor QRSS Pattern	<b>devSyncPortTestControl</b> for <i>monQRSS</i> to <i>idle</i> on the interface
Start Monitor All Zeros Pattern	<b>devSyncPortTestControl</b> for <i>monZeros</i> on the interface
Stop Monitor All Zeros Pattern	<b>devSyncPortTestControl</b> for <i>monZeros</i> to <i>idle</i> on the interface
Start Monitor All Ones Pattern	<b>devSyncPortTestControl</b> for <i>monOnes</i> on the interface
Stop Monitor All Ones Pattern	<b>devSyncPortTestControl</b> for <i>monOnes</i> to <i>idle</i> on the interface
Start Monitor 63 Pattern	<b>devSyncPortTestControl</b> for <i>mon63</i> on the interface
Stop Monitor 63 Pattern	<b>devSyncPortTestControl</b> for <i>mon63</i> to <i>idle</i> on the interface
Start Monitor 511 Pattern	<b>devSyncPortTestControl</b> for <i>mon511</i> on the interface
Stop Monitor 511 Pattern	<b>devSyncPortTestControl</b> for <i>mon511</i> to <i>idle</i> on the interface
Start Monitor 2047 Pattern	<b>devSyncPortTestControl</b> for <i>mon2047</i> on the interface
Stop Monitor 2047 Pattern	<b>devSyncPortTestControl</b> for <i>mon2047</i> to <i>idle</i> on the interface
Start Monitor 2 <sup>15</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>mon2E15</i> on the interface
Stop Monitor 2 <sup>15</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>mon2E15</i> to <i>idle</i> on the interface
Start Monitor 2 <sup>20</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>mon2E20</i> on the interface
Stop Monitor 2 <sup>20</sup> -1 Pattern	<b>devSyncPortTestControl</b> for <i>mon2E20</i> to <i>idle</i> on the interface
Start Monitor User-Defined Pattern	<b>devSyncPortTestControl</b> for <i>monUserDefined</i> on the interface and <b>devSyncPortTestArgument</b> to the 2-byte pattern value
Stop Monitor User-Defined Pattern	<b>devSyncPortTestControl</b> for <i>monUserDefined</i> to <i>idle</i> on the interface
Inject Error	<b>devSyncPortSendControlInjectErr</b> to <i>inject</i>
Clear Monitor Error	<b>devSyncPortMonResultErrorCount</b> to <i>clear</i>
Number of Errors Monitored	Read value in: <b>devSyncPortMonResultErrorCount</b>
Number of Errors Injected	<b>devSyncPortSendControlErrorCount</b>

Table D-1. SNMP MIB to User Interface Command Cross-Reference (11 of 16)

User Interface Command	SNMP MIB Object
main/test/port (voice):	Set <b>devVoiceTestType</b> to:      With <b>devVoiceTestAction</b> set to:
Start Digital Loopback	<i>digitalLoopback</i> <i>start</i>
Stop Digital Loopback	<i>digitalLoopback</i> <i>stop</i>
Start Analog Loopback	<i>analogLoopback</i> <i>start</i>
Stop Analog Loopback	<i>analogLoopback</i> <i>stop</i>
Start Line Loopback	<i>lineLoopback</i> <i>start</i>
Stop Line Loopback	<i>lineLoopback</i> <i>stop</i>
Start Send DRS to T1	<i>networkDRSTone</i> <i>start</i>
Stop Send DRS to T1	<i>networkDRSTone</i> <i>stop</i>
Start Send DRS to User	<i>userDRSTone</i> <i>start</i>
Stop Send DRS to User	<i>userDRSTone</i> <i>stop</i>
Start Send Quiet to T1	<i>networkQuietTone</i> <i>start</i>
Stop Send Quiet to T1	<i>networkQuietTone</i> <i>stop</i>
Start Send Quiet to User	<i>userQuietTone</i> <i>start</i>
Stop Send Quiet to User	<i>userQuietTone</i> <i>stop</i>
main/test/port (voice):	Set <b>devVoiceTestType</b> to:      With <b>devVoiceTestAction</b> set to:
Set Tx ABCD Bits	<i>testTXBits</i> <i>start</i> and <b>devVoiceTestArgument</b> specifying the ABCD bit values
Set Rx ABCD Bits	<i>testRXBits</i> <i>start</i> and <b>devVoiceTestArgument</b> specifying the ABCD bit values
Set Tip & Ring Leads	<i>testTRLeads</i> <i>start</i> and <b>devVoiceTestArgument</b> specifying Tip and Ring values
Set E-Lead State	<i>testELeads</i> <i>start</i> and <b>devVoiceTestArgument</b> set to <i>idle</i> or <i>active</i>
	From <b>devVoiceTestType</b> Read:
Tx ABCD Bits	<i>testTXBits</i>
Rx ABCD Bits	<i>testRXBits</i>
Tip & Ring Leads	<i>testTRLeads</i>
E-Lead State	<i>testELeads</i>
M-Lead State	<i>testTRLeads</i>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (12 of 16)**

User Interface Command	SNMP MIB Object	
main/test/port (OCU):	Set <b>devOcuTestType</b> to:	With <b>devOcuTestControl</b> set to:
Start OCU LB	<i>locOCULB</i>	<i>running</i>
Stop OCU LB	<i>locOCULB</i>	<i>idle</i>
Start Non-Latching CSU LB	<i>locNonLatchingCSULB</i>	<i>running</i>
Stop Non-Latching CSU LB	<i>locNonLatchingCSULB</i>	<i>idle</i>
Start Latching CSU LB	<i>locLatchingCSULB</i>	<i>running</i>
Stop Latching CSU LB	<i>locLatchingCSULB</i>	<i>idle</i>
Start Non-Latching DSU LB	<i>locNonLatchingDSULB</i>	<i>running</i>
Stop Non-Latching DSU LB	<i>locNonLatchingDSULB</i>	<i>idle</i>
Start Latching DSU LB	<i>locLatchingDSULB</i>	<i>running</i>
Stop Latching DSU LB	<i>locLatchingDSULB</i>	<i>idle</i>
Start OCU Line LB	<i>locLineLB</i>	<i>running</i>
Stop OCU Line LB	<i>locLineLB</i>	<i>idle</i>
Start OCU Data LB	<i>locDataLB</i>	<i>running</i>
Stop OCU Data LB	<i>locDataLB</i>	<i>idle</i>
Start OCU DS-0 LB	<i>locDS0LB</i>	<i>running</i>
Stop OCU DS-0 LB	<i>locDS0LB</i>	<i>idle</i>
Start remote Latching CSU LB	<i>remLatchingCSULB</i>	<i>running</i>
Stop remote Latching CSU LB	<i>remLatchingCSULB</i>	<i>idle</i>
Start remote Latching DSU LB	<i>remLatchingDSULB</i>	<i>running</i>
Stop remote Latching DSU LB	<i>remLatchingDSULB</i>	<i>idle</i>
Start remote Latching OCU LB	<i>remLatchingOCULB</i>	<i>running</i>
Stop remote Latching OCU LB	<i>remLatchingOCULB</i>	<i>idle</i>
Start remote Non-Latching CSU LB	<i>remNonLatchingCSULB</i>	<i>running</i>
Stop remote Non-Latching CSU LB	<i>remNonLatchingCSULB</i>	<i>idle</i>
Start remote Non-Latching DSU LB	<i>remNonLatchingDSULB</i>	<i>running</i>
Stop remote Non-Latching DSU LB	<i>remNonLatchingDSULB</i>	<i>idle</i>
Start remote Non-Latching OCU LB	<i>remNonLatchingOCULB</i>	<i>running</i>
Stop remote Non-Latching OCU LB	<i>remNonLatchingOCULB</i>	<i>idle</i>
Start Send All Zeros to User	<i>sendZerosUser</i>	<i>running</i>
Stop Send All Zeros to User	<i>sendZerosUser</i>	<i>idle</i>
Start Send All Ones to User	<i>sendOnesUser</i>	<i>running</i>
Stop Send All Ones to User	<i>sendOnesUser</i>	<i>idle</i>
Start Send 63 to User	<i>send63User</i>	<i>running</i>
Stop Send 63 to User	<i>send63User</i>	<i>idle</i>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (13 of 16)**

User Interface Command	SNMP MIB Object
main/test/port (OCU) (continued):	Set <b>devOcuTestType</b> to:      With <b>devOcuTestControl</b> set to: (continued)
Start Send 511 to User	<i>send511User</i> <i>running</i>
Stop Send 511 to User	<i>send511User</i> <i>idle</i>
Start Send 2047 to User	<i>send2047User</i> <i>running</i>
Stop Send 2047 to User	<i>send2047User</i> <i>idle</i>
Start Send All Zeros to User	<i>sendZerosT1</i> <i>running</i>
Stop Send All Zeros to User	<i>sendZerosT1</i> <i>idle</i>
Start Send All Ones to T1	<i>sendOnesT1</i> <i>running</i>
Stop Send All Ones to T1	<i>sendOnesT1</i> <i>idle</i>
Start Send 63 to T1	<i>send63T1</i> <i>running</i>
Stop Send 63 to T1	<i>send63T1</i> <i>idle</i>
Start Send 511 to T1	<i>send511T1</i> <i>running</i>
Stop Send 511 to User	<i>send511User</i> <i>idle</i>
Start Send 2047 to T1	<i>send2047T1</i> <i>running</i>
Stop Send 2047 to T1	<i>send2047T1</i> <i>idle</i>
Inject Error	Set <b>devOcuSendControlInjectErr</b> to <i>inject</i>
Clear Monitor Error	Set <b>devOcuMonResultErrorCount</b>
Number of Errors Monitored	Read value from <b>devOcuMonResultErrorCount</b>
Number of Errors Injected	Read value from <b>devOcuSendControlErrorCount</b>

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (14 of 16)**

User Interface Command	SNMP MIB Object
<b>CONFIG</b>	
main/config/load followed by main/config/save:	Set: <b>devConfigAreaCopy</b> to the selected area: <i>active-to-customer1</i> , <i>factory1-to-active</i> , etc.
main/config: Accept Configuration Mismatch	Set: <b>devCfgCardAction</b> to <i>accept</i>
main/config/network:  Network Interface Line Framing Format Line Coding Format ANSI Performance Report Msgs. Management Link DDL Rate Network Time Slot Circuit Identifier	Set/Read:  <b>ifAdminStatus</b> to <i>up</i> or <i>down</i> <b>dsx1LineType</b> <b>dsx1LineCoding</b> <b>dsx1Fdl</b> <b>dsx1Fdl</b> ( <i>fdl</i> only) <b>ifSpeed</b> <b>devDs1FracTable</b> entry, with <b>devDs1FracIndex</b> for DDL <b>dsx1Circuit Identifier</b>
main/config/dsx:  Interface Status Line Framing Format Line Coding Format	Set/Read:  <b>ifAdminStatus</b> to <i>up</i> or <i>down</i> <b>dsx1LineType</b> <b>dsx1LineCoding</b>
main/config/sync:  Port Status Port Type Port Base Rate Transmit Clock Source Embedded Data Link EDL Management Link Invert Transmit and Received Data	Set/Read:  <b>ifAdminStatus</b> to <i>up</i> or <i>down</i> <b>rs232PortType</b> <b>devSyncDataPortConfigBaseRate</b> <b>rs232SyncPortClockSource</b> to <i>internal</i> or <i>external</i> <b>ifAdminStatus</b> to <i>up/down</i> of EDL for this port <b>devPortUsage</b> to <i>none</i> or <i>netLink</i> <b>rs232SyncPortEncoding</b> to <i>nrzi</i>
main/config/voice_port:  Port Status Signaling Type Terminating Impedance Wink Delay Wink Duration Rx Gain Tx Gain Ring-back Tone Trunk Cond. in CGA  Operating Mode	Set/Read:  <b>ifAdminStatus</b> to <i>up</i> or <i>down</i> <b>devVoiceConfigSignalingType</b> <b>devVoiceConfigTermImpedance</b> <b>devVoiceConfigWinkDelay</b> <b>devVoiceConfigWinkDuration</b> <b>devVoiceConfigRxGain</b> <b>devVoiceConfigTxGain</b> <b>devVoiceConfigRingBackTone</b> <b>devVoiceConfigTrunkCondInCGA</b>  Read: <b>devVoiceConfigOperatingMode</b>



Table D-1. SNMP MIB to User Interface Command Cross-Reference (15 of 16)

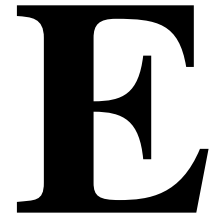
User Interface Command	SNMP MIB Object
<b>CONFIG</b>	
main/config/ocu:  Port Status Port Rate Loopback Detection	Set/Read:  <b>ifAdminStatus</b> to <i>up</i> or <i>down</i> <b>devOcuRate</b> <b>devOcuLoopbackDetection</b>
main/config/cross_connect:  DSX-1-to-Network Assignments Network to Network Assignments Voice Port Assignments Sync Data Port Assignments OCU-DP Port Assignments Clear DSX-1 Time Slots Clear Network Interface Time Slots Clear Slot <i>nn</i>	Fully supported by the device cross-connect MIB objects using:  <b>devDs1FracTable</b> <b>devDs1FracTable</b> <b>devDs1FracTable</b> <b>devSyncDataPortAssignTable</b> <b>devDs1FracTable</b> Use <b>devDs1FracTable</b> to clear all time slots Use <b>devDs1FracTable</b> to clear all time slots Use <b>devDs1FracTable</b> to clear all time slots
main/config/system:  Test Timeout Test Duration Primary Clock Source Secondary Clock Source	Set/Read:  <b>devConfigTestTimeout</b> <b>devConfigTestDuration</b> <b>devConfigClockSrcTable</b> (read only) <b>devConfigClockSrcTable</b> (read only)
main/config/user/com: COM Port Port Usage Port Type Data Rate Character Length Parity Stop Bits Ignore Control Leads Clock Source	Set/Read:  <b>devPortUsage</b> to <i>netlink</i> , <i>alarm</i> , or <i>terminal</i> See the Asynchronous/Synchronous Port Table for the entry <b>rs232PortInSpeed</b> or <b>rs232PortOutSpeed</b> for the port <b>rs232AsyncPortBits</b> for the port <b>rs232AsyncPortParity</b> for the port <b>rs232AsyncPortStopBits</b> for the port <b>rs232PortInFlowType</b> for the port <b>rs232SyncPortClockSource</b> to <i>internal</i> or <i>external</i>
main/config/management/security:  IP Address Access Type	Set/Read:  <b>devSecurityMgrIpAddress</b> <b>devSecurityMgrAccess</b> to <i>read</i> or <i>readWrite</i>
main/config/management/trap:  IP Address Destination General Traps Enterprise-Specific Traps Link Traps Link Traps Interfaces	Set/Read:  <b>devTrapMgrIpAddress</b> <b>devTrapMgrDestination</b> <b>devConfigTrapEnable</b> <b>devConfigTrapEnable</b> <b>devConfigTrapEnable</b> <b>ifLinkUpDownTrapEnable</b> for the interface

**Table D-1. SNMP MIB to User Interface Command Cross-Reference (16 of 16)**

User Interface Command	SNMP MIB Object
main/control/device_name:  System Name System Contact System Location	Set/Read:  <b>sysName object</b> from the System group <b>sysContact object</b> from the System group <b>sysLocation object</b> from the System group
System Alarm Relay Cut-Off:	Set/Read: <b>devConfigAlarmRelayCutoff</b>
Reset:	Set: <b>devHWControlReset</b> to <i>reset</i> .

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# Cables, Connectors, and Pin Assignments



---

## COM Port

The COM (communications) port connects to an async terminal or other management interface.

These cables are:

- 14-foot, 26 AWG, 8-conductor, with a non-keyed 8-position modular jack interface/connector at one end, and
- 25-pin or 9-pin connector at the other end, depending upon the management interface used.

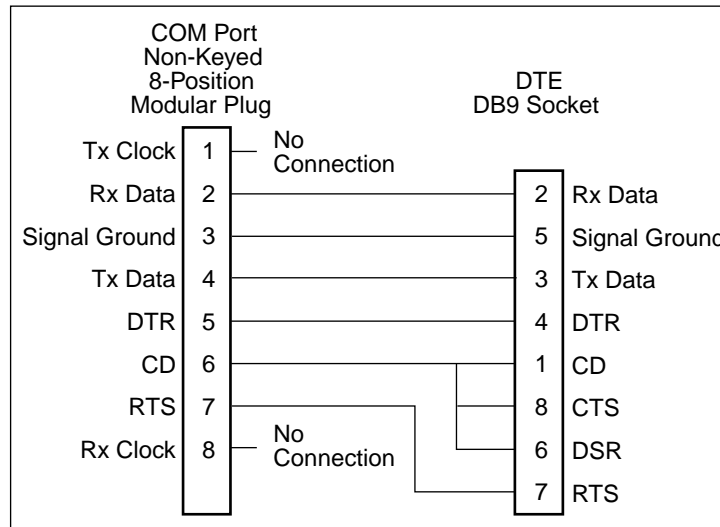
Refer to the appropriate cable section.

The following table shows the signals and pin assignments for the COM port interface/connector.

Signal	Direction	Pin #
DCE Transmit Clock (TXC)	Out	1
DCE Received Data (RXD)	Out	2
Signal Ground (SG)	—	3
DCE Transmit Data (TXD)	In	4
DCE Data Terminal Ready (DTR)	In	5
DCE Carrier Detect (CD)	Out	6
DCE Request to Send (RTS)	In	7
DCE Received Clock (RXC)	Out	8

### COM Port-to-PC Cable

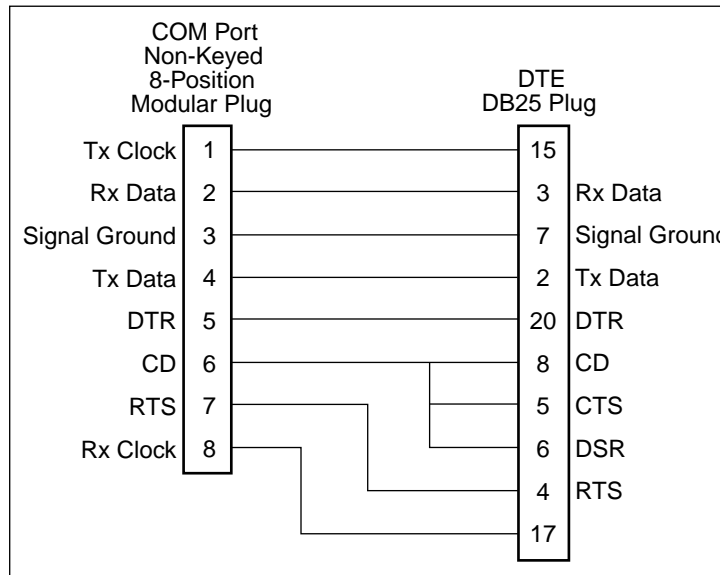
This cable comes with the T1 access unit. The following shows the pin assignments from the COM port to the DTE interface.



97-14909-01

### COM Port-to-Terminal/Printer Cable

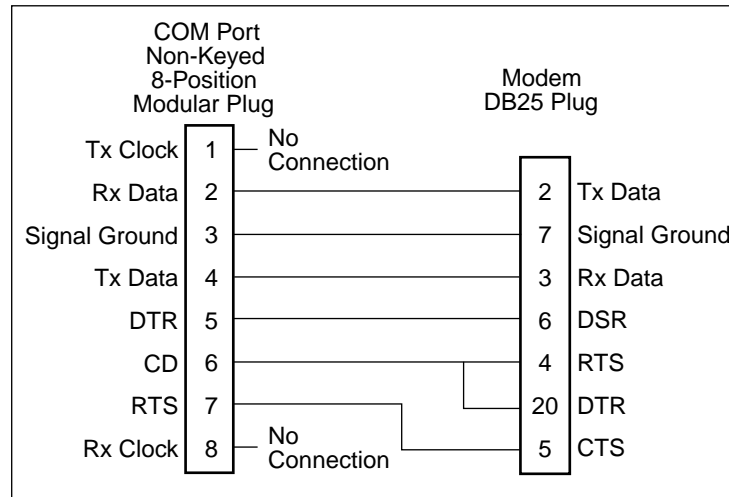
Order this cable when connecting the COM port to a terminal or printer, rather than to a PC; it does not come with the T1 access unit. The following shows the pin assignments from the COM port to the DTE interface.



97-14910-01

## COM Port-to-Modem Cable

Order this cable when connecting the COM port to a modem or other external device. The following shows the pin assignments from the COM port to the external device.



97-15669

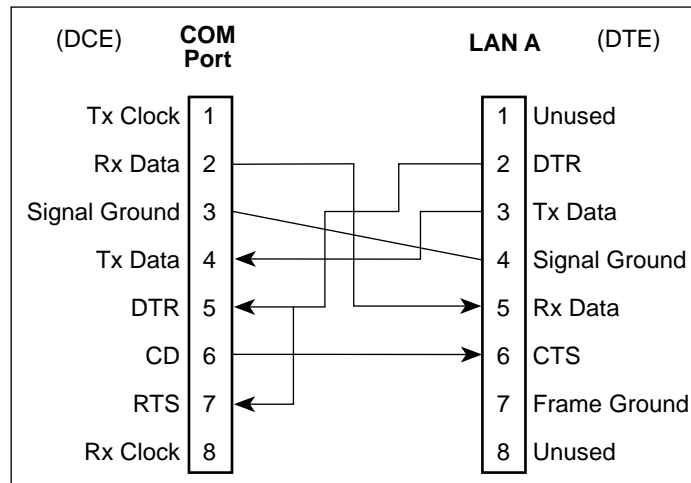
## Gender Adapter/Changer

When connecting the COM port to a router or Frame Relay Assembler/Disassembler (FRAD), a gender adapter is required to convert the COM Port-to-Terminal/Printer cable's plug-type interface to a socket-type interface for the AUX port.

## LAN Adapter and Cables

The LAN adapter is ordered along with the appropriate cable. Be sure to specify whether you need a Token Ring or an Ethernet LAN Adapter.

The following shows the pin assignments for the cable between the LAN Adapter (LAN A) and the T1 access unit's COM port or COM Port-to-PC Adapter.



496-14908

## T1 Network Interface Cable

Network access is via a 14-foot cable with an RJ48C unkeyed plug-type connector on each end. The following table shows pin assignments and the purpose of each.

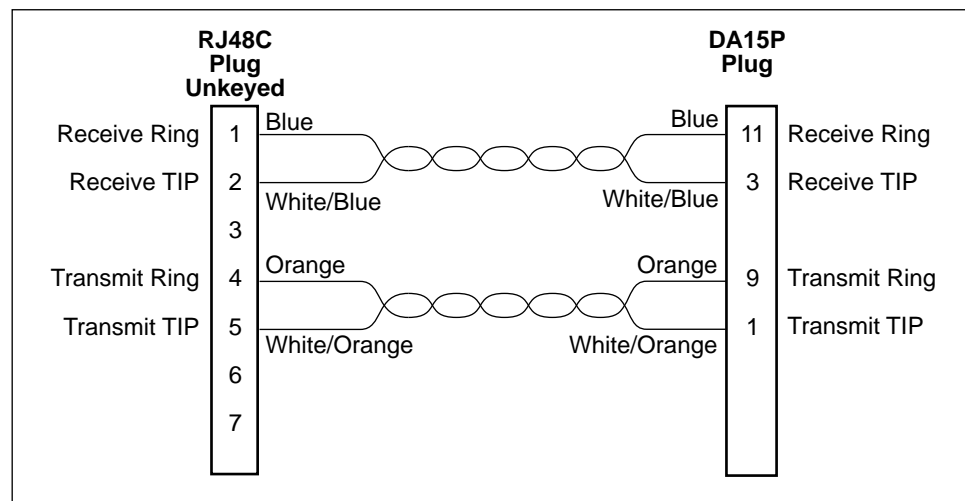
Function	Circuit	Pin Number
Receive ring from the network	R1	1
Receive tip from the network	T1	2
Transmit ring to the network	R	4
Transmit tip to the network	T	5

## DSX-1 Port Interface

The DSX-1 Port cable is a cable with a 15-pin DB15 on one end. The following table shows pin assignments and the purpose of each.

Function	Circuit	Pin #
Receive tip from the DTE	T1	1
Transmit tip to the DTE	T	3
Shield	–	2,4
Receive ring from the DTE	R1	9
Transmit ring to the DTE	R	11

## T1 Line Interface Cable



493-14342-01

The following table contains T1 Network Interface Connector information.

### T1 Network Interface Connector (DA15P)

Signal	Pin Number	
	RJ48C	DA15P
Receiver Ring	1	11
Receiver Tip	2	3
Transmitter Ring	4	9
Transmitter Tip	5	1

## EIA-530A Port Interface

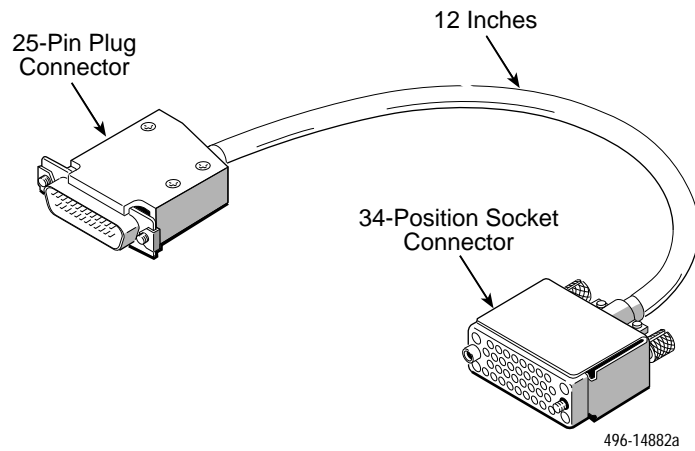
The following table shows the EIA-530A circuit and pin assignments that are supported for a port connector/interface (Port 1 or Port 2).

Signal	Circuit Mnemonic	ITU/ CCITT #	Direction	25-Pin Pin #
Shield	—	—	—	1
Transmitted Data (TXD)	BA	103	To DCE	2 (A) 14 (B)
Received Data (RXD)	BB	104	From DCE	3 (A) 16 (B)
Request to Send (RTS)	CA	105	To DCE	4 (A) 19 (B)
Clear to Send (CTS)	CB	106	From DCE	5 (A) 13 (B)
Data Set (or DCE) Ready (DSR)	CC	107	From DCE	6
Signal Ground/Common (SG)	AB	102A	—	7
Received Line Signal Detector (RLSD or LSD)	CF	109	From DCE	8 (A) 10 (B)
Transmit Signal Element Timing (TXC – DTE Source)	DA	113	To DCE	11 (B) 24 (A)
Transmitter Signal Element Timing (TXC – DCE Source)	DB	114	From DCE	12 (B) 15 (A)
Receiver Signal Element Timing (RXC – DCE Source)	DD	115	From DCE	17 (A) 9 (B)
Local Loopback (LL)	LL	141	To DCE	18
Data Terminal (or DTE) Ready (DTR)	CD	108/1, /2	To DCE	20
Remote Loopback (RL)	RL	140	To DCE	21
Signal Common	AC	102B	—	22, 23
Test Mode Indicator (TM)	TM	142	From DCE	25



### EIA-530A-to-V.35 DTE Adapter Cable

Used as an interface between the 25-position EIA-530A Sync Data Port connector and a DTE's V.35 connector.



530 SIGNAL	DB25 PLUG	MS34 SOCKET	V.35 SIGNAL
SHIELD	1	A	SHIELD
TD-A	2	P	TD-A
TD-B	14	S	TD-B
RD-A	3	R	RD-A
RD-B	16	T	RD-B
TXC-A	15	Y	TXC-A
TXC-B	12	AA	TXC-B
RXC-A	17	V	RXC-A
RXC-B	9	X	RXC-B
RTS	4	C	RTS
CTS	5	D	CTS
RLSD	8	F	RLSD
DSR	6	E	DSR
SIG. COMMON	7	B	SIG. COMMON
TT-A	24	U	TT-A
TT-B	11	W	TT-B
DTR	20	H	DTR
RL	21	N	RL
LL	18	L	LL
TM	25	NN	TM
SIG. COMMON	23		

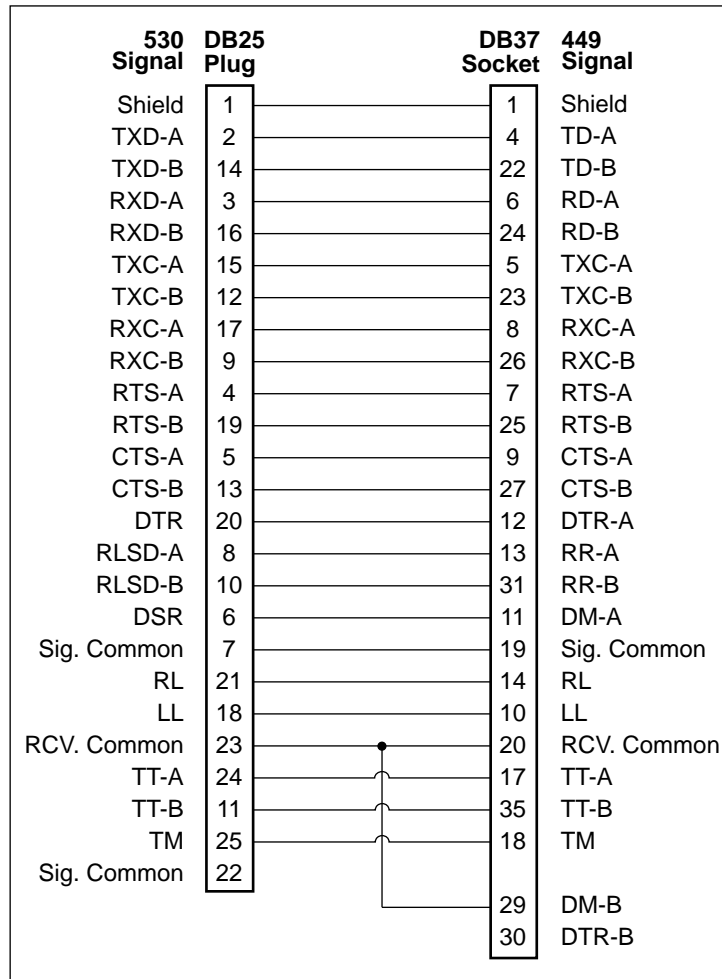
497-15233

The following table provides the pin assignments for the 25-position Port 1 or Port 2 connector/interface and a DTE's 34-position V.35 connector.

Signal	ITU/ CCITT #	25-Pin Plug Pin #	Direction	34-Pin Socket Pin #
Shield	—	1	—	A
Transmit Data (TXD)	103	2 (A) 14 (B)	To DCE	P (A) S (B)
Received Data (RXD)	104	3 (A) 16 (B)	From DCE	R (A) T (B)
Request to Send (RTS)	105	4	To DCE	C
Clear to Send (CTS)	106	5	From DCE	D
Data Set (or DCE) Ready (DSR)	107	6	From DCE	E
Signal Ground/Common (SG)	102	7, 23	—	B
Data Channel Received Line Signal Detector (RLSD or LSD)	109	8	From DCE	F
Transmitter Signal Element/ Terminal Timing (TT) — DTE Source	113	24 (A) 11 (B)	To DCE	U (A) W (B)
Transmitter Signal Element Timing (TXC) — DCE Source	114	15 (A) 12 (B)	From DCE	Y (A) AA (B)
Receiver Signal Element Timing (RXC) — DCE Source	115	17 (A) 9 (B)	From DCE	V (A) X (B)
Local Loopback (LL)	141	18	To DCE	L
Data Terminal (or DTE) Ready (DTR)	108/1, /2	20	To DCE	H
Loopback/Maintenance (RL)	140	21	To DCE	N
Test Mode Indicator (TM)	142	25	From DCE	NN

### EIA-530A-to-RS449 DTE Adapter Cable

Used as an interface between the 25-position Sync Data Port connector and a DTE's RS449 connector.



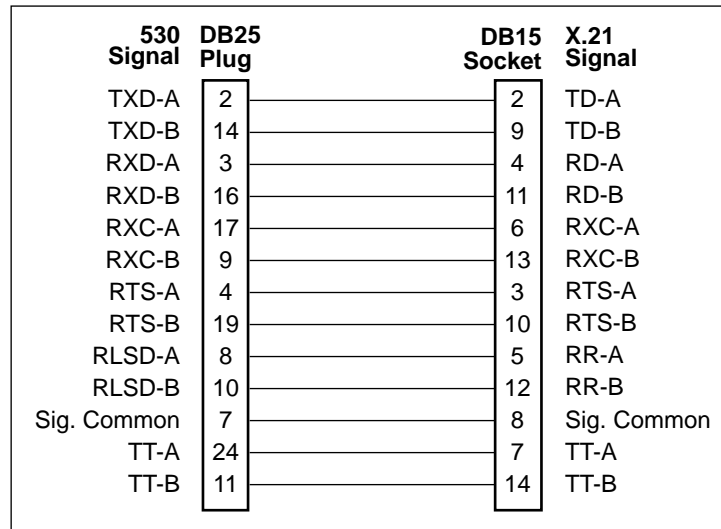
496-15147

The following table provides the pin assignments for the 25-position Sync Data connector/interface and a DTE's 37-position RS449 connector.

Signal	ITU/ CCITT #	25-Pin Plug Pin #	Direction	37-Pin Socket Pin #
Shield	—	1	—	1
Transmit Data (TXD/TD)	103	2 (A), 14 (B)	To DCE	4 (A), 22 (B)
Receive Data (RXD/RD)	104	3 (A), 16 (B)	From DCE	6 (A), 24 (B)
Request to Send (RTS)	105	4 (A), 19 (B)	To DCE	7 (A), 25 (B)
Clear to Send (CTS)	106	5 (A), 13 (B)	From DCE	9 (A), 27 (B)
Data Set Ready/Data Mode (DSR/DM)	107	6	From DCE	11 (A)
Signal Ground (SG)	102A	7	—	19
Data Channel Received Line Signal Detect/Receiver Ready (RLSD/RR)	109	8 (A), 10 (B)	From DCE	13 (A), 31 (B)
Transmitter Signal Element Timing/Transmit Timing (TXC) — DCE Source	114	15 (A), 12 (B)	From DCE	5 (A), 23 (B)
Receiver Signal Element Timing/ Receive Timing (RXC) — DCE Source	115	17 (A), 9 (B)	From DCE	8 (A), 26 (B)
Local Loopback (LL)	141	18	To DCE	10
Data Terminal (or DTE) Ready (DTR/TR)	108/1, /2	20	To DCE	12 (A)
Remote Loopback (RL)	140	21	To DCE	14
Receive Common (RC)	102B	23	—	20, 29
Transmitter Signal Element/ Terminal Timing (TT) — DTE Source	113	24 (A), 11 (B)	To DCE	17 (A), 35 (B)
Test Mode (TM)	142	25	From DCE	18
no connection	—	—	—	30, 37

## EIA-530A-to-X.21 DTE Adapter Cable

Used as an interface between the 25-position Sync Data Port connector and a DTE's X.21 connector.



496-15146

The following table provides the pin assignments for the 25-position Port 1 or Port 2 connector/interface and a DTE's 15-position X.21 connector/interface.

Signal	ITU/ CCITT #	25-Pin Plug Pin #	Direction	15-Pin Socket Pin #
Transmit Data (TXD/TD)	103	2 (A) 14 (B)	To DCE	2 (A), 9 (B)
Received Data (RXD/RD)	104	3 (A) 16 (B)	From DCE	4 (A), 11 (B)
Request to Send (RTS)	105	4 (A) 19 (B)	To DCE	3 (A), 10 (B)
Signal Ground/Common	102	7	—	8
Data Channel Received Line Signal Detector/Receiver Ready (RLSD/RR)	109	8 (A) 10 (B)	From DCE	5 (A), 12 (B)
Receiver Signal Element Timing (RXC) — DCE Source	115	17 (A) 9 (B)	From DCE	6 (A), 13 (B)
Transmitter Signal Element Timing/ Terminal Timing (TT) — DTE Source	113	24 (A) 11 (B)	To DCE	7 (A), 14 (B)

## Voice APM Cables

This section provides the pin assignments for the FXO, FXS and E&M voice APM 50-pin Amphenol connectors (RJ27X socket), followed by the pin assignments for the extension cables that can be used with these APMs.

### FXO/FXS Voice APM Connector

The FXO/FXS Analog Voice APM uses a single 50-pin connector to provide eight 2-wire interfaces for connecting to analog voice equipment.

#### FXO/FXS 50-Pin Amphenol Connector

Port	Pin	Signal
1	26	T
	1	R
2	29	T
	4	R
3	32	T
	7	R
4	35	T
	10	R
5	38	T
	13	R
6	41	T
	16	R
7	44	T
	19	R
8	47	T
	22	R
All other pins are unconnected.		

**E&M Voice APM Connector**

The E&M Analog Voice APM uses a single 50-pin connector (RJ27X socket) to provide eight 2-wire interfaces for connecting to analog voice equipment.

**E&M 50-Pin Amphenol Connector (1 of 2)**

<b>Port</b>	<b>Pin</b>	<b>Function</b>	<b>Signal</b>
1	26	Transmit tip	T
	1	Transmit ring	R
	27	Receive tip	T1
	2	Receive ring	R1
	28	E Lead	E
	3	M Lead	M
2	29	Transmit tip	T
	4	Transmit ring	R
	30	Receive tip	T1
	5	Receive ring	R1
	31	E Lead	E
	6	M Lead	M
3	32	Transmit tip	T
	7	Transmit ring	R
	33	Receive tip	T1
	8	Receive ring	R1
	34	E Lead	E
	9	M Lead	M
4	35	Transmit tip	T
	10	Transmit ring	R
	36	Receive tip	T1
	11	Receive ring	R1
	37	E Lead	E
	12	M Lead	M

**E&M 50-Pin Amphenol Connector (2 of 2)**

<b>Port</b>	<b>Pin</b>	<b>Function</b>	<b>Signal</b>
5	38	Transmit tip	T
	13	Transmit ring	R
	39	Receive tip	T1
	14	Receive ring	R1
	40	E Lead	E
	15	M Lead	M
6	41	Transmit tip	T
	16	Transmit ring	R
	42	Receive tip	T1
	17	Receive ring	R1
	43	E Lead	E
	18	M Lead	M
7	44	Transmit tip	T
	19	Transmit ring	R
	45	Receive tip	T1
	20	Receive ring	R1
	46	E Lead	E
	21	M Lead	M
8	47	Transmit tip	T
	22	Transmit ring	R
	48	Receive tip	T1
	23	Receive ring	R1
	49	E Lead	E
	24	M Lead	M
All	25	Signal Ground	SG
	50	Signal Battery	SB



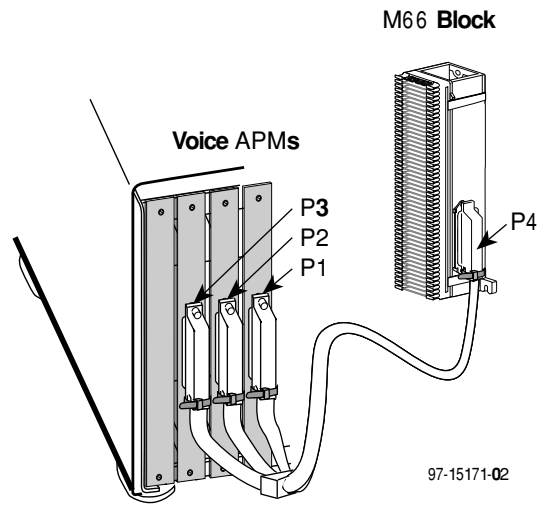
## Extension Cables

Extension cables can be ordered for use with the 50-pin FXO, FXS and E&M Voice APM connectors. They are all straight-through cables (i.e., Pin 1 on the voice APM side is Pin 1 on the M66 block side of the cable), and they coincide with the pins on the 50-pin APM connector.

The following table identifies these cables, indicates the voice APM it is used with, and describes when you might use each:

### Extension Cables

Extension Cable	Length	Voice APM	When Used
1 Amphenol plug-to-1 Amphenol plug cable  ( <i>Twisted pair/25-pair: 1-26, 2-27, 3-28 . . . 25-50</i> )	3'	E&M FXO FXS	To connect the voice APM's 50-pin Amphenol connector to the M66 block.  When the M66 block is further than five feet from the APM connector, used as an extension to the 5-foot cable normally used.  See <i>FXO/FXS Voice APM Connector</i> on Page E-12 or <i>E&amp;M Voice APM Connector</i> on Page E-13 for pin assignments.
1 Amphenol socket-to-1 Amphenol plug cable  ( <i>Twisted pair/25-pair: 1-26, 2-27, 2-28 . . . 25-50</i> )	25'	E&M FXO FXS	When the M66 block is further than five feet from the APM's connector, used as an extension to the 5-foot 1 Amphenol plug-to-1 Amphenol plug cable.  See <i>FXO/FXS Voice APM Connector</i> on Page E-12 or <i>E&amp;M Voice APM Connector</i> on Page E-13 for pin assignments.
3 Amphenol plugs-to-1 Amphenol plug connector assembly  ( <i>Twisted pair: T1-R1 . . . T24-R24, S1-S2</i> )	6'	FXO FXS	To condense three voice APMs onto the single M66 block connector.  Extend the cable using the 25-foot 1 Amphenol socket-to-1 Amphenol plug 25-pair cable.  See <i>3 Amphenol Plugs-to-1 Amphenol Plug Cable</i> on Page E-17 for pin assignments.
3 Amphenol plugs-to-4 Amphenol plugs connector assembly  ( <i>Twisted pair: T1-R1 . . . T24-R24, TR1-RR1 . . . TR24-RR24, M1-E1 . . . M24-E24, SG1-SG1 . . . SG3-SG3</i> )	6'	E&M	To consolidate signals from three voice APMs and segregate four applications signals onto four M66 blocks (e.g., all transmit signals on one block, all receive signals on a second block, all E&M signals on a third, and all battery and signal ground signals on the fourth).  Extend the cable using the 25-foot 1 Amphenol socket-to-1 Amphenol plug 25-pair cable.  See <i>3 Amphenol Plugs-to-4 Amphenol Plugs Cable</i> starting on Page E-19 for pin assignments.

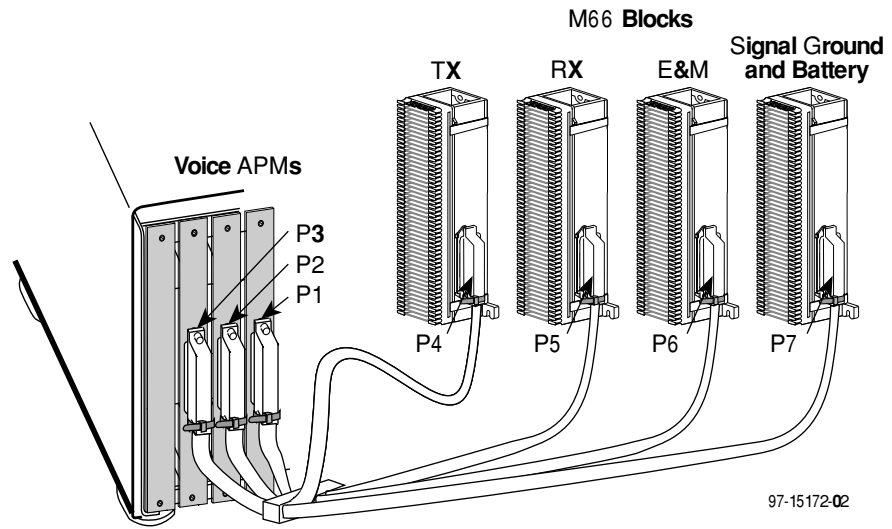


**3 Amphenol Plugs-to-1 Amphenol Plug Cable**

**3 Amphenol Plugs-to-1 Amphenol Plug Cable**

<b>M66 Plug</b>	<b>Pin</b>	<b>Connects to APM Plug</b>	<b>Pin</b>	<b>Signal</b>	<b>M66 Plug</b>	<b>Pin</b>	<b>Connects to APM Plug</b>	<b>Pin</b>	<b>Signal</b>
P4	1	P1	1	R Port 1	P4	26	P1	26	T Port 1
	2		4	R Port 2		27		29	T Port 2
	3		7	R Port 3		28		32	T Port 3
	4		10	R Port 4		29		35	T Port 4
	5		13	R Port 5		30		38	T Port 5
	6		16	R Port 6		31		41	T Port 6
	7		19	R Port 7		32		44	T Port 7
	8		22	R Port 8		33		47	T Port 8
	9	P2	1	R Port 1		34	P2	26	T Port 1
	10		4	R Port 2		35		29	T Port 2
	11		7	R Port 3		36		32	T Port 3
	12		10	R Port 4		37		35	T Port 4
	13		13	R Port 5		38		38	T Port 5
	14		16	R Port 6		39		41	T Port 6
	15		19	R Port 7		40		44	T Port 7
	16		22	R Port 8		41		47	T Port 8
	17	P3	1	R Port 1		42	P3	26	T Port 1
	18		4	R Port 2		43		29	T Port 2
	19		7	R Port 3		44		32	T Port 3
	20		10	R Port 4		45		35	T Port 4
	21		13	R Port 5		46		38	T Port 5
	22		16	R Port 6		47		41	T Port 6
	23		19	R Port 7		48		44	T Port 7
	24		22	R Port 8		49		47	T Port 8
	25	-	-	-		50	-	-	-

### 3 Amphenol Plugs-to-4 Amphenol Plugs Cable



**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P1 (1 of 2)**

<b>P1 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
1	R (Port 1)	P4	1	R (Port 1)	Transmit Ring
2	R1 (Port 1)	P5	1	R1 (Port1)	Receive Ring
3	M (Port 1)	P6	1	M (Port 1)	M Lead
4	R (Port 2)	P4	2	R (Port 2)	Transmit Ring
5	R1 (Port 2)	P5	2	R1 (Port 2)	Receive Ring
6	M1 (Port 2)	P6	2	M (Port 2)	M Lead
7	R (Port 3)	P4	3	R (Port 3)	Transmit Ring
8	R1 (Port 3)	P5	3	R1 (Port 3)	Receive Ring
9	M (Port 3)	P6	3	M (Port 3)	M Lead
10	R (Port 4)	P4	4	R (Port 4)	Transmit Ring
11	R1 (Port 4)	P5	4	R1 (Port 4)	Receive Ring
12	M (Port 4)	P6	4	M (Port 4)	M Lead
13	R (Port 5)	P4	5	R (Port 5)	Transmit Ring
14	R1 (Port 5)	P5	5	R1 (Port 5)	Receive Ring
15	M (Port 5)	P6	5	M (Port 5)	M Lead
16	R (Port 6)	P4	6	R (Port 6)	Transmit Ring
17	R1 (Port 6)	P5	6	R1 (Port 6)	Receive Ring
18	M (Port 6)	P6	6	M (Port 6)	M Lead
19	R (Port 7)	P4	7	R (Port 7)	Transmit Ring
20	R1 (Port 7)	P5	7	R1 (Port 7)	Receive Ring
21	M (Port 7)	P6	7	M (Port 7)	M Lead
22	R (Port 8)	P4	8	R (Port 8)	Transmit Ring
23	R1 (Port 8)	P5	8	R1 (Port 8)	Receive Ring
24	M (Port 8)	P6	8	M (Port 8)	M Lead
25	SG (Ports 1–8)	P7	1–8	SG (Ports 1–8)	Signal Ground

**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P1 (2 of 2)**

<b>P1 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
26	T (Port 1)	P4	26	T (Port 1)	Transmit Tip
27	T1 (Port 1)	P5	26	T1 (Port 1)	Receive Tip
28	E (Port 1)	P6	26	E (Port 1)	E Lead
29	T (Port 2)	P4	27	T (Port 2)	Transmit Tip
30	T1 (Port 2)	P5	27	T1 (Port 2)	Receive Tip
31	E (Port 2)	P6	27	E (Port 2)	E Lead
32	T (Port 3)	P4	28	T (Port 3)	Transmit Tip
33	T1 (Port 3)	P5	28	T1 (Port 3)	Receive Tip
34	E (Port 3)	P6	28	E (Port 3)	E Lead
35	T (Port 4)	P4	29	T (Port 4)	Transmit Tip
36	T1 (Port 4)	P5	29	T1 (Port 4)	Receive Tip
37	E (Port 4)	P6	29	E (Port 4)	E Lead
38	T (Port 5)	P4	30	T (Port 5)	Transmit Tip
39	T1 (Port 5)	P5	30	T1 (Port 5)	Receive Tip
40	E (Port 5)	P6	30	E (Port 5)	E Lead
41	T (Port 6)	P4	31	T (Port 6)	Transmit Tip
42	T1 (Port 6)	P5	31	T1 (Port 6)	Receive Tip
43	E (Port 6)	P6	31	E (Port 6)	E Lead
44	T (Port 7)	P4	32	T (Port 7)	Transmit Tip
45	T1 (Port 7)	P5	32	T1 (Port 7)	Receive Tip
46	E (Port 7)	P6	32	E (Port 7)	E Lead
47	T (Port 8)	P4	33	T (Port 8)	Transmit Tip
48	T1 (Port 8)	P5	33	T1 (Port 8)	Receive Tip
49	E (Port 8)	P6	33	E (Port 8)	E Lead
50	SB (Ports 1–8)	P7	26–33	SB (Ports 1–8)	Signal Battery

**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P2 (1 of 2)**

<b>P2 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
1	R (Port 1)	P4	9	R (Port 9)	Transmit Ring
2	R1 (Port 1)	P5	9	R1 (Port 9)	Receive Ring
3	M (Port 1)	P6	9	M (Port 9)	M Lead
4	R (Port 2)	P4	10	R (Port 10)	Transmit Ring
5	R1 (Port 2)	P5	10	R1 (Port 10)	Receive Ring
6	M (Port 2)	P6	10	M (Port 10)	M Lead
7	R (Port 3)	P4	11	R (Port 11)	Transmit Ring
8	R1 (Port 3)	P5	11	R1 (Port 11)	Receive Ring
9	M (Port 3)	P6	11	M (Port 11)	M Lead
10	R (Port 4)	P4	12	R (Port 12)	Transmit Ring
11	R1 (Port 4)	P5	12	R1 (Port 12)	Receive Ring
12	M (Port 4)	P6	12	M (Port 12)	M Lead
13	R (Port 5)	P4	13	R (Port 13)	Transmit Ring
14	R1 (Port 5)	P5	13	R1 (Port 13)	Receive Ring
15	M (Port 5)	P6	13	M (Port 13)	M Lead
16	R (Port 6)	P4	14	R (Port 14)	Transmit Ring
17	R1 (Port 6)	P5	14	R1 (Port 14)	Receive Ring
18	M (Port 6)	P6	14	M (Port 14)	M Lead
19	R (Port 7)	P4	15	R (Port 15)	Transmit Ring
20	R1 (Port 7)	P5	15	R1 (Port 15)	Receive Ring
21	M (Port 7)	P6	15	M (Port 15)	M Lead
22	R (Port 8)	P4	16	R (Port 16)	Transmit Ring
23	R1 (Port 8)	P5	16	R1 (Port 16)	Receive Ring
24	M (Port 8)	P6	16	M (Port 16)	M Lead
25	SG (Ports 1–8)	P7	9–16	SG (Ports 9–16)	Signal Ground

**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P2 (2 of 2)**

<b>P2 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
26	T (Port 1)	P4	34	T (Port 9)	Transmit Tip
27	T1 (Port 1)	P5	34	T1 (Port 9)	Receive Tip
28	E (Port 1)	P6	34	E (Port 9)	E Lead
29	T (Port 1)	P4	35	T (Port 10)	Transmit Tip
30	T1 (Port 1)	P5	35	T1 (Port 10)	Receive Tip
31	E (Port 1)	P6	35	E (Port 10)	E Lead
32	T (Port 1)	P4	36	T (Port 11)	Transmit Tip
33	T1 (Port 1)	P5	36	T1 (Port 11)	Receive Tip
34	E (Port 1)	P6	36	E (Port 11)	E Lead
35	T (Port 1)	P4	37	T (Port 12)	Transmit Tip
36	T1 (Port 1)	P5	37	T1 (Port 12)	Receive Tip
37	E (Port 1)	P6	37	E (Port 12)	E Lead
38	T (Port 1)	P4	38	T (Port 13)	Transmit Tip
39	T1 (Port 1)	P5	38	T1 (Port 13)	Receive Tip
40	E (Port 1)	P6	38	E (Port 13)	E Lead
41	T (Port 1)	P4	39	T (Port 14)	Transmit Tip
42	T1 (Port 1)	P5	39	T1 (Port 14)	Receive Tip
43	E (Port 1)	P6	39	E (Port 14)	E Lead
44	T (Port 1)	P4	40	T (Port 15)	Transmit Tip
45	T1 (Port 1)	P5	40	T1 (Port 15)	Receive Tip
46	E (Port 1)	P6	40	E (Port 15)	E Lead
47	T (Port 1)	P4	41	T (Port 16)	Transmit Tip
48	T1 (Port 1)	P5	41	T1 (Port 16)	Receive Tip
49	E (Port 1)	P6	41	E (Port 16)	E Lead
50	SB (Ports 1–8)	P7	34–41	SB (Ports 9–16)	Signal Battery



**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P3 (1 of 2)**

<b>P3 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
1	R (Port 1)	P4	17	R (Port 17)	Transmit Ring
2	R1 (Port 1)	P5	17	R1 (Port 17)	Receive Ring
3	M (Port 1)	P6	17	M (Port 17)	M Lead
4	R (Port 2)	P4	18	R (Port 18)	Transmit Ring
5	R1 (Port 2)	P5	18	R1 (Port 18)	Receive Ring
6	M (Port 2)	P6	18	M (Port 18)	M Lead
7	R (Port 3)	P4	19	R (Port 19)	Transmit Ring
8	R1 (Port 3)	P5	19	R1 (Port 19)	Receive Ring
9	M (Port 3)	P6	19	M (Port 19)	M Lead
10	R (Port 4)	P4	20	R (Port 20)	Transmit Ring
11	R1 (Port 4)	P5	20	R1 (Port 20)	Receive Ring
12	M (Port 4)	P6	20	M (Port 20)	M Lead
13	R (Port 5)	P4	21	R (Port 21)	Transmit Ring
14	R1 (Port 5)	P5	21	R1 (Port 21)	Receive Ring
15	M (Port 5)	P6	21	M (Port 21)	M Lead
16	R (Port 6)	P4	22	T (Port 22)	Transmit Ring
17	R1 (Port 6)	P5	22	R1 (Port 22)	Receive Ring
18	M (Port 6)	P6	22	M (Port 22)	M Lead
19	R (Port 7)	P4	23	R (Port 23)	Transmit Ring
20	R1 (Port 7)	P5	23	R1 (Port 23)	Receive Ring
21	M (Port 7)	P6	23	M (Port 23)	M Lead
22	R (Port 8)	P4	24	R (Port 24)	Transmit Ring
23	R1 (Port 8)	P5	24	R1 (Port 24)	Receive Ring
24	M (Port 8)	P6	25	M (Port 24)	M Lead
25	SG (Ports 1–8)	P7	17–24	SG (Port 17–24)	Signal Ground

**3 Amphenol Plugs-to-4 Amphenol Plugs Cable for P3 (2 of 2)**

<b>P3 Pin #</b>	<b>Designation</b>	<b>Connects To</b>	<b>Pin #</b>	<b>Designation</b>	<b>Function</b>
26	T (Port 1)	P4	42	T (Port 17)	Transmit Tip
27	T1 (Port 1)	P5	42	T1 (Port 17)	Receive Tip
28	E (Port 1)	P6	42	E (Port 17)	E Lead
29	T (Port 2)	P4	43	T (Port 18)	Transmit Tip
30	T1 (Port 2)	P5	43	T1 (Port 18)	Receive Tip
31	E (Port 2)	P6	43	E (Port 18)	E Lead
32	T (Port 3)	P4	44	T (Port 19)	Transmit Tip
33	T1 (Port 3)	P5	44	T1 (Port 19)	Receive Tip
34	E (Port 3)	P6	44	E (Port 19)	E Lead
35	T (Port 4)	P4	45	T (Port 20)	Transmit Tip
36	T1 (Port 4)	P5	45	T1 (Port 20)	Receive Tip
37	E (Port 4)	P6	45	E (Port 20)	E Lead
38	T (Port 5)	P4	46	T (Port 21)	Transmit Tip
39	T1 (Port 5)	P5	46	T1 (Port 21)	Receive Tip
40	E (Port 5)	P6	46	E (Port 21)	E Lead
41	T (Port 6)	P4	47	T (Port 22)	Transmit Tip
42	T1 (Port 6)	P5	47	T1 (Port 22)	Receive Tip
43	E (Port 6)	P6	47	E (Port 22)	E Lead
44	T (Port 7)	P4	48	T (Port 23)	Transmit Tip
45	T1 (Port 7)	P5	48	T1 (Port 23)	Receive Tip
46	E (Port 7)	P6	48	E (Port 23)	E Lead
47	T (Port 8)	P4	49	T (Port 24)	Transmit Tip
48	T1 (Port 8)	P5	49	T1 (Port 24)	Receive Tip
49	E (Port 8)	P6	49	E (Port 24)	E Lead
50	SB (Ports 1–8)	P7	42–49	SB (Ports 17–24)	Signal Battery

## OCU Port

The OCU-DP APM can have either two or six ports, each port having an RJ48S connector. Connect the OCU port to the DDS network using one of the following cables:

- 14-foot DDS cable
- 25-foot DDS cable

### OCU Port Connector

The OCU-DP port is a USOC RJ48S connector. The following table shows pin assignments and the purpose of each.

Function	Circuit	Pin #
Transmit ring	R	1
Transmit tip	T	2
Receive tip	T1	7
Receive ring	R1	8

## T1 Mass Termination Cable

A T1 mass termination cable is available to connect up to seven NAMs mounted in a 9000 Series Access Carrier to an M66 block. The T1 mass termination cable is a 5-foot RJ48H cable consisting of a 50-pin plug at one end and seven RJ48C plugs at the other end. The following shows pin assignments for the RJ48H connector.

### RJ48H Connector Pinouts for T1 Mass Termination Cable

Line #	Circuits			
	T1 <sup>1</sup>	R1 <sup>2</sup>	T <sup>3</sup>	R <sup>4</sup>
1	26	1	39	14
2	27	2	40	15
3	28	3	41	16
4	29	4	42	17
5	30	5	43	18
6	31	6	44	19
7	32	7	45	20

<sup>1</sup> Receive Tip from Network  
<sup>2</sup> Receive Ring from Network  
<sup>3</sup> Transmit Tip to Network  
<sup>4</sup> Transmit Ring to Network

# Technical Specifications



Specification	Criteria
<b>Network Access Module (NAM)</b>	
<b>Approvals</b>	
FCC Part 15	Class A digital device.
FCC Part 68	Refer to the equipment's label for the Registration Number.
Industry Canada	Refer to the equipment's label for the Certification Number.
UL	Refer to the equipment's label for the UL listing.
CSA – Safety	Refer to the equipment's label for CSA safety information.
<b>Weight</b>	
T1 NAM	1 lb. 2 oz. (.510 kg)
T1 I/O Card	6 oz. (.170 kg)
<b>Physical Environment</b>	
Operating temperature	35° F to 122° F (1.7° C to 50° C)
Storage temperature	–4° F to 158° F (–20° C to 70° C)
Relative humidity	5% to 85% (noncondensing)
Shock and vibration	Withstands normal shipping and handling
<b>Power Consumption</b>	9.4 watts, 0.78 amps input current at 12 volts
<b>Network 1/2 T1 Interface</b>	
Physical Interface (USA)	RJ48C
Physical Interface (Canada)	CA81A using adapter cable
Framing Format	D4, ESF
Coding Format	AMI, B8ZS
Line Build-Out (LBO)	0.0 dB, –7.5 dB, –15 dB, –22.5 dB
ANSI PRM	Selectable
Bit Stuffing	FCC Part 68, AT&T TR 62411
Yellow Alarm Generation	Selectable

<b>Specification</b>	<b>Criteria</b>
<b>DSX-1 Interface (9161 only)</b> Physical Interface Framing Format Coding Format DTE Line Equalization Send AIS	DB15 socket D4, ESF AMI, B8ZS 5 selectable ranges from 0 to 655 feet (0 to 196.5 meters) Selectable
<b>DTE Ports/Interfaces</b> Standards Rates	EIA-530A, V.35, RS-449, V.11, X.21 Nx64 – 64K to 1.536 Mb Nx56 – 56K to 1.344 Mb
<b>COM Port/Interface</b> Data Rates	9.6, 14.4, 19.2, 28.8, 38.4 , 57.6, and 115.2 kbps. 57.6 and 115.2 kbps are recommended for FTP download only.
<b>DBM (Backup) connector</b> (reserved for future use)	One 8-position modular keyed USOC RJ45 jack
<b>Clocking Sources</b>	T1 network interface (1 or 2), any port, internal clock, DSX-1 T1 interface (9161 only), or external clock
<b>Loopbacks</b> Standard Additional For 9161 Only	Network Line Loopback, Network Payload Loopback, V.54 Loop 2 (DCLB) and V.54 Loop 3 (DTPLB) Network Repeater Loopback, DTE Loopback DSX-1 Line Loopback, DSX-1 Payload Loopback, and DSX-1 Repeater Loopback

Specification	Criteria
<b>Sync Data APM</b>	
<b>Weight</b> Sync Data APM Sync Data I/O card	15 oz. (.425 kg) 6 oz. (.170 kg)
<b>Size</b> Sync Data APM Sync Data I/O card	11.58" x 8.00" (29.41 cm x 20.32 cm) 2.90" x 10.15" (7.37 cm x 25.78 cm)
<b>Physical Environment</b> Operating temperature Storage temperature Relative humidity Shock and vibration	35° F to 122° F (1.7° C to 50° C) –4° F to 158° F (–20° C to 70° C) 5% to 85% (noncondensing) Withstands normal shipping and handling
<b>Power Consumption</b>	5.8 watts, 0.48 amps input current at 12 volts
<b>DTE Ports/Interfaces</b> Standards Rates	EIA-530A, V.35, RS-449, V.11, X.21 Nx64 – 64K to 1.536 Mb Nx56 – 56K to 1.344 Mb
<b>Loopbacks</b> Standard Additional	V.54 Loop 2 (DCLB) and V.54 Loop 3 (DTPLB) DTE Loopback

Specification	Criteria
<b>Dual DSX APM</b>	
<b>Weight</b> DSX APM DSX I/O card	15 oz. (.425 kg) 6 oz. (.170 kg)
<b>Size</b> DSX APM DSX I/O card	11.58" x 8.00" (29.41 cm x 20.32 cm) 2.90" x 10.15" (7.37 cm x 25.78 cm)
<b>Physical Environment</b> Operating temperature Storage temperature Relative humidity Shock and vibration	35° F to 122° F (1.7° C to 50° C) –4° F to 158° F (–20° C to 70° C) 5% to 85% (noncondensing) Withstands normal shipping and handling
<b>Power Consumption</b>	3.5 watts, 0.29 amps input current at 12 volts
<b>DSX-1 Interface</b> Physical Interface Framing Format Coding Format DTE Line Equalization Send AIS	15-position (DB15) subminiature connector DB15 socket D4, ESF AMI, B8ZS 5 selectable ranges from 0 to 655 feet (0 to 196.5 meters) Selectable



Specification	Criteria
<b>Voice APMs</b>	
<b>Weight</b>	
E&M APM	14 oz. (.397 kg)
FXO APM	1 lb. (.454 kg)
FXS APM	1 lb. (.454 kg)
Voice I/O card	6 oz. (.170 kg)
<b>Size</b>	
E&M/FXO/FXS APM	11.58" x 8.00" (29.41 cm x 20.32 cm)
Voice I/O card	2.90" x 10.15" (7.37 cm x 25.78 cm)
<b>Physical Environment</b>	
Operating temperature	35° F to 122° F (1.7° C to 50° C)
Storage temperature	-4° F to 158° F (-20° C to 70° C)
Relative humidity	5% to 85% (noncondensing)
Shock and vibration	Withstands normal shipping and handling
<b>Cable Length</b>	
Maximum cable length	18,000 feet using 26 AWG
<b>Power Consumption</b>	
E&M APM	3.1 watts, 0.26 amps input current at 12 volts
FXO APM	3.5 watts, 0.29 amps input current at 12 volts
FXS APM (8 lines talking)	10.1 watts, 0.84 amps input current at 12 volts
FXS APM (8 lines ringing)	13.3 watts, 1.11 amps input current at 12 volts
<b>Interface Connector</b>	50-pin amphenol connector (RJ27X)
<b>Operating Modes</b>	
E&M	E&M Transmit Only
FXO	DPT FXO FXO DN FXO DN Wink
FXS	DPO FXS FXS DN FXS DN Wink PLAR

Specification	Criteria
<b>Signaling Types</b> E&M FXO FXS	Type I Type II Type IV Type V Loop Start Loop Start/Forward Disconnect Ground Start Loop Start Loop Start/Forward Disconnect Ground Start Ground Start Immediate Ground Start Automatic PLAR D3 PLAR D4

Specification	Criteria
<b>OCU-DP APM</b>	
<b>Weight</b> 2-port OCU-DP APM 6-port OCU-DP APM OCU-DP I/O card	0.800 lbs. (.362 kg) 1.052 lbs. (.477 kg) 0.286 lbs. (.130 kg)
<b>Size</b> OCU-DP APM OCU-DP I/O card	11.58" x 8.00" (29.41 cm x 20.32 cm) 2.90" x 10.15" (7.37 cm x 25.78 cm)
<b>Physical Environment</b> Operating temperature Storage temperature Relative humidity Shock and vibration	35° F to 122° F (1.7° C to 50° C) -4° F to 158° F (-20° C to 70° C) 5% to 85% (noncondensing) Withstands normal shipping and handling
<b>Power Consumption (max)</b> 2-Port OCU 6-Port OCU	2.78 watts, 0.232 amps input current at 12 volts 5.04 watts, 0.420 amps input current at 12 volts
<b>DDS Ports</b> Standards Rates	AT&T PUB 62310, Bellcore TA-TSY-00077, ANSI T1.410, AT&T PUB 61330, AT&T TR41458 56 kbps, 64 kbps Clear Channel, 4-wire Switched 56
<b>Loopbacks</b>	DS-0, OCU Line, OCU Data, OCU, Local and Remote Latching and Non-Latching DSU/CSU



# Equipment List

# G

Equipment	Feature Number
<b>2-Slot Housing</b>	
2-Slot Housing, 120 Vac Power Supply, Cables, Manuals	9002-B1-200
2-Slot Housing, 9161 Single T1 NAM, 120 Vac Power Supply, Cables, Manuals	9162-A1-201
2-Slot Housing, 9261 Dual T1 NAM, 120 Vac Power Supply, Cables, Manuals	9262-A1-201
<b>5-Slot Housing</b>	
Desktop 5-Slot Housing, 120 Vac Power Supply, Cables, Manuals	9005-B1-200
Rack-Mount 5-Slot Housing (without bezel and chassis skins), 120 Vac Power Supply, Cables, Manuals	9005-B1-209
Desktop 5-Slot Housing, DC Power Supply, Cables, Manuals	9005-B1-500
Rack-Mount 5-Slot Housing (without bezel and chassis skins), DC Power Supply, Cables, Manuals	9005-B1-509
Desktop 5-Slot Housing, 9161 Single T1 NAM, 120 Vac Power Supply, Cables, Manuals	9165-A1-201
Rack-Mount 5-Slot Housing (without bezel and chassis skins), 9161 Single T1 NAM, AC Power Supply, Cables, Manuals	9165-A1-209
Desktop 5-Slot Housing, 9161 Single T1 NAM, DC Power Supply, Cables, Manuals	9165-A1-501
Rack-Mount 5-Slot Housing (without bezel and chassis skins), 9161 Single T1 NAM, DC Power Supply, Cables, Manuals	9165-A1-509
Desktop 5-Slot Housing, 9261 Dual T1 NAM, 120 Vac Power Supply, Cables, Manuals	9265-A1-201
Rack-Mount 5-Slot Housing (without bezel and chassis skins), 9261 Dual T1 NAM, AC Power Supply, Cables, Manuals	9265-A1-209
Desktop 5-Slot Housing, 9261 Dual T1 NAM, DC Power Supply, Cables, Manuals	9265-A1-501
Rack-Mount 5-Slot Housing (without bezel and chassis skins), 9261 Dual T1 NAM, DC Power Supply, Cables, Manuals	9265-A1-509

<b>Equipment</b>	<b>Feature Number</b>
<b>Access Carrier</b>	
14-Slot Access Carrier, Fan Tray, Baffle, Universal AC Power Supply, Cables, Manuals	9007-B1-409
1xT1 Carrier NAM Spare, 9161 Single T1 NAM, NAM Manual	9161-B2-902
1xT1 Carrier NAM with I/O, Cables, Manuals	9167-B1-902
2xT1 Carrier NAM Spare, 9261 Dual T1 NAM, NAM Manual	9261-B2-902
2xT1 Carrier NAM with I/O, Cables, Manuals	9267-B1-902
<b>Access Carrier Parts</b>	
Access Carrier Baffle Assembly	9007-S1-897
Universal Power Supply Fan Tray	9007-S1-898
Access Carrier Auxiliary Fan Tray	9007-S1-899
<b>T1 NAM Upgrade Kits</b>	
Software to upgrade 9161 T1 NAM for FXO capability, software instructions, current FXO feature (9109-F1-658)	9161-F1-658
Software to upgrade the 9161 Single T1 NAM, new NAM I/O, and manuals	9161-F1-620
Software to upgrade the 9261 Dual T1 NAM, new NAM I/O, and manuals	9261-F1-620
Hardware and Software Upgrade, 9261 Overlay, E8 Jumper, 2xT1 I/O, Software, Cables, Manuals	9261-F1-902
<b>Rack/Wall Mounting Kits</b>	
Mounting Brackets for 5-slot	9001-F1-890
Universal 2/5-slot Wall Mount Kit	9008-F1-893
<b>Power Supplies</b>	
120 Vac Power Supply (for 2-slot housing)	9002-F1-020
120 Vac Power Supply (for 5-slot housing)	9005-F1-020
DC Power Supply (for 5-slot housing)	9005-F1-050
Universal Power Supply (for Access Carrier)	9007-F1-040
<b>T1 NAMs</b>	
9161 Single T1 Network Access Module (NAM)	9161-B1-902
9261 Dual T1 Network Access Module (NAM)	9261-B1-902

<b>Equipment</b>	<b>Feature Number</b>
<b>APMs</b>	
High-Speed Synchronous Data Application Module (APM)	9109-F1-604
FXS Analog Voice Application Module (APM), 2-Wire	9109-F1-648
FXO Analog Voice Application Module (APM), 2-Wire	9109-F1-658
E&M Analog Voice Application Module (APM), 4-Wire	9109-F1-668
Dual DSX Application Module (APM)	9109-F1-692
OCU-DP 2-Port Application Module (APM)	9109-F1-622
OCU-DP 6-Port Application Module (APM)	9109-F1-626
<b>Manual</b>	
Model 916x/926x T1 Access Mux Technical Reference (paper), 9161-A2-GH30	9161-M2-001

<b>Equipment</b>	<b>Feature Number</b>	<b>Cable Part Number</b>
<b>Cables/Connectors</b>		
Network Interface Cable, 20 ft.	3100-F1-500	035-0209-2031
V.35 Interconnect Cable, 1 ft.	3100-F1-570	035-0244-0031
V.11/X.21 Interconnect Cable, 1 ft.	3100-F1-571	035-0302-0131
RS449 Interconnect Cable, 1 ft.	3100-F1-580	035-0245-0031
DB25 COM Port Cable (25 D to 8 mod), 14 ft.	3100-F2-540	035-0314-1431
DB9 COM Port Cable (9 DSUB-to-8 mod), 14 ft.	3100-F2-550	035-0313-1431
LAN COM Port Cable (8 mod-to-8 mod)	3100-F2-910	035-0315-1431
Voice Cable (Amphenol plug-Amphenol plug, 25 pairs), 6 ft.	9008-F1-531	035-0320-0531
Voice Cable (Amphenol socket-Amphenol plug, 25 pairs), 25 ft.	9008-F1-532	035-0321-2531
Voice Connector (3 Amphenol plug-4 Amphenol plug), 6 ft.	9008-F1-533	035-0318-0631
Voice Connector (3 Amphenol plug-1 Amphenol plug), 6 ft.	9008-F1-534	035-0319-0631
M66 Block (with 2 socket 50-pin connectors)	9008-F1-535	—
Modem Cable (8-pin RJ45-to-DB25 plug)	9008-F1-550	035-0336-1431
RJ48S DDS Network Cable (14 ft.)	3600-F3-501	035-0267-1431
RJ48S DDS Cable (25 ft.)	3600-F3-502	035-0267-2531
T1 Mass Termination Cable (50-pin plug-to- seven RJ48S plug), 5 ft.	9007-F1-500	035-0363-0531



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# Glossary

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<b>AIS</b>	Alarm Indication Signal. An all ones signal transmitted to maintain transmission continuity and to indicate to the receiving terminal that a transmission fault exists at either the transmitting terminal or upstream of the transmitting signal. Sometimes referred to as Blue Alarm.
<b>AMI</b>	Alternate Mark Inversion. A line coding technique used to accommodate the ones density requirements of E1 or T1 lines.
<b>APM</b>	Application Module.
<b>AWG</b>	American Wire Gauge. An indication of wire size. The heavier the gauge, the lower the AWG number, and the lower the impedance.
<b>BES</b>	Bursty Error Seconds. A second in which more than one, but less than 320 CRC6 error events have occurred.
<b>BPV</b>	Bipolar Violation. In a bipolar signal, a one (mark, pulse) which has the same polarity as its predecessor.
<b>B8ZS</b>	Bipolar with Eight Zero Substitution. Encoding scheme for transmitting clear channel signals over a T1 line.
<b>COM port</b>	Communications port. A computer's serial communications port used to transmit to and receive data from a modem. The modem connects directly to this port.
<b>configuration option</b>	Device software that sets specific operating parameters for the device. Sometimes referred to as straps.
<b>CRC</b>	Cyclic Redundancy Check. A mathematical method of confirming the integrity of received digital data.
<b>CSS</b>	Controlled Slip Seconds. A period in which a frame was added or deleted because of a variance in timing.
<b>CSU</b>	Channel Service Unit. A device that connects service user equipment or a DSU to the local digital telephone loop.
<b>DCE</b>	Data Communications Equipment. The equipment that provides the functions required to establish, maintain, and end a connection. It also provides the signal conversion required for communication between the DTE and the network.
<b>DID</b>	Direct Inward Dialing.
<b>DPO</b>	Dial Pulse Originating.
<b>DPT</b>	Dial Pulse Terminating.
<b>DSU</b>	Data Service Unit. Data communications equipment that provides timing, signal regeneration, and an interface to data terminal equipment. A subrate DSU/CSU is normally referred to as a DSU.
<b>DSX-1</b>	Digital Signal Cross Connect level 1. An interconnection point for terminals, multiplexers and transmission facilities.
<b>DS0</b>	Digital Signal level 0 (zero). A 64 kbps digital telecommunications signal or channel.

<b>DS1</b>	Digital Signal level 1 (one). A digital signal transmitted at the rate of 1.544 Mbps in North America.
<b>DTE</b>	Data Terminal Equipment. The equipment, such as a computer or terminal, that provides data in the form of digital signals for transmission.
<b>DTMF</b>	Dual Tone Multifrequency. The basis of operation for a pushbutton telephone.
<b>D4</b>	The transmission standard that specifies 12 frames as a superframe that is used for frame synchronization and to locate signaling bits.
<b>EER</b>	Excessive Error Rate. An error rate that is greater than the threshold that has been configured in the device.
<b>EON</b>	End of Number.
<b>ES</b>	Errored second. A second with one or more ESF error events (one or more CRC6 error events or OOFs).
<b>ESD</b>	ElectroStatic discharge. An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.
<b>ESF</b>	Extended Superframe. The T1 transmission standard that specifies 24 frames as an extended superframe to be used for frame synchronization and to locate signaling bits.
<b>FCC</b>	Federal Communications Commission. The Board of Commissioners that regulates all electrical communications that originate in the United States.
<b>FDL</b>	Facility Data Link. The selected framing bits in the ESF format used in a wide-area link that are used for control, monitoring, and testing.
<b>FXO</b>	Foreign Exchange Office. An APM that extends voice channel connectivity to remote switching equipment. The FXO interface appears as a telephone to the connecting equipment.
<b>FXODN</b>	Foreign Exchange Office Software-Defined Network.
<b>FXS</b>	Foreign Exchange Station. An APM that provides voice channel connectivity directly to handsets or to PBX equipment.
<b>FXSDN</b>	Foreign Exchange Station Software-Defined Network.
<b>ICMP</b>	Internet Control Management Protocol. Internet protocol that allows for the generation of error messages, tests packets, and information messages related to IP.
<b>IP</b>	Internet Protocol. An open networking protocol used for internet packet delivery.
<b>ITU</b>	International Telecommunication Union. The telecommunications agency of the United Nations, established to provide standardized communications procedures and practices. Before March 1993 it was called CCITT.
<b>LBO</b>	Line Build-out. The amount of attenuation of the transmitted signal that is used to compensate for the length of wire between the transmitter and the receiver.
<b>LCD</b>	Liquid Crystal Display. Thin glass plates containing liquid crystal material. When voltage is applied, the amount of light able to pass through the glass plates is altered so that messages can be displayed.
<b>LED</b>	Light Emitting Diode. A light or status indicator that glows in response to the presence of a certain condition (e.g., an alarm).
<b>LLB</b>	Line Loopback. A test in which the received signal on the network interface is looped back to the network without change.

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<b>LOF</b>	Loss of Frame. Occurs when a DS1 terminal is unable to synchronize on the DS1 signal for some interval.
<b>LOFC</b>	Loss of Frame Count. The number of LOFs declared.
<b>loopback</b>	A diagnostic procedure that sends a test message back to its origination point. Used to test various portions of a data link in order to isolate an equipment or data line problem.
<b>LOS</b>	Loss of Signal. The T1 line condition where there are no pulses.
<b>MIB</b>	Management Information Base. A database of managed objects used by SNMP to provide network management information and device control.
<b>MUX</b>	Multiplexer. A device used to interleave or simultaneously transmit multiple independent data streams into a single high-speed data stream. Multiplexing techniques include FDM (frequency division multiplexing), TDM (time division multiplexing), and STDM (statistical time division multiplexing).
<b>NAM</b>	Network Access Module. A type of CCA that accesses or acts as an interface with the network.
<b>OCU-DP</b>	Office Channel Unit–Data Port.
<b>OOF</b>	Out Of Frame. An error condition in which frame synchronization bits are in error.
<b>OPX</b>	Off-Premises Extension.
<b>PAD</b>	Packet Assembly and Disassembly. The term PAD often is used with regard to X.25 networks; however, it can apply to any packet-switched network, such as frame relay.
<b>PBX</b>	Private Branch Exchange. Telephone switching equipment dedicated to one customer. A PBX connects private telephones to each other and to the public dial network.
<b>PDU</b>	Protocol Data Unit. A message containing protocol-specific information.
<b>PDV</b>	Pulse Density Violation. The number of ones (marks, pulses) is not adequate for the line requirement.
<b>PLAR</b>	Private Line Automatic Ringdown.
<b>PPP</b>	Point-to-Point Protocol, as specified by Internet RFC 1661.
<b>PSTN</b>	Public Switched Telephone Network. A network shared among many users who can use telephones to establish connections between two points. Also known as dial network.
<b>QRSS</b>	Quasi-Random Signal. A test pattern simulating a random pattern of digital ones and zeros used to simulate normal transmission.
<b>RBS</b>	Robbed Bit Signaling. Signaling used for voice-call processing over a T1 line.
<b>RIP</b>	Routing Information Protocol. A protocol for exchanging routing information.
<b>SES</b>	Severely Errored Seconds. Usually defined as a second during which a specific number of CRC errors was exceeded, or an OOF or other critical error occurred.
<b>SLIP</b>	Serial Line Internet Protocol. Protocol for serial operation on an internet.
<b>SNMP</b>	Simple Network Management Protocol. Protocol for open networking management.
<b>UAS</b>	Unavailable Seconds. A count of one-second intervals when service is unavailable.
<b>Vac</b>	Volts alternating current.

<b>VF</b>	Voice Frequency. The part of the audio frequency range used to transmit voice sound (usually 300 Hz to 3400 Hz). This band is used by the modem for its modulated signal.
<b>virtual circuit</b>	A logical link/connection or packet-switching mechanism established between two devices at the start of transmission.
<b>Yellow Alarm</b>	An outgoing signal transmitted when a DS1 terminal has determined that it has lost the incoming signal.

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