DECserver 900MC

Installation and Configuration

Part Number: EK-DSRVX-IC. A01

This manual describes how to install and configure the DECserver 900MC.

Revision/Update Information: This is a new document.

FCC Notice — Class A Computing Device:
This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference.
Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference. Any modifications to this device - unless expressly approved by the manufacturer - can void the user's authority to operate this equipment under part 15 of the FCC rules.

VCCI Notice — Class 1 Computing Device:
This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas. Consequently, when used in a residential area or in an adjacent area thereto, radio interference may be caused to radios and TV receivers. Read the instructions for correct handling.

CE Notice — Class A Computing Device:

Warning!
This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Achtung!
Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Avertissement!
Cet appareil est un appareil de Classe A. Dans un environment résidentiel cet appareil peut provoquer des brouillages radioélectriques. Dans ce cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.

Contents

Preface

Safety

1 Product Introduction

2 Installing the Module

3 Installing the Setup Port Cable

4 Configuring the Module in a DEChub 900

5 Installing Flash RAM

6 Configuring the Modem Ports Using the Access Server Manager

7 Configuring the Modems Ports Using the Console Commands

8 Removing the Module

A Problem Solving

B Connector and Cable Assignments

C Product Specifications

D Microcom Networking Protocol

E Regulatory Requirements

F AT Commands

Figures

Glossary

Tables

Preface

Overview

Purpose of This Document

This manual describes how to install, configure, and use the DECserver 900MC
module. It also provides problem solving, connector and cable assignments, product
specifications, AT commands, and information on the Microcom Networking Protocol
(MNP).

Intended Audience

This manual is intended for use by personnel who will install, configure, and use the
DECserver 900MC.

Organization

This manual is organized as follows:

Section	Description
Chapter 1	Provides an overview of the DECserver 900MC module and describes its features.
Chapter 2	Provides instructions for installing the DECserver 900MC module in a DEChub 900 MultiSwitch.
Chapter 3	Provides instructions for installing the setup port on the DECserver 900MC.
Chapter 4	Provides configuration information when the module is installed in a DEChub 900 MultiSwitch.
Chapter 5	Provides information on how to install Flash RAM.
Chapter 6	Provides information on how to configure the module's built-in modems using the Access Server Manager.
Chapter 7	Provides information on how to configure the module's built-in modems using console commands.
Chapter 8	Provides information on how to remove the module from the DEChub 900 MultiSwitch.
Appendix A	Provides installation-specific problem solving information using the LEDs and seven-segment display. In addition, it contains general modem use problem solving information.
Appendix B	Provides connector and pin assignment information.
Appendix C	Provides product specifications for the DECserver 900MC.
Appendix D	Provides information on the Microcom Networking Protocol (MNP).
Appendix E	Provides information on regulatory requirements.
Appendix F	Provides information on the AT command set, including command syntax and a description of each command.
Glossary	Lists pertinent terms and their definitions.

Conventions and Terms

Overview

This book uses the following conventions.

Convention	Description
`Special Type`	This `special type` in examples indicates system output.
Boldface	Boldface type in examples indicates user input.
<Return>	Indicates that you should press the Return key.

Terms Used in This Manual

This book uses the following terms:

Term	Definition
Ethernet	DIGITAL's term for its product compatibility with ISO 8802-3/ANSI/IEEE 802.3 standards and the Ethernet standards for CSMA/CD local area networks (LANs).
SNMP	Simple Network Management Protocol, an industry standard protocol for network management.

Associated Documents

The following documents provide related information about the module. For information on how to order additional documentation, see the ordering information provided in this preface.

Title and Order	Description
DEChub 900 MultiSwitch Owner's Manual	Provides installation, use, security, and troubleshooting information for the DEChub 900 MultiSwitch.
DEChub ONE Installation	Provides installation and operation guidelines for single-slot hub configuration, including rack-mount options and cabling.
DECserver Network Access Software Installation or *DECserver Network Access Server Getting Started*	Provides information on how to install the operational software for DECserver modules on systems running the Windows 95, Windows NT, OpenVMS, Digital UNIX, ULTRIX, or UNIX operating systems.
Network Access Server Command Reference	Provides information on the usage and syntax of commands for various network access servers.
Network Access Server Management	Provides the procedures to perform management tasks on various network access servers.
Network Access Server Problem Solving	Provides problem-solving procedures and tools for various network access servers.

Title and Order	Description
clearVISN Installation	Provides pre- and post-installation information, as well as actual installation procedures for each application.
clearVISN Product Overview	Provides an overview of clearVISN, an explanation of each application and descriptions of all concepts necessary to understand and use the application efficiently.
clearVISN Configuration and Use	Provides information for starting each application, configuring them and general use information.

Correspondence

Documentation Comments

If you have comments or suggestions about this document, send them to the Network Products Engineering.

Attn.:	Documentation Project Manager
FAX:	(508) 486-6093
E-MAIL:	doc_feedback@lkg.mts.dec.com

Online Services

To locate product specific information, refer to the following online services:

BBS   To read the Bulletin Board System, set your modem to 8 bits, no parity, 1 stop bit and dial 508-486-5777 (U.S.)

WWW   The Digital Equipment Corporation Network Products Business Home Page on the World Wide Web is located at the following addresses:

North America:	http://www.networks.digital.com
Europe:	http://www.networks.europe.digital.com
Australia:	http://www.digital.com.au/networks

How to Order Additional Documentation

To order additional documentation, use the following information:

To Order:	Contact:
By Telephone	USA (except Alaska, New Hampshire, and Hawaii):
	1-800-DIGITAL (1-800-344-4825)
	Alaska, New Hampshire, and Hawaii: 1-603-884-6660
	Canada: 1-800-267-6215
Electronically (USA only)	Dial 1-800-DEC-DEMO (For assistance, call 1-800-DIGITAL)
By Mail (USA and Puerto Rico)	DIGITAL EQUIPMENT CORPORATION P.O. Box CS2008 Nashua, New Hampshire 03061 (Place prepaid orders from Puerto Rico with the local Digital subsidiary: 809-754-7575)
By Mail (Canada)	DIGITAL EQUIPMENT of CANADA LTD. 940 Belfast Road Ottawa, Ontario, Canada K1G 4C2 Attn.: A&SG Business Manager
Internationally	DIGITAL EQUIPMENT CORPORATION Attn.: A&SG Business Manager c/o local Digital subsidiary or approved distributor
Internally	U.S. Software Supply Business (SSB) DIGITAL EQUIPMENT CORPORATION 8 Cotton Road Nashua, New Hampshire 03063

Safety

Overview

Any warning or caution that appears in this manual is defined as follows:.

WARNING	Contains information to prevent personal injury.
CAUTION	Contains information to prevent damage to equipment.
VORSICHT	Enthält Informationen, die beachtet werden müssen um den Benutzer vor Schaden zu bewahren.
ACHTUNG	Enthält Informationen, die beachtet werden müssen um die Gerate vor Schaden zu bewahren.
DANGER	Signale les informations destinées à prévenir les accidents corporels.
ATTENTION	Signale les informations destinées à prévenir la détérioration du matériel.
AVISO	Contiene información para evitar daños personales.
PRECAUCIÓN	Contiene información para evitar daños al equipo.

The cautions that must be observed for the hardware described in this manual are listed below in English, German, French, and Spanish.

CAUTION	This action deletes all configured settings and replaces them with factory default values. All configuration settings will be lost.
ACHTUNG	Bei diesem Vorgang werden alle Konfigurationseinstellungen gelöscht und die Werkseinstellungen wieder eingesetzt. Alle Konfigurationsdaten gehen verloren.
ATTENTION	Cette action supprime tous les paramètres de configuration et les remplace par des valeurs prédéfinies. Tous les paramètres de configuration seront perdus.
PRECAUCIÓN	Esta intervención borrará todos los parámetros de configuración y los sustituirá por valores por defecto definidos de fábrica. Se perderán todos los parámetros de configuración.

Chapter 1

Product Introduction

Overview

Introduction

This chapter describes the DECserver 900MC module and its features.

In This Chapter

Topic	Page
What is the DECserver 900MC?	1-2
Features	1-3

What is the DECserver 900MC?

The DECserver 900MC is a nine-port network access server that provides remote access connections to an Ethernet local area network (LAN). The DECserver 900MC includes four megabytes (MB) of memory and runs Version 2.1 (or greater) of the DECserver Network Access Server (DNAS) software.

You can install and configure the DECserver 900MC in a DEChub 900 MultiSwitch (also referred to as DEChub 900) or as a stand-alone unit in a DEChub ONE or DEChub ONE-MX docking station.

The DECserver 900MC contains one serial port and eight modem ports. Each modem port is equipped with a built-in Microcom DeskPorte Fast+ modem.

Each DeskPorte Fast+ modem provides the following features:

- V.34 data rates up to 33,600 Bps

- 2-wire switched line interface through individual 8-pin MJ connectors

- Universal Direct Access Arrangement (DAA)
  (DAA allows different countries to connect without requiring different product variants or hardware jumpers.)

- V.42 and V.42bis error correction and data compression protocols

- Microcom Networking Protocol (MNP) support (see Appendix D, Microcom Networking Protocol)

- Cellular operation using the MNP Class 10 protocol with Adverse Channel Enhancements (ACE) (see Appendix D, Microcom Networking Protocol)

Features

Your DECserver 900MC includes the following features.

Hot Swap

The module's hot swap capability allows you to install or remove the module from a DEChub 900 without turning off power to the hub.

Configuration and Management

The module offers the following configuration and management options:

- Set-up port for initial configuration of the module using a terminal or personal computer.

- Advanced Graphical User Interface (GUI) manageability with Digital's Access Server Manager application.

- Advanced Graphical User Interface (GUI) manageability with Digital's clearVISN MultiChassis Manager application.

Protocols and Standards

The module supports the following protocols and standards:

- Compatibility with the proposed ITU-T V.34 protocol (14400 to 33600 bps) modem port speeds. (V.34 is implemented using Rockwell International Corporation's V.FC chip.)

- Serial port speeds of up to 115200 bps

- 2-wire switched line operation

- ITU-T protocol standards: V.21, V.22, V.22bis, V.23, V.32, and V.32bis

- Bell 212A and Bell 103 protocol standards

- V.42 error correction, including LAPM and MNP Classes 2 to 4 (see Appendix D, Microcom Networking Protocol)

- V.42bis compression as well as MNP Class 5 Data Compression (see Appendix D, Microcom Networking Protocol)

- MNP Class 10 Adverse Channel Enhancements (see Appendix D, Microcom Networking Protocol)

Special Features

The module's built-in modems include the following special features:

- Enhanced operation in cellular environments

- Multi-protocol auto-answering to automatically answer incoming calls using various modulation protocols

- Trellis coded modulation for forward error correction

- Near and far end echo cancellation

- Preset factory configuration switches for V.34 auto-reliable operation

- Auto-dial, auto-answer, manual dial, and manual answer capabilities during asynchronous operation

- Automatic power-up diagnostics

- Asynchronous 11-bit character support

Chapter 2

Installing the Module

Overview

Introduction

This chapter explains how to install the DECserver 900MC in a DEChub 900 Multiswitch. To install the module as a standalone unit, refer to the *DEChub One* (or *DEChub ONE-MX*) *Installation* manual.

In This Chapter

Module Components

This section describes the front and back panels of the DECserver 900MC module and the components of each panel. For problem-solving information using the LEDs, refer to Appendix A, Problem Solving.

Front Panel Features

Table 2-1 describes the front-panel components that are illustrated in Figure 2-1.

Table 2-1: Front Panel Components

Item	Icon	Name	Description
1		Power LED	Lights when the module has power.
2		Module OK LED	Lights when the module passes self-test. Flashes when a non-fatal error occurs on self-test. If the module fails self-test, the Module OK LED is off.
3		Network OK	Lights when the module has an active network connection.
4		Network Activity LED	Flashes or remains on depending on network activity.
5		Seven-Segment Display	Provides error and status information regarding testing, loading, and power conditions (see Appendix A, Problem Solving for details).
6		Flash RAM Slot	Provides an opening for the Flash RAM card.
7		Reset Switch	Resets the module to factory defaults. To reset: while turning on the power, press and hold the reset switch until the Module OK LED flashes; or if the DECserver 900MC is in operation mode (the seven-segment display shows the "race track" pattern), hold the switch in for ten-seconds. The module reboots with factory defaults.
8		Port State LEDs	Provides connection status on a per port basis.

Module Components

Table 2-1: Front Panel Components

Item	Icon	Name	Description
9		Serial Port Connector	Provides connection for an asynchronous device. The serial port connector is known as the console port and referred to as Port 9 by the software.
10		Modem Port Connectors (8-pin MJ)	Connects the built-in modem to a two-wire telephone line. Supports both MP8 and MP6 phone cables.

Figure 2-1: Front Panel LEDs and Connector
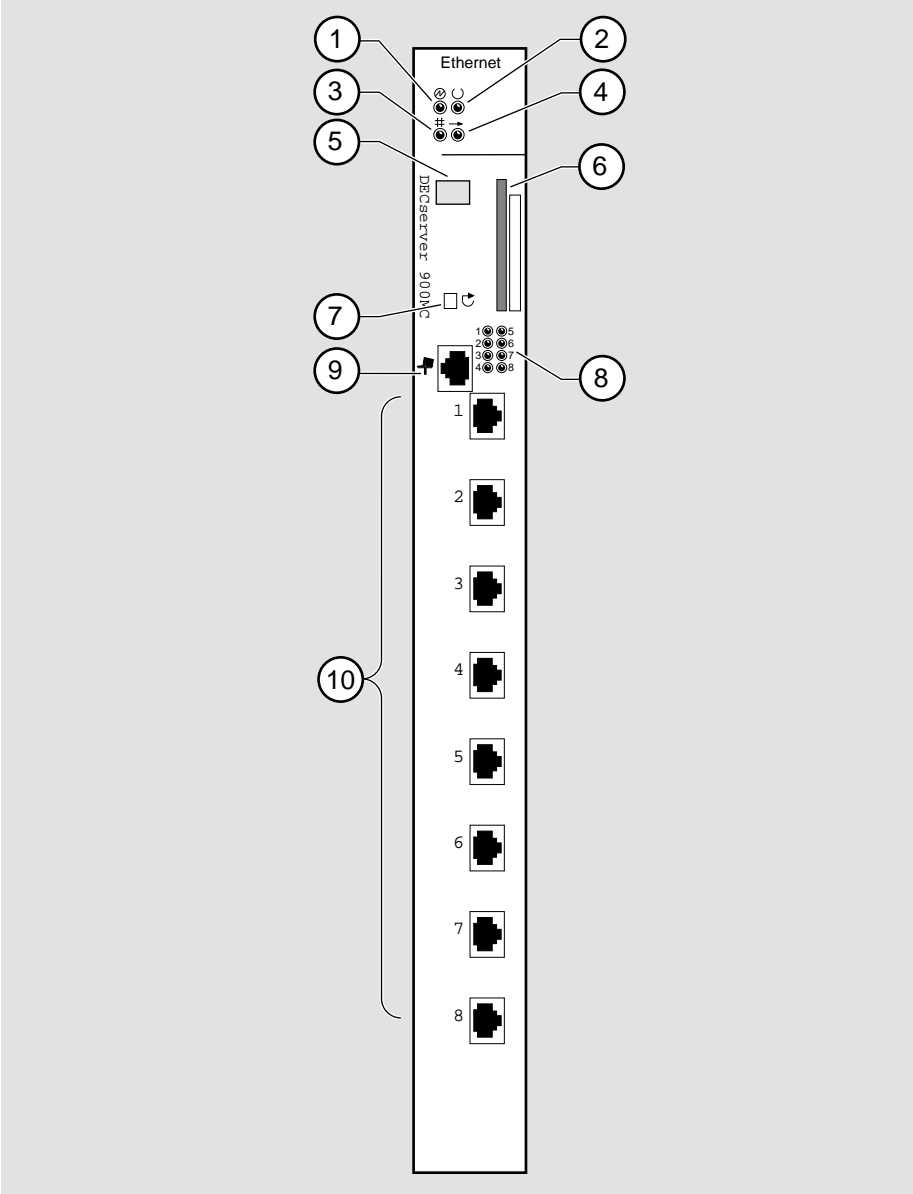
NPB-0692-96F

Back Panel Features

Table 2-2 describes the back panel components that are illustrated in Figure 2-2.

Table 2-2: Back Panel Components

Item	Name	Description
1	Locking tab	Locks the module into a DEChub 900 backplane or into a DEChub ONE docking station.
2	48-pin connector	Provides network and power connections to the module when the module is installed into a DEChub 900 or DEChub ONE docking station.
3	Grounding bolt	Provides a chassis grounding connection to the module when the module is installed into a DEChub 900 MultiSwitch or a DEChub ONE docking station.
4	Manufacturing label	Lists the module's part number, serial number, revision level, and power requirements.
5	160-pin connector	Provides network and power connections to the module when the module is installed into a DEChub 900 or a DEChub ONE docking station.
6	Mounting tab	Secures the module to the backplane when the module is installed into a DEChub 900 or a DEChub ONE docking station.
7	Grounding fingers	Provide additional chassis grounding between the module and a DEChub 900 or a DEChub ONE docking station.

Figure 2-2: Back Panel Features
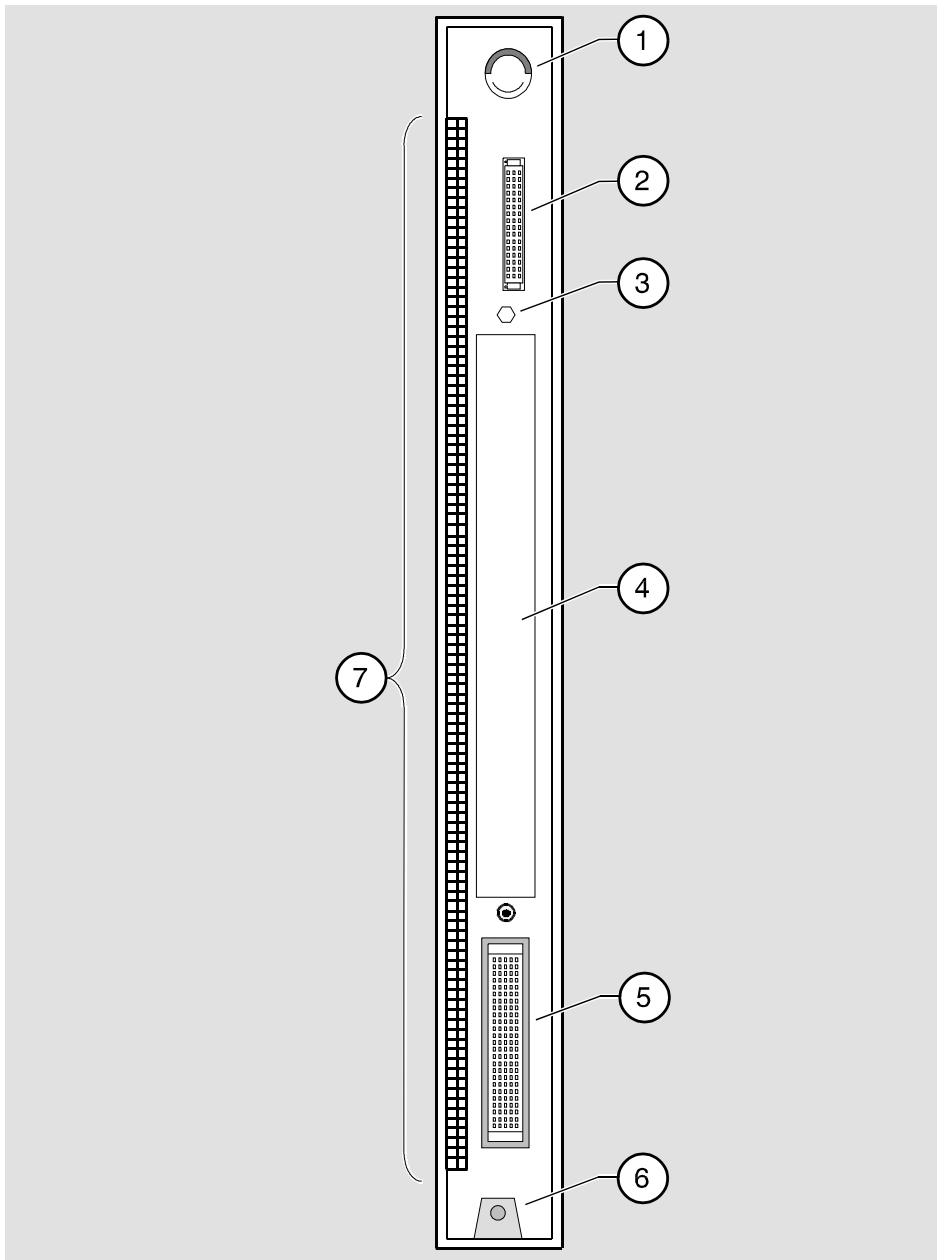
NPG-9723-95F

How to Install the Module

The hot-swap feature allows you to install the module into the DEChub 900 without turning off power to the hub. Seating the module initiates the module's powerup sequence if enough power is available.

To install the module, complete the following tasks:

Task 1: Compare the Power Ratings

Compare the module's power ratings with the values shown in the Hub Manager Status display (Figure 2-3).

If any of the module's power requirements (**1**) exceed the values shown in the status display (**2**) add another power supply (see the *DEChub 900 MultiSwitch Owner's Manual*).

Figure 2-3: Power Ratings
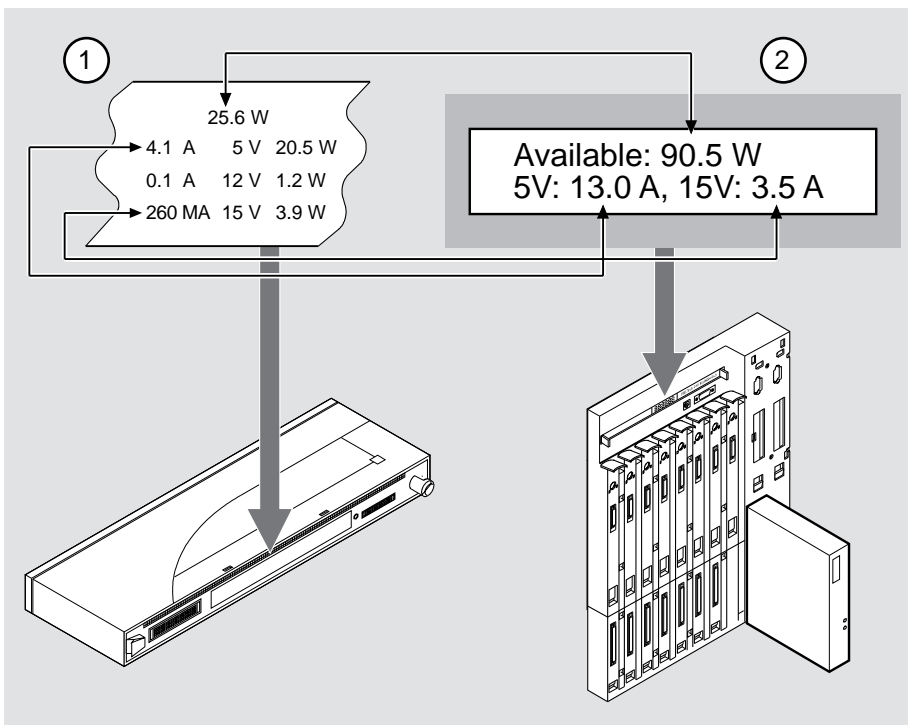
NPB-0715-96F

Task 2: Seat the Module

To seat the module into the DEChub 900 MultiSwitch, complete the following steps:

Step	Action
1	Place the module's mounting tab **(1)** into a mounting slot on the DEChub 900 MultiSwitch.
2	Pull up on the release lever **(2)** to its unlocked position.
3	Pivot the module on the mounting tab and align the connectors.
4	Firmly push the module onto the backplane connectors.
5	Press down on the release lever **(3)** to ensure that it is locked.

Figure 2-4: Seating the Module

NPG-0004-95F

Task 3: Verify Initial LED Operation

If this is a new installation, turn on the power to the DEChub 900 MultiSwitch. If the module was installed while the DEChub 900 was powered up, seating the module will initiate the module's power up sequence. For locations of the module's LEDs, refer to Figure 2-1.

Verify that the module's Power LED and the Module OK LED light within 1 minute. The LEDs light in the following stages:

Stage	Description
1	The Power LED lights when power is applied to the DEChub 900, then the module performs a self-test.
2	After the module completes self-test, the Module OK LED lights. Then the Hub Manager status identifies the module as a `DECserver 900MC`.

NOTE

If the LEDs do not operate as described, refer to Appendix A, Problem Solving.

Task 4: Connect Port Cables

Connect the port cables to any available port connector on the module. Ports 1 through 8 contain built-in modems. The console port is a serial port, also known as Port 9 by the software. For more information on the proper cables to use, see Appendix B, Connector and Cable Assignments.

To connect the port cables to the module, complete the following steps:

Step	Action
1	Align the release tab on the cable plug (**1**) with the keyway on the module's connector.
2	Insert the plug into the connector, ensuring that the release tab snaps into the locked position.

Figure 2-5: Connecting the Cable
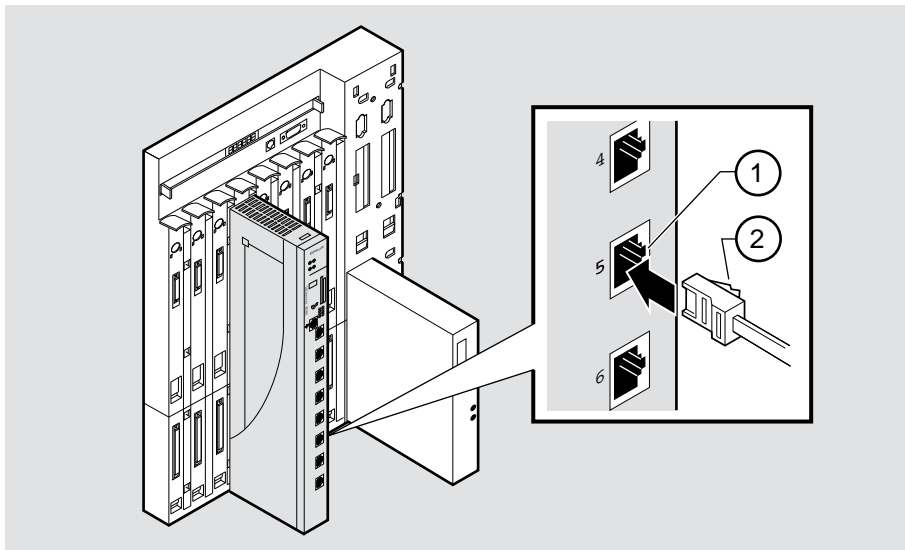
NPB-0694-96F

NOTE

The DECserver 900MC does not support the out-of-band management (OBM) port or the setup port on the DEChub One. However, console redirect is supported.

Chapter 3

Installing the Setup Port Cable

Overview

Introduction

This chapter describes how to connect the DECserver 900MC module to the setup port on a DEChub 900 MultiSwitch.

In This Chapter

Topic	Page
Signaling Standards	3-2
Setup Port Device Cabling	3-3
Connecting the Setup Port	3-4

Signaling Standards

Signaling Standards

Signals from the DEChub 900 Hub setup port conform to the EIA-232D signaling standard at 9600 baud. To the user, the port appears as a data terminal equipment (DTE) device.

The DEChub 900 Hub Manager setup port is compatible with devices that use the EIA-423 signaling standard.

3-2 Installing the Setup Port Cable

Setup Port Device Cabling

The setup port (Figure 3-1) on the DEChub 900 MultiSwitch can be connected to a setup port device (a terminal or personal computer). Use the following cables and adapters to connect the setup port to a setup port device:

If the setup port device is...	Use this cable...	With this adapter...
PC with a 9-pin D-Sub communications port	BN24H-xx[1]	H8571-J
Terminal with a 25-pin D-Sub connector	BN24H-xx	H8575-A
Terminal with a 6-pin MMJ connector	BN24H-xx	Not required.

1.xx indicates cable length in meters.

Connecting the Setup Port

To connect a personal computer or a terminal (**3**) to the setup port (**2**) on the DEChub 900 MultiSwitch , complete the following steps:

Step	Action
1	Ensure that the transmit and receive baud rates on the setup port device (**3**) are set to 9600 baud.
2	Connect the setup port device to the setup port connector.

Figure 3-1: Setup Port Cabling Components

DEChub 900 Multiswitch

BN24H   H8571-J   H8575-A

NPB-0714-96F
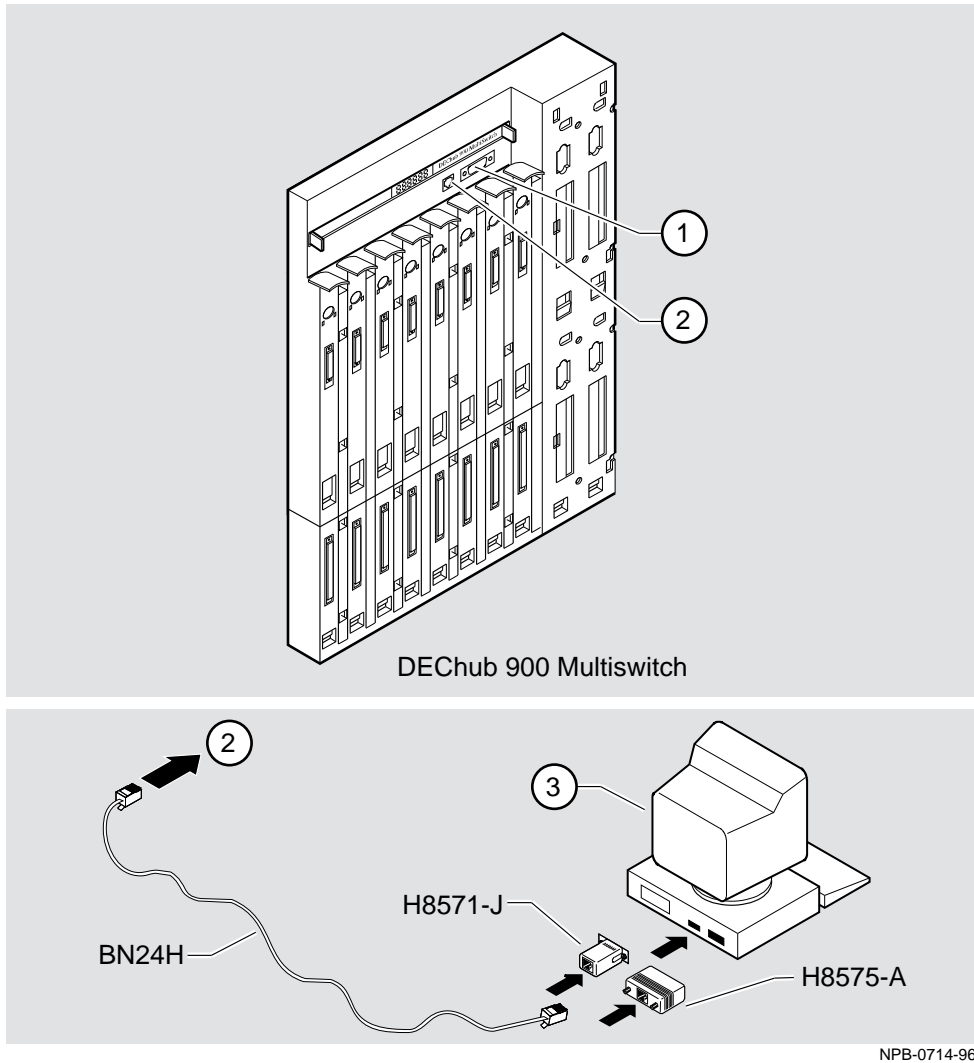
The following legend identifies the setup port cabling:

Item	Description
1	OBM Port
2	Setup Port
3	Setup Port Device

Chapter 4

Configuring the Module in a DEChub 900

Overview

Introduction

This chapter describes how to configure your DECserver 900MC when it resides in a DEChub 900 MultiSwitch.

In this Chapter

DEChub 900 MultiSwitch INSTALLATION MENU

The following example shows the DEChub 900 MultiSwitch INSTALLATION MENU.

To access the module's installation menu, you must choose the following option: [5] Start Redirect Mode.

The following example shows the dialog associated with this option:

```
DEChub 900 MultiSwitch
============================================================

        DEChub 900 MultiSwitch INSTALLATION MENU

        [1]  Reset with Factory Defaults
        [2]  Reset with Current Settings
        [3]  Show Current Settings
        [4]  Configure IP
        [5]  Start Redirect Mode




=============================================================

        Enter selection number: 5 <Return>

        Press Return for Main Menu ...
```

[5] Start Redirect Mode

The `Start Redirect Mode` option redirects the DEChub 900 MultiSwitch Hub Manager set-up port to the set-up port of any network module (such as the DECserver 900MC) that is installed into the DEChub 900. This option allows you to configure or obtain status of an installed network module by accessing the specified network module's installation menu.

After you choose the `Start Redirect Mode` option from the `DEChub 900 MultiSwitch INSTALLATION MENU`, the screen prompts you for a slot number as shown in the following example. After you enter the number of the slot in which the DECserver 900MC is installed (3, in this example), the console is redirected to this slot.

NOTE

The slot number will change to reflect the slot in which your module is installed.

The following example shows you how to select a slot number:

```
               Enter selection: 5

=======================================================
Enter the slot number for redirection (1-8):  3 <Return>
Console redirected to 3: DECserver 900MC
Attempting connection [Ctrl/C to Abort]...
Connection successful!
```

If the redirection is successful, after you press **<Return>**, the DECserver 900MC INSTALLATION MENU appears on your screen.

Using Menus to Configure the Module

The following screen shows the options available from the DECserver 900MC
INSTALLATION MENU when the module is operating in a DEChub 900
configuration.

NOTE

When your module is installed in the DEChub 900, the slot number where the
module is installed appears at the top of the menu.

```
 DECserver 900MC  - slot 3
 ==============================================================

           DECserver 900MC INSTALLATION MENU

         [1]  Reset with Factory Defaults
         [2]  Reset with Current Settings
         [3]  Show Current Settings
         [4]  Configure IP




  ==============================================================
         Enter selection:  [n]  <Return>
```

[1] Reset with Factory Defaults

This option reboots the module, causing its configured Non-volatile Random Access Memory (NVRAM) parameters to be initialized to factory default values followed by a module reset. If you need to reboot the module and retain the current settings, choose option [2] from the DECserver 900MC INSTALLATION MENU.

CAUTION

This action deletes all configured settings and replaces them with factory default values. All configuration settings will be lost.

NOTE

Allow approximately 3 to 5 minutes for the module to reboot and complete self-test.

The following example shows the dialog associated with this option:

```
                    Enter selection : 1

DECserver 900MC - slot 3
===========================================================

             RESET WITH FACTORY DEFAULTS


 * * * * * * * * * * * * * * * * * * * * * * *   *
 *         IMPORTANT!    IMPORTANT!    IMPORTANT!   *
 * * * * * * * * * * * * * * * * * * * * * * *   * *
  This selection will delete the current configuration
  settings and reset the system with the factory default
  settings. All configuration settings will be lost.
   * * * * * * * * * * * * * * * * * * * * * * * *

===========================================================
     Press Y to confirm [N]:  Y <Return>
     Press Return for Main Menu...
```

[2] Reset with Current Settings

This option resets the module but leaves the module's configured nonvolatile configuration storage parameters at their current values.

NOTE

Allow approximately 1 minute for the module to restart.

The following example shows the dialog associated with this option:

```
                  Enter selection:  2

DECserver 900MC  - slot 3
================================================================
            RESET WITH CURRENT SETTINGS

  This selection will reset your system with the current
   configuration settings.
================================================================
          Press Y to confirm [N] :  <Return>
          Press Return for Main Menu...
```

[3] Show Current Settings

This option shows the module's current settings. If the module is being configured for the first time, some fields are blank.

The following example shows the display associated with this option.

```
                    Enter selection : 3


  DECserver 900MC - slot 3
  ================================================================


  DECserver 900MC,Network Access SW V2.1,HW=V1.4,RO=V6.4-0,SW=BL11,
  LAT V5.1, LOAD IMAGE:  WWENG2
  SysUpTime                                : 00:49:59  0 resets
  SNMP Read/Write Community         : PRVTRW

Interface  IP Address    Subnet Mask    Def.Gateway     Other Info
Ethernet   16.20.52.101  255.255.255.0                  08-00-2b-a2-a4-34
================================================================

                 Press Return Key to Continue .....

DECserver 900MC  - slot 3
================================================================
```

[4] Configure IP

This option provides you with IP configuration selections.

The following example shows the dialog associated with this option:

```
             Enter selection : 4

 DECserver 900MC - slot 3
 ==========================================================
                  IP CONFIGURATION

        [1]   Set SNMP Read/Write Community
        [2]   Set In-Band Interface IP Address
        [3]   Return to Main Menu



 ==========================================================

    Enter selection number : [n] <Return>
```

The following pages describe the IP Configuration options:

Topic	Page
[1] Set SNMP Read/Write Community	4-9
[2] Set In-Band Interface IP Address	4-10

[1] Set SNMP Read/Write Community

This option prompts you to enter the module's read/write community name. The community name can be used for read/write access control.

The following example shows the dialog associated with this option:

```
                 Enter selection : 1


   DECserver 900MC - slot 3
================================================================
              SET SMNP READ/WRITE COMMUNITY


Format:  The format for a community name is a string, consisting
         of 4 to 31 printable ASCII characters, that
         describes the relationship between an SNMP agent and
         one or more SNMP managers. The string defines the
         authentication mechanism that is employed to validate
         the use of the community by the sending SNMP entity.
================================================================

Enter the community string [public] : public96 <Return>

         SNMP Read/Write community string set.

         Press Return for IP Configuration Menu...
```

[4] Configure IP

[2] Set In-Band Interface IP Address

This option prompts you to change or enter the module's in-band IP address, subnet mask, and default gateway for the in-band interface. If an IP address was previously configured, the screen displays an in-band IP address.

NOTE

If you would like to change a previously configured IP address on the module, you must first change the IP address and then, reboot the module in order for the new IP address to take effect.

You do not need to configure the module with a subnet mask for SNMP communications with management stations located on the same subnet as the module.

The factory default setting is no in-band address.

The following example shows the dialog associated with this option:

```
                  Enter selection : 2
 DECserver 900MC  - slot 3
 ================================================================

            IN-BAND INTERFACE IP ADDRESS CONFIGURATION

 Format: The standard 4 octet dotted decimal notation in which
         each octet of the address is represented as a decimal
 .       separated by a '.' character.

                     example: 16.20.40.156

       To delete the IP address, enter 0 in the appropriate
       address field.

 Interface  IP Address   Subnet Mask   Def.Gateway   Other Info

 In-Band

 OBM Port                                             Active
 ================================================================
  Enter the IP address [] : 16.20.216.91 <Return>
  Enter the Subnet Mask [] : 255.255.255 0 : <Return>
  Enter the Default Gateway []  16.21.0.1   <Return>

           Press Return for IP Configuration Menu.....
```

Chapter 5

Installing Flash RAM

Overview

Introduction

This chapter describes how to use a Flash RAM card for loading or upgrading the operational software. The Flash RAM card can be hot swapped and may be inserted and removed at anytime.

In This Chapter

Topic	Page
Inserting the Flash RAM Card	5-2
Booting the Module	5-3

Inserting the Flash RAM Card

The Flash RAM card when properly inserted will protrude from the front panel about 1/4 inch. The Flash RAM card is keyed and cannot be inserted improperly.

To insert the Flash RAM card, complete the following steps:

Step	Action
1	Locate the Flash RAM slot on the front of the module (Figure 5-1).
2	Insert the Flash RAM card into the Flash RAM slot.

Figure 5-1: Inserting the Flash RAM Card
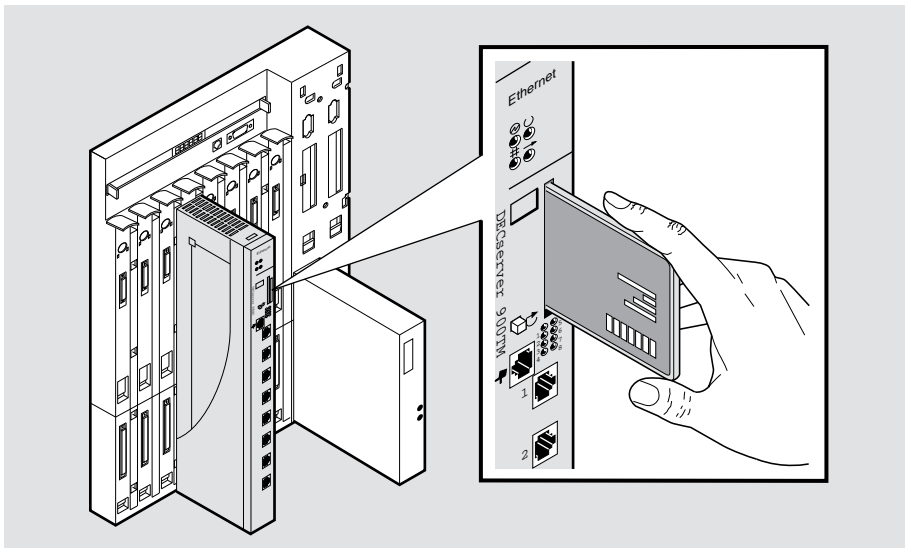
NPB-0695-96F

Booting the Module

Once the Flash RAM card is in place, load the operational software by powering the module. Once you boot the DECserver 900MC, the Flash RAM card may be left in place or removed.

NOTE

You can update Flash RAM by issuing the INITIALIZE FROM ETHERNET IMAGE xxx UPDATE FLASHRAM command from the DECserver 900MC. For more information, see the *Network Access Server Command Reference.*

Chapter 6

Configuring the Modem Ports Using the Access Server Manager

Overview

Introduction

In order to use the DeskPorte Fast+ built-in modems on the DECserver 900MC, you must first configure them. DIGITAL recommends that you use the Access Server Manager application to configure the DECserver 900MC modems. You can also use the Access Server Manager to change modem properties, update the modem firmware, and send commands manually to the modem.

You can perform many of these Access Server Manager functions using the DECserver Network Access Software console commands (see Chapter 7, Configuring the Modems Ports Using the Console Commands).

NOTES

- For software installation information, refer to the *DECserver Network Access Software Installation* manuals.

- The appearance and layout of the Access Server Manager screens may change in future versions of the Access Server Manager software.

In This Chapter

Topic	Page
Adding the DECserver 900MC to the Database	6-2
Configuring the Modem	6-3

Adding the DECserver 900MC to the Database

To configure the DECserver 900MC modems using the Access Server Manager application, you have to:

1)   Add the DECserver 900MC to the Access Server Manager's database.

2)   Set the modem country location.

Start the Access Server Manager application and complete the following steps:

Step	Action
1	With the Access Server Manager Browser displayed, click on **New**.
2	Enter the DECserver 900MC's Internet address or select it from the drop-down list if you entered the address into the NetRider BootP Loader database.
3	Enter a name for the DECserver 900MC access server.
4	Click on **OK**. The application displays the Country page.
5	Is the displayed country correct? • If yes, click on **Close**. • If no, select the correct country from the drop-down list and click on the **Set Country Now**. Then, click on **Close**. Note: If you change the country code, reboot the DECserver 900MC to have the new country code take effect. **Before Phone Line Connection:** Be sure to set the correct country location for the modems before you connect them to telephone lines.

Configuring the Modem

After starting the Access Server Manager application and opening the Modem dialog, you can:

- Use the Configure page to set modem properties for each modem.

- Use the Command page to manually send commands to one or more modems.

- Use the Firmware page to upgrade the modem firmware.

- Use the Country page to set the country location for the modem.

Setting Modem Properties

To set modem properties, start the Access Server Manager application and complete the following steps:

Step	Action
1	Select the access server from the Access Server Manager Browser and click on **Open**.
2	From the Configuration page: **a)** Click on **Modems** **b)** Click on **Configure**

Step	Action
3	From the Configuration page in the Modem dialog, select the port whose modem you want to configure or click on **Select All** to configure all of the modem ports.

4	Click on **Properties**.

Step	Action
5	On the General page, set any or all of the following values:

- Phone Uses — tone or pulse dialing.

- Serial Port — enter port speed or click on **use port settings** to set modem speed to be the same as the port speed settings.

- Flow Control — check **use flow contro**l and select hardware or software flow control.

Click on **Help** to read information about each field. Click on **OK** when you have finished or click on the **Commands** tab.

Step	Action
6	On the Commands page, set the following modem commands, if required. In most cases, you can accept the default settings.
	• Factory Init — Resets the modem to factory default settings.
	• DSR follows connect — Sets the DSR (Data Set Ready) state when a connection is established.
	• Auto Answer enabled — Tells the modem to answer incoming calls.
	• Result Codes — Causes the modem to display verbose (rather than numeric) result codes.
	• No DTR disconnects — Requires a DTR (Data Terminal Ready) signal to be present in order for the modem to accept commands and causes the modem to hang up if the DTR is not present.
	• Save configuration — Tells the modem to save the modem settings to a user profile (commonly referred to in modem documentation as NVRAM locations) and to use that user profile for initialization when powering up or resetting the modem.
	• Port Speed — If your modem requires a command to lock the serial port speed, check this box.
	• Lock Speed — If the **Port Speed command required** box is checked, enter the command your modem uses to lock port speed.
	• Extra settings — Commands for any additional modem settings that are necessary. No additional commands are required for most modems used with access servers.
	Click on **OK** when you have finished or click on the **Configure** tab.

Sending Commands to the Modem

To manually send commands to the modem on one or more ports, start the Access Server Manager application and complete the following steps:

Step	Action
1	Select the access server from the Access Server Manager Browser and click on **Open**.
2	From the Configuration page: **a)** Click on **Modems** **b)** Click on **Configure**
3	Click on the **Command** tab in the Modem dialog.
4	From the drop-down list, select the port to which you want to send modem commands or click on **Select All** to send commands to all modems
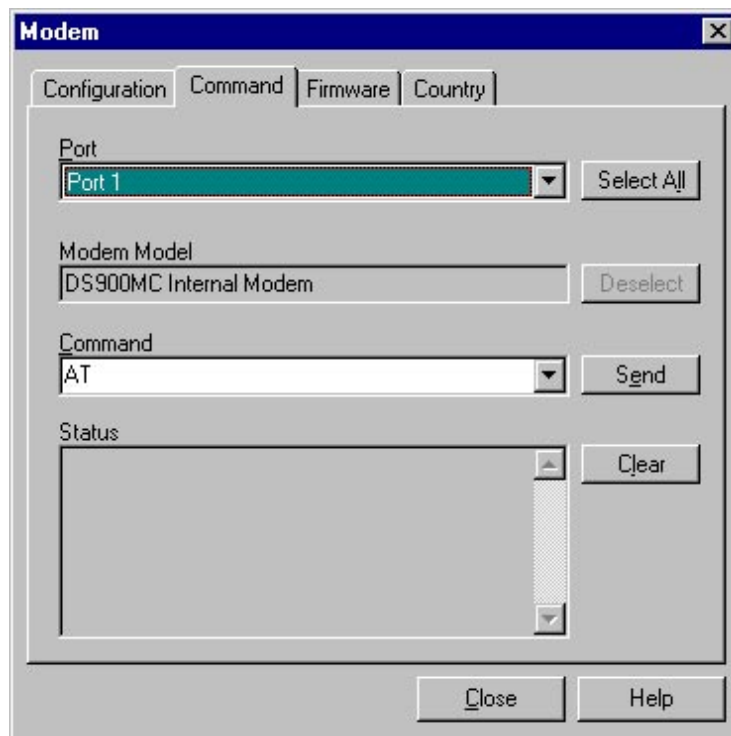
| **5** | In the **Command** data field, enter the modem command you want to send (see Appendix F, AT Commands). |

Step	Action
6	Click on **Send**. (The command you send and the modem's response appear in the Status box.)
	Clearing the Status Box: Click on **Clear** to delete any messages that appear in the Status box.
7	Click on **Close** when finished.

Upgrading Modem Firmware

Start the Access Server Manger application and do the following:

Step	Action
1	Insert the Modem firmware diskette into a diskette drive or copy the firmware file to your PC's hardware drive.
2	Select the access server from the Access Server Manager Browser and click on **Open**.
3	From the Configuration page:
	a) Click on **Modems**
	b) Click on **Configure**
4	Click on the **Firmware** tab in the Modem dialog box.

Step	Action
5	From the drop-down list, select the port whose firmware you want to upgrade or click on **Select All** to send upgrade firmware on all ports
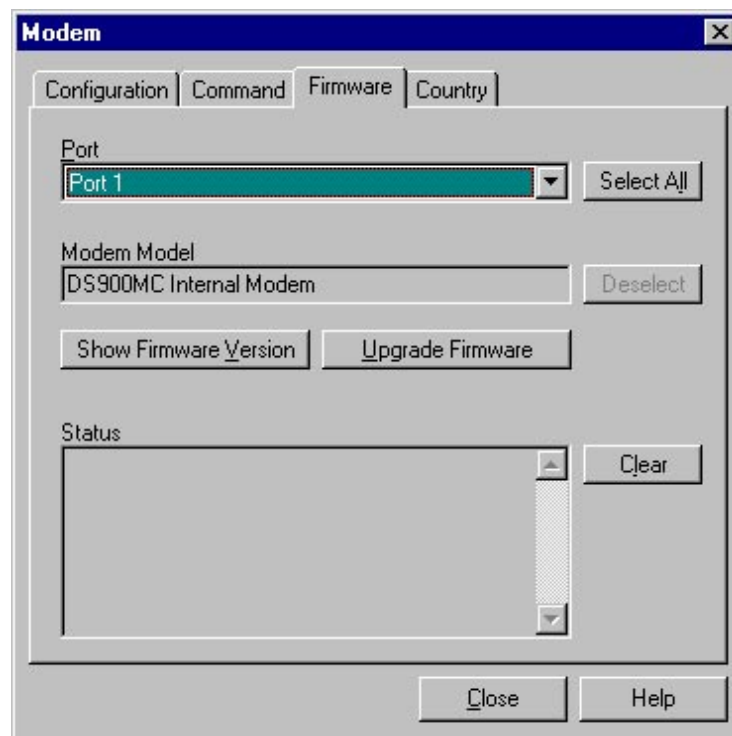
6	Click on **Upgrade Firmware** and select the firmware file that you want to use.
7	Click on **Open**.
8	Click on **Close**.

NOTE

It takes approximately 6 minutes for an individual modem to complete a firmware upgrade. This means it may take 48-60 minutes to upgrade all eight ports.

Changing the Country Location

Set the country location before connecting the modem to a telephone line. The country setting indicates the country where the DECserver 900MC module is used.

NOTE

The DECserver 900MC must be rebooted in order for the country code to take effect.

To change the country code, start the Access Server Manager application and complete the following steps:

Step	Action
1	Select the access server from the Access Server Manager Browser and click on **Open**.
2	From the Configuration page: **a)** Click on **Modems** **b)** Click on **Configure**
3	Click on the **Country** tab on the Modem dialog.

Step	Action
4	From the drop-down list, select the country where you are using the DECserver 900MC access server
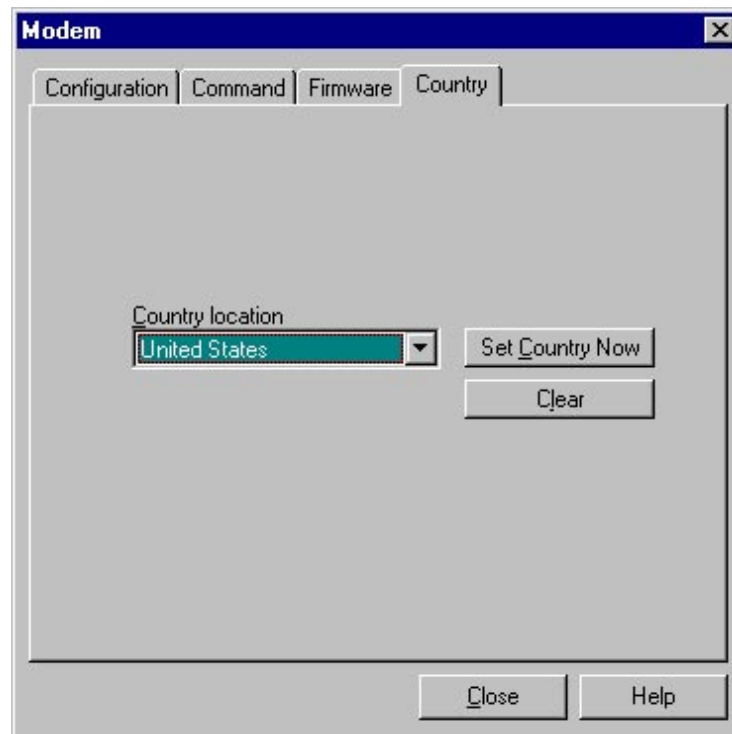
Step	Action
5	Click on **Set Country Now**.
6	Click on **Close**.
	Note: The DECserver 900MC must be rebooted in order for the country code to take effect.

Chapter 7

Configuring the Modems Ports Using the Console Commands

Overview

Introduction

In order to use the DeskPorte Fast+ built-in modems on the DECserver 900MC, you must first configure them. DIGITAL recommends that you use the Access Server Manager application to configure the DECserver 900MC modems (see Chapter 6, Configuring the Modem Ports Using the Access Server Manager). However, you can perform some functions using the DECserver Network Access Software console commands.

This chapter explains how to use the console commands. For more information on the console commands, see the *Network Access Server Management* and *Network Access Server Command Reference* manuals.

In This Chapter

Setting the Country Code

Introduction

You can connect a terminal to the console port, known as port 9 by the DECserver Network Access Software (DNAS). Once the terminal is connected, use DNAS commands to set the modem country code and to log out the port. If necessary, you can use the console port to send AT commands (see Appendix F, AT Commands) directly to the modem.

Displaying the Current Country Setting

Issue the SHOW/LIST/MONITOR COUNTRY command at the console port to display all of the valid country codes and the current country location setting.

Setting the Country Code

Before connecting the modem to a telephone line, set the country code for the country in which the DECserver 900MC is used.

NOTE

In order for the new country code to take effect, you must reboot the DECserver 900MC.

To set the country code, issue the following command at the console port:

```
DEFINE COUNTRY country_number
```

Valid country codes are listed in Table 7-1.

Example

This example shows how to set the country standard for South Africa and reboot the DECserver 900MC using a 10-minute delay:

```
Local> DEFINE COUNTRY 16

Local> INITIALIZE DELAY 10
```

For more information about the INITIALIZE command, refer to the *DECserver Network Access Server Command Reference* manual.

Table 7-1: Country Codes

Country	Code	Country	Code
Australia	20	Japan	13
Austria	22	Netherlands	5
Belgium	23	New Zealand	11
Czech Republic	18	Norway	8
Denmark	10	Poland	19
Finland	9	South Africa	16
France	25	Spain	6
Germany	17	Sweden	7
Ireland	24	Switzerland	14
Israel	15	United Kingdom	2
Italy	3	United States	1
Italy SIP	4		

Logging Out Ports

Introduction

You can log out a port and reset the port characteristics to their factory defaults or you can log out a port and send a reset signal to the port.

Logging Out a Port and Resetting Port Characteristics to Factory Defaults

To log out a port and reset the port's characteristics to the factory defaults, use the following command:

```
LOGOUT PORT port-list FACTORY
```

Example

This example shows how to log out ports 2 through 8 and reset the port characteristics to their factory defaults.

```
Local> LOGOUT PORT 2-8 FACTORY
```

Logging Out a Port and Sending a Reset Signal

To log out a modem port, use the following command:

```
LOGOUT PORT port-list MODEM [RESET]
```

NOTE

This command performs the functional equivalent of a power-cycle.

Example

This example shows how to disconnect sessions on ports 2 through 8 and send a reset signal to these ports.

```
Local> LOGOUT PORT 2-8 MODEM
```

Communicating With the Modem

DIGITAL recommends that you use the Access Server Manager application to configure the modem or send commands directly to the modem. If necessary, you can communicate with the modem using a local or remote console.

To communicate directly with the modem using the console port, complete the following steps. For more information about DNAS command syntax, see the *Network Access Server Command Reference* manual.

Step	Action
1	Set up a service on the target modem port using the SET SERVICE CONNECTIONS ENABLED command.
2	Connect to the service using the CONNECT command.
3	Enter the correct modem commands. See Appendix F, AT Commands for more information about AT commands.

Example

This example shows how to establish a service on modem port 1 called modems, connect to the service, and enter a modem command. The modem responds with OK, indicating it is ready to receive additional commands.

```
Local> SET SERVICE modems PORTS 1 CONNECTIONS ENABLED

Local> CONNECT modems

Local> AT

OK
```

When you are done communicating with the modem, press the Break key to return to the Local> prompt. Then, type Disconnect at the Local> prompt.

Chapter 8

Removing the Module

Overview

Introduction

This chapter describes how to remove the module from a DEChub 900 MultiSwitch. To remove the module from a standalone unit, refer to the *DEChub ONE (or DEChub ONE-MX) Installation* manual.

In This Chapter

Topic	Page
Removing the Cable	8-2
Unseating the Module	8-3

Removing the Cable

To remove cables from the module, press the release tab (**1**) on the cable plug, then pull out the cable (see Figure 8-1).

Figure 8-1: Removing the Cable
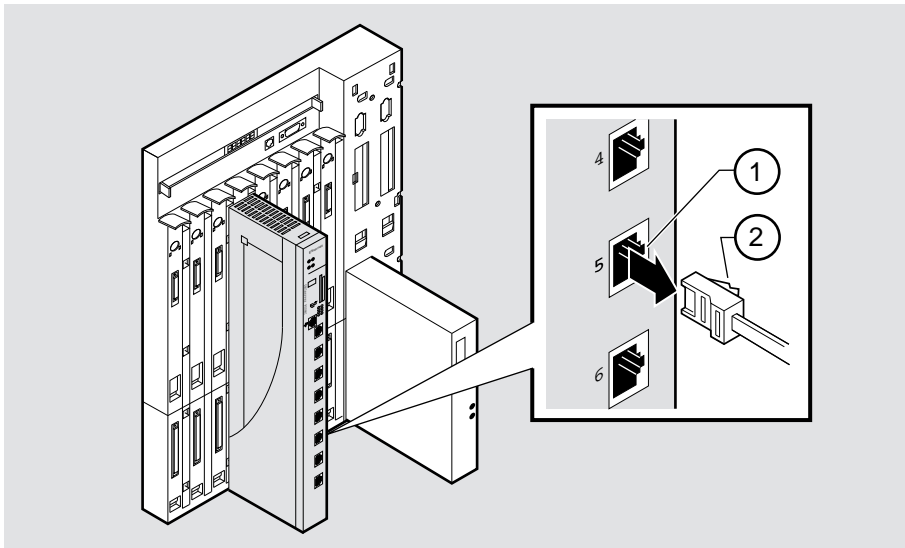
NPB-0771-96F

Unseating the Module

To unseat the module from the DEChub 900, complete the following steps:

Step	Action
1	Hold the module and lift the release lever **(1)** located at the top of the DEChub 900 slot.
2	While holding up the release lever **(2)**, pivot the module back on its bottom mounting tab **(3)**.
3	Remove the module.

Figure 8-2: Unseating the Module
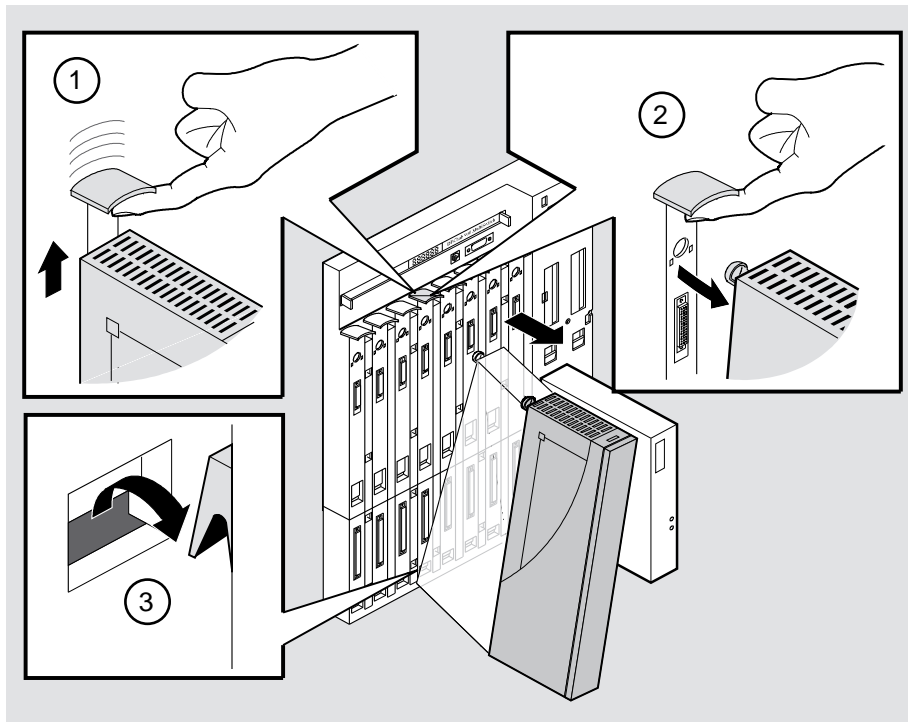
NPG-0008-95F

Appendix A

Problem Solving

Overview

Introduction

This appendix describes the LED functions and provides problem solving information. The sections of this appendix are listed below.

In This Appendix

LED Descriptions

The module and port LEDs provide dynamic indications of the status of the module and ports. The LEDs can be in various states and can change color depending on the operational status of the module or port and the level of activity on the network.

Module LED States

The module's LEDs can be in various states (off, on, or flashing) and can change color depending on the operational status of the module or the level of activity on the network.

Table A-1 shows the states that are possible for each of the module's LEDs.

Table A-1: Module LED States

LED Name	ICONS	Off	On	Flashing
Power		No power to module.	Module receiving power.	Faulty power connection or insufficient power.
Module OK		After 2 minutes, the module failed self-test.	Module passed self-test.	Non-fatal self-test failure. Unit may still be operational.
Network OK		Module is not connected to a properly terminated and enabled LAN through the DEChub 900.	Network connection is operational.	Network connection is disabled by network management.
Network Activity		No network activity.	Network has heavy traffic.	Flashes more rapidly and appears brighter as network traffic increases.

Port LED States

The module also contains an LED on each port. The port LED's can be in various states (off, orange, or green).

Table A-2 shows the possible states for the port LEDs.

Table A-2: Port State LEDs

LED Name	Off	Orange	Green
Port State	Module is online, but the built-in modem on the port is not in use. Note: The term online refers to the module operating with the DECserver Network Access Software code.	Port is receiving power. Port LED will go off when the module is booted. If diagnostics detects a fatal error with the modem, the port LED will remain orange.	The built-in modem on the port is connected and operating, either answering or originating a call.

Normal Powerup

When the module's power is initially turned on, the following events occur:

Event	Description
1	The Power LED lights and remains lit. The Port LEDs turn orange. All other LEDs light and then turn off. This verifies that the individual LEDs are operational.
2	The module initiates its built-in self-test. The seven-segment display indicates the self-test status.
3	After the successful completion of self-test (approximately two to five minutes), the Module OK LED lights and remains on.
4	The remaining LEDs indicate their operational status, as described in Table A-3.

Problem Solving Using the LEDs

When diagnosing a problem with the module, note that the problem is often indicated by the states of the module LEDs. Table A-3 lists the states of the LEDs for various error conditions that can occur during initial installation of the device, along with probable causes and corrective actions to take.

Table A-3: Problem Solving Using the LEDs

Symptom	Probable Cause	Corrective Action
Power LED is off.	Bad power LED.	Replace the module.
	The module is not receiving power.	Check the power LED on the DEChub 900.
	If the DEChub 900 power LED is off, the cause of the problem is the DEChub 900 power supply.	See the troubleshooting procedures in the *DEChub 900 MultiSwitch Owner's Manual*.
	If the DEChub power LED is on and the other power LEDs are off, then the DEChub has a power problem.	See the troubleshooting procedures in the *DEChub 900 MultiSwitch Owner's Manual*.
	If the power LED turns on when the module is reseated in the same slot, then the module was not properly seated.	Make sure the module is properly seated in the slot.
	If the power LED turns on when the module is reseated in another slot, then the problem is with the DEChub.	See the troubleshooting procedures in the *DEChub 900 MultiSwitch Owner's Manual*.
	If the module does not turn on in a known good slot, then the module is defective.	Replace the module.

Table A-3: Problem Solving Using the LEDs

Symptom	Probable Cause	Corrective Action
Power LED is flashing.	The module connection is faulty.	Lift the release lever, then reseat the module.
	Faulty DEChub 900 slot connection.	Reinstall the module into another slot.
	DEChub 900 power supply is faulty.	Replace the DEChub 900 power supply.
Module OK LED is off.	Module does not have sufficient power.	Ensure Power LED is on.
	Self-test is in progress.	Wait up to five-minutes for self-test to complete.
	Self-test failed.	If the LED does not light after five-minutes, lift the release lever momentarily to repeat the self-test. If self-test fails again, replace the module.
Module OK LED is flashing	Non-fatal error.	See the error message on the console port.
	Fan is faulty.	Call your DIGITAL representative to replace the fan.
Seven-segment display is flashing C, d, or n.	Memory failure.	Return the unit to Digital Equipment Corporation.
Seven-segment display is flashing or displaying an 8.	Fatal error.	Return the unit to Digital Equipment Corporation.
Seven-segment display shows a 3.	There is a problem downloading the software. The software will continue to try to load.	If the display persists, see the error message on the console port.

Table A-3: Problem Solving Using the LEDs

Symptom	Probable Cause	Corrective Action
The Network Activity LED is off.	There is low network activity or no network activity.	Ensure that the network is active. If the Network Activity LED still fails to turn on, then turn the unit off momentarily by removing it from the power supply. Check that the Network Activity LED blinks momentarily during the LED powerup self test.
	The module or another unit in the DEChub may not be connected to an active segment.	Connect a known active segment to any unit in the DEChub.
	If the module is connected to a known active segment and the Network Activity LED is off, then the module is defective.	Replace the module.
The Port LED is orange.	Diagnostics has detected a fatal error on the modem port.	Call your DIGITAL representative.

Table A-3: Problem Solving Using the LEDs

Symptom	Probable Cause	Corrective Action

After correctly installing the module on a DEChub 900, the information display does not read:
 	
`DECserver 900MC`
`up`
 	
but the "race track" pattern is displayed.
	An old version of the DECserver Network Access Software was loaded into the DECserver 900MC.	Reload the DECserver 900MC with Version 2.1 or later of the DECserver Network Access Software.

After correctly installing the module on a DEChub 900, the information display does not read:
 	
`DECserver 900MC`
`up`
	Defective module.	Replace the module.

After correctly installing the module on a DEChub 900, the hub manager does not display configuration information.	Defective module.	Replace the module.

Problem Solving Using the Seven-Segment Display

This section shows the codes that appear on the seven-segment display during power-up and initialization self-test.

NOTES

- When the display codes are rotating, the DECserver 900MC is receiving power. (The rotating code is referred to as the "race track" pattern.)

- When the display codes are off, the DECserver 900MC is not receiving power or the display is broken.

In Figure A-1, the first column indicates a horizontal view (standalone). The second column indicates a vertical view (hub) of the codes. The third column describes the events indicated by the codes.

Problem Solving Using the Seven-Segment Display

Figure A-1: Seven-Segment Display Codes

Ꮄ	⊡	Initial power is on
F	ᏌᏞ	Initializing
E	⊔	Internal testing
d	ᎁ	SIM 1 testing
C	⊔	SIM 2 testing
b	ᎁ	Internal testing
A	▭	Internal testing
9	ᎁ	Internal testing
7	Γ	Internal testing
5	Ꮮᎁ	Network interface external testing
=	ⅠⅠⅠ	Software is loading from Flash RAM or is updating Flash RAM
4	⊐	Server is requesting software from network
3	Ꮇ	Attempting to retry software load
2	Ꮑᎁ	Loading software
1	—	Server is requesting a dump
0	▭	Dumping software
H	⊒	Hardware and firmware versions are of incompatable revisions
∏	⊏	No SIMs or wrong type of SIMs is installed
P	ᎁ	Internal testing

LKG-8099-93I

Troubleshooting Tips When Using Your Built-in Modems

This section lists information to aid you when using your built-in modems. For more information on the DECserver Network Access Software, see the *Network Access Server Release Notes.* For more information on AT command syntax, see Appendix F, AT Commands.

Symptom	Corrective Action
Modem does not connect at 33400 bps.	Your modem's speed is limited by the type of modem you are connecting to and the quality of the phone lines that you use. Determine the type of modem you are calling or answering. For slower modems, the highest mutually supported speed is the maximum connect speed possible.
Modem does not dial out.	Ensure the telephone cable connections are secure.
	If the software displays **NO DIALTONE**, enter the **ATX3** command to make it dial without detecting dial tone.
	If you need an outside-access code, such as **9**, include it and a comma before the number you are dialing.
	Ensure that you are using **ATDT** for tone dialing or **ATDP** for pulse phone lines.
	Ensure the country code is set.
Modem does not connect. (If it displays **NO CARRIER** after dialing the number, it did not connect.)	Use a hand-held telephone to dial the remote modem. If the remote modem does not answer, the problem is with the remote modem.
	Use a line that does not require an outside-access code.
	Lower your connection speed.
	Use **M**, **Y**, or **A** dial modifiers.
	Shut off extra features using **AT-J0**, **AT-K0**, or **AT%L3**.

Troubleshooting Tips When Using Your Built-in Modems

Symptom	Corrective Action
Modem throughput is slower than expected.	If you are calling another Microcom V.34 modem and cannot connect at 33400 bps, lower your modem-port speed using the **%B***n* command. If your connection succeeds, the problem is the quality of your phone lines.
	If your file transfer rate is slow, experiment with the **%C***n* command for different forms of data compression. Certain types of files are already compressed and can cause delays as the modem tries to compress them again.
	Experiment with **N***n* for different forms of error correction. Be careful, you may sacrifice data integrity if you turn off error correction.

Appendix B

Connector and Cable Assignments

Overview

Introduction

This appendix shows the pin assignments of the connectors and cables that are part of, or can be used with, the module. Chapter 2, Installing the Module describes how to connect the port cables.

The DECserver 900MC contains nine-ports, 1 asynchronous port and 8 built-in modem ports. The asynchronous port is used as the console port and is known as Port 9 by the DECserver Network Access Software.

In This Appendix

Topic	Page
Compatible Cables for the Console Port	B-2
8-Pin MJ Console Connector Information	B-3
8-Pin MJ Telephone Connector Information	B-4

Compatible Cables for the Console Port

This section lists and describes compatible cables for the DECserver 900MC console port. Before connecting cables to the DECserver 900MC console ports, verify the supported modem signals with the person managing the DECserver 900MC. This information is necessary to determine which cables to use. For more information on the signals, refer to the *Network Access Server Management* manual.

Table B-1 describes the compatible cables for the DECserver 900MC console port.

Table B-1: Compatible Cables for DECserver 900MC Console Port

Type of Cable	Description
H8585-AC MJ8 to DB25 (male) modem adapter	Use this adapter with the BN25G cable to connect high-speed modems to the DECserver 900MC console port.
H8585-AB MJ8 to DB25 (male) modem adapter	Use this adapter with the BN25G cable to connect low-speed modems to the DECserver 900MC console port.
H8585-AA MJ8 to DB9 (female) null-modem adapter	Use this adapter with the DN25G cable to convert the DECserver 900MC console port connector to the DB9 connector for cabling to PC asychronous ports.
H8584-AC MP8 to MMJ adapter	Use this adapter to convert the console port to a DECserver 300 terminal server configuration.
BN24H MP8 to MP6 office cable	Use this office cable to connect from the 6-pin MMJ port of a terminal or printer to the 8-pin MJ faceplace data connector. The BN24H is configured with one 6-pin modified modular plug, one standard 8-pin plug, and crossover wiring.
BN25G MP8 to MP8 equipment cable	Use this cable as either a patch cord or an office cable. It is configured with standard 8-pin modular plugs, which connect four unshielded twisted pairs pin-to-pin.

8-Pin MJ Console Connector Information

This section contains information on the 8-pin MJ console connector. The DECserver 900MC uses an 8-pin MJ connector on the console port, which can be configured by the software to support the pin signals indicated in Table B-2.

Figure B-1: 8-Pin MJ Description for Console Port
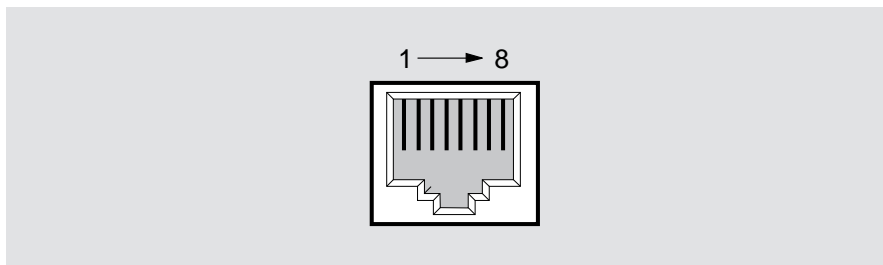
NPG-8719-95F

Table B-2: DECserver 900MC Console Port Pin Assignments

Pins	Signal Name	Software Default[1]	Software Alternative
1	RXD GND	RXD GND	RXD GND
2	RXD	RXD	RXD
3	TXD GND	TXD GND	TXD GND
4	CTS or RI (selected by the software)	CTS	RI
5	RTS or DSRS (selected by the software)	RTS	DSRS
6	TXD	TXD	TXD
7	DTR	DTR	DTR
8	DSR or DCD (selected by the software)	DSR	DCD

1.To change default values, refer to the *Network Access Server Management* manual.

8-Pin MJ Telephone Connector Information

This section contains information on the 8-pin MJ telephone connector. The DECserver 900MC uses an 8-pin MJ connector on Ports 1 through 8. Both MP8 and MP6 phone cables are supported. The signal information is displayed in Table B-3.

Figure B-2: 8-Pin MJ Description for Modem Ports
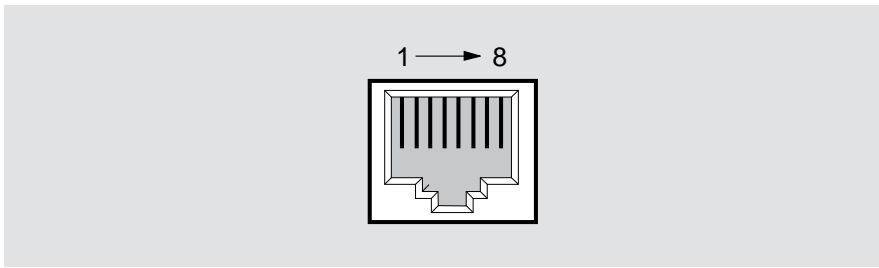
NPG-8719-95F

Table B-3: DECserver 900MC Modem Port Pin Assignments

Pins	Signal Name
4	Telephone Interface (Tip)
5	Telephone Interface (Ring)

Appendix C

Product Specifications

Overview

Introduction

This appendix lists the specifications and available parts for the DECserver 900MC.

In This Appendix

Topic	Page
Product Specifications	C-2
Acoustical Specifications	C-3
Connectors	C-4

Product Specifications

Table C-1 lists the product specifications for the DECserver 900MC module.

Table C-1: Product Specifications

Parameter	Specification
Environment	
Operating Temperature[1]	5° C to 50° C (41 ° F to 122 ° F)
Relative Humidity	10% to 95% noncondensing
Altitude	
• Operating	Sea level to 2400 m (8,000 ft)
• Non-operating	Sea level to 4900 m (16,000 ft)
Power	25.6
	4.1 A, 5Vdc 260A, 15Vdc 0.1 A, 12Vdc
Physical	
Height	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)
Depth	15.25 cm (6 in); 25.40 cm (10.0 in) when installed as a standalone unit.
Weight	1.66 Kg (3.65 lb)[2]
Shock (Class A/B for products weighing under 100 lbs)	10 G / 10 ms half sine pulse in three orthogonal axes
Vibration (Class C)	5 to 200 Hz sine sweep @ 0.25 G limited by 0.02" (0.5mm) displacement DA* 200 to 500 Hz sine sweep @ 0.10 G
Certification	CE, CSA, FCC, TÜV, UL, VCCI

[1]For sites above 2400 m (8,000 ft), decrease the operating temperature specification by 1.8° C for each 1000 m or 3.2°F for each 3200 ft.

[2] Add 1.59 Kg (3.5 lb) when attached to a DEChub ONE and 2.10 Kg (4.63 lb) when attached to a DEChub ONE MX.

Acoustical Specifications

Table C-2 lists the acoustical specifications measured in full conformance with ISO 9296 and ISO 7779 for the DECserver 900MC module in English.

Table C-2: Acoustics - Declared values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd}, B	Sound Pressure Level L_{pAm}, dBA (bystander positions)
	Idle/Operate	Idle/Operate
DSRVX-M	5.2	38
DSRVX-M + DEHUA	5.4	41
DSRVX-M + DEF1H	5.4	40

1. Current values for specific configurations are available from Digital Equipment Corporation representatives (1 B = 10 dBA).

Table C-3 lists the acoustical specifications measured in full conformance with ISO 9296 and ISO 7779/DIN EN27779 for the DECserver 900MC module in German.

Table C-3: Schallemissionswerte Werteangaben nach ISO 9296 und ISO 7779/DIN EN277792[1]

Produkt	Schalleistungspegel L_{WAd}, B	Schalldruckpegel L_{pAm}, dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	Leerlauf/Betrieb
DSRVX-M	5,2	38
DSRVX-M + DEHUA	5,4	41
DSRVX-M + DEF1H	5,4	40

1. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

Connectors

Table C-4 lists the connectors for DECserver 900MC, DEChub ONE, and DEChub ONE-MX.

Table C-4: Connectors for the DECserver 900MC

Connectors	Quantity
DECserver 900MC	
8-pin MJ	9
DEChub ONE	
15-pin D-Sub (AUI Connector)	1
DEChub ONE-MX	
15-pin D-Sub (AUI)	1
Redundant power connector (D-Sub)	1

Appendix D
Microcom Networking Protocol

Overview

Introduction

This appendix briefly describes each Microcom Networking Protocol (MNP) class and its features.

In This Appendix

Topic	Page
MNP Class 10 and MNP Class 5	D-2
Other Classes of MNP	D-3

MNP Class 10 and MNP Class 5

Each built-in modem on the DECserver 900MC supports Microcom Networking Protocol (MNP) Class 10 and MNP Class 5 Data Compression. The modem is compatible with all Microcom MNP products. Its enhanced MNP service is completely transparent to the user.

Table D-1 shows the features of MNP Class 10 and MNP Class 5.

Table D-1: MNP Class 10 and MNP Class 5

Class	Features
MNP Class 10	Optimizes performance when operating under poor line conditions.
	Provides compatibility with non-MNP modems.
	Improves the initial connection success rate by making multiple negotiation attempts when configured for auto-reliable mode.
	Uses Dynamic Transmit Level Adjustment to automatically calculate optimal transmit levels to compensate for cellular telephone signal distortion.
	Allows the user to configure the modem to negotiate the link at a low speed modulation, then upshift to a higher speed at the completion of link negotiation.
	Improves link performance during adverse channel conditions by aggressive adaptive packet assembly.
	Maximizes throughput by continuously monitoring the line quality and link performance, and then dynamically upshifting or downshifting to the optimum modulation speed.
MNP Class 5	Provides data compression, which, combined with MNP Class 4, allows throughput of almost twice the connection speed.
	Dynamically adjusts to the type of data being transmitted for maximum compression efficiency.

Other Classes of MNP

There are several other classes of MNP. Table D-2 contains a description of each class.

Table D-2: Other MNP Classes

Class Name	Description
MNP Class 2	Uses standard asynchronous framing techniques for data transmission and error correction. Due to this protocol overhead, the actual throughput is less than the bps rate of the modem.
MNP Class 3	Uses synchronous framing techniques. The modem removes start and stop bits associated with each character prior to transmitting by MNP. This results in a 20% increase in performance over Class 2. Thus, the actual throughput is greater than the modem's bps rate.
	Example:Microcom SX/2400 modems operating at Class 3 service transmits data at 2600 bps.
MNP Class 4	Uses synchronous framing techniques plus improvements developed by Microcom: Adaptive Packet Assembly and Optimized Data Phase. These enhancements result in better performance for all types of connections.
	Adaptive Packet Assembly automatically adjusts the size of the data packets based on the quality of the telephone line. When the line quality is good and there are few retransmissions, the modem increases the packet size. When the line quality is poor and retransmissions are frequent, the size of the packet decreases in order to maintain high throughput during error correction under poor conditions.
	Optimized Data Phase is the redesign of the MNP protocol header that reduces the number of overhead bytes per data packet.
	Example:Modems operating at Class 4 service transmit data at 2900 bps.

Other Classes of MNP

Table D-2: Other MNP Classes

Class Name	Description
MNP Class 6	Allows half-duplex, fast-train high-speed reliable connections with other MNP Class 6 modems at speeds of 4800 to 9600 bps.
	Universal Link Negotiation allows the modem to automatically connect with other MNP modems at the highest common speed and protocol.
	Statistical Duplexing adjusts the line bandwidth and data traffic flow during reliable connections to achieve maximum throughput, resulting in error-free transmission over 2-wire dial-up or leased lines at effective throughputs as high as 11000 bps on the AX/9600 Plus and 19200 bps on the AX/9624c with data compression.
MNP Class 7	Provides Enhanced Data Compression, which combined with Class 4 allows throughput of more than twice the connection speed. MNP Class 7 Enhanced Data Compression not only dynamically adjusts to the type of data being transmitted, but allows for the probability of character frequency, for superior compression efficiency.
MNP Class 9	Includes enhanced Universal Link Negotiation.

Appendix E

Regulatory Requirements

Overview

Introduction

This appendix contains information on regulatory requirements.

In This Appendix

Regulatory Requirements

There are certain Telephone Company and FCC regulations that apply to the DeskPorte FAST $^+$ modems when used within the United States and Canada. Table E-1 lists these regulations.

Table E-1: Regulations for United States and Canada

Country Name	Regulations
United States and Canada	The FCC has rules that permit this device to be directly connected to the telephone network, using a standardized jack. Do not use this equipment on a party or coin line.
	Malfunctioning equipment may cause damage to the telephone network. If this device is not functioning properly, disconnect it until the problem has been fixed. Otherwise, the telephone company may temporarily disconnect service.
	Repair of the modem can only be carried out by Digital Equipment Corporation. It is the responsibility of the user requiring service to report the need for service to Digital Equipment Corporation.
	If you encounter any problems with your telephone after installing any new device, disconnect the device to see if it is the source of the problem.
	The telephone company may make changes to its technical operations or procedures. If such changes affect the compatibility or use of the modem, the telephone company is required to provide adequate notice of the changes.

Information Requested by the Telephone Company

If the telephone company requests information about the equipment connected to their lines, you should provide them with the following information:

- Telephone number to which the device is connected.

- Ringer equivalence number (REN), found on the FCC sticker attached to the device. The REN determines the number of devices which may be connected to the same telephone number. In most areas, the sum of the RENs of all devices connected to the same line should not exceed five. If too many devices are attached, they may not ring properly.

- USOC telephone jack required (RJ11, RJ41, or RJ45).

- FCC registration number, which is found on the FCC sticker attached to the device.

Canadian Department of Communications Requirements

The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. 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. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility 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 the user to disconnect the equipment.

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

NOTE

Users should not attempt to make electrical ground connections themselves, but should contact the appropriate electrician authority.

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

Canadian EMI Limits

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Appendix F

AT Commands

Overview

Introduction

This appendix lists the modem AT commands in alphabetical order. It also contains the commands to change or read registers and the register descriptions.

In This Appendix

AT Commands

This section lists all the modem AT commands in alphabetical order. A command argument printed in bold is the command default setting. In most cases, you will not need to change the default setting.

NOTE

The A/ command is the only command not preceded by "AT" and not followed by a carriage return.

A/ Repeat Last Command

Re-executes the last command immediately.

A Answer

Forces the modem to go off hook in answer mode, regardless of the value of register S0. If result codes are enabled, your computer displays RING (long form) or 2 (short form) when it receives a call.

$An Auto-Answer Auto-Logon

Performs a logon sequence (created using the $Ln command) after accepting a call from a remote system. If the sequence is successful, a connection to the remote system is established.

Sequences 1 to 4 are predefined and used as default logon sequences during Dial Access Security. Sequence 5 is predefined and used for Connection Password Security. Sequence 0 disables auto-answer auto-logon.

%A*n* Auto-Reliable Fallback Character

Where *n* is an integer between 0 and 127 indicating an ASCII character (default is 0, the auto-reliable fallback character is disabled).

Sets the ASCII character recognized as the auto-reliable fallback character on the answering modem. In auto-reliable mode, when the modem encounters an incoming auto-reliable fallback character from the remote system, it automatically switches to normal mode and passes the character to the serial port. Auto-reliable fallback character recognition stops if the modem receives a SYN character (decimal 22).

NOTE

- Do not set *n*=63 or *n*=126. These settings interfere with V.42 negotiations.

- With this command, \N3\C2 must also be set.

---

*A Request Remote Access

Initiates a request for remote access. When you type AT*A   the requesting modem waits 10 seconds for a response from the answering modem. If that modem denies remote access, the requesting modem displays REMOTE ACCESS FAILED (numeric 40) and returns to command state.

This command automatically sends the character set by *S. For the *A command to be successful, *S must be set the same on both modems.

NOTE

Register S12 (guard time) should be set to the same value on both modems. If register S12 is set to a value greater than 127, the requesting modem waits up to 20 seconds for a response to a remote access request. Remote access is available only during a normal connection or during an MNP reliable connection without data compression.

\An Maximum MNP Block Size

Sets maximum block size for MNP stream link connections.

0 = Sets block size up to a maximum of 64 characters
1 = Sets block size up to a maximum of 128 characters
2 = Sets block size up to a maximum of 192 characters
3 = Sets block size up to a maximum of 256 characters

-AnAuto-Retrain Threshold

Sets the maximum number of times the modem can auto-retrain, where n = 0 to 255 (Default = 0).

Bn ITU-T/Bell Mode

0 = Uses ITU-T V.22 and V.21 standards at 1200 and 300 bps

1 = Uses Bell 212A and 103 standards at 1200 and 300 bps

$Bn Serial Port Bps Rate

Where n = 75, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, **115200** bps

Sets the serial port bps rate when issued.

%Bn Modem Port Bps Rate

Where n = 75, 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, V14400, 16800, 19200, 21600, 24000, 26400, 28800, 33600 bps

When you enter this locally, sets the modem port bps rate. Downshifting can still take place.

When you enter this during a remote access session, the new modem port bps rate does not take effect until the current connection ends.

If %G0 is set, an AT issued locally causes the modem port speed to match the serial port speed, regardless of any previous %B setting.

If %G1 is set, the modem speed is changed only when you enter a %Bn command. Entering %F1, %F2, or %F3 causes the modem to change to either split speed or 1200 bps.

\B*n* Transmit Break

Where *n* is an integer between 1 and 9 indicating the time (in increments of 100 milliseconds) to send the Break. (Default is **300** milliseconds). During a reliable link the Break always equals 300 milliseconds

Transmits a Break to the remote system from command state. To return to connect state, type ATO. (See also \K.)

%C*n*Compression Control

%C0	Disables data compression.
%C1	Enables MNP Class 5 Data Compression only.
%C2	Enables V.42bis compression only.
%C3	Enables both V.42bis and MNP Class 5 compressions. The modem matches the capability of the remote modem.

Determines whether the modem attempts to use data compression during reliable connections. We recommend leaving this command at its default setting **(%C3).** This allows the modem to establish a reliable connection using either MNP Class 5 Data Compression or V.42bis compression, depending on the capability of the remote modem. Setting this command to 1 or 2 restricts the modem to using either MNP Class 5 Data Compression or V.42bis compression, respectively, otherwise a non-compression connection results.

If the remote modem does not support data compression or has data compression disabled, the modem can establish a connection without data compression, regardless of the modem's %C setting.

NOTES

- We recommend disabling bps rate adjust (\J0) for the most throughput. When bps rate adjust (\J1) is set and the modem establishes a reliable connection at speeds between 4800 and 14400 bps, the serial port adjusts to 9600 bps. If the connection speed is above 14400 bps, the serial port adjusts to 19200 bps.

- Remote access is available during normal connections or during MNP reliable connections when data compression is disabled (%C0).

&C*n*Serial Port DCD Control

&C0   DCD always On.

&C1   DCD follows the state of the carrier from the remote system; DCD turns On after the connect message.

&C2   DCD On except momentarily at disconnect.

    Controls the Carrier Detect (DCD) signal on the serial port. Use this command if your computer requires DCD to be Off at certain times. See also the \D command description.

NOTE

The &C and \D settings are ignored while connected in V.23 half-duplex direct mode (%F3) or ITU-T V.13 (&R2). Hardware flow control overrides the &C and \D settings for CTS operation. (See also \Q.)

@C*n*CTS, DSR, and DCD Connect Message Control

@C0   CTS, DSR, and DCD On after the connect message is sent.

@C1   CTS, DSR, and DCD On before the connect message is sent.

    Specifies whether CTS, DSR, and DCD go On before or after a connect message. Use this command with :T14.

\C*n*Auto-Reliable Buffer

\C0   Does not buffer data during link negotiation. Switches to normal or direct mode if no SYN character detected within 3 seconds.

\C1   Buffers all data on the answering modem until it receives either 200 non-SYN characters or a SYN character within 3 seconds (this delay is longer for modem speeds 300 or below). If it receives 200 non-SYN characters, the modem switches to normal mode and passes the data through to the serial port. If it detects a SYN character within 3 seconds, it attempts to establish a reliable connection. Otherwise, it switches to normal mode.

\C2   Does not buffer data on the answering modem. Switches to normal mode upon receipt of a character defined by the AT%A command and passes that character to the serial port.

Determines whether the answering modem set to auto-reliable mode and auto-answer buffers data from the remote modem during the 3 seconds when it tries to establish a reliable connection. When the modem receives calls both from modems that support MNP and from modems that do not, set \C2. This allows the modem to switch to normal mode as soon as it detects a log-on character (defined by %A) from a non-MNP caller. This eliminates the 3-second wait. (See the \N command description for more information about auto-reliable and normal modes.)

For example, use %A to set the auto-reliable fallback character to ASCII 13 (carriage return). Then set \C2\N3. Non-MNP callers who connect and press to log on do not have to wait for the 3-second auto-reliable window to expire before data can pass.

NOTES

When either \C1 or \C2 is set, reliable and normal connections may result independently of bps rate adjustments. However, when \C0 is set, bps rate adjustments affect the type of connection as follows:

- reliable and direct connections may result when bps rate adjust is On (\J1)

- reliable and normal connections may result when bps rate adjust is Off (\J0)

When falling back to V.23 full duplex connections and either \C1 or \C2 is set, reliable and normal connections may result independently of the \W command. However, when \C0 is set, the split serial port speed affects the type of connection as follows:

- direct connections result when split speed is enabled (\W1)

- normal connections result when split speed is disabled (\W0)

When either \C0\N3 or \C1\N3 are set, the modem takes approximately 12 seconds to drop to a normal mode V.21 connection.

D *<dial string>* Dial

Where <dial string> is a string of up to 98 characters. Valid dial string characters are: 0-9, dial modifiers, and for tone dialing A, B, C, D, #, and *. The modem ignores invalid characters. Dial strings longer than 98 characters produce an error message.

Dials a telephone number and attempts to establish a connection. The Dial command must be the last one on a command line.

To cancel the Dial command, press any key or use your data communications software to lower DTR (unless &D0 is set).

Example   To dial the telephone number 011 22 555 1234, type:
ATD 011225551234

NOTE

After disconnect, there is a five second delay before the modem goes off hook in originate mode.

Dial Modifiers

Dial modifiers allow you to add conditions to the telephone number you dial. You can use several modifiers with the same telephone number. Dial modifiers include:

J   (Link Negotiation) Perform link negotiation at 1200 bps for the current connection only. (This dial modifier is equivalent to the *H1 command.)

K   (Cell-Side Cellular Connection) Sets M1 for the current connection only.

Nn   (Dial an Alternate Stored Number) Follows the last character in a dial string and, if the modem fails to make a connection, the Nn modifier dials an alternate telephone number. n is a two-digit number between 01 and 40 that corresponds to a telephone number stored in the directory with the &Zn or \Pn command.

Example   ATD 5551234N03

If you do not enter a value for n, the modem dials the first stored entry.

You can also store the Nn modifier at the end of the dial string. If you do not specify any value for n at the end of a stored phone number and the modem fails to make a connection, it dials the number in the next position. Stored number 01 follows stored number 40.

Example   AT\P04 5551234N03

O   (Cell-Side Cellular Call) Sets the modem to operate with a cell-side (remote) cellular phone, for the current connection only. This has the same effect as including the cellular string \N2)M1:E0@M18*H1 in the dial command. These settings use the MNP reliable mode, force power adjustment for cell-side calls, select an initial transmit level of -18 dBm, and force link negotiation to occur at 1200 bps.

NOTE

This modifier is unnecessary for land-side (central) sites. Your modem automatically adjusts to incoming cellular calls.

P   **(Pulse Dial)** Placed anywhere in the dial string, causes the modem to pulse dial the number.

Example   ATD P5551234

Tone dial is the default setting. The last P or T dial modifier used remains in effect until you either issue a dial command with a different P or T modifier or reset the modem. Also, you can combine P and T dial modifiers within a dial string.

Example   Pulse dial a local telephone number and tone dial an access code and telephone number by typing: ATD P5551234 T33 5556789

R   (Dial a Number in Answer Mode) Must follow the last character in the dial string. Causes the modem to dial in answer mode when calling an originate-only modem.

Example   ATD 5551234R

S   (Dial the First Stored Telephone Number) Follows the Dial command and causes the modem to dial the telephone number stored as entry 01 with the &Z01 or \P01 command. The telephone number displayed as the modem dials it.

Example   ATDS

T   (Tone Dial) Placed anywhere in the dial string, causes the modem to tone dial the number.

Example   ATD T12345

NOTE

Tone dial is the default setting. The last P or T dial modifier used remains in effect until you either enter a dial command with a different P or T modifier or reset the modem. You can combine P and T dial modifiers within a dial string.

Example	Pulse dial a local telephone number and tone dial an access code and telephone number by typing: ATD P5551234 T33 56789
W	(Wait for Dial Tone Before Dialing) Inserted between digits in a dial string, causes the modem to wait for a second dial tone up to the register S7 time delay before dialing the number. If the modem receives a dial tone before the register S7 delay expires, it continues dialing. If it does not receive a dial tone, it displays NO DIALTONE and hangs up.
Example	ATD 5551234 W 5556789
^A	(Link Negotiation) Perform link negotiation at 4800 bps for the current connection only. (This dial modifier is equivalent to the *H2 command.)
,	(Pause During Dial) Inserted in a dial string, causes the modem to pause for the register S8 delay before dialing the next digit. The default is **2 seconds**. Use more than one comma for a longer pause.
Example	When you need to dial {9} and pause for another dial tone before dialing an outside line, do the following: ATD 9,,5551234
@	(Wait for Quiet Answer Before Dialing) Inserted between characters in a dial string and causes the modem to wait for the register S7 time delay, for at least one ring followed by five seconds of silence, before acting on the next character in the dial string. If the modem does not detect this sequence, it displays NO ANSWER and hangs up. Use this modifier when the system you are calling does not provide a dial tone.
Example	ATD 5551234 @ 43210
!	(Flash) Inserted between characters in a dial string, causes the modem to go on hook for 1/2-second and then go back off hook, as though you depressed the switch-hook button on your telephone.
;	(Return to Command State After Dialing) Added to the end of a dial string, tells the modem to remain in command state after it dials the digits preceding the semicolon. This lets you enter dial strings longer than 98 characters. After the final Dial command, the modem tries to establish a connection. To abort dialing before you attempt to make a connection, type ATH. Each Dial command except the last one must end with a semicolon.
Example	ATD 9,5551234; OK ATD 5556789 @ 55512345678 W 344
+n	(Force Logon Sequence) Dial, connect, and perform the logon sequence n (where n=1-9).
Example	To perform sequence 1, type: ATD5551234+1

$ (Bong Detect) Detects an AT&T BELLCORE service prompt to enter a calling card number and authorization. When the modem encounters a "$" modifier within a dial string, it waits to receive this "bong" signal. Once it detects it, the modem continues processing the dial string. If the time set by register, S7 elapses first, the modem hangs up and displays NO PROMPT TONE.

NOTE

This modifier is valid only in the United States, Canada, Mexico, and Israel.

Operating Mode Dial Modifiers

Use the following dial modifiers to override the \Nn command setting. Placed anywhere in the dial string, these modifiers cause the modem to override the \Nn setting for that connection only.

Example If your modem is set for \N3 (auto-reliable) for answering and you are calling a modem that you know does not support error correction, use the Z dial modifier to force normal mode: ATD 5551234Z

M (Dial in LAPM Mode) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in LAPM reliable mode for the current connection only.

Q (Dial in LAPM Mode with Fallback to Normal) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in LAPM reliable mode with fallback to normal mode for the current connection only.

U (Dial in Direct Mode) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in direct mode for the current connection only.

V (Dial in LAPM Mode with Fallback to MNP) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in LAPM reliable mode with fallback to MNP for the current connection only.

X (Dial in Auto-Reliable Mode) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in auto-reliable mode for the current connection only.

Y (Dial in MNP Reliable Mode) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in MNP reliable mode for the current connection only.

Z (Dial in Normal Mode) Placed anywhere in the dial string, causes the modem to override the current operating mode and dial in normal mode for the current connection only.

DL Redial the Last Telephone Number Dialed

Redials the last telephone number that the modem dialed.

D/*n* Dial a Stored Telephone Number

Where *n* is a two-digit integer between 01 and 40 that specifies a telephone number previously stored in the directory with the &Z*n*= or \P*n* command.

Dials one of 40 telephone numbers stored in the directory with the &Z*n*= or \P*n* command. The telephone number is displayed as it is dialed.

$D Power-Up Diagnostics

Performs power-up diagnostics. Also, when all switches in both banks are up, performs a reset and power-up diagnostics continuously.

%D*n* Disconnect Buffer Delay

Where *n* is an integer from 0 to 255 representing seconds (Default is **0**).

Sets a delay during which the modem attempts to process data in its transmit or receive buffer before disconnecting. When your software lowers DTR or you type ATH, the modem attempts for *n* seconds to empty its transmit buffer before disconnecting. When carrier drops, the modem attempts for *n* seconds to empty its receive buffer before disconnecting. If its buffers are empty or if *n*=0, the modem disconnects without delay.

If a physical disconnect occurs (for example, the connection drops from too many retransmissions in reliable mode), the modem can process only the receive buffer. If the delay expires before the modem empties its buffers or it is in command state at disconnect, it may loose data.

&D*n* DTR Control

&D0 Ignores DTR. DTR is not needed for auto-answer.

&D1 Enters command state on detecting On-to-Off transition of DTR; DTR is not needed for auto-answer.

&D2 Goes on hook on detecting On-to-Off transition of DTR and prepares the serial port to accept an AT at any speed. DTR is needed for auto-answer.

&D3 Goes on hook and resets on detecting On-to-Off transition of DTR and prepares the serial port to accept an AT at any speed. DTR is needed for auto-answer.

The On-to-Off transition of DTR must last as long as the value specified in register S25 (default is 0.05 second). Positive transitions of DTR (Off-to-On) that occur within five seconds after disconnect are ignored.

-D Repeat Dial

-D *<dial string>*	Where <dial string> is a string of up to 98 characters. Valid dial string characters are: 0-9, dial modifiers, and for tone dial, #, A, B, C, D and *. The modem ignores invalid characters.
-D/*n*	Where *n* is a two-digit integer between 01 and 40 that specifies a telephone number previously stored with \P*n*.
-DL	Redials the last number dialed.
-DS	Dials the first entry stored in the directory.

Redials a number up to 9 tries until connection. In reliable mode, it does not redial if a remote modem answers but fails to establish a reliable connection.

:D*n* Manual Dial

:D0	Modem does not go off hook when DTR is raised.
:D1	Modem goes off hook in originate mode when DTR is raised. &Dn (where n=1, 2, or 3) must also be set.
:D2	Modem goes off hook in originate mode and dials the first stored telephone number when either DTR is raised or the T/D button is pressed. &Dn (where n=1, 2, or 3) must also be set. The O/A button must be in originate mode (not lit).

Determines whether modem goes off hook in originate mode if DTR is raised.

NOTE

When :D1 or :D2 is set, register :T18 must be set to 0.

\D*n* Serial Port DSR/CTS Control

\D0	DSR and CTS are always On.
\D1	DSR and CTS follow DCD. If &C1 is also set, DSR follows off hook.
\D2	DSR and CTS both follow DCD.
\D3	DSR complies with ITU-T recommendations, CTS is always On.
\D4	DSR and CTS comply with ITU-T recommendations.

Controls the Data Set Ready (DSR) and Clear To Send (CTS) signals on the serial port. Use this command when the central-site computer requires the DSR and CTS signals to be Off at specific times.

NOTES

- Hardware flow control overrides &C and \D settings for CTS. (See \Q.)

- The modem ignores &C and \D settings while connected in V.23 half-duplex direct mode (%F3) or ITU-T V.13 (&R2).

- When \D4 is set, &D should be set to a value greater than 0.

- ITU-T recommends that DSR comes On when establishing a connection and drops when the connection ends.

- ITU-T recommends that CTS follows DTR while in command state; drop either when answer tone is detected when originating, when going off hook when answering, or when connection ends; and follows connection status during connection.

Use the following table when your computer requires DSR and CTS to be Off. It shows &C and \D settings and the result of combining the two commands.

&C	\D	Result
0	0	DCD On, DSR On, CTS On
0	1	DCD On, DSR On, CTS On
0	2	DCD On, DSR On, CTS On
0	3	DCD On, DSR complies with the ITU-T recommendations, CTS On
0	4	DCD On, CTS/DSR comply with the ITU-T recommendations
1	0	DCD follows modem carrier, DSR On, CTS On
1	1	DCD follows modem carrier, DSR follows off hook, CTS follows DCD
1	2	DCD follows modem carrier, DSR and CTS both follow DCD setting
1	3	DCD follows modem carrier, DSR complies with the ITU-T recommendations, CTS On
1	4	DCD follows modem carrier, CTS/DSR comply with the ITU-T recommendations

&C	\D	Result
2	0	DCD On (Off for a few seconds at disconnect only), DSR On, CTS On
2	1	DCD, DSR, and CTS On (Off for a few seconds at disconnect)
2	2	DCD, DSR, and CTS On (Off for a few seconds at disconnect)
2	3	DCD Off at disconnect then On, DSR complies with the ITU-T recommendations, CTS On
2	4	DCD On (Off for a few seconds at disconnect), CTS/DSR comply with the ITU-T recommendations

E*n* Command Echo

E0   Inhibits the echoing of commands to the local device.

E1   Echoes commands to the local device.

%E*n* Auto-Retrain

%E0   Disables the automatic retrain sequence.

%E1   Enables the automatic retrain sequence (at 2400 bps or higher).

When %E1 is set and line quality is too poor to sustain communications, the modem tries up to three times to resynchronize the modems (for a total of up to six seconds) before hanging up. The TST indicator lights during auto-retraining. The modem can retrain during connections at 2400 bps or higher. Use ATO1 to force the retrain sequence when %E0 is set.

NOTE

The modem ignores %E0 during V.34, V.32bis and V.32 connections.

---

*E*n* Enable Remote Access

*E0   Disables remote access.

*E1   Enables remote access.

Determines how the modem responds to a request for remote access. Remote access is available only during a normal connection or during an MNP reliable connection without data compression.

NOTE

The modem does not support remote access during LAPM reliable connections.

-E*n* Modem Port Data Length

-E0   Enables 10-bit data during normal mode connections.

-E1   Enables 11-bit data during normal mode connections.

Determines the number of data bits used on the modem port during normal mode connections (when \N0 is set) when the serial port is configured for asynchronous transmission of 11-bit characters. Both modems must be set to the same number of data bits.

NOTE

The modems will not be able to pass data when a reliable connection (\N3 or \N5 is set) falls back to a normal connection with 11-bit data characters enabled on both modems.

.:E*n* Compromise Equalizer

:E0   Disables the compromise equalizer only when the modem is in V.32bis or V.32 mode; may be useful for direct line connections or PBX-to-PBX connections.

:E1   Enables the compromise equalizer; may be useful for outside-line-to-outside-line or PBX-to-outside-line connections.

Controls equalization operation when the modem connects in V.32bis or V.32.

\E*n* Data Echo

\E0   Does not echo data sent by the local computer.

\E1   Echoes data sent by the local computer.

                When operating in connect state, determines whether the modem echoes characters
                sent from the local computer. \E1 functions only during normal mode connections.

%F*n* V.23 Mode

%F0   Allows multi-protocol answering; disables V.23 mode on originating modem.

%F1   75 bps transmit, 1200 bps receive (split speed) V.23 operation.

%F2   1200 bps transmit, 75 bps receive (split speed) V.23 operation.

%F3   1200 bps transmit, 1200 bps receive (half duplex) V.23 operation.

                Determines the V.23 mode used at 1200 bps. You can configure either channel with
                the %Fn command for transmitting or receiving data. For split-speed operation, the
                originating and answering modems must be set to opposite V.23 split-speed mode
                command settings: set %F1 on the modem transmitting at 75 bps and %F2 on the
                modem transmitting at 1200 bps. For example, if you set your modem to transmit data
                at 1200 bps and receive data at 75 bps, it can establish a V.23 connection only with a
                remote modem that transmits data at 75 bps and receives data at 1200 bps.

NOTE

Typing AT%Fn (where n=1, 2, or 3) disables all protocols except V.23. Typing
AT%Bn forces the %F0 setting.

During normal split-speed connections:

- Set \J0 to operate at the speed of the serial port prior to the connection.

- Set \J1 for a 1200 bps constant speed.

During direct connections, the computer must also be able to accommodate split
transmit and receive speeds. For other connections, you can use \Wn to control serial
port speed.

V.23 half-duplex operation is available only for direct and normal connections. V.23
half-duplex connections should have %F3 set on both modems.

NOTES

- The connect message displayed when a V.23 half-duplex connection is established is CONNECT V.23 HDX.

- The connect message displayed when a V.23 split-speed connection is established is CONNECT V.23.

- When the originating modem is set to normal mode, you must send a few characters to the answer modem before the modem can fall back to a V.23 half-duplex connection.

When %F0 is set and the modem is at 1200 bps or higher, it can answer as a V.23 1200/75 bps modem or a V.23 1200/1200 bps half-duplex modem.

When %F3 is set, the modem can only establish normal or direct 1200 bps half-duplex connections.

The \S command shows MODEM BPS V.23 when the modem establishes a V.23 connection.

This section lists the commands to configure the modem for each modulation protocol and mode. Modem connection speeds are in parentheses.

When %F1, %F2, or %F3 is set for V.23 connections:

Protocol	Command
V.23 (TX 75 bps/RX 1200 bps) Split Serial Port Speed	%F1\W1
V.23 (TX 75 bps/RX 1200 bps) Constant Serial Port Speed	\W0%F1\J0
V.23 (TX 1200 bps/RX 75 bps) Split Serial Port Speed	%F2\W1
V.23 (TX 1200 bps/RX 75 bps) Constant Serial Port Speed	\W0%F2\J0
V.23 (1200 bps half duplex)	%F3

NOTES

- If a direct connection results, the computer must be set to split speed to match the modem speeds.

- All V.23 connections are available only for direct and normal connections.

&F Restore Factory Defaults

First restores the factory default settings and, if Bank 2, Switch 5 is up, sets the options selected by the configuration switches. Stored telephone numbers are preserved.

-F*n* Secondary Flow Control

-F0   Disables secondary flow control characters.

-F1   Enables secondary flow control characters.

Controls whether the modem sends or receives secondary flow control characters on the serial port. When -F1 is set and primary flow control enabled on the serial port, the modem sends two flow control characters (one primary and one secondary) to the host for flow control processing.

If the modem receives either a primary or secondary XOFF flow control character, it stops sending data until it receives the corresponding primary or secondary XON character.

\F Read Stored Phone Numbers

Displays the telephone numbers currently stored in the telephone directory. To cancel a display, issue a Break with your data communications software.

$G*n* Dial Access Security

$G0   Disables Dial Access Security.

$G1   Enables Dial Access Security.

Controls whether the modem uses Dial Access Security during logon. If you also want the modem to auto-answer, set register S0=1.

%G*n* Independent Serial Port/Modem Port Speed

%G0   Serial port speed determines modem port speed.

%G1   %B command determines modem port speed.

Determines whether the modem port speed updates to match the serial port speed with each AT command. When %G1 is set, the modem port speed does not update, and you must change it with a %B or %Fn command.

When you send an AT command string to the modem, it adjusts its modem port speed automatically to match the AT speed. You can disable this feature with %G1. When %G1 is set, you can change the modem speed with the %Bn (where n is the new modem speed) and %Fn commands.

This section lists the commands to configure the modem for each modulation protocol and mode. Modem connection speeds are in parentheses.

Protocol	When %F0 is set: Issue %G0:	Issue %G1:
V.21 (75-300 bps)	B0 at 300 bps	B0%B300
Bell 103 (75-300 bps)	B1 at 300 bps	B1%B300
V.22 (600 bps)	at 600 bps	%B600
V.22 (1200 bps)	B0 at 1200 bps	B0%B1200
Bell 212A (1200 bps)	B1 at 1200 bps	B1%B1200
V.22bis (2400 bps)	at 2400 bps	%B2400
V.32 (4800 bps)	at 4800 bps	%B4800
V.32 (7200 bps)	at 7200 bps	%B7200
V.32 (9600 bps)	at 9600 bps	%B9600
V.32bis (12000 bps)	at 12000 bps	%B12000
V.32bis (14400 bps)	at 14400 bps	%B14400
V.34 (14400 bps)	at 14400 bps	%BV14400
V.34 (16800 bps)	at 16800 bps	%B16800
V.34 (19200 bps)	at 19200 bps	%B19200
V.34 (21600 bps)	at 21600 bps	%B21600
V.34 (24000 bps)	at 24000 bps	%B24000

Protocol	When %F0 is set: Issue %G0:	Issue %G1:
V.34 (26400 bps)	at 26400 bps	%B26400
V.34 (28800 bps)	at 28800 bps	%B28800

NOTE

For the modem to achieve the highest possible throughput available, set the modem port speed by typing AT%G1%B*n* (where *n* equals the desired speed).

&G*n* Guard Tone

&G0   Disables guard tone.

&G1   Sets guard tone on the answering modem to 550 Hz.

&G2   Sets guard tone on the answering modem to 1800 Hz.

NOTE

Outside the United States and Canada, some phone systems require a modem to send a guard tone after an answer tone.

\G*n* Modem Port Flow Control

\G0   Disables modem port flow control.

\G1   Sets modem port flow control to XON/XOFF.

\G2   Sets modem port flow control to unidirectional XON/XOFF.

Sets the flow control method used to pace data between modems during a normal mode connection. When \G1 is set, the modem sends an XOFF character to stop receiving data, and sends an XON character to resume. When \G2 is set, the modem sends XON and XOFF characters to the remote device but ignores XON and XOFF characters from the remote device.

NOTES

- The reliable mode has its own method of flow control and ignores the \G setting. However, \Qn settings remain active.

- Both modems must have the same primary flow control characters set during normal connections. (See the :T9 and :T10 register descriptions.)

H   Hang Up

H0   Disconnects from the remote system and hangs up the telephone line.

H1   Disconnects from the remote system and goes off hook in command mode.

The modem ignores positive transitions of DTR for five seconds after disconnecting.

NOTE

If %D is set to a value other than 0, hang up may not occur immediately.

$H*n* Edit Dial Access Security Database

Where *n*=1-40 indicates a position in the Dial Access Security database. Allows the security administrator to enter valid users and passwords.

)H*n* Automatic Dial Connection Restoral Timer

Where *n* is an integer from 0 to 255 minutes (Default is **0** (disabled)).

When a connection fails, specifies how long the local modem tries to re-establish the physical data link with the remote modem. It also specifies how long the remote modem waits for the local modem to re-establish the link. If the modems do not establish a new connection in the time specified by)H, they disconnect.

This command is only valid during MNP reliable connections. It must be set on both modems. If flow control is enabled, the modems stop receiving data from the host until the time specified by)H expires or until a connection is reestablished.

NOTE

Your modem will try 9 redials (see the -D command), so do not set)H greater than 2.

---

*H*n* Link Negotiation Speed

*H0   Link negotiation occurs at the highest supported speed.

*H1   Link negotiation occurs at 1200 bps.

*H2   Link negotiation occurs at 4800 bps.

Sets the connection speed for link negotiation for connections before upshift occurs between two MNP Class 10 modems. Use the *H1 or *H2 setting to set the connection speed to 1200 or 4800 bps, respectively, to facilitate link negotiation over poor telephone lines.

-H*n* Dumb Mode

-H0   Disables dumb mode (sets smart mode).

-H1   Enables dumb mode.

Used to configure the modem to ignore commands and not send result codes. The modem is in smart mode when it recognizes commands.

NOTE

If you set dumb mode, you can reset the modem to accept AT commands by turning it off and on.

\H*n* **Hewlett Packard ENQ/ACK**

\H0   HP ENQ/ACK protocol disabled.

\H1   HP ENQ/ACK protocol enabled during MNP reliable link; modem emulates terminal.

\H2   HP ENQ/ACK protocol enabled during MNP reliable link; modem emulates host.

Hewlett Packard ENQ/ACK support allows the modem to emulate the ENQ/ACK protocol when an MNP reliable link is established. Flow control may be used in addition to the ENQ/ACK protocol if the host or terminal supports it. Each data block should not exceed 250 characters. To use the HP ENQ/ACK protocol:

- Set the modem at the host to \H1.

- Set the modem at the terminal to \H2.

- Enable either XON/XOFF (\Q1) or hardware (\Q3) flow control on the serial port on both modems to prevent data loss.

- Establish an MNP reliable link.

NOTE

The modem does not support HP ENQ/ACK protocol during V.42 LAPM reliable connections.

---

^H **Host Port Upgrade**

Installs new firmware from a computer file to the modem's flash memory.

NOTE

This is part of the memory update operations.

I*n* **Identification** ;

I0   Displays the 4-digit modem product code.

I1   Performs a checksum on the firmware ROM and displays the 3-digit result.

I2   Performs a checksum on the firmware ROM and displays the checksum status, which should display OK.

I3   Displays modem name and revision.

$I Display Dial Access Security Database

Allows the security administrator to display the Dial Access Security database.

%I*n* Edit Connection Security Password (Asynchronous Mode)

Edit Connection Security password n, where n = 0 to 49. (Default is **no password**.)

Allows the security administrator to set a new password or change the existing password. Passwords set by this command are verified during link negotiation by using the $M command.

You can password protect the Connection Security password with the $P command. If a password exists and has not been entered within the last two minutes, the modem prompts you for this password first. Then it asks you for the Connection Security password at the NEW PASSWORD: prompt.

NOTE

If the logon sequence has no password protection, then any user can set a new password or edit an existing one by using the %I command.

Passwords must contain exactly five alphanumeric characters. The modem ignores upper case or lower case and parity. You must type the old password correctly to enter a new password. You must type the new password the same way both times for it to take effect. Periods echo as you type the password.

You can enter up to fifty passwords for both the originating and answering modems (see %I*n*, where *n* = 0 to 49). During link negotiation, the originating modem sends password 0 to the answering modem when $M1 is set. The answering modem checks its list of passwords to see whether the password matches any of its passwords 0 though 49. If there is a match, the connection proceeds. If not, the connection fails. When $M2 is set on the answerer, if the originator's password does not match one of the answerer's passwords, the answerer uses auto-logon string 5 to prompt the remote user (up to three times) for the Connection Security password. If the Auto-Logon sequence fails, the connection fails.

Default sequence 5 is:
D2A20' Connection Password:' P2 '^M^J'Z

Where:	Means:
D2A20 'Connection Password:'P2	send the string **Connection Password:** to the remote user and wait for a string containing the user's password. Echo periods to the remote user. If a string is not received within 20 seconds, abort and disconnect.
'^M^J'	send a carriage return and a line feed.
Z	check the Connection Security Password Database for the password. If there is a match, the connection proceeds. If no match, retry the sequence up to two times more (for a total of three tries), then disconnect.

%I*n*;*ppppp*;*sssss*Edit Connection Security Password (V.25bis Synchronous Mode)

Edit Connection Security password *n*, where *n* = 0 to 49, *ppppp* is the Security Database Password, and *sssss* is the Connection Security Password.

Allows the security administrator to set a new password or change the existing password. If you set $M1 or $M2, the modem verifies passwords set by this command during connection establishment.

You can password-protect the Connection Security password with the $P command. If a Security Database Password exists, you must enter it accurately for the new Connection Security Password to take effect. If there is no Security Database Password, you can just enter the two semicolons and new Connection Security Password.

Passwords must contain exactly five alphanumeric characters. The modem ignores upper case or lower case and parity.

You can enter up to fifty passwords for both the originating and answering modems (see %I*n*, where *n* = 0 to 49). During connection establishment, the originating modem sends password 0 to the answering modem. The answering modem checks its list of passwords to see whether the password matches any of passwords 0 to 49. If there is a match, the connection proceeds. If not, the connection fails.

*I Modem Identifier

Sets the modem identifier that displays as part of the remote access session banner. You can also display the identifier with the \S command. When you enter the *I command, the ID: prompt appears.

The identifier can consist of up to 25 ASCII characters. It truncates after the twenty-fifth character. There is no default setting for the *I command.

$J*n* Clear Dial Access Security Database, Stored Telephone Numbers, and Connection Security Password Database

$J0   Clears the Dial Access Security database and restores the factory default auto-logon sequences $L1 - $L5.

$J1   Clears the Dial Access Security database, restores the factory default auto-logon sequences $L1 - $L5, and clears the Connection Security Password Database. Also, clears stored telephone numbers from the modem's telephone directory and clears the last dialed number.

WARNING

AT$J1 is a very powerful command. It clears all passwords from the modem's security databases and all stored telephone numbers.

-J*n* Detect Phase

-J0   Disables the detect phase.

-J1   Enables the detect phase.

Indicates whether the originating modem sends the V.42 control sequence to the answering modem to determine the type of error correction it has enabled. The answering modem can have LAPM, MNP, or no error correction enabled. See the \N command description for the types of connections.

\J*n* Bps Rate Adjust

\J0   Disables the bps rate adjustment feature.

\J1   Enables the bps rate adjustment feature.

After establishing a connection with \J1 set, the modem automatically adjusts its serial port speed to match the connection's speed until that connection terminates. If your computer does not automatically change to the adjusted bps rate, you must manually change the bps rate to the new setting. When **\J0** is set, the serial port rate is independent of the rate of the connection.

When the modem establishes a reliable connection at speeds between 4800 and 14400 bps with bps rate adjustment enabled, the serial port speed adjusts to 9600 bps. If the connection speed is above 14400 bps, the serial port adjusts to 19200 bps. If you set the serial port to the modem's highest rate of 115200 bps, turn off bps rate adjustment to make sure that the serial port stays at 115200 bps.

NOTES

- Refer to the %F command description for information about using the \J command during V.23 connections.

- See the %Un command for information about resetting the serial port bps rate. When \J1\C0\N3 are set, the modem uses direct mode instead of normal mode if a reliable connection is not established.

We recommend turning off bps rate adjust (\J0) when you use data compression to retain the highest throughput.

$K*n* Disable Switch Banks

$K0   Enables all configuration switch banks.

$K1   Disables switches.

-K*n* MNP Extended Services

-K0   Disables MNP Extended Services.

-K1   Enables MNP Extended Services.

-K2   Enables MNP Extended Services without MNP indication during the answer detect phase.

MNP Extended Services allow two modems that support them to use MNP data services that are not available with LAPM. For example, two modems with MNP Extended Services enabled will negotiate MNP Class 10 with V.42bis compression in preference to LAPM.

:K*n* Kermit/UUCP Protocol

:K0   Disables Kermit and UUCP spoofing asynchronous protocols.

:K1   Enables Kermit spoofing asynchronous protocol.

:K2   Enables UUCP spoofing asynchronous protocol.

Enables the Kermit or UUCP spoofing asynchronous protocol (emulation). The same protocol (Kermit or UUCP) must be enabled on *both* the originating and answering modems. You can use the Kermit and UUCP protocols only during an MNP reliable connection, with or without data compression. The protocols are not available during direct, normal, or synchronous operation.

The Read Online Status command displays KERMIT when the modem establishes a Kermit connection and UUCP for a UUCP connection.

See also the :Q command.

\K*n* Break Control

Where *n* is a number between 0 and 5 indicating the type of Break the modem transmits (Default is **5**).

Determines the type of Break the modem transmits when a Break enters the modem. The following tables list the different effects of the *n* value when the modem receives or transmits the Break. The modem can buffer up to four Breaks on both the modem port and the serial port.

NOTE

In the reliable link connect state, the sender's Break control setting determines how the receiver handles the Break.

The following table illustrates the \K*n* command.

Command	Local DTE sends Break during reliable or normal connection	Local DTE sends \B*n* ; local modem in command mode, during reliable or normal connection	Local modem sends Break during Direct connection	Remote modem sends Break during normal connection
\K0	Enter command state; no Break to remote system1	Empty data buffers; send Break to remote system	Send Break to remote system; set modem to command state	Empty data buffers; send Break to serial port
\K1	Empty data buffers; send Break to remote system	Same as \K0	Send Break to remote system	Same as \K0
\K2	Same as \K0	Immediately send Break to remote system	Same as \K0	Immediately send Break to serial port
\K3	Immediately send Break to remote system	Same as \K2	Same as \K1	Same as \K2
\K4	Same as \K0	Send Break to remote system in sequence with any transmit data being buffered	Same as \K0	Send Break to serial port in sequence with receive data being buffered
\K5	Send Break to remote system in sequence with transmit data	Same as \K4	Same as \K1	Same as \K4

1.Forces the modem to command state. To transmit a Break and enter connect state, issue AT\BO. (See the \B command description for details.)

$L*n* Logon Sequence

Edit logon sequence *n*, where *n* = 1-9.

Allows you to edit logon sequences to be used during normal or reliable connections in either originate mode or auto-answer mode. If a Security Database password has been set, you must enter the correct password before you can edit a logon sequence. (See also the $P command.) If no password has been set, anyone can edit the logon sequence.

%L*n* Speed Matching

%L0   Provides partial speed matching.

%L1   Enables speed matching.

%L2   Disables speed matching.

%L3   Enables ITU-T Automode.

Determines whether the modem uses speed matching to establish a connection.

With %L3 set, modem operation complies with the proposed annex to the ITU-T V.32 specification for automoding when interworking with V.22bis and V.22 modems. :T13 defines how long the answering modem tries to establish an ITU-T automode connection. %L3 must be set in order for register :T13 to take effect.

The following charts indicate the connections that the modem can establish when %L1 or %L3 is set.

| | *Modem* | *Setting* | *on* | *Answering* | *Modem* | |
Mode Setting on Originating Modem	**V.22[b]**	**V.22[a]**	**V.22bis**	**V.32**	**V.32bis**	**V.34**
V.34 (14400-28800)	---	V.22[a]	V.22bis	V.32	V.32bis	V.34
V.32bis (4800-14400)	---	V.22[a]	V.22bis	V.32	V.32bis	V.32bis
V.32 (4800-9600)	---	V.22[a]	V.22bis	V.32	V.32	V.32
V.22bis (2400)	---	V.22[a]	V.22bis	V.22bis	V.22bis	V.22bis
V.22[a] (1200)	---	V.22[a]	V.22[a]	V.22[a]	V.22[a]	V.22[a]
V.22[b] (600)	V.22[b]	---	---	---	---	---

Mode Setting on Originating Modem	*Modem* V.22[b]	*Setting* V.22[a]	*on* V.22bis	*Answering* V.32	*Modem* V.32bis	V.34
V.23[a] (xmt 75)	---	V.23[b]	V.23[b]	V.23[b]	V.23[b]	V.23[b]
V.23[b] (xmt 1200)	---	---	---	---	---	---
V.23[c] (half-duplex)	---	V.23[c]	V.23[c]	V.23[c]	V.23[c]	V.23[c]
V.21(75-300)	---	V.21	V.21	V.21	V.21	V.21
Bell212A (1200)	---	V.22[a]	V.22[a]	V.22[a]	V.22[a]	V.22[a]
Bell103 (300)	---	Bell103	Bell103	Bell103	Bell103	Bell103

Mode Setting on Originating Modem	*Modem* V.23[a]	*Setting* V.23[b]	*on* V.23[c]	*Answering* V.21	*Modem* Bell212A	Bell103
V.34 (14400-28800)	---	---	---	---	V.22[a]	---
V.32bis (4800-14400)	---	---	---	---	V.22[a]	---
V.32 (4800-9600)	---	---	---	---	V.22[a]	---
V.22bis (2400)	---	---	---	---	V.22[a]	---
V.22[a] (1200)	---	---	---	---	V.22[a]	---
V.22[b] (600)	---	---	---	---	---	
V.23[a] (xmt 75)	---	V.23[b]	---	---	---	---
V.23[b] (xmt 1200)	V.23[a]	---	---	---	---	
V.23[c] (half-duplex)	---	---	V.23[c]	---	---	---

Mode Setting on Originating Modem	Modem V.23[a]	Setting V.23[b]	on V.23[c]	Answering V.21	Modem Bell212A	Bell103
V.21(75-300)	---	---	---	V.21	V.21	---
Bell212A (1200)	---	---	---	---	Bell212A	Bell212A
Bell103 (300)	---	---	---	---	Bell103	Bell103

To restrict the possible connections that can result, either **%**L0 or %L2 can be set on either the originating or answering modem. The following table shows the possible connection speeds if %L0- is set:

Modem Speed	Possible Connection Speed
300	300
600	600
1200	1200
2400	1200, 2400
4800	4800
7200	4800, 7200
9600	4800, 7200, 9600
12000	4800, 7200, 9600, 12000
14400	4800, 7200, 9600, 12000, 14400
14400V	14400
16800	14400, 16800
19200	14400, 16800, 19200
21600	14400, 16800, 19200, 21600
24000	14400, 16800, 19200, 21600, 24000
26400	14400, 16800, 19200, 21600, 24000, 26400
28800	14400, 16800, 19200, 21600, 24000, 26400, 28800

NOTE

If %L2- is set, the modem speed and the connection speed are identical.

$M*n* Connection Security Password Control

$M0   The originating modem sends the Connection Security password; the answering
                 modem does not verify the Connection Security password.

$M1   The originating modem sends the Connection Security password; the answering
                 modem verifies the Connection Security password for all connections. If the
                 originator's password does not match one of the answerer's passwords, the connection
                 fails.

$M2   The originating modem sends the Connection Security password; the answering
                 modem verifies the Connection Security password for all connections. If the
                 originator's password does not match one of the answerer's passwords, the answerer
                 uses auto-logon string 5 to prompt the remote user (up to three times) for the
                 Connection Security password. If the Auto-Logon sequence fails, the connection fails.

)M*n* Power Level Adjustment for Cellular Telephone Connections

)M0   For central site modems: Auto-adjustment (adjusts power level if remote modem is set
                 to)M1). Use for MNP Class 10 modems that will connect to both cellular telephone
                 and non-cellular telephone site modems.

)M1   For cell-side cellular modems: Forces adjustment of power level.

                 Adjusts the power levels during link negotiation for reliable connections to
                 accommodate signaling requirements of cellular telephone equipment.

*M Modify Remote Access Level

                 Initiates a request to move up from a Level 0 remote access session to a Level 1 remote
                 access session. With security enabled and a Level 1 password set, the modem prompts
                 for a valid password up to three times before granting Level 1 access. With security
                 disabled or enabled but a Level 1 password not set, the modem grants Level 1 access
                 on request without further prompting.

-M*n* MNP Class Connection Messages

-M0   Disables MNP Class connection messages.

-M1   Enables MNP Class connection messages.

                 Determines whether MNP Class connection messages are displayed. The -M1 setting
                 overrides the \V command setting for long form connection result codes and the W
                 command for serial port connect messages.

                 When -M1 is set and an MNP connection established, the connect message is
                 CONNECT MNPn/x, where n equals the MNP Class (from 1 to 10) and x equals the
                 type of data compression used (V.42bis or MNP Class 5). If)M1 is set, the message is
                 CONNECT MNPn/y/x, where y equals CELLULAR. If the modems do not negotiate
                 compression, the message is CONNECT MNPn.

During LAPM V.42bis connections when -M1 is set, the connection message is CONNECT LAPM/V42BIS. During LAPM connections with no compression active, the message is CONNECT LAPM.

When -M1 is set, the message during normal and direct connections is CONNECT.

The modem ignores this command with short-form result codes enabled by V0.

Setting X0 will also override the -M setting by displaying only CONNECT.

@M*n* Select Transmit Level (Only for Cellular Connections)

@M0	Use an initial transmit level of -26 dBm.
@M1	Use an initial transmit level of -30 dBm.
@M2	Use an initial transmit level of -10 dBm.
@M10	Use an initial transmit level of -10 dBm.
@M35	Use an initial transmit level of -35 dBm.

Selects the initial transmition level for your connection. You can set levels from -10 dBm through -35 dBm. The command is structured as follows:
From @M10 through @M35, the level set is the variable expressed as -dBm. For example, @M18 sets -18 dBm.

We recommend that you set @M18 when making cell-side cellular calls. You may need to adjust this level, depending on your cellular equipment.

\N*n* Operating Mode

\N0	Sets normal mode.
\N1	Sets direct mode.
\N2	Sets reliable mode.
\N3	Sets auto-reliable mode.
\N4	Sets LAPM reliable mode.
\N5	Sets LAPM reliable mode with fallback to normal mode.
\N6	Sets LAPM reliable mode with fallback to MNP reliable mode.

NOTE

You can use dial modifiers to set the operating mode for a single call. See the D command description for details.

Normal mode (\N0) can communicate with nearly any modem. Error correction does not take place in normal mode.

Direct mode (\N1) does not buffer data and ignores flow control. Also, in connect state, the serial port always adjusts to the speed of the connection, regardless of the setting of \Jn. Error correction does not occur.

NOTE

Setting \J0 disables the escape code sequence in direct mode.

Reliable mode (\N2) uses the MNP reliable link to provide error detection and automatic retransmission of data if an error occurs. This provides for error-free communications between your system and another that supports the MNP reliable link. When \N2 is in effect, the modem disconnects if it fails to establish an MNP reliable link immediately after making a connection.

During an MNP reliable link, both modems should use flow control on the serial port. When the modem detects a transmission error, it holds data in a buffer attempting to retransmit.

NOTE

You may not want to use certain other protocols, such as HP Block Mode, with MNP. Such protocols have particular timing requirements that can interfere with MNP's effectiveness.

Auto-reliable mode (\N3) allows the modem to communicate with remote systems that support the MNP or LAPM reliable link and with systems that do not support the reliable link. In auto-reliable mode, the answering modem looks for incoming MNP or LAPM protocol characters from the remote modem. If it detects them within approximately three seconds, it tries to establish a reliable link connection.

When the modem is set to auto-answer in auto-reliable mode, you can shorten this three-second period by using the %A command with the \C2 command.

NOTE

If both modems are set to auto-reliable mode, a normal connection or no connection could result due to noise on the telephone line.

LAPM reliable mode (\N4) uses the LAPM reliable link to provide error detection and automatic retransmission of data if an error occurs. This ensures that communications between your system and the remote system are error-free. The remote system must also be equipped to handle a LAPM reliable link. The modem attempts to establish an LAPM reliable link immediately after making a connection. If the attempt fails, the modem disconnects.

LAPM reliable mode with fallback to normal mode (\N5) attempts to establish an LAPM reliable connection. If the LAPM connection attempt fails, the modem falls back to a normal connection.

LAPM reliable mode with fallback to MNP reliable mode (\N6) attempts to establish an LAPM reliable connection. If the LAPM connection attempt fails, the modem then tries to establish an MNP reliable connection.

The following chart indicates the type of connections, depending on the operating mode. NC indicates No Connection. Where more than one operating mode is in a column, the first mode is for the originating modem and the second mode is for the answering modem.

Note for MNP Extended Services:

In the following table, you can use MNP Extended Services for V.42 connections where LAPM appears if both modems are set with -K1 or -K2

:

Answering Modem	\N0	*Originating* \N1	\N2	*Modem* \N3	\N4	\N5	\N6
\N0	normal	direct/normal	NC	normal	NC	normal	NC
\N1	normal/ direct	direct	NC/	normal/ direct	NC	normal/ direct	NC
\N2	NC	NC	MNP	MNP	NC	NC	MNP
\N3	normal	direct/normal	MNP	LAPM	LAPM	LAPM	LAPM
\N4	NC	NC	NC	LAPM	LAPM	LAPM	LAPM
\N5	normal	direct/normal	NC	LAPM	LAPM	LAPM	LAPM
\N6	NC	NC	MNP	LAPM	LAPM	LAPM	LAPM

NOTE

The modem does not support LAPM error correction for Bell 103, V.21, and V.23 connections.

$N List Connection Security Passwords

Displays the Connection Security Password database. (See %I and $P for details on setting these passwords.)

O*n* Enter Connect State

O0   Enters connect state.

O1   Begins an equalizer retrain sequence when operating at 2400 bps or higher and then returns to connect state.

Type ATO1 to reduce errors due to loss of equalization when excessive bit error rates are present.

NOTE

Issuing **ATO1** during a remote access session returns ERROR.

$O*n* Originate/Answer Control

$O0	Determines whether originate or answer mode as set by the O/A button.
$O1	Disables O/A button and forces originate mode.
$O2	Disables O/A button and forces answer mode.

The modem reads the O/A button to determine whether to operate in originate or answer mode when:

- you press the T/D button

- you type AT$T2

- it is in leased-line mode

NOTE

The modem saves the $O value when you set it. You do not have to enter an &W or *W to save it.

%O*n* V.23 Equalizer Control;

%O0	Disables equalizers in V.23 half-duplex mode.
%O1	Enables equalizers in V.23 half-duplex mode.

Determines whether equalizers are set in V.23 half-duplex mode. To avoid transmission errors during V.23 half-duplex connections, equalizer settings must be the same on both modems.

-O*n* Serial Port Parity

-O0	7 data bits, odd parity.
-O1	7 data bits, even parity.
-O2	7 data bits, mark parity.
-O3	7 data bits, space parity.
-O4	8 data bits, no parity.
-O5	8 data bits, odd parity.
-O6	8 data bits, even parity.
-O7	8 data bits, mark parity.

Allows you to change the serial port parity setting that is automatically set by the AT sequence.

You can also use the -O command to change the serial port parity while connected to a remote device. Use this command when the local device supports XON/XOFF flow control and detects parity. This command ensures that all XON and XOFF characters generated by the modem have the correct parity.

You cannot change the modem port parity during a connection. When parity is required for a connection and is different than the parity set by the AT sequence, the parity must be set at the same time the dial command is issued and issued on the same command line.

Example   AT-O4D12345

NOTES

- The AT sequence cannot be used to match 8 bit data with mark parity. Eight data bits plus mark parity can only be set by the AT-O command. If -O7 is not set, the modem defaults to 8 data bits, no parity.

- The AT sequence cannot be used to match space parity; no parity is set instead. You must issue AT-O3 to set space parity.

P   Pulse Dial

Changes the current dialing mode to pulse. **Tone dialing** is the default.

$P Security Database Password

Allows you to change the password needed to edit the auto-logon sequences, Dial Access and auto-logon commands, and Connection Security passwords. The default is that no password has been set.

The following prompts appear when you issue the $P command:

Prompt:	Response:
OLD PASSWORD:	Type the existing password for verification. Press Enter. If a password has not been set, just press Enter.
NEW PASSWORD:	Type a new password and press Enter.
NEW PASSWORD:	For verification, type the new password and press Enter again.

Passwords must contain exactly five alphanumeric characters. Upper case or lower case and parity are ignored. You must type the old password correctly in order to enter a new password. You must type the new password the same way both times for it to take effect. Periods are echoed as the password is entered.

NOTES

- The password becomes valid 2 minutes after the last logon or Connection Security password was entered.

- If you forget your password, you can just press at the OLD PASSWORD: prompt.

$P Security Database Password (V.25bis Synchronous Mode)

AT$P*ooooo***;***nnnnn***;** Where *ooooo* equals the old password and *nnnnn* equals the new password

Sets a new password or changes an existing password. Issue this command at least once to enable the modem's connection security operation for the first time. If a password has never been set or you erase it, there is no password connection security in effect.

You must type the two ; (semicolons) where indicated. Passwords must contain exactly five alphanumeric characters. The modem ignores upper case or lower case and parity. You must type the old password correctly in order to enter a new password.

NOTE

If you forget your password, you can just press at the OLD PASSWORD: prompt.

&P*n* Dial Pulse Ratio

&P0   Make = 39%, Break = 61%.

&P1   Make = 33%, Break = 67%.

Controls the ratio of the off-hook (make) to on-hook (break) interval that the modem uses for pulse dialing.

*P*n* Remote Access Passwords

*P0   Sets Level 0 remote access password.

*P1   Sets Level 1 remote access password.

Allows you to set a password used to establish a remote access session.

NOTE

Important: Set all passwords **before** enabling security.

The *P command must be the last command on the command line. Both Level 0 and Level 1 passwords are set to null at the factory.

The following prompts appear when you issue this command:

Prompt:	Response:
OLD PASSWORD:	Type the existing password for verification. Press Enter. If a password has not been set, just press Enter.
NEW PASSWORD:	Type a new password and press Enter.
NEW PASSWORD:	For verification, type the new password and press Enter again

Passwords must contain exactly five alphanumeric characters. The modem ignores upper case or lower case and parity. You must type the old password correctly in order to enter a new password. You must type the new password the same way both times for it to take effect. Periods echo on the terminal as you enter the passwords.

-P*n* Check Parity

-P0	Ignores parity of special characters.
-P1	Processes special characters *only* if their parity matches that of the serial port.
-P2	Processes special characters *only* if their parity matches that of the serial port. Recognizes modem port flow-control characters, however, *regardless* of whether their parity matches the serial port parity.

Controls checking of parity for XON and XOFF characters, the escape code sequence, and HP ACK characters. In command state, the modem sends all command echoes and command responses to the computer with parity that matches the serial port's.

When -P0 or -P1 is set, all received data is passed through to the computer at 8 data bits, no parity.

When -P2 is set, all received data is passed through to the computer with parity corrected to match the serial port parity.

NOTE

The -P command is used only for 10-bit data; the modem ignores -P*n* when it is set for 11-bit data.

\P*n* *<dial string>* Write a Stored Telephone Number

Where *n* is the telephone directory position from 01 to 40 and <dial string> is a string of up to 39 characters. Valid dial string characters are: 0-9, dial modifiers, and for tone dialing A, B, C, D, #, and*. Dial strings longer than 39 characters return an error message. The modem ignores invalid characters.

Stores a telephone number in the modem's telephone directory.

Q*n* Quiet

Q0	Enables output of result codes.
Q1	Disables output of result codes.
Q2	Disables answer mode result codes only.

Determines whether the modem sends result codes and status codes (OK, BUSY, RING, etcetera) to your computer.

*Q Recover Remote Access Configuration

Discards configuration changes you made during a Level 1 remote-access session but did not save with an *U. The *Q or *U commands do not affect commands that configure remote-access operation or telephone numbers that you added or changed.

NOTE

When you modify stored telephone numbers during a remote-access session, your changes take effect immediately.

-Q*n* Fallback Modulation Speeds

-Q0   Disables fallback from a V.32bis or V.32 MNP reliable connection to an MNP reliable 2400 or 1200 bps connection.

-Q1   Enables fallback from a V.32bis or V.32 MNP reliable connection to an MNP reliable 2400 bps connection.

-Q2   Enables fallback from a V.32bis or V.32 MNP reliable connection to an MNP reliable 2400 or 1200 bps connection.

Controls whether the modem can fall back from a V.32bis or V.32 MNP reliable connection to a V.22bis MNP reliable connection at 2400 bps or a V.22 MNP reliable connection at 1200 bps. Fallback may occur when poor telephone lines cause excessive MNP retransmissions.

Fallback from a V.32bis or V.32 MNP reliable connection to a 4800 bps V.32bis or V.32 MNP reliable connection is always enabled, regardless of the -Q setting. The modem always uses the V.22 standard when it falls back from a V.32bis or V.32 MNP reliable connection to a 1200 bps MNP reliable connection, regardless of the B setting.

:Q*n* Kermit Mark Character

Where *n* is an integer from 0 to 31 indicating an ASCII character (Default is 1)

Defines the Kermit mark character the modem uses with the Kermit spoofing asynchronous protocol enabled. This character must match the computer's Kermit mark character. Most computers use the default Kermit mark character (1). Both the originating and answering modems must use the same Kermit mark character. See also the :K command.

\Q*n* Serial Port Flow Control

\Q0	Disables flow control.
\Q1	Enables bi-directional XON/XOFF flow control.
\Q2	Enables unidirectional hardware flow control; the modem uses CTS to control the terminal.
\Q3	Enables bi-directional hardware flow control.
\Q4	Enables unidirectional XON/XOFF flow control.
\Q5	Keeps CTS Off until connection for unidirectional hardware flow control
\Q6	Keeps CTS Off until connection for bi-directional hardware flow control; ignores RTS until connection.

Sets the type of flow control used on the serial port. If the serial port speed is faster than the modem port speed, data from your computer enters the modem faster than it leaves. The modem holds characters in a buffer and sends them out at the slower modem port bps rate. When the buffer is full, flow control instructs your computer to stop transmitting data to the modem; the modem continues to send out the characters and empty the buffer. When there is room in the buffer, flow control instructs your computer to resume transmitting data to the modem.

For reliable connections, retransmissions can reduce the effective modem port speed. If this occurs, flow control prevents buffer overflow.

During direct mode connections, the modem does not use flow control and ignores the \Q setting.

NOTE

Hardware flow control overrides the &C and \D settings for CTS operation.

\Q1: Enables bi-directional XON/XOFF flow control. Sending an XOFF character stops data transmission; sending an XON character restarts it. The modem generates XON and XOFF characters at the same parity as on the serial port. The serial port responds to XON and XOFF characters from the local computer in the same way.

\Q2: Enables unidirectional hardware flow control. The modem turns CTS Off to signal the local computer to stop transmitting data, and turns CTS On to signal the local computer to resume transmitting data.

\Q3: Sets bi-directional hardware flow control using the CTS and RTS signals. The modem uses the CTS signal to start and stop data transmission from the local computer. When RTS is Off, the modem stops transmitting data to the local computer. When RTS is On the modem resumes sending data.

\Q4: Enables unidirectional XON/XOFF flow control. The modem serial port generates, but does not respond to, XON/XOFF flow control characters. This setting allows for computers to transmit data that has XON and XOFF data characters. The computer can still be set to respond to XON/XOFF flow control characters sent to it from the modem during serial port flow control.

\Q5: Enables unidirectional hardware flow control the same as \Q2, but also keeps CTS Off until a connection is established.

\Q6: Enables bi-directional hardware flow control the same as \Q3, but also keeps CTS Off until a connection is established and ignores RTS while not connected.

%R*n* Read All Registers

%R0	Displays the contents of all S-registers in decimal and hexadecimal integers in tabular format.
%R1	Displays the contents of all :T*n* registers in decimal and hexadecimal integers in tabular format.

&R*n* RTS/CTS Options

&R0	CTS tracks RTS in synchronous mode.
&R1	CTS ignores RTS in synchronous mode.
&R2	ITU-T V.13 emulates half-duplex over a full duplex line.

Use either &R0 or &R2 to simulate half-duplex synchronous operation. When &R0 is set, after the register S26 time delay, CTS follows the state of RTS sent from the computer. When &R1 is set, CTS remains On for the duration of the connection.

NOTES

- The modem ignores &R during asynchronous connections.

- Refer to the register :T15 description for details on RTS/CTS.

---

*R*n* Enable Remote Access Security

*R0   Disables remote access security.

*R1   Enables remote access security.

           Control remote access security. With remote access security on and passwords set, password entry determines whether the modem grants Level 0 or Level 1 access at the start of a remote access session. With remote access security off, the modem does not require passwords and grants Level 0 access.

NOTES

- Remote access is available only during a normal connection or during an MNP reliable connection without data compression.

- You must disable remote access security on the local modem, not during a remote access session.

- Set all passwords before you enable remote access security. Otherwise, an error message appears.

:R*n* Simulate Ring

:R0   Modem does not simulate ring or act on pulse leads.

:R1   If DTR is low and &D1, &D2, or &D3 is set, the modem simulates ring until DTR is raised. If DTR is high or if &D0 is set, the modem does not simulate ring and connects immediately. If the modem simulates a ring and DTR is not raised after 30 seconds, the modem disconnects.

:R2   Does not simulate ring, but acts on pulse leads.

           During MI/MIC operation, controls whether the modem simulates ring according to the &D setting, as noted above.

\R*n* Serial Port Ring Indicator

\R0   Keeps the Ring Indicator signal On for the duration of the telephone call.

\R1   Turns Off the Ring Indicator signal after the telephone call is answered.

           Controls the Ring Indicator (RI) signal. When an incoming call comes in, the RI signal tracks the ring signal on the telephone line.

S*n*? Read Configuration Register

           Where *n* is an integer. Displays the contents in decimal form of the selected S-register.

%S*n* Display Switch Settings

%S0   Displays Bank 1 switch settings.

%S1   Displays Bank 2 switch settings.

%S2   Displays internal switch settings.

&S*n* DSR Options

&S0   DSR is always on.

&S1   DSR complies with ITU-T recommendations.

Controls the Data Set Ready (DSR) signal on the serial port.

NOTE

&S0 is equivalent to setting \D0. &S1 is equivalent to setting \D3.

---

*S*n* Remote Access Attention Character

Where *n* is an integer between 0 and 126 indicating an ASCII character
[Default is **42, ***].

Defines the attention character to request a remote access session. To request a remote access session using this character, establish a connection and type the attention character four times in succession (do not type a carriage return). The *A command sends this sequence automatically.

In normal mode, register S12 sets the guard time that precedes and follows the attention character sequence. It should be set to the same value on both the originating and answering modems. Reliable mode uses its own timing and the modem ignores register S12. During reliable connections, allow a short pause between typing each attention character, or type AT*A instead.

NOTE

Remote access is available only during a normal connection or during an MNP reliable connection without data compression.

\S Read Online Status

Displays a list of modem commands and their current settings. This command also displays the active connection type, as well as the elapsed connect time and the telephone number most recently dialed.

The \S command displays several screens. Press any key to move to the next screen. To cancel the display, type the line-delete character – or send a Break.

T   Tone Dial

Changes the current dialing mode to tone. This is the modem's default.

&T*n* Test and Diagnostics Commands

&T0   Ends test in progress.

&T1   Local analog loopback.

&T3   Local digital loopback.

&T4   Respond to remote digital loopback.

&T5   Do not respond to remote digital loopback.

&T6   Remote digital loopback.

&T7   Remote digital loopback with self-test.

&T8   Local analog loopback with self-test.

NOTE

The modem does not support &T*n* commands for Bell 103, V.13, V.21, and V.23 modes.

&T0: Ends a test in progress without terminating a connection, and returns the local and remote modems to normal operation. If a self-test is in progress, &T0 reports any errors. The &T0 command must be the last command on a command line.

&T1: The modem should display the characters on your screen exactly as you type them. The modem must be in normal or direct mode and set to 1200 bps or higher.

&T3: Allows a remote modem that does not support the ITU-T V.54 standard to perform a Remote Digital Loopback test with your modem. The modem must connect in normal or direct mode and be set to 1200 bps or higher.

&T4: Allows the modem to respond to a remote caller's request to enter Remote Digital Loopback mode.

&T5: Prevents the modem from responding to a Remote Digital Loopback request.

&T6: Instructs the remote modem to initiate a Remote Digital Loopback test. This command is available only when the modem is connected in normal or direct mode and set to 1200 bps or higher.

&T7: Instructs the remote modem to enter a Remote Digital Loopback with Self-Test. Upon completion of the test, the modem reports errors to the local device. This command is available only when the modem connects in normal or direct mode and is set to 1200 bps or higher.

&T8: The modem sends itself the ITU-T V.54 test pattern and verifies these characters. Upon completion of the test, the modem reports errors to the local device. This command is available only when the modem is in normal or direct mode and set to 1200 bps or higher.

:T*n*? Read Configuration Register

Where *n* is an integer indicating a :T-register. Displays the contents in decimal form of the selected :T-register.

\T*n* Inactivity Timer i.Inactivity timer;

Where *n* is an integer between 0 and 90 specifying minutes (Default is **0**).

Specifies the number of minutes the modem waits for data before automatically hanging up. **T0** (default) disables the inactivity timer. The inactivity timer is only available during normal and reliable link connections; the modem ignores it in direct or synchronous mode.

%U*n* Clear Serial Port Speed

%U0   When issued, allows the current serial port speed (19200 bps or lower) to change to another speed.

%U1   Always keeps the current serial port speed. To change the serial port speed, you *must* enter %U1 each time you change the serial port speed.

%U2   Allows the current serial port speed to change from any speed.

NOTES

- You do not need to issue %U when bps rate adjust causes the serial port speed to change during a connection.

- You need to issue AT%U0 when changing from 11-bit characters to 10-bit characters, and from 10-bit to 11-bit.

- When the serial port speed is set to 38400 bps or higher, it cannot be changed until you enter an AT%U command or reset the modem.

***U Update Remote Access Configuration**

Saves configuration changes made during a Level 1 remote access session. At disconnect, the modem loses configuration changes you made during a Level 1 session if you do not enter *U, and it restores the original configuration. This command does not affect remote access configuration commands. Stored telephone number changes take effect immediately during a remote access session.

NOTE

To save the configuration even after the modem is reset, also issue either &W or *W.

:U*n* DCD Time Delay

Where *n* is an integer from 0 to 255 representing periods of 12.5 milliseconds. Default is **0**. During MI/MIC operation, sets how long the modem waits before turning on DCD (carrier detect).

NOTES

- The :U command takes effect when :R1 is set. If the DCD signal is already On before the connection, the modem ignores the :U command.

- The modem supports this command in Dial Access Security. :R does not need to be set.

@U*n* Minimum Connection Speed

Where *n* = 300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, V14400, 16800, 19200, 21600, 24000, 26400, 28800, 33600 bps.

Sets the minimum modem port speed for connections. For example, if you want your modem to only make connections greater than or equal to 4800 bps, set AT@U4800. The modem will only make connections at 4800 bps or higher.

V*n* Result Code Form

V0   Sends short-form result codes.

V1   Sends long-form result codes.

Selects whether the modem sends long-form (words) or short-form (numeric) result codes to your computer. The format of the connection result codes is dependent upon the \V, W, and -M commands.

$V*n* Logon View Mode

$V0   Disables pass through of data during the logon sequence.

$V1   Enables pass through of data during the logon sequence.

Determines whether data passes through from the remote system to the local computer during the logon sequence. With view mode disabled ($V0), the modem does not pass through any data and delays the connect message until the logon sequence is complete. With view mode enabled (**$V1**), the connect message displays and then data pass through during the logon sequence.

%V Display Modem Firmware Version

Displays the modem firmware main code version.

-V Split Serial Port Speed with Multi-Protocol Auto-Answer

-V0   Enables V.23 split serial port speed connections within the multi-protocol auto-answer feature.

-V1   Disables V.23 split serial port speed connections within the multi-protocol auto-answer feature.

Determines whether the serial port uses split transmit and receive speed operation when using the multi-protocol auto-answer feature. %F0 must also be set.

:V*n* CTS Time Delay

Where *n* is an integer from 0 to 255 representing periods of 12.5 milliseconds. Default is **0**. During MI/MIC operation, sets how long the modem waits before turning on CTS (Clear to Send).

NOTES

- The :V command takes effect when :R1 is set. If the CTS signal is already On before the connection, the :V command is ignored.

- The modem supports this command in Dial Access Security. :R does not need to be set.

\V*n* Error Correction Result Code Form

\V0   Uses standard long-form result codes: CONNECT <speed>.

\V1   Adds /REL to long-form error correction result codes: CONNECT <speed>/REL.

\V2   Displays long-form error correction protocol result codes: CONNECT <speed>/REL-MNP or CONNECT <speed>/REL-LAPM or CONNECT <speed>/REL-CELLULAR.

\V3   Adds /REL to long form error correction result codes: CONNECT <speed>/REL. Displays Hayes-compatible short-form (numeric) result codes.

\V4   Displays long-form error correction protocol result codes: CONNECT <speed>/REL-MNP or CONNECT <speed>/REL-LAPM or CONNECT <speed>/REL-CELLULAR.

Determines whether result codes indicate that a reliable link connection is in effect. The W setting determines the contents of the <speed> field. Setting -M1 changes the format of the long-form connect result codes.

Even for a reliable connection, use \V0 when your data communications software does not expect to see a reliable link result code.

Use \V1, **\V2**, \V3 or \V4 when your software supports error correction result codes.

Use V0\V3 if your communications software requires Hayes-compatible connection result codes. Note that when V1 is set to select long-form result codes \V3 is equivalent to \V1.

Use \V3 or \V4 when you want to see the actual connect speed.

NOTE

When either \V1 or \V2 is set, the message CONNECT 9600/REL displays during 4800, 7200, and 12000 bps reliable connections. When either \V3 or \V4 is set, the actual modem bps rate displays for 4800, 7200, and 12000 bps reliable connections.

---

^V Display Bootstrap Revision

Requests modem to display its current flash memory bootstrap revision.

NOTE

This is part of the memory update operations.

W*n* Connection Speed Reporting

W0   Displays serial port connect messages.

W1   Displays serial port connect messages.

W2   Displays modem port connect messages.

When W0 or W1 is set, the speeds reported in connect messages indicate the serial port speed.

When **W2** is set, the speeds reported in connect messages indicate the modem port speed.

When X0 is also set, CONNECT displays, regardless of the W setting.

%Wn Pulse Digit Command

%W0   *n* pulse digits dialed for each number.

%W1   *n*+1 pulse digits dialed for each number.

%W2   10-*n* pulse digits dialed for each number.

For pulse dialing, determines whether the modem dials each number in a dial string *n* pulses, *n*+1 pulses, or 10-*n* pulses. For example, when **%W0** is in effect, it dials 6 with 6 pulses. However, with %W1, it dials 6 with 7 pulses; with %W2, it dials 6 with 4 pulses.

NOTE

With %W0 or %W2 set, the modem dials digit 0 with 10 pulses. When %W1 is set, digit 0 is dialed with 1 pulse.

&Wn Store Current Configuration

Stores current user profile *n* (where *n* = 0 to 3) (Default is **0**).

Stores the active commands and certain S-registers. You store telephone numbers independently with the \P*n* and &Z*n* commands. The &W command stores the serial port speed and parity and the modem port speed that are in effect when you enter &W.

The &W command does not store the following restricted S-registers:

S 2	S 3	S 4	S 5
S 6	S 7	S 8	S 9
S 1 0	S 1 1	S 1 2	

The modem saves the following command settings when you enter them. You do not need to also enter &W or *W.

The following table lists the remote access settings:

Command	Description
*E	Enable Remote Access
*I	Modem Identifier
*P	Remote Access Password
*R	Enable Remote Access Security
*S	Remote Access Attention Character

The following table lists the auto-logon settings:

Command	Description
$H	Edit Dial Access Security Database
$L	Logon Sequence
$P	Security Database Password

The following table lists other commands:

Command	Description
%I	Edit Connection Security Password
$K	Disable Switch Banks
$O	Originate/Answer Control
$T	T/D Button Control
&Y	Designate Default User Profile

See also the *W and Z commands.

*W*n* Store Complete Configuration

Stores complete user profile *n* (where *n* = 0 to 3) (Default is **0**).

Stores all active commands and registers as well as the restricted S-registers not stored with &W. (See the &W command description.)

Save telephone numbers independently with the \P*n* and &Z*n*= commands. The *W command saves the serial port speed and parity and the modem port speed in effect when you enter *W .

See also the &W, &Y, and Z commands.

NOTES

- The &W and *W commands share the same stored configuration area. Issue one of these commands to override the other stored settings.

- The &W command setting stores default settings for the restricted S-registers. If &W is issued after issuing *W, the default settings for the restricted S-registers are stored. If you change the setting of one of the restricted S-registers and want to save it, use the *W command instead of the &W command.

X*n* Extended Result Codes

X0   Modem ignores dial tone and busy signals. Displays CONNECT when it establishes a connection. Smartmodem 300 compatible.

X1   Modem ignores dial tone and busy signals. Sends a connect result code including bps rate when it establishes a connection.

X2   Modem ignores busy signals. Displays NO DIALTONE if it does not detect one within 5 seconds of dialing. Sends a connect result code reflecting bps rate when it establishes a connection.

X3   Modem ignores dial tone. Displays BUSY if it detects a busy signal. Sends a connect result code reflecting bps rate when it establishes a connection.

X4   Displays NO DIALTONE if it does not detect one within 5 seconds of dialing. Displays BUSY if it detects a busy signal. Sends a connect result code reflecting bps rate when it establishes a connection.

Determines whether the modem responds to dial tone and busy signals, and what kind of CONNECT result codes are displayed. Result codes are further controlled by the V*n* command. Result codes indicate MNP reliable mode only when either \V1, \V2, \V3, \V4, or -M1 is set. When the modem ignores dial tone, it waits for the register S6 time delay to expire and then dials regardless of whether a dial tone is present.

NOTE

The "W" dial modifier causes the modem to wait for dial tone regardless of the X setting.

---

*X Exit Remote Access

Moves remote access down one level. When you enter an *X command during a Level 1 remote access session, access moves down to Level 0. When you enter it during a Level 0 session, the remote access session terminates and the originating modem returns to connect state.

-X Display Stored Switch Settings

Displays the current stored configuration switch settings.

:X*n* DSR Time Delay

Where *n* is an integer from 0 to 255 representing periods of 12.5 milliseconds. Default is **0**. During MI/MIC operation, sets how long the modem waits before turning on DSR (Data Set Ready).

NOTES

- The :X command takes effect when :R1 is set. If the DSR signal is already On before the connection, the :X command is ignored.

- The modem supports this command in Dial Access Security. :R does not need to be set.

\X*n* XON/XOFF Pass-Through

\X0   Processes XON/XOFF flow control characters.

\X1   Processes XON/XOFF flow control characters and passes them through to the local or remote system so that the local or remote device also processes the XON and XOFF characters.

Determines whether XON/XOFF flow control characters pass to the remote or local modem. With XON/XOFF flow control enabled on the serial port (\Q1) and pass through enabled (\X1), the modem also transmits to the remote device any XON and XOFF characters sent to the serial port from the local device.

NOTE

With **\X0** set and XON/XOFF flow control enabled, local devices such as computers or printers may send XON and XOFF characters to the modem serial port. If the modem is already controlling the flow of data to the remote system, local flow control characters will not interfere with the connection. However, if \X1 is set, local flow control characters also pass through to the remote system. These flow control characters are intended for the local system and may turn on the flow of data from the remote system before the modem is ready to receive more data, resulting in a loss of data.

Y*n* Long Space Disconnect

Y0   Disables long space disconnect on receipt of H, T/D toggle, or DTR drop if &D2 or &D3 is set.

Y1   Enables long space disconnect on receipt of H, T/D toggle, or DTR drop if &D2 or &D3 is set.

Sends a Break up to 4 seconds before disconnecting in response to an H command, when toggling the T/D button, or if DTR drops and either &D2 or &D3 is set. If &D3 is set and DTR drops, the modem disconnects. If the answer modem sees the Break, it drops the connection.

NOTES

- This command is available only during normal, direct, and synchronous connections.

- Y1 must be set on both modems for this command to take effect.

&Y*n* Designate Default User Profile

Selects user profile *n* (where *n* = 0 to 3). (Default is **0**).

Designates which of four user profiles loads into active configuration at power up, reset, or when DTR drops when &D3 is set. The modem saves this command immediately after you enter it; you do not have to enter &W or *W. Also, when you enter &F, this command does not change.

See also the &W, *W, and Z commands

NOTE

The &Y setting takes effect immediately. When you reset or power up the modem, it restores the last user profile setting selected.

Z*n* Reset

Resets user profile *n* (where *n* = 0 to 3).

Hangs up the telephone line; clears the modem and serial port buffers; and when you enter the next AT command sets the parity and bps rate to match the local computer. Also, restores commands and registers that you last saved with either the &W or *W command, or the factory defaults if you have not entered an &W or *W.

To reset the modem, type: ATZn   (where *n* = 0 to 3).

If the OK response does not appear, type ATQ to enable result codes.

See also the &W, *W, and &Y commands.

&Z*n=<dial string>* Write Stored Telephone Number

Where *n* is a directory position from 01 to 40 and *<dial string>* is a string of up to 39 characters. Valid dial string characters are: 0-9, dial modifiers, and for tone dialing A, B, C, D, #, and *. Dial strings longer than 39 characters return an error message. The modem ignores invalid characters.

Stores a telephone number in position *n* of the modem's telephone directory. When entering a stored number with the &Z*n=* command you can use any dial modifiers available with the Dial command. The &Z*n=* command must be the last command on a command line.

Commands to Change or Read Registers

This section explains how to change S-register and :T-register values and describes each register. Some registers control a single function. Other registers control several functions and are bit mapped. Use bit mapped registers for reading modem status only. Use commands or switches to change the modem's settings.

Sn=x or :Tn=x Change the Value of a Register

Changes the value of S-register or :T-register "*n*" to a new value "*x*".

=x Change the Value of the Last Referenced S-Register

Changes the value of the last referenced S-register or the register pointed to with the ATS*n* command. For example, if the last register command used was ATS0=2, issuing AT=4 changes the value of register S0 from 2 to 4.

? Display the Value of the Last Referenced S-Register

Displays the value of the last S-register referenced in a read, write, or point to command.

Sn Point to New Register

Where *n* is an integer from 0 to 27, indicating a register. Instructs the modem to point to the register whose location is *n*. This becomes the last referenced register. For example, typing ATS1 places the pointer at register S1 and returns the command prompt.

%Rn ; Read All Registers

%R0   Displays the contents of all S registers in decimal and hexadecimal integers in tabular format.

%R1   Displays the contents of all :T*n*=*n* commands in decimal and hexadecimal integers in tabular format.

Read Configuration Register

S*n*?   Where *n* is an integer, indicating an S-register.

:T*n*?   Where *n* is an integer, indicating a :T-register.

Displays the contents in decimal form only of register "*n*".

Register Descriptions

This section describes the registers in numerical order (S0 to S27 and T0 to T50).

S0 Ring to Auto-Answer On

Range: 0 - 255 rings

Default: **1 ring (auto-answer enabled)**

Sets the number of rings required before the modem answers. ATS0=0 disables auto-answer.

S1 Ring Counter

Range: 0 - 255 rings

Default: **0 rings**

Keeps a running total of the number of rings that occur before the modem answers a call. If no ring occurs within eight seconds after the last ring, the ring counter resets to 0.

S2 Escape Code Character

Range: 0 - 255, ASCII decimal

Default: **43** (+)

Sets the character used for the three-character escape code sequence. When the modem is in connect state and receives the escape code sequence, it enters command state. Setting register S2 to 0 disables the escape code character. See register S12 to set the guard time that brackets the escape code character.

NOTE

The modem does not store this register with &W; use *W to save it.

S3 Carriage Return Character

Range: 0 - 127, ASCII decimal

Default: **13 (carriage return)**

Sets the character recognized as a carriage return. The carriage return terminates command lines and result codes.

NOTE

The modem does not store this register with &W; use *W to save it.

S4 Line Feed Character

Range: 0 - 127, ASCII decimal

Default: **10 (linefeed)**

Sets the character recognized as a line feed. The line feed character follows the carriage return at the end of command lines and result codes.

NOTE

The modem does not store this register with &W; use *W to save it.

S5 Backspace Character

Range: 0 - 32, ASCII decimal

Default: **8 (backspace)**

Sets the character recognized as a backspace.

NOTE

The modem does not store this register with &W; use *W to save it.

S6 Wait Before Dialing

Range: 2 - 255 seconds

Default: **2 seconds**

Sets the length of the pause after off hook before the modem dials. The modem always pauses for a minimum of two seconds, even if S6 is set less than 2.

NOTES

- Register S6 is valid only when either X0, X1, or X3 is set.

- The modem does not store this register with &W; use *W to save it.

S7 Wait for Carrier After Dial

Range: 0 - 255 seconds

Default: **60 seconds**

Sets the length of time that the modem waits for:

- carrier from remote modem before hanging up (originate or answer mode)

- ring back (originate mode only, and only if either X3 or X4 is set)

- dial tone when the "W" dial modifier is encountered in a dial string

- quiet answer when the "@" dial modifier is encountered in a dial string

---

NOTE

The modem does not store this register with &W; use *W to save it.

S8 Pause Time for Dial Delay

Range:　　　　0 - 255 seconds

Default:　　**2 seconds**

Sets the length of time to pause when the modem encounters the comma pause dial modifier (",").

NOTE

The modem does not store this register with &W; use *W to save it.

S9 Carrier Detect Response Time

Range:　　　　0 - 255 tenths of a second

Default:　　**6 (0.6 seconds)**

Determines how long a signal must be present before the modem recognizes it as a carrier.

NOTES

- The modem does not store this register with &W; use *W to save it.

- Register S9 is only used in normal and direct modes.

S10 Delay for Hang Up After Carrier Loss

Range: 0 - 255 tenths of a second

Default: **60 (6 seconds)**

Sets the length of time the modem waits before hanging up after loss of carrier, allowing for a temporary loss. Both modems should have equal S10 values. Otherwise, disconnect occurs when the lower value is reached. When register S10 is set to 255, the modem functions as if carrier is always present.

After disconnecting, the modem waits for a minimum of five seconds before going off hook again in originate mode.

NOTES

- The modem does not store this register with &W; use *W to save it.

- Register S10 is ignored during V.34, V.32bis, V.32, V.22bis, and V.22 reliable connections.

S11 DTMF Tone Dialing Speed

Range: 50 - 100 milliseconds

Default: **75 milliseconds**

Sets the length of time after the last tone was sent and before the next tone is sent when the modem is dialing over a touch tone line.

NOTE

The modem does not store this register with &W; use *W to save it.

S12 Escape Code Guard Time and Remote Access Attention Sequence Guard Time

Range: 0 - 255 (fiftieths of a second)

Default: 50 (1 second)

Sets the minimum "quiet" time that must be present before and after entering the three-character escape code or the remote access attention sequence. The time delay between each character in the escape code or remote access attention sequence must be less than this guard time. If register S12 is set to 0, the time it takes to enter the escape code or remote access attention sequence does not affect recognition.

NOTES

- The modem does not store this register with &W; use *W to save it.

- Register S12 sets the guard time that precedes and follows the attention character sequence. For the remote access attention sequence guard time during normal mode, S12 should be set to the same value on both the originating and answering modems. Reliable mode uses its own timing and register S12 is ignored.

S14 Bit Mapped Register

Bit Position	Function	Decimal Value
0	not used	
1	command echo	0 no echo 1 echo
2	result codes	0 result codes 1 no result codes
3	result type	0 short form 1 long form
4	dumb mode	0 smart mode 1 dumb mode
5	dial methods	0 tone dial 1 pulse dial
6	not used	
7	originate/answer	0 answer mode 1 originate mode

S16 Bit Mapped Register, Test Options

Bit Position	Function	Decimal Value
0	local analog loopback	0 disabled 1 enabled
1	not used	
2	local digital loopback	0 disabled 1 enabled
3	remote digital loopback status (indicated by the remote modem)	0 loopback off 1 loopback in progress
4	initiate remote digital loopback	0 disabled 1 enabled

Bit Position	Function	Decimal Value
5	initiate remote digital loopback with self-test	0 disabled 1 enabled
6	initiate local analog loopback with self-test	0 disabled 1 enabled
7	not used	

NOTES

- The modem does not support diagnostic tests in Bell 103, V.13, V.21, or V.23 modes.

- Commands enable and disable loopback test options. Register S16 is a read-only register that displays loopback test option status, and is available only when the modem is in normal or direct mode. The modem supports all loopback tests at 1200 bps or higher.

S18 Test Timer

Range: 0 - 255 seconds

Default: 0 seconds (disables timer)

Sets how long the modem conducts a loopback diagnostic test. Register S18 is available only in normal or direct mode.

When register S18 is set to 0, type AT&T0 followed by Enter to end a test.

NOTE

Register S18 is not supported for V.54 loopback tests by switch or circuit.

S21 Bit Mapped Register

Bit Position	Function	Decimal Value
0	Telco Jack	0 default 1 not supported

1,2[1]	CTS/RTS synchronous	0 **on hook**: CTS follows RTS
		  off hook: CTS Off until connection
		  After connection:
		 CTS Off in response to On-to-Off RTS transition;
		CTS On in response to Off-to-On RTS transition after delay specified in S26 (&R0)
		1 **on hook**: CTS On;
		  off hook: CTS Off until connection.
		  After connection: CTS On for duration of carrier signal (&R1)
		2 ITU-T V.13 emulates half-duplex over a full duplex line (&R2)

3,4	DTR	0 Ignores DTR (&D0) 1 On-to-Off DTR transition: modem enters command state (&D1) 2 On-to-Off DTR transition: modem goes on hook (&D2) 3 On-to-Off DTR transition: modem resets (&D3)
5	DCD	0 DCD always On 1 DCD On indicates data carrier is present or indicates DCD On except momentarily at disconnect
6	not used	
7	long space disconnect	0 off (Y0) 1 on (Y1)

1.See also register :T15 description.

S22 Bit Mapped Register

Bit Position	Function	Decimal Value	Description
4,5,6	result code	0	same as X0
	options	4	same as X1
		5	same as X2
		6	same as X3
		7	same as X4
7	make/break ratio	0	39/61
		1	33/67

S23 Bit Mapped Register

Bit Position	Function	Decimal Value	Description
0	Respond to Remote Digital Loopback	0	disabled
		1	enabled
1,2,3	Serial Port Bps	0	0 to 300 bps
		1	600 bps
		2	1200 bps
		3	2400 bps
		4	4800 bps
		5	9600 bps
		6	19200 bps
		7	38400, 57600, and 115200 bps
4,5	Parity option	0	even
		1	space/none
		2	odd
		3	mark
6,7	Guard tones	0	disabled
		1	550 Hz
		2	1800 Hz
		3	not used

The Respond to Remote Digital Loopback option is ignored during reliable connections.

NOTE

If you use register S23 to change the parity set automatically or set by -O*n*, the same number of data and stop bits used before the change is retained. For example, if 8 data bits and even parity is set (-O6) and you change register S23 to odd parity, the 8 data bits and 1 parity bit are retained. However, the parity becomes odd instead of even, changing the Serial Port Parity command setting to -O5.

S25 Delay to DTR and Asynchronous/Synchronous Time Delay

Range: Delay to DTR: 0 - 255 hundredths of a second
              Async/sync mode: 0 - 255 seconds

Default: **Delay to DTR: 5 hundredths of a second (0.05 seconds)**
              Async/sync mode: 5 seconds and 0.05 seconds

Delay to DTR: During asynchronous mode and during synchronous mode with &M2 or &M3 set, the modem ignores an On-to-Off transition of DTR that is less than the register S25 time delay.

Asynchronous/synchronous time delay: Register S25 has two functions when &M1 is set. First, it sets the number of seconds the modem waits to check DTR after establishing a connection. This allows enough time to disconnect the modem from an asynchronous terminal and attach it to a synchronous computer without forcing the modem back to command state. Then, after this time delay, the Delay to DTR time delay described above takes effect when loss of DTR occurs.

S26 RTS to CTS Delay Interval

Range: 0 - 255 hundredths of a second

Default: **1 hundredth of a second (0.01 seconds)**

When Clear To Send (CTS) tracks Request To Send (RTS) and the modem detects an Off-to-On transition of RTS, register S26 sets how long the modem waits before turning on CTS. CTS tracks RTS when either **&R0** or **&R2** is set.

NOTE

The modem uses this register during synchronous operation only.

S27 Bit Mapped Register

Bit Position	Function	Decimal Value	Description
0,1	transmission mode	0	asynchronous mode (&M0)
		1	asynchronous/ synchronous mode (&M1)
		2	synchronous dial stored number mode (&M2)
		3	synchronous manual dial mode (&M3)
2-3	leased-line operation	0	leased line off (&L0)
		1	2-wire leased line on (&L1 or &L3)
		2	4-wire leased line on (&L2 or &L4)
4,5	synchronous transmit	0	default
	clock source	1	&X1
		2	&X2
		3	not supported
6	answer tone when at 1200 bps	0	ITU-T V.22bis/ V.22 (B0)
		1	Bell 212A when supported (B1)
7	not used		

Register Descriptions

:T0=*n* Timer for V.22bis, V.22, and V.32 Modes During Multi-Protocol Answer

Range: Where *n* is an integer from 0 to 255 representing tenths of a second

Default: **40 (4 seconds)**

This command requires 1200 bps or higher operation with %F0%L1 set.

Determines how long the modem attempts to establish a V.32, V.22bis, or V.22 connection before attempting to establish a V.23 split speed or V.21 connection. During this period, the modem sends V.22bis or V.22 carrier.

:T1=*n* Timer for V.23 Split-Speed Mode During Multi-Protocol Answer

Range: Where *n* is an integer from 0 to 255 representing tenths of a second.

Default: **30 (3 seconds)**

This command requires 1200 bps or higher operation with %F0%L1 set.

When the modem is unable to establish a V.32, V.22bis, or V.22 connection, :T1 determines how long the modem attempts to establish a V.23 split-speed connection before attempting a V.21 or V.23 half-duplex connection. During this period, the modem sends a V.23 forward channel carrier.

NOTE

If :T1 is set to 0, the modem does not send a V.23 forward channel carrier during the multi-protocol answer sequence.

:T2=*n* Timer for V.21 Mode During Multi-Protocol Answer

Range: Where *n* is an integer from 0 to 255 representing tenths of a second.

Default: **0 (V.23 half duplex disabled)**

This command requires 1200 bps or higher operation with %F0%L1\N3 set.

When the modem is unable to establish a V.32, V.22bis, V.22, or V.23 split-speed connection, :T2 determines how long the modem attempts to establish a V.21 connection before attempting a V.23 half-duplex connection. During this period, the modem sends V.21 carrier.

Set **:T2=20** (2 seconds) when including V.23 half duplex in the multi-protocol answer modem.

NOTE

If :T2 is set to 0, V.23 half-duplex connections are not attempted. The modem attempts to establish a connection for the length of time specified by register S7 before hanging up.

:T3=*n* Timer for V.21 and V.23 Answer Tone Duration

Range: Where *n* is an integer from 0 to 33 representing tenths of a second.

Default: **33 (3.3 seconds)**

This command requires either V.21 operation (%F0 is set and the modem speed is 300 bps) or V.23 operation (%F*n*, where n=1, 2, or 3).

When the answering modem is set for V.21 or V.23 operation, :T3 determines the duration of the V.25 answer tone that is sent to the originating modem. When :T3 is set to 0, no answer tone is sent. All V.21 and V.23 answers begin with two seconds of silence unless :T3 is set to 0.

When the originating modem is set for V.21 or V.23 operation, :T3 determines how long the modem waits after detecting answer tone before proceeding with the connection. When :T3 is set to 0, the originating modem does not wait for answer tone.

:T4=*n* Timer for Line Turnaround Delay - Carrier On

Range: Where *n* is an integer from 0 to 255 (in increments of 12.5 milliseconds).

Default: **20 (250 milliseconds)**

This command takes effect only during normal mode V.23 half-duplex connections.

After the modem turns the carrier off, this command determines the minimum time the modem waits for the remote modem to respond before turning carrier back on again to resume sending data.

:T5=*n* Timer for V.23 Half-Duplex Intercharacter Delay

Range: Where *n* is an integer from 0 to 255 (in increments of 12.5 milliseconds).

Default: **7 (87.5 milliseconds)**

This command takes effect only during normal mode V.23 half-duplex connections.

Sets the length of time the modem waits after transmitting the last data character in the transmit buffer before turning carrier off. :T5 may need to be adjusted if the local computer intercharacter time causes excessive line turnarounds.

:T6=*n* Timer for DCD Turn On Delay

Range: Where *n* is an integer from 0 to 255, representing milliseconds

Default: **200 milliseconds (2 tenths of a second)**

This command takes effect during only normal mode V.23 half-duplex connections.

Sets how long the modem waits after carrier goes on before it starts looking for data. This command may be set to exclude the turn on noise that occurs when DCD turns On during V.23 half-duplex connections.

If :T6 is set to 0, the modem waits 256 milliseconds before looking for data.

:T7=*n* Timer for False Answer Abort

Range: Where *n* is an integer from 0 to 255, representing seconds

Default: **60 seconds**

Setting :T7=0 disables this timer.

This command takes effect only when the modem falls back to a normal mode V.23 half-duplex connection.

Sets the amount of time the modem waits before hanging up when it receives no data from the local computer. If this command is set to a value greater than zero, the timer starts when the modem connects. If the modem does not receive data from the local computer in the specified time, it hangs up.

:T9=*n* Primary XON Flow Control Character

Range: Where *n* is a decimal from 0 to 255, representing an 8-bit character.

Default: **11 hexadecimal (or 17 decimal) <DC1>**

Defines the character used for primary XON flow control on the modem and serial ports. Enable primary flow control with \Q1, \Q4, \G1, or \G2.

NOTE

With modem port flow control, both modems must have the same primary flow control characters set during normal connections.

:T10=*n* Primary XOFF Flow Control Character

Range: Where *n* is a decimal from 0 to 255, representing an 8-bit character.

Default: 13 hexadecimal (or 19 decimal) <DC3>

Defines the character used for primary XOFF flow control on the modem and serial ports. Enable primary flow control with \Q1, \Q4, \G1, or \G2.

NOTE

With modem port flow control, both modems must have the same primary flow control characters set during normal connections.

:T11=*n* Secondary XON Flow Control Character

Range: Where *n* is a decimal from 0 to 255, representing an 8-bit character.

Default: F9 hexadecimal (or 249 decimal)

Defines the character used for secondary XON flow control on the modem's serial port. For secondary flow control to take effect, you must set either -F1\Q1 or -F1\Q4.

:T12=*n* Secondary XOFF Flow Control Character

Range: Where *n* is a decimal from 0 to 255, representing an 8-bit character.

Default: FB hexadecimal (or 251 decimal)

Defines the character used for secondary XOFF flow control on the modem serial port. For secondary flow control to take effect, you must set either -F1\Q1 or -F1\Q4.

:T13=*n* Automode Timer

Range: Where *n* is an integer from 0 to 255, representing tenths of a second.

Default: 15 (1.5 seconds)

Sets a timer to allow modems to connect in Automode. If the originating modem is set to 2400 bps or lower and has a problem connecting to your modem, we recommend increasing the value of this command to 40 (4 seconds) on the answering modem.

NOTE

Use :T13 *only* when %L3 is in effect.

:T14=*n* Connect Message Delay Timer

Range: Where *n* is an integer from 0 to 255, in 100 millisecond intervals.

Default: **0**

Specifies how long to wait before or after a connect message before CTS, DSR, DCD go high. Use this command with @Cn (where *n*=0 or 1).

:T15=*n* V.24 Control Register

Range: Where *n* is an integer from 0 to 255 (see chart below).

Default: **159**

This command is bit-mapped and used as follows:

Bit Position	Function	Description
0	0	CTS is not affected by synchronous and direct mode retrains
	1	CTS is lowered during synchronous and direct mode retrains
1	0	CTS is not affected by leased-line restoral or dial backup operation
	1	CTS is lowered during leased-line restoral or dial backup operation in synchronous and direct modes
2	0	RTS is ignored while not connected when &R0 or &R2 set
	1	CTS follows RTS when not connected when &R0 or &R2 set
3	0	DTR operates according to &D setting in leased-line operation
	1	DTR is ignored in leased line while establishing a connection and while connected, regardless of the &D setting. DTR operates according to the &D setting during switched line and dial backup operation
4	0	Raising DTR forces the modem off hook in leased-line mode when the modem is idle

Bit Position	Function	Description
	1	Raising DTR does not force the modem off hook in leased-line mode when the modem is idle, regardless of the &D setting
5	0	No synchronous clocks until connection
	1	Synchronous clocks always On (only valid in synchronous by switch)
6	0	DCD LED follows connection status
	1	DCD LED always follows modem carrier when &C1 is set
7	0	V.32 answer tone without phase reversals
	1	V.32 answer tone with phase reversals

:T16=*n* CTS Turn On Delay Timer

Range: Where *n* is an integer from 0 to 255 (in increments of 12.5 milliseconds)

Default: 0

After DCD and/or DSR have been turned On while connecting, determines how long the modem waits before turning On CTS.

:T17=*n* V.32/V.32bis Connection Training Timer

Range: Where *n* is an integer from 0, 5 to 32

Default: 0, use dynamic training sequences – equivalent to a setting of 28

This register controls the length of the training sequences exchanged when trying to establish V.32 and V.32bis connections.

Reduces the time required to establish a connection by setting **:**T17 to a value less than 28; this increases the modem's sensitivity to noise on the line.

Reduces the modem's sensitivity to noise by setting :T17 to a value greater than 28; this lengthens the time required to make a connection.

:T18=*n* Busy Out When DTR is Low Timer

Range: Where *n* is an integer from 0 to 255 seconds

Default: **0**

When DTR is low, the modem goes off hook and busies out the line after the time set by :T18 expires. When DTR is raised, the modem re-enters command state. &D*n* (where *n*=1, 2, or 3) must also be set.

Setting :T18=0 disables this feature.

NOTE

Manual Dial (:D*n*) cannot be used when :T18 is in effect. :D0 must be set when :T18 is set to a non-zero value.

:T19=*n* Bit Mapped Register

Range: Where *n* is an integer from 0 to 255 (see below for the valid values for *n*)

Default: **1**

This command controls MNP link control and is used as follows:

Bit Position	Function	Description
0	0	Modem keeps a non-MNP10 1200 bps connection if no MNP link activity is received from the remote modem.
	1	Modem disconnects a non-MNP10 1200 bps connection if no MNP link activity received from remote modem for two minutes.

:T22 DSR Timer

Range: Where *n* is an integer from 0 to 255 (in increments of 12.5 milliseconds)

Default: **34 (425 milliseconds)**

After DCD and/or CTS drop, :T22 identifies how long the modem waits before DSR is dropped when disconnecting. For example, if \D2 and &C1 are set, when DCD and CTS drop, the modem then waits the amount of time specified by :T22 before dropping DSR.

:T23 Bit Mapped Register

Bit Position	Function	Decimal Value	Description
0-3	not used		
4	Rate negotiation at startup	1	At the start of a V.32 connection, makes modem examine line quality and set speed accordingly
		2	disabled
5-7	not used		

:T26 Bit Mapped Register

Bit Position	Function	Description
0	0	Enables 2-second billing delay
	1	Disables 2-second billing delay. This bit decreases connection time, but may affect attaining connections
1	0	Normal answer tone length in V.32 mode
	1	Shortens answer tone length in V.32 mode

:T28 Bit Mapped Register

Default: **0**

This register is used with the #CID=*n* and *T commands for the Caller Number Delivery (CND) feature. To enable the recording of the CND number, Bit 0 must be set to 1 (On).

Bit Position	Function	Description
0	0	does not record CND number or display CND message in \S report
	1	records CND number and displays CND message in \S report
1	0	disables Alternate CND message format
	1	enables Alternate CND message format
2	0	does not display CND message if Q2 is set
	1	displays CND message if Q2 is set
3	0	enables auto-answer, depending on the register S0 setting
	1	disables auto-answer if an "O" or "P" is received in the CND message

:T42=*n* V.34 Connection Speed Selection

0   Default V.34 connection speed selection

1   Highest V.34 connection speed selection (about 2 speeds above default)

2   Higher V.34 connection speed selection (about 1 speed above default)

3   Default V.34 connection speed

4   Lower V.34 connection speed (about 1 speed below default)

5   Lowest V.34 connection speed (about 2 speeds below default)

This register allows the user to change the V.34 connection speed according to line quality. We recommend that you leave this register at its default setting.

If you notice that your modem falls back during V.34 connections, or that you are seldom able to make 28800 connections, you can try the lower settings of this register.

:T49=*n* Bit Mapped Register

Range: Where *n* is an integer from 0 to 255

Default: **15 (all types auto-answer using Distinctive Ring)**

Controls which of four Distinctive Ring types (Type 1, Type 2, Type 3, or Type 4) automatically answers when a RING signal is received. See also register :T50.

Bit Position	Function	Description
0	0	Type 1 disabled
	1	Type 1 enabled
1	0	Type 2 disabled
	1	Type 2 enabled
2	0	Type 3 disabled
	1	Type 3 enabled
3	0	Type 4 disabled
	1	Type 4 enabled
4-7		not used

:T50=*n* Bit Mapped Register

Range: Where *n* is an integer from 0 to 255

Default: **15 (all types send RING message)**

Controls which of four Distinctive Ring types (Type 1, Type 2, Type 3, or Type 4) sends a RING message to the host. Also lets you optionally send a unique message (RING1, RING2, RING3, RING4) to further identify which line is receiving the RING signal. See also register :T49.

Bit Position	Function	Description
0	0	Type 1 disabled
	1	Type 1 enabled
1	0	Type 2 disabled
	1	Type 2 enabled
2	0	Type 3 disabled
	1	Type 3 enabled
3	0	Type 4 disabled
	1	Type 4 enabled
4-6		not used
7	0	unique RING message disabled
	1	unique RING message enabled

Glossary

This glossary lists terms that relate to modem operations. The following table describes each term.

Term	Definition
Adaptive Packet Assembly	The process by which MNP automatically adjusts the size of data packets based on the quality of the telephone line. When the line quality is good and there are few retransmissions, the size of the packets increases. When the line quality is poor and retransmissions are frequent, the size of the packets decreases in order to maintain high throughput.
Adverse Channel Enhancements (ACE)	Optimizes performance of the modem when operating under poor line quality conditions.
Analog transmission	Transmission method by which data is sent as a continuous range of changes in amplitude or frequency. Standard telephone lines use analog transmission.
Answer modem	The modem that emits answer tone at off hook. Can only establish a connection with an originating modem.
Answer tone	The tone an answering modem emits before carrier is exchanged.
Asynchronous	Data communications using an asynchronous computer. Data is usually sent using start/stop bit protocol and 8 bits (the most significant bit may be a parity bit).
AT Mode	The state that the modem is in when it is using the Hayes AT command set.

Term	Definition
Attention code	The AT characters tell the modem that a command follows.
Auto-answer mode	The state in which the modem automatically answers the telephone when it rings.
Auto-reliable mode	The mode in which the modem can answer calls and establish an asynchronous connection both with modems that support MNP or LAPM error correction and with modems that do not support error correction.
Automatic speed matching	The ability of the modem to automatically adjust its modem port speed to the speed of the remote modem.
Bell 103	Bell 103 protocol is for 300 bps full-duplex connections. Bell 103 is not supported for synchronous connections; digital (loop 1A) and analog (V.54 loop 3) loopbacks; LAPM connections.
Bell 212A	Bell 212A protocol is for 1200 bps full-duplex connections.
Bps rate	The rate at which information is sent. A unit of measure equal to the number of bits transmitted or received per second. Sometimes referred to as speed or communications rate.
Bps rate adjust	The ability of the modem to automatically adjust its serial port speed to match the connection speed.
Caller Number Delivery (CND)	A service available from telephone companies in some parts of the USA and other countries. With this service, the telephone company sends information (such as the telephone number) about the calling party with the RING signal to the party being called.
Caller ID (CID)	See Caller Number Delivery.
Carrier	The frequency exchanged by modems used to transmit and receive data.

Term	Definition
CCITT	(Now ITU-T) International Telegraph and Telephone Consultative Committee, the former name for the international organization that decides upon recommended communication protocol standards. See also ITU-T.
Carrier Detect (CD)	A V.24 (EIA232) signal sent from the modem to the local computer, usually indicating that the modem has detected a carrier signal over the communications line.
Cellular network	A cellular service available to cellular phone users by subscription. The service area is usually subdivided into geographical cells, each with its own radio tower (cell site). The modem making the call through a cellular phone is the cell-side or remote site and one using a conventional phone is the land-side or central site.
Command response	The OK response character that is sent to your terminal or computer to indicate the modem is ready to enter AT mode commands.
Command state	The state the modem is in when it can accept commands that you enter at the keyboard.
Compromise equalization	A method of compensating for the differences in attenuation at different frequencies.
Configuration settings	The command and register settings that determine how the modem communicates over the serial port and modem port.
Connect state	The state the modem is in when transmitting or receiving data over the communications line.
Cyclic Redundancy Check (CRC)	A method of error-checking used by MNP, where the sender and receiver both perform a polynomial algorithm on each data packet transmitted over the communications line. If the results do not match, a transmission error occurred and the packet is retransmitted.

Term	Definition
Clear To Send (CTS)	A V.24 (EIA232) signal sent from the modem to the local computer, usually indicating that the modem is ready to receive data from the local computer.
Data compression	A technique that combines duplicate characters and recodes characters based on the frequency and/or order in which they appear, to achieve increased throughput.
Data link layer	The part of MNP that handles the actual exchange of data between the two modems.
Data Carrier Detect (DCD)	See Carrier Detect.
Default setting	A setting that the modem always uses unless otherwise specified.
Digital transmission	Transmission method by which data is sent as a stream of electrical pulses. Each pulse is an off or on electrical current that represents a 0 or 1 data bit. Computers and terminals use digital transmission.
Distinctive Ring	A service available from some telephone companies that allows the detection of four types of different rings. Distinctive Ring works before the modem goes off hook. When available in a phone service area, it allows the assignment of several phone numbers to one phone line. For each phone number assigned to the same line, a different ring signal is sent to the modem.
Data Set Ready (DSR)	A V.24 (EIA232) signal sent from the modem to the local computer, usually indicating that the modem is ready to establish a connection.
DataTerminal Ready (DTR)	A V.24 (EIA232) signal sent from the local computer to the modem, usually indicating that the local computer is ready to begin communication.
Dumb mode	The state in which the modem does not recognize commands or send result codes.

Term	Definition
Dynamic Transmit Level Adjustment	The capability to automatically calculate optimal transmit levels to compensate for cellular telephone signal distortion.
EIA	Electronic Industries Association.
Escape code	A series of three consecutive characters (preceded and followed by a guard time of one second or user-selectable setting) that is sent to the modem, causing it to exit connection state and enter command state.
Factory default switch settings	The configuration switch settings that are in effect when the modem is shipped from the factory.
Flow control	The use of characters or V.24 (EIA232) signals to start and stop the flow of data to avoid data loss during buffering.
Full duplex	Communication method by which data can be transmitted in two directions simultaneously.
Guard time	An interval of time that must be present before the first character and after the last character of the escape code in order for the modem to recognize the escape code and enter command state. Also, the time that precedes and follows the remote access attention character sequence.
Guard tone	A constant tone generated by the answering modem during V.22 and V.22bis connections.
Half duplex	Communication method by which data can be transmitted in two directions, but in only one direction at a time.
ITU-T (Formerly CCITT)	International Telegraph and Telephone Union — Telecommunication Standardization Section, the international organization that decides upon recommended communication protocol standards.
ITU-T V.21	The V.21 protocol is used for 300 bps full-duplex connections. V.21 mode is not supported for synchronous connections; V.54 digital and analog; or LAPM connections.

Term	Definition
ITU-T V.22	The V.22 protocol is used for 1200 bps and 600 bps full-duplex connections. The version of V.22 your modem supports is Alternative B.
ITU-T V.22bis	The V.22bis protocol enhances V.22 by adding 2400 bps full-duplex connections.
ITU-T V.23	The modem supports two V.23 modes: one-way forward channel at 1200 bps with a 75 bps back channel; and main channel half duplex at 1200 bps. V.23 mode is not supported for synchronous connections; V.54 digital and analog loopbacks; leased-line operation; or MNP and LAPM connections.
ITU-T V.32	The ITU-T V.32 protocol is for full-duplex data transfer over general switched telephone networks at 9600 and 4800 bps. V.32 employs echo cancellation and trellis coded modulation.
ITU-T V.32bis	An MNP or LAPM error-free asynchronous connection at 14400, 12000, 9600, 7200, or 4800 bps with another modem that supports MNP or LAPM. The ITU-T V.32bis specification enhances V.32 by adding 14400, 12000, and 7200 bps speeds and special rate sequences to shorten speed upshifting and downshifting.
ITU-T V.34	An MNP or LAPM error-free asynchronous connection at 28800, 26400, 24000, 21600, 19200, 16800, 14400, or 33600 bps with another modem that supports MNP or LAPM. The V.34 protocol being adopted by the ITU-T provides several modulation enhancements to make the most of the new, more capable telephone networks. It operates better over noisy lines and holds connections more consistently. V.34 offers full-duplex data transfer over general switched telephone networks at several speeds ranging from 14400 bps to 28800 bps, depending on line conditions encountered during the connection.

Term	Definition
Link Access Procedure for Modems (LAPM)	An HDLC error correction protocol for use with error-correcting modems. Part of the ITU-T V.42 protocol.
Local computer	The computer the modem is attached to via the serial port.
Local system	The modem and the computer it is attached to.
Microcom Networking Protocol (MNP)	A data communications protocol that allows error-free interactive communications with a variety of computers or terminals over ordinary voice-grade telephone lines.
Mode Indicator/Mode Indicator Common (MI/MIC)	Allows the modem to be used with dial-back security devices and Bell 801-type automatic calling units.
MNP reliable link	Communications established with a remote computer, using the Microcom Networking Protocol to perform error checking and correction.
Modem	MOdulator-DEModulator. A device that permits a computer to communicate with other computers or terminals over analog telephone lines. The local modem converts digital input from the local computer into analog signals, which are then transmitted over the telephone line. The remote modem on the other end of the connection reconverts the analog signals into digital signals, which are then transmitted to the remote computer.
Modem port	Modem-to-remote system connection. The port through which analog signals are exchanged over the telephone line.
Multi-protocol auto-answer	The state in which the modem can auto-answer incoming calls and establish a connection at any speed from 28800 bps or lower. The modem can connect using any of the following modulation protocols: V.34, V.32bis, V.32, V.22bis, V.22 (1200 bps only), V.21, V.23 split speed (1200 bps transmit/75 bps receive only), V.23 half-duplex, Bell 212A, and Bell 103.

Term	Definition
Noise	Unwanted signal disturbances over a communication line, such as variation in voltage or current, that can affect the integrity of data transmitted over the line or cause the loss of connection.
Normal operation	A standard asynchronous connection that does not use error correction, established with any V.34, V.32bis, V.32, V.23, V.22bis, V.22, V.21, Bell 212A, or Bell 103 modem.
Off hook	The condition that is similar to picking up a telephone receiver. The modem goes off hook to dial or answer and remains off hook while connected.
On hook	The condition that is similar to hanging up a telephone receiver. You cannot enter the connect state when the modem is on hook.
Online	Connected to a remote system.
Optimized Data Phase	Redesign of the MNP protocol header, which reduces the number of overhead bytes per data packet.
Originate modem	The modem that emits carrier in response to answer tone from a remote answer modem.
Parity	A method of error-checking by which an extra bit is added to every character. The value of the bit is set so that the sum of the data bits and the parity bit is always either even (for even parity) or odd (for odd parity). For example, if parity is set to even, and a character is received with a sum that is odd, the computer knows that an error has occurred.
Protocol	A set of rules or parameters for communicating between two computers.
Postal Telephone Telegraph (PTT)	A local government's organization that governs internal and international communications.
Pulse dialing	Telephone dialing accomplished by sending a series of pulses, which sound like loud clicks.

Term	Definition
Reliable operation	An MNP or LAPM error-free connection with another MNP or LAPM modem.
Remote system	Any computer with which you communicate using the modem and a communications line.
Result code	A message the modem sends to the local computer containing information about the state of the modem.
Retrain	A method of re-establishing a better quality connection when the quality of the current connection causes data to be continuously retransmitted.
Request To Send (RTS)	A V.24 (EIA232) signal sent from the local computer to the modem, usually indicating that the computer is ready to begin sending data to the modem.
Serial port	The port through which digital signals are exchanged between the modem and the local computer.
Smart mode	The state in which the modem recognizes commands and sends result codes.
Spoofing	A technique to enhance data throughput. During a parallel-port connection, the modem sends messages to the remote computer to maintain the data flow without interruption. This emulates (spoofs) a protocol typically used in serial communications.
Synchronous	Data communications using a synchronous computer. Data transmission is clock-driven and does not use start/stop protocol.
Tone dialing	Telephone dialing accomplished by sending a series of tones.