C I S C O **S** Y S T E M S

Doc. No. 78-3003-01

12-Port Modem AT Command Set and Register Summary

This document contains the following information:

* Instructions for entering AT commands

* Summary of the AT command set used by the 12-port modems

* Instructions for entering register commands

* Summary of the modem S and :T registers

Entering AT Commands

Consider the following guidelines when you issue the AT commands to a modem:

* To use the AT command set, you must select the modem and open a direct-connect session. Use the **modem at-mode-permit** command to allow the modem to accept the direct-connect session. Then use the **modem at-mode** command to open the direct-connect session. The following example opens a direct-connect session with modem 1 in slot 1:

```
access server# config t
access server(config)# line 1
access server(config-line)# modem at-mode-permit
```

The modem can now accept a direct-connect session. The following command opens the direct-connect session for AT commands:

```
access server# modem at-mode 1/1
You are now entering AT command mode on slot 1 modem 1.
Please type CTRL-C to exit AT command mode.
ATH
OK
```

* To exit a direct-connect session with a modem, press Control-C.

- AT commands can be entered at any serial port speed up to 115200 bps. If an AT command is entered at 38400 bps or above, the serial port locks at that speed. Use one of the following methods to unlock the serial port:

  — Use the **$B***n* command (Serial Port Bps Rate) to set the port speed. Enter **AT$B***n* (n is any supported serial port speed).

  — Use the**%U0** command (Clear Serial Port Speed) to change the port speed. Enter **AT%U0** to unlock the serial port speed and enter **AT** at the new serial port speed.

  — Use the **&D2** or **&D3** commands (DTR Control) to prepare the serial port to accept an AT command at any speed.

  — Enter **AT** at the new serial port speed.

- Enter commands as either uppercase or lowercase, not mixed case.

- All commands except **A/** (Repeat Last Command) and +++ (Escape Code) are preceded by the AT prefix and are executed when you press Return or Enter.

- The command length limit is 98 characters. The modem does not count the AT prefix, Return, and space characters.

- A missing numeric argument is assumed to be zero. For example, the Data Echo command **\E** is equivalent to **\E.**

- The modem operates in one of two modes: idle state (no connection established with another modem) or connect state. Use the following commands to change operating states:

  — To enter command state from connect state without breaking the connection, enter +++ (Escape Code), without pausing and do not press Return.

  — To return to connect mode, enter **AT0** and press Return.

AT Command Sets

Modem commands descriptions are grouped by command prefix and are found in the following sections:

Alphabetic Command Set

This section describes the modem commands that begin with an alphabetic (A to Z) character.

A   (Answer)

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

A/   (Repeat the Last Command)

Reexecutes the last command one time. **A/** does not use the AT prefix or a Return.

AT   (Attention)

Informs the modem that commands are being issued to it. **AT** must precede all other commands except **A/**.

Bn   (ITI–U/Bell Mode)

Selects the modem connection type used when connecting at 300 and 1200 bps. **B**n is ignored when the modem port is set to other speeds. The ITI–U/Bell mode command options are listed in Table 1.

Table 1   ITI–U/Bell Mode Command Options

Command	Description
B0	ITU–T V.22 standard at 300 and 1200 bps.
B1	Bell 212A standard at 300 and 1200 bps.

D{dial string}   (Dial)

Dials a telephone number to establish a connection. The Dial command must be the last command on a command line. The *dial string* can contain up to 98 characters. Valid dial string characters are: digits 0 to 9, the dial modifiers listed in Table 2, and # and * for tone dialing. The modem ignores invalid characters. Dial strings longer than 98 characters return an error. For example, to dial the telephone number 1 617 555 1234, enter the following command:

```
D 16175551234
```

To cancel the Dial command, press any key or set Data Terminal Ready (DTR) to off unless **&D0** (DTR ignored) is set. After disconnect, there is a five second delay before the modem is set off hook in originate mode.

Dial Modifiers

Dial modifiers add conditions to the telephone number that you are dialing. You can use several dial modifiers within the same telephone number. Unless otherwise noted, dial modifiers can be placed anywhere in the dial string. Dial modifiers are listed in Table 2.

Table 2   Dial Command Modifier Options

Modifier	Description
A	Performs link negotiation at 4800 bps only for the current connection. This dial modifier is equivalent to the ***H2** command (Link Negotiation at 4800 bps).
J	Performs link negotiation at 1200 bps. This dial modifier is equivalent to the ***H1** command (Link Negotiation at 1200 bps).
K	The number dialed is a cellular connection. Adjusts the power level for a single cellular connection.This option is used for modems attached to cellular interfaces.
L	Redials the last telephone number dialed.
M	Dials in Link Access Procedure for Modem (LAPM) Mode. The modem overrides the current operating mode and dials in LAPM mode for that connection only.

Nn	Dials an alternate stored number. This modifier follows the last character in a dial string. If the modem fails to make a connection, the **N**n modifier dials the alternate telephone number n stored in the directory. The argument n is a number between 1 and 9, referencing a telephone number stored in the directory with the **&Z** or **\P**n command (Store Telephone Number). If you do not enter a value for n, the modem dials the first stored entry. For example, to dial the third stored telephone number as an alternate telephone number, enter the following command and press Return:
	
	`ATD 55554321N3`
	
	The **N**n modifier may also be stored in the directory 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, even if it is null. Stored number 1follows stored number 9.
	
	For example, to store a telephone number and an alternate number in directory entry four, enter the following command and press Return:
	
	`AT\P4 5551234N3`

P	Pulse dials the number. 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. You can combine **P** and **T** dial modifiers within a dial string. For example, to pulse dial a local telephone number and tone dial an access code and telephone number, enter the following command and press Return: `ATD P5552345 T335 6789`
Q	Dials in LAPM mode with fallback to normal**.** The modem overrides the current operating mode and dials in LAPM mode with fallback to normal mode for that connection only.
R	Dials a number in answer mode when calling an originate-only modem. The modifier must follow the last character in the dial string. For example, to dial the telephone number 5552345 in answer mode, enter the following command and press Return: `ATD 5552345R`
S	Dials the first stored telephone number. The **S** modifier must immediately follow **D** in the dial command. The modem dials the telephone number stored as entry **1** with the **&Z** or **\P1** command. The telephone number is displayed as it is dialed. The **S** modifier cannot be stored with the phone number in the first directory position. For example, to dial the first stored telephone number, enter the following command and press Return: `ATDS`
T	Tone dials the number. 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. You can combine **P** and **T** dial modifiers within a dial string. For example, to pulse dial a local telephone number and tone dial an access code and telephone number, enter the following command and press Return: `ATD P12345 T335 6789`

Modifier	Description
U	Dials in direct mode. The **U** modifier overrides the current operating mode and dials in direct mode for that connection only. For example, enter the following command and press Return: `ATD 12345U`
V	Dials in LAPM mode with fallback to MNP**.** The **V** modifier overrides the current operating mode and dials in LAPM mode with fallback to MNP for that connection only. For example, enter the following command and press Return: `ATD 12345V`
W	Waits for the dial tone before dialing. The **W** modifier is inserted between digits in a dial string. The modem waits for the time specified in register S7 for a second dial tone before dialing the number. If the modem receives a dial tone before the register S7 time delay expires, it continues dialing. If no dial tone is received, the modem returns NO DIALTONE and hangs up. For example, enter the following command and press Return: `ATD 12345 W 67890`
X	Dials in autoreliable mode. The modem overrides the current operating mode and dials in autoreliable mode for that connection only. For example, enter the following command and press Return: `ATD 12345X`
Y	Dials in MNP reliable mode**.** The modem overrides the current operating mode and dials in MNP reliable mode for that connection only. For example, enter the following command and press Return: `ATD 12345Y`
Z	Dials in normal mode**.** The modem overrides the current operating mode and dials in normal mode for that connection only. For example, enter the following command and press Return: `ATD 12345Z`
,	Pauses during dialing**.** The modem pauses for the time specified in register S8 before dialing the next digit. Use more than one comma for a longer pause. For example, use the comma when you need to dial "9" and pause to wait for another dial tone before dialing an outside line: `ATD 9,,5552345`
@	Waits for quiet answer before dialing**.** This modifier is inserted between characters in a dial string. The modem waits for the time specified in register S7 for at least one ring, followed by 5 seconds of silence, before acting on the next character in the dial string. If the modem does not detect this sequence, it returns a NO ANSWER result code and hangs up. Use this modifier when the system you are calling does not provide a dial tone. For example: `ATD 5551234 @ 43210`
!	Sets the modem on hook for one–half second and then back off hook, when this modifier is inserted in the dial string. This is equivalent to depressing the switch-hook button on your telephone. **Note:** See any country-specific addendum for differences.

;	Returns to command state after dialing**.** Add this modifier to the end of a dial string. The modem remains in command state after it dials the digits preceding the semicolon so that you can issue dial strings longer than 98 characters. After the final dial command is issued, it tries to establish a connection. To abort dialing before you attempt to make a connection, issue the **H** command (Hang Up). Each dial command except the last one must end with a semicolon. For example:
	
	`ATD 9,12345;`
	OK
	`ATD 78989 @ 12345 W 344`

DL   (Redial the Last Telephone Number Dialed)

Redials the last telephone number that the modem dialed.

D/*n*   (Dial a Stored Telephone Number)

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

Range

1 to 9

Default

0

E*n*   (Command Echo)

Configures the modem to echo commands to the workstation. Command echo options are listed in Table 3.

Default

E1

Table 3   Command Echo Options

Command	Description
E0	Prevents echoing commands to the workstation.
E1	Enables echoing commands to the workstation.

H   (Hang Up)

Disconnects from the remote system and hangs up the telephone line. If the **%D*n*** (Disconnect Buffer Delay) time is nonzero, the hang up can be delayed until the modem has transmitted all the data in its transmit buffer. Ring signals and positive transitions of Data Terminal Ready (DTR) are ignored for 5 seconds after disconnect.

I*n*   (Identification)

Identification command options are listed in Table 4.

Table 4   Identification Command Options

Command	Description
I0	Displays the four-digit modem product code.
I1	Runs a checksum on the firmware ROM and displays the three-digit result.

Command	Description
I2	Runs a checksum on the firmware ROM and displays the checksum status.
I3	Displays modem name and revision.

O*n*   (Enter Connect State)

Sets the modem to connect state. Connect state command options are listed in Table 5.

Table 5   Connect State Command Options

Command	Description
O0	Enters connect state.
O1	Begins an equalizer retrain sequence when operating at 2400 bps or higher and then returns to connect state. Use the **O1** command to reduce loss of equalization because of excessive bit error rates.

P   (Pulse Dial)

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

Q*n*   (Quiet)

Configures the modem to send result and status codes, such as OK, BUSY, and RING, to your workstation. Quiet command options are listed in Table 6.

Default
Q0

Table 6   Quiet Mode Command Options

Command	Description
Q0	Enables output of result codes.
Q1	Disables output of result codes.
Q2	Disables only answer mode result codes. Status report messages are not affected.

S*n*?   (Read Configuration Register)

Displays the contents of the S register specified by *n* in decimal format.

Range
0 to 27

Default
0

T   (Tone Dial)

Sets the current dialing mode to tone. This is the default dialing mode.

V*n*   (Result Code Form)

Selects the result code format sent to your workstation. The **\V*n*** command (Error Correction Result Code Form) modifies the connect messages to reflect a reliable link connection. Result code command options are listed in Table 7.

Default

V1

Table 7   Result Code Form Command Options

Command	Description
V0	Sends short form result codes.
V1	Sends long form result codes.

W*n*   (Connection Speed Reporting)

Displays the serial port or modem port speed in connect messages. When **X0** command (Extended Result Codes) is set, CONNECT displays for any **W*n*** command option. Connection speed reporting command options are listed in Table 8.

Default

W2

Table 8   Connection Speed Reporting Command Options

Command	Description
W0	Displays serial port connect messages.
W1	Displays serial port connect messages.
W2	Displays modem port connect messages.

X*n*   (Extended Result Codes)

Selects the extended result code format that is sent to the workstation. Extended result codes command options are listed in Table 9.

The following commands also affect the result code format:

- The **V*n*** command (Result Code Form) selects short or long form result codes.

- The **\V*n*** command (Result Code Form) or **-M1** command (MNP Class Connect Messages) must be set to indicate MNP reliable mode in the result code.

When the modem is set to ignore the dial tone, it waits for the register S6 time delay and dials with or without a dial tone.

Default
X4

Note The **W** dial modifier causes a wait for dial tone for any **X**n command setting.

Table 9   **Extended Result Codes Command Options**

Command	Description
X0	Sends a connect result code when a connection is established. The modem ignores the dial tone and busy signals.
X1	Sends a connect result code reflecting the bps rate when a connection is established. The modem ignores the dial tone and busy signals.
X2	Sends a connect result code reflecting the bps rate when a connection is established. The modem sends a NO DIALTONE result code if the dial tone is not detected within 5 seconds of a dial attempt. The modem ignores busy signals.
X3	Sends a connect result code reflecting the bps rate when a connection is established. The modem sends a BUSY result code if a busy signal is detected. The modem ignores the dial tone.
X4	Sends a connect result code reflecting the bps rate when a connection is established. The modem sends a NO DIALTONE result code if dial tone is not detected within 5 seconds of dial attempt. The modem sends a BUSY result code if a busy signal is detected.

Yn   (Long Space Disconnect)

Configures the modem to send a 4-second Break on receipt of a **H** command (Hang Up). The answering modem disconnects if it receives the Break. This command is used only in normal and direct connections. Long space disconnect command options are listed in Table 10.

The 4-second Break also is sent if **Y1** and the following **&D**n command (Data Terminal Ready Control) is set:

- **&D2** is set and Data Terminal Ready (DTR) transitions off.

- **&D3** is set and DTR transitions off. The sending modem disconnects after the Break.

Default
Y0

Table 10   **Long Space Disconnect Command Options**

Command	Description
Y0	Disables the long space disconnect on receipt of **H** command. The normal break signal is sent.
Y1	Enables the long space disconnect on receipt of **H** command. **Y1** must be set on both modems for this command to take effect.

Z   (Reset)

Hangs up the telephone line and clears the modem and the serial port buffers. When the next **AT** command is issued, the factory defaults are restored, and the parity and bps rate are set to match the local workstation.

The **Z** command restores any settings stored with the **&W** or ***W** commands since the last power reset. If no settings are stored, the factory default settings (**&F**) are restored.

For example, to reset the modem, enter the following command and press Return:

```
ATZ
```

Caret Command Set

This section describes the modem commands that begin with a caret (**^**) character.

^H   (Host Port Upgrade)

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

^V   (Display Bootstrap Revision)

Requests that the modem display its current Flash memory bootstrap revision.

Dollar Command Set

This section describes the modem commands that begin with a dollar (**$**) character.

$B*n*   (Serial Port Bps Rate)

Sets the serial port rate to *n* bps.

Range
300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps

Default
38400 bps

$D   (Power-Up Diagnostics)

Runs power-up diagnostics.

Percent Command Set

This section describes the modem commands that begin with a percent (**%**) character.

%A*n*   (Autoreliable Fallback Character)

Specifies the ASCII character recognized as the autoreliable fallback character on the answering modem. In autoreliable mode, when the modem encounters an incoming autoreliable fallback character from the remote system, it automatically switches to normal mode and passes the character to the serial port. Autoreliable fallback character recognition stops if the modem receives a SYN character (decimal 22). The **\N3** (Operating Mode) and **\C2** (Autoreliable Buffer) commands also must be set.

Caution   Do not use the settings *n* = 63 or *n* = 126. They interfere with V.42.

Range
0 to 127 (ASCII decimal)

Default
0 (Autoreliable fallback character is disabled)

%B*n*   (Modem Port Bps Rate)

Sets the modem port bps rate. Downshifting can still occur.

The **%B*n*** command is affected by the following **%G*n*** command (Independent Serial/Modem Port Speed) options:

- If **%G0** is issued locally, the modem port speed is matched to the serial port speed, regardless of any previous **%B*n*** setting.

- If **%G1** is set, the modem speed changes only when an **%B*n*** command is entered.

Range
300, 600, 1200, 2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800 bps

Default
28800

%C*n* (Compression Control)

Sets the modem to use a data compression method in reliable connections. The recommended default command setting **%C3** allows the modem to establish a reliable connection using V.42 *bis* compression or MNP Class 5 Data Compression, depending on the capability of the remote modem.

If the remote modem does not support data compression or has data compression disabled, the modem can establish a noncompression connection with any **%C*n*** setting.

Throughput is affected by the **\J***n* command (bps Rate Adjust) options:

- **\J0** (Disable bps rate adjust) is recommended for the highest throughput.

- **\J1** (Enable bps rate adjust) causes the serial port to adjust to 9600 bps when a reliable connection is established at a speed from 2400 to 14400 bps. At 16800 bps or higher, the serial port speed adjusts to 19200 bps.

Default

%C3

Table 11   Compression Control Command Options

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

%D*n*   (Disconnect Buffer Delay)

Specifies a delay time for the modem to process data in its transmit or receive buffers before disconnecting. When Data Terminal Ready (DTR) transitions off or a **H** command (Hang Up) is issued, the modem attempts for *n* seconds to empty its transmit buffer before disconnecting. When the carrier transitions off, the modem attempts for *n* seconds to empty its receive buffer before disconnecting. If the buffers are empty or if *n* = 0, the modem disconnects immediately.

If a physical disconnect occurs (for example, the connection is lost), only the receive buffer can be processed. If the delay expires before the modem empties its buffers, or if the modem is in command state at disconnect, data can be lost. The receive buffer might not empty before disconnecting if **%E1** (Autoretrain) is set during normal mode connections at 2400 bps or higher.

Range

0 to 255 seconds

Default

0

%E*n*   (Autoretrain)

Sets the modem to resynchronize (autoretrain) up to three times (for a total of up to 6 seconds) before hanging up. The modem only resynchronizes for connection speeds of 2400 bps or higher. The **%E***n* command is ignored in V.32 communication. Autoretrain command options are listed in Table 12.

Default

%E1

Table 12   Autoretrain Command Options

Command	Description
%E0	Disables the automatic retrain sequence. Use **O1** command (Enter Connect State) to force the retrain sequence when **%E0** is set.
%E1	Enables the automatic retrain sequence at 2400 bps or higher.

%G*n*   (Independent Serial Port and Modem Port Speed)

Sets the modem port speed independent of the serial port speed. The modem port speed is set by the **%B***n* command (Modem Port bps Rate). Independent serial and modem port speed command options are listed in Table 13.

Default

%G0

Table 13   Independent Serial and Modem Port Speed Command Options

Command	Description
%G0	Updates the serial and modem port speeds each time an **AT** command line is entered. The serial port speed determines the modem port speed.
%G1	Updates the modem port speed only when a **%B***n* (Modem Port bps Rate) command is issued.

The following tables list the command strings to set modem port speeds:

- Table 14 lists commands for modem protocols to 14400 bps.

- Table 15 lists commands for V.34 modem port speeds to 28800 bps.

Table 14   Modem Port Speed Commands to 14400 BPS

Protocol	%G0	%G1
V.21 (300 bps)	Using **B0** at 300 bps	**B0%B300**
Bell 103 (300 bps)	Using **B1** at 300 bps	**B1%B300**
V.22 (600 bps)	At 600 bps	**%B600**
V.22 (1200 bps)	Using **B0** at 1200 bps	**B0%B1200**
Bell 212A (1200 bps)	Using **B1** at 1200 bps	**B1%B1200**
V.22 *bis* (2400 bps)	At 2400 bps	**%B2400**
V.32 (4800 bps)	At 4800 bps	**%B4800**
V.32 (9600 bps)	At 9600 bps	**%B9600**
V.32 *bis* (14400 bps)	At any speed above 9600 bps	**%B14400**

Table 15   Modem Port Speed Commands for V.34

	When %M2 is set:
V.34 Speed	**%G1**
2400 bps	**%B2400**
4800 bps	**%B4800**
7200 bps	**%B7200**
9600 bps	**%B9600**
12000 bps	**%B12000**
14400 bps	**%B14400**
16800 bps	**%B16800**
19200 bps	**%B19200**
21600 bps	**%B21600**
24000 bps	**%B24000**
26400 bps	**%B26400**
28800 bps	**%B28800**

%L*n*   (Speed Matching)

Configures the modem to use speed matching when establishing a connection. Speed matching command options are listed in Table 16.

Default

%L1

Table 16   Speed Matching Command Options

Command	Description
%L0	Provides partial speed matching.
%L1	Enables speed matching.
%L2	Disables speed matching.
%L3	Enables V.8 automode with fallback to ITU-T automode.
%L4	Enables V.8 automode only.

Modem Connection Modes Using Speed Matching

Table 17 lists connections the modem can establish with **%L1** or **%L3** set.

Table 17   Modem Connection Modes with %L1 or %L3 Set

Mode Setting on Originating Modem	Bell103	Bell212A	V.22[b]	V.22[a]	V.22 *bis*	V.32	V.32 *bis*	V.34
V. 34 (2400–28800)	—	—	—	V.22[a]	V.22 *bis*	V.32	V.32 *bis*	V.34
V.FC (14400–28800)	—	V.22[a]	—	V.22[a]	V.22 *bis*	V.32	V.32 *bis*	V.34
V.32 *bis* (4800–14400)	—	V.22[a]	—	V.22[a]	V.22 *bis*	V.32	V.32 *bis*	V.32 *bis*
V.32 (4800–9600)	—	V.22[a]	—	V.22[a]	V.22 *bis*	V.32	V.32	V.32
V.22 *bis* (2400)	—	V.22[a]	—	V.22[a]	V.22 *bis*	V.22 *bis*	V.22 *bis*	V.22 *bis*
V.22[a] (1200)	—	V.22[a]	—	V.22[a]	V.22[a]	V.22[a]	V.22[a]	V.22[a]
V.22[b] (600)	—	—	V.22[b]	—	—	—	—	—
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.22[a]	—	V.21	V.21	V.21	V.21	V.21
Bell212A (1200)	Bell212A	Bell212A	—	V.22[a]	V.22[a]	V.22[a]	V.22[a]	V.22[a]
Bell103 (300)	Bell103	Bell103	—	Bell103	Bell103	Bell103	Bell103	Bell103

Restricted Speed Matching

Use the **%L0** or **%L2** command options on both the originating and answering modem to restrict the connection speed. Table 18 lists connection speeds using the **%L0** partial speed matching option. Table 19 lists connections speeds using the **%L2** speed matching disabled option. If **%L2** is set, the modem speed matches the possible connection speed.

Table 18   Connection Speeds with Partial Speed Matching (%L0 Option)

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

Modem Speed	Possible Connection Speed
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

Table 19   Connection Speeds with Speed Matching Disabled (%L2 Option)

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

%M*n* (Modulation Selection)

Sets the modem modulation mode. Modulation selection command options are listed in Table 20.

Default

%M2

Table 20   Modulation Selection Command Options

Command	Description
%M0	Disables V.34 modulation modes.
%M1	Disables V.34 modulation modes.
%M2	Enables all modulation modes (default).

%R*n*   (Read All Registers)

Displays the contents of the modem S and :T registers as a table of values in decimal and hexadecimal format. The read all register command options are listed in Table 21.

Table 21   Read All Registers Command Options

Command	Description
%R0	Displays the contents of all S registers as decimal and hexadecimal integers in tabular format.
%R1	Displays the contents of all :T registers as decimal and hexadecimal integers in tabular format.

%U*n*   (Clear Serial Port Speed)

Sets the serial port speed. The clear serial port speed command options are listed in Table 22.

Default
%U0

Table 22   Clear Serial Port Speed Options

Command	Description
%U0	Allows the current serial port speed to be changed to any other speed. This option is not required for speeds of 19200 bps and lower.
%U1	Always keeps the current serial port speed. You must enter **%U1** each time you change the serial port speed.
%U2	Allows the current serial port speed to be changed from any speed.

%V   (Display Modem Firmware Version)

Displays the modem firmware version.

Ampersand Command Set

This section describes the modem commands that begin with an ampersand (**&**) character.

&C*n*   (Serial Port DCD Control)

Controls the Data Carrier Detect (DCD) signal level. Use this command if your workstation requires DCD to be off at certain times. The serial port DCD control command options are in Table 23. See also the **D***n* command.

Default
%C1

Table 23   Serial Port DCD Control Command Options

Command	Description
&C0	DCD is always on.
&C1	DCD follows the state of the carrier from the remote system. DCD turns on after the connect message.
&C2	DCD is on except for momentarily at disconnect.

&D*n*   (DTR Control)

Specifies the modem action when Data Terminal Ready (DTR) transitions off. The on-to-off transition of DTR must last as long as the value specified in register S25. Positive transitions of DTR (off-to-on) within 5 seconds after disconnect are ignored. DTR control command options are listed in Table 24.

Default
&D2

Table 24   DTR Control Command Options

Command	Description
&D0	Ignores DTR. DTR is not needed for autoanswer.
&D1	Enters command state on detecting on-to-off transition of DTR. DTR is not needed for autoanswer.
&D2	Sets the modem on hook when detecting an on-to-off transition of DTR and prepares the serial port to accept an AT at any speed. DTR is needed for autoanswer.
&D3	Sets the modem on hook and resets when detecting an on-to-off transition of DTR and prepares the serial port to accept an AT at any speed. DTR is needed for autoanswer.

&F   (Restore Command Defaults)

Restores the command default settings. Stored telephone numbers are not cleared.

&G*n*   (Guard Tone)

Sets the guard tone frequency on the answering mode. Guard tone command options are listed in Table 25.

Default
&G0

Table 25   Guard Tone Command Options

Command	Function
&G0	Disables the guard tone.
&G1	Sets the guard tone on the answering modem to 550 Hz.
&G2	Sets the guard tone on the answering modem to 1800 Hz.

&P*n*   (Dial Pulse Ratio)

Sets the ratio of the off-hook (make) to on-hook (break) time that the modem uses for pulse dialing. Dial pulse ratio command options are listed in Table 26.

Default
&P0

Table 26   Dial Pulse Ratio Command Options

Command	Description
&P0	Make = 39%, Break = 61%
&P1	Make = 33%, Break = 67%

&S*n*   (DSR Options)

Sets the serial port Data Set Ready (DSR) signal. DSR command options are listed in Table 27.

Default
&S0

Table 27   DSR Command Options

Command	Description
&S0	DSR is always on. **&S0** is equivalent to setting the Serial Port DSR/CTS command **\D.**
&S1	DSR is on with the answer tone. **&S1** is equivalent to setting the Serial Port DSR/CTS command **\D3**.

&T*n*   (Diagnostic Test Mode)

Configures the modem to run a local or remote diagnostic test. Use the **&T0** command to stop a running diagnostic test. Diagnostic test mode command options are listed in Table 28.

Default
&T5

Table 28   Diagnostic Test Command Options

Command	Description
&T0	Ends a test in progress. The test ends without terminating a connection, returning 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	Runs a local analog loopback test. The modem should display the characters on your screen exactly as you enter them. The modem must be in normal or direct mode and set to 1200 bps or higher.
&T3	Local digital loopback test. Allows a remote modem that does not support the CCITT V.54 standard to perform a remote digital loopback test with the modem. The modem must be in normal or direct mode and set to 1200 bps or higher.
&T4	Responds to a remote digital loopback test request. Allows the modem to respond to a remote caller's request to enter remote digital loopback mode. The modem must be in normal or direct mode and set to 1200 bps or higher.
&T5	Does not respond to a remote digital loopback test request. Prevents the modem from responding to a remote digital loopback request.
&T6	Initiates a remote digital loopback test. Instructs the remote modem to initiate a remote digital loopback test. The modem must be in normal or direct mode and set to 1200 bps or above.
&T7	Initiates a remote digital loopback with self-test. Instructs the remote modem to enter a remote digital loopback with self-test. After the test is complete, the remote modem reports errors to the local device. The modem must be in normal or direct mode and set to 1200 bps or above.
&T8	Runs a local analog loopback with self-test. The modem sends itself the ITU-T V.54 test pattern and verifies the characters to make sure they are received correctly. When the test is complete, 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 above.

&W*n*   (Store Current Configuration)

Stores the current configuration as user profile *n*. The **&W*n*** command stores the active commands and S registers, except restricted S registers S2 to S12. Telephone numbers are stored independently with the **\P*n*** and **&Z*n*** commands. **AT&W** stores the serial port speed and parity and the modem port speed in effect when you enter **&W**.

Note   The **&W** and ***W** commands share the same stored configuration area. Use one of the commands to override the other stored settings. The ***W** command stores the current settings for the restricted S registers S2 to S12. If **&W** is used after a ***W** command, the default settings for the restricted S registers are stored.

Range

0 to 3

Default

0

Parenthesis Command Set

This section describes the modem commands that begin with a right-parenthesis ()) character.

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

Adjusts the power levels during link negotiation for reliable connections to accommodate signaling requirements of cellular telephone equipment. Power level command options are listed in Table 29.

Default
)M0

Table 29   Power Level Command Options

Command	Description
)M0	Adjusts the power level for central site modems if the remote modem is set to **)M1**. Use this option for MNP10 modems that connect to both cellular and noncellular site modems.
)M1	Autoadjusts the power level for cellular modems.

Asterisk Command Set

This section describes the modem commands that begin with an asterisk (*) character.

*H*n*   (Link Negotiation Speed)

Sets the link negotiation speed for a connection before the modems upshift. Link negotiation speed command options are listed in Table 30.

Default
***H0**

Table 30   Link Negotiation Speed Command Options

Command	Description
***H0**	Link negotiation occurs at the highest supported speed. Use ***H0** if you plan to answer calls from modems that do not support MNP Class 10 connections.
***H1**	Link negotiation occurs at 1200 bps. Use ***H1** for cellular connections.
	If **@M1** is set, it is assumed that the modem is connected to a cellular phone. When a 1200 bps connection is established, the modem attempts upshifts to the highest supported speed. If unsuccessful, the modem downshifts to 1200 bps.
***H2**	Link negotiation occurs at 4800 bps. Use ***H2** to facilitate noncellular link negotiation over poor telephone lines.

*I   (Modem Identifier)

Sets the modem identifier displayed on the INC static snapshot. When the ***I** command is issued, the following prompt appears: `ID:`

The identifier can consist of up to 25 ASCII characters. It is truncated after the twenty-fifth character. The modem identifier is also displayed by the **\S** command (Read Online Status).

Default
None

*W*n*   (Store Complete Configuration)

Stores the complete modem configuration as user profile *n*. The ***W*n*** command stores the active commands and the current values of restricted S registers S2 to S12 not stored with **&W**. The ***W** command saves the serial port speed and parity and the modem port speed in effect when *W*n* is used. Telephone numbers are stored with the **\P*n*** and **&Z*n*** commands.

Note   The **&W** and ***W** commands share the same stored configuration area. Use one of the commands to override the other stored settings. The **&W** command stores the default settings for the restricted S registers S2 to S12. If **&W** is used after a ***W** command, the default settings for the restricted S registers are stored.

Hyphen Command Set

This section describes the modem commands that begin with a hyphen (-) character.

-D{*dial string*}   (Repeat Dial)

Redials a telephone number, up to 9 times, until a connection is made. In reliable mode, the modem does not redial the number if the remote system answers but fails to establish a reliable connection. Repeat dial command options are listed in Table 31.

The *dial string* contains up to 98 characters. Valid dial string characters are 0–9, the dial modifiers listed in Table 2, and the # and * characters for tone dial. The modem ignores invalid characters.

Table 31   Repeat Dial Command Options

Command	Description
-D/*n*	Where *n* is an integer between 1 and 9 that specifies a telephone number previously stored with the **\P** command.
-DL	Redials the last number dialed.
-DS	Dials the first entry stored in the directory.

-E*n*   (Modem Port Data Length)

Specifies the number of data bits used on the modem port during normal mode connections when the **\N0** command (Operating Mode) is set, and the serial port is configured for asynchronous transmission of 11-bit characters. Both modems must be set to the same number of data bits. Modem port data length command options are listed in Table 32.

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

Default

-E0

Table 32   Modem Port Data Length Command Options

Command	Description
-E0	Enables 10-bit data during normal mode connections.
-E1	Enables 11-bit data during normal mode connections.

-H*n*   (Dumb Mode)

Configures the modem to ignore commands on the Data Terminal Equipment (DTE) port and not send result codes. The modem is in smart mode when it recognizes commands. Dumb mode command options are listed in Table 33.

Default

-H0

Table 33   Dumb Mode Command Options

Command	Description
-H0	Disables dumb mode (sets smart mode).
-H1	Enables dumb mode.

-J*n*   (Detect Phase)

Configures the originating modem to send a control sequence to the answering modem to determine the type of error correction enabled. The answering modem can have LAPM, MNP, or no error correction enabled. See the **\N*n*** command (Operating Mode) description for information about the types of connections that can be established. Detect phase command options are listed in Table 34.

Default

-J1

Table 34   Detect Phase Command Options

Command	Description
-J0	Disables the detect phase.
-J1	Enables the detect phase.

-K*n*   (MNP Extended Services)

Configures the modem to use MNP extended services that are not available when operating in LAPM mode. For example, two modems with MNP extended services enabled negotiate MNP Class 10 with V.42 *bis* compression instead of to LAPM. MNP extended services command options are listed in Table 35.

Default
-K1

Table 35   MNP Extended Services Command Options

Command	Description
-K0	Disables MNP extended services.
-K1	Enables MNP extended services.
-K2	Enables MNP extended services without MNP indication during the answer detect phase.

-M*n*   (MNP Class Connect Messages)

Determines whether MNP class connect messages are displayed. The **-M1** setting overrides the **\V** command (Error Correction Result Code Form) setting for long-form connection result codes and the **W***n* command (Connection Speed Reporting) for serial-port connect messages. MNP class connect messages command options are listed in Table 36.

The following commands override the **-M***n* command options:

- **V0** (short form result codes enabled)

- **X0** (extended result codes disabled) displays only CONNECT.

Default
-M0

Table 36   MNP Connect Messages Command Options

Command	Description
-M0	Disables MNP class connect messages.
-M1	Enables the following formats for MNP class connect messages. *n* equals the MNP class (from 1 to 10), and *x* equals the type of data compression used (V.42 *bis* or MNP Class 5).
	• CONNECT for normal and direct connections.
	• CONNECT MNP*n*/*x*, for MNP connections.
	• CONNECT MNP*n* for modems that do not negotiate compression.
	• CONNECT MNP*n*/CELLULAR/*x* If)**M1** (Power Level Adjustment) is set.
	• CONNECT LAPM for LAPM connections with no compression active.
	• CONNECT LAPM/V42 *bis* for LAPM V.42 *bis* connections.

-O*n*   (Serial Port Parity)

Changes the serial port parity set by the AT sequence. You also can use the **-O***n* 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 modem-generated XON and XOFF characters have the correct parity. Serial port parity command options are listed in Table 37.

Modem port parity cannot be changed after a connection is established. When the parity required for a connection is not the parity set by the sequence, the parity must be set at the same time the dial command is issued and issued on the same command line. The AT sequence cannot be used to match space parity; no parity is set instead. You must issue **-O3** to set space parity.

Default
-O4

Table 37   Serial Port Parity Command Options

Command	Description
-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

-P*n*   (Check Parity)

Controls parity checking of XON and XOFF characters, the escape code sequence, and HP ACK characters. In command state, all command echoes and command responses from the modem are sent to the workstation with parity that matches the serial port parity. Check parity command options are listed in Table 38.

Default
-P0

Table 38   Check Parity Command Options

Command	Description
-P0	Ignores parity for special characters. All received data is passed to to the workstation with parity corrected to match the serial port parity.
-P1	Processes special characters received from the workstation only if their parity matches the serial port parity. All received data is passed to to the workstation at 8 data bits with no parity.
-P2	Processes special characters only if their parity matches the serial port parity . Modem port flow control characters are recognized, regardless of whether their parity matches the serial port parity. All received data is passed to to the workstation with parity corrected to match the serial port parity.

-Q*n*   (Fallback Modulation Speed)

Configures the modem to fall back from a V.32 *bis*, or V.32 MNP reliable connection at 14400 bps, 9600, 7200, or 4800 bps to a V.22 *bis* MNP reliable connection at 2400 bps or a V.22 MNP reliable connection at 1200 bps. Fallback can occur when poor telephone lines cause excessive MNP retransmissions.

Fallback from a V.32 *bis* or V.32 MNP reliable connection to V.32 *bis* or V.32 4800 bps is always enabled for any **-Q***n* command option. The modem always uses the V.22 standard when it falls back from a V.32 MNP reliable connection to a 1200 bps MNP reliable connection for any **B***n* setting. Table 39 lists modulation speed command options.

Default
-Q2

Table 39   Modulation Speed Command Options

Command	Description
-Q0	Disables fallback from a V.32 *bis*, or V.32 MNP reliable connection to an MNP reliable 2400 or 1200 bps connection.
-Q1	Enables fallback from a V.32 *bis*, or V.32 MNP reliable connection to an MNP reliable 2400 bps connection.
-Q2	Enables fallback from a V.32 *bis*, or V.32 MNP reliable connection to an MNP reliable 2400 or 1200 bps connection.

Colon Command Set

This section describes the modem commands that begin with a colon (:) character.

:D*n*   (Manual Dial)

Sets the modem off hook in originate mode when Data Terminal Ready (DTR) is raised. Manual dial command options are listed in Table 40.

Default
:D0

Table 40   Manual Dial Command Options

Command	Description
:D0	The modem is not set off hook when DTR is raised.
:D1	The modem is set off hook in originate mode when DTR is raised. **&D***n* (DTR Control) also must be set. For example, If **&D2** is set, the modem is set off hook 5 seconds after recognizing the positive transition of DTR.
:D2	The modem is set off hook in originate mode and dials the first stored telephone number when DTR is raised. **&D***n* must also be set.

:E*n*   (Compromise Equalizer)

Configures the modem to use the compromise equalizer when the modem connects in V.32 mode. Compromise equalizer command options are listed in Table 41.

Default
:E1

Table 41   Compromise Equalizer Command Options

Command	Description
:E0	Disables the compromise equalizer only when the modem is in V.32 mode. Use **:E0** only when you are performing back-to-back or PBX-to-PBX V.32 mode connections.
:E1	Enables the compromise equalizer. Use **:E1** for outside line-to-outside line or PBX-to-outside line connections.

:T*n*?   (Read Configuration Register)

Displays the contents of the :T register, specified by *n,* in decimal format.

@Character Command Set

This section describes the modem commands that begin with an at (@) character.

@C*n* (CTR, DSR, and DCD Connect Message Control)

Sets Data Set Ready (DSR), Clear To Send (CTS), and Data Carrier Detect (DCD) on before or after a connect message. Connect message control command options are listed in Table 42.

Default
@C0

Table 42   Connect Message Control Command Options

Command	Description
@C0	Sets CTS, DSR, and DCD on before the connect message is sent.
@C1	Sets CTS, DSR, and DCD on after the connect message is sent.

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

Selects the initial transmit level for the connection. You can set levels from -10 to -35 decibels per milliwatt (dBm). From **@M10** to **@M35**, the level set is the variable expressed as -dBm. Select transmit level command options are listed in Table 43.

Default
@M0

Table 43   Select Transmit Level Command Options

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

Backslash Command Set

This section describes the modem commands that begin with a backslash (/) character.

\A*n*   (Maximum MNP Block Size)

Sets the maximum block size for MNP stream link connections. MNP block size commands are listed in Table 44.

Default
\A3

Table 44   MNP Block Size Command Options

Command	Description
\A0	Sets the block size maximum to 64 characters.
\A1	Sets the block size maximum to 128 characters.
\A2	Sets the block size maximum to 192 characters.
\A3	Sets the block size maximum to 256 characters.

\B*n*   (Transmit Break)

Sends a Break for *n* milliseconds to the remote system from command state where *n* is an integer between 1 and 9 indicating the time length (in increments of 100 milliseconds) of the Break. In a reliable link, the Break always equals 300 milliseconds. Use the **O** command (Enter Connect State) to return to connect state. See also the **\K** command (Break Control).

Range
1 to 9 (100 millisecond increments)

Default
3 (300 milliseconds)

\C*n*   (Autoreliable Buffer)

Configures the modem to buffer data in autoreliable, autoanswer mode. The answering modem's data buffer can be used to store data in the 3-second link negotiation for a reliable connection. Autoreliable buffer command options are listed in Table 45.

For example, use **%A** to set the autoreliable fallback character to ASCII 13 (carriage return). Then set **\C2** and **\N3** (Autoreliable mode). Non-MNP callers who connect and press Return to log on do not wait for the 3-second autoreliable window to expire before data can pass. See the **\N***n* command (Operating Mode) for more information about autoreliable and normal modes.

The **\J***n* command (bps Rate Adjust) affects the type of connection established. Reliable and direct connections may result when **\J1** (bps Rate Adjust) is used. Reliable and normal connections may result when bps rate adjust is not used (**\J0**).

Default

\C0

Note   When either **\C1** or **\C2** is set, reliable and normal connections can result regardless of bps rate adjustments.

Table 45   Autoreliable Buffer Command Options

Command	Description
\C0	Data is not buffered during link negotiation. The modem changes to normal or direct mode if a SYN character is not detected within 3 seconds.
\C1	Buffers all data on the answering modem until 200 non-SYN characters are received or a SYN character is detected within 3 seconds.
	If 200 non-SYN characters are received, the modem changes to normal mode and passes the data to the serial port. If the modem detects a SYN character within 3 seconds, it attempts to establish a reliable connection. Otherwise, the modem changes to normal mode.
\C2	Data is not buffered on the answering modem. The modem changes to normal mode when it receives an autoreliable fallback character defined by the **%A** command and passes that character to the serial port. Use the **%C2** command when the modem receives calls from modems that support MNP and modems that do not support MNP, so that the modem can change to normal mode as soon as it detects a logon character (defined by **%A**) from a non-MNP caller, eliminating the 3-second wait.

\D*n*   (Serial Port DSR/CTS Control)

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. Serial port DSR/CTS control command options are listed in Table 46.

Selecting hardware flow control for the serial port overrides the **\D***n* command. When hardware flow control is selected, the CTS line indicates the ability of the modem to receive data from your workstation, and the DSR action does not change.

Default

\D0

Table 46   Serial Port DSR/CTS Control Command Options

Command	Description
\D0	DSR and CTS are always on.
\D1	DSR and CTS follow DCD. If the **&C1** command (Serial Port DCD Control) is also set, DSR follows off hook.
\D2	DSR and CTS both follow DCD.
\D3	DSR follows the answer tone, CTS is always on.
\D4	DSR and CTS comply with ITU-T recommendations.

Serial Port Signal Options

Use the **&C***n* and **\D***n* commands to control the serial port DCD, DSR, and CTS signal levels when your workstation requires DCD, DSR, and CTS to be off at certain times. The command options and signal level results are shown in Table 47.

Table 47   Serial Port Signal Options

&C*n* Option	\D*n* Option	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 with the answer tone, CTS on.
0	4	DCD on, CTS and DTR comply with 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 CD.
1	2	DCD follows modem carrier, DSR and CTS both follow CD setting.
1	3	DCD follows modem carrier, DSR with the answer tone, CTS on.
1	4	DCD follows modem carrier, CTS and DTR comply with ITU-T recommendations.
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 with the answer tone, CTS on.
2	4	DCD on (off for a few seconds at disconnect only), CTS and DTR comply with ITU-T recommendations.

\E*n*   (Data Echo)

Configures the modem to echo characters sent from the local workstation in connect state. Data echo command options are listed in Table 48.

Default
\E0

Table 48   Data Echo Command Options

Command	Description
\E0	Does not echo data sent by the local workstation.
\E1	Echoes data sent by the local workstation. **\E1** functions only with normal mode connections.

\F   (Display Stored Phone Numbers)

Displays the telephone numbers currently stored in the telephone directory.

\G*n*   (Modem Port Flow Control)

Sets the flow control method used to pace data between modems during a normal mode connection. Modem port flow control command options are listed in Table 49.

A reliable link has its own method of flow control and ignores the **\G***n* setting. The **\Q***n* command (Serial Port Flow Control) settings determine Data Terminal Equipment (DTE) port flow control during a reliable link.

Default
\G0

Table 49   Modem Port Flow Control Command Options

Command	Description
\G0	Disables modem port flow control.
\G1	Sets modem port flow control to XON/XOFF. The modem sends an XOFF character to stop received data and sends an XON character to resume reception of data.
\G2	Sets modem port flow control to unidirectional XON/XOFF. The modem sends XON and XOFF characters to the remote device but ignores XON and XOFF characters received from the remote device.

\J*n*   (Bps Rate Adjust)

Automatically adjusts the speed of the serial port to match the speed of the connection. The bps rate adjust command options are listed in Table 50.

When a reliable connection is established at a speed between 4800 and 14400 bps, and the bps rate adjust option is enabled, the serial port speed always adjusts to 9600 bps. If the connection is established at 14400 bps or higher, the serial port speed is adjusted to 19200 bps. If you set the serial port to the modem's highest rate of 115200 bps, turn off bps rate adjust so that the serial port stays at 115200 bps.

Default
\J0

Note   When **\J1**, **\C0** (the autoreliable buffer), and **\N3** (the autoreliable mode) are set, the modem uses direct mode instead of normal mode if a reliable connection is not established.

Table 50   bps Rate Adjust Command Options

Command	Description
\J0	Disables bps rate adjust. The serial port rate is independent of the rate of the connection. This option is recommended for the highest throughput when data compression is used.
\J1	Enables bps rate adjust. The modem automatically adjusts the speed of the serial port to match the speed of the connection until the connection terminates. If your workstation does not automatically change to the adjusted bps rate, you must manually change the bps rate to the new setting. See the **%U** command (Clear Serial Port Speed) for information about resetting the serial port bps rate.

\K*n*   (Break Control)

Determines the type of Break the modem transmits when a Break enters the modem. The break control command options listed in Table 51 describe the different effects of the *n* value when the modem receives or transmits a Break signal. The modem can buffer up to four Breaks on both the modem port and the serial port.

Default

\K5

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

Table 51   Break Control Command Options

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 system[1]	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, enter: **AT\BO Return** (See the \B command description for details.)

\N*n*   (Operating Mode)

Selects the modem operating mode. Operating mode command options are listed in Table 52.

Default
\N3

Note   Dial modifiers also can be used to set the operating mode for a single call. See the Dial Modifiers descriptions for details.

Table 52   Operating Mode Command Options

Command	Description
\N0	Sets normal mode. **\N0** can be used to communicate with most modems. No error correction is performed in normal mode.
\N1	Sets direct mode. **\N1** ignores flow control and does not buffer data. In connect state, the serial port always adjusts to the speed of the connection for any **\J***n* setting**.** No error correction is performed in direct mode. The escape code sequence is disabled in direct mode if **\J0** is set.

Command	Description
\N2	Sets MNP reliable mode. The modem disconnects if it fails to establish an MNP reliable link immediately after making a connection. \N2 uses the MNP reliable link to provide error detection and automatic data retransmission if an error occurs. This provides error–free communications between systems that supports the MNP reliable link. Some protocols are not timed to work with MNP, and can interfere with its effectiveness.

Both modems should use flow control on the serial port in an MNP reliable link. When a transmission error is detected, data is buffered during the retransmission. |
| \N3 | Sets autoreliable mode. The answering modem looks for incoming MNP or LAPM protocol characters from the remote modem. If it detects the characters within approximately 3 seconds, it tries to establish a reliable link connection. If both modems are set to autoreliable mode, a normal connection or no connection could result because of noise on the telephone line.

When the modem is set to autoanswer in autoreliable mode, you can shorten this 3 second period by using the %A command with the \C2 command.

\N3 lets the modem communicate with remote systems which may not support the MNP or LAPM reliable link. |
\N4	Sets LAPM reliable mode. The modem attempts to establish a LAPM reliable link immediately after making a connection. If the attempt fails, the modem disconnects. The remote system must also support a LAPM reliable link. \N4 uses the LAPM reliable link to provide error detection and automatic data retransmission, ensuring error–free communications.
\N5	Sets LAPM reliable mode with fallback to normal mode. \N5 attempts to establish a LAPM reliable connection. If the attempt fails, the modem falls back to a normal mode connection.
\N6	Sets LAPM reliable mode with fallback to MNP reliable mode. \N6 attempts to establish a LAPM reliable connection. If the LAPM connection attempt fails, the modem tries to establish an MNP reliable connection.

Table 53 lists connections that can be established, depending on the operating mode enabled on each modem. When more than one operating mode is listed within a column, the first mode is for the originating modem and the second is for the answering modem. **NC** indicates no connection.

Note For LAPM connections listed in Table 53, if the originate and answer modems have **-K1** (MNP Extended Services) set for V.42 connections, the extended features of MNP are applied during the connection.

Table 53   Possible Connections for Operating Mode Command Options

Answering Modem	Originating Modem						
	\N0	**\N1**	**\N2**	**\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	MNP	LAPM	LAPM	LAPM
\N4	NC	NC	NC	LAPM	LAPM	LAPM	LAPM
\N5	Normal	Direct/ Normal	NC	LAPM[1]	LAPM	LAPM	LAPM
\N6	NC	NC	MNP	MNP	LAPM	LAPM	LAPM

1. For the modem to establish a LAPM connection, **-K0** must be set.

\P*n*{*dial string*}   (Store a Telephone Number)

Stores a telephone number in the modem's telephone directory where *n* is an integer (01 to 40) and *dial string* is a string of up to 98 characters. Valid dial string characters are: 0 to 9, dial modifiers, and # and * for tone dialing. Dial strings longer than 98 characters return error messages. The modem ignores invalid characters. Phone numbers are not saved to a power reset.

\Q*n*   (Serial Port Flow Control)

Selects the flow control method used in the serial port. In direct mode connections, the modem ignores the **\Q***n* command. Serial port flow control command options are listed in Table 54.

Default
\Q3

Table 54   Serial Port Flow Control Command Options

Command	Description
\Q0	Disables flow control.
\Q1	Enables bidirectional XON/XOFF flow control. Data transmission is stopped by an XOFF character, and restarted by an XON character. The modem generates XON and XOFF characters at the same parity used on the serial port. The serial port responds to XON and XOFF characters sent by the local workstation in the same way.
\Q2	Enables unidirectional hardware flow control. The modem turns Clear To Send (CTS) off to signal the local workstation to stop transmitting data and turns CTS on to signal the local workstation to resume transmitting data.
\Q3	Enables bidirectional hardware flow control using CTS and Request To Send (RTS). The modem uses CTS to start and stop transmission from the local workstation. When RTS is off, the modem stops transmitting. When RTS is on the modem resumes transmission.

Command	Description
\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 and keeps CTS off until the connection is established.
\Q6	Enables bidirectional hardware flow control and keeps CTS off until a connection is established. RTS is ignored when it is not connected.

\R*n*   (Serial Port Ring Indicator)

Controls the Ring Indicator (RI) signal. RI follows the incoming ring signal on the telephone line. Serial port ring indicator command options are listed in Table 55.

Default

\R1

Table 55   Serial Port Ring Indicator Command Options

Command	Description
\R0	Turns on the ring indicator signal on after the ring and keeps it on for the duration of the telephone call.
\R1	Turns off the ring indicator signal after the telephone call is answered.

\S   (Read Online Status)

Displays a list of the modem commands and their current settings, the active connection type, 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. Press Control X (line delete) or the Break key to cancel the display.

\T*n*   (Inactivity Timer)

Specifies the time the modem waits before hanging up when data is not sent or received. The inactivity timer is only available during normal and reliable link connections. **\T0** disables the inactivity timer.

Range

0 to 90 minutes

Default

0 (Disabled)

\V*n*   (Error Correction Result Code Form)

Sets the result code format to display a reliable link connection. The <speed> field content is determined by the **W** command (Connection Speed Reporting) setting. Setting **-M1** (MNP Class Connect Messages) changes the format of the long form connection result codes. Error correction result code command options are listed in Table 56.

Set **V0\V3** if your software requires Hayes compatible connection result codes. When **V1** is set to select long form result codes, **\V3** is equivalent to **\V2**.

Default

\V2

Table 56   Error Correction Result Code Command Options

Command	Description
\V0	Uses the standard long form result codes: CONNECT <speed>. Use **\V0** when your communications software does not expect a reliable link result code, even if a reliable connection is established.
\V1	Adds /REL to long form error correction result codes: CONNECT <speed> /REL. The speed 9600/REL also indicates 4800, 7200, and 12000 bps reliable connections.
\V2	Displays long form error correction protocol result codes: • CONNECT <speed> /REL–MNP • CONNECT <speed>/REL–LAPM • CONNECT <speed>/REL–CELLULAR The speed 9600/REL also indicates 4800, 7200, and 12000 bps reliable connections.
\V3	Adds /REL to long form error correction result codes: CONNECT <speed> /REL Displays Hayes compatible short form result codes. The result code displays the actual modem bps rate.
\V4	Enables long form error correction result codes: • CONNECT <speed> /REL–MNP • CONNECT <speed>/REL–LAPM • CONNECT <speed>/REL–CELLULAR The result code displays the actual modem bps rate.
\V5	Enables reporting of the modulation type: • CONNECT <speed> / modulation /REL–MNP • CONNECT <speed>/ modulation /REL–LAPM • CONNECT <speed> / modulation /REL–CELLULAR

\W*n*   (Split Serial Port Speed)

Determines whether the serial port uses split transmit and receive speed operation when **%F1** or **%F2** is set to select V.23 mode. Split serial port speed command options are listed in Table 57.

Default

\W0

Table 57   Split Serial Port Speed Command Options

Command	Description
\W0	Disables split serial port speed.
\W1	Enables split serial port speed.

\X*n*   (XON/XOFF Passthrough)

Determines whether XON/XOFF flow control characters are sent to the remote or local modem. When XON/XOFF flow control is enabled on the serial port (\Q1) and XON/XOFF passthrough is enabled (\X1), the modem also transmits any XON and XOFF characters sent to the serial port from the local device to the remote device. Passthrough command options are listed in Table 58.

Default
\X0

Caution   With **\X0** (XON/XOFF passthrough) set and XON/XOFF flow control enabled, local devices such as printers can send XON and XOFF characters to the modem serial port. If the modem is 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 passthrough to the remote system. These characters can turn on the flow of data from the remote system before the modem is ready to receive it, which results in loss of data.

Table 58   XON/XOFF Passthrough Command Options

Command	Description
\X0	Processes XON/XOFF flow control characters.
\X1	Processes XON/XOFF flow control characters and passes them to the local or remote system so that the local or remote device also processes the XON and XOFF characters.

Modem S and :T Register Summary

The modem saves configuration settings in S and :T registers similar to Hayes Smartmodem 2400 registers. Each register is used to control a single modem function or is bit mapped to control several functions. This section describes the commands that can be used to display and change the register values. We recommend that you use the following commands only to display the register contents and use the **AT** command set to change register values.

Read All Registers

Use the **%R***n* command to display the contents of a register set. The register set contents is displayed as a table in decimal and hexadecimal format.

%R0 displays the contents of all S registers.

%R1 displays the contents of all :T registers.

Point to a New Reference Register

Use the **S***n* or **:T***n* command to change the modem register pointer to register *n*. Register *n* then becomes the reference register for following register commands.

ATS*n* changes the modem register pointer to S register *n*.

AT:T*n* changes the modem register pointer to :T register *n*.

Read a Configuration Register

Use the **S***n***?** or **:T***n***?** command to display the contents of register *n*. The register contents are displayed in decimal format only. Register *n* becomes the reference register.

ATS*n***?** displays the contents of S register *n*.

AT:T*n***?** displays the contents of :T register *n*.

Change the Value of a Register

Use the **S***n*=*x* or **:T***n*=*x* command to change the value of register *n* to *x*. Register *n* becomes the reference register.

ATS*n*=*x* changes the value of S register *n* to *x*.

AT:T*n*=*x* changes the value of :T register *n* to *x*.

Display the Value of the Reference Register

Use the **AT?** command to display the value of the last referenced S register in a read, write, or pointer command.

Change the Value of the Reference Register

Use the **AT**=*x* command to change the value of the last referenced S register to *x*.

S Register Descriptions

This section describes the purpose and format of each S register.

S0   (Ring to Autoanswer On)

Register S0 specifies the number of rings required before the modem answers. Set register S0 to zero to disable autoanswer. Ring signals are ignored for 5 seconds after disconnect.

Range

0 to 255 rings

Default

1 ring (Autoanswer on one ring is the factory default switch setting)

S1   (Ring Counter)

Register S1 counts the rings before the modem answers a call. If there is no ring within 8 seconds of the last ring, S1 is reset to zero. Ring signals are ignored for 5 seconds after disconnect.

S2   (Escape Code Character)

Register S2 specifies 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 zero disables the escape code character. Register S12 is used to set the guard time that must be present before and after the escape code character.

Range
0 to 255 (ASCII decimal)

Default
43 (+)

S3   (Carriage Return Character)

Register S3 specifies the Carriage Return (CR) character. The Carriage Return terminates command lines and result codes.

Range
0 to 127 (ASCII decimal)

Default
13 (Carriage Return)

S4   (Line Feed Character)

Register S4 specifies the Linefeed (LF) character. The Linefeed character follows the Carriage Return at the end of command lines and result codes.

Range
0 to 127 (ASCII decimal)

Default
10 (Linefeed)

S5   (Backspace Character)

Register S5 specifies the Backspace (BS) character.

Range

0 to 32 (ASCII decimal)

Default

8 (Backspace)

S6   (Wait Before Dialing)

Register S6 specifies the time that the modem waits after transitioning off hook before dialing. The modem waits for a minimum of two seconds, even if register S6 is set to a value less than two. Register S6 is used only when **X0**, **X1**, or **X3** command (Extended Result Code) is set.

Range

2 to 255 seconds

Default

2 seconds

S7   (Wait for Carrier After Dial)

Register S7 specifies the time that the modem waits for one of the following conditions:

- A carrier from the remote modem before hanging up in originate or answer mode.

- A ringback only in originate mode, and only if **X3** or **X4** (Extended Result Codes) is set.

- A dial tone when the Wait for Dial Tone (**W**) dial modifier is encountered in a dial string.

- A quiet answer when the Wait for Quiet Answer (**@**) dial modifier is used in a dial string.

Range

0 to 255 seconds

Default

60 seconds

S8   (Pause Time for Dial Delay)

Register S8 specifies the time that the modem waits when the pause (**,**) dial modifier is used in a dial string.

Range

0 to 255 seconds

Default

0

S9   (Carrier Detect Response Time)

Register S9 specifies the time that a signal must be present before the modem recognizes it as a carrier. Register S9 is only used in normal and direct modes.

Range

0 to 255 (increments of .1 seconds)

Default

6 (.6 seconds)

S10   (Delay for Hang Up After Carrier Loss)

Register S10 specifies the time that the modem waits before hanging up after a loss of carrier, allowing for a temporary loss. Both modems should have equal values set for register S1. If the register S10 values are unequal, a 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 a minimum five seconds before going off hook in originate mode.

Note   Register S10 is ignored in V.34, V.32, V.32 *bis*, V.22, and V.22 *bis* reliable connections.

Range

0 to 255 (increments of .1 seconds)

Default

60 (6 seconds)

S11   (DTMF Tone Dialing Speed)

Register S11 specifies the time interval between tones when the modem is dialing over a touch tone line.

Range

50 to 100 milliseconds

Default

50 milliseconds

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

Register S12 sets the minimum quiet time that must be present before and after the three character escape code. 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 zero, the time to enter the escape code or remote access attention sequence does not affect recognition.

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 register S12 is ignored.

Range

0 to 255 (increments of .02 seconds)

Default

50 (1 second)

S14   (Bit-Mapped Register)

Register S14 is bit mapped for the functions listed in Table 59.

Table 59   Register S14 Functions

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

Bit Position	Function	Decimal Value
5	Dial method	0 Tone dial
		1 Pulse dial
6	Not used	
7	Originate/answer	0 Answer mode
		1 Originate mode

S16   (Bit-Mapped Register for 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 does not support diagnostic tests in Bell 103, V.13, V.21, or V.23 modes. The register is bit mapped for the functions listed in Table 60.

Table 60   Register S16 Functions

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	0 Loopback off
	(Initiated by the remote modem)	1 Loopback in progress
4	Initiate Remote Digital Loopback	0 Disabled
		1 Enabled
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	

S18   (Test Timer)

Register S18 specifies the maximum elapsed time for a modem loopback diagnostic test. Register S18 is available only when the modem is in normal or direct mode. When register S18 is set to zero, enter the **&T0** command (End Test in Progress) to end a test. Register S18 is not supported for V.54 loopback tests by switch or circuit.

Range

0 to 255 seconds

Default

0 seconds (disables the timer)

S21   (Bit-Mapped Register)

Register S21 is bit mapped for the functions listed in Table 61.

Table 61   Register S21 Functions

Bit Position	Function	Decimal Value	
0	Telco Jack	0	Default.
		1	Not supported.
1	Not used		
2	Clear To Send/Request To Send (synchronous only)	0	On hook: CTS on; off hook: V.22 and V.22 *bis* CTS off until connecting. After connecting: CTS is off in response to an on-to-off RTS transition; CTS is on in response to an off-to-on RTS transition after the delay time set in register S26.
		1	On hook: CTS on; off hook: CTS off until connecting. After connecting: CTS on for duration of carrier signal.
3,4	Data Terminal Ready	0	Ignores DTR
		1	On-to-off DTR transition: modem enters command state.
		2	On-to-off DTR transition: modem is set on hook.
		3	On-to-off DTR transition: modem reset.
5	Data Carrier Detect	0	DCD always on.
		1	DCD on indicates data carrier is present or DCD on except momentarily at disconnect.
6	Not used		
7	Long space disconnect	0	Disabled.
		1	Enabled.

S22   (Bit-Mapped Register)

Register S22 is bit mapped for the functions listed in Table 62.

Table 62   Register S22 Functions

Bit Position	Function	Decimal Value	
0–3	Not used		
4,5,6	Result code options	0	Same as **X0**
		4	Same as **X1**
		5	Same as **X2**
		6	Same as **X3**
		7	Same as **X4**
7	Make/break ratio	0	39% Make/61% Break
		1	33% Make/67% Break

S23   (Bit-Mapped Register)

Register S23 is bit mapped for the functions listed in Table 63.

Note   Register S23 changes the parity automatically or by the **-O**n command (Serial Port Parity), but the data and stop bits are retained.

Table 63   Register S23 Functions

Bit Position	Function	Decimal Value	
0	Respond to Remote Digital Loopback (ignored in reliable connections)	0	Disabled
		1	Enabled
1,2,3	Serial Port bps Rate	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, or 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

S25   (Delay to DTR and Asynchronous/Synchronous Time Delay)

Delay to Data Terminal Ready (DTR): In asynchronous and synchronous modes 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 time delay: Register S25 has two functions when **&M1** is set. It sets the time 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 workstation without forcing the modem back to command state. After this time delay, the Delay to DTR time delay takes effect on loss of DTR.

Range

0 to 255 (increments of .01 seconds for Delay to DTR, and increments of seconds for asynchronous/synchronous mode)

Default

5 (.05 seconds for Delay to DTR. 5 seconds and .05 seconds for asynchronous/synchronous mode)

S27   (Bit-Mapped Register)

Register S27 is bit mapped for the functions listed in Table 64.

Table 64   Register S27 Functions

Bit Position	Function		Decimal Value
0,1	Transmission mode	0	Asynchronous mode
		1	Asynchronous/synchronous mode
		2	Synchronous dial stored number mode
		3	Synchronous manual dial mode
2,3	Leased line operation	0	Leased line off (**&L0**)
		1	Leased line on (**&L1** or **&L2**)
		2	Not supported
4,5	Synchronous transmit	0	Default
		1	**&X1**
		2	**&X2**
		3	Not supported
6	Answer tone at 1200 bps	0	CCITT V.22 *bis*/V.22
		1	Bell 212A
7	Not used		

:T Register Descriptions

This section describes the purpose and format of each :T register.

:T0   (Timer for V.22 *bis*, V.22, and V.32 Modes During Multi-Protocol Answer)

Register :T0 sets the time limit for the modem to establish a V.32, V.22 *bis*, or V.22 connection before switching to establish a V.23 split speed or V.21 connection. In this time period, the modem sends V.22 *bis* or V.22 carrier. This register setting requires 1200 bps or higher operation with **%F0%L1** set.

Range

0 to 255 (.1 seconds increments)

Default

40 (4 seconds)

:T3   (Timer for V.21 and V.23 Answer Tone Duration)

Register :T3 is used in V.21 mode (**%F0** is set and the modem speed is 300 bps) or V.23 mode (**%F1, %F2,** or **%F3**).

In answering mode, register :T3 sets the time limit for the V.25 answer tone sent by the answering modem to the originating modem. When :T3 is set to zero, no answer tone is sent. All V.21 and V.23 answers begin with 2 seconds of silence before sending the answer tone unless :T3 is set to zero.

In originating mode, register :T3 sets the time the originating modem waits after detecting answer tone before proceeding with the connection. When :T3 is set to zero, the originating modem does not wait for answer tone.

Range

0 to 33 (increments of .1 seconds)

Default

33 (3.3 seconds)

:T4   (Timer for Line Turnaround Delay and Carrier On)

Register :T4 specifies the minimum time that the modem waits for the remote modem to respond after turning carrier off and before turning carrier back on again to resume sending data. Register :T4 is used only in normal mode V.23 half-duplex connections.

Range

0 to 255 (increments of 12.5 milliseconds)

Default

20 (250 milliseconds)

:T6   (Timer for DCD Turn On Delay)

Register :T6 specifies the time that the modem waits after it raises carrier before it starts looking for data. This register can be set to exclude noise that occurs when Data Carrier Detect (DCD) is raised in V.23 half-duplex connections. If :T6 is set to zero, the modem waits 256 milliseconds before looking for data. Register :T6 is used only in normal mode V.23 half-duplex connections.

Range

0 to 255 milliseconds.

Default

200 milliseconds

:T9   (Primary XON Flow Control Character)

Register :T9 specifies the character used for primary XON flow control on the modem and serial ports. Both modems must have the same primary flow control characters set during normal connections. Use the **\Q1** or **\Q4** command (Serial Port Flow Control), and **\G1** or **\G2** command (Modem Port Flow Control) to specify primary flow control.

Range

0 to 255 (The decimal value of an 8-bit character)

Default

17 (DC1 or 11 hexadecimal)

:T10   (Primary XOFF Flow Control Character)

Register :T10 specifies the character used for primary XOFF flow control on the modem and serial ports. Both modems must have the same primary flow control characters set during normal connections. Use the **\Q1** or **\Q4** command (Serial Port Flow Control) options, and **\G1** or **\G2** command (Modem Port Flow Control) options to specify primary flow control.

Range

0 to 255 (The decimal value of an 8-bit character)

Default

19 (DC3 or 13 hexadecimal)

:T11   (Secondary XON Flow Control Character)

Register :T11 specifies the character used for secondary XON flow control on the modem's serial port. Use the **-F1\Q1** or **-F1\Q4** commands to specify secondary flow control.

Range

0 to 255 (The decimal value of an 8-bit character)

Default

249 (F9 hexadecimal)

:T12   (Secondary XOFF Flow Control Character)

Register :T12 specifies the character used for secondary XOFF flow control on the modem serial port. Use the **-F1\Q1** or **-F1\Q4** commands to specify secondary flow control.

Range

0 to 255 (The decimal value of an 8-bit character)

Default

251 (FB hexadecimal)

:T14   (Connect Message Delay Timer)

Register :T14 specifies the time that the modem waits before or after a connect message before Clear To Send (CTS), Data Set Ready (DSR), or Data Carrier Detect (DCD) are raised. Use this register setting with the **@C0** or **@C1** command (CTS, DSR, and DCD Message Control options).

Range

0 to 255 (increments of 100 milliseconds)

Default

0

:T16   (CTS Turn On Delay Timer)

Register :T16 specifies the time that the modem waits before raising Clear To Send (CTS) after Data Carrier Detect (DCD) or Data Set Ready (DSR) have been raised in connect mode.

Range

0 to 255 (increments of 12.5 milliseconds)

Default

0

:T17   (V.32/V.32 *bis* Connection Training Timer)

Register :T17 specifies the time limit for exchanging training sequences when establishing V.32 and V.32 *bis* connections.

To reduce the time required to establish a connection, set :T17 to a value less than 28, which increases the modem's sensitivity to noise on the line.

To reduce the modem's sensitivity to noise, set :T17 to a value greater than 28, which lengthens the time required to make a connection.

Range

0, 1, or 5 to 32 seconds

Default

0 (Use dynamic training sequences, equivalent to a setting of 28)

:T19 (Bit-Mapped Register)

Register :T19 specifies the MNP link control. The register is bit mapped for the functions listed in Table 65.

Table 65   Register :T19 Functions

Bit Position	Function	
0	0	Keeps a non-MNP10 1200 bps connection if no MNP link activity is received from the remote modem.
	1	Disconnects a non-MNP10 1200 bps connection if no MNP link activity is received from the remote modem after 2 minutes.

:T22 (DSR Timer)

Register :T22 specifies the time that the modem waits before Data Set Ready (DSR) transitions off after Data Carrier Detect (DCD) or Clear To Send (CTS) transition off in disconnect mode. For example, if **\D2** (Serial Port DSR/CTS Control) and **&C1** (Serial Port DCD Control) are set when DCD and CTS transition off, the modem waits for the time specified by register :T22 before setting DSR off.

Range

0 to 255 (increments of 12.5 milliseconds)

Default

34 (425 milliseconds)

:T23 (Bit-Mapped Register)

Register :T23 is bit mapped for the functions listed in Table 66.

Table 66   Register :T23 Functions

Bit Position	Function	Decimal Value	
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)

Register :T26 is bit mapped for the functions listed in Table 67.

Table 67   Register :T26 Functions

Bit Position	Function	
0	0	Enables 2 second billing delay.
	1	Disables two second billing delay. This bit decreases connection time, but can affect attaining connections
1	0	Enables the normal answer tone length in V.32 mode
	1	Shortens answer tone length in V.32 mode

:T42   (V.34 Connection Speed Selection)

Register :T42 specifies the V.34 connection speed according to line quality. The default register value zero is recommended. See Table 68 for register values corresponding to line speed.

Change the register value if your modem falls back in V.34 connections; if you are unable to make 28800 bps connections, try the lower settings of this register.

Range

0 to 5

Default

0

Table 68   Register :T42 V.34 Connection Speed Selection

Register Value	Description
0	Default V.34 connection speed selection (default setting)
1	Highest V.34 connection speed selection (about 2 speeds higher than default)
2	Higher V.34 connection speed selection (about 1 speeds 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)