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Contents

Using Modem Commands3
 Entering a Command.....3
 Editing and Executing a
 Command.....3
 Omitting a Parameter in a
 Command Line.....3
 Repeating a Command.....3
 Understanding Result Codes.....4
 Using Online Mode4
 Escaping from an Online
 Session to the Command
 Mode4
 Creating a Command Mode
 Shortcut.....4
 Creating a Command Mode
 Icon4
AT Command Set6
 AT Data Command Set
 Summary.....6
 Result Code Summary.....7
 AT Command Descriptions.....9
S Registers.....24
 Setting S Register Default
 Values24
 Modifying an S Register.....24
 Reading an S Register.....24
 S-Register Summary25
 S-Register Descriptions26

Compaq Global Mini PCI 56k (V.90) Modem by 3Com

Compaq Global Mini PCI 10/100 LAN + 56k (V.90) Modem by 3Com

Modem Commands

Abstract: This document includes comprehensive coverage of the following topics:

- AT command set used to control modem functionality at an advanced level
- S-registers used to control modem functionality at an advanced level

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Modem Commands Document

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Using Modem Commands

Entering a Command

Use the following guidelines when issuing modem commands:

- When using AT commands, start every command line (except the A/, A>, and +++ commands) with the attention (AT) code characters; otherwise, the modem will not execute the command.
- Type commands following the AT prefix in uppercase or lowercase letters or a combination of both.
- Always type the AT prefix in the same case (not At or aT).
- Enter telephone numbers with or without punctuation; for example, (123) 456-7890 or 1234567890

Editing and Executing a Command

If you make an error while typing a command, simply backspace over the mistake, then retype. You cannot backspace over the AT prefix because it is interpreted immediately after it is typed.

To execute a command line, press the **Enter** key. (Pressing the **Enter** key tells the modem to process the command line.)

Omitting a Parameter in a Command Line

If you enter a command that normally includes a numeric parameter, such as ATHn, without the numeric parameter, the missing parameter is assumed to be the default parameter.

For example, the Hn (hang-up) command can have a numeric parameter of zero (**H0**), which is the default, or of one (**H1**); however, if the parameter is missing, **ATH** plus the **Enter** key is the equivalent of **ATH0** plus the **Enter** key. This rule does not apply to the D (dial) command.

Repeating a Command

You can repeat the last command line issued by entering the A/ command. Because it also repeats the AT prefix and the **Enter** key function, you are not required to enter the AT prefix or press the **Enter** key when repeating this command.

The last command entered remains in the command buffer until the modem is reset or power to the modem is turned off. Both actions clear the buffer and make the A/ command invalid since there is no command for the modem to repeat.

Understanding Result Codes

A result code is the modem response to a command. It may be issued in either of two possible formats: words (the long form, also known as verbose) or numeric characters (the short form, represented by digits). The result code format is set using the Vn command:

- V1 for words (default)
- V0 for numeric characters

Using Online Mode

In the online mode, the transmitting modem receives characters from the computer, converts the data to analog signals, then transmits these signals over the telephone line.

The process of altering a signal for transmission is called modulation. The receiving modem receives analog signals from the telephone when in the online mode and converts or demodulates the signal, returning it to the digital form that can be used by the computer.

Escaping from an Online Session to the Command Mode

Use the following steps to break out of a data transfer session (online mode) and return to command mode:

1. Press and hold the **Shift** key and type +++.
2. An **OK** result code is displayed.
3. Enter modem commands as needed.
4. Resume online session by entering AT0 command or terminate the connection with the ATH0 command.

Creating a Command Mode Shortcut

An easy way to issue commands to the modem is via HyperTerminal, included with Windows 95, Windows 98, and Windows NT. You can create a shortcut for accessing HyperTerminal and sending commands to the modem. To create a command mode shortcut on the Windows desktop:

1. Create a Command Mode icon.
2. From the HyperTerminal dialog box, click the Command icon.
3. Select File ⇨ Create Shortcut
or
Click the right mouse button.
4. A Command Mode Shortcut icon is displayed.
5. Select and drag the shortcut icon to the desktop.
6. To quit HyperTerminal, Select File ⇨ Exit.

Creating a Command Mode Icon

To create a command mode icon using HyperTerminal:

1. If you are using Windows 95 or Windows NT:
select Start ⇨ Programs ⇨ Accessories ⇨ HyperTerminal.
If you are using Windows 98:
select Start ⇨ Programs ⇨ Accessories ⇨ Communications ⇨ HyperTerminal.
2. Double-click the Hypertrm.exe icon.
3. The Connection Description dialog box is displayed.
4. Type Command in the Name option.
5. Click OK.
6. The Phone Number dialog box is displayed.
7. Select Connect Using ⇨ Direct to COM2.
8. Click OK.
9. The Modem Port Settings dialog box is displayed.
10. Click OK.
11. The command mode screen is displayed with a blinking cursor in the upper-left corner.
Commands can now be sent to the modem, and the modem responds with a result code.
12. Click File, then Save to save the session.
13. Click File, then Exit to quit.
14. A command mode icon is displayed in the HyperTerminal dialog box.

AT Command Set

AT Data Command Set Summary

Command	Description	Command	Description
\$	Display online command list	&\$	Display online help for & command
+++	Escape to online command mode	&A	Result code control
/	Pause	&B	DTE speed
A/	Repeat last command	&C	Data Carrier Detect (DCD) control
A>	Continuously repeat last command	&D	Data Terminal Ready (DTR) control
A	Answer command	&F	Set factory profiles
B	U.S./ITU-T Answer Sequence	&G	Guard tone control
D	Dial command	&H	Flow control for transmitted data
E	Character echo command	&I	Flow control for received data
F	Online echo command	&K	Data compression control
H	Hook control	&M	Error correction control
I	Identification/checksum option	&N	Link speed control
L	Speaker volume	&R	RTS control
M	Speaker control	&S	Data Set Ready (DSR) option
O	Return to online data mode	&U	Link rate control
Q	Result code control	&W	Store active profile
S	Read/write an S-Register	&Y	Set break handling
S\$	Display online help	&Z	Store telephone number
V	Result code form		
X	Result code selection and functions		
Y	Select power-on/reset default configuration		
Z	Reset and recall stored profile		

Result Code Summary

Result Code	Numeric	Description
OK	0	Command executed
CONNECT	1	Modem connected to line
RING	2	A ring signal has been detected
NO CARRIER	3	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone
ERROR	4	Invalid command
CONNECT 1200 EC*	5	Connection at 1200 bits/s
NO DIALTONE	6	No dial tone detected
BUSY	7	Busy signal detected
NO ANSWER	8	Remote end never answered
CONNECT 2400	10	Connection at 2400 bits/s
CONNECT 9600	13	Connection at 9600 bits/s
CONNECT 4800	18	Connection at 4800 bits/s
CONNECT 7200	20	Connection at 7200 bits/s
CONNECT 12000	21	Connection at 12000 bits/s
CONNECT 14400	25	Connection at 14400 bits/s
CONNECT 16800	43	Connection at 16800 bits/s
CONNECT 19200	85	Connection at 19200 bits/s
CONNECT 21600	91	Connection at 21600 bits/s
CONNECT 24000	99	Connection at 24000 bits/s
CONNECT 26400	103	Connection at 26400 bits/s
CONNECT 28800	107	Connection at 28800 bits/s
CONNECT 31200	151	Connection at 31200 bits/s
CONNECT 33600	155	Connection at 33600 bits/s
CONNECT 33333	182	Connection at 33333 bits/s

Continued

* EC only appears when the extended result codes configuration option is enabled. EC is replaced by one of the following symbols, depending upon the error control method used:

- V.42bis—V.42 error control and V.42bis data compression
- V42—V.42 error control only
- MNP 5—MNP class 4 error control and MNP class 5 data compression
- MNP 4—MNP class 4 error control only
- NoEC—No error control protocol

Result Code Summary *continued*

Result Code	Numeric	Description
CONNECT 37333	186	Connection at 37333 bits/s
CONNECT 41333	190	Connection at 41333 bits/s
CONNECT 42666	194	Connection at 42666 bits/s
CONNECT 44000	198	Connection at 44000 bits/s
CONNECT 45333	202	Connection at 45333 bits/s
CONNECT 46666	206	Connection at 46666 bits/s
CONNECT 48000	210	Connection at 48000 bits/s
CONNECT 49333	214	Connection at 49333 bits/s
CONNECT 50666	218	Connection at 50666 bits/s
CONNECT 52000	222	Connection at 52000 bits/s
CONNECT 53333	226	Connection at 53333 bits/s
CONNECT 54666	230	Connection at 54666 bits/s
CONNECT 56000	234	Connection at 56000 bits/s
CONNECT 57333	238	Connection at 57333 bits/s

AT Command Descriptions

+++ Escape sequence

The escape sequence allows the modem to exit data mode and enter online command mode. While in online command mode, you may communicate directly to your modem using AT commands. Once you are finished, you may return to data mode using the ATO command.

A pause, the length of which is set by the Escape Guard Time (S12), must be used after an escape sequence is issued. This pause prevents the modem from interpreting the escape sequence as data.

The value of the escape sequence character may be changed using Register S2.

\$ Display AT Command List

Displays a basic AT command list as well as online Help.

A/ Repeat Last Command

Causes the modem immediately to repeat the previous command such as redialing a telephone number. The previously executed command remains in the command buffer until AT is entered or power is turned off. Both actions clear the buffer and make the A/ command invalid since there is no command to repeat. It is not necessary to enter either a <cr> or AT.

A> Repeat Last Command

Causes the modem to continuously repeat the previous command such as redialing a telephone number. It is not necessary to enter either a <cr> or AT.

A Answer Command

Causes the modem to answer a call without waiting for a ring. This is useful in manually answering a call or when making a direct connection with another modem.

Bn Communication Standard Setting

This command is used to answer certain types of calls. A setting of "0" causes the modem to use the standard ITU-T answer sequence. This is required to answer all V.34 type calls, as well as calls from overseas. A setting of "1" is commonly used to answer legacy HST-type calls. It should not be used to answer V.34 calls.

B0 ITU-T V.34 answer sequence (default).

B1 U.S answer tone.

Result Codes:

OK n = 0, 1.

ERROR Otherwise.

Dn Dial

This is the standard Dial command, which is commonly appended with "T" or "P" for tone or pulse dialing, respectively.

The following may be used as dial string modifiers:

n	Phone number, 0 through 9.
L	Redials last number. Should be the first character following ATD, ignored otherwise.
P	Pulse dialing.
T	Touch-Tone dialing.
R	Call an originate-only modem.
,	Pause during dialing. Pause for time specified in Register S8 before processing the next character in the dial string.
W	Wait for dial tone. Modem waits for a second dial tone before processing the dial string.
@	Wait for answer.
!	Hook flash. Causes the modem to go on-hook for 0.5 second and then return to off-hook.
#	Auxiliary tone dial digit.
*	Auxiliary tone dial digit.
;	Return to command mode. Causes the modem to return to command mode after dialing the number without disconnecting the call.
S=n	Dial a telephone number previously stored using the &Zn=x command (see the &Zn=x Store Telephone Number command for further information). The range of n is 0 - 3.
&	Wait for credit card bong.
\$	Display list of dial commands.

En Character Echo Command

This command controls whether the characters entered from your computer keyboard are echoed back to your monitor while the modem is in command mode.

E0	Turn command echo off..
E1	Turn command echo on (default).

Result Codes:

OK	n = 0, 1.
ERROR	Otherwise.

Fn Online Echo Command

This command enables or disables the online echo. An enabled online echo causes any data transmitted while online to be echoed back to the screen/communications application.

F0 Turn online echo on.

F1 Turn online echo off.

Result Codes:

OK n = 0, 1.

ERROR Otherwise.

Hn Hook Control

This command instructs the modem to go on-hook to disconnect a call, or off-hook to make the phone line busy.

H0 Modem goes on-hook (default).

H1 Modem goes off-hook.

Result Codes:

OK n = 0, 1.

ERROR Otherwise.

In Request Identification/Checksum

This command interrogates the modem for its product code, checksum, or ROM revision code.

I0 Display the 4-digit product code.

I1 Calculates ROM checksum and displays it on the DTE.

I2 Performs a ROM check and verifies the checksum displaying OK or ERROR.

I3 Returns the controller firmware version.

I4 Returns the current modem settings.

I5 Returns user profiles.

I6 Returns link diagnostics.

I7 Returns the product configuration.

I8 Displays black list screen.

I10 Displays VXD configuration screen.

I11 Displays V.34 link screen.

Result Codes:

OK n = 0 - 8, 10, 11.

ERROR Otherwise.

The ATII1 result has two pages; the user must hit a key to get the second page.

	Description	K56flex Connection	V.90 Connection
1	Last Connection	56K	V.90
2	Initial Transmit Carrier Rate	28800	28800
3	Initial Receive Carrier Rate	50000	49333
4	Final Transmit Carrier Rate	28800	28800
5	Final Receive Carrier Rate	50000	49333
6	Protocol Negotiation Result	LAPM	LAPM
7	Data Compression Result	V.42bis	V.42bis
8	Estimated Noise Level	152	152
9	Receive Signal Power Level (-dBm)	25	25
10	Transmit Signal Power Level (-dBm)	16	16
11	Round Trip Delay (msec)	4	4
12	Near Echo Level (-dBm)	NA	NA
13	Far Echo Level (-dBm)	NA	NA
14	Transmit Frame Count	3	3
15	Transmit Frame Error Count	0	0
16	Receive Frame Count	0	0
17	Receive Frame Error Count	0	0
18	Retrain by Local Modem	0	0
19	Retrain by Remote Modem	0	0
20	Call Termination Cause	0	0
21	Robbed-Bit Signaling	00	00
22	Digital Loss (dB)	6	6
23	Remote Server ID	4342C3	NA

OK

The AT111 command may be issued from online command mode or after the end of a call. After a call, some values are no longer valid; it is useful to know which ones. Each of the line items in the AT111 result is explained next:

1. V.90, 56K, V.34, or V.32 depending on the type of connection negotiated.
2. Initial upstream rate.
3. Initial downstream rate.
4. Current or final upstream rate.
5. Current or final downstream rate.
6. LAPM or MNP or None, depending on V.42 negotiation.
7. V.42bis or MNP or None, depending on V.42 negotiation.
8. Mean-square error of received downstream signal. This is the difference between received constellation point and reference decision point. This is a dimensionless decimal number, only valid during a call. Higher numbers are worse. There is no absolute quality threshold; it depends on the downstream data rate. The number varies during a call, so it can be useful to sample a few times.
9. The received signal power, although labeled –dBm, is only a relative measure for comparing calls to/from different locations. Only valid during a call.
10. Upstream transmit signal power.
11. Round-trip delay in milliseconds.
12. Echo levels are valid for V.34 only.
13. Echo levels are valid for V.34 only.
14. Number of LAPM frames sent upstream during this call. Count wraps around at 65535.
15. Number of REJ frames received at the analog client modem.
16. Number of LAPM frames received by the client during this call. Count wraps at 65535.
17. Number of frames received in error by the client.
18. Number of retrains or rate renegotiations requested by this modem.
19. Number of retrains or rate renegotiations requested by remote modem.
20. Reason for call ending, only valid after call ends.
 - 0 = Local modem command: ATH, DTR drop.
 - 1 = Remote modem: cleardown, loss of signal.
 - 2 = No answer, busy, etc.
 - 3 = Training failure V.90, K56flex, or V.34.
 - 4 = Protocol failure if required by \N4, for example.
21. For PCM connection, a hexadecimal 6-bit pattern of T1 frames with robbed-bit signaling.
22. For PCM connection only, the downstream digital loss.
23. For K56flex connection only, the V.8bis info sent by the server. Meaning is defined at the server and by convention.

Ln Speaker Volume

This command sets speaker volume to low, medium, or high.

- L0 Selects low volume.
- L1 Selects low volume.
- L2 Selects medium volume (default).
- L3 Selects high volume.

Result Codes:

- OK n = 0, 1, 2, 3.
- ERROR Otherwise.

Mn Speaker Control

This command turns the speaker on or off..

- M0 The speaker is off.
- M1 The speaker is on until a connection is made (default).
- M2 The speaker is always on.
- M3 The speaker is on until the carrier is detected, except while dialing.

Result Codes:

- OK n = 0, 1, 2, 3
- ERROR Otherwise

On Online Data Mode

Forces the modem to the online data mode. Use this command to return to the online mode after "escaping" to command mode.

- O0 Instructs the modem to exit online command mode and return to data mode (see AT Escape Sequence, +++).
- O1 This command issues a retrain (automatically return to the highest speed) before returning to online data mode.

Result Codes:

- OK n = 0, 1.
- ERROR Otherwise.

Qn Result Code Control

Result codes are informational messages sent from the modem and displayed on your monitor. Basic result codes are OK, CONNECT, RING, NO CARRIER, and ERROR. Also sometimes referred to as "quiet" mode, the Q setting controls the level of result codes generated by the modem.

- Q0 Display result codes (default).
- Q1 Quiet mode; no result codes.
- Q2 Displays result codes only in Originate Mode.

Result Codes:

- OK n = 0 - 2.
- ERROR Otherwise.

Sn Read/Write an S-Register

Sets the register r to the specified value n.

The Sr? command reads (displays) the value in register r.

- Q\$ Display the list of S-register settings.
- Qr=n Set S-register "r" to "n".
- Qr\$ Display the value of S-register "r".

Result Codes:

- OK n = \$, r = n, r\$.
- ERROR Otherwise.

S\$ Display Online Help for S-Registers

Displays online Help for S-registers.

Vn Result Code Form

Determines the type of result code. The V command determines if the result code is sent as words or numbers.

- V0 Display result codes in numeric form.
- V1 Display result codes in verbose form (words).

Result Codes:

- OK n = 0, 1.
- ERROR Otherwise.

	ATV0	ATV1
Result Code Format	<numeric code><CR>	<CR><LF> <verbose code><CR><LF>

Xn Result Code

Selects the result code set and dialing functions.

- X0 Report basic call progress result codes—OK, CONNECT, RING, NO CARRIER (also for busy, if enabled, and dial tone not detected), NO ANSWER, and ERROR.
- X1 Report basic call progress result codes and the connection rate—OK, CONNECT, RING, NO CARRIER (also for busy, if enabled, and dial tone not detected), NO ANSWER, CONNECT XXXX, and ERROR.
- X2 Report basic call progress result codes and the connection rate—OK, CONNECT, RING, NO CARRIER (also for busy, if enabled), NO DIAL TONE, NO ANSWER, CONNECT XXXX, and ERROR.
- X3 Report basic call progress result codes and the connection rate—OK, CONNECT, RING, NO CARRIER, NO ANSWER, CONNECT XXXX, BUSY, and ERROR.
- X4 Report basic call progress result codes and the connection rate—OK, CONNECT, RING, NO CARRIER, NO ANSWER, CONNECT XXXX, BUSY, NO DIAL TONE, and ERROR (default).

Extended Result Codes

- Disabled: Displays only the basic result codes OK, CONNECT, RING, NO CARRIER, and ERROR.
- Enabled: Displays basic result codes, along with the connect message and the modem's data rate, and an indication of the modem's error correction and data compression operation.

Dial Tone Detect

- Disabled: The modem dials a call regardless of whether it detects a dial tone. The period of time the modem waits before dialing is specified in register S6.
- Enabled: The modem dials only upon detection of a dial tone, and disconnects the call if the dial tone is not detected within 10 seconds.

Busy Tone Detect

- Disabled: The modem ignores any busy tones it receives.
- Enabled: The modem monitors for busy tones.

Result Codes:

- OK n = 0 - 4.
- ERROR Otherwise.

Yn Select Power-On/Reset Default Configuration

Controls the configuration template used when issuing a "ATZ" or "ATZ0" command to the modem.

Y0 On the next reset, use &W0 settings (default).

Y1 On the next reset, use &W1 settings.

Y2 On the next reset, use &F0 settings.

Y3 On the next reset, use &F1 settings.

Y4 On the next reset, use &F2 settings.

Result Codes:

OK n = 0 - 4.

ERROR Otherwise.

Zn Reset and Recall Stored Profile

Resets the modem, recalls the specified user profile from nonvolatile memory (NVRAM), and places it in the active configuration area.

Z0 Reset the modem according to the settings of ATY.

Z1 Reset the modem and use &W0 settings.

Z2 Reset the modem and use &W1 settings.

Z3 Reset the modem using &F0 settings and load factory default profile 1.

Z4 Reset the modem using &F1 settings and load factory default profile 0.

Z5 Reset the modem using &F2 settings and load factory default profile 2.

Result Codes:

OK n = 0 - 5.

ERROR Otherwise.

&\$ Display Online Help for Ampersand Commands

Displays online Help for the ampersand (&) commands.

&An Result Code Control

This modem always auto retrains.

&A0 Disable data compression result codes.

&A1 Enable data compression result codes.

&A2 Enable modulation result codes.

&A3 Enable data compression result codes and add V.42bis and MNP 5 protocol indicators (default).

Result Codes:

OK n = 0 - 3.

ERROR Otherwise.

&Bn DTE Speed

DTE rate control: This command is not used by the Winmodem architecture. Instead, the Winmodem is capable of automatically adapting to the Windows COM port rate.

&B0 Use a floating DTE speed (default).

&B1 Use a fixed DTE speed.

&B2 Use a fixed DTE speed when using data compression.

Result Codes:

OK n = 0 - 2.

ERROR Otherwise.

&Cn Data Carrier Detect (DCD) Control

Data Carrier Detect is a signal from the modem to your computer indicating that the carrier signal is being received from a remote modem. DCD normally turns off when the modem no longer detects the carrier signal.

&C0 Carrier detect is always on.

&C1 Carrier detect is controlled by the modem (default).

Result Codes:

OK n = 0, 1.

ERROR Otherwise.

&Dn Data Terminal Ready (DTR) Control

This command interprets how the modem responds to the state of the DTR signal and changes to the DTR signal.

- &D0 Ignore DTR.
- &D1 Use online command mode.
- &D2 DTE controls DTR (default).

Result Codes:

- OK n = 0 - 2.
- ERROR Otherwise.

&Fn Load Factory Settings

This command loads the configuration stored and programmed at the factory. This operation replaces all of the command options and the S-register settings in the active configuration with factory values.

- &F0 Set the factory profile that uses hardware (RTS/CTS) flow control (this is the active profile when the modem is shipped).
- &F1 Set the factory profile that uses hardware (RTS/CTS) flow control.
- &F2 Set the factory profile that uses hardware (XON/XOFF) flow control.

Result Codes:

- OK n = 0 - 2
- ERROR Otherwise.

&Gn Guard Tone Control

Determines guard tone selection.

- &G0 Guard tone disabled (default).
- &G1 Sets guard tone to 550 Hz.
- &G2 Sets guard tone to 1800 Hz.

Result Codes:

- OK n = 0 - 2.
- ERROR Otherwise.

&Hn Flow Control for Transmitted Data

- &H0 Disable flow control.
- &H1 Enable hardware flow control (default).
- &H2 Enable software (XON/XOFF).
- &H3 Enable software and hardware flow control.

Result Codes:

- OK n = 0 - 3.
- ERROR Otherwise.

&In Flow Control for Received Data

- &I0 Disable flow control (default).
- &I1 Send XON/XOFF signals to modems on both ends.
- &I2 Send XON/XOFF signals to your modem only.

Result Codes:

- OK n = 0 - 2.
- ERROR Otherwise.

&Kn Data Compression Control

Enables/disables data compression.

- &K0 Disable data compression.
- &K1 Enable data compression (V.42bis, MNP 5, NONE) [default].
- &K2 Enable data compression (forces V.42bis).
- &K3 Use selective data compression.

Result Codes:

- OK n = 0 - 3.
- ERROR Otherwise.

&Mn Error Correction Control

- &M0 Disable error correction in 1200 bps and faster transfers.
- &M4 Allow V.42 or MNP error correction in 1200 bps and faster transfers (default).
- &M5 Allow either V.42 or MNP error correction in 1200 bps and faster transfers.

Result Codes:

- OK n = 0, 4, 5.
- ERROR Otherwise.

&Nn Link Speed Control

&N0	Highest link speed (default).	&N20	Link speed = 32000 bps.
&N1	Link speed = 300 bps.	&N21	Link speed = 33333 bps.
&N2	Link speed = 1200 bps.	&N22	Link speed = 34666 bps.
&N3	Link speed = 2400 bps.	&N23	Link speed = 36000 bps.
&N4	Link speed = 4800 bps.	&N24	Link speed = 37333 bps.
&N5	Link speed = 7200 bps.	&N25	Link speed = 38666 bps.
&N6	Link speed = 9600 bps.	&N26	Link speed = 40000 bps.
&N7	Link speed = 12000 bps.	&N27	Link speed = 41333 bps.
&N8	Link speed = 14400 bps.	&N28	Link speed = 42666 bps.
&N9	Link speed = 16800 bps.	&N29	Link speed = 44000 bps.
&N10	Link speed = 19200 bps.	&N30	Link speed = 45333 bps.
&N11	Link speed = 21600 bps.	&N31	Link speed = 46666 bps.
&N12	Link speed = 24000 bps.	&N32	Link speed = 48000 bps.
&N13	Link speed = 26400 bps.	&N33	Link speed = 49333 bps.
&N14	Link speed = 28800 bps.	&N34	Link speed = 50666 bps.
&N15	Link speed = 31200 bps.	&N35	Link speed = 52000 bps.
&N16	Link speed = 33600 bps.	&N36	Link speed = 53333 bps.
&N17	Link speed = 28000 bps.	&N37	Link speed = 54666 bps.
&N18	Link speed = 29333 bps.	&N38	Link speed = 56000 bps.
&N19	Link speed = 30666 bps.	&N39	Link speed = 57333 bps.

Result Codes:

OK	n = 0 - 39.
ERROR	Otherwise.

&Rn RTS Control

&R0	Ignore RTS.
&R1	Receive to DTE/RTS high (default).

Result Codes:

OK	n = 0, 1.
ERROR	Otherwise.

&Sn Data Set Ready (DSR) Option

This command selects DSR action.

&S0 DSR is always on (default).

&S1 DSR signals that the modem is ready to send data.

Result Codes:

OK	n = 0, 1.
ERROR	Otherwise.

&Un Link Rate

Sets floor connect speed. When &U is greater than 0, &N serves as the ceiling connect rate. See &N (Link Speed Control).

&N0	Highest link speed (default).	&N20	Link speed = 32000 bps.
&N1	Link speed = 300 bps.	&N21	Link speed = 33333 bps.
&N2	Link speed = 1200 bps.	&N22	Link speed = 34666 bps.
&N3	Link speed = 2400 bps.	&N23	Link speed = 36000 bps.
&N4	Link speed = 4800 bps.	&N24	Link speed = 37333 bps.
&N5	Link speed = 7200 bps.	&N25	Link speed = 38666 bps.
&N6	Link speed = 9600 bps.	&N26	Link speed = 40000 bps.
&N7	Link speed = 12000 bps.	&N27	Link speed = 41333 bps.
&N8	Link speed = 14400 bps.	&N28	Link speed = 42666 bps.
&N9	Link speed = 16800 bps.	&N29	Link speed = 44000 bps.
&N10	Link speed = 19200 bps.	&N30	Link speed = 45333 bps.
&N11	Link speed = 21600 bps.	&N31	Link speed = 46666 bps.
&N12	Link speed = 24000 bps.	&N32	Link speed = 48000 bps.
&N13	Link speed = 26400 bps.	&N33	Link speed = 49333 bps.
&N14	Link speed = 28800 bps.	&N34	Link speed = 50666 bps.
&N15	Link speed = 31200 bps.	&N35	Link speed = 52000 bps.
&N16	Link speed = 33600 bps.	&N36	Link speed = 53333 bps.
&N17	Link speed = 36000 bps.	&N37	Link speed = 54666 bps.
&N18	Link speed = 38400 bps.	&N38	Link speed = 56000 bps.
&N19	Link speed = 40800 bps.	&N39	Link speed = 57333 bps.

Result Codes:

OK	n = 0 - 39.
ERROR	Otherwise.

&Wn Store Active Profile

Saves the active profile to the specified stored profile.

&W0 Write (store) user profile 0 to memory.

&W1 Write (store) user profile 1 to memory.

Result Codes:

OK	n = 0, 1.
ERROR	Otherwise.

&Yn Set Break Handling

This command does not change the behavior of the modem, but is included for compatibility with applications that issue the &Y0 command.

&Y0 Destructive, but doesn't send break..

&Y1 Destructive, expedited (default).

&Y2 Nondestructive, expedited.

Result Codes:

OK	n = 0 - 2.
ERROR	Otherwise.

&Zn Store Telephone Number

The modem can store telephone numbers. The format is AT&Zn=s, where n is the desired location and s is the dial string.

&Zs Store phone number.

&Z? Display phone number.

Result Codes:

OK	n = s, ?
ERROR	Otherwise.

S Registers

Setting S Register Default Values

The S register default values function reliably under most circumstances. However, these values may be modified if necessary.

For example, it may take an especially long time to get a dial tone in your office, so you may choose to reset S7 for a longer wait time.

Modifying an S Register

You can modify or change the value of an S register from Command Mode (Terminal Mode) or from a standard data or fax communication application. For example:

1. Type **ATS11=70**, then press **Enter**. This sets S11 to a value of 70.
2. If you then enter **AT = 95**, it resets S11 to a value of 95 since the modem remembered that S11 was the last register referenced.
3. If you enter an **S =** command with no parameter (value), the register number defaults to zero and the modem changes the value of **S0**. Therefore, the following commands are equivalent:
ATS0 = 3 and ATS = 3.

Reading an S Register

To read the contents of a given S register in the Terminal Mode (Command Mode), type **ATSn?** (where n is the number of the register), then press **Enter**.

When modifying a register, the modem also remembers the location of the last inquiry. For example, the following sequence of commands displays the contents of the S11 register:

ATS11? This command displays the value of S11.

AT? This command also displays the value of S11.

When you use an **S?** with no value the register number defaults to zero and the modem responds with the value of S0 (i.e., **ATS?**).

S-Register Summary

Register	Default	Description
S0	0 rings	Ring to answer on
S1	0 rings	Ring count
S2	43	Escape code character
S3	13	Carriage return character
S4	10	Line return character
S5	8 secs	Backspace character
S6	4 secs	Wait for blind dial
S7	60 secs	Wait time for carrier
S8	2 secs	Pause time for comma
S9	0.106	Carrier detect validation time
S10	0.7	Lost carrier to hang-up delay
S11	70 ms	Touch Tone spacing
S12	2 secs	Escape guard time
S13	0	Bitmapped register
S15	0	Bitmapped register
S16	0	Bitmapped test register
S18	0 secs	Test timer
S19	0 mins	Inactivity timer
S21	0.010 sec	Error correction break length
S22	17	Character code for XON
S23	19	Character code for XOFF
S25	0	Response to DTR change
S27	0	Bitmapped register
S28	8	V.32 handshake time
S29	20	V.21 answer mode fallback timer
S32	2	Connection bitmapped operations
S33	32	V.34 connection setup control flags
S34	16	V.34 connection setup control flags
S38	0	Delay before forced hangup

S-Register Descriptions

S0 Ring to Answer On

Sets the number of rings required before the modem automatically answers a call. If set to 0, auto-answer mode is disabled and manual answer is in effect.

Range: 0 - 255

Default: 0

Units: Rings

S1 Ring Count

Counts and logs the number of rings received.

Range: 0 - 255

Default: 0

Units: Rings

S2 Escape Code Character

Designates the ASCII character used to indicate an escape character.

Range: 0 - 127

Default: 43

Units: ASCII

S3 Carriage Return Character

Designates the ASCII character used for carriage returns.

Range: 0 - 127, ASCII decimal

Default: 13

Units: ASCII

S4 Line Feed Character

Designates the ASCII character used for line feeds.

Range: 0 - 127, ASCII decimal

Default: 10

Units: ASCII

S5 Backspace Character

Designates the ASCII character used for backspaces.

Range: 0 - 127, ASCII decimal

Default: 8

Units: ASCII

S6 Wait for Blind Dial

Dial tone wait time; if AT command X is set to X2 or X4, the modem ignores this register and dials as soon as it detects a dial tone.

Range: 2 - 255

Default: 4

Units: Seconds

S7 Wait Time for Carrier

Denotes the wait time, in seconds, for a carrier after dialing or answering. If the modem does not detect a carrier after a specified wait time, it hangs up.

Range: 1 - 255

Default: 60

Units: Seconds

S8 Pause Time for Comma

Sets the time, in seconds, that the modem must pause when the "," dial modifier is used in the dial string.

Range: 0 - 255

Default: 2

Units: Seconds

S9 Carrier Detect Validation Time

Sets the time, in tenths of a second, that the carrier must be present before the modem considers it valid and turns on carrier detect (CD) if applicable.

Range: 1 - 255

Default: 0.106

Units: 0.1 seconds

S10 Lost Carrier to Hang-Up Delay

Sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect.

Range: 1 - 255
Default: 7
Units: 0.1 seconds

S11 Touch-Tone Spacing

Sets the duration of tones in Touch-Tone dialing.

Range: 0 - 255
Default: 70
Units: 0.001 seconds

S12 Escape Code Guard Time

Determines the minimum idle period before and after the entry of the escape code sequence. Also, it defines the maximum period, in fiftieths of a second, allowed between consecutive asynchronous escape characters S2 for the escape sequence to be considered valid. If this register is set to 0, the guard time of the escape sequence is disabled.

Range: 0 - 255
Default: 2 seconds
Units: 0.02 seconds

S13 Bitmapped Register

Selects the data bit(s) you want the modem set on, and sets S13 to the total of the values in the Value column. For example, AT S13.0=17 enables bit 0 (value 1) and bit 4 (value 16).

1 = Reset on DTR loss
2 = Reduced non-ARQ transmit buffer
4 = Set DEL = backspace
8 = Do DS0 on DTR
16 = Do DS0 on Reset
128 = Escape code hang-up

S15 Bitmapped Register

Selects the data bit(s) you want the modem set on, and sets S13 to the total of the Value column. For example, AT S13.0=17 enables bit 0 (value 1) and bit 4 (value 16).

- 1 = MNP/V.42 disabled in V.22
- 2 = MNP/V.42 disabled in V.22bis
- 4 = MNP/V.42 disabled in V.32, V.34
- 8 = Disable MNP handshake
- 16 = Disable MNP level 4
- 32 = Disable MNP level 3

S16 Bitmapped Test Register

Selects the data bit(s) you want the modem set on, and sets S13 to the total of the Value column. For example, AT S13.0=17 enables bit 0 (value 1) and bit 4 (value 16).

- 2: Dial test
- Range: 2
- Default: 0

S18 Test Timer

Sets the length of time, in seconds, that the modem conducts a test before returning to the command mode. When this register value is zero, the test will not automatically terminate. The test must be terminated from the command mode by issuing the &T0 or H command.

- Range: 0 - 255
- Default: 0
- Units: Seconds

S19 Inactivity Timer

Sets the duration, in minutes, for the inactivity timer. The timer activates when there is no data activity on the phone line; at time-out the modem hangs up. A setting of 0 disables the timer function.

S19=0 disables the timer.

- Range: 0 - 255
- Default: 0
- Units: Minutes

S21 Error Correction Break Length

Sets the length, in 10-millisecond units, of breaks sent from the modem to the computer; applies to MNP or V.42 mode only.

Range: 0 - 255
Default: 1
Units: 0.01 seconds

S22 Character Code for XON

Stores the ASCII code for the XON character.

Range: 0 - 127
Default: 17
Units: ASCII

S23 Character Code for XOFF

Stores the ASCII code for the XOFF character.

Range: 0 - 127
Default: 19
Units: ASCII

S25 Response to DTR Change

Responds to changes to the DTR. The increment is 10 milliseconds. If &D1 or &D2 is selected, a change in DTR shorter than the S25 time is ignored. If &D3 is selected, any on-to-off transition of DTR causes a hard reset.

Range: 0 - 255
Default: 0

S27 Bitmapped Register

Selects the data bit(s) you want the modem set on, and sets S13 to the total of the values in the Value column. For example, `ATS13.0=17` enables bit 0 (value 1) and bit 4 (value 16). Software compatibility mode (128) forces "9600" connect message for V.32 connections greater than 9600 bps for some software which cannot accept these messages.

- 1 = V.21 mode
- 2 = Disable TCM
- 4 = Disable V.32
- 8 = Disable 2100 Hz
- 16 = Enable V.23 fallback
- 32 = Disable V.32bis
- 128 = Software compatibility mode

S28 V.32 Handshake Time

Sets the V.32 handshaking time in tenths of a second. A value of 0 eliminates V.32 answer tones for a faster connection, while 255 disables all connections except V.32 at 9600 bps.

- Range: 0 - 255
- Default: 8
- Units: 0.1 seconds

S29 V.21 Answer Mode Fallback Timer

Sets the duration, in tenths of a seconds, of the V.21 answer mode fallback timer.

- Range: 0 - 255
- Default: 20
- Units: 0.1 seconds

S32 Connection Bitmapped Operations

This register sets the maximum line data rate. In K56flex and V.90 mode, S37 controls the upstream V.34 rate.

- 1 = V.8 call indicate enable
- 2 = Enable V.8 mode(default)
- 8 = Disable V.34 modulation
- 16 = Disable V.34+ modulation
- 32 = Disable X2 modulation
- 611 = Disable V.90 modulation

S33 V.34 Connection Setup Control Flags

Selects the data bit(s) you want them modem set on, and sets S13 to the total of the values in the Value column. For example, AT S13.0=17 enables bit 0 (value 1) and bit 4 (value 16).

- 1 = Disable 2400 symbol rate
- 2 = Disable 2743 symbol rate
- 4 = Disable 2800 symbol rate
- 8 = Disable 3000 symbol rate
- 16 = Disable 3200 symbol rate
- 32 = Disable 3429 symbol rate (default)
- 128 = Disable shaping

S34 V.34 Connection Setup Control Flags

Selects the data bit(s) you want the modem set on, and sets S13 to the total of the Value column. For example, AT S13.0=17 enables bit 0 (value 1) and bit 4 (value 16).

- 16 = Disable nonlinear coding (default)
- 32 = Disable transmit level deviation
- 64 = Disable preemphasis
- 128 = Disable precoding

S38 Delay Before Forced Hang-up

Specifies the delay between the receipt of the H command disconnect and the disconnect operation. The modem will wait for the number of seconds specified in S38 for the remote modem to acknowledge all data in the modem buffer before disconnecting.

Range: 0 - 255

Default: 0

Units: Seconds