COMPAQ
White Paper

Contents

Compaq V.90 Integrated Modem Commands

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

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

- AT FAX command set to control fax communications

- V.25ter AT command set for Microsoft PC98 and PC99 modem drivers specifications

- V.80 AT command set for V.80 standards

NOTE: Use of these controls may alter modem performance and behavior and should only be used with knowledge of their affects.

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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/ 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's 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 Online Mode to Online Command Mode

Use the following steps to break out of a data transfer session (online mode) and enter the online command mode. The established connection is maintained, but input is interpreted locally and not transmitted to the remote connection.

1. Press and hold the **Shift** key and type **+++.**

    An **OK** result code is displayed.

2. Enter modem commands as needed.

3. Return to online mode 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.

    The Connection Description dialog box is displayed.

3. Type Command in the Name option.

4. Click OK.

   The Phone Number dialog box is displayed.

5. Select Connect Using ⇨ Direct to Com 2.

6. Click OK.

   The Modem Port Settings dialog box is displayed.

7. Click OK.

   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.

8. Click File, then Save to save the session.

9. Click File, then Exit to quit.

   A command mode icon is displayed in the HyperTerminal dialog box.

AT Command Set

AT Data Command Set Summary

Command	Description	Command	Description
+++	Escape to online command mode	&Q	Asynchronous communications mode
A	Answer command	&S	Data set ready (DSR) option
A/	Repeat last command	&T	Self-test commands
B	Communication standard setting	&V	View active configuration
C	Carrier control	&W	Store current configuration
D	Dial command	&Y	Select stored profile for hard reset
E	Echo command	&Zn=x	Store telephone number
F	Online data character echo command	\A	MNP Block Size
H	Hook control	\B	Send Break
I	Request ID information	\G	Modem port flow control
L	Monitor speaker volume	\J	Adjust bits/s rate control
M	Monitor speaker mode	\K	Set break control
N	Modulation handshake	\N	Error control mode selection
O	Return to online data mode	\Q	Local flow control selection
P	Select pulse dialing	\R	Ring indicator off after answer
Q	Result code control	\T	Inactivity timer
S	Set or Query S Register values	\V	Protocol result code
T	Select tone dialing	\X	XON/XOFF pass through
V	DCE response format	-C	Data calling tone
W	Result Code Option	-V90	Enable/disable V.90 settings
X	Result code selection and call progress monitoring	%B	View numbers in blacklist
Y	Long-space disconnect	%C	Data compression control
Z	Reset and Recall stored profile	%E	Automatic rate change
&B	V.32 auto retrain	VDR	Distinctive ring and cadence report
&C	Data carrier detect (DCD) control	DR	Compression reporting
&D	Data Terminal Ready (DTR) control	DS	V.42bis
&F	Local factory settings	ER	Error control reporting
&G	V.22bis guard tone control	ES	Buffered mode
&J	Auxiliary relay options	IFC	Flow control
&K	Local flow control selection	ILRR	DTE rate reporting
&M	Asynchronous communications mode	MR	Modulation reporting
&P	Pulse dial make-to-break ration selection	MS	Modem carrier

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 EC*	10	Connection at 2400 bits/s
CONNECT 4800 EC*	11	Connection at 4800 bits/s
CONNECT 9600 EC*	12	Connection at 9600 bits/s
CONNECT 14400 EC*	13	Connection at 14400 bits/s
CONNECT 19200 EC*	14	Connection at 19200 bits/s
CONNECT 7200 EC*	24	Connection at 7200 bits/s
CONNECT 12000 EC*	25	Connection at 12000 bits/s
CONNECT 16800 EC*	86	Connection at 16800 bits/s
CONNECT 300 EC*	40	Connection at 300 bits/s
CONNECT 21600 EC*	55	Connection at 21600 bits/s
CONNECT 24000 EC*	56	Connection at 24000 bits/s
CONNECT 26400 EC*	57	Connection at 26400 bits/s
CONNECT 28800 EC*	58	Connection at 28800 bits/s
CONNECT 31200 EC*	59	Connection at 31200 bits/s
CONNECT 33600 EC*	60	Connection at 33600 bits/s
CONNECT 38400 EC*	28	Connection at 38400 bits/s (DTE rate)
CONNECT 57600 EC*	18	Connection at 57600 bits/s (DTE rate)
CONNECT 115200 EC	87	Connection at 115200 bits/s (DTE rate)
DELAYED	88	Delay is in effect for the dialed number
BLACKLISTED	89	Dialed number is blacklisted
BLACKLIST FULL	90	Blacklist is full
CONNECT 32000 EC*	70	Connection at 32000 bits / s (K56flex mode) or V.90
CONNECT 34000 EC*	71	Connection at 34000 bits / s (K56flex mode)
CONNECT 36000 EC*	72	Connection at 36000 bits / s (K56flex mode) or V.90
CONNECT 38000 EC*	73	Connection at 38000 bits / s (K56flex mode)
CONNECT 40000 EC*	74	Connection at 40000 bits / s (K56flex mode) or V.90
CONNECT 42000 EC*	75	Connection at 42000 bits / s (K56flex mode)

Continued

Result Code Summary continued

Result Code	Numeric	Description
CONNECT 44000 EC*	76	Connection at 44000 bits / s (K56flex mode) or V.90
CONNECT 46000 EC*	77	Connection at 46000 bits / s (K56flex mode)
CONNECT 48000 EC*	78	Connection at 48000 bits / s (K56flex mode) or V.90
CONNECT 50000 EC*	79	Connection at 50000 bits / s (K56flex mode)
CONNECT 52000 EC*	80	Connection at 52000 bits / s (K56flex mode) or V.90
CONNECT 54000 EC*	81	Connection at 54000 bits / s (K56flex mode)
CONNECT 56000 EC*	82	Connection at 56000 bits / s (K56flex mode)
CONNECT 28000 EC*	100	Connection at 28000 bits / s (V.90 mode)
CONNECT 29333 EC*	101	Connection at 29333 bits / s (V.90 mode)
CONNECT 30666 EC*	102	Connection at 30666 bits / s (V.90 mode)
CONNECT 33333 EC*	103	Connection at 33333 bits / s (V.90 mode)
CONNECT 34666 EC*	104	Connection at 34666 bits / s (V.90 mode)
CONNECT 37333 EC*	105	Connection at 37333 bits / s (V.90 mode)
CONNECT 38666 EC*	106	Connection at 38666 bits / s (V.90 mode)
CONNECT 41333 EC*	107	Connection at 41333 bits / s (V.90 mode)
CONNECT 42666 EC*	108	Connection at 42666 bits / s (V.90 mode)
CONNECT 45333 EC*	109	Connection at 45333 bits / s (V.90 mode)
CONNECT 46666 EC*	110	Connection at 46666 bits / s (V.90 mode)
CONNECT 49333 EC*	111	Connection at 49333 bits / s (V.90 mode)
CONNECT 50666 EC*	112	Connection at 50666 bits / s (V.90 mode)
CONNECT 53333 EC*	113	Connection at 53333 bits / s (V.90 mode)
CONNECT 54666 EC*	114	Connection at 54666 bits / s (V.90 mode)

* 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:
- V42bis—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

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.

Do not precede this command with an AT prefix or conclude it by pressing Enter.

A   Answer Command

This command instructs the modem to go off-hook and answer an incoming call.

A/   Repeat Last Command

This command repeats the last command string entered. Do not precede this command with an AT prefix or conclude it by pressing Enter.

Bn   Communication Standard Setting

This command determines CCITT vs. Bell standard.

B0:   Selects CCITT V.22 mode when the modem is at 1200 bits/s.

B1:   Selects Bell 212A when the modem is at 1200 bits/s (default).

B2:   Deselects V23 reverse channel (same as B3).

B3:   Deselects V23 reverse channel (same as B2).

B15:   Selects V.21 when the modem is at 300 bits/s.

B16:   Selects Bell 103J when the modem is at 300 bits/s (default).

Result Codes:

OK   n = 0, 1, 2, 3, 15, 16

ERROR   Otherwise

Cn   Carrier Control

The modem will accept the C1 command without error in order to assure backward compatibility with communications software that issues the C1 command. However, this modem does not support the C0 command. The C0 command may instruct some other modems to not send carrier (i.e., it puts them in a receive-only mode).

C0:   Transmit carrier always off.

C1:   Normal transmit carrier switching.

Result Codes:

OK   n = 1

ERROR   Otherwise

Dn   Dial

This command instructs the modem to begin the dialing sequence. The dial string (n, including modifiers and the telephone number) is entered after the ATD command.

A dial string can be up to 40 characters long. Any digit or symbol (0-9, *, #, A, B, C, D) may be dialed as touch-tone digits. Characters such as spaces, hyphens, and parentheses do not count; they are ignored by the modem and may be included in the dial string to enhance readability.

The following may be used as dial string modifiers:

L   Redials last number. Should be the first character following ATD, ignored otherwise.

P   Pulse dialing

T   Touch-tone dialing (default)

,   Pause during dialing. Pau se 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 quiet answer. Wait for five seconds of silence after dialing the number. If silence is not detected, the modem sends a NO ANSWER result code back to the user.

!   Hook flash. Causes the modem to go on-hook for 0.5 seconds and then return to off-hook.

;   Return to command mode. Causes the modem to return to command mo de after dialing the number without disconnecting the call.

^   Disable data calling tone transmission

S=n   Dial a telephone number previously stored using the &Zn=x command (see the

         &Zn=x command for further information). The range of n is 0-3.

$ Bong tone detection

En   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:   Disables echo to the computer .

E1:   Enables echo to the computer (default).

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

Fn   Online Data Character Echo Command

This command determines whether the modem will echo data from the DTE. This modem does not support the F0 version of the command. However, the modem will accept F1, which may be issued by older communication software, to assure backward compatibility.

F0:   Online data character echo enabled (NOT SUPPORTED, ERROR).

F1:   Online character echo disabled.

Result Codes:

OK   n = 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 ID Information

This command displays specific product information about the modem.

I0:   Returns default speed and controller firmware version , same as I3.

I1:   Calculates ROM checksum and displays it on the DTE .

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

I3:   Returns the default speed and the controller firmware version, same as I0.

I4:   Returns firmware version for data pump.

I5:   Returns the board ID: software version, hardware version, and country ID.

I6:   Returns OK.

I7:   Returns OK.

I8:   Returns OK.

I9:   Returns country code (i.e. NA Ver. 1).

I11   Displays connection information as described below:

Result Codes:

OK   n = 0, 1, 2, 3, 4, 9

ERROR   Otherwise

The ATI11 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	V42bis	V42bis
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

Press any key to continue; ESC to quit.

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 ATI11 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 ATI11 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. V42bis 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.

    The received signal power, although labeled –dBm, is only a relative measure for comparing calls to/from different locations. Only valid during a call.

9. Upstream transmit signal power.

10. Round-trip delay in milliseconds.

11. Echo levels are valid for V.34 only.

12. Echo levels are valid for V.34 only.

13. Number of LAPM frames sent upstream during this call. Count wraps around at 65535.

14. Number of REJ frames received at the analog client modem.

15. Number of LAPM frames received by the client during this call. Count wraps around at 65535.

16. Number of frames received in error by the client.

17. Number of retrains or rate renegotiations requested by this modem.

18. Number of retrains or rate renegotiations requested by remote modem.

19. 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.

20. For PCM connection only, a hexadecimal 6-bit pattern of T1 frames with robbed-bit signaling.

21. For PCM connection only, the downstream digital loss.

22. For K56flex connection only, the V.8bis info sent by the server. Meaning is defined at the server and by convention.

23. Example above is from a recent Ascend MAX in u-Law.

Ln   Monitor 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   Monitor Speaker Mode

This command turns the speaker on or off.

M0:   The speaker is off

M1:   The speaker is on until the modem detects the carrier signal (default)

M2:   The speaker is always on when modem is off-hook

M3:   The speaker is on until the carrier is detected, except while dialing

Result Codes:

OK   n = 0, 1, 2, 3

ERROR   Otherwise

Nn   Modulation Handshake

This command controls whether or not the local modem performs a negotiated handshake at connection time with the remote modem when the communication speed of the two modems is different.

N0:   When originating or answering, this is for handshake only at the communication standard specified by S37 and the ATB command.

N1:   When originating or answering, begin the handshake only at the communication standard specified by S37 and the ATB command. During handshake, fallback to a lower speed may occur (default).

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

On   Return Online to Data 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 before returning to online data mode.

O3:   This command issues a rate renegotiation before returning to online data mode.

Result Codes:

OK   n = 0, 1, 3

ERROR   Otherwise

P   Select Pulse Dialing

This command configures the modem for pulse (non touch-tone) dialing. Dialed digits are pulsed until a T command or dial modifier is received. Tone dial is the default setting.

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. The ATQ command allows the user to turn result codes on or off.

Q0:   Enables modem to send result codes to the computer (default).

Q1:   Disables modem from sending result codes to the com puter.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

T   Select Tone Dialing

This command instructs the modem to send DTMF tones while dialing. Dialed digits are tone dialed until a P command or dial modifier is received. This is the default setting.

Vn   DCE Response Format

This command controls whether result codes (including call progress and negotiation progress messages) are displayed as words or their numeric equivalents.

For the result code, see the "Result Code Summary" section of this document.

V0:   Displays result codes as digits.

V1:   Displays result codes as text (default).

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

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

Wn   Result Code Option

W0   CONNECT result code reports DTE speed. Disable protocol result codes.

W1   CONNECT result code reports DTE speed. Enable protocol result codes.

W2   CONNECT result code reports DCE receive speed. Enable protocol result

codes (default).

Result Codes:

OK   n = 0, 1, 2

ERROR   Otherwise

Xn   Result Code Selection and Call Progress Monitoring

This command enables tone detection options used in the dialing process. As these functions are chosen, the result codes of the modem chip set are also affected. Therefore, this command is frequently used to control the responses of the modem chip set.

	Extension Result Code	Dial Tone Detect	Busy Tone Detect
X0	Disable	Disable	Disable
X1	Enable	Disable	Disable
X2	Enable	Enable	Disable
X3	Enable	Disable	Enable
X4	Enable	Enable	Enable (default)
X5	Enable	Enable	Enable
X6	Enable	Enable	Enable
X7	Disable	Enable	Enable

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 date 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, 1, 2, 3, 4, 5, 6, 7

ERROR   Otherwise

Yn   Long Space Disconnect

Long space disconnect is always disabled.

Y0:   Disable long space disconnect (default).

Y1:   Enable long space disconnect. NOT SUPPORTED.

Result Codes:

OK   n = 0

ERROR   Otherwise

Zn   Recall Stored Profile

This command instructs the modem chip set to go on-hook and restore the profile saved by the last &W command. Either Z0 or Z1 restores the same single profile.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

&Bn   V.32 Auto Retrain

This modem always auto retrains.

&B0:   Disable V.32 auto retrain - NOT SUPPORTED.

&B1:   Enable V.32 auto retrain (default).

Result Codes:

OK   n = 1

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:   The state of the carrier from the remote modem is ignored. DCD circuit is always on.

&C1:   DCD turns on when the remote modem's carrier signal is detected, and off when the carrier signal is not detected (default).

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

&Dn   DTR Control

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

&D0:   Ignore. The modem ignores the true status of DTR and treats it as always on. This should only be used if your computer does not provide DTR to the modem.

&D1:   If the DTR signal is not detected while in online data mode, the modem enters command mode, issues OK result code, and remains connected.

&D2:   If the DTR signal is not detected while in online data mode, the modem disconnects
        (default).

&D3:   Reset on the on-to-off DTR transition.

Result Codes:

OK   n = 0, 1, 2, 3

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.

&Gn   V.22bis Guard Tone Control

This command determines which guard tone, if any, to transmit while transmitting in the high
band (answer mode). This command is only used in V.22 and V.22bis mode. This option is not
used in North America and is for international use only.

&G0:   Guard tone disabled (default).

&G1:   Sets guard tone to 550 Hz.

&G2:   Sets guard tone to 1800 Hz.

Result Codes:

OK   n = 0, 1, 2

ERROR   Otherwise

&Jn   Auxiliary Relay Option

&J0:   The auxiliary relay is never closed.

&J1:   NOT SUPPORTED, responds ERROR.

Result Codes:

OK   n = 0

ERROR   Otherwise

&Kn   Local Flow Control Selection

&K0:   Disable flow control

&K1:   Reserved

&K2:   Reserved

&K3:   Enable RTS/CTS flow control (default)

&K4:   Enable XON/XOFF flow control

Result Codes:

OK   n = 0, 3, 4

ERROR   Otherwise

&Mn   Asynchronous Communications Mode

&M0:   Asynchronous mode (default)

&M1:   Reserved

&M2:   Reserved

&M3:   Reserved

&M4:   Reserved

Result Codes:

OK   n = 0

ERROR   Otherwise

&Pn   Pulse Dial Make-to-Break Ration Selection

&P0:   39/61 make/break ratio, 10PPS

&P1:   33/67 make/break ratio, 10PPS (default)

&P2:   33/67 make/break ratio, 20PPS

&M3:   Reserved

&M4:   Reserved

Result Codes:

OK   n = 0, 1, 2

ERROR   Otherwise

&Qn   Asynchronous Communications Mode

&Q0:   Asynchronous Mode, buf fered. Same as \N0**.**

&Q5:   Error Control Mode, buffered (default). Same as \N3.

&Q6:   Asynchronous Mode, buffered. Same as \N0.

&Q8:   MNP error control mode. If an MNP error control protocol is not

       established, the modem will fallback according to the current user setting in S36.

&Q9:   V.42 or MNP error control mode. If either error control protocol is

       established, the modem will fallback according to the current user setting in S36.

Result Codes:

OK   n = 0, 5, 6, 8, 9

ERROR   Otherwise

&Sn   Data Set Ready (DSR) Option

This command selects DSR action.

&S0:   DSR always ON (default).

&S1:   DSR comes on when establishing a connection and goes off when the connection ends.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

&Tn   Self-Test Commands

This command allows the user to perform diagnostic tests on the modem. These tests can help to isolate problems when experiencing periodic data loss or random errors.

&T0   Abort. Stops any test in progress.

&T1   Local analog loop. This test verifies modem operation, as well as the connec tion between the modem and computer. Any data entered at the local DTE is modulated, then demodulated, and returned to the local DTE. To work properly, the modem must be offline.

&T3   Local digital loopback test

&T6   Remote digital loopback test. This test can verify the integrity of the local modem, the communications link, and the remote modem. Any data entered at the local DTE is sent to, and returned from the remote modem. To work properly, the modems must be online with error control disabled.

Result Codes:

OK   n = 0

CONNECT   n = 1, 3, 6

ERROR   Otherwise

&V View Active Configuration and Stored Profile

This command is used to display the active profiles.

&V0:   View active file

For example:

Option	Selection	AT Command
Comm Standard	Bell	B
CommandCharEcho	Enabled	E
Speaker Volume	Medium	L
Speaker Control	OnUntilCarrier	M
Result Codes	Enabled	Q
Dialer Type	Tone	T/P
Result Code Form	Text	V
Extend Result Code	Enabled	X
Dial Tone Detect	Enabled	X
Busy Tone Detect	Enabled	X
LSD Action	Standard RS232	&C
DTR Action	Standard RS232	&D

Press any key to continue; ESC to quit.

Option	Selection	AT Command
V22b Guard Tone	Disabled	&G
Flow Control	Hardware	&K
Error Control Mode	V42, MNP, Buffer	\N
Data Compression	Enabled	%C
AutoAnswerRing#	0	S0
AT Escape Char	43	S2
CarriageReturnChar	13	S3
Linefeed Char	10	S4
Backspace Char	8	S5
Blind Dial Pause	2 sec	S6
NoAnswer Timeout	50 sec	S7
" , " Pause Time	2 sec	S8

Press any key to continue; ESC to quit.

Option	Selection	AT Command
No Carrier Disc	2000 msec	S10
DTMF Dial Speed	95 msec	S11
Escape GuardTime	1000 msec	S12
Data Calling Tone	Disabled	S35
Line Rate	33600	S37
DSVD mode	Disabled	-SSE

Stored Phone Numbers

&Z0=

&Z1=

&Z2=

&Z3=

OK

&Wn   Store Current Configuration

This command stores certain command options and S-register values into the nonvolatile memory of the modem. The ATZ command or a power-up reset of the modem restores this profile.

Result Codes:

OK   n = 0

ERROR   Otherwise

&Yn   Select Stored Profile for Hard Reset

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

&Y0:   Select stored profile 0 on power-up

&Y1:   ERROR

Result Codes:

OK   n = 0

ERROR   Otherwise

&Zn=x   Store Telephone Number

This command is used to store up to four dialing strings in the nonvolatile memory of the modem for later dialing. The format for the command is &Zn = "stored number" where n is the location 0-3 to which the number should be written. The dial string may contain up to 40 characters. The ATDS = n command dials using the string stored in location n.

Result Codes:

OK   n = 0, 1, 2, 3

ERROR   Otherwise

\An   Select Maximum MNP Block Size

The modem will operate an MNP error corrected link using a maximum block size controlled by the parameter supplied.

\A0:   64 characters

\A1:   128 characters

\A2:   192 characters

\A3:   256 characters (default)

Result Codes:

OK   n = 0, 1, 2, 3

ERROR   Otherwise

\Bn   Transmit Break to Remote

In non-error-control mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100ms according to parameter specified. The command works in conjunction with the \K command.

\B1 - \B9:   Break length in 100ms units. (Default = 3; non-error-control mode only.)

Result Codes:

OK   If connected in data modem mode.

NO CARRIER   If not connected or connected in fax modem mode.

\G   Modem Port Flow Control

\G0:   Returns an "OK" for compatibility (default).

\G1:   NOT SUPPORTED responds ERROR.

Result Codes:

OK   n = 0

ERROR   Otherwise

\ J   Bits/s Rate Adjusted

This command determines whether or not the negotiated connect speed of the modem forces the adjustment of the speed of the DTE to the speed of the modem.

\J0:   Buffer mode. Error control selected (or not) by \Nn command (default).

\J1:   Force the max DCE rate to the DTE rate.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

\K   Break Control

Controls the response of the modem to a break received from the DTE or the remote modem or the \B command. The response is different in three separate cases.

The first case is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

\K0:   Enter online command mode, no break sent to remote modem.

\K1:   Clear data buffers and send break to remote modem.

\K2:   Same as 0.

\K3:   Send break to remote modem immediately.

\K4:   Same as 0.

\K5:   Send break to remote modem in sequence with transmitted data (Default).

The second case is where the modem is in the online command state (waiting for AT commands) during a data connection, and the \B is received in order to send a break to the remote modem:

\K0:   Clear data buffers and send break to remote modem.

\K1:   Clear data buffers and send break to remote modem. (Same as 0.)

\K2:   Send break to remote modem immediately.

\K3:   Send break to remote modem immediately. (Same as 2.)

\K4:   Send break to remote modem in sequence with transmitted data.

\K5:   Send break to remote modem in sequence with transmitted data.

                (Same as 4; Default).

The third case is where there is a break received from a remote modem during a connection:

\K0:   Clear data buffers and send break to the DTE.

\K1:   Clear data buffers and send break to the DTE. (Same as 0.)

\K2:   Send break immediately to DTE.

\K3:   Send break immediately to DTE. (Same as 2.)

\K4:   Send break in sequence with received data to DTE.

\K5:   Send break in sequence with received data to DTE. (Same as 4.) (Default).

Result Codes:

OK   n = 0, 1, 2, 3, 4, 5

ERROR   Otherwise

\Nn   Error Control Mode Selection

This command determines the type of error control used by the modem when sending or receiving data.

\N0:   Buffer mode. No error control (same as &Q6).

\N1:   Direct mode.

\N2:   *MNP* or disconnect mode. The modem attempts to connect using MNP 2-4 error control procedures. If this fails, the modem disconnects. This is also known as MNP reliable mode.

\N3:   V.42, *MNP*, or buffer (default). The modem attempts to connect in V.42 error control mode. If this fails, the modem attempts to connect in *MNP* mode. If this fails, the modem connects in buffer mode and continues operation. This is also known as V.42/ *MNP* auto reliable mode (same as &Q5).

\N4:   V.42 or disconnect. The modem attempts to connect in V.42 error control mode. If this fails, the call will be disconnected.

\N5:   V.42. *MNP* or buffer (same as \N3).

\N7:   V.42. *MNP* or buffer (same as \N3).

Result Codes:

OK   n = 0, 1, 2, 3, 4,5,7

\Qn   Local Flow Control Selection

\Q0:   Disable flow control. Same as &K0.

\Q1:   XON/XOFF software flow control. Same as &K4.

\Q2:   CTS-only flow control. This is not supported a nd the response is ERROR.

\Q3:   RTS/CTS to DTE (default). Same as &K3.

Result Codes:

OK   n = 0, 1, 3

ERROR   Otherwise

\Rn   Ring indicator signal off after the telephone call is answered (Compatibility command)

\R0:   Ring indicator signal is off after the telephone call is answered.

Result Codes:

OK   n = 0

ERROR   Otherwise

\Tn   Inactivity Timer

This command specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. A setting of zero disables the timer. Alternatively, this timer may be specified in register S30. This function is only applicable to buffer mode.

\T0:   Inactivity timer disabled (default).

Result Codes:

OK   n = 0-255

ERROR   Otherwise

\Vn   Protocol Result Code

\V0:   Disable protocol result code appended to DCE speed.

\V1:   Enable protocol result code appended to DCE speed (default).

\V2:   Same as \V1.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

\Xn   XON/XOFF Pass Through

\X0:   Modem processes XON/XOFF flow control characters locally (DEFAULT).

\X1:   Modem processes and passes XON/XOFF flow control characters.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

-Cn   Data Calling Tone

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

-CO: Disabled (default).

-C1:   Enabled.

Result Codes:

OK   n = 0, 1

ERROR   Otherwise

-V90=<n>   Command to enable/disable V.90 and change downstream rate

-V90=0   Disables V.90

-V90=1   Enables V.90 Auto Rate (default value)

-V90=n   Controls the downstream rate

-V90?   Shows the current value

-V90=?   Shows the range [0-21]

The table below shows the possible values of n:

"AT-V90=n"	Downstream Rate
0	V.90 disabled
1	Auto Rate (default)
2	28000 kbit/s
3	29333 kbit/s
4	30666 kbit/s
5	32000 kbit/s
6	33333 kbit/s
7	34666 kbit/s
8	36000 kbit/s
9	37333 kbit/s
10	38666 kbit/s
11	40000 kbit/s
12	41333 kbit/s
13	42666 kbit/s
14	44000 kbit/s
15	45333 kbit/s
16	46666 kbit/s
17	48000 kbit/s
18	49333 kbit/s
19	50666 kbit/s
20	52000 kbit/s
21	53333 kbit/s

%B   View Numbers in Blacklist

If blacklisting is in effect, this command displays the numbers for which the last call attempted in the past two hours failed. The ERROR result code appears in countries that do not require blacklisting.

%Cn   Data Compression Control

This command determines the operation of V.42bis and *MNP* class 5 data compression. Online changes do not take effect until a disconnect occurs first.

%C0:   V.42bis/*MNP* 5 disabled. No data compression.

%C1:   V.42bis/*MNP* 5 enabled. Data compression enabled (default).

Result Codes:

OK   `   n = 0, 1

ERROR   Otherwise

%En   Enable/Disable Auto-Retrain and Fallback/Fall Forward

Provides option for the modem to automatically monitor line quality to fall back when line quality is insufficient and to fall forward when line quality is sufficient.

%E0:   Disable fallback/fall forward

%E1   Enable fallback, Disable fall forward

%E2:   Enable fallback/fall forward (default)

Result Codes:

OK   n = 0, 1, 2

ERROR   Otherwise

VDR   Distinctive Ring and Cadence Report

This command enables the distinctive ring feature which allows a report of DROF/DRON to follow an exact ring cadence sent over the phone line.

VDR?   Returns the current values of <enable> and <report>/

VDR+?   Queries the DCE for the range of supported distinctive ring configurations.

DCE returns: (0,1), (0-255)

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:

- Type **ATS11=70**, then press **Enter.**

- This sets S11 to a value of 70.

- 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.

- 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 display 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 (for example **ATS?**).

S-Register Summary

Register	Default	Description
S0	0	Automatic answer ring number
S1	0	Ring counter
S2	43	AT escape character
S3	13	Command line termination character
S4	10	Response formatting character
S5	8	Command line editing character
S6	2	Wait before dialing
S7	50	Connection completion time-out
S8	2	Comma dial modifier time
S10	20	Automatic disconnect delay
S11	95	DTMF dialing speed
S12	50	Escape guard time
S14	8	General bit-mapped options status
S21	48	V.24 bit-mapped options status
S22	112	Results bit-mapped options status
S24	10	Timer to control sleep mode
S28	1	V.34 modulation enable/disable
S30	0	Inactivity timer
S35	0	Data calling tone
S36	7	Negotiation fallback
S37	0	Dial line rate
S38	1	Enable/disable K56flex settings
S42*	1	Auto rate
S43*	1	Auto mode
S48	7	LAPM error control and feature negotiation
S89	10	Timer to control sleep mode
S91	15	Line transmit level
S108	7	Network codec type

* S-registers 42 and 43 are for test and debugging purposes only.

S-Register Descriptions

S0   Auto Answer Ring Number

This register determines the number of rings the modem will count before automatically answering a call. Enter 0 (zero) if you do not want the modem to automatically answer at all. When disabled, the modem can only answer with an ATA command.

      Range: 0-255

      Default: 0

      Units: rings

S1   Ring Counter

This register is read-only. The value of S1 is incremented with each ring. If no rings occur over a six second interval, this register is cleared.

      Range: 0-255

      Default: 0

      Units: rings

S2   AT Escape Character (user defined)

This register determines the ASCII value used for an escape sequence. The default is the + character. The escape sequence allows the modem to exit data mode and enter command mode when online. Values greater than 127 disable the escape sequence.

      Range: 0-255

      Default: 43

      Units: ASCII

S3   Command Line Termination Character (user defined)

This register determines the ASCII values as the carriage return character. This character is used to end command lines and result codes.

      Range: 0-127, ASCII decimal

      Default: 13 (carriage return)

      Units: ASCII

S4   Response Formatting Character (user defined)

This register determines the ASCII value used as the line feed character. The modem uses a line feed character in command mode when it responds to the computer.

      Range: 0-127, ASCII decimal

      Default: 10 (line feed)

      Units: ASCII

S5   Command Line Editing Character (user defined)

This register sets the character recognized as a backspace and pertains to asynchronous only. The modem will not recognize the backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes the backspace character, an ASCII space character, and a second backspace character back to the local DTE. This means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0-127, ASCII decimal

Default: 8 (backspace)

Units: ASCII

S6   Wait Before Dialing

This register sets the length of time, in seconds, that the modem must wait after going off-hook before dialing the first digit of the telephone number. The modem always pauses for a minimum of two seconds, even if the value of S6 is less than two seconds. The wait for dial tone call progress feature (W dial modifier in the dial string) will override the value in register S6. This operation, however, may be affected by some ATX options according to country restrictions.

Range: 2-65

Default: 2

Units: seconds

S7   Connection Completion Time-Out

This register sets the time, in seconds, that the modem must wait before hanging up because carrier is not detected. The timer is started when the modem finishes dialing (originate), or goes off-hook (answer). In originate mode, the timer is reset upon detection of an answer tone if allowed by country restriction. The timer also specifies the wait for silence time for the @ dial modifier in seconds. S7 is not associated with the W dial modifier.

Range: 1-255

Default: 50

Units: seconds

S8   Comma Dial Modifier Time

This register sets the time, in seconds, that the modem must pause when it encounters a comma (,) in the dial command string.

Range: 0-65

Default: 2

Units: seconds

S10   Automatic Disconnect Delay

This register 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.

The actual interval the modem waits before disconnecting is the value in register S10.

　　　　Range:　　　　1-254

　　　　Default:　　　　20

　　　　Units:　　　　.1 seconds

S11   DTMF Dialing Speed

This register determines the dialing speed which is prefixed for each country.

　　　　Range:　　　　50-150

　　　　Default:　　　　95

　　　　Units:　　　　.001 seconds

S12   Escape Guard Time

This register sets the value (in 20 ms increments) for the required pause after the escape sequence (default 1 s).

　　　　Range:　　　　0-255

　　　　Default:　　　　50

　　　　Units:　　　　.02 seconds

S14   General Bit Mapped Options Status

Indicates the status of command options. Only bit 3 and bit 6 are used, read-only.

　　　　Bit 3　　　　Result codes (Vn)

　　　　　　　　0 = Numeric (V0)

　　　　　　　　1 = Verbose (V1) (Default)

　　　　Bit 6　　　　Pulse dial PPS selection (&Pn)

　　　　　　　　0 = 10 PPS (&p0, &p1) (Default)

　　　　　　　　1 = 20 PPS (&p2)

　　　　Default:　　　　8 (00001000b)

S21   V.24/General Bit Mapped Options Status

Indicates the status of command options. Only bits 3, 4, and 5 are used, read-only.

Bits 3-4   **DTR behavior (&Dn)**

0 =   &D0 selected

1 =   &D1 selected

2 =   &D2 selected (Default)

3 =   &D3 selected

Bit 5   **DCD behavior (&Cn)**

0 =   &C0 selected

1 =   &c1 selected (Default)

Default: **48 (00110000b)**

S22   Results Bit Mapped Options Status

Indicates the status of command options. Only bits 4, 5, and 6 are used, read only.

Bits 4-6   **result codes (Xn)**

0 =   X0 selected

4 =   X1 selected

5 =   X2 selected

6 =   X3 selected

7 =   X4 selected (Default)

Bit 7   **Pulse dial make/break ratio (&Pn)**

0 =   33/67 make/break ratio (&P1, &P2) (Default)

1 =   39/61 make/break ratio (&P0)

Default: **112 (01110000b)**

S24   Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from DTE, no RING) in the off-line command state before the modem places itself into standby mode. A value of zero prevents standby mode. S24 is an alias for S89.

Note: If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products that allowed time-outs down to one second.

Range:	0, 5-255
Default:	10
Units:	Seconds

S28   V.34 Modulation Enable/Disable

This register enables/disables V.34 modulation.

0 = disabled, 1-255 = enabled

> Range: 0-255
>
> Default: 1

S30   Inactivity Timer

S30 specifies the length of time (in minutes) that the modem will wait before disconnecting when no data is sent or received. This function is only applicable to buffer mode.

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

S35   Data Calling Tone

Data Calling Tone is a tone of certain frequency and cadence as specified in V.25 which allows remote Data/FAX/Voice discrimination. The frequency is 1300 Hz with a cadence of .5 s on and 2 s off.

0 = disabled, 1 = enabled

> Range: 0-1
>
> Default: 0

S36   Negotiation Fallback

This is a non-operational command that is included for compatibility with older programs. Use the \N command to change EC protocol behavior.

S37   Dial Line Rate (default 0)

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

S37 = 0	auto rate
S37 = 1	reserved
S37 = 2	1200/75 bits/s
S37 = 3	300 bits/s
S37 = 4	reserved
S37 = 5	1200 bits/s
S37 = 6	2400 bits/s
S37 = 7	4800 bits/s
S37 = 8	7200 bits/s
S37 = 9	9600 bits/s
S37 = 10	12000 bits/s
S37 = 11	14400 bits/s
S37 = 12	16800 bits/s
S37 = 13	19200 bits/s
S37 = 14	21600 bits/s
S37 = 15	24000 bits/s
S37 = 16	26400 bits/s
S37 = 17	28800 bits/s
S37 = 18	31200 bits/s
S37 = 19	33600 bits/s

S38   K56flex Downstream Rate

To force a particular K56flex downstream rate, use S-register S38. S38=0 disables K56flex, and may allow a more reliable V.34 connection. S38=1 default allows the modem to select the downstream rate automatically. Other values of S38 force the downstream rate, with fallback to V.34 if unsuccessful at the configured rate:

S38 = 0	56K disabled
S38 = 1	56K enabled - automatic rate selection (default)
S38 = 2	32000 bits/s
S38 = 3	34000 bits/s
S38 = 4	36000 bits/s
S38 = 5	38000 bits/s

S38 = 6	40000 bits/s
S38 = 7	42000 bits/s
S38 = 8	44000 bits/s
S38 = 9	46000 bits/s
S38 = 10	48000 bits/s
S38 = 11	50000 bits/s
S38 = 12	52000 bits/s
S38 = 13	54000 bits/s
S38 = 14	56000 bits/s

The following chart shows how the number of robbed-bit signaling (RBS) frames detected decreases the true DCE rate per:

RBS links	Rate hit (kbit/s)
0	0
1	2
2	4
3	4
4	6
5	8
6	8

For example, if S38=10 and there are 3 RBS links, the K56flex downstream rate will be 48-4=44 kbit/s. The exception is for 32 kbit/s and 34 kbit/s, which are the true rates regardless of RBS frames detected.

S42   Auto Rate

This command is used for testing and debugging only.

V.32bis and V.22bis auto rate is disabled. Retrain operation is disabled or enabled in data mode, and fallback is disabled in data mode.

0 = auto rate disabled, 1 = enabled.

Range: 0-1
Default: 1

S43   Auto Mode

This command is used for testing and debugging only.

V.32bis startup auto mode operation disabled.

0 = auto mode disabled, 1 = enabled.

Range: 0-1
Default: 1

S48 LAPM Error Control and Feature Negotiation (default 7)

This is a non-operational command that is included for compatibility with older programs. Use the \N command to change EC protocol behavior.

S89 Timer to Control Sleep Mode

This command displays the number of seconds of inactivity (no characters sent from the DTE, no RING) in the offline command state before the modem places itself into standby mode. A value of zero prevents standby mode.

Note: If a number between 1 and 4 is entered for this register, it will set the value to 5, and the inactivity before standby will be 5 seconds. This is done for compatibility with previous products that allowed time-outs down to one second.

> Range: 0, 5-255
> Default: 10

S91 Line Transmit Level

This register is effective only for Japan. It specifies the line transmit level in dBm with an implied minus sign.

> Range: 6-15
>
> Default: 15
>
> Units: 1dB

S108 Network Codec Type

> S108 = 22 u-Law
>
> S108 = 33 A-law
>
> S108 = 7 default, or any other value

Note: This coding is as specified by digital modem in V.8bis information. If an old server does not tell its code type in V.8bis, then the client modem chooses based on its country ID. U-law regions are Japan, Taiwan, Korea, Hong Kong, North America, and Latin America. Everywhere else is A-law.
This S-Register is valid only in K56flex mode.

AT FAX Command Set

Class 1 FAX Commands

The Lucent Technologies HSM Data/FAX Complete Chip Set supports FAX commands conforming to EIA standard 578. These commands are given here with short descriptions; complete explanations are given in the standard, available from the Electronic Industry Association.

AT FAX Command Set Summary

Command	Description
+FCLASS?	Service class indication
+FCLASS = ?	Service class capabilities
+FCLASS = n	Service class selection
+FTS = <n>	Transmission silence
+FRS = <n>	Receive silence
+FTM = <m>	Transmit FAX data with <m> carrier
+FRM = <m>	Receive FAX data with <m> carrier
+FTH = <m>	Transmit HDLC data with <m> carrier
+FRH = <m>	Receive HDLC data with <m> carrier
+FTM = ?	Transmit FAX modulation
+FRM = ?	Receive FAX modulation
+FTH = ?	Transmit HDLC Data modulation
+FRH = ?	Receive HDLC Data modulation
+FMI?	Manufacturer Identification
+FMM?	Product Identification
+FMR?	Version/Revision Information
+FPR = <n>	Set DTE-DCE Fax port rate
+FPR = ?	Reports all fax port rate that DCE supports
+FPR?	Reports the current fax port rate of DTE-DCE
+FAA = <n>	Set DCE Adaptive answer mode
+FAA = ?	Display valid adaptive answer values that DCE supports
+FAA?	Display current set value of adaptive answer mode

AT FAX Command Set Descriptions

+FCLASS?   Service Class Indication

This command causes the modem to display the current setting. The modem can operate either as a Class 0 data modem or a class 1 FAX modem.

Typical responses:

+FCLASS?   000 if in data mode; 001 if in FAX class 1.

+FCLASS=?   Service Class Capabilities

This command causes the modem to display the classes it supports.

Typical responses:

+FCLASS = ?   0, 1

+FCLASS=n   Service Class Selection

This command sets the modem for class n operation, where n is either a 0 or 1.

Parameters: 0, 1

Default: 0

Command options:

+FCLASS = 0   Select data mode.

+FCLASS = 1   Select Facsimile Class 1.

+FTS=<n>   Transmission Silence

This command causes the modem to stop transmitting data and pause for 10 * n ms. At the end of this period, the modem then responds **OK**. You can specify any number from 0 through 255 as the value of n; for example, a value of 5 specifies a period of 50 ms.

> n = 0-255 (10 ms intervals)

+FRS=<n>   Receive Silence

This command causes the modem to listen and wait for a 10 * n ms period of silence on the line. At the end of this period, the modem then responds **OK**. You can specify any number from 0 through 255 as the value of n; for example, a value of 5 specifies a period of 50 ms.

> n = 0-255 (10 ms intervals)

+FTM=<m> Transmit FAX Data with <m> Carrier

This command causes the modem to transmit data at the modulation specified by <m>. The following chart shows the values you can enter for this command and the meaning of those values.

Command Option	Modulation	Speed (bits/s)
+FTM=3	V.21 Channel 2	300
+FTM=24	V.27ter	2400
+FTM=48	V.27ter	4800
+FTM=72	V.29	7200
+FTM=96	V.29	9600
+FTM=73	V.17	7200
+FTM=74	V.17 (short train)	7200
+FTM=97	V.17	9600
+FTM=98	V.17 (short train)	9600
+FTM=121	V.17	12000
+FTM=122	V.17 (short train)	12000
+FTM=145	V.17	14400
+FTM=146	V.17 (short train)	14400

+FRM=<m>   Receive FAX Data with <m> Carrier

This command causes the modem to receive data at the modulation specified by <m>.

Command Option	Modulation	Speed (bits/s)
+FRM=3	V.21 Channel 2	300
+FRM=24	V.27ter	2400
+FRM=48	V.27ter	4800
+FRM=72	V.29	7200
+FRM=96	V.29	9600
+FRM=73	V.17	7200
+FRM=74	V.17 (short train)	7200
+FRM=97	V.17	9600
+FRM=98	V.17 (short train)	9600
+FRM=121	V.17	12000
+FRM=122	V.17 (short train)	12000
+FRM=145	V.17	14400
+FRM=146	V.17 (short train)	14400

+FTH=<m>Transmit HDLC Data with <m> Carrier

This command causes the modem to transmit data framed in the HDLC protocol at the modulation specified by <m>.

Command Option	Modulation	Speed (bits/s)
+FTH=3	V.21 Channel 2	300
+FTH=24	V.27ter	2400
+FTH=48	V.27ter	4800
+FTH=72	V.29	7200
+FTH=96	V.29	9600
+FTH=73	V.17	7200
+FTH=74	V.17 (short train)	7200
+FTH=97	V.17	9600
+FTH=98	V.17 (short train)	9600
+FTH=121	V.17	12000
+FTH=122	V.17 (short train)	12000
+FTH=145	V.17	14400
+FTH=146	V.17 (short train)	14400

+FRH=<m> Receive HDLC Data with <m> Carrier

This command causes the modem to receive data framed in the HDLC protocol at the modulation specified by <m>.

Command Option	Modulation	Speed (bits/s)
+FRH=3	V.21 Channel 2	300
+FRH=24	V.27ter	2400
+FRH=48	V.27ter	4800
+FRH=72	V.29	7200
+FRH=96	V.29	9600
+FRH=73	V.17	7200
+FRH=74	V.17 (short train)	7200
+FRH=97	V.17	9600
+FRH=98	V.17 (short train)	9600
+FRH=121	V.17	12000
+FRH=122	V.17 (short train)	12000
+FRH=145	V.17	14400
+FRH=146	V.17 (short train)	14400

+FPR=<n> Select Fax port rate

This command sets the DTE to DCE fax port rate.

DTE command	DCE action	Description or notes
+FPR = 0	Execute +IPR = 0	Select automatic rate detection
+FPR = 1	Execute +IPR = 2400	Set DTE-DCE to 2400 bit/s
+FPR = 2	Execute +IPR = 4800	Set DTE-DCE to 4800 bit/s
+FPR = 4	Execute +IPR = 9600	Set DTE-DCE to 9600 bit/s
+FPR = 8	Execute +IPR = 19200	Set DTE-DCE to 19200 bit/s
+FPR = 10	Execute +IPR = 38400	Set DTE-DCE to 38400 bit/s
+FPR = 18	Execute +IPR = 57600	Set DTE-DCE to 57600 bit/s
+FPR = ? (if all values listed above are supported)	Report (0,1,2,4,8,10,18)	DCE supports 2400, 4800, 9600, 19200, 38400, and 57600 bit/s
+FPR? (if +IPR = 0)	Report 0	DTE-DCE rate is automatically detected
+FPR? (if +IPR = 2400)	Report 1	DTE-DCE rate is 2400 bit/s
+FPR? (if +IPR = 4800)	Report 2	DTE-DCE rate is 4800 bit/s
+FPR? (if +IPR = 9600)	Report 4	DTE-DCE rate is 9600 bit/s
+FPR? (if +IPR = 19200)	Report 8	DTE-DCE rate is 19200 bit/s
+FPR? (if +IPR = 38400)	Report 10	DTE-DCE rate is 38400 bit/s
+FPR? (if +IPR = 57600)	Report 18	DTE-DCE rate is 57600 bit/s
+FPR? (all other +IPR settings)	Report 255	255 indicates invalid setting

+FAA Adaptive Answer

A Service Class 1 Facsimile DCE may have the ability to answer as a data modem DCE or as a Facsimile DCE. It also may be able to adaptively change from Class 1 facsimile mode (+FCLASS=1.0) to data modem operation (+FCLASS=0) in response to the incoming call. The +FAA parameter controls this feature.

Write syntax: +FAA=<value>

Valid values: 0, 1

Default value: 0

Mandatory value: 0

+FAA=0   The DCE answers only as a Class 1 facsimile device. No automatic switching of service class shall occur based on the calling device type.

+FAA=1   The DCE can answer and automatically determine whether to answer as a
                facsimile DCE or as a data modem. If a data modem is detected, the DCE
                operates as described in 8.3.2.4.

Note: The +FAA parameter controls automatic switching only from Class 1 to Class 0 for call
answering only. It does not affect call origination, switching to Class 1 from other classes, or
switching to classes other than Class 0.

+FMI? Manufacturer Identification

Read Syntax: **AT+FMI?**

This parameter reports the manufacturer identification.

+FMM? Product Identification

Read Syntax: **AT+FMM?**

This parameter reports product identification.

+FMR? Version / Revision Information

Read Syntax: **AT+FMR?**

This parameter reports the version, revision level, or other pertinent information for the device.

V.25ter AT Command Set

These +GMx commands are required by Microsoft PC9x specifications:

- Manufacturer Identification (+GMI?)

- Version/Revision Information (+GMR?)

- Modem Identification (+GMM?)

The PC99 reporting command's values and parameters are displayed using the following:

- Current sub-parameter value (+ *command*?)

- Where *command* is the command set (e.g., AT+DR?)

- Supported range of values (+ *command*=?)

- Where *command* is the command set (e.g., AT+DR=?)

The chip set supports the following functionalities of the V.25ter for a H.324 call:

- The modified function of the ATD command when issued while the analog voice connection is established. This command will not cause the DTMF dialing and tone detection associated with the usual ATD # command.

- The AT commands, sub-parameters, and values listed in the following chart.

V.25ter AT Commands

Command	Sub-parameter	Values	Description
AT+A8E=<v8o>, <v8a>,<v8cf>	v8o	<1> (default) Disables the CI option while in V.8 origination. However, the modem detects ANSam and is capable of starting in V.34 mode when initiating the call as a data call. <6> Enables DCE control of V.8 and CI option.	Defined for two conditions: as a parameter to configure V.8 originating and answering operation while the DCE is on-hook, and to initiate an action if the DCE is off-hook. V.8 negotiation does not preclude simultaneous implementation of other negotiation means such as V.8bis, V.18, or V.32bis.
	v8a	<1> (default) Disables the CI option while in V.8 negotiation. However, the modem sends the ANSam and is capable of starting in V.34 mode when answering a call <5> Enables DCE control of V.8 and CI option.	
	v8cf	<21h> Call function for H.324 calls <c1h> Call function for DSVD calls	
AT+A8E?			Reports current values of sub-parameters
AT+A8E=?			Reports supported ranges of values <v8o>, <v8a>, and <v8cf>

V.25ter AT Commands continued

+A8I:<v8cf><CR>			Used by an answering DCE if +A8E,<v8a> !=0, to indicate detection of a V.8 CI signal and to report the recovered Call Function octet(s). Value <v8cf> is a hexadecimal code octet that can take values as shown above in +A8E command.
+A8M=<hexadeci-mal coded CM or JM octet string>	Coded CM or JM octet	Refer to V.8 document for coding.	Directs the DCE to send a V.8 CM or JM signal using the specified hexadecimal coded string.
+A8A:<type><CR>	<type>	<1> Indicates V.8 ANSam signal flags <0> Indicates no ANSam signal detected	Used by a calling DCE if +A8E <v8o> #0 to indicate detection of an answering signal.
AT+DR		<1> Compression reporting on <0> Compression reporting off	Turns compression reporting on or off.
AT+MR		<1> Modulation reporting on <0> Modulation reporting off	Turns modulation reporting on or off.
AT+ER		<1> Error control reporting on <0> Error control reporting off	Turns error control reporting on or off.
AT+ILRR		<1> DTE rate reporting on <0> DTE rate reporting off	Turns DTE rate reporting on or off.
AT+ES=<1,0,1>, <0,1,0>,<4,4,6>, <2,3,5>,<3,3,5>, <4,0,6>,<3,0,2>, <2,0,2>,<3,2,4>	<1,0,1>	Buffered mode	Determines the error correction mode.
	<0,1,0>	Direct mode	
	<4,4,6>	MNP or disconnect mode	
	<2,3,5>	LAPM or disconnect mode	
	<3,3,5>	LAPM or disconnect mode	
	<4,0,6>	MNP or buffered mode	
	<3,0,2>	LAPM, MNP, or buffered modem (default)	
	<2,0,2>	LAPM or buffered mode	
	<3,2,4>	LAPM, MNP, or disconnect mode	
AT+IFC=<0,0>, <1,1>,<3,1>,<2,2>	<0,0>	No flow control	Determines the local flow control method.
	<1,1>	Software flow control, XON/XOFF characters processed by modem.	
	<3,1>	Software flow control, XON/XOFF characters passed to DTE	
	<2,2>	Hardware flow control	
AT+DS=<3,0>, <0,0>,<0>	<3,0>	V42bis	Determines the data compression method.
	<0,0>	No compression	
	<0>	No compression	

V.25ter AT Commands continued

AT+MS=<carrier>, <automode>, <max_rate>, <max_rx_rate>	<carrier>	Specifies the preferred modem carrier to use in originating or answering a connection. V21 Rec. V.21 V22 Rec. V.22 V22B Rec. V.22bis V23S Rec. V.23, with switched carrier, TDM V23C Rec. V.23, with constant carrier, asymmetric FDM V26B Rec. V.26bis V27TC Rec. V.27ter, with constant carrier, FDM V32 Rec. V.32 V32B Rec. V.32bis V34 Rec. V.34 **NOTE:** Manufacturer proprietary strings may be defined. They will not begin with "V."	Used to control the manner of operation of the modulation capabilities in the DCE. For DCE that support a primary and an auxiliary channel, this parameter applies to the primary channel.
	<automode>	An optional numeric value which enables or disables automatic modulation negotiation (e.g., Annex A/V.32bis or Recommendation V.8). The default value is enabled if it is defined for the associated modulation (e.g., Recommendation V.32bis, V.8, or V.34). However, there are modulations for which there is no automatic negotiation defined (e.g., Recommendation V.26bis). <0> Disabled <1> Enabled, with Rec. V.8 or Annex A/V.32bis where applicable (recommended default, if possible)	
	<max_rate>	Optional numeric value which specifies the highest value at which the DCE may establish a connection. If unspecified (set to 0), it is determined by the modulation means selected in the <carrier> and <automode> settings and by the current DTE-DCE rate. Non-zero values for this subparameter are decimal encoded in units of bit/s. Recommended default: 0, maximum supported by <carrier>.	

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V.25ter AT Commands continued

	<max_rx_rate>	Optional numeric value which specifies the highest value at which the DCE may establish a connection. If unspecified (set to 0), it is determined by the modulation means selected in the <carrier> and <automode> settings and by the current DTE-DCE rate. Non-zero values for this subparameter are decimal encoded in units of bit/s.	
		May be used to condition distinct limits for the receive direction as distinct from the transmit direction. For example, it can be used to select either direction for asymmetric modulations like Recommendation V.23 with constant carrier.	
		NOTE: Recommendation V.34 has provisions for selectively enabling modulation rates in any combination, selectively disabling any rate. Future versions of this Recommendation may define additional optional subparameters to control this V.34 feature.	
		Recommended default: 0, if implemented.	
AT+MS?	<carrier>, <automode>, <max_rate>, <max_rx_rate>	The current active settings are reported under control of the +MR parameter. Optional subparameters do not need to be reported if not implemented or set to 0.	The DCE shall transmit a string of information to the DTE, reporting the current +MS subparameter settings.
		For example, +MS: V32B,1,1200,14400 if set to Recommendation V.32bis, automode, explicit limits, but no distinct receive and transmit rate limits.	
AT+MS=?	(list of supported <carrier> values), (list of supported <automode> values), (list of supported <max_rate> values), (list of supported <max_rx_rate> values)		The DCE shall transmit a string of information to the DTE.

V.80 AT Command Set

The chip set supports the Synchronous Access Mode and most of the commands specified in V.80 standards. The commands are either AT commands issued in the command mode, or in-band commands transmitted in the data stream. These in-band commands are delimited by the EM character (hexadecimal 19, or numerically, 19H). Refer to ITU - V.80 Recommendations for details of in-band signaling.

V.80 AT Commands

Command	Sub-parameters	Values	Description
+ES=[<orig_rqst> [,,<ans_fbk>]]	Orig_rqst ans_fbk	<6> Initiate Synchronous Access Mode when the data state is entered. <8>Initiate Synchronous Access Mode when connection is completed and Data State is entered.	Controls operation of the V.42 protocol in the DCE
+ES?			Reads syntax command to query current values of the +ES sub-parameters. The DCE transmits this string of information text to the DTE: +ES:<orig_rqst>, ,<ans_fbk>.
+ES=?			Tests syntax command to obtain all defined values of the +ES sub-parameters. The DCE transmits this string of information text to the DTE: +ES:(list of supported <orig_rqst> values), ,(list of supported <ans_fbk> values).