

DATA/FAX/VOICE AT Command Set

V.90 PCI Windows Modem (LHT)

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Note: The commands listed all conform to the TIA/EIA-602 standard for Data and TIA/EIA-578 Class 1 Fax standard.

AT Commands Reference

AT commands are issued to the modem to control the modem's operation and software configuration. AT commands can only be entered while the modem is in command mode. The format for entering AT commands is:

TYPE: ATXn

where X is the AT command, and n is the specific value for that command.

PRESS: Enter

Any command issued is acknowledged with a response in either text or numeric values known as result codes. Table 2 lists all the valid result codes.

For multiple AT commands in the same command line, the commands are executed in the order received from the DTE. Should execution of a command result in an error, or a character be not recognized as a valid command, execution is terminated, the remainder of the command line is ignored, and the ERROR result code is issued. Otherwise, if all commands execute correctly, only the result code associated with the last command shall be issue; result codes for preceding commands are suppressed.

In the following listing, all commands and command-values accepted by the modem are shown; any entries other than those shown cause the ERROR result code.

+++ Escape sequence

The escape sequence allows the modem to exit data mode and enter on-line command mode. While in on-line 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 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.

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.

A Answer Command

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

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: Unselects V23 reverse channel (same as B3).
B3: Unselects 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, 15, 16
ERROR Otherwise

Cn Carrier Control

The modem will accept the C1 command without error in order to ensure 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. The modem displays the dialing string in the following format: "Dialing...xxxxxxx" where "xxxxxxx" is the last number dialed.
 P Pulse dialing. (e.g. ATDPxxx. Dialing set to pulse as default.)
 T Touch-tone dialing (default). (e.g. ATDTxxx. Dialing set to tone as default.)
 , 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 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 mode 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 or not 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 if 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 (e.g., 12AB).
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 (e.g., 94).
I5: Returns the board ID: software version, hardware version, and country ID.
I6 Response OK
I7 Response OK
I8 Response OK
I9: Returns country code (e.g., North America Ver. 1).

Result Codes:

OK n = 0—9
ERROR Otherwise

Ln Monitor Speaker Volume

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

L0: Selects lowest 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 On-line to Data Mode

O0: Instructs the modem to exit on-line command mode and return to data mode (see AT Escape Sequence, +++).

O1: This command issues a retrain before returning to on-line data mode.

O3: This command issues a rate re-negotiation before returning to on-line 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 computer.

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. (Numeric response codes are not supported by this modem.)

V1: Always displays result codes as text (default).

Result Codes:

OK n = 1
ERROR Otherwise

	ATV0	ATV1
Result Code Format	<numeric code><CR> Not supported	<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 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 modem chip set's result codes are also affected. Therefore, this command is frequently used to control the modem chip set's responses. The primary function of this control is to control the modem chip set's call response capabilities.

	Ext. 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 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, 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 on-line data mode, the modem enters command mode, issues OK result code, and remains connected.

&D2: If the DTR signal is not detected while in on-line data mode, the modem disconnects (default). If this signal is not present, the modem will not answer or dial.

&D3: Monitor DTR signal when an on-to-off transition occurs, the modem performs a soft reset as if the ATZ command was received.

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.

&F0: Recall factory setting as active configuration (this is the only option supported by this modem).

&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 Ratio Selection

This Command is effective only for Japan.

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

<u>Option</u>	<u>Selection AT</u>	<u>Cmd</u>
V22b Guard Tone	Disable	&G
Flow Control	Hardware	&K
Error Control Mode	V42, MNP, Buffer	\N
Data Compression	V42bis/MNP5	%C
AutoAnswerRing#	0	S0
AT Escape Char	43	S2
CarriageReturn Char	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.

<u>Option</u>	<u>Selection AT</u>	<u>Cmd</u>
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

Press any key to continue; ESC to quit.

Stored Phone Numbers

&Z0=
 &Z1= 101
 &Z2=
 &Z3=

OK

&Wn Store Current Configuration

This command stores certain command options and S-register values into the modem's nonvolatile memory. The ATZ command or a powerup 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 powerup
 &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 modem's nonvolatile memory 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.

\AO 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 correction 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 corrected 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 Adjust Bits/s Rate Control

When this feature is enabled, the modem emulates the behavior of modems that force the DTE interface to the line speed.

\J0: Turn off feature (default).
\J1: Turn on feature.

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

\Kn 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 states. The first state is where the modem receives a break from the DTE when the modem is operating in data transfer mode:

\K0 Enter on-line command mode, no break sent to the 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 on-line 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 data.
- \K5 Send break to remote modem in sequence with data. (Same as 4.) (Default.)

The third case is where a break is 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 a break immediately to DTE.
- \K3 Send a break immediately to DTE. (Same as 2.)
- \K4 Send a break in sequence with received data to DTE.
- \K5 Send a 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 in MNP 2-4 error control procedure. 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

\Q 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, and 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

OK	n = 0
ERROR	Otherwise

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.

OK	$n = 0 \rightarrow 255$
ERROR	Otherwise

\V0: Disable protocol result code
 \V1: Enable protocol result code
 \V2: Enable protocol result code

OK	$n = 0, 1, 2$
ERROR	Otherwise

\X0 Modem processes XON/XOFF flow control characters locally (DEFAULT).
 \X1 Modem processes and pass XON/XOFF flow control characters.

OK	$n = 0, 1$
ERROR	Otherwise

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.

OK	$n = 0, 1$
ERROR	Otherwise

Use this command to enable/disable V.90 connection and control V.90 connection rate. The command syntax is `AT-V90=x`. Where x is a value from the list below.

<u>AT-V90=x</u>	<u>Downstream Rate</u>
0	V.90 disabled
1	Auto Rate (default)
2	28000 bits / s
3	29333 bits / s
4	30666 bits / s
5	32000 bits / s

6	33333 bits / s
7	34666 bits / s
8	36000 bits / s
9	37333 bits / s
10	38666 bits / s
11	40000 bits / s
12	41333 bits / s
13	42666 bits / s
14	44000 bits / s
15	45333 bits / s
16	46666 bits / s
17	48000 bits / s
18	49333 bits / s
19	50666 bits / s
20	52000 bits / s
21	53333 bits / s

Additional Commands

AT-V90?	Shows the current value and displays the selected range.
AT-V90=?	Shows the range of values (0-21).

%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 Enable/Disable Data Compression

Enables or disables data compression negotiation on an error corrected link.

%C0 Disables data compression

%C1 Enables both V.42 bis and MNP 5 data compression

Result Codes:

OK	n = 0, 1
ERROR	Otherwise

AT Commands for Testing and Debugging

The following commands are to be used for testing and debugging only and are not meant for general use.

&&C **Write to/Read from DSP Register**

AT&&C<loc>,<val> writes the value <val> to DSP register at location <loc>.

AT&&C<loc> reads from location <loc>.

&&L **Line-to-Line Loopback**

This command provides a loopback for line-to-line.

&&R **Write to/Read from DSP RAM Location**

AT&&R<loc>,<val> writes the value <val> to DSP RAM location <loc>.

AT&&R<loc> reads from location <loc>.

&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 connection 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 off-line.

&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 on-line with error control disabled.

Result Codes:

OK	n = 0
CONNECT	n = 1, 3, 6
ERROR	Otherwise

ATI11 **Display Diagnostic Information for the last modem connection**

The "ATI11" command displays the following diagnostic information for the last modem connection. A value of "NA" will be displayed if that parameter is not applicable for that connection (See Table 1 on the next page).

Table 1. Diagnostic Information

Description	Example	Comments
Last Connection	V.34	56K/V.90/V.34/V.32 - The last data connection is successful. Failure - The last data connection failed.
Initial Transmit Carrier Rate	33600	The upload connection rate after initial negotiation.
Initial Receive Carrier Rate	33600	The download connection rate after initial negotiation.
Final Transmit Carrier Rate	33600	The last upload connection rate.
Final Receive Carrier Rate	33600	The last download connection rate.
Protocol Negotiation Result	V.42	Possible results are: V.42, MNP or noEC
Data Compression Result	V.42bis	Possible results are: V.42bis, MNP5 or no Compression.
Estimated Noise Level	10	An average of the squared error between the received constellation point and the decision point.
Receive Signal Power Level (-dBm)	20	Receive signal level in -dBm
Transmit Signal Power Level (-dBm)	10	Transmit signal level in -dBm
Round Trip Delay (msec)	60	Measured Round Trip Delay in milliseconds
Near Echo Level (-dBm)	39	Measured Near Echo Level in -dBm
Far Echo Level (-dBm)	60	Measured Far Echo Level in -dBm
Transmit Frame Count	5000	Number of HDLC frames transmitted.
Transmit Frame Error Count	10	Number of frame errors transmitted
Receive Frame Count	5000	Number of HDLC frames received.
Receive Frame Error Count	10	Number of frame errors received
Retrain and Rate Negotiate Event by the local Modem	10	Number of retrains initiated by the local modem.
Retrain and Rate Negotiate Event by the remote Modem	10	Number of retrains initiated by the remote modem.
Call Termination Cause	0	0 - Call Terminated by Local Modem 1 - Call Terminated by Remote Modem 2 - No Answer - the Remote Modem did not answer 3 - Training Failure - the modems failed to negotiate V.34 or 56K protocols. 4 - Protocol Failure - the modems failed to negotiate V.42 protocol.
Robbed-Bit Signaling (56K only)	7	The number of robbed-bits encountered during the last connection.
Digital Loss	0	Digital Loss in dB.
Remote Server I.D.	XXXXXX	The I.D. number of the remote server.

S-Registers Reference

S-Registers Definitions

S-registers generally affect how the AT commands perform. Contents of the registers can be displayed or modified when the modem is in command mode.

To display the value of an S-register:

TYPE: ATSn?

where n is the register number.

PRESS: Enter

To modify the value of an S-register:

TYPE: ATSn = r

where n is the register number, and r is the new register value.

PRESS: Enter

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, Ring Counter, 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 valued 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 on-line. 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 back to the local DTE the backspace character, an ASCII space character, and a second backspace character. This means a total of three characters are transmitted each time the modem processes the backspace character.

Range: 0→32, 127
Default: 8 (backspace)
Units: ASCII

S6 Wait Before Dialing

This register sets the length of time, in seconds, that the modem must wait (pause) 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: 0.1 seconds

S11 DTMF Dialing Speed

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

Range: 50→150
Default: 95
Units: 0.001 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: 0.02 seconds

S14 General Bit Mapped Options Status

Indicates the status of command options. Only bit 2 and bit 5 are used, read only.

Bit 3 Result codes (Vn)
1 = Verbose (VI) (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 the DTE, no RING) in the off-line 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 which allowed time-outs down to 1 s.

Range: 0, 5→255
Default: 10

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

S32 Synthetic Ring Volume

This register specifies a synthetic ring volume in dB with an implied minus sign.

Range:
Default: 16

S33 Synthetic Ring Frequency

This register specifies a synthetic ring frequency. Valid ranges are 0-5, with 0= disabled and 1-5 corresponding to 5 ring frequencies.

Range: 0-5
Default: 0

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 (default 7)

This register specifies the action to take in the event of negotiation failure when error control is selected.

S36 = 0, 2	Hang up.
S36 = 1, 3	Fall back to an asynchronous connection.
S36 = 4, 6	Attempt MNP. If MNP fails, hang up.
S36 = 5, 7	Attempt MNP. If MNP fails, fall back to asynchronous connection.

S37 Dial Line Rate (default 0)

S37 = 0	maximum modem speed (default).
S37 = 1	reserved
S37 = 2	1200 bits/s and 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 Dial Line Rate (default 1)

There are 2 S-registers for K56flex connections. S38 sets the maximum 56K downstream speed that the modem attempts to connect. To disable K56flex, set S38 to 0. S37 register is used to control the upstream V.34 rate. (ref. V.34 Data/Fax Document). Use the *AT-V90=x* command to control V.90 connections.

S38 = 0	56K disabled
S38 = 1	56K enabled - automatic speed selection - maximum modem speed (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

S40 ETC Startup Autorating (default 0, range 0→2)

S20=0	Startup with normal autorating.
S20=1	Startup at initial rate of 4800 or below.
S20=2	Startup at initial rate of 9600 or below.
Range:	0→2
Default:	0

S42 Auto Rate (default 1, range 0→1)

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 (default 1, range 0→1)

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)

S48 = 7 Negotiation enabled.
S 48 = 128 Negotiation disabled; forces immediate fallback options specified in S36.

The following chart lists the S36 and S48 configuration settings necessary to negotiate certain types of connections:

	S48=7	S48 =128
S36 = 0, 2	LAPM or hangup	do not use
S36 = 1, 3	LAPM or async	async
S36 = 4, 6	LPAM, MNP, or hangup	MNP or hangup
S36 = 5, 7	LAPM, MNP, or async	MNP or async

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 off-line 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 which allowed time-outs down to 1 s.

Range: 0, 5→255
Default: 10

S90 Local Phone Status

This register tells the status of the local phone. It is read only.

0 = local phone on-hook
1 = local phone off-hook

S91 Line Transmit Level

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

Range: 6→15
Default: 15
Units: 1 dB

S92 Direct Connect Transmit Level (default 20)

Sets the transmit level, in dBm for direct connect. This value may have different settings for different phones.

Table 2. The Result Code Summary

<u>Result Code</u>	<u>Description</u>
OK	Command executed
CONNECT	Modem connected to line
RING	A ring signal has been detected
NO CARRIER	Modem lost carrier signal, or does not detect carrier signal, or does not detect answer tone.
ERROR	invalid command
CONNECT 1200 EC*	Connection at 1200 bits/s
NO DIALTONE	No dial tone detected
BUSY	Busy signal detected
NO ANSWER	No quiet answer
CONNECT 2400 EC*	Connection at 2400 bits/s
CONNECT 4800 EC*	Connection at 4800 bits/s
CONNECT 9600 EC*	Connection at 9600 bits/s
CONNECT 14400 EC*	Connection at 14400 bits/s
CONNECT 19200 EC*	Connection at 19200 bits/s
CONNECT 7200 EC*	Connection at 7200 bits/s
CONNECT 12000 EC*	Connection at 12000 bits/s
CONNECT 16800 EC*	Connection at 16800 bits/s
CONNECT 300 EC*	Connection at 300 bits/s
CONNECT 21600 EC*	Connection at 21600 bits/s
CONNECT 24000 EC*	Connection at 24000 bits/s
CONNECT 26400 EC*	Connection at 26400 bits/s
CONNECT 28800 EC*	Connection at 28800 bits/s
CONNECT 31200 EC*	Connection at 31200 bits/s
CONNECT 33600 EC*	Connection at 33600 bits/s
CONNECT 38400 EC*	Connection at 38400 bits/s
CONNECT 57600 EC*	Connection at 57600 bits/s
CONNECT 115200 EC	Connection at 115200 bits/s
DELAYED	Delay is in effect for the dialed number
BLACKLISTED	Dialed number is blacklisted
BLACKLIST FULL	Blacklist is full
CONNECT 32000 EC*	Connection at 32000 bits/s, 56K rate
CONNECT 34000 EC*	Connection at 34000 bits/s, 56K rate
CONNECT 36000 EC*	Connection at 36000 bits/s, 56K rate
CONNECT 38000 EC*	Connection at 38000 bits/s, 56K rate
CONNECT 40000 EC*	Connection at 40000 bits/s, 56K rate
CONNECT 42000 EC*	Connection at 42000 bits/s, 56K rate
CONNECT 44000 EC*	Connection at 44000 bits/s, 56K rate
CONNECT 46000 EC*	Connection at 46000 bits/s, 56K rate
CONNECT 48000 EC*	Connection at 48000 bits/s, 56K rate
CONNECT 50000 EC*	Connection at 50000 bits/s, 56K rate
CONNECT 52000 EC*	Connection at 52000 bits/s, 56K rate
CONNECT 54000 EC*	Connection at 54000 bits/s, 56K rate
CONNECT 56000 EC*	Connection at 56000 bits/s, 56K rate
CONNECT 58000 EC*	Connection at 58000 bits/s, 56K rate
CONNECT 60000 EC*	Connection at 60000 bits/s, 56K rate
CONNECT 28000 EC*	Connection at 28000 bits/s, V.90 rate
CONNECT 29333 EC*	Connection at 29333 bits/s, V.90 rate
CONNECT 30666 EC*	Connection at 30666 bits/s, V.90 rate
CONNECT 32000 EC*	Connection at 32000 bits/s, V.90 rate
CONNECT 33333 EC*	Connection at 33333 bits/s, V.90 rate
CONNECT 34666 EC*	Connection at 34666 bits/s, V.90 rate
CONNECT 36000 EC*	Connection at 36000 bits/s, V.90 rate
CONNECT 37333 EC*	Connection at 37333 bits/s, V.90 rate
CONNECT 38666 EC*	Connection at 38666 bits/s, V.90 rate
CONNECT 40000 EC*	Connection at 40000 bits/s, V.90 rate
CONNECT 41333 EC*	Connection at 41333 bits/s, V.90 rate
CONNECT 42666 EC*	Connection at 42666 bits/s, V.90 rate
CONNECT 44000 EC*	Connection at 44000 bits/s, V.90 rate
CONNECT 45333 EC*	Connection at 45333 bits/s, V.90 rate
CONNECT 46666 EC*	Connection at 46666 bits/s, V.90 rate
CONNECT 48000 EC*	Connection at 48000 bits/s, V.90 rate
CONNECT 49333 EC*	Connection at 49333 bits/s, V.90 rate
CONNECT 50666 EC*	Connection at 50666 bits/s, V.90 rate
CONNECT 52000 EC*	Connection at 52000 bits/s, V.90 rate
CONNECT 53333 EC*	Connection at 53333 bits/s, V.90 rate

- 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 FAX Command Set

Class 1 FAX Commands

The 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.

The 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

+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, 008 if in voice mode.

+FCLASS=? **Service Class Capabilities**

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

Typical responses:

+FCLASS = ? 0, 1, 8, 80

+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, 8
Default: 0

Command options:

+FCLASS = 0 Select data mode.
+FCLASS = 1 Select Facsimile Class 1.
+FCLASS = 8 Select voice mode.

+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 50ms.

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 table shows the values you can enter for this command and the meaning of those values.

Command Option	Modulation	Speed (bits/s)
+FTM=3	V.21Channel	2300
+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

Manufacturer Identification (+FMI?)

Read Syntax: **AT+FMI?**

This parameter reports the manufacturer identification. Typically, the text consists of the name of the manufacturer, but the manufacturer may choose to provide more information (e.g., address, telephone number for customer service, etc.). The maximum text length is 80 characters. It is preferred that the first eight characters be unique.

Product Identification (+FMM?)

Read Syntax: **AT+FMM?**

This parameter reports product identification. Typically, the text consists of the name of the product. but the manufacturer may choose to provide more information. The maximum text length is 80 characters. It is preferred that the first eight characters be unique.

Version / Revision Information (+FMR?)

Read Syntax: **AT+FMR?**

This parameter reports the version, revision level, or other pertinent information for the device. Typically, the text consists of the version of the product, but the manufacturer may choose to provide more information (e.g., date code). The maximum text length is 80 characters. It is preferred that the first eight characters be unique.

Response Format (ATV)

Write Syntax: **ATV<value>**

Valid Values: 1
Default Value: 1

ATV1 verbose

This modem supports only text (verbose) result codes.

	ATV0 (not supported)	ATV1
Result Code Format		<CR><LF> <verbose code><CR><LF>

AT Voice Command Set

The AT Voice Command set follows a modified IS-101 architecture. The commands are sent through the COM port, but the data path is sent either through the COM port or through a DMA channel using the wave driver.

General AT Voice Commands

AT+FCLASS=8 Enter Voice Mode

The command AT+FCLASS=8 puts the modem in voice mode. TAD modes are placed under the more general heading of voice mode, and use a particular subset of voice mode commands to implement its respective features and functions. The modem controller will maintain the overall state of the system so as to know when voice commands are issued in the context of using the TAD or other voice contexts.

- AT+FCLASS? Returns the current DCE mode
- AT+FCLASS=? Queries the DCE for the range of modes supported DCE returns: 0, 1, 8 (data, FAX, voice)

AT+VIP Initialize Voice Parameters

The command AT+VIP causes the modem to initialize all the voice parameters to their default values. The command has no effect on the +FCLASS setting.

AT+FMI?, AT+FMM?, AT+FMR DCE Identification Commands

This command will enable DCE identification.

- +FMI? = Report manufacturer ID
- +FMM? = Report product identification (model)
- +FMR? = Report version or revision level

AT+VIT = <Timer> DTE/DCE Inactivity Timer

This command sets the DCE's value for the DTE/DCE inactivity timer. The units are in one seconds.

AT+VIT? Returns the current value of the timer

AT+VIT=? Queries the DCE for the range of supported values

AT+VEM=<mask> Event Reporting and Masking

The DTE can use this command to disable an event report regardless of the DCE state, or of the analog signal source or destination configuration. Mask is Bits 0→33 (i.e., FFFFFFFFC). See the IS-101 specification for defined bit values.

AT+VEM? Returns the current values of the mask

AT+VEM=? Queries the DCE for the range of supported service level events

AT+FMI?, AT+FMM?, AT+FMR DCE Identification Commands

This command will enable DCE identification.

- +FMI? = Report manufacturer ID
- +FMM? = Report product identification (model)
- +FMR? = Report version or revision level

AT+VIT = <Timer> DTE/DCE Inactivity Timer

This command sets the DCE's value for the DTE/DCE inactivity timer. The units are in one seconds.

AT+VIT? Returns the current value of the timer

AT+VIT=? Queries the DCE for the range of supported values

AT+VNH = <Hook> Automatic Hang-up Control

This command causes the DCE to enable or disable automatic hangups in the data and facsimile modes. See the ISO-101 specification for the detailed description of this command and its interaction with the +FCLASS and ATH commands.

<hook> = 0 The DCE retains automatic hangups (which is the way in the other non-voice modes).

<hook> = 2 The DCE disables automatic hangups in the other non-voice modes. The DTE only performs a logical hang-up (returns the "OK" result code).

AT+VNH? Returns the current value

AT+VNH=? Returns the supported values

AT Voice Command Set Related to Telephone Answering Device

AT+VTD=<dur> Beep Tone Duration Timer

This command sets the default duration for DTMF/tone generation in 0.01 s increments. For DTMF digits, beep tone duration is the interdigit time. For tone generation, this number is the actual tone duration.

AT+VTD? Returns the current value

AT+VTD=? Returns the supported values

AT+VTS=<string> DTMF and Tone Generation in Voice Mode

This command will cause the modem to produce a sequence of DTMF tones (or other tones, such as dial tone, busy, silence, etc.) as specified in the string parameter. Specifications for the format of tone strings are detailed in IS-101.

AT+VTS=? reports the range of frequencies supported for tone generation, as well as tone duration. Example: (300→3000), (300→3000), (0→400).

AT+VLS=? Analog Source/Destination Selection and DTMF/Tone Reporting

Requests for the modem's DTMF/Tone reporting capabilities are made using this command. For each system configuration in voice mode, the modem reports the capabilities that are enabled for the configuration. Also, for each configuration, the modem indicates tone-reporting capabilities for each of the three different voice states: voice transmit data, voice receive data, and voice command state (voice idle). TAD supports each of the following IS-101 analog source/destination configurations:

Label # Description

- 0 DCE on-hook, local phone connected to Telco.
- 1 DCE off-hook, DCE connected to Telco.
- 2 DCE off-hook, local phone connected to DCE.
- 3 DCE off-hook, local phone connected to Telco, DCE to local phone.
- 4 Speaker connected to DCE, DCE on-hook (playback messages)
- 5 Speaker connected to DCE, DCE off-hook (call screening)
- 6 Microphone connected to DCE, DCE on-hook (record greeting)

AT+VSD=<sds, sdi> Silence Detection (QUIET and SILENCE)

This command sets both the **silence detection sensitivity** (<sds>) and **silence detection interval** (<sdi>). Larger values of <sds> indicate that the modem is to treat noisier line conditions as silence.

<sds> = 128 ; Nominal level of sensitivity; -40 dBm (default) .

<sds> > 128 ; More aggressive ; <sds>=129 is -39 dBm.

<sds> < 128 ; Less aggressive; <sds>=127 is -41 dBm.

The <sdi> specifies the amount of time the modem shall wait before reporting silence to the DTE. It is used for determining the Presumed hang-up (SILENCE), after which the modem sends <DLE>-s to DTE. Default is 5 seconds.

AT+VSD? Returns the current value

AT+VSD=? Returns the supported values

AT+VTX Enter Voice Transmit Data State

Using this command will cause the modem to begin the voice transmission process with the voice stream sent through the COM port. Applications using the wave interface do not use the AT+VTX command. There are two ways for the DCE to leave voice transmit state:

1. Modem receives <DLE> - <ETX> in voice stream.
2. DTE/DCE inactivity timer expires.

AT+VRX Enter Voice Receive Data State

Using this command enables the modem to begin voice receive state with the voice stream received through the COM port. Applications using the wave interface do not use the AT+VRX command. The modem returns the CONNECT result code to the DTE. The DCE leaves voice receive state when:

1. Modem receives <DLE> - ! from the DTE.
2. Upon expiration of the silence detection timer, the modem passes <DLE> shielded event codes indicating presumed hang-up (<DLE>-s), or presumed end-of-message (<DLE>-q).

AT+VSM=<cml>,<vsr> Compression Method and Sampling Rate Specifications

This command enables the compression method and sampling specifications where cml = compression method label and vsr = voice sampling rate.

AT+VSM? returns the numeric and string labels of the compression method currently in use, and the sampling rate currently in use.
AT+VSM=? reports the voice compression methods supported by the DCE, and the voice sampling rates at which they are supported: The default is 129,8000 (16-bit linear, 8.0 kHz)

128, 8-bit linear, (7200, 8000, 11025)
129, 16-bit linear, (7200, 8000, 11025)
130, 8-bit A-law, (8000)
131, 8-bit m-law, (8000)
132, IMA ADPCM, (8000)

AT+VRA=<interval> Ringback Goes Away Timer

The modem uses the ringback goes away timer when originating a call. This command sets this timer to the amount of time the modem shall wait between ringbacks before assuming that the remote station has gone off-hook.

AT+VRA? Returns the current value.

AT+VRA=? Returns the range of supported values.

AT+VRN=<interval> Ringback Never Appeared Timer

The modem uses the ringback never appeared timer when originating a call. The AT+VRN command sets this timer to the amount of time that the modem shall spend looking for an initial ringback. If ringback is not detected within this interval, the modem shall assume that the remote station has gone off-hook.

AT+VRN? Returns the current value.

AT+VRN=? Returns the supported values.

AT+VPR=<rate> Select DTE/DCE Interface Rate

The AT+VPR command returns an OK for any rate but has no action.

Events Reported to the DTE :

The modem will return OK when going off-hook in voice mode (+FCLASS=8). After answering in voice mode, the modem may send any of the following <DLE> shielded event codes to the DTE, as appropriate:

<DLE> Shielded Codes Sent from DCE to DTE

Code	Character	Description
0	→	9, A→D, #, * DTMF tones

a Answer tone	h Local phone on-hook
b Busy tone	H Local phone off-hook
c Fax calling tone	R Ring
d Dial tone	s Silence timer has expired
e Data calling tone	<ETX> End of voice data transmission
	@ CAS tone detected

<DLE> Codes Sent to DCE:

For simple actions in voice mode, the modem may send any of the following <DLE> shielded event codes (in ASCII) to the DTE, as appropriate:

<DLE> Shielded Codes Sent from DTE to DCE

Code Character Description:

- u Bump up the volume by 1 dB
- d Bump down the volume by 1 dB
- <ETX> End of voice data transmission
- ! End receive data state

AT Voice Command Set Not Defined In IS-101 Specifications

S32 Synthetic Ring Volume

This command will provide a synthetic ring volume in dB with an implied minus sign. The default = 10.

S33 Synthetic Ring Frequency

This command will provide a synthetic ring frequency. The valid values are 0→5, with 0 = disabled and 1→5 = five varying ring frequencies. The default = 0.

AT+VTS=! This does a flash hook.