



Commands

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General Commands

AT - Command Prefix

A - Answer

B - US/ITU-T Answer Sequence

C - Transmitter - No longer used

D - Dial

E - Echo

F - Duplex

H - Hook

I - Inquiry

L - Volume

M - Speaker

O - Online

P - Pulse Dial

Q - Quiet

T - Tone Dial

V - Result Codes

X - Result Code Options

Y - Set Default Profile

Z - Reset

A/ - Re-Execute Command

A> - Re-Execute Command Continuously

+++ - Escape Code

AT (Command Prefix)

Function	Prefix to modem commands. "AT" may be in lowercase or uppercase, but not mixed case.
Command Syntax	AT <Argument>
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.

Notes

In order for the modem to accept the "AT", there must be 1 ms of inactivity preceding the command on the DTE TD line. This timing constraint is a result of rack applications, where older versions of product, experienced a situation where DTR dropped or the remote DCE disconnected during an ASCII file transfer. The ASCII file that was still being sent to the modem at a high baud rate after it disconnected contained the characters "AT". The product then went into command mode and waited for the line terminator character ([S3](#)) to follow. The host was unaware that it had sent an "AT" to the modem, but reported that the modem was unresponsive.

"AT" must precede all other commands except the [A/](#), [+++](#), and [A>](#) commands. Any characters that preceded the "AT" are ignored. Any characters that follow the "AT" are treated as commands, until the line terminator character (determined by [S3](#)) is received.

When a command prefix is entered, modem clears previous command buffer in preparation for accepting a new command line.

Related

All of them.

A (Answer)

Function	Command to execute answer sequence. Modem goes off hook, waits for billing delay time, then sends answer tone and goes into handshake sequence.
Command Syntax	ATA
Argument	None.
Default	N/A
DTE Interface	DSR is asserted after modem goes off hook, if &S0=1 , and modem is not in test mode (following ITU-T V.22bis recommendation, self test section)
LED	None.
Aborting Events	<p>Any key pressed during the answer sequence will abort it and return modem to command mode.</p> <p>DTR is not asserted and &D is not equal 1; or the time stored in S7 expires.</p>
Notes	<p>The speaker is activated when the modem goes off-hook, as set by the M command.</p> <p>Any other commands that follow ANSWER (A) are ignored.</p>
Related	S0

B (US/ITU-T Answer Sequence)

Function	Select between US answer sequence (2325 Hz) and ITU-T answer sequence (2100 Hz and 2250 Hz).
Command Syntax	ATB<argument>
Argument	0 - ITU-T V.25 answer sequence. Also used to answer calls originating outside the US or Canada. 1 - Bell answer tone
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	B0 is required to activate &G1 and &G2 commands.
Related	&G



C (Transmitter)

Function	No longer functional
Command Syntax	N/A
Argument	N/A
Default	N/A
DTE Interface	N/A
LED	N/A
Aborting Events	N/A
Notes	Command is ignored and does not generate ERROR message.
Related	N/A

D (Dial)**Function**

Modem goes off hook, enters originate mode (unless R command is used), waits the number of seconds stored in the [S6](#) register, if [X](#) command is set to 0,1,3 or 5, and dials string that follows. Call progress result codes (if any) are sent to the DTE (See the [Q](#), [V](#) and [X](#) commands). The result is that the modem establishes a data connection and goes into data mode (or command mode: see ";" argument), or fails to establish a data connection and reverts to command mode.

Command Syntax

ATD<argument>

Arguments**Argument****Description**

0-9

Numeric digits. Numbers to be dialed

#, *

Extended touch tone pad tones

,

Pause - modem delays for the number of seconds stored in the [S8](#) register before executing the following commands or arguments in dial string

;

Return to command mode after dialing is completed

!

Flash switch hook. The modem goes off hook for 0.5 sec, the goes on hook for 0.5 sec and goes offhook again. This command is primarily used to transfer calls to another extension.

T

Touch tone dialing - [S11](#) resister sets duration and spacing of touch-tones.

P

Pulse dialing - modem pulse dials using [&P](#) command parameter.

@

Wait for answer - modem will dial string, detect at least one ring signal, wait for five seconds of silence at the remote end for up to the number of seconds stored in the [S7](#) register, and then execute the rest of the dial string that follows the @ command. This command is functional when the [X](#) command is set to 3,4,5 and 6.

R

Reverse frequencies - modem reverses originate and answer frequencies, so that it originates in answer mode.

Sn

Modem dials string found in NVRAM location n (n = 0-3).

"

Quote mode - when inserted at the beginning of a dial string, it can be followed by "dialable" letters in either touch tone or pulse dial modes. Also used to indicate termination of dial string. The second quote is not required unless other commands follow the dial string.

/	Short delay - modem delays 125 ms before proceeding with dial string execution. Can also be a non-dial command.
W	Wait for second dial tone before proceeding with dial tone execution. This feature is active when result code option X3 or greater has been issued. If the modem is set to X2 or lower, the modem interprets the W as a comma (two seconds pause default value or the value of S8).
L	Causes the modem to dial the number that is stored in last dialed buffer. This buffer is reset on ATZ or power on reset. ATDL? will display the number that is in the buffer.

If no argument is given, modem goes off hook waits for answer tone in preparation for making a data connection.

Default N/A

DTE Interface DSR is asserted after dialing, when the modem detects the remote modem's answer tone if [&S1](#) (DSR is always on if [&S0](#))

LED None.

Any key pressed - When a dial string is aborted, any additional commands following the dial string are not executed.

Failure to establish data connection.

Aborting Events No carrier sensed after time in [S7](#) register has elapsed.

Failure to detect ring signal or silence during processing of an @ command.

The modem detects a busy signal and the [X](#) parameter is set to 3, 4, 5 and 6.

The modem detects no dial tone and the [X](#) parameter is set to 2, 4 or 6.

Modem will go off hook and dial as soon as it detects dial tone, if [X](#) command is set to 2, 4 or 6 ("fast dial" mode).

Notes The speaker is activated when modem goes off-hook, as set by the M command.

Dial string may include up to 60 characters, excluding "AT" prefix, <CR> character and spaces.

Related [X](#)

E (Echo)

Function	Enables echo of commands to DTE in command mode. Echo is initialized by DIP switch # 4 (if present). Echo is also initialized by system reset commands (see Z command).
Command Syntax	ATE<argument>
Argument	0 - Modem does not echo commands to DTE in command mode 1 - Modem echoes commands to DTE in command mode
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Echo is turned off when parsing a command line, and reverts to the state defined by the E command otherwise.
Related	None.



F (Duplex)

Function	Modem echoes transmitted data to DTE in on-line mode.
Command Syntax	ATF<argument>
Argument	0 - Transmitted data is echoed to DTE in on-line mode 1 - Transmitted data is not echoed to DTE in on-line mode
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

H (Hook)

Function	Command the modem to connect with the phone line.
Command Syntax	ATH<argument>
Argument	0 - Modem goes on hook (opens phone line relay). 1 - Modem goes off hook (closes phone line relay).
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

I (Inquiry)

Function Command returns various information screens to DTE.

Command Syntax ATl<argument>

Argument

Argument	Description
0	4 digit product code (yyyyx, where x is a revision identifier and y is the maximum speed divided by 10) is sent to the DTE. (example: 1440 for Sportster)
1	Modem performs checksum operation on supervisor code and sends results to DTE
2	Modem tests RAM by writing and reading alternating Hex bytes 55h and AAh into the RAM, and returns the results by "ERROR" or "OK" result code to the DTE.
3	Modem returns Product ID string. The string contains the Company name, the Product line name and the speed of the product. Additionally, some special features like FAX and VOICE will also be listed
4	Modem sends one screen of data to the DTE indicating the present configuration of the following settings: <ol style="list-style-type: none"> 1. B, E, F, M, Q, V and X commands 2. DTE baud rate, parity, word length, dial type (pulse or tone), and H setting (On or Off Hook). 3. &A, &B, &C, &D, &G, &H, &I, &K, &M, &N, &P, &R, &S, &T, and &Y 4. S-register values from (S0 - S42) 5. LAST DIALED #:
5	Modem sends two screens of data to DTE indicating present configuration of the following commands stored in each NVRAM template: <ol style="list-style-type: none"> 1. Dial type, B, F, M, X commands. For PC Internal version, E, Q, and V commands 2. Stored default baud rate, Stored parity, Stored Word length. 3. &A, &B, &G, &H, &I, &K, &M, &N, &P, &R, &S, &T, and &Y settings. For PC Internal version &D and &C commands. 4. S-register values from S0, S2-S15, S19, S21-S23, S25, S27, S28, S29 - S36, S38 - S42. 5. Phone numbers stored in locations 0 through 3.

- 6 Modem sends diagnostic screen to DTE with the following information from the previous data connection:
 1. Numbers of characters sent, received, and lost.
 2. Numbers of octets (compressed characters) sent, received.
 3. Numbers of blocks sent, received, and re-sent.
 4. Numbers of retrains requested, granted.
 5. Number of line reversals.
 6. Numbers of protocol blocks in error.
 7. Numbers of link time-outs, link "naks".
 8. Negotiated settings for data compression (on/off), equalization (long/short).
 9. Fallback enabled/disabled - (indicates whether modem negotiated a fallback during connection).
 10. Error Correcting Protocol (LAPM, MNP or NONE).
 11. DCE speed.
 12. Disconnect reason.
 13. Duration of the last call.
- 7 Product configuration. One screen of data is sent to the DTE that contains the following information:
 1. Product type (External or Internal).
 2. Options
 3. Clock Frequency
 4. EPROM Size
 5. RAM Size
 6. Code date.
 7. Code revision.
- 8 Blacklist screen (International products only)
- 9 Plug and Play feature. Modem will issue the following string (text after ";" are comments):


```
(                                     ; Begin PnP
1.0                                 ; Plug and Play Version 1.0
                                   ; *note: ASCII vs. Binary
                                   ; representation
USRxxxx                           ; EISA Manufacturer ID (xxxx is a
                                   ; model specific number)
SPORTSTER 33.6 FAX INT ( or EXT ) ;
\                                  ; No serial number
\MODEM                            ; Class ID
\                                  ;
\Sportster 33.6 FAX INT ( or EXT ) ; User Name
)                                  ; End PnP
```
- 10 Reserved
- 11 Extended Link Diagnostics -- Modem will provide extended information to aid customer support configuration of the product



Technical Ref.

Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	<ctrl> C or <ctrl> K - Aborts display from that point on. Display of screens can be halted by <ctrl>S and restarted by any key.
Notes	See I-Screen for details on inquiry screen parameters.
Related	None.



L (Volume)

Function	Command is used to control modem speaker volume on the PC Internal form factor.
Command Syntax	ATL<argument>
Argument	0 - Low 1 - Low 2 - Medium 3 - High
Default	2
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

M (Speaker)

Function	Command is used to control modem speaker
Command Syntax	ATM<argument>
Argument	0 - Turns speaker off. 1 - Speaker is on during dial string execution until carrier is detected or modem goes on hook. 2 - Speaker is on all the time. 3 - Speaker is turned on after last digit in dial string is dialed, and then turned off when carrier is detected or until time stored in S7 has elapsed.
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

O (Online)

Function	Commands modem to return to previously established connection.
Command Syntax	ATO<argument>
Argument	<p>0 - Issued when off-hook and when S13.7 = 0 for detection of escape code (on-line command mode). The modem will remain on line and return to a connected data transfer mode.</p> <p>1 - Issued when modem is in on-line command mode. Causes modem to return to data mode and at the same time initiates a retrain. Retrain will only be initiated at speeds above 1200 baud.</p>
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	When ATO1 is issued in on-hook state result code "OK" is returned.
Related	None.

P (Pulse Dial)

Function	Command causes the modem to dial in pulse mode when dialing a dial string. This is the default setting on power up.
Command Syntax	ATP
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

Q (Quiet)

Function	Command enables or disables display of result codes. Quiet mode is set by DIP switch # 3 (if present) on external modems (with DIP switches).
Command Syntax	ATQ<argument>
Argument	0 - Result codes are sent to DTE. 1 - Result codes are not sent to DTE. 2 - Result codes are not sent when in Answer mode.
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Quiet mode is used in some applications such as printer-modem installations, where publishing the result code to the DTE would be undesirable.
Related	None.



T (Tone Dial)

Function	Command places the modem in touch-tone dialing mode for dialing strings.
Command Syntax	ATT
Argument	None
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

V (Result Codes)

Function	Command instructs modem to send result codes in either verbal or numeric modes to the DTE. Verbal response mode is controlled by DIP switch # 2 on the external modem. Verbal response mode is also set from software reset.
Command Syntax	ATV<argument>
Argument	0 - Enables numeric mode for result codes. Numeric codes are followed by a terminating character (S3 Default = <CR>, 0Dh) only. 1 - Enables verbal mode for result codes. Verbal codes are preceded and followed by S3 and S4 settings (<CR> and <LF> are defaults).
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

X (Result Code Options)

Function Command selects or deselects result codes and call progress options according to <argument>

Command Syntax ATX<argument>

Below is a chart containing the variations on the arguments for X and the result codes they enable.

	Numeric	Verbal	X0	X1	X2	X3	X4
	0	OK	Y	Y	Y	Y	Y
	1	CONNECT	Y	Y	Y	Y	Y
	2	RING	Y	Y	Y	Y	Y
	3	NO CARRIER	Y	Y	Y	Y	Y
	4	ERROR	Y	Y	Y	Y	Y
	5	CONNECT 1200		Y	Y	Y	Y
	6	NO DIAL TONE			Y		Y
	7	BUSY				Y	Y
	8	NO ANSWER *				Y	Y
	9	reserved					
Argument	10	CONNECT 2400		Y	Y	Y	Y
	11	RINGING					Y
	13	CONNECT 9600		Y	Y	Y	Y
	.	CONNECT 4800-56000		Y	Y	Y	Y
	236	CONNECT 57333		Y	Y	Y	Y

Below is a table of special dialing functions. These functions are activated by the value of the X command. In the case of both Adaptive dialing and Fast dial, neither function will run if the X command is not set for it. In the case of Wait for 2nd dial tone and Wait for answer, only a fixed delay will be used if the X command is not set for them.

	Function	X0	X1	X2	X3	X4
	Adaptive Dialing			Y	Y	Y
	Wait for second dial tone (W)				Y	Y
	Wait for answer (@)				Y	Y
	Fast dial			Y		Y

Default 4

DTE Interface None.

LED None.

Aborting Events None.

Notes * Requires @; replaces NO CARRIER

Related [Result Codes](#)

Y (Set Default Profile)

Function	Select default system profile. This command allows one of three profiles to be chosen for use at power and upon software reset. The modem will use either of the stored NVRAM configurations or it will use the factory default settings. This parameter is stored separately within the NVRAM and is read in before any other values. The modem uses the parameter to determine its course of action during any kind of reset. If no parameter is provided, then 0 is assumed. This parameter is reset by the &F command.
Command Syntax	ATY<argument>
Argument	0 - Use NVRAM configuration 0 1 - Use NVRAM configuration 1 2 - Use factory configuration 0 3 - Use factory configuration 1 4 - Use factory configuration 2 6 - Same as I6 11 - Lists the signal strength at certain frequencies
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Sends "OK" result code to DTE before executing the command. Clears command line buffer. If A/ command is entered subsequently, modem sends OK result code to DTE, but doesn't execute any command. Arguments that follow in the command buffer are not executed. External modems only use arguments 0,1, 6 and 11
Related	None.

Z (Reset)

Function	Software reset command. Modem resets to either factory defaults or NVRAM settings, dependent parameter issued with the command. The modem uses the parameter and changes settings accordingly. If no parameter is provided, then 0 is assumed. U.S. Robotics (Sportster) products also use DIP switch #7 to determine which configuration is loaded.
Command Syntax	ATZ<argument>
Argument	0 - Reset then load configuration indicated by Y setting (also DIP switch 7 on externals) 1 - Reset then load NVRAM configuration 0 2 - Reset then load NVRAM configuration 1 3 - Reset then load factory configuration 0 4 - Reset then load factory configuration 1 5 - Reset then load factory configuration 2
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Sends "OK" result code to DTE before executing the command. Clears command line buffer. Arguments that follow in the command buffer are not executed.
Related	None.

A/ (Re-Execute Command)

Function	The A/ command causes the modem to re-execute the last command that was executed one time. This command does not take the AT prefix or a carriage return.
Command Syntax	A/
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

A> (Re-Execute Command Continuously)

Function	The A> command causes the modem to re-execute the last command that was executed continuously. The S6 register value is used as a delay between re-executions. This command does not take the AT prefix or a carriage return.
Command Syntax	A>
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	Any key during the execution delay period, will terminate the operation.
Notes	None.
Related	None.

+++ (Escape Code)

Function	Command is a three-character sequence using the character defined by S2 register [Default = "+", decimal 43]. Used when modem is in data mode to either terminate the connection or to proceed to on-line command mode, depending on the setting of S13 . This command does not take the AT prefix or a carriage return.
Command Syntax	+++
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Escape code sequence must be preceded and followed by "guard time" found in S12 register (default is one second), to be executed.
Related	None.

Ampersand Commands

[&A](#) - ARQ Result Codes Enable

[&B](#) - DTE Data Rate

[&C](#) - Carrier Detect

[&D](#) - Data Terminal Ready

[&F](#) - Load Factory Defaults

[&G](#) - Guard Tone

[&H](#) - Transmit Flow Control

[&I](#) - Receive Software Flow Control

[&K](#) - Data Compression

[&M](#) - Error Control and Synchronous Operation

[&N](#) - DCE Link Rate

[&P](#) - Make/Break Ratio

[&R](#) - Receive Hardware Flow Control

[&S](#) - DSR Options

[&T](#) - Diagnostic Tests

[&U](#) - DCE Link Rate Floor

[&W](#) - Write To NVRAM

[&Y](#) - Break Handling

[&Z](#) - Write Dial String To NVRAM

&A (ARQ Result Codes)

Function	Command enables/disables display of ARQ result codes if X command argument is 1 or greater (see X command).
Command Syntax	AT&A <Argument>
Argument	0 - "/ARQ" connection result codes are disabled. 1 - "/ARQ" connection result codes are enabled. 2 - Additional modulation indicator (E.G. V34) in result codes for calls at or above 4800 bps. 3 - Protocol of call reported: LAPM, MNP, or NONE. If modem negotiated for data compression, type of compression is added to the result code: V42BIS, MNP5.
Default	3
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	X

&B (DTE Data Rate)

Function	Command selects how DTE data rate is determined.
Command Syntax	AT&B<argument>
Argument	0 - Modem DTE interface rate follows the DCE connection rate. 1 - Modem DTE interface follows DTE rate, regardless of DCE connection rate. 2 - Fixed for ARQ calls/variable for non-ARQ calls. Answer mode only. When the modem goes off hook and answers in ARQ mode, it shifts its serial port rate to the one written in NVRAM. In non-ARQ mode it acts as if set to &B0 when answering, and switches its serial port rate to match the call's connection rate.
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

&C (Carrier Detect)

Function	Command controls the carrier detect signal from the modem to the computer. On the external form factor, carrier detect is also controlled by DIP switch # 6 (if present) upon power up and software reset.
Command Syntax	AT&C<argument>
Argument	0 - Carrier Detect override (CD) is always on. 1 - Modem send the carrier detect signal when it connects with another modem and drops the signal when it disconnects.
Default	1
DTE Interface	CD will go true if &C1 when a connection is made. CD will return to a false state after the connection is dropped.
LED	CD LED toggles on state of &C.
Aborting Events	None.
Notes	None.
Related	None.

&D (Data Terminal Ready)

Function	Command controls the DTR signal from the DTE to the modem. On the external form factor, DTR is also controlled by DIP switch #1 (if present) at power up.
Command Syntax	AT&D<argument>
Argument	0 - DTR override, assume DTR is always on. 1 - On-line command mode on DTR low. Modem enters command mode on DTR transition to low state. Returns on-line when DTR returns high. 2 - Computer must send DTR for the modem to accept commands, and dropping DTR terminates a call. 3 - Host must send DTR for modem to accept commands, and dropping DTR terminates any active call and causes modem to do a soft reset.
Default	2
DTE Interface	DTR line
LED	DTR LED toggles on state of DTR.
Aborting Events	None.
Notes	None.
Related	None.

&F (Load Factory Defaults)

Function	Command resets command options to factory default ROM settings to RAM.
Command Syntax	AT&F<argument>
Argument	0 - Load standard factory configuration. 1 - Load factory configuration 1 Hardware Flow Control. 2 - Load factory configuration 2 Software Flow Control.
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	Settings

&G (Guard Tone)

Function	Command results in modem sending a guard tone after 2100 Hz answer tone is sent, during connection sequence. This command applies only to overseas calls at 2400 or 1200 bps.
Command Syntax	AT&G<argument>
Argument	0 - No guard tone sent (US/Canada). 1 - 550 Hz guard tone follows answer tone. To be activated requires that argument of B command is 0. 2 - Enable 1800 Hz guard tone. To be activated requires that argument of B command is 0.
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	B

&H (Transmit Flow Control)

Function	Command enables/disables flow control on transmitting channel.
Command Syntax	AT&H<argument>
Argument	0 - Transmit data flow control disabled. 1 - Enables hardware flow control (CTS) 2 - Enables software flow control XON/XOFF, using characters stored in S22 and S23 for XON/XOFF flow control characters, respectively. 3 - Enables hardware and software flow control.
Default	1
DTE Interface	None.
LED	The CTS LED follows the state of the CTS signal (only).
Aborting Events	None.
Notes	None.
Related	&I , &R , S22 , S23

&I (Receive Software Flow Control)

Function Command enables software flow control options.

Command Syntax AT&I<argument>

Value	Description
0	Disable XON/XOFF flow control of received data. All ASCII characters are transparent to modem except escape sequence
1	Modem responds to XON/XOFF characters as defined in S-registers 22 and 23, respectively. Modem also passes the characters through to the remote DCE.
2	Modem responds to XON/XOFF characters as defined in S-registers 22 and 23, respectively, but does not pass the characters to the remote DCE.
3	Enables Hewlett-Packard host mode. Modem receives an ENQ (decimal 05 ASCII) character every 80 characters from the host via the RS-232 line, and returns an ACK (decimal 06 ASCII) character to the host via the RS-232 line under two conditions: <ul style="list-style-type: none">a. The Modem responds immediately if the transmit buffers are empty.b. The Modem will not respond with ACK if transmit buffers are 90% full, but responds with ACK when transmit buffers fall below 30% full.
4	Enables Hewlett-Packard terminal mode. Modem receives an ENQ from the remote DCE and passes it to the DTE. Modem sends no further data to the DTE until it responds with an ACK.
5	Enables special flow control as follows: <ul style="list-style-type: none">a. If modem is in error-correction mode, it responds the same way as if the argument were 2.b. If modem is not in error-correction mode, it responds as though the argument was 0, except that it responds to XON/XOFF characters from the remote DCE, and does not pass them to the DTE.

Default 0

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related [&I](#), [&H](#), [S22](#), [S23](#)

&K (Data Compression)

Function	Command enables MNP level 5 or V42bis data compression. Requires that an MNP or a LAPM link has been established.	
Command Syntax	AT&K<argument>	
	Value	Description
	0	Data compression disabled
	1	Automatic selection/deselecting. Data compression is enabled if the DTE data rate is higher than the link rate (see &B and &N commands), and the remote DCE either supports MNP level 5 option in the MNP link request or V42bis in the LAPM link request.
	2	Data compression enabled. The setting is used to keep the modem from disabling data compression, however for this option to work error control must be enabled (&M4 or &M5).
	3	Selective data compression disables MNP data compression, but not MNP error correction. It allows a V42bis connection with compression or an MNP connection without compression.
Default	1	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	&M	

&M (Error Control)

Function	Command enables error control option.
Command Syntax	AT&M<argument>
Argument	0 - No error control. MNP or V.42 link request is ignored . 1 - RESERVED 2 - RESERVED 3 - RESERVED 4 - Automatic selection between V.42, MNP error control and non-error controlled data link. 5 - Error controlled link. If remote DCE doesn't respond to V.42 or MNP link request, modem disconnects call.
Default	4
DTE Interface	None.
LED	If &M is set to 4 or 5 and an error-control link is established, the ARQ LED will turn on.
Aborting Events	None.
Notes	If &M is set to 0, error control will be disabled.
Related	&K



&N (DCE Link Rate)

Function	Command selects variable or fixed maximum DCE data rates
Command Syntax	AT&N<argument>
Argument	See Speeds for list of arguments
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	&U

&P (Make/Break Ratio)

Function	Command enables one of two possible phone line relay duty cycles used during pulse dialing.
Command Syntax	AT&P<argument>
Argument	0 - US/Canada make/break ratio of 39%/61%. 1 - UK make/break ratio of 33%/67%.
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	To call or answer overseas modems at 300 bps, set the modem to ITU-T V.21 mode. See S27
Related	None.

&R (Receive Hardware Flow Control)

Function	Command enables options for received data hardware flow control.
Command Syntax	AT&R<argument>
Argument	0 - Reserved. 1 - RTS signal is ignored. 2 - Modem sends data to DTE only if RTS is asserted.
Default	2
DTE Interface	RTS, CTS
LED	None.
Aborting Events	None.
Notes	If DTR and RTS are both not asserted during a data connection, and &R is set to 2, modem sends result codes to DTE. This is because in a Basic program, the only way to drop DTR is by closing the COM port, thus forcing RTS low also. In this case, modem is not allowed to send a "NO CARRIER" result code and go on hook, unless it interprets this combination of events as a warrant to send the no carrier result code.
Related	&I , &H



&S (DSR Options)

Function	Command selects among options.
Command Syntax	AT&S<argument>
Argument	0 - DSR is always asserted. 1 - DSR is asserted when modem starts a data connection and not asserted when carrier is lost.
Default	0
DTE Interface	DSR
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

&T (Diagnostic Tests)

Function Command controls the diagnostic test modes internal to the modem.

Command Syntax AT&T<argument>

Value	Description
0	Terminates current test.
1	Initiates analog loop back test at any link rate, modulation, compression or error control. S16 =4 may be set for a test pattern. Modem must be off-line without any other test in progress such as, S16 =1. From off-line it will enter test and give a "CONNECT..." message and is ready to receive loop back characters. If the test is denied for one of the above reasons an "ERROR" message is issued. If on-line when issued modem will drop call and issue a "CONNECT..." and then is ready to receive loop back character.
2	RESERVED
3	Initiates digital loop back test at any link rate, modulation, compression or error control, which allows the remote end to test out their transmit and receive paths. All data received by local modem is sent back out. Modem has to be in on-line command mode, after receiving the command it starts the test and issues an "OK" terminated.
4	Grant remote digital loop back: will allow the local modem to respond to a request for remote digital loop back.
5	Deny remote digital loop back to the remote end requesting loop back.
6	Initiates remote digital loop back at link rates of 2400 or 1200 bps with any compression or error control. Modem must be off-hook and in on-line command mode without any other test in progress such as, S16 =1 or 8. If this condition is met, and permission is granted by the remote modem, the modem then enters the state test and issues a "CONNECT..." message. When S16 is set to 4 a test pattern will be sent. If the test is denied for one of the above reasons an "ERROR" message is issued and the modem returns to on-line command mode.

- 7 Initiates remote digital loop back with self-test at link rates of 2400 or 1200 bps, with any compression or error control. Modem must be off-hook and in on-line command mode without any other test in progress such as, [S16=4](#). Remote access permission must be granted as well. Modem enters test and issue a "OK" message. Modem then sends out a pattern of repeating "U's which can not be seen by the user as modem stays in on-line command mode. If the test is denied for one of the above reasons an "ERROR" message is issued and returned to on-line command mode.
- 8 Initiates analog loop back with self-test at any link rate, modulation, compression or error control. Modem must be off-line without any other test in progress such as, [S16=1](#). From off-line it will enter test and give a "OK" message. The modem then sends out a test pattern of repeating "U's which can not be seen by the user as the modem stays in on-line command mode. If the test is denied for one of the above reasons an "ERROR" message is issued. If on-line when issued, modem will drop call and issue a "CONNECT..." and then be ready to send loop back characters.

Default	5
DTE Interface	None.
LED	None.

To terminate tests, you must be in on-line command mode.

1 - The test can be terminated by entering a &T0, or ATH0, lowering DTR, doing this modem will go off-line and issue a "OK" response; ATZ will end test and then reset modem; the expiration of the test timer that uses [S18](#). Also, by any key if [S16](#)=4 was set.

2 - N/A.

3 - The test can be terminated by entering a &T0, which will end test and respond with a "OK" response; or by ATH0 or lowering DTR will end test go off-line and issue a "OK" response; or by ATZ will end test, issue a "OK" response and then reset modem; or by the expiration of the test timer that uses [S18](#).

4 - N/A.

5 - N/A.

Aborting Events

6 - The test can be terminated by entering a &T0, which will end test and respond with a "OK" response; or by either ATH0 or lowering DTR will end test go off-line and issue a "OK" response; or by ATZ will end test issue a "OK" response and then reset modem; or by the expiration of the test timer that uses [S18](#). Also if [S16](#)=4 was set any key entered will abort test.

7 - The test can be terminated by entering a &T0, which will end test, give a three digit error count, (error count of 255 is given for errors over 255) and respond with a "OK" response; or by either ATH0 or lowering DTR which will end the test, go off-line and issue a "OK" response; or by ATZ will end test, issue a "OK" response and then reset modem; or by the expiration of the test timer that uses [S18](#).

8 - The test can be terminated by entering a &T0, entering an ATH0, or by lowering DTR. After getting one of these commands, the modem will give a three-digit error count. 255 is used for errors greater than 255. The modem will then go off-line and issue a "OK" response. An ATZ will end test, issue the above error response and then reset the modem. The test timer ([S18](#)) expiration will issue a report and an "OK" response like &T0.

Notes

None.

Related

[S16](#), [S18](#)

&U (DCE Link Rate Floor)

Command sets minimum DCE connection data rates. This command work in conjunction with &N. The table below defines the interactions.

Function	&N=0		&N>0
	&U=0 or &U>&N	Modem doesn't limit connect speed.	Modem connects at &N speed only.
	&U>0	Modem connects in range from maximum speed down to &U setting	Modem connects in range from &N setting down to &U setting.
Command Syntax	AT&U<argument>		
Argument	See Speeds for list of arguments		
Default	0		
DTE Interface	None.		
LED	None.		
Aborting Events	None.		
Notes	None.		
Related	&N		

&W (Write to NVRAM)

Function	Command writes current modem configuration to NVRAM. The general intent of this command is that all commands and registers which are not in production test commands or S1 , are stored in NVRAM.
Command Syntax	AT&W <argument>
Argument	0 - Store to NVRAM pattern 0. 1 - Store to NVRAM pattern 1.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	The following command settings are stored in NVRAM: B , F , M , X , E , Q , V , L , &A , &B , &C , &D , &G , &H , &I , &K , &M , &N , &P , &R , &S , &T (stores &T 4 or &T 5 only), &Y , S0 , S2 to S13 , S15 , S19 , S21 to S23 , S25 , S27 to S42 , &Z 0 through &Z 3 dial strings, Word length and parity, Data rate
Related	None.

&Y (Break Handling)

Function	Command enables various methods of handling break sequences when a break is received from DTE or remote DC.
Command Syntax	AT&Y<argument>
Argument	<p>0 - Destructive option. When modem receives break signal from DTE, it clears data from transmit buffer, but does not pass break to the remote DCE. Both local and remote Modems reset data compression tables.</p> <p>1 - Expedited destructive option. When modem receives break signal from DTE, it clears data from transmit buffer and sends break to remote DCE Modem, also resets data compression tables.</p> <p>2 - Expedited nondestructive option. When modem receives break signal from the DTE, it does not clear transmit buffer, but sends break to remote DCE out of sequence.</p> <p>3 - Reserved</p>
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

&Z (Write Dial String to NVRAM)

Function	Command writes dial string to NVRAM First command syntax is "AT&Zn=s". This command is used to write an input dial string into NVRAM. The parameters n and s are defined as follows: n - Save position 0 through 3 [Default = 0 if no argument for n is given]. s - Dial string up to 36 characters, not including <CR>, "AT" or space characters. Non-dial string commands are not allowed in the dial string. Second command syntax is "AT&Zn=L". This command is used to write the previously input dial string to NVRAM. The parameter n is defined as follows: n - Position 0 through 3 [Default = 0 if no argument for n is given]. Third command syntax is "AT&Zn?" This command is used to display the current dial string stored in NVRAM. The parameter n is defined as follows: n - Position 0 through 3 [Default = 0 if no argument for n is given]. Fourth command syntax is "AT&ZL?" This command is used to display the last executed dial string. There are no parameters for this command.
Argument	See above.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Phone number is stored until a non-dial command or a line terminator (S3) is encountered.
Related	None.

S-Registers

S0 - Answer on Ring	S22 - XON Character
S1 - Ring Counter	S23 - XOFF Character
S2 - Escape Code Character	S24 - Reserved
S3 - Carriage Return Character	S25 - DTR Recognition Time
S4 - Line Feed Character	S26 - Reserved
S5 - Backspace Character	S27 - Connection Options - Bitmapped Register
S6 - Dial Wait Time	S28 - v.32 Handshaking Time
S7 - Carrier Wait Time	S29 - v.21 Answer Mode Fallback Timer
S8 - Pause Wait Time	S30 - Deadman Timer Function
S9 - Carrier to Connect Wait Time	S31 - TAD Audio Level Adjust
S10 - Loss Of Carrier Wait Time	S32 - Connection Options - Bitmapped Register
S11 - Touch Tone Spacing And Duration	S33 - v.34/v.34+ Connection Setup - Bitmapped Register
S12 - Guard Time	S34 - v.34/v.34+ Connection Setup - Bitmapped Register
S13 - Bitmapped Register	S35 - x2 Connection Setup - Bitmapped Register
S14 - Reserved	S36 - Reserved
S15 - ARQ Options - Bitmapped Register	S37 - v.90 Connection Setup - Bitmapped Register
S16 - Test Options - Bitmapped Register	S38 - DTR Drop Delay
S17 - Reserved	S39 - Reserved
S18 - Test Mode Timer	S40 - Reserved
S19 - Inactivity Timer	S41 - Bitmapped Register
S20 - Reserved	
S21 - Break Character Length	

S0 (Answer on Ring)

Function	Sets the number of rings on which to answer when modem is set to Auto Answer mode
Command Syntax	ATS0= <Argument>
Argument	0-255
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	If the modem does not have DIP switches, then if DTR is asserted and S0 is not 0, the modem will answer on ring <value of S0>
Related	A , S1

S1 (Ring Counter)

Function	Stores the number of rings received
Command Syntax	ATS1= <Argument>
Argument	N/A
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	You can set S1 to a value and it will be increased when a ring comes in. Issuing ATS1? will cause the modem to return the current value of S1. Issuing ATS1=? will cause S1 to reset to zero and report that value.
Related	A , S0

S2 (Escape Code Character)

Function	Stores the ASCII decimal code for the escape code character
Command Syntax	ATS2= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	43 (decimal for +)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S3 (Carriage Return Character)

Function	Stores the ASCII decimal code for the carriage return character
Command Syntax	ATS3= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	13 (decimal for CR)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S4 (Line Feed Character)

Function	Stores the ASCII decimal code for the line feed character
Command Syntax	ATS4= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	10 (decimal for LF)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S5 (Backspace Character)

Function	Stores the ASCII decimal code for the backspace character
Command Syntax	ATS5= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	8 (decimal for BS)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S6 (Dial Wait Time)

Function	Stores the number of seconds that the modem will wait before executing a dial string or wait for dial tone
Command Syntax	ATS6= <Argument>
Argument	0-255 (in seconds)
Default	2
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	If X is set to 2 or 4, this counter represents the amount of time the modem will wait for a dial tone before responding with NO DIAL TONE (if none is present). If X is set to 0,1 or 3, the counter represents the amount of time the modem will wait before dialing.
Related	X , D

S7 (Carrier Wait Time)

Function	Stores the number of seconds modem will wait for a carrier signal after executing a dial string or answer before returning on-hook and sending a "NO CARRIER" result code to the DTE
Command Syntax	ATS7= <Argument>
Argument	0-255 (in seconds)
Default	60
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	D

S8 (Pause Wait Time)

Function	Stores the number of seconds for pause option (.) in the Dial command.
Command Syntax	ATS8= <Argument>
Argument	0-255 (in seconds)
Default	2
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	D

S9 (Carrier to Connect Wait Time)

Function	Stores the number of tenths of a second that modem will receive carrier signal before recognizing a valid connection. Modem ignores setting above 2400 bps due to length of handshaking sequences
Command Syntax	ATS9= <Argument>
Argument	0-255 (in 1/10 seconds)
Default	6
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



S10 (Loss of Carrier Wait Time)

Function	Stores the number of tenths of a second that modem will wait after loss of carrier before disconnecting.
Command Syntax	ATS10= <Argument>
Argument	0-255 (in 1/10 seconds)
Default	14
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



S11 (Touch Tone Spacing and Duration)

Function	Stores the duration and spacing, in milliseconds, of dialed touch tones
Command Syntax	ATS11= <Argument>
Argument	0-255 (in milliseconds)
Default	70
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S12 (Guard Time)

Function	Stores the duration, in fiftieths of a second, for the guard time of the escape sequence.
Command Syntax	ATS12= <Argument>
Argument	0-255 (in 1/50 seconds)
Default	50
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	<u>+++</u>

S13 (Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS13= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

	Value	Description
Argument	1	Reset modem when DTR is dropped
	2	Reset non-MNP transmit buffer from 1.5K bytes to 128 bytes.
	4	Set backspace key to delete.
	8	Autodial the number stored in NVRAM location 0 when DTR is asserted.
	16	Autodial the number stored in NVRAM location 0 upon software reset or when modem is powered up.
	32	Disable V.32bis ASL mode.
	64	Disable Quick Retrains
	128	Disconnect on escape code.
Default	0	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	None.	

S15 (Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS15= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

	Value	Description
	1	Disable ARQ/MNP for V.22
	2	Disable ARQ/MNP for V.22bis
	4	Disable ARQ/MNP for V.32/V.32bis/V.32terbo
	8	Disable MNP handshake.
	16	Disable MNP level 4.
	32	Disable MNP level 3.
Argument	64	MNP incompatibility.
	128	Disable V.42 operation.

Special settings - 136 (128 + 8) - Disable V.42 detection phase

Notes for S15=64 setting:

- Increases time allowed to establish connection by one second for compatibility with some modem manufacturer's products.
- Changes MNP link identifier from a USR standard to "generic" for compatibility with some modem manufacturer's products.
- Eliminates remote end echo, so no one will connect to themselves if the remote DCE echoes the MNP link request.
- Changes the delay of some control characters, for compatibility with some modem manufacturer's products.

Default 0

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.

S16 (Test Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS16= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

Argument	Value	Description
	1	Reserved.
	2	Dial test - when a touch tone digit is entered from the DTE in a dial string, the tone continues until a carriage return character from the DTE aborts it - for testing purposes.
	4	Test pattern generation - A test pattern is generated by the Modem and sent out over the phone link. A key press abort will terminate this function.
	8	Reserved.
	16	Reserved.
	32	Reserved.
	64	Reserved.
	128	Reserved.

Default 0

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.

S18 (Test Mode Timer)

Function	Stores the time for the diagnostics test mode &T . A value of 0 disables timer.
Command Syntax	ATS18= <Argument>
Argument	0-255 (in seconds)
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	&T

S19 (Inactivity Timer)

Function	Stores the duration for the inactivity timer. If modem senses no data transmission for a time exceeding the non-zero value in this register, it will disconnect the call. A value of 0 disables the function. Any value other than 0 enables it.
Command Syntax	ATS19= <Argument>
Argument	0-255 (in seconds)
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



S21 (Break Character Length)

Function	Stores the lengths of break characters sent from modem to DTE. For use in MNP or V.42 mode only.
Command Syntax	ATS21= <Argument>
Argument	0-255 (in 1/100 seconds)
Default	10
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S22 (XON Character)

Function	Stores the ASCII decimal code for the XON character
Command Syntax	ATS22= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	17 (decimal for DC1)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	&I

S23 (XOFF Character)

Function	Stores the ASCII decimal code for the XOFF character
Command Syntax	ATS23= <Argument>
Argument	Decimal representation for the character. See ASCII for more options.
Default	19 (decimal for DC3)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	&I



S25 (DTR Recognition Time)

Function	Sets DTR recognition time
Command Syntax	ATS25= <Argument>
Argument	0-255 (in 1/100 seconds)
Default	20
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S27 (Test Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS27= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

	Value	Description
Argument	1	V.21/ Bell 103 mode select (V.21 if set, Bell 103 if not)
	2	Enable unencoded modulation in V.32 mode.
	4	Disable V.32 modulation.
	8	Disable 2100 Hz answer tone.
	16	Enable V.23 fallback mode
	32	Used to disable V.32bis mode
	64	Disable V.42 Selective Reject
	128	Software compatibility mode. All connect messages above or equal to 9600 bps are expressed as "CONNECT 9600".
Default	0	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	None.	

S28 (V.32 Handshaking Time)

Function	Specifies how long the handshaking occurs with v.32
Command Syntax	ATS28= <Argument> 0-255 (in 1/10 seconds)
Argument	If S28 is set to 0, there will be no v.32 answer tones. This will produce a faster connection. If S28 is set to 255, it will disable all connections except v.32 9600 bps.
Default	8
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



S29 (V.21 Answer Mode Fallback Timer)

Function	v.21 Answer Mode Fallback Timer
Command Syntax	ATS29= <Argument>
Argument	0-255 (in 1/10 seconds)
Default	20
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S30 (Deadman Timer)

Function	Deadman timer
Command Syntax	ATS30= <Argument>
Argument	0-255 (in seconds)
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	#BDR



S31 (TAD Audio Level Adjust)

Function	Adjusts the volume for TAD applications
Command Syntax	ATS31= <Argument>
Argument	0-255
Default	128
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S32 (Connection Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS32= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

Argument	Value	Description
	1	V.8 Call Indicate enable.
	2	Enable V.8 mode.
	4	Disable V.FC modulation.
	8	Disable V.34 modulation.
	16	Disable V.34+ modulation.
	32	Disable x2 modulation.
	64	Disable V90 modulation.
	128	Reserved.

Default 2

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.

S33 (V.34/V.34+ Connection Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS33= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

Argument	Value	Description
	1	Disable 2400 Symbol rate.
	2	Disable 2743 Symbol rate.
	4	Disable 2800 Symbol rate.
	8	Disable 3000 Symbol rate.
	16	Disable 3200 Symbol rate.
	32	Disable 3429 Symbol rate.
	64	Reserved
	128	Disable Shaping.

Default 0

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.



S34 (V.34/V.34+ Connection Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS34= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

Argument	Value	Description
	1	Disable 8S-2D trellis encoding.
	2	Disable 16S-4D trellis encoding.
	4	Disable 32S-2D trellis encoding.
	8	Disable 64S-4D trellis encoding.
	16	Disable Non linear coding.
	32	Disable TX level deviation
	64	Disable Pre-emphasis.
	128	Disable Pre-coding.

Default 0

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.



S35 (x2 Connection Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS35= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers. This register is a little different in that the values between 0 and 7 represent 8 different variations on one setting, whereas normally, 0-7 would encompass two variations (on and off) for three values (1, 2, 4). To set this S-Register, it would be best to use the second method of adding the values up. So, in this example, to set the back channel rate to a max of 24000 and disable A/m law detection, you would issue ATS35=35.

	Value/Setting	Description
Argument	0-7	Bit field Limit x2 back channel operation. 0 -- No back channel limit 1 -- 28800 Max rate. 2 -- 26400 Max rate. 3 -- 24000 Max rate 4 -- 21600 Max rate 5 -- 19200 Max rate 6 -- 16800 Max rate 7 -- 14400 Max rate
	8	Enable x2 server operation.
	16	Enable x2 A law operation.
	32	Disable automatic A/m law detection.
	64	Disable reduced power.
	128	Reserved.
	0	
Default	0	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	None.	

S37 (V.90 Connection Options - Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS37= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers. This register is a little different in that the values between 0 and 15 represent 16 different variations on one setting, whereas normally, 0-15 would encompass two variations (on and off) for four values (1, 2, 4, 8). To set this S-Register, it would be best to use the second method of adding the values up. So, in this example, to set the back channel rate to a max of 24000 and disable A/mu law detection, you would issue ATS35=20.

	Value	Description
Argument	0-15	Bit field: Limit V90 back channel operation. 0 - No Back Channel limit 1 - 31200 Max rate. 2 - 28800 Max rate. 3 - 26400 Max rate. 4 - 24000 Max rate. 5 - 21600 Max rate. 6 - 19200 Max rate. 7 - 16800 Max rate. 8 - 14400 Max rate. 9 - 12000 Max rate. 10 - 9600 Max rate. 11 - 7200 Max rate. 12 - 4800 Max rate. 13 - Undefined. 14 - Undefined. 15 - Undefined.
	16	Disable automatic A/mu law detection.
	32	Force A law operation.
	64	Reserved.
	128	Reserved.
	0	
Default	0	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	None.	

S38 (DTR Drop Delay)

Function	Sets an optional delay before a forced hang-up and clearing of the Transmit buffer when DTR drops during an ARQ call. This allows time for a remote modem to acknowledge receipt of all transmit data before it is disconnected.
Command Syntax	ATS38= <Argument>
Argument	0-255 (in seconds)
Default	0 (Modem immediately hangs up when DTR drops)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

S41 (Bitmapped)

Function Multiple Functions. See Arguments.

Command Syntax ATS41= <Argument>

0-255 - See [Bitmaps](#) for details on how to set bitmapped registers.

	Value	Description
	1	Distinctive Ring Enable
	2	Speakerphone connect message override Off = Full-Duplex SpeakerPhone Mode On = Half-Duplex SpeakerPhone Mode
Argument	4	Digital Line Guard Disable
	8	Reserved.
	16	Reserved.
	32	Reserved.
	64	Reserved.
	128	Reserved.
Default	0	
DTE Interface	None.	
LED	None.	
Aborting Events	None.	
Notes	None.	
Related	Distinctive Ring	



Technical Ref.

Commands used by both Fax Class 1 and Fax Class 2.0

[+FCLASS](#) - Set Fax Class/Query Fax Class

[+FTS](#) - Stop Transmission and Pause

[+FRS](#) - Wait For Silence

[+FTM](#) - Transmit Data with Carrier

[+FRM](#) - Receive Data with Carrier

[+FTH](#) - Transmit HDLC Data with Carrier

[+FRH](#) - Receive HDLC Data with Carrier

[+FATX](#) - Asynchronous Transmit

[+FARX](#) - Asynchronous Receive

+FCLASS (Set Fax Class)

Function	Sets the current FCLASS to <argument>.
Command Syntax	AT+FCLASS=<argument>
Argument	0 - Data Mode 1 - Group 3 Facsimile Service Class 1 mode 2.0 - Group 3 Facsimile Service Class 2.0 mode +FCLASS=? Returns the current +FCLASS setting, either 0,1, or 2.0 +FCLASS? Returns the possible values of +FCLASS
Default	0
DTE Interface	None.
LED	The ARQ/FAX LED flashes when +FCLASS is set to 1 or 2.0.
Aborting Events	None.
Notes	None.
Related	None.

+FTS (Stop Transmission and Pause)

Function	This command causes the modem to stop any transmission. The modem then waits for the specified amount of time, and then sends the OK result code to the DTE. The value <time> is in 10 millisecond intervals.
Command Syntax	AT+FTS=<argument>
Argument	0-255
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FRS (Wait for Silence)

Function	Causes the modem to listen, and to report back an OK result code when silence has been present on the line for the amount of time specified. The value <time> is in 10 millisecond intervals. The command will terminate when the required amount of silence on the line is detected or the DTE sends the modem another character, which is discarded. In either event, the OK result code will be returned to the DTE.
Command Syntax	AT+FRS=<argument>
Argument	0-255
Default	0
DTE Interface	None.
LED	None.
Aborting Events	Any character sent from the DTE to the modem will abort the wait. The modem will then return an OK result code to the DTE.
Notes	None.
Related	None.

+FTM (Transmit Data with Carrier)

Causes the modem to transmit data using the modulation selected with the argument. [Modulation](#) lists all possible values and what they do for the arguments.

Function	The modem returns the CONNECT result code and transmits the proper training sequence in the selected mode, followed by constant 1 bits, until data is received from the DTE.
Command Syntax	AT+FTM=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem will filter transparent commands, <DLE><char>, as specified in EIA/TIA-578
LED	None.
Aborting Events	The modem will abort when it receives a <DLE><ETX> character from the DTE.
Notes	None.
Related	None.

+FRM (Receive Data with Carrier)

Causes the modem to enter receive mode using the modulation specified in [Modulation](#).

Function	When the selected carrier is detected, the modem will send the CONNECT result code to the DTE. If a different signal is detected, the modem shall send a +FCERROR (Connect Error) result code to the DTE, and return to command state.
Command Syntax	AT+FRM=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem will filter transparent commands, <DLE><char>, as specified in EIA/TIA-578
LED	None.
Aborting Events	Loss of carrier will abort +FRM and cause the modem to return a NO CARRIER result code.
Notes	None.
Related	None.

+FTH (Transmit HDLC Data with Carrier)

Causes the modem to transmit data framed in HDLC protocol using the modulation mode selected. The values for the <mod> parameter are listed in [Modulation](#).

Function	The modem will send the CONNECT result code to the DTE, and transmit signal converter training (if required) followed by flags until the first byte of data is sent by the DTE.
Command Syntax	AT+FTH=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem-DTE interface is specified in EIA/TIA-578.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FRH (Receive HDLC Data with Carrier)

Causes the modem to receive HDLC framed data using the modulation specified by <argument> and delivers the next frame to the DTE. Values for <modulation> are specified in [Modulation](#)

Function	If the modem detects the selected carrier with an HDLC flag, the modem shall send the CONNECT result code to the DTE. If a different signal is detected, the modem shall send +FCERROR (Connect Error) result code to the DTE and return to command state. The modem will return to command state upon loss of carrier, sending the NO CARRIER result code to the DTE.
Command Syntax	AT+FRH=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem-DTE interface is specified in EIA/TIA-578.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FATX (Asynchronous Transmit)

Function	The +FTH command causes the modem to transmit asynchronously using the modulation specified by <argument>. Values for <argument> are specified in Modulation
Command Syntax	AT+FATX=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem-DTE interface is specified in EIA/TIA-578.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FARX (Asynchronous Receive)

Function	The +FTH command causes the modem to receive asynchronously using the modulation specified by <argument>. Values for <argument> are specified in Modulation
Command Syntax	AT+FARX=<argument>
Argument	3, 24, 48, 72, 96, 97, 98, 121, 122, 145, 146
Default	0
DTE Interface	The modem-DTE interface is specified in EIA/TIA-578.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



Technical Ref.

Commands used by Fax Class 2.0 only

General	+FBU - HDLC Frame Reporting Parameter - NOT SUPPORTED
+FDT - Data Transmission	
+FDR - Data Reception	+FNR - Negotiations Message Reporting
+FKS - Session Termination	T.30 Procedure Control Parameters
+FIP - Initialize Fax Parameters	+FPS - Post Status
Class 2.0 Parameters	+FCQ - Copy Quality Checking
+FMI - Request Manufacturer ID	+FRQ - Receive Quality Thresholds - NOT SUPPORTED
+FMM - Request Model ID	+FAA - Adaptive Answer
+FMR - Request Model Revision	+FCT - DTE Phase C Timeout
T.30 Session Parameters	+FHS - Call Termination Status
+FCC - Modem Capabilities	+FRY - ECM Retry Value - NOT SUPPORTED
+FIS - Current Session Negotiating Position	+FMS - Minimum Phase C Speed
+FCS - Current Session Parameters	DTE-DCE Interface Parameters
+FLI - Local ID	+FLO - Flow Control Selection
+FNS - Non-standard Frame FIF Parameter	+FPR - Serial Port Rate Selection
Polling	+FPP - Packet Protocol Selection
+FPI - Local Polling ID	+FBO - Data Bit Order
+FLP - Indicate Document To Poll	+FEA - Phase C Received EOL Alignment
+FSP - Request To Poll	+FFC - Format Conversion - NOT SUPPORTED
+FCR - Capability To Receive	+FBS - Buffer Size



+FDT (Data Transmission)

Function	The +FDT command requests the modem to transmit a page. It is issued at the beginning of a page either in Phase B or in Phase D.
Command Syntax	AT+FDT
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FDR (Data Reception)

Initiates data reception. This command may be issued after:

Function 1) Answering
 2) Dialing
 3) Receiving a document
 4) Receiving a page.

Command Syntax AT+FDR

Argument None.

Default None.

DTE Interface None.

LED None.

Aborting Events None.

Notes None.

Related None.





+FKS (Session Termination)

Function	Initiates an orderly termination to a fax session.
Command Syntax	AT+FKS
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FIP (Initialize Fax Parameters)

Function	Initializes the Class 2.0 parameters to their default values. This command does not change the setting of +FCLASS .
Command Syntax	AT+FIP
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



+FMI (Request Manufacturer ID)

Function	Returns the manufacturers identification string.
Command Syntax	AT+FMI
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Read-only.
Related	None.



+FMM (Request Model ID)

Function	Returns the models identification string.
Command Syntax	AT+FMM
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Read-only.
Related	None.



+FMR (Request Modem Revision)

Function	Returns the modems revision dates
Command Syntax	AT+FMR
Argument	None.
Default	None.
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Read-only.
Related	None.

+FCC (Modem Capabilities)

Function	The +FCC parameters are used to constrain the modem's capabilities for all sessions. Any modification to +FCC will also cause the +FCC values to be copied into +FIS
Command Syntax	AT+FCC=<arguments>
Argument	VR, BR, WD, LN, DF, EC, BF, ST
Default	0,0,0,2,0,0,0,0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Possible values shown in Subparameters
Related	None.

+FIS (Current Session Negotiating Position)

The +FIS parameters are used to constrain the modem's capabilities for the current session. +FIS is set to the values stored in [+FCC](#) after:

Function	1) modem initialization 2) execution of a +FIP , initialize parameters, command 3) modification of the +FCC parameters 4) termination of a session.
Command Syntax	AT+FIS=<arguments>
Argument	VR, BR, WD, LN, DF, EC, BF, ST
Default	0,0,0,2,0,0,0,0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Possible values shown in Subparameters
Related	None.

+FCS (Current Session Parameters)

Returns the current session capabilities as negotiated by both stations.

+FCS is set to the default values after:

Function

- 1) Modem initialization
- 2) Execution of a [+FIP](#), initialize parameters, command
- 3) Termination of a session.

Command Syntax

AT+FCS

Argument

N/A

Default

N/A

DTE Interface

None.

LED

None.

Aborting Events

None.

Notes

Read-only. Values shown in [Subparameters](#)

Related

None.

+FLI (Local ID)

Function	The Local ID string is used by the remote station to identify the originating station.
Command Syntax	AT+FLI=<argument>
Argument	Up to 20 printable ASCII characters
Default	null string
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FNS (Non-Standard Frame FIF Parameter)

Function	Stores a non-standard facilities frame to be used as NSF or NSS. The string can be appended by repeated writes. If a null string is written, then the string will be initialized to null and the previous octets will be deleted.
Command Syntax	AT+FNS=<argument>
Argument	String of hex offsets to a maximum of 90
Default	null string
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



Technical Ref.

+FPI (Local Polling ID)

Function	The polling ID string is used by the remote station to identify the originating station.
Command Syntax	AT+FPI=<argument>
Argument	Up to 20 printable ASCII characters.
Default	null string
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FLP (Indicate Document to Poll)

Function	Indicates whether or not a document to poll exists.
Command Syntax	AT+FLP=<argument>
Argument	0 - No document to poll 1 - There is a document to poll
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	The parameter will be reset to 0 after the polled document is sent.
Related	None.



Technical Ref.

+FSP (Request to Poll)

Function	Indicates whether or not the originating station wishes to poll (and receive a document) or not.
Command Syntax	AT+FSP=<argument>
Argument	0 - No document to poll 1 - Can receive a polled document
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	The parameter will be reset to 0 after the polled document is sent. In order for a station to receive a polled document, Capability to Receive, +FCR , must also be set to 1.
Related	None.

+FCR (Capability to Receive)

Function	Enables or disables fax reception
Command Syntax	AT+FCR=<argument>
Argument	0 - Disable 1 - Enable
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FNR (Negotiations Message Reporting)

Function	Enables or disables reporting of various messages. A value of 0 disables reporting. A value of 1 enables reporting.
Command Syntax	AT+FNR=<arguments>
Argument	RPR, TPR, IDR, NSR
Default	0,0,0,0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Values for arguments are in Subparameters
Related	None.

+FPS (Post Status)

Function	Stores the post page message from the last data transfer. The page status is determined by the receiving station. If copy quality checking is disabled (+FCQ = 0), then +FPS=1.
Command Syntax	AT+FPS=<arguments>
Argument	1-5
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Values for arguments are in Subparameters
Related	None.

+FCQ (Copy Quality Checking)

Function	Controls the detection and correction of data errors for both transmitting and receiving.
Command Syntax	AT+FCQ=<arguments>
Argument	RQ, TQ
Default	1,0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Values for arguments are in Subparameters
Related	None.

+FAA (Adaptive Answer)

Function	Controls the mode that the modem will answer in and whether automatic mode switching is enabled.
Command Syntax	AT+FAA=<arguments>
Argument	0 - Fax only 1 - Data detection, choose appropriate mode
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FCT (DTE Phase C Timeout)

Function	Determines how long the modem will wait for a command after transmitting all available Phase C data. If the time-out is reached, the modem will issue an orderly abort command, +FKS .
Command Syntax	AT+FCT=<arguments>
Argument	0-255
Default	30
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



+FHS (Call Termination Status)

Function	Indicates the cause of the most recent hang-up.
Command Syntax	AT+FHS
Argument	0-FFh
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Read only. Values available in Subparameters
Related	None.

+FMS (Minimum Phase C Speed)

Function	Sets the minimum data rate for data transmission. This parameter can be used to limit the data transfer time and cost.
Command Syntax	AT+FMS=<arguments>
Argument	0-5
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FLO (Flow Control Selection)

Function	Selects the method of flow control used in data transfer between the modem and the serial port.
Command Syntax	AT+FLO=<arguments>
Argument	0 - Flow control disabled 1 - XON/XOFF flow control 2 - Hardware flow control
Default	1
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FPR (Serial Port Rate Selection)

Function	Selects the serial port rate used by the modem. A value of 0 selects the modem to autobaud with the remote station.
Command Syntax	AT+FPR=<arguments>
Argument	0,1,2,4,8,16,24
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Values available in Subparameters
Related	None.

+FPP (Packet Protocol Selection)

Function	Enables or disables DTE-DCE packet protocol
Command Syntax	AT+FPP=<arguments>
Argument	0 - Disable 1 - Enable
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FBO (Data Bit Order)

Function	Controls the bit order for Phase C data transfers. The bit order for Phase B and Phase D data transfers is always direct order.
Command Syntax	AT+FBO=<arguments>
Argument	0 - Direct 1 - Reversed
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



+FEA (Phase C Received EOL Alignment)

Function	Enables or disables byte-alignment of EOL markers in the data stream.
Command Syntax	AT+FEA=<arguments>
Argument	0 - Disable 1 - Enable
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

+FBS (Buffer Size)

Function	Reports the sizes of the transmit and receive buffers. The first value is the transmit buffer size and the second value is the receive buffer size.
Command Syntax	AT+FBS=<arguments>
Argument	TBS, RBS
Default	1800,4000
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Read only.
Related	None.



Voice Commands

#BDR - Select DTE Port Rate	#MDL - Identify Model
#CID - Caller ID	#MFR - Identify Manufacturer
#CLS - Select Data/Fax/Voice	#REV - Identify Revision Level
Commands Available In Voice Mode (#CLS=8)	
#VBQ - Query Buffer Size	#VSD - Silence Deletion
#VBS - Bits Per Sample	#VSK - Buffer Skid Setting
#VBT - Beep Tone Timer	#VSM - Compression Method Selection
#VCI - Identify Compression Methods	#VSP - Silence Detection Period
#VGR - Voice Receive Gain	#VSR - Sampling Rate Selection
#VGT - Voice Transmit Gain	#VSS - Silence Detection Tuner
#VLS - Voice Line Select	#VTD - DTMF Tone Reporting
#VRA - Ringback Goes Away Timer	#VTM - Enable Timing Mark Placement
#VRN - Ringback Never Came Timer	#VTS - Generate Tone Signals
#VRX - Voice Receive	#VTX - Voice Transmit

#BDR (Select DTE Port Rate)

Function	<p>This command forces the modem to select a specific DTE/modem port rate without further speed sensing on the interface. When a valid #BDR=n command is entered, the OK result code is sent at the current assumed speed. After the OK has been sent, the modem switches to the speed indicated by the #BDR=n command it has just received. When in Online Voice Command Mode and the #BDR setting is nonzero (no auto detect selected), the modem supports a full duplex DTE interface. This means that the DTE can enter commands at any time, even if the modem is in the process of sending a shielded code indicating DTMF detection to the DTE. When in Online Voice Command Mode and the #BDR setting is zero (auto detect selected), shielded code reporting to the DTE is disabled. [Note that when #BDR has been set nonzero, the modem employs the S30 Deadman Timer, and this timer starts at the point where #BDR is set nonzero. If this period expires (nominally 60 seconds) with no activity on the DTE interface, the modem reverts to #BDR=0 and #CLS=0.]</p> <p>AT#BDR= <Argument></p>
Command Syntax	<p>AT#BDR? - Returns the current setting of the #BDR command as an ASCII decimal value in result code format.</p> <p>AT#BDR=? - Returns a message indicating the speeds that are supported.</p>
Argument	0-48 (port rate = <argument>*2400 bps)
Default	0 (Auto detect)
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	When #BDR is set to a non-zero value, the modem will return OK at the current speed, then switch to the new speed.
Related	S30

#CID (Caller ID)

Function	This command selects or disables Caller ID recognition and reporting in any mode. AT#CID= <Argument>
Command Syntax	AT#CID? - Returns the current setting (0,1 or 2) of the #CID command as an ASCII decimal value in result code format. AT#CID=? - Returns "0,1,2". 0 - Caller ID Detection disabled 1 - Enables formatted Caller ID reporting of ICLID SDM (Single Data Message) and MDM (Multiple Data Message) packets. Example: DATE=1234 TIME=1234 NMBR=1234567890 NAME=ABCDEFGF 2 - Enables unformatted Caller ID reporting of any ICLID packet received after the first RING cycle including SDM, MDM, or call waiting packets. The DCE shall present all data items and packet control information, found in the Single Messages Format, contained in the Single Data Message (SDM) and in the Multiple Data Message (MDM) packets. The DCE shall present the entire Caller ID packet in ASCII hex as printable numbers. The characters in the ASCII hex message shall be in the bit order presented to the DCE. The DCE shall not insert spaces, <CR>, <LF> ASCII codes, for formatting, between the characters of the packet. Example: MESG=0412303332313134303539313435353132333435
Argument	
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Caller ID can not be detected when in voice mode. The reason is that the CID information is presented at 7200 samples per second and both voice modes (GSM and IMA ADPCM) supported by our voice modems are at 8000 samples per second. So, Caller ID information must be detected in data mode.
Related	Caller ID

#CLS (Select Data/Fax/Voice)

Function	This command selects data, fax or voice mode operation. AT#CLS= <Argument>
Command Syntax	AT#CLS? - Returns the current setting (0,1,2.0, or 8) of the #CLS command as an ASCII decimal value in result code format. AT#CLS=? - Returns "0,1,2.0,8". 0 - Data. This is similar to setting +FCLASS=0 , and instructs the modem to act like a data modem on subsequent answer or originate operations. When a disconnect or inactivity time out in the non-autodetect mode is detected, the modem automatically sets the #CLS setting to 0 and hangs up. This ensures that the modem is always in a known state despite disorderly DTE behavior. 1 - Class 1 fax. This is similar to setting +FCLASS=1 , and instructs the modem to be a Class 1 fax modem. Once this is set, the +FAA command can be used to force subsequent answers to be Class 1 adaptive answers. 2.0 - Class 2.0 fax. This is similar to setting +FCLASS=2.0 , and instructs the modem to be a Class 2.0 fax modem. Once this is set, the +FAA command can be used to force subsequent answers to be Class 2.0 adaptive answers. 8 - Voice Mode. This is the main setting the DTE uses to effect directed or adaptive answer or originate sequences involving voice modes. All telephone calls initialized by #CLS=8 result (after answer or successful call progress) in the modem going into Online Voice Command Mode.
Argument	
Default	0
DTE Interface	None.
LED	If #CLS=1 or =2.0 is sent, the ARQ/Fax LED will start blinking.
Aborting Events	None.
Notes	If the modem is in voice mode (#CLS=8) and +FCLASS=1 or =2.0 is issued, the modem will treat it as if #CLS=1 or =2 (respectively) were issued.
Related	None.



#MDL (Identify Model)

Function	This command requests the model number or name of the modem.
Command Syntax	AT#MDL?
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Output should be the same as AT <u>I3</u>
Related	None.



Technical Ref.

#MFR (Identify Manufacturer)

Function	This command requests the modem manufacturer.
Command Syntax	AT#MFR?
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Output should be either USRobotics or 3Com Corp.
Related	None.

#REV (Identify Revision Level)

Function	This command requests the revision level of the modem code.
Command Syntax	AT#REV?
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Output should match EPROM Revision and EPROM Date in AT <u>I7</u> .
Related	None.

#VBQ (Query Buffer Size)

Function	This query-only command returns the size of the modem's voice transmit and voice receive buffers in ASCII decimal, followed by the OK result code.
Command Syntax	AT#VBQ?
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
	Output should be similar to:
Notes	TX BUF = 1280 RX BUF = 1280
Related	None.

#VBS (Bits Per Sample)

Function	This command selects the degree of ADPCM voice compression to be used. It has no effect if GSM compression is being used.
Command Syntax	AT#VBS=<argument>
Argument	2 - 2 bits per sample 3 - 3 bits per sample 4 - 4 bits per sample #VBS=? returns "2,3,4" #VBS? returns the current setting
Default	4
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	#VCI

#VBT (Beep Tone Timer)

Function	This command defines the time period which is used by the modem as the DTMF or fixed tone duration for generating tones via the D command while in Online Voice Command Mode.
Command Syntax	AT#VBT=<argument> 0-40 (in 1/10 seconds)
Argument	0 will disable tone generation capability #VBT=? returns "0-40" #VBT? returns the current setting
Default	10
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VCI (Identify Compression Methods)

Function	This command queries the modem as to its compression method and raw bits-per-sample capability.
Command Syntax	AT#VCI?
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Output will be similar to: USRobotics;GSM-B;8 USRobotics;G.721 ADPCM;4 USRobotics;IMA ADPCM;4
	<OP0C0>;<D> pairs, separated by <LF0>s. Within each line, the <O> is left justified, and is separated from the <D> by the semicolon character and separated from the bits-per-sample string by another semicolon.<F255P255C255>. F is the author of compression. P is the method of compression. C is number of bits per sample.
Related	None.

#VGR (Voice Receive Gain)

Function	This command sets the speaker volume (for the receive channel) when the modem is in speakerphone mode.
Command Syntax	AT#VGR=<argument>
Argument	0-255
Default	128
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Based on this parameter the threshold for the AGC is set inside the DCE. The number otherwise has no meaning. The value of zero mutes the speaker. The values larger than 128 indicate a larger gain than nominal and values less than 128 indicate smaller gain than nominal.
Related	#VGT

#VGT (Voice Transmit Gain)

Function	This command sets the microphone volume (for the transmit channel) when the modem is in speakerphone mode.
Command Syntax	AT#VGT=<argument>
Argument	0-255
Default	128
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	Based on this parameter the threshold for the AGC is set inside the DCE. The number otherwise has no meaning. The value of zero mutes the microphone. The values larger than 128 indicate a larger gain than nominal and values less than 128 indicate smaller gain than nominal.
Related	#VGR

#VLS (Voice Line Select)

Function	This action command can be used to select which devices are routed through the modem.
Command Syntax	<p>AT#VLS=<argument></p> <p>0 - This command instructs the modem that when entering any of the three voice operating submodes (Online Command, Transmit, or Receive), that the telephone line interface should be routed through the modem. The OK response is sent to the DTE, and any previous connection is lost (i.e., the modem ends up on-hook as a result of issuing this command to connect to the telephone line). Result Codes: OK</p> <p>1 - This command instructs the modem to route only the handset through the modem. This setting can be chosen before recording a greeting message. Result Codes: VCON</p> <p>2 - This command instructs the modem to route only the speaker through the modem. This setting can be chosen before playing back any message. The modem immediately switches to Online Voice Command Mode, and the VCON response is generated for completeness. However, since this is an output only device, nothing of consequence can happen until the DTE sends the #VTX command. Result Codes: VCON</p> <p>3 - This command instructs the modem that only the auxiliary input device (microphone) should be routed through the modem. This setting can be chosen before recording a greeting message. Result Codes: VCON</p> <p>4 - This command is the same as #VLS =0, except that the modem enables the external speaker as well as the telephone line/handset circuit. Result Codes: OK</p> <p>6 - This command instructs the modem that both the microphone and speaker should be routed through the modem. This setting can be chosen for Full duplex AEC speakerphone operation. Result Codes: VCON</p> <p>#VLS? This query returns the current setting of the #VLS command as an ASCII decimal value in result code format.</p> <p>#VLS=? This query requests a report of the device types available for selection. The response is a series of numbers separated by commas, and each number indicates a device position number. Currently, device position numbers do happen to correspond to device type numbers, but this correlation is not required (i.e., 0's could be placed in the first few device position number locations to correspond to multiple telephone line connections).</p>
Argument	
Default	0
DTE Interface	None.
LED	None.



Technical Ref.

Aborting Events None.

Notes None.

Related None.



#VRA (Ringback Goes Away Timer)

Function	This command can be used, when originating a voice call (#CLS=8) to set the "Ringback Goes Away" timer value, i.e., an amount of time measured from when the ringback cadence stops once detected. If ringback is not detected within this period, the modem assumes that the remote has picked up the line and switches to Online Voice Command Mode. Every time a ringback cycle is detected, this timer is reset.
Command Syntax	AT#VRA=<argument> 0-255 (in 1/10 seconds)
Argument	0 - Turns off the "ringback goes away timer." After one ringback, the dialing modem sends VCON and enters Online Voice Command Mode immediately. #VRA? Returns the current setting of the #VRA command as an ASCII decimal value in result code format. #VRA=? Returns the message, "0-255".
Default	70
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	If in Speakerphone mode (#VLS=6) the modem will be detecting ringback, busy and dial tone before the timer expires. It will also route the incoming signal to the external speaker.
Related	None.

#VRN (Ringback Never Came Timer)

Function	This command can be used when originating a voice call (#CLS=8) to set the "Ringback Never Came" timer value, i.e., an amount of time measured from completion of dialing. If ringback is not detected within this period, the modem assumes the remote has picked up the line and switches to Online Voice Command Mode.
Command Syntax	AT#VRN=<argument> 0-255 (in 1/10 seconds)
Argument	0 - Turns off the "ringback goes away timer." After dialing, the dialing modem sends VCON and enters Online Voice Command Mode immediately. #VRN? Returns the current setting of the #VRN command as an ASCII decimal value in result code format. #VRN=? Returns the message, "0-255".
Default	100
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	If in Speakerphone mode (#VLS=6) the modem will be detecting ringback, busy and dial tone before the timer expires. It will also route the incoming signal to the external speaker.
Related	None.

#VRX (Voice Receive)

Function	This action command is only valid if the modem is in the Online Voice Command Mode (indicated previously with the VCON message), and is the switch to the Voice Receive Mode. This command is used when a voice file is to be received from the line, microphone, or handset. The #VLS command should have been previously issued to select the input source.
Command Syntax	AT#VRX
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



#VSD (Silence Detection)

Function	This command provides no function but will respond correctly for compatibility purposes.
Command Syntax	AT#VSD=<argument>
Argument	0,1
Default	0
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VSK (Buffer Skid Setting)

Function	This command queries and sets the number of bytes of spare space, after the XOFF threshold is reached, in the modem's buffer during Voice Transmit Mode. This equates to the "skid" spare buffer space, or the amount of data the DTE can continue to send after being told to stop sending data by the modem, before the modem voice transmit buffer overflows.
Command Syntax	AT#VSK=<argument> 0-255 (in bytes)
Argument	This number defines the 255 unused bytes remaining in the modem voice transmit buffer after an XOFF is sent to the DTE. #VSK? Returns the current setting of the #VSK command as an ASCII decimal value in result code format. #VSK=? Returns the message, "255".
Default	255
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VSM (Compression Method Selection)

Function	This command selects the method of compression and the sampling rate.
Command Syntax	<p>AT#VSM=<arguments></p> <p><cml>,<vsr></p> <p><cml> : DTE uses this parameter to select the compression method. This subparameter is the means to select the compression method, and has the form of a numerical constant. The DTE can obtain the label and an identifier using the #VSM=? command.</p> <p><vsr> : The DTE selects the DCE Voice sampling rate from among those supported; listed in the response of the #VSM=? command. The units are samples for second. This value overwrites the #VSR command.</p>
Argument	<p>#VSM=?</p> <p>The response for this command will be <cml>, <cmid>, <vsr> <cr><lf><cml><cr><lf></p> <p><cml>: this sub parameter is a numerical label of the compression method.</p> <p><cmid>: This sub parameter is a string describing the Compression method.</p> <p><vsr>: This sub parameter is a range of values that contains the DCE supported range of voice samples per second of the analog signal.</p> <p>Example:</p> <p>128,GSM/USR,8000</p> <p>129,G.721 ADPCM/USR,8000</p> <p>130,IMA ADPCM/USR,8000</p> <p>#VSM?</p> <p>The response for this command should be the current compression method and the sampling rate. Example: "128,8000"</p>
Default	128,8000
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VSP (Silence Detection Period)

This command sets the Voice Receive Mode silence detection period (inactivity timer) value. The parameter can be used when receiving voice data. This is an amount of time, which if elapsed without receiving any ADPCM data, causes the modem to send the <DLE>s or <DLE>q codes after insuring that the buffer is empty. There are two cases:

Function	1. With the modem's silence deletion feature enabled, the #VSP setting is in effect an inactivity timer. The modem must reset this non-silent data timer on every byte of voice data received.
	2. With the modem's silence deletion feature disabled, the modem determines what constitutes silence. This involves monitoring and debouncing the modem value for average energy. If this debounced value is less than an arbitrary threshold constituting the modem's definition of silence for a period greater than that defined by the #VSP setting, the modem sends the <DLE>q or <DLE>s shielded code to the DTE.
Command Syntax	AT#VSP=<arguments> 0-255 (in 1/10 seconds) #VSP=0 Turns off the silence period detection timer.
Argument	#VSP? Returns the current setting of the #VSP command as an ASCII decimal value in result code format. #VSP=? Returns the message, "0-255".
Default	55
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VSR (Sampling Rate Selection)

Function	This parameter, along with the bits per sample (#VBS) command, determines the necessary DTE interface speed to transmit and receive in the Voice Mode.
Command Syntax	AT#VSR=<argument> 8000
Argument	#VSR? Returns the current setting of the #VSR command as an ASCII decimal value in result code format. #VSR=? Returns the message "8000"
Default	8000
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VSS (Silence Detection Tuner)

Function	This command enables or disables the Voice Receive mode silence detection, and controls the sensitivity employed by the modem in compressing periods of silence.
Command Syntax	AT#VSS=<argument> 0 - Disables silence detection by the modem when in Voice Receive Mode. 1 - Least sensitive setting. When this command is received by the modem, the system is configured to a state which is least likely to detect and compress periods of silence, but still able to do so if the line is really quiet. 2 - Midrange setting. When this command is received by the modem, the system is configured to a state that is likely to be the best overall compromise on normal telephone lines. 3 - Most sensitive setting. When this command is received by the modem, the system is configured to a state that is most likely to detect and compress periods of silence. #VSS? Returns the current setting of the #VSS command as an ASCII decimal value in result code format. #VSS=? Returns the message, "0-3".
Argument	
Default	2
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VTD (DTMF Tone Reporting)**Function**

This command queries and controls which types of tones can be detected and reported to the DTE via shielded codes in Voice Transmit, Voice Receive, and Online Voice Command Modes.

Command Syntax

AT#VTD=<arguments>

i,j,k

i = Voice Transmit Mode, j = Voice Receive Mode, k = Online Voice Command Mode

Argument

Bit	Value	Variables
0	0	0 - Disable DTMF tone capability
	1	1 - Enable DTMF tone capability
1	0	0 - Disable V.25 1300 Hz Calling tone capability
	2	1 = Enable V.25 1300 Hz Calling tone capability
2	0	0 = Disable T.30 1100 Hz Facsimile Calling tone capability
	4	1 = Enable T.30 1100 Hz Facsimile Calling tone capability
3	0	0 = Disable V.25/T.30 2100 Hz Answer tone capability
	8	1 = Enable V.25/T.30 2100 Hz Answer tone capability
4	0	0 = Disable Bell 2225 Hz Answer tone capability
	16	1 = Enable Bell 2225 Hz Answer tone capability
5	0	0 = Disable call progress tone and cadence (e.g., busy and dial tone)
	32	1 = Enable call progress tone and cadence (e.g., busy and dial tone)
6-7	0	Reserved

The arguments are specified by taking the desired bitmapped characteristics, summing them to a decimal value, then getting the hexadecimal equivalent (see [ASCII](#) for translation table). Each of the three arguments is set this way.

#VTD? Returns the current setting of the #VTD command as an ASCII decimal value in result code format.

#VTD=? Returns the message "3F,3F,3F".

Default

3F,3F,3F

DTE Interface

None.

LED

None.

Aborting Events

None.

Notes

Right now, the only supported setting for this command is 3F,3F,3F.

Related

None.

#VTM (Timing Mark Placement)

Function	This command provides no function other than command response compatibility when used on USRobotics based modem.
Command Syntax	AT#VTM=<argument>
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VTS (Generate Tone Signals)

Function	This action command can be issued to play one of more DTMF or other tones (such as a "beep") if and only if the modem is in the Online Voice Command Mode. The modem parses and plays the tones defined in the parameter in the order listed, and no key abort is accepted.
Command Syntax	<p>AT#VTS=<arguments></p> <p>The arguments can take three forms:</p> <p>Dual or Single Tones: These are represented by a substring [x,y,z] enclosed in square brackets ("[]") within the parameter. Each such substring consists of three sub-elements corresponding to two frequencies in Hz (0, or 200-3000) and a duration (ASCII decimal in units of 100 ms).</p> <p>Example:</p> <p>#VTS=[1700,2200,1] would send a dual tone of 1700Hz/2200Hz for 100ms</p>
Argument	<p>Varying DTMF Digits: This is represented by a substring enclosed in curly braces ("{}") within the parameter. Each such substring consists of two sub-elements corresponding to a DTMF digits (0-9,A-D,*,#), and alternate durations in units of 100 ms.</p> <p>Example:</p> <p>#VTS={0,20} would send the DTMF tone "0" for 2 seconds.</p> <p>DTMF digits, with duration defined by #VBT. This is represented by a value x (non-bracketed) corresponding to a DTMF digit (0-9,A-D,*,#) in the parameter field.</p> <p>Example:</p> <p>#VTS=0 would send the DTMF tone "0"</p>
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.

#VTX (Voice Transmit)

Function	This action command can be issued if and only if the modem is in the Online Voice Command Mode (indicated previously with the VCON message), and is the switch to Voice Transmit Mode. #VTX is used when a voice file is to be transmitted to the line, speaker, or handset. The #VLS command should have been previously issued to select the output source.
Command Syntax	AT#VTX
Argument	None.
Default	N/A
DTE Interface	None.
LED	None.
Aborting Events	None.
Notes	None.
Related	None.



Appendix A - Result Codes

Below is a table listing result codes in both their numeric (V0) and verbal forms (V1).

Numeric	Verbal	Numeric	Verbal
0	OK	85	CONNECT 19200
1	CONNECT	88	CONNECT 19200/ARQ
2	RING	91	CONNECT 21600
3	NO CARRIER	94	CONNECT 21600/ARQ
4	ERROR	97	CONNECT 21600/VFC
5	CONNECT 1200	98	CONNECT 21600/ARQ/VFC
6	NO DIAL TONE	99	CONNECT 24000
7	BUSY	100	CONNECT 24000/ARQ
8	NO ANSWER	101	CONNECT 24000/VFC
9	reserved	102	CONNECT 24000/ARQ/VFC
10	CONNECT 2400	103	CONNECT 26400
11	RINGING	104	CONNECT 26400/ARQ
13	CONNECT 9600	105	CONNECT 26400/VFC
14	CONNECT/ARQ	106	CONNECT 26400/ARQ/VFC
15	CONNECT 1200/ARQ	107	CONNECT 28800
16	CONNECT 2400/ARQ	108	CONNECT 28800/ARQ
17	CONNECT 9600/ARQ	109	CONNECT 28800/VFC
18	CONNECT 4800	110	CONNECT 28800/ARQ/VFC
19	CONNECT 4800/ARQ	111	CONNECT 21600/V34
20	CONNECT 7200	112	CONNECT 21600/ARQ/V34
21	CONNECT 12000	113	CONNECT 24000/V34
22	CONNECT 12000/ARQ	114	CONNECT 24000/ARQ/V34
24	CONNECT 7200/ARQ	115	CONNECT 26400/V34
25	CONNECT 14400	116	CONNECT 26400/ARQ/V34
26	CONNECT 14400/ARQ	117	CONNECT 28800/V34
33	CONNECT 9600/V32	118	CONNECT 28800/ARQ/V34
37	CONNECT 9600/ARQ/V32	120	CONNECT 2400/V34
38	CONNECT 4800/V32	122	CONNECT 2400/ARQ/V34
39	CONNECT 4800/ARQ/V32	124	CONNECT 4800/V34
40	CONNECT 7200/V32	126	CONNECT 4800/ARQ/V34
41	CONNECT 12000/V32	128	CONNECT 7200/V34
42	CONNECT 12000/ARQ/V32	130	CONNECT 7200/ARQ/V34
43	CONNECT 16800	132	CONNECT 9600/V34
44	CONNECT 7200/ARQ/V32	134	CONNECT 9600/ARQ/V34
45	CONNECT 14400/V32	136	CONNECT 12000/V34
46	CONNECT 14400/ARQ/V32	138	CONNECT 12000/ARQ/V34
47	CONNECT 16800/ARQ	139	CONNECT 14400/VFC



Technical Ref.

Numeric	Verbal	Numeric	Verbal
140	CONNECT 14400/V34	201	CONNECT 45333/ARQ
141	CONNECT 14400/ARQ/VFC	202	CONNECT 45333/x2
142	CONNECT 14400/ARQ/V34	203	CONNECT 45333/ARQ/x2
143	CONNECT 16800/VFC	204	CONNECT 46666
144	CONNECT 16800/V34	205	CONNECT 46666/ARQ
145	CONNECT 16800/ARQ/VFC	206	CONNECT 46666/x2
146	CONNECT 16800/ARQ/V34	207	CONNECT 46666/ARQ/x2
147	CONNECT 19200/VFC	208	CONNECT 48000
148	CONNECT 19200/V34	209	CONNECT 48000/ARQ
149	CONNECT 19200/ARQ/VFC	210	CONNECT 48000/x2
150	CONNECT 19200/ARQ/V34	211	CONNECT 48000/ARQ/x2
151	CONNECT 31200	212	CONNECT 49333
152	CONNECT 31200/ARQ	213	CONNECT 49333/ARQ
153	CONNECT 31200/V34	214	CONNECT 49333/x2
154	CONNECT 31200/ARQ/V34	215	CONNECT 49333/ARQ/x2
155	CONNECT 33600	216	CONNECT 50666
156	CONNECT 33600/ARQ	217	CONNECT 50666/ARQ
157	CONNECT 33600/V34	218	CONNECT 50666/x2
158	CONNECT 33600/ARQ/V34	219	CONNECT 50666/ARQ/x2
180	CONNECT 33333	220	CONNECT 52000
181	CONNECT 33333/ARQ	221	CONNECT 52000/ARQ
182	CONNECT 33333/x2	222	CONNECT 52000/x2
183	CONNECT 33333/ARQ/x2	223	CONNECT 52000/ARQ/x2
184	CONNECT 37333	224	CONNECT 53333
185	CONNECT 37333/ARQ	225	CONNECT 53333/ARQ
186	CONNECT 37333/x2	226	CONNECT 53333/x2
187	CONNECT 37333/ARQ/x2	227	CONNECT 53333/ARQ/x2
188	CONNECT 41333	228	CONNECT 54666
189	CONNECT 41333/ARQ	229	CONNECT 54666/ARQ
190	CONNECT 41333/x2	230	CONNECT 54666/x2
191	CONNECT 41333/ARQ/x2	231	CONNECT 54666/ARQ/x2
192	CONNECT 42666	232	CONNECT 56000
193	CONNECT 42666/ARQ	233	CONNECT 56000/ARQ
194	CONNECT 42666/x2	234	CONNECT 56000/x2
195	CONNECT 42666/ARQ/x2	235	CONNECT 56000/ARQ/x2
196	CONNECT 44000	236	CONNECT 57333
197	CONNECT 44000/ARQ	237	CONNECT 57333/ARQ
198	CONNECT 44000/x2	238	CONNECT 57333/x2
199	CONNECT 44000/ARQ/x2	239	CONNECT 57333/ARQ/x2
200	CONNECT 45333	256	CONNECT 28000

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Technical Ref.

257	CONNECT 28000/ARQ	287	CONNECT 40000/ARQ/V90
258	CONNECT 28000/V90	288	CONNECT 33333/V90
259	CONNECT 28000/ARQ/V90	289	CONNECT 33333/ARQ/V90
260	CONNECT 29333	290	CONNECT 37333/V90
261	CONNECT 29333/ARQ	291	CONNECT 37333/ARQ/V90
262	CONNECT 29333/V90	292	CONNECT 41333/V90
263	CONNECT 29333/ARQ/V90	293	CONNECT 41333/ARQ/V90
264	CONNECT 30666	294	CONNECT 42666/V90
265	CONNECT 30666/ARQ	295	CONNECT 42666/ARQ/V90
266	CONNECT 30666/V90	296	CONNECT 44000/V90
267	CONNECT 30666/ARQ/V90	297	CONNECT 44000/ARQ/V90
268	CONNECT 32000	298	CONNECT 45333/V90
269	CONNECT 32000/ARQ	299	CONNECT 45333/ARQ/V90
270	CONNECT 32000/V90	300	CONNECT 46666/V90
271	CONNECT 32000/ARQ/V90	301	CONNECT 46666/ARQ/V90
272	CONNECT 34666	302	CONNECT 48000/V90
273	CONNECT 34666/ARQ	303	CONNECT 48000/ARQ/V90
274	CONNECT 34666/V90	304	CONNECT 49333/V90
275	CONNECT 34666/ARQ/V90	305	CONNECT 49333/ARQ/V90
276	CONNECT 36000	306	CONNECT 50666/V90
277	CONNECT 36000/ARQ	307	CONNECT 50666/ARQ/V90
278	CONNECT 36000/V90	308	CONNECT 52000/V90
279	CONNECT 36000/ARQ/V90	309	CONNECT 52000/ARQ/V90
280	CONNECT 38666	310	CONNECT 53333/V90
281	CONNECT 38666/ARQ	311	CONNECT 53333/ARQ/V90
282	CONNECT 38666/V90	312	CONNECT 54666/V90
283	CONNECT 38666/ARQ/V90	313	CONNECT 54666/ARQ/V90
284	CONNECT 40000	314	CONNECT 56000/V90
285	CONNECT 40000/ARQ	315	CONNECT 56000/ARQ/V90
286	CONNECT 40000/V90		

Appendix B - Fax Class 1 Result Codes

The below table lists the response codes for the modem in Fax Class 1 mode.

Numeric	Verbose	Description
0	OK	The previous command has been processed successfully.
1	CONNECT	The DCE is has just connected to another fax modem.
2	RING	(Optional) Reports the receipt of a network altering ring.
3	NO CARRIER	No carrier is being received from the DCE.
4	ERROR	The previous command line has not been recognized or was completed abnormally.
5	NO DIAL TONE	(Optional) Dial tone was not received within the timeout period.
6	BUSY	(Optional) A busy signal was detected.
3	NO CARRIER	(Optional) DCE sends this response if a connection cannot be established (see EIA/TIA-578 sec. 8.4).
51	CONNECT/FAX	(Optional) The DCE has established a fax connection. This response is used only when fax/data mode is selected.

Appendix C - Fax Class 2.0 Result Codes

Phase A Responses

+FCO Fax Connection

The +FCO message indicates a connection has been made to a Group 3 fax station.

+FDM Transition to Data Modem

The +FDM message indicates that a connection has been made with a remote data modem and that the local station is going to switch to a data modem. This response is enabled when [+FAA](#)=1 and disabled when [+FAA](#)=0.

Phase B Responses

+FCS DCS Frame Information

syntax: +FCS: VR, BR, WD, LN, DF, EC, BF, ST (see [Subparameters](#))

Reports the current session parameters. This message is sent after a [+FDT](#) or [+FDR](#) command is executed and new DCS frames are sent.

+FIS DIS Frame Information

syntax: +FIS: VR, BR, WD, LN, DF, EC, BF, ST (see [Subparameters](#))

Reports the remote station's capabilities. [ATD](#), [ATA](#), [+FDT](#) or [+FDR](#) commands may generate this message.

+FTC DTC Frame Information

syntax: +FTC: VR, BR, WD, LN, DF, EC, BF, ST (see [Subparameters](#))

Reports the remote station's capabilities. [ATD](#), [ATA](#), [+FDT](#) or [+FDR](#) commands may generate this message.

+FPO Remote Polling Indication

Indicates that the remote station has a document to poll. [ATD](#), [ATA](#), [+FDT](#) or [+FDR](#) commands may generate this message.

+FTI Report Remote ID, TSI

Reports the remote TSI ID string. [ATD](#), [ATA](#), [+FDT](#) or [+FDR](#) commands may generate this message.

+FCI Report Remote ID, CSI

Reports the remote CSI ID string. ATD, ATA, +FDT or +FDR commands may generate this message.

+FPI Report Remote ID, CIG

Reports the remote CIG ID string. ATD, ATA, +FDT or +FDR commands may generate this message.

+FNF Report NSF Frame

Reports a Non-Standard Facilities Frame. ATD, ATA, +FDT or +FDR commands may generate this message.

+FNS Report NSS Frame

Reports a Non-Standard Setup Frame. ATD, ATA, +FDT or +FDR commands may generate this message.

+FNC Report NSC Frame

Reports a Non-Standard Commands Frame. ATD, ATA, +FDT or +FDR commands may generate this message.

Phase C Responses

+FPS T.30 Phase C Page Reception

syntax: PPR, LC, BLC, CBLC, LBC (see below)

The +FPS message is generated by the receiving station at the end of data reception. The sub parameters are as follows:

PPR reports the post page response according to the table below:

Table 1: Post Page Response, PPR

VALUE	LABEL	RESULT CODE	DESCRIPTION
1	MCF	OK	page good
2	RTN	ERROR	page bad, retrain requested
3	RTP	OK	page good, retrain requested
4	PIP	OK	page good, remote request for a procedure interrupt
5	PIN	ERROR	page bad, remote request for a procedure interrupt

LC, Line Count, reports the number of lines sent.

BLC, Bad Line Count, reports the number of bad lines set.

CBLC, Consecutive Bad Line Count, reports the number of consecutive bad lines sent.

LBC, Lost Byte Count, reports the number of lost bytes.

Phase D Responses

+FET Post Page Message

The Post Page Message indicates whether or not the transmitting station has more data or not.

PPM CODE	T.30 MNEMONIC	DESCRIPTION
0	MPS	another page, same document
1	EOM	another document
2	EOP	no more data

Appendix D - Shielded <DLE> Commands from the DCE

<DLE>0 - <DLE>9, <DLE>*, <DLE>#, <DLE>A -<DLE>D

DTMF Digits 0 through 9, *, #, or A through D detected by the modem, i.e., user has pressed a key on a local or remote telephone. The modem sends only one <DLE> code per DTMF button pushed.

<DLE>a (currently not supported)

Answer Tone (CCITT). Sent to the DTE when the [V.25/T.30](#) 2100 Hz Answer Tone (Data or Fax) is detected. If the DTE fails to react to the code, and the modem continues to detect Answer tone, the code is repeated as often as once every half second.

<DLE>b

Busy. Sent in Voice Receive Mode when the busy cadence is detected, after any remaining data in the voice receive buffer. The modem sends the busy <DLE>b code every 4 seconds if busy continues to be detected and the DTE does not react. This allows the DTE the flexibility of ignoring what could be a false busy detection.

<DLE>c

Calling Tone. Sent when the [T.30](#) 1100 Hz Calling Tone (Fax Modem) is detected in any of the voice operating modes. The modem assumes that the calling tone is valid and sends this code only after 4 seconds of proper cadence has been detected. If the DTE does not react to the <DLE>c, and calling tone continues, the code is sent again as often as once every 4 seconds.

<DLE>d

Dialtone. Sent in Voice Receive Mode when dial tone is detected after any remaining data in the voice receive buffer. The modem sends the <DLE>d code every 4 seconds if dial tone continues to be detected and the DTE does not react. This allows the DTE the flexibility of ignoring what could be false dial tone detection.

<DLE>e (currently not supported)

European Data Modem Calling Tone. Sent when the [V.25](#) 1300 Hz Calling Tone (Data Modem) is detected in a voice submode. The modem assumes that the calling tone is valid, and sends this code only after 4 seconds of proper cadence has been detected. If the DTE does not react to the <DLE>e and calling tone continues, the code is sent again as often as once every 4 seconds.

<DLE>f (currently not supported)

Bell Answer Tone. Sent when Bell 2225 Hz Answer Tone (Data) is detected. If the DTE fails to react to the code and the modem continues to detect Answer tone, the code is repeated as often as every 1/2 second.

<DLE>*

Call Indicator signal (CI). Send when the [V.8](#) CI is detected in any of the voice operating modes initiating a session of data transmission. RapidCommVoice is currently using "*" as an indicator for data transmission.

<DLE>h

Hung Up Handset. Sent immediately when the modem detects that the local handset has hung-up (i.e., has transitioned from off-hook to on-hook) while in any of the three voice submodes.

<DLE>o (currently not supported)

Overflow. Sent in Voice Receive Mode if the voice receive data buffer overflows, in which case, the latest data is lost in favor of retaining the oldest data in the buffer. (The DTE may not have been reading data from the modem lately.) The modem inserts the <DLE>o at the end of the buffer, thus marking the location where data was lost by the DTE. The modem does not append <E> <D> <DLE>o codes to the buffer contiguously. If more than one data byte is lost before the DTE begins reading again, there is only one <DLE>o code in the data stream. However, if the DTE resumes reading, and then once again allows the buffer to overflow, a new <DLE>o is appended to the data by the modem. Thus, the <E> <D> <DLE>o does not indicate how many bytes of contiguous data has been lost, but may report multiple gaps of lost data in the data stream.

<DLE>q

Quiet. Sent in Voice Receive Mode following any remaining data in the receive voice buffer when the silence detection timer ([#VSP](#)) expires and there has been voice data passed to the DTE. Note that with [#VSS=0](#), the Quiet message never occurs. But with silence detection turned on, [#VSS](#) may not in itself be sufficient since "cracks and pops" for a short duration directly after a connection should not be considered voice. In general, <DLE>q is sent if first there was sound, and now there is no sound, and means that somebody has stopped talking, and according to the criteria selected in the [#VSP](#) and [#VSS](#) settings, is probably not going to start again. If the DTE ignores the <DLE>q code, the modem automatically resets its timer and sends the code again if the [#VSP](#) time period again expires. This allows the DTE time to react to what may be false silence detection.

<DLE>R (currently not supported)

Ring. Sent in online voice command mode and a valid ring is detected. This command is currently not supported.

<DLE>r (currently not supported)

Ringback. Sent after dialing and the timers [#VRA](#) or [#VRN](#) does not expire and a valid ringback has been detected. This command is currently not supported.

<DLE>s

Silence. Sent in Voice Receive Mode after the silence detection timer ([#VSP](#)) expires and if valid voice has not been detected ([#VSS](#)). In general, <DLE>s is sent if no sound was detected at all. This differs slightly from Quiet (<DLE>q) in that it can be used by the DTE in its discrimination algorithms as a means of determining if anything at all is coming from the remote station. If the DTE ignores the <DLE>s code, the modem automatically resets its timer and sends the code again if the [#VSP](#) time period again expires. This allows the DTE time to react to what may be a false detection of silence.

<DLE>t

Handset Off-Hook. Sent one time when the local handset transition from on-hook to off-hook is detected in any of the three voice submodes.

<DLE>u (currently not supported)

Underrun. Sent in Voice Transmit Mode when the voice transmit buffer becomes empty without receiving a <DLE><ETX> or <DLE><CAN> command first. The modem remains in transmit mode, but issues the <DLE>u to indicate that silence is being generated. When the DTE resumes sending bytes, the modem allows a small number of bytes to build up in the buffer before re-enabling the transmitter to avoid repeated underruns. However, with the underrun condition, the modem does not wait for the XOFF threshold (or timer) to be met before resuming, as it does on an initial transmit or resume operation because the remote listener may be unaware of the underrun, and keeping the silence short may serve to mask the underrun altogether.

<DLE><ETX>

End of Stream. <DLE><ETX> is sent to denote the end of a voice data stream, similar to fax Class 1 and 2. This occurs in Voice Receive Mode only after the DTE issues the key abort.

Shielded <DLE> Commands from the DTE

Most commands issued for voice are implemented as extensions to the AT command set, and are accepted only if the modem is in a valid command mode, such as Online Voice Command Mode. However, there are some operations that are available to the DTE without necessitating a switch to Online Voice Command Mode. The most obvious of these is the <DLE><ETX> which the DTE issues during Voice Transmit Mode to terminate an output message. Table 3-2 lists shielded <DLE> commands recognized by the modem.

<DLE><ETX>

Terminate. Sent during Voice Transmit Mode to indicate that the DTE has finished transmitting a voice message. The modem completes transmission of any remaining data in the voice transmit buffer before responding with the VCON message and entering Online Voice Command Mode. (This command is ignored by the modem when not in Voice Transmit Mode.)

<DLE><CAN>

Cancel. Sent during Voice Transmit Mode to indicate that the DTE has finished transmitting a voice message and wants the modem to discard any remaining data in the voice transmit buffer. The modem immediately purges its buffer and then responds with the VCON message entering Online Voice Command Mode. (This command is ignored by the modem when not in Voice Transmit Mode.)

<DLE>p (currently not supported)

Pause. Sent during Voice Transmit Mode to force the modem to suspend sending voice data to the selected output device(s). Any data currently in the voice transmit buffer is saved until either a resume (<DLE>r), or cancel <DLE><CAN>, is received, in which case the data is lost. If a <DLE><ETX> is received during the paused state, the modem processes it normally, and also automatically resumes transmission of the data left in the buffer (appended with <DLE><ETX>). Any other data received from the DTE while in this paused state is placed in the transmit buffer according to available space, with flow control active. (This command is ignored in other voice submodes.)

<DLE>r (currently not supported)

Resume. Sent during Voice Transmit Mode to force the modem to resume sending voice data to the selected output device(s). Any data currently in the voice transmit buffer is now played. (This command is ignored in other voice modes.) The pause and resume commands are different than a simple suspension of data; data in the buffer is "frozen" and not played when the DTE pauses.

Appendix E - &F Settings

Setting	&F0	&F1	&F2
B	0	0	0
E	1	1	1
F	1	1	1
L	2	2	2
M	1	1	1
Q	0	0	0
V	1	1	1
X	1	4	4
Y	0	0	0
&A	1	3	3
&B	0	1	1
&C	1	1	1
&D	2	2	2
&G	0	0	0
&H	0	1	2
&I	0	0	2
&K	1	1	1
&M	4	4	4
&N	0	0	0
&P	0	0	0
&R	1	2	1
&S	0	0	0
&T	5	5	5
&U	0	0	0
&Y	1	1	1

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Technical Ref.

S0	0	0	0
S1	0	0	0
S2	43	43	43
S3	13	13	13
S4	10	10	10
S5	8	8	8
S6	2	2	2
S7	60	60	60
S8	2	2	2
S9	6	6	6
S10	14	14	14
S11	70	70	70
S12	50	50	50
S13	0	0	0
S15	0	0	0
S16	0	0	0
S18	0	0	0
S19	0	0	0
S21	10	10	10
S22	17	17	17
S23	19	19	19
S25	5	5	5
S27	0	0	0
S28	8	8	8
S29	20	20	20
S30	0	0	0

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Technical Ref.

S31	128	128	128
S32	2	2	2
S33	0	0	0
S34	0	0	0
S35	0	0	0
S36	14	14	14
S38	0	0	0
S39	0	0	0
S40	1	1	1
S41	0	0	0
S42	0	0	0

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Appendix F - &N&U Settings

Value	Speed	Value	Speed
0	Variable	20	32000
1	300	21	33333
2	1200	22	34666
3	2400	23	36000
4	4800	24	37333
5	7200	25	38666
6	9600	26	40000
7	12000	27	41333
8	14400	28	42666
9	16800	29	44000
10	19200	30	45333
11	21600	31	46666
12	24000	32	48000
13	26400	33	49333
14	28800	34	50666
15	31200	35	52000
16	33600	36	53333
17	28000	37	54666
18	29333	38	56000
19	30666	39	57333

Appendix G - Setting Bitmapped S-Registers

Bitmapped registers are an easy way to store multiple logical switches in one setting. The bitmapped registers, like regular ones, store the setting in 8 bits. That means 256 possibilities ($2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$ or 0-255). However, the bitmapped registers can have each bit be assigned to a different logical setting.

Let's take S34 as an example. Below is a listing of the variables for S34.

Bit	Value	Description
0	1	Disable 8S-2D trellis encoding
1	2	Disable 16S-4D trellis encoding
2	4	Disable 32S-2D trellis encoding
3	8	Disable 64S-4D trellis encoding
4	16	Disable Non linear coding
5	32	Disable TX level deviation
6	64	Disable Pre-emphasis
7	128	Disable Pre-coding

To set bitmapped registers, you can do one of two things.

1) Specify the bit

You can specify the bit to enable or disable by using the format `ATSn.b=x` where *n* is the S Register, *b* is the bit (0-7) and *x* (0 or 1) is the setting. Along the line of the above example, you would set TX Level Deviation to disabled by issuing `ATS34.5=1`. The disadvantage of this is that you have to issue multiple commands to set multiple variables in one bitmapped register.

2) Construct the settings

You can also set all the bitmapped settings in one command. You do this by adding up all the values that you want to set. In the above example, if you wanted to set TX Level Deviation (32) and Pre-coding (128) to disabled, you would issue `ATS34=160`.



Technical Ref.

Appendix H - +FARX, +FATX, +FRH, +FRM, +FTH, +FTM Settings

Value	Data Rate	Modulation Type
3	300	v.21 channel 2
24	2400	v.27ter
48	4800	v.27ter
72	7200	v.29
73	7200	v.17
74	7200	v.17 with short training
96	9600	v.29
97	9600	v.17
98	9600	v.27 with short training
121	12000	v.17
122	12000	v.17 with short training
145	14400	v.17
146	14400	v.17 with short training

Appendix I - Subparameters

+FCC, +FCS, and +FIS

Label	Function	Values	Description	
VR	Vertical Resolution	0	Normal. 98 lines per inch (lpi)	
		1	Fine. 196 lpi	
BR	Bit Rate	0	2400 bps	
		1	4800 bps	
		2	7200 bps	
		3	9600 bps	
WD	Page Width	0	1728 pixels in 215 mm	
		1	2048 pixels in 255 mm	
		2	2432 pixels in 303 mm	
LN	Page Length	0	A4. 297 mm	
		1	B4. 364 mm	
		2	unlimited length	
DF	Data Compression Format	0	1-D Modified Huffman	
EC	Error Correction	0	Disabled	
BF	Binary File Transfer	0	Disabled	
ST	Scan Time Per Line		VR = 0	VR = 1
		0	0 ms	0 ms
		1	5 ms	5 ms
		2	10 ms	5 ms
		3	10 ms	10 ms
		4	20 ms	10 ms
		5	20 ms	20 ms
		6	40 ms	20 ms
		7	40 ms	40 ms

+FNR

Label	Reports Affected
RPR	Receiver parameters, +FIS and +FTC
TPR	Transmitter parameters, +FCS
IDR	ID strings, +FTI, +FCI, and +FPI
NSR	Non-Standard frames, +FNF, +FNS , and +FNC

+FPS

Value	T.30 Mnemonic	Description
1	MCF	Page good
2	RTN	Page bad, retrain requested
3	RTP	Page good, retrain requested
4	PIN	Page bad, interrupt requested
5	PIP	Page good, interrupt requested

+FCQ

Label	Value	Description
RQ	0	Receive checking disabled. +FPS will be set to 1
	1	Receive checking enabled
	2	Receive checking enabled. Modem will detect and correct errors
TQ	0	Transmit checking disabled
	1	Transmit checking enabled. Modem will send <CAN> following any errors
	2	Transmit checking enabled. Modem will detect and correct errors

+FHS

Value (hex)	Description
<i>00-0F</i>	<i>Call Placement and Termination</i>
00	Normal and proper end of connection
01	Ring detect without successful handshake
02	Call aborted from +FKS or <CAN>
03	No loop current
04	Ringback detected. no answer
05	Ringback detected. answer without CED
<i>10-1F</i>	<i>Transmit Phase A and Miscellaneous Errors</i>
10	Unspecified Phase A error
11	No answer
<i>20-3F</i>	<i>Transmit Phase B Handup Codes</i>
20	Unspecified transmit Phase B error

21	Remote cannot receive or send
22	COMREC error in transmit Phase B
23	COMREC invalid command received
24	RSPREC error
25	DCS sent three times without response
26	DIS / DTC received three times
27	Failure to train at 2400 bit/s or +FMS value
28	RSPREC invalid response received
40-4F	<i>Transmit Phase C Handup Codes</i>
40	Unspecified transmit Phase C error
41	Unspecified image format error
42	Image conversion error
43	DTE to DCE underflow
44	Unrecognized transparent data command
45	Image error. line length wrong
46	Image error. page length wrong
47	Image error. wrong compression code
50-6F	<i>Transmit Phase D Hand-up Codes</i>
50	Unspecified transmit Phase D error
51	RSPREC error
52	No response to MPS
53	Invalid response to MPS
54	No response to EOP
55	Invalid response to EOP
56	No response to EOM
57	Invalid response to EOM
58	Unable to continue after PIN or PIP
70-8F	<i>Receive Phase B Hand-up Codes</i>
70	Unspecified Receive Phase B error
71	RSPREC error
72	COMREC error
73	T.30 T2 time-out. expected page not received
74	T.30 T1 time-out. after EOM received
90-9F	<i>Receive Phase C Hand-up Codes</i>
90	Unspecified Receive Phase C error
91	Missing EOL
93	DCE to DTE buffer overflow
A0-BF	<i>Receive Phase D Hand-up Codes</i>
A0	Unspecified Receive Phase D errors
A1	RSPREC invalid response
A2	COMREC invalid response



Technical Ref.

A3
C0-DF
E0-EF

Unable to continue after PIN or PIP
reserved for future standardization
reserved for manufacturer use

+FPR

Value	Port Rate
0	Autobaud
1	2400
2	4800
4	9600
8	19200
16	38400
24	57600

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Appendix J - Caller ID

Here's the structure for Caller ID (CID) information in the USA, as specified by Bellcore. To enable it on the modem, set [#CID](#) to either 1 or 2. If you want to skip past the technical details, you can jump down to [How To Use Caller ID](#).

Caller ID comes in two forms, Calling Number Delivery (CND) and Calling Name Delivery (CNAM). They are commonly known as Caller ID and Caller ID With Name, respectively. The method for presenting the data comes in two forms, Single Data Message Format (SDMF) and Multiple Data Message Format (MDMF). CNAM is always presented in MDMF and CND can be presented using SDMF (USA seems to use this exclusively for CND) or MDMF (Canada seems to use this for CND on DMS switches). In the future, all Caller ID information may be sent in MDMF.

Both SDMF and MDMF have the same basic parameters:

Parameter	Value
Link Type	Simplex, two-wire
Transmission Scheme	Analog, Phase-coherent Frequency Shift Keying
Logical 1 (Mark)	1200 +/- 12 Hz
Logical 0 (Space)	2200 +/- 22 Hz
Transmission Rate	1200 bps
Transmission Level	-13.5 +/- 1 dBm
Data Application	Serial/Binary/Asynchronous

See the below table for the sequences of a normal transmission using either SDMF or MDMF.

Stage	SDMF	SDMF Value	MDMF	MDMF Value
1	First Ring	N/A	First Ring	N/A
2	Guard Time	>/= ~500ms	Guard Time	>/= ~500ms
3	Channel Seizure	30 bytes of 55h	Channel Seizure	30 bytes of 55h
4	Carrier	150ms of Mark	Carrier	150ms of Mark
5	Message Type	04h	Message Type	80h
6	Message Length	variable	Message Length	variable
7	Month	variable	Parameter Type - Time	01h
8	Day	variable	Parameter Length	08h
9	Hour	variable	Month	variable
10	Minute	variable	Day	variable
11	<phone number digits>	variable	Hour	variable
12	Checksum	variable	Minute	variable
13	Guard Time	>/= ~450ms	Parameter Type - Number	02h
14	Second Ring	N/A	Parameter Length	variable
15			<phone number digits>	variable
16			Parameter Type - Name	07h
17			Parameter Length	variable
18			<name>	variable
19			Checksum	variable
20			Guard Time	>/= ~450ms
21			Second Ring	N/A

In the above example, if MDMF is used to send CND information, then stages 16 through 18 are not present.

Also, if the caller number is marked as Private or Out Of Area/Unavailable, then SDMF will send "P" (50h - Private) or "O" (49h - Out Of Area/Unavailable) in stage 11. MDMF will send 04h in stage 13, 01h in stage 14 and "P" (50h) or "O" (49h) in stage 15.



Technical Ref.

Finally, if the caller name is marked as Private or Out Of Area/Unavailable, then MDMF will send 08h in stage 16, 01h in stage 17 and "P" (50h) or "O" (49h) in stage 18.

Here's an explanation of the stages:

CID information is sent between the first and second ring. The information must start by ~500ms (Guard Time) after the end of the first ring and must end ~450ms before the second ring.

After the guard time, both SDMF and MDMF send the Channel Seizure Signal, 30 bytes of "U" (55h) (approximately 250 ms at 1200 bps), to signify upcoming data. Then, The Carrier Signal is sent, which is 150ms of Mark (1) state.

Next comes the Message Type. This signifies whether the message will be SDMF (04h) or MDMF (80h).

Then, the Message Length. This tells the receiver how many data words (bytes) it should expect to receive. Convert this to decimal.

Then, for MDMF, comes the Parameter Type. This indicates the type of data that is coming next. In this case, it's 01h, signifying Time data. Then, MDMF has a Parameter Length field, which will be 08h, for the 8 bytes of Time data.

SDMF goes right into the Time Data:

Time Data is divided up into Month, Day, Hour, and Minute. Each is represented by two bytes. The Hour field is in military time.

Then, MDMF would send another Parameter Type field, this time a 02h, for Number. And, again, the Parameter Type, this time a variable length, depending on the size of the phone number sent.

SDMF goes right into the phone number. Each digit is represented by the hex value for that digit (30h for 0, 31h for 1, etc.).

Then, if the message includes the caller name information, MDMF will send another sequence of Parameter Type, Parameter Length and data bytes.

Finally, Checksum Word. This is the two's complement of the modulo 256 sum of the bytes in stages 5 through 11 for SDMF, 5 through 15 (or 18 if CNAM) for MDMF. The receiving device should calculate the modulo 256 of the data it received, then add that and the Checksum. If the result is zero, then the message was received successfully. If not, then the device will pass data signifying a line error, as retransmission is not an option.

Here's an example of a Caller ID transmission using SDMF:

55 <----130 ms MARK---->

04 12 31 31 30 37 32 30 31 30 38 34 37 32 36 32 35 31 35 31 55

That would be translated to:

11/7 8:10p

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Here's an example of a Caller ID transmission using MDMF:

ms MARK---->

80 27 01 08 31 31 30 37 32 30 31 30 02 0A 38 34 37 32 36 32 35 31 35 31 07 10 55 53 52 20 54 45 43
48 20 53 55 50 50 4F 52 54 FD

That would be translated to:

11/7 8:10p

(847) 262-5151

USR TECH SUPPORT

How To Use Caller ID

Developing an application that will retrieve Caller ID information can be quite simple (at least the CID part). You can do one of two things:

You can take the formatted output of `#CID=1` and capture a substring of the textstream containing the CID data for each field. The advantage to this is that you don't have to convert it yourself. The disadvantage is that you might want it in a different format and early USR modems with Caller ID support had a problem with retrieving and formatting Caller ID information on some Canadian phone lines.

Or, you could take the unformatted output of `#CID=2`, convert it yourself and display it how you like. The unformatted stream will contain fields 5 through 11 with SDMF or fields 5 through 15 (or 18) for MDMF format. The advantage of this is that you can convert it once and format it however you like. Also, for older USR models, it will properly display CID info on the problematic phone lines mentioned above. The disadvantage is that you will have to convert the information.

To get the Caller ID specs, go to [Bellcore](#) and search the catalog for:

TR-NWT-000031
TR-NWT-001188



Appendix K - Distinctive Ring

The original USRobotics Sportster Voice modems (models 1171 and 1172) and most newer voice and non-voice modems support distinctive ring as provided by a majority of the North American telecommunication providers polled in conjunction with the [Bellcore](#) documented standards. The command to enable DRING is [S41=1](#). Once enabled, the modem will respond with "RING A|RING B|RING C|RING D" depending on the ring cadence observed from the telephone line. Please note that the complete ring cadence is separated from the next ring cadence by a period of 4 seconds without ring voltage.

RING A	2s ON	4s OFF				
RING B	800ms ON	400ms OFF	800ms ON	4s OFF		
RING C	200ms ON	400ms OFF	200ms ON	400ms OFF	800ms ON	4s OFF
RING D	200ms ON	400ms OFF	800ms ON	400ms OFF	200ms ON	4s OFF



Appendix L - GSM Information

GSM (Groupe Speciale Mobile) is a couple of things. It is an organization devoted to making mobile communications easier, by having one standard. While that may not seem to be very related to our voice modems, but it is. GSM created a specification for compressing audio signals to save space when transmitting over the airwaves. USR adopted this standard for use in our voice modems (we support GSM 6.10) because it would suit the same purpose. With it, we could take a voice signal from the phone line and compress it enough to be able to transmit it over the serial link at acceptable speeds. Now, on to the technical details.

GSM is a frame based speech coder, that is, it processes one frame at a time. gsm_coder will compress 160 PCM samples into a 17 word (16 bit) or 33 bytes GSM frame. gsm_decoder will decompress a gsm frame into 160 PCM samples. The gross bit rate is 13 kbps.

General I/O format for GSM

PCM Input for gsm_coder:

- Sample is at 4 bits/8kHz
- Input anti-aliasing filter
- 16 bits signed format. Linear PCM directly from linear AIC.
- The bit format is s.v.v.v.v.v.v.v.v.v.v.v.v.v.x.x. where S is the sign bit, v a valid bit, and x a "don't care" bit.
- 160 sample buffer size.

Output from gsm_decoder:

- 160 sample buffer size
- 16 bits signed format. Linear PCM with 3 '0' LSBs.
- The bit format is s.v.v.v.v.v.v.v.v.v.v.v.v.v.0.0.0. where s is the sign bit, v is a valid bit.

GSM bit frame format

The following table details the GSM bit frame format. In a GSM frame, gsm_head is defined by the application to identify the frame, e.g. the frame index. Please note that the 8 LSBs of the last (17th) word are not used by GSM. Those bits can be used by the applications, or simply be stripped away for the byte mode to reduce the bit rate. GSM frame size is either 17 words or 33 bytes.

Index	Byte1	Byte2	Index	Byte1	Byte2
1	Head(4) LAR1(4)	LAR1(2) LAR2(6)	10	X210(2) X211(3) X212(3)	N3(7) B3(1/2)
2	LAR3(5) LAR4(3/5)	LAR4(2/5) LAR5(4) LAR6(2/4)	11	B3(1/2) M3(2) XMAX3(5/6)	XMAX3(1/6) X30(3) X31(3) X32(1/3)
3	LAR6(2/4) LAR7(3) LAR8(3)	N1(7) B1(1/2)	12	X32(2/3) X33(3) X34(3)	X35(3) X36(3) X37(2/3)
4	B1(1) M1(2) XMAX1(5/6)	XMAX1(1/6) X10(3) X11(3) X12(1/3)	13	X37(1/3) X38(3) X39(3) X310(1/3)	X310(2/3) X311(3) X312(3)
5	X12(2/3) X13(3) X14(3)	X15(3) X16(3) X17(2/3)	14	N4(7) B4(1/2)	B4(1/2) M4(2) XMAX4(5/6)
6	X17(1/3) X18(3) X19(3) X110(1/3)	X110(2/3) X111(3) X112(3)	15	XMAX4(1) X40(3) X41(3) X42(1/3)	X42(2/3) X43(3) X44(3)
7	N2(7) B2(1/2)	B2(1/2) M2(2) XMAX2(5/6)	16	X45(3) X46(3) X47(2/3)	X47(1/3) X48(3) X49(3) X410(1/3)
8	XMAX2(1/5) X20(3) X21(3) X22(1/3)	X22(2/3) X23(3) X24(3)	17	X410(2/3) X411(3) X412(3)	
9	X25(3) X26(3) X27(2/3)	X27(1/3) X28(3) X29(3) X210(1)			

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Application I/O format for GSM

The 17 word GSM frame is encapsulated. The "begin frame word" is 0xFEFE and the "end frame word" is 0xA5A5. Occasionally, the "begin" word will be 0xB6B6. This indicates that the volume is below the silence threshold defined by the DSP. The 34th byte is always 0x00. A total of 19 words is used to transmit a GSM voice frame across the serial device.

As of the release of the x2 based voice modems, the option to enable UN-encapsulated GSM is now available. [S41](#) (Voice Options Bitmap) defines the how this is accomplished. During playback to the modem, it will always auto-detect encapsulated GSM, un-encapsulated GSM, or ADPCM data. During record from the modem, [S41](#) will determine the format of the GSM data if [#VSM](#) has selected GSM as the audio data format.



Appendix M - Determination Methods

Here are ways to determine whether or not a particular modem has a certain feature:

Data Options:

V.90 or x2 or V.34 or v.FC: Issue [AT+V](#) and look for the line beginning with Options. The space from there until the CR/LF pair will list the data modulations, V.32bis and above. Note that if the modem supports the 33.6 extensions of V.34, it will list "V.34+". If just 28.8 V.34, then it will say "V.34"

Fax Options:

To determine the fax classes supported, you can do one of two things. First, you can issue [AT+V](#) and look for "Class 1" or "Class 2.0" on the line beginning "Fax Options". Second, you can issue [AT+FCLASS](#) with the fax class for which you wish to check.

Line Options:

To determine whether or not a modem supports Caller ID, the easiest way is to issue [AT+CID=1](#). If the modem responds "OK", then it's supported. To determine whether or not a modem support Distinctive Ring, you can either issue [AT+SR=1](#) and check for "OK" or issue [AT+V](#) and look at the Line Options line. Just search for "Distinctive Ring". This will also work for Caller ID if you check for "Caller ID".

Voice Codecs:

The best way to determine what voice codecs a modem supports is to issue [#VCI?](#) and check the output. Each codec will be on a separate line listing the code manufacturer, the codec type and the number of bits per sample, each separated by a semi-colon. If the modem responds with ERROR, then it's not a voice modem.

V.80

The way to tell whether or not a modem supports V.80 is to issue a [AT+ESA=?](#). If the modem returns ERROR, then the modem does not support V.80.

Appendix N - Voice Samples**Originating Speakerphone**

DTE/Application	DCE/Modem	Description
AT#CLS=8	OK	Modem enters voice mode.
AT#VLS=6	VCON	Modems selects speakerphone mode
AT#VRN=0	OK	Don't wait for ringback
ATDT<number>	CONNECT	Modem enters CALL PROGRESS state. It dials any DTMF digits that follow. The DTMF digits being dialed out are echoed to the local speaker. Once the CONNECT message is sent, transmission is two way. Start talking.

Answering Speakerphone

DTE/Application	DCE/Modem	Description
		First ring
	RING	If Caller ID and/or Distinctive Ring are enabled, the modem and application perform whatever actions are necessary
	RING	Second ring
AT#CLS=8	OK	Modem enters voice mode.
AT#VLS=6	VCON	Modems selects speakerphone mode
ATA	CONNECT	Start talking

Hanging Up

DTE/Application	DCE/Modem	Description
ATH	OK	Modem hangs up the line
AT#VLS=0	OK	Telephone line interface routed through modem
AT#CLS=0	OK	Data mode



Switching Call Waiting Lines

DTE/Application	DCE/Modem	Description
		Modem in speakerphone mode, conversation taking place when Call Waiting beep/click is heard
AT# VTS =!	OK	Switches to other "line".
AT# VTS =!	OK	Switches back to first "line".

Switching from Speakerphone to Handset

DTE/Application	DCE/Modem	Description
	<dle>t	Modem in speakerphone mode, detects handset connected to modem is off hook.
AT# VGR =0	OK	Mutes the speaker
AT# VGT =0	OK	Mutes the microphone

Switching from Handset to Speakerphone

DTE/Application	DCE/Modem	Description
		Modem in handset mode, user presses Mute/Hold on handset. If the modem is not in speakerphone mode already, switch to it (see above).
AT# VGR =n	OK	Set speaker gain to desired level (n)
AT# VGT =n	OK	Set microphone gain to desired level (n)

Appendix O - Glossary

Please note that the definitions below will be updated and made clearer as time goes on.

ASCII - American Standard Code for Information Interchange. A code established by [ANSI](#) (American National Standards Institute) to translate 128 characters into 7 bit binary language.

Baud Rate - The number of changes in the carrier wave per second. Not the same as bits per second, as there can be multiple bits per baud, resulting in a bit rate much higher than the baud rate. See [Symbol Rate](#)

Bit - Binary digit. A logical value (mark or space, on or off, yes or no) used by computers to represent information.

Bits per second (bps) - Also known as bit rate. The speed at which data is transferred between two systems. Not the same as baud rate.

Blers - From ATi6, block Errors. Number of errors found in data and protocol blocks.

Blocks Received - From ATi6, v.42 blocks received from remote modem.

Blocks Resent - From ATi6, v.42 blocks resent to remote modem due to block errors (Blers).

Blocks Sent - From ATi6, v.42 blocks sent to remote modem.

Byte - A unit of information, comprised of a number of bits. 7 bit and 8 bit bytes are the most common.

Carrier - A signal wave used for data transmission. To transmit information, characteristics of the carrier can be modified, such as amplitude and frequency.

CCITT - Consultative Committee for International Telephone and Telegraph (English translation). A group set up to establish standards related to the telephone and telegraph infrastructure. In 1992, their function was moved to a sector of the [ITU](#) and they were dissolved.

Carrier Frequency - 1) The number of times per second the carrier wave will completely alternate. 2) From ATi11, the frequency of the carrier wave on the receive/transmit channels (respectively).

Carrier Offset - From ATi11, the amount, in Hz, that the local modem needs to compensate to allow a successful carrier signal with the remote modem and its timing source.

Chars Lost - From ATi6, number of characters lost in transit.

Chars Received - From ATi6, number of characters received by the local modem from the remote modem.

Chars Sent - From ATi6, number of characters sent from the local modem to the remote modem.

Clock Freq. - From ATi7, the "speed" of the internal clock used by the modem.



Data Compression - 1) A method of taking data, finding repetitive sequences, and replacing them with representative markers, thereby reducing the number of bytes being transmitted from modem to modem (but not DTE to DTE). The two data compression technologies supported by our modems are v.42bis and MNP 5. 2) In the ATi6 screen, this indicates the compression protocol, dictionary size/max. string length

DSP Date - From ATi7, the DSP code date. Concerns code related to DSP functions.

DSP Revision - From ATi7, the DSP code revision.

EPROM - 1) Erasable Programmable Read Only Memory 2) From ATi7, the size of the EPROM in the modem

Equalization - From ATi6, a legacy field from the Courier. Applicable for HST calls only.

Fallback - From ATi6, whether or not the modem can speed shift. Only active when online and using a high speed protocol (> 2400).

Far Echo Loss - The amount of signal strength lost due to echo, calculated at a far point in the circuit. From ATi11, the signal amount lost.

Fax Options - From ATi7, a list of the major fax modulations supported by the modem.

FLASH Date - From ATi7, the supervisor code date. This is the primary method for determining which code is in the modem. AKA EPROM Date, Code Date

FLASH Rev - From ATi7, the revision level of the supervisor code.

ITU - [International Telecommunications Union](#). A standards committee set up to establish guidelines for the telecommunications and radiocommunications sectors.

Last Call - From ATi6, length (hh:mm:ss) of the last or current call.

Line Options - From ATi7, a list of the major phone line interface options supported by the modem.

Line Reversals - From ATi6, a legacy field from the Courier. This is the number of the times the channels on an HST connection reversed to allow the bandwidth to be used more effectively.

Link NAKs - From ATi6, Negative ACKnowledgements on the link.

Link Timeouts - From ATi6, number of instances where communications ceased unexpectedly.

Modem - Acronym for MOdulator/DEModulator. A device that, on one channel, takes serial data from the [UART](#), converts it from digital signals to analog form suitable for transfer over phone lines. On the other channel, it does the reverse, converting the analog signal from the phone line, converting it back to digital and sending it on to the [UART](#).

Modulation - 1) A method of altering the carrier to represent bits being transmitted. 2) In ATi11, the modulation used in the current/last connection.

Near Echo Loss - The amount of signal strength lost due to echo, calculated at a close point in the circuit. From ATi11, the signal amount lost.



Technical Ref.

Nonlinear Encoding - From AT111, a method for improving distortion immunity near the perimeter of a signal constellation by introducing a non-uniform two-dimensional (2D) signal point spacing.

Octets Lost - From AT16, number of compressed characters lost.

Octets Received - From AT16, number of compressed characters received from remote modem. If this number is greater than the [Chars Received](#), then the modems are using MNP5 on an already compressed file.

Octets Sent - From AT16, number of compressed characters sent to remote modem. If this number is greater than the [Chars Sent](#), then the modems are using MNP5 on an already compressed file.

Options - From AT17, a list of the major speed modulations supported by the modem.

Precoding - From AT111, A non-linear equalization method for reducing equalizer noise enhancement caused by amplitude distortion. Equalization is performed at the transmitter using precoding coefficients provided by the remote modem.

Preemphasis - From AT111, amount of the signal increase on the receive/transmit channels (respectively).

Product ID - From AT17, the model number

Product Type - From AT17, the country for which the device was manufactured and the form factor.

Protocol - 1) Error control. A way for the receiving modem to detect errors and request retransmission of data. Incorrectly called error correction. 2) In AT16, the error control protocol used by the current/last connection.

RAM - 1) Random Access Memory 2) In AT17, the amount of RAM in the modem

Recv/Xmit Level - From AT111, the signal "loudness" on the receive/transmit channels (respectively).

Retrains Granted - From AT16, number of full retrains granted to remote modem.

Retrains Requested - From AT16, number of full retrains requested by local modem.

Round Trip Delay - From AT111, the amount of time it take data to reach the opposite end and receive acknowledgement from the remote DCE.

Shaping - A method of avoiding points in the constellation where there are deficiencies. From AT111, whether or not shaping is ON on the receive/transmit channels, respectively.

SNR - 1) Signal to Noise Ratio. The strength of the signal on the channel, when compared to the noise level. 2) From AT111, the last SNR value calculated for the current/last connect.

Speed - From AT16, last or current Receive/Transmit channel speeds.

Speed Shift - 1) A change in the speed level which takes a fraction of a second. Compare to retrain, which is an almost complete reestablishment of the protocols and take multiple seconds. 2) From AT111, the number of speed shifts to a higher/lower level.

Status - From AT111, information on the connection. Details on subsections is proprietary information.

Symbol Rate - 1) the number of carrier wave signal changes per second. Similar to baud rate, not the same as bits per second. 2) In AT111, the "baud rate" of the receive/transmit channels (respectively).

Timing Offset - From AT111, the amount, in parts per million, that the local modem needs to compensate to allow a successful carrier signal with the remote modem and its timing source.

Trellis Code - From AT111, the type of trellis code modulation used.

Trellis Code Modulation - A method of adding redundant bits to the stream, which reduces the error rate.

UART - Universal Asynchronous Receiver/Transmitter. A device that, at it's basic level, converts the data in parallel (byte at a time) form from the computer to serial form (bits at a time with start/stop bits and parity) to send to another device (modem, e.g.) and vice versa.

V.90 (or x2) Peak Speed - From AT16, highest speed reached on the receive channel.

Voice Options - From AT17, a list of the major voice options supported by the modem.
