

AT COMMANDS & S-REGISTERS

SUPPORTED AT COMMANDS & S-REGISTER DEFINITIONS FOR THE FOLLOWING PRODUCTS:

***Part #:* CH1786**

***Part #:* CH1786A**

***Part #:* CH1787**

***Part #:* CH1794**

***Part #:* CH1794A**

***Part #:* CH1799**

***Part #:* CH1799A**

***Part #:* CH2056**

***Part #:* CH2056A**

***Part #:* CH2100**

***Part #:* CH2124**

***Part #:* CH2160**

***Part #:* CH2165**

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AT Commands

A command line is a string of characters sent from a DTE to the modem (DCE) while the modem is in a command state. A command line has a prefix, a body, and a terminator. Each command line (with the exception of the A/ command) must begin with the character sequence AT and must be terminated by a carriage return. Commands entered in upper case or lower case are accepted, but both the A and T must be of the same case, i.e., "AT"=ASCII 065, 084 or "AT"= ASCII 097, 116. The body is a string of commands restricted to printable ASCII characters (032-126). Space characters (ASCII 032) and control characters other than CR (ASCII 013) and BS (ASCII 010) in the command string are ignored. The default terminator is the ASCII <CR> character. Characters that precede the AT prefix are ignored. The command line interpretation begins upon receipt of the carriage return character.

Characters within the command line are parsed as commands with associated parameter values. The basic commands consist of single ASCII characters, or single characters preceded by a prefix character (e.g., "&"), followed by a decimal parameter. Missing decimal parameters are evaluated as 0.

The modem supports the editing of command lines by recognizing a backspace character. When modem echo is enabled, the modem responds to receipt of a backspace or delete by echoing a backspace character, a space character, and another backspace. The hex value to be used for the backspace character is programmable through register S5. Values equal to 0 or greater than 127, or the value which corresponds to the carriage return character, cannot be used for the backspace character. This editing is not applicable to the AT header of a command. A command line may be aborted at any time by entering <cntrl-x> (18h).

The AT sequence may be followed by any number of commands in sequence, except for commands such as Z, D, or A. Commands following commands Z, D, or A on the same command line will be ignored. The maximum number of characters on any command line is 39 (including A and T). If a syntax error is found anywhere in a command line command, the remainder of the line will be ignored and the ERROR result code will be returned.

Most commands entered with parameters out of range will not be accepted and the ERROR response will be returned to the DTE.

Commands will only be accepted by the modem once the previous command has been fully executed, which is normally indicated by the return of an appropriate result code.

Execution of commands D and A, either as a result or a direct command or a re-execute command, will be aborted if another character is entered before completion of the handshake.

Escape Code Sequence

When the modem has established a connection and has entered on-line data mode, it is possible to break into a data transmission in order to issue further commands to the modem in an on-line command mode. This is achieved by the DTE sending to the modem a sequence of three ASCII characters specified by register S2. The default character is '+'. The maximum time allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE is controlled by the S12 register.

AT Command Set

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown for each configuration command are those used in factory profile 0.

I. BASIC AT COMMANDS

A/ - Re-execute Command

The modem behaves as though the last command line had been resent by the DTE. "A/" will repeat all the commands in the command buffer.

The principal application of this command is to place another call (using the Dial command) that failed to connect due to a busy line, no answer, or a wrong number. This command must appear alone on a command line. This command should not be terminated by a carriage return.

AT=x - Write to Selected S-Register

This command writes the value x to the currently selected S-Register. An S-Register can be selected by using the ATSn command. All of the S-Registers will return the OK response if x is a number. Some registers may not be written due to country specific PTT limitations.

Result Codes:

OK For all arguments.

AT? - Read Selected S-Register

This command reads and displays the selected S-Register. An S-Register can be selected by using the ATSn command.

Result Codes:

OK For all arguments.

A - Answer

The modem will go off-hook and attempt to answer an incoming call if correct conditions are met. Upon successful completion of answer handshake, the modem will go on-line in answer mode. This command may be affected by the state of Line Current Sense, if enabled. (Most countries do not require Line Current Sense.)

Bn - CCITT or Bell

When the modem is configured to allow either option, the modem will select Bell or CCITT modulation for a line speed connection of 300 according to the parameter supplied. Any other line speed will use a CCITT modulation standard.

- B0 Selects CCITT operation at 300 or 1200bps during Call Establishment and sequent connection.
- B1 Selects BELL operation at 300 or 1200 bps during Call Establishment and a subsequent connection. (Default)

Result Codes:

OK n=0, 1
ERROR Otherwise.

Dn - Dial

This command directs the modem to go on-line, dial according to the string entered and attempt to establish a connection. If no dial string is supplied, the modem will go on-line and attempt the handshake in originate mode.

IMPORTANT NOTE

If the ATD command is issued before register S1 has cleared, the modem will respond with the NO CARRIER result code.

Dial modifiers. The valid dial string parameters are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces being ignored.

- 0-9 DTMF digits 0 to 9.
- * The "star" digit (tone dialing only).
- A-D DTMF digits A, B, C and D. Some countries may prohibit sending of these digits during dialing.
- L Redial last number: the modem will redial the last valid telephone number. The L must be immediately after the D with all the following characters ignored (CH1786A, CH179X, CH2056, CH2160, and CH2165 only).
- P Select pulse dialing: pulse dial the numbers that follow until a "T" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is selected.
- T Select tone dialing: tone dial the numbers that follow until a "P" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
- S=n Dial the number stored in the directory (n=0 to 3). See &Zn command.
- ! Flash: the modem will go on hook for a time defined by the value of S29. Country requirements may limit the time imposed.

- W** Wait for the dial tone: the modem will wait for dial tone before dialing the digits following "W." If dial tone is not detected within the time specified by S6, the modem will abort the rest of the sequence, return on hook, and generate an error message.
- @** Wait for silence: the modem will wait for at least 5 seconds of silence in the call progress frequency band before continuing with the next dial string parameter. If the modem does not detect these 5 seconds of silence before the expiration of the call abort timer (S6), the modem will terminate the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with a BUSY result code. If answer tone arrives during execution of this parameter, the modem handshakes.
- &** Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S6, the modem will abort the rest of the sequence, return on-hook and generate an error message (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160, and CH2165 only).
- '** Dial pause: the modem will pause for a time specified by S8 before dialing the digits following ",'".
- ;** Return to command state. Added to the end of a dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the ",'". This allows the user to issue additional AT commands while remaining off-hook. The additional AT commands may be placed in the original command line following the ",'"; and/or may be entered on subsequent command lines. The modem will enter call progress only after an additional dial command is issued without the ",'"; terminator. Use "H" to abort the dial in progress, and go back on-hook.
- ^** Toggles calling tone enable/disable: applicable to current dial attempt only (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160, and CH2165 only).

En - Command Echo

The modem enables or disables the echo of characters supplied from the DTE back to the DTE. This does not affect responses supplied from the modem to the DTE. The parameter value, if valid, is written to S14 bit 1.

- E0** Disables command echo.
- E1** Enables command echo. (Default)

Result Codes:

OK n=0 or 1.
ERROR Otherwise.

Hn – Disconnect (Hang-up)

This command initiates a hang up sequence.

This command may not be available for some countries due to PTT restrictions.

- H0** The modem will release the line if the modem is currently on-line, and will terminate any test (AT&T) that is in progress.
- H1** If on-hook, the modem will go off-hook and enter command mode.

Result Codes:

OK n=0 or 1.
ERROR Otherwise.

In – Identification

The modem reports the DTE the requested result according to the command parameter.

- I0 Reports product code. Example: 28800
- I3 Reports firmware Identification code. Example: V3.400-V90_2M_DLS

Ln – Speaker Volume

The modem sets the speaker volume control according to the parameter supplied. The parameter value, if valid is written to S22 bits 0 and 1.

- L0 Low volume.
- L1 Low volume. (Default for CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)
- L2 Medium volume (Default for CH1786, CH1787, CH2100 and CH2124 only)
- L3 High volume.

Result Codes:

- OK n=0 to 3.
- ERROR Otherwise

Mn – Speaker Control

This command selects when the speaker will be on or off. The parameter value, if valid, is written to S22 bits 2 and 3.

- M0 Speaker is always off.
- M1 Speaker is on during call establishment, but off when receiving carrier. (Default)
- M2 Speaker is always on.
- M3 Speaker is off when receiving carrier and during dialing, but on during answering.

Result Codes:

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

On – Return to On-Line Data Mode

This command determines how the modem will enter the on-line data mode. If the modem is in the off-line command mode (no connection), ERROR is reported.

- O0 Enters on-line data mode without a retrain. If a connection exists, this command connects the DTE back to the remote modem after and escape (+++).
- O1 Enters on-line data mode with a retrain before returning to on-line data mode.

Result Codes:

- OK =0 or 1 and a connection exists.
- ERROR Otherwise or if not connected.

P – Set Pulse Dial Default

This command forces pulse dialing until the next T dial modifier or T command is received. Sets S14 bit 5.

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (e.g., ATDT...), this command is overridden so that all future dialing will be tone dialed. (See T command.) This command may not be permitted in some countries.

Result Code:

OK

Qn – Quiet Results Codes Control

The command enables or disables the sending of result codes to the DTE. The parameter value, if valid, is written to S14 bit 2.

Q0 Enables result codes to the DTE. (Default)

Q1 Disables result codes to the DTE.

Result Code:

OK n=0 or 1.
ERROR Otherwise.

Sn – Read/Write S-Register

The modem selects an S-Register, performs an S-Register read or write function, or reports the value of an S-Register.

Sn Establishes S-Register n as the last register accessed.

Sn=v Sets S-Register n to the value v.

Sn? Reports the value of S-Register n.

The parameter n can be omitted, in which case the last S-Register accessed will be assumed. The S can be omitted for AT= and AT?, in which case the last S-Register accessed will be assumed.

For example: ATS7 establishes S7 as the last accessed register.
 AT=40 sets the contents of the last register accessed to 40.
 ATS=20 sets the contents of the last register accessed to 20.

IMPORTANT NOTE

If n is beyond the allowed S-Register range for the particular product, an OK will be issued after command execution and it will appear that value v has been accepted but value v will not actually be stored in the specified out of range S-Register n.

T – Set Tone Dial Default

This command forces DTMF dialing until the next P dial modifier or P command is received. The modem will set an S-Register bit to indicate that all subsequent dialing should be conducted in tone mode.

Result Code:

OK

Vn – Result Code Form

This command selects the sending of short-form or long-form codes to the DTE. The parameter, if valid, is written to S14 bit 3.

V0 Enables short-form (terse) result codes. Line feed is not issued before a short-form result code.

V1 Enables long-form (verbose) result codes. (Default)

Result Code:

OK n=0 or 1.
ERROR Otherwise.

Wn – Connect Message Control (not supported by CH1786, CH1787, CH2100 and CH2124 only)

This command controls the format of CONNECT messages. The parameter value, if valid, is written to S31 bits 2 and 3. Note that the Wn command can be overridden by register S95 bits (see S95 description).

WO Upon connection, the modem reports only the DTE speed (e.g., CONNECT 19200). Subsequent responses are disabled. (Default.)

- W1 Upon connection, the modem reports the line speed, the error correction protocol, and the DTE speed, respectively. Subsequent responses are disabled.
- W2 Upon connection, the modem reports the DCE speed (e.g., CONNECT 19200). Subsequent responses are disabled.

Result Code:

OK	n=0, 1 or 2.
ERROR	Otherwise.

Xn –Result Codes

Cermetek modems respond to commands issued from the DTE and to activity on the line PSTN by providing the DTE with result codes indicating status. Result codes that can be sent vary by product. If result codes are suppressed, no result code is sent to the DTE.

Two forms of each result code are available: long-form (or an English-like “verbose” response), and short-form (or data-like numeric response). The long-form code is preceded and terminated by the sequence <CR><LF>. The short-form is terminated by <CR> only with no preceding sequence.

The following is a complete list of result codes supported by Cermetek modems. The verbose response is listed first followed by the terse response in parenthesis.

The Xn command selects which subset of the result messages will be used by the modem to inform the DTE of the results of commands.

Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a “W” can be placed in the dial string (See D command). Note that the information below is based upon the default implementation of the X results table. Table 1 indicates the messages which are enabled for each X value.

If the modem is in facsimile mode (+FCLASS=1 or 2), the only message sent to indicate a connection is CONNECT without a speed indication.

- X0 Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR and NO ANSWER result codes. Blind dialing is enabled/disabled by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively (Busy signal and dial tone are not detected in CH1786, CH1787, CH2100 and CH2124).
- X1 Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER and CONNECT XXXX (XXXX=rate). Blind dialing by country parameters. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER will be reported instead of NO DIAL TONE. The value 100b is written to S22 bits 6, 5, and 4, respectively (Busy signal and dial tone are not detected in CH1786, CH1787, CH2100 and CH2124).
- X2 Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIAL TONE, NO ANSWER, and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER will be reported instead of BUSY. The value 101b is written to S22 bits 6, 5, and 4, respectively.
- X3 Enables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER and CONNECT XXXX. Blind dialing is enabled. The value 110b is written to S22 bits 6, 5, and 4, respectively (Dial tone is not detected in CH1786, CH1787, CH2100 and CH2124).
- X4 Enables monitoring of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively. (Default)

Result Codes:

OK	n=0 to 4.
ERROR	Otherwise.

Tables 1-1 and 1-2 contain a summary of all possible Result Codes. These tables indicate which Result Codes will be presented to the DTE based on the ATXn option selected and the modem model in use. Refer to Attachment 1 for a complete description of each result code.

Table 1-1: Summary of Result Codes For CH1786, CH1787, CH2100 and CH2124 Products only.

Short Form	Long Form	0	1	2	3	4	Notes
+F4	+FCERROR	X	X	X	X	X	
0	OK	X	X	X	X	X	
1	CONNECT	X	X	X	X	X	
2	RING	X	X	X	X	X	
3	NO CARRIER	X	X	X	X	X	
4	ERROR	X	X	X	X	X	
5	CONNECT 1200	1	X	X	X	X	
6	NO DIAL TONE	3	3	X	X	X	
7	BUSY	3	3	3	X	X	
8	NO ANSWER	X	X	X	X	X	
10	CONNECT 2400	1	X	X	X	X	
13	DATA	X	X	X	X	X	
15	FAX	1	X	X	X	X	

NOTES: 1. An (X) in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of (n) (shown at the top of the column) has been selected by the use of the Xn command. If the column is blank, then no message will be generated for that (X) option. A numeral indicates which less restrictive status messages will be output for that (X) option.

Table 1-2: Summary of Result Codes For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only.

Short Form	Long Form	0	1	2	3	4	Notes
+F4	+FCERROR	X	X	X	X	X	CH1786A and up
0	OK	X	X	X	X	X	CH1786A and up
1	CONNECT	X	X	X	X	X	CH1786A and up
2	RING	X	X	X	X	X	CH1786A and up
3	NO CARRIER	X	X	X	X	X	CH1786A and up
4	ERROR	X	X	X	X	X	CH1786A and up
5	CONNECT 1200	1	X	X	X	X	CH1786A and up
6	NO DIAL TONE	3	3	X	X	X	CH1786A and up
7	BUSY	3	3	3	X	X	CH1786A and up
8	NO ANSWER	X	X	X	X	X	CH1786A and up
9	CONNECT 0600	1	X	X	X	X	CH1786A and up
10	CONNECT 2400	1	X	X	X	X	CH1786A and up
11	CONNECT 4800	1	X	X	X	X	CH1786A and up
12	CONNECT 9600	1	X	X	X	X	CH1786A and up
13	CONNECT 7200	1	X	X	X	X	CH1786A and up
14	CONNECT 12000	1	X	X	X	X	CH1786A and up
15	CONNECT 14400	1	X	X	X	X	CH1786A and up
16	CONNECT 19200	1	X	X	X	X	CH1786A and up
17	CONNECT 38400	1	X	X	X	X	CH1786A and up
18	CONNECT 57600	1	X	X	X	X	CH1786A and up
19	CONNECT 115200	1	X	X	X	X	CH1786A and up
20	CONNECT 230400	X	X	X	X	X	CH1786A and up
22	CONNECT 75TX/1200RX	1	X	X	X	X	CH1786A and up
23	CONNECT 1200TX/75RX	1	X	X	X	X	CH1786A and up
24	DELAYED	4	4	4	4	X	CH1786A and up
25	MESSAGE-WAITING						CH1786A and up
32	BLACKLSTED	4	4	4	4	X	CH1786A and up
33	FAX	X	X	X	X	X	CH1786A and up
35	DATA	X	X	X	X	X	CH1794 and up
40	+MRR:300	X	X	X	X	X	CH1794 and up

Table 1-2: Summary of Result Codes For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only (Continuation).

Short Form	Long Form	0	1	2	3	4	Notes
42	+MRR: 600	X	X	X	X	X	CH1786A and up
44	+MRR: 1200/75	X	X	X	X	X	CH1786A and up
45	+MRR: 75/1200	X	X	X	X	X	CH1786A and up
46	+MRR: 1200	X	X	X	X	X	CH1786A and up
47	+MRR: 2400	X	X	X	X	X	CH1786A and up
48	+MRR: 4800	X	X	X	X	X	CH1786A and up
49	+MRR: 7200	X	X	X	X	X	CH1786A and up
50	+MRR: 9600	X	X	X	X	X	CH1786A and up
51	+MRR: 12000	X	X	X	X	X	CH1786A and up
52	+MRR: 14400	X	X	X	X	X	CH1786A and up
53	+MRR: 16800	X	X	X	X	X	CH1799 and up
54	+MRR: 19200	X	X	X	X	X	CH1799 and up
55	+MRR: 21600	X	X	X	X	X	CH1799 and up
56	+MRR: 24000	X	X	X	X	X	CH1799 and up
57	+MRR: 26400	X	X	X	X	X	CH1799 and up
58	+MRR: 28800	x	X	X	X	X	CH1799 and up
59	CARRIER 16800	1	X	X	X	X	CH1799 and up
61	CARRIER 21600	1	X	X	X	X	CH1799 and up
62	CARRIER 24000	1	X	X	X	X	CH1799 and up
63	CARRIER 26400	1	X	X	X	X	CH1799 and up
64	CARRIER 28800	1	X	X	X	X	CH1799 and up
66	+DR: ALT	X	X	X	X	X	CH1786A and up
67	+DR: V.42B	X	X	X	X	X	CH1786A and up
68	+DR: V44	X	X	X	X	X	CH1786A and up
69	+DR: NONE	X	X	X	X	X	CH1786A and up
70	+ER: NONE	X	X	X	X	X	CH1786A and up
77	+ER: LAPM	X	X	X	X	X	CH1786A and up
78	+MRR: 31200	X	X	X	X	X	CH1799 and up
79	+MRR: 33600	X	X	X	X	X	CH1799 and up
80	+ER: ALT	X	X	X	X	X	CH1786A and up
81	+ER: ALT-CELLULAR	X	X	X	X	X	CH1786A and up
83	LINE IN USE	X	X	X	X	X	CH1786A and up
84	CONNECT 33600	X	X	X	X	X	CH1799 and up
85	OFF-HOOK INTRUSION	X	X	X	X	X	CH1786A and up
86	LINE REVERSAL DETECTED	X	X	X	X	X	CH1786A and up
87	NO LINE	X	X	X	X	X	CH1786A and up
91	CONNECT 31200	X	X	X	X	X	CH1786A and up
130	+ILRR	X	X	X	X	X	CH1786A and up
134	+MCR: B103	X	X	X	X	X	CH1786A and up
135	+MCR: B212	X	X	X	X	X	CH1786A and up
136	+MCR: V21	X	X	X	X	X	CH1786A and up
137	+MCR: V22	X	X	X	X	X	CH1786A and up
138	+MCR: V22B	X	X	X	X	X	CH1786A and up
139	+MCR: V23	X	X	X	X	X	CH1786A and up
139	+MCR: V23C	X	X	X	X	X	CH1786A and up
140	+MCR: V32	X	X	X	X	X	CH1786A and up
141	+MCR: V32B	X	X	X	X	X	CH1786A and up
142	+MCR: V34	X	X	X	X	X	CH2056 and up
145	+MCR: V90	X	X	X	X	X	CH2056 and up

NOTES: 1. An (X) in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of (n) (shown at the top of the column) has been selected by the use of the Xn command. If the column is blank, then no message will be generated for that (X) option. A numeral indicates which less restrictive status messages will be output for that (X) option.

Table 1-2: Summary of Result Codes For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only (Continuation).

Short Form	Long Form	0	1	2	3	4	Notes
146	+MCR: V92	X	X	X	X	X	CH2056 and up
147	+MCR: V92	X	X	X	X	X	CH2056 and up
150	+MRR: 32000	X	X	X	X	X	CH2056 and up
151	+MRR: 34000	X	X	X	X	X	CH2056 and up
152	+MRR: 36000	X	X	X	X	X	CH2056 and up
153	+MRR: 38000	X	X	X	X	X	CH2056 and up
154	+MRR: 40000	X	X	X	X	X	CH2056 and up
155	+MRR: 42000	X	X	X	X	X	CH2056 and up
156	+MRR: 44000	X	X	X	X	X	CH2056 and up
157	+MRR: 46000	X	X	X	X	X	CH2056 and up
158	+MRR: 48000	X	X	X	X	X	CH2056 and up
159	+MRR: 50000	X	X	X	X	X	CH2056 and up
160	+MRR: 52000	X	X	X	X	X	CH2056 and up
161	+MRR: 54000	X	X	X	X	X	CH2056 and up
162	+MRR: 56000	X	X	X	X	X	CH2056 and up
165	CONNECT 32000	X	X	X	X	X	CH2056 and up
166	CONNECT 34000	X	X	X	X	X	CH2056 and up
167	CONNECT 36000	X	X	X	X	X	CH2056 and up
168	CONNECT 38000	X	X	X	X	X	CH2056 and up
169	CONNECT 40000	X	X	X	X	X	CH2056 and up
170	CONNECT 42000	X	X	X	X	X	CH2056 and up
171	CONNECT 44000	X	X	X	X	X	CH2056 and up
172	CONNECT 46000	X	X	X	X	X	CH2056 and up
173	CONNECT 48000	X	X	X	X	X	CH2056 and up
174	CONNECT 50000	X	X	X	X	X	CH2056 and up
175	CONNECT 52000	X	X	X	X	X	CH2056 and up
176	CONNECT 54000	X	X	X	X	X	CH2056 and up
180	CONNECT 28000	X	X	X	X	X	CH1799 and up
181	CONNECT 29333	X	X	X	X	X	CH1799 and up
182	CONNECT 30667	X	X	X	X	X	CH1799 and up
183	CONNECT 33333	X	X	X	X	X	CH2056 and up
184	CONNECT 34667	X	X	X	X	X	CH2056 and up
185	CONNECT 37333	X	X	X	X	X	CH2056 and up
186	CONNECT 38667	X	X	X	X	X	CH2056 and up
187	CONNECT 41333	X	X	X	X	X	CH2056 and up
188	CONNECT 42667	X	X	X	X	X	CH2056 and up
189	CONNECT 45333	X	X	X	X	X	CH2056 and up
190	CONNECT 46667	X	X	X	X	X	CH2056 and up
191	CONNECT 49333	X	X	X	X	X	CH2056 and up
192	CONNECT 50677	X	X	X	X	X	CH2056 and up
193	CONNECT 53333	X	X	X	X	X	CH2056 and up
194	CONNECT 54677	X	X	X	X	X	CH2056 and up
195	+MRR: 28000	X	X	X	X	X	CH2056 and up
196	+MRR: 29333	X	X	X	X	X	CH2056 and up
197	+MRR: 30667	X	X	X	X	X	CH2056 and up
198	+MRR: 33333	X	X	X	X	X	CH2056 and up
199	+MRR: 34667	X	X	X	X	X	CH2056 and up
200	+MRR: 37333	X	X	X	X	X	CH2056 and up
201	+MRR: 38667	X	X	X	X	X	CH2056 and up
202	+MRR: 41333	X	X	X	X	X	CH2056 and up
203	+MRR: 42667	X	X	X	X	X	CH2056 and up
204	+MRR: 45333	X	X	X	X	X	CH2056 and up
205	+MRR: 46667	X	X	X	X	X	CH2056 and up
206	+MRR: 49333	X	X	X	X	X	CH2056 and up

Table 1-2: Summary of Result Codes For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only (Continuation).

Short Form	Long Form	0	1	2	3	4	Notes
207	+MRR: 50667	X	X	X	X	X	CH2056 and up
208	+MRR: 53333	X	X	X	X	X	CH2056 and up
209	+MRR: 54667	X	X	X	X	X	CH2056 and up
210	+MRR: 25333	X	X	X	X	X	CH1786A and up
211	+MRR: 26667	X	X	X	X	X	CH1786A and up
212	+MRR: 25333	X	X	X	X	X	CH1786A and up
213	+MRR: 22666	X	X	X	X	X	CH1786A and up
214	DIGITAL LINE DETECTED	X	X	X	X	X	CH1786A and up

NOTES: 1. An (X) in a column indicates that the message (either the long form if verbose, or the value only for short form) will be generated when that particular value of (n) (shown at the top of the column) has been selected by the use of the Xn command. If the column is blank, then no message will be generated for that (X) option. A numeral indicates which less restrictive status messages will be output for that (X) option.

Zn - Soft Reset and Restore Profile

The modem performs a soft reset and restores (recalls) the configuration profile according to the factory parameter supplied. If no parameter is specified, zero is assumed.

Z0 Soft reset and restore stored profile 0.

Z1 Soft reset and restore stored profile 1.

Result Codes:

OK n=0 or 1.
ERROR Otherwise.

II. & COMMANDS

&Cn - RLSD (DCD) Options

The modem controls the RLSD output in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bit 5.

&C0 RLSD remains ON at all times. (Default)

&C1 RLSD follows the state of the carrier.

Result Codes:

OK n=0 or 1.
ERROR Otherwise.

&Dn - DTR Options (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see S25.

&D0 DTR drop is interpreted according to the current &Qn setting as follows:
&Q0, &Q5, &Q6 DTR is ignored (assumed ON). Allows operation with DTEs that do not provide DTR.

&D1 DTR drop is interrupted according to the current &Qn setting as follows:
&Q0, &Q1, &Q4 DTR drop is interpreted by the modem as if the asynchronous escape sequence
&Q5, &Q6 has been entered. The modem returns to asynchronous command state without disconnecting.

&D2 DTR drop is interpreted according to the current &Qn setting as follows:
&Q0, &Q5, &Q6 DTR drop causes the modem to hang-up. Auto-answer is inhibited. (Default)

- &D3 DTR drop is interpreted according to the current &Qn setting as follows:
 &Q0, &Q5, &Q6 DTR drop causes the modem to perform a soft reset as if the Z command was received. The &Y setting determines which profile is loaded.

&Dn - DTR Options (CH1786, CH1787, CH2100 and CH2124 only)

This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also, see S25.

- &D0 Modem ignores DTR. (Default)
- &D1 Modem assumes command state when ON-to-OFF transition is detected on DTR.
- &D2 Modem hangs up, assumes command state and disables auto-answer upon detecting ON-to-OFF transition on DTR.
- &D3 Modem assumes initialization state upon detecting an ON-to-OFF transition DTR.

&Fn - Restore Factory Configuration (Profile)

The modem loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Register descriptions. A configuration (profile) consists of a subset of S-Registers.

- &F Restore factory configuration 0.
- &F1 Restore factory configuration 1.

Result Codes:

OK
 ERROR If the modem is connected.

&Kn - Flow Control (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

This command defines the DTE/DCE (terminal/modem) flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.

- &K0 Disables flow control.
- &K3 Enables RTS/CTS flow control. (Default for data modem modes)
- &K4 Enables XON/XOFF flow control.
- &K5 Enables transparent XON/XOFF flow control.
- &K6 Enables both RTS/CTS and XON/XOFF flow control. (Default for fax modem and voice modes).

Result Codes:

OK n=0, 3, 4, 5 or 6.
 ERROR Otherwise.

&Qn - Sync/Async Mode

This command is an extension of the &M command and is used to control the connection modes permitted. It is used in conjunction with S36 and S48 for CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 products. Also, see \N command.

- &Q0 Selects asynchronous operation. The value 000b is written to S27 bits 3, 1 and 0, respectively. Default for CH1786, CH1787, CH2100 and CH2124.
- &Q1 To &Q4 Not supported.
- &Q5 The modem will try to negotiate an error-corrected link. The modem can be configured using S36 to determine whether a failure will result in the modem returning on-hook. To turn off all

error-correcting, use \N0 command. The value 101b is written to S27 bits 3, 1 and 0, respectively. (Default)

&Q6 Not Supported

Result Codes:

OK n=0 to 6.
ERROR Otherwise.

&Rn - CTS Option (Not valid for CH1786, CH1787, CH2100 and CH2124)

This command selects how the modem will control CTS. See S21 Bit 2 for written parameter value.

&R0 CTS tracks RTS

&R1 CTS always on. (Default)

Result Codes:

OK n=0 to 1.
ERROR Otherwise.

&Sn - DSR Override

This command selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.

&S0 DSR will remain ON at all times. (Default)

&S1 DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

Result Codes:

OK n=0 to 1.
ERROR Otherwise.

&V - Display Current Configuration and Stored Profiles

Reports the current (active) configuration, the stored (user) profiles, and the four stored telephone numbers. The stored profiles and telephone numbers are not displayed if the NVRAM is not installed or if the NVRAM is not operational as detected by the NVRAM test during reset processing.

Example For CH1786, CH1787, CH2100 and CH2124:

ACTIVE PROFILE:

B1 E1 L2 M1 Q0 V1 X4 Y0 &C1 &D2 &G0 &J0 &L0 &P0 &Q0 &R0 &S1 &X0 &Y0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030
S08:002 S09:006 S10:014 S12:050 S14:0AH S16:00H S18:000 S21:70H
S22:76H S23:17H S25:005 S26:001 S27:40H S28:01H

STORED PROFILE 0:

B1 E1 L2 M1 Q0 V1 X4 Y0 &C1 &D2 &G0 &J0 &L0 &P0 &Q0 &R0 &S1 &X0
S00:000 S14:0AH S18:000 S21:70H S22:76H S23:17H S25:005 S26:001
S27:40H S28:01H

STORED PROFILE 1:

B1 E1 L2 M1 Q0 V1 X4 Y0 &C1 &D2 &G0 &J0 &L0 &P0 &Q0 &R0 &S1 &X0
S00:000 S14:0AH S18:000 S21:70H S22:76H S23:17H S25:005 S26:001
S27:40H S28:01H

TELEPHONE NUMBERS:

&Z0= 555-1212 &Z1= 9,555-1212
&Z2=9,1-408-555-1212 &Z3=9,1,408,555,1212

Result Code:

OK

Example For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165:

ACTIVE PROFILE:

B1 E1 L1 M1 N0 Q0 T V1 W2 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q6 &R1 &S1 &T5 &X0 &Y1
 S00:001 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030 S08:002 S09:001
 S10:014 S11:100 S12:050 S18:000 S25:005 S26:001 S36:007 S38:020 S46:138 S48:007
 S95:000

STORED PROFILE 0:

B1 E1 L1 M1 N0 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
 S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:085 S12:050 S18:000
 S36:007 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1:

B1 E1 L1 M1 N0 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q6 &R1 &S1 &T5 &X0
 S00:001 S02:043 S06:002 S07:030 S08:002 S09:001 S10:014 S11:100 S12:050 S18:000
 S36:007 S40:104 S41:195 S46:138 S95:000

TELEPHONE NUMBERS:

0=555-1212 1=9,1-408-555-1212
 2=9,555-1212 3=9,1,408,555,1212

Result Code:

OK

&Wn - Store Current Configuration

Saves the current (active) configuration (profile), including S-Registers, in one of the two user profiles in NVRAM as denoted by the parameter value. This command will yield an ERROR message if the NVRAM is not installed or is not operational as detected by the NVRAM test.

The current configuration is comprised of the list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon executing a Zn command or at power up (See &Yn command).

&W0 Store the current configuration as profile 0.

&W1 Store the current configuration as profile 1.

Result Codes:

OK n=0 or 1.
 ERROR Otherwise.

&Yn - Designate a Default Reset Profile

Selects which user profile will be used after a hard reset.

&Y0 The modem will use profile 0.

&Y1 The modem will use profile 1.

Result Codes:

OK n=0 to 1.
 ERROR If n>1, or if NVRAM is not installed or is not operational.

& Zn - Store Telephone Number

The modem can store up to four telephone numbers and each telephone number dial string can contain up to 36 digits (for CH1786, CH1787, CH2100 and CH2124 only) or 31 digits (for CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

& Zn=X n=0 to 3 and X=dial string: (Requires 256 byte NVRAM.)

Result Codes for CH1786, CH1787, CH2100 and CH2124 only:

OK For n≤3, and X<36 digits.
 ERROR If n>3, X>32 digits, or if NVRAM is not installed or is not operational.

Result Codes for CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only:

OK For n≤3, and X<31 digits.
 ERROR If n>3, X>32 digits, or if NVRAM is not installed or is not operational.

Read using the &V command.

III. % COMMANDS (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

%C - Enable/Disable Data Compression

Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link. The parameter value, if valid, is written to S41 bits 0 and 1.

%C0 Disables data compression. Resets S46 bit 1.

%C1 Enables MNP 5 data compression negotiation. Resets S46 bit 1.

%C2 Enables V.42 bis data compression. Sets S46 bit 1.

%C3 Enables both V.42 bis and MNP5 data compression. Sets S46 bit 1. (Default)

Result Codes:

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

IV. \ AND - COMMANDS (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

\Bn - Transmit Break to Remote

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length in multiples of 100 ms according to parameter specified. If a number in excess of 9 is entered, 9 is used. The command works in conjunction with the \K command.

In error correction mode, the modem will signal a break through the active error correction protocol, giving no indication of length.

\B1-\B9 Break length in 100 ms units. (Default = 3) (Non-error corrected mode only.)

Result Codes:

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

NOTE

When the modem receives a break from the remote modem, break is passed to the DTE as follows: In non-error correction mode direct, the break length is passed; in non-error correction mode normal and in error correction mode, a 300 ms break is passed. Send break to remote modem in sequence with transmitted data.

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

\Nn - Operating Mode (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

This command controls the preferred error correcting mode to be negotiated in subsequent data connection. This command is affected by the OEM firmware configuration.

\N0 Selects normal speed buffered mode (Disables error-correction mode.) (Forces &Q6.)

\N1 Serial interface selected - Selects direct mode, &Q0 mode of operation. (Forces &Q0.)

- \N2 Selects reliable (error-correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=7.)
- \N3 Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode. (Forces &Q5, S36=7 and S48=7.)
- \N4 Selects LAPM error-correction mode. Failure to make an LAPM error-correction connection results in the modem hanging up. (Forces &Q5 and S48=0). [Note: The -K1 command can override the \N4 command.]
- \N5 Selects MNP error-correction mode. Failure to make an MNP error correction connection results in the modem hanging up. (Forces &Q5, S36=4, and S48=128.)

Result Codes:

OK n=0 to 5.
 ERROR Otherwise.

\Vn - Single Line Connect Message Enable

The single line connect message format can be enabled or disabled by the \Vn command as follows:

- \V0 Connect messages are controlled by the command settings X, W, and S95.
- \V1 Connect messages are displayed in the single-line format described below subject to the command settings V (Verbose) and Q (Quiet). In Non-Verbose mode (V0), single numeric result code is generated for CONNECT DTE.

When single line connect messages are enabled, there are no CARRIER, PROTOCOL, or COMPRESSION messages apart from the fields described below.

The single line connect message format is:

CONNECT<DTE Speed></Modulation></Protocol></Compression></Line Speed>

Where:

DTE speed = DTE speed, e.g., 57600.
 Modulation = "V32" for V.32 or V.32 bis modulations.
 = "VFC" for V.FC™ modulations.
 = "V34" for V.34 modulations.

NOTE

Modulation is omitted for all other messages.

Protocol = "NONE" for no protocol.
 = "ALT" for Microcom Network Protocol.
 = "LAPM" for LAP-M protocol.

Compression = "CLASS5" for Microcom MNP5 compression.
 = "V42BIS" for V.42 bis compression.
 Note: Compression is omitted if protocol is NONE.

Line Speed = Asymmetric rates are displayed as /rate:TX/rate:RX, e.g., /1200 TX/75 RX.
 Symmetric rates are displayed as single DCE rate, e.g., 14400.

-Kn - MNP Extended Services

Enables or disables conversion of a V.42 LAPM connection to an MNP 10 connection. The parameter value, if valid, is written to S40 bits 0 and 1.

- K0 Disables V.42 LAPM to MNP 10 conversion (Default)
- K1 Enables V.42 LAPM to MNP 10 conversion.

- K2 Enables V.42 LAPM to MNP 10 conversion; inhibits MNP Extended Services initiation during V.42 LAPM answer mode detection phase.

Result Codes:

OK	n=0 to 2
ERROR	Otherwise

V. + COMMANDS (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

+MCR - Report Syntax

This command reports carrier protocol.

Response: +MCR:n

Where n is an alphanumeric code corresponding to the reported carrier. Defined values are:

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
V90	For V.90
V56	For K56flex
V92	For V.92

+MR – Modulation Reporting Control

This parameter controls whether or not the extended-format +MCR: and +MRR: intermediate result codes are transmitted from the modem to the DTE. If enabled, +MCR: and +MRR: intermediate result codes represent the current (negotiated or renegotiated) modulation (+MCR[Ⓢ]) and rates (+MRR[Ⓢ]) that are transmitted at the point during connect negotiation (handshaking) at which the modem has determined which modulation and rate will be used, i.e., before any Error Control or Data Compression reports are transmitted, and before any final result code (e.g., CONNECT) is transmitted.

S95 bit 2 is reset to 0 for +MR=0 and is set to a 1 for +MR=2. The more recent setting of +MR or S95 bit 2, and the W command setting, determines modulation result code reporting (see S95 Parameter and W Command).

Syntax

+MR:n

Defined Values.

Where n is a decimal number corresponding to the selected option:

- 0 Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted). (Default.)
- 1 Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with tx rate, rx rate).
- 2 Enables reporting of modulation connection (+MCR: and +MRR: are transmitted with rx rate only).

Reporting Current or Selected Values

Command: +MR?

Response: +MR:<current value>

Example: +MR: 0 For default setting.

Reporting Supported Range of Parameter Values

Command: +MR=?
 Response: +MR: (<value>range)
 Example: +MR: (0-2)

+MRR – Report Syntax

This command reports DCE transmission and reception rates.

Response: +MRR:<tx_rate>, <rx_rate>

<tx_rate> Decimal transmit rate in bits/s.

<rx_rate> Decimal receive rate in bits/s.

Example: +MRR:28800,48000

+MS – Select Modulation

This extended-format compound parameter controls the manner of operation of the modulation capabilities in the mode. It accepts six sub-parameters:

Syntax

+MS=[<carrier>[,<automode>[,<min_tx_rate>[,<max_tx_rate>[,<min_rx_rate>[,<max_rx_rate>]]]]]]

Where: <carrier>, <min_tx_rate>, <max_tx_rate>, <min_rx_rate>, and <max_rx_rate> values are listed in Table 2 (see definitions on following page).

Table 2-1: AT+MS Command Supported Data Rates for CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165.

Modulation (bps)	<carrier>	Possible (<min_tx_rate>, <max_tx_rate>, (<min_rx_rate>), and (<max_rx_rate>) Rates
Bell 103*	B103	300
Bell 212*	B212	1200 Rx/75 Tx or Rx/1200Tx
V.21*	V21	300
V.22 bis*	V22B	2400 or 1200
V.23*	V23C	1200
V.32	V32	9600 or 4800
V.32 bis	V32B	14400, 12000, 9600, 7620 or 4800
V.34	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 or 2400
V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
K56flex	K56	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000
V.92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 upstream	V92	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000

NOTE: Modulation schemes with "*" are the only schemes supported by the CH1786A.

Defined Values.

- <carrier>** A string which specifies the preferred modem carrier to use in originating or answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters. <carrier> values for ITU standard modulations take the form: <letter><1-4 digits><other letters as needed>. Defined values are listed in Table 2.
- <automode>** A numeric value which enables or disables automatic modulation negotiation (e.g., ITU-T V.32bis AnnexA or V.8).
 0 = Automode disabled.
 1 = Automode enabled. (Default.)
- <min_rx_rate> and <max_rx_rate>** Numeric values which specify the lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate at which the modem may establish a receive connection. May be used to condition distinct limits for the receive direction as distinct from the transmit direction. Values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table I. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate supported by the selected carrier).
- <min_tx_rate> and <max_tx_rate>** Numeric values which specify the lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate at which the modem may establish a transmit connection. Non-zero values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table I. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_tx_rate>) and highest (<max_tx_rate>) supported by the selected carrier).

Reporting Current or Selected Values

Command: +MS?

Response: +MS: <carrier>,<automode>,<min_tx_rate>,<max_tx_rate>,<min_rx_rate>,<max_rx_rate>

IMPORTANT NOTE

The current active settings are reported under control of the +MR parameter.

Example: +MS: K56, 1,300,33600,300,56000 For default values.
 This example allows maximum system flexibility to determine optimal receive and transmit rates during operation.

Reporting Supported Range of Parameter Values

Command: +MS=?

Response: +MS: (<carrier>range),(<automode>range),(<min_tx_rate>range),(<max_tx_rate>range), (<min_rx_rate>range), (<max_rx_rate>)

Example: +MS: (B103,B212,V21,V22,V22B,V23C,V32,V32B,V34,K56,V90),(0,1),(300-33600),(300-33600), (300-56000),(300-56000)

Result Codes:

OK Valid sub parameter string
 ERROR Otherwise.

For additional information about the +MS command and for a discussion concerning compatibility differences with older products, see Application Note # 147.

+VCID - Caller ID (CID)

This command controls reporting and presentation of data provided by the PSTN Caller ID services. Data is presented to the DTE between the first and the second ring indication. This command affects the data format for incoming calls as the call is being received.

Syntax

+VCID=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Disable Caller ID reporting. (Default.)
- 1 Enables Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Parameter Description><Value> pair format. The expected pairs are: date, time name, and caller code (telephone number). ASCII data is presented.
- 2 Enables Caller ID with unformatted presentation to the DTE. The data is presented in a continuous string. HEXADECIMAL data is presented.

+VRID - Report Caller ID (CID)

This command reports the data provided by the PSTN Caller ID services for the last received call.

Syntax

+VRID=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Enables Caller ID with formatted presentation to the DTE. The modem presents the data items in a <Parameter Description><Value> pair format. The expected pairs are: date, time name, and caller code (telephone number).
- 1 Reports Caller ID with unformatted presentation to the DTE.

Reporting Supported Range of Parameter Values

Command: +VRID=?

Response: +VRID: n

Example: +VRID: (0, 1)

Refer to application Note # 174 for a more detailed discussion of Caller ID, including several examples.

+VIT - Voice Inactivity Timer (DTE/Modem)

This command sets the modem's initial value for the DTE/modem inactivity timer.

Syntax

+VIT=<timer>

Defined Values

<timer> Decimal number corresponding to the time in units of 1.0 second. A value of 0 disables the timer.

Reporting Current or Selected Values

Command: +VIT=?

Response: <timer>

Example: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VIT=?

Response: <timer>range

Example: 0 – 255 Where 0 -255 is the Duration set by S30.

Result Codes**OK** <timer> = 0 -255**ERROR** Otherwise, or if not in Voice Mode**+VID - Beep Tone Duration Timer**

This command causes the modem to set the default DTMF/tone generation duration.

Syntax

+VTD=<dur>

Defined Values

<dur> Decimal number specifying the default DTMF/tone generation duration in units of 0.01 second. A value of 0 specifies the value entered by the S11 parameter (50 – 255 ms). The range is 0.01 to 2.55 seconds for <dur> = 1 to 255.

Reporting Current or Selected Values

Command: +VTD?

Response: <dur>

Example: 100 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VTD=?

Response: (<dur>range)

Example: (0 – 255)

Result Codes**OK** <dur>=0 – 255**ERROR** Otherwise, or not in Voice Mode.**+VTS- Send Voice Tone(s)**

This command causes the modem to send DTMF digit or hookflash tones with the duration specified by +VTD, to send DTMF digit or hookflash tones with duration specified by this command, or to send single or dual tone frequencies with duration specified with is command.

Syntax

+VTS=<string>

Defined Values

<string> The tone generation consists of elements in a list where each element is separated by a comma. Each element can be:

1. A single character which the modem interprets as a DTMF digit (0–9, #, *, or A-D) or hookflash (!), with a duration given by the +VTD command.
2. A 3-element string enclosed in square brackets, “[freq1,freq2,dur]”, which the modem interprets as a general dual tone and duration selection, or
3. A 2-element string enclosed in curly braces, “{X,dur}”, which the modem interprets as a DTMF digit (0–9, #, *, or A-D) or hookflash (!) with a duration (dur) different than that given by the +VTD command.

Missing subparameters assume the default value. Unspecified values always default to zero for frequencies, DTMF * for DTMF tones, and +VTD for duration. The omission of commas (and associated subparameters) are valid.

The quantity in the square brackets consists of a 3-element list (freq1,freq2,dur), which can be used to send single or dual tones. The first element is the first frequency (freq1) with range 0 or 200-3000Hz. The second element is the

second frequency (freq2) with range 0 or 200-3000Hz. The third element is the duration (dur) in 0.01 second intervals with range 0-255 (ASCII units of 10ms). A list may contain null elements. For example, [3000] means that the DCE generates a single tone at 3000Hz for the default duration, [3000,3300] means that the DCE generates a dual tone at 3000 and 3300Hz for the default duration, and [,3300] means that the DCE generates a single tone at 3300Hz for the default duration.

The quantity in the curly braces consists of 2-element list (X,dur), which can be used to send DTMF tones or hookflash. The first element is the DTMF tone or hookflash (!) character (X), and the second element is the duration (dur) in 0.01 seconds. The characters are of the same set given above. A list may contain null elements. For example, {2} means DTMF tone "2" for the default duration, and {} means silence for the default duration.

The modem will stop the tone generation at the point in the string where the modem detects a parsing error, encounters an invalid frequency range, encounters a <CR>, or encounters a semi-colon.

Reporting Supported Range of Parameter Values

Command: +VTS=?
 Response: (<freq1>range), (<freq2>range), (<dur>range)
 Example: (200-3000),(200-3000),(0-255)

Result Codes

OK Valid command.
ERROR The <string> command is invalid, or a selected frequency is out of range.

Example 1. This example illustrates tone generation without using any null elements. The command example is followed by a description of command execution.

```
AT+VTS={!,30},1,2,[1000,1300,50],!,{*,6},[800,1300,50],9
```

1. Hookflash with a duration of 300ms.
2. Play DTMF 1 with a duration given by the +VTD command.
3. Play DTMF 2 with a duration given by the +VTD command.
4. Play tone pair at 1000Hz and 1300Hz with a duration of 500ms.
5. Hookflash with a duration given by the +VTD command.
6. Play DTMF * with a duration of 60ms.
7. Play tone pair at 800Hz and 1300Hz with a duration of 500ms.
8. Play DTMF 9 with a duration given by the +VTD command.

Example 2. This example illustrates tone generation using any null elements. The command example is followed by a description of command execution.

```
AT+VTS=1,2,[1000,1300,50],[800],9
```

1. Play DTMF 1 with a duration given by the +VTD command.
2. Play DTMF 2 with a duration given by the +VTD command.
3. Play tone pair at 1000Hz and 1300Hz with a duration of 500ms.
4. Play tone pair at 800Hz and 1300Hz with a duration of 500ms.
5. Play DTMF 9 with a duration given by the +VTD command.

Refer to Application Note # 134 for a more detailed discussion of DTMF tone detection and generation.

VI. \$ COMMANDS – CH1786A, CH179XA and CH2056A only

\$F - Fast Connect Control

This command allows configuring the CH1786A, CH179XA and CH2056A to connect to other modems that support non-standard V.22,V.22 bis, and V.29 fast connect protocols. It is used in conjunction with S17.

Syntax

\$Fn

Defined Values

Decimal number which specifies the initial requested mode of operation when the modem is operating as the originator. The options are:

- 0 Normal connection (default)
- 1 Fast Connect without answer tone (Not Supported)
- 2 V.22 FastConnect
- 3 Fast Connect with answer tone (Not Supported)
- 4 V.29 FastPOS (Not Supported)

VII. V.92 +P AND –Q COMMANDS

Modem-On-Hold, Quick Connect, and PCM Upstream are only available with CH2056A models when connecting in V.92 data mode. V.92 features are only available when the server called is a V.92 server that supports that particular feature.

This section describes the +P (PCM DCE) and –Q commands and parameters used to control the V.92 Mode of operation.

+PCW - Call Waiting Enable

This command controls operation of the CH2056A in the presence of call waiting.

Syntax

+PCW=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Request modem-on-hold if enabled by +PMH and collect caller ID information if enabled by +VRID. Toggle V.24 circuit 125. (Default).
- 1 Hang-up.
- 2 Ignore call waiting.

Result Codes

OK n = 0, 1, or 2

ERROR Otherwise

Reporting Selected Value(s)

Command: +PCW?

Response: +PCW: n

Example: +PCW: 0

Reporting Supported Range of Parameter Values

Command: +PCW=?

Response: +PCW: (n range)

Example: +PCW: (0, 1, 2)

+PMH - Modem-on-Hold Enable

The Modem-on-Hold (MOH) function allows the CH2056A to pause a currently active data call to the Internet and to place the call on hold and then use the same PSTN line to accept an incoming call or to place an outgoing voice call. This feature is available only with a connection to an ISP supporting MOH. MOH can be executed through either of two methods:

Method 1. Enable MOH through the +PMH command. With Call Waiting Detection (+PCW command) enabled, an incoming call can be detected while online. Using a string of commands, the modem negotiates with the server to place the data connection on hold while the line is released so that it can be used to conduct a voice call. Once the voice call is completed, the modem can quickly renegotiate with the server back to the original data call.

Method 2. Use third party communication software that utilizes the Conexant Modem-on-Hold drivers within the MicroSoft Windows PC operating systems. Using this method, the software can detect an incoming call, place the data connection on hold, and switch to the incoming voice call.

This command controls the selection of Modem-on-Hold in the modem. The action of the modem in response to modem-on-hold events is determined by the state of this command as well as the state of a negotiated handshake with a V.92-complaint server in V.92 Mode.

Syntax

+PMH=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Modem-on-Hold enabled in V.92 Mode. (Default).
- 1 Disabled modem-on-hold.

Result Codes

OK 0 or 1 in V.92 Mode (see the +MS command).
ERROR Otherwise.

Reporting Current or Selected Value

Command: +PMH?
Response: +PMH: n
Example: +PMH: 0

Reporting Supported Range of Parameter Values

Command: +PMH=?
Response: +PMH: (n range)
Example: +PMH: (0, 1)

+PMHT - Modem-on-Hold Timer

This command controls whether or not the CH2056A will grant or deny a Modem-on-Hold (MOH) request as well as setting the MOH Timeout value.

Syntax

+PMHT=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Deny V.92 modem-on-hold Request (Default).
- 1 Grant MOH with 10 second timeout
- 2 Grant MOH with 20 second timeout
- 3 Grant MOH with 30 second timeout
- 4 Grant MOH with 40second timeout
- 5 Grant MOH with 1 minutes timeout
- 6 Grant MOH with 2 minutes timeout
- 7 Grant MOH with 3 minutes timeout
- 8 Grant MOH with 4 minutes timeout
- 9 Grant MOH with 6 minutes timeout
- 10 Grant MOH with 8 minutes timeout
- 11 Grant MOH with 12 minutes timeout
- 12 Grant MOH with 16 minutes timeout
- 13 Grant MOH with indefinite timeout

Result Codes

OK 0-13 in V.92 Mode (+MS=V92)
ERROR Otherwise.

Reporting Current or Selected Value

Command: +PMHT?
Response: +PMHT: n
Example: +PMHT: 0

Reporting Supported Range of Parameter Values

Command: +PMHT=?
Response: +PMHT: (n range)
Example: +PMHT: (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13)

+PMHR - Initiate Modem-on-Hold

This command requests the CH2056A to initiate or to confirm a Modem-on-Hold procedure. The CH2056A will return ERROR if Modem-on-Hold is not enabled or if the modem is in an idle condition. The CH2056A will return the string response +PMHR:n where n is a decimal value corresponding to the status of the CH2056A's hold exchange procedure as defined below. This response may be delayed depending upon the context under which the +PMHR command is made, i.e., if the +PMHR is in response to an incoming Modem-on-Hold request or if it the CH2056A is initiating a request.

Note. If Modem-on-Hold is enabled but the remote server does not support V.92, then the CH2056A will always report 0 to show that the hold request is denied.

Syntax

+PMHR

Response**+PMHR=n**

Where n is a decimal number corresponding to the maximum hold time the server or hold-granting modem will allow.

- 0 V.92 MOH request denied or not available.
- 1 MOH with 10 second timeout Granted.
- 2 MOH with 20 second timeout Granted.
- 3 MOH with 30 second timeout Granted.
- 4 MOH with 40second timeout Granted.
- 5 MOH with 1 minutes timeout Granted.
- 6 MOH with 2 minutes timeout Granted.
- 7 MOH with 3 minutes timeout Granted.
- 8 MOH with 4 minutes timeout Granted.
- 9 MOH with 6 minutes timeout Granted.
- 10 MOH with 8 minutes timeout Granted.
- 11 MOH with 12 minutes timeout Granted.
- 12 MOH with 16 minutes timeout Granted.
- 13 MOH with indefinite timeout Granted.

Result Codes

OK 0-13 in V.92 Mode (+MS=V92)
ERROR Otherwise.

+PIG - PCM Upstream Ignore

PCM Upstream boots the upstream data rates between the user and ISP thereby reducing upload times for large files and email attachments. A maximum of 48kbps upstream rate is supported with PCM Upstream enabled, in contrast to a maximum of 32.2kbps upstream rate with PCM Upstream not enabled. PCM Upstream is supported by the +PCM command. PCM Upstream is disabled by default.

This command controls the selection of PCM Upstream in CH2056A modems. The actual state of PCM Upstream is determined by the state of this command as well as the state of a negotiated handshake with a V.92-complaint server in V.92 Mode.

Syntax**+PIG=n****Defined Values**

Where n is a decimal number corresponding to the selected option:

- 0 Enable PCM upstream negotiation.
- 1 Disable PCM upstream negotiation. (Default).

Result Codes

OK 0 or 1 in V.92 Mode (+MS=V.92)
ERROR Otherwise.

Reporting Selected Value (s)

Command: +PIG?
 Response: +PIG: n
 Example: +PIG: 1

Reporting Supported Range of Parameter Values

Command: +PIG=?
 Response: +PIG: (n range)
 Example: +PCW: (0, 1)

+PMHF - V.92 Modem-on-Hold Hook Flash

This command causes the CH2056A to initiate the hook switch sequence when in the Modem-on-Hold procedure. This enables switching to the second call (incoming or outgoing). This command applies only to V.92 Modem-on-Hold. There are no parameters associated with is command.

Syntax

+PMHF

Result Codes

OK When the CH2056A completes the flash hook sequence.
ERROR If this command is initiated and the CH2056A is not on hold.

+PQC – V.92 Phase 1 and Phase 2 Control

The Quick Connect feature enables the CH2056A to shorten the connect time of subsequent calls to a server supporting quick connect. The quick connect feature is controlled via the +PQC command.

This command controls the global enabling or disabling of the V.92 shortened Phase 1 and Phase 2 startup procedures. This command is used in conjunction with the +PSS command.

Syntax

+PQC=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 Enable Short Phase 1, Short Phase 2, Short Phase 3 and Short Phase 4. (Default).
- 1 Not Supported.
- 2 Enable Short Phase 1 only.
- 3 Disable all Short Phases.

Result Codes

OK 0, 2, or 3 in V.92 Mode (+MS=V.92)
ERROR Otherwise.

Reporting Selected Values

Command: +PQC?
 Response: +PQC: n
 Example: +PQC: 0

Reporting Supported Range of Parameter Values

Command: +PQC=?
 Response: +PQC: (n range)
 Example: +PQC: (0, 1, 3)

+PSS - Use Short Sequence

This command causes a calling modem to force either a V.92 short or full startup sequence as defined by the +PQC command on the next and subsequent connections.

Syntax

+PSS=n

Defined Values

Where n is a decimal number corresponding to the selected option:

- 0 The modems decide whether or not to use the short startup procedures. The short startup procedures can only be used if enabled by the +PQC command. (Default).
- 1 Reserved.
- 2 Forces the use of the startup procedures on the next and subsequent connections independent of the setting of the +PQC command.

Result Codes**OK** 0-2, in V.92 Mode (+MS=V.92)**ERROR** Otherwise.**Reporting Selected Values**

Command: +PSS?

Response: +PSS: n

Example: +PSS: 0

Reporting Supported Range of Parameter Values

Command: +PSS=?

Response: +PSS: (n range)

Example: +PSS: (0, 1, 2)

+QCPC – Force Full Startup Procedure Next Connection

This command causes the CH2056A to use full startup procedures on the next connection attempt regardless of the setting of the +PQC command. After this attempt, the CH2056A will select the startup procedure as defined by the +PQC command. If a shortened startup procedure is enabled by the +PQC command, the quick connect profile will also be updated on the next connection attempt.

Syntax

-QCPC

Result Codes**OK** In V.92 Mode (+MS=V.92).**ERROR** Otherwise.**-QCPS - Enable Quick Connect Profile Save**

This command controls whether or not the CH2056A will save the generated quick connect profile.

Syntax

-QCPS=n

Defined Values

Where n is a decimal number corresponding to the desired option:

- 0 Do not allow the quick connect profile to be saved.
- 1 Allow the quick connect profile to be saved. (Default).

Result Codes**OK** 0 or 1 in V.92 Mode (+MS=V.92) and quick connect is enabled (+PSS=0).**ERROR** Otherwise.

Reporting Selected Value(s)

Command: -QCPS?
 Response: -QCPS: n
 Example: -QCPS: 1

Reporting Supported Range of Parameter Values

Command: -QCPS=?
 Response: -QCPS: (n range)
 Example: -QCPS: (0, 1)

VIII. +FLCASS COMMANDS

This command selects the active service class (mode).

Syntax

+FCLASS=<mode>

Defined Values

<mode>	Decimal number which corresponds to the selected service class.
0	Select Data Mode (Section 3). (Default)
1	Select Facsimile Class 1 Mode.
1.0	Select Facsimile Class 1.0 Mode. (Not Supported by CH1786, CH1787, CH2100 and CH2124 Products)
8	Select Voice Mode. (Only Supported by CH1786A, CH179XA and CH2056A Products)
10	Reserved.

Result Codes

OK For<mode>=0, 1, 1.0, 8, and 10
ERROR Otherwise

Reporting Current or Selected Values

Command: +FCLASS?
 Response: +FCLASS: <mode>
 Example: +FCLASS: 0 For the default setting.

Reporting Supporting Range of Parameter Values

Command: +FCLASS=?
 Response: +FCLASS: (<mode>range)
 Example: +FCLASS: (0, 1, 1.0, 8, 10)

IX. FAX COMMANDS

The FAX I/O interface supports asynchronous serial and parallel interfaces. The character format is 8 bits data, no parity, and 1 stop bit. Start and stop elements are removed from the transmit data and added to the receive data. Both transmit and receive data are buffered. Flow control using XON/XOFF or RTS/CTS is provided.

DTE-to-Modem Transmit Data Stream.**Characters Detected**

<DLE><data>
 <DLE><ETX>
 <DLE><DLE>

Action Taken

Delete <DLE><data> characters.
 Recognize as a string terminator and take appropriate action.
 Replace with single <DLE> character.

Modem-to-DTE Receive Data Stream.

Characters Detected
<DLE>

Action Taken
Insert extra <DLE> ahead of <DLE>.

The modem also identifies the end of a frame by inserting <DLE><ETX> into the data stream after the FCS bytes.

FAX Mode Selection.

FAX Class 1 and FAX Class 1.0 commands are identified in Table I. FAX Class 1.0 includes all FAX Class 1 commands.

Table I. FAX Class 1 and FAX Class 1.0 Commands

Command Parameter	Function	Applicable in FAX Class 1	Applicable in FAX Class 1.0
+FCLASS=<class>	Select read or test service class	X	X
+FAE=<value>	Auto answer enable	X	X
+FTS=<time>	Stop transmission and pause	X	X
+FRS=<time>	Wait for silence	X	X
+FTM=<mod>	Transmit data with <mod> carrier	X	X
+FRM=<mod>	Receive data with <mod> carrier	X	X
+FTH=<mod>	Transmit HDLC data with <mod> carrier	X	X
+FRH=<mod>	Receive HDLC data with <mod> carrier	X	X
+FAR=<off/on>	Adaptive reception control	-	X
+FCL=<time>	Carrier loss timeout	-	X
+FDD=<value>	Double escape character replacement control	-	X
+FIT=<time>, <action>	DTE inactivity timeout	-	X
+FPR=<rate>	Fixed DTE Rate	-	X
+FMI	Report manufacturer ID	-	X
+FMM	Report model ID	-	X
+FMR	Report revision ID	-	X
+FLO	Flow Control	-	X
+IFC	Local DTE-modem flow control (see Section 3.2.1.14)	X	X
A	Answer (see Section 3.2.3.4)	X	X
D <string>	Dial (see Section 3.2.3.1)	X	X
H	Hang-up (see Section 3.2.3.5)	X	X

FAX Origination.

Origination of FAX calls is made using the ATD command. Upon completion of the dial function, a calling tone at 1100 Hz is transmitted, with a cadence of 0.5 seconds on and 3 seconds off. The modem automatically enters mode +FRH=3 and sends the CONNECT message to the DTE when FSK flags are detected from the remote.

FAX Answering

Answering of FAX calls is identical to answering of data calls with the exception that the modem enters the fax handshaking mode instead of the data handshaking mode after going off-hook. If +FAE=0, the modem, after sending answer tone, automatically enters FAX mode (+FTH=3), sends the CONNECT message to the DTE, and starts sending FSK flags. If +FAE=1, the modem determines whether the caller is a data modem or fax modem and sends the DATA or FAX result code, respectively, to the DTE.

FAX Control Transmission

FAX control transmission is initiated by the +FTH=<mod> command.

FAX Control Reception

FAX control reception is initiated using the AT+FRH=<mod> command.

FAX Data Reception.

FAX data reception is initiated using the AT+FRM=<mod> command.

FAX Data Transmission.

FAX data transmission is initiated by the AT+FTM=<mod> command.

Refer to Application Note 144 for a complete discussion of the available FAX commands and their usage.

X. IMPROVEMENT OF MODEM CELLULAR OPERATION

The following recommendations may be taken either individually or collectively and are known to improve cellular operation when using Cermetek CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 products.

Software Commands.

The following software commands may be issued separately or in any combination. Note that the **AT** attention string should be included at the beginning of each line.

The following examples illustrate separate usage of the commands.

Enter: **ATN5<CR>** Selects MNP error correcting.
Response: **OK**

Enter: **AT-K1<CR>** Converts V.42 LAPM to MNP10.
Response: **OK**

Enter: **AT-SEC=1,18<CR>** Enables MNP10 error correcting (not supported by CH1794).
Response: **OK**

The following examples illustrate usage of all the commands collectively.

Enter: **ATN5-K1-SEC=1,18<CR>**
Response: **OK**

Additional Recommendations.

Generally, the best cellular operation is obtained when using the slowest possible data rate. The slower the better: 1200bps, 2400bps, or 9600bps are preferred. Stationary operation is better than mobile operation.

XI. S-REGISTERS

The S-Registers are summarized in Tables 3-1, 3-2, 3-3 and 3-4 located in Attachment 2. These tables include both the Firmware Default and the Factory Default values. Value for Registers denoted with an (*) may be stored in either of the two user profiles by executing the appropriate &Wn command. The stored user profiles may be loaded at any time by executing the appropriate Zn command. Registers or register fields quoted as “reserved” are reserved for current or future use, or are permanently overridden by country specific PSTN limitations. All bit-mapped registers are “read only”. To modify bit mapped registers, the user must execute the appropriate AT command controlling the relevant bits in the S-Register.

Factory Defaults.

The Factory Defaults are those values established by Cermetek and set at the factory prior to delivery. The Factory Default values are based on experience, the desire to maximize robust field performance and, when possible, maintenance of inter-family compatibility. Factory Default values are stored in NVRAM in the defined user profiles and are loaded into the active configuration at power up, when the Zn command is executed or when a reset is initiated. The designated default user profile is specified by the &Yn command. The user may modify the user profiles and save the modifications by executing the appropriate &Wn command.

Firmware Defaults.

Firmware defaults are provide as a failsafe parameter set that are always available to the user, regardless of the prior command strings executed by the user. These defaults are NOT user modifiable and are invoked by executing the &F, &F0 or &F1 commands.

ATTACHMENT 1

Complete Discussion of AT Command Result Codes

THE FOLLOWING RESULT CODES APPLY TO ALL CERMETEK PRODUCTS EXCEPT AS NOTED

+FCERROR (+F4) (CH1786, CH1787, CH2100 and CH2124 only).

FAX carrier error.

+FCERROR (+F4) (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165only).

High speed FAX data (V.27, V.29, V.33, or V.17) is expected but a V.21 signal is received.

OK (0)

The OK code is returned by the modem to acknowledge execution of a command line.

CONNECT (1)

The modem will send this result code upon connection when:

1. The line speed is 300 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 300 bps and the modem has been instructed to report the DTE speed to the DTE upon connection, or
3. The range of result code responses is restricted by the X command such that no speed reporting is allowed.

RING (2)

The modem sends this result code when incoming ringing is detected on the line.

When cellular interface is selected, RING indicates that the cellular phone is receiving an incoming call.

NO CARRIER (3)

The modem sends this result code when attempting to establish a call if:

1. Ringback is detected and later ceases but no carrier is detected within the period of time determined by register S7, or
2. No ringback is detected within the period of time determined by register S7. This result code is also used when the modem auto-disconnects due to loss of carrier.

Under X0, if busy tone detection is enforced, this result code is used as a response to the detection of busy or circuit busy. Under X0, if dial tone detection is enforced or selected, this result code is used to indicate that dial tone has not been detected.

ERROR (4)

The modem returns this result code if the command line contains a syntax error or it is unable to execute a command contained in the command line. It is issued if a command does not exist or if the parameter supplied is outside the permitted range.

Under X0, X1, X2, and X3, this result is used instead of DELAYED and BLACKLISTED.

1. The line speed is 1200 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 1200 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting. (Also, see the W command).

CONNECT 1200 (5)

The modem has connected to the line and either the line speed is 1200bps and DCE speed reporting is enabled, or the DTE speed is 1200bps and DTE speed reporting is enabled.

NO DIAL TONE (6)

For X2 and X4, the modem sends this result code if it has been instructed to wait for dial tone during dialing but none is received. When cellular phone interface is selected, NO DIALTONE indicates that cellular services is not currently available.

BUSY (7)

For X3 and X4, if busy tone detection is enforced, the modem sends this result code when attempting to originate a call if the busy (engaged) signal is detected on the line.

NO ANSWER (8)

The modem sends this result code when attempting to originate a call if a continuous ring-back signal is detected on the line until the expiration of the timer S7.

CONNECT 600 (9) (Not Supported by CH1786, CH1787, CH2100 and CH2124)

The modem has connected to the line, the DTE speed is 600bps, and DTE speed reporting is enabled.

CONNECT 2400 (10)

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 2400 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 2400 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 4800 (11) (Not Supported by CH1786, CH1787, CH2100 and CH2124)

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 4800 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 4800 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 9600 (12) (Not Supported by CH1786, CH1787, CH2100 and CH2124)

For the X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 9600 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 9600 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

DATA (13) (For CH1786, CH1787, CH2100 and CH2124 only)

Connected as data modem during auto answer.

CONNECT 7200 (13) (For CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only)

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 7200 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 7200 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 12000 (14) (Not Supported by CH1786, CH1787, CH2100 and CH2124)

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 12000 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 12000 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

FAX (15) (For CH1786, CH1787, CH2100 and CH2124 only)

Connected as fax modem during auto answer.

THE FOLLOWING RESULT CODES ARE NOT SUPPORTED BY CH1786, CH1787, CH2100 AND CH2124 PRODUCTS**CONNECT 14400 (15)**

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 14400 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 14400 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 19200 (16)

For X1, X2, X3, and X4, the modem sends this result code when:

1. The line speed is 19200 bps and the modem has been instructed to report the line speed to the DTE upon connecting, or
2. The DTE speed is 19200 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 38400 (17)

For X1, X2, X3 and X4, the modem sends this result code upon connecting when the DTE speed is 38400 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 57600 (18)

For X1, X2, X3 and X4, the modem sends this result code upon connecting when the DTE speed is 57600 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 115200 (19)

For X1, X2, X3 and X4, the modem sends this result code upon connecting when the DTE speed is 115200 bps and the modem has been instructed to report the DTE speed to the DTE upon connecting.

CONNECT 75RTX/1200RX (22)

For X1, X2, X3 and X4, the modem returns this result code upon establishing a V.23 originate connection when the modem has been instructed to report the DCE speed upon connection.

CONNECT 1200TX/75RX (23)

For X1, X2, X3 and X4, the modem returns this result code upon establishing a V.23 originate connection when the modem has been instructed to report the DCE speed upon connection.

DELAYED (24)

For X4, the modem returns this result code when a call fails to connect and the number dialed is considered "delayed" due to country blacklisting requirements.

BLACKLISTED (32)

For X4, the modem returns this result code when a call fails to connect and the number dialed is considered "blacklisted."

FAX (33)

The modem returns this result code when a fax modem connection is established in a facsimile mode.

DATA (35)

The modem returns this result when a data modem connection is established in facsimile mode.

+MRR: 300 (40)

The modem returns this result code when a 0-300 bps data rate has been detected on the line and carrier reporting has been established. (See S95 and Xn).

+MRR: 1200/75 (44)

The V.23 backward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn).

+MRR: 75/1200 (45)

The V.23 forward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn).

+MRR: 1200 (46)

The modem sends this result code when a 1200 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 2400 (47)

The modem sends this result code when a 2400 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 4800 (48)

The modem sends this result code when a 4800 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 7200 (49)

The modem sends this result code when a 7200 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 9600 (50)

The modem sends this result code when a 9600 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 12000 (51)

The modem sends this result code when a 12000 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 14400 (52)

The modem sends this result code when a 14400 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 16800 (53)

The modem sends this result code when a 16800 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 19200 (54)

The modem sends this result code when a 19200 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 21600 (55)

The modem sends this result code when a 21600 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 24000 (56)

The modem sends this result code when a 24000 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 26400 (57)

The modem sends this result code when a 26400 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+MRR: 28800 (58)

The modem sends this result code when a 28800 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

CONNECT 16800 (59)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 16800 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 21600 (61)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 21600 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 24000 (62)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 24000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 26400 (63)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 26400 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 28800 (64)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 28800 bps and the modem has been instructed to report the DTE speed upon connecting.

+DR: ALT (66)

This message is sent to the DTE when the modem has connected in MNP Class 5 and COMPRESSION message reporting has been enabled. (See S95 and Xn).

+DR: V.42B (67)

This message is sent to the DTE when the modem has connected in V.42 bis and COMPRESSION message reporting has been enabled. (See S95 and Xn).

+DR: NONE (69)

This message is sent to the DTE when the modem has connected without data compression and COMPRESSION message reporting has been enabled. (See S95 and Xn).

+ER: NONE (70)

This message is sent to the DTE when the modem has connected without any form of error correction, and the PROTOCOL message reporting has been enabled. (See S95 and Xn).

+ER: LAPM (77)

This message is sent to the DTE when the modem has connected in the V.42 LAPM mode of error correction, and PROTOCOL message reporting has been enabled. (See S95 and Xn).

CARRIER 31200 (78)

The Modem sends this result code when a 31200 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

CARRIER 33600 (79)

The Modem sends this result code when a 33600 bps data rate has been detected on the line and carrier reporting has been enabled. (See S95 and Xn).

+ER: ALT (80)

This message is sent to the DTE when the modem has connected in the MNP mode of error correction, and PROTOCOL message reporting has been enabled. (See S95 and Xn).

+ER: ALT-CELLULAR (81)

This message is sent to the DTE when the modem has connected to the MNP 10 mode and cellular power level adjustment is enabled (M1 or M2). (See S95 and Xn).

LINE IN USE (83)

The modem attempted to go Off-Hook when an extension was already occupying the line.

CONNECT 33600 (84)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 33600 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 31200 (91)

For X1, X2, X3, and X4, the modem returns this result code upon connecting when the DTE speed is 31200 bps and the modem has been instructed to report the DTE speed upon connecting.

+MCR: B103 (134)

The modem has connected to the line with Bell 103 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: B212 (135)

The modem has connected to the line with Bell 212 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V21 (136)

The modem has connected to the line with ITU-T V.21 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V22 (137)

The modem has connected to the line with ITU-T V.22 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V22B (138)

The modem has connected to the line with ITU-T V.22bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V23 (139)

The modem has connected to the line with ITU-T V.23 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V32 (140)

The modem has connected to the line with ITU-T V.32 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V32B (141)

The modem has connected to the line with ITU-T V.32bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V34 (142)

The modem has connected to the line with ITU-T V.34 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: K56 (144)

The modem has connected to the line with ITU-T K56flex modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MCR: V90 (145)

The modem has connected to the line with ITU-T V.90 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)

+MRR: 32000 (150)

Te modem has connected to the line at 32000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 34000 (151)

Te modem has connected to the line at 34000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 36000 (152)

Te modem has connected to the line at 36000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 38000 (153)

Te modem has connected to the line at 38000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 40000 (154)

Te modem has connected to the line at 40000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 42000 (155)

Te modem has connected to the line at 42000bps and carrier reporting is enabled. ((See S95 and Xn.)

+MRR: 44000 (156)

Te modem has connected to the line at 44000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 46000 (157)

Te modem has connected to the line at 46000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 48000 (158)

Te modem has connected to the line at 48000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 50000 (159)

Te modem has connected to the line at 50000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 52000 (160)

Te modem has connected to the line at 52000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 54000 (161)

Te modem has connected to the line at 54000bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 56000 (162)

Te modem has connected to the line at 56000bps and carrier reporting is enabled. (See S95 and Xn.)

CONNECT 32000 (165)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 32000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 34000 (166)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 34000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 36000 (167)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 36000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 38000 (168)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 38000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 40000 (169)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 40000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 42000 (170)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 42000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 44000 (171)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 44000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 46000 (172)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 46000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 48000 (173)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 48000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 50000 (174)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 50000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 52000 (175)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 52000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 54000 (176)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 54000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 56000 (177)

For X1, X2, X3 and X4, the modem returns this result code upon connecting when the DTE speed is 56000 bps and the modem has been instructed to report the DTE speed upon connecting.

CONNECT 230400 (178)

The modem has connected to the line, the DTE speed is 230400 bps, and DTE speed reporting is enabled.

CONNECT 28000 (180)

The modem has connected to the line at 28000 bps and DCE SPEED reporting is enabled.

CONNECT 29333 (181)

The modem has connected to the line at 29333 bps and DCE SPEED reporting is enabled.

CONNECT 30667 (182)

The modem has connected to the line at 30667 bps and DCE SPEED reporting is enabled.

CONNECT 33333 (183)

The modem has connected to the line at 33333 bps and DCE SPEED reporting is enabled.

CONNECT 34667 (184)

The modem has connected to the line at 34667 bps and DCE SPEED reporting is enabled.

CONNECT 37333 (185)

The modem has connected to the line at 37333 bps and DCE SPEED reporting is enabled.

CONNECT 38667 (186)

The modem has connected to the line at 38667 bps and DCE SPEED reporting is enabled.

CONNECT 41333 (187)

The modem has connected to the line at 41333bps and DCE SPEED reporting is enabled.

CONNECT 42667 (188)

The modem has connected to the line at 42667 bps and DCE SPEED reporting is enabled.

CONNECT 45333 (189)

The modem has connected to the line at 28000bps and DCE SPEED reporting is enabled.

CONNECT 46667 (190)

The modem has connected to the line at 46667 bps and DCE SPEED reporting is enabled.

CONNECT 49333 (191)

The modem has connected to the line at 49333 bps and DCE SPEED reporting is enabled.

CONNECT 50667 (192)

The modem has connected to the line at 50667 bps and DCE SPEED reporting is enabled.

CONNECT 53333 (193)

The modem has connected to the line at 53333 bps and DCE SPEED reporting is enabled.

CONNECT 54667 (194)

The modem has connected to the line at 54667 bps and DCE SPEED reporting is enabled.

+MRR: 28000 (195)

The modem has connected to the line at 28000 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 29333 (196)

The modem has connected to the line at 29333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 30667 (197)

The modem has connected to the line at 30667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 33333 (198)

The modem has connected to the line at 33333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 34667 (199)

The modem has connected to the line at 34667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 37333 (200)

The modem has connected to the line at 37333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 38667 (201)

The modem has connected to the line at 38667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 41333 (202)

The modem has connected to the line at 41333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 42667 (203)

The modem has connected to the line at 42667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 45333 (204)

The modem has connected to the line at 45333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 46667 (205)

The modem has connected to the line at 46667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 49333 (206)

The modem has connected to the line at 49333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 50667 (207)

The modem has connected to the line at 50667 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 53333 (208)

The modem has connected to the line at 53333 bps and carrier reporting is enabled. (See S95 and Xn.)

+MRR: 54667 (209)

The modem has connected to the line at 54667 bps and carrier reporting is enabled. (See S95 and Xn.)

ATTACHMENT 2 S-REGISTER SUMMARY

Table 3-1: S-Register Summary for CH1786, CH1787, CH2100 and CH2124 Products only.

Register	Description	Range	Units	Saved	Firmware Defaults	Factory Defaults
S0	Ring to Answer On	0-255	rings	*	000	001
S1	Ring Count	0-255	rings		000	000
S2	Escape Code Character	0-127	ASCII		043	043
S3	Carriage Return Character	0-127	ASCII		013	013
S4	Line Feed Character	0-127	ASCII		010	010
S5	Back Space Character	0-32, 127	ASCII		008	008
S6	Maximum Wait Time for Dial Tone	2-255	s		002	002
S7	Maximum Wait Time for Data Carrier	1-255	s		030	030
S8	Pause Time for Comma	0-255	s		002	002
S9	Carrier Detect Response Time	1-255	1/10s		006	006
S10	Lost Carrier to Hang-up Delay	1-255	1/10s		014	014
S11	DTMF Dialing Speed	50-255	ms		095	095
S12	Escape Code Guard Time	0-255	1/50s		050	050
S13	Reserved	-	-	-	000	000
S14	Bit Mapped Options Register	Bit Mapped	none	*	170 (AAH)	170 (AAH)
S15	Reserved	-	-	-	000	000
S16	Modem Test Options	Bit Mapped	none		000	000
S17	FAX Mode Null Byte Timer	0-255	4ms incr		000	000
S18	Test Timer	0-255	s	*	000	000
S19	Protocol Interface Speed	0-1	none		000	000
S20	FAX Mode Inactivity Timer	0-127	s		000	000
S21	Bit Mapped Option Register	Bit Mapped	none	*	000	096 (06H)
S22	Bit Mapped Option Register	Bit Mapped	none	*	118 (76H)	118 (76H)
S23	Bit Mapped Option Register	Bit Mapped	none	*	007 (07H)	023 (17H)
S24	Sleep Mode Inactivity Timer	0-255	s		000	000
S25	Delay to DTR Off	0-255	0.01s	*	005	005
S26	RTS to CTS Delay Interval	0-255	0.01s	*	001	001
S27	Bit Mapped Option Register	Bit Mapped	none	*	064 (40H)	064 (40H)
S28	Bit Mapped Option Register	Bit Mapped	none	*	000	001

- NOTES:**
- Parameters indicated with a (*) in the Saved column may be stored in User Profile n=0, 1 by executing the appropriate &Wn command.
 - A stored Profile is a subset of allowed parameters and is comprised of those parameters displayed with the &V command.
 - Factory Default values that are different from the Firmware Default values are highlighted in **BOLD**.
 - Restore Factory Default values using Zn command.
 - Restore Firmware Default values using &Fn command.

Table 3-2: S-Register Summary for CH1786A Products only.

Register	Function	Range	Units	Saved	Firmware Defaults	Factory Defaults
S0	Rings to Auto-Answer	0-255	rings	*	000	001
S1	Ring Counter	0-255	rings		000	000
S2	Escape Character	0-255	ASCII	*	043	043
S3	Carriage Return Character	0-127	ASCII		013	013
S4	Line Feed Character	0-127	ASCII		010	010
S5	Backspace Character	0-255	ASCII		008	008
S6	Wait Time before Dial Tone or Blind Dialing	2-255	s	*	002	002
S7	Wait Time for Carrier, Silence or Dial Tone	1-255	s	*	050	050
S8	Pause Time for Dial Delay Modifier	2-255	s	*	002	002
S9	Carrier Detect Response Time	1-255	0.1s	*	006	006
S10	Carrier Loss Disconnect Delay	1-255	0.1s	*	014	014
S11	DTMF Tone Duration	50-255	0.001s	*	085	085
S12	Escape Prompt Delay	0-255	0.02s	*	050	050
S13	Reserved	-	-		000	000
S14	General Bit Mapped Options Status	-	-	*	146 (92H)	146 (92H)
S15	Reserved	-	-		000	000
S16	Test Mode Bit Mapped Options Status (&T)	-	-		000	000
S17	POS Option	-	-		000	000
S19	Reserved	-	-		000	000
S20	Reserved	-	-		000	000
S21	V.24/General Bit Mapped Options Status	-	-		052 (34H)	100 (74H)
S22	Speaker/Results Bit Mapped Options Status	-	-		117 (75H)	117 (75H)
S23	General Bit Mapped Options Status	-	-		000	000
S24	Sleep Inactivity Timer	0-255	s		000	000
S25	Delay to DTR off	0-255	0.01s		005	005
S26	RTS-to-CTS Delay	0-255	0.01s		001	001
S27	General Bit Mapped Options Status	-	-		073 (49H)	074 (4AH)
S28	General Bit Mapped Options Status	-	-		000	000
S29	Flash Dial Modifier	0-255	0.01s		070	070
S30	Disconnect Inactivity Timer	0-255	10ms		000	000
S31	General Bit Mapped Options Status	-	-		192 (C0H)	192 (C0H)
S36	LAPM Failure Control	-	-	*	007	007
S37	Line Connection Speed	-	-		000	000
S38	Delay Before Forced Hang-up	0-255	s		020	020
S39	Flow Control Bit Mapped Options Status	-	-		003	003
S40	General Bit Mapped Options Status	-	-	*	104 (68H)	104 (68H)
S41	General Bit Mapped Options Status	-	-	*	195 (C3H)	192 (C0H)
S43-S45	Reserved	-	-		-	-
S46	Data Compression Control	-	-	*	138	136
S48	V.42 Negotiation Control	-	-		007	007
S82	LAPM Break Control	-	-		000	000
S86	Call Failure Reason Code	0-26	-		021	021
S91	PSTN Transmit Attenuation Level	0-15	dBm		011	011
S92	FAX Transmit Attenuation Level	0-15	dBm		011	011
S95	Result Code Messages Control	-	-	*	000	000
S210	V.34 Symbol Rate	0-255	-		141 (8CH)	141 (8CH)

- NOTES:**
- Parameters indicated with a (*) in the Saved column may be stored in User Profile n=0, 1 by executing the appropriate &Wn command.
 - A stored Profile is a subset of allowed parameters and is comprised of those parameters displayed with the &V command.
 - Factory Default values that are different from the Firmware Default values are highlighted in **BOLD**.
 - Restore Factory Default values using Zn command.
 - Restore Firmware Default values using &Fn command

Table 3-3: S-Register Summary for CH179X, CH2056, CH2160 and CH2165 Products only.

Register	Function	Range	Units	Saved	Firmware Defaults	Factory Defaults
S0	Rings to Auto-Answer	0-255	rings	*	000	000
S1	Ring Counter	0-255	rings		000	000
S2	Escape Character	0-255	ASCII	*	043	043
S3	Carriage Return Character	0-127	ASCII		013	013
S4	Line Feed Character	0-127	ASCII		010	010
S5	Backspace Character	0-255	ASCII		008	008
S6	Wait Time before Dial Tone or Blind Dialing	2-255	s	*	002	002
S7	Wait Time for Carrier, Silence or Dial Tone	1-255	s	*	050	050
S8	Pause Time for Dial Delay Modifier	0-255	s	*	002	002
S9	Carrier Detect Response Time	1-255	0.1s	*	006	006
S10	Carrier Loss Disconnect Delay	1-255	0.1s	*	014	014
S11	DTMF Tone Duration	-	-		095	095
S12	Escape Prompt Delay	0-255	0.02s	*	050	050
S13	Reserved	-	-		000	000
S14	General Bit Mapped Options Status	-	-	*	138 (8AH)	138 (8AH)
S15	Reserved	-	-		000	000
S16	Test Mode Bit Mapped Options Status (&T)	-	-		000	000
S17	POS Option	-	-		000	000
S19	Reserved	-	-		000	000
S20	Reserved	-	-		000	000
S21	V.24/General Bit Mapped Options Status	-	-	*	052 (34H)	020 (14H)
S22	Speaker/Results Bit Mapped Options Status	-	-	*	117 (75H)	117 (75H)
S23	General Bit Mapped Options Status	-	-	*	000	000
S24	Sleep Inactivity Timer	0-255	s	*	000	000
S25	Delay to DTR off	0-255	0.01s		005	005
S26	RTS-to-CTS Delay	0-255	0.01s		001	001
S27	General Bit Mapped Options Status	-	-	*	073 (49H)	073 (49H)
S28	General Bit Mapped Options Status	-	-	*	000	000
S29	Flash Dial Modifier	0-255	0.01s		070	070
S30	Disconnect Inactivity Timer	0-255	10ms		000	000
S31	General Bit Mapped Options Status	-	-	*	192 (C0H)	192 (C0H)
S36	LAPM Failure Control	-	-	*	007	007
S37	Line Connection Speed	-	-	*	000	000
S38	Delay Before Forced Hang-up	0-255	s		020	020
S39	Flow Control Bit Mapped Options Status	-	-	*	003	003
S40	General Bit Mapped Options Status	-	-	*	104 (68H)	104 (68H)
S41	General Bit Mapped Options Status	-	-	*	195 (C3H)	195 (C3H)
S43-S45	Reserved	-	-		-	-
S46	Data Compression Control	-	-	*	138	138
S48	V.42 Negotiation Control	-	-	*	007	007
S82	LAPM Break Control	-	-		000	000
S86	Call Failure Indeification	0-26	-		021	021
S91	PSTN Transmit Attenuation Level	0-15	dBm		10	10
S92	FAX Transmit Attenuation Level	0-15	dBm		10	10
S95	Result Code Messages Control	-	-	*	000	000
S210	V.34 Symbol Rate	0-255	-		13 (0DH)	13 (0DH)

- NOTES:**
- Parameters indicated with a (*) in the Saved column may be stored in User Profile n=0, 1 by executing the appropriate &Wn command.
 - A stored Profile is a subset of allowed parameters and is comprised of those parameters displayed with the &V command.
 - Factory Default values that are different from the Firmware Default values are highlighted in **BOLD**.
 - Restore Factory Default values using Zn command.
 - Restore Firmware Default values using &Fn command.

Table 3-4: S-Register Summary for CH179XA and CH2056A Products only.

Register	Function	Range	Units	Saved	Firmware Defaults	Factory Defaults
S0	Rings to Auto-Answer	0-255	rings	*	000	001
S1	Ring Counter	0-255	rings		000	000
S2	Escape Character	0-255	ASCII	*	043	043
S3	Carriage Return Character	0-127	ASCII		013	013
S4	Line Feed Character	0-127	ASCII		010	010
S5	Backspace Character	0-255	ASCII		008	008
S6	Wait Time before Dial Tone or Blind Dialing	2-255	s	*	002	002
S7	Wait Time for Carrier, Silence or Dial Tone	1-255	s	*	050	030
S8	Pause Time for Dial Delay Modifier	0-255	s	*	002	002
S9	Carrier Detect Response Time	1-255	0.1s	*	006	001
S10	Carrier Loss Disconnect Delay	1-255	0.1s	*	014	014
S11	DTMF Tone Duration	50-255	0.001s	*	085	100
S12	Escape Prompt Delay	0-255	0.02s	*	050	050
S13	Reserved	-	-		000	000
S14	General Bit Mapped Options Status	-	-	*	146 (92H)	146 (92H)
S15	Reserved	-	-		000	000
S16	Test Mode Bit Mapped Options Status (&T)	-	-		000	000
S17	POS Option	-	-		000	000
S19	Reserved	-	-		000	000
S20	Reserved	-	-		000	000
S21	V.24/General Bit Mapped Options Status	-	-		052 (34H)	116 (74H)
S22	Speaker/Results Bit Mapped Options Status	-	-		117 (75H)	117 (75H)
S23	General Bit Mapped Options Status	-	-		000	000
S24	Sleep Inactivity Timer	0-255	s		000	000
S25	Delay to DTR off	0-255	0.01s		005	005
S26	RTS-to-CTS Delay	0-255	0.01s		001	001
S27	General Bit Mapped Options Status	-	-		073 (49H)	074 (4AH)
S28	General Bit Mapped Options Status	-	-		000	000
S29	Flash Dial Modifier	0-255	0.01s		070	070
S30	Disconnect Inactivity Timer	0-255	10ms		000	000
S31	General Bit Mapped Options Status	-	-		192 (C0H)	192 (C0H)
S36	LAPM Failure Control	-	-	*	007	007
S37	Line Connection Speed	-	-		000	000
S38	Delay Before Forced Hang-up	0-255	s		020	020
S39	Flow Control Bit Mapped Options Status	-	-		003	003
S40	General Bit Mapped Options Status	-	-	*	104 (68H)	104 (68H)
S41	General Bit Mapped Options Status	-	-	*	195 (C3H)	195 (C3H)
S43-S45	Reserved	-	-		-	-
S46	Data Compression Control	-	-	*	138	138
S48	V.42 Negotiation Control	-	-		007	007
S82	LAPM Break Control	-	-		000	000
S86	Call Failure Reason Code	0-26	-		021	021
S91	PSTN Transmit Attenuation Level	0-15	dBm		011	011
S92	FAX Transmit Attenuation Level	0-15	dBm		011	011
S95	Result Code Messages Control	-	-	*	000	000
S210	V.34 Symbol Rate	0-255	-		141 (8DH)	141 (8DH)

- NOTES:**
- Parameters indicated with a (*) in the Saved column may be stored in User Profile n=0, 1 by executing the appropriate &Wn command.
 - A stored Profile is a subset of allowed parameters and is comprised of those parameters displayed with the &V command.
 - Factory Default values that are different from the Firmware Default values are highlighted in **BOLD**.
 - Restore Factory Default values using Zn command.
 - Restore Firmware Default values using &Fn command.

S-REGISTER DEFINITIONS

The values listed as defaults are the Firmware Defaults and are also listed in Tables 3-1, 3-2, 3-3 and 3-4, as applicable.

S0 - Number of Rings to Auto-Answer.

Sets the number of the rings required before the modem automatically answers a call. Setting this register to zero disables the auto-answer mode.

Range: 0-255 rings

Default: 0

S1 - Ring Counter.

S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval.

Range: 0-255 rings

Default: 0

S2 - Escape Character.

S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII "+". A value over 127 disables the escape process, i.e., no escape character will be recognized.

Range: 0-127 (CH1786, CH1787, CH2100 and CH2124 only)

Range: 0-255, ASCII decimal (All Other Products)

Default: 43 (+)

S3 - Carriage Return Character.

Sets the command line and result code terminator character. Pertains to asynchronous operation only.

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

S4 - Line Feed Character.

Sets the character recognized as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used.

Range: 0-127, ASCII decimal

Default: 10 (Line Feed)

S5 - Backspace Character.

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

Range: 0-32, 127 (CH1786, CH1787, CH2100 and CH2124)

Range: 0-32, ASCII decimal (All Other Products)

Default: 8 (Backspace)

S6 - Wait Time for Dial Tone Before Blind Dialing.

Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing. This operation, however, may be affected by some Xn options according to country restrictions. The "Wait for Dial Tone" call progress feature (W dial modifier in the dial string) will override the value in register S6.

The modem pauses for a minimum of 2 seconds even if the value of S6 is set to less than 2 seconds.

Range: 2-255 seconds.

Default: 2

S7 - Wait for Carrier After Dial.

Sets the length of time, in seconds, that the modem will wait for carrier before hanging up. The timer is started when the modem finishes dialing (originate case), or 2 seconds after going off-hook (answer case). In originate mode, the timer is reset upon detection of answer tone if allowed by country restrictions. Sets the length of time, in seconds, that modem will wait for silence when encountering the @ dial modifier before continuing with the next dial string parameter.

Range: 1-255 Seconds

Default: 30 (CH1786, CH1787, CH2100 and CH2124)

Default: 50 (All Other Products)

S8 - Pause Time For Dial Delay.

Set the time, in seconds, that the modem must pause when the “,” dial modifier is encountered in the dial string.

Range: 0-255 seconds

Default: 2

S9 - Carrier Detect Response Time. (CH1786, CH1787, CH2100 and CH2124 only).

Sets the length of time, in tenths of a second, that the carrier must be present before the modem considers it valid and turns on RLSD. As this time is increased, there is less chance to detect a false carrier due to noise from the telephone line.

Range: 1-255 tenths of a second

Default: 6 (0.6 second)

S9 - Carrier Detect Response Time. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

S9 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: 6 tenths of a second

Default: 6 (0.6 second)

S10 - Lost Carrier To Hang Up Delay.

Sets the length of time, in tenths of a second, that the modem waits before hanging up after a loss of carrier. This allows for a temporary carrier loss without causing the local modem to disconnect. When register S10 is set to 255, the modem functions as if a carrier is always present.

The actual interval the modem waits before disconnection is the value in register S10 minus the value in register S9. Therefore, the S10 value must be greater than the S9 value or else the modem disconnects before it recognizes the carrier.

CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only: For Call Waiting detection, if the modem is set to US country code (default) and $S10 \geq 16$, then the modem will detect the Call Waiting tone and hang-up the line. If $S10 < 16$, the modem will not detect Call Waiting tone.

Range: 1-255 tenths of a second

Default: 14 (1.4 seconds)

S11 - DTMF Tone Duration.

S11 operation is country dependent. S11 sets the duration of DTMF dialing tones. This register has no effect on pulse dialing.

Range: 50-255 milliseconds

Default: 95 (95 milliseconds) (All Other Products)

Default: 85 (85 milliseconds) (CH1786A, CH179XA and CH2056A only)

S12 - Escape Prompt Delay (EPD).

Define the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Note that sending of the OK result code does not affect entry into command mode. The minimum guard time before the first plus and the last plus should be greater than 1 second. (See Escape Code Sequence.)

Range: 0-255 1/50 of a second

Default: 50 (1 second)

S13 - Reserved.

S14 - General Bit-Mapped Options Status. (CH1786A, CH179XA and CH2056A only).

Indicates the status of various command options.

Default: 146 (92H) (10010010b)

Bit 0 This bit is ignored.

Bit 1 Command echo (En)

0 = Disabled (E0)

1 = Enabled (E1) (Default)

Bit 2 Quiet mode (Qn)

	0 = Send result codes (Q0) (Default)
	1 = Do not send result codes (Q1)
Bit 3	Result Codes (Vn)
	0 = Numeric (V0)
	1 = Verbose (V1) (Default)
Bit 4	Reserved
Bit 5	Tone (T)/Pulse (P)
	0 = Tone (T) (Default)
	1 = Pulse (P)
Bit 6	Reserved
Bit 7	Originate/Answer
	0 = Answer
	1 = Originate (Default)

S14 - General Bit-Mapped Options Status. (CH179X, CH2056, CH2160 and CH2165 only).

Indicates the status of various command options.

Default:	138 (8AH) (10001010b)
Bit 0	This bit is ignored.
Bit 1	Command echo (En)
	0 = Disabled (E0)
	1 = Enabled (E1) (Default)
Bit 2	Quiet mode (Qn)
	0 = Send result codes (Q0) (Default)
	1 = Do not send result codes (Q1)
Bit 3	Result Codes (Vn)
	0 = Numeric (V0)
	1 = Verbose (V1) (Default)
Bit 4	Reserved
Bit 5	Tone (T)/Pulse (P)
	0 = Tone (T) (Default)
	1 = Pulse (P)
Bit 6	Reserved
Bit 7	Originate/Answer
	0 = Answer
	1 = Originate (Default)

S14 - General Bit-Mapped Options Status. (CH1786, CH1787, CH2100 and CH2124 only).

Indicates the status of various command options.

Default:	170 (AAH) (10101010b)
Bit 0	Reserved
Bit 1	Command echo (En)
	0 = Disabled (E0)
	1 = Enabled (E1) (Default)
Bit 2	Quiet mode (Qn)
	0 = Send result codes (Q0) (Default)
	1 = Do not send result codes (Q1)
Bit 3	Result Codes (Vn)
	0 = Numeric (V0)
	1 = Verbose (V1) (Default)
Bit 4	Reserved
Bit 5	Tone (T)/Pulse (P)
	0 = Tone (T)
	1 = Pulse (P) (Default)
Bit 6	Reserved
Bit 7	Originate/Answer
	0 = Answer
	1 = Originate (Default)

S15 - Not Supported.

S16 - Modem Test Option. (CH1786, CH1787, CH2100 and CH2124 only).

Controls the diagnostic modes as follows:

Bit 0	Local Analog Loopback L3 (See &T1 command)
	0 = Disabled (Factory Default)
	1 = &T1-Enabled
Bit 1	Reserved
Bit 2	Local Digital Loopback (See &T3 command)
	0 = Disabled (Factory Default)
	1 = &T3-Enabled
Bit 3	Remote Digital Loopback L2 (See &T6 command)
	0 = Disabled (Factory Default)
	1 = &T6-Enabled
Bit 4-7	Not used

S16 - Modem Test Option. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

Indicates the test in progress status.

Default:	0
Bit 0	Local analog loopback
	0 = Disabled (Default)
	1 = Enabled (&T1)
Bit 1-7	Not used

S17 - Fax Mode Null Byte Timer. (CH1786, CH1787, CH2100 and CH2124 only).

The value of S17 determines the length of time null bytes are sent by the modem if the last byte sent during DTE under run in FAX Mode is not a null byte. $0 \leq S17 \leq 250$ corresponds to a timer value of 0-1 second (i.e., the timer value is the value of S7 times 4 ms).

Range:	0-250ms in 4ms increments
Default:	0

S17 - Not Supported. (CH179X, CH2056, CH2160 and CH2165 only).**S17 - Fast Connect. (CH1786A, CH179XA and CH2056A only).**

Used for V.22 Fast Connect. S17 selects the different options available for Point of Sale applications.

Default	0 (00000000b)
Bit 0	0
Bit 1	0
Bit 2	0
Bit 3	0
Bit 4	0
Bit 5	0
Bit 6	0
Bit 7	0
Bit 0	V.80 sub-mode selection
	0 = Enable transparent sub-mode (Default)
	1 = Enable framed sub-mode
	Note: When V.80 is enabled in V.22 fast connect (\$F2) or V.29 FastPOS (\$F4), the modem automatically connects in framed sub-mode even if bit 1=0
Bit 1	V.22bis/V.22/Bell 212 early data mode selection
	0 = Enable normal V.22bis/V.22/Bell 212 handshake (Default)
	1 = Enable early data mode (CTS turned ON sooner) for V.22bis/V.22/Bell 212
Bit 2	Logical/physical hang-up selection
	0 = Enable logical hang-up if remote had already dropped its carrier when H command is issued to the modem. Otherwise, the modem waits for S38 delay before it physically disconnects. (Default)
	1 = Enable physically hang-up if remote side had already dropped its carrier when H command is issued to the modem. Otherwise, the modem does not wait for S38 delay but hangs up immediately.
Bit 3	Enable/Disable HDLC in V.22 fast connect (applicable only in V.22 fast connect mode \$F2 is selected, and &Q0, &Q5, or &Q6 is selected)
	0 = Enable asynchronous mode (Default)
	1 = Enable HDLC (synchronous mode)

Note: If V.80 Synchronous Access Mode is enabled, the modem will automatically connect in V22 fast connect synchronous mode even if bit 3=0

Bit 3	Not Supported
Bit 4	V.29 FastPOS mode selection 0 = Enable V.29 FastPOS (Default) 1 = Enable V.29 FastPOS alternate sequence
Bit 5	V.29 FastPOS fallback selection 0 = Enable V.29 FastPOS with fallback to standard V.22bis (Default) 1 = Enable V.29 FastPOS with fallback to V.22 fast connect
Bit 6	Fast Bell 103/V.21 (applicable only if Bell 103, or V.21, or V.23 half-duplex (HDX) is enabled; see +MS and B2 commands) 0 = Enable standard Bell 103/V.21,V.23HDX (Default) 1 = Enable fast Bell 103/V.21 or non-standard V.23HDX21
Bit 7	Not used (Reserved)

S18 - Test Timer. (CH1786, CH1787, CH2100 and CH2124 only).

Sets the length of time, in seconds, that the modem conducts a test (commanded by &Tn) before returning to the command mode. If this register value is zero, the test will not automatically terminate. The test must be terminated from the command mode by issuing an &T0 or H command. When S18 is nonzero, the modem returns the OK message upon test termination.

Range: 0-255 seconds

Default: 0

S18 - Not Supported. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).**S19 - Conexant Protocol interface Speed. (CH1786, CH1787, CH2100 and CH2124 only).**

Not Supported.

Range: None

Default: 0

S19 - Reserved. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

S19 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S20 - Fax Mode Inactivity Timer. (CH1786, CH1787, CH2100 and CH2124 only).

S20 can be used to cause the modem to automatically place the telephone On-Hook or reset itself if inactivity (of variable duration) is detected while in Fax Mode.

Range: 1-127 seconds

Default: 0

S20 - Reserved. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

S20 is supported for backwards compatibility only. No value can be written. Responds with default value.

Range: None

Default: 0

S21 - V.24/General Bit-Mapped Options. (CH1786, CH1787, CH2100 and CH2124 only).

Indicates the status of various command functions.

Default: 00

Bit 0 Telco Jack (See &J Command)

0 = &J0-11/RJ-45S (Default)

1 = &J1-RJ-12/RJ-13

Bit 1 Reserved

Bit 2 Ready to Send (RTS)/Clear to Send (CTS). (See &R Command)

0 = &R0-CTS tracks RTS (Not Supported) (Default)

1 = &R1-RTS is ignored

Bit 3, 4 Data Terminal Ready (DTR) (See &D Command)

4 3

0 0 &D0-Modem ignores DTR (Default)

0 1 &D1-Modem goes to command state if ON-to-OFF transition on DTR

1 0 &D2-Modem "hang up" if ON-to-OFF transition on DTR

Bit 5	1 = &D3-Modem goes to initialization state if ON-to-OFF transition on DTR Data Carrier Detect (DCD) (See &C Command) 0 = &C0-DCD is always on (Default) 1 = &C1-An ON condition on DCD indicates the presence of a valid data carrier
Bit 6	Data Set Ready (DSR) (See &S Command) 0 = &S0-DSR is always on (Default) 1 = &S1-DSR is turned on at the start of handshaking
Bit 7	Long Space Discount (See Y Command) 0 = &Y0-Disabled (Default) 1 = &Y1-Enabled

S21 - V.24/General Bit Mapped Options Status. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

Indicates the status of various command options.

Default:	52 (34h) (00100100b)
Bit 0	Not Supported
Bit 1	Reserved
Bit 2	CTS behavior (&Rn) 0 = CTS tracks RTS (&R0) 1 = CTS always on (&R1) (Default)
Bits 3-4	DTR behavior (&Dn) 0 = &D0 selected (Default) 1 = &D1 selected 2 = &D2 selected 3 = &D3 selected
Bit 5	RLSD (DCD) behavior (&Cn) 0 = &C0 selected 1 = &C1 selected (Default)
Bit 6	DSR behavior (&Sn) 0 = &S0 selected (Default) 1 = &S1 selected
Bit 7	Not Supported

S22 - Speaker/Results Bit-Mapped Options Status. (CH1786, CH1787, CH2100 and CH2124 only).

Indicates the status of various command options.

Default:	118 (76H) (01100101b)
Bits 0-1	Speaker volume (Ln) 0 = Off (L0) 1 = Low (L1) 2 = Medium (L2) (Default) 3 = High (L3)
Bits 2-3	Speaker Control (Mn) 0 = Speaker disabled (M0) 1 = Speaker on until carrier detected (M1) (Default) 2 = Speaker always on (M2) 3 = Speaker on during handshake only (M3)
Bits 4-6	Limit result codes (Xn) 0 = X0 4 = X1 5 = X2 6 = X3 7 = X4 (Default)
Bit 7	Make/Break Ratio (See &P Command) 0 = &P0-39/61 United States/Canada (Default) 1 = &P1-33/67 UK/Hong Kong

S22 - Speaker/Results Bit-Mapped Options Status. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

Indicates the status of command options.

Default:	117 (75h) (01110101b)
Bits 0-1	Speaker volume (Ln)

	0 = Off (L0)
	1 = Low (L1) (Default)
	2 = Medium (L2)
	3 = High (L3)
Bits 2-3	Speaker Control (Mn)
	0 = Disabled (M0)
	1 = Off on carrier (M1) (Default)
	2 = Always on (M2)
	3 = On during handshake (M3)
Bits 4-6	Limit result codes (Xn)
	0 = X0
	4 = X1
	5 = X2
	6 = X3
	7 = X4 (Default)
Bit 7	Reserved

S23 - General Bit-Mapped Options Status. (CH1786, CH1787, CH2100 and CH2124 only).

Indicated the status of various command options.

Default: 007 (07H) (00001110b)

Bit 0	Obey request from remote modem for a Remote Digital Loopback (see &T4 and &T5 Commands)
	0 = &T5 selected-RDL disabled
	1 = &T4 selected-RDL enabled (Default)
Bit 1, 2	Communications Rate
	2 2
	0 0 300 bps
	0 1 Reserved
	1 0 1200 bps
	1 1 2400 bps (Default)
Bit 3	Reserved
Bit 4, 5	Parity Option
	5 4
	0 0 Even parity (Default)
	0 1 Space parity
	1 0 Odd parity
	2 2 Mark/None parity
Bit 6, 7	Guard Tones (See &G Command)
	7 6
	0 0 &G0-Guard tone disabled (Default)
	0 1 Reserved
	1 0 &G2-1800Hz guard tone
	1 1 Reserved

S23 - General Bit-Mapped Options Status. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

S23 indicates the status of various command options.

Default: 0

Bits 0-6 Not Used

Bits 6-7	Guard tone (&Gn)
	0 = None (&G0) (Default)
	1 = None (&G1)
	2 = 1800Hz (&G2)

S24 - Sleep Inactivity Timer.

Sets the length of time, in seconds, that the modem will operate in normal mode with no detected telephone line or DTE line activity before entering low-power sleep mode. The timer is reset upon any DTE line or telephone line activity. If the S24 value is zero, neither DTE line nor telephone inactivity will cause the modem to enter the sleep mode.

Range: 0-255 seconds

Default: 0

S25 - Delay to DTR.

Sets the length of time that the modem will ignore DTR before taking the action specified by &Dn. Its units are in one hundredths of a second.

Range: 0-255 (hundredths of seconds)

Default: 5

S26 - RTS to CTS Delay.

Sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Pertains to synchronous operation only.

Range: 0-255 hundredths of a second

Default: 1

S27 - Bit-Mapped Options. (CH1786, CH1787, CH2100 and CH2124 only).

Indicates status of various command options.

Default: 064 (40H) (01000000b)

Bit 3, 1, 0 Communications Mode Option (See &D Command)

3 1 0

0 0 0 = &Q0 selected-Asynchronous (Factory Default)

0 0 1 = &Q1 selected-Synchronous (Not Supported)

0 1 0 = &Q2 selected- Synchronous (Not Supported)

0 1 1 = &Q3 selected- Synchronous (Not Supported)

1 0 0 = Reserved

1 0 1 = Reserved

1 1 0 = Reserved

1 1 1 = Reserved

Bit 2 Dial Up/Leased Line Option

0 = Dial Up (Factory Default)

1 = Leased Line (Not Supported)

Bit 4, 5 Synchronous Transmit Clock Source Selection (see &X Command)

5 4

0 0 = &X0-Internal Clock (Factory Default)

0 1 = &X1-External DTE Clock (Not Supported)

1 0 = &X2-Receive Clock (Not Supported)

1 1 = Reserved

Bit 6 Communications Standard Option (See B Command)

0 = B0-CCITT V.22bis/V.22

1 = B1-Bell 212A (Factory Default)

Bit 7 Data/Fax Discrimination (i.e., AT+FAA Status)

0 = Data/Fax auto answer mode disabled (AT+FAA=0)

1 = Data/Fax auto answer mode enabled (AT+FAA=1)

S27 – Bit-Mapped Options Status. (CH1786A, CH179XA and CH2056A only)

indicates the status of various command options.

Default: 73 (49H) (01001001b)

Bits 0, 1, 3 Synchronous/asynchronous selection (&Mn/&Qn)

3 1 0

0 0 0 = &M0 or &Q0

0 0 1 = &M1 or &Q1

0 1 0 = &M2 or &Q2

0 1 1 = &M3 or &Q3

1 0 0 = Reserved

1 0 1 = &Q5 (Default)

1 1 0 &Q6

Bit 2 Leased line control (&Ln)

0 = Dial up line (&L0) (Default)

Bit 4-5 Internal clock select (&Xn)

0 = Internal clock (&X0) (Default)

1 = External clock (&X1)

2 = Slave clock (&X2)

Bit 6 CCITT/Bell mode select (Bn)

0 = CCITT mode (B0)

Bit 7 1 = Bell mode (B1) (Default)
 Reserved

S28 - Bit-Mapped Options. (CH1786, CH1787, CH2100 and CH2124 only).

Default: 00

Bit 2, 1, 0 Transmit Level Attenuation (See %Ln Command)

2	1	0 = Description
0	0	0 = 0dB attenuation (Default)
0	0	1 = 2dB attenuation
0	1	0 = 4dB attenuation
0	1	1 = 6dB attenuation
1	0	0 = 8dB attenuation
1	0	1 = 10dB attenuation
1	1	0 = 12dB attenuation
1	1	1 = 14dB attenuation

Bit 5, 4, 3 DTMF Transmit Level Attenuation (See %Dn Command)

5	4	3 = Description
0	0	0 = 0dB attenuation (Default)
0	0	1 = 2dB attenuation
0	1	0 = 4dB attenuation
0	1	1 = 6dB attenuation
1	0	0 = 8dB attenuation
1	0	1 = 10dB attenuation
1	1	0 = 12dB attenuation
1	1	1 = 14dB attenuation

Bit 6 Dialing Pulses per Second

0 = 10pps (Default)
 1 = 20pps

Bit 7 Secondary Defaults (See %J Command)

0 = &F Defaults (Default)
 1 = %J Defaults

S28 - Bit-Mapped Options Status for Pulse Dialing. (CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 only).

Default: 0

Bits 0-1 Reserved

Bit 2 Reserved (always 0).

Bits 3-4 Pulse dialing (&Pn)

0 = 39%-61% make/break ratio at 10 pulses per second (&P0) (Default.)
 1 = 33%-67% make/break ratio at 10 pulses per second (&P1)
 2 = 39%-61% make/break ratio at 20 pulses per second (&P2)
 3 = 33%-67% make/break ratio at 20 pulses per second (&P3)

Bits 5-7 Reserved

NOTE

S-Register S29 and higher apply to CH1786A, CH179X, CH179XA, CH2056, CH2056A, CH2160 and CH2165 Products only.

S29 – Flash Dial Modifier Time.

S29 sets the length of time, in units of 10ms, that the modem will go On-Hook when it encounters the flash (!) dial modifier in the dial string. S29 is a country dependent parameter and is not modifiable by the user.

Range: 0-255 10ms intervals

Default: 70 (700ms)

S30 - Disconnect Inactivity Timer.

Sets the length of time, in tens of seconds, that the modem will stay on-line before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The timer is inoperative in synchronous mode.

Range: 0-255 tenths of seconds (0-2550 seconds)

Default: 0 (disabled)

S31 - Bit-Mapped Options Status.

Default:	192 (C0H) (11000000b)
Bit 0	Single line connect message enable/disable (\Vn) 0 = Messages controlled by S95, Wn and Vn (\V0) (Default) 1 = Single line connect message (\V1)
Bit 1	Auto line speed detection (Nn) 0 = Disabled (N0) (Default) 1 = Enabled (N1)
Bits 2-3	Error correction progress messages (Wn) 0 = DTE speed only (W0) (Default) 1 = Full reporting (W1) 2 = DCE speed only (W2)
Bits 4-5	Caller ID (#CID) 0 = Caller ID disabled (#CID=0) (Default) 1 = Short (formatted) Caller ID enabled (#CID=1) 2 = Long (unformatted) Caller ID enabled (#CID=2)
Bits 6-7	Reserved (Default = 11b)

S34-S35 - Reserved.**S36 - LAPM Failure Control. (CH179X, CH2056, CH2160 and CH2165 only).**

Default:	7 (00000111b)
Bits 0-2	This value indicates what should happen upon a LAPM failure. These fallback options are initiated immediately upon connection if S48=128. If an invalid number is entered, the number is accepted into the register, but S36 will act as if the default value has been entered. 0 = Modem disconnects. 1 = Modem stays on-line and a Direct mode connection is established. 2 = Reserved 3 = Modem stays on-line and a Normal mode connection is established. 4 = An MNP connection is attempted and, if it fails, the modem disconnects. 5 = An MNP connection is attempted and, if it fails, a direct mode connection is established. 6 = Reserved 7 = An MNP connection is attempted and, if it fails, a Normal mode connection is established. (Default)
Bits 3-7	Reserved

S38 - Delay Before Forced Hang Up.

This register specifies the delay between the modem's receipt of the H command to disconnect (or ON-to-OFF transition of DTR if the modem is programmed to follow the signal), and the disconnect operation. Applicable to error-correction connection only. This register can be used to ensure that data in the modem buffer is sent before the modem disconnects.

1. If S38 is set to a value between 0 and 254, the modem will wait that number of seconds for the remote modem to acknowledge all data in the modem buffer before disconnecting. If time expires before all data is sent, the NO CARRIER result code will be issued to indicate that data has been lost. If all data is transmitted prior to time-out, the response to the H0 command will be OK.
2. If S38 is set to 255, the modem does not time-out and continues to attempt to deliver data in the buffer until the connection is lost or the data is delivered.

Range: 0-255 seconds
Default: 20

39 - Flow Control Bit-Mapped Options Status.

Default:	3 (00000011b)
Bits 0-2	Status of command options 0 = No flow control 3 = RTS/CTS (&K3) (Default) 4 = XON/XOFF (&K4) 5 = Transparent XON (&K5) 6 = Both methods (&K6)

Bits 3-7 Reserved

S40 – General Bit-Mapped Options Status.

Indicates the status of command options.

Default: 104 (68h) (01101000b)

Bits 0-1 MNP Extended Services (-Kn)
 0 = Disable extended services (-K0) (Default)
 1 = Enable extended services (-K1)
 2 = Enable extended services (-K2)

Bit 2 Reserved

Bits 3-5 Break Handling (\Kn)

0 = \K0
 1 = \K1
 2 = \K2
 3 = \K3
 4 = \K4
 5 = \K5 (Default)

Bits 6-7 Reserved

S41 - General Bit-Mapped Options Status.

Indicates the status of command options.

Default: 13 (C3h) (00001101b)

Bits 0-1 Compression selection (%Cn)
 0 = Disabled (%C0)
 1 = MNP 5 (%C1)
 2 = V.42 bis (%C2)
 3 = MNP 5 and V.42 bis (%C3) (Default)

Bits 2, 6 Auto retain and fallback/fall forward (%En)

Bit 6	Bit 2	
0	0 =	Retrain and fallback/fall forward disabled (%E0)
0	1 =	Retrain enabled (%E1)
1	0 =	Fallback/fall forward enabled (%E2) (Default)

Bit 3 Reserved

Bit 4-5 Reserved

Bit 7 Reserved

S46 - Data Compression Control.

Controls selection of compression. The following actions are executed for the given values:

Range: 136 or 138

Default: 138

S46 = 136 Execute error-correction protocol with no compression.

S46 = 138 Execute error-correction protocol with compression. (Default)

S48 - V.42 Negotiation Action.

The V.42 negotiation process determines the capabilities of the remote modem. However, when the capabilities of the remote modem are known and negotiation is unnecessary, this process can be bypassed if so desired.

Range: 0,7 or 128. If an invalid number is entered, it is accepted into the S-Register, but S48 will act as if 128 has been entered.

Default: 7

S48=0 Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM.

S48=7 Enable negotiation. (Default)

S48=128 Disable negotiation; bypass the detection and negotiation phases; and proceed at once with the fallback action specified in S36. Can be used to force MNP.

S82 - Break Handling Options. (Not Supported)

S82 is for compatibility purposes only, changing this register will not have any effect.

S86 - Call Failure Reason Code.

When the modem issues a NO CARRIER result code, a value is written to this S-Register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. The code definitions are:

Range:	0-26
Default:	21
S86=0	Normal hang-up, no error occurred
S86=1	Reserved
S86=2	Reserved
S86=3	Call Waiting caused disconnect
S86=4	Physical carrier loss
S86=5	No error correction at the other end
S86=6	No response to feature negotiation
S86=7	This modem is async only; the other modem is sync only
S86=8	No framing technique in common
S86=9	No protocol in common
S86=10	Bad response to feature negotiation
S86=11	No sync information from the remote modem
S86=12	Normal hang-up initiated by the remote modem
S86=13	Retransmission limit reached
S86=14	Protocol violation occurred
S86=15	Lost DTR
S86=16	Received GSTN clear-down
S86=17	Inactivity timeout
S86=18	Speed not supported
S86=19	Long space disconnect
S86=20	Key abort disconnect
S86=21	Clears previous disconnect reason
S86=22	No connection established
S86=23	Disconnect after three detected
S86=24	Call Waiting tone detected
S86=25	Extension pickup detected
S86=26	Remote hang-up detected

S91 - PSTN Transmit Attenuation Level

In non-PCM modes (V.90 and V.92 are PCM modes), S91 sets the transmit attenuation level from 0 to 15 dBm for the PSTN mode, resulting in a transmit level from 0 to -15 dBm. This is a country dependent parameter and is not user modifiable.

Range:	0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level)
Default:	11 (-11 dBm transmit level)

S92 - Fax Transmit Attenuation Level

S92 sets the transmit attenuation level from 0 to 15 dBm for the fax mode, resulting in a transmit level 0 to -15 dBm. This is a country dependent parameter and is not user modifiable.

Range:	0 to 15 dBm (Corresponding to 0 to -15 dBm transmit level)
Default:	11 (-11 dBm transmit level)

S95 - Extended Result Codes.

A bit set to a 1 in this parameter, in conjunction with the W command, will enable the corresponding extended result code.

The +MR, +ER, and +DR settings also control S95 bits 2, 3, and 5, respectively. The more recent settings of +MR, +ER, and +DR, or host writing of S95 bits 2, 3, 5, along with the W command setting, determine the corresponding actual result code reporting (see +MR, +ER, DR and W command).

Default:	0
Bit 0	CONNECT result code indicates DCE aped instead of DTE speed
Bit 1	Append/ARQ to CONNECT XXXX result code in error-correction mode (XXX=rate)
Bit 2	Enable +MCR: XXXX result code (XXXX=modulation) and +MRR: XXXX result code (XXXX=rate) (Also see +MR)
Bit 3	Enable +ER: XXXX result code (XXXX=protocol identifier)
Bit 4	Reserved

Bit 5 Enable +DR: XXXX result code (XXXX=compression type)
 Bit 6-7 Reserved

S210 - V.34 Symbol Rates

The bits in this parameter control V.34 symbols rates and enables/disables V.34 asymmetric rates. This parameter is used for diagnostic purpose only.

Default:

Bit 0-2 Selects the range of allowed V.34 symbol rates

2	1	0	=	Symbol Rates (baud)
0	0	0	=	2400 only
0	0	1	=	2400 only (no 2734)
0	1	0	=	2400, 2800
0	1	1	=	2400, 2800, 3000
1	0	0	=	2400, 2800, 3000, 3200
1	0	1	=	2400, 2800, 3000, 3200, 3429 (Default)

Bit 3 Enable/disable V.34 asymmetric rates
 0 = Disable asymmetric rates
 1 = Enable asymmetric rates (Default)

Bit 4-7 Reserved

Examples

S210=13 Enable asymmetric rates with all symbol rates available (Default)
 S210=5 Disable asymmetric rates with all symbol rates available
 S210=8 Enable asymmetric rates with only 2400 baud available
 S210=11 Enable asymmetric rates with 2400 to 3000 baud available

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