



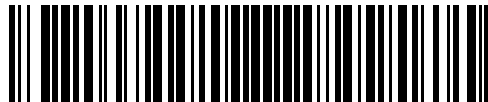
# CRD 1500 Modem/Charging Cradle



## Programmer's Guide



# **CRD 1500 Modem/Charging Cradle Programmer's Guide**



**72E-52775-01**  
**Revision A — May 2001**

***CRD 1500 Modem/Charging Cradle  
Programmer's Guide***

*72E-52775-01*

*Revision A*

*May 2001*



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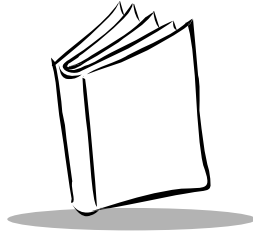
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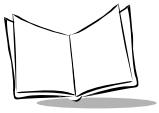
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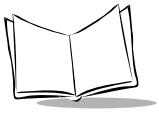
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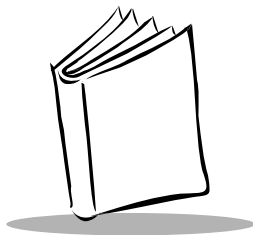
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*CRD 1500 Modem/Charging Cradle Programmer's Guide*





## *About This Guide*

### **Introduction**

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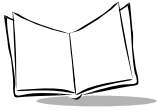
The *CRD 1500 Modem/Charging Cradle Programmer's Guide* provides information necessary for developing applications for the SPT 1500/1550 using the SPT 1500 Modem/Charging Cradle.

### **Notational Conventions**

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This document uses these conventions:

- “terminal” refers to both the SPT 1500 and SPT 1550.
- “User” refers to anyone using an application on the SPT 1500 or SPT 1550.
- “You” refers to the developer or other person using this manual as a reference to develop applications for the SPT 1500 or SPT 1550.
- Italics are used to highlight specific items in the general text, and to identify chapters and sections in this and related documents. It also identifies names of dialog boxes and tabs within dialog boxes.
- Bullets (•) indicate:
  - lists of alternatives or action items.
  - lists of required steps that are not necessarily sequential.
- Numbered lists indicate a set of sequential steps, i.e., those that describe step-by-step procedures.



## Service Information

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If you have a problem with your equipment, contact the Symbol Support Center. If your problem cannot be resolved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given special directions.

---

**Note:** *Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container has not been kept, contact Symbol to have another sent to you.*

---

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Symbol Technologies, Inc.  
One Symbol Plaza  
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1-800-659-2240

### United Kingdom

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United Kingdom  
0800 328 2424 (Inside UK)  
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### Canada

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Bugis Junction Office Tower  
Singapore 188024  
337-6588 (Inside Singapore)  
+65-337-6588 (Outside Singapore)

### **Australia**

Symbol Technologies Pty. Ltd.  
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Melbourne, Victoria 3004  
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+61-3-9866-6044 (Outside Australia)

### **Denmark**

Symbol Technologies AS  
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DK-3450 Allerod, Denmark  
7020-1718 (Inside Denmark)  
+45-7020-1718 (Outside Denmark)

### **Finland**

Oy Symbol Technologies  
Kaupintie 8 A 6  
FIN-00440 Helsinki, Finland  
9 5407 580 (Inside Finland)  
+358 9 5407 580 (Outside Finland)

### **Germany**

Symbol Technologies GmbH  
Waldstrasse 68  
D-63128 Dietzenbach, Germany  
6074-49020 (Inside Germany)  
+49-6074-49020 (Outside Germany)

### **Austria**

Symbol Technologies Austria GmbH  
Prinz-Eugen Strasse 70  
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2.Haus, 5.Stock  
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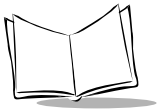
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### **Italy**

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Symbol Technologies Africa Inc.  
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Rutherford Estate  
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+27-11-4405668 (Outside South Africa)

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Symbol Technologies S.A.  
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Symbol will use new or refurbished parts at its discretion and will own all parts removed from repaired products. Customer will pay for the replacement product in case it does not return the replaced product to Symbol within 3 days of receipt of the replacement product. The process for return and customer's charges will be in accordance with Symbol's Exchange Policy in effect at the time of the exchange.

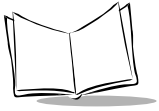
Customer accepts full responsibility for its software and data including the appropriate backup thereof.

Repair or replacement of a product during warranty will not extend the original warranty term.

Symbol's Customer Service organization offers an array of service plans, such as on-site, depot, or phone support, that can be implemented to meet customer's special operational requirements and are available at a substantial discount during warranty period.

### **General**

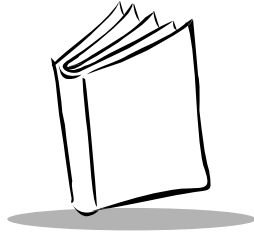
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# *Chapter 1*

## *AT Command Set*

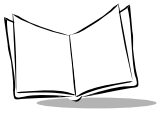
### **Introduction**

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The Symbol MCDA Modem Card is used internally within the CRD1500-1000MC and CRD1500-1000EU.

The 14.400kbps (V32bis) modem has additional Data Compression (MNP5, V42bis) for faster throughput to take advantage of the higher serial port speeds to the SPT1500. Error Correction (MNP4, V42) is also included.

This chapter describes AT commands for the modem, along with parameters applicable to each command. The defaults for each configuration command are those used in the factory profile 0.



## AT Commands

---

### ***A/, Re-execute Command***

#### **Description**

The modem behaves as if the DTE has re-sent the last command line. "A/" repeats all commands in the command buffer.

This command re-executes a call (using the Dial command) that failed to connect due to a busy line, no answer, or a wrong number, and must appear alone on a command line. Do not terminate with a carriage return.

### ***AT= x, Write to Selected S-Register***

#### **Description**

Writes the value *x* to the currently selected S-Register. Use the ATSn command to select an S-Register. All S-Registers return OK 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***

#### **Description**

Reads and displays the selected S-Register. Use the ATSn command to select an S-Register.

#### **Result Codes**

OK      For all arguments

### ***A, Answer***

#### **Description**

The modem goes off-hook and attempts to answer an incoming call if proper conditions are met. When answer handshake is complete, the modem goes on-line in answer mode.



## **Bn, CCITT or Bell**

### **Description**

When configured to allow either option, the modem selects Bell or CCITT modulation for a line speed connection of 300 or 1200 bps according to the parameter supplied. Any other line speed uses a CCITT modulation standard. The parameter value, if valid, is written to **S27** bit 6. (See [Fn, Select Line Modulation](#) on page 1-6.)

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

### **Result Codes**

- OK       $n = 0$  or  $1$
- ERROR   Otherwise

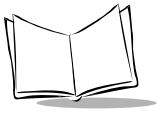
## **Cn, Carrier Control**

### **Description**

Included for compatibility only, and has no effect other than returning a result code. The only valid parameter is 1.

### **Result Codes**

- OK       $n = 1$
- ERROR   Otherwise



## Dn, Dial

### Description

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 goes on-line and attempts the handshake in originate mode.

### Note

If the ATD command is issued before the S1 register clears, the modem responds with the NO CARRIER result code.

### Dial Modifiers

Valid dial string parameters follow. Punctuation characters may be used for clarity; parentheses, hyphen, and spaces are ignored.

- 0-9 DTMF digits 0 to 9.
- \* The 'star' digit (tone dialing only).
- # The 'gate' digit (tone dialing only).
- A-D DTMF digits A, B, C, and D.
- L **Re-dial last number:** the modem re-dials the last valid telephone number. The L appears immediately after the D; characters that follow are ignored.
- P **Select pulse dialing:** pulse dial the numbers that follow until "T" is encountered. Affects current and subsequent dialing. Pulse dialing is not fitted on standard European model CRD1500-100M-01.
- T **Select tone dialing:** tone dial the numbers that follow until "P" is encountered. Affects current and subsequent dialing.
- R This command is accepted but not acted on.
- S=n Dial the number stored in the directory (n = 0 to 3) (see [&Zn=x, Store Telephone Number](#) on page 1-25).
- W **Wait for dial tone:** the modem waits for a dial tone before dialing the digits following "W". If a dial tone is not detected within the time specified by S6, the modem aborts the sequence, returns on-hook, and generates an error message.

- @       **Wait for silence:** the modem waits 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 the silence before the expiration of the call abort timer (S7), the modem terminates the call attempt with a NO ANSWER message. If busy detection is enabled, the modem may terminate the call with the BUSY result code. If an answer tone arrives during execution of this parameter, the modem handshakes.
- ,       **Dial pause:** the modem pauses for a time specified by S8 before dialing the digits following “;”.
- ;       **Return to command state:** Added to the end of a dial string, returns the modem to the command state after processing the portion of the dial string preceding the “;”. This allows you to issue additional AT commands while remaining off-hook. Place these commands in the original command line following the “;” and/or on subsequent command lines. The modem enters 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.
- ( )      **Ignored:** may be used to format the dial string.
- **Ignored:** may be used to format the dial string.
- <space> **Ignored:** may be used to format the dial string.
- <i>      **Invalid character:** ignored.

## En, *Command Echo*

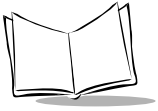
### Description

Enables or disables the echo of characters to the DTE according to the parameter supplied. 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



## **Fn, Select Line Modulation**

### **Description**

Selects the line modulation according to the parameter supplied. The line modulation is fixed unless Automode is selected. This command interacts with the S37 and the N command. The parameter value, if valid, is written to S37 bits 0-4.

To select line modulation, we recommend that either the F command, or a combination of the S37 and the N command be used, but not both.

- F0      Selects auto-detect mode. Sets N1 and sets S31 bit 1. In this mode, the modem configures for automode operation. All connect speeds supported by the modem are possible according to the remote modem's preference. The contents of S37 are ignored, as well as the sensed DTE speed.
- F1      Selects V.21 or Bell 103 according to the B setting as the only acceptable line speed resulting in a subsequent connection. Sets N0, sets S37 to 1, and clears S31 bit 1. This command is equivalent to command string ATN0S37=1.
- F2      Not supported.
- F3      Selects V.23 as the only acceptable line modulation for a subsequent connection. Originator is at 75 bps and answerer is at 1200 bps. Sets N0, sets S37 to 7, and clears S31 bit 1. This command is equivalent to command string ATN0S37=7.
- F4      Selects V.22 1200 or Bell 212A according to the B command setting as the only acceptable line speed for a subsequent connection. Sets N0, sets S37 to 5, and clears S31 bit 1. This command is equivalent to command string ATN0S37=5.
- F5      Selects V.22 bis as the only acceptable line modulation for a subsequent connection. Sets N0, sets S37 to 6, and clears S31 bit 1. This command is equivalent to command string ATN0S37=6.
- F6      Select V.32 bis 4800 or V.32 4800 as the only acceptable line modulation for a subsequent connection. Sets N0, sets S37 to 8, and clears S31 bit 1. This command is equivalent to command string ATN0S37=8.
- F7      Selects V.32 bis 7200 as the only acceptable line modulation for a subsequent connection. Sets N0, sets S37 to 12, and clears S31 bit 1. This command is equivalent to command string ATN0S37=12. This setting also allows

connection at the Rockwell proprietary 7200 V.32 speed, e.g., with a RC9696/12 based modem.

- F8 Selects V.32 bis 9600 or V.32 9600 as the only acceptable line modulations for a subsequent connection. Sets N0, sets S37 to 9, and clears S31 bit 1. This command is equivalent to command string ATN0S37=9.
- F9 Selects V.32 bis 12000 as the only acceptable line modulation for a subsequent connection. Sets N0, sets S37 to 10, and clears S31 bit 1. This command is equivalent to command string ATN0S37=10. This setting also allows connection at the Rockwell proprietary 12000 V.32 speed, e.g., with a RC9696/12 based modem.
- F10 Selects V.32 bis 14400 as the only acceptable line modulation for a subsequent connection. Sets N0, sets S37 to 11, and clears S31 bit 1. This command is equivalent to command string ATN0S37=11.

## **Hn, Disconnect (Hang-Up)**

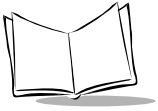
### **Description**

Initiates a hang up sequence.

- H0 Releases the line if the modem is on-line, and terminates any test (AT&T) in progress. Country-specific, modulation-specific, and error correction protocol-specific (S38) processing is handled outside the H0 command.
- H1 If on-hook, the modem goes off-hook and enters command mode. The modem returns on-hook after a period of time determined by S7.

### **Result Codes**

- OK n = 0 or 1
- ERROR Otherwise



## Nn, Automode Enable

### Description

Enables or disables automode detection. The parameter value, if valid, is written to S31 bit 1.

- N0 Disables automode detection (equivalent to setting the +MS <automode> subparameter to 0). A subsequent handshake is conducted according to the contents of S37 or, if S37 = 0, according to the most recently sensed DTE speed.
- N1 Enables automode detection (equivalent to setting the +MS <automode> subparameter to 1). This command is also equivalent to Default.

### Result Codes

- OK n = 0 or 1
- ERROR Otherwise

### Notes

1. The Nn and S37=x commands override the +MS command settings. When the N0 or N1 command is issued, the +MS subparameters are updated to reflect the Nn and S37 values (see [+MS, Select Modulation](#) on page 1-34 and [S37, Desired Line Connection Speed](#) on page 2-19). For example:  
N1S37=10 updates the +MS command subparameters to reflect +MS=10,1,300,12000  
N0S37=10 updates the +MS command subparameters to reflect +MS=10,0,12000,12000
2. The +MS command is recommended over the Nn and S37=x commands.

## ***On, Return to On-Line Data Mode***

### **Description**

Determines how the modem enters the on-line data mode. In the on-line command mode, the modem enters the on-line data mode with or without a retrain. In the off-line command mode (no connection), ERROR is reported.

- O0 Enters on-line data mode without a retrain. Handling is determined by the Call Establishment task. If a connection exists, this command connects the DTE back to the remote modem after an escape (+++).
- O1 Enters on-line data mode with a retrain before returning to on-line data mode.

### **Result Codes**

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

## ***P, Set Pulse Dial Default***

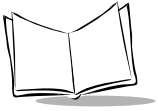
### **Description**

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

A dial command that specifies the dialing mode for a particular call (e.g., ATDT) overrides this command so that all future dialing is tone dialed. (See [T, Set Tone Dial Default](#) on page 1-11.) Pulse dialing is not fitted on standard European model CRD1500-1100M-01.

### **Result Code**

- OK



## **Qn, Quiet Result Codes Control**

### **Description**

Enables or disables the sending of result codes to the DTE according to the parameter supplied. 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 Codes**

- OK        n = 0 or 1
- ERROR    Otherwise

## **Sn, Read/Write S-Register**

### **Description**

Selects an S-Register, performs an S-Register read or write function, or reports the value of an S-Register.

- n         Establishes S-Register n as the last register accessed
- n=v       Sets S-Register n to the value v
- n?        Reports the value of S-Register n

Omit the parameter n to assume the last S-Register accessed. Omit the S for AT= and AT? to assume the last S-Register accessed. 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.

If the number "n" is not in the range of available S-Registers, the modem returns the ERROR message. The value "v" is "MOD"ed with 256. If the result is outside the range permitted for a given S-Register the values are stored, but functionally the lower and higher limits are observed. Input and output are in decimal format. Note that some S-Registers are read-only.



In some cases, writing to the S-Register appears to be accepted but the value is not written. Some commands are accepted, but the value may be limited and replaced by a maximum or minimum value.

## **T, Set Tone Dial Default**

### **Description**

Forces DTMF dialing until the next P dial modifier or P command is received. The modem sets an S-Register bit to conduct all subsequent dialing in tone mode. The DP command overrides this command. Clears S14 bit 5.

### **Result Code**

OK

## **Vn, Result Code Form**

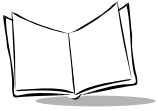
### **Description**

Selects whether short-form or long-form result codes are sent 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 Codes**

- OK      n = 0 or 1
- ERROR   Otherwise



## **Wn, Connect Message Control**

### **Description**

Controls the format of CONNECT messages. The parameter value, if valid, is written to S31 bits 2 and 3. Note that register S95 bits can override the Wn command (see [S95, Extended Result Codes](#) on page 2-24).

- W0      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 14400). Subsequent responses are disabled.

### **Result Codes**

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

## **Xn, Extended Result Codes**

### **Description**

Selects which subset of the result messages are used by the modem to inform the DTE of the results of commands.

Due to the many network tones available, varying by region and PBX, it may be necessary to blind dial. To enforce dial tone detection, place a "W" in the dial string (see [Dn, Dial](#) on page 1-4 command). [Table 1-1 on page 1-13](#) indicates the messages enabled for each X value.

- X0      Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. If busy tone detection is enforced and busy tone is detected, NO CARRIER is reported. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER is reported instead of NO DIAL TONE. The value 000b is written to S22 bits 6, 5, and 4, respectively.

- X1 Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX (XXXX = rate). If busy tone detection is enforced and busy tone is detected, NO CARRIER is reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO CARRIER is reported instead of NO DIALTONE. The value 100b is written to S22 bits 6, 5, and 4, respectively.
- X2 Disables monitoring of busy tones; send only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIALTONE, NO ANSWER, and CONNECT XXXX. If busy tone detection is enforced and busy tone is detected, NO CARRIER is reported instead of BUSY. If dial tone detection is enforced or selected and dial tone is not detected, NO DIALTONE is reported instead of NO CARRIER. 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. If dial tone detection is enforced and dial tone is not detected, NO CARRIER is reported. The value 110b is written to S22 bits 6, 5, and 4, respectively.
- X4 Enables monitoring of busy tones; send all messages. The value 111b is written to S22 bits 6, 5, and 4, respectively (default).

See also [S13, Check Line Quiet before Line Seize](#) on page 2-8 regarding use of No Dialtone.

## Result Codes

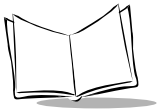
OK n = 0 to 4

ERROR Otherwise

**Table 1-1. Result Codes**

Short Form	Long Form	n Value in ATXn Command				
		0	1	2	3	4
0	OK	x	x	x	x	x
1	CONNECT	x	x	x	x	x

**Note:** 'x' indicates the message (either the long form if verbose, or the value only for short form) is generated when that particular value of 'n' (at the top of the column) is selected via ATXn. If the column is blank, no message is generated for that option. A numeral indicates which less explicit message (verbose or short form) is output for that option. (See [Chapter 2, S-Registers](#)).



**Table 1-1. Result Codes (continued)**

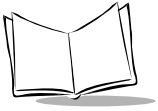
Short Form	Long Form	n Value in ATXn Command				
		0	1	2	3	4
2	RING	x	x	x	x	x
3	NO CARRIER	x	x	x	x	x
4	ERROR	x	x	x	x	x
5	CONNECT 1200	1	x	x	x	x
6	NO DIALTONE	3	3	x	x	x
7	BUSY	3	3	3	x	x
8	NO ANSWER	x	x	x	x	x
9	CONNECT 0600	1	x	x	x	x
10	CONNECT 2400	1	x	x	x	x
11	CONNECT 4800	1	x	x	x	x
12	CONNECT 9600	1	x	x	x	x
13	CONNECT 7200	1	x	x	x	x
14	CONNECT 12000	1	x	x	x	x
15	CONNECT 14400	1	x	x	x	x
16	CONNECT 19200	1	x	x	x	x
17	CONNECT 38400	1	x	x	x	x
18	CONNECT 57600	1	x	x	x	x
19	CONNECT 115200	1	x	x	x	x
22	CONNECT 75TX/1200RX	1	x	x	x	x
23	CONNECT 1200TX/75RX	1	x	x	x	x
24	DELAYED	4	4	4	4	x
32	BLACKLISTED	4	4	4	4	x

**Note:** 'x' indicates the message (either the long form if verbose, or the value only for short form) is generated when that particular value of 'n' (at the top of the column) is selected via ATXn. If the column is blank, no message is generated for that option. A numeral indicates which less explicit message (verbose or short form) is output for that option. (See [Chapter 2, S-Registers](#)).

Table 1-1. Result Codes (continued)

Short Form	Long Form	n Value in ATXn Command				
		0	1	2	3	4
33	FAX	x	x	x	x	x
35	DATA	x	x	x	x	x
40	CARRIER 300	x	x	x	x	x
44	CARRIER 1200/75	x	x	x	x	x
45	CARRIER 75/1200	x	x	x	x	x
46	CARRIER 1200	x	x	x	x	x
47	CARRIER 2400	x	x	x	x	x
48	CARRIER 4800	x	x	x	x	x
49	CARRIER 7200	x	x	x	x	x
50	CARRIER 9600	x	x	x	x	x
51	CARRIER 12000	x	x	x	x	x
52	CARRIER 14400	x	x	x	x	x
66	COMPRESSION: CLASS 5	x	x	x	x	x
67	COMPRESSION: V.42 bis	x	x	x	x	x
69	COMPRESSION: NONE	x	x	x	x	x
70	PROTOCOL: NONE	x	x	x	x	x
77	PROTOCOL: LAPM	x	x	x	x	x
80	PROTOCOL: ALT	x	x	x	x	x
81	PROTOCOL: ALT-CELLULAR	x	x	x	x	x
+F4	+FCERROR	x	x	x	x	x

**Note:** 'x' indicates the message (either the long form if verbose, or the value only for short form) is generated when that particular value of 'n' (at the top of the column) is selected via ATXn. If the column is blank, no message is generated for that option. A numeral indicates which less explicit message (verbose or short form) is output for that option. (See [Chapter 2, S-Registers](#)).



## ***Yn, Long Space Disconnect***

### **Description**

Enables/disables the generation and response to long space disconnect. The parameter value, if valid, is written to S21 bit 7.

- Y0      Disables long space disconnect (default).
- Y1      Enables long space disconnect. In non-error correction mode, the modem sends a long space of four seconds before going on-hook, and responds to the receipt of a long space (i.e., a break signal greater than 1.6 seconds) by going on-hook.

### **Result Codes**

- OK      n = 0 or 1
- ERROR   Otherwise

## ***Zn, Soft Reset and Restore Profile***

### **Description**

Performs a soft reset and restores (recalls) the configuration profile according to the 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

## AT& Commands

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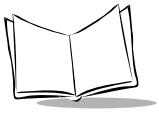
### &Dn, DTR Option

#### Description

Interprets the ON to OFF transition of the DTR signal from the DTE according to the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. See [S25, Delay To DTR](#) on page 2-15.

- |                            |   |
|----------------------------|---|
| <b>&amp;D0</b>             | DTR drop is interpreted according to the current &Qn setting as follows:  |
| &Q0, &Q5, &Q6              | DTR is ignored (assumed ON). Allows operation with DTEs which do not provide DTR.   |
| &Q1, &Q4                   | DTR drop causes the modem to hang up. Auto-answer is not affected.  |
| &Q2, &Q3                   | DTR drop causes the modem to hang up. Auto-answer is inhibited.   |
| <b>&amp;D1</b>             | DTR drop is interpreted according to the current &Qn setting as follows:  |
| &Q0, &Q1, &Q4,<br>&Q5, &Q6 | The modem as if the asynchronous escape sequence was entered, and returns to asynchronous command state without disconnecting.          |
| &Q2, &Q3                   | DTR drop causes the modem to hang up. Auto-answer is inhibited.   |
| <b>&amp;D2</b>             | DTR drop is interpreted according to the current &Qn setting as follows:  |
| &Q0 through &Q6            | DTR drop causes the modem to hang up. Auto-answer is inhibited (default).   |
| <b>&amp;D3</b>             | DTR drop is interpreted according to the current &Qn setting as follows:  |
| &Q0, &Q1, &Q4,<br>&Q5, &Q6 | DTR drop causes the modem to perform a soft reset as if the Z command were received. The &Y setting determines which profile is loaded. |
| &Q2, &Q3                   | DTR drop causes the modem to hang up. Auto-answer is inhibited.   |

If &Q5, &Q6, is in effect, the action taken is the same as for &Q0.



## **&Fn, Restore Factory Configuration (Profile)**

### **Description**

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.

&F0      Restore factory configuration 0

&F1      Restore factory configuration 1

### **Result Codes**

OK

ERROR If the modem is connected

## **&Gn, Select Guard Tone**

### **Description**

Generates the guard tone selected by this command according to the parameter supplied (DPSK modulation modes only). The parameter value, if valid, is written to S23 bits 6 and 7.

&G0      Disables guard tone

&G1      Disables guard tone

&G2      Selects 1800 Hz guard tone (default)

### **Result Codes**

OK      n = 0 to 2

ERROR Otherwise



## **&Kn, Flow Control**

### **Description**

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
&K4	Enables XON/XOFF flow control
&K5	Enables transparent XON/XOFF flow control
&K6	Enables both RTS/CTS and XON/XOFF flow control

### **Result Codes**

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

## **&Mn, Asynchronous/Synchronous Mode Selection**

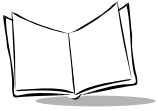
### **Description**

Determines the DTR operating mode. The modem treats the &M command as a subset of the &Q command.

&M0	Selects direct asynchronous operation. Note that the command sequence &M0\N0 selects normal buffered mode, but the command sequence \N0&M0 selects direct mode. This is because the \N0 command is analogous to the &Q6 command. The value 000b is written to S27 bits 3, 1, and 0, respectively (See <a href="#">&amp;Qn, Sync/Async Mode</a> on page 1-20).
-----	---

### **Result Codes**

OK	n = 0
ERROR	Otherwise



## &Qn, Sync/Async Mode

### Description

This command is an extension of the &M command and controls the connection modes permitted. It is used in conjunction with S36 and S48. (See [Nn, Automode Enable](#) on page 1-8.)

When the &Q0 to &Q4 command is issued to select the mode, the subsequent connect message reports the DCE speed regardless of the W command and S95 settings.

- &Q0      Selects direct asynchronous operation. The value 000b is written to S27 bits 3, 1, and 0, respectively. See [&Mn, Asynchronous/Synchronous Mode Selection](#) on page 1-19.
- &Q4      Selects AutoSync operation. The value 100b is written to S27 bits 3, 1, and 0, respectively.

AutoSync operation, when used in conjunction with the Hayes Synchronous Interface (HSI) capability in the DTE, provides synchronous communication capability from an asynchronous terminal.

**Starting AutoSync:** Set registers S19, S20, and S25 to the desired values before selecting AutoSync operation with &Q4. After the CONNECT message is issued, the modem waits the period of time specified by S25 before examining DTR. If DTR is on, the modem enters the synchronous operating state; if DTR is off, the modem terminates the line connection and returns to the asynchronous command state.

**Stopping AutoSync:** AutoSync operation stops when the carrier is lost, or DTR transitions from on-to-off. Loss of carrier returns the modem to the asynchronous command state. An on-to-off transition of DTR returns the modem to the asynchronous command state and either does not terminate the line connection (&D1 active) or terminates the line connection (any other &Dn command active).

- &Q5      The modem tries to negotiate an error-corrected link. Use S36 to configure the modem to determine whether a failure will return the modem on-hook, or will cause the modem to fallback to an asynchronous connection. The value 101b is written to S27 bits 3, 1, and 0, respectively (default).
- &Q6      Selects asynchronous operation in normal mode (speed buffering). The value 110b is written to S27 bits 3, 1, and 0, respectively.

## Result Codes

OK        n = 0 to 6

ERROR    Otherwise

## **&Rn, RTS/CTS Option**

### Description

Selects how the modem controls CTS. CTS operation is modified if hardware flow control is selected (see [&Kn, Flow Control](#) on page 1-19 command). The parameter value, if valid, is written to S21 bit 2.

**&R0**        CTS tracks the state of RTS; S26 defines the RTS-to-CTS delay. CTS turns OFF if required by flow control.

**&R1**        CTS is normally ON (RTS transitions are ignored) and turns OFF only if required by flow control.

## Result Codes

OK        n = 0 or 1

ERROR    Otherwise

## **&Tn, Test and Diagnostics**

### Description

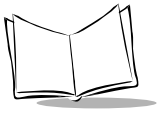
Performs selected test and diagnostic functions according to the parameter supplied. A test can be run only when in an asynchronous operation in non-error-correction mode (normal or direct mode). To terminate a test in progress, enter the escape sequence first, except for parameters 7 and 8 (see [Chapter 2, S-Registers](#)). If S18 is non-zero, a test terminates after the time specified by S18 and displays the OK message.

For tests 3, 6, and 7, a connection between the two modems must be established.

**&T0**        Terminates test in progress. Clears S16.

**&T1**        Initiates local analog loopback, V.54 Loop 3. Sets S16 bit 0. If a connection exists when this command is issued, the modem hangs up. The CONNECT XXXX message appears upon the start of the test.

**&T2**        Returns ERROR.



- &T3 Initiates local digital loopback, V.54 Loop 2. Sets S16 bit 2. If no connection exists, ERROR is returned. Sets S16 bit 4 when the test is in progress.
- &T4 Enables digital loopback acknowledgment for remote request, i.e., an RDL request from a remote modem is allowed. Sets S23 bit 0.
- &T5 Disables digital loopback acknowledgment for remote request, i.e., an RDL request from a remote modem is denied. Clears S23 bit 0. (Default.)
- &T6 Requests a remote digital loopback (RDL), V.54 Loop 2, without self test. If no connection exists, ERROR is returned. Sets S16 bit 4 when the test is in progress. The CONNECT XXXX message appears upon the start of the test.
- &T7 Requests a remote digital loopback (RDL), V.54 Loop 2, with self test. (In self test, a test pattern is looped back and checked by the modem.) If no connection exists, ERROR is returned. When the test is terminated either via expiration of S18, or via the &T0 or H command, the number of detected errors is reported to the DTE. Sets S16 bit 5 when the test is in progress.
- &T8 Initiates local analog loopback, V.54 Loop 3, with self test. (In self test, a test pattern is looped back and checked by the modem.) If a connection exists, the modem hangs up before the test is initiated. When the test is terminated either via expiration of S18, or via the &T0 or H command, the number of detected errors is reported to the DTE. Sets S16 bit 6 when the test is in progress. This command may not be available in some countries due to PTT restrictions.

## **&V, Display Current Configuration and Stored Profiles**

### **Description**

Reports the current (active) configuration, the stored (user) profiles, and the first four stored telephone numbers.

### **Result Code**

OK

### **Example**

AT&V

ACTIVE PROFILE:

B0 E1 L1 M1 N1 QO T V1 W0 X4 Y0 &C0 &D0 &G2 &J0 &K3 &Q5 &R1 &S0 &T4 &X0 &Y0  
S00:002 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:030 S08:002 S09:006  
S10:014 S11:255 S12:050 S18:000 S25:005 S26:001 S36:007 S37:000 S38:020 S46:138  
S48:007 S95:000

STORED PROFILE 0:

B0 E1 L1 M1 N1 QO T V1 W0 X4 Y0 &C0 &D0 &G2 &J0 &K3 &Q5 &R1 &S0 &T4 &X0  
S00:002 S02:043 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000  
S36:007 S37:000 S40:105 S41:003 S46:138 S95:000

STORED PROFILE 1:

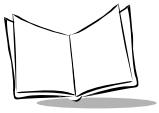
B0 E1 L1 M1 N1 QO T V1 W0 X4 Y0 &C0 &D0 &G2 &J0 &K3 &Q5 &R1 &S0 &T4 &X0  
S00:002 S02:043 S06:002 S07:030 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000  
S36:007 S37:000 S40:105 S41:003 S46:138 S95:000

TELEPHONE NUMBERS:

0 = 1 =

2 = 3 =

OK



## **&V1, Display Last Connection Statistics**

### **Description**

Displays the last connection statistics in the following format (shown with typical results):

TERMINATION REASON	LINK DISCONNECT or LOCAL REQUEST
LAST TX data rate	14400 BPS
HIGHEST TX data rate	14400 BPS
LAST RX data rate	14400 BPS
HIGHEST RX data rate	14400 BPS
Error correction PROTOCOL	LAPM
Data COMPRESSION	V42Bis
Line QUALITY	030
Highest SPX RX state	068
Highest SPX TX state	067

## **&Wn, Store Current Configuration**

### **Description**

Saves the current (active) configuration (profile), including S-Registers, in one of the two user profiles in NVRAM as denoted by the parameter value.

The current configuration contains a list of storable parameters illustrated in the &V command. These settings are restored to the active configuration upon receiving an Zn command or at power up (see [&Yn, Designate a Default Reset Profile](#) on page 1-25 command).

&W0 Stores the current configuration as profile 0.

&W1 Stores the current configuration as profile 1.

### **Result Codes**

OK n = 0 or 1

ERROR Otherwise

## **&Yn, Designate a Default Reset Profile**

### **Description**

Selects which user profile is used after a hard reset.

&Y0 The modem uses profile 0.

&Y1 The modem uses profile 1.

### **Result Codes**

OK n = 0 to 1

ERROR If n > 1, or if NVRAM is not installed or is not operational

## **&Zn=x, Store Telephone Number**

### **Description**

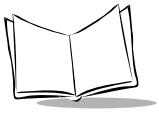
The modem can store up to four telephone numbers. Each telephone number dial string can contain up to 34 digits.

&Zn=x n = 0 to 3 and x = dial string.

### **Result Codes**

OK For n ??3, and x ??34 digits

ERROR If n > 3, x > 35 digits



## AT% Commands

---

### **%C, *Enable/Disable Data Compression***

#### **Description**

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 MNP 5 data compression. Sets S46 bit 1 (default).

#### **Result Codes**

OK n = 0, 1, 2, or 3

ERROR Otherwise

### **%En - *Enable/Disable Line Quality Monitor and Auto-Retrain or Fallback/Fall Forward***

#### **Description**

Controls whether the modem automatically monitors the line quality and requests a retrain (%E1), or falls back when line quality is insufficient and forward when line quality is sufficient (%E2). The parameter value, if valid, is written to S41 bits 2 and 6.

If enabled, the modem attempts to retrain for a maximum of 30 seconds.

- %E0 Disables line quality monitor and auto-retrain.
- %E1 Enables line quality monitor and auto-retrain.
- %E2 Enables line quality monitor and fallback/fall forward (default).

#### **Result Codes**

OK n = 0, 1, or 2



ERROR Otherwise

**Fallback/Fall Forward:** When %E2 is active, the modem monitors the line quality (EQM). When line quality is insufficient, the modem initiates a rate re-negotiation to a lower speed within the V.32 bis/V.32 modulation speeds. The modem continues to fall back within the current modulation if necessary until the speed reaches 4800 bps. Below this rate, the modem only retrains if EQM thresholds are exceeded. If the 4800 bps. EQM is sufficient for at least one minute, the modem initiates a rate re-negotiation to a higher speed within the current modulation speeds. Rate renegotiations are done without a retrain if a V.32 bis connection is established.

Speeds attempted during fallback/fall forward are those available in the rate sequences exchanged during the initial connection. Fallback/fall forward is available in error correction and normal modes, but not in direct mode or synchronous mode with external clocks.

## **%L, *Line Signal Level***

### **Description**

Returns a value which indicates the received signal level. This value is a comparable indication of the receive level.

### **Result Codes**

OK

## **%Q, *Line Signal Quality***

### **Description**

Reports the line signal quality. Returns the higher order byte of the EQM value. Based on the EQM value, retrain or fallback/fall forward may be initiated if enabled by %E1 or %E2.

### **Example**

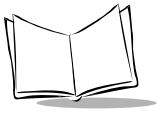
AT%Q

015

### **Result Codes**

OK      If connected

ERROR If not connected, or connected in 300 bps, V.23, or fax modes



## AT\ Commands

---

### ***\An, Select Maximum MNP Block Size***

#### **Description**

The modem operates an MNP error corrected link using a maximum block size controlled by the parameter supplied. The parameter value, if valid, is written to S40 bits 6 and 7.

\A0	64 characters
\A1	128 characters (default)
\A2	192 characters
\A3	256 characters

#### **Result Codes**

OK	n = 0 to 3
ERROR	Otherwise

### ***\Bn, Transmit Break to Remote***

#### **Description**

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

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

**\Kn, Break Control****Description**

Controls the response of the modem to a break received from the DTE or the remote modem, or the \B command according to the parameter supplied. The parameter value, if valid, is written to S40 bits 3, 4, and 5. The response is different in three separate states.

**First State**

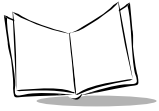
The modem receives a break from the DTE when the modem is operating in data transfer mode:

- \K0 Enter on-line command mode, no break sent to the remote modem.
- \K1 Clear data buffers and send break to remote modem.
- \K2 Enter on-line command mode, no break sent to the remote modem.
- \K3 Send break to remote modem immediately.
- \K4 Enter on-line command mode, no break sent to the remote modem.
- \K5 Send break to remote modem in sequence with transmitted data (default).

**Second State**

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

- \K0 Clear data buffers and send break to remote modem.
- \K1 Clear data buffers and send break to remote modem.
- \K2 Send break to remote modem immediately.
- \K3 Send break to remote modem immediately.



*CRD 1500 Modem/Charging Cradle Programmer's Guide*

- \K4      Send break to remote modem in sequence with data.
- \K5      Send break to remote modem in sequence with data (default).

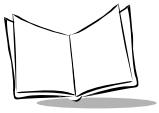
### **Third State**

A break is received from a remote modem during a non-error corrected connection:

- \K0 Clear data buffers and send break to the DTE.
- \K1 Clear data buffers and send break to the DTE.
- \K2 Send a break immediately to DTE.
- \K3 Send a break immediately to DTE.
- \K4 Send a break in sequence with received data to DTE.
- \K5 Send a break in sequence with received data to DTE (default).

### **Result Codes**

- OK n = 0 to 5
- ERROR Otherwise



## **\Nn, Operating Mode**

### **Description**

Controls the preferred error correcting mode to be negotiated in a subsequent data connection.

- \N0 Selects normal speed buffered mode (disables error-correction mode). (Forces &Q6.)
- \N1 Selects direct mode and is equivalent to &M0, &Q0 mode of operation. (Forces &Q0.)
- \N2 Selects reliable (error-correction) mode. The modem first attempts a LAPM connection, then an MNP connection. Failure to make a reliable connection causes the modem to hang up. (Forces &Q5, S36=4, and S48=7.)
- \N3 Selects auto reliable mode. This is similar to \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 causes the modem to hang 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 causes the modem to hang up. (Forces &Q5, S36=4, and S48=128.)

### **Result Codes**

- OK n = 0 to 5
- ERROR Otherwise

## AT+ Commands

---

### +GCI, Country Profiles

#### Description

The +GCI command functionality is in accordance with ITU V.250 and T.35 as follows:

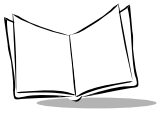
- +GCI=xx Changes country code where xx is the T.35 code defined in the following table. The new country code is used after the next reset (either power or Z command).
- +GCI? Returns the T.35 code for the active country.
- +GCI=? Returns all the supported T.35 codes within the firmware.

To improve compatibility with different drivers, the older Rockwell/ Conexant \*NC format is also supported. The modem responds to either command format, but the ITU V.250 +GCI format is recommended for new code.

- \*NCyy Changes country code where yy is the code defined in the following table. The new country code is used after the next reset (either power or Z command). Setting may be checked with the I5 command for a response of 0yy.

**Table 1-2. Table of Country Codes according to ITU T.35**

Country	+GCI=xx	*NCyy	Country	+GCI=xx	*NCyy
USA (default)	B5	22	Italy	59	08
Europe (see notes that follow)	FD	55	Japan	00	43
Argentina	07	23	Malaysia	6C	26
Australia	09	40	Mexico	73	27
Austria	0A	01	Peru	88	28
Brazil	16	24	Portugal	8B	12
Canada	20	20	Singapore	9C	47
Chile	25	25	Spain	A0	13
Reserved for future Czek use	2E	50	Taiwan	FE	46

**Table 1-2. Table of Country Codes according to ITU T.35 (continued)**

Country	+GCI=xx	*NCyy	Country	+GCI=xx	*NCyy
Greece	46	17	Reserved for future Turkey use	AE	14
Reserved for future Hungary use	51	51			

## European Notes

1. European-specific hardware is required. To avoid damage, use CRD1500-1000EU in Europe.
2. Both the USA (B5) and European (FD) codes contain the same settings; you may use the default B5 setting in Europe. The separate codes maintain compliance with ITU T.35
3. Pulse dialing characteristics vary in Europe. Countries that do not fully support tone dialing support pulse dialing using the specific Country Code instead of European (FD).
4. If you have problems with the modem, try the specific country setting.

## +MS, *Select Modulation*

### Description

This extended-format command selects the modulation and, optionally, enables or disables automode, specifies the lowest and highest connection rates, selects ?-Law or A-Law codec type, and enables or disables robbed bit signaling generation (server modem) or detection (client modem) using one to five subparameters. The command format is:

```
+MS= <mod> [, [<automode>], [<min_rate>], [<max_rate>]  
[, [<x_law>], [<rb_signaling>]]]]<CR>
```

### Notes

1. For 14400 bps and lower speeds, the Nn command and S37 register can alternatively be used, where the +MS subparameters are modified to reflect the Nn and S37=x settings. Use of the Nn and S37=x commands is not recommended but is provided for compatibility with existing communication software. (The +MS command does not update S37.)



- Subparameters not entered (enter a comma only or <CR> to skip the last subparameter) remain at their current values.

## Reporting Selected Options

The modem can send a string of information to the DTE consisting of selected options using the following command:

```
+MS?
```

The response is:

```
+MS: <mod>,<automode>,<min_rate>,<max_rate>,<x_law>,<rb_signaling>
```

For example:

```
+MS: 56,1,300,56000,0,0
```

```
+MS: 11,1,300,33600,0,0
```

```
+MS: 10,1,300,14400,0,0
```

## Reporting Supported Options

The modem can send a string of information to the DTE consisting of supported options using the following command:

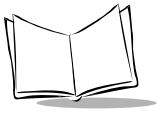
```
+MS=?
```

The response is:

```
+MS: (list of supported <mod> values), (list of supported <automode> values),
      (list of supported <min_rate> values), (list of supported <max_rate> values),
      (list of supported <x_law> values), (list of supported <rb_signaling> values)
```

For example:

```
+MS: (0,1,2,3,9,10,64,69),(0,1),(300-14400),(300-14400),(0,1),(0,1)
```



## Subparameter Definitions

*<mod>*

A decimal number which specifies the preferred modulation (automode enabled) or the modulation (automode disabled) to use in originating or answering a connection. The options are:

**Table 1-3. Modulation Rates**

<b>&lt;mod&gt;</b>	<b>Modulation</b>	<b>Possible Rates (bps) 1</b>	<b>Notes</b>
<b>0</b>	V.21	300	
<b>1</b>	V.22	1200	
<b>2</b>	V.22 bis	2400 or 1200	
<b>3</b>	V.23	1200	See Note 2???
<b>9</b>	V.32	9600 or 4800	
<b>10</b>	V.32 bis	14400, 12000, 9600, 7200, or 4800	Default for RC144
<b>64</b>	Bell 103	300	
<b>69</b>	Bell 212	1200	

Note: See optional *<automode>*, *<min\_rate>*, and *<max\_rate>* subparameters

The modem may also automatically switch to another modulation (automode), subject to the following constraints:

- The modem may not be able to automatically switch from certain modulations (specified by *<mod>*). For example, there is no standard way to automode from Bell 103 to V.23.
- The DTE may disable automode operation (see *<automode>* below).
- The DTE may constrain the range of modulations available by specifying the lowest and highest rates (see *<min\_rate>* and *<max\_rate>*).

*<automode>*

an optional numeric value which enables or disables automatic modulation negotiation using V.8 bis/V.8 or V.32 bis Annex A. The options are:

- 0 Automode disabled
- 1 Automode enabled using V.8 bis/V.8 or V.32 Annex A (default)

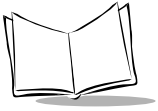
The default value is 1, which enables automode. However, there are modulations for which there is no automatic negotiation, e.g., Bell 212 (*<mod>* = 69).

For *<automode>* = 0 (automode disabled, i.e., fixed modulation):

- If *<max\_rate>* is within the rates supported by the selected modulation, the selected rate is that specified by *<max\_rate>*. For example:  
+MS=10,0,1200,4800 selects V.32 bis 4800 bps fixed rate.
- If *<max\_rate>* is greater than the highest speed supported by the modulation specified by *<mod>*, the starting rate is the highest rate supported by the selected modulation. For example:  
+MS=10,0,2400,14400 selects V.32 bis 14400, 12000, 9600, 7200, or 4800 bps.
- To emulate the N0S37=x command sequence to select fixed mode operation, set the *<max\_rate>* and *<min\_rate>* to the same requested speed, and *<mod>* to be the modulation for that speed. For example:  
+MS=10,0,12000,12000 selects V.32 bis 12000 bps fixed mode (as in N0S37=10).

For *<automode>* = 1 (automode enabled, i.e., automatically selected speed and modulation), the modem connects at the highest possible rate in accordance with V.8 bis/V.8, or V.32 bis Annex A if V.8 bis/V.8 is not supported by the remote modem.

- If *<max\_rate>* is greater than the highest rate supported by the modulation specified by *<mod>*, the modem automodes down from the highest rate of the selected modulation. For example:  
+MS=10,1,1200,24000 selects automodding down from V.32 bis 14400 bps.
- To emulate the N1S37=x sequence command, set the modulation and the rate to start automodding down from using *<mod>* and *<max\_rate>*, respectively. Set *<min\_rate>* to 300 to allow automodding down to V.21 300 bps. For example:  
+MS=9,1,300,12000 selects automode starting at V.32 bis 12000 bps (same as N1S37=10).



*<min\_rate>*

an optional number which specifies the lowest rate at which the modem may establish a connection. The value is decimal coded, in units of bps, e.g., 2400 specifies the lowest rate to be 2400 bps.

*<max\_rate>*

an optional number which specifies the highest rate at which the modem may establish a connection. The value is decimal coded, in units of bps, e.g., 14400 specifies the highest rate to be 14400 bps. The default is 28800 for 28800 bps.

*<x\_law>*

an optional number which specifies the codec type. The options are:

- 0 = ?-Law
- 1 = A-Law

Note that ATZ resets the *<x\_law>* selection to 0 (?-Law).

*<rb\_signalling>*

an optional number which enables or disables robbed bit signalling generation in a server modem or enables or disables robbed bit signalling detection in a client modem. The options are:

- 0 = Robbed bit signalling generation (server modem) or detection (client modem) disabled (default)
- 1 = Robbed bit signalling generation (server modem) or detection (client modem) enabled

Note that ATZ resets the *<rb\_signalling>* selection to 0 (disabled).

## Result Codes

OK        Valid subparameter string

ERROR    Otherwise



## Chapter 2

# S-Registers

[Table 2-1](#) summarizes the S-Registers and their default values. Use the `&Wn` command to store registers denoted with an '\*' in one of the two user profiles. Use the `Zn` command to load any of these profiles. "Reserved" denotes registers reserved for current or future use by the firmware, or are permanently overridden by PTT limitations.

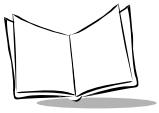
All bit-mapped registers are read-only. Use the appropriate AT command that controls the relevant bits in the S-Register to change the value.

### Factory Defaults

---

The factory default values are stored in ROM and are loaded into the active configuration at power up or by the `ATZn` command. The designated default profile is subsequently loaded, and may change some of the factory default values. Use the `&Yn` command, where *n* is one of the two possible user profiles, to change the designated default profile.

The defaults in the table are those in factory profiles zero and one. Enter the `&Fn` command at any time to load the factory default values.



**Table 2-1. S-Register Summary**

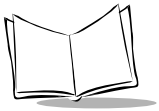
Register	Function	Range	Units	Saved	Default**
<b>S0</b>	Rings to Auto-Answer	0-255	rings	*	1
<b>S1</b>	Ring Counter	0-255	rings		0
<b>S2</b>	Escape Character	0-255	ASCII	*	43
<b>S3</b>	Carriage Return Character	0-127	ASCII		13
<b>S4</b>	Line Feed Character	0-127	ASCII		10
<b>S5</b>	Backspace Character	0-255	ASCII		8
<b>S6</b>	Wait Time for Dial Tone	2-255	s	*	4
<b>S7</b>	Wait Time for Carrier	1-255	s	*	50
<b>S8</b>	Pause Time for Dial Delay Modifier	0-255	s	*	2
<b>S9</b>	Carrier Detect Response Time	1-255	0.1 s	*	6
<b>S10</b>	Carrier Loss Disconnect Time	1-255	0.1 s	*	14
<b>S11</b>	DTMF Tone Duration		0.001 s	*	95
<b>S12</b>	Escape Prompt Delay	0-255	0.02 s	*	50
<b>S13</b>	Check Line Quiet Before Seize	0-1	-		1
<b>S14</b>	General Bit Mapped Options Status	-	-	*	138 (8Ah)
<b>S15</b>	Reserved	-	-	-	
<b>S16</b>	Test Mode Bit Mapped Options Status (&T)	-	-		0
<b>S17</b>	Reserved	-	-		-
<b>S18</b>	Test Timer	0-255	s	*	0
<b>S19</b>	AutoSync Options	-	-		0
<b>S20</b>	AutoSync HDLC Address or BSC Sync Character	0-255	-	*	0
<b>S21</b>	V.24/General Bit Mapped Options Status	-	-	*	52 (34h)

\*Register value may be stored in one of two user profiles with the &W command.

Table 2-1. S-Register Summary (continued)

Register	Function	Range	Units	Saved	Default**
<b>S22</b>	Results Bit Mapped Options Status	-	-	*	117 (75h)
<b>S23</b>	General Bit Mapped Options Status		-	*	62 (3Dh)
<b>S24</b>	Sleep Inactivity Timer	0-255	s	*	0
<b>S25</b>	Delay to DTR Off	0-255	s or 0.01 s		5
<b>S26</b>	RTS-to-CTS Delay	0-255	0.01 s		1
<b>S27</b>	General Bit Mapped Options Status	-	-	*	73 (49h)
<b>S28</b>	General Bit-Mapped Options Status	-	-	*	0
<b>S30</b>	Disconnect Inactivity Timer	0-255	10 s		0
<b>S31</b>	General Bit-Mapped Options Status	-	-	*	194 (C2h)
<b>S32</b>	XON Character	0-255	ASCII	17 (11h)	
<b>S33</b>	XOFF Character	0-255	ASCII	19 (13h)	
<b>S34-S35</b>	Reserved	-	-		-
<b>S36</b>	LAPM Failure Control	-	-	*	7
<b>S37</b>	Line Connection Speed	-	-	*	0
<b>S38</b>	Delay Before Forced Hangup	0-255	s		20
<b>S39</b>	Flow Control Bit Mapped Options Status	-	-	*	3
<b>S40</b>	General Bit-Mapped Options Status	-	-	*	104 (68h)
<b>S41</b>	General Bit-Mapped Options Status	-	-	*	195 (C3h)
<b>S42-S45</b>	Reserved	-	-		-
<b>S46</b>	Data Compression Control	-	-	*	138
<b>S48</b>	V.42 Negotiation Control	-	-	*	7
<b>S82</b>	LAPM Break Control	-	-		128(40h)

\*Register value may be stored in one of two user profiles with the &W command.



**Table 2-1. S-Register Summary (continued)**

Register	Function	Range	Units	Saved	Default**
<b>S86</b>	Call Failure Reason Code	0-255	-		-
<b>S95</b>	Result Code Messages Control	-	-	*	0

\*Register value may be stored in one of two user profiles with the &W command.

## S-Register Definitions

---

### ***S0, Number of Rings to Auto-Answer***

#### **Description**

Sets the number of rings required before the modem automatically answers a call. Set to zero to disable auto-answer mode.

Range: 0-255 rings

Default: 1

### ***S1, Ring Counter***

#### **Description**

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***

### **Description**

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 is recognized.

Range: 0-255, ASCII decimal

Default: 43 (+)

## **S3, *Carriage Return Character***

### **Description**

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

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

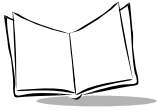
## **S4, *Line Feed Character***

### **Description**

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**

### **Description**

Sets the character recognized as a backspace. Pertains to asynchronous operation only. The modem does not recognize the Backspace character if it is set to a value 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; therefore a total of three characters are transmitted each time the modem processes the Backspace character.

Range: 0-32, ASCII decimal

Default: 8 (Backspace)

## **S6, Wait Time for Dial Tone Before Blind Dialing, or After “W” Dial Modifier**

### **Description**

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

S6 also sets the length of time, in seconds, the modem waits for a dial tone when encountering a “W” dial modifier before returning a NO DIAL TONE result code.

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

Range: 2-255 seconds

Default: 4

## ***S7, Wait Time For Carrier After Dial, For Silence***

### **Description**

Sets the length of time, in seconds, the modem waits for carrier before hanging up. The timer is started when the modem finishes dialing (originate), or 2 seconds after going off-hook (answer). In originate mode, the timer resets when an answer tone is detected, if allowed by country restrictions.

S7 also sets the length of time, in seconds, the modem waits for silence when encountering the @ dial modifier before continuing with the next dial string parameter.

Range: 1-255 seconds

Default: 50

## ***S8, Pause Time For Dial Delay***

### **Description**

Sets the time, in seconds, the modem must pause when encountering the “,” dial modifier in the dial string.

Range: 0-255 seconds

Default: 2

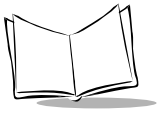
## ***S9, Carrier Detect Response Time***

### **Description**

Sets the time, in tenths of a second, the carrier must be present before the modem considers it valid and turns on RLSD. As this time increases, 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)



## **S10, Lost Carrier To Hang Up Delay**

### **Description**

Sets the length of time, in tenths of a second, 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 set to 255, the modem functions as if a carrier is always present.

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

Range: 1-255 tenths of a second

Default: 14 (1.4 seconds)

## **S12, Escape Prompt Delay (EPD)**

### **Description**

Defines the maximum time, 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 is not sent. Note that sending of the OK result code does not affect entry into command mode.

Range: 0-255 1/50 of a second

Default: 50 (1 second)

## **S13, Check Line Quiet before Line Seize**

### **Description**

Causes the modem to 'listen' to the line, in the high impedance state, prior to originating a call. If activity is detected, the modem does not seize the line, but responds 'NO DIALTONE' and remains in command mode. Activity is qualified by signals with a duration of 200ms or more. Silence is qualified as 3 seconds of inactivity. If this register is 0, the feature is inactive. If this register is non-zero, the feature is active.

Range: 0-1

Default: 1

## **S14, General Bit Mapped Options Status**

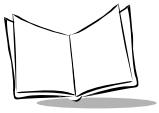
### **Description**

Indicates the status of 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)

### **S15, Reserved**



## **S16, General Bit Mapped Test Options Status**

### **Description**

Indicates the test in progress status.

Default: 0

- Bit 0 Local analog loopback
  - 0 = Disabled (default)
  - 1 = Enabled (&T1)
- Bit 1 Not used
- Bit 2 Local digital loopback
  - 0 = Disabled (default)
  - 1 = Enabled (&T3)
- Bit 3 Remote digital loopback (RDL) status
  - 0 = Modem not in RDL (default)
  - 1 = RDL in progress
- Bit 4 RDL requested (AT&T6)
  - 0 = RDL not requested (default)
  - 1 = RDL requested (&T6)
- Bit 5 RDL with self test
  - 0 = Disabled (default)
  - 1 = Enabled (&T7)
- Bit 6 Local analog loopback (LAL) with self test
  - 0 = Disabled (default)
  - 1 = Enabled (&T8)
- Bit 7 Not used

## **S17, Reserved**

## S18, Test Timer

### Description

Sets the length of time, in seconds, the modem conducts a test (commanded by &Tn) before returning to the command mode. If this register value is zero, the test does not automatically terminate; you must issue an &T0 or H command from the command mode. When S18 is non-zero, the modem returns the OK message upon test termination.

Range: 0-255 seconds

Default: 0

## S19, AutoSync Bit Mapped Options

### Description

Defines the options for AutoSync operation (see [&Qn, Sync/Async Mode](#) on page 1-20). S19 must be set to the desired value before &Q4 is issued.

Default: 0

Bit 0 Reserved

Bit 1 BSC/HDLC format select

0 = BSC selected (default)

1 = HDLC selected

Bit 2 Address detection enable/disable

0 = Disabled (default)

1 = Enabled

Bit 3 NRZI/NZI coding select

0 = NRZI (default)

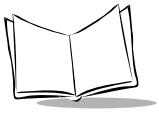
1 = NZI

Bit 4 Idle indicator select

0 = Mark idle (default)

1 = Flag or sync idle

Bits 5-7 Reserved



## **S20, AutoSync HDLC Address or BSC Sync Character**

### **Description**

Defines the HDLC address (S19 bit 1 = 1) or BSC Sync Character (S19 bit 1 = 0) for AutoSync operation (see [&Qn, Sync/Async Mode](#) on page 1-20). Set S20 to the desired value before issuing &Q4.

Range: 0-255

Default: 0

## **S21, V.24/General Bit Mapped Options Status**

### **Description**

Indicates the status of command options.

Default: 52 (34h) (00110100b)

Bit 0 Set by &Jn command but ignored otherwise.

0 = &J0 (default)

1 = &J1

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

1 = &D1 selected

2 = &D2 selected (default)

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 Long space disconnect (Yn)

0 = Y0 (default)

1 = Y1

## **S22, Speaker/Results Bit Mapped Options Status**

### **Description**

Indicates the status of command options.

Default: 117 (75h) (01110101b)

Bits 0-3 Reserved

Bits 4-6 Limit result codes (Xn)

0 = X0

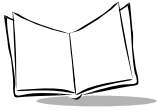
4 = X1

5 = X2

6 = X3

7 = X4 (default)

Bit 7 Reserved



## S23, General Bit Mapped Options Status

### Description

Indicates the status of command options.

Default: 62 (3Dh) (00111110b)

Bit 0 Grant RDL

0 = RDL not allowed (&T5) (default)

1 = RDL allowed (&T4)

Bits 1-3 DTE Rate

0 = 0 - 300 bps

1 = 600 bps

2 = 1200 bps

3 = 2400 bps

4 = 4800 bps

5 = 9600 bps

6 = 19200 bps

7 = 38400 bps or higher (default)

Bits 4-5 Assumed DTE parity

0 = even

1 = not used

2 = odd

3 = none (default)

Bits 6-7 Guard tone (&Gn)

0 = None (&G0) (default)

1 = None (&G1)

2 = 1800 Hz (&G2)

## ***S24, Sleep Inactivity Timer***

### **Description**

Sets the length of time, in seconds, the modem operates 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***

### **Description**

Sets the length of time the modem ignores DTR for taking the action specified by &Dn. Its units are seconds for one hundredths of a second.

Range: 0-255 (1 second for synchronous modes 1; 0.01 second otherwise)

Default: 5

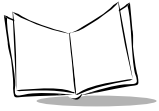
## ***S26, RTS to CTS Delay***

### **Description**

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.

Range: 0-255 hundredths of a second

Default: 1



## S27, Bit Mapped Options Status

### Description

Indicates the status of 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	= &Q4
1	0	1	= &Q5 (default)
1	1	0	= &Q6

Bit 2 Leased line control (&Ln)

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

Bits 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)

1 = Bell mode (B1) (default)

Bit 7 Reserved

## S28, Bit Mapped Options Status

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)

Bit 5-7 Reserved

## **S30, Disconnect Inactivity Timer**

### **Description**

Sets the length of time, in tens of seconds, the modem remains online before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received resets the timer. In other modes, any data transmitted resets the timer. The timer is inoperative in synchronous mode.

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

Default: 0 (disabled)

## **S31, Bit Mapped Options Status**

Default: 194 (C2h) (11000010b)

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)

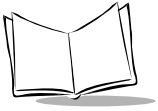
- 0 = Disabled (N0)
- 1 = Enabled (N1) (default)

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)

## **S32, XON Character**

### **Description**

Sets the value of the XON character.

Range: 0-255, ASCII decimal

Default: 17 (11h)

## **S33, XOFF Character**

Sets the value of the XOFF character.

Range: 0-255, ASCII decimal

Default: 19 (13h)

## **S34-S35, Reserved**

## **S36, LAPM Failure Control**

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 behaves as if the default value was 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

## S37, Desired Line Connection Speed

### Description

Specifies the desired line connection speed.

### Notes

1. When the Nn command is issued or the S37 register value is modified, the +MS command subparameters are updated to reflect the speed and modulation specified by the S37 value (see [+MS, Select Modulation](#) on page 1-34). For example:  
  
If N0 command is active, S37=10 updates the +MS command subparameters to reflect +MS=10,1,300,12000  
  
If N1 command is active, S37=10 updates the +MS command subparameters to reflect +MS=10,0,12000,12000
2. S37 is not updated by the +MS command.
3. Use of the +MS command is recommended instead of the Nn and S37=x commands. Nn and S37=x commands are supported for compatibility with existing communication software.

Default: 0

Bits 0-4 Desired line connection speed. This is interlinked with the Fn command. If an invalid number is entered, the number is accepted into the register, but S37 behaves as if the default value was entered.

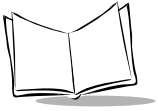
0 = Attempt automode connection. If N0 is active, connection is attempted at the most recently sensed DTE speed (+MS command settings are updated to the appropriate values). If N1 is active, connection is attempted at the highest possible speed (+MS settings are updated to 11,1,300,1440 to reflect V.32bis automode, 300 bps minimum speed, and 14400 bps maximum speed) (default).

1-3 = Attempt to connect at 300 bps. F1 command

4 = Reserved.

5 = Attempt to connect at V.22 1200 bps. F4 command

6 = Attempt to connect at V.22 bis 2400 bps. F5 command



- 7 = Attempt to connect at V.23.
- 8 = Attempt to connect at V.32 bis/V.32 4800 bps. F6 command
- 9 = Attempt to connect at V.32 bis/V.32 9600 bps. F8 command
- 10 = Attempt to connect at V.32 bis 12000 bps. F9 command
- 11 = Attempt to connect at V.32 bis 14400 bps. F10 command
- 12 = Attempt to connect at V.32 bis 7200 bps. F7 command

Bits 5-7 Reserved

## **S38, Delay Before Forced Hang Up**

### **Description**

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. Use this register 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 waits 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 is issued to indicate that data was lost. If all data is transmitted prior to time-out, the response to the H0 command is 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



## **S39, Flow Control Bit Mapped Options Status**

### **Description**

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**

### **Description**

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)

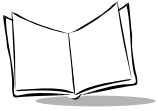
Bit 2 Reserved

Bits 3-5 Break Handling (\Kn)

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

Bits 6-7 MNP block size (\An)

- 0 = 64 chars (\A0)
- 1 = 128 chars (\A1) (default)



2 = 192 chars (\A2)

3 = 256 chars (\A3)

## **S41, General Bit Mapped Options Status**

### **Description**

Indicates the status of command options.

Default: 195 (C3h) (11000011b)

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 retrain 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

Bits 4-5 Reserved

Bit 7 Reserved

## **S46, Data Compression Control**

### **Description**

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**

### **Description**

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

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

Default: 7

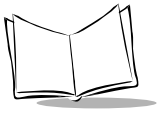
S48=0 Disable negotiation; bypass the detection and negotiation phases; and proceed with LAPM.

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**

S82 is for compatibility purposes; changing this register has no affect.



## **S86, Call Failure Reason Code**

### **Description**

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 cause codes are:

Range: 0, 4, 5, 9, 12, 13, or 14

Default:

- S86=0 Normal disconnect, no error occurred.
- S86=4 Loss of carrier.
- S86=5 V.42 negotiation failed to detect an error-correction modem at the other end.
- S86=9 The modems could not find a common protocol.
- S86=12 Normal disconnect initiated by the remote modem.
- S86=13 Remote modem does not respond after 10 re-transmissions of the same message.
- S86=14 Protocol violation.

## **S95, Extended Result Codes**

### **Description**

The bits in this register can be set to override some of the Wn command options. A bit set to 1 in this register enables the corresponding result code regardless of the Wn setting.

Default: 0

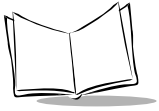
- Bit 0 CONNECT result code indicates DCE speed instead of DTE speed.
- Bit 1 Append/ARQ to CONNECT XXXX result code in error-correction mode (XXXX = rate).
- Bit 2 Enable CARRIER XXXX result code (XXXX = rate).
- Bit 3 Enable PROTOCOL XXXX result code (XXXX = protocol identifier).

Bit 4 Reserved.

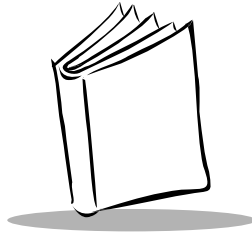
Bit 5 Enable COMPRESSION result code (XXXX = compression type).

Bit 6 Reserved.

Bit 7 Reserved.



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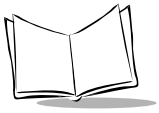
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(please include revision level)

How familiar were you with this product before using this manual?

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Did this manual meet your needs? If not, please explain.

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\_\_\_\_\_

What topics need to be added to the index, if applicable?

\_\_\_\_\_  
\_\_\_\_\_

What topics do you feel need to be better discussed? Please be specific.

\_\_\_\_\_  
\_\_\_\_\_

What can we do to further improve our manuals?

\_\_\_\_\_  
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