APPENDIX C

AT Commands and S-Registers

This appendix contains the following information:

- Instructions for entering AT commands
- Summary of the AT command set used by the quad modems
- Listing of the user-programmable defaults
- Summary of the modem's S-registers

Entering AT Commands

Keep the following in mind when you issue AT commands to a modem:

- To use the AT command set, the modem requires communications software to put the computer in terminal mode so that keyboard entry bypasses the processor and goes directly to the modem.
- Enter commands in either uppercase or lowercase, not mixed case.
- All commands except **A/**, **A>** and **+++** are preceded by the AT prefix and are executed when you press **Return** or **Enter**.
- Command length limit is 64 characters. The modem does not count the AT prefix, **Return**, or spaces.
- A missing numeric argument is assumed to be zero. For example, the hang up command **ATH** is the equivalent of **ATH0**.

- The modem usually operates in one of two modes: command mode (no connection established with another modem) or online mode.

  When in online mode, the only command the modem recognizes is the escape code (+++), which forces the modem back to command mode in two different ways. If DIP switch 9 is off, the modem disconnects before returning to command mode. If DIP switch 9 is on (factory setting), the modem maintains the connection and enters online-command mode, a state in which it maintains the connection and can also accept commands.

- The command mode local echo default is no echo: the modem does not display commands sent from the keyboard. To enable local echo, install the modems with DIP switch 4 off, or send the modem the following command:

  ```
  ATE1
  ```

AT Command Sets

This section contains the following information:

- Basic command set (see Table C-1)
- Result code options for the **X***n* command (see Table C-2)
- Ampersand command set (see Table C-3)
- Percent command set (see Table C-4)

Table C-1 lists the basic modem command set.

Table C-1 Basic Modem Command Set

Command	Function
&	See the ampersand command set in Table C-3.
%	See the percent command set in Table C-4
$	Help basic command summary request.
>	Repeat the last command continuously until canceled by pressing any key. If used in a dial string, automated redialing terminates after ten attempts.

Command	Function
/ (slash)	Pause for 125 milliseconds.
+++	Escape code, preceded and followed by a guard time of at least one second of no data transmission. The modem responds to +++ by returning to Command mode and doing the following (depending on the setting of DIP switch 9): hangs up and sends NO CARRIER result code (switch 9 off), or retains phone line connection and sends OK result code (switch 9 on)
A	Force answer mode when the modem has not received an incoming call.
A/	Re-execute the last issued command one time. **A/** does not require the AT prefix or a **Return**.
A>	Re-execute the last issued command continuously until canceled by pressing any key. Dial strings are re-executed ten times, after which execution terminates. This command does not take the AT prefix or a **Return**.
AT	Attention: lets the modem know commands are being issued to it. Must precede all other commands except **A/**, **A>** and +++.
B*n*	Handshake options: **B0** ITU-T V.25 answer sequence. This is the default setting. Also required to answer overseas calls at 1,200 bps and above. **B1** Bell answer tone. **B2** Force Bell 208B mode (synchronous, 4,800 bps).
C*n*	Transmitter enabled/disabled. **C0** Transmitter disabled; receive-only condition. **C1** Transmitter enabled.

Command	Function
D	Dial the number that follows and enter Originate mode. Optional parameters: **P** Pulse dial. This is the default setting. **T** Tone dial. **,** Pause for 2 seconds. **;** Return to Command mode after dialing. **“** Dial the letters that follow. **!** Transfer call (flash switch-hook). **W** Wait for second dial tone (with X3 or higher). **@** Wait for an answer (with X3 or higher). **R** Reverse frequencies.
D$	Help dial command summary request.
DL	Dial the last-dialed number.
DL?	Display the number stored in the last-dialed number buffer.
DS*n*	Dial the phone number stored in NVRAM at position *n* (*n* = 0–3).

Command	Function
E*n*	Command mode local echo (display) of keyboard commands ON/OFF. Default = setting of DIP switch 4. **E0** Local echo off. **E1** Local echo on.
F*n*	Online local echo of transmitted data on or off. Sometimes referred to as the duplex setting. **F0** Local echo on. Sometimes called half duplex. Modem copies to the screen data it sends to the remote system. **F1** Local echo off. This is the default setting. Sometimes called full duplex. Receiving system may send a remote echo of data.
H*n*	On/off hook control. **H0** Hang up (go on hook). **H1** Go off hook. Busy out phone line.

Command	Function
I*n*	Inquiry. **I0** Display product code. **I1** Display results of ROM checksum. **I2** Display results of RAM test. **I3** Display call duration or real time (see K*n*). **I4** Display current modem settings. **I5** Display NVRAM settings. **I6** Display link diagnostics. **I7** Display product configuration. **I8** Reserved. **I9** Display standard feature group B settings. **I10** View link security account status.
K*n*	Modem clock operation: Call-duration or real-time mode. **K0** Return call duration at ATI3 and ATI6. When modem is offline, returns duration of last call. This is the default setting. **K1** Return actual time at ATI3 and ATI6. Clock is set using ATI3=HH:MM:SS K1.

Command	Function
O*n*	Return online after command execution. **O0** Return online (normal). **O1** Return online and retrain. Use if there were errors in a non-ARQ data transfer.
O0	Return online (normal).
O1	Return online and retrain. Use if there were errors in a non-ARQ data transfer.
P	Pulse dial (default).
Q*n*	Quiet mode: result codes displayed/suppressed. Default = setting of DIP switch 3. **Q0** Result codes displayed. **Q1** Result codes suppressed (quiet). **Q2** Result codes suppressed in answer mode.
S$	Help S-register summary request.
S*r*?	Query contents of register *r*.
S*r*=*n*	Set S-register value: *r* is any S-register; *n* must be a decimal number between 0 and 255.
S*r*.*b*=*n*	Alternative command for setting bit-mapped registers: *r* is the bit-mapped register; .*b* is the bit; *n* is 0 (off) or 1 (on).
T	Tone dial.
V*n*	Return result codes in words or numbers (written/numeric mode). Default = setting of DIP switch 2. **V0** Numeric mode. **V1** Written mode.

Command	Function
X*n*	Result code set options. Default = X1, extended set, codes 0–5, 10, and the remaining connect codes in Table C-2.
Z	Software reset. If DIP switch 10 is off, the modem loads the settings in NVRAM. If DIP switch 10 is on, the modem loads the &F0 template, clearing all flow control and high performance settings.

Table C-2 lists the result code options for the **Xn** command.

Table C-2 Result Code Options for the X*n* Command

	Setting							
Result Codes	**X0**	**X1**	**X2**	**X3**	**X4**	**X5**	**X6**	**X7**
0/OK	x	x	x	x	x	x	x	x
1/CONNECT	x	x	x	x	x	x	x	x
2/RING	x	x	x	x	x	x	x	x
3/NO CARRIER	x	x	x	x	x	x	x	x
4/ERROR	x	x	x	x	x	x	x	x
5/CONNECT 1200		x	x	x	x	x	x	x
6/NO DIAL TONE			x		x		x	x
7/BUSY				x	x	x	x	x
8/NO ANSWER				x	x	x	x	x
9/RESERVED								
10/CONNECT 2400		x	x	x	x	x	x	x
11/RINGING						x	x	x
12/VOICE						x	x	
13/CONNECT 9600		x	x	x	x	x	x	x
18/CONNECT 4800		x	x	x	x	x	x	x
20/CONNECT 7200		x	x	x	x	x	x	x

	Setting							
Result Codes	**X0**	**X1**	**X2**	**X3**	**X4**	**X5**	**X6**	**X7**
21/CONNECT 12000		x	x	x	x	x	x	x
25/CONNECT 14400		x	x	x	x	x	x	x
43/CONNECT 16800		x	x	x	x	x	x	x
85/CONNECT 19200		x	x	x	x	x	x	x
91/CONNECT 21600		x	x	x	x	x	x	x
99/CONNECT 24000		x	x	x	x	x	x	x
103/CONNECT 26400		x	x	x	x	x	x	x
107/CONNECT 28800		x	x	x	x	x	x	x
Functions								
Adaptive dialing			x	x	x	x	x	x
Wait for second dial tone (W)				x	x	x	x	x
Wait for answer (@)				x	x	x	x	x
Fast dial			x		x		x	x

Table C-3 lists the modem ampersand commands.

Table C-3 Ampersand Command Set

Command	Function
&$	Help extended command summary request.
&A*n*	Enable/disable additional result code subsets. See the X*n* command in Table C-1. **&A0** ARQ result codes disabled. **&A1** ARQ result codes enabled. **&A2** V32 modulation codes enabled. **&A3** Additional error control indicator (LAPM, MNP, or NONE) and data compression type (V42 *bis* or MNP Level 5). This is the default setting.
&B*n*	Serial port rate. **&B0** Serial port rate switches to follow connection. **&B1** Serial port rate remains fixed at the computer setting. Allowable rates are 115.2, 57.6, 38.4, 19.2, 9.6kbps and 4,800, 2,400, 1,200, and 300 bps. This is the default setting. **&B2** In answer mode, shift to the fixed serial port rate for ARQ calls, follow the connection rate for non-ARQ calls.

Command	Function
&C*n*	Carrier Detect (CD) signal, modem to computer. The setting of DIP switch 6 determines CD operations at power-on and reset. **&C0** CD override (CD always on). **&C1** Modem sends CD signal when it connects with another modem, drops CD on disconnect.
&D*n*	Data Terminal Ready (DTR) signal, computer to modem. DIP switch 1 sets DTR operations at power-on and reset. **&D0** DTR override (DTR always on). **&D1** If issued before connecting, the modem enters online command mode during a call when DTR is toggled. &D1 functions similarly to the escape code (+++). Return online with ATO, or hang up with ATH. **&D2** Normal DTR. Terminal must send DTR for modem to accept commands.
&F*n*	Load one of four (ROM) templates into RAM (*n* = 0, 1, 2, or 3). See the section "User-Programmable Defaults" later in this appendix.
&G*n*	Guard tone for 2,400/1,200 bps calls from overseas. **&G0** No guard tone (U.S., Canada). This is the default setting. **&G1** 550 Hz guard tone (some European countries). **&G2** 1800 Hz guard tone. Requires B0 setting.

Command	Function
&H*n*	Transmit data flow control. **&H0** Flow control disabled. **&H1** Hardware (Clear to Send) flow control. This is the default setting. **&H2** Software (XON/XOFF) flow control. **&H3** Hardware and software flow control.
&I*n*	Received Data software flow control. **&I0** Flow control disabled. This is the default setting. **&I1** XON/XOFF to local modem and remote computer. **&I2** XON/XOFF to local modem only. **&I3** Host mode, Hewlett-Packard protocol. **&I4** Terminal mode, Hewlett-Packard protocol. **&I5** Same as &I2 in ARQ mode. In non-ARQ mode, XON/XOFF to remote modem for link flow control.

Command	Function
&K*n*	Data compression. **&K0** Disabled. **&K1** Auto enable/disable. This is the default setting. Disabled if modem is set to &B0 and serial port rate switches to match link rate. **&K2** Enabled regardless of &B*n* setting. **&K3** Selective data compression—MNP Level 5 disabled.
&L*n*	Normal/leased phone line. **&L0** Normal phone line. This is the default setting. **&L1** Leased line; enables the modem to reconnect.

Command	Function
&M*n*	Error Control (ARQ). **&M0** Normal mode, error control disabled. **&M1** Online synchronous mode without V.25 *bis*. **&M2** Reserved. **&M3** Reserved. **&M4** Normal/ARQ mode. This is the default setting. Normal connection if ARQ connection cannot be made. **&M5** ARQ mode. Modem hangs up if ARQ connection cannot be made. **&M6** V.25 *bis* mode, using a character-oriented Binary Synchronous communications protocol. **&M7** V.25 *bis* synchronous mode, using HDLC Protocol.

Command	Function
&N*n*	Link rate variable or fixed. With fixed link rate, modem hangs up if called or calling modem is operating at a different rate. **&N0** Variable link operations. Negotiates highest possible link rate with remote modem. This is the default, and the recommended setting. **&N1** 300 bps **&N2** 1200 bps **&N3** 2400 bps **&N4** ,800 bps **&N5** 7200 bps **&N6** 9600 bps **&N7** 12 kbps **&N8** 14.4-kbps **&N9** 16.8-kbps **&N10** 19.2-kbps **&N11** 21.6-kbps **&N12** 24 kbps **&N13** 26.4-kbps **&N14** 28.8-kbps
&P*n*	Pulse dialing make/break ratio. **&P0** U.S./Canada make/break ratio. This is the default setting. **&P1** U.K. make/break ratio.

Command	Function
&R*n*	Received data hardware (RTS) flow control. **&R0** Delay between DTE's RTS signal and the modem's CTS response; duration set by S26. **&R1** Ignore RTS. **&R2** Received data sent to computer only when RTS is high; used only if computer supports RTS. This is the default setting.
&S*n*	Data Set Ready (DSR) operations. **&S0** DSR override, always on. This is the default setting. **&S1** Modem sends computer a DSR signal when it detects a modem tone on the phone line. **&S2** On loss of carrier, modem sends computer a pulsed DSR signal; Clear to Send (CTS) follows Carrier Detect (CD). **&S3** This is the same as &S2, but without CTS following CD. **&S4** DSR follows CD. **&S5** CTS follows CD, with DSR normal.

Command	Function
&T*n*	Modem testing. The following analog tests (&T1 and &T8) are only valid for the quad analog modem and the quad analog/digital configured for analog mode. **&T0** End test. **&T1** Initiate analog loopback testing. **&T2** Reserved. **&T3** Initiate local digital loopback testing. **&T4** Grant remote digital loopback. This is the default setting. **&T5** Prohibit remote digital loopback. **&T6** Initiate remote digital loopback testing. **&T7** Initiate RDL with self-test and error correction. **&T8** Initiate analog loopback with self-test and error correction. **&T9** Generates a tone to verify the digital signal processor's ability to generate analog tones and T1 line diagnostics. Command syntax is **AT&T8**=*Freq*,*Amp*, where the Frequency can be from 300 to 4,000 Hz and the amplitude from –40 to 0 dBm. Press any key to cancel the tone testing. **&T10** Sets the modem to receive analog test tones. This test reports the received tones in frequency and amplitude to the DTE interface on a five-second basis (either to a connected terminal interface or through an SNMP manager). Press any key to cancel the tone testing.

Command	Function
&W	Write current settings to NVRAM.
&X*n*	Synchronous clock source. The **&X1** and **&X2** commands are only valid for analog modems; they are not supported for digital T1 applications. **&X0** Modem's transmit clock. This is the default setting. **&X1** DTE's transmit clock. **&X2** Modem's receiver clock.
&Y*n*	Break handling. Destructive breaks clear the buffer; expedited breaks are sent immediately to the remote system. Under data compression, destructive breaks cause both modems to reset their compression tables. **&Y0** Destructive, don't send break. **&Y1** Destructive, expedited. This is the default setting. **&Y2** Nondestructive, expedited. **&Y3** Nondestructive, unexpedited; modem sends break in sequence with data received from computer.
&Z*n*=L	Write the last dialed number to NVRAM at position *n* (*n* = 0, 1, 2, or 3).
&Z*n*=*s*	Write the following dial string (*s*) to NVRAM at position *n* (*n* = 0, 1, 2, or 3).
&Z*n*?	Display the phone number stored in NVRAM at position *n* (*n* = 0, 1, 2, or 3).

Table C-4 lists the percent commands.

Table C-4 Percent Command Set

%$	Help percent command summary request.
%A=	Set up the host security account. The %A= command is automatically written to NVRAM and does not require an **&W** command. You must specify two fields: • The account password. This identifies the host security account. It can be up to eight characters (ASCII characters 32–127) and is case sensitive. • Prompt for phone number (Y/N). **Y** indicates that the host modem will prompt the remote user to enter a phone number; the host modem disconnects and then dials back. **N** indicates that no prompt will be made. The fields are entered after the equal sign, separated by a comma, as in the following example for an account with the password BILL and dialback prompting enabled. **AT%A=BILL,Y<Enter>**
%B*n*	Configure the serial port rate during a remote access session. **%B0** 110 bps **%B1** 300 bps **%B2** 600 bps **%B3** 1200 bps **%B4** 2400 bps **%B5** 4800 bps **%B6** 9600 bps **%B7** 19200 bps **%B8** 38400 bps **%B9** 57600 bps **%B10** = 115200 bps

%C*n*	Configuration control during remote access session. **%C0** Defer configuration. This is the default setting. Configuration changes are deferred until the call is ended, and take effect for subsequent connections. This command does not have to be entered; it is the default unless one of the following %C values is entered. **%C1** Restore configuration. Use this command to cancel any configuration changes made during remote access and restore the original configuration. However, commands that have been written to NVRAM (with &W) will not be restored to their previous settings. Additionally, if immediate configuration changes are forced (with %C2), those changes cannot be reversed with %C1. **%C2** Execute configuration. Forces configuration changes to take effect immediately, during the current connection. Do not force immediate configuration changes unless absolutely necessary, as this may result in an unreliable connection or even a loss of connection.
%CN*n*=*s*	Sets the Carrier Access Code number, where *n* is a position in NVRAM (from 1–3) and *s* is a numeric string containing from 1 to 10 digits. This code allows programming of Dialed Number Indicate Service or Automatic Number Indicate, a service offered by the telephone company.

%CI*n*=*s*

Sets the carrier access code–associated initialization string, where *n* is a position in NVRAM (1, 2, 3, or 4) and *s* is a configuration string of up to 30 characters. Do not include the AT attention prefix in the initialization string.

%CN*n*=*s* and %CI*n*=*s* allow you to configure a stored initialization string feature in the quad modems. First, define up to three full or partial telephone numbers that may be dialed to access the modem, using the AT%CN*n*=*s* command. An initialization string (without the AT command prefix) can then be associated with the carrier access code number by using the AT%CI*n*=*s* command. Four initialization strings may be stored: three of them to match the carrier access code of a specified carrier access code number, and the fourth to be executed if the modem receives an unknown carrier access code (no full or partial match).

When a call comes in, the quad modem compares the number dialed against the defined carrier access code numbers. An initialization string is then used to configure the modem to answer the call.

The carrier access code numbers defined, with their associated initialization strings, can be viewed by entering the **ATI9** command.

The quad modem identifies the carrier access code on incoming calls by returning special RING result codes, as follows.

- No DNIS or ANI information received: RING (normal).
- Only DNIS information received: RING/5 (where 5 is the DNIS number).
- ANI and DNIS information received: RING/5/5551212 (where 5 is the DNIS and 5551212 is the ANI).
- Only ANI information received: RING//5551212 (where two slashes indicate no DNIS, and 5551212 is the ANI).

The CAC associated with the last call received is displayed on the current settings screen (obtained by issuing the command **ATI4**), as follows:

```
LAST DNIS #: nn. .nn
```

or

```
LAST ANI #: nn..nn
```

%D*n*	Toggle between analog and digital modes (quad analog/digital modems only). **%D0** Analog mode. A digital only modem returns an error if sent this command. **%D1** Digital mode. An analog-only modem returns an error if sent this command. When set to %D1, the modem displays the message "DCE=Digital (DS0)" on the I4 command screen to indicate that the modem has been configured for digital and is linked with the T1 NAC. If no T1 link has been established, the modem displays the message "DCE=Digital (DS) ?" It may take up to 30 seconds to establish a T1 link. If this message persists, there is either no T1 module is present, or there is a hardware problem.
%E=*n*	Use the **%E=***n* command to edit the link security configuration, where n = 1, 2, 3, or 4. **%E=1** Erase local access password. **%E=2** Erase autopass password. **%E=3** Erase password account. **%E=4** Erase account status information.
%F*n*	Configure the data format during a remote access session. **%F0** No parity, 8 data bits. **%F1** Mark parity, 7 data bits. **%F2** Odd parity, 7 data bits. **%F3** Even parity, 7 data bits.
%L=	Set the local access password for link security.

%P*n*	Assign remote access password. **%P0** Create password that allows viewing privileges only. **%P1** Create password that allows viewing and configuration privileges.
%P*n*=*s*	Set the following password string (*s*) at position *n* (*n* = 0 or 1).
%P*n*?	Display the password stored at position *n* (*n* = 0 or 1).
%S=	Access link security settings by entering the local access password.
%T	Tone recognition. Enables modem, when off hook, to detect the tone frequencies of dialing modems.
%V=	Set link security autopass password for both the host and remote modem.

User-Programmable Defaults

You can create your own default configuration and store it in NVRAM using the **&W** command described in the chapter "Quad Modems." As long as DIP switch 10 is off when you power on the modem, your defaults are loaded into the modem's NVRAM. You can view the NVRAM contents with the **ATI5** command.

This section includes information about options you can store in NVRAM, including S-register settings. The modem has four factory setting templates (**&F0**–**&F3**). By default, the first time the modem is turned on, it loads the settings stored in NVRAM, which are the same as the settings in factory template 1 (**&F1**), listed in Table C-5.

The following command substitutes several user-defined defaults for factory settings. The modem also stores the rate, word length, and parity that your software is set to when it receives the AT command prefix:

```
ATTX6&M5&W
```

Table C-5 through Table C-8 list the settings of each configuration template plus the S-registers that can be stored in NVRAM.

The modem is shipped with DIP switch 10 off, so when it is powered on it loads the settings from NVRAM. Until these settings are changed, they are they same as the settings permanently stored in configuration template 1 (**&F1**). You can alter any of these settings, create your own power-on defaults, and then save them using the **&W** command.

Table C-5 Hardware Flow Control Default Template

NVRAM Options	Setting	Description
Handshake option	B0	ITU-T answer sequence
Error control/sync	&M4	Normal/error control
Data compression	&K1	Enabled
Transmit data flow control	&H1	Hardware flow control enabled
Rec'd data hardware flow control	&R2	Enabled
Rec'd data software flow control	&I0	Disabled
Serial port rate select	&B1	Serial port rate fixed higher than connect rate
Link rate select	&N0	Variable
Result code subset	X7	Extended. Includes all codes except
Protocol response codes	&A3	Full protocol codes
Tone or pulse dialing	P	Pulse dial
Online local echo	F1	Disabled
Remote digital loopback	&T4	Grant remote digital loopback
Normal/leased/cellular line	&L0	Normal phone line
Data set ready operations	&S0	Override enabled
Break handling	&Y1	Clear buffer, send immediately
Stored telephone number	&Z0–3=0	Blank
Pulse dial make/break ratio	&P0	U.S. and Canada
Guard tone	&G0	U.S. and Canada

NVRAM Options	Setting	Description
Word length	8	
Parity	0	None
DTE rate	19.2 kbps	–

Word length, parity, and the DTE rate are detected by the modem from the AT prefix of the **&W** command that writes your defaults to NVRAM. Set your software to the desired word length, parity, and serial port rate defaults before sending the modem the **AT . . . &W** string.

The **&F2** and **&F3** factory setting templates (see Table C-6) are similar to the **&F1** template, with the exception of the commands that are highlighted in bold.

Table C-6 &F2 Software Flow Control Default Template

NVRAM Options	Setting	Description
Handshake option	B0	ITU-T answer sequence
Normal/error control/sync	&M4	Normal/error control
Data compression	&K1	Enabled
Transmit data flow control	**&H2**	**Software flow control enabled**
Rec'd data hardware flow control	**&R1**	**Disabled**
Rec'd data software flow control	**&I2**	**Enabled**
Serial port rate select	&B1	Serial port rate fixed higher than connect rate
Link rate select	&N0	Variable
Result code subset	X7	Extended. Includes all codes except VOICE
Protocol response codes	&A3	Full protocol codes
Tone and pulse dialing	P	Pulse dial
Online local echo	F1	Disabled
Remote digital loopback	&T4	Grant remote digital loopback
Normal/leased/cellular line	&L0	Normal phone line

NVRAM Options	Setting	Description
Data set ready operations	&S0	Override enabled
Break handling	&Y1	Clear buffer, send immediately
Stored telephone number	&Z0–3=0	Blank
Pulse dial make/break ratio	&P0	U.S. and Canada
Guard tone	&G0	U.S. and Canada
Word length	8	
Parity	0	None
DTE rate	19.2 kbps	–

Word length, parity, and the DTE rate are detected by the modem from the AT prefix of the **&W** command that writes your defaults to NVRAM. Set your software to the desired word length, parity, and serial port rate defaults before sending the modem the **AT . . . &W** string.

If DIP switch 10 is on when the modem is powered on, or you load factory template 0 (**&F0**), the settings in Table C-7 take effect.

Table C-7 &F3 Software Flow Control Default Template

NVRAM Options	Setting	Description
Handshake option	B0	ITU-T answer sequence
Normal/error control/sync	&M4	Normal/error control
Data compression	&K1	Enabled
Transmit data flow control	&H0	Disabled
Rec'd data hardware flow control	&R1	Disabled
Rec'd data software flow control	&I0	Disabled
Serial port rate select	&B0	Detect from AT command: then follow connection rate
Link rate select	&N0	Variable
Result code subset	X1	Basic

NVRAM Options	Setting	Description
Error-control response codes	&A1	Enabled
Tone/pulse dialing	P	Pulse dial
Online local echo	F1	Disabled
Remote digital loopback	&T4	Grant remote digital loopback
Normal/leased/cellular line	&L0	Normal phone line
Data set ready operations	&S0	Override enabled
Break handling	&Y1	Clear buffer, send immediately
Stored telephone number	&Z0–3=0	Blank
Pulse dial make/break ratio	&P0	U.S. and Canada
Guard tone	&G0	U.S. and Canada
Word length	7	
Parity	1	Even
DTE rate	9600 bps	–

Word length, parity, and the DTE rate are selected by the modem from the AT prefix of the **&W** command that writes your defaults to NVRAM. Set your software to the desired word length, parity, and serial port rate defaults before sending the modem the **AT . . . &W** string.

S-Register NVRAM Options

Table C-8 lists the S-registers for which values can be stored in NVRAM, along with the factory settings.

Table C-8 S-Register Factory Settings

NVRAM S-Register Option	Register	Setting
Number of rings to answer, ASCII decimal	S0	1
Escape code character, ASCII decimal	S2	43
Carriage return character, ASCII decimal	S3	13

NVRAM S-Register Option	Register	Setting
Line feed character, ASCII decimal	S4	10
Backspace character, ASCII decimal	S5	8
Dial wait-time, sec	S6	2
Carrier wait-time, sec	S7	60
Pause during dial/before repeat, sec	S8	2
Carrier detect time, 1/10th sec	S9	6
Carrier loss wait-time, 1/10th sec	S10	7
Tone duration, spacing, ms	S11	70
Escape code guard time, 1/50th sec	S12	50
Bit-mapped	S13	0
Bit-mapped	S25	0
Inactivity/hang up timer, min.	S19	0
Received break length, 10-ms units	S21	10
XON character, ASCII decimal	S22	17
XOFF character, ASCII decimal	S23	19
Duration of pulsed DSR, 20-ms units	S24	150
Minimum DTR recognition time, 10-ms units	S25	5
Delay between RTS, CTS response (sync oper.)	S26	1
Bit-mapped	S27	0
V.32 handshake time, 10-ms units	S28	8
V.21/V.23 fallback timer, 1/10th sec	S29	20
Unusual software compatibility	S31	0
Bit-mapped	S33	0
Bit-mapped	S34	0
Unusual software incompatibility	S37	0
Delay ARQ-call hang-up when DTR drops, sec.	S38	0
Allowable login attempts	S41	0

NVRAM S-Register Option	Register	Setting
Remote access ASCII characters	S42	126
Remote guard time, 1/50th sec	S43	200
Re-establish leased-line connect, sec	S44	15
Bit-mapped	S47	0
Additional answer tone duration, 1/10 sec	S49	16
Billing delay period, 1/50 sec	S50	100
Bit-mapped	S51	0
Bit-mapped	S53	0
Bit-mapped	S54	0
Bit-mapped	S55	0
Bit-mapped	S56	0