Modem Control Codes

This section lists the command and control codes for popular modems. Most modems use a standard AT command set that was developed by Hayes and augmented by U.S. Robotics. Table 27 comes in handy when you need to reconfigure a modem without the original manual. Even if your modem is not Hayes or U.S. Robotics, it probably follows most of these commands because this command set has become somewhat of a standard. S-register values listed at the end of the table are also somewhat standard but are more subject to variation in the defaults by brand and model.

Table 27 Modem AT Commands and S-Register Features

Command	Modem Functions and Options
&	See Extended Command Set
%	See Extended Command Set
A	Force Answer mode when modem has not received an incoming call
A/	Reexecute last command once

(continues)

Table 27 Continued

Command	Modem Functions and Options	
A>	Repeat last command continuously	
Any key	Terminate current connection attempt; exit Repeat mode	
AT	Attention: must precede all other commands, except A/, A>, and +++	
Bn	Handshake options	
	B0	CCITT answer sequence
	B1	Bell answer tone
Cn	Transmitter On/Off	
	C0	Transmitter Off
	C1	Transmitter On—Default
Dn	Dial number *n* and go into originate mode	
	Use any of these options:	
	P	Pulse dial—Default
	T	Touch-tone dial
	,	(Comma) Pause for two seconds
	;	Return to command state after dialing
	"...	Dial the letters that follow
	!	Flash switch-hook to transfer call
	W	Wait for second dial tone (if X3 or higher is set)
	@	Wait for an answer (if X3 or higher is set)
	R	Reverse frequencies
	S	Dial stored number
DL	Dial the last-dialed number	
DSn	Dial number stored in NVRAM at position	
En	Command mode local echo; not applicable after a connection has been made	
	E0	Echo Off
	E1	Echo On
Fn	Local echo On/Off when a connection has been made	
	F0	Echo On (Half duplex)
	F1	Echo Off (Full duplex)—Default
Hn	On/Off hook control	
	H0	Hang up (go on hook)—Default
	H1	Go off hook
In	Inquiry	
	I0	Return product code
	I1	Return memory (ROM) checksum
	I2	Run memory (RAM) test
	I3	Return call duration/real time
	I4	Return current modem settings
	I5	Return NVRAM settings
	I6	Return link diagnostics
	I7	Return product configuration
Kn	Modem clock operation	
	K0	ATI3 displays call duration—Default
	K1	ATI3 displays real time; set with ATI3=HH:MM:SSK1

Command	Modem Functions and Options	
Ln	Loudness of speaker volume	
	L0	Low
	L1	Low
	L2	Medium
	L3	High
Mn	Monitor (speaker) control	
	M0	Speaker always Off
	M1	Speaker On until carrier is established—Default
	M2	Speaker always On
	M3	Speaker On after last digit dialed, Off at carrier detect
O	Return online after command execution	
	O0	Return online, normal
	O1	Return online, retrain
P	Pulse dial	
Qn	Result codes display	
	Q0	Result codes displayed
	Q1	Result codes suppressed (quiet mode)
	Q2	Quiet in answer mode only
Sr=n	Set Register commands: r is any S-register; n must be a decimal number between 0 and 255.	
Sr.b=n	Set bit .b of register r to n (0 / Off or 1 / On)	
Sr?	Query register r	
T	Tone dial	
Vn	Verbal / Numeric result codes	
	V0	Numeric mode
	V1	Verbal mode
Xn	Result code options	
Yn	Long space disconnect	
	Y0	Disabled
	Y1	Enabled; disconnects after 1 1 / 2-second break
Z	Software reset	
+++	Escape code sequence, preceded and followed by at least one second of no data transmission	
/ (Slash)	Pause for 125 msec	
>	Repeat command continuously or up to 10 dial attempts, Cancel by pressing any key	
$	Online Help—Basic command summary	
&$	Online Help—Ampersand command summary	
%$	Online Help—Percent command summary	
D$	Online Help—Dial command summary	
S$	Online Help—S-register summary	
<Ctrl>-S	Stop / restart display of Help screens	
<Ctrl>-C	Cancel display Help screens	
<Ctrl>-K	Cancel display Help screens	

(continues)

Table 27 Continued

Command	Modem Functions and Options
Extended Command Set	
&An	ARQ result codes 14–17, 19
	&A0 Suppress ARQ result codes
	&A1 Display ARQ result codes—Default
	&A2 Display HST and V.32 result codes
	&A3 Display protocol result codes
&Bn	Data Rate, terminal-to-modem (DTE / DCE)
	&B0 DTE rate follows connection rate—Default
	&B1 Fixed DTE rate
	&B2 Fixed DTE rate in ARQ mode; variable DTE rate in non-ARQ mode
&Cn	Carrier Detect (CD) operations
	&C0 CD override
	&C1 Normal CD operations
&Dn	Data Terminal Ready (DTR) operations
	&D0 DTR override
	&D1 DTR Off; goes to command state
	&D2 DTR Off; goes to command state and on hook
	&D3 DTR Off; resets modem
&F	Load factory settings into RAM
&Gn	Guard tone
	&G0 No guard tone; U.S., Canada—Default
	&G1 Guard tone; some European countries
	&G2 Guard tone; U.K., requires B0
&Hn	Transmit Data flow control
	&H0 Flow control disabled—Default
	&H1 Hardware (CTS) flow control
	&H2 Software (XON / XOFF) flow control
	&H3 Hardware and software control
&In	Received Data software flow control
	&I0 Flow control disabled—Default
	&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 ARQ mode-same as &I2; non-ARQ mode; look for incoming XON / XOFF
&Jn	Telephone jack selection
	&J0 RJ-11 / RJ-41S / RJ-45S
	&J1 RJ-12 / RJ-13
&Kn	Data compression
	&K0 Disabled
	&K1 Auto enable / disable—Default
	&K2 Enabled
	&K3 V.42bis only

Command	Modem Functions and Options

Extended Command Set

&Ln	Normal/Leased line operation	
	&L0	Normal phone line—Default
	&L1	Leased line
&Mn	Error Control/Synchronous Options	
	&M0	Normal mode, no error control
	&M1	Sync mode
	&M2	Sync mode 2—stored number dialing
	&M3	Sync mode 3—manual dialing
	&M4	Normal/ARQ mode—Normal if ARQ connection cannot be made—Default
	&M5	ARQ mode—hang up if ARQ connection cannot be made
&Nn	Data Rate, data link (DCE/DCE)	
	&N0	Normal link operations—Default
	&N1	300bps
	&N2	1,200bps
	&N3	2,400bps
	&N4	4,800bps
	&N5	7,200bps
	&N6	9,600bps
	&N7	12Kbps
	&N8	14.4Kbps
&Pn	Pulse dial make/break ratio	
	&P0	North America—Default
	&P1	British Commonwealth
&Rn	Received Data hardware (RTS) flow control	
	&R0	CTS tracks RTS
	&R1	Ignore RTS—Default
	&R2	Pass received data on RTS high; used Pass received data on RTS high Extended Command Set
&Sn	Data Set Ready (DSR) override	
	&S0	DSR override (always On—Default)
	&S1	Modem controls DSR
	&S2	Pulsed DSR; CTS follows CD
	&S3	Pulsed DSR
&Tn	Modem testing	
	&T0	End testing
	&T1	Analog loopback
	&T2	Reserved
	&T3	Digital loopback
	&T4	Grant remote digital loopback
	&T5	Deny remote digital loopback
	&T6	Initiate remote digital loopback

(continues)

Table 27 Continued

Command	Modem Functions and Options
Extended Command Set	
	&T7 Remote digital loopback with self-test
	&T8 Analog loopback with self-test
&W	Write current settings to NVRAM
&Xn	Synchronous timing source
	&X0 Modem's transmit clock—Default
	&X1 Terminal equipment
	&X2 Modem's receiver clock
&Yn	Break handling. Destructive breaks clear the buffer; expedited Breaks are sent immediately to remote system
	&Y0 Destructive, but don't send break
	&Y1 Destructive, expedited—Default
	&Y2 Nondestructive, expedited
	&Y3 Nondestructive, unexpedited
&Zn=L	Store last-dialed phone number in NVRAM at position
&Zn=s	Write phone number(s) to NVRAM at position n (0-3); 36 characters maximum
&Zn?	Display phone number in NVRAM at position n (n=0-3)
%Rn	Remote access to Rack Controller Unit (RCU)
	%R0 Disabled
	%R1 Enabled
%T	Enable Touch-tone recognition
Modem S-Register Functions and Defaults	
S0	Number of rings before automatic answering when DIP switch 5 is UP. Default = 1. S0 = 0 disables Auto Answer, equivalent to DIP switch 5 Down
S1	Counts and stores number of rings from incoming call
S2	Define escape code character. Default = +
S3	Define ASCII carriage return
S4	Define ASCII line feed
S5	Define ASCII Backspace
S6	Number of seconds modem waits before dialing
S7	Number of seconds modem waits for a carrier
S8	Duration (sec) for pause (,) option in Dial command and pause between command reexecutions for Repeat (>) command
S9	Duration (.1 sec units) of remote carrier signal before recognition
S10	Duration (.1 sec units) modem waits after loss of carrier before hanging up
S11	Duration and spacing (ms) of dialed touch-tones
S12	Guard time (in .02 sec units) for escape code sequence (+++)
S13	Bitmapped register:
	1 Reset when DTR drops
	2 Auto answer in originate mode
	4 Disable result code pause
	8 DSO on DTR low-to-high

Modem S-Register Functions and Defaults

	16	DS0 on power up, ATZ
	32	Disable HST modulation
	64	Disable MNP Level 3
	128	Watchdog hardware reset
S15	Bitmapped register:	
	1	Disable high-frequency equalization
	2	Disable online fallback
	4	Force 300bps back channel
	8	Set non-ARQ transmit buffer to 128 bytes
	16	Disable MNP Level 4
	32	Set Del as Backspace key
	64	Unusual MNP incompatibility
	128	Custom applications only

Bitmapped Register

1	Analog loopback		
2	Dial test		
4	Test pattern		
8	Initiate remote digital loopback		
16	Reserved		
32	Reserved		
64	Reserved		
128	Reserved		
S18	&Tn Test timer, disabled when set to 0		
S19	Set inactivity timer in minutes		
S21	Length of Break, DCE to DTE, in 10ms units		
S22	Define ASCII XON	17	17
S23	Define ASCII XOFF	19	19

Modem S-Register Functions and Defaults

S24	Duration (20ms units) of pulsed DSR when modem is set to &S2 or &S3	
S25	Delay to DTR in 10ms units	
S26	Duration (10ms units) of delay between RTS and CTS, synchronous mode	
S27	Bitmapped register:	
	1	Enable V.21 modulation, 300bps
	2	Enable unencoded V.32 modulation
	4	Disable V.32 modulation
	8	Disable 2100Hz answer tone
	16	Disable MNP handshake
	32	Disable V.42 Detect phase
	64	Reserved
	128	Unusual software incompatibility
S28	Duration (.1 sec units) of V.21/V.23 handshake delay	

(continues)

Table 27 Continued

Command	Modem Functions and Options	
Modem S-Register Functions and Defaults		
S32	Voice / Data switch options: 1	
	0	Disabled
	1	Go off hook in originate mode
	2	Go off hook in answer mode
	3	Redial last-dialed number
	4	Dial number stored at position 0
	5	Auto answer toggle On / Off
	6	Reset modem
	7	Initiate remote digital loopback
S34	Bitmapped register:	
	1	Disable V.32bis
	2	Disable enhanced V.32 mode
	4	Disable quick V.32 retrain
	8	Enable V.23 modulation
	16	Change MR LED to DSR
	32	Enable MI / MIC
	64	Reserved
	128	Reserved
S38	Duration (sec) before disconnect when DTR drops during an ARQ call	

ARQ = Automatic repeat request
ASCII = American Standard Code for Information Interchange
BPS = Bits per second
CCITT = Consultative Committee for International Telephone and Telegraph
CD = Carrier detect
CRC = Cyclic redundancy check
DCE = Data communications equipment
DTE = Data terminal equipment
EIA = Electronic Industries Association
HDLC = High-level data link control
HST = High-speed technology
Hz = Hertz
LAPM = Link access procedure for modems
MI/MIC = Mode indicate/Mode indicate common
MNP = Microcom networking protocol
NVRAM = Non-volatile memory
RAM = Random access memory
ROM = Read-only memory
SDLC = Synchronous Data Link Control
MR = Modem ready
LED = Light-emitting diode

DTR = Data terminal ready
CTS = Clear to send
RTS = Ready to send
DSR = Data set ready