Hayes Modem Command Summary

Here is a list of the Hayes Modem Command Set. Most modems follow this command set to large extent.

Commands

In order to get a Hayes modem to do anything an initialization string needs to be sent. These usually begin with "AT" (for 'attention').

Commands may be strung together. They prepare the modem for communications, setting such features as dialing mode, waits, detection of the busy signal and many other settings. Newer modem communications programs reset the initializations string for you according to which menu options you select, which features you enable, etc.

For many years Hayes modems have been **the** standard. As the field of modem manufactures has grown, most have adhered at least loosely to the Hayes standard. The following is a partial list of the Hayes command set. (called the AT commands). The **Hayes Command Set** can be divided into four groups:

Basic Command Set
> A capital character followed by a digit. For example, M1.

Extended Command Set
> An "&" (ampersand) and a capital character followed by a digit. This is an extension of the basic command set. For example, "&M1". Note that "M1" is different from "&M1".

Proprietary Command Set
> Usually started by either a backslash ("\"), or a percent sign ("%"), these commands vary widely among modem manufacturers. For that reason, only a few of these commands are listed below.

Register Commands
> Sr=n where "r" is the number of the register to be changed and "n" is the new value that is being assigned.

A "register" is computerese for a specific physical location in memory. Modems have small amounts of memory onboard. This fourth set of commands is used to enter values in a particular register (memory location). The register will be storing a particular "variable" (alphanumeric information) which is utilized by the modem and communication software. For example, S7=60 instructs your computer to "Set register #7 to the value 60."

Note: Although most commands are defined by a letter-number combination (L0, L1, etc.), the use of a zero is optional. In this case, L0 is the same as a plain "L" - keep this in mind when reading the table below.

Here are some of the most important characters that may appear in the modem initialization string. These characters normally should not be changed.

AT   This tells the modem that modem commands follow. This must begin each line of commands.

Z   This resets the modem to default state.

, (comma)

      makes your software pause for a second. You can use more than one , in a row. For example, ",,,," tells the software to pause four seconds. (The duration of the pause is governed by the setting of register S8.

^M   This sends the terminating Carriage Return character to the modem. This is a control code that most communication software translate as a "carriage return."

The Basic Hayes Command Set – Alphabetical

Command	Description	Comments
A0 or A	Answer incoming call	
A/	Repeat last command.	(Don't preface with AT. Enter usually aborts.)
B0 or B	Call negotiation	V32 Mode/CCITT ans Seq
B1		Bell 212A Answer Seq
B2		Verbose/Quiet On Answer
D	Dial	Dial the following number and then handshake in originate mode.
		Dial Modifiers (These are common but most modems will have more.)
		P Pulse dial
		T Touch Tone dial
		W Wait for second dial tone
		, Pause for time specified in register S8 (usually 2 seconds)
		; Remain in command mode after dialing
		! Flash switch-hook (Hang up for a half second as in transferring a call)
		L Dial last number
E0 or E	No Echo	Will not echo commands to the computer
E1	Echo	Will echo commands to the computer (so one can see what one types)
H0 or H	Hook status	On hook - hang up
H1		Off hook - phone picked up
I0 or I	Inquiry, Information, or	(This command is very model

		Interrogation	specific. I0 usually returns a number or code, while higher numbers often provide much more useful information.)
L0 or L		Speaker Loudness Modems with volume control knobs will not have these options.	Off or low volume
L1			Low volume
L2			Medium volume
L3			Loud or high volume
M0 or M		Speaker off	(M3 is also common, but different on many brands)
M1			Speaker on until remote carrier detected (until the other modem is heard)
M2			Speaker is always on (data sounds are heard after CONNECT)
N0 or N		Handshake Speed	Handshake only at speed in S37
N1			Handshake at highest speed larger than S37
O0 or O		Return Online	(O0 see also X1 as dial tone detection may be active)
O1			Return Online after an equalizer retrain sequence
Q0 or Q		Quiet mode	Off - Displays result codes, user sees command responses (e.g. OK)
Q1			On - Result codes are suppressed, user does not see responses
Sn?			Query the contents of S-register n
Sn=r		Store	Store the value r in S-register n
V0 or V		Verbal?	Numeric result codes
V1			English result codes (e.g. CONNECT, BUSY, NO CARRIER etc.)
X0 or X		Smartmodem	Hayes Smartmodem 300 compatible result codes
X1			Usually adds connection speed to basic result codes (e.g. CONNECT 1200)
X2			Usually adds dial tone

		detection (preventing blind dial and sometimes ATO)
X3		Usually adds busy signal detection
X4		Usually adds both busy signal and dial tone detection
Z0 or Z	Reset	Reset modem to stored configuration (Z0, Z1 etc. for multiple profiles) (Same as &F (factory default) on modems with out NVRAM (non volatile memory)

The Extended Hayes Command Set:
(Ampersand Commands)

Command	- Description -	Comments
&B0 or &B	Retrain Parameters	Disable auto retrain function
&B1		Enable auto retrain function
&B2		Enable auto retrain, but disconnect if no line improvement over period dictated by S7
&C0 or &C	Carrier detect	signal always on
&C1		Indicates remote carrier (usual preferred default)
&D0 or &D	Data Terminal Ready (DTR)	Signal ignored (See your manual on this one!)
&D1		If DTR goes from On to Off the modem goes into command mode (some modems)
&D2		Some modems hang upon DTR On to Off transition. (Usual prefered default)
&D3		Hang up, reset modem and return to command mode upon DTR
&F0 or &F	Factory defaults	Generic Hayes-compatible defaults. This is usually a good thing to use in your init string, since the &F1-&F3 settings can vary among modems, and they may actually be the cause of connection problems. (Since you never

		know exactly what Brand X's &F2 really changes.
		On the other hand, it pays to try out the other options below; many people's problems can be solved by replacing a complicated init string with a simple &F2 or the like. However, if you're building an init string, it's best to start with a simple &F, and not use the "customized" form of defaults.
&F1		Factory defaults tailored to an IBM-PC compatible user
&F2		Factory defaults for a Mac w/software handshaking
&F3		Factory defaults for a Mac w/hardware handshaking
&G0 or &G	Guard tones	Disable guard tones
&K0 or &K	Local flow control	Disable local flow control
&K1		Enable RTS/CTS hardware local flow control
&K2		Enable XON/XOFF software local flow control
&K3		Enable RTS/CTS hardware local flow control
&K4		Enable XON/XOFF software local flow control
&L0 or &L	Dial mode	Select dial-up mode
&M0 or &M	Error Control mode	Select asynchronous non-EC mode (same as &Q0)
&P0 or &P	Pulse dialing ratio	U.S./Canada pulse dialing 39% make/ 61% break ratio
&P1		U.K./Hong Kong pulse dialing 33% make/ 67% break ratio
&Q0 or &Q	Error Control mode	Asynchronous non-EC more. No data buffering. ASB disabled.
&Q5		Select V.42 EC operation (requires flow control)
&Q6		Asynchronous mode with ASB (requires flow control)
&Q8		Select alternate EC protocol (MNP)
&Q9		Conditional data

Command	- Description -	Comments
		compression: V.42bis = yes, MNP5 = no.
&S0 or &S	DSR Action Select	Always on (default)
&S1		Follows EIA specification (Active following carrier tone, and until carrier is lost.)
&T0 or &T	Self test	Model specific self tests on some modems
&U0 or &U	Trellis code modulation	Enable V.32 TCM
&U1		Disable V.32 TCM
&V0 or &V	View active	(And often stored) configuration profile settings (or ATI4)
&W0 or &W	Store profile	In NVRAM (&W0, &W1 etc. for multiple profiles) Some settings cannot be stored. These often don't show on &V or ATI4
&Y0 or &Y	Select Configuration Loaded at power-up	Load profile 0 (default)
&Y1		Load profile 1
&Zn=x	Soft reset and Load Stored profile #n	Note: All items after the &Z on the command line are ignored

Backslash & Percent Commands:

Command	- Description -	Comments
\A0 or \A	Character maximum MNP block size	64 character maximum
\A1		128 character maximum
\A2		192 character maximum
\A3		256 character maximum
%C0 or %C	Data Compression Enable/Disable	Disabled
%C1		MNP5 Enabled
%C2		V.42bis (BTLZ) Enabled
%C3		MNP5 & V.42bis (BTLZ) Enabled
%D0 or %D	Data compression	512 BLTZ dictionary size
%D1		1024 BLTZ dictionary size
%D2		2048 BLTZ dictionary size
%D3		4096 BLTZ dictionary size
%E0 or %E	Escape method	ESCAPE DISABLED
%E1		+++AT method (default)
%E2		<BREAK>AT method
%E3		BOTH methods enabled

%E4		Disable "OK" to +++
%E5		Enable "OK" to +++
\J0 or \J	DTE Auto Rate Adjustment	Disabled
J1		DTE rate is adjusted to match carrier rate.
\N0 or \N	Connection type	Normal connection (see below for definitions)
\N1		Direction connection
\N2		MNP Auto-reliable connection
\N3		Auto-reliable connection
\N4		V.42bis reliable link with phase detection
\N5		V.42bis auto-reliable link with phase detection
\N6		V.42 reliable link with phase detection
\N7		V.42 auto-reliable link with phase detection

Note: A *direct connection* is a simple straight-though connection without any error correction or data compression. In this case, the computer-to-modem and modem-to-modem speeds must be identical.

A *normal* connection uses flow control (either software or hardware) to buffer the data being sent or received, so that the modem can transmit data at a different rate than the computer is actually sending or receiving it. For example, a computer may send actual data at 57kbps, but using compression, the modem only actually sends 28.8kbps. This is the mode use by most modems.

A *reliable* connection is a type of normal connection; if, for some reason, data compression or error correction cannot be established or maintained, the connection will hang up. (In essence, such a modem ensures that all connections are reliable, for it will hang up if the connection isn't.)

Likewise, an *auto-reliable* connection is virtually the same, except that the modem will try to renegotiate the connection in order to establish a reliable connection. Again, this is the mode that most modems use.

S-Registers:

Register	Range	Default	Function
S0	0-255 rings	1-2	Answer on ring number Don't answer if 0
S1	0-255 rings	0	If S0>0 this register counts incoming rings
S2	0-127 ASCII	43 +	Escape to command

			mode character
S2	>127		no ESC
S3	0-127 ASCII	13 CR	Carriage return character
S4	0-127 ASCII	10 LF	Line feed character
S5	0-32,127 ASCII	8 BS	Backspace character
S6	2-255 seconds	2	Dial tone wait time (blind dialing, see Xn)
S7	1-255 seconds	30-60	Wait time for remote carrier
S8	0-255 seconds	2	Comma pause time used in dialing
S9	1-255 1/10 sec.	6	Carrier detect time required for recognition
S10	1-255 1/10 sec.	7-14	Time between loss of carrier and hangup
S11	50-255 millisec.	70-95	Duration and spacing of tones when tone dialing
S12	0-255 1/50 sec.	50	Guard time for pause around +++ command sequence
S36	Fallback options when error correction link fails: 0 - Disconnect 1 - Establish Direct connection 3 - Establish Normal connection 4 - Establish a MNP connection if possible, else Disconnect 5 - Establish a MNP connection if possible, else Direct connection 7 - Establish a MNP connection if possible, else Normal connection	7	Negotiation Failure Treatment
S37	1 = 300 bps 5 = 1200 bps 6 = 2400 bps 7 = 1200/75 bps (v.23	0	Negotiation Speed (Initial handshake)

	mode) 8 = 4800 bps 9 = 9600 bps 10 = 12000 bps 11 = 14400 bps 12 = 7200 bps		

Many modems have dozens, even hundreds, of S registers, but only the first dozen or so are fairly standard. They are changed with a command like ATSn=N, and examined with ATSn? (e.g. "AT S10=70 S1?" would tell the modem not to hang up for seven seconds should it not hear the answering modem, and return the number of times the phone last rang.)