

## Advanced Programming

This section provides additional commands for the more advanced modem user. Included is a description of registers and how to use them in the command line.

Some of the commands have parameters. The parameter value, usually 0, 1, or 2, follows the command. When you do not select a command parameter, the modem assumes a value of 0. For example, command echo is disabled when you use the E command to select a parameter value of 0. Command echo is enabled when you designate a parameter value of 1. E used alone is the same as E0.

COMMAND	PARAMETERS	FUNCTION
AT	None	Attention.
A/	None	Repeat preceding command sequence.
A	None	Answer call immediately.
B	0 1 (Default)	Selects CCITT V.22 operation when communicating at 1200 bps. Selects Bell 212A at 1200 bps.
C	0 1 (Default)	Not permitted; returns ERROR result code. Normal transmit carrier switching (preset).
D	n L P T R S W , ; @ ! ^	Dial telephone number (n). Dial the last string that was dialed. Pulse dial mode. Touch Tone mode. Reverse to answer mode after dialing. Dial stored number. Wait for dial tone before dialing. Pause (2 seconds). Return to command state after dialing. Wait for quiet answer (5 seconds of silence after detecting ringback). Flash 0.5 second on-hook. Turn on call tone.
E	0 1 (Default)	Commands are not echoed. Commands are echoed.
F	0 1 (Default)	Error. On-line state character echo disabled.
H	0 1 (Default)	On hook (hang-up). go off hook.
I	0 (Default) 1 2 3	Request product identification code. Performs checksum on firmware ROM; returns checksum. Performs checksum on firmware ROM; returns OK or ERROR. Reports firmware revision number.

L	0 (Default) 1 2 (Default) 3	Low speaker volume. Low speaker volume. Medium speaker volume. High speaker volume.
M	0 1 (Default) 2 3	Speaker off. Speaker on until carrier detected. Speaker always on. Speaker on until carrier detected, except during dialing.
O	0 1 (Default)	Return to on-line state. Return to on-line state and retrain.
Q	0 (Default) 1	Modem returns result codes. Modem does not return result codes.
V	0 1	Numeric result codes. Word result codes.
X	0 1 2 3 4 (Default)	Basic status set/blind dialing. Extended status set/blind dialing. Extended status set/dial tone detection. Extended status set/blind dialing/Busy tone detection. Extended status set/dial tone & busy tone detection.
Y	0 (Default) 1	Long space disconnect disabled. Long space disconnect enabled.
Z	0 (Default) 1	Recall stored profile 0. Recall stored profile 1.

#### Bn BELL/CCITT MODE SELECT

B0 CCITT V.22 operation at 1200 bps

B1 BELL 212A operation at 1200 bps (default)

Most 1200 bps modems in the United States operate using the BELL 212A specification. To communicate with a 1200 bps modem conforming to the international CCITT V.22 standard, enter B0 before dialing.

#### En ECHO BACK CHARACTERS IN COMMAND MODE

E0 No characters echoes back to the computer in command mode.

E1 Echoes back characters to the computer typed in command mode (default)

This command controls the echoing back of commands to your computer. In most personal computer applications, the default E1 is used so that you can see what you just typed. When running in half-duplex mode, you should use the E0 command to avoid having two copies of each character displayed on the screen.

Hn Activate switchhook

H0 go on hook (hang up (default)

H1 go off hook (pick up the phone)

This command make the modem pick up or hang up the phone in the same way as a telephone handset is picked up to answer a call or placed back on the switchhook to terminate a call. You can use H0 to terminate a call. You generally do not need to use the H1 command, since the modem automatically answers an incoming call if you have not set the S0 to 0.

In Request product code and ROM checksum

I0 Display product code

I1 Display ROM checksum

I2 Display ROM checksum as OK or ERROR

You use this command as a diagnostic tool when troubleshooting.

Ln SPEAKER VOLUME

L0 Low speaker volume

L1 Low speaker volume

L2 Medium speaker volume

L3 High speaker volume

This command controls the volume of your modem's speaker.

Mn SPEAKER ON/OFF COMMANDS

M0 Speaker always off

M1 Speaker on until carrier detected (default)

M2 Speaker always on

M3 Disables speaker while dialing and when receiving carrier

You use the M commands to control the speaker in your computer when you use the modem. M0 turns the speaker off at all times. M1 lets you hear dial, ring, and connection. The M2 command turns on the speaker at all times, which might be useful in debugging transmission problems. M3 lets you monitor just the ring and connection process.

ON PLACE MODEM IN THE ON-LINE DATA MODE

O0 Modem returns to on-line state.

O1 Modem returns to on-line state and initiates an equalizer retrain sequence.

When connected to another modem, you might need to go back into command mode (using +++) to give the modem a command. After you complete the commands, an ATO or ATO1 command returns the modem to the on-line condition.

NOTE: Retraining lets two 2400 BPS modems resynchronize themselves. The modems accomplish this by outputting a signal sequence which consists of a 0011 pattern. Depending on the parity/data bit configuration you are using at the time, the retrain patterns are displayed as question marks or up arrows.

Qn ENABLE/DISABLE RESULT CODES

Q0 Result codes sent (default)

Q1 No result codes sent

Your use the Q commands to enable or disable result codes (such as OK, CONNECT 2400, ERROR, and so on). In the Q0 default mode the modem returns result codes. In Q1 modes, the modem does not send result codes.

Vn SETS RESULT CODE FORMAT

V0 Selects numeric result codes

V1 Selects verbal result codes (default)

See "Command Results" for a list of command result codes.

Xn Select extended result code set

By using the X commands, you can enable and disable the following modem functions: no dialtone detect, busy detect, blind dial capability, and send only the CONNECT message. Refer to the table below.

TABLE 8.X COMMAND FUNCTIONS

FUNCTION	X0	X1	X2	X3	X4
Busy detected	No	No	No	Yes	Yes
Dial tone detected	No	No	Yes	No	Yes
Connect Message only	Yes	No	No	No	No
Blind dial enabled	Yes	No	No	Yes	No

The default is X4.

Sending only the CONNECT message complies with Hayes Smart-Modem 300 compatibility. When you select X1 through X4 the modem returns the full range of connect messages.

When blind dialing, the modem dials regardless of the presence or absence of a dial tone. The modem waits the number of seconds determined by Register S6, which has a default of 2 seconds.

Yn LONG SPACE DISCONNECTED OPTION

Y0 Long space Disconnect Disabled (Default)

Y1 Long Space Disconnect Enabled

This option affects how your modem treats breaks in the carrier signal. If you enable this option, then your modem disconnects from the phone line whenever it loses the carrier.

Zn Recall Stored Profile

Z0 Recall stored profile 0 (Default)

Z1 Recall stored profile 1

Zn makes the modem load modem settings you stored using the &W0 command. You must wait at least 2 seconds after you send this command before you send another command. Your modem ignores any commands you place after the Z command on the command line.

COMMAND	PARAMETERS	FUNCTION
&C	0 (Default) 1	DCD (Data Carrier Detect) always on. DCD on indicates presence of data carrier.
&D	0 (Default) 1 2 3	Modem ignores DTR (Data Terminal Ready). Modem assumes command mode when on-to-off transition is detected on DTR. When on-line with a host system, modem goes on-hook and assumes command mode upon detecting an on-to-off transition on DTR. Modem goes through an initialization sequence upon detecting an on-to-off transition to DTR.
&F	None	Resets the modem to the factory default values for all S registers and commands.
&G	0 (Default) 1 2	No guard tone. 550 Hz guard tone. 1800 Hz guard tone.
&J	0 (Default)	Suitable for RJ-11, RJ-41S, or RJ-45S. type phone jacks. The auxiliary relay is never operated.
&L	0 (Default) 1	Dial-up line. Leased Line (not supported) Modem will respond with OK.
&M	0 (Default) 1 2 3	Selects asynchronous transmission. Reserved. Reserved. Reserved.
&P	0 (Default) 1	Pulse dial make:break ratio 39:61 (USA) Pulse dial make:break ratio 33:67 (UK/HK).
&Q	0 (Default) 1 2 3	Idle: Normal; On-line: Asynchronous. Reserved. Reserved. Reserved.
&R	0 1 (Default)	Sets the CTS in response to RTS Allows the modem to ignore RTS
&S	0 (Default) 1	DSR (Data Set Ready) always on. DSR operates in accordance with EIA RS-232 specifications.

&T		See "Modem Test Commands."
&V		Display active and stored profiles.
&W	0 (Default) 1	Store active profile as profile 0. Store active profile as profile 1.
&X	0 (Default) 1 2	Selects internal timing. Reserved. Reserved.
&Y	0 (Default) 1	Select profile 0 on power up. Select profile 1 on power up.
&Z		Stored telephone number in location 0 (default) 1, 2, or 3. See details for example.

&Cn DATA CARRIER DETECT (DCD) CONTROL

&C0 DCD always on (default).

&C1 DCD follows state of data carrier.

When n=0, the modem ignores the hardware signal, and operates as through a carrier is always present.

When n=1, the modem operates according to the actual hardware DCD signal.

&Dn DATA TERMINAL READY (DTR) CONTROL

&D0 The modem ignores DTR (default).

&D1 The modem goes into command mode if an on-to-off transition is detected on DTR.

&D2 When on line with a host system, the modem goes on hook and assumes command mode upon detecting an on-to-off transition on DTR. Auto answer does not function when DTR is off (low).

&D3 An on-to-off transition on DTR causes the modem to go through an initialization sequence. Default values for all commands and registers are reinstated.

The modem ignores any DTR transition that lasts for less than the value contained in Register S25. The default is one second.

&F RESTORE DEFAULT CONFIGURATION

The &F command restores the factory default values to all registers and commands.

&Gn GUARD TONE OPTION

&G0 No guard tone (default).

&G1 550 Hz guard tone.

&G2 1800 Hz guard tone.

This command controls the guard tone when your modem is in a CCITT mode. The modem never sends a tone in Bell modes.

&Jn TELEPHONE JACK SELECTION

&J0 Suitable for an RJ-11, RJ-41S, or RJ-45S type phone jack. The auxiliary relay is never operated (default).

&J1 Suitable for an RJ-12, or RJ-13 type phone jack. The A lead is connected to the A1 lead while the modem is off hook.

This command is only included for compatibility and performs no function except to load the S-register.

&Ln LEASED/DIALUP LINE SELECTION

&L0 Dial-up line (default).

&L1 Leased line (not supported).

This command controls the selection of leased line or dial-up line. This modem supports only a single line. However, if &L1 is selected, the modem will respond with OK.

&Mn COMMUNICATIONS MODE

We provided this command for compatibility with earlier versions of the command set. Refer to the &Q command.

&Pn PULSE DIAL MAKE/BREAK RATIO SELECT

&P0 U.S. Setting, 39% make/61% break (default).

&P1 U.K./Hong Kong setting, 33% make/67% break.

This command determines the ration of off hook (make) to on hook (break) intervals when pulse dialing.

&Qn COMMUNICATIONS MODE OPTION

	IDLE STATE	ON-LINE STATE
&Q0	Normal	Asynchronous (default)
&Q1	Normal	Reserved
&Q2	Dial when DTR high; Hang up when DTR low	Reserved
&Q3	Talk/Data when DTR high or low.	Reserved

&Rn RTS (REQUEST TO SEND)/CTS (CLEAR TO SEND) OPTIONS

&R0 Sets the CD=TS in response to RTS. Modem responds with OK.

&R1 Allows the modem to ignore RTS. The modem turns on RTW when it is on-line and ready to received synchronous data. CTS remains on until the modem hangs up. this mode would not be used if half-duplex operation is intended. CTS is always on in the asynchronous command state. (default)

&Sn DATA SET READY (DSR) CONTROL

&S0 DSR always on (default)

&S1 DSR is in accordance w/EIA RS-232C specifications

As soon as your modem detects a carrier signal from the other modem, DSR is asserted. As soon s the carrier is confirmed as valid, DCD (carrier detect) is asserted (high). Both are de-asserted (low) at the same time when the connection is broken.

NOTE: It is possible to assert DSR, but never establish DCD, resulting in a failed connection.

&T MODEM TEST COMMANDS

See the "Modem Test Commands" chapter for complete information about this command.

&V DISPLAY ACTIVE AND STORED PROFILES

The &V command causes the modem to display the active and stored profiles (commands and register settings) and stored phone numbers.

&W STORE PROFILES

&W0 Store active profile as user profile 0

&W1 Store active profile as user profile 1

The &W command writes the storable parameters of the active configuration to volatile memory. the current values of the following commands and registers are stored:

COMMANDS: Bn, Cn, En, Ln, Mn, P or T, Qn, Vn, Yn, Xn, & Cn, &Dn, & Gn, &Jn, &Mn, &Pn, &Qn, &Rn, &Sn, &T4 or &T5, and &Xn

REGISTERS: S0, S14, S18, S21, S22, S23, and S26

&xN CLOCK SOURCE SELECTION

&x0 Selects internal timing. The modem generates the transmit clock signal (default)

&X1 Reserved

&X2 Reserved

This command selects the source of the synchronous transmit clock for the modem during synchronous operation.

In asynchronous mode, the transmit and receive clocks are turned off. In



synchronous mode, the clocks are turned on with the frequency 2400 Hz or 1200 Hz corresponding to the speed that is selected for modem operation.

&Yn SELECT STORED PROFILE ON POWER UP

&Y0 Use user profile 0 on power up.

&Y1 Use user profile 1 on power up.

The &Y command selects which stored profile is used at modem power up or a hard reset. The selected &Y command survives a power outage.

&Zn=x STORE TELEPHONE NUMBER

&Z0=x Store telephone number (x) in telephone memory 0.

&Z1=x Store telephone number (x) in telephone memory 1.

&Z2=x Store telephone number (x) in telephone memory 2.

&Z3=x Store telephone number (x) in telephone memory 3.

The &Z command lets you store up to four telephone numbers for later autodialing using the DS command. For example, to store 817-555-1234 in the telephone memory 0, type:

AT&Z0-8175551234ENTER

(smc-12/14/93)