Do You Know Your Modem’s AT?

By Sunil Hazari

Telecommunication technology has made it possible to easily exchange data over phone lines. The basic components needed for networking two computers are: a source computer, a destination computer, telephone lines, communication software and a modem at each end.

A modem is used to connect a computer to another mainframe or another microcomputer. If two microcomputers are in close proximity, a “null modem” cable which connects between the serial ports of the computers may be used. The serial port may use a 25 pin connector (IBM PC and compatible) or a 8 pin-Mini DIN plug (Mac Plus, SE, II, IIx, IIcx). In general, if two computers are separated by a distance greater than 100 feet, it is advisable to use a modem.

The basic function of a modem at one end is to take a digital signal and modulate it to an analog signal. At the other end, another modem takes this analog signal and demodulates it back to a digital signal thus making it possible for the two computers to “talk” to each other.

The speed at which a modem communicates is expressed in terms of Baud Rate. Although common baud rates used today are 1200 and 2400 baud, it is possible to have baud rates as high as 19,200 baud.

Modems may be classified as (i) Internal, or (ii) External. As the name suggests, an internal modem fits in a slot inside the computer whereas an external modem may be connected to the telephone instrument and placed beside the computer. External modems have the advantage of having status indicators which can be used for troubleshooting and/or monitoring the operations of the modem. Display lights found on the front panel of most modems are:

- **AA:** Modem is set to answer incoming calls.
- **DSR:** Indicates modem is ON and ready to operate.
- **DTR:** Indicates computer is ready and connected to the modem.
- **HS:** The modem is operating at its maximum speed.
- **RI:** Indicates that the modem is receiving an incoming ring signal.
- **TX:** Modem is transmitting data.
- **RX:** Modem is receiving data.

Some modems also provide additional features like error detection and correction, data compression, ability to store numbers, synchronous/asynchronous operation, auto-dialing, battery back-up, automatic log-on instructions, and password protection.

Although “Hayes compatible” modems have been the de facto standard in the industry, there are other manufacturers who deviate from the Hayes command set by providing their own command set. Modem parameters are controlled either by changing DIP switches inside the modem or by issuing commands from the keyboard. User friendly communication software has made it possible to bypass the command set by providing windows and menus, but there are times when you might find it necessary to change parameters of the modem by using commands. Since Hayes compatible modems are the most commonly used modems, the following is a description and list of Hayes commands which may be used to set active configuration.

The Hayes compatible modems always use the attention (AT) command prefix to alert the modem. During the “command mode” the modem accepts and acts on commands provided from the keyboard. Once a connection is made to another computer, the modem changes to an “on-line state.” In the command mode, all commands (except the A/ and +++) to the modem are preceded by AT and end with a carriage return. Most commands have a single letter or numerical value but multiple commands can also be used provided the total number of characters including the AT prefix does not exceed sixty characters. The following commands are entered as ATxx followed by a carriage return.

- **+++** (Escape)
- **A/** (Again)
- **A** (Answer)

Causes the modem to go off line and return to the command state. Does not use the AT prefix or a carriage return.

Repeats the last command.

This command does not require a AT prefix or a carriage return.

Changes the mode from voice to data and puts the modem in the answer mode.

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**D**
Dial

Sends dialing instructions to the modem. This command may be followed by the phone number or special characters which modify the dialing procedure.

. - pause
; - return to command state
P - pulse dial
T - tone dial.

For example, the command ATDT9,555-1212 instructs the modem to use the touch-tone system to dial 9 (for an outside line), pause and then dial the phone number 555-1212. The modem ignores characters like hyphens and spaces.

**E**
Echo

Controls the display on the screen.

ATE or ATE0 does not show keystrokes.

ATE1 displays keystrokes.

ATH0 or ATH terminates the call.

ATH1 takes the phone off the hook.

If the modem is equipped with a speaker, the ATMx command can be used to control its operation.

ATM or ATM0 - Always turns the speaker off.

ATM1 - Turns the speaker off once the connection is made.

**H**
Hook

Controls the display on the screen.

ATE or ATE0 does not show keystrokes.

ATE1 displays keystrokes.

ATH0 or ATH terminates the call.

ATH1 takes the phone off the hook.

If the modem is equipped with a speaker, the ATMx command can be used to control its operation.

ATM or ATM0 - Always turns the speaker off.

ATM1 - Turns the speaker off once the connection is made.

**M**
Monitor Speaker

Controls the display on the screen.

ATE or ATE0 does not show keystrokes.

ATE1 displays keystrokes.

ATH0 or ATH terminates the call.

ATH1 takes the phone off the hook.

If the modem is equipped with a speaker, the ATMx command can be used to control its operation.

ATM or ATM0 - Always turns the speaker off.

ATM1 - Turns the speaker off once the connection is made.

**Q**
Quiet

Controls the display on the screen.

ATE or ATE0 does not show keystrokes.

ATE1 displays keystrokes.

ATH0 or ATH terminates the call.

ATH1 takes the phone off the hook.

If the modem is equipped with a speaker, the ATMx command can be used to control its operation.

ATM or ATM0 - Always turns the speaker off.

ATM1 - Turns the speaker off once the connection is made.

**V**
Verbose

Displays messages on the screen in the verbal or terse mode.

ATV or ATV0 - Display messages in the form of codes.

ATV1 - Display verbal messages.

Depending on the ATVx command, the modem displays the following codes or messages on the terminal.

ATX or ATX0 - Enable result codes 0-4
ATX1 - Enable result codes 0-5 and 10
ATX2 - Enable result codes 0-6 and 10 and activate redial
ATX3 - Enable result codes 0-5, 7, 10
ATX4 - Enable all result codes 0-10.

**X**
Extend Result Code

When the modem executes a command, the following result codes or messages are displayed on the terminal by the modem depending on the ATVx and ATXx setting.

<table>
<thead>
<tr>
<th>Code</th>
<th>Message</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OK</td>
<td>Modem status is OK and command can be executed.</td>
</tr>
<tr>
<td>2</td>
<td>Connect</td>
<td>Modem has detected a carrier signal and is about to go on-line.</td>
</tr>
<tr>
<td>3</td>
<td>Ring</td>
<td>An incoming call.</td>
</tr>
<tr>
<td>4</td>
<td>Error</td>
<td>Invalid command, or line has more than six characters.</td>
</tr>
<tr>
<td>5</td>
<td>Connect 1200</td>
<td>Connection made at 1200 Baud.</td>
</tr>
<tr>
<td>6</td>
<td>No dial tone</td>
<td>Telephone dial tone not detected by modem.</td>
</tr>
<tr>
<td>7</td>
<td>Busy</td>
<td>Line at other end is busy.</td>
</tr>
<tr>
<td>8</td>
<td>No answer</td>
<td>Device at other end did not provide a signal.</td>
</tr>
<tr>
<td>9</td>
<td>Connect 2400</td>
<td>Connection made at 2400 Baud.</td>
</tr>
<tr>
<td>11</td>
<td>Ringing</td>
<td>Line at other end is ringing.</td>
</tr>
<tr>
<td>12</td>
<td>Voice Detected</td>
<td>The modem detects a voice instead of a computer tone.</td>
</tr>
</tbody>
</table>

**Z**
Zap (Reset)

Causes the modem to reset to default setting from non volatile memory and perform a self-test.

&D

DTR

Set DTR state.

AT&D or AT&D0 forces DTR ON.

AT&D1 - Puts modem in command state when DTR goes low.

&F

Factory setting

Load the factory setting from ROM into the active configuration area.

&W

Write Setting

Write current setting of S registers to non volatile memory.

S

Registers

The S registers are a set of locations used to store values which determine the timing of certain actions. The syntax is in the form ATSn=x where n is the register number and x is the value to be stored. The functions of registers S0-S16 are explained below.