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**WiModem<sup>TM</sup>**

Internet modem for CBM computers

***Installation & Usage Manual***

**Firmware v6.20**

Manual v3.6

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## **Introduction**

Thank you for purchasing the WiModem! This is device will let you connect your Commodore computer to the internet using standard terminal software.

Please join our support forum at [www.cbmstuff.com/forum](http://www.cbmstuff.com/forum).

## **Installation Requirements**

The WiModem simply plugs into your computer's USER PORT. If you do not know where your computer's user port is located, please consult the manual that came with your computer. **NOTE: POWER TO THE COMPUTER MUST BE OFF WHILE INSERTING OR REMOVING THE WiMODEM!**

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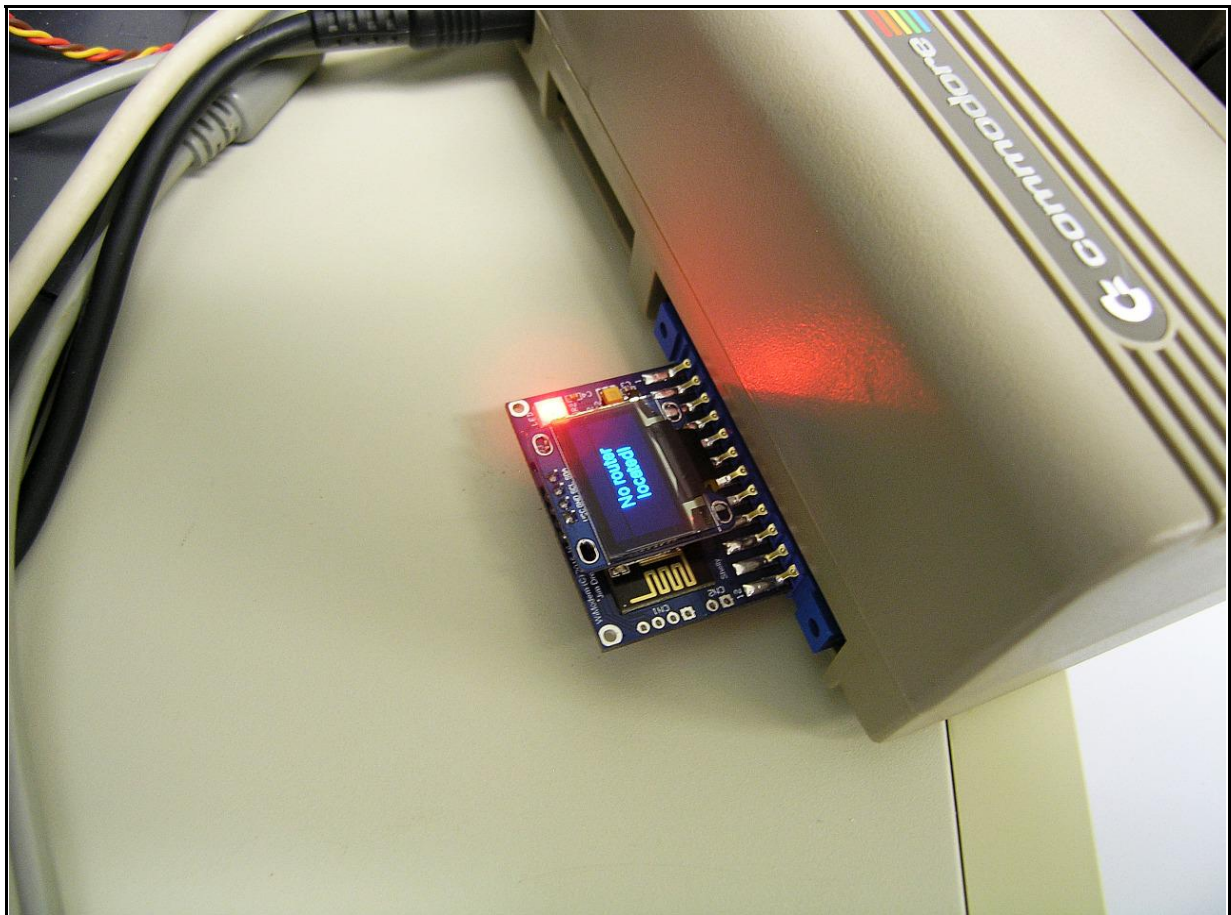
## **Legal Information**

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## SECTION 1 – INSTALLATION

The WiModem can be used with a VIC-20, C64, C128, C128DCR, SX-64, or Plus/4 computer. All of these computers have standard USER PORTs.

With the computer's power turned off, plug the WiModem into the USER PORT with the components facing upwards. The white LED should be visible. See Figure 1 for an example of the WiModem plugged into a C64.



**Figure 1 – WiModem plugged into a Commodore 64**

## **SECTION 2 – USAGE**

### **1. Introduction**

The WiModem emulates a standard Hayes compatible modem. All of the standard (and most of the extended) AT commands are fully emulated. The default baud rate for the WiModem is 300 baud. The default can be changed.

Load a terminal program, and set the terminal program's baud rate to 300 baud. You should set your terminal program to use standard ASCII during the initial setup of the WiModem. As a test to make sure the WiModem and terminal program are communicating, enter the following into your terminal program (note: {RETURN} means press the RETURN key – you do not enter those characters):

```
ATI{RETURN}
```

If the baud rate is 300 baud, and the terminal type is ASCII mode you should now see information about the WiModem, ie:

```
WiModem – (C)2015-22 By Jim Drew
```

```
Firmware:v5.00 -11/07/22
```

```
Baud:300
```

```
Outgoing Port:1541
```

```
Incoming Port: 6400
```

```
SSID:No Router!
```

```
MAC:xx:xx:xx:xx:xx:xx
```

```
IP:0.0.0.0
```

```
FCC ID: 2AHMR-ESP12F
```

The MAC address is the unique ID of the WiFi module used on the WiModem, and that number will be different from what you see above. Notice that because there is no Internet connection at this point the SSID shows as “No Router!”, and the IP address is 0.0.0.0.

The WiModem has a status LED that can be multiple colors depending on the what the status is alerting you to. The FAQ section of the manual lists the LED colors and their meaning.

## 2. Setting up the Internet Connection

The biggest difference between a standard modem and the WiModem is the fact that we are not using a telephone line to communicate with the outside world. Instead, we are using a high-speed WiFi connection. The WiModem uses your local WiFi router as the bridge to communicate with the Internet. The WiModem needs to know about the router's SSID and encryption type (if encryption is used). There are four ways to setup the WiModem connection with your router:

1. Using the WPS button on your router.
2. Using a mobile device with AT\*WIFI.
3. Manually entering the SSID (router name) and passphrase (password).
4. Use a network scan (AT\*N), select the network number and add a passphrase (if necessary).

The easiest way to setup your router connection is by using the WPS setup. To do this, simply press the WPS button on your router and then enter the following in your terminal program:

```
AT*WPS{RETURN}
```

The WiModem will respond with WPS ACTIVATED, and then the WiModem's status LED will turn white. For the next 30 seconds the WiModem will attempt a WPS connection with your router. Note: you should always press the WPS button on your router **before** issuing the WPS command via your terminal program. Once the WPS has completed (or has timed out) you will see, "Looking for router..". If the WPS setup was successful you will see, "Connected to xxxxx" (where xxxxx is the name of your router). If the WPS was not successful you will see, "No router located!".

The second way to setup your router connection is by enabling a WiFi portal. This can be done by entering the following your terminal program:

```
AT*WIFI{RETURN}
```

This enables a WiFi portal so that a mobile device (phone, tablet, etc.) can then be used to setup the WiModem to router connection. After the portal is enabled go to your mobile device's WiFi setup and look for "WiModem" in the list of WiFi devices and select it. Follow the on-screen instructions.

The third way to setup your router connection is to manually enter the router's name and passphrase. Note: if your router is not passphrase protected, you can omit the passphrase. **The name and passphrase are case sensitive** (which is why it is always a good idea to use an ASCII terminal mode when doing the setup). When manually entering a SSID, the router name can not contain any space characters (see option 3 if your router name has space characters in it). If you don't know the name of your router you can do a scan for all available networks by entering the following in your terminal program:

```
AT*N{RETURN}
```

After a few seconds, a list of all of the available routers will be displayed, along with the signal strength and encryption type. For example you might see something that looks like this:

Scanning available networks:

Networks available: 2

```
0 - NETGEAR24 (-51 dBm), WPA2
1 - NETGEAR24-Guest (-52 dBm), Auto
```

To manually setup the SSID you would enter the following into your terminal program:

```
AT*SSID[name][,passphrase]{RETURN}
```

Using the above example, if you wanted to setup the WiModem to use the router with the name of NETGEAR24 (which has a passphrase of WiModem1) you would enter the following into your terminal program:

```
AT*SSIDNETGEAR24,WiModem1{RETURN}
```

At this point you would see, "Looking for router..." and a few seconds later you would see, "Connected to NETGEAR24".

**NOTE: There is no space character between the last character of 'D' in 'SSID' and the first character of the router name!**

The last way to setup your WiModem for use with your router is by using the number from the network scan (AT\*N). Using the above example, if you wanted to connect to the second entry (NETGEAR24-Guest) you would enter the following:

```
AT*NS1[,passphrase]{RETURN}
```

This would select the second entry and attempt to find the router.

If your router can not be located, it may be too far away or too close to your WiModem, or something is blocking the signal between the router and WiModem (like a big block of metal – so keep hard drives and such away from the WiModem). You can use the AT\*N command to scan for available networks and see the signal strength of your router. The lower the dBm value, the stronger the signal is. Signal strengths with a value higher than -85dBm are considered marginal, and indicate something is blocking the signal between the WiModem and router.

Once the router and WiModem are connected together the status LED will turn yellow and you are now ready to surf the Internet! The SSID information is permanently stored in the WiModem. So, the next time you connect power to your WiModem the router will automatically be connected.

The WiModem is shipped with a default of 300 baud. As a quick check to see if the Internet connection is working you can try entering the following into your terminal program (set to 300 baud):

```
ATDT GOOGLE.COM:80{RETURN}
```

Note: {RETURN} throughout this manual means to press the **RETURN** key.

If the Internet is working you should see, "CONNECT" and the status LED will turn green. Congratulations! You have connected to Google's web server! To hang up the connection, press the "+" key 3 times in a row (within 1 second). You should see, "OK". Now enter the following to hang up the connection:

```
ATH{RETURN}
```

You will see another "OK" message and the connection is terminated.

### **3. Supported AT Commands**

The WiModem supports all of the standard Hayes commands, following the industry standard syntax. The WiModem also has numerous new commands. All commands will start with the first two characters being "AT", followed by the command itself. Below is a list of all supported commands. Note: commands that are labeled in **black** are standard Hayes compatible commands, and commands labeled in **blue** are WiModem specific commands. A command with [] indicates a value can be accepted. <> indicates an optional parameter. **Do not enter the actual "[ ]" or "<>" or {RETURN} characters in any example shown.**

After entering a new command value, there will be a response returned. If the command succeeds, then OK will be returned. Otherwise, ERROR will be return.

Some commands are set by using a value following the command and others require the use of an = character prior to the value. For example to set the carrier mode (ATC) to the value of 1 you would enter:

```
ATC1{RETURN}
```

Some commands require a = symbol to set an option.

To set the busy message to "go away" you would enter:

```
AT*BUSY=go away{RETURN}
```

To set the phone book entry for the first position you would enter:

```
AT&Z0=url_goes_here:1234{RETURN}
```

To view the value of a command, follow the command with a ?, ie:

```
ATC?{RETURN}
```

```
1
```

The response is 1 (because we set it to 1 in the above example).



AT\*BUSY?  
go away

The response is "go away" because that is what we set it in the above example).

There are some variations to the Hayes command set, so look at each command described below for the exact syntax.

When the WiModem is not connected to a server it is in COMMAND mode, where AT commands can be accepted. To enter COMMAND mode while connected to a server (ONLINE), press the '+' key three times in a row (+++) within 1 second. The LED will turn cyan in color, and the WiModem will then be in COMMAND mode. Use the ATO command to return to ONLINE mode.

## **AT COMMAND LIST**

### **AT** – Attention

Just entering AT{RETURN} by itself will result in an OK response.

### **ATA** – Answer incoming call

This command will answer the incoming connection when RING is being displayed. It is possible to use the S-code (S0) to enable auto-answering so the ATA command is not necessary. The default incoming port is 6400. The incoming port number can be set (see AT\*L below).

### **ATB[x]** – Get/Set communications Standard [0-5]

This command has no affect on the operation of the WiModem. It is supported for the completeness of Hayes command set. Default is 0.

### **ATC[x]** – Get/Set transmit Carrier Protocol [0-5]

This command has no affect on the operation of the WiModem. It is supported for the completeness of Hayes command set. Default is 0.

### **ATDS=[x]** – Dial stored phone book entry

This command will “dial” (connect) using the phone book entry [x], where 'x' is a value between 0 and 9 from the phone book. See AT&Z for information on using the phone book.

**ATD, ATDT, or ATDP** – Dial URL [name]<:port number>

ATDT is a hold over from the DT command meaning “Dial Tone”. There was also ATDP for pulse dialing. With the WiModem, ATD, ATDT, and ATDP all do the same thing, which is make a connection using a name and optionally a port, ie:

```
ATDT COMMODORESERVER.COM:1541
```

The name is the server you want to connect to, and the port number is the port to use for the connection. If no port number is included, the default port number will be used. The default port is set with the AT\*P command.

**ATE[x]** – Get/Set auto echo [0/1]

The auto echo command controls whether characters typed into the terminal are echoed back to the display while in COMMAND mode. Default is 1.

Like most AT commands, entering the command followed by a ? will return the current value, ie:

```
ATE?{RETURN}
1
```

This would indicate that the auto echo is enabled.

To set the auto echo you would enter ATE followed by either a 0 (off) or 1 (on), ie:

```
ATE0{RETURN}
```

This would disable the auto echo.

**ATH. ATH0** – Hang up connection

This command is used only while connected and in the COMMAND mode. Entering ATH will terminate the connection. ATH0 is also allowed to be fully compatible with the Hayes command set.

### **ATH1** – Connection is OFF HOOK

This command ignores all connection attempts being made to the WiModem. Optionally an "OFF HOOK" message can be sent to the device attempting to make a connection. See AT\*OFFHOOK for details.

This command can be used for a BBS to prevent answering connections during a down period, like for maintenance. ATH or ATH0 disables this function, allowing a connection to once again be made.

### **ATI** – Information

This command will display information about the WiModem. ATIO is also allowed to be fully compatible with the Hayes command set.

### **ATI1** – Detailed Information

This command will display information containing the status of various registers.

### **ATI2** – Information about CPU

This command will display information pertaining the CPU and flash memory.

### **ATI3** – Connection time information

This command will display information about the amount of time the WiModem has been powered up, the current connection duration, and the last connection duration.

### **ATI4** – Static IP setup information

This command will display information about the network mode, static IP address, gateway address, and subnet mask.

### **ATI5** – Caller log information

This command will display the date, time, and IP address of the last 20 incoming connections.

**ATL[x]** – Get/Set speaker volume level [0/1/2/3/4]

This command was used to set the speaker volume level with old dial-up modems. It doesn't do anything with the WiModem, but it is supported so that old terminal and BBS software will work without errors.

**ATM[x]** – Get/Set speaker mode [0/1/2/3/4]

This command was used to set the speaker mode with old dial-up modems. It doesn't do anything with the WiModem, but it is supported so that old terminal and BBS software will work without errors.

**ATN[x]** – Get/Set carrier negotiation [0/1/2/3/4/5]

This command was used to set the carrier negotiation type with old dial-up modems. It doesn't do anything with the WiModem, but it is supported so that old terminal and BBS software will work without errors.

**ATO** – Go online

This command will exit COMMAND mode and return to ONLINE mode. This command has no affect when OFFLINE and in COMMAND mode.

**ATQ[x]** – Get/Set quiet mode [0/1]

This command will change the quiet mode. When the quiet mode is 1 (on), no responses are returned when commands are entered. When the quiet mode is 0 (off), responses are shown. Default is 0.

## **ATS[x][=]** – Get/Set S-Registers

This command will change the current S-Register value. To see a particular S-Register value (such as S2) you would enter:

```
ATS2?{RETURN}
```

To set a S-Register value (such as S2 to 43) you would enter:

```
ATS2=43{RETURN}
```

S-Registers currently supported:

- S0 – Auto-answer rings (0 is default), 0 = auto-answer off
- S1 – Auto-answer ring count
- S2 – ESCape character (43 is default, '+' character)
- S3 – Carriage Return (CR) character (13 is default)
- S4 – Linefeed (LF) character (10 is default)
- S5 – Backspace (BS) character (8 is default)
- S6 – Time to wait before dialing (0 is default)
- S7 – Wait time before connection after dialing (0 is default)
- S8 – Duration of delay for comma (0 is default)
- S9 – Connection detect response time (0 is default)
- S10 – Delay between lost connection and hang-up (0 is default)
- S11 – DMTF tone duration (0 is default)
- S12 – ESCape guard time (50 is default)
- S30 – Inactivity timer (0 is default), 0 = OFF
- S32 – XON character (17 is default)
- S33 – XOFF character (19 is default)
- S37 – DCE speed (6 is default)
- S73 – Maximum connect time (0 is default), 0 = OFF

## **ATV[x]** – Get/Set verbose mode [0/1]

This command will change the verbose mode. When the verbose mode is 1 (on), responses are shown as descriptive ASCII text. When the verbose mode is 0 (off), responses are shown as numbers that represent the actual response. Default is 1.

**ATW[x]** – Get/Set negotiation progress messages [0/1/2]

This command was used to determine what progress messages were shown during carrier negotiation phase with old dial-up modems. It doesn't do anything with the WiModem, but it is supported so that old terminal and BBS software will work without errors.

**ATX[x]** – Get/Set extended response control [0/1]

This command turns on/off the extended responses. With the value set to 1, the response "CONNECT" will include the connection speed (ie CONNECT 9600 for 9600 baud). Default is 0.

**ATZ** – Reset settings

This command will reload the last stored settings. Note: The baud rate is not changed! ATZ0 is also allowed to be fully compatible with the Hayes command set.

**AT\*A[x]** – Get/Set autodial [0/1]

This command will disable or enable the Autodial feature. When this feature is enabled the first phone book entry will automatically be dialed on power up. 0 = Disabled, 1 = Enabled. Default is 0.

### **AT\*B[baud]<config>** – Get/Set baud rate [baud] and config

This command will set the baud rate. One of the valid baud rates shown below must be entered. An invalid baud rate will return an error. A valid baud rate will respond with "OK", and then change the actual baud rate. After the OK response you need to change the baud rate of your terminal software to match the entered baud rate.

It is also possible to set the serial configuration, which is the number of data bits, parity, and number of stop bits. Setting the config is optional.

For example, to set the baud rate to 1200 you would enter:

```
AT*B1200{RETURN}
```

To set the baud rate to 110 baud with 7 data bits, even parity, and 2 stop bits, you would enter:

```
AT*110,7E2{RETURN}
```

Possible baud rates are: 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200, and 230400. Default is 300.

Possible configuration settings are: 8N1, 8E1, 8O1, 8N2, 8E2, 8O2, 7N1, 7E1, 7O1, 7N2, 7E2, and 7O2. Default is 8N1.

### **AT\*BL[x]** – Get/Set buffer limit [limit]

This command will set the buffer limit used before CTS is asserted during hardware handshaking. Default is 1024, with a range of 64 to 8192.

### **AT\*BT[x]** – Get/Set byte threshold [size]

This command will set the byte threshold. The byte threshold is the maximum number of characters required in the transmit buffer before packet data is immediately sent over-air to the router. Default is 5, with a range of 1 to 50. This command works in conjunction with AT\*HO. When there are fewer than the number of byte threshold characters in the buffer, the HOLD OFF DELAY is used to determine when those bytes are sent.



**AT\*BUSY[=x]** – Get/Set BUSY message [message]

This command will set the message that is displayed to an incoming connection when there is already a connection established. The message is limited to 80 characters and can include space characters.

**AT\*C[x]** – Get/Set CTS polarity [0/1]

This command will change the CTS polarity. 0 = Normal, 1 = Inverted. Default is 0.

**AT\*CT[x]** – Get/Set connection timer [0/1]

This command will enable or disable the connection timer, which shows the current connection time on the OLED screen. 0 = Disabled, 1 = Enabled. Default is 1.

**AT\*D[x]** – Get/Set DCD polarity [0/1]

This command will change the DCD polarity. 0 = Normal, 1 = Inverted. Default is 1.

**AT\*FLIP** – Flip OLED screen orientation

Each time this command is received, the WiModem's OLED screen will be flipped top to bottom or bottom to top .

**AT\*GW[=gateway address]** – Get/Set gateway address

This command will set the gateway address, used by the router. This is necessary when setting the network to use a static IP address (see AT\*NET).

**AT\*HELP** – HELP menu

This command will display the list of available commands.

**AT\*HELP!** – Detailed HELP menu

This command will display the list of available commands along with the command's usage syntax.

**AT\*HO[x]** – Get/Set hold off delay[time in milliseconds]

This command will set the hold off delay. The hold off delay is the amount of time to wait before sending the data over-air to the router when there are fewer than the BYTE THRESHOLD number of bytes in the transmit buffer. Default is 25, with a range of 1 to 250. This command works in conjunction with AT\*HO. When there are fewer than the number of byte threshold characters in the buffer, the HOLD OFF DELAY is used to determine how long before those bytes are sent. See the AT\*BT command for more details.

**AT\*IP[=IP address]** – Get/Set static IP address

This command will set the static IP address used by the router. This is necessary when setting the network to use a static IP address (see AT\*NET).

**AT\*L[port number]** – Get/Set incoming (listening) port number

This command will change the port number that is used for incoming connections. Default is 6400.

**AT\*LED[x]** – Get/Set LED brightness [0-9]

This command will change the brightness of the LED. A value of 0 turns off the LED completely. Default is 5.

**AT\*MODE[x]** – Get/Set WiFi mode[0/1]

This command will change the WiFi mode of the WiModem232. A value of 0 is the normal operating mode. A value of 1 will power off the WiModem's WiFi module, reducing power consumption to a fraction of the normal current required. Saving (using AT&W ) with the value set to 1 will make the WiModem power up with the WiFi disabled. Powering off the WiFi module can eliminate any potential noise in the system due to a WiFi transmitter being in close proximity (such as when directly connected).

**AT\*N** – Scan for available networks

This command will show all of the networks (routers) that are within usable distance from the WiModem. The signal strength and encryption type is also shown.

**AT\*NET[=DHCP/STATIC]** – Get/Set network type

This command will set the network to either use a DHCP or static IP address connection to the router. You enter either DHCP or STATIC as the network type. You **must** set the static IP address, gateway address, and subnet mask prior to using the STATIC option.

**AT\*NS[number]<,passphrase>** – Setup router using network list

This command will change the router connection. The number (0-99) is the number shown in the list of networks when the AT\*N command is used. If your router uses an encryption you can also enter the passphrase (with a comma separating the number and passphrase).

### **AT\*NULLMODEM[x]** - Enable NULL modem mode [0/1]

This command puts the WiModem232 into NULL modem mode. It is required that you have TWO Wmodem232 boards or ONE WiModem232 and ONE C64 WiModem to use this feature. Putting the WiModem232 into NULL MODEM mode will let you use the dual setup as a NULL MODEM cable emulator. A value of 0 will enable the NULL MODEM in temporary mode. Rebooting the WiModem232 will return it to its normal operating mode as a WiFi modem. This is handy when you want to do high speed file transfers between two retro machines in a temporary setup. A value of 1 will enable the NULL MODEM in permanent mode. Power cycling the WiModem232 will not restore the normal operation. Instead, the WiModem232 will always boot up in NULL MODEM mode. Once the WiModem232 is in permanent NULL MODEM mode you can restore it to normal operating mode by shorting the two emergency reset jumpers on the bottom of WiModem232 board. Short the jumper pads until the WiModem232's LED changes to yellow and then to red. At that point the WiModem232 will then reboot itself after you remove the short from the jumper pads. Once rebooted, the WiModem232 will then be back to the normal WiFi operating mode. The permanent mode should be used in cases where a permanent solution is required, such as a serial printer, plotter, or other RS-232 device where there is no direct terminal access to be able to change the modem settings directly.

When powering up a Wimodem232 in NULL MODEM mode its LED will slowly strobe while it looks for a 2<sup>nd</sup> WiModem232. Once both WiModem232 boards are powered up and connected, the LED on each WiModem232 will turn green. At this point they are ready to use.

### **AT\*OFFHOOK[=x]** - Get/Set OFF HOOK message [message]

This command will set the message that is displayed to an incoming connection when ATH1 is used to make the WiModem ignore incoming connections. The message is limited to 80 characters and can include space characters.

### **AT\*P[port number]** - Get/Set default outgoing port number

This command will change the port number that is used when no port number is included with the ATDT command. Default is 1541.

**AT\*R[x]** – RTS polarity [0/1]

This command will change the RTS polarity. 0 = Normal, 1 = Inverted. Default is 0.

**AT\*REBOOT** – Reboot the WiModem

This command can be used to reboot the WiModem if ever necessary.

**AT\*SCAN** – Re-scan for last used router

This command can be used to re-scan for the last used router. This is handy in cases where the signal is blocked during power up.

**AT\*SLEEP[x]** – Get/Set sleep delay[0-59]

This command will set the amount of time that the OLED and LED will remain on when there is no serial activity. A value of 0 (default) will never change the OLED and LED. Otherwise the value will be the number of minutes before the OLED screen and LED are powered off when there is no serial activity. Any serial activity will restore the display and LED state.

**AT\*SSID[name]<,passphrase>** – Setup router connection

This command will change the router connection. The name is the name of the router to connect to. If your router uses an encryption you can also enter the passphrase (with a comma separating the name and passphrase). See example at the beginning of this manual.

**AT\*SUB[=subnet mask]** – Get/Set subnet mask address

This command will set the subnet mask address used by the router. This is necessary when setting the network to use a static IP address (see AT\*NET).

### **AT\*T[x]** – Get/Set translation mode [0/1]

This command will change the translation mode. 0 = none, 1 = TELNET. If you want to log into a telnet specific site you must first change this setting to 1. Other translation types will be added in the future. Default is 0.

### **AT\*TIME?** – Get UTC time stamp

This command will display the current time in UTC format. You can use the AT\*UTC command to change the UTC offset.

### **AT\*TS[x]** – Get/Set TELSTAR mode [0/1]

This command will change the TELSTAR mode. 0 = disabled, 1 = enabled. Enable this mode when accessing TELSTAR. This will allow the COMMAND mode to use either 0x5F and 0x0D as the CR character. Default is 0.

### **AT\*UPDATE** – Update firmware

This command updates the WiModem's firmware by contacting the CBMSTUFF.COM server, fetching the latest version, and then re-flashing itself. During a firmware update the status LED will be purple.

### **AT\*UTC[x]** – Get/Set UTC time offset [-11 to +12]

This command will change the UTC offset. You can enter the UTC offset for your time zone so that when you use the AT\*TIME function it will display your local time. This is also necessary for the IP logging. The UTC range is -11 to +12. Default is -7.

### **AT\*WPS** – Start WPS

This command will start a WPS session to make a secure connection with your router and automatically set the SSID and passphrase.

A WPS session will erase the last connection information if a failure occurred. During a WPS session the status LED will be white.

**AT&BC?** – Show all banned connection entries

You can ban the IP address of an incoming connection. This can prevent robo-callers from rendering your BBS useless! There is a maximum of 10 different IP addresses that you can ban, but you can ban entire octet range (0-255) as well. To list the banned connection entries you would enter:

```
AT&BC?{RETURN}
```

**AT&BC[x]?** – Show a specific banned connection entry

To see a particular banned connection entry (such as entry 3) you would enter:

```
AT&BC3?{RETURN}
```

Nothing is displayed when the banned connection entry has not been set.

**AT&BC[x]=<IP Address>** – Set banned connection entry

This command can set/change the banned connection entry (IP address) specified by [x]. The value of x can be 0 to 9. The IP address must consist of 4 octets separated by period (.) characters, such as 192.168.1.1 which is typical for your home router. You can use an asterisk (\*) character to represent an entire range (0-255) to ban for an octet. For example, 192.168.1.\* would ban every incoming connection that was from 192.168.1.0 to 192.168.1.255.

To erase a banned connection entry, you would enter no data after the = character:

```
AT&BC[x]={RETURN}
```

**AT&C[x]** – Get/Set DCD operating mode [0/1]

This command will change the DCD mode. 0 = always connected, 1 = DCD follows server connection. Default is 1.

### **AT&D[x]** – Get/Set DTR operating mode [0-3]

This command enables monitoring of the DTR line and will do different actions based on the setting:

0 - Status of DTR signal is ignored. Default mode.

1 - DTR signal is monitored. The modem enters command state after an on-to-off transition of DTR signal. If the connection is established, the ATO command returns to the on-line state.

2 - DTR signal is monitored. The modem hangs up and enters command state after an on-to-off transition of DTR signal.

3 - DTR signal is monitored. The modem hangs up and resets after an on-to-off transition of DTR signal.

### **AT&F** – Restore factory settings

This command will restore all of the settings to the factory defaults. The phone book and spoof number entries are not cleared with this command. Baud rate is reset to 300.

### **AT&FS** – Clear spoof number entries

This command clears all of the spoof number entries.

### **AT&FP** – Restore factory phone book

This command will restore all of the phone book entries to the factory defaults.

### **AT&G[x]** – Get/Set Guard Tone character [0-255]

This command has no affect on the operation of the WiModem. It is supported for the completeness of Hayes command set. Default is 0.



**AT&K[x]** – Get/Set hardware flow control mode [0/1/2/3]

This command will change the hardware handshaking mode. 0 = off, 1+ = on. Default is 0.

**AT&S[x]** – Get/Set DSR operating mode [0-2]

This command has no affect on the operation of the WiModem. It is supported for the completeness of Hayes command set. Default is 0.

**AT&SN?** – Show all spoof number entries

Spoofing a number is the ability to convert an incoming phone number into a url:port number.

A good example of why you would need to do this is for special programs like Q-Link that connected using their own custom program through a local phone number. Software like this required a phone number consisting of only numeric digits. You can connect to Q-Link today by spoofing the number.

To show all of the spoof entries you would enter:

```
AT&SN?{RETURN}
```

**AT&SN[x]?** – Show spoof number entry

To see a particular spoof entry (such as entry 3) you would enter:

```
AT&SN3?{RETURN}
```

Nothing is displayed when the spoof entry has not been set.

### **AT&SN[x]=** – Set spoof number entry

This command can change the spoof phone number entry specified by [x]. The value of x can be 0 to 9. To set the spoof entry, enter:

```
AT&SN[x]=phone number,url<:port number>{RETURN}
```

The port number is optional. If you do not include the port number then the default port number (set using the AT\*P command) will be used when connecting. To set entry 0 for Q-Link you would enter:

```
AT&SN0=5551212,Q-LINK.NET:5190 {RETURN}
```

### **AT&V, AT&V0** – View settings

This command will show all of the settings that are stored.

### **AT&V1** – View string settings

This command will show the settings of commands that use text strings.

### **AT&W** – Write settings permanently

This command will store the current settings permanently so that reboots will use the same settings. AT&W0 is also allowed to be fully compatible with the Hayes command set.

### **AT&Z?** – Show all phone book entries

The phone book is a great way to store your most favorite url's, making them easy to connect to by using the ATDS=x command. Of course the WiModem's "phone book" is really URL's, not phone numbers.

To show all of the phone book entries you would enter:

```
AT&Z?{RETURN}
```

**AT&Z[x]?** – Show phone book entry

To see a particular phone book entry (such as entry 3) you would enter:

```
AT&Z3?{RETURN}
```

Nothing is displayed if the phone book entry has not been set.

**AT&Z[x]=** – Set phone book entry

This command can change the phone book entry specified by [x]. The value of x can be 0 to 9. To set the phone book entry, enter:

```
AT&Z[x]=name<:port number>{RETURN}
```

The port number is optional. If you do not include the port number then the default port number (set using the AT\*P command) will be used when connecting. To set entry 3 to COMMODORESERVER.COM with a port of 1541 you would enter:

```
AT&Z3=COMMODORESERVER.COM:1541{RETURN}
```

## SECTION 3 – TROUBLE SHOOTING

Problem: The WiModem won't power up.

Solution: Make sure that you have the board plugged in fully and the computer powered on.

Problem: The WiModem won't connect to my router.

Solutions:

- Make sure that your router SSID does not contain space characters. If it does, you will need to use the AT\*NS command to set the router SSID/Passphrase.
- Make sure that your router is close enough to the WiModem. You can use the AT\*N command to determine the signal strength of the router.
- Make sure that your router is not too close! You need to have a few feet of separation between the WiModem and your router.
- Make sure your terminal program is in ASCII or ANSI mode while entering the SSID and Passphrase. The SSID and Passphrase are case sensitive!

Problem: After connecting to a Telnet system, the WiModem just sits there or disconnects immediately.

Solution: Telnet specific systems (like tty.sdf.org:23) require that the translation mode be set to 1 (AT\*T1).

Problem: I connected to a BBS and when I start a download it immediately starts having bad blocks and retries.

Solution: Make sure that the translation mode is set to 0 (AT\*T0). This turns off the Telnet translation.

Problem: When I type I don't see the text show up on the terminal.

Solutions:

- Make sure the baud rate of the WiModem matches the baud rate set in the terminal software.
- Make sure the terminal is set correctly for handling DCD.

Problem: When I connect to a BBS, the baud rate changes.

Solution: Change the terminal software to handle DCD.

## **EMERGENCY RESET**

In the event that the WiModem is "locked out" (due to the baud rate being set to a something that a terminal program can not use) you can short the two holes marked CN2 together (anytime power in on). Shorting these two holes together for 3 or more seconds will make the LED turn blue, indicating that the baud rate has been set to 300 baud. At this point you can remove the short between the two holes and the WiModem will reboot with the new baud rate. If you short the two holes for more than 10 seconds the LED will flash red/blue until you remove the short. Doing this resets ALL of the settings (AT&F).

## **SECTION 4 – TIPS & HINTS**

There are dozens of Bulletin Board Systems (BBS) out there that are using the WiModem as their virtual modem!

Several features were created to better support BBS setups in these modern times.

### **Inactivity Timeouts**

S-Register S30 is used for an inactivity timeout period. By default this register is set to 0 (OFF). Setting this register enables a timer that resets when any serial data is sent or received. If no serial communications occur within the timeout period, the connection is terminated. This register value multiplied by 10 is the number seconds that must go by without serial data before the disconnection occurs. Example:

```
ATS30=6{RETURN}
```

This example would set S-Register S30 to 6, which is 6 x 10 seconds (60 seconds). Most BBS setups typically have a 5 to 10 minute inactivity disconnection requirement. You would set S30=36 for 5 minutes, or 72 for 10 minutes. Valid values are 1 to 255, which is 10 seconds to 42.5 minutes.

Because some BBS setups and terminal programs have an auto-check feature, it could be possible that S-Register S30 will not work for disconnection sessions after a period of time. In these cases S-Register S73 can be used as a maximum connection timeout period. By default this register is set to 0 (OFF). This is just like S30 except that this does not look at serial activity. Instead, this is a hard cut off timer and starts from when the connection occurs. The units for the register are different from S30 though. The register value multiplied by 60 seconds is the number of minutes that will occur before automatic disconnection occurs. Example:

```
ATS73=15{RETURN}
```

This example would set S-Register S73 to 15, which is 15 x 1 minute (15 minutes). Valid values are 1 to 255, which is 1 minute to 4.25 hours.

## **IP Banning**

Yes, it happens! There are robo-callers pinging IP addresses across the world, looking for vulnerabilities or just being pests!

If this happens your BBS could be tied up forever because other users would not be able to get through! For this reason, there is the ability to ban an IP address or series of addresses. See the AT&BC command for details.

## **Improving File Transfer Success**

The reality is that phone lines have data that travels at the speed of light with a relatively direct connection from modem to modem. Internet based modems have a lot of latency in their pathway – the modem to the router, the router to the ISP, the ISP to the bridge, and each bridge to the next... and back! Each step induces some amount of latency. File transfer protocols like Zmodem require a sub-50ms ACK time which is difficult to achieve outside of the local router range. You can do a PING test to see what the actual PING time between the WiModem and destination you are having issues with. This will give you an idea how well your router setup and Internet connection is working.

Always try to use a RAW (non-Telnet) connection if possible. Fortunately, Telnet is very old and being moved away from. Telnet mode requires translation, which is another step in the latency chain.

Try changing the channel the WiModem uses (in your router's settings). You maybe find congestion is occurring due to multiple devices trying to use the same WiFi channel.

PiHole and similar devices can affect latency if all Internet traffic is funneled through them.

Make sure you are using hardware handshaking if your baud rates are very high, especially when using a slower retro computer. Make sure that your cable supports the hardware handshaking too. Not all cables have all signals. Also make sure that you are using a MODEM cable and NOT a NULL-MODEM cable! A NULL-MODEM cable is only for connecting a computer to a computer, with the Tx/Rx and handshaking lines swapped. This will not work with a modem, printer, or any other serial device.



## SECTION 5 – FAQ

*Q: Can I use the WiModem for connecting to a BBS?*

A: Yes, including telnet connections.

*Q: Can I use the WiModem for operating a BBS?*

A: Yes! ATA and auto-answer are supported.

*Q: Can AT commands be sequential (ie. ATE0C0&K1)?*

A: Yes. When more than one command is grouped in sequence, the only response that will be returned is either OK or ERROR. Only commands that set a value can be used in a group. For example, ATE0 is acceptable but ATE? is not, and will generate an ERROR response.

*Q: How much power does the WiModem use?*

A: The WiModem uses an average of ~80mA while transmitting and ~25mA while receiving. OLED option uses ~10mA more current.

*Q: What are the LED colors, and what do they mean?*

A: RED – No WiFi connection  
YELLOW – COMMAND mode, not connected to a server  
ORANGE – COMMAND mode, in auto-answer mode  
GREEN – ONLINE (connected to server)  
CYAN – COMMAND mode, connected to server  
PURPLE – UPDATE mode, firmware is being downloaded/flashed  
WHITE – WPS mode  
BLUE – Baud rate reset (by shorting jumper pads)  
BLUE/RED flashing – WiModem settings reset to factory defaults

*Q: Is the WiModem capable of more than 2400 baud?*

A: Yes. The well known "UP9600" hack is built into the WiModem. You will need to enable the hardware handshaking to use this feature at 9600 baud. COMMODORESERVER.COM's V1541 38400 baud driver is also supported, but requires that the CTS, RTS, and DCD polarities to be reversed as this driver uses normal RS-232 polarity levels (Commodore polarities are actually backwards from the industry standard).

*Q: Why does my C128DCR or C128 w/1571 drive not boot when the WiModem is plugged in?*

A: The C128 has a fast serial (SRQ) support. The UP9600 hack uses the SRQ line. The UP9600 hack works in C64 mode, just not C128 mode. In order to make the WiModem work in C128 mode you must disable the

UP9600 hack. See our website forum for detailed information on how to disable the UP9600 hack.

*Q: Can I set the WiModem to use a static IP address?*

A: Yes! You need to do the following:

Set the IP address you want to use by using the command AT\*IP.

Set the gateway address by using the command AT\*GW=.

Set the subnet mask by using the command AT\*SUB=.

Finally, set the network type by using the command AT\*NET=STATIC. To restore the WiModem to use a DHCP connection, use the command AT\*NET=DHCP.

Please join our support forum at [www.cbmstuff.com/forum](http://www.cbmstuff.com/forum).



Model: ESP-12  
FCC ID: 2ADUIESP-12

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: *(i.)* this device may not cause harmful interference and *(ii.)* this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



**WARNING: To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.**

