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

Internet modem for CBM computers

***Installation & Usage Manual***

**Firmware v1.93**

Manual v1.9

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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.

## **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!**

## **Warranty Information**

This product carries a limited lifetime warranty. Units subject to improper installation, misuse, abuse, or modifications will not be covered under this warranty. We may at our discretion either repair or replace the unit covered under warranty. The customer will pay all freight charges to and from our facility. cbmstuff.com must be contacted to obtain a return authorization. Any product returned without authorization will be returned without repair or replacement.

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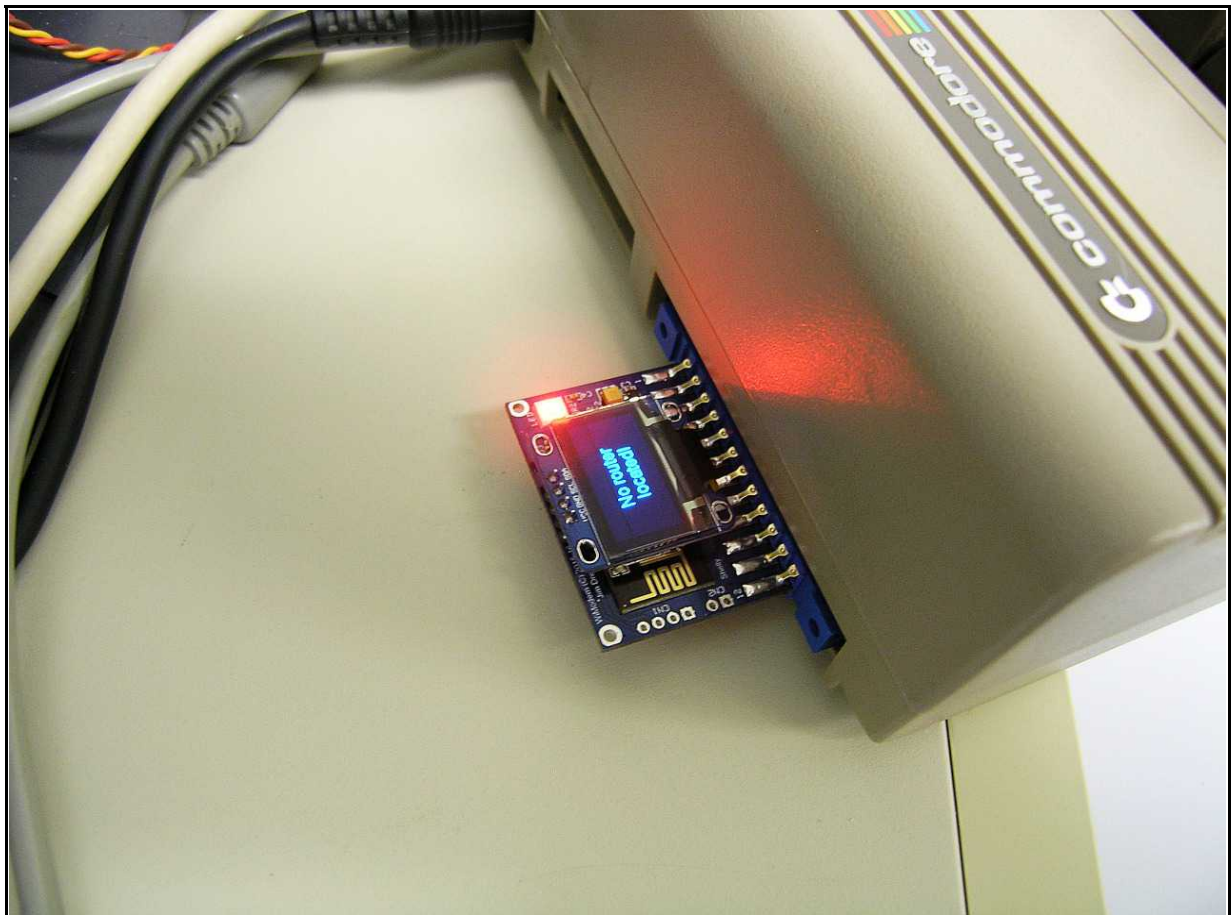
## **Legal Information**

The 'look and feel' and functionality of this product are protected by U.S. copyright laws. Various terminology and feature names are protected under U.S. trademark laws.

## 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. Most of the usual AT commands are fully emulated. The default baud rate for the WiModem is 2400 baud. The default can be changed.

Load a terminal program, such as Zterm, CCGMS, NovaTerm, etc. Set the terminal program's baud rate to 2400 baud. Keep your terminal program running in ASCII mode while going through this manual. **ASCII mode is required when setting up your SSID/Passphrase!** 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 2400 baud, and the terminal type is ASCII mode you should now see information about the WiModem, ie:

```
WiModem – (C)2015-17 By Jim Drew
```

```
Firmware:v1.1-08/06/16  
Baud:2400  
Port:1541  
SSID:  
MAC:8C:F2:13:7F:CF:5D  
IP:0.0.0.0
```

NOTE: you should not see the text with upper/lower case reversed, ie:

```
wImODEM - (C)2015-17 bY jIM dREW
```

If you do see the upper/lower case text reversed then you are in the wrong terminal mode! You **MUST** change terminal modes to ASCII or router setup will **NOT** work! Once the router connection has been established, you can use any terminal mode you like.

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 is blank, 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 three ways to setup the WiModem with your router:

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

The easiest way to setup your internet 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:

```
ATWPS<RETURN>
```

The WiModem will respond with WPS ACTIVATED, and 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 WiModem for use with your router is to manually enter the router's name and password. **The name and password 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][,password]<RETURN>

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

AT\*SSID NETGEAR24,WiModem1<RETURN>

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

The third way to setup your WiModem for use with 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[,password]<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 -80dBm 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 turn on the power to your computer the connection will automatically be made.

As a quick check to see if the internet connection is working, you can try the following:

```
ATDT GOOGLE.COM:80<RETURN>
```

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. You should see, "OK". Now enter the following to hang up the connection:

```
ATH<ENTER>
```

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

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

The WiModem supports most of the Hayes commands, plus numerous new commands. All AT 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 shown in black are standard Hayes compatible commands, and commands shown in **blue** are WiModem specific commands. [] indicates a value can be accepted. <> indicates an optional parameter. **Do not enter the actual "[" or "<>" characters in any example shown.**

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 teal in color, and the WiModem will then be in COMMAND mode. You need to use the ATO command to return to ONLINE mode.

#### **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 to enable auto-answering so the ATA command is not necessary. The incoming port number is always 6400.

## **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 7. Use AT&Z to show all of the phone book entries.

## **ATDT** – Dial URL [name<:port number>]

This ATDT is a hold over from the DT command meaning “Dial Tone”. There was also ATDP for pulse dialing. With the WiModem, ATDT will make a connection using the name and optionally the 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.

## **ATDP** – Same as ATDT to add compatibility for pulse dial systems.

## **ATE[x]** – Auto echo [0/1]

The auto echo command controls whether characters typed into the terminal are echoed back to the display.

Like most AT commands, entering just the command itself without a value 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** – 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.

**ATHELP** – HELP menu

This command will display the list of available commands.

**ATHELP!** – Detailed HELP menu

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

**ATI** – Information

This command will display information about the WiModem.

**ATI!** – Detailed Information

This command will display information about the WiModem along with the status of various registers.

**ATLED[x]** – Set LED brightness [0-9]

This command will show or change the brightness of the LED.

## **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]** – Quiet mode [0/1]

This command will show or 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.

## **ATRESET** – Reboot the WiModem

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

## **ATSCAN** – 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.

## **ATUPDATE** – Update firmware

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

## **ATV[x]** – Verbose mode [0/1]

This command will show or 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.

## **ATWPS** – Start WPS

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

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

### **ATZ** – Reset settings

This command will reload the last stored settings.

### **AT\*B[baud]** – Set baud rate [baud]

This command will show or set the baud rate. One of the valid baud rates above must be selected. An invalid baud rate will return an error. A valid baud rate will return, "OK" and then change the actual baud rate. To change the baud rate to 1200, you would enter:

```
AT*B 1200<RETURN>
```

Possible baud rates are: 300, 600, 1200, 2400, 4800, 9600, 14400, 19200, 38400, and 57600.

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

This command will show or change the port number that is used for incoming connections. 6400 is the default.

### **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\*NS[number][,password]** –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 **password** (with a comma separating the number and password).

**AT\*SSID[name][,password]** – Setup router connection

This command will show or 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 **password** (with a comma separating the name and password). See example at the beginning of this manual.

**AT\*C[x]** – CTS polarity [0/1]

This command will show or change the CTS polarity. 0 = Normal, 1 = CBM.

**AT\*D[x]** – DCD polarity [0/1]

This command will show or change the DCD polarity. 0 = Normal, 1 = CBM.

**AT\*L[port number]** – Default incoming port number

This command will show or change the port number that is used for incoming connections. 6400 is the default.

**AT\*P[port number]** – Default outgoing port number

This command will show or change the port number that is used when no port number is included during the ATDT command. 1541 is the default.

**AT\*R[x]** – RTS polarity [0/1]

This command will show or change the RTS polarity. 0 = Normal, 1 = CBM.

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

This command will show or change the DCD mode. The DCD (device connected). 0 = always connected, 1 = DCD follows server connection.

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

This command will restore all of the settings to the factory defaults. The phone book is not cleared with this command.

### **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&K[x]** – RTS/CTS handshaking mode [0/1]

This command will show or change the hardware handshaking mode. 0 = off, 1 = on.

### **AT&SN[x][=]** – Spoof number entries [0-9]

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. There is no ability to enter anything except a phone number (numeric digits). You can connect to Q-Link today by spoofing the number.

This command will show or change the spoof phone number entry specified by [x]. The value of x can be 0 to 9. To see a particular spoof entry (such as entry 3), you would enter:

```
AT&SN3<RETURN>
```

Nothing is displayed if the spoof entry has not been set.  
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 could enter:

```
AT&SN0=5551212,QLINK.LYONLABS.ORG:5190 <RETURN>
```

*Note that Q-Link requires that DCD be always on (AT&C0) and the baud rate set to either 300 or 1200 baud.*

**AT&W** – Write settings permanently

This command will store the current settings permanently so that reboots will use the same settings.

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

This command will show the list of phone book entries that are currently stored.

**AT&Z[x][=]** – Phone book entries [0-9]

This command will show or change the phone book entry specified by [x]. The value of x can be 0 to 9. 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. 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>
```

Of course the WiModem “phone book” is really URL's, not phone numbers.

## **S-REGISTER Commands**

S-Register commands change the internal operation of the WiModem.

### **ATS[x][=]** – S-Registers

This command will show or 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 supported:

S0 – Auto-answer rings (3 is default, 0 means no auto-answer)

S2 – ESCape character (43 is default, '+' character)

S12 – Guard time value (50 is default, 1 second)

## SECTION 3 – FAQ

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

A: Yes, if the BBS is using a telnet connection.

*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: No, not currently. AT commands must be issued individually (ie. ATE0, ATC0, AT&K1).

*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  
GREEN – ONLINE (connected to server)  
TEAL – COMMAND mode, connected to server  
PURPLE – UPDATE mode, firmware is being downloaded/flushed  
WHITE – WPS mode

*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.

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.**

