DSP004 Intelligent Character Display
Quick Start Guide

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1.0 Purpose and Format of this Quick Start Guide

The purpose of this Quick Start Guide is to show the user how to connect to, and communicate with, the DSP004 unit. Focus is on correctly establishing communications for both the Windows and MacOS environments. Section 2.0 of this guide provides an explanation of virtual com ports, and is provided for those who may be unfamiliar with this technology. Section 3 is a general overview of the basic components and configurations required to power, and to set up communications with, the display. The last two sections detail how to connect and configure the serial emulators using either Windows or MacOS, respectively, and they explain how to test custom characters.

2.0 VCP's and Serial Terminal Emulators

Virtual COM Ports (VCP's) described here are software drivers which allow a USB port to be used for serial communications. The virtual com port driver, once installed, permits serial communications to and from a device through the USB port. Serial Terminal Emulator software provides a user interface to facilitate these serial communications, which is how communication with the DSP004 is accomplished.
The VCP drivers require specific chips to be connected to the USB port. These are made by a number of manufacturers, with one of the most commonplace ones being the FT232RL Chip made by FTDI. The drivers for these chips are available for use on a variety of different operating systems including Windows, MacOS and Linux.
The chips for these drivers can be integrated into devices to which a USB cable is connected. These chips can also be integrated into the USB cable itself or alternatively they can be made available in the form of a standalone module. These types of hardware can be found at electronics distributors as well as on Amazon.

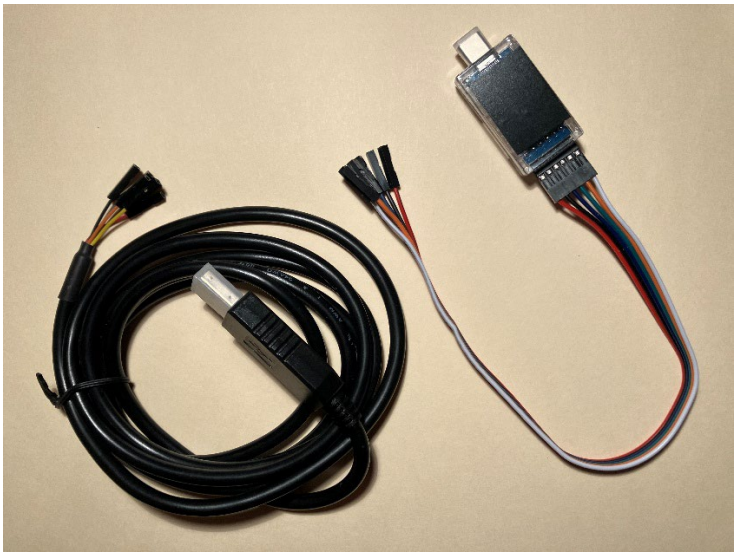

Fig. A. Example showing an older-style USB with integrated VCP module (left), and a newer USB-C standalone adapter module (right).

The DuPont Connectors on these adapters permit hookup to the DSP004 display unit. Any number of USB cable/connector/module combinations may be used to accommodate the specific needs for a particular user. In this guide only two are shown for simplicity: one where an external separate supply is used with an integrated USB cable/VCP driver module, and another where USB power is used, with a standalone VCP module

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On the latest operating systems, the drivers for these chips self-install once the adapter cable or module is connected to the computer USB port.

The serial terminal emulator software used in this guide are YAT for Windows, which is free for download at SourceForge.net, and WCHSerialPort for MacOS, which is available for free in the Apple App Store.

3.0 Typical Development Setup

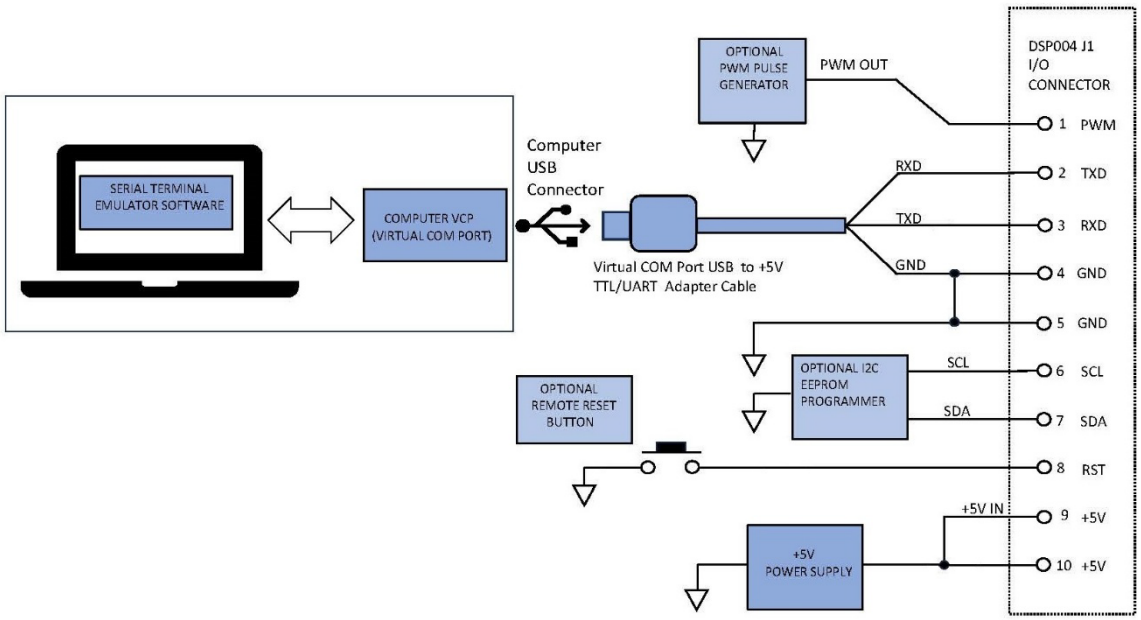


FIGURE B- DEVELOPMENT SETUP USING SEPARATE POWER SUPPLY

USB ports of the older type which are not compliant to USB-C should not be used for powering the display, as the output current capability of these older-specification ports is insufficient for powering the display unit reliably. In this case the power must be provided by a separate supply. This type of setup which uses a separate power supply is shown in Fig. B above. The power supply should be rated to be capable of providing 1.0 A current at +5VDC. A lab supply may be used; alternatively, a variety of affordable wall-mount or desktop type AC adaptors can be found on the market.

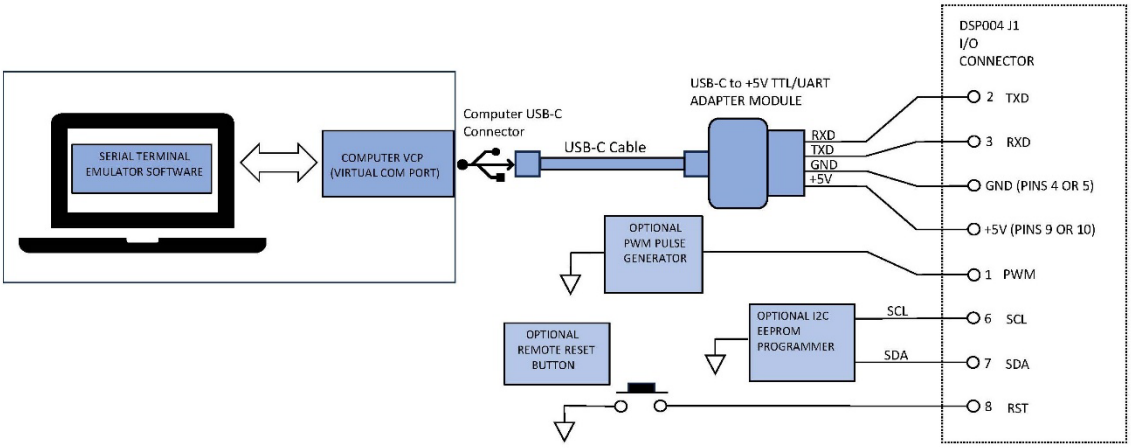


FIGURE C- DEVELOPMENT SETUP USING USB-C POWER

Fig.C above depicts a USB-powered setup, which takes advantage of the enhanced power capability of USB-C ports. USB-C ports generally have greater that 1.0 A current capability and can be found on many of the latest Windows and Mac laptops. In all cases it is nonetheless recommended to check the computer documentation to verify the +5V power available on the USB-C port can deliver 1.0 A current minimum.

There are few if any USB-C cables which have VCP chips integrated into them, but there are many standalone USB-C adapter modules which may be used (ref. Fig.A). These have a USB-C port on one end and connectors on the other. If using a USB-C cable in your setup, as shown in Fig.C, be sure the +5V TTL/Uart adapter has on it a USB-C *receptacle* socket.

After having determined the setup to be used, connect the USB adapter +5V, TXD, RXD and GND accordingly. For information on how to implement optional PWM or EEPROM programming, refer to the User Manual, # 1031-DSP004-M. Note the unit comes shipped with a 10-pin SIP male post header strip that may be used. Installation of this header or any other type of connector the user chooses will not void the warranty, provided there is no damage to the lands/traces that would render the unit inoperative.

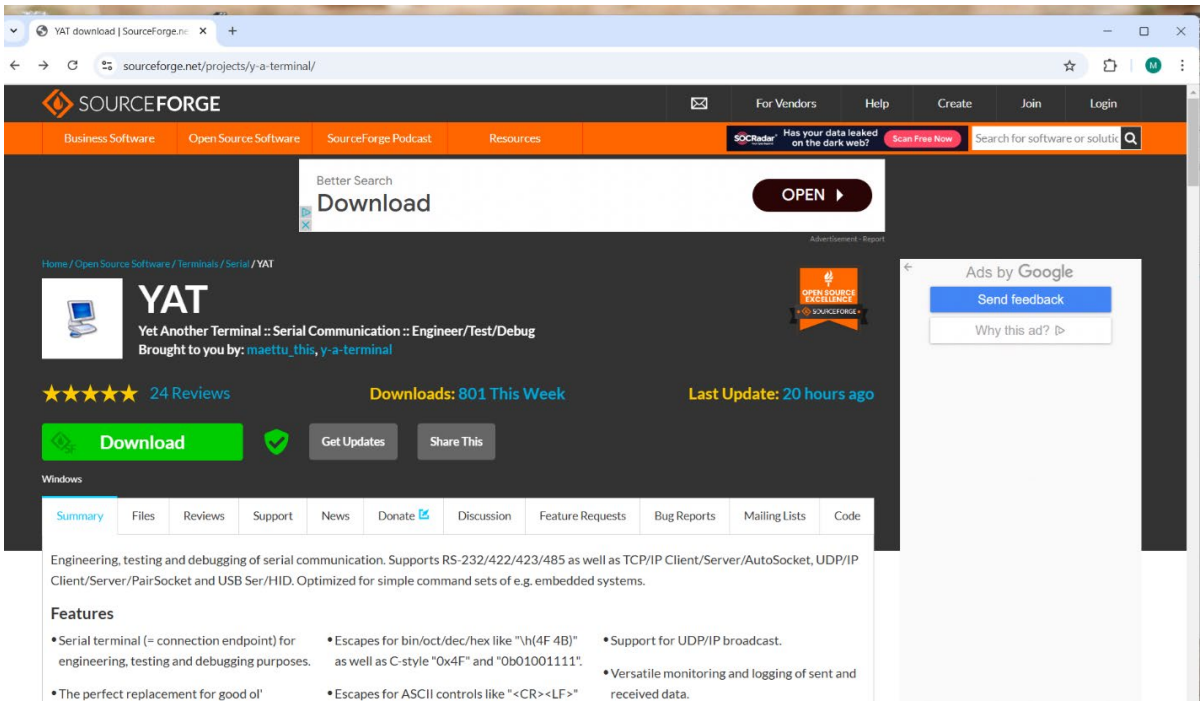
Before moving onto learning how to configure the Serial Terminal Emulator, ensure the CONFIG switch on the back of the display is set to the NORM position. In this setting, the Menu button is enabled for use. Additionally, in this setting, the DSP004 unit runs using these fixed default configuration settings:

a) Baud rate is set to 38400.
b) RXIN EOL Terminator is set to <CR>
c) TXOUT EOL Terminator is set to <CR><LF>

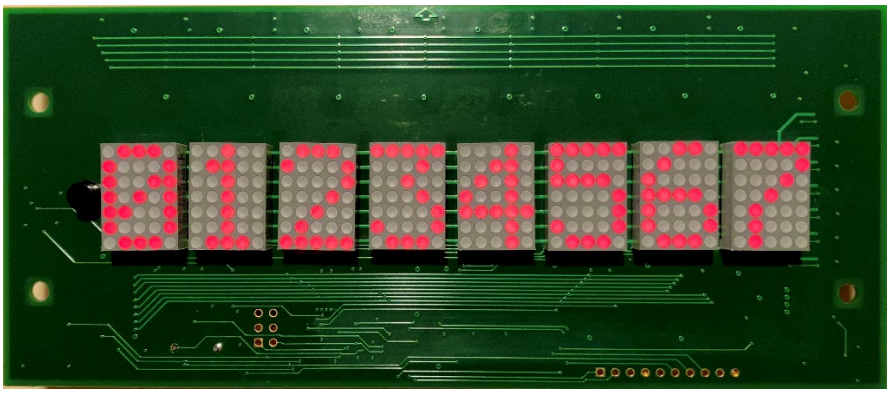
Note: Serial data format is fixed at 8 data bits, 1 stop bit, no parity, no flow control, in both NORM and PRGM mode settings.

4.0 Configuring a Serial Emulator for Windows Operating System

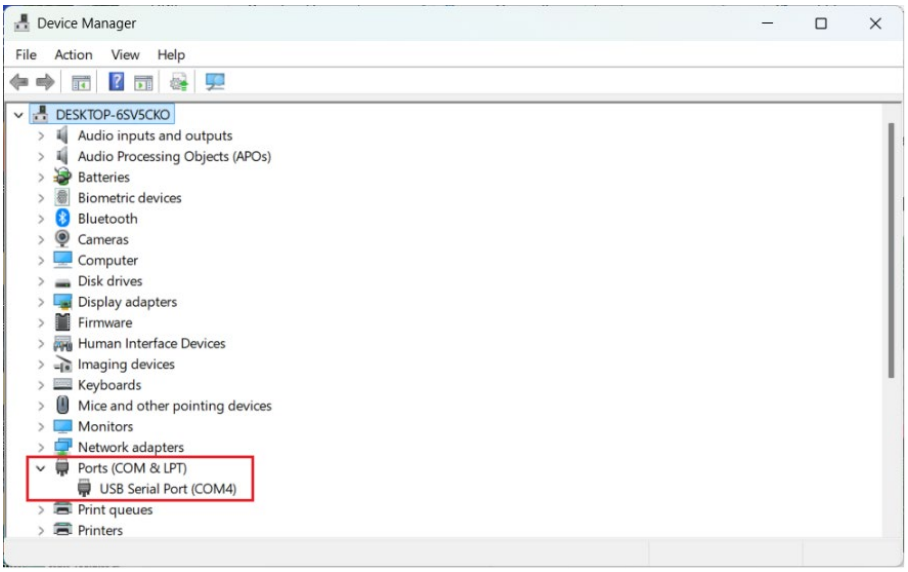
For Microsoft Windows, YAT may be used. It is available free of charge at sourceforge.net. Download and install it according to the instructions provided.



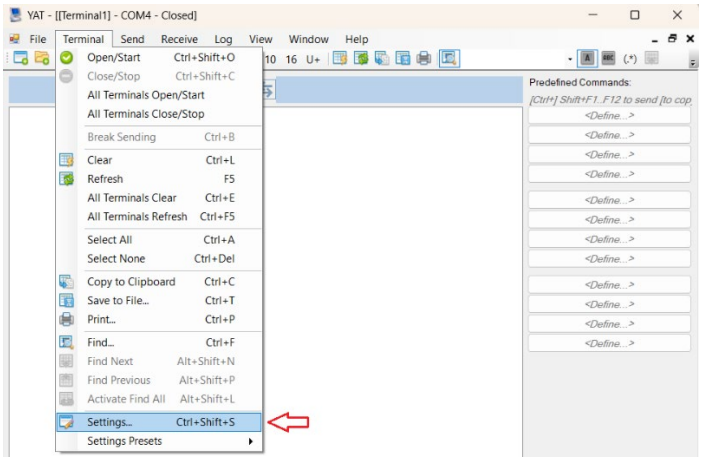
1. With the device connected with USB cables/adapter modules as outlined in section 3, connect the USB cable to the computer and apply power to the display unit. Depending on your operating system version, you may have to wait a minute or so after you initially connect the adapter cable/module to the USB port, for the VCP drivers to install. Ensure the “CONFIG” switch on the back of the display is in the “NORM” position.
   A non-scrolling display output should appear as below:



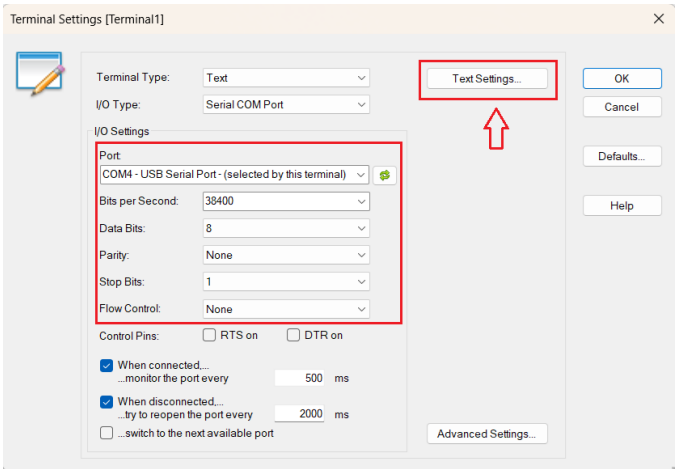
2. Determine the COM port number being used by the display. Do this by opening the Windows Device Manager, and click on “Ports (COM & LPT)”. The appearance of a “USB Serial Port” or some other port name referencing “USB” and “Serial” verifies that the drivers have already installed correctly. Take a note of the COM Port number- in the case of the example below, it is COM4.
The window may then be closed.



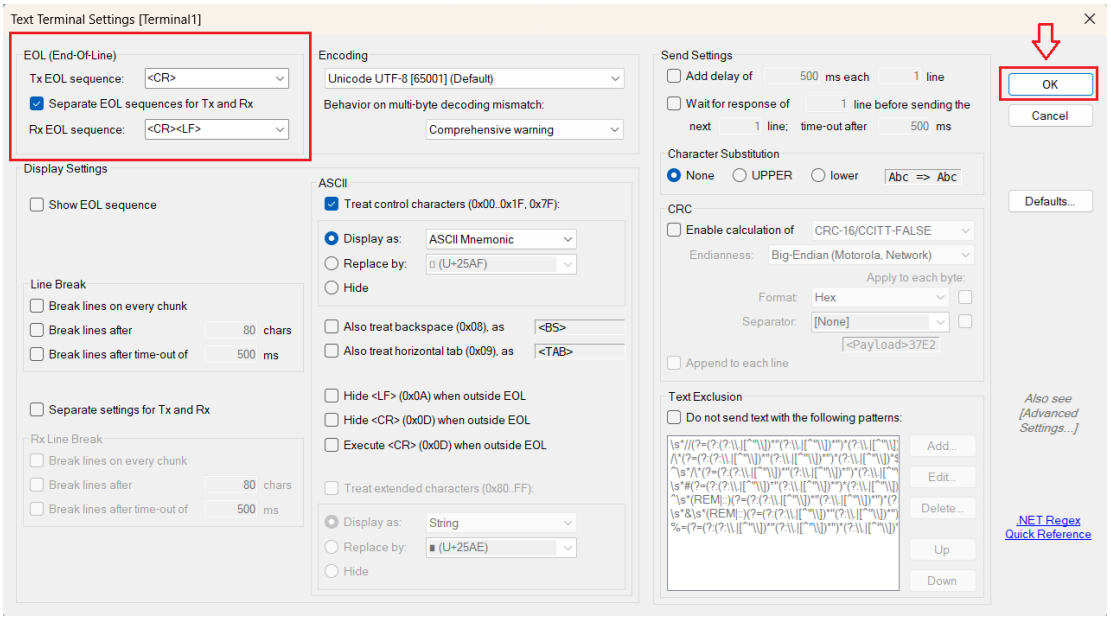
3. Open YAT. On the top menu, go to “Terminal” and click on “Settings”:



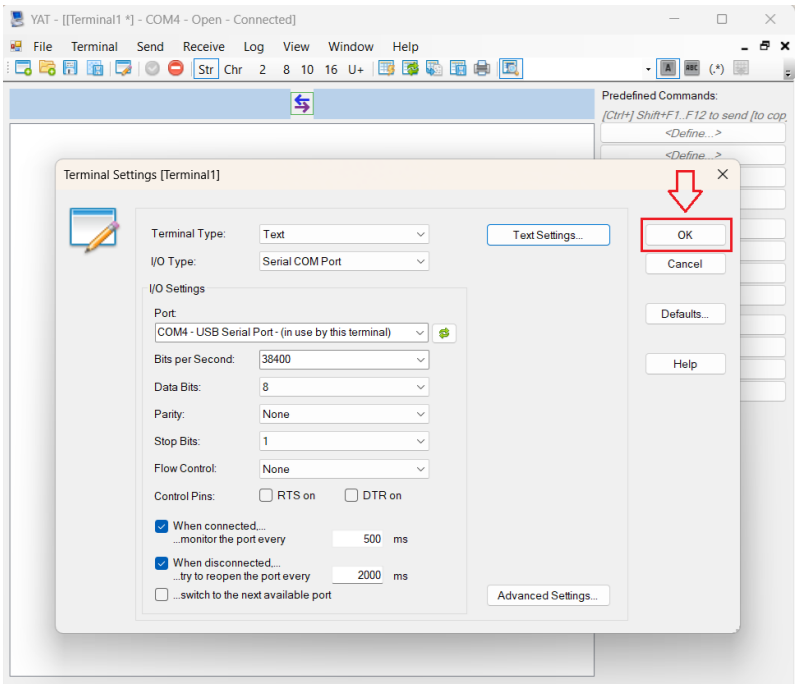
4. In the “I/O Settings” section of the Terminal Settings window:
   a) Under “Port”, select the correct COM port you found in Step 2- in this example case, COM4.
   b) In “Bits per Second”, select 38400.
   c) In “Data Bits”, ensure “8” is selected.
   d) In “Parity”, ensure “None” is selected.
   e) In “Stop Bits” ensure 1 is selected.
   f) In “Flow Control” select None.
   g) Leave all other entries as-is in their default configuration.
   Next, click the “Text Settings” button:



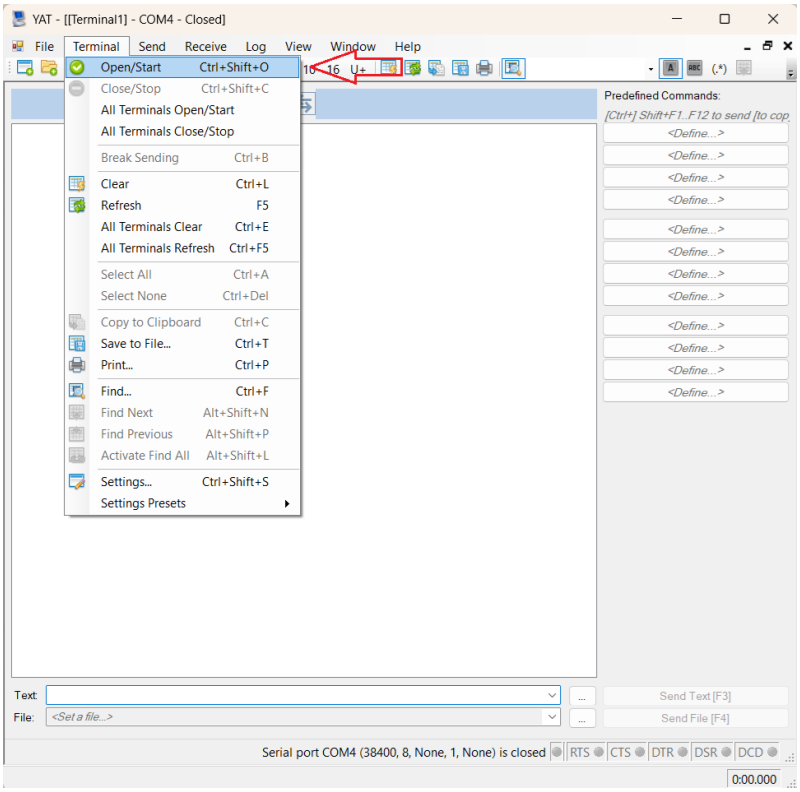
5. In the “Text Terminal Settings” window below, in the “EOL (End of Line)” section:
   a) Click box to enable ‘Separate EOL sequences for Tx and Rx”.
   b) Select <CR> for “Tx EOL sequence”.
   c) Select <CR><LF> for “Rx EOL sequence”.
   d) Leave all other settings as-is in default configuration.
   e) Click “OK” to save settings and close this window:



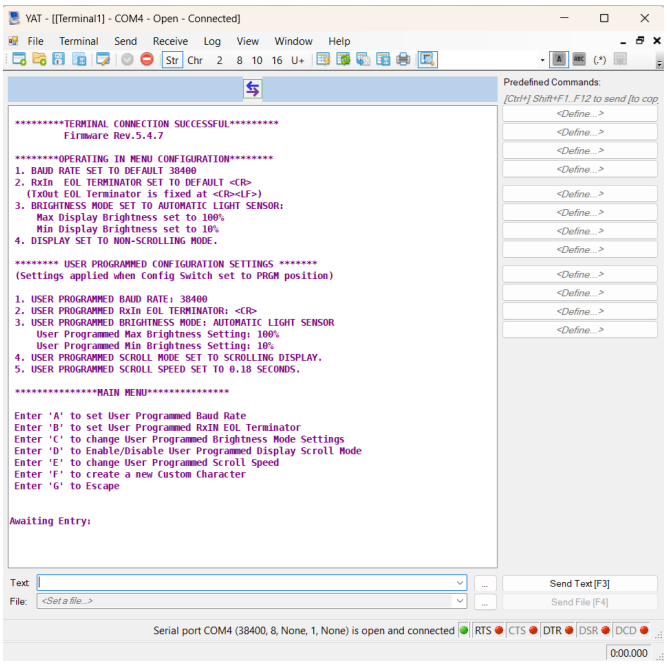
6. In the “Terminal Settings” window click “OK” to save the settings and close the window:



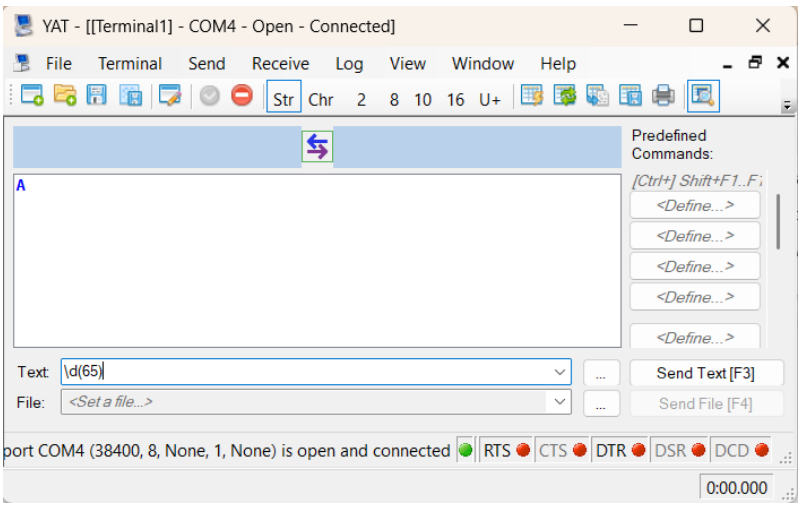
7. Go to “Terminal” and click “Open/Start”:



8. Again ensuring the “CONFIG” switch is set to “NORM” position, push the “MENU” button on the back of the unit. Connection is successful if the user interface menu appears as below. One may have to widen the emulator window to see the entire menu. Verify communications by entering characters and interacting with the user interface. This is done by typing entries into the “Text” window and then clicking the “Send Text” button.

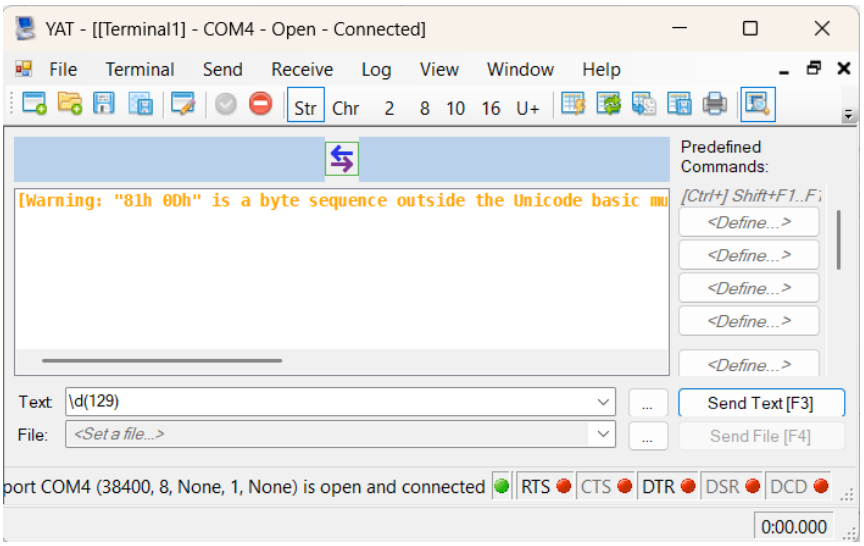


9. To test a custom character, it is necessary to have the terminal emulator send a number, not a string of characters, over the serial line. For example, to test the symbol for the capital letter ‘A’, one needs to send the number 65 over the serial line. It is quite simple to do with YAT. Sending \d(65) in the text entry window will cause the number 65 to be sent, resulting in a capital A being seen on the display unit.



(Note: to send an actual backslash character, send \\ . Consult the YAT quick start guide for more information).

To test a custom character with an ASCII number of 129 assigned to it, send \d(129) in the text entry window.

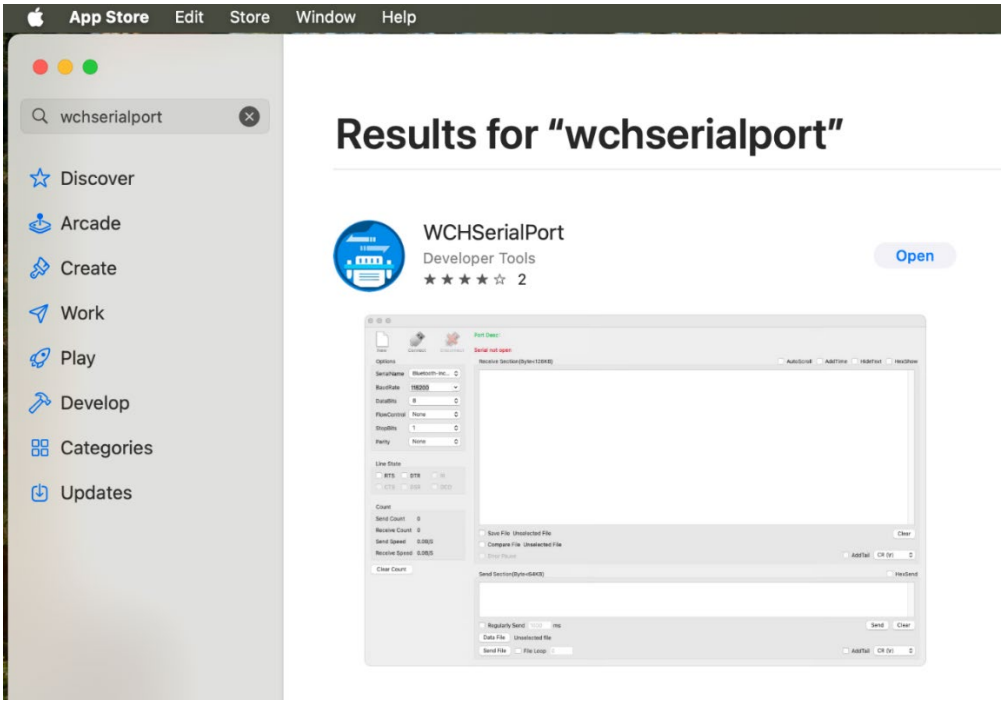


Note that a warning message appears in the send/receive window; this is normal and is simply informing the user that 129 is outside the Unicode symbol system. All custom characters will cause this warning to be displayed.
At the factory, ASCII 129 has been assigned as an “UP” arrow for testing purposes. Provided it has not been overwritten by the user, it should appear as below:

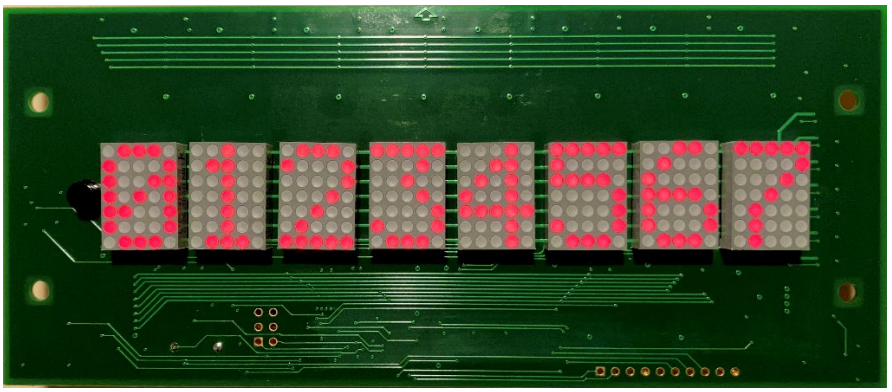
Note that YAT configuration settings will be retained: After closing and re-opening YAT, it is not necessary to re-enter the settings.

5.0 Configuring a Serial Emulator for MacOS Operating System

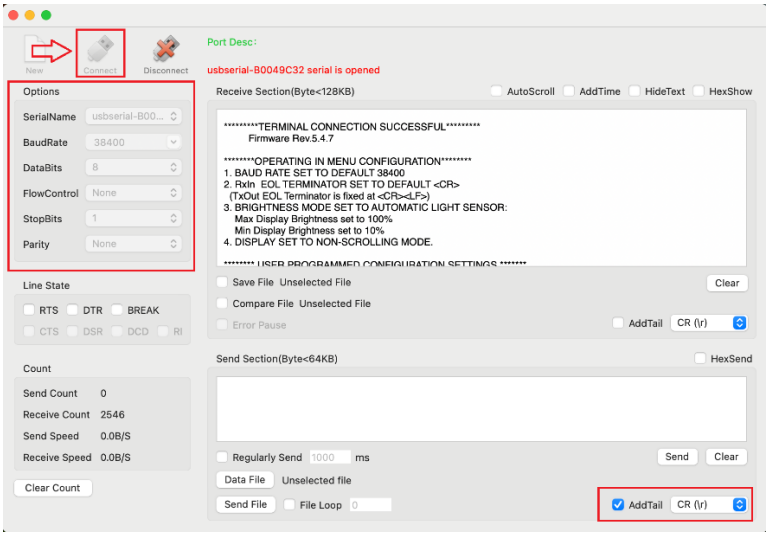
1. For Apple MacOS, WCHSerialPort may be used. It is available free of charge in the Apple App Store. Download and install it according to the instructions provided.



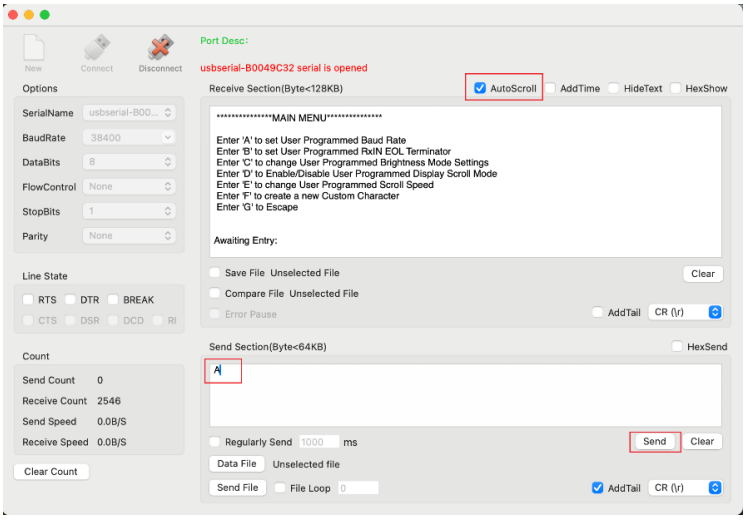
2. With the device connected with USB cables/adapter modules as outlined in Section 3, connect the USB cable to the computer and apply power to the display unit. Depending on your operating system version, you may have to wait a minute or so after you initially connect the adapter cable/module to the USB port, for the VCP drivers to install. Ensure the “CONFIG” switch on the back of the display is in the “NORM” position.
   A non-scrolling display output should appear as below:



3. Open the application. In the “Options” section (see below):
   a) In the “Serial Name” list, select a name referencing “usb” and/or “serial”. This is also an indication that the VCP drivers have been installed.
   b) In the “Baud Rate” section, select 38400 from the list.
   c) DataBits should be left at the default value of 8.
   d) FlowControl should be left at the default value of None.
   e) StopBits should be left at the default value of 1.
   f) Parity should be left at the default value of None.
4. At the lower right in the “Send” section, check “AddTail”. It should be left at default value of CR.
5. At the top left of the window, Click “Connect”.
6. If connection is successful, the Menu should appear as below in the Receive Section.

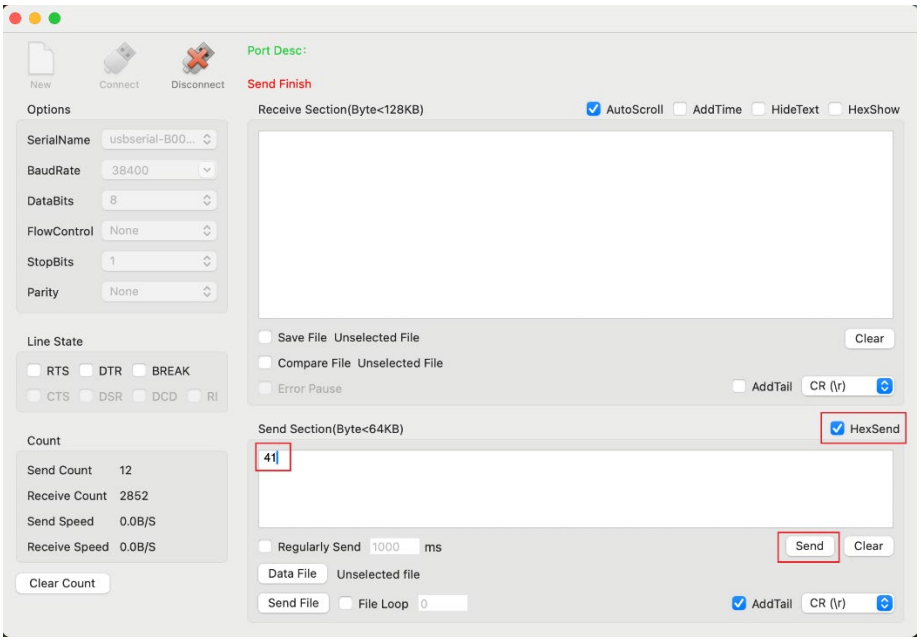


7. Scroll down to the bottom of the menu in the Receive Section. Click “AutoScroll” as shown below.

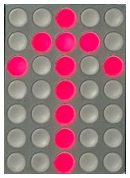


8. Verify communications and functionality by interacting with the menu. Type entries in the “Send Section” and then click the “Send” button, as depicted above.

9. To test a custom character, it is necessary to have the terminal emulator send a number, not a string of characters, over the serial line. For example, to test the symbol for the capital letter ‘A’, one needs to send the number 65 over the serial line. It is quite simple to do with WCHSerialPort. In the “Send” section, check “HexSend”. Next enter the hexadecimal equivalent of Decimal 65, which is 41, end click “Send”. The letter capital “A” should appear on the display unit.



To test a custom character with an ASCII number of 129 assigned to it, send the hexadecimal equivalent for decimal 129, which is 81. At the factory, ASCII 129 has been assigned as an “UP” arrow for testing purposes. Provided it has not been overwritten by the user, it should appear as below:



When the application is closed, upon re-opening you will need to re-select the Serial Name, re-select Baud rate to 38400, and re-check the “Add Tail” box.