

8x4 Composite Video Matrix Switch Manual

With RS-232 Control

Rev D

Part Number
87-211-408-A

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Document History

REV	Date	Action
A	July 30, 2012	Original document
B	June 7, 2013	Update, Part number change/clarification
C	Sep 2, 2013	Update of USB/RS-232 Commands
D	Feb 11, 2014	Corrected Mechanical Drawing

1 Overview

The 87-211-408-A (8X4 Matrix Switch) is an Eight In/Four Out, non-blocking composite video matrix switch controlled via a RS-232 interface. Video/signal interface consists of eight composite video input, and four composite video output channels. Signal routing is non-blocking, permitting any input to be routed to any output or outputs without signal degradation. Video inputs are 75Ω terminated. Video outputs are buffered with 75Ω series termination. An internal test pattern reference may also be selected to any of the output channels.

The unit also incorporates a Standard Definition (SD) Test Pattern Generator. Available test patterns are Color Bar, Black Burst, or disabled (for a small reduction in unit over-all power consumption). Test signal is also configurable for both NTSC and PAL B/D/G/H/I standard.

Remote control functions and access to unit status are possible using the RS-232 interface. The RS-232 interface is a fully isolated, minimal “3-Wire”, EIA-232 compliant interface.

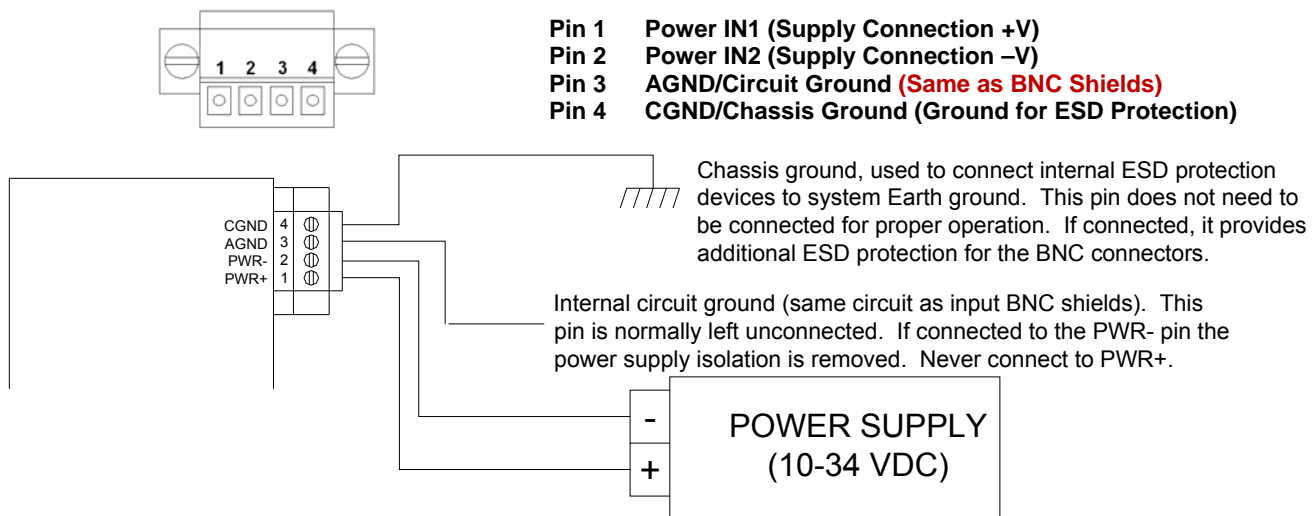
A Universal Serial Bus (USB) port/interface provides the unit maintenance interface. This permits the user to view and change the default configuration parameters. Internal non-volatile memory is used to hold the power up default settings.

A multi-color LED (green/orange) provides power and operational status.

Power input, RS-232, and video input/output ports are all fully isolated to assist the user in preventing ground loops. Power and control connectors have an integrated threaded/screw flange for shock and high vibration environments.

2 Power Requirements

This unit has an internal switching supply that isolates supply power from the internal power. The units will operate correctly from 12-24 VAC or 10-34 VDC. Units are equipped with full wave rectification on the power front end, so power may be applied to Pin 1 & 2 using either polarity.



Internal Circuit ground (AGND/Pin-3) is the ground reference for the internal circuits. It is NOT the input voltage return path of pins 1 and 2. The user has the option of floating internal circuits, with respect to any system ground, by not connecting to this pin. The user also has the option to connect the circuit ground to the chassis ground or the input power ground (or both). This power connector pin-out permits the user to define the grounding environment the unit is used in.

Chassis ground (CGND/Pin-4) is connected to internal ESD protection devices. The chassis ground does not need to be connected for proper operation. Secondary ESD protection connections exist between the input and output video signals and internal circuit ground.

The power connector (J7) is a 4 pin 3.5mm center header (Phoenix Contact #1897267) and mating power plug (Phoenix Contact #1847071) with screw flanges for vibration and shock resistance.

The unit has a multi-color LED (green/orange/yellow) to indicate power and operational status.

3 Universal Serial Bus (USB) Maintenance Interface

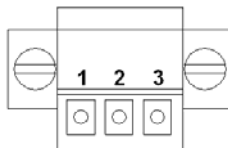
The Universal Serial Bus (USB) maintenance port provides a terminal interface that permits the user to perform several functions: Selection of the control mode, setting configuration parameters, displaying status, and performing debug/maintenance. **Maintenance commands and functions are described at greater detail in Section 6.**

The mini-USB port connects to the unit processor to form a virtual serial communication channel. A terminal program such as HyperTerminal¹ is used to view, enter, and modify configuration parameters. The configuration is saved in non-volatile memory so the unit initializes with the correct configuration at power-up. The Xon/Xoff flow control is used during the download of new code so the data transfer is held while the processor updates internal FLASH memory.

NOTE: USB shield is referenced to Chassis Ground. It is therefore possible for a ground “Sneak Path” to be created through the connected laptop computer. This will typically occur when the laptop or peripherals are connected to an external power source.

4 RS-232 Interface

Serial Control Port is a 2.5kV fully isolated, minimal “3-Wire”, RS-232 interface. It conforms to the EIA/TIA-232E and ITU-T V.28 specifications. Output voltage swing is typically $\pm 10V$. Input voltage swing is protected against over-voltages of up to $\pm 30V$. Maximum cable length is not defined by the standard, but typically cables greater than 50 feet (15m) are subject to distance limitations imposed by the capacitance of the cable. The mating interface connector is a 3.5mm three pin plug, with screw flanges for vibration and shock resistance. (Phoenix Contact #1847068)



Pin 1	(RX) Receive
Pin 2	(TX/RX Return)/RS-232 Ground
Pin 3	(TX) Transmit

The RS-232 interface signals and ground are fully isolated from internal circuit ground and input power. Communication factory default is 19,200bps 8N1, but may be configured to an alternate fixed baud rate using the USB Maintenance interface.

¹ HyperTerminal is no longer a software component of post Windows-XP operating systems. Alternate terminal programs such as Hercules Setup may be considered.

5 Serial (RS-232) Control

The RS-232 port supports basic serial communication, command line interface for control and status functions. Data Communication Equipment (DCE), such as a computer running a standard serial terminal program, may be utilized. (Default: 9600bps 8N1) RS-232 command and control interface consists of a command string of ASCII characters and ended by a carriage return ↵.

Symbols:

↵ = Carriage Return (0x0D)

• = Space (0x0A)

X1 = Output Number (1-4)

X2 = Input Number (1-8)

The following shows the different commands available for command and control functions using RS-232. (Commands are case sensitive)

RS-232 Commands:

help↵ Lists the available user commands.

info↵ Responds with unit identification, software and hardware revision information.

Output selection is accomplished using any of the following command line formats. A single command line may be used to select the route path of a single or multiple outputs. Port selection is based on control segments, 4 characters in length, "sX1X2f" one or more of these segments may be issued on the command line. X1 output port selection may be placed in any order when multiple control segments are entered on the command line. The command line format: 'S' represents Start, followed by output number, input number and 'F' end of string.

SX1X2F↵ Matrix control command (Input X2 is selected to Output X1)

SX1X2F.....SX1X2F↵ Command string with multiple output selection.

Upon command completion, a status response string representing the current matrix Input/Output configuration is returned. Even if only one 4 byte command string was transmitted, or an invalid command was received, the status response is always generated. Response string echo's the input format.

(Example: "S11FS22FS33FS44F" indicates that IN1>Out1, IN2>OUT2, IN3>OUT3, and IN4>OUT4)

NOTE: Upon power-up the unit automatically reports the 16-byte status string indicating what input is routed to each output. Power-up routing defaults parameter may be reconfigured using the USB Maintenance interface.

6 Maintenance Mode Commands (USB)

This unit has a USB port to permit the user to retrieve information, change parameters, and select specific inputs for system debug. The intent of this port is for it to be connected to a laptop computer and use HyperTerminal to communicate with the internal processor.

The unit should be powered up before the USB cable is plugged in. The computer then enumerates the USB interface and establishes the Serial communication port number. The “port” should now be visible when configuring the terminal program. The USB port will adjust for baud rate automatically. Typical rates are 9600-19200. Other configuration parameters should be configured 8-N-1. (8bit, No parity, 1Stop)

Symbols:

↵ = Carriage Return (0x0D)

● = Space (0x0A)

X1 = Output Number (1-4)

X2 = Input Number (1-8)

The following shows the different commands available in Maintenance Mode. Commands are case sensitive.

Configuration Commands:

info↵ Responds with unit identification, software and hardware revision information.

status↵ Status command displays the current Matrix configuration for all outputs and test generator configuration (NTSC/PAL, ColorBars/Blackburst/Off)

tgen●NTSC↵ Configures Test Generator Mode for NTSC

tgen●PAL↵ Configures Test Generator Mode for PAL B/D/G/H/I

tgen●BARS↵ Configures Test Generator Pattern for ColorBars

tgen●BLACK↵ Configures Test Generator Pattern for Blackburst/BlackBars

tgen●OFF↵ Turns internal Test Generator Off (as a power saving option)

set●default↵ Saves the current matrix configuration as the power-up default

Output Selection:

Output selection is accomplished using any of the following command line formats. A single command line may be used to select the route path via a singular or multiple. Port selection is based on control segments, 4 characters in length, “sX1 X2f” one or more of these segments may be issued on the command line. X1 output port selection may be placed in any order when multiple control segments are entered on the command line.

sX1 X2f↵ Matrix control command (Input X2 is selected to Output X1)

sX1 X2f...sX1 X2f↵ Command string with multiple output selection.

Upon command completion, a status response string representing the current matrix Input/Output configuration is returned. Even if only one 4 byte command string was transmitted, or an invalid command was received, the status response is always generated. Response string echo's the input format.

(Example: “S11FS22FS33FS44F” indicates that IN1>Out1, IN2>OUT2, IN3>OUT3, and IN4>OUT4)

Depending on the selected option it may be necessary to change or configure additional parameters. Some parameter value changes may not be available or take effect until the next system reset or power-up is performed. All parameters are retained in non-volatile memory

7 Specifications:

Video Formats:	NTSC or PAL	
Input Connectors:	BNC (8)	
Input Termination:	75 Ohms, DC coupled	
Output Connector:	BNC (4)	
Output Terminations:	75 Ω (series), DC coupled	
USB Interface (ASCII data)	8 bit any baud 1 stop No parity no flow control necessary	
Power LED:	Green (Indicates uP is running) Yellow (Used to display control mode at power-up)	
Operating Temperature:	-40C to +85C	
Power:	12-24V AC, 10-34V DC (either polarity on PWR connector)	
Supply Current: (actual TBD)	500ma at 12 VDC 250ma at 28 VDC	
Power Connector:	3.5mm 4 pin terminal block Mating plug	(Phoenix Contact #1843813) (Phoenix Contact #1847071)
RS-232 Connector:	3.5mm 3 pin terminal block Mating plug	(Phoenix Contact #1843800) (Phoenix Contact #1847068)
Specified Torque ²	3.5mm Plug Terminal/M2: 0.22-0.25Nm 3.5mm Plug Flange/M2.5: 0.40-0.50Nm	
Package Dimensions:	4.4" x 2.2" x 2.15"	
Mounting:	6-32 threaded inserts (2)	
Weight:	20oz (with connectors)	

² Phoenix Contact indicates that Torque specified under DIN EN 60947-1 is sufficient to secure connections, however recommended those listed.

8 Mechanical

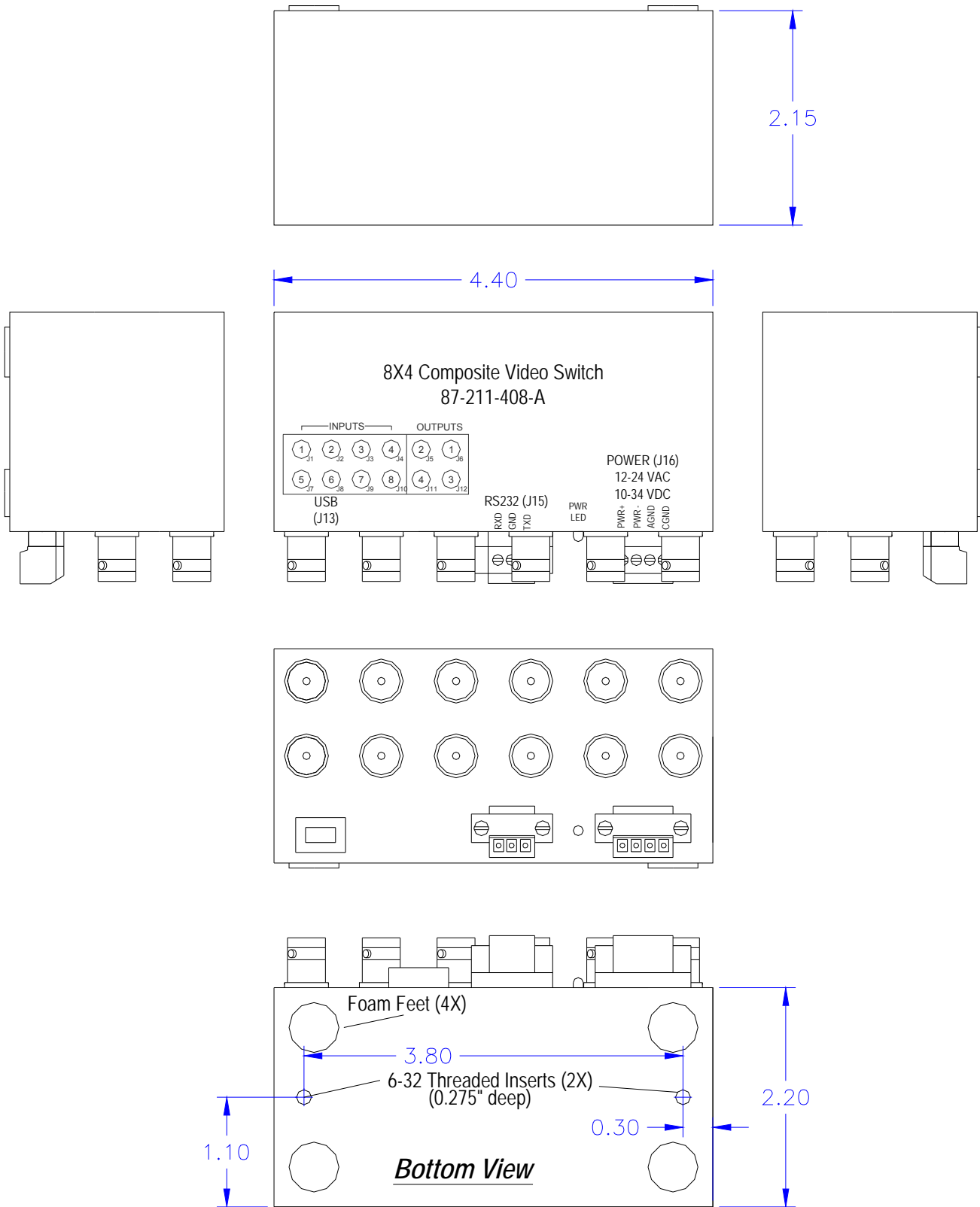


Figure 1: 8x4 Matrix Switch

Alternate Terminal Programs

If you've recently upgraded or are working on a computer with Vista/Windows-7, you have no doubt discovered post Windows-XP operating systems no longer include HyperTerminal. The majority of alternative serial terminal emulation programs are sufficient in supporting basic configuration of the option and parameters on VAC product. However in order to support field upgrade of firmware, the terminal emulator must be capable of ASCII file transfer and Xon/Xoff flow control.

Be sure that the appropriate x64/x86/Unix Silicon Lab's CP2102 driver is installed. Windows based operating systems should identify the "COM" port associated with the unit in the "Device Manager" of the Computer Management screen as "Silicon Labs CP210x USB to UART Bridge". Unit communication parameters are set for 9600, 8N1, and Xon/Xoff flow control.

While no warranty or guarantee is implied, NetBurner Inc has a handy terminal program "Multi-threaded TTY" they distribute in support of their product offerings. (www.netburner.com/support/resources/cb34-ex)

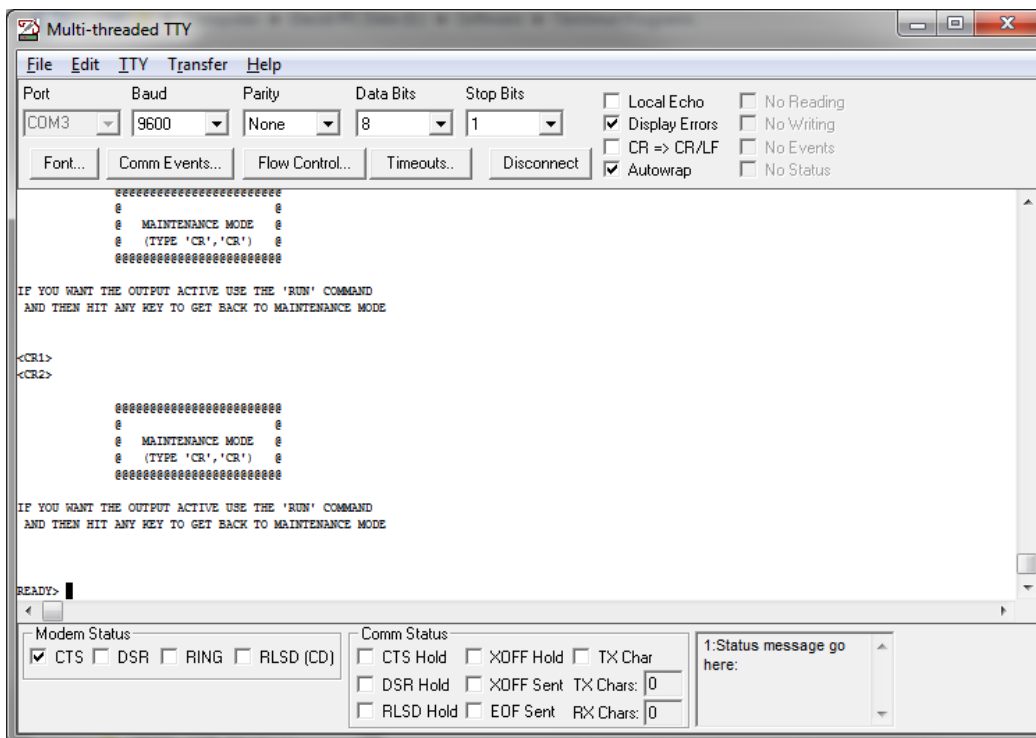


Figure 2: MTTY Serial Terminal Interface

Mtty.exe is a single executable. The example screen above shows the USB Bridge connection as COM3. Configure your "Port" setting to the port your computer has associated with the unit. Set communication parameters for 9600 8N1. Xon/Xoff flow control is configured under the "Flow Control" tab. ASCII file transfer is under the "Transfer" menu pull-down. Don't forget about the "Connect" button.

The Hercules SETUP software utility is a very powerful Serial port terminal, UDP/IP terminal, and TCP/IP Client Server terminal. This software may be downloaded free from www.hw-group.com. HWgroup should be commended for making this excellent software available as Freeware and are indeed worthy of financial support. While functional for unit configuration, serial emulation supports only binary and not ASCII file transfer (required for firmware update).

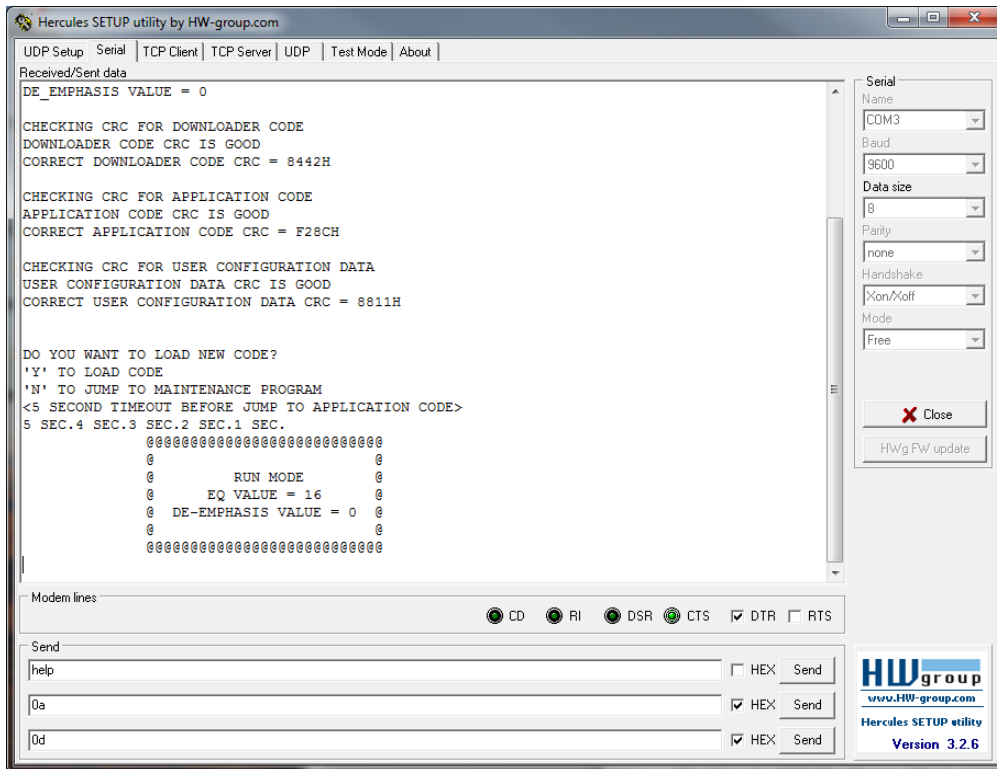


Figure 3: Serial Terminal Tab/Window

Hercules SETUP is a single executable. Some changes from the default configuration settings are required. Click on the “Serial” Tab and the window should appear similar to that of Figure 3. Set “Name” for the units associated “COM” port. For the screen above it just so happened to be COM3. Configure the remaining items for 9600 8N1, Xon/Xoff, and Mode = Free. There is no box for the stop bit ‘1’.

The next step is VERY important. There are additional settings accessed by clicking the right mouse button.

Un-Check most everything
Change Transmit EOL to “CR (Mac)”

Use the Open/Close button to connect/disconnect to/from the “COM” port.

