

## **Sierra Radio Systems Station Controller**

### **Model CX-1 4 Port HF Coax Relay Module Reference Manual**

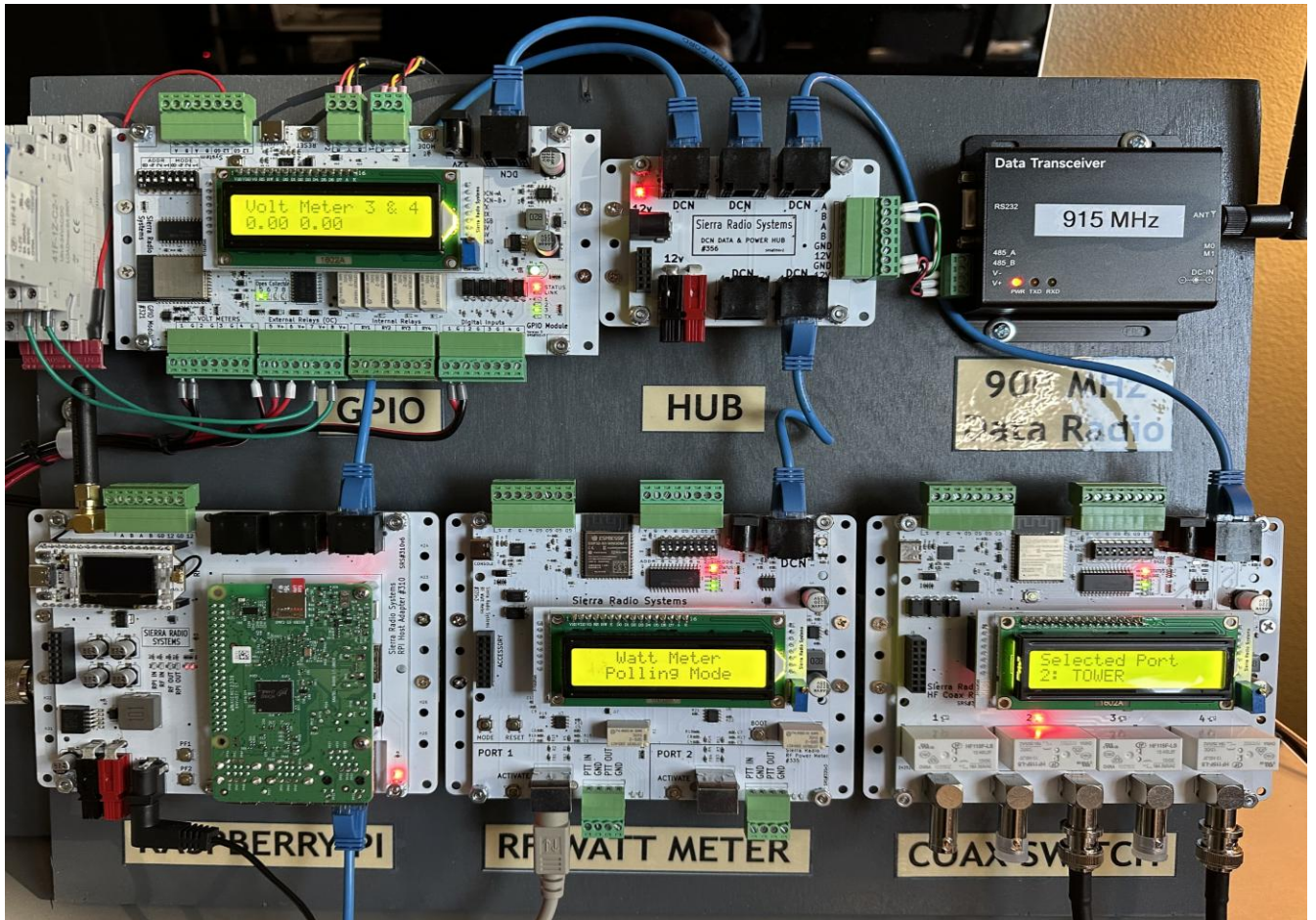


**sierraradio.net**

Version 1

## Typical Hardware Installation

This example shows a typical system mounted to a plywood board using DIN rails and clips.

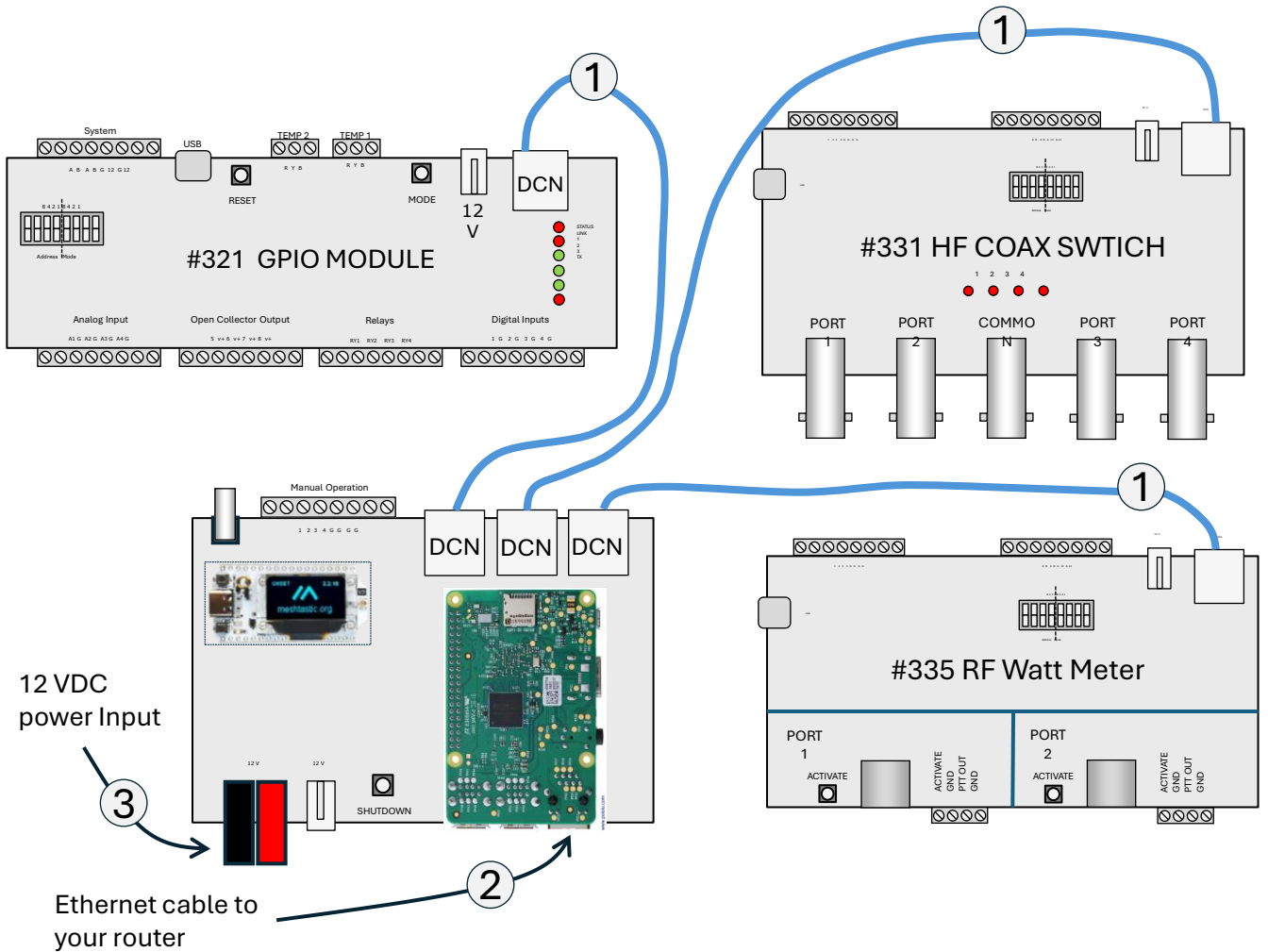


In the example pictured above you can see a full system including from top left:

- Optional 6A slim DIN rail mount SPDT relays
- GPIO Module
- Optional 5 port DCN power and data hub
- Optional 900 MHz DCN data radio

On the bottom row from the left:

- Raspberry Pi Module
- RF Watt Meter Module
- Coax Relay Module



**In this open example, you only need three connections to get your system up and running.**

- ① CAT6 cables between the Raspberry Pi host adapter module and each of the control modules. These provide power and data to the control modules.
- ② Ethernet cable from your router to the network jack on the Raspberry Pi
- ③ 12 VDC power input to the powerpole or 2.1mm barrel jack.

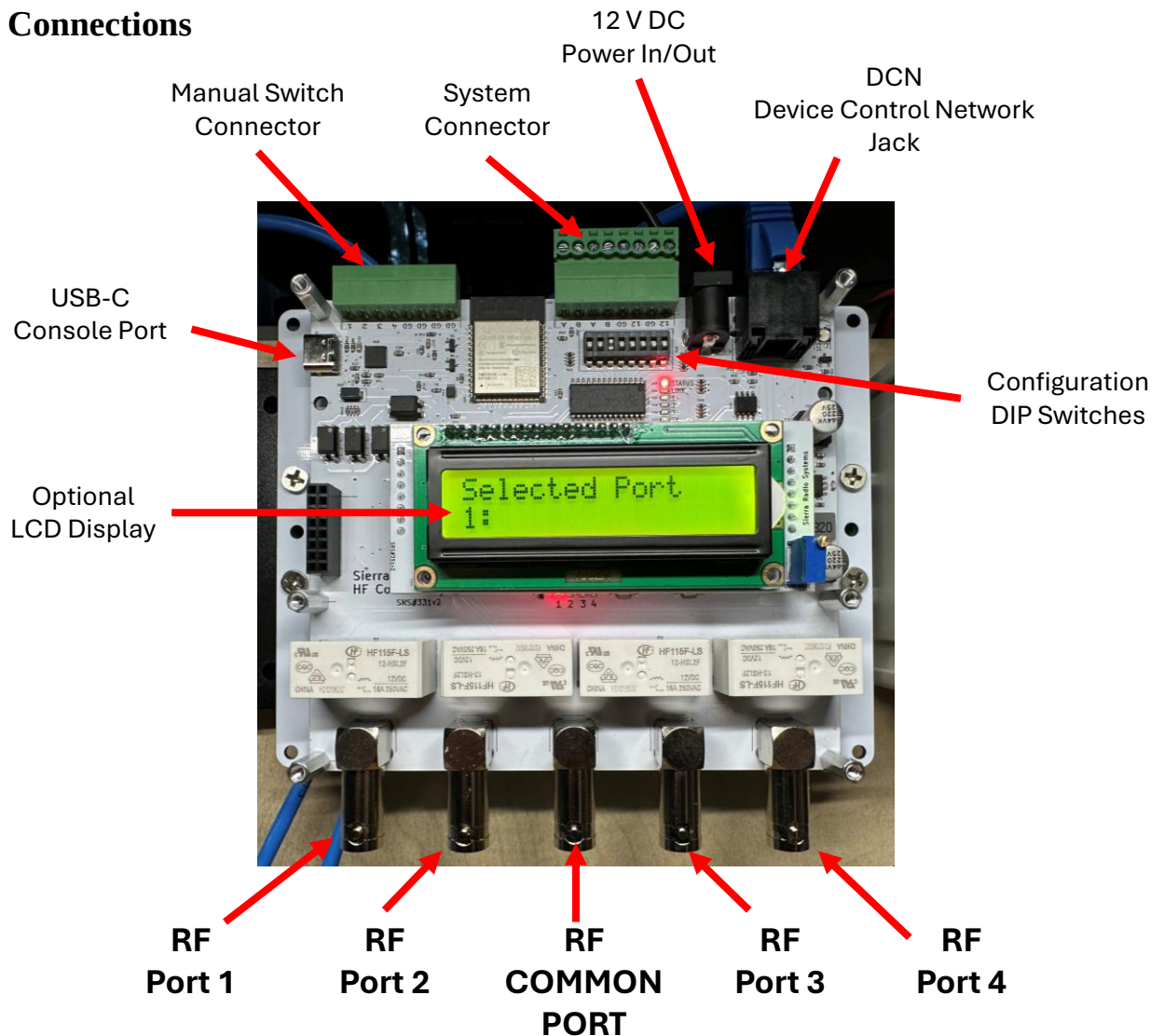
## Product Overview

The model CX-1 4 Port Coax Relay Module can be used to switch one radio to four antennas or one antenna to four radios. In a remote station configuration you typically are switching one radio to four antennas. The coax relay is designed for HF and 6 meters. All testing is done at a maximum power of 100 watts.

The RF switching uses latching relays. This is an important feature because when power is removed from the coax relay board, the last port to be selected will remain connected even without power..

Band	Insertion Loss	Port Isolation	Maximum Power	Suitability
HF (1.8-30 MHz)	< 0.1 dB	> 50 dB	100 Watts	Very good
6m (50-54 MHz)	< 0.1 dB	> 50 dB	100 Watts	Very good
2m (144-148 MHz)	< 0.5 dB	> 50 dB	100 Watts	Fair

## Connections

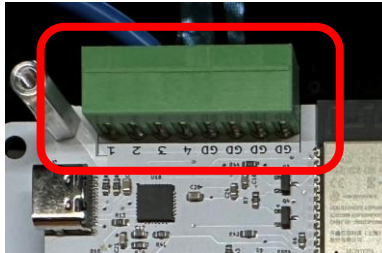


## Connections

### Manual Switch Terminal Block

The relays can be actuated by briefly shorting one of the pins on the terminal block to ground. If you are looking at the board with this terminal block in the upper left corner, from left to right the connections are:

- Select port 1
- Select port 2
- Select port 3
- Select port 4
- Ground
- Ground
- Ground
- Ground



This is used to connect the pins to a set of 4 pushbuttons to actuate the selected port manually.

### System Connector

The system connector in the middle/right of the top of the board next to the DIP switches is the system terminal block connector. This is an optional extra set of connections. The same pin configuration as the system terminal block on the GPIO Module when holding the board so the system connector is in the upper left of the module:

- DCN RS-485 A
- DCN RS-485 B
- DCN RS-485 A
- DCN RS-485 B
- Ground
- +12 VDC in/out
- Ground
- +12 VDC in/out



### 12 V DC Power In/Out

The modules all have their own built in 12v power supply. The system needs an input voltage between 10 and 18 volts to operate. The 12 VDC power jack is in parallel with the 12 VDC power pins on the DCN RF-45 modular jack.

## Configuration DIP Switches

The DIP switches set the devices network address and operating mode.

### Address switches – The first 4 DIP switches

The left 4 DIP switches are used to set the device address.

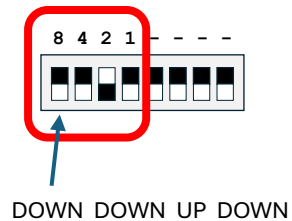
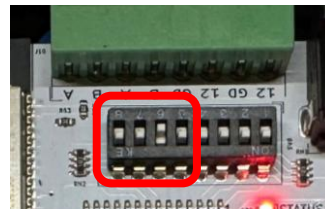
Device address can be any number from 1-15 set through the dip switch.  
 Address 00 is reserved for the main control program, Node Red dashboard.  
 There is an option to set other addresses through the USB serial port.  
 The default device addresses are:

- Main dashboard RPI            0
- GPIO Module                    1
- Coax Relay Module            2
- RF Watt Meter Module        3

In the above example the address DIP switches are set for a value of 2.

### Address Table

Address	Bit 8	Bit 4	Bit 2	Bit 1
00	DOWN	DOWN	DOWN	DOWN
01	DOWN	DOWN	DOWN	UP
02	DOWN	DOWN	UP	DOWN
03	DOWN	DOWN	UP	UP
04	DOWN	UP	DOWN	DOWN
05	DOWN	UP	DOWN	UP
06	DOWN	UP	UP	DOWN
07	DOWN	UP	UP	UP
08	UP	DOWN	DOWN	DOWN
09	UP	DOWN	DOWN	UP
10	UP	DOWN	UP	DOWN
11	UP	DOWN	UP	UP
12	UP	UP	DOWN	DOWN
13	UP	UP	DOWN	UP
14	UP	UP	UP	DOWN
15	UP	UP	UP	UP

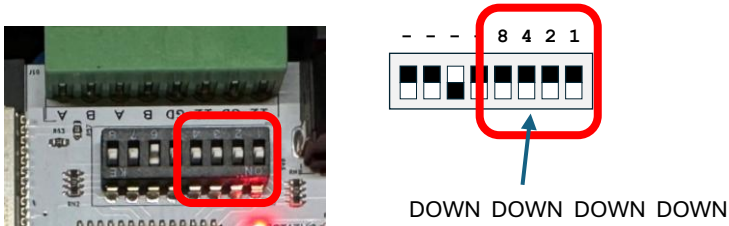


## Configuration DIP Switches

The DIP switches set the devices network address and operating mode.

### Mode switches – The second 4 DIP switches

The left 4 DIP switches are used to set the device address.



The mode switches are normally all switched off. This will run the module in it's normal mode. Some modules have different behaviors enabled by the switches. These will be document in the future.

## USB-C Console Port

The USB port is not normally used in typical operation of the system. It's primary purpose is to configure the operating parameters of the coax relay board and flash new versions of firmware. The console port that allows you to communicate with the board from a dumb terminal program like Putty. You can see the various steps that get executed as the module boots up, send it configuration commands, and other uses. Set your dumb terminal for 9600 baud, 8N1 and check out what the board is doing on boot or configure parameters.



If you are using a Windows computer we recommend the free dumb terminal program called Putty. You can get putty here:

For Putty go to <https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

If you are using a linux computer, the popular terminal program is called minicom.

## Using the USB-C Console Port

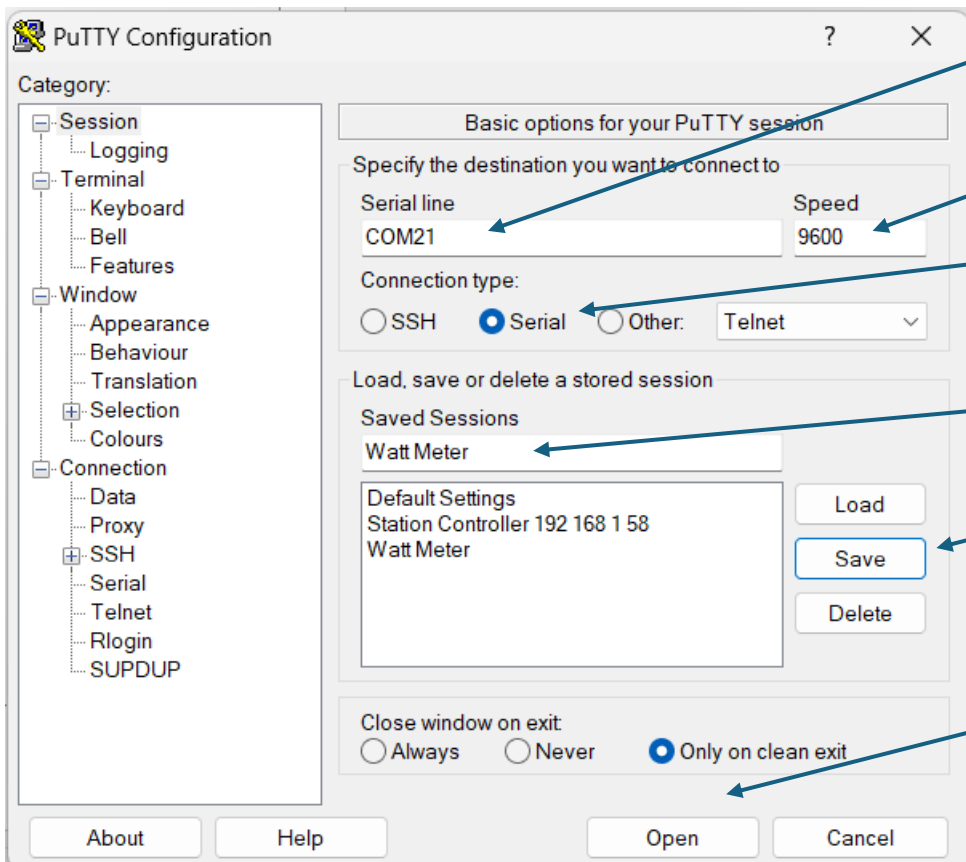
The USB port is not normally used in typical operation of the system. It's primary purpose is to configure the operating

When you plug your USB-C cable into the watt meter module and PC, a new serial port will be added to your system. On Windows you can determine the COM port number by looking at the "Computer Management" utility. At the Windows search bar, type "computer" and you should see Windows pop up an option to select Computer Management. Launch this program. Click on "Device Manager" then click on "Ports". All the available serial ports will be shown. The watt meter will present itself as a SiLabs serial device. Take note of the COM port number. We will need that for the Putty terminal program.

Launch Putty, configure the serial port parameters and "open" a connection to the serial port.

- You must select "Serial" as your connection type.
- Enter COMxx on the host name field where xx is the port number you noted in the Computer Management utility. For example "com21".
- Set the baud rate to 9600
- Enter a name for this connection in the "Saved Sessions" field. This can be any text like Watt Meter.
- Then click on the "open" button and you will be connected to the watt meter.

## Configuring the Putty session

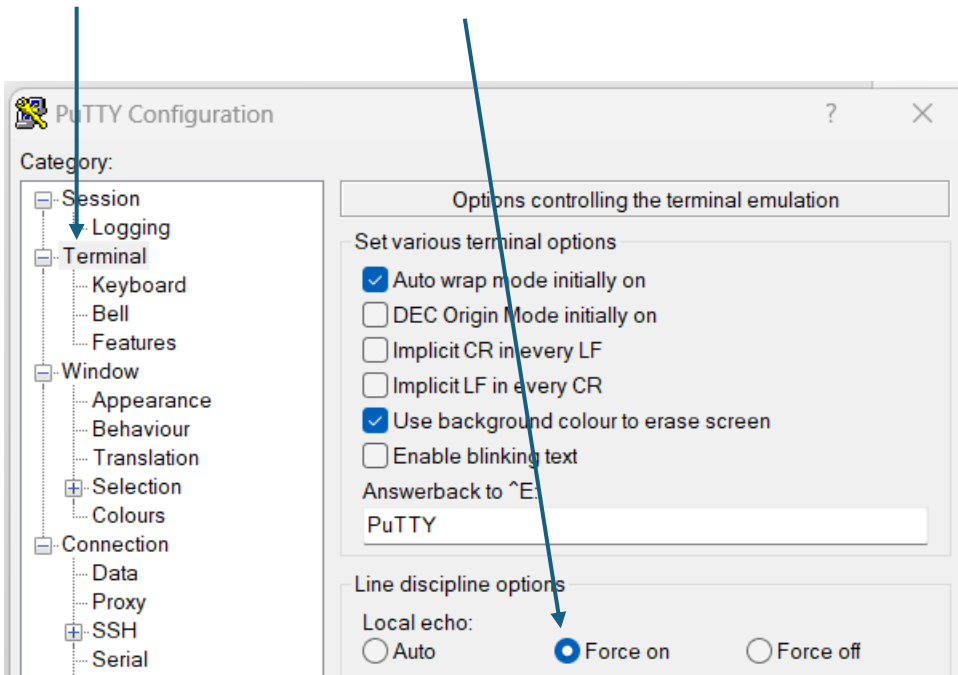


The screenshot shows the PuTTY Configuration dialog box with the following settings and annotations:

- Category:** Connection
- Basic options for your PuTTY session:**
  - Specify the destination you want to connect to:
    - Serial line: COM21 (Annotation: Enter the COM port number.)
    - Speed: 9600 (Annotation: Enter 9600)
  - Connection type: Serial (Selected) (Annotation: Select Serial)
- Load, save or delete a stored session:**
  - Saved Sessions: Watt Meter (Annotation: Enter connection name)
  - Default Settings: Station Controller 192 168 1 58, Watt Meter
  - Buttons: Load, Save (Annotation: Click save), Delete
- Close window on exit:** Only on clean exit (Selected) (Annotation: Click open)
- Buttons:** About, Help, Open, Cancel

## Configuring the Putty session

Select the “Terminal” menu. Turn on local echo.



Now that you have established a connection with the console port, you can enter commands and get information about the state of the control module.

The commands you use are the same as the commands that the Node Red dashboard uses to communicate with the module.

On the console, all commands are prefixed by a //

For example the command HELP would be entered as **//HELP**

The most common command you will want to use is the LABEL commands that assign text to be displayed on the module’s LCD display, if one is installed.

To list all current labels enter the command:

**//LABEL**

The module will return a list of all current labels.

To change a label uses the command **//LABELn, YOURTEXT**

Where n, is the antenna port number 1..4 and YOURTEXT is the text you want on the display.

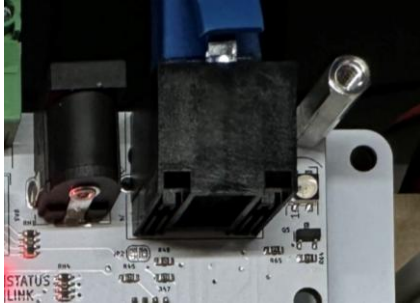
For example if port 2 is connected to your 20m Yagi beam antenna you might want to enter:

**//LABEL2 , 20M YAGI**

Labels can be up to 13 Characters long and can contain spaces.

## DCN Device Control Network Jack

The DIP switches set the devices network address and operating mode.



The DCN port is an RJ45 modular connector and is used to communicate with the main dashboard computer, typically a Raspberry Pi. The DCN jack can also accept or supply the 12v DC system power. If you supply 12 VDC to the Raspberry Pi host adapter board, the only connection you need to a control module like the coax relay module is just a piece of CAT5 or CAT6 cable.

## Optional LCD Display



The optional LCD display is not necessary but it does provide a convenient way to see what the current state of the control module. In the case of the coax relay module, it shows the currently selected port and an optional text label.

The LCD display can be unplugged and plugged back in at any time but we recommend doing this with the power off. The controller will automatically start displaying information when the LCD is plugged in and the power is applied to the module.