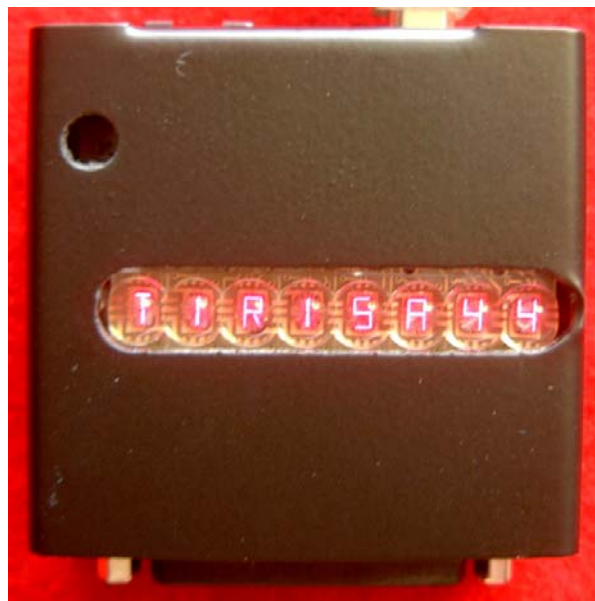
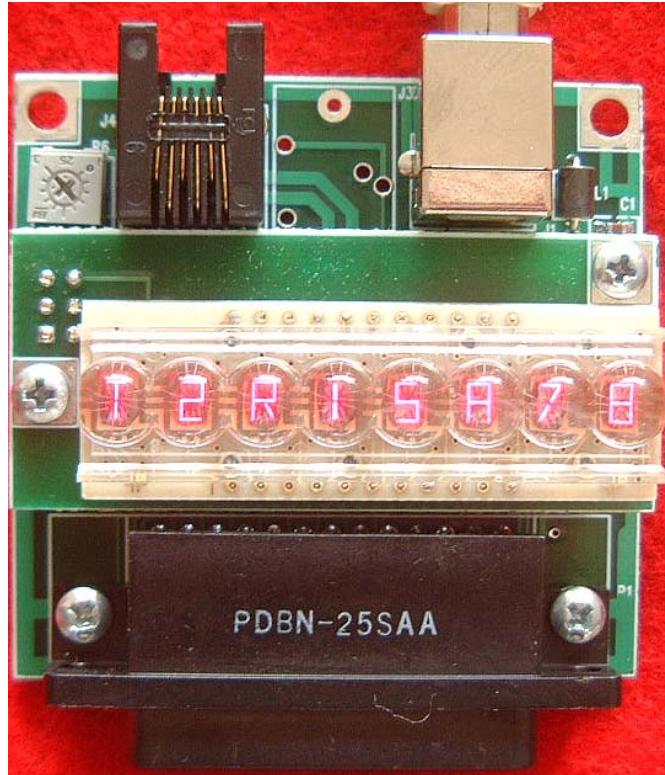




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SO2Rxlatt USB Serial to LPT SO2R Translation Board Version 8B firmware



Functional Description

The PIEXX SO2Rxlat board is a USB device that will translate MK2R style serial commands to the appropriate signal levels that would normally be generated on a computers LPT port. The SO2Rxlat board will allow operators of LPT port based peripherals to use newer computers that lack a LPT port. The SO2Rxlat responds to commands that allow for Transmit Focus, Receive Focus, Radio Select, Stereo Enable as well as 2 separate 4 bit BCD outputs for band / antenna selection.

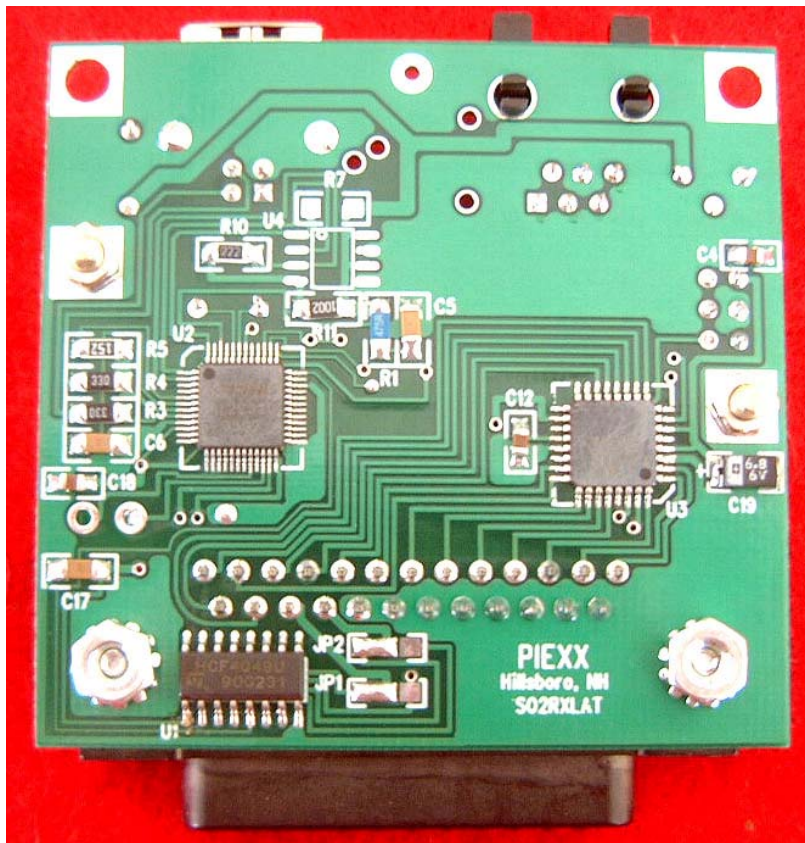
The SO2Rxlat board incorporates 2 USB serial ports. The first port is used as the communications device to the SO2Rxlat boards controller. This controller handles the task of converting MK2R style serial commands to the appropriate LPT functions. The second serial port does double duty. The first job of the second serial port is to develop the CW and PTT signals from its DTR and RTS handshake line outputs. This leaves the second serial ports communications path, TX and RX lines, available to perform general purpose rig control tasks. The second serial port can be purchased as either a standard RS-232 port or a CI-V (Icom) style communications port.

Setting The Jumpers

There are 2, 3-pin jumpers on the rear of the SO2Rxlat board that are used to set the polarity of the PTT and CW output signals relative to the asserted state of the RTS and DTR handshake lines on the second serial port. The 3-pin jumpers are set by placing a solder pad short between the center pad and either the left or right pad. Do not short all three pads!

Jumper	Signal	Handshake	Setting
JP1	PTT	RTS	If the left pads are jumpered the output will go to +5 when RTS is asserted. If the right pads are jumpered the output will go to 0V when RTS is asserted.
JP2	CW	DTR	If the left pads are jumpered the output will go to +5 when DTR is asserted. If the right pads are jumpered the output will go to 0V when DTR is asserted.

As shipped, the jumpers are set so that PTT and CW will be in the logic HIGH state when RTS and DTR are asserted.



JP1 and JP2 jumpered such that PTT and CW got to +5 VDC when RTS and DTR are asserted.

Setting the Mode POT

Pot R6, located in the upper left of the SO2Rxlat board, is used to set one of four possible operating modes as follows:

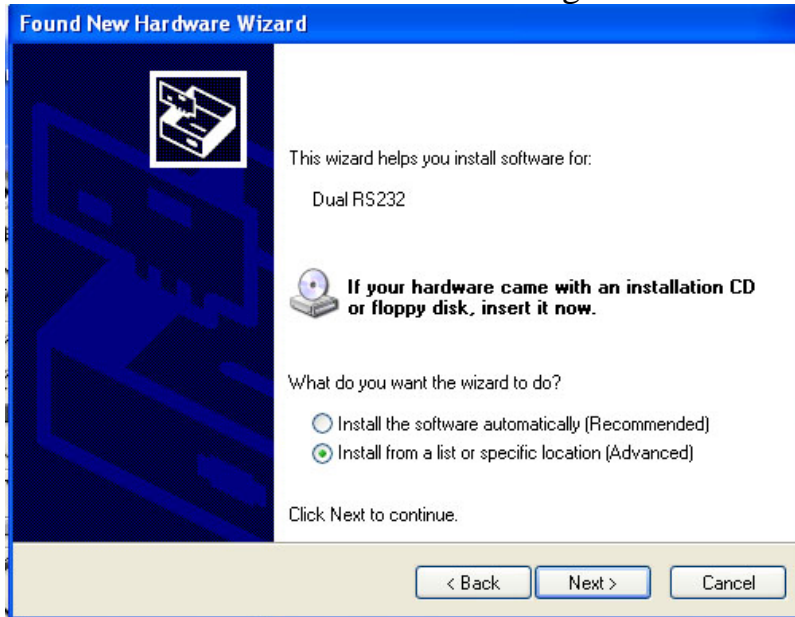
- Pot R6 adjusted fully counterclockwise. The communications rate to the SO2Rxlat controller is set for 4800 baud and the display, if installed, will be in the data mode. If no display is installed on your SO2Rxlat board, use this setting to select 4800 baud.
- Pot R6 adjusted fully clockwise. The communications rate to the SO2Rxlat controller is set for 9600 baud and the display, if installed, will be in the data mode. If no display is installed on your SO2Rxlat board, use this setting to select 9600 baud.
- Pot R6 adjusted more than $\frac{1}{4}$ rotation from the fully counterclockwise position, but less than $\frac{1}{2}$ of fully clockwise. The communications rate to the SO2Rxlat controller is set for 4800 baud and the display, will be in the text mode.
- Pot R6 adjusted less than $\frac{1}{4}$ rotation from the fully clockwise position, but more than $\frac{1}{2}$ of fully clockwise. The communications rate to the SO2Rxlat controller is set for 9600 baud and the display, will be in the text mode.

The SO2Rxlat board is shipped with the pot set fully clockwise; 9600 baud.

Loading the USB drivers

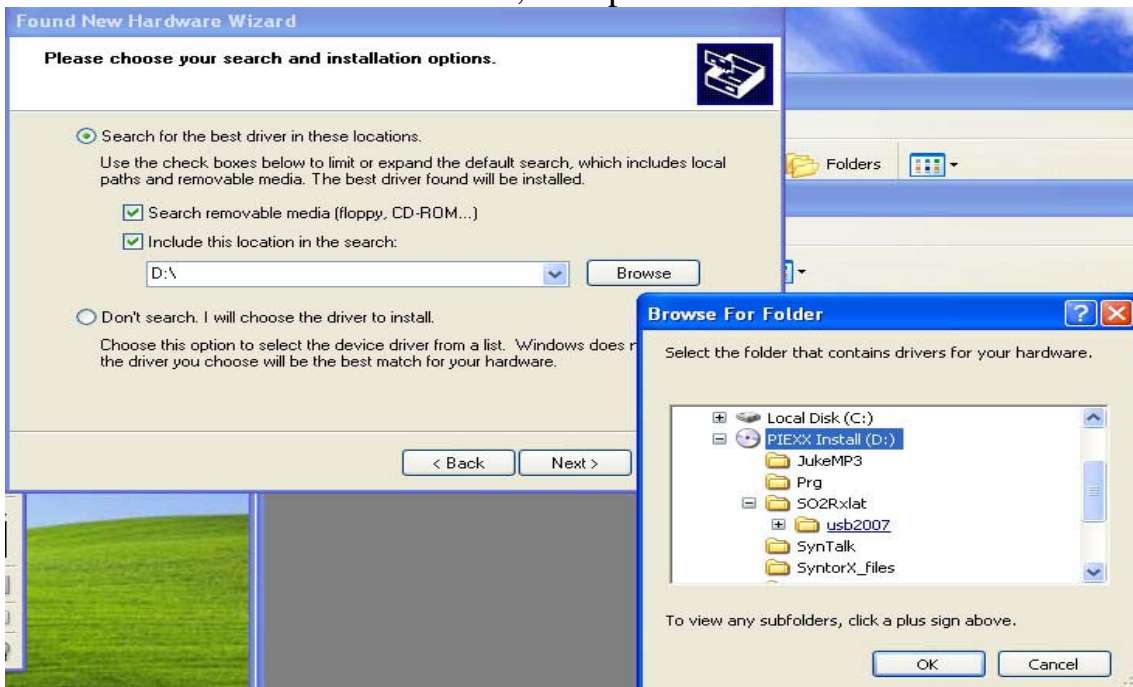
The SO2Rxlat board uses a FTDI 2232 USB to serial port chip which has become a very popular device to provide serial port functionality. This device is a well-behaved product and installation of the drivers is done in a common fashion. If you are familiar with loading drivers in a Windows XP environment, skip this section and proceed as usual, otherwise you may follow these step-by-step instructions.

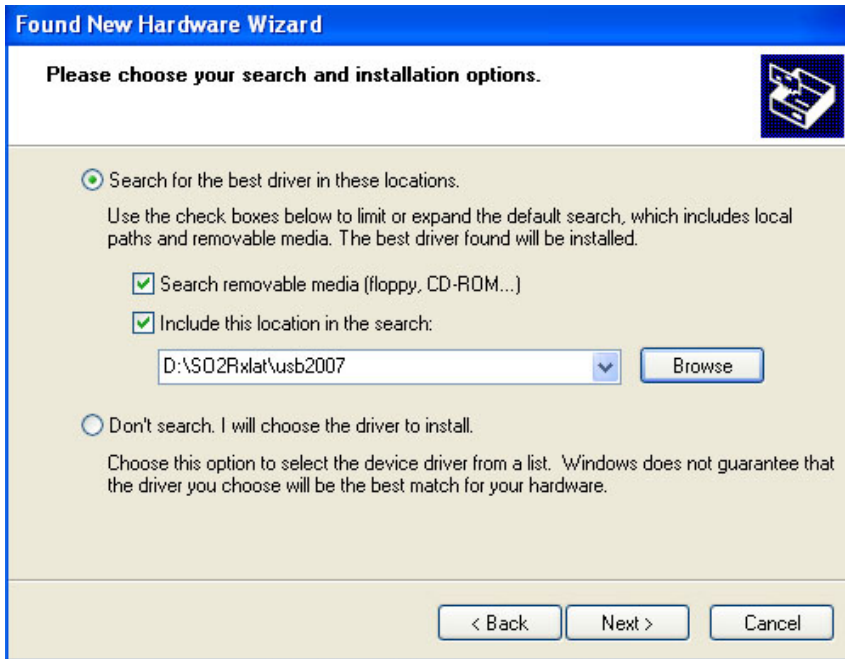
When you first plug in the SO2Rxlat board into your Windows system you will see the new hardware detected message...



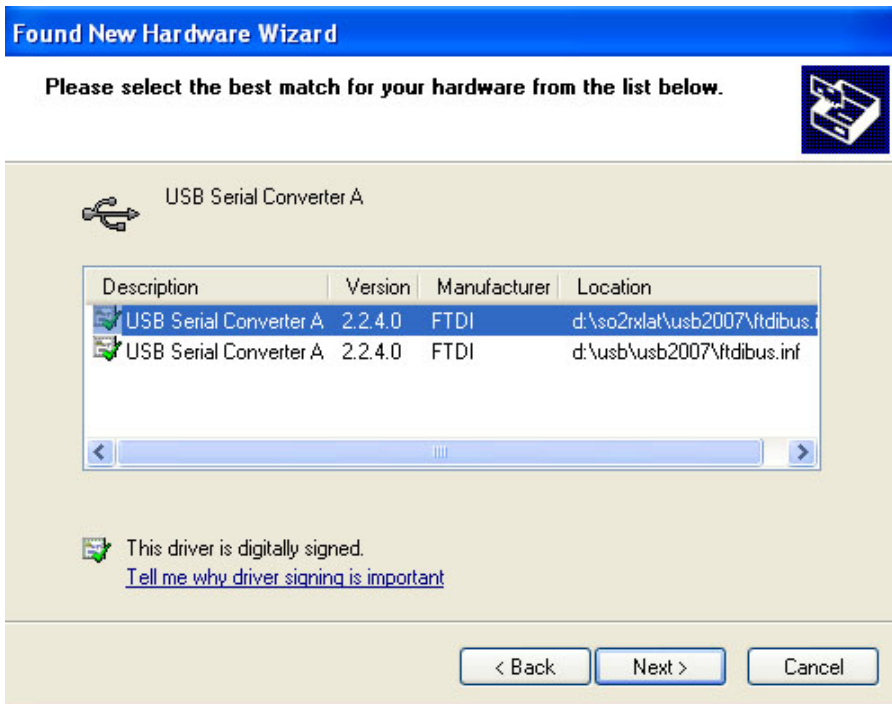
Select the ‘Install from a list or specific location’ radio button and press Next.

Make sure the PIEXX Install CD is installed in your CD drive, then browse to the SO2Rxlat then usb2007 folder, then press next





The system will do a bit of searching as it searches for the driver...



Make sure the latest driver is highlighted, then press Next.



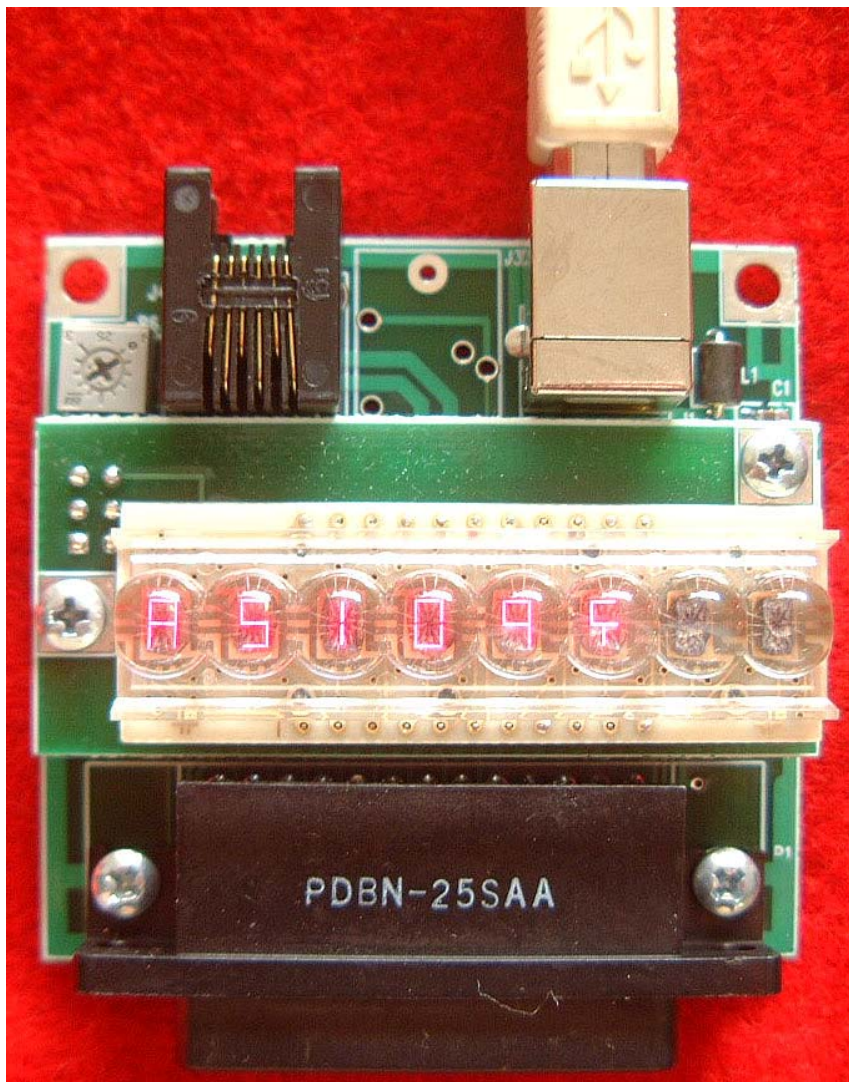
After the driver is loaded, click finish.

Since there are 2 serial ports on the SO2Rxlat board, this procedure will repeat as it loads the second, same, driver. Just follow the previous installation instructions a second time.

Data Display

The data display can operate in two different modes depending on the setting of the Mode POT. The two modes are the text mode, which is useful for debugging communications protocol problems, or the data mode, which gives a visual representation of the states of the output lines.

In the text mode the display will show the data that the SO2Rxlate board has received on its serial port. The display will scroll in this information line by line with a 2-3 second pause each time it receives a carriage return character. The display buffer in the SO2Rxlat is approximately 200 characters long. If more than the maximum amount of data is received, the SO2Rxlat will forego the friendly formatting of data until the buffer has become sufficiently emptied to display normally.

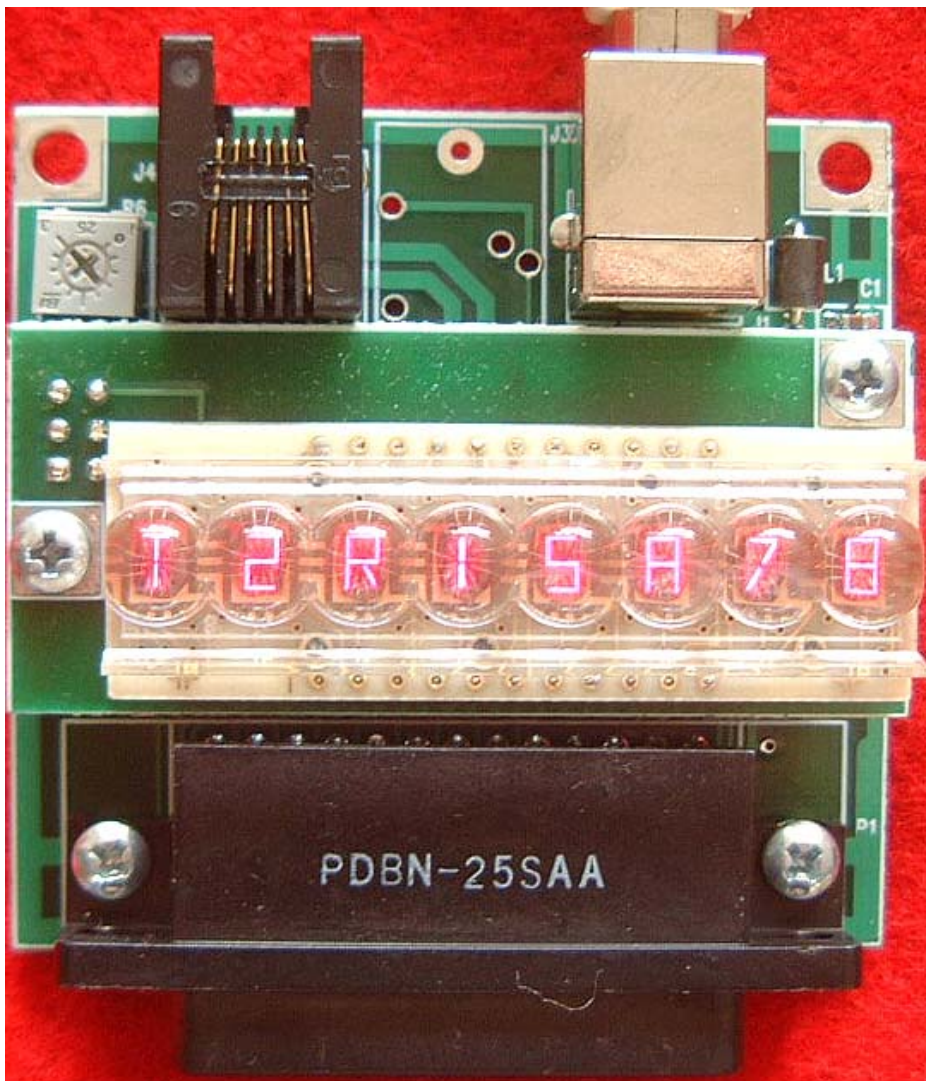


Display in the text mode. The display is showing that the SO2Rxlat has received a data line of “AS109cr”. The last visible symbol on the line is the representation of a carriage return character.

When the display is in the data mode, the 8 digits of the display are used to indicate the status of the various I/O lines generated by the SO2Rxlat board. As an example, the display:

T 2 R 1 S A 9 8

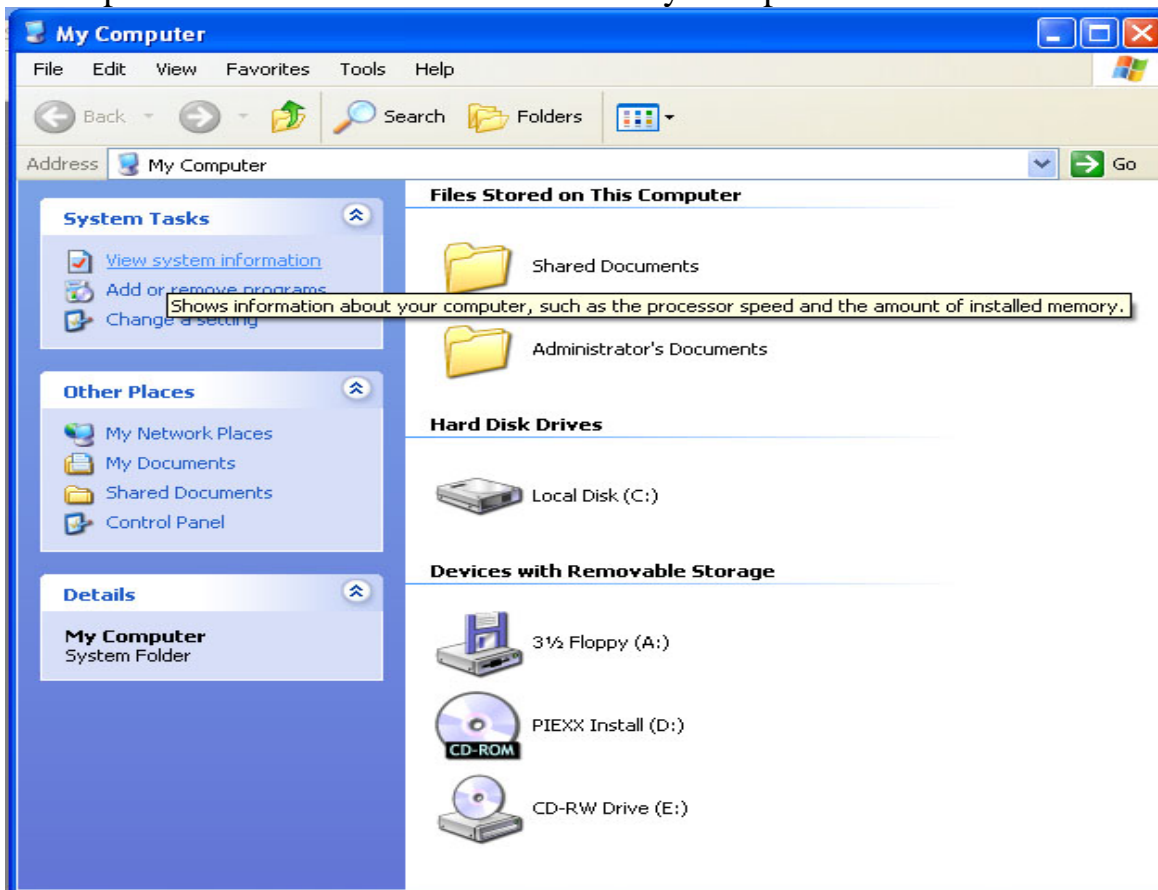
Indicates, starting from the left, that Transmitter 2 is selected, Receiver 1 is selected, the Stereo mode is selected, antenna 1 is set to 9 and antenna 2 is set to 8.



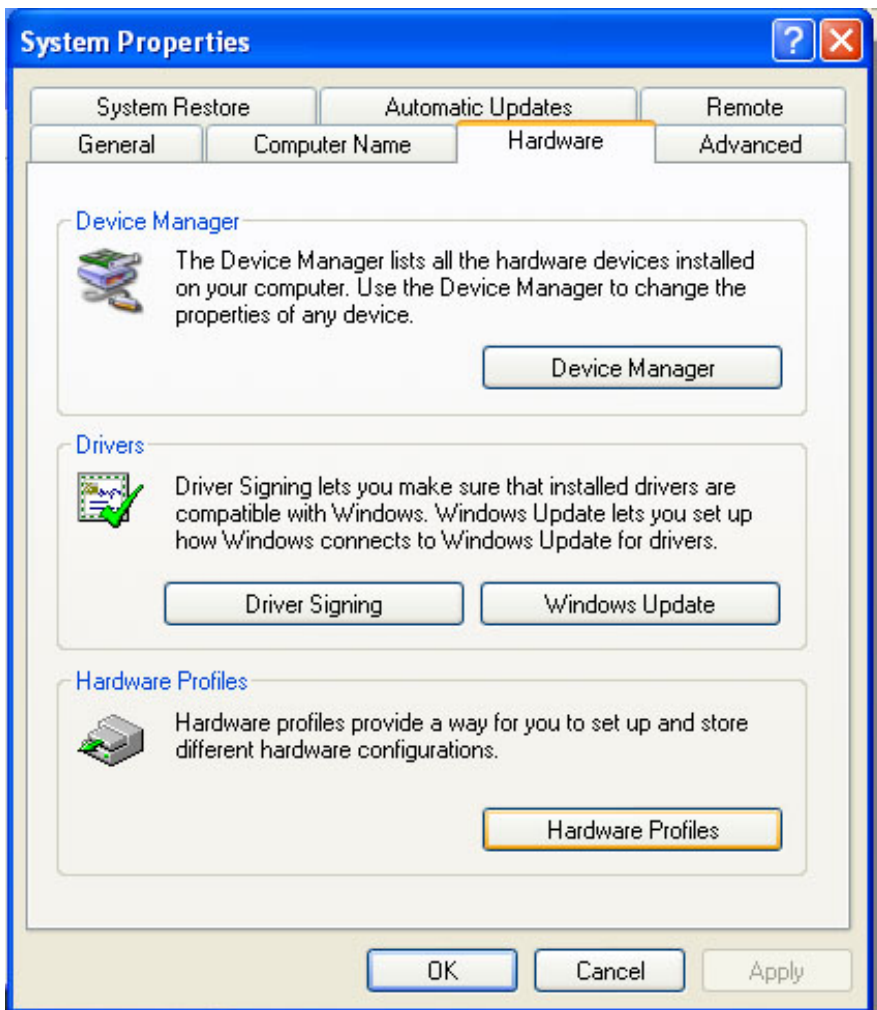
Use Device Manager to determine / change the com port assignments

After you load the SO2Rxlat drivers, two new communications ports will be available to your computer. You will need to use the windows Device Manager tools to determine at what com port addresses these new devices reside. In addition, you can use Device Manager to re-assign these ports to more appropriate values.

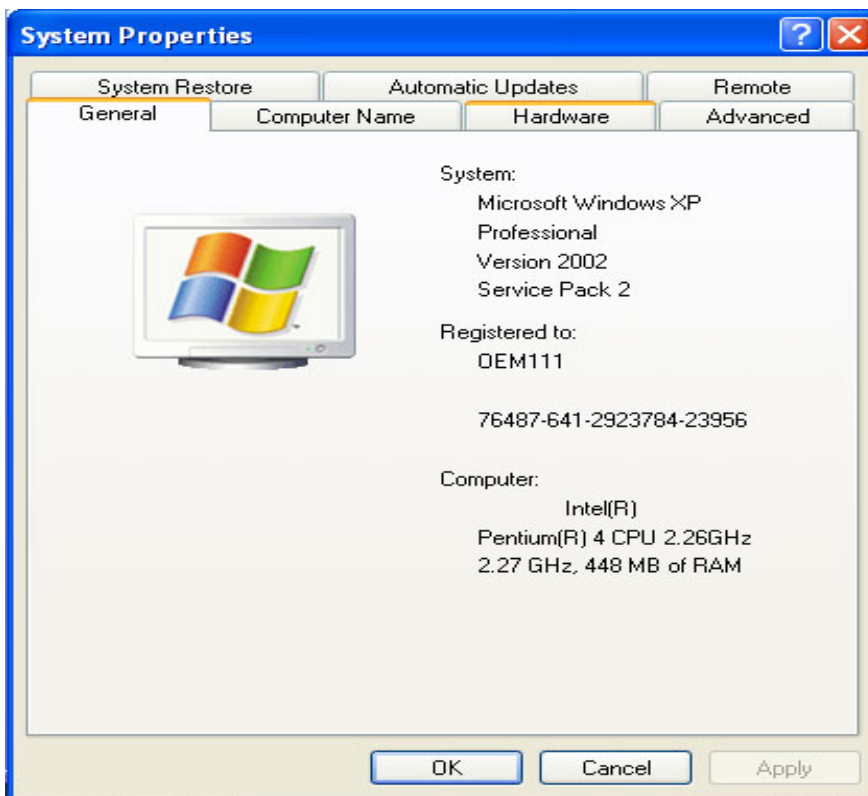
To get to the Device Manager, either double click My Computer on your desktop or click the Start button and then My Computer.



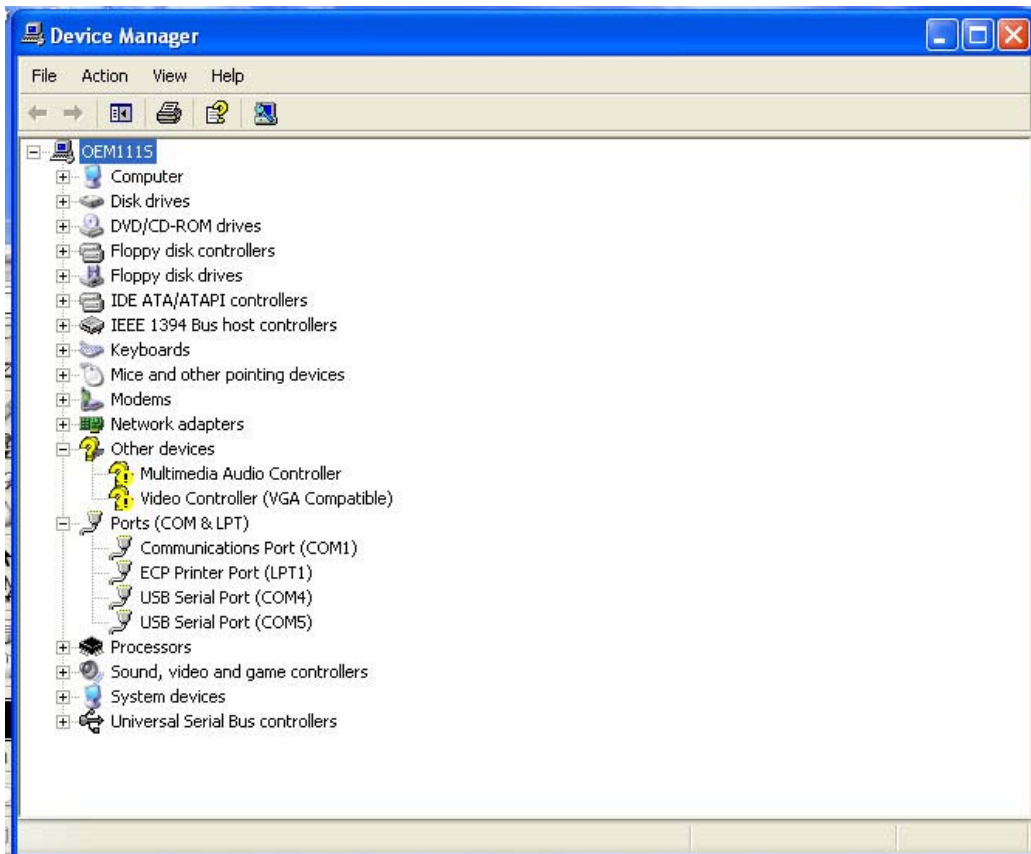
Now click the View System information button under the System Tasks



From the System Properties page, click the Device Manager button.



Next, click the Hardware tab.



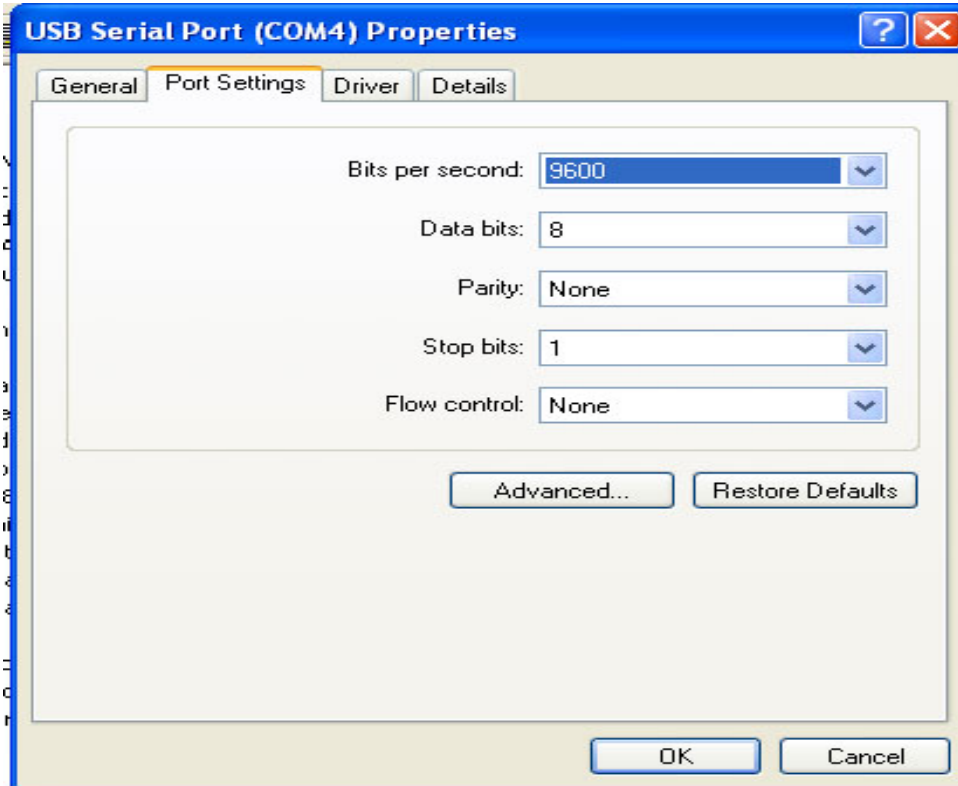
Now, click the small + sign next to the Ports (COM & LPT) to expand the view of the available ports.

You should see at least two USB serial ports. If you have other serial USB adapters connected to your system you will see more than two USB serial ports. You can determine which of the ports is associated with the SO2Rxlat board by un-plugging the USB cable from the SO2Rxlat and noticing which ports leave the list of available COM ports. If you unplug the SO2Rxlat, make sure you plug it back in and you should see the 2 COM ports associated with it re-appear in the list. Be patient it might take a few seconds for your computer to re-establish connectivity with the SO2Rxlat board.

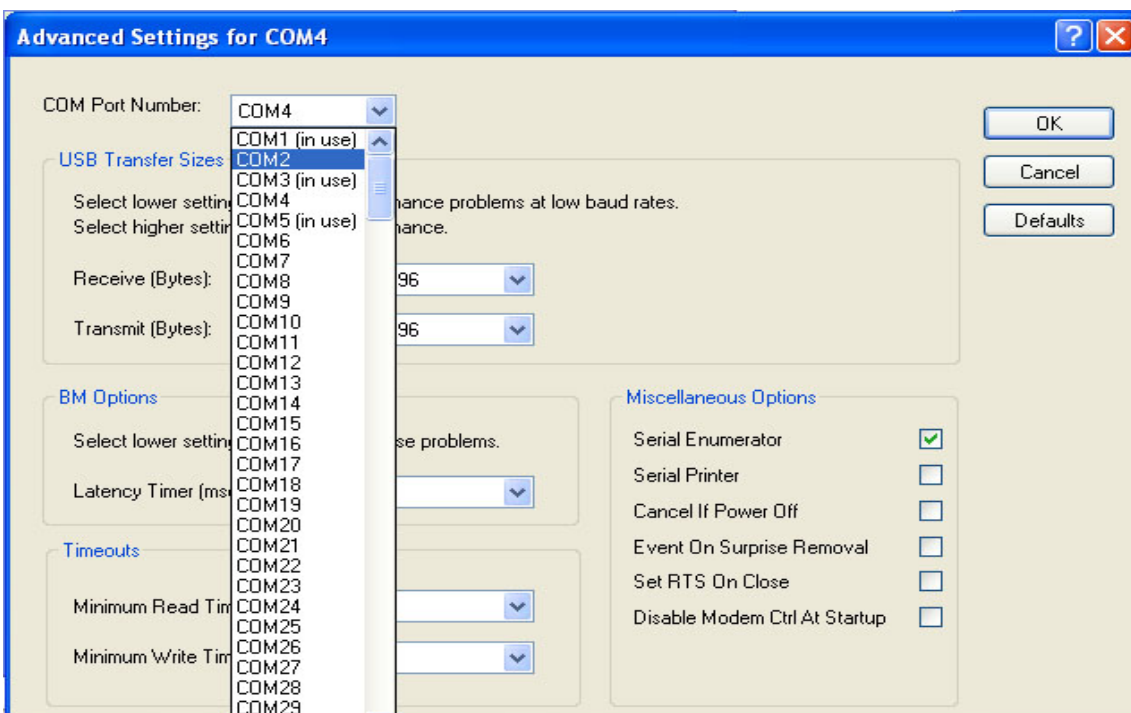
Now that you can see the 2 SO2Rxlat board ports, you may want to re-assign them to different COM port addresses. Usually the lower number port will be the port that communicates with the SO2Rxlat controller and the higher number port will be the 2nd serial port that is used to generate the PTT and CW signals as well as possibly being used as a rig control port. In the example above, the computer assigned COM4 to the SO2Rxlat controller and COM5 to the 2nd serial port.

It will be a good idea to re-assign the 2nd serial port to one in the address range of COM1 to COM4 because some logging software, N1MM for example, wants

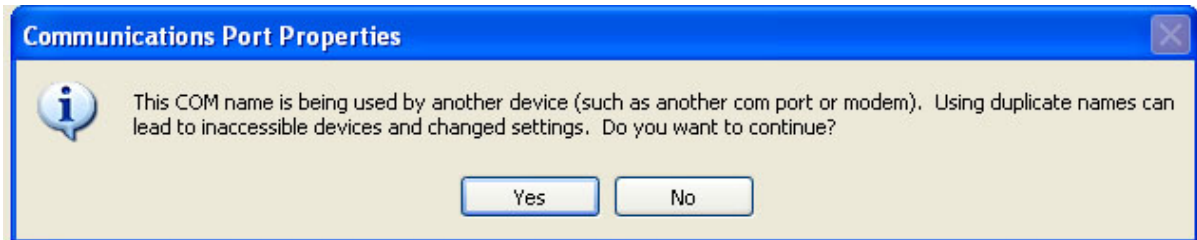
to have CW and PTT generated from a COM port in this address range. In the example shown above, COM1 is a port provided on the motherboard, so this COM port is not available for use, so for this example, you may have different com ports shown on your system so use what you have) lets change the 2nd serial port to COM3. To accomplish this, double click the USB Serial Port (COM5) device in the Device Manager listing, and then select the Port Settings tab.



Next, click the Advanced button.



Click the check mark next to the COM Port Number and select COM3, or whatever COM port number you want the 2nd serial port on in your system. Don't worry if the list says that the COM port is in use, unless of course it showed up previously in the Device manager as really being in use! Now, press the OK button.



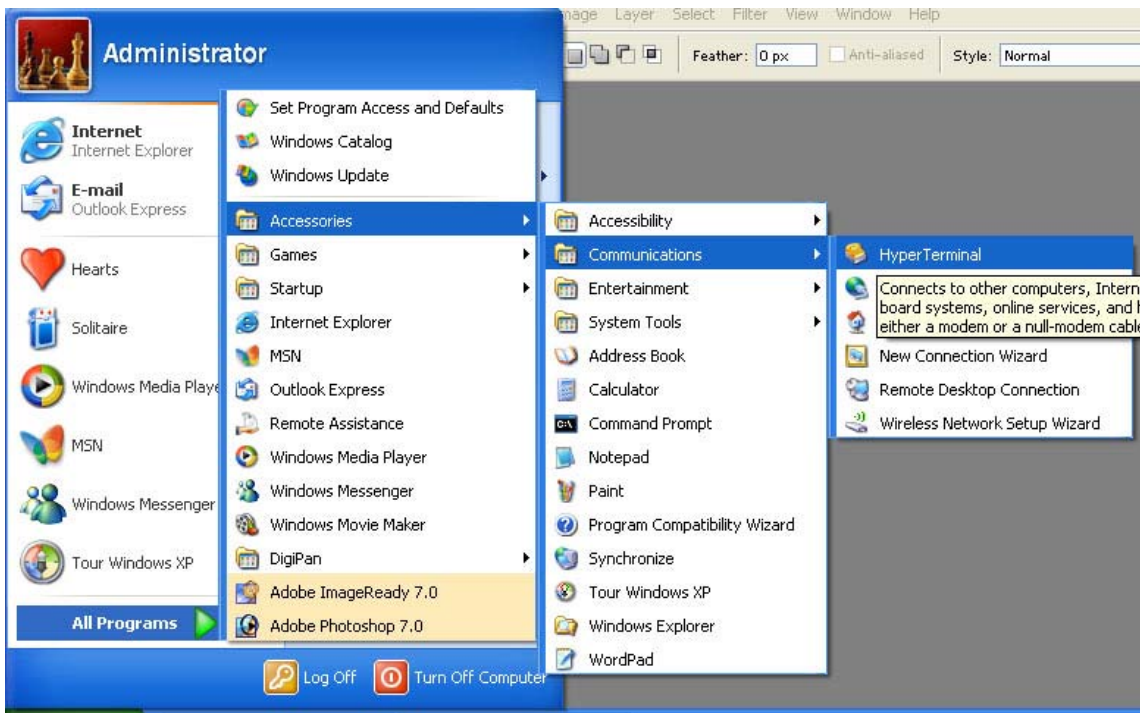
If the computer warns you that the port may be in use by another device, press the yes to tell the system to make the change anyway.

Press OK to leave the USB Serial Port device properties dialog box and then exit Device Manager. ***After changing COM Port addresses, it may be necessary to reboot your computer to have the changes take effect. So, reboot your computer now!***

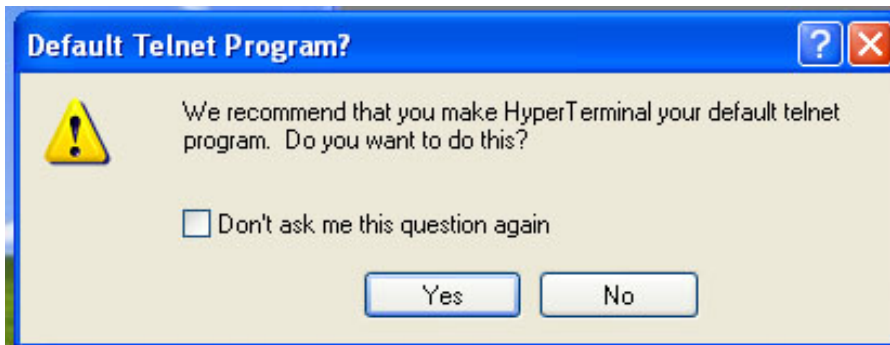
Using HyperTerminal to check connectivity to the SO2Rxlat

You can use the Windows Hyper Terminal program to make sure that you can communicate with the SO2Rxlat board. To do this we will connect to the COM port address that is associated with the SO2Rxlat controller, which is COM4 in the example shown above. This port is usually the lower port number that you saw after you first added the SO2Rxlat board, not the 2nd port whose address you changed. If in doubt, you can always use the techniques outlined below to check both ports.

To start Hyper Terminal click the Start button, then put your mouse over All Programs, then Accessories, then Communications and finally click Hyper Terminal.



If this is the first time you have run Hyper Terminal, you may see the Default Telnet Program dialog, click Yes or No as you see fit.



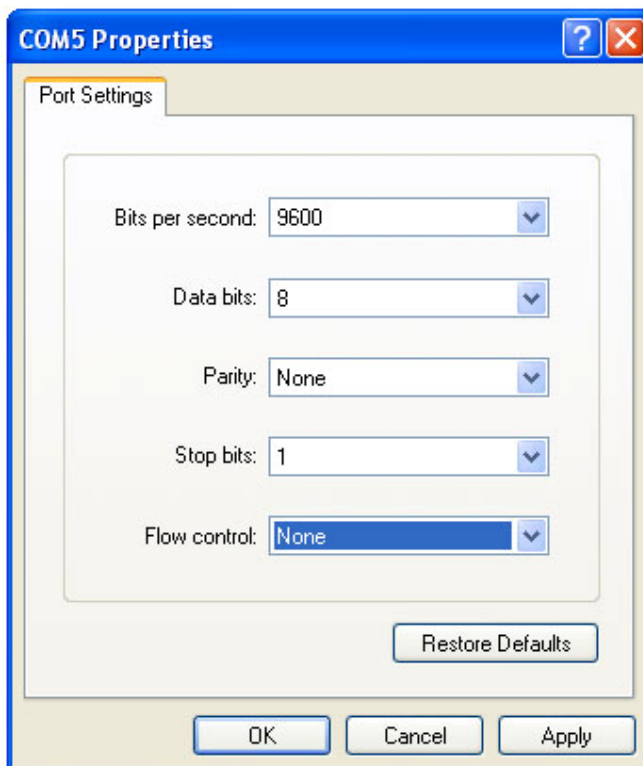
In the New connection box type a name, I used comm5 in my example, but it is just a name you can call it anything you like.



In the Connect To dialog, press the check mark next to the Connect using drop down box and select the COM port associated with the SO2Rxlat controller. This is COM5 on our sample system. Press the OK button.



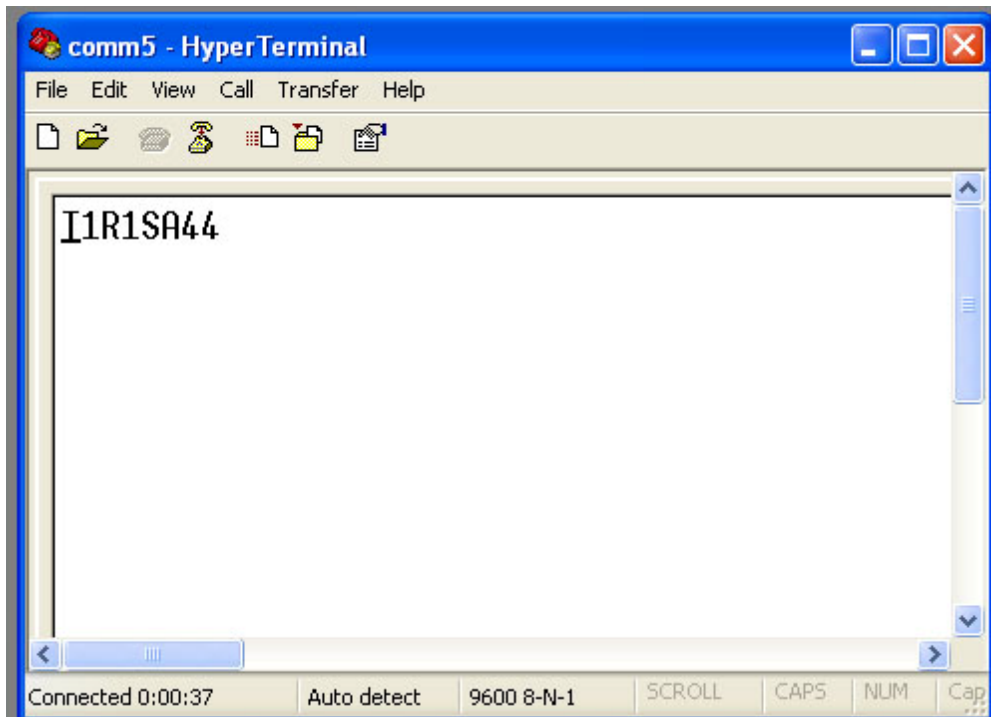
Next you will need to set the Port Settings parameters. The Bits per second field should be set in accordance with the COM data rate selected earlier with the Mode Pot (R6) setting. If you set the pot fully clockwise, as shipped from PIEXX, you will use 9600 in the Bits per second field. Make sure you set the Flow control to None, this is important! Now press Apply.



Now you will see a blank Hyper Terminal program box. Put your cursor in the box and type:

px?

That is the letter p followed by the letter x followed by a ? and finally press the enter button on your keyboard. If all is well the SO2Rxlat board will return a string of 8 characters that indicates the current status of the SO2R output lines.



When you are finished with the experiment, you should close the Hyper Terminal program. If you leave Hyper Terminal open, your rig control software will not be able to access the COM port that is open with Hyper Terminal.

Setting the polarity of the switch inputs

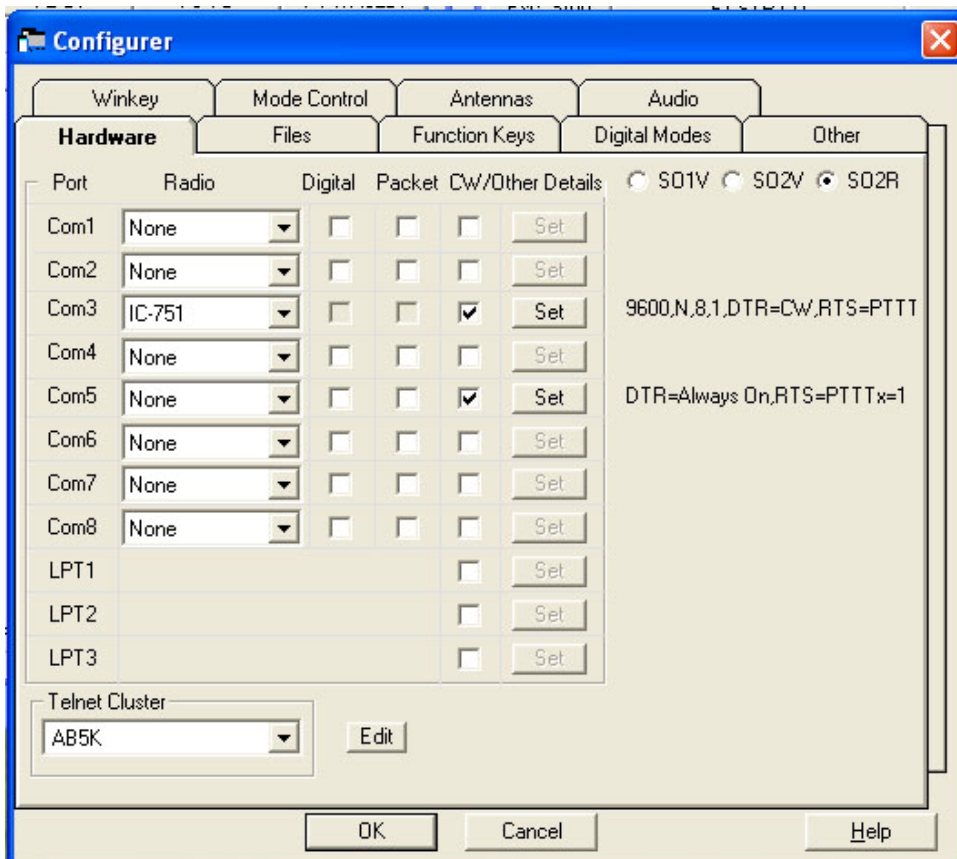
The SO2Rxlat board has 2 inputs that can be read by the rig control software. In the OSTRP protocol these inputs correspond to P1 pins 15, for CR0, and pin 6 for CR1. By default the switches will be identified as active when the corresponding input is pulled low to ground. However this can be modified by use of the FSP (foot switch polarity) command. “FSP00(cr)” sets the input switches to the default condition. “FSP10(cr)” sets foot switch 1 (CR0) to the active high or active when floating state. “FSP01(cr)” sets foot switch 2 (CR1) to the active high or active when floating state. Finally, “FSP11(cr)” sets foot switches 1 and 2 to the active high or active when floating state. Sending the FSPxx command will also save the foot switch polarity in the SO2Rxlat non volatile ram such that the sent value will become the power up state of the SO2Rxlat. You can also determine the current foot switch input polarity in force by sending “?FSP(cr)”.

Setting up the N1MM program to use with your SO2Rxlat board

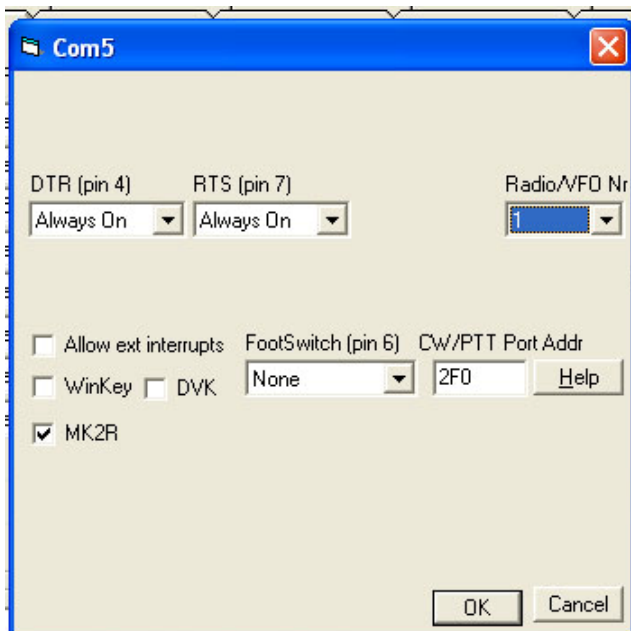
The SO2Rxlat board will work with any logging program that supports the MK2R serial protocol. The sample provided below shows how to set up one specific program, N1MM, to operate in conjunction with the PIEXX device.

In the following example, the SO2Rxlat controller is attached to COM5 and the 2nd serial port is attached to COM3. In our setup, COM3 is used for PTT and CW as well as being used for rig control on a IC-751.

Start the N1MM program, then enter Hardware Configure by selecting the Config tab then clicking Configure Ports, Telnet Address, Other. Click on the Hardware tab.



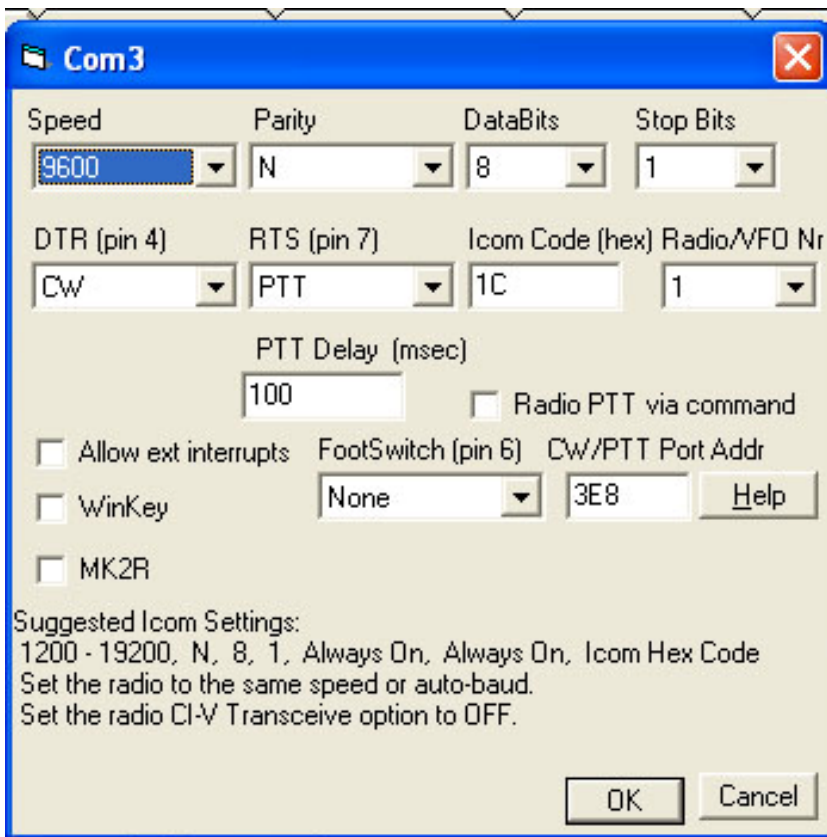
Select the CW/Other check box on both COM3 and COM5. Both of these ports will be used for these functions. In this example COM3 is also used for rig control of a IC-751 transceiver, so the Radio type for COM3 is set to a IC-751. If you are not using the 2nd serial port for rig control, leave the radio type set as None. Next, press the Set button associated with COM5.



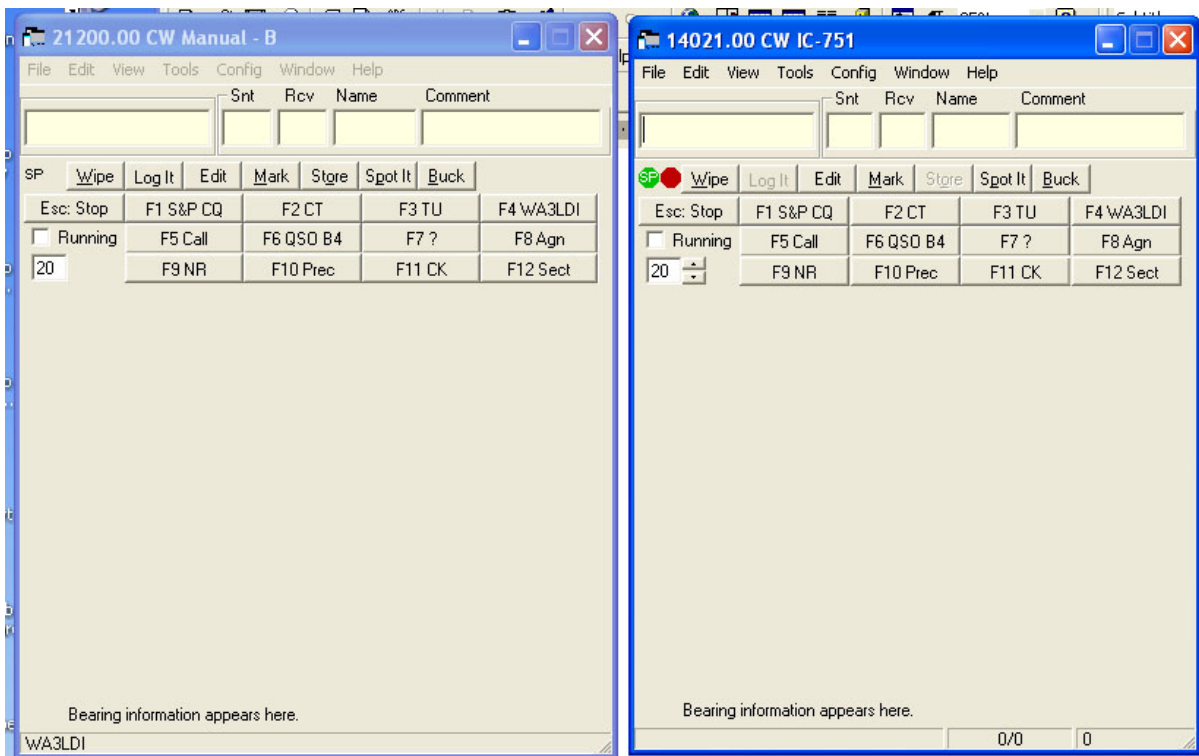
In the Com5 dialog box, press the MK2R button. This lets N1MM know to send SO2R related commands to this port. Press OK.

Next, press the Set button associated with Com3. In this dialog box you will be setting the parameters associated with PTT, CW and, in our case, rig control of the IC-751. Select CW in the DTR (pin 4) drop down box. Select PTT in the RTS (pin 7) drop down box.. NOTE: The PTT signal is generated on pin 16 of the SO2Rxl at P1 connector and CW is available on pin 17 of this connector. Set the PTT delay to a reasonable value, 100 msec is probably OK. The CW/PTT port address should be set for the appropriate value for the hardware associated with the chosen COM port. If you selected a COM port number between 1 and 4 for the 2nd serial port, as we did in this example at COM3, then the default value N1MM enters in this address should be fine. If you did not select a COM1-COM4 address for the 2nd serial port, beware!

In addition, we set the Speed, Parity, DataBits, Stop Bits, Icom Code to the appropriate values for our IC-751.



Press OK to complete the configuration of COM3.



N1MM should now be set up to communicate with the SO2Rxlax board. You definitely need to read your N1MM manual for operating instructions, but as a quick test you should see the SO2Rxlax change the receive focus in accordance with which radio is highlighted.

If you press the ~ key on your keyboard (don't hold the shift key you are really selecting the ` key) you will see the SO2Rxlat respond by toggling between the Stereo and Mono modes.

Changing bands, on a radio connected with rig control to the N1MM program, this is the IC-751 in our setup, will cause the antenna select BCD value change on the SO2Rxlat board.

Serial Protocol and Valid commands-

The communications to the SO2Rxlat can be either 9600 or 4800 baud, as determined by the setting of the Mode POT. All communications expect 8 data bits, 1 stop bit and no parity bit. All command lines are terminated with a carriage return character. Letter data is not sensitive to the case. That is, the SO2Rxlat translates all received alphabetic characters to upper case. The line feed character, if received, is ignored.

The SO2Rxlat board will respond to the following commands:

AS1xx, where xx can be 1-9 or 01 to 09. This command sets the state of the antenna select lines for antenna 1.

AS2xx, where xx can be 1-9 or 01 to 09. This command sets the state of the antenna select lines for antenna 2.

FT1 – Selects transmitter 1. This command sets pin 14 to a high state and resets pin 3 to a low state.

FT2 – Selects transmitter 2. This command sets pin 3 to a high state and resets pin 14 to a low state.

FR1 – Selects receiver 1 which sets P1 pin 4 to a low state. This command also turns off the Stereo bit setting P1 pin 5 to a low state.

FR2 – Selects receiver 2 which sets P1 pin 4 to a high state. This command also turns off the Stereo bit setting P1 pin 5 to a low state.

FRS – Turns the Stereo bit on. If the display is in the data mode, the 5th character changes between S and M. P1 pin 5 goes to a high state when this command is issued.

H – Reads the status of the 2 foot switch inputs. This command returns: HXY(CR) Where X is the on off state of footswitch 1 and Y is the state of foot switch 2. X and Y will be either a 0, if the switch is open or 1 if the switch is closed.

PXRESET – Resets the SO2Rxlat board. This command, in conjunction with a specific PC program, is used to reflash the board.

PX? – This command requests the status of the SO2Rxlat board. The SO2Rxlat will return a string of 8 characters, in exactly the same format as the display in the DISPLAY mode, followed by a carriage return character.

DEFAULT – This command is used to set the power on state of the SO2Rxlat. Once you have the outputs defined the way you want them to be on power up, issue the DEFAULT command and they will be saved into nonvolatile memory.

OTRSP Commands:

Serial communications with the OTRSP protocol expects a comm. Port rate of 9600 BAUD. If you have no display on your SO2Rxlat, set the configuration pot full clockwise. All communications expect 8 data bits, 1 stop bit and no parity bit. All command lines are terminated with a carriage return character. Letter data is not sensitive to the case. That is, the SO2Rxlat translates all received alphabetic characters to upper case. The line feed character, if received, is ignored.

“AUX1xx”, where xx can be 1-9 or 01 to 09. This command sets the state of the antenna select lines for antenna 1.

“?AUX1” – This command requests the state of the AUX1 outputs. The SO2Rxlat will respond with “AUX1xx(cr)” where xx is the value of the antenna 1 select lines.

“AUX2xx”, where xx can be 1-9 or 01 to 09. This command sets the state of the antenna select lines for antenna 2.

“?AUX2” – This command requests the state of the AUX2 outputs. The SO2Rxlat will respond with “AUX2xx(cr)” where xx is the value of the antenna 2 select lines.

“TX1” – Selects transmitter 1. This command sets pin 14 to a high state and resets pin 3 to a low state.

“TX2” – Selects transmitter 2. This command sets pin 3 to a high state and resets pin 14 to a low state.

“?TX” – This command requests the state of the currently selected transmitter. The SO2Rxlat will respond with “TX1(cr)” if transmitter 1 is selected, or “TX2(cr)” if transmitter 2 is selected.

“ETXx”, where x is 0 or 1 – This command enables (argument sent is 1) or disables (argument sent is 0) the unsolicited mode for changes made to the TX status. If ETX1 is sent, the SO2Rxlat will respond with \$TXx (x will be 1 or 2) when a TX focus command is sent. There is a 50mS dwell between the change

of TX focus and the \$TXx command response to allow for switching time in the equipment

“?ETX” – This command requests the state of unsolicited mode enable status for TX commands.

“RX1” – Selects receiver 1 which sets P1 pin 4 to a low state. This command also turns off the Stereo bit setting P1 pin 5 to a low state.

“RX2” – Selects receiver 2 which sets P1 pin 4 to a high state. This command also turns off the Stereo bit setting P1 pin 5 to a low state.

“RX1S” – Selects receiver 1 which sets P1 pin 4 to a low state. This command also turns on the Stereo bit setting P1 pin 5 to a high state.

“RX2S” – Selects receiver 2 which sets P1 pin 4 to a high state. This command also turns on the Stereo bit setting P1 pin 5 to a high state.

“?RX” – This command requests the state of the currently selected receiver. The SO2Rxlat will respond with “RX1(cr)” if receiver 1 is selected, or “RX2(cr)” if receiver 2 is selected in the mono mode. The SO2Rxlat will respond with “RX1S(cr)” if receiver 1 is selected, or “RX2S(cr)” if receiver 2 is selected in the stereo mode.

“ERXx”, where x is 0 or 1 – This command enables (argument sent is 1) or disables (argument sent is 0) the unsolicited mode for changes made to the RX status. If ERX1 is sent, the SO2Rxlat will respond with \$RXx (x will be 1 or 2) when a RX focus command is sent.

“?ERX” – This command requests the state of unsolicited mode enable status for RX commands.

“?NAME” – This command requests the name and firmware version of the SO2Rxlat device. The SO2Rxlat will report this information, terminated with a carriage return character.

“?CR0” – This command requests the state of foot switch 1. Return will be “CR00(cr)” if the foot switch is open and “CR01(cr)” if the foot switch is activated.

“?CR1” – This command requests the state of foot switch 2. Return will be “CR10(cr)” if the foot switch is open and “CR11(cr)” if the foot switch is activated.

“ECR0x”, where x is 0 or 1 – This command enables (argument sent is 1) or disables (argument sent is 0) the unsolicited mode for foot switch 1. If the unsolicited mode for foot switch 1 is enabled, the SO2Rxlat will respond when the indicated foot switch changes state. If the switch is activated the SO2Rxlat will send “\$CR01(cr)”. If the user release the foot switch the SO2Rxlat will send “\$CR00(cr)”.

“ECR1x”, where x is 0 or 1 – This command enables (argument sent is 1) or disables (argument sent is 0) the unsolicited mode for foot switch 2. If the unsolicited mode for foot switch 2 is enabled, the SO2Rxlat will respond when the indicated foot switch changes state. If the switch is activated the SO2Rxlat will send “\$CR11(cr)”. If the user release the foot switch the SO2Rxlat will send “\$CR10(cr)”.

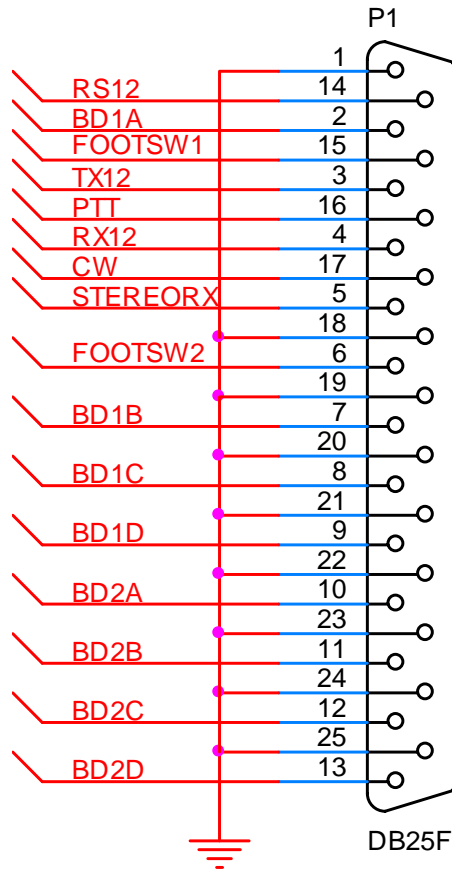
“?ECR0” – This command requests the state of unsolicited mode enable status for foot switch 1. If the unsolicited mode enable status is set to report unsolicited events on foot switch 1 then “ECR01(cr)” will be returned, else then “ECR00(cr)” will be returned.

“?ECR1” – This command requests the state of unsolicited mode enable status for foot switch 2. If the unsolicited mode enable status is set to report unsolicited events on foot switch 1 then “ECR11(cr)” will be returned, else then “ECR10(cr)” will be returned.

“FSPxy”, where x specifies the polarity of foot switch 1 and y specifies the polarity of foot switch 2. – This command can be used to alter the asserted state of the 2 foot switch inputs. The values of x and y can be either ‘0’ or ‘1’ with ‘0’ indicating that active state of the foot switch is when the foot switch input is tied low, and a ‘1’ indicates that the active state is when the input is tied high or left floating. Using this command updates the EEPROM (nonvolatile) memory setting in the SO2Rxlat for this parameter. That is, this parameter will be recalled through a power down up cycle of the SO2Rxlat.

“?FSP” – This command requests the current state of foot switch polarity modifier.

P1 Wiring



Pin Function

- 1 Ground.
- 2 Band (antenna) data for channel 1, data bit 0 (lsb).
- 3 Transmit focus. - This pin will go to a logic LOW level when radio 1 has TX focus and to a logic HIGH level when Radio 2 has TX focus. Pin 3 is the complement of Pin 14.

4 Receive focus. - This pin will go to a logic LOW level when radio 1 has RX focus and to a logic HIGH level when Radio 2 has RX focus.

5 Stereo select. This pin will be in a logic high state when stereo operation is requested. The FRS command sets this pin high, either FR1 or FR2 sets it low.

6 Foot switch input 2. This input is internally pulled high with a 2.2K resistor to +5VDC. Normally, this input is activated by a switch connecting this input to ground. This is a TTL level input! This input should not be pulled lower than ground level or higher than +5 VDC. The active state of the input is a function of the FSP programming. Please review the section on “Setting the polarity of the switch inputs”.

7 Band (antenna) data for channel 1, data bit 1.

8 Band (antenna) data for channel 1, data bit 2.

9 Band (antenna) data for channel 1, data bit 3 (msb).

10 Band (antenna) data for channel 2, data bit 0 (lsb).

11 Band (antenna) data for channel 1, data bit 1.

12 Band (antenna) data for channel 1, data bit 2.

13 Band (antenna) data for channel 1, data bit 3 (msb).

14 Radio Select A/B. - This pin will go to a logic HIGH level when radio 1 has TX focus and to a logic LOW level when Radio 2 has TX focus. Pin 14 is the complement of Pin 3.

15 Foot switch input 1. This input is internally pulled high with a 2.2K resistor to +5VDC. Normally, this input is activated by a switch connecting this input to ground. This is a TTL level input! This input should not be pulled lower than ground level or higher than +5 VDC. The active state of the input is a function of the FSP programming. Please review the section on “Setting the polarity of the switch inputs”.

16 PTT output. This output goes to a HIGH state when transmit is commanded. The transmit signal comes from the active state of the RTS handshake line on the SO2Rxlat boards 2nd serial port.

17 CW output. This output goes to a HIGH state when CW keying is commanded. The CW signal comes from the active state of the DTR handshake line on the SO2Rxlat boards 2nd serial port.

18 – 25 Ground.