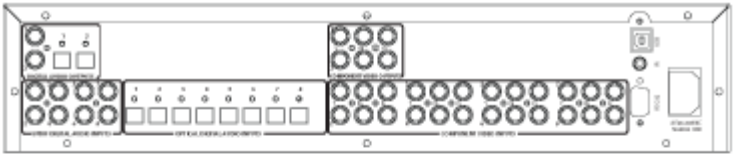
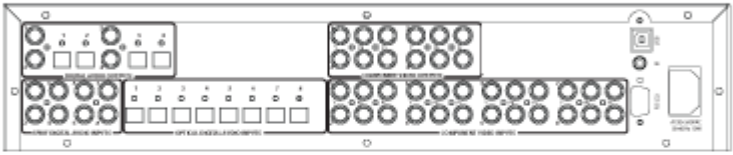
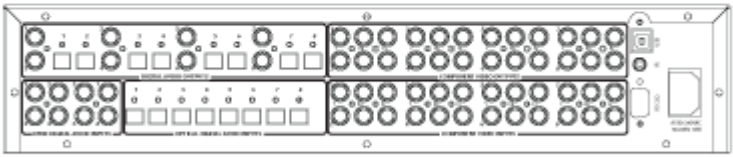
Integrator’s Guide to Serial Protocols







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Introduction

This document will describe the serial protocols for all of the NeoPro and Neothings products.

The first part will describe configuring and connecting the ports. Many pages are dedicated to the proper installation of the USB drivers, so in the case of an RS-232 controlled system, these can be safely skipped.

The second part describes the serial commands and responses which are common to both the USB and the RS-232 ports. The matrix under control does not treat any port differently.

USB Driver Installation

When using the USB port, the matrix switch will be installed as a virtual COM port. This means that any control program capable of controlling a device through a normal serial port should be able to control the matrix through a USB port.

This driver set is for all versions of MS Windows. Linux and Mac drivers can be made available upon request.

The following process is for Windows XP, but other versions of Windows will be very similar.

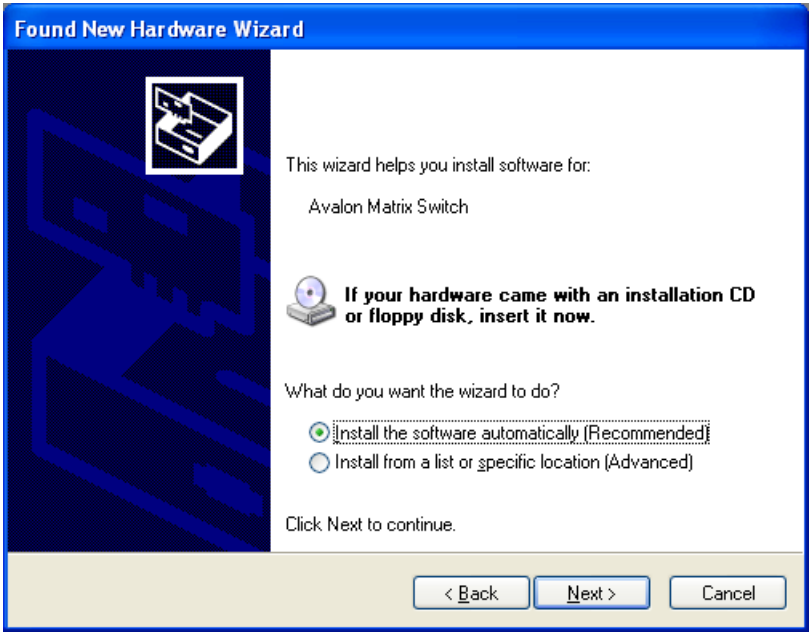
Step 1 – Connect the cable

Windows will detect the new hardware, and launch the plug and play wizard.

Step 2 – Found New Hardware Wizard

The first window will attempt to use the internet to find the driver, Select "**No, not at this time**", and click **Next**.

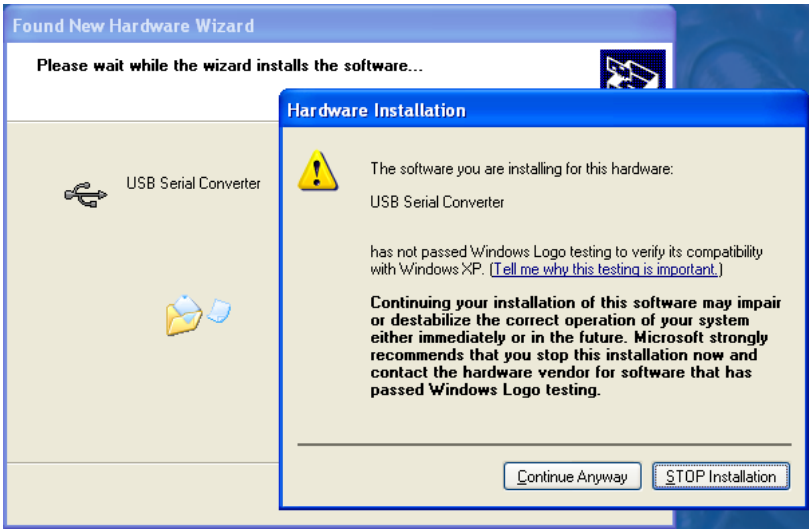
Step 3 – Driver location



The next window attempts to find the driver disc. Insert the driver CD disc in the your CD-ROM drive if you haven't already.

Leave the button labeled "**Install the software automatically (recommended)**" selected, and click **Next**.

Step 4 – Continue Anyway

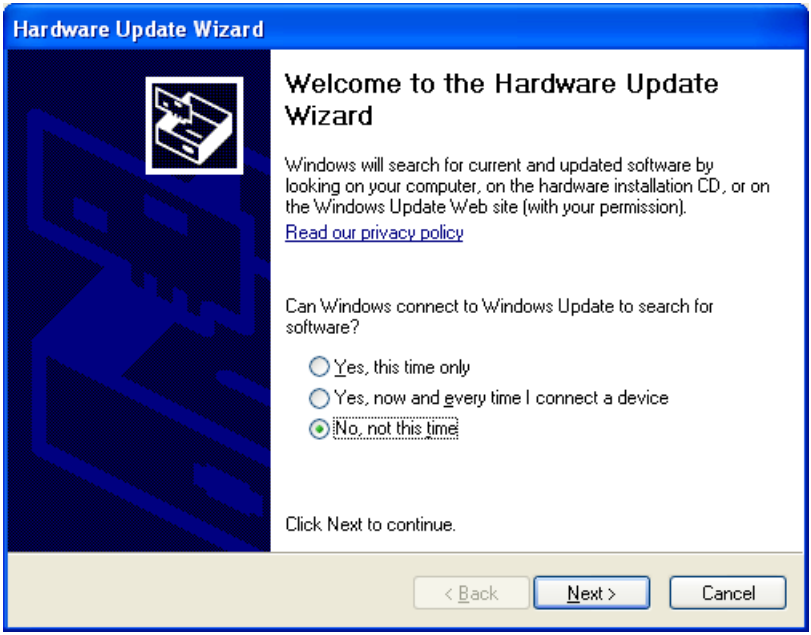


Windows will prompt on logo testing. Click "**Continue Anyway**"

Step 5 – Completion of first half

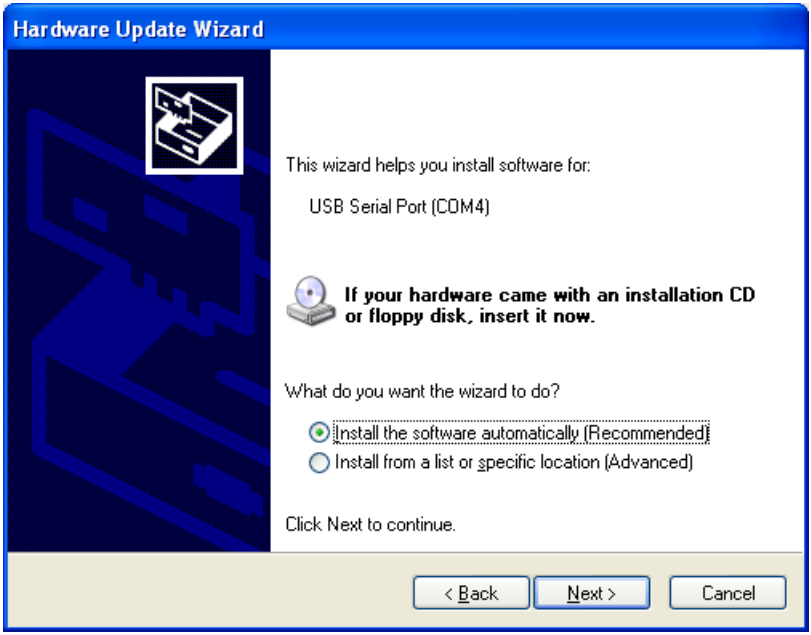
Click “**Finish**”.

Step 6 – Installing virtual COM port driver



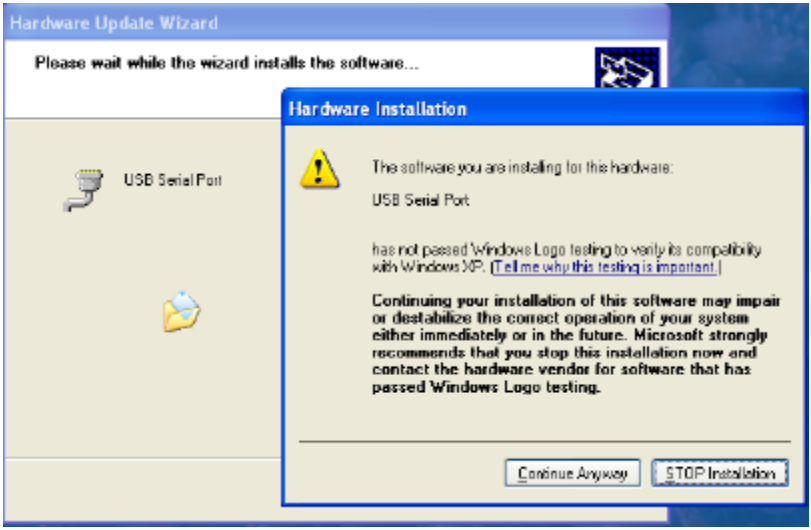
Windows will again start the new hardware wizard to install the virtual COM port driver. Click "**No, not this time**", then click **Next**.

Step 7 – Finding the driver



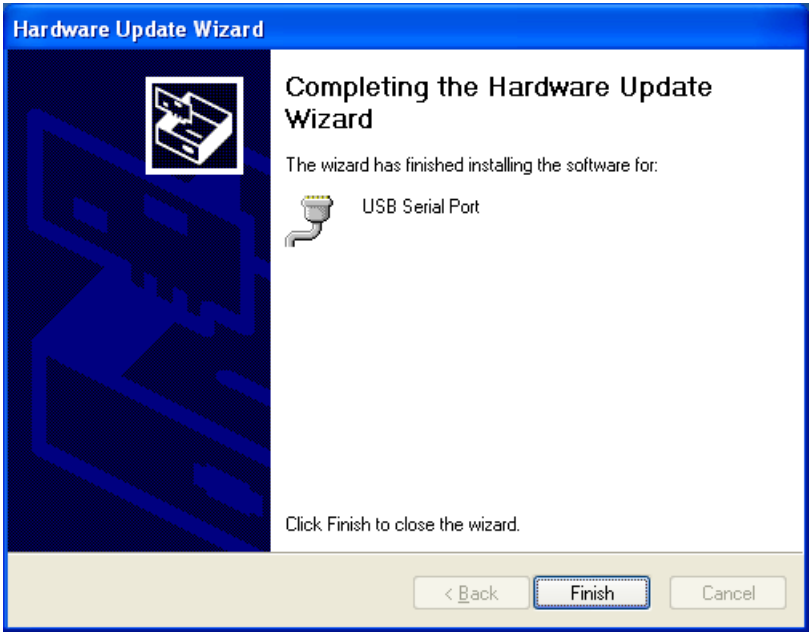
Leave the button labeled "**Install the software automatically (recommended)**" selected, and click **Next**.

Step 8 – Continue Anyway



Windows will prompt on logo testing. Click "**Continue Anyway**"

Step 9 – Completing the Hardware Update Wizard

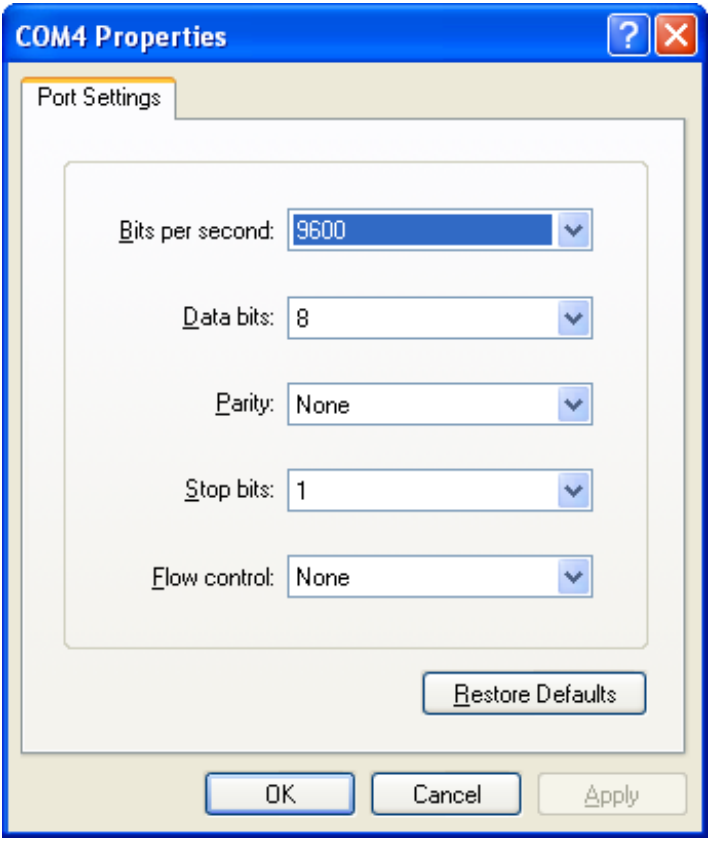


This is the final step, click **Finish**

At this point, the drivers are installed properly.

USB and RS-232 COM Port Settings

Whether using a Windows terminal program such as Hyperterminal, a control application, or a dedicated control systems, the baud rate settings are the same: 9600 baud, 8 data, no parity, 1 stop, no flow control. The COM port shown in the following example may change depending on your system.



Commands

The commands are structured so that a control program can communicate with the matrix in a structured and reliable two-way method. The control system can always understand the state of the matrix switch. These commands are also human readable ascii text, which will help in troubleshooting and testing.

The main concept to understand is that to the control system, the matrix looks like several independent switches. Each matrix section has a board number. Board # 0 is a virtual board that represents all boards in the box. Any command sent to board 0 will affect all matrices.

Command structure

A command is always wrapped in square braces, and each field is separated by commas.

Structure prototype:

`[Bx,Xx,X,Y]`

Bx = board number

Xx = board type

X= the input number to be routed

Y= the output number to be routed

Bx Board number

B0 = Virtual board for all matrices

B1 = Component video matrix (Avalon and Borrego)

B2 = Digital audio matrix (Avalon only)

B2=Analog audio matrix (Borrego only)

B3=Composite video (or SPDIF) matrix (Borrego only)

Xx Board Type

00 = Virtual board 0 type[1]

C2 = 8x2 component video matrix

C4 = 8x4 component video matrix

C8 = 8x8 component video matrix

B2 = 8x2 digital audio matrix (Avalon)

B4 = 8x4 digital audio matrix (Avalon)

B8 = 8x8 digital audio matrix (Avalon)

B2 = 8x2 analog audio matrix (Borrego)

B4 = 8x4 analog audio matrix (Borrego)

B8 = 8x8 analog audio matrix (Borrego)

A2 = 8x2 component video matrix

A4 = 8x4 component video matrix

A8 = 8x8 component video matrix

X Input

0 = The ‘mute’ or disable selection

1-8 = Source inputs 1 through 8

---

[1] Since board 0 will control multiple types of boards at the same time, the type field has no real meaning. Fill this field with 00 to make it a valid command.

Y Output

1-8 = Outputs 1 through 8, but only up to the max number of outputs on the model in use.

Examples

`[B0,00,2,4]`

Routes input 2 to output 4 on all matrices

`[B2,B2,6,1]`

Routes input 6 to output 1 on the audio 8x2 matrix

`[B2,B8,0,1]`

Mutes the audio on output 1 of the 8x8 audio matrix

The serial port will not echo characters back to the sender. Instead once the command is completed, the response will be sent back as shown in the Query section below.

Setup and Misc commands

The following commands are stored in EEPROM memory, so they will still be set after a power outage.

[S,x,y]

S = Setup function

x=function letter, y=argument

L=LED lights on the front panel

0=blackout

1=normal state (default)

R=Front IR receiver

0=disabled

1=enabled (default)

B=Front panel buttons

0=disabled

1=enabled (default)

V=Verbosity

0=responds only when sent a command

1=any change in state from front, IR, or other ports are sent out like queries (default)

Power Control

[P,n]

P=power control

0=power off

1=power on

The response to these commands is the same as the command itself (i.e. sending `[P,1]` will get a response of `[P,1]`)

Query commands

`[?B0]`

Putting a “?” inside the bracket, followed by Bx will return the full structure of the matrix being queried.

Since there are up to eight outputs on each board, up to eight structures will be returned per board.

Querying a single board will invoke a single board structure response, but querying a macro such as B0 will invoke all boards to respond.

Example response to [?B0] on an 8x4 Borrego matrix will look like:

```
[[B1,C4,3,1][B1,C4,2,2][B1,C4,6,3][B1,C4,2,4][B2,B4,3,1][B2,B4,2,2][B2,B4,3,3][B2,B4,2,4][B3,A4,3,1][B3,A4,2,2][B3,A4,3,3][B3,A4,2,4]]
```

Note that there is another level of braces that wraps the entire query response.

Example response to [?B1] on an 8x2 matrix will look like:

```
[[B1,C2,3,1][B1,C2,2,2]]
```

[?V]

Returns product ID and version

```
[V,A12]
```

```
A= Avalon
```

```
B= Borrego
```

12= major and minor version, or v1.2[2]

[?S]

[2] The major and minor version is more referring to the serial protocol version. If there are any changes in the protocol, the at least the minor version will increment. However there may be minor-minor product firmware upgrades that occur that do not effect the serial protocol, and will not be reflected in theis version string.

Returns all setup parameters. i.e.:

```
[[S,L,1][S,R,1][S,B,1][S,V,1]]
```

[?P]

Returns power state

```
[P,1]
```

Errors

The Avalon switch will only attempt to process a command between matching [and] braces, so garbage before and after the braces is thrown away. However the characters between the braces will be processed, and if invalid, an error signal is sent.

Any command syntax error will result in a response of

```
[E]
```

Maximum Response Time

Maximum time to process any command and complete the serial response, is 150mS.

Uninstalling the USB drivers

There is typically no harm in leaving the drivers installed in Windows. It is usually desired to keep them installed so that when the device is plugged back in, it will be recognized automatically and is assigned the same COM port number.

However, if you need to uninstall the drivers for any reason, use the Windows Control panel to do so.

To Uninstall:

Click the **Start** Menu

Select **Settings**, then **Control Panel**

Click **Add or Remove Programs**

Find **Neothings Avalon/Borrego USB Drivers**

Click **Change /Remove**

Follow the on screen instructions.

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