Configuring Mach3 to work with Ocean Controls CNC kits

This guide will enable you to use Ocean Controls CNC Kits with Mach 3, it contains the pin mappings needed for basic operation of a 3 or 4 axis system.
The settings described here are also available in the Mach3Mill.xml setup file available from Ocean Controls. If this file is loaded into Mach 3 the port and pin configurations should match the wiring diagram and this guide can be used to check that it is correct.
First load the Engine Configuration by clicking *Config -> Ports and Pins* to bring up the following window.
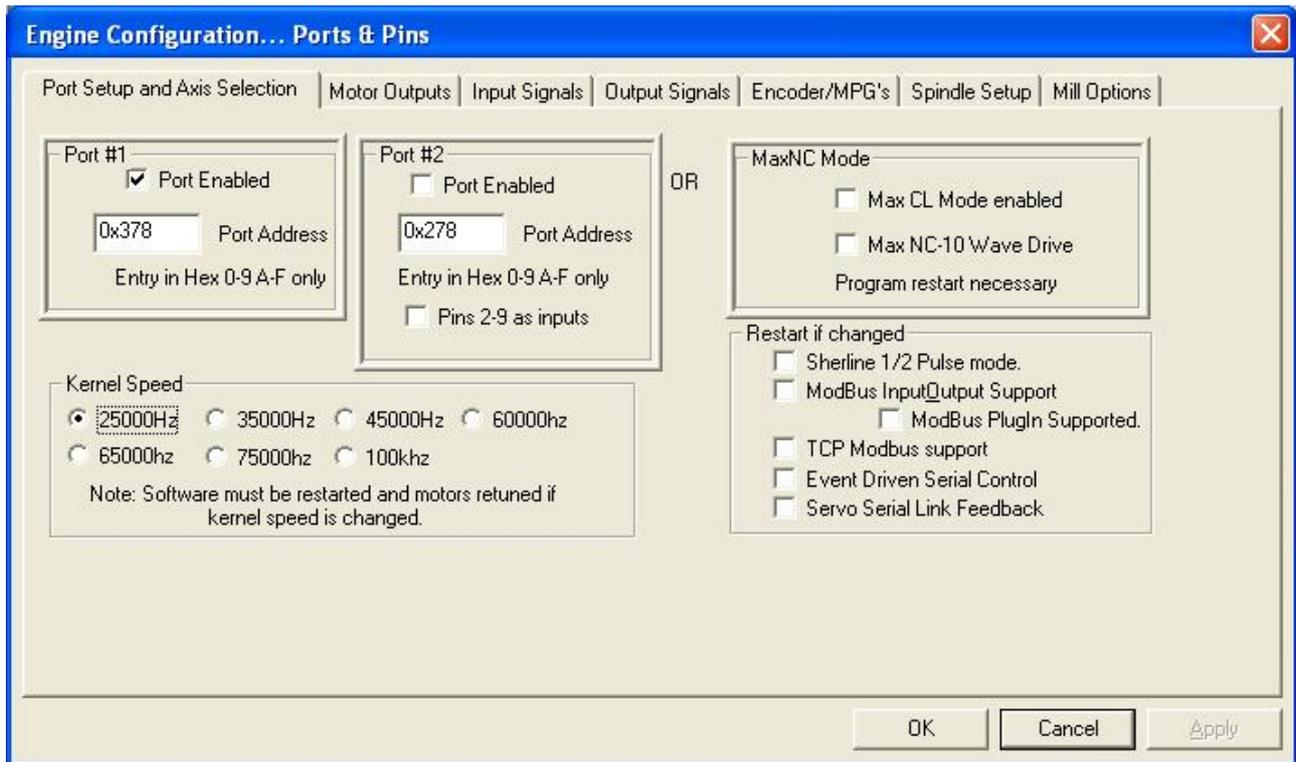
In this window check that Port #1 is enabled and the address is 0x378, this should not be changed unless you have a different address for the parallel port. This can be the case if you have added a parallel port card to a computer that did not ship with one.
The Kernel Speed is the speed the system will run at and the maximum output frequency. 25000Hz is generally fine for most applications. If extremely fine micro-stepping is used then you may need to increase the Kernel Speed.
Click Apply if you have made any changes.

Motor Outputs:

On the next tab "Motor Outputs" the pins that control the motors are set up.

To use Mach 3 with the KTA/KTB-205 from Ocean Controls you will need to set the pins the same as in the following screenshot:

Engine Configuration... Ports & Pins

Port Setup and Axis Selection | **Motor Outputs** | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options

Signal	Enabled	Step Pin#	Dir Pin#	Dir LowActive	Step Low Ac...	Step Port	Dir Port
X Axis	✔	2	3	✘	✘	1	1
Y Axis	✔	4	5	✘	✘	1	1
Z Axis	✔	6	7	✘	✘	1	1
A Axis	✔	8	9	✘	✘	1	1
B Axis	✘	0	0	✘	✘	0	0
C Axis	✘	0	0	✘	✘	0	0
Spindle	✘	0	0	✘	✘	0	0

OK   Cancel   Apply
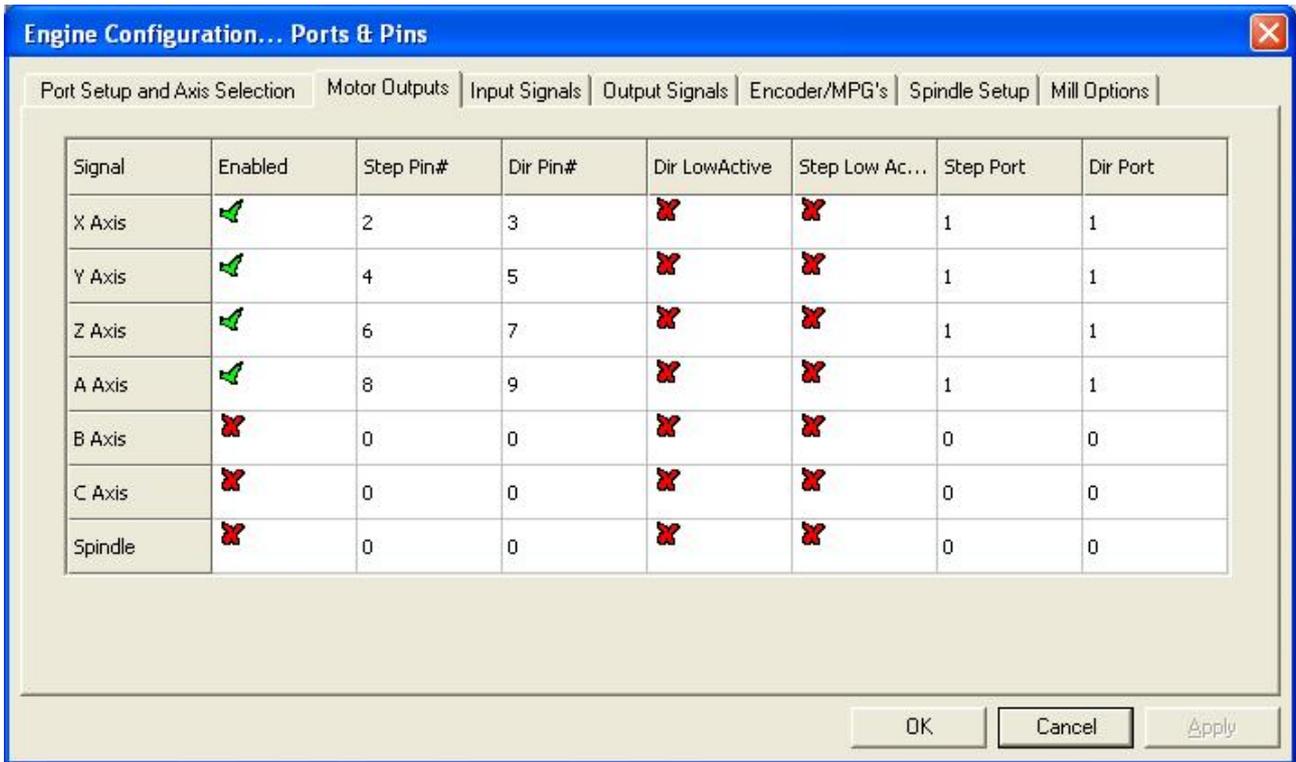
Note that X, Y, Z and A axes are all enabled. If you are only using a 3 axis kit, ensure the A axis is disabled by changing its tick to a cross. Also note that all the signals are on port 1, that is Step Port and Dir Port for all enabled signals is set to 1.

Input Signals:
The third tab is the Input Signals. For this setup, two limit switches should be used for each axis and these are wired in parallel. The limit switches can be set up as in the following images:
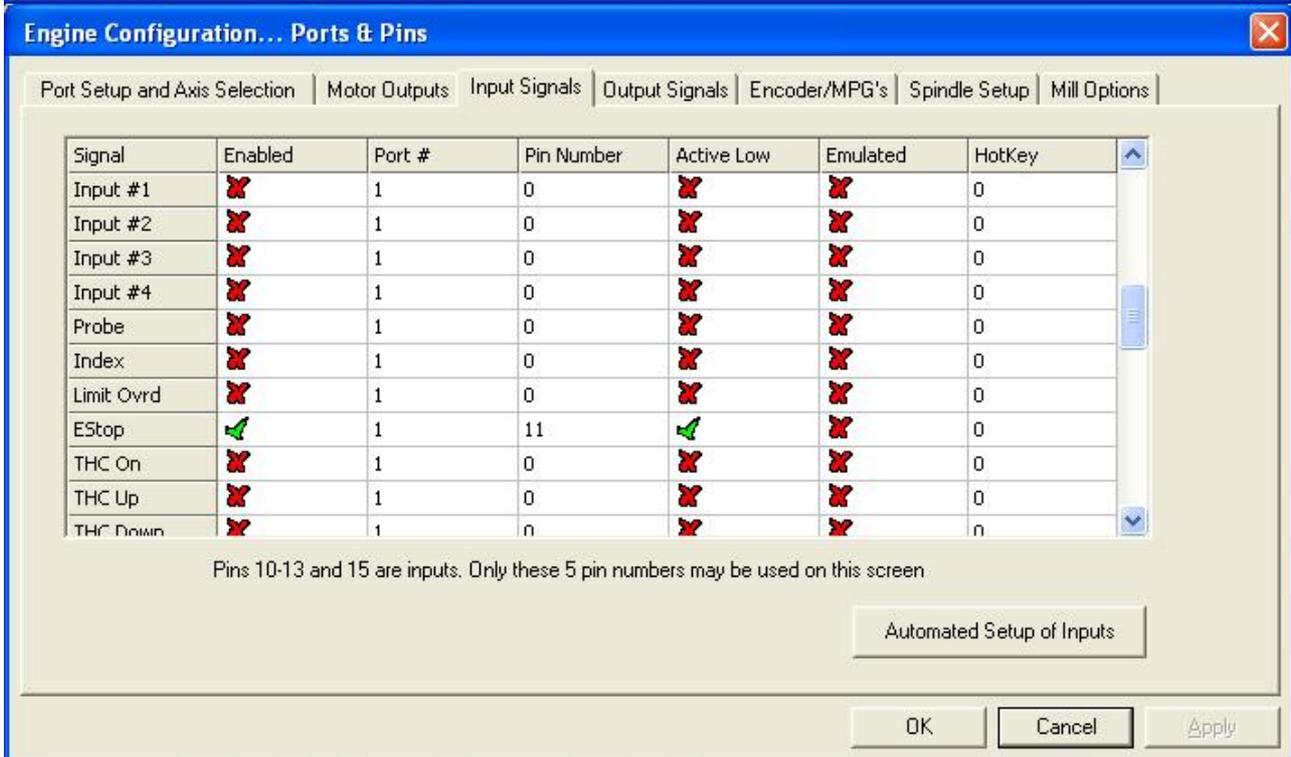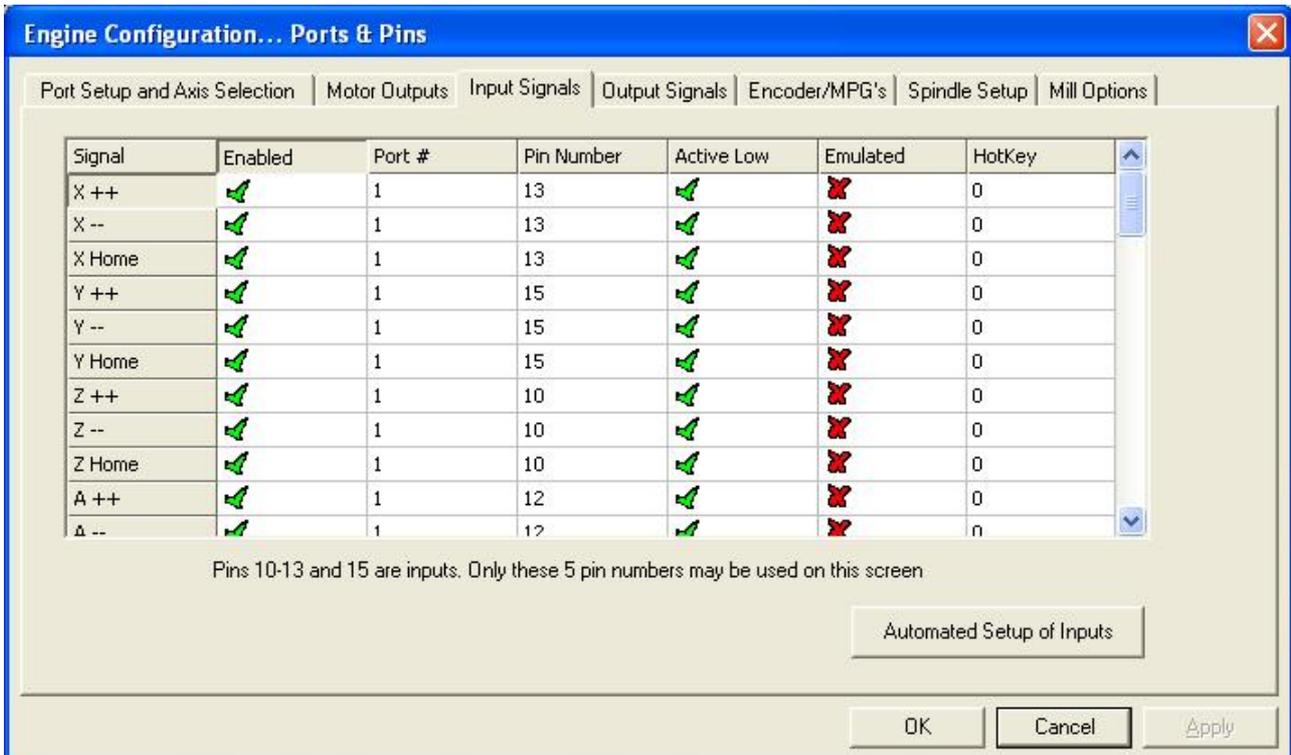
Note that for each axis, the one pin is used for three signals, that is, positive limit, negative limit and Home. Normally Open micro-switches can be used in parallel to trigger the input, or multiple NPN proximity switches can be connected directly to the input.
If the 4th axis is not used the A inputs can be disabled and pin 12 can be used for another signal i.e. probe or index.
Note that all the signals use port 1 and are Active Low.

Outputs Signals:
In the next tab the outputs are initialized:

Engine Configuration... Ports & Pins

| Port Setup and Axis Selection | Motor Outputs | Input Signals | Output Signals | Encoder/MPG's | Spindle Setup | Mill Options |

Signal	Enabled	Port #	Pin Number	Active Low
Digit Trig	✖	1	0	✖
Enable1	✖	1	0	✖
Enable2	✖	1	0	✖
Enable3	✖	1	0	✖
Enable4	✖	1	0	✖
Enable5	✖	1	0	✖
Enable6	✖	1	0	✖
Output #1	✔	1	17	✖
Output #2	✔	1	14	✖
Output #3	✖	1	0	✖
Output #4	✖	1	0	✖

Pins 2 - 9 , 1, 14, 16, and 17 are output pins. No other pin numbers should be used.

OK   Cancel   Apply

Output 1 and 2 correspond to Relays 1 and 2 when set up like in the screenshot.
Relays 1 and 2 can now be set up to control the spindle motor, flood or mist by setting them up on the Spindle setup tab.
Pins 1 and 16 can be used for other functions such as a charge pump controller.

Motor Setup:
When connecting the motors to their drivers, set up the dip switches on each driver to match the motors rated current as best as possible.

Next set the micro-stepping, keep in mind that the higher the micro-stepping the finer the end resolution, but this comes at the cost of speed.

When the steps/rev are set keep a note of this number, as it is needed to set up Mach 3 with the steps per unit value.

Click *Config -> Select Native Units* to bring up a dialog where you can select whether you will work in mm or inches. Choose the units you wish to work with and click OK.

Now go to *Config -> Motor Tuning.* Here you can enter the steps per unit (in the bottom left) for each axis. There are a number of values you must know before you can continue, these are the micro-step value, the gear ratio of any gears or belts and the thread pitch, this is assuming you have a lead screw or ball screw setup.

To calculate the steps per unit value follow this example.

If we have a driver set at 3200 steps per revolution, direct connection to the thread and a thread pitch of 10mm the motor will need 3200 pulses to turn once fully. Because it is directly connected one full turn will move the thread 10mm linearly, which means that 3200/10 = 320 steps will move the driver 1mm linearly. So 320 will be entered in the steps per unit box if the native units are set to mm.

This should be repeated for each axis. Ensure you save the settings.

Before you start the machine keep your hand near the ESTOP just in case anything goes wrong.

KTA-205/KTB-205 Pin Reference

Signal	Pin
X Step	2
X Dir	3
Y Step	4
Y Dir	5
Z Step	6
Z Dir	7
A Step	8
A Dir	9
X Limit	13
Y Limit	15
Z Limit	10
A Limit	12
ESTOP	11
Relay 1	17
Relay 2	14
Spare Out 1	1
Spare Out 2	16