

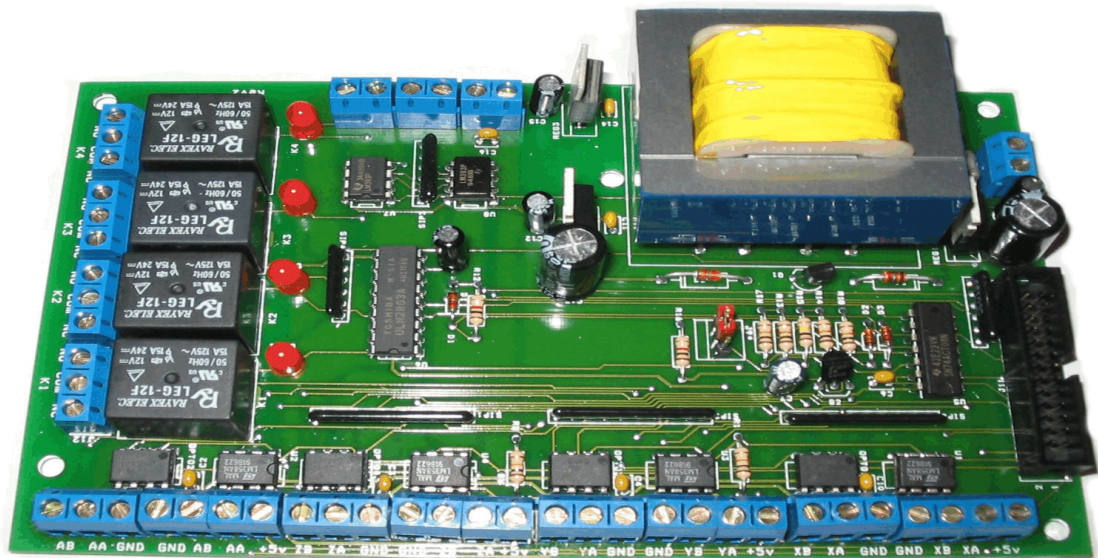
Sound Logic

Encoder Interface

**4-axis parallel port encoder interface
For Mach2/3 CNC control software**

Closed loop operation for Servo and Stepper systems

General User's Guide



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4-axis Mach2/3 Encoder Interface

Purpose:

To interface a second PCI parallel port card from a PC running Mach software with up to 4 individual encoder/Gecko drive inputs. Which will display the data in a “DRO” on a Mach screen. Giving the user, real time data count feedback from each encoder thereby displaying the actual position of each axis. And used with provided Macropump for this particular purpose, alerts the user with an LED next to the offending axis and prompts a sonalert device if used in the event of a step/count discrepancy. The machine will be halted in “feedhold” status. A screen.set is also supplied that is designed for this purpose as well and both are sent via Email with purchase.

May also be used as a stand-alone device to accept encoder data and relay it to PC for use solely as DRO for all types of encoder data input with Mach software.

Which would require, only one PCI parallel port card, Namely, Port1. Or simply used as 8 general use inputs instead of encoder inputs. Inputs such as MPG's, Probes, OEM triggers etc. Plus 4 software controlled onboard relays rated 125 VAC and 15 amps. Designed to be used in conjunction with Sound Logic PC-2-route breakout board.

Operates on 115/220 volts at 60 Hz. Note: 115 volts- JP1 and JP2 are installed. 220 volts must have a jumper installed between JP1-1 to JP2-2. And existing jumpers must be removed.

Features:

- **PCB**
 - Fr4 Material
 - Solder mask on both sides
 - Silkscreen legend on topside
 - Plated through holes
 - Isolated 5 volts and grounds for the encoder interface parallel port IO
 - All outputs are buffered
 - Operational when Mach is in “reset” to provide the user encoder DRO position for manual machining operations.
 - 4 onboard relays rated 125 volts AC at 15 amps
- to control spindle, coolant, vacuum pump etc. via M-codes in Mach software. Coupled with Sound Logic PC to route Breakout board relay control jumpers will equal 8 controllable outputs in total.

Connectors:

J1 (X axis)

+5v Encoder +5v
XA Encoder A
XB Encoder B
GND Encoder Gnd

J2 (X Gecko encoder inputs)

Gnd Gecko Gnd
XA Gecko encoder A input
XB Gecko encoder B input

J1 (Y axis)

+5v Encoder +5v
YA Encoder A
YB Encoder B
GND Encoder Gnd

J2 (Y Gecko encoder inputs)

Gnd Gecko Gnd
YA Gecko encoder A input
YB Gecko encoder B input

J1 (Z axis)

+5v Encoder +5v
ZA Encoder A
ZB Encoder B
GND Encoder Gnd

J2 (Z Gecko encoder inputs)

Gnd Gecko Gnd
ZA Gecko encoder A input
ZB Gecko encoder B input

J1 (A axis)

+5v Encoder +5v
AA Encoder A
AB Encoder B
GND Encoder Gnd

J2 (A Gecko encoder inputs)

Gnd Gecko Gnd
AA Gecko encoder A input
AB Gecko encoder B input

Note 1: Any axis J1 connector not used with a Gecko may be used for general purpose inputs on A & B terminal. The optical Isolator associated with an input used for general purpose may NOT be used if anyone of the encoder inputs are wired to A Gecko drive's encoder inputs.

All the inputs except J18-1 has comparators on them set for $\frac{1}{2}$ VCC to provide good noise immunity.

J16 General use input

J17 General use input

J18 General use input

Note: J18-1 does not have a comparator associated with its input.

Connectors:

J11 Connected to second parallel port

Pin 1	K1 relay out J12
Pin 2	Encoder/general purpose input see Note1
Pin 3	Encoder/general purpose input see Note1
Pin 4	Encoder/general purpose input see Note1
Pin 5	Encoder/general purpose input see Note1
Pin 6	Encoder/general purpose input see Note1
Pin 7	Encoder/general purpose input see Note1
Pin 8	Encoder/general purpose input see Note1
Pin 9	Encoder/general purpose input see Note1
Pin 10	Input 1/MPG1 A to J16-2
Pin 11	Input 2/MPG1 B to J16-1
Pin 12	Input 3/MPG2 A to J17-1
Pin 13	Input 4/MPG2 B to J17-2
Pin 14	K2 relay J13
Pin 15	Probe/Switch (pulled up to +5v) J18-1 & J18-2 = GND
Pin 16	K3 relay J15
Pin 17	Charge pump / K4 relay J15
Pin 18-28	GND

J9 (mode)

CP uses charge pump

NCP no charge pump

A special cable can be connected (see note 2) from the MODE jumper on the encoder interface to the MODE jumper on the Sound Logic breakout board and use the charge pump from the breakout board for both boards.

This provides one more relay out (K4) for other uses.

J10

115 vac / 220 vac

For 115vac JP1 and JP2 are installed, use as is

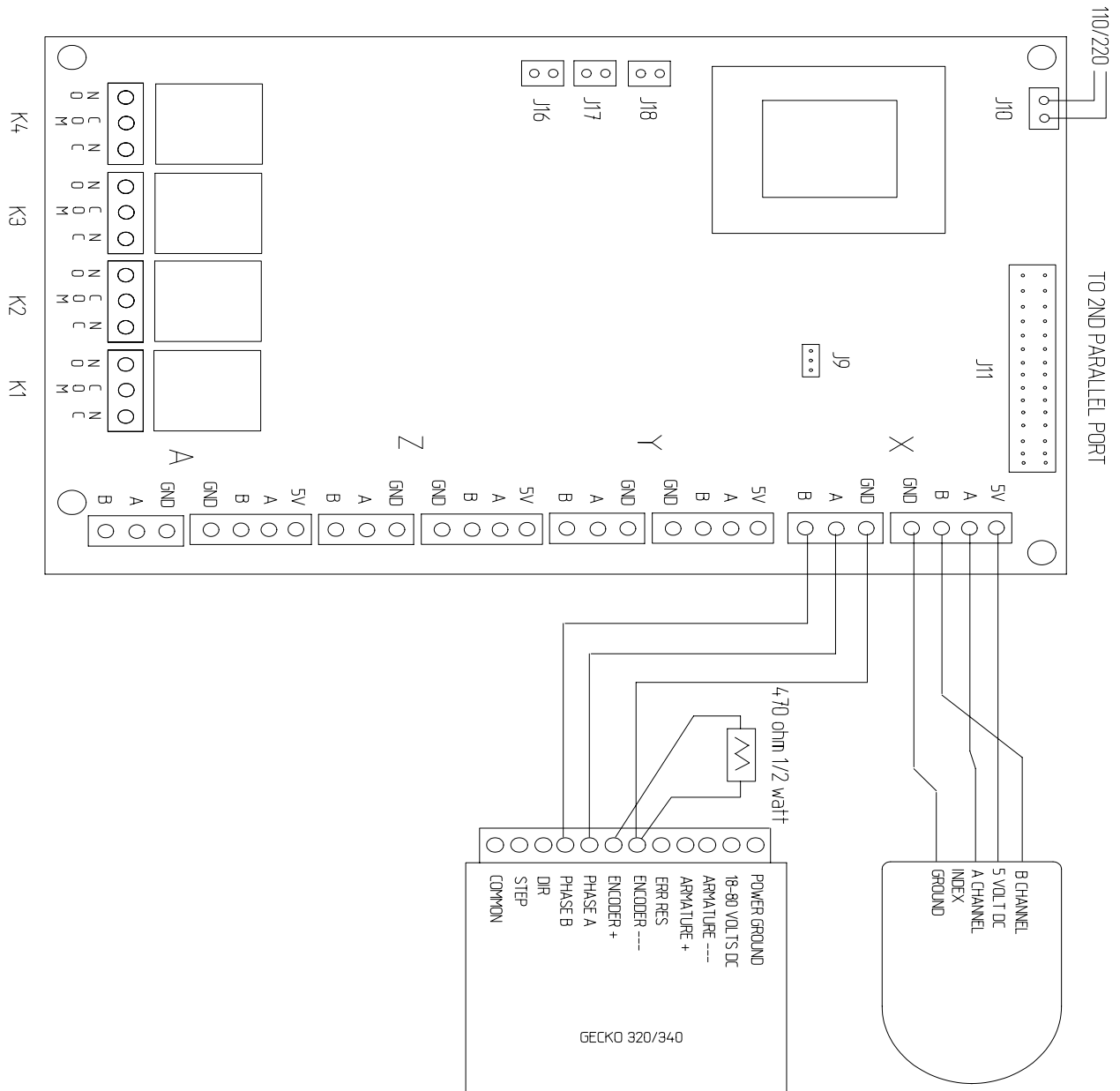
For 220vac A jumper from JP1-1 to JP2-1 must be installed and the two existing jumpers for 115 vac operation must be removed.

Note 2:

J9-1

J9-2 Red jumper between J9-1 and J9-2 is for charge pump on output 4.

J9-3 Red jumper between J9-2 and J9-3 is for no charge pump and output 4 may be used in the same manner as output 1,2 and 3.



Typical wiring for use with a Gecko servo-drive, To use with other types of drives such as stepper-type that require no feedback, connection to the encoder is all that is required. And is the same basic configuration for any type of 5VDC input device i.e. MPG's, OEM triggers, Probes etc.

Guide for installing second PCI parallel port in Windows XP

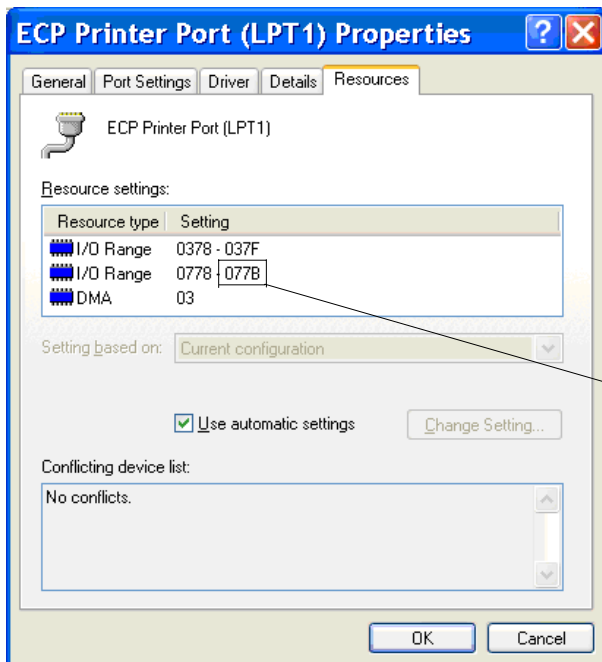
Step 1. Remove power from PC and open enclosure. Install PCI parallel port card in any available PCI slot. Replace screw and secure PC enclosure.

Step 2. Boot PC, Windows will automatically find the new hardware and install a driver for it. If not, the card should come with it's own software driver on included disc. Install from the OEM disc instead.

Step 3. Mach will need to know the address of this port to communicate with it. It will need be entered into the "Config/ports and pins/ port setup and axis selection" menu in Mach software. To find the address of the newly installed second parallel port, simply navigate to the hardware profiles in Windows XP as follows:

Click: Start/Control Panel/System/Hardware/Device Manager/Ports (Com & LPT)/ Printer Port LPT/ Resources.

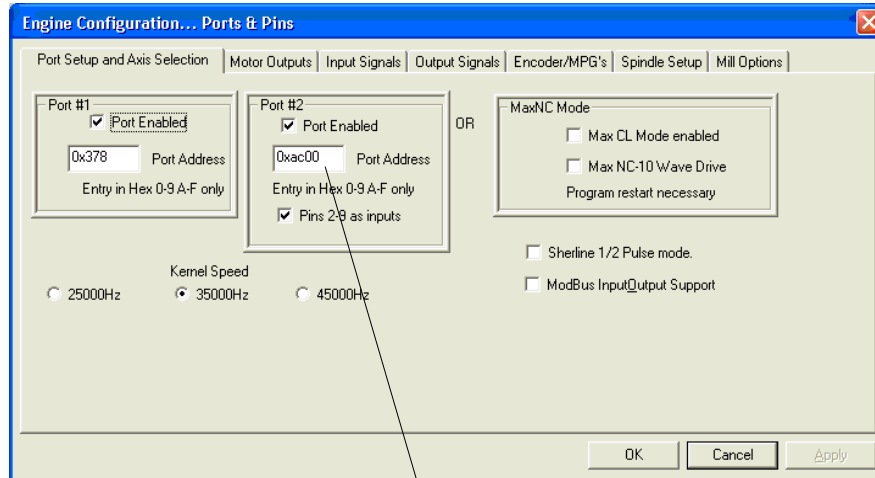
A window like the one below should be displayed. The first line will be the primary parallel port and the second line should correspond to the second parallel port. The four digits in the box are what is needed to be entered into Mach "config" "Ports and pins" menu. Mach will automatically change it to "0x778" when the address is saved/Applied. Also on the same menu in Mach, place a check in the "Enable port 2" and "Pins 2-9 as inputs" boxes.



Typical screen configuration:

On the following pages are displayed screenshots with suggested configurations for Mach software using the Sound Logic Encoder interface. Each tab of the of “Config”/”ports and pins” screen will be covered

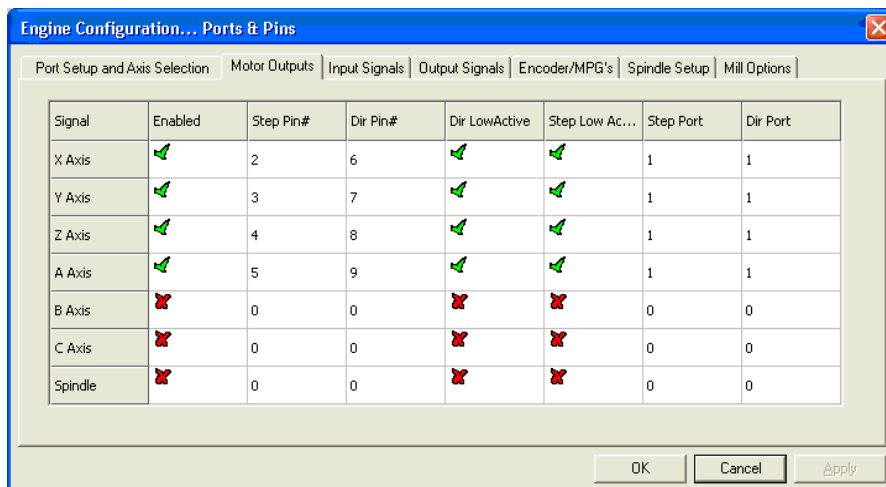
Note that Port#2 is enabled. Address has been entered and “Pins 2-9 as inputs” has also been enabled. Kernel speed is based on each users particular demands.



Motor Outputs:

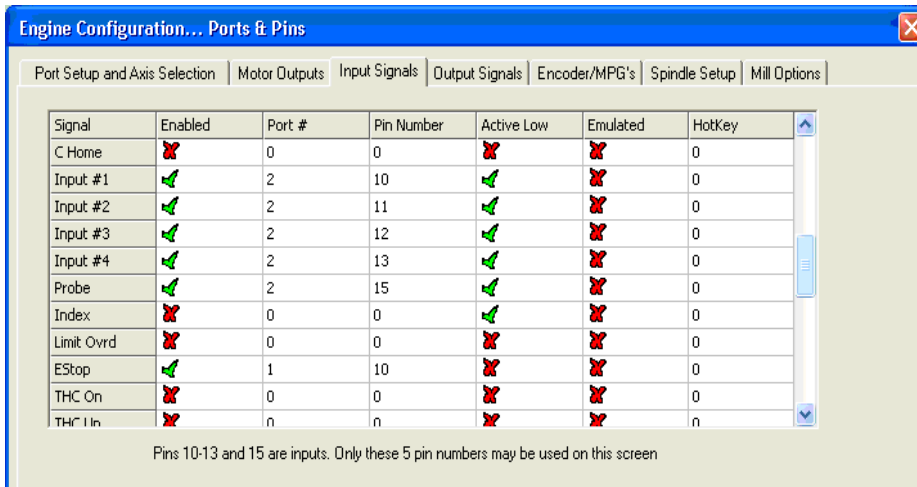
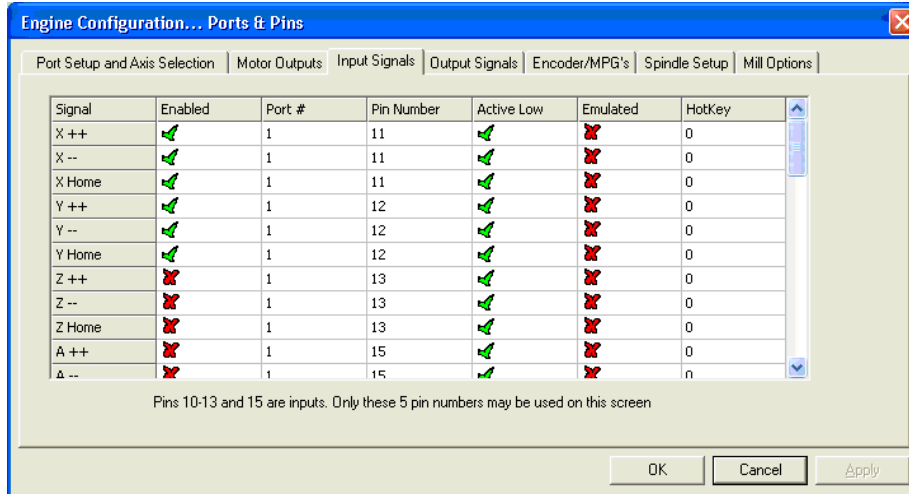
2nd port address entered here.

The following screen is a configuration for use with the Sound Logic Breakout Board. If another breakout/distribution device is used your configuration may differ. Note that “active low” may be opposite also depending your particular configuration. All axis’s used must be enabled.



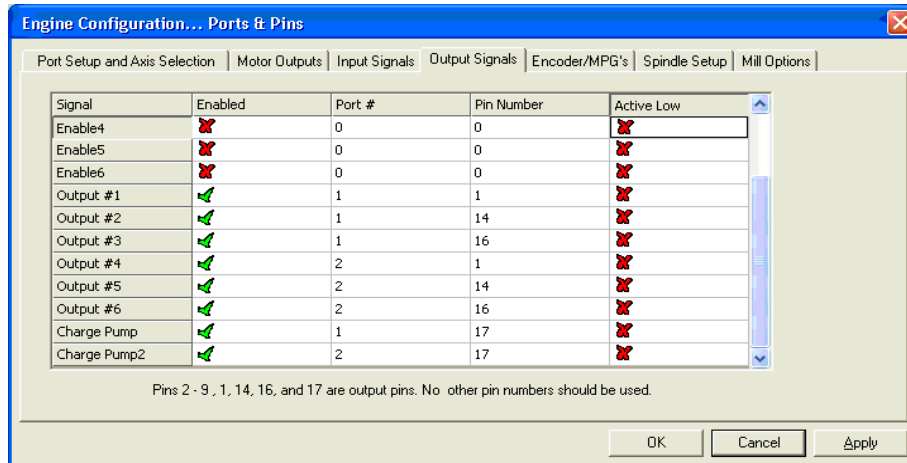
Input Signals:

Below are two depictions of the same tab and screen. The upper screen depicts the port and pin selection for limits and may also be used as general purpose inputs. And pertains to the Sound Logic Breakout Board. Note that port two is entered in the lower screenshot. This pertains to the Encoder interface. Port 1 deals with the Breakout board and Port 2 is associated with the Encoder interface.



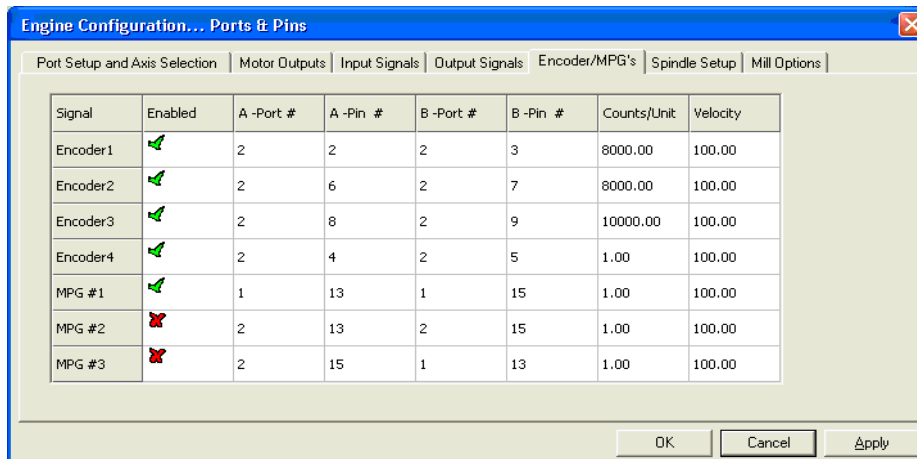
Output Signals:

Output signals are depicted below. Note which are enabled and which pins are selected and their respective ports. These will control auxiliary devices such as spindle, coolant, pumps, etc. The encoder interface has 4 relays on board rated at 125 vac and 15 amps. The Sound Logic Breakout board requires a solid state relay to be used with each of its outputs. Note on Charge pump J-9 mode, See page 5 to free up one of the outputs for other uses.



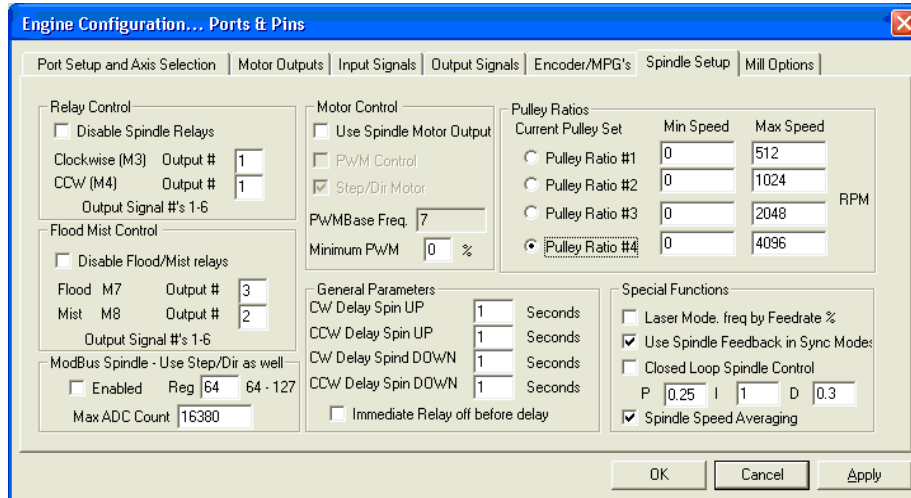
Encoder MPG's:

In the screen below, Port 2, proper pin number and steps per unit must be entered. The steps per unit will be the same as in “motor tuning” menu. Or simply the CPR in quadrature of the encoder device times the pitch lead of the ballscrew. Again, depending on your particular configuration. If the DRO reads in opposite, simply swap encoder A&B pins. If encoder data is displayed on an incorrect DRO simply swap with the correct encoder entry. Example: If Encoder 3 is displayed on Encoder 2, and 2 on 3, swap with one another.



Spindle Setup:

Below is the spindle setup menu. Note that the “Disable spindle relays” and “Disable flood/Mist relays” are unchecked and the proper output numbers are selected. And are the only entries relevant to the encoder interface on this menu.



Mill options: (not shown)

The last tab in the “Ports and Pins” configuration covers digitizing and THC selections. And there are no relevant entries to the Encoder Interface.

Encoder screenset for Mach3:

Below is a screenshot of the encoder screenset for Mach3. The software DRO's (shown) and the encoder DRO's (on settings page) are monitored and in the event that the two are out of synchronization with one another, The machine is halted in "feedhold", an LED next to that axis flashes and a sonalert if used sounds an audible alarm. The "Sync" key to the left of the offending axis may be pressed and this will update the software DRO in relation to the encoder DRO, and ultimately machine position, clearing the fault. Jogging is not affected by a discrepancy/fault and allows the user to reposition machine if necessary before clearing fault. The max allowable error is entered on the settings page as well.

Accompanying this screenset is one special screen for manual operation which basically consists of three large DRO's that read encoder data while Mach software is in reset or for those who wish to use the Encoder Interface in conjunction with Mach as a simple DRO for all types of measuring applications and data collection.

Essentially, A PC running Mach, the Encoder Interface and up to 4 encoders will produce a 4 axis DRO for all types of machines. Plus, 4 software controlled relay outputs.

The possibilities and uses of the Encoder Interface are virtually unlimited. Any input device that operates on 5vdc and has a return signal of at least 2.5 vdc may be used.

