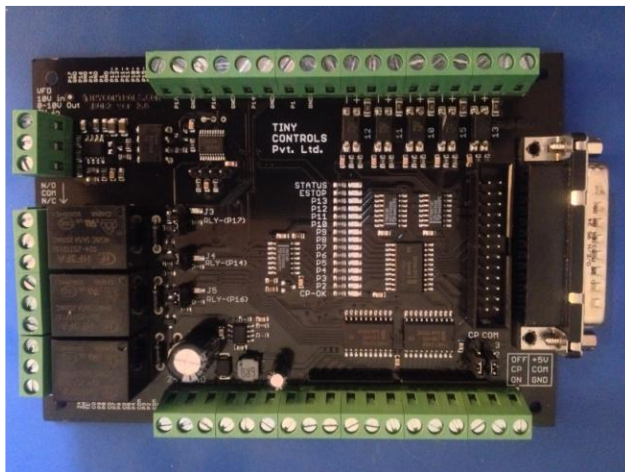




PP-BOB2-V2 PARALLEL PORT BREAKOUT BOARD



Document: Operation Manual

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THIS MANUAL CONTAINS INFORMATION FOR INSTALLING AND OPERATING THE FOLLOWING PRODUCT:

■ PP-BOB2-V2.0 PARALLEL PORT BREAKOUT BOARD

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In the following pages, PP-BOB2-V2.0 “Parallel Port Breakout Board” is termed as Breakout Board or simply BOB.

PARALLEL PORT BREAKOUT BOARD INCLUDES

1. Breakout Board
2. Cable wire with DB-25 Connector

GENERAL DESCRIPTION

The parallel port breakout board card is designed for a flexible interface between CNC machine and computer system. The board is fully compatible with software like Mach3, Turbo CNC, EMC2, KCAM etc.

The Breakout Board (BOB) translates signals between CNC machines and PC signals and isolate PC motherboards from electrical problems. The BOB gives step and direction outputs to steppers for 4 axes of CNC. The outputs for X- axis are buffered twice and received from two different connectors to make card useful for gantry style machines. All the outputs are buffered and received through screw terminals from card.

These outputs can be received in Pull up or Pull down states and motor Common output signal can be set as low or high by changing the jumper configuration.

Three relays are provided on the board and an isolated PWM to 0-10V analog output circuit is provided for controlling the spindle speed.

An on-board charge pump is provided for safety of card. It is jumper configurable and it can be operated from frequencies as low as 200Hz to more than 15 KHz. Charge pump can be set disabled and this buffered output can be used as general purpose output by changing the position of respective jumper.

Input terminals compatible with 24V are filtered for noise ensuring that there is no possibility of error. LED indicator for inputs and outputs make the signal debugging task easy.

All the outputs can also be used as general purpose outputs making the system flexible.

A DB-25 connector and 26 pin box header is provided on the board making its connections with PC easy.

TECHNICAL SPECIFICATIONS

| Contents | Specifications |
|--------------------------------|--|
| Communication terminals | Parallel port terminal for connection with PC & 26 pins box header |
| Axes | 4 axes and X- slave |
| Axes drive control type | Step/ Dir |
| Digital outputs | 14 |
| Digital inputs | 5 |
| Analog output (0-10V) isolated | 1 |
| Test Output | 4khz signal |
| Relay | 3 |
| Supply voltage | 24V DC |
| Max Power Consumption | 24V/ 0.5A |
| Ambient temperature range | 0°-55° C |
| Dimensions | 135x95 |
| Weight | 40g |

BREAKOUT BOARD TERMINALS

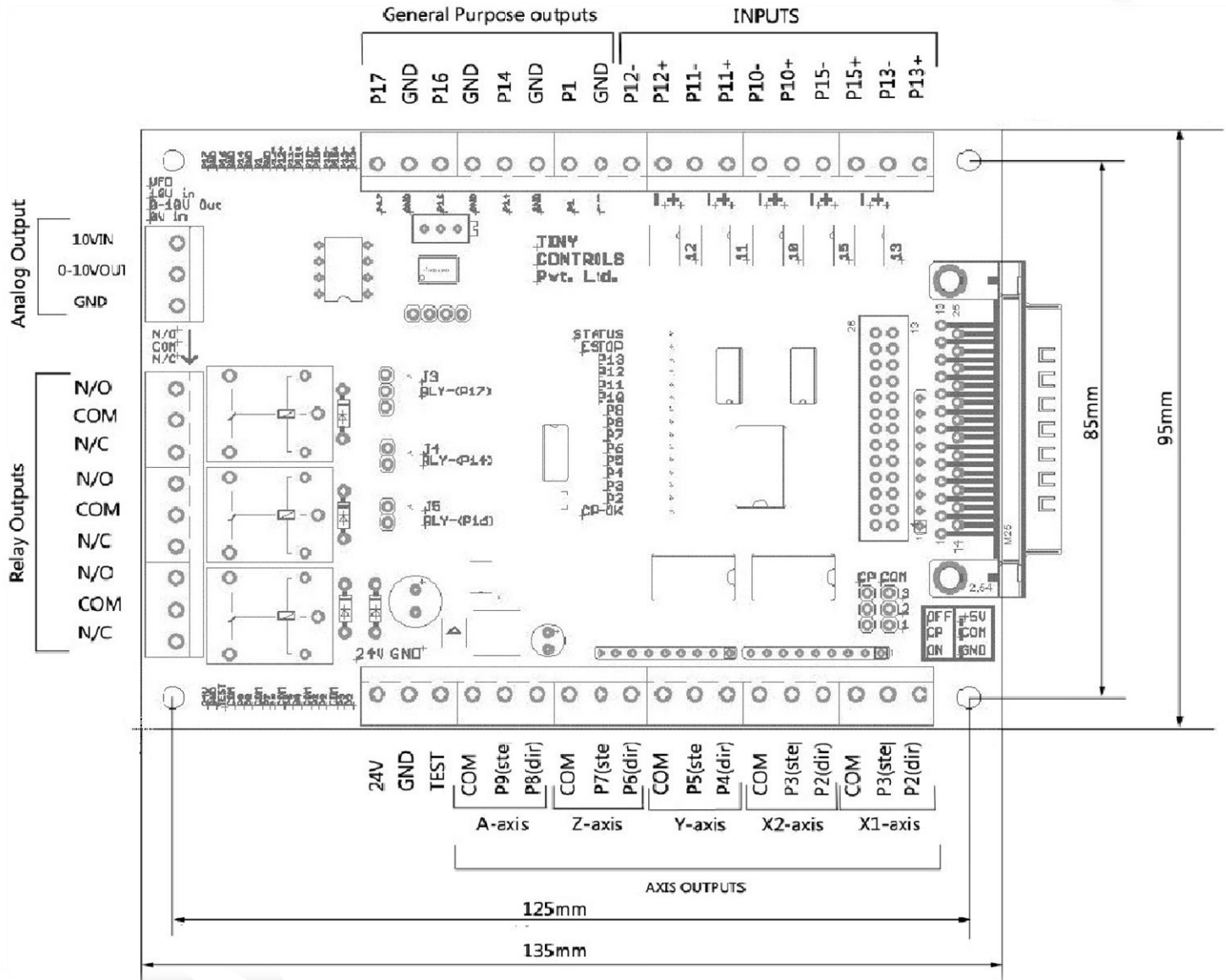


FIG:1

CONNECTING OUTPUTS:

Axes outputs:

PP-BOB2-V2.0 has dedicated Step, Dir and COM outputs for four independent axes named as X, Y, Z and A-axis. The X-axis outputs are double buffered, named as X1 and X2 and received through two individual terminals allowing easy connection to two motors on the same axis. This type of “**Hardware slaving**” of motors is used in gantry style machine design when two motors are used on the same axis. In total, there are five 3 pins terminals connectors with signal Com, Step and Direction. These are tied to parallel port signals as shown in figure [FIG:1](#). However, for any system, if the outputs for any axis aren't used, then these outputs can be used for any purpose other than axis control. User can use these outputs as general purpose outputs.

Analog output 0-10V:

A 0-10V analog output signal goes directly to VFD to control the spindle. This circuit is completely isolated from rest of the control board. If 10V input is fed from VFD to terminal 10V Analog IN; an analog output in range of 0-10V can be drawn from terminal 0-10V Analog OUT.

Test:

Generates an output signal of frequency 4khz , for testing the stepper driver axis.

CONNECTING INPUTS:

Power supply:

Apply a supply voltage of +24V DC , make sure that polarity is correct.

Input terminals:

The board has five opto-isolated inputs connected to signal P10, P11, P12, P13 and P15. All inputs are filtered for noise and are active low. Active low means that when the input of opto-isolator is driven, the signal becomes low.

Signal P15 is dedicated to the emergency switch and the corresponding LED indicator “ESTOP” shows activity of this signal.

The example circuits mentioned further in the manual show how to wire different types of signals/ devices to board inputs.

JUMPER SETTINGS:

| JUMPERS | POSITION 1-2 | POSITION 2-3 |
|---------------------|--|---|
| Jumper1 (J1) | Charge pump on P1 enabled | Charge pump disabled |
| Jumper2 (J2) | COM output pulled down to ground (0v) | COM output pulled up to Vcc(+5v) |
| Jumper3 (J3) | P17 controls the Relay(P17) through PWM signal | P17 acts as general purpose output signal |
| | POSITION1-2(mounted) | POSITION1-2(removed) |
| Jumper4 (J4) | P14 controls the Relay(P14) | P14 acts as general purpose output signal |
| Jumper5 (J5) | P16 controls the Relay(P16) | P16 acts as general purpose output signal |

J1 at position 1-2:

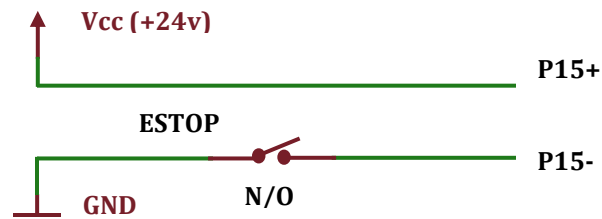
When J1 is mounted at position 1-2, charge pump on P1 signal is enabled. In this mode, user needs to configure the CNC software to output the charge pump signal on P1. On the application of an appropriate charge pump signal, the output buffers are enabled. Charge pump works for frequency as low as 200Hz to more than 15 KHz.

LED INDICATORS:

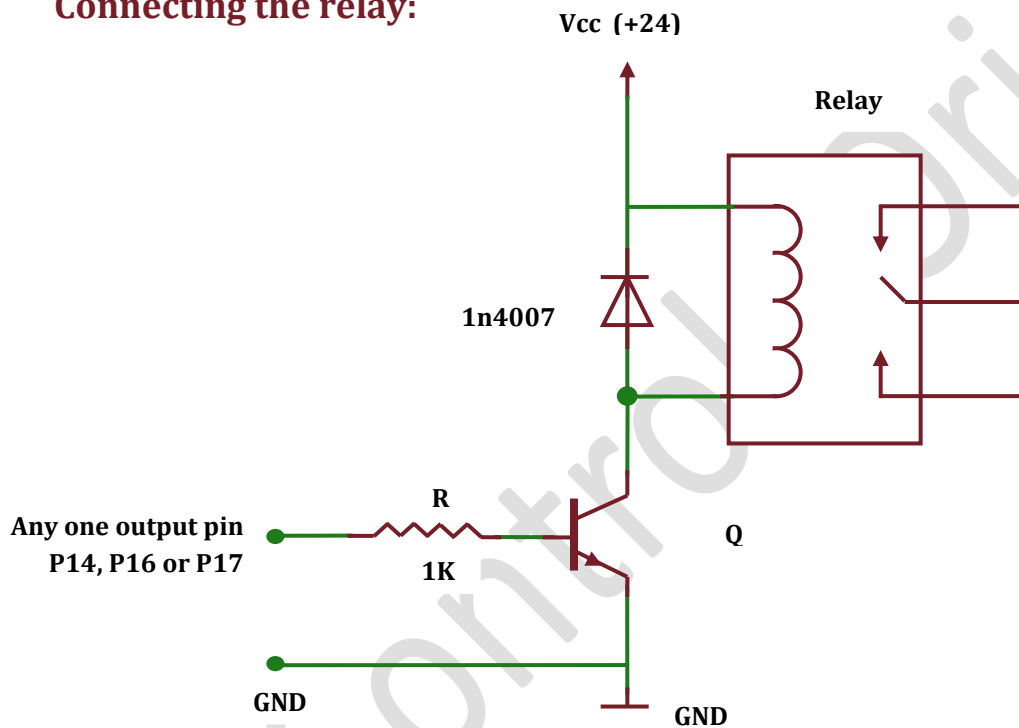
| LED | FUNCTION |
|---------------|--|
| P2-P9 | Indicates the activity of respective output terminal |
| P10-P13,ESTOP | Indicates the activity of respective input terminal |
| P14,P16,P17 | Indicates the activity of respective signals |
| CP-OK | Glows when an charge pump signal is detected at P1 |
| STATUS | <ul style="list-style-type: none"> Blinks fast if there is no PWM signal at P17 Blinks slow if an PWM of duty less 10% is detected Glows continuously if detected PWM signal duty is greater than 10% |

EXAMPLE: INPUT/ OUTPUTS CONNECTIONS

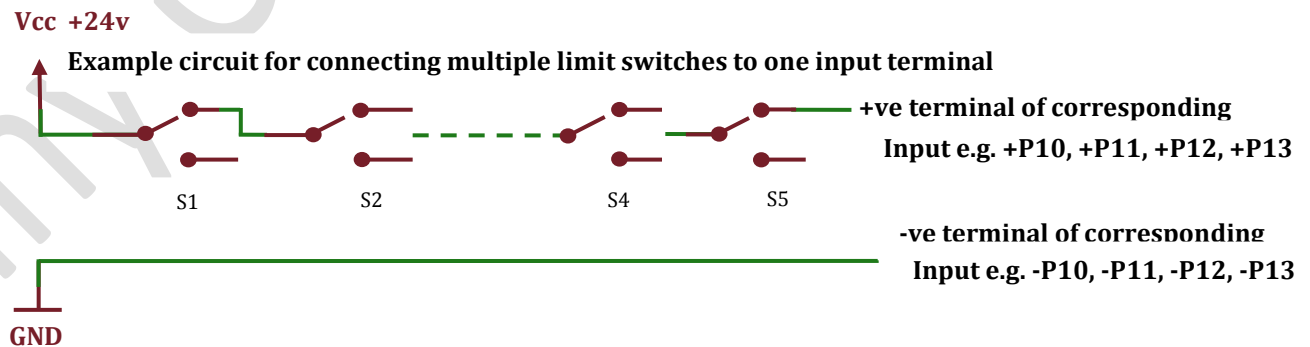
Example Circuit for connecting emergency switch



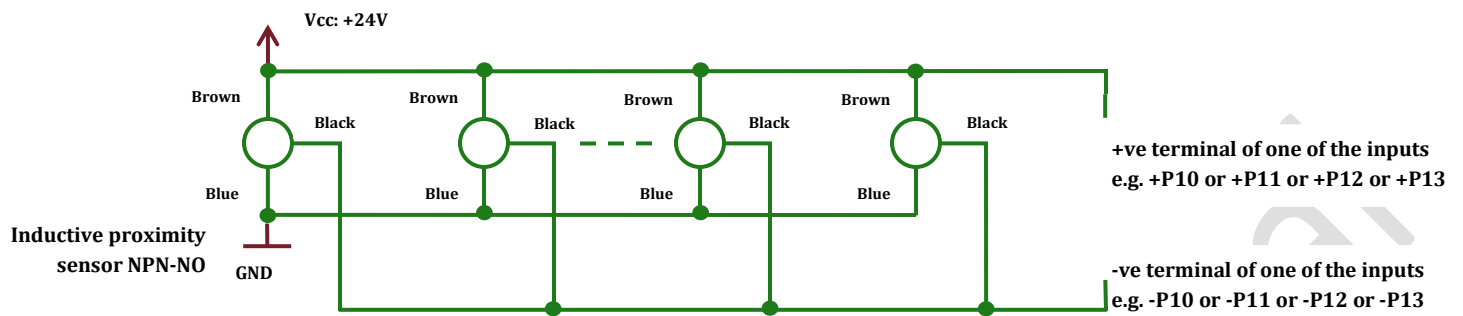
Connecting the relay:



Connecting multiple switches:

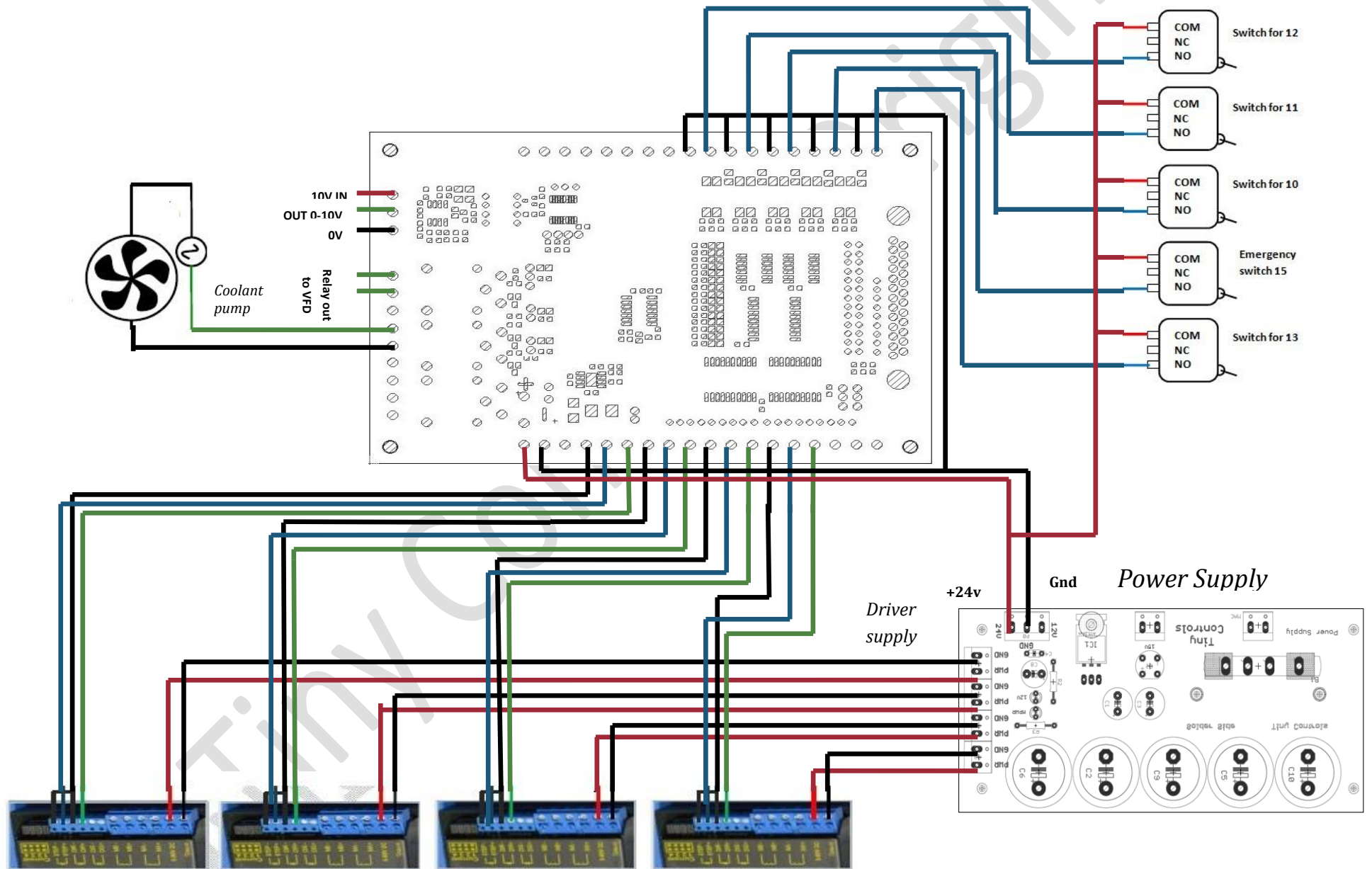


Connecting multiple switches:



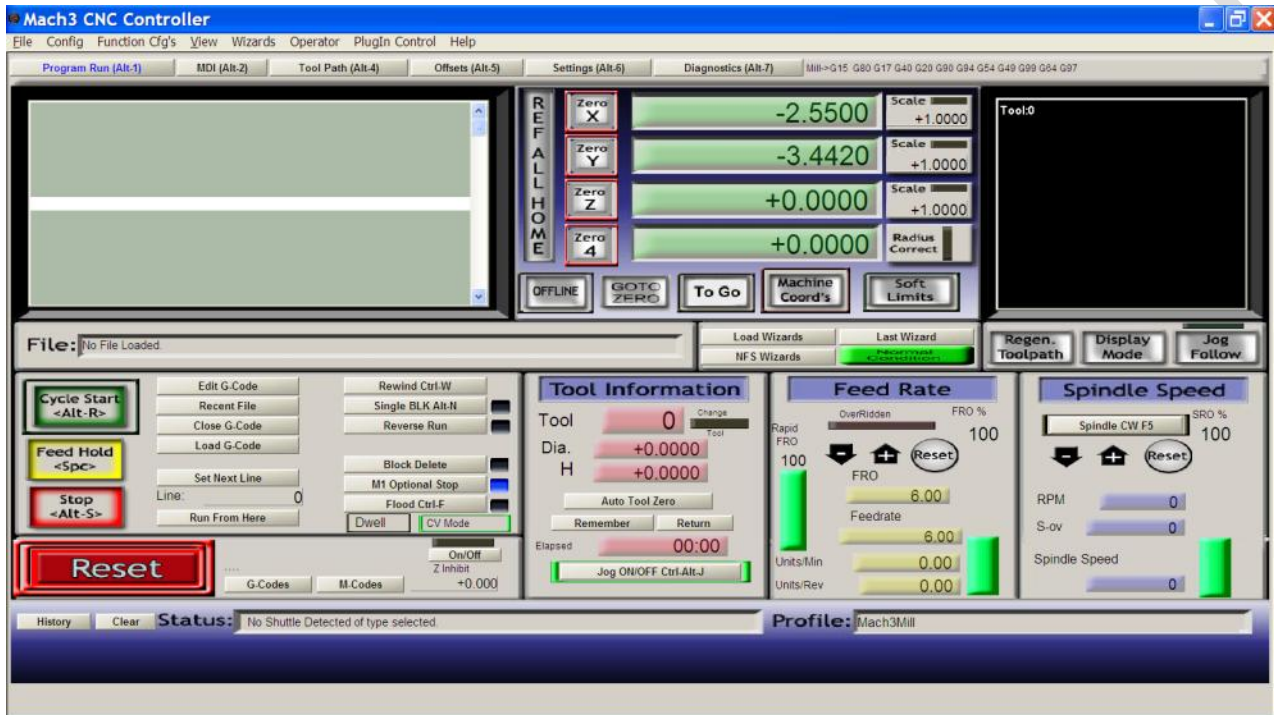
Note: The above example circuits are just suggestions and may not work with all kinds of switches/ sensors voltages etc.

Connection diagram



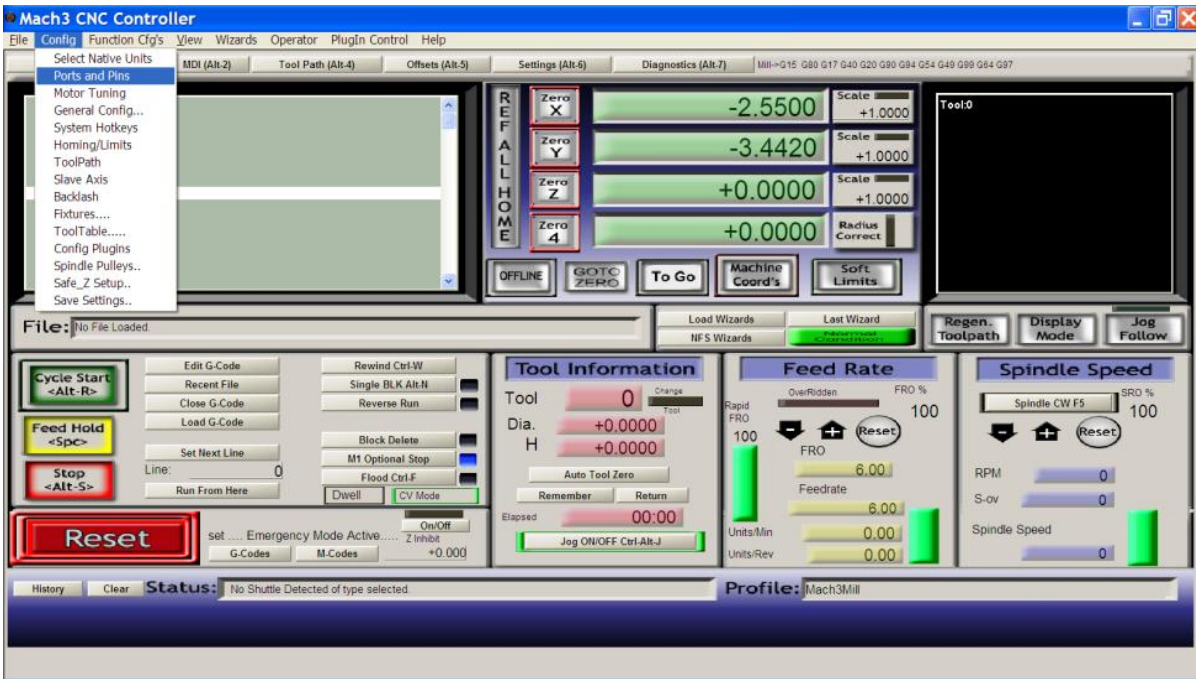
Example: Mach3 Configuration

Step 1: After installing “Mach3” software, run Mach3 Mill from desktop.

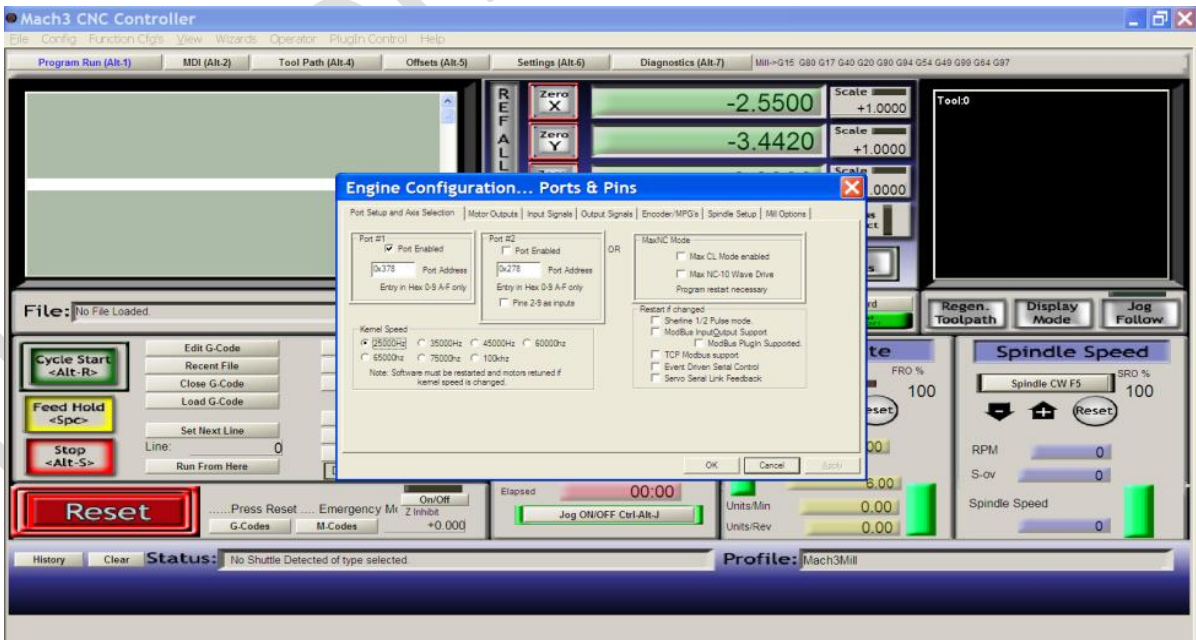


Step 2: To select the native units of choice, Select Config =>Select native unit. Press Ok if the message appears. Select units for “Motor setup” by clicking on option button and press Ok. Choose Inches for Imperial units.

Step 3: Configure ports and pins in Mach3. Select Config=> Ports and Pins.

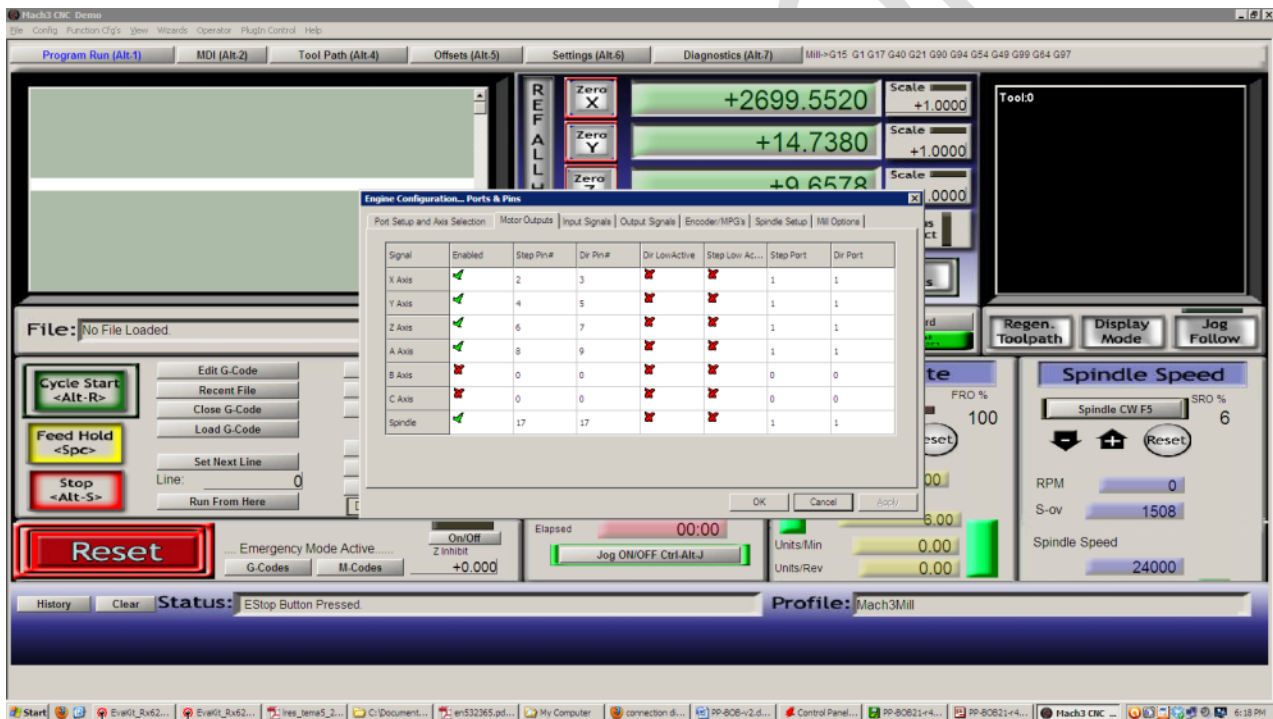


Step 4: After step 3, a window appears. A screen for first tab “Port setup and Axis select” appears. If the port available on computer motherboard is to be used, standard address for the port is “0x378”. But other addresses are sometimes used as well. This information is conveyed to Mach3 by selecting “Ports and Pins” under Config menu. Shown below is an example where the default “computer motherboard” is selected and standard address in “0x378”.



Step 5: Click on “Motor outputs” tab. Here, user can select the number of motors needed to be controlled and to which pin in printer port, drives for all motors are to be connected. Use the identical sequence as given below to configure.

- Enable X, Y, Z, A-axis and Spindle for **PP-BOB2-V2** by ensuring that there is a green checkmark in first column of those axes.
- The second column sets pin to which the step input on our motor drive is connected. In this case, X-axis drive step input is connected to pin 2, Y to pin 4, Z to pin 6, A to pin 8 and spindle to pin 17.
- The third column sets drive direction inputs. In this case, X-axis direction input is connected to pin 3, Y to pin 5, Z to pin 7, A to pin 9 and spindle to pin 17.



Note: It's not mandatory to enable all four axes, if not required. For example in case of lathe machine; only X and Z axes needed to be enabled. So disable the other axes.

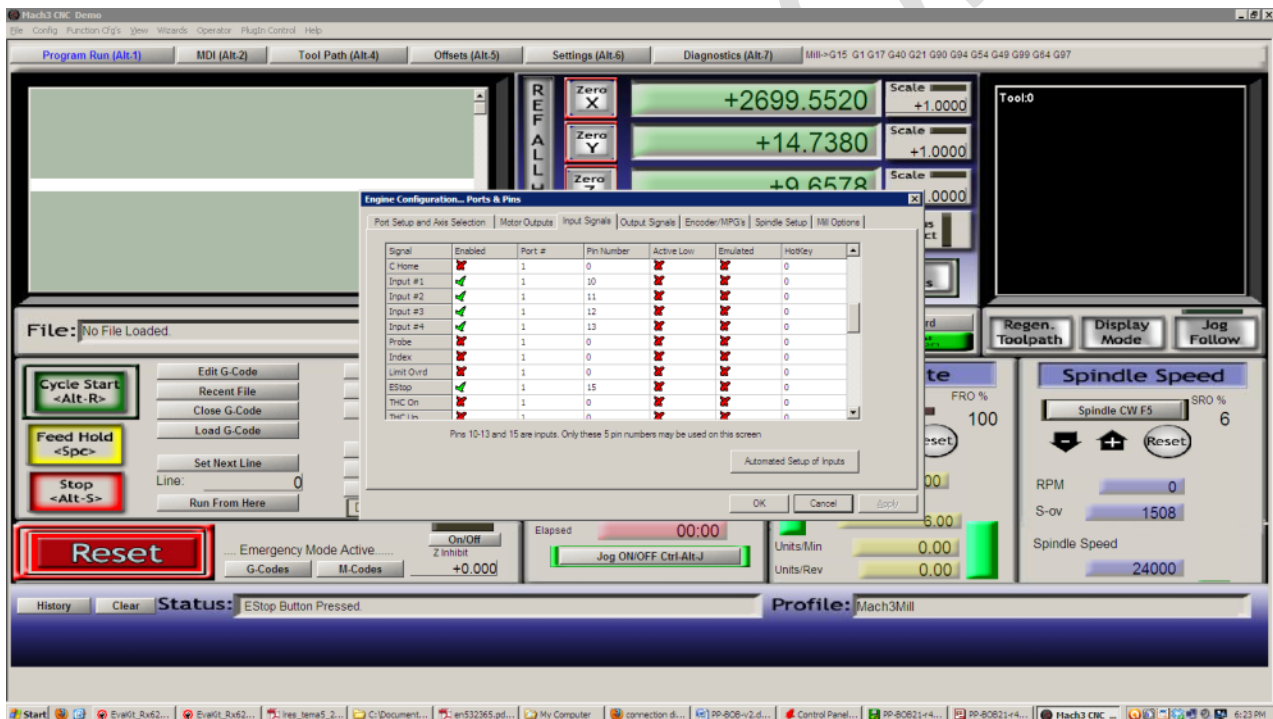
If one of the axis moves in reverse direction, user can correct it by ticking “Active Low” on corresponding “Dir low active”.

Step 6: Click on “Input signal” tab to configure Input signals. Configure the following settings.

- a. To enable the input terminals, enable Input# 1, Input# 2, Input# 3 and Input# 4.
- b. Change pin numbers 10, 11, 12 and 13 respectively in pin number column.

Step 7: A good machine tool has an emergency stop button which if pressed, halts the machine movement in the safest way possible to prevent any damage to machine and injury to operator.

This manual allows the user to pay attention to how the Mach3 understands the emergency button and whether it has been pressed. Use the steps given below to configure the emergency button:

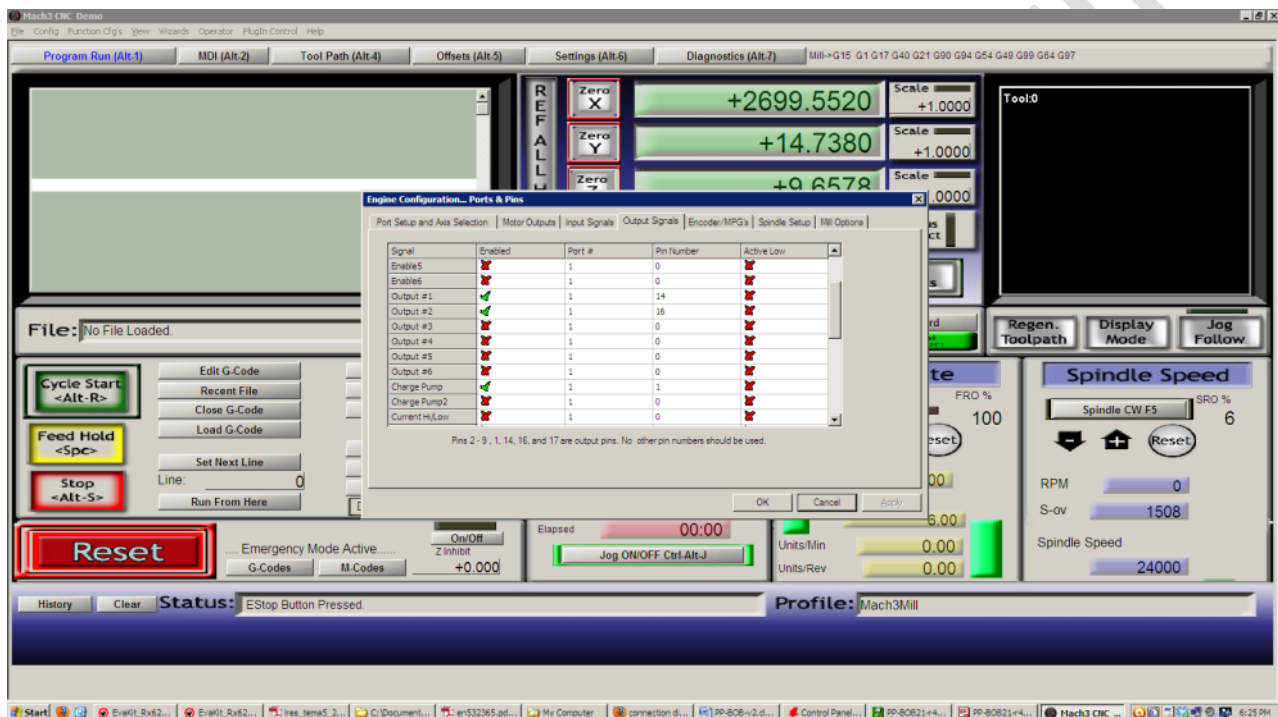


- a. Config=> Ports and Pins=>Input signals.
- b. Enable EStop enable by checking green checkmark.
- c. In pin number column, make it 15.
- d. Emulated can be ticked for test purpose (when physical switches are not attached).

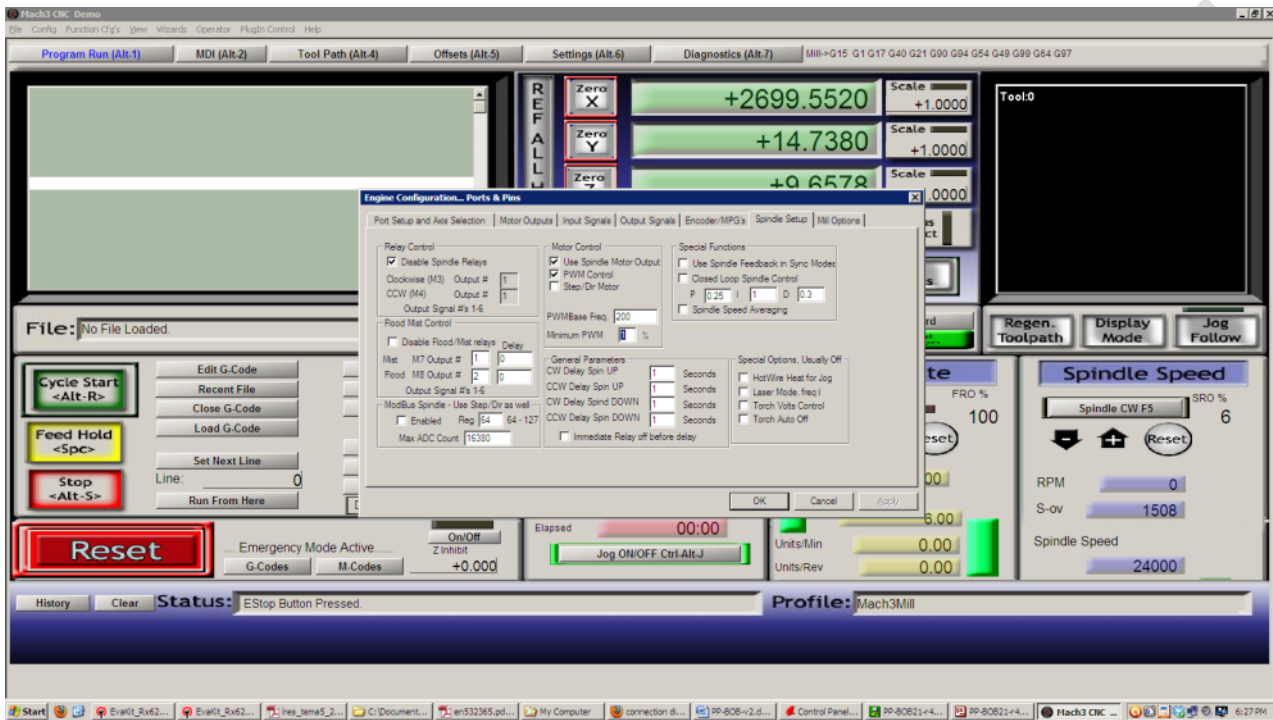
Step 8: Click on “Output signals” tab for configuring output signals. Configure the following settings.

- To enable relays with J5 and J6, enable the output# 1 and output# 2.
- Change the pin number 14 for output#1 and pin number 16 for output# 2.
- To enable charge pump, enable charge pump and change pin number to 1.

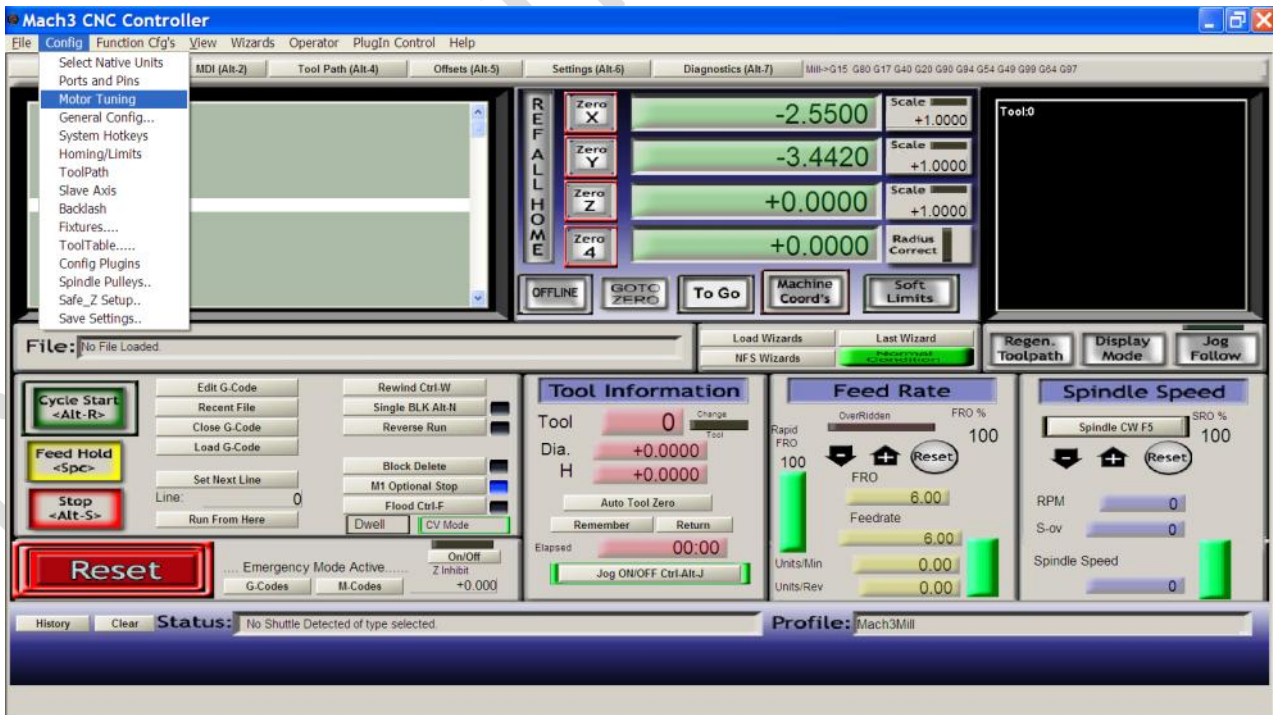
These steps are shown below:



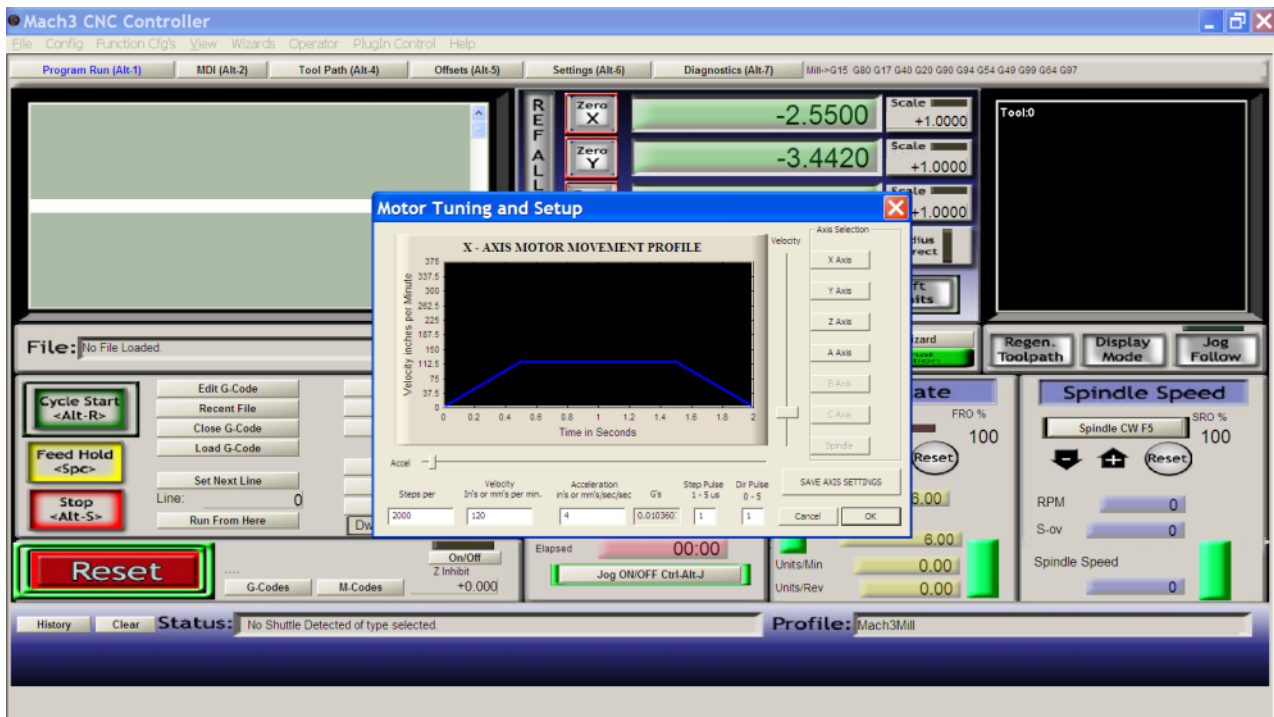
Step 9: Click on “Spindle setup” tab. Please note that on M3 and M4 commands, spindle moves in clockwise and anticlockwise directions respectively. Tick on disabled “Spindle relays” in relay control section. All this is to be controlled through PWM.



Step 10: Save all the configurations by clicking on Apply and then Ok button.



Step 11: Select Config=> Motor Tuning Config. Configure motor tuning parameter for each axis.



Press “Save axis settings” every time any parameter value is changed else any changes made by the user won’t be saved.