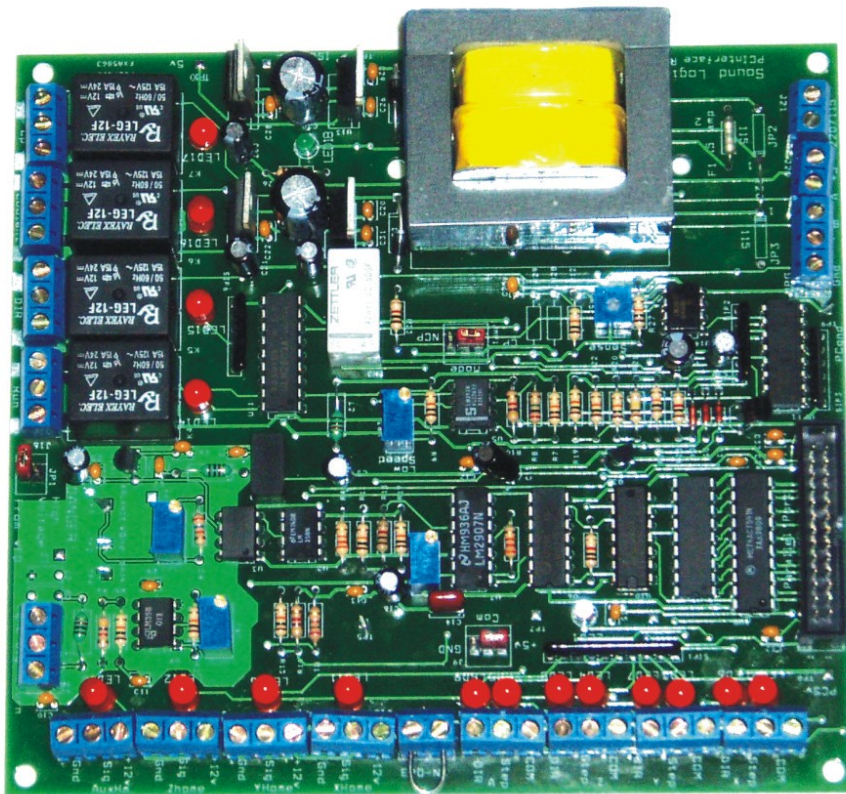


Sound Logic

PC-2-Route All In One Model M2 OEM

**PC parallel port break-out board
For Mach2 OEM model which includes the
Relay board and Spindle Speed board
functions**

General User's Guide



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IMPORTANT INFORMATION

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PC-2-Route All-in one OEM board

Rev. 1.0

Purpose:

To interface the PC parallel port to the Gecko stepper motor drives and to control four relays for powering on aux devices such as spindle, vacuum pump, and coolant pump from 115VAC.

The all-in one board also includes the spindle speed function that can control a variable frequency drive (VFD) through an optically isolated 0 to 10 volts. The board has an output for one Quadrature encoder that can be used for a manual pulse generator.

The interface uses a transformer with dual primary and secondary windings and optical-isolators to totally isolate the PC parallel port from the stepper motor power supply and the equipment being controlled. Operates on 115 volts AC or 220 volts AC (jumper selectable) 50hz or 60hz.

PC-2-Route All-in one OEM board

Rev. 1.0

Features:

: PCB:

- : Fr4 material
- : Solder mask on both sides
- : Silkscreen (legends) on the topside.
- : Plated through holes
- : Inputs and outputs are optical-isolated.
- : Isolated 5 volts and grounds for the PC parallel port IO.
- : All outputs are buffered.
- : Mode select jumper for M1 or N1 operation.

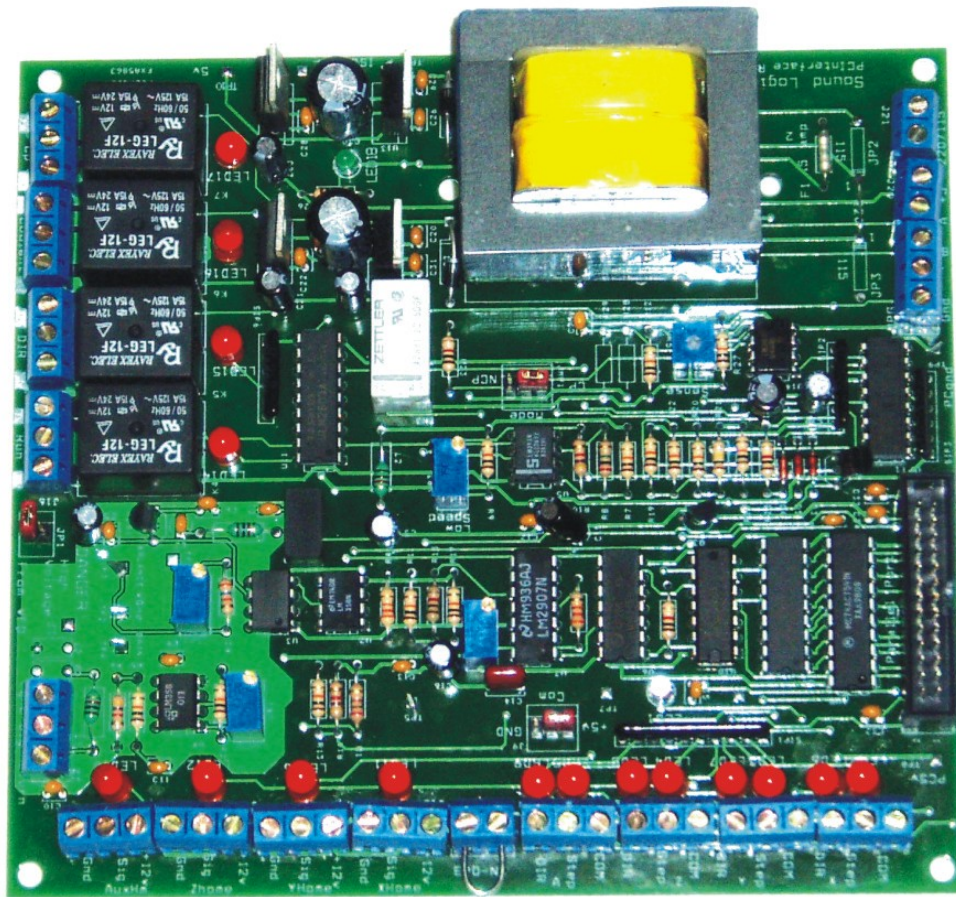
: Connectors:

- . All terminals are labeled as to their function.
- : 12 - screw type terminals for attaching the step, direction signals to the Gecko drives
- : 12 - screw type terminals for home and limit proximity sensors or switches.
- : 26 pin header for the ribbon cable to connect to the printer parallel port.
- : J19 EPO connector.
- : J21 220/120 power connector
- : Jmp1 Mode switch to selects the mode of operation CP/NCP
- : J20 MPG screw terminals
- : J2 Spindle speed output
- : JP1 jumper for VFD
- : J16-J19 Relay outputs

Transformer:

- . Dual primary windings allow operation at 115 VAC or 220 VAC. The voltage is selected using the soldered jumpers JP1 and JP2.
 - 115 VAC solder in both JP1 and JP2 jumpers.
 - 220 VAC solder one jumper between JP1-1 and JP2-1.
 - This is indicated on the PCB.
- . Dual secondary.
 - Winding one supplies 5volts via a regulator for the PC side optical-isolators.
 - Winding two supplies 5volts for the machine side optical- isolators and 12volts for the Solid State relays and proximity sensors. Both are regulated.

The grounds of these two power supplies **MUST NOT BE CONNECTED TOGETHER OR TO EARTH** doing so will destroy the isolation and expose the sensitive electronics in the PC to the inductive spikes form the motors.



Power Supply

The power supply transformer has a dual secondary winding. One side provides a regulated 5 VDC to power the optical isolators in the Gecko drives or any other drivers that require 5 VDC. The negative side of the 5 VDC power supply is common to the common side of the PC. The PC is totally isolated from the motor and relay circuits.

The second winding provides power to a 5 VDC power supply to driving solid state relays. The 5 VDC power is also used with an optical isolator to convert the 12 VDC signal from the proximity sensors back to 5 VDC before it goes back to the PC as a limit signal.

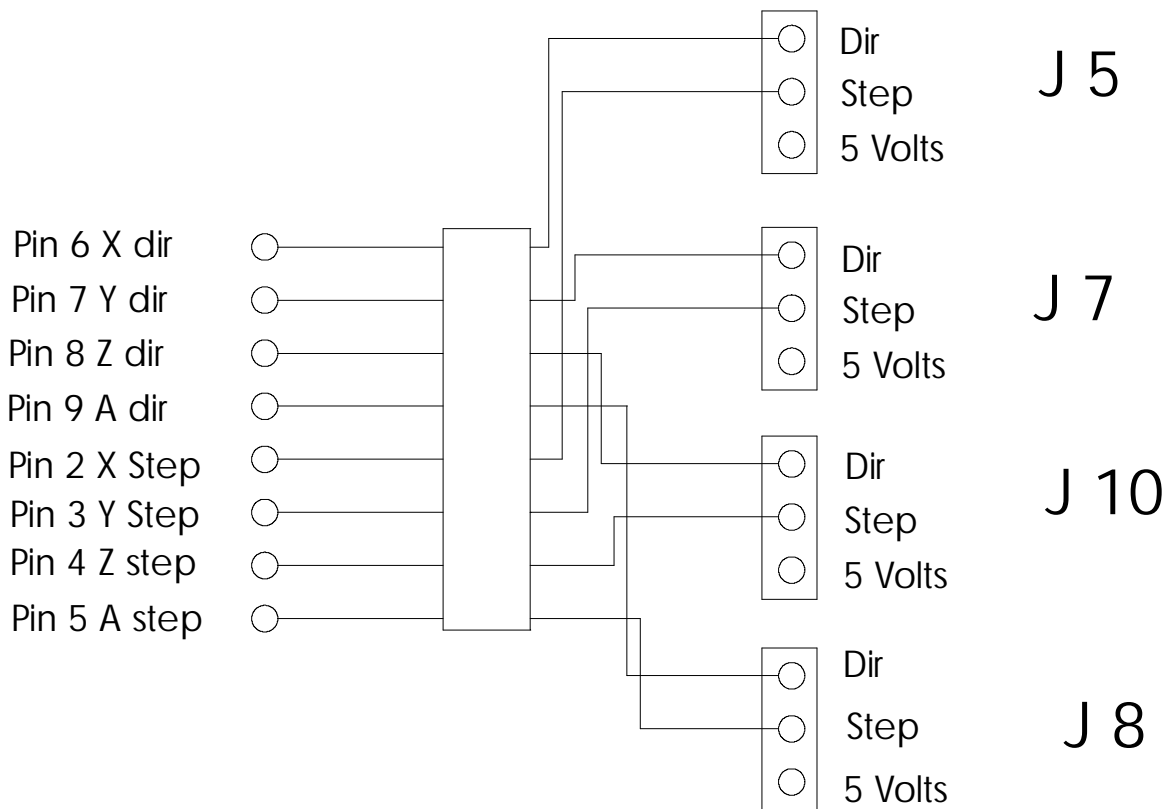
The secondary winding also provides power to a 12 VDC regulated power supply. The 12 VDC power is used to provide power to the proximity sensors and to drive solid state relays.

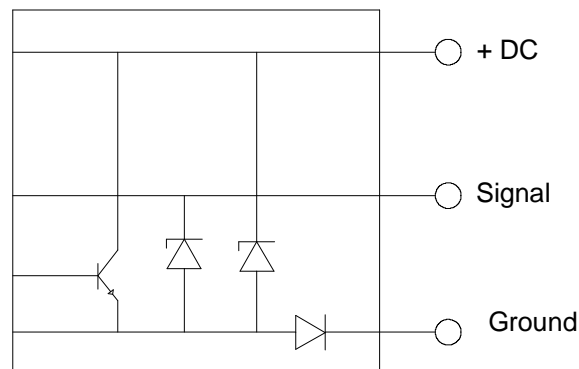
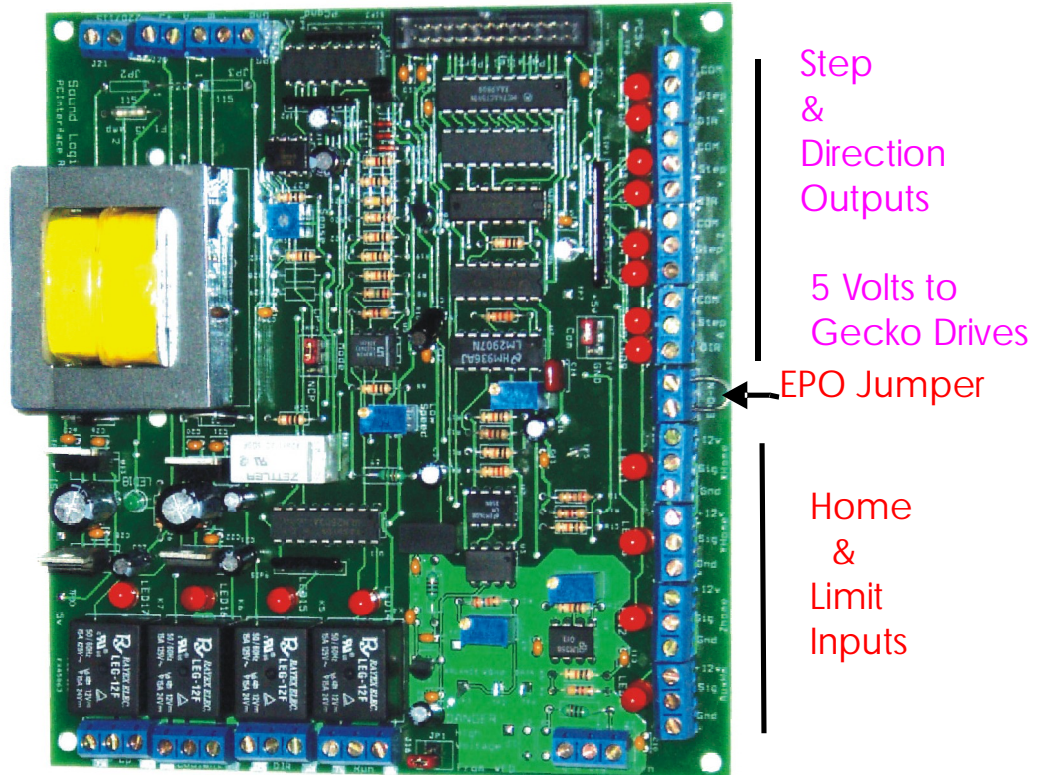
Step and Direction Pin Layout

The Step and Direction signal come in from the parallel port on pins 2 through 9. The signals then go through an Optical Isolator. The Optical Isolator provides electrical isolation between the inputs from the computer and the outputs.

The outputs then go to J1 through J5. Each Step and Direction line has a LED which can be used to assist in troubleshooting.

The lights on the Step lines will seem very dim at high speeds.





NPN Inductive Proximity Sensor

NOTE: The break-out board was designed to use either **NPN** or **PNP** inductive proximity sensors.

Mach2 supports home and limit switches. In the picture at the top of the page, the lower 12 screw terminal are the connections for the X, Y, Z, and Aux home and limit proximity sensors.

The breakout board support inductive proximity sensors by using three screw terminals. One screw terminal is for 12 volts to power the inductive proximity sensors. One is for the signal and one id for the ground.

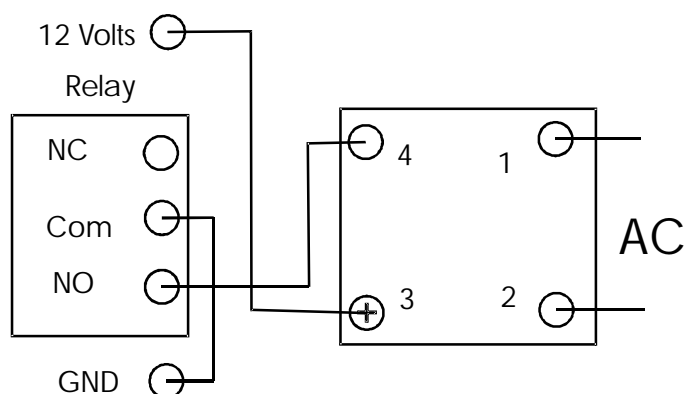
You can also use micro switches connected between the signal screw terminal and the ground screw terminal.

Sound Logic PC2CNC Interface

1. Four axes Step and Dir and common on 4 screw terminals.
Common is selectable from +5v to Gnd
Default is +5v
2. One Limit input for each Limit/home switch.
Inputs are optically isolated the common ground floats.
3. Four relay outputs each SPDT relay rated at 15 amps 115 volts.
 1. Spindle Run Relay
 2. Spindle Direction Relay
 3. Coolant Relay
 4. Charge pump Relay energized when Mach2 is active.
4. Optically isolated Analog 0 to 10v for spindle speed via a VFD.
5. One Quadrature encoder input
You sacrifice the A and Z limit functions.
This input can be used for a spindle feedback on lathes for
Threading or for a Manual Pulse Generator.
6. 115 / 220 power in
Selectable using Jp1 and JP2
7. J13 EPO input normally closed.
Wire this input through the normally closed contacts on the Emergency.
Power Off switch, or leave the jumper in place.
8. The charge pump enables the output relays and step & Dir signals only after Mach2 is running and reset has been clicked. Out 4 will be active and may be used to drive a solid state relay to activate the motor power supply. Any fault will de-activate the charge pump, remove power form the motors, and disable the step & dir signals form the drives.

Solid-state relay connection
Through an output relay.

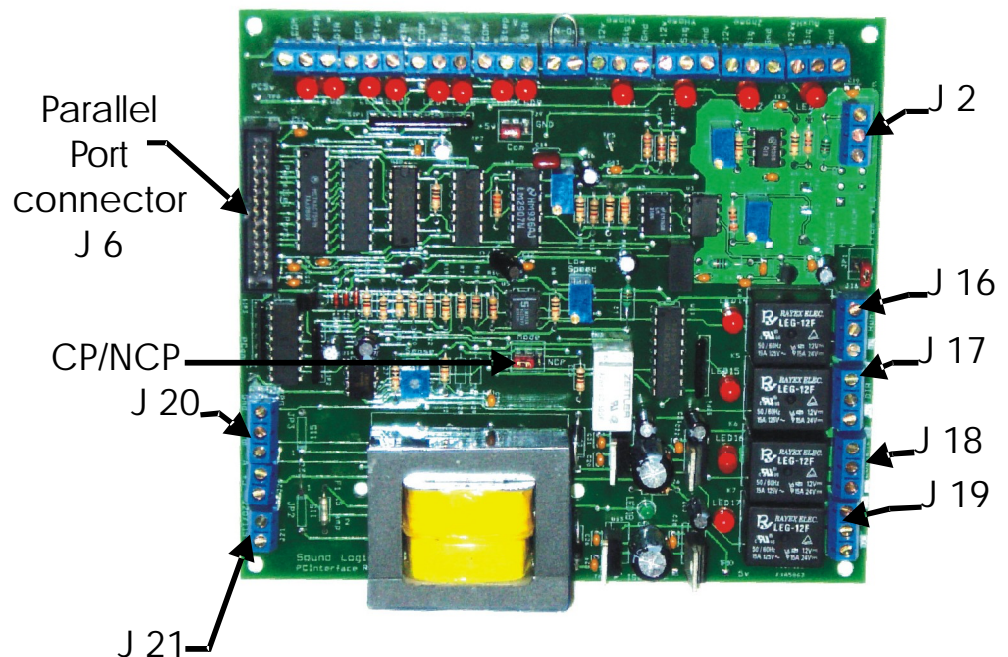
The 12 volts and ground can be
take from any one of the limit
switch screw terminals.



Connector Pin out.

J6 26 pin header to parallel port on the PC.

- J6 -1 Spindle step out
- 2 X step
- 3 Y step
- 4 Z step
- 5 A step
- 6 X dir
- 7 Y dir
- 8 Z dir
- 9 A dir
- 10 Estop
- 11 X Lim/home
- 12 Y Lim/Home
- 13 Z Lim/Home
- 14 Dir out relay
- 15 A Lim/Home
- 16 Coolant relay
- 17 Charge pump
- 18 to 20 PCgnd



J20 Encoder in

- Pins 1 & 2 ground.
- Pin 3 switch input to change between axes
- Pin 4 B to encoder
- Pin 5 A to encoder
- Pin 6 +5v

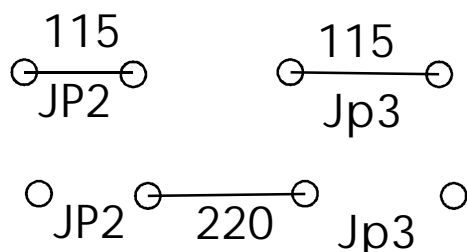
The +5v and ground are from the floating ground power supply on the Interface board.

J21 Power in.

Jp1 and Jp2 are used to set the input voltage.

For 115 VAC, Jp1 and Jp2 both have jumpers installed. (See below)

For 220 there is only one jumper (see below)



J16 Run relay
NC normally closed
Com is the center terminal
NO normally closed.

J17 DIR relay
NC normally closed FWD
Com is the center terminal
NO normally closed. REV
J18 Coolant relay
NC normally closed
Com is the center terminal
NO normally closed.

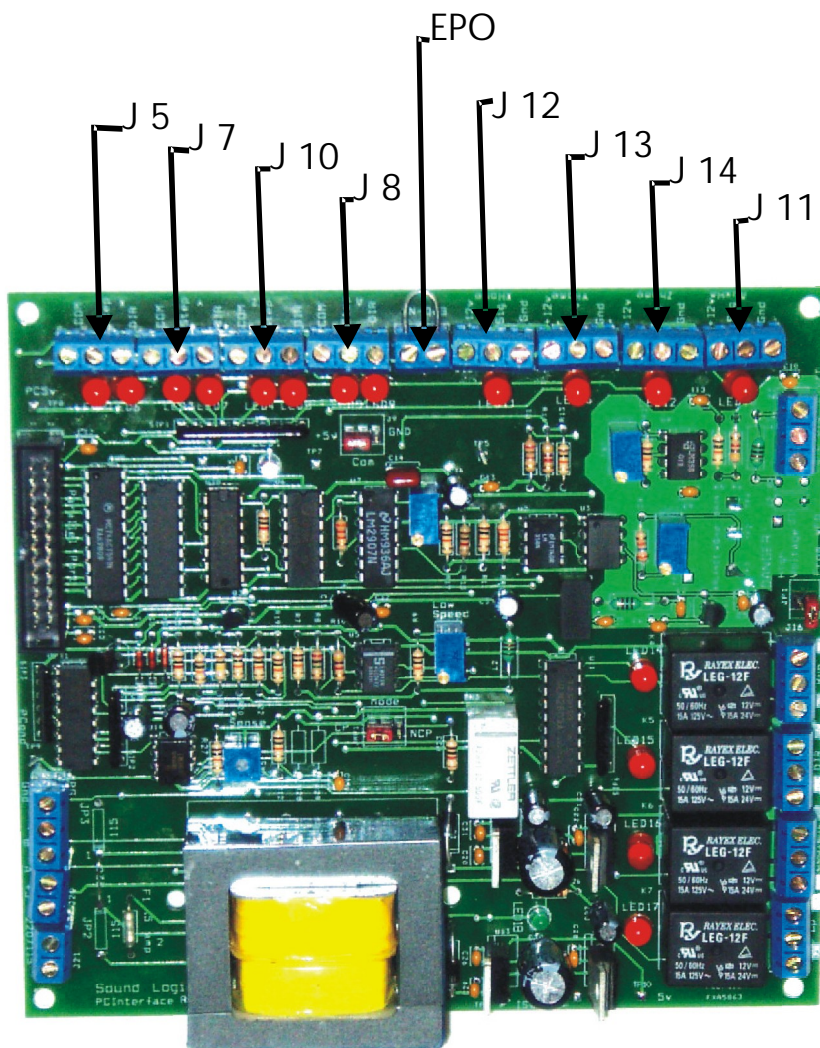
J19 Charge Pump relay
NC normally closed
Com is the center terminal
NO normally closed.

J2 VFD analog signals

Egnd earth.
Sig 0-10v
Return gnd.

JP1 mode select
Connects the com for Dir to the Normally Open on the Run relay.
This routes the gnd for the dir signal through the normally open contact of the run relay.
When the run relay closes it will select Fwd or REV determined by the Dir relay.

- J11 Home / Limit switch input for the A axis
+12v is isolated and is used for powered switches such as proximity or optical switches.
Sig Low active input
Gnd (floating gnd)
- J12 Home / Limit switch input for the X axis
+12v is isolated and is used for powered switches such as proximity or optical switches.
Sig Low active input
Gnd (floating gnd)
- J13 Home / Limit switch input for the Y axis
+12v is isolated and is used for powered switches such as proximity or optical switches.
Sig Low active input
Gnd (floating gnd)



J14 Home / Limit switch input for the Z axis
+12v is isolated and is used for powered switches such as proximity or optical switches.
Sig Low active input
Gnd (floating gnd)

J5 X axis
Step to drive
Dir to drive
Com +5v for Gecko drives
Selected by J9

J7 Y axis
Step to drive
Dir to drive
Com +5v for Gecko drives
Selected by J9

J10 Z axis
Step to drive
Dir to drive
Com +5v for Gecko drives
Selected by J9

J8 A axis
Step to drive
Dir to drive
Com +5v for Gecko drives
Selected by J9

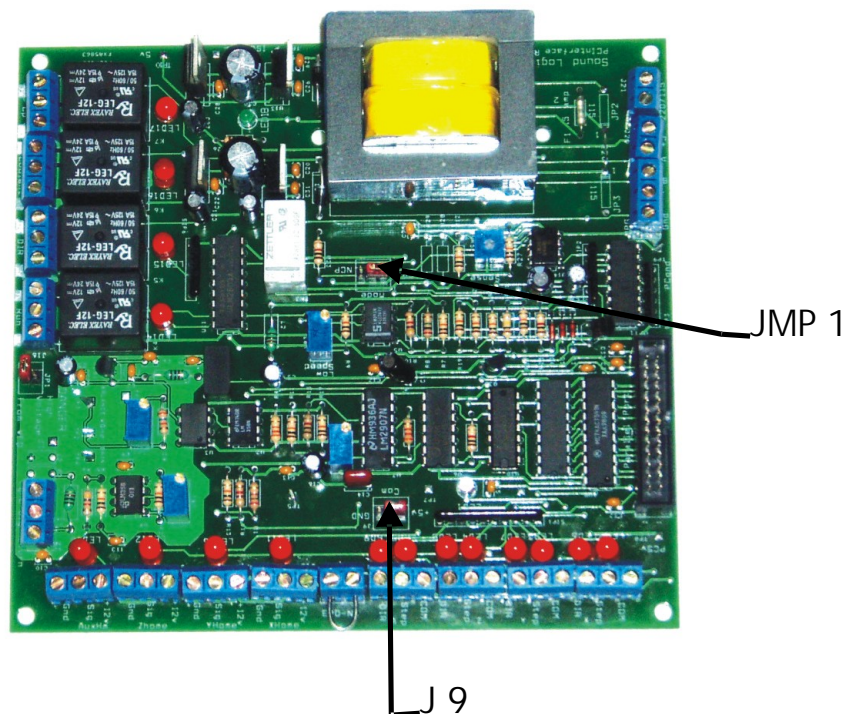
J9 com selector for drives
Jump to GND for Rutex and other drives using a common gnd.
Jump to +5c for Gecko and other drives using common +5v .

Jmp 1 charge pump MODE selector.
CP charge pump active
NCP charge pump by-passed.

J8 A axis
 Step to drive
 Dir to drive
 Com +5v for Gecko drives
 Selected by J9

J9 com selector for drives
 Jump to GND for Rutex and other drives using a common gnd.
 Jump to +5c for Gecko and other drives using common +5v .

Jmp 1 charge pump MODE selector.
 CP charge pump active
 NCP charge pump by-passed.



Sound Logic PC2CNC Interface

Load the PC2CNC interface XML file to configure Mach2.

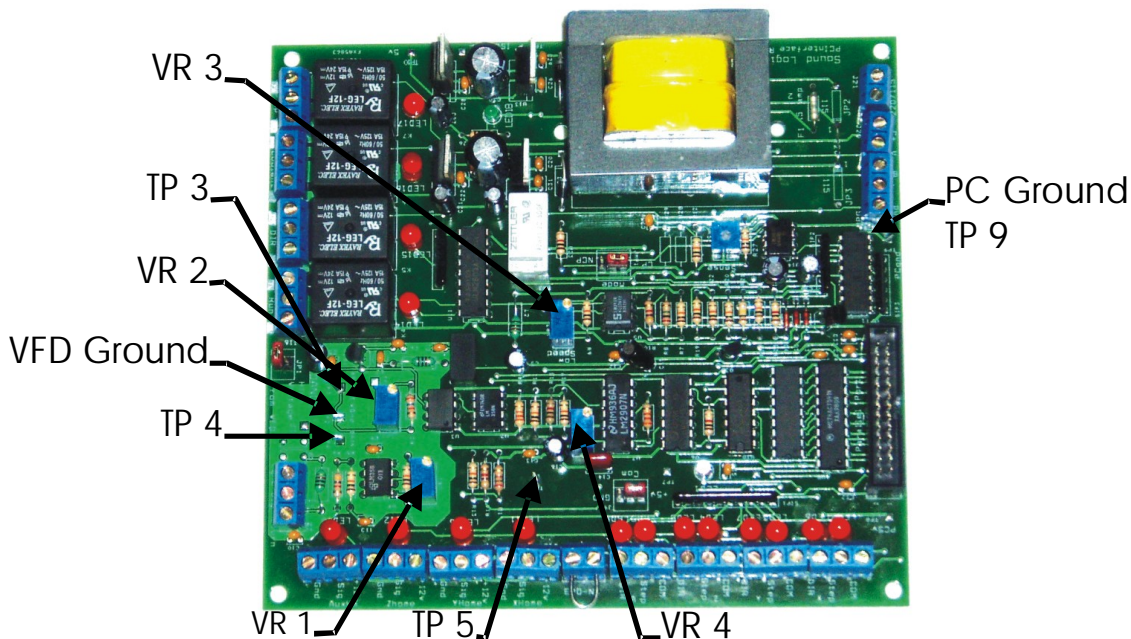
Screen shot of the configuration will be provided.

1. Step and dir signals for X,Y,Z, and A axes
2. Home / Limit switch inputs for each axis
3. Spindle speed control
4. Spindle speed defaults to 3600 RPM. You may change in Config/Logic page
5. change the selected pulley to the maximum speed for your spindle.
6. Charge pump

Spindle Speed Set up

Turn power of to the VFD !!!

1. Change to the Config / Logic page of Mach2.
Enter the maximum speed for you spindle into pulley 4 (default is 3600)
You may set the other 3 pulley setting to any speed you may want as the Maximum speed.
2. On the RUN screen set the spindle speed DRO to the maximum speed set in the pulley settings .
3. Clip ground lead of a Multimeter to PCgnd
4. Clip Plus lead of meter to Tp5
5. Toggle spindle ON
6. Adjust Vr4 for 5.0 volts
7. Move the ground lead to VFD gnd (Turn power of to the VFD !!!)
8. Move the Plus lead to Balance TP3
9. Adjust Vr2 to 5.0 volts
10. Move Plus Lead to Gain TP4
11. Adjust Vr1 to 5.0 volts for a 0 to 5v control or 10 volts for a 0 to 10 volts control
12. Set the speed DRO to 100 or the lowest speed you will use



13. Adjust Vr3 CCW until the Spindle Run relay engages

14. Adjust Vr3 CW until the relay disengages

This is the low speed drop out

Remove both leads

Power off the board

Connect the VFD Use shielded wire and wire the shield to chassis. Connect on the VFD end. Remember if your FVD is not isolated it could be 200v above ground and is very dangerous and it takes several seconds to discharge.

Be Careful !!!

Power it up

Power the board

Send

Test STEP and Dir

- ┌ Power the PC on and run Mach2

The following assumes that you have connected power to the breakout board and have a good parallel port cable connected between the PC and the breakout board.

- ┌ All of the STEP and DIR LEDs will be ON.
If the Geckos are not connected they will be off.
- ┌ This is a good troubleshooting tool.
- ┌ Click on the Mach2 Reset button
- ┌ The out 4 LED will come ON. All the Step and Dir LEDs will be off. Jog the X axis by pressing the UP arrow keys
The Step LED will come ON and stay on. (The pulse is are too narrow to see.)
The Dir LED will come ON and OFF by pressing the UP arrow
Then the Down arrow.
- ┌ Test the other axes the same. The Y axis is the Left / right arrow
The Z axis it the page up and page down.
The A axis is the + and keys (not shifted)

Test Home switches

The following assumes that you have connected power to the breakout board and have a good parallel port cable connected between the PC and the breakout board.

Start Mach2 and click on the Mach2 Reset button. The Out 4 LED should come ON. The out 4 LED indicates that Mach2 has control and the charge pump safety circuit is working.

Select the Mach2 diagnostic page.

Use a clip lead to momentarily connect the Sig input terminal for the X axis to the GND terminal. **Results:** The LED by the terminal will come ON. On the Mach2 diagnostic page, the home and limits lights should come on. The Mach2 reset button should blink indicating that a limit had been sensed.

Remove the jumper and the LEDs will go out. Reset Mach2 and the Out 4 LED will come back on.

Do the same test for the Y, Z, and A axis.

NOTE:

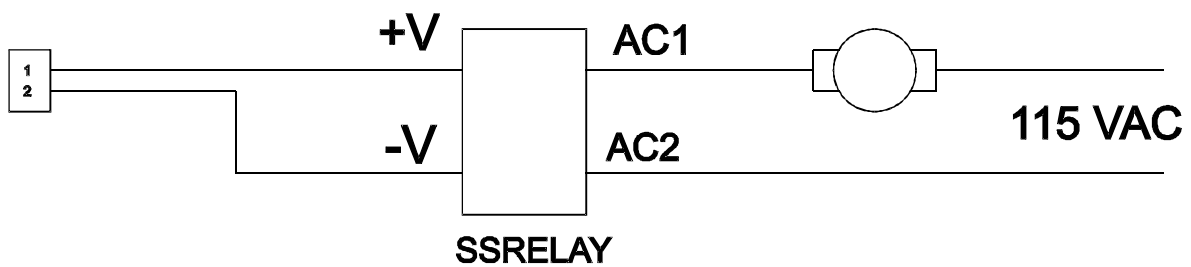
If you use normally closed home limit switches The Home LEDs will be ON. You will need to open the connection rather than short them and the LEDs will go out. The LEDs in Mach2 will still come on when the input is activated (Opened)

NOTE: If you are going to use normally closed limit switches, you will need to tell Mach2. In the Mach2 section under Ports and pins/input pins, there are check boxes for **active low**. You will need to remove the check for all inputs that are going to be normally closed.

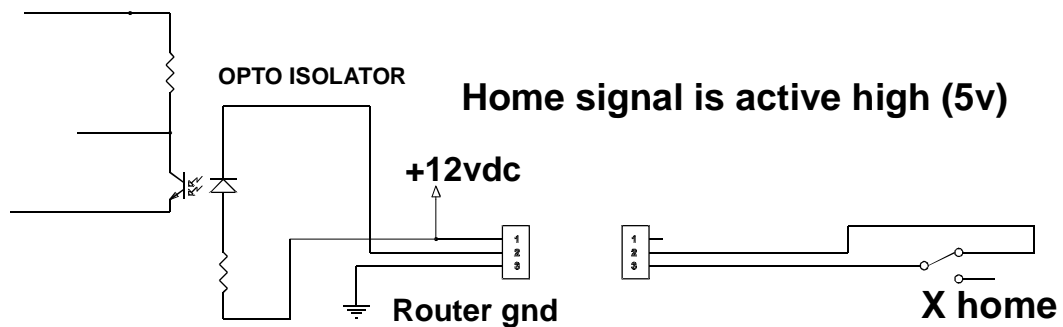
Disclaimer:

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The above circuit is a sample of a solid state relay used with the pc-2-route break-out board. The break-out board provides 12 VDC to power the relay.



The above circuit is a sample of a micro switch being used in place of a proximity switch as a home limit switch.

