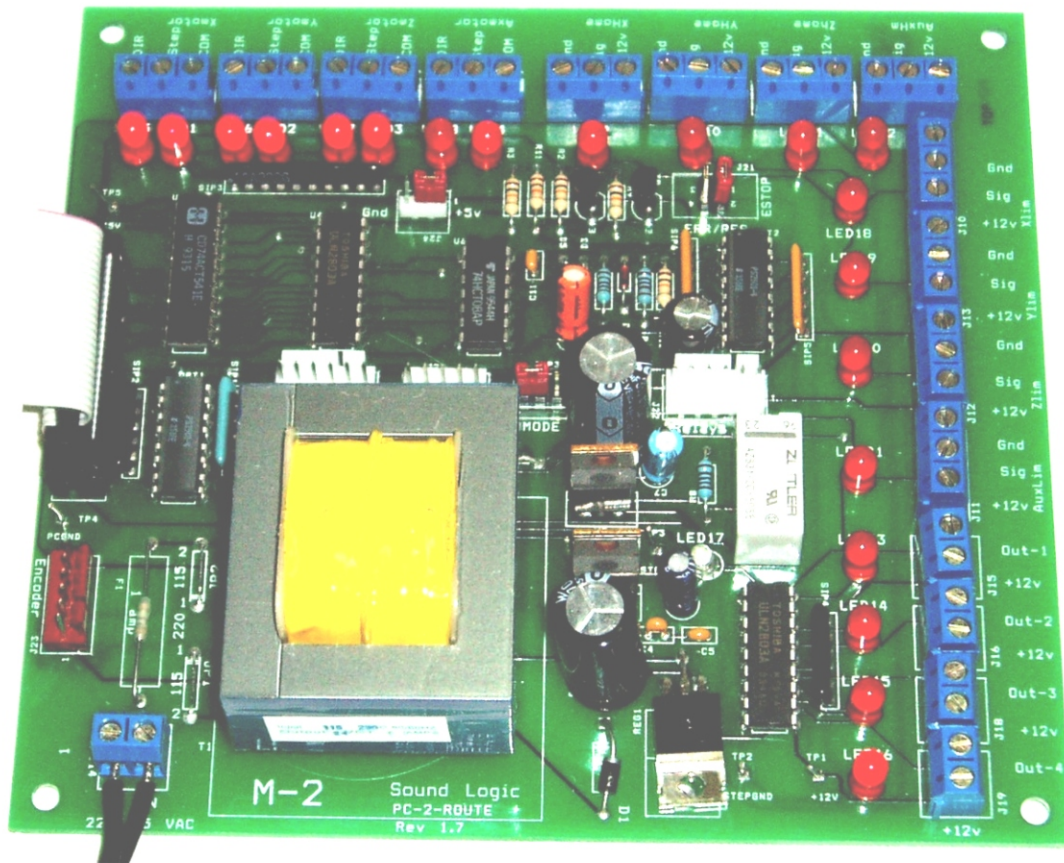


Sound Logic

## PC-2-Route Model M2

PC parallel port break-out board  
For Mach2 users

General User's Guide



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# PC-2-RouteN

## Rev. 1.7

### Purpose:

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

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.

**NOTE:** Rev. 1.6 added another jumper (J24). This Jumper was added to make it easier for users to use Rutex drives. The jumper can be set to ground or +5 volts. The default will be +5 volts for the Gecko drives. When set to ground the ground will be connected to the PC ground.

### 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.

See **Mach1&2 features**

#### ●Connectors:

A. All terminals are labeled as to their function.

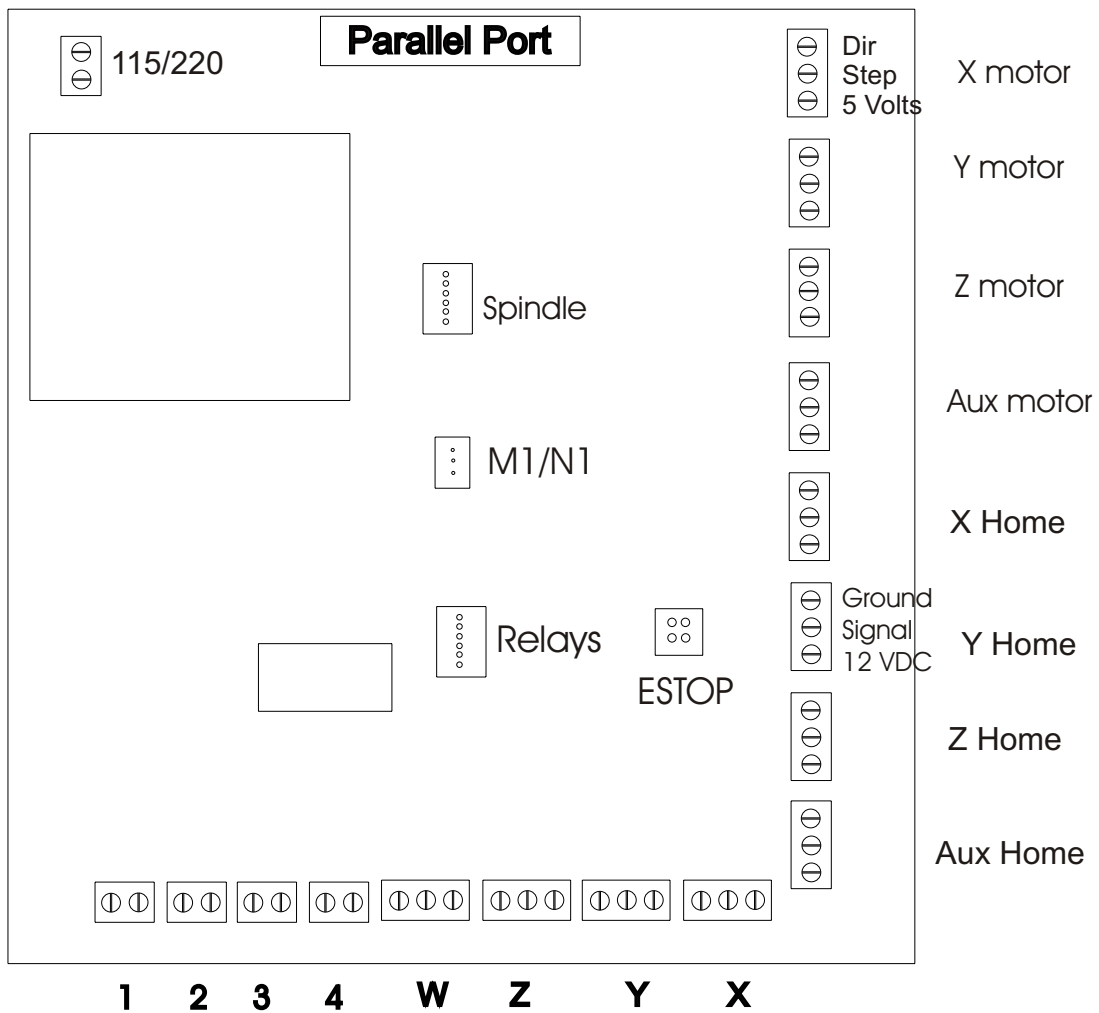
- 12 - three terminal screw type terminals for attaching the step, direction signals to the Gecko drives and home and limit proximity sensors or switches.
- J1 26 pin header for the ribbon cable to connect to the printer parallel port.
- J20 6 pin single inline connector to Spindle speed control. ( In development )
  - Pin1 +18 dc unregulated
  - Pin2 buffered out1 step
  - Pin3 buffered out2 dir.
  - Pin4 PCgnd
  - Pin5 +12v isolated form PC
  - Pin6 Gnd isolated form PC

- J22 connection for a relay PCB containing 4 relays
  - Pin 1 = 12vdc All coils
  - Pin 2 = K1 coil
  - Pin 3 = K2 coil
  - Pin 4 = K3 coil
  - Pin 5 = K4 coil
 Normally open contacts are connected to screw terminals.

### **Encoder**

- J23 6 pin single inline connector for quadrature encoder input.
  - Pin1 isolated GND
  - Pin2 isolated Gnd
  - Pin3 isolated to Pin 12 of parallel port (in1)
  - Pin4 isolated to Pin 13 of parallel port (in2)
  - Pin5 isolated to Pin 15 of parallel port (switch)
  - Pin6 isolated +5v
- J24 Rev. 1.6 added another jumper (J24). This Jumper was added to make it easier for users to use Rutex drives. The jumper can be set to ground or +5 volts. The default will be +5 volts for the Gecko drives. When set to ground the ground will be connected to the PC ground.
- 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 from 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.

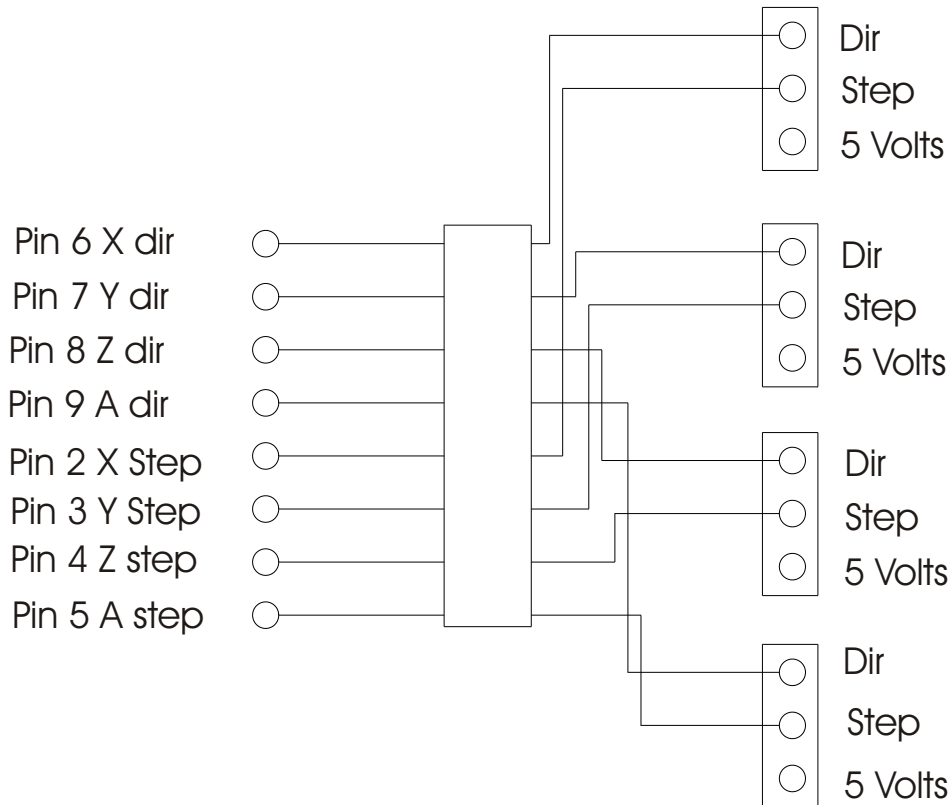
The secondary winding also provides power to a 12 VDC regulated power supply. The 12 VDC power is used to provide power to the proximity sensors and to drive solid state relays.

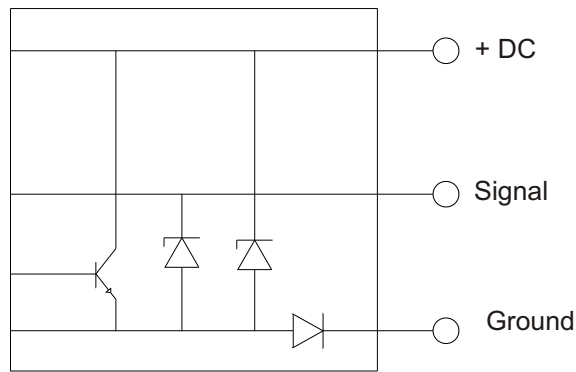
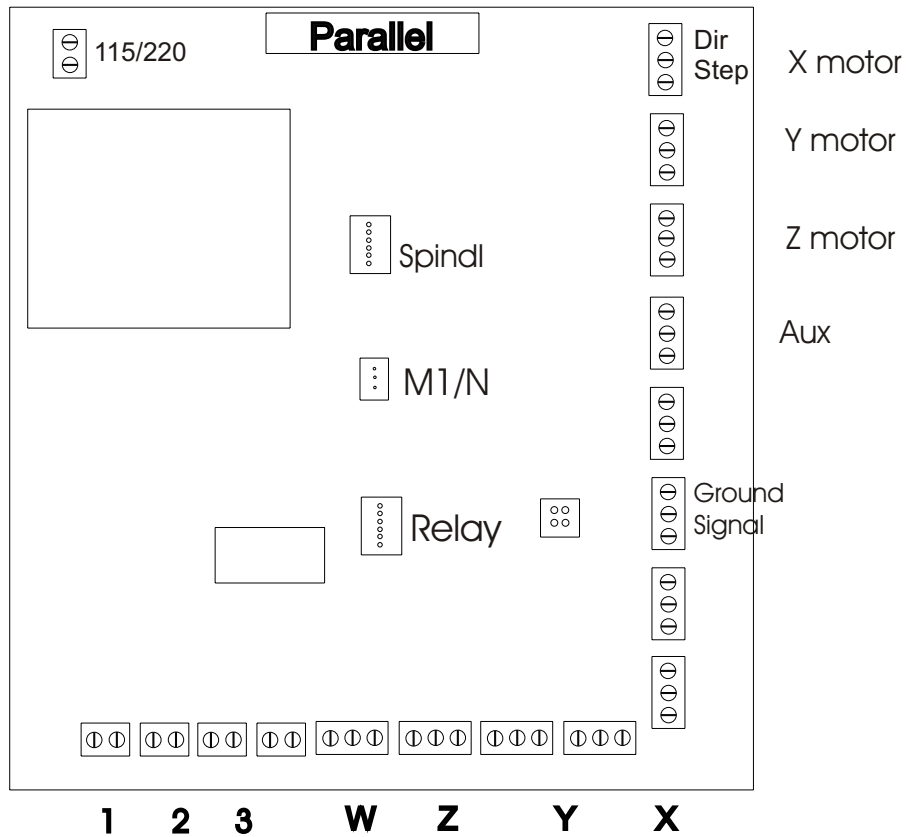
## Step and Direction Pin Layout

The Step and Direction signal come in from the parallel port on pins 2 through 9. They 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 **NPN** inductive proximity sensors.

Mach1 supports home and limit switches. In the diagram at the top of the page, J6, J7, J8, and J9 are the primary connections for the X, Y, Z, and Aux proximity sensors. J10, J11, J12, and J13 are the secondary connections for the proximity sensors. The signal line is connected internally on the board between the primary connectors and the secondary connectors. For example the signal line for the X Home (J6) is connected to the signal line on J10 (X lim).

The extra four sets of screw terminals (J10 - J13) enable you to use a second proximity sensor on any axis. Mach 1 will know which sensor has been detected by the direction that the axis was moving.

## Testing the PCB:

Before connecting the PC or the Gecko drives or switches.

- Power up the interface. The Green LED will light.  
On some of the earlier board Out1 to Out3 will light as well.
  - Clip the ground clip of your meter or scope to TP4 (Pcgnd) and the + lead to TP5 (PC5v) to read the +5 volt for the PC side. Note: there are two separate 5 volt supply's. One is to power the Gecko drives. The second one is used on the limit input side to power the chips. This keeps the grounds separate when powering the Gecko drives.
  - Move the ground clip to TP2 (RGND) and the + lead to TP3 (Step5v) to read the 5 volts then to TP1 (+12v) to test the 12 volts on the controlled equipment side.
  - If readings are correct continue the tests.
  - Locate the HOME sensor connectors J6, J7, J8 and J9. Connect a jumper from pin-2 to pin-3 for each axis, note the LEDs located by each connector should illuminate.
  - Locate the Limit sensor connectors J10, J11, J12, and J13. Connect a jumper from pin-sig to pin-gnd for each axis, note the LEDs located by each connector should illuminate.
  - The HOME and LIMIT switches share a pin for each axis. If the axis is homing the program sees the input as a home otherwise it sees it as a limit and caused Mach2 to halt the program and blink the ESTOP icon. (See Mach1&2 manual)
  - Power down the interface.
  - Connect the 25pin printer port cable to J2 and the other end to the parallel port of the PC. Power up the interface.
10. You will need to set the steps per inch, speeds, and acceleration according to your machines requirements. See Mach 2 help files. You may also download a basic setup profile to get you started. Filename SoundLogic.XML Copy it to Mach2 subdirectory. Start Mach2 not Mach2 mill and you will see a list of profiles. Select Sound Logic. You will still need to tune your motors and set your parallel port address.



Sound Logic PC2Route connections to the parallel port.

J2

Pin1	Out1
Pin 2	X Step
Pin 3	Y Step
Pin 4	Z Step
Pin 5	A Step
Pin 6	X dir
Pin 7	Y dir
Pin 8	Z dir
Pin 9	A dir
Pin 10	ESTOP
Pin 11	X Home
Pin 13	Z Home
Pin 12	Y Home
Pin 14	Out2
Pin 15	A Home
Pin 16	Out3
Pin 17	Out4 charge-pump pin
Pin 18	26 PC Ground

●Connect the Home and Limit switches.

●Power up the PC-2-RouteN interface.

●Manually operate the switches to verify they are wired properly. Monitor the diagnostic page in Mach2 and note the switch input are operating and that the ESTOP light comes on. Check each switch.

●Power down the interface.

16. Make sure the X, Y, And Z axes are in the middle of their range.

17. Connect the Gecko drives according to the Gecko installation sheet.

WARNING! If you are running in N1 mode (Not using Mach2). Connect the relays after the axes are completely checked out. The external devices should be off until the program is running to PREVENT ACCIDENTS. See **Mach2** for exception.

18. Power up the PC-2-RouteN interface and the Gecko drive.  
The LEDs on the drives should light.

19. NC1 contacts of K1 on the PC2RouteN PCB are connected to the ESTOP pin 10 and PC ground.

20. NO2 contacts of K1 supplies 5 Volt to the Geckos drives.

21. When the board is powered and J21 pins 1&2 are shorted (normally has jumper) 5v will be supplied to the Geckos and the ESTOP condition will be removed allowing Mach2 ESTOP to be cleared.

22. To use this to inform Mach2 of an ESTOP simply remove the jumper and wire the two pins to a normally closed contact of the ESTOP sw. When the ESTOP switch is pressed the relays opens and 5 volts will be removed from the Geckos and Mach2 will be informed of the ESTOP via pin 10 of J2. If 120vac to the PC-2-RouteN PCB through a normally closed contact of your ESTOP switch will accomplish the same thing.

If J21 is not used it must have a jumper on pins 1&2 or you can never clear the ESTOP in Mach2 Switch.

23. Use the arrow keys jog the X and Y. Use the page UP and Down for the Z noting the LED indicators by the connectors to the Gecko drives. The step and direction LEDs will both light going one direction and only the step LED will light going the opposite direction. The step LED intensity will vary a small amount with the speed of the pulses; in fact you may not be able to distinguish any change. If you have a scope you will be able to see them.

24. Jog each axes to limit switches. Note LEDS and Mach2 Diagnostic page input indicators.

25. Note that Out4 LED is lit when Mach2 is running and the ESTOP has been cleared. You can use Out4 to turn on the power supply to the Gecko drives via a solid-state relay. Out1 is for Spindle Out2 for Flood and Out3 for Mist.

These outputs are used to drive solid-state relays that apply power to the devices they control. They may be tested using M codes or the icons in Mach2 diagnostic page or program page.

25. Load one of the sample programs and run it.

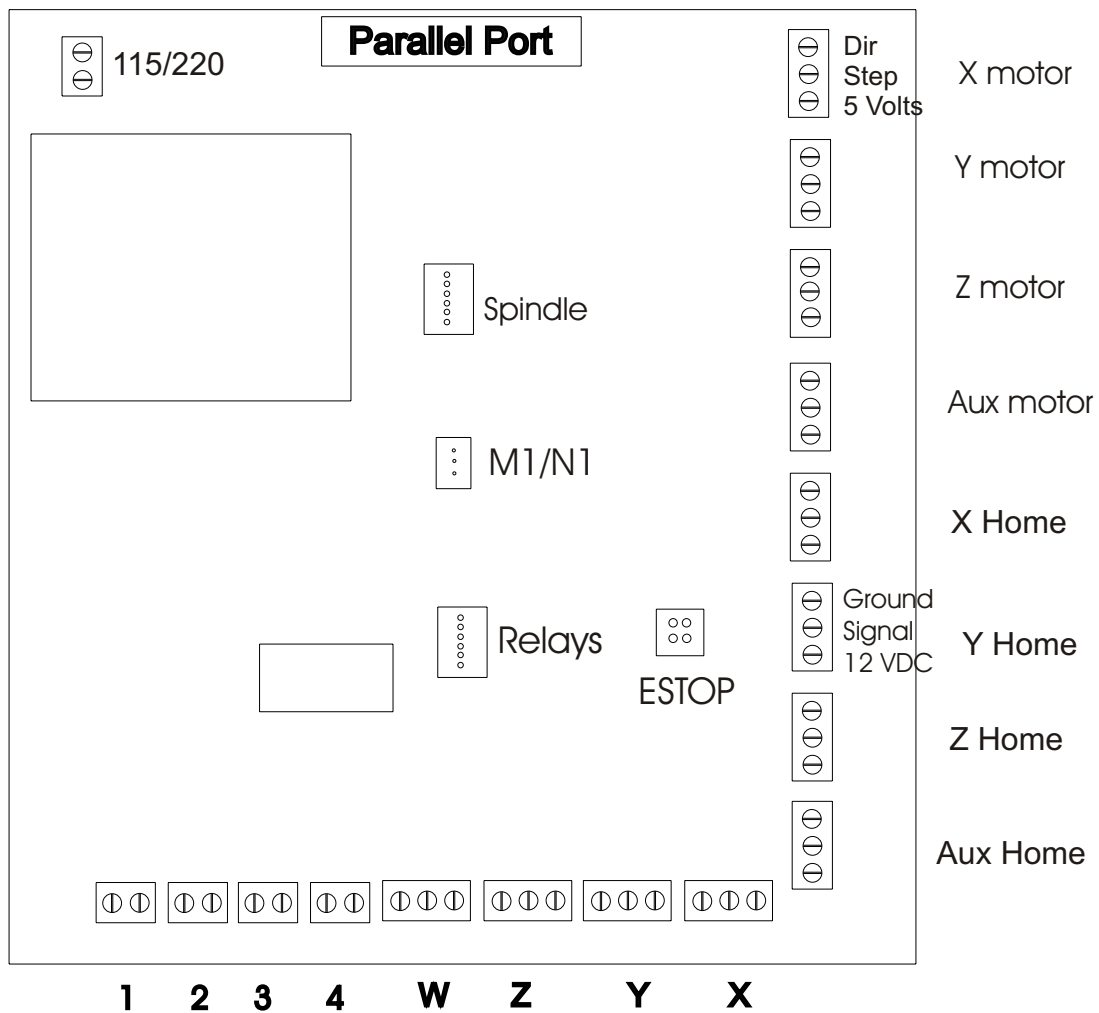
## Mach1&2 feature

Jp3 is used to select the mode of operation. The PC parallel port will set some of the output pins (pin 1, 14, 16 and 17) high when you power it up.

In N1 mode the outputs are enabled at all times. If external devices are left on and the PC is powered on, the devices will start. This could cause serious injury.

Selecting Jp3 to M1 mode and setting up Mach2 charge-pump to Pin 17 will inhibit all 4 outputs until Mach2 program is running and the ESTOP is cleared.

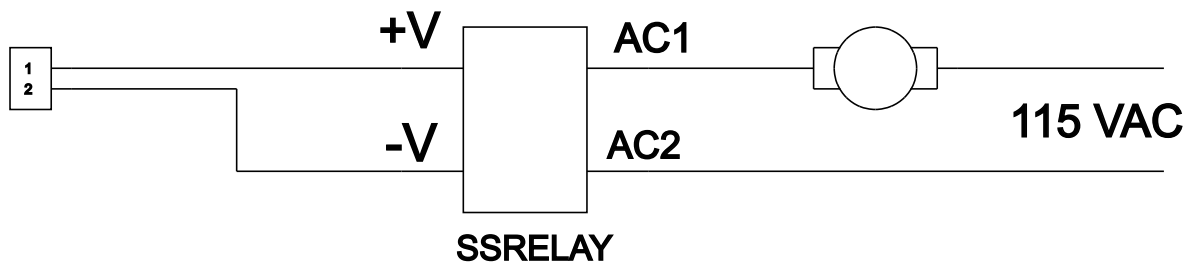
Mach1 will send a 12.5khz signal to pin 17 this will be sensed and will enable out1, out2, and out3 for output. Out4 will be on as long as the 12.5khz signal is detected a may be used to power the Gecko and motor power supply via solid-state relay.



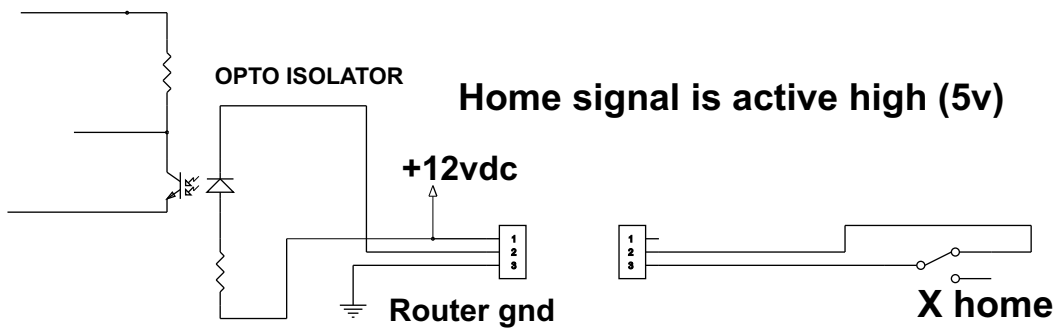
**Disclaimer:**

Sound Logic or James T. Cullins assumes no responsibility or liability for any damage done to persons, PC, Gecko drives, equipment being controlled, loss of time or loss of work incurred while using the PC2Route interface board, all versions.

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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.