



MULTIFUNCTION CNC BOARD Rev5

Overview

This card has been designed to provide a flexible interface and functions to your computer projects, by using the parallel port control software. This board comes as a response to many customers that have been asking for a faster way to connect devices and reduce the possibility of wiring errors.

Features

- ***Support for up to 250khz optoisolation on step and direction signals.***

New on this revision is that the optoisolation circuit has been optimized and now supports full optoisolation at speeds over 250 khz. Noise from the drivers or other devices cannot affect the performance of the optoisolators.

- ***Built-in Variable Speed Control.***

It has an optoisolated analog 0-10VDC output that will convert a step signal into an analog signal that can be used to command a commercial VFD. This analog can be adjusted using on-board pot, so this board can be adjusted to other voltages.

- ***Built-in 12 amp AC Solid State Relay.***

It is very useful to use a solid state relay instead of a mechanical relay for starting motors or other devices that might produce arcs at contact. This will increase the life of the motors and relay. This relay is also optoisolated from the rest of the board and has a replaceable fuse.

- ***Two Built-in 10 amp Solid State Relay with NO and NC positions.***

Mechanical relays are very flexible because they can be used for AC or DC and come with NO and NC (Normally Open and Normally Closed) positions. Both relays share the common VCC_IN, but one reacts to Pin 1 and the other one to Pin16. That way Pin1 can be used for the solid state relay or the eletromechanical relay. Please note that both can be used at the same time.

- ***All pins can be used in a concurrent manner.***

You can use all the input or output pins in a concurrent manner. For example, if you are using output pin #1 to control the Built-in Solid State Relay Board, you can also access that signal from the output pin on the board or from the DB25 connector for output. Each connection will not affect the other current from the other connection.

- ***Fully optoisolated***

The card isolates connections to protect your computer from short-circuit. An opto-isolator is an integrated circuit that transmits the signal through an encapsulated LED and phototransistor. When the signal is on, the LED lights up, the phototransistor captures it and relays the signal. In that way, your computer's electronics are completely isolated from your circuitry. The signals are transmitted through light and not through physical connections. In this way, a power surge has no way of reaching your computer. That is the reason why this card has two power connections. One power connection is power powering the circuit that interacts with the PC, the other connection is for powering the circuit that interacts with your cnc system. Extra precautions have been taken when designing this circuit, by taking into consideration the extremely high voltages that stepper drivers can achieve and lack of experience that some users could have in wiring circuits of this kind. This board keeps the grounds of the PC isolated from the grounds of the rest of your CNC circuit.

- ***Buffered outputs.***

All inputs and outputs are buffered through the use of high speed and high power buffers, with the result that your devices receive all the power they need.

- ***Output pins 1,2,3,4,5,6,7,8,9,14,16,17.***

- ***Input pins 10,11,12,13,15.***

- ***Status LEDs on all inputs and output connections.***

No more guessing. You can SEE all your signals. Save valuable time and brainpower for cncing.

- ***Has an extra DB25 female connection for output.***

You can use this card to optoisolate any existing setup just by connecting this card between your computer and your current setup. That way, you can also see and access all your signals. This makes this card ideal for use with the xylotex, hobbycnc or other non-optoisolated boards. You only have to add this board to a DB25 male connection to a male cable.

- ***Input and output pins with close by ground connections.***

Forget about grounding problems. Easily connect your pin by using your close by ground connection. No need to be an electronics expert to ground all your stuff. The terminals next to pins 2-9 can be set to have +5VDC or GND according to your needs. There is a jumpers that allows you to select +5VDC or GND for the COM pins.

- ***Easy installation of an On/Off switch. You can control the card externally.***

An On/Off or a Safety Charge Pump can easily be installed to enable or disable the card. CNC could be dangerous machines and, remember, safety comes first. This card is provided with an extra pin (EN) that allows you to control the card externally by enabling or disabling outputs. The card must have +5vdc supplied in the EN pin to enable outputs.

- **All TTL 5VDC signals.**

Interface directly with parallel port interface products and other CNC4PC cards. 5VDC (TTL) cards are very common among automation devices.

- **Works directly with popular CNC hardware and software.**

That goes for GeckoDrive, DeskCNC or Rutex and parallel port control software such as mach2, Linux EMC, TurboCNC, CNCZeus and other/ (Not all have been tested).

- **Screw-On connections for all terminals.**

You only have to screw-on the wires to make all your connections.

Installation

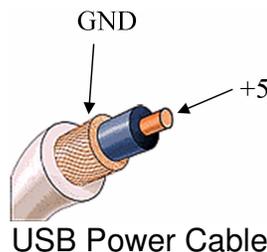
Requirements:

A power supply with 5vdc@ 2 amps. It also requires a connection to your PC power supply. A 6' USB cable is provided, so as to enable you to draw current directly from your PC. You can also wire it directly to your PC power supply. Cnc4pc offers an electronic switching power supply that is ideal for this board. Other commercial laptop type power supplies can also be used.

Wiring:

Follow the information on the wiring guide found in the web at http://www.cnc4pc.com/Tech_Docs/C11_Wiring_Guide.pdf, and these steps:

1. Connect the USB cable provided to the board on the PC side of the power input side.



2. Connect to power the other side of the board.
3. Provide +5 to enable pin. To install an external switch or safety charge pump connect the output to this pin. If you enable the on-board safety charge pump, you can leave this pin unconnected.
4. You can connect the parallel port cable and run your control software. You should be able to see the status of each pin. The OUTPUTS ENABLE LED on the center of the board should lit, indicating the outputs are enabled.
5. Connect the relays like you would connect any other switch. Keep in mind the solid state relay is only for AC currents, you cannot use it with DC currents.
6. If you need the analog output to have an optoisolated signal and ground, please power the analog circuit with a different power supply. If the VFD provides a 12vdc reference, then you could use it to power this circuit. If you are using this circuit to replace a potentiometer, keep in mind the analog output must go to the wiper connection and the ground connection of the analog output to the ground connection of the pot.

WARNING: If using a conventional DC controller, the grounds of this circuit MUST be kept isolated from the grounds of the board.

Configuring the Analog Output:

It is strongly recommend you read your control software's manual. You need to configure your control software to control the spindle as if it was any other angular axis. This card requires a 25 KHz input signal to deliver 10VDC. So you need to configure the steps per minute and velocity, to deliver a total of 1,500,000 (25,000 hz x 60 seconds) pulses when going at max speed. I suggest setting using 1,000 for steps per unit and 1,500 for velocity. For acceleration values adjust them to where you feel comfortable. Keep in mind the acceleration of the motor must also be set in your VFD.

For configuring Machx follow these steps:

1. Go to Config / Ports&Pins / Motor Outputs. Enable the spindle and select the port and pins you wired for step and direction.
2. Go to Config / Ports&Pins / Spindle Setup. In the motor control box, check Use Spindle Motor Output and Step /Dir Motor. Under Pulley Ratios set the pulley ratios of your machine.
3. Go to Config / Motor Tuning / Spindle. On Steps per unit put 1,000, for velocity put 1,500. For Acceleration, choose the acceleration that you feel comfortable with. Start slow, increase acceleration as you test your system. Under Step Pulse length, use a number from 1 to 5. This number is directly proportional to the final voltage you will get in the analog output. Use this number and the fine tuning pot to adjust the voltage you want to get at max speed.

Fine Tuning:

Make sure that when you reach the max speed in your software you get 10VDC out. This voltage can vary depending on many things, including the electrical properties of parallel port or breakout board you are using, the length of the step pulse your software is delivering, and the normal hi or low status of your step pin. Play with the fine tuning pot in the card, the normally hi or low status of your pin, and the pulse width

FAQ

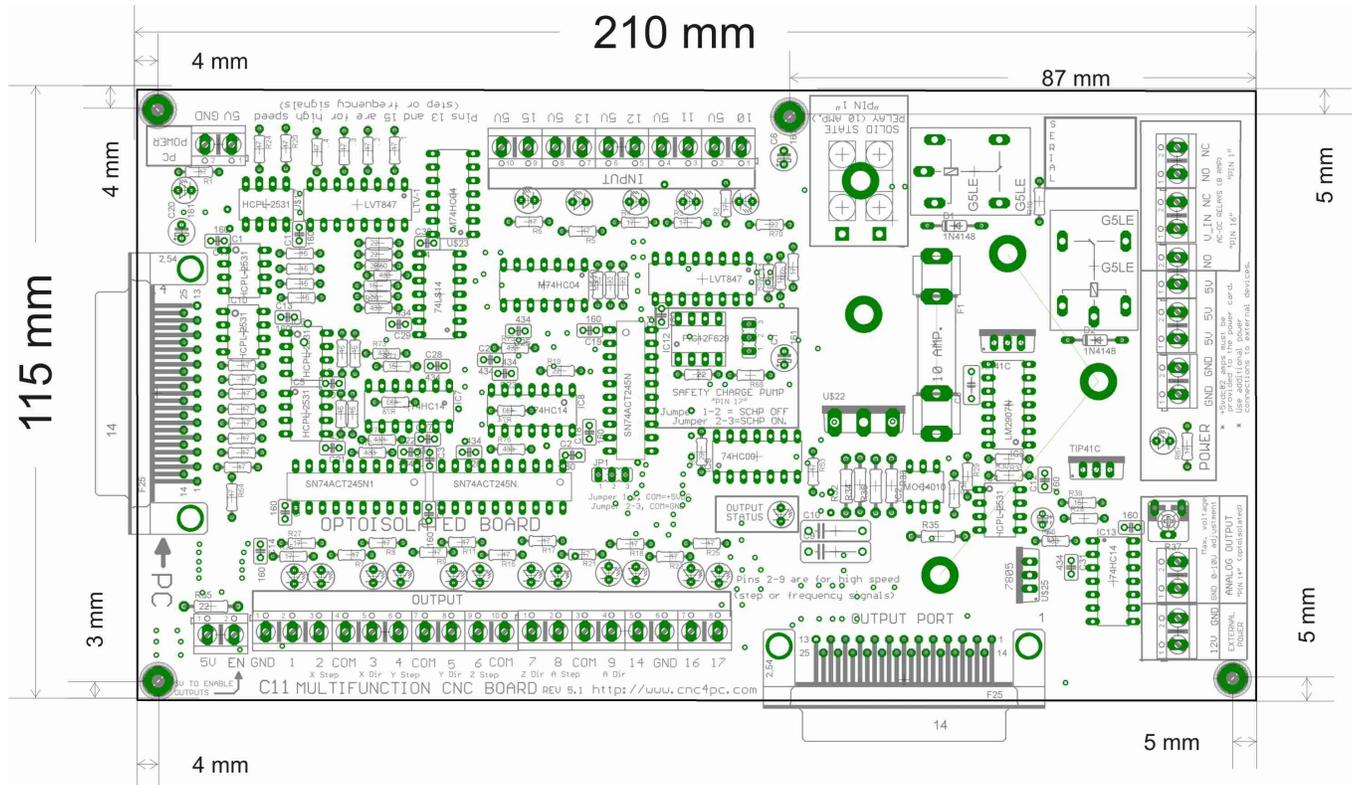
1. **Can I use the signals from the DB25 for output and the signals on the output and input pins at the same time?** Yes, but keep in mind that you have a total 24 mA per output pin, if you are using it twice and you are sharing the same current. If you have a cable connected in the DB25, but you are not using that pin, no current is drawn.
2. **Can I power both sides with the same current source (power supply)?** Yes, but you will loose optoisolation in your board. Keep in mind that this board uses up 70 mA on the PC side and 1800 mA on the output side. You can draw a maximum of 500 mA from a USB port.
3. **Will this card protect my computer from a short or power surge in my drivers or wiring?** Yes, this is the best protection you can get. Your PC signals are optically isolated from your cnc system. In case of a meltdown, the card would take the

damage. The most probable thing is that it could be easily repaired by replacing a couple of inexpensive ICs.

It can work with parallel ports with voltages from 3.3 and 5 volts.

Power consumption 70 mA on the PC side of the circuit, and 950 mA on the output side of the circuit. Keep in mind you can draw a maximum of 600mA from a USB port, so do not attempt to connect this connection to a USB port.

Dimensions:



Disclaimer:

Use caution. CNC machines are dangerous machines. Neither DUNCAN USA, LLC nor Arturo Duncan are liable for any accidents resulting from the improper use of these devices.