PLCIO2 Programmable Logic Controller
Updated 3/26/10

Overview:

PLCIO2 is a programmable logic controller which provides:

35 Inputs (bipolar, with a choice of 5V or 24V)
39 Outputs (20SPST, 2 SPDT, 17 open collector)
1 Analog output (12 bits for spindle control)

Overall response time is 30ms input to output. Also provided is a Fast I/O feature which allows Inp26 and Out31 to react in 6ms. PLCIO2 is compatible with Centroid's proprietary fiber optic (3 fibers) interface, but requires a special PIC chip (PLCIO2 PIC) on the CPU7 or CPU9 CNC motion control card.

Power Connections:

The PLCIO2 requires a 5V logic power source along with a +/- 12V analog power source. The grounds from each power supply are NOT to be connected together. Doing so would negate the isolation and possibly cause noise from the spindle speed inverter to be transmitted to other parts of the PLCIO2 board.

H1 Power Input

|		
Logic Section Power	+5V	
	5 GND	
	5 GND	
	LMT GND	
Analog Section Power	-12V	
	12 GND	
	+12V	
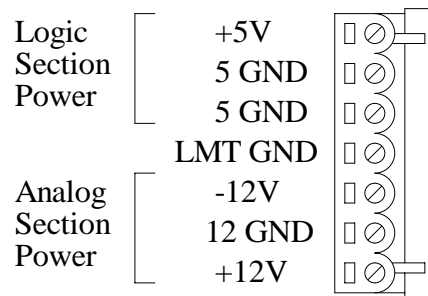
## Wiring Inputs to the PLCIO2:

The PLCIO2 can accept contact closures, PNP, and NPN type inputs. Compare sensor specifications to the "Power Supply and Input Specs" table to make sure a particular sensor will work reliably.
 Inputs are grouped into banks of four with the common for that particular bank on the fifth pin. NPN and PNP sensors must use separate banks for proper operation. Switches can be wired so they resemble either type of sensor so they can share banks with sensors of similar operation.

Typical PLCIO2 Inputs
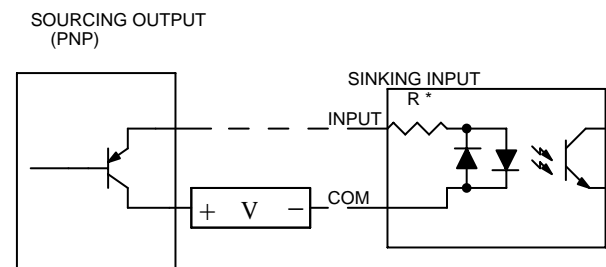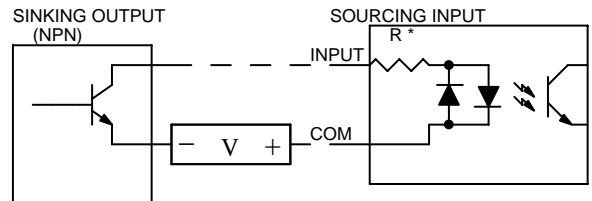
*Note: V is user supplied 5 to 24 volts.
(See next section)
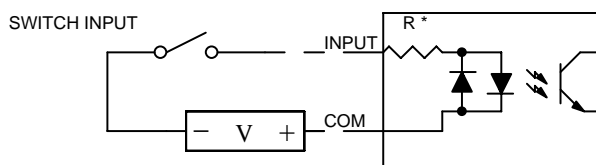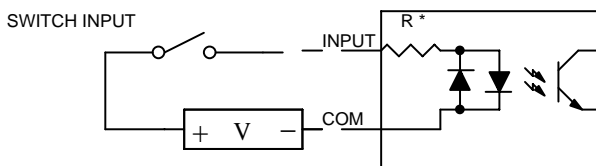
Determining Input Voltage:

The input voltage accepted by each bank (+V) is determined by the value of the SIP that is associated with each bank. These sips are normally in sockets and are located directly above the input headers.

To determine which voltage a specific bank is set up for look at the last 3 digits on the SIP. These numbers are either located on the top or the front of the SIP.
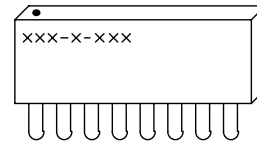
$$471 = 470 \text{ ohms} \rightarrow 5 \text{ Volt bank}$$
$$222 = 2.2K \text{ ohms} \rightarrow 24 \text{ Volt Bank}$$

These resistor values produce about 10 mA across the optocoupler inputs. Replacing a SIP with a different value SIP can change the input voltage range that the PLCIO2 takes. If a SIP is not available, four individual resistors can be used in its place.
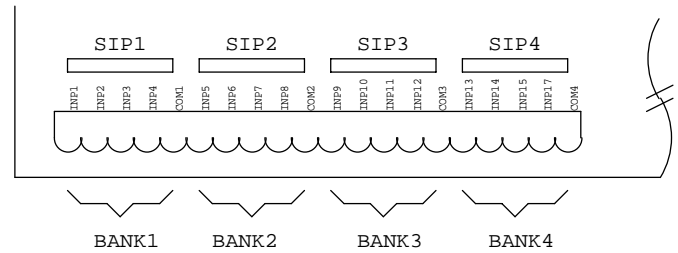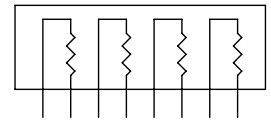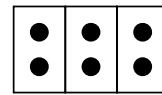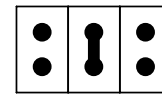
Limit Switch Power Source

There is a jumper block located above the limit switch header on the PLCIO2. This is for the limit switch inputs. If the limit switch cable is not used then no jumpers should be in place. If the limit switch cable is used then see the diagram to the right. Note: it is not recommended that the PLCIO2 supply the power for the limit switches, as it will negate the isolation of the inputs.

Wiring to the Relay Outputs:

The PLCIO2 has a common and a normally open contact for each output. Outputs 15 and 32 also have available a normally closed contact in addition to the common and normally open contacts. The relays on the PLCIO2 are rated for:

$$5A @ 30VDC$$
$$0.3A @ 110VDC$$
$$10A @ 125VAC$$
$$8A @ 277VAC$$

Input SIP Locations
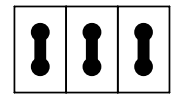

Typical SIP

xxx-x-xxx

Internal diagram of SIP

Jumper settings

Limit Switch
Cable Not Used

External Supply
Needed for
Limit Switches

PLCIO2 Supplies
5 Volts for Limit
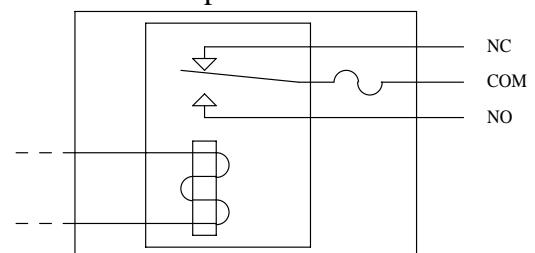Switches

Typical PLCIO2 Output Relay

COM
NO

Outputs 15 and 32

NC
COM
NO
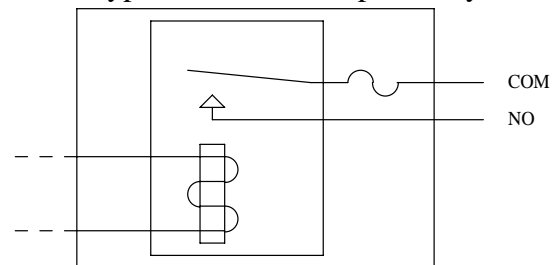
Analog output for Spindle:

The PLCIO2 has a 0-10V analog output for inverters. This output is located on the input side of the PLCIO2 next to the power header. These pins get connected to the analog input of the inverter. Do NOT connect the ground from this output to any ground other than the one it was intended for.

Typical DAC output

+12 ANALOG

12 BIT D/A

INSIDE PLCIO2

ANALOG OUTPUT TO INVERTER

ANALOG GROUND TO INVERTER (SGND)

-12 ANALOG
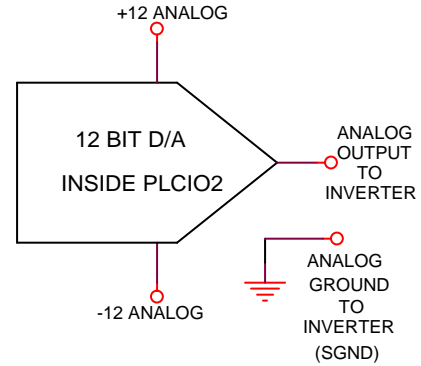
Wiring Transistor Outputs:

The PLCIO2 has 17 available transistor outputs. These outputs are to be used with 5V relays to drive any additional signals needed. To hook up the relay simply attach one side of the coil to the 5V VCC output and then attach the other side to the output pin. It is not recommended that these outputs be used for any other purpose because they are not noise immune and improper use of these outputs may cause the PLCIO2 to function improperly

Typical Transistor Output

VCC Output

5V LOGIC

OUTPUT

4
3

1
2

5 V RELAY
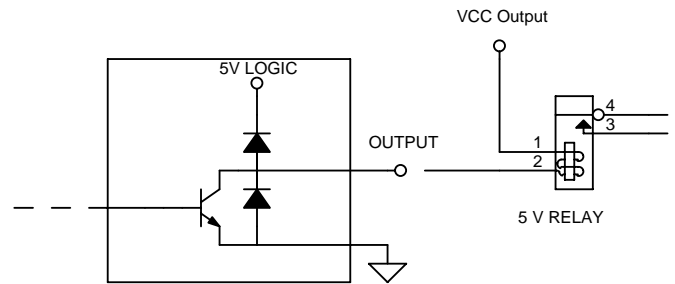
Fast I/O:

The Fast I/O is a hard-coded function that is enabled when Out40 is turned on in the PLC program. The Fast I/O immediately turns off Out31when a falling edge is detected on Inp26. This is done immediately before sending any data back to the CPU7. This function is self-resetting. This means that after Out31 is turned off the PLCIO2 needs to resend Out40 signal in order to reactivate the Fast I/O. This function was developed to prevent the possibility of a carousel moving too far due to communication delays.

(Note: when Out40 is low the Out31 and Inp26 function normally. If you don't want to use Fast I/O simply never turn on Out40)

Timing Diagrams of Fast I/O

Fast I/O Enabled

OUT40

INP26
OUT31

6mS

Normal PLC Operation

OUT40

INP26
OUT31

30mS
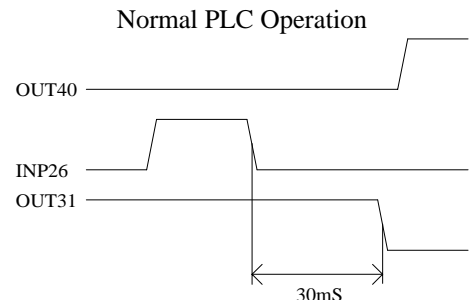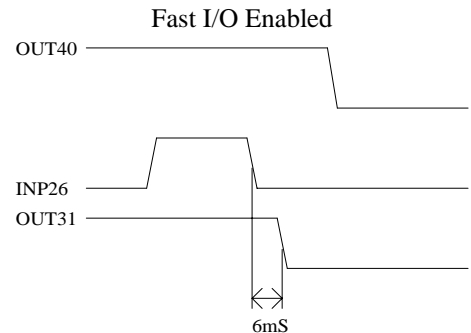
PLCIO2 Specifications Sheet

Power Supply and Input Specs

Characteristic	Min.	Typ.	Max.	Unit
Logic Supply Voltage (VCC)	4.5	5	5.5	V
Logic Supply Current	—	.75	2.6	A
DAC Supply Voltages	±11.5	±12	±15	V
DAC Supply Current	—	150	300	mA
Input Voltage (Vinp) (limit switches)*	—	5	9	V
Input Voltage (Vinp) (others)	—	24	26	V
Input On Voltage	Vinp-1.25	—	—	V
Input Off Voltage	—	—	1.25	V

*The normal configuration is the first 8 inputs on the PLCIO2 are set up for 5V limit switches with all other inputs being set up for 24V inputs.

Output Specs

Characteristic	Min.	Typ.	Max.	Unit
Relay Output Voltage	—	24	277	V
Relay Output Current @ 277VAC	—	—	8	A
Relay Output Current @ 30VDC	—	—	5	A
Relay Output Current @ 110VDC	—	—	300	mA
Relay Output Current @ 125VAC	—	—	10	A
Transistor Output current sinking	—	—	400	mA
Transistor Output Voltage	—	5	5.5V	V
Analog output Voltage	0	—	10	V
Analog output Current	—	1	20	mA

Timing Specs

Characteristic	Min	Typ.	Max.	Unit
Time from input trigger until PLC program recognizes Input	-	15	-	ms
Time from PLC output on until relay on	-	15	-	ms

PLCIO2 Dimensions

13.875"
352.425 mm

2.875"
73.025 mm

**Dia
0.188"**
4.775 mm

14.500"
368.300 mm

3.250"
82.550 mm

5.000"
127.000 mm
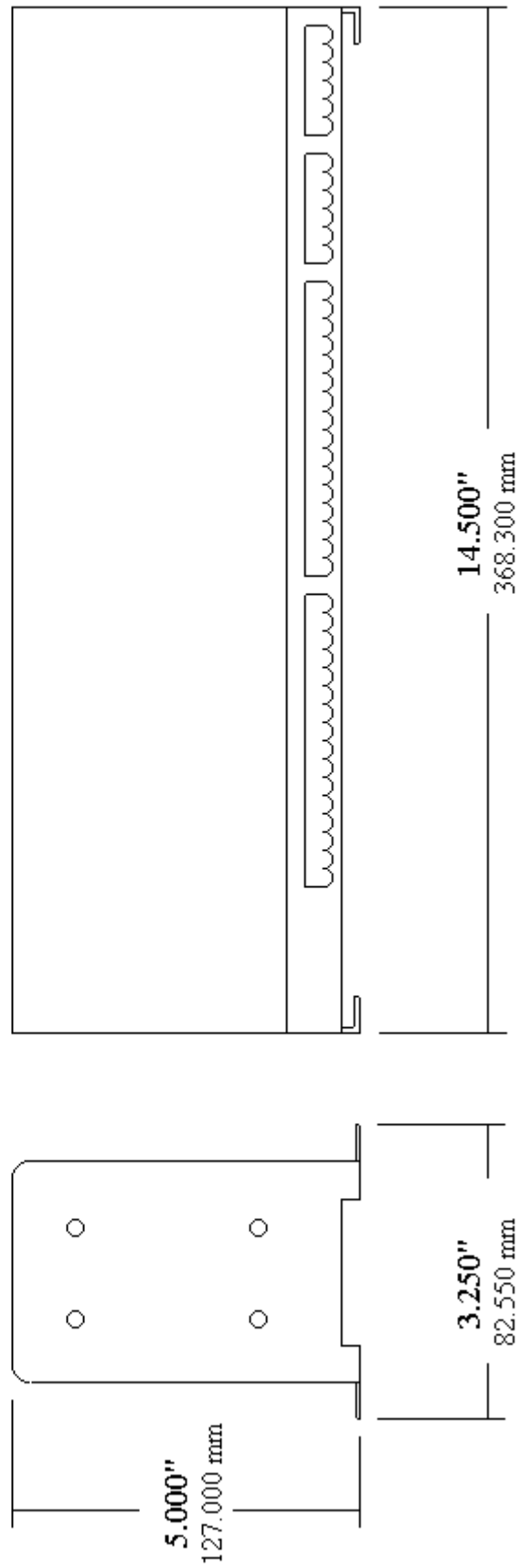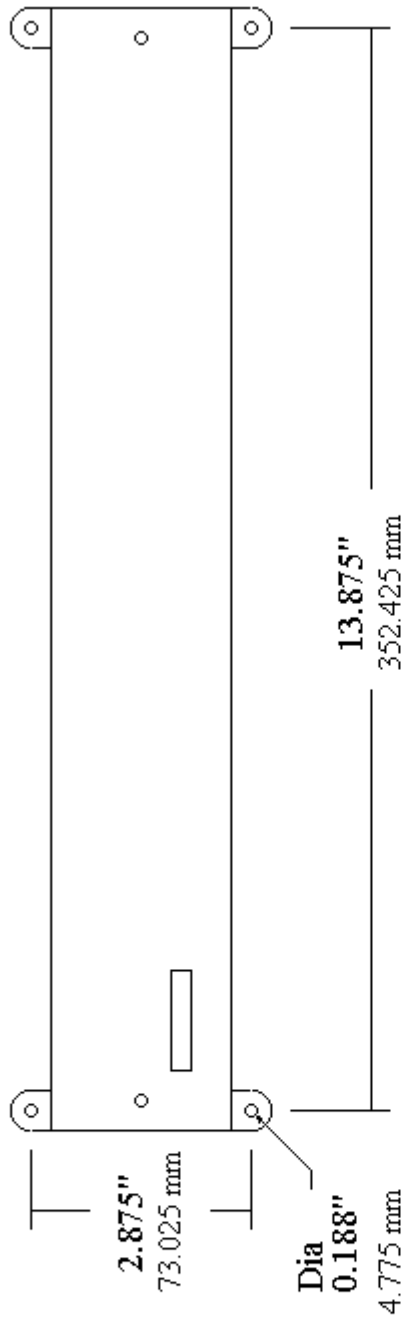
Pinout For PLCIO2

Limit switch header H5 carries

duplicates to INP1 thru INP8 and drive fault header H10 carries a duplicate of INP62. See "Limit Switch Power Source" section for notes on H5 power connection.

(See figure below)

```
LMT GND
INP62        H10
COM9
LMT GND

INP1
INP2
INP3
INP4         H5
INP5
INP6
INP7
INP8
LMT GND
COM1
```

* NOTE: inp26, out31, and out40 have special Fast I/O functions. See "Fast I/O" section for details.

Drive Fault Cable

Drive Limit Switch Cable
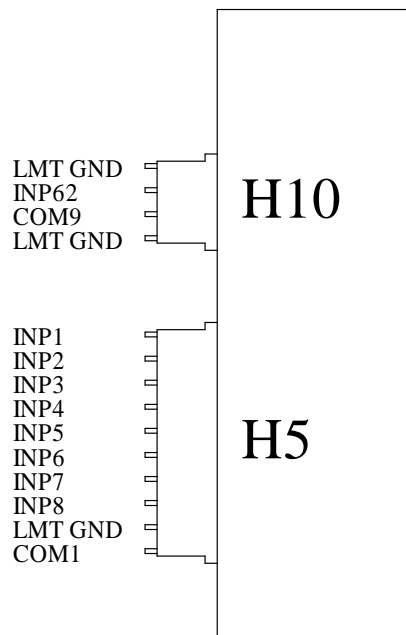
H10

H5

Fiber Optics to CPU10

1
2
3

PLCIO2

H4	H3	H2	H1
INP1	INP18	INP59	+5V
INP2	INP19	INP60	5 GND
INP3	INP20	INP61	5 GND
INP4	INP21	INP62	LMT GND
COM1	COM5	COM9	-12V
INP5	INP22	SGND	12 GND
INP6	INP23	0 - 10V	+12V
INP7	INP24		
INP8	INP25		
COM2	COM6		
INP9	INP26 *		
INP10	INP27		
INP11	INP28		
INP12	INP29		
COM3	COM7		
INP13	INP30		
INP14	INP31		
INP15	INP32		
INP17	SPARE		
COM4	COM8		

H6

OUT1
OUTCOM1
OUT2
OUTCOM2
OUT3
OUTCOM3
OUT4
OUTCOM4
OUT5
OUTCOM5
OUT6
OUTCOM6
OUT7
OUTCOM7
OUT8
OUTCOM8
OUT9
OUTCOM9
OUT10
OUTCOM10

H7

OUT11
OUTCOM11
OUT12
OUTCOM12
OUT13
OUTCOM13
OUT14
OUTCOM14
OUT15NO
OUT15NC
OUTCOM15
OUT29
OUTCOM29
OUT30
OUTCOM30
OUT31 *
OUTCOM31
OUT32NO
OUT32NC
OUTCOM32

H8

OUT33
OUTCOM33
OUT34
OUTCOM34
OUT35
OUTCOM35
OUT36
OUT37
OUT38
OUT39
OUT40 *
OUT41
OUT42
OUT43
OUT44
OUT45
OUT46
OUT47
OUT48
SPARE

H9

OUT59
OUT60
OUT61
OUT62

5 GND
+5V