

Introduction

This document describes how to install Expanded I/O PLC in an OmniTurn GT-75 with G4 CNC. The installation involves hardware and software changes to the CNC and hardware changes to the spindle drive cabinet.

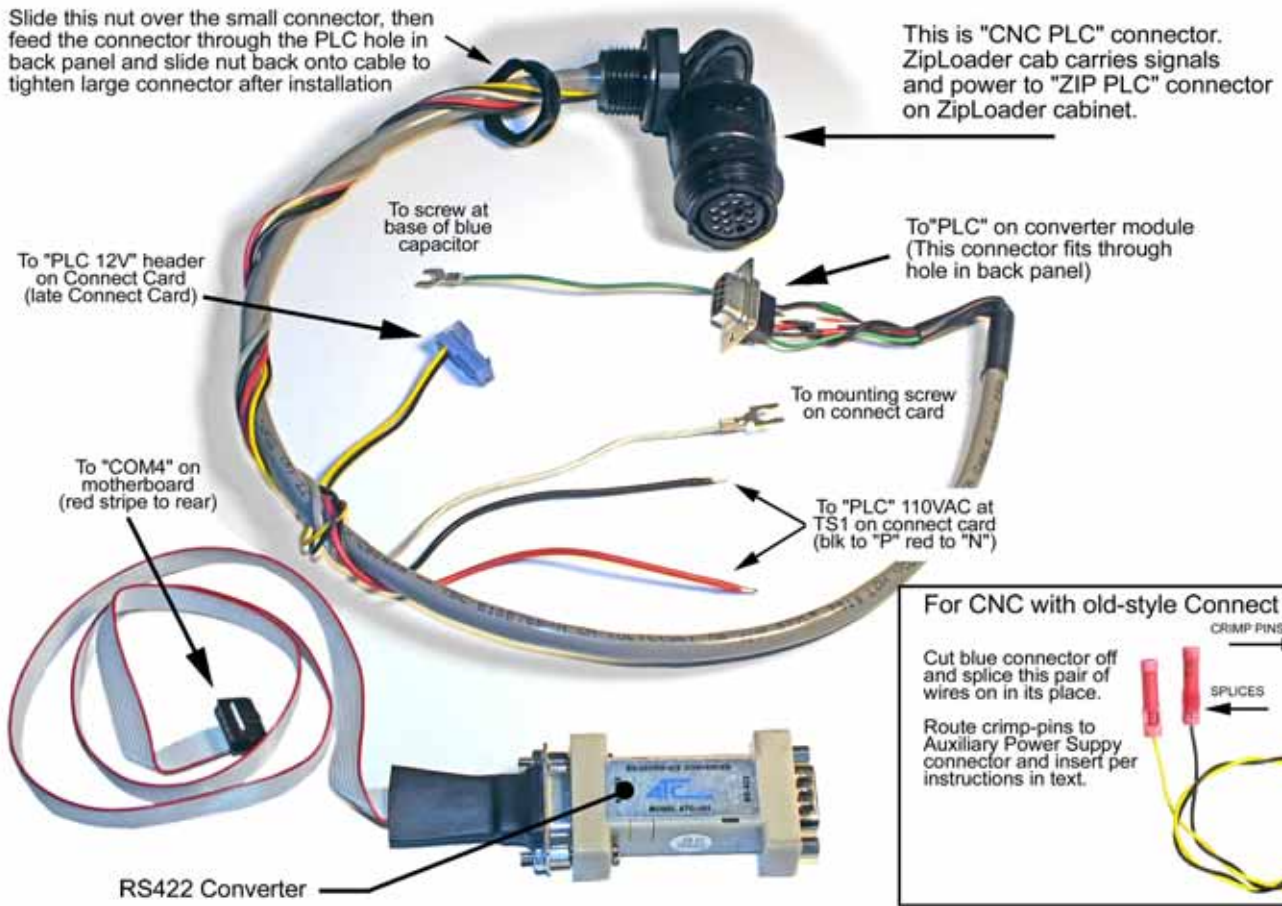
Overview

CNC: Install right-angle 14-pin bulkhead on rear panel to connector to carry communications and power to the PLC. Install RS422 Converter to communicate with the PLC. (See Pages 2 - 7).

Spindle Drive: Install 14-pin bulkhead connector in Spindle Drive Box for communications and power to the PLC.

Computer: Copy new files to the hard drive so OmniTurn can control the loader (Page 13).

CNC Control Modification Parts



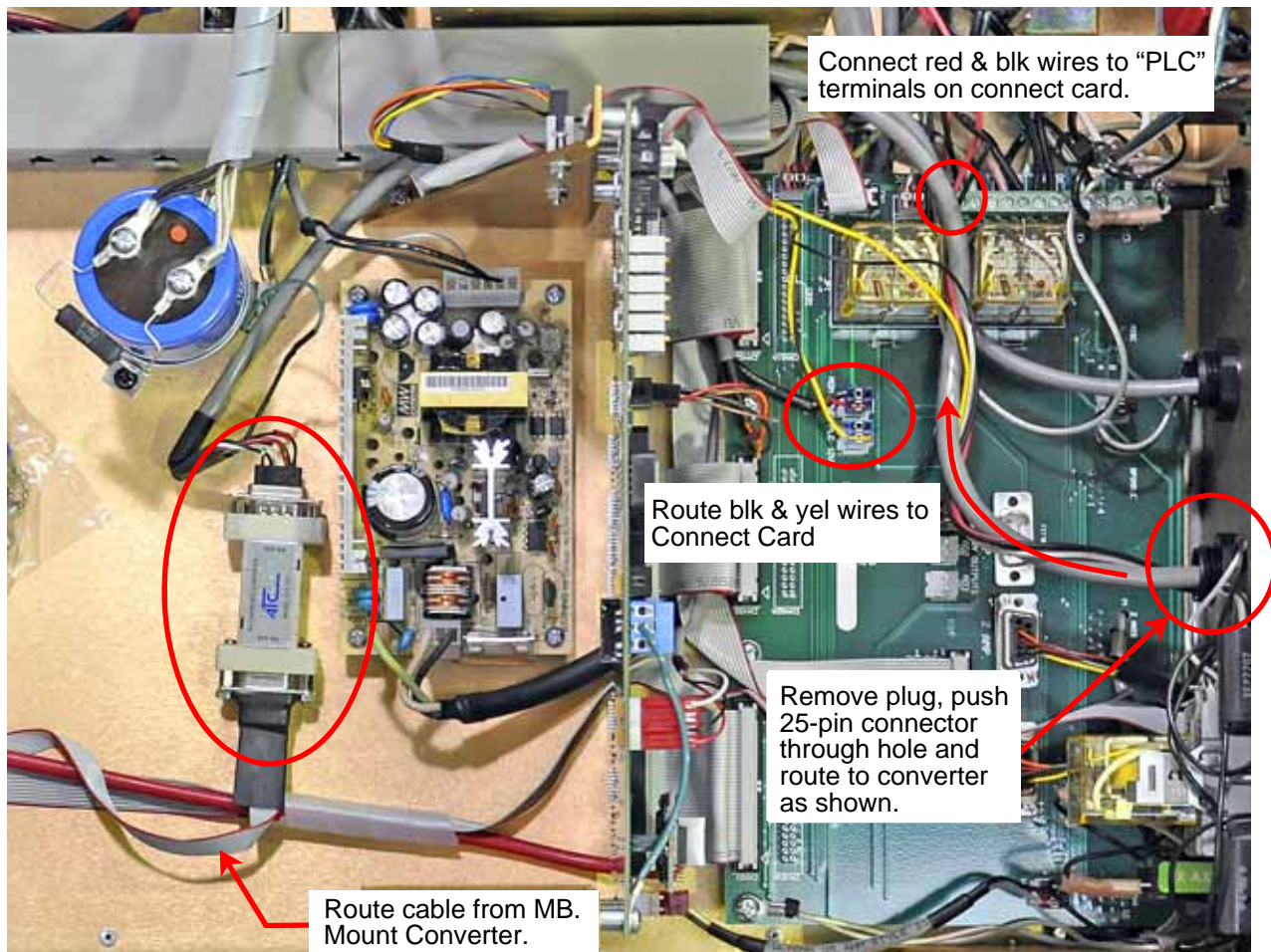
CNC Control Modification Summary

The general steps to install PLC option in the CNC Control are listed below.

More detailed instructions start on next page. See previous page for illustrated parts list.

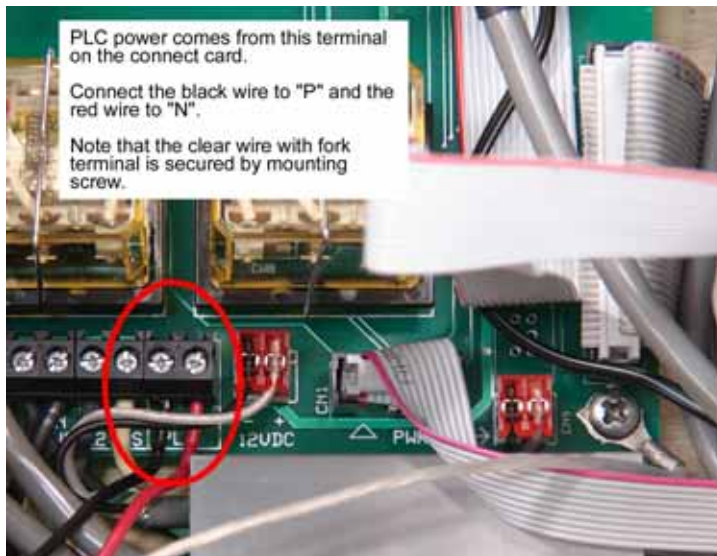
1. Punch hole in rear panel; install special bulkhead connector; route cables to connect card (110vac), Auxiliary Power Supply (+12vdc) and RS422 Converter. (Page 3)
2. Connect black & red wire to "PLC" stations on Connect Card terminal strip. (Page 3)
3. Connect blue plug on black & yellow wires to "PLC 12V" on connect card (new-style) OR insert black & yellow wires into existing Auxiliary Power Supply output connector. Page 3)
4. Route 10-pin ribbon cable from COM4 port on computer motherboard; connect cables to RS422 Converter and stick it to chassis. (Page 4)

Complete Installation, Inverter Drive



Install PLC Connector

1. Remove plug from 7/8" hole next to OpSta (Operator's Station) connector.
2. Push all cables through hole from the outside, and through the nut that secures the connector to the panel. The 25-pin connector *does* fit, but the nut must be squeezed hard to 'oval' it for clearance.
3. Route the cables to their final locations per over-all picture on previous page.

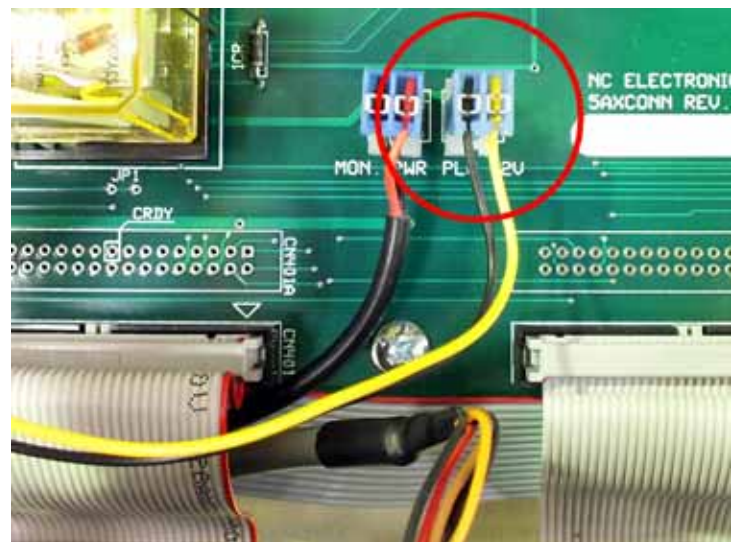


Connect 110vac Wires

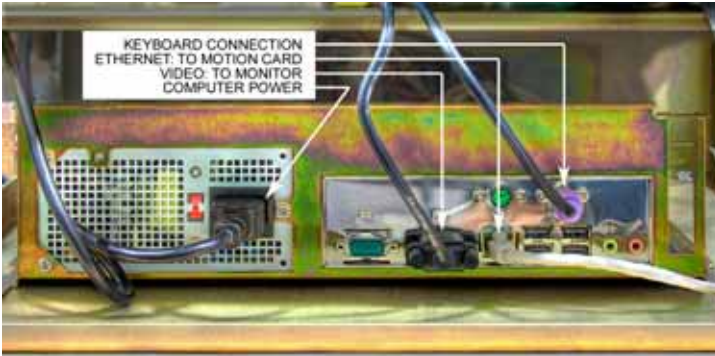
1. The "PLC" terminals are at end of Connect Card terminal board as shown at left.
 2. Loosen the locking screws, insert the wires and re-tighten.
 3. The black wire should go to "P" and the red wire to "N".
- These wires supply power to the PLC.

Route Black & Yellow wire to "PLC 12V" header on new-style Connect Card

If your G4 CNC has the old-style Connect Card, there is no "PLC 12V" header available, so you must cut off the blue connector, and use the butt-splices on black & yellow pair of wires provided with crimp-pins to plug into auxiliary power supply as shown on next page.



Connecting to Epia M830 MotherBoard

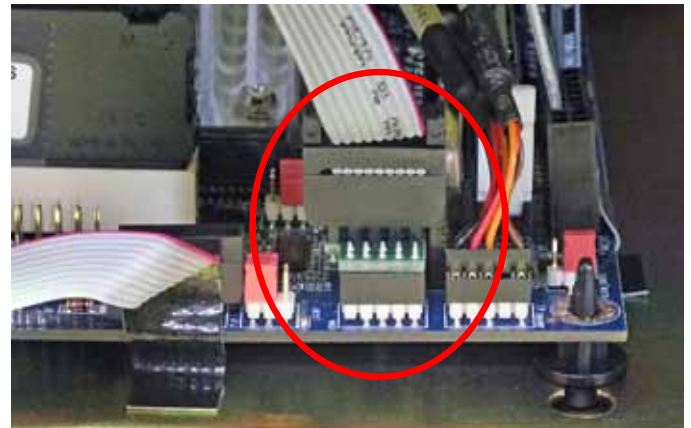
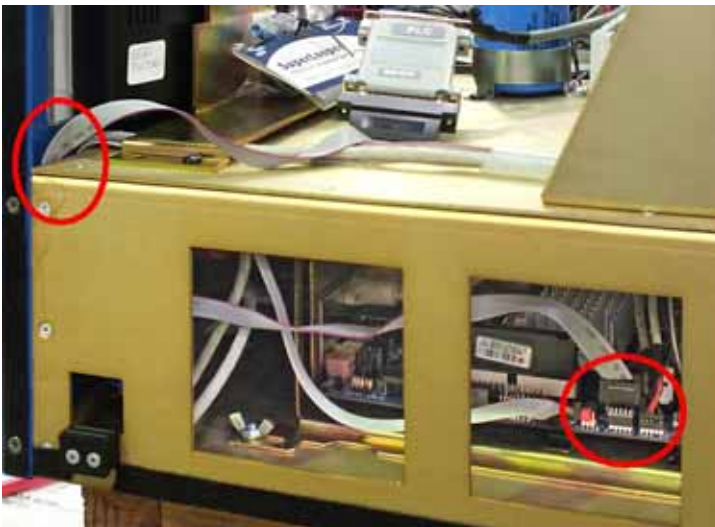


Back Panel of Epia M830 Mother Board



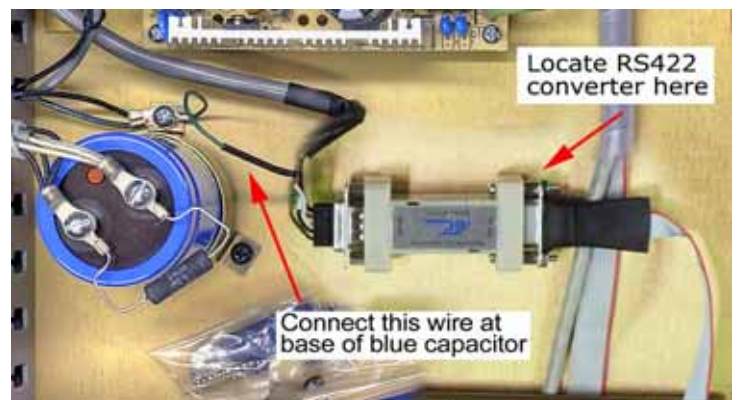
Route Ribbon Cable to COM4

The 10-pin ribbon cable connects to COM4 port on motherboard using adapter: route cable through space between front-panel and chassis (below left) and connect to motherboard as shown below. **Be sure that all pins are engaged;** it's easy to miss a row a row or column.



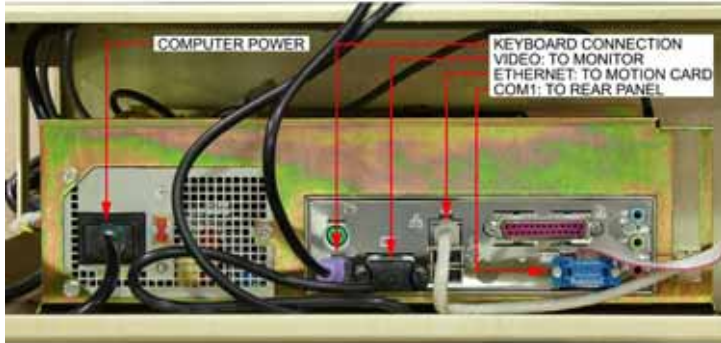
Mount RS422 Converter

Double-sided tape is used to affix RS422 converter to the control chassis. Locate the converter as shown at right, peel off the backing and stick it to the chassis. Route black wire with terminal to one of the screws that mount the blue servo power supply capacitor. This is the shield wire for the communications cable.

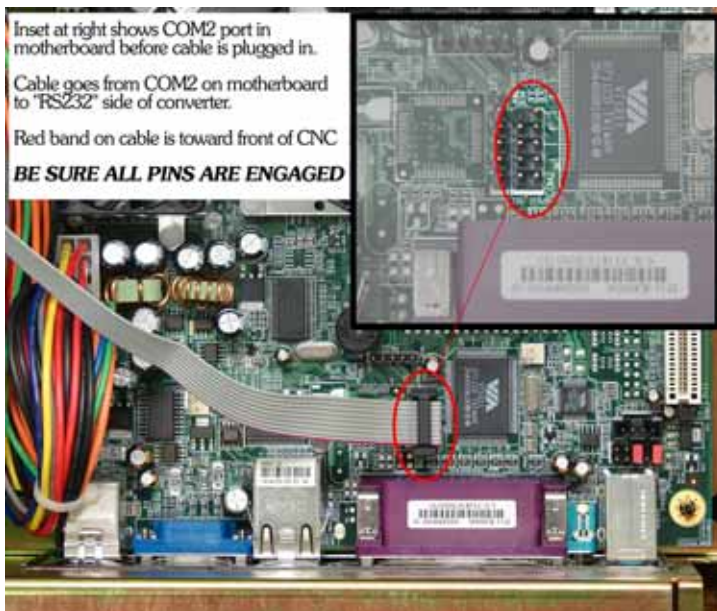


Connecting to Epia ML MotherBoard

**This page illustrates early G4 motherboard.
Cable routing is same as on previous page.**



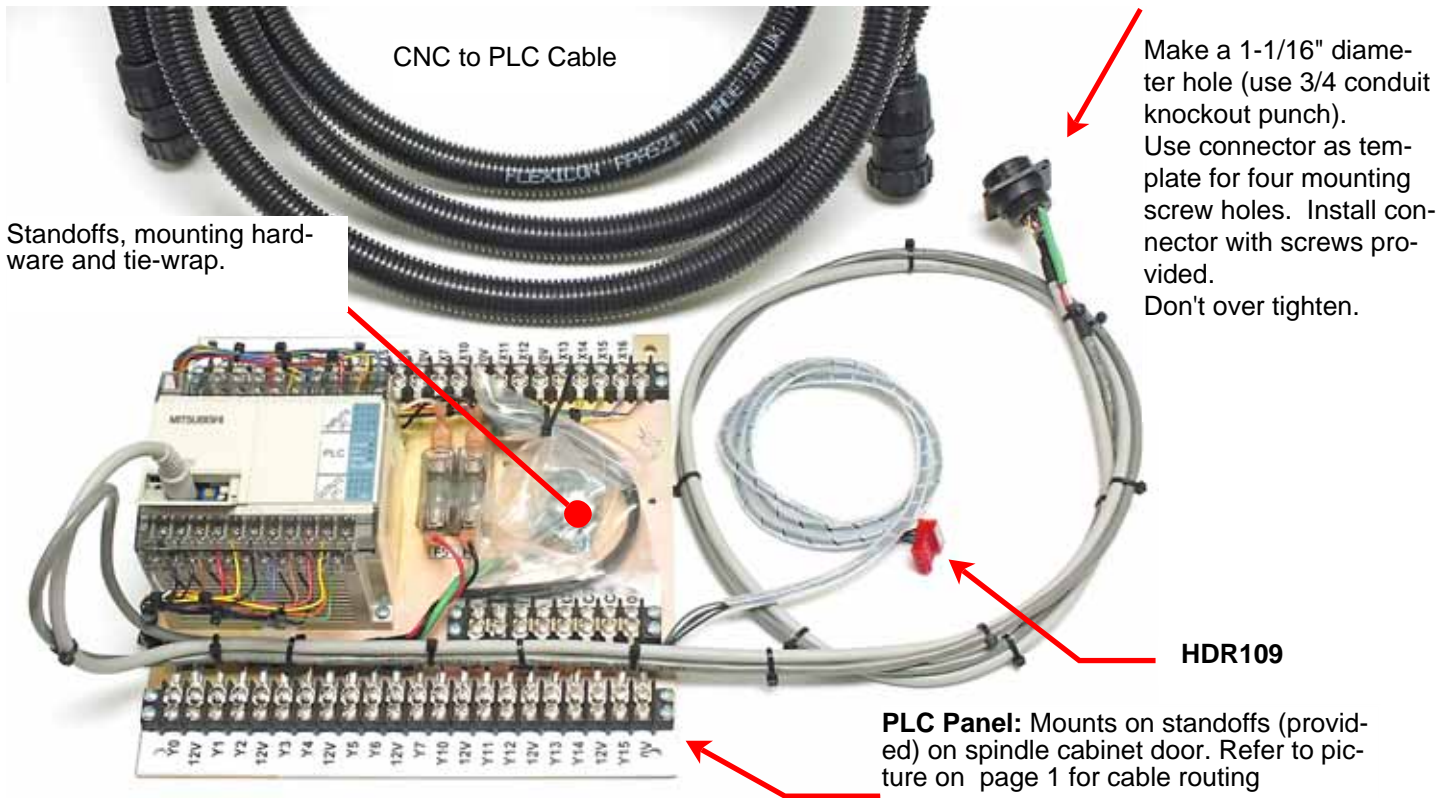
Back Panel of Epia ML Mother Board



Route Ribbon Cable to COM2

The 10-pin ribbon cable connects to COM2 port on computer motherboard: remove front panel, disconnect cables (see below) and slide computer chassis out to access the COM2 port. **Be sure that all pins are engaged;** it's easy to miss a row a row or column.

Spindle Drive Cabinet Modification Parts



Wiring PWB Version

Route cable and connect to Printed Wiring Board at HDR-108 per picture below.



Test

The PLC-specific M-functions are already installed in your CNC.

To test the installation, go to MDI mode and exercise the M-functions below and observe the lamps on the PLC per the door label:

Y4 always ON except during E-stop

M32=Y0 ON
M33=Y1 ON
M38= Y0, Y1, OFF
M60=Y3 ON
M61=Y3 OFF

M62: First, use jumper to short X7 to 0V, then issue M62

M62 (with jumper)=Y2 ON for 1/2 second, then OFF (1/2 second pulse)
CNC will display waitoff7 in command line: remove jumper to continue

PLC I/O Assignment for Barfeeder

INPUTS:

X0 - NOT E-Stop

Description:

This input is ON when neither lathe nor bar feeder is in emergency stop.

X7 - End of Bar

Description:

This input must turn ON (shorted to 0V) when the end of the bar is reached and remain ON until the bar change cycle is complete.

OUTPUTS:

Y0 - Air tool (M-32 turns on, M38 turns off)

Y1 - Air tools (M-33 turns on, M38 turns off)

Y2 - Initiate bar load (M62: Y2 pulses on for 1/2 second, then CNC waits for End of Bar to clear)

Y3 - Enable bar pusher (M60 turns on, M61 turns off)

Y4 - NOT E-stop (Signals barfeeder that lathe is not in E-stop. Follows **X0** exactly.)

User M-Function Descriptions for Barfeeder

M32 - Air tool #1 (PLC output Y0 on)

M32.USR code:
setb0
end

M33 - Air tool #2 (PLC output Y1 on)

M33.USR code:
setb1
end

M38 - Airtools off (PLC output Y0 & Y1 off)

M38.USR code:
clrb0
clrb1
end

M60 - Enable bar pusher (PLC output Y3 on)

M60.USR code:
setb3
end

M61 - Disable bar pusher (PLC output Y3 off)

M61.USR code:
clrb3
end

M62 - Change bar (Pulse PLC output Y2, wait for end of bar signal (X7) to clear)

M62.USR code:
setb2
delay.5
clrb2
waitoff7
end

Editing & Writing .usr files to access the additional I/O:

To edit or create a usr file on the OmniTurn, turn on the OmniTurn. At **Please backup program files (Y/N)** prompt, press and hold Ctrl key, then press C key (Ctrl-C)

At **K:\CNC>** prompt, type **C:** then press enter

At **C:\RUNFILES>** prompt type **edit m??.usr** (where m?? is the number of the M-function: for example, **m62.usr** where 62 replaces the question marks) then press enter to start OmniTurn editor.

Edit the program as usual, save and exit, then restart the OmniTurn.

There are only six commands in the 'usr language':

- setbn** Turns an *output* ON: setb10 turns on output Y10.
- setmn** Turns a *mark* ON: setm7 turns on M7 in PLC.
- clrbn** Turns an *output* OFF: clrb10 turns off output Y10.
- clrmn** Turns a *mark* OFF: clrm7 turns off M7 in PLC
- waitonn** Stops the usr program until an *input* turns ON :waiton14 waits for X14 to go on.
- waitmonn** Stops the usr program until a *mark* in the PLC is set: waitmon8 waits for M8.
- waitoffn** Stops the usr program until an *input* turns OFF: waitof14 waits for X14 to go off.
- waitmoffn** Stops the usr program until a *mark* is cleared: waitmoff8 waits for M8 to clear.
- delayn** This command stops the usr program for a number of seconds, from .1 sec to 10: delay.3 waits for 3/10 of a second. Used for pulsing an output, mostly.
- end** This command must be the last command in every usr program.

Conditional Sub-Routine M-Function

M97InCnPn

In is the PLC Input which is monitored. Generally EOB, X7
Cn is the Condition of the input to cause the jump: 1 (on) or 0 (off)
Pn is the number of the sub-routine to execute

Notes:The PLC Inputs are X0 through X7: grounding an input turns it on.
The input must be active *before* the M97 block is called

code for program

```
·  
·  
·M97I5C1P2 (Execute Subroutine #2 if Input 5 is on)  
·  
·  
·M30(Or M02: end of program)
```

}1

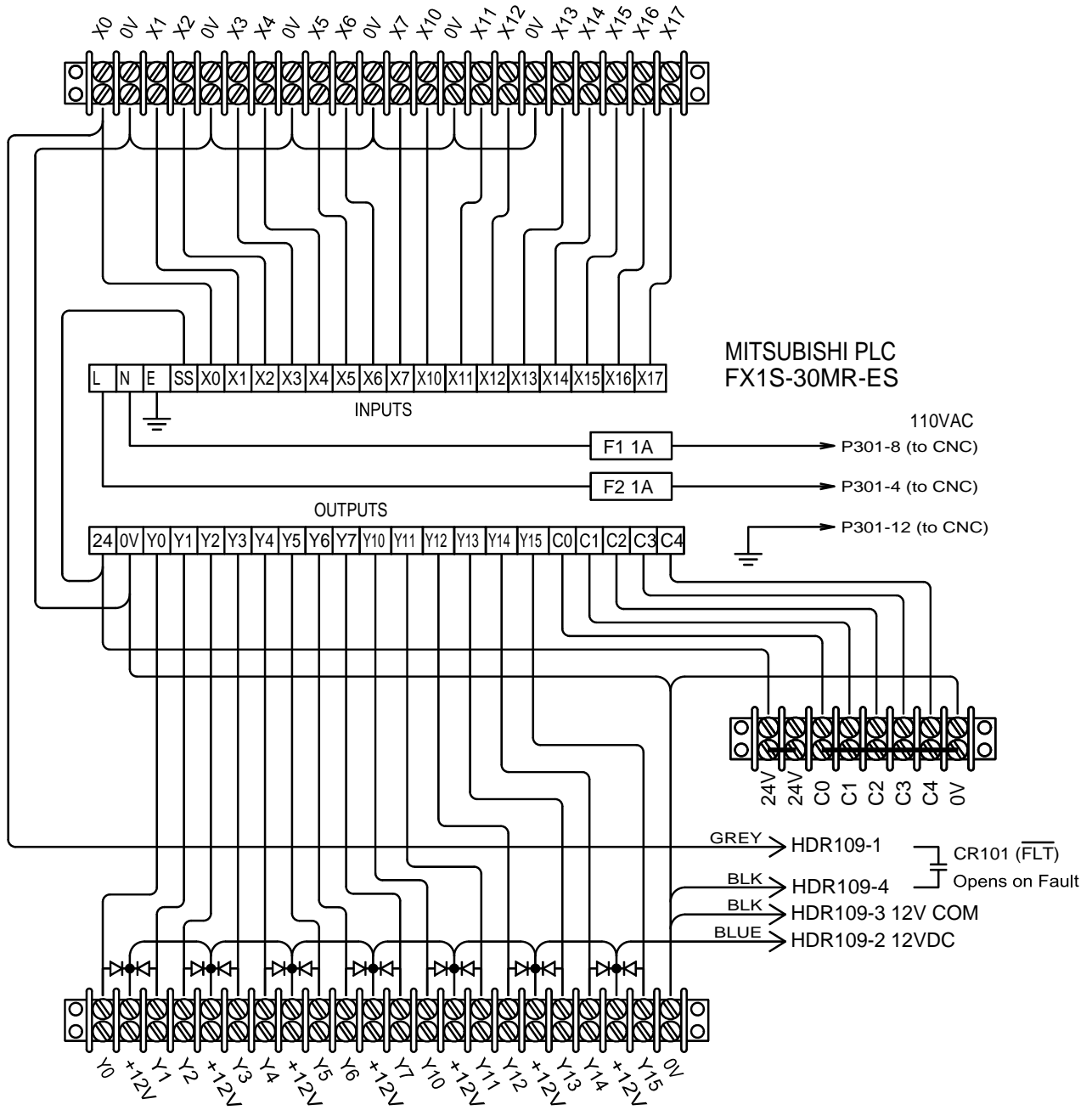
code for subroutine #1

```
·  
·  
·M99(End of sub routine)
```

}2

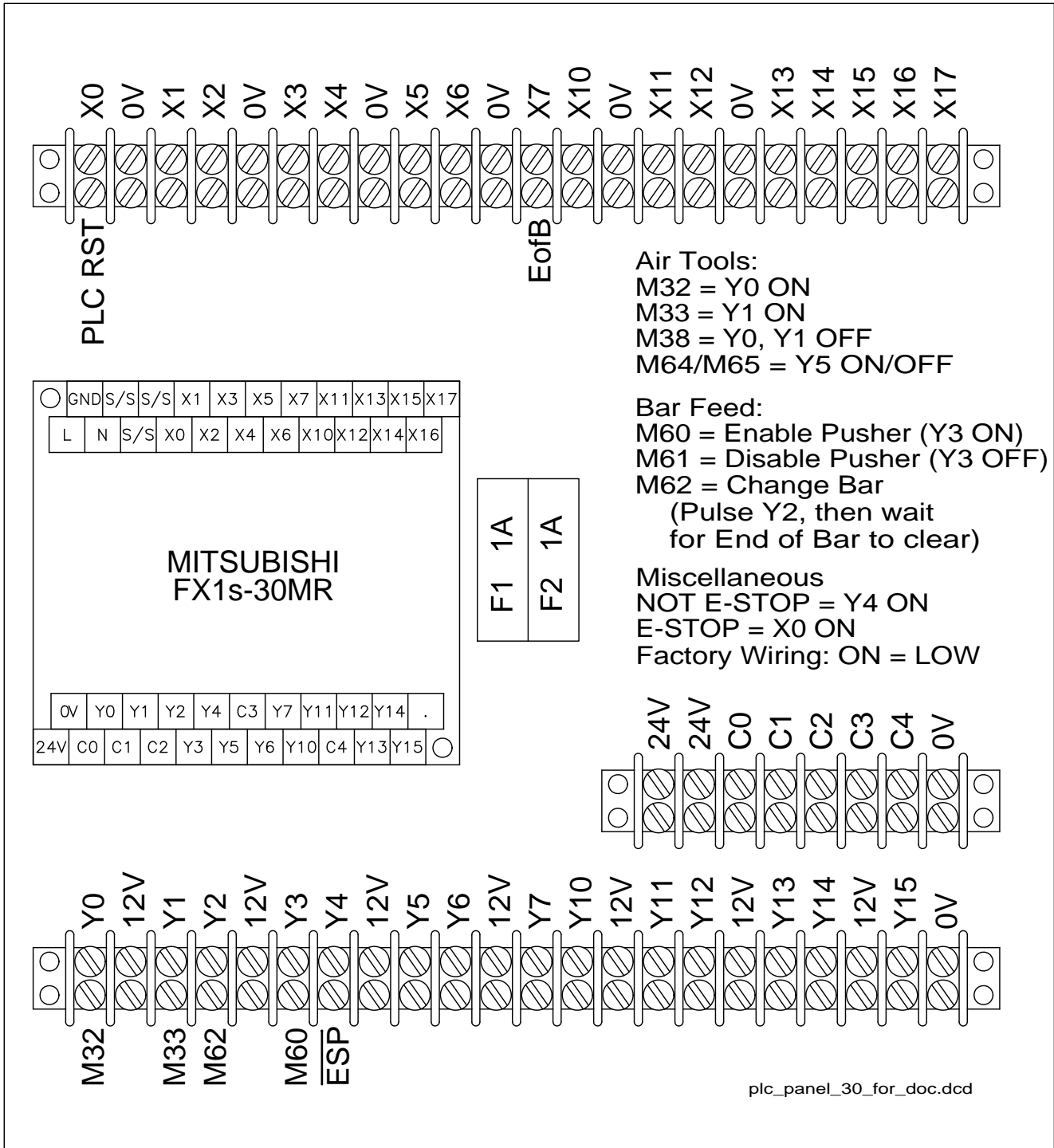
code for subroutine #2

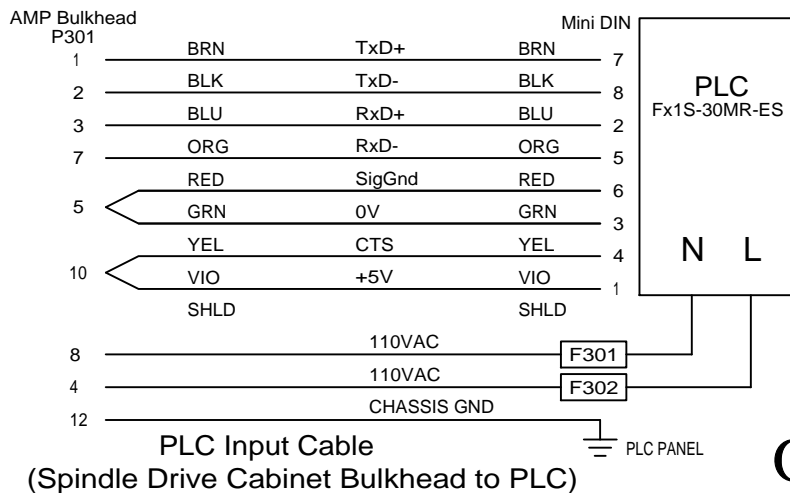
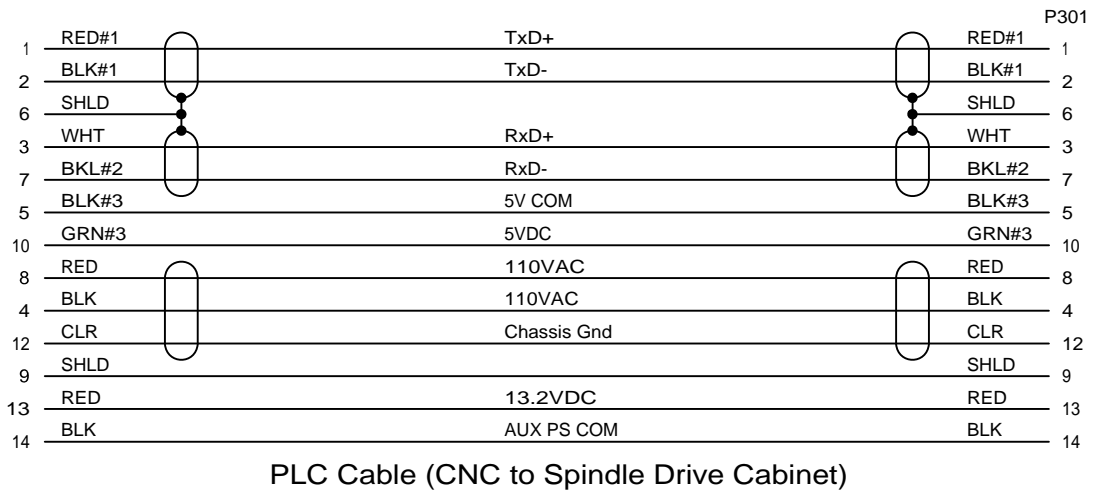
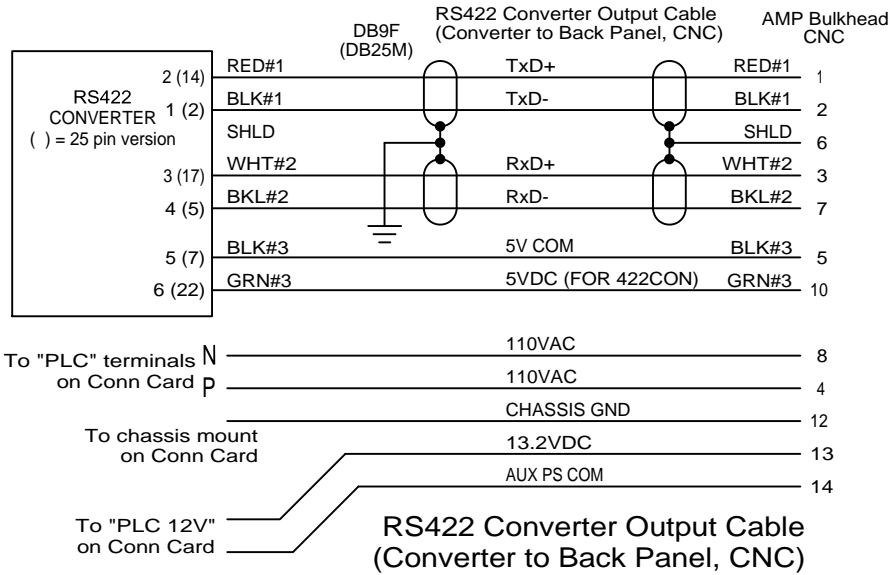
```
·  
·  
·M99(End of sub routine)
```

Expanded I/O (PLC) Wiring

plc_sch_30-wide-G4_CNC.dcd





plc_cbl.dcd March 2016

OmniTurn
PLC CABLES