# Table of Contents

# OmniTurn - Trouble shooting guide

**The Yellow power light won't come on**

The yellow power light indicates that the computer and auxiliary power supplies are working. The 12V should come on when the system is turned on and the computer is working. If the monitor displays the start-up information but the yellow power light is off, replace the bulb (#53 miniature bayonet).

- Be sure there is power to the machine.
- Check that disconnect on spindle cabinet is ON.
- Check that the CNC Control is plugged into socket on back of machine.
- Check the fuse on the back of the CNC Control.
- Check fuses on step-down transformer in spindle cabinet.
- Check fuse on auxiliary power supply in CNC Control.

**The Blue servo light won't come on**

The Blue servo light indicates that the servos have been turned on. If this won't illuminate that means that the E-Stop string is open, or there is a problem with the drives or their control system.
If you hear the servos engage when the button is pressed, but the blue light is off, replace the bulb (#53 miniature bayonet).

- Check the that the E-stops on CNC and Operator's Station (palm box) are released.
- Check that the Operator's Station is plugged into the CNC.
- Check the 1CR relay on the connect card in the control, be sure it is plugged in.
- Check voltage at CRDY test-point on Connect Card (see page 6-12). At "Please turn servos on" prompt, CRDY should stay near zero volts when Servos On button is pressed. If voltage at CRDY goes up to 12V ribbon cable to motion card could be bad, or problem could be on motion card. If CRDY stays low, the E-Stop string could be open (see schematic on page 6.18) or ribbon cable to front panel connect card could be bad or Servos On switch could be bad.

**The Monitor won't come on**

- If the rest of the system works (the yellow light comes on and, after 1 minute, you can turn on Caps Lock Light on keyboard) but you do not get an image on the screen there could be a problem with the monitor. Make sure 12V cable from CRT, is attached to CN10 on connect card.
- If the Caps Lock Light won't light, the computer is probably not booting up.

**The Red Motion Stop light come on every time you try to move the slide**

- Check that the Spindle Drive is not faulted; press the reset button on the the spindle drive cabinet located at the left side of GT-75 and GT-Jr.
- Check the hatch on GT-Jr, or any interlocked doors on your system. To jog the machine with door open during setup, get the interlock bypass key from your supervisor.
- If you have a barfeeder, check that the end of bar circuit is not activated

**"Servo Axis Error" when you try to jog the slide:**

Most common cause is from over-travelling the slide and hitting a "hard stop".

- Press "ESC", this will reset the control. If the control shuts down again when you try to jog the axis go to the next step.
- Check the two thermal overloads. These are located on the rear panel of the CNC. It can take a few minutes for the overload to cool enough to be reset. Press "Esc" and try to jog again.
- Turn the control off, wait 15 seconds, turn the control on again. This will reset the Servo driver card. If the control shuts down again when you try to jog, go to the next step.
- Check for loose motor cable; set power off, then disconnect and reconnect.

**If only one axis is giving you problems, do the following:**

- Turn the control off and swap the cables to the motors, Z to X and X to Z. When you try to jog in Z, the X motor should move; when you try to jog in X, the Z motor should move.
- Turn the control back on and try to jog in the good axis; if the "bad" motor moves, the motor is probably ok and the motion control card is bad; if the motor doesn't move, it's probably bad. Try the other axis and verify your conclusions.
- If you have questions about this procedure, call the factory (541-332-7004)

## The slide crashes whenever a program is run

Problem

- The HOME position has been improperly set
- Either the tool offsets have not been set or have been lost
- Your program is incorrect
- Check the XnZn statements after a tool change, be sure you have one for each and they are correct.

Solutions

- Reset HOME
- Check your tool offset table
- Check your program
- Reset the tool
- Reload the tool offset table, see F10 in the automatic mode

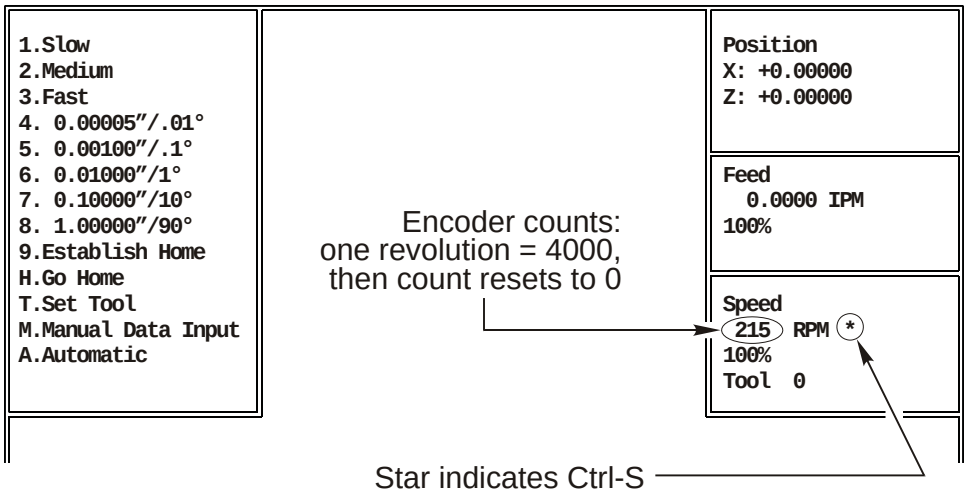
## Spindle won't come on

- Check that both E-stops are released, on CNC control and operator's station
- Turn the "spindle override" pot on the CNC control full CW
- Turn the spindle switch on the CNC control to "AUTO"
- Check that the spindle lock pin is pulled out
- Check that MISC cable from the OmniTum CNC to Spindle Cabinet is connected
- Check that Operator Station Cable is connected to Spindle Cabinet
- Spindle drive box must be turned on (attachments only)
- Cables to the spindle drive box must be plugged in

- Spindle drive may be in 'fault' condition. Push the red reset button on the spindle drive box to reset the spindle drive. This could be tripped for a number of reasons:

  - Too low or too high line voltage
  - The duty cycle is too much; cycle time is too short and too often.
  - Noise from coolant pump or other contacts
  - Acceleration or deacceleration are to short (standard 5hp drive). *Parameters can be set to change these: see "AC Spindle Drive" pg 6.18*

# Spindle Encoder Counts (Ctrl-S Diagnostic)




## Spindle Encoder Counts (Ctrl-S Diagnostic)

Pressing Ctrl-S in Jog Mode enables display of spindle encoder counts and marker.

If the slide doesn't move, or moves erratically in any "inches per revolution" mode (g95, g33, g83 etc) Ctrl-S is a quick way to determine if the spindle encoder is at fault.

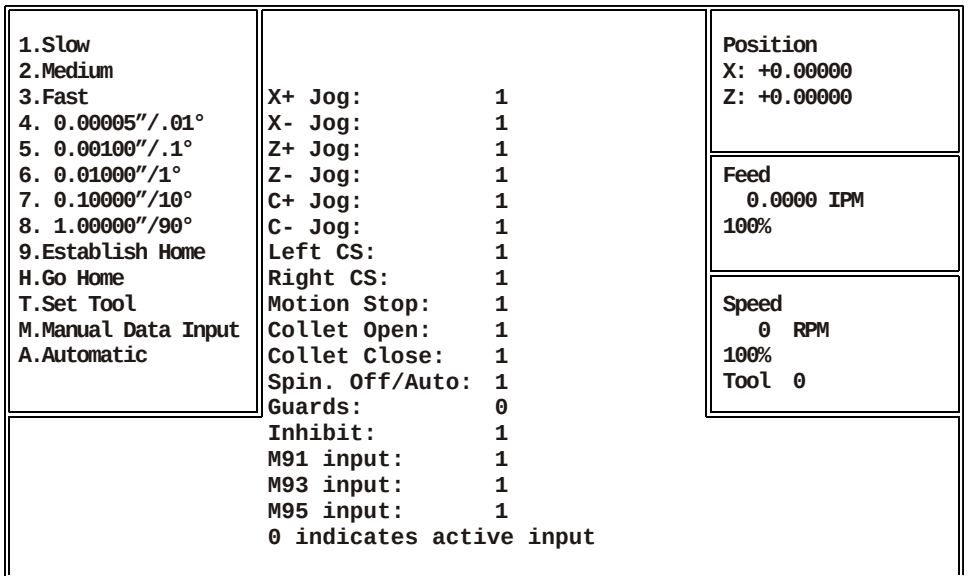
When Ctrl-S is active, a star (*) appears to the right of RPM in the spindle speed box. The numbers to the left of RPM are encoder counts. Turning the spindle by hand will increase or decrease the numbers until the marker is encountered. There are 4000 encoder counts and one marker. When the marker is encountered, the numbers will increase to 3999, then reset to zero.

To verify that the spindle encoder is functional, go to Jog Mode, press Ctrl-S, then slowly turn the spindle while watching the encoder count.

Initially, turn the spindle first one way, then the other less than 1/8 turn: unless you are right at the marker, the numbers should count up in one direction and count down in the other. If the numbers don't change, or if they only change in one direction, the encoder is faulty.

If the numbers increase and decrease, turn the spindle to increase the numbers. If the marker is working properly, the numbers should count to 4000, then start over at zero. If the numbers don't reset, the encoder is faulty. To alert you to this, the color of the numbers will reverse at about 4100 counts.

# Input Monitor Function (Alt-I Diagnostic)




## Input Monitor Function (Alt-I Diagnostic)

Pressing Alt-I in Jog Mode displays status of inputs.

Active inputs (on) are displayed as 0, inactive inputs (off) are shown as 1.

This diagnostic is helpful for quickly determining if the states of the various switches and M-functions are being communicated to the motion control card.

For example: if the machine won't jog, you can quickly verify that the motion control card is reading the state of the Jog Stick by moving the Jog Stick and watching the 1's change to 0's.

Note that the Spindle Off/Auto switch is only monitored when the spindle is commanded to be on.

Also, when door interlock switch is open (1), the Spindle Off/Auto switch is shown as off (1) regardless of its actual condition, and Motion Stop is shown as on (0) regardless of its actual condition.

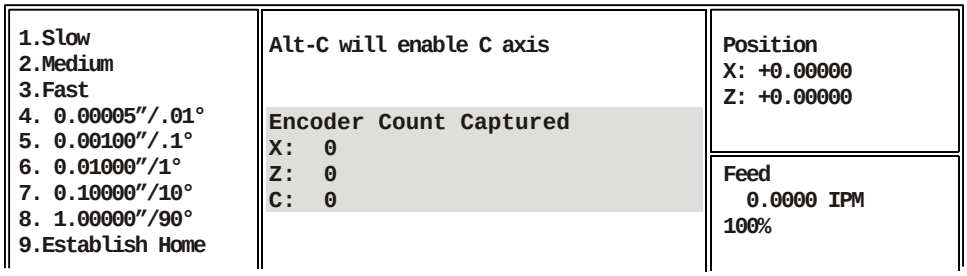
If guard input is disabled by the presence of the noguards.txt file, the guards input will be shown as active(0) whether the door is open or not.

To cancel Alt-I press Alt-I again.

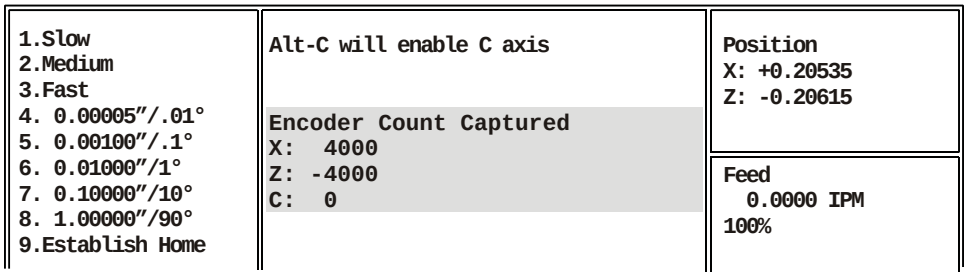
**Positioning Problems:**
Your parts are not maintaining size; measurements are different part to part.

**Using Ctrl-H to diagnose repeatability problems**
This test will quickly determine if the problem is electrical or mechanical. It is not necessary to load any special program, or to re-home the machine.

Go to Jog Mode.
Press and hold Ctrl Key, then press H Key: the following box will appear:




Select Jog 1 (Jog Slow) and jog the slide toward the nearest mark on the scale in the axis you’re having trouble with. When the “Position” counter passes 0.20000, the “Encoder Count Captured” number should change to 4000 (either plus or minus, depending on the direction you jogged). Illustration below assumes you started at home; if you started at other location, the Position will be at any multiple of 0.200”.




If the both axes read 4000 , the problem is mechanical: loose coupler, excess backlash, entire slide loose on ways, bad spindle, tooling, etc. Review the suggestions on the next page for help in determining the mechanical cause of the repeatablilty or size problem.

If either axis reads other than 4000, the problem could be a bad bad motor encoder, or some trouble on the motion card.

At this point, to narrow it down, you must load a test program that can run with the motor cables swapped. Controls ship with a program named *smaltest* on the harddrive. *Smaltest* only moves the slide one inch from home in X & Z, so it is safe to run with tooling on the slide. Run five or ten cycles of *smaltest*, then do the Ctrl-H test again. Note which axis is not 4000. Set the E-Stop to turn off servos, and swap the motor cables at the back of the control. Run five or ten cycles of smaltest and do Ctrl-H test again: If the same axis doesn’t read 4000, the problem is on the motion card. If that axis reads 4000, but the other axis is now not reading 4000, the problem is in the motor encoder.

**Positioning Problems:**
The slide has mechanical problems with repeating a size

- The part is moving, check your work holding fixture
- Be sure the tooling is held tightly
- If you have an **attachment**, see if the slide is loose on the lathe
- The ball screw nut has come loose in it's housing
- Loose encoder at the end of the axis motor
- Loose coupling between the Servo motor and the ball screw for axis movement

To see if it is a mechanical problem position the slide close to the spindle, mount an indicator on the slide so it touches the headstock, zero out the indicator and then push and pull the slide with servos on. The indicator should show some movement as you push and pull on the slide. However it should return to Zero when you let go. If the slide does not come back to Zero then there is something loose, (Slide, Ballscrew nut, Ballscrew taper roller bearing, etc).

To check if the slide for repetition try running a simple program that will show the type of error that you are getting clearly. Run the program in "cycle repeat":

```
g90g94f300(TEST PROGRAM FOR Z AXIS)
t30(Move the slide so indicator is 1 inch away from headstock)
x0z1
z.1
f20z0 (Creep up on the indicator)
g04f1(Read the indicator during the dwell)
f300z1
m30

g90g94f300(TEST PROGRAM FOR X AXIS)
t31(Move the slide so indicator is 1 inch away from headstock)
xlz0
x.1
x0f20
g04f1(Read the indicator during the dwell)
f300x1
M30
```

After running the program and studying the way the indicater repeats, or doesn't, you should have an idea of what your mechanical problem could be. If not, call the factory and describe the type of error that you are seeing, for example: constant creeping in one direction, random movement in both directions, jumping.

**Using Alt-G to diagnose Feed Hold problems:**
If the slide won't jog, or if the Feed Hold lamp is lit, the problem could be in the CNC Control or in the Spindle Drive Cabinet. To determine where the problem lies, press and hold the Alt key, then press G key (Alt-G). If the slide jogs with Alt-G active, the problem is in the Spindle Drive Cabinet; if the slide still wont jog, the problem is in the CNC Control.

Note that the slide will not jog if a door, hatch or splash-guard is open. If it is necessary to operate the machine with door, hatch or splash-guard open, there is an interlock by-pass key. Only personnel specially trained by your company should have access to the interlock by-pass key.

## SERVO MOTOR REPLACEMENT INSTRUCTIONS

**Removal:**

***Set main disconnect OFF and lock out for safety.***

1. Disconnect the cable for the faulty motor at rear of CNC and pull it clear of wireways cable clamps and panel holes. Push the slide away from the motor to access the motor coupling For X-Axis, the slide brake assembly must be removed. Two 6-32 cap screws secure the cylinder to the saddle.

2. Remove the sheet metal covering the slide nearest the motor you wish to change. On X-Axis this cover is held with acorn nuts on 1/4-20 all-thread; on Z-Axis the cover is held by the three phillips head screws through the scale. Remove the motor cover, which is held with one screw.

4. Loosen the cap screw holding the clamp on the coupling on the motor side.

5. Remove two 3/8-18 cap screws that hold the motor mount and motor to the base. You may have to lightly tap the motor mount to remove it from the machine, as it is pinned for alignment.

6. Remove four 10-32 cap screws that hold the motor to the motor mount.

**Replacement:**

1. Attach the replacement motor to the motor mount with four 10-32 cap screws.

2. Notice the mark on the end of the motor shaft and another on the face of the motor. These marks are aligned when the motor is at “home”. Turn the motor shaft so that the marks are 180° apart; that is 1/2 turn. This provides about 0.100” clearance past home

3. For X-Axis, push the slide all the way down, against the Bellville stack; for Z-Axis, push the slide all the way to the left, against the Bellville stack.

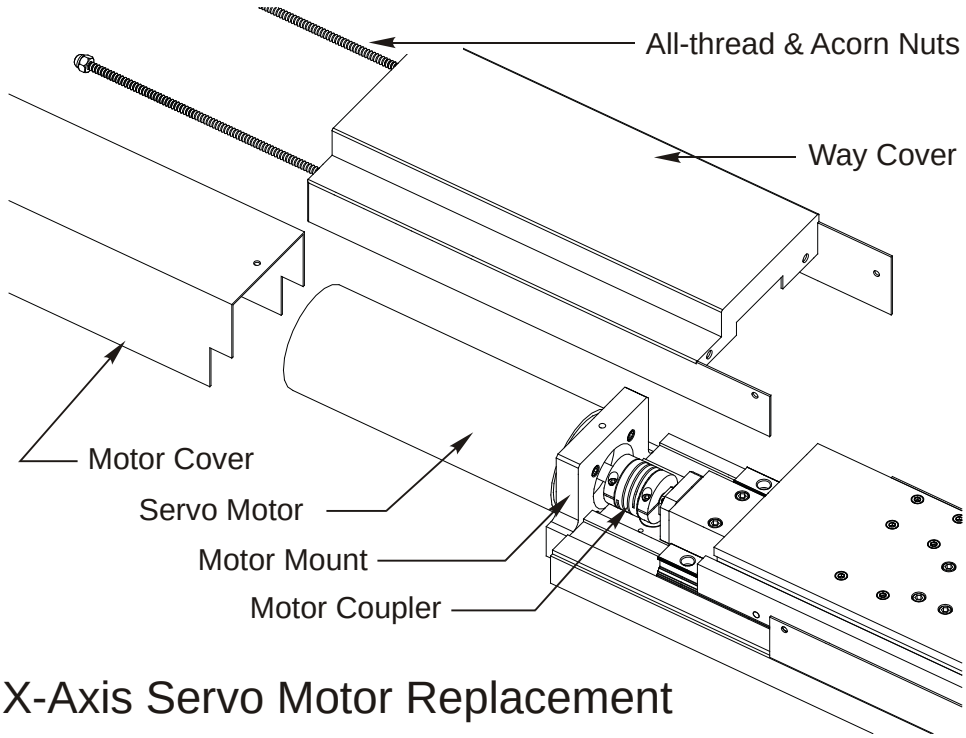
4. Attach the motor mount to the base, slipping the shaft into the coupler. Don’t let the shaft turn much. Tighten the motor mount to the machine before tightening the clamp on the coupler.

5. Replace the sheet metal as required.

6. After re-assembly, jog the axis to both ends and verify that the pointer will go just slightly past “0”; jog back to the other side of “0”, then establish Home as usual. If the pointer does not indicate ”0”, loosen it and move it to zero.

**CAUTION - YOUR TOOL OFFSETS HAVE CHANGED**. The slide will not home *exactly* where used to: If you are set up on a job you must re-set all offsets.

## SERVO MOTOR REPLACEMENT INSTRUCTIONS




X-Axis Servo Motor Replacement

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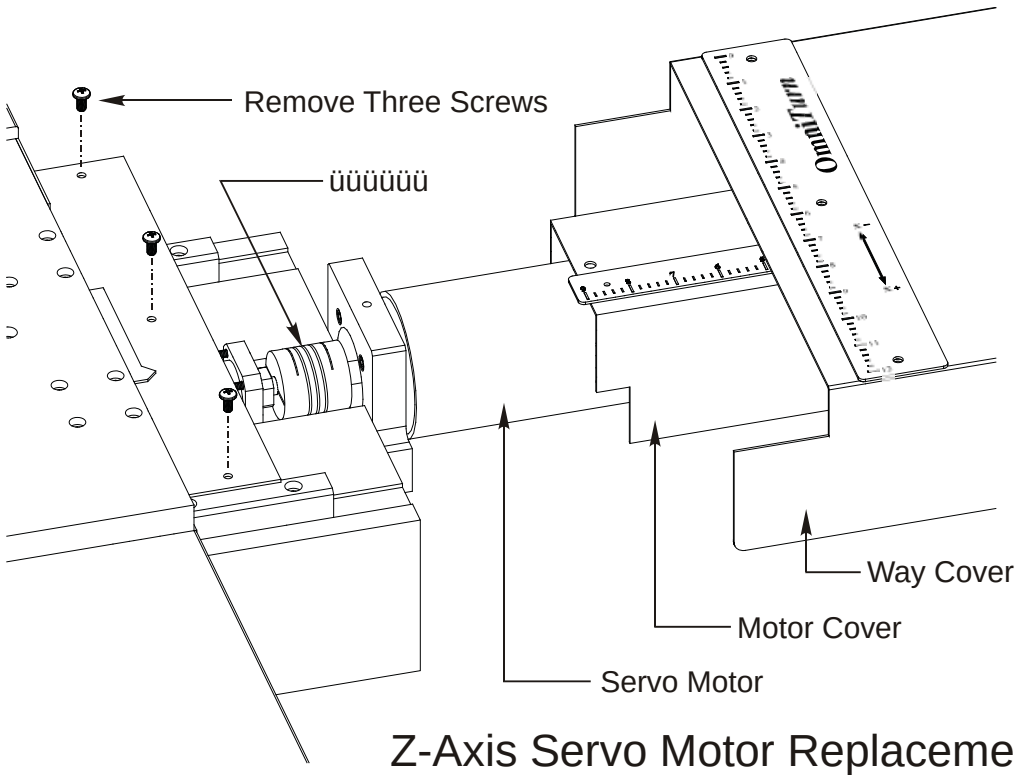
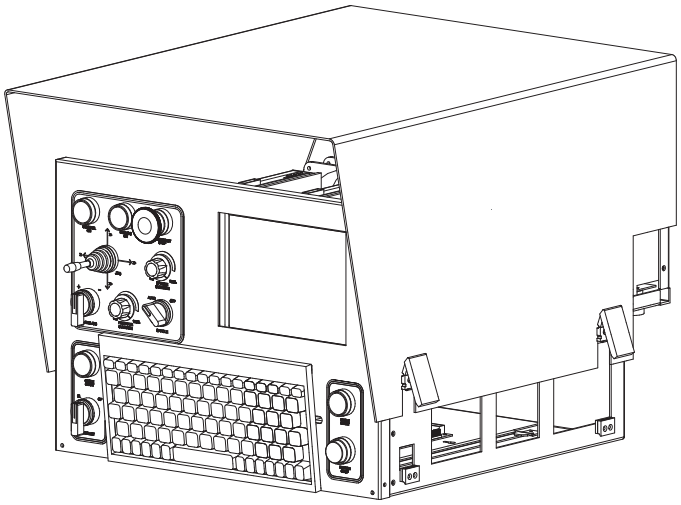
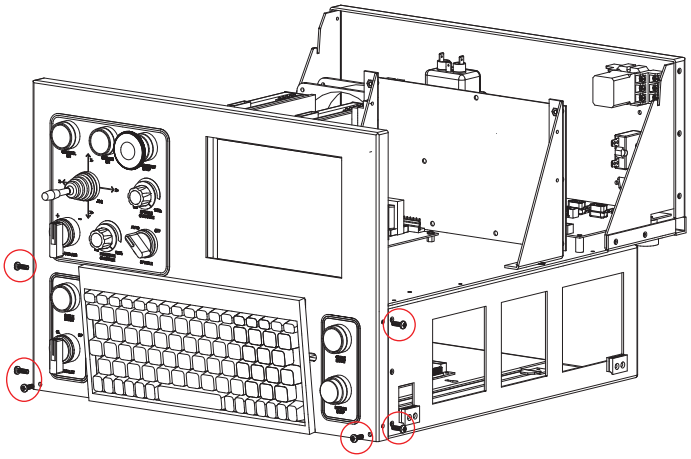



Z-Axis Servo Motor Replacement

# To Disassemble the CNC Control

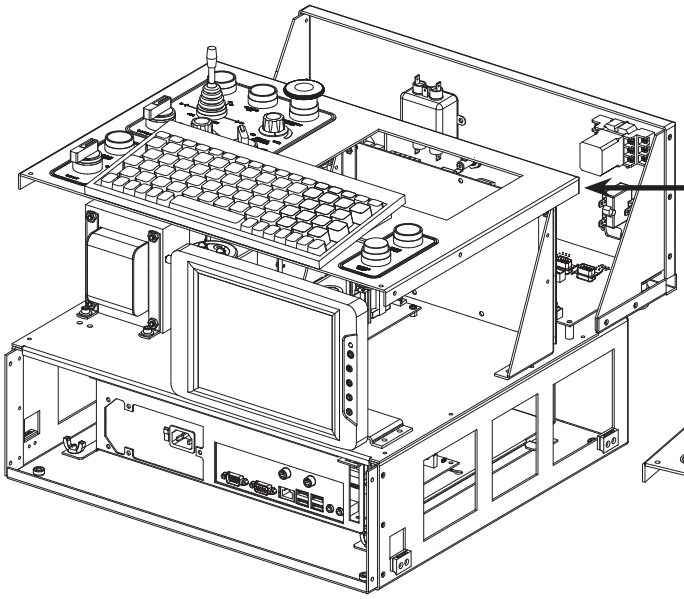


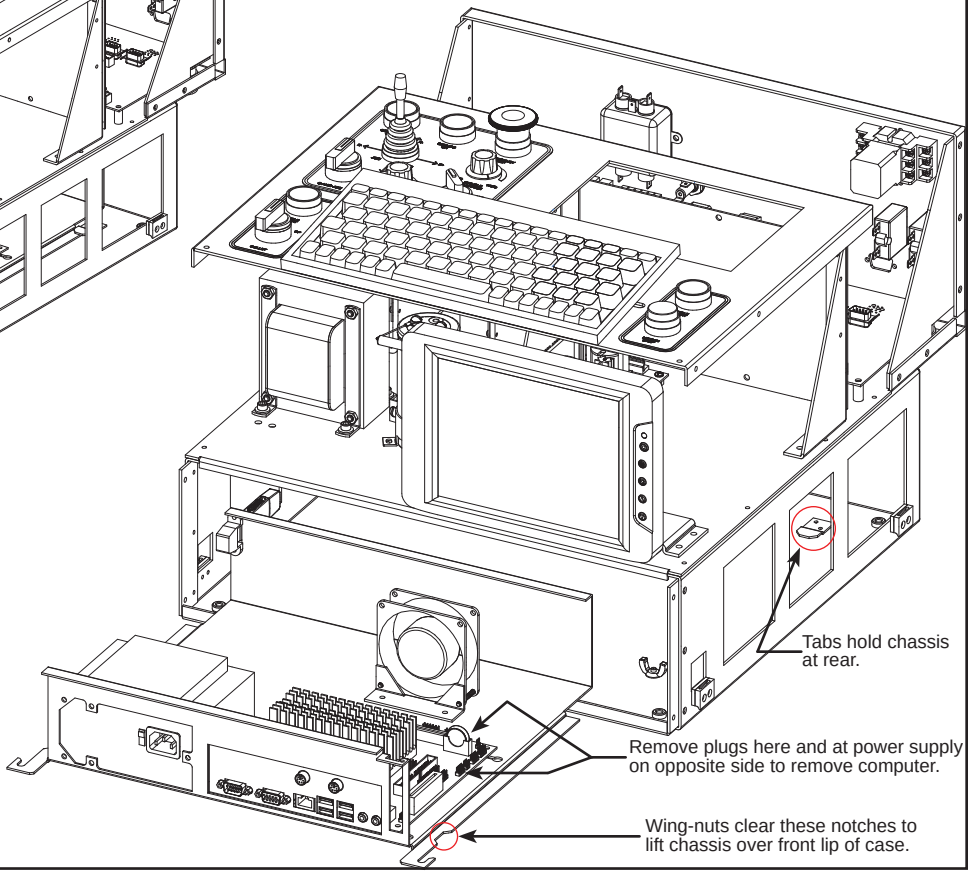
Un-plug power cord, then remove the blue cover.



Remove six screws holding front panel.

***It is not necessary to disconnect cables to front-panel.***
Stow panel gently on top of components as shown at left.

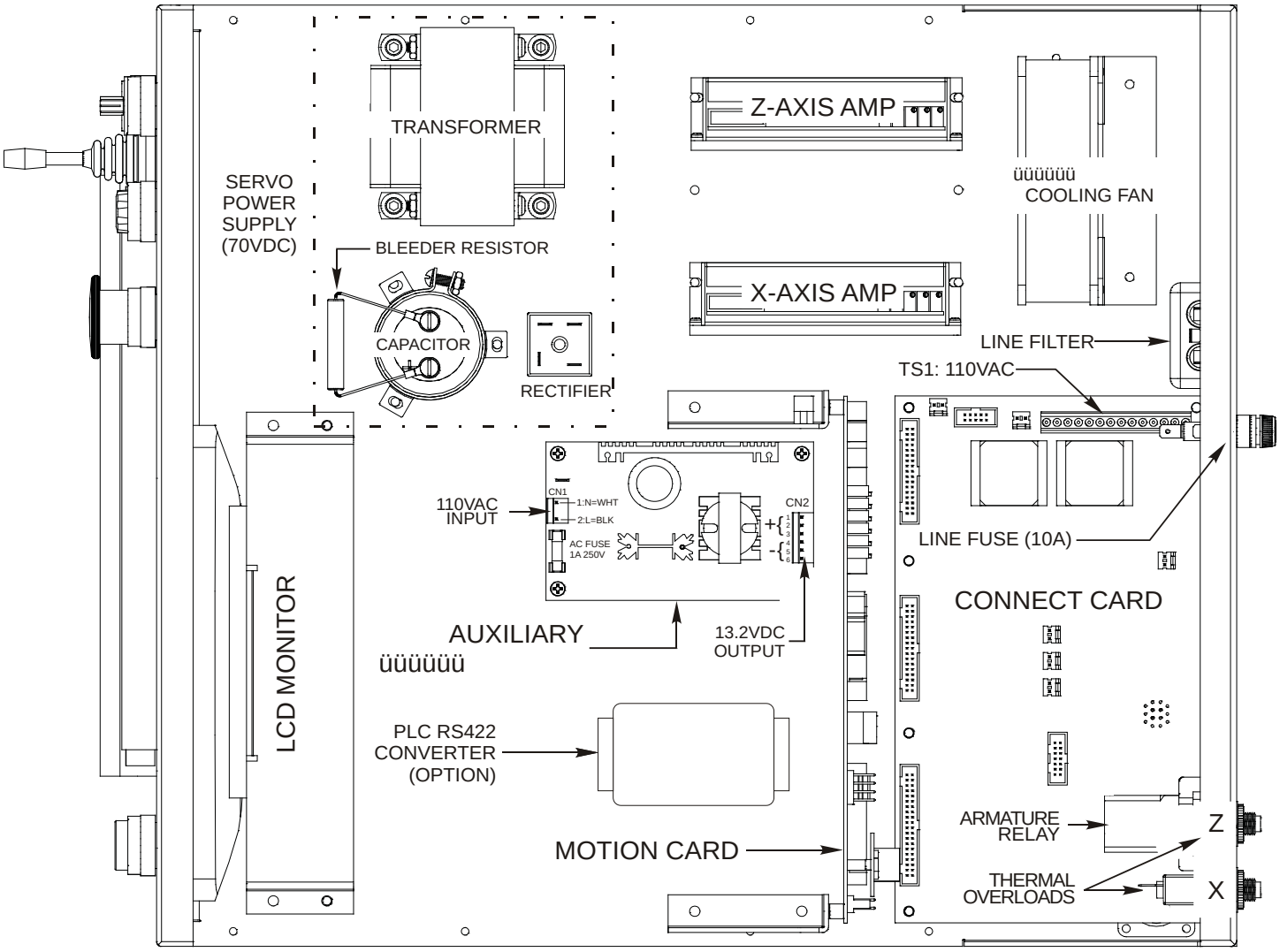





The computer is held in with wing-nuts at the front; it slides under tabs at the rear.

**NOTE:** Three plugs must be disconnected before removing the computer, two on headers indicated at right, and one power supply connector near power supply.

## CNC Top Chassis

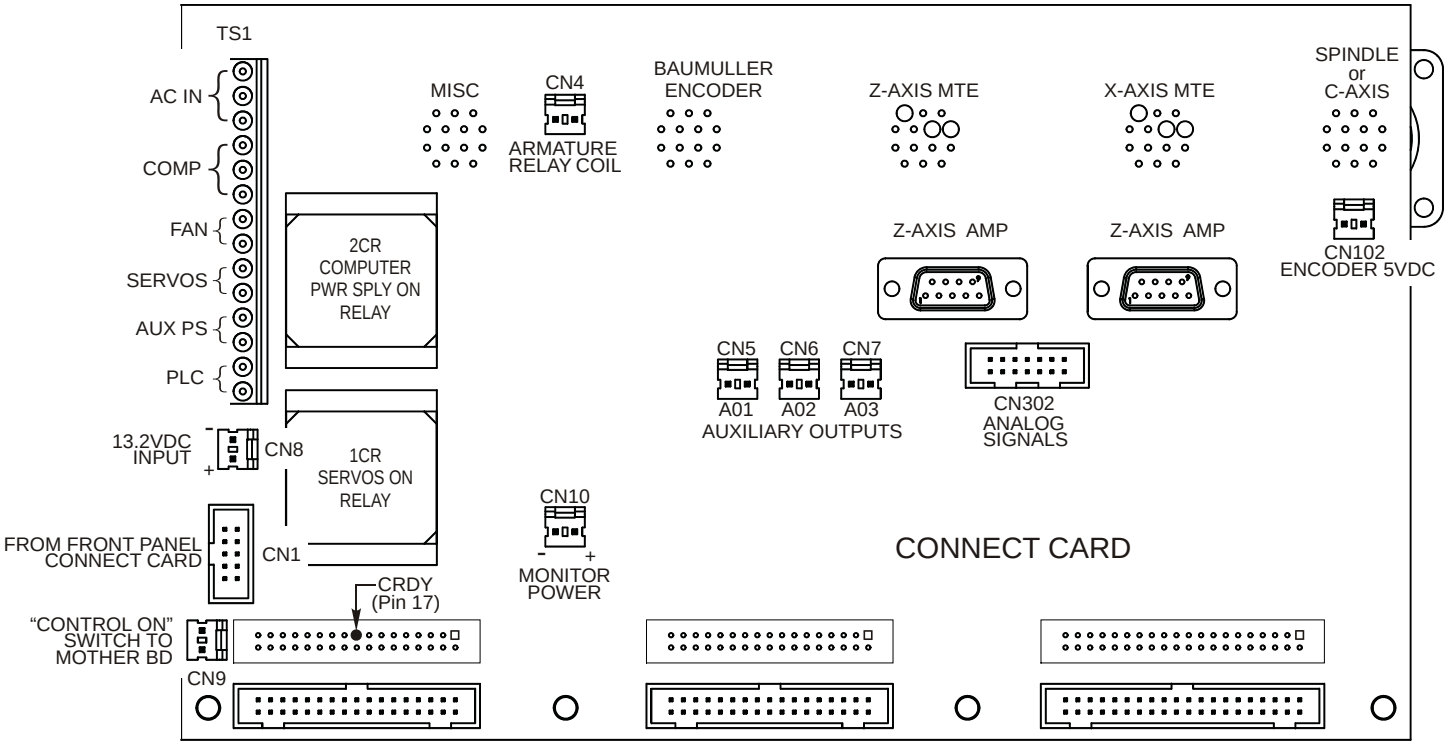



The illustration above shows the location of the main components. Detailed drawings of the Servo Amps, Connect Card and Motion Card will be found on the following pages.

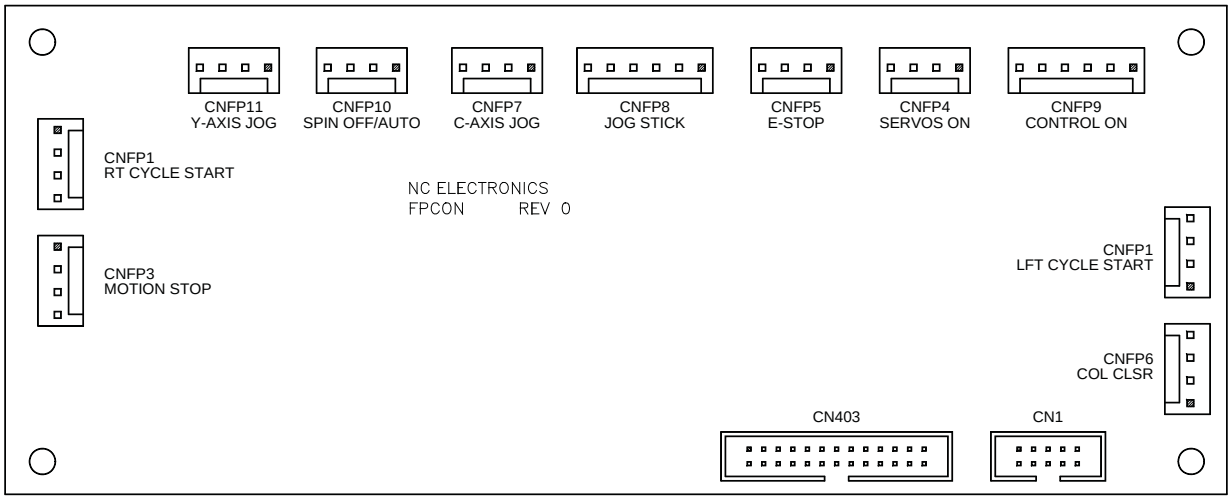
The new generation motion card no longer communicates with the computer via accessory card slots so it has been moved from the computer chassis to the top chassis. It is mounted vertically adjacent to the connect card.

The servo amps and cooling fan have been rearranged to provide better cooling.

## Connect Card

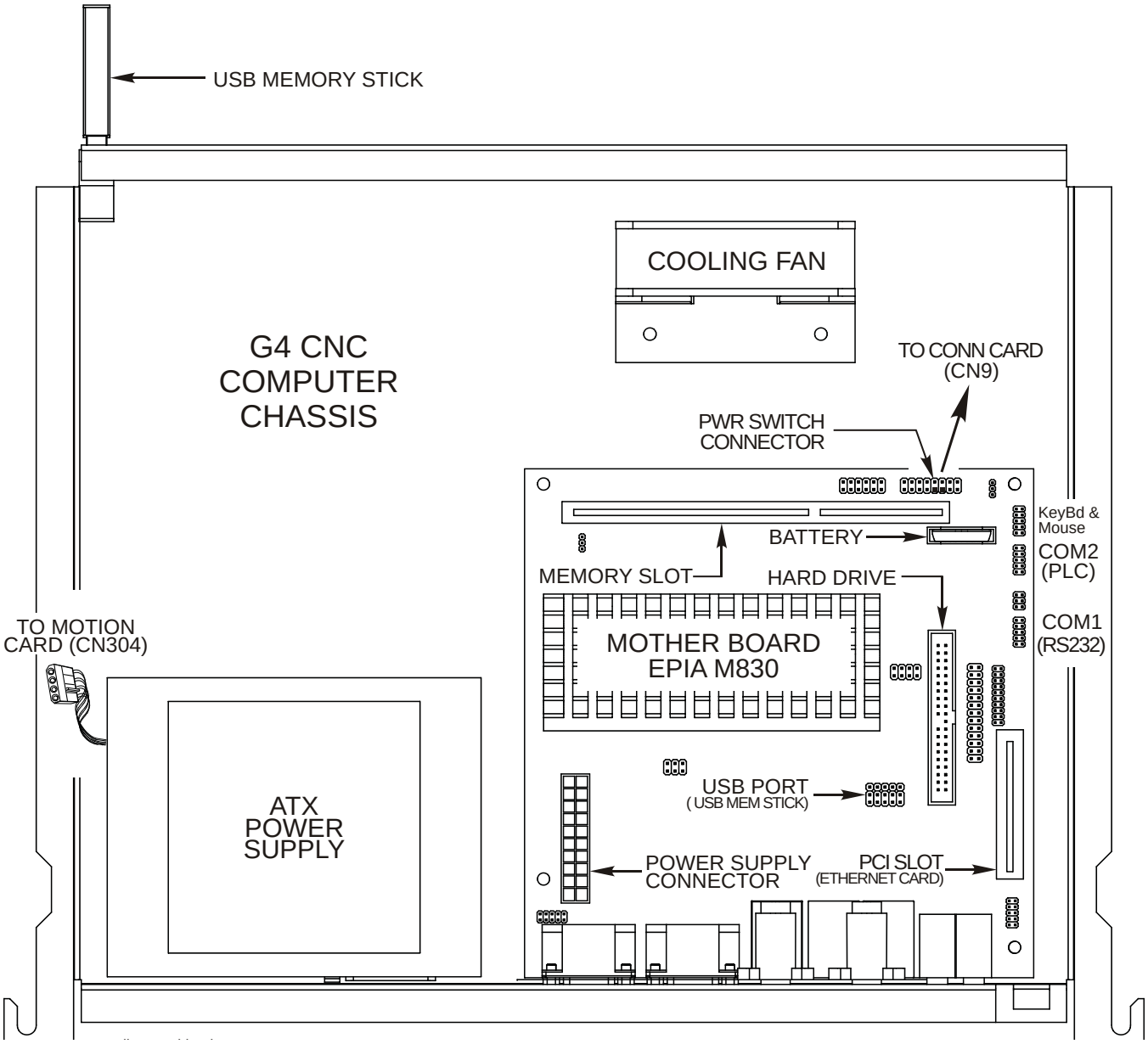



## CNC Front-Panel Connect Card

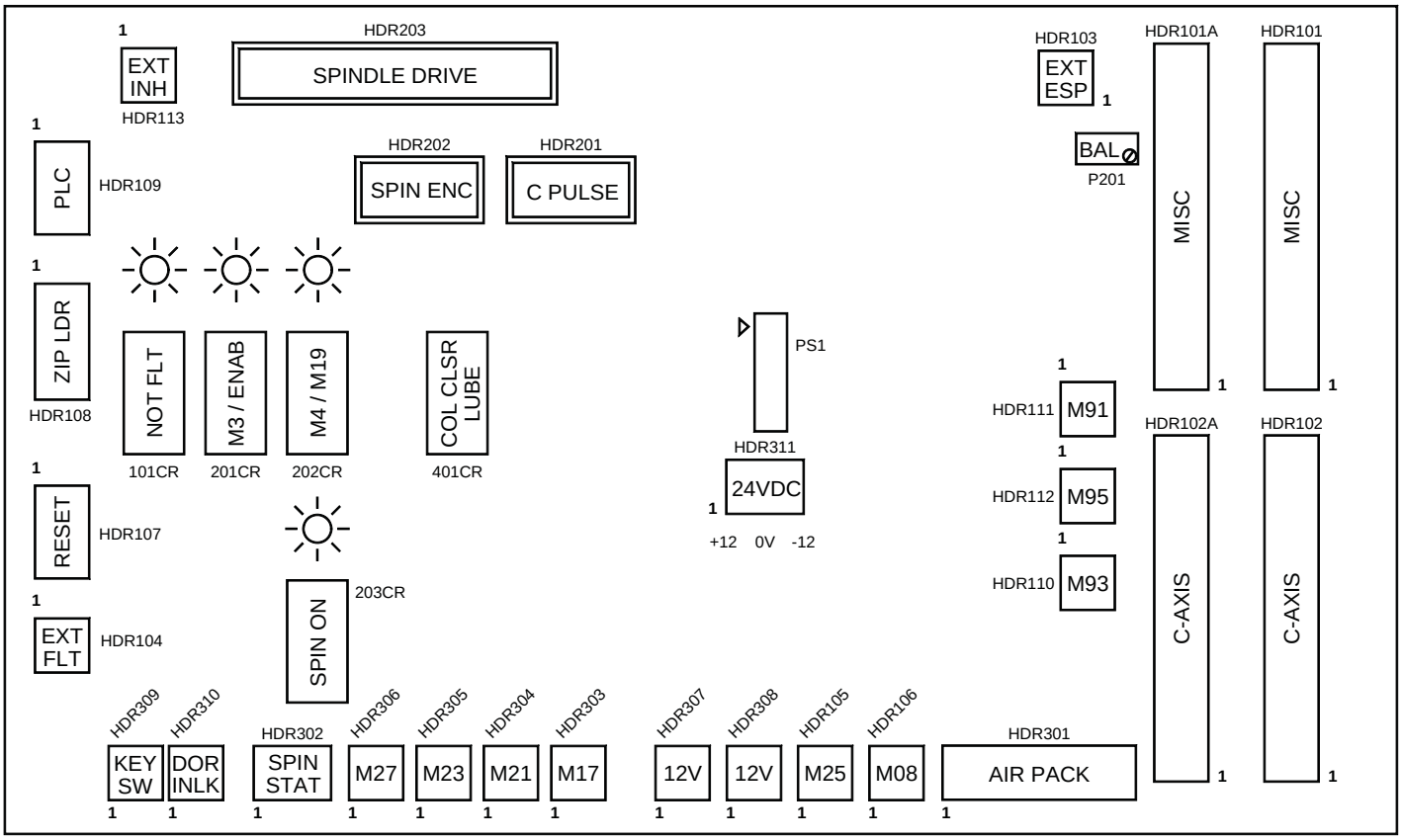



front_panel_connect_card.dcd

# CNC Computer Chassis



## Spindle Drive Circuit Card Assembly




spindle_panel_pwb.dcd

TB1 no longer exists; the following table lists corresponence between the TB1 test points and the current location of signals and voltages.

| | | |
|---|---|---|
| TB1-1 | Analog Com . . . . . | HDR101-11 |
| TB1-2 | Analog Sig . . . . . | HDR101-10 |
| TB1-5 | M03 . . . . . | HDR101-6 |
| TB1-7 | M04 . . . . . | HDR101-4 |
| TB1-8 | +12V. . . . . | HDR307-1 |
| TB1-9 | +12V. . . . . | HDR101-9 |
| TB1-10 | M08 . . . . . | HDR101-5 |
| TB1-11 | M25 . . . . . | HDR101-1 |
| TB1-12 | M13 . . . . . | HDR101-3 |
| TB1-15 | M12 . . . . . | HDR101-7 |
| TB1-19 | 0V. . . . . | HDR101-2 |
| TB1-21 | CC Lube. . . . . | HDR301-6 |
| TB1-23 | E-Stop . . . . . | HDR104-1 |
| TB1-25 | Inhibit . . . . . | HDR101-8 |
| TB1-30 | Guards . . . . . | HDR101-13 |

## Setting OMNITURN Servo Amplifiers

***NOTE:*** *The amplifiers are pre-set at the factory and should only rarely require slight adjustmets to following error. Steps 2 & 3 on pages 6.13 & 6.14 are the only adjustments normally required.*

If for some reason it becomes necessary to re-set the amplifiers from scratch, pre-set the pots as follows:

Signal Gain: Full CCW *then four turns CW* ("Full CCW" means 20 turns)
Tach Gain: Full CW ("Full CW" means 20 turns)
Comp: Full CCW *then three turns CW*
Current Limit: Full CW

**Tools required:** A digital voltmeter (DMM or DVM)
Fine tipped probes, or paper clips
Jewlers common screwdriver or "tweaker"

To correctly setup the servo amps, it is necessary to adjust pots on the Servo Amps and on the Motion Card.

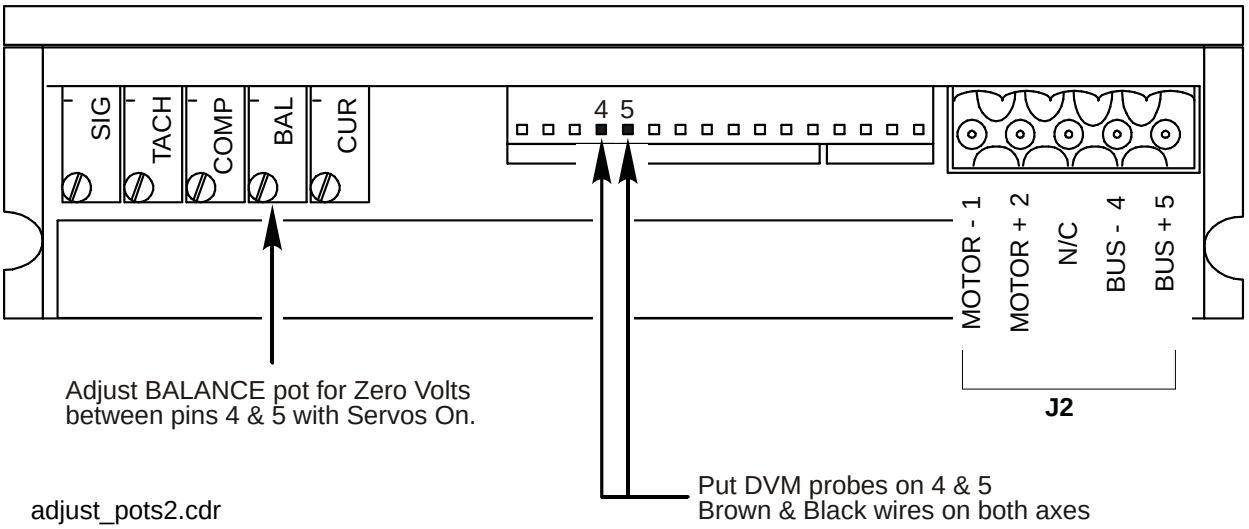
Set Servos ON *(All adjustments are made with servos ON.)*

The steps are as follows:
1. Servo Amplifier Balance Adjustment
2. Motion Card Zero Adjustment
3. Servo Amplifier Following Error Adjustment
4. Re-check Servo Amp balance and re-adjust as required
5. Re-check Servo Amp following error

### *1. Servo Amplifier Balance Adjustment*

Put probes of DVM between Pins 4 & 5 on servo amp signal connector. If the probe-tips are too large, cut pieces of paper clip and insert into connector holes to make contact.
Adjust BALANCE pot on Servo Amplifier for 0V +/- 0.005V

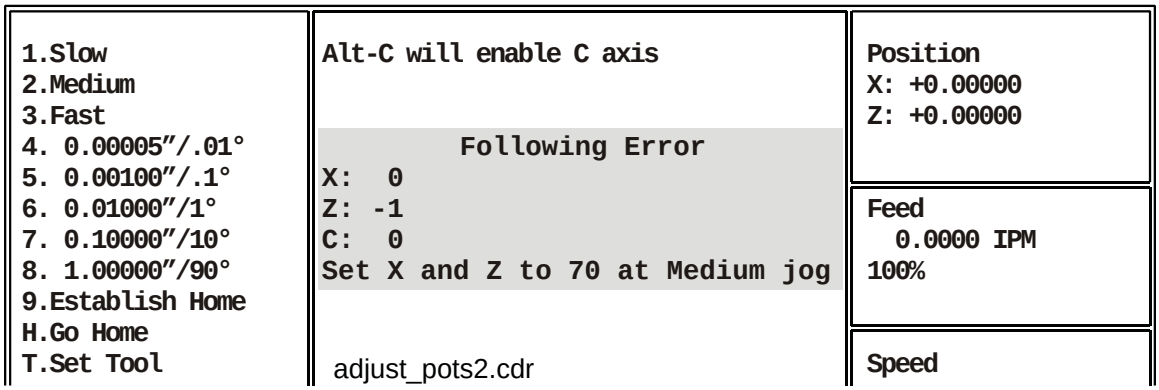
SERVO AMPLIFIER BALANCE ADJUSTMENT

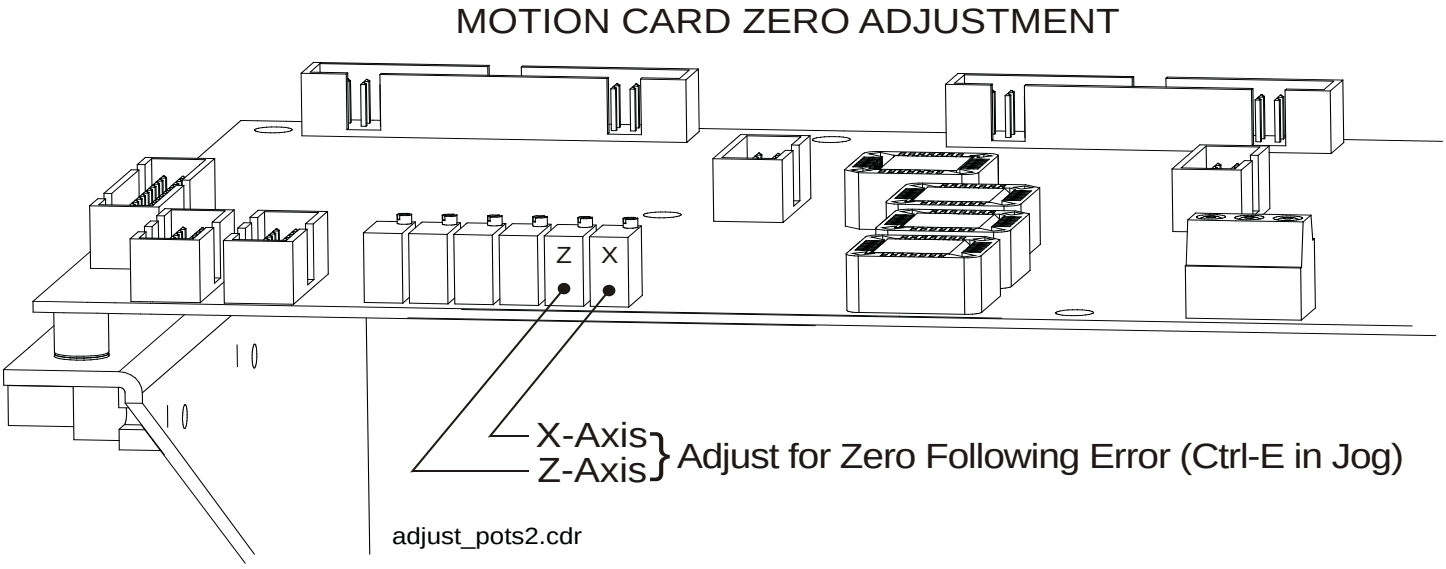


## Setting OMNITURN Servo Amplifiers, con't

### *2. Motion Card Zero Adjustment (Ctrl-E)*

In Jog Mode, open Following Error display box. (Press and hold Ctrl key, then press 'E' key).
On the Motion Card, adjust the X and Z Axis Zero pots for zeros at the X: and Z: locations.
Note that +/- 1 is acceptable; the numbers may alternate between 0 and 1.



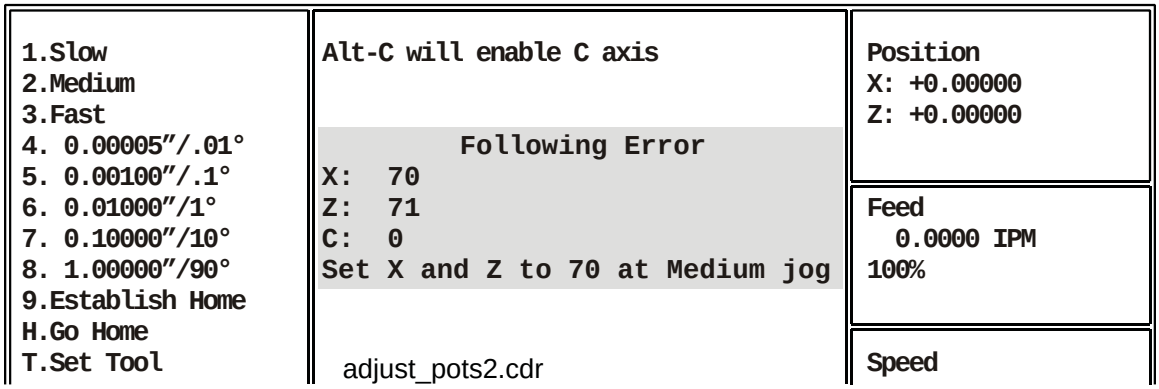
## Setting OMNITURN Servo Amplifiers, con't

### *3. Servo Amplifier Following Error Adjustment (Ctrl-E)*

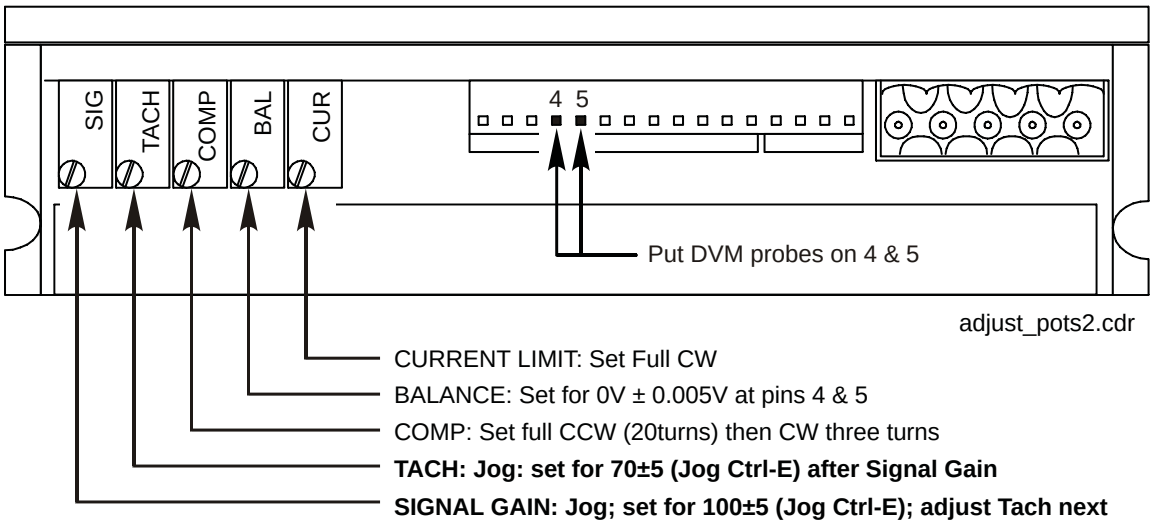
In Jog Mode, open Following Error display box. (Press and hold Ctrl key, then press 'E' key).
NOTE: The Feedrate Override defaults to 100% in Ctrl-E mode.

**Select Jog 2 (Medium Jog)**

On the Servo Amplifier, adjust the Signal Gain pot ***while jogging;*** adjust for 100 counts ± 5 at the X and Z locations. Next, adjust the Tach pot ***while jogging;*** adjust for 70 ±2 counts at the X and Z locations.
It doesn't matter which direction you jog; the polarity will change, but the numbers will be effective.




SERVO AMPLIFIER FOLLOWING ERROR ADJUSTMENT



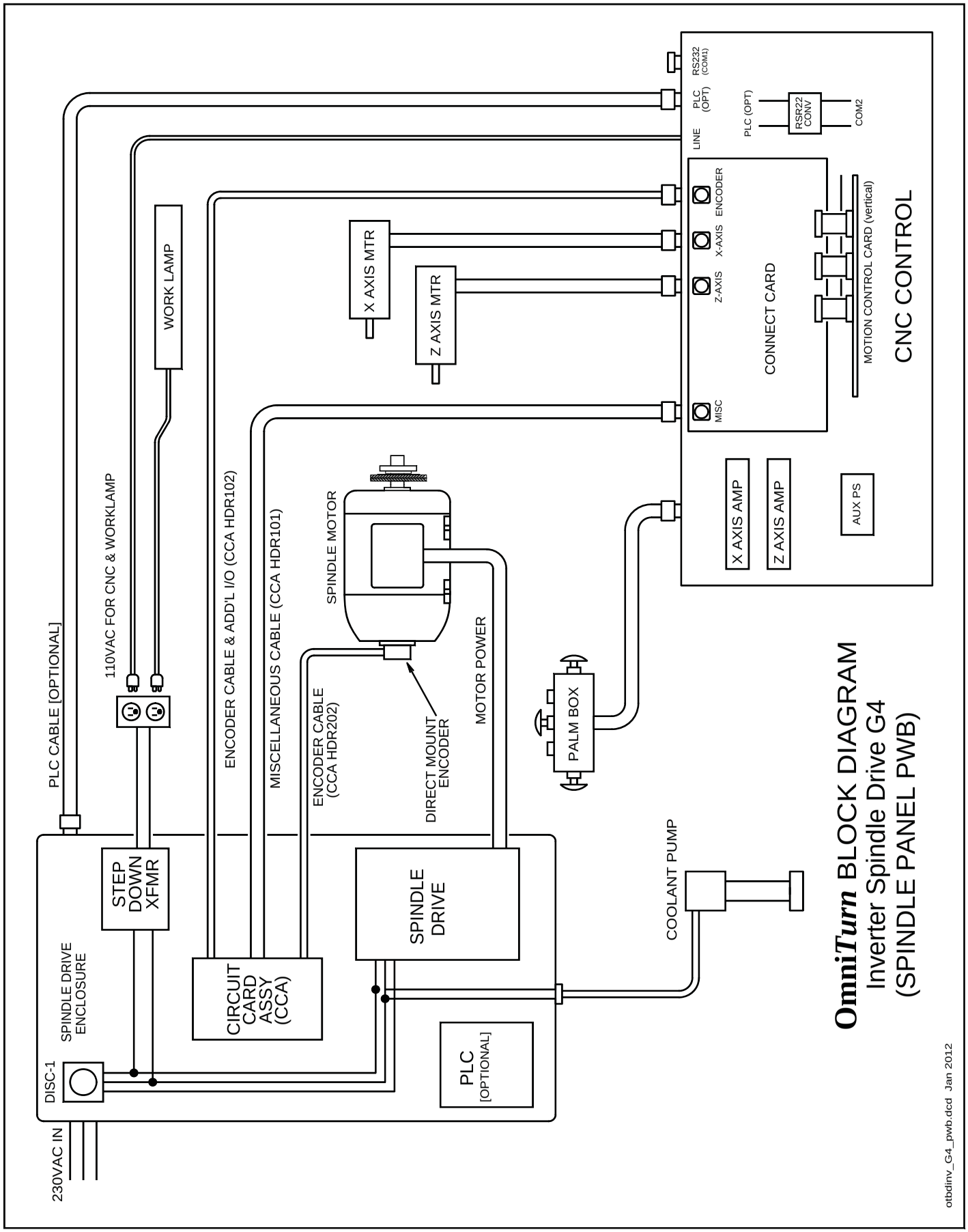

### *4. Re-check Servo Amp balance and re-adjust as required*

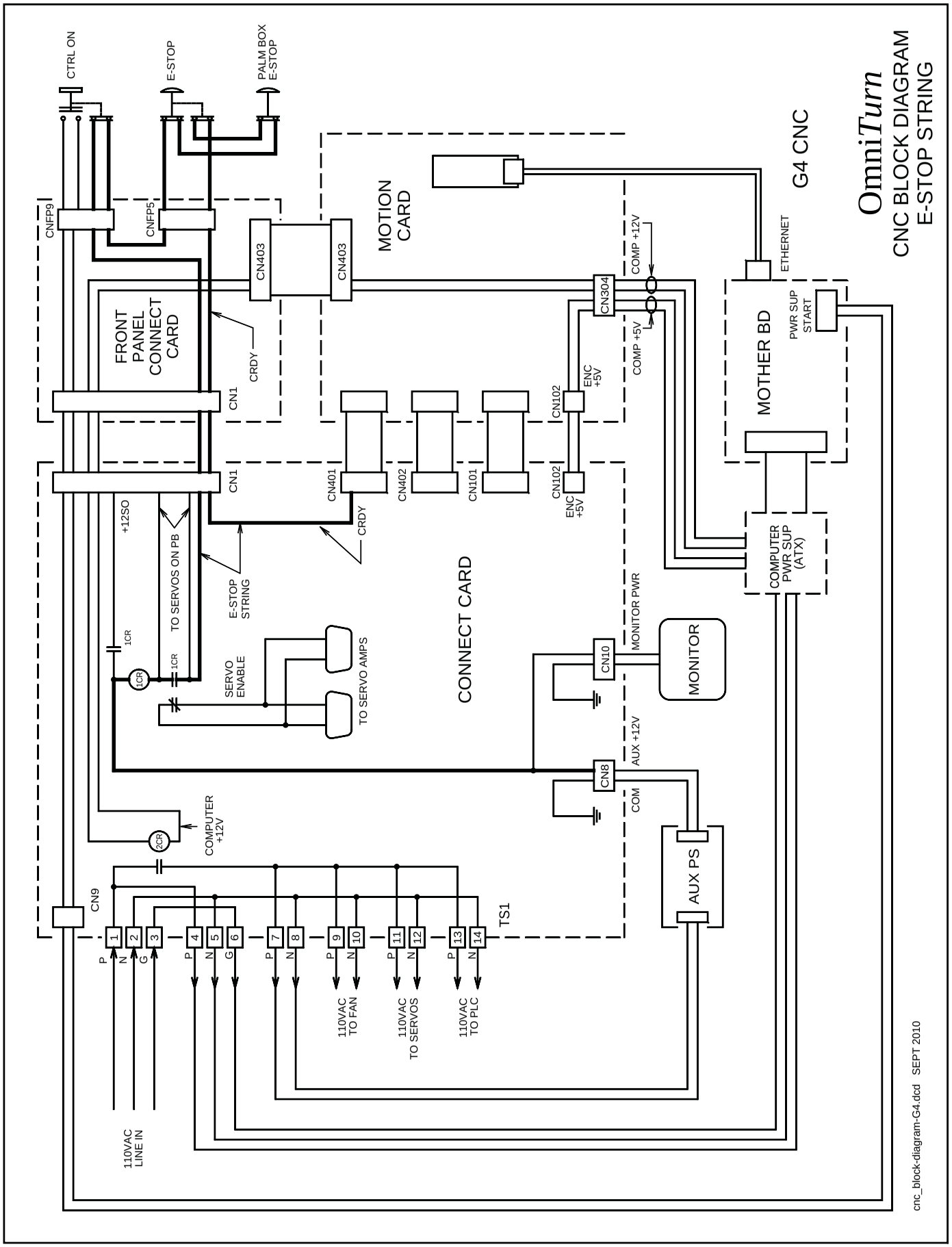
Verify that the voltage between pins 4 & 5 is still 0V ± 0.005 at rest (not jogging). Adjust Balance pot as required to set 0V.

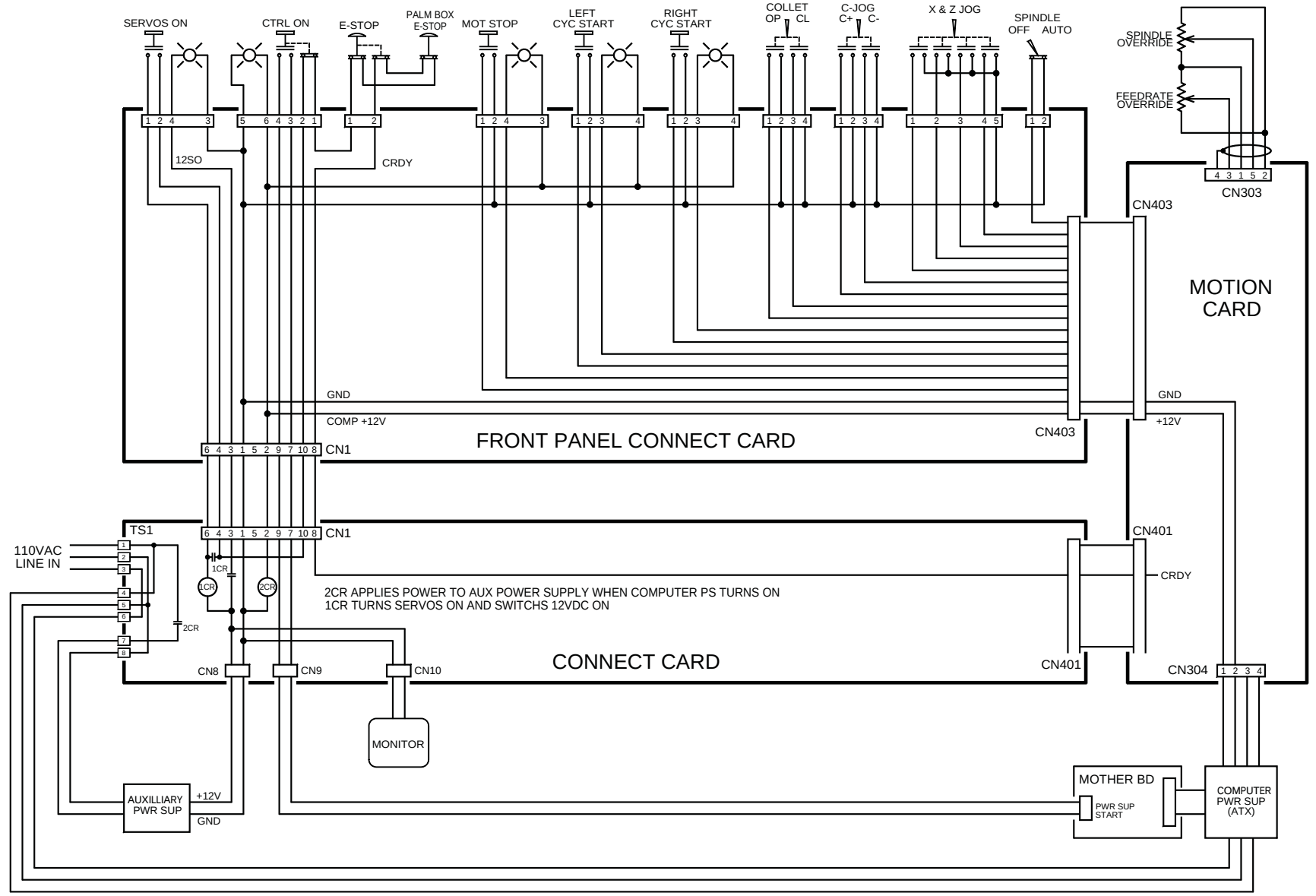
### *5. Re-check Servo Amp following error*

After re-adjusting the balance, be sure to jog back & forth at Jog 2 and re-adjust the Tach pot for 70 ± 2 counts. Ctrl-E again to close the Following Error box.

This concludes the Servo Amplifier setup procedure.


CNC CONTROL
CONNECT CARD
MOTION CONTROL CARD (vertical)
LINE
RS232 (COM1)
PLC (OPT)
PLC (OPT)
RSR22 CONV
COM2
MISC
Z-AXIS
X-AXIS
ENCODER
X AXIS AMP
Z AXIS AMP
AUX PS
X AXIS MTR
Z AXIS MTR
WORK LAMP
110VAC FOR CNC & WORKLAMP
PLC CABLE [OPTIONAL]
ENCODER CABLE & ADD'L I/O (CCA HDR102)
MISCELLANEOUS CABLE (CCA HDR101)
SPINDLE MOTOR
ENCODER CABLE (CCA HDR202)
DIRECT MOUNT ENCODER
MOTOR POWER
PALM BOX
COOLANT PUMP
STEP DOWN XFMR
SPINDLE DRIVE
CIRCUIT CARD ASSY (CCA)
PLC [OPTIONAL]
SPINDLE DRIVE ENCLOSURE
DISC-1
230VAC IN
OmniTurn BLOCK DIAGRAM
Inverter Spindle Drive G4
(SPINDLE PANEL PWB)
otbdinv_G4_pwb.dcd Jan 2012

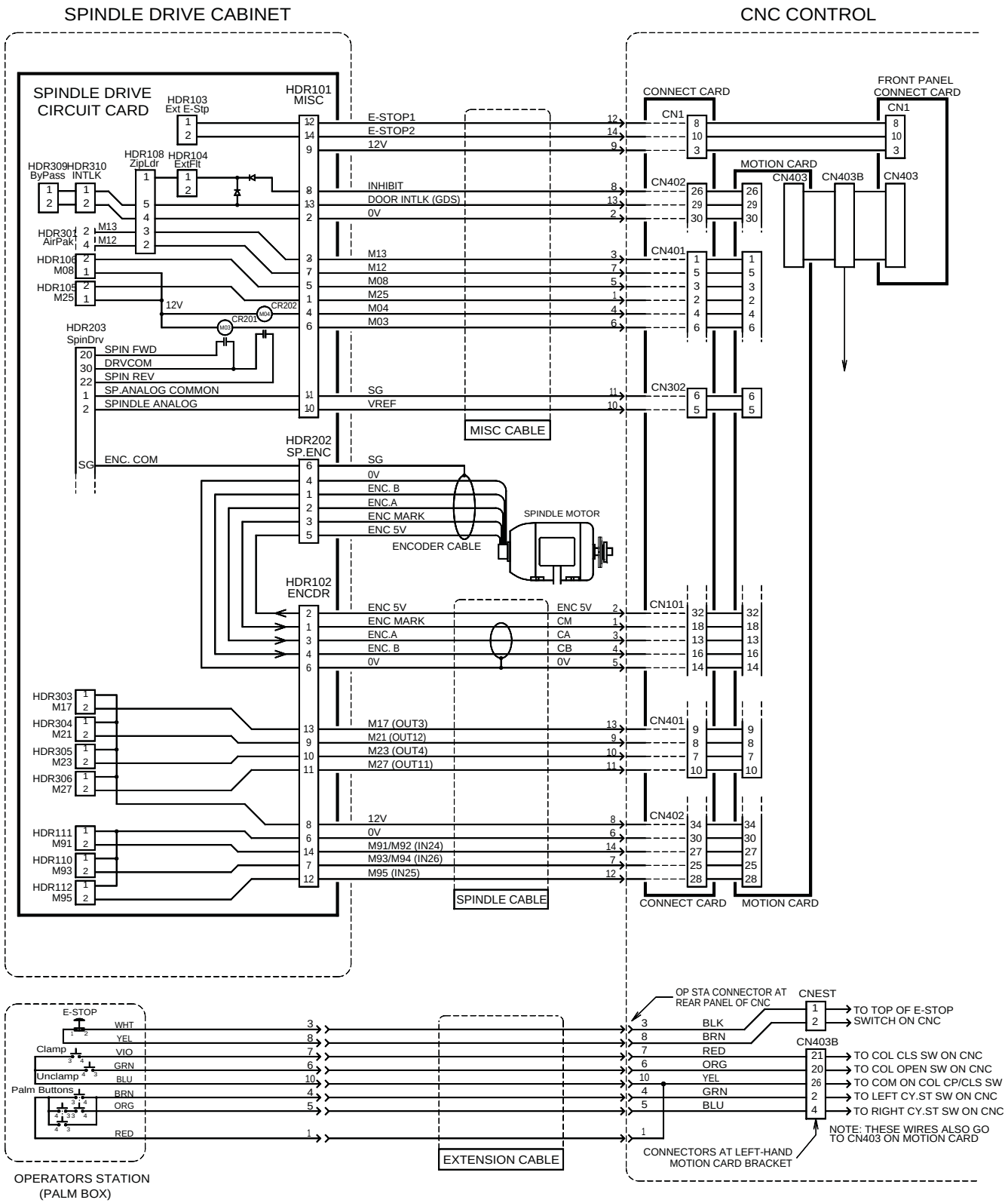

OmniTurn
CNC BLOCK DIAGRAM
E-STOP STRING
G4 CNC
CTRL ON
E-STOP
PALM BOX E-STOP
CNFP9
CNFP5
FRONT PANEL CONNECT CARD
CN1
CRDY
CN403
MOTION CARD
ETHERNET
CN304
COMP +12V
COMP +5V
MOTHER BD
PWR SUP START
CN102
ENC +5V
CN401
CN402
CN101
+12SO
TO SERVOS ON PB
1CR
E-STOP STRING
SERVO ENABLE
TO SERVO AMPS
CONNECT CARD
COMPUTER PWR SUP (ATX)
MONITOR PWR
CN10
MONITOR
AUX +12V
CN8
COM
AUX PS
COMPUTER +12V
2CR
CN9
TS1
110VAC LINE IN
110VAC TO FAN
110VAC TO SERVOS
110VAC TO PLC
cnc_block-diagram-G4.dcd SEPT 2010




G4 CNC

Fp_sch-G4.dcd MAY 2010

OmniTurn
FRONT PANEL INTERFACE



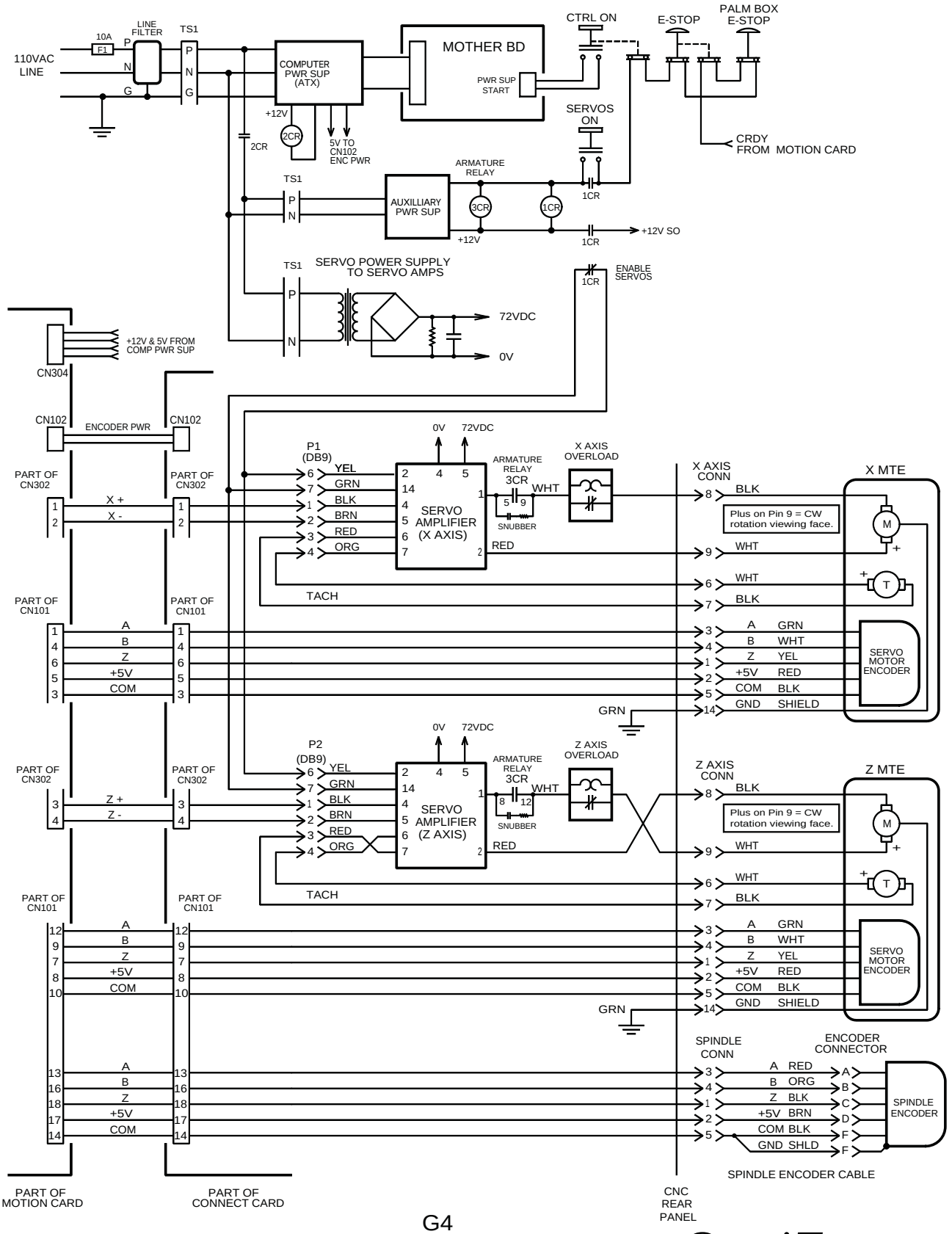

INVERTER DRIVE

G4 CNC

OmniTurn

MISCELLANEOUS CABLE AND OPERATORS STATION

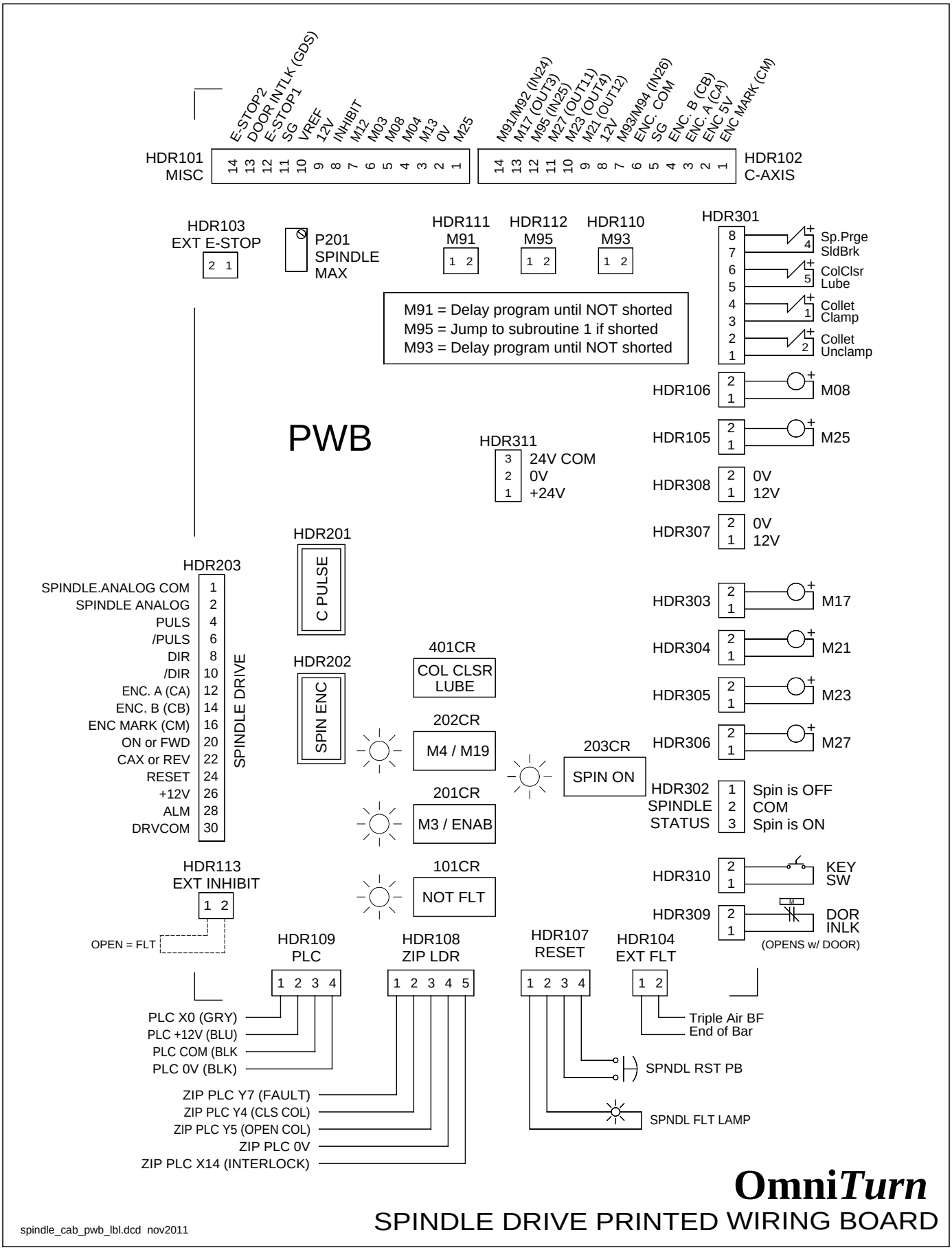
misc_cb_inv-G4_pwb.dcd aug2011




G4
INVERTER DRIVE

OmniTurn
SERVO DRIVE INTERFACE

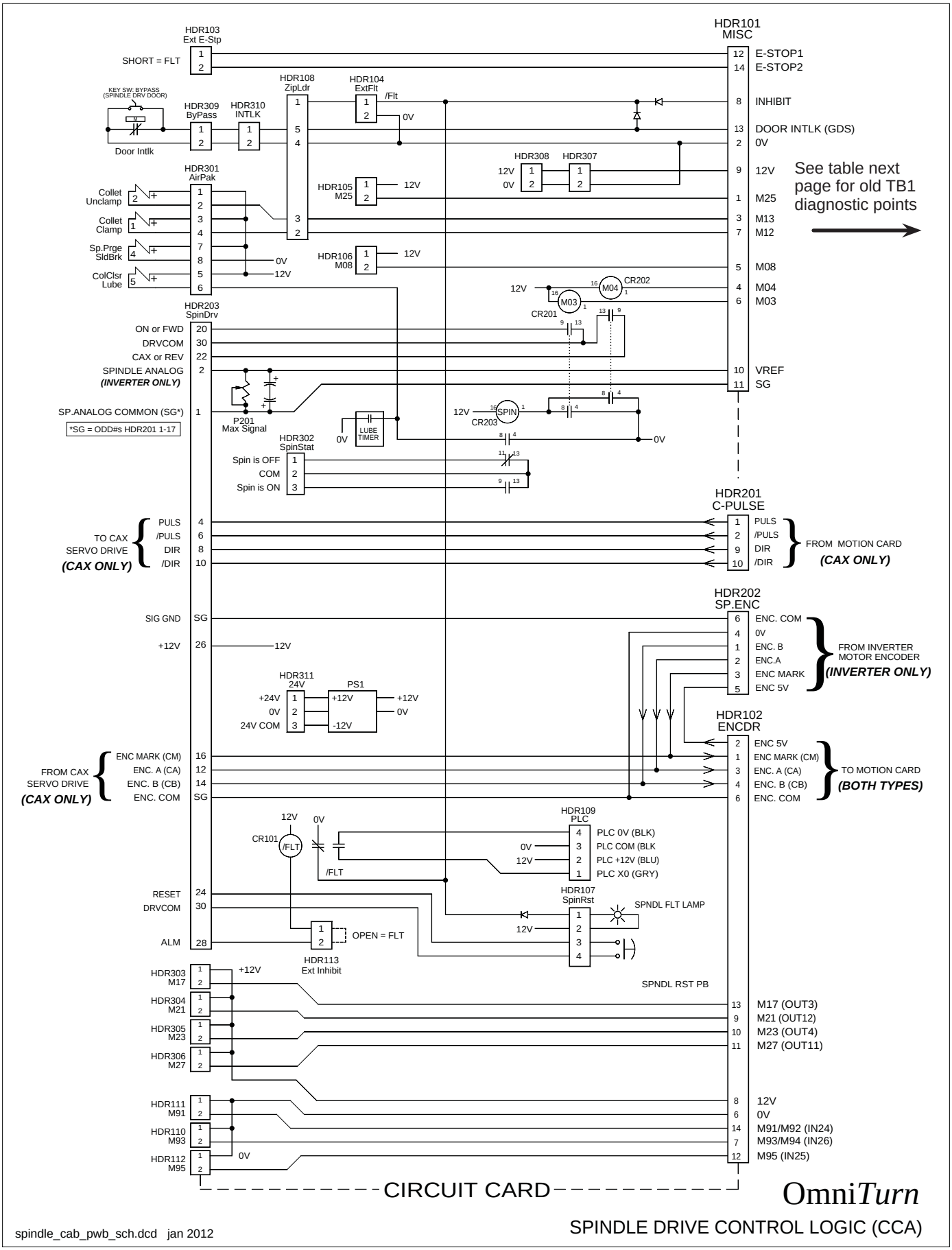
srvo_sch-G4.dcd 8/2010 (chgd sp.encoder wire colors)




**Omni*Turn***

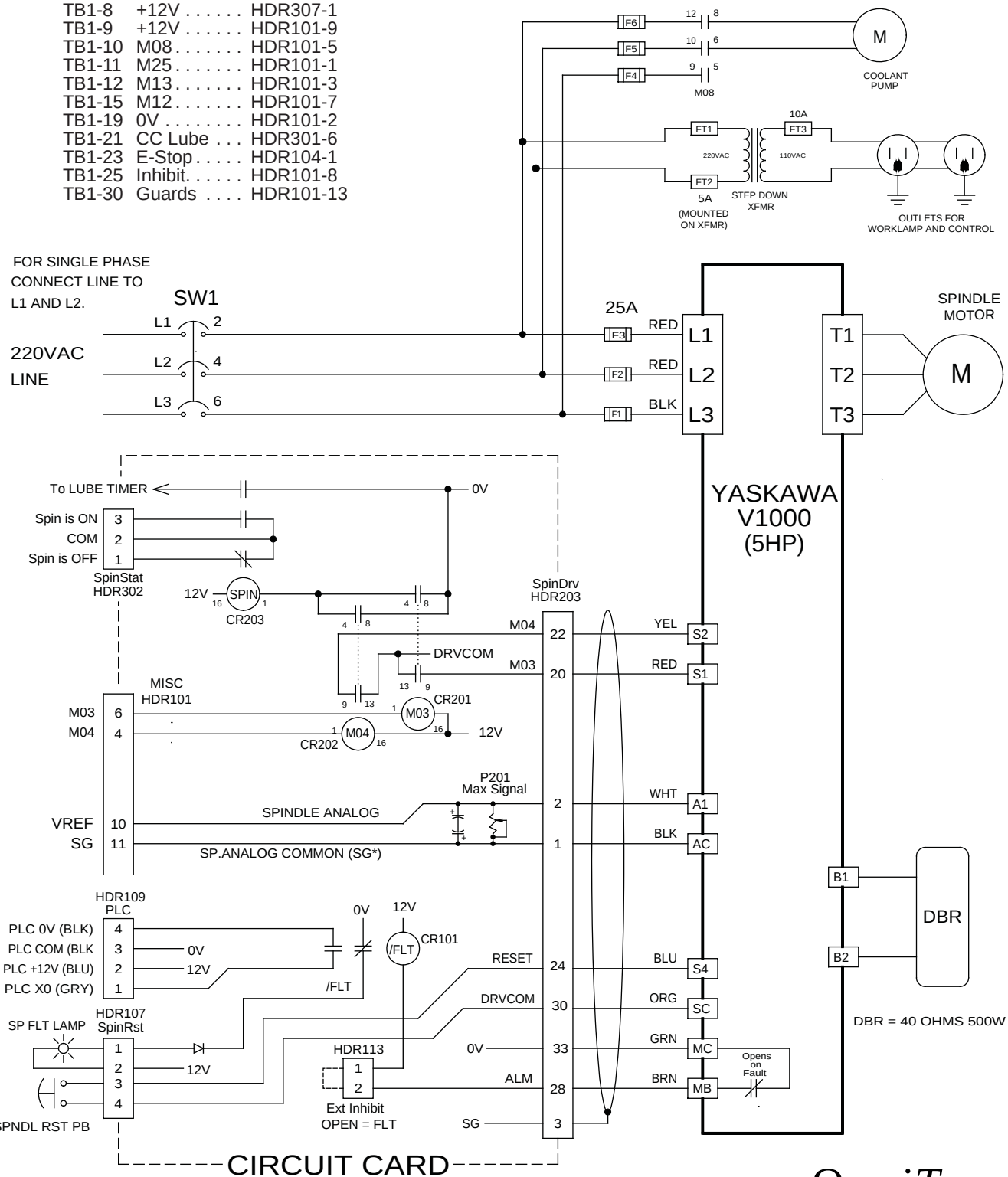
SPINDLE DRIVE PRINTED WIRING BOARD

spindle_cab_pwb_lbl.dcd nov2011


HDR103
Ext E-Stp
SHORT = FLT
HDR101
MISC
E-STOP1
E-STOP2
HDR108
ZipLdr
HDR104
ExtFlt
/Flt
0V
KEY SW: BYPASS
(SPINDLE DRV DOOR)
HDR309
ByPass
HDR310
INTLK
Door Intlk
INHIBIT
DOOR INTLK (GDS)
0V
HDR308
HDR307
12V
0V
See table next
page for old TB1
diagnostic points
HDR301
AirPak
Collet
Unclamp
Collet
Clamp
Sp.Prge
SldBrk
ColClsr
Lube
HDR105
M25
HDR106
M08
M25
M13
M12
M08
M04
M03
CR202
CR201
HDR203
SpinDrv
ON or FWD
DRVCOM
CAX or REV
SPINDLE ANALOG
(INVERTER ONLY)
SP.ANALOG COMMON (SG*)
*SG = ODD#s HDR201 1-17
P201
Max Signal
LUBE
TIMER
CR203
SPIN
VREF
SG
HDR302
SpinStat
Spin is OFF
COM
Spin is ON
HDR201
C-PULSE
TO CAX
SERVO DRIVE
(CAX ONLY)
PULS
/PULS
DIR
/DIR
FROM MOTION CARD
(CAX ONLY)
HDR202
SP.ENC
SIG GND
+12V
ENC. COM
FROM INVERTER
MOTOR ENCODER
(INVERTER ONLY)
ENC. B
ENC.A
ENC MARK
ENC 5V
HDR311
24V
PS1
+24V
24V COM
-12V
HDR102
ENCDR
FROM CAX
SERVO DRIVE
(CAX ONLY)
ENC MARK (CM)
ENC. A (CA)
ENC. B (CB)
TO MOTION CARD
(BOTH TYPES)
HDR109
PLC
CR101
/FLT
PLC 0V (BLK)
PLC COM (BLK
PLC +12V (BLU)
PLC X0 (GRY)
HDR107
SpinRst
SPNDL FLT LAMP
RESET
DRVCOM
ALM
OPEN = FLT
HDR113
Ext Inhibit
SPNDL RST PB
HDR303
M17
HDR304
M21
HDR305
M23
HDR306
M27
M17 (OUT3)
M21 (OUT12)
M23 (OUT4)
M27 (OUT11)
HDR111
M91
HDR110
M93
HDR112
M95
M91/M92 (IN24)
M93/M94 (IN26)
M95 (IN25)
CIRCUIT CARD
OmniTurn
SPINDLE DRIVE CONTROL LOGIC (CCA)
spindle_cab_pwb_sch.dcd jan 2012

OLD TB1 DIAGNOSTIC POINTS

| | | |
|---|---|---|
| TB1-1 | Analog Com | HDR101-11 |
| TB1-2 | Analog Sig. . | HDR101-10 |
| TB1-5 | M03 . . . . . | HDR101-6 |
| TB1-7 | M04 . . . . . | HDR101-4 |
| TB1-8 | +12V . . . . . | HDR307-1 |
| TB1-9 | +12V . . . . . | HDR101-9 |
| TB1-10 | M08 . . . . . | HDR101-5 |
| TB1-11 | M25 . . . . . | HDR101-1 |
| TB1-12 | M13 . . . . . | HDR101-3 |
| TB1-15 | M12 . . . . . | HDR101-7 |
| TB1-19 | 0V . . . . . | HDR101-2 |
| TB1-21 | CC Lube . . . | HDR301-6 |
| TB1-23 | E-Stop . . . . . | HDR104-1 |
| TB1-25 | Inhibit. . . . . | HDR101-8 |
| TB1-30 | Guards . . . . | HDR101-13 |

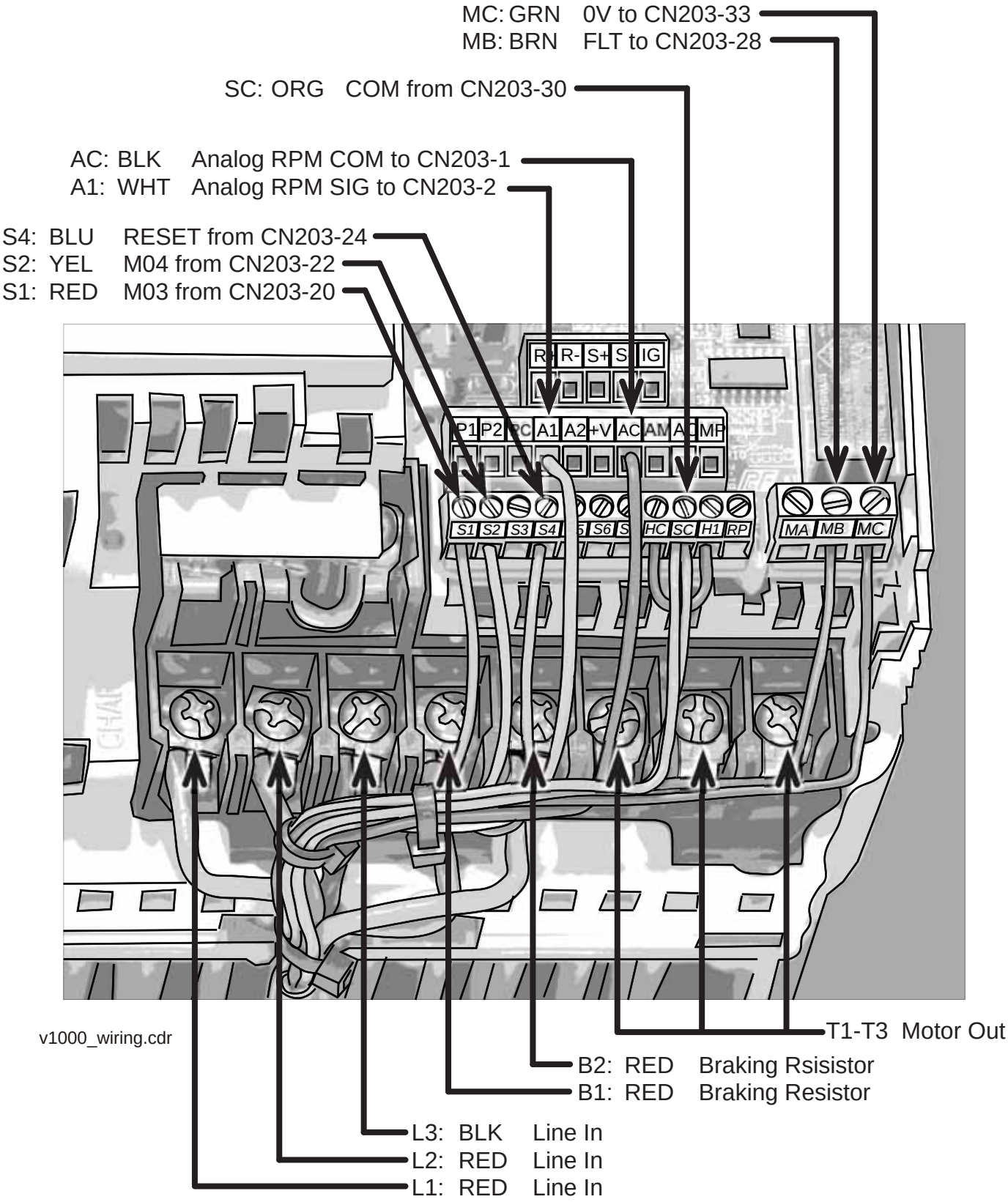



OmniTurn

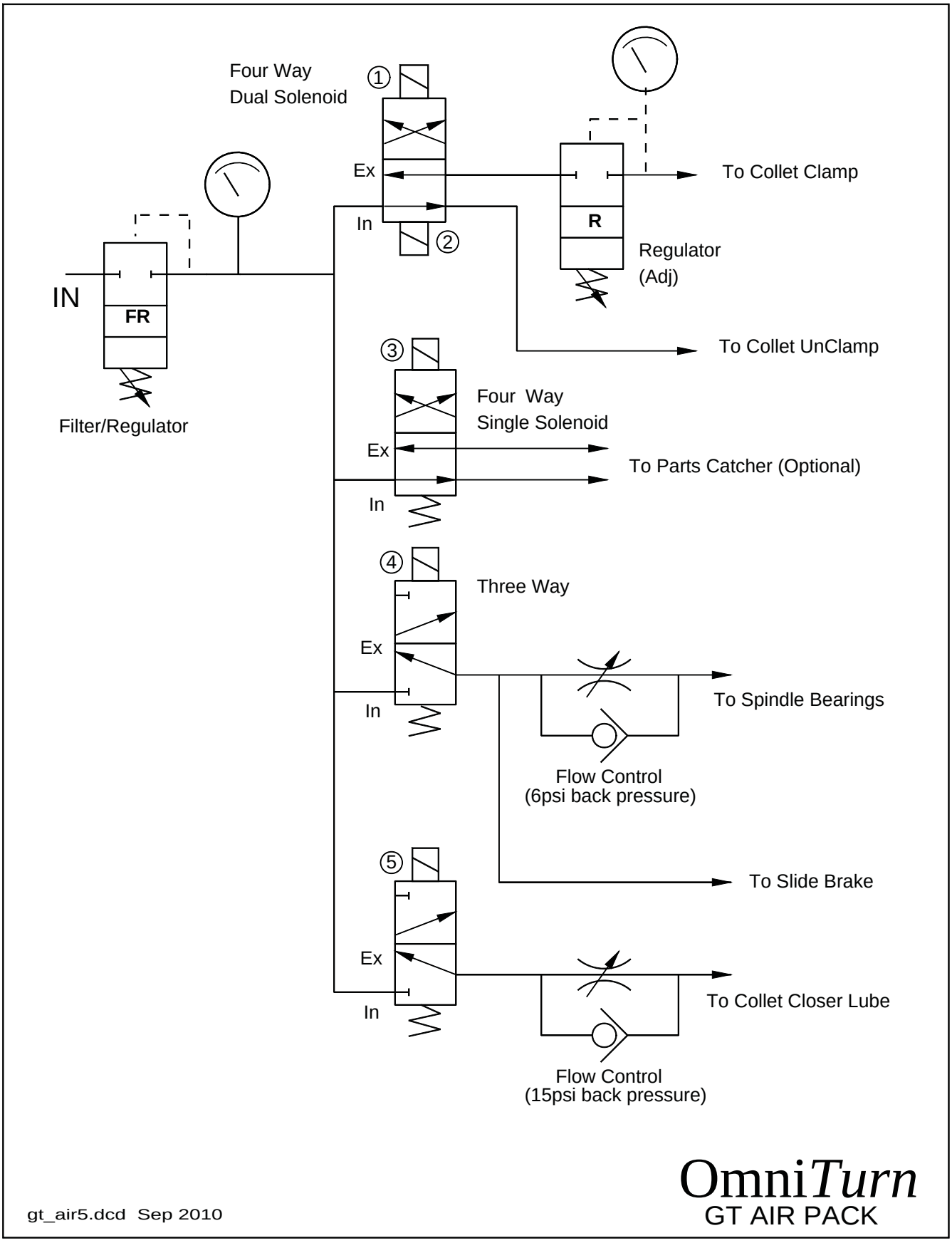
INVERTER SPINDLE DRIVE w/CCA

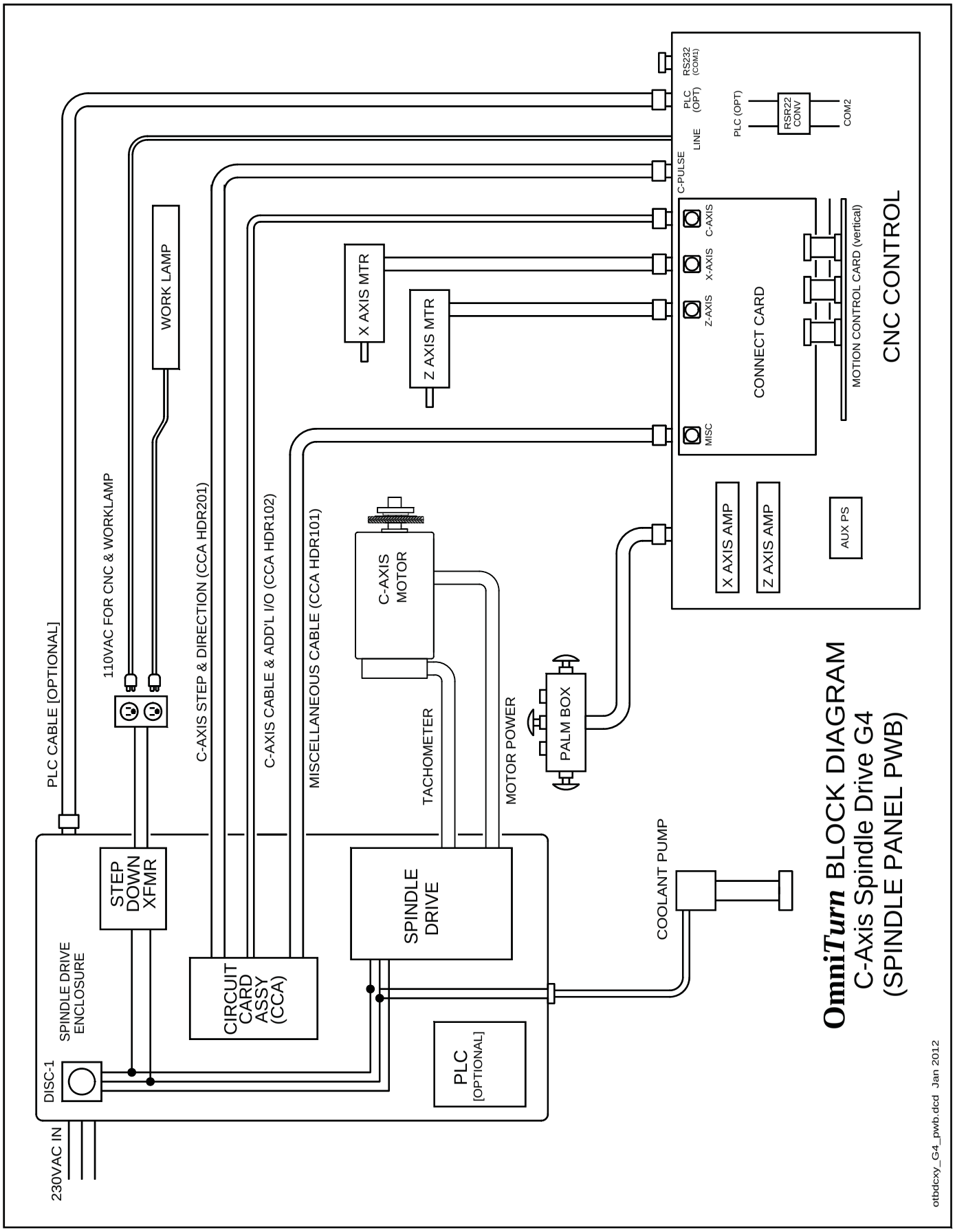
# OmniTurn - Trouble shooting guide

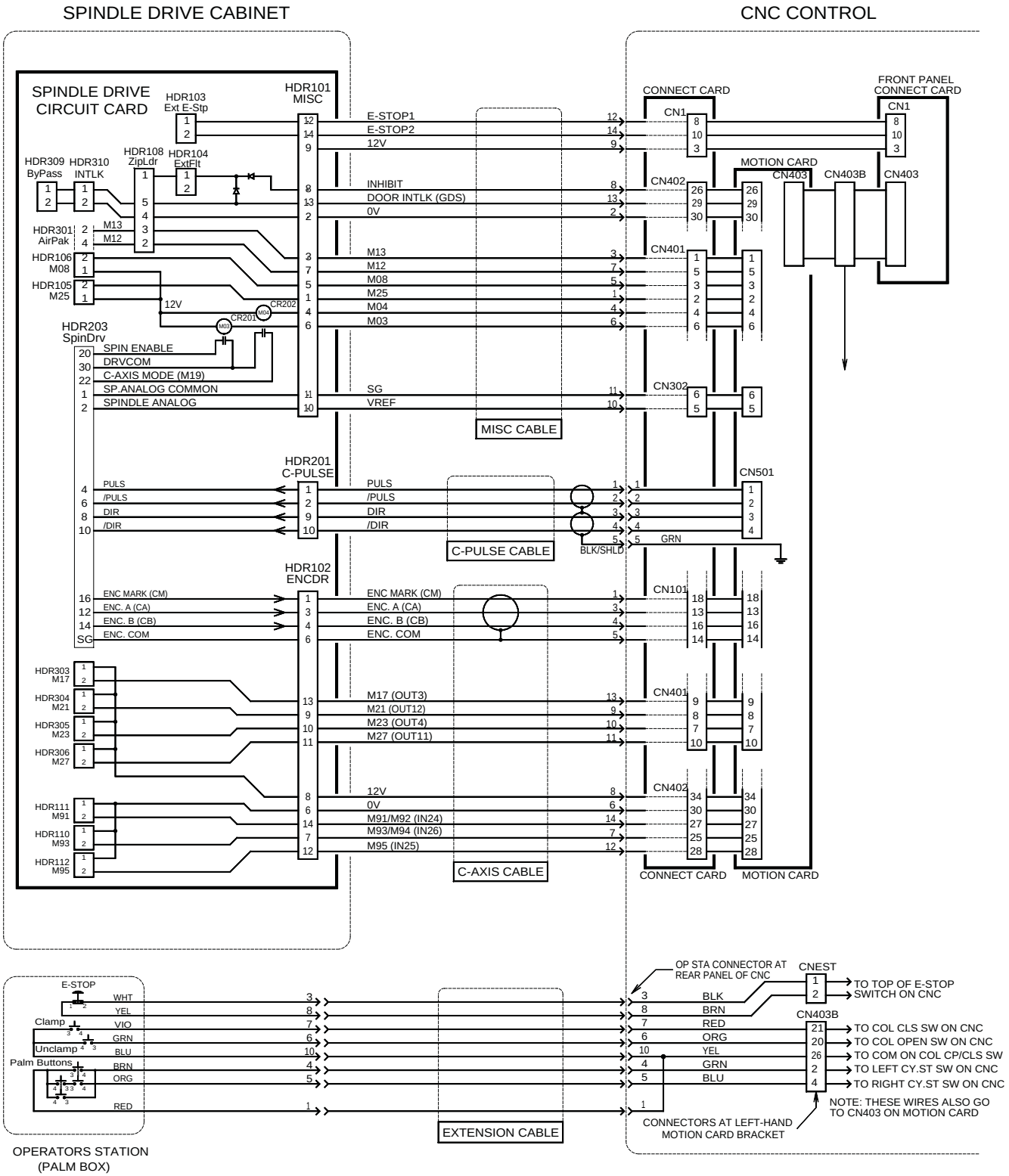
## 5hp Spindle Drive Wiring (Yaskawa V1000)




v1000_wiring.cdr


Four Way
Dual Solenoid
①
Ex
In
②
To Collet Clamp
R
Regulator
(Adj)
IN
FR
Filter/Regulator
To Collet UnClamp
③
Four Way
Single Solenoid
Ex
In
To Parts Catcher (Optional)
④
Three Way
Ex
In
To Spindle Bearings
Flow Control
(6psi back pressure)
⑤
To Slide Brake
Ex
In
To Collet Closer Lube
Flow Control
(15psi back pressure)
gt_air5.dcd Sep 2010
OmniTurn
GT AIR PACK


OmniTurn BLOCK DIAGRAM
C-Axis Spindle Drive G4
(SPINDLE PANEL PWB)
CNC CONTROL
CONNECT CARD
MOTION CONTROL CARD (vertical)
RS232 (COM1)
PLC (OPT)
C-PULSE
LINE
PLC (OPT)
RSR22 CONV
COM2
C-AXIS
X-AXIS
Z-AXIS
MISC
X AXIS AMP
Z AXIS AMP
AUX PS
X AXIS MTR
Z AXIS MTR
WORK LAMP
110VAC FOR CNC & WORKLAMP
PLC CABLE [OPTIONAL]
C-AXIS STEP & DIRECTION (CCA HDR201)
C-AXIS CABLE & ADD'L I/O (CCA HDR102)
MISCELLANEOUS CABLE (CCA HDR101)
C-AXIS MOTOR
TACHOMETER
MOTOR POWER
PALM BOX
COOLANT PUMP
SPINDLE DRIVE ENCLOSURE
STEP DOWN XFMR
CIRCUIT CARD ASSY (CCA)
SPINDLE DRIVE
PLC [OPTIONAL]
DISC-1
230VAC IN
otbdcxy_G4_pwb.dcd Jan 2012



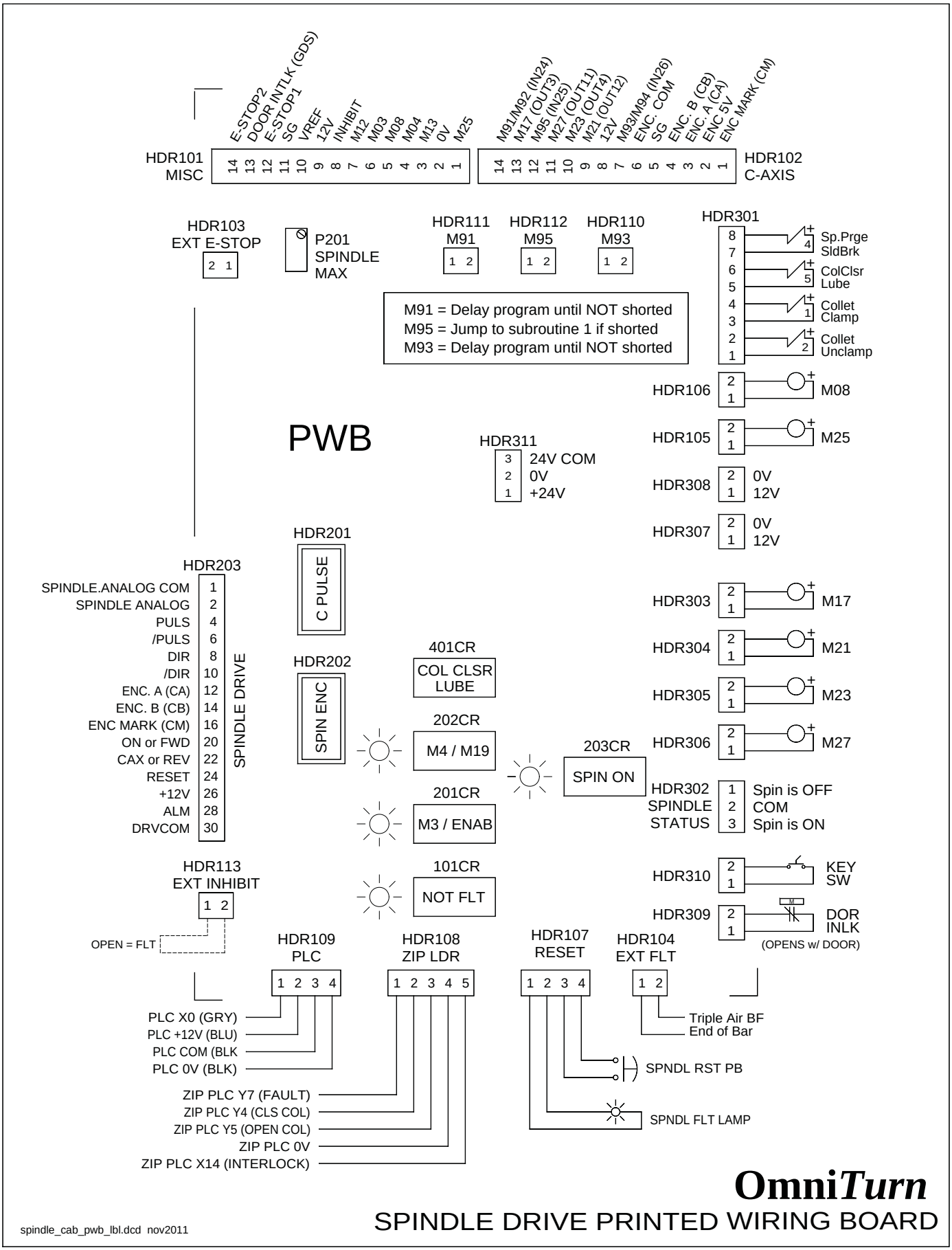

C-AXIS DRIVE

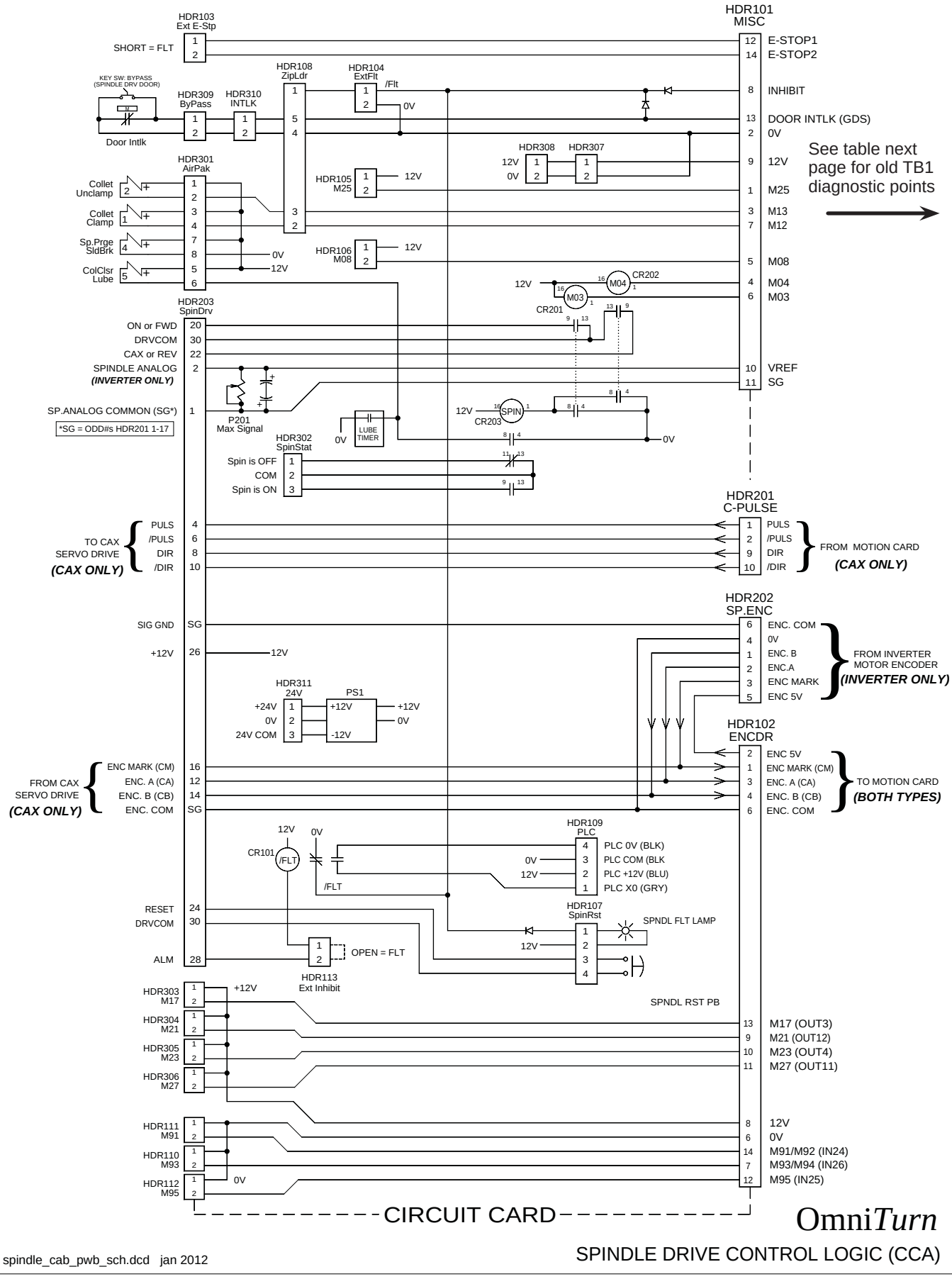
G4 CNC

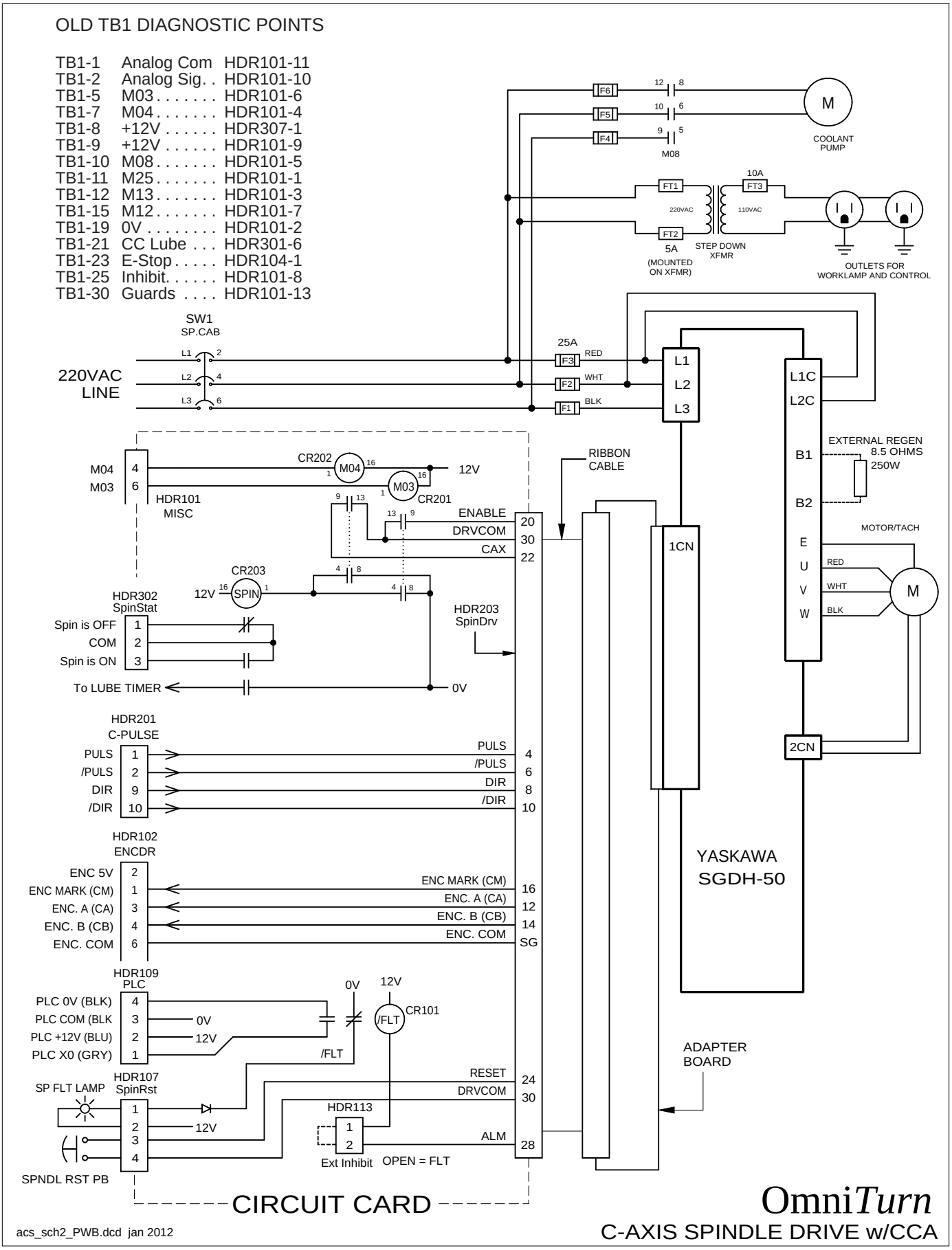
OmniTurn

MISCELLANEOUS CABLE AND OPERATORS STATION

misc_cb_cax-G4_pwb.dcd aug2011


HDR101
MISC
14 13 12 11 10 9 8 7 6 5 4 3 2 1
E-STOP2
DOOR INTLK (GDS)
E-STOP1
SG
VREF
12V
INHIBIT
M12
M03
M08
M04
M13
0V
M25
HDR102
C-AXIS
14 13 12 11 10 9 8 7 6 5 4 3 2 1
M91/M92 (IN24)
M17 (OUT3)
M95 (IN25)
M27 (OUT11)
M23 (OUT4)
M21 (OUT12)
12V
M93/M94 (IN26)
ENC. COM
SG
ENC. B (CB)
ENC. A (CA)
ENC 5V
ENC MARK (CM)
HDR103
EXT E-STOP
2 1
P201
SPINDLE
MAX
HDR111
M91
1 2
HDR112
M95
1 2
HDR110
M93
1 2
M91 = Delay program until NOT shorted
M95 = Jump to subroutine 1 if shorted
M93 = Delay program until NOT shorted
HDR301
8 7 6 5 4 3 2 1
Sp.Prge
SldBrk
ColClsr
Lube
Collet
Clamp
Collet
Unclamp
PWB
HDR106
M08
HDR105
M25
HDR311
3 24V COM
2 0V
1 +24V
HDR308
0V
12V
HDR307
0V
12V
HDR201
C PULSE
HDR203
SPINDLE.ANALOG COM 1
SPINDLE ANALOG 2
PULS 4
/PULS 6
DIR 8
/DIR 10
ENC. A (CA) 12
ENC. B (CB) 14
ENC MARK (CM) 16
ON or FWD 20
CAX or REV 22
RESET 24
+12V 26
ALM 28
DRVCOM 30
SPINDLE DRIVE
HDR303
M17
HDR304
M21
HDR305
M23
HDR306
M27
HDR202
SPIN ENC
401CR
COL CLSR
LUBE
202CR
M4 / M19
203CR
SPIN ON
201CR
M3 / ENAB
101CR
NOT FLT
HDR302
SPINDLE
STATUS
1 Spin is OFF
2 COM
3 Spin is ON
HDR113
EXT INHIBIT
1 2
OPEN = FLT
HDR310
KEY
SW
HDR309
DOR
INLK
(OPENS w/ DOOR)
HDR109
PLC
1 2 3 4
HDR108
ZIP LDR
1 2 3 4 5
HDR107
RESET
1 2 3 4
HDR104
EXT FLT
1 2
PLC X0 (GRY)
PLC +12V (BLU)
PLC COM (BLK
PLC 0V (BLK)
ZIP PLC Y7 (FAULT)
ZIP PLC Y4 (CLS COL)
ZIP PLC Y5 (OPEN COL)
ZIP PLC 0V
ZIP PLC X14 (INTERLOCK)
Triple Air BF
End of Bar
SPNDL RST PB
SPNDL FLT LAMP
OmniTurn
SPINDLE DRIVE PRINTED WIRING BOARD
spindle_cab_pwb_lbl.dcd nov2011


HDR103
Ext E-Stp
SHORT = FLT
KEY SW: BYPASS
(SPINDLE DRV DOOR)
Door Intlk
HDR309
ByPass
HDR310
INTLK
HDR108
ZipLdr
HDR104
ExtFlt
/Flt
0V
HDR101
MISC
12 E-STOP1
14 E-STOP2
8 INHIBIT
13 DOOR INTLK (GDS)
2 0V
9 12V
1 M25
3 M13
7 M12
5 M08
4 M04
6 M03
See table next page for old TB1 diagnostic points
HDR308
HDR307
12V
0V
HDR105
M25
HDR106
M08
HDR301
AirPak
Collet Unclamp
Collet Clamp
Sp.Prge SldBrk
ColClsr Lube
CR202
CR201
M03
M04
HDR203
SpinDrv
ON or FWD 20
DRVCOM 30
CAX or REV 22
SPINDLE ANALOG 2
(INVERTER ONLY)
SP.ANALOG COMMON (SG*) 1
*SG = ODD#s HDR201 1-17
P201
Max Signal
LUBE TIMER
CR203
SPIN
HDR302
SpinStat
Spin is OFF
COM
Spin is ON
10 VREF
11 SG
HDR201
C-PULSE
TO CAX SERVO DRIVE
(CAX ONLY)
PULS 4
/PULS 6
DIR 8
/DIR 10
1 PULS
2 /PULS
9 DIR
10 /DIR
FROM MOTION CARD
(CAX ONLY)
HDR202
SP.ENC
SIG GND SG
+12V 26
6 ENC. COM
4 0V
1 ENC. B
2 ENC.A
3 ENC MARK
5 ENC 5V
FROM INVERTER MOTOR ENCODER
(INVERTER ONLY)
HDR311
24V
+24V
0V
24V COM
PS1
+12V
-12V
HDR102
ENCDR
FROM CAX SERVO DRIVE
(CAX ONLY)
ENC MARK (CM) 16
ENC. A (CA) 12
ENC. B (CB) 14
ENC. COM SG
2 ENC 5V
1 ENC MARK (CM)
3 ENC. A (CA)
4 ENC. B (CB)
6 ENC. COM
TO MOTION CARD
(BOTH TYPES)
CR101
/FLT
HDR109
PLC
4 PLC 0V (BLK)
3 PLC COM (BLK
2 PLC +12V (BLU)
1 PLC X0 (GRY)
RESET 24
DRVCOM 30
ALM 28
HDR107
SpinRst
SPNDL FLT LAMP
OPEN = FLT
HDR113
Ext Inhibit
SPNDL RST PB
HDR303 M17
HDR304 M21
HDR305 M23
HDR306 M27
HDR111 M91
HDR110 M93
HDR112 M95
13 M17 (OUT3)
9 M21 (OUT12)
10 M23 (OUT4)
11 M27 (OUT11)
8 12V
6 0V
14 M91/M92 (IN24)
7 M93/M94 (IN26)
12 M95 (IN25)
CIRCUIT CARD
OmniTurn
SPINDLE DRIVE CONTROL LOGIC (CCA)
spindle_cab_pwb_sch.dcd jan 2012


OLD TB1 DIAGNOSTIC POINTS
TB1-1 Analog Com HDR101-11
TB1-2 Analog Sig. . HDR101-10
TB1-5 M03 . . . . . HDR101-6
TB1-7 M04 . . . . . HDR101-4
TB1-8 +12V . . . . . HDR307-1
TB1-9 +12V . . . . . HDR101-9
TB1-10 M08 . . . . . HDR101-5
TB1-11 M25 . . . . . HDR101-1
TB1-12 M13 . . . . . HDR101-3
TB1-15 M12 . . . . . HDR101-7
TB1-19 0V . . . . . HDR101-2
TB1-21 CC Lube . . . HDR301-6
TB1-23 E-Stop . . . . . HDR104-1
TB1-25 Inhibit. . . . . HDR101-8
TB1-30 Guards . . . . HDR101-13
F6
F5
F4
M08
M
COOLANT PUMP
10A
FT1
FT3
220VAC
110VAC
FT2
5A
(MOUNTED ON XFMR)
STEP DOWN XFMR
OUTLETS FOR WORKLAMP AND CONTROL
SW1
SP.CAB
220VAC LINE
L1
L2
L3
25A
F3
F2
F1
RED
WHT
BLK
L1
L2
L3
L1C
L2C
B1
B2
EXTERNAL REGEN
8.5 OHMS
250W
MOTOR/TACH
E
U
V
W
RED
WHT
BLK
M
M04
M03
HDR101
MISC
CR202
CR201
12V
RIBBON CABLE
ENABLE
DRVCOM
CAX
20
30
22
1CN
2CN
CR203
SPIN
HDR302
SpinStat
Spin is OFF
COM
Spin is ON
To LUBE TIMER
HDR203
SpinDrv
0V
HDR201
C-PULSE
PULS
/PULS
DIR
/DIR
4
6
8
10
HDR102
ENCDR
ENC 5V
ENC MARK (CM)
ENC. A (CA)
ENC. B (CB)
ENC. COM
16
12
14
SG
YASKAWA
SGDH-50
HDR109
PLC
PLC 0V (BLK)
PLC COM (BLK
PLC +12V (BLU)
PLC X0 (GRY)
/FLT
CR101
ADAPTER BOARD
SP FLT LAMP
HDR107
SpinRst
RESET
DRVCOM
24
30
HDR113
ALM
28
Ext Inhibit
OPEN = FLT
SPNDL RST PB
CIRCUIT CARD
OmniTurn
C-AXIS SPINDLE DRIVE w/CCA
acs_sch2_PWB.dcd jan 2012

THE DUNHAM TOOL COMPANY
Div. of Preferred Technologies, Inc.

# Collet Usage and Collet Closer Maintenance

Inserting Collet:

1) With piston (item 2) in forward or released position, back off locking key (item 17) , enabling drawtube (item 7) to be turned by knurled collet adjusting knob (item 15).

2) Place collet in spindle. Turn knurled knob (item #15) clockwise until taper of collet engages with taper of spindle.

3) Align locking key (item 17) with adjusting slot (4 slots provided) on draw tube, engage locking key (item 17). This prevents drawtube from turning and becoming loose during operation.

How to control holding force:

1) By using the regulator and gage, start with air pressure of 20 Ibs.; increase pressure gradually until part is held sufficiently for machining operation.

*USE MINIMUM PRESSURE NECESSARY FOR HOLDING PART.*

If part still slips at pressure greater than 60psi, try a serated collet; serrations increase gripping force by10% without increasing pressure.

2) The Dunham Air Actuator permits even gripping pressure although workpiece may have diameter variation. Holding force can be adjusted for any type of machining by increasing or decreasing the air pressure.

Maintenance:

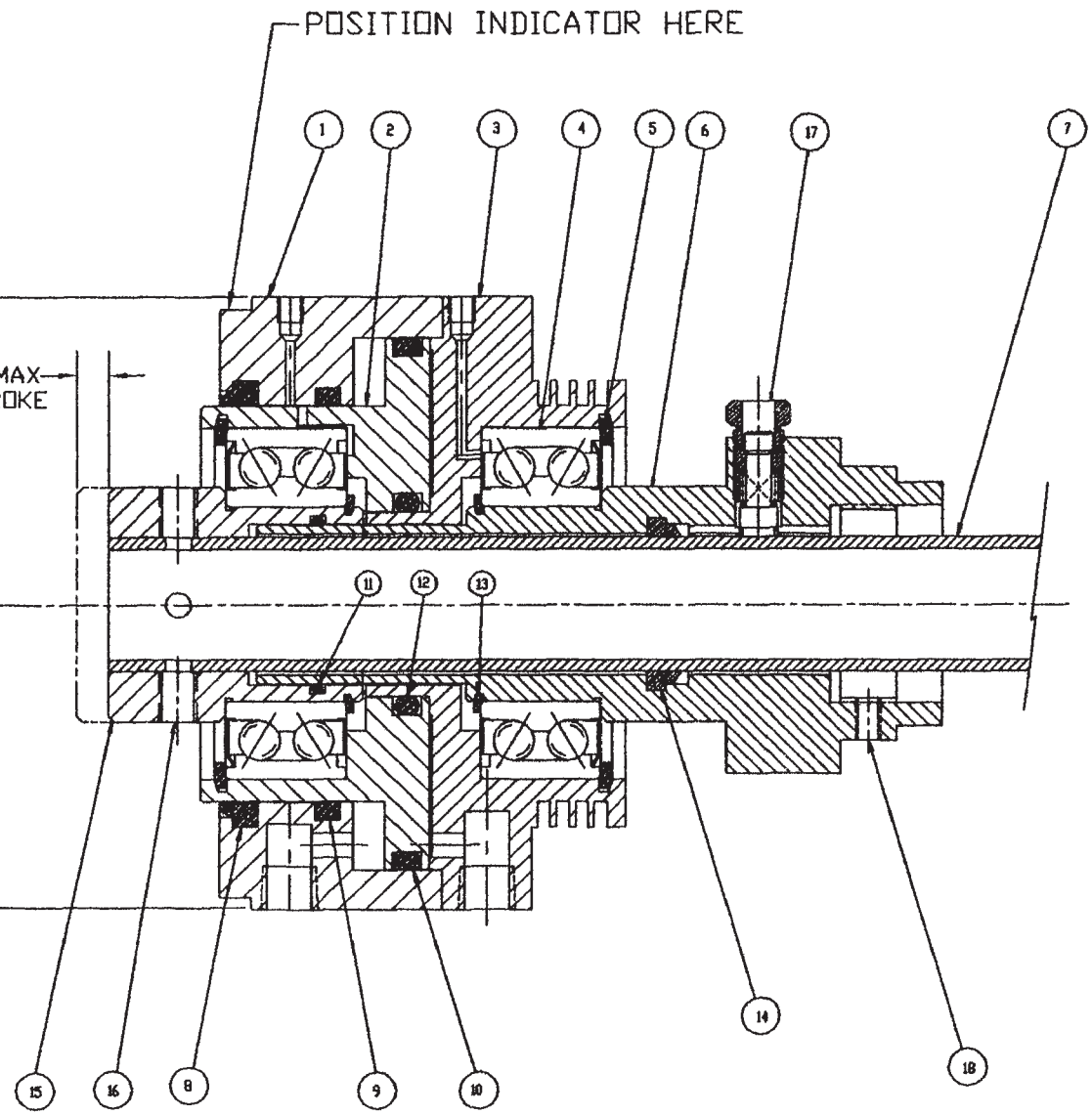
1) Little or no maintenance is required. Bearings are self lubricating. All components such as bearings, “0” ring seals and retaining rings are standard. (See drawing #MC545 when ordering replacements.)

Installing an air cleaner and lubricator in line is advisable, but not essential.

The purchaser or end user of this retrofit unit is fully responsible for the fabrication and application of special protective guarding to cover this unit’s moving parts. Drawtube cutoff must be performed as instructed above. Oil must be available for the oil-mist system.

8 Parklawn Drive· Bethel· CT· 06801 • USA· 203-739-0415· FAX: 203-739-0461 *www.dunhamtool.com preferred@dunhamtool.com*

| REVISIONS | | | |
|---|---|---|---|
| REV | DESCRIPTION | DATE | APPROVED |
| A | ENGINEERING RELEASE | 11/97 | MG |




| ITEM | PART NO. | DESCRIPTION | QTY. |
|---|---|---|---|
| 19 | #10-24 X 1" LG. | SOCKET HEAD CAP SCREW | 6 |
| 18 | 1/4-20 X 3/8 LG | BRASS POINT SOC SET SCREW | 3 |
| 17 | MA299-H | LOCKING KEY ASSEMBLY | 1 |
| 16 | 3/8-16 X 5/8 LG | HALF DOG POINT SET SCR | 4 |
| 15 | MC544 | KNURLED ADJUSTING KNOB | 1 |
| 14 | 00602100A | DISOGRIN SEAL | 1 |
| 13 | 5102-196 | TRU-ARC SNAP RING | 2 |
| 12 | D-328 | "O" - RING | 1 |
| 11 | D-130 | "O" - RING | 1 |
| 10 | Q4353 | QUAD RING | 1 |
| 9 | Q4345 | QUAD RING | 1 |
| 8 | 006-044 | DISOGRIN SEAL | 1 |
| 7 | MB244-H6 | DRAWTUBE | 1 |
| 6 | MC543-A | MAIN BRG. MOUNT | 1 |
| 5 | 5002-354 | TRU-ARC SNAP RING | 2 |
| 4 | B-5551OND | DACC BEARING (ONE SHIELD) | 2 |
| 3 | MC542 | MAIN BRG. HOUSING | 1 |
| 2 | MC541 | PISTON | 1 |
| 1 | MC540 | CYLINDER | 1 |

UNLESS OTHERWISE SPECIFIED
ANGLES MAY VARY ±1°
DECIMAL DIM MAY VARY
.xx ±.025 .xxx ±.005
FRACTIONAL DIM MAY VARY ±1/64
ROUND EDGES .005-.015
CORNERS TO HAVE FILLETS .005-.020
SURFACE FINISH

THE DUNHAM TOOL COMPANY
NEW FAIRFIELD, CONNECTICUT

AIR COLLET ACTUATOR - OIL MIST
NC ELECTRONICS

DWN. MG | DATE 11/97 | MATL | FIN
CHK. | DATE | NEXT ASSY.
SCALE 1:1 | DWG NO. MC586 | REV A

# Collet Closer Installation and Maintenance

**MODEL #DACCOM-NC for OMNITURN**
**AIR POWERED ROTARY ACTUATOR**
**(REF. DWG. MCS86)**

Maximum pull force: 17911bs. @ 90 PSI (19.9 X line pressure).
Maximum push force: 1458 Ibs. @ 90 PSI (16.2 X line pressure).
Maximum stroke : 5/16”
Maximum RPM : 4500 (continuous)
6000 (intermittent)
Largest diameter : 6.18”
Length : 7.06” open (without spindle adapter)
6.7S” closed
Weight : 14 Ibs 11 oz. (without spindle adapter)
Through hole : 1.06”

Compressed air requirements:
Actuation: Variable 15 to 90 P.S.!.; clean, dry air required.
*USE MINIMUM PRESSURE NECESSARY FOR HOLDING PART*
Cooling : 15 P.S.!.; clean, lubricated

Description:

This Dunham air powered rotary actuator operates at up to 4500 RPM, even when powered with maximum air pressure. Special consideration has been given to enhance its durability; this includes hardened wear surfaces, complete sealing of rotating components, and urethane wipers. The bearings are shielded, positive air pressure moves throughout the actuator, and the drawtube mount acts as a seal.

The air actuator is designed to mount to rotating devices, most commonly spindles. The unit will provide a push or pull force capable of openingorclosing collets, fixtures, and short stroke power chucks.

Installation: (reference Assembly Drawing MC586)

1) Spindle Mounting Adapter (Main Bearing Mount):

Spindle Adapter (item 6) does not need to be further machined to fit spindle end. This special mounting adapter has been specifically designed and machined for the Omni-Turn Lathe so that it threads directly onto the back end of the Omniturn spindle. The actuator mOunting surface of the adapter must measure at least .001” T.I.R. perpendicular with the spindle when mounted.

2) Secure actuator assembly by tightening set screws onto the spindle. Attach air lines to ports on actuator. Insert collet into spindle; power the actuator to its forward position.

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Insert drawtube (item 7), through the actuator, with its threaded end toward the front of the spindle. Be certain that drawtube lock (item 17) is retracted to allow insertion of drawtube. Rotate drawtube to fully engage the drawtube threads with collet threads; back off 1-1/2 revolutions. Measure the remaining length extending from the knurled knob, if any. Remove the drawtube to cut off excess length. The drawtube must be flush with the knurled knob (item 15) when later reinstalled.

3) Fastening Drawtube to Actuator:

The drawtube must have four, equally spaced, 1/4” holes drilled 11/16” from the draw tube end. These holes must be drilled within .003” of drawtube centerline.

The holes must be chamfered burr free. The drawtube is now reinstalled into the air actuator. Tighten the four 3/8”-16 socket head set screws (item 16) so their half dog points engage the newly drilled 1/4” holes. The screws must then be loosened 1/8 turn. Drawtube installation is now complete.

4) Adjusting Actuator Concentricity:

Adjust three brass point set screws (item 18) to general tightness; please note that this mounting adapter has been designed for ease of mounting and alignment with its ground front face, bore face and bore diameter. Reduce air pressure supplied to forward port of actuator to 15 P.S.I. Using a dial indicator reach to indicator point identified on drawing MC586. Rotate spindle slowly to measure the rise and fall of this portion of the actuator. Adjust concentricity with the use of the three set screws (item 18) lightly. If actuator is in good alignment with the spindle, the indicator should measure .0005”-.0010” concentricity. Tighten three set screws to spindle securely.

5) Attached Oil-Mist Lubrication:

To operate actuator to full potential, attaching the oil-mist lubricator assembly is required. The unit supplied must be mounted close to actuator while providing easy access to the oil reservoir. Attach oil-mist to ports labeled on drawing #MC545. A shut off valve MUST be used to turn off air supplied to oil-mist assembly when not in use.

FAILURE TO USE THIS LUBRICATION MAY RESULT IN UNIT FAILURE. The air regulator should be adjusted to 15 P .5.1. The Norgren “Type L07 Lubricator” should be adjusted to supply 1 drop every 40 seconds. The reservoir should be replenished with Mobil “DTE” light (or equivalent) as required. A small amount of grease is displaced out of the bearings by the rotation and the oil-mist lubricator; this should be considered normal.

FAILURE TO COMPLETE THE PROPER INSTALLATION AS INSTRUCTED ABOVE CAN RESULT IN OPERATOR INJURY OR PREMATURE WEAR ON THE UNIT.

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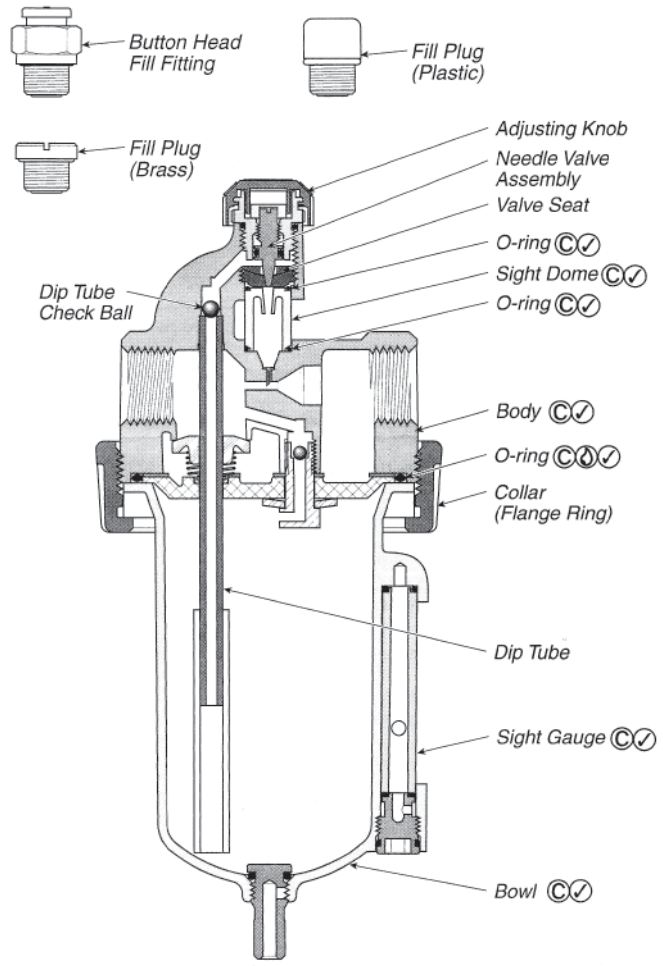
# L606 Lubricator

## Installation

1.The lubricator should be installed with reasonable accessibility for service whenever possible - repair service kits are available. Keep pipe or tubing lengths to a minimum with inside clean and free of dirt and chips. Pipe joint compound should be used sparingly and applied only to the male pipe - never into the female port. Do not use PTFE tape to seal pipe joints - pieces have a tendency to break off and lodge inside the unit, possibly causing malfunction. Also, new pipe or hose should be installed between the lubricator and equipment being lubricated.
2. The upstream pipe work must be clear of accumulated dirt and liquids.
3. Select a lubricator location as close as possible to the equipment being lubricated and downstream of any pressure regulator.
4. Install lubricator so that air flows in the direction of arrow on body.
5. Install lubricator vertically with bowl drain mechanism (if supplied) at the bottom.

## Operation and Service

1. Filling - Lubricators can be filled while under pressure and without shutting down equipment. Slowly remove either fill plug and fill to 1/4" to top of bowl using correct oil. For proper automatic fill operation, the oil inlet pressure to lubricator must be maintained between 10 and 200 PSI above air pressure to lubricator.
Suggested Lubricant: F442
Petroleum based oil of 100 to 200 SSU viscosity at 100°F and an aniline point greater than 200°F. (Mobil DTE24 and Sun Company Sunvis 932 are good examples). Do not use oils with adhesives, compound oils containing solvents, graphite, detergents or synthetic oils.
2. Replace the Fill Plug (by turning clockwise) and seat firmly. Excessive torque is not required. Turn on air supply, if leakage occurs, **DO NOT OPERATE** - conduct repairs again. The lubricator is now ready for setting.
3. Oil Delivery Adjustment - To adjust oil delivery, turn Adjustment Knob on top of the lubricator.
Leaner - Clockwise
Richer - Counterclockwise
By counting the number of drops per minute in the Sight Dome, you can adjust to your requirements. Generally, one drop per minute downstream for every 10 - 15 SCFM flow is satisfactory. 25 drops per minute equals one (1) ounce per hour - volume of oil passing through the Sight Dome.
**NOTE:** This is a constant density type lubricator which delivers a constant ratio of oil air flow. Therefore, if air flow increases or decreases, oil delivery will be adjusted proportionately. ONLY IF A DIFFERENT RATIO IS DESIRED SHOULD YOUR ADJUSTMENT KNOB SETTING BE CHANGED AFTER YOUR INITIIAL SETTING.
4. Cleaning - Erratic lubricator operation or loss of lubrication is almost always due to dirt (rust, pipe tape, etc.) in the needle valve or venturi area. To clean, shut off and vent all air line pressure to the unit being cleaned. In most cases cleaning is needed only in the oil metering area. Pull off Adjusting Knob and remove Needle Valve Assembly by turning out large hex nut. Remove Needle Valve Seat and clean removed parts with alcohol making sure hole in seat is clear. With a #57 drill, make sure hole in bottom of sight gauge area is open. Remove Bowl. Clean parts with soapy water or denatured alcohol **but do not use denatured alcohol on plastic bowl, sight dome or sight gauge.** If using compressed air to blow dry, be sure to wear appropriate eye protection.
5. After servicing, apply system pressure and check for air leaks. If leakage occurs, **Do Not Operate** - conduct servicing again.




Lightly grease with provided lubricant.

Inspect for nicks, scratches, and surface imperfections. If present, reduced service life is probable and future replacement should be planned.

Clean with lint-free cloth.

| | | | |
|---|---|---|---|
| Bowl | | | |
| Polycarbonate | BK606Y | B | 1/4",3/8" |
| Zinc with Sight Gauge | BK605WY | W | 1/4",3/8" |
| Polycarbonate | BK606A | B | 1/2" |
| Aluminum | BK603A | E | 1/2" |
| Zinc with Sight Gauge | BK605WA | W | 1/2" |
| Aluminum with Sight Gauge | BK606X30A | G | 1/2" |
| Aluminum | BK603B | E | 3/4" thru 1-1/2" |
| Zinc with Sight Gauge | BK6D5WB | W | 3/4" thru 1-1/2" |
| Aluminum with Sight Gauge | BK606X30B | G | 3/4" thru 1-1/2" |
| Repair Kit | | | |
| Dip Tube Repiacement Kit | DTK606 | Al | All Sizes |
| Needle Valve Assembly | RK606Y | All | All Sizes |
| Sight Dome Repair Kit | RK606SY | All | All Sizes |
| Sight Gauge Bowl Repair Kit | RBK605WY | W | 114", 3/8" |
| Sight Gauge Bowl Repair Kit | RKB605WA | W | 1/2" |
| Sight Gauge Bowl Repair Kit | RKB606X30A | G | 1/2" |
| Sight Gauge Bowl Repair Kit | RKB606WB | W | 3/4" thru 1-1/2" |
| Sight Gauge Bowl Repair Kit | RKB606X30B | G | 3/4" thru 1-1/2" |
| Button Head Fill Fitting (3/4 Hex.) | SAA606C109-1 | - | - |
| Button Head Fill Fitting (11/16 Hex.) | L606C14 | - | - |
| Fill Plug (Brass) | SA606B4 | - | - |
| Fill Plug (Plastic) | SAP04113 | - | - |

## OmniTurn GT75 & GTJr

## MAINTENANCE & LUBRICATION SCHEDULE

NOTE: Preventative maintenance reminders will periodically appear on the control monitor to prompt the operator of various lubrication requirements. The schedule below lists these requirements in greater detail.

DAILY
1. Check main air pressure: 30psi minimum for stand-alone GT, depending on collet pressure requirement. If any OmniTurn loader is installed, then 90psi.
2. Check collet closer lubricator (mounted on bulkhead in spindle motor compartment). With spindle running observe the sight glass for oil flow. If necessary, adjust oil flow to one drop per 30 seconds. Use Mobile Light DTE oil or equivalent.
3. Remove any heavy chip build up from guards and way covers.

WEEKLY
1. Check air regulator/filter
   - Drain main regulator bowl (loosen plug CW)
   - Drain coalescing filter bowl (loosen plug CW)

MONTHLY
1. Examine main regulator element; replace with Watts EKF31if it shows serious contamination.
2. Examine coalescing filter element; replace with Watts EK504VY if it looks oil-coated.

EVERY FOUR TO SIX MONTHS (Water-Based Coolant)
Lubricate the ways and ball screws.

NOTE: If CUTTING OIL is used, no lubrication is necessary, ever.

The linear guide manufacturer recommends charging the bearing blocks with lithium grease every 4,000,000 inches of travel. On the Z-axis, this is about 96,000 parts with two inches of thread done in 8 passes.

## LUBRICATING the WAYS and BALL SCREWS

There is a fitting on each of the eight bearing blocks. Three pieces of sheet metal and the accordion bellows must be removed to access the fittings and ball screws. The accordion bellows is removed by lifting each end off its holder, exposing the spindle-end Z-axis fittings. The other Z-axis fittings are exposed by removing the wide piece of sheet metal with the X-axis scale affixed. Three screws through the X-axis scale hold this in place. The X-axis covers are held in place by four long all-thread rods and acorn nuts, two on each end of the tooling plate. See page 6.7 for illustration.

With the sheet metal removed, thoroughly grease each bearing block with lithium grease.
A “needle tip” is required to fit the fitting on the blocks. Tips are available from Napa (pn 715-1215) or MSC (pn 48527378).

The ball screws should be lubricated with a drizzle of Slick-50 over the entire exposed length.