

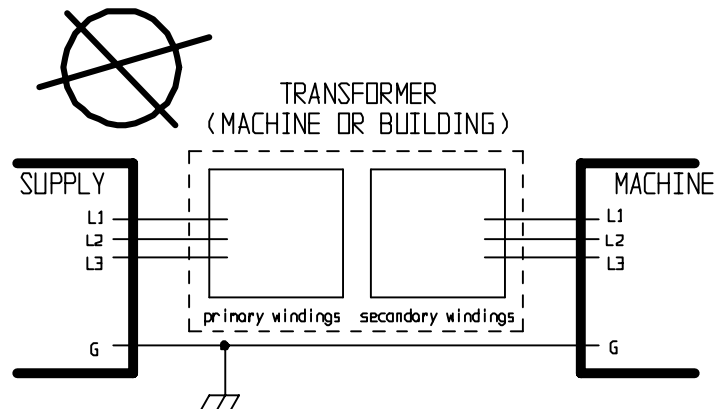
Electrical Manual

ML45

Rev.1
7-11-01

***** CAUTION *****

DRIVES WILL BE DAMAGED BY INCORRECT POWER CONNECTION



Disconnect transformer entirely from power supply.

Check resistance between transformer ground wire and each secondary leg.

If resistance is more than 1 or 2 ohms, then the transformer ground wire is not connected to a neutral point within the secondary windings.

or

Disconnect transformer entirely from power supply.

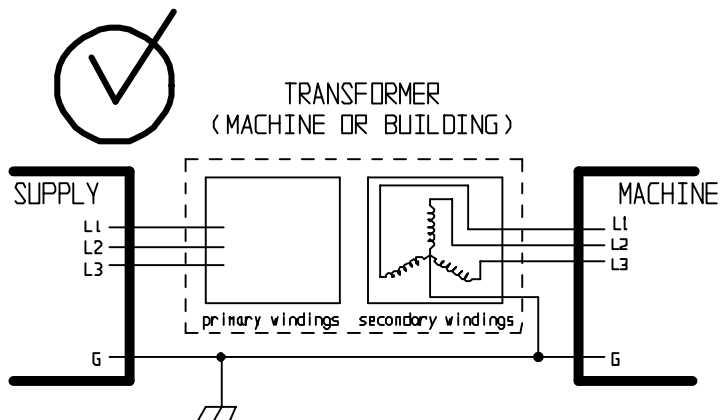
Remove transformer cover and follow transformer ground wire to determine if it is merely a case ground or if it actually goes to a neutral point within the secondary windings.

or

Check voltages between each secondary leg and ground.

If they are not equal, the secondary windings are "floating" with respect to ground.

THE GROUND WIRE GOING INTO THE MACHINE MUST BE CONNECTED TO A NEUTRAL POINT WITHIN THE SECONDARY WINDINGS AND TO EARTH GROUND.



The secondary windings must be grounded.

Voltages between each secondary leg and ground should be equal, half the voltage between secondary legs.

Table of Contents

Electrical Safety Rules	0
Machine Schematic.....	1
Panel Layout.....	16
Remote Hand Controller.....	19
MC5 Spindle Drive Parameters	20
ML45 Lathe.....	20
Yaskawa Axis Drive Parameters for Partner ML45	22
Procedure: Setting up gains for Centurion 6's	23
Card Cage Gain Setting Procedure.....	23
Drive Setting Procedure	24
Centurion 6 CNC Connector Signal Listing.....	25
Connector X-Input	25
Connector Y-Input	25
Connector Z-input.....	25
Connector A-Input	25
Connector X-Output.....	25
Connector Y-Output.....	26
Connector Z-Output.....	26
Connector A-Output.....	26
Connectors X, Y, Z, A and B Axis (DC Brush Drives).....	26
Connectors X, Y, Z, A and B Axis (Yaskawa Brushless Drives).....	26
Axis Home Connector.....	26
Spindle Drive Connector.....	27
Spindle Encoder Connector	27
Miscellaneous Connector (Misc).....	27
Front Panel Connector (FPP) and J2 on keyboard encoder card.....	27
Power Connector.....	27
Connector Handwheel for remote handwheel option	27
Connector Tool Changer	28
Connector COM1 (Card Cage).....	28
Connector COM2 For rigid tapping option.....	28
Connector Floppy Disk	28
Connector CRT (Video).....	28
Connectors in the CNC control box	28
Connector CRT (Monitor Power).....	28
Connector FPACC.....	28
Connector P2.....	29
Keyboard DIN Connector (J1).....	29
Connectors in the Mag Box	29
Connectors ATC1 and 1-1E	29
Connector ATC2.....	29
Connector on +24 VDC Regulated Power Supply	29
Connector COM1 (on Mag Panel).....	29
Card Cage Assembly	30
LCD Front Panel Assembly.....	35
Remote Panel Assembly.....	37
LCD Chassis Assembly.....	39

Electrical Safety Rules

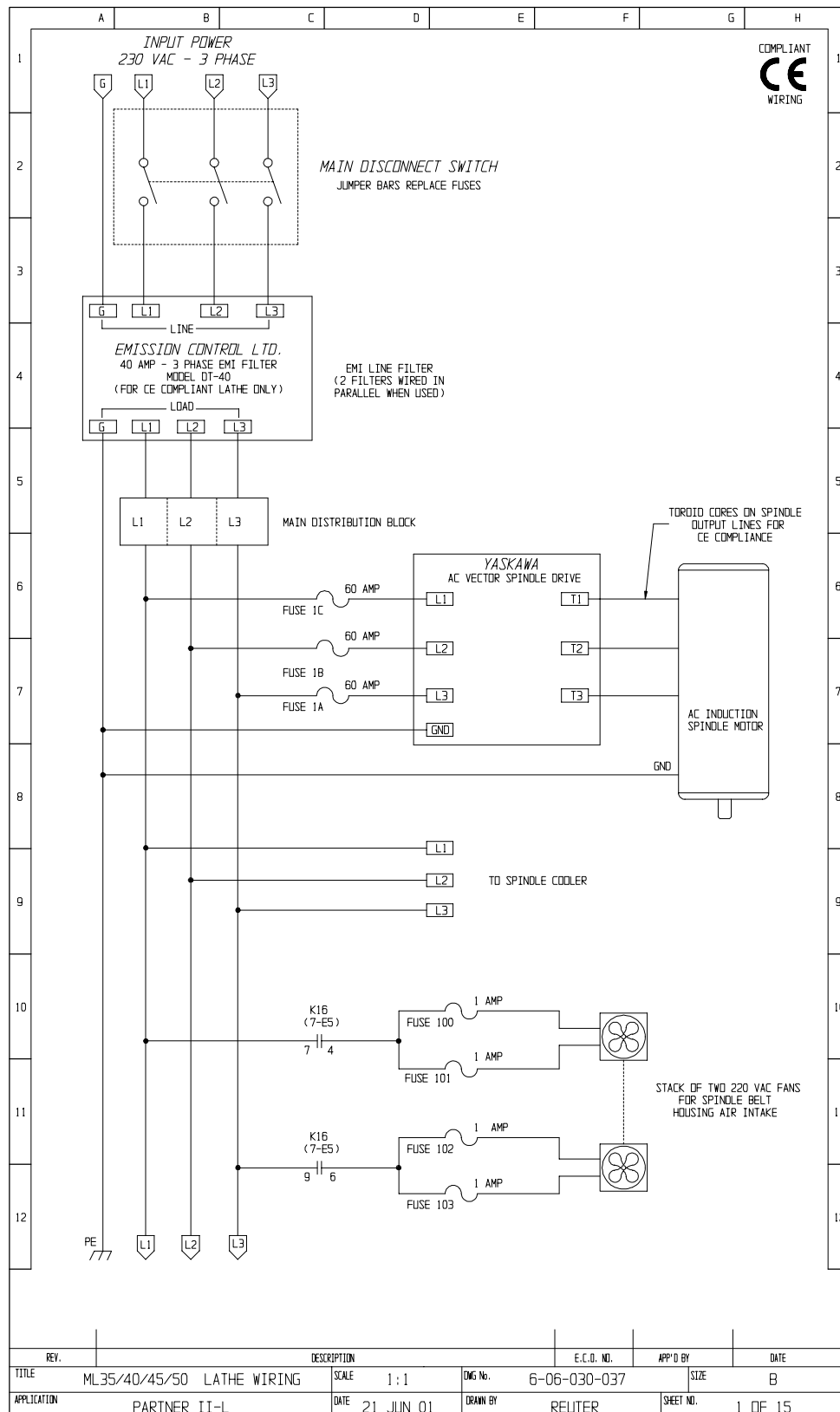
Read and understand the following list of cautions before attempting to perform service on this equipment. **Failure to observe these rules can result in death or serious injury.**

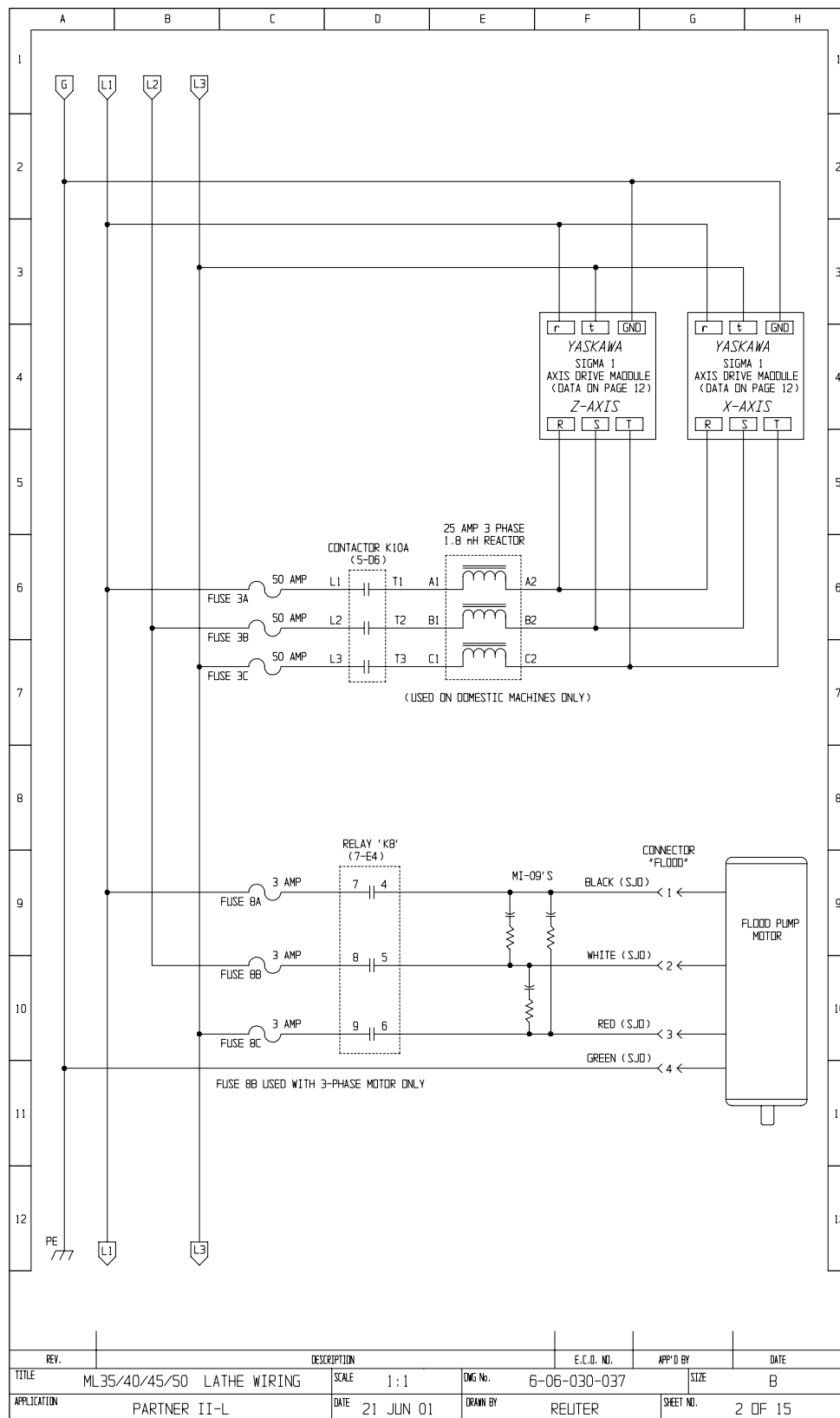
Caution

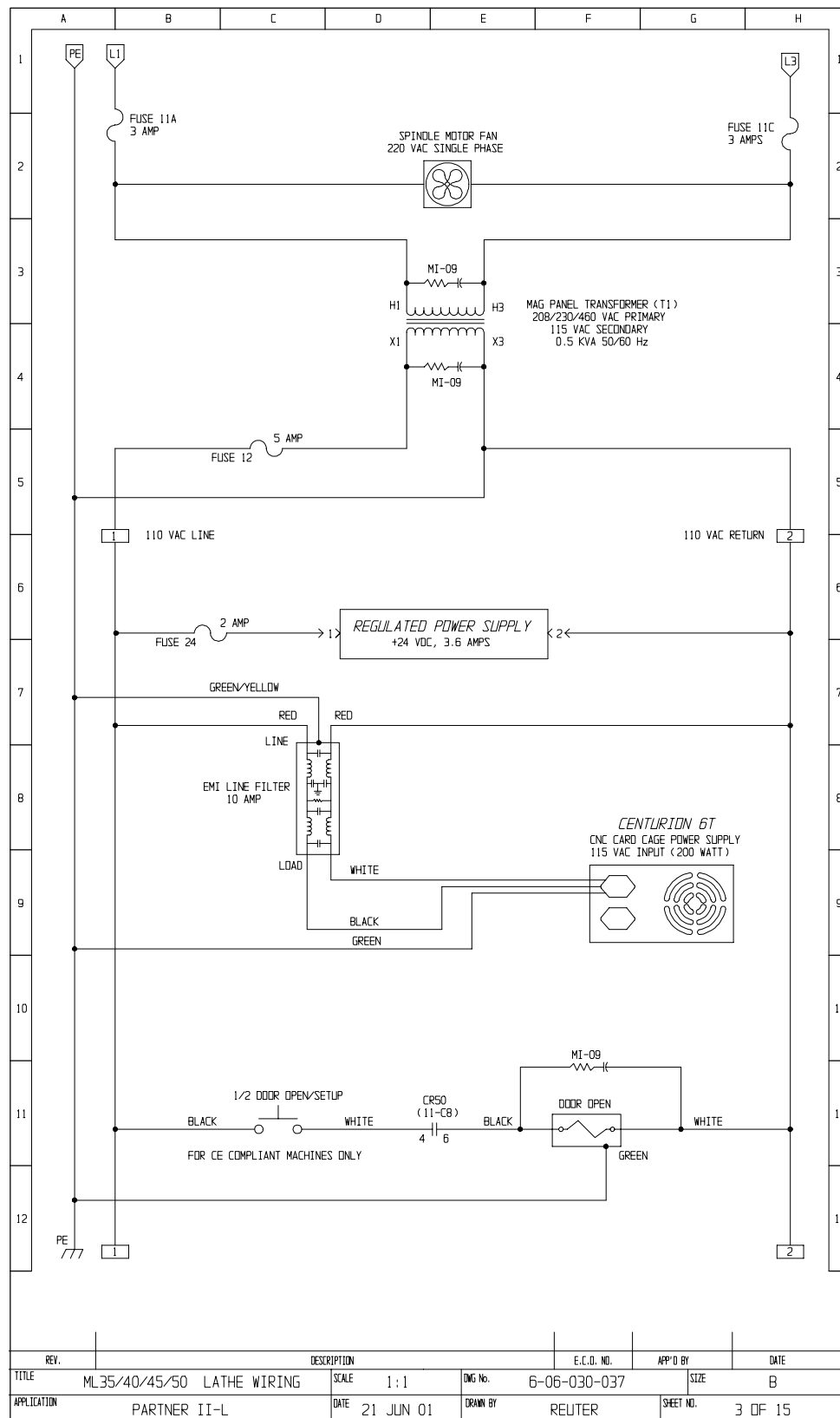
- Beware of High Voltage present within the machine's electrical cabinet
- Do not attempt to service electrical components unless you are qualified to work on them safely
- Only qualified personnel should attempt to make current and voltage readings
- Always turn the main power off before servicing components within the electrical cabinet
- Always keep hands and fingers away from live electrical terminals
- Remove jewelry while servicing the machine to avoid shorting any electrical circuits
- Allow all components to discharge before servicing them, wait at least 15 seconds after powering off, before servicing

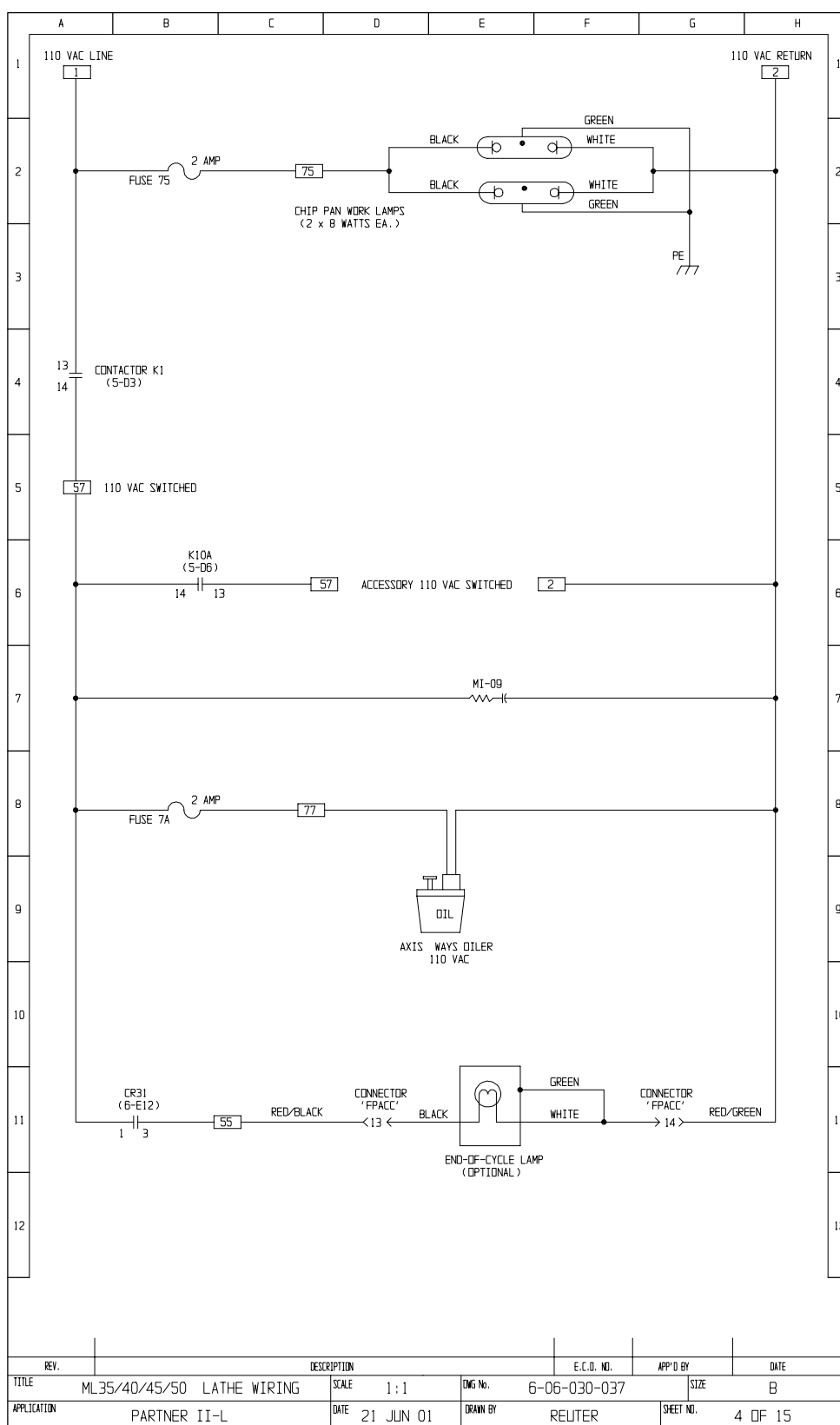
FAILURE TO FOLLOW THESE RULES CAN RESULT IN SERIOUS INJURY OR DEATH

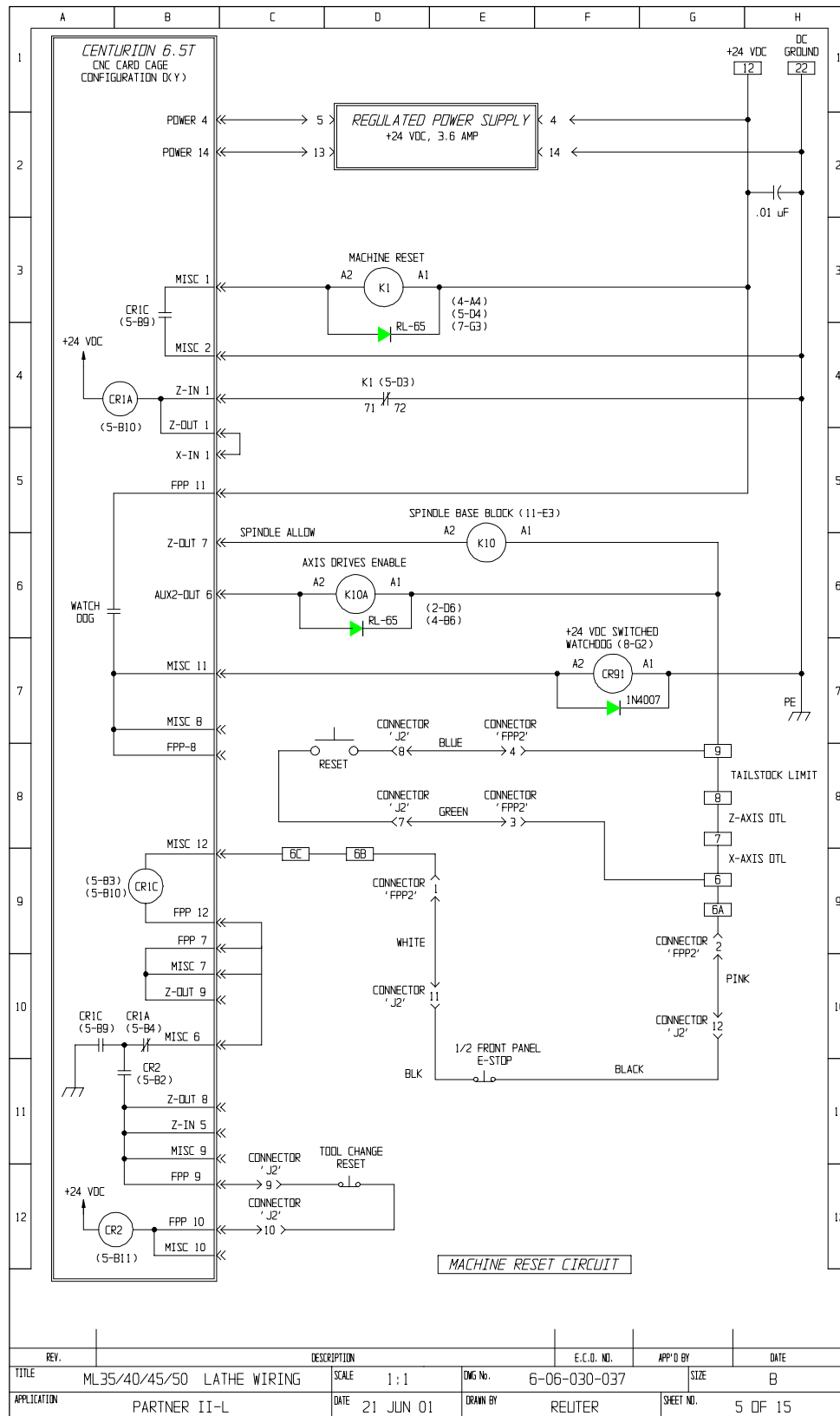
Machine Schematic

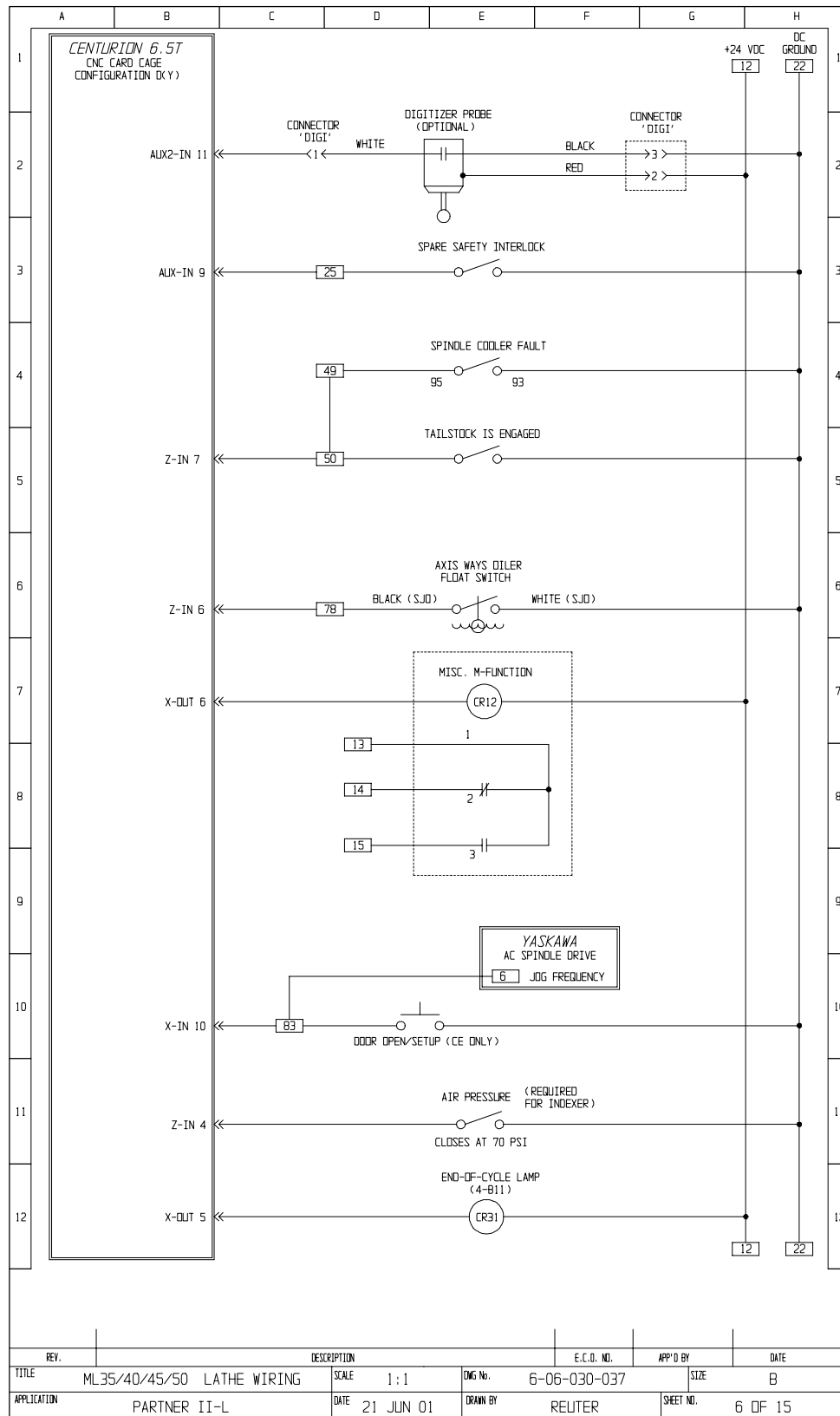


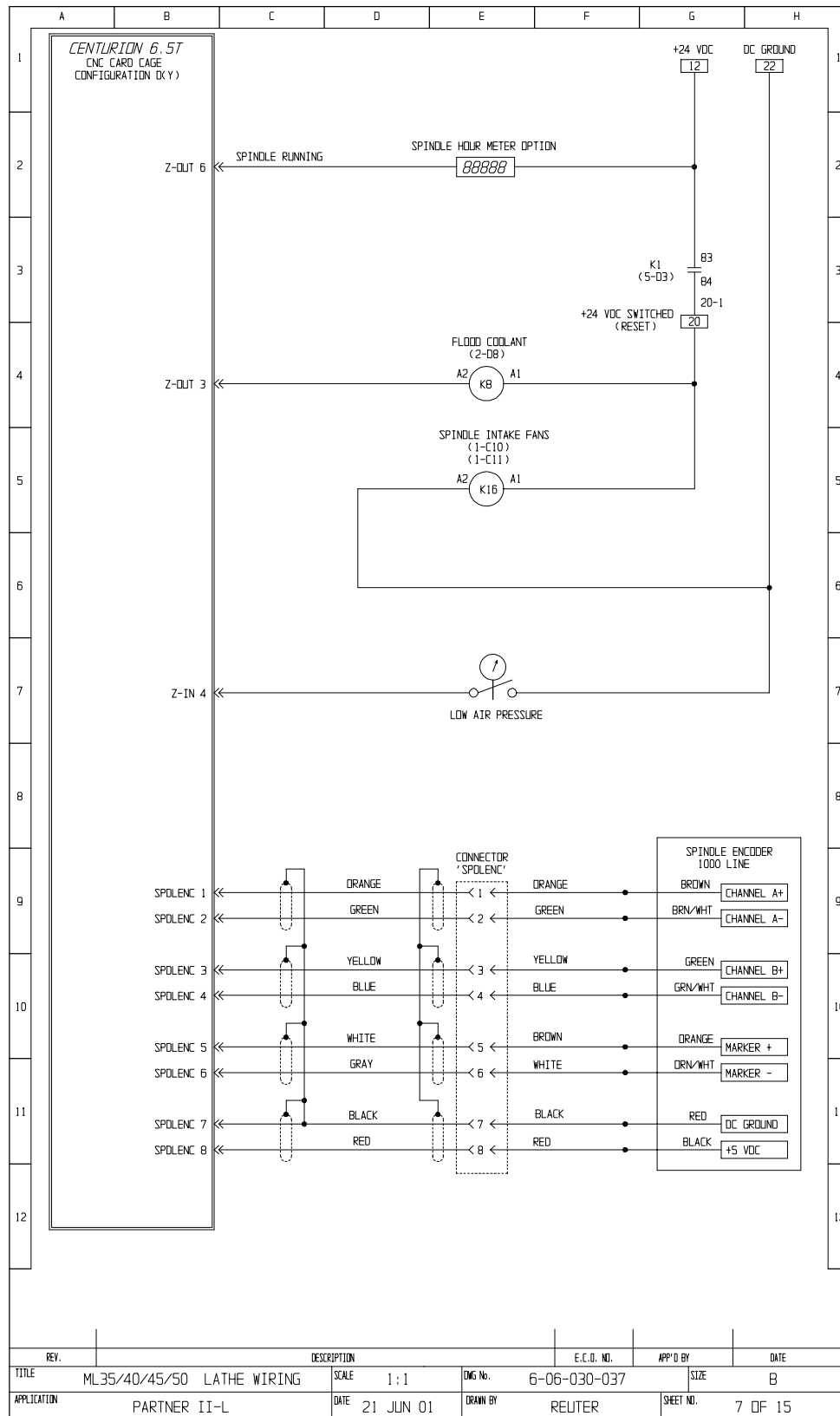


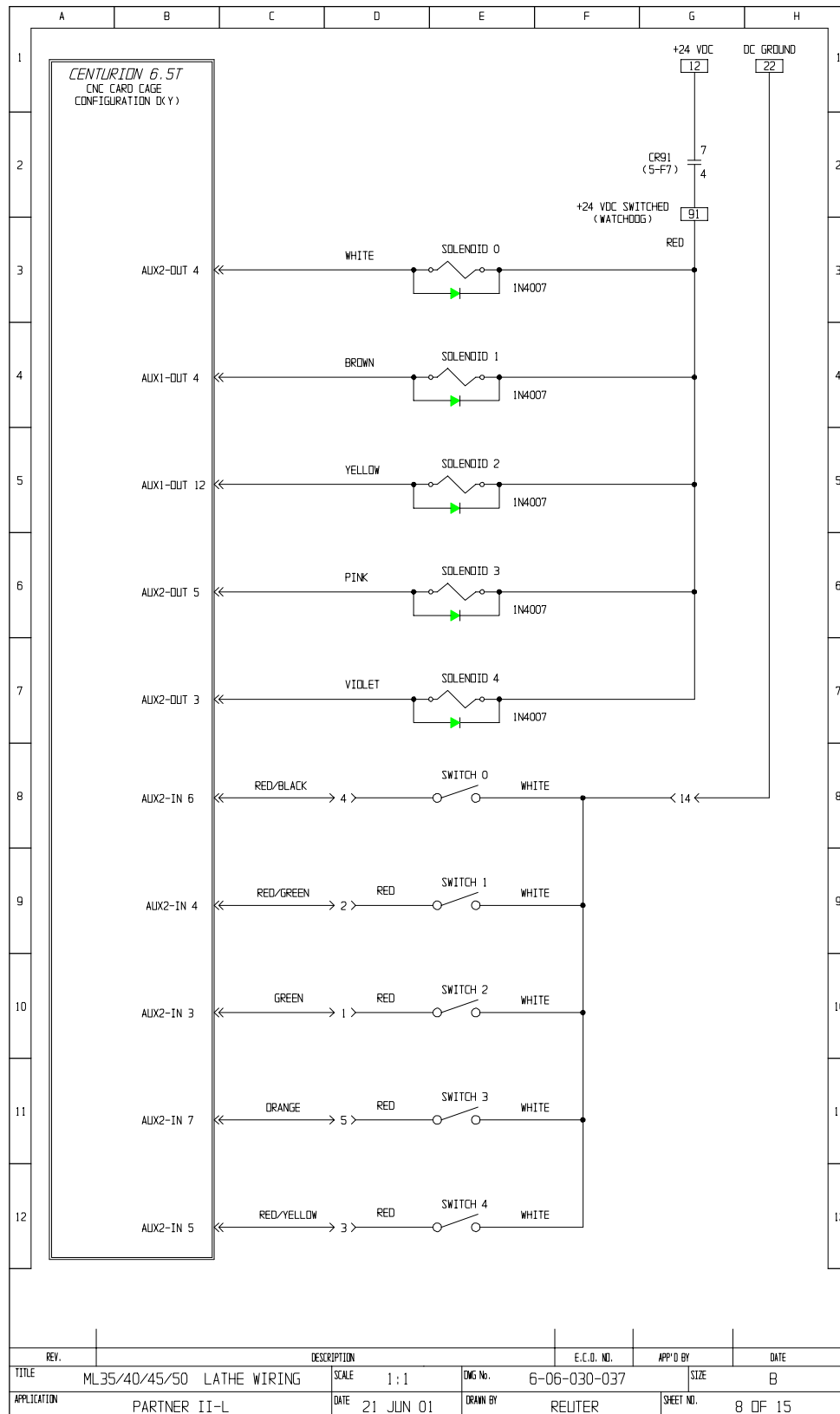












	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

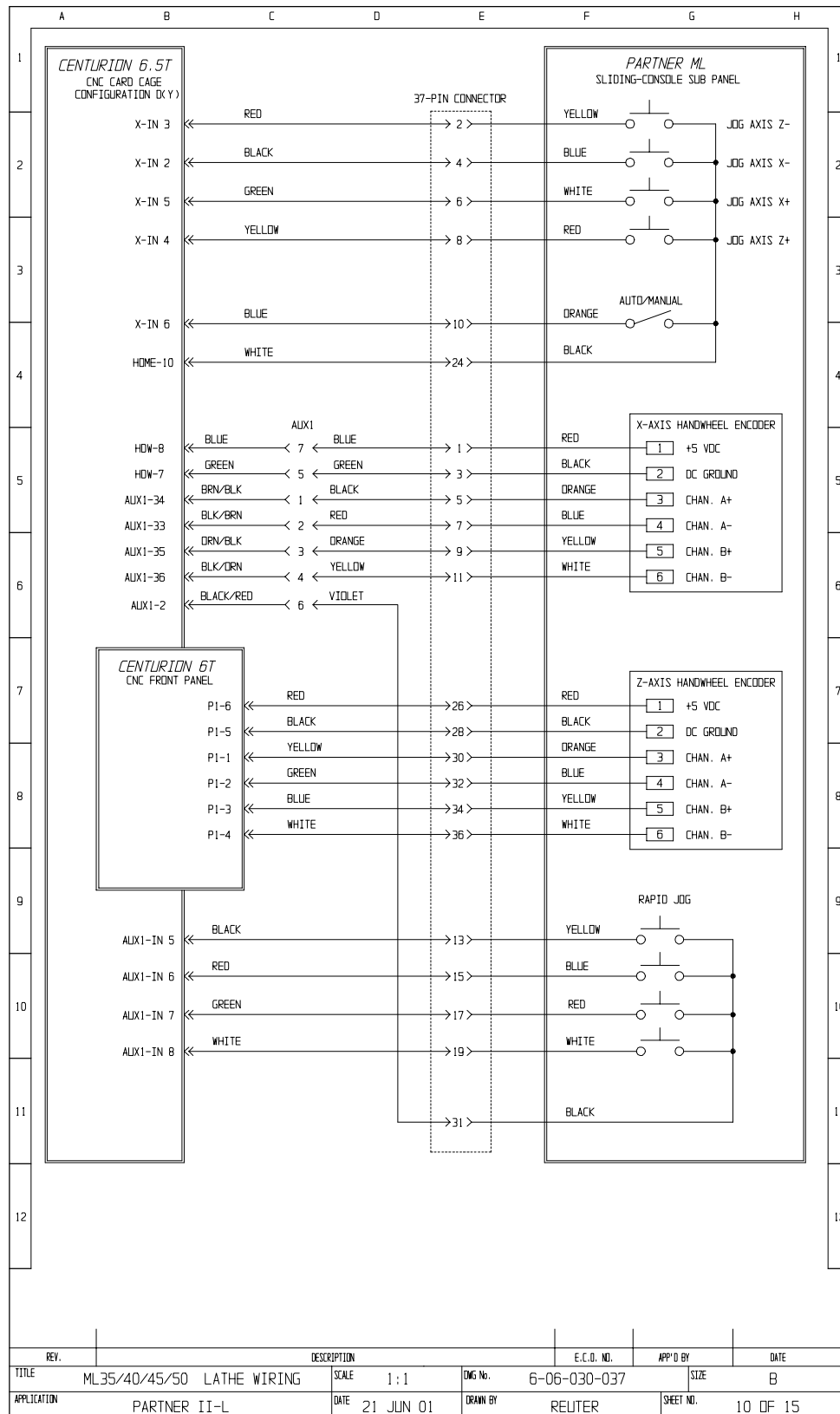
CARD CAGE	SWITCH	SOLENOIDS				
		No. 0	No. 1	No. 2	No. 3	No. 4
AUX2-IN 3	2	N/A	0	1	0	1
AUX2-IN 4	1	N/A	1	0	1	0
AUX2-IN 5	4	0	1	1	0	0
AUX2-IN 6	0	1	0	0	0	0
AUX2-IN 7	3	0	0	0	1	1
COMMAND		M40	M41	M42	M43	M44

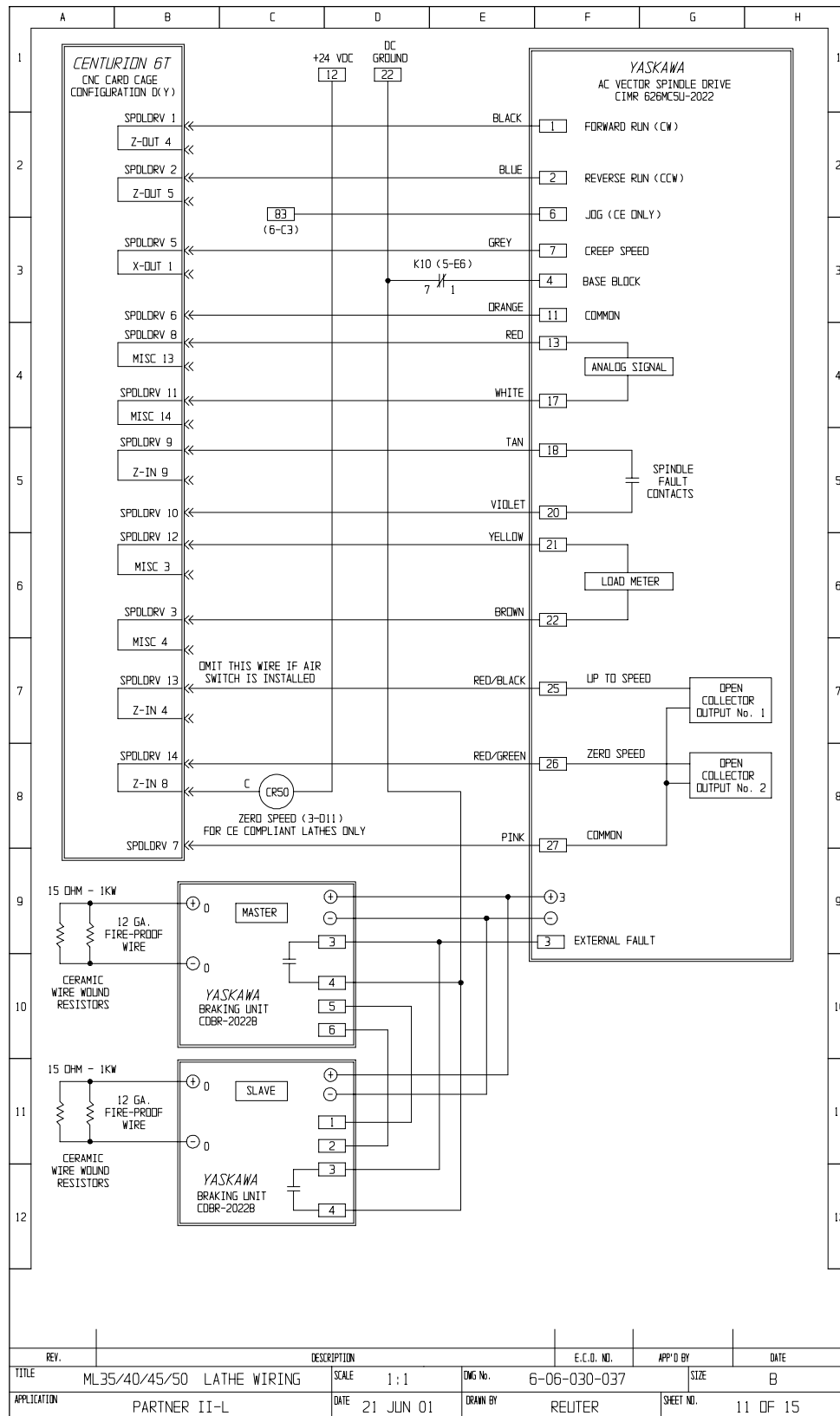
1 = SOLENOID ENERGIZED
0 = SOLENOID DE-ENERGIZED

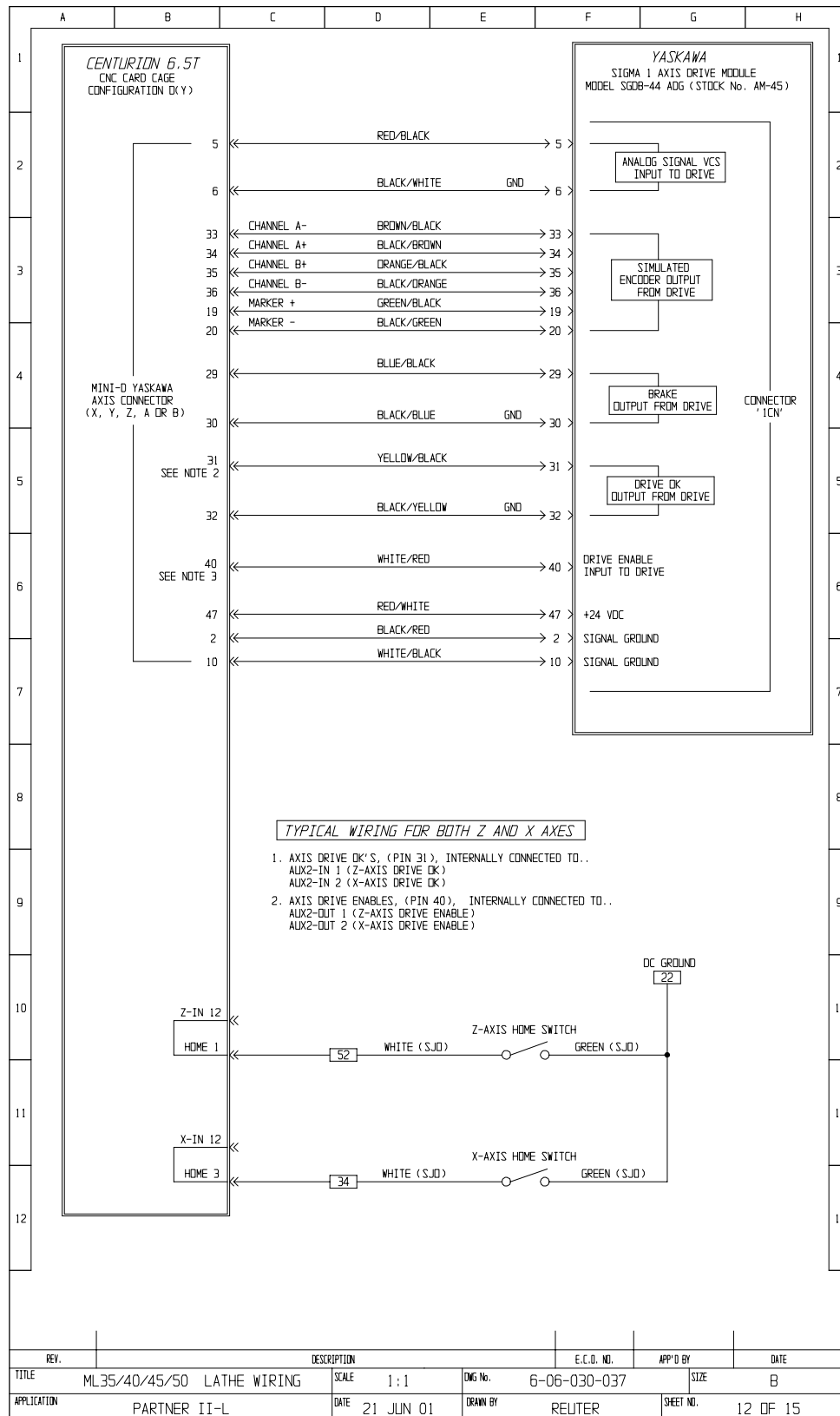
COMMAND	OPERATION	RANGE
NEUTRAL (M40)	SET AUX2-OUT 3 LOOK FOR AUX2-IN 5 CLEAR AUX2-OUT 3 SET AUX2-OUT 4 SET AUX2-OUT 5	SPINDLE IS STOPPED
GEAR 1 (M41)	SET AUX1-OUT 4 SET AUX2-OUT 3	6 - 65 RPM
GEAR 2 (M42)	SET AUX1-OUT 12 SET AUX2-OUT 3	13 - 130 RPM
GEAR 3 (M43)	SET AUX1-OUT 4 SET AUX2-OUT 5	30 - 300 RPM
GEAR 4 (M44)	SET AUX1-OUT 12 SET AUX2-OUT 5	60 - 630 RPM

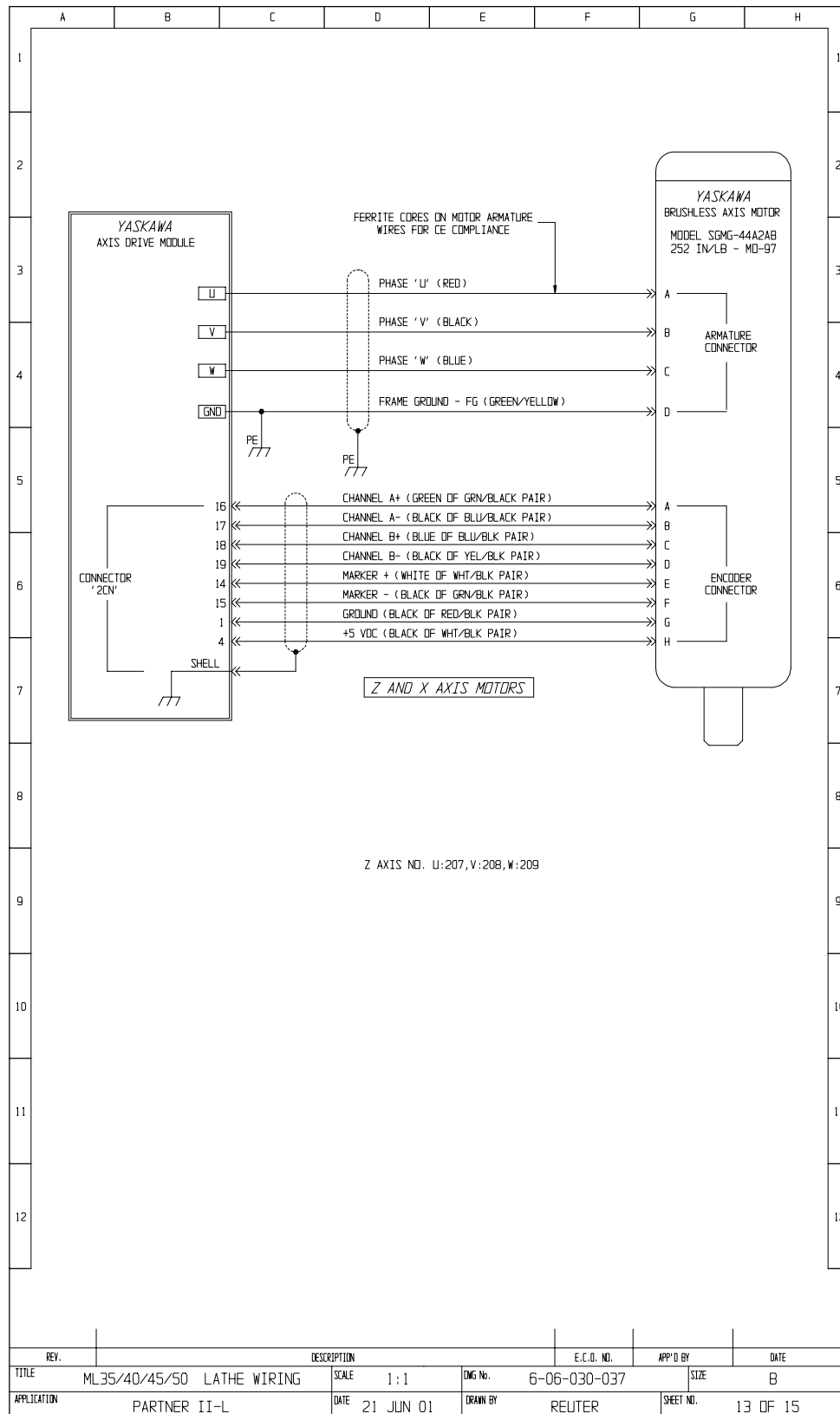
CLEAR ALL OUTPUTS BEFORE SETTING NEXT OPERATION SET.
SPINDLE DRIVE JOGS CW/CCW AT 1Hz (D1-09 = 1 Hz) (H1-05 = 6)

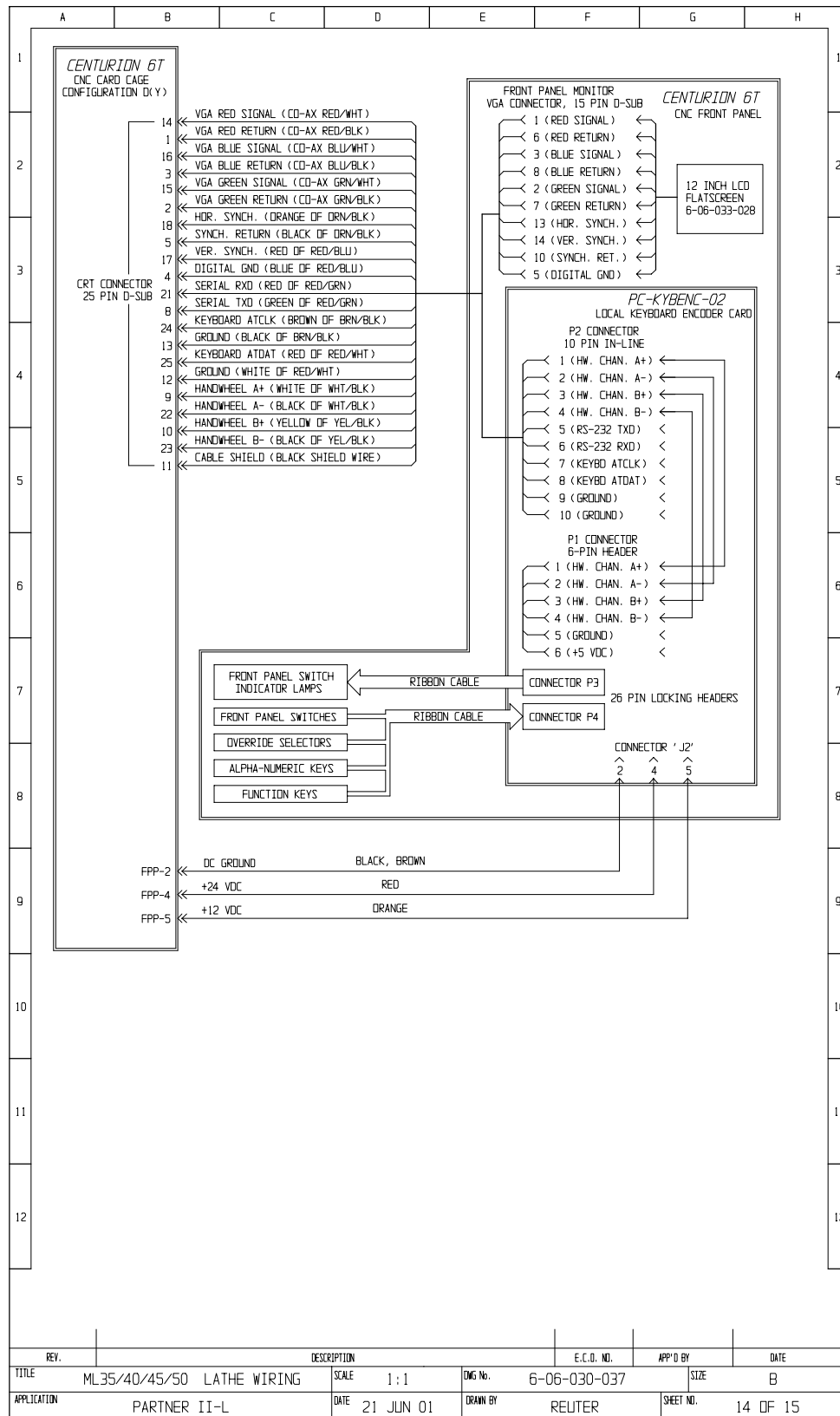
REV.	DESCRIPTION	SCALE	DATE	APP'D BY	DATE
TITLE	ML35/40/45/50 LATHE WIRING	1:1	DATE	6-06-030-037	SIZE B
APPLICATION	PARTNER II-L	DATE 21 JUN 01	DRAWN BY REUTER	SHEET NO. 9 OF 15	

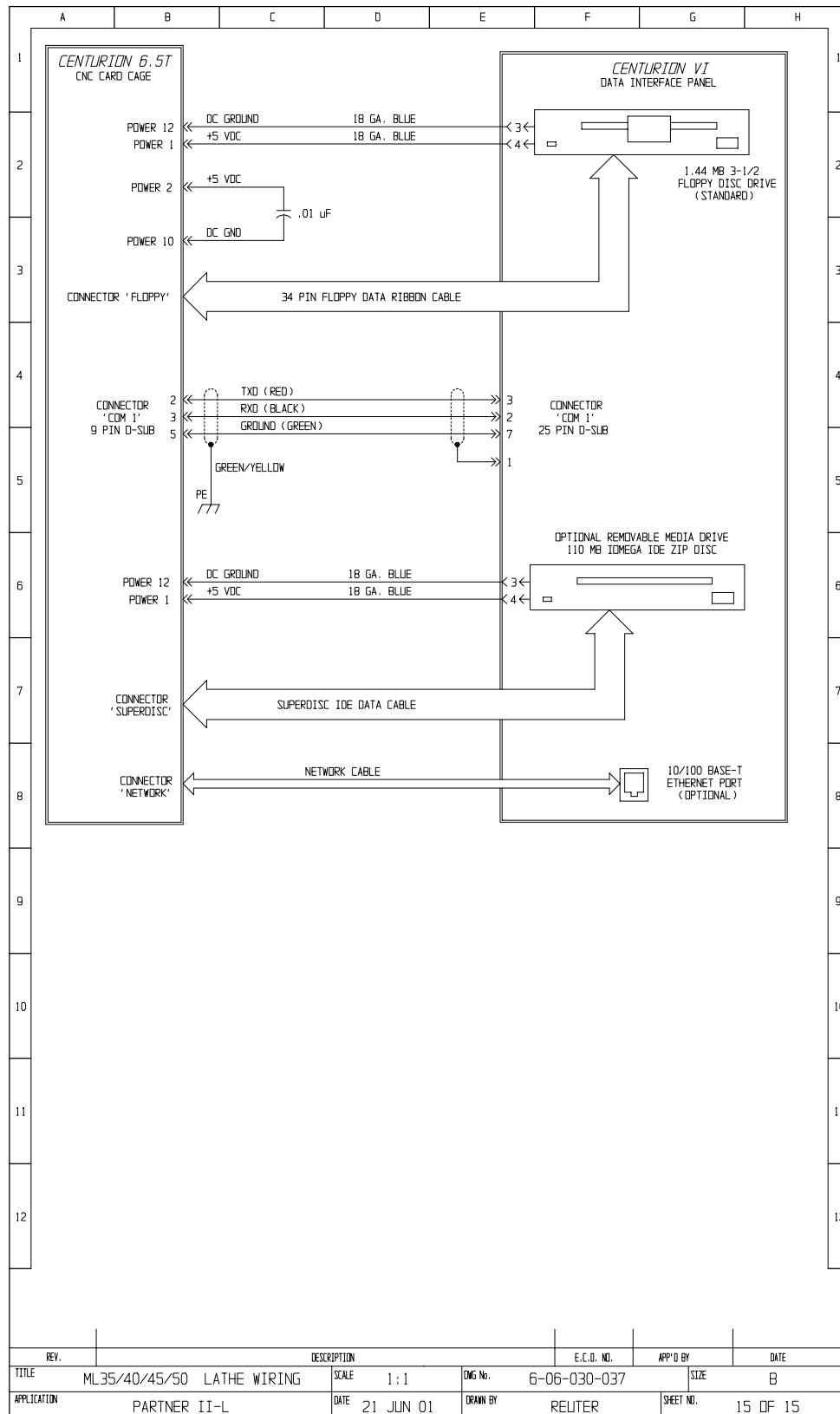




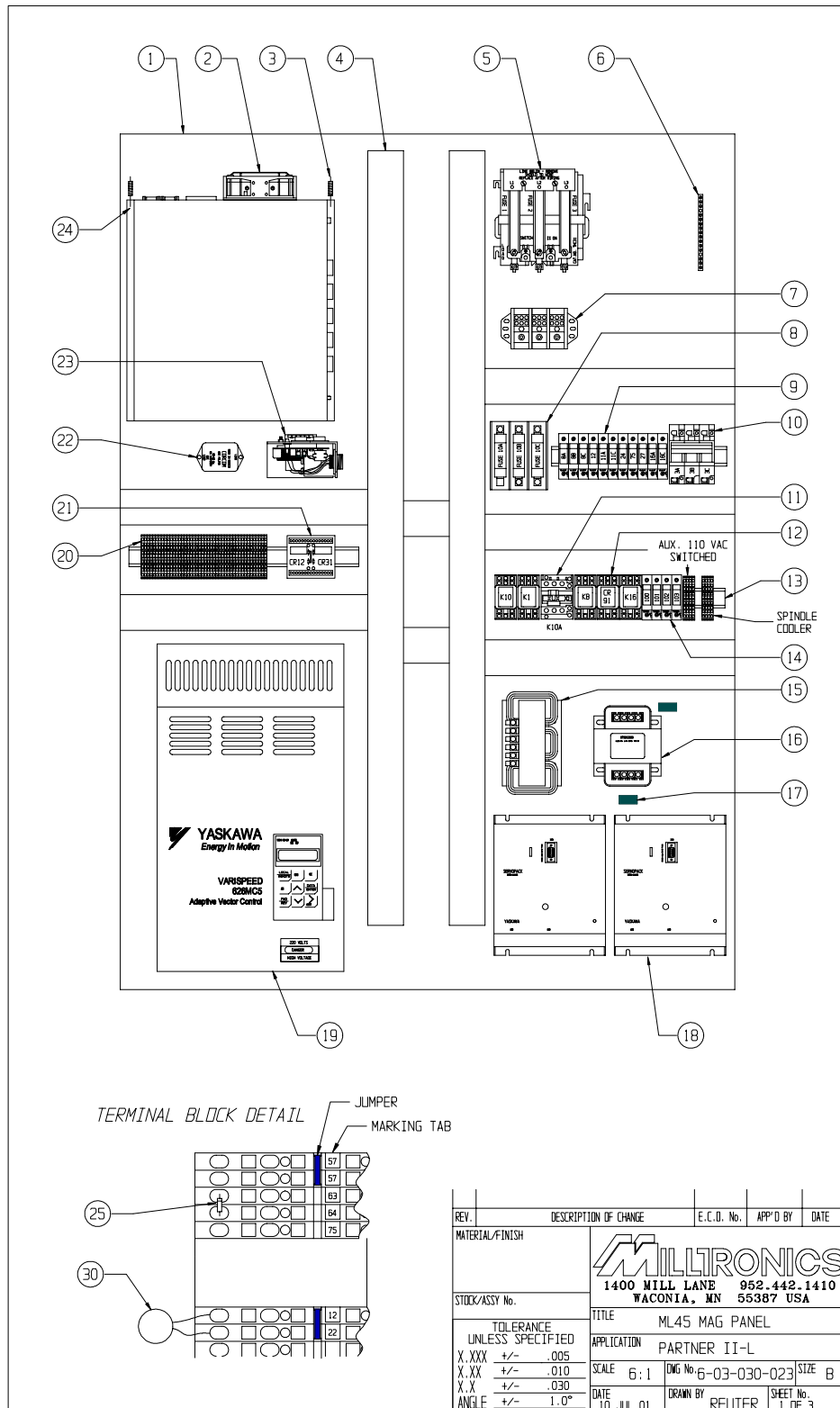








Panel Layout



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION	QTY.	REMARKS
1	NONE	ML45 LATHE MAG PANEL	1	
2	6126-1	CENTURION 6-T CNC CARD CAGE	1	
3	HD-63	CARD CAGE SPRING HANGER	2	
4	WC-65	WIRE DUCT, 2 IN.	16 FT.	
	WC-66	WIRE DUCT COVER, 2 IN.	16 FT.	
5	FU-39	MAIN DISCONNECT SWITCH, 60 AMP GENERAL ELECTRIC TCH33	1	
	FU-41	DISCONNECT JUMPER BARS, 100 AMP GENERAL ELECTRIC THC3300 (SET OF 3)	1	
6	BU-04	GROUND BUS BAR (SQUARE-D)	1	
7	TB-20	3-PHASE DISTRIBUTION BLOCK	1	
8	FU-61	FUSE BLOCK, 3-PHASE FRN-R	1	
	FU-54	FUSE, FRN-R-60, 60 AMP	2	FUSES 10A, 10B, 10C
9	FU-77	FUSE HOLDER, SINGLE FND	15	
	FU-72	FUSE, FND-1/2, 1/2 AMP (BUSS)	2	FUSES 16A & 16C
	FU-73	FUSE, FND-1, 1 AMP (BUSS)	4	FUSES 100, 101, 102, 103
	FU-74	FUSE, FND-2, 2 AMP (BUSS)	3	FUSES 24, 27, 75
	FU-75	FUSE, FND-3, 3 AMP (BUSS)	5	FUSES 8A, 8B, 8C, 11A, 11C
	FU-76	FUSE, FND-5, 5 AMP (BUSS)	1	FUSE 12
10	FU-78	FUSE HOLDER, 3-PHASE FND	1	
	FU-80	FUSE, FND-50, 50 AMP (BUSS)	3	FUSES 3A, 3B, 3C
11	RL-64	CONTACTOR RELAY, 5 HP TELEMECANIQUE LP101810	1	
	RL-65	CONTACTOR DIODE TELEMECANIQUE LA40C1U	1	CONTACTOR K10A
12	RL-48	CONTROL RELAY, 10 AMP	5	
	RL-06	RELAY SOCKET BASE	5	RELAYS K1, K8, K10, K16, CR91
13	WX-167	DIN RAIL, 35 x 7.5 mm	X	
14	IA-19	3-PHASE REACTOR,	1	
15	TR-14	TRANSFORMER, 220/110, .5 KVA	1	
16	MI-09	NOISE SUPPRESSOR, 220 VOLT	8	
17	AM-45	AXIS DRIVE AMPLIFIER, SGOB-44ADG	2	
18	PS-50	AC VECTOR SPINDLE DRIVE, CIMR-MCSU2022	1	
19	TB-30	TERMINAL BLOCK, 4-POSN., TOP ENTRY	39	
	TB-32	TERMINAL BLOCK JUMPER, 10 POSN.	1	
	TB-33	TERMINAL BLOCK LABEL TAB, SHEET OF 100	.39	
	TB-31	TERMINAL BLOCK END PIECE/DIVIDER	9	
20	9107	QUAD RELAY BOARD	1	
21	MI-10	LINE FILTER, 10 AMP	1	
22	B177-1	REGULATED POWER SUPPLY, +24 VDC @ 3.6 AMPS	1	
23	WX-129	CARD CAGE RUBBER SHOCK MOUNT	4	
24	DI-03	DIODE, 1N4007	1	
25	CA-16	CAPACITOR, .01 uF CERAMIC DISC	2	
	PS-51	SPINDLE BRAKING UNIT, 22 KW YASKAWA CDBR-2022B	2	MOUNTED ON BOTTOM OF MAG BOX

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE ML45 MAG PANEL		
X.XXX	+/- .005	APPLICATION PARTNER II-L		
X.XX	+/- .010	SCALE 6:1	DWG No. 6-03-030-023	SIZE B
X.X	+/- .030	DATE 10 JUL 01	DRAWN BY REUTER	SHEET No. 2 OF 3
ANGLE	+/- 1.0°			

-TERMINAL BLOCK DIRECTORY-

1 - 110 VAC LINE (JUMPERED x3)
 2 - 110 VAC RETURN (JUMPERED x4)
 55 - END-OF-CYCLE LAMP
 57 - 110 VAC SWITCHED (JUMPERED x3)
 75 - WORKLAMPS
 77 - 110 VAC OILER
 12 - +24 VDC (JUMPERED x4)
 20 - +24 VDC SWITCHED/RESET (JUMPERED x2)
 22 - DC GROUND (JUMPERED x5)
 6C - RESET CIRCUIT/CARD CAGE MISC 12
 6B - JUMPERED TO 6C/FRONT PANEL E-STOP
 6A - FRONT PANEL E-STOP/JUMPERED TO 6
 6 - X-AXIS OTL/FRONT PANEL RESET
 7 - Z-AXIS OTL
 8 - TAILSTOCK LIMIT
 9 - FRONT PANEL RESET/JUMPERED TO 91
 13 - SPARE M-FUNCTION COMMON
 14 - SPARE M-FUNCTION N/C
 15 - SPARE M-FUNCTION N/O
 25 - SPARE SAFETY INTERLOCK
 34 - X-AXIS HOME
 49 - SPINDLE COOLER FAULT
 50 - TAILSTOCK ENGAGED
 52 - Z-AXIS HOME
 78 - OILER FAULT SWITCH (OILER IS EMPTY)
 83 - DOOR OPEN/SETUP (CE ONLY)
 91 - +24 VDC SWITCHED/WATCHDOG (JUMPERED x2)

ADDITIONAL TERMINAL BLOCKS FOR SPINDLE COOLER
 LABELED L1, L2, L3.

AND AUXILIARY TERMINAL BLOCKS FOR AVAILABLE 110 VAC SWITCHED.

-FUSE DIRECTORY-

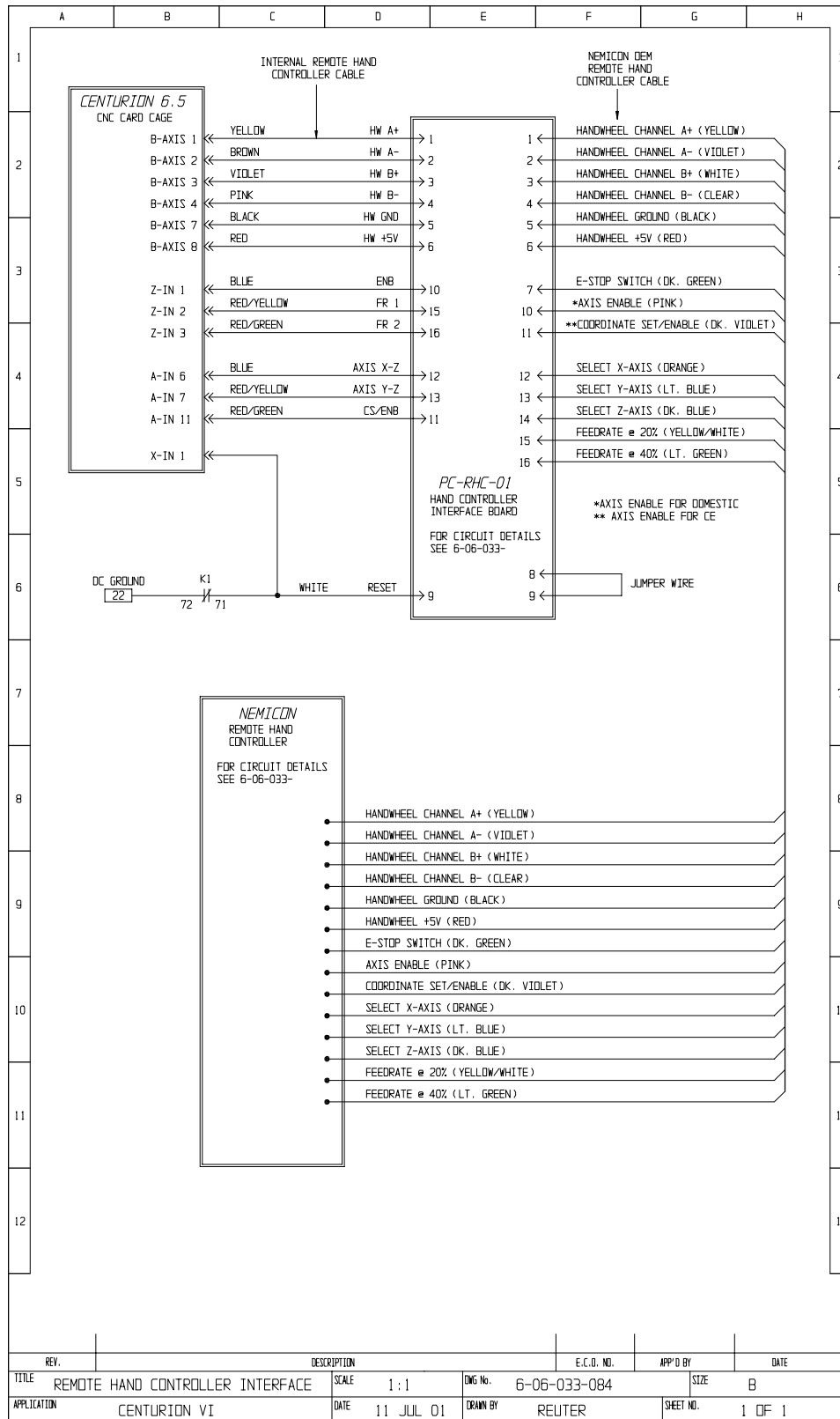
FUSES 3A, 3B, 3C - PANEL MAIN POWER (50 AMP)
 FUSES 8A, 8B, 8C, FLOOD PUMP (3 AMP)
 FUSES 10A, 10B, 10C - SPINDLE DRIVE POWER (60 AMP)
 FUSES 11A & 11C - TRANSFORMER PRIMARY (3 AMP)
 FUSES 12 - TRANSFORMER SECONDARY (5 AMP)
 FUSES 16A, 16C - TRANSMISSION FANS (1/2 AMP)
 FUSE 24 - 24 VDC POWER SUPPLY (2 AMP)
 FUSE 75 - WORKLAMPS (2 AMP)
 FUSES 100, 101, 102, 103 - SPINDLE BELT HOUSING VENTILATION (1 AMP)

-RELAY DIRECTORY-

K1 - MACHINE RESET (110 VAC SWITCHED)
 K8 - FLOOD COOLANT
 K10 - SPINDLE ENABLE
 K10A - AXIS DRIVES ENABLE
 K16 - SPINDLE BELT HOUSING VENTILATION
 CR12 - MISC. M-FUNCTION
 CR31 - END-OF-CYCLE LAMP
 CR91 - +12 VDC SWITCHED/WATCHDOG

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE ML45 MAG PANEL		
X.XXX +/- .005		APPLICATION PARTNER II-L		
X.XX +/- .010		SCALE 6:1	DWG No. 6-03-030-023	SIZE B
X.X +/- .030				
ANGLE +/- 1.0°		DATE 10 JUL 01	DRAWN BY REUTER	SHEET No. 3 OF 3

Remote Hand Controller



MC5 Spindle Drive Parameters

for
ML45 Lathe

7-09-01

Parameter	Name	MC5 2022 30 HP	Unit
INITIALIZE CONSTANTS			
A1-01	Access Level	4	
A1-02	User Setting	2	
PROGRAM CONSTANTS			
B1-01	Reference Selection	1	
B1-07	LOC/REM RUN Sel	0	
B1-02	Operation Method	1	
B2-03	D/C Injection Braking	.25	
AUTO TUNING CONSTANTS			
C1-01*	Accel Time 1	4.5	sec
C1-02*	Decel Time 1	5.5	sec
C1-03*	Accel Time 2	10	sec
C1-04*	Decel Time 2	10	sec
C1-07*	Accel Time 4	10	sec
C1-08*	Decel Time 4	10	sec
C1-11	Acc/Dec SW Freq	0.	Hz
C2-01	SCrv Acc @ Start	.30	
C2-02	SCrv Acc @ End	.30	
C2-03	SCrv Dec @ Start	.20	
C2-04	SCrv Dec @ End	0	
C5-01*	ASR P Gain	20	
C5-02*	ASR I Gain	.5	
C5-03*	ASR P Gain 2	20	
C5-04*	ASR I Time 2	.5	sec
C5-06	ASR Delay Time	0.004	
C6-01	Carrier Freq Max	10.	KHz
C8-08	AFR Gain	1	
C8-09	AFR Time	50	
C8-27	Inverse rate current		A
C8-28	DCCT Gain		
D1-09	Jog Reference	1.	Hz
MOTOR CONSTANTS			
E1-02	Motor Selection	0	
E1-04*	Max Frequency	95	Hz
E1-05	Max Voltage	230	V
E1-06	Base Frequency	60.	Hz
E1-13	Base Voltage	230	V
E2-01	Motor Rated FLA	77.2	A
E2-02	Motor Rated Slip	.61	Hz
E2-03	No-load Current	27.	A
E2-04	Number of Poles	4	
E2-05	Term Resistance	.075	Ohm
E2-06	Leak Inductance	19.5	%
E2-07	Saturation Comp1	.33	
E2-08	Saturation Comp2	.6	
E3-01	Control Method	2	
E4-01	Max Frequency 2	60.	Hz
E4-02	Max Voltage 2	230.	VAC

Parameter	Name	MC5 2022 30 HP	Unit
E4-03	Base Frequency 2	60.	Hz
E5-01	Motor Rated FLA2	77.2	A
E5-02	Motor Rated Slip2	1.7	Hz
E5-03	No-load Current 2	18.5	A
E5-05	Term Resistance2	.079	Ohm
E5-06	Leak Inductance2	19.5	%
OPTION CONSTANTS			
F1-01	FG Constant	1024	
F1-02	PG Fdbk Loss Sel	1	
F1-03	PG Overspeed Sel	1	
F1-04	PG Deviation Sel	3	
F1-05	PG Rotation Sel	0	
F1-06	PG Output Ratio	1	
F1-08	PG Overspd Level	115	
F1-11	PG Deviate Time	.5	
F1-14	PGO Time	2.	
F4-03	A0 Ch2 Select	3	
INPUTS			
H1-01	Terminal 3 Sel	24	
H1-02	Terminal 4 Sel	8	
H1-03	Terminal 5 Sel	3	
H1-04	Terminal 6 Sel	4	
H1-05	Terminal 7 Sel	6	
H1-06	Terminal 8 Sel	F	
OUTPUTS			
H2-01	Terminal 9 and 10 Sel	0	
H2-02	Terminal 25 Sel	2	
H2-03	Terminal 26 Sel	1	
H3-01	Terminal 13 Sel	0	
H3-02	Terminal 13 Sel	100.	%
H3-05	Terminal 16 Sel	0	
H4-01	Terminal 21 Sel	3	
RS 232			
H5-01	Serial Comm Adr	1F	
H5-02	Serial Comm Sel	3	
H5-03	Serial Corn Sel	0	
H5-04	Serial Fault Sel	3	
H5-05	Serial Flt Dtct	1	
L1-01	Motor Protect OFF	1	
L3-04	StallP Decel Sel	1	
L8-05	Ph Loss In Sel	0	
L8-07	Ph Loss Out Sel	1	
WINDING CHANGE CONSTANTS			
P1-02	Frequency Width	5.0	Hz
P1-03	Ansback Det Time	0.2	Sec
P1-04	Wye Winding Sel	1	
P1-05	CASE Param 5	.01	

This listing contains the spindle drive parameters that have been changed by Milltronics Manufacturing. All other parameters remain unchanged and are the factory default settings from Yaskawa.

Yaskawa Axis Drive Parameters for Partner ML45

X-Axis

Cn-01=008CH
Cn-02=0000H
Cn-03=00415
Cn-04=00050
Cn-05=01000
Cn-06=00800
Cn-07=00000
Cn-08=00800
Cn-09=00800
Cn-0A=00984
Cn-0B=00020
Cn-0C=00800
Cn-0D=00000
Cn-0E=00000
Cn-0F=00000
Cn-10=00100
Cn-11=08192
Cn-12=00050
Cn-13=00034
Cn-14=10000
Cn-15=03000
Cn-16=00010
Cn-17=00025
Cn-18=00100
Cn-19=00100
Cn-1A=00028
Cn-1B=00007
Cn-1C=00000
Cn-1D=00000
Cn-1E=01024
Cn-1F=00100
Cn-20=00200
Cn-21=00300
Cn-22=00006
Cn-23=00000
Cn-24=00004
Cn-25=00001
Cn-26=00000
Cn-27=00000
Cn-28=00000
Cn-29=00002
Cn-2A=00177
Cn-2B=00000
Cn-2C=52500
Cn-2D=00410

Z-Axis

Cn-01=008CH
Cn-02=0000H
Cn-03=00208
Cn-04=00070
Cn-05=00400
Cn-06=00800
Cn-07=00000
Cn-08=00800
Cn-09=00800
Cn-0A=01968
Cn-0B=00020
Cn-0C=00800
Cn-0D=00000
Cn-0E=00000
Cn-0F=00000
Cn-10=00100
Cn-11=08192
Cn-12=00050
Cn-13=00034
Cn-14=10000
Cn-15=03000
Cn-16=00010
Cn-17=00000
Cn-18=00100
Cn-19=00100
Cn-1A=00028
Cn-1B=00007
Cn-1C=00000
Cn-1D=00000
Cn-1E=01024
Cn-1F=00100
Cn-20=00200
Cn-21=00300
Cn-22=00006
Cn-23=00000
Cn-24=00004
Cn-25=00001
Cn-26=00000
Cn-27=00000
Cn-28=00000
Cn-29=00002
Cn-2A=00177
Cn-2B=00000
Cn-2C=52500
Cn-2D=00410

Procedure: Setting up gains for Centurion 6's

Card Cage Gain Setting Procedure

The motion control cards are pre-adjusted in the assembly area by commanding a move of 0.2048" and adjusting the gain pot so the analog is **5** volts. This adjustment can be made on the machine as well, but some parameters should be noted before making the adjustments.

Note 1: Before making any adjustments on the Centurion 6 make sure that the AXIS parameters "Velocity Gain" are set to zero and the machine is re-homed.

Note 2: The offset pots should be adjusted to show zero following error when the machine is at rest before making gain adjustments.

The gain adjustments done in the assembly area are done for moves on axes that have 10,000 pulses/inch. If the PPU on the machine is something other than 10,000 you must move a different distance. The **5** volts should be tuned in for a 2,048 pulse move.

Example 1:

A rotary axis has 500 pulses/degree. You should see **5** volts after a move of 4,096 degrees, (I.E. $10,000/500 \times 0.2048$)

Example 2:

A machine has a PPU of 10,160. You should see **5** volts after moving 0.2016 inches (I.E. $10,000/10,160 \times 0.2048$). In most cases this small difference is not significant.

Note 3: The encoder multiplier parameter will have no affect on the above adjustments.

Drive Setting Procedure

After the motion control cards have been adjusted, the drives are tuned.

1. In AXIS parameters, check once again that Velocity Gain values are 0 (see above); check that Excess Error is set to 0.500; **re-home** the machine.
2. Use the hand-held digital operator to set CN-03 on Yaskawa axis drives. The correct value on all VM machines is 328. CN-03 is the equivalent of a gain pot. Move an axis at 100 ipm and observe the following error. It should be **0.050 for all axes on all machines**, except rotary axes. Tweak the motion control card gain pot for final adjustment, to get as close to 0.050 as necessary.
3. If the machine has analog drives, then adjust the drive gain pot to set the following error at 100 ipm to 0.050 **for all axes on all machines**. Once again, the final adjustment may be made by tweaking the motion control card gain pot, if necessary.
4. If the axis PPU is something other than 10,000 you must tune the drives accordingly.
Example: A rotary axis has a PPU of 500. You should move the axis at 2,000 degrees per minutes (I.E. $10,000/500 \times 100$) and tune the drive so you see a following error of 1.000 degree (I.E. $10,000/500 \times \mathbf{0.050}$).
5. Test that you can achieve max rapid and that the following error at max rapid is correct. Check in AXIS parameters to see the value for max rapid, then use the following formula:

Following error at max rapid = max rapid/100 x **0.050**.

Example: A VM24 has max rapids of 800 ipm. You should see a following error of .400 at full rapid (I.E. $800/100 \times \mathbf{0.050} = .400$).

6. Go back into AXIS parameters and set Velocity Gain to 100. **Re-home** machine.

Centurion 6 CNC Connector Signal Listing

Connector X-Input

Pin 1 - Machine emergency stopped	Pin 8 - Spindle zero speed
Pin 2 - Spare	Pin 9 - Spindle drive fault
Pin 3 - Spare	Pin 10 - Spool Reverse
Pin 4 - Spindle up-to-speed	Pin 11 - Digitizing probe signal
Pin 5 - Tool Change	Pin 12 - Key (jumped to Home-1 and X-axis10)
Pin 6 - Lube Fault (oiler empty)	Pin 13 - No connect
Pin 7 - CNC wait channel	Pin 14 - No connect

Connector Y-Input

Pin 1 - Air pressure	Pin 8 - Tool out switch pushed – (requested)
Pin 2 - Tool carousel at home (jumped to TCH-8)	Pin 9 - Chip pan door is open (feedhold)
Pin 3 - Tool carousel at pocket (jumped to TCH-9)	Pin 10 - Set-up button
Pin 4 - Tool changer arm is in (jumped to TCH-10)	Pin 11 - Edit switch (keylock)
Pin 5 - Tool changer arm is out (jumped to TCH-11)	Pin 12 - Key (jumped to Home-3)
Pin 6 - Spare Y-axis 10)	Pin 13 - No connect
Pin 7 - Orient roller is in - prox signal (jumped to TCH-12)	Pin 14 - No connect

Connector Z-input

Pin 1 - Remote HW Enable	Pin 8 - Tool Setting
Pin 2 - Remote FOV1	Pin 9 - High/Low Gear
Pin 3 - Remote FOV2	Pin 10 - Arm Parked
Pin 4 - OverTemp	Pin 11 - Auger Switch
Pin 5 - Top (on arm tool changer)	Pin 12 - Key (jumped to home 5 and Z-axis 10)
Pin 6 - Middle (on arm tool changer)	Pin 13 - No connect
Pin 7 - Bottom (on arm tool changer)	Pin 14 - No connect

Connector A-Input

Pin 1 - X-axis Yaskawa drive OK/Fault (jumped through JS3 to X-axis 9)	Pin 8 - Remote HW Coord 1
Pin 2 - Y-axis Yaskawa drive OK/Fault (jumped through JS3 to Y-axis 9)	Pin 9 - Remote HW Coord 2
Pin 3 - Z-axis Yaskawa drive OK/Fault (jumped through JS3 to Z-axis 9)	Pin 10 - Remote HW Coord 3
Pin 4 - A-axis Yaskawa drive OK/Fault(jumped through JS3 to A-axis 9)	Pin 11 - Remote HW set Coord
Pin 5 - B-axis Yaskawa drive OK/Fault (jumped through JS3 to B-axis 9)	Pin 12 - Key (jumped to home 7 and A-axis 10)
Pin 6 - Remote HW Axis 1	Pin 13 - No connect
Pin 7 - Remote HW Axis 2	Pin 14 - No connect

Connector X-Output

Pin 1 - Excess Error	Pin 8 - Tool change
Pin 2 - Spray mist coolant	Pin 9 - Allow Reset
Pin 3 - Flood coolant	Pin 10 - Delayed reset
Pin 4 - Spindle clockwise	Pin 11 - Spindle latch
Pin 5 - Spindle counter clockwise	Pin 12 - Rotary clamp
Pin 6 - Spindle drive OK	Pin 13 - Key
Pin 7 - Drawbar Enable (VK5 & MB-Auto only)	Pin 14 - No connect

Centurion 6 CNC Connector Signal Listing

Connector Y-Output

Pin 1 - Creep speed	Pin 8 - Blowoff/Drumdoor/FeedHold (jumped to TCH-Yin9)
Pin 2 - Tool changer arm in/ pot down (jumped to TCH-1)	Pin 9 - Gear 1 of 4 Gear
Pin 3 - Power drawbar (jumped to TCH-2)	Pin 10 - Low range - Gear 2 of 4
Pin 4 - Tool carousel clockwise (jumped to TCH-3)	Pin 11 - Medium range – Gear 3 of 4
Pin 5 - Tool carousel counter clockwise (jumped to TCH-4)	Pin 12 - High range - Gear 4 of 4
Pin 6 - Spindle enable	Pin 13 - Key
Pin 7 - Orient roller (jumped to TCH-5)	Pin 14 - No connect

Connector Z-Output

Pin 1 - MC1G / Optical Probe On	Pin 8 - Miscellaneous M-code No. 2
Pin 2 - MC1D / Hard Tap (For no ramps on CSM)	Pin 9 - Miscellaneous M-code No. 3
Pin 3 - MC1C / Auger for Chip removal M38/M39	Pin 10 - Miscellaneous M-code No. 4
Pin 4 - MC1B	Pin 11 - Miscellaneous M-code No. 5
Pin 5 - MC1A	Pin 12 - Spindle reverse
Pin 6 - Miscellaneous M-code No. 1	Pin 13 - Key
Pin 7 - End-of-cycle lamp	Pin 14 - No connect

Connector A-Output

Pin 1 - X-Axis drive enable (jumped through JS3 to X-axis 13)	Pin 8 - Spare
Pin 2 - Y-Axis drive enable (jumped through JS3 to Y-axis 13)	Pin 9 - Spare
Pin 3 - Z-Axis drive enable (jumped through JS3 to Z-axis 13)	Pin 10 – Spindle Running
Pin 4 - A-Axis drive enable (jumped through JS3 to A-axis 13)	Pin 11 – Door Open
Pin 5 - B-Axis drive enable (jumped through JS3 to B-axis 13)	Pin 12 – Door Close
Pin 6 - Axis drives enable	Pin 13 - Key connect
Pin 7 - Arm (on Swing-Arm TlChngr)	Pin 14 - No

Connectors X, Y, Z, A and B Axis (DC Brush Drives)

Pin 1 - Channel A +	Pin 8 - +5 VDC
Pin 2 - Channel A -	Pin 9 - Axis fault/OK (jumped through JS3 to A-Input)
Pin 3 - Channel B +	Pin 10 - Axis home switch (also found on Home Connector)
Pin 4 - Channel B -	Pin 11 - Axis analog signal
Pin 5 - Marker -	Pin 12 - Axis analog ground
Pin 6 - Marker +	Pin 13 - Axis Enable/Disable (jumped through JS3 to A- Output)
Pin 7 - DC ground	Pin 14 - Key

Connectors X, Y, Z, A and B Axis (Yaskawa Brushless Drives)

Pin 1 - 0 VDC	Pin 20 - Marker -	Pin 34 - Channel A -
Pin 2 - 0 VDC	Pin 29 - Servo ready	Pin 35 - Channel B +
Pin 5 - Axis analog signal	Pin 30 - 0 VDC	Pin 36 - Channel B -
Pin 6 - 0 VDC	Pin 31 - Alarm output	Pin 40 - Servo ON
Pin 10 - 0 VDC	Pin 32 - 0 VDC	Pin 47 - +24 VDC
Pin 19 - Marker +	Pin 33 - Channel A +	All other pins are no connect

Axis Home Connector

Pin 1 - X-axis home switch signal (jumped to X-axis 10 & X-input 12)	Pin 8 - A-axis home switch ground
Pin 2 - X-axis home switch ground	Pin 9 - B-axis home switch signal (jumped to B-axis 10 & A-input 11)
Pin 3 - Y-axis home switch signal (jumped to Y-axis 10 & Y-input 12)	Pin 10 - B-axis home switch ground
Pin 4 - Y-axis home switch ground	Pin 11 - Key

Centurion 6 CNC Connector Signal Listing

Pin 5 - Z-axis home switch signal (jumped to Z-axis 10 & Z-input 12)	Pin 12 - No connect
Pin 6 - Z-axis home switch ground	Pin 13 - No connect
Pin 7 - A-axis home switch signal (jumped to A-axis 10 & A-input 12)	Pin 14 - No connect

Spindle Drive Connector

Pin 1 - Forward Run (jumped to X-out 4)	Pin 8 - Spindle analog signal (jumped to Misc-13)
Pin 2 - Reverse Run (jumped to X-out 5)	Pin 9 - Spindle fault contacts (jumped to X-in 9)
Pin 3 - Ground	Pin 10 - Ground
Pin 4 - Key	Pin 11 - Spindle analog signal ground (jumped to Misc-14)
Pin 5 - Creep speed (jumped to Y-out 1)	Pin 12 - Spindle load meter (jumped to Misc-3)
Pin 6 - Ground	Pin 13 - Up-to-speed (jumped to X-in 4)
Pin 7 - Ground	Pin 14 - Zero speed (jumped to X-in 8)

Spindle Encoder Connector

Pin 1 - Channel A +	Pin 6 - Marker +	Pin 11 - DC ground
Pin 2 - Channel A -	Pin 7 - DC ground	Pin 12 - DC ground
Pin 3 - Channel B +	Pin 8 - +5 VDC	Pin 13 - DC ground
Pin 4 - Channel B -	Pin 9 - DC ground	Pin 14 - Key
Pin 5 - Marker -	Pin 10 - No connect	

Miscellaneous Connector (Misc)

Pin 1 - Machine reset - CR1C (+24 VDC)	Pin 8 - Reset 2 (jumped to FPP-8)
Pin 2 - Machine reset - K1 coil	Pin 9 - Tool change 1
Pin 3 - Load meter analog	Pin 10 - Tool change 2
Pin 4 - DC ground	Pin 11 - E-stop 1
Pin 5 - Key	Pin 12 - E-stop 2
Pin 6 - Excess error latch	Pin 13 - Spindle analog
Pin 7 - Reset 1 (jumped to FPP-7)	Pin 14 - DC ground

Front Panel Connector (FPP) and J2 on keyboard encoder card

Pin 1 - No connect	Pin 8 - Front panel reset switch (jumped to Misc-8)
Pin 2 - Front panel DC ground	Pin 9 - Front panel tool change reset switch (jumped to Misc-9)
Pin 3 - Key	Pin 10 - Front panel tool change reset switch (jumped to Misc-10)
Pin 4 - Front panel +24 VDC	Pin 11 - Front panel emergency stop switch (jumped to Misc-11)
Pin 5 - Front panel +12 VDC	Pin 12 - Front panel emergency stop switch (jumped to Misc-12)
Pin 6 - No connect	Pin 13 - No connect
Pin 7 - Front panel reset switch (jumped to Misc-7)	Pin 14 - No connect

Power Connector

Pin 1 - +5 VDC	Pin 6 - +12 VDC	Pin 11 - DC ground
Pin 2 - +5 VDC	Pin 7 - -12 VDC	Pin 12 - DC ground
Pin 3 - +5 VDC	Pin 8 - No connect	Pin 13 - DC ground
Pin 4 - +24 VDC	Pin 9 - Key	Pin 14 - DC ground
Pin 5 - No connect	Pin 10 - DC ground	

Connector Handwheel for remote handwheel option

Pin 1 - Channel A +	Pin 6 - No connect	Pin 11 - DC ground
Pin 2 - Channel A -	Pin 7 - DC ground	Pin 12 - DC ground
Pin 3 - Channel B +	Pin 8 - +5 VDC	Pin 13 - DC ground
Pin 4 - Channel B -	Pin 9 - DC ground	Pin 14 - Key
Pin 5 - No connect	Pin 10 - No connect	

Centurion 6 CNC Connector Signal Listing

Connector Tool Changer

Pin 1 - Tool changer arm in (jumped to Y-out 2)	Pin 8 - Tool carousel at home prox (jumped to Y-in 2)
Pin 2 - Power drawbar (jumped to Y-out 3)	Pin 9 - Tool carousel at pocket (jumped to Y-in 3)
Pin 3 - Tool carousel clockwise (jumped to Y-out 4)	Pin 10 - Tool changer arm in (jumped to Y-in 4)
Pin 4 - Tool carousel counter clockwise (jumped to Y-out 5)	Pin 11 - Tool changer arm out (jumped to Y-in 5)
Pin 5 - Tool carousel orient roller cylinder (jumped to Y-out 7)	Pin 12 - Tool carousel orient prox (jumped to Y-in 7)
Pin 6 - 20 pocket tool changer door open (jumped to Y-out 8)	Pin 13 - No connect
Pin 7 - Key	Pin 14 - No connect

Connector COM1 (Card Cage)

Pin 2 -	TXD
Pin 3 -	RXD
Pin 5 -	DC ground
All other pins	no connect

Connector COM2 For rigid tapping option

Pin 1 - Channel A +	Pin 4 - Channel B -	Pin 7 - +5 VDC
Pin 2 - Channel A -	Pin 5 - Marker +	Pin 8 - DC Ground
Pin 3 - Channel B +	Pin 6 - Marker -	Pin 9 - No connect

Connector Floppy Disk

Standard IBM personal computer floppy disk drive data port

Connector CRT (Video)

Pin 1 - VGA red signal return	Pin 14 - VGA red signal
Pin 2 - VGA green signal return	Pin 15 - VGA green signal
Pin 3 - VGA blue signal return	Pin 16 - VGA blue signal
Pin 4 - Digital ground	Pin 17 - VGA vertical synch.
Pin 5 - VGA synch. Return	Pin 18 - VGA horizontal synch.
Pin 6 - No connect	Pin 19 - No connect
Pin 7 - No connect	Pin 20 - No connect
Pin 8 - Serial I/O TXD	Pin 21 - Serial I/O RXD
Pin 9 - Front panel handwheel channel A +	Pin 22 - Front panel handwheel channel A -
Pin 10 - Front panel handwheel channel B +	Pin 23 - Front panel handwheel channel B -
Pin 11 - Cable shield	Pin 24 - Keyboard ATCLK
Pin 12 - DC ground	Pin 25 - Keyboard ATDAT
Pin 13 - DC ground	

Connectors in the CNC control box

Connector CRT (Monitor Power)

Pin 1 -	Monitor power 110 VAC line
Pin 3 -	Monitor power 110 VAC return
Pin 14 -	Monitor chassis ground
(All other pins are no connect)	

Connector FPACC

Pin 1 - Front panel fan +24 VDC	Pin 8 - Front panel emergency stop common
Pin 2 - Front panel fan DC ground	Pin 9 - Setup switch signal
Pin 3 - Chip pan door open feedhold signal	Pin 10 - Setup switch common
Pin 4 - Chip pan door open ground	Pin 11 - Chip pan door open 110 VAC
Pin 5 - Tool out switch signal	Pin 12 - Chip pan door open 110 return

Centurion 6 CNC Connector Signal Listing

- | | |
|---|-----------------------------------|
| Pin 6 - Tool out switch common | Pin 13 - End-of-cycle lamp signal |
| Pin 7 - Front panel emergency stop signal | Pin 14 - End-of-cycle lamp common |

Connector P2

- | | |
|---|------------------------|
| Pin 1 - Front panel handwheel channel A + | Pin 6 - Serial I/O RXD |
| Pin 2 - Front panel handwheel channel A - | Pin 7 - Keyboard ATCLK |
| Pin 3 - Front panel handwheel channel B + | Pin 8 - Keyboard ATDAT |
| Pin 4 - Front panel handwheel channel B - | Pin 9 - DC ground |
| Pin 5 - Serial I/O TXD | Pin 10 - DC ground |

Keyboard DIN Connector (J1)

- | | |
|------------------------|-------------------|
| Pin 1 - Keyboard EXCLK | Pin 4 - DC ground |
| Pin 2 - Keyboard EXDAT | Pin 5 - +5 VDC |
| Pin 3 - No connect | |

Connectors in the Mag Box

Connectors ATC1 and 1-1E

- | | |
|---|---|
| Pin 1 - Tool changer carousel power – return | Pin 9 - Tool changer arm out prox |
| Pin 2 - Tool changer carousel power – clockwise | Pin 10 - Tool arm in/tool arm out prox |
| Pin 3 - Tool changer carousel power - counter clockwise | DC ground |
| Pin 4 - Home/at pocket prox DC ground | Pin 11 - Key |
| Pin 5 - Home/at pocket prox +24 VDC | Pin 12 - Tool changer arm in/out signal |
| Pin 6 - Tool carousel home prox | Pin 13 - 20 pocket tool changer door open signal |
| Pin 7 - Tool carousel at pocket prox | Pin 14 - Tool changer arm & door solenoids common |
| Pin 8 - Tool changer arm in prox | |

Connector ATC2

- | | |
|---|---|
| Pin 1 - Spindle orient solenoid signal | Pin 8 - Spindle orient prox chassis ground |
| Pin 2 - Power drawbar solenoid signal | Pin 9 - Drawbar solenoid chassis ground |
| Pin 3 - Spray mist air solenoid signal | Pin 10 - Key |
| Pin 4 - Spindle orient solenoid +24 VDC | Pin 11 - Spray mist solenoid chassis ground |
| Pin 5 - Power drawbar solenoid +24 VDC | Pin 12 - Spindle orient prox signal |
| Pin 6 - Tool Out switch | Pin 13 - Spindle orient prox +24 VDC |
| Pin 7 - Spray mist air solenoid +24 VDC | Pin 14 - Spindle orient prox DC ground |

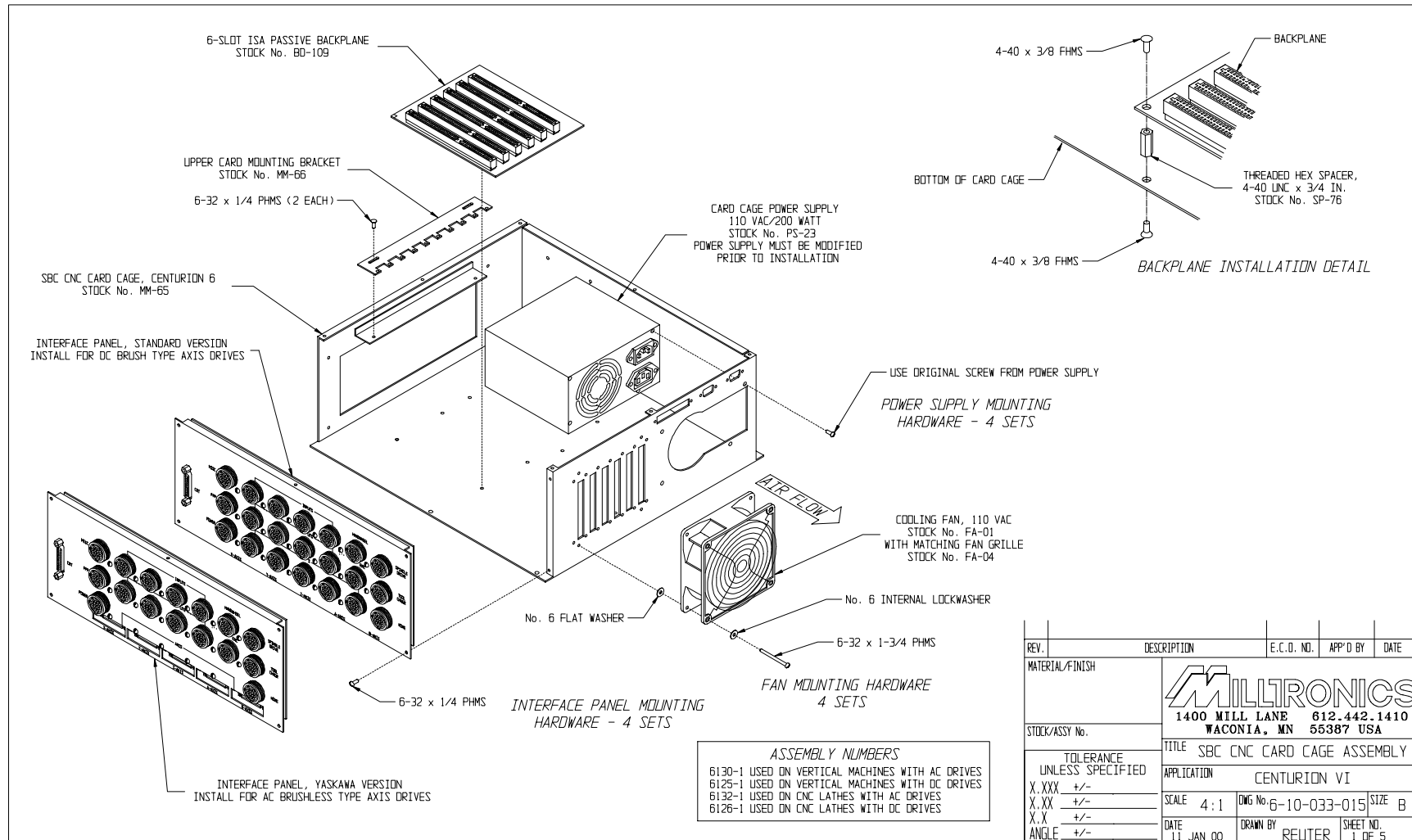
Connector on +24 VDC Regulated Power Supply

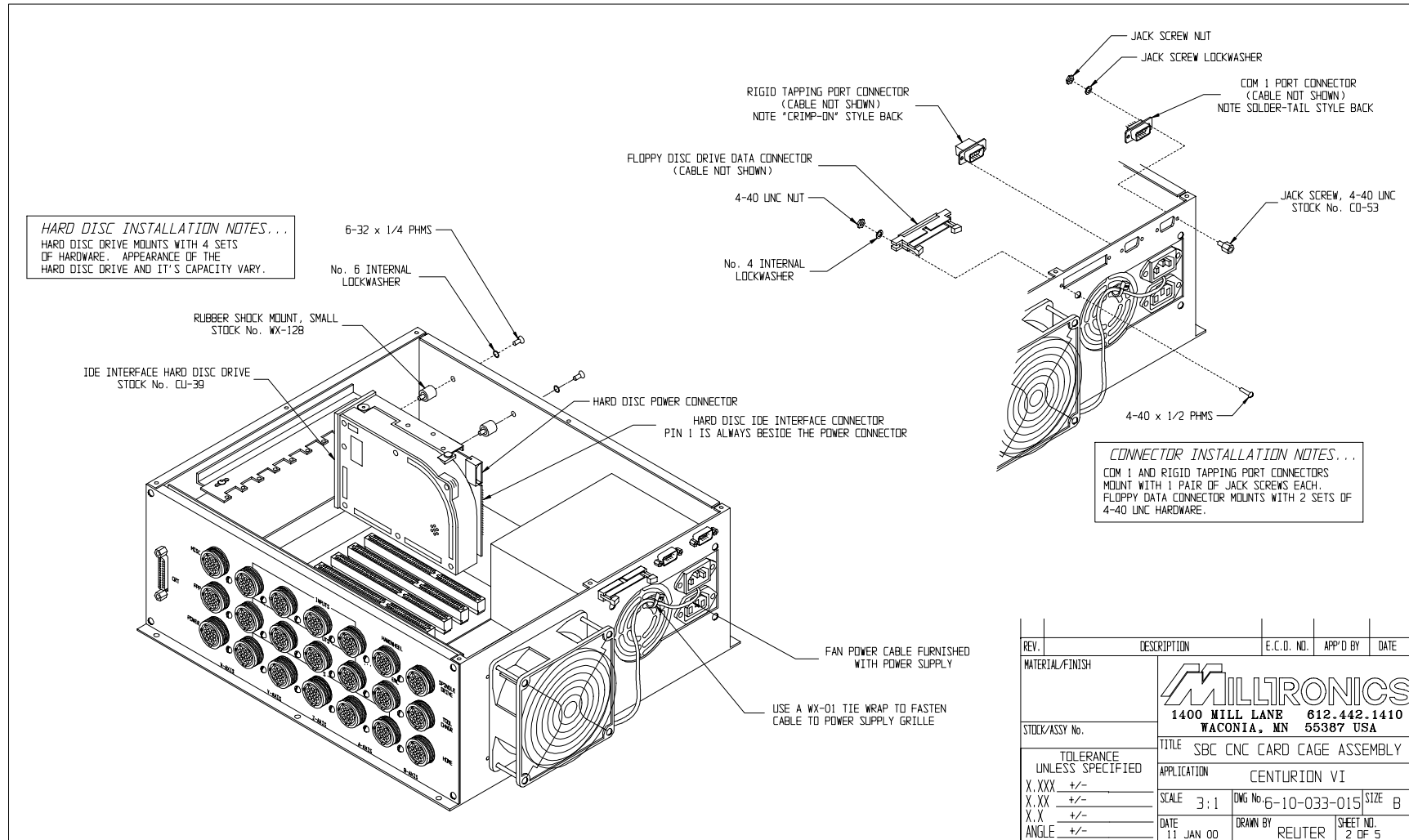
- | | |
|------------------------|---------------------|
| Pin 1 - 110 VAC line | Pin 8 - No connect |
| Pin 2 - 110 VAC return | Pin 9 - No connect |
| Pin 3 - No connect | Pin 10 - No connect |
| Pin 4 - +24 VDC | Pin 11 - DC ground |
| Pin 5 - +24 VDC | Pin 12 - DC ground |
| Pin 6 - Key | Pin 13 - DC ground |
| Pin 7 - No connect | Pin 14 - DC ground |

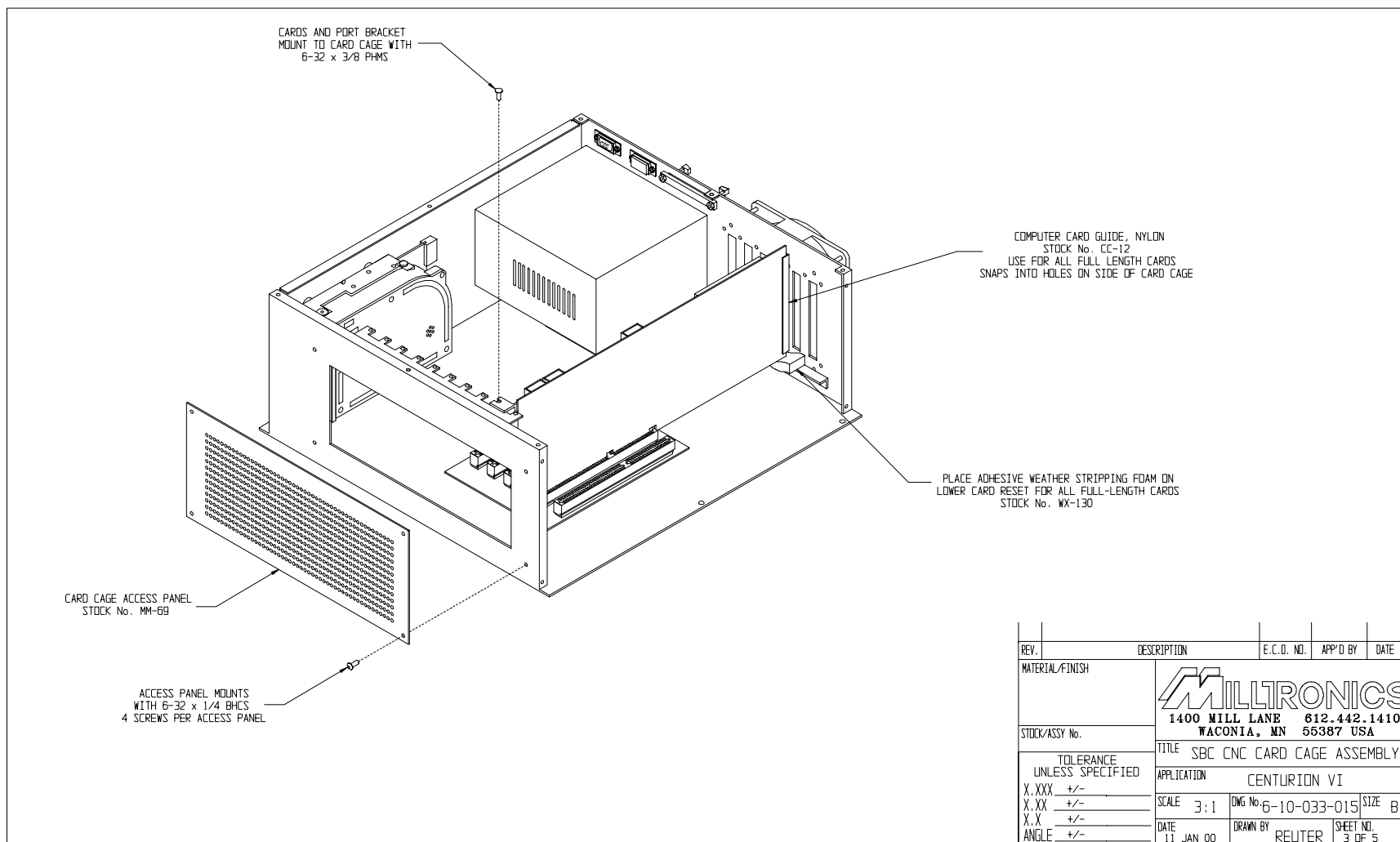
Connector COM1 (on Mag Panel)

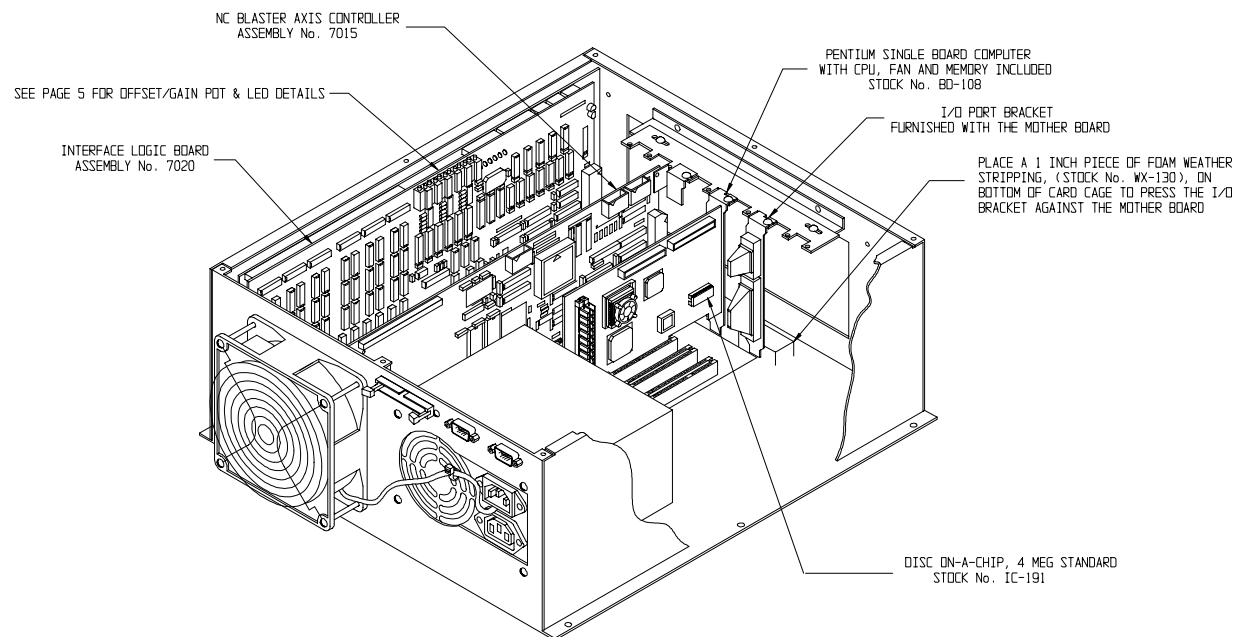
- Pin 2 - RXD
Pin 3 - TXD
Pin 7 - Ground
All other pins no connect

Card Cage Assembly

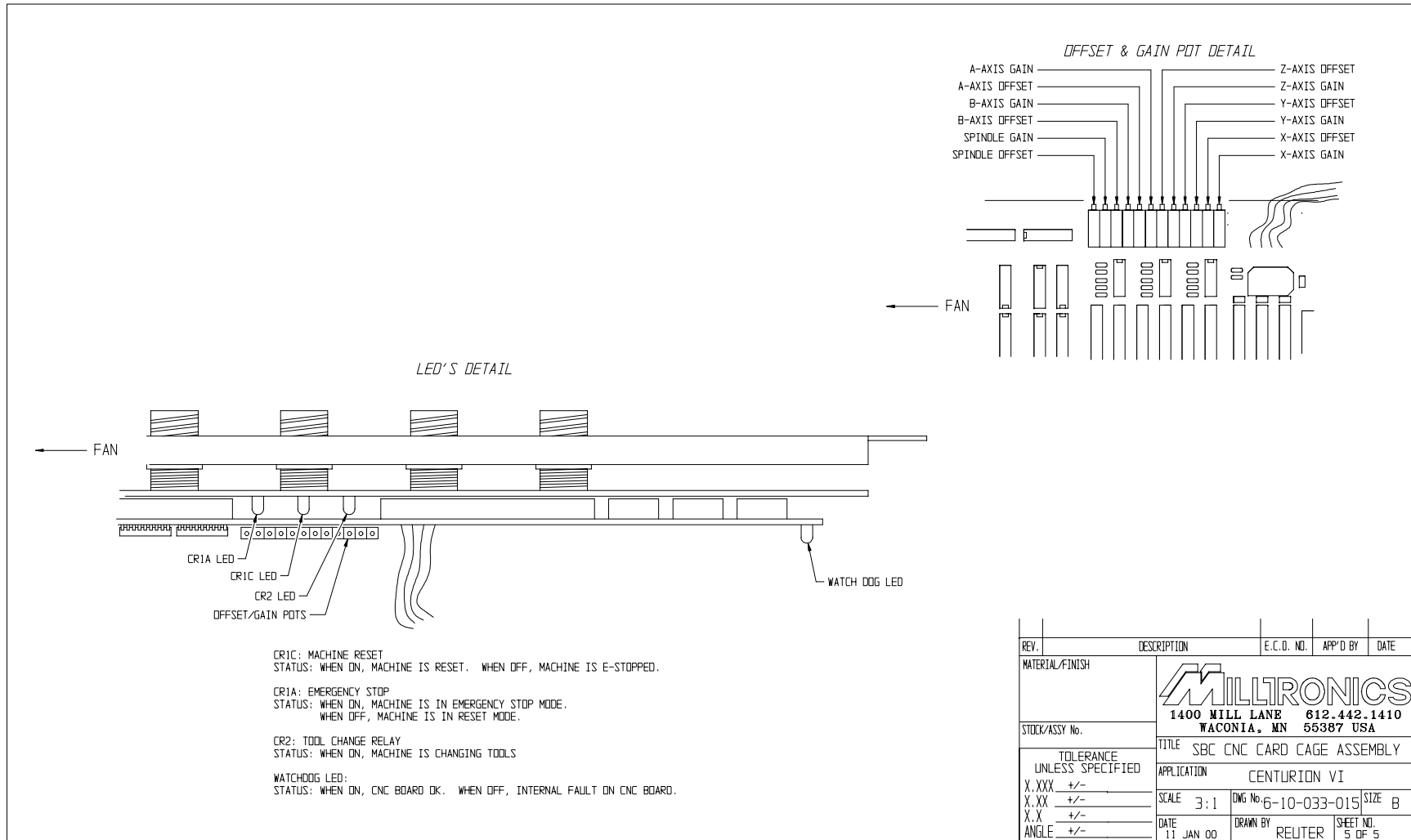






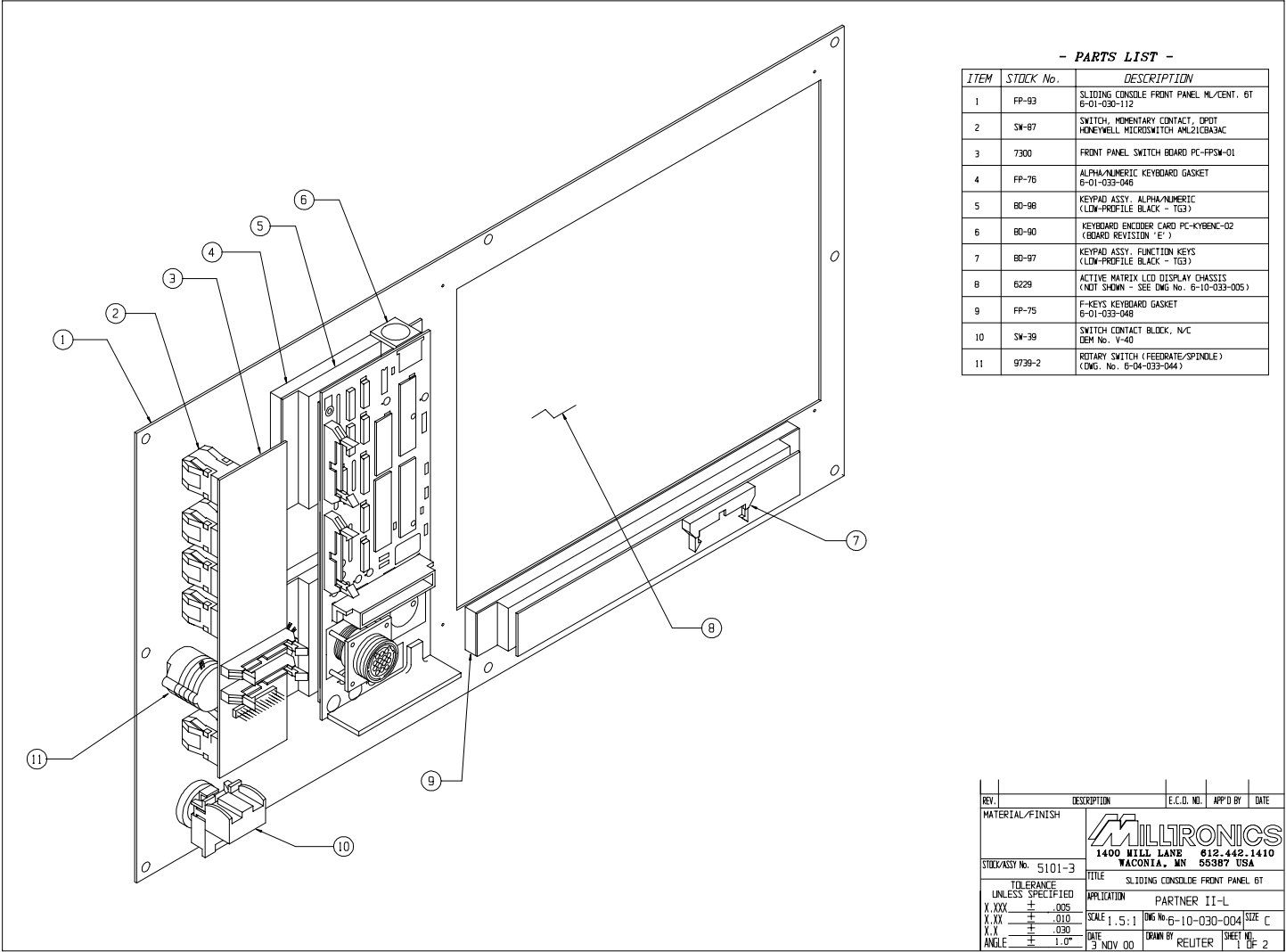


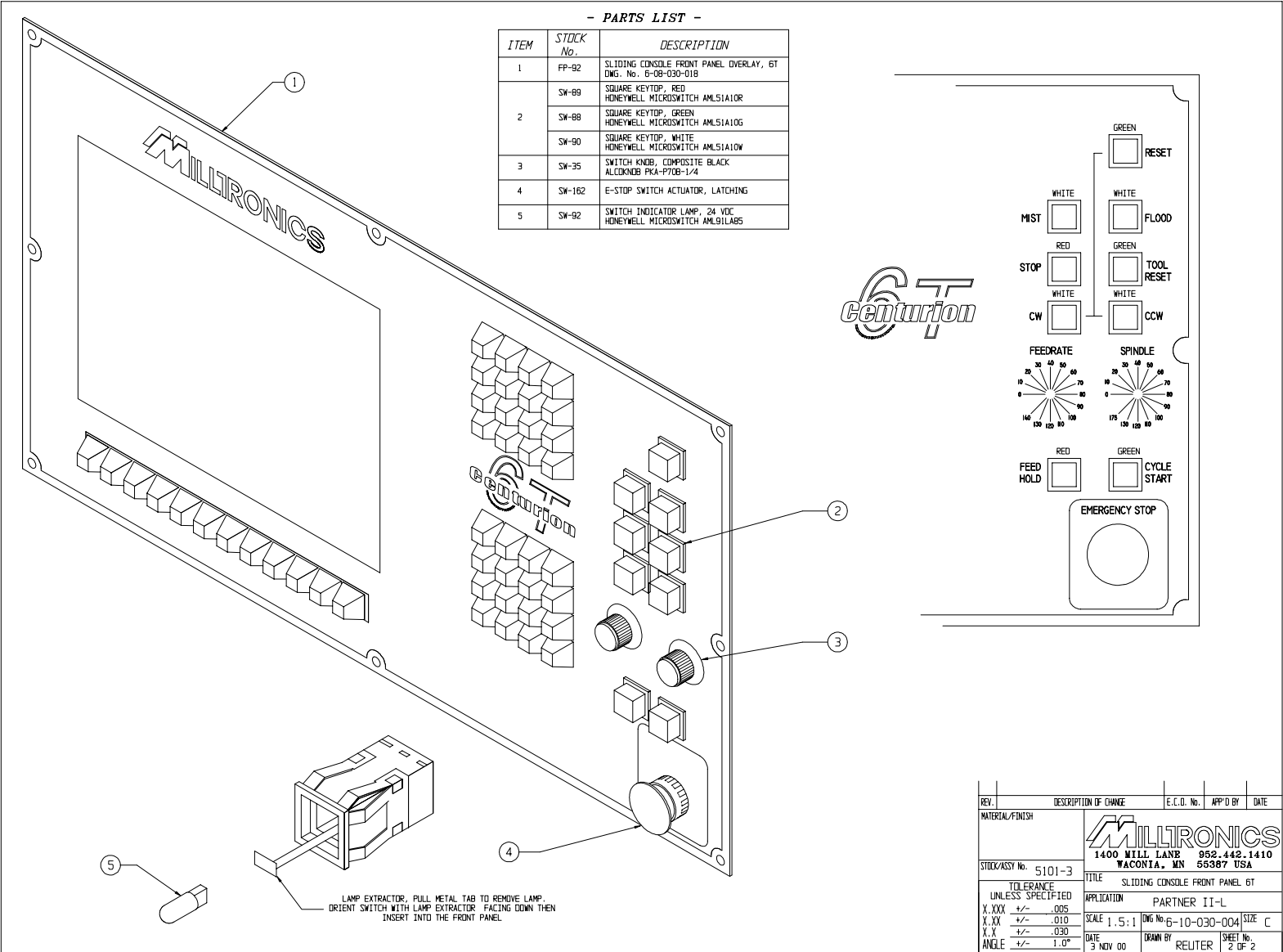
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE SBC CNC CARD CAGE ASSEMBLY		
X.XXX +/-		APPLICATION CENTURION VI		
X.XX +/-		SCALE 3:1 DWG No. 6-10-033-015 SIZE B		
X.X +/-		DATE 11 JAN 00 DRAWN BY REUTER SHEET NO. 4 OF 5		
ANGLE +/-				



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		MILLIRONICS 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE SBC CNC CARD CAGE ASSEMBLY		
X.XXX +/-		APPLICATION CENTURION VI		
X.XX +/-		SCALE 3:1		
X.X +/-		DWG NO. 6-10-033-015		
ANGLE +/-		DATE 11 JAN 00		
		DRAWN BY REUTER		
		SHEET NO. 5 OF 5		

LCD Front Panel Assembly





Remote Panel Assembly

1
2
3
4
5
6
7
8
9
10

AUTO
MANUAL
RAPID JOG

Z-AXIS

X-AXIS

+X
-X
+Z
-Z

PARTS LIST

ITEM	STOCK No.	DESCRIPTION
1	FP-88	ML SLIDING CONSOLE SUB-PANEL DWG. No. 6-01-030-107
	FP-91	ML SLIDING CONSOLE SUB-PANEL OVERLAY DWG. No. 6-08-030-019
2	SW-151	TOGGLE SWITCH, SPOT
3	SW-20	SWITCH ACTUATOR, GREEN
4	MPL-06	HANDWHEEL, 2-SPOKE. 4.92 DIA.
5	EO-32	ENCODER, (MANUAL PULSE GENERATOR) NEMICON/DAIDD OVM-01-20-13
6	SW-167	JOYSTICK HANDLE, 4 POSITION IDEC ARNS-04SB
7	HARDWARE	SETSCREW, CUP POINT, 1/4-20 UNC.
8	HARDWARE	ACORN NUT, 5/16-18 UNC.
9	MPL-07	HANDWHEEL, 2-SPOKE. 3.15 DIA.
10	HARDWARE	BRASS SPACER (INCLUDED IN EO-32 PACKAGE)

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No. 9845				
TOLERANCE UNLESS SPECIFIED		TITLE ML SLIDING CONSOLE SUB-PANEL		
X.XXX +/- .005		APPLICATION PARTNER II-L		
X.XX +/- .010		SCALE 2:1 DWG No. 6-10-030-005 SIZE B		
X.X +/- .030		DATE 2 NOV 00 DRAWN BY REUTER SHEET No. 1 OF 5		
ANGLE +/- 1.0°				

MARK ON JOYSTICK BASE FACES UP

"BOTTOM" CONTACTS

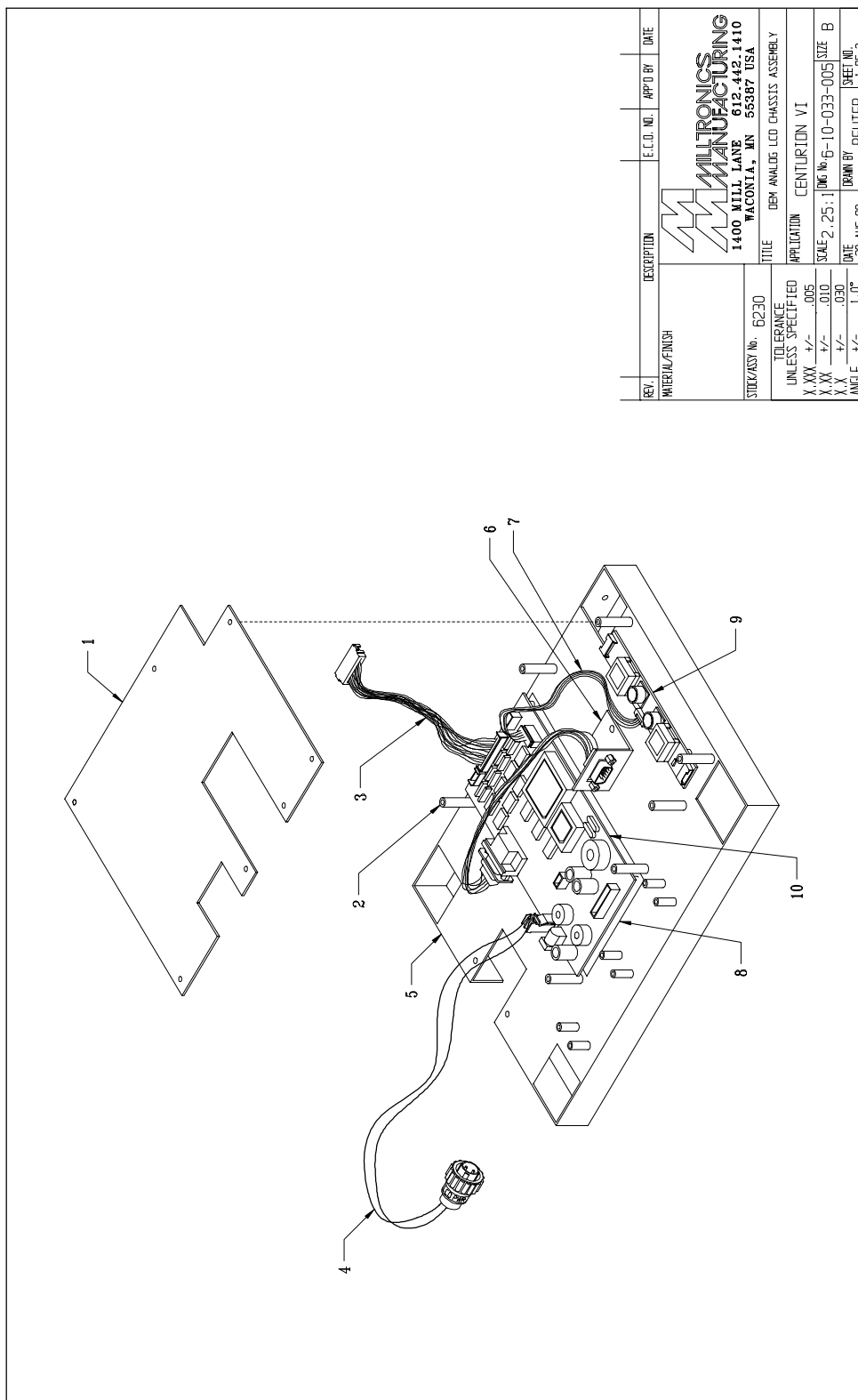
"TOP" CONTACTS

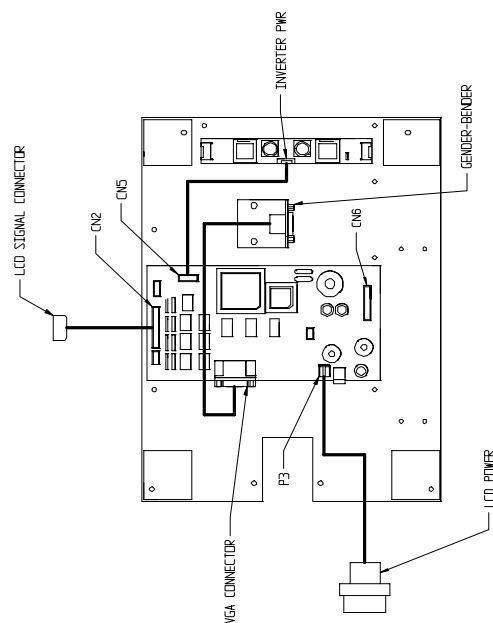
PARTS LIST

ITEM	STOCK No.	DESCRIPTION
1	SP-98	HEX SPAXER, ALUMINUM, 6-32 UNC F/F (USE No. 6 INTERNAL LOCKWASHER WHERE SPACER SCREWS INTO PANEL)
2	CD-129	CONNECTOR, 37 PIN FEMALE, CPC
3	SW-40	SWITCH CONTACT BLOCK, N/O
4	HARDWARE	LOCKWASHER, INTERNAL, No. 6
5	HARDWARE	RHMS, 6-32 x 3/8
6	SW-170	JOYSTICK CONTACT BLOCK, N/O IDEC BR-1
7	HARDWARE	SHCS, M5-.8 x 10 METRIC
8	HARDWARE	LOCKWASHER, INTERNAL, No. 10
	8970-1	CABLE, SUBPANEL X-AXIS ENCODER (PAGE 3)
	8970-2	CABLE, SUBPANEL Z-AXIS ENCODER (PAGE 3)
	8971	CABLE, SUBPANEL RAPID JOG (PAGE 4)
	8972	CABLE, SUBPANEL JOYSTICK (PAGE 5)

REV.	DESCRIPTION OF CHANGE	E.C.O. No.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 952.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No. 9845				
TOLERANCE UNLESS SPECIFIED		TITLE ML SLIDING CONSOLE SUB-PANEL		
X,XXX	+/- .005	APPLICATION PARTNER II-L		
X,XX	+/- .010	SCALE 2:1 DWG No 6-10-030-005 SIZE B		
X,X	+/- .030	DATE 2 NOV 00		
ANGLE	+/- 1.0°	DRAWN BY REUTER SHEET No. 2 OF 5		

LCD Chassis Assembly





—INSTRUCTIONS—

1. MOUNT THE VGA CABLE-BENDER TO THE CHASSIS WITH 6-32 x 1/2 RHMS AND NO. 8 LOCKWASHERS.
2. PLACE THE WX-242 INSULATOR SO IT LIES UNDER THE DIGITAL VIEW BOARD. INDEX THE INSULATOR WITH THE MOUNTING STANDOFFS FOR THE PC BOARD.
3. INSTALL THE ANALOG-TO-DIGITAL CONVERSION BOARD. THE WIRES FROM THE VGA CABLE-BENDER MUST LIE ON TOP OF THE CONVERSION BOARD. USE 4-40 x 1/4 RHMS AND LOCKWASHERS TO MOUNT THE BOARD. ATTACH THE OTHER END OF THE VGA CABLE-BENDER TO THE VGA CONNECTOR ON THE CONVERSION BOARD AND SECURE WITH THE CONNECTOR SCREWS.
4. MOUNT THE DCCT INVERTER BOARD TO THE CHASSIS WITH 4-40 x 1/4 RHMS AND LOCKWASHERS. CONNECT THE INVERTER POWER CABLE TO THE INVERTER BOARD. (SMALLER PLUG). CONNECT THE OTHER END TO THE CONVERSION BOARD CONNECTOR 'CN5'. THESE PLUGS ARE KEVED TO FIT ONLY ONE WAY ON EITHER BOARD'S CONNECTORS.
5. PLUG THE ANALOG LCD POWER CABLE. (2-PIN END), INTO THE 'P3' CONNECTOR ON THE CONVERSION BOARD.
6. CONNECT THE DUAL IN-LINE END OF THE LCD SIGNAL CABLE INTO 'CN2' CONNECTOR ON THE CONVERSION BOARD. THIS CONNECTOR IS KEVED AND WILL FIT ONLY ONE WAY. CONTAIN THE LOOSE WIRES OF THE CABLE WITH WX-011 TIE WRAPS.
7. PLACE TWO 6" INTERVAL LOCKWASHERS ON THE 6-32 STUDS. THESE ARE THE ONLY STUDS ON THE CHASSIS. THEN SCREW ON THE SP-58 SPACERS.
8. PLACE THE LCD CHASSIS COVER ON THE COMPLETED ASSEMBLY AND USE 6/32 x 1/4 RHMS AND LOCKWASHERS TO SECURE IT IN PLACE.

- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	PL-63	LCD CHASSIS BACK COVER DWG No. 6-01-033-042
2	SP-98	6-32 x 1-1/4 FEMALE/MALE HEX SPACER
3	CB-42	DV/SHARP LCD SIGNAL CABLE DIGITAL VIEW No. 224-30
4	9495	ANALOG LCD POWER CABLE DWG. No. 6-04-033-079
5	BR-95	12 IN. LCD DISPLAY CARRIER DWG No. 6-01-033-023
6	9497	ANALOG VGA GENDER-SENDER ASSEMBLY DWG No. 6-04-033-080
7	CB-41	HDI/4034/3520 POWER CABLE DIGITAL VIEW No. 42080170
8	W-242	DIGITAL VIEW REG INSULATOR DWG No. 6-01-033-047
9	PS-44	CEFT BACKLIGHT INVERTER XENON No. US320
10	BD-80	ANALOG LCD DISPLAY CONVERSION BOARD

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
WATERMANS		 MILLTRONICS MANUFACTURING 1400 MTLL LANE 612.442.1410 WACONIA, MN 55387 USA		
ORDER/AST NO.	TITLE DEM ANALOG LID CHASSIS ASSEMBLY APPLICATION CENTURION VI TOL GRANCE UNLESS SPECIFIED X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 X.XX +/- .010 X.XX +/- .010			