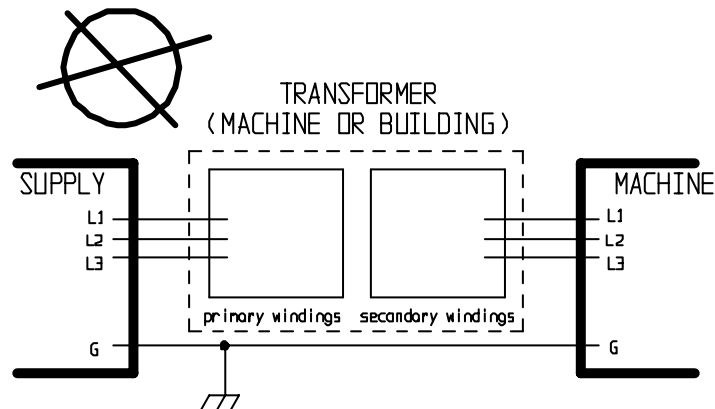


Electrical Manual
CE ML18 & 22
With M5 and Sigma2

Rev.2
10-08-02

***** 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.

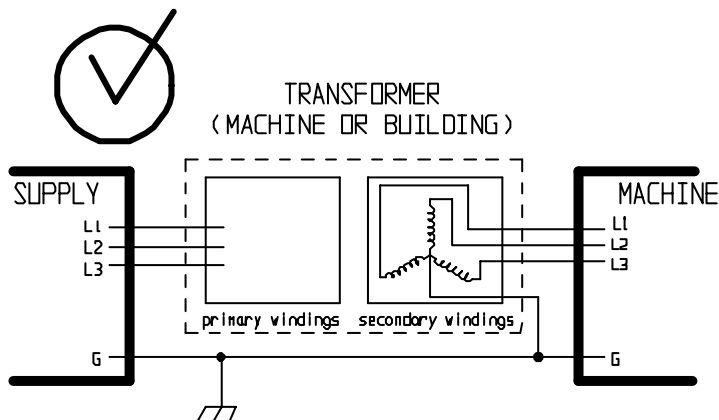
Remove transformer cover and follow transformer ground wire to determine if it is merely a case ground or if it actually goes to a neutral point within the secondary windings.

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.

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Manual Revision History

1-22-02	Original ML22 version. M5 spindle system, and Sigma2 axis drives and motors
10-7-02	Add ML18, update electrical drawings to Revision B, remove Dorian turret wiring, update I/O listings

Electrical Safety Rules

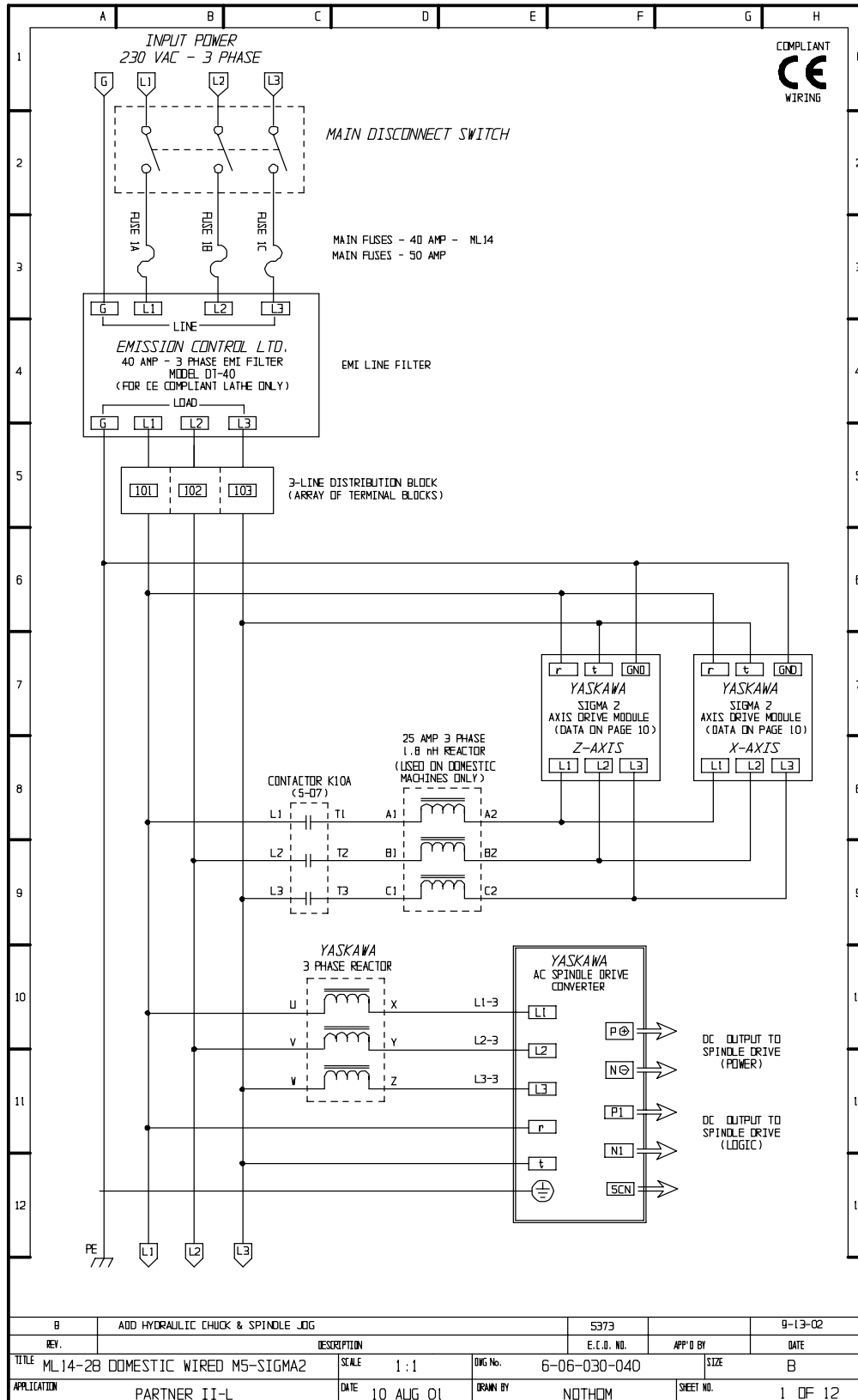
Read and understand the following list of cautions before attempting to perform service on this equipment. **Failure to observe these rules can result in death or serious injury.**

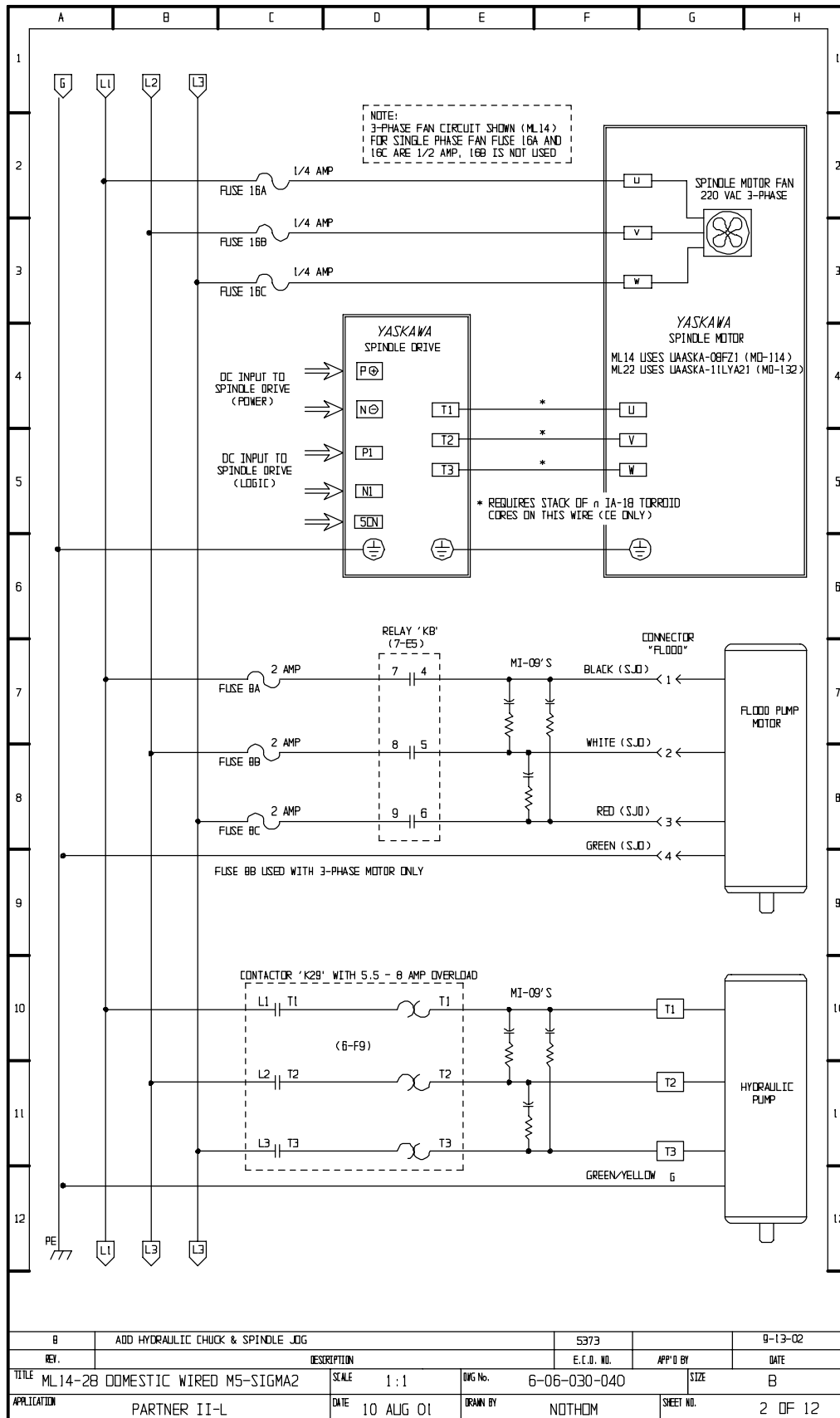
Caution

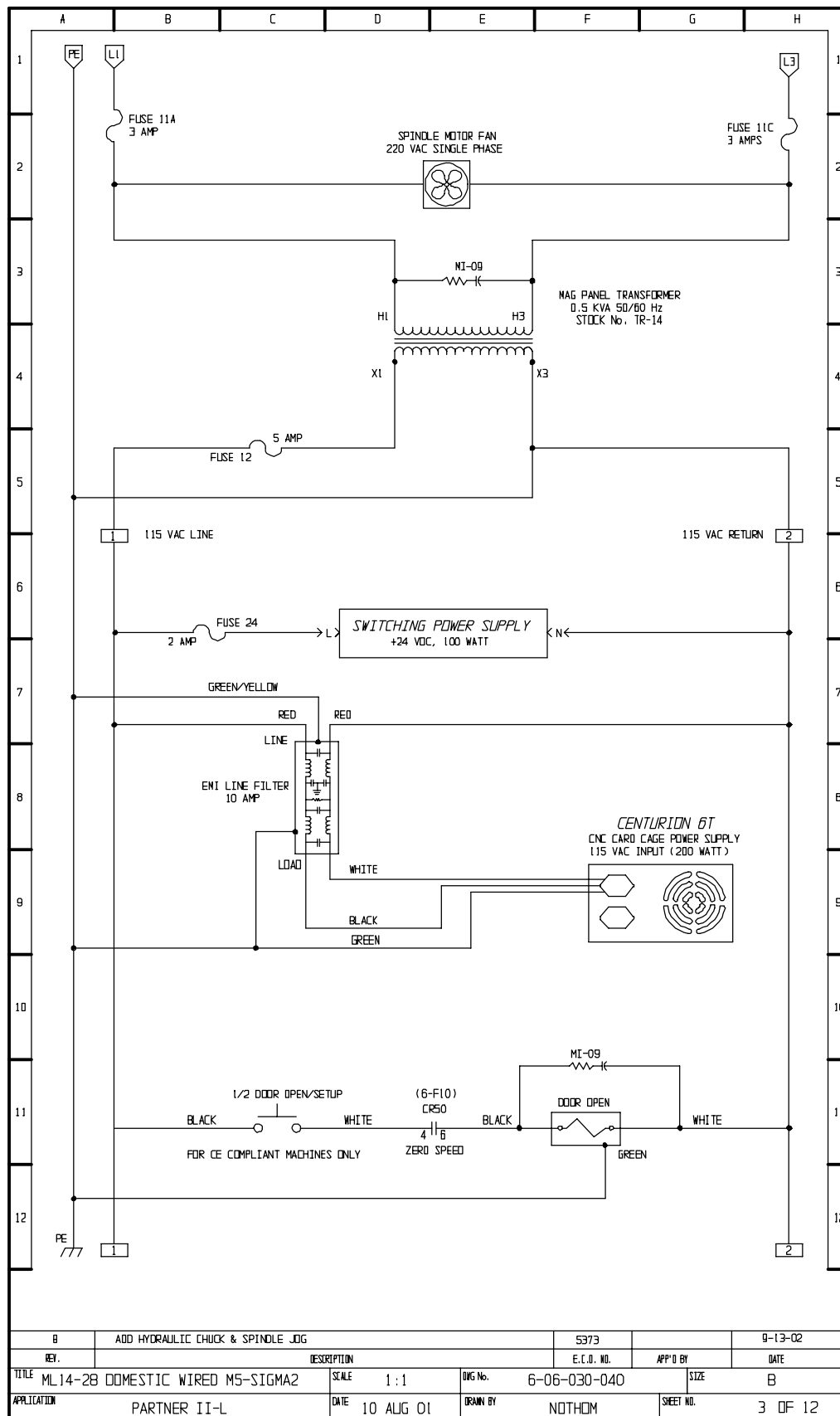
- Beware of High Voltage present within the machine's electrical cabinet
- Do not attempt to service electrical components unless you are qualified to work on them safely
- Only qualified personnel should attempt to make current and voltage readings
- Always turn the main power off before servicing components 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

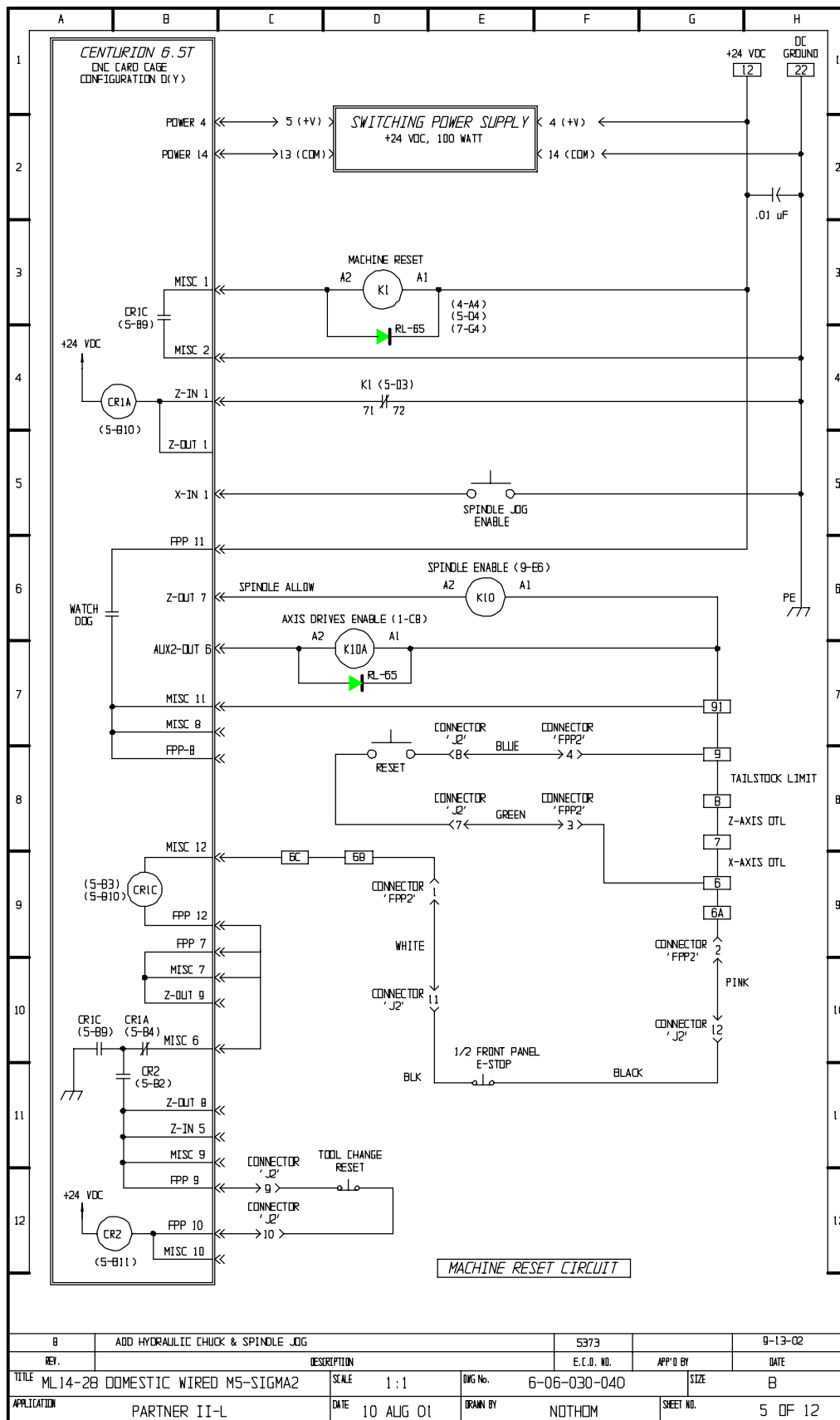
Machine Schematic

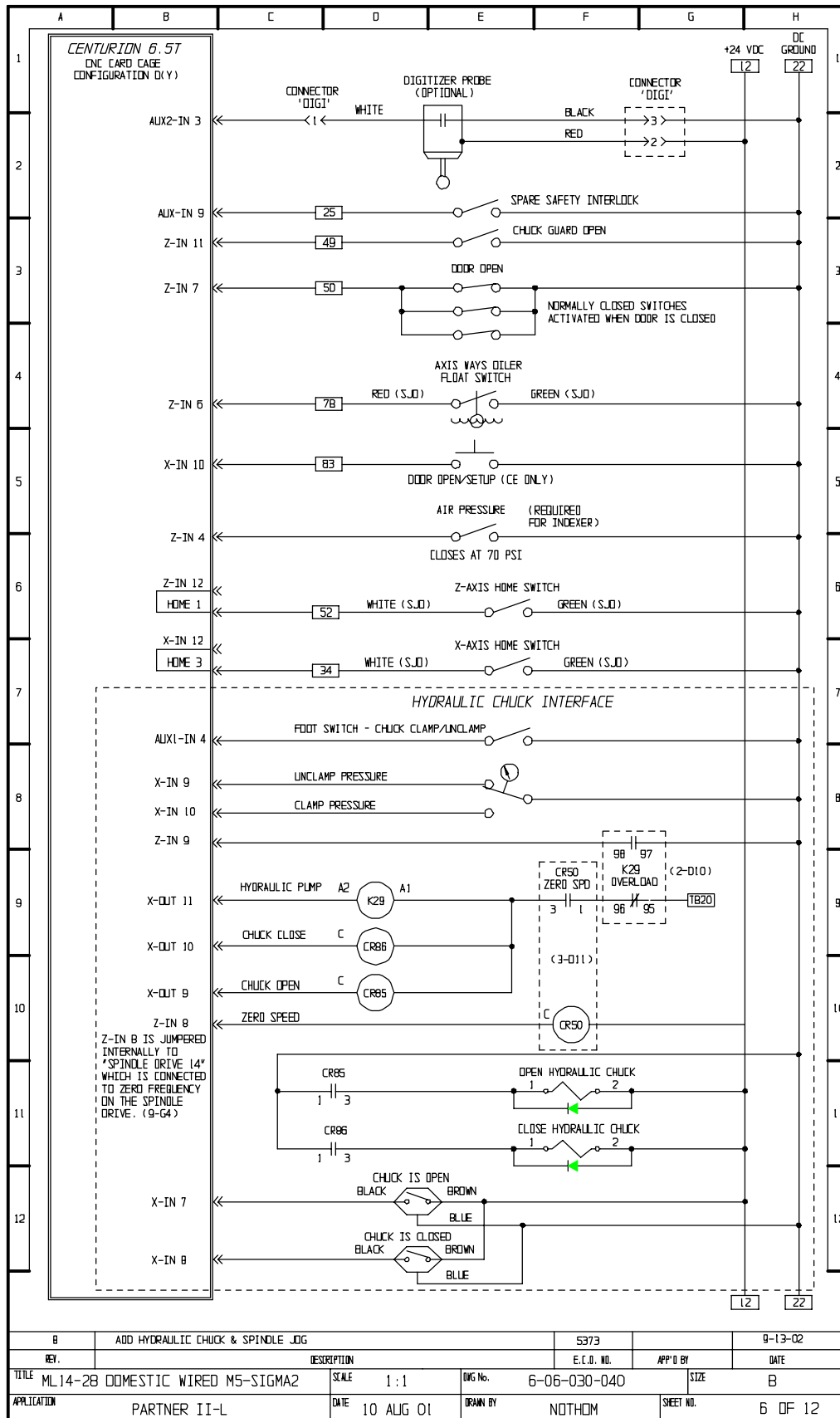


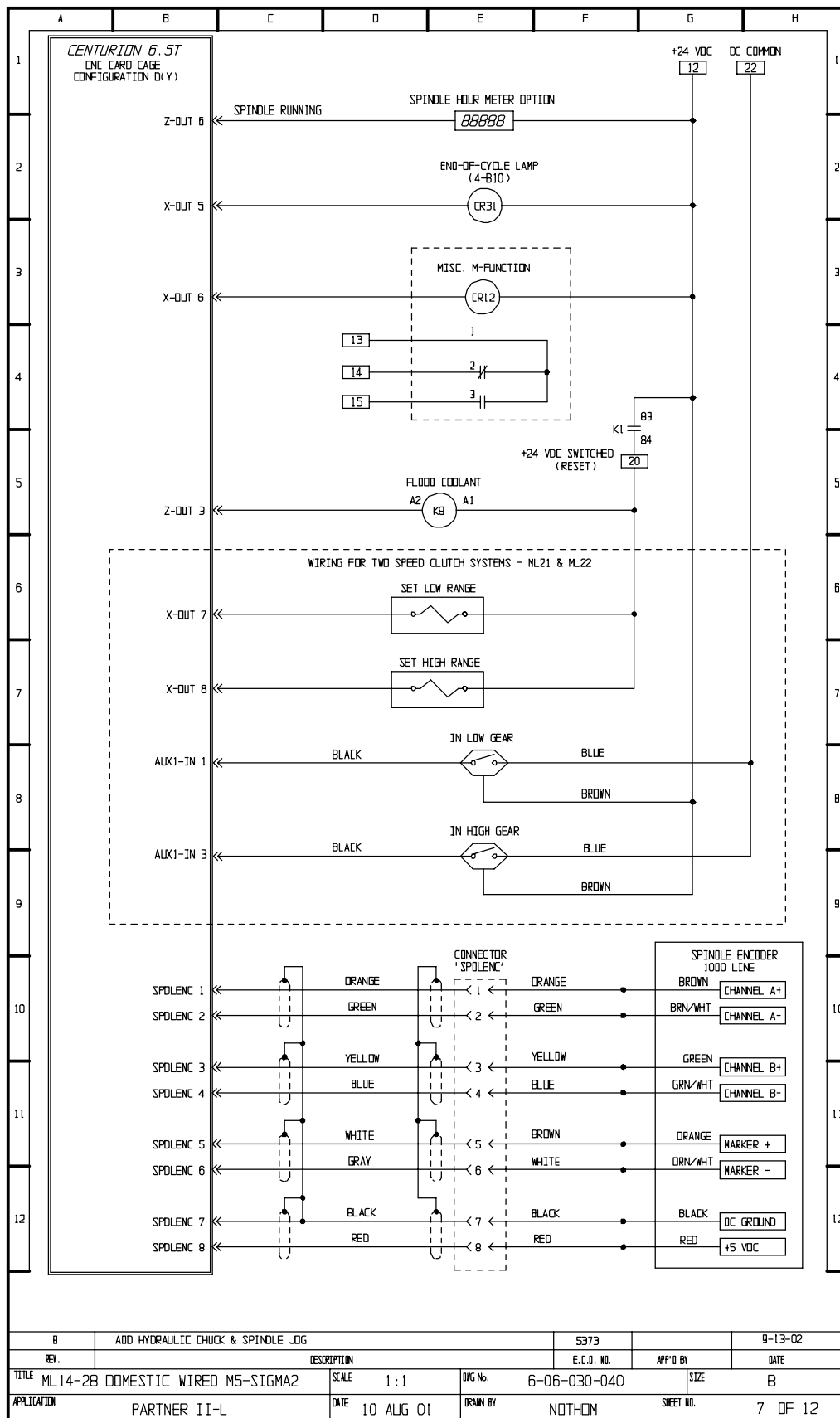


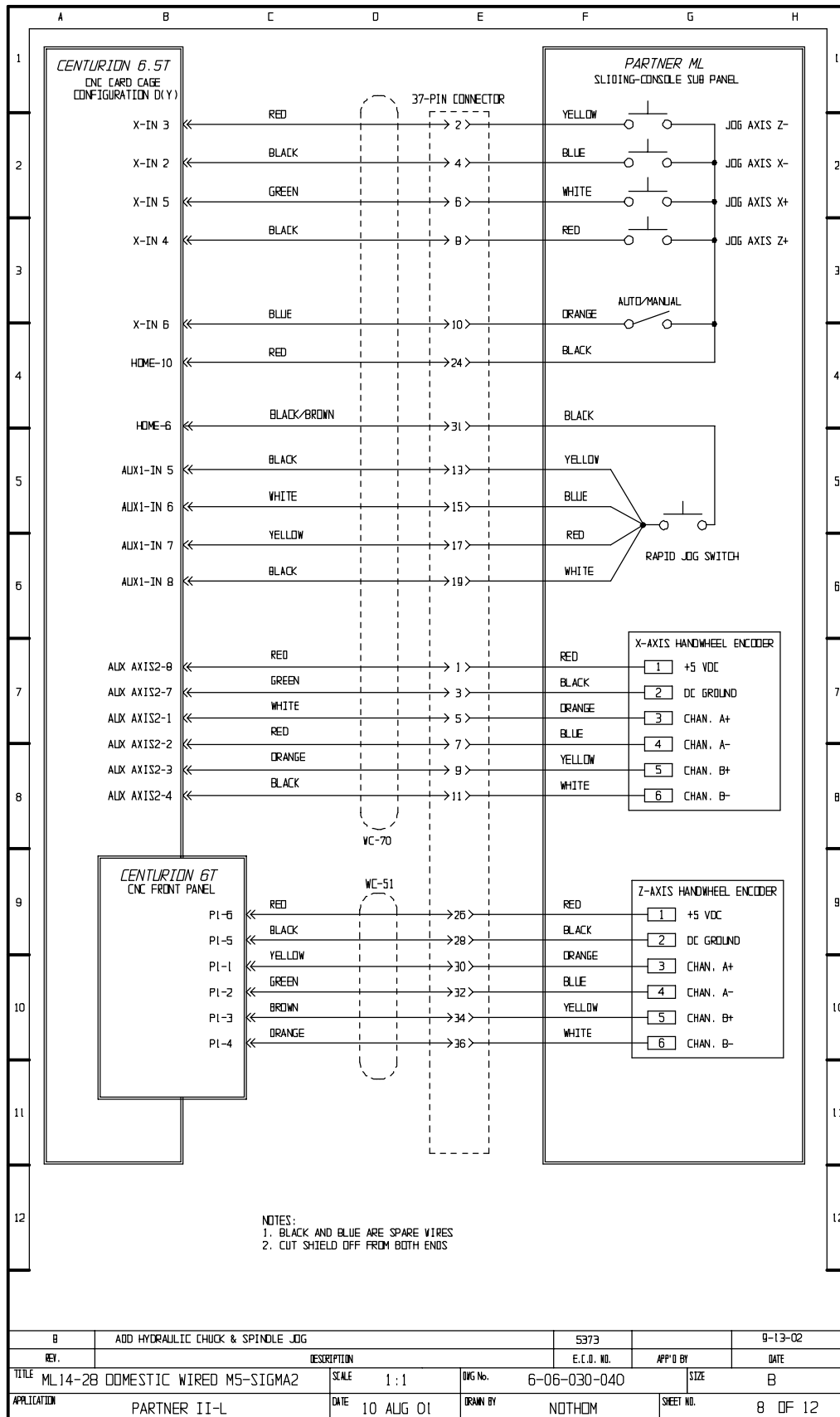


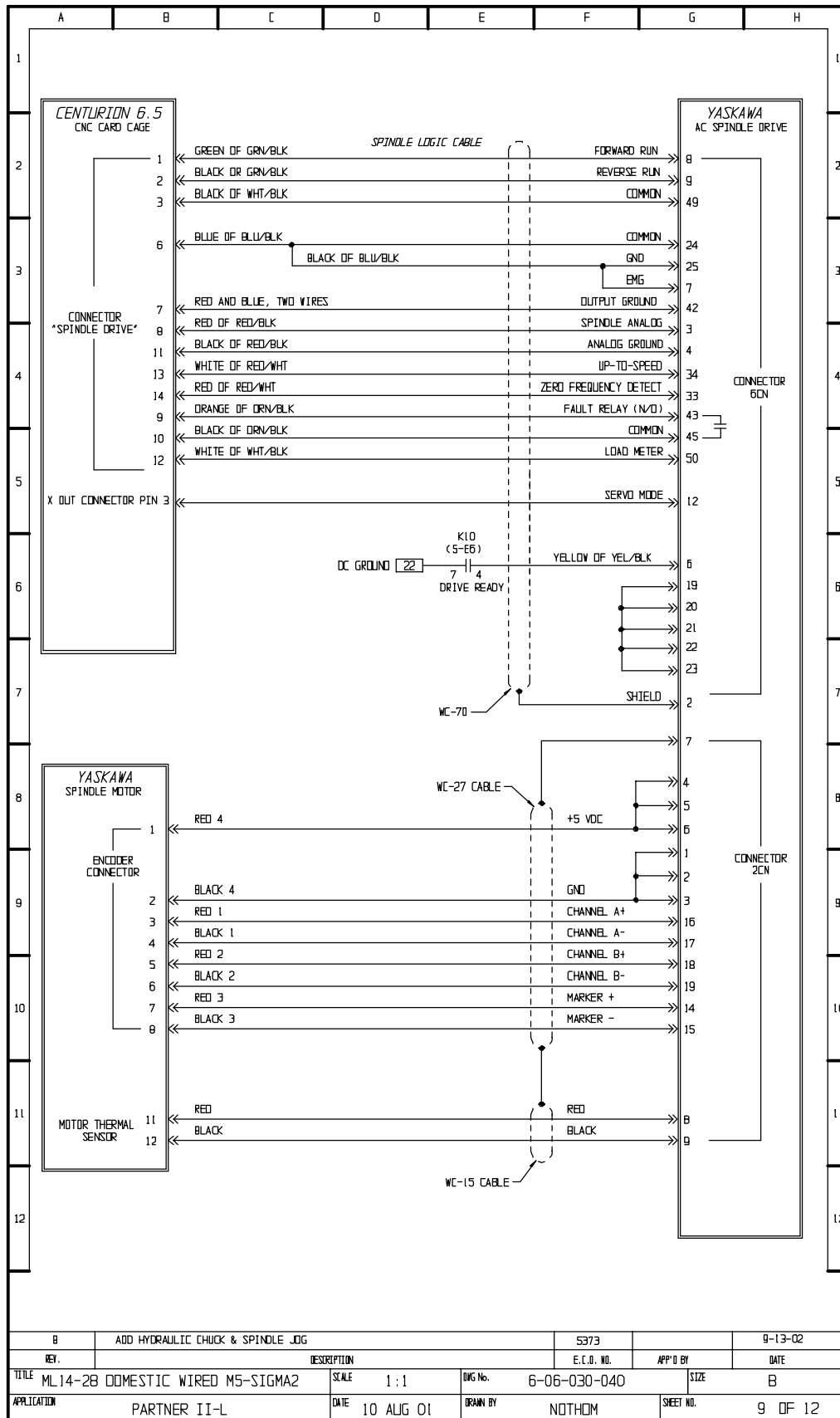


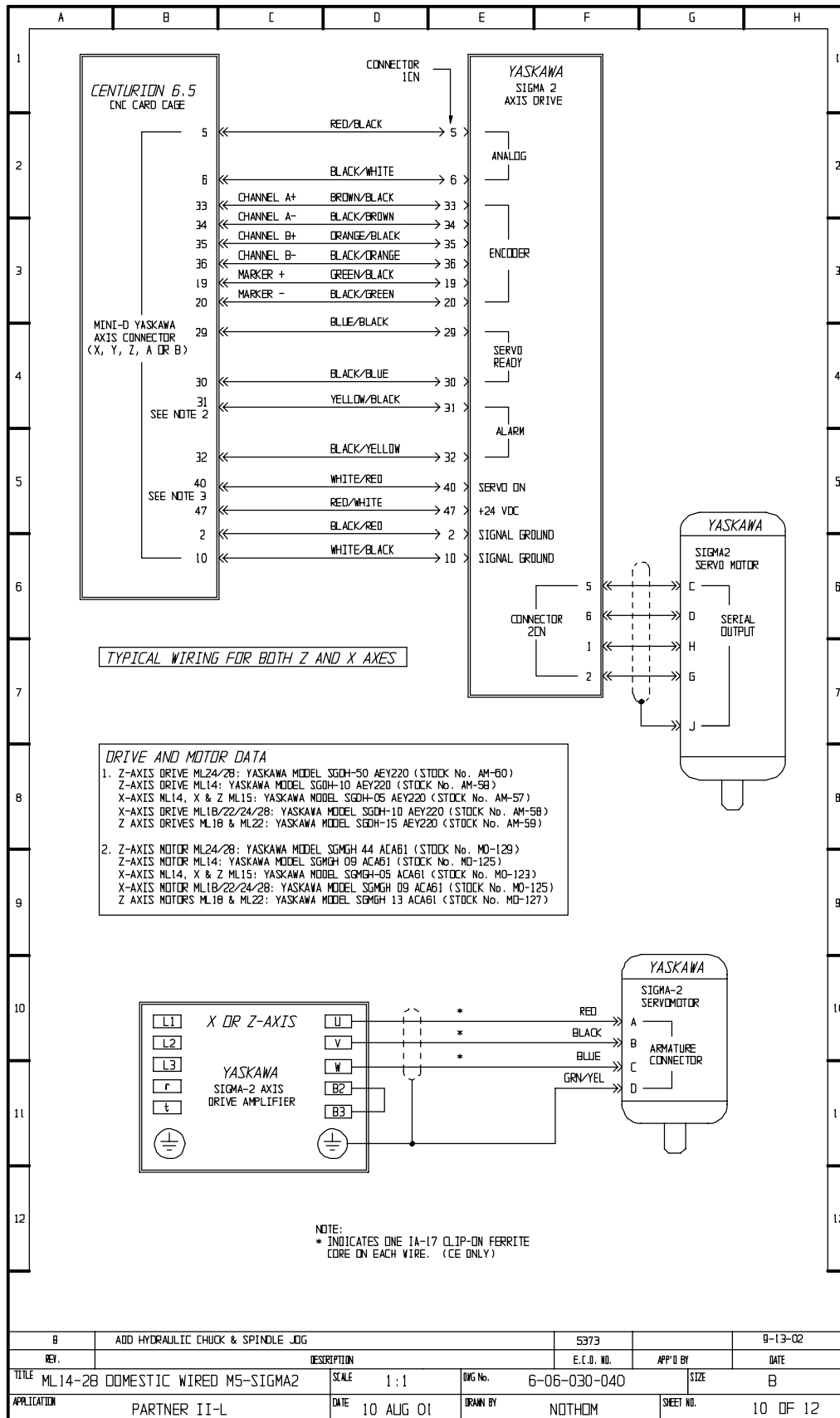


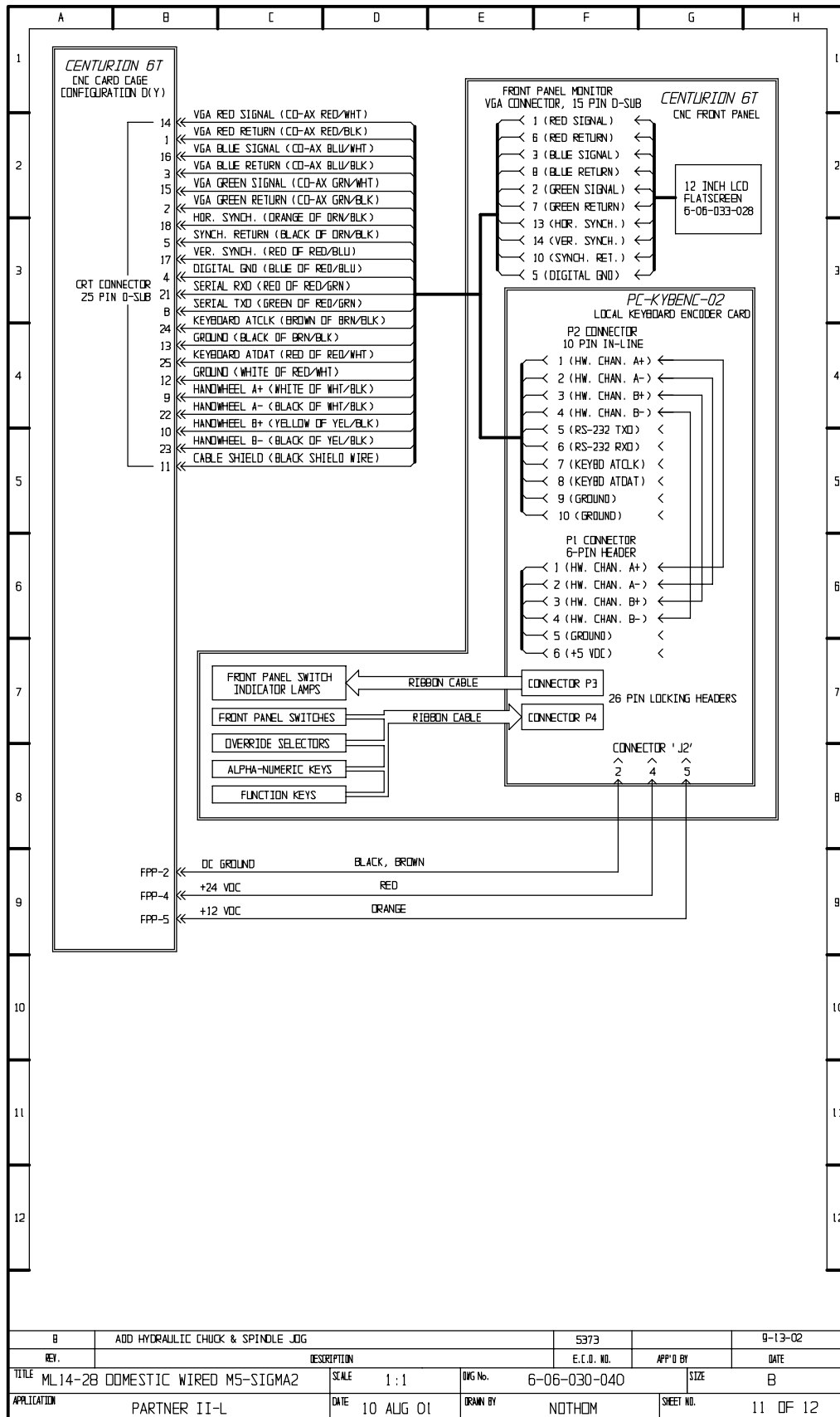


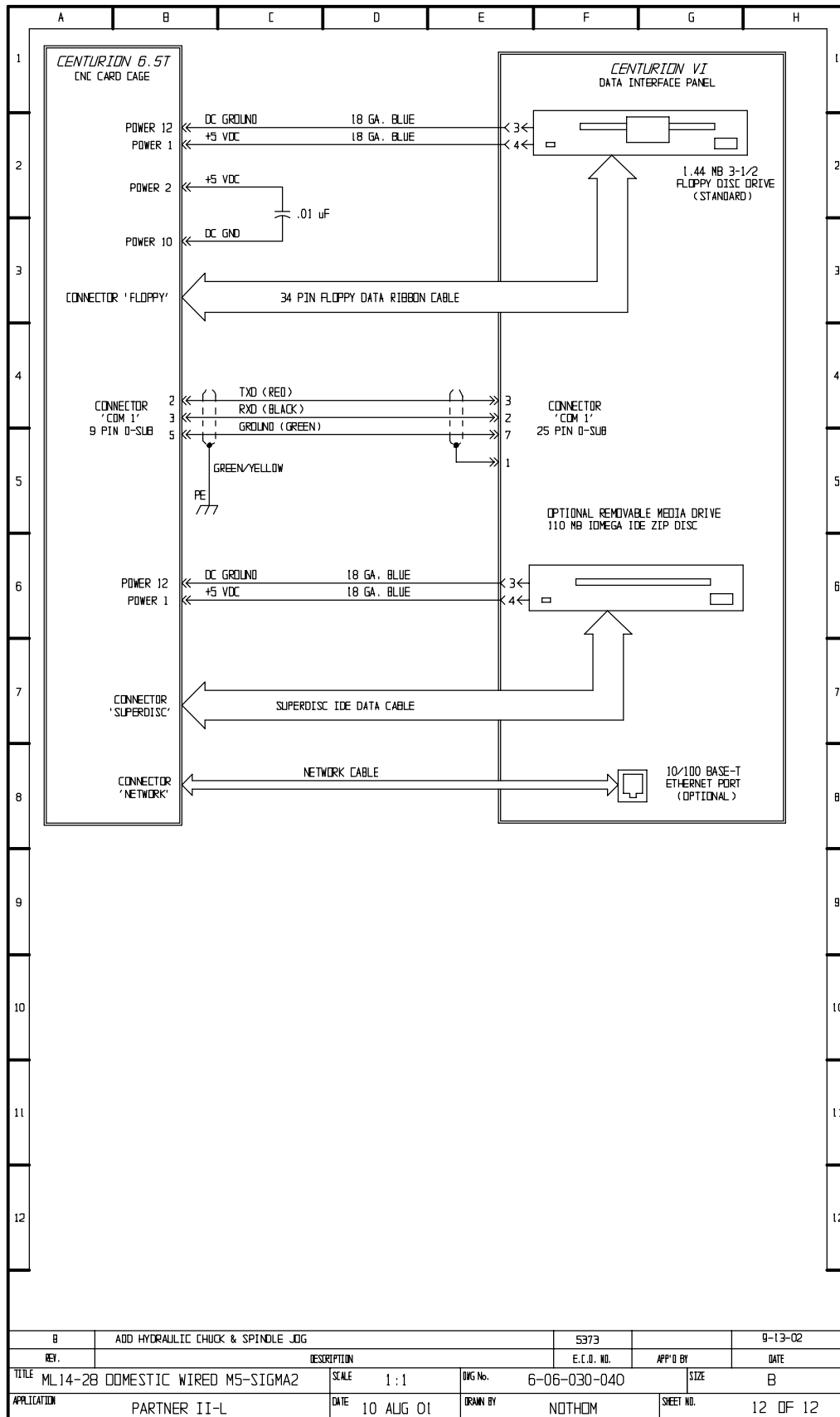




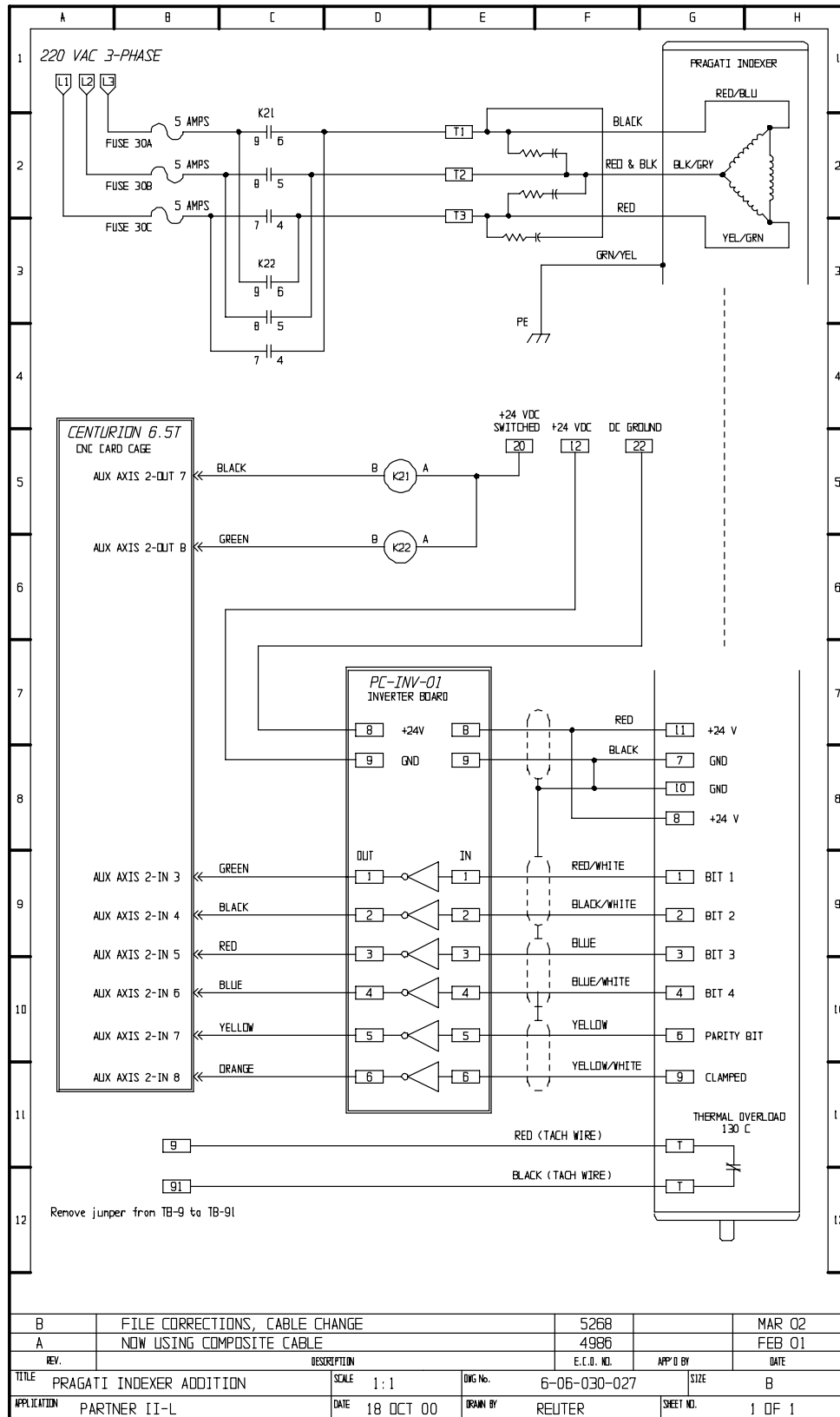




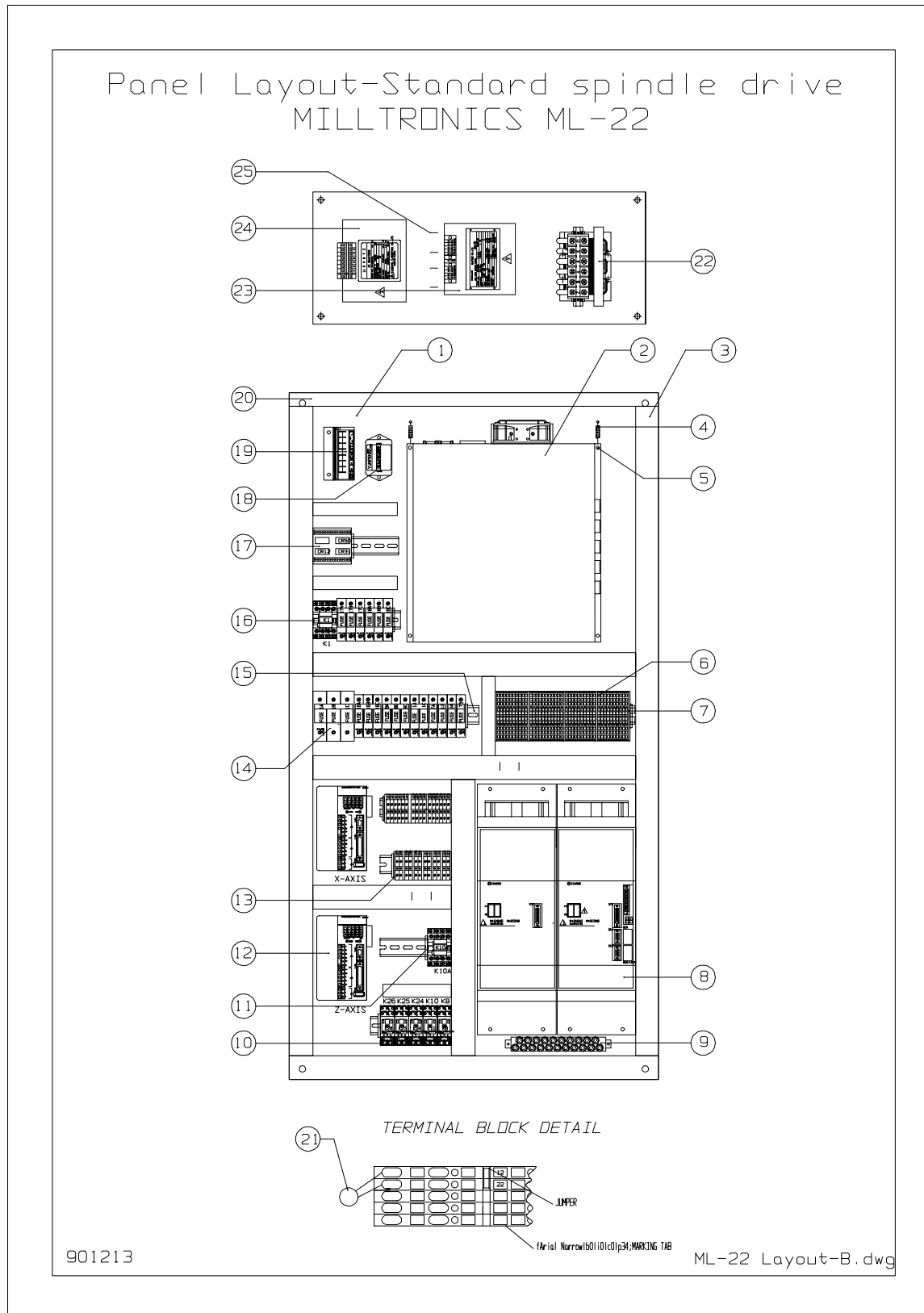




Pragati Turret Wiring



Panel Layout



ML18/22 Electrical Parts List

ITEM	STOCK NO.	DESCRIPTION	QTY	REMARKS
1	PL-54	1300mmx700mm MAG PANEL 1115-73031-400	1	
2	6132-1	CENTURION 6.5T CNC CARD CAGE		SEE ITEMS 4 & 5
3	WC-67	WIRE DUCT, 1.5 IN.		
	WC-68	WIRE DUCT COVER, 1.5 IN.		
4	HD-63	CARD CAGE SPRING HANGER	2	
5	WX-129	RUBBER SHOCK MOUNT, 8-32 UNC M/F	4	
6	TB-30	TERMINAL BLOCK 4-POSN, TOP ENTRY	41	
	TB-32	TERMINAL BLOCK JUMPER, 10 POSN.	2.2	
	TB-33	TERMINAL BLOCK LABEL TAB, SHEET OF 100	0.82	
	TB-31	TERMINAL BLOCK END PIECE	1	
7	TB-35	TERMINAL BLOCK END STOP	10	
8	PS-55	AC SPINDLE CONTROLLER, CIMR-M5A2011	1	SPINDLE DRIVE
	PS-56	AC SPINDLE CONTROLLER, CIMR-MR5A2011	1	CONVERTER
9	BU-06	GROUNDING BUS BAR	1	
10	RL-48	CONTROL RELAY, +24 VDC COIL, 10 AMP DPDT	2 or 5	RELAY K8, K10, K24, K25, K26
	RL-06	RELAY SOCKET BASE	2 or 5	
11	RL-64	CONTACTOR RELAY, DC COIL, . 5HP TELEMECANIQUE NO. LP1D1810	1	CONTACTOR K10A
	RL-65	CONTACTOR NOISE SUPPRESSOR DIODE TELEMECANIQUE NO. LA4DC1U	1	
12	AM-58	AXIS DRIVE MODULE YASKAWA NO. SGD-10AEY220	1	X-AXIS DRIVE (ML18/22)
	AM-59	AXIS DRIVE MODULE YASKAWA NO. SGD-15AEY220	2	Z-AXIS DRIVE (ML18/22)
13	TB-37	3-PHASE TERMINAL BLOCK (DISTRIBUTION)	28	
14	FU-50	FUSE, 50AMP	3	FUSE 1A, 1B, 1C
	FU-01	FUSE, 5AMP	1	FUSE 12
	FU-33	FUSE, 3AMP	2	FUSE 11A, 11C
	FU-74	FUSE, 2AMP	5	FUSE 8A,8B, 8C, 7A, 24
	FU-74	FUSE, 2AMP (OPTION)	6	FUSE 17A/B/C ; FUSE 18A/B/C
	FU-46	FUSE, 1AMP	1	FUSE 75
		FUSE, 1/4AMP	3	FUSE 16A, 16BC, 16C
	FU-77	FUSE BLOCK, SINGLE 10 x 38	12 or 18	
	FU-78	FUSE BLOCK, SINGLE 14 x 51	1	
15	WX-187	7.5 x35mm DIN RAIL, 3 IN. PIECE	8	
16	RL-69	CONTACTOR RELAY, DC COIL, . 3HP TELEMECANIQUE NO. LP1D1210	1	CONTACTOR K1

ML18/22 Electrical Parts List

ITEM	STOCK NO.	DESCRIPTION	QTY	REMARKS
	RL-61	CONTACTOR AUXILIARY, 2-N/O, 2-N/C TELEMECANIQUE NO. LA1DN22	1	
	RL-65	CONTACTOR NOISE SUPPRESSOR DIODE TELEMECANIQUE NO. LA4DC1U	1	
17	9107	M-FUNCTION QUAD RELAY BOARD	1	
18	MI-10	LINE FILTER, 110 VAC, 10AMP	1	
19	PS-49	REGULATED POWER SUPPLY, +24 VDC, 4.5 AMPS	1	
20	WC-104	WIRE DUCT, 1 IN.		
	WC-105	(DISTRIBUTION)		
21	CA-61	CAPACITOR, 0.01UF CERAMIC DISC	2	
22	IA-21	YASKAWA (VS-656MR5) AC REACTOR	1	CODE NO.X010060
23	TR-46	TRANSFORMER, 0.56 KVA, 50/60 HZ	1	
24	IA-19	3-PHASE REACTOR, 25 AMP, 1.8mH	0 or 1	DOMESTIC MODELS ONLY
25	MI-09	NOISE SUPPRESSOR, 600 VOLT	4 or 6	

Terminal Block Directory
TERMINAL BLOCKS LISTED LEFT TO RIGHT

1. (x3 JUMPERED) 110 VAC LINE
2. (x4 JUMPERED) 110 VAC RETURN
55. END-OF-CYCLE LAMP
57. (x2 JUMPERED), 110 VAC SWITCHED
75. WORK LAMP
- <DIVIDER>
12. (x4 JUMPERED), +24 VDC
20. (x2 JUMPERED), +24 VDC SWITCHED
22. (x5 JUMPERED), DC GROUND
- <DIVIDER>
- 6C. NOT ASSIGNED
- 6B. FRONT PANEL RESET SWITCHES
- 6A. FRONT PANEL RESET SWITCHES
6. FRONT PANEL / X-AXIS LIMIT
7. X-AXIS / Z-AXIS LIMITS
8. Z-AXIS / TAIL STOCK LIMITS
9. TAIL STOCK LIMIT
13. SPARE M-FUNCTION, COMMON
14. SPARE M-FUNCTION, N/C
15. SPARE M-FUNCTION, N/C
25. SPARE SAFETY INTERLOCK
34. X-AXIS HOME SWITCH
49. CHUCK GUARD OPEN
50. Z-AXIS HOME SWITCH
78. OILER FLOAT SWITCH (LOW OIL)
83. DOOR OPEN / SETUP (CE ONLY)
91. (x2 JUMPERED) WATCHDOG-SWITCHED +24 VDC
- <TERMINAL BLOCK END STOP>

Relay & Contactor Directory

CONTACTORS

K1. MACHINE RESET
K10A. AXIS DRIVES ENABLE

CONTROL RELAYS

K8. FLOOD PUMP (ALL MACHINES)	K24. CONVEYOR PUMP FORWARD (OPTION)
K10. SPINDLE ENABLE	K25. CONVEYOR PUMP REVERSE (OPTION)
	K26. WASH DOWN PUMP (OPTION)

QRB RELAYS

CR12. SPARE M-FUNCTION
CR31. END-OF-CYCLE LAMP
CR50. ZERO SPEED (FOR CE COMPLIANT LATHES ONLY)

- FUSE DIRECTORY -

FUSE 1A.	-	MAIN DISCONNECT SWITCH L1. (50 AMP)
FUSE 1B.	-	MAIN DISCONNECT SWITCH L2 (50 AMP)
FUSE 1C.	-	MAIN DISCONNECT SWITCH L3 (50AMP)
FUSE 16A.	-	SPINDLE MOTOR FAN. (1/4 AMP)
FUSE 16B.	-	SPINDLE MOTOR FAN. (1/4 AMP)
FUSE 16C.	-	SPINDLE MOTOR FAN. (1/4 AMP)
FUSE 8A.	-	FLOOD PUMP,L1. (2 AMP)
FUSE 8B.	-	FLOOD PUMP,L2. (2 AMP)
FUSE 8C.	-	FLOOD PUMP,L3 (2 AMP)
FUSE 11A.	-	TRANSFORMER PRIMARY,L1. (3 AMP)
FUSE 11C.	-	TRANSFORMER PRIMARY,L3 (3 AMP)
FUSE 7A.	-	AXIS WAYS OILER (2AMP)
FUSE 12.	-	TRANSFORMER SECONARY (5 AMP)
FUSE 24.	-	+ 24 VDC POWER SUPPLY (2 AMP)
FUSE 75.	-	WORKLAMP (1 AMP)
FUSE 17A.	-	WASH DOWN PUMP . (2 AMP) (OPTION)
FUSE 17B.	-	WASH DOWN PUMP . (2 AMP) (OPTION)
FUSE 17C.	-	WASH DOWN PUMP . (2 AMP) (OPTION)
FUSE 18A.	-	CHIP CONVYOR PUMP . (2 AMP) (OPTION)
FUSE 18B.	-	CHIP CONVYOR PUMP . (2 AMP) (OPTION)
FUSE 18C.	-	CHIP CONVYOR PUMP . (2 AMP) (OPTION)

M5 Spindle Parameters for ML18 & 22

10-7-02

PARAMETER	DESCRIPTION	ML18	ML22
C1-01	P Gain	100	100
C1-02	I Gain	40	40
C1-05	Proportional Gain / SV Mode	100	100
C1-06	I Gain / SV Mode	100	100
C1-09	Torque Filter	1.0	1.0
C1-10	Soft Start Time	3.0	3.0
C1-19	Zero Speed Detect	30	10
C1-25	Motor Code	03	029
C1-26	Max RPM (in Motor RPM)	3751	4742
C1-35	Zero Speed Brake Time	0	1
C1-36 Bit 3	SV Mode Enabled	1	1
C1-38 Bit 1	Load Meter Filter	1	1

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 by Yaskawa.

Sigma2 Axis Drive Parameters for ML18 & 22

1-22-02

P#	ML18 & 22		
	X		Z
000	0001H		0000H
100	80		45
101	450		500
201	984		1968
300	360		720
401	40		100
408	---		0001H
409	---		363
40A	---		250

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 by Yaskawa.

Card Cage Gain Setting Procedure

Note: Perform only at the advice of a factory representative.

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

Note: Perform only at the advise of a factory representative.

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. $10,000/500 \times 0.050$).
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. $800/100 \times .050 = .400$).

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

ML Series Centurion 6 CNC Connector Signal Listing

Connector Z-Input

Pin 1 - Machine emergency stopped	Pin 8 - Spindle zero speed
Pin 2 - Spare	Pin 9 - Spindle drive fault
Pin 3 - Spare	Pin 10 - Spare
Pin 4 - Air pressure	Pin 11 - Chuck guard open
Pin 5 - Tool Change	Pin 12 - Home switch
Pin 6 - Lube Fault (oiler empty)	Pin 13 - No connect
Pin 7 - Door open	Pin 14 - No connect

Connector X-Input

Pin 1 - Spindle JOG	Pin 8 - No connect
Pin 2 - Remote JOG 1	Pin 9 - No connect
Pin 3 - Remote JOG 2	Pin 10 - No connect
Pin 4 - Remote JOG 3	Pin 11 - Edit Switch
Pin 5 - Remote JOG 4	Pin 12 - Home Switch
Pin 6 - Manual Mode	Pin 13 - No connect
Pin 7 - No connect	Pin 14 - No connect

Connector Aux1-Input

Pin 1 - Low range	Pin 8 - Rapid JOG 4
Pin 2 - No connect	Pin 9 - Remote HW enable
Pin 3 - High range	Pin 10 - Remote HW FOV1/setup button
Pin 4 - No connect	Pin 11 - Remote HW FOV2/ctrl overtemp
Pin 5 - Rapid JOG 1	Pin 12 - No connect
Pin 6 - Rapid JOG 2	Pin 13 - No connect
Pin 7 - Rapid JOG 3	Pin 14 - No connect

Connector Aux2-Input

Pin 1 - Z drive OK	Pin 8 - Pragati locked
Pin 2 - X drive OK	Pin 9 - Remote HDW Axis 1
Pin 3 - Pragati bit 1	Pin 10 - Remote HDW Axis 2
Pin 4 - Pragati bit 2	Pin 11 - Remote HDW Set Coord/Digitize
Pin 5 - Pragati bit 3	Pin 12 - No connect
Pin 6 - Pragati bit 4	Pin 13 - No connect
Pin 7 - Pragati parity	Pin 14 - No connect

Connector Z-Output

Pin 1 - Excess Error / Software estop	Pin 8 - Tool change
Pin 2 - Spray mist coolant	Pin 9 - Allow Reset
Pin 3 - Flood coolant	Pin 10 - In manual mode
Pin 4 - Spindle clockwise	Pin 11 - Delayed E-stop
Pin 5 - Spindle counter clockwise	Pin 12 - Spindle reverse
Pin 6 - Spindle running	Pin 13 - Key
Pin 7 - Spindle allow	Pin 14 - No connect

Connector X-Output

Pin 1 - Spindle creep mode	Pin 8 - High range select
Pin 2 - No connect	Pin 9 - Miscellaneous M-code No. 2
Pin 3 - No connect	Pin 10 - Miscellaneous M-code No. 3
Pin 4 - No connect	Pin 11 - Miscellaneous M-code No. 4
Pin 5 - End of cycle light	Pin 12 - Miscellaneous M-code No. 5
Pin 6 - Miscellaneous M-code No. 1	Pin 13 - Key
Pin 7 - Low range select	Pin 14 - No connect

ML Series Centurion 6 CNC Connector Signal Listing

Connector Aux2-Output

Pin 1 - Z-Axis drive enable	Pin 8 - Pragati CCW
Pin 2 - X-Axis drive enable	Pin 9 - Spare
Pin 3 - No connect	Pin 10 - No connect
Pin 4 - No connect	Pin 11 - No connect
Pin 5 - No connect	Pin 12 - No connect
Pin 6 - Axis drives enable	Pin 13 - Key
Pin 7 - Pragati CW	Pin 14 - No connect

Connectors X, Y, Z, A and B Axis

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 - Z-axis home switch (jumped to Z-axis pin 12)	Pin 8 - No connect
Pin 2 - No connect	Pin 9 - No connect
Pin 3 - X-axis home switch (jumped to X-axis pin 12)	Pin 10 - No connect
Pin 4 - No connect	Pin 11 - Key
Pin 5 - No connect	Pin 12 - No connect
Pin 6 - No connect	Pin 13 - No connect
Pin 7 - No connect	Pin 14 - No connect

Spindle Drive Connector

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

ML Series Centurion 6 CNC Connector Signal Listing

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	

Connector COM1 (Card Cage)

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

Connector Floppy Disk

Standard PC 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 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
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

ML Series Centurion 6 CNC Connector Signal Listing

Pin 4 - Front panel handwheel channel B -
Pin 5 - Serial I/O TXD

Pin 9 - DC ground
Pin 10 - DC ground

Keyboard DIN Connector (J1)

Pin 1 - Keyboard EXCLK
Pin 2 - Keyboard EXDAT
Pin 3 - No connect

Pin 4 - DC ground
Pin 5 - +5 VDC

Connectors in the Mag Box

Connector on +24 VDC Regulated Power Supply

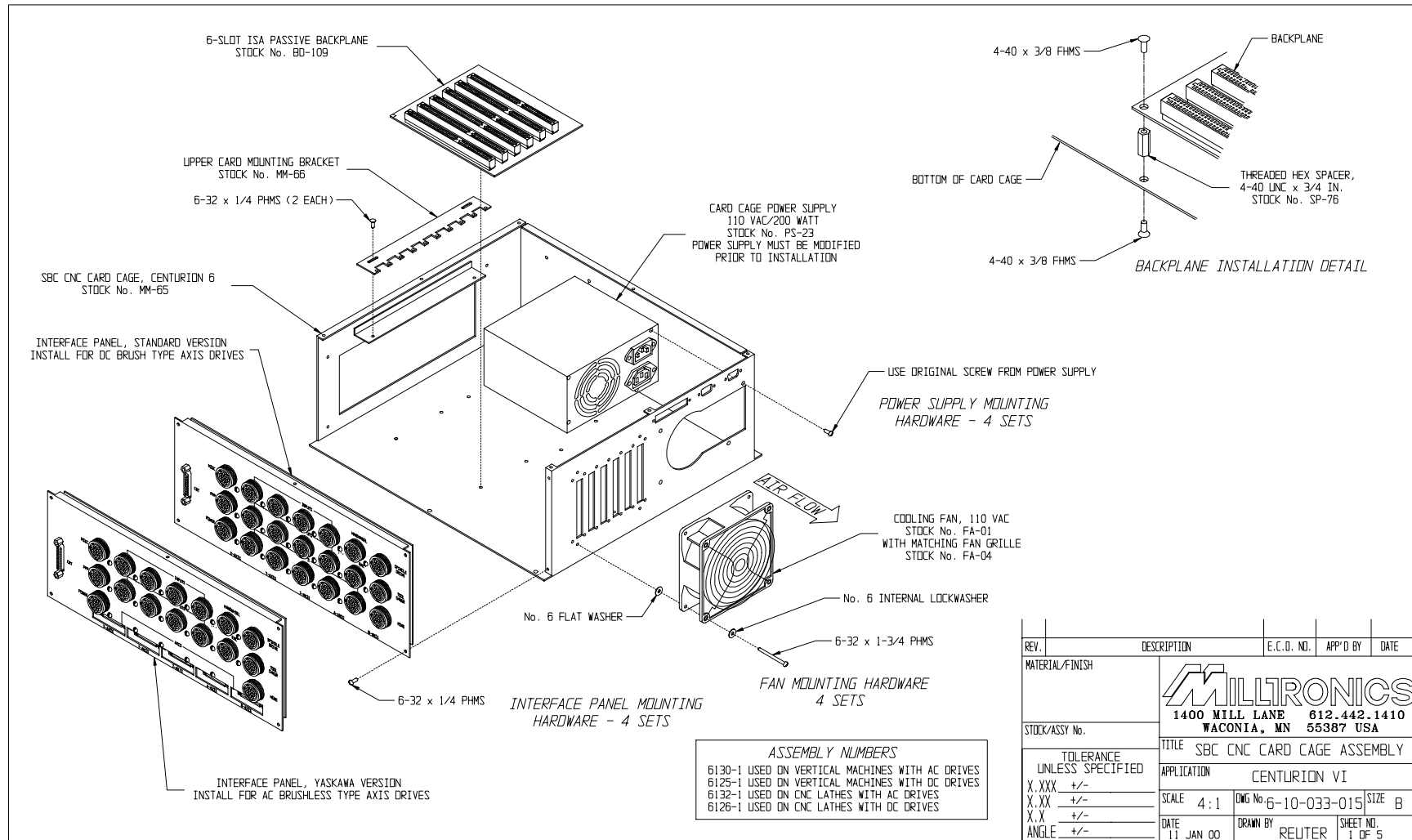
Pin 1 - 110 VAC line
Pin 2 - 110 VAC return
Pin 3 - No connect
Pin 4 - +24 VDC
Pin 5 - +24 VDC
Pin 6 - Key
Pin 7 - No connect

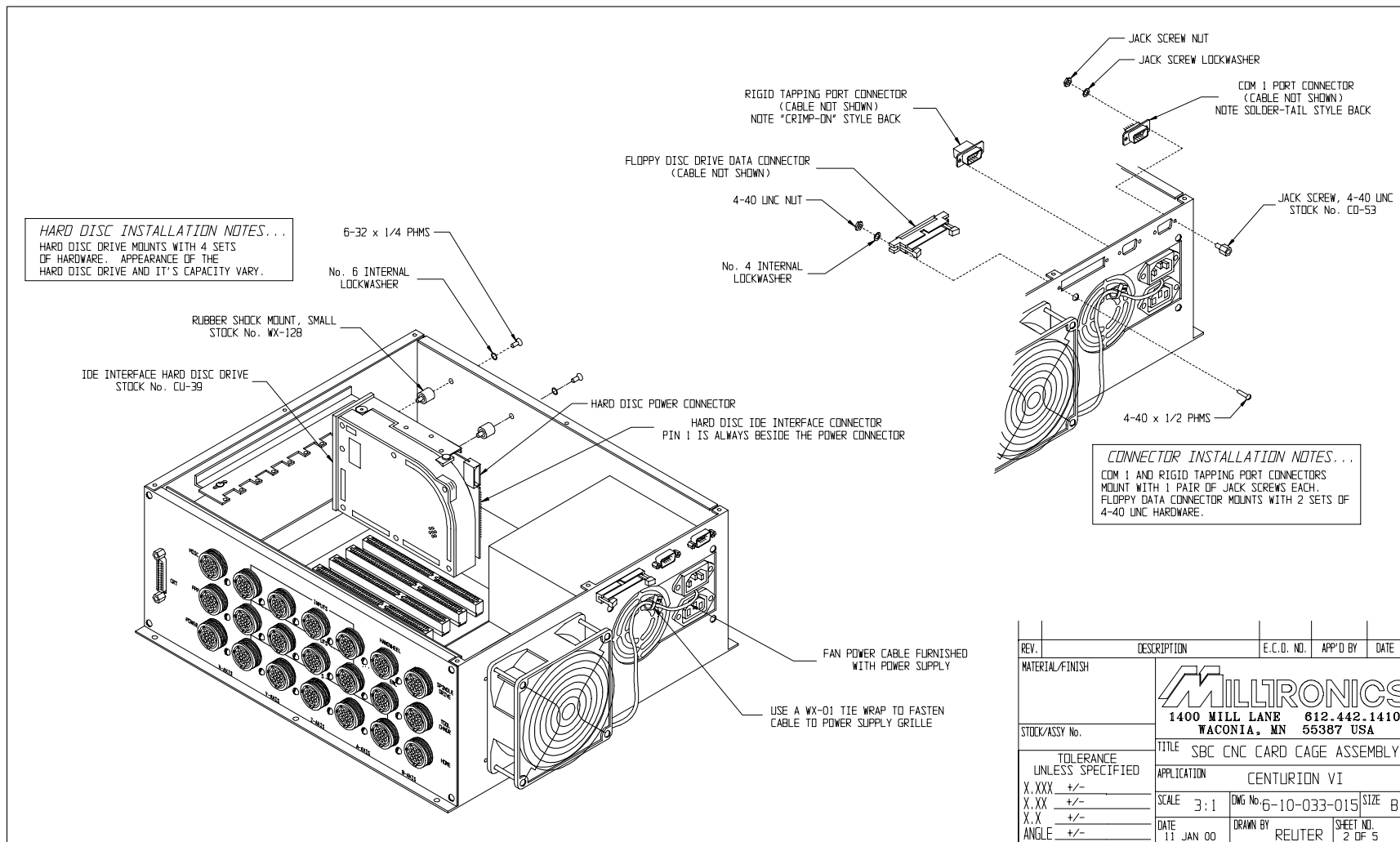
Pin 8 - No connect
Pin 9 - No connect
Pin 10 - No connect
Pin 11 - DC ground
Pin 12 - DC ground
Pin 13 - DC ground
Pin 14 - DC ground

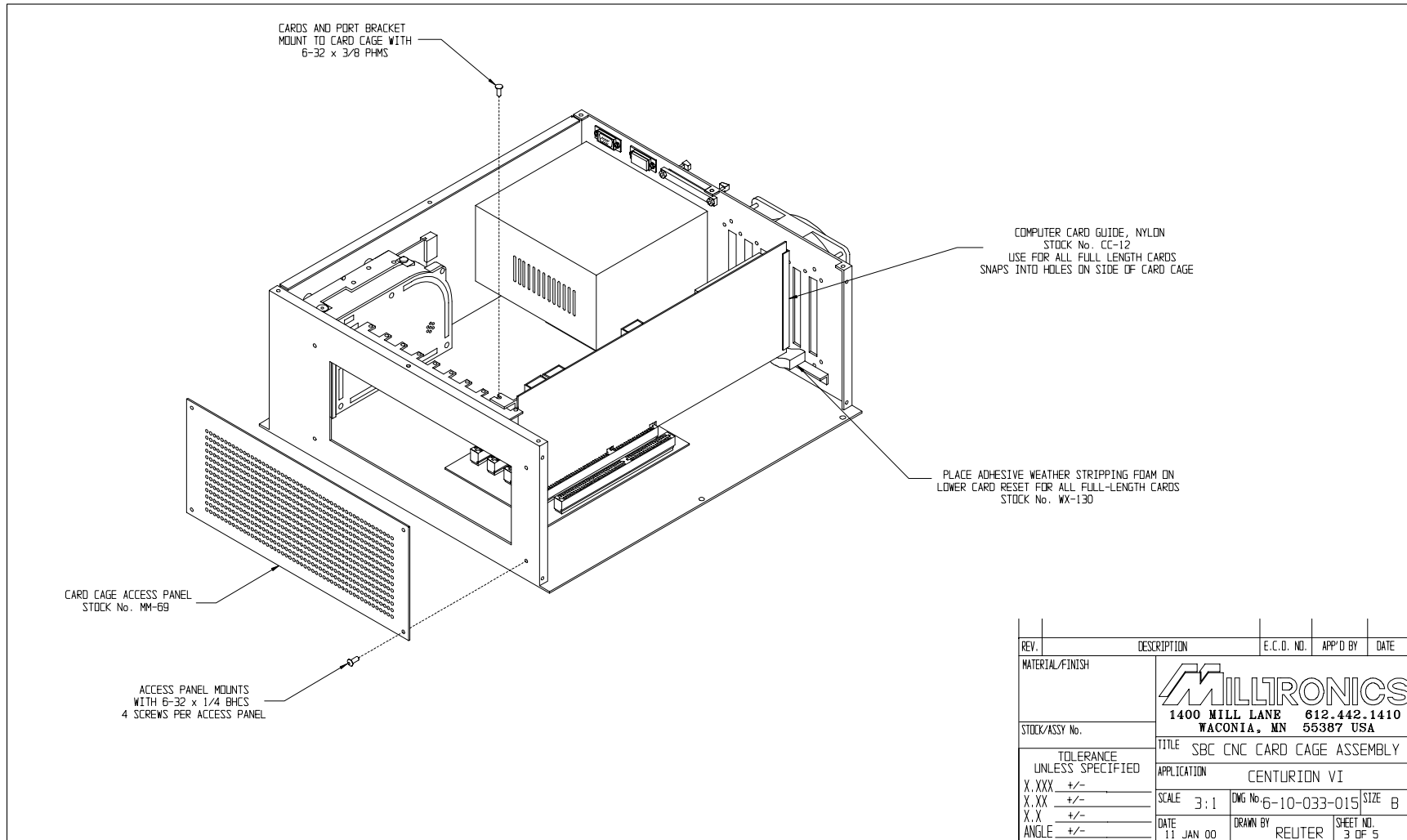
Connector COM1 (on Mag Panel)

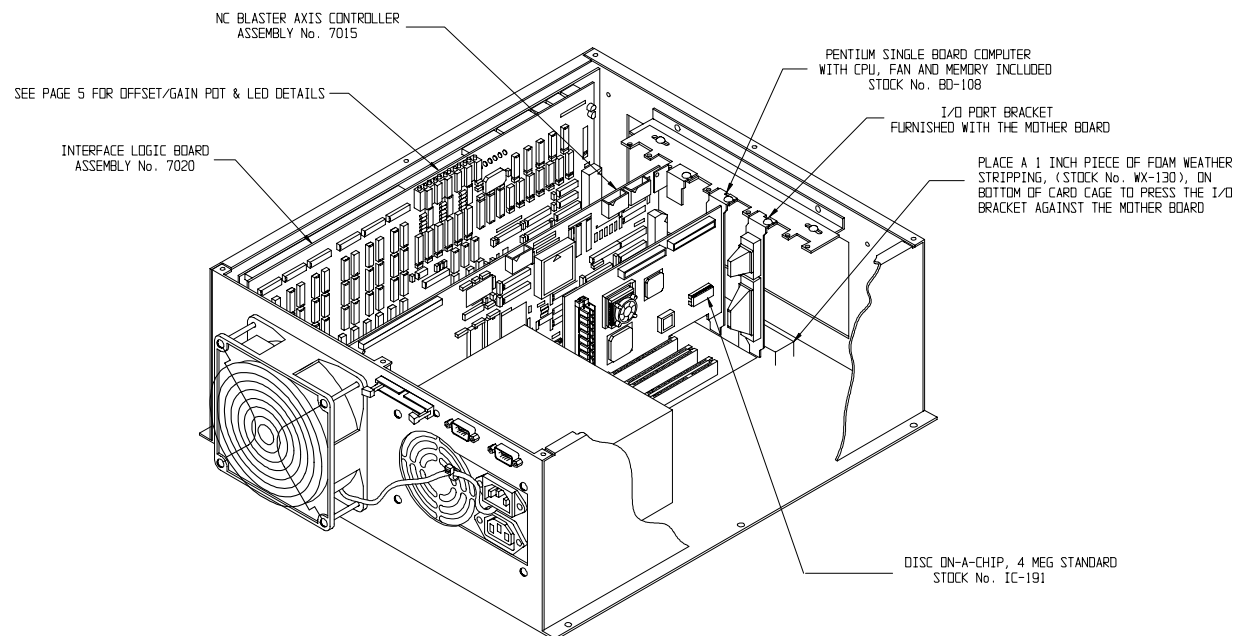
Pin 2 - RXD
Pin 3 - TXD
Pin 7 - Ground
All other pins no connect

Card Cage Assembly

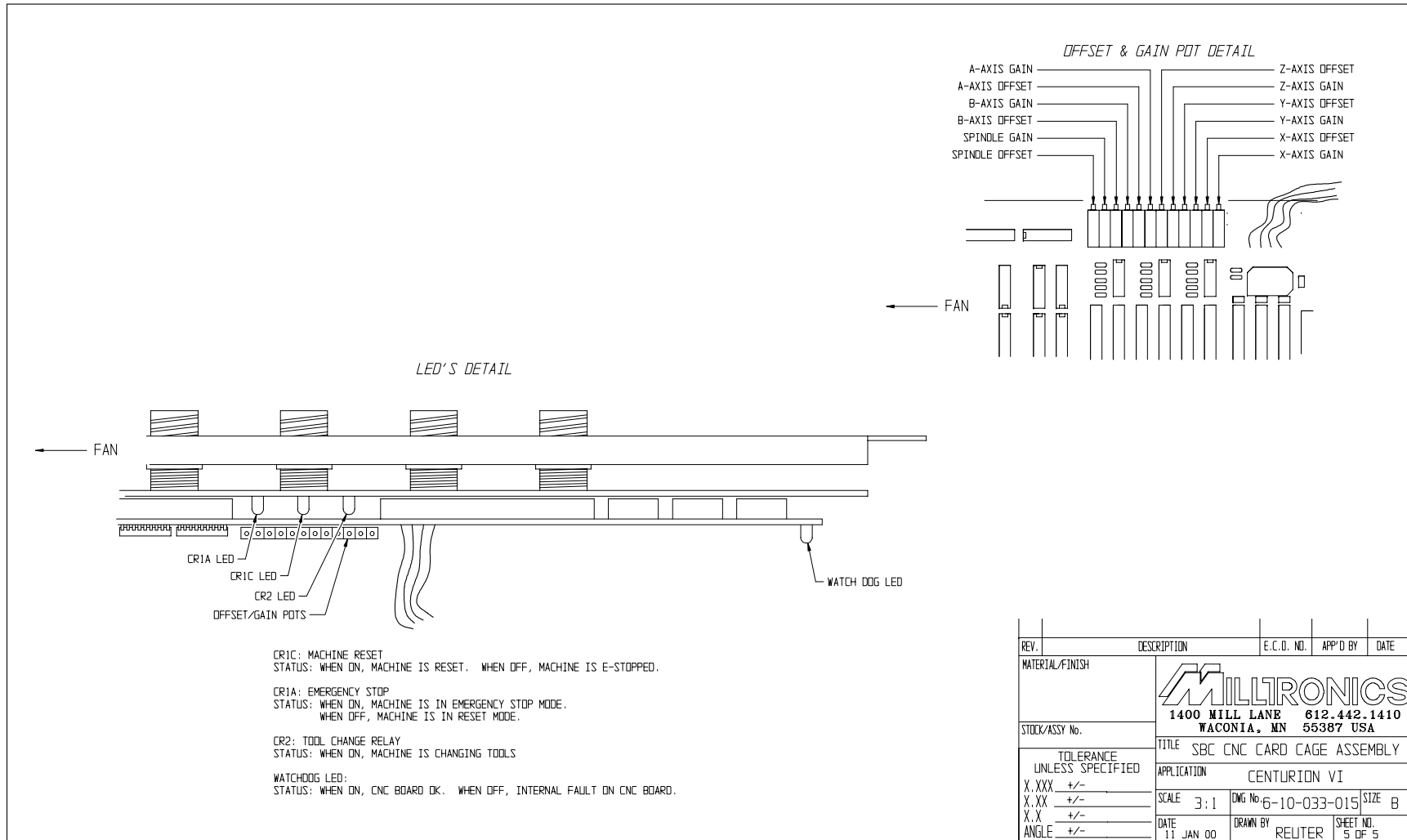




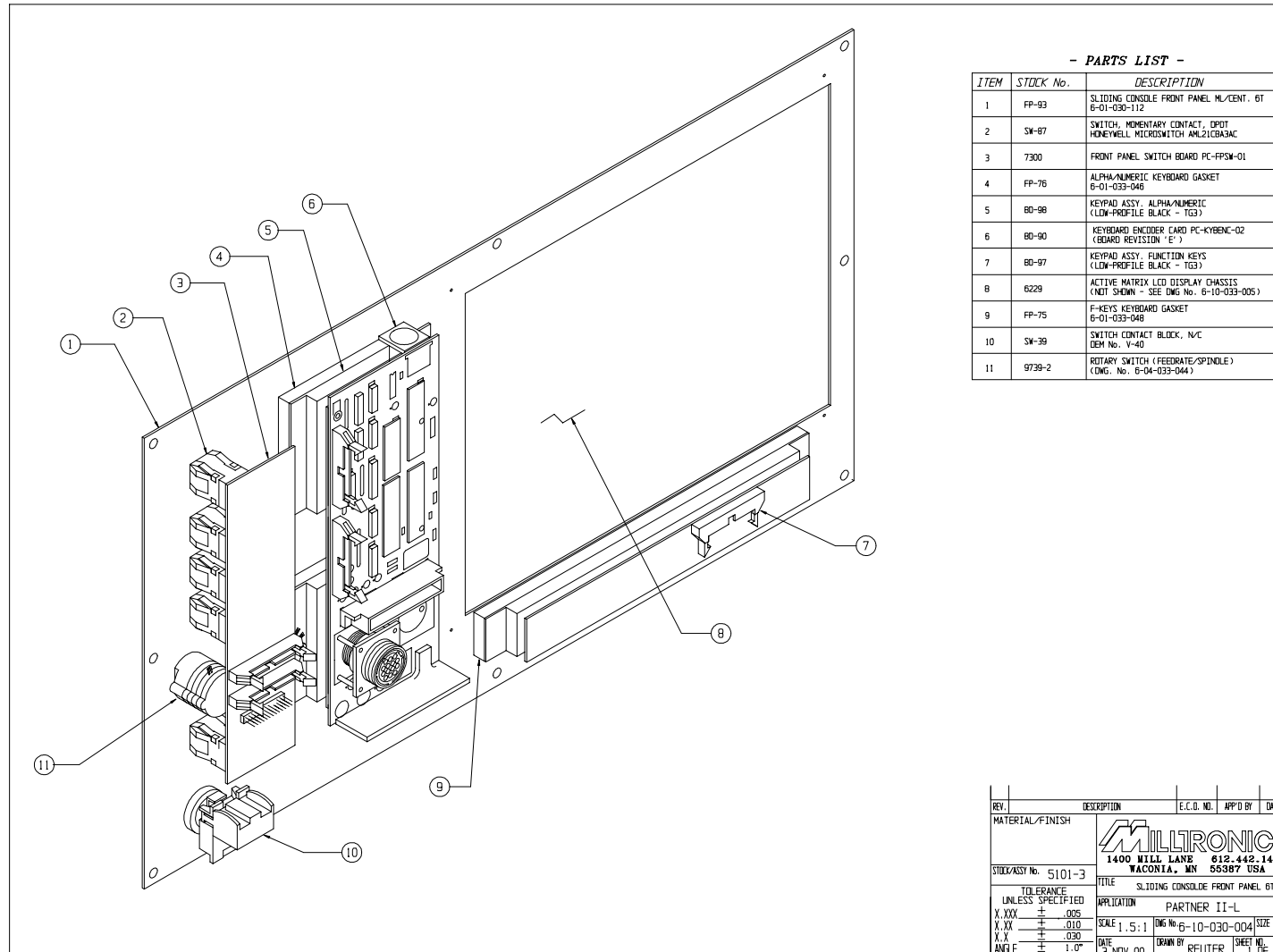


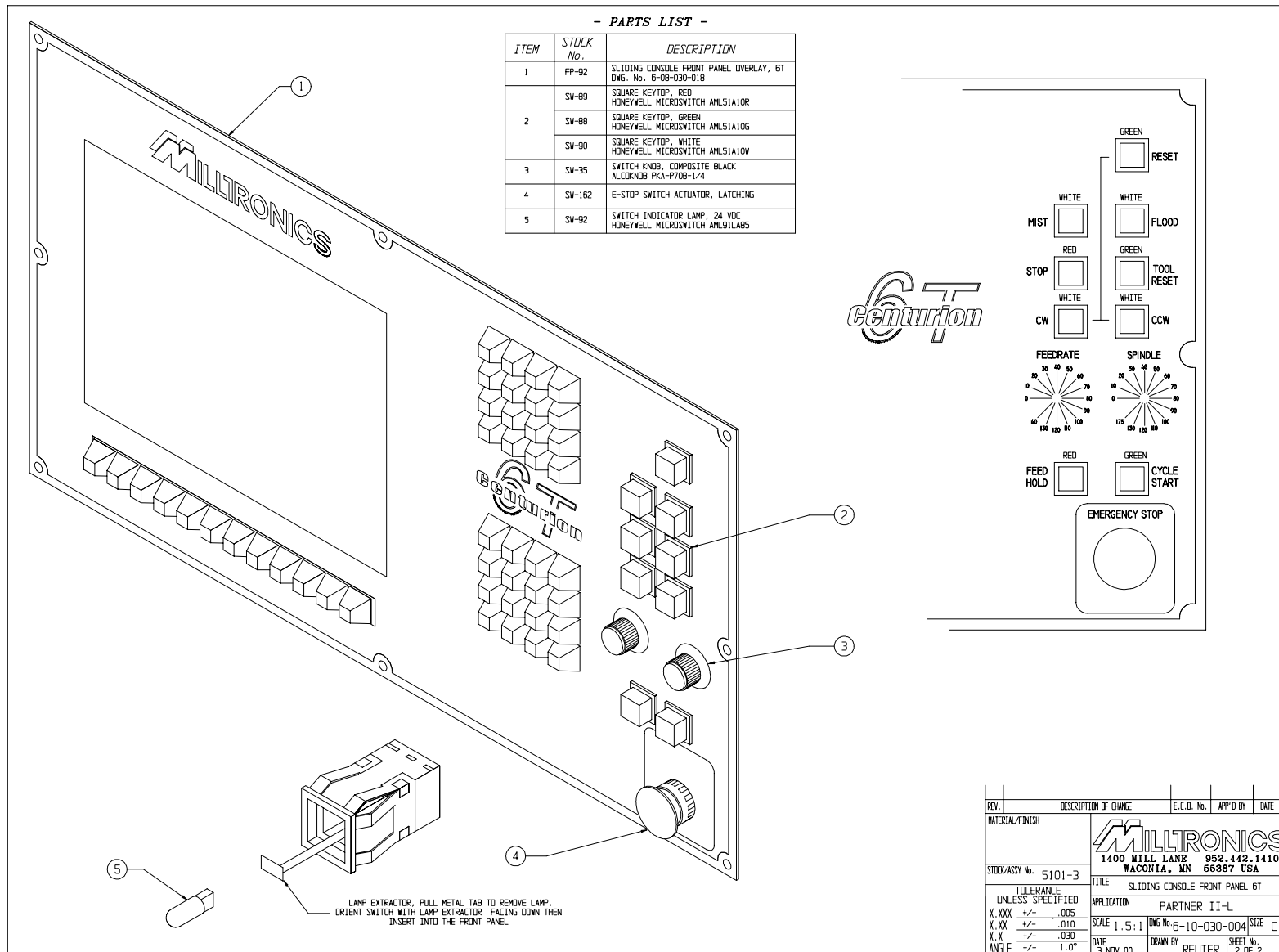


REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE SBC CNC CARD CAGE ASSEMBLY		
X.XXX +/-		APPLICATION CENTURION VI		
X.XX +/-		SCALE 3:1 DWG No. 6-10-033-015 SIZE B		
X.X +/-		DATE 11 JAN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

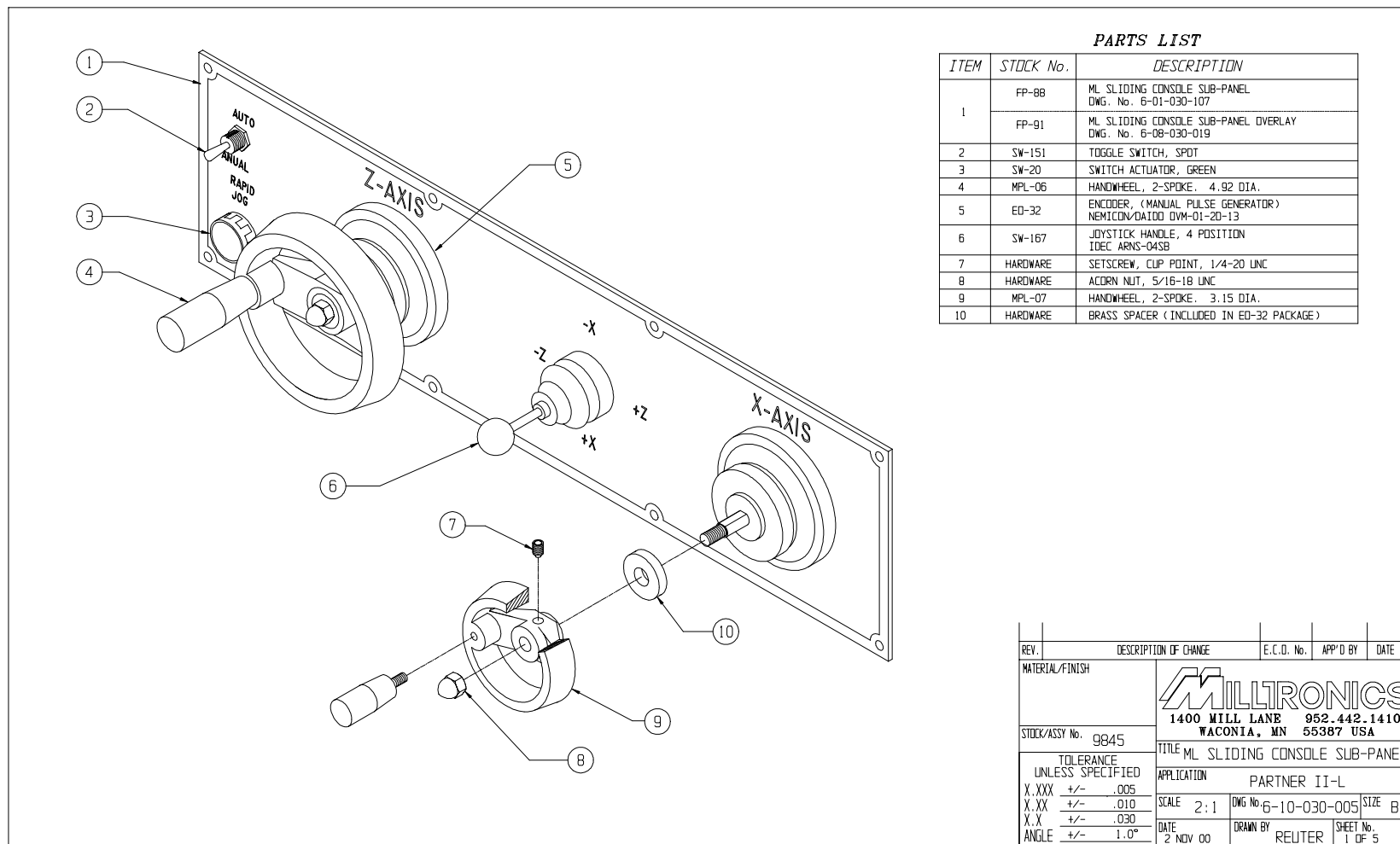


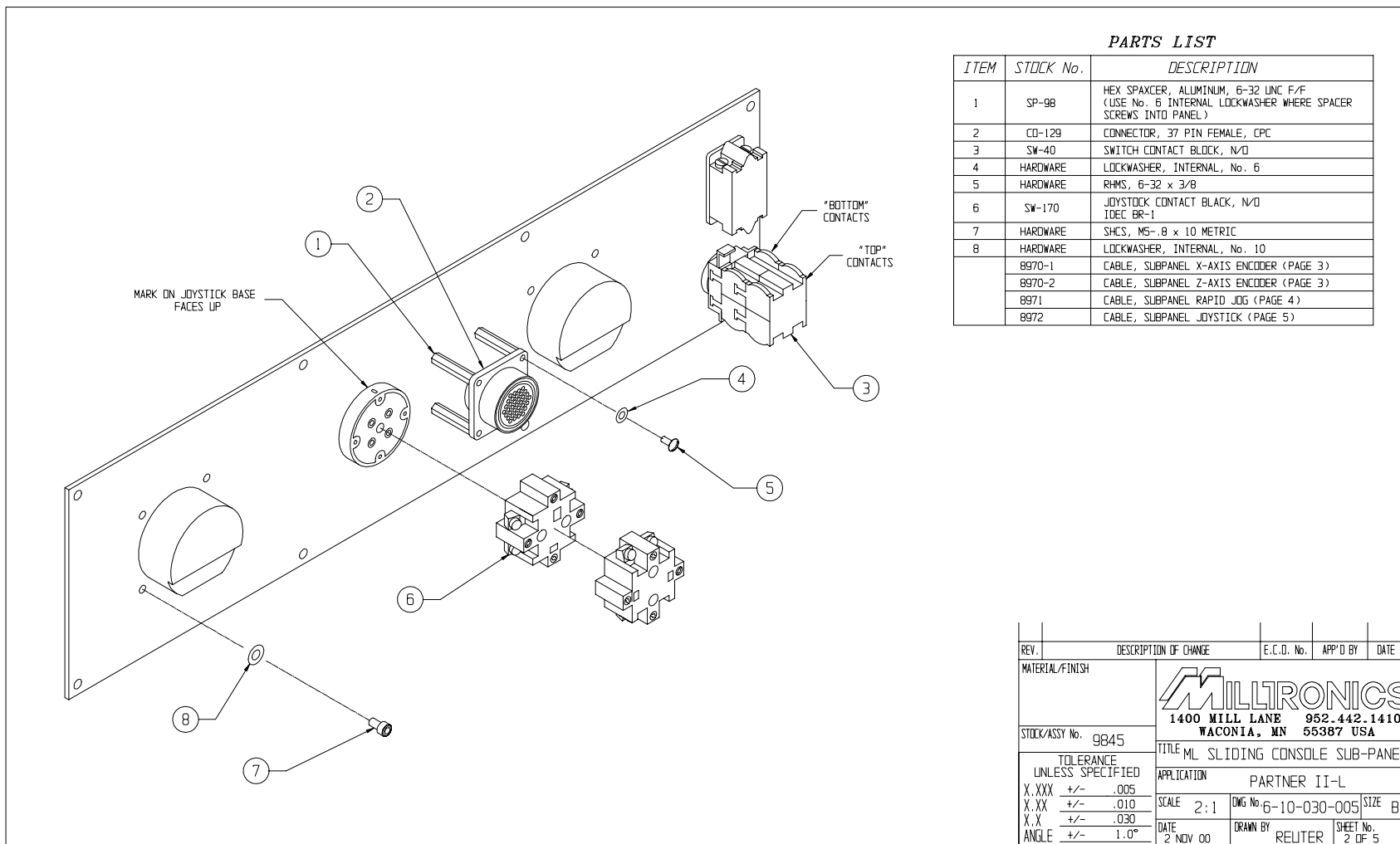
LCD Front Panel Assembly



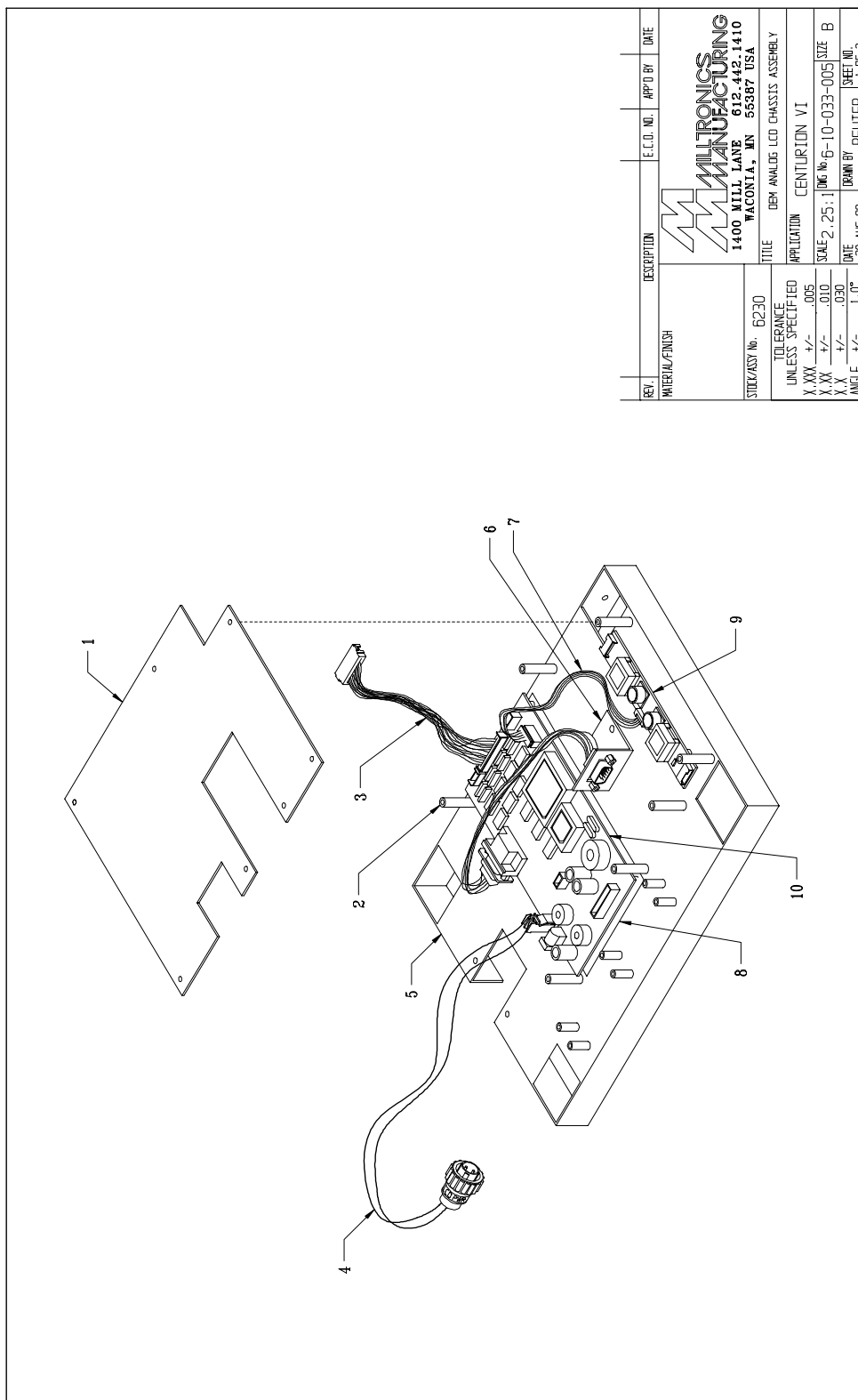


Remote Panel Assembly



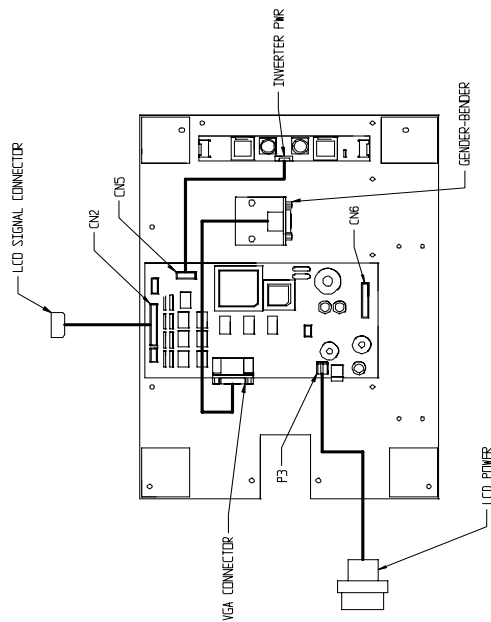


LCD Chassis Assembly



- INSTRUCTIONS -

1. MOUNT THE VGA GENDER-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 GENDER-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 GENDER-BENDER TO THE VGA CONNECTOR ON THE CONVERSION BOARD AND SECURE WITH THE CONNECTOR SCREWS.
4. MOUNT THE LEFT INVERTER BOARD TO THE CHASSIS WITH 6-32 x 1/2 RHMS AND NO. 8 LOCKWASHERS. CONNECT THE POWER CABLE TO THE INVERTER BOARD. SMALLER PLUGS CONNECT THE OTHER END TO THE CONVERSION BOARD CONNECTOR 'CN5'. THESE PLUGS ARE KEYS 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 KEYS AND WILL FIT ONLY ONE WAY. CONTAIN THE LOOSE WIRES OF THE CABLE WITH WX-01 TIE WRAPS.
7. PLACE NO. 6 INTERNAL LOCKWASHERS ON THE 6-32 STUDS. THESE ARE THE ONLY STUDS ON THE CHASSIS. THEN SCREW ON THE SP-5B 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 DNG No. 6-01-033-042
2	SP-5B	6-32 x 1-1/4 FEMALE/FEMALE HEX SPACER
3	CB-42	DV/SHARP LCD SIGNAL CABLE DIGITAL VIEW No. 23430
4	9496	ANALOG LCD POWER CABLE DNG No. 6-04-033-079
5	BR-95	12 IN. LCD DISPLAY CARRIER DNG No. 6-01-033-029
6	9497	ANALOG VGA GENDER-BENDER ASSEMBLY DNG No. 6-04-033-080
7	CB-41	HL014034/SS20 POWER CABLE DIGITAL VIEW No. 420800170
8	WX-242	DIGITAL VIEW PCB INSULATOR DNG No. 6-01-033-047
9	PS-44	CCT BACKLIGHT INVERTER XENTER No. LS820
10	BD-80	ANALOG LCD DISPLAY CONVERSION BOARD DIGITAL VIEW MODEL NO. AC-6811 v.3

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
	MATERIAL FINISH			
	1400 MILL LANE 612.442.1410 WACONIA, MN 55387 USA			
	STOCK/ASY No. 6230	TITLE	DEM ANALOG LCD CHASSIS ASSEMBLY	
	UNLESS SPECIFIED	APPLICATION	CENTURION VI	
	X XX +/- .005	SCALE	2.25:1	DWG No 6-10-033-005
	X X +/- .030	SIZE	B	
	X X +/- 1.0"	DATE	24 JUN 98	REV NO
		REITER	1	2 OF 2

