

OPERATIONS MANUAL

FOR A

VM16 MACHINE

ELECTRICAL AND MECHANICAL DRAWINGS

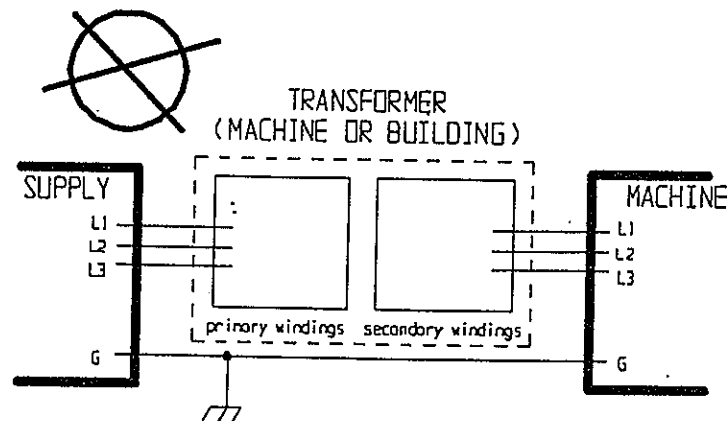
Milltronics Manufacturing Company

1400 Mill Lane

Waconia, MN 55387

612-442-1410

******* 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.

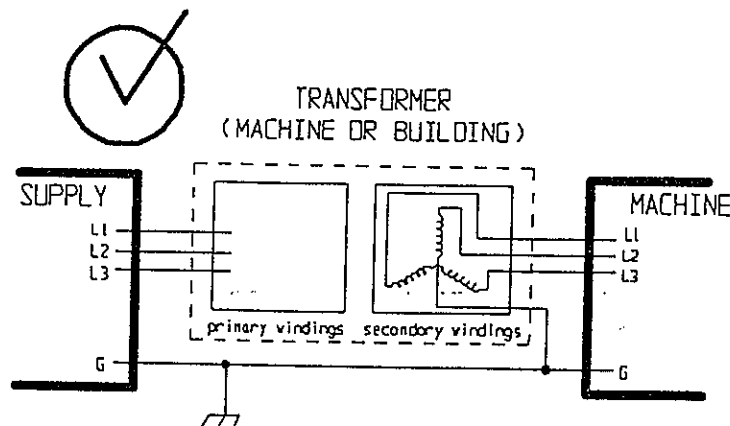
Remove transformer cover and follow transformer ground wire to determine if it is merely a case ground or if it actually goes to a neutral point within the secondary windings.

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.**

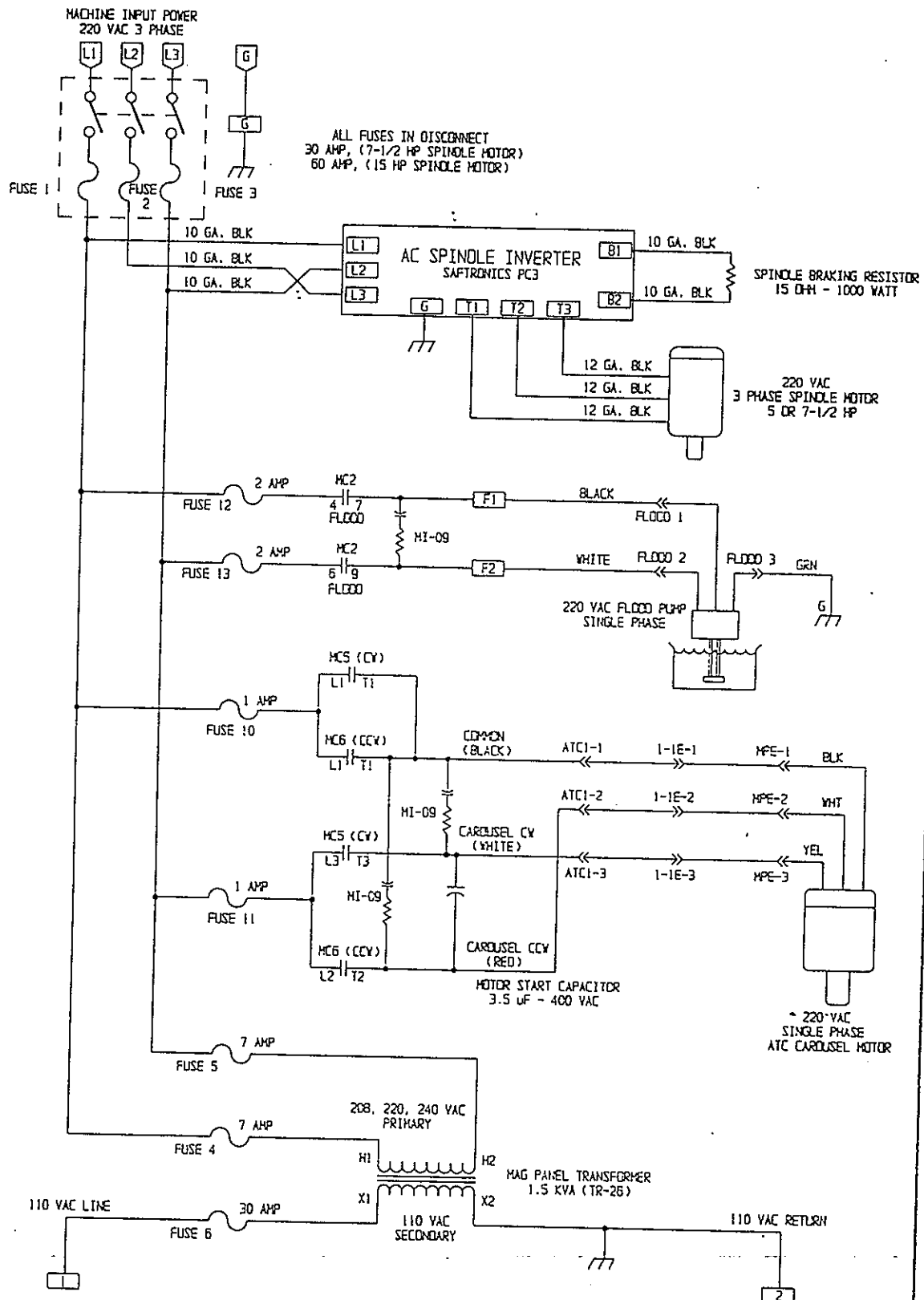


The secondary windings must be grounded.

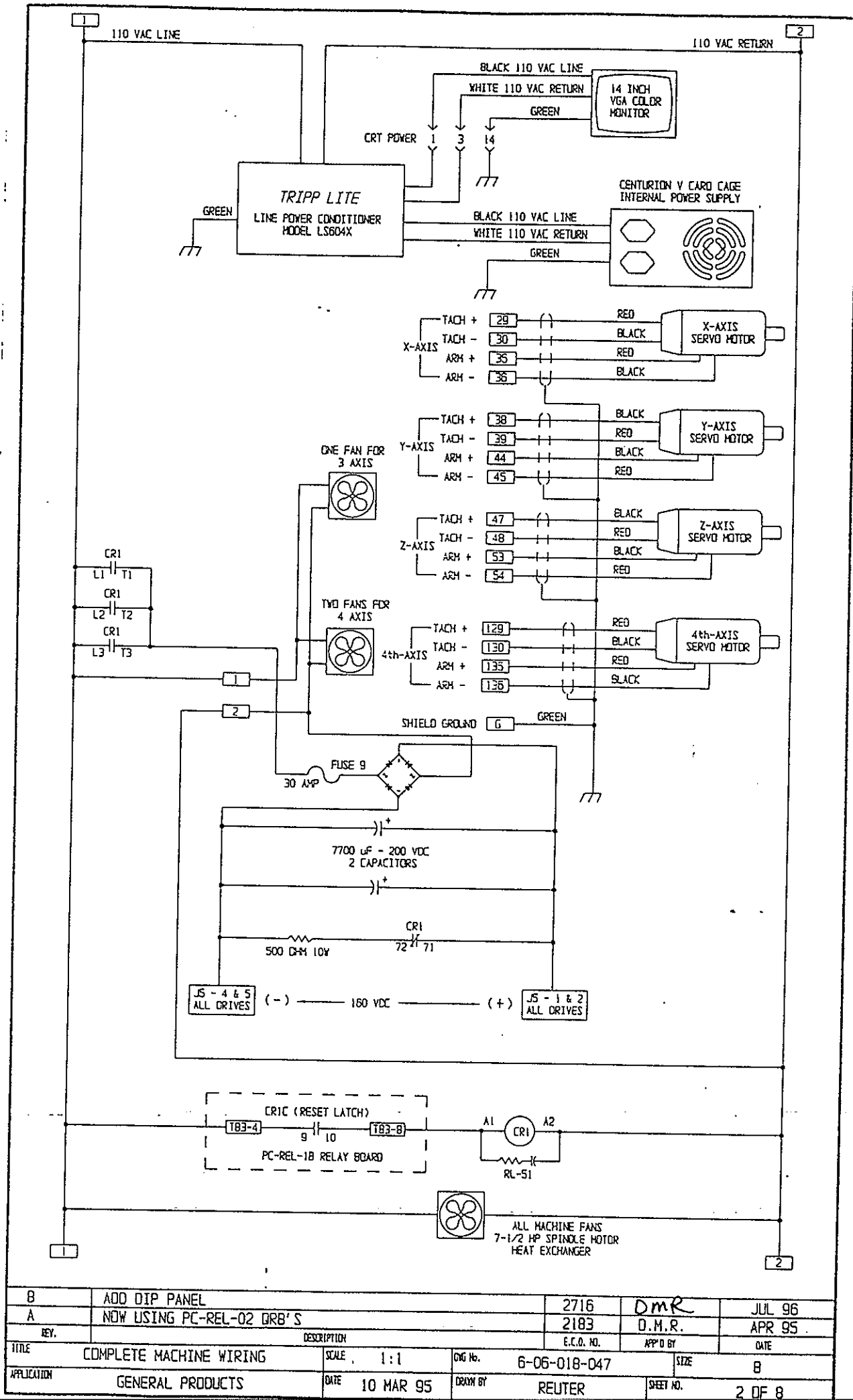
Voltages between each secondary leg and ground should be equal,
 half the voltage between secondary legs.

ELECTRICAL DRAWINGS and PARAMETERS MILLTRONICS PARTNER SERIES CNC

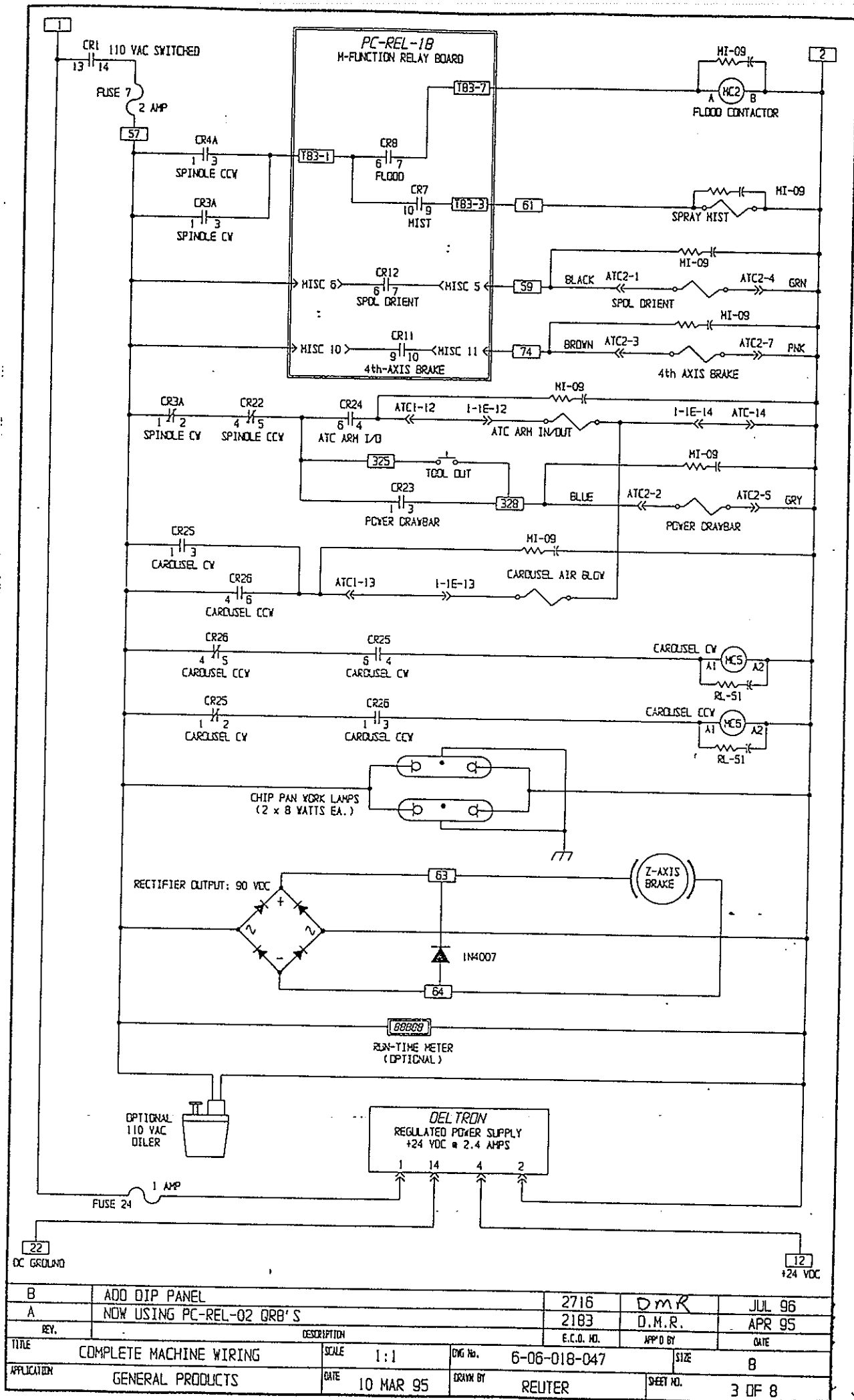
1. Electrical Schematics
2. Magnetics Panel Layouts
3. Spindle Drive Specifications and Parameters
4. Axis Drive Parameter Descriptions, Error Codes, and Settings
5. Automatic Tool Changer Parameters
6. Card Cage Plug Definitions
7. Front Panel Assemblies
8. Card Cage Assemblies
9. List of Included Documents
10. Laser Calibration Records



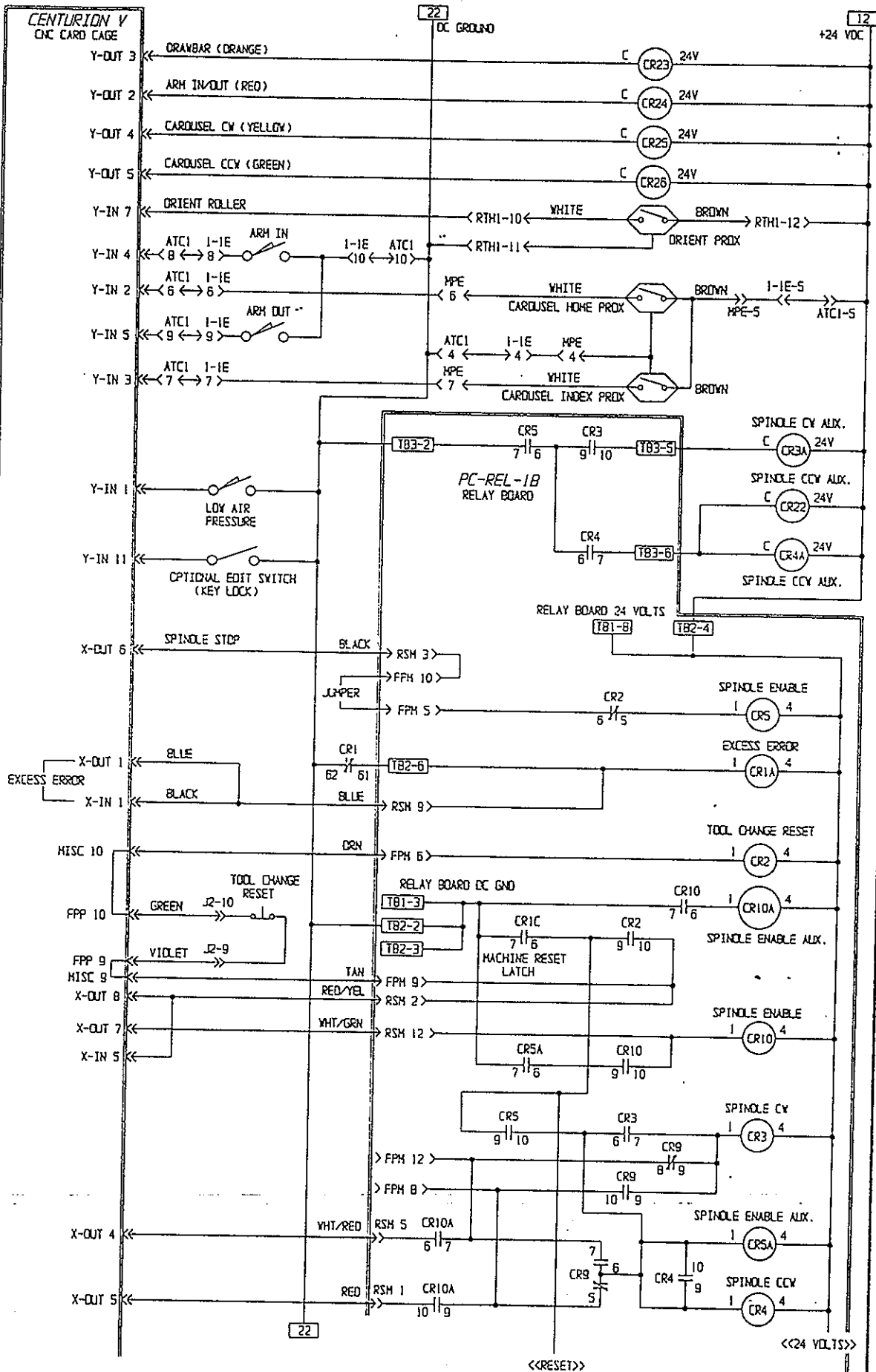
B	ADD DIP PANEL	2716	DMR	JUL 96
A	NOW USING PC-REL-02 GRB'S	2183	D.M.R.	APR 95
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	COMPLETE MACHINE WIRING	SCALE 1:1	ENG No. 6-06-018-047	SIZE 8
APPLICATION	GENERAL PRODUCTS	DATE 15 MAR 95	DRAWN BY REUTER	SHEET NO. 1 OF 8



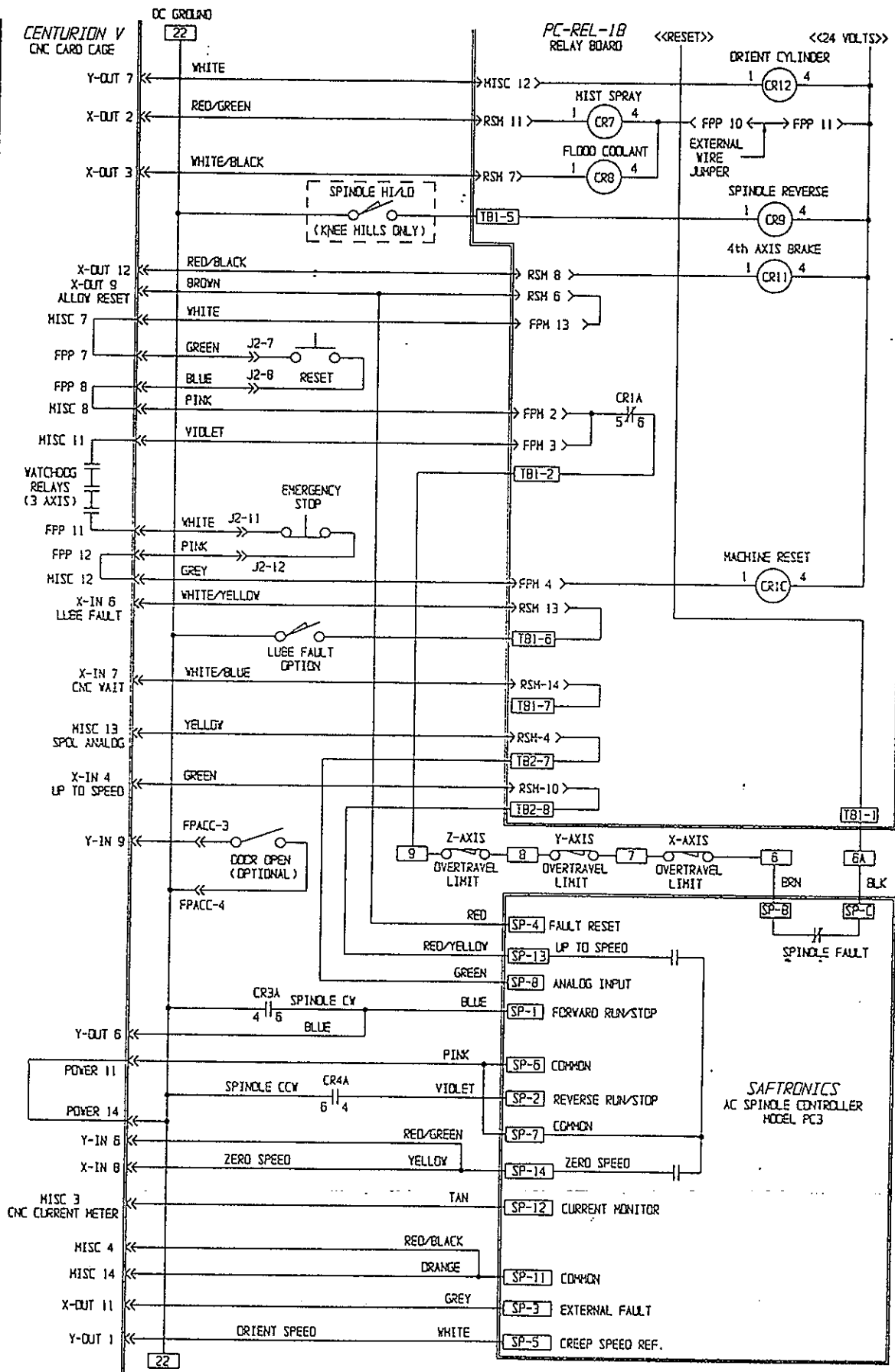
B	ADD DIP PANEL	2716	DmR	JUL 96
A	NOW USING PC-REL-02 DRB'S	2183	D.M.R.	APR 95
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	COMPLETE MACHINE WIRING	SCALE 1:1	6-06-018-047	SIZE 8
APPLICATION	GENERAL PRODUCTS	DATE 10 MAR 95	DRAWN BY REUTER	SHEET NO. 2 OF 8



B	ADD DIP PANEL	2716	DmR	JUL 96
A	NOW USING PC-REL-02 QRB'S	2183	D.M.R.	APR 95
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	COMPLETE MACHINE WIRING	SCALE	1:1	DWG. No. 6-06-018-047
APPLICATION	GENERAL PRODUCTS	DATE	10 MAR 95	DRAWN BY REUTER
				SHEET NO. 3 OF 8



B	ADD DIP PANEL	2716	DMR	JUL 96
A	NOW USING PC-REL-02 GRB'S	2183	D.M.R.	APR 95
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	COMPLETE MACHINE WIRING	SCALE 1:1	ENG. NO. 6-06-018-047	SIZE 8
APPLICATION	GENERAL PRODUCTS	DATE 15 MAR 95	DRAWN BY REUTER	SHEET NO. 4 OF 8



B	ADD DIP PANEL	2716	DMK	JUL 96
A	NOW USING PC-REL-02 GRB'S	2183	D.M.R.	APR 95
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TITLE	COMPLETE MACHINE WIRING	SCALE 1:1	DATE 6-06-018-047	SIZE B
APPLICATION	GENERAL PRODUCTS	DATE 15 MAR 95	DRAWN BY REUTER	SHEET NO. 5 OF 8

PC3 SPINDLE DRIVE PARAMETERS

Issued 1 Oct 1997

PARAMETER

FUNCTION

Level 1 – Basic Motor Control Data

Can be accessed by setting NO-00 = 01 (factory default). Parameters NO-00 thru NO-19 can be read or changed

NO-00	First, Second and Third Functions Setting/Reading
NO-01	Operation and Stopping Method and Selection V/F pattern
NO-02	Maximum Output Frequency 2000 - 6000 Spindle Speed 4000 - 8000 Spindle Speed
NO-03	Maximum Voltage
NO-04	Base Frequency
NO-05	Intermediate Output Frequency
NO-06	Intermediate Output Frequency Voltage
NO-07	Minimum Output Frequency
NO-08	Minimum Output Frequency Voltage
NO-09	Acceleration Time 1
NO-10	Deceleration Time 1
NO-11	Acceleration Time 2
NO-12	Deceleration Time 2
NO-13	Frequency Reference 1
NO-14	Frequency Reference 2
NO-15	Frequency Reference 3
NO-16	Frequency Reference 4
NO-17	Jog Frequency Reference
NO-18	Motor Protection Selection
NO-19	Motor Rated Current

Level 2 – Basic Application Related Functions

Can be accessed by setting NO-00 = 02. Parameters NO-00 thru NO-29 can be read or changed.

NO-20	Run Signal Selection
NO-21	Output Motor and S-Curve Accel/Decel Selection
NO-22	Frequency Reference Gain
NO-23	Frequency Reference Bias
NO-24	Frequency Upper Limit
NO-25	Frequency Lower Limit
NO-26	DC Injection Braking Current
NO-27	DC Injection Braking Time at Stop
NO-28	DC Injection Braking time at Start
NO-29	Automatic Torque Boost Gain

PARAMETER**FUNCTION****Level 3 – Advanced Application Functions**

Can be accessed by setting NO-00 = 03. Parameters NO-00 thru NO-59 can be read or changed.

NO-30	Stall Prevention Level while Running
NO-31	Stall Prevention Level while Running
NO-32	Multifunction Input Selection 1
NO-33	Multifunction Input Selection 2
NO-34	Multifunction Input Selection 3
NO-35	Multifunction Analog Input Selection
NO-36	Multifunction Output Selection 1
NO-37	Multifunction Output Selection 2
NO-38	Multifunction Output Selection 3
NO-39	Frequency Detection Level
NO-40	Over torque Detection Function Selection
NO-41	Over torque Detection Level
NO-42	Over torque Detection Level
NO-43	Carrier Frequency
NO-44	Parameter Not Used
NO-45	Analog Monitor Gain
NO-46	Operation Selection After Momentary Power Loss
NO-47	Fault Retry Selection
NO-48	Fault Record
NO-49	PROM Number (Version)
NO-50	Prohibited Frequency
NO-51	Prohibited Width
NO-52	Parameter Not Used
NO-53	Parameter Not Used
NO-54	Parameter Not Used
NO-55	Parameter Not Used
NO-56	Parameter Not Used
NO-57	Parameter Not Used
NO-58	Parameter Not Used
NO-59	Parameter Not Used

PC3 SPINDLE DRIVE ERROR INDICATORS

INDICATION

Uu1

Uu2

Uu3

oC

oU

FU

oH

oL1

oL2

oL3

rr

rH

EF3

EF5

EF6

EF7

EF8

CPF02

CPF03

CPF04

CPF05

CPF06

FAULT DEFINITION

Low Voltage (PUV)

Low Voltage (CUV)

Low Voltage (MC-ANS fault)

Over Current

Over Voltage

Blown Fuse

Heat Sink Too Hot

Overload

Overload

Over Torque

Regenerative Transistor Failure

Braking Resistor Unit Overheated

External Terminal 3 Failure

External Terminal 5 Failure

External Terminal 6 Failure

External Terminal 7 Failure

External Terminal 8 Failure

Control Circuit Failure

NV-RAM (SRAM) Failure

NV-RAM (BCC, Access Code)

A/D Convertor Failure in CPU

Optional Connection Failure

MACHINE SPECIFIC PARAMETER SETTINGS

PARAMETER	VALUE FOR VM16	VALUE FOR VK/MB-AUTO
NO-00	03	03
NO-01	1000	1000
NO-02	120.0/130.0	144.0
NO-03	200.0	200.0
NO-04	060.0	060.0
NO-05	010.0	010.0
NO-06	045.0	045.0
NO-07	001.0	001.0
NO-08	005.0	005.0
NO-09	001.0	003.0
NO-10	002.5	002.5
NO-11	010.0	010.0
NO-12	002.0	002.0
NO-13	000.0	000.0
NO-14	000.0	000.0
NO-15	000.0	000.0
NO-16	000.0	000.0
NO-17	002.0	002.0
NO-18	0010	0010
NO-19	18.0	18.0
NO-20	1000	1000
NO-21	0100	0100
NO-22	1.00	1.00
NO-23	00.00	00.00
NO-24	100	100
NO-25	000	000
NO-26	035	035
NO-27	0.5	0.5
NO-28	0.0	0.0
NO-29	1.0	1.0
NO-30	170	170
NO-31	160	160
NO-32	01	01
NO-33	13	13
NO-34	05	05
NO-35	00	00
NO-36	05	05
NO-37	02	02
NO-38	01	01
NO-39	000.0	000.0

PARAMETER	VALUE FOR VM16	VALUE FOR VK/MB-AUTO
NO-40	0000	0000
NO-41	160	160
NO-42	00.1	00.1
NO-43	04	04
NO-44	(not used)	(not used)
NO-45	1.00	1.00
NO-46	0000	0000
NO-47	00	00
NO-48	U EF3	U EF3
NO-49	0800	0800
NO-50	000.0	000.0
NO-51	01.0	01.0

Parameters NO-52 thru NO-59 are not used

GA370

DESCRIPTION OF THE GA370:

The GA370 is a modular, high power, high bandwidth PWM servo amplifier designed for use with DC permanent magnet servomotors. The GA370 utilizes today's latest technology in power semiconductors for high efficiency which in turn makes the amplifier extremely reliable in today's and tomorrow's demanding applications.

DESCRIPTION OF FEATURES AND MODEL NUMBERING INFORMATION:

SIGNAL INPUT:

The GA370 has two signal input configurations controlled by JP1. Configuration A (JP1 set on A) has two single-ended inputs SIG. IN. (J1-2) and AUX. IN. (J1-1). Configuration B (JP1 set on B) has one single-ended input AUX. IN (J1-1) and one differential input DIFF. IN (J2-1), DIFF. RET. (J2-2).

VELOCITY MODE OR CURRENT MODE OPTIONS:

The GA370 is most often used to close a critically damped velocity loop using a DC tachometer for velocity feedback. However, the input summing amplifier can be reduced to a gain of one by connecting a 5K resistor across pins 1 and 4 of J3. The gain of the GA370 can then be adjusted from 0 to 3 Amps/Volt.

EXTERNAL PROGRAMMABLE CURRENT LIMIT:

Pins 1 and 3 of J3 can be used to externally program the current limit by connecting a resistor or potentiometer across them.

+ AND - LIMITS:

The GA370 may be configured for four different end of travel limit circuits.

Type A: Requires grounding of pin 6 and 7 to disable amplifier.

Type B: Requires a positive voltage at pin 6 or pin 7 to disable amplifier.

Type C: Requires the removal of a ground from pin 6 or pin 7 to disable amplifier.

Type D: Requires the removal of a positive voltage from pin 6 or pin 7 to disable amplifier.

The amplifier is normally shipped with the type A + and - limit configuration

LOCK OUT (TOTAL INHIBIT AND FAULT MONITOR):

Lock Out has two functions, total inhibit and fault monitor. When Lock Out is pulled to ground, either by the amplifier fault sensing circuit or some external circuit, the amplifier is totally inhibited

CARRIER FREQUENCY:

The GA370 is provided with a carrier frequency of 30 KHz.

PROTECTION CIRCUITS:

The following protection circuit are integral to the GA370 amplifier to prevent damage to the amplifier and your equipment. When activated these protection circuits will totally inhibit the amplifier and turn on the fault output.

OVER VOLTAGE INDICATOR (RED LED):

The indicator LED will turn ON and latch indicating the D.C. bus voltage has exceeded the maximum safe voltage for your system. This circuit protects the motor and amplifier from high D.C. bus voltages.

GA370

LOW SPEED ELECTRONIC CIRCUIT BREAKERS (RED LED):

The indicator LED will turn ON and latch indicating the Low Speed Electronic Circuit Breaker (LS/ECB) has fired. This circuit protects the motor, amplifier and mechanical system from damage due to excessive mechanical bind or possibly driving into a hard mechanical stop.

Circuit operation is as follows:

When the motor current exceeds the value set at TP9, typically 1.5 VDC (scale factor 1 VOLT = 10 AMPS), UIB-14 switches positive and voltage on C46 begins integrating up. If the current remains above the set point, typically for 1.5 seconds, the LS/ECB latch will trigger.

HIGH SPEED ELECTRONIC CIRCUIT BREAKER (RED LED):

The indicator LED will turn ON and latch indicating the High Speed Electronic Circuit Breaker (HS/ECB) has fired. This circuit protects the amplifier from dead shorts across the amplifier output terminals. The HS/ECB is always factory set and should not be adjusted. The typical factory setting is 45 Amps for 10 microseconds.

TEMP INDICATOR OPERATION (RED LED):

The Temp Indicator LED will Turn ON and latch when the transistor heatsink temperature exceeds 170°F.

SPECIFICATIONS:

OUTPUT POWER (For each GA370 amplifier module)

OUTPUT CURRENT (Peak):	±25 AMPS
OUTPUT CURRENT (RMS):	±15 AMPS
OUTPUT VOLTAGE (typical)	±100 VDC

INPUT POWER:

FANS:	120 VAC, 50/60 Hz @ 1 AMP
D.C. BUS VOLTAGE	
TYPICAL:	65 VDC TO 170 VDC
MAXIMUM:	200 VDC
(Higher bus voltages available, consult Glentek.)	

Note: DC bus voltage should be selected approximately 10% to 20% above the maximum Voltage required at motor terminals for maximum system efficiency.

SIGNAL INPUTS:

VOLTAGE, MAXIMUM

Aux. Input	±70 Volts
Sig. Input	±70 Volts
Diff. Input	±13 Volts
Tach. Input	±90 Volts

GAIN, MAXIMUM

Sig. And Aux. Inputs	15,000 Amps/Volt
Tachometer	7,000 Amps/Volt

Input Impedance, Minimum	30K Ohm
Drift (Ref. To Input), Maximum	0.01 mV/°C
Frequency Response, Minimum	1,500 Hz
Dead Band	None
Form Factor	1.01

GA370

OTHER INPUTS AND OUTPUTS:

+ and - Limits (Type "A")
Lock Out

Activated by a 3 ma. contact closure to common.
Total Inhibit, activated by a 3 ma. contact closure to common. Fault monitor, 10k ohm pull up to +15VDC, Will sink 15 ma.

Reset

Activated by a 3ma. contact closure to common

MECHANICAL:

Mounting
Cooling

Any position
50°C Ambient Max

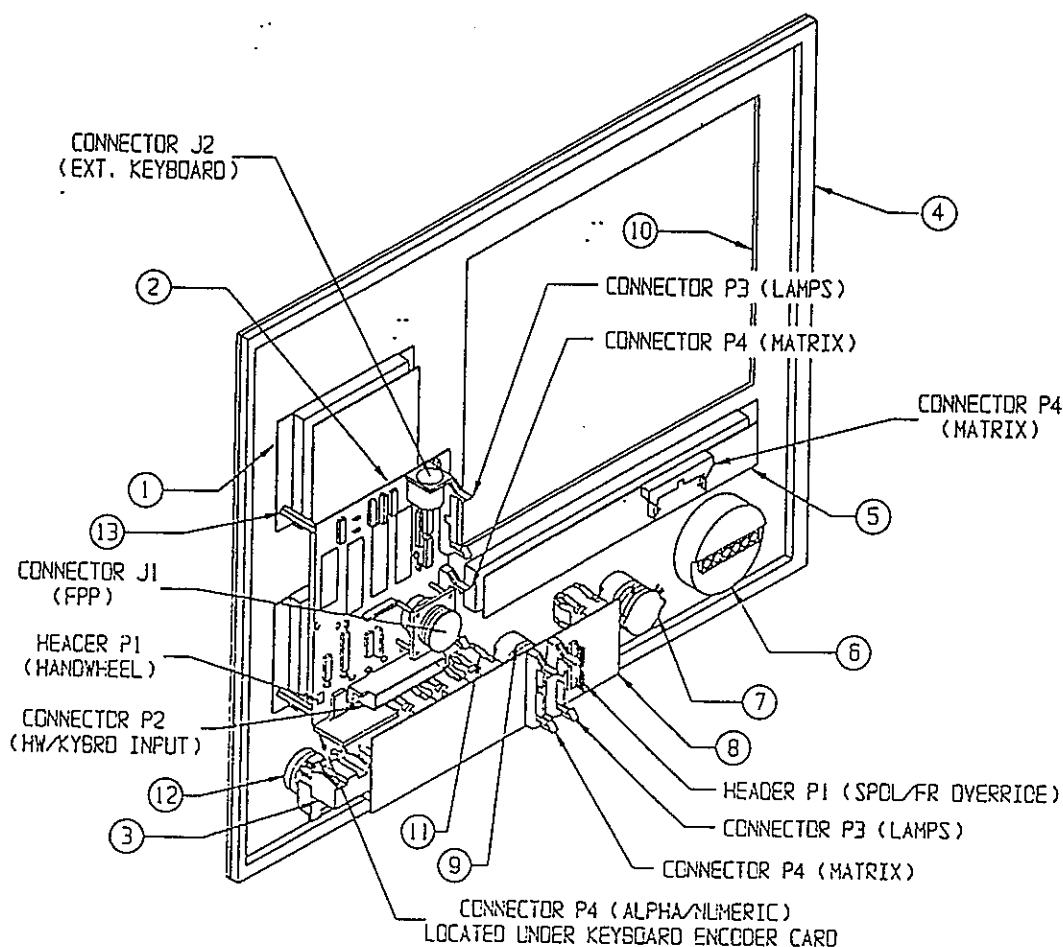
TYPICAL FACTORY SETTINGS:

Sig. And Aux. Gain
Tach. Gain
Current Limit
Comp.
LS/ECB
HS/ECB

5V(Sig.)/7V(Tach.)
50%
CCW (OFF)
CCW (Min. Bandwidth)
15A @ 3 sec.
45A @ 10 micro sec.

Yin01	Air Switch (Wired to N.C. contact on air switch) (Causes low air pressure caution message during tool change sequence)
Yin02	Carousel Home (Wired to ATC-6 tool changer cable GND active) (Signal comes from tool changer home prox switch)
Yin03	Carousel at Pocket (Index) (Wired to ATC-7 tool change cable GND active) (signal comes from pocket prox)
Yin04	Arm in at Spindle (Wired to ATC-8 tool change cable GND active) (signal comes from arm in prox switch)
Yin05	Arm Out Away from Spindle (Wired to ATC-9 tool change cable GND active) (signal comes from arm out prox switch)
Yin06	At Zero Speed, Parallel with Xin8 (Wired to Yaskawa spindle drive SP-13 or 12½ HP to SHFT)
Yin07	Orient Prox (Wired to RTH1-10 of orient hard tap plug) (Signal active when orient roller is in cam slot)
Yin08	Spare
Yin09	Input to halt machine operation when doors are open. Optional
Yin10	Spare
Yin11	Edit Key Switch (When active, prevents exit from Run screen once entered. Intended to be attached to an Edit Key to prevent operators from doing anything but running programs.)

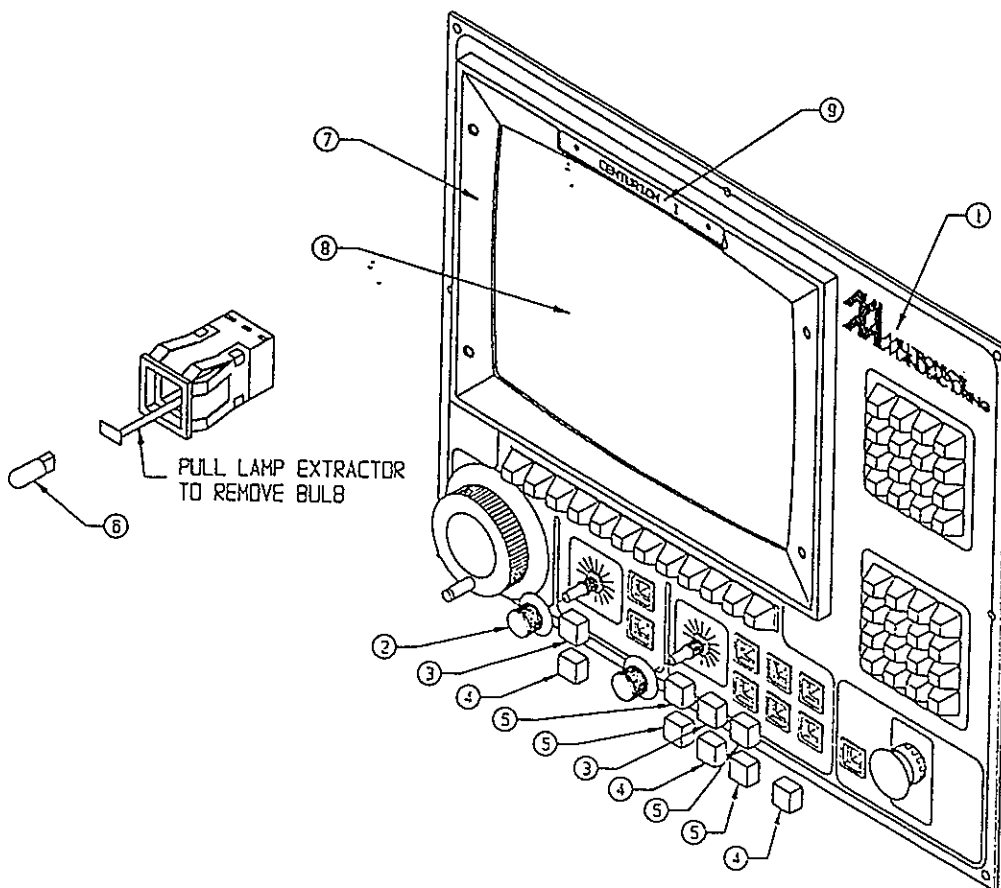
Yout01	Creep Speed (Wired to Yaskawa spindle drive SP-5 or 12½HP TBJ-2 CR47 creep relay)
Yout02	Arm in Sol./Arm Out (Wired to TBC-1 CR24 arm in/out sol.)
Yout03	Drawbar (Wired to TBI-2)
Yout04	Carousel CW (Wired to TBC-2)
Yout05	Carousel CWW (Wired to TBG-2)
Yout06	Spindle CW (TBH-16 Yaskawa spindle drive used to select direction during orient creep)
Yout07	Orient Pin (Wired to MISC-12 relay card) (Pin engages orient prox, tells CNC when pin drops into slot and orient is complete)
Yout08	Door Open/Close (20 Pocket)
Yout09	Spindle Drive Disable (12½ HP option)
Yout10	Low Range (12½ HP option)
Yout11	Medium Range (12½ HP option)
Yout12	High Range (12½ HP option)



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	80-51	KEYPAD ASSY. ALPHA/NUMERIC DIGITRAN No. KCD245-01
2	7315	KEYBOARD ENCODER CARD PC-KYBENC-02 MHC DVG. 6-07-004-011
3	SY-39	SWITCH CONTACT BLOCK, N/C, DEN No. V-40
4	FP-51	FRONT PANEL GASKET, MHC 6-01-004-007
5	80-50	KEYPAD ASSY. FUNCTION KEYS DIGITRAN No. KCD245-01
6	ED-30	HANDWHEEL ENCODER, 100 COUNT SUNTAK No. LGS-022-100
7	SY-14	ROTARY SWITCH (FEEDRATE) ELECTROSWITCH No. 74-0246
8	7300	FRONT PANEL SWITCH BOARD PC-FPSY-01 MHC DVG. 6-07-004-006
9	SY-14	ROTARY SWITCH (SPINDLE) ELECTROSWITCH No. 74-0246
10	FP-60	14 INCH CRT FRONT PANEL 6-01-004-053
11	SY-87	SWITCH, MOMENTARY CONTACT, DPDT HONEYWELL MICROSWITCH AHL21CBA3AC
12	SY-23	SWITCH ACTUATOR, RED MUSHROOM TOP ALCO T2050-2
13	SP-72	HEX SPACER, 6-32 UNC M/F x 1.25

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	FRONT PANEL ASSEMBLY - REAR	SCALE 3:1	DWG No. 6-11-004-000	SIZE 8
APPLICATION	CENTURION V	DATE 4 FEB 93	DRAWN BY REUTER	SHEET NO. 1 OF 1

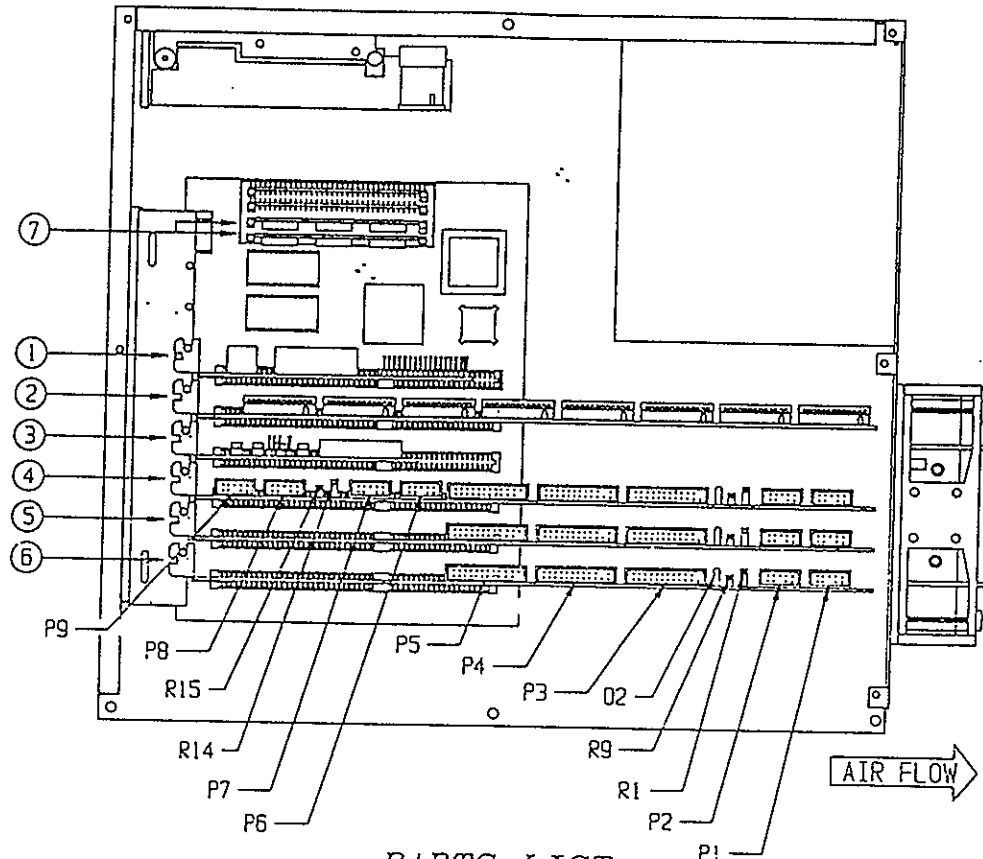


- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	FP-S8	14 IN. CRT FRONT PANEL OVERLAY 6-08-004-003
2	SY-35	SWITCH KNOB, COMPOSITE BLACK ALCORNOK PKA-P708-1/4
3	SY-69	SQUARE KEYTOP, RED HONEYWELL MICROSWITCH AML51A10R
4	SY-82	SQUARE KEYTOP, GREEN HONEYWELL MICROSWITCH AML51A10G
5	SY-90	SQUARE KEYTOP, WHITE HONEYWELL MICROSWITCH AML51A10W
6	SY-92	SWITCH INDICATOR LAMP, 24 VDC HONEYWELL MICROSWITCH AML91LABS
7	FP-S7	14 IN. CRT BEZEL HMC 6-01-004-057
8	FP-S9	14 IN. CRT LEXAN WINDOW, SMOKE HMC 6-01-004-054
9	LB-40	CENTURION V NAMEPLATE HMC 6-08-004-004

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TITLE	FRONT PANEL ASSEMBLY - FRONT	SCALE 3:1	DWG No. 6-11-004-001	SIZE B
APPLICATION	CENTURION V	DATE 25 FEB 93	DESIGN BY	PRINTED
			SHEET NO.	1 OF 1

DIAGRAM SHOWN FOR 3-AXIS STANDARD SYSTEMS

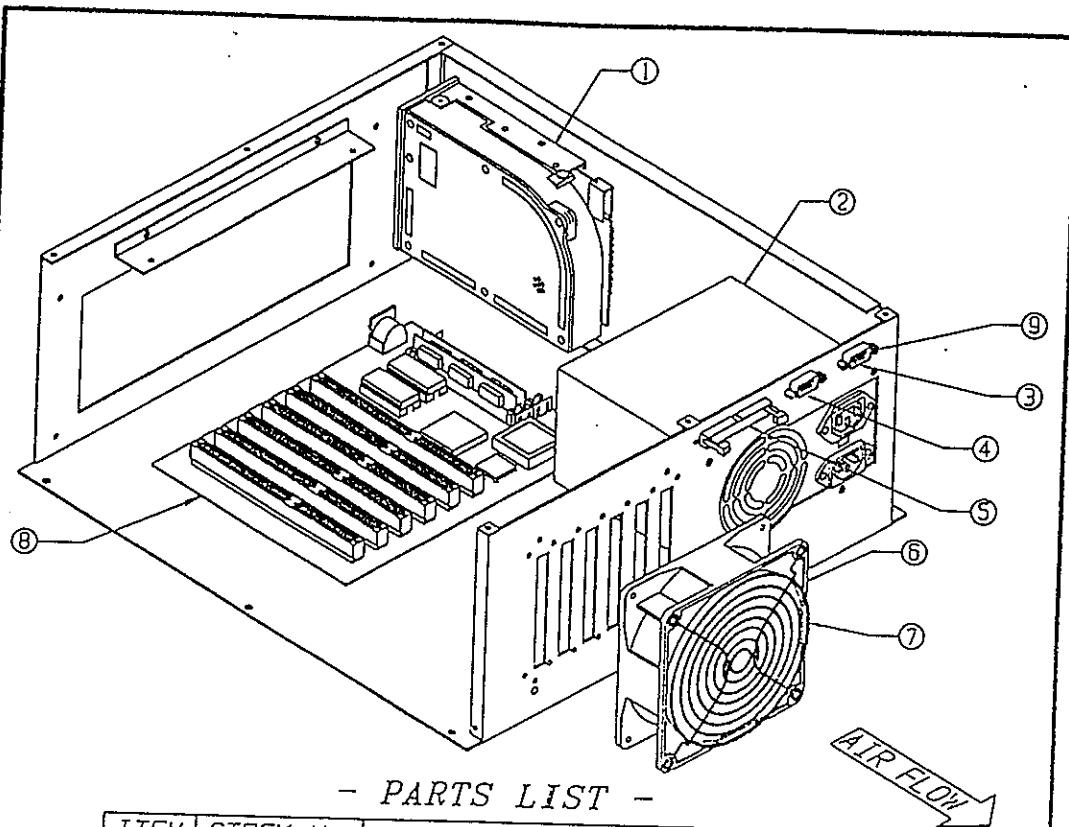


- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	BD-52	IDE HDD/FDD CONTROLLER & I/O PORTS
2	BD-49	VIDEO GRAPHICS ARRAY (VGA) CARD
3	ASSY No. 7205	SIMODISK HARD DRIVE EMULATOR BOARD MILLTRONICS MANUFACTURING COMPANY PC-SIMODISK-01
4	ASSY No. 7000	ACROLOOP X-AXIS COMPUTER CONTROLLER MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (FULL BOARD)
5	ASSY No. 7005	ACROLOOP AXIS COMPUTER - Y-AXIS MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (AXIS ONLY)
6	ASSY No. 7005	ACROLOOP AXIS COMPUTER - Z-AXIS MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (AXIS ONLY)
7	BD-55	MOTHERBOARD MEMORY, 1 MEG SIMM (2 EA.)

P1 AXIS ENCODER INPUT
 P2 AXIS DRIVE ANALOG INPUT
 R1 AXIS GAIN ADJUST
 R9 AXIS OFFSET ADJUST
 D1 WATCHDOG LED
 P3 AXIS OUTPUT
 P4 AXIS INPUT
 P5 MACHINE AXIS INTERFACE
 P6 SPINDLE ENCODER INPUT
 P7 SPINDLE LOAD METER/ANALOG OUTPUT
 R14 SPINDLE OFFSET ADJUST
 R15 SPINDLE GAIN ADJUST
 P8 KEYBOARD INPUT
 P9 VIDEO OUTPUT (EGA ONLY)

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (012) 474-0100 CHANDASSEN, WI 53317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE CARD CAGE ELECTRONICS ASSY.		APPLICATION CENTURION V		
SCALE 2.5:1		ENG No. 6-11-004-024	SIZE B	
DATE 2 MAR 94		DRN BY REUTER	SHEET NO. 2 OF 5	



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	CU-39	HARD DISC DRIVE, IDE, 40 MB SEAGATE TECHNOLOGIES No. ST-157/A
2	PS-23	POWER SUPPLY, BABY AT, 200 W
3		PERIPHERAL PORT, SERIAL, 'COM-1' (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-006
4		PERIPHERAL PORT, SERIAL, 'RIGID TAPPING' (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-006
5		PERIPHERAL PORT, FLOPPY DISC DRIVE (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-003
6	FA-1	FAN, COOLING, 110 VAC TRW No. A47815A15T3 POWER CABLE, (FA-03), NOT SHOWN
7	FA-04	FAN GRILLE FOR FA-01 WFG 473
8	BD-43	MOTHERBOARD, IBM AT/386SX, 40 MHZ
9	CD-53	JACK SCREW ASSY, 4-40 UNC THREAD TRW No. D-20418-2

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANDLASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE CARD CAGE ELECTRONICS ASSY.		
X.XXX	+/- .005	APPLICATION CENTURION V		
X.XX	+/- .010	SCALE 3:1		
X.X	+/- .030	DATE 2 MAR 94		
ANGLE	+/- 1.0°	DRAWN BY REUTER		
		SHEET NO. 3 OF 5		