

OPERATIONS MANUAL

PARTNER 5E

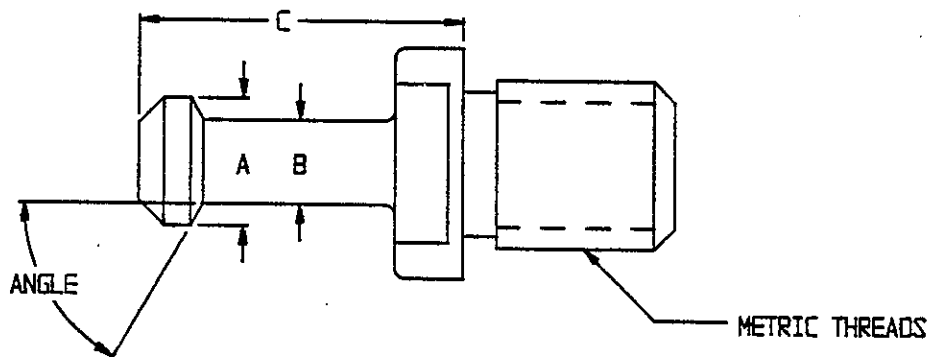
MILLTRONICS MANUFACTURING COMPANY

**7870 Park Drive
Chanhassen, MN 55317**

612-474-8100

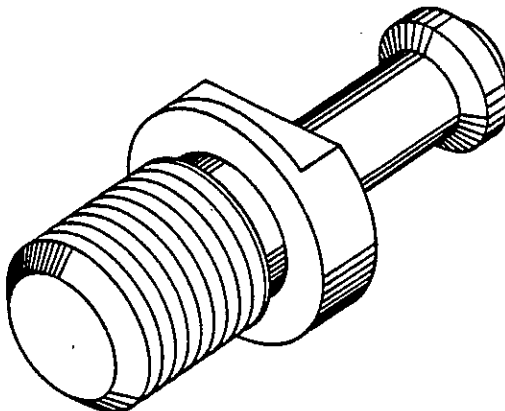
**RETENTION KNOBS
STYLE BT-FLANGE**

BT-FLANGE TAPER	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNAMETAL PART No.	VALENITE PART No.
	A	B	C	ANGLE				
40	.59	.39	1.38	45°	PARTNER VII & VIII	RB4M-0001		
				60°	PARTNER I, IV, V & VI	RB4M-0002		
45	.75	.55	1.57	45°	PARTNER VII	RB5M-0001		



Notes...

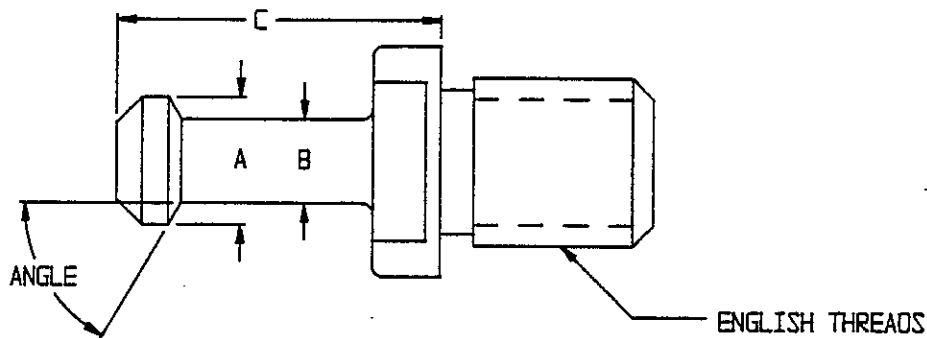
COMMAND CORPORATION
TEL: 1.800.328.2197
FAX: 1.612.755.1116



B	DRAWING CORRECTIONS	1780	W/V	3/94
A	ADD PARTNER 6 & 8	1410	N.M.	7/93
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.		TITLE BT-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	+/- .005	SCALE 1:1		DWG No. 6-00-018-030
X.XX	+/- .010	DATE 1 FEB 89		SIZE B
X.X	+/- .030	DRAWN BY REUTER		SHEET NO. 1 OF 1
ANGLE	+/- 1.0°			

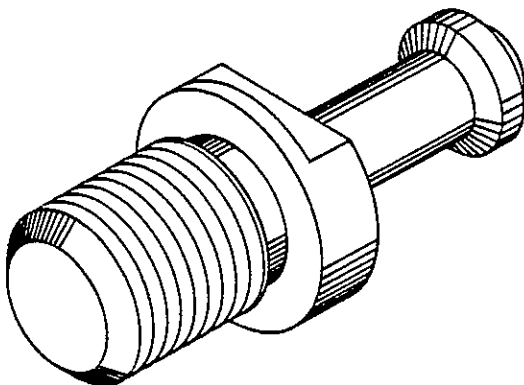
**RETENTION KNOBS
STYLE V-FLANGE**

V-FLANGE TAPER	DIMENSIONS				MILLTRONICS MACHINE	COMMAND PART No.	KENNMETAL PART No.	VALENITE PART No.
	A	B	C	ANGLE				
40	.59	.39	1.27	45°	PARTNER VII & VIII	RB4E-0001		
				60°	PARTNER I, IV, V & VI	RB4E-0002	RK31114A	PT-532-60
30	DWG. No. 6-01-018-010				PARTNER III B	MA-129		



Notes...

1. COMMAND CORPORATION CORRESPONDENCE NUMBERS,
TEL - 1.800.328.2197
FAX - 1.612.755.1116.
2. 30-TAPER RETENTION KNOB IS A PRODUCT
OF MILLTRONICS MANUFACTURING COMPANY,
REORDER PART No. MA-129.



C	DRAWING CORRECTIONS	1781	W/M	3/94
B	ADD PARTNER VI & VIII	1409	M.F.	7/93
A	ADD PART No.		M.F.	8/89
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.		TITLE V-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	+/- .005	SCALE 1:1		DWG No. 6-00-018-031
X.XX	+/- .010	DATE FEB 89		SHEET NO. 8
X.X	+/- .030	DRAWN BY REUTER		1 OF 1
ANGLE	+/- 1.0°			

UNCRATING:

Carefully remove protective crating so that machine and parts are not marred or damaged. In the event of damage in transit, IMMEDIATELY notify the distributor from whom the machine was purchased, as well as the transportation company making delivery.

SHORTAGES:

Check shipment carefully against the itemized packing list. In case of shortages, report them IMMEDIATELY to the distributor from whom the machine was purchased.

CLEANING:

Thoroughly clean protective coating from the machine with a suitable cleaning solution.

WARNING

IT IS NOT RECOMMENDED THAT GASOLINE OR ANY OTHER HIGHLY INFLAMMABLE CLEANING AGENT BE USED.

Do not move the table, knee, saddle or ram until all ways have been well cleaned and lubricated. Then move table, saddle, and knee to limit stop in one direction. Clean and lubricate the exposed ways and then move each unit to the opposite limit stop and similarly clean and lubricate the exposed ways.

BASIC MACHINE SPECIFICATIONS

Range

Table travel (X axis)	31 in.
Saddle travel (Y axis)	18 in.
Quill travel	6 in.
Knee travel (Z axis manual)	16 in.
RAM travel	Rigid
Max. weight of workpiece	1000 lbs.

Table

Overall sizes	16.5 X 47.5 in.
T-Slots	4 on 2-1/2 in. centers
T-Slot size	5/8 in.
Height above floor (max.)	56 in.

Milling

Feed rate	0.1 to 200 IPM
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Space and Weight

Floor area	7 X 10 ft.
Height	97 in.
Net weight	6,600 lbs.
Shipping weight	6,900 lbs.

Power

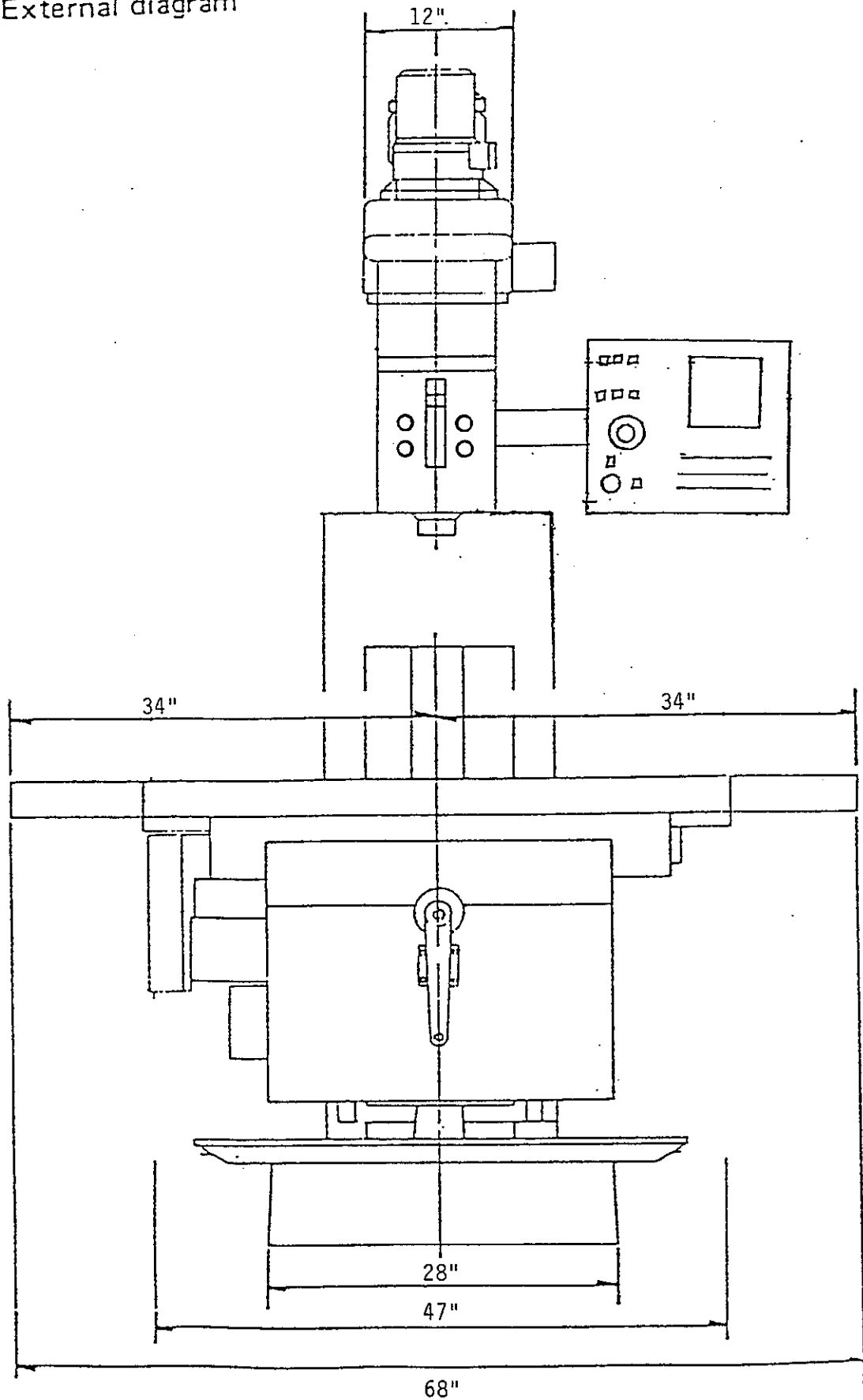
Electrical supply	60 Hz. 3 phase 220/230/440/460 V
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Color

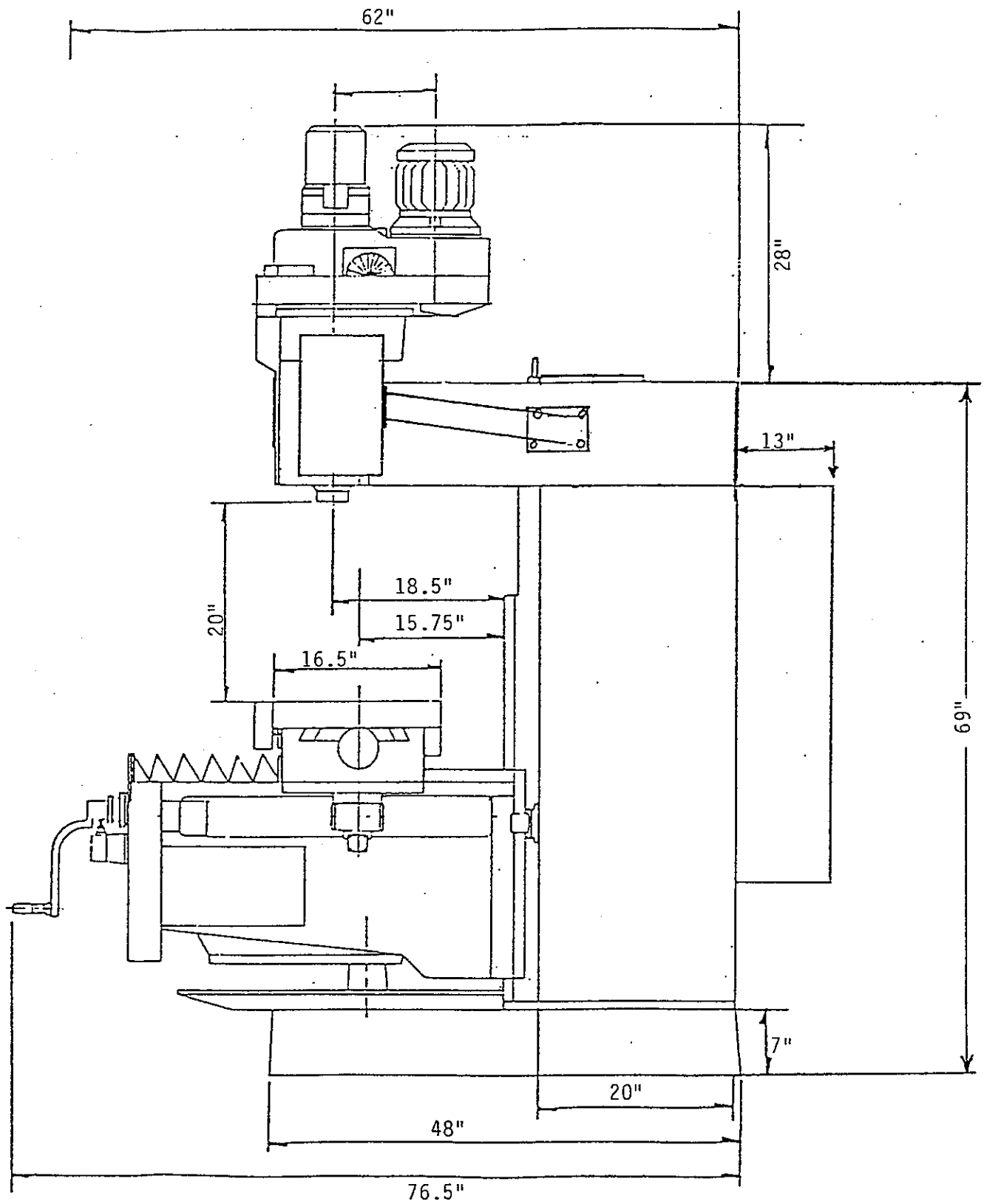
Standard	Gray
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PARTNER V

External diagram

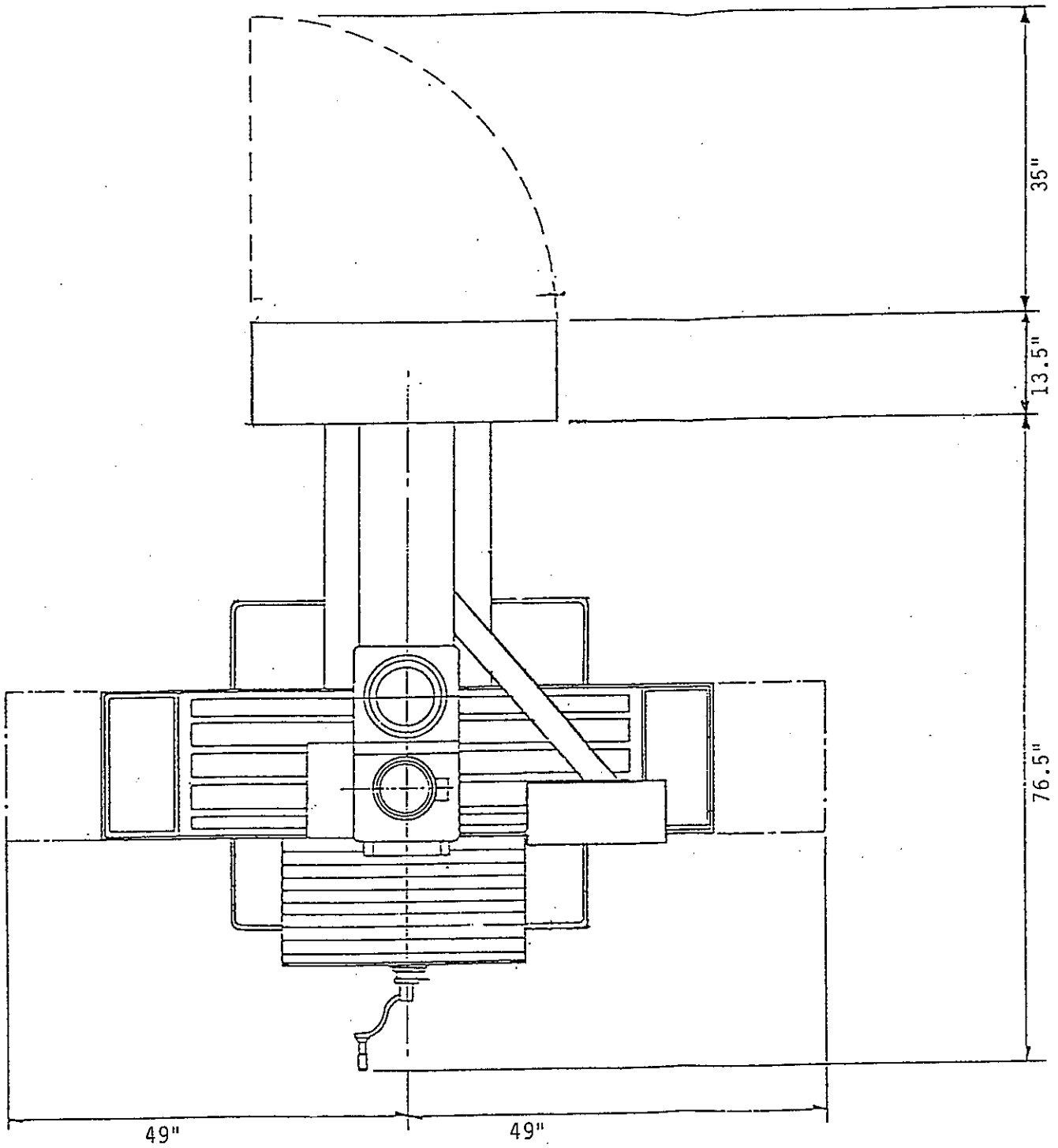


PARTNER V



EXTERNAL DIAGRAM

PARTNER V



FLOOR SPACE DIAGRAM

Upper radial bearing (6007) BG-03
Front sliding pulley bearing (6011) BG-04
Front Main pulley(6009) BG-05
Driving gear bearing(6910) BG-08x2
Driving gear bearing (6909) BG-05x2
Upper back gear shaft(6005) BG-06
Lower Back gear shaft (30205)BG-07
Spindle thrust (7011 Mech)BG-19
Spindle Radial (6209)BG-20
X and Y thrust (MM30BS62H) BG-21x2
X and Y radial (6205) BG-24
Z axis thrust (7204) BG-01x2
Z axis radial (6209) BG-02
Front knee crank (07097) BG-27 x2 race
for BG-27 is BG-28x2
Rear knee crank(6205) BG-24
Knee lead screw(32205) x 2

LIFTING AND PLACING ON SOLID FOUNDATION

The machine should be lifted by using the I-bolt on top of the machine.

The column and base are a one-piece casting. When setting the machine on a concrete foundation, it is advisable to use a little grout (thin mortar) to take care of any unevenness in the concrete as well as to provide a solid foundation at all points.

When setting the machine on a floor that is uneven, shims should be used to correct this condition. See Figure 1 for installation layout.

NOTE

IT IS RECOMMENDED THAT THE MACHINE BE SECURED TO THE FLOOR TO PREVENT MOVEMENT OR TIPPING DUE TO OFF-CENTER LOADING.

Before securing machine to floor (i.e. tightening hold down bolts), make certain all four corners are making contact with the floor or shims, after machine is leveled. If this is not done, it is possible to twist the column and put a bind in the ways.

LEVELING MACHINE:

Set the machine by levelling the work table lengthwise and crosswise with a precision level.

CONNECTING POWER SUPPLY:

To connect the power have a qualified electrician proceed as follows:

1. Check motor wiring to ensure it is compatible with power supply.
2. Connect machine wiring to power supply making sure connection complies to all local electrical codes.
3. Check for correct spindle rotation.

ADJUSTMENT OF KNEE GIB

Remove chip wiper and adjust screw until smooth movement is attained. Replace chip wiper.

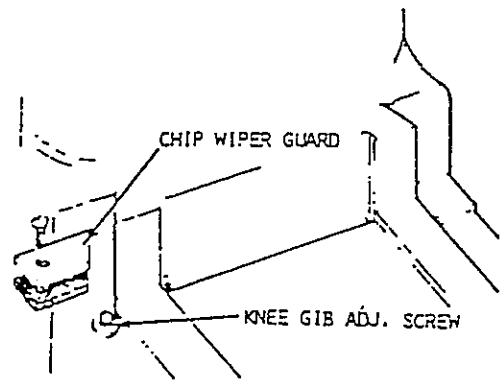


Figure 2. Knee-Column Gib

LUBRICATION

The machine has an automatic lubrication system that oils all necessary parts. The recommended way oil is Mobil VAC-2.

SPINDLE BRAKE

The brake lever can be moved in either direction to stop the spindle. It also will activate automatically when the spindle is turned off. There are no adjustments on the brake, so it must be replaced when worn out.

CAUTION

BE CERTAIN THAT THE SPINDLE BRAKE IS RELEASED BEFORE STARTING THE MOTOR. THIS IS IMPORTANT AS THE MOTOR CAN BE DAMAGED IF THE SWITCH IS TURNED ON WITH THE BRAKE IN THE LOCKED POSITION.

HI-NEUTRAL-LO LEVER

The lever is used to put the head into either direct drive or backgear. Rotate the spindle by hand to facilitate meshing of the clutch or gears.

Neutral can be obtained at mid-way position, and is provided to permit free spindle rotation for indicating and set-up.

In high speed (Direct Drive) the spindle is driven by tapered clutch teeth. If the clutch is not meshed tightly, clutch rattle will be heard. This can be corrected by moving the detent plate upward as the clutch wears. This is also the reason for possible loss of neutral, requiring the reversal of the detent plate.

CAUTION

DO NOT shift Hi-Lo Lever while the motor is running.

RECOMMENDATIONS

Use 2, 3, or 4 flute end mills. Eight flute end mills are usually not as satisfactory for general milling. When using shell mills, face mills, or any other tooling, proper machining practice should be observed.

CAUTION

DO NOT TRY TO CHANGE SPINDLE SPEED ON VARI-DRIVE HEAD
UNTIL MOTOR IS RUNNING. THIS COULD CAUSE PARTS BREAKAGE.

Spindle Feeds are adjusted by turning speed change handwheel on the front of the belt housing. There are two ranges shown: 60 to 500, and 500 to 4200.

60 - 500 RPM is obtained through the back-gear drive and is referred to as low range. To engage the back-gears, use the lever marked Hi-Neutral-Lo on the right side of the head. Move this lever to the "LO" position and use low range on the variable speed dial.

When shifting to "LO," DO NOT FORCE THE LEVER if the back gears do not mesh. Hold the lever so that the gears are clear of one another, rotate the spindle nose by hand until the gears line up, and then put the unit in "LO" (back gear).

500 - 4200 RPM is direct drive and is the high range. The same procedure as previously described is used to select this range except the Hi-Neutral lever is set in the Hi position.

Wear on the vari-drive belt will cause a slight change in the speeds to that shown in windows on the dial. This can be corrected as follows. Crank the speed change handwheel snugly against the high speed stop. (This will be near the 4200 reading on the dial.) Use a tachometer to determine the spindle speed, then turn the pivot stud, after loosening the jam nut, until the spindle speed registers 4200 on the tachometer; tighten the jam nut.

Now reposition the speed dial plate to match the tachometer reading. This is done by loosening the Hex nut until the spindle speed registers 4200 on the tachometer; tighten the jam nut.

DO NOT LOOSEN THE 3 HEX NUTS on the upper part of the Quill Housing. These are set at the factory and are used only for alignment.

REMOVING THE MOTOR

Run the head to the lowest speed of either range and shut off the motor. This puts the Vari-Drive belt in the best position for disassembly.

1. DISCONNECT THE POWER.
2. Remove the cover (B, Figure 3) at the lower end of the motor shaft. Use two cover screws (A) to fasten the spring (C) on the lower end of the motor shaft to the lower motor vari-drive pulley. This will reduce the hazard of personal injury that is always present when a heavy spring is under compression. When the pulley, spring retainer, and spring are securely fastened as a single unit, crank the speed change handwheel to the top speed position.
3. Now remove the screws (D) that fasten the motor to the belt housing. The motor should be lifted slightly and pulled firmly away from the spindle and toward the rear of the belt housing. This will pull the vari-drive belt deeply into the spindle pulley providing the slack needed to slip the belt over the motor pulley.
4. Now lift the motor high enough to rest the motor base GENTLY on the adjusting screw (E) seen directly in front of the motor flange. The belt can now be slipped over the lower pulley and the motor removed from the housing.

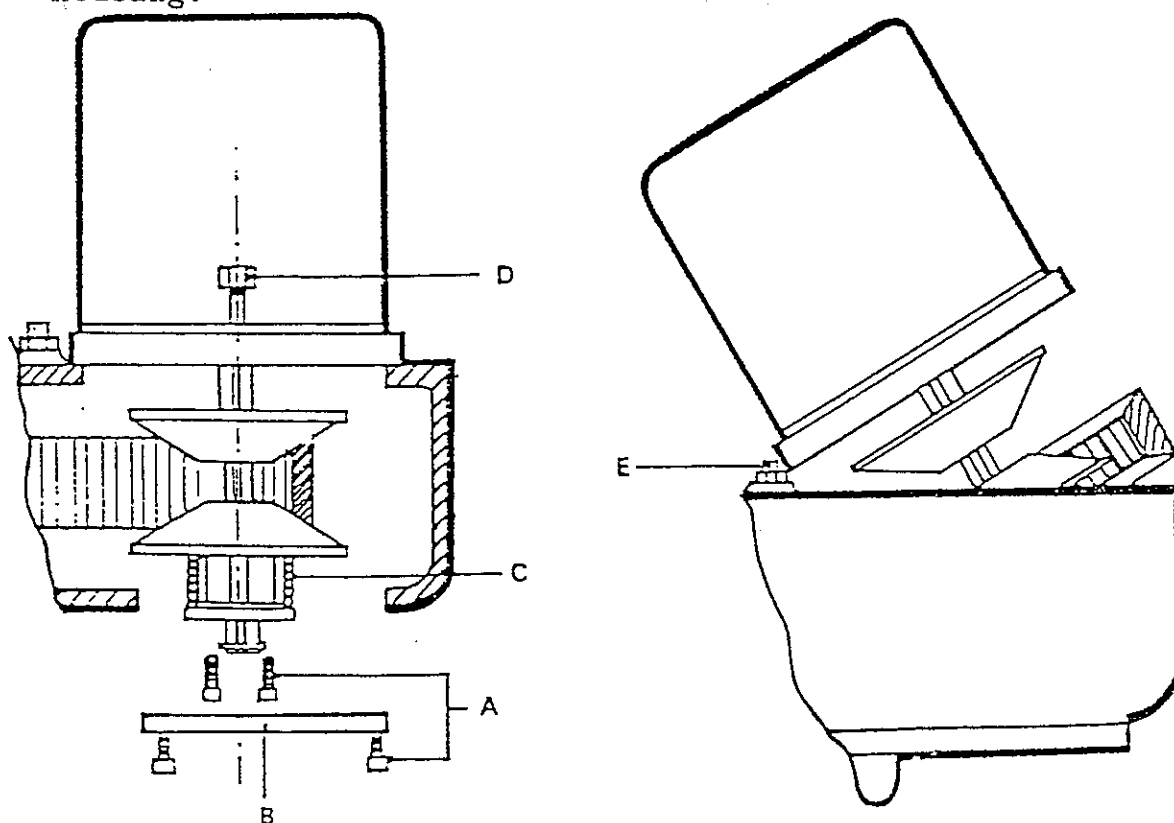


Figure 3. Removing the Motor (Side View)

CHANGING VARI-DRIVE BELT

Complete the previous procedures for removing the motor, then remove the three screws (A, Fig 4) and lift out the top bearing cap (B). Looking down inside of the housing, locate and remove two socket head cap screws and sleeves (C). Next, remove the six screws (D) then holding the belt housing (E) to the base.

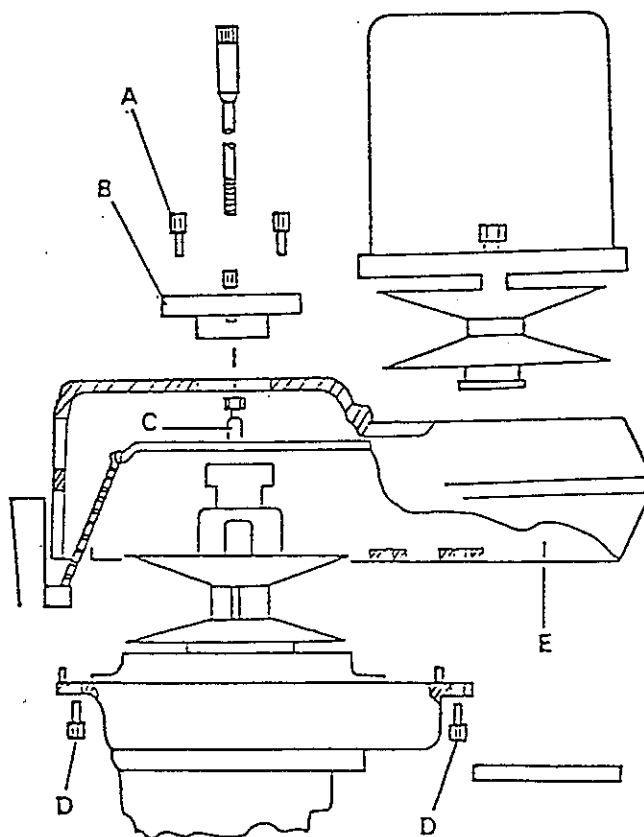


Figure 4. Removing the Vari-Drive Belt

Remove the old belt and replace it with a new belt. Do not use a substitute belt purchased from other than a # 383032B-13 of Bando V/S Belt. Vibration and heat could result from the use of the wrong belt.

CHANGING THE TIMING BELT (Figure 5)

Complete the operation for removing the motor. Then put the Hi-Neutral-Lo lever in the Lo position, remove the drawbar (A, Figure 5), and lower the spindle.

Remove screws (B) holding the upper and lower housing together, including the two lower screws (C) in speed changer bracket just below the speed dial.

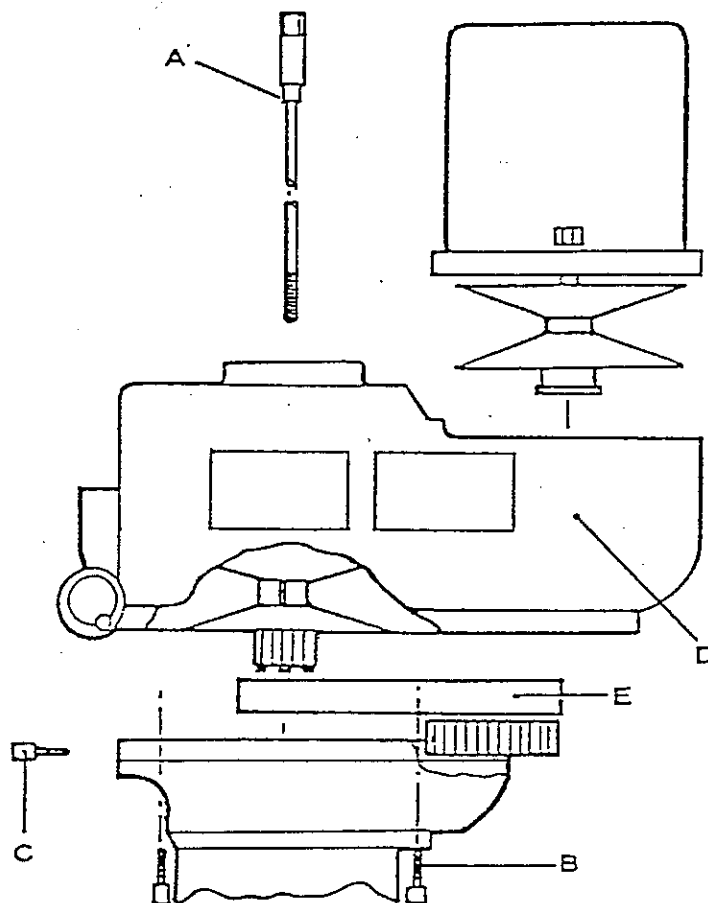


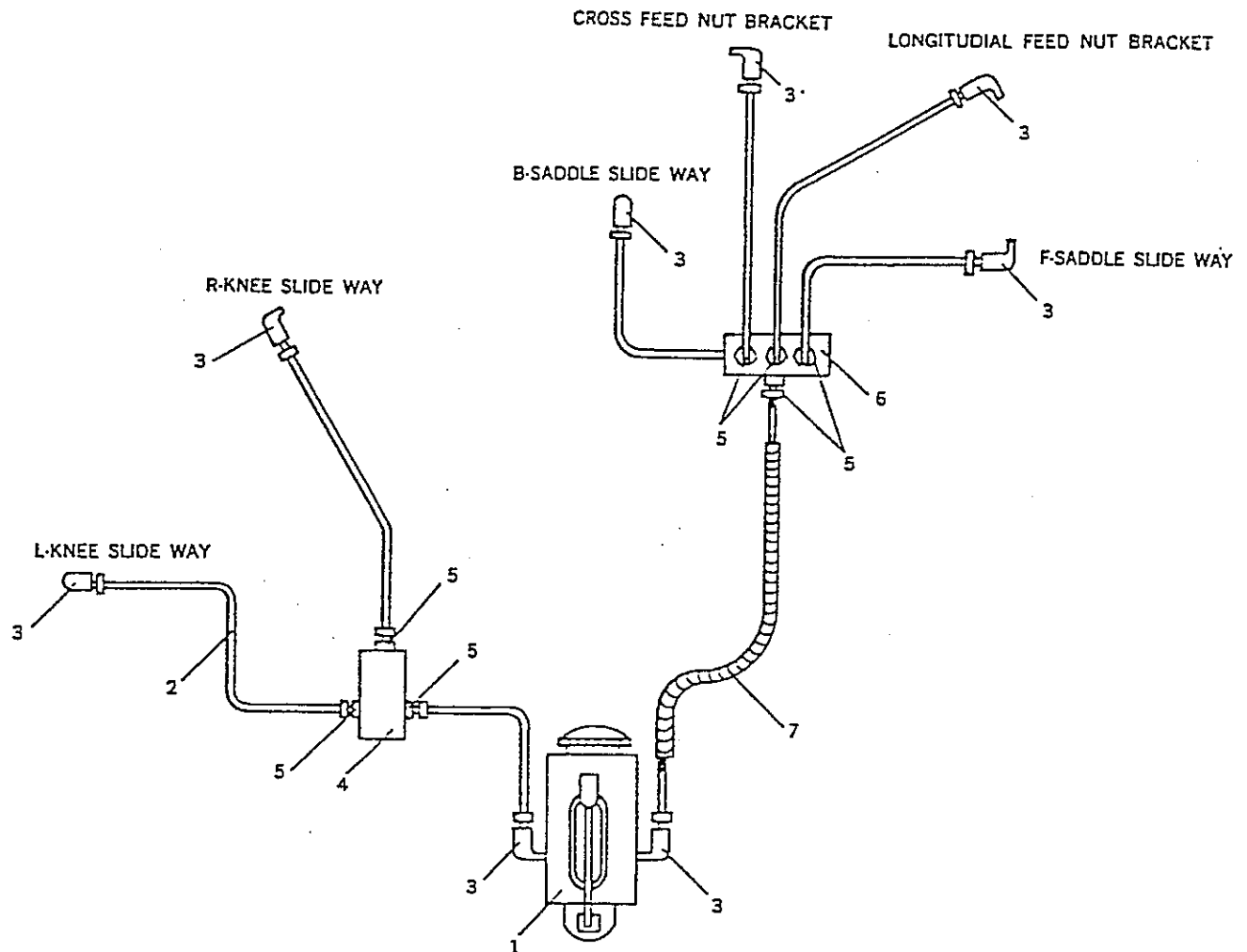
Figure 5. Removing Timing Belt

A slight blow under the speed changer bracket may be needed to separate the upper housing (D) from its base.

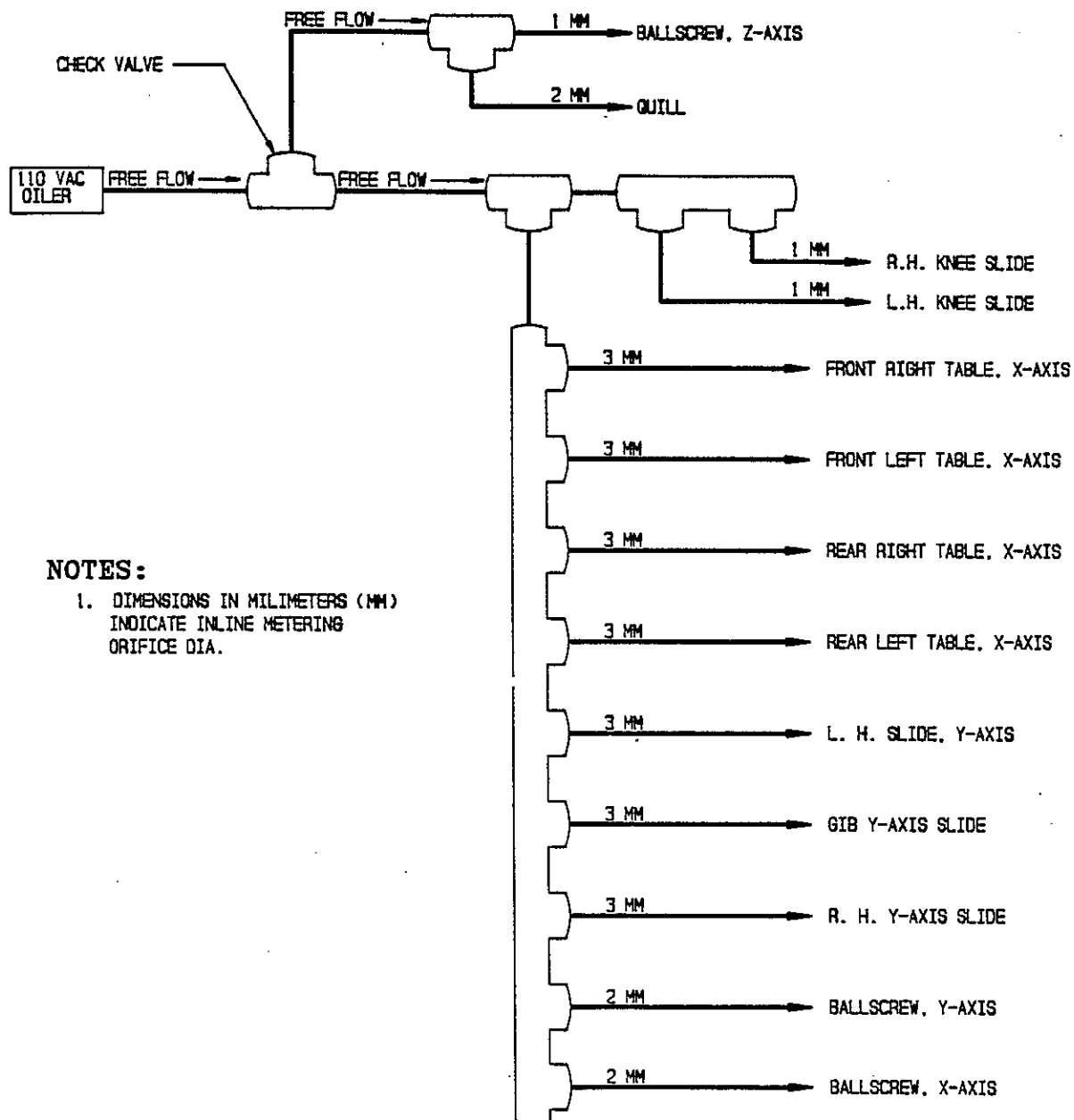
As the housings are being separated, the HTD belt (E) still connects them, resisting the separating movement. The separation can be assisted by gently pushing the belt off the large pulley as the upper housing is being raised.

Remove the old belt and replace with a new belt.

CENTRAL LUBRICATING OIL-FEEDING EQUIPMENT



ITEM NO.	PARTS NO.	DESCRIPTION
1	9001	Autolube Pump
2	9002	Aluminum Pipe
3	9003	Elbow Joint (8 Req.)
4	9004	T-Joint
5	9005	Straight Joint (7 Req.)
6	9006	Oil Regulating Distributor
7	9007	Outside Steel Flexible Tube



NOTES:

1. DIMENSIONS IN MILLIMETERS (MM)
INDICATE INLINE METERING
ORIFICE DIA.

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CRANDALLS, NH 03317 (612-474-8100)		
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH		TITLE: LUBE LINE MAP APPLICATION: PARTNER V		
		SCALE 1.5:1	DWG NO. 6-01-016-101	SIZE B
		DATE: 30 APR 87	DRAWN BY REUTER	SHEET NO. 1 OF 1

WARNING USE ONLY

MOBIL VACTRA No. 2
AMOCO WAYTAC No. 68
SUNOCO SUNWAYLUBE No. 1180
OR EQUIVALENT OIL

REV.	DESCRIPTION	ECO NO.	APP'D BY	DATE
MATERIAL/FINISH MATL: 22 GA. BRUSHED ALUMINUM		MILLTRONICS MANUFACTURING COMPANY 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No. LB-02		TITLE LUBE DECAL		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX ±		SCALE .5:1	DWG NO. 6-08-018-009	SIZE D
X.XX ±		DATE 17 APR 91	DRAWN BY REUTER	SHEET NO. 1 OF 1
X.X ±				
ANGLE ±				

Parts List

001	Indicating Block (1 Required)	088	Timing Belt Pulley (1 Required)
002	Bottom Cover (1 Required)	089	Timing Belt Pulley (1 Required)
003	Bearing Lock Nut (1 Required)	090	Washer (1 Required)
004	Spacer (1 Required)	091	Guard Cover (1 Required)
005	Plate Seat (1 Required)	092	Motor Support Seat (2 Required)
006	Limit Switch Insulator (3 Required)	093	Motor Support Seat (3 Required)
008	Graduating Plate (1 Required)	094	Adjustable Screw (1 Required)
009	Quill Driver (1 Required)	095	Mounting Plate (1 Required)
010	Plate Cover (1 Required)	096	Motor Fixed Plate (1 Required)
011	Servo Motor Bracket (1 Required)	097	Cover (1 Required)
012	Quill (1 Required)	098	Plunger (3 Required)
013	Ball Screw Z (1 Required)	099	Bottom Seat (1 Required)
014	Bearing Bracket (1 Required)	100	Stroke Stopper (2 Required)
015	Quill Housing (1 Required)	101	Chip Cover Fixed Plate (1 Required)
016	Head Fixed Seat (1 Required)	108	Chip Spacer (1 Required)
017	Motor Timing Belt Pulley (1 Required)	109	Servo Motor Cover (Y) (1 Required)
018	Ball Screw Timing Belt Pulley (1 Required)	110	Servo Motor Cover (X) (1 Required)
019	Pulley Flange (4 Required)	113	Guard Cover (1 Required)
020	Motor Lock Plate (6 Required)	114	Meter Locking Blade
021	Ball Screw Timing Belt Pulley (1 Required)	115	Adjustable Blade
022	Pulley Flange (4 Required)	116	Eyebolt
023	Motor Timing Belt Pulley (2 Required)	117	Coupling Muff (1 Required)
025	Bearing Cover (1 Required)	118	Coupling Cover (1 Required)
026	Bearing Seat (1 Required)	119	Timing Belt Pulley Flange (2 Required)
027	Spacer (Large) (1 Required)	120	Timing Belt Pulley (1 Required)
028	Spacer (Small) (1 Required)	121	Coupling Cover (1 Required)
029	Servo Motor Seat (1 Required)	122	Coupling Muff (1 Required)
030	Timing Belt Housing (1 Required)	123	Quill Chip Guard (1 Required)
031	Ball Screw X (1 Required)	124	Switch Fixed Blade (2 Required)
032	Bracket (1 Required)	125	Enlarge Tube (1 Required)
033	Bearing Seat (1 Required)	126	Dust Guard Support (1 Required)
034	Bearing Cover (1 Required)	127	Spindle (1 Required)
035	Oil Collector (Front) (1 Required)	128	Bearing Cover (1 Required)
038	Saddle (1 Required)	129	Nosepiece (1 Required)
039	Table (1 Required)	131	Head Setting Plunger (1 Required)
040	Oil Collector (Rear) (1 Required)	133	Belt Housing (1 Required)
041	Web Filter (1 Required)	134	Driving Gear (1 Required)
042	Servo Motor Seat (1 Required)	135	Spindle Driving Spline (1 Required)
043	Bearing Seat (1 Required)	136	Spindle Driving Clutch (1 Required)
045	Spacer (Large) (1 Required)	137	Clutch Ring (1 Required)
046	Spacer (Small) (1 Required)	138	Backgear Driving Ring (1 Required)
047	Bearing Cover (1 Required)	139	Backgear Pinion (1 Required)
048	Ball Screw Y (1 Required)	140	Backgear Shaft (1 Required)
049	Bracket (1 Required)	141	Back Gear (1 Required)
050	Oil Trough (1 Required)	142	Bearing Cover (1 Required)
051	Guide Plate (1 Required)	143	Magnetic Clutch Support (1 Required)
052	Guide Plate (1 Required)	144	Pulley Bearing Housing (1 Required)
053	Saddle-Knee Gib (1 Required)	145	Pulley Washer (1 Required)
054	Table-Saddle Gib (1 Required)	146	Pulley Spacer (1 Required)
055	Dog (2 Required)	147	Pulley Shaft (1 Required)
056	Ball Screw Guard (1 Required)	148	Main Spindle Pulley (1 Required)
057	Ball Screw Guard (2 Required)	149	Main Sliding Pulley (1 Required)
058	Ball Screw Guard (1 Required)	150	Sliding Motor Pulley (1 Required)
059	Limit Switch Seat (1 Required)	151	Fixed Motor Pulley (1 Required)
060	Elevating Screw Seat (1 Required)	152	Motor Shaft Sleeve (1 Required)
061	Screw Nut (1 Required)	153	Pulley Bushing (1 Required)
062	Elevating Screw (1 Required)	154	Spring Rest (1 Required)
063	Guard Cover (1 Required)	155	Washer (1 Required)
064	Spacer (Large) (1 Required)	156	Motor (1 Required)
065	Spacer (Small) (1 Required)	157	Motor Locking Bolt (2 Required)
066	Bearing Seat (1 Required)	158	Bearing Cover (1 Required)
067	Elevating Bevel Gear (1 Required)	159	Bearing Cover (1 Required)
068	Bevel Gear (1 Required)	160	Balancing Plate (1 Required)
069	Bevel Gear Spacer (1 Required)	161	Regulating Screw (1 Required)
070	Knee (1 Required)	162	Balancing Plate Bushing (2 Required)
071	Bearing Seat (1 Required)	163	Connecting Piece (1 Required)
072	Bearing Spacer (Small) (1 Required)	164	Change Speed Driving Jaw (1 Required)
073	Bearing Spacer (Large) (1 Required)	165	Driving Support Shaft (1 Required)
074	Bearing Cover (1 Required)	166	Cam Pin (1 Required)
075	Graduation Ring (1 Required)	167	Change Speed Cam (1 Required)
076	Chip Cover Fixed Plate (7 Required)	168	Change Speed Cam Shaft (1 Required)
077	Front Cover (1 Required)	169	Cam Shaft Support Plate (1 Required)
078	Graduation Disk (1 Required)	170	Cam Shaft Handle (1 Required)
079	Clutch Hub (Y) (1 Required)	171	Bushing (1 Required)
080	Manual Handle (Z) (1 Required)	186	Driving Bevel Gear (1 Required)
081	Wheel Shaft (1 Required)	187	Driven Bevel Gear (1 Required)
082	Column (1 Required)	195	Blower Fixed Plate (1 Required)
083	Guide Plate (1 Required)	196	Handle (1 Required)
084	Guide Plate (1 Required)	197	Dust Cap (1 Required)
085	Clutch Hub Set Screw (1 Required)	198	Bearing Spacer (Small) (1 Required)
086	Gib (1 Required)	199	Bearing Spacer (Large) (1 Required)
087	Limit Switch Seat (1 Required)	200	Draw Bar (1 Required)

201	Gear Motor (1 Required)	338	1/4-20NC x 3/4" LG Socket Cap Screw (24 Required)
202	Counter Induction Switch (2 Required)	339	STW-25 Retaining Ring (External) (4 Required)
203	Limit Switch (3 Required)	340	Yamatake LDS-5200K Limit Switch (3 Required)
211	Speed-Change Box (1 Required)	341	Pipe (2 Required)
212	Motor Seat (1 Required)	342	Nipple (2 Required)
213	Worm Shaft (1 Required)	343	Packing (4 Required)
214	Dog (1 Required)	344	Screw Cover (2 Required)
215	Worm (1 Required)	345	SKF 6205 Bearing (4 Required)
216	Spur Gear (1 Required)	346	5/16-18NC x 1-1/8" LG Socket Cap Screw (3 Required)
217	Worm Shaft Bushing (1 Required)	347	1/4-20NC x 1/2" LG Socket Cap Screw (6 Required)
218	Worm Gear Bushing (1 Required)	348	SKF 32205 Bearing (2 Required)
219	Worm Gear Sleeve (1 Required)	349	5/16-18NC x 7/8" LG Socket Cap Screw (5 Required)
220	Pinion Shaft (1 Required)	350	8 x 7 x 20 Key (1 Required)
221	Manual Driving Bevel Gear (1 Required)	351	#6 x 30 Key (1 Required)
222	Middle Gear (1 Required)	352	5/16-18NC x 3/8" LG Socket Set Screw (1 Required)
223	Middle Shaft Gear (1 Required)	353	SKF 7205B Bearing (2 Required)
224	Middle Shaft Gear Bushing (1 Required)	354	5/16-18NC x 1" LG Socket Cap Screw (4 Required)
225	Shift Sleeve (1 Required)	355	Chip Cover (1 Required)
226	Shift Driving Gear (1 Required)	356	ø25 x 6 Woodruff Key (1 Required)
227	Graduation Disk (1 Required)	357	STW-20 Retaining Ring (External) (1 Required)
228	Handwheel (1 Required)	358	5/16-18NC x 3/8" LG Socket Set Screw (1 Required)
229	Branch Shaft (1 Required)	359	Limit Switch (1 Required)
230	Thrust Spacer (1 Required)	360	5/16-18NC x 4" LG Socket Cap Screw (4 Required)
231	Washer (1 Required)	361	8 x 7 x 30 Key (1 Required)
232	Speed Table (1 Required)	362	2HP-6P Motor (1 Required)
233	Worm Shaft Bushing (1 Required)	363	#7 x 35 Key (1 Required)
234	Dust Cap (1 Required)	364	5/16" Spring Washer (1 Required)
235	Saddle-Knee Dust Wiper (1 Required)	365	3/16-24NC x 1/2" LG Flat Head Screw (27 Required)
236	Knee-Column Dust Wiper (1 Required)	366	1/4-20NC x 5/8" LG Socket Cap Screw (4 Required)
301	FANUC-0M Servo Motor (1 Required)	367	3/8-16NC x 1" LG Socket Cap Screw (6 Required)
302	5/16-18NC x 1-1/2" LG Hexagon Cap Bolt (12 Required)	368	3/8-16NC Hexagon Nut (3 Required)
303	5/16" Spring Washer (12 Required)	369	1/2-12NC Hexagon Nut (2 Required)
304	240H x 100 Timing Belt (1 Required)	370	1/2" Spring Washer (2 Required)
305	3/8-16NC x 3/4" LG Socket Cap Screw (4 Required)	371	3/8-16NC x 1" LG Hexagon Cap Screw (4 Required)
306	3/16-24NC x 3/8" LG Round Head Screw (20 Required)	372	3/16-24NC x 1/4" LG Round Head Screw (4 Required)
307	ø16 x 5 Woodruff Key (3 Required)	373	5/8-11NC x 1-7/8" LG Hexagon Cap Screw (12 Required)
308	3/8" Spring Washer (10 Required)	374	5/8" Spring Washer (12 Required)
309	M10 x 1.25 Hexagon Nut (3 Required)	375	3/16-24NC x 5/8" LG Round Head Screw (4 Required)
310	1/4-20NC x 3/4" LG Socket Cap Screw (10 Required)	376	3/16-24NC x 1/2" LG Round Head Screw (30 Required)
311	SKF 7204B Bearing (2 Required)	377	3/16-24NC x 1-5/8" LG Round Head Screw (4 Required)
312	1/8-40NC x 1-1/8" LG Round Head Screw (6 Required)	378	Ampere Meter (1 Required)
313	Z-15GQ-22B (OMRON) Limit Switch (2 Required)	379	1/4-20NC x 1" LG Socket Cap Screw (12 Required)
314	3/8-16NC x 7/8" LG Socket Cap Screw (2 Required)	380	AN 06 Bearing Locknut (1 Required)
315	3/16-24NC x 3/8" LG Flat Head Screw (2 Required)	381	AW 06 Bearing Washer (1 Required)
316	3/16-24NC x 5/8" LG Socket Cap Screw (20 Required)	382	Spannelemente (2 Required)
318	SKF 6204 Bearing (1 Required)	383	FAFNIR MM30BS62H Bearing (1 Required)
319	3/16-24NC x 1/2" LG Socket Cap Screw (6 Required)	384	1/4-20NC x 1-3/4" LG Socket Cap Screw
320	AW-04 Bearing Washer (1 Required)	385	3/16-32NF x 1/2" LG Flat Head Screw (48 Required)
321	AN-04 Bearing Lock Nut (1 Required)	386	1/8HP Pump (1 Required)
322	#6 x 25 Key (1 Required)	390	AN 08 Bearing Locknut (1 Required)
323	1/2-12NC x 5" LG Socket Cap Screw (6 Required)	391	AW 08 Bearing Washer (1 Required)
324	AN 05 Bearing Lock Nut (3 Required)	392	AN 07 Bearing Locknut (1 Required)
325	AW05 Bearing Washer (3 Required)	393	AW 07 Bearing Washer (1 Required)
326	22 x 26 Spannelemente (2 Required)	394	5/16-18NC x 1-1/4" LG Socket Cap Screw (3 Required)
327	FAFNIR MM25BS62H Bearing (1 Required)	395	1/2-12NC Hexagon Nut (2 Required)
328	5/16-18NC x 1" LG Socket Cap Screw (4 Required)	396	1/2 Spring Washer (2 Required)
329	270H x 100 Timing Belt (3 Required)	401	3/8-16NC x 1-1/2" LG Socket Cap Screw (2 Required)
330	3/8-16NC x 2-1/2" Socket Cap Screw (8 Required)	402	3/8-16NC x 1-3/4" LG Socket Cap Screw (3 Required)
331	FANUC-5M Servo Motor (2 Required)	403	SKF 6007Z Bearing (1 Required)
332	1/4-20NC x 3" LG Socket Cap Screw (6 Required)	404	SKF 6011Z Bearing (1 Required)
333	1/2-12NC x 3" LG Socket Cap Screw (4 Required)	405	SKF 6009Z Bearing (1 Required)
334	5/16-18NC x 1-1/2" LG Socket Cap Screw (10 Required)		
335	3/8-16NC x 1-3/4" LG Socket Cap Screw (18 Required)		
336	ø8 x 40 Taper Pin (12 Required)		
337	3/8-16NC x 1-1/2" LG Socket Cap Screw (14 Required)		

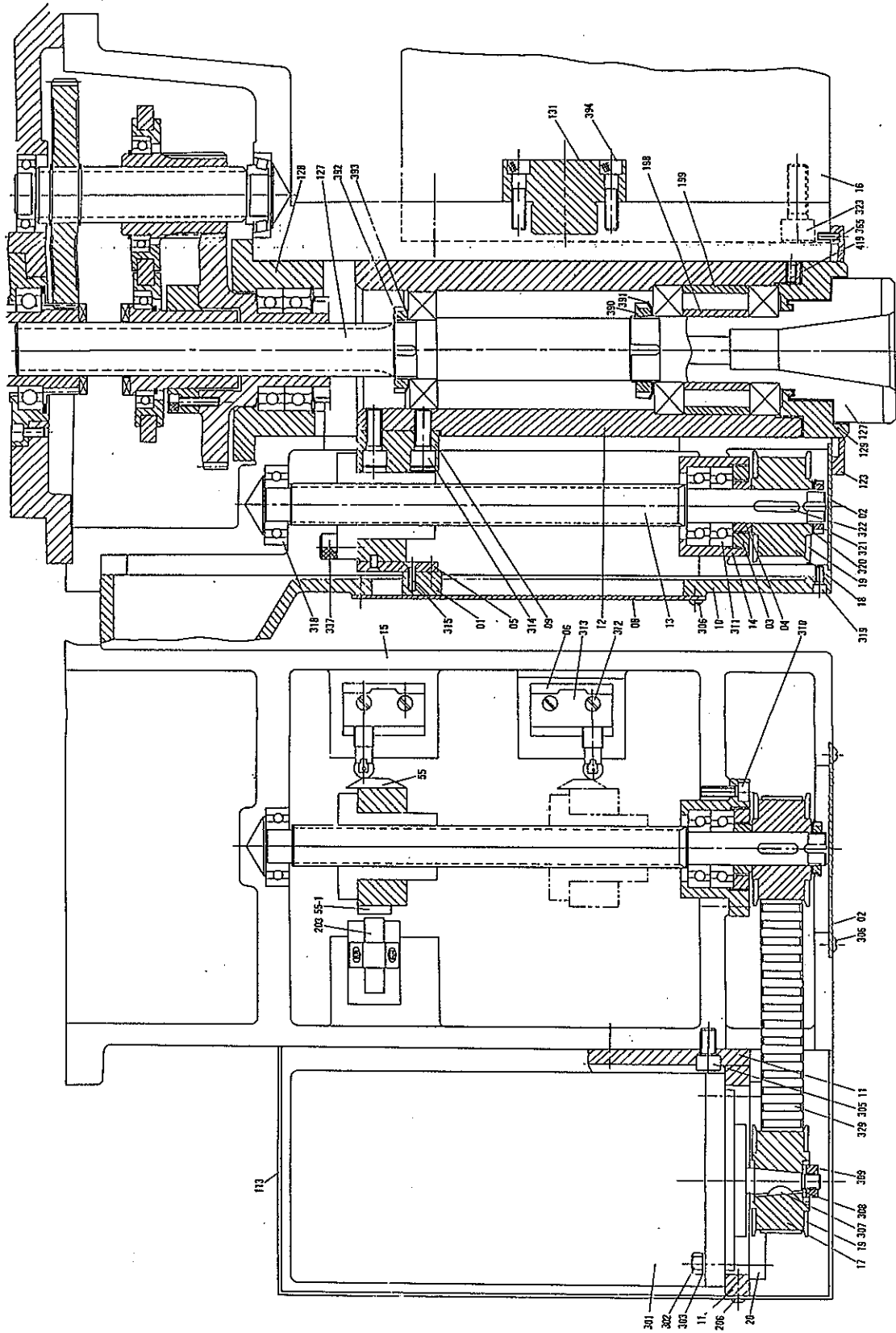
406 Spring (1 Required)
 407 1/4-20NC x 3/4" LG Socket Cap Screw
 (12 Required)
 408 3/8-16NC Hexagon Nut (7 Required)
 409 3/8" Washer (2 Required)
 410 $\phi 4$ x 20 Spring Pin (1 Required)
 411 Roll Pin (1 Required)
 412 Roll Pin (1 Required)
 413 1/4-20NC x 1" LG Socket Cap Screw
 (2 Required)
 414 Retaining Ring (4 Required)
 415 STW-38 Retaining Ring (External) (1 Required)
 417 RTW-75 Retaining Ring (Internal) (2 Required)
 418 3/8" Spring Washer (8 Required)
 419 1/4-28NF x 1/4" LG Socket Set Screw
 (2 Required)
 420 #8 x 30 Key (1 Required)
 421 Spring (1 Required)
 422 STW-24 Retaining Ring (External) (1 Required)
 423 3/8" Spring Washer (1 Required)
 424 3/8-16NC x 1" LG Socket Cap Screw
 (1 Required)
 425 3/16-32NF x 1/2" LG Flat Head Screw
 (3 Required)
 426 3/16-24NC x 5/8" LG Round Head Screw
 (5 Required)
 427 #8 x 30 Key (1 Required)
 428 8 x 5.5 x 95 Key (1 Required)
 430 3/16-24NC x 1/2" LG Socket Cap Screw
 (3 Required)
 431 Spring Washer (1 Required)
 432 $\phi 5$ x 30 Taper Pin (1 Required)
 433 $\phi 5$ x 50 Taper Pin (1 Required)
 434 Handle (1 Required)
 435 1/4-20NC x 1/2" Socket Cap Screw
 (4 Required)
 436 OGURA TMB-5 Brake (1 Required)
 438 $\phi 3$ x 30 Spring Pin (1 Required)
 440 Variable Transmission Belt (1 Required)
 441 RS-35 Chain (1 Required)
 443 STW-50 Retaining Ring (External) (2 Required)
 444 SKF 6005 Bearing (1 Required)
 445 SKF 30205 Bearing (1 Required)
 446 STW-34 Retaining Ring (External) (2 Required)
 447 1/4-20NC x 1" LG Socket Cap Screw
 (4 Required)
 450 Spring (1 Required)
 451 $\phi 1/4$ " Steel Ball (1 Required)
 452 3/8-16NC x 1" LG Socket Cap Screw
 (3 Required)
 453 AN-45 Bearing Locknut (1 Required)
 454 AW-45 Bearing Washer (1 Required)
 455 SKF 6009 Bearing (2 Required)
 456 SKF 6910 Bearing (2 Required)
 457 SKF 6209 Upper Spindle Bearing
 458 SKF 7011 Lower Spindle Bearing (2 Req)
 or FAFNIR 2MM 9111 W/Cr Bul

2 bearings; Thrust SKF 5110/
Radial SKF 6007-2Z or FAFNIR 9107 Kdd

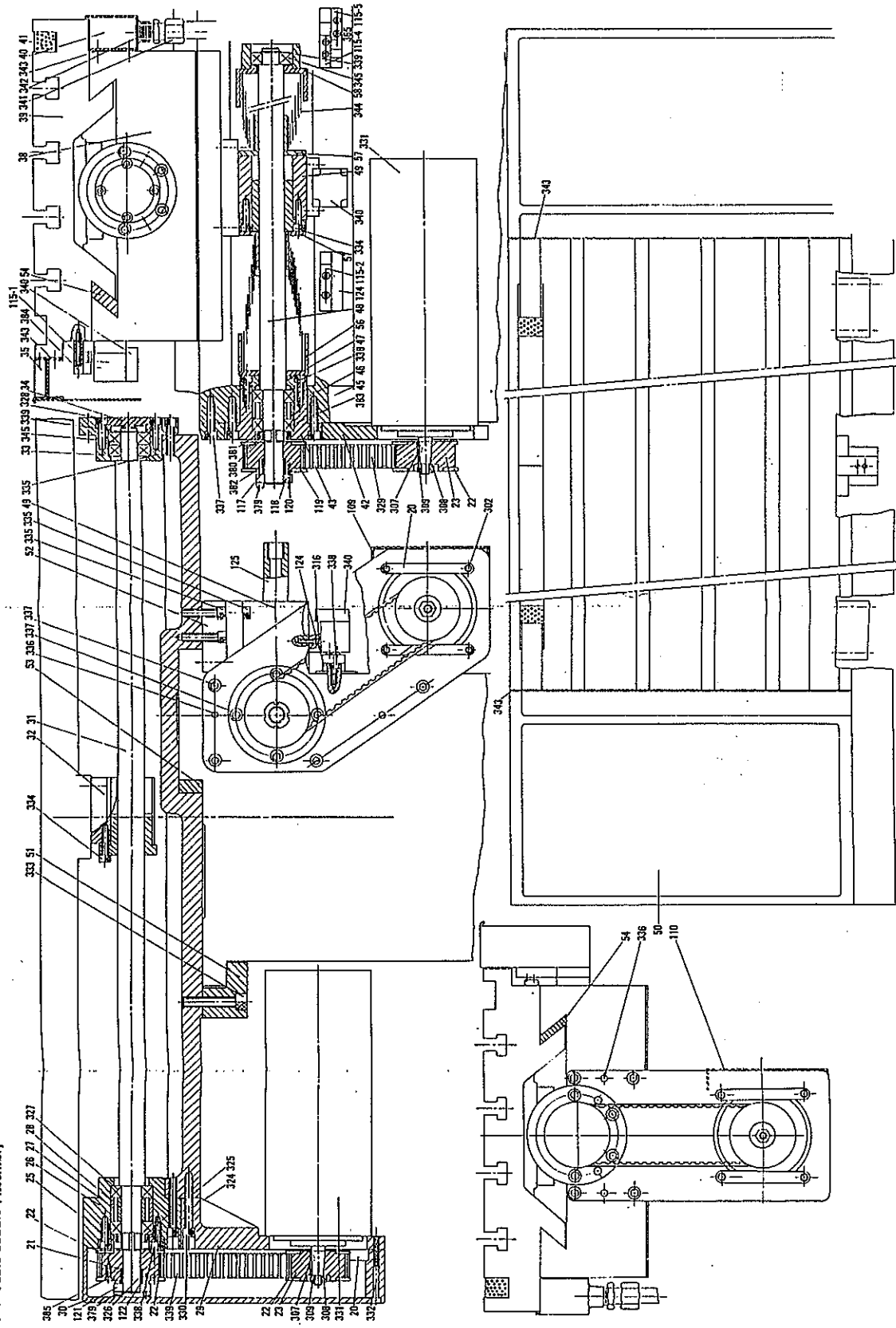
2 bearings; Thrust SKF 51107
Radial SKF 6007-2Z or FAGNIR 9107 Kdd



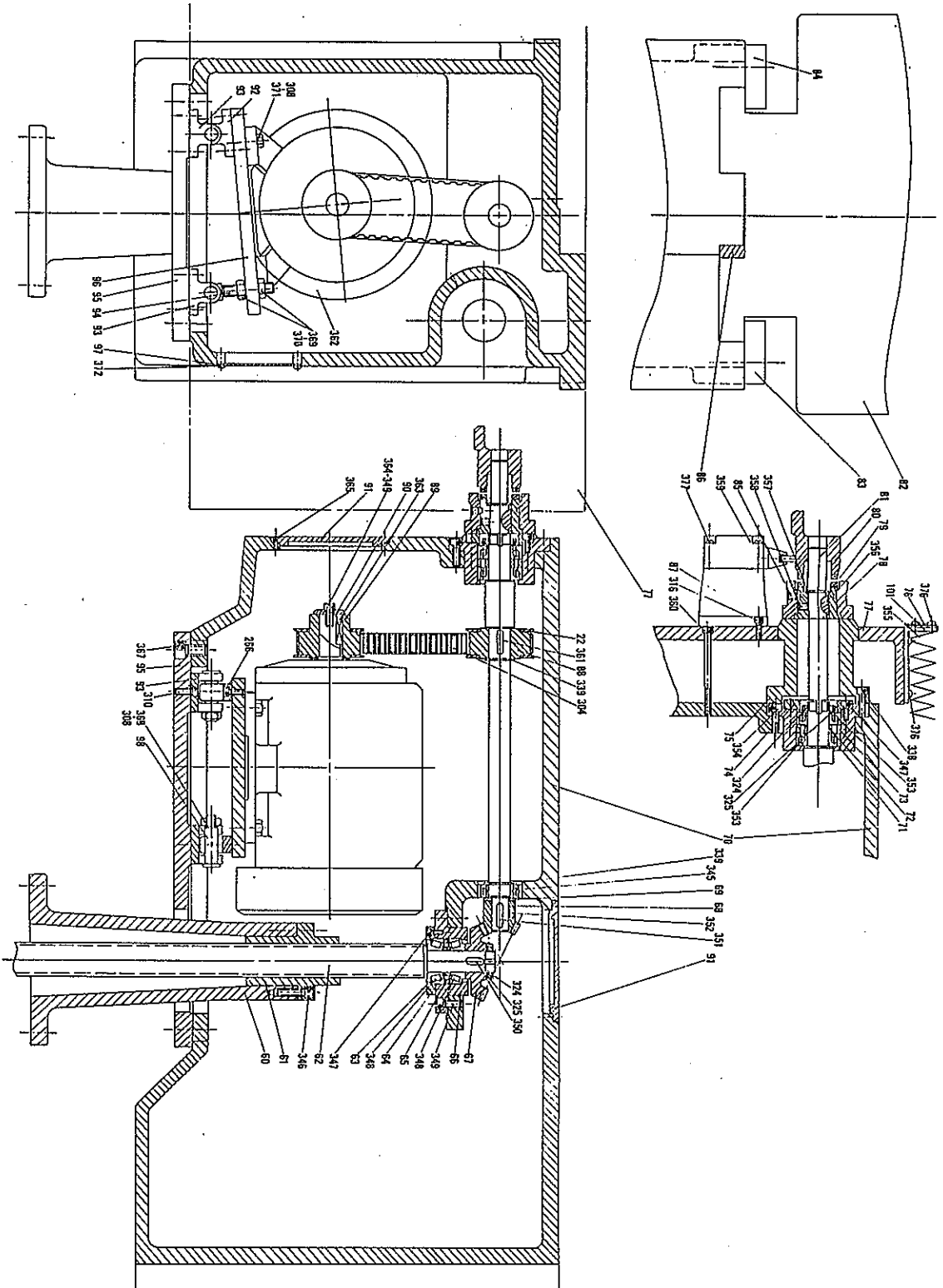
7-3 Head Assembly



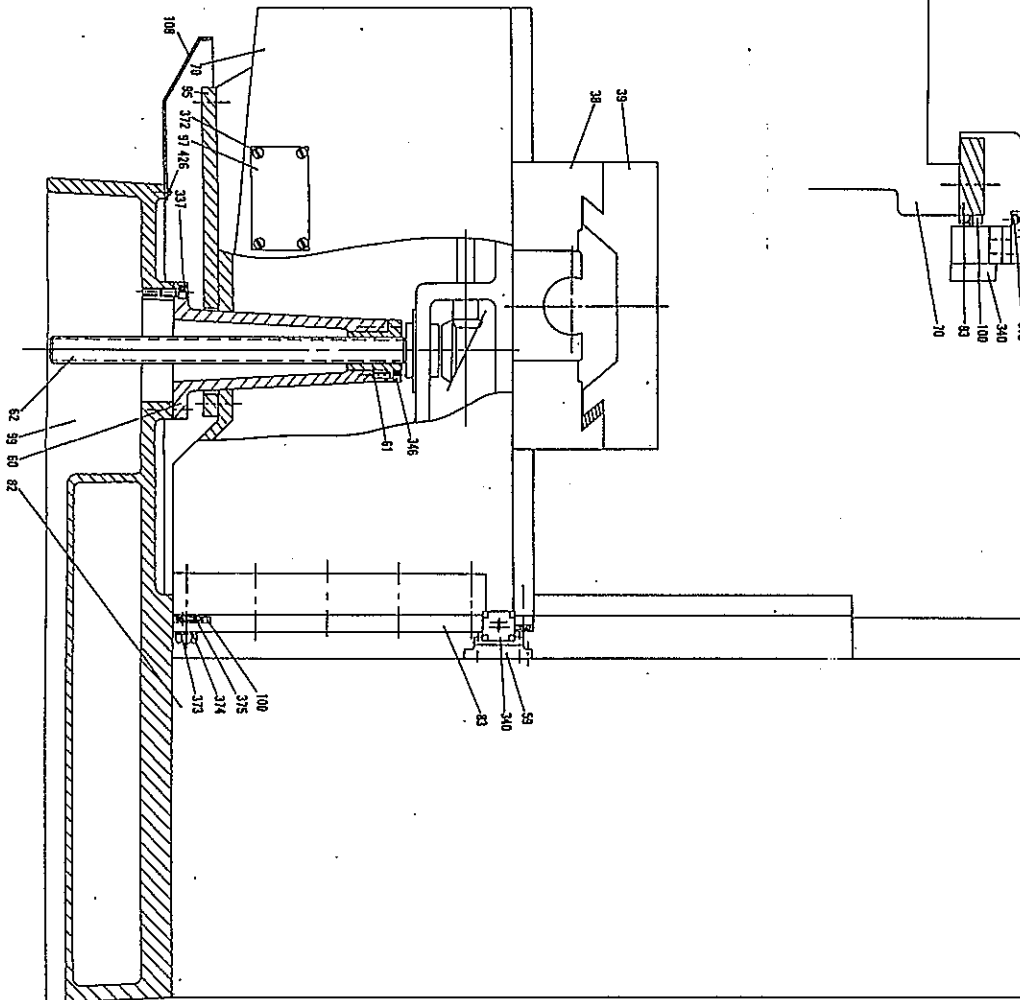
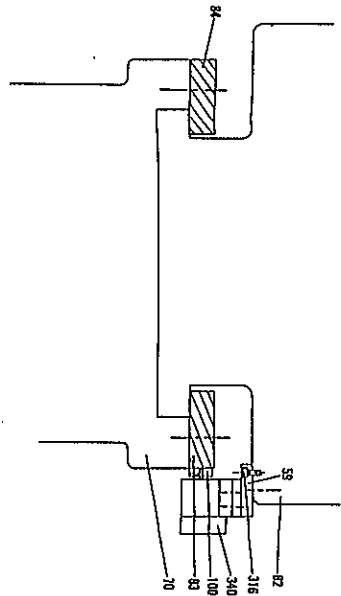
7-4 Table Saddle Assembly



7.5 Knee Elevating Assembly



7-6 Turret & Knee Assembly



MEASURING POWER SUPPLY AND BUSS VOLTAGE USING A DC VOLT METER

- 1) CONNECT COMMON LEAD OF THE DC VOLT METER TO TERMINAL BLOCK BLOCK 22 (DC GROUND) AND THE OTHER LEAD TO TERMINAL BLOCK BEING CHECKED SEE TABLE (1.1)

TABLE 1.1 POWER SUPPLY TERMINAL BLOCK

TERMINAL BLOCK	VOLTAGE
12	24 VDC
23	5.1 VDC
26	14.9 VDC
27	-14.9 VDC

- 2) TO CHECK BUSS VOLTAGE SET DC VOLT METER TO ABOUT THE 200 VOLT RANGE. CONNECT THE COMMON LEAD TO THE NEGATIVE TERMINAL OF THE CAPACITOR ON DRIVE PLATE THE OTHER LEAD TO THE POSITIVE TERMINAL. USE TABLE (1.2) FOR CORRECT BUSS VOLTAGE READINGS.

TABLE 1.2 BUSS VOLTAGE FOR MILLS

MILL	BUSS VOLTAGE
2, 3, 4	95 - 105
5	150 - 160

- 3) TO CORRECT BUSS VOLTAGE MOVE THE SECONDARY TAP TO ADJUST VOLTAGE HIGHER OR LOWER ACCORDING TO DRIVE BUSS TRANSFORMER SETTINGS ON PAGE 1.

DRIVE BUSS TRANSFORMERS SETTINGS

CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
110 VAC	3356 1KVA	H1-H2 110	X1-X2 68 X1-X3 72 X1-X4 79
220 VAC (NOTE NEED TO JUMP H1 TO H3 & H2 TO H4)	3357 1KVA	H1-H2 220	X1-X2 68 X1-X3 72 X1-X4 79
440 VAC (NOTE NEED TO JUMP H2 TO H3 & H1 TO H4)	3357 1KVA	H2-H4 220	X1-X2 68 X1-X3 72 X1-X4 79
208 VAC	3358 1.5KVA	H1-H2 208	X1-X2 110
240 VAC	3358 1.5KVA	H1-H3 240	X1-X2 110
480 VAC	3358 1.5KVA	H1-H4 480	X1-X2 110

SYSTEM 110 TRANSFORMER SETTING

CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
208 VAC	3263 .5KVA	H1-H2 208	X1-X2 110
240 VAC	3263 .5KVA	H1-H3 240	X1-X2 110
480 VAC	3263 .5KVA	H1-H4 480	X1-X2 110

PARTNER 5 ELECTRICAL DRAWINGS

1. Centurion 5 Front Panel Assembly - Front View
2. Centurion 5 Front Panel Assembly - Rear View
3. Centurion 5 Card Cage Electronics Assembly (1-5)
4. 15/24 VDC Power Supply Assembly
5. 15/24 VDC Power Supply Schematic
6. 160 VDC Drive Plate Layout
7. 160 VDC Drive Plate Schematic
8. 160 VDC Mag Panel Layout
9. Procedure to Change AC Spindle Inverter Parameters
10. AC Spindle Inverter Parameters - Yaskawa G3 (1-2)
11. AC Spindle Inverter Faults Listing (G3)
12. Centurion 5 Card Cage Interface Panel Plug Definitions
13. Manual/Avanti Toll Changer I/O
14. Machine Terminal Block & Relay Definitions
15. Axis Motor/Encoder Interface Schematic
16. AC System Wiring With AC Spindle Inverter
17. AC System Wiring For Reeves Spindle Drive
18. DC System Wiring With AC Spindle Inverter
19. DC System Wiring For Reeves Spindle Drive
20. M-Function Relay Board Layout
21. M-Function Relay Board Plug Definitions
22. M-Function Relay Board Schematic

TERMINAL BLOCK DESIGNATORS

- | | |
|-------------------------------|---|
| 1. 115 VAC HOT | 54. Z-MOTOR - |
| 2. 115 VAC COMMON | 56. SPINDLE ENABLE |
| 6. X OTL SW. OUT | 57. SW. 115 VAC HOT |
| 6A. SPINDLE FAULT | 61. 115 VAC FOR SPRAY |
| 7. Y OTL SW. OUT/X OTL SW. IN | 63. +24V. (POWER KNEE)(PARTNER V ONLY) |
| 8. Z OTL SW. OUT/Y OTL SW. IN | 64. DC. COMMON (POWER KNEE)(PARTNER V ONLY) |
| 9. Z OTL SW. IN | 65. SW. 220 VAC FOR AUTOLUBE |
| 12. +24 VDC FROM PWR. SUPPLY | 66. 220 VAC FOR AUTOLUBE |
| 13. M-FUNC. COMMON | 74. SW. 115 VAC FOR 4TH-AXIS BRAKE |
| 14. M-FUNC. N/O | 80. 120 VAC FOR BUSS |
| 15. M-FUNC. N/C | 98. KNEE UP (PARTNER V ONLY) |
| 16. 2nd M-FUNC. COMMON | 99. KNEE DOWN (PARTNER V ONLY) |
| 17. 2nd M-FUNC. N/O | 100. Z AXIS DISABLE (AVANTI ATC) |
| 18. 2nd M-FUNC. N/C | 102. Z AXIS DISABLE (AVANTI ATC) |
| 22. GROUND FROM PWR. SUPPLY | 129. A-MOTOR TACH + |
| 26. +15 VDC FROM PWR. SUPPLY | 130. A-MOTOR TACH - |
| 27. -15 VDC FROM PWR. SUPPLY | 135. A-MOTOR + |
| 29. X-MOTOR TACH + | 136. A-MOTOR - |
| 30. X-MOTOR TACH - | 325. TOOL OUT |
| 35. X-MOTOR + | 328. POWER DRAWBAR |
| 36. X-MOTOR - | F1. SW. 115 VAC TO FLOOD COOLANT |
| 38. Y-MOTOR TACH + | G. CHASSIS GROUND |
| 39. Y-MOTOR TACH - | |
| 44. Y-MOTOR + | |
| 45. Y-MOTOR - | |
| 47. Z-MOTOR TACH + | |
| 48. Z-MOTOR TACH - | |
| 53. Z-MOTOR + | |

RELAYS

- | | |
|------------------------------------|--------------------------------|
| CR1. RESET | CR30. CW (AVANTI ATC) |
| CR1A. EXCESS ERROR | CR31. CCW (AVANTI ATC) |
| CR1B. DRIVE DISABLE | CR32. HOME (AVANTI ATC) |
| CR1C. DRIVE RESET | CR33. ZERO SPEED (AVANTI ATC) |
| CR2. TOOL CHANGE RESET | CR34. TOOL OUT (AVANTI ATC) |
| CR3. SPINDLE CLOCKWISE | CR35. TOOL IN (AVANTI ATC) |
| CR3A. SPINDLE CW YASKAWA | CR36. DISABLE ATC (AVANTI ATC) |
| CR4. SPINDLE COUNTERCLOCKWISE | CR64. 220 FOR AUTO LUBE |
| CR4A. SPINDLE CCW YASKAWA | MC1F. SPINDLE CW. (AC) |
| CR5. SPINDLE STOP | MC1R. SPINDLE CCW (AC) |
| CR5A. SPINDLE SAFETY | MC2. FLOOD COOLANT (AC) |
| CR7. SPRAY MIST | MC3F. POWER KNEE FORWARD |
| CR8. FLOOD COOLANT | (PARTNER V ONLY) |
| CR9. SPINDLE HI/LO | MC3R. POWER KNEE REVERSE |
| CR10. SPINDLE ENABLE | (PARTNER V ONLY) |
| CR10A. SPINDLE SAFETY | |
| CR11. AUXILIARY RELAY | |
| CR12. AUXILIARY RELAY | |
| CR22. DRAWBAR | |
| CR23. DRAWBAR (PARTNER I ATC) | |
| CR24. TOOL OUT/IN (PARTNER I ATC) | |
| CR25. CAROUSEL CW (PARTNER I ATC) | |
| CR26. CAROUSEL CCW (PARTNER I ATC) | |

A FORMERLY 6-04-015-102					
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE	
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317			
STOCK No.					
TOLERANCE UNLESS SPECIFIED		TITLE TERMINAL BLOCK DES.			
X.XXX	+	APPLICATION GENERAL PRODUCTS			
X.XX	+	SCALE 1:1	DMG NO. 6-04-018-019	SIZE 8	
X.X	+	DATE 14 MAY 90	DRAWN BY THOMPSON	SHEET NO. 1 OF 1	
ANGLE	+				

CHANGING SPINDLE RANGE

To change pulley range:

1. Remove motor shroud on head to expose belt and pulleys (Note the tension on the spindle belt.)
2. Loosen 4 bolts on the spindle motor mounting plate.
3. Relieve tension on the belt by loosening the screw located on the front of the spindle motor mounting plate.
4. Move the belts to the desired speed range.
5. Increase tension on the belt to previous amount of tension from Step 1.
6. Tighten 4 bolts on the spindle motor mounting plate.
7. Replace motor shroud on the head.

To change spindle range parameter:

1. Press F7 (PARMS)
2. Press F9 (CTRL)
3. Press F10 & F8 (CURSOR DOWN) to "spindle range" parameter
4. Press F3 (TOGGLE) to low or high depending on pulley selection

GEAR RANGE

SAFTRONICS PC3

~~YASKAWA~~ FAILURE INDICATIONS AND DETAILS

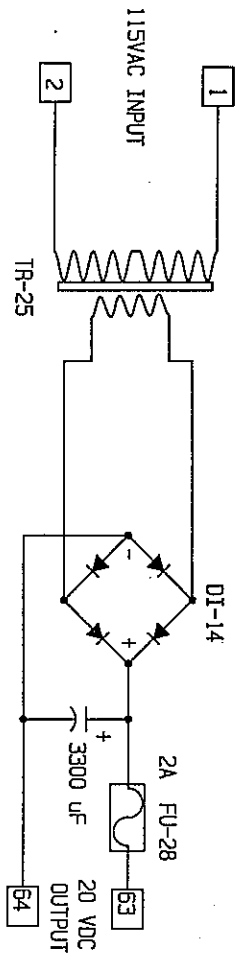
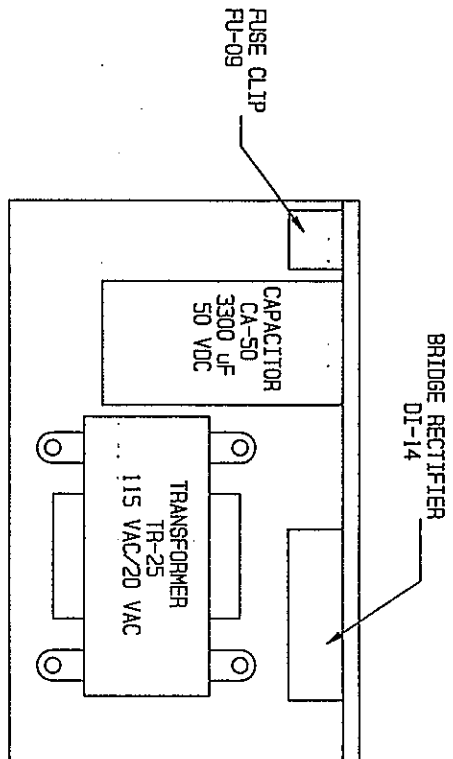
<u>Indication</u>	<u>Failure Indication Item</u>
Uu1	Low voltage (PUV)
Uu2	Low voltage (CUV)
Uu3	Low voltage (MC-ANS fault)
oC	Overcurrent
oU	Overvoltage
FU	Fuse blown
oH	Radiation fin overheated
oL 1	Overload
oL 2	Overload
oL 3	Overtorque
rr	Regenerative transistor failure
rH	Braking resistor unit overheated
EF3	External terminal 3 failure
EF5	External terminal 5 failure
EF6	External terminal 6 failure
EF7	External terminal 7 failure
EF8	External terminal 8 failure
CPF02	Control circuit failure
CPF03	NV-RAM (S-RAM) failure
CPF04	NV-RAM (BCC, Access Code)
CPF05	A/D convertor failure in CPU
CPF06	Optional connection failure

5
PARTNER 1 & 6 YASKAWA PARAMETERS
PC3 Inverter

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
NO-00	First, second & third functions setting/reading	03
NO-01	Operation & Stopping method & Selection V/F pattern	1000
NO-02	Maximum Output Frequency	
	2000-6000 Spindle Speed	120.0
	4000-8000 Spindle Speed	130.0
NO-03	Maximum Voltage	200.0
NO-04	Base Frequency	060.0
NO-05	Intermediate Output Frequency	010.0
NO-06	Intermediate Output Frequency Voltage	045.0
NO-07	Minimum Output Frequency	001.0
NO-08	Minimum Output Frequency Voltage	005.0
NO-09	Acceleration Time 1	001.0
NO-10	Deceleration Time 1	002.0
NO-11	Acceleration Time 2	010.0
NO-12	Deceleration Time 2	002.0
NO-13	Frequency Reference 1	000.0
NO-14	Frequency Reference 2	000.0
NO-15	Frequency Reference 3	000.0
NO-16	Frequency Reference 4	000.0
NO-17	Jog Frequency Reference	002.0
NO-18	Motor Protection Selection	0010
NO-19	Motor Rated Current	18.0
NO-20	Run Signal Selection	1000
NO-21	Output Monitor & S-curve Accel/Decel Selection	0100
NO-22	Frequency Reference Gain	1.00
NO-23	Frequency Reference Bias	00.00
NO-24	Frequency Upper Limit	100
NO-25	Frequency Lower Limit	000
NO-26	DC Injection Braking Current	035
NO-27	DC Injection Braking Time at Stop	0.5
NO-28	DC Injection Braking Time at Start	0.0
NO-29	Automatic Torque Boost Gain	1.0
NO-30	Stall Prevention Level While Running	170
NO-31	Stall Prevention Level While Running	160
NO-32	Multifunction Input Selection 1	01
NO-33	Multifunction Input Selection 2	13
NO-34	Multifunction Input Selection 3	05
NO-35	Multifunction Analog Input Selection	00
NO-36	Multifunction Output Selection 1	05
NO-37	Multifunction Output Selection 2	02
NO-38	Multifunction Output Selection 3	01
NO-39	Frequency Detection Level	000.0
NO-40	Overtorque Detection Function Selection	0000
NO-41	Overtorque Detection Level	160
NO-42	Overtorque Detection Level	00.1
NO-43	Carrier Frequency	04
NO-44	Not Used	
NO-45	Analog Monitor Gain	1.00

5
PARTNER 1 & 6 YASKAWA PARAMETERS
PC3 Inverter
Page 2

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
NO-46	Operation Selection After Momentary Power Loss	0000
NO-47	Fault Retry Selection	00
NO-48	Fault Record	U EF3
NO-49	Prom No.	08000
NO-50	Prohibited Frequency	000.0
NO-51	Prohibited Width	01.0
NO-52 - 59	NOT USED	



REV.	DESCRIPTION	E.C.O. NO.	APPROVED BY	DATE
	TOLERANCE (UNLESS SPECIFIED)			
	X.XXX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	SCALE 1:1			
	DATE 25 MAY 89			
	DRAWN BY REUTER			
	SHEET NO. 1 OF 1			

INDUSTRIAL INFORMATION CONTROLS
7870 PULS DRIVE
CLEVELAND, OH 44137
(612-475-8100)

TITLE: BRAKE POWER SUPPLY

APPLICATION: PARTNER V

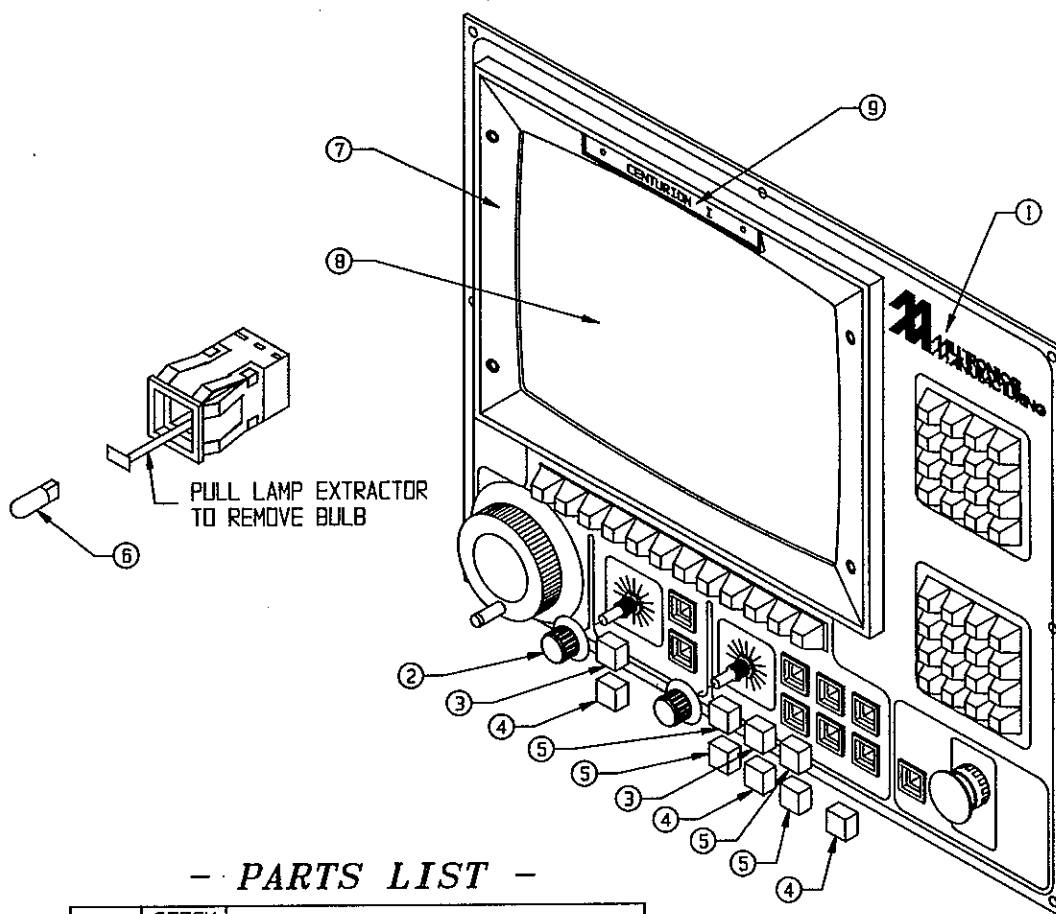
SIZE B

ELECTRICAL PRINTS FOR PARTNER 5D

INSTRUCTIONS

- 1) PAGES 1 & 2 ARE DETERMINED IF THE MILL IS EQUIPPED WITH V-BELT SPINDLE (DRAWINGS 6-06-016-108, 6-06-018-037) OR AC INVERTER SPINDLE (DRAWINGS 6-06-016-107, 6-06-018-038).
- 2) ALL INTERCONNECT DIAGRAMS HAVE A SCALE ON THE LEFT SIDE OF THE PAGE TO HELP LOCATE RELAY CONTACTS. LOCATION NUMBERS OF EACH CONTACT ARE NUMBERED NEXT TO THE RELAY COIL.
EXAMPLE: (2,12) 2=PAGE NUMBER 12= SCALE NUMBER

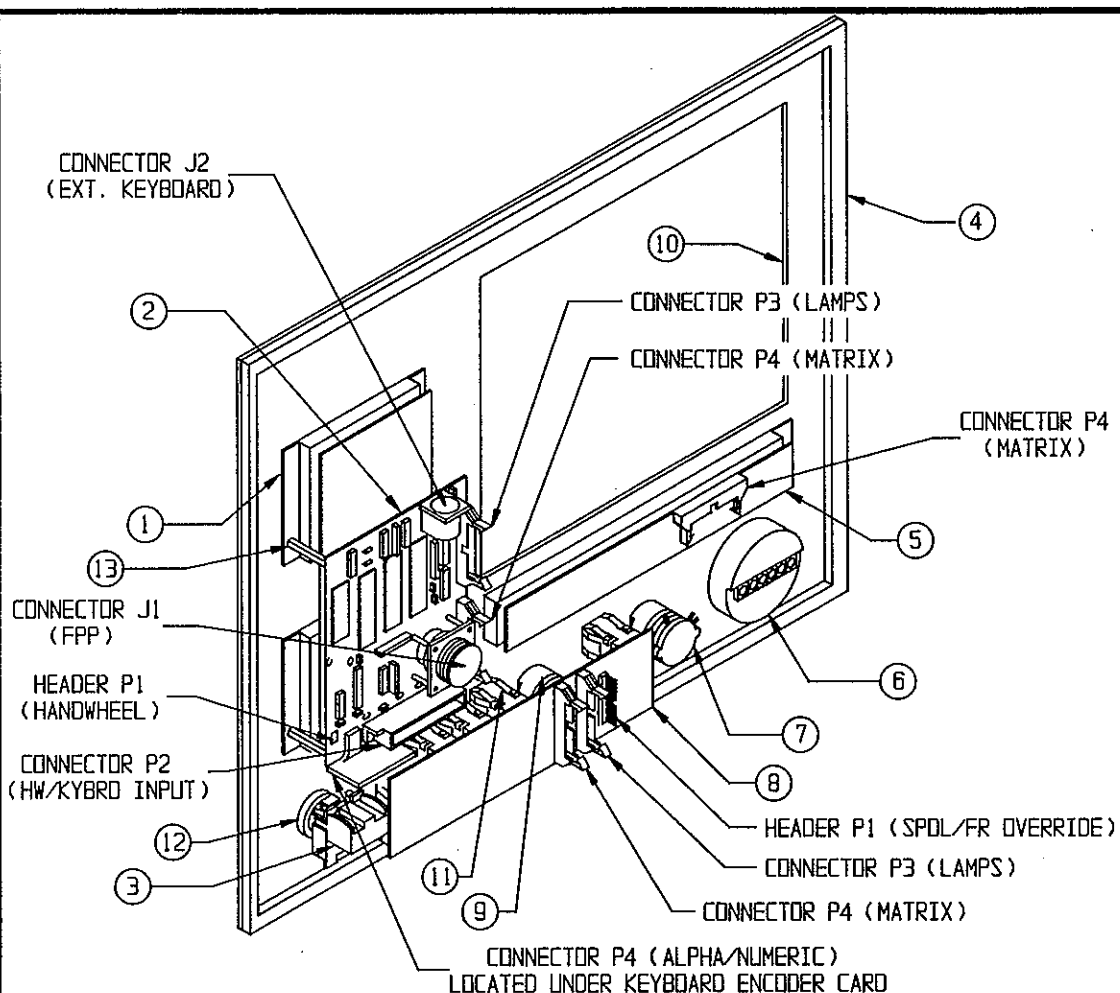
PAGE	DRAWING #	TITLE
0	6-04-018-019	TERMINAL BLOCK DESIGNATION
1	6-06-016-108	AC SYSTEM WIRING C5
2	6-06-018-037	DC SYSTEM WIRE C5
1	6-06-016-107	AC SYSTEM WIRING C5 W/YASKAWA
2	6-06-018-038	DC SYSTEM WIRE C5 W/YASKAWA
3	6-06-018-035	MOTOR/ENCODER INTERFACE C5
4	6-06-018-018	4-AXIS DRIVE SCHEMATIC
5	6-06-018-021	PC-REL-1B SCHEMATIC
6	6-06-018-021	PC-REL-1B SCHEMATIC
7	6-03-018-000	PC-REL-1B PANEL LAYOUT
8	6-04-018-005	PC-REL-1B I/O PLUG DEFINITIONS
9	6-06-018-032	24, +/-15VDC POWER SUPPLY
10	6-03-016-108	BRAKE POWER SUPPLY



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	FP-58	14 IN. CRT FRONT PANEL OVERLAY 6-08-004-003
2	SW-35	SWITCH KNOB, COMPOSITE BLACK ALCOKNOB PKA-P708-1/4
3	SW-89	SQUARE KEYTOP, RED HONEYWELL MICROSWITCH AML51A10R
4	SW-82	SQUARE KEYTOP, GREEN HONEYWELL MICROSWITCH AML51A10G
5	SW-90	SQUARE KEYTOP, WHITE HONEYWELL MICROSWITCH AML51A10W
6	SW-92	SWITCH INDICATOR LAMP, 24 VDC HONEYWELL MICROSWITCH AML91LA85
7	FP-57	14 IN. CRT BEZEL MMC 6-01-004-057
8	FP-59	14 IN. CRT LEXAN WINDOW, SMOKED MMC 6-01-004-054
9	LB-40	CENTURION V NAMEPLATE MMC 6-08-004-004

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE FRONT PANEL ASSEMBLY - FRONT		APPLICATION CENTURION V		
SCALE 3:1		DWG No 6-11-004-001	SIZE B	
DATE 25 FEB 93		DRAWN BY REUTER	SHEET NO. 1 OF 1	

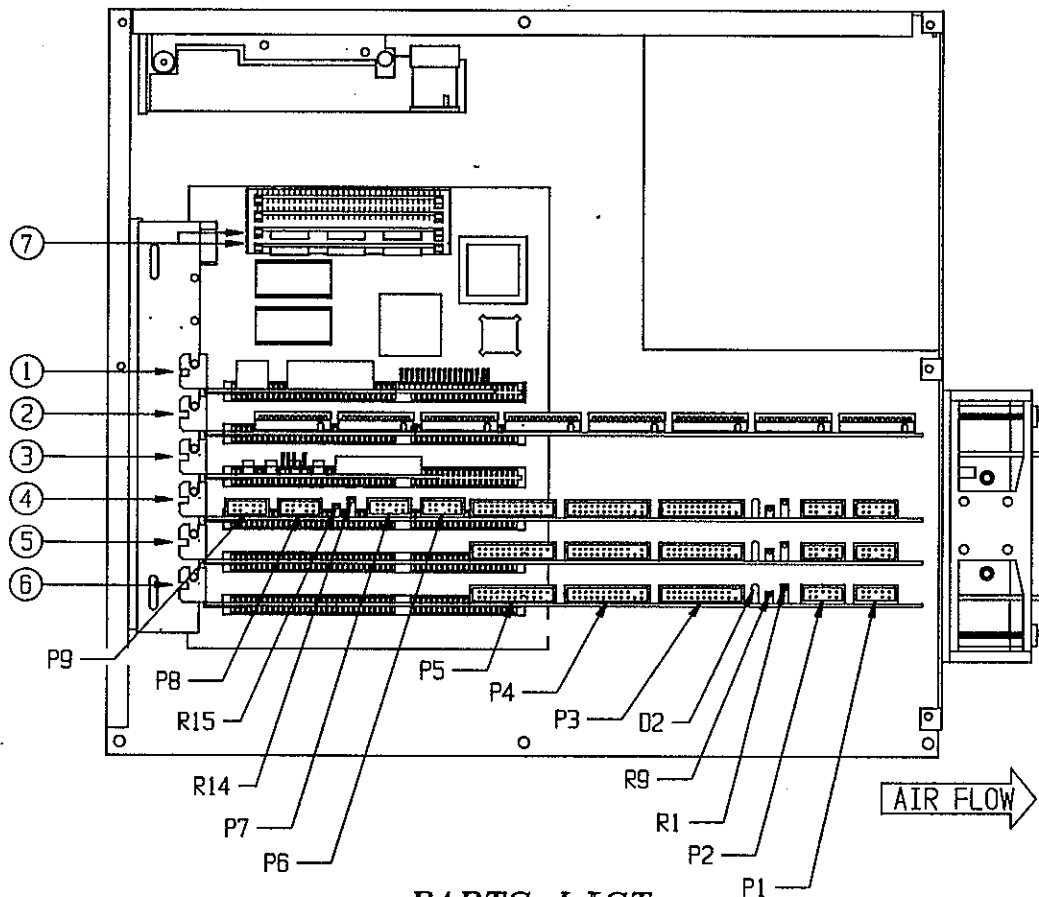


- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	80-51	KEYPAD ASSY. ALPHA/NUMERIC DIGITRAN No. KC0246-01
2	7315	KEYBOARD ENCODER CARD PC-KYBENC-02 MMC DWG. 6-07-004-011
3	SW-39	SWITCH CONTACT BLOCK, N/C, DEM No. V-40
4	FP-51	FRONT PANEL GASKET, MMC 6-01-004-007
5	80-50	KEYPAD ASSY. FUNCTION KEYS DIGITRAN No. KC0245-01
6	EO-30	HANDWHEEL ENCODER, 100 COUNT SUMTAK No. LGS-022-100
7	SW-14	ROTARY SWITCH (FEEDRATE) ELECTROSWITCH No. 74-0246
8	7300	FRONT PANEL SWITCH BOARD PC-FPSW-01 MMC DWG. 6-07-004-006
9	SW-14	ROTARY SWITCH (SPINDLE) ELECTROSWITCH No. 74-0246
10	FP-60	14 INCH CRT FRONT PANEL 6-01-004-053
11	SW-87	SWITCH, MOMENTARY CONTACT, DPDT HONEYWELL MICROSWITCH AML21CBA3AC
12	SW-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.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE		FRONT PANEL ASSEMBLY - REAR		
APPLICATION		CENTURION V		
SCALE	3:1	DWG No	6-11-004-000	SIZE B
DATE	4 FEB 93	DRAWN BY	REUTER	SHEET NO. 1 OF 1

DIAGRAM SHOWN FOR 3-AXIS STANDARD SYSTEMS

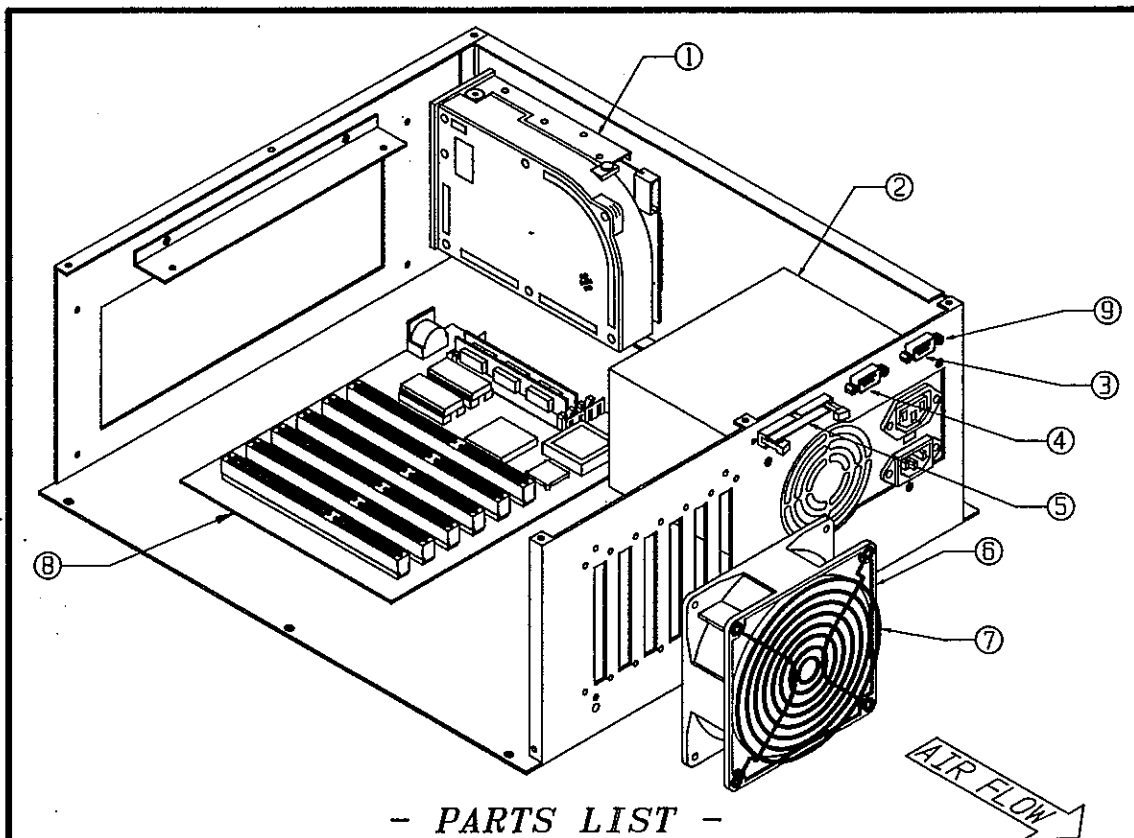


- PARTS LIST -

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	SIMDISK HARD DRIVE EMULATOR BOARD MILLTRONICS MANUFACTURING COMPANY PC-SIMDISK-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)

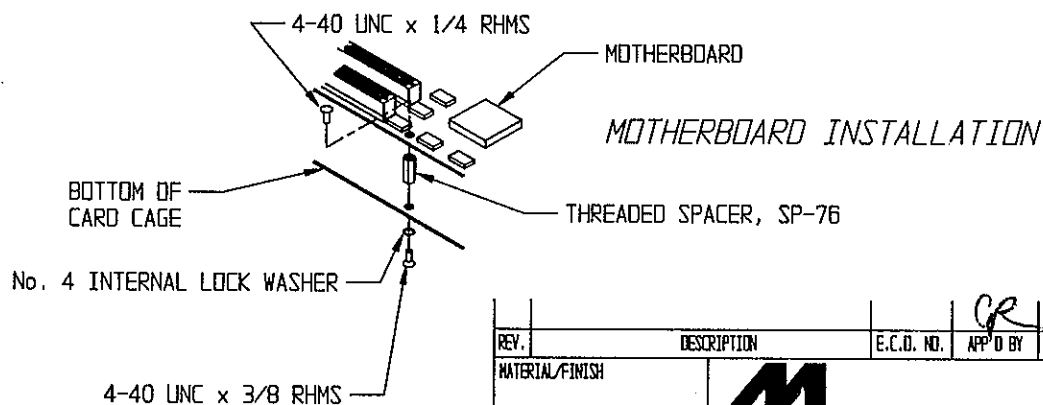
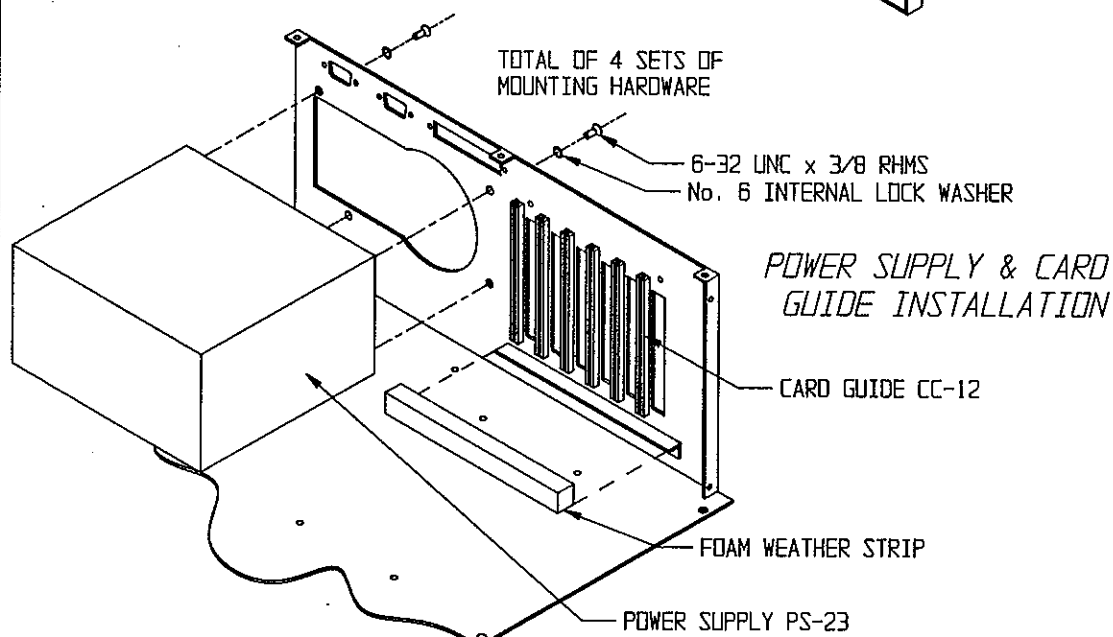
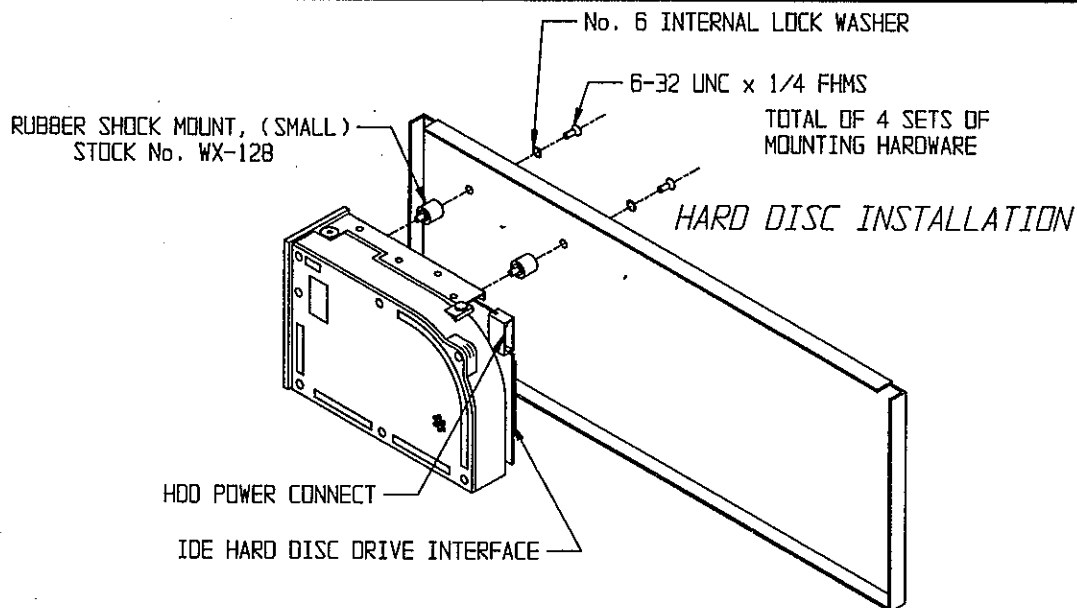
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE CARD CAGE ELECTRONICS ASSY.		
X.XXX +/- .005		APPLICATION CENTURION V		
X.XX +/- .010		SCALE 2.5:1 DWG No. 6-11-004-024 SIZE B		
X.X +/- .030		DATE 2 MAR 94		
ANGLE +/- 1.0°		DRAWN BY REITER SHEET NO. 2 OF 5		



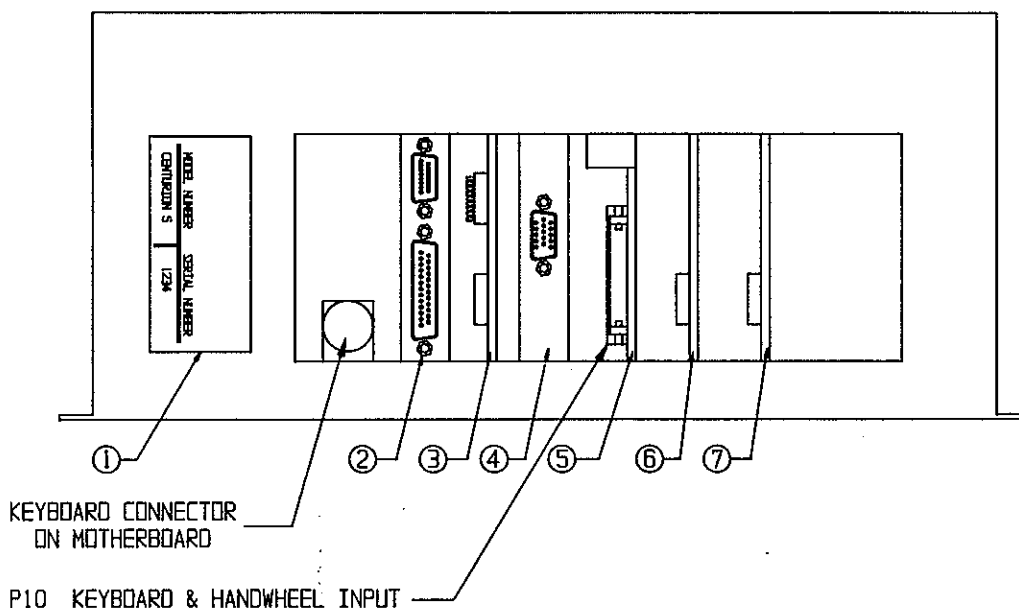
- PARTS LIST -

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. A47B15A15T3 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.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, 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	DMG No 6-11-004-024	SIZE B
X.X	+/- .030	DATE 2 MAR 94	DRAWN BY REUTER	SHEET NO. 3 OF 5
ANGLE	+/- 1.0°			



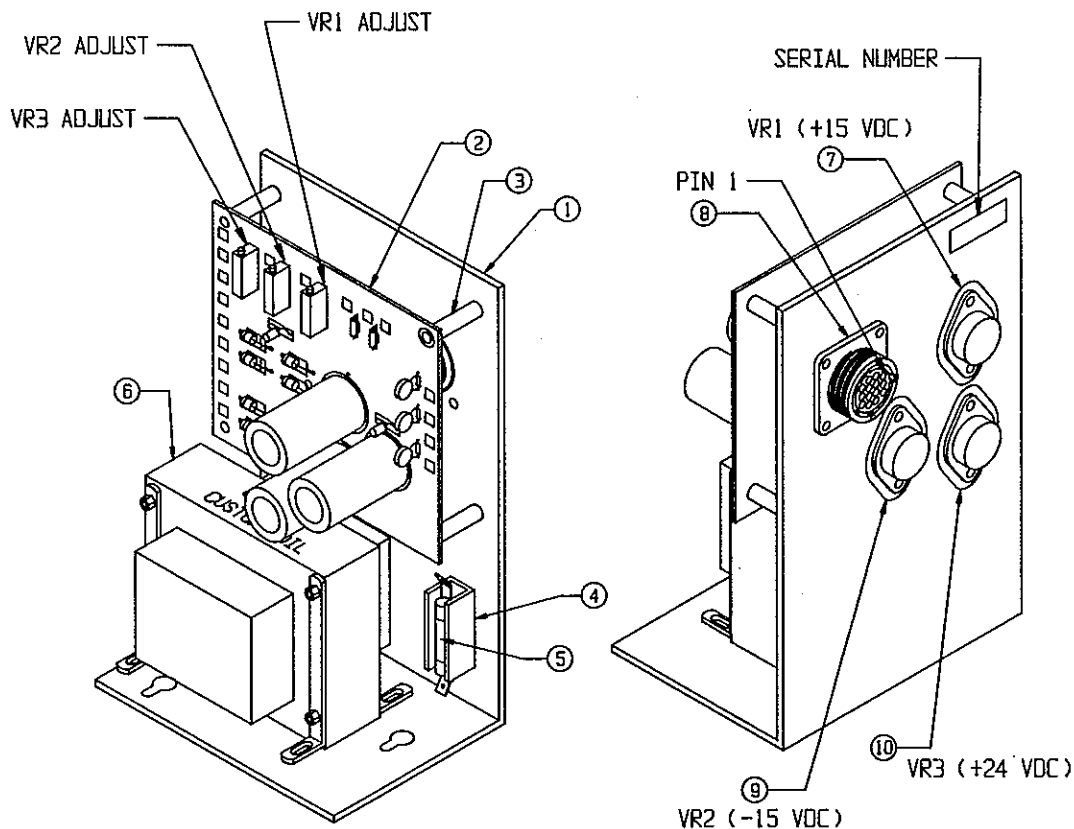
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
			CR	
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.		TITLE CARD CAGE ELECTRONICS ASSY.		
TOLERANCE UNLESS SPECIFIED		APPLICATION CENTURION V		
X.XXX	+/- .005	SCALE 3:1	DWG No 6-11-004-024	SIZE B
X.XX	+/- .010	DATE 2 MAR 94	DRAWN BY REUTER	SHEET NO. 4 OF 5
X.X	+/- .030			
ANGLE	+/- 1.0°			



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	LB-03	SERIAL No./MODEL No. TAG
2	BD-52	IDE HDD/FDD CONTROLLER & I/O PORTS
3	ASSY 7205	SIMDISK HARD DRIVE EMULATOR CARD MMC PC-SIMDISK-01
4	BD-49	VIDEO GRAPHICS ARRAY (VGA) CARD
5	ASSY 7000	ACROLOOP X-AXIS COMPUTER CONTROLLER MMC PC-ACRCON-02 (FULL)
6	ASSY 7005	ACROLOOP AXIS COMPUTER Y-AXIS MMC PC-ACRCON-02 (PARTIAL)
7	ASSY 7005	ACROLOOP AXIS COMPUTER Z-AXIS MMC PC-ACRCON-02 (PARTIAL)

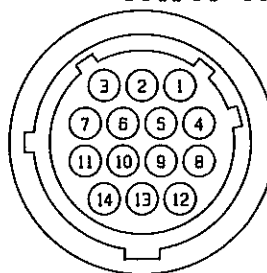
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE		CARD CAGE ELECTRONICS ASSY.		
APPLICATION		CENTURION V		
SCALE 2:1		DWG No. 6-11-004-024	SIZE B	
DATE 2 MAR 94		DRAWN BY REUTER	SHEET NO. 5 OF 5	



- PARTS LIST -

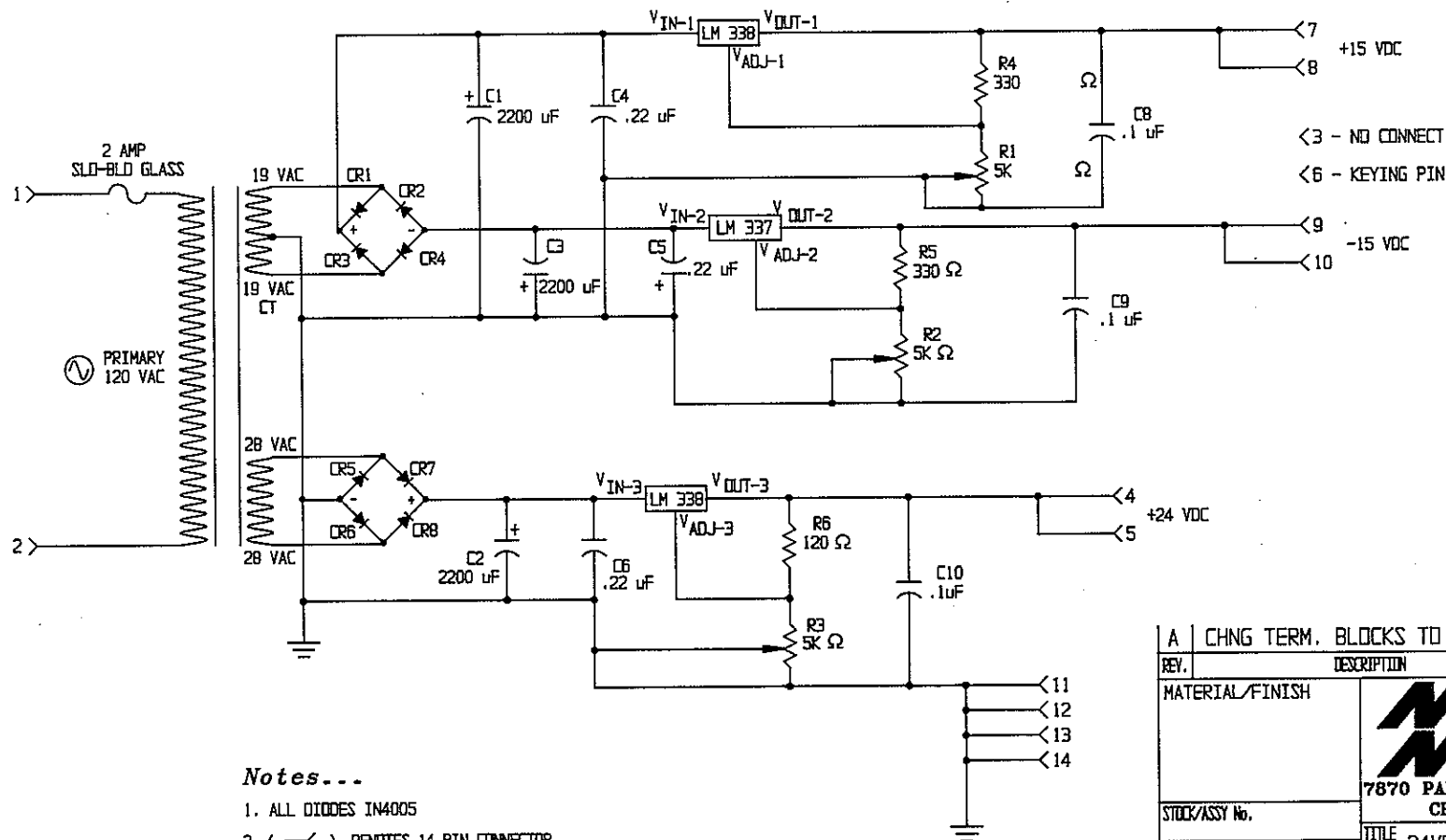
ITEM	STOCK No.	DESCRIPTION
1	BR-57	+/-15 VDC - 24 VDC P.S. BRKT DWG No. 6-01-018-050
2	BD-42	PRINTED CIRCUIT BOARD PC-15/24 PS-01 PARTS L/D - 6-03-018-013
3	SP-56	NYLON SPACER, No. 6 x 1-1/4 CATAMOUNT No. SPNY-089
4	FU-09	FUSE CLIP, BUSSMAN No. S8102-1X
5	FU-28	FUSE, GLASS, 2 AMP SLO-BLO BUSSMAN No. MDL2
6	TR-30	TRANSFORMER, IRON CORE, MULTI-TAP CUSTOM COIL No. 891-100
7	TS-09	VOLTAGE REGULATOR, LM338
8	CD-18	CONNECTOR, 14 PIN, ROUND, FEMALE AMP No. 206043-1
9	RG-04	VOLTAGE REGULATOR, LM337
10	RG-10	VOLTAGE REGULATOR, LM338

- OUTPUT CONNECTOR PINS -



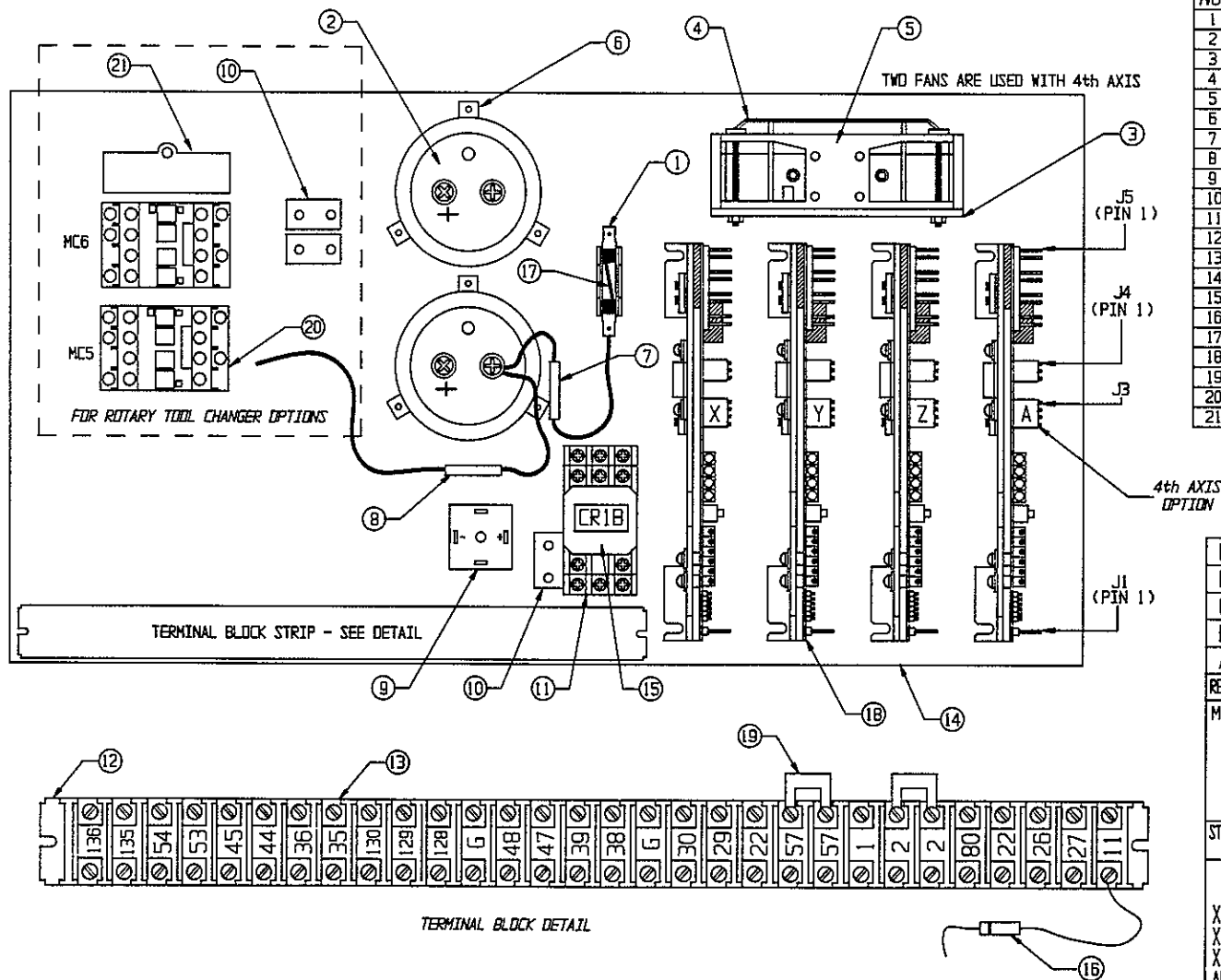
1	110 VAC INPUT
2	110 VAC INPUT
3	NO CONNECT
4	+24 VDC
5	+24 VDC
6	NO CONNECT - KEY
7	+15 VDC
8	+15 VDC
9	-15 VDC
10	-15 VDC
11	GROUND
12	GROUND
13	GROUND
14	GROUND

REV.	DESCRIPTION	E.C.B. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE		15/24 VDC POWER SUPPLY ASSY.		
APPLICATION		GENERAL PRODUCTS		
SCALE		1.5:1	DWG No 6-11-018-001	SIZE B
DATE		4 FEB 94	DRAWN BY REUTER	SHEET NO. 1 OF 1



A CHNG TERM. BLOCKS TO CD18		1147	RE	2/93
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK/ASSY No.		7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
TOLERANCE UNLESS SPECIFIED		TITLE 24VDC, +/-15VDC POWER SUPPLY		
X.XXX	± .005	APPLICATION GENERAL PRODUCTS		
X.XX	± .010	SCALE 1.25:1		
X.X	± .030	DATE 31 OCT 89		
ANGLE	± 1.0°	DRAWN BY THOMPSON		
		SHEET NO. 1 OF 1		

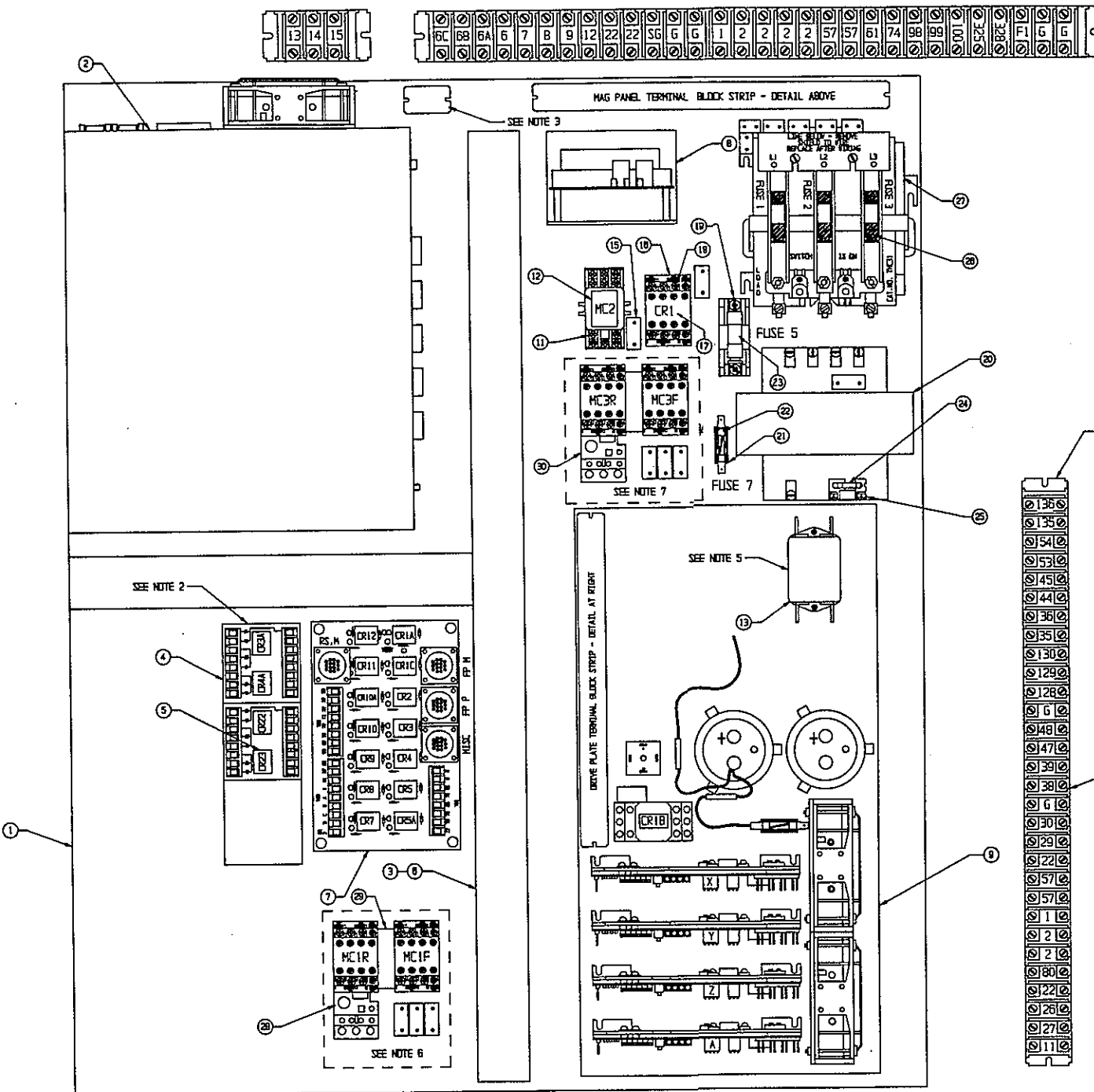
- PARTS LIST -



No.	QTY	STOCK No.	DESCRIPTION
1	1	FU-09	FUSE CLIP, SINGLE MDL
2	2	CA-51	CAPACITOR, 7700 uFD 200 VDC
3	1 or 2	BR-09	FAN BRACKET
4	1 or 2	FA-04	FAN GUARD WFG 473
5	1 or 2	FA-01	FAN A47B15A15T3
6	2	CA-30	CAPACITOR MOUNTING RING VR-12
7	1	RE-48	RESISTOR 10 OHM 10 W 5% VC10F
8	1	RE-90	RESISTOR - 500 OHM/10W
9	1	DI-14	MDA 3502 BRIDGE RECTIFIER
10	1 or 3	MI-09	NOISE SUPPRESSOR 220V
11	1	RL-06	RELAY SOCKET BASE SL711
12	1	TB-02	TERMINAL BLOCK END PIECE No. 630
13	30	TB-01	TERMINAL BLOCK No. 625
14	1	PL-39	160 VDC DRIVE PLATE
15	1	RL-05	RELAY TPDT 20308-84
16	1	DI-04	ZENER DIODE - 1N4745
17	1	FU-46	FUSE, 1A, SLD-BLD, MDL GLASS
18	3 or 4	AM-25	AXIS SERVO DRIVE AMP, GLENTEK GA370-3
19	2	TB-16	TERMINAL BLOCK JUMPER, 2 POSITION
20	2	RL-56	CONTACTOR RELAY, 3 HP
21	1	MD-72	MOTOR START CAPACITOR, 3.5uF 400 VAC

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
E	FILE UPDATE, SERIES F	1725	CK	2/94
D	REM. INDUCTORS, ETC...	658	T.W.	10/91
C	ADD CONNECTOR I.D.	345	T.W.	12/90
B	ADD TB-57	305	K.R.B.	10/90
A	REFERENCE TO E.C.D.	296	K.R.B.	10/90

MATERIAL/FINISH		TITLE	
STOCK/ASSY No. 8205		160 VDC DRIVE PLATE	
TOLERANCE UNLESS SPECIFIED		APPLICATION	
X.XXX ± .005		GENERAL PRODUCTS	
X.XX ± .010		SCALE 2.5:1	
X.X ± .030		DATE 19 JAN 90	
ANGLE ± 1.0°		DRAWN BY THOMPSON	
		SHEET NO. 1 OF 2	



PARTS LIST

No.	QTY	S/N	DESCRIPTION
1	1	PL-40	33 x 39 MAG PANEL, FABRICATED
2	1	6100	CENTURION V CMC CARD CAGE
3	4, 5'	WC-65	WIRE DUCT, 2 x 2.5 LGB
4	5	WC-64	SNAP TRACK CARD CARRIER
5	6	8107	DOUBLE RELAY CARD PC-REL-01
6	4, 5'	WC-66	WIRE DUCT COVER C 2.0 LGB
7	1	8150	M-FUNCTION RELAY CRAD PC-REL-18
8	1	8177	15/24 VDC POWER SUPPLY
9	1	8205	160 VDC, 3 or 4 AXIS DRIVE PLATE
10	1	TB-02	TERMINAL BLOCK END PIECE
11	1	RL-06	RELAY SOCKET BASE SL711
12	1	RL-05	RELAY, TPOT, 20300-84
13	1	MT-10	LINE FILTER BVI
14	32	TB-01	TERMINAL BLOCK, 2 POST
15	14	MI-09	NOISE SUPPRESSOR 220V
16	1	RL-51	CONTACTOR NOISE SUPPRESSOR
17	1	RL-50	AUXILIARY CONTACTOR LA10-N13
18	1	RL-49	CONTACTOR RELAY, 3 HP, LCI-0181006
19	1	FU-45	FUSE BLOCK, SINGLE FRN-R
20	1	TR-26	TRANSFORMER, 1.5KVA
21	1	FU-08	FUSE HOLDER, SINGLE MOL GLASS
22	1	FU-46	FUSE, 1 AMP SLD-BLD, MOL GLASS
23	1	FU-37	FUSE, FRN-R, 15A, 250V SLD-BLD
24	1	FU-29	FUSE, 30 AMP SLD-BLD, MOL GLASS
25	1	FU-11	FUSE CLIP KIT, MOL
26	3	FU-30	FUSE, FRN-R, 30 AMP SLD-BLD
27	1	SV-42	SWITCH, DISCONNECT, TOCB1
28	1	RL-54	CONTACTOR OVERLOAD, 18 AMP
29	2	RL-32	MECHANICAL CONTACTOR INTERLOCK
30	1	RL-53	CONTACTOR OVERLOAD, 12 AMP

Notes...

- REF. TO DWG. No. 6-03-018-015 FOR COMPLETE DRAWING OF THE DRIVE PLATE. SHOWN WITH ALL 4 AXES INSTALLED.
- CONTROL RELAYS FOR AC SPINDLE INVERTER.
- ADD 1 (TB-02) & 3 (TB-01) FOR OPTIONAL M-FUNCTION.
- PART QUANTITIES ARE FOR MAG PANEL ASSEMBLY ONLY. REF. TO SUB-ASSEMBLY DRAWINGS FOR OTHER PART QUANTITIES. PART QUANTITIES INCLUDE OPTIONS.
- LINE FILTER SHOWN IN THIS LOCATION WHEN PARTNER V KNEE OPTIONS ARE INSTALLED. OTHERWISE LINE FILTER IS PLACED WHERE MCIF & MCIR ARE LOCATED.
- CONTACTORS MCIF & MCIR AND ASSOCIATED COMPONENTS ARE FOR PARTNER V REEVES SPINDLE DRIVE, (NO AC SPINDLE INVERTER).
- CONTACTORS MCIR & MCIF AND ASSOCIATED COMPONENTS ARE FOR THE PARTNER V POWER KNEE OPTION.

B REGENERATE FILE		1809	4/94
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY DATE
MATERIAL/FINISH		MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANDHASSEN, MN 55317	
STOCK/ASSY No.		TITLE 160 VDC MAG PANEL	
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS	
X.XXX +/- .005		SCALE 3:1	DWG No. 6-03-018-017
X.XX +/- .010		DATE 14 MAY 91	DRAWN BY REUTER
X.X +/- .030			SHEET NO. 1 OF 1
ANGLE +/- 1.0°			

PROCEDURE TO CHANGE YASKAWA PARAMETERS
For G3 Inverter

1. Depress DRIVE/PRG to select program mode. (Drive light turns off.)
2. Depress FWD/REV/MODE to select system constant (SN), (AN), (BN) or (CN).
3. RESET/> key moves flashing digit to appropriate digit to be changed.
4. ^ changes digit from zero thru nine.
5. Depress DATA/ENTER to indicate internal data.
6. If data is correct, goto Step 2; if data needs to be changed, proceed to Step 7.
7. Use RESET and ^ keys to change internal data. (Steps 3, 4)
8. Depress DATA/ENTER key to store changed data; display should read "END".
9. GOTO Step 2.
10. If finished, depress DRIVE/PRG; remote light should come on.

PARTNER 5 YASKAWA PARAMETERS
G3 3.7 Inverter

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
SN-01	KVA Selection (*If G3 inverter is G3 5.5, SN-01 should be 05.)	*04
SN-02	V/F Pattern Selection	OF
SN-03	Operator Status	1010
SN-04	Operation Mode Select 1	0000
SN-05	Operation Mode Select 2	0000
SN-06	Operation Mode Select 3	0001
SN-07	Operation Mode Select 4	0000
SN-08	Operation Mode Select 5	0000
SN-09	Operation Mode Select 6	0000
SN-10	Select Stall Prevention	0010
SN-11	Momentary Power Loss Protection	0000
SN-12	External Fault Signal Input (3)	0000
SN-13	Not Used	0000
SN-14	Motor Protection	0010
SN-15	Soft Input Terminal 5	03
SN-16	Soft Input Terminal 6	04
SN-17	Soft Input Terminal 7	06
SN-18	Soft Input Terminal 8	08
SN-19	Multi Function Analog Input	00
SN-20	Soft Output Terminals	01
SN-21	Soft Output Terminals	01
SN-22	Soft Output Terminals	02
SN-23	Not Used	00
SN-24	Not Used	00
SN-25	Analog Speed Setter	0000
SN-26	Digital Speed Setter	0000
SN-27	Digital Pulse Monitor Option	0000
SN-28	Analog Output Monitor Option	0100
BN-01	Acceleration Time #1	1.0
BN-02	Deceleration Time #1	1.0
BN-03	Acceleration Time #2	10.0
BN-04	Deceleration Time #2	10.0
BN-05	Frequency Reference Gain	100.0
BN-06	Frequency Reference Bias	0
BN-07	Torque Compensation Gain	1.0
BN-08	Motor Rated Slip	4.4
BN-09	Energy Saving Level Gain	80
BN-10	Monitor Mode at Power-up	1
BN-11	Soft Analog Output Gain	1.00
BN-12	Soft Analog #2 Output Gain	1.00
AN-01	Digital Reference #1	0.00
AN-02	Digital Reference #2	0.00
AN-03	Digital Reference #3	0.00
AN-04	Digital Reference #4	0.00
AN-05	Digital Reference #5	0.00
AN-06	Digital Reference #6	0.00
AN-07	Digital Reference #7	0.00
AN-08	Digital Reference #8	0.00
AN-09	Jog Frequency Reference	0.0

PARTNER 5 YASKAWA PARAMETERS

G3 3.7 Inverter

Page 2

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
CN-01	Motor Rated Input Voltage	200.0
CN-02	Maximum Output Frequency	170.0
CN-03	Maximum Output Voltage	200.0
CN-04	Maximum Voltage Frequency	60.0
CN-05	Breakpoint Frequency	10.0
CN-06	Breakpoint Voltage	45.0
CN-07	Minimum Frequency	1.0
CN-08	Minimum Voltage	3.0
CN-09	Motor Rated Current	18.0
CN-10	DC Injection Braking Start Frequency	1.0
CN-11	DC Braking Current	70
CN-12	DC Injection Time at Stop	0.5
CN-13	DC Injection Time at Start	0.0
CN-14	Frequency Reference Upper Limit	100
CN-15	Frequency Reference Lower Limit	0
CN-16	Prohibited Frequency Points	0
CN-17	Prohibited Frequency Points	0
CN-18	Prohibited Frequency Points	0
CN-19	Prohibited Frequency Deadband	0.0
CN-20	Operator Display Mode	00000
CN-21	Speed Comparator Reference	0.0
CN-22	Comparator Hysteresis	2.0
CN-23	Carrier Frequency Upper Limit	2.5
CN-24	Carrier Frequency Lower Limit	0.4
CN-25	Carrier Frequency Gain	6
CN-26	Overtorque Detection Level	160
CN-27	Overtorque Detection Time	0.1
CN-28	Stall Prevention Level During Accel	170
CN-29	Stall Prevention Limiter	30
CN-30	Stall Prevention Level at Set Speed	160
CN-31	Motor Line to Line Resistance	.472
CN-32	Motor Iron Loss	.172
CN-33	Torque Compensation Limiter	50
CN-34	Motor No Load Current	30
CN-35	Slip Compensation Delay Time	1.0
CN-36	No. of Auto-reset Attempts	0
CN-37	Power Loss Ride Through Time	0.0
CN-38	Speed Search Deactivation Level	150
CN-39	Speed Search Decel Time	0.0
CN-40	Minimum Base Block Time	0.0
CN-41	V/F Pattern Speed Search	100
CN-42	Voltage Recovery Time	0.3

YASKAWA FAILURE INDICATIONS AND DETAILS

<u>Indication</u>	<u>Failure Indication Item</u>
Uu1	Low voltage (PUV)
Uu2	Low voltage (CUV)
Uu3	Low voltage (MC-ANS fault)
oC	Overcurrent
oU	Overvoltage
FU	Fuse blown
oH	Radiation fin overheated
oL 1	Overload
oL 2	Overload
oL 3	Overtorque
rr	Regenerative transistor failure
rH	Braking resistor unit overheated
EF3	External terminal 3 failure
EF5	External terminal 5 failure
EF6	External terminal 6 failure
EF7	External terminal 7 failure
EF8	External terminal 8 failure
CPF02	Control circuit failure
CPF03	NV-RAM (S-RAM) failure
CPF04	NV-RAM (BCC, Access Code)
CPF05	A/D convertor failure in CPU
CPF06	Optional connection failure

CENTURION V MILL INTERFACE PLUGS DESIGNATION
PC-INTF-01 29-Jan-91

14 PIN AMP PLUGS

Pin No.	MISC.	FRONT PANEL	POWER PLUG	ENCODER PLUG
1	N.C.	+5VDC	+5VDC	+CH. A
2	N.C.	GND	+5VDC	-CH. A
3	N.C.	KEY	+5VDC	+CH. B
4	N.C.	+24VDC	+24VDC	-CH. B
5	KEY	+12VDC	N.C.	+MARK
6	GND	-12VDC	+12VDC	-MARK
7	RESET 1	RESET 1	-12VDC	GND
8	RESET 2	RESET 2	N.C.	+5VDC
9	TCHNG 1	TCHNG 1	KEY	GND
10	TCHNG 2	TCHNG 2	GND	GRID
11	ESTOP 1A	ESTOP 1B	GND	SIGNAL
12	ESTOP 2	ESTOP 2	GND	GND
13	SP. ANA.	SP. ANA.	GND	GND
14	GND	GND	GND	KEY

PIN	X INPUTS	DESCRIPTION	X OUTPUTS	DESCRIPTION
1	IN. 1	E-STOP	OUT. 1	EXCESS ERROR
2	IN. 2	SPINDLE CW	OUT. 2	SPRAY MIST
3	IN. 3	SPINDLE CCW	OUT. 3	FLOOD
4	IN. 4	UP TO SPEED	OUT. 4	SPINDLE CW
5	IN. 5	IN TOOL CHANGE	OUT. 5	SPINDLE CCW
6	IN. 6	LUBE FAULT	OUT. 6	SPINDLE STOP
7	IN. 7	WAIT CHANNEL	OUT. 7	SPINDLE ENB.
8	IN. 8	ZERO SPEED	OUT. 8	TCH RESET
9	IN. 9	SPARE	OUT. 9	ALLOW RESET
10	IN. 10	SPINDLE REVERSE	OUT. 10	M-10 (PULSE)
11	IN. 11	DIGITIZING	OUT. 11	M-11 (PULSE)
12	KEY	(Set M-10, Clear M-11)	OUT. 12	4TH AXIS BRAKE
13	N/O CONTACT	ACROLOOP (P2)	KEY	
14	N/C CONTACT	ACROLOOP (P2)	CONTACT COM.ACROLOOP (P2)	

For Manual/Avanti Tool Changer Milling Machines
January 8, 1991

Output Plug Definitions

				<u>SET</u>	<u>CLEAR</u>
Yout01	1	M20	output pulsed	M60	M70
Yout02	1	M21	output pulsed	M61	M71
Yout03	1	M22	output pulsed	M62	M72
Yout04	1	M23	output pulsed	M63	M73
Yout05	1	M24	output pulsed	M64	M74
Yout06	1	M25	output pulsed	M65	M75
Yout07	1	M26	output pulsed	M66	M76
Yout08	1	M27	output pulsed	M67	M77
Yout09	1	M28	output pulsed	M68	M78
Yout10	1	M29	output pulsed	M69	M79

Input Plug Definitions

Yin01	1	M20	waiting
Yin02	1	M21	waiting
Yin03	1	M22	waiting
Yin04	1	M23	waiting
Yin05	1	M24	waiting
Yin06	1	M25	waiting
Yin07	1	M26	waiting
Yin08	1	M27	waiting
Yin09	1	M28	waiting
Yin10	1	M29	waiting

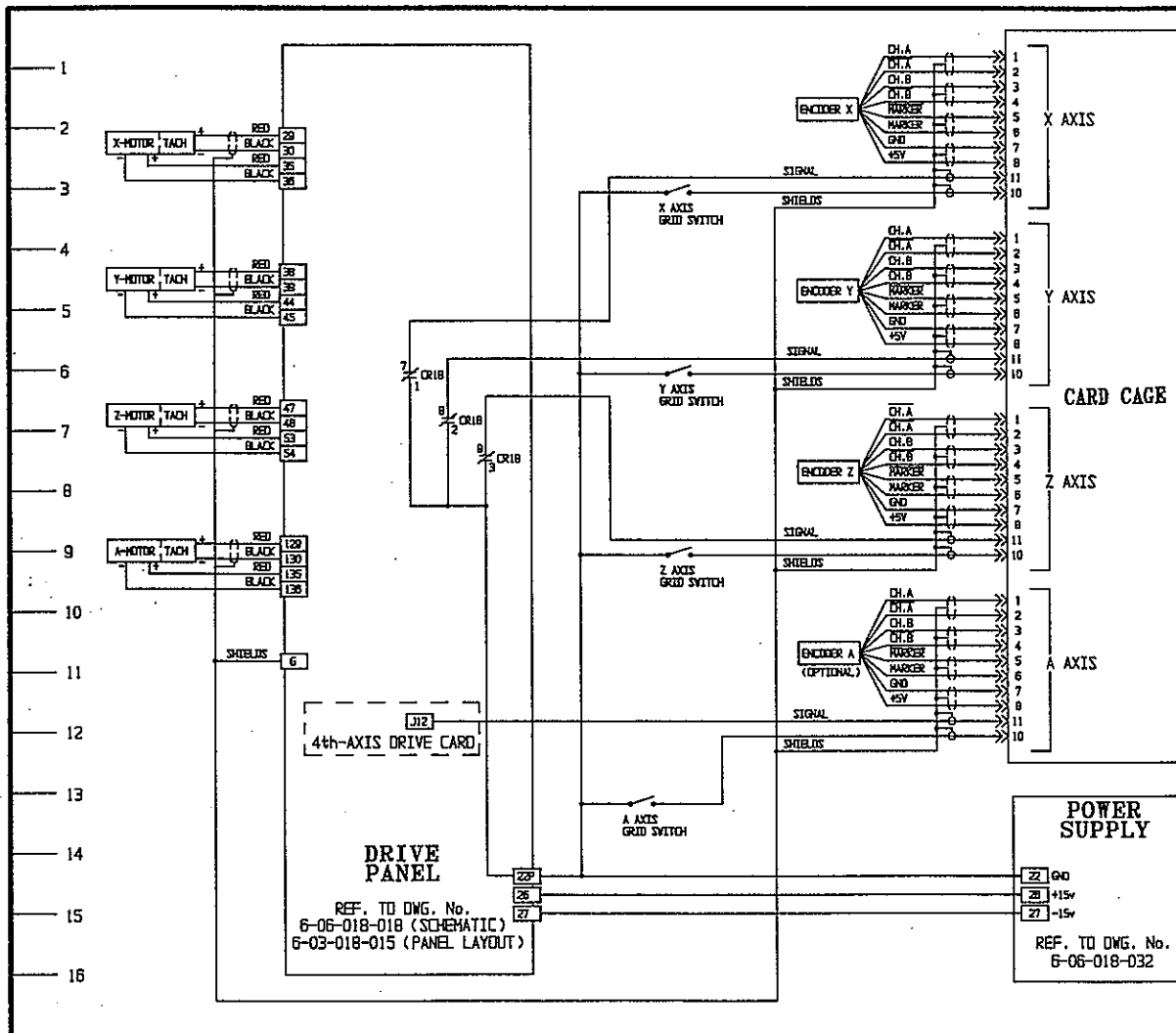
TERMINAL BLOCK DESIGNATORS

- | | |
|-------------------------------|--|
| 1. 115 VAC HOT | 54. Z-MOTOR - |
| 2. 115 VAC COMMON | 56. SPINDLE ENABLE |
| 6. X OTL SW. OUT | 57. SW. 115 VAC HOT |
| 6A. SPINDLE FAULT | 61. 115 VAC FOR SPRAY |
| 7. Y OTL SW. OUT/X OTL SW. IN | 63. +24V. (POWER KNEE X PARTNER V ONLY) |
| 8. Z OTL SW. OUT/Y OTL SW. IN | 64. DC. COMMON (POWER KNEE X PARTNER V ONLY) |
| 9. Z OTL SW. IN | 65. SW. 220 VAC FOR AUTOLUBE |
| 12. +24 VOC FROM PWR. SUPPLY | 66. 220 VAC FOR AUTOLUBE |
| 13. M-FUNC. COMMON | 74. SW. 115 VAC FOR 4TH-AXIS BRAKE |
| 14. M-FUNC. N/O | 80. 120 VAC FOR BUSS |
| 15. M-FUNC. N/C | 98. KNEE UP (PARTNER V ONLY) |
| 16. 2nd M-FUNC. COMMON | 99. KNEE DOWN (PARTNER V ONLY) |
| 17. 2nd M-FUNC. N/O | 100. Z AXIS DISABLE (AVANTI ATC) |
| 18. 2nd M-FUNC. N/C | 102. Z AXIS DISABLE (AVANTI ATC) |
| 22. GROUND FROM PWR. SUPPLY | 129. A-MOTOR TACH + |
| 26. +15 VOC FROM PWR. SUPPLY | 130. A-MOTOR TACH - |
| 27. -15 VOC FROM PWR. SUPPLY | 135. A-MOTOR + |
| 29. X-MOTOR TACH + | 136. A-MOTOR - |
| 30. X-MOTOR TACH - | 325. TOOL OUT |
| 35. X-MOTOR + | 328. POWER DRAWBAR |
| 36. X-MOTOR - | F1. SW. 115 VAC TO FLOOD COOLANT |
| 38. Y-MOTOR TACH + | G. CHASSIS GROUND |
| 39. Y-MOTOR TACH - | |
| 44. Y-MOTOR + | |
| 45. Y-MOTOR - | |
| 47. Z-MOTOR TACH + | |
| 48. Z-MOTOR TACH - | |
| 53. Z-MOTOR + | |

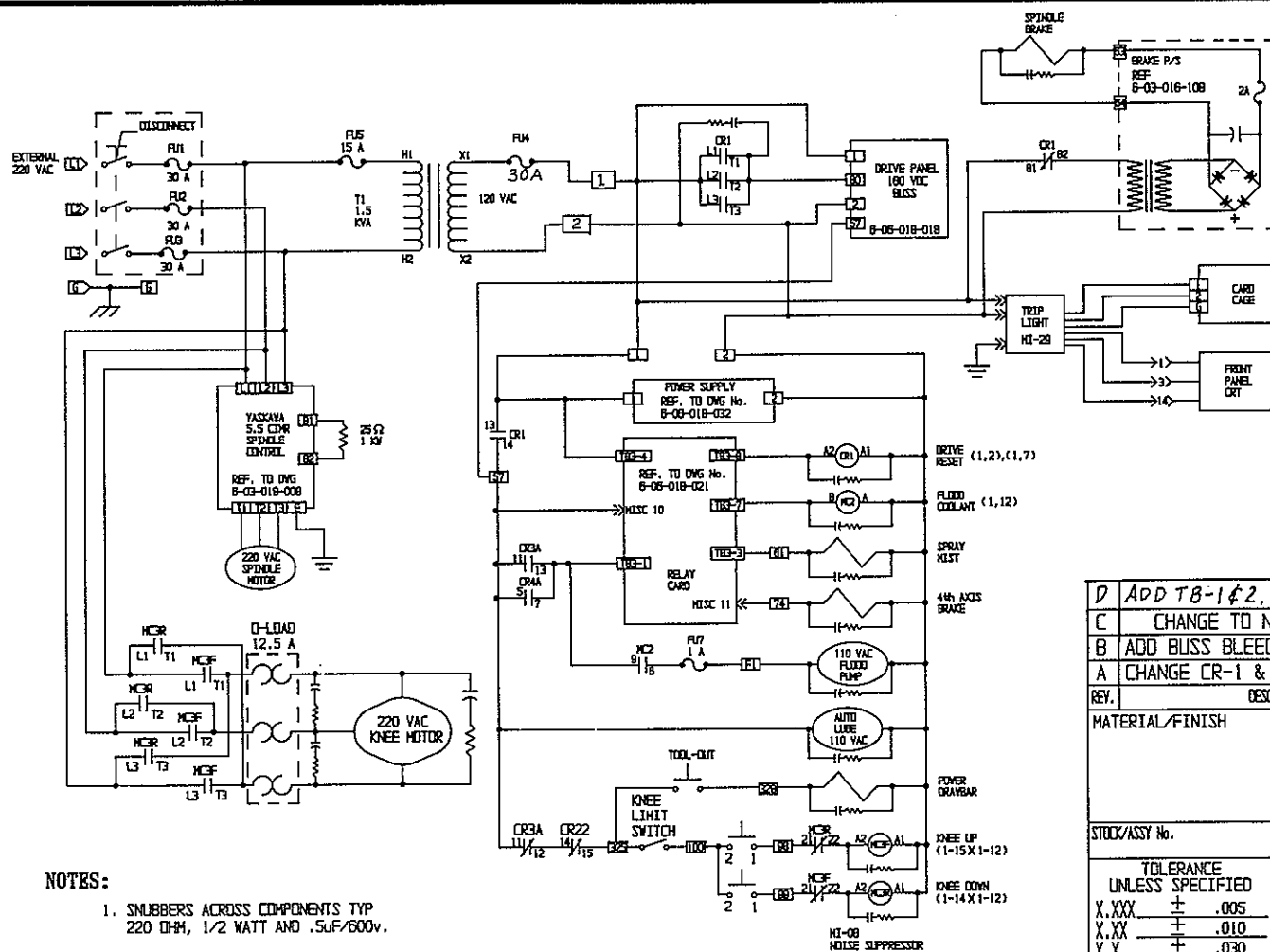
RELAYS

- | | |
|------------------------------------|--------------------------------|
| CR1. RESET | CR30. CW (AVANTI ATC) |
| CR1A. EXCESS ERROR | CR31. CCW (AVANTI ATC) |
| CR1B. DRIVE DISABLE | CR32. HOME (AVANTI ATC) |
| CR1C. DRIVE RESET | CR33. ZERO SPEED (AVANTI ATC) |
| CR2. TOOL CHANGE RESET | CR34. TOOL OUT (AVANTI ATC) |
| CR3. SPINDLE CLOCKWISE | CR35. TOOL IN (AVANTI ATC) |
| CR3A. SPINDLE CW YASKAWA | CR36. DISABLE ATC (AVANTI ATC) |
| CR4. SPINDLE COUNTERCLOCKWISE | CR64. 220 FOR AUTO LUBE |
| CR4A. SPINDLE CCW YASKAWA | MC1F. SPINDLE CW. (AC) |
| CR5. SPINDLE STOP | MC1R. SPINDLE CCW (AC) |
| CR5A. SPINDLE SAFETY | MC2. FLOOD COOLANT (AC) |
| CR7. SPRAY MIST | MC3F. POWER KNEE FORWARD |
| CR8. FLOOD COOLANT | (PARTNER V ONLY) |
| CR9. SPINDLE HI/LO | MC3R. POWER KNEE REVERSE |
| CR10. SPINDLE ENABLE | (PARTNER V ONLY) |
| CR10A. SPINDLE SAFETY | |
| CR11. AUXILIARY RELAY | |
| CR12. AUXILIARY RELAY | |
| CR22. DRAWBAR | |
| CR23. DRAWBAR (PARTNER I ATC) | |
| CR24. TOOL OUT/IN (PARTNER I ATC) | |
| CR25. CAROUSEL CW (PARTNER I ATC) | |
| CR26. CAROUSEL CCW (PARTNER I ATC) | |

A FORMERLY 6-04-015-102					
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE	
MATERIAL/FINISH		 MILLIRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317			
STOCK No.					
TOLERANCE UNLESS SPECIFIED		TITLE TERMINAL BLOCK DES.			
X.XXX ±		APPLICATION GENERAL PRODUCTS			
X.XX ±		SCALE 1:1		DRG NO. 6-04-018-019	SIZE B
X.X ±		DATE 14 MAY 90		DRAWN BY THOMPSON	SHEET NO. 1 OF 1
ANGLE ±					

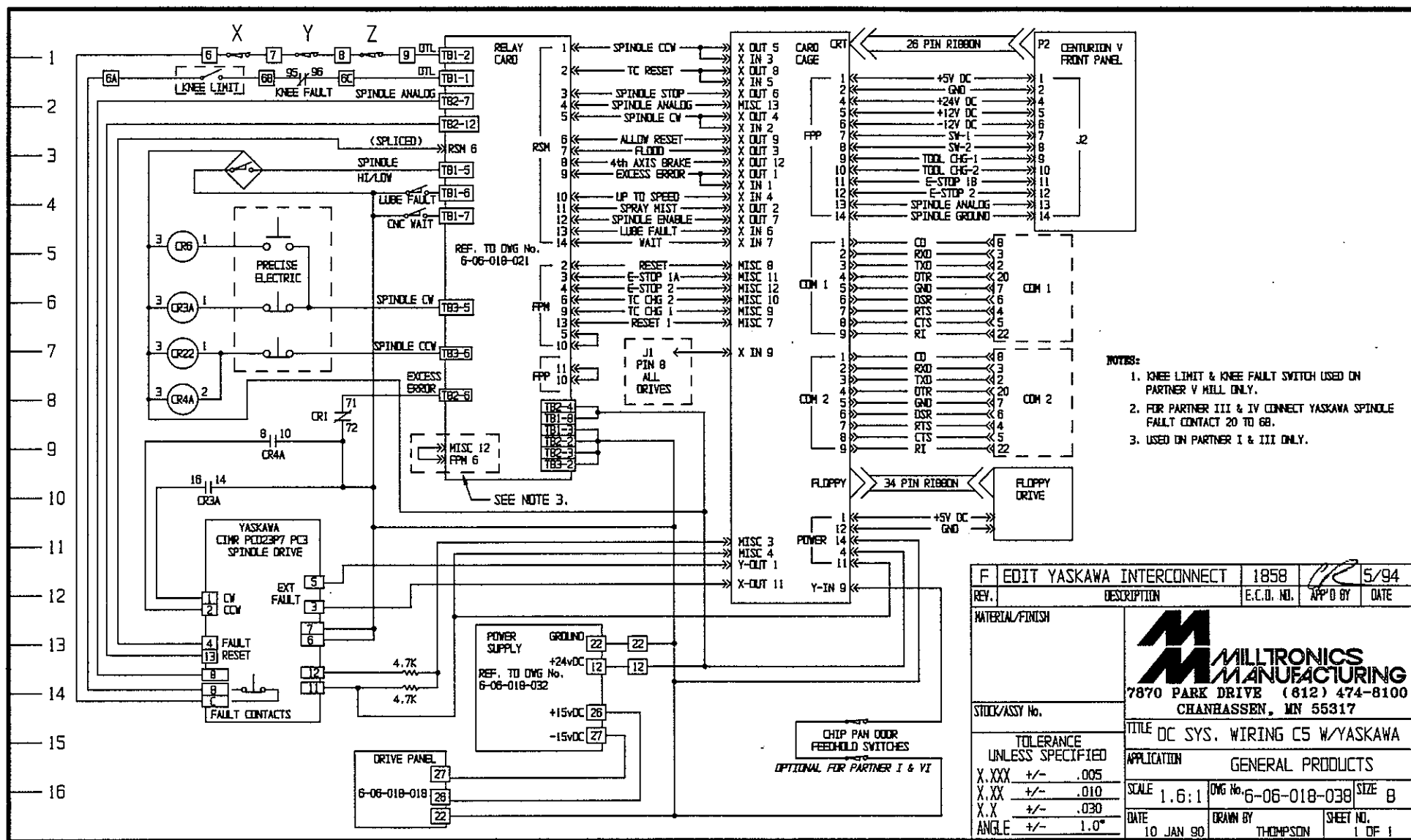


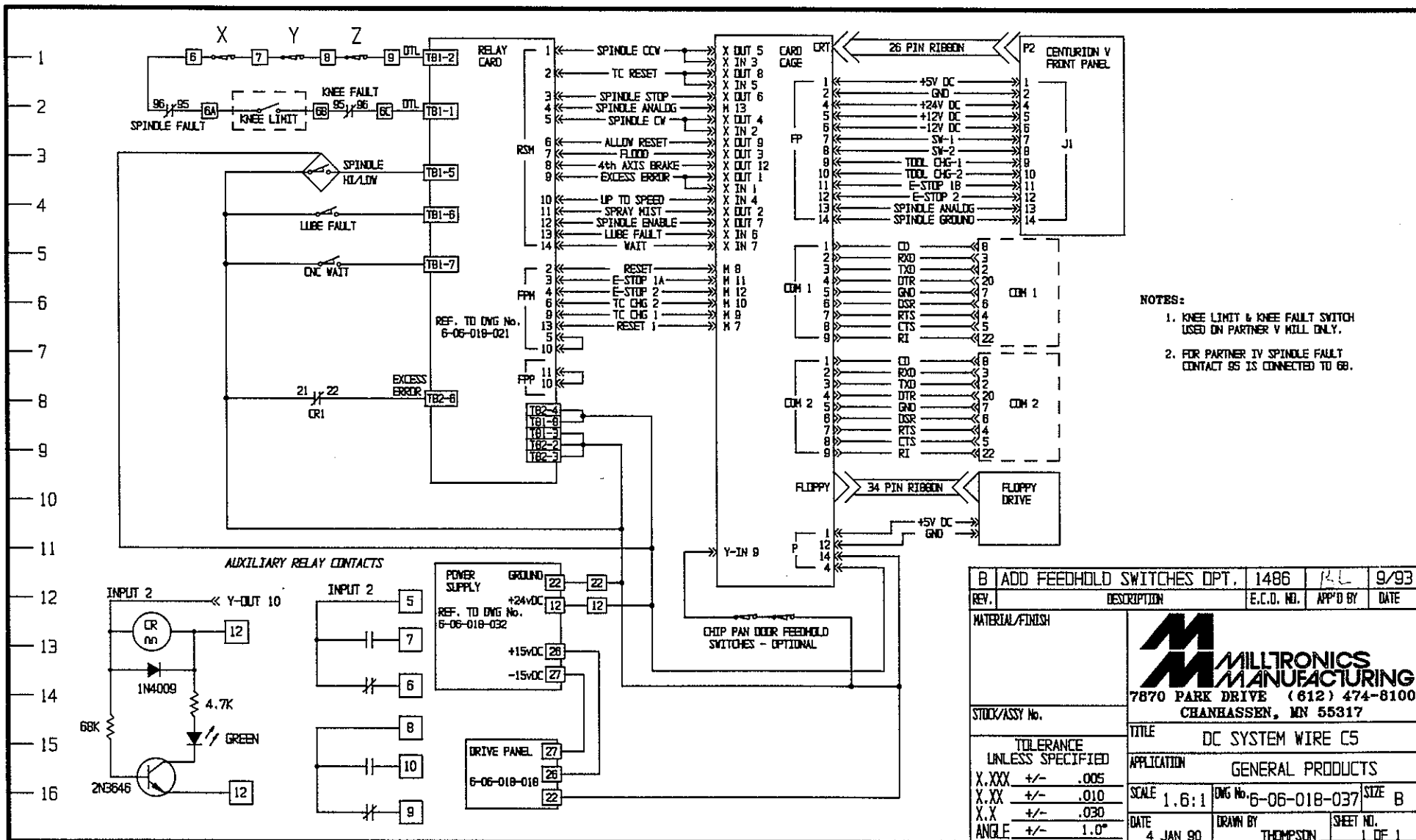
A REF. TO ECD PAPERWORK		304.	KRB	10/90
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLIRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.				
TOLERANCE UNLESS SPECIFIED		TITLE MOTOR/ENCODER INTERFACE C-5		
X.XXX ±		APPLICATION GENERAL PRODUCTS		
X.XX ±		SCALE 2:1	DWG NO. 6-06-018-035	SIZE B
X.X ±		DATE 2 JAN 90	DRAWN BY THOMPSON	SHEET NO. 1 OF 1
ANGLE ±				

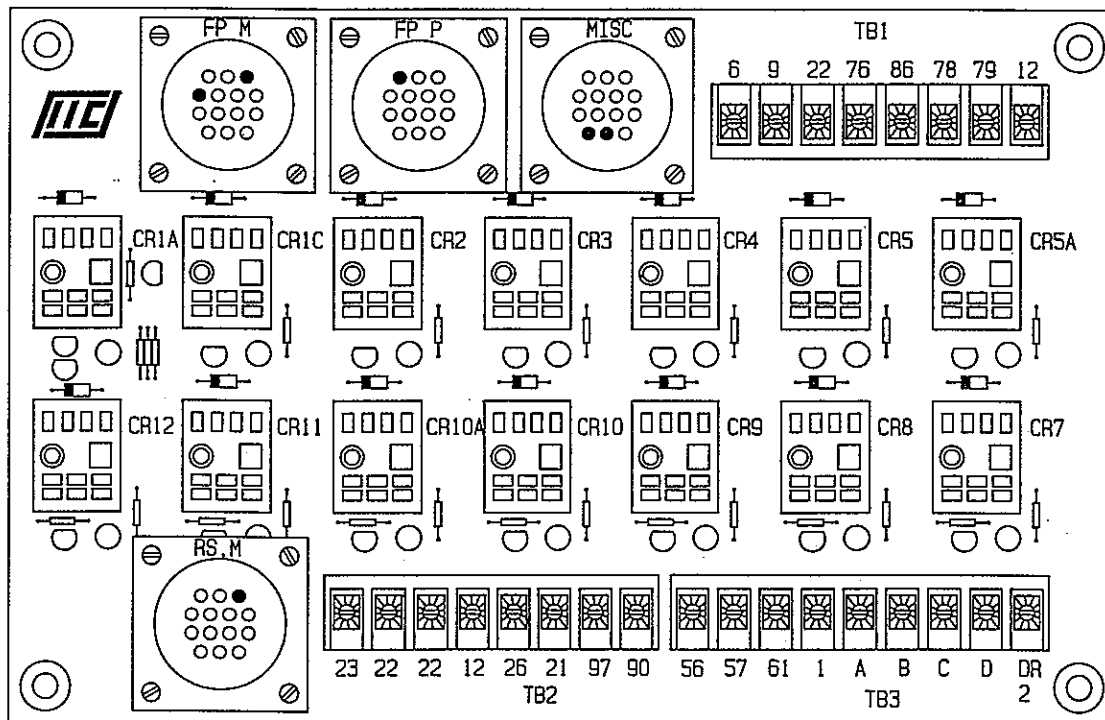


D	ADD TB-1 & 2, CHNG FU4	971	M.F.	10/92
C	CHANGE TO N/C CONTACT	915	M.F.	8/92
B	ADD BUSS BLEEDER	696	C.R.	1/92
A	CHANGE CR-1 & MISC-9	447	M.F.	3/91
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317				
STOCK/ASSY No.		TITLE		
TOLERANCE UNLESS SPECIFIED		AC SYSTEM WIRING CS W/YASKAWA		
APPLICATION		PARTNER V		
X.XXX ± .005		SCALE 1.5:1		DWG No. 6-06-016-107
X.XX ± .010		DATE 2 JAN 90		SIZE B
X.X ± .030		DRAWN BY THOMPSON		SHEET NO. 1 OF 1
ANGLE ± 1.0°				

MILLTRONICS MANUFACTURING
7870 PARK DRIVE (612) 474-8100
CHANHASSEN, MN 55317





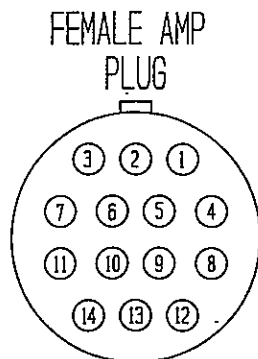


REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED			
	X.XXX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	SCALE 1:1	DWG NO. 6-03-018-000	SIZE B	
	DATE: 15 NOV 88	DRAWN BY REUTER	SHEET NO. 1 OF 1	

ITE INDUSTRIAL INFORMATION CONTROLS
 7870 PARK DRIVE (612-474-8100)
 CHARLASSON, MN 55317

TITLE: PC-REL-1B PANEL ASSY.

APPLICATION: GENERAL PRODUCTS



TERMINAL BLOCK

1	2	3	4	5	6	7	8
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T.B. 1

T.B. No.	FUNCTION	INT. DEST.
1 (6)	OVER TRAVEL LIMITS	CR5-4
2 (9)	OVER TRAVEL LIMITS	CR1A
3 (22)	GND	
4 (76)	+15V	
5 (86)	SPINDLE HI/LOW	
6 (78)	CNC AUTO LUBE	CR9
7 (79)	CNC WAIT CHANNEL	RSM-13
8 (12)	+24V	RSM-14

T.B. 2

T.B. No.	FUNCTION	INT. DEST.
1 (23)	+5V	
2 (22)	GND	
3 (22)	GND	
4 (12)	+24V	
5 (26)	+15V	
6 (21)	EXCESS ERROR	CR1A
7 (97)	SPINDLE ANALOG	RSM-4
8 (90)	AUTO SPEED	RSM-10

T.B. 3

T.B. No.	FUNCTION	INT. DEST.
1(56)	AC MAGNETICS	CR5-7
2(57)	AC MAGNETICS	CR7-9
3(61)	AC MAGNETICS	CR7-9
4(1)	AC MAGNETICS	CR1C-9
5(A)	AC MAGNETICS	CR3-10
6(B)	AC MAGNETICS	CR4-7
7(C)	AC MAGNETICS	CR8-7
8(D)	AC MAGNETICS	CR1C-10
9(CR2)	AC MAGNETICS	CR11-5

F.P.M.

PIN No.	FUNCTION	INT. DEST.
1	KEY	
2	RESET	CR1A-5
3	E STOP	FPW-2
4	E STOP	CR1C
5	SPINDLE STOP	CR2-6
6	TOOL CHANGE	CR2
7	KEY	
8	SPINDLE CCV	CR5-10
9	TOOL CHG RESET	RSM-2
10	SPINDLE STOP	RSM-3
11	COOLANT SPRAY	CR-7
12	SPINDLE CV	CR5-10
13	RESET	RSM-6
14	COOLANT FLOOD	CR8

F.P.P.

PIN No.	FUNCTION
1	+5VDC
2	+5V
3	KEY
4	GND
5	GND
6	GND
7	GND
8	+15V
9	+15V
10	SWITCHED 24V
11	24V
12	SPARE
13	SPARE
14	SPARE

MISC.

PIN No.	FUNCTION
1	CR 12-10
2	CR 12-8
3	CR 12-9
4	N/A
5	CR 12-7
6	CR 12-6
7	CR 12-5
8	SPARE
9	CR 11-8
10	CR 11-9
11	CR 11-10
12	CR 12 COIL
13	KEY
14	KEY

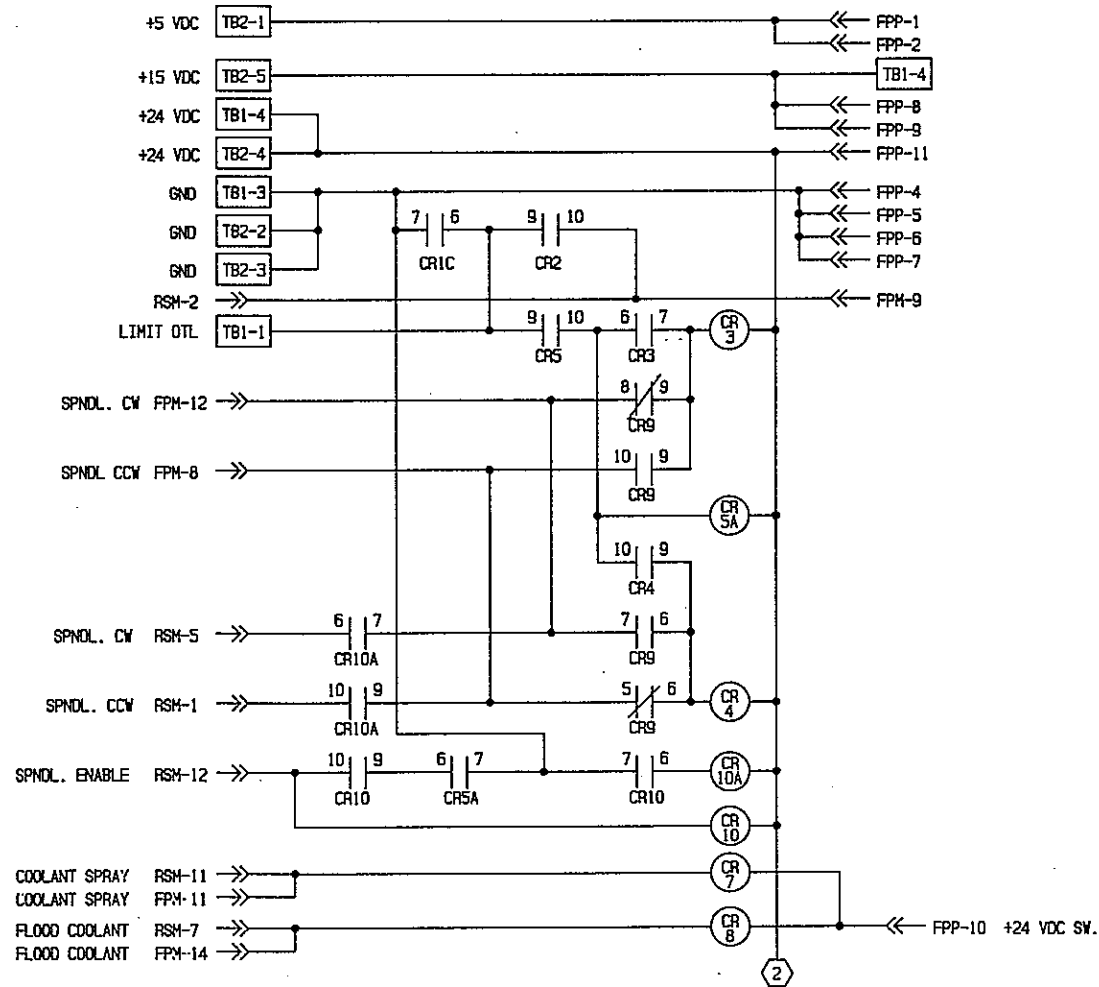
RSM (CNC)

PIN No.	FUNCTION	INT. DEST.
1	SPINDLE CCV	CR10A-10
2	TOOL CHG RESET	CR5-10
3	SPINDLE STOP	FPW-10
4	SPINDLE ANALOG	TB2-7
5	SPINDLE CV	CR10A-6
6	RESET ALLOW	FPW-13
7	COOLANT FLOOD	CR8
8	S-WORD DISABLE	CR11
9	EXCESS ERROR	TB2-6
10	UP TO SPEED	TB2-8
11	COOLANT SPRAY	CR7
12	SPINDLE ENABLE	CR5-10
13	LUBE FAULT	TB1-6
14	WAIT CHANNEL	TB1-14

NOTES:

1. TABLES REFERENCE
TO PC REL. 18 I/O
BOARD ONLY

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED X.XXX ± X.XX ± .01 X.X ± .02 ANGLE ± .01				
ITC INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHAMPAIGN, NY 55317 (612-474-8100)				
TITLE: PC REL. 18 I/O PLUG DEF.				
APPLICATION: GENERAL PRODUCTS				
MATERIAL/FINISH		SCALE 1:1		
DWG NO. 6-04-018-005		SIZE B		
DATE: 11 AUG 88		DRAWN BY: REUTER		SHEET NO. 1 OF 1



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED				
X.XXX	±	 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLASSER, NY 55317 (612-474-8100)		
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH		TITLE: PC-REL-1B SCHEMATIC APPLICATION: GENERAL PRODUCTS		
SCALE 1:1		DWG NO. 6-06-018-021		SIZE B
DATE: 6 MAR 89		DRAWN BY REUTER		SHEET NO. 1 OF 3

