

Partner 5D

Operations Manual

Milltronics Manufacturing Company
1400 Mill Lane
Waconia, MN 55387
952-442-1410

Upper Radial (6007) BG-03
Front sliding pulley (6011) BG-04
Front main pulley (6009) BG-05
Driving gear bearings (6910) BG-08

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

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

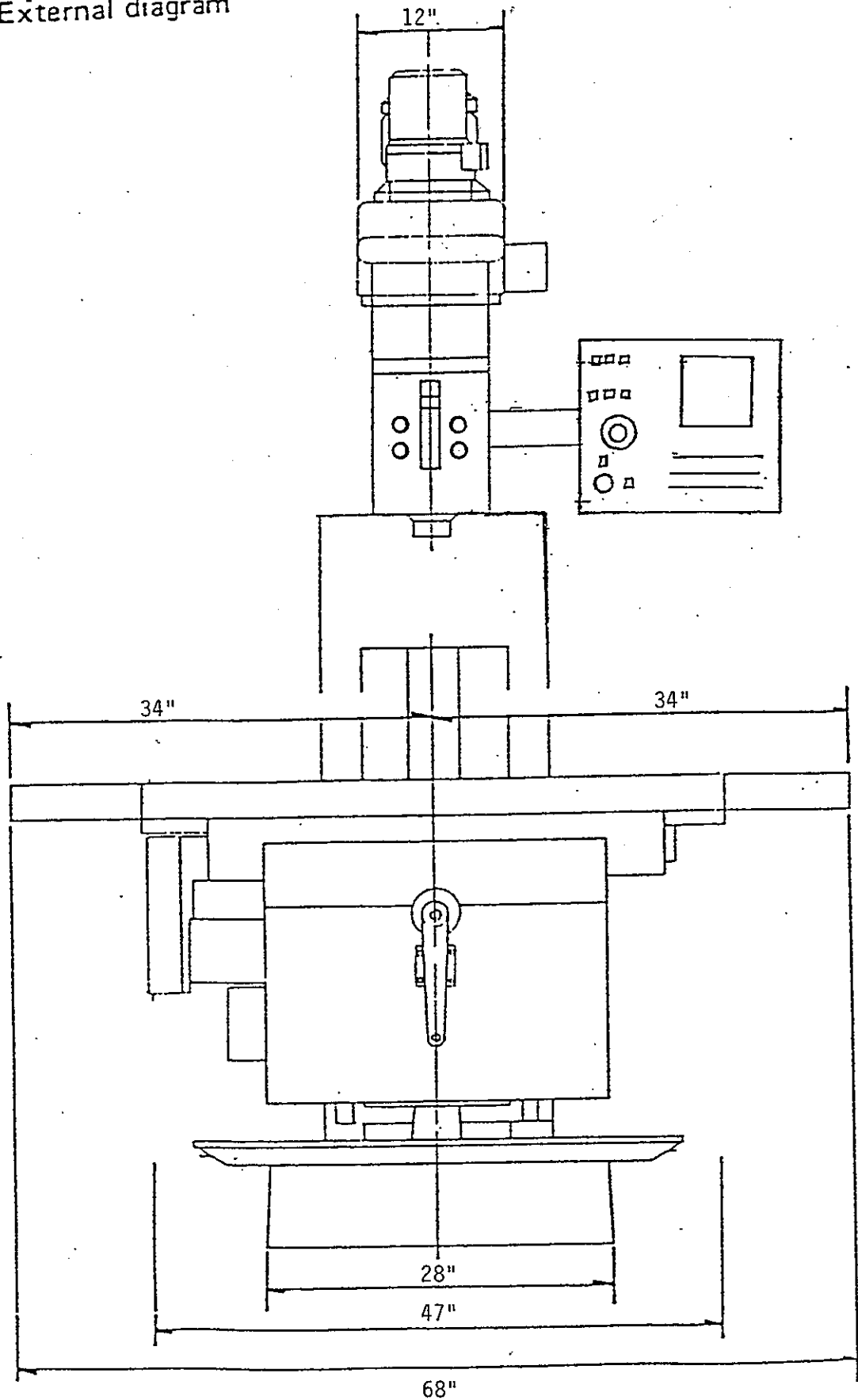
Electrical supply	60 Hz. 3 phase 220/230/440/460 V
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Color

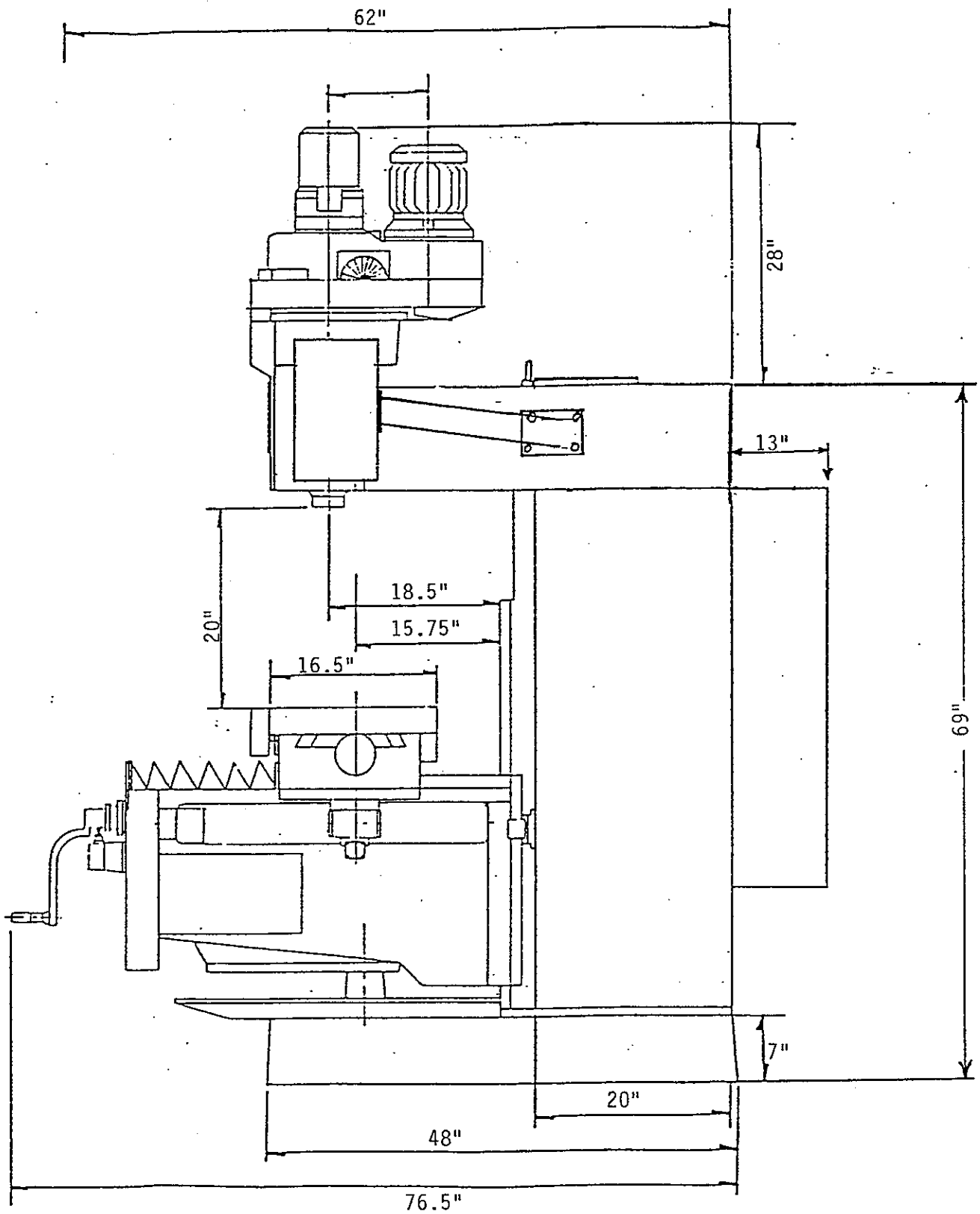
Standard	Gray
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PARTNER V

External diagram

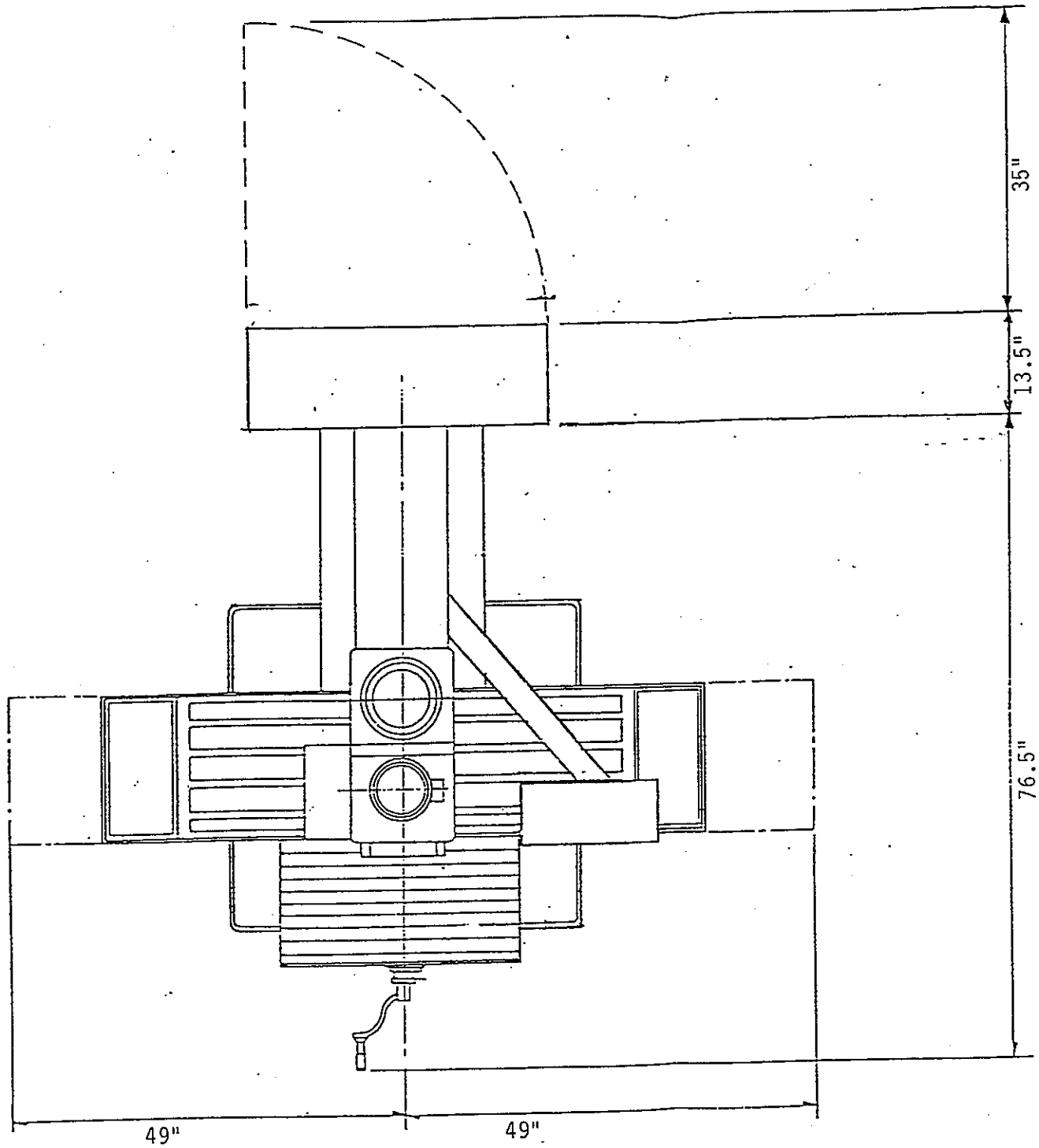


PARTNER V



EXTERNAL DIAGRAM

PARTNER V



FLOOR SPACE DIAGRAM

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.

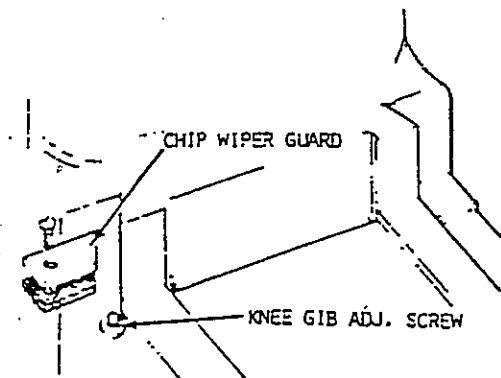


Figure 2. Knee-Column Gib

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.

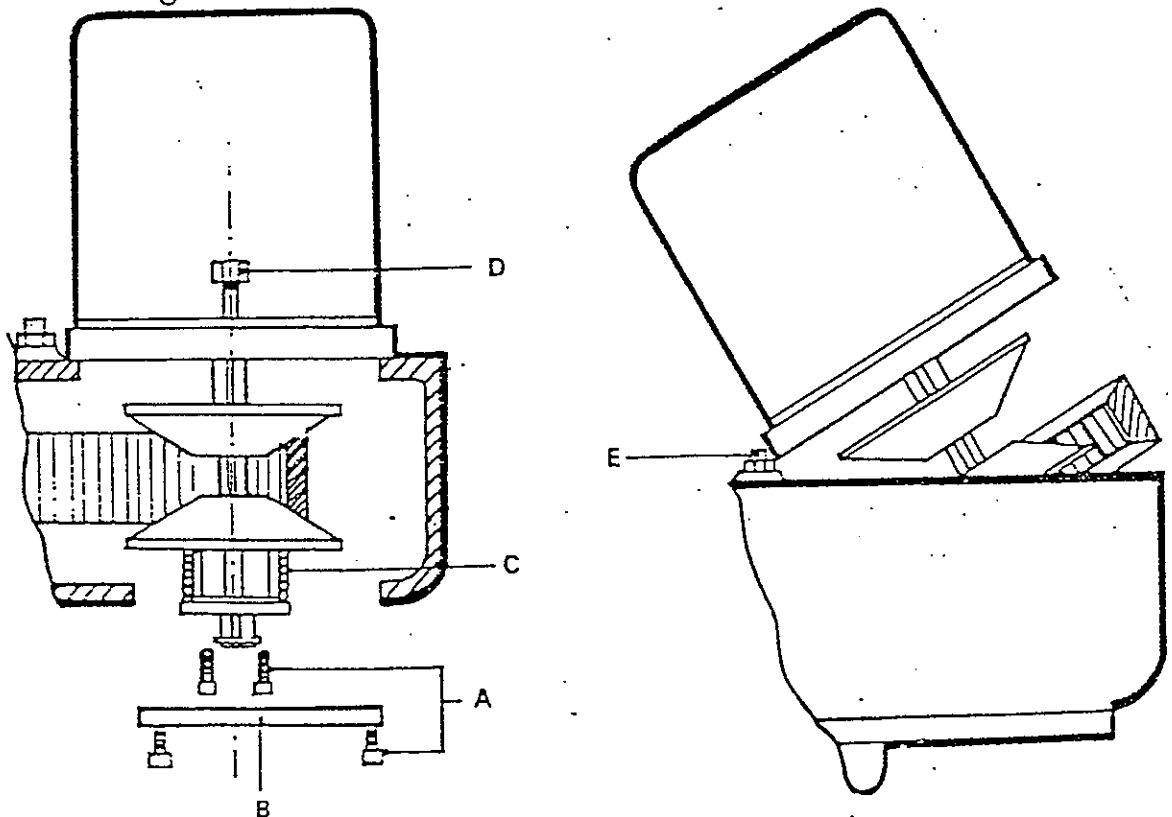


Figure 3. Removing the Motor (Side View)

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.

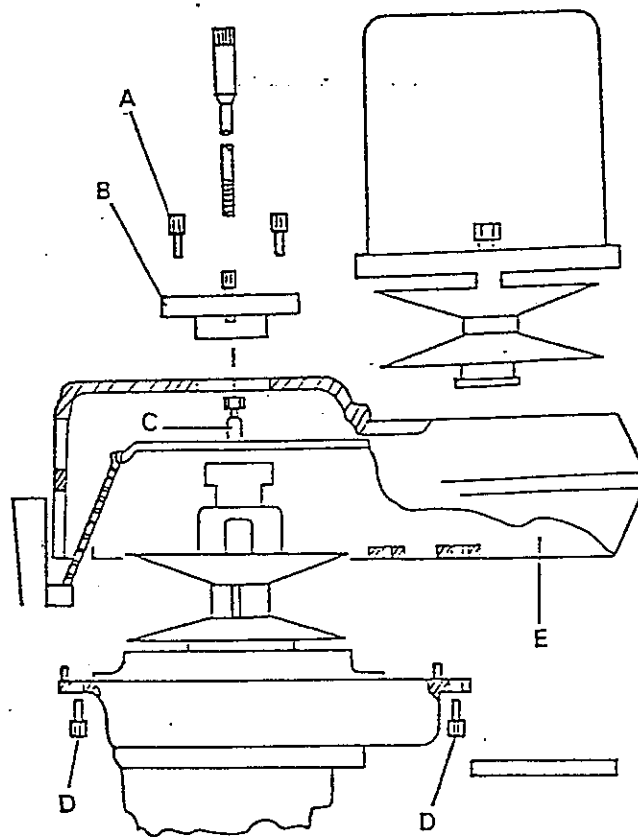


Figure 4. Removing the Vari-Drive Belt

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.

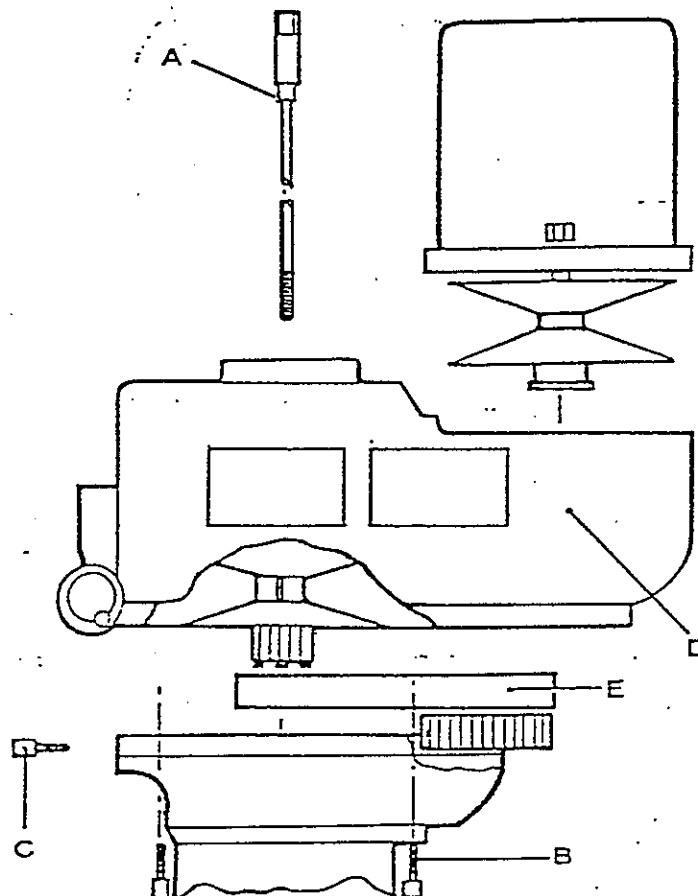


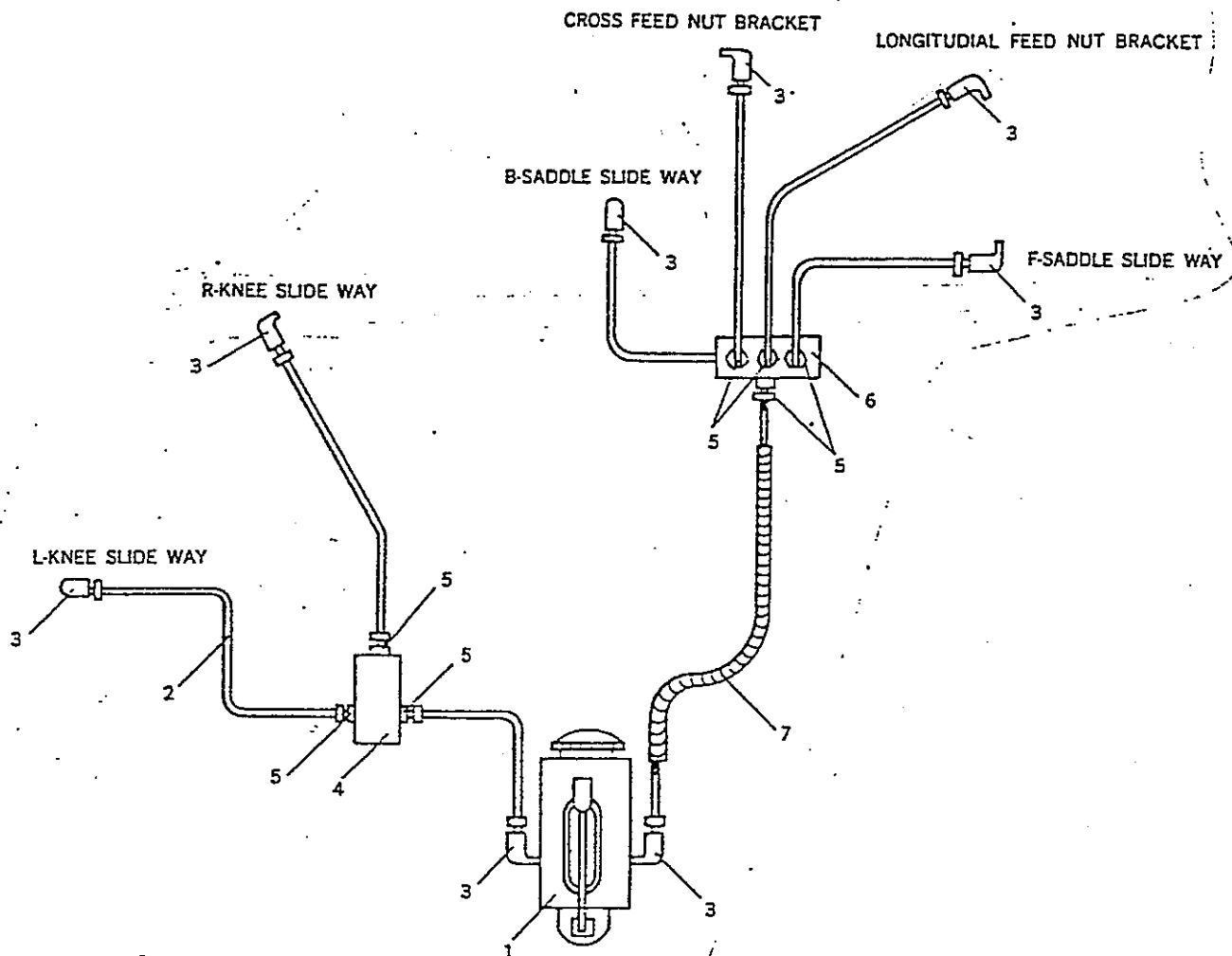
Figure 5. Removing Timing Belt

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

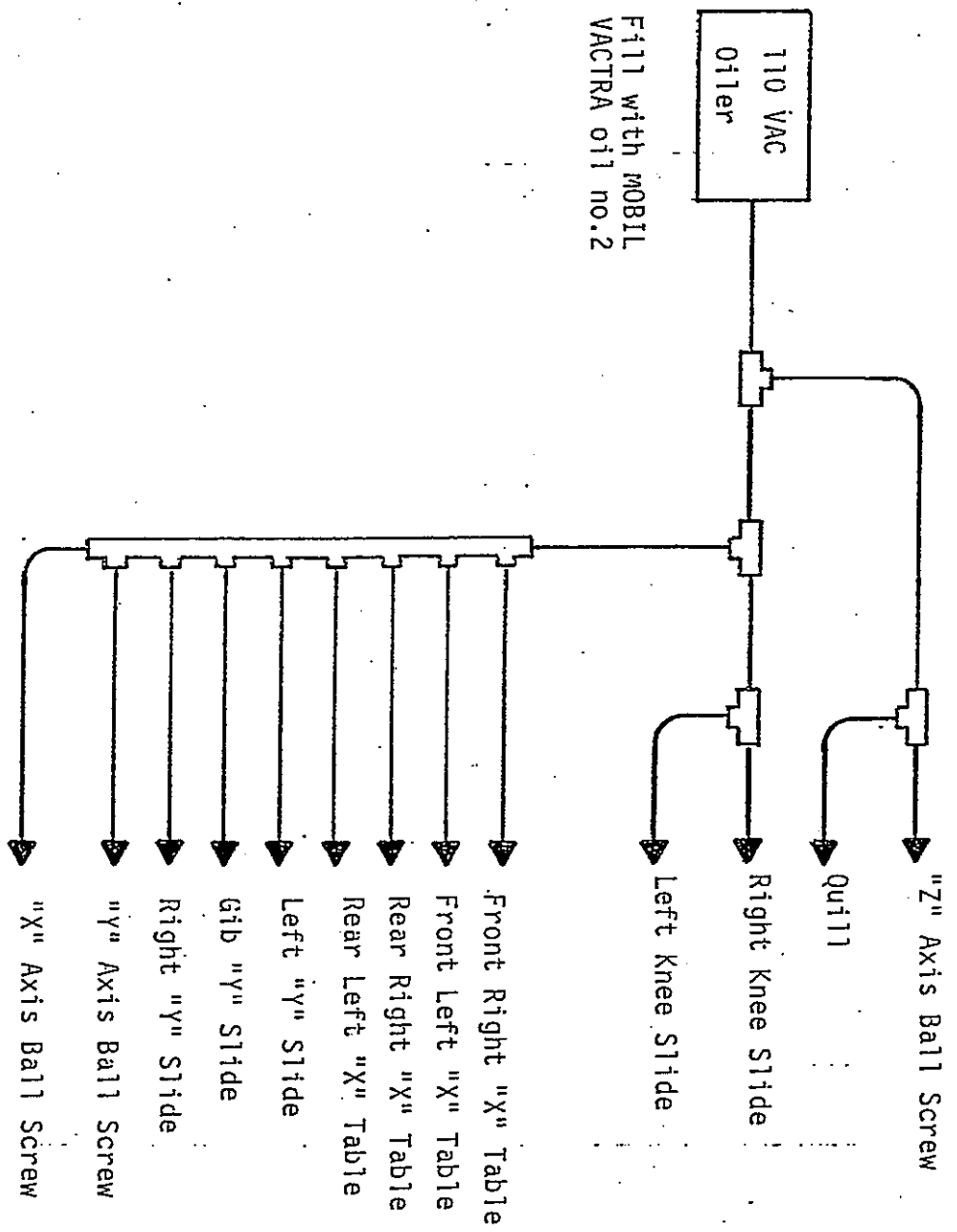
As the housings are being separated, the HTD belt (E) still connects them, resisting the separating movement. The separation can be assisted by gently pushing the belt off the large pulley as the upper housing is being raised.

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



WARNING

USE ONLY

MOBIL VACTRA no.2

AMOCO WAYTAC no.68

**SUNOCO SUNWAYLUBE no.1180
OR EQUIVALENT**

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	#25 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-OM 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	#16 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	#8 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 ϕ 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 ϕ 5 x 30 Taper Pin (1 Required)
 433 ϕ 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 ϕ 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 ϕ 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

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

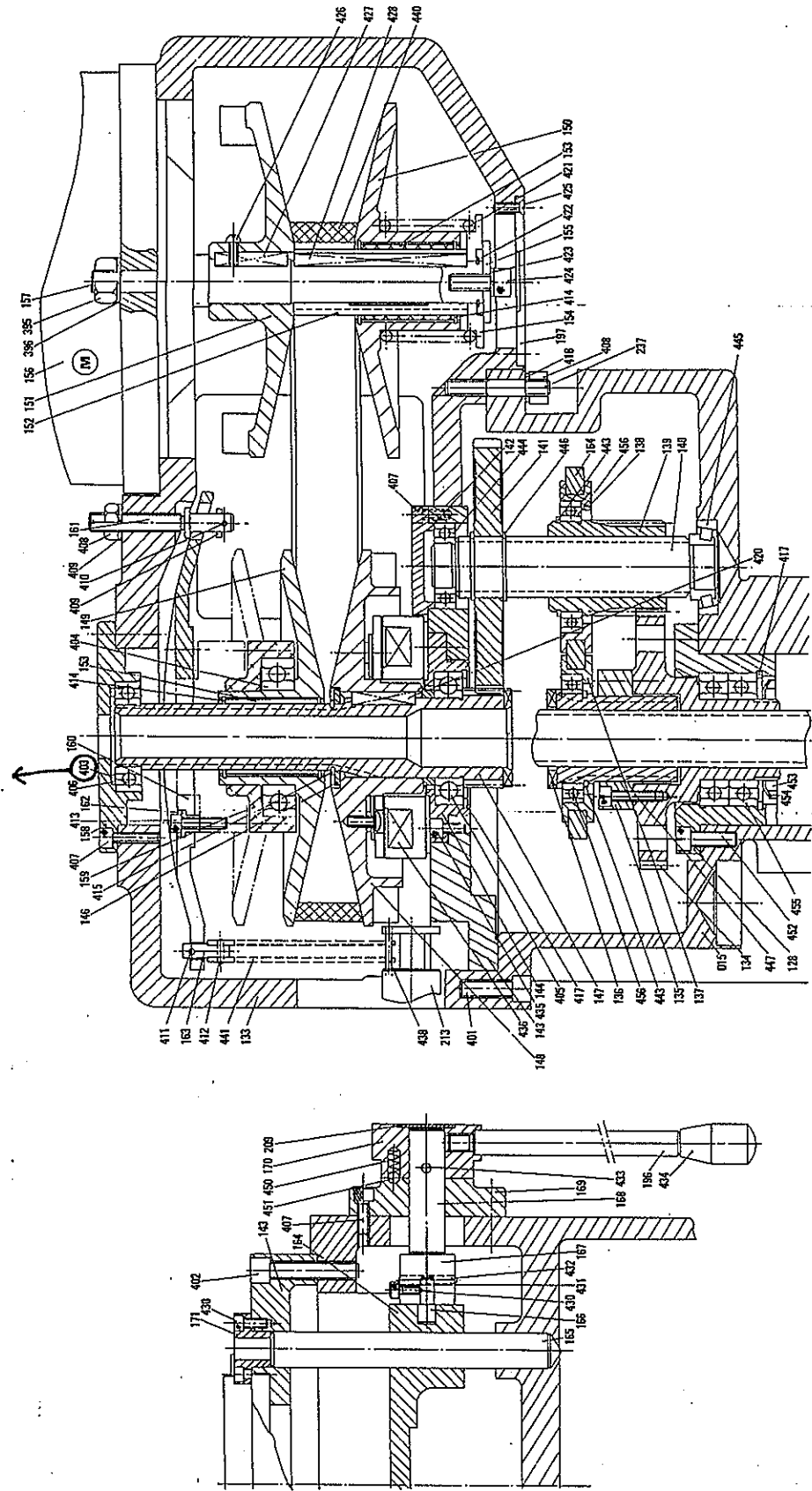
CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
110 VAC	3356 1KVA	H1-H2 110	X1-X2 68 X1-X3 72 X1-X4 79
220 VAC	3357 1KVA	H1-H2 220	X1-X2 68 X1-X3 72 X1-X4 79
(NOTE NEED TO JUMP H1 TO H3 & H2 TO H4)			
440 VAC	3357 1KVA	H2-H4 220	X1-X2 68 X1-X3 72 X1-X4 79
(NOTE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

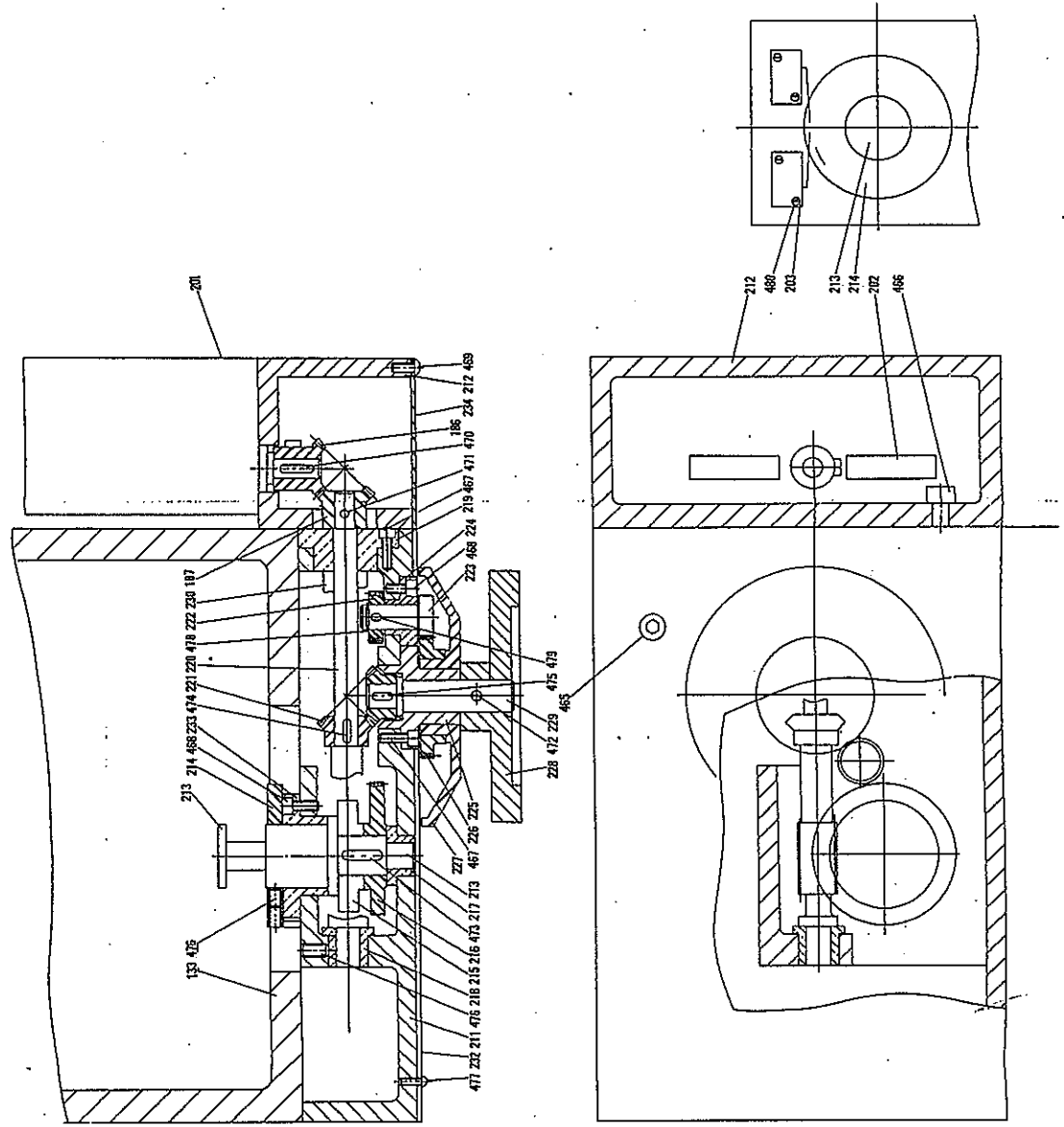
CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
208 VAC	3263 .5KVA	H1-H2 208	X1-X2 110
240 VAC	3263 .5KVA	H1-H3 240	X1-X2 110
480 VAC	3263 .5KVA	H1-H4 480	X1-X2 110

7-1 Belt Housing Assembly

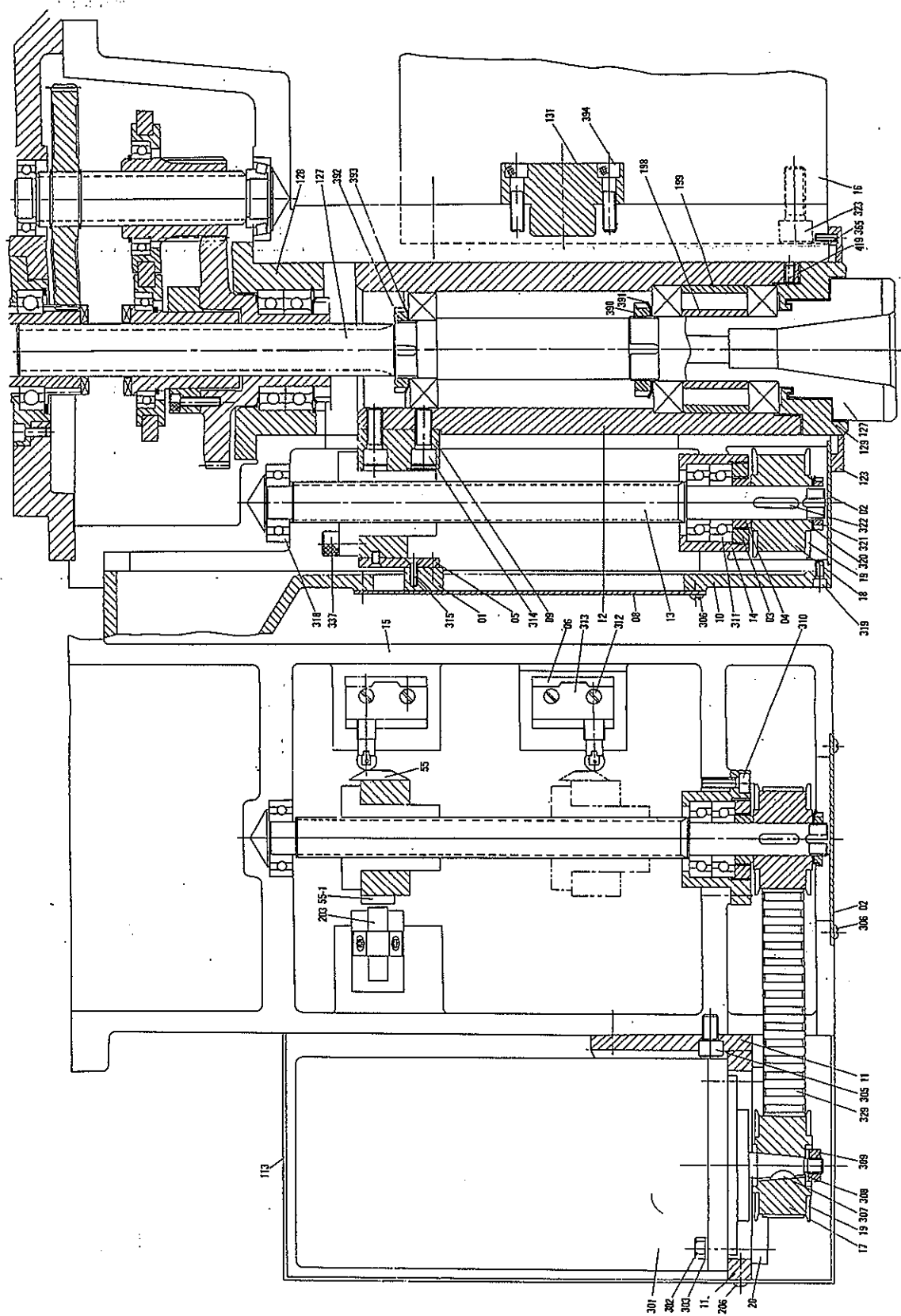
2 bearings: Thrust SKF 51107
Radial SKF 6007-22 or FAFNIR 9107 Kdd



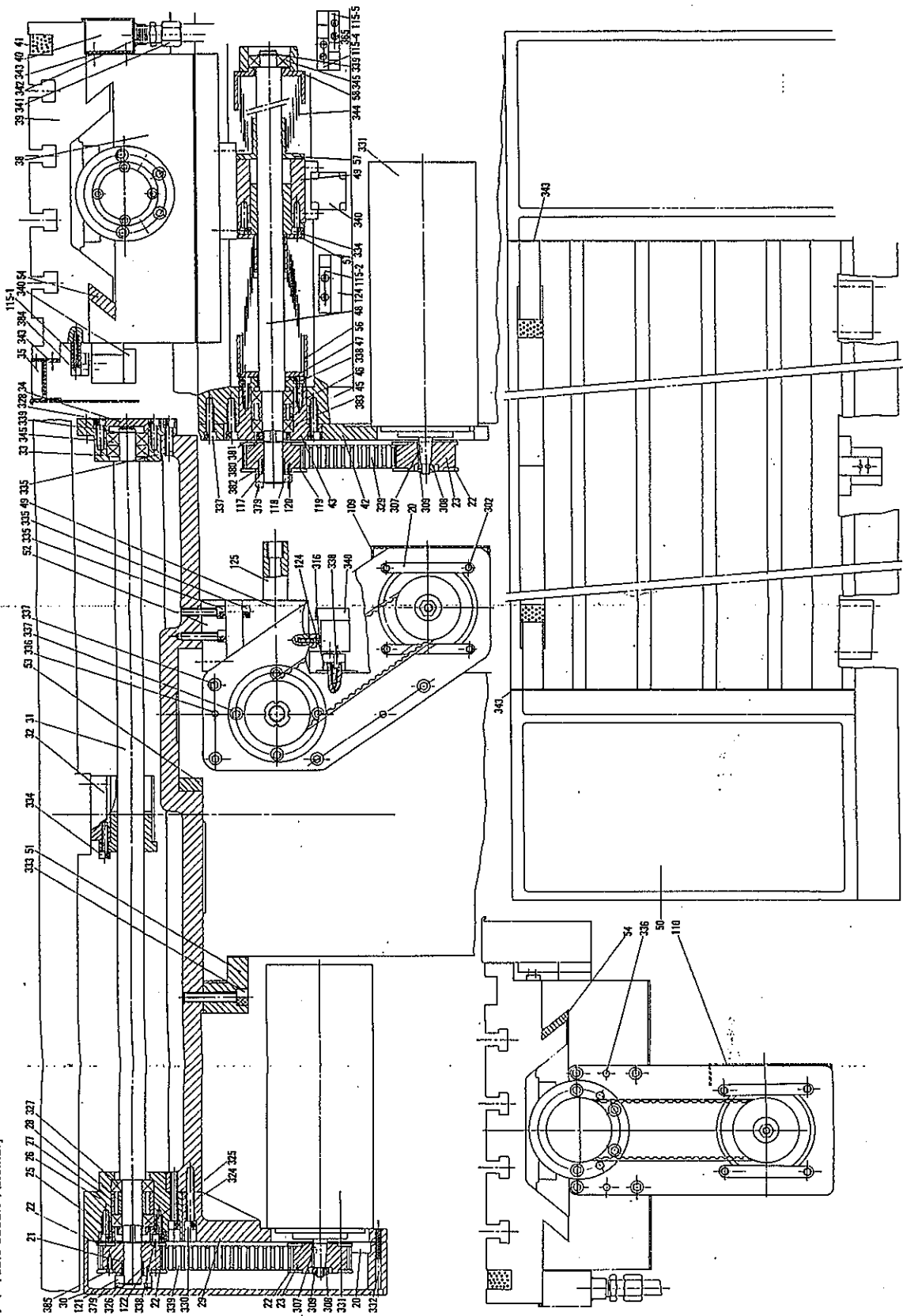
7-2 Speed Control Mechanism



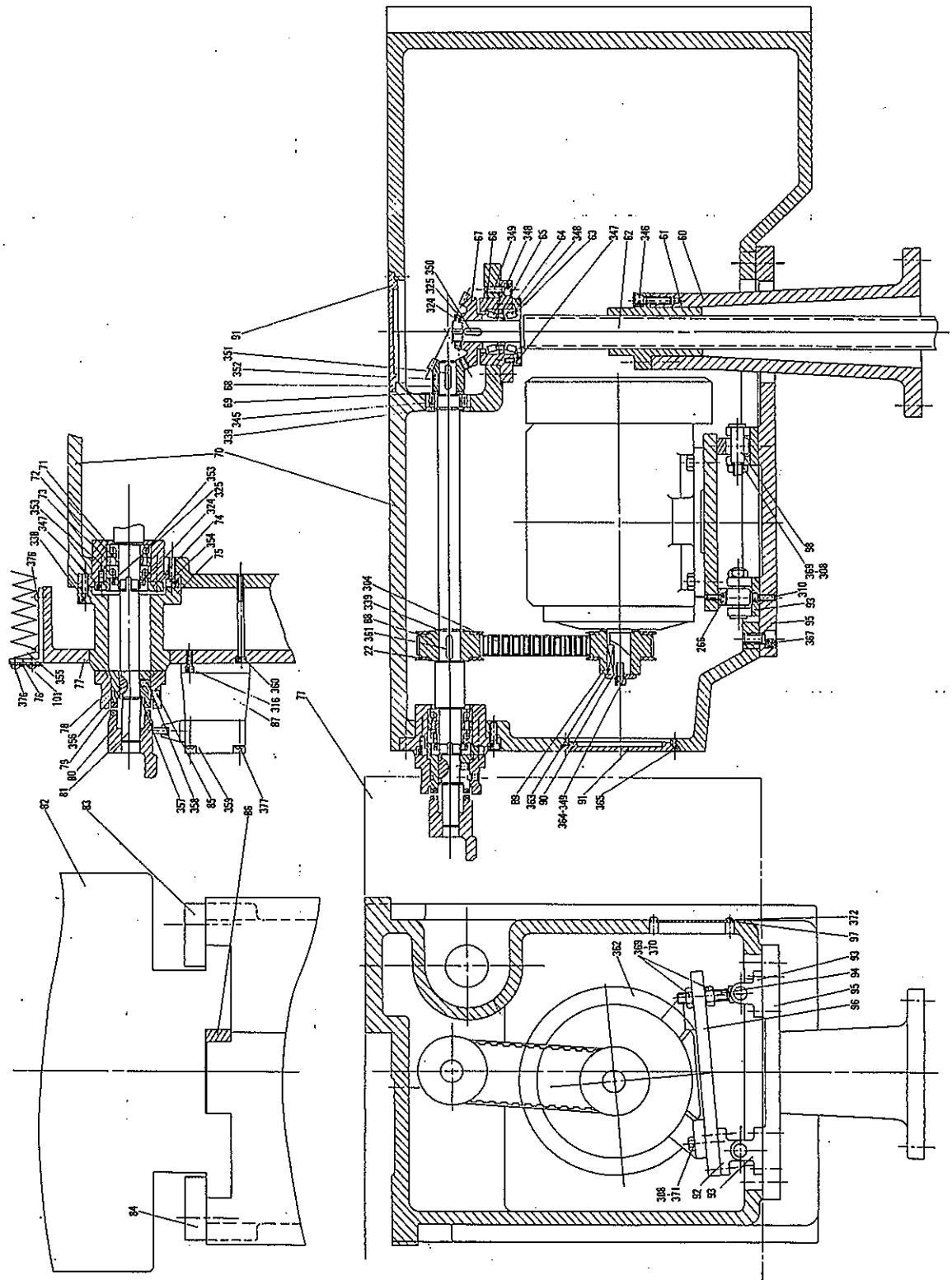
7-3 Head Assembly



7-4 Table Saddle Assembly



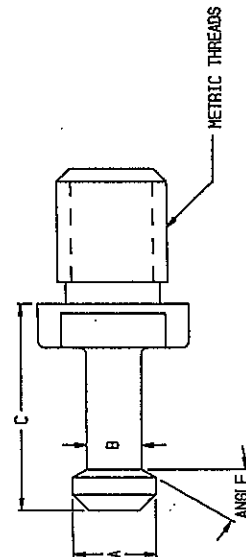
7-5 Knee Elevating Assembly



This technical drawing illustrates a mechanical assembly, likely a valve or actuator, through several views. The main view is a cross-section showing a central shaft (346) passing through a housing (38, 39). The shaft is connected to a lever arm (61) which is pivoted on a support (345). The lever arm is linked to a piston rod (100) that moves within a cylinder (375). The piston rod is connected to a piston (374) which is sealed against the cylinder wall (373). A return spring (59) is shown coiled around the piston rod. A control line (58) is connected to the lever arm. A detailed view of the lever arm and its pivot is shown in the upper left, with components labeled 59, 316, 340, 100, 83, and 70. Another detailed view of the piston and cylinder assembly is shown in the lower left, with components labeled 84, 70, 55, 372, 57, 426, 371, and 108. The drawing uses standard engineering conventions, including hatching for different materials and dashed lines for hidden internal features.

COMMAND RETENTION KNOBS
STYLE BT-FLANGE
JAPANESE

BT-FLANGE TAPER	PART NO.	DIMENSIONS			MILL TRONICS MACHINE
		A	B	C	
40	RB4M-0001	.59	.39	1.38	PARTNER VII
45	RB4M-0002	.75	.55	1.57	PARTNER IV & V
	RB5M-0001	.75	.55	1.57	PARTNER VII



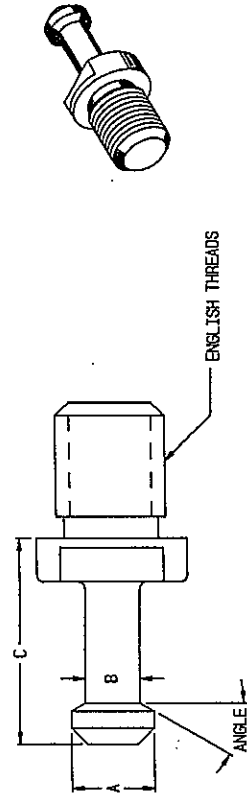
NOTES:
CORVAND CORPORATION
TEL: 1-(800)-328-2197
FAX: 1-(612)-755-1116

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	MATERIAL/FINISH			
	STOCK NO.			
	TOLERANCE UNLESS SPECIFIED			
	X.XXX	±		
	X.XX	±		
	X.X	±		
	ANGLE	±		
	TITLE	BT-FLANGE RETENTION KNOB		
	APPLICATION	GENERAL PRODUCTS		
	SCALE	1:1	DWG NO.	6-00-018-030
	DATE	1 FEB 89	DRAWN BY	REUTER
				SHEET NO. 1 OF 1

**MILL TRONICS
MANUFACTURING**
7870 PARK DRIVE (612) 474-8100
CHANDHASSEN, MN 55317

RETENTION KNOBS
STYLE V-FLANGE
JAPANESE

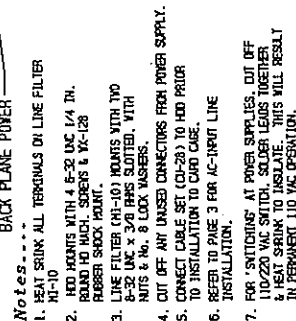
V-FLANGE TAPER	DIMENSIONS			MILL TRONICS MACHINE	COMMAND PART No.	KENMETAL PART No.	VALENITE PART No.
	A	B	C	ANGLE			
40	.59	.39	1.27	45°	RB4E-0001		
				60°	RB4E-0002	RK31114A	PT-532-60
30	DWG. No. 6-01-018-010			PARTNER III	MA-129--		



NOTES:

COMMAND CORPORATION
TEL: 1-800-328-2197
FAX: 1-612-755-1116
3D-TAPER RETENTION KNOB
IS A PRODUCT OF IIC/MILL TRONICS
REORDER PART No. MA-129

A	ADD PART #	49	M.F.	8/89
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		MILL TRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.		TITLE V-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XX ±		SCALE 1:1 DWG No. 6-00-018-031 SIZE B		
X.XX ±		DATE 1 FEB 89 DRAW BY REUTER SHEET No. 1 OF 1		
X.XX ±				
X.XX ±				

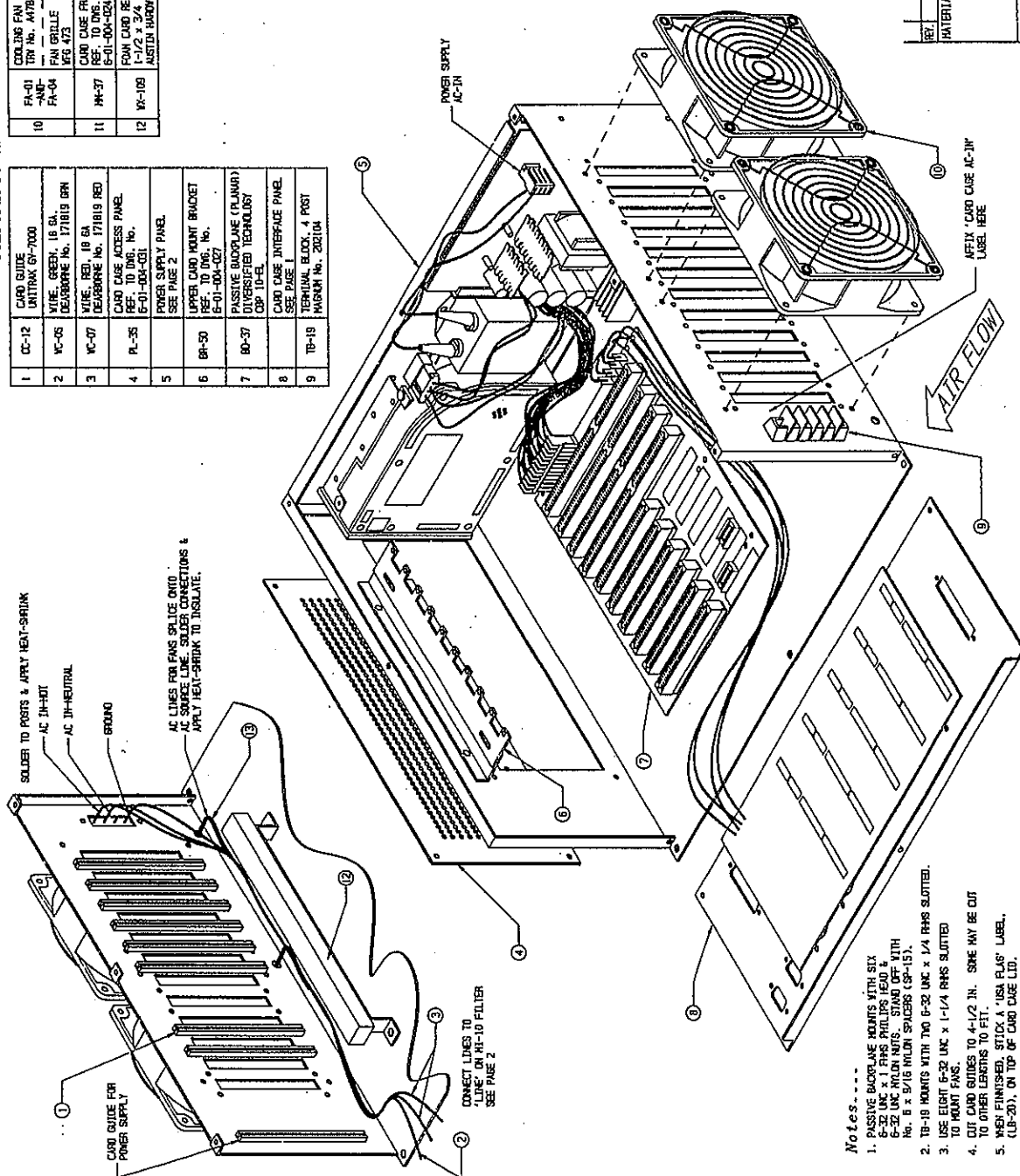


	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL / FINISH	 MILLIRONICS MANUFACTURING 7870 PARK DRIVE (S12) 474-8100 CHENNAWISSEN, MN 55517			
SUCTION IN.	TITLE CARD CAGE ELECTRONICS ASSY.			
UNLESS SPECIFIED	UNITED STATES V			
X COPY	SIZE	1, 25, 1	DATE	NOV 10 1964
X COPY	NO.	10-004-008	REUTER	C
X COPY	DATE	FEB 90	REUTER	1964
X COPY	DATE	FEB 90	REUTER	1964

10	FA-01 AND- FA-04	COOLING FAN TRY No. A47B15A15T3 -- -- -- FAN GRILLE CARG 473
11	HW-37	CARD CASE FRAME REF. TO DWS. No. 6-01-004-024
12	YK-109	FOAM CARD REST 1-1/2 x 3/4 ALUSTIN HARDWARE No. P8500

1	CC-12	CARD GUIDE UNITRAC 69-7000
2	VC-05	VINE, GREEN, 18 GA. DEBARRE No. 171819 GRN
3	VC-07	VINE, RED, 18 GA. DEBARRE No. 171819 RED
4	PL-35	CARD CASE ACCESS PANEL REF. TO DWG. No. 101-404-031
5		POWER SUPPLY PANEL SEE PAGE 2
6	BR-50	UPPER CARD MOUNT BRACKET No. 101-404-027
7	80-37	PASSIVE BLOCKING (RAMU)1 DIVERSIFIED TECHNOLOGY COP 10-EL
8		CARD CASE INTERFACE PANEL SEE PAGE 1
9	TB-19	TERMINAL BLOCK, 4 POST MARSHAL No. 2002104

10	FA-01 AND- FA-04	COOLING FAN TRY No. A47B15A15T3 -- -- -- FAN GRILLE CARG 473
11	HW-37	CARD CASE FRAME REF. TO DWS. No. 6-01-004-024
12	YK-109	FOAM CARD REST 1-1/2 x 3/4 ALSTIN HARDWARE No. P8500



1. POSITIVE BOURNE MOUNTS WITH SIX 6-32 UNC MOUNT NUTS STAND OFF WITH 1/4" SPACERS. (SEE DRAWING FOR PARTS LIST.)
2. TB-19 MOUNTS WITH TWO 6-32 UNC X 1/4" NUTS SLIDED IN TO MOUNT PANS.
3. USE EIGHT 6-32 UNC X 1-1/2" NUTS SLIDED TO MOUNT PANS.
4. CUT CARD GUIDES TO 4-1/2" IN. SOME MAY BE CUT TO OTHER LENGTHS TO FIT.
5. WHEN FINISHED, STICK A USA FLAG LABEL, (LIP-20), ON TOP OF CARD CASE.
6. USE WIRE TIES (W-01) TO TANGLES LOOSE WIRES IN THE CARD CASE.
7. LOADS MOUNT ON UPPER CARD MOUNT BRKT. WITH 6-32 UNC X 3/8" NUTS.
8. ACCESS PANEL, INTERFACE PANEL & LID MOUNT WITH 6-32 UNC NUTS.

[illegible]

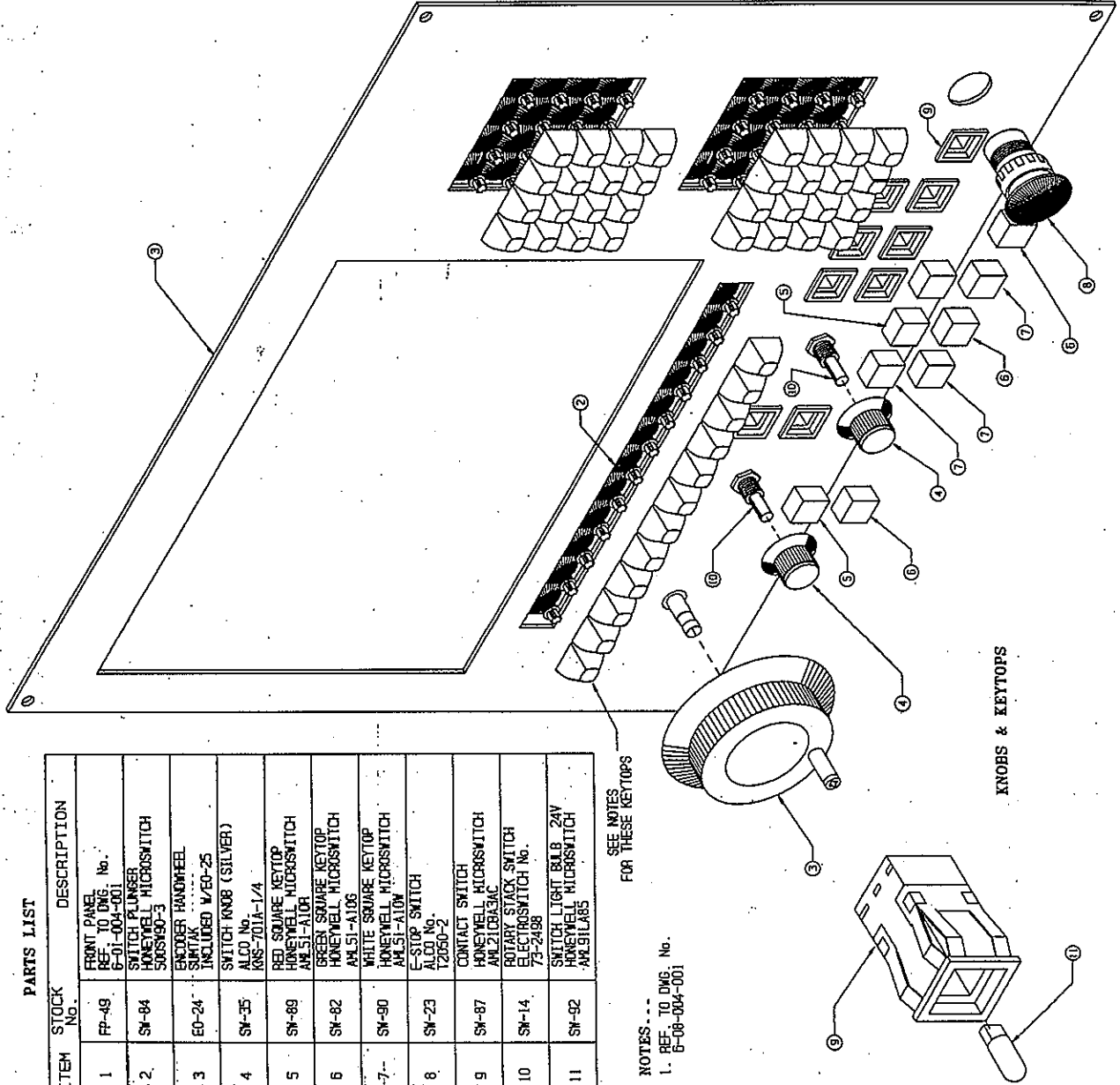
[illegible][illegible]

PARTS LIST

ITEM	STOCK No.	DESCRIPTION
1	FP-49	FRONT PANEL REF. TO DWG. No. 6-01-004-001
2	SW-84	SWITCH PLUNGER HONEYWELL MICROSWITCH SOSUNO-3
3	EO-24	ENCODER HANDWHEEL SMTAK INCLUDED W/EO-25
4	SW-35	SWITCH KNOB (SILVER) ALCO No. KMS-701A-1/4
5	SW-89	RED SQUARE KEYTOP HONEYWELL MICROSWITCH AMLS1-A1DR
6	SW-82	GREEN SQUARE KEYTOP HONEYWELL MICROSWITCH AMLS1-A1DG
7	SW-90	WHITE SQUARE KEYTOP HONEYWELL MICROSWITCH AMLS1-A1DW
8	SW-23	E-STOP SWITCH ALCO No. T2050-2
9	SW-87	CONTACT SWITCH HONEYWELL MICROSWITCH AMLS1-03AC
10	SW-14	ROTARY SWITCH ELECTROSWITCH No. 75-2408
11	SW-92	SWITCH LIGHT BULB 24V HONEYWELL MICROSWITCH AMLS1A85

NOTES...
1. REF. TO DWG. No.
6-00-004-001

SEE NOTES
FOR THESE KEYTOPS



KNOBS & KEYTOPS

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	MATERIAL/FINISH			
MILLERONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHASSISSEY, MN 55517				
TITLE: FRONT PANEL SW. & CONT. PART PARTITION: CENTURION V SCALE: 1.5:1 DATE: 20 SEP 85 DRAWN BY: REUTER CHECKED BY: JF				
STOCK No. UNLESS SPECIFIED ALL DIMENSIONS IN INCHES DECIMALS FRACTIONS TOLERANCES UNLESS SPECIFIED				

ITEM	STOCK NO.	DESCRIPTION
1	FR-49	GENIE 100 FRONT PANEL P-41 100-001 No.
2	BO-40	P-4000-01 P.C. BOARD P-407 100-001 No.
3		GENIE RETARD ASST. P-407 100-006 No.
4	SW-73	P-400-00-00 IN. REL STANDOFF FEMALE/FEMALE
5	SW-23	1-STOP SWITCH P-407 100-2210 12069-2
6	SW-29	5-STOP CONTACT BLOCK, V/C A/C NO. V-40
7	SW-67	ON/OFF SWITCH (LEVER) P-407 100-0001 JW-21233AC
8	BO-34	P-400-01 P.C. BOARD P-407 100-006 No.
9	SW-14	STACK POLE ROTARY SWITCH ELECTRIFICATION No. 73-2009
10	EO-25	5-STOP-3 ENCLOSURE P-407 100-51-L
11		P-407 RETARD ASST. P-407 100-006 No.



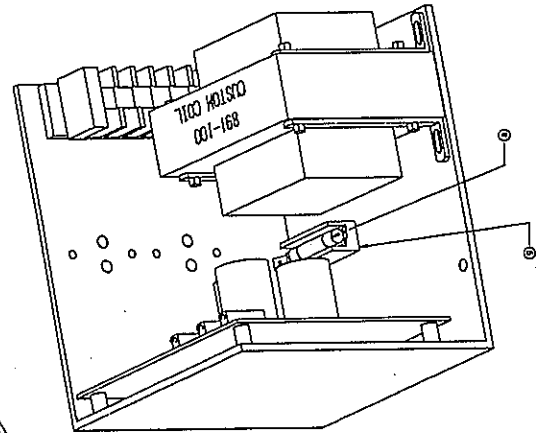
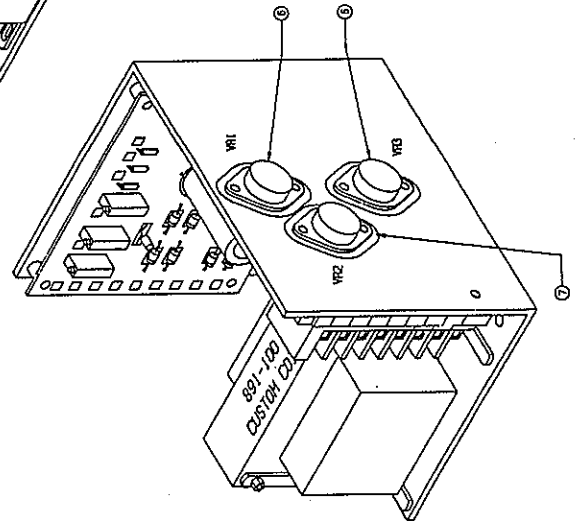
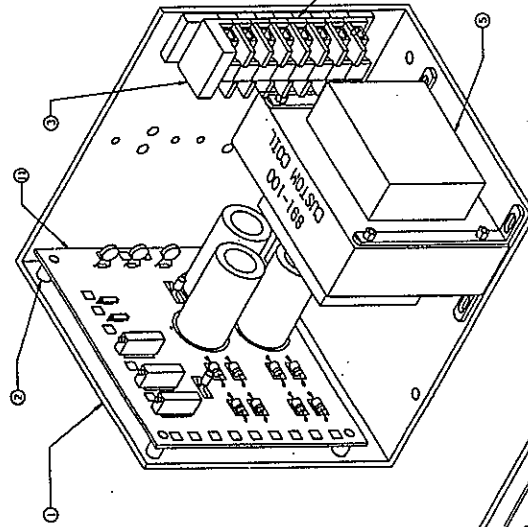
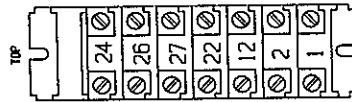
1. 26 PIN MALE RIBBON CABLE CONNECTORS MOUNTED ON PC-15x15-01 UNDER KEYBOARD ENCODER CARDS ARE KEYBOARD MATRIX/P4.

REV.	DESCRIPTION	E.C.D. NO.	PPT'D BY	DATE
MATERIAL FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANDLER, MN 55317		
STCK NO.	IN BLANK UNLESS SPECIFIED	TITLE FNT PANEL SW. & CONT. REV.		
X-107	+	MILLTRONIC CENTURION V		
X-108	+	SOLE, 1, 5:1	NO. 10, 6-10-004-002	SIZE C
X-109	+	DATE NOV 83	DRWN BY	REITER
X-110	+	27	NOV 83	1 OF 1
ANGLE	+			

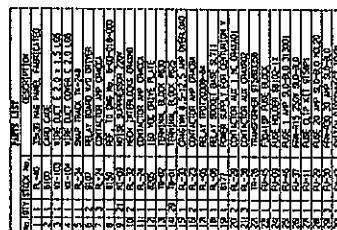
-PARTS LIST-

ITEM/STOCK No.	DESCRIPTION
1	81-57
2	81-58
3	81-59
4	81-60
5	81-61
6	81-62
7	81-63
8	81-64
9	81-65
10	81-66
11	81-67

Notes:-
 1. 81-57 HANTS WITH FOUR 8-32 UNC x 5/8 RHS
 2. TERMINAL BLOCKS HANTS WITH TWO 8-32 UNC x 1/4 RHS
 3. TRANSFORMER HANTS WITH TWO 8-32 UNC x 1/4 RHS
 4. 81-58 HANTS WITH TWO 8-32 UNC x 1/4 RHS & 81-59 HANTS
 5. RISE CLIP HANTS WITH ONE 8-32 UNC x 1/4 RHS



REV.	DESCRIPTION	E.C.D. NO.	APPROVED	DATE
1	MATERIAL FINISH			
MILITRONICS MANUFACTURING 7670 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317				
TITLE: 15/24PS-01 ASSY.				
UNLESS SPECIFIED				
WELDON GENERAL PRODUCTS				
SCALE 1.5:1 DRAWING 10-018-003 SIZE C				
DATE 28 MAR 90 DRAWN BY REUTER SHEET NO. 1 OF 2				



- NOTES:**
1. INDUCTION AND DRIVE FOR 4TH AXIS OPTION.
 2. BRAKE AND KICK FOR PARTNER V HILL ONLY.
 3. CONTROL RELAYS FOR AC SPINDLE INVERTER.
 4. MAGNETIC STARTER FOR STANDARD SPINDLE CONFIGURATION.

[illegible]

PROCEDURE TO CHANGE YASKAWA PARAMETERS

1. Depress DRIVE/PRG to select program mode. (Drive light turns off.)
2. Depress FWD/REV/MODE to select system constant (Sn) or control constant (Cn).
3. RESET moves flashing digit to appropriate digit to be changed.
4. ^ changes digit from zero thru nine.
5. Depress RUN/DATA 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 STOP/SET key to temporarily store changed data.
9. Depress JOB/NO. to indicate constant, that internal data was changed.
10. Depress DSPL/ENTR to store data; should display "END".
11. GOTO Step 2.
12. If finished depress DRIVE/PRG; remote light should come on.

PARTNER V YASKAWA SPINDLE PARAMETERS

29-Jan-91

SYSTEM CONSTANT	FUNCTION	PARAMETER VALUE
--------------------	----------	--------------------

SN-01	KVA SELECTION	04
SN-02	V/F PATTERN SELECTION	0F
SN-03	OPERATOR STATUS	1010
SN-04	OPERATION SIGNAL SELECTION	0000
SN-05	PROTECTION CHARACTERISTICS	0000
SN-06	OVERTORQUE DETECTION	0000
SN-07	OPTIONAL FUNCTION SELECTION	0000
SN-08	EXTERNAL TERMINAL 5	00
SN-09	EXTERNAL TERMINAL 6	03
SN-10	EXTERNAL TERMINAL 7	05
SN-11	EXTERNAL TERMINAL 8	06
SN-12	CONTACT OUTPUT 9,10	02

CONTROL CONSTANT	FUNCTION	PARAMETER VALUE
---------------------	----------	--------------------

CN-01	MAX FREQUENCY (F MAX)	190.0
CN-02	MAX VOLTAGE (V MAX)	200.0
CN-03	MAX VOLTAGE FREQUENCY (F A)	060.0
CN-04	V/F CONSTANT (F B)	003.0
CN-05	V/F CONSTANT (V C)	013.0
CN-06	MIN OUTOUT FREQUENCY (F MIN)	001.5
CN-07	MIN OUTPUT FREQ. VOLTAGE (V MIN)	007.0
CN-08	ACCELERATION TIME	0001.0
CN-09	DECELERATION TIME	0001.5
CN-10	DC BRAKING VOLTAGE	020.0
CN-11	DC BRAKING TIME AT STOP	000.5
CN-12	DC BRAKING TIME AT START	00.0
CN-13	FREQUENCY COMMAND GAIN	1.00
CN-14	FREQUENCY COMMAND BIAS	00.0
CN-15	FREQUENCY COMMAND UPPER LIMIT	100
CN-16	FREQUENCY COMMAND LOWER LIMIT	000
CN-17	SETTING PROHIBITED FREQUENCY 1	000.0
CN-18	SETTING PROHIBITED FREQUENCY 2	000.0
CN-19	SETTING PROHIBITED FREQUENCY 3	000.0
CN-20	MOTOR RATED CURRENT	014.0
CN-21	CARRIER FREQUENCY LOWER	0380
CN-22	TORQUE COMPENSATION GAIN	2.5
CN-23	OVER TORQUE DETECTING LEVEL	160
CN-24	FREQUENCY MONITOR GAIN	1.00
CN-25	CURRENT MONITOR GAIN	1.00
CN-26	INCHING FREQUENCY	006.0
CN-27	FREQ. COMMAND 1 FOR MULTI-STEP RUN	000.0
CN-28	FREQ. COMMAND 2 FOR MULTI-STEP RUN	000.0
CN-29	ACCEL/DECEL TIME	010.0
CN-30	SAVE ENERGY GAIN	080

CONTROL
STATUS

FUNCTION

PARAMETER
VALUE

ON-01	DISABLE AUTOMATIC CARRIER FREQ.	0040
ON-19	MIN. OUTPUT FREQ. FOR MAX. CARRIER	020.0
ON-20	MAX. OUTPUT FREQ. FOR MIN. CARRIER	004.0

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		OUT. 12	4TH AXIS BRAKE
		(Set M-10, Clear M-11)		
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

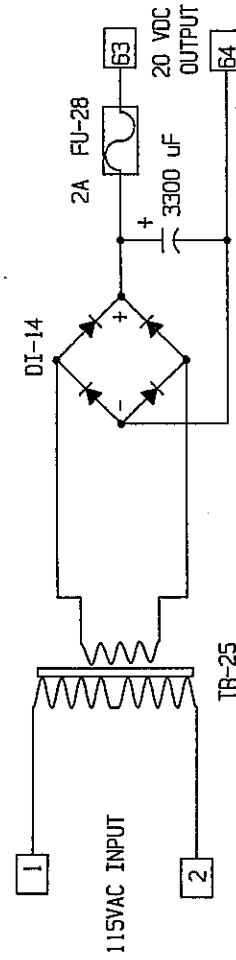
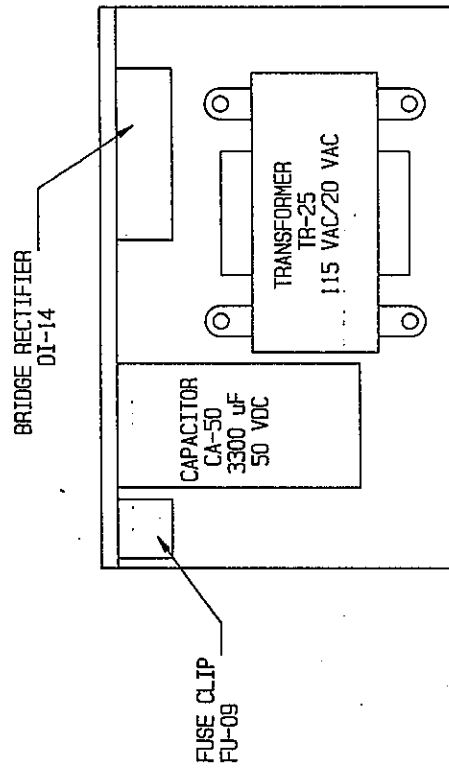
Yin01	1	M20	waiting
Yin02	1	M21	waiting
Yin03	1	M22	waiting
Yin04	1	M23	waiting
Yin05	1	M24	waiting
Yin06	1	M25	waiting
Yin07	1	M26	waiting
Yin08	1	M27	waiting
Yin09	1	M28	waiting
Yin10	1	M29	waiting

ELECTRICAL PRINTS FOR PARTNER 5D

INSTRUCTIONS

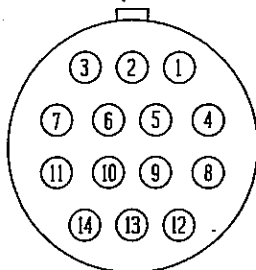
- 1) PAGES 1 & 2 ARE DETERMINED IF THE MILL IS EQUIPPED WITH V-BELT SPINDLE (DRAWINGS 6-06-016-108, 6-06-018-037) OR AC INVERTER SPINDLE (DRAWINGS 6-06-016-107, 6-06-018-038).
- 2) ALL INTERCONNECT DIAGRAMS HAVE A SCALE ON THE LEFT SIDE OF THE PAGE TO HELP LOCATE RELAY CONTACTS. LOCATION NUMBERS OF EACH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



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED			
	X.XX			
	X.X			
	X.X			
	ANGLE			
	MATERIAL/FINISH			
	INDUSTRIAL INFORMATION CONTROLS 7070 PINE BLVD CHICAGO, IL 60637 TITLE: BRAKE POWER SUPPLY APPLICATION: PARTNER V SCALE 1:1 DATE: 25 MAY 89 DRWN BY: REUTER SIZE B SHEET NO. 1 OF 1			

FEMALE AMP PLUG



TERMINAL BLOCK

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---

T.B. 1

T.B. No.	FUNCTION	INT. DEST.
1 (6)	OVER TRAVEL LIMITS	CR1A-5
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	CR1-5
2(57)	AC MAGNETICS	CR5-7
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

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	CR10A-10
9	TOOL CHG RESET	RSM-2
10	SPINDLE STOP	RSM-3
11	COOLANT SPRAY	CR-7
12	SPINDLE CV	CR10A-6
13	RESET	RSM-6
14	COOLANT FLOOD	CR8

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

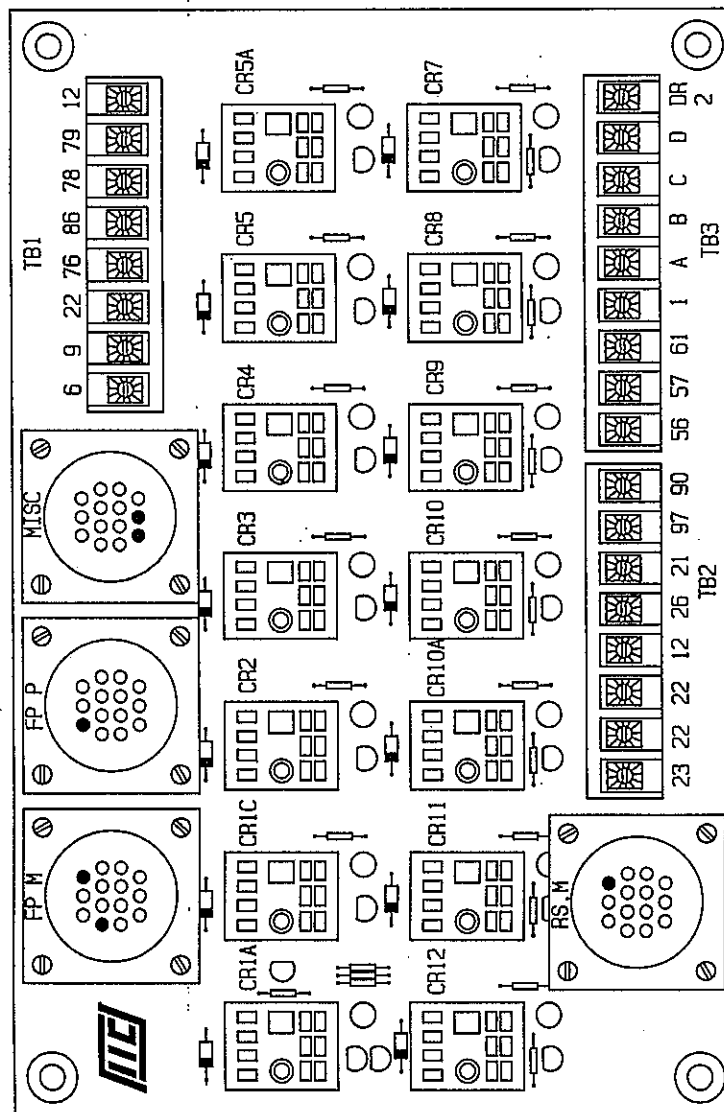
PIN No.	FUNCTION
1	CR 12-10
2	CR 12-8
3	CR 12-9
4	N/A
5	CR 12-7
6	CR 12-6
7	CR 12-5
8	SPARE
9	CR 11-8
10	CR 11-9
11	CR 11-10
12	CR 12 COIL
13	KEY
14	KEY

PIN No.	FUNCTION	INT. DEST.
1	SPINDLE CCV	CR10A-10
2	TOOL CHG RESET	RSM-2
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	CR10A-6
13	LUBE FAULT	TB1-6
14	WAIT CHANNEL	TB1-14

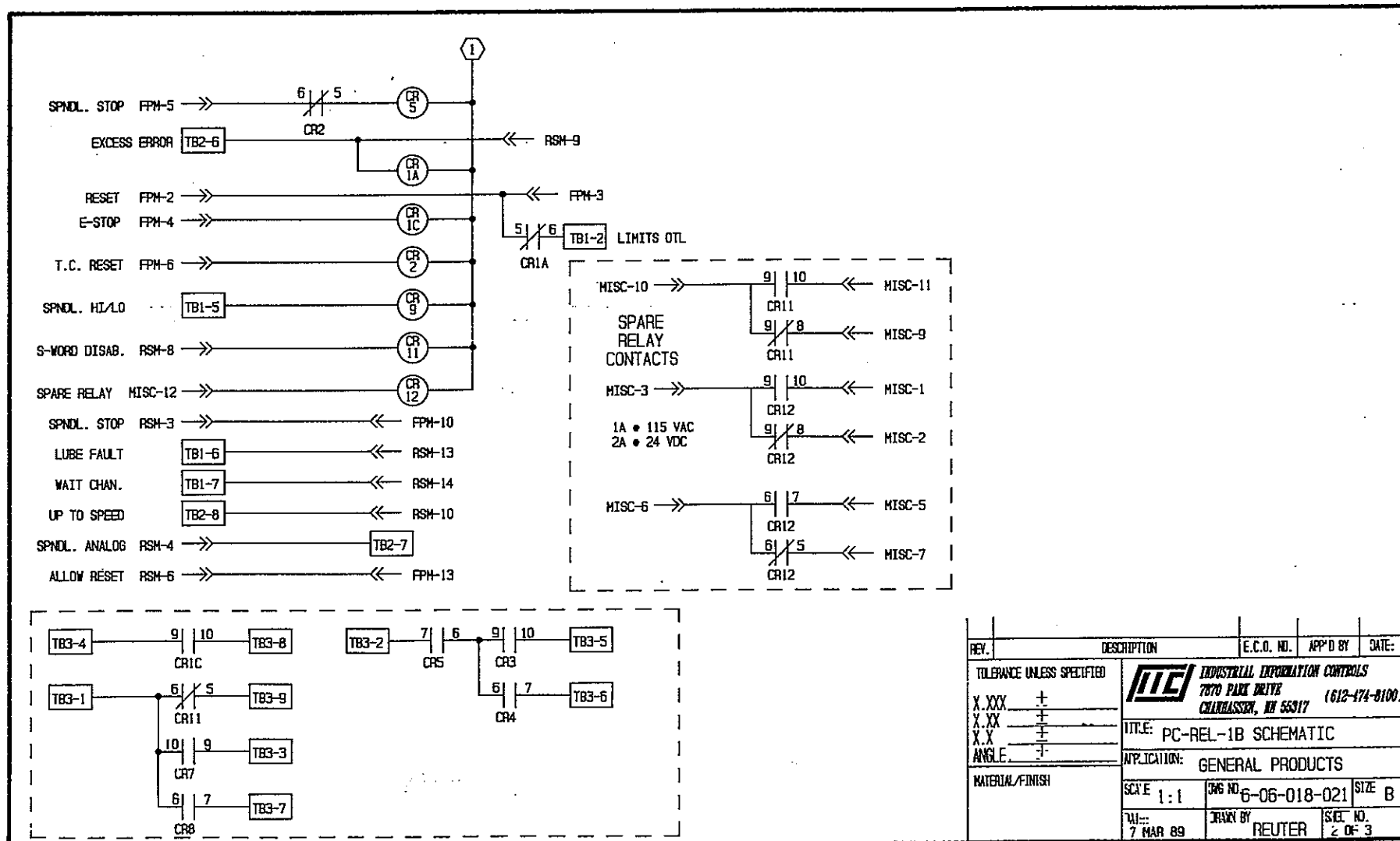
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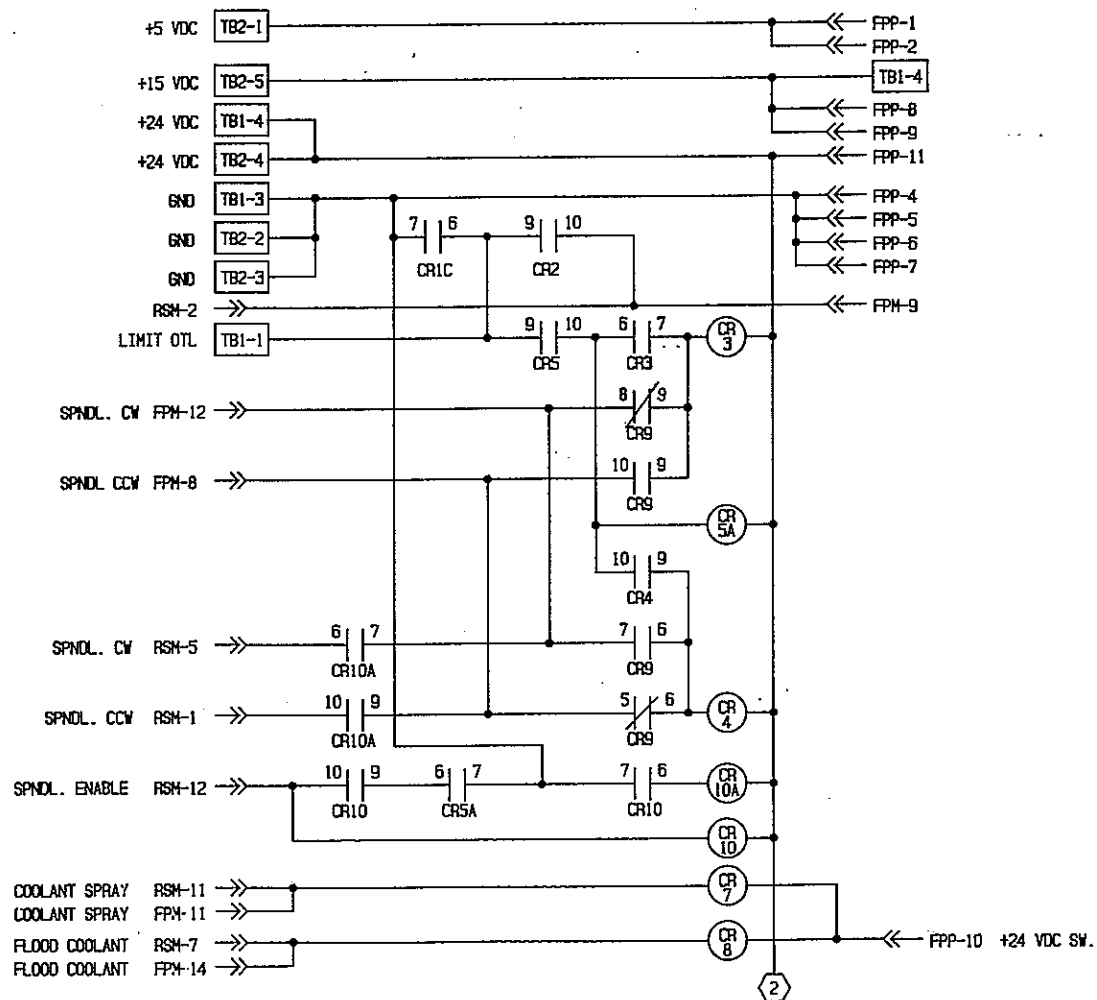
1. TABLES REFERENCE
TO PC.REL. 18 I/O
BOARD ONLY

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±	1/2		
X.X	±	1/4		
ANGLE	±	1/2		
MATERIAL/FINISH				
				
TITLE: PC REL. 18 I/O PLUG DEF.				
APPLICATION: GENERAL PRODUCTS				
SCALE 1:1	DWG NO. 6-04-018-005	SIZE B		
DATE: 11 AUG 88	DRAWN BY REUTER	SHEET NO. 1 OF 1		

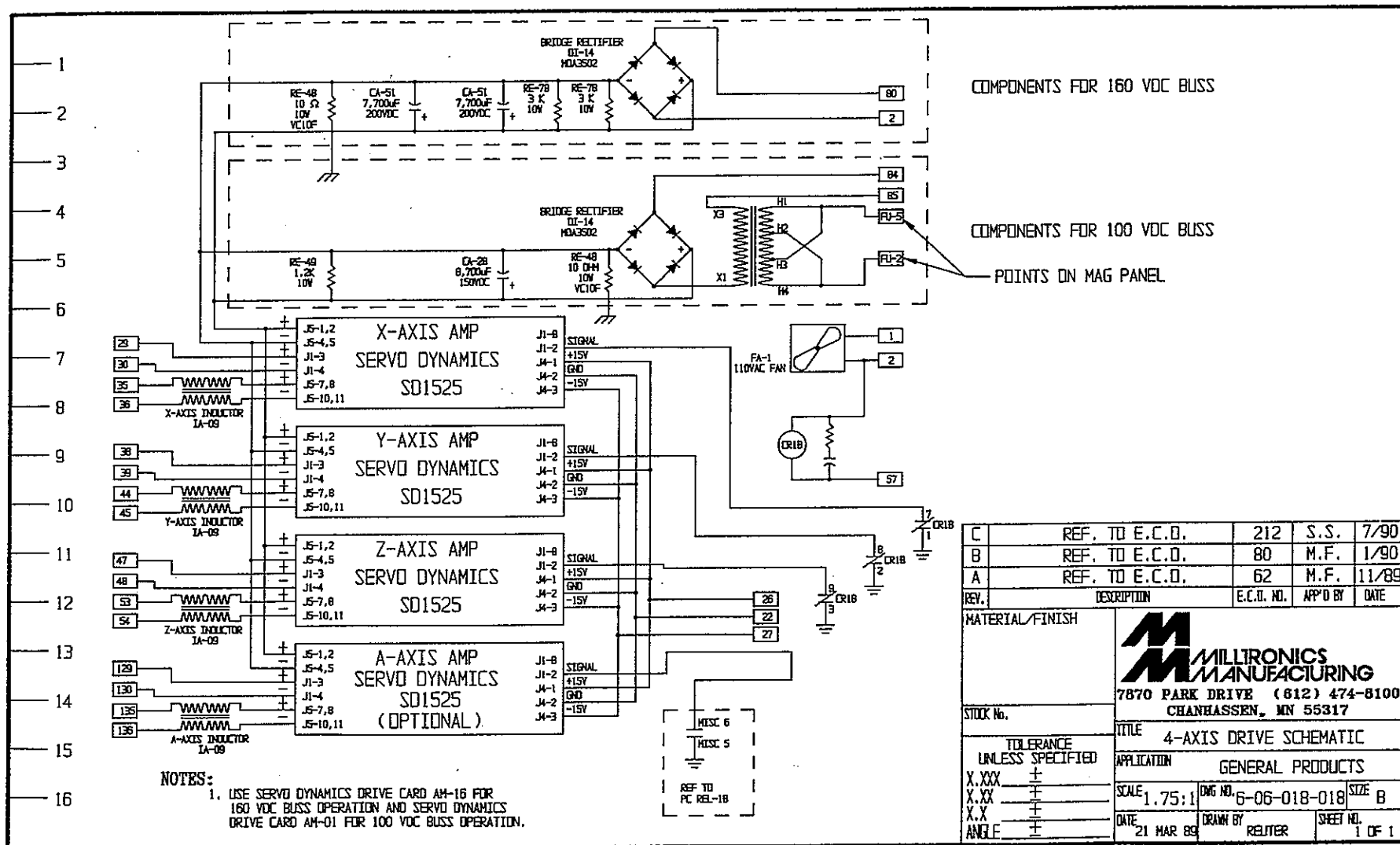


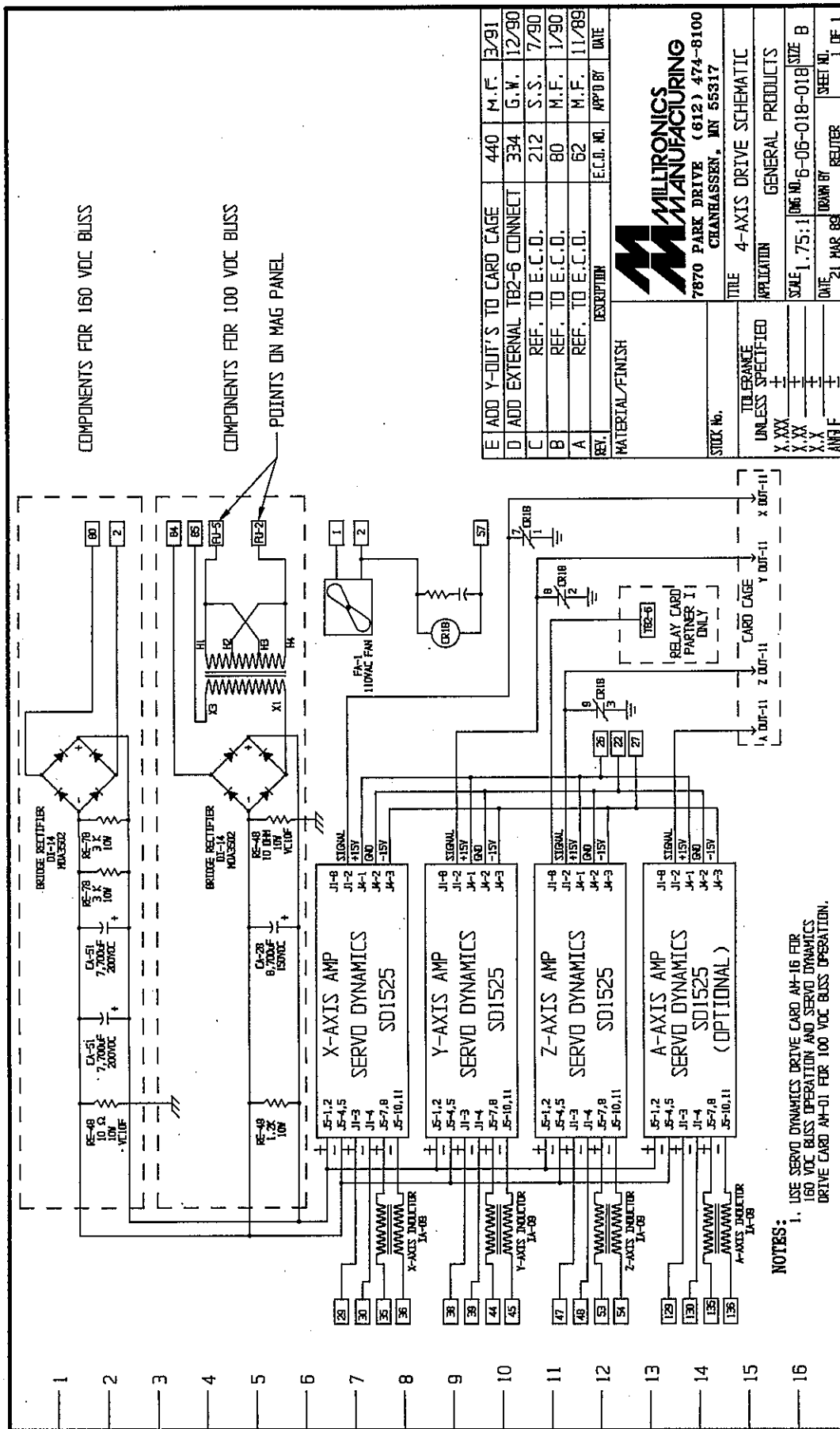
REV.	DESCRIPTION	E.C.A. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED			
	X.XXX			
	X.XX			
	X.X			
	ANGLE			
	MATERIAL/FINISH			
	IIE INDUSTRIAL INFORMATION CONTROLS 7070 PARK BLVD (612-474-8100) CHICAGO, IL 60637			
	TITLE: PC-REL-1B PANEL ASSY.			
	APPLICATION: GENERAL PRODUCTS			
	SCALE 1:1	DWG NO. 6-03-018-000	SIZE B	
	DATE: 15 NOV 88	DRAWN BY: REUTER	SHEET NO. 1 OF 1	





REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE (UNLESS SPECIFIED) X.XXX ± X.XX ± X.X ± ANGLE ±				
INDUSTRIAL INFORMATION CONTROLS 7070 PARK DRIVE CHARLHASTEN, NY 55317 (612-474-8100)				
TITLE: PC-REL-1B SCHEMATIC				
APPLICATION: GENERAL PRODUCTS				
MATERIAL/FINISH	SCALE 1:1	DWG NO. 6-06-018-021	SIZE B	
	DATE: 6 MAR 89	DRAWN BY REUTER	SHEET NO. 1 OF 3	



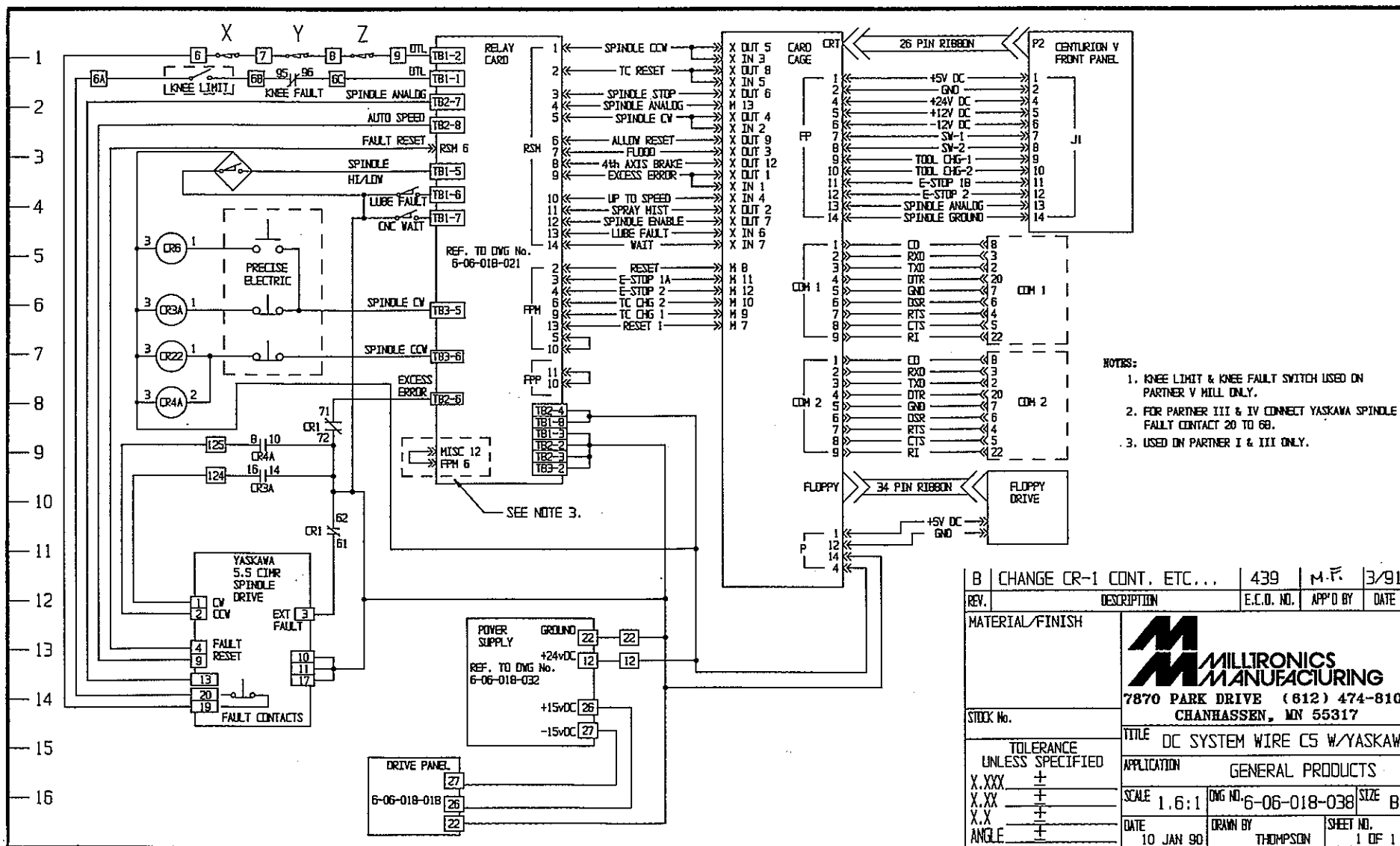


E	ADD Y-OUT'S TO CARD CAGE	440	M.F.	3/91
D	ADD EXTERNAL TB2-6 CONNECT	334	G.W.	12/90
C	REF. TO E.C.D.	212	S.S.	7/90
B	REF. TO E.C.D.	80	M.F.	1/90
A	REF. TO E.C.D.	62	M.F.	11/89
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK NO.				
TOLERANCE				
UNLESS SPECIFIED				
X.XXX ±				
X.XX ±				
X.X ±				
X ±				
ANGLE ±				

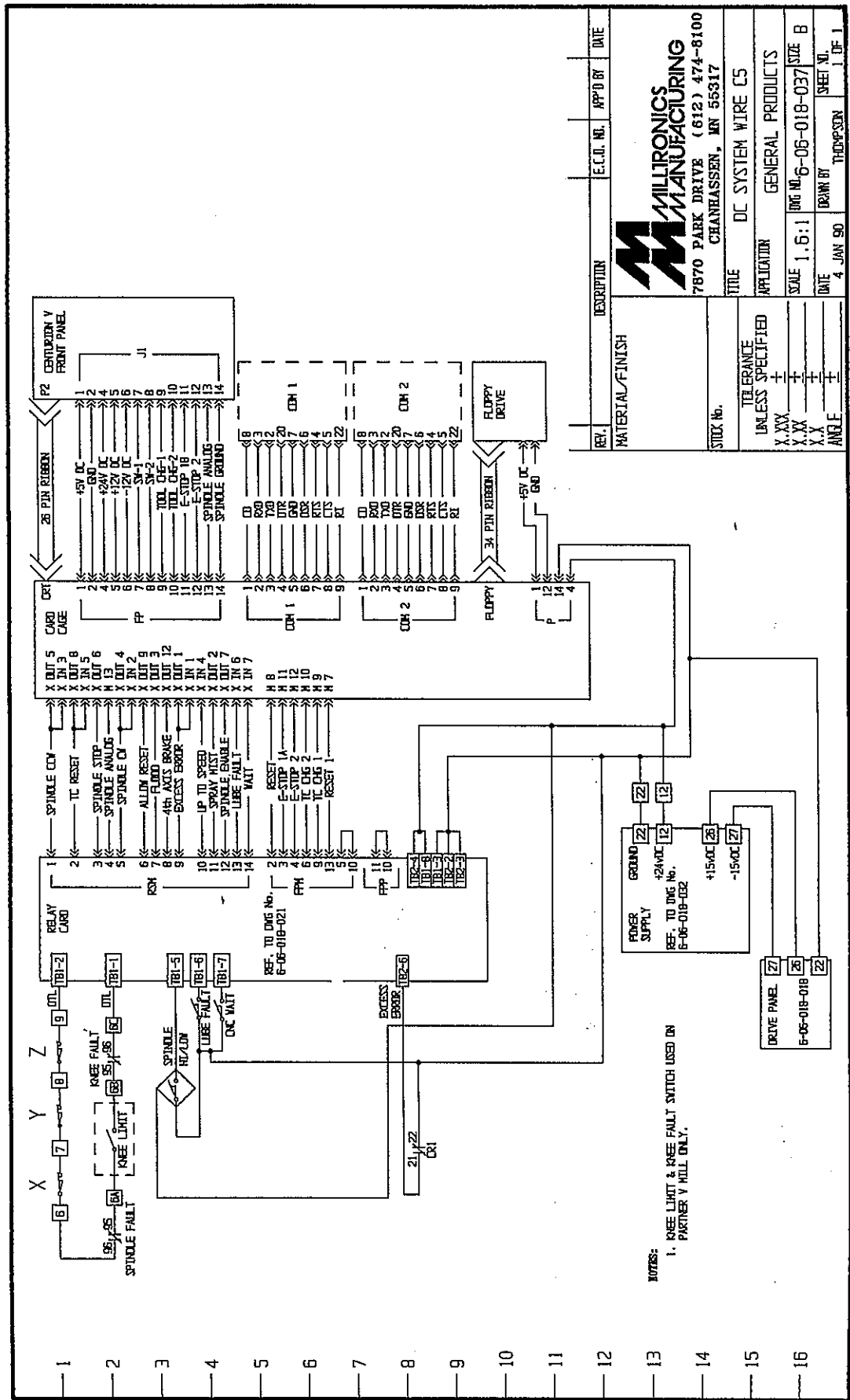


MILLTRONICS MANUFACTURING
 7870 PARK DRIVE (812) 474-8100
 CRANFORD, MN 55317

TITLE	4-AXIS DRIVE SCHEMATIC
APPLICATION	GENERAL PRODUCTS
SCALE	1.75:1
DATE	21 MAR 88
DESIGNED BY	REITER
SHEET NO.	1 OF 1



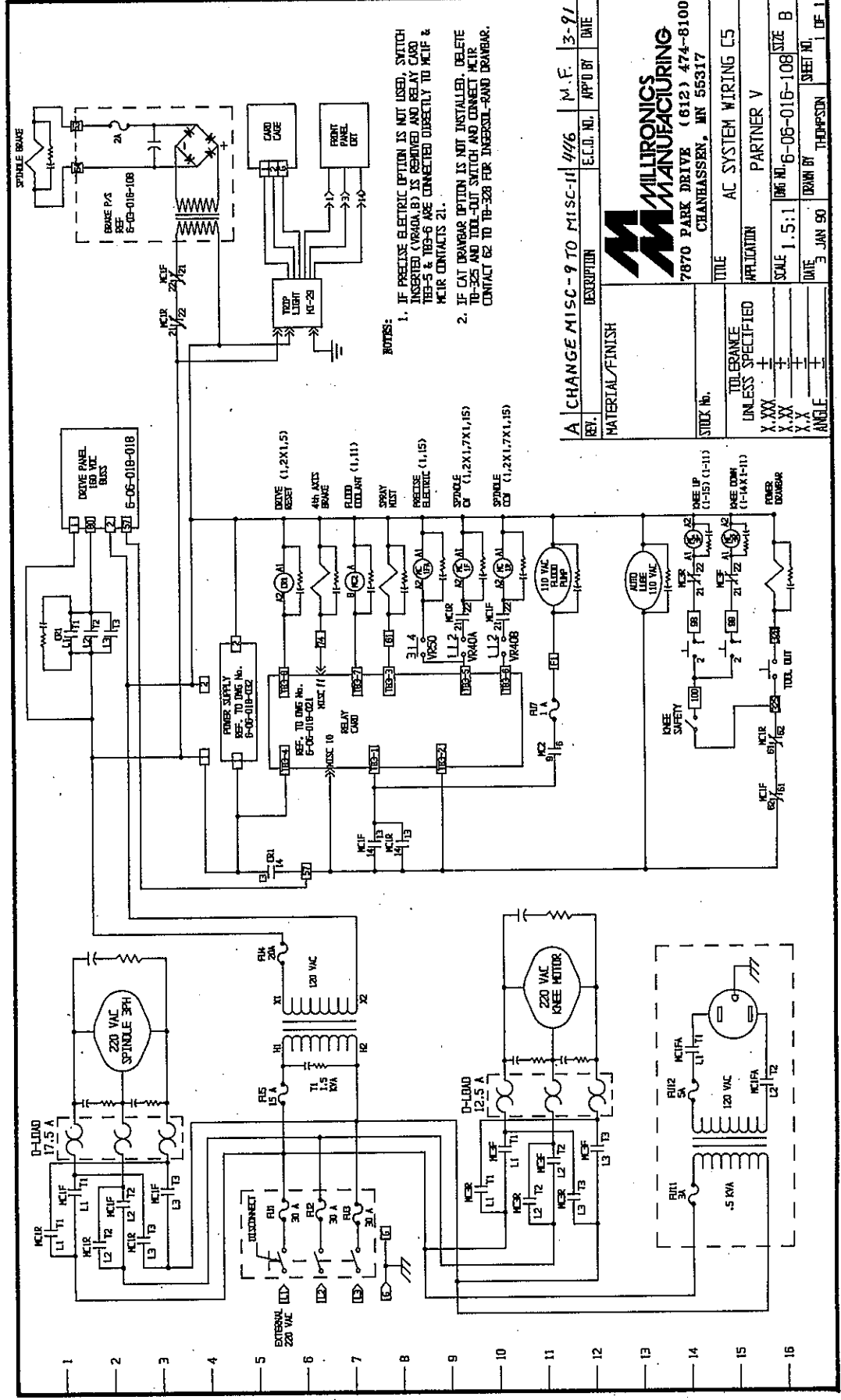
B	CHANGE CR-1 CONT. ETC...	439	M.F.	3/91
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX	+			
X.XX	+			
X.X	+			
ANGLE	+			
TITLE DC SYSTEM WIRE CS W/YASKAWA				
APPLICATION GENERAL PRODUCTS				
SCALE 1.6:1	DWG NO. 6-06-018-038	SIZE B		
DATE 10 JAN 90	DRAWN BY THOMPSON	SHEET NO. 1 OF 1		



REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
	MATERIAL/FINISH			
	STOCK No.			
	TOLERANCE UNLESS SPECIFIED			
	Y.XXX			
	X.XX			
	X.X			
	ANGLE			
	DATE			
	DRAWN BY			
	THOMPSON			
	SHEET NO.			
	OF 1			

MILLITRONICS MANUFACTURING
 7870 PARK DRIVE (612) 474-8100
 CHANEASSEN, MN 55317

TITLE: DC SYSTEM WIRE C5
 APPLICATION: GENERAL PRODUCTS
 SCALE: 1.6:1
 DATE: 4 JAN 90
 DRAWN BY: THOMPSON
 SHEET NO.: 1 OF 1



- NOTES:
1. IF PRELISE ELECTRIC OPTION IS NOT USED, SWITCH INSERTED (WAS 18) IS REMOVED AND RELAY C400, TRS-5 & TRS-6 ARE CONNECTED DIRECTLY TO MCIF & MCIR CONTACTS 21.
 2. IF CAT DRAWBAR OPTION IS NOT INSTALLED, DELETE TRS-5 AND TOL-OUT SWITCH AND CONNECT MCIR CONTACT 62 TO TRS-5 FOR UNDERSL-RAND DRAWBAR.

A CHANGE MISC-9 TO MISC-11 4/96		M.F.	3-91
REV.	DESCRIPTION	E.C.D. NO.	APPRO BY
MATERIAL/FINISH			
STUDY NO.			
TITLE			
APPLICATION			
PARTNER V			
SCALE 1.5:1			
DATE 3 JAN 90			
DRAWN BY THOMPSON			
SHEET NO.			
1 OF 1			

MILLIRONICS
MANUFACTURING
7870 PARK DRIVE (612) 474-8100
CHANDLER, MN 55317

RELAYS

TERMINAL BLOCK DESIGNATORS

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

- CR30. CW (AVANTI ATC)
- CR31. CCW (AVANTI ATC)
- CR32. HOME (AVANTI ATC)
- CR33. ZERO SPEED (AVANTI ATC)
- CR34. TOOL OUT (AVANTI ATC)
- CR35. TOOL IN (AVANTI ATC)
- CR36. DISABLE ATC (AVANTI ATC)
- CR64. 220 FOR AUTO LUBE
- MC1F. SPINDLE CW (AC)
- MC1R. SPINDLE CCW (AC)
- MC2. FLOOD COOLANT (AC)
- MC3F. POWER KNEE FORWARD (PARTNER V ONLY)
- MC3R. POWER KNEE REVERSE (PARTNER V ONLY)

- CR1. RESET
- CR1A. EXCESS ERROR
- CR1B. DRIVE DISABLE
- CR1C. DRIVE RESET
- CR2. TOOL CHANGE RESET
- CR3. SPINDLE CLOCKWISE
- CR3A. SPINDLE CW YASKAWA
- CR4. SPINDLE COUNTERCLOCKWISE
- CR4A. SPINDLE CCW YASKAWA
- CR5. SPINDLE STOP
- CR5A. SPINDLE SAFETY
- CR7. SPRAY MIST
- CR8. FLOOD COOLANT
- CR9. SPINDLE HI/LO
- CR10. SPINDLE ENABLE
- 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		E.C.O. NO.		APP'D BY	DATE
DESCRIPTION					
MATERIAL/FINISH					
 MILLITRONICS MANUFACTURING 7870 PARK DRIVE (812) 474-8100 CHANDELSEN, MN 55317					
TITLE					
TERMINAL BLOCK DES.					
APPLICATION					
GENERAL PRODUCTS					
SCALE		1:1		DWG NO. 6-04-018-019	
DATE		14 MAY 90		SHEET NO. 1 OF 1	
DRAWN BY		THOMPSON		SHEET NO. 1 OF 1	

