

Partner 5A & B

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

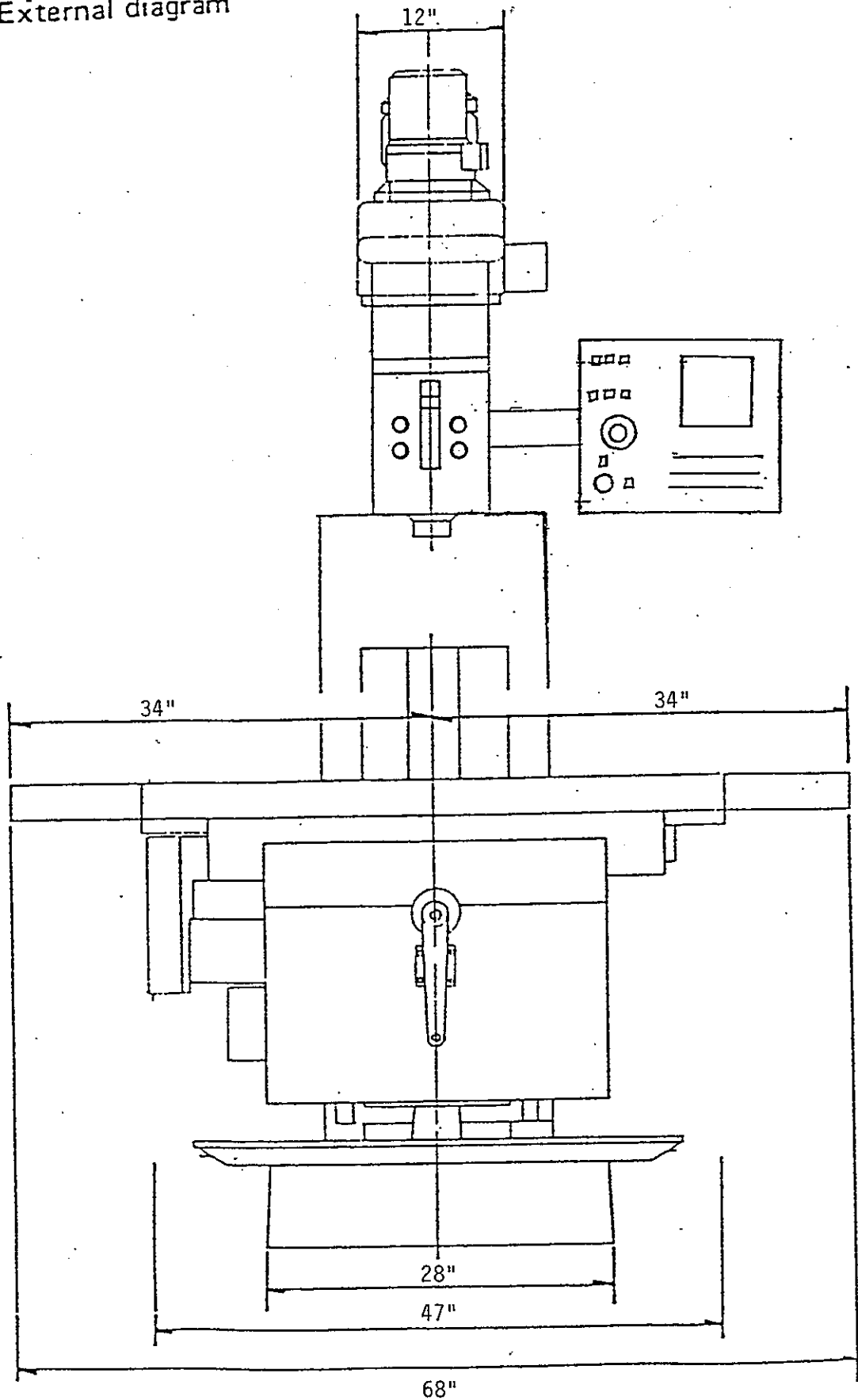
Electrical supply	60 Hz. 3 phase 220/230/440/460 V
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Color

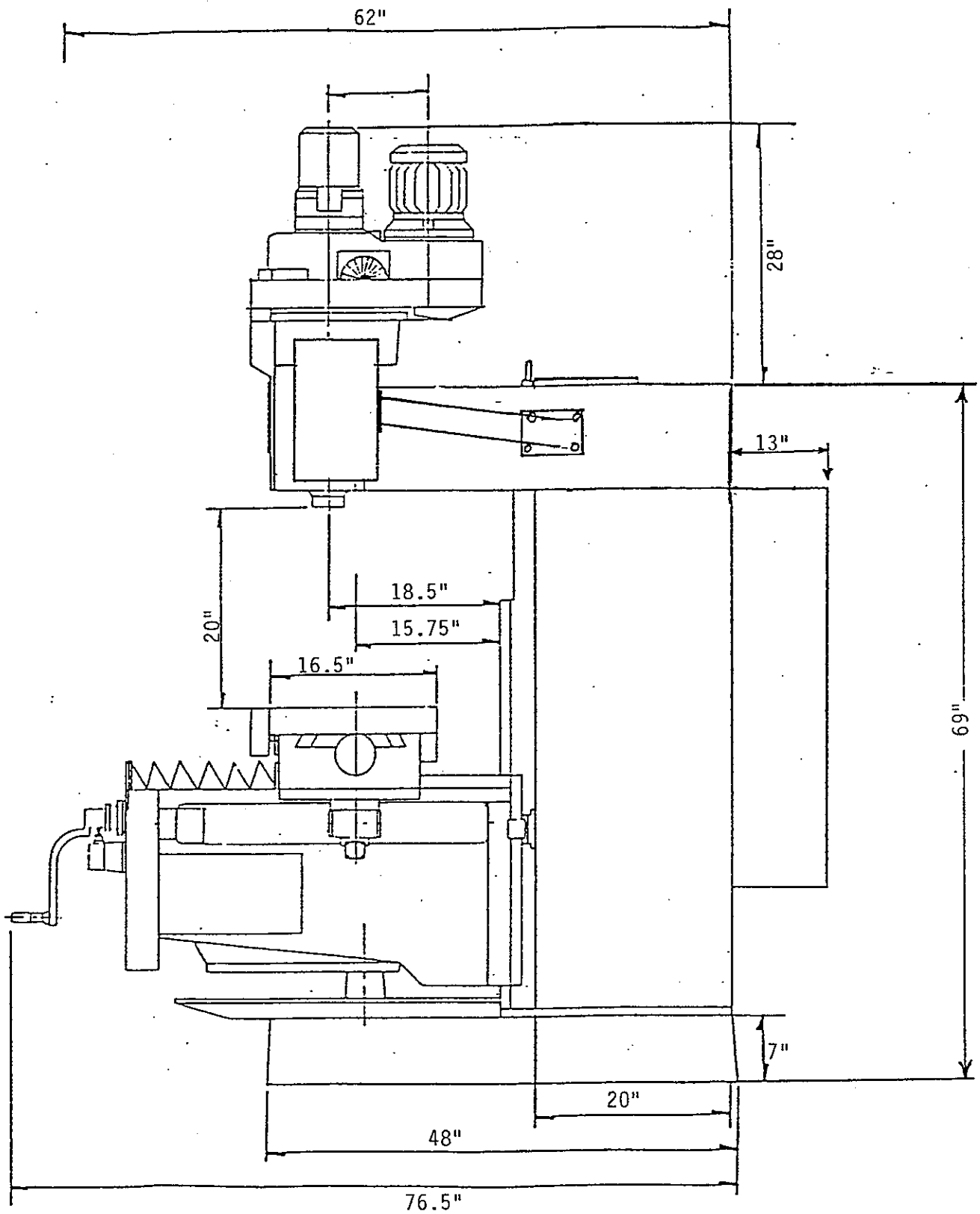
Standard	Gray
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PARTNER V

External diagram

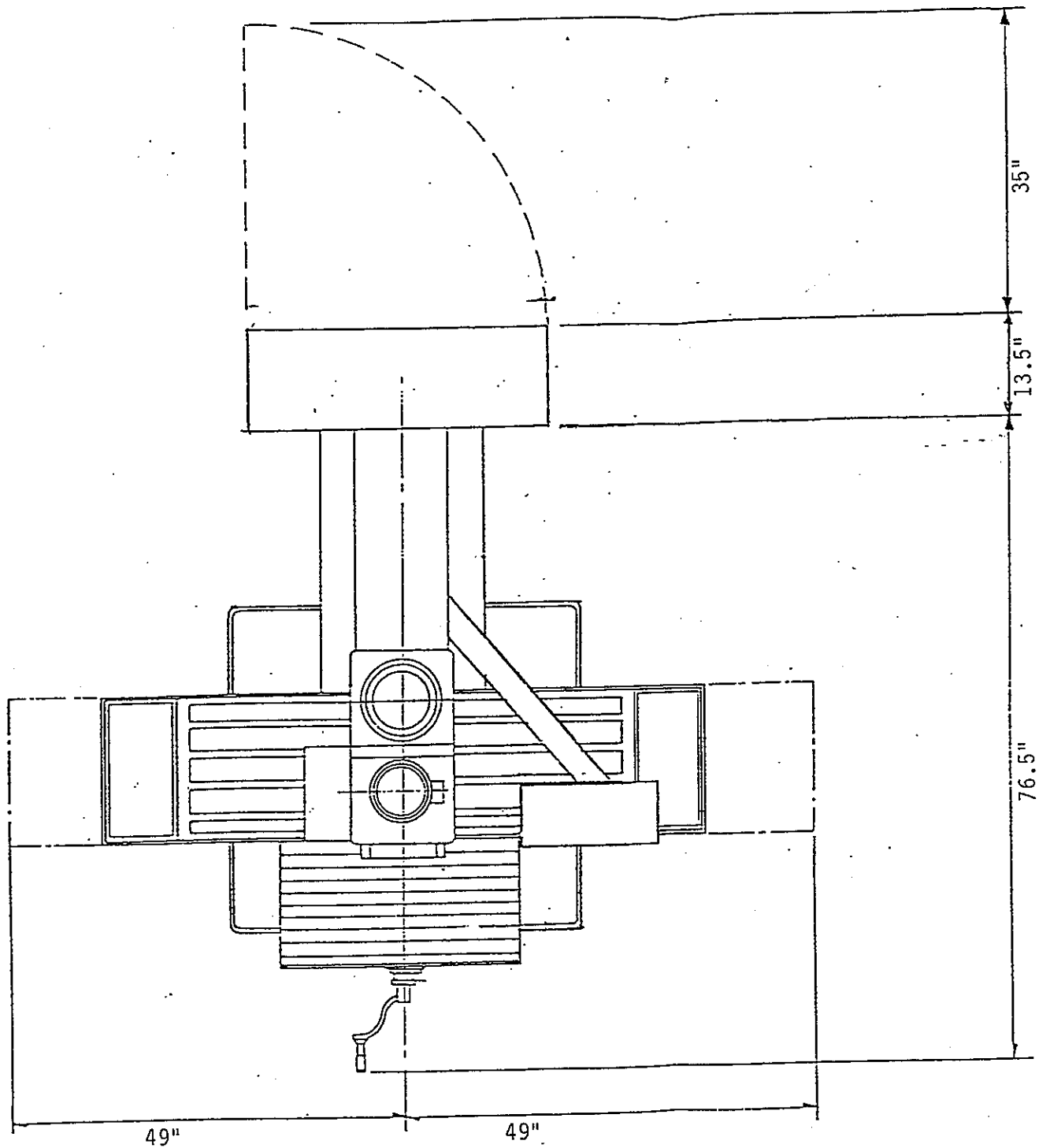


PARTNER V



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.

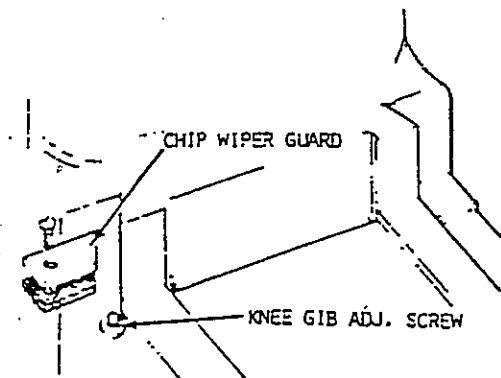


Figure 2. Knee-Column Gib

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.

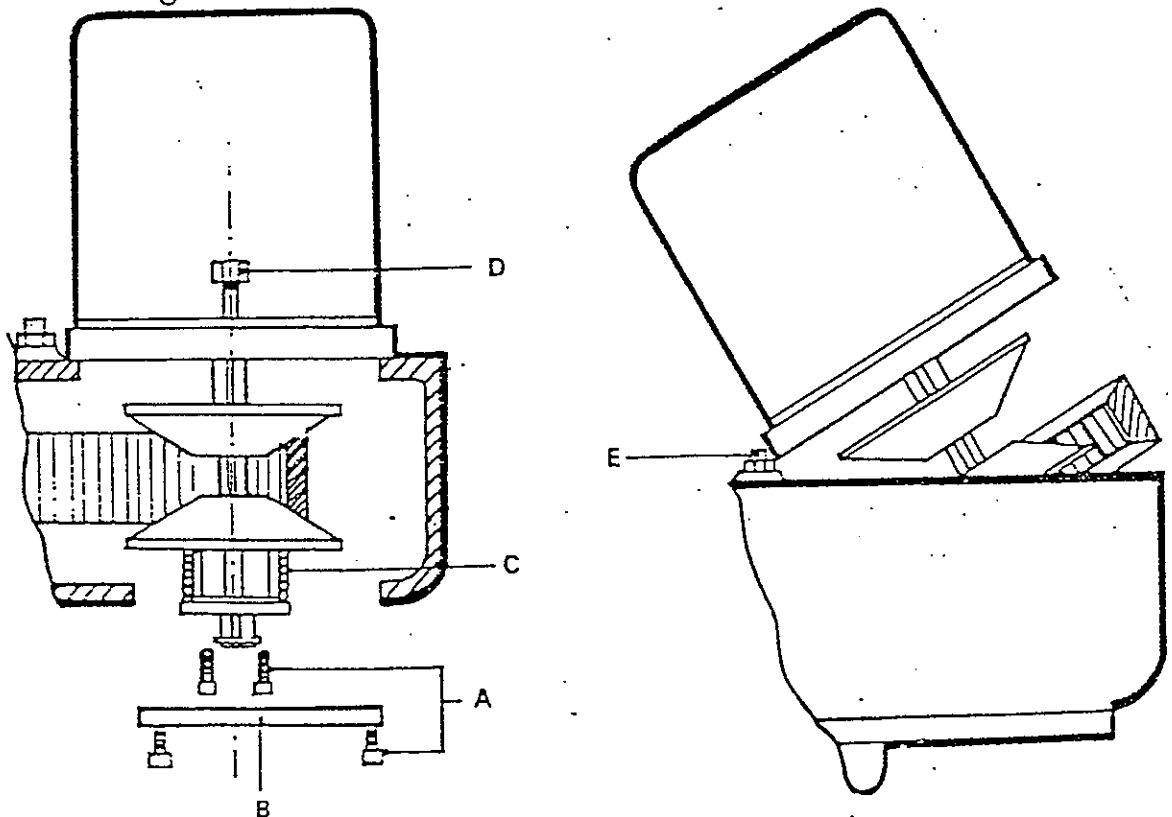


Figure 3. Removing the Motor (Side View)

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.

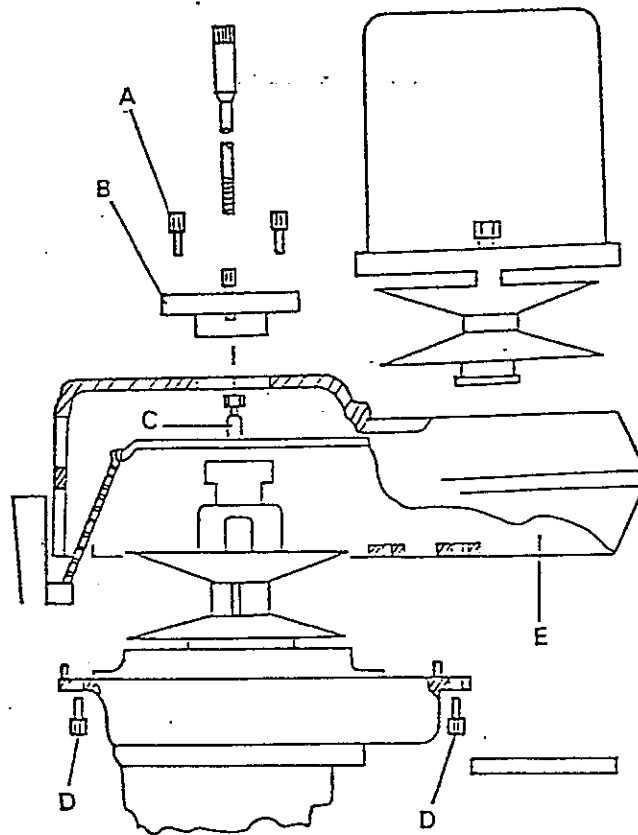


Figure 4. Removing the Vari-Drive Belt

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.

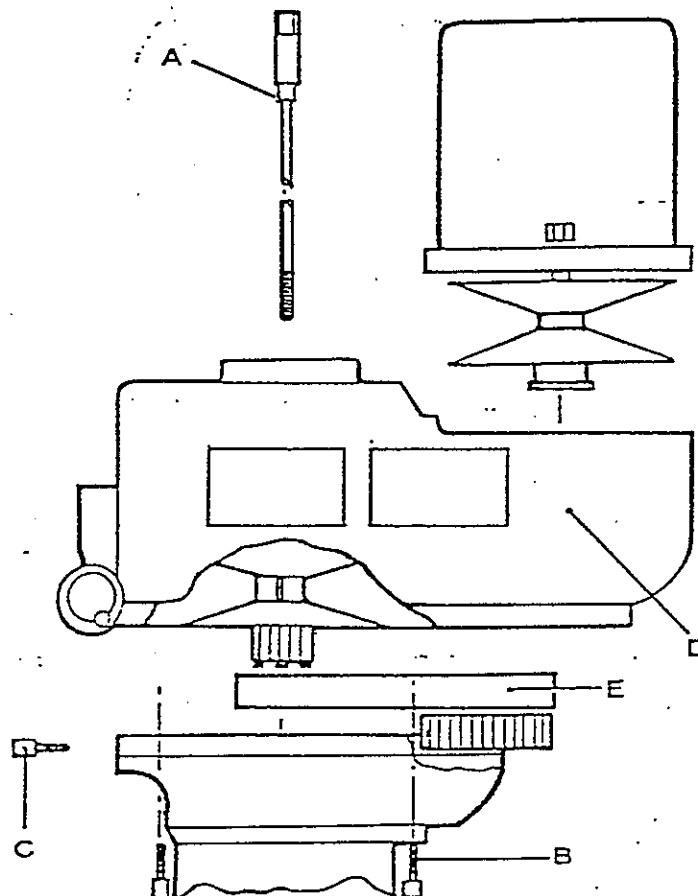


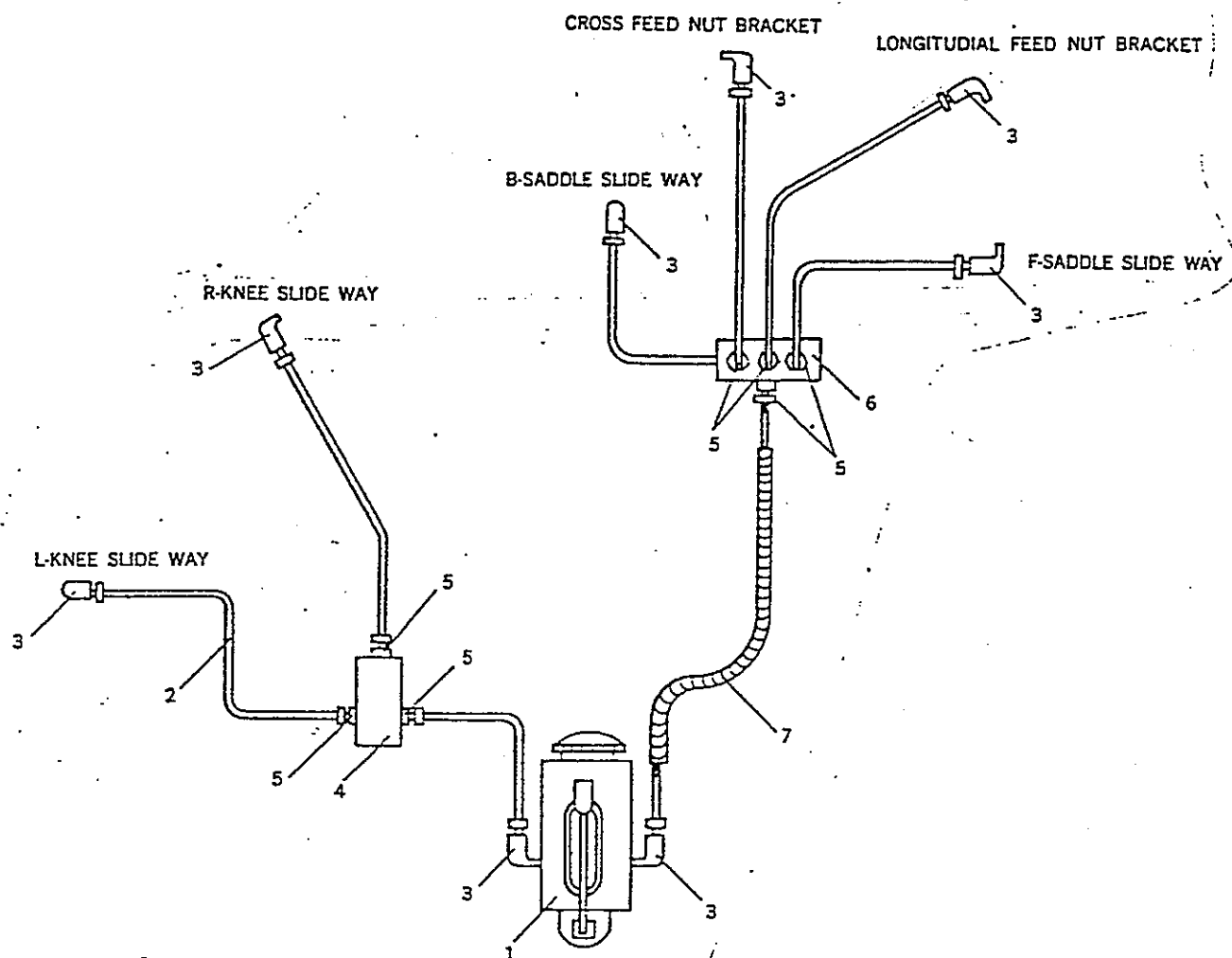
Figure 5. Removing Timing Belt

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

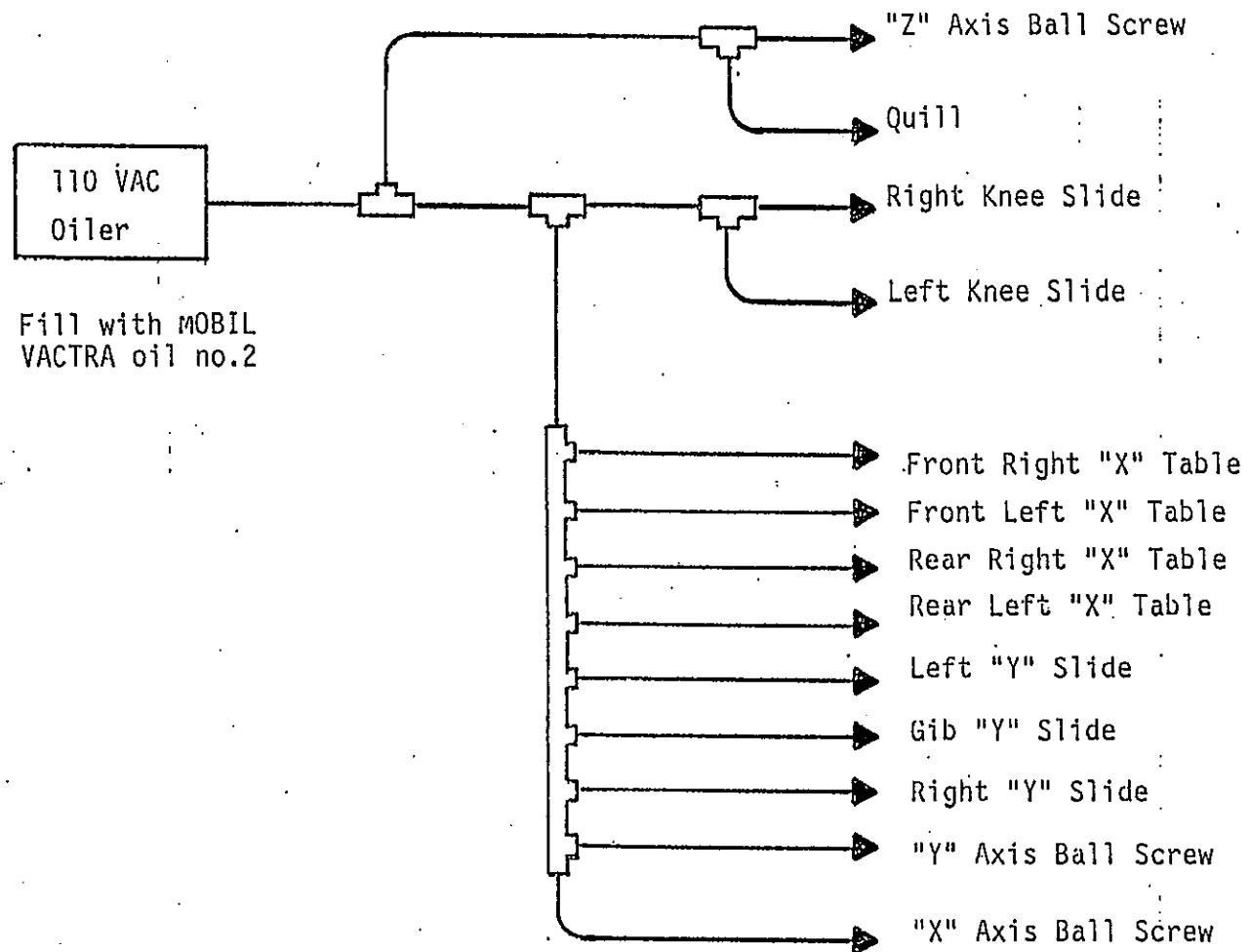
As the housings are being separated, the HTD belt (E) still connects them, resisting the separating movement. The separation can be assisted by gently pushing the belt off the large pulley as the upper housing is being raised.

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

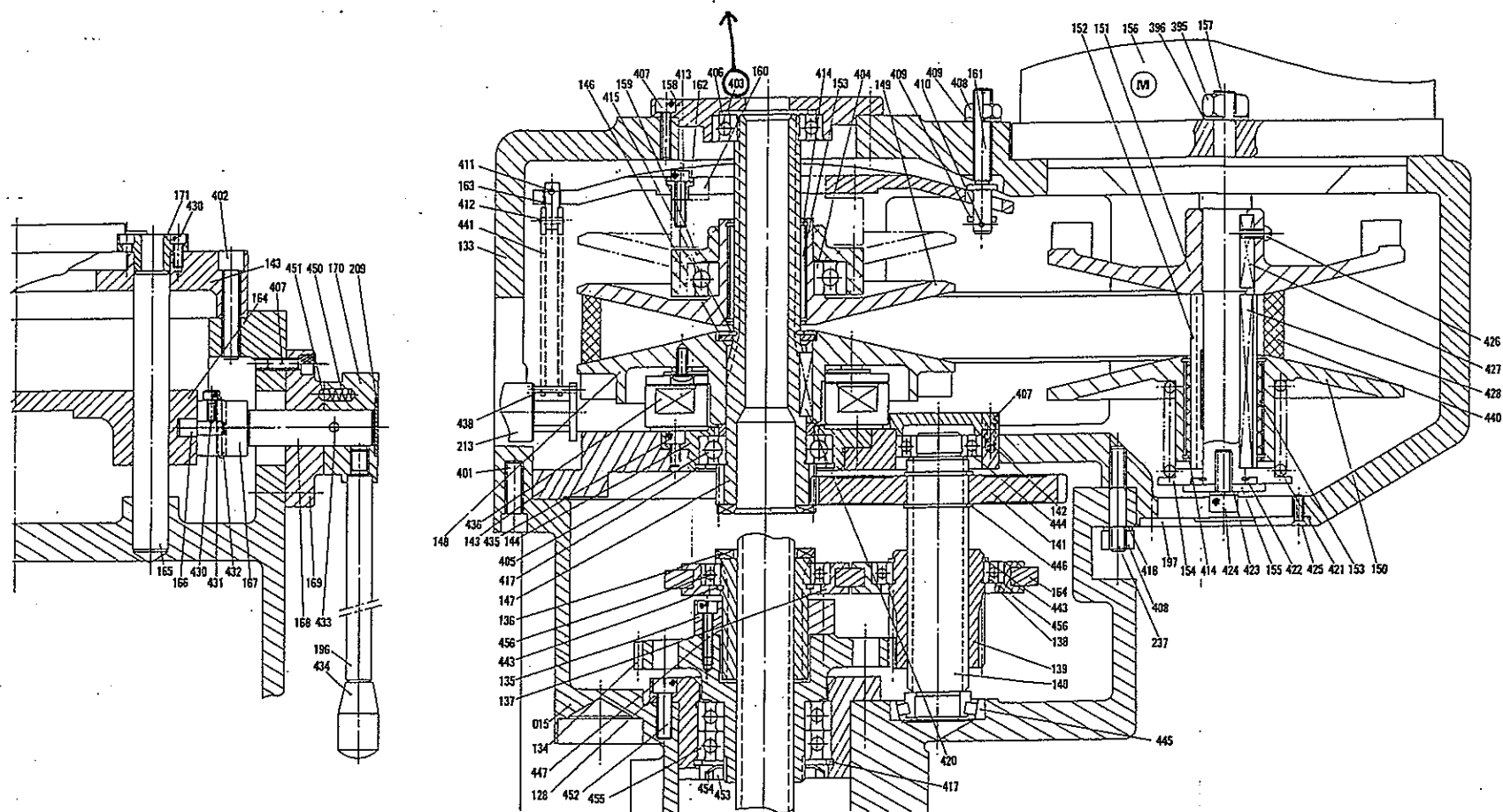
CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
110 VAC	3356 1KVA	H1-H2 110	X1-X2 68 X1-X3 72 X1-X4 79
220 VAC	3357 1KVA	H1-H2 220	X1-X2 68 X1-X3 72 X1-X4 79
(NOTE NEED TO JUMP H1 TO H3 & H2 TO H4)			
440 VAC	3357 1KVA	H2-H4 220	X1-X2 68 X1-X3 72 X1-X4 79
(NOTE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

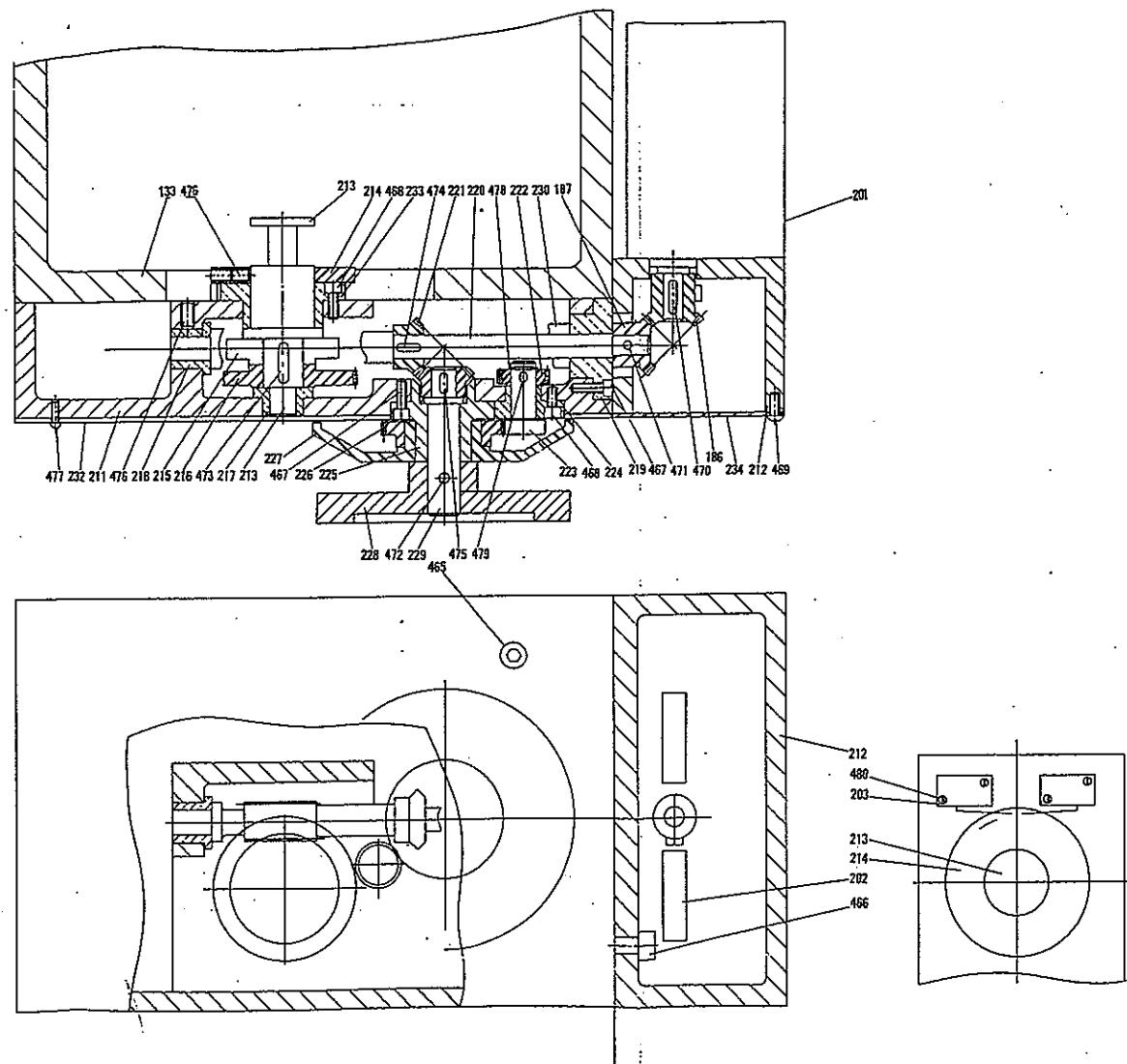
CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
208 VAC	3263 .5KVA	H1-H2 208	X1-X2 110
240 VAC	3263 .5KVA	H1-H3 240	X1-X2 110
480 VAC	3263 .5KVA	H1-H4 480	X1-X2 110

7-1 Belt Housing Assembly

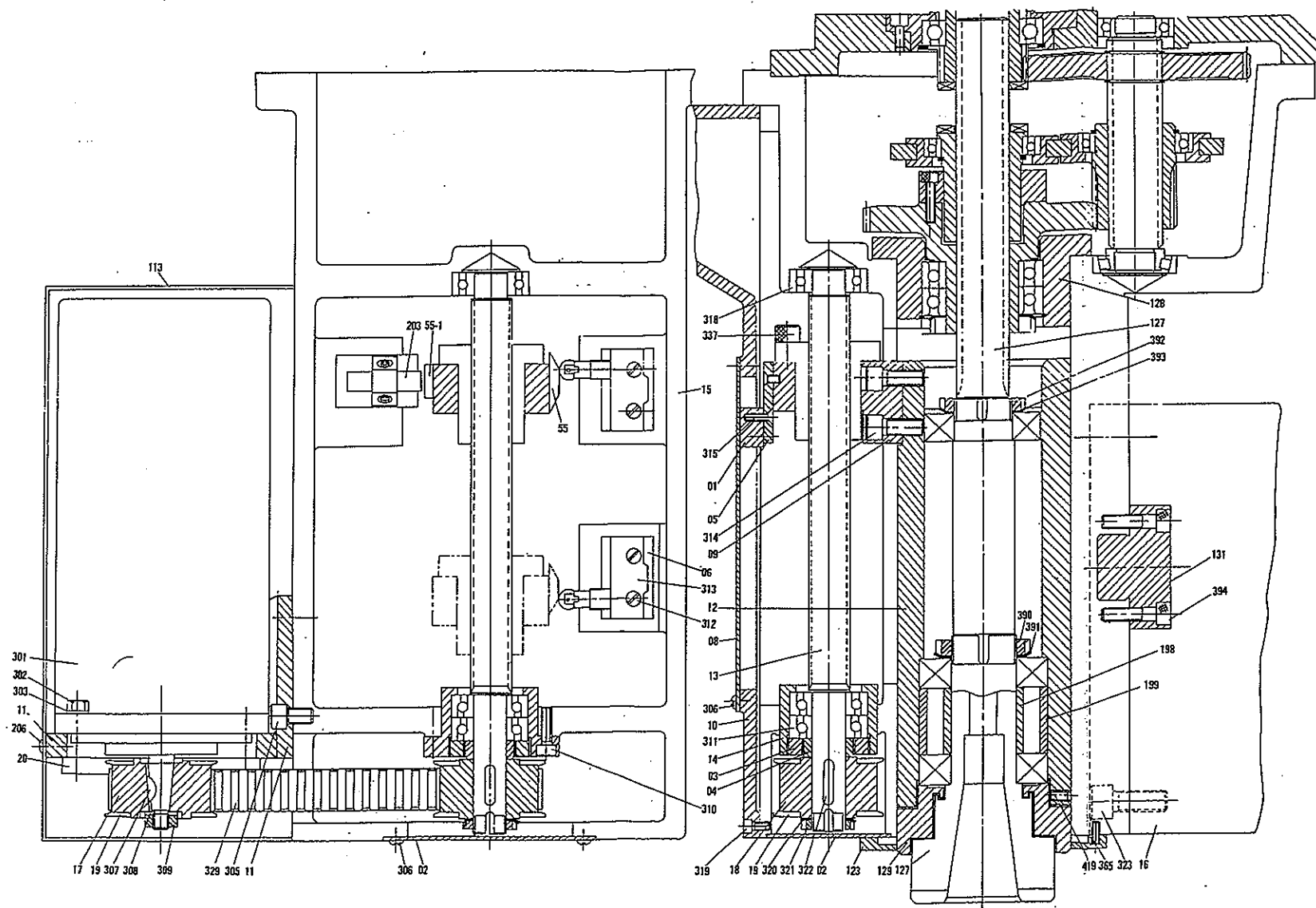
2 bearings; Thrust SKF 51107
Radial SKF 6007-22 or FAFNIR 9107 Kdd



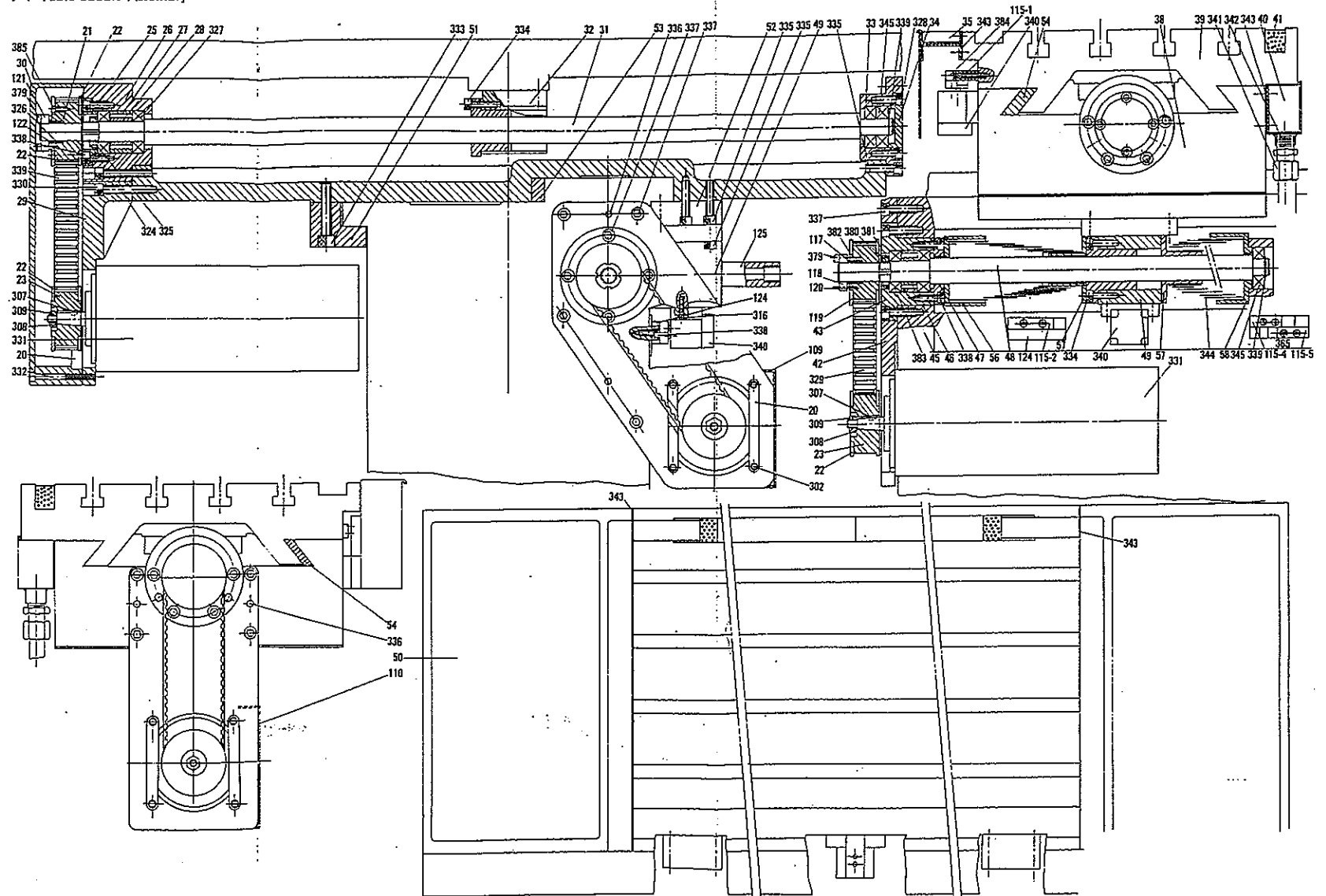
7-2 Speed Control Mechanism



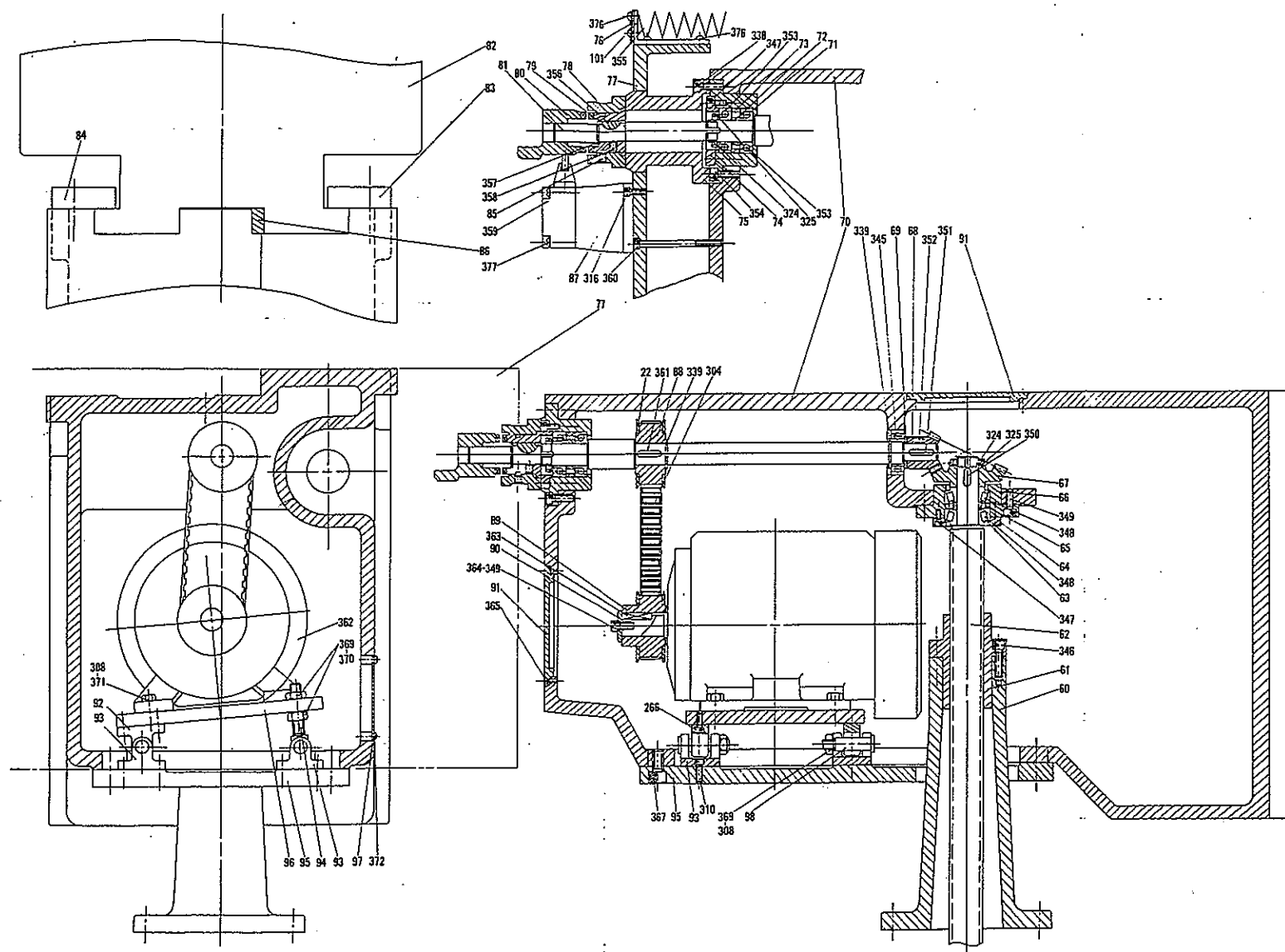
7-3 Head Assembly



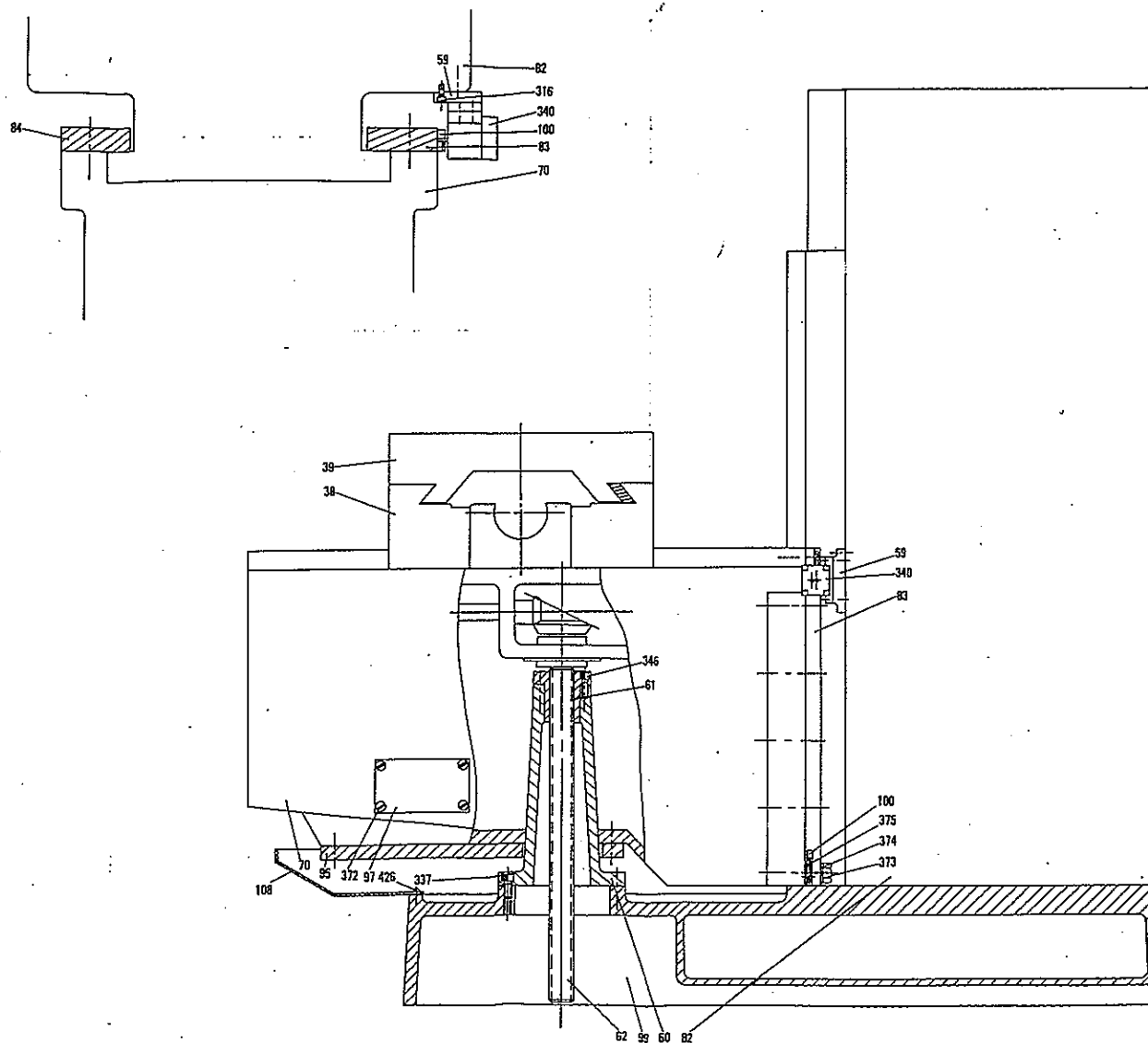
7-4 Table Saddle Assembly



7-5 Knee Elevating Assembly

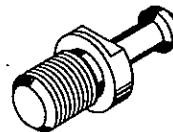
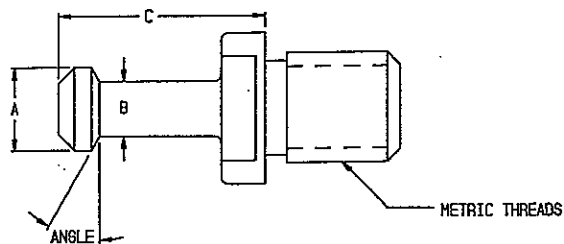


7-6 Turret & Knee Assembly



**COMMAND RETENTION KNOBS
STYLE BT-FLANGE
JAPANESE**

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

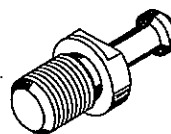
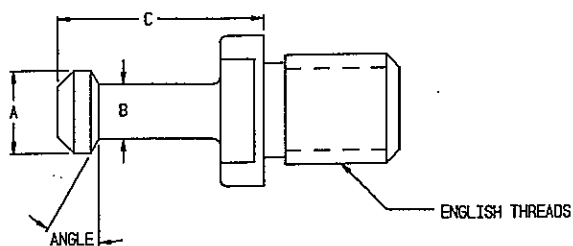


NOTES:
COMMAND CORPORATION
TEL: 1-(800)-328-2197
FAX: 1-(612)-755-1116

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.		TITLE BT-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	±	SCALE 1:1	DWG NO. 6-00-018-030	SIZE B
X.XX	±	DATE 1 FEB 89	DRAWN BY REUTER	SHEET NO. 1 OF 1
X.X	±			
ANGLE	±			

**RETENTION KNOBS
STYLE V-FLANGE
JAPANESE**

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	RB4E-0001		
				60°	PARTNER IV & V	RB4E-0002	RK31114A	PT-532-60
30	DWG. No. 6-01-018-010				PARTNER III	MA-129		

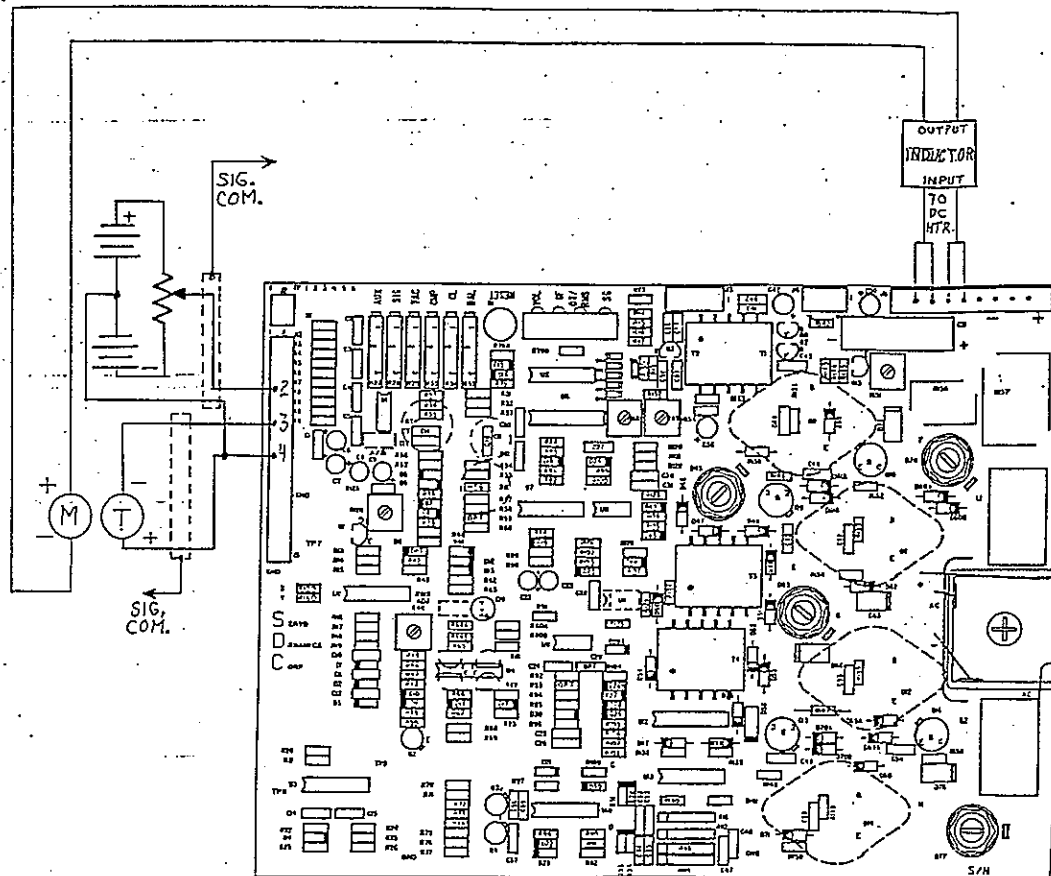


NOTES:

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

30-TAPER RETENTION KNOB
IS A PRODUCT OF IIC/MILLTRONICS
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		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.		TITLE V-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	±	SCALE 1:1	DWG NO. 6-00-018-031	SIZE B
X.XX	±	DATE 1 FEB 89	DRAWN BY REUTER	SHEET NO. 1 OF 1
X.X	±			
ANGLE	±			



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				
 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLHASSER, NY 55317 (612-474-8100) TITLE: S.D. DRIVE AMP. EXT. APPLICATION: GENERAL PRODUCTS				
SCALE	N/A	DWG NO.	6-00-017-024	SIZE B
DATE	18 APR 86	DRAWN BY	REUTER	SHEET NO. 3 OF 3

FRONT OF CRT DISPLAY
DISPLAYTEK

HORIZONTAL
CENTERING



VERTICAL
LINEARITY



VERTICAL
HOLD



VERTICAL
SIZE



CONTRAST



FOCUS

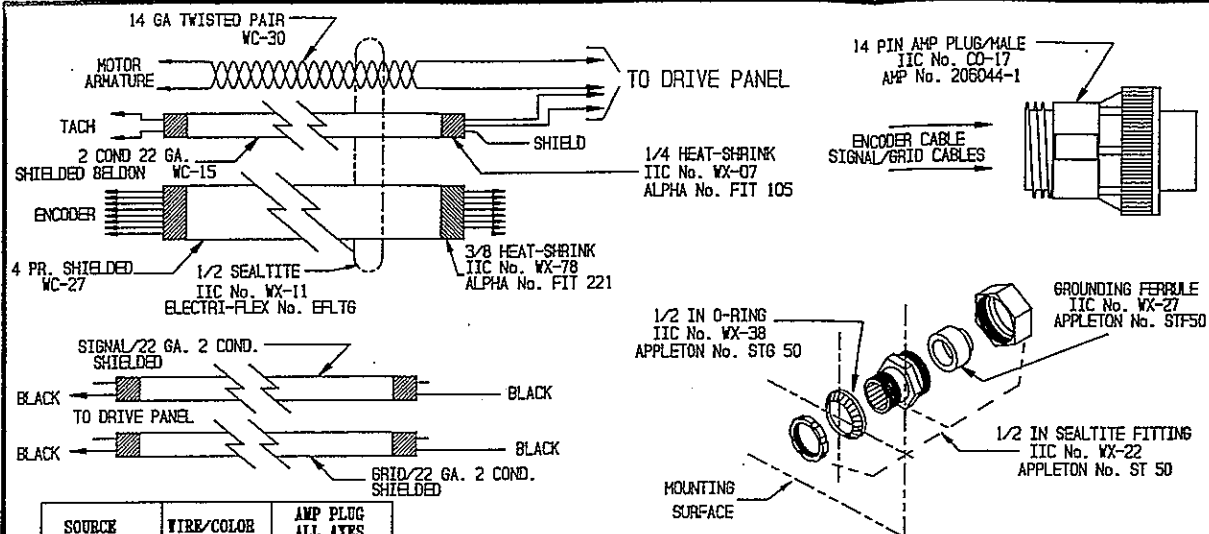


MASTER
BRIGHTNESS



10 9 8 7 6 5 4 3 2 1

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLASSON, NY 55317 (612-474-8100)		
X.XXX	±	TITLE: CRT PC TRIMPOT LOCATOR APPLICATION: GENERAL PRODUCTS SCALE 1:1 DWG NO. 6-02-018-101 SIZE B DATE: 20 SEP 88 DRAWN BY REUTER SHEET NO. 1 OF 1		
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				



SOURCE	WIRE/COLOR	AMP PLUG ALL AXES
TACH SHIELD	18 GA. GRN	TB-6
CH. A BRWN	1 BLK 22 GA	P-1
CH. A BRN/WHT	1 RED 22 GA	P-2
CH. B GREEN	2 BLK 22 GA	P-3
CH. B GRN/WHT	2 RED 22 GA	P-4
MARKER ORG	3 RED 22 GA	P-5
MARKER OR/WHT	3 BLK 22 GA	P-6
+5VDC RED	4 BLK 22 GA	P-7
GND BLACK	4 RED 22 GA	P-8
SHIELDS	18 GA. GRN	TB-6
SIGNAL	22 GA	P-11
GRID	22 GA.	P-10

SOURCE	COLOR/WIRE	X	Y	Z
MOTOR +	RED 14 GA	TB-35	TB-44	TB-53
MOTOR -	BLK 14 GA	TB-36	TB-45	TB-54
TACH +	RED 22 GA	TB-29	TB-38	TB-47
TACH -	BLK 22 GA	TB-30	TB-39	TB-48
SIGNAL	RED 22 GA	TB-28	TB-37	TB-46
GRID	BLK 22 GA	TB-34	TB-43	TB-52

GENERAL NOTES

TACH WIRES:

CUT OFF SHIELD ON MOTOR END AND SECURE WITH HEAT-SHRINK. PULL 4 IN. WIRE THRU SHIELD AND SECURE WITH HEAT-SHRINK. LABEL SHIELD AS '6'.

ENCODER WIRES:

CUT OFF SHIELD ON MOTOR ENDS AND SECURE WITH HEAT-SHRINK. LABEL AS 1,2,3,4. PULL 4 IN. WIRE THRU SHIELDS. PLACE MALE AMP PINS ON WIRES. LABEL WIRES 1 THRU 8. INSTALL PINS TO PLUG.

GRID WIRE:

CUT OFF SHIELD AND RED WIRE ON MOTOR END. SECURE WITH HEAT-SHRINK. LABEL AS '10'. CUT OFF RED WIRE AND COVER SHIELD WITH HEAT-SHRINK. PLACE MALE AMP PIN ON BLACK WIRE AND INSTALL INTO PLUG.

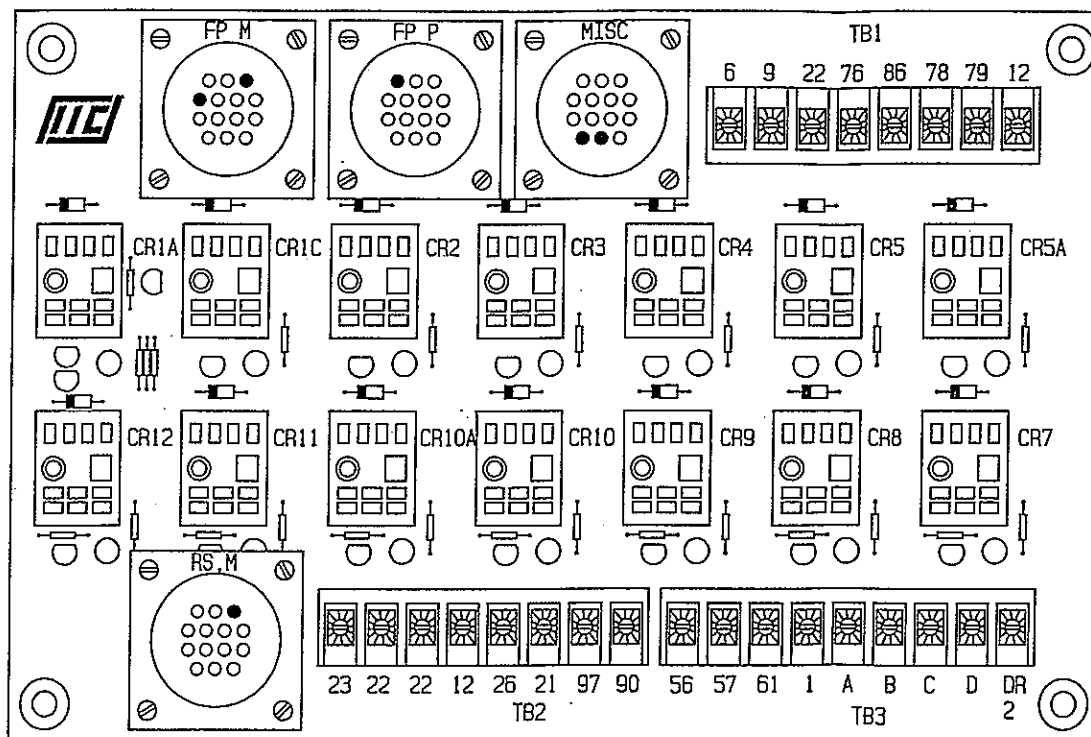
SIGNAL WIRE:

CUT OFF SHIELD AND BLACK WIRE ON MOTOR END. SECURE WITH HEAT-SHRINK. LABEL AS '11'. CUT OFF BLACK WIRE AND COVER SHIELD WITH HEAT-SHRINK. PLACE MALE AMP PIN ON RED WIRE AND INSTALL INTO PLUG.

ARMATURE WIRES (PARTNER V)

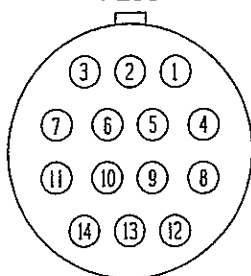
12 GA. RED/BLACK TWISTED PAIR

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED				
X.XXX	±	INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLHASTEN, NY 55317 (612-474-8100)		
X.XX	±			
X.X	±			
X.X	±			
ANGLE	±	TITLE: X,Y,Z MOTOR CABLES/ASSY.		
MATERIAL/FINISH		APPLICATION: GENERAL PRODUCTS		
SCALE 1:1		DWG NO. 6-04-018-006	SIZE B	
DATE: 7 DEC 88		DRAWN BY REUTER	SHEET NO. 1 OF 2	



REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED X.XXX ± X.XX ± X.X ± ANGLE ±				
MATERIAL/FINISH				
SCALE 1:1 DATE: 15 NOV 88				
DESCRIPTION INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLASSER, NY 55317 (612-474-8100)				
TITLE: PC-REL-1B PANEL ASSY. APPLICATION: GENERAL PRODUCTS				
DWS NO. 6-03-018-000 DRAWN BY REUTER SHEET NO. 1 OF 1				
SIZE B				

FEMALE AMP PLUG



TERMINAL BLOCK

1 2 3 4 5 6 7 8

PIN F.P.M.

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 CCW	CR5-11 CR8-4
9	TOOL CHG RESET	RSM-2
10	SPINDLE STOP	RSM-3
11	COOLANT SPRAY	CR-7
12	SPINDLE CW	CR-14 CR8-7
13	RESET	RSM-6
14	COOLANT FLOOD	CR8

PIN F.P.P.

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 MISC.

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 RSM (CNC)

No.	FUNCTION	INT. DEST.
1	SPINDLE CCW	CR10A-10
2	TOOL CHG RESET	CR-8 CR-4
3	SPINDLE STOP	FPW-10
4	SPINDLE ANALOG	TB2-7
5	SPINDLE CW	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	CR-10 CR-8
13	LUBE FAULT	TB1-6
14	WAIT CHANNEL	TB1-14

NOTES:

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

T.B. 1

T.B. No.	FUNCTION	INT. DEST.
1 (6)	OVER TRAVEL LIMITS	CR5-9 CR2-4
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

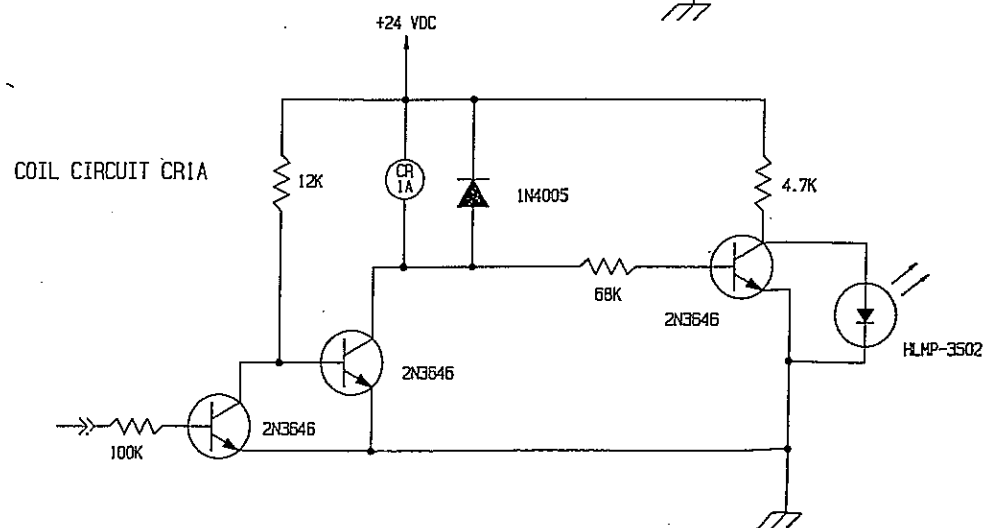
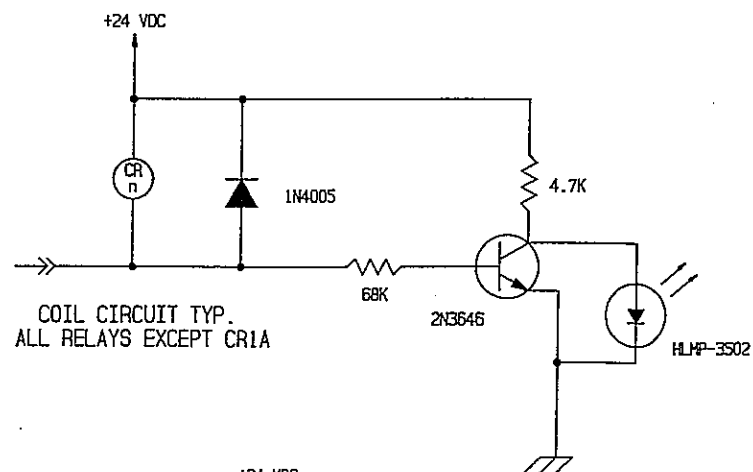
T.B. 2

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

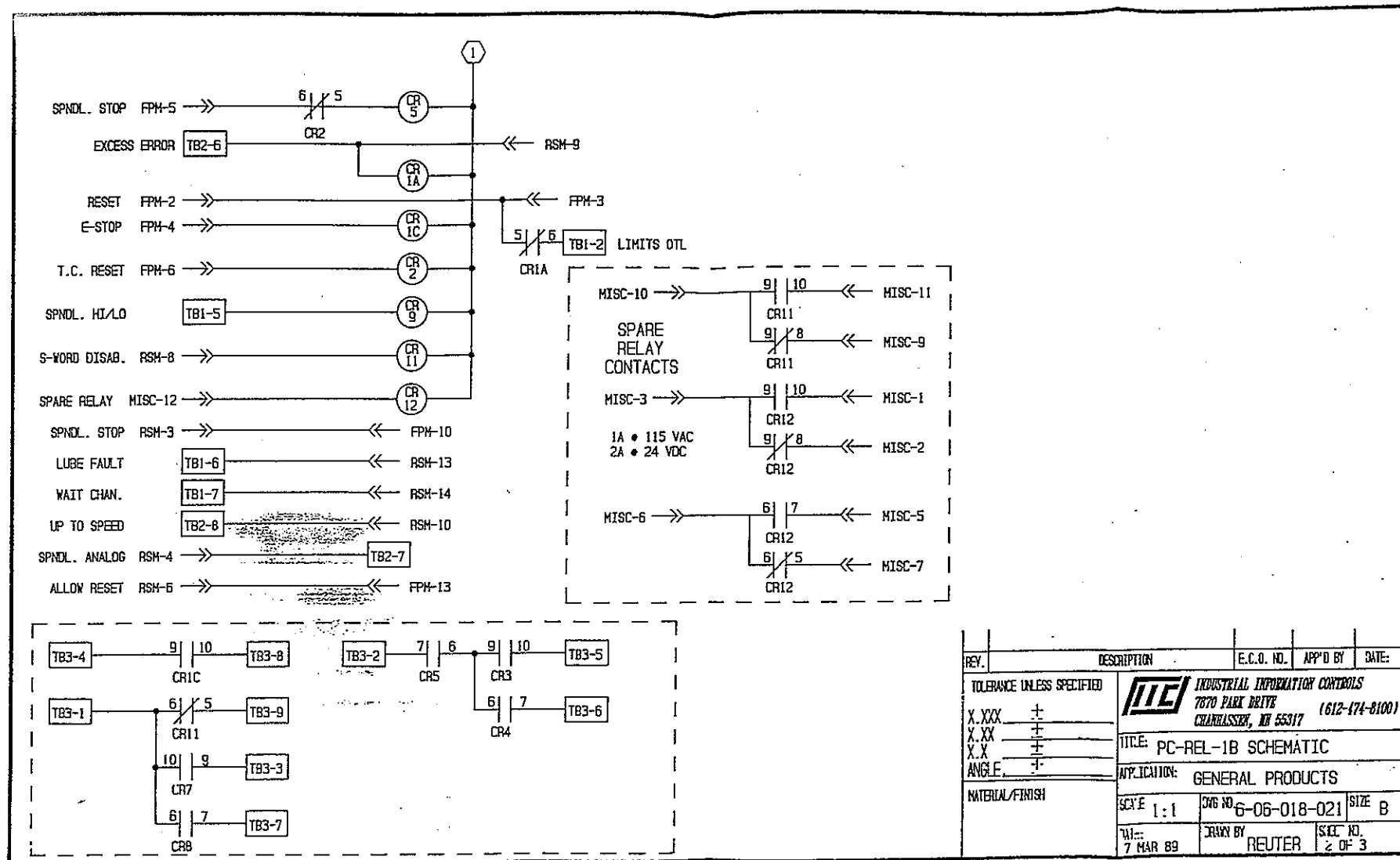
T.B. 3

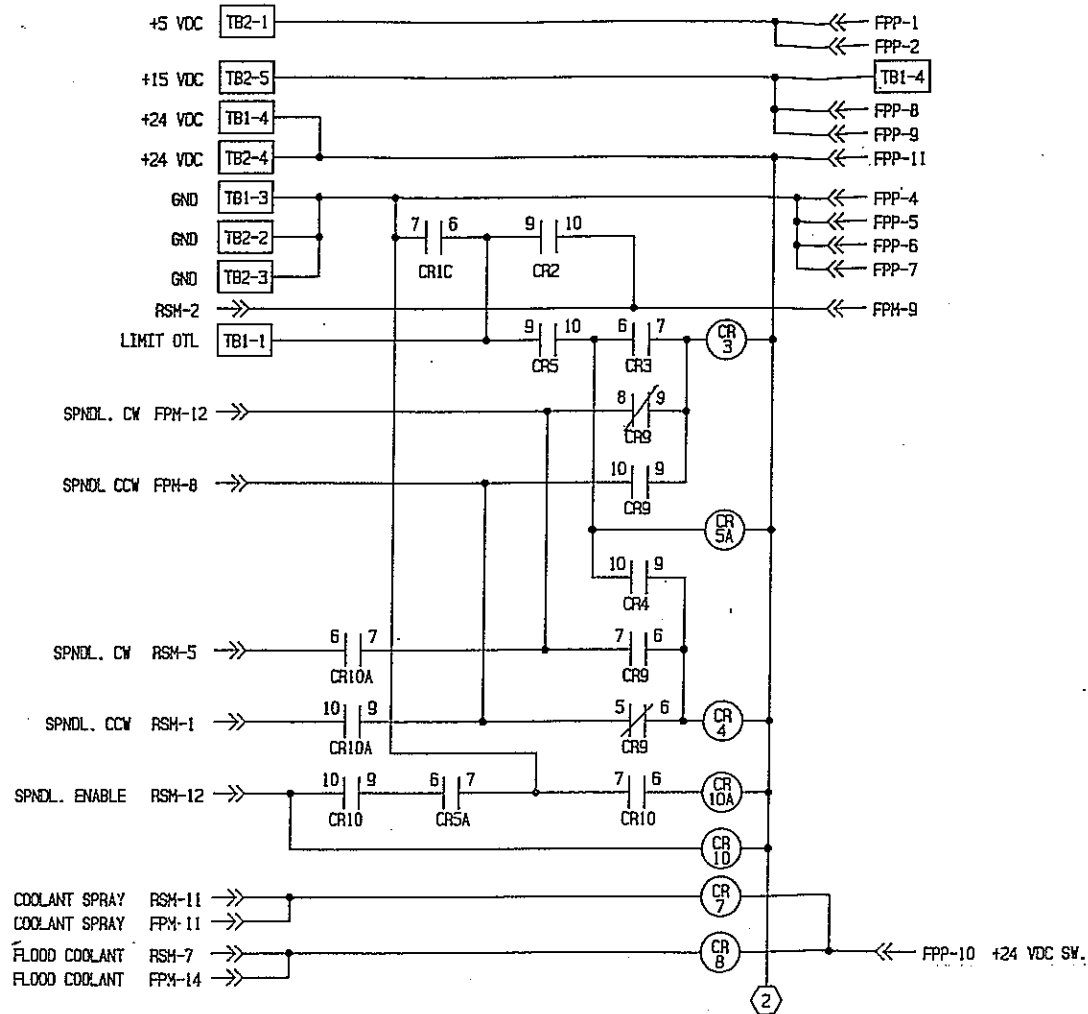
T.B. No.	FUNCTION	INT. DEST.
1(56)	AC MAGNETICS	CR1-4 CR-8 CR-4
2(57)	AC MAGNETICS	CR5-7
3(61)	AC MAGNETICS	CR7-9
4(1)	AC MAGNETICS	CR1C-9
5(A)	AC MAGNETICS	CR3-10
6(B)	AC MAGNETICS	CR4-7
7(C)	AC MAGNETICS	CR8-7
8(D)	AC MAGNETICS	CR1C-10
9(DR2)	AC MAGNETICS	CR11-5

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				
 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLHASSER, MN 55317 (612-474-8100)				
TITLE: PC REL. 1B I/O PLUG DEF.				
APPLICATION: GENERAL PRODUCTS				
SCALE 1:1	DRG 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		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLISSE, NY 55317 (612-474-8100)		
X.XXX	±			
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: MAR 89		DRAWN BY REUTER		SER. NO. 3 OF 3

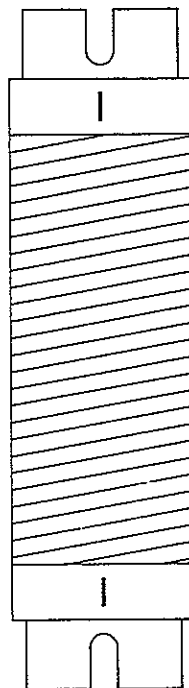
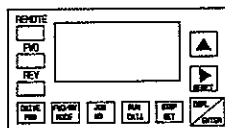




REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				
INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLISSEN, NY 55317 (612-474-8100) TITLE: PC-REL-1B SCHEMATIC APPLICATION: GENERAL PRODUCTS SCALE: 1:1 DATE: 6 MAR 89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

Varispeed 616G II

230V Series
YASKAWA Electric Co., Ltd. JAPAN



REGENERATION RESISTOR
25 Ω 1kW
MILLWAUKEE No. 40-240-25RC
IIC No. RE-85

APPLICATIONS

YASKAWA MODEL CIMR 5.5G2
IIC No. PS-17
RESISTOR: RE-85
FOR USE ON PARTNER MILLS
III, IV, V

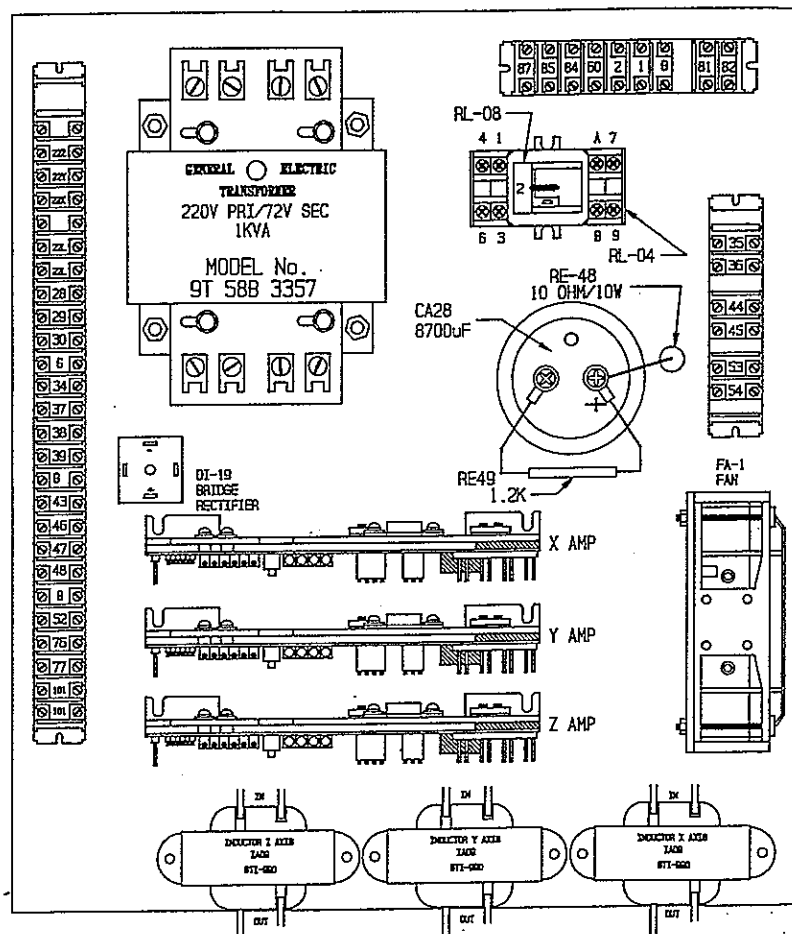
YASKAWA MODEL CIMR 2.2G2
IIC No. PS-19
RESISTOR: RE-84
FOR USE ON PARTNER MILLS
I & II

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
	TOLERANCE UNLESS SPECIFIED			
	X.XXX $\pm$			
	X.XX $\pm$			
	X.X $\pm$			
	ANGLE $\pm$			
	MATERIAL/FINISH			
	SCALE 2.25:1	DWG NO. 6-03-018-010	SIZE B	
	DATE: 27 MAR 89	DRAWN BY: REUTER	SHEET NO. 1 OF 1	

ITC INDUSTRIAL INFORMATION CONTROLS
7870 PARK DRIVE
CHARLHASTEN, MN 55317 (612-474-8100)

TITLE: YASKAWA CONTROL PANEL

APPLICATION: GENERAL PRODUCTS

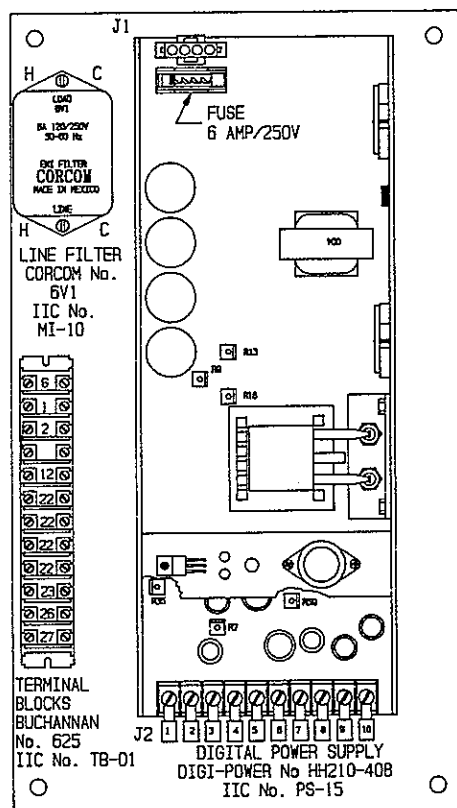


REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				
SCALE 2.5:1		DWG NO. 6-03-018-004	SIZE B	
DATE: 18 NOV 88		DRAWN BY REUTER	SHEET NO. 1 OF 1	

INDUSTRIAL INFORMATION CONTROLS
7870 PARK DRIVE
CHARLHAM, NH 03017 (612-474-8100)

TITLE: 3 AXIS DRIVER AMP BOARD

APPLICATION: GENERAL PRODUCTS



POWER SUPPLY DATA

J1-1	115VAC HOT OUTPUT
J1-2	NOT USED
J1-3	CHASSIS GROUND
J1-4	115VAC COMMON INPUT
J2-1	NOT USED (POWER FAIL)
J2-2	GND. (POWER FAIL RET.)
J2-3	-15VDC • 1.5A OUTPUT
J2-4	GROUND
J2-5	+24VDC • 2.0A OUTPUT
J2-6	+15VDC • 4.0A OUTPUT
J2-7	GROUND
J2-8	GROUND
J2-9	+5VDC • 20A OUTPUT
J2-10	+5VDC • 20A OUTPUT

J1 CONNECTOR - AMP P/N 350779-1
J1 SOCKET - AMP P/N 350689-1

R9-ILIM ADJ.: PRESET TO 120% TOTAL POWER OUTPUT
R13-OVP ADJ.: PRESET TO 140% (ALL OUTPUTS)
R16-B+ ADJ.: PRESET (INTERNAL VOLTAGE)

ASSEMBLY WIRING (ALL 14 GA.)

FROM	TO	FROM	TO
J1-3	TB-6	J2-5	P-4
LF-GND	TB-6	J2-6	TB-26
LF-LINE-C	TB-1	J2-6	P-6
J1-4	LF-LOAD-H	J2-6	P-8
LF-LINE-H	TB-2	J2-7	TB-22
J1-1	LF-LOAD-C	J2-7	P-13
J2-2	TB-22	J2-8	TB-22
J2-2	P-10	J2-8	P-11
J2-3	TB-27	J2-8	P-12
J2-3	P-7	J2-9	P-1
J2-4	TB-22	J2-9	P-2
J2-4	P-14	J2-10	TB-23
J2-5	TB-12	J2-10	P-3

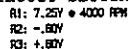
TRIM POT DEFINITIONS

R 9 ILIM ADJUST	R35 +5V ADJUST
R13 OVP ADJUST	R57 -15V ADJUST
R16 +3V ADJUST	R58 +15V ADJUST

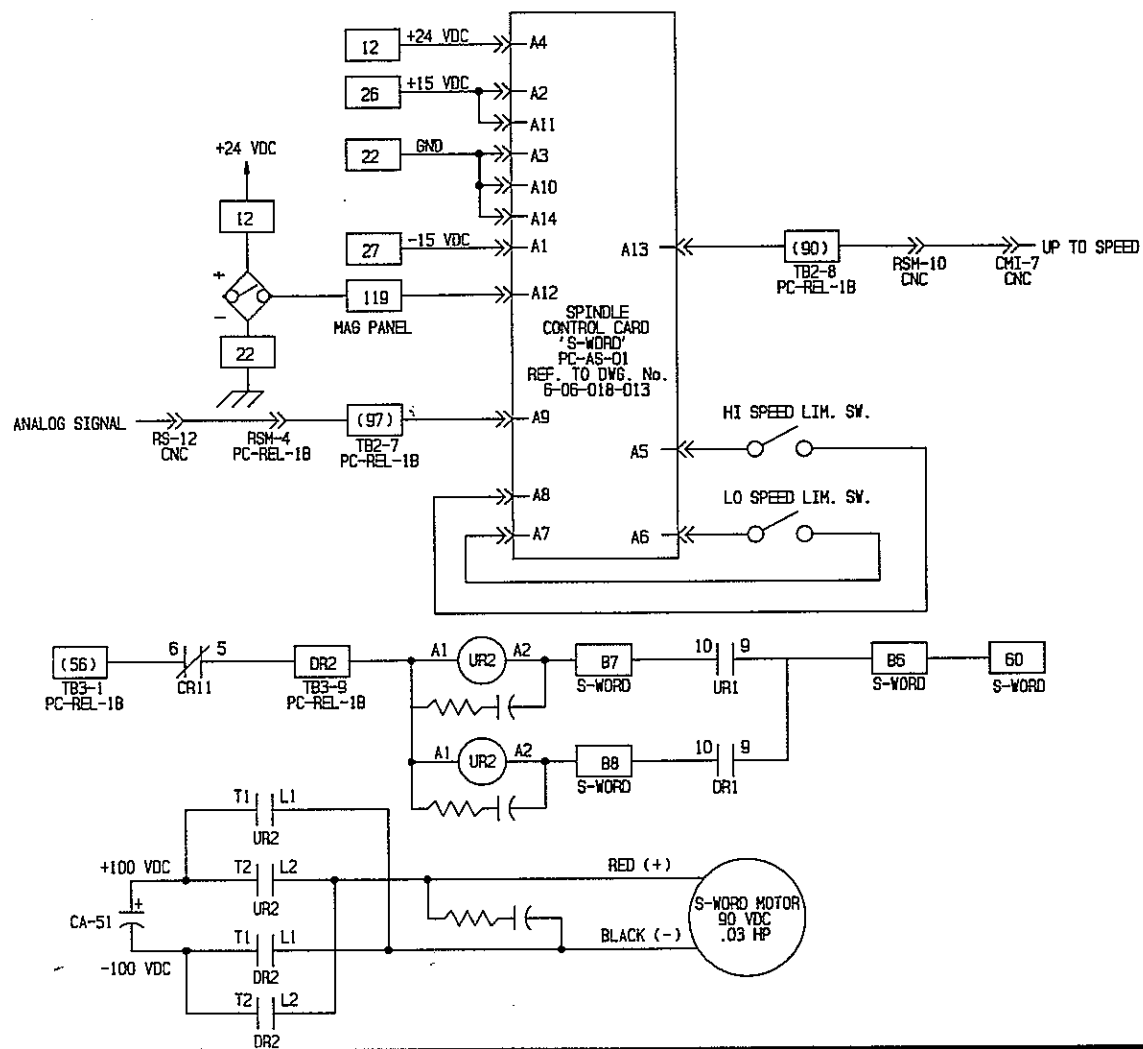
NOTES:

1. 'P' DESIGNATES MALE AMP PLUG, CO-17
2. USE 14 GA. BLUE WIRE (WC-05) FOR P-PLUG ALL LENGTHS: 38 IN. STAND ALONE MODELS LEGTH: 30 IN.
3. BEND J2 WIRES TO RIGHT FOR STAND ALONE MODELS. BEND J2 WIRES TO LEFT FOR ALL OTHER APPLICATIONS.

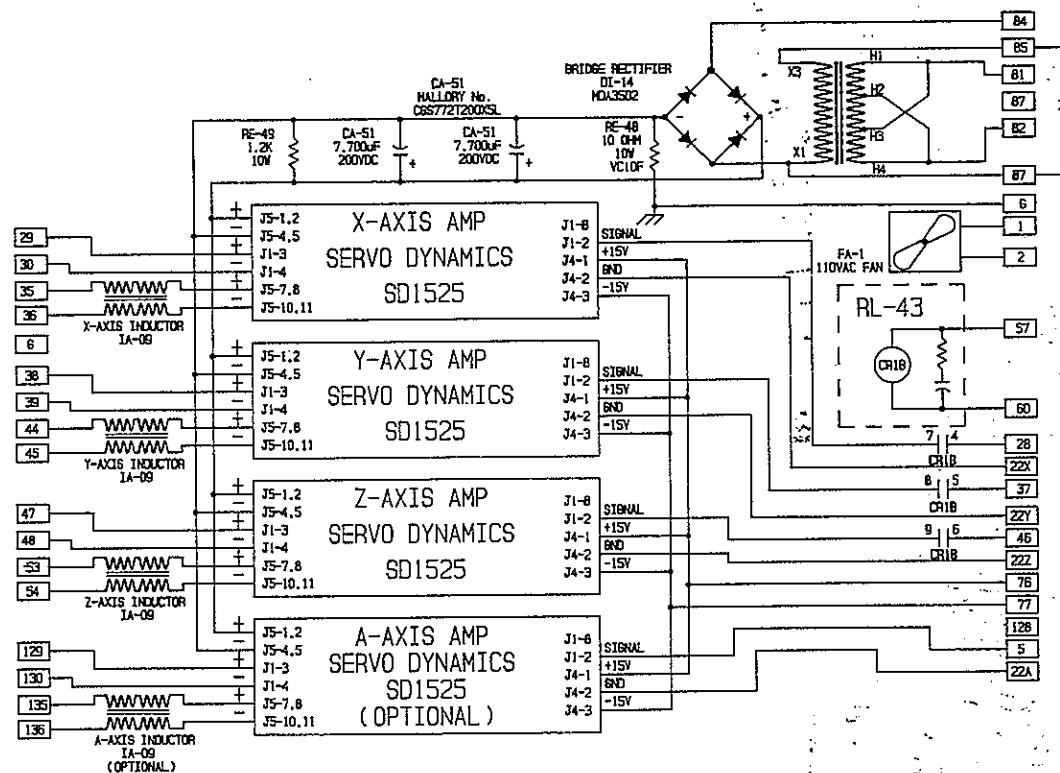
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHATELAIN, NY 55317 (612-474-8100)		
X.XXX	±	TITLE: DIGITAL PWR. PANEL ASSY.		
X.XX	±			
X.X	±			
ANGLE	±	APPLICATION: GENERAL PRODUCTS		
MATERIAL/FINISH		SCALE 2.5:1	DWG NO 6-03-018-001	SIZE B
		DATE: 17 NOV 88	DRAWN BY REUTER	SHEET NO. 1 OF 1



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHATELAIN, MN 55317 (612-474-8100)		
X.XXX	±	TITLE: PC-AS-01 (S-WORD) SCHEMATIC APPLICATION: GENERAL PRODUCTS		
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH		SCALE 1.5:1	DRG NO. 6-06-018-013	SHEET 8
		DATE: 20 MAR 89	DRAWN BY REUTER	SHEET 1 OF 1



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
X	±			
ANGLE	±			
MATERIAL/FINISH				
INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHANNESSE, NH 05517 (602-474-8100) TITLE: PC-AS-01 (S-WORD) INTERCONNECT APPLICATION: GENERAL PRODUCTS				
SCALE 1:1		DWG NO. 6-06-018-017		SIZE B
DATE: 17 MAR 89		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 ±			
	MATERIAL/FINISH			
	SCALE 1.75:1	DWG NO. 6-05-018-018	SIZE B	
	DATE: 21 MAR 89	DRAWN BY: REUTER	SHEET NO. 1 OF 1	

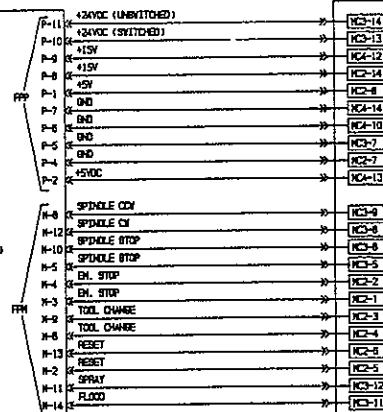
ITE INDUSTRIAL INFORMATION CONTROLS
7870 PARK DRIVE (612-474-8100)
CHANNASSEN, MN 55317

TITLE: 4-AXIS DRIVE SCHEMATIC

APPLICATION: GENERAL PRODUCTS

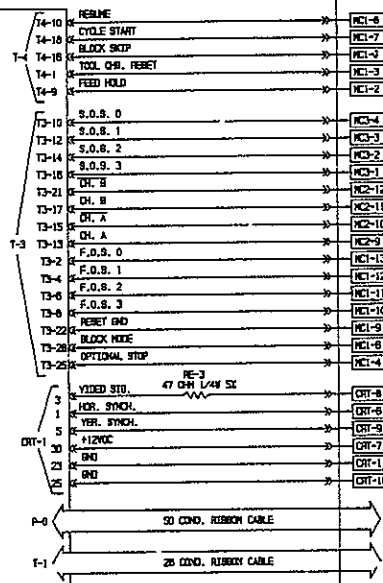
RELAY CARD PC-REL-1B

REF. TO DWG. No.
6-06-018-021 (SCHEMATIC)
6-04-018-005 (PLUG DEF.)
6-03-018-000 (PANEL LAYOUT)



FRONT PANEL REF. TO DWG. No. 6-06-018-026 (SCHEMATIC)

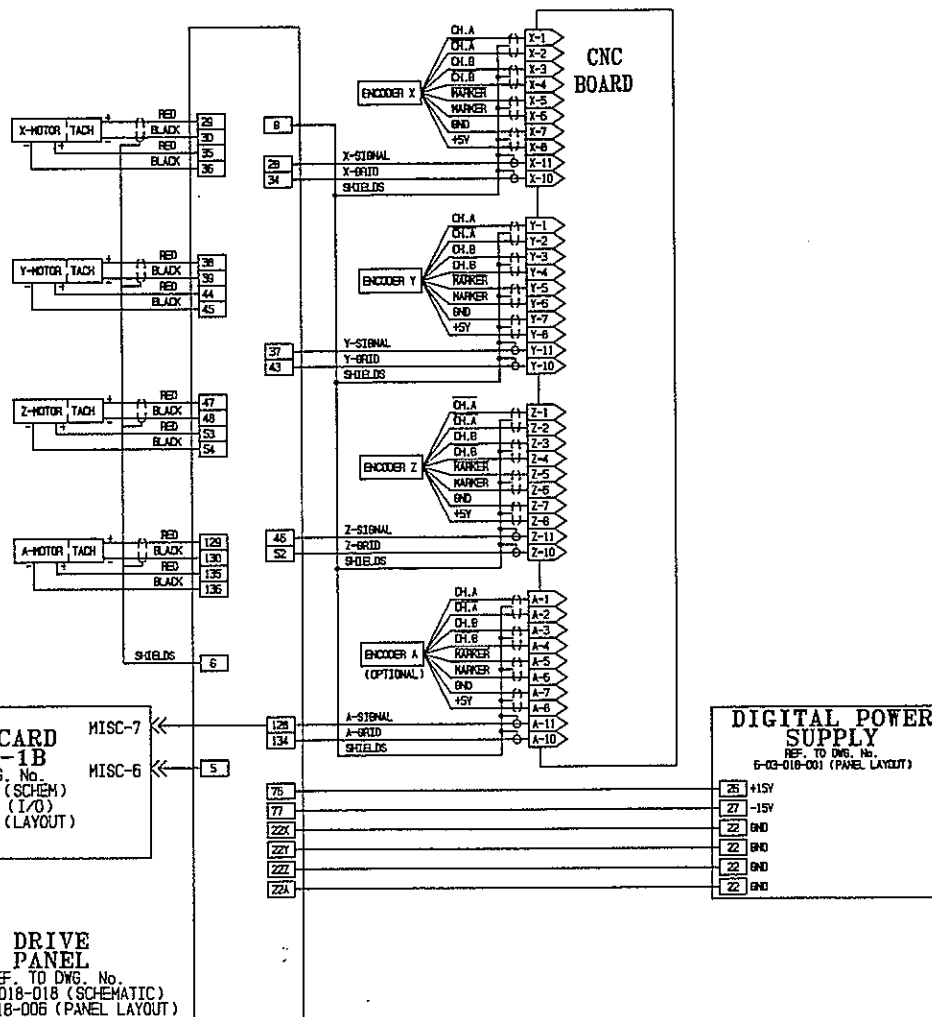
CNC BOARD



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHANTLISSEN, NY 55317 (612-474-8100)		
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH		TITLE: CNC/FRONT PANEL INTERFACE		
APPLICATION:		GENERAL PRODUCTS		
SCALE: 2.25:1		DWG NO. 6-06-018-027		SIZE B
DATE: 27 MAR 89		DRAWN BY REUTER		SHEET NO. 1 OF 1

RELAY CARD
PC-REL-1B
REF. TO DWG. No.
6-06-018-021 (SCHEM)
6-04-018-005 (I/O)
6-03-018-000 (LAYOUT)

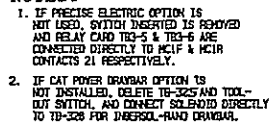
DRIVE
PANEL
REF. TO DWG. No.
6-06-018-018 (SCHEMATIC)
6-03-018-006 (PANEL LAYOUT)



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
	TOLERANCE UNLESS SPECIFIED			
	X.XXX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	SCALE 2:1	DWG NO. 6-06-018-028	SIZE B	
	DATE: 29 MAR 89	DRAWN BY REUTER	SHEET NO. 1 OF 1	

ITC INDUSTRIAL INFORMATION CONTROLS
7870 PARK DRIVE
CHANNASSEN, MN 55317 (612-474-8100)

TITLE: MOTOR/ENCODER INTERFACE
APPLICATION: GENERAL PRODUCTS



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED	 INDUSTRIAL INFORMATION CONTROLS 7870 PIRT DRIVE CHANASSA, NY 55317 (612-474-8100)			
X.XXX ±	TITLE: MAG PANEL WIRING/AC APPLICATION: GENERAL PRODUCTS			
X.XX ±				
X.X ±				
X.X ±				
ANGLE ±	SCALE 2:1 DWG NO. 6-06-018-022 SIZE B			
MATERIAL/FINISH	DATE: 27 MAR 89 DRAWN BY REUTER SHEET NO. 1 OF 1			

TERMINAL BLOCK DESIGNATORS

1.	115 VAC HOT.	129.	A-MOTOR TACH +
2.	115 VAC COMMON	130.	A-MOTOR TACH -
6.	X OTL SW. OUT.	134.	A-GRID SWITCH
7.	Y OTL SW. OUT/X OTL SW. IN	135.	A-MOTOR +
8.	Z OTL SW. OUT/Y OTL SW. IN	136.	A-MOTOR -
9.	Z OTL SW. IN	328.	POWER DRAWBAR
12.	+24 VDC FROM PWR. SUPPLY	F1.	SW. 115 VAC TO FLOOD COOLANT
22.	GROUND FROM PWR. SUPPLY	6.	CHASSIS GROUND
23.	+5 VDC FROM PWR. SUPPLY	22L.	MACHINE SW. GROUND
25.	+15 VDC FROM PWR. SUPPLY	22X.	X-AMP GROUND
27.	-15 VDC FROM PWR. SUPPLY	22Y.	Y-AMP GROUND
28.	X-AMP ANALOG SIGNAL	22Z.	Z-AMP GROUND
29.	X-MOTOR TACH +	22A.	A-AMP GROUND
30.	X-MOTOR TACH -		
34.	X-GRID SWITCH		
35.	X-MOTOR +		
36.	X-MOTOR -		
37.	Y-AMP ANALOG SIGNAL		
38.	Y-MOTOR TACH +		
39.	Y-MOTOR TACH -		
43.	Y-GRID SWITCH		
44.	Y-MOTOR +		
45.	Y-MOTOR -		
46.	Z-AMP ANALOG SIGNAL		
47.	Z-MOTOR TACH. +		
48.	Z-MOTOR TACH. -		
52.	Z-GRID SWITCH		
53.	Z-MOTOR +		
54.	Z-MOTOR -		
56.	115 VAC FOR FLOOD/SPRAY		
57.	SW. 115 VAC HOT		
60.	SW. 115 VAC COMMON		
61.	115 VAC FOR SPRAY		
65.	SW. 220 VAC FOR AUTOLUBE		
66.	220 VAC FOR AUTOLUBE		
74.	SW. 115 VAC FOR A-AXIS BRAKE		
76.	+15 VDC FOR AMPS		
77.	-15 VDC FOR AMPS		
78.	LUBE FAULT SWITCH		
79.	WAIT CHANNEL SWITCH		
81.	220 VAC FOR DRIVE TRANSFORMER		
82.	220 VAC FOR DRIVE TRANSFORMER		
84.	SW. 72 VAC TO RECTIFIER		
85.	SW. 72 VAC TO DRIVE TRANSFORMER		
86.	SPINDLE HI/LO PROX. SWITCH		
87.	72 VAC TO RECTIFIER		
101.	DRIVE AMPS DISABLE		
119.	S-WORD PROX. SWITCH		
120.	CR-11 COIL S-WORD DISABLE		
121.	CR-12 COIL		
129.	A-AMP ANALOG SIGNAL		

RELAYS

CR1.	RESET
CR1A.	EXCESS ERROR
CR1B.	DRIVE DISABLE
CR1C.	DRIVE RESET
CR2.	TOOL CHANGE RESET
CR3.	SPINDLE CLOCKWISE
CR4.	SPINDLE COUNTERCLOCKWISE
CR5.	SPINDLE STOP
CR5A.	SPINDLE SAFETY
CR7.	SPRAY MIST
CR8.	FLOOD COOLANT
CR9.	SPINDLE HI/LO
CR10.	SPINDLE ENABLE
CR10A.	SPINDLE SAFETY
CR11.	DISABLE S-WORD
CR12.	AUXILIARY RELAY
MC1F.	SPINDLE CW (AC)
MC1R.	SPINDLE CCW (AC)
MC2.	FLOOD COOLANT (AC)
UR1.	UP SPINDLE SPEED (S-WORD)
DR1.	DOWN SPINDLE SPEED (S-WORD)
UR2.	UP SPINDLE SPEED (AC)
DR2.	DOWN SPINDLE SPEED (AC)

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHANHASSEN, MN 55317 (612-474-8100)		
X.XXX	±	TITLE: TERMINAL BLOCK DES.		
X.XX	±	APPLICATION: PARTNER IV		
X.X	±	SCALE: N/A Dwg No. 6-04-015-101 SIZE B		
ANGLE	±	DATE: 22 NOV 88 DRAWN BY: REUTER 1 OF 1		
MATERIAL/FINISH				