

Partner 4-D, 4E, 4S

Operations Manual

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

RL-24,27,32,38 Relays
AM-16 Axis drive card
NU-60 drawbar cylinder
PS-21 Power Supply
MP-03 Gib #57
MP-34 Gib #58

Upper radial bearing (6009) BG-05
Front sliding pulley bearing(6013) BG-29
Front Main pulley bearing (6912) BG-23
Spindle pulley hub bearing (6010) BG-11
Back gear bearing (6203) BG-13 x 2
Spindle thrust (7010 matched) BG-22
Spindle radial BG-20 or BG-12 x 2 (one or the other)
X and Y thrust bearing (7204) BG-01
X axis radial bearing(6204) BG-02
Z axis thrust bearing(30203)BG-10 x 2
Z axis radial bearing (6003) BG-09 x 1

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)	32 in.
Saddle travel (Y axis)	16 in.
Quill travel	5 in.
Knee travel (Z axis manual)	12 in.
RAM travel	Rigid
Max. weight of workpiece	850 lbs.

Table

Overall sizes	13 X 42 in.
T-Slots	3 on 2-1/2 in. centers
T-Slot size	5/8 in.
Height above floor (max.)	47-1/4 in.

Milling

<u>Feed rate</u>	0.1 to 200 IPM
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Space and Weight

Floor area	7 X 10 ft.
Height	82-3/16 in.
Net weight	4,400 lbs.
Shipping weight	4,600 lbs.

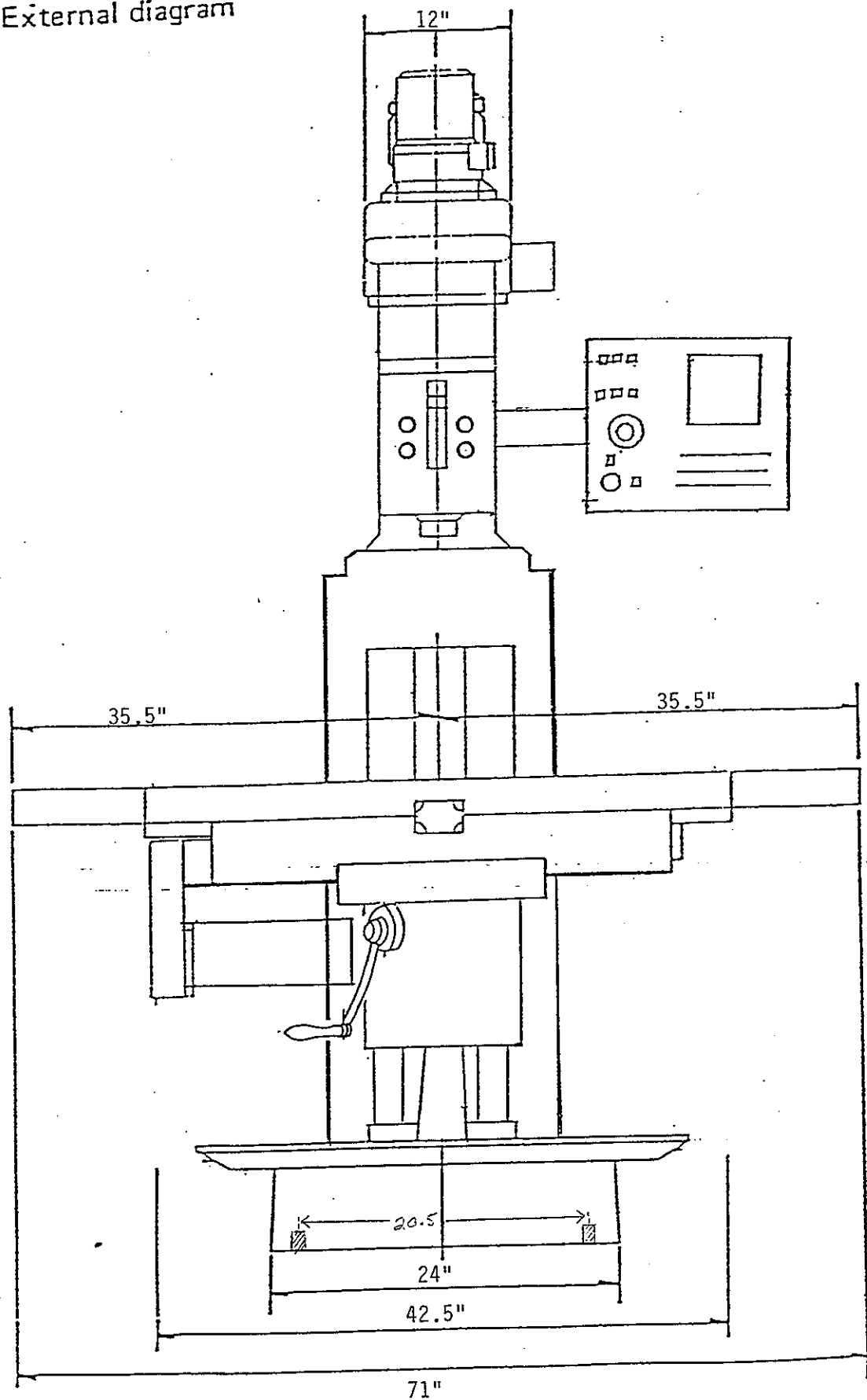
Power

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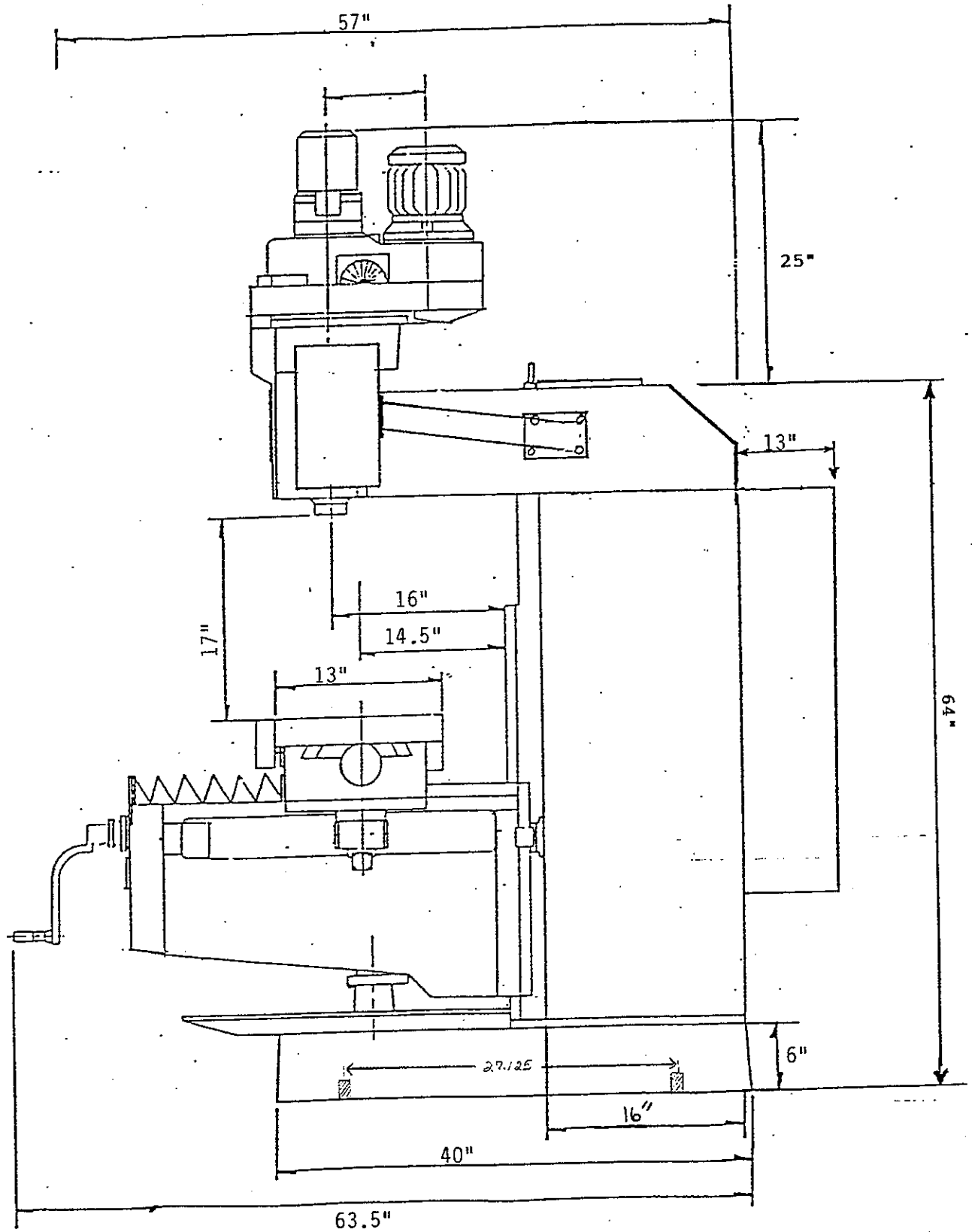
Color

Standard	Gray
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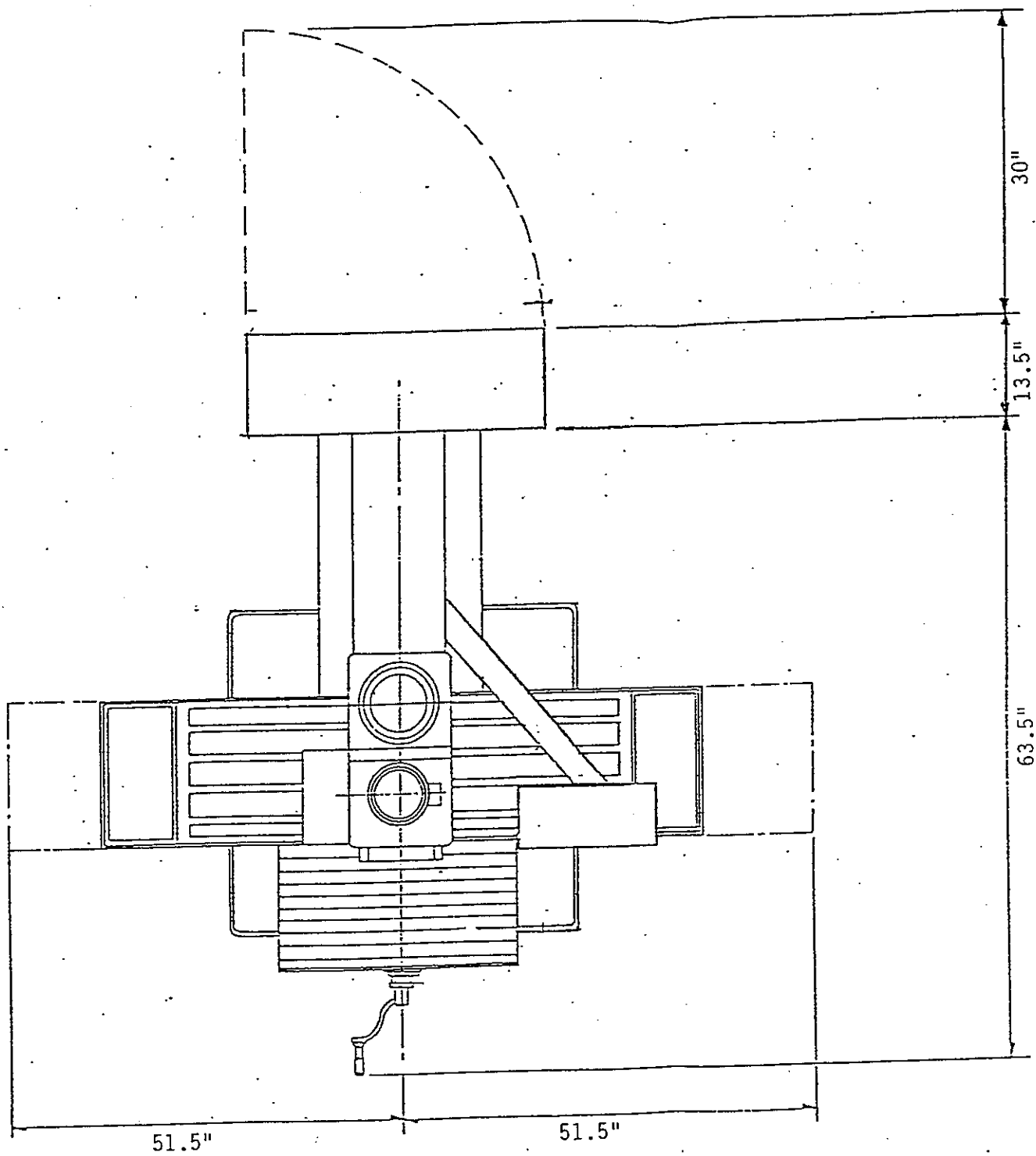
External diagram



PARTNER IV



EXTERNAL 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.

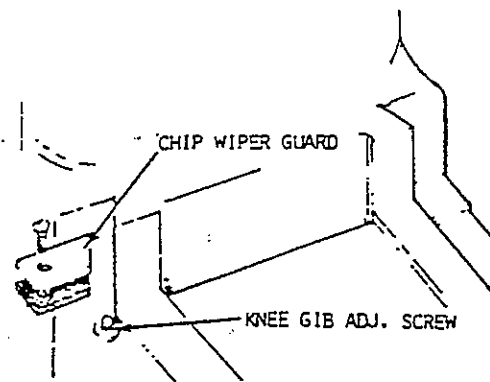


Figure 2. Knee-Column Gib

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.

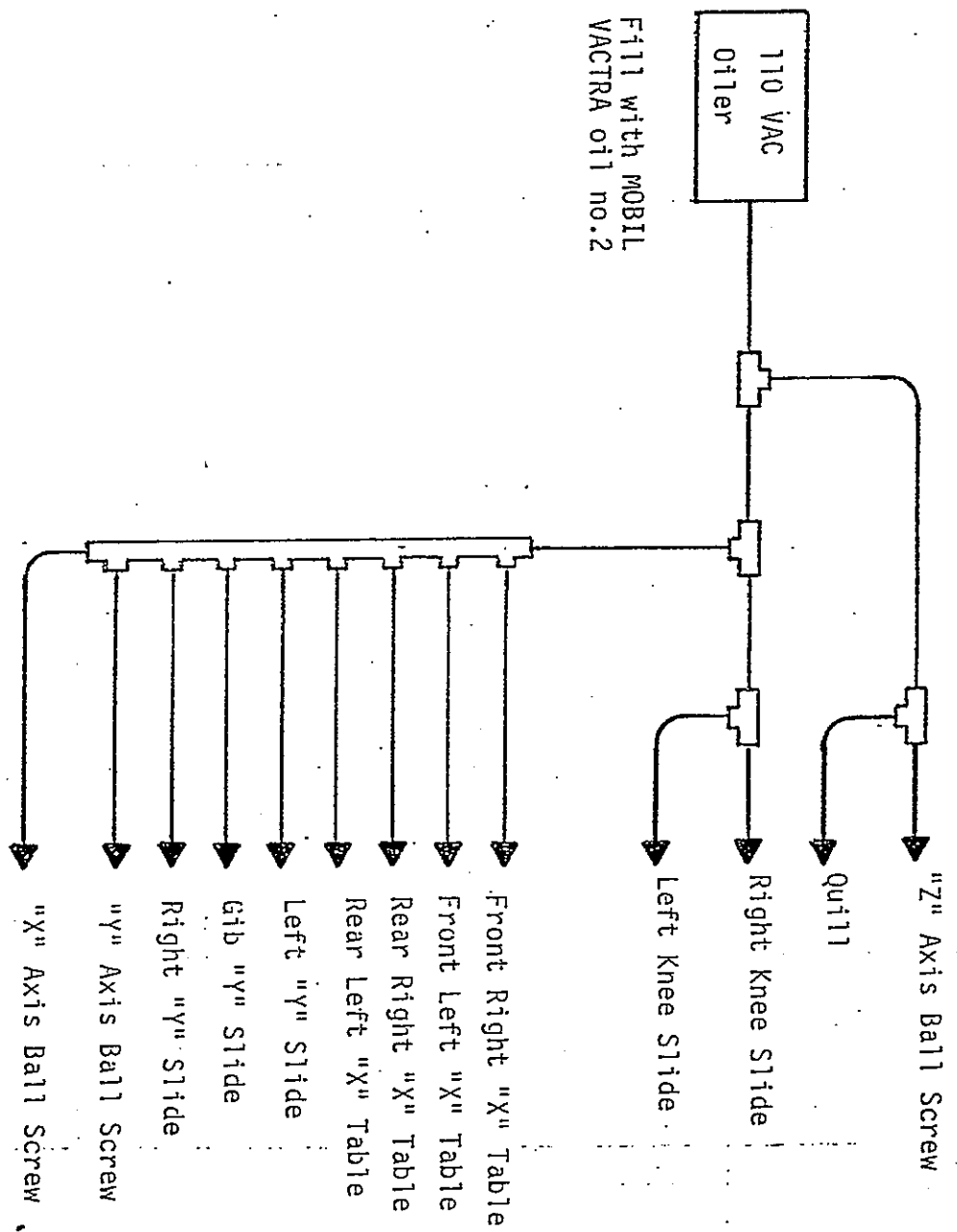
When shifting to "LO," DO NOT FORCE THE LEVER if the back gears do not mesh. Hold the lever so that the gears are clear of one another, rotate the spindle nose by hand until the gears line up, and then put the unit in "LO" (back gear).

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.



WARNING

USE ONLY

**MOBIL VACTRA no.2
AMOCO WAYTAC no.68
SUNOCO SUNWAYLUBE no.1180
OR EQUIVALENT**

MEASURING POWER SUPPLY AND BUSS VOLTAGE USING A DC VOLT METER

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

TABLE 1.1 POWER SUPPLY TERMINAL BLOCK

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

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

TABLE 1.2 BUSS VOLTAGE FOR MILLS

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

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

DRIVE BUSS TRANSFORMERS SETTINGS

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

SYSTEM 110 TRANSFORMER SETTING

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

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 IV YASKAWA SPINDLE PARAMETERS
January 29, 1991

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	(Set M-10, Clear M-11)	OUT. 12	4TH AXIS BRAKE
13	N/O CONTACT	ACROLOOP (P2)	KEY	
14	N/C CONTACT	ACROLOOP (P2)	CONTACT COM.ACROLOOP (P2)	

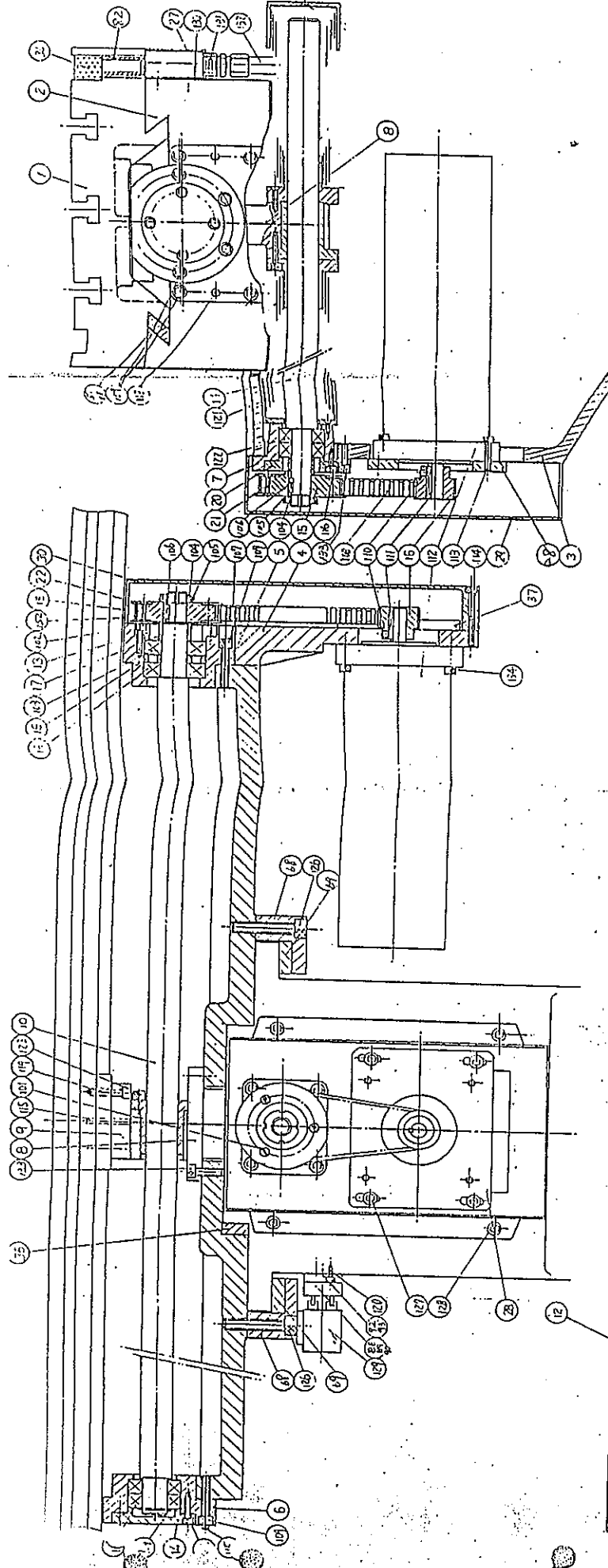
For Manual/Avanti Tool Changer Milling Machines
January 8, 1991

Output Plug Definitions

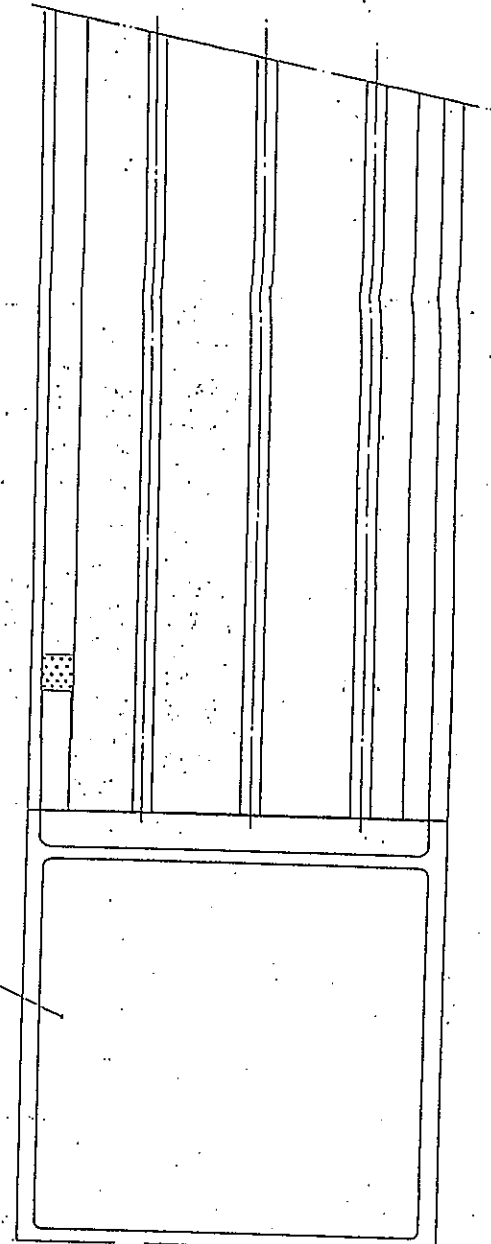
				<u>SET</u>	<u>CLEAR</u>
Yout01	1	M20	output pulsed	M60	M70
Yout02	1	M21	output pulsed	M61	M71
Yout03	1	M22	output pulsed	M62	M72
Yout04	1	M23	output pulsed	M63	M73
Yout05	1	M24	output pulsed	M64	M74
Yout06	1	M25	output pulsed	M65	M75
Yout07	1	M26	output pulsed	M66	M76
Yout08	1	M27	output pulsed	M67	M77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

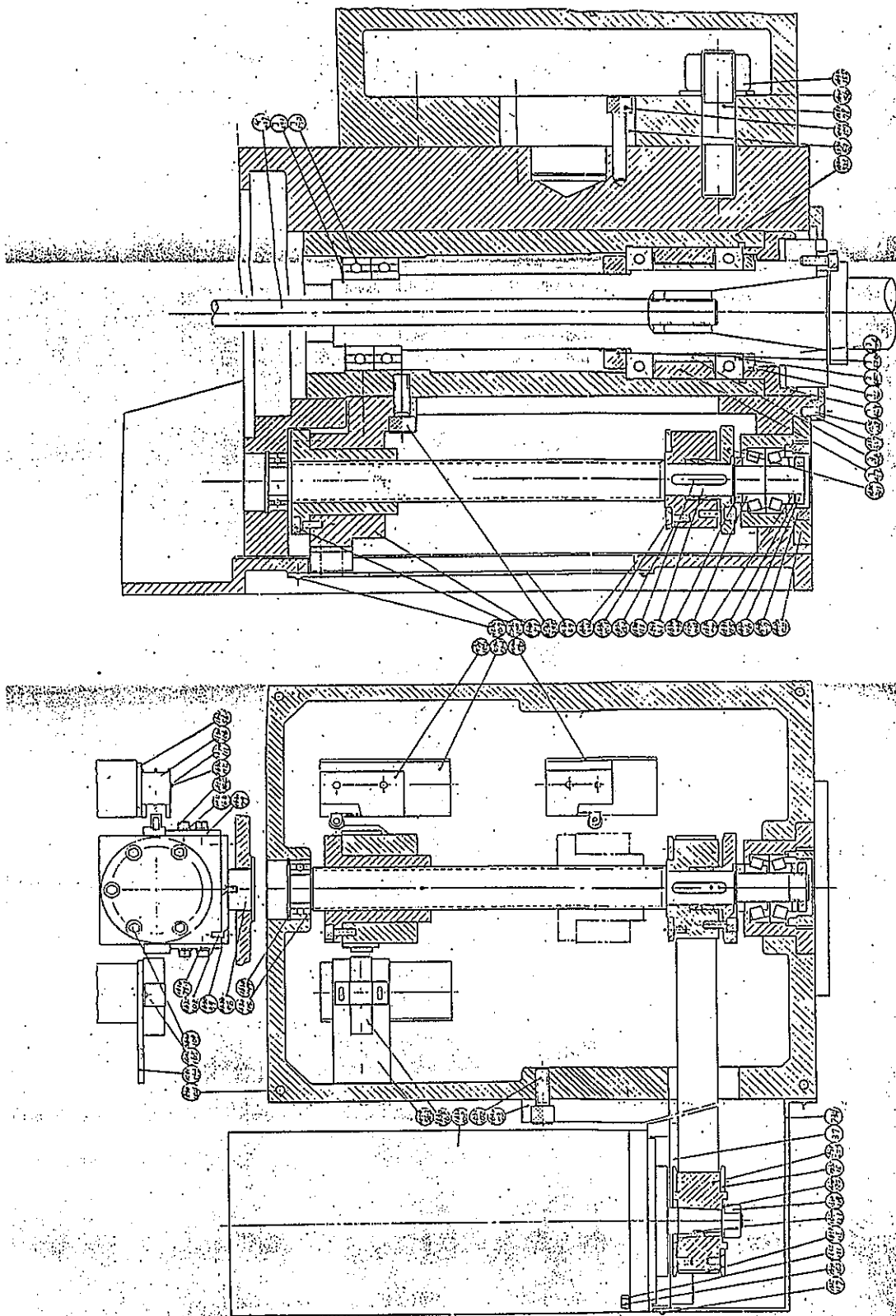
Input Plug Definitions

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

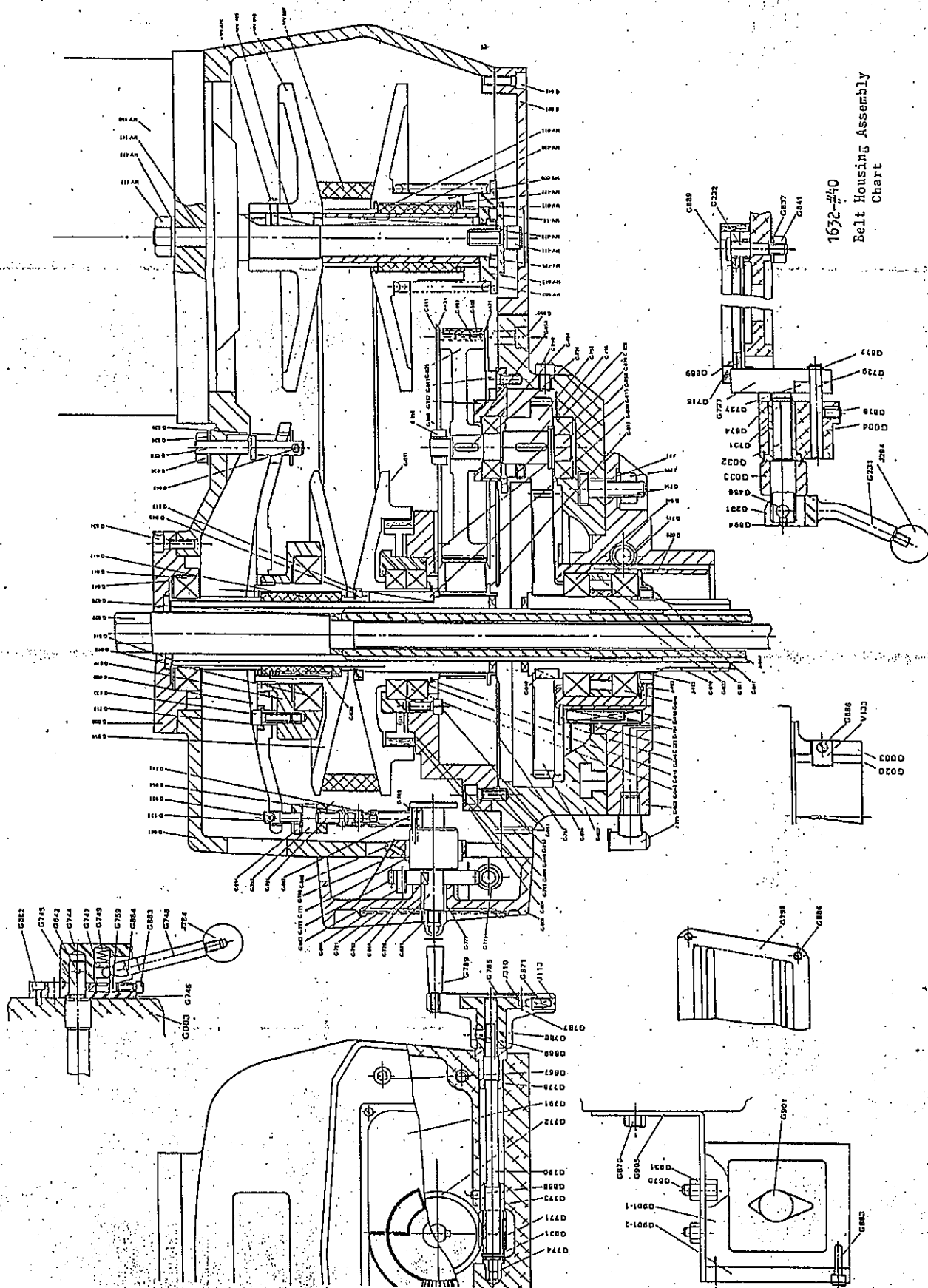


Z axis belt BT-13

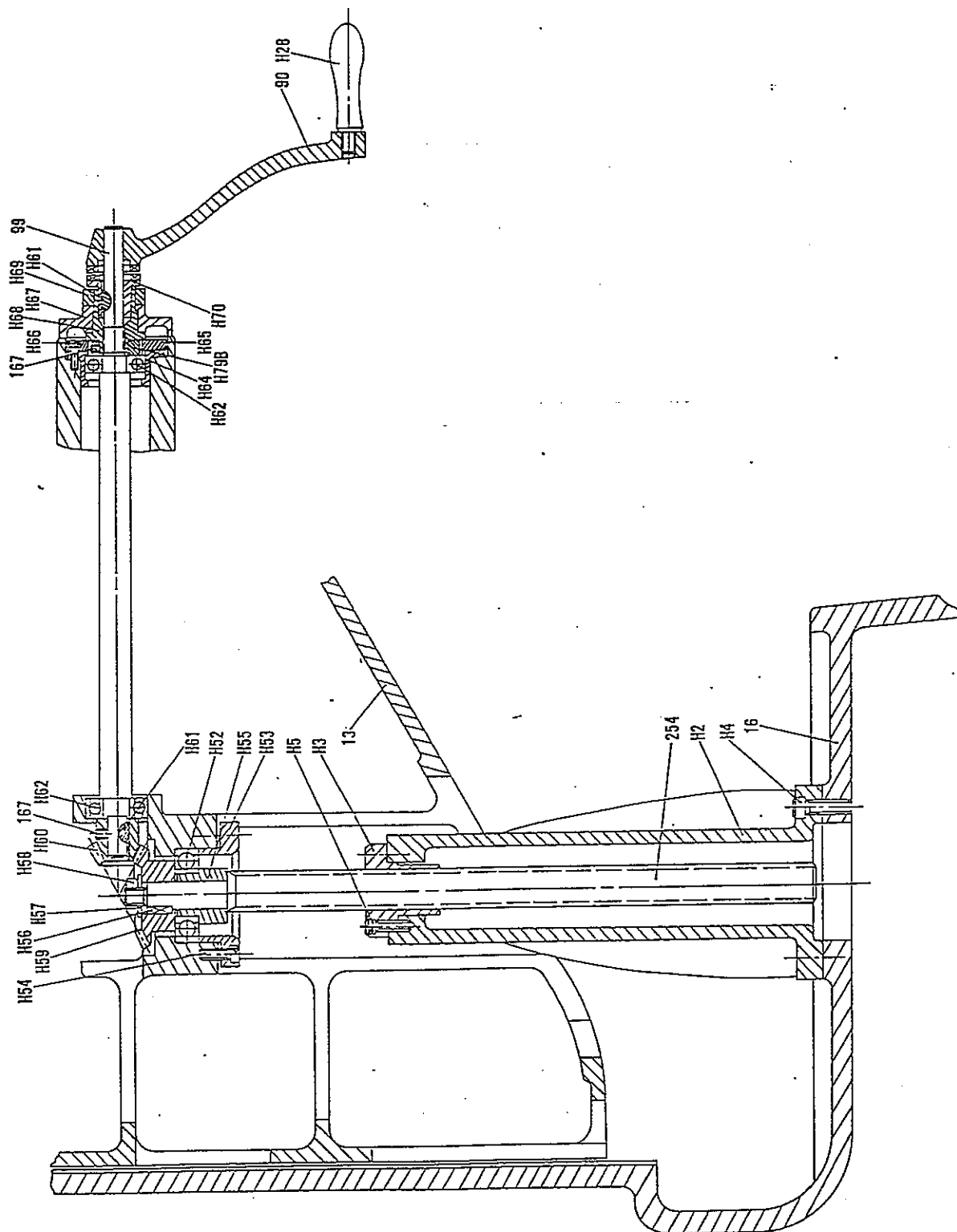




1632-#40
Head Mechanic Assembly



7-5 Knee Elevating Mechanism



Parts List

02	Ball Screw Y (1 Required)	91	Base Oil Pan (1 Required)
03	Bracket (1 Required)	93	Spacer (1 Required)
04	High-Low Speed Sensor Seat (1 Required)	94	Set Plate For MELDAS (1 Required)
05	Bearing Bracket Y (1 Required)	95	Set Plate For MELDAS (1 Required)
06	Bearing Cover (1 Required)	96	Gib Adjusting Screw (10 Required)
07	Spacer (1 Required)	97	Dog For MELDAS (1 Required)
09	Timing Belt Pulley Y (1 Required)	98	Head Fixing Plunger (1 Required)
10	Timing Belt Pulley Flange (12 Required)	99	Gear Shaft (1 Required)
11	Dust Cap (1 Required)	100	5/16-18NC x 1-1/2" LG Socket Cap Screw (4 Required)
13	Knee (1 Required)	101	Spring Washer (12 Required)
14	Table (1 Required)	102	3/8-16NC x 3/4" LG Socket Cap Screw (4 Required)
15	Saddle (1 Required)	103	FANUC - 0M or MELDAS HD-81 Servo Motor (1 Required)
16	Column (1 Required)	104	3/16-24NC x 1/2" LG Socket Cap Screw (6 Required)
17	Column-Knee Gib (1 Required)	105	SKF 6003 Bearing (1 Required)
18	Knee-Saddle Gib (1 Required)	106	OMRON Z156W-22 Limit Switch (2 Required)
19	Saddle-Table Gib (1 Required)	107	3/16-24NC x 1/2" LG Round Head Cap Screw (6 Required)
20	Bearing Bracket (1 Required)	108	3/16-24NC x 1/2" LG Flat Head Screw (5 Required)
21	Bearing Bracket (1 Required)	109	3/16-24NC x 5/8" LG Socket Cap Screw (9 Required)
22	Bearing Cover (2 Required)	110	3/8-24NF x 1-1/4" LG Socket Cap Screw (2 Required)
23	Dust Cap (1 Required)	111	1/8" Washer (6 Required)
24	Dust Cap (1 Required)	112	1/8-40NC x 1-1/8" LG Round Head Screw (6 Required)
25	Timing Belt Pulley (3 Required)	113	#6 x 30 Key (1 Required)
26	Timing Belt Pulley (2 Required)	114	SKF 30203 Bearing (2 Required)
27	Motor Lock Plate (6 Required)	115	AW03 Bearing Washer (2 Required)
28	Cover (1 Required)	116	AN03 Bearing Locknut (2 Required)
29	Motor Seat (1 Required)	117	3/16-24NC x 1/4" LG Round Head Screw (4 Required)
30	Ball Screw X (1 Required)	118	230H x 1" Timing Belt (1 Required)
31	Ball Screw Guard (1 Required)	119	M10 x 1.25 Hexagon Nut (3 Required)
32	Ball Screw Guard (1 Required)	120	3/8" Spring Washer (3 Required)
33	Ball Screw Guard Cover (2 Required)	121	#16 x 5 Woodruff Key (3 Required)
34	Ball Screw Guard (1 Required)	122	3/8-16NC x 1 LG Socket Cap Screw (12 Required)
35	Ball Screw Guard (1 Required)	123	#40 x 600 LG Screw Cover (2 Required)
36	Ball Screw Guard Cover (1 Required)	124	3/8-16NC x 1-3/8" LG Socket Cap Screw (4 Required)
37	Ball Screw Guard Cover (1 Required)	125	3/16-24NC x 1/2" LG Flat Head Screw (2 Required)
38	Fixing Plunger Nut (1 Required)	126	3/16-24NC x 1/2" LG Flat Head Screw (16 Required)
40	Limit Switch Seat (1 Required)	127	FAFNIR MM20BS 47H Bearing (2 Required)
41	Limit Switch Seat (1 Required)	128	1/4-20NC x 5/8" LG Socket Cap Screw (10 Required)
42	Plate (2 Required)	129	3/16-24NC x 5/8" LG Socket Cap Screw (18 Required)
44	Bearing Bracket Z (1 Required)	130	Yamatake LDS-5200K Limit Switch (2 Required)
47	Bearing Cover (1 Required)	131	#6 x 25 Key (2 Required)
48	Turret (1 Required)	132	1/2-20NF Hexagon Nut (2 Required)
49	Ram (1 Required)	133	5/16-18NC x 3/4" LG Socket Cap Screw (8 Required)
50	Servo Motor Cap (1 Required)	134	300H x 1" Timing Belt (1 Required)
51	Quill Driver (1 Required)	135	3/16-32NF x 1/2" LG Flat Head Screw (36 Required)
52	Plate Cover (1 Required)	136	1/2-12NC x 2-1/2" LG Socket Cap Screw (8 Required)
53	Seat, Servo Motor Z (1 Required)	137	#19 x 3 Woodruff Key (2 Required)
54	Quill (1 Required)	138	5/16-18NC x 1-3/8" LG Socket Cap Screw (8 Required)
55	Washer (1 Required)	139	AN04 Bearing Locknut (1 Required)
56	Insulator (3 Required)	140	AW04 Bearing Washer (1 Required)
57	Graduating Plate (1 Required)	141	#40 x 950 LG Screw Cover (2 Required)
58	Indicating Block (1 Required)	142	SKF6204 Bearing (2 Required)
59	Indicating Plate (1 Required)	143	1/4-20NC x 3/4" LG Socket Cap Screw (6 Required)
60	Quill Housing (1 Required)	144	185H x 1" Timing Belt (1 Required)
61	Ball Screw Z (1 Required)	145	1/4-20NC x 1" LG Socket Cap Screw (6 Required)
62	Nosepiece (1 Required)	146	FANUC-5M or MELDAS HD-81 Servo Motor (2 Required)
63	Spindle (1 Required)	148	3/16-24NC x 1/2" LG Flat Head Screw (8 Required)
64	Draw Bar (1 Required)	149	RTW-35 Retaining Ring (Internal) (1 Required)
66	Timing Belt Pulley (1 Required)	150	Chip Cover (1 Required)
67	Shaft Sleeve (1 Required)	151	1/4-20NC x 3" LG Socket Cap Screw
68	Spring Ring (1 Required)	152	1/4"-20NC x 1/2" LG Socket Cap. Screw (4 Required) (2 Required)
69	Hand Wheel (1 Required)		
70	Bevel Gear (Small) (1 Required)		
71	Bevel Gear (Large) (1 Required)		
72	Chip Guard Bracket (1 Required)		
75	Hand Wheel (1 Required)		
76	Chip Guard (1 Required)		
77	Column Back Cover (1 Required)		
78	Bolt (4 Required)		
79	Dog (2 Required)		
79-1	Dog (1 Required)		
80	Handle (2 Required)		
81	Fixed Piece (Right) (2 Required)		
82	Fixed Piece (Left) (2 Required)		
83	Dog (2 Required)		
84	Dog (2 Required)		
85	Dog (2 Required)		
86	Limit Switch Enlarge Cover (1 Required)		
87	Motor Seat (1 Required)		
88	Dust Cap (1 Required)		
89	Servo Motor Cover (1 Required)		
90	Manual Handle (1 Required)		

- 153 1/4—20NC x 5/8" LG Socket Cap Screw
(2 Required)
- 154 Pump (1 Required)
- 155 1/2—12NC Hexagon Nut (4 Required)
- 156 1/2" Spring Washer (4 Required)
- 157 5/16—18NC x 1-1/4" LG Socket Cap Screw
(3 Required)
- 158 3/16—24 x 1-1/2" LG Socket Cap Screw
(3 Required)
- 159 3/16—24NC x 5/16" LG Socket Set Screw
(1 Required)
- 162 #3 x 14 Key (1 Required)
- 163 1/4—20NC x 3/8" LG Socket Set Screw
(3 Required)
- 164 3/16" Spring Washer (4 Required)
- 165 Yamatake FLZ-4A6H Proximity Switch
(1 Required)
- 166 3/16—24 x 3/4" LG Flat Head Screw
(10 Required)
- 167 1/4—20NC x 1/4" LG Socket Set Screw
(1 Required)
- 168 1/4—20NC x 3/8" LG Socket Set Screw
(1 Required)
- 169 Compression Spring (1 Required)
- 170 Bearing # 51101 (1 Required)
- 171 S12 Snap Ring (1 Required)
- 172 5/16"—18NC x 3/4" LG Socket Cap. Screw (2 Required)
- 173 Reduce Speed Motor (1 Required)
- 174 Sensor Switch (2 Required)
- 175 1/8"—40NF x 1/2" LG Flat Screw (1 Required)
- 176 3/16" Flat Washer (1 Required)
- 177 3/16"—24NC x 5/16" LG Socket Set Screw (6 Required)
- 178 3/16"—32NF x 1/4" LG Round Head Screw (5 Required)
- 179 Limit Switch (2 Required)
- 180 1/8"—32NC x 3/4" LG Round Head Screw (4 Required)
- 182 $\phi 4 \times 15\ell$ Spring Pin (2 Required)
- 183 3/16"—24NC x 1/2" LG Socket Cap. Screw (3 Required)
- 184 1/4"—20NC x 3/8" LG Socket Set Screw (2 Required)
- 185 3/16"—24NC x 1 1/4" LG Socket Cap. Screw (3 Required)
- 186 3/16"—32NF x 3/8" LG Flat Screw (9 Required)
- 228 Variable Bar Bushing (1 Required)
- 229 Variable Gear (1 Required)
- 230 Limit Switch Fixing Plate (1 Required)
- 231 Sensor Plunger (1 Required)
- 232 Insulate Plate (1 Required)
- 233 Limit Adjusting Ring (1 Required)
- 234 Variable Worm Shaft (1 Required)
- 235 Motor Seat Cover Plate (1 Required)
- 236 Motor Seat (1 Required)
- 237 Variable Driving Gear (1 Required)

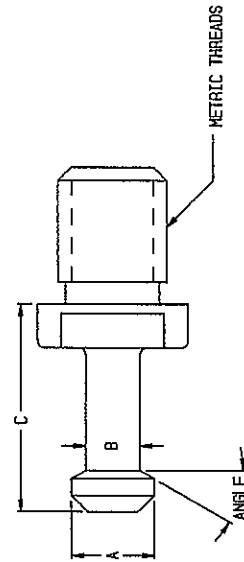
Timing Screw Housing (1 Required)
 Timing Screw Nut (1 Required)
 1/4"-16NC x 1" LG Hex Socket Head Cap
 Screw (3 Required)
 1/4"-20NC x 3/4" LG Hollow Head Cap Screw
 (3 Required)
 H28 Handle (1 Required)
 H51 Elevating Screw (1 Required)
 H52 SKF 6207Z Bearing (1 Required)
 H53 Bearing Retainer Ring (1 Required)
 H54 1/4"-20NC x 1/2" LG Hex Socket Head Cap
 Screw (3 Required)
 H55 Bearing Bushing (1 Required)
 H56 3/16" x 3/16" x 7/8" LG Key (1 Required)
 H57 Washer (1 Required)
 H58 1/2"-20NF Jam Nut (2 Required)
 H59 Bevel Gear (1 Required)
 H60 Bevel Pinion (1 Required)
 H61 No. 7 Woodruff Key (2 Required)
 H62 6204Z Bearing (2 Required)
 H64 Bearing Cap (1 Required)
 H65 Bearing Retainer Ring (3 Required)
 H66 1/4"-20NC x 1/2" LG Hex Socket Head Cap
 Screw (9 Required)
 H67 Dial With 100 Graduation (1 Required)
 H68 Dial Holder (1 Required)
 H69 Dial Lock Nut (4 Required)
 H70 Gearshaft Clutch Insert (1 Required)
 H79 Dial Holder (3 Required)

G210 Spindle Bull Gear
 G212 Bearing Jam Nut
 G213 Timing Belt Pulley
 G214 Timing Belt Pulley Flange
 G263 8 x 8 x 15 LG Key
 G494 5 x 5 x 15 LG Key
 G495 5 x 5 x 20 LG Key
 G503 230H Timing Belt
 G508 AW08 Safety Washer
 G701 Belt Cover
 G702 Gear Box
 G703 Main Spindle Support
 G706 Pulley Shaft Clutch
 G707 Main Spindle Pulley
 G708 Main Sliding Pulley
 G709 Sliding Motor Pulley
 G710 Fixed Motor Pulley
 G711 Motor Shaft Sliding Sleeve
 G712 Pulley Bushing
 G714 8 x 8 x 80 LG Key
 G715 Main Spindle Brake
 G717 Main Sliding Pulley Bearing Housing
 G718 Balancing Beam
 G719 Balancing Beam Bushing
 G720 Protecting Cover
 G721 Main Pulley Ring
 G722 Pulley Fastening Ring
 G723 Cover for Main Spindle Bearing Bracket
 G724 Clutch Ring
 G740 Spindle Gear Hub
 G742 Spacer
 G743 Spacer
 G745 Hi-Low Change Shaft
 G750 Clutch Spring
 G752 Drive Ring
 G753 Bolt
 G754 Protecting Sheet
 G755 Driving Gear
 G756 Square Head Screw
 G757 Cover For Driving Gear Shaft Bearing
 G758 Driving Gear Shaft
 G761 Washer
 G762 Spring Rest
 G763 Operating Spring
 G764 Clutch Spring Guide Bar
 G765 Washer
 G775 Change Speed Gear Shaft Rear Bushing
 G776 Change Speed Gear Shaft
 G777 Change Speed Gear Shaft Front Bushing

G779 Regulating Screw (R.H.)
 G780 Metal Sheet
 G781 Regulating Screw (L. H.)
 G782 Regulating Nut
 G783 RS35 Chain
 G784 Regulating Screw For Balancing Beam
 G791 Speed Plate
 G792 Speed Disk
 G823 3/8" - 16NC x 1" LG Hex Socket Head Screw
 G825 SKF6007-2RS Bearing
 G826 SKF6010-2RS Bearing
 G827 SKF6008Z Bearing
 G828 SKF6203-2RS Bearing
 G830 372634-13 Variable Transmission Belt
 G831 3/8 x 15 LG Elastic Pin
 G834 1/4"-20NC x 3/4" LG Hex Socket Head Screw
 G835 S35 Snap Ring
 G838 3/8"-16NC Hex Head Nut
 G839 Washer
 G842 3/4 x 20 LG Elastic Pin
 G843 8 x 8 x 40 LG Key
 G845 7/16"-14NC x 1" LG Hex Socket Head Screw
 G846 7/16" Spring Washer
 G849 S25 Snap Ring
 G852 R68 Snap Ring
 G853 5/16"-18NC x 3/4" LG Hex Socket Head Screw
 G854 3/8 x 20 LG Elastic Pin
 G856 S50 Snap Ring
 G857 8 x 8 x 40 LG Key
 G858 6203 Wave Washer
 G859 1/2"-20NF Hex Head Nut
 G860 1/2" Washer
 G861 1/4"-20NC x 3/4" LG Hex Socket Head Screw
 G864 Spring Ring
 G865 3/8" Spring Washer
 G866 4 x 4 x 7 LG Key
 G878 1/4"-20NC x 3/8" LG Set Screw
 G882 3/16"-24NC x 3/8" LG Hex Socket Head Screw
 G885 5/16"-18NC Blind Nut
 G886 3/16"-24NC x 3/8" LG Round Head Screw
 G887 3/8 x 25 LG Elastic Pin
 G890 5/16"-18NC x 3/8" LG Hex Socket Head Screw
 G891 3/16"-32NF x 3/8" LG Flat Screw
 G900 Main Motor Spindle
 G903 Main Motor Fan
 G904 Main Motor Cover
 J23 Felt Retainer Ring
 J35 Quill Skirt
 J71 Bolt Washer
 J149 Drawbar Washer
 J272 AN06 Lock Nut
 J276 #10-32 x 5/16" LG Round Head Screw
 J295 Oil Cup
 M76 Felt
 V117 Drawbar Knob

COMMAND RETENTION KNOBS
STYLE BT-FLANGE
JAPANESE

BT-FLANGE TAPER	PART No.	DIMENSIONS			MILL TRONICS MACHINE
		A	B	C	ANGLE
40	RB4M-0001	.59	.39	1.38	45°
	RB4M-0002				60°
45	RB5M-0001	.75	.55	1.57	45°

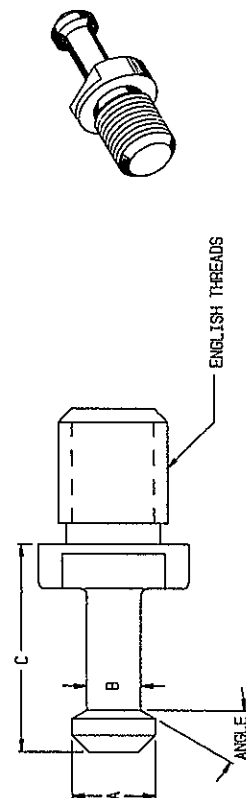


NOTES:
COMMAND CORPORATION
TEL: 1-(800)-328-2197
FAX: 1-(612)-755-1116

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		MILL TRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANDHASSEN, MN 55317		
STOCK No.		TITLE BT-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X .XX	±	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	±			

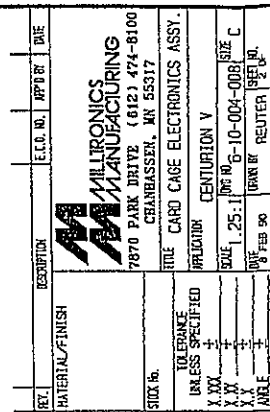
RETENTION KNOBS
STYLE V-FLANGE
JAPANESE

V-FLANGE TAPER	DIMENSIONS			MILLITRONICS MACHINE	COMMAND PART No.	KENMETAL PART No.	VALENITE PART No.
40	A	B	C	ANGLE	PARTNER VII	R84E-0001	
30	.59	.39	1.27	45°	PARTNER IV & V	R84E-0002	PT-532-60
	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 ITC/MILLITRONICS
REORDER PART NO. MA-129

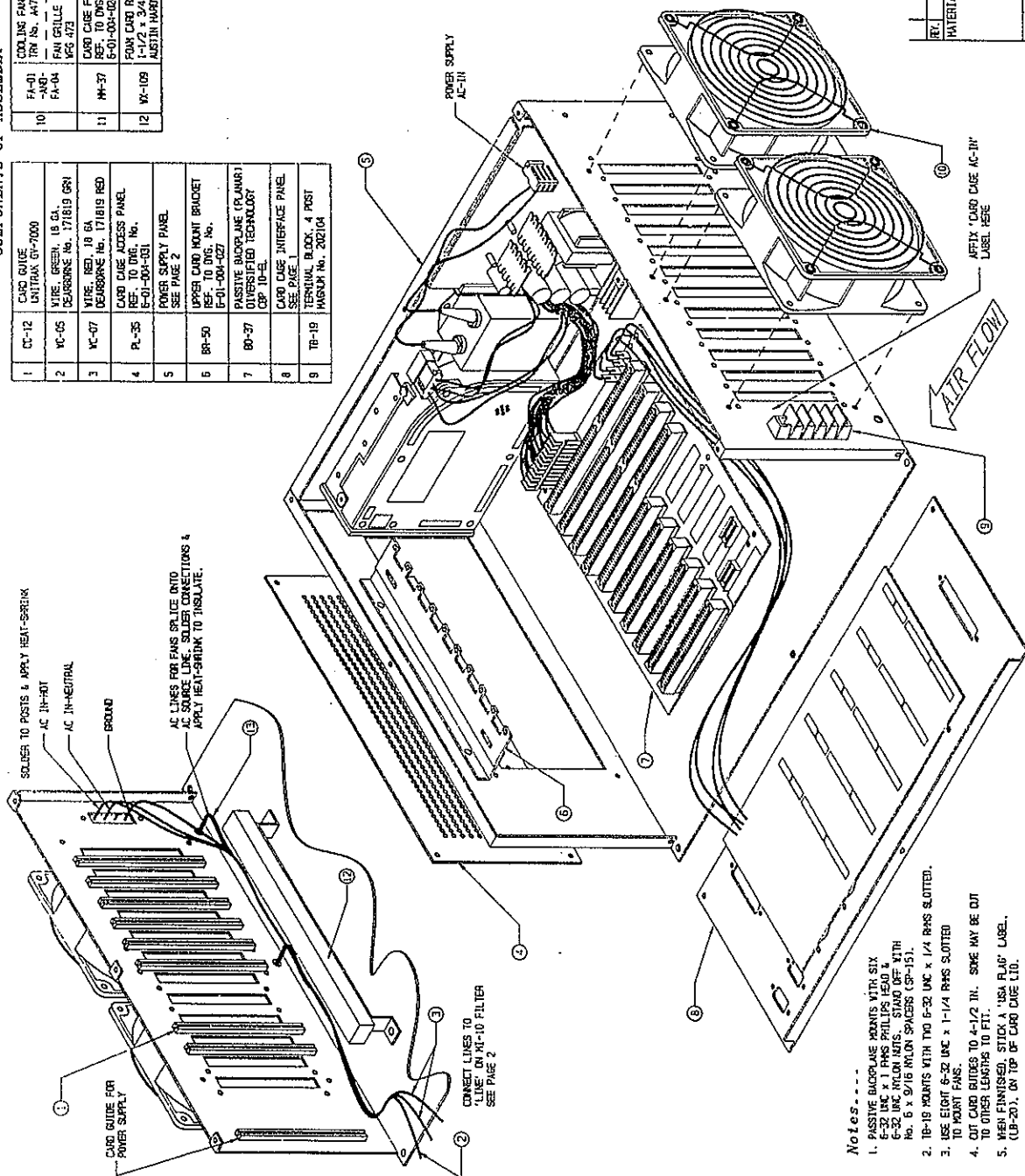
A	ADD PART #	49	M.F.	8/89
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		MILLITRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANDHASSEN, MN 55317		
STOCK No.		TITLE V-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XX		SCALE 1:1		
X.XX		SIZE B	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



COMPONENTS OF ASSEMBLY

1	CC-12	CARD GUIDE LITRAX 07-2000
2	VC-05	VIRE. GREEN, 18 GA. DEADEND No. 171819 GRN
3	VC-07	VIRE. RED, 18 GA. DEADEND No. 171819 RED
4	PL-35	CARD CAGE ACCESS PANEL REF. TO DWS. No. 6-01-004-024
5		POWER SUPPLY PANEL SEE PAGE 2
6	BR-50	UPPER CARD MOUNT BRACKET REF. TO DWS. No. 6-01-004-027
7	BO-37	PASSIVE BACKPLANE (PLANS) OVERSAMPLIFIED TECHNOLOGY OSP 10-EL
8		CARD CAGE INTERFACE PANEL SEE PAGE 1
9	TR-19	TERMINAL BLOCK, 4 POST HARJUN No. 202104

10	FA-01	COOLING FAN TAN IN. 4701818193
11	FA-04	FAN GRILLE WEG 473
12	KA-109	POWER CARD REST 1-1/2 x 3/4 AUSTIN HARDWARE No. PR500



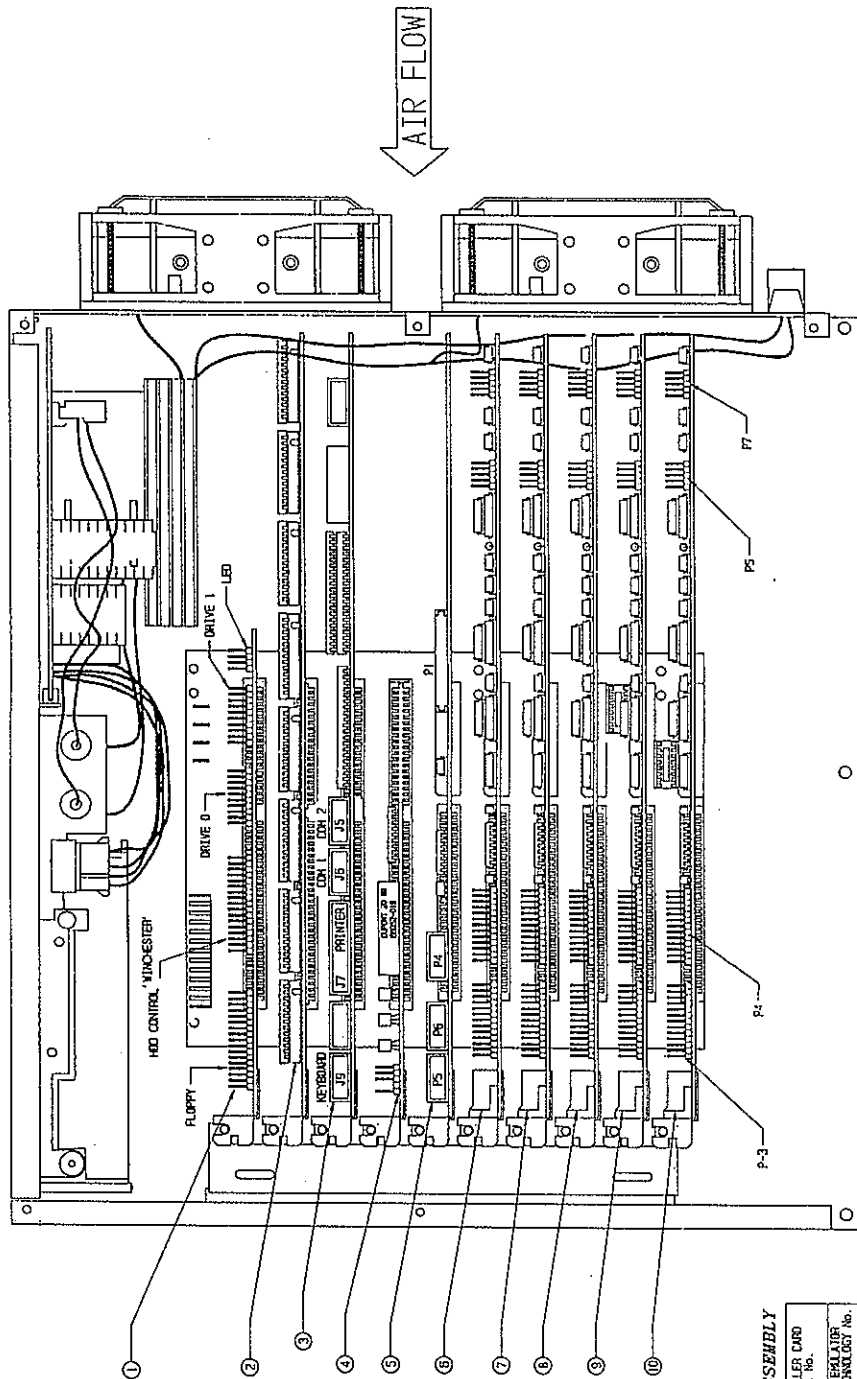
Notes

- PASSIVE BACKPLANE MOUNTS WITH SIX 6-32 UNC x 1 PHNS PHILLIPS HEAD & NO. 6 x 9/16 INCLON SPACERS (SP-151).
- TR-19 MOUNTS WITH TWO 6-32 UNC x 1/4 PHNS SLOTTED.
- USE ELIOT 6-32 UNC x 1-1/4 PHNS SLOTTED TO MOUNT FANS.
- OF CARD ENTERS TO 4-1/2 IN. SOME MAY BE CUT TO OTHER LENGTHS TO FIT.
- WHEN FINISHED, STICK A "USA FLAG" LABEL, (CP-20), ON TOP OF CARD CAGE LID.
- USE WIRE TIES (WV-01) TO HARNESS LOOSE WIRES IN THE CARD CAGE.
- CARDS MOUNT ON UPPER CARD MOUNT BRKT. WITH TWO 6-32 UNC x 3/8 PHNS.
- ACCESS PANEL, INTERFACE PANEL & LID MOUNT WITH 6-32 UNC PHNS.
- UPPER CARD MOUNT BRACKET MOUNTS WITH TWO 6-32 UNC PHNS SLOTTED & NO. 6 INT. STAR WASHERS.

REV.	MATERIAL/FINISH	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

AMILLIRONICS
MANUFACTURING
7670 PARK DRIVE (612) 474-8100
CENTAGASSON, MN 55317

FILE CARD CAGE ELECTRONICS ASSY.
CENTURION V
SCALE 2:125:1
DATE 15 FEB 90
DRAWN BY REUTER
SHEET 1 OF 3



COMPONENTS OF ASSEMBLY

1	80-38	HDD/CD CONTROLLER CARD WESTERN DIGITAL No. WD-10034-992
2	80-38	CD-ROM/CD-RW DRIVE UNIVERSAL TECHNOLOGY No. UDR 651
3	80-36	286-16MHz CPU CARD UNIVERSIFIED TECHNOLOGY No. UTS-286
4	80-35	EXPANDED GRAPHICS ADAPTOR PARADISE AUTOSWITCH EGA 350
5	80-33	ACRODOP CONTROLLER VER. 1.0 E-07-001-003
6	80-22	ACRODOP AXIS COMPUTER P-ACH-184-03 Y-AXIS
7	80-22	ACRODOP AXIS COMPUTER P-ACH-184-03 Y-AXIS
8	80-22	ACRODOP AXIS COMPUTER P-ACH-184-03 Y-AXIS
9	80-22	ACRODOP AXIS COMPUTER P-ACH-184-03 Y-AXIS
10	80-22	ACRODOP AXIS COMPUTER P-ACH-184-03 Y-AXIS

REV.	MATERIAL/FINISH	DESCRIPTION	E.C.D. NO.	APPROV.	DATE
AA MILITRONICS MANUFACTURING 7070 PARK DRIVE (612) 474-8100 CHANEASSEN, MN 55317					
SOLD No. TITLE CARD CASE ELECTRONICS ASSY. UNLESS SPECIFIED PARTITION CENTURION V SCALE 1.5:1 P/S No. 6-10-004-008 SIZE C DATE 21 FEB 99 DRAWN REUTER 4 OF 5					

ITEM STOCK No.	DESCRIPTION
1	1616 KEYPAD ASSY. REF TO DMC No. P-01-004-001
2	PC-4788-01 P.C. BOARD P-01-004-001
3	1616 KEYPAD ASSY. REF TO DMC No.
4	S-2000 IN V2 IN HEX STANDOFF PCAL FEMALE RESISTOR No. 2210
5	1616 KEYPAD ASSY. REF TO DMC No.
5	1616 KEYPAD ASSY. REF TO DMC No.
7	PC-4788-01 P.C. BOARD P-01-004-001
8	1616 KEYPAD ASSY. REF TO DMC No.
9	1616 KEYPAD ASSY. REF TO DMC No.
10	1616 KEYPAD ASSY. REF TO DMC No.
11	1616 KEYPAD ASSY. REF TO DMC No.



1. 26 PIN MALE RIBBON CABLE CONNECTORS MOUNTED ON PC-15x16-01 UNDER KEYBOARD ENCODER CARD USE KEYBOARD MATRIX/P4.

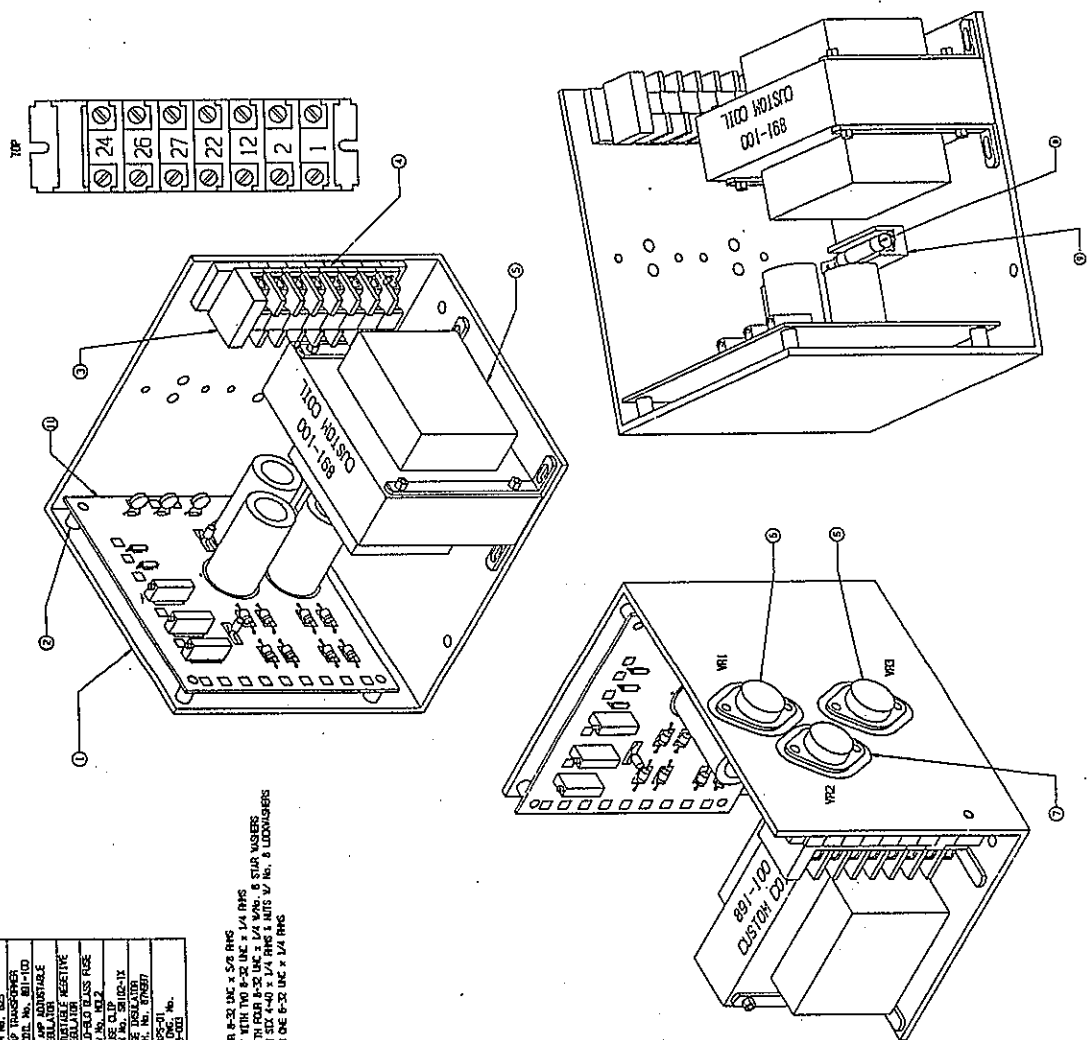
REV.	DESCRIPTION	Q.C.O. NO.	APPROB.	DATE
	MATERIAL/FINISH			
	INDIC. NO.			
	TOLERANCE UNLESS SPECIFIED			
	X .00			
	X .01			
	X .02			
	X .03			
	X .04			
	X .05			
	X .06			
	X .07			
	X .08			
	X .09			
	X .10			
	X .11			
	X .12			
	X .13			
	X .14			
	X .15			
	X .16			
	X .17			
	X .18			
	X .19			
	X .20			
	X .21			
	X .22			
	X .23			
	X .24			
	X .25			
	X .26			
	X .27			
	X .28			
	X .29			
	X .30			
	X .31			
	X .32			
	X .33			
	X .34			
	X .35			
	X .36			
	X .37			
	X .38			
	X .39			
	X .40			
	X .41			
	X .42			
	X .43			
	X .44			
	X .45			
	X .46			
	X .47			
	X .48			
	X .49			
	X .50			
	X .51			
	X .52			
	X .53			
	X .54			
	X .55			
	X .56			
	X .57			
	X .58			
	X .59			
	X .60			
	X .61			
	X .62			
	X .63			
	X .64			
	X .65			
	X .66			
	X .67			
	X .68			
	X .69			
	X .70			
	X .71			
	X .72			
	X .73			
	X .74			
	X .75			
	X .76			
	X .77			
	X .78			
	X .79			
	X .80			
	X .81			
	X .82			
	X .83			
	X .84			
	X .85			
	X .86			
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	X .108			
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	X .110			
	X .111			
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	X .114			
	X .115			
	X .116			
	X .117			
	X .118			
	X .119			
	X .120			
	X .121			
	X .122			
	X .123			
	X .124			
	X .125			
	X .126			
	X .127			
	X .128			
	X .129			
	X .130			
	X .131			
	X .132			
	X .133			
	X .134			

-PARTS LIST-

[illegible]

Notes...

1. 80-42 MOUNTS WITH FOUR 8-32 UNC x 5/8 RMS
2. TERMINAL BLOOD MOUNT WITH TWO 8-32 UNC x 1/4 RMS
3. TRANSFORMERS MOUNT WITH FOUR 8-32 UNC x 1/4 W/6, 8 STAR WASHERS
4. REGULATOR MOUNT WITH SIX 4-40 x 1/4 RMS & NUTS W/ W/6, 8 LOCKWASHERS
5. FUSE CLIP MOUNTS WITH ONE 6-32 UNC x 1/4 RMS



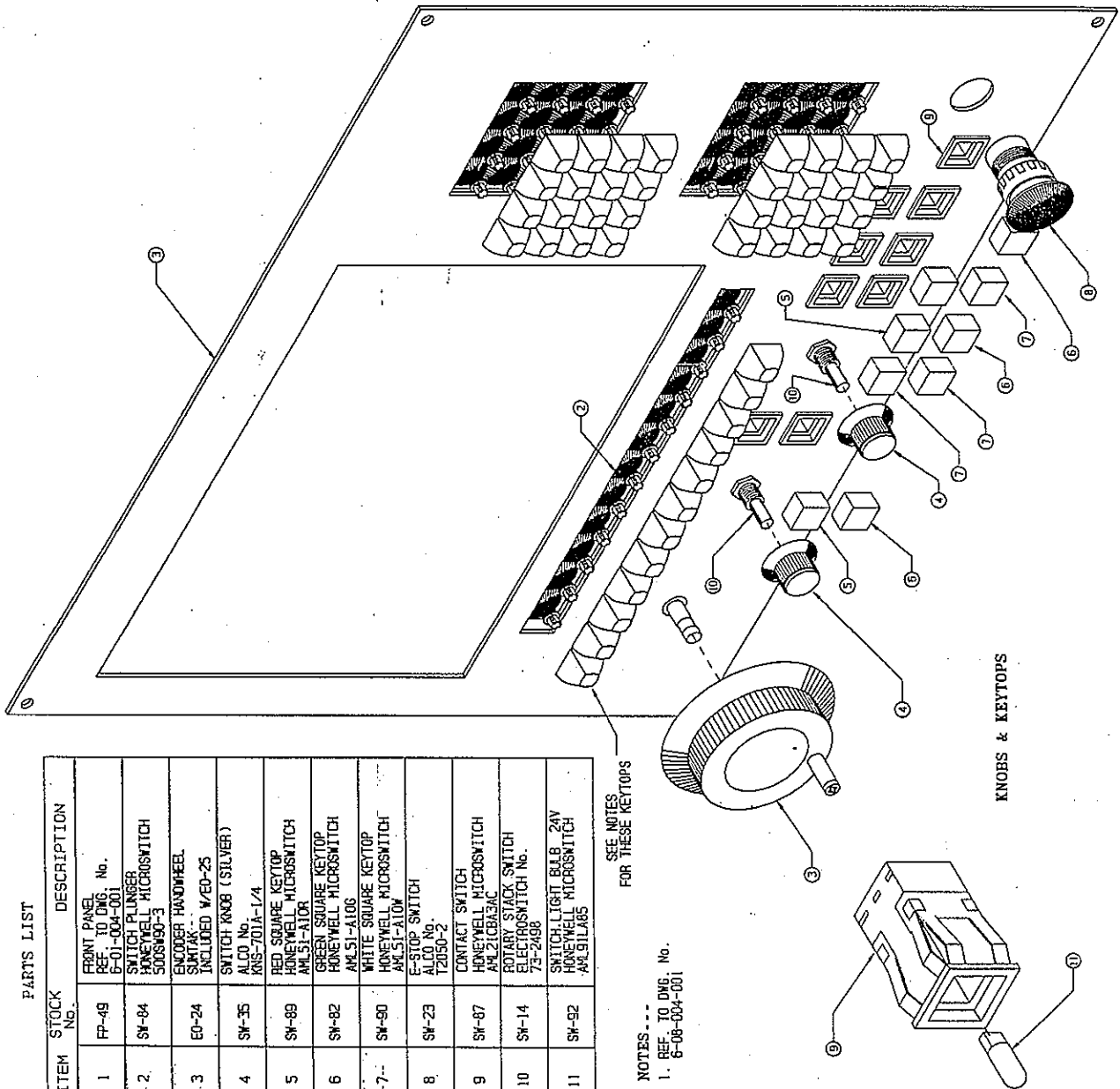
REV.	DESCRIPTION	E.C.R. NO.	APPROV'D	DATE
	MATERIAL FINISH			
		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (WY) 474-8100 CENTRALLEXSH, WY 55317		
SHEET No.	TOLERANCE UNLESS SPECIFIED	TITLE 15-24PS-OI ASSY. APPLICATION GENERAL PRODUCTS		
X XX	+	SHEET 1 OF 2		
X XX	+	SHEET 1 OF 2		
X X	+	SHEET 1 OF 2		
X X	+	SHEET 1 OF 2		
UNFIN	+	SHEET 1 OF 2		

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 5008490-3
3	EO-24	ENCODER HANDHEEL SMTAK-- INCLUDED W/EO-25
4	SW-35	SWITCH KNOB (SILVER) ALCO No. AKS-701A-1/4
5	SW-89	RED SQUARE KEYTOP HONEYWELL MICROSWITCH AKL51-A10R
6	SW-82	GREEN SQUARE KEYTOP HONEYWELL MICROSWITCH AKL51-A10S
7--	SW-90	WHITE SQUARE KEYTOP HONEYWELL MICROSWITCH AKL51-A10W
8	SW-23	5-STOP SWITCH ALCO No. 72050-2
9	SW-87	CONTACT SWITCH HONEYWELL MICROSWITCH AKW21CB3AC
10	SW-14	ROTARY STACK SWITCH ELECTROSMITH No. 75-2498
11	SW-82	SWITCH/LIGHT BULB 24V HONEYWELL MICROSWITCH AKL91LA85

NOTES---

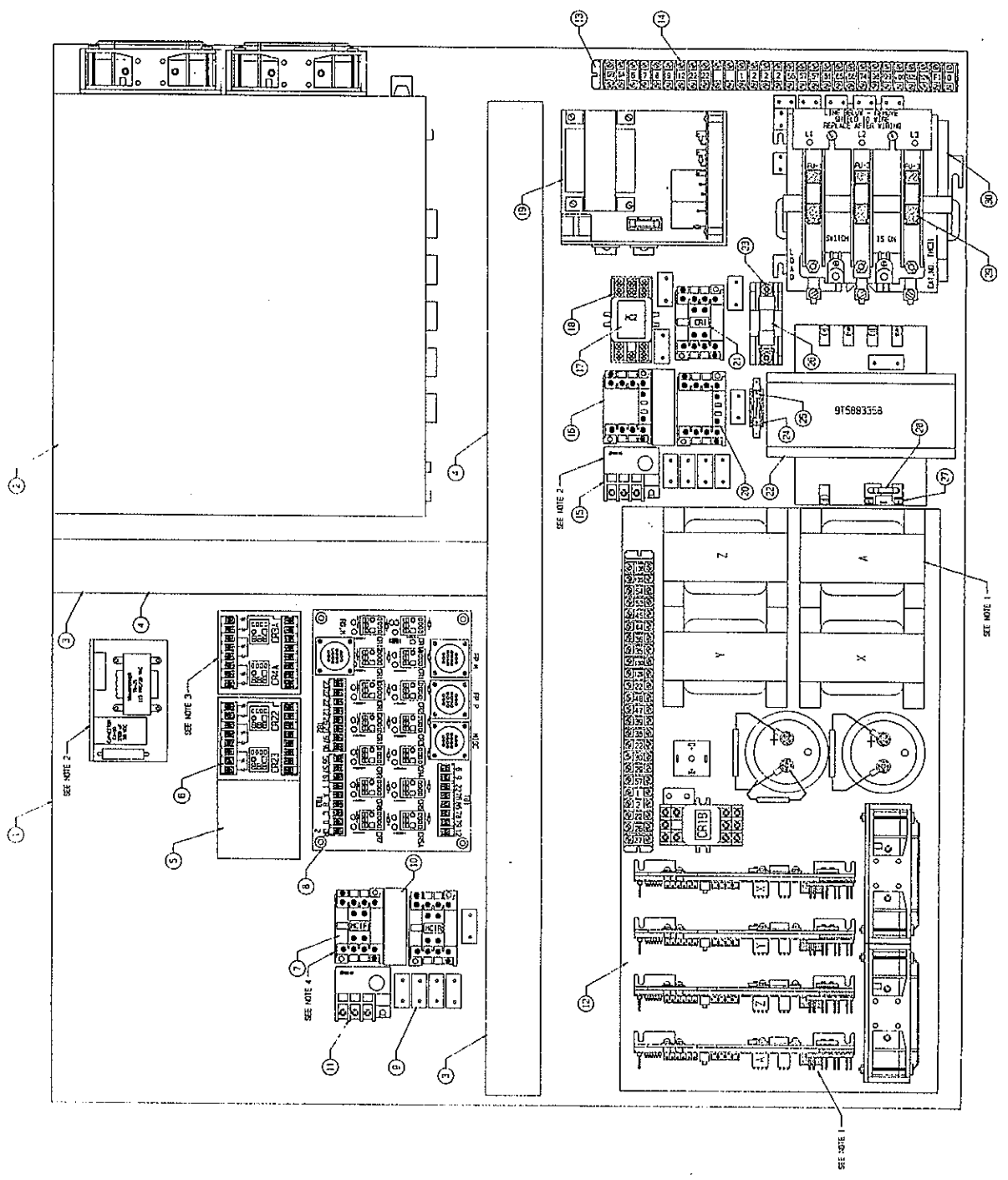
1. REF. TO DWG. No.
8-08-004-001

SEE NOTES
FOR THESE KEYTOPS

REL.	DESCRIPTION	E.C.O. NO.	APPRO BY	DATE
MATERIAL FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANLHASSEN, MN 55317		
STOCK NO.		TITLE: INT PANEL SW & CONT. PART		
TO QUOTE		ARLINGTON CENTURION V		
UNLESS SPECIFIED		QUOTE 1: 5:1 DATE 28 SEP 89 QUOTE 2: 1:1 DATE 28 SEP 89 QUOTE 3: 1:1 DATE 28 SEP 89 QUOTE 4: 1:1 DATE 28 SEP 89		
X X X		NO. 10 10-004-001		
X X X		SHEET NO.		
X X X		QUANT BY		
X X X		REITER		
X X X		1 OF		

- NOTES:
1. INDUCTION AND DRIVE FOR 4TH AXIS OPTION.
 2. BASE AND INFE FOR PARTNER Y MILL ONLY.
 3. CONTROL RELAYS FOR AC SPINDLE INVERTER.
 4. MAGNETIC STARTER FOR STANDARD SPINDLE CONFIGURATION.

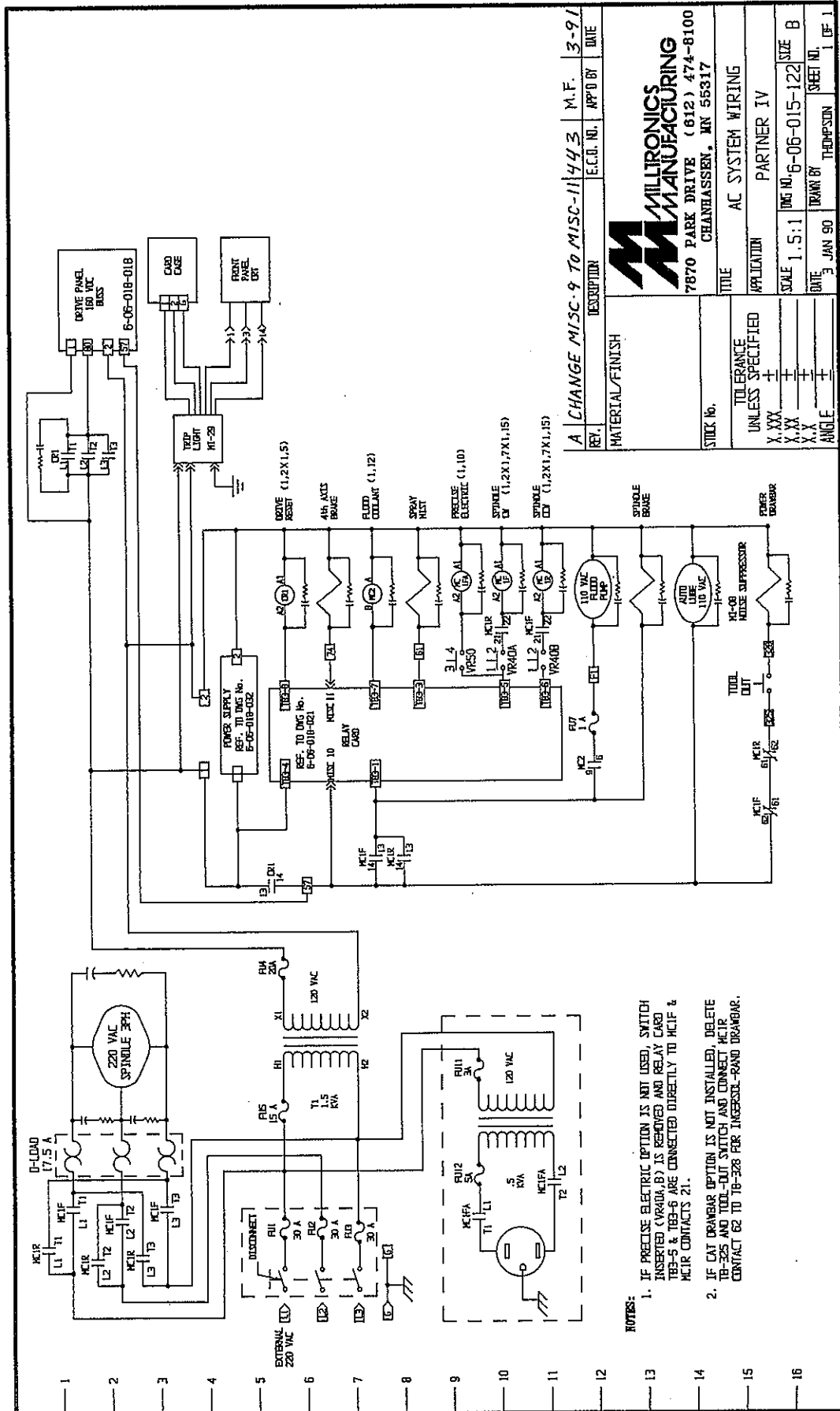
NO.	DESCRIPTION	QTY	UNIT
1	INDUCTION MOTOR	1	EA
2	BASE AND INFE	1	EA
3	CONTROL RELAYS	1	EA
4	MAGNETIC STARTER	1	EA
5	INDUCTION MOTOR	1	EA
6	BASE AND INFE	1	EA
7	CONTROL RELAYS	1	EA
8	MAGNETIC STARTER	1	EA
9	INDUCTION MOTOR	1	EA
10	BASE AND INFE	1	EA
11	CONTROL RELAYS	1	EA
12	MAGNETIC STARTER	1	EA
13	INDUCTION MOTOR	1	EA
14	BASE AND INFE	1	EA
15	CONTROL RELAYS	1	EA
16	MAGNETIC STARTER	1	EA
17	INDUCTION MOTOR	1	EA
18	BASE AND INFE	1	EA
19	CONTROL RELAYS	1	EA
20	MAGNETIC STARTER	1	EA
21	INDUCTION MOTOR	1	EA
22	BASE AND INFE	1	EA
23	CONTROL RELAYS	1	EA
24	MAGNETIC STARTER	1	EA
25	INDUCTION MOTOR	1	EA
26	BASE AND INFE	1	EA
27	CONTROL RELAYS	1	EA
28	MAGNETIC STARTER	1	EA
29	INDUCTION MOTOR	1	EA
30	BASE AND INFE	1	EA
31	CONTROL RELAYS	1	EA
32	MAGNETIC STARTER	1	EA
33	INDUCTION MOTOR	1	EA
34	BASE AND INFE	1	EA
35	CONTROL RELAYS	1	EA
36	MAGNETIC STARTER	1	EA
37	INDUCTION MOTOR	1	EA
38	BASE AND INFE	1	EA
39	CONTROL RELAYS	1	EA
40	MAGNETIC STARTER	1	EA
41	INDUCTION MOTOR	1	EA
42	BASE AND INFE	1	EA
43	CONTROL RELAYS	1	EA
44	MAGNETIC STARTER	1	EA
45	INDUCTION MOTOR	1	EA
46	BASE AND INFE	1	EA
47	CONTROL RELAYS	1	EA
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49	INDUCTION MOTOR	1	EA
50	BASE AND INFE	1	EA
51	CONTROL RELAYS	1	EA
52	MAGNETIC STARTER	1	EA
53	INDUCTION MOTOR	1	EA
54	BASE AND INFE	1	EA
55	CONTROL RELAYS	1	EA
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62	BASE AND INFE	1	EA
63	CONTROL RELAYS	1	EA
64	MAGNETIC STARTER	1	EA
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66	BASE AND INFE	1	EA
67	CONTROL RELAYS	1	EA
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74	BASE AND INFE	1	EA
75	CONTROL RELAYS	1	EA
76	MAGNETIC STARTER	1	EA
77	INDUCTION MOTOR	1	EA
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79	CONTROL RELAYS	1	EA
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91	CONTROL RELAYS	1	EA
92	MAGNETIC STARTER	1	EA
93	INDUCTION MOTOR	1	EA
94	BASE AND INFE	1	EA
95	CONTROL RELAYS	1	EA
96	MAGNETIC STARTER	1	EA
97	INDUCTION MOTOR	1	EA
98	BASE AND INFE	1	EA
99	CONTROL RELAYS	1	EA
100	MAGNETIC STARTER	1	EA



RELAYS

CR1.	RESET	CR30.	CW (AVANTI ATC)
CR1A.	EXCESS ERROR	CR31.	CCW (AVANTI ATC)
CR1B.	DRIVE DISABLE	CR32.	HOME (AVANTI ATC)
CR1C.	DRIVE RESET	CR33.	ZERO SPEED (AVANTI ATC)
CR2.	TOOL CHANGE RESET	CR34.	TOOL OUT (AVANTI ATC)
CR3.	SPINDLE CLOCKWISE	CR35.	TOOL IN (AVANTI ATC)
CR3A.	SPINDLE CW YASKAWA	CR36.	DISABLE ATC (AVANTI ATC)
CR4.	SPINDLE COUNTERCLOCKWISE	CR6A.	220 FOR AUTO LUBE
CR4A.	SPINDLE CCW YASKAWA	MC1F.	SPINDLE CW. (AC)
CR5.	SPINDLE STOP	MC1R.	SPINDLE CCW (AC)
CR5A.	SPINDLE SAFETY	MC2.	FLOOD COOLANT (AC)
CR7.	SPRAY MIST	MC3F.	POWER KNEE FORWARD
CR8.	FLOOD COOLANT		(PARTNER V ONLY)
CR9.	SPINDLE HI/LO	MC3R.	POWER KNEE REVERSE
CR10.	SPINDLE ENABLE		(PARTNER V ONLY)

A FORMERLY 6-04-015-102		DESCRIPTION		E.C.D. NO.		APP'D BY		DATE			
MATERIAL/FINISH		 MILLIRONICS MANUFACTURING 7870 PARK DRIVE (812) 474-8100 CHANASSEN, MN 55317		TITLE		TERMINAL BLOCK DES.		GENERAL PRODUCTS		SIZE	
										B	
										SHEET NO.	
										DRAWN BY	
										THOMPSON	
STOCK No.		TOLERANCE UNLESS SPECIFIED		APPLICATION		SCALE 1:1		Dwg. No. 6-04-018-019		DATE	
										14 MAY 90	
										X.XXX ±	
										X.XX ±	
										X.X ±	
ANGLE											



NOTES:

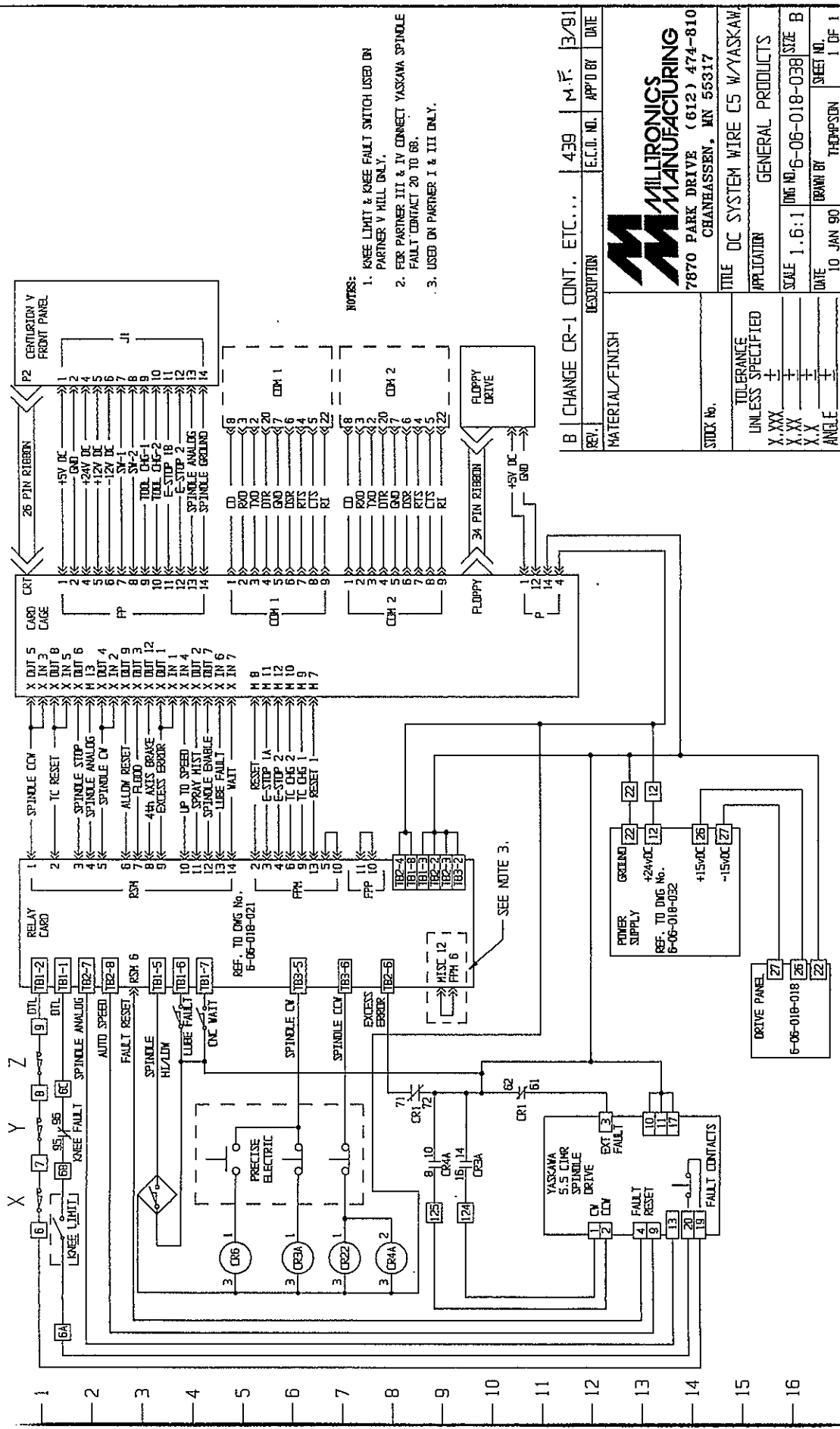
1. IF PRECISE ELECTRIC OPTION IS NOT USED, SWITCH INSERTED (V240A B) IS REMOVED AND RELAY CARD TEB-5 & TEB-6 ARE CONNECTED DIRECTLY TO KCIF & KCIF CONTACTS 21.
2. IF CAT DRIVE/REAR OPTION IS NOT INSTALLED, DELETE TB-225 AND TELL-OUT SWITCH AND CONNECT KCIF CONTACT 62 TO TB-528 FOR INTERLOCK-RAND DEBARBAR.

REV. 3-91
DESCRIPTION: A CHANGE MISC-9 TO MISC-111443
M.F. 3-91
DATE

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
1	A CHANGE MISC-9 TO MISC-111443			3-91

MILLITRONICS MANUFACTURING	
7870 PARK DRIVE (812) 474-8100	
CHANDHASSEN, MN 55317	

TITLE	AC SYSTEM WIRING
APPLICATION	PARTNER IV
SCALE	1.5:1
DWG NO.	6-06-015-122
SIZE	B
DATE	3 JAN 90
DRAWN BY	THOMPSON
SHEET NO.	1 OF 1



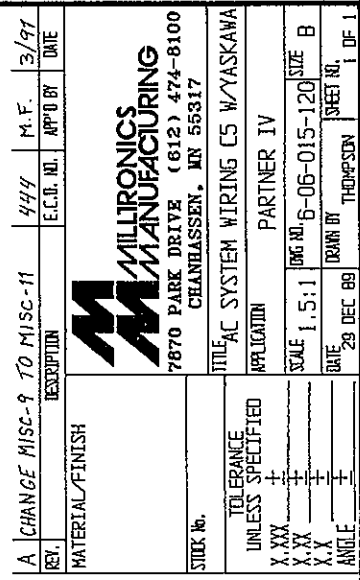
REV.	DESCRIPTION	E.C.D. NO.	APPROV.	DATE
B	CHANGE CR-1 CONT. ETC...	439	M.F.	3/91

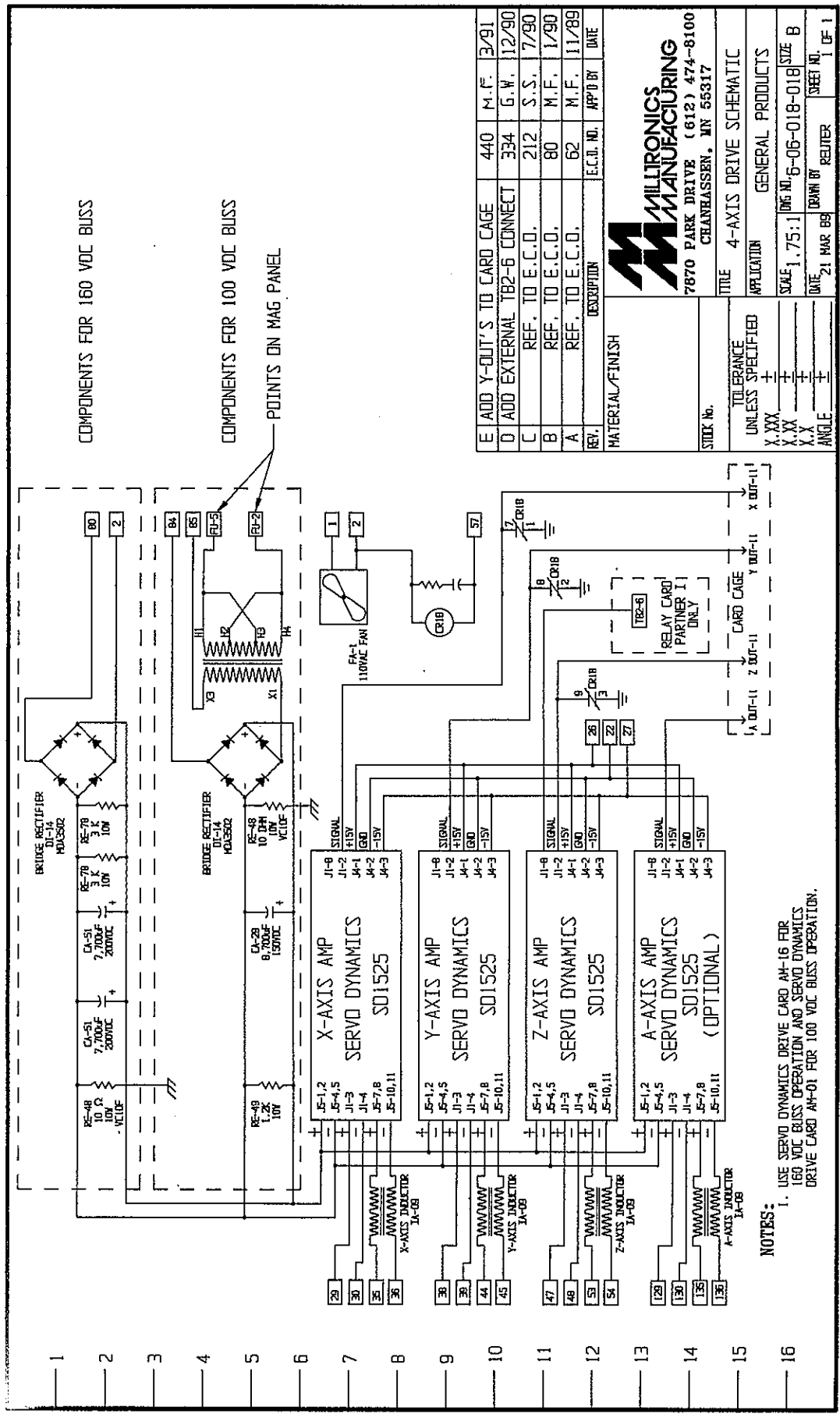
MATERIAL/FINISH	
STOCK No.	
TOLERANCE UNLESS SPECIFIED	
X.XXX	±
X.XX	±
X.X	±
ANGLE	±

TITLE		APPLICATION		GENERAL PRODUCTS	
DC SYSTEM WIRE CS WYASKAW					
7870 PARK DRIVE (612) 474-810					
CHANHASSEN, MN 55317					
SCALE	1.6:1	DWG NO	6-06-018-038	SHEET NO.	B
DATE	10 JAN 90	DRAWN BY	THOMPSON	SHEET NO.	1 OF 1



MILLERONICS MANUFACTURING
 7870 PARK DRIVE (612) 474-810
 CHANHASSEN, MN 55317





COMPONENTS FOR 160 VDC BUSS

COMPONENTS FOR 100 VDC BUSS
POINTS ON MAG. PANEL

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
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

MATERIAL/FINISH	STOCK No.	TOLERANCE UNLESS SPECIFIED	APPLICATION	GENERAL PRODUCTS	SCALE	DATE	REV.	REITER	SHEET NO.	OF
		X.XX ±			1.75:1	21 MAR 89			1	1
		X.XX ±								
		X.X ±								
		ANGLE ±								

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

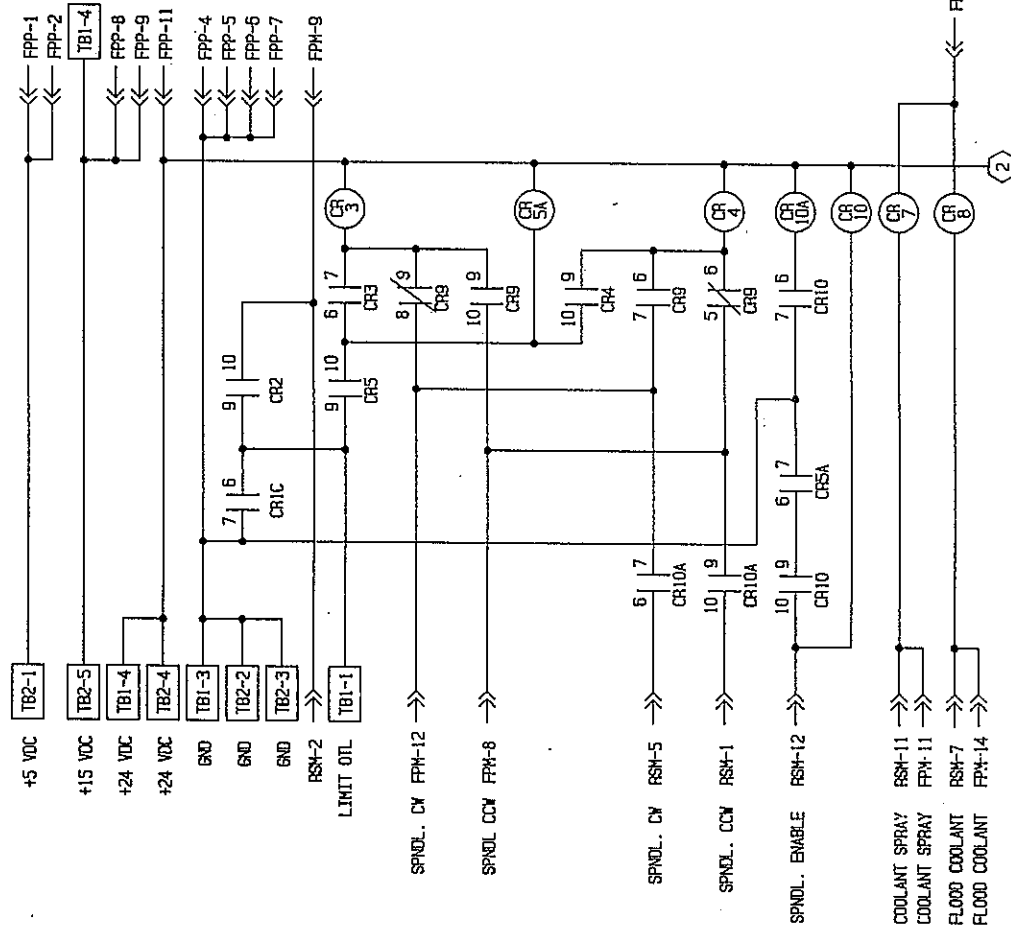
TITLE 4-AXIS DRIVE SCHEMATIC

APPLICATION GENERAL PRODUCTS

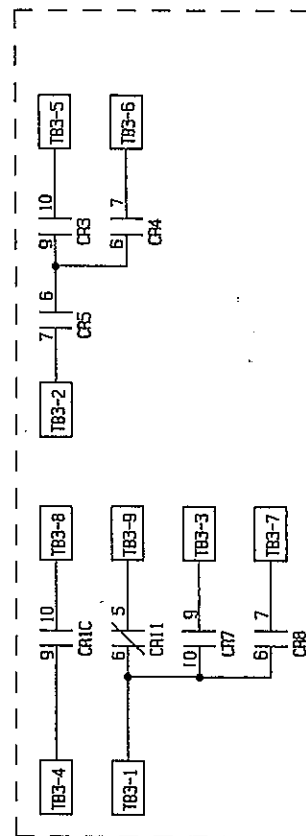
SCALE 1.75:1 Dwg No. 6-06-018-018 SIZE B

DATE 21 MAR 89 DRAWN BY REITER SHEET NO. 1 OF 1

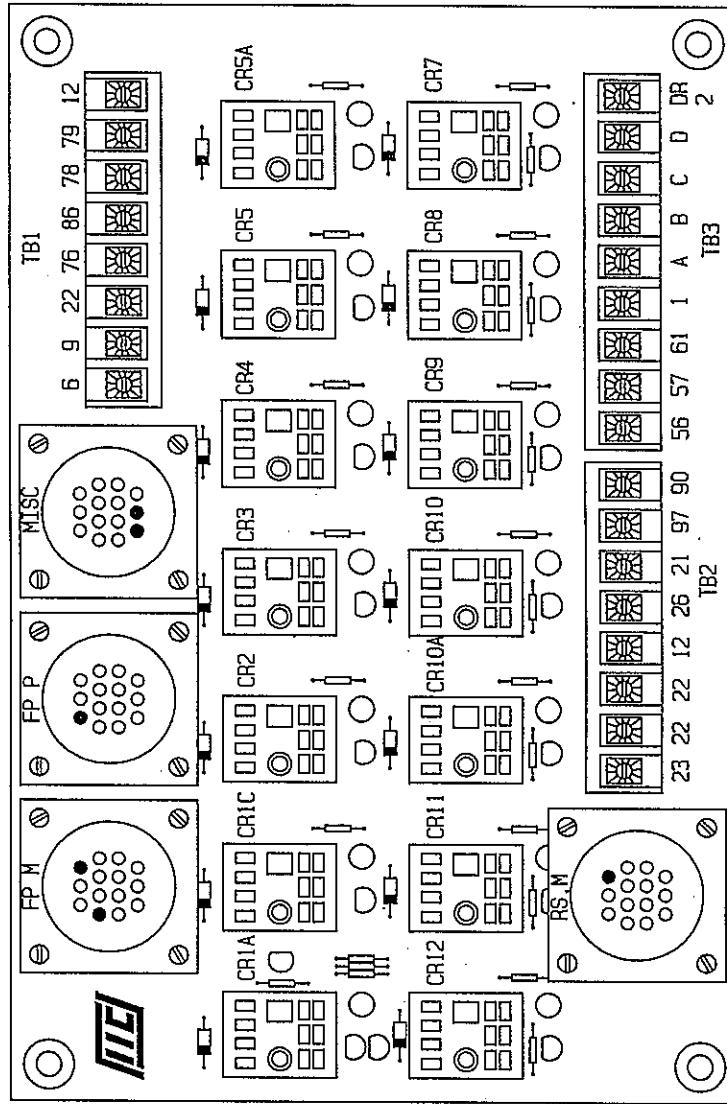
NOTES:
1. USE SERVO DYNAMICS DRIVE CARD AH-16 FOR 160 VDC BUSS OPERATION AND SERVO DYNAMICS DRIVE CARD AH-01 FOR 100 VDC BUSS OPERATION.



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED	 INSTALLATION INFORMATION CONTROLS 7670 PARK DRIVE CARLESSON, MI 55317 (612-474-8100)		
	X .XXX ±	TITLE: PC-REL-1B SCHEMATIC APPLICATION: GENERAL PRODUCTS		
	X .XX ±			
	X .X ±			
	X .X ±			
	ANGLE ±			
MATERIAL/FINISH		SCALE 1:1	DWG NO. 5-06-018-021	SIZE B
		DATE: 6 MAR 89	DRAWN BY: REUTER	SHEET NO. 1 OF 3

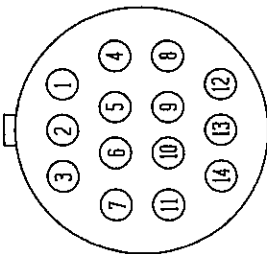


REF.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
	TOLERANCE UNLESS SPECIFIED	 INDUSTRIAL INFORMATION CONTROLS 7070 PARK DRIVE (612-474-8100) CENTRALISSE, MN 55317		
	X .XXX +			
	X .XX +			
	X .X +			
	ANGLE . . +			
	TITLE: PC-REL-1B SCHEMATIC			
	APPLICATION: GENERAL PRODUCTS			
	SCALE 1:1		DWG NO. G-06-018-021	SITE B
	MATERIAL/FINISH			
	DATE: 7 MAR 89	DRAWN BY: REUTER	CHECK NO. 2 OF 3	



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	INDUSTRIAL INFORMATION CONTROLS			
	7070 PANEL DATA			
	CHARLESTON, MI 48037			
	TITLE: PC-REL-1B PANEL ASSY.			
	APPLICATION: GENERAL PRODUCTS			
	SCALE 1:1			
	DATE: 15 NOV 88			
	DRAWN BY: REUTER			
	SHEET NO. 1 OF 1			

FEMALE AMP PLUG



TERMINAL BLOCK

1 2 3 4 5 6 7 8

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

PIN RSM (CNC)

No.	FUNCTION	INT. DEST.
1	SPINDLE ON	CR10A-10
2	TOOL CHG RESET	CR-9
3	SPINDLE STOP	FRM-10
4	SPINDLE ANALOG	TE2-7
5	SPINDLE ON	CR10A-6
6	RESET ALLOW	FRM-13
7	COOLANT FLOOD	CR8
8	S-WORD DISABLE	CR11
9	EXCESS ERROR	TE2-6
10	UP TO SPEED	TE2-8
11	COOLANT SPRAY	CR7
12	SPINDLE ENABLE	CR-9
13	LUBE FAULT	IB1-5
14	WAIT CHANNEL	IB1-14

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 OIL
13	KEY
14	KEY

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 F.P.M.

No.	FUNCTION	INT. DEST.
1	KEY	
2	RESET	CR1A-5
3	E STOP	FRM-2
4	E STOP	CRIC
5	SPINDLE STOP	CR2-5
6	TOOL CHANGE	CR2
7	KEY	
8	SPINDLE ON	CR-10
9	TOOL CHG RESET	RS4-2
10	SPINDLE STOP	RS4-3
11	COOLANT SPRAY	CR-7
12	SPINDLE ON	CR-10
13	RESET	RS4-6
14	COOLANT FLOOD	CR8

T.B. 1

T.B. No.	FUNCTION	INT. DEST.
1 (6)	OVER TRAVEL LIMITS	CR-9
2 (9)	OVER TRAVEL LIMITS	CR1A
3 (22)	GND	
4 (76)	+15V	
5 (86)	SPINDLE HI/LOW	
6 (78)	CNC AUTO LUBE	CR8
7 (79)	CNC WAIT CHANNEL	RS4-13
8 (12)	+24V	RS4-14

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	RS4-4
8 (90)	AUTO SPEED	RS4-10

T.B. 3

T.B. No.	FUNCTION	INT. DEST.
1 (56)	AC MAGNETICS	CR-10
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

REV.	DESCRIPTION	E.C.O. NO.	APPRO BY	DATE
INDUSTRIAL INFORMATION CONTROLS 7670 PARK DRIVE CHAMBERSBURG, PA 15317				
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
TITLE: PC REL. 1B I/O PLUG DEF.				
APPLICATION: GENERAL PRODUCTS				
SCALE 1:1				
DATE: 11 AUG 88				
DRAWN BY: REUTER				
SHEET NO. 1 OF 1				

