

Electrical and Mechanical Manual

Partner 4B

Milltronics Manufacturing Company

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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 (NOTE NEED TO JUMP H1 TO H3 & H2 TO H4)	X1-X2 68 X1-X3 72 X1-X4 79
440 VAC	3357 1KVA	H2-H4 220 (NOTE NEED TO JUMP H2 TO H3 & H1 TO H4)	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

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

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.

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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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.

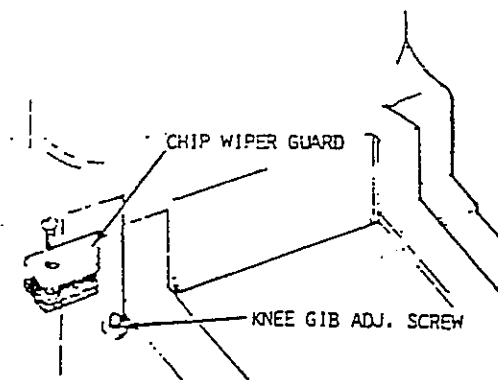


Figure 2. Knee-Column Gib

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.

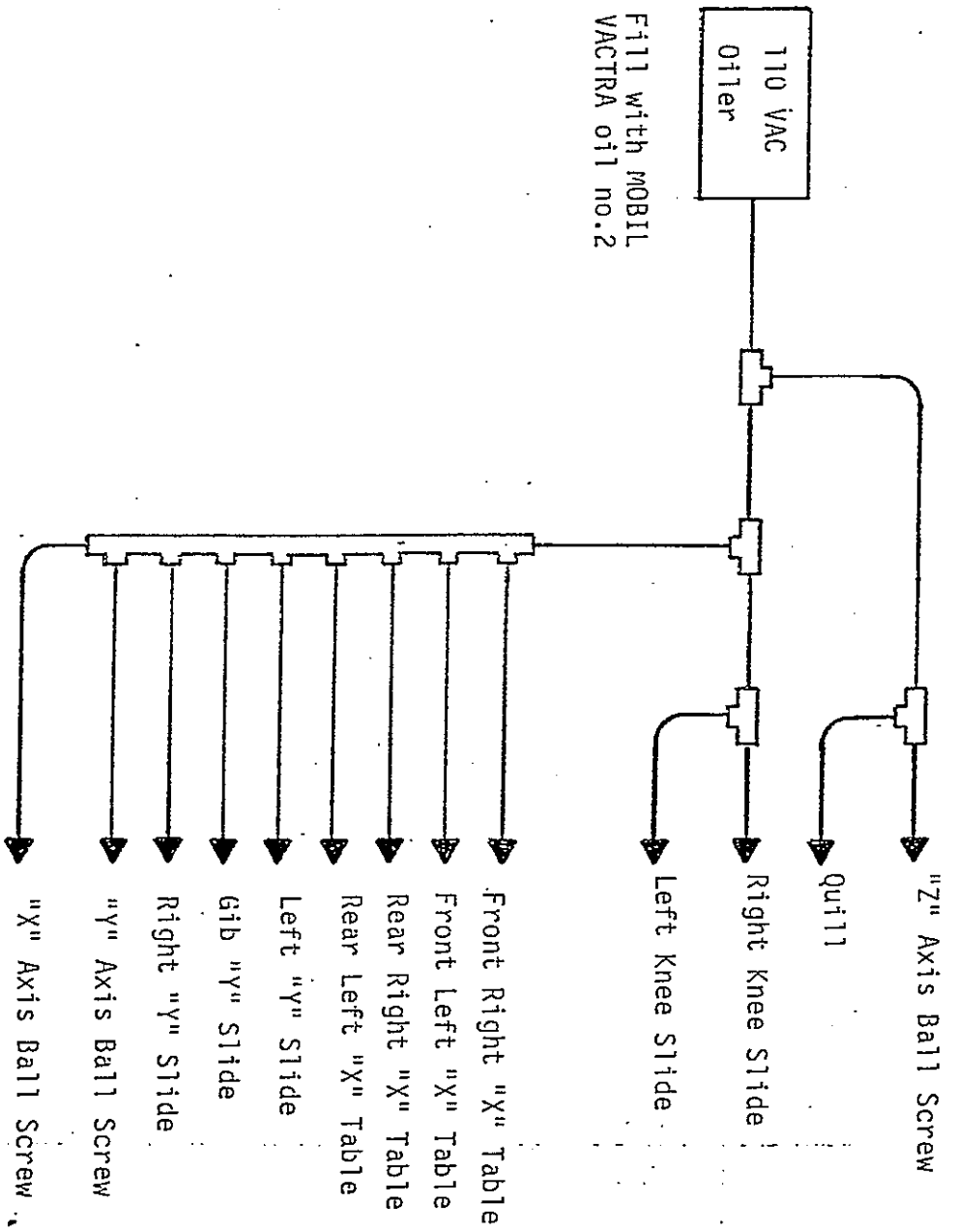
When shifting to "LO," DO NOT FORCE THE LEVER if the back gears do not mesh. Hold the lever so that the gears are clear of one another, rotate the spindle nose by hand until the gears line up, and then put the unit in "LO" (back gear).

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**

PROCEDURE TO CHANGE YASKAWA PARAMETERS

1. DEPRESS DRIVE/FRG 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 JOG/NO. TO INDICATE CONSTANT, THAT INTERNAL DATA WAS CHANGED.
10. DEPRESS DSPL/ENTR TO STORE DATA, SHOULD DISPLAY "END".
11. GOTO TO STEP 2.
12. IF FINISHED DEPRESS DRIVE/FRG, REMOTE LIGHT SHOULD COME ON.

PARTNER IV YASKAWA SPINDLE PARAMETERS

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)	130.0
CN-02	MAX VOLTAGE (V MAX)	220.0
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 OUTPUT FREQUENCY (F MIN)	001.5
CN-07	MIN OUTPUT FREQ..VOLTAGE (V MIN)	007.0
CN-08	ACCELERATION TIME	0003.0
CN-09	DECELERATION TIME	0004.0
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	1.0
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	030

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

CNC SOFTWARE SPINDLE PARAMETERS

PARA #	PARA. VALUE
88	042365
89	600070
90	100400

NOTES:

1. SET GAIN POT OVDC = 0rpm, 10VDC = 6000rpm.
2. ABOVE PARAMETERS ARE FOR PARTNER IVB USING:

QTY.	DESCRIPTION
1	1 7/8" ID BUSHING
1	28H100 REEVES PULLEY
1	360H100 BELT
1	32H100 MOTOR PULLEY
1	3/4" ID BUSHING BORED TO <u>1.023</u>
	1.025

LISTED NUMERICALLY ARE PARTNER IV DRAWINGS FOUND IN MANUAL

DRAWING #	DESCRIPTION
6-04-015-101	TERMINAL BLOCK DES.
6-06-015-116	MAG PANEL WIRING YASKAWA/DC
6-06-015-119	MAG PANEL WIRING YASKAWA/AC
6-00-018-020	SD DRIVE AMP EXT.
6-00-018-030	BT-FLANGE RETENTION KNOB
6-00-018-031	V-FLANGE RETENTION KNOB
6-02-018-101	CRT PC TRIMPOT LOCATOR
6-03-018-000	PC-REL-1B PANEL ASSY.
6-03-018-001	DIGITAL PWR. PANEL ASSY.
6-03-018-004	3 AXIS DRIVER AMP BOARD
6-03-018-005	3 AXIS MAG PANEL ASSY
6-03-018-006	4 AXIS DRIVE PANEL
6-03-018-007	4 AXIS MAG PANEL ASSY
6-03-018-008	YASKAWA CONTROL PANEL
6-04-018-005	PC REL 1B I/O LPUG DEF.
6-04-018-006	X,Y,Z MOTOR CABLES/ASSY.
6-06-018-013	PC-AS-01 (S-WORD) SCHEMATIC
6-06-018-017	PC-AS-01 (S-WORD) INTERCONNECT
6-06-018-018	4 AXIS DRIVE SCHEMATIC
6-06-018-021	PC-REL-1B SCHEMATIC
6-06-018-022	MAG PANEL WIRING/AC
6-06-018-023	SYSTEM INTERCONNECT/DC
6-06-018-026	CNC FRONT PANEL SCHEMATIC
6-06-018-027	CNC/FRONT PANEL INTERFACE
6-06-018-028	MOTOR/ENCODER INTERFACE

Drawbar washers
MA-124 x 90

1 6 3 2 P A R T S L I S T

<u>PARTS DESCRIPTION</u>	<u>PARTS NUMBER</u>	<u>QUANTITY</u>
SENSOR SEAT	1630-004	1
PULLY FLAUGE	1630-010	2
PULLY FLAUGE	1630-0101	1
TIMING PULLEY	1630-0251	1
TIMING PULLEY	1630-0261	1
BEARING BRACKET	1630-044	1
BEARING COVER	1630-047	1
QUILL DRIVER	1630-051	1
WASHER	1630-055	1
INSULATOR	1630-056	1
INSULATOR	1630-0561	1
INSULATOR	1630-0563	1
GRADUATING PLATE	1630-057	1
INDICATING BLOCK	1630-058	1
INDICATING PLATE	1630-059	1
BALL SCREW	1630-061	1
DOG	1630-079	1
DOG	1630-0791	1
SPACER	1630-098	1
HEAD FIXING PLUNGER	1630-098	1
VARIABLE BAR BUSHING	1630-228	1
VARIABLE GEAR	1630-229	1
LIMIT SWITCH SW-259/WX-306	1630-230	1
SENSOR PLUNGER	1630-231	1
VARIABLE WORM SHAFT	1630-234	1
MOTOR SEAT COVER PLATE	1630-235	1
MOTOR SEAT	1630-236	1
VARIABLE DRIVING GEAR	1630-237	1
SCREW	1630-255	2
ADAPTER SEAT	1630-256	1
PRESSING CAP	1630-311	1
HEAD	1630-322	1
LOCKING BOLT	1630-323	1
LOCKING BOLT	1630-324	2
QUILL	1630-325	1
PLATE COVER	1630-326	1
PROTECTING COVER	1630-327	1
TABLE	1632-001	1
SADDLE	1632-002	1
KNEE	1632-003	1
MOTOR SEAT	1632-004	1
BEARING BRACKET (X-AXIS)	1632-005	1
BEARING BRACKET (X-AXIS)	1632-006	1
BEARING BRACKET (Y-AXIS)	1632-007	1
SCREW NUT SEAT (Y-AXIS)	1632-008	1

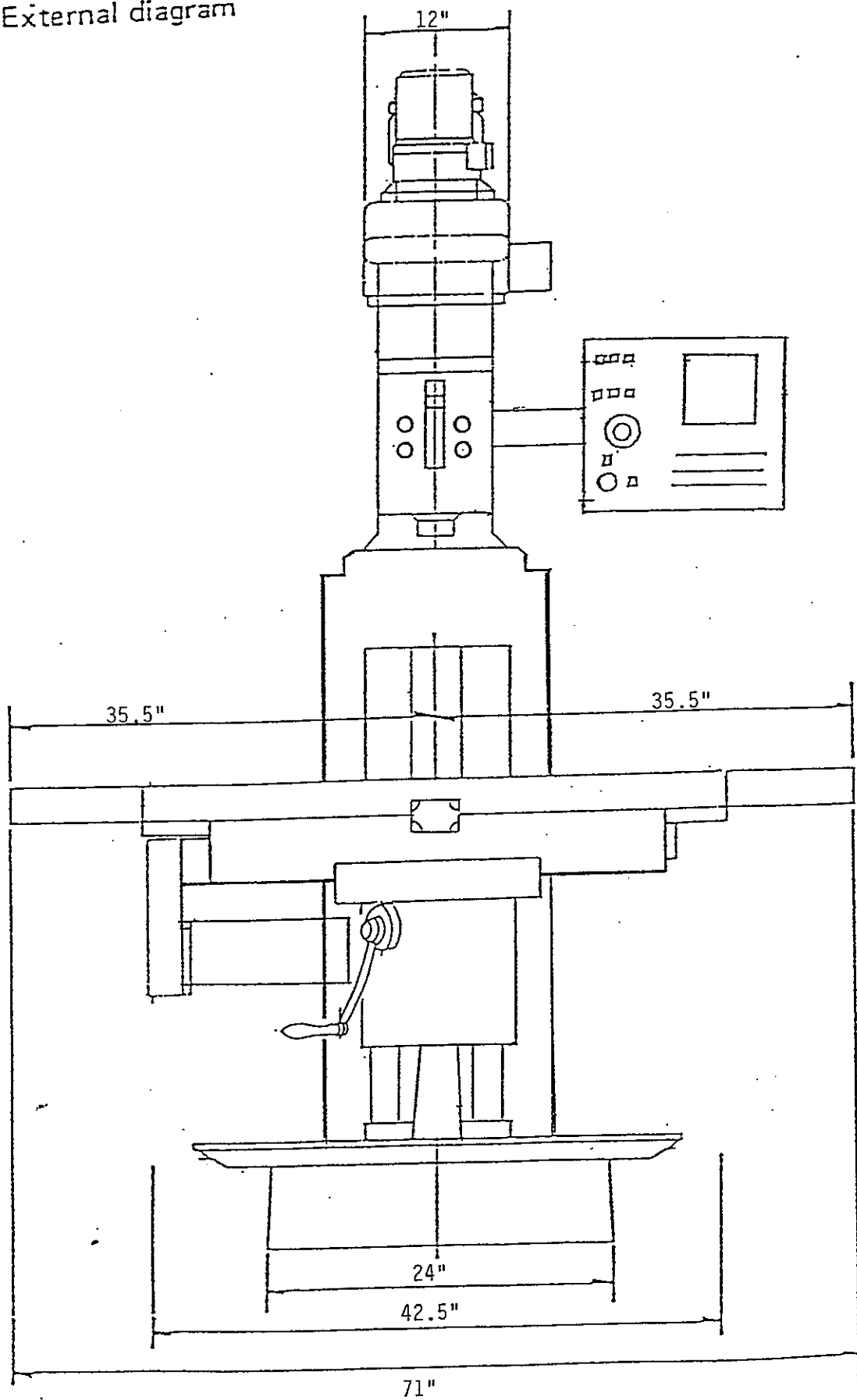
SCREW NUT SEAT (X-AXIS)	1632-009	1
BALL SCREW (X-AXIS)	1632-010	1
BALL SCREW (Y-AXIS)	1632-011	1
TABLE TRAY	1632-012	1
TABLE TRAY	1632-0121	1
BEARING COVER (X-AXIS)	1632-013	1
BEARING COVER (X-AXIS)	1632-014	2
TIMING PULLEY (LARGE)	1632-015	2
TIMING PULLEY (SMALL)	1632-016	1
SPACER	1632-017	1
SPACER (LARGE)	1632-018	1
SPACER (SMALL)	1632-019	1
BEARING COVER (Y-AXIS)	1632-020	1
SPACE RING	1632-021	4
PULLEY FLANGE	1632-022	
OIL SPOUT	1632-027	1
MOTOR SEAT	1632-028	1
MOTOR COVER	1632-029	1
MOTOR COVER	1632-030	1
TIMING PULLEY (Z-AXIS)	1632-032	4
DACKING BLOCK	1632-033	1
FUEL FILTER	1632-034	1
GIB (SADDLE-KNEE)	1632-036	1
OTOR LOCK PLATE	1632-037	1
TIMING PULLEY	1632-040	
GASKET	1632-043	2
GIB ADJUSTING SCREW	1632-044	7
PROTECT PLATE	1632-045	1
SWITCH SEAT	1632-046	1
DOG	1632-047	2
DOG	1632-048	4
COVER	1632-055	1
GIB	1632-057	1
GIB	1632-058	1
GEAR FEED SHAFT	1632-066	1
GUIDE PLATE	1632-068	2
GIB	1632-069	2
ADJUSTING BOLT	1632-071	4
DRIVING KEY	1632-073	2
PLUNGER	1632-074	2
CHIP PLATE	1632-076	1
CHIP PLATE	1632-077	1
CHIP PLATE	1632-078	1
LOCK SCREWN	1632-081	4
LEAK OIL LINE	1632-082	1
COLUMN	1632-083	1
BASE	1632-084	1
GUIDE PLATE (LEFT)	1632-085	1
GUIDE PLATE (RIGHT)	1632-086	1
GIB	1632-087	2

PROTECTING PLATE	1632-091	1
GIB	1632-094	1
COVER	1632-096	1
ADJUSTING SCREW	1632-097	7
ELEVATING HANDLE	1632-098	1
MOTOR SEAT	1632-099	1
ENLARGE COVER	1632-100	1
LOCKING BOLT	1632-200	4
PRESSING CAP	1632-201	2
MOTOR SEAT	1632-206	1
COVER	1632-209	1
RAM	1632-211	1
COVER	1632-233	1
BELT HOUSING	G001	1
GEAR BOX	G002	1
SUPPORT PLATE	G003	1
SUPPORT	G004	1
SPEED CHANGE BOX	G005	1
DOWN COVER	G007	1
LIPPER COVER	G008	1
BALANCING BEAM	G009	1
BEARING HOUSING	G010	1
MAIN SPINDLE PULLEY	G011	1
NYLON SLEEVE	G012	1
PULLEY FASTENING RING	G013	1
MAIN SLIDING PULLEY	G014	1
BEARING HOUSING	G015	1
WASHER	G016	1
CLUTCH RING	G017	1
PULLEY SHAFT	G018	1
SLIDING GEAR HUB	G019	1
SLIDING BEARING HUB	G020	1
SPACER (OUTER)	G021	1
SPACER (INNER)	G022	1
DRIVE RING	G023	1
BULL GEAR	G024	1
TIMING PULLEY	G025	1
LOCKING SCREW	G026	1
DRAW BAR	G027	1
WASHER	G028	1
DRAWBAR KNOB	G031	1
BRAKE SHAFT	G032	1
BRAKE SHAFT COLLAR	G033	1
SPEED DISK	G034	1
BRAKE HANDLE	G231	1
BRAKE RING SCREW	G232	1
ROLL PIN	G456	1
SPINDLE BRAKE	G715	1
BUSH	G719	2
BRAKE CAM	G727	2

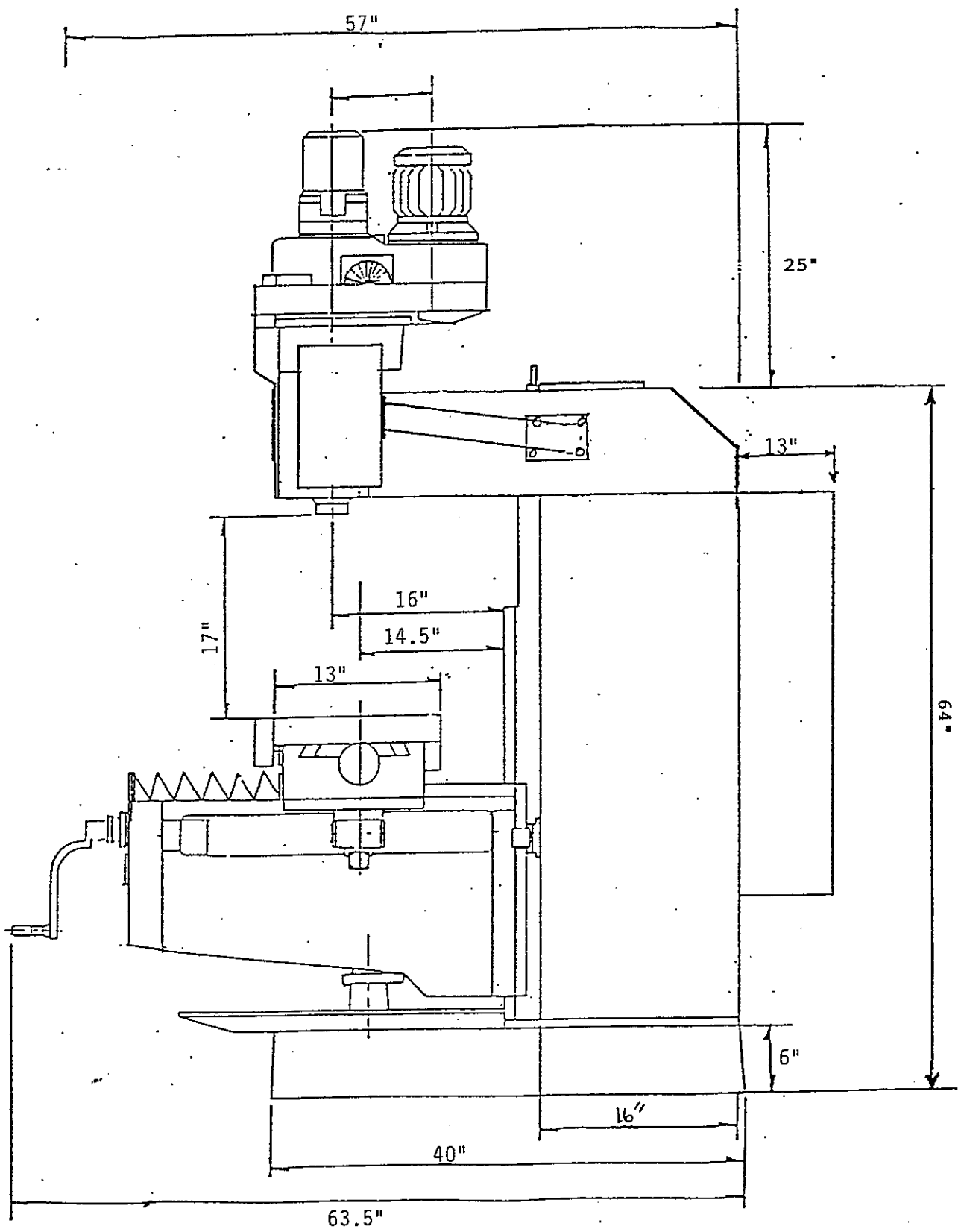
BRAKE ROTATION BOLT	G729	1
BRAKE SHAFT BUSHING	G731	1
HI-LOW CRANK BLOCK	G744	1
HI-LOW CHANGE SHAFT	G745	1
HI-LOW SET PLATE	G746	1
HI-LOW SET PIN	G747	1
HI-LOW CONTROL LEVER	G748	1
COMPRESSION SPRING	G749	1
CLUTCH SPRING	G750	3
PROTECTING SHEET	G754	1
DRIVING GEAR	G755	1
SQUARE HEAD SCREW	G756	3
BEARING COVER	G757	1
DRIVING GEAR SHAFT	G758	1
LOCKING PIECE	G759	1
CLUTCH SPRING GUIDE BAR	G764	3
CHANGE SPEED WORM	G771	1
CHANGE SPEED GEAR	G772	1
BUSH	G773	1
BUSH	G774	1
BUSH	G775	1
GEAR SHAFT	G776	1
BUSH	G777	1
BUSH	G778	1
REGULATING SCREW (R.H.)	G779	1
METAL SHEET	G780	1
REGULATING SCREW (L.H.)	G781	1
REGULATING NUT	G782	1
WARNING PLATE	G785	1
CHANGE SPEED HAND WHEEL	G787	1
CHANGE SPEED HD WHEEL HUB	G788	1
CHNG SPD HD WHEEL HANDLE	G789	1
CHANGE SPEED WORM SHAFT	G790	1
SPEED PLATE	G791	1
SPEED DISK	G792 (G034)	1
PROTECTING PLATE	G798	2
COMPRESSION SPRING	G871	1
SWITCH BOX	G9011	1
SWITCH BOX COVER	G9012	1
MOTOR SWITCH BRACKET	G905	1
ELEVATING SCREW HOUSING	H002	1
ELEVATING SCREW-NUT	H003	1
HANDLE	H028	1
ELEVATING SCREW	H051	1
BEARING RETAINER RING	H053	1
BEARING BUSHING	H055	1
BEVEL GEAR	H059	1
BEVEL DINION	H060	1
BEARING CAP	H064	1
BEARING RETAINER RING	H065	3

GRADUATION DIAL	H067	1
DIAL HOLDER	H068	1
DIAL LOCK NUT	H069	4
GEARSHAFT CLUTCH INSERT	H070	1
TABLE LOCK PLUNGER	H120	1
PLUNGER	H1200	1
LOCK BOLT	H121	7
LOCK BOLT HANDLE	H122	7
HOOK	H276	1
WASHER	J071	3
SPRING SCREW	J113	1
PULLEY FLANGE	J491	2
MAIN SPINDLE	J464	1
SPINDLE DIRT SHIELD	J466	1
SPACER	J467	1
SPACER	J468	1
NOSEPIECE	J469	1
LOCKING NUT	J470	1
LOCKING NUT	J472	1
SLIDING MOTOR PULLEY	MV3-009	1
FIXED MOTOR PULLEY	MV3-010	1
FIXED MOTOR PULLEY	MV3-0101	1
(W/BRAKES)		
MOTOR SHAFT SLEEVE	MV3-011	1
PULLEY BUSHING	MV3-012	1
SPRING BRACKET	MV3-043	1
WASHER	MV3-044	1
LOCKING SCREW	MV3-142	1
5 HP MOTOR	MV3-150	1
LOCK BLADE	V133	2

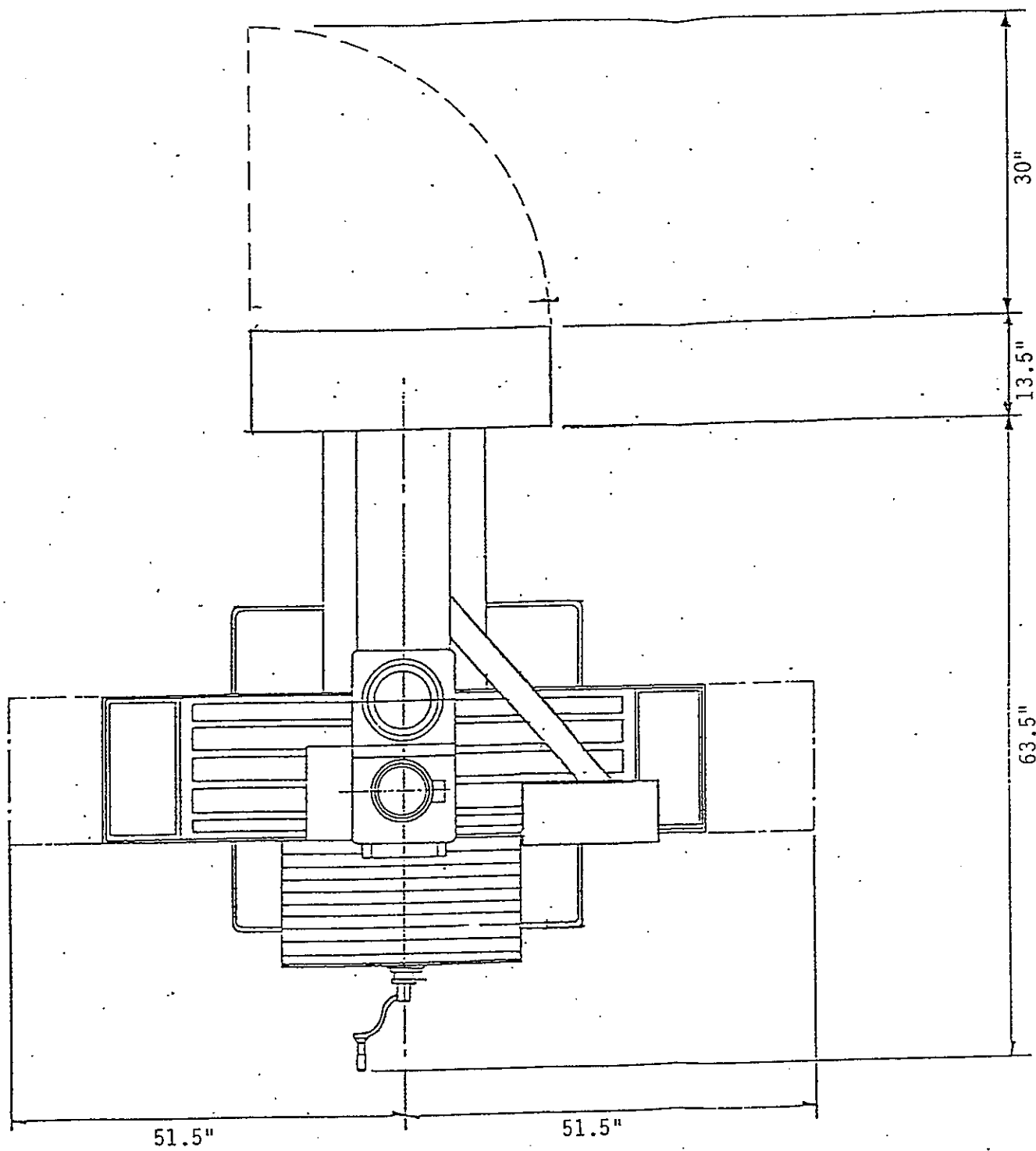
External diagram



PARTNER IV

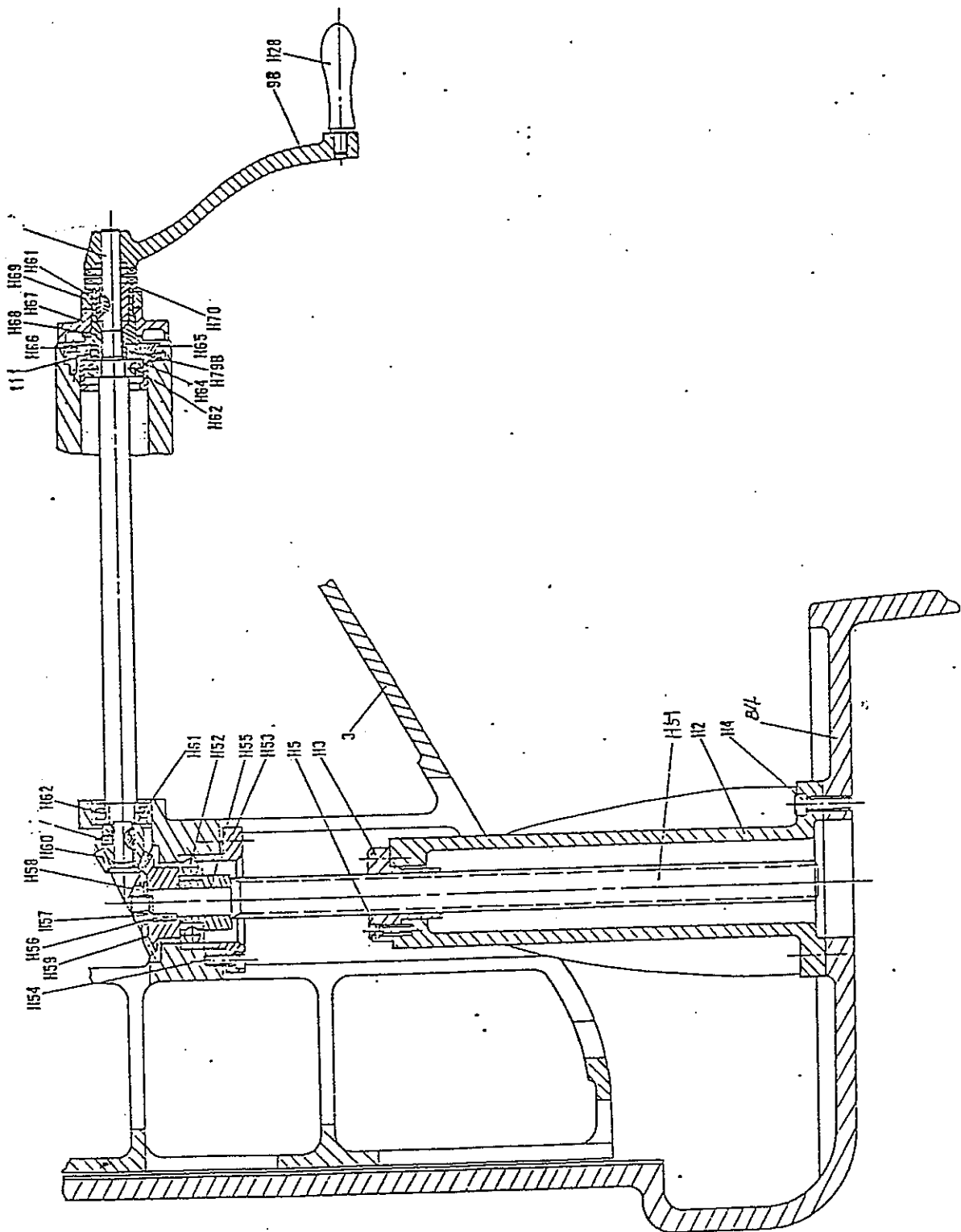


EXTERNAL DIAGRAM



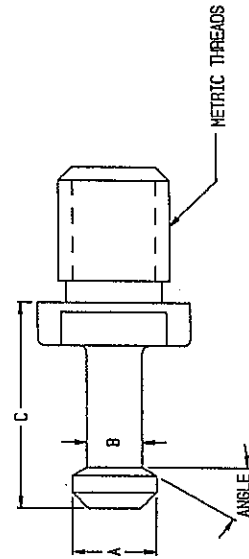
1632-#40

Knee Elevating Mechanism



COMMAND RETENTION KNOBS
STYLE BT-FLANGE
JAPANESE

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

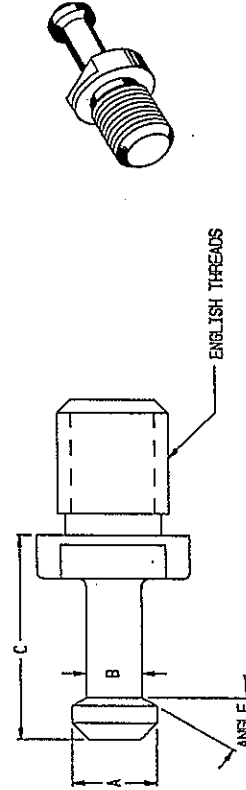


NOTES:
COMMAND CORPORATION
TEL: 1-800-328-2197
FAX: 1-612-755-1116

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED			
	X.XX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	INDUSTRIAL INFORMATION CONTROLS 7670 PINE DRIVE CHARLESTON, IN 46317 TEL: (612) 774-8100			
	TITLE: BT-FLANGE RETENTION KNOB			
	APPLICATION: GENERAL PRODUCTS			
	SCALE 1:1	DWG NO. G-00-018-030	SIZE B	
	DATE 1 FEB 89	DRAWN BY REUTER	SEEK NO. 1 OF 1	

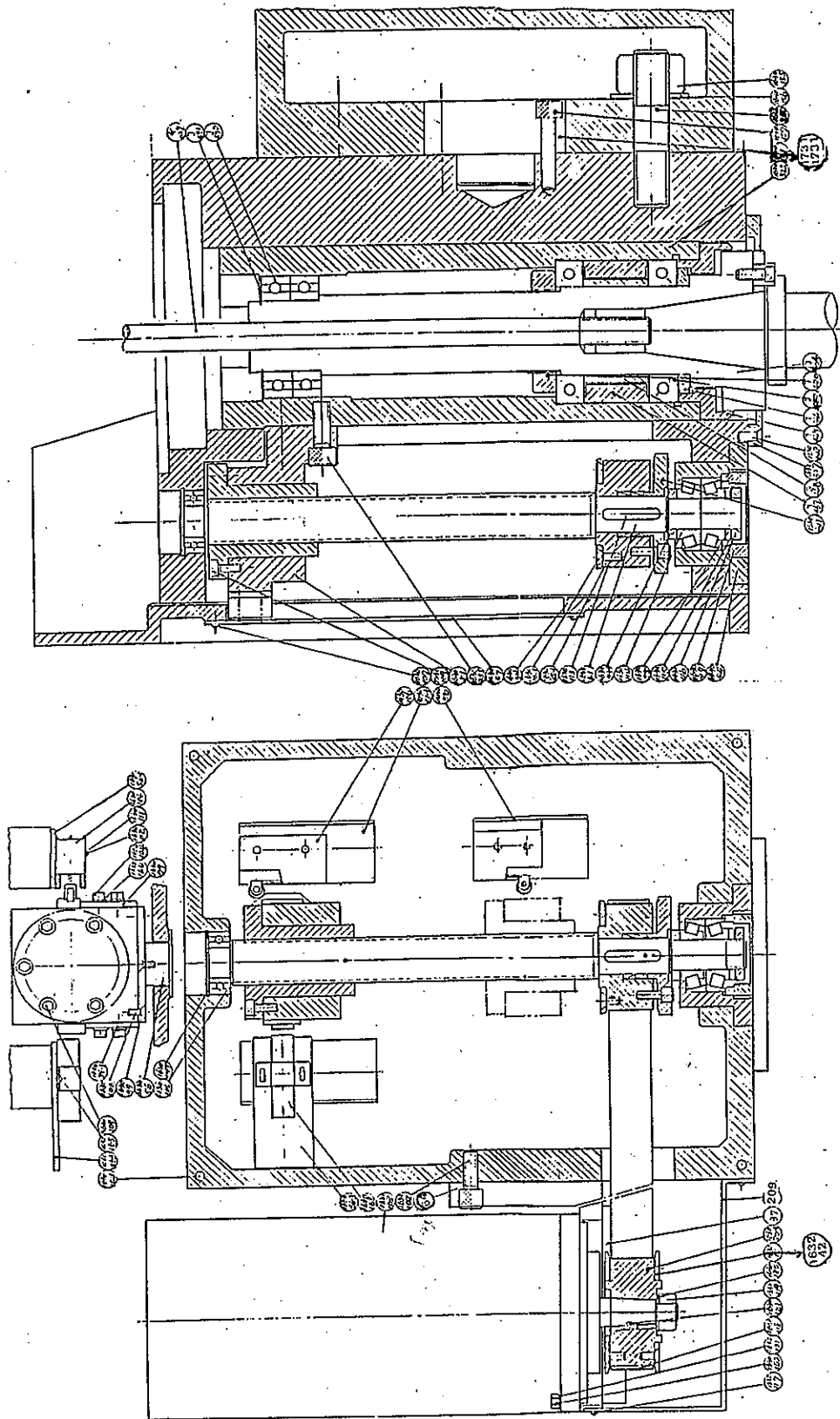
COMMAND RETENTION KNOBS
STYLE V-FLANGE
JAPANESE

V-FLANGE TAPER	PART No.	DIMENSIONS			MILLITRONICS MACHINE
		A	B	C	
40	RB4E-0001	.59	.39	1.27	PARTNER VII
	RB4E-0002				PARTNER IV & V
30	MA-129	DWG. No. 6-01-018-010			PARTNER III

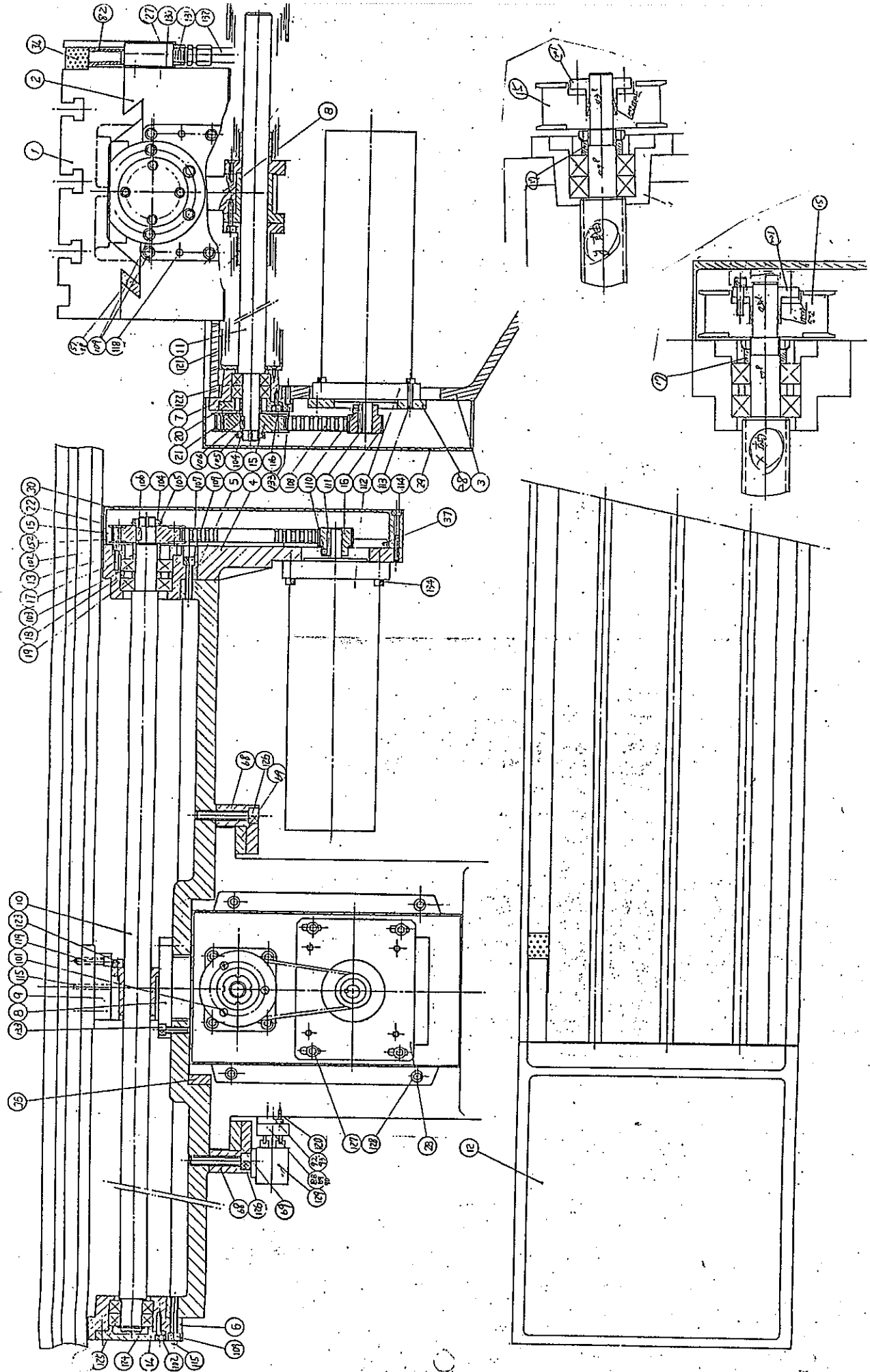


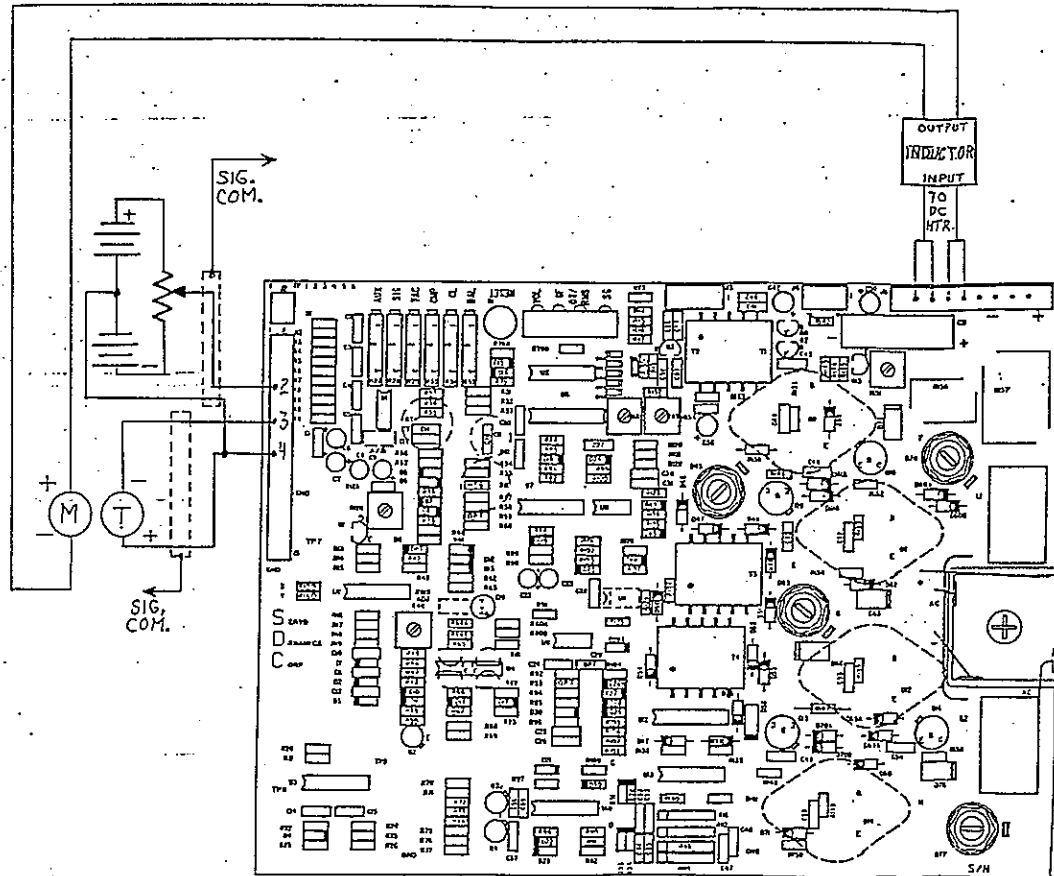
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				
 INDUSTRIAL INFORMATION CONTROLS 7070 PARK DRIVE CHICAGO, IL 60637 (612-474-8100)				
TITLE: V-FLANGE RETENTION KNOB				
APPLICATION: GENERAL PRODUCTS				
SCALE 1:1				
DWG NO. 6-00-018-031				
DATE: 1 FEB 89				
DRAWN BY: REUTER				
SHEET NO. 1 OF 1				

1



1632-#40
Head Mechanic Assembly





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. 6-00-017-020 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

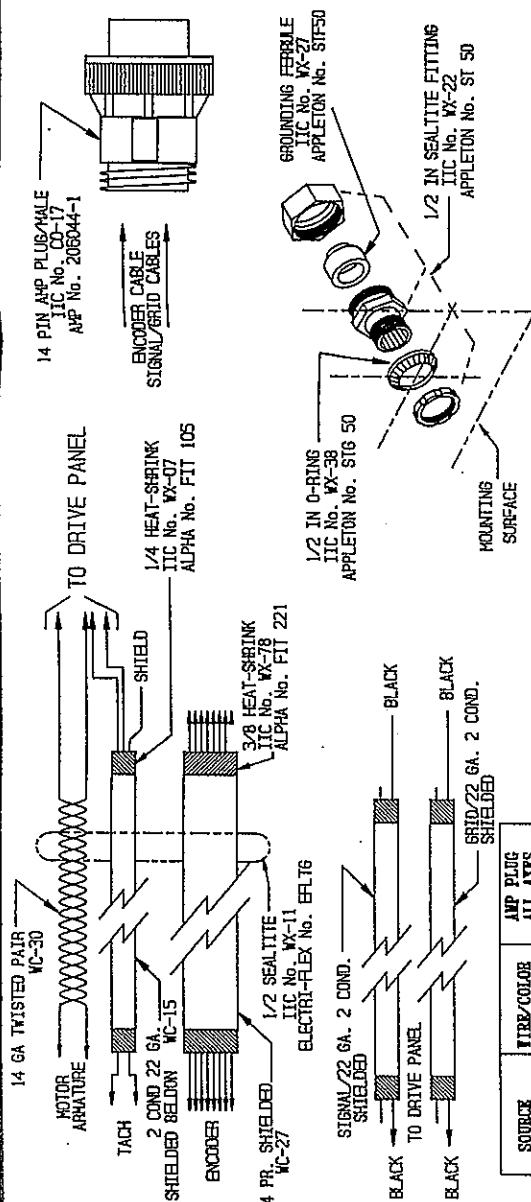


MASTER
BRIGHTNESS



10 9 8 7 6 5 4 3 2 1

REV.	DESCRIPTION	E.C.D. 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				



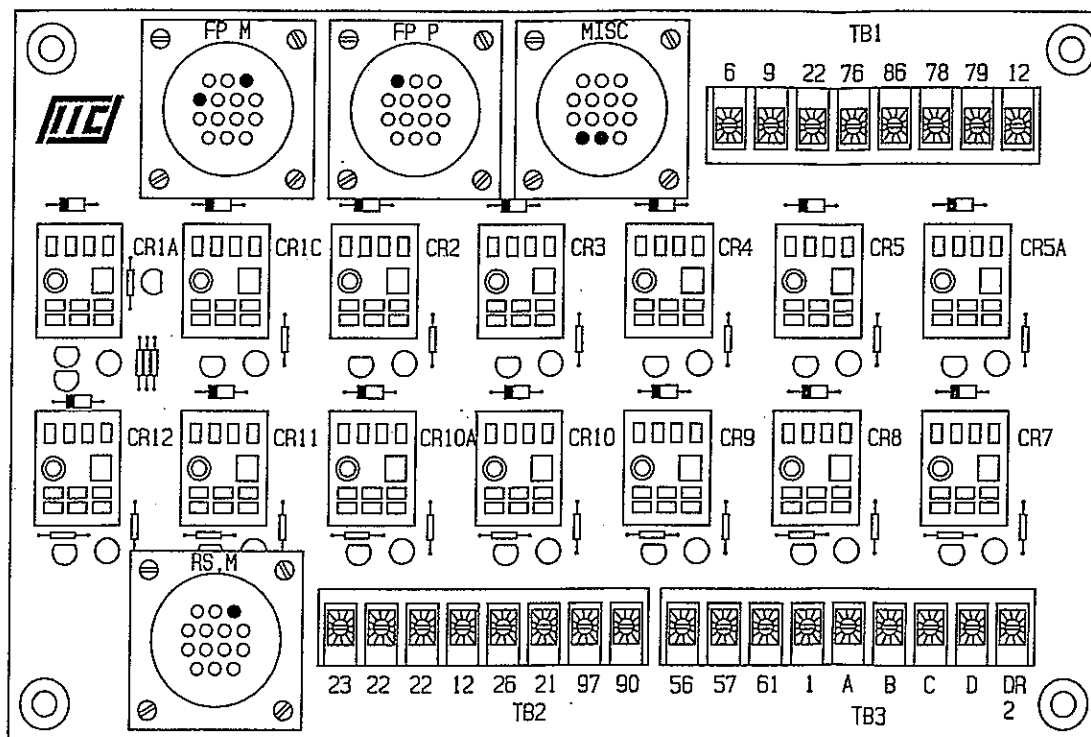
GENERAL NOTES

- TACH WIRES:
CUT OFF SHIELD ON MOTOR END AND SECURE WITH HEAT-SHRINK. LABEL AS '10'. CUT OFF RED 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

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/WHI	1 RED 22 GA	P-2
CH.B GRN	2 BLK 22 GA	P-3
CH.B GRN/WHI	2 RED 22 GA	P-4
MARKER ORG	3 RED 22 GA	P-5
MARKER OR/WT	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

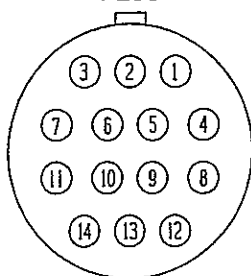
SOURCE	COLOR/WIRE	DESTINATION
MOTOR +	RED 14 GA	TB-35 TB-44 TB-53
MOTOR -	BLK 14 GA	TB-36 TB-45 TB-54
TACH +	RED 22 GA	TB-29 TB-38 TB-47
TACH -	BLK 22 GA	TB-30 TB-39 TB-48
SIGNAL	RED 22 GA	TB-28 TB-37 TB-46
GRID	BLK 22 GA	TB-34 TB-43 TB-52

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
INDUSTRIAL INFORMATION CONTROLS 7070 PARK DRIVE CHILMARK, MA 03317 612-474-8100				
TOLERANCE UNLESS SPECIFIED X.XXX ± X.XX ± X.X ± ANGLE ±				
TITLE: X.Y.Z MOTOR CABLES/ASSY.				
APPLICATION: GENERAL PRODUCTS				
SCALE: 1:1				
DWG NO: 6-04-018-006				
DATE: 7 DEC 88				
TRUNK BY: REUTER				
SHEET NO: 1 OF 2				



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

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	CR2-9 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

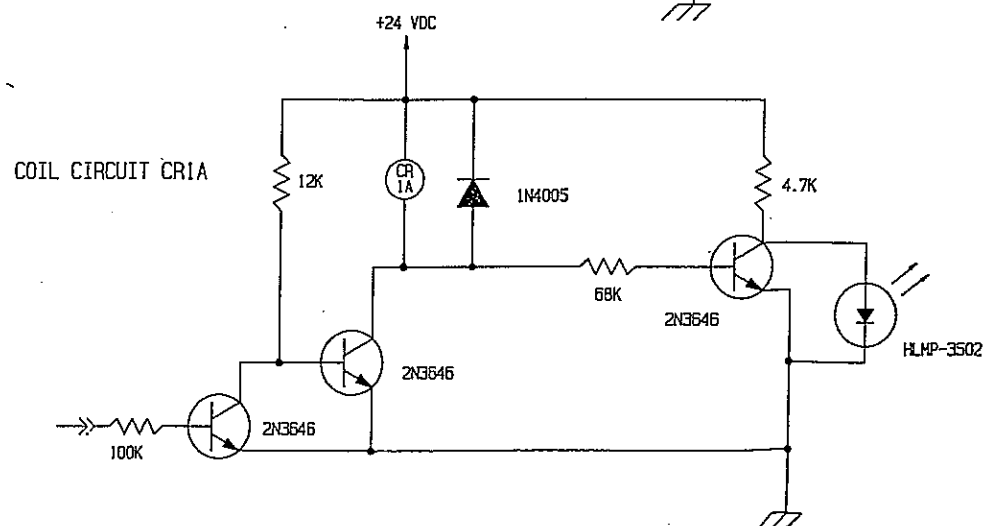
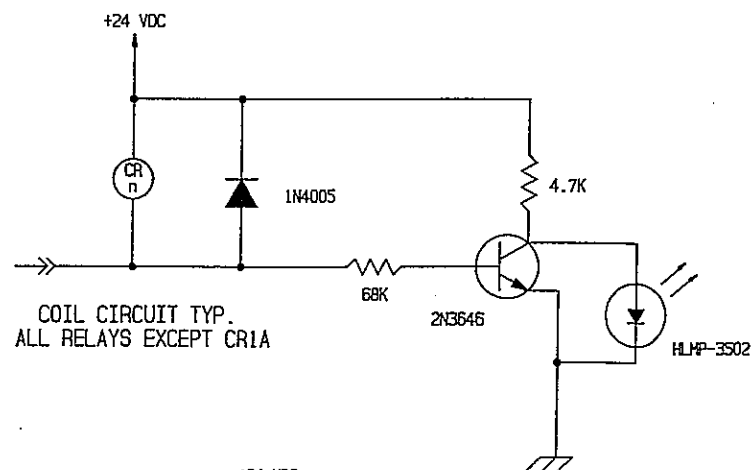
T.B. 2

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		

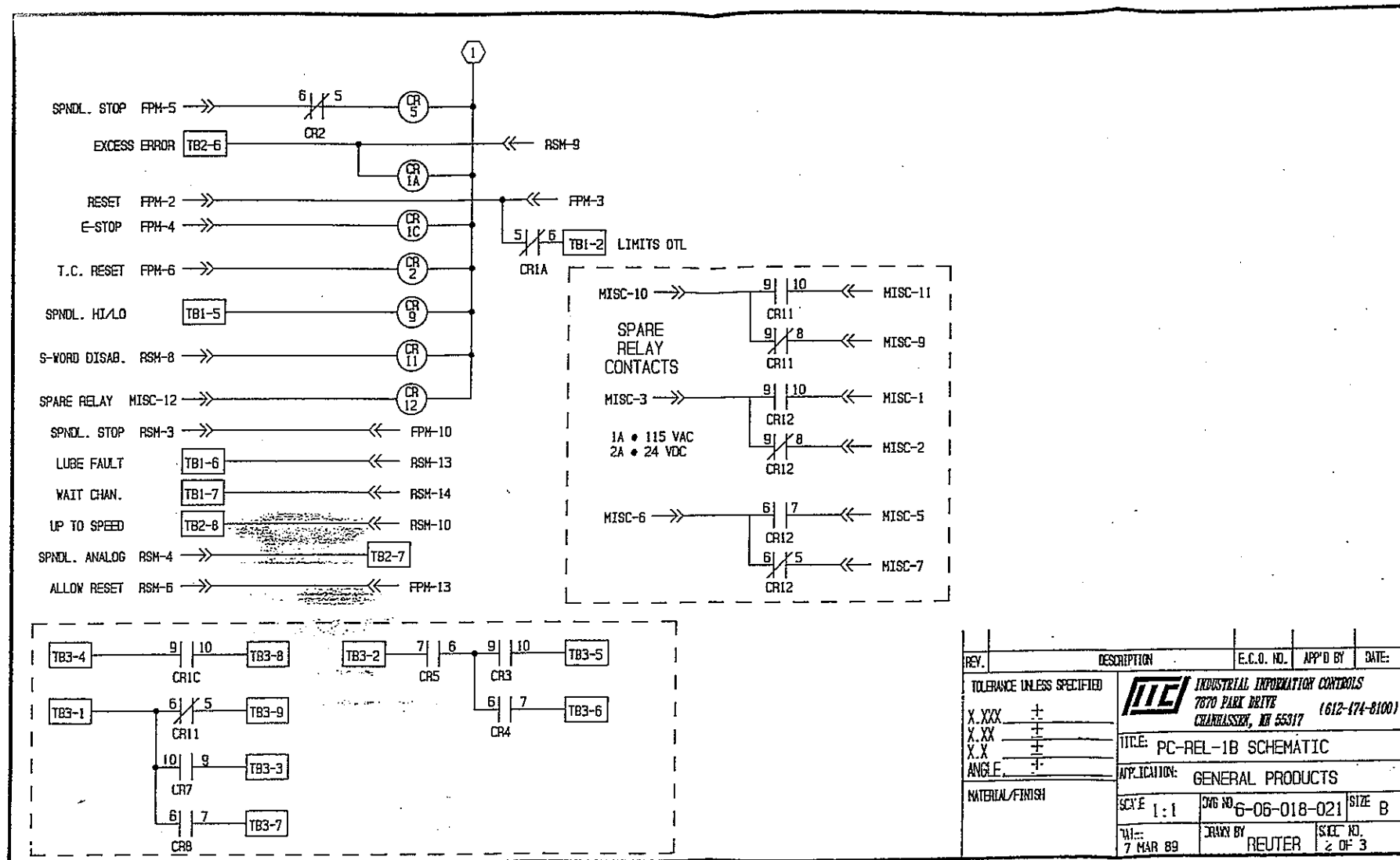


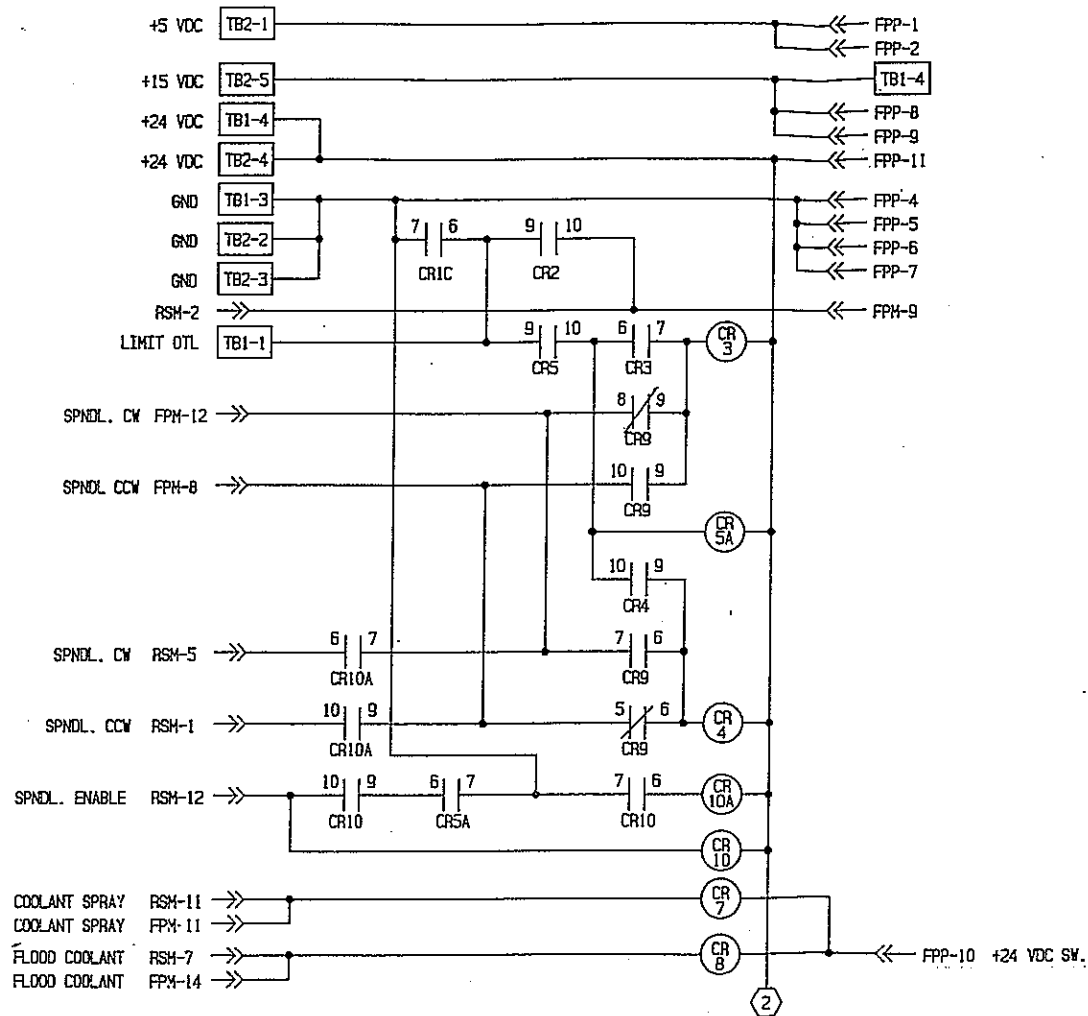
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED X.XXX ± X.XX ± X.X ± ANGLE ±				
MATERIAL/FINISH				
SCALE 1:1 DATE: MAR 89				
DWG NO. 6-06-018-021 DRAWN BY REUTER				
SIZE 6 3 OF 3				

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

TITLE: PC-REL-1B SCHEMATIC

APPLICATION: GENERAL PRODUCTS

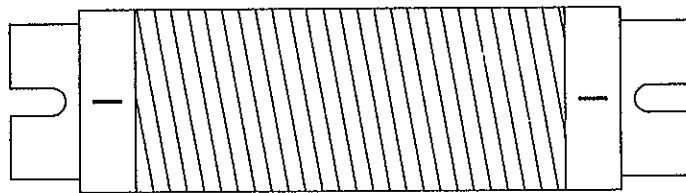
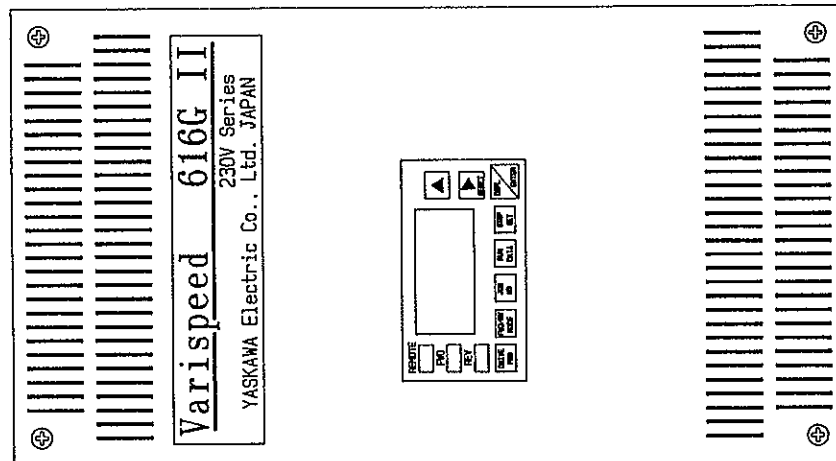




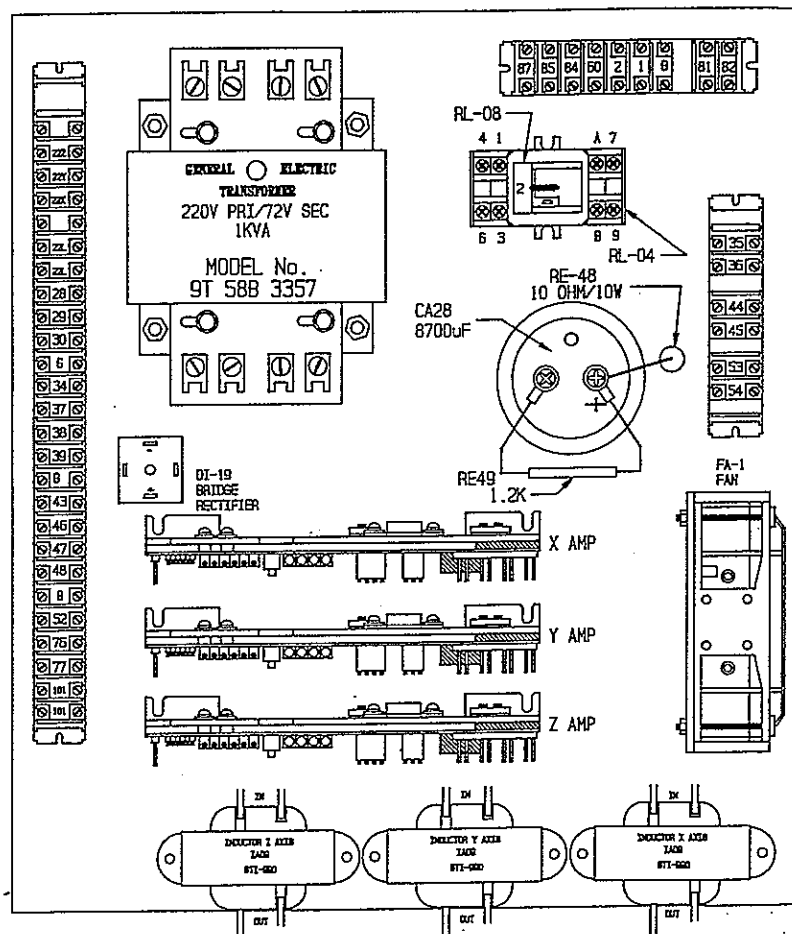
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH				
 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHARLESTON, NY 55317 (612-474-8100)				
TITLE: PC-REL-1B SCHEMATIC				
APPLICATION: GENERAL PRODUCTS				
SCALE 1:1	DWG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

REGENERATION RESISTOR
25 Q. 1W
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 HILLS
III. IV. V
YASKAWA MODEL CIMR 2.2G2
IIC No. PS-19
RESISTOR: RE-84
FOR USE ON PARTNER HILLS
I & II



REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
	TOLERANCE UNLESS SPECIFIED			
	X.XXX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	INDUSTRIAL INFORMATION CONTROLS			
	7070 PARK DRIVE (612-474-8100)			
	CHICAGO, IL 60631			
	TITLE: YASKAWA CONTROL PANEL			
	APPLICATION: GENERAL PRODUCTS			
	SCALE: 2.25:1	DWG NO. 5-03-018-010	SIZE B	
	DATE: 27 MAR 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	±			
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
CHARLHASTEN, NY 55317
(612-474-8100)

TITLE: 3 AXIS DRIVER AMP BOARD

APPLICATION: GENERAL PRODUCTS



- ### ASSEMBLY WIRING (ALL 14 GA.)

FROM	TO	FROM	TO
J1-3	TB-6	J2-5	P-4
LF-6ND	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

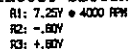
TRIM POT DEFINITIONS

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

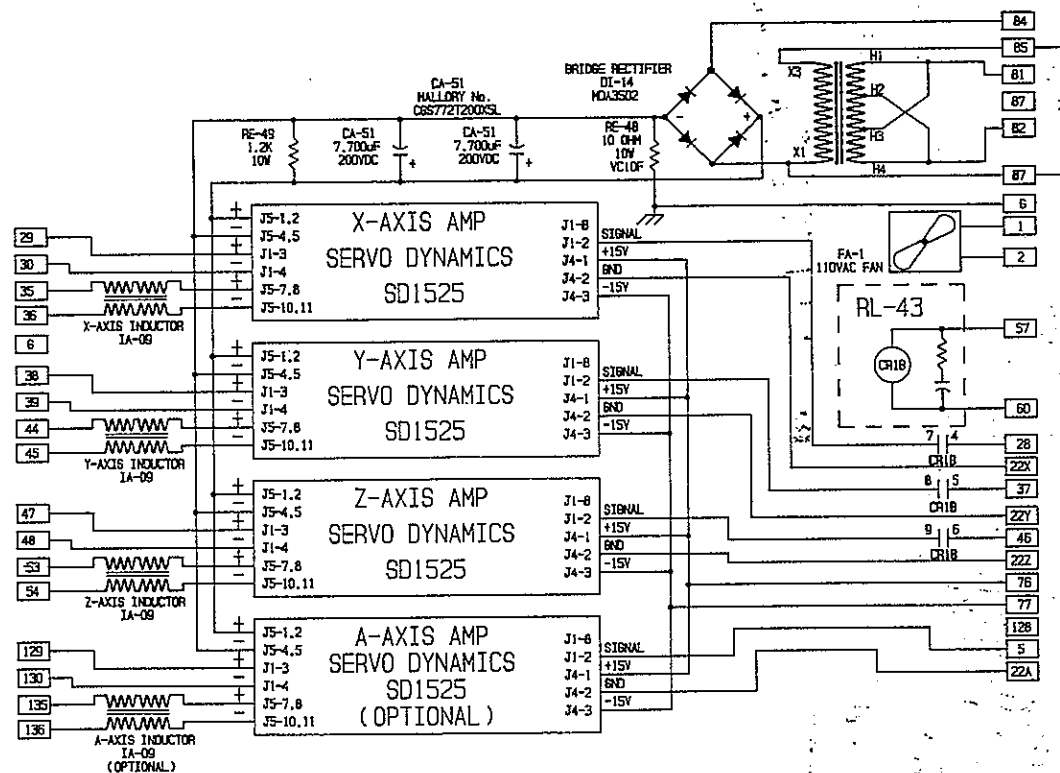
NOTES:

1. 'P' DESIGNATES MALE AMP PLUG. CO-17
2. USE 14 GA. BLUE WIRE (WC-06) FOR P-PLUG ALL LENGTHS: 38 IN. STAND ALONE MODELS LEHTH: 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 7070 PARK DRIVE CLAREMONT, NY 5517		
X .XXX	±	TITLE: DIGITAL PWR. PANEL ASSY. APPLICATION: GENERAL PRODUCTS		
X .XX	±			
X .X	±			
ANGLE	±			
MATERIAL/FINISH		SCALE: 2.5:1 DATE: 17 NOV 88	DWG NO: 6-03-018-001 DRAWN BY: REUTER	SIZE B 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	SIZE B
		DATE: 20 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	SHEET NO. 1 OF 1	DATE: 21 MAR 89
		DRAWN BY REUTER		

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

TITLE: 4-AXIS DRIVE SCHEMATIC

APPLICATION: GENERAL PRODUCTS

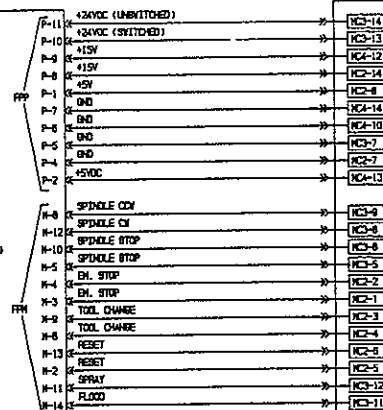
SCALE 1.75:1

DATE: 21 MAR 89

DRAWN BY REUTER

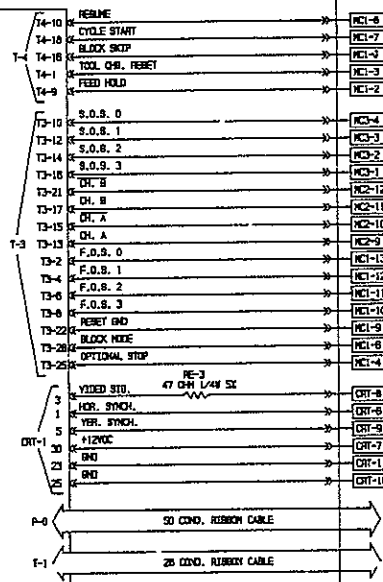
RELAY CARD PC-REL-1B

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



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

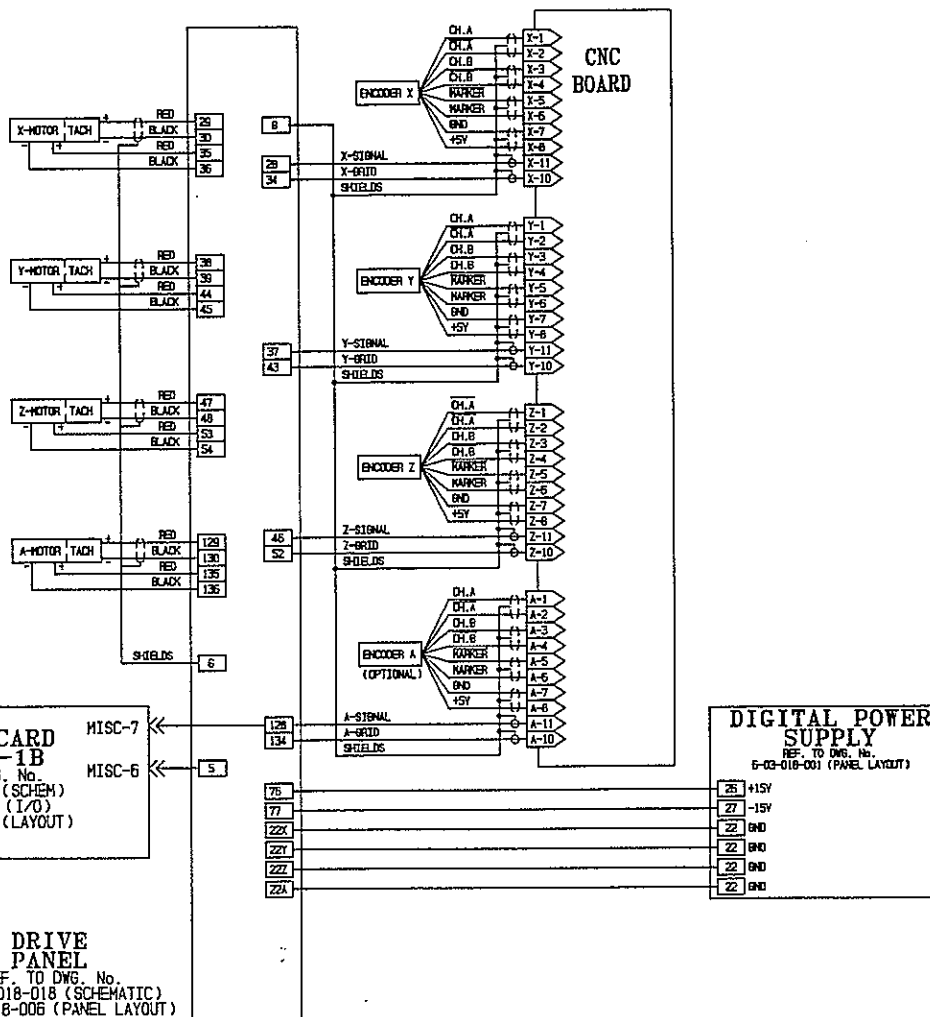
CNC BOARD



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 CHANHASSEN, MN 55317 (612-474-8100)				
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)

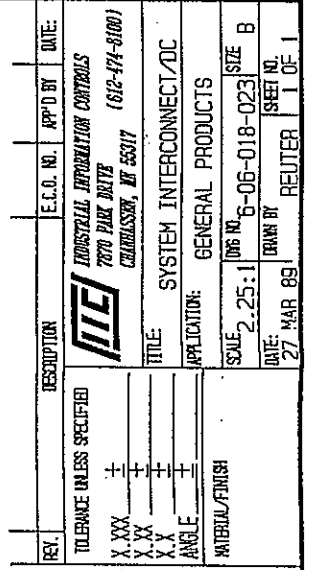
DRIVE
PANEL
REF. TO DWG. No.
6-06-018-018 (SCHEMATIC)
6-03-018-006 (PANEL LAYOUT)

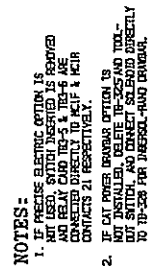


REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
	TOLERANCE UNLESS SPECIFIED			
	X.XXX ±			
	X.XX ±			
	X.X ±			
	ANGLE ±			
	MATERIAL/FINISH			
	SCALE 2:1	DWG NO. 6-06-018-028	SIZE B	
	DATE: 29 MAR 89	DRAWN BY REUTER	SHEET NO. 1 OF 1	

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.	APPRO'D BY	DATE:
	TOLERANCE IN LESS SPECIFIED	 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE (512-474-8100) CLEVELAND, OH 55317		
X XXX	±	TITLE: MAG PANEL WTRING/AC APPLICATION: GENERAL PRODUCTS		
X XX	±			
X X	±			
X.X	±			
ANGLE	±			
MATERIAL/FINISH		SCALE 2:1	DWG NO. 6-05-018-022	SIZE B
DATE:	27 MAR 89	DRAWN BY	REITER	SHEET NO. 05-1

TERMINAL BLOCK DESIGNATORS

1. 115 VAC HOT.	129. A-MOTOR TACH +	CR1. RESET	DR2. DOWN SPINDLE SPEED (AC)
2. 115 VAC COMMON	130. A-MOTOR TACH -	CR1A. EXCESS ERROR	
6. X OTL SW. OUT	134. A-GRID SWITCH	CR1B. DRIVE DISABLE	
7. Y OTL SW. OUT/X OTL SW. IN	135. A-MOTOR +	CR1C. DRIVE RESET	
8. Z OTL SW. OUT/Y OTL SW. IN	136. A-MOTOR -	CR2. TOOL CHANGE RESET	
9. +24 VDC FROM PWR. SUPPLY	32B. POWER DRAWBAR	CR3. SPINDLE CLOCKWISE	
12. +24 VDC FROM PWR. SUPPLY	F1. SW. 115 VAC TO FLOOD COOLANT	CR4. SPINDLE COUNTERCLOCKWISE	
22. GROUND FROM PWR. SUPPLY	6. CHASSIS GROUND	CR5. SPINDLE STOP	
23. +5 VDC FROM PWR. SUPPLY	22L. MACHINE SW. GROUND	CR5A. SPINDLE SAFETY	
25. +15 VDC FROM PWR. SUPPLY	22X. X-AMP GROUND	CR7. SPRAY MIST	
27. -15 VDC FROM PWR. SUPPLY	22Y. Y-AMP GROUND	CR8. FLOOD COOLANT	
28. X-AMP ANALOG SIGNAL	22Z. Z-AMP GROUND	CR9. SPINDLE HI/LO	
29. X-MOTOR TACH +	22A. A-AMP GROUND	CR10. SPINDLE ENABLE	
30. X-MOTOR TACH -		CR10A. SPINDLE SAFETY	
34. X-GRID SWITCH		CR11. DISABLE S-WORD	
35. X-MOTOR +		CR12. AUXILIARY RELAY	
36. X-MOTOR -		MC1F. SPINDLE CW (AC)	
37. Y-AMP ANALOG SIGNAL		MC1R. SPINDLE CCW (AC)	
38. Y-MOTOR TACH +		MC2. FLOOD COOLANT (AC)	
39. Y-MOTOR TACH -		UR1. UP SPINDLE SPEED (S-WORD)	
43. Y-GRID SWITCH		UR1. DOWN SPINDLE SPEED (S-WORD)	
44. Y-MOTOR +		UR2. UP SPINDLE SPEED (AC)	
45. Y-MOTOR -		DR2. DOWN SPINDLE SPEED (AC)	
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			
85. SW. 72 VAC TO RECTIFIER			
86. SW. 72 VAC TO DRIVE TRANSFORMER			
87. 72 VAC TO PROX. SWITCH			
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

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
 INDUSTRIAL INFORMATION CONTROLS 7870 PAPE DRIVE CHILMARK, MA 01937				
TOLERANCE UNLESS SPECIFIED				
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±			
TITLE: TERMINAL BLOCK DES.				
APPLICATION: PARTNER IV				
SCALE	N/A	DWG NO.	6-04-015-101	SHEET 8
DATE	25 NOV 88	DESIGN BY	NEUTER	1061

