

OPERATIONS MANUAL

PARTNER 7E

MILLTRONICS MANUFACTURING COMPANY

**7870 Park Drive
Chanhassen, MN 55317**

612-474-8100

PARTNER 7

ELECTRICAL DRAWINGS

Partner 7D Manual Drawing Index
04 January 1991

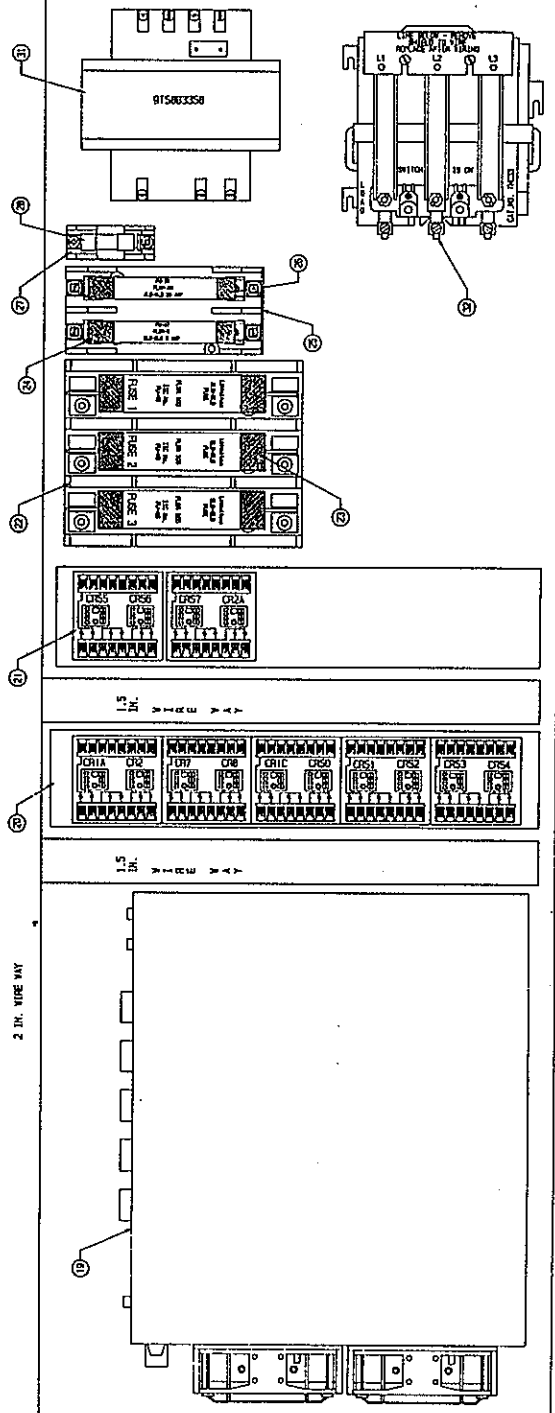
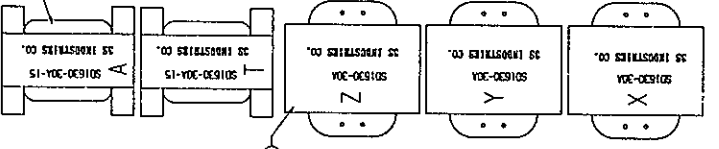
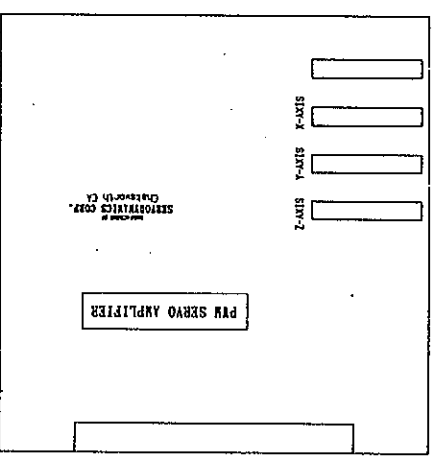
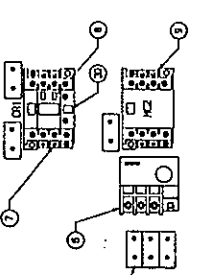
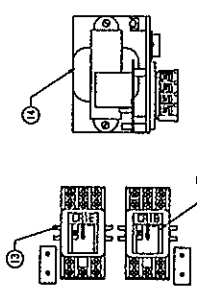
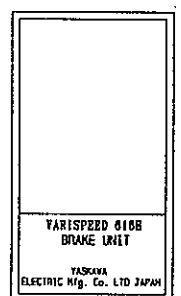
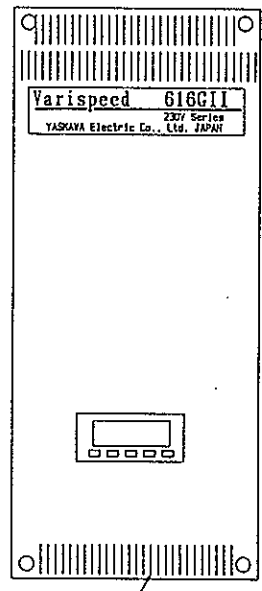
<u>P7cm</u>	<u>Drawing #</u>	<u>Pg</u>	<u>Rv</u>	<u>Description</u>
2,001	6-03-020-002	0	0	Mag Panel Assy
2,002	6-06-020-033	0	0	AC System Wire C5
2,003	6-06-020-034	1	A	DC System Wire C5
2,004	6-06-020-034	2	A	DC System Wire C5
2,005	6-06-020-012	0	A	Motor Encoder Interface
2,006	6-06-020-017	1	D	Rem Tool Change Panel Assy
2,007	6-06-020-018	0	B	SD4-3060 3 Axis Drive Amp
2,008	6-06-020-002	1	0	Solenoid Loc./Air Line Map
2,009	6-04-020-001	2	A	Interconnect Box Cable-Table
2,010	6-02-020-000	0	0	Axis Servo Motor Assy
2,011	6-02-020-002	0	0	Tool Changer Motor Assy
2,012	6-06-018-030	0	0	24 VDC Power Supply
3,001	6-10-004-008	2	0	Card Cage Electronics Assy
3,002	6-10-004-008	3	0	Card Cage Electronics Assy
3,003	6-10-004-008	4	0	Card Cage Electronics Assy
3,004	6-10-004-008	5	0	Card Cage Electronics Assy
3,005	6-10-004-001	0	0	Fnt Panel SW. & Cont /FNT
3,006	6-10-004-002	0	0	Fnt Panel SW. & Cont /REV
4,001	6-00-018-030	0	0	Bt-Flange Retention Knob
4,002	6-00-018-031	0	A	V-Flange Retention Knob

PARTNER 7 TERMINAL BLOCK LISTING

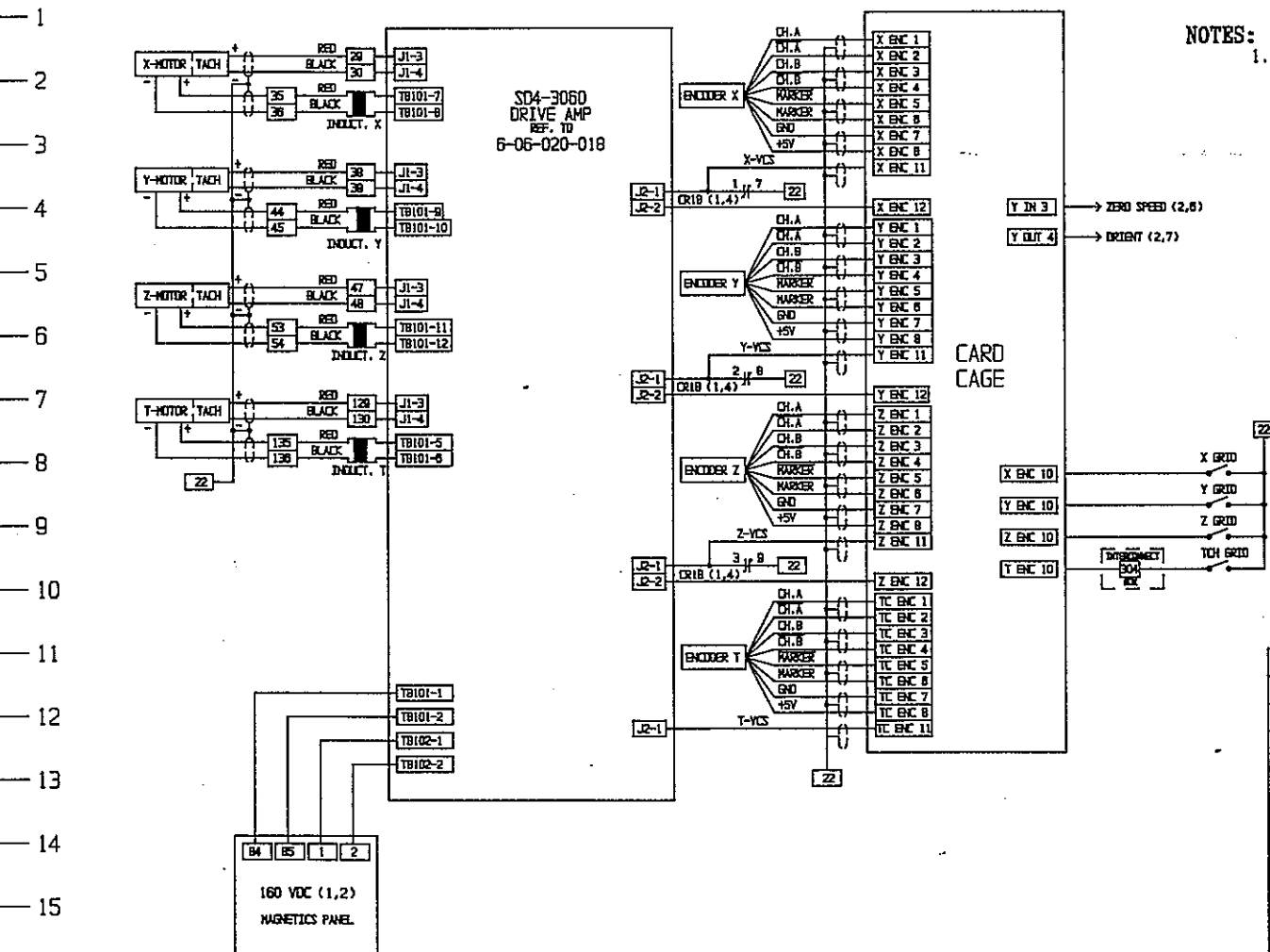
NUMBER	DESCRIPTION
6	CHASSIS GROUND
F1	3 PHASE FLOOD PUMP
F2	3 PHASE FLOOD PUMP
F3	3 PHASE FLOOD PUMP
1	110VAC HOT
2	110VAC RETURN
6	X-AXIS OTL/SPINDLE FAULT CONTACTS
6A	SPINDLE FAULT CONTACTS/FLOOD FAULT CONTACTS
6B	FLOOD FAULT CONTACTS/AIR LOSS CONTACTS
6C	AIR LOSS CONTACTS/REMOTE E-STOP
6D	REMOTE E-STOP
7	X-AXIS OTL/Y-AXIS OTL
8	Y-AXIS OTL/Z-AXIS OTL
9	Z-AXIS OTL
12	24VDC
13	CONTACT COMMON SPARE M-FUNCTION
14	N.O. CONTACT SPARE M-FUNCTION
15	N.C. CONTACT SPARE M-FUNCTION
22	DC GROUND
29	X-AXIS TACH (+)
30	X-AXIS TACH (-)
35	X-AXIS ARMATURE (+)
36	X-AXIS ARMATURE (-)
38	Y-AXIS TACH (+)
39	Y-AXIS TACH (-)
44	Y-AXIS ARMATURE (+)
45	Y-AXIS ARMATURE (-)
47	Z-AXIS TACH (+)
48	Z-AXIS TACH (-)
53	Z-AXIS ARMATURE (+)
54	Z-AXIS ARMATURE (-)
57	SWITCHED 110VAC
61	SPRAY MIST SOLENOID
74	4TH AXIS BRAKE OPTION
129	CARROUSELL TACH (+)
130	CARROUSELL TACH (-)
135	CARROUSELL ARMATURE (+)
136	CARROUSELL ARMATURE (-)
138	4TH AXIS TACH (+)
139	4TH AXIS TACH (-)
144	4TH AXIS ARMATURE (+)
145	4TH AXIS ARMATURE (-)

NO.	QTY	STOCK NO.	DESCRIPTION
1	3	VT-101	WIRE TRACT 11.5 X 1.5 LB 5
2	3	VT-102	WIRE COVER 11.5 LB 5
3	1	DA-13	RELAY COVER 1.5 LB 5
4	1	DA-13	RELAY COVER 1.5 LB 5
5	1	DA-13	RELAY COVER 1.5 LB 5
6	1	DA-13	RELAY COVER 1.5 LB 5
7	1	DA-13	RELAY COVER 1.5 LB 5
8	1	DA-13	RELAY COVER 1.5 LB 5
9	1	DA-13	RELAY COVER 1.5 LB 5
10	1	DA-13	RELAY COVER 1.5 LB 5
11	1	DA-13	RELAY COVER 1.5 LB 5
12	1	DA-13	RELAY COVER 1.5 LB 5
13	1	DA-13	RELAY COVER 1.5 LB 5
14	1	DA-13	RELAY COVER 1.5 LB 5
15	1	DA-13	RELAY COVER 1.5 LB 5
16	1	DA-13	RELAY COVER 1.5 LB 5
17	1	DA-13	RELAY COVER 1.5 LB 5
18	1	DA-13	RELAY COVER 1.5 LB 5
19	1	DA-13	RELAY COVER 1.5 LB 5
20	1	DA-13	RELAY COVER 1.5 LB 5
21	1	DA-13	RELAY COVER 1.5 LB 5
22	1	DA-13	RELAY COVER 1.5 LB 5
23	1	DA-13	RELAY COVER 1.5 LB 5
24	1	DA-13	RELAY COVER 1.5 LB 5
25	1	DA-13	RELAY COVER 1.5 LB 5
26	1	DA-13	RELAY COVER 1.5 LB 5
27	1	DA-13	RELAY COVER 1.5 LB 5
28	1	DA-13	RELAY COVER 1.5 LB 5
29	1	DA-13	RELAY COVER 1.5 LB 5
30	1	DA-13	RELAY COVER 1.5 LB 5
31	1	DA-13	RELAY COVER 1.5 LB 5
32	1	DA-13	RELAY COVER 1.5 LB 5
33	1	DA-13	RELAY COVER 1.5 LB 5

REF.	DESCRIPTION	E.C.C. NO.	APPROB.	DATE
MATERIAL/FINISH				
MILITRONICS MANUFACTURING				
7870 PARKWAY, SUITE 100, NEWTON, MA 02459				
TITLE: MAG PANEL ASST				
PARTITION: PARTNER VII				
SCALE: 2.5:1 (SEE 6-03-000-00000000)				
SHEET: 1 OF 1				



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NOTES:

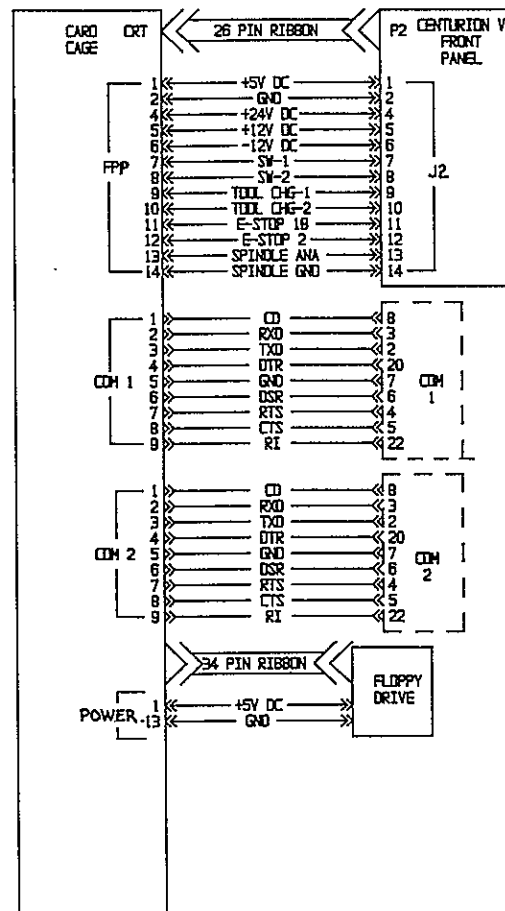
1. TOOL CHANGE SERVO DRIVE USE 1525/10 160 VDC DRIVE CARD.

B	REF. TO E.C.O.	596	M.F.	9/91
A	REF. TO E.C.O.	135	M.F.	3/90
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX		±		
X.XX		±		
X.X		±		
ANGLE		±		
TITLE		MOTOR/ENCODER INTERFACE		
APPLICATION		PARTNER VII		
SCALE		2:1	DWG NO.	6-06-020-012
DATE		6 FEB 89	DRAWN BY	REUTER
			SHEET NO.	1 OF 1

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

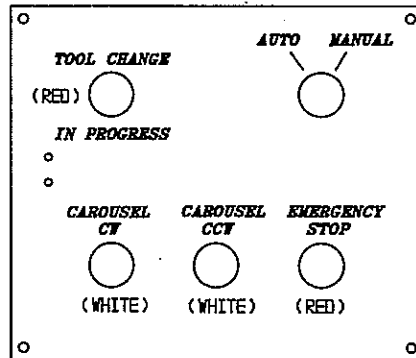
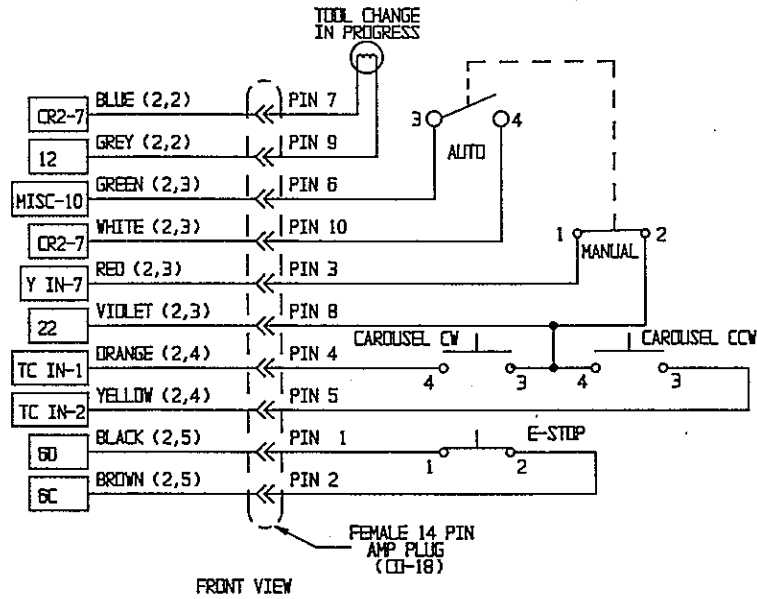
NUMBER	DESCRIPTION
328	INTERCONNECT BOX (DRAWBAR SOLENOID)
351	INTERCONNECT BOX (TOOL POT UP SOLENOID)
352	INTERCONNECT BOX (TOOL POT DOWN SOLENOID)
354	INTERCONNECT BOX (TOOL ARM UP SOLENOID)
355	INTERCONNECT BOX (TOOL ARM DOWN SOLENOID)
356	INTERCONNECT BOX (ARM 75 IN SOLENOID)
357	INTERCONNECT BOX (ARM 180 OUT SOLENOID)
358	INTERCONNECT BOX (ARM 180 IN SOLENOID)
359	INTERCONNECT BOX (ARM 75 OUT SOLENOID)
360	INTERCONNECT BOX (ORIENT PIN SOLENOID)
375	INTERCONNECT BOX (TOOL POT UP LIMIT)
376	INTERCONNECT BOX (TOOL POT DOWN LIMIT)
377	INTERCONNECT BOX (TOOL ARM UP LIMIT)
378	INTERCONNECT BOX (TOOL ARM DOWN LIMIT)
379	INTERCONNECT BOX (ARM 75 OUT LIMIT)
380	INTERCONNECT BOX (ARM 75 IN LIMIT)
381	INTERCONNECT BOX (ARM 180 IN LIMIT)
382	INTERCONNECT BOX (ARM 180 OUT LIMIT)

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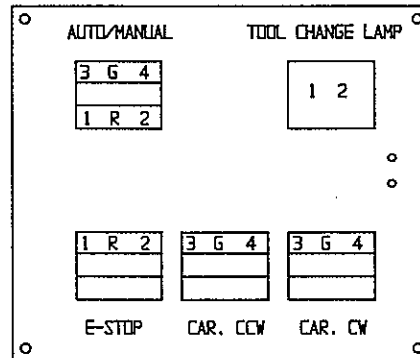


C	REF. TO E.C.O.	641	M.F.	10791
B	REFERENCE TO E.C.O.	595	M.F.	9/91
A	ADD CR-12	303	K.B.	10/90
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.		TITLE DC SYSTEM WIRE CS		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VII		
X.XXX	±	SCALE 1.6:1	DWG NO. 6-06-020-034	SIZE B
X.XX	±	DATE 18 DEC 89	DRAWN BY THOMPSON	SHEET NO. 2 OF 2
X.X	±			
ANGLE	±			

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BACK VIEW

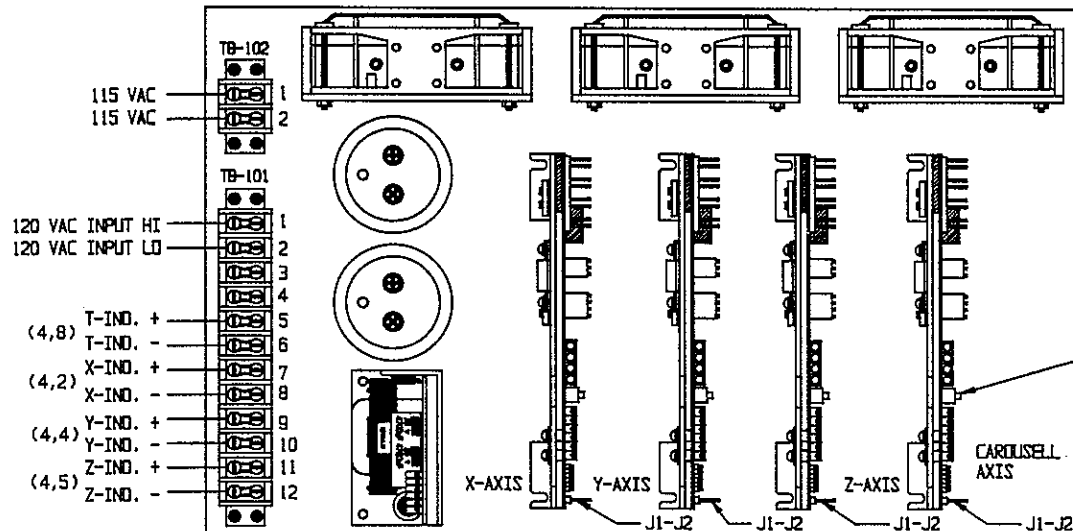


Notes...

1. REF. TO DWG No. 6-10-020-004 FOR ASSEMBLY INSTRUCTIONS.
2. USE 18 GA. WIRE FOR SWITCH INTERCONNECT.

E	REFERENCE TO E.C.O.	597	M.F.	9/91
D	REFERENCE TO E.C.O.	297	K.B.	10/90
C	DRAWING ENHANCEMENTS	264	S.S.	8/90
B	REFERENCE TO ECD PAPERWORK	131	M.F.	3/90
A	REGENERATE TO CAD		M.F.	2/89
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
 MILLIRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317				
STOCK No.		TITLE REM. TOOL CHANGE PANEL ASSY:		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VII		
X.XXX	±	SCALE 1:1	DWG NO. 6-06-020-017	SIZE B
X.XX	±			
X.X	±			
ANGLE	±	DATE 3 JUNE 88	DRAWN BY REUTER	SHEET NO. 1 OF 1

SERVO DYNAMICS AXIS AMPLIFIER
SD4-3060
INTERIOR VIEW



ADDITIONAL DRIVE CARD
FOR CAROUSELL AXIS
SERVO DYNAMICS 1525-10
STOCK No. AM-01

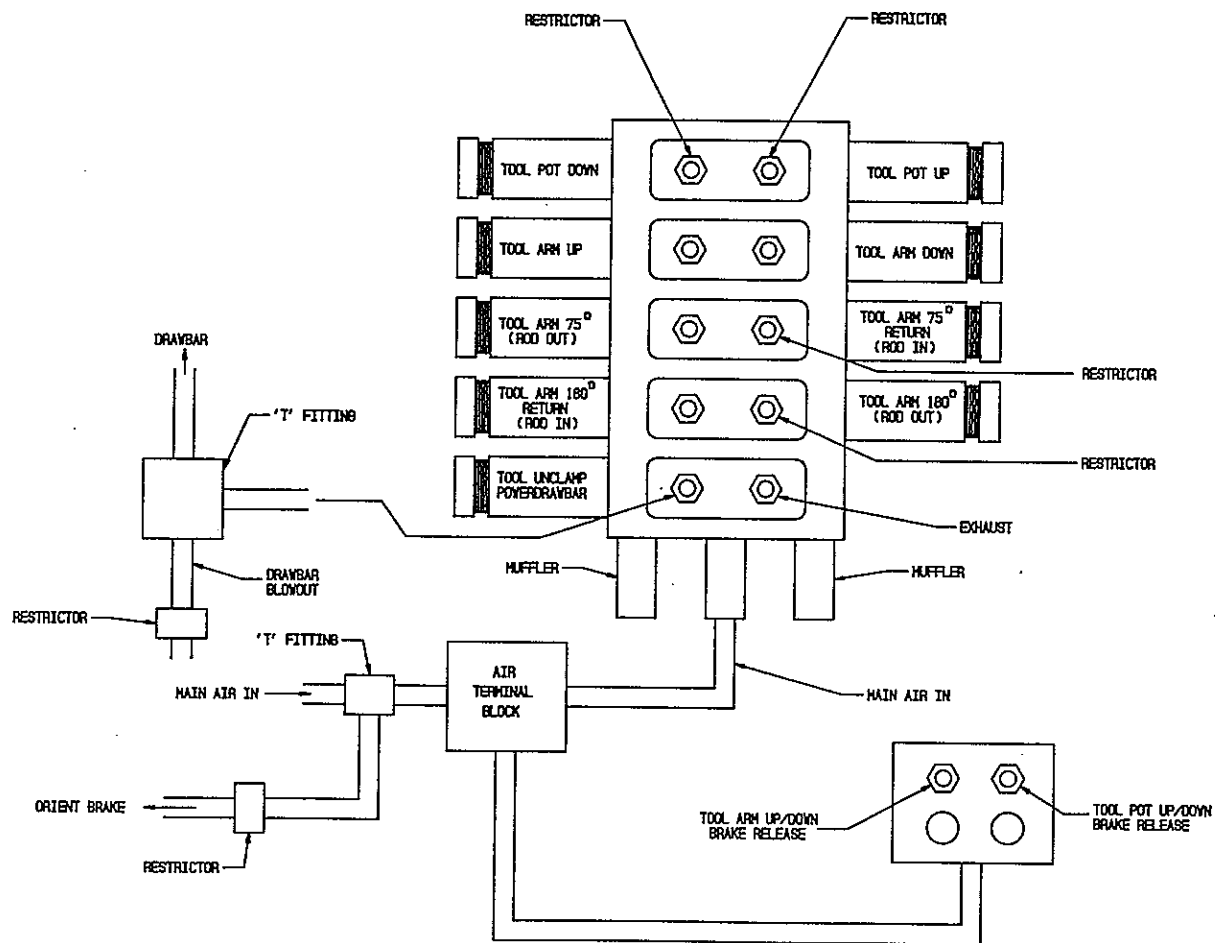
DRIVE INSTALLATION DATA

1	J2	1	DIFFERENTIAL INPUT 1
2	J2	2	DIFFERENTIAL INPUT 2
3	J2	3	AUXILIARY
4	J2	4	SIGNAL
5	J2	5	TACH.
6	J2	6	SIG. COMMON
7	J2	7	CURRENT MONITOR
8	J2	8	N.O. RT. LIMIT SW.
9	J2	9	N.O. LT. LIMIT SW.
10	J2	10	REMOTE SHUTDOWN
11	J2	11	COMMON
12	J2	12	+15 VDC
13	J2	13	COMMON
14	J2	14	-15 VDC
15	J2	15	REMOTE RESET
16	J2	16	N.C. RT. LIMIT SW.
17	J2	17	N.C. LT. LIMIT SW.
18	J1	18	18 PIN MOLEX

	RESISTANCE READINGS ON SERVO AMPLIFIER BOARDS
X-AXIS:	SIGNAL-3.36K TACH-4.78K COMPENSATION-685K
Y-AXIS:	SIGNAL-3.33K TACH-5.31K COMPENSATION-635 Ω
Z-AXIS:	SIGNAL-5K TACH-7K COMPENSATION-777 Ω
CAROUSELL AXIS	SIGNAL-7.7K TACH-5.3K COMPENSATION-1.13K

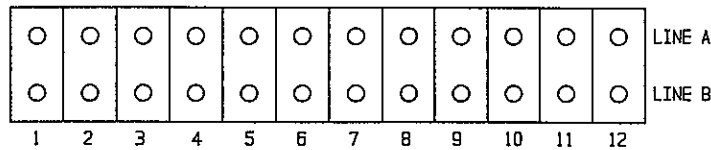
NOTES: 'A/B' JUMPER MUST BE IN 'B' POSITION
FOR DIFFERENTIAL VELOCITY INPUT
STOCK No. AM-21

C	REFERENCE TO E.C.O.	598	M.F.	9/91
B	ADD CAROUSELL AXIS	136	M.F.	4/90
A	REGENERATE TO CAD		M.F.	2/89
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH				
STOCK No.		7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
TOLERANCE UNLESS SPECIFIED		TITLE SD4-3060 3 AXIS DRIVE AMP		
X.XXX ±		APPLICATION PARTNER VII		
X.XX ±		SCALE 3:1		
X.X ±		DATE 31 MAY 88		
ANGLE ±		DRAWN BY REUTER		
		SHEET NO. 1 OF 1		



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
TOLERANCE UNLESS SPECIFIED X.XXX $\pm$ X.XX $\pm$ X.X $\pm$ ANGLE $\pm$				
INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHANHASSEN, MN 55317 (612-474-8100)				
TITLE: SOLENOID LOC./AIR LINE MAP APPLICATION: PARTNER VII				
SCALE 1.75:1 DWG NO. 6-06-020-002 SIZE B				
DATE: 23 DEC 88 DRAWN BY REUTER SHEET NO. 1 OF 1				

NOISE SUPPRESSORS (MI-09)



TERMINAL BLOCKS (MP-1) UPPER ROW



TERMINAL BLOCKS (MP-2) BOTTOM ROW

TERMINAL BLOCK INTERCONNECT

TB No. LABEL	CABLE SIGNAL	TB No. LABEL	CABLE SIGNAL
328	POWER DRAWBAR SOL.	304	CARDUSEL GRID
351	TOOL POT UP SOL.	375	TOOL POT UP LIMIT SW.
352	TOOL POT DOWN SOL.	376	TOOL POT DOWN LIMIT SW.
360	SPOL ORIENT SOL.	377	ARM UP LIMIT SW.
354	ARM UP SOL.	378	ARM DOWN LIMIT SW.
355	ARM DOWN SOL.	379	ARM 75° OUT LIM. SW.
2	110 VAC LOW (COM)	380	ARM 75° IN (RETURN) L.S.
357	ARM 180° OUT	22	24 VDC (COM) LIMIT SW.
358	ARM 180° IN (RETURN)	382	ARM 180° OUT LIMIT SW.
359	ARM 75° OUT	381	ARM 180° IN (RETURN) L.S.
356	ARM 75° IN (RETURN)	6B	LO AIR PRESS. L.S. N/C
61	SPRAY MIST	6C	LO AIR PRESS. L.S. N/C
57	AUTO-LUBE PUMP	7B	LUBE FAULT LIMIT SW.
74	4th-AXIS SOLENOID		

NOISE SUPPRESSOR INTERCONNECT

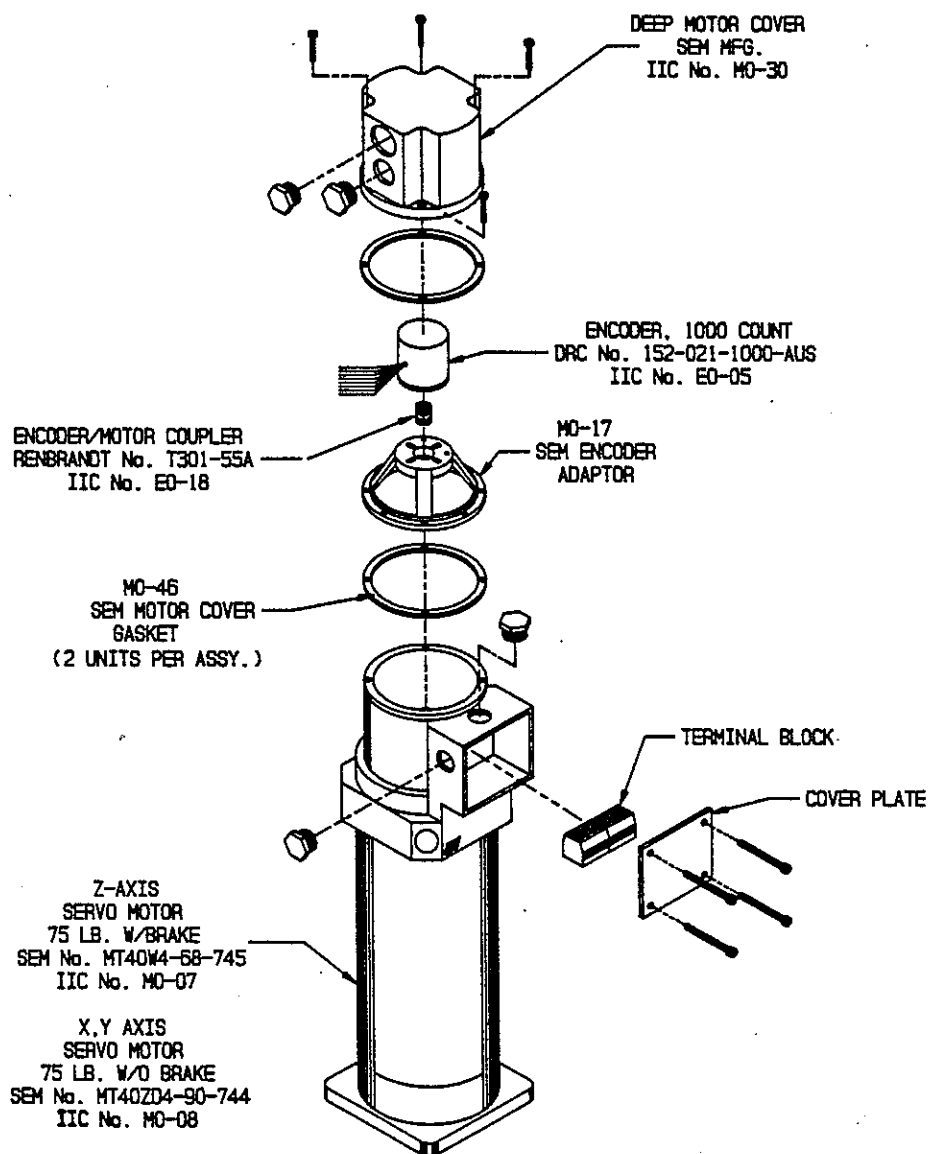
No./LINE B	TB No.
1	328
2	351
3	352
4	354
5	355
6	356
7	357
8	358
9	359
10	360
11	361
12	74

BUSS LINE A TO TB-2
ALL NOISE SUPPRESSORS

A REF TO ECO		133	M.F.	3/90
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 INTERCONNECT BOX CABLE-TABLE		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VII		
X.XXX	±	SCALE 1.5:1	DWG NO. 6-04-020-001	SIZE B
X.XX	±	DATE 10 SEP 88	DRAWN BY REUTER	SHEET NO. 2 OF 2
X.X	±			
ANGLE	±			

NOTES...

1. NOISE SUPPRESSOR No 12 IS FOR
4th-AXIS OPTION.

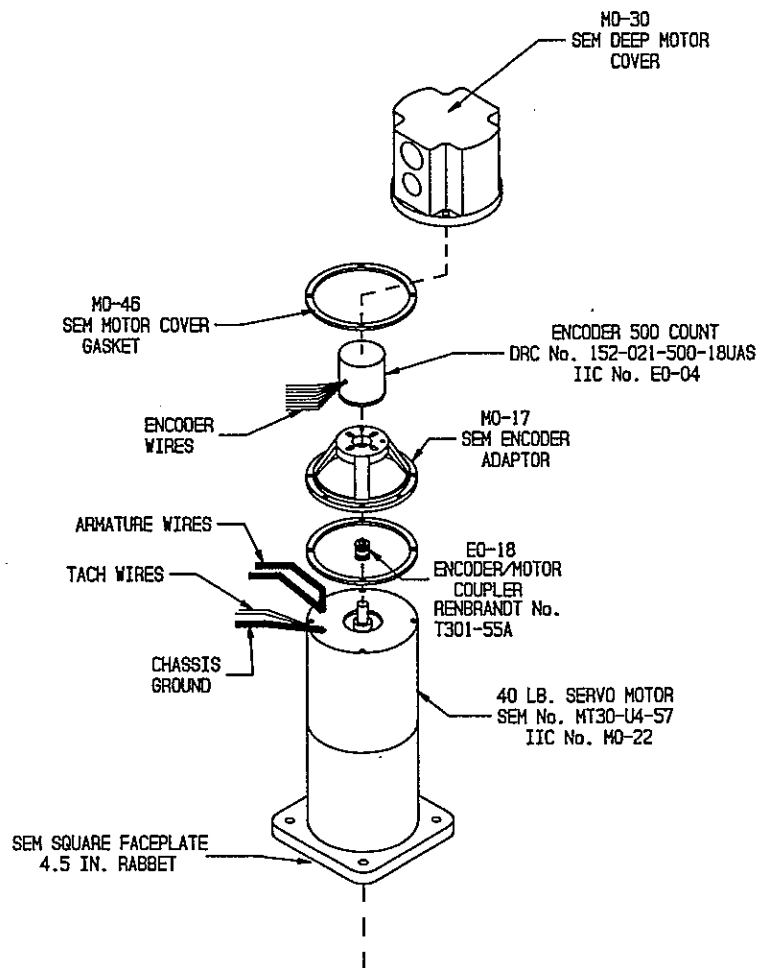


TERMINAL BLOCK LEGEND
(AS SEEN ON INSIDE OF COVER PLATE)

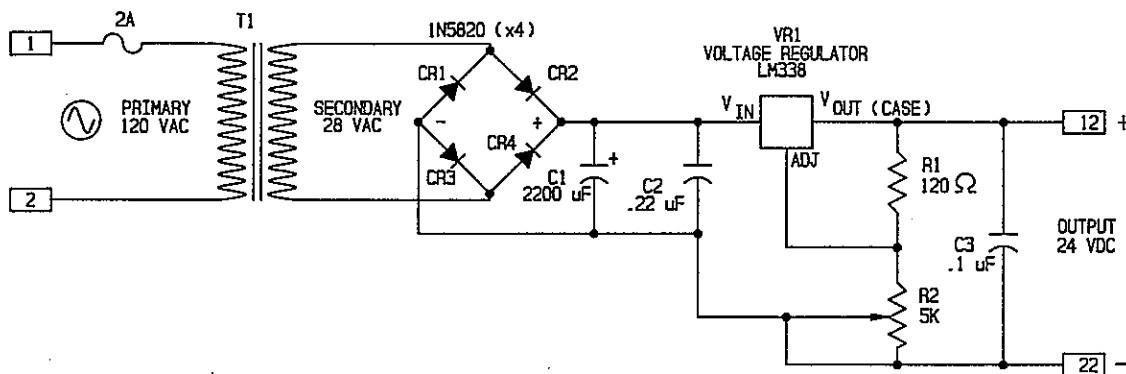
CW ROTATION DRIVE END

MOTOR +	MOTOR -	TACH +	TACH -	K1	K2	BRAKE +	BRAKE -
A1	A2	T1	T2			B1	B2
└ ARMATURE ─┘		└ TACH ─┘		└ T/O ─┘		└ BRAKE ─┘	

REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		 INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE CHANDLER, NH 03025 (602-474-8100)		
X.XXX	±			
X.XX	±			
X.X	±			
ANGLE	±	TITLE: AXIS SERVO MOTOR ASSY.		
MATERIAL/FINISH		APPLICATION: PARTNER VII		
SCALE 5:1		DWG NO. 6-02-020-000	SIZE B	
DATE: 20 FEB 89		DRAWN BY REUTER	SHEET NO. 1 OF 1	

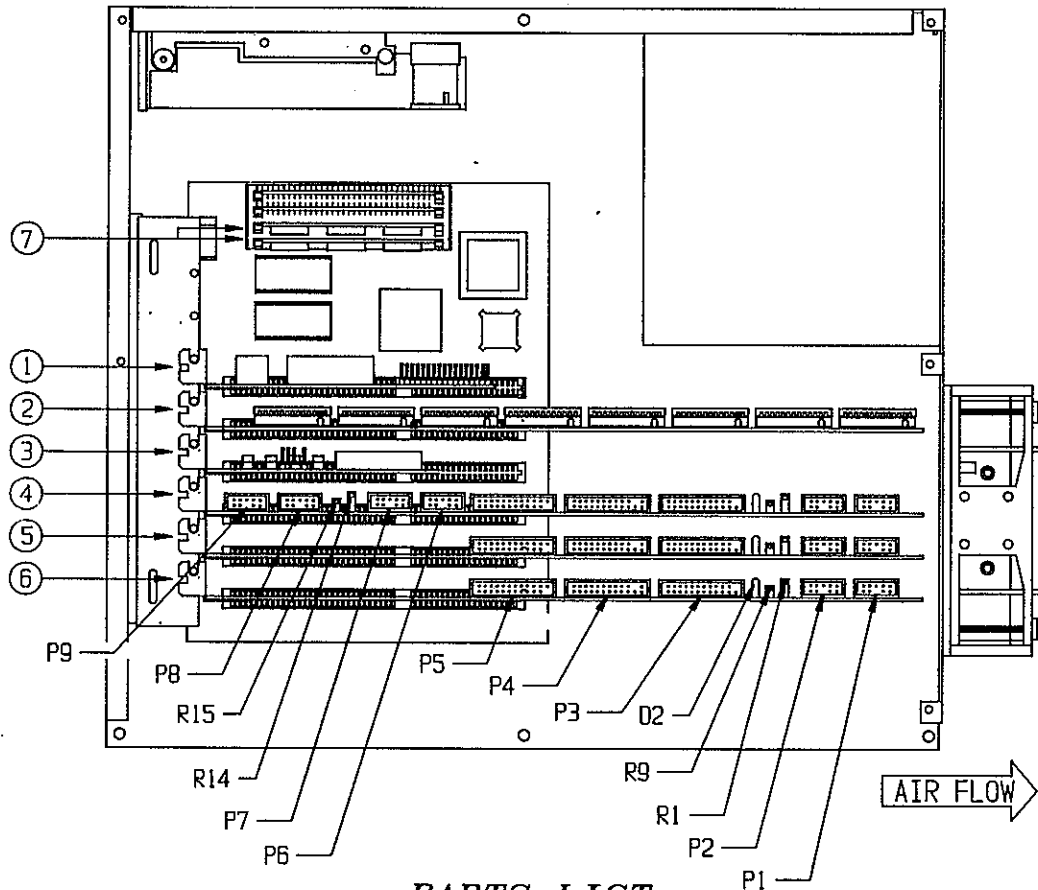


REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE:
TOLERANCE UNLESS SPECIFIED		ITC INDUSTRIAL INFORMATION CONTROLS 7870 PARK DRIVE (612-474-8100) CHANNASSEN, MN 55317		
X.XXX	±	TITLE: TOOL CHANGER MOTOR ASSY.		
X.XX	±	APPLICATION: PARTNER VII		
X.X	±	SCALE 5:1 DWG NO. 6-02-020-002 SIZE B		
ANGLE	±	DATE: 21 FEB 89 DRAWN BY REUTER SHEET NO. 1 OF 1		
MATERIAL/FINISH				



REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLITRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.				
TOLERANCE UNLESS SPECIFIED		TITLE 24 VDC POWER SUPPLY		
X.XXX ±		APPLICATION GENERAL PRODUCTS		
X.XX ±		SCALE 1:1	DWG NO. 6-06-018-030	SIZE B
X.X ±		DATE 29 SEP 89	DRAWN BY REUTER	SHEET NO. 1 OF 1
ANGLE ±				

DIAGRAM SHOWN FOR 3-AXIS STANDARD SYSTEMS

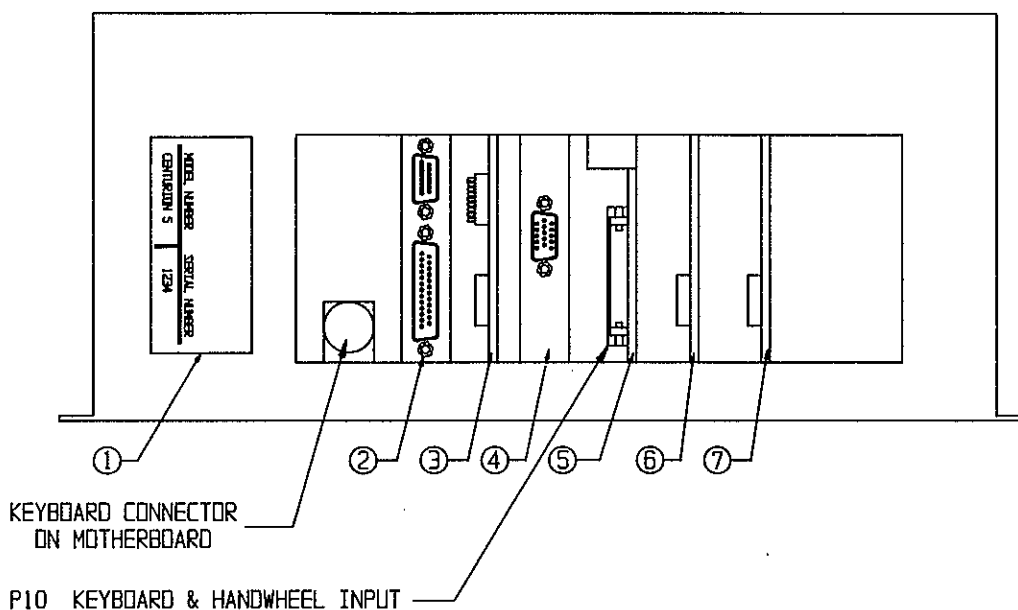


- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	BD-52	IDE HDD/FDD CONTROLLER & I/O PORTS
2	BD-49	VIDEO GRAPHICS ARRAY (VGA) CARD
3	ASSY No. 7205	SIMDISK HARD DRIVE EMULATOR BOARD MILLTRONICS MANUFACTURING COMPANY PC-SIMDISK-01
4	ASSY No. 7000	ACROLOOP X-AXIS COMPUTER CONTROLLER MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (FULL BOARD)
5	ASSY No. 7005	ACROLOOP AXIS COMPUTER - Y-AXIS MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (AXIS ONLY)
6	ASSY No. 7005	ACROLOOP AXIS COMPUTER - Z-AXIS MILLTRONICS MANUFACTURING COMPANY PC-ACRON-02 (AXIS ONLY)
7	BD-55	MOTHERBOARD MEMORY, 1 MEG SIMM (2 EA.)

P1 AXIS ENCODER INPUT
 P2 AXIS DRIVE ANALOG INPUT
 R1 AXIS GAIN ADJUST
 R9 AXIS OFFSET ADJUST
 D1 WATCHDOG LED
 P3 AXIS OUTPUT
 P4 AXIS INPUT
 P5 MACHINE AXIS INTERFACE
 P6 SPINDLE ENCODER INPUT
 P7 SPINDLE LOAD METER/ANALOG OUTPUT
 R14 SPINDLE OFFSET ADJUST
 R15 SPINDLE GAIN ADJUST
 P8 KEYBOARD INPUT
 P9 VIDEO OUTPUT (EGA ONLY)

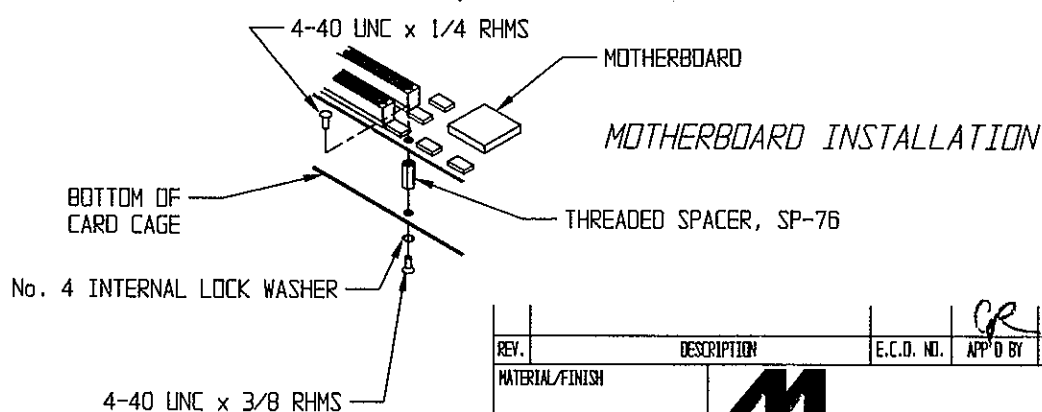
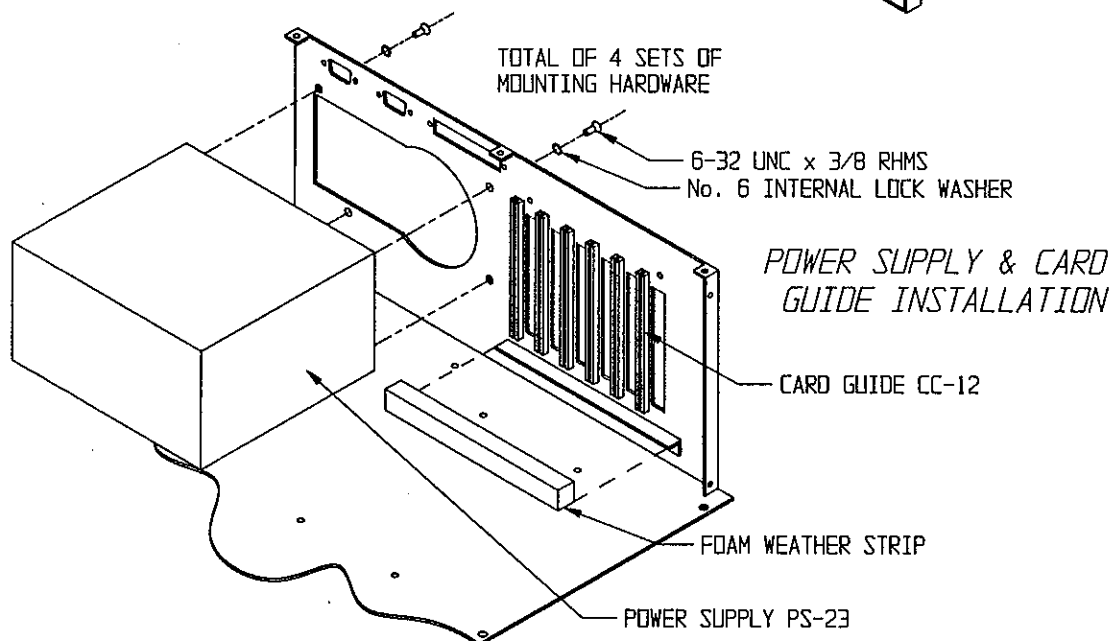
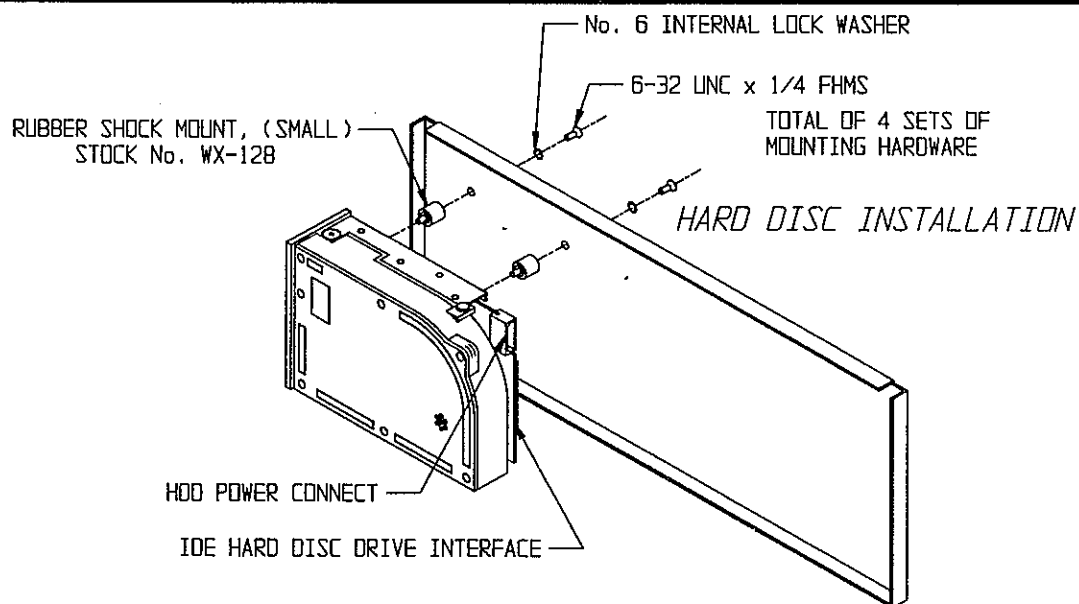
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE CARD CAGE ELECTRONICS ASSY.		
X.XXX +/- .005		APPLICATION CENTURION V		
X.XX +/- .010		SCALE 2.5:1 DWG No. 6-11-004-024 SIZE B		
X.X +/-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



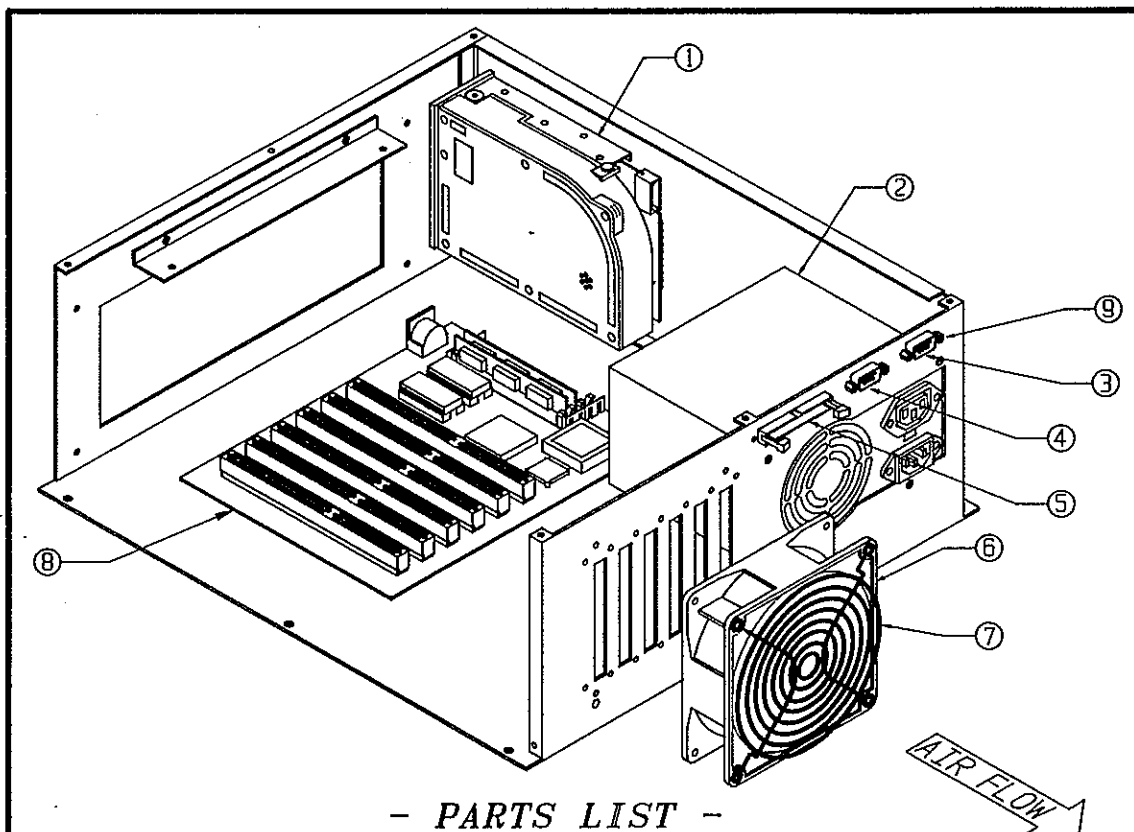
- PARTS LIST -

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

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



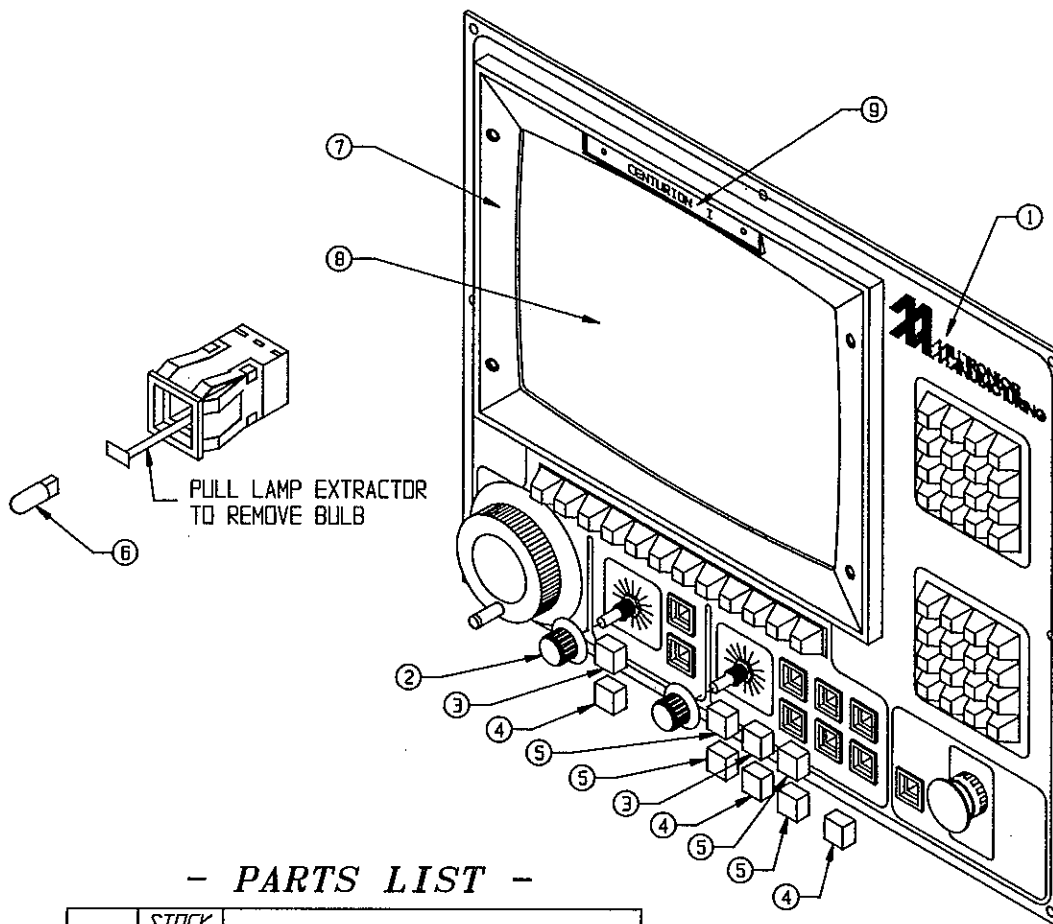
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
			CR	
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE CARD CAGE ELECTRONICS ASSY.		
X.XXX +/- .005		APPLICATION CENTURION V		
X.XX +/- .010		SCALE 3:1		OWG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



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	CU-39	HARD DISC DRIVE, IDE, 40 MB SEAGATE TECHNOLOGIES No. ST-157/A
2	PS-23	POWER SUPPLY, BABY AT, 200 W
3		PERIPHERAL PORT, SERIAL, 'COM-1' (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-006
4		PERIPHERAL PORT, SERIAL, 'RIGID TAPPING' (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-006
5		PERIPHERAL PORT, FLOPPY DISC DRIVE (CABLE NOT SHOWN), REF. TO CABLE DRAWING No. 6-04-004-003
6	FA-1	FAN, COOLING, 110 VAC TRW No. A47B15A15T3 POWER CABLE, (FA-03), NOT SHOWN
7	FA-04	FAN GRILLE FOR FA-01 WFG 473
8	BO-43	MOTHERBOARD, IBM AT/386SX, 40 MHz
9	CO-53	JACK SCREW ASSY, 4-40 UNC THREAD TRW No. D-20418-2

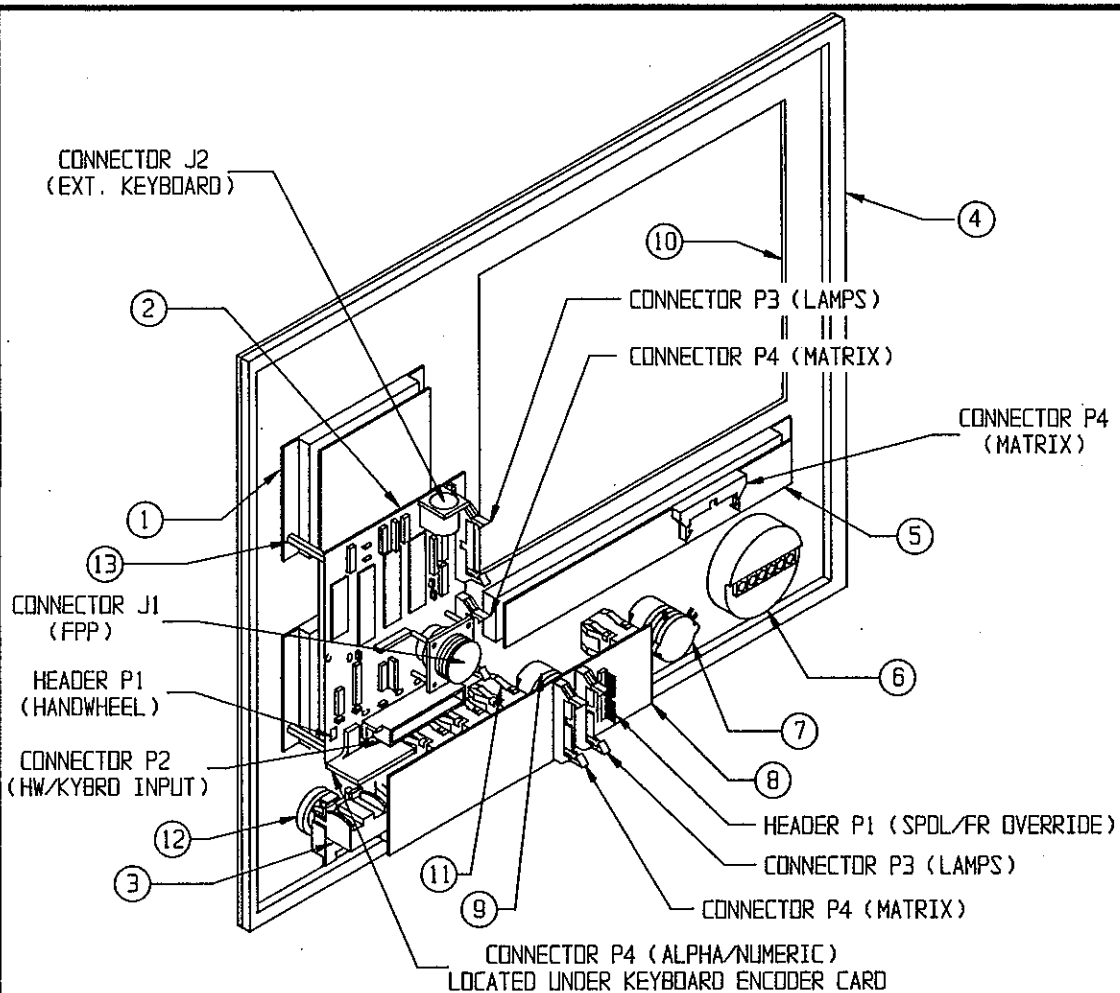
REV.	DESCRIPTION	E.C.O. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED		TITLE CARD CAGE ELECTRONICS ASSY.		
X.XXX	+/- .005	APPLICATION CENTURION V		
X.XX	+/- .010	SCALE 3:1	DWG No 6-11-004-024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



- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	FP-58	14 IN. CRT FRONT PANEL OVERLAY 6-08-004-003
2	SW-35	SWITCH KNOB, COMPOSITE BLACK ALCOCKNOB PKA-P708-1/4
3	SW-89	SQUARE KEYTOP, RED HONEYWELL MICROSWITCH AML51A10R
4	SW-82	SQUARE KEYTOP, GREEN HONEYWELL MICROSWITCH AML51A10G
5	SW-90	SQUARE KEYTOP, WHITE HONEYWELL MICROSWITCH AML51A10W
6	SW-92	SWITCH INDICATOR LAMP, 24 VDC HONEYWELL MICROSWITCH AML91LAB5
7	FP-57	14 IN. CRT BEZEL MHC 6-01-004-057
8	FP-59	14 IN. CRT LEXAN WINDOW, SMOKE MHC 6-01-004-054
9	LB-40	CENTURION V NAMEPLATE MHC 6-08-004-004

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



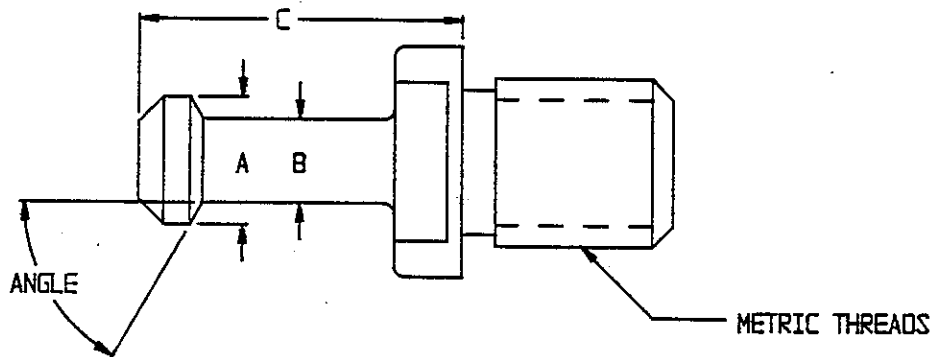
- PARTS LIST -

ITEM	STOCK No.	DESCRIPTION
1	BD-51	KEYPAD ASSY. ALPHA/NUMERIC DIGITRAN No. KC0246-01
2	7315	KEYBOARD ENCODER CARD PC-KYBENC-02 MHC DWG. 6-07-004-011
3	SW-39	SWITCH CONTACT BLOCK, N/C, DEM No. V-40
4	FP-51	FRONT PANEL GASKET, MHC 6-01-004-007
5	BD-50	KEYPAD ASSY. FUNCTION KEYS DIGITRAN No. KC0245-01
6	ED-30	HANDWHEEL ENCODER, 100 COUNT SUNTAK No. LGS-022-100
7	SW-14	ROTARY SWITCH (FEEDRATE) ELECTROSWITCH No. 74-0246
8	7300	FRONT PANEL SWITCH BOARD PC-FPSW-01 MHC DWG. 6-07-004-006
9	SW-14	ROTARY SWITCH (SPINDLE) ELECTROSWITCH No. 74-0246
10	FP-60	14 INCH CRT FRONT PANEL 6-01-004-053
11	SW-87	SWITCH, MOMENTARY CONTACT, DPDT HONEYWELL MICROSWITCH AML21CBA3AC
12	SW-23	SWITCH ACTUATOR, RED MUSHROOM TOP ALCO T2050-2
13	SP-72	HEX SPACER, 6-32 UNC M/F x 1.25

REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.				
TOLERANCE UNLESS SPECIFIED				
X.XXX +/- .005 X.XX +/- .010 X.X +/- .030 ANGLE +/- 1.0°				
TITLE FRONT PANEL ASSEMBLY - REAR		APPLICATION CENTURION V		
SCALE 3:1		DWG No 6-11-004-000	SIZE B	
DATE 4 FEB 93		DRAWN BY REUTER	SHEET NO. 1	OF 1

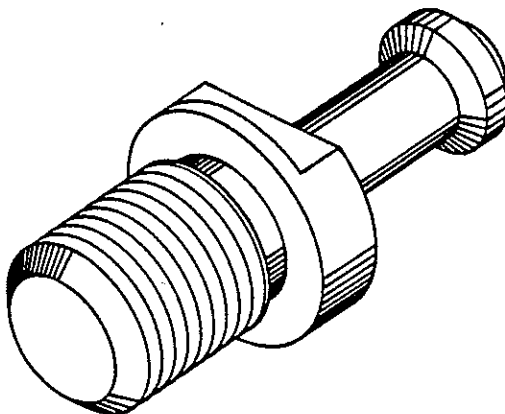
**RETENTION KNOBS
STYLE BT-FLANGE**

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



Notes...

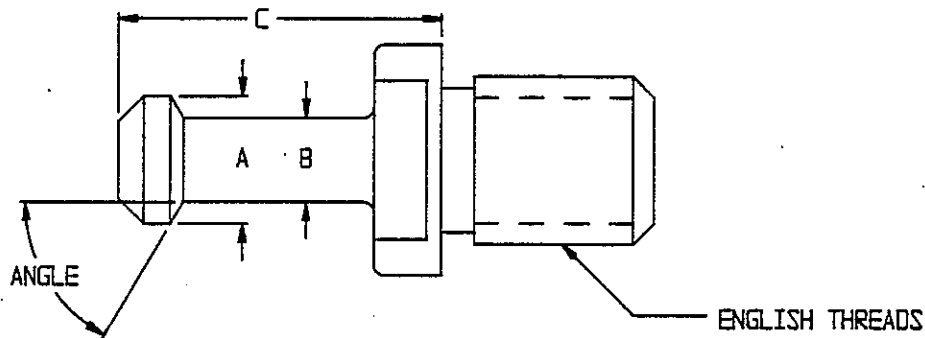
COMMAND CORPORATION
TEL: 1.800.328.2197
FAX: 1.612.755.1116



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

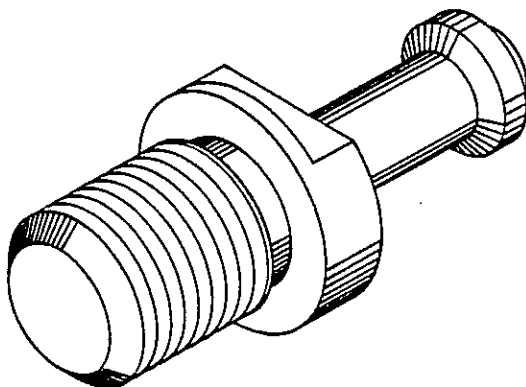
**RETENTION KNOBS
STYLE V-FLANGE**

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



Notes...

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



C	DRAWING CORRECTIONS	1781	10/14	3/94
B	ADD PARTNER VI & VIII	1409	M.F.	7/93
A	ADD PART No.		M.F.	8/89
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK/ASSY No.		TITLE V-FLANGE RETENTION KNOB		
TOLERANCE UNLESS SPECIFIED		APPLICATION GENERAL PRODUCTS		
X.XXX	+/- .005	SCALE 1:1		
X.XX	+/- .010	DATE 1 FEB 89		
X.X	+/- .030	DRAWN BY REUTER		
ANGLE	+/- 1.0°	SHEET NO. 1 OF 1		

MECHANICAL DRAWINGS

CONTENTS:

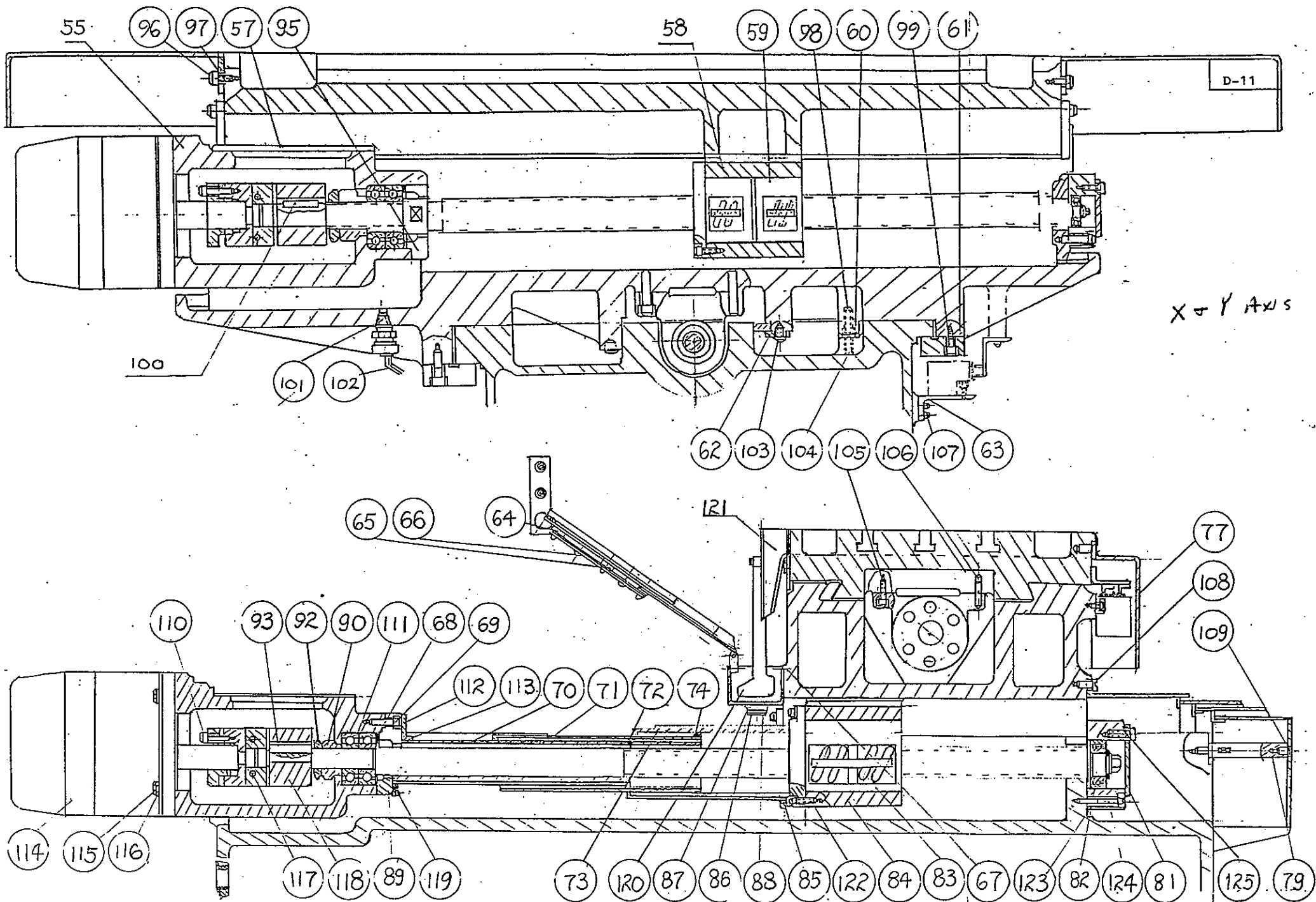
1. Bed and Table	D-3.....D11
2. Column	D12.....D17
3. X Axis Ball Screw	D18.....D19
4. Y Axis Ball Screw	D20..... D21
5. Z Axis Ball screw	D22.....D23
6. Spindle Head	D24.....D30
7. Automatic Tool Changer	D31.....D38
8. Lubricating Piping diagram	D39..... D40

1.	BED AND TABLE		
NO.	NAME	Q'TY	REMARKS
1	Protecting case	1	
2	Cushion	1	
3	Bed	1	
4	Saddle	1	
5	Table	1	
6	Dog Seat	1	
7	Dog	4	
8	Dog Seat	1	
9	Dog	2	
10	Protecting case	1	
11	Gib	1	
12	Strike-off Board	4	
13	Plate	1	
14	Adjustable Screw	3	
15	Plate	1	
16	Gib	2	
17	Plate	1	
18	Strike-off board	4	
19	Plate	1	
20	Strike-off board	5	
21	Strike-off board	1	

NO.	NAME	Q'TY	REMARKS
22	Strike-off board	8	
23	Cradle	1	
24	Cushion	1	
25	Apron	1	
26	Platen	2	
27	Platen	2	
28	Oil cover	1	
29	Steel Wire Mesh	1	
30	Strike-off board	4	
31	Strike-off board	4	
32	Jointed body	1	
33	Lid	2	
34	Cushion	1	
35	Oil Nozzle	1	
36	Pin	2	
37	Scrape Chip board	2	
38	Hinge axis	2	
39	Hinge	4	
40	Down Chip Carriage	1	
41	Chip Carriage plate	1	
42	Upper chip carriage plate	1	
43	Shaft	2	
44	Support	2	

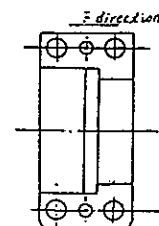
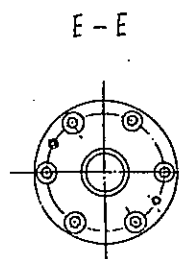
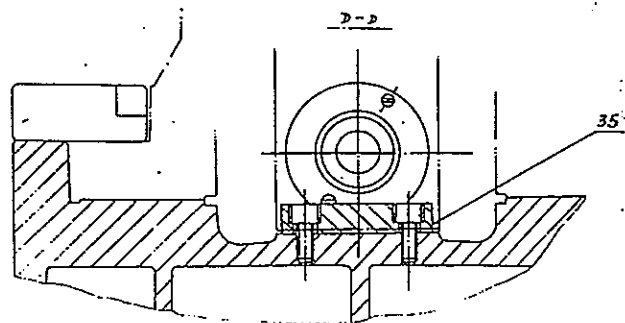
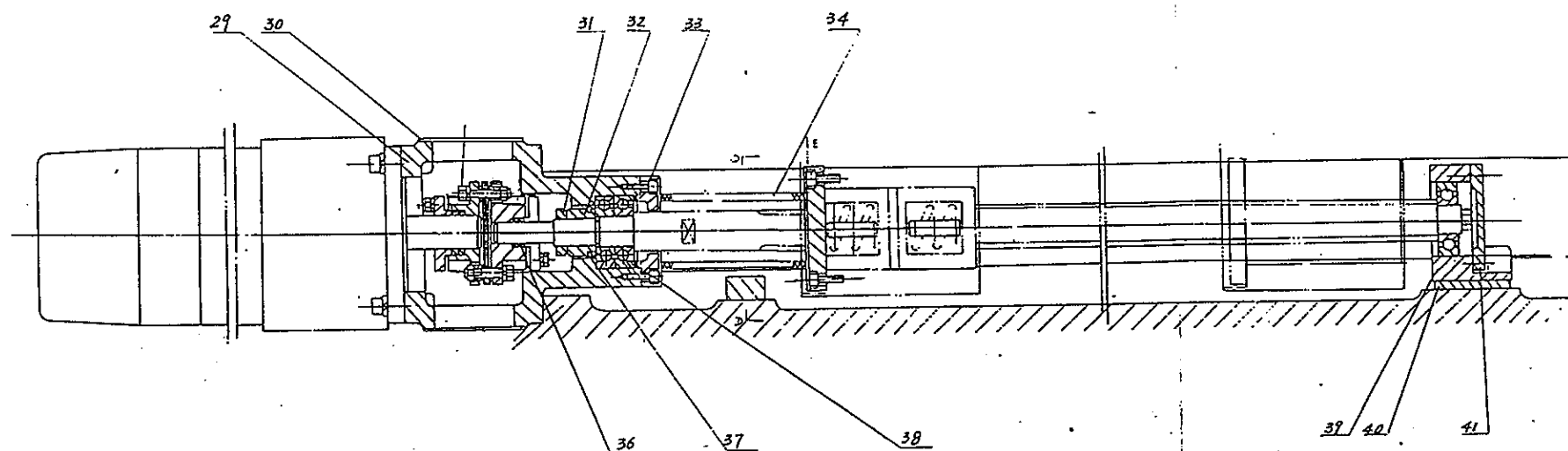
NO.	NAME	Q'TY	REMARKS
45	Lever	4	
46	Lever	2	
47	Lever	2	
48	Lever	4	
49	Left Pedestal	1	
50	Right Pedestal	1	
51	Pedestal for oil tank	1	
52	Jointed body	1	
53	Jointed Body	1	
54	Stop	1	
55	Motor seat	1	
56	Pad	2	
57	Cover Plate	3	
58	Screw Seat	2	
59	X axis Ball Screw*	1 set	
60	Stop	2	
61	Guide brace	2	
62	Small Plate	2	
63	Foot Step	1	
64	Chip Cover	2	
65	Chip Cover	2	
66	Washer	2	
67	Apron	1	

NO.	NAME	Q'TY	REMARKS
68	Spacer Washer	2	
69	Left plate	1	
70	Left sleeve	1	
71	Middle sleeve	1	
72	Washer	1	
73	Right Sleeve	1	
74	Washer	1	
75	Cushion	1	
76	Cushion	1	
77	Cover Sheet	1	
78	Guard sheet	1	
79	Support	1	
80	Foot Step	1	
81	Lid	2	
82	Bearing	2	
83	Y axis Ball screw set	1 set	
84	Ball screw Pedestal	1	
85	Right plate	1	
86	Lid	1	
87	Cushion	1	
88	Oil space	1	
89	Flange	1	
90	Nut	2	



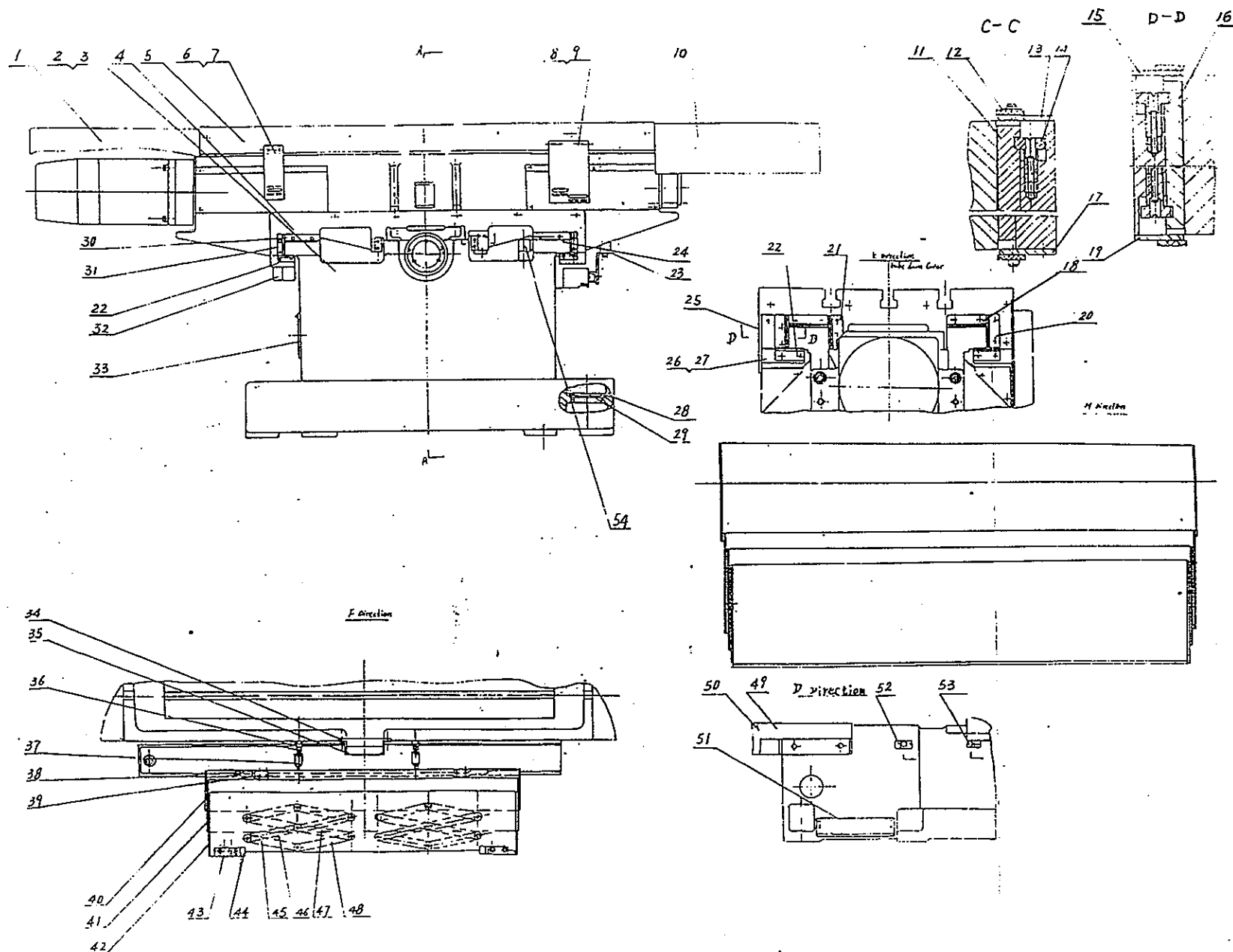
Z AXIS

A - A



NO.	NAME	Q'TY	REMARKS
91	Motor base	1	
92	Nut	2	
93	Connecting Bar	1	
94	Coupling	2 sets	
95	Flange	1	
96	M6 x 30 screw	4	
97	Oil Seal	4	
98	Oil Cap	1	
99	M12 x 35 Hex Screw	12	
100	Key 8 x 40	1	
101	Oil Cap	1	
102	Oil line o4	1 set	
103	Screw		
104	Oil Line o4	1 set	
105	M12x35 Hex Screw*	4	
106	Tap Pin o8 x 50	1	
107	M6 x 12 Hex screw	1	
108	Half round screw M6 x12	6	
109	Flat head screw M6 x 12	2	
110	M8 Hex screw	4	
111	Bearing 30x72x38	2	
112	Angle Plate	1	
113	Angle Plate	1	
114	Servo Motor	1	

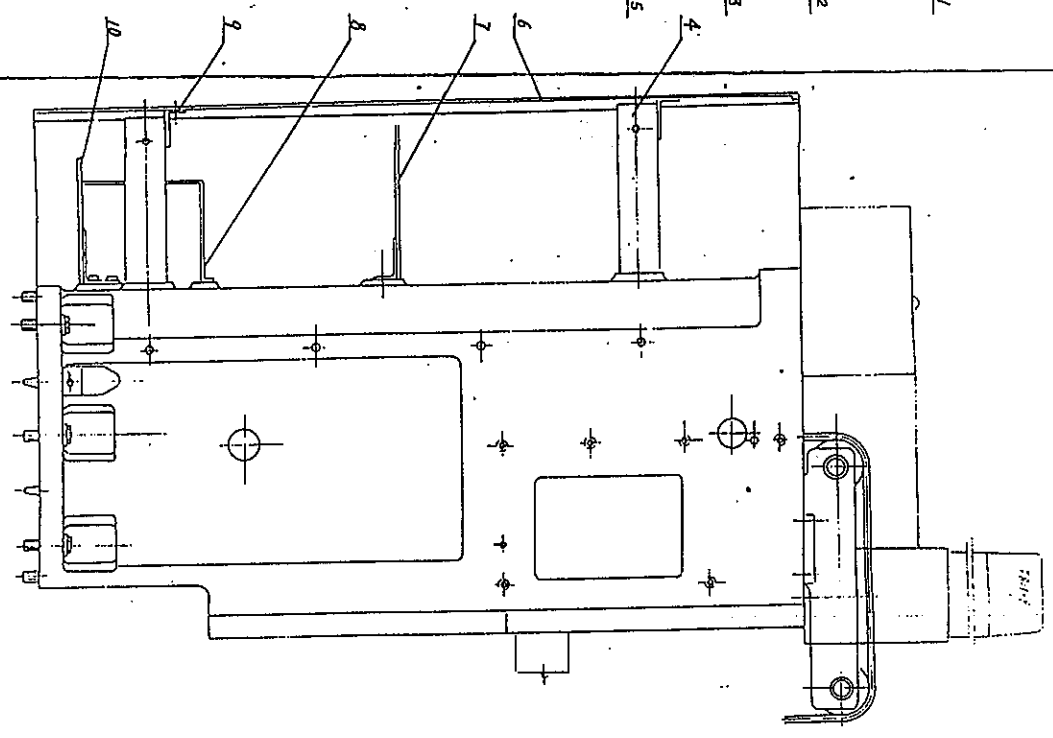
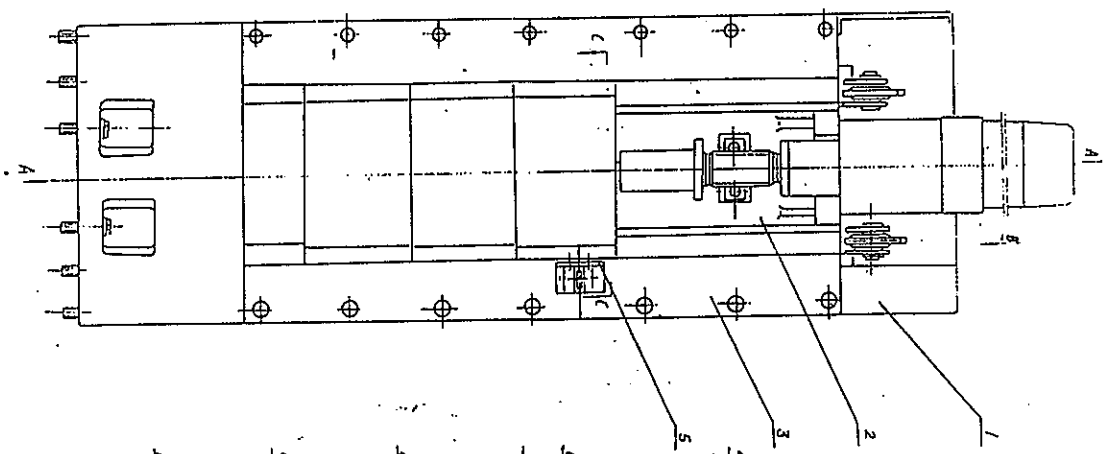
115	Mrox45 Hex Screw	4
116	Spring Washer o10	4
117	Coupling Assembly	1 set
118	Coupling Assembly	1 set
119	Screw	1
120	Chip Wiper Arm	3
121	Protection cover	1
122	Screw	4
123	End cover	1
124	Screw	4

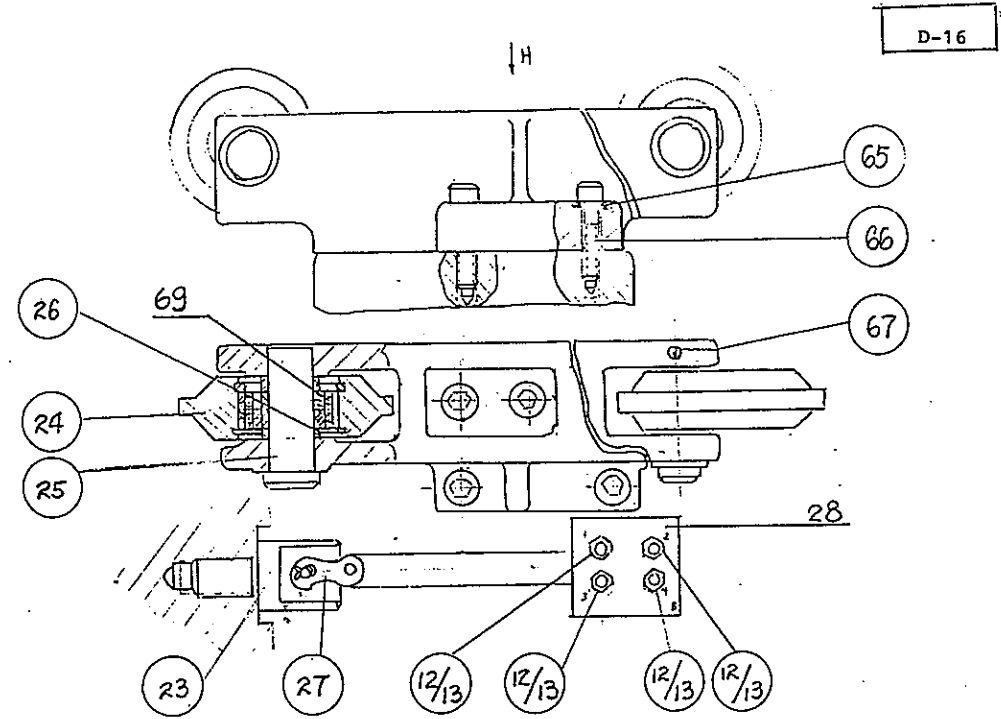
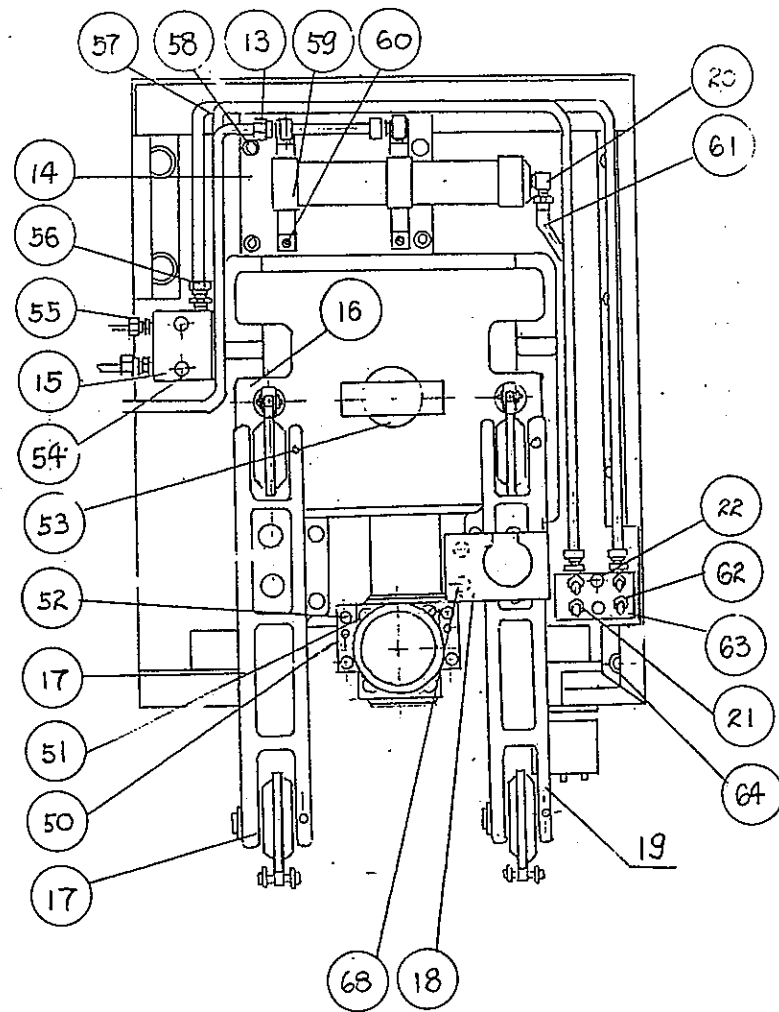


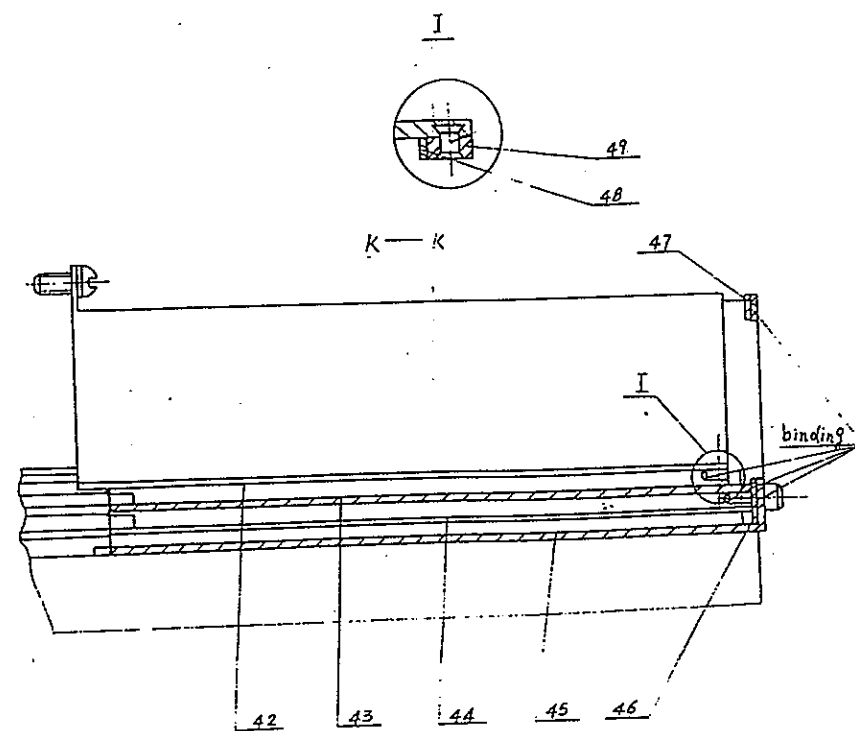
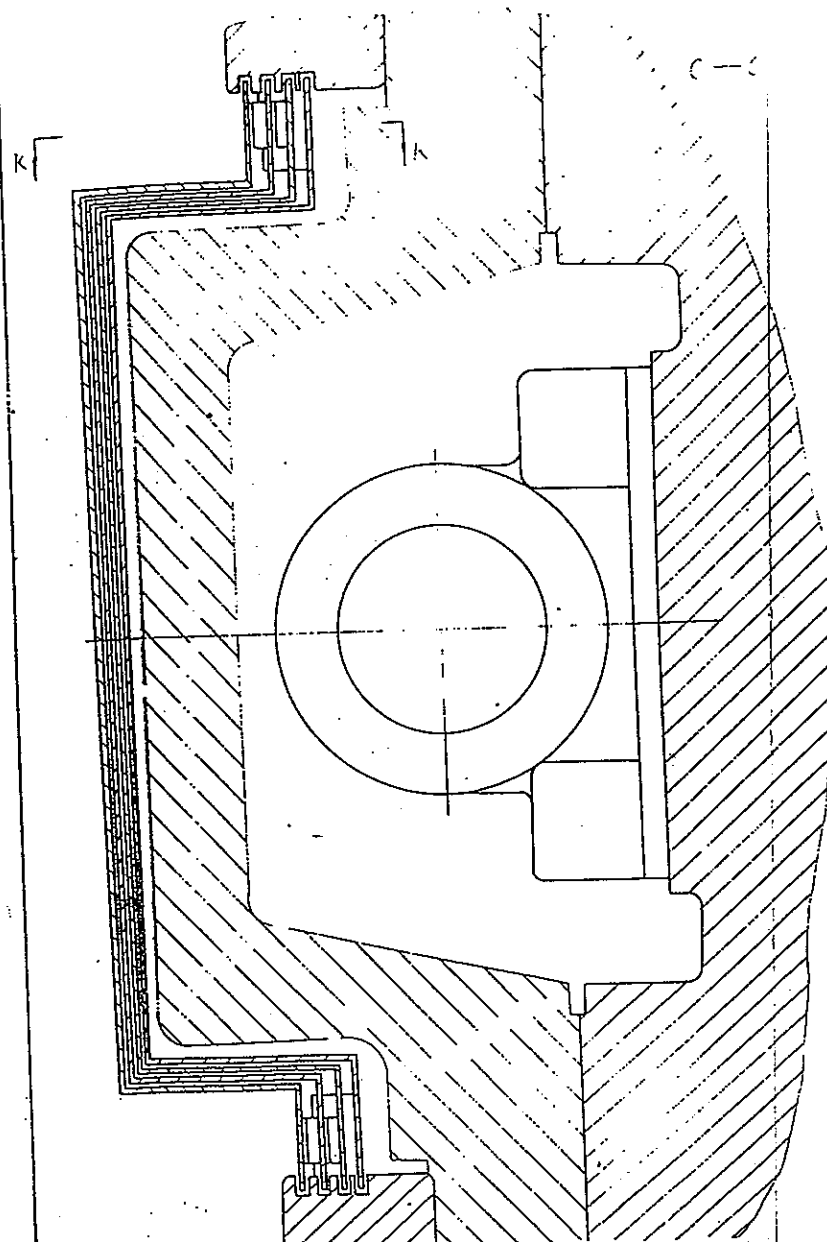
2. COLUMN			
NO.	NAME	Q'TY	REMARKS
1	Top cover	1	
2	Column	1	
3	Platen	1	
4	Supports	4	
5	Switch stock	1	
6	Back gland plate	1	
7	Upper foot-treadle	1	
8	Lid for Line Feed	1	
9	Press brake	4	
10	Down foot treadle	1	
11	Angle conical pipe coupling	2	
12	Jointed sleeve	3	
13	Nut	3	
14	Bottom plate	1	
15	Oil seperator	1	
16	Counter weight	1	
17	Left weight support	1	
18	Box for line feed	1	
19	Right weight support	1	
20	Angle Pipe coupling	1	
21	Angle Pipe coupling	1	

NO.	NAME	Q'TY	REMARKS
22	Oil seperator	1	
23	screw	2	
24	Chain wheel	4	
25	Chain wheel	4	
26	Spacer bush	8	
27	Pivot	4	
28	Angle corical pipe coupling	1	
29	Case	1	
30	Lid	2	
31	Nut	1	
32	Nut	1	
33	Flange	1	
34	Extensible cover set	1	
35	Dog	1	
36	Coupling	1 set	
37	Sketeton type rubber oil	1	
38	Spacer washer	1	
39	Bearing bracket	1	
40	Adjustable cushion	1	
41	Flange	1	
42	Plate guard		
43	plate guard	1	
44	Plate guard	1	

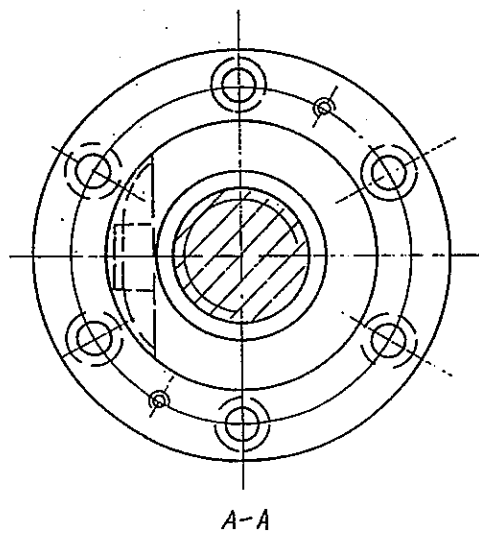
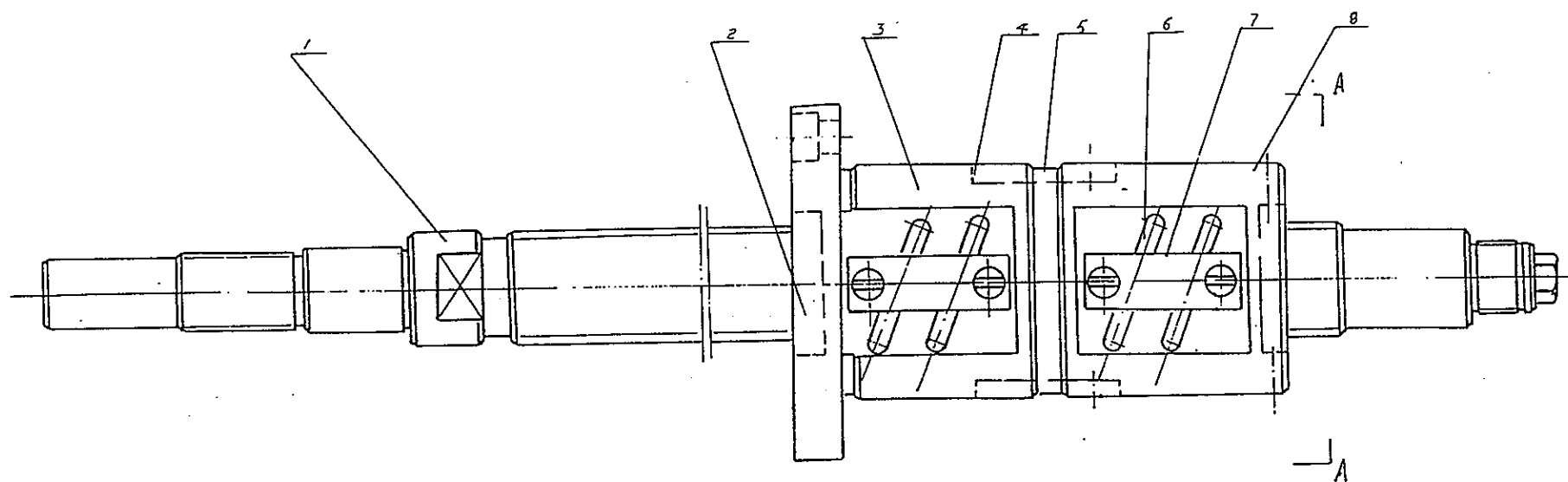
NO.	NAME	Q'TY	REMARKS
45	Plate guard	1	
46	Rubber strip	1	
47	Rubber strip	2	
48	Rubber strip	4	
49	Plate guard with block	8	
50	Motor Seat	1	
51	Screw	4	
52	Screw	4	
53	Counter Balance Weight	1	
54	Screw	2	
55	Pipe Line Connector	2	
56	Pipe Line connector	1	
57	Pipe Line	1 set	
58	Screw	4	
59	Clamp	2	
60	Screw	4	
61	Pine Line	1 set	
62	Pine line connector	1	
63	Oil regulating distributor	1	
64	Dust Cover	1	
65	Spring Washer	2	
66	Screw	4	
67	Oil filling	2	
68	Connector	2	



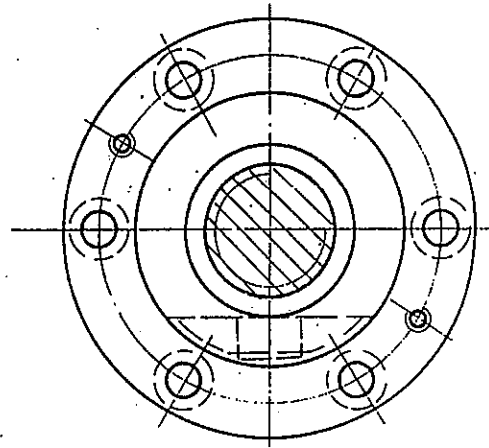
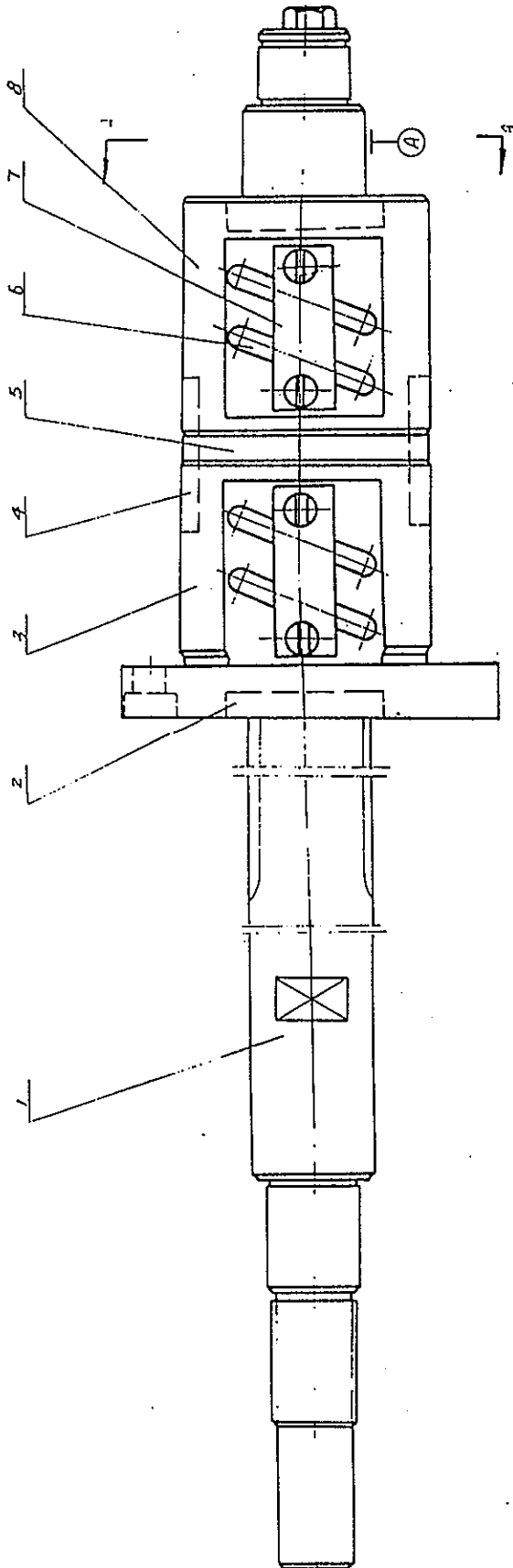




3. X AXIS BALL SCREW				
NO.		NAME	Q'TY	REMARKS
1	12301	X asis ball screw	1	
2	12801	Seal ring	2	
3	12302	Ball nut	1	
4	12307	Key	2	
5	11305	Adjust cushion	1	
6	12304	Return tube	2	
7	12306	Platen	2	
8	12303	Ball nut	1	

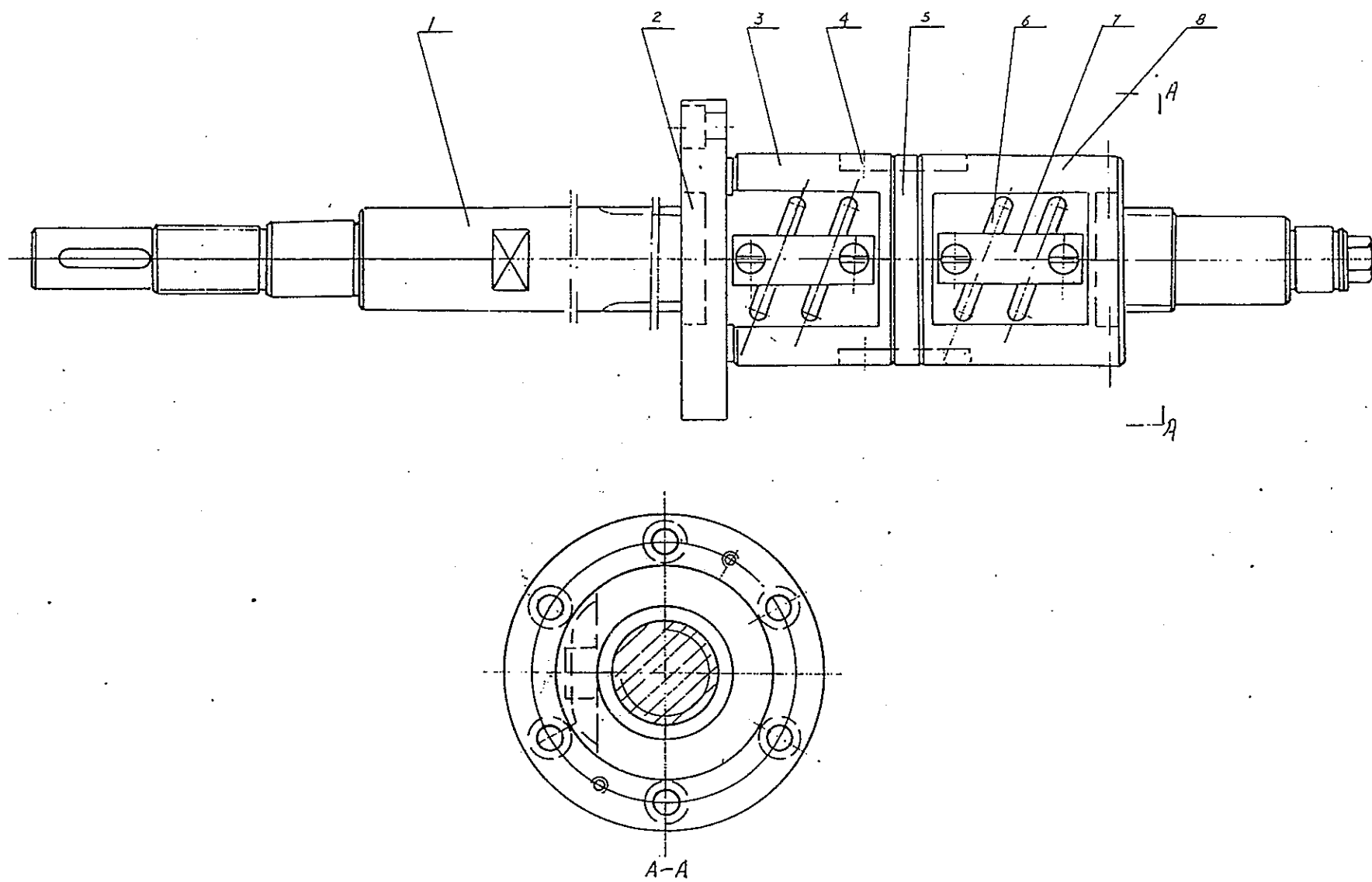


4.	Y AXIS BALL SCREW		
NO.	NAME	Q'TY	REMARKS
1	13301	Y axis ball screw	1
2	12801	Seal ring	2
3	12302	Ball Nut	1
4	12307	Key	2
5	11305	Adjust cushion	1
6	12304	Return tube	2
7	12306	Platen	2
8	12303	Ball nut	1



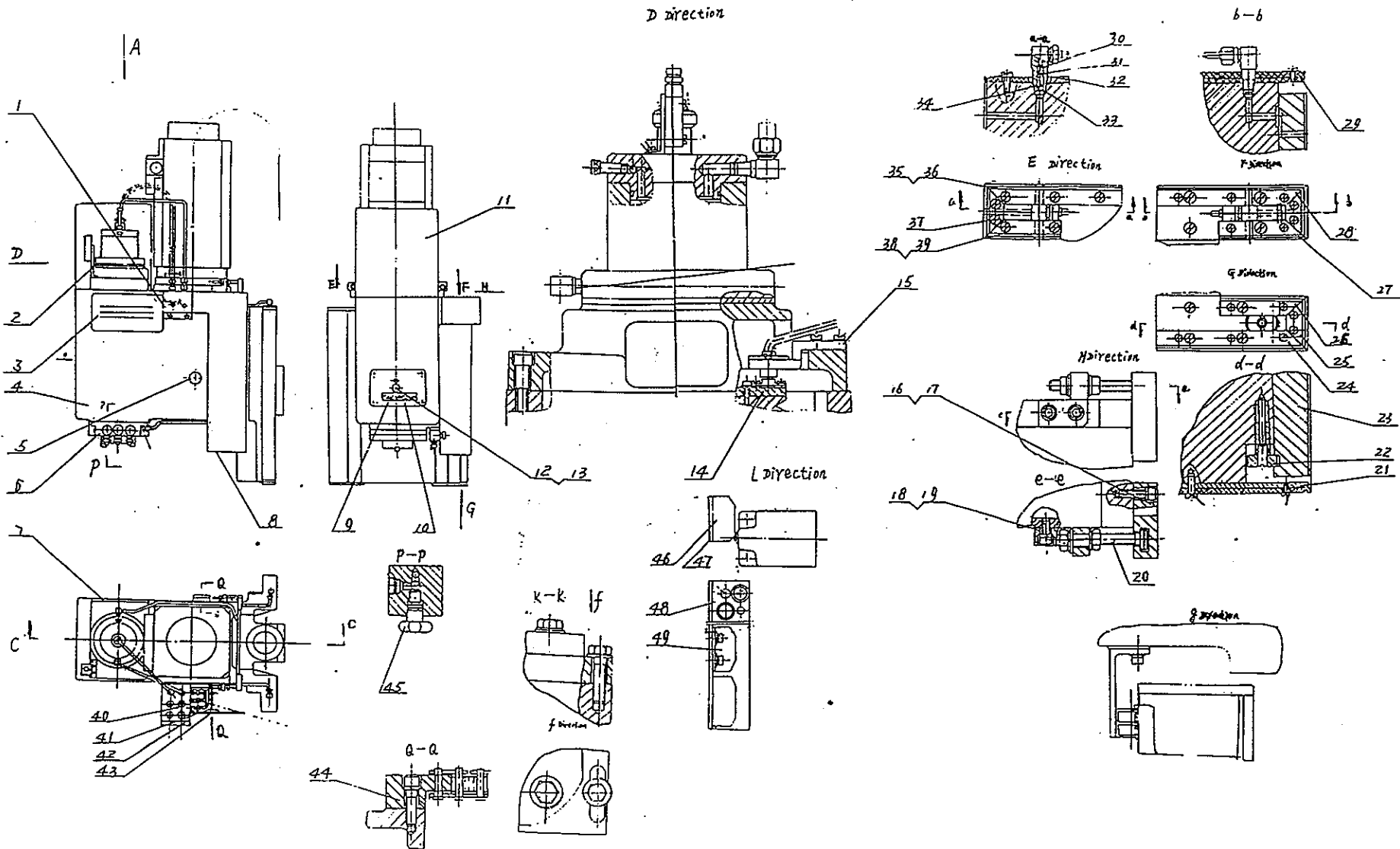
A-A

5. Z AXIS BALL SCREW				
NO.		NAME	Q'TY	REMARKS
1	13301	Y axis ball screw	1	
2	12801	Seal ring	2	
3	12302	Ball Nut	1	
4	12307	Key	2	
5	11305	Adjust cushion	1	
6	12304	Return tube	2	
7	12306	Platen	2	
8	12303	Ball nut	1	



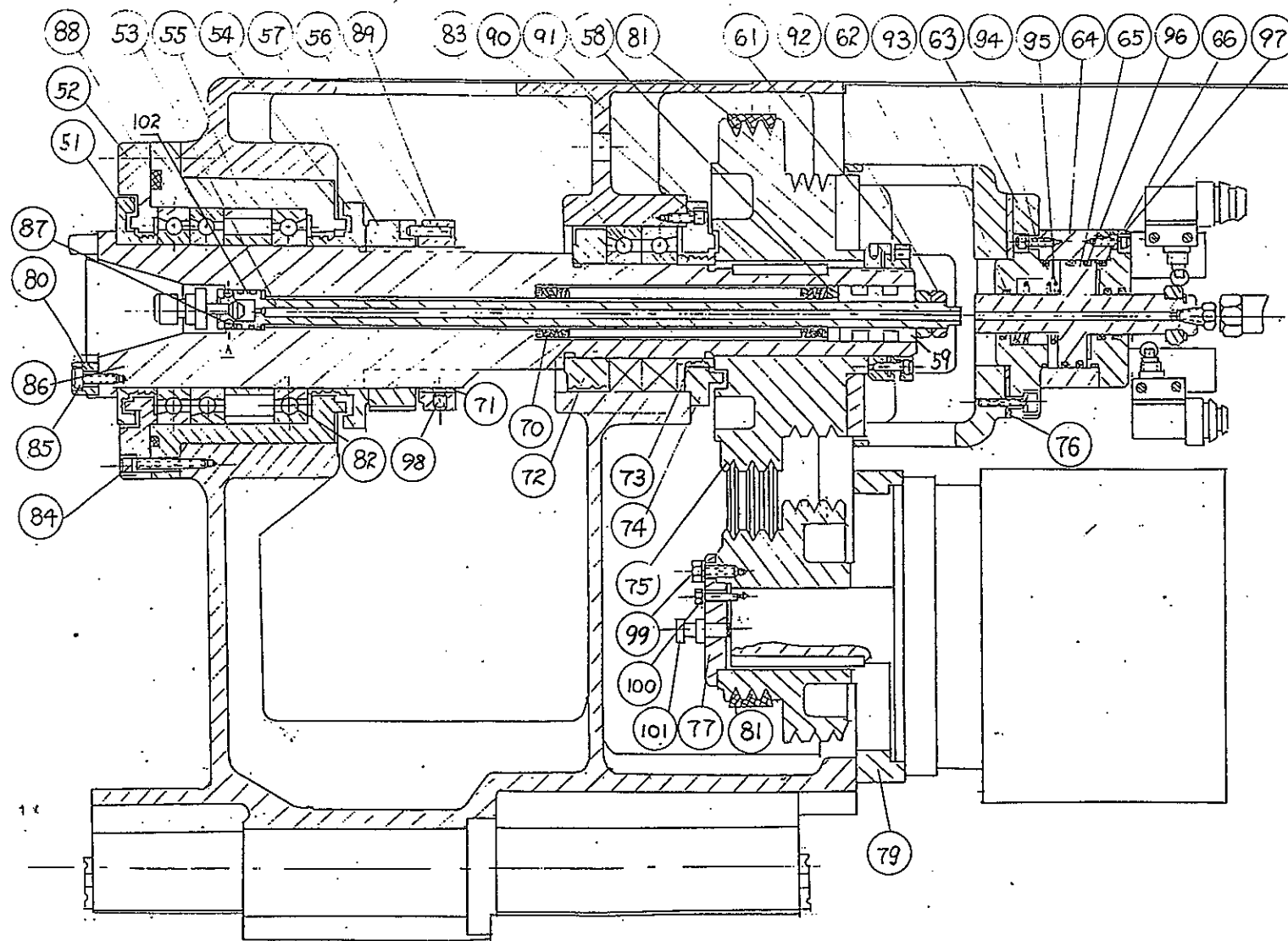
6. SPINDLE HEAD			
NO.	NAME	Q'TY	REMARKS
1	Cuent diverter	1	
2	Supporting plate	1	
3	Louver	1	
4	Spindle case	1	
5	Lid	2	
6	Cooling seal	1	
7	Louver	4	
8	Plate	1	
9	Label of button	1	
10	Lid	1	
11	Cover	1	
12	Supporting plate	1	
13	Resistance fixed plate	1	
14	Bearing Plate	1	
15	Supporting plate	1	
16	Supporting plate	1	
17	Supporting plate	1	
18	Small Pedestal	1	
19	Small Pedestal	1	
20	T-Slot screw	2	
21	Bearing plate	1	
22	Adjust nut	1	

NO.	NAME	Q'TY	REMARKS
23	Gib	1	
24	Strike-off board	1	
25	Strike-Off board	1	
26	Strike-off board	1	
27	Strike-off board	1	
28	Strike-off board	1	
29	Bearing plate	1	
30	Plug	2	
31	O-ring Seat	2	
32	Protecting sheet	2	
33	Plug	2	
34	Pipe coupling	2	
35	Strike- off board	1	
36	Strike- off board	1	
37	Strike- off board	2	
38	Strike- off board	1	
39	Strike- off board	1	
40	Straight pipe coupling	1	
41	Support	1	
42	Plate	1	
43	Plate	1	
44	Chain supporting plate	2	
45	Handle	3	
46	Overtravel bag	2	



NO.	NAME	Q'TY	REMARKS
70	Spring	108	
71	Pressure block	1	
72	Seal Bush	1	
73	Sleeve	1	
74	Flange	1	
75	Bell pulley	1	
76	Adjust cushion	1	
77	Flange	1	
78	Bell pulley	1	
79	Motor base	1	
80	Positioning key	1	
81	Ban Flexscrum Type#SE/ 8M1040 TIMING BELT	1	
82	Bearing 80x130x116	3	
83	Bearing 75x115x40	2	
84	M10x25 Hex Screw	6	
85	M15x25 Hex Screw	1	
86	Spindle	1	
87	Steel Ball 0.125 o1/4	4	
88	Fillet	1	
89	Pin o5x20	1	
90	Screw M8	6	
91	Key 12x80	1	

92	Nut M16x1.5	2
93	O-Ring	1 set
94	Screw M8 x 25	4
95	Spring	1
96	O-Ring	1 set
97	Half round screw M6x12	4 pcs
98	Set Screw M6 x 10	1
99	Hex screw M6 x 15	4
100	Hex screw M5 x30	3
101	Screw Nut M8 x25	1 set

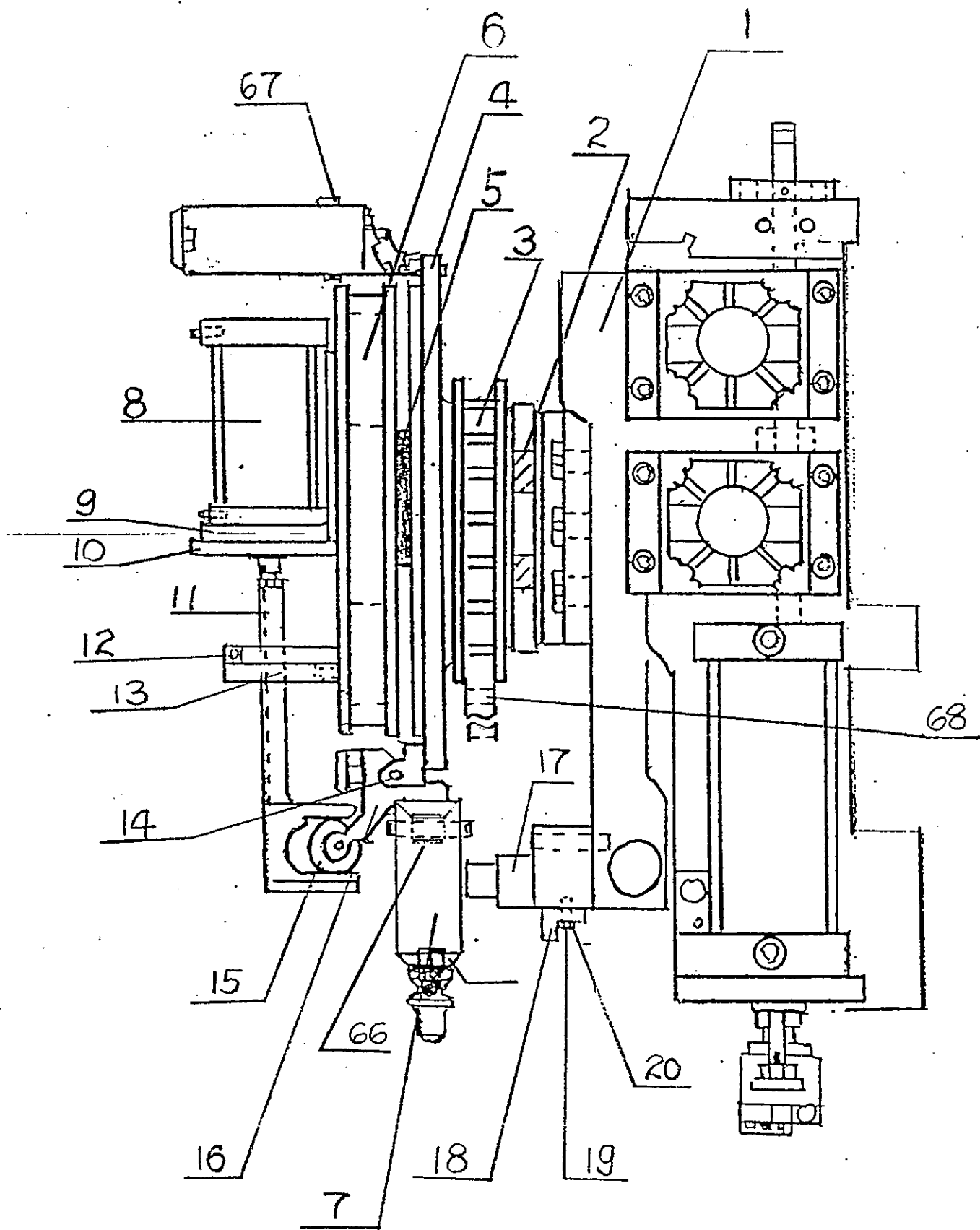


7. AUTOMATIC TOOL CHANGER			
NO.	NAME	Q'TY	REMARKS
1	Foundation Mounting	1	
2	Screw	8	
3	Pully	1	
4	Rotating Plate	1	
5	Adjustment Plate	1	
6	Alignment Plate	1	
7	Tool Pot	20	
8	Tool Pot Air Cylinder	4	
9	Adjusting Plate	1	
10	Air Cylinder Mounting Base	1	
11	Shaft	1	
12	Supporting Plate	2	
13	Supporting Plate	1	
14	Hinge	1	
15	Roller	1	
16	Guide Plate	1	
17	Guide Plate	1	
18	Dog	2	
19	Guide Plate	2	
20	Screws M6 x 20 & M6 x 35	2 each	
21	Sleeve	1	

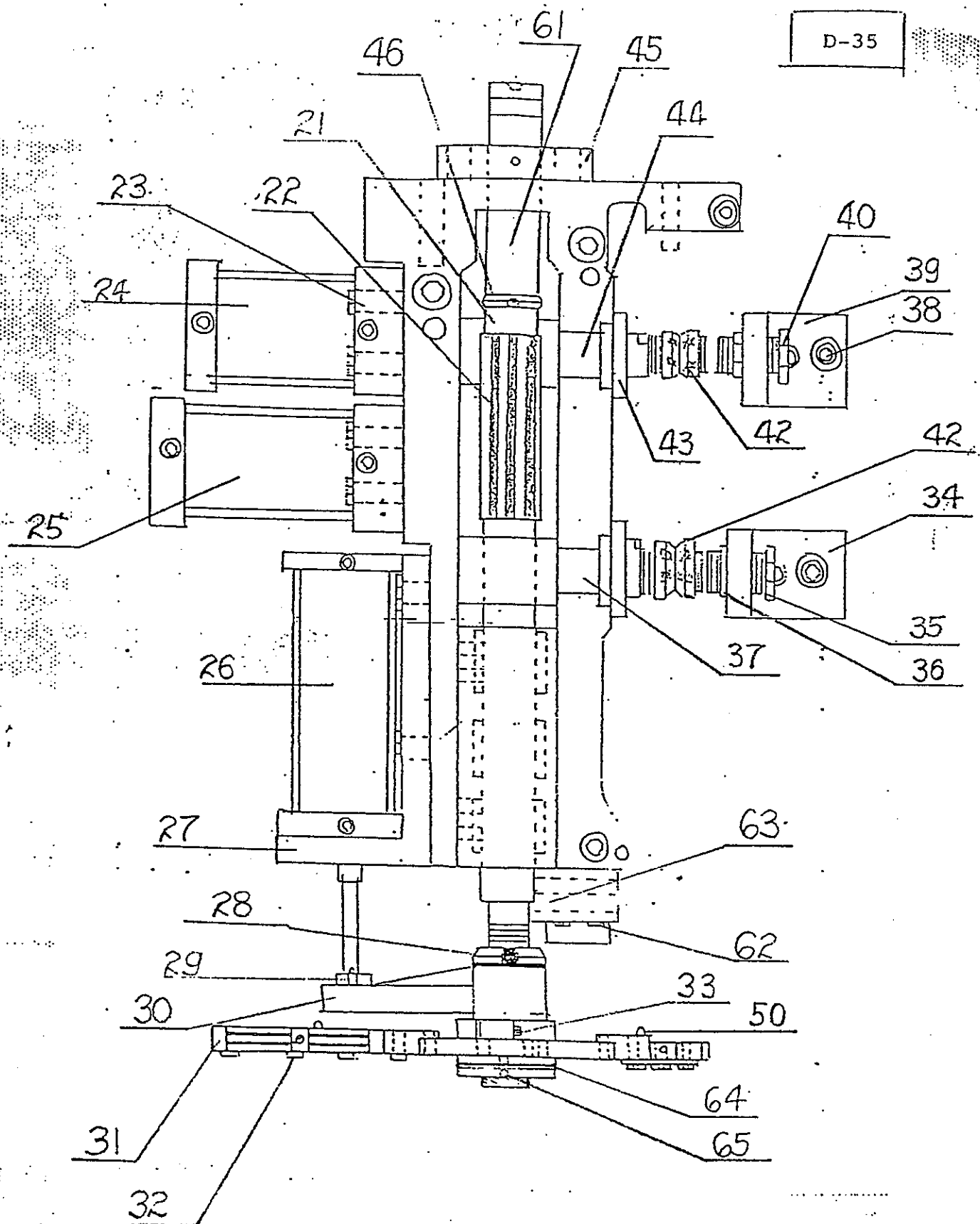
NO.	NAME	Q'TY	REMARKS
22	Gear	2	
23	Screw M10 x 15	4	
24	Air cylinder for 75 degrees	1	
25	Air Cylinder for 180 degrees	1	
26	Arm Up/down air cylinder	1	
27	Supporting plate	1	
28	Nut	1	
29	Hex Nut	4	
30	Support Block	1	
31	Jaw Block	1	
32	screw M6 x16	6	
33	Screw	1	
34	180 degrees stopper	1	
35	180 degrees stopper adj screw	1	
36	Nut	1	
37	180 degrees gear rack	1	
38	Hex screw M12 x 40	4	
39	75 degrees stopper	1	
40	75 degrees stopper adj screw	3	
41	Nut	2	
42	Nut	1	
43	Gear rack supporting block	1	

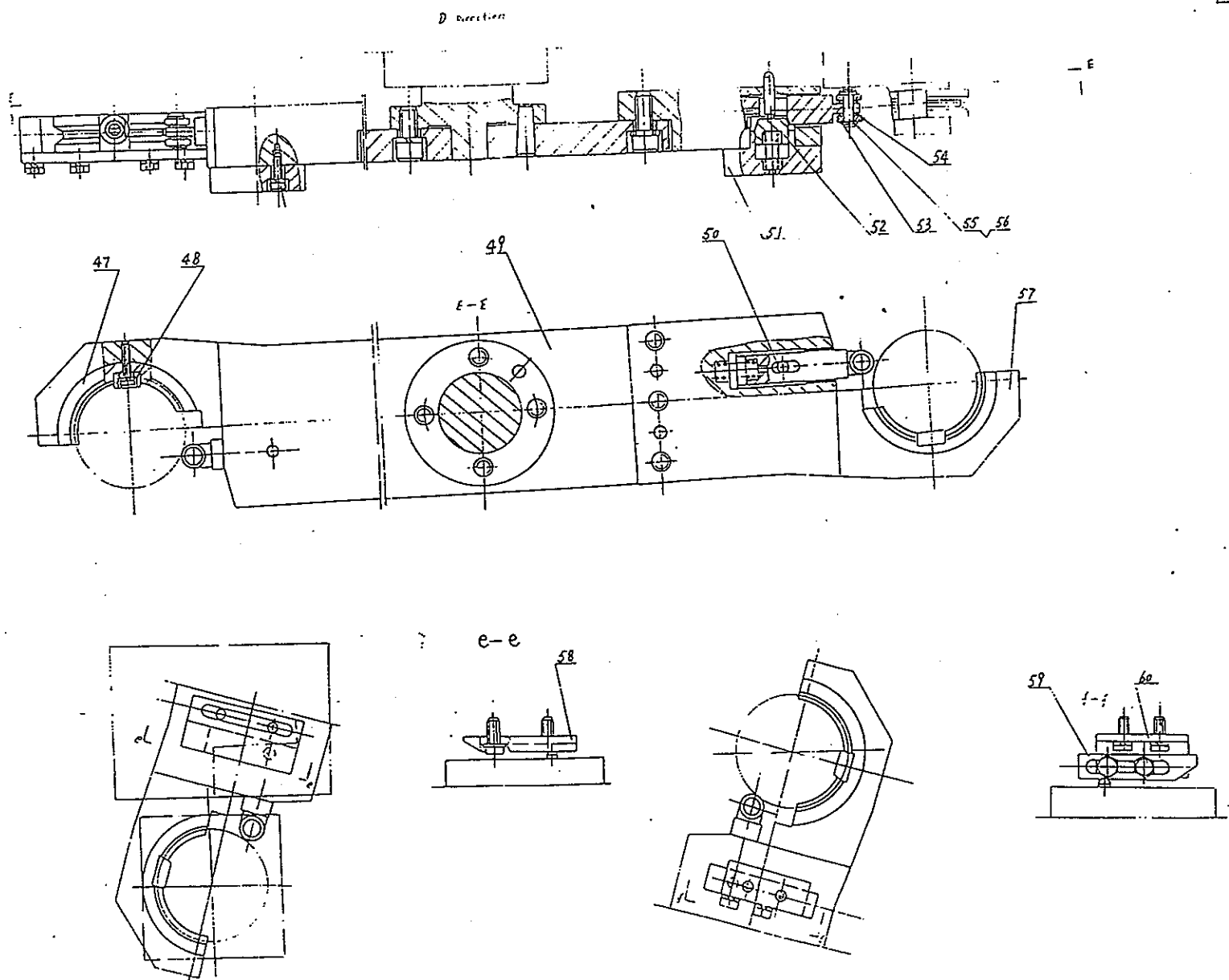
NO.	NAME	Q'TY	REMARKS
44	75 degrees Gear rack	3	
45	Alignment lock nut	3	
46	Nut and set screw	1 set	
47	Jaw	2	
48	Key	2	
49	Arm	1	
50	Top pin	2	
51	Gland	2	
52	Pin	2	
53	Roller	4	
54	Washer	4	
55	Shaft	2	
56	Circlip with shaft	2	
57	Jaw block	2	
58	Dog	1	
59	Dog	1	
60	Guide plate	1	
61	ATC spindle	1	
62	Screw M6x20, M6x35	2 each	
63	Dog	1	
64	Lock washer	1	
65	Lock Nut	2	
66	Sleeve	1	

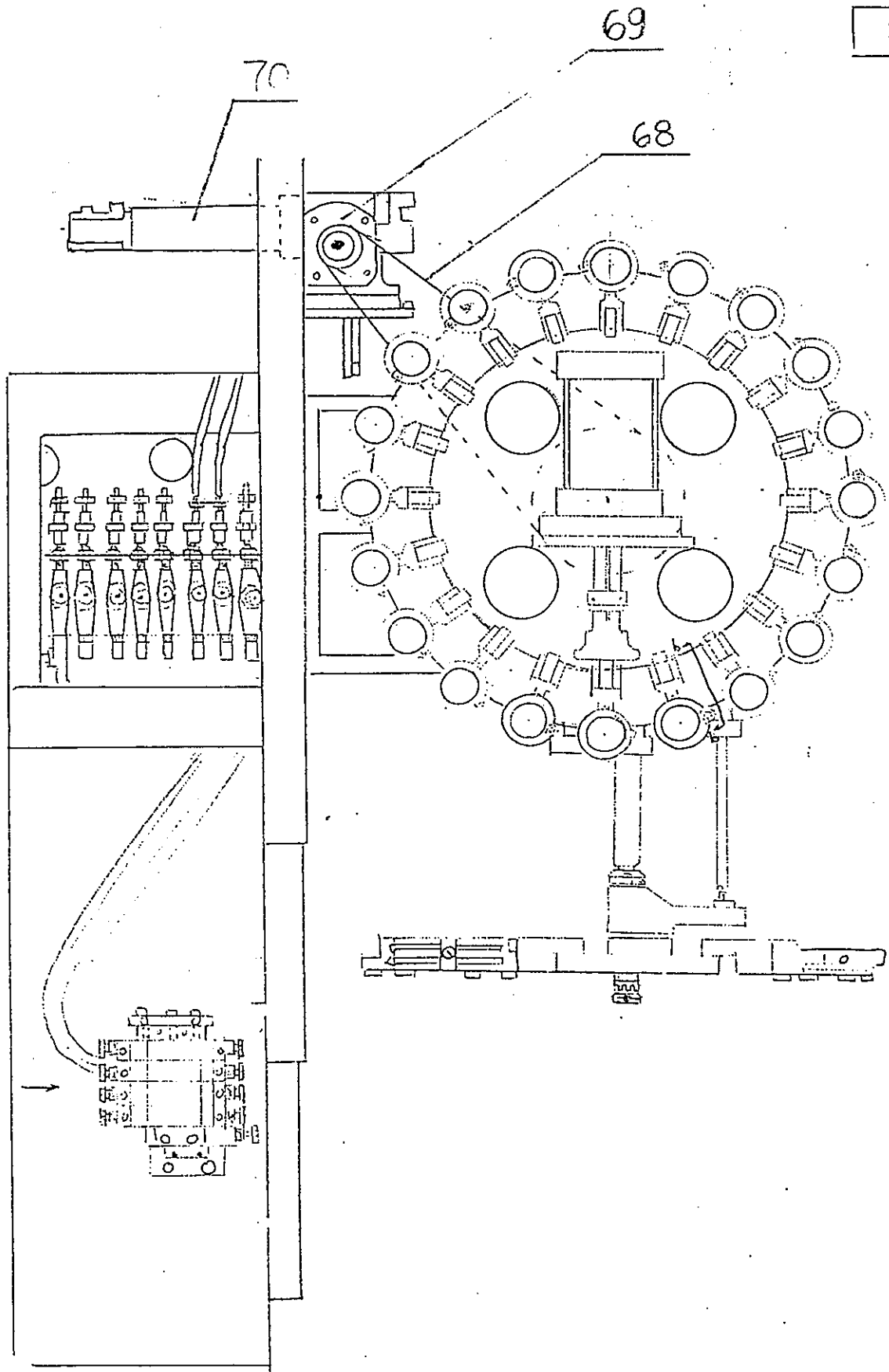
NO.	NAME	Q'TY	REMARKS
67	Adjusting screw	1	
68	Timing Belt	1	
69	Gear Box	1	
70	Servo Motor	1	

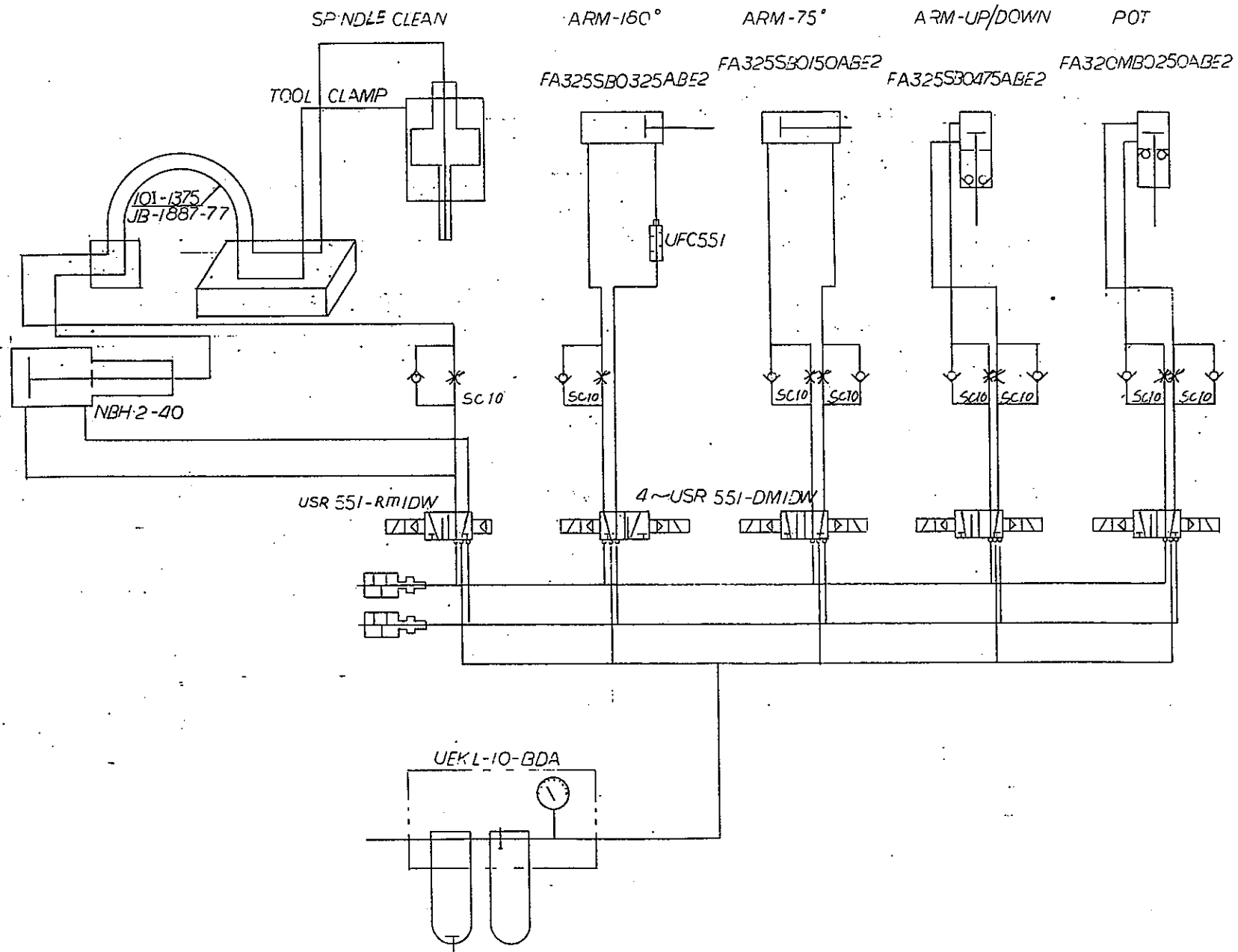


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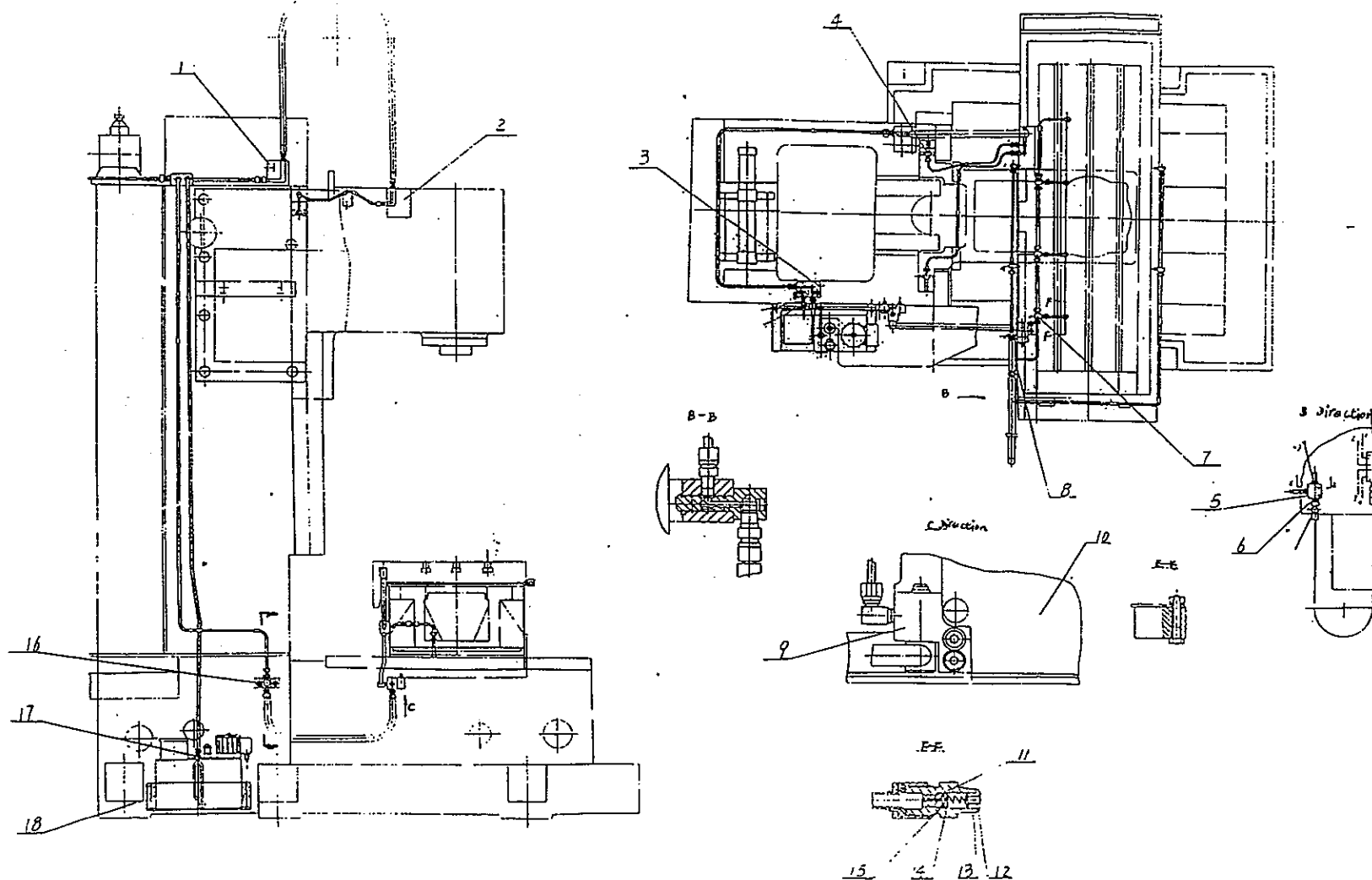




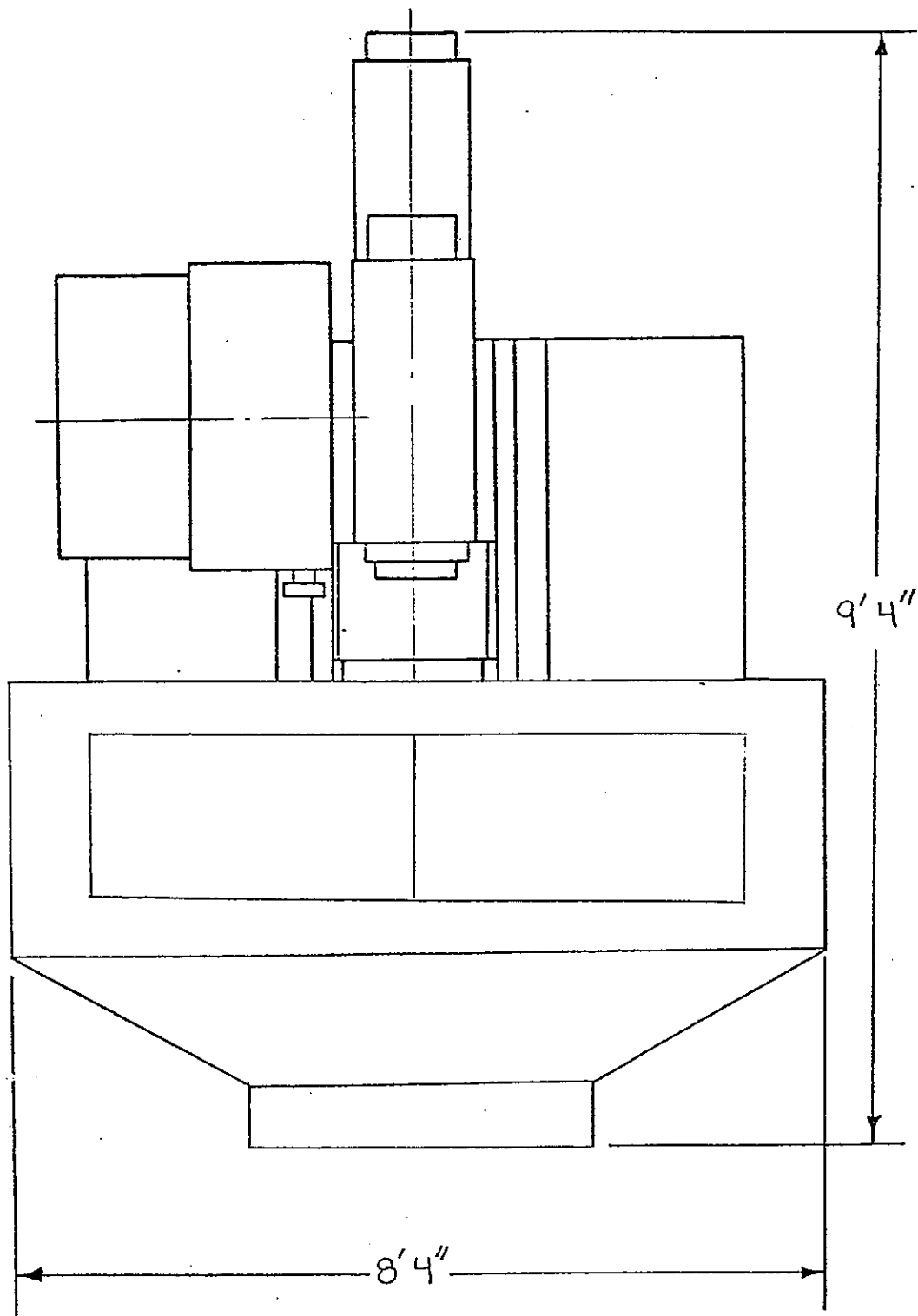




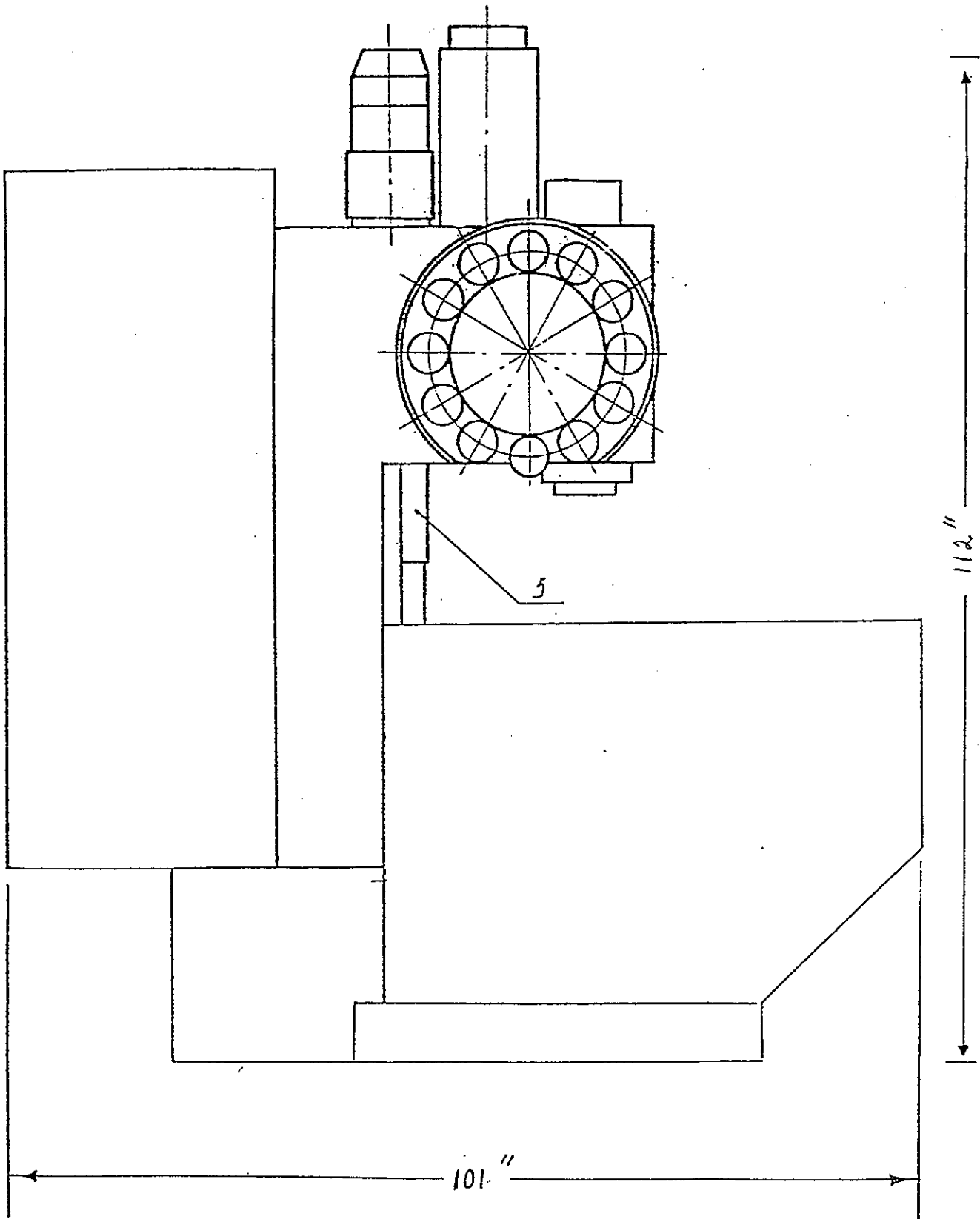
.8. LUBRICATING PIPING DIAGRAM			
NO.	NAME	Q'TY	REMARKS
1	Oil separator	1	
2	Current divider	1	
3	Oil separator	1	
4	Pipe coupling	2	
5	Oil separator	1	
6	Pipe coupling	2	
7	Three-way pipe coupling	3	
8	Bottom plate	1	
9	Fitting	1	
10	Guide strip	2	
11	Plug	4	
12	Plug	4	
13	pipe coupling	4	
14	Protecting sheet	4	
15	O-ring seat	4	
16	Fitting	1	
17	pipe coupling	1	
18	Support of oil box	1	

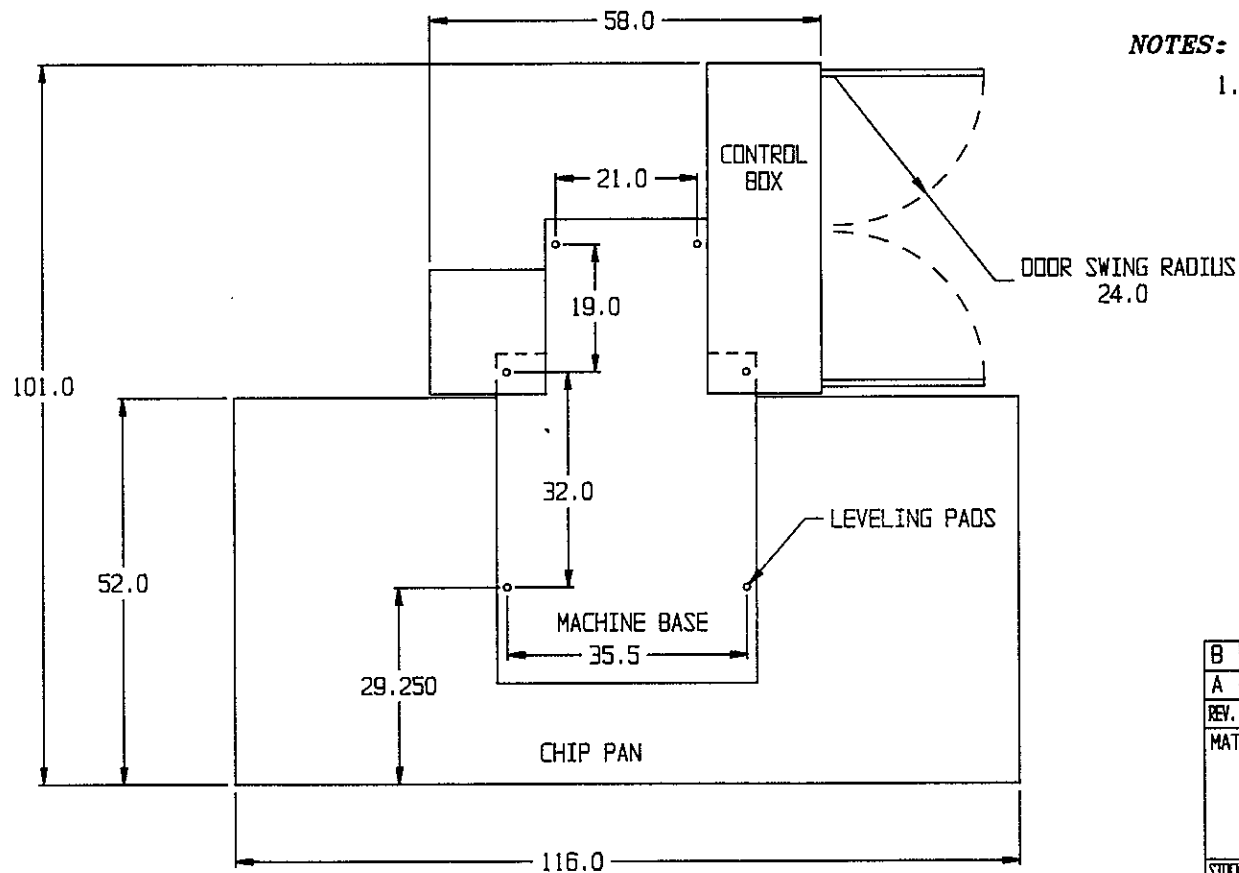


PARTNER VII OVERALL DIMENSIONS



PARTNER 7 OVERALL DIMENSIONS



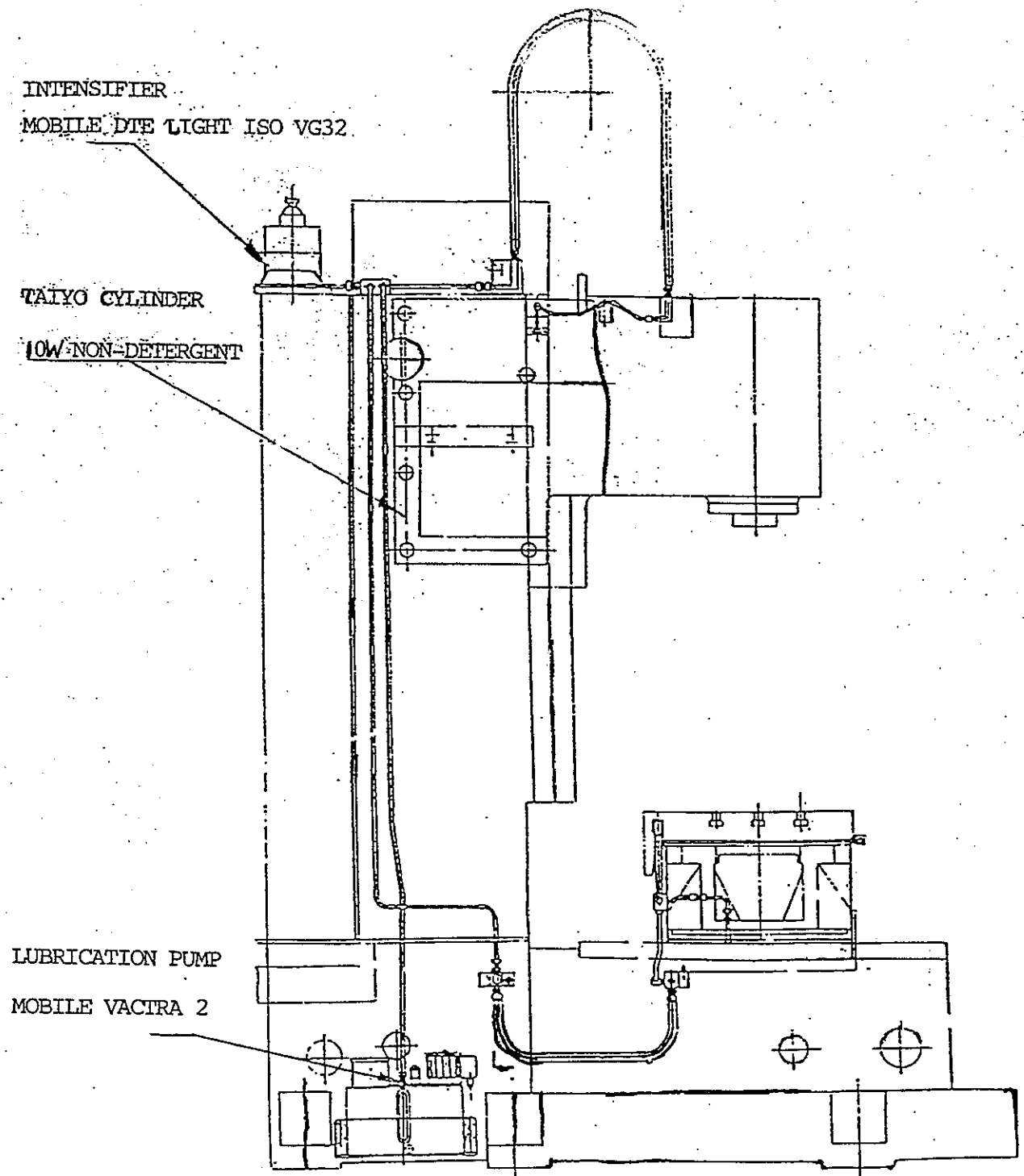


NOTES:-

1. APPROX. WEIGHT - 14,000 LBS.
APPROX. HEIGHT - 114 In.

B	ADD NOTE	1121	H/V	1/93
A	REMOVE MAG BOX	458	C.R.	3/90
REV.	DESCRIPTION	E.C.D. NO.	APP'D BY	DATE
MATERIAL/FINISH		 MILLTRONICS MANUFACTURING 7870 PARK DRIVE (612) 474-8100 CHANHASSEN, MN 55317		
STOCK No.		TITLE INSTALLATION DRAWING		
TOLERANCE UNLESS SPECIFIED		APPLICATION PARTNER VII		
X.XXX	±	SCALE 20:1	DWG NO. 6-01-020-059	SIZE 8
X.XX	±			
X.X	±			
X	±			
ANGLE	±	DATE 24 JAN 91	DRAWN BY REUTER	SHEET NO. 1 OF 1

4. LIST OF RECOMMENDED LUBRICATING OILS



1. INSTALLATION

1) INSTALLATION SITE

Do not install the machine where it is exposed to direct sunlight, chips or other refuse, water, oil etc. and foreign vibration.

Ambient temperature: 0 – 45°

Humidity: 10 – 90% RH

2) INPUT POWER

Electrical systems should be shielded against noises caused by electric welders, electrospark machining equipment, etc.

Excessive voltage drops resulting from insufficient capacity of plant power lines can cause malfunctioning of the NC unit. As a general rule, the machine should be wired independently from the main plant power source.

- Input power source capacity: 19 KVA
23 KVA

- Current capacity:
$$A = \frac{\text{KVA} \times 1000}{V \times \sqrt{3}}$$

With 200V input voltage A = 55 ampere

With 220V input voltage A = 50 ampere

- Permissible input voltage fluctuation: AC 200/220V $\pm 10\%$, 50/60 Hz
- Electric wire for input power source: 220V, 14 – 22 mm² (in case of metal piping)

3) GROUNDING*

Ground the machine singularly as much as possible. When grounding use as short and thick (8mm²) grounding wire as possible. Class 3 grounding with grounding resistance of 100 Ω or less.

4) INSTALLATION PROCEDURE

4.1) Transporting the Machine

Lift the machine following the procedures below:

- (1) Move the head to the lowest position.
- (2) Move the table to the middle position of X-axis then move the saddle to the nearest position to column.
- (3) Turn off the power, and disconnect the power wires.
- (4) Remove the coolant pump, then remove the coolant tank.
- (5) remove the chip pan, use two bars through the lifting holes to lift the machine.
- (6) lift the machine carefully.

4.2) Foundation and Leveling

Place 8 leveling plates on the solid floor and install the machine with the leveling adjust bolts on the plates. Use a precision level dial with a sensitivity of about 0.02mm/m (0.0008"/40") to level the machine. For longitudinal and cross directions the level dial should be fall within 0.04mm/m (0.0016"/40").

- Precautions in installation

(1) Maintenance area

There must be no obstacles impeding opening / closing of the electric control board door.

(2) Check for obstacles within the table travel range.

(3) Open space for coolant tank removal.

5) CHECK BEFORE TURNING POWER ON

- (1) Check bolts for tightness.
- (2) Check electric connectors for tightness.
- (3) Make sure that air hoses or pipes are completely connected.
- (4) Input power supply
Voltage, R/S/T phases

Check the above items and then turn power on.
Make sure that there are no interfering object.

6) CHECK AFTER THE INITIAL START-UP

- (1) Check the oil level.
- (2) Warm up the spindle as follows.
At 1000 rpm for 30 minutes.
At 2000 rpm for 30 minutes.
(Also warm up the spindle when the machine has not been used for a long period of time.)
- (3) Operate the X, Y and Z axes at a low speed for 30 minutes so that the lubricant fits well with their slide ways.
- (4) Check that all functions work properly.

2. LUBRICATION

1) AUTOMATIC LUBRICATION UNIT

Oil for lubricating the slide ways and ball screws is supplied automatically and intermittently by the lubricating system installed at the back side of the column. When oil in the tank is used up, a buzzer warning is given automatically, in this case, replenish oil promptly. When replenishing, use clean containers so as not to admit foreign matter. In addition, before starting the day's operation, run the machine the full stroke of each axis so that oil permits into all sliding surface points.

2) AIR UNIT

Compressed air is used for the following:

- * Air blow: Air is blown from the inside the spindle to the tool shank and from outside the spindle to the tool magazine side to remove dust when tools are automatically replaced.
 - * Tool clamp/unclamp: Used for the cylinder to clamp and unclamp tools.
 - * Tool : $\overline{arm}$ up/down: Used for the cylinder to move the tool magazine up/down.
 - * Tool : $\overline{arm}$ left/right: Used for the cylinder to move the tool magazine left/right.
- The required air pressure is 6 — 6.5 kg/cm² , 85psi

3) COOLANT UNIT

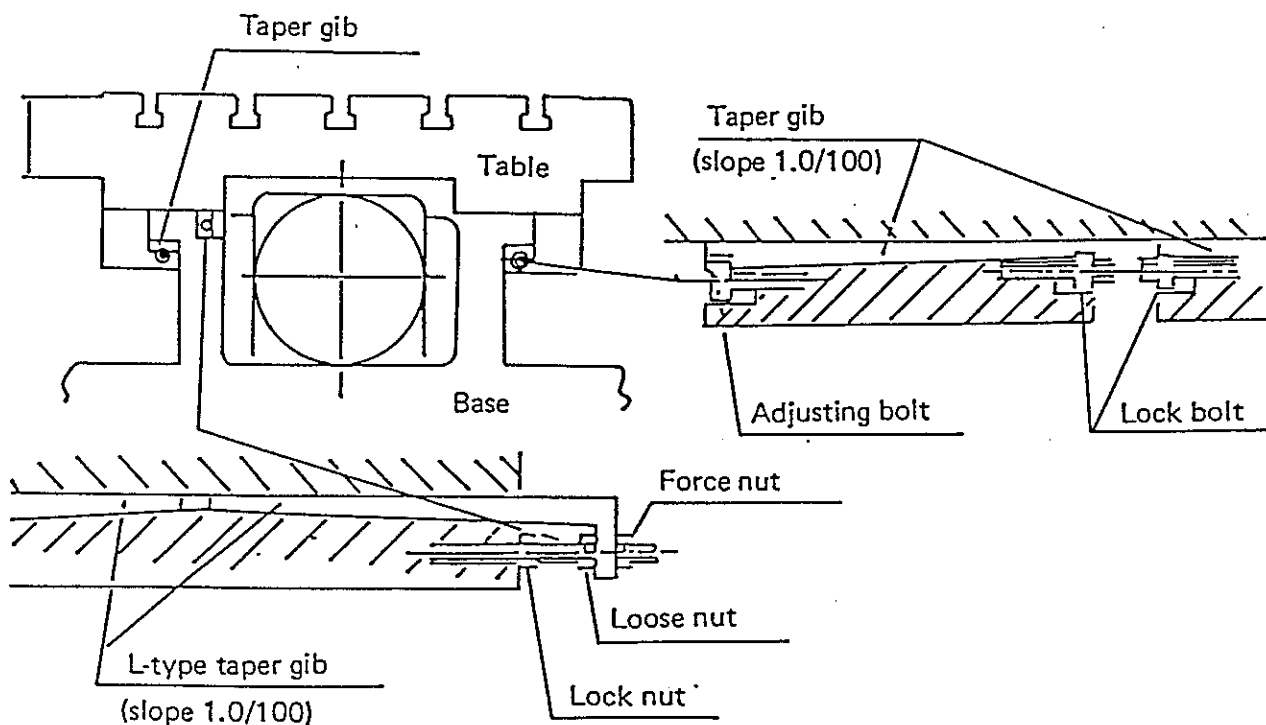
The coolant tank is separately installed to facilitate cleaning the tank interior and supplying coolant. Choose proper coolant, selected according to the kind of workpiece.

3. ADJUSTING OF GIBS

The guide surfaces are ground after being hardened, and the opposite sliding surfaces are lined with Turcite B and lubricated automatically to keep the wear of sliding surfaces to a minimum. As a means of further adjusting for wear and assuring proper sliding, taper gibs are provided. When adjusting, if the gib is tightened too firmly, the oil film may be broken and the sliding surfaces may be worn. Therefore, always tighten the gibs properly to assure the best operating conditions.

1) Table Gib Adjustment

- 1) Loosen the lock bolt in the middle end of the table. (only for VMC 980, 1000) Tighten the adjusting bolt in the both end of the table until the taper gib is fully tightened; then loosen the screw approx. one turn. Firmly tighten the lock bolt.
- 2) L-type taper gib turn loose nut back. Turn force nut forward until the taper gib is fully tightened; then turn back the force nut approx. one turn. Firmly tighten the loose nut.

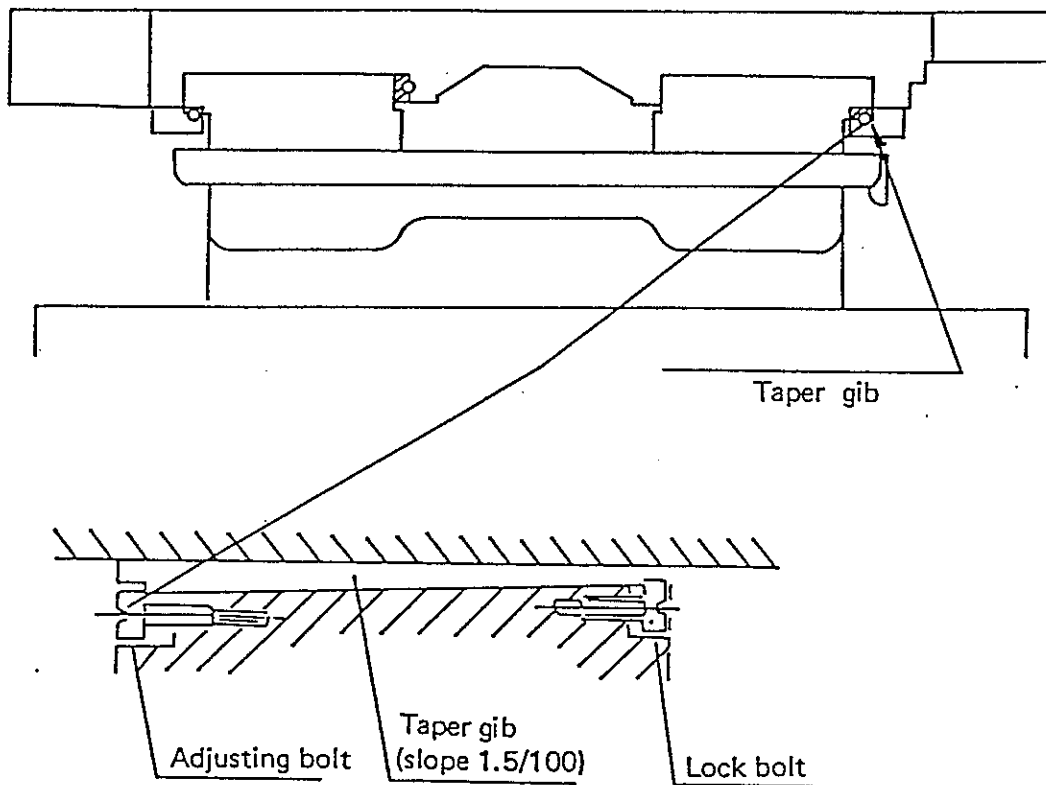


2) Saddle Gib Adjustment

Remove the slide cover for protection of the saddle front sliding parts.

Then adjust the gib following the procedure below:

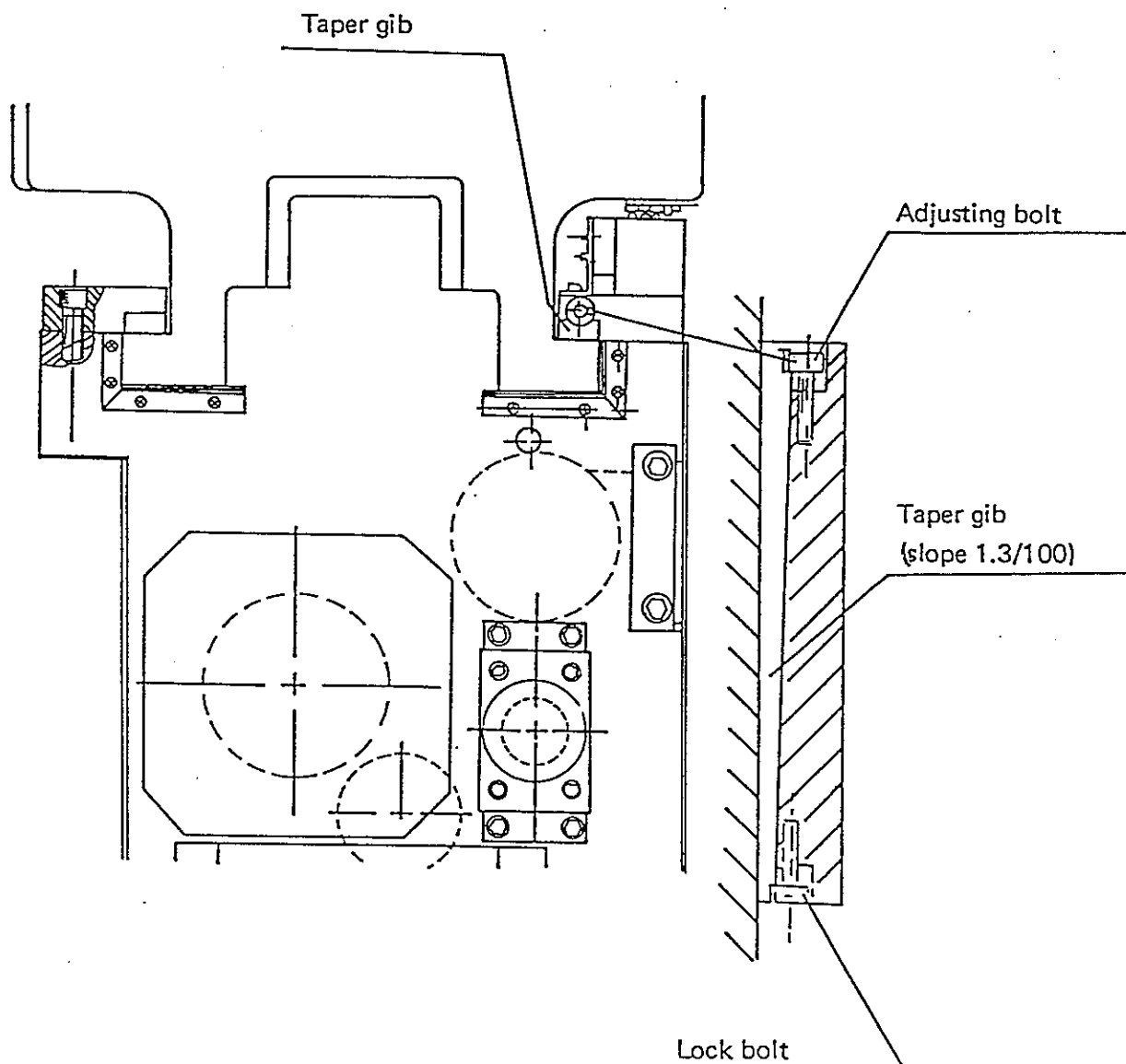
- 1) Loosen the lock bolt of the saddle rear part.
- 2) Tighten the adjusting bolt of the saddle front part until the taper gib is fully tightened; then loosen the screw approx. one turn.
- 3) Firmly tighten the lock bolt of the saddle rear part.



3) Head Gib Adjustment

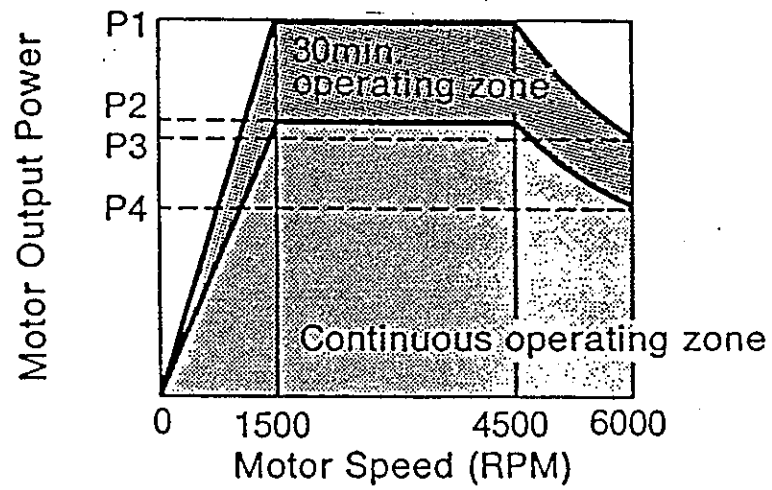
Adjust the gib following the procedure below:

- 1) Lower the spindle head about 8" (200 mm) from the home position.
- 2) Loosen the lock bolt of the spindle head lower part.
- 3) Tighten the adjusting bolt of the spindle head upper part until the taper gib is tightened fully; then loosen the screw approx. one turn.
- 4) Firmly tighten the lock bolt of the spindle head lower part.



Output Power P1/P2/P3/P4

SJ-11A
11/7.5/8/5.5 (kw)
15/10/10/7 (HP)



PARTNER VII DRIVE BUSS TRANSFORMERS SETTINGS

04 January 1991

CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
208 VAC	4404 5KVA	H1-H2 208	X1-X2 110
240 VAC	4404 5KVA	H1-H2 240	X1-X2 110
480 VAC	4404 5KVA	H1-H3 480	X1-X2 110

PARTNER VII SYSTEM 110 TRANSFORMER SETTING

CUSTOMER INPUT VOLTAGE	TRANSFORMER	PRIMARY INPUT BUSS VOLTAGE	SECONDARY OUTPUT BUSS VOLTAGE
208 VAC	3358 1.5KVA	H1-H2 208	X1-X2 110
240 VAC	3358 1.5KVA	H1-H2 240	X1-X2 110
480 VAC	3358 1.5KVA	H1-H3 480	X1-X2 110

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. BUSS VOLTAGE SHOULD READ APPROXIMATELY 160 VOLTS.

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 7 YASKAWA PARAMETERS
G3 Inverter

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
SN-01	KVA Selection	07
SN-02	V/F Pattern Selection	OF
SN-03	Operator Status	1010
SN-04	Operation Mode Select 1	0000
SN-05	Operation Mode Select 2	0000
SN-06	Operation Mode Select 3	0001
SN-07	Operation Mode Select 4	0000
SN-08	Operation Mode Select 5	0000
SN-09	Operation Mode Select 6	0000
SN-10	Select Stall Prevention	0010
SN-11	Momentary Power Loss Protection	0000
SN-12	External Fault Signal Input (3)	0000
SN-13	Not Used	0000
SN-14	Motor Protection	0010
SN-15	Soft Input Terminal 5	03
SN-16	Soft Input Terminal 6	04
SN-17	Soft Input Terminal 7	06
SN-18	Soft Input Terminal 8	08
SN-19	Multi Function Analog Input	00
SN-20	Soft Output Terminals	01
SN-21	Soft Output Terminals	01
SN-22	Soft Output Terminals	02
SN-23	Not Used	00
SN-24	Not Used	00
SN-25	Analog Speed Setter	0000
SN-26	Digital Speed Setter	0000
SN-27	Digital Pulse Monitor Option	0000
SN-28	Analog Output Monitor Option	0100
BN-01	Acceleration Time #1	1.0
BN-02	Deceleration Time #1	1.0
BN-03	Acceleration Time #2	10.0
BN-04	Deceleration Time #2	10.0
BN-05	Frequency Reference Gain	100.0
BN-06	Frequency Reference Bias	0
BN-07	Torque Compensation Gain	1.0
BN-08	Motor Rated Slip	2.2
BN-09	Energy Saving Level Gain	80
BN-10	Monitor Mode at Power-up	1
BN-11	Soft Analog Output Gain	1.00
BN-12	Soft Analog #2 Output Gain	1.00
AN-01	Digital Reference #1	0.00
AN-02	Digital Reference #2	0.00
AN-03	Digital Reference #3	0.00
AN-04	Digital Reference #4	0.00
AN-05	Digital Reference #5	0.00
AN-06	Digital Reference #6	0.00
AN-07	Digital Reference #7	0.00
AN-08	Digital Reference #8	0.00
AN-09	Jog Frequency Reference	3.0

PARTNER 7 YASKAWA PARAMETERS
G3 Inverter
Page 2

<u>PARAMETER</u>	<u>DESCRIPTION</u>	<u>DATA</u>
CN-01	Motor Rated Input Voltage	200.0
CN-02	Maximum Output Frequency	200.0
CN-03	Maximum Output Voltage	200.0
CN-04	Maximum Voltage Frequency	60.0
CN-05	Breakpoint Frequency	10.0
CN-06	Breakpoint Voltage	45.0
CN-07	Minimum Frequency	0.5
CN-08	Minimum Voltage	11.0
CN-09	Motor Rated Current	38.5
CN-10	DC Injection Braking Start Frequency	20.0
CN-11	DC Braking Current	70
CN-12	DC Injection Time at Stop	0.5
CN-13	DC Injection Time at Start	0.0
CN-14	Frequency Reference Upper Limit	100
CN-15	Frequency Reference Lower Limit	0
CN-16	Prohibited Frequency Points	0
CN-17	Prohibited Frequency Points	0
CN-18	Prohibited Frequency Points	0
CN-19	Prohibited Frequency Deadband	1.0
CN-20	Operator Display Mode	00000
CN-21	Speed Comparator Reference	0.0
CN-22	Comparator Hysteresis	2.0
CN-23	Carrier Frequency Upper Limit	2.5
CN-24	Carrier Frequency Lower Limit	0.4
CN-25	Carrier Frequency Gain	6
CN-26	Overtorque Detection Level	160
CN-27	Overtorque Detection Time	0.1
CN-28	Stall Prevention Level During Accel	170
CN-29	Stall Prevention Limiter	30
CN-30	Stall Prevention Level at Set Speed	160
CN-31	Motor Line to Line Resistance	.472
CN-32	Motor Iron Loss	.172
CN-33	Torque Compensation Limiter	50
CN-34	Motor No Load Current	30
CN-35	Slip Compensation Delay Time	1.0
CN-36	No. of Auto-reset Attempts	0
CN-37	Power Loss Ride Through Time	0.0
CN-38	Speed Search Deactivation Level	150
CN-39	Speed Search Decel Time	0.0
CN-40	Minimum Base Block Time	0.0
CN-41	V/F Pattern Speed Search	100
CN-42	Voltage Recovery Time	0.3

YASKAWA FAILURE INDICATIONS AND DETAILS

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

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

14 PIN AMP PLUGS

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

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

Partner VII Tool Changer

Input Plug Definitions January 8, 1991

Yin01 0 Tool Change
Yin02 0 In Tool Change
Yin03 0 Spindle Orient
Yin04 0 Zero Speed
Yin05 0 Estopped
Yin07 0 Manual/Auto
Zin01 0 Pot up
Zin02 0 Pot down
Zin03 0 Arm up
Zin04 0 Arm down
Zin05 0 In 75
Zin06 0 Out 75
Zin07 0 In 180
Zin08 0 Out 180
Zin09 0 Begin Change
Zin11 0 Estopped

Output Plug Definitions January 8, 1991

Yout01 0 Spindle CW
Yout02 0 CR2
Yout03 0 Creep Speed
Yout04 0 Orient Pin
Yout05 0 Begin Change
Yout06 0 Changing ??
Yout07 0 M60/M70 out
Yout08 0 M61/M71 out
Yout09 0 -- spare --
Yout10 0 M62/M72 out
Yout11 0 M63/M73 out
Yout12 0 M64/M74 out

Zout01 0 Solenoid
Zout02 0 Pot Down
Zout03 0 Arm Down
Zout04 0 75 Out
Zout05 0 180 In
Zout06 0 Drawbar
Zout07 0 M65/M75 out
Zout08 0 M66/M76 out
Zout09 0 In Progress
Zout10 0 M67/M77 out
Zout11 0 M68/M78 out
Zout12 0 M69/M79 out

SCHEDULE
of
PREVENTIVE MAINTENANCE

PARTNER 7

TYPES OF OIL AND GREASES

1. *Chain Oil:* Any motorcycle chain lube or 90 weight oil
2. *Way Lube:* Mobil Vectra #2
Amoco Waytac #68
Sunoco Sunwaylube #1180
3. *Hydraulic Oil:* Mobil DTE #24
4. *Tool Changer Roller:* Lubriplate gear grease
5. *Air Line Oil:* Valocite #10
Mobil DTE Light
6. *Bearing Grease:* Mobiltemp SHC 32

DAILY CHECKS

1. Keep chips cleaned out from between the table and the column.
2. Make sure there is enough oil in the oiler to run the day's production or the machine will stop when the oiler becomes empty.
3. Notice if the Y and Z axis ways appear to be getting oil. If they are not, stop the machine and check the oiling system.
4. Check to see that the air regulator oil reservoir has enough oil to run the day's production.
5. Run the machine the full stroke of each axis so that oil penetrates into all sliding surface points.

MONTHLY CHECKS

1. Grease tool pocket rollers with Lubriplate gear grease. Pockets should be rotated to the tool change position and manually flipped down by depressing the manual override on the pot down solenoid. See Drawing 1 for grease points.
2. Oil tool pot up and down slide bushing with way oil. See Drawing 2 for oil point.
3. Service the automatic lube system and check the air over oil intensifiers for correct oil level. Verify the proper flow of oil to each of the lube points.
4. Check the tool holder drawbar hydraulic reservoir for correct oil level.
5. Grease the tool pocket rollers with Lubriplate gear grease. Rotate the pockets to the tool change position and manually flip them down by depressing the manual override on the tool pot down solenoid. See Drawing 1 for grease points.
6. Grease the tool changer arm racks, gears and pivot bushings with Lubriplate gear grease. See Drawings 3 and 4.
7. Oil the tool retention rollers and plunger on the tool change arm with way oil. See Drawing 5.

EVERY SIX MONTHS CHECKS

1. Oil the counter balance chain and rollers with a good grade of chain oil. See Drawing 6.
2. Ball screws should be greased by putting a bearing grease along the X, Y and Z screws.
3. The X, Y and Z axis bearings at each end of the ball screws should be checked and greased if necessary.
4. The axis gib should be checked. If the backlash parameter set in the control has become too large, the gibs should probably be tightened.
5. The power supply voltages +5, +15, and +24 should be checked at the connector in the middle of the CPU board. If the +5 is more than ± 0.05 volts off, the power supply should be adjusted. The +15 and +24 should be adjusted if they are off by more than ± 0.1 volts.
6. Check the drawbar hydraulic reservoir located at the top rear of the machine. Use Mobil DTE #24 to fill if low.

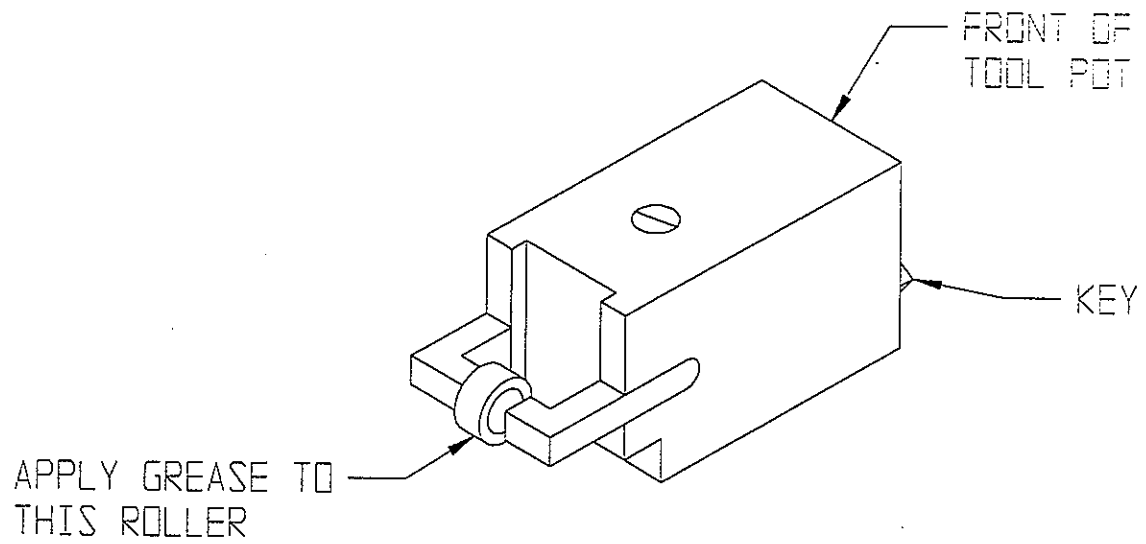
YEARLY PREVENTIVE MAINTENANCE INSPECTION

The following inspection is a suggested minimum procedure and is not all-encompassing. In general, the machine should receive a thorough visual inspection of both mechanical and electrical components. For additional information see the Operating Instruction and Service Manual.

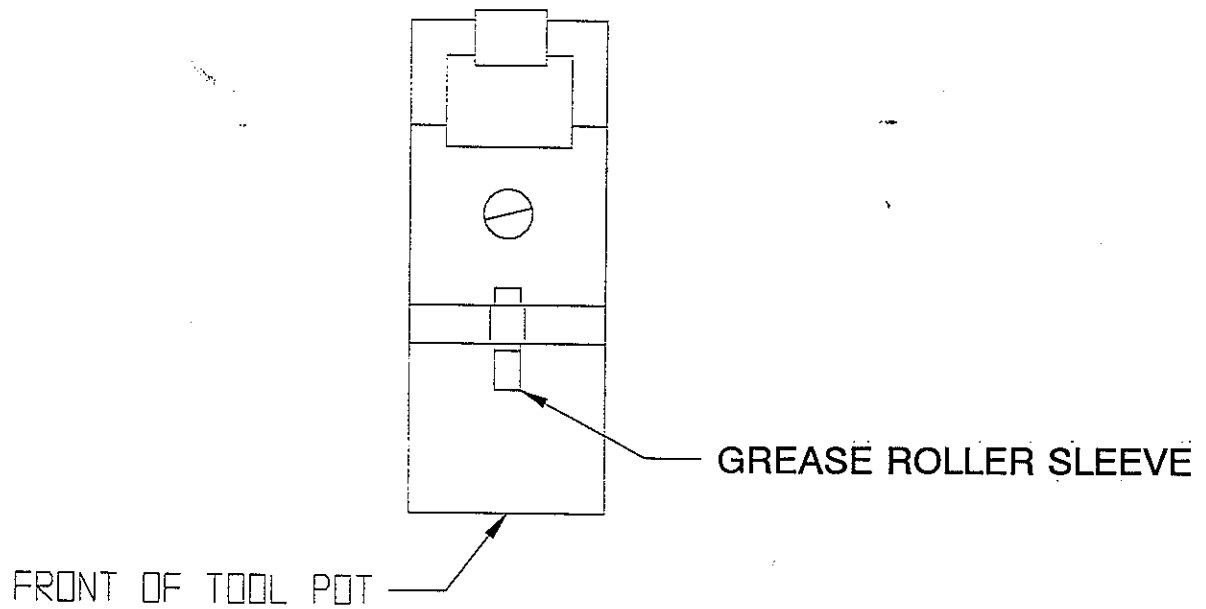
1. Visually inspect the entire machine tool. Look for broken or missing components. Check the axis slides for loose gibs and/or wear. Check that all safety equipment is in place and operating properly.
2. Cycle the machine via the CNC to confirm the proper operation of all features. Drive the three (3) axis slides to their extreme limits to verify the travel limit stops.
3. Load the tool changer with several tools in random pockets. Via the CNC, call up and command the tools to be exchanged, loaded and stored. Verify the operation of the pneumatic system, check the air pressure regulator setting, and check for proper retention of the tooling in the spindle.
4. Cycle the three (3) axis slides and check for excessive backlash in the ball nut/screw drive, loose ball screw bearing retainer nuts and improperly adjusted slide gibs. Recompensate via the CNC control only if the backlash cannot be mechanically adjusted to within the required limits of accuracy.
5. Check the spindle for run out and adjust the bearings if necessary. Inspect the spindle internal taper and drawbar for wear.
6. Inspect the axis and spindle drive motors and their mounting system. Inspect the spindle drive belt and replace it if there is excessive wear.
7. Service the automatic lube system and check the air over oil intensifiers for correct oil level. Verify the proper flow of oil to each of the lube points.
8. Service the flood coolant system. Check for proper solenoid valve operation and flow.
9. Check the tool holder drawbar hydraulic reservoir for correct oil level.
10. Inspect and lubricate the counter balance chain and rollers. Check for free movement of the counterbalance weight.

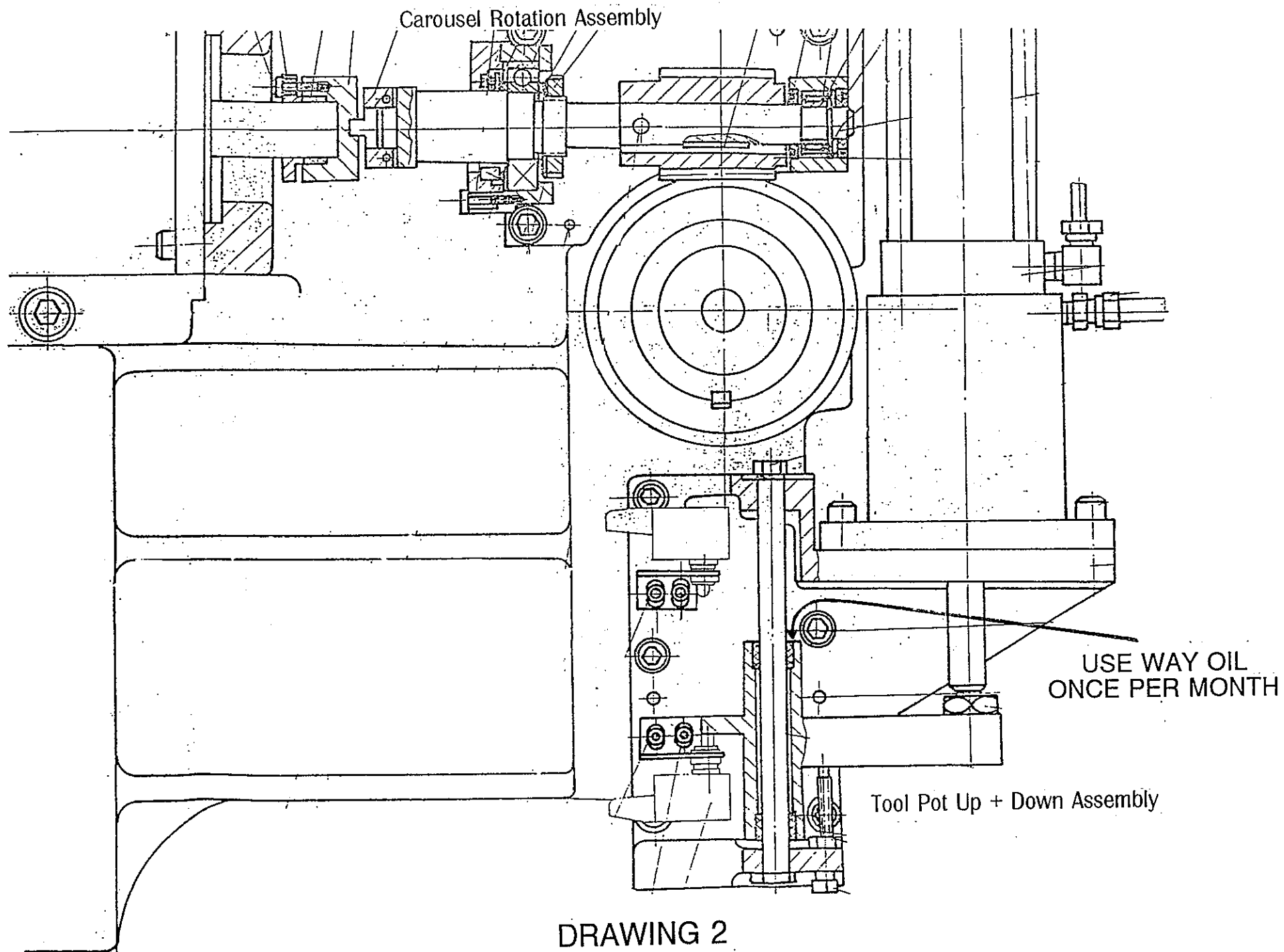
11. Grease the tool pocket rollers with Lubriplate gear grease. Rotate pockets to the tool change position and manually flip them down by depressing the manual override on the tool pot down solenoid. See Drawing 1 for grease points.
12. Oil the tool pot up and down slide bushing with way oil. See Drawing 2 for oil point.
13. Grease the tool changer arm racks, gears and pivot bushings with Lubriplate gear grease. See Drawings 3 and 4.
14. Oil the tool retention rollers and plunger on the tool change arm with way oil. See Drawing 5.
15. Oil the three (3) axis slides with way oil and grease the ball screws.
16. Visually inspect the three (3) axis slide ball screw bearings for lack of lubrication. Manually rotate the screws and check for proper operation. Adjust and grease the bearings as required.
17. Verify the "level" of the machine and check the anchor bolt nuts for required torque.
18. Visually inspect the contents of the two (2) electrical cabinets. Check plug-in relays for seating in sockets; look for signs of local overheating, and loose or broken wires or connectors; and clean the cooling fans.
19. Service the CNC control and check the +5, +15, -15, and +24 power supply voltages at the connector in the middle of the CPU board. Adjust the power supply if the following limits are exceeded: +5 @ ± 0.05 volts; +15 and +24 @ ± 0.1 volts.
20. Inspect the axis and spindle drive motors. Check the condition of tach couplings, brushes and commutator, and the general internal condition of the motor.

DRAWING 1

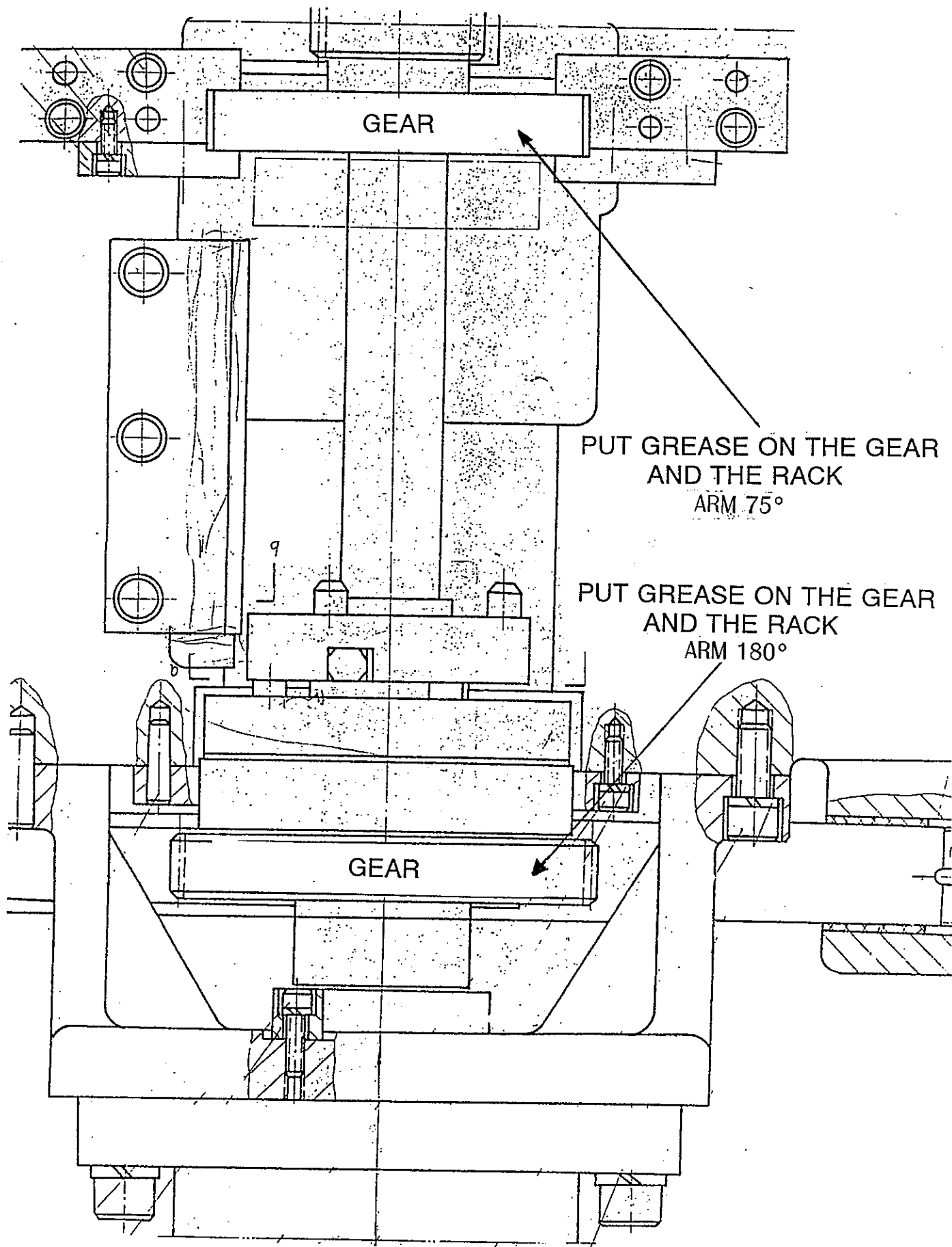


TOOL POT IN DOWN POSITION
AT CAROUSEL ORIENT

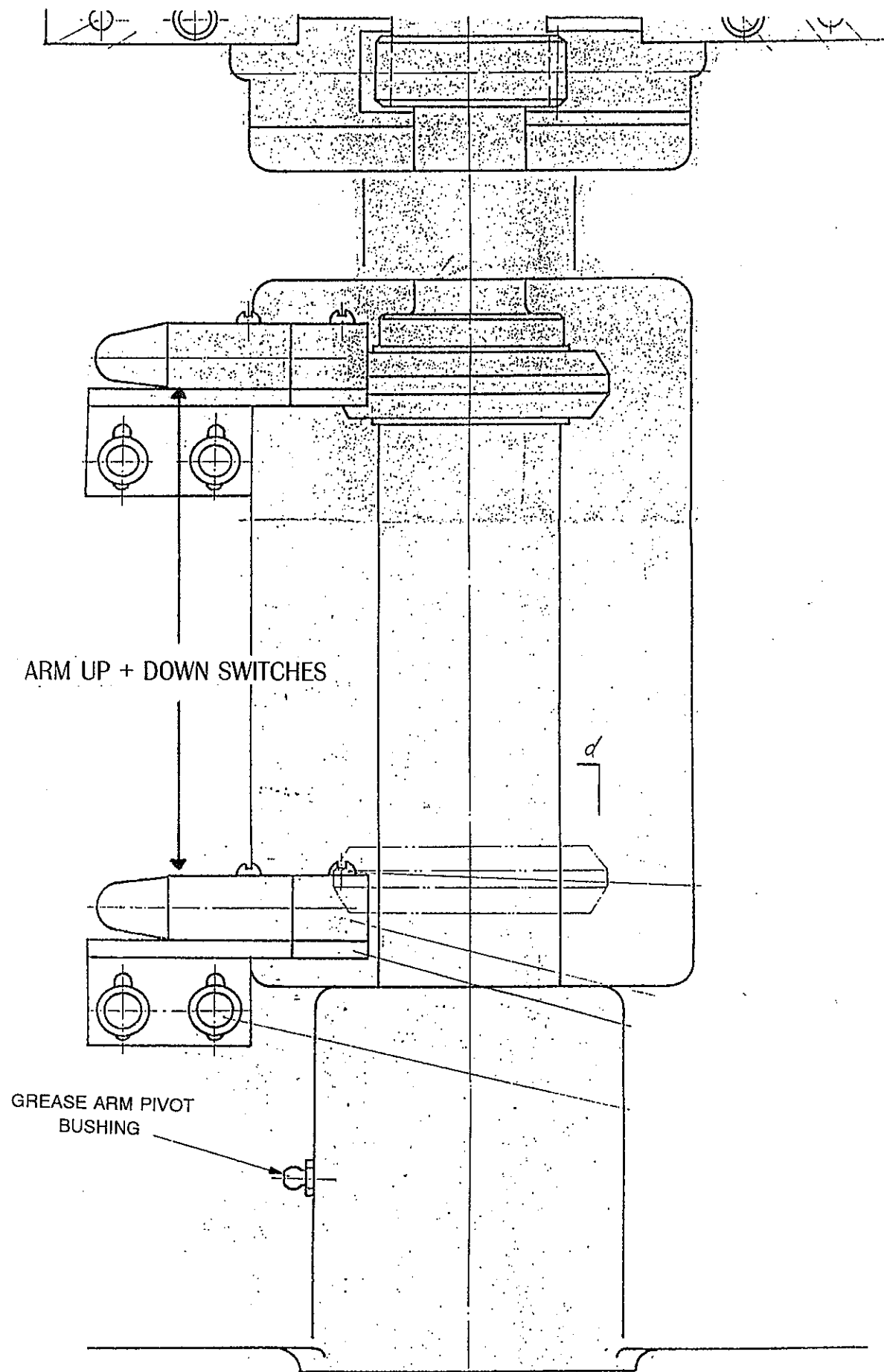




DRAWING 2

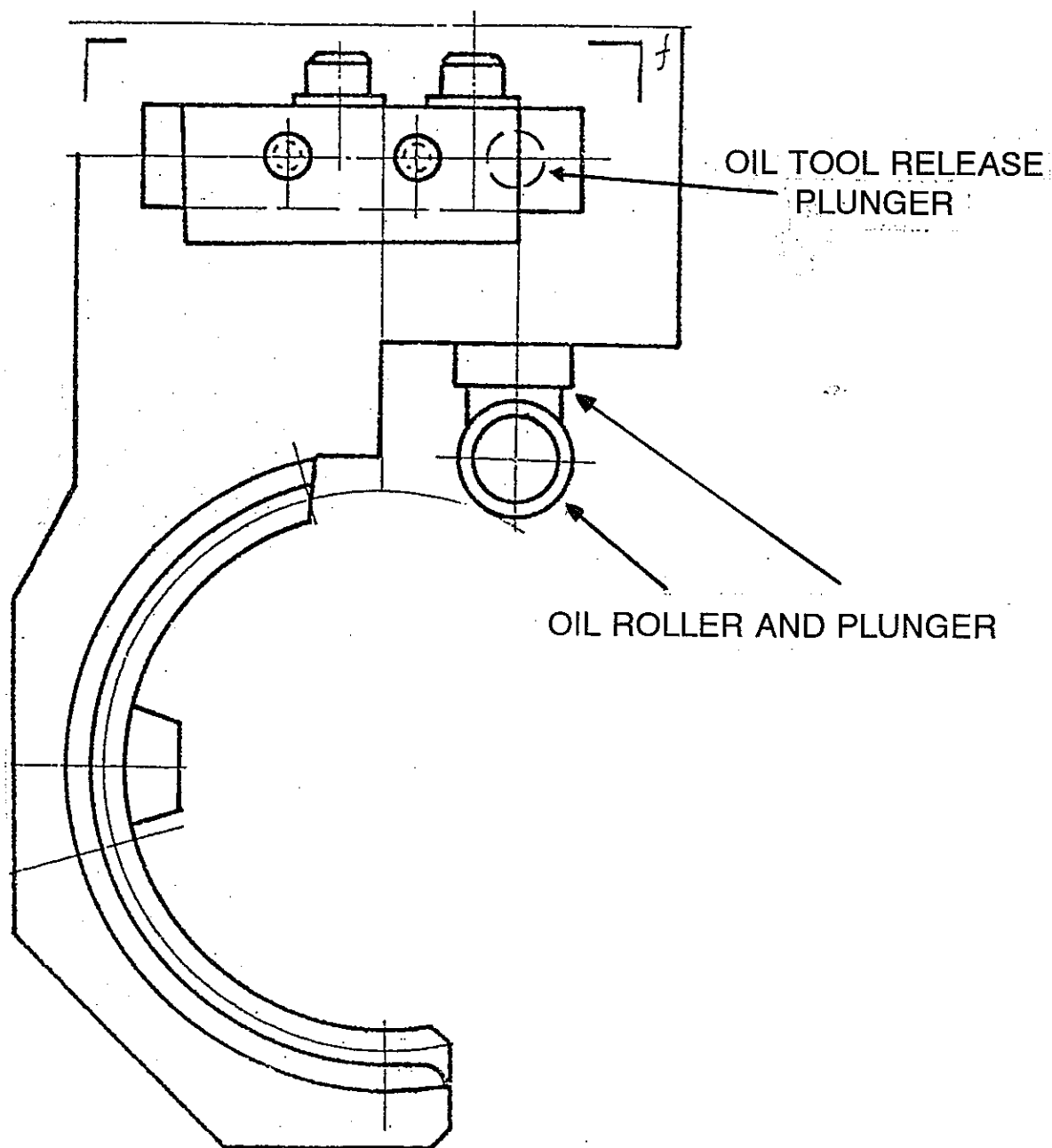


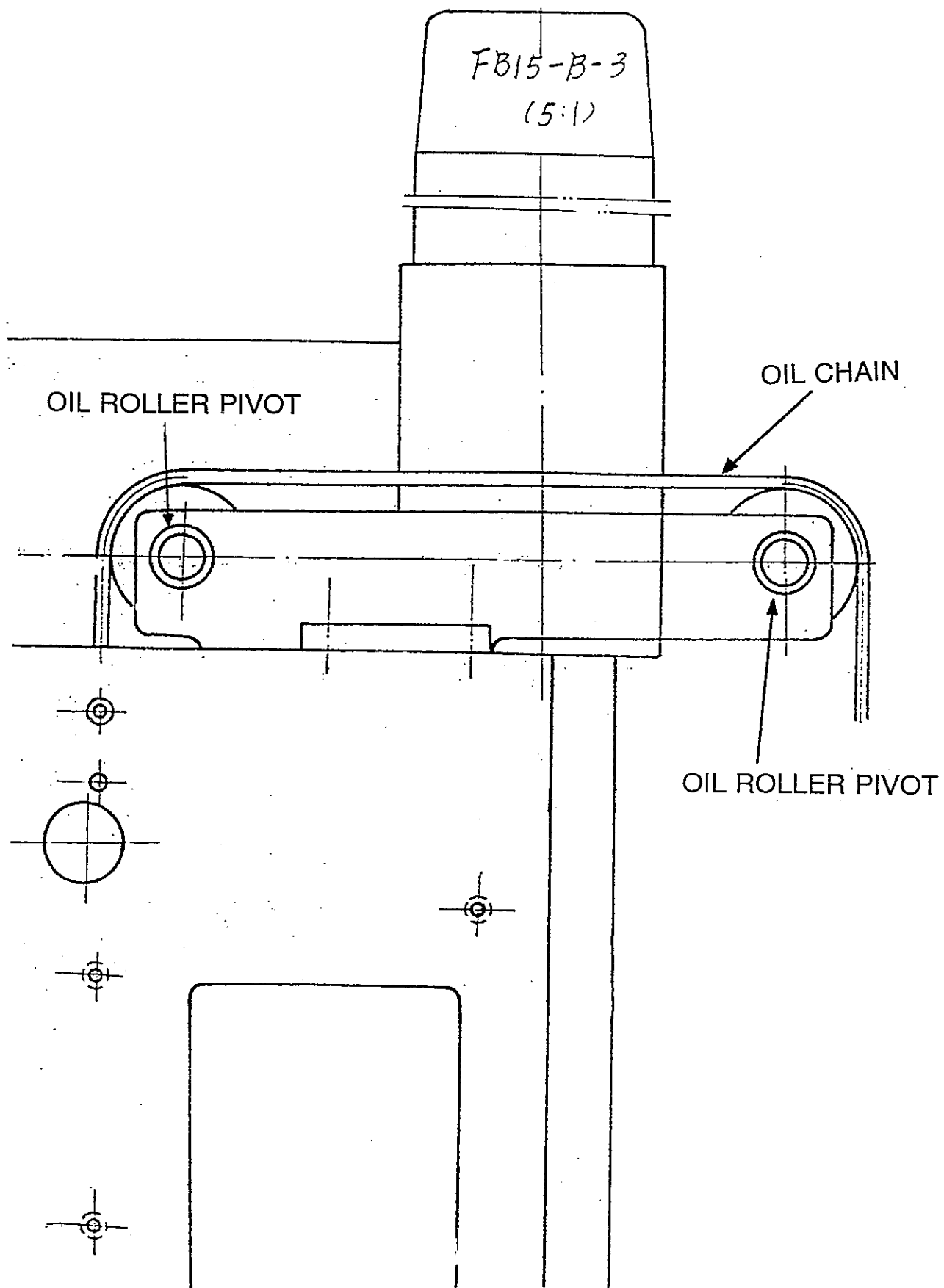
DRAWING 3



DRAWING 4

DRAWING 5





DRAWING 6

PARTNER 7

Step By Step to Re-Orient the Arm

1. With air ON and machine ON, fire the arm down. *Note: Make sure the arm is all the way down and not jammed in the rack of the 180° cylinder.*
2. Check 75° cylinder so that it is in the rod out position. Fire cylinder if necessary.
3. Remove air from the machine and bleed the system by pushing the power drawbar button repeatedly until all air is exhausted.
4. By hand, rotate the arm until it is in the start position (parallel to head).
5. Place a hydraulic jack under the center of the arm shaft and raise it out of the 180° cylinder and into the 75° cylinder. *Note: Make sure the arm shaft lines up with the 75° cylinder rack so that to not damage them.*
6. Fire the arm up cylinder.
7. Replace air to the machine (100 psi).
8. Remove the hydraulic jack and check the 180° cylinder so that it is in the start position (rod in).
9. Attempt a tool change. If not successful, call the factory for further assistance.

NOTE 1: For Centurion IV, air cylinders are fired by pushing a manual button on the appropriate solenoid.

NOTE 2: For Centurion V, air cylinders are fired through the CNC. The RESET button must be held down to fire a cylinder when air is removed.