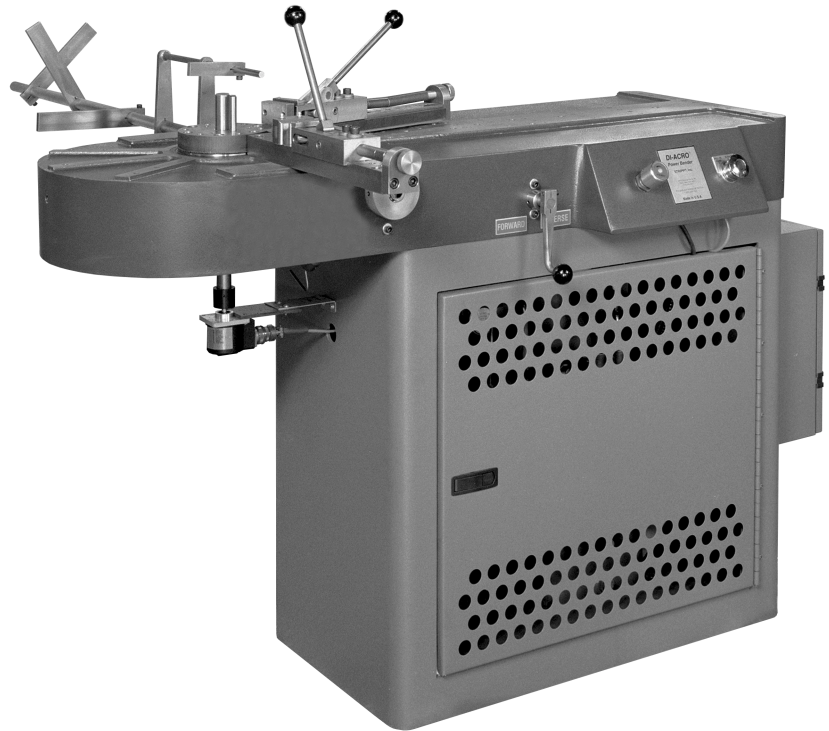


[®]
Di-Acro

OPERATOR'S MANUAL & INSTRUCTIONS

Number 6 & 8 Di-Acro Power Bender



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INTRODUCTION

This instruction manual serves two purposes:

1. It outlines essential information for installation, operation and maintenance of Power Benders No. 6 and 8.
2. It gives a complete parts breakdown identified by number, should replacements be required.

It is recommended that the operator become familiar with the bender's instructions and operating details. It is also recommended that the foreman or supervisor familiarize himself with the operating details of the machine to insure its continued efficient service.

The Di-Acro Power Benders are designed to accommodate two different types of tooling.

The No. 6 is designed to handle tubing to 1.125 inch diameter (.060 wall-mild steel) and round bars up to .563 inch diameter.

The No. 8 bender will handle round bar up to 1" in diameter and tubing to 1.500" diameter.

CAUTION

Always Read and understand this instruction manual before operating the No. 6 or No. 8 bender.

Always Make certain that other individuals are not in the working area of this machine before operating.

Always Keep fingers, hands, arms, elbows, head, feet or other parts of the body clear of swinging arm and out of tooling area while machine is in operation.

Always Make certain power is off when installing or changing tooling.

Always Make certain power is disconnected when servicing machine.

Never Allow untrained personnel to operate this machine.



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SECTION II CNC OPTION SPECIFICATIONS

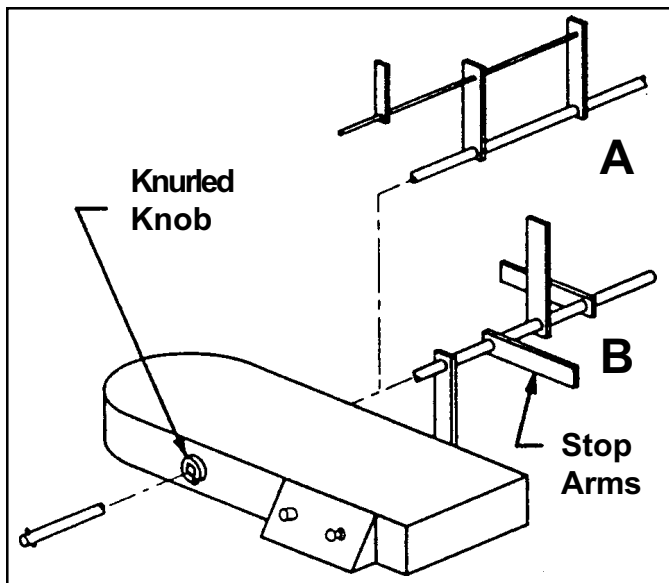
	No. 6 Tooling Head	No. 8 Tooling Head
Capacity (Material)	1-1/4" OD Tube (.060 wall mild steel)	1-1/2" OD Tube (.060 wall mild steel)
	3/4" IPS	1" IPS
	5/8" Round (solid mild steel)	1" Round (solid mild steel)
	1/4"x2" Flat (easy way)	3/8"x4" (easy way)
	1/4"x1" Flat (hard way)	3/8"x1" (hard way)
Radius Capacity	9"	24"
Degree of Bend	280°	360°
Hydraulic Pressure	1000 PSI	1000 PSI
Motor	3 HP	3 HP
Cylinder	4"	4"
Floor Space	18"x62"	18"x62"
Shipping Weight	1,150 lbs.	1,150 lbs.
Spindle Torque	3487 ft./lbs.	3487 ft./lbs.
Power Required	208, 230 or volt, 3 phase, 60 hz	

INSTALLATION

During shipment, the bender may have accumulated a coating of dust or grit. Remove all dirt and rust presentative with cleaning solvent.

WARNING: To prevent serious bodily injury fasten machine to floor through 4 holes (5/8" Dia.) provided in the base of machine.

When shipped the gauge is removed for packing purposes. Install one of the two gauge groups as illustrated below.



NOTE: Install gauge group "A" for short or single length bends. Install group "B" for longer, or multiple length bends.

NOTE: It is suggested that all four stop arms be placed at right angles to each other even if only one or two so that the knurled knob can be easily turned into position the stops.

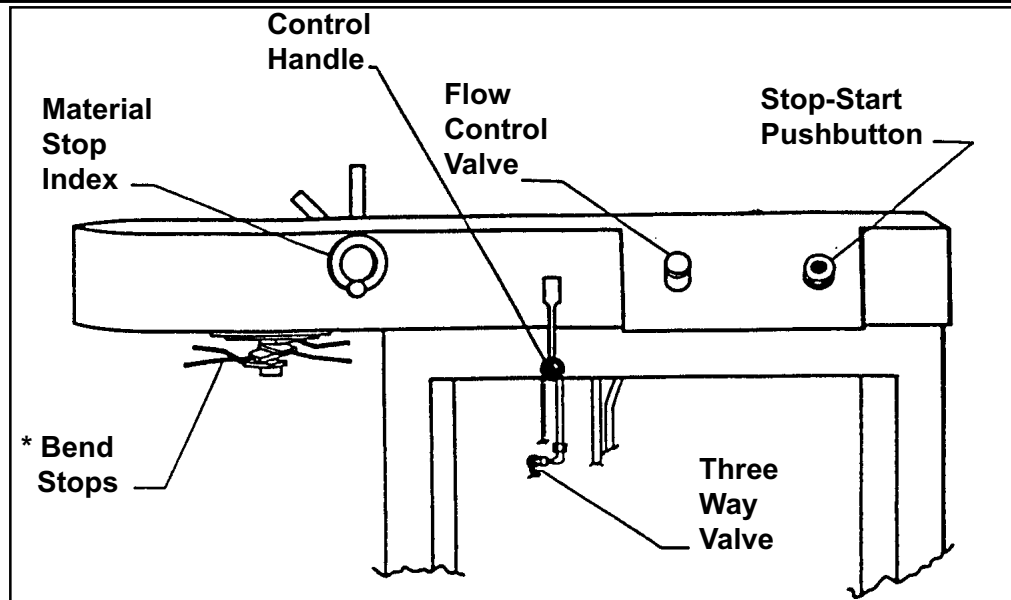
Connect electrically to a three phase input power supply making certain the transformer and motor are connected properly for power being supplied (208, 230, or 460).

Pull "START" push-button and check pump rotation. Proper rotation is shown by the directional arrow on shroud located at the top of the motor. To change pump rotation, interchange two supply lines.

Check pump reservoir and fill to the proper level in the sight gauge.

LUBRICATION

Fill pump with anti-wear hydraulic oil such as Mobil DTE-26 or equivalent. A viscosity between 120 and 250 SUS should be maintained. If this is not available, automotive oil SAE 20-20W, type SC, SD, SE is an acceptable substitute when there is little or no water contamination. Detergent dispersant additives in these oils hold water in a tight emulsion and prevent separation of water, even after long standing periods. A minimum of lubrication is required on the No. 6 and No. 8 benders. A single grease fitting on the rack cam requires lubrication every 500 hours of operation or every three months. The same schedule applies to the miscellaneous linkages on the control and gauges. Use NLGI No. 2 grease on the grease fittings, and a No. 30 machine oil on the linkages.



* May be replaced with optional Control-A-Bend (CNC) control

Start-Stop Push-button

Pulling button starts pump motor and lights lamp. Pushing button stops motor and extinguishes lamp.

Control Handle

Moving the handle to the left or right operates a valve, directing oil to the bending cylinder. The angle of bend stop, returns handle to the neutral position. The handle may also be returned to neutral manually.

NOTE: Holding the handle in the offset position enables operator to by pass angle of bend stops. To make use of a bend stop which is third in sequence, operator must hold control handle in offset position until the first two stops are bypassed. Immediately after bypassing the second bend stop, operator should release the control handle leaving it at its detent position. The third bend stop will then return the handle to its neutral position.

CAUTION: When angle bends are not to be bypassed, move handle to detent position and release.

Direction of bend rotation is indicated by "FORWARD-REVERSE" legend plates. These plates may be reversed if clockwise bending is desired.

NOTE: the Di-Acro No. 6 and No. 8 benders are set up to bend in the counter-clockwise direction when shipped. The bending direction can be reversed, but a decrease in machine load capacity will result. Therefore it is not recommended that the bending direction be reversed unless absolutely necessary, see page 6 for No. 6 bender, page 7 for No. 8 bender.

Flow Control Valve

This valve controls bending speed by bleeding a portion of the pump fluid volume to its holding tank. Operating speed can be controlled in bending direction only as return to starting position is always at full speed. To change bending speed control to other direction, see three way valve.

Pressure Gauge

Indicates the pressure used while bending. To check the maximum set system pressure, hold the control handle until bending spindle reaches the end of travel. Continue holding the handle, the Relief valve will indicate system pressure. If no pressure is indicated, see 3-way valve. To adjust system pressure, see Relief valve.

Three Way Valve

This push-pull valve allows the flow control valve to regulate the bending speed either clockwise or counter-clockwise direction:

1. To control bending speed in clockwise direction, push on valve handle.
2. To control bending speed in counter-clockwise direction, pull on valve handle.

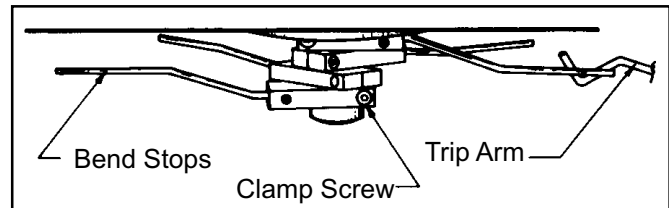
NOTE: If bending speed is adjustable when traveling in return direction instead of bending direction or if pressure gauge indicates no pressure during bending cycle, but shows pressure during return, change position of three-way valve.

Relief Valve

The relief valve, located at the back of the pump is used to limit system pressure. System pressure is usually set at 1,200 PSI but can be set up to 1,500 PSI. To check pressure, see Pressure gauge. To adjust pressure, loosen lock nut and turn screw in to increase pressure, out to decrease pressure.

Bend Stops (qty of four)

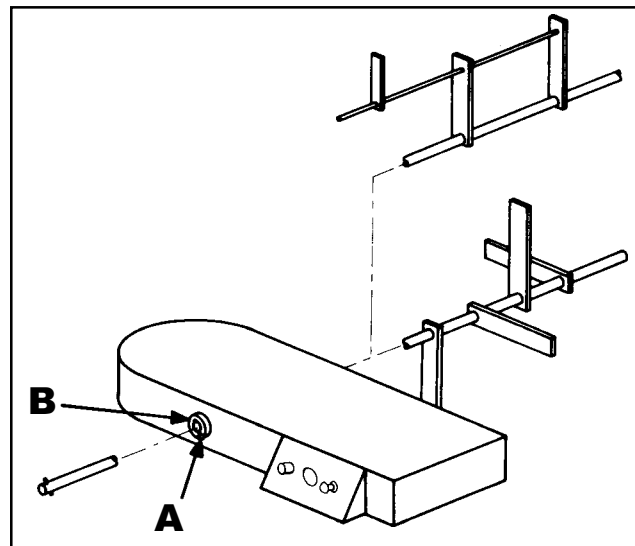
These stops are used to achieve a desired angle of bend and are located as shown in the following diagram.



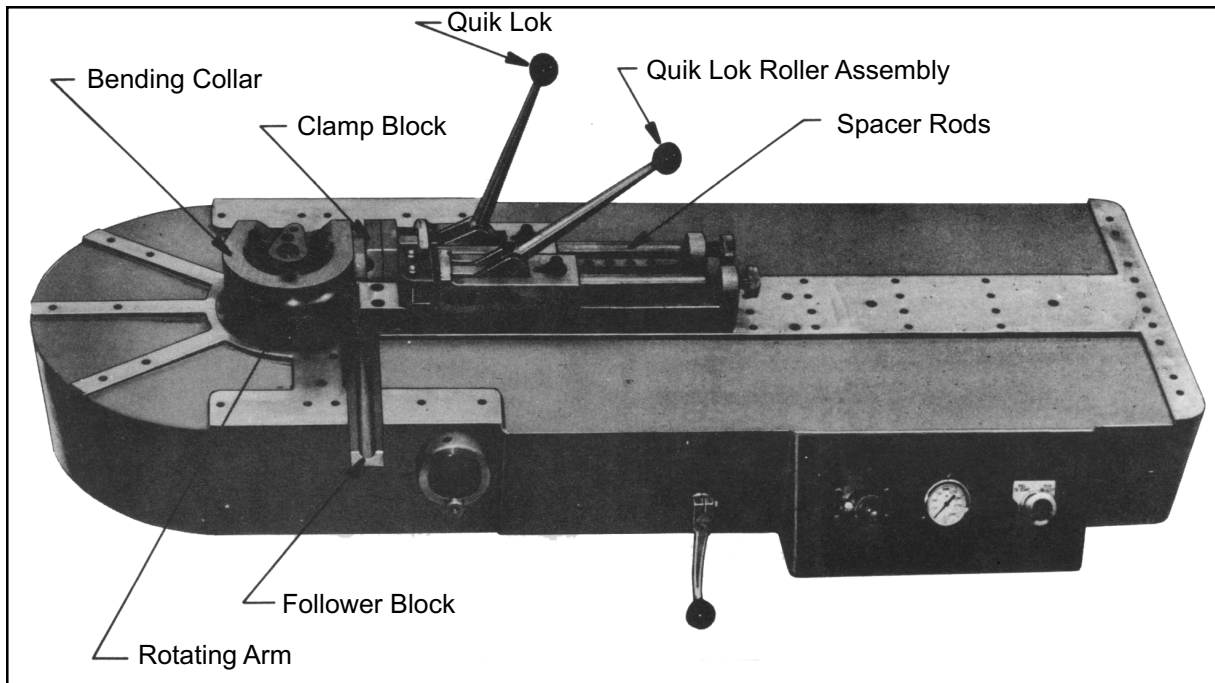
To set stops, loosen clamp screw and adjust stops to activate trip arm when desired angle is achieved. In order to make a bend beyond a stop, it is necessary to hold the control handle until that bend stop bypasses the trip arm.

Material Stops Index (qty of 4)

These stops are used to gauge leg length of a part so that duplicate parts can be formed. (To adjust, loosen the socket head cap screw which clamps the stop to the stop rod, and slide stop to desired position. Retighten screw.)



To set more than one stop, pull knob "A" and rotate index knob "B" 90°. Pin connected to Knob "A" will locate stop rod in place. Adjust another stop to a desired length.



Set Up No. 6 Bender

NOTE: This example set up is of forming in the counter-clockwise direction.

The following is a step by step procedure for installing a #6 tooling head.

When you first receive your machine and tooling head, make sure you have all the proper parts and quantity parts. Refer to pages 19 and 20 for #6 tooling head components.

1. Turn power on. Make sure that the rack assembly is fully retracted into the cylinder. Once in position, turn power off.
2. Place rotating arm assembly on machine top as shown on this page.
3. Place slide bar adjacent to the rotating arm.
4. Insert the 3/8" socket head cap screws into the holes on the slide and loosely thread them into the table top.
5. Insert the three 1/2" diameter dowels into the holes of the slide bar so they are flush at the top. At this point tighten the 3/8" screws and secure the bar.

6. Turn power on and with rotating arm in place over pinion assembly, slowly engage the control handle so that the pinion assembly rotates in a counter-clockwise direction. Rotate pinion assembly until threaded holes line up with clearance holes on the rotating arm. Once the holes are aligned, turn power off, insert and tighten the six 7/16" socket head cap screws.

7. Insert the holding pin and 1/2" radius pin into their proper positions on the rotating arm.

8. Install the proper bending collar.

9. Attach the proper clamp block to the hanger assembly.

10. Adjust quik-lok slide that controls the clamp block.

- A. Bolt to the rotating arm at position where material can be held firmly between bending collar and clamp block.

- B. Add spacer rods as necessary to assure firm pressure between clamp block and bending collar.

11. Adjust quik-lok slide that controls follow block (excessive pressure not necessary).

12. Clamp material with clamp block.

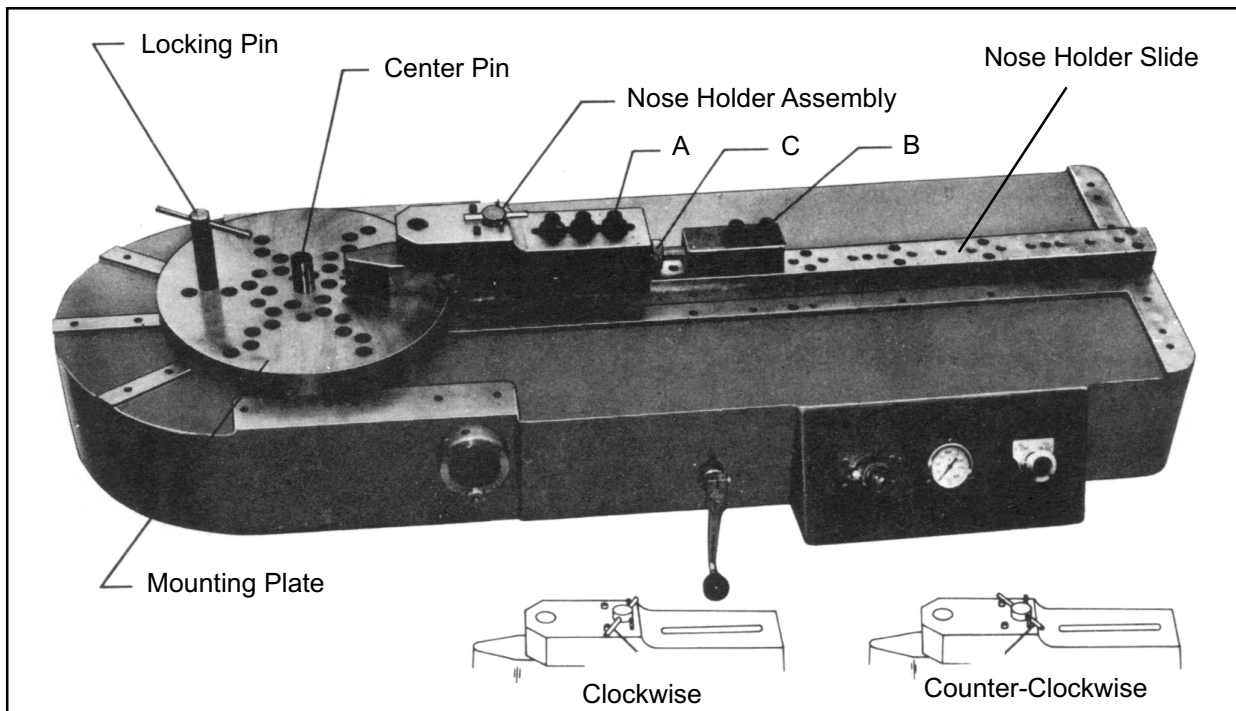
13. Clamp material with follow block.
14. Pull power.
15. Actuate control lever to forward position and test bend part.

NOTE: After desired angle has been achieved, bend stops and material stops indexes can be adjusted in order to duplicate parts. Adjust these gauging systems as described previously in this manual.

To Set Up For Clockwise Bending

1. Remove quik-lok that controls clamp block from rotating arm.

2. Remove quik-lok that controls follow block.
3. Remove rotating arm and slide.
4. Remove and flip over screw support on the end of the rotating arm.
5. Turn power on and fully extend cylinder.
6. Turn power off.
7. Push three-way valve in.
8. Repeat steps 8 through 15 in set up for counter-clockwise bending.



Set Up No. 8 Bender

NOTE: This example is of forming in the counter-clockwise direction.

When you first receive your machine and tooling head, make sure you have all the proper parts and quantity of parts. Refer to pages 23 & 24 for #8 tooling head components.

1. Turn power on. Make sure that the rack assembly is retracted fully into the cylinder. Once in position turn power off.
2. Place mounting plate on machine top as shown on this page.
3. Place nose holder slide on machine so that machine dowel and screw holes are aligned.

4. Locate 3/8" socket head cap screws and insert through the slide and loosely thread them into the table top.
 5. Insert the four 1/2" diameter dowels into the holes of the slide bar so they are flush at the top. Tighten the 3/8" screws and secure the bar.
 6. Place the nose holder assembly on slide. **Do not** bolt down at this time.
 7. Insert desired center pin or radius collar.
 8. At this time you need to determine the proper location of the locking pin. Place a sample piece of the material to radius collar. Insert the locking pin into the mounting plate so that the material will be held in position when turning the locking pin in a counter-clockwise rotation.
 9. The mounting plate should be located so that the locking pin will be adjacent to the forming nose on the side opposite the instrument panel when the cylinder rod is all the way back in the cylinder. Turn power on and with mounting plate in place over pinion assembly slowly engage the control handle so that the pinion assembly rotates in a counter clockwise direction. Rotate pinion assembly until threaded hole line up with holes in the mounting plate. Insert the six 7/16" screws in the mounting plate and tighten.
- When it becomes necessary to change position of mounting plate, remove the six mounting screws in the top of the plate, which mount it to the spur pinion gear. Position mounting plate in desired position and replace screws.
10. Rotate locking pin in a counter-clockwise direction and lock material against center pin.
 11. Adjust nose holder assembly
 - a. Tighten bolts "B" securely
 - b. Finger tighten bolts "A"
 - c. Adjust nose holder support screw "C" until nose comes in contact with material.
 - d. Tighten bolts "A" securely.
 12. Pull power pushbutton.
 13. Pull control lever to forward position and test bend part.
- NOTE:** After desired angle has been achieved, bend stops and material stop indexes can be adjusted in order to duplicate parts. Adjust these gauging systems as described previously in this manual.
- ### To Set Up For Clockwise Bending
1. Change position of pin "P" to position shown on page 7.
 2. Push three-way valve in.
- Bend control is now in clockwise direction.
- * Required bending pressure can be reduced by backing off nose holder.

TABLE ASSEMBLY

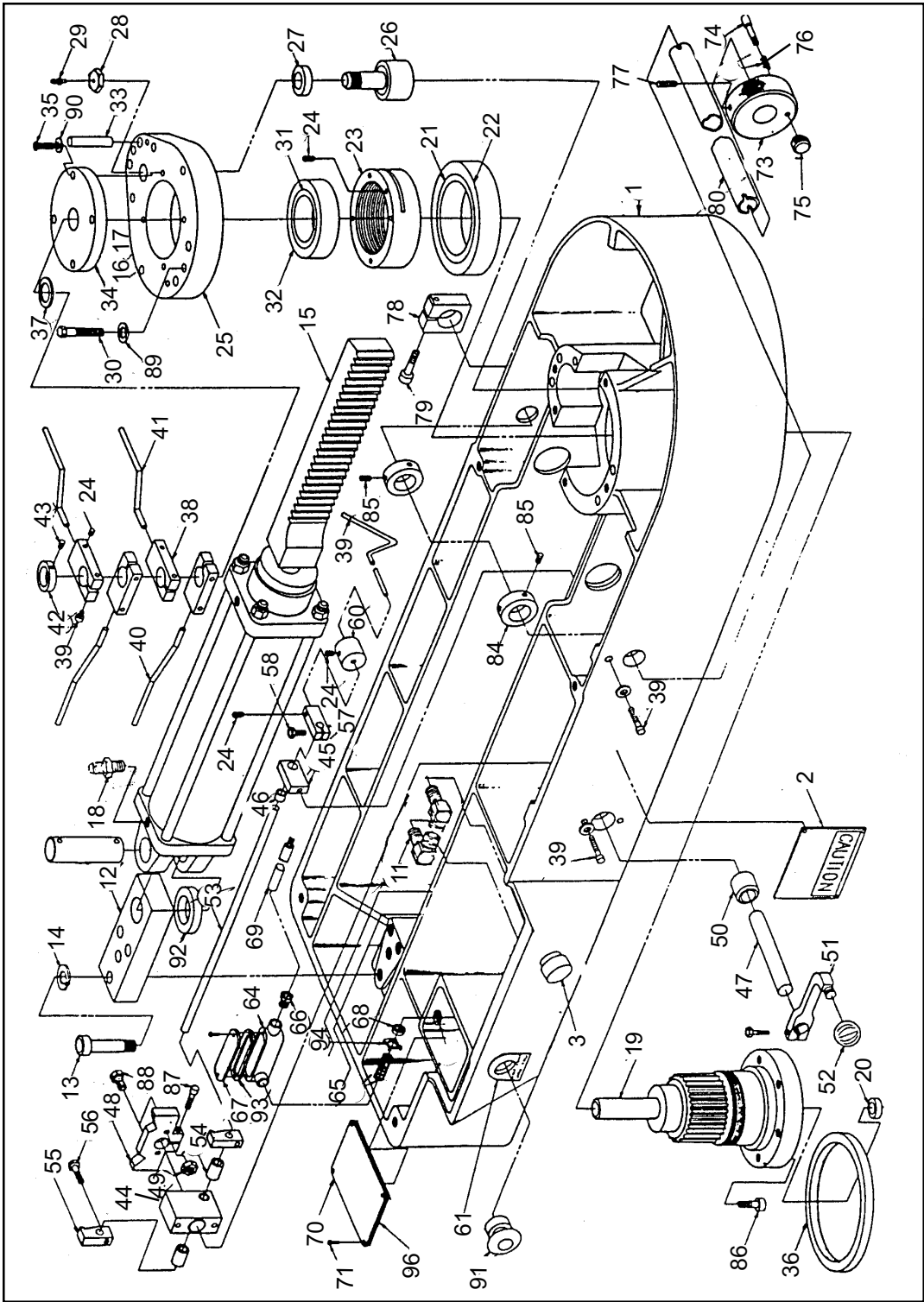


TABLE ASSEMBLY

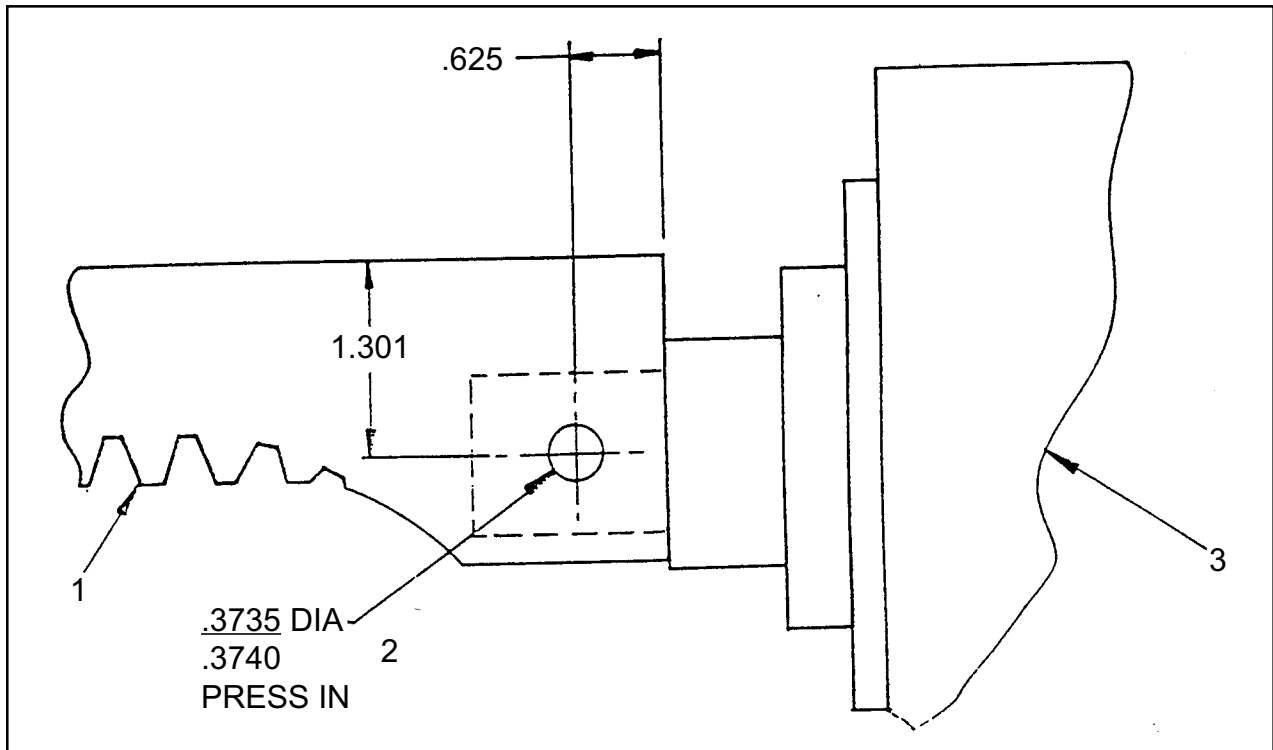
ITEM #	PART NO.	DESCRIPTION	QTY
1	8150110-505	TABLE	1
2	8156650-300	DANGER SIGN	2
3	1000341-000	FLOW CONTROL VALVE	1
11	800780-000	90 DEGREE ADAPTER	2
12	8991111-000	CYLINDER MOUNT	1
13	20A0508C2104	SCREW	4
14	62X0508	WASHER	4
15	8150371-170	CYLINDER ASSEMBLY	1
16	120464-000	SHIM	1
17	120465-000	SHIM	1
18	1000305-000	STR. ADAPTER	2
19	8150390-108	PINION ASSEMBLY	1
20	8150120-308	LOCATING BUSHING	1
21	8310100-300	CONE	1
22	8310100-400	CUP	1
23	8150470-509	LOCK RING	1
24	23A0104C0308	SCREW	7
25	8000110-608	GEAR CASE COVER	1
26	8310301-100	CAM FOLLOWER	1
27	8150110-808	CAM FOLLOWER SPACER	1
28	8150470-400	NUT	1
29	8690100-200	GREASE FITTING	1
30	21A0308C2000	SCREW	6
31	8310100-100	CONE	1
32	8310100-200	CUP	1
33	19A0102X2104	PIN	4
34	8150111-008	TAKE-UP CUP	1
35	20B0516C0708	SCREW	4
36	8371005-600	OIL SEAL	1
37	8310710-700	THRUST BEARING	1
38	8200130-108	TRIP CLAMP	4
39	20A0516C1104	SCREW	5
40	8000130-108	TRIP ARM	2
41	8100130-108	TRIP ARM	2
42	8300130-108	COLLAR	1
43	23A0104C0104	SCREW	1
44	8000130-170	CONTROL BLOCK ASSEMBLY	1
45	8300130-100	BEARING MOUNT	1
46	8310410-800	BEARING	1
47	8700130-109	CONTROL SHAFT	1
48	8920130-109	CAM	1
50	8800130-109	COLLAR	1



TABLE ASSEMBLY

ITEM#	PART NO.	DESCRIPTION	QTY
51	8150130-109	CONTROL HANDLE	1
52	8120810-600	KNOB	1
53	8200130-100	CONTROL ROD	1
54	8150130-108	SPACER	2
55	8100130-100	TRIP DOG	2
56	21A0516C0304	SCREW	2
57	8151130-106	TRIP ARM CLAMP	1
58	21A0104F1000	SCREW	1
59	8100130-106	TRIP ARM	1
60	8200130-106	WEIGHT	1
61	8650312-100	LEGEND PLATE	1
64	8331510-500	ELECTROLET OL-1	1
65	8370519-400	NIPPLE	1
66	24349-000	STR CONDUIT CONN	1
67	8315043-000	COVER	1
68	8331507-300	BUSHING	1
69	22291-000	WIRE	22.5 FT
70	8150110-905	COVER	1
71	22AX10F0104	SCREW	4
73	8150120-805	INDEX KNOB	1
74	8151120-307	PIN	1
75	8200120-307	KNOB	1
76	8151510-206	SPRING	1
77	20A0104F1000	SCREW	2
78	8150130-400	CLAMP	1
79	18151-000	SCREW	1
80	8151142-007	STOP ROD SUPPORT	1
84	8300142-007	STOP ROD SUPPORT	2
85	23A0516C0104	SCREW	4
86	20A0516C1102	SCREW	6
87	20A0516C1104	SCREW	1
88	21A0516C1000	BOLT	1
89	62X0308	WASHER	6
90	62X0516	WASHER	4
91	8330304-000	PUSH BUTTON SWITCH	1
92	8150110-800	SPACER	2
93	8315155-000	GASKET	1
94	11577-000	NUT LOCK ELEC.	1
95	8315101-000	SEAL RING	1
96	13396-000	GASKET	1
97	8370505-800	BUSHING	3

4 INCH CYLINDER ASSEMBLY

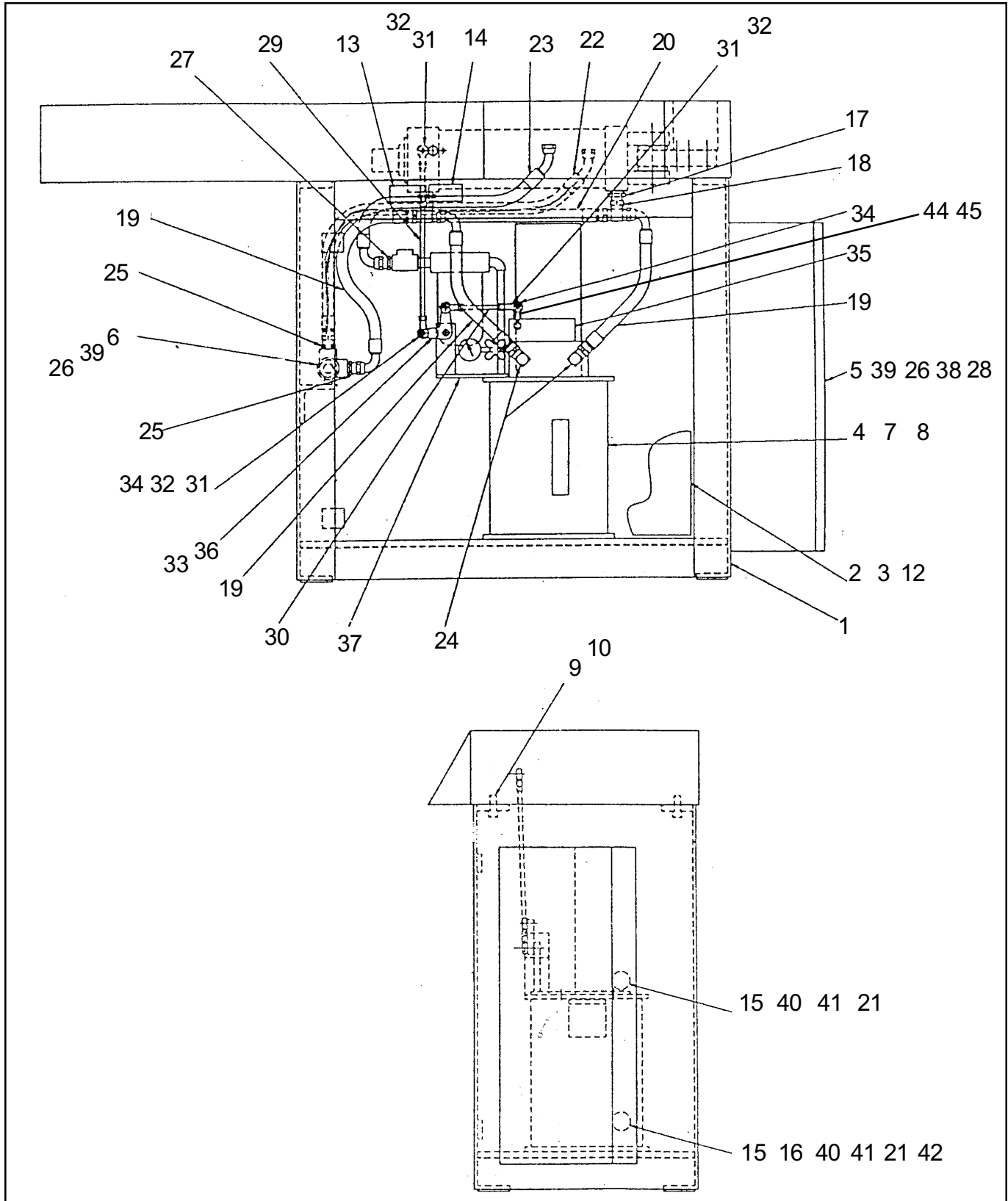


ITEM #	PART NO.	DESCRIPTION	QTY
1	8150121-607	RACK	1
2	19A0308X2000	PIN	1
3	8150371-100	CYLINDER	1

Seal kit P/N 803309-000 (not shown)

NOTE: When ordering itm #1-Rack Drill 3/8" dia. hole in rack and align hole with hole in piston rod.

BASE ASSEMBLY



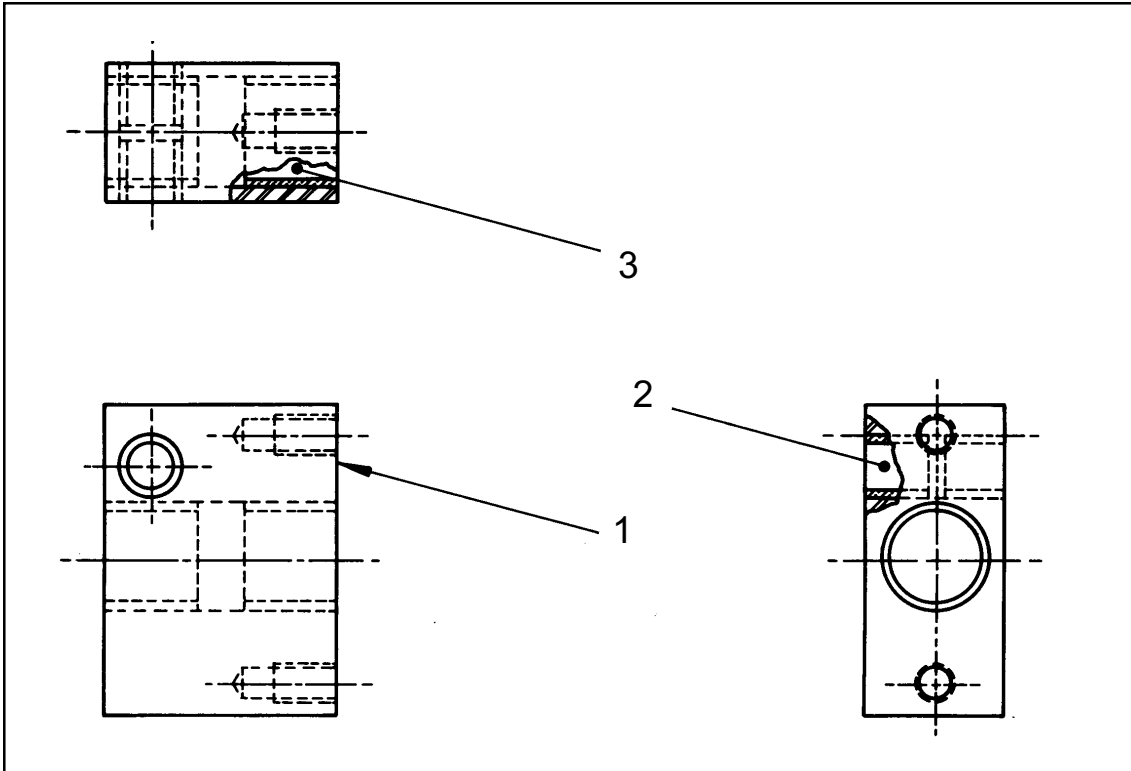


BASE ASSEMBLY

BASE ASSEMBLY

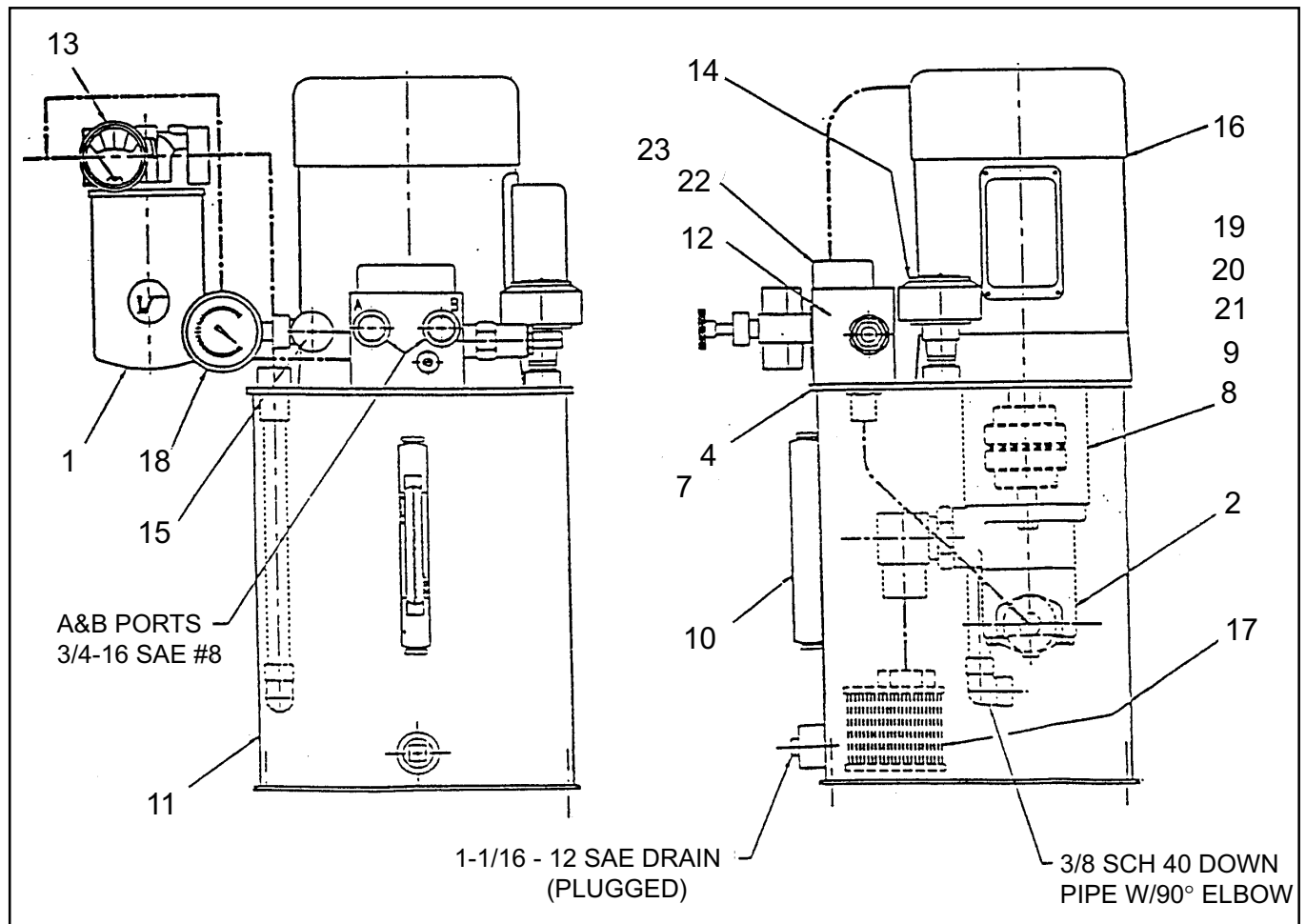
ITEM#	PART NO.	DESCRIPTION	QTY
1	121871-000	BASE ASSY	1
2	121871-200	DOOR	1
3	803343-000	LATCH	1
4	1000307-000	HYDRAULIC POWER SUPPLY	1
5	8300330-770	ENCLOSURE ASSY	1
6	8370310-370	SLECTOR VALVE	1
7	20A0308C0304	SCREW	4
8	62X0308	WASHER	4
9	20A0102C1104	SCREW	4
10	62X0102	WASHER	4
11	35X0516C	NUT	1
12	122070-000	NAME PLATE	1
13	8150650-310	FORWARD PLATE	1
14	8000650-310	REVERSE PLATE	1
15	24349-000	STR CONDUIT CONNECTOR	3
16	14806-000	WIRE	12FT
17	1000305-000	STR ADAPTER AEROQUIP	1
18	1000306-000	TEE-ADAPTER AEROQUIP	2
19	121864-000	HOSE ASSY	3
20	121865-000	HOSE ASSY	1
21	63X0304C0102	WASHER	2
22	121867-000	HOSE ASSY	1
23	121868-000	HOSE ASSY	1
24	800780-000	ELBOW	2
25	800720-000	ADAPTER	3
26	62X0516	WASHER	5
27	800265-000	CONDUIT BODY	1
28	16442-000	HOLE SEAL OIL TIGHT	1
29	121901-000	CONTROL ROD-LONG	1
30	121902-000	CONTROL ROD-SHORT	1
31	1000342-000	ROD END	4
32	31X0516C	NUT	4
33	25X01020102	SHOULDER BOLT	1
34	25X05160102	SHOULDER BOLT	3
35	1000357-000	DIRECTIONAL VALVE	1
36	121899-000	BELL CRANK	1
37	121900-000	BELL CRANK MTG. PLATE	1
38	61X0516	WASHER	3
39	20A0516C0304	SCREW	5
40	24350-000	CONDUIT CONNECTOR	1
41	24346-000	CONDUIT	4FT
42	8332001-200	TERMINAL	12
43	16367-000	HYDRAULIC OIL DTE	3GAL
44	1000357-100	HEX SHAFT	1
45	8120317-600	HEX SHAFT PIN	2

CONTROL BLOCK ASSEMBLY



ITEM #	PART NO.	DESCRIPTION	QTY
1	8910130-109	CONTROL SHAFT BRACKET	1
2	8310410-800	BEARING	2
3	8310411-100	BEARING	2

POWER PACK ASSEMBLY



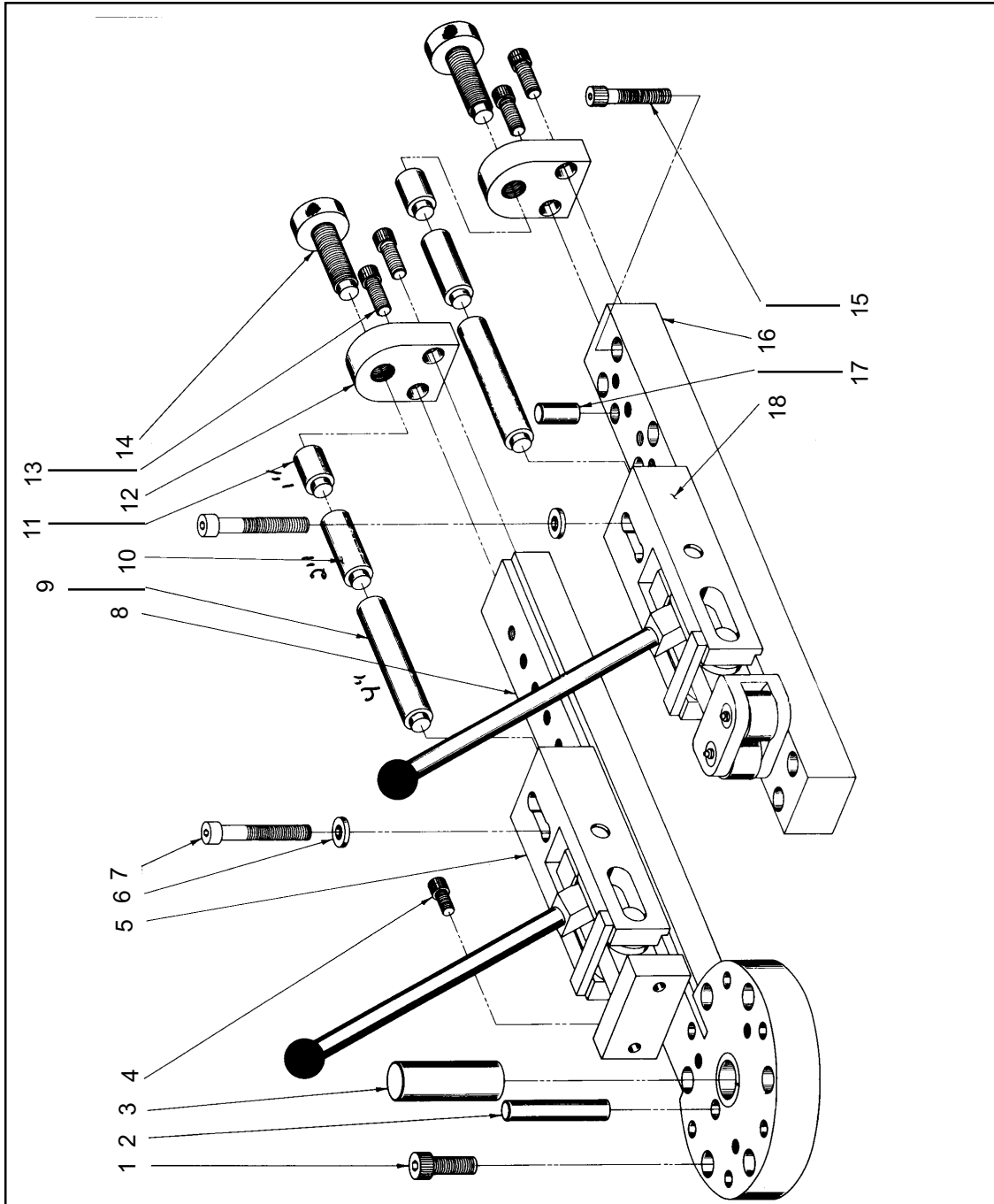


POWER PACK ASSEMBLY

POWER PACK ASSEMBLY

ITEM #	PART NO.	DESCRIPTION	QTY
1	1000375-000	RETURN FILTER	1
2	1000417-000	VICKERS PUMP	1
4	1000418-000	COVER ASSY	1
7	1000419-000	GASKET FOR RESERVOIR	1
8	1000420-000	COUPLING COVER	2
9	1000421-000	GASKET FOR 40-03498-02	2
10	1000422-000	THERMOMETER GAUGE	1
11	1000423-000	T3V RESERVOIR	1
12	1000373-000	MANIFOLD BLOCK	1
13	1000424-000	GAUGE STEM MOUNTED	1
14	1000425-000	BREATHER AIR VENT	1
15	1000426-000	NEEDLE VALVE	1
16	1000427-000	ELECTRIC MOTOR	1
17	1000428-000	SUCTION STRAINER	1
18	1000374-000	GAUGE 0-2000 PSI LIQUID	1
19	1000429-000	COUPLING	1
20	1000430-000	COUPLING	1
21	1000431-000	COUPLING	1
22	1000357-000	DIRECTIONAL CONTROL VALVE	1
23	20AX10C2000	SCREW	4

NO. 6 TOOLING HEAD



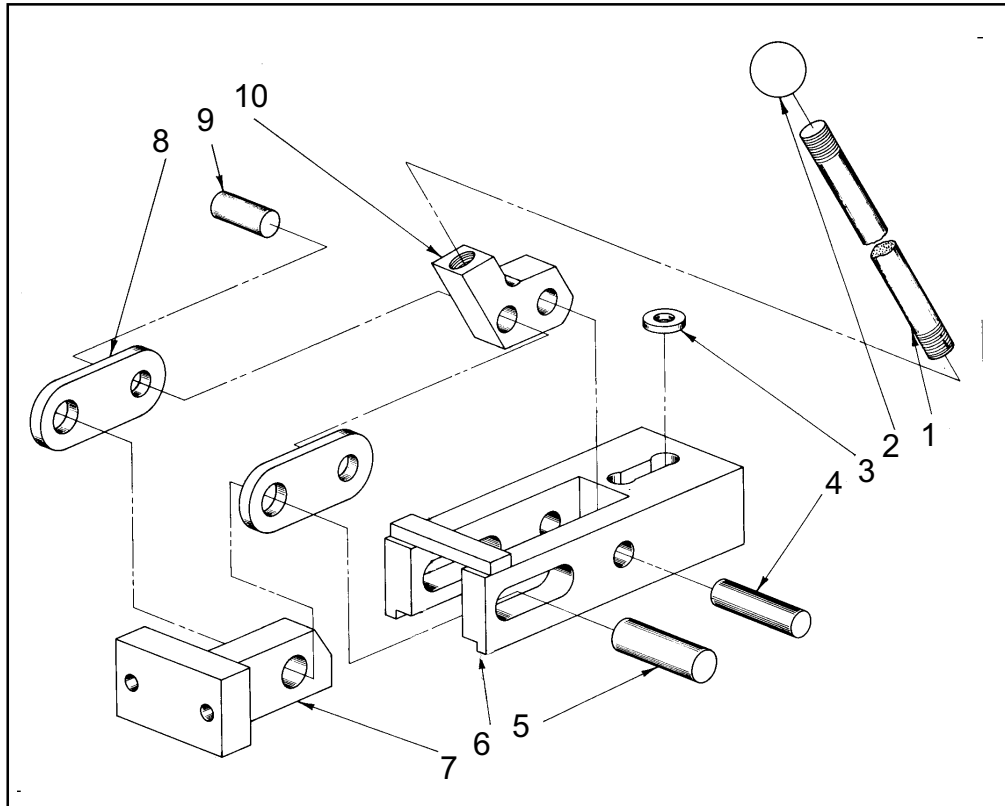


NO. 6 TOOLING HEAD ASSEMBLY

NO. 6 TOOLING HEAD

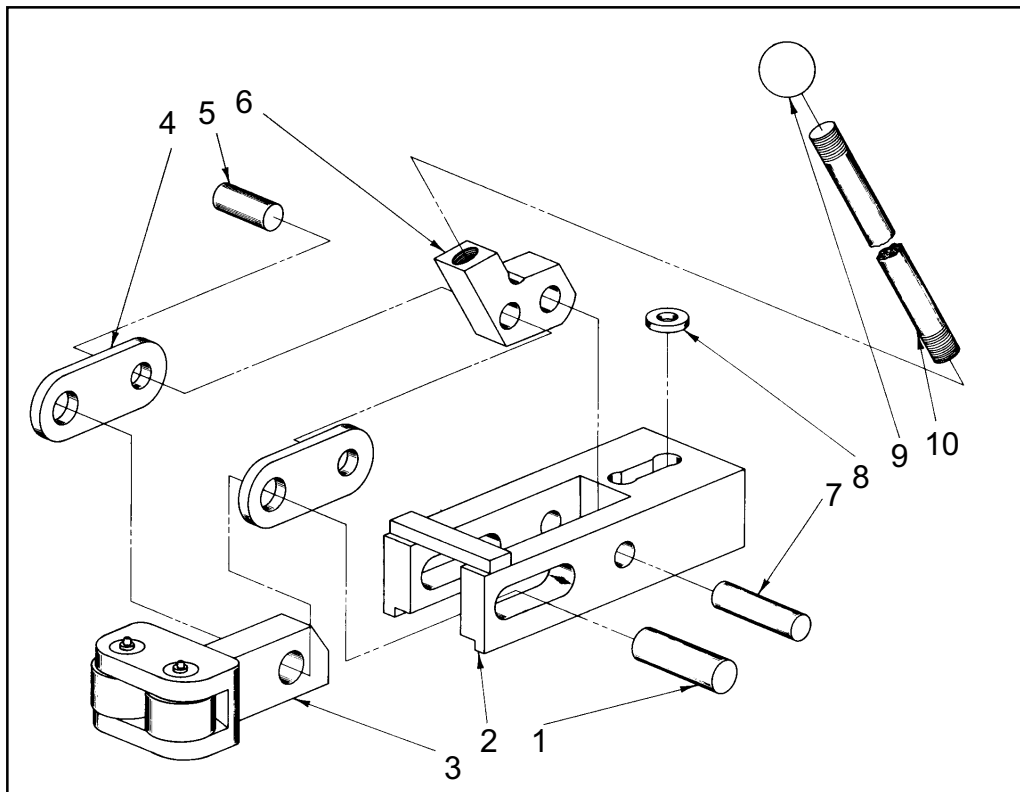
ITEM#	PART NO.	DESCRIPTION	QTY
1	20A0716C1104	SCREW	6
2	8156120-302	HOLDING PIN	1
3	8130016-970	RADIUS PIN	1
4	20A0516C0508	SCREW	2
5	8156111-371	HANGER ASSY	1
6	61X0308C1332	WASHER	4
7	20A0308C2102	SCREW	4
8	8200111-371	ROTATING ARM ASSEMBLY	1
9	8400111-301	SPACER ROD C	2
10	8300111-301	SPACER ROD B	2
11	8156111-301	SPACER ROD A	2
12	8700111-301	SCREW SUPPORT	2
13	20A0308C1000	SCREW	4
14	8500111-301	KNR HEAD SCREW	2
15	20A0308C1304	SCREW	12
16	8910111-300	SLIDE	1
17	19A0102X1304	DOWEL	3
18	8000111-371	ASSY COMP ROLLER	1
19	8150610-270	WRENCH HEX (NOT SHOWN)	1
20	8000610-270	WRENCH HEX (NOT SHOWN)	1
21	802935-000	HEX KEY W/ TEE HANDLE (NOT SHOWN)	1

HANGER ASSEMBLY



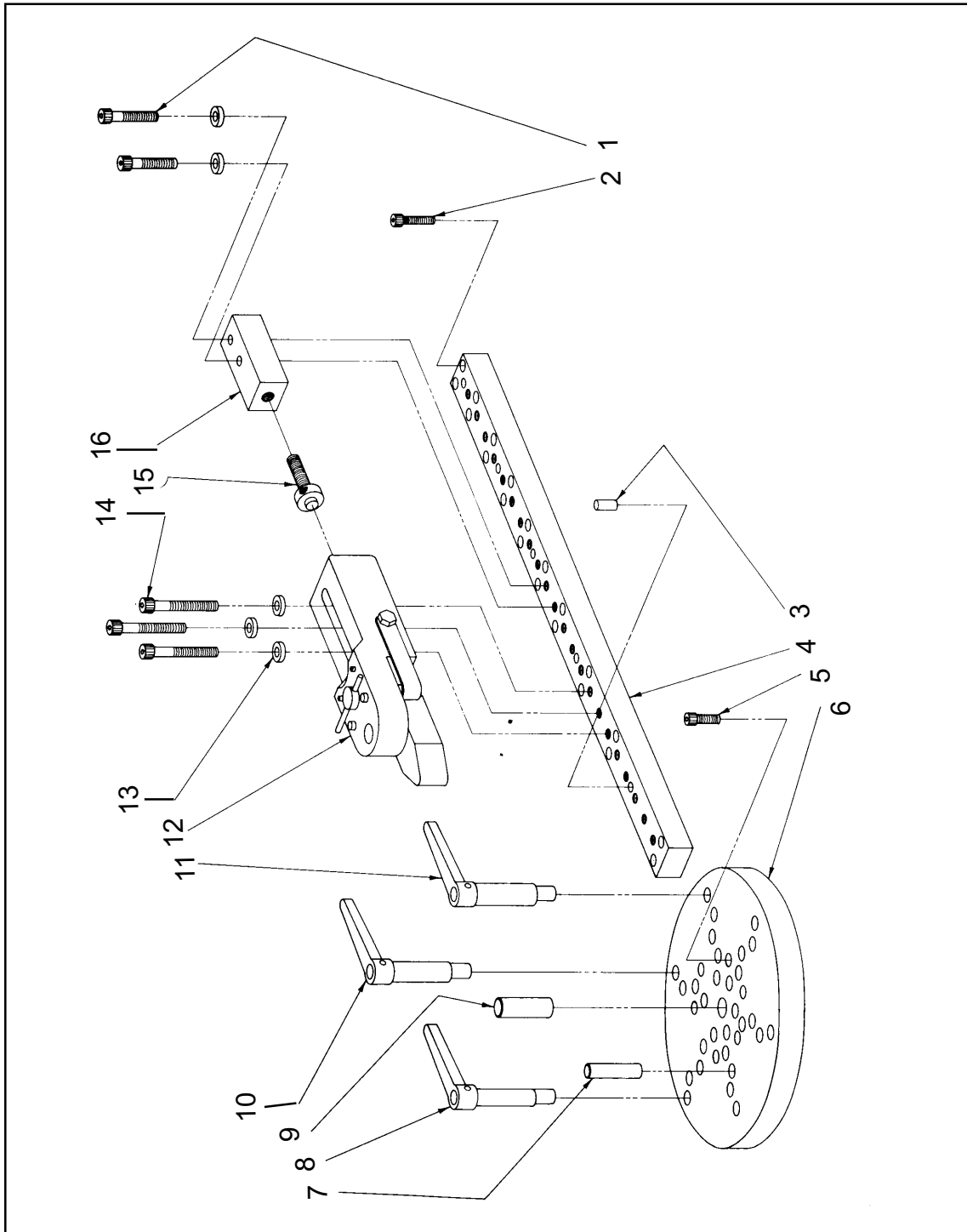
ITEM#	PART NO.	DESCRIPTION	QTY
1	8500111-300	HANDLE ROD	1
2	8120810-700	PLASTIC KNOB	1
3	61X0308C1332	WASHER	1
4	19A0102X2102	PIN	1
5	19A0508X2102	PIN	1
6	8156111-302	HANDLE WELDMENT	1
7	8920111-300	NOSE ASSY	1
8	8930111-300	LINK	2
9	8156120-301	LINK PIN	1
10	8400111-300	HANDLE BLOCK	1

PRESSURE ROLLER ASSEMBLY



ITEM#	PART NO.	DESCRIPTION	QTY
1	19A0508X2102	PIN	1
2	8156111-302	HANGER WELDMENT	1
3	8100111-371	ROLLER ASSY	1
	8600111-301	ROLLER HOLDER	1
	8156111-300	ROLLER	2
	8200120-301	ROLLER PIN	2
	8690100-200	DRIVE FTG	2
4	8930111-300	LINK	2
5	8156120-301	LINK PIN	1
6	8400111-300	HANDLE BLOCK	1
7	19A0102X2102	PIN	1
8	61X0308C1332	WASHER	1
9	8120810-700	PLASTIC KNOB	1
10	8500111-300	HANDLE ROD	1

NO. 8 TOOLING HEAD



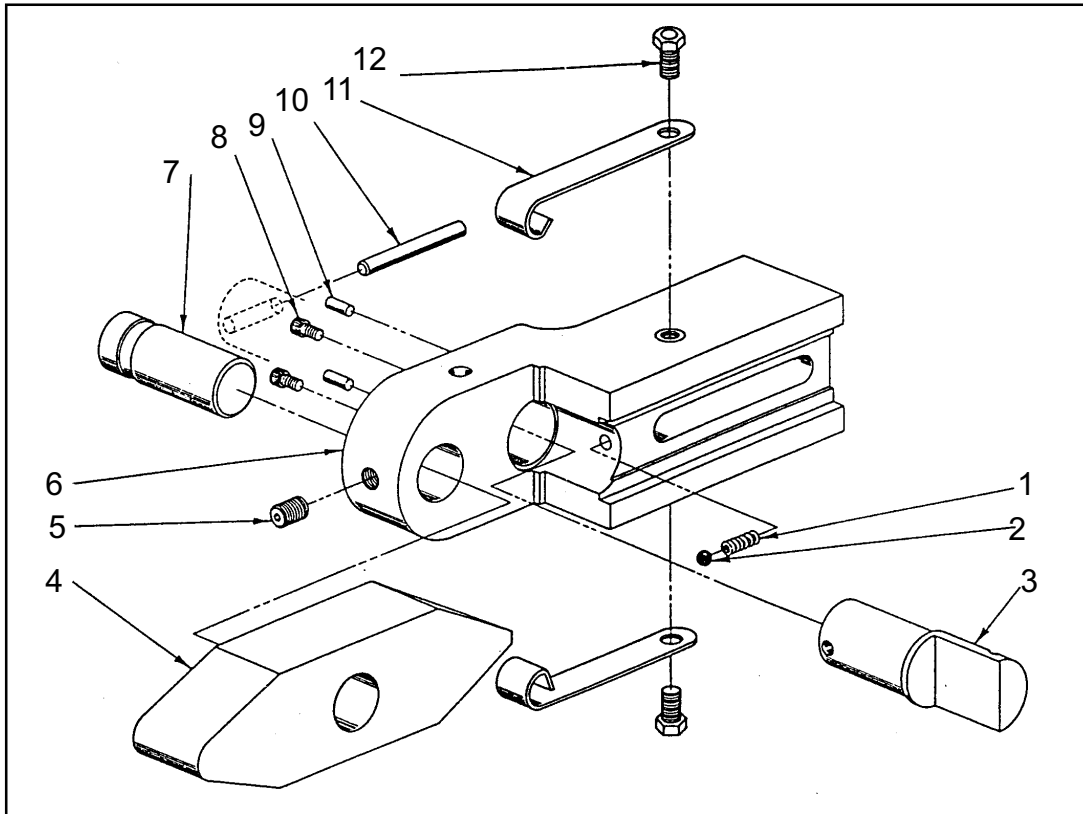


NO. 8 TOOLING HEAD ASSY.

NO. 8 TOOLING HEAD ASSY.

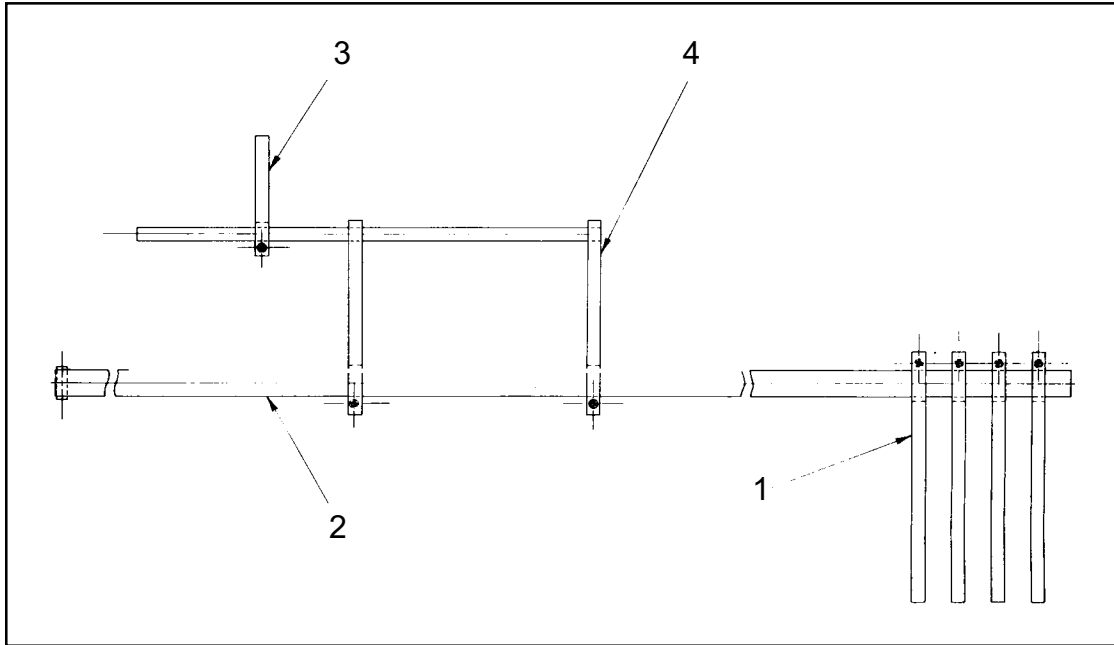
ITEM#	PART NO.	DESCRIPTION	QTY
1	20A0102C2102	SCREW	2
2	20A0308C1304	SCREW	16
3	19A0102X1304	PIN	4
4	8158121-703	NOSE HOLDER SLIDE	1
5	20A0716C1104	SCREW	6
6	8158110-501	MOUNTING PLATE	1
7	8158120-302	PIN	1
8	8158111-370	LOCKING PIN SMALL	1
9	8130016-970	RADIUS PIN	1
10	8000111-370	LOCKING PIN MEDIUM	1
11	8100111-370	LOCKING PIN LARGE	1
12	8158121-771	NOSE HOLDER ASSY	1
13	61X0102	WASHER	5
14	20A0102C3102	SCREW	3
15	8300121-701	NOSE HLDR SPT SCREW	1
16	8158121-701	NOSE HOLDER SUPPORT	1
17	8150610-270	WRENCH HEX (NOT SHOWN)	1
18	8000610-270	WRENCH HEX (NOT SHOWN)	1
19	0802935-000	HEX KEY W/ TEE HANDLE	1

NOSE HOLDER ASSEMBLY



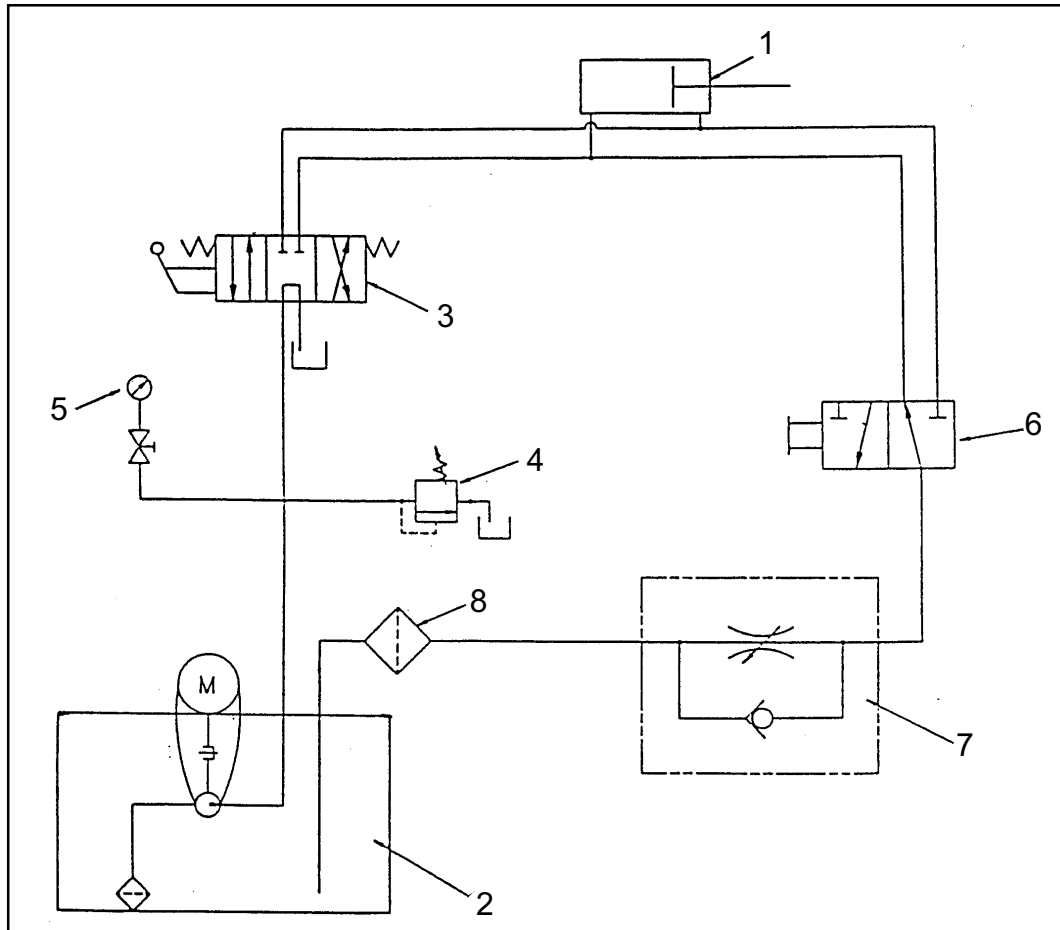
ITEM#	PART NO.	DESCRIPTION	QTY
1	8210510-204	SPRING	1
2	8699900-300	STEEL BALL	1
3	8158121-702	TRIGGER	1
4	8500121-701	FORMING NOSE	1
5	10917-000	CUP POINT	1
6	8600121-701	NOSE HOLDER	1
7	8400121-701	NOSE PIN	1
8	20A0104F0102	SCREW	2
9	8310301-200	NEEDLE ROLLER	2
10	18A0104X3000	PIN	1
11	8158510-401	NOSE SPRING	2
12	21A0516C0102	SCREW	2

GAUGE GROUP



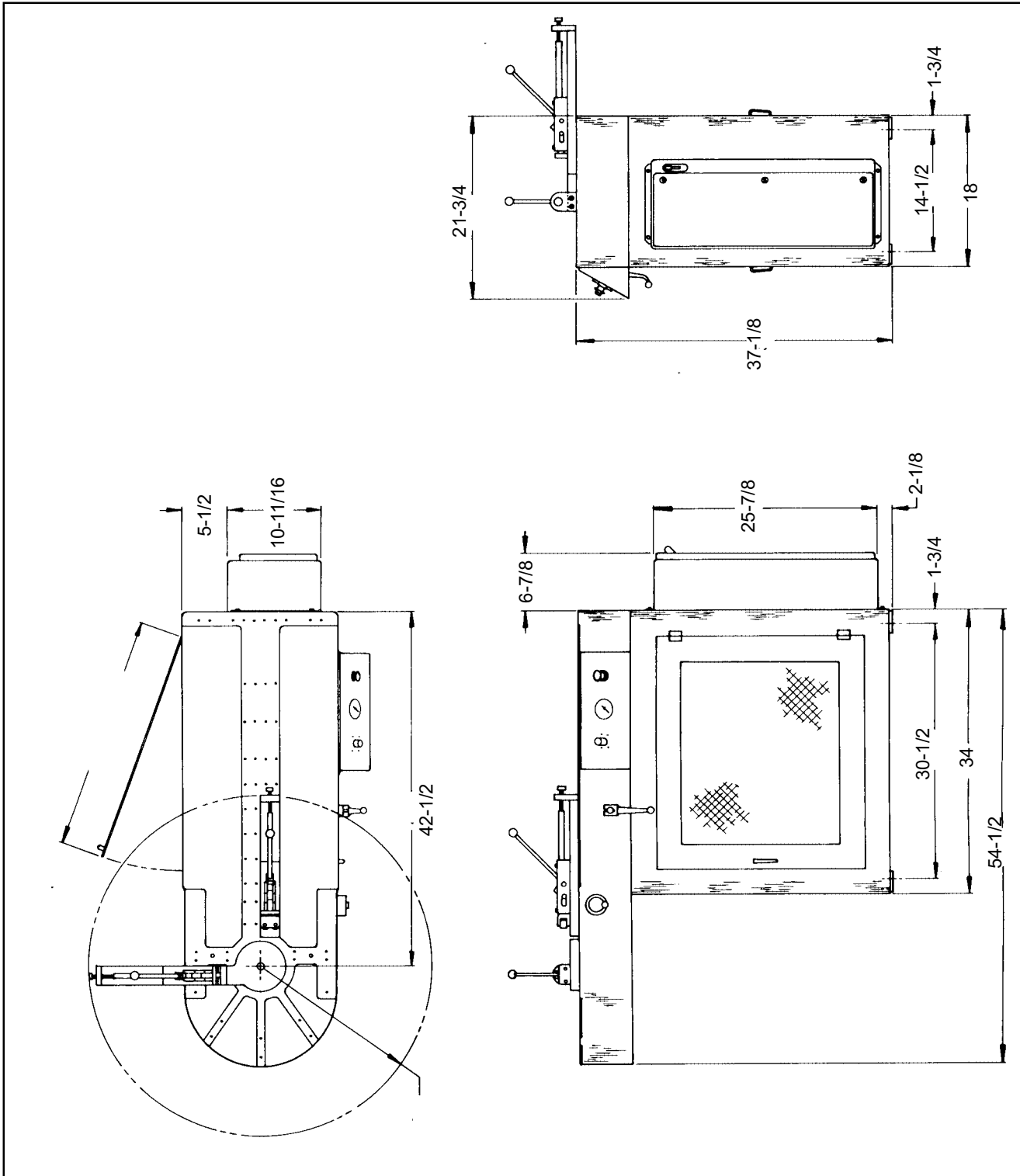
ITEM#	PART NO.	DESCRIPTION	QTY
1	8000142-007	STOP ARM	4
2	8151142-006	STOP ROD WELDMT	1
3	8200142-007	STOP BRACKET ARM	1
4	8100142-007	STOP BRACKET ASSY	1

HYDRAULIC DIAGRAM

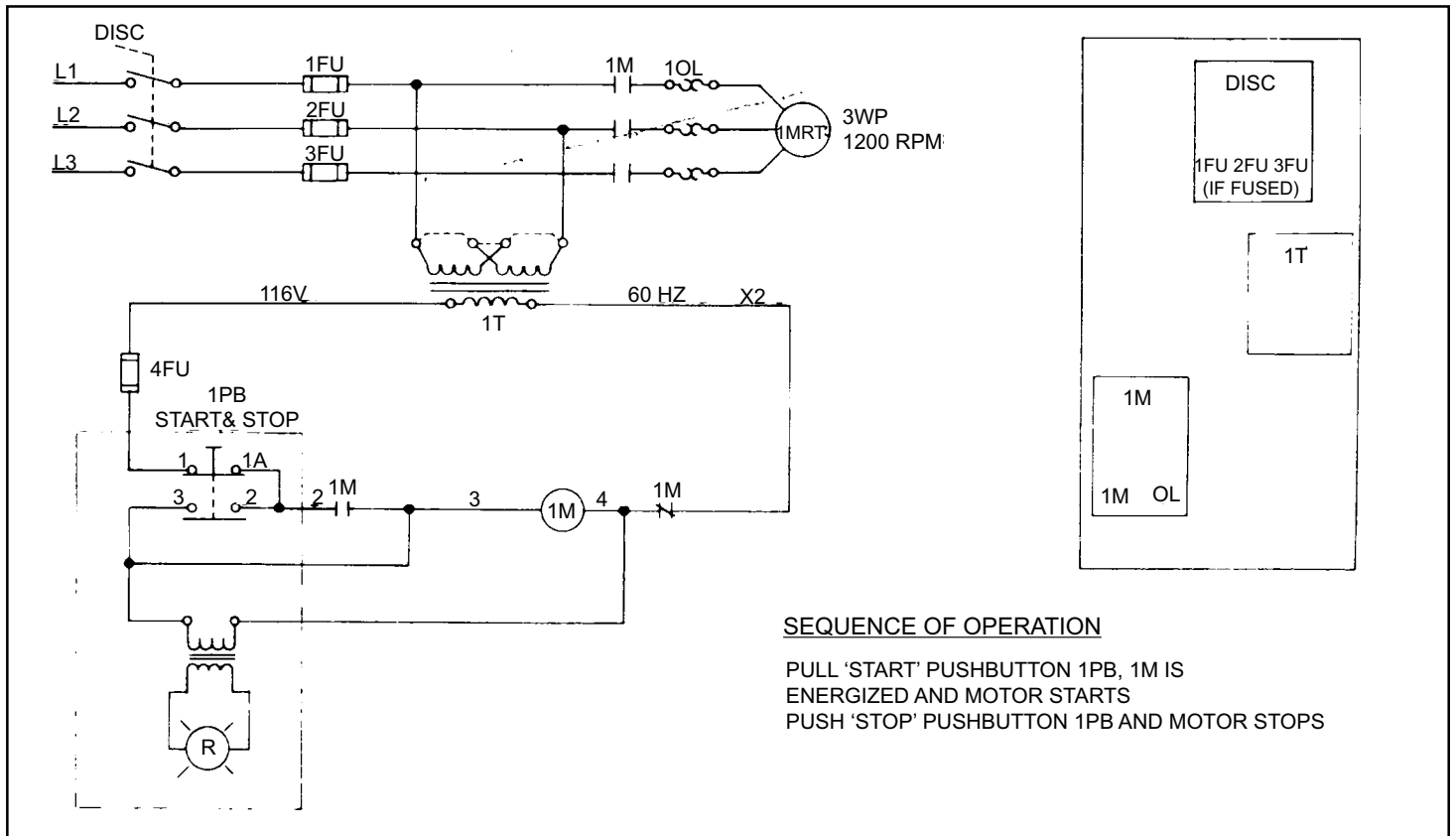


ITEM#	PART NO.	DESCRIPTION	QTY
1	8991111-000	CYL MT-4	1
2	1000307-000	HYD POWER UNIT	1
3	1000357-000	DIRECTIONAL VALVE	1
4	1000373-000	MANIFOLD BLOCK	1
5	1000374-000	PRESSURE GAUGE	1
6	8370310-370	SEL VALVE PAINT	1
7	1000341-000	FLOW CONTROL VAVLE	1
8	1000375-000	RETURN FILTER	1

FLOOR PLAN



ELECTRICAL DIAGRAM



SYM	PART NO.	DESCRIPTION	QTY
*1T	8331104-300	TRANSFORMER	1
1OL	8332301-700	HEATER ELEMENT	3
1OL	8332301-000	HEATER ELEMENT	3
1M	8330401-300	STARTER FURNAS 14CF32AA	1
**1T	8331104-100	TRANS. #B050BTZ13	1
1&2PB	8330304-000	PUSH BUTTON SWITCH	2
1MTR	8330106-500	MOTOR	1

*208, 380, 575 VOLTS

**230, 460 VOLTS

IT'S EASY TO BEND

Increased knowledge of the cold bending of metal and improvements in bending machines during the past decade have opened new horizons in the manufacturing field as many forming operations not considered practical some years ago can now be readily performed.

Technically metal bending is rather involved due to the physical change that occurs within the material during the bending operation and also because the numerous types of alloys available each react differently when formed.

Rather than discuss these technical problems, the purpose of this booklet is to illustrate and describe the multitude of bending operations that can easily be accomplished without special engineering knowledge provided a few elementary principles are observed.

PRODUCT DESIGN

Design of the formed parts in a product generally determines whether or not they can be efficiently and economically produced. Give careful consideration to these suggestions.

Selection of material is of first importance as it must be sufficiently ductile to produce a satisfactory bend of the smallest radius required and still be strong enough to provide the rigidity which the product demands.

It is usually desirable to designate the largest practical radius as this gives wider latitude in choice of material and often assures a better bend in both strength and appearance.

By using the same size material and designating identical radii for each bend whenever possible, the tooling of the bending machine can be simplified and the highest possible production obtained as a number of successive bends can then be progressively made in a part, thereby completing it before it is removed from the machine.

Compound bends or adjacent bends in different planes should be avoided if possible because of conflict that may occur between the bends which might necessitate special tooling. This is especially true in tubing but also holds for solid materials.

Generally the smallest recommended radius for tubing, measured to the exact center of the tube, is 1-1/2 times the outside diameter of the tube provided an inside mandrel is used when bending. This minimum centerline radius should be increased to at least 2-1/2 times the outside diameter of the tube if the bend is to be made without an inside mandrel.

In making a bend near the end of a tube, a straight length equal to at least the diameter of the tube should extend beyond the bend. If a bend is required to the very end of the tube, a straight length should be allowed and trimmed after forming.

If tubing is to be bent without an inside mandrel the heaviest practical wall should be used. As a rule, in non-ferrous metals, one quarter to half hard tubing provides best results.

When bending channels, angles, mouldings, and extrusions the centerline radius of the bend should usually be at least three times the width of the flange to be formed edge-wise.

CHOICE OF BENDING MACHINE

A number of bending machines are offered on the market today and your choice of the most suitable bender can largely be determined by the range of your bending requirements.

These machines are available in both small and large manually operated models as well as power driven units; some designed for one specific application and others capable of performing a wide variety of operations.

Should your work consist only of one specialized operation such as the bending of thin wall tubing on a high speed basis, obviously a completely automatic bender is the answer.

If, on the other hand, your jobs are so varied that you are called on to form a variety of materials such as tubing, angle, channel, extrusions, mouldings, and bus bars in addition to solid materials, a universal all-purpose bender will best serve your needs.

Oftentimes small parts can be formed faster and cheaper with manually operated benders provided production quantities do not warrant completely automatic equipment.

Careful study of specifications, capacities and working range of the various benders under consideration will enable you to choose the most logical unit for your own operations.

TOOLING THE BENDER

All bending machines merely provide a means of applying power either manually or mechanically to perform the bending operation and supply mountings for the bending tools.

These tools consist of a form or radius collar having the same shape as the desired bend, a clamping block or locking pin that securely grips the material during the bending operation and a forming roller or follow block which moves around the bending form.

When bending materials of open cross section such as tubing, channel, angle and extrusions, the bending form should exactly fit the contour of the material to provide support during their forming operation. This is also true of the clamping block and forming roller, as only by completely confining the material can a perfect bend be obtained.

Since all metals are somewhat elastic, they will spring back more or less after they are formed and for that reason the bending form must usually have a smaller radius than the required bend. The amount of springback is dependent upon the type of material, its size and hardness, as well as the radius of the bend and it is usually necessary to experiment somewhat to determine the exact size of the bending form.

Bending is no different than any machining operation in that the results obtained will be in direct proportion to the care taken in properly tooling the bender for the job to be done.

BENDER TOOLING

SPECIAL TOOLING FOR YOUR SPECIAL BENDING NEEDS

When you have a bending problem in production or design, Di-Acro can aid you at no obligation. Just send blueprints, dimensioned sketches, or the part you wish to produce to our Applications Engineering Department and your plans will receive prompt attention.

Special tooling? Here is some tooling we have available: Crush-bend tooling, automatic follow-bar return, wiper dies and ball mandrels for thin-walled tight radius tube bending, power clamping for high speed application, pneumatic mandrel extractor.

SPRING BACK - When determining the size of the Radius Pin or Collar, spring-back should be compensated for. A frequent way is by overbending slightly beyond the required angle. After the amount of spring-back has been determined, the Angle Gauge can be set so that all bends will be duplicated. In addition to overbending, it may be necessary, in some cases, to form the material around a Radius Pin or Radius Collar of smaller radius than the desired bend. The actual size of the Radius Pin or Collar can best be determined by experiment for the material and conditions.

FORMING ROLLER - To eliminate work marking and reduce operator effort, it is often desirable to replace the Forming Nose (furnished as standard equipment), with a Forming Roller.

BUILT-UP FORMING NOSE - This is used to increase the material width range of Di-Acro Benders. Must be used with wider or stacked radius collars.

There are two tube bending methods:

1. The "Forming Roller" method is recommended for (a) all large bends where centerline radius is at least 4 times the outside diameter (O.D.) of the tube, (b) pipe and heavy wall tubing, and (c) very small diameter tubing.
2. The "Follow Block" method, which allows forming thin wall tubing to a centerline radius as small as 2-1/2 times the O.D. without using inside mandrels or fillers.

Guard against spring-back (see above). To prevent the tube from slipping during forming, the Quik-Lok Clamp is recommended, used with Type A Radius Collar. For locking smaller size tubing the Clevis and Swivel Clamps with Type B Radius Collars are used on No. 1 and No. 1A Benders.

PARTS REQUIRED FOR "FORMING ROLLER" BENDING METHOD - Grooved Radius Collar - one for every radius and tube size. - Grooved Forming Roller - one for each tube size only. - Clamp Block - for use with Quik-Lok Clamp on all Di-Acro Benders. One for each tube size. - Swivel and Clevis Clamps - for No. 1 and No. 1A Benders. One for each tube size.

PARTS REQUIRED FOR "FOLLOW-BLOCK" BENDING METHOD - Grooved Radius Collar - one for every radius and tube size. - Forming Roller - one covers all "Follow Block" operations. - Follow Block - one for each tube size only. Listed length will accommodate a 180 degree bend. - Clamp Block - for use with Quik-Lok Clamp on all Di-Acro Benders. One for each tube size. - Swivel and Clevis Clamps - for No. 1 and No. 1A Benders. One for each tube size. Style B collars only.