MP9500 **Bender**

USA MADE | DURABLE | AFFORDABLE

OPERATIONS MANUAL

METALpro

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metalprocorp.com

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INTRODUCTION

This manual provides the information required for assembling, setting up, operating, and maintaining the **MP9500 Bender**. Included as a part of this manual are a replacement parts lists and assembly illustrations to guide you.

Included in manual are the specifications and capabilities of the Bender. If you have questions regarding the capabilities of the **MP9500 Bender** for a new application or need assistance in determining tooling requirements, please contact us at:

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The first several pages of this manual view safety and cautionary information. This safety section summarizes the design safety elements, reviews WARNINGS, and lists the WARNING labels on the machine and accessories. It is your responsibility to understand all WARNINGS.

Observe all WARNINGS and CAUTIONS during installation, operation, servicing, and maintenance of the **MP9500 Bender**.

WARRANTY INFORMATION

Metalpro Corporation (seller) will, within three (3) years from date of purchase replace F.O.B. the factory, any goods which are defective in materials and/or workmanship provided the buyer, at the seller's option, return the defective goods prepaid to the seller. Warranty is void if warranty application is not submitted within 30 days of purchase date. Punches, dies, and/or blades are warranted to be free of defects in materials and workmanship within thirty (30) days of purchase date.

This warranty does not apply to machines and/or components that have been altered, changed, modified in any way, subjected to abuse, abnormal use, inadequate maintenance, and lubrication, or subjected to use beyond recommended capacities and specifications. In no event shall the seller be liable for labor costs expended on such goods or consequential damages. Seller shall not be liable to purchaser or any other person for loss or damage directly or indirectly arising from the use of the goods, from any representations or warranty of fitness, or to waive any of the foregoing terms of sale, and none shall be binding on the seller.

This warranty is non-transferable.

RETURN AND REFUND POLICY

METALpro offers a 3-year limited manufacturing warranty on all METALpro machines from manufacturing defects.

- The Buyer has 30 days from date of delivery to contact the Seller regarding a return
- All METALpro returns are subject to a 20% restock fee
- The Buyer is responsible for shipping item back to METALpro at 4715 136th Ave Hamilton, MI 49419 and providing pictures showing condition of product before it ships
- The product needs to be in new/unused condition and be in original METALpro packaging for resale
- If not, Buyer is liable for cost to repair and repackage item additional to the 20% restock fee
- All returns are subject to METALpro's inspection at time of delivery

Any questions or concerns please contact METALpro's Customer Service at (262)-679-0504.

SAFETY

To prevent serious bodily injury:

- **Do not** operate, install tooling, service, or adjust machine without proper instructions and without reading and understanding the operations manual.
- **Do not** service the machine with the electrical power connected.
- **Do not** operate machine without all dies properly seated, pinned, and fastened.
- **Do not** loosen the lock nut tensioning to the sunbursts without first disengaging the cylinder and rotating the sunbursts to the “down” position. This is when the flat edges are parallel to the floor (Figure 7 on page 13).
- **Do not** bend pipe or tubing without the feed cage properly positioned and secured.
- **Do** get help to install the large and heavy rotating dies
- **Do** stand clear of the pipe, tubing, and other material during the bending operation
- **Do** make sure that the sunburst pusher properly seats in the sunbursts during the bending operation.

SAFETY SUMMARY

- Wear approved eye protection when using the **MP9500 Bender**.
- Observe and follow the WARNINGS displayed on the **MP9500 Bender** and keep hands and clothing clear of all moving parts.
- The bending operation will cause the end of the tubing to rotate upward. Make sure there is clearance for this movement. Keep your hands and clothing clear of the pipe as it is bent.
- Before doing any repairs on the **MP9500 Bender**, make sure it is unplugged.
- Any OSHA guarding requirements are the responsibility of the purchaser

UNCRATING, INSPECTION, ASSEMBLY, AND INSTALLATION

For assembly and installation, refer to the exploded views as well as the bill of materials.

- Using a forklift or pallet jack, move the crated **MP9500 Bender** as close as practical to the workstation where the Bender will be assembled and installed.
- Uncrate the Bender.
- Make sure the instructional material and the packing list are preserved and that all components are accounted for prior to discarding the shipping crate.
- Carefully inspect the Bender. Make sure all items listed on the packing list are present.
- If damage is discovered, report the nature of the damage to the carrier. Replace any damaged components before using the bender.
- The installation site should be level.
- Tools required
  - adjustable wrench
  - ½" wrench
  - ¾" socket
  - ¾" wrench
  - ½" socket
  - 9/16" socket
  - 3/32" - ⅜" hex or T-handle wrench set

DESCRIPTION

The **MP9500 Bender** is a multipurpose rotary bending machine. The straightforward design allows for quick set-up and ease of use.

Each size of tubing or pipe to be bent requires three die components, the rotating die, the stationary die and the moving die. The rotating dies are cylindrical with a raised edge (for square tubing) or one, two or three half round grooves (for round tubing) around the circumference. The stationary dies are rectangular blocks with a tapered rectangular groove (for square tubing) or one, two or three half round grooves (for round tubing). The moving dies are also rectangular blocks with a rectangular groove (for square tubing) or one, two or three grooves (for round tubing).

The moving die, which is held between the sunbursts by a hitch pin, grips and pulls the tubing through the stationary die as the sunbursts rotate. The gripping is aided by set screws (square tubing) or set collars (round tubing and pipe). The rotation of the sunbursts is caused by the extension of the cylinder rod. The stationary die keeps the tubing positioned as it is pulled to be formed. The tubing is formed against the rotating die.

The **MP9500 Bender** is a single stroke machine. The foot switch controls stroke direction. When the foot switch pedal is held in one direction, the bender cylinder rod will travel in that direction and will stop only if the pedal is released, or the maximum stroke is reached. Note: Four strokes of the cylinder are required to bend the full 180 degrees.

DIMENSIONS AND WEIGHT

Width: 40 Inches
Height: 66 Inches
Depth: 24 Inches
Weight: Approximately 325 lbs. and includes packaging

OPERATIONAL CAPACITY

Approximately 4 to 5 strokes per minute for the smallest pipe
Maximum force 12 Tons

BENDER CAPACITY

The **MP9500 Bender** easily handles a wide variety of professional, farm, and industrial production jobs. Using different dies, the machine can bend ½" up to 2" square tubing, ½" to 2" round tubing and ½" to 1½" pipe up to 180 degrees.

Call METALpro customer service to discuss specific requirements.

SPECIFICATIONS

Electrical Requirement 110V, 20 amp service
Hydraulic Power Self-contained, 2500 psi

HARDWARE AND COMPONENTS

Item	Description	Qty
42	5/16 -18 x ¾" carriage bolt	10
43	5/16 -18 lock nut	10
44	5/16" flat washer	10
45	½ -13 x 1¾" hex head screw	4
47	½" flat washer	4
48	½" lock nut	4
13	½" x 3⅝" pin	2
14	¼" die/sunburst install pin	1
15	½" x 6½" hitch pin with bridge pin	1
60	⅜ -16 x ⅝" hex head screw	2
65	⅜" flat washer	2
95	cylinder hold clamp	1
100	⅝ -11 x 4" threaded rod	2

Above items are packed in a bag

Item	Description	Qty
	Bender Head Assembly (includes items 1, 2, 9, 10,11, 12, 24, 34, 35, 36, 37, 40, 41, 46, 53, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 96, 97, 98, 99, 101, 102)	1
3	Sunburst	2
4	Front Panel	1
6	Lower Shelf (includes items: 5, 7, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 39, 41, 42, 43, 49, 50, 51, 52, 54, 55)	1
	Upper Shelf Assembly	1
8	Leg (includes item 38)	2

BILL OF MATERIAL

Item	MP Number	Description	Qty
1	1004	bender head mounting plate	1
2	1002	side plate	2
3	1003	sunburst	2
4	5062	front panel	1
5	5061	reservoir cover	1
6	5057	lower shelf	1
7	5058	upper shelf	1
8	5059	leg	2
9	1001	bottom plate	1
10	1000	top plate	1
11	1007	tube gauge	1
12	1006	sunburst pusher	1
13	1023	½" x 3⅝" pin	2
14	1024	¼" die/sunburst install pin	1
15	1022	½" x 6½" hitch pin w/bridge pin	1
24	1005	hydraulic cylinder (2" bore x 12" stroke)	1
26	5051	⅜" x 31" hydraulic hose assembly	2
34	1010	3" diameter x 1/16" Teflon disc	2
35	1025	3" diameter x 1/16" urethane disc	2
36	1026	spring guide	2
37	1009	spring 1" od x 2½" lg	2
38	5039	plastic end cap	4
39	5022	⅜ -16 x 1" hex head screw	4
40	1013	⅜ -16 x 1¾" hex head screw	1
41	5023	⅜" lock washer	5
42	5031	5/16-18 x ¾" carriage bolt	14
43	5032	5/16 -18 lock nut	14
44	5017	5/16" flat washer	10
45	5011	½ -13 x 1¾" hex head screw	4
46	7021	½ -13 x 1¼ flat head screw	4
47	5012	½" flat washer	4
48	5065	½ -13 lock nut	4
49	7029	¼ -20 x ¾" hex head screw	8
50	5038	¼ -20 lock nut	10
51	5037	¼" flat washer	2
52	5036	¼ -20 x 2" hex head screw	2
53	5018	5/16 -18 x ¾" hex head screw	24
54	7031	5/16 -18 x 3" hex head screw	4
55	5033	5/16" lock washer	28
56	1014	¾" x 4½" shoulder bolt	1
57	1015	¾" x 3¾" shoulder bolt	1
58	1016	⅝ -11 lock nut	2
59	1019	¾" flat washer	2
60	5025	⅜ -16 x ⅝" hex head screw	4
61	1020	⅜" id x 2" od flat washer	2
62	1018	⅝" flat washer	4
63	1027	⅜ -16 x 4" hex head screw	2
64	5019	⅜ -16 lock nut	2
65	5020	⅜" flat washer	4
66	1008	magnetic gauge	1

BILL OF MATERIAL (CONTINUED)

Item	MP Number	Description	Qty
90	see pages 7 & 8	rotating die	1
91	see pages 7 & 8	stationary die	1
92	see pages 7 & 8	moving die	1
93	1028	¼ -20 x ¼" socket head set screw	2
94	5028	⅜ -16 x ⅜" socket head set screw	2
95	1029	cylinder hold clamp	1
96	1030	feed cage side plate	2
97	1031	feed cage top plate	1
98	1032	feed cage roller pin	9
99	1033	⅝ -11 x 7½" threaded rod	2
100	1036	⅝ -11 x 4" threaded rod	2
101	1035	5/16 -18 x ¾" socket flat head screw	8
102	1034	⅝ -11 hex nut	6
	6026	dual foot switch	1
	6062	pump/motor assembly 110V	1

TUBING DIE SET

Tube Size	MP Number	Description	C/L Radius	Min Wall	Max Wall	Weight
½", ⅝", ¾"	9500	½", ⅝", ¾" round rotating die	3"	.035/.049/.049	.187/.187/.187	20
	9520	½", ⅝", ¾" round stationery die	any			6
	9540	½", ⅝", ¾" round moving die	any			8
⅞", 1"	9501	⅞", 1" round rotating die	3"	.065/.083	0.187	19
	9502	⅞", 1" round rotating die	4"	.049/.065	0.187	36
	9521	⅞", 1" round stationery die	any			6
	9541	⅞", 1" round moving die	any			8
1", 1⅜"	9503	1", 1⅜" round rotating die	4"	.065/.095	0.187	33
	9504	1", 1⅜" round rotating die	5"	.049/.083	0.187	53
	9522	1", 1⅜" round stationery die	any			5
	9542	1", 1⅜" round moving die	any			7
1⅛", 1¼"	9505	1⅛", 1¼" round rotating die	5"	.065/.083	0.187	54
	9506	1⅛", 1¼" round rotating die	6"	.049/.065	0.187	80
	9523	1⅛", 1¼" round stationery die	any			6
	9543	1⅛", 1¼" round moving die	any			7
1½"	9507	1½" round rotating die	5"	0.109	0.187	80
	9508	1½" round rotating die	6"	0.095	0.187	83
	9524	1½" round stationery die	any			6
	9544	1½" round moving die	any			7
1¾"	9509	1¾" round rotating die	5"	0.120	0.187	53
	9510	1¾" round rotating die	6"	0.109	0.187	79
	9525	1¾" round stationery die	any			5
	9545	1¾" round moving die	any			7
2"	9511	2" round rotating die	6"	0.120	0.187	76
	9526	2" round stationery die	any			5
	9546	2" round moving die	any			7
	9720	Tubing die set includes 9500, 9502, 9504, 9505 & 9508 round rotating dies 9520,9521,9522,9523,9524 round stationery dies 9540, 9541, 9542, 9543 & 9544 round moving dies				291

PIPING DIE SET

Pipe Size	MP Number	Description	C/L Radius	Min Wall	Max Wall	Weight
½", ¾"	9550	½", ¾" pipe rotating die	3"	Schedule 40	Schedule 80	19
	9551	½", ¾" pipe stationery die	any			6
	9552	½", ¾" pipe moving die	any			8
¾", 1"	9553	¾", 1" pipe rotating die	4"	Schedule 40	Schedule 80	33
	9554	¾", 1" pipe stationery die	any			5
	9555	¾", 1" pipe moving die	any			7
1¼"	9556	1¼" pipe rotating die	5"	Schedule 40	Schedule 80	54
	9557	1¼" pipe stationery die	any			5
	9558	1¼" pipe moving die	any			7
1½"	9559	1½" pipe rotating die	6"	Schedule 40	Schedule 80	77
	9566	1½" pipe stationery die	any			5
	9567	1½" pipe moving die	any			7
2"	9565	2" pipe rotating die	7"			84
	9568	2" pipe stationery die				4
	9569	2" pipe moving die				6
	9710	Pipe Die Set includes 9550, 9553, 9556 & 9559 pipe rotating dies 9551, 9554,9557 & 9566 pipe stationery dies 9552, 9555, 9558 & 9567 pipe moving dies				233

LEG STAND ASSEMBLY – Refer to Figure 1

Step 1: Place the two legs (59) on edge and position the lower shelf (57) and the upper shelf (58) with pump/motor assembly between them.

Step 2: Install 5/16 -18 x 3/4" carriage bolts (31), 5/16" flat washers (17), and 5/16 -18 lock nuts (32) hand tight.

Step 3: Set the base upright. Put the dual foot switch (108) on the lower shelf (57).

Step 4: Viewed from the operating side of the Ironworker, the motor will be at the right side of the base.

Step 5: Make sure the legs and the shelves are properly positioned and square. Tighten the lock nuts on the backside of the bender. Leave the lock nuts on the front side hand tight until the front panel (62) is installed.

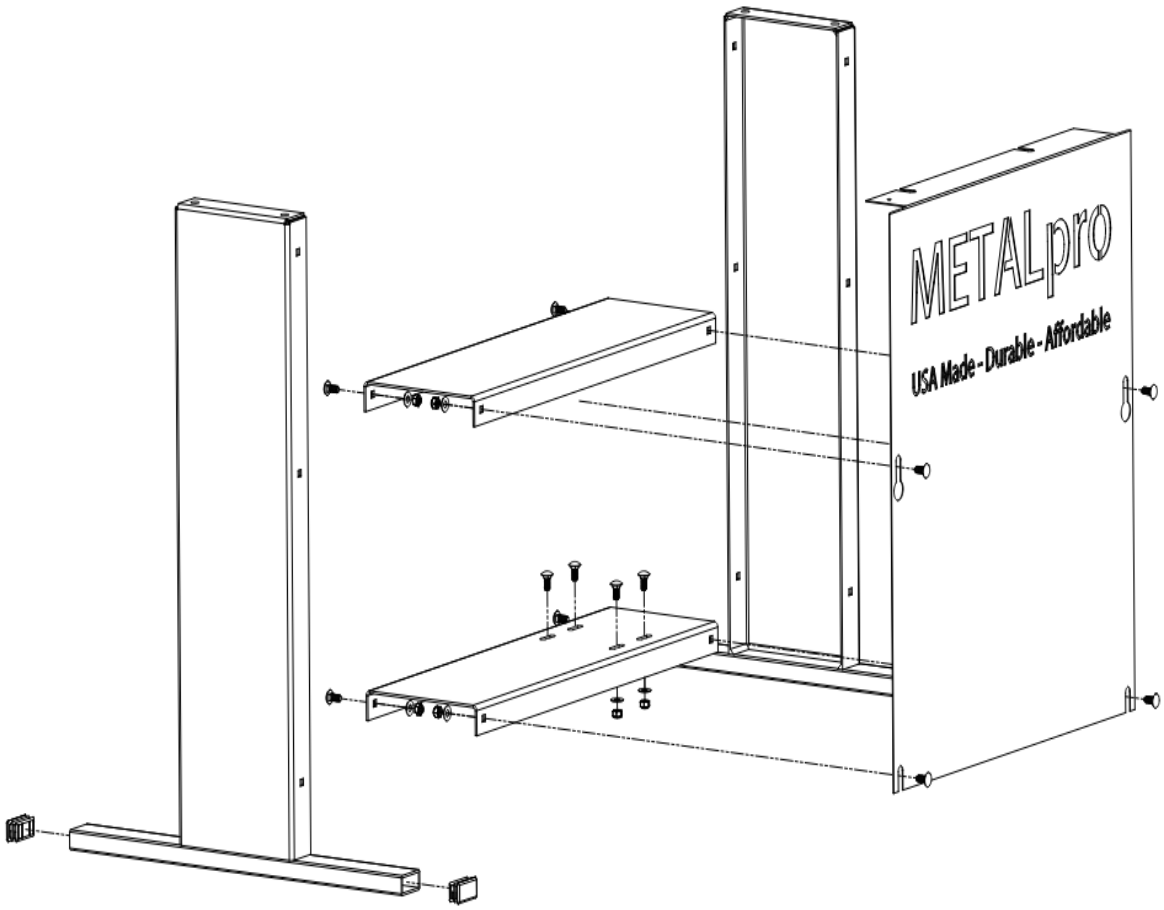

FIGURE 1:
LEG STAND ASSEMBLY

BENDER HEAD ASSEMBLY – Refer to Figure 2

Step 1: Lift and position the bender head assembly over the leg stand assembly on top of the leg stand assembly. Lower the bender head until it is properly positioned and resting on the base. As viewed from the operating side of the tubing bender, the motor will be at the right side of the leg stand assembly.

Step 2: Before removing the lifting strap, install four ½ -13 x 1¾" hex head screws (45), ½" flat washers (47), and ½ -13 lock nuts (48) hand tight.

Step 3: Position the front panel (4), (Figure 2, page 7) so the lip of the panel is flush against the bottom of the bender head assembly by first slipping the long edge of the panel inside of carriage bolts (42) of upper shelf (7). Make sure the holes in the bender head assembly and the slots in the lip of the front panel are aligned. Install two ⅜ -16 x ⅝" hex head screws (60) and ⅜" flat washers (65) and tighten (Figure 3).

Step 4: Tighten the lower and the upper shelf mounting screws (Items 42, 43 and 44).

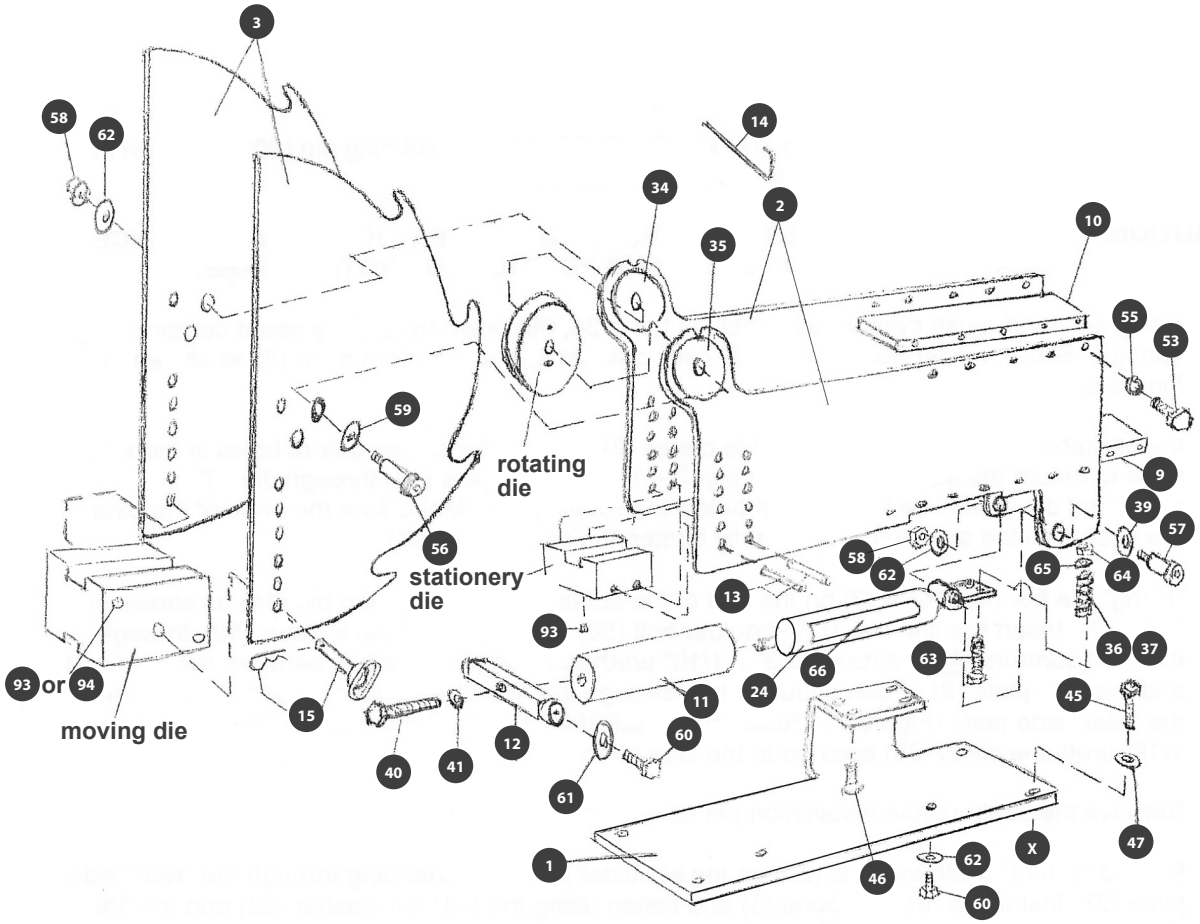

FIGURE 2:
BENDER HEAD ASSEMBLY

HYDRAULIC INSTALLATION – Refer to Figures 1, 2, 3

CAUTION: DO NOT ALLOW PIPE TAPE TO OBSTRUCT THE FITTING OPENINGS. IF YOU USE PIPE SEALANT, USE ONLY ENOUGH TO ACHIEVE A GOOD SEAL. DO NOT ALLOW ANY OF THE PIPE SEALING COMPOUND TO GET IN THE HYDRAULIC SYSTEM.

Step 1: Connect the hydraulic hoses as shown.

WARNING: USE THE REAR PORTS OF THE CYLINDER ONLY. THE LOWER PORT ON THE LEFT SIDE OF THE CYLINDER MUST REMAIN PLUGGED.

Step 2: Tighten the fittings on the hydraulic hoses.

Step 3: Remove the breather/fill plug from the hydraulic reservoir.

Step 4: Fill the reservoir to within 1” of the top with Recommended ISO 32 hydraulic Oil or AW/AL ISO 68 20W/20, ISO 32 10W, Mobil DTE 24-SSU, or equal hydraulic Oil. Replace the breather/fill plug.

Step 5: Prime the hydraulic system as follows:

- Plug the bender motor into a 110V, 20 amp circuit.
- Start the pump by switching on the motor.
- Using the foot switch, cycle the hydraulic cylinder up and down slowly.
- Complete ten cycles to make sure all the air has been purged from the hydraulic system.

CAUTION: AFTER THE HYDRAULIC SYSTEM HAS BEEN PRIMED, REMOVE THE BREATHER/FILL PLUG AND ADD HYDRAULIC OIL TO WITHIN 1" OF THE TOP OF HE RESERVOIR. OPERATING THE TUBING BENDER WITH INADEQUATE HYDRAULIC OIL SUPPLY WILL CAUSE DAMAGE TO THE PUMP AND CYLINDER.

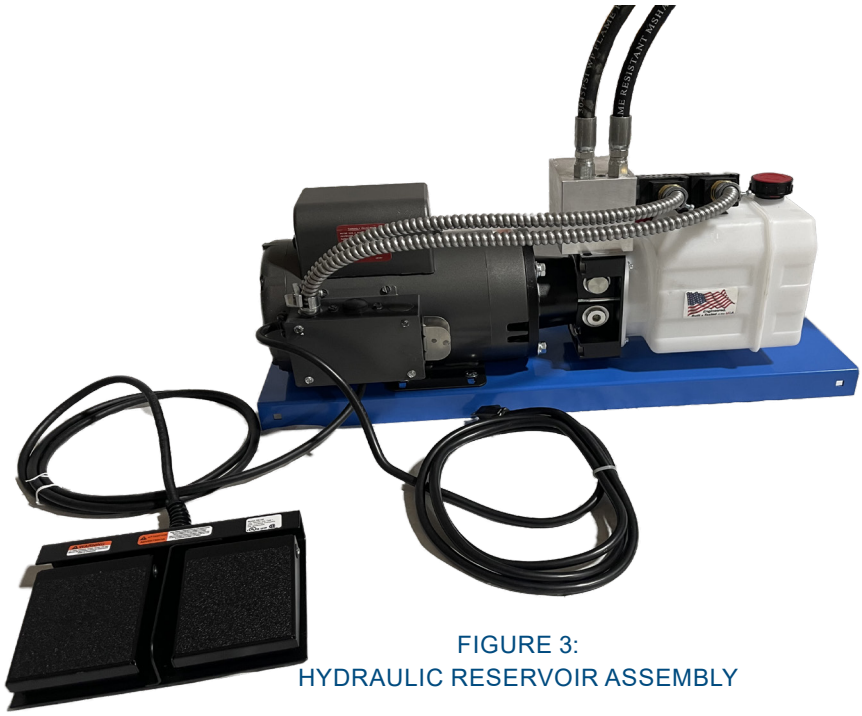

FIGURE 3:
HYDRAULIC RESERVOIR ASSEMBLY

BENDER DIE INSTALLATION – Refer to Figures 4, 5, 6, 7, 8

Step 1: Insert sunburst/die installation pin (14) into the ¼" hold in the rotating die (90) as shown in Figure 4. Hang the rotating die in the position shown.

CAUTION: THE ROTATING DIES ARE STEEL AND ARE VERY HEAVY. ASSISTANCE MAY BE REQUIRED TO LIFT AND POSITION THE ROTATING DIE.

Step 2: Using left hand, push cylinder assembly (11, 12, 24, 66) down toward leg stand compressing springs. Slide cylinders hold clamp (95) over cylinder end and bottom plate (8) as shown in Figure 5.

Step 3: Install stationary die (91) between side plates (2). Select the proper pair of holes in the side plate to mount the stationary die and slip 2 – ½" x 3⅝" pins (13) through die. The stationary die should be located just below the rotating die. Make sure the ends of the pins are flush with the side plates and lightly tighten the set screws (93).

Step 3: Hang the front sunburst (3) on the end of the sunburst/die installation pin (14) as shown in Figure 6. Insert the ¾" x 4½" shoulder bolt (56) through a ¾" flat washer (59), through the front sunburst AND through a 3" x 1/16" urethane disc (35) which is between the sunburst and the side plate (2). Push shoulder bolt through the "front" side plate, rotating die (90) and the "rear" side plate (Figure 6). Note: Some MP9500 Tubing Benders may have the 3" x 1/16" urethane discs (35) epoxied to the side plates (2).

Step 5: Remove the sunburst/die installation pin as shown.

Step 6: Put a 3" x 1/16" urethane disc (35) on the shoulder bolt (56) extending through the 'rear' side plate (2). Install the rear sunburst (3) and fasten using the ⅝" flat washer (62) and the ⅝ -11 lock nut (58) as shown in Figure 7.

Step 7: Tighten the lock nut.

CAUTION: THIS IS THE 'DOWN' POSITION FOR THE SUNBURSTS. ALWAYS ROTATE THE SUNBURSTS TO THIS POSITION BEFORE LOOSENING THE LOCKNUT. FAILURE TO DO SO COULD RESULT IN INJURY AS THE SUNBURSTS WILL ROTATE QUICKLY TO THIS POSITION DUE TO GRAVITY.

IMPORTANT: TIGHTEN THE LOCKNUT TO THE MINIMUM TIGHTNESS REQUIRED TO ALLOW THE SUNBURSTS TO BE ROTATED 90 DEGREES AND BE HELD BY THE 3" X 1/16" URETHANE WASHERS (35) IN THE POSITION SHOWN IN FIGURE 8.

Step 8: Install the moving die (92) in the proper pin hole using hitch and clevis pin (15). The moving die should be at the same height as the stationary die (91) (Figure 5) previously installed.

Step 9: Using left hand, push cylinder assembly (11, 12, 24, 66) down toward leg stand. Remove cylinder hold clamp (95) and reposition cylinder assembly and sunbursts as shown in Figure 8. This is the 'ready' position.

BENDER DIE INSTALLATION

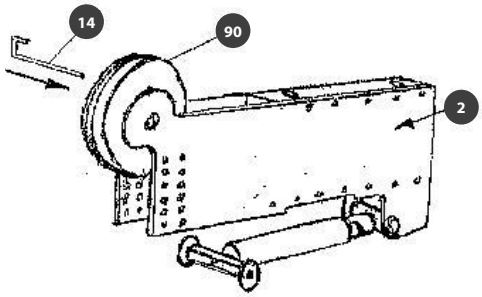

FIGURE 4

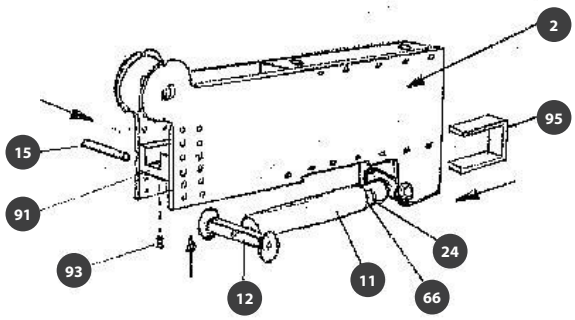

FIGURE 5

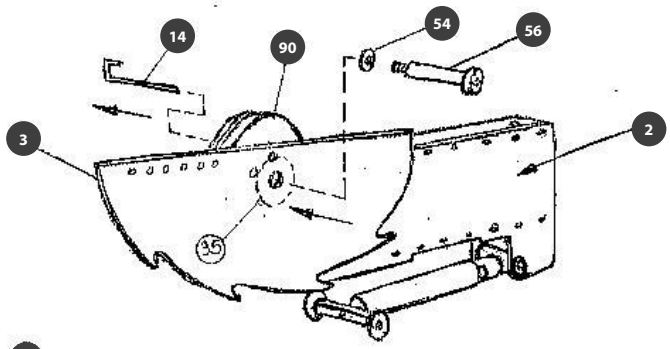

FIGURE 6

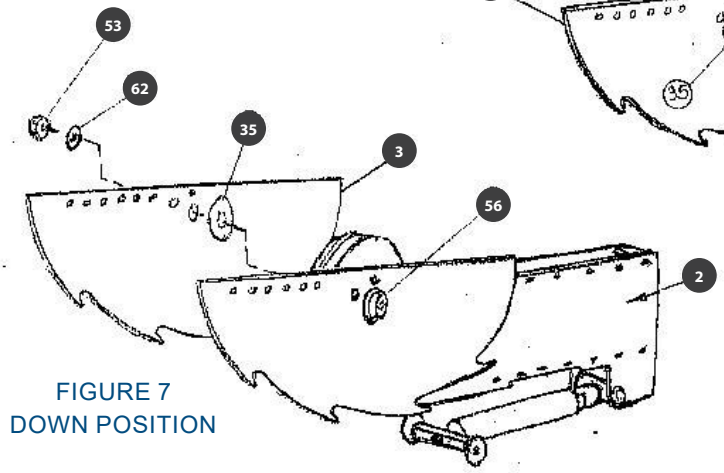

FIGURE 7
DOWN POSITION

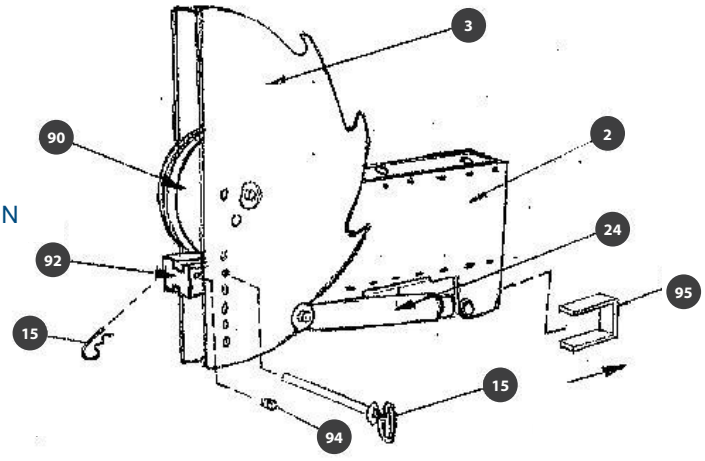

FIGURE 8
READY POSITION

BENDING TUBE AND PIPE – Refer to Figures 9, 10, 11

Step 1: Install rotating, stationary and moving dies as previously described.

Step 2: Adjust the feed cage so that the roller tops are at the same height as the groove in the stationary die. This can be done by inserting a smaller piece of tubing or rod (that is known to be straight) through the stationary die and across the roller tops. Loosen the ⅝ -11 hex nuts (102) that are under the top plate (10). Turn the ⅝ -11 hex nuts (102) above the top plate clockwise to raise the feed cage or counterclockwise to lower the feed cage. Tighten the nuts when the height is correctly set. Note: The ⅝ -11 x 7½" threaded rods (99) are used with the 5" and 6" rotating dies (90). The ⅝ -11 x 4" threaded rods (100) are used with the 3" and 4" rotating dies (90). The ⅝ -11 hex nuts (102) under the top plate (10) and above the feed cage top (97) are removed when using the 3" rotating die.

WARNING: BENDING LARGE OR HEAVY PIPE OR TUBING WITHOUT USING OR PROPERLY ADJUSTING THE FEED CAGE WILL RESULT IN DAMAGE TO THE MP9500 TUBING BENDER.

Step 3: Examine the tubing to be bent. Remove and scale any scale or dirt and smooth any large irregularities that could cause feed problems through the stationary die. Put a few drops of light lubricant in the groove of the stationary die. Insert the tubing through the feed cage, stationary die and moving die. Note: The cylinder (24) must be fully retracted, and the sunbursts rotated to the ready position to feed the tubing through the moving die.

Step 4: Turn the MP9500 Tubing Bender on. Rotate the sunburst (3) and, therefore, the moving die (92) by using the foot switch down SLIGHTLY to tighten the moving die groove bottom against the tubing. This removes the "slack" that is built into the system.

CAUTION: DO NOT BEND THE TUBE DURING THIS PROCESS

Step 5: Measure the gap between the stationary and moving dies (⅛" – ¾" typically). Measure the distance from the right edge of the moving die to the end of the tube extended through the moving die. Add these two measurements. The sum is the length of the tubing to the start of the bend (see Figure 12).

Step 6: To adjust the length, use foot switch to loosen the tubing in the dies and move the tubing in the appropriate direction. Repeat steps 4 and 5 until the length is correct. Tighten set screw (93) to hold the tubing during the bending process. With round tubing or pipe, slide the proper set collar onto the tube up to the moving die and tighten the set screw.

Step 7: Look at the magnetic gauge (66). The edge of the tube gauge (11) should be on the 0/45/90/135 line. Slide the magnetic gauge on the cylinder to 'zero' the gauge.

Step 8: Bend the tube by moving the control valve lever down. As the proper degree of bend is approached, slow the speed by moving the control valve lever up toward the center position. When the proper angle is reached, stop the bend and retract the cylinder slightly, allowing the sunbursts to rotate from the spring back. Note the approximate degrees of spring back. Making sure the sunburst pusher (12) is properly seated in the sunbursts (3), overbend the tubing by the degrees of spring back.

Step 9: Retract the cylinder again (allowing the sunbursts to rotate from the spring back) far enough to allow for removal of the hitch pin (15). Mark the tubing at the end of the moving die and loosen the set screw (93). Remove the hitch pin and moving die.

Step 10: Slide the bent tubing out of the **MP9500 Bender** and measure the bend angle. It is very likely the tubing will be slightly under bent. If so, slide the tubing back into the MP9500, reinstall the moving die in the same position (using the mark put on the tubing in step 9), tighten the set screw and reinsert the hitch pin. Bend the tubing slightly more noting the degree of bend. Remove, re-measure and repeat as necessary. Once the proper bend has been accomplished, the degree of bend as observed using the magnetic gauge will have been established. The same bend in other pieces of the same tubing can then be repeated in one shot.

NOTE: WITH EXPERIENCE, THE DEGREES OF OVERBENDING NECESSARY FOR VARIOUS TUBING AND PIPE WILL BECOME KNOWN AND MINIMIZE THE EFFORT DESCRIBED IN STEP 10.

BENDING TUBE AND PIPE

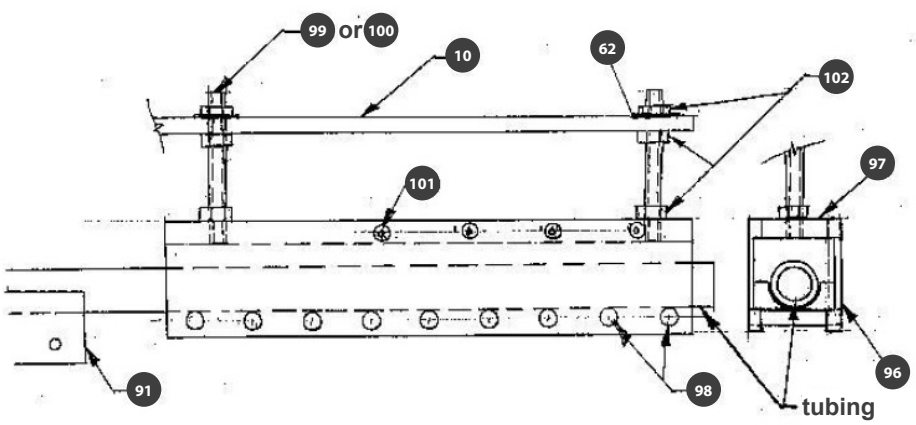

FIGURE 9

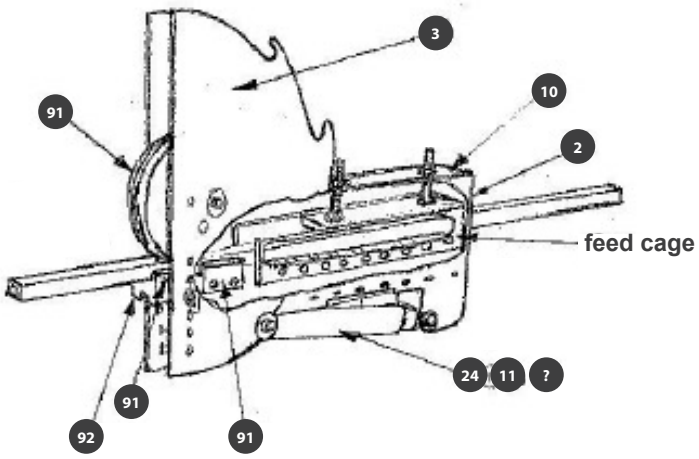

FIGURE 10

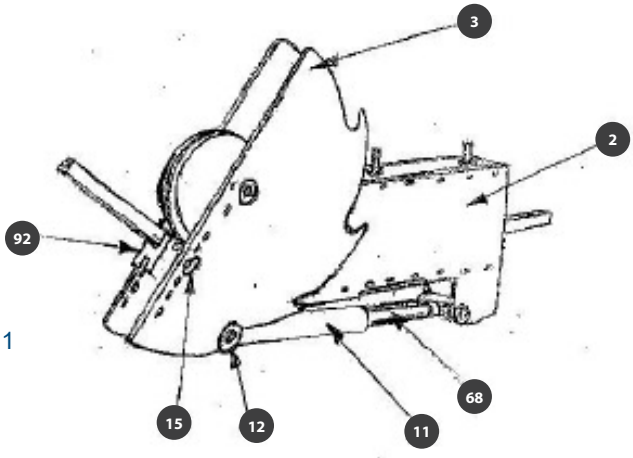

FIGURE 11

BENDING INSTRUCTIONS AND TERMINOLOGY

WARNING: WEAR APPROVED EYE PROTECTION WHEN OPERATING THE MP9500 TUBING BENDER. OBSERVE THE WARNINGS DISPLAYED AND KEEP HANDS AND CLOTHING CLEAR OF ALL MOVING PARTS.

The movement of the foot switch determines the direction of travel. Depressing one pedal down causes the cylinder rod to extend, moving the other foot pedal causes the cylinder rod to retract.

Releasing the foot switch returns it to the center position; this stops, but does not reverse, the travel direction.

Speed of travel is regulated by how far the foot switch is depressed. As foot switch is moved further downward or upward, the speed of travel increases.

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BEND RADIUS – Refer to Figures 12, 13

The **MP9500 Bender** can be used to bend from ½" to 2" square tubing, ½" to 2" round tubing and ½" to 1½" pipe.
Pages 19 & 20 indicate the minimum and maximum wall thicknesses that can be consistently and accurately formed.

The size of the rotating die determines the bend radius of the tubing. With square tubing, the bend radius is the "inside" radius of the bent tube. With round tubing or pipe, the bend radius is the "centerline" of the tube or pipe.

NOTE: BECAUSE ALL TUBING WILL EXHIBIT SOME AMOUNT OF "SPRINGBACK", THE FINISHED BEND RADIUS MAY BE SLIGHTLY LARGER THAN THE ROTATING DIE SIZE.

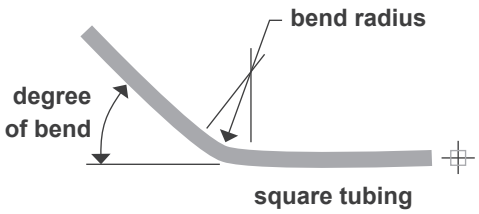

FIGURE 12

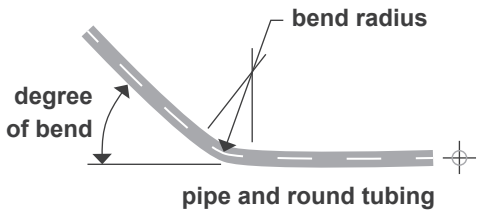

FIGURE 13

DEGREE OF BEND – Refer to Figures 5, 8, 9, 12, 13

The **MP9500 Bender** can bend tubing up to 180 degrees. Each step on the sunbursts can yield at least 45 degrees of bend. Therefore, to bend the tubing 180 degrees, 4 strokes of the cylinder are required.

A bending gauge (66) is magnetically affixed to the cylinder. The gauge is calibrated to measure the degrees of rotation of the sunbursts in each of the 4 strokes of the cylinder. Setting the gauge to zero relative to the tube gauge (11) at the absolute start of the bend ensures the best accuracy.

NOTE: BECAUSE OF 'SPRINGBACK' THE TUBING MAY NEED TO BE BENT PAST THE DEGREE OF BEND REQUIRED. SOME TUBING MAY SPRINGBACK UP TO 10 DEGREES AND REQUIRE AN EQUAL AMOUNT OF OVER BENDING.

When doing multiple tubes with the same bend, an initial sample should be made and verified as accurate while noting the necessary bend angle on the magnetic gauge allowing for spring back. Bending repeatability is then accomplished.

FEED CAGE – Refer to Figures 9, 10

The **MP9500 Bender** is equipped with an adjustable 'feed cage.' The purpose of the feed cage is to support the tubing as it is drawn through the bender head to ensure that the degree of bend remains accurate and consistent. Additionally, the feed cage absorbs the downward pressure of the tubing created by the bending process. This pressure can be detrimental to the stationary die (91), the 1/2" x 3-5/8" pins (13) and the side plates (2). Additionally, the tubing itself can be scraped and damaged by the stationary die which has a hardened surface.

WARNING: BENDING LARGE OR HEAVY PIPE OR TUBING WITHOUT USING OR PROPERLY ADJUSTING THE FEED CAGE WILL RESULT IN DAMAGE TO THE MP9500 TUBING BENDER.

The feed cage is adjusted properly when the top of the rollers are the same height as the bottom of the tubing groove in the stationary die as shown.

NOTE: THE ⅝ -11 X 7½" THREADED RODS (99) ARE USED TO SUPPORT THE FEED CAGE WHEN EITHER THE 5" OR 6" RADIUS DIES ARE USED. THE ⅝ -11 X 4" THREADED RODS (100) ARE USED WITH THE 3" OR 4" RADIUS DIES. ONLY THE TWO ⅝ -11 HEX NUTS (102) ON TOP OF THE BENDER ARE USED WHEN ADJUSTING THE FEED CAGE FOR USE WITH 3" RADIUS DIES.

BENDING 2" PIPE – Refer to Figure 14

The 2” pipe die does not use the “Feed Cage” to support the tube. Instead, a ⅝" steel support plate laid directly on bottom plate (#9) supports the pipe. Refer to the drawing below for proper positioning.

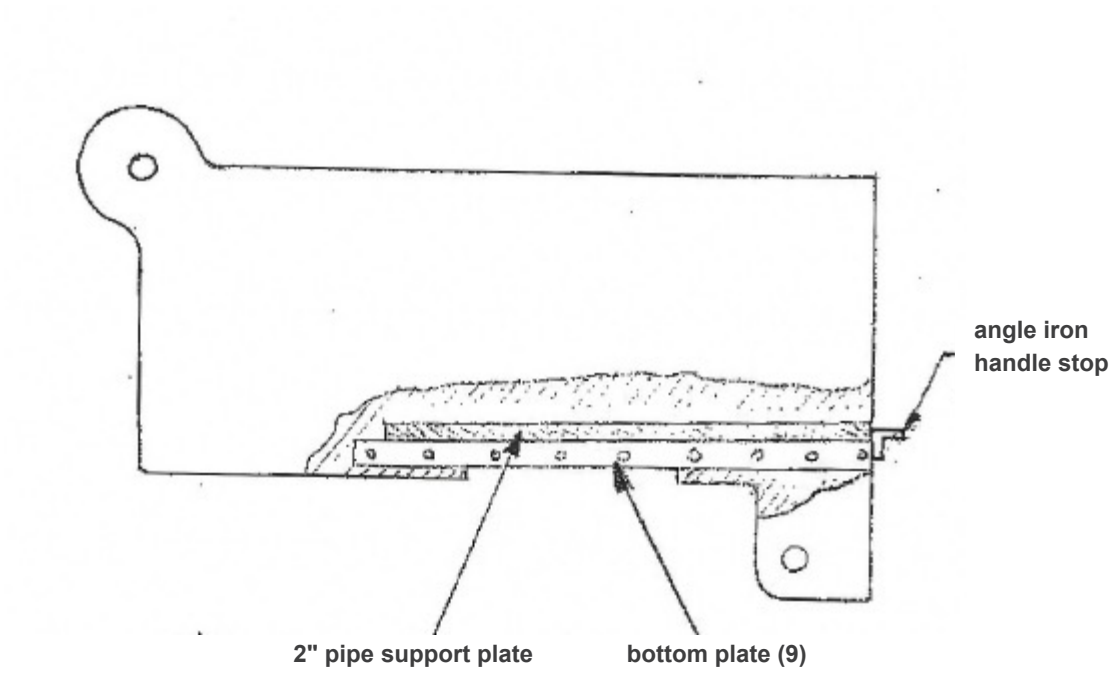

FIGURE 14

TUBING USAGE

Square Tubing	Bend Angle in Degrees									
	15	**30**	**45**	**60**	**75**	**90**	**120**	**150**	**180**	**Usage per degree**
½", 3" radius	.85"	1.7"	2.55"	3.40"	4.25"	5.10"	6.81"	8.51"	10.21"	.057"
4" radius	1.11"	2.22"	3.34"	4.45"	5.56"	6.67"	8.9"	11.12"	13.35"	.074"
5" radius	1.37"	2.75"	4.12"	5.5"	6.87"	8.25"	10.99"	13.74"	16.49"	.092"
6" radius	1.64"	3.27"	4.91"	6.54"	8.18"	9.82"	13.09"	16.36"	19.63"	.109"
⅝", 3" radius	.87"	1.73"	2.60"	3.47"	4.34"	5.20"	6.94"	8.67"	10.4"	.058"
4" radius	1.13"	2.26"	3.39"	4.52"	5.64"	6.77"	9.03"	11.29"	13.55"	.075"
5" radius	1.39"	2.78"	4.17"	5.56"	6.95"	8.34"	11.12"	13.91"	16.69"	.093"
6" radius	1.65"	3.30"	4.96"	6.61"	8.26"	9.91"	13.22"	16.52"	19.83"	.11"
¾", 3" radius	.88"	1.77"	2.65"	3.53"	4.42"	5.30"	7.07"	8.83"	10.6"	.059"
4" radius	1.15"	2.29"	3.44"	4.58"	5.73"	6.87"	9.16"	11.45"	13.74"	.076"
5" radius	1.41"	2.81"	4.22"	5.63"	7.03"	8.44"	11.26"	14.07"	16.88"	.094"
6" radius	1.67"	3.34"	5.01"	6.67"	8.34"	10.01"	13.35"	16.69"	20.02"	.111"
⅞", 3" radius	.9"	1.8"	2.7"	3.6"	4.5"	5.4"	7.2"	9"	10.8"	.06"
4" radius	1.16"	2.32"	3.48"	4.6"	5.81"	6.97"	9.29"	11.62"	13.94"	.077"
5" radius	1.42"	2.85"	4.27"	5.69"	7.12"	8.54"	11.39"	14.23"	17.08"	.095"
6" radius	1.69"	3.37"	5.06"	6.74"	8.43"	10.11"	13.48"	16.85"	20.22"	.112"
1", 3" radius	.92"	1.83"	2.75"	3.66"	4.58"	5.5"	7.3"	9.16"	10.99"	.061"
4" radius	1.18"	2.36"	3.53"	4.71"	5.89"	7.07"	9.4"	11.78"	14.13"	.079"
5" radius	1.44"	2.88"	4.32"	5.76"	7.2"	8.6"	11.52"	14.4"	17.28"	.096"
6" radius	1.7"	3.4"	5.1"	6.81"	8.51"	10.21"	13.61"	17.01"	20.42"	.113"
1⅛", 3" radius	.93"	1.86"	2.8"	3.73"	4.66"	5.59"	7.46"	9.32"	11.19"	.062"
4" radius	1.19"	2.39"	3.58"	4.78"	5.967"	7.17"	9.55"	11.94"	14.33"	.08"
5" radius	1.46"	2.91"	4.37"	5.82"	7.28"	8.74"	11.65"	14.56"	17.47"	.097"
6" radius	1.72"	3.44"	5.15"	6.87"	8.59"	10.31"	13.74"	17.18"	20.61"	.115"
1¼", 3" radius	.95"	1.9"	2.85"	3.8"	4.74"	5.69"	7.59"	9.49"	11.39"	.063"
4" radius	1.21"	2.42"	3.63"	4.84"	6.05"	7.26"	9.68"	12.11"	14.53"	.081"
5" radius	1.47"	2.94"	4.42"	5.89"	7.36"	8.83"	11.78"	14.72"	17.67"	.098"
6" radius	1.73"	3.47"	5.2"	6.93"	8.67"	10.4"	13.87"	17.34"	20.81"	.116"
1⅜", 3" radius	.97"	1.93"	2.9"	3.86"	4.83"	5.79"	7.72"	9.65"	11.58"	.064"
4" radius	1.23"	2.45"	3.68"	4.91"	6.13"	7.36"	9.82"	12.27"	14.72"	.082"
5" radius	1.49"	2.98"	4.47"	5.95"	7.44"	8.93"	11.91"	14.89"	17.86"	.099"
6" radius	1.75"	3.5"	5.25"	7"	8.75"	10.5"	14"	17.5"	21"	.117"
1½", 4" radius	1.24"	2.49"	3.73"	4.97"	6.22"	7.46"	9.95"	12.43"	14.92"	.083"
5" radius	1.51"	3.01"	4.52"	6.02"	7.53"	9.03"	12.04"	15.05"	18.06"	.1"
6" radius	1.77"	3.53"	5.3"	7.07"	8.83"	10.6"	14.13"	17.67"	21.2"	.118"
1¾", 5" radius	1.54"	3.08"	4.61"	6.15"	7.69"	9.23"	12.3"	15.38"	18.45"	.103"
6" radius	1.8"	3.6"	5.4"	7.2"	9"	10.8"	14.4"	18"	21.6"	.12"
2", 6" radius	1.83"	3.66"	5.5"	7.33"	9.16"	11"	14.66"	18.32"	21.99"	0.122"

TUBING USAGE

Round Tubing	Bend Angle in Degrees									
	15	**30**	**45**	**60**	**75**	**90**	**120**	**150**	**180**	**Usage per degree**
3" die radius	.79"	1.57"	2.36"	3.14"	3.93"	4.71"	6.28"	7.85"	9.42"	.053"
4" die radius	1.05"	2.09"	3.14"	4.19"	5.24"	6.28"	8.37"	10.47"	12.56"	.070"
5" die radius	1.31"	2.62"	3.93"	5.24"	6.54"	7.85"	10.47"	13.08"	15.70"	.087"
6" die radius	1.57"	3.14"	4.71"	6.28"	7.85"	9.42"	12.56"	15.70"	18.84"	.105"
7" die radius	1.83"	3.66"	5.50"	7.33"	9.16"	10.99"	14.66"	18.32"	21.99"	.122"

MAINTENANCE

During maintenance of the **MP9500 Bender**, also check condition of all hydraulic and moving parts. Repair any damage and replace any worn parts. Call METALpro customer service with any questions or concerns.

CLEANING

WARNING: ALWAYS WEAR EYE PROTECTION WHEN CLEANING THE Bender

Step 1: Keep the Tubing Bender clean. Periodically remove chips, dirt and debris from the Tubing Bender, paying particular attention to the interior around the dies and feed cage. Use an appropriate brush to remove heavy accumulations. During periods of heavy use, clean the Tubing Bender more frequently.

Step 2: Wipe away any oil that is found. It may be hydraulic oil, which indicates a hydraulic system leak. Inspect the Tubing Bender hydraulic system and repair any leaks.

HYDRAULIC SYSTEM MAINTENANCE

Recommended ISO 32 hydraulic oil, AW/AL hydraulic oil ISO 68 SAE 20W/20, ISO 32 SAE 10W, Mobil DTE 24-SSU or equal

Step 1: Check the entire hydraulic system for signs of leakage and check the condition of all hydraulic hoses at least monthly. Replace any damaged hoses and eliminate any leaks found.

Step 2: Remove the breather/fill plug from the hydraulic reservoir to check the oil level and condition. Add hydraulic oil if necessary to within 1" of the top of the reservoir.

Step 3: Check the oil condition. Although the oil is colored, it must be clean. If the oil is contaminated, drain the pump, the hydraulic cylinder, and the reservoir. Clean the interior of the reservoir, fill, and reprime the hydraulic system as described **previously.**

MP9500 **Accessories**

USA MADE | DURABLE | AFFORDABLE

MP9500 **Round Tube Dies**

Size	Part #	Description	C/L Radius	List Price	Minimum Wall	Maximum Wall	Lbs
½", ⅝", ¾"	MP95T-012	½", ⅝", ¾" round tube die set	3"	$1250.00	.035/.049/.049	.187/.187/.187	34
⅞", 1"	MP95T-078	⅞", 1" round tube die set	4"	$1250.00	.049/.065	.187	34
1", 1⅜"	MP95T-100	1", 1⅜" round tube die set	5"	$1250.00	.049/.083	0.187	33
1⅛", 1¼"	MP95T-118	1⅛", 1¼" round tube die set	6"	$1250.00	.049/.065	0.187	93
1½"	MP95T-112	1½" round tube die set	6"	$1250.00	0.095	0.187	96
1¾"	MP95T-134	1¾" round tube die set	6"	$1250.00	0.109	0.187	91
2"	MP95T-200	2" round tube die set	6"	$1250.00	0.120	0.187	89

MP9500 **Round Pipe Die Sets**

Size	Part #	Description	C/L Radius	List Price	Minimum Wall	Maximum Wall	Lbs
1½", ¾"	MP95P-012	½", ¾" pipe die set	3"	$1250.00	Schedule 40	Schedule 80	38
¾", 1"	MP95P-034	¾", 1" pipe die set	4"	$1250.00	Schedule 40	Schedule 80	45
1¼"	MP95P-114	1¼" pipe die set	5"	$1250.00	Schedule 40	Schedule 80	67
1½"	MP95P-112	1½" pipe die set	6"	$1250.00	Schedule 40	Schedule 80	89
2"	MP95P-200	pipe die set	7"	$1250.00	Schedule 40	Schedule 80	98

METALpro

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MP9500 **Accessories**

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MP9500 **Square Tube Die Sets**

Size	Part #	Description	C/L Radius	List Price	Minimum Wall	Maximum Wall	Lbs
½"	MP95S-012	½" Square tube die set	3"	$1425.00	.065	.065	36
⅝"	MP95S-058	⅝" Square tube die set	4"	$1425.00	.049	.065	55
¾"	MP95S-034	¾" Square tube die set	4"	$1425.00	.049	.120	55
⅞"	MP95S-078	⅞" Square tube die set	4"	$1425.00	.083	.083	56
1"	MP95S-100	1" Square tube die set	5"	$1425.00	.049	.120	75
1⅛"	MP95S-118	1⅛" Square tube die set	5"	$1425.00	.065	.065	75
1¼"	MP95S-114	1¼" Square tube die set	5"	$1425.00	.065	.120	75
1½"	MP95S-112	1½" Square tube die set	6"	$1425.00	.109	.120	109
1¾"	MP95S-134	1¾" Square tube die set	6"	$1425.00	.120	.120	109
2"	MP95S-200	2" Square tube die set	6"	$1425.00	.120	.120	109

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