

- 1 -

MB MITTLER BROS. MACHINE & TOOL

Operating, Servicing, and Safety Manual

Model # 2500 180° Hydraulic Bender



CAUTION: Read and Understand

These Operating, Servicing, and
Safety Instructions, Before Using
This Machine.

1-800-467-2464

10 Cooperative Way Wright City, MO 63390

P.O. Box 110 Foristell, MO 63348

1-636-745-7757 Fax 1-636-745-2874

www.mittlerbros.com

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SAFETY

The purpose of the safety section of this manual is to inform operators and maintenance personnel of the precautions to be taken while operating or servicing the machine. The following are a few basic guidelines to follow, but as with any type of machinery good judgment and a safe attitude should be applied at all times.

1. Always disconnect power, lock-out and tag-out machine per OSHA regulations before attempting to service this machine.
2. Always wear safety glasses or other approved eye protection while operating or servicing the machine.
3. Keep all body parts and any foreign objects away from moving parts. Do not reach into the machine without first disconnecting all power sources.
4. Do not attempt to override any safety device on the machine.
5. Do not operate the machine if it has been damaged or is not operating properly.
6. Do not wear jewelry (watches, rings, necklaces, etc.), or loose fitting clothing while operating or servicing the machine.
7. The machine should only be operated or serviced by properly trained, authorized personnel.
8. Replacement parts should have the same specification and operation as the original parts on the machine.
9. All guards and covers must be in place before operating the machine.
10. Before starting the machine be sure it is set up properly.
11. Make sure the machine is properly grounded.
12. The machine and work area should be kept neat and clean.
13. Do not operate or service any machine while under the influence of drugs or alcohol.

NOTE: THESE SAFETY RULES ARE FOR YOUR BENEFIT TO HELP PREVENT INJURY TO YOURSELF AND/OR YOUR CO-WORKERS. REVIEW ALL SETUP AND OPERATING PROCEDURES, WHETHER COVERED OR NOT, IN THIS MANUAL TO HELP INSURE **SAFE OPERATION OF THE MACHINE.**

HYDRAULIC SAFETY PRECAUTIONS

WARNING

General Operation

- All WARNING statements must be carefully observed to help prevent personal injury.
- Before operating the pump, all hose connections must be tightened with the proper tools. Do not over tighten. Connections should only be tightened securely and leak-free. Over tightening can cause premature thread failure or high pressure fittings to split at pressures lower than their rated capacities.
- Should a hydraulic hose ever rupture, burst, or need to be disconnected, immediately shut off the pump and release all pressure. Never attempt to grasp a leaking pressurized hose with your hands. The force of escaping hydraulic fluid could cause serious injury.
- Do not subject the hose to potential hazard such as fire, sharp surfaces, extreme heat or cold or heavy impact. Do not allow the hose to be altered or kink, twist, curl, crush, cut, or bend so tightly that the fluid flow within the hose is blocked or reduced. Periodically inspect the hose for wear, because any of these condition's can damage the hose and possibly result in personal injury.
- Do not use the hose to move attached equipment. Stress can damage hose and possibly cause personal injury.
- Hose material and coupler seals must be compatible with the hydraulic fluid used. Hoses also must not come in contact with corrosive materials such as creosote-impregnated objects and some paints. Consult the manufacturer before painting a hose. Hose deterioration due to corrosive materials can result in personal injury. Never paint the couplers.
- Inspect machine for wear, damage, and correct function before each use. Do not use machinery that is not in proper working order, but repair or replace it as necessary.
- Replace worn or damaged safety decals.
- Modification of a product requires written Power Team authorization.
- Use only components with the same pressure rating when assembling a system or machine.

Pump

- Do not exceed the hydraulic pressure rating noted on the pump data plate or tamper with the internal high pressure relief valve. Creating pressure beyond the rated pressure can result in personal injury.
- Before replenishing the fluid level, retract the system to prevent overfilling the pump reservoir. An overfill can cause personal injury due to excess reservoir pressure create when cylinders are retracted.

Air Supply

- Shut off and disconnect the air supply when the pump is not in use or before breaking any connections in the system.

PREPARATION & SET-UP

Air Supply Hook-Up

Remove the thread protector from the air inlet of the pump. Select and install the threaded fittings which are compatible with your air supply fittings. The air supply should be 20 CFM (.57 M³/min.) and 100 PSI (7 BAR) at the pump to obtain the rated hydraulic pressure. Air pressure should be regulated to a maximum of 140 PSI (9 BAR). Secure your pump fitting to the air supply.

WARNING: If improperly used, pressurized equipment can be potentially hazardous. Therefore:

- Hydraulic connections must be securely fastened before building pressure in the system.
- Release all system pressure before loosening any hydraulic connection in the system.

Venting the Reservoir

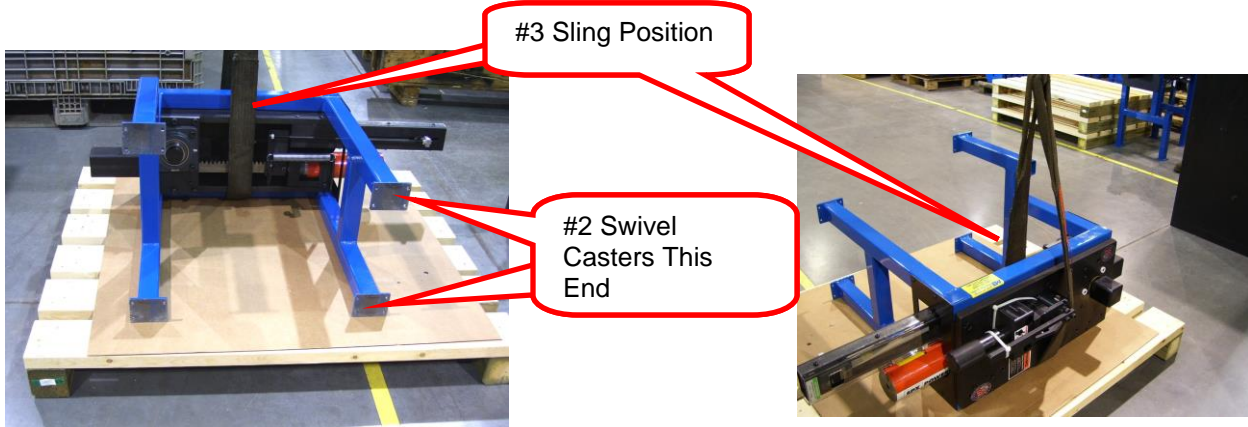
To improve hydraulic fluid delivery and increase useable hydraulic fluid capacity, remove shipping plug and install filler/vent cap before using the pump.

#2500 BENDER CONTENTS

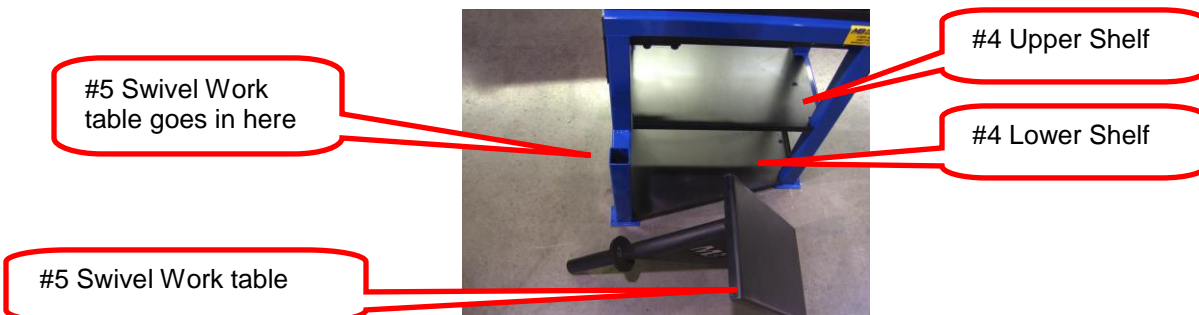
- 1ea Main bender assembly mounted to stand
- 1ea Swivel work table
- 1ea Rectangle shaped shelf
- 1ea Angle shaped shelf
- 2ea Rigid casters
- 2ea Swivel Casters, Locking
- 16ea 5/16-18 x 3/4 Hex Bolt (for mounting casters)
- 16ea 5/16-18 Hex Nut (for mounting casters)
- 16ea 5/16 Lock washer (for mounting casters)
- 16ea 5/16 Flat washer (for mounting casters)
- 5ea “U” spacers for pressure roller shaft, 1” thick
- 1ea #2500-300 Small adjustable Saddle
- 1ea #2500-301 Medium adjustable Saddle
- 1ea Operating, Servicing, and Safety Manual

UNCRATE & SETUP

1. Remove shrink wrap and upper crating structure. Remove the two black shelves and work table from the skid. Locate the box that contains the casters.
2. Attach the casters to the mounting plates using the supplied hardware. The swivel casters should be mounted on the same end of the machine as the hydraulic cylinder and digital readout.



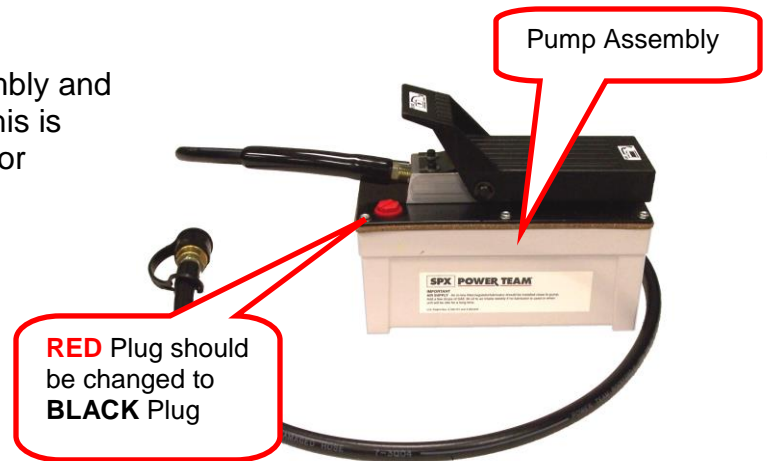
3. Once the casters are installed, use a sling positioned as shown above, to lift the machine onto the casters. **CAUTION: MACHINE IS HEAVY AND MAY CAUSE DAMAGE OR INJURY IF CARE IS NOT USED.**
4. Install the bottom shelf (with angled side) onto the bottom of the frame. It will rest on the caster mounting plates. The bent sides point up. Install the upper shelf (rectangle shaped) next. This one also should have the bent sides pointing up. You will have to tilt the shelves to fit in between the legs and then lay them flat.



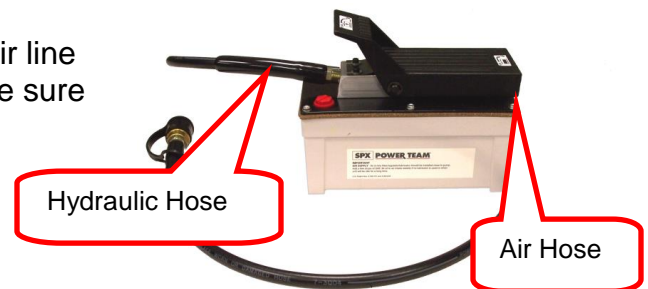
5. Slip the swivel work table into the open end of the square tube leg

HYDRAULIC SYSTEM

1. Remove the **RED Plug** in the pump assembly and replace with the supplied **BLACK plug**. This is the reservoir venting system and damage or inoperability may result if not changed out.



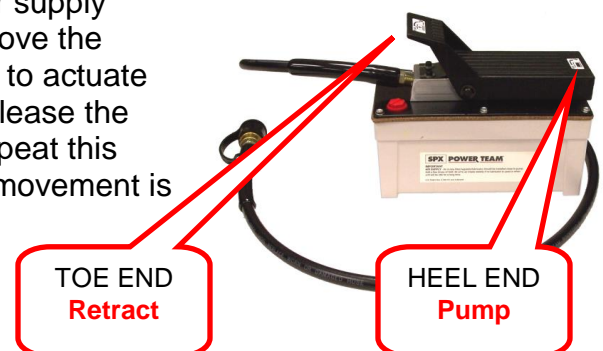
2. Attach the hydraulic hose to the pump. Attach an air line fitting for your shop air to other end of the pump. Be sure to use a quality thread sealer on both connections



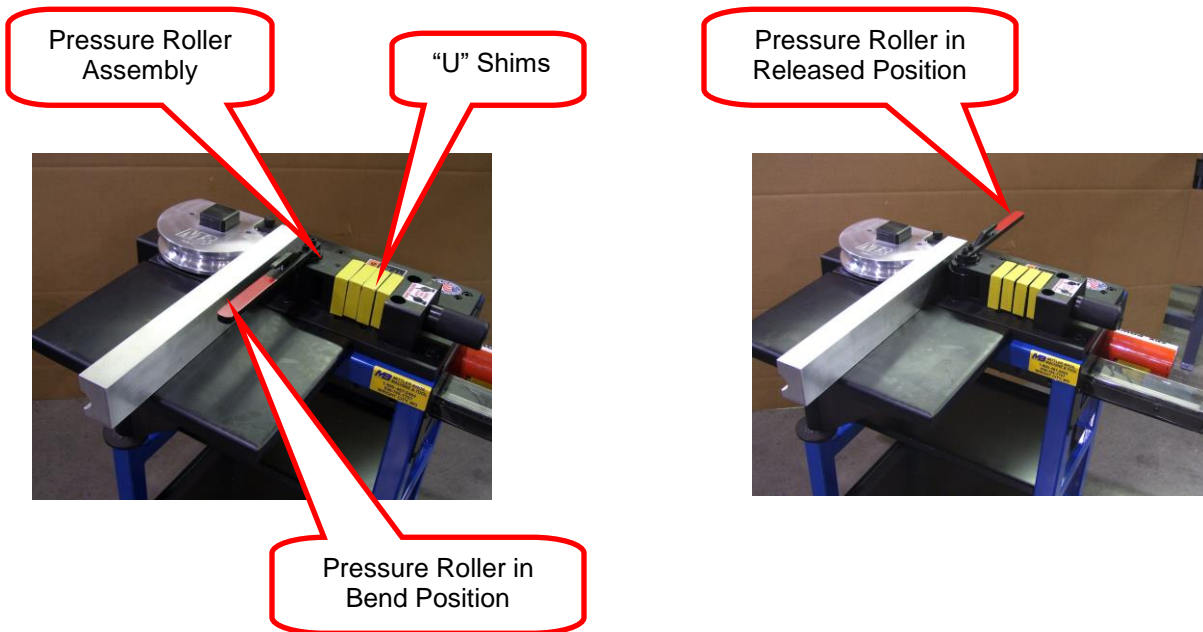
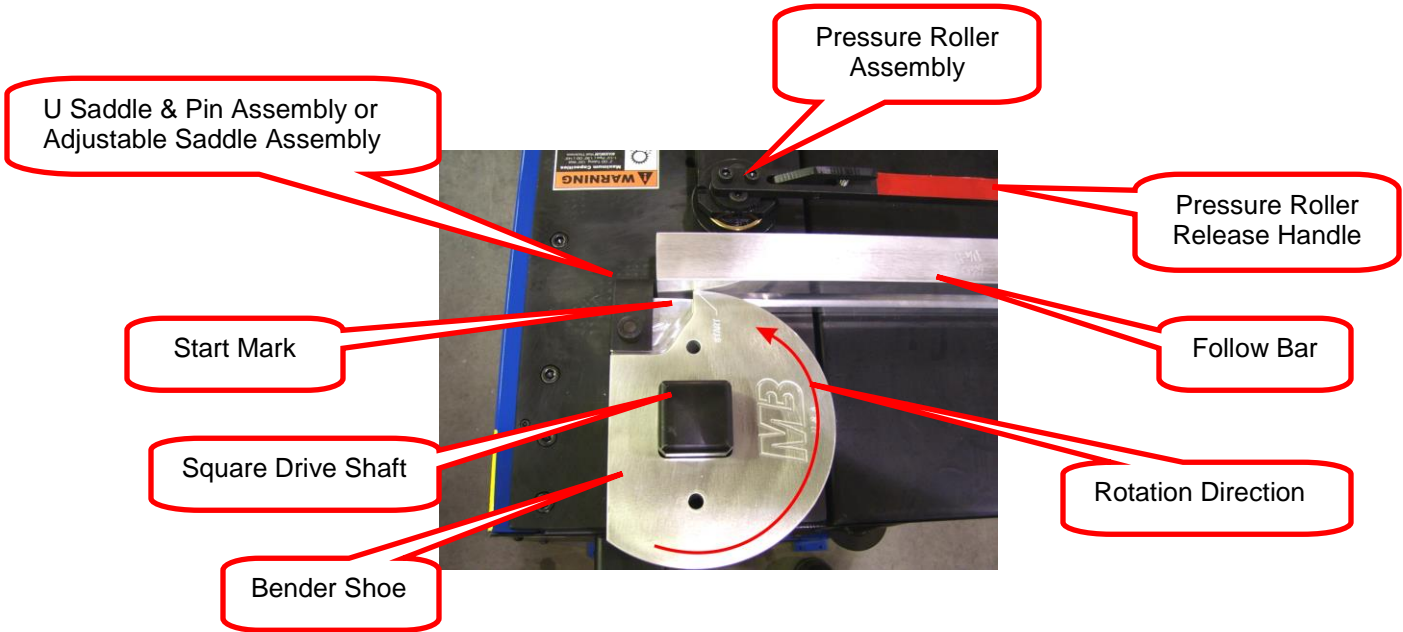
3. Push the pump foot pedal to the release position (TOE END) to relieve all internal pressure. Push the MALE hose end, from the pump, into the FEMALE Cylinder fitting & then thread the retainer collar hand tight. This procedure will insure that the male & female fittings positively seat against each other, eliminating any possibility of air locking. Failing to follow this procedure may cause the cylinder to not retract and / or leak.



4. **BLEED THE CYLINDER**; Connect a compressed air supply (90PSI) to the pump. Elevate the pump and hose above the cylinder. Push the hydraulic pump pedal **HEEL END** to actuate the cylinder. Run the cylinder out about half way. Release the pump by pressing on the **TOE END** of the pedal. Repeat this process three or four times or until the ram cylinder movement is smooth.



GETTING READY TO BEND



1. Slide the main **Bender Shoe** over the **Square Drive Shaft**. Be sure that the **MB** and **START** are facing up and that they are positioned as shown above. The **START** engraving should be closest to the **Pressure Roller Assembly**.
2. Position the **Pressure Roller Assembly** to the correct position by adding or subtracting "U" shims until the follow bar is almost touching the bender shoe, **Be Sure the Pressure Release Handle Is in the Bend Position as Shown**.

3. Move the **Pressure Release Handle** to the RELEASED position and place the tubing (which has already been marked with the bend start points) into the **Bender Shoe** with the first bend start mark aligned with the **START** arrow on the **Bender Shoe**. Slip the **“U” Saddle** or **Adjustable Saddle** over the tubing and the **Bender Shoe**. Align the holes and install the pin, if using the adjustable saddle, tighten down the clamp knob.
CAUTION: THE PIN MUST BE COMPLETELY THROUGH BOTH SIDES OF THE “U” SADDLE! FAILURE TO HAVE PIN COMPLETELY INSTALLED MAY RESULT IN EQUIPMENT DAMAGE AND / OR PERSONEL INJURY!
4. Align the front edge of the **Follow Bar** with the **START** arrow on the **Bender Shoe**. Be sure the start mark on the tubing is still lined up with the **START** arrow as well. Run the **Pressure Roller Adjusting Shaft** up to the Follow Bar.
5. **PRESSURE ROLLER ADJUSTMENT:** Move the Pressure Roller Release Handle into the BEND position being sure that it locks into place.
6. Start bending by stepping on the foot pedal. Go slowly and stop as soon as all of the slack in the shoe, follow bar & pressure roller is taken up.

DIGITAL READOUT OPERATION

1. Turn **“ON”** the **Digital Readout Assembly**.
2. Press the **“in/mm”** button so that the **“mm”** scale is readable. **NOTE:** Using the **“mm”** scale will provide a one degree of bend readout for each **“mm”** of indicator travel, for example, a 45mm reading is equivalent to 45° of bend.
3. Press the **“zero”** button when you have taken all of the slack up (**step 6 above**). This will give you an accurate degree reading.



TUBING SPRING BACK

The tubing material, wall thickness and amount of bend angle will all influence the amount of spring-back that must be allowed for.

It is best to test a sample piece of tubing to determine the “spring-back” before making your first bend with the type tubing material, wall thickness, and bend angle. Example: Make a 90-degree bend (digital readout reading 90-degrees) and remove from the shoe. Position the bent tube on the flat table top of bender with bent angle pointing up and measure the angle of the bend. If the bend is 87-degrees, then 3-degrees of spring-back needs to be included, thus bending to 93-degrees will produce a 90-degree finished bend.

PLEASE CONTACT US IF YOU NEED FURTHER ASSISTANCE.

CORRECTED MATHEMATICAL FORMULA FOR HYDRAULIC TUBING BENDER

The following formula should be used to determine the start point for each required bend.

The example will be for a Double Bevel Bend

L1 = 26	25 degree angle
L2 = 15	65 degree angle
L3 = 39	65 degree angle
L4 = 15	25 degree angle
L5 = 26	

Bend #1 Start Point:

$$L1 - \frac{1}{2} \text{ developed length (DL25)} - \frac{1}{2} \text{ (Gain)}$$
$$26'' - \frac{1}{2} (3.064'') - \frac{1}{2} (.050)$$
$$26'' - 1.532'' - .025'' = 24.448$$

Bend #2 Start Point:

$$L1 + L2 - \text{Gain 1} - \frac{1}{2} \text{ (DL65)} - \frac{1}{2} \text{ (Gain 2)}$$
$$26 + 15 - .050 - \frac{1}{2} (7.941) - \frac{1}{2} (.973'')$$
$$26 + 15 - .050 - 3.9705 - .48895 = 36.491$$

Bend #3 Start Point:

$$L1 + L2 + L3 - \text{Gain 1} - \text{Gain 2} - \frac{1}{2} \text{ (DL65)} - \frac{1}{2} \text{ (Gain 3)}$$
$$26 + 15 + 39 - .050'' - .978 - \frac{1}{2}(7.941) - \frac{1}{2} (.972'')$$
$$26 + 15 + 39 - .050'' - .978 - 3.9705 - 0.486 = 74.515$$

Bend #4 Start Point:

$$L1 + L2 + L3 + L4 - \text{Gain 1} - \text{Gain 2} - \text{Gain 3} - \frac{1}{2} \text{ (DL25)} - \frac{1}{2} \text{ (Gain 4)}$$
$$26 + 15 + 39 + 15 - .050 - .978 - .978 - \frac{1}{2} (3.054) - \frac{1}{2} (0.497)$$
$$26 + 15 + 39 + 15 - .050 - .978 - .978 - 1.527 - 0.025 = 91.442$$

GAIN FACTORS

Degree of Bend	Multiplier
1	.0000
2	.0000
3	.0000
4	.0000
5	.0000
6	.0001
7	.0001
8	.0003
9	.0003
10	.0005
11	.0006
12	.0008
13	.0010
14	.0013
15	.0015
16	.0018
17	.0022
18	.0026
19	.0031
20	.0036
21	.0042
22	.0048
23	.0055
24	.0062
25	.0071
26	.0079
27	.0090
28	.0100
29	.0111
30	.0126

Degree of Bend	Multiplier
31	.0136
32	.0150
33	.0165
34	.0181
35	.0197
36	.0215
37	.0234
38	.0254
39	.0276
40	.0298
41	.0322
42	.0347
43	.0373
44	.0400
45	.0430
46	.0461
47	.0493
48	.0527
49	.0562
50	.0600
51	.0637
52	.0679
53	.0721
54	.0766
55	.0812
56	.0860
57	.0911
58	.0963
59	.1018
60	.1075

Degree of Bend	Multiplier
61	.1134
62	.1196
63	.1260
64	.1327
65	.1397
66	.1469
67	.1544
68	.1622
69	.1703
70	.1787
71	.1874
72	.1964
73	.2058
74	.2156
75	.2257
76	.2361
77	.2470
78	.2582
79	.2699
80	.2891
81	.2944
82	.3074
83	.3208
84	.3347
85	.3491
86	.3640
87	.3795
88	.3955
89	.4121
90	.4292

GAIN = GAIN FACTOR FOR DEGREE OF BEND X RADIUS

EXAMPLE:

FIND THE GAIN FOR AN 85 DEGREE BEND
USING A 7 INCH RADIUS

$$\text{GAIN} = .3491 \times 7 = 2.4437 \text{ OR } 2 \frac{7}{16}$$

TABLE FOR OFFSET MULTIPLIER

Degree of Bend	Multiplier
1	57.30
2	28.65
3	19.11
4	14.33
5	11.47
6	9.57
7	8.21
8	7.18
9	6.39
10	5.76
11	5.24
12	4.81
13	4.45
14	4.13
15	3.86
16	3.63
17	3.42
18	3.24
19	3.07
20	2.92
21	2.79
22	2.67
23	2.56
24	2.46

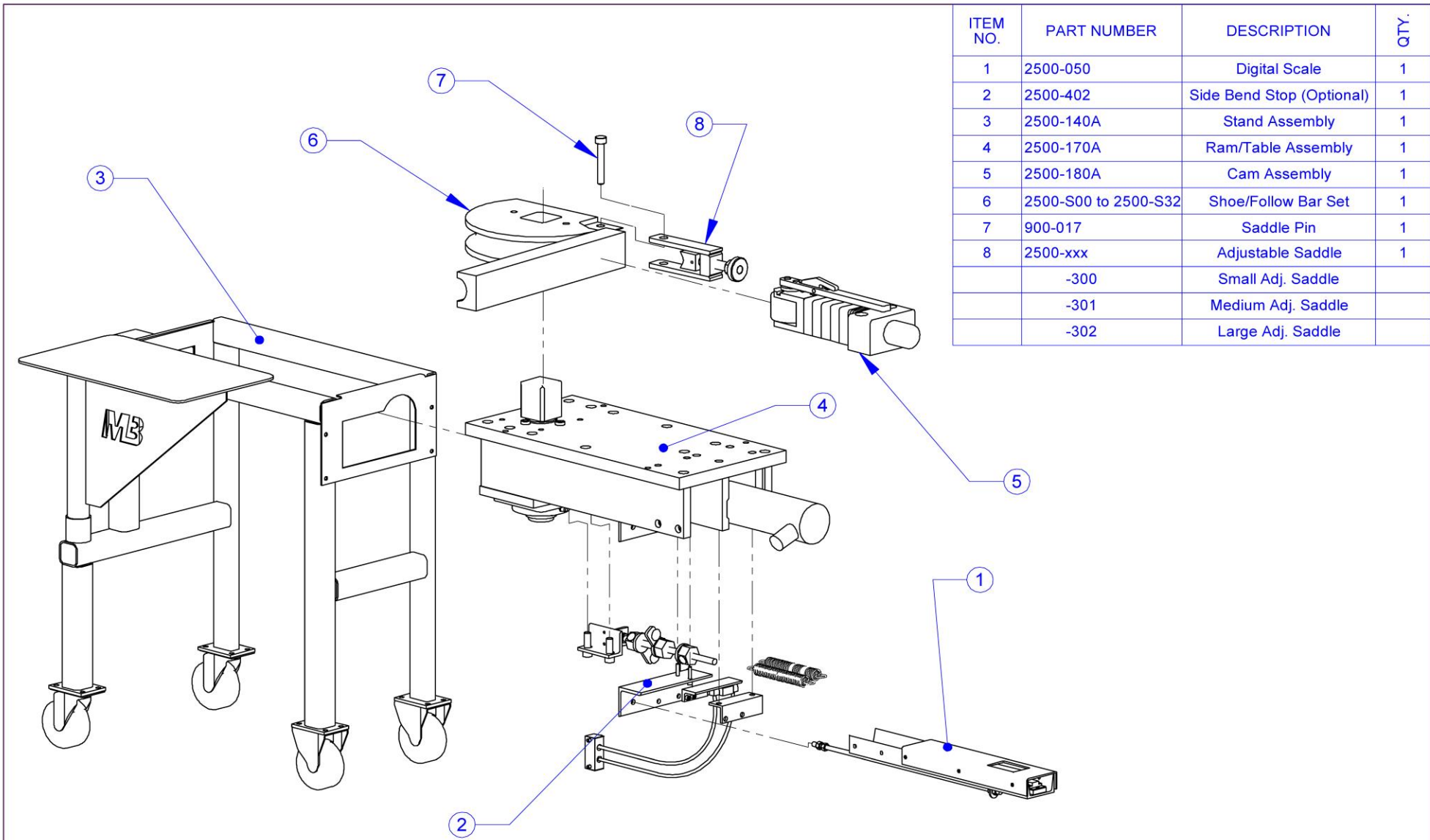
Degree of Bend	Multiplier
25	2.37
26	2.28
27	2.20
28	2.13
29	2.06
30	2.00
31	1.94
32	1.89
33	1.84
34	1.79
35	1.74
36	1.70
37	1.66
38	1.62
39	1.59
40	1.56
41	1.52
42	1.49
43	1.46
44	1.44
45	1.41
46	1.39
47	1.37
48	1.35

DISTANCE BETWEEN BENDS = OFFSET MULTIPLIER FOR DEGREE x OFFSET HEIGHT

EXAMPLE:

**FIND THE DISTANCE BETWEEN BENDS FOR A
15 INCH OFFSET USING 25 DEGREE BENDS.**

DISTANCE BETWEEN BENDS = 2.37 X 15 = 35.55 OR 35 9/16



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-050	Digital Scale	1
2	2500-402	Side Bend Stop (Optional)	1
3	2500-140A	Stand Assembly	1
4	2500-170A	Ram/Table Assembly	1
5	2500-180A	Cam Assembly	1
6	2500-S00 to 2500-S32	Shoe/Follow Bar Set	1
7	900-017	Saddle Pin	1
8	2500-xxx	Adjustable Saddle	1
	-300	Small Adj. Saddle	
	-301	Medium Adj. Saddle	
	-302	Large Adj. Saddle	

4/5/2011		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±.015 ONE PLACE DECIMAL ±.015 TWO PLACE DECIMAL ±.010 THREE PLACE DECIMAL ±.005 ANGULAR ±1°		NAME	DATE
			DRAWN	BAB	3/10/11
			CHECKED		
			ENG APPR.		
			MFG APPR.		
			Q.A.		
		QUANTITY	COMMENTS		
		MATERIAL YYYY			
		FINISH			
	NEXT ASSY	USED ON			
APPLICATION		DO NOT SCALE DRAWING			

MB MITTLER BROS. MACHINE & TOOL
 10 Cooperative Way, Wright City, MO. 63390
 (636)745-7757 Fax (636)745-2874

TITLE:
180 Hyd. Tubing Bender

SIZE	DWG. NO.	REV
A	2500-000	

SCALE: 1:11 WEIGHT: 275.038 SHEET 1 OF 1

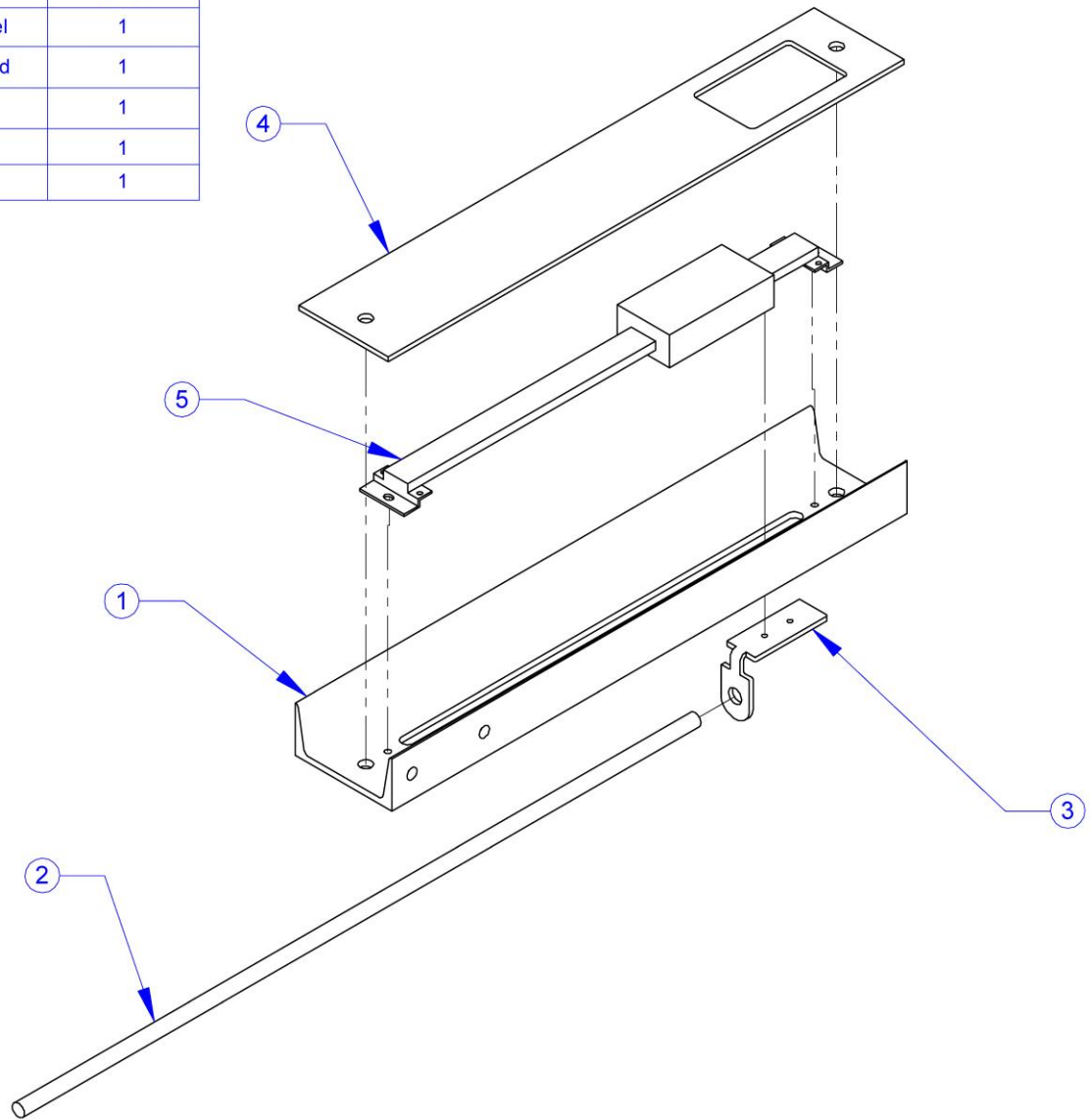
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ITEM NO.	PART NUMBER	Description	QTY.
1	2500-034-03	Digital Mounting Channel	1
2	2500-146	Digital Scale Linkage Rod	1
3	2500-151 Rev A	Digital Scale Mount	1
4	2500-025-03	Lexan Guard	1
5	2500-503	Digital Scale	1

Note:
This Digital Scale Assembly was
used from August 2008 - Present.

Refer to the chart below for Digital Scale
Assemblies from all time periods.

Time Frame That Digital Scale was Manufactured During	Drawing
2001 - Nov 2006	2500-050-01
Dec 2006 - July 2008	2500-050-02
August 2008 - Present	2500-250-03



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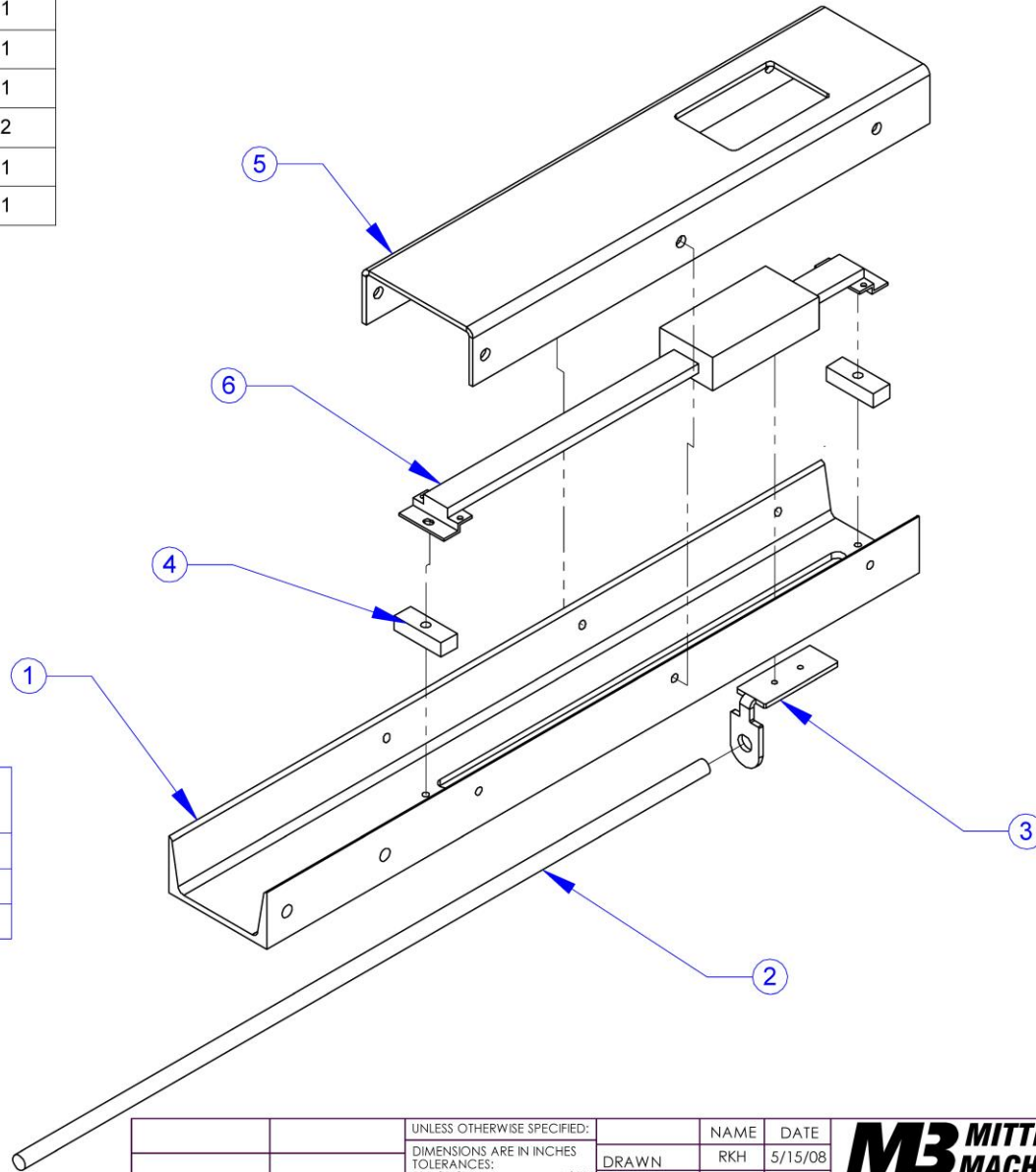
UNLESS OTHERWISE SPECIFIED:		NAME	DATE	MB MITTLER BROS. MACHINE & TOOL 10 Cooperative Way, Wright City, MO. 63390 (636)745-7757 Fax (636)745-2874	
DIMENSIONS ARE IN INCHES		DRAWN	BAB		12/7/10
TOLERANCES:		CHECKED			
FRACTIONAL ±.015		ENG APPR.			
ONE PLACE DECIMAL ±.015		MFG APPR.			
TWO PLACE DECIMAL ±.010		Q.A.			
THREE PLACE DECIMAL ±.005		COMMENTS			
ANGULAR ±1°					
QUANTITY				TITLE:	
MATERIAL				Digital Scale 8/2008 to Present	
FINISH				SIZE DWG. NO. REV	
NEXT ASSY	USED ON			A 2500-050-03	
APPLICATION	DO NOT SCALE DRAWING			SCALE: 1:4 WEIGHT: 7.012 SHEET 1 OF 1	

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-034-02	Digital Mounting Channel	1
2	2500-146	Digital Scale Linkage Rod	1
3	2500-151	Digital Scale Mount	1
4	2500-024	Mnt Pcs for Digital Scale	2
5	2500-025-02	Lexan Guard	1
6	2500-503	Digital Scale	1

Note:
This Digital Scale Assembly was used from Dec. 2006 to July 2008.

Refer to the chart below for Digital Scale Assemblies from all time periods.

Time Frame That Digital Scale was Manufactured During	Drawing
2001 - Nov 2006	2500-050-01
Dec 2006 - July 2008	2500-050-02
August 2008 - Present	2500-250-03

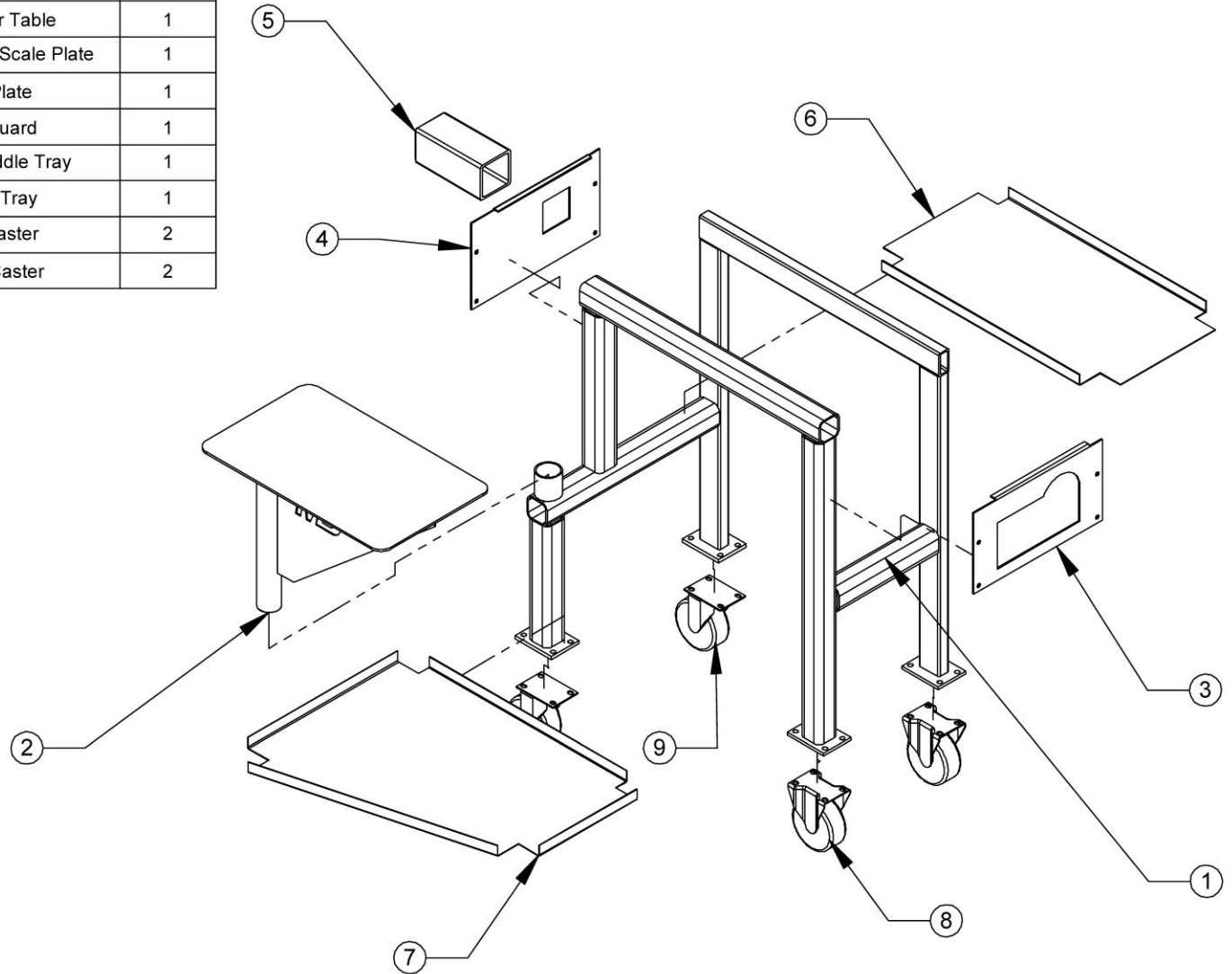


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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE		
		DIMENSIONS ARE IN INCHES		DRAWN	RKH 5/15/08		
		TOLERANCES:		CHECKED			
		FRACTIONAL ±.015		ENG APPR.			
		ONE PLACE DECIMAL ±.015		MFG APPR.			
		TWO PLACE DECIMAL ±.010		Q.A.			
		THREE PLACE DECIMAL ±.005		COMMENTS			
		ANGULAR ±1°					
		QUANTITY	1	TITLE: Digital Scale 12/2006 - 7/2008			
		MATERIAL	yyyy			SIZE	DWG. NO.
		FINISH				A	2500-050-02
NEXT ASSY	USED ON			REV			
APPLICATION		DO NOT SCALE DRAWING		SCALE: 1:4	WEIGHT: 8.619		
				SHEET 1 OF 1			

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10 Cooperative Way, Wright City, MO. 63390
(636)745-7757 Fax (636)745-2874

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-136	180 Bender Stand	1
2	2500-155	Follow Bar Table	1
3	2500-122	Hyd. Cyl./Dig. Scale Plate	1
4	2500-205	Rack Plate	1
5	2500-141	Rack Guard	1
6	2500-139	Stand -- Middle Tray	1
7	2500-138	Bottom Tray	1
8	760-2-04208-445	Rigid Caster	2
9	760-2-04256-445BRK4	Swivel Caster	2



4/5/2011		UNLESS OTHERWISE SPECIFIED:	NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN	BAB
		TOLERANCES:	CHECKED	
		FRACTIONAL ±.015	ENG APPR.	
		ONE PLACE DECIMAL ±.015	MFG APPR.	
		TWO PLACE DECIMAL ±.010	Q.A.	
		THREE PLACE DECIMAL ±.005	COMMENTS	
		ANGULAR ±1°		
		QUANTITY		
		MATERIAL		
		YYYY		
		FINISH		
	NEXT ASSY	USED ON		
		APPLICATION		
		DO NOT SCALE DRAWING		

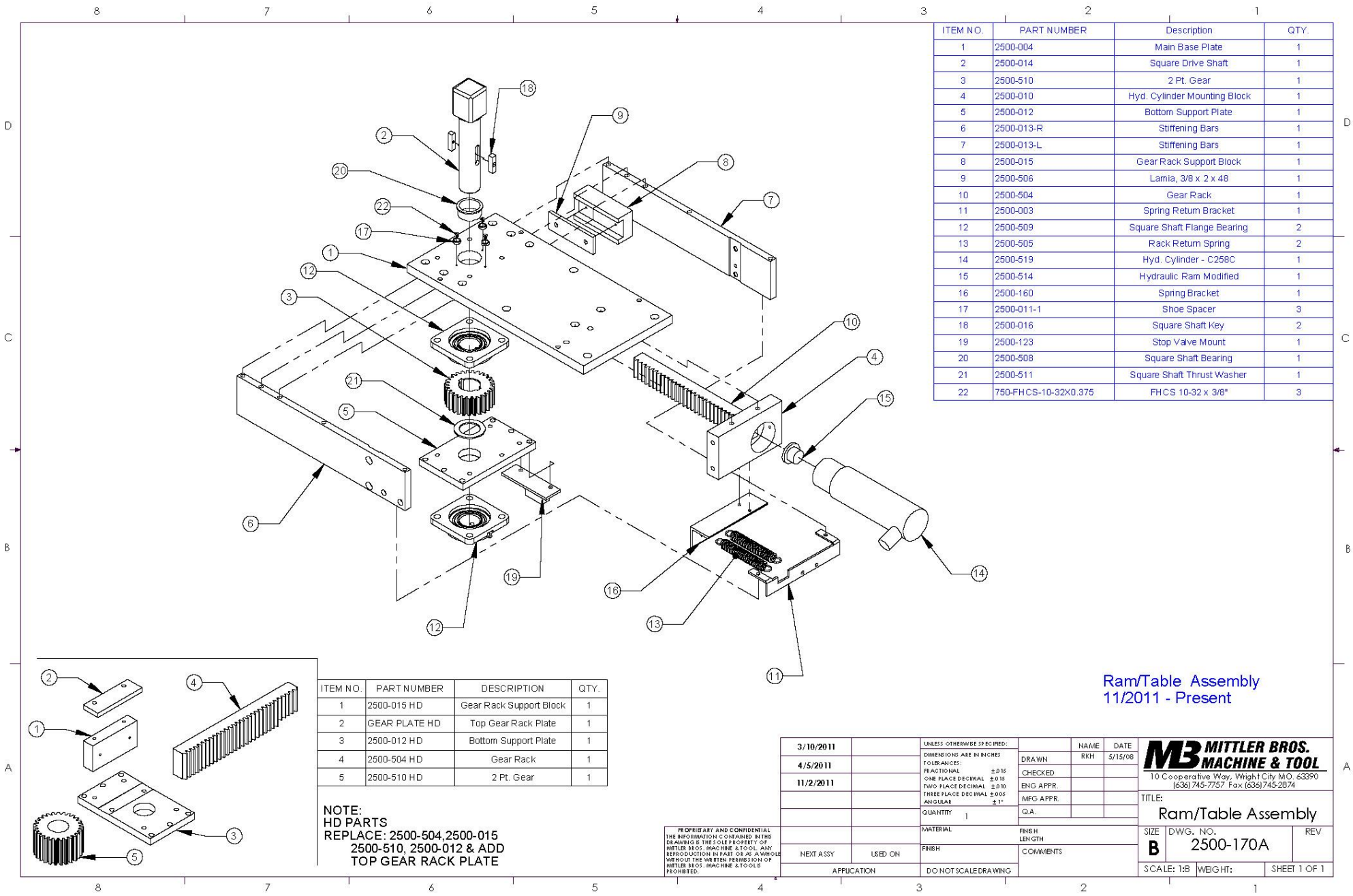
M3 MITTLER BROS. MACHINE & TOOL
 10 Cooperative Way, Wright City, MO, 63390
 (636)745-7757 Fax (636)745-2874

TITLE: **Stand Assembly**

SIZE DWG. NO. REV
A 2500-140A

SCALE: 1:12 WEIGHT: 89.980 SHEET 1 OF 1

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ITEM NO.	PART NUMBER	Description	QTY.
1	2500-004	Main Base Plate	1
2	2500-014	Square Drive Shaft	1
3	2500-510	2 Pt. Gear	1
4	2500-010	Hyd. Cylinder Mounting Block	1
5	2500-012	Bottom Support Plate	1
6	2500-013-R	Stiffening Bars	1
7	2500-013-L	Stiffening Bars	1
8	2500-015	Gear Rack Support Block	1
9	2500-506	Lamia, 3/8 x 2 x 48	1
10	2500-504	Gear Rack	1
11	2500-003	Spring Return Bracket	1
12	2500-509	Square Shaft Flange Bearing	2
13	2500-505	Rack Return Spring	2
14	2500-519	Hyd. Cylinder - C258C	1
15	2500-514	Hydraulic Ram Modified	1
16	2500-160	Spring Bracket	1
17	2500-011-1	Shoe Spacer	3
18	2500-016	Square Shaft Key	2
19	2500-123	Stop Valve Mount	1
20	2500-508	Square Shaft Bearing	1
21	2500-511	Square Shaft Thrust Washer	1
22	750-FHCS-10-32X0.375	FHCS 10-32 x 3/8"	3

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-015 HD	Gear Rack Support Block	1
2	GEAR PLATE HD	Top Gear Rack Plate	1
3	2500-012 HD	Bottom Support Plate	1
4	2500-504 HD	Gear Rack	1
5	2500-510 HD	2 Pt. Gear	1

NOTE:
 HD PARTS
 REPLACE: 2500-504, 2500-015
 2500-510, 2500-012 & ADD
 TOP GEAR RACK PLATE

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Ram/Table Assembly
 11/2011 - Present

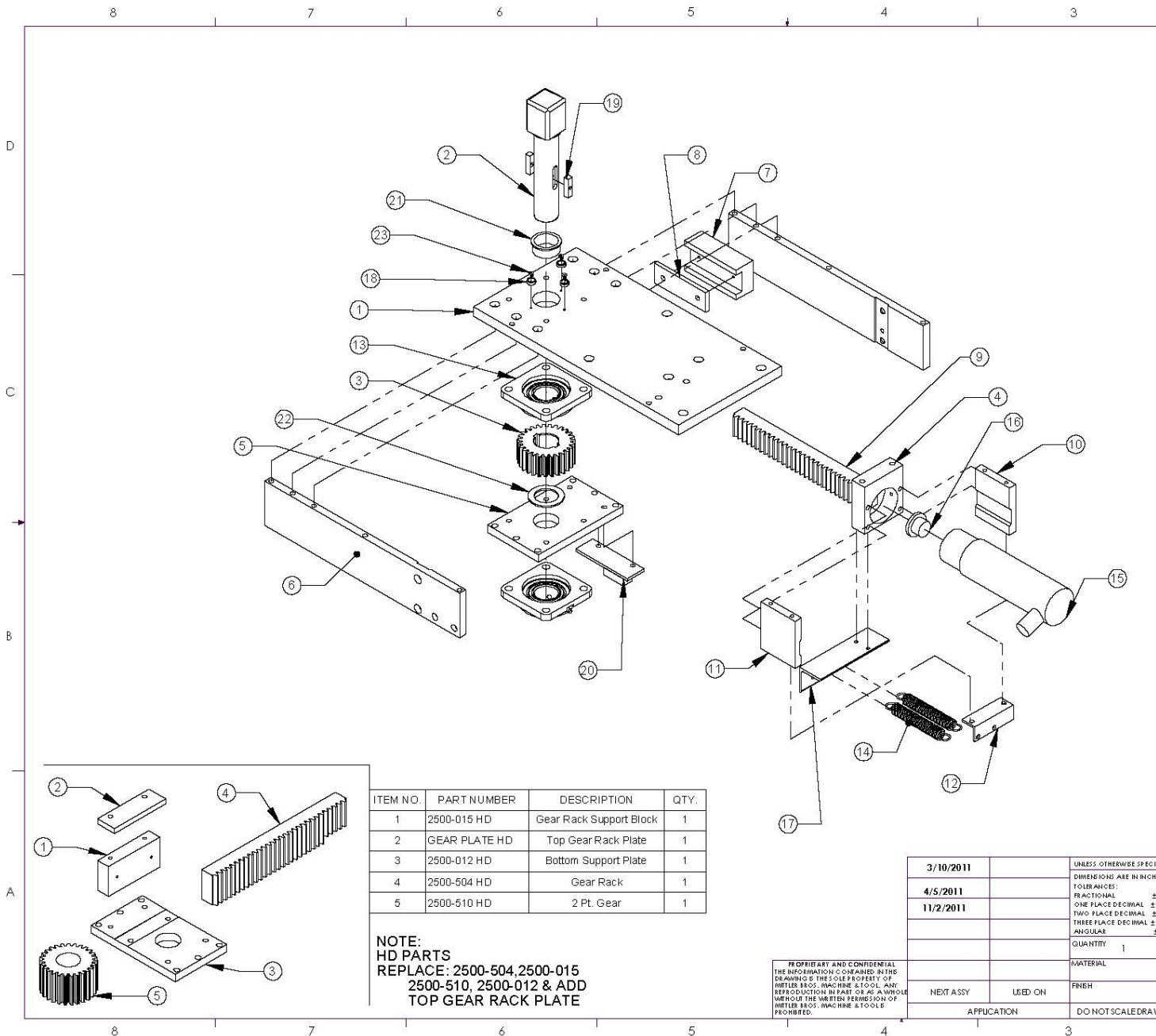
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4/5/2011		DIMENSIONS ARE IN INCHES	DRAWN	RKH	5/15/08
11/2/2011		TOLERANCES:	CHECKED		
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		ONE PLACE DECIMAL ± 0.15	MFG APPR.		
		TWO PLACE DECIMAL ± 0.10	Q.A.		
		THREE PLACE DECIMAL ± 0.05			
		ANGULAR ± 1°			
		QUANTITY 1			
		MATERIAL	FINISH		
			LENGTH		
		FINISH	COMMENTS		
		NEXT ASSY	USED ON		
		APPLICATION	DO NOT SCALE DRAWING		

MB MITTLER BROS.
 MACHINE & TOOL
 10 Cooperative Way, Wright City MO, 63390
 (636) 745-7757 Fax (636) 745-2874

TITLE:
Ram/Table Assembly

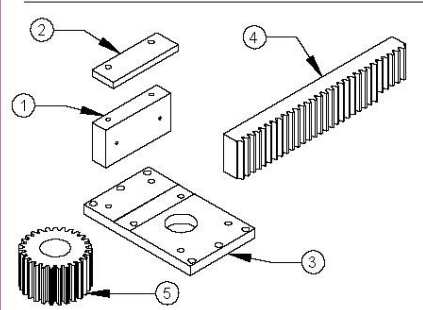
SIZE DWG. NO. REV
B 2500-170A

SCALE: 1:8 WEIGHT: SHEET 1 OF 1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-004	Main Base Plate	1
2	2500-014	Square Drive Shaft	1
3	2500-510	2 Pt. Gear	1
4	2500-010 Pre 11_2011	Hyd. Cylinder Mounting Block	1
5	2500-012	Bottom Support Plate	1
6	2500-013	Stiffening Bars	2
7	2500-015	Gear Rack Support Block	1
8	2500-506	Lamia, 3/8 x 2 x 48	1
9	2500-504	Gear Rack	1
10	2500-009	Hyd. Mount Block Gusset	1
11	2500-009 Mirror	Hyd. Mount Block Gusset Mirrored	1
12	2500-003 - Pre 11_11	Spring Return Bracket - Long	1
13	2500-509	Square Shaft Flange Bearing	2
14	2500-505	Rack Return Spring	2
15	2500-519	Hyd. Cylinder - C258C	1
16	2500-514	Hydraulic Ram Modified	1
17	2500-160	Spring Bracket	1
18	2500-011-1	Shoe Spacer	3
19	2500-016	Square Shaft Key	2
20	2500-123	Stop Valve Mount	1
21	2500-508	Square Shaft Bearing	1
22	2500-511	Square Shaft Thrust Washer	1
23	750-FHCS-10-32X0.375	FHCS 10-32 x 3/8"	3

Ram/Table Assembly
8/2010 - 11/2011



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-015 HD	Gear Rack Support Block	1
2	GEAR PLATE HD	Top Gear Rack Plate	1
3	2500-012 HD	Bottom Support Plate	1
4	2500-504 HD	Gear Rack	1
5	2500-510 HD	2 Pt. Gear	1

NOTE:
HD PARTS
REPLACE: 2500-504, 2500-015
2500-510, 2500-012 & ADD
TOP GEAR RACK PLATE

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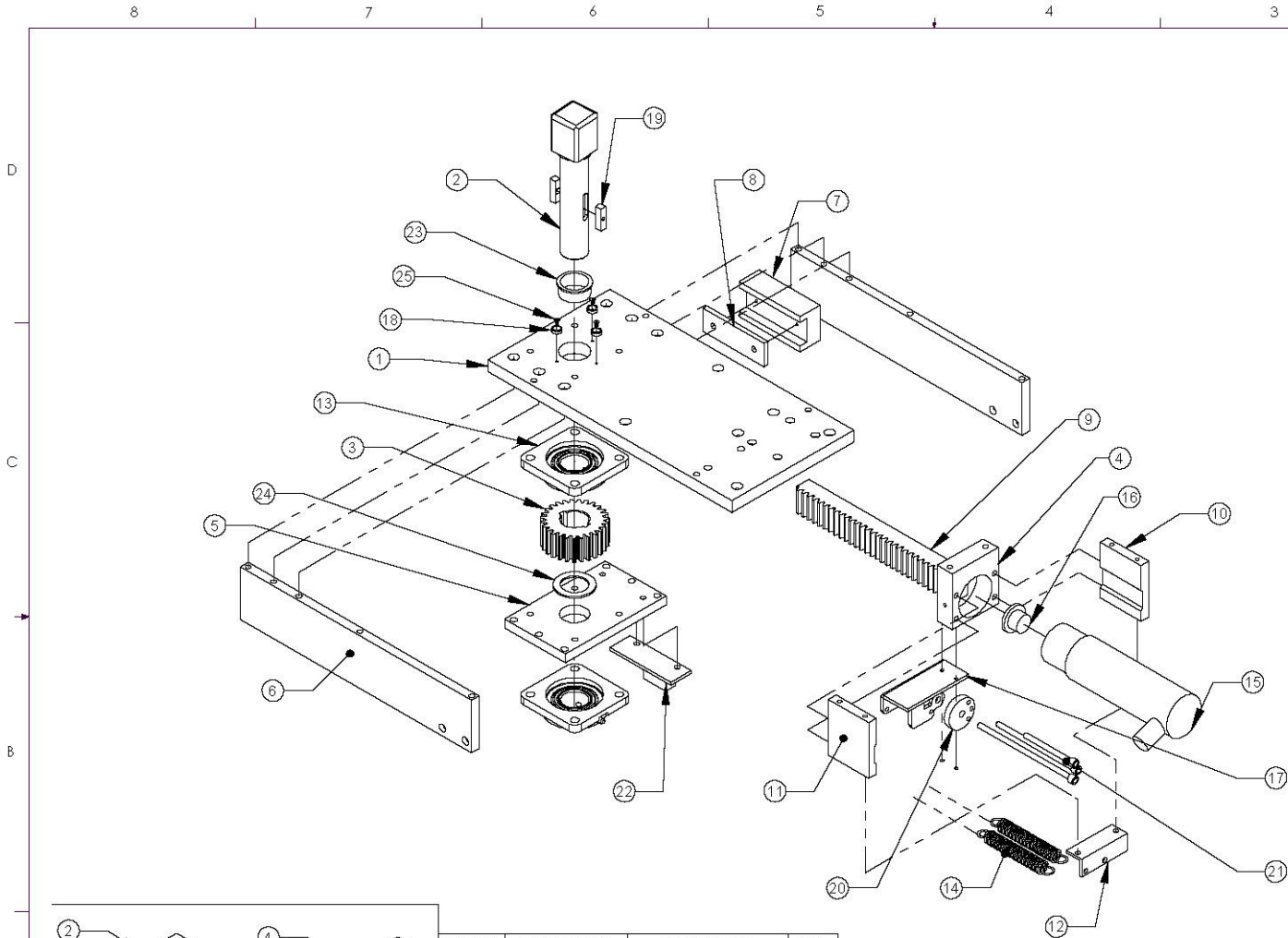
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4/5/2011		TOLERANCES:	CHECKED	RKH	5/15/08
11/2/2011		FRACTIONAL: ±0.15	ENG APPR.		
		ONE PLACE DECIMAL: ±0.15	MFG APPR.		
		TWO PLACE DECIMAL: ±0.10	Q.A.		
		THREE PLACE DECIMAL: ±0.05			
		ANGULAR: ±1°			
		QUANTITY: 1			
		MATERIAL	FINISH		
			LEN GTH		
NEXT ASSY	USED ON	FINISH	COMMENTS		
APPLICATION		DO NOT SCALE DRAWING			

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10 Cooperative Way, Wright City MO. 63390
(636) 745-7757 Fax (636) 745-2874

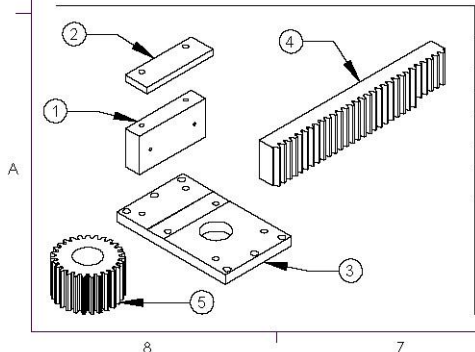
TITLE:
Ram/Table Assembly

SIZE DWG. NO. REV
B 2500-170A 8/10 To 11/11

SCALE: 1/8" WEIGH HT: SHEET 1 OF 1



ITEM NO.	PART NUMBER	Description	QTY.
1	2500-004	Main Base Plate	1
2	2500-014	Square Drive Shaft	1
3	2500-510	2 Pt. Gear	1
4	2500-010	Hyd. Cylinder Mounting Block	1
5	2500-012	Bottom Support Plate	1
6	2500-013	Stiffening Bars	2
7	2500-015	Gear Rack Support Block	1
8	2500-506	Lamia, 3/8 x 2 x 48	1
9	2500-504	Gear Rack	1
10	2500-009	Hyd. Mount Block Gusset	1
11	2500-009 Mirror	Hyd. Mount Block Gusset Mirrored	1
12	2500-003	Spring Return Bracket - Long	1
13	2500-509	Square Shaft Flange Bearing	2
14	2500-505	Rack Return Spring	2
15	2500-519	Hyd. Cylinder - C258C	1
16	2500-514	Hydraulic Ram Modified	1
17	2500-135	Bend Stop Bracket	1
18	2500-011-1	Shoe Spacer	3
19	2500-016	Square Shaft Key	2
20	2500-131	Bend Stop Adjuster	1
21	2500-040	Adjustable Stops	1
22	2500-123	Stop Valve Mount	1
23	2500-508	Square Shaft Bearing	1
24	2500-511	Square Shaft Thrust Washer	1
25	750-FHCS-10-32X0.375	FHCS 10-32 x 3/8"	3



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-015 HD	Gear Rack Support Block	1
2	GEAR PLATE HD	Top Gear Rack Plate	1
3	2500-012 HD	Bottom Support Plate	1
4	2500-504 HD	Gear Rack	1
5	2500-510 HD	2 Pt. Gear	1

NOTE:
 HD PARTS
 REPLACE: 2500-504, 2500-015
 2500-510, 2500-012 & ADD
 TOP GEAR RACK PLATE

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Ram/Table Assembly
 Pre 8/2010

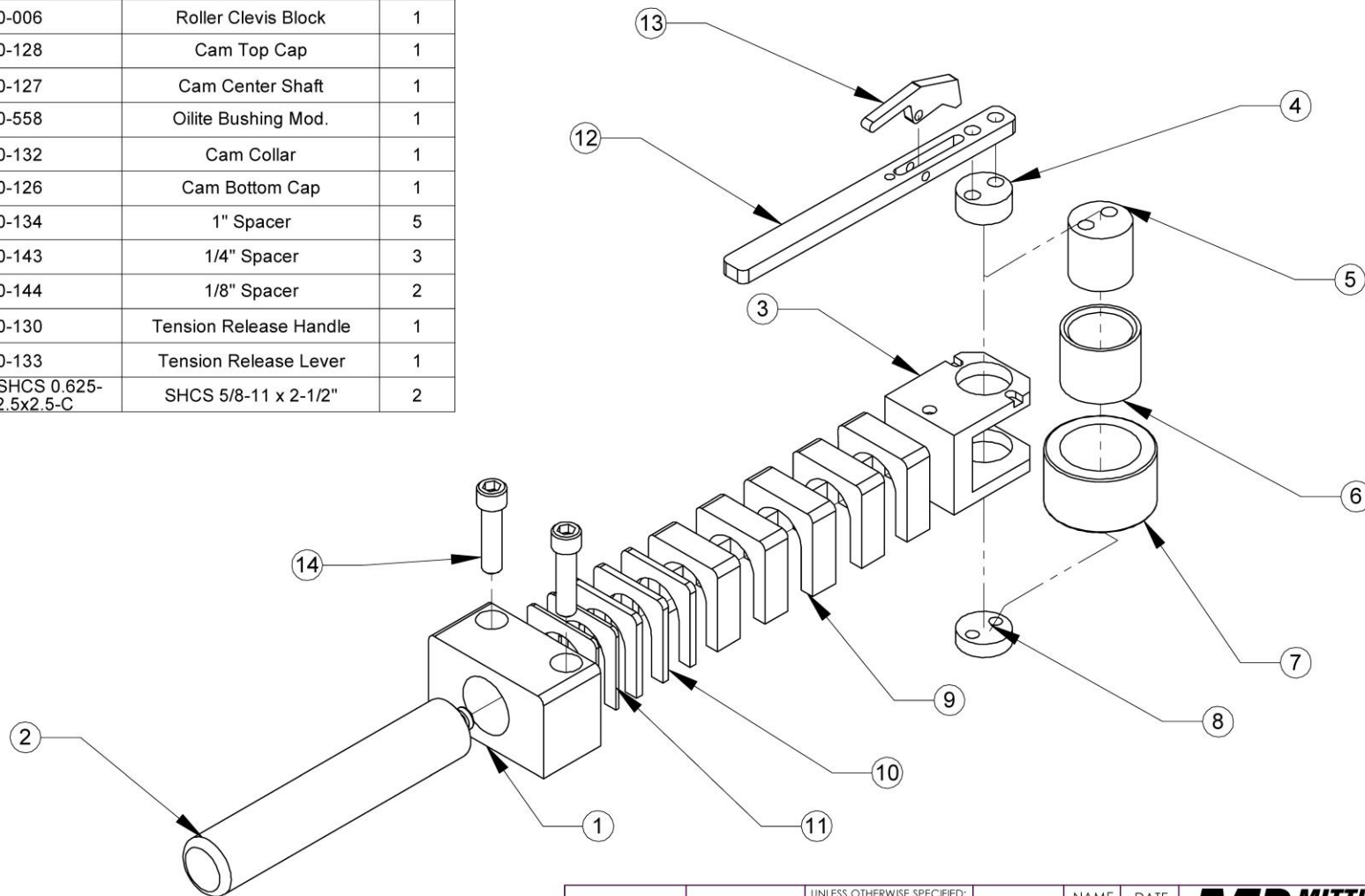
4/5/2011	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES	NAME RKH	DATE 5/15/08
	TOLERANCES: FRACTIONAL ± 0.15 ONE PLACE DECIMAL ± 0.15 TWO PLACE DECIMAL ± 0.10 THREE PLACE DECIMAL ± 0.05 ANGULAR ± 1°	DRAWN CHECKED	
	QUANTITY 1	ENG APPR. MFG APPR.	
	MATERIAL	FINISH LENGTH	
NEXT ASSY	USED ON	COMMENTS	
APPLICATION	DO NOT SCALE DRAWING		

MB MITTLER BROS. MACHINE & TOOL
 10 Coopers Ave Way, Wright City MO. 63390
 (636) 745-7757 Fax (636) 745-2674

TITLE:
Ram/Table Assembly
 SIZE DWG. NO. REV
B 2500-170A
 SCALE: 1:8 WEIGHT: SHEET 1 OF 1

BOM Table			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	2500-001	Acme Screw Mounting Block	1
2	2500-129	Support Rod	1
3	2500-006	Roller Clevis Block	1
4	2500-128	Cam Top Cap	1
5	2500-127	Cam Center Shaft	1
6	2500-558	Oillite Bushing Mod.	1
7	2500-132	Cam Collar	1
8	2500-126	Cam Bottom Cap	1
9	2500-134	1" Spacer	5
10	2500-143	1/4" Spacer	3
11	2500-144	1/8" Spacer	2
12	2500-130	Tension Release Handle	1
13	2500-133	Tension Release Lever	1
14	HX-SHCS 0.625-11x2.5x2.5-C	SHCS 5/8-11 x 2-1/2"	2

REVISIONS			
REV.	DESCRIPTION	DATE	BY
A	REVISIONS MADE TO PARTS 126, 127, 128, 130	10/7/2009	BAB
B	RENAMED DWG FROM 2500-010 ASSEM TO 2500-180A	2/23/2011	BAB
C	ADDED ITEM 14	6/1/2011	BAB



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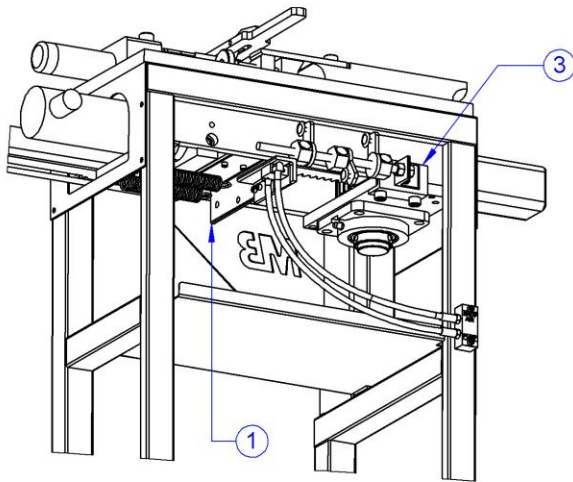
		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN INCHES	DRAWN	RHK	5/15/08
		TOLERANCES:	CHECKED		
		FRACTIONAL ±0.015	ENG APPR.		
		ONE PLACE DECIMAL ±0.015	MFG APPR.		
		TWO PLACE DECIMAL ±0.010	Q.A.		
		THREE PLACE DECIMAL ±0.005	COMMENTS		
		ANGULAR ±1°			
		QUANTITY			
		MATERIAL			
		YYYY			
		FINISH			
	NEXT ASSY	USED ON			
	APPLICATION	DO NOT SCALE DRAWING			

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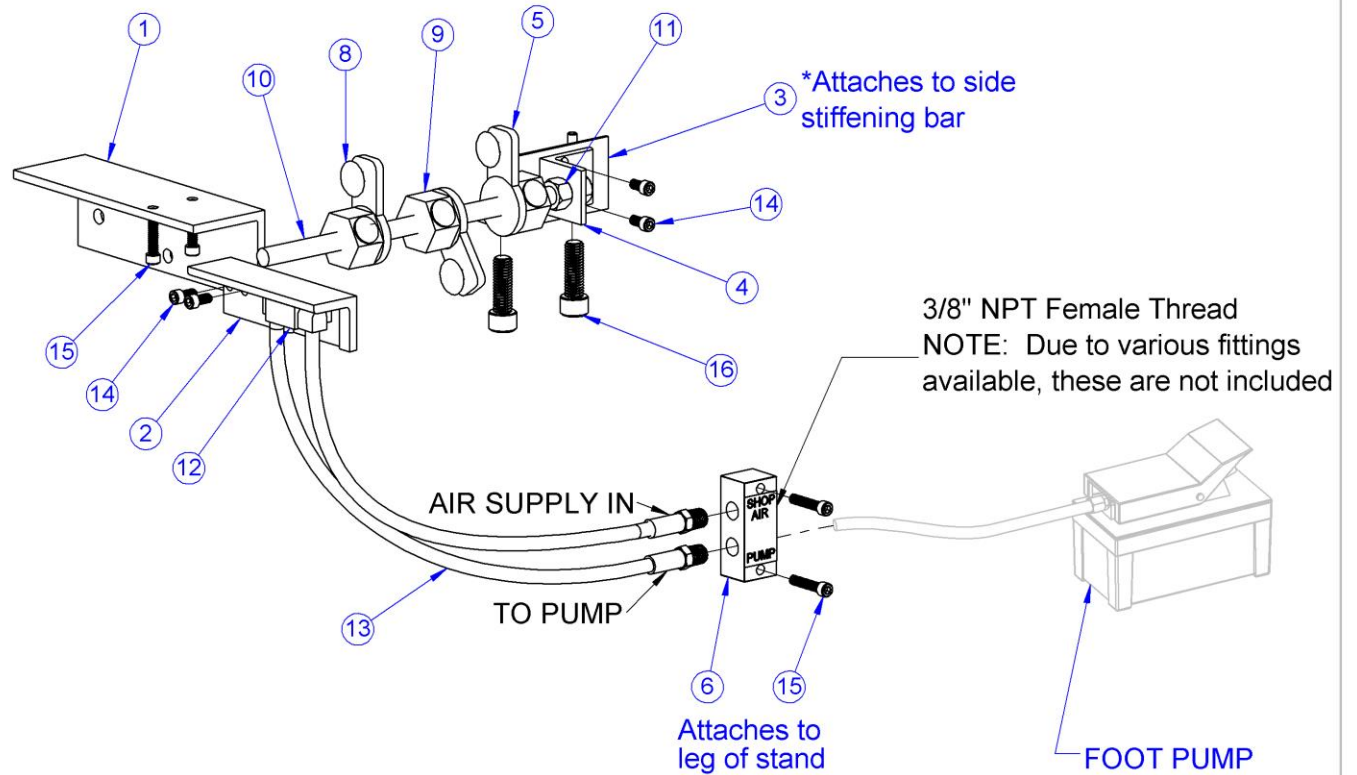
TITLE: **Cam Assembly**

SIZE	DWG. NO.	REV
A	2500-180A	C

SCALE: 1:5 WEIGHT: 26.128 SHEET 1 OF 1



*Attaches to bottom of gear rack



3/8" NPT Female Thread
NOTE: Due to various fittings available, these are not included

FOOT PUMP AND HOSE (NOT INCLUDED)

ITEM NO.	PART NUMBER	Description	QTY.
1	2500-160	Spring Bracket *Standard on machines after 8/2010	1
2	2500-161	Switch Bracket	1
3	2500-162	Stop Adjustment Bracket Mount *Standard on machines after 8/2010	1
4	2500-163	Stop Adjustment Bracket	1
5	2500-164	Arm	3
6	2500-165	Manifold	1
7	2500-521	Brass Pipe Elbow	2
8	2500-523	Elevator Bolt	3
9	2500-524	Button Thread Collar Nut	3
10	2500-525	1/2"-13 x 11" Threaded Rod	1
11	.500" Hex Nut	1/2" Hex Nut	2
12	2500-522	Air Valve	1
13	Air Hose	18" Air Hose	2
14	91251A537	1/4"-20 x 1/2" SHCS	4
15	91251A544	1/4"-20 x 1-1/4" SHCS	4
16	91251A716	1/2"-13 x 1-1/2" SHCS	2

***Note:**
If purchased before 8/2010,
Items 1, 3, 16, 17 are required.

If purchased after 8/2010,
Items 1, 3, 16, 17 are
standard on machine.

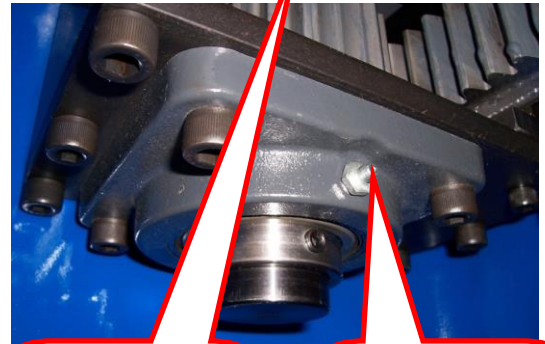
PROPRIETARY AND CONFIDENTIAL		NAME	DATE
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UNLESS OTHERWISE SPECIFIED:		DIMENSIONS ARE IN INCHES	
QUANTITY		TOLERANCES:	
MATERIAL		FRACTIONAL ±1/32	
FINISH		ONE PLACE DECIMAL ±.015	
		TWO PLACE DECIMAL ±.010	
		THREE PLACE DECIMAL ±.005	
		ANGULAR ±1°	
DO NOT SCALE DRAWING		COMMENTS:	
		10 Cooperative Way, Wright City, MO 63390 (636)745-7757 Fax (636)745-2874	
TITLE: Air Stop Kit			
SIZE	DWG. NO.	REV	
A	2500-400		
SCALE: 1:5	WEIGHT: 8.253	SHEET 1 OF 1	

MAINTANANCE

WARNING

Be sure the cylinder is completely retracted and that the hydraulic pump is disconnected before servicing this machine.

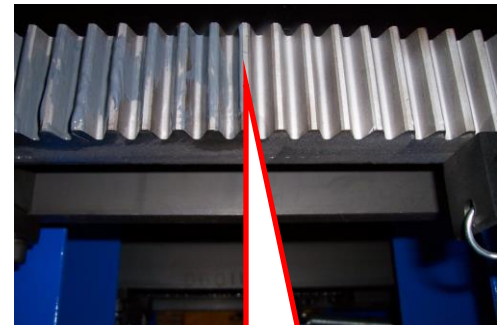
- There are two bearing blocks that are greaseable. These can be accessed from under the top by looking in from the opening. The lower fitting is visible and the upper fitting is up between the frame rails of the bender. A few pumps of high quality grease every month is recommended for average use. If you are using the bender on a more aggressive schedule, shorten the intervals between greasing.



Upper Grease Fitting

Lower Grease Fitting

- Using the same grease that you use for the bearings brush a small amount on the rack teeth when ever the bearings are greased. If the rack teeth seem dirty or gritty clean them before applying the grease.



Grease on Rack Teeth

Recommended Hydraulic Oil: **AW46** with Foam Suppressant



BLACK Fill / Vent Plug

Digital Read Out Assembly Battery: **SR44 1.5 Vol**





MAINTENANCE

Inspecting The Hydraulic Fluid Level

Check the fluid level in the reservoir after every 10 hours of use. Drain and replenish the reservoir with Power Team hydraulic fluid after every 300 hours of use approximately.

<p>Air Hydraulic Pump For pumps with a 105 cubic inch (1.71) reservoir capacity The fluid level should be 1/2 inch (12.7 mm) from the filler / vent cap with all cylinders retracted.</p>	<p>Electric Hydraulic Pump For pumps with a 2 gallon (7.61) reservoir capacity The fluid level should be 1-3/4 inch (44.5 mm) from the filler / vent cap with all cylinders retracted.</p>
--	---

For Machines With:

<p>SPX Power Team Orange & White Cylinder with Black Letters White & Black Pump</p>  <p>Use: AW 46 - Non Foaming Hydraulic Fluid or Flame Out # 220 Fire Resistant Hydraulic Fluid</p>	<p>Enerpac Yellow Cylinder with Black Letters Yellow & Black Pump</p>  <p>Use: ISO 7 HF 101 Gal or ISO 32 HF 100 Qt. or Mobil DTE 24 Hydraulic Oil is Compatible with Enerpac Components</p>
---	---

Refilling The Reservoir

If additional fluid must be added to reservoir, **use only manufacturer suggested hydraulic fluid.**

Clean the entire area around the filler plug before adding fluid to the reservoir.

Remove the filler plug and insert a clean funnel with filter.

The cylinder must be fully retracted and the air supply disconnected when adding the fluid to the reservoir.

OPTIONAL EQUIPMENT

HYDRAULIC 180° TUBE BENDER SHOE LIST

ROUND TUBE SIZE	C/L RADIUS	PART #
3/4"	4"	2500-S09
1"	4"	2500-S08
1-1/8"	4"	2500-S07
1-1/4"	5"	2500-S06
1-3/8"	5"	2500-S05
1-1/2"	6"	2500-S04
1-5/8"	7"	2500-S03
1-3/4"	7"	2500-S02
1-3/4"	8"	2500-S01
2"	8"	2500-S00
SQUARE TUBE SIZE		
3/4"	4"	2500-S11
1"	4"	2500-S10
1-1/8"	4"	2500-S12
1-1/4"	5"	2500-S13
1-1/2"	6"	2500-S14
1-3/4"	7"	2500-S15
1-3/4"	8"	2500-S16
2"	8"	2500-S18
PIPE SIZE		
1"	5"	2500-S30
1-1/4"	6"	2500-S31
1-1/2"	8"	2500-S32

Adjustable Saddles for 90° & 180° Hydraulic Benders



Saddle eliminates the need for individual saddles for each tubing size. Two sizes handle 5/8" to 1-3/4" Round & Square Tubing.

Advantages

- Securely holds each tube, eliminates tube creep
- Easy Release "V" Block eliminates Stuck Saddle from tube spring back
- Easier Bend-to-Bend Alignment with light pressure on tube

Small & Medium Adjustable Saddles included with purchase of new Hydraulic Tube Bender since December 2006.

Adjustable Saddles must be purchased with new shoe sets if Bender was built before December 2006.

[2500-300](#)

Adjustable Saddle, Small 5/8" to 1-3/8"

[2500-301](#)

Adjustable Saddle, Medium 1-1/2 to 1-3/4

[2500-302](#)

Adjustable Saddle, Large 2" OD

Pumps



[900-504-6](#) Air Hydraulic Pump, 6' Hose & Fitting

[900-508-6](#) Electric Hydraulic Pump, Hose & Fittings 6'



Bend Aligner







End material waste and slow trial & error fabrication. Excellent addition if you have our [BEND CALCULATOR PRO](#) software. This great accessory assures precise axial alignment of notches and bends. Add the finishing touch to your *Ultimate Notcher* and your *Bender!*

Notch & Bend Aligner Complete w/ SmartTool..... [1800-STA](#)

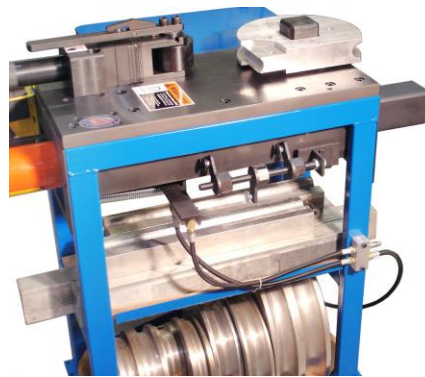
Bend Aligner Mount Only..... [1800-A](#)

Bend Protractors



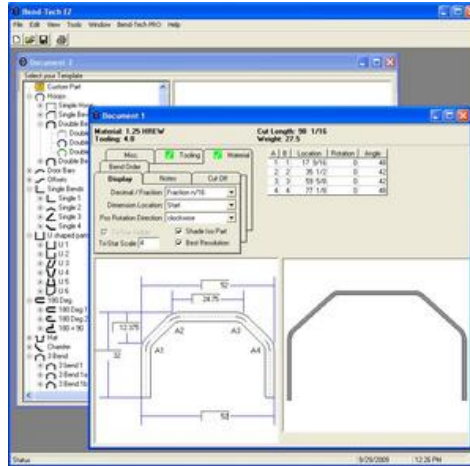
- | | | |
|---|------------------------|---------------------------|
|  | 2100-4 | 4" Protractor Assembly |
|  | 2100-5 | 5" Protractor Assembly |
|  | 2100-6 | 6" Protractor Assembly |
|  | 2100-7 | 7" Protractor Assembly |
|  | 2100-8 | 8" Protractor Assembly |
|  | 2100 | 4" Thru 8" Protractor Set |

Bend Stop for Hydraulic 180° Tube Bender



[2500-400](#) Bend Stop Kit for 180° Bender

BEND-TECH EZ

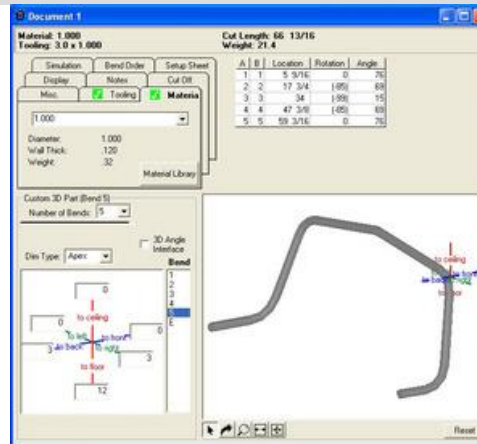


Designed for simple 2d parts!

[900-510](tel:900-510)

Bend-Tech EZ Software

BEND-TECH EZ-3D



Designed for 3d bending, with 360 degree part rotation!

[900-511](tel:900-511)

Bend-Tech EZ-3D Software

BEND-TECH PRO



Full 3d Assembly & Manufacturing Instructions, plus all EZ features!

[900-512](tel:900-512)

Bend-Tech Pro Software

[900-513](tel:900-513)

Bend-Tech SE Software