

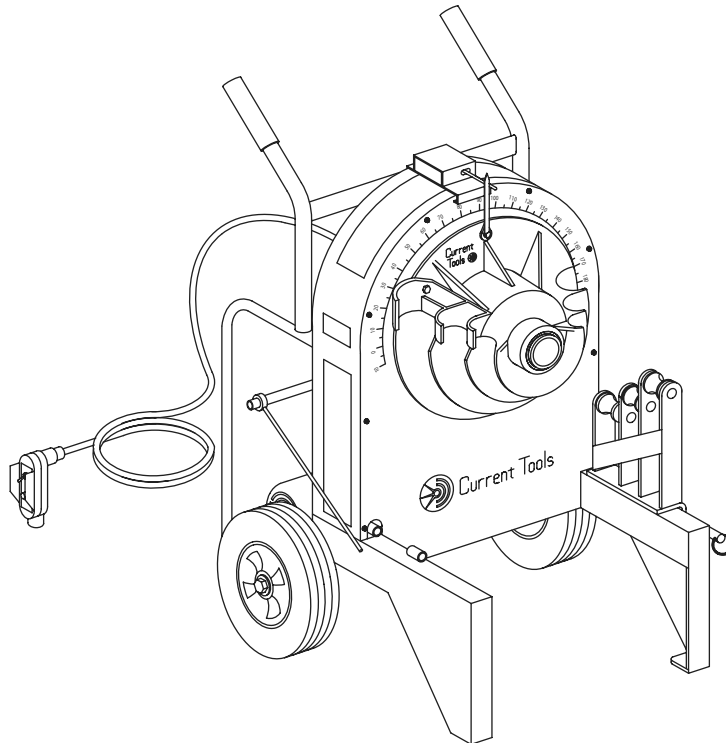


Current Tools

FOR THE PROFESSIONAL ELECTRICIAN

77DL Series Electric Bender

**for bending 1/2" thru 2" RIGID - EMT - IMC
and 40 mil PVC coated RIGID Conduit**



Operating, Maintenance, Safety and Parts Manual

11/14



Read and understand this material before operating or servicing this Bender. Failure to understand how to safely operate and service this unit may result in serious injury or death.

This manual is free of charge. All personnel who operate this Bender should have a copy of this manual and read and understand its contents. To request a copy, call or write to the address below. All information, specifications and product designs may change due to design improvements or updates and are subject to change without notice. Current Tools does not assume any liability for damages resulting from misuse or incorrect application of its products.

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Safety Alert Symbol

THIS SAFETY SYMBOL is used to call your attention to instructions that concern your personal safety. It means: ATTENTION! BE AWARE! THIS IS AN IMPORTANT SAFETY INSTRUCTION!

Read, understand, and follow these safety instructions. Failure to follow these safety instructions may result in injury or death.

DANGER

Immediate hazards which, if not avoided, **WILL** result in serious personal injury or death.

WARNING

Hazards or unsafe practices which, if not avoided, **COULD** result in serious personal injury or death.

CAUTION

Hazards or unsafe practices which, if not avoided, **COULD** result in minor personal injury or property damage.

RETAIN SAFETY INFORMATION



This manual should be read and understood by all personnel who operate or service this bender. Failure to understand how to safely operate and service this unit could result in injury or death. This unit should only be operated and serviced by qualified personnel.



IMPORTANT SAFETY INFORMATION

⚠ DANGER

NEVER operate the bender in an explosive atmosphere.

⚠ WARNING

NEVER operate the bender in wet or damp locations. Do NOT expose the bender to rain.

⚠ WARNING

ALWAYS use 120 VAC, 20 AMP ground fault protected receptacle for power supply that is properly installed and meets all applicable electrical codes. See grounding instructions on page 9.

⚠ WARNING

ALWAYS inspect power cord before using bender. Replace damaged or worn cords.

⚠ WARNING

ALWAYS disconnect bender before servicing.

⚠ WARNING

ALWAYS make sure switch is in the off position before plugging in. This will reduce the risk of unintentional starting.

⚠ WARNING

Do NOT modify the plug provided with the bender.

⚠ WARNING

ALWAYS use 12-gauge extension cords that have three prong grounding type plugs and three-hole receptacles that accept the bender's plug. Do NOT use an adapter.

⚠ WARNING

NEVER use an extension cord longer than 100 feet.

⚠ WARNING

ALWAYS replace damaged extension cords.

⚠ WARNING

ALWAYS disconnect the bender before servicing or changing shoes, attachments or roller supports, and when not in use.

⚠ WARNING

ALWAYS inspect the bender before operating. Replace any damaged, missing or worn parts.

⚠ WARNING

NEVER alter this equipment. Doing so will void this warranty.

⚠ WARNING

NEVER remove guards, they are installed for your protection.

⚠ WARNING

ALWAYS check for damaged or worn parts. Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.

IMPORTANT SAFETY INFORMATION *continued . . .*

▲ WARNING

ALWAYS use recommended accessories. Consult this manual for recommended accessories. The use of improper accessories may cause risk of injury.

▲ WARNING

ALWAYS keep hands and feet away from pinch points such as bending shoes, roller supports and conduit when bender is in use.

▲ WARNING

Operator must ALWAYS face the front of the bender with the bending degree scale visible and maintain a minimum of 3 feet distance while the conduit is being bent. All other personnel must remain out of the area while the bender is in operation.

▲ WARNING

ALWAYS use appropriate shoe groove and roller support for the type and size conduit to be bent.

▲ WARNING

If bending shoe will not turn, STOP unit and unplug before checking for any obstructions.

▲ WARNING

Do NOT use bender or attachment to do a job for which it was not designed.

▲ WARNING

ALWAYS keep conduit under control when unloading.

▲ WARNING

ALWAYS keep the path of the bending conduit clear of obstructions. Make sure all obstacles are clear of the bending path BEFORE you bend the conduit.

▲ WARNING

Be sure handle is bolted securely to the bender frame before moving or transporting the bender.

▲ WARNING

NEVER stand on bender. Serious injury could occur if the bender is tipped or if the bending shoe is unintentionally contacted.

▲ WARNING

ALWAYS wear approved safety glasses when the bender is in operation.

▲ WARNING

ALWAYS wear proper apparel. Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewelry which may get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair.

▲ WARNING

ALWAYS keep children away. All visitors should be kept a safe distance from work area.

▲ WARNING

ALWAYS make bender childproof with lockouts, master switches or by unplugging unit.

▲ CAUTION

The bender and some accessories exceed 50 lbs. and will require more than one person to lift, transport and assemble.

▲ CAUTION

Only use the bender for its intended purpose as specified in this manual.

▲ CAUTION

ALWAYS use this bender in a dry, well lighted area.

▲ CAUTION

ALWAYS maintain bender with care. Keep bender clean for best and safest performance.

SPECIFICATIONS - 77DL SERIES ELECTRIC BENDER

1/2" thru 2" RIGID conduit
 1/2" thru 2" EMT conduit
 1/2" thru 2" IMC conduit
 1/2" thru 2" 40 mil PVC coated RIGID conduit
 1/2" thru 2" schedule 40 steel pipe

No modification to the 77DL POWER UNIT is required to accommodate these shoes or roller supports.

No tools are required to install or remove these shoes and roller supports.

The 77DL Series Electric Bender is NOT to be used for bending any conduit or pipe wall thickness above schedule 40 pipe.

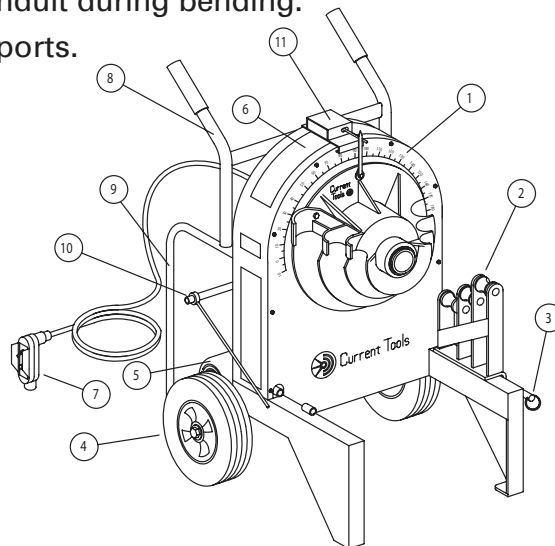
width	29 1/2"
length	24 3/4"
height	39"
weight	258 lbs. Power Unit Only - without shoes

MODEL DESCRIPTIONS

77DL	Electric Bender Power Unit only, without shoes and roller supports
77RIG-DL	Electric Bender with shoes and roller supports for 1/2" thru 2" RIGID conduit and schedule 40 pipe and 1/2" thru 1 1/4" IMC conduit
77EMT-DL	Electric Bender with shoes and roller supports for 1/2" thru 2" EMT conduit
77IMC-DL	Electric Bender with shoes and roller supports for 1 1/2" and 2" IMC conduit
77PVC-DL	Electric Bender with shoes and roller supports for 1/2" thru 2" PVC coated RIGID conduit

FEATURES

1. **Bending Degree Scale** - easy to read for exact bends.
2. **Roller Supports** - for supporting the conduit during bending.
3. **Hinge Pin** - for securing the roller supports.
4. **12 inch Wheels** - for easy mobility.
5. **D.C. Motor** - quiet and strong.
6. **Bending Instructions Decal** - easy to read for quick reference.
7. **Remote Pendant** - Includes magnet and 6 ft. cord. (Bend and unload from pendant.)
8. **Removable Handle** - may be removed for dog-leg bends
9. **Back Rails** - Protect the back of bender and enable the bender to be used horizontally
10. **Stub-up Length Stop** - Make multiple stub-ups of the same length.
11. **Adjustable Limit Switch** - Automatically stops bend.
 (Shoes have pointer to activate limit switch)



Special Features

The 77DL Series Electric Benders have a unique feature to remove the handles during a "Dog-Leg Bend." See Figure 1 below.

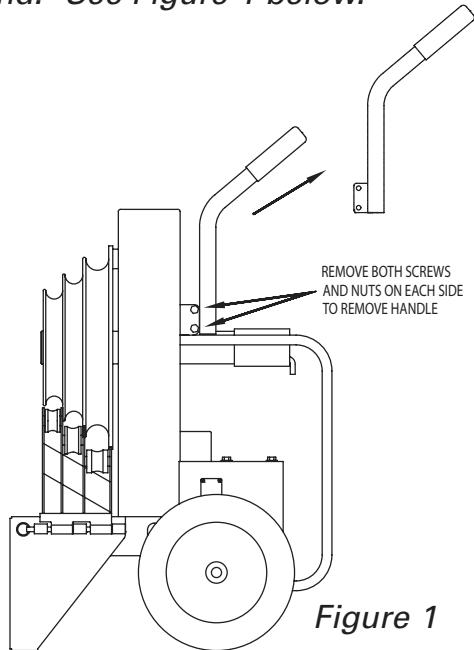


Figure 1

The 77DL Series Electric Benders may also be used in a horizontal position. The bender can operate in this position as efficiently as it does in the upright position. See Figure 2 below.

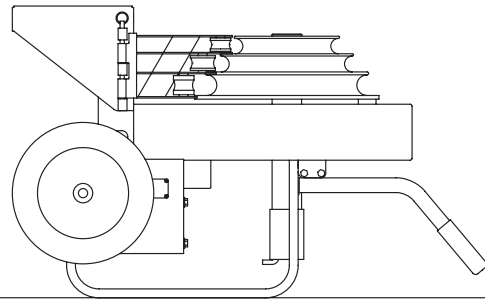
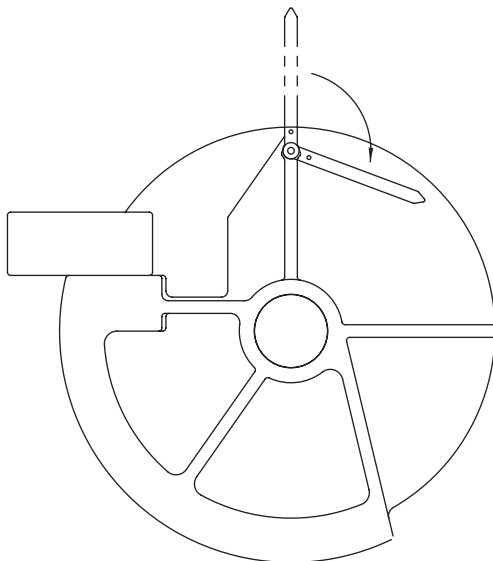


Figure 2

WARNING

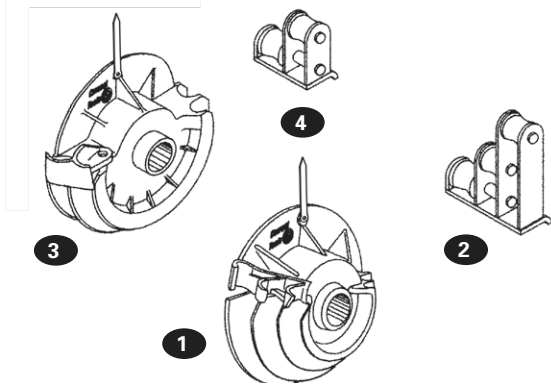
When replacing handle, be sure to replace screws and nuts and also to tighten securely before moving or transporting.



To protect the pointer on the shoes, the pointer may be rotated out of the way. Loosen the thumb screw and rotate the pointer as shown. Then retighten the thumb screw.

SHOE GROUPS

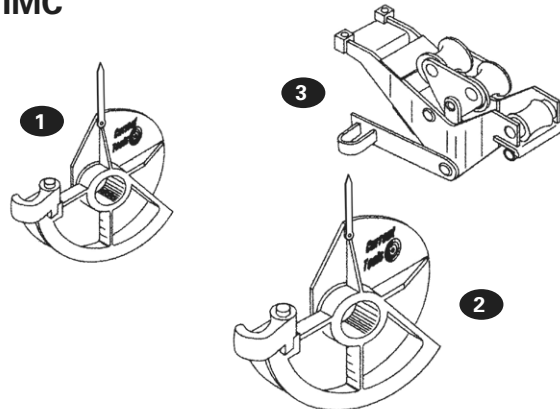
RIGID



700 R-DL - for bending 1/2" thru 2" RIGID conduit, 1/2" thru 1 1/4" IMC conduit and 1/2" thru 2" schedule 40 pipe includes the following four items.

Key	Catalog	Description
1	2-1301DL	1/2" thru 1 1/4" bending shoe
2	2-1001	1/2" thru 1 1/4" roller support
3	2-1401DL	1 1/2" and 2" bending shoe
4	2-1002	1 1/2" and 2" roller support

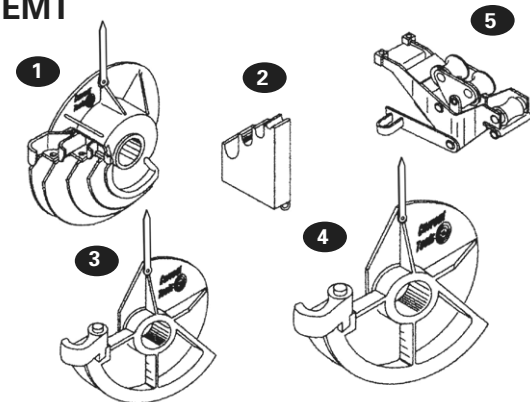
IMC



700 I-DL - for bending 1 1/2" and 2" IMC includes the following four items.

Key	Catalog	Description
1	2-1801DL	1 1/2" bending shoe
2	2-1901DL	2" bending shoe
3	2-1200	1 1/2" thru 2" IMC roller support unit
4	8-0501	metal storage box (not shown)

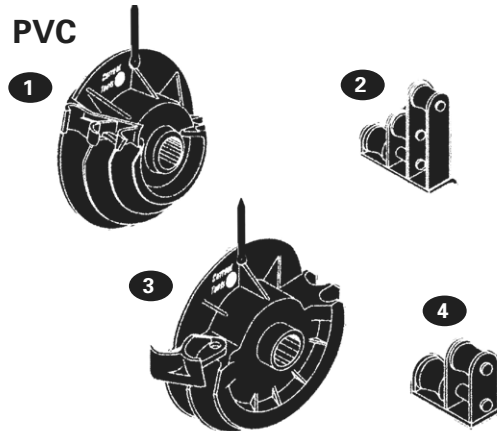
EMT



700 E-DL - for bending 1/2" thru 2" EMT (Thinwall) includes the following six items.

Key	Catalog	Description
1	2-1501DL	1/2" thru 1 1/4" bending shoe
2	2-1003	1/2" thru 1 1/4" EMT support
3	2-1601DL	1 1/2" bending shoe
4	2-1701DL	2" bending shoe
5	2-1100	1 1/2" thru 2" EMT roller support
6	8-0501	metal storage box (not shown)

PVC



700 P-DL - for bending 1/2" thru 2" 40 mil PVC coated RIGID

includes the following five items.

Key	Catalog	Description
1	2-2001DL	1/2" thru 1 1/4" bending shoe
2	2-1004	1/2" thru 1 1/4" roller support
3	2-2101DL	1 1/2" and 2" bending shoe
4	2-1005	1 1/2" and 2" roller support
5	8-0501	metal storage box (not shown)

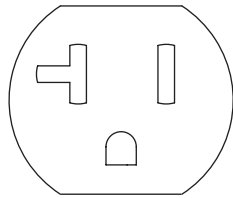
CONDUIT CENTERLINE BENDING RADII

size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
EMT	4 1/4"	5 3/8"	6 3/4"	8 3/4"	8 9/32"	9 3/16"
IMC	4 3/8"	4 1/2"	5 3/4"	7 1/4"	8 9/32"	9 3/16"
RIGID	4 3/8"	4 1/2"	5 3/4"	7 1/4"	8 1/4"	9 1/2"

GROUNDING INSTRUCTIONS

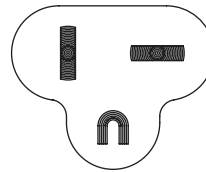
WARNING

ELECTRIC SHOCK HAZARD! Only connect the bender to a 20 AMP GFCI protected circuit. Do NOT modify the plug which is provided with the unit. Failure to follow these warnings can result in serious injury or death.



RECEPTACLE

Figure 3



PLUG

Figure 4

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. The bender is equipped with an electric cord having an equipment grounding conductor and a grounding plug. Only connect the bender to a 20 AMP GFCI protected receptacle which is properly installed and grounded to meet all applicable electrical codes. Do NOT use an adapter.

Do NOT modify the plug provided. If it will not fit the receptacle, have the proper receptacle installed by a qualified electrician.

Improper connection of the equipment grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment grounding conductor to a live terminal.

Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the bender is properly grounded.

Use only 3-wire extension cords that have 3-prong grounding plugs and 3-pole receptacles that accept the bender's plug.

Repair or replace damaged or worn cord immediately.

This bender is intended for use on a circuit that has a receptacle that looks like the one illustrated in Figure 3 above. The bender has a grounding plug that looks like the plug illustrated in Figure 4 above.

MOUNTING BENDING SHOES

Choose desired shoe size and type (RIGID, IMC, EMT, or 40 mil PVC coated RIGID) and slide shoe onto the main drive sprocket shaft. See Figure 5 below.

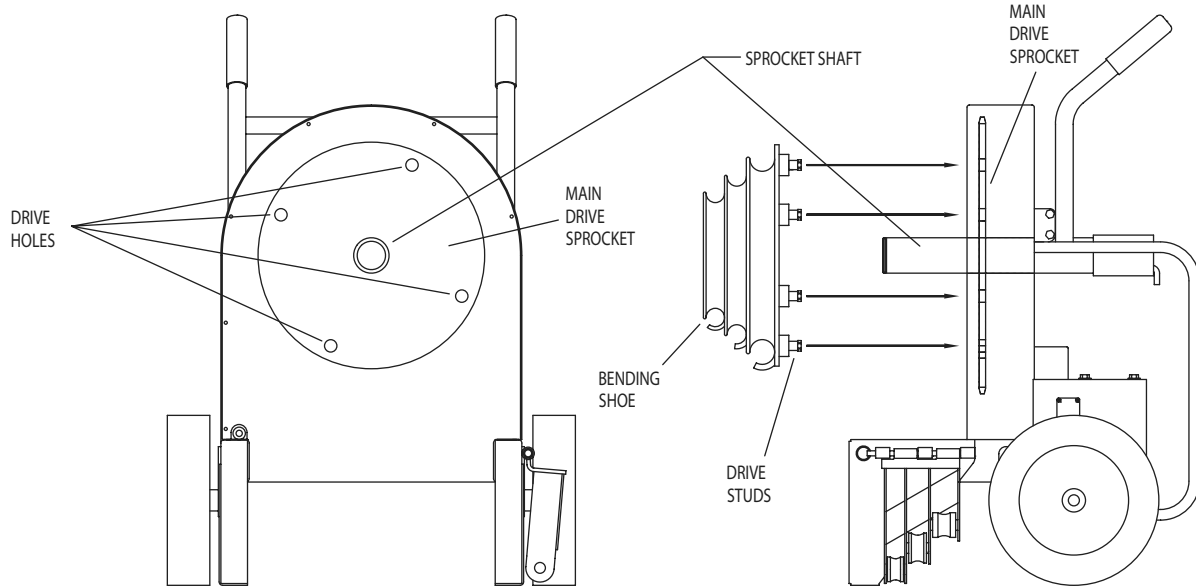


Figure 5

Figure 6

Next, align the four drive studs on the back of the shoe with the four drive holes in the main drive sprocket.

Push the shoe onto the main drive sprocket shaft. See Figure 6.

MOUNTING ROLLER SUPPORTS

Choose the desired roller support for the corresponding shoe size and type (RIGID, IMC, EMT, or 40 mil PVC coated RIGID). The appropriate size and type of roller support MUST be used with the corresponding shoe size and type.

Mount the roller support on the right leg of the bender as you face the bender. Secure the roller support with the quick release hinge pin. See Figure 7.

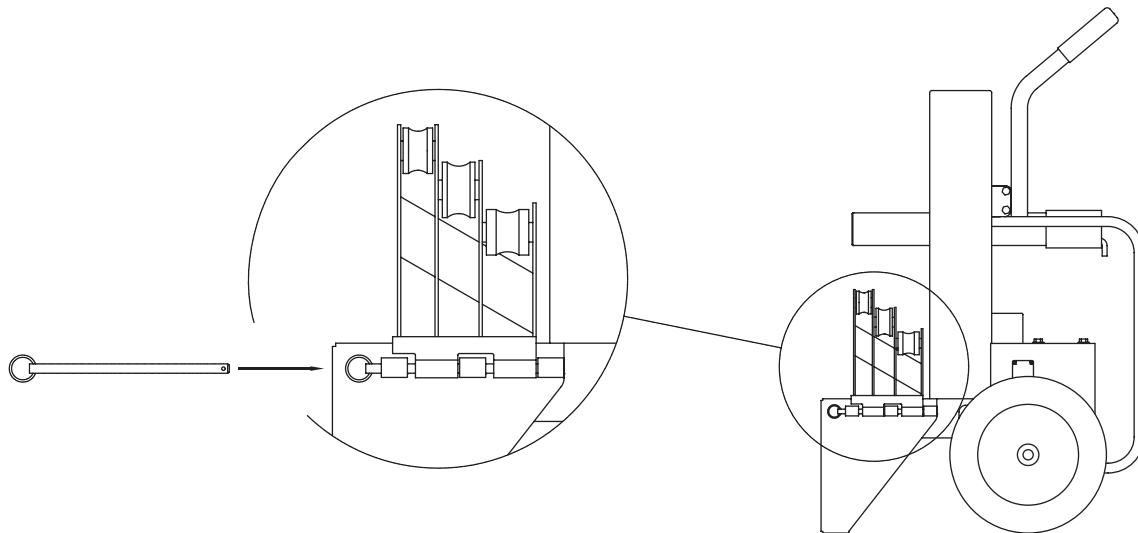


Figure 7

MOUNTING INSTRUCTIONS FOR GREENLEE® SHOES AND ROLLER SUPPORTS

Bending shoes and roller supports from Greenlee® 555®, R, E, I (RIGID, EMT, IMC) and 40 mil PVC coated RIGID benders with serial number PL and AAJ will fit the 77DL bender. The Greenlee® 555® shoes do not utilize a pointer or limit switch, therefore when using them on the 77DL bender you will operate the bender in the manual mode. All 77DL bending shoes and roller supports will fit Greenlee® 555® R, E, I benders with PL and AAJ serial numbers.

* Greenlee® 555® and 555 Classic® are registered trademarks of Greenlee/Textron.

GENERAL BENDING INSTRUCTIONS

Bending instructions for:

- 1/2" thru 2" RIGID conduit
- 1/2" thru 1 1/4" EMT conduit
- 1/2" thru 1 1/4" IMC conduit
- 1/2" thru 2" 40 mil PVC coated RIGID conduit
- 1/2" thru 2" schedule 40 pipe

! DANGER

NEVER operate this bender in an explosive atmosphere. Injury or Death may occur.

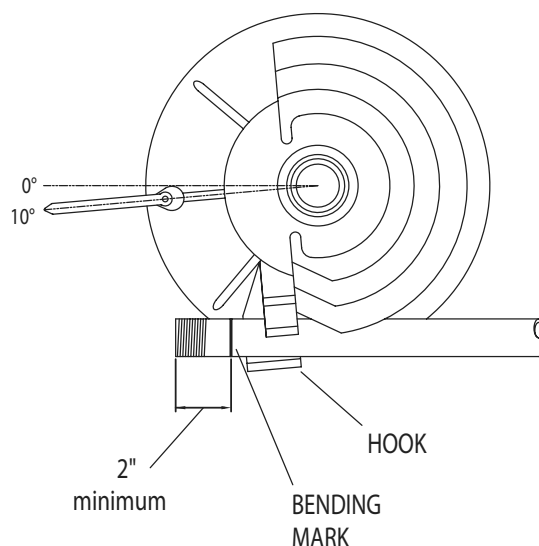
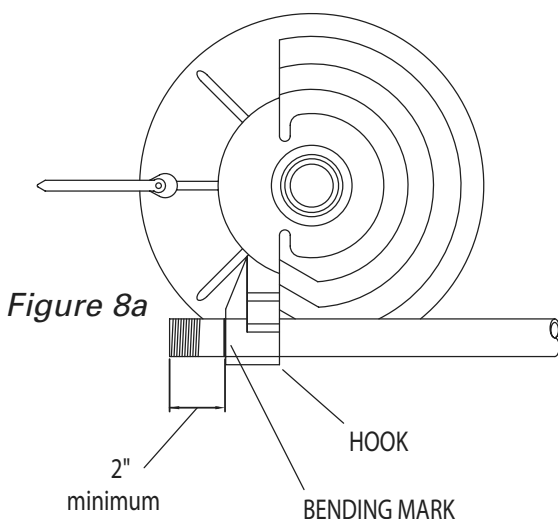
See pages 10 and 11 for mounting shoes and roller supports.
Be sure to match the appropriate shoe with its corresponding roller support.

1. Mark pipe/conduit to desired length. Note that a minimum of 2" from the end of the conduit to the front edge of the hook is required to eliminate flattening the end of the pipe/conduit. See Figure 8a.

NOTE: Stub-up and Offset Dimensions can be found on the Bending Charts on pages 21 thru 24 of this manual or on the bending instructions decal on top of each bender.

NOTE: The Model 77DL is equipped with a stub-up length stop feature which will allow you to easily make multiple stub-ups of the same length. See page 14 for complete instructions on using this feature.

2. Rotate the bending shoe to 10 degrees below the 0 (zero) degree setting, as shown in Figure 8b below.



PLACE BENDING MARK IN LINE WITH
FRONT (OUTSIDE) EDGE OF HOOK

GENERAL BENDING INSTRUCTIONS *continued . . .*

3. After marking the pipe/conduit, place it into the bender. See Figure 8a. The pipe/conduit should slide over the correct size roller support, through the shoe groove and into the hook. The bending mark should be at the front (OUTSIDE) edge of the hook. See Figure 8a.

NOTE: The Model 77DL is equipped with an adjustable limit switch. Loosen the thumb screw and locate the limit switch to the desired degree of bend. The 77DL shoes are equipped with a pointer that will activate the limit switch and stop the bender when the pointer contacts the limit switch spring in the bending (clockwise) direction.

NOTE: The adjustable limit switch will only be activated in the bend (clockwise) direction.

4. Using the remote pendant, place the "Bend/Unload" switch in the "bend" position. Press the "Jog" button and advance the bender shoe. Be sure to check the alignment of the bending mark as the rotating shoe locks the pipe/conduit into position. Advance the bender shoe. When the pointer on the shoe reaches the limit switch, the bender will stop. See Figure 9A.

NOTE: If you do not want to use the adjustable limit switch, remove it from the top of the bender frame and attach it to the back of the bender frame using the magnet provided on the limit switch bracket.

NOTE: Due to springback in pipe/conduit, some over bending is necessary to achieve the desired degree of bend. See page 22 or the bending instruction decal on top of each bender for approximate springback compensation figures.

5. To release the pipe/conduit, place the "Bend/Unload" switch in the "Unload" position. Press the "Jog" button and reverse the shoe far enough to release the conduit. Then, rotate the roller support out of the way. See Figure 9B. The pipe/conduit can now be removed.

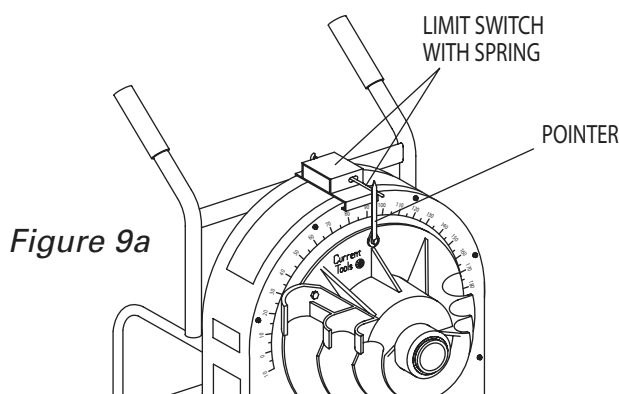


Figure 9a

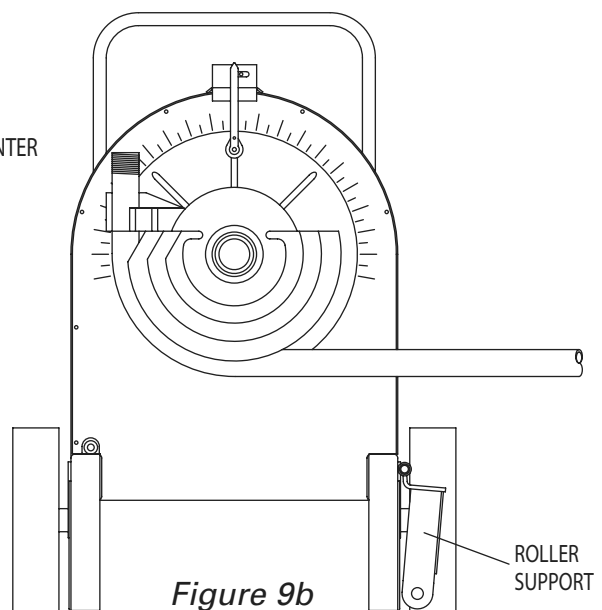


Figure 9b

WARNING

The pipe/conduit should be under control when unloading. Failure to do this may result in injury or death.

STUB-UP LENGTH STOP INSTRUCTIONS

The Model 77DL is equipped with a stub-up length stop feature which will allow you to easily make multiple stub-ups of the same length. After you have measured and marked the conduit for the first stub-up, place the conduit into the shoe and locate the bending mark on the front (outside) edge of the hook.

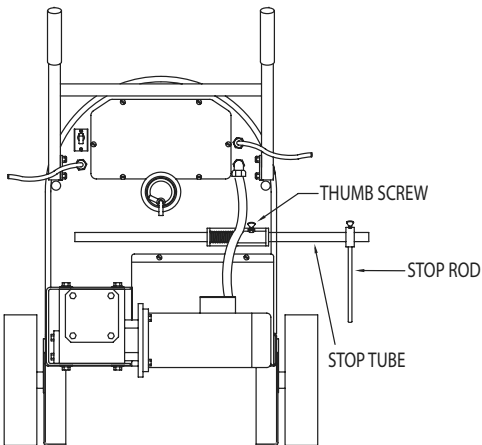


Figure 18A

Next, loosen the thumb screw and slide the stop tube until the stop rod reaches the end of the conduit (see Figure 18A and 18B). Before bending, rotate the stop rod downward to avoid conduit hitting the stop rod (see Figure 18C).

After the bend is completed remove the conduit. Rotate the stop rod upward. Place the next piece of conduit into the bender until it touches the stop rod. Repeat the process above.

NOTE: You can replace the stop tube with a piece of 1/2" rigid conduit if you have stub-ups that are longer than the stop tube provided with the 77DL Bender.

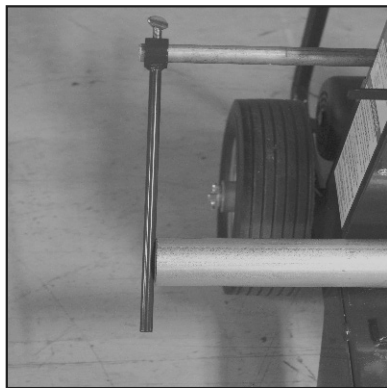


Figure 18B

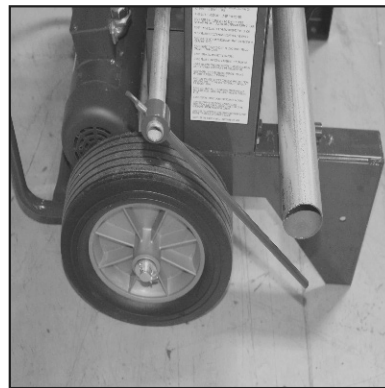


Figure 18C

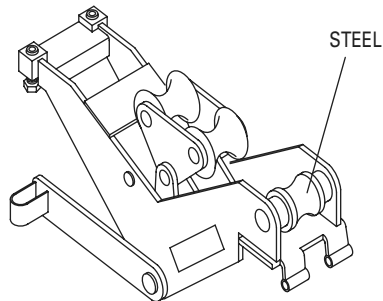
NOTE: If you do not want to use the stub-up feature, loosen the thumb screw and retract the stop tube until it is out of the way for bending conduit.



BENDING INSTRUCTIONS FOR 1 1/2" AND 2" EMT & IMC CONDUIT

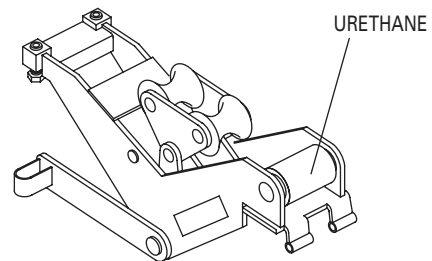
1. See pages 10 and 11 for mounting shoes and roller supports.
Be sure to match the appropriate shoe with its corresponding roller support.

NOTE: The outside roller on the 1 1/2" thru 2" IMC roller support is steel. See Figure 10. The outside roller on the 1 1/2" thru 2" EMT roller support is urethane. See Figure 11.



IMC ROLLER SUPPORT

Figure 10



EMT ROLLER SUPPORT

Figure 11

2. Mark the conduit to the desired length. Note that a 2" minimum dimension is required to eliminate flattening the end of the conduit. See Figure 12.

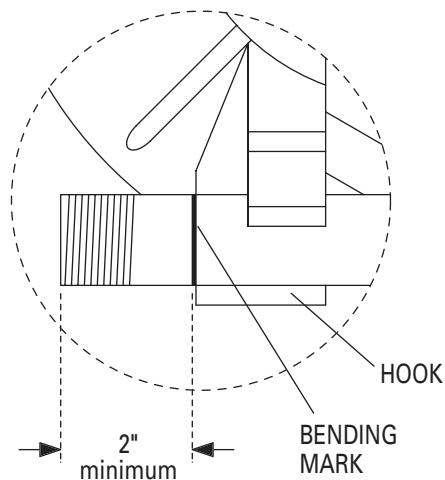


Figure 12

NOTE: "Stub-up" and "Offset" dimensions can be found on the bending charts on pages 21 thru 24 of this manual or on the bending instruction decal located on the top of each bender.

BENDING INSTRUCTIONS FOR 1 1/2" AND 2" EMT & IMC CONDUIT *continued . . .*

3. Rotate the bending shoe to 10 degrees below the 0 (zero) degree setting. See Figure 8b.
4. After marking the conduit, place it into the bender. The conduit should slide over the roller support and through the shoe groove and into the hook. The bending mark should be at the front (OUTSIDE) edge of the hook. See Figure 12.

NOTE: The appropriate size and type of roller support **MUST** be used with the corresponding shoe size and type.

5. Step on the "Engaging Pedal" which will raise the rollers to come in contact with the conduit. See Figure 13. Be sure the correct rollers for the size conduit being bent are in position to engage the conduit.

NOTE: See SQUEEZE ADJUSTMENT PROCEDURE on page 18.

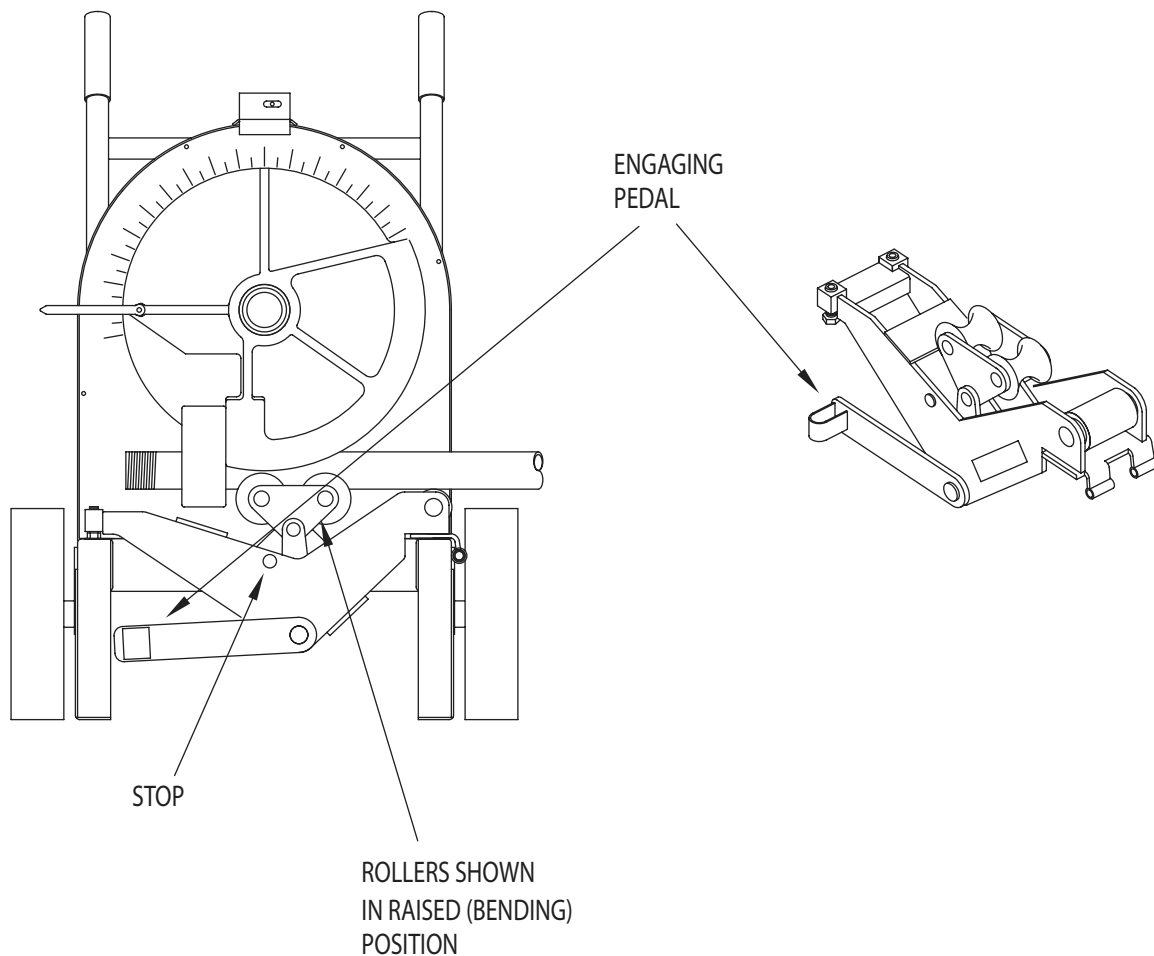


Figure 13

BENDING INSTRUCTIONS FOR 1 1/2" AND 2" EMT & IMC CONDUIT *continued . . .*

6. Keep foot pressure on the engaging pedal and push the Bend/Unload switch to the *Bend* position. Then press the Jog button. The conduit will pull the roller support against the stop. Foot pressure can then be removed from the engaging pedal. Be sure to check the alignment of the bending mark as the rotating shoe locks the conduit into position.

NOTE: If the roller support will not pull against the stop, the squeeze adjustment is too tight and will need to be adjusted. See squeeze adjustment procedure on page 18.

Advance the bender shoe to the desired degree of bend. When the pointer on the shoe reaches the limit switch, the bender will stop.

NOTE: Due to springback in pipe/conduit, some over bending is necessary to achieve the desired degree of bend. See page 22 or the bending instructions decal located on the top of each bender for approximate springback compensation figures.

NOTE: Do NOT allow the rollers to come in contact with the bending shoe. The shoe and rollers squeeze the conduit but they should never touch each other.

7. To release the conduit, place the "Bend/Unload" switch in the "Unload" position. Press the "Jog" button and reverse the shoe. The rollers will then drop, allowing removal of the conduit.

WARNING

The pipe/conduit should be under control when unloading.
Failure to do this may result in injury or death.

8. After removal of the conduit, inspect it for wrinkling or excessive side marks. If these conditions occur, refer to the SQUEEZE ADJUSTMENT PROCEDURE. See page 18.

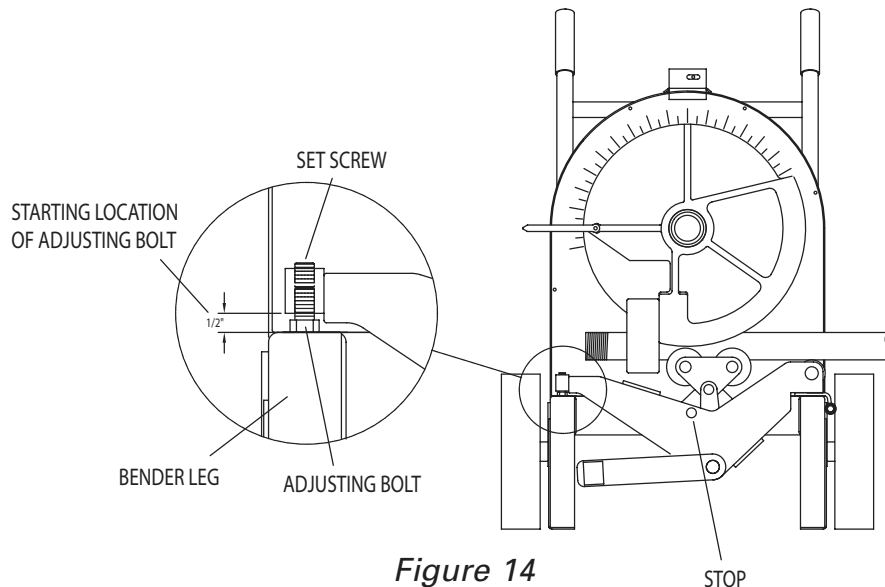


SQUEEZE ADJUSTMENT PROCEDURE FOR 1 1/2" AND 2" EMT & IMC ROLLER SUPPORTS

The 77DL bender has a Squeeze Adjustment feature if wrinkling or side marking becomes a problem during the bending process. This feature allows you to increase or decrease the amount of pressure applied to the conduit during bending, thereby eliminating these problems. Begin with the 1/2" starting location of the adjusting bolts as shown in Figure 14.

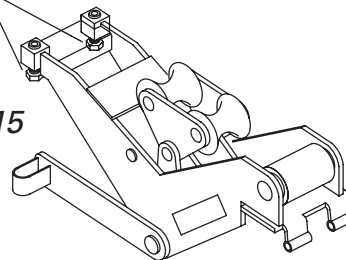
1. If wrinkling occurs, pressure against the conduit during the bending process must increase. To increase the squeeze (pressure), loosen both set screws and turn both adjusting bolts one-half turn clockwise. Tighten both set screws and bend one piece of conduit to test the adjustment. If wrinkling still occurs, repeat the procedure.

NOTE: Both adjusting bolts MUST be in contact with the bender leg. See Figure 15.



BOTH ADJUSTING BOLTS
MUST CONTACT BENDER
LEG

Figure 15



2. If side marking occurs, or loading IMC or EMT is a problem, pressure against the conduit during the bending process must be decreased. To decrease the squeeze (pressure), loosen both set screws and turn both adjusting bolts one-half turn counter-clockwise. Tighten both set screws and bend one piece of conduit to test the adjustment. If side marking still occurs, repeat the procedure.

NOTE: Both adjusting bolts MUST be in contact with the bender leg.

WARNING

ALWAYS disconnect power supply before removing any guards or covers and before servicing this bender. Failure to do so may result in serious injury or death.

1. The Gear Box is filled with oil at the factory and should not require periodic flushing. If the Gear Box is opened for repair, flush by filling the unit with an AGMA #7 oil. Next, run the unit with no load for 3 minutes. Then, drain and refill the unit with 28 fluid ounces of an AGMA #7 oil such as the ones listed below.

Amoco – Amoco Worm Gear Oil

Chevron – Cylinder Oil 460X

Exxon – CYLESSTIC TK460

Mobil – 600 W Cylinder Oil

Shell – Sun Gear Oil 7C

2. To inspect FRONT #60 chain tension:

- Remove front cover plate.
- To adjust, loosen hex bolt with 3/4 wrench and rotate chain tensioner toward chain as shown until chain moves no more than a total of 1/4". See Figure 16 below.
- Grease chain periodically with a good quality MP grease.

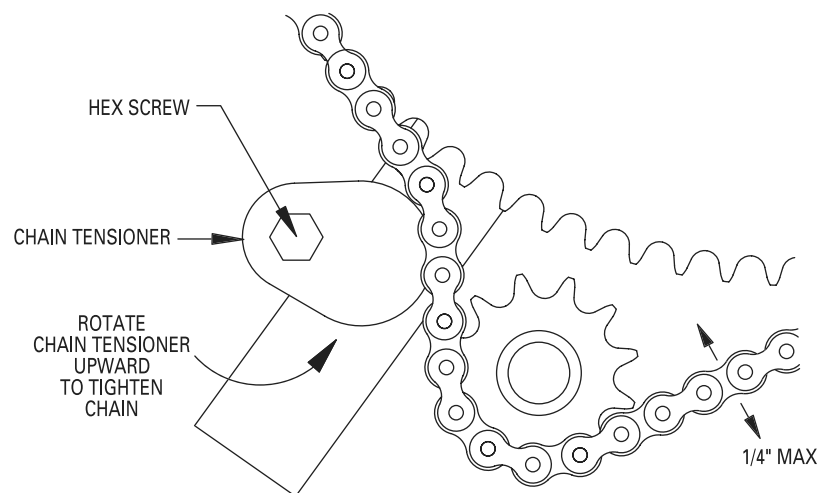


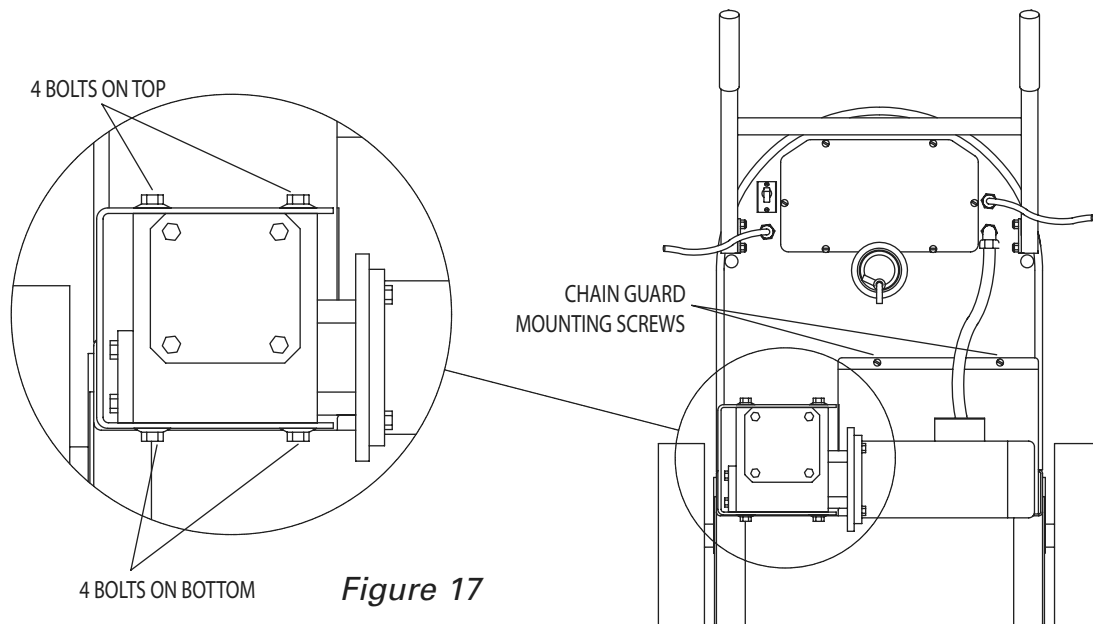
Figure 16

3. To inspect REAR #40 chain tension:

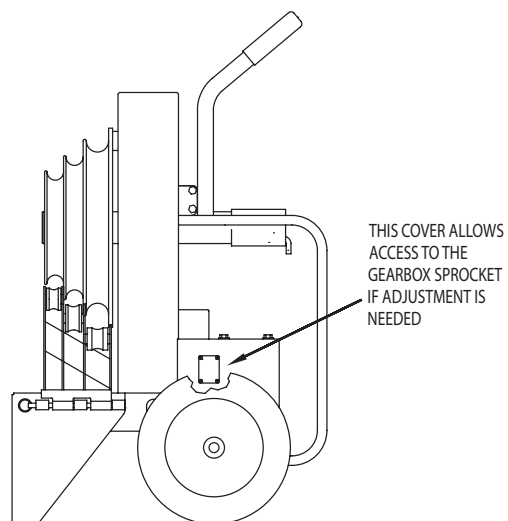
- Check chain tension after an initial break-in period of 2 - 3 hours of use and tighten per the instructions below. See Figure 17. Thereafter, inspect monthly.
- Remove the chain guard by taking out the 2 mounting screws.
- Loosen 8 bolts (4 on top and 4 on bottom) that hold the gear box in position.
- To tighten chain, move the gear box to the left and re-tighten bolts.
- For correct tension, chain should deflect approximately 1/8".

NOTE: Be sure to keep the gear box and motor in line with the bender.

- Grease chain periodically with a good quality MP grease.



- Access to the gearbox sprocket is possible by removing access door as shown.





STUB-UP BENDING INFORMATION AND CHARTS

To locate bending marks and springback of 15, 30, 45, 60, and 90 degree bends for a desired stub:

1. Check Chart A, B, or C for deduct length. Note that minimum stub length is deduct length plus 2".
2. Measure and mark desired stub length on conduit (stub length mark). Subtract "Deduct Length" from this mark and make a second mark (bending mark). See Fig 18a and 18b. Place bending mark at front edge of shoe hook. See Figure 18c. Check Chart A, B, or C for springback of desired degree of bend. Bender should be advanced to this degree to obtain desired degree of bend.

Figure 18a

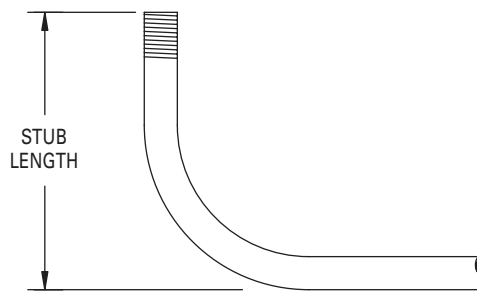


Figure 18b

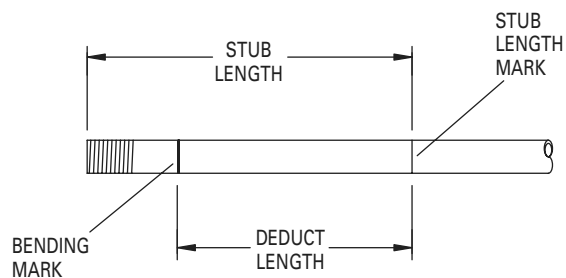
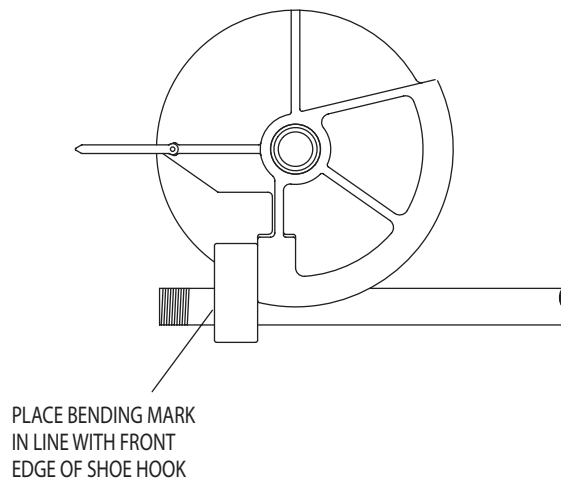


Figure 18c



STUB-UP BENDING INFORMATION AND CHARTS *continued . . .*

Chart A – RIGID Conduit/Schedule 40 Pipe

Conduit Size	Deduct Length	Springback				
		15°	30°	45°	60°	90°
1/2"	8 1/2"	20	36 1/4	51 1/4	67 1/2	97 1/2
3/4"	8 1/2"	16 1/4	31 1/4	46 1/4	61 1/4	92 1/2
1"	10"	17 1/2	32 1/2	47 1/2	63 3/4	93 3/4
1 1/4"	12 3/4"	17 1/2	32 1/2	47 1/2	63 3/4	95
1 1/2"	14 1/4"	18 3/4	33 3/4	48 3/4	65	95
2"	16 1/8"	20	35	48 3/4	63 3/4	96 1/4

Chart B – EMT Conduit

Conduit Size	Deduct Length	Springback				
		15°	30°	45°	60°	90°
1/2"	7"	16 1/4	32 1/2	47 1/2	63 3/4	95
3/4"	8 7/8"	17 1/2	33 3/4	48 3/4	63 3/4	95
1"	10 3/4"	17 1/2	32 1/2	48 3/4	65	95
1 1/4"	13 1/8"	17 1/2	33 3/4	48 3/4	65	95
1 1/2"	13 7/8"	16 1/4	31 1/4	46 1/4	61 1/4	92 1/2
2"	15 3/8"	17 1/2	33 3/4	48 3/4	63 3/4	95

Chart C – IMC Conduit

Conduit Size	Deduct Length	Springback				
		15°	30°	45°	60°	90°
1/2"	8 1/2"	21 1/4	37 1/2	52 1/2	68 3/4	98 3/4
3/4"	8 1/2"	17 1/2	32 1/2	47 1/2	63 3/4	93 3/4
1"	10"	17 1/2	32 1/2	47 1/2	63 3/4	95
1 1/4"	12 3/4"	18 3/4	33 3/4	48 3/4	65	96 1/4
1 1/2"	13 3/4"	17 1/2	33 3/4	48 3/4	63 3/4	95
2"	15 1/4"	20	35	50	65	96 1/4

NOTE: Springback figures are approximate.

Minimum Stub Length = Deduct Length plus 2"



OFFSET BENDING INFORMATION AND CHARTS

To locate bending marks for a desired offset:

1. Measure distance from end of conduit to start of bend and mark conduit. (Mark 1) See Figure 19b.
2. Refer to chart E for measurement "X" and deduct this distance from Mark 1 and place Mark 2 on conduit. See page 24.
3. Refer to chart D for center-to-center distance between marks. Measure this distance from Mark 2 and place Mark 3 on conduit.
4. Layout of bends is now complete. Next, place Mark 2 in line with front edge of shoe hook and make first bend. See Figure 19c.
5. Rotate conduit 180 degrees. Place Mark 3 in line with front edge of shoe hook and complete second bend.

Figure 19a

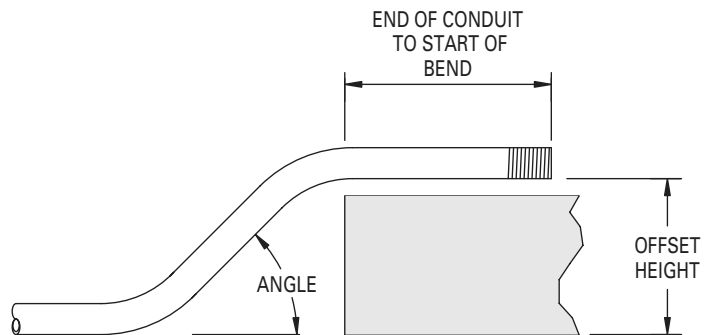


Figure 19b

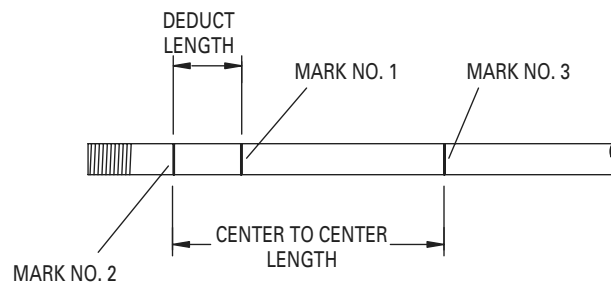
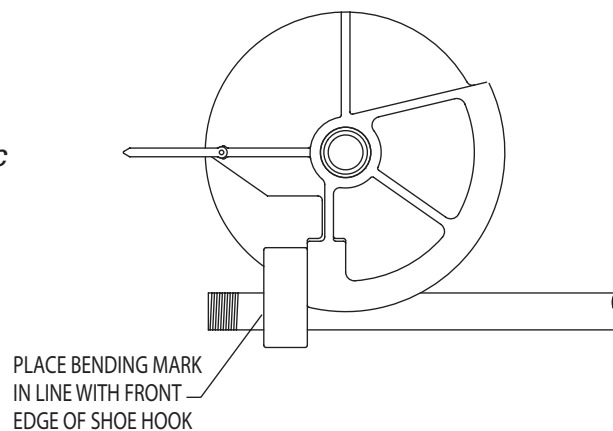


Figure 19c



OFFSET BENDING INFORMATION AND CHARTS *continued . . .*

Chart D – Offset Height *Figures are approximate.*

Offset Height		2	4	6	8	10	12	14	16	18	20	22
15°	Max Conduit Size	3/4"	1 1/2"	2"	2" and smaller							
	Center-to-Center	7 3/4"	15 7/16"	23 3/16"	30 15/16"	38 5/8"	46 3/8"	54 1/16"	61 13/16"	69 9/16"	77 1/4"	85"
30°	Max Conduit Size		3/4"	1"	1 1/2"	2"	2" and smaller					
	Center-to-Center		8"	12"	16"	20"	24"	28"	32"	36"	40"	44"
45°	Max Conduit Size			1/2"	1"	1 1/4"	1 1/2"	2"	2" and smaller			
	Center-to-Center			8 1/2"	11 5/16"	14 1/8"	16 15/16"	19 13/16"	22 5/8"	25 7/16"	28 1/4"	31 1/8"

To locate center-to-center distance of offset bending marks other than those listed in Chart D, use the following multipliers. Multiply the height of offset desired by 3.86 on 15 degree bends, 2 on 30 degree bends, and 1.4 on 45 degree bends.

Chart E *Figures are approximate.*

Conduit Size	1/2	3/4	1	1 1/4	1 1/2	2
"X"	3 1/16"	3 1/16"	3 3/16"	4"	4 1/4"	4 1/2"

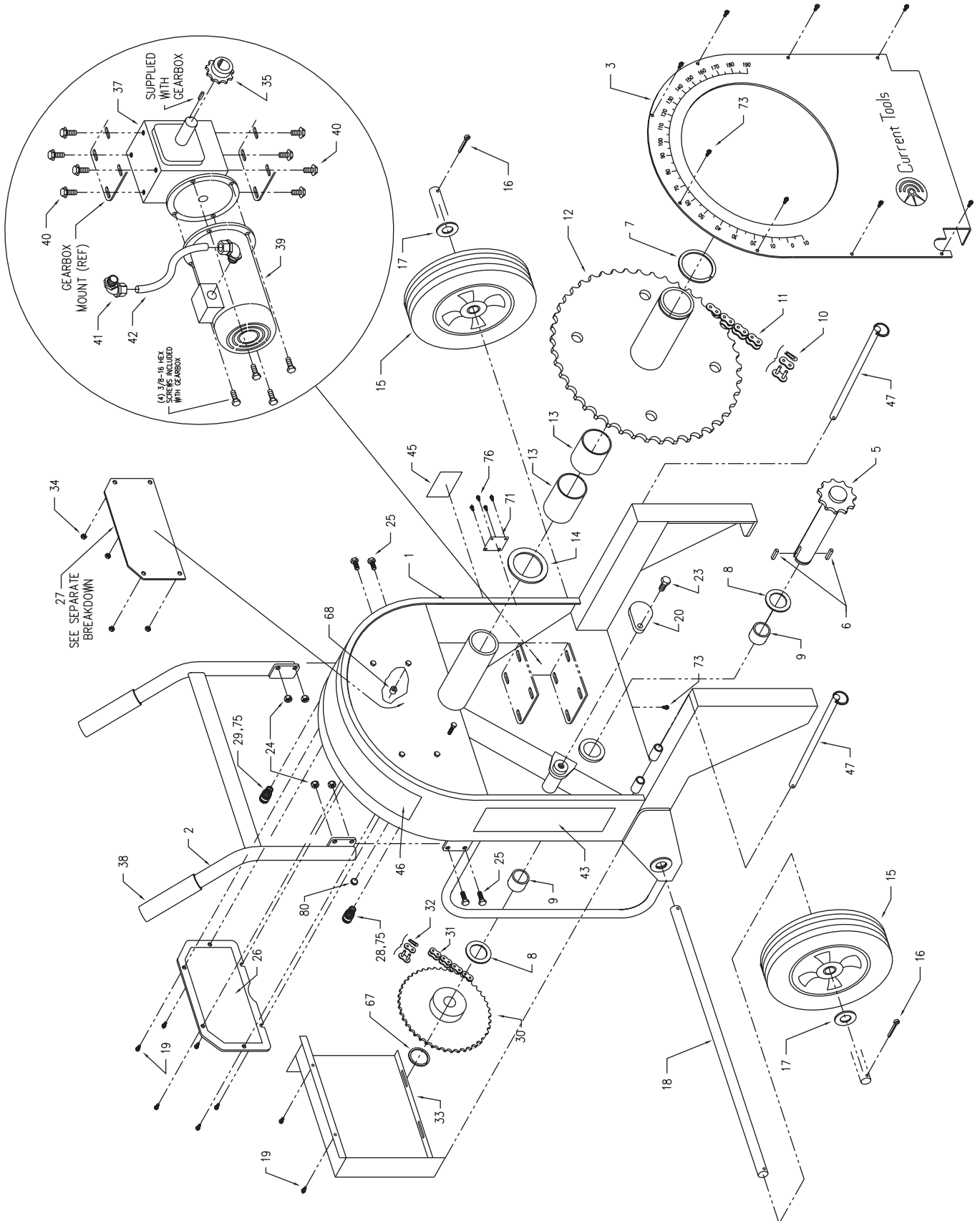
! WARNING

ALWAYS disconnect power supply before removing any guards or covers and before servicing this bender. Failure to do so may result in serious injury or death.

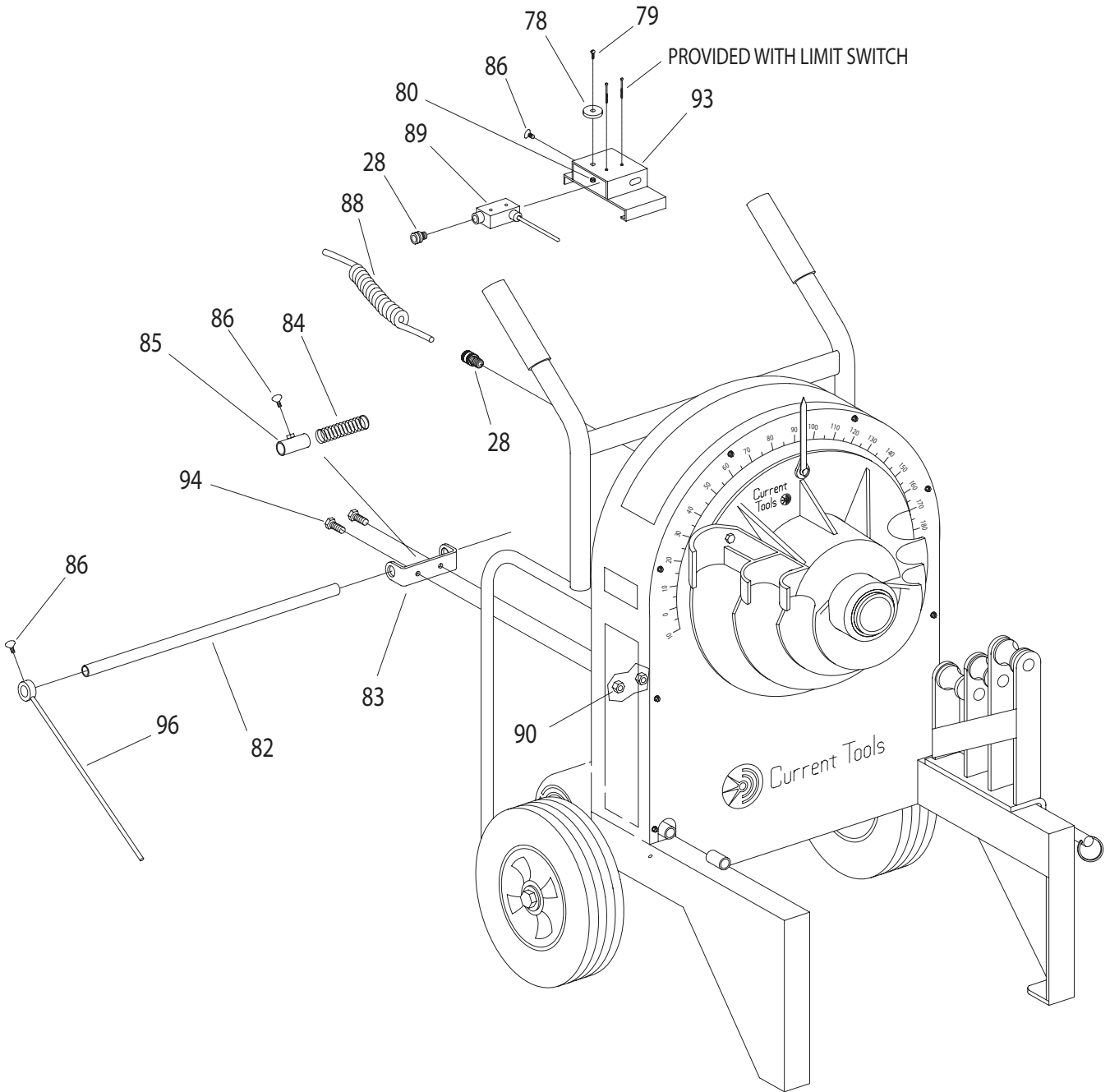
Problem	Cause	Diagnosis	Cure
1. Bender will not operate	Power source	Check for voltage at power source	If power is on, go to (#3)
2. No power at bender	Bad power cord	Ohm cord for broken wire	Replace cord
3. Power to bender but will not operate	Circuit breaker / power switch in the off position	Check power on load side of breaker to neutral with volt meter	Turn circuit breaker on. If on, go to next step.
	Fuse #1 blown	Ohm circuit for short	Replace
	Control Transformer bad	Check voltage in and out, if input but no output	Replace
	Contactora bad	Check contacts and ohm coil for open circuit	Replace
	Bridge rectifier bad	Check with ohm meter	Replace
	Switch bad Motor bad	Check with ohm meter Check brushes and ohm for open or short armature	Replace Replace
4. Motor runs but will not bend	Chain from gear box to jack shaft broken	Remove cover and visually check for broken parts	Replace
	Bad gear box	Motor running but no output through gear box	Replace
	Chain from jack shaft to shoe sprocket broken	Remove cover and visually check for broken parts	Replace
	Key between motor and gear box missing	Remove motor from gear box	Replace key
5. Bender operates in one direction only	Bad FWD / REV switch	Ohm switch for open contact or shorted contacts	Replace
	Bad pendant cord	Ohm for broken wire	Replace
	Bad contactora	Check contacts and ohm coil for open circuit	Replace
6. Contactors chatter	Low power to bender	Check with amp meter	Do not use long drop cords
7. Pointer passes bend angle limit switch in clockwise direction	Bend angle limit switch failed	Check contacts in the bend angle limit switch contactora and ohm coil for open circuit	Replace contactora if bad. If contactora tests good, replace bend angle limit switch



EXPLODED VIEWS

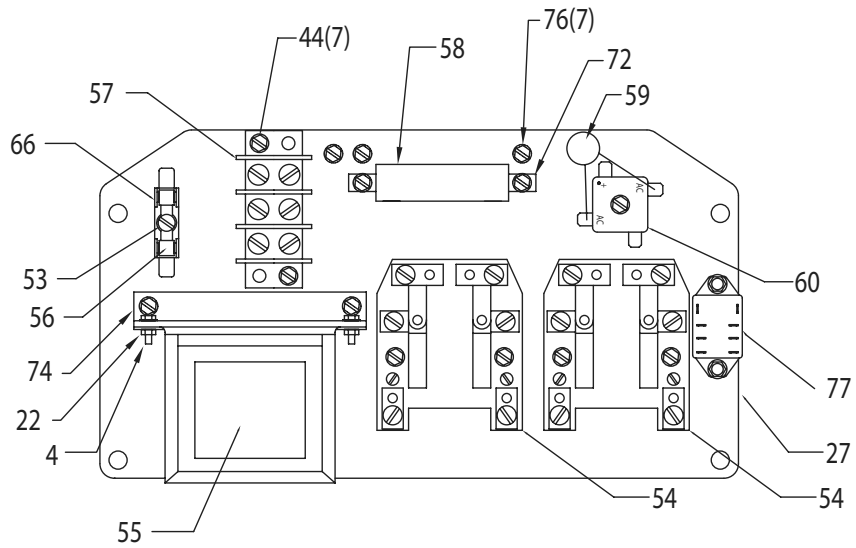


EXPLODED VIEWS

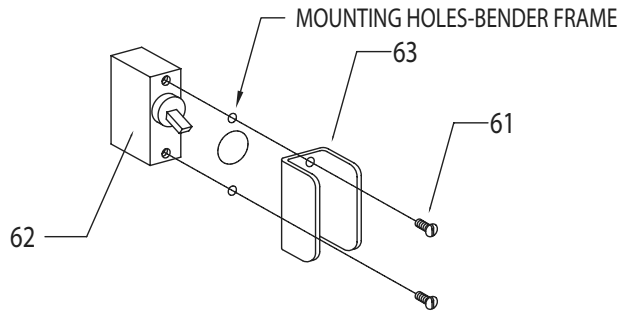


EXPLODED VIEWS *continued . . .*

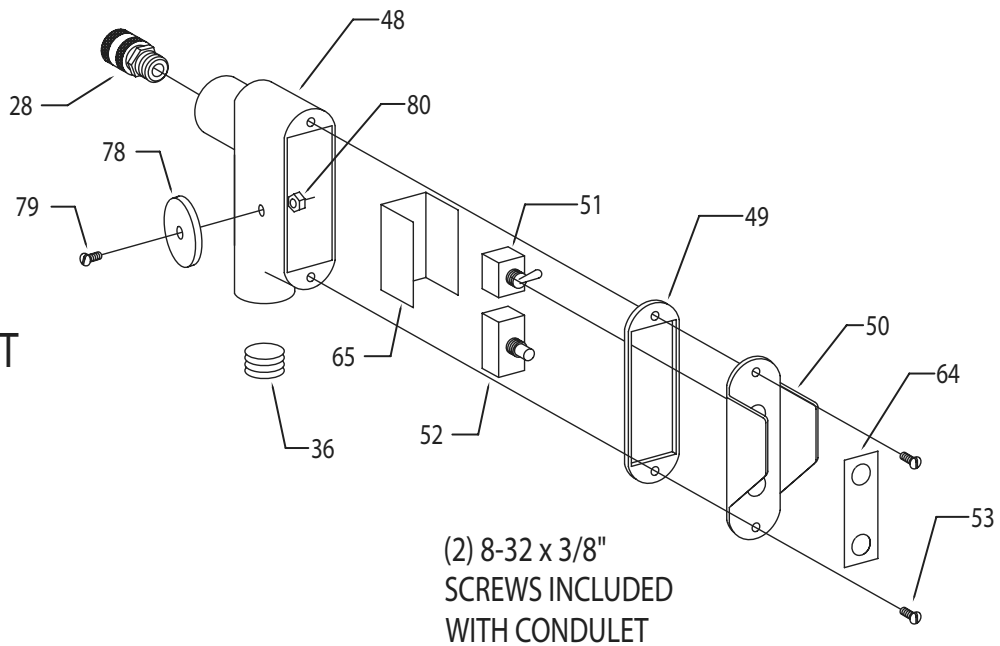
**ELECTRICAL
PLATE**



**CIRCUIT
BREAKER
SWITCH**



**REMOTE
PENDANT**





PARTS LIST — 77DL SERIES ELECTRIC BENDER

ITEM #	PART #	QTY	DESCRIPTION
1	77-375	1	FRAME
2	77-346	1	HANDLE
3	77-004D	1	COVER
4	77-004	2	SCREW - #8-32 X 1/2" THD CUTTER
5	77-343	1	SPROCKET SHAFT
6	77-006A	2	KEY - SQUARE, 1/4" X 3/4" LONG
7	77-007	1	RETAINING RING - EXT, 2 1/2"
8	77-008	2	WASHER - PHENOLIC (JACKSHAFT)
9	77-009	2	SLEEVE BEARING
10	77-010	1	#60 MASTER LINK
11	77-011	1	#60 CHAIN
12	77-394	1	SPROCKET - MAIN DRIVE #60
13	77-070	2	SLEEVE - PHENOLIC
14	77-014	1	WASHER - PHENOLIC (MAIN)
15	77-015	2	WHEEL
16	77-016	2	PIN - COTTER, 3/16" X 1 1/4"
17	77-017	2	WASHER - 3/4" USS
18	77-429	1	AXLE
19	77-033A	8	SCREW - HEX, 10 X 1/2, #2 TEKS
20	77-413	1	CHAIN TENSIONER
22	453-16A	2	NUT - HEX #8 - 32
23	8092-2	1	SCREW - HEX 1/2 - 13 X 1"
24	2-1301-4	4	NUT - HEX, 5/16 - 18 (NYLON INS.)
25	77-002D1	4	SCREW - HEX 5/16 - 18 X 3/4
26	77-026	1	COVER - ELECTRICAL
27	77-339	1	PLATE - ELECTRICAL
28	77-028A	3	STRAIN RELIEF - PENDANT
29	77-028	1	STRAIN RELIEF - POWER CORD
30	77-288	1	SPROCKET - #40 B48
31	77-031	1	CHAIN - #40
32	77-032	1	MASTER LINK - #40
33	77-468	1	COVER - REAR CHAIN
34	9518SR-12	4	NUT - HEX, 1/4-20 (LOCK)
35	77-237	1	SPROCKET - #40 B13
36	77-3-1A	1	PLUG - PLASTIC
37	77-037	1	GEAR BOX
38	504-1	2	GRIP
39	77-039	1	MOTOR
40	77-040	8	BOLT - FLANGE LOCK, 3/8 - 16 X 3/4

PARTS LIST *continued . . .*

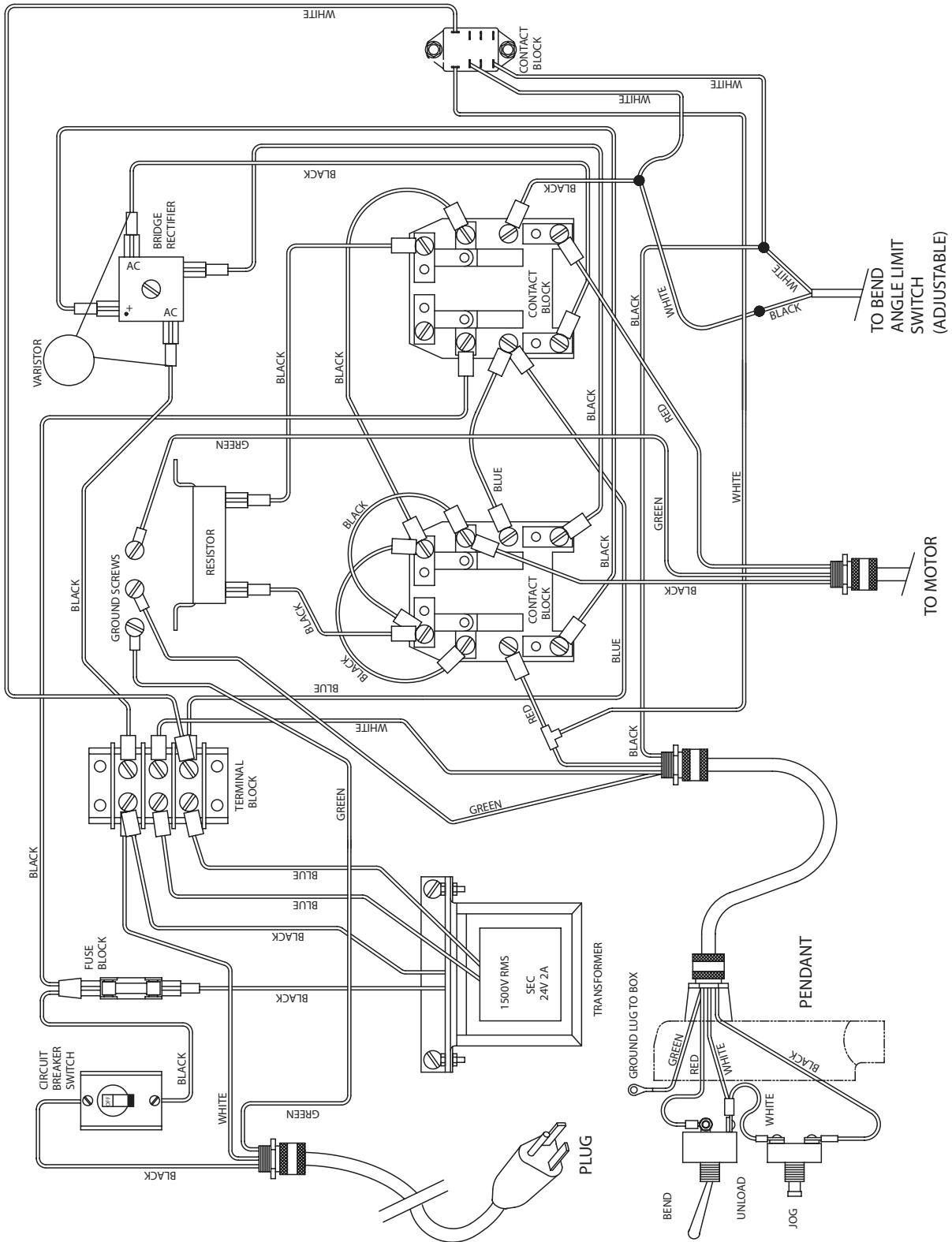
<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
41.....	77-041.....	2	FITTING - 90° LIQUITITE
42.....	77-042A.....	1	FLEX CONDUIT
43.....	77-043.....	1	DECAL - SAFETY INFORMATION
44.....	77-004B.....	7	SCREW - #8 - 32 X 5/8" THD CUTTER
45.....	77-045.....	1	SERIAL NUMBER PLATE
46.....	77-046.....	1	DECAL - BENDING INSTRUCTIONS
47.....	77-047.....	2	PIN - ROLLER SUPPORT
48.....	77-048.....	1	CONDULET - 1/2"
49.....	77-451.....	1	GASKET
50.....	77-128.....	1	GUARD - PENDANT SWITCH
51.....	77-051.....	1	SWITCH - FORWARD / REVERSE
52.....	77-052.....	1	SWITCH - JOG
53.....	77-053.....	3	SCREW - #8 - 32 X 3/8" PAN HEAD MACH.
54.....	77-054.....	2	CONTACTORS
55.....	77-055.....	1	TRANSFORMER - 24 VOLT
56.....	77-056.....	1	FUSE
57.....	77-057.....	1	TERMINAL BLOCK
58.....	77-058.....	1	RESISTOR
59.....	77-508.....	1	VARISTOR WITH WIRES
60.....	77-060.....	1	BRIDGE RECTIFIER
61.....	77-061.....	2	SCREW - PAN HD PHILLIPS, 6 -32 X 3/8"
62.....	77-062.....	1	CIRCUIT BREAKER
63.....	77-063.....	1	COVER - CIRCUIT BREAKER
64.....	77-064.....	1	DECAL - PENDANT
65.....	77-065.....	1	FISH PAPER - INSULATING
66.....	77-066.....	1	FUSE HOLDER
67.....	77-067.....	1	RETAINING RING
68.....	450-20.....	4	SPACER
69.....	77-068.....	1	CORD - POWER (not shown)
70.....	77-071.....	1	CORD - PENDANT (not shown)
71.....	77-714.....	1	ACCESS COVER
72.....	77-058A.....	2	BRACKET - RESISTOR
73.....	452-6A.....	9	SCREW #8 X 1/2" SELF DRILL
74.....	77-387.....	1	BRACKET - TRANSFORMER
75.....	77-041A.....	2	NUT - 1/2" LOCK
76.....	77-004A.....	11.....	SCREW - #8 - 32 X 3/8" THD CUTTER
77.....	747-7.....	1	RELAY
78.....	747-19.....	2	MAGNET
79.....	451-22.....	2	SCREW - PAN HD PHILLIPS, 10-32 X 3/8"
80.....	451-21.....	2	NUT HEX 10-32 (NYLON INS)

PARTS LIST *continued . . .*

<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
82.....	77DL-968	1	STOP TUBE
83.....	77DL-964	1	.BRACKET — STOP TUBE
84.....	77DL-1	1	SPRING
85.....	77DL-969	1	LOCKING TUBE
86.....	77DL-2	3	THUMB SCREW 5/16-18 X1/2
88.....	77DL-3	1	CORD – COILED
89.....	77DL-4	1	LIMIT SWITCH
90.....	2-1301-4	2	HEX NUT 5/16-18 (NYLON INSERT)
93.....	77DL-970	1	.BRACKET – LIMIT SWITCH
94.....	77-002D1	2	SCREW HEX HD 5/16-18 X 3/4"
96.....	77DL-971	1	STOP ROD



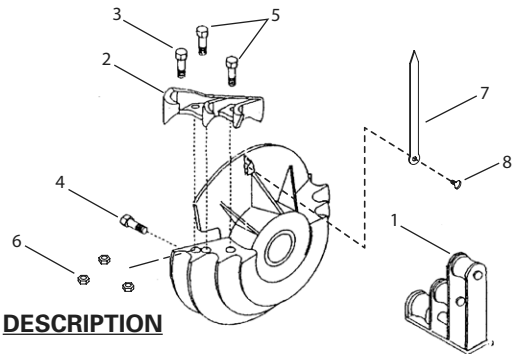
ELECTRICAL SYSTEM DIAGRAM - 77DL BENDER





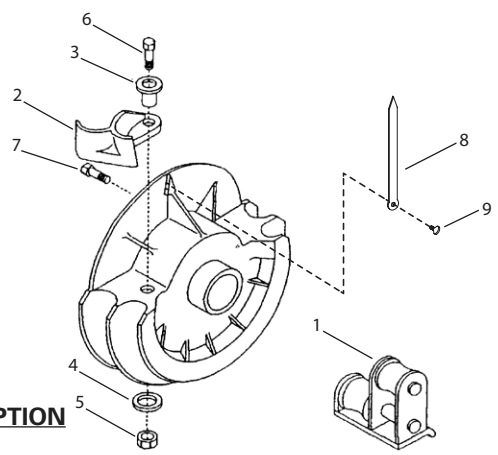
PARTS LIST — BENDING SHOES & ROLLER SUPPORTS

Bending Shoe & Roller Support — 1/2" to 1 1/4" RIGID & IMC Conduit



ITEM #	PART #	QTY	DESCRIPTION
1	2-1001	1	ROLLER SUPPORT, 1/2" TO 1 1/4" RIGID & IMC
	2-1301DL		BENDING SHOE ASSEMBLY (INCLUDES 2-8)
2	2-1302	1	HOOK
3	2-1501-5	1	3/8 - 16 X 1 1/4" SKT HD CAP SCREW
4	2-1304	4	DRIVE STUD
5	2-1501-3	2	3/8"-16 X 1 1/2" SKT HD CAP SCREW
6	2-1501-4	3	NUT – HEX 3/8"-16 NYLON INSERT
7	77DL-967	1	POINTER – SHOE
8	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

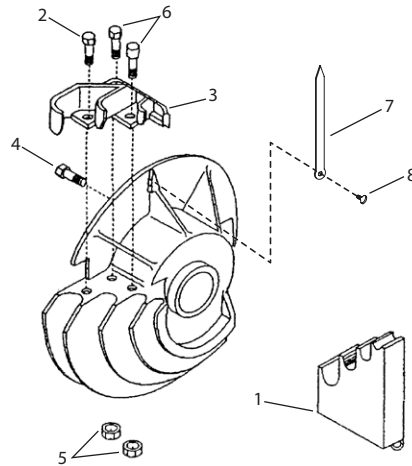
Bending Shoe & Roller Support — 1 1/2" to 2" RIGID Conduit



ITEM #	PART #	QTY	DESCRIPTION
1	2-1002	1	ROLLER SUPPORT, 1 1/2" TO 2" RIGID CONDUIT
	2-1401DL		BENDING SHOE ASSEMBLY 1 1/2" TO 2" RIGID (INCLUDES 2-9)
2	2-1402	1	HOOK
3	2-1403	1	SPACER – PIVOT
4	2-1404	1	FLAT WASHER
5	2-1401-4	1	5/8 - 11 HEX NUT, NYLON INSERT
6	751-9	1	5/8 - 11 X 3" SKT HD CAP SCREW
7	2-1304	4	DRIVE STUD
8	77DL-967	1	POINTER – SHOE
9	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

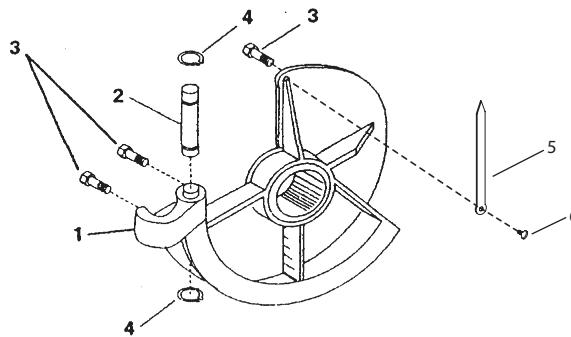
PARTS LIST — BENDING SHOES & SUPPORTS *continued . . .*

**Bending Shoe & Roller Support —
1/2" to 1 1/4" EMT Conduit**



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	2-1003	1	EMT SUPPORT, 1/2" TO 1 1/4" EMT CONDUIT
	2-1501DL		BENDING SHOE ASSEMBLY, 1/2" TO 1 1/4" EMT CONDUIT (INCLUDES 2-8)
2	2-1501-5	1	3/8 - 16 X 1/14" HEX HD CAP SCREW (GRADE 8)
3	2-1504	1	HOOK
4	2-1304	4	DRIVE STUD
5	2-1501-4	2	3/8 - 16 HEX NUT, NYLON INSERT
6	2-1501-3	2	3/8 - 16 X 1 1/2" HEX HD SCREW (GRADE 8)
7	77DL-967	1	POINTER — SHOE
8	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

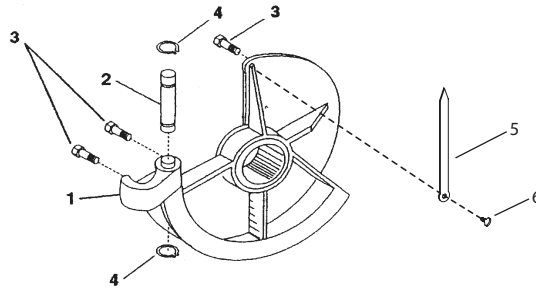
**Bending Shoe —
1 1/2" EMT Conduit**



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
	2-1601DL		SHOE UNIT, 1 1/2" EMT (INCLUDES 1-6)
1	2-1802	1	HOOK 1 1/2" EMT
2	2-1603	1	PIN, 1 1/2" EMT HOOK
3	2-1304	3	DRIVE STUD
4	2-1604	2	RETAINING RING
5	77DL-967	1	POINTER — SHOE
6	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

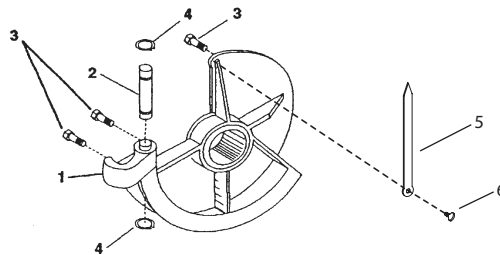
PARTS LIST — BENDING SHOES & SUPPORTS *continued . . .*

Bending Shoe — 2" EMT Conduit



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
	2-1701DL	1	SHOE UNIT, 2" EMT (INCLUDES 1-6)
1	2-1702	1	HOOK, 2" EMT
2	2-1703	1	PIN, 2" EMT HOOK
3	2-1304	3	DRIVE STUD
4	2-1604	2	RETAINING RING
5	77DL-967	1	POINTER — SHOE
6	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

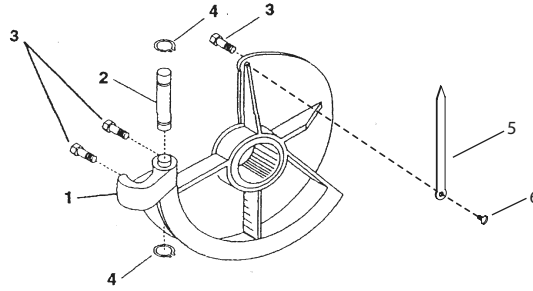
Bending Shoe — 1 1/2" IMC Conduit



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
	2-1801DL	1	SHOE UNIT, 1 1/2" IMC (INCLUDES 1-6)
1	2-1802	1	HOOK, 1 1/2" IMC
2	2-1603	1	PIN, 1 1/2" IMC
3	2-1304	3	DRIVE STUD
4	2-1604	2	RETAINING RING
5	77DL-967	1	POINTER — SHOE
6	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

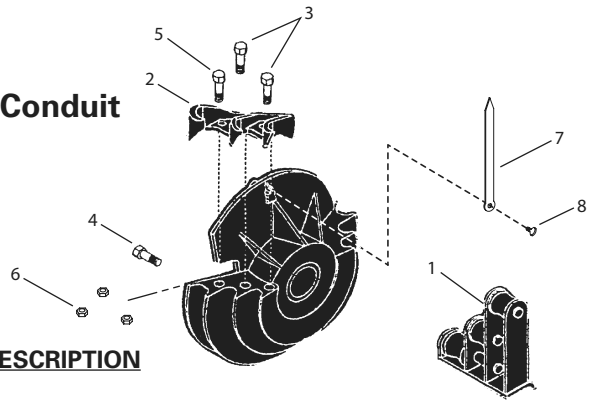
PARTS LIST — BENDING SHOES & SUPPORTS *continued . . .*

**Bending Shoe —
2" IMC Conduit**



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
	2-1901DL		SHOE UNIT, 2" IMC (INCLUDES 1-6)
1	2-1902	1	HOOK, 2" IMC
2	2-1703	1	PIN, 2" IMC
3	2-1304	3	DRIVE STUD
4	2-1604	2	RETAINING RING
5	77DL-967	1	POINTER — SHOE
6	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

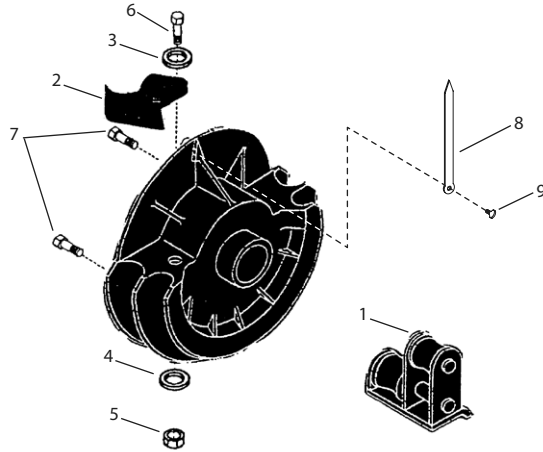
**Bending Shoe & Roller Support —
1/2" to 1 1/4" 40 mil PVC Coated RIGID Conduit**



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	2-1004	1	ROLLER SUPPORT, 1/2" TO 1 1/4" PVC COATED RIGID
	2-2001DL		BENDING SHOE ASSEMBLY, 1/2 TO 1 1/4" PVC COATED RIGID (INCLUDES 2-8)
2	2-1302	1	HOOK
3	2-1501-3	2	3/8" - 16 X 1 1/2" HEX HEAD CAP SCREW (GRADE 8)
4	2-1304	4	DRIVE STUD
5	2-1501-5	1	3/8" - 16 X 1 1/4" HEX HEAD CAP SCREW (GRADE 8)
6	2-1501-4	2	3/8 - 16 HEX NUT, NYLON INSERT
7	77DL-967	1	POINTER — SHOE
8	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"

PARTS LIST — BENDING SHOES & SUPPORTS *continued . . .*

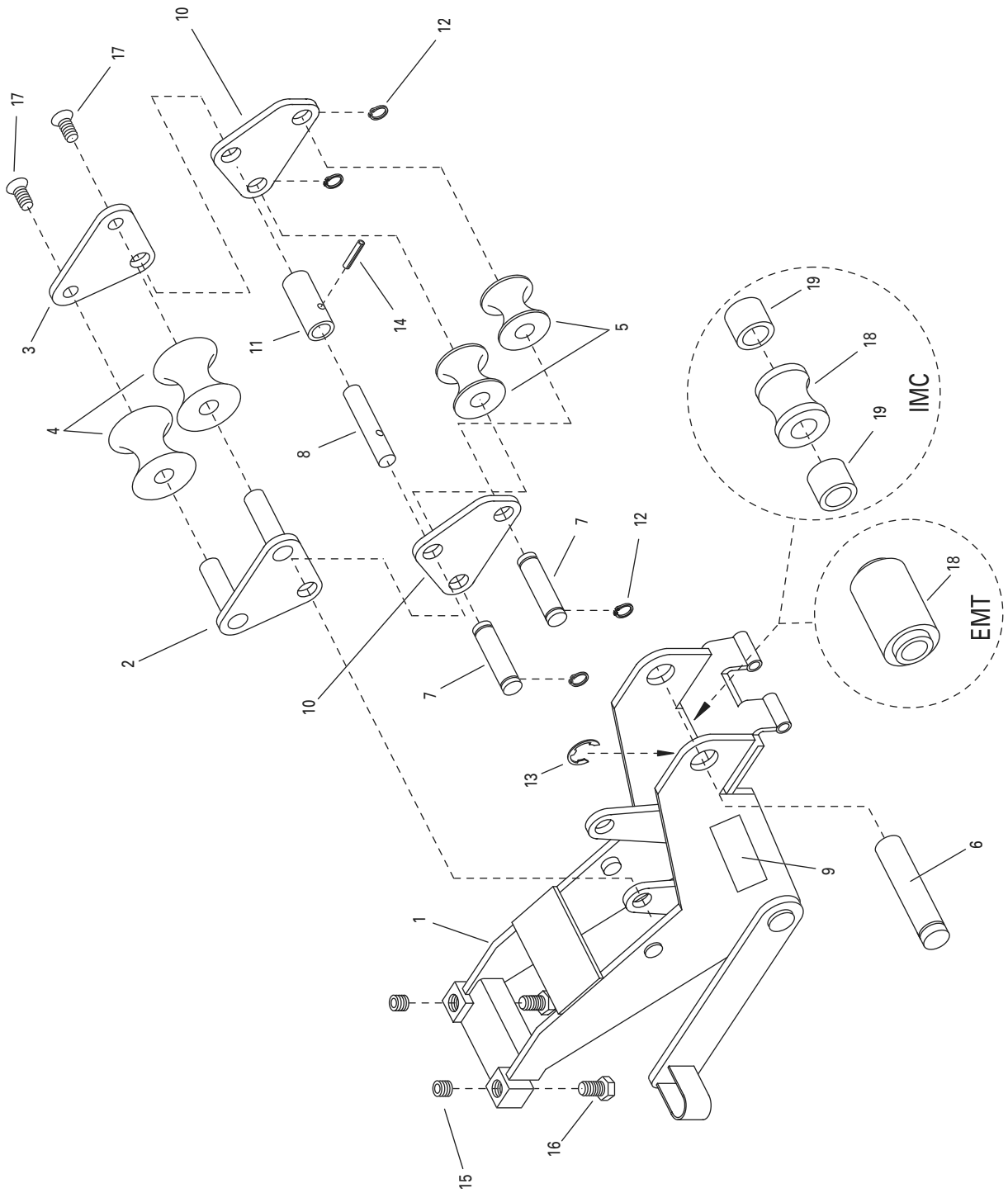
Bending Shoe & Roller Support — 1 1/2" to 2" 40 mil PVC Coated RIGID Conduit



<u>ITEM #</u>	<u>PART #</u>	<u>QTY</u>	<u>DESCRIPTION</u>
1	2-1005	1	ROLLER SUPPORT, 1 1/2" TO 2" PVC COATED RIGID
	2-2101DL		BENDING SHOE ASSEMBLY, 1 1/2" TO 2" PVC COATED RIGID (INCLUDES 2-9)
2	2-1402	1	HOOK
3	2-1403	1	SPACER – PIVOT
4	2-1404	1	FLAT WASHER
5	2-1401-4	1	5/8 - 11 HEX NUT NYLON INSERT
6	751-9	1	5/8 - 11 X 3" SKT HD CAP SCREW
7	2-1304	4	DRIVE STUD
8	77DL-967	1	POINTER – SHOE
9	77DL-5	1	THUMB SCREW 1/4-20 X 1/2"



EXPLODED VIEW — ROLLER SUPPORT





PARTS LIST — ROLLER SUPPORT – EMT

2-1100 ROLLER SUPPORT UNIT, 1 1/2" & 2" EMT

ITEM #	EMT PART #	QTY	DESCRIPTION
1.....	2-1102	1	FRAME
2.....	2-1114	1	2" ROLLER SUPPORT WELDMENT
3.....	2-1115	1	2" ROLLER SUPPORT PLATE
4.....	2-1116	2	2" EMT FRONT ROLLER
5.....	2-1103	2	1 1/2" EMT ROLLER
6.....	2-1104	1	ROLLER PIN
7.....	2-1105	2	1 1/2" ROLLER PIN
8.....	2-1106	1	ROLLER PIVOT PIN
9.....	2-1100-1.....	1	EMT DECAL
10.....	2-1107	2	1 1/2" PIVOT PLATE
11.....	2-1108	1	SPACER
12.....	2-1109	4	RETAINING RING
13.....	2-1110	1	RETAINING RING
14.....	2-1111	1	ROLL PIN
15.....	2-1112	2	SCREW, 1/2-13 UNC X 3/4 CUP PT. SKT. SET
16.....	2-1113	2	SCREW, 1/2-13 UNC X 1 HEX HD. CAP
17.....	2-1118	2	SCREW, 7/16-14 UNC X 1 FLAT HEAD
18.....	2-1101	1	ROLLER, URETHANE



PARTS LIST — ROLLER SUPPORT – IMC

2-1200 ROLLER SUPPORT UNIT, 1 1/2" & 2" IMC

ITEM #	IMC PART #	QTY	DESCRIPTION
1.....	2-1203	1	FRAME
2.....	2-1114	1	2" ROLLER SUPPORT WELDMENT
3.....	2-1115	1	2" ROLLER SUPPORT PLATE
4.....	2-1205	2	2" IMC ROLLER
5.....	2-1204	2	1 1/2" IMC ROLLER
6.....	2-1104	1	ROLLER PIN
7.....	2-1105	2	1 1/2" ROLLER PIN
8.....	2-1106	1	ROLLER PIVOT PIN
9.....	2-1200-1.....	1	IMC DECAL
10.....	2-1107	2	1 1/2" PIVOT PLATE
11.....	2-1108	1	SPACER
12.....	2-1109	4	RETAINING RING
13.....	2-1110	1	RETAINING RING
14.....	2-1111	1	ROLL PIN
15.....	2-1112	2	SCREW, 1/2-13 UNC X 3/4 CUP PT. SKT. SET
16.....	2-1113	2	SCREW, 1/2-13 UNC X 1 HEX HD. CAP
17.....	2-1118	2	SCREW, 7/16-14 UNC X 1 FLAT HEAD
18.....	2-1201	1	ROLLER, STEEL
19.....	2-1202	2	SPACER