

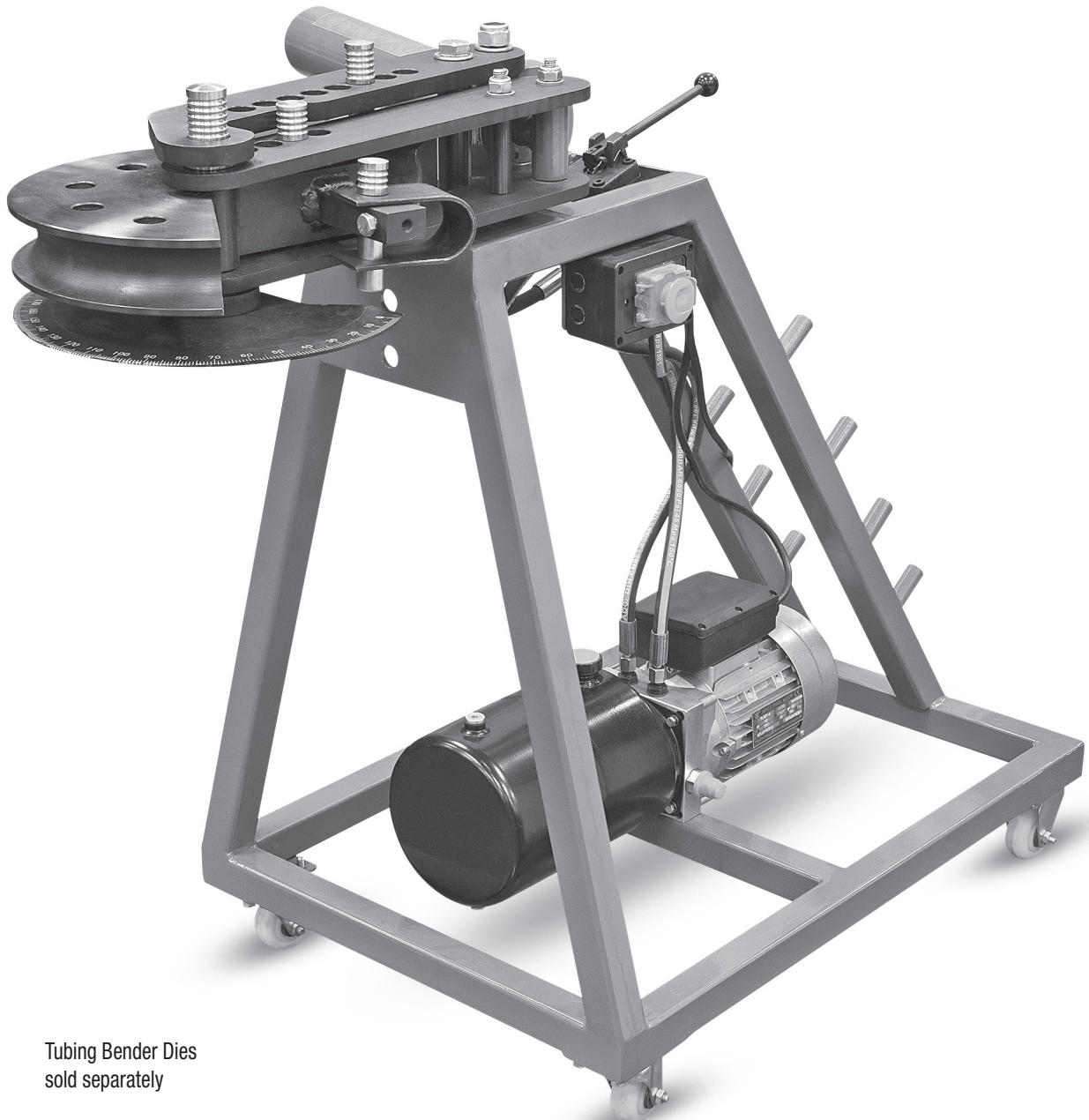
Eastwood[®]

DO THE JOB RIGHT.[®]

Item #22199

HYDRAULIC TUBING BENDER

INSTRUCTIONS



Tubing Bender Dies
sold separately

The **EASTWOOD HYDRAULIC TUBING BENDER** is a high quality, precision tool capable of creating accurate, smooth, kink-free bends, up to 180° in aluminum, steel, stainless steel and copper tubing, in sizes ranging from 3/4" to 2" with available Eastwood Die Sets. Build roll bars, shop fixtures, go-kart frames and much more with high accuracy and professional results.

CONTENTS

- (1) Frame and Bender Assembly **[A]**
- (2) Swivel Casters **[B]**
- (2) Fixed Casters **[C]**
- (1) Degree Plate **[D]**
- (18) M8 x1.25 Bolts **[E]**
- (18) M8 Lock washers **[F]**
- (1) Flexible Pointer **[G]**
- (1) 2" Long x Ø 7/8" U-Strap Pin **[H]**
- (1) 3" Long x Ø 7/8" U-Strap Pin **[J]**
- (1) 4.25" Long x Ø 7/8" Die Drive Pin **[K]**
- (1) 5.35" Long x Ø 7/8" Follow Block Pin **[L]**
- (1) 5.5" Long x Ø 1" Pivot Pin **[M]** (installed)

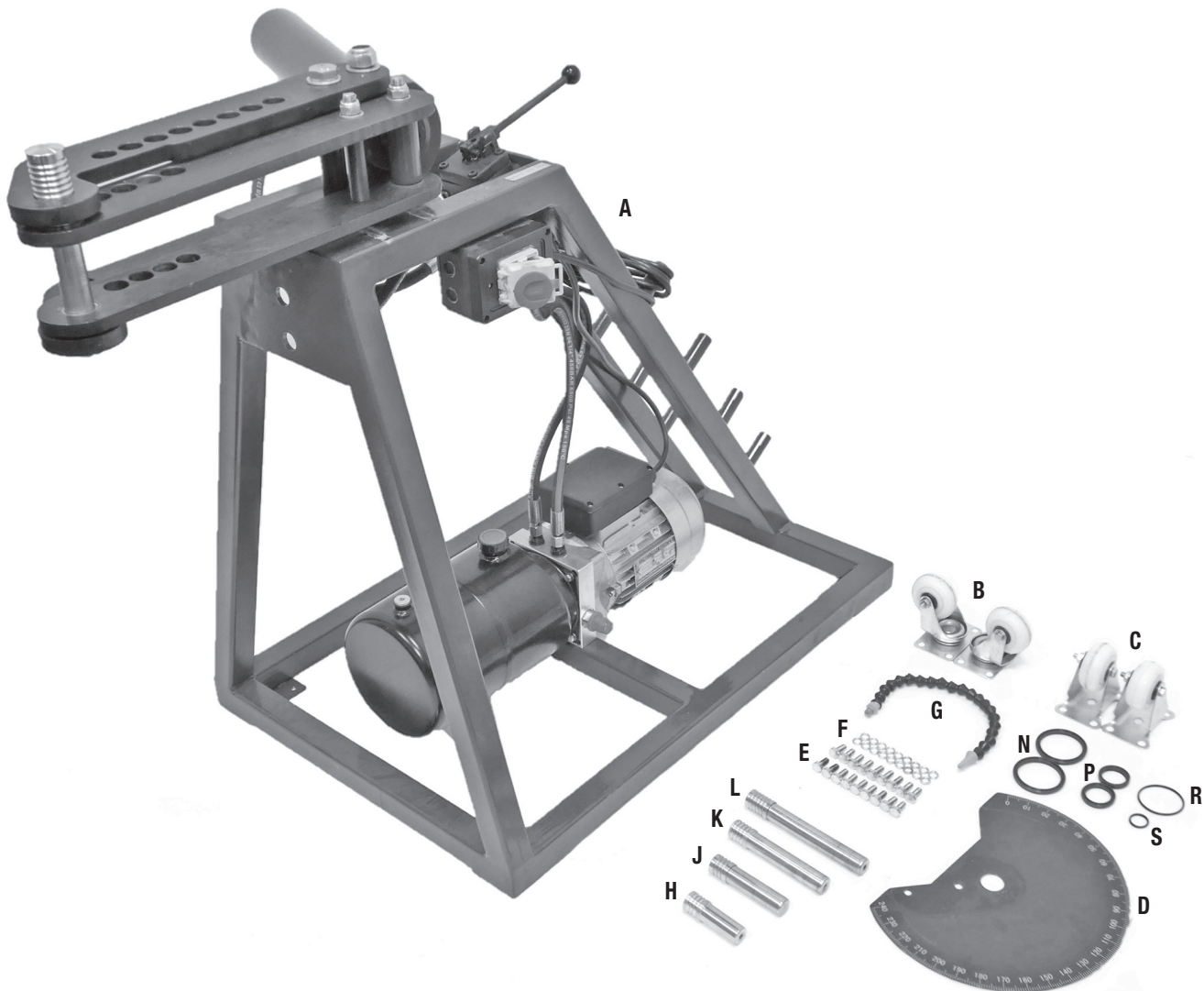
▲ NOTICE

The following parts are included as a convenience should the Hydraulic Cylinder require future rebuilding.

Hydraulic Cylinders require specialized tools, equipment and techniques for repair.

The installed Cylinder **MUST** be professionally rebuilt at a local hydraulic component repair facility. **DO NOT** attempt self-repair.

- (2) 30mm I.D. x 40mm O.D. Replacement Hydraulic Cylinder Seals **[N]**
- (2) 20mm I.D. x 30mm O.D. Replacement Hydraulic Cylinder Seals **[P]**
- (1) 55mm O.D. x 3.00mm Replacement O-Ring Seal **[R]**
- (1) 24mm O.D. x 3.25mm Replacement O-Ring Seal **[S]**



SPECIFICATIONS

Motor Horsepower:	1
Power Requirements:	120 VAC, 60Hz, 11.5Amps
Power Cord:	8' long [2.4m], 16 Ga., Grounded
Hydraulic Fluid Type:	10W Hydraulic Fluid
Hydraulic Cylinder Bore:	63mm
Hydraulic Cylinder Stroke:	12" [0.3m]
Maximum Material Capability:	2" O.D. x 0.120" Wall Mild Steel, Aluminum and Copper (Stainless, Chromoly and other harder materials may be limited to 2" O.D. x 0.090" Wall)
Maximum Recommended Bend Angle:	90° for 120° Dies and 180° for 240° Dies (Dies NOT INCLUDED)

SAFETY INFORMATION

The following explanations are displayed in this manual, on the labeling, and on all other information provided with this product:

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

GENERAL SAFETY RULES

WARNING

Read all instructions. Failure to follow all instructions listed below may result in electric shock, fire and/or serious injury. The term "power tool" in all of the warnings listed below refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

SAVE THESE INSTRUCTIONS

1) WORK AREA SAFETY

- a) Keep work area clean and well lit. Cluttered or dark areas invite accidents.
- b) Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Power tools create sparks which may ignite the dust or fumes.
- c) Keep children and bystanders away while operating a power tool. Distractions can cause you to lose control.

2) ELECTRICAL SAFETY

- a) Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools. Unmodified plugs and matching outlets will reduce risk of electric shock.
- b) Avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is earthed or grounded.
- c) Do not expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.
- d) Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges or moving parts. Damaged or entangled cords increase the risk of electric shock.
- e) When operating a power tool outdoors, use an extension cord suitable for outdoor use. Use of a cord suitable for outdoor use reduces the risk of electric shock.

3) PERSONAL SAFETY

- a) Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating power tools may result in serious personal injury.
- b) Use safety equipment. Always wear eye protection. Safety equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.
- c) Avoid accidental starting. Ensure the switch is in the off-position before plugging in. Carrying power tools with your finger on the switch or plugging in power tools that have the switch on invites accidents.
- d) Remove any adjusting key or wrench before turning the power tool on. A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
- e) Do not overreach. Keep proper footing and balance at all times. This enables better control of the power tool in unexpected situations.
- f) Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose clothes, jewelry or long hair can be caught in moving parts.
- g) If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used. Use of these devices can reduce dust-related hazards.

4) POWER TOOL USE AND CARE

- a) Do not force the power tool. Use the correct power tool for your application. The correct power tool will do the job better and safer at the rate for which it was designed.
- b) Do not use the power tool if the switch does not turn it on and off. Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
- c) Disconnect the plug from the power source and/or the battery pack from the power tool before making any adjustments, changing accessories, or storing power tools. Such preventive safety measures reduce the risk of starting the power tool accidentally.
- d) Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool. Power tools are dangerous in the hands of untrained users.
- e) Maintain power tools. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tools operation. If damaged, have the power tool repaired before use. Many accidents are caused by poorly maintained power tools.
- f) Keep cutting tools sharp and clean. Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- g) Use the power tool, accessories and tool bits etc., in accordance with these instructions and in the manner intended for the particular type of power tool, taking into account the working conditions and the work to be performed. Use of the power tool for operations different from those intended could result in a hazardous situation.



⚠️ READ INSTRUCTIONS

- Thoroughly read and understand this manual before using.
- Save for future reference.



⚠️ WARNING PINCH HAZARD!

- This tool has leveraged rotating components that generate greatly amplified crushing and bending forces which can quickly cause severe injury! Keep fingers and hands away from moving parts when operating.



⚠️ WARNING CUT HAZARD!

- Handling sharp metal can cause serious cuts. Wear thick, well-fitting work gloves to prevent cuts from handling sharp metal.



⚠️ CAUTION FALL HAZARD!

- Strenuous physical force may need to be applied to the Tubing Bender during use. Failure to ensure proper footing can quickly result in a fall which could inflict serious personal injury or property damage. Always work in a clean, uncluttered environment.

⚠️ CAUTION INJURY HAZARD!

- Be sure there is sufficient working room around the tool to allow for safe handling of various lengths of tubing.



⚠️ NOTICE

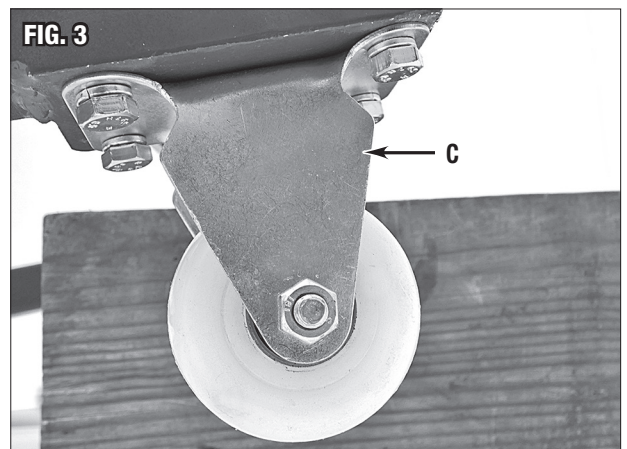
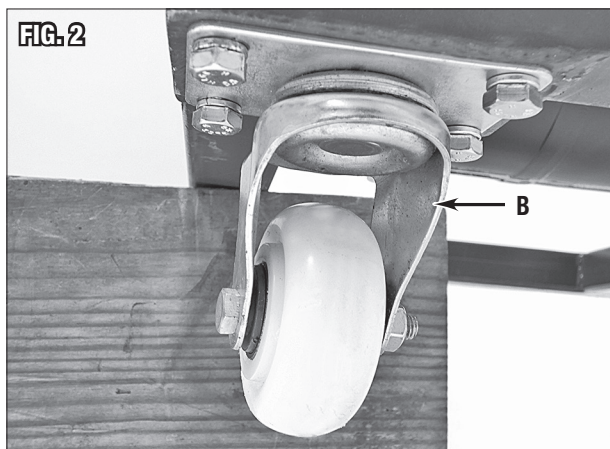
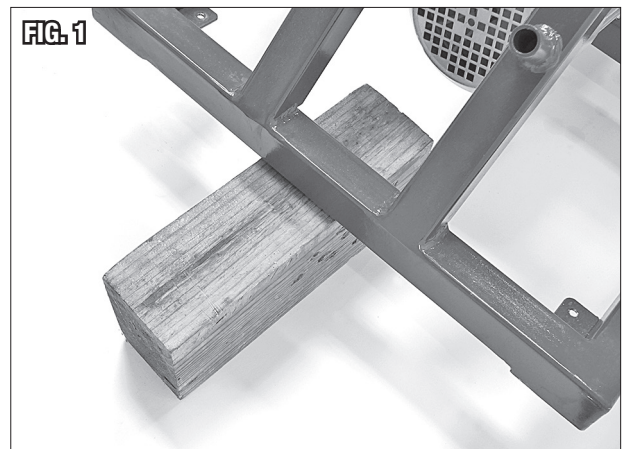
- Excessive resistance while operating could indicate a defect with the workpiece material or broken or damaged Tubing Bender components. To avoid injury, stop work immediately and inspect workpiece material for nicks, dents, welds, excessive scale or remaining coatings. Clean or repair as necessary or discard and begin with a new piece. Also inspect Tubing Bender components for looseness or damage.

ASSEMBLY

CASTER ATTACHMENT

Note that there are two Swivel Casters **[B]** and two Fixed Casters **[C]**. The two Swivel Casters **[B]** must be attached to the same end of the Frame for proper mobility. Mounting both Swivel Casters under the Front angled frame members is recommended.

- Raise and firmly support the frame of the Tubing Bender, align the flanges of the two Swivel Casters **[B]** under the Front of the frame and, using a 13mm wrench (not included), M8 Bolts **[E]** and Lock washers **[F]**, securely attach them (**FIGS 1 & 2**).
- With the Frame still supported, mount the two Fixed Casters **[C]** to the Rear of the frame (**Fig 3**).



CHECKING HYDRAULIC FLUID LEVEL

⚠ NOTICE

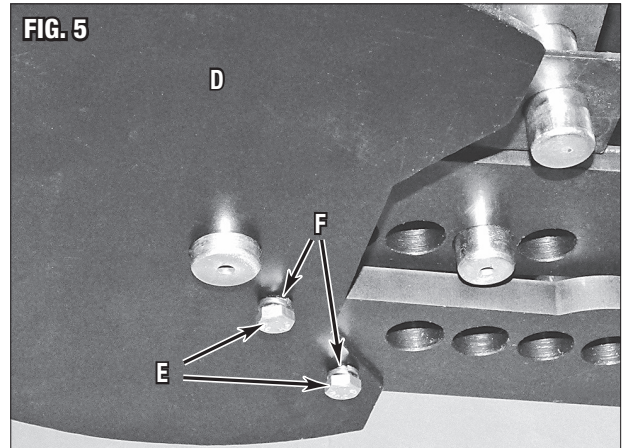
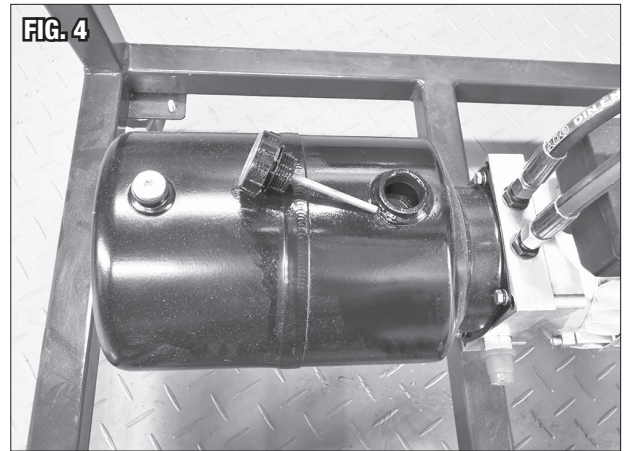
Use only a high quality, 10w hydraulic oil. DO NOT use motor oil, transmission fluid or any other type of oil or fluid material.

The Eastwood Hydraulic Tubing Bender comes pre-filled with 10W Hydraulic Oil. Before initial operation, it is important to verify that the level is correct and that no fluid was lost during shipping.

1. Verify the Power Switch Cover is shut, preventing operation.
2. Disconnect the Bender from power supply.
3. Remove the Oil Fill Plug/Dipstick from the upper front area of the Oil Reservoir (FIG 4).
4. Check oil level by observing the line on the Dipstick. The oil level is 100% full when it is at the line.
5. If oil is not present on the Dipstick, a quality 10W Hydraulic Oil (not included) must be added until it is present and at or below the line.
6. Replace Oil Fill Plug/Dipstick and tighten securely.

ATTACH DEGREE PLATE

- Locate the Degree Plate [D] under the Lower Frame Plate, align the 2 holes in the Degree Plate with those in the Lower Frame Plate and fasten with two M8 Bolts [E] and Lock washers [F] (FIG 5).



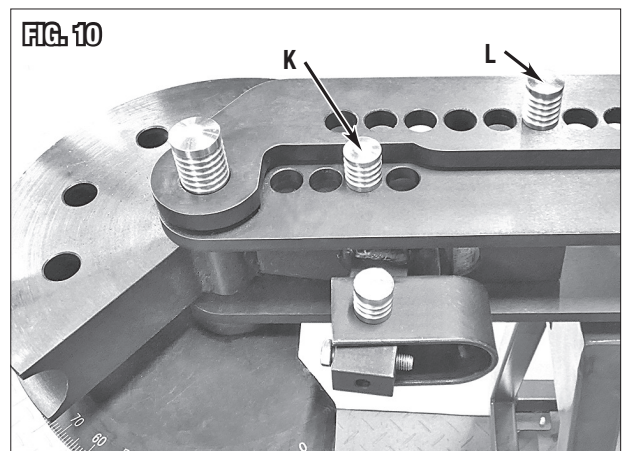
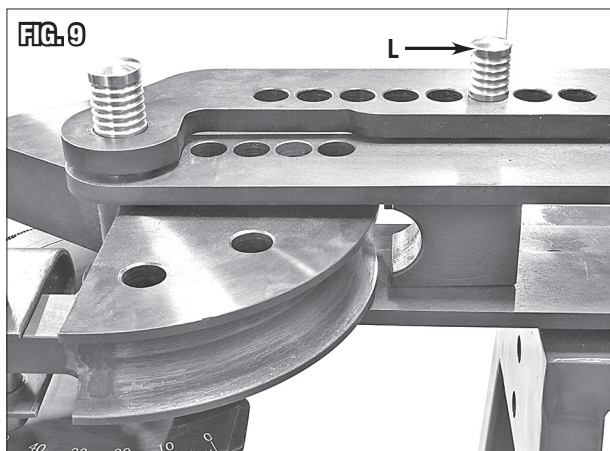
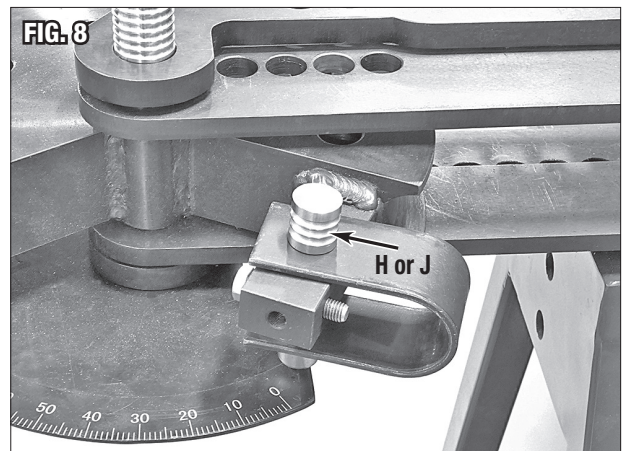
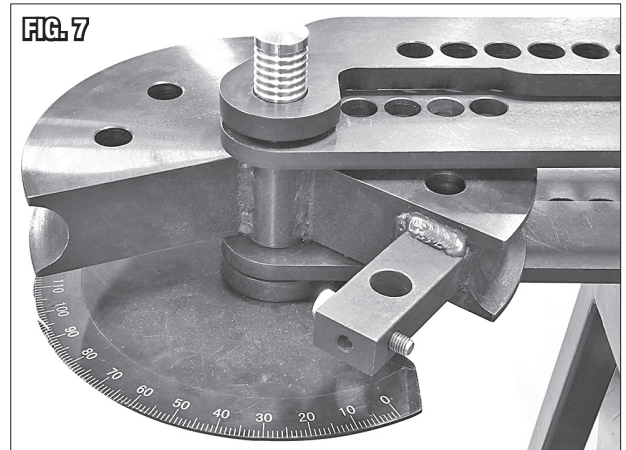
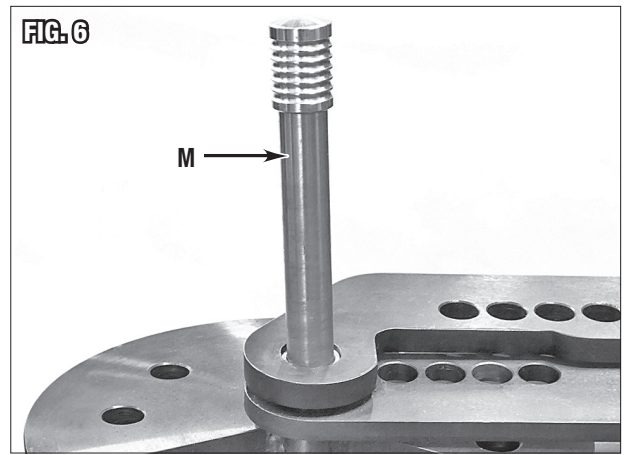
INSTALLING DIES

NOTICE

Dies are NOT INCLUDED with the Eastwood Hydraulic Tubing Bender and are available separately. Curved Dies, U-Straps and Die Follow Bars are sized as a matched set each in accordance with a specific tubing size.

- Remove the large, pre-installed 5.5" Long x \varnothing 1" Pivot Pin [M].
- Insert the selected Forming Die in the Frame with the curved edge facing the actuating cylinder end and with the Clamp oriented toward the offset (FIG 6).
- Re-install the 5.5" Long x \varnothing 1" Pivot Pin [M] through the upper and lower Fixed Arms and Moveable Drive Arms, the Die pivot hole and both Bushings (FIG 7).
- Place the corresponding sized U-Strap (included with Die Set) over the rectangular, Offset Block feature of the Forming Die (included with Die Set) then add one of the \varnothing 7/8" x 2" or 3" U-Strap Pins [H OR J] to retain it (FIG 8).
- Set the corresponding sized Die Follow Bar (included with Die Set) between the upper and lower fixed and moveable arms then add the 5.35" Long x \varnothing 7/8" Follow Block Pin - [L] in the appropriate holes in the Fixed Arms to retain it (FIG 9).
- Drop the 4.25" Long x \varnothing 7/8" Die Drive Pin [K] through the hole in the outer Die edge (closest to the U-Clamp) that aligns with ones in the moveable drive arms (FIG 10).

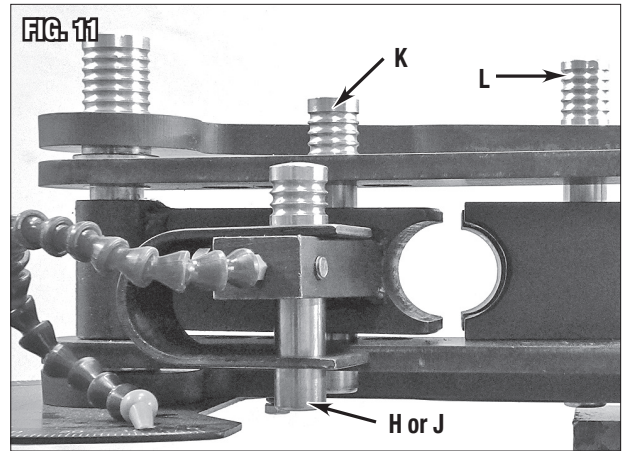
NOTE: If the Pivot Pin [M] is found to be stuck while performing a Die size change, loosen both bolts attaching the Fixed Arms, lift upward on the Fixed Arms and Moveable Die Arms assembly slightly to release weight and support it while re-tightening the attachment bolts.



ATTACHING DEGREE POINTER

- After mounting a selected Die set (not included), thread the base of the Degree Pointer [G] into the M9 thread on the end of the rectangular bar Offset Arm feature of the Die (FIG 11).

NOTE: The Degree Pointer must be removed and re-installed with each Die size change.



INSTALLATION AND LOCATION

- The Bender **MUST** be located on a solid and level surface for proper operation and safety.
- The Bender **MUST** be located in a clean, dry, well-lighted environment free of dust, grit, or other contaminants.
- Consideration **MUST** be given to the movement of the free end of tubing being bent and the amount of open space surrounding the Bender. Ensure surrounding area is clear of people and obstacles.

OPERATION

⚠ CAUTION PINCH HAZARD!

The Eastwood Hydraulic Tubing Bender exerts tremendous bending and crushing forces in operation which can present a hand/finger pinch hazard and cause potentially serious injuries in a matter of seconds. Avoid moving parts while operating and wear thick, well-fitting work gloves to prevent cuts from handling sharp metal. The use of safety shoes is strongly recommended.

⚠ CAUTION INJURY HAZARD!

If any breakage or damage to the Bender occurs, **DO NOT USE** until proper repairs are made.

The Eastwood Hydraulic Tubing Bender was specifically designed to be operated by one person only. Never have one person operate the lever while one handles the material workpiece or serious injury could occur.

Injury or property damage could occur from being struck by moving workpiece material. Before beginning work, be sure the surrounding work area is clear of obstructions or persons to accommodate the swing of long sections of workpiece material.

⚠ NOTICE

The Eastwood Hydraulic Tubing Bender, as with many advanced metal working tools, requires a learning curve to become proficient in its use. Plan on using a generous amount of practice material in order to achieve a “feel” for the tool and learn what results to expect before attempting a finished piece.

In addition, it is strongly suggested that a set of “templates” be made of each size, material, thickness and degree of bend for every type of tubing you plan to use in a planned project. This will save a great deal of time and material waste when planning future projects.

Workpiece material must be clean of any rust, burrs, nicks, welds or coatings before attempting to bend or interference and binding will occur.

Apply only a minimal amount of lubricant to material and die surfaces to prevent the tubing from binding during the bending process. **DO NOT** over lubricate.

The Hydraulic Tubing Bender is equipped with a multi-function Power Switch. The ON / OFF Push Buttons (**FIG 12**) are located behind a hinged Cover that incorporates an Emergency Stop Button, and serves as a Safety Lock-Out when latched (**FIG 13**). Swing open the Cover to access the ON / OFF Push Buttons for normal use. Press the large, red Emergency Stop Button in the event of a malfunction or emergency, or to set the Button in the Safety Lock-Out position by latching the Cover in the closed position. Slide the Button towards the Cover Hinge to un-latch.

⚠ NOTICE

Should a malfunction occur during the operation of the Bender, hitting the red EMERGENCY STOP BUTTON will stop all motion immediately.

HELPFUL TIP: Once the learning curve provides familiarity with the characteristics of the Eastwood Hydraulic Tubing Bender and how it reacts with the most commonly formed tubing sizes, materials and bend amounts, it is extremely helpful to create a series of “Templates” that can be used as patterns.

For example: if 2” Chromoly steel tubing is frequently used, it saves a great deal of time and effort in future projects by creating templates in 22.5°, 45°, 90°, 120° & 180° and more as needed. On these, mark the amount of material required to make each bend and the amount of “springback” encountered.

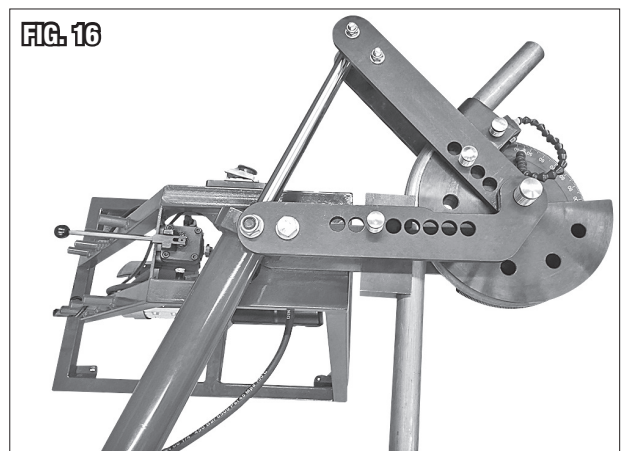
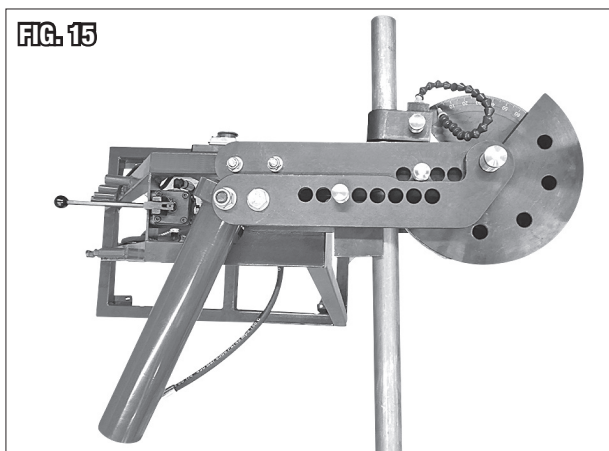
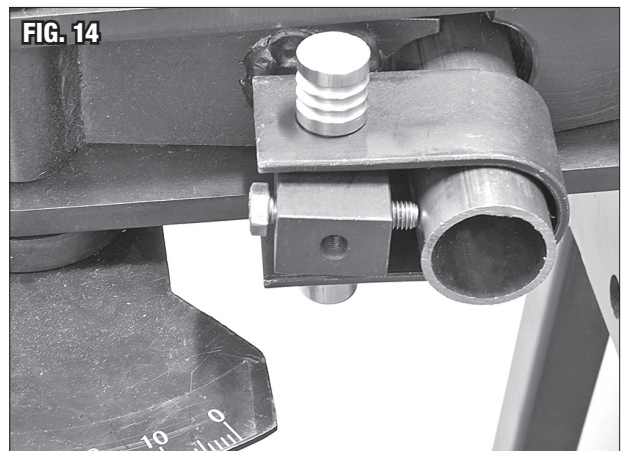
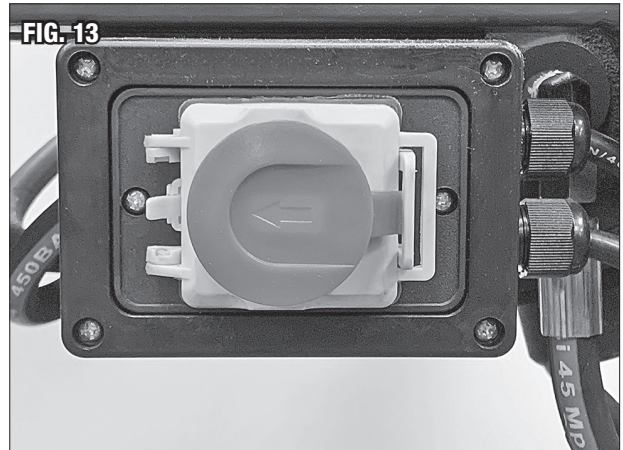
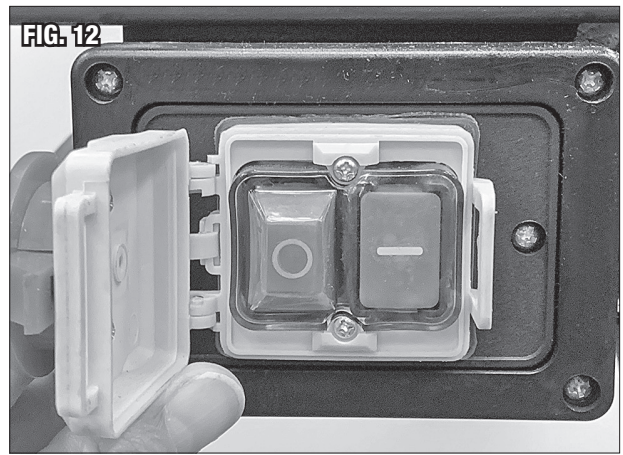
- Slip the workpiece tube in place between the curved Die and Die Follow bar then place the U-Clamp over the outer side of the workpiece tube (**FIG 14**). Lightly tighten the Tensioner Bolt if needed.

NOTE: On thinner walled material, it may be helpful to place a small cut out section of material being used between end of the Tensioner Bolt and outer side of workpiece tubing to protect the surface and avoid creating possible dents or damage.

- Begin exerting carefully modulated downward pressure on the Actuator Handle to take up any lash and eliminate looseness then set the Pointer to indicate “0°” on the Degree Plate (**FIG 15**).
- Slowly and steadily apply downward pressure on the Actuator Handle to create a curved bend in the workpiece.

⚠ NOTICE

Approx. 40° to 45° of tube bending angle is possible with each full extension stroke of the Hydraulic Cylinder and the drive point on the Die must be moved to continue the bend (**Fig 16**).



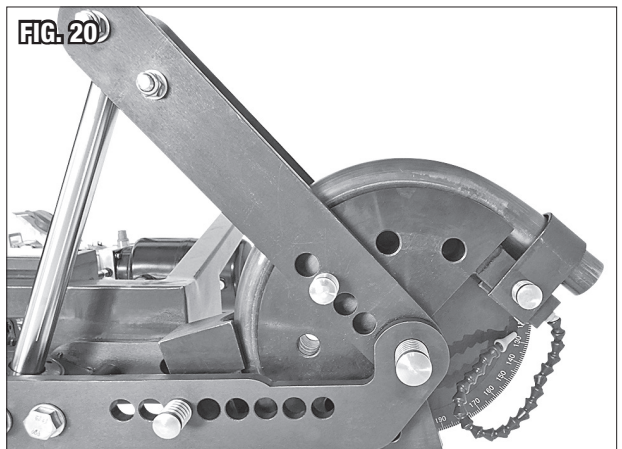
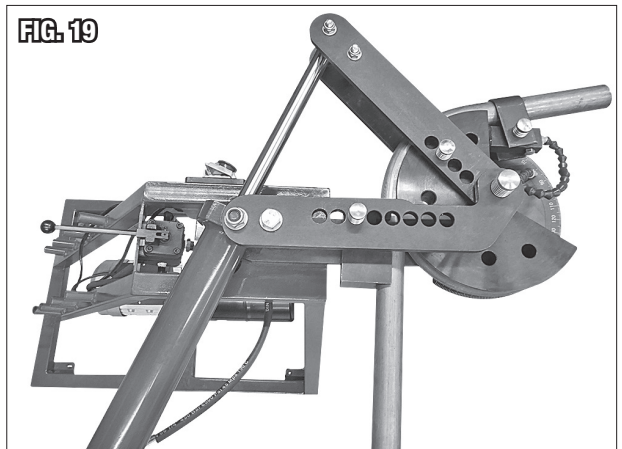
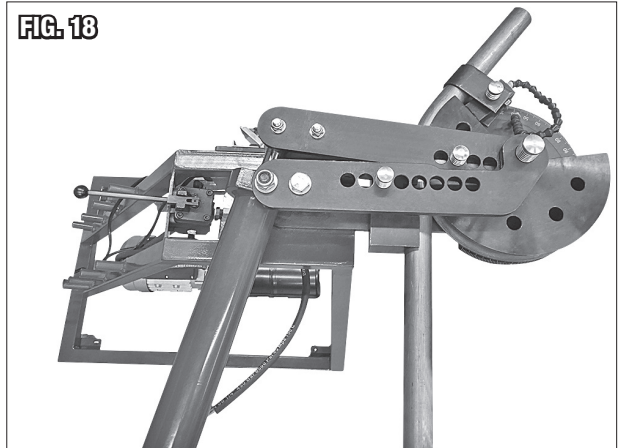
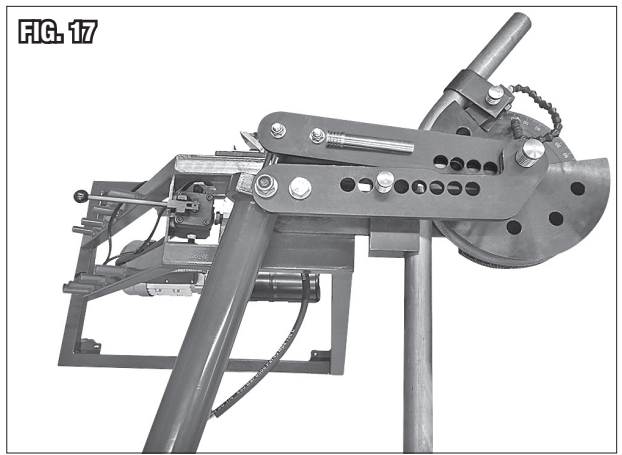
At the end of the stroke, the Die Drive Pin [K] must be pulled out and repositioned in the Drive Arms closer toward the center of the Die as follows:

- Very lightly, modulate the Actuating Handle upward to retract the Cylinder slightly to relieve any tension in the workpiece and Die components.
- Pull the Die Drive Pin [K] from the Die and Die Drive Arms (FIG 17) and fully retract the Cylinder by moving the Actuator Handle upward.
- Move the Die Drive Pin [K] to another hole further inward on the Die (FIG 18). **NOTE:** If the pin holes in the Die Drive Arms do not align with the next available Die hole, the Cylinder may be advanced slightly to allow Pin alignment.
- As previously, slowly and steadily push downward on the Bender Handle, continuing to further bend the workpiece tubing. Watch the position of the Pointer on the Degree Wheel carefully as the desired bend angle is approached (FIG 19).

⚠ NOTICE

There will be a certain amount of “springback” meaning that the Pointer must be pushed several degrees past the Degree Wheel target then allow it to “spring back” to the final degree mark. This varies widely according to the particular material, diameter and thickness. Chromoly and high carbon steel will generally have more “springback” than milder steels and aluminum. This is one reason that some “trial and error” must be performed to explore the properties of the material before working on a final project piece.

- To achieve more bending range as needed; the above steps may need to be repeated until the desired bend angle is reached (FIG 20).



TUBING LAY OUT

The following mathematical formula may be applied for specific degrees of bend:

- Beginning with the value of the Bend Radius of the Die to be used, multiply it by 6.28.
- Next, multiply the value found by the planned degree of bend.
- Lastly, divide that value by 360.
- Also, be aware that an additional 4" of straight section per bend is required as it is clamped in the "U-Strap. This section may be cut off after the bend is created.

The following are several examples;

For use of a 4" Bend Radius Die making a 120° bend, calculate:

- 4" Bend Radius x 6.28 = 25.12.
- 25.12 x 120° = 3014.4
- 3014.4 / 360 = 8.38"
- 8.38" + 4" = 12.38"

For use of a 6" Bend Radius Die making a 30° bend calculate:

- 6" Bend Radius x 6.28 = 38.28
- 38.28 x 30° = 1184.4
- 1184.4/360 = 3.19"
- 3.19" + 4" = 7.19"

As an alternative, the following chart provides the most common bend angles of 90° and 180°. This chart is intended to be used as an approximate "rule-of-thumb" when laying out a project to help determine the amount of tubing needed.

NOTE: The following figures are representative of the average linear amount of tubing required for a given size and the bend radius it will yield @ 90° for 120° Dies and @ 180° for 240° Dies.

Please note the final tubing length is dependent upon the particular wall thickness, diameter and hardness of the tubing used. These figures are for the Length of the bend portion only as measured at the centerline of the tubing. Remember to add 4" of clamping length.

TUBING LAYOUT LENGTH CHART

Die Tubing Size	Die Bend Radius	90°	180°
3/4"	3"	4-3/4"	9-7/16"
1"	4"	6-5/16"	12-9/16"
1-1/2"	5"	7-7/8"	15-3/4"
1-5/8"	5"	7-7/8"	15-3/4"
1-3/4"	6"	9-7/16"	18-7/8"
2"	6"	9-7/16"	18-7/8"

MAINTENANCE

- Before each use, verify 10W hydraulic oil is present on the Dipstick. If needed, fill using a high quality 10W hydraulic oil until it is present on the Dipstick.
- Provide several drops of a good quality motor oil to all pivot points and rotating parts periodically to prevent binding.
- Keep all areas of the tool clean particularly those surfaces that contact metal workpieces. Dirt and metal chips can cause uneven bending and Die damage.
- Store in a clean & dry environment when not in use. Coat all machined surfaces with a light lubricant film of oil or suitable protectant to prevent rust formation.

TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Does Not Run When Switch is Turned On	No power to Hydraulic Pump Motor	Check 120 VAC input plug connection.
		Check for tripped circuit breaker. The Pump Motor operates on a 15 Amp Minimum circuit.
Motor Runs Too Slow/ Develops Low Power	Excessive voltage drop due to under-sized and or too long of an extension cord used	Extension cords not recommended. If necessary, use only 14 Gauge or larger cord and limit length to 25'.
Cylinder Stops Before Bend is Completed	Low fluid level in Reservoir	Retract cylinder fully and check fluid level. Add a high quality, 10w hydraulic oil as needed.
	Tripped Circuit Breaker	Check for tripped circuit breaker. The Pump Motor operates on a 15 Amp Minimum circuit.
	Obstruction or binding of components	Retract cylinder and check thoroughly for any obstructions or binding of components.
	Material wall thickness too great and has exceeded the maximum 0.120" [3mm] @ 2" wall thickness capability of the machine	Retract cylinder and re-evaluate material selection.

ADDITIONAL ITEMS

- #21118 1.0" x 4" Radius, 120° Die
- #21119 1.5" x 5" Radius, 120° Die
- #21120 1.625" x 5" Radius, 120° Die
- #21121 1.75" x 6" Radius, 120° Die
- #21122 2" x 6" Radius, 120° Die
- #21124 1.0" x 4" Radius, 240° Die
- #21125 1.5" x 5" Radius, 240° Die
- #21126 1.625" x 5" Radius, 240° Die
- #21127 1.75" x 6" Radius, 240° Die

If you have any questions about the use of this product, please contact

The Eastwood Technical Assistance Service Department: 800.343.9353 >> email: tech@eastwood.com

PDF version of this manual is available at eastwood.com

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