

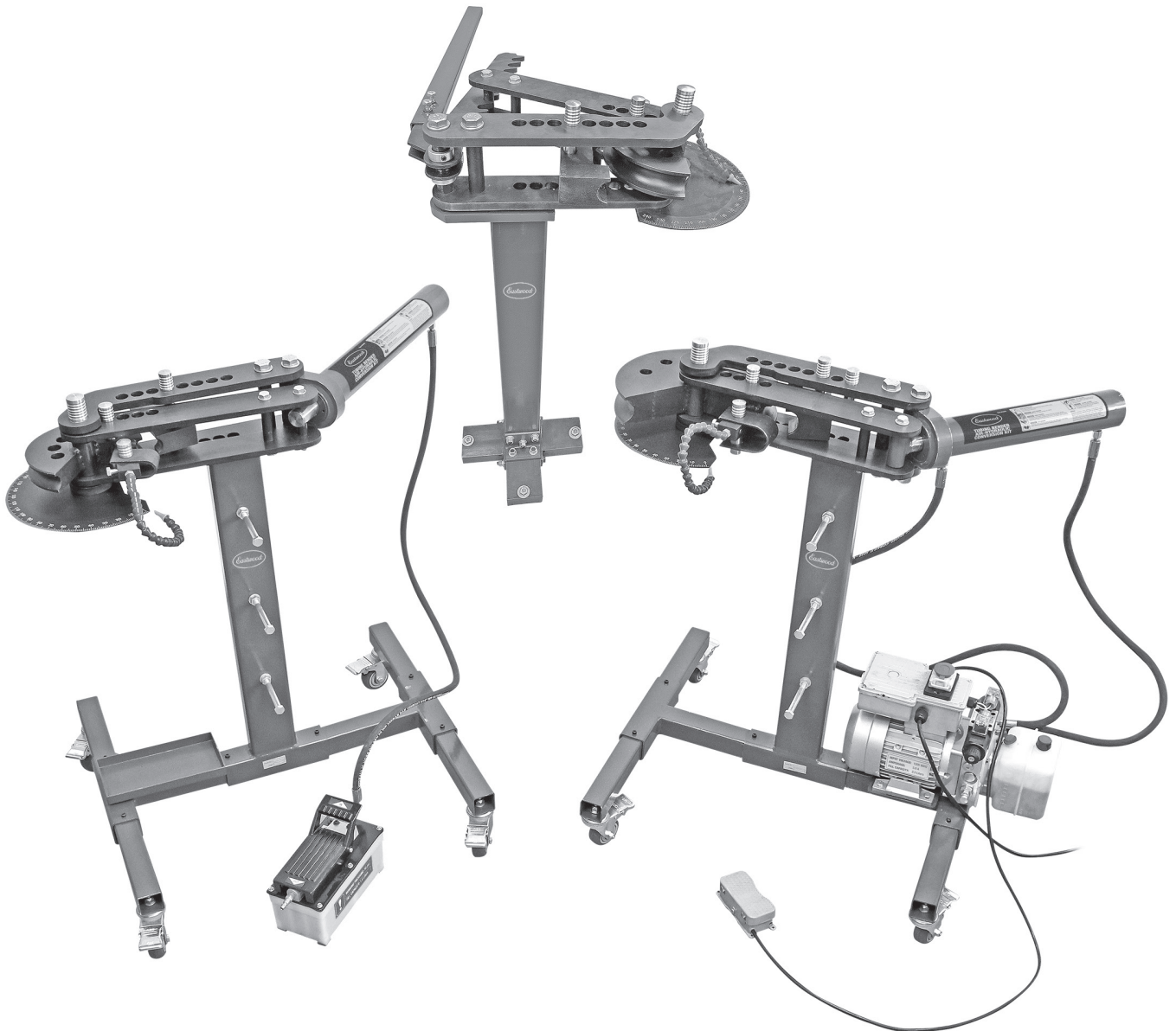
Eastwood[®]

DO THE JOB RIGHT.[®]

Item #21115 #72075
#21116 #72076
#21129 #72077

HIGH-CAPACITY TUBING BENDER SYSTEM

ASSEMBLY AND OPERATING INSTRUCTIONS



The **EASTWOOD HIGH CAPACITY TUBING BENDER SYSTEM** is a high quality, precision system capable of creating accurate, smooth, kink-free bends up to 180° in aluminum, steel, stainless steel and copper tubing, in sizes ranging from 1" to 2" with available Eastwood Tube Bending Die Sets. The Tubing Bender Frame can optionally be paired with a floor-mounted Stand and Handle for manual bending or a rolling Stand and Air or Electro-Hydraulic Conversion Kit. Expand your shop's capability to build roll bars, shop fixtures, go-kart frames, hand railing, braces and much more with high accuracy and professional results.

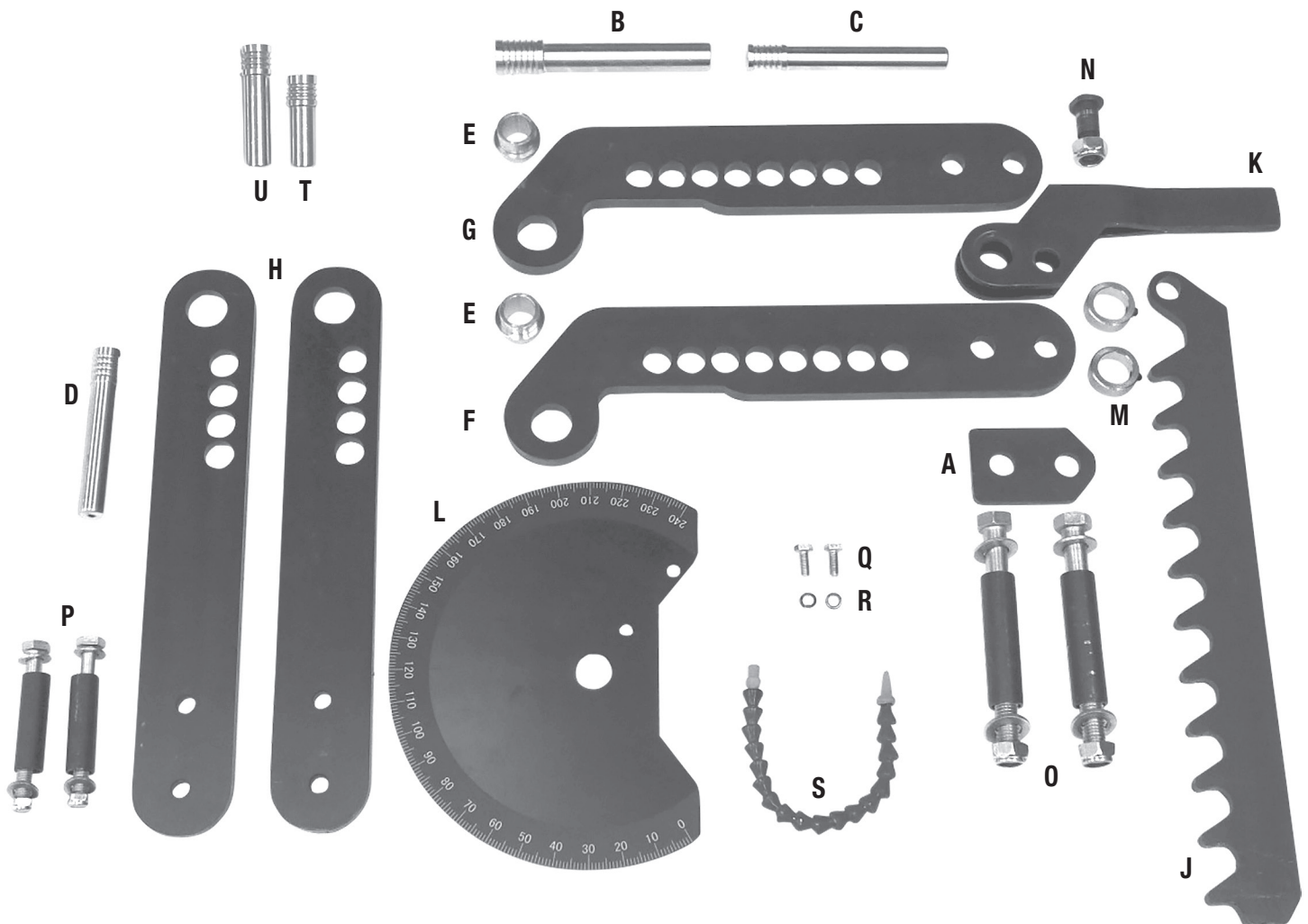
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#21115 HIGH-CAPACITY TUBING BENDER

INCLUDES

- (1) Spacer Plate [A]
- (1) $\varnothing 1"$ x 6-1/2" [$\varnothing 24.8\text{mm}$ x 165mm] Pivot Pin [B]
- (1) $\varnothing 7/8"$ x 6-3/4" [$\varnothing 21.8\text{mm}$ x 172mm] Frame Pin [C]
- (1) $\varnothing 7/8"$ x 5-3/8" [$\varnothing 21.8\text{mm}$ x 136mm] Drive Link Pin [D]
- (2) Brass Flanged Bushings [E]
- (1) Upper Frame Plate [F]
- (1) Lower Frame Plate (with M8 threaded mounting holes) [G]
- (2) Drive Links [H]
- (1) Ratchet Plate [J]
- (1) Ratchet Drive Link [K]
- (1) Degree Plate [L]
- (2) Shaft Collars with Set Screw [M]
- (1) M18 Shoulder Bolt with Nylon Locknut [N]
- (2) M18x180 Frame Bolts with Spacer, Washers, Nylon Locknut [O]
- (2) M12x120 Drive Link Bolts with Spacer, Washers, Nylon Locknut [P]
- (2) M8x20 Hex Head Screws [Q]
- (2) M8 Lock Washers [R]
- (1) Flexible Pointer [S]
- (1) $\varnothing 7/8"$ x 3" [$\varnothing 21.8\text{mm}$ x 76mm] U-Strap Drive Pin [T]
- (1) $\varnothing 7/8"$ x 4" [$\varnothing 21.8\text{mm}$ x 102mm] U-Strap Drive Pin [U]



#21129 MANUAL HANDLE

INCLUDES

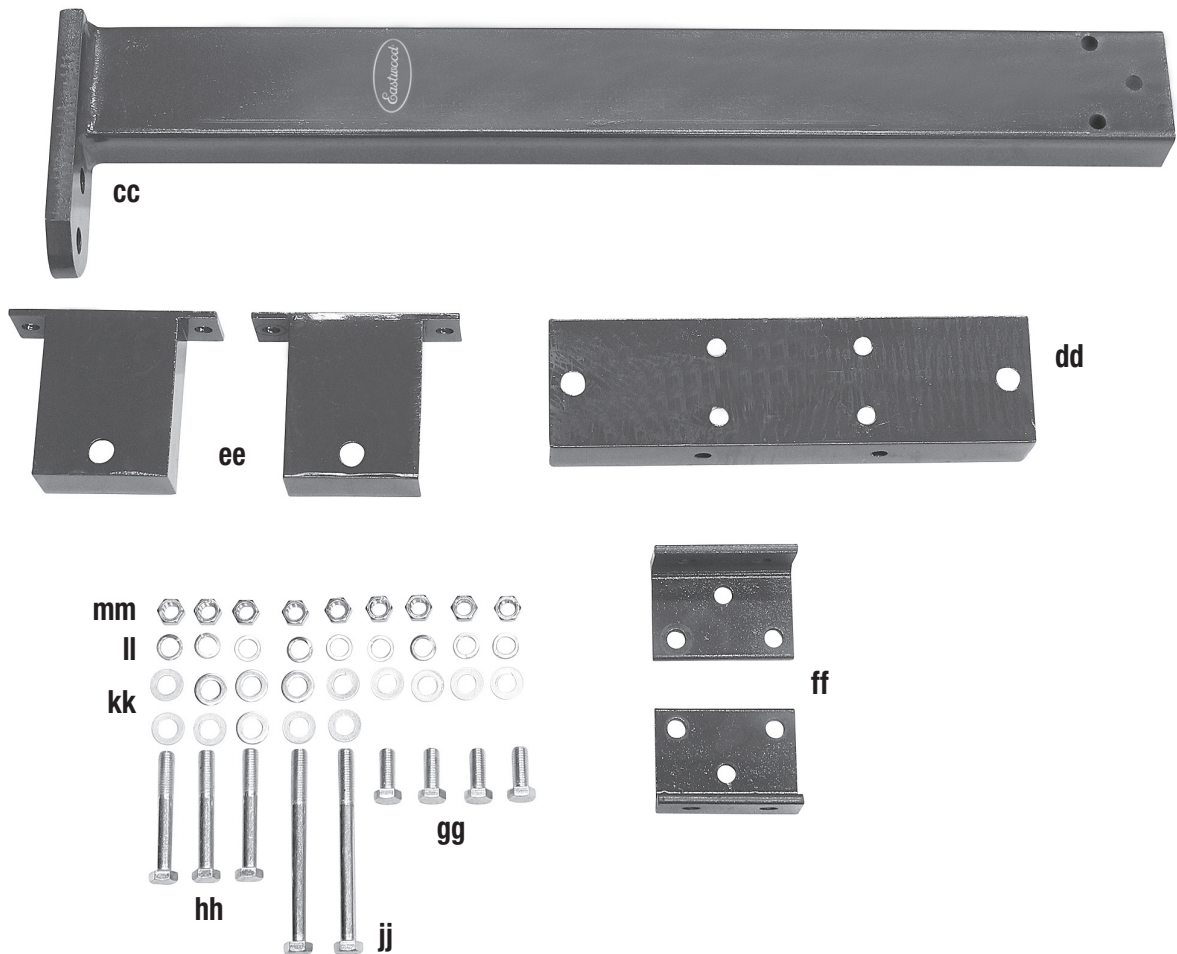
- (1) Handle [aa]
- (4) M10x20 Cap Screws [bb]



#21116 FLOOR-MOUNTED STAND

INCLUDES

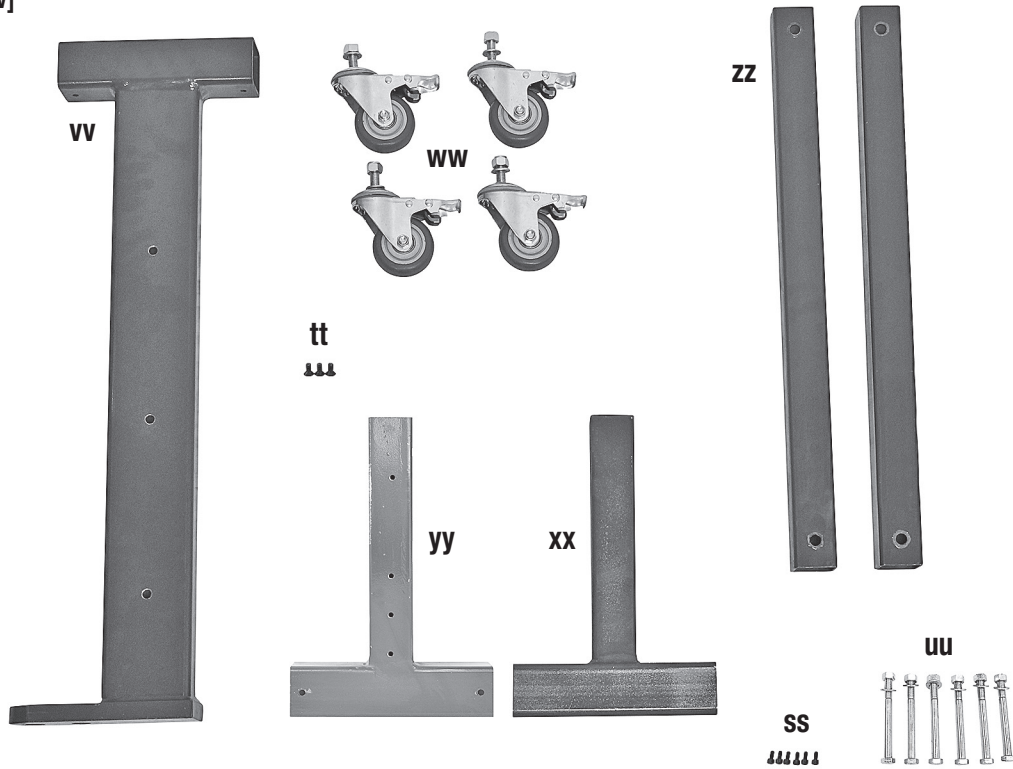
- (1) Pedestal [cc]
- (1) Base [dd]
- (2) Base Extensions [ee]
- (2) Angle Gussets [ff]
- (4) M12x30 Bolts [gg]
- (3) M12x85 Bolts [hh]
- (2) M12x135 Bolts [jj]
- (18) M12 Washers [kk]
- (9) M12 Lock Washers [ll]
- (9) M12 Nuts [mm]



#72075 ROLLING STAND

INCLUDES

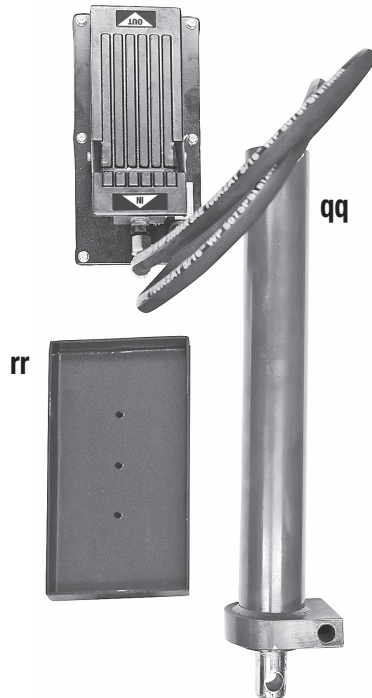
- (6) M6x12 Socket Head Screws [ss]
- (3) M6x12 Flat Head Screws [tt]
- (6) M12x100 Cap Screws with Washer, Nut [uu]
- (1) Base Pedestal [vv]
- (4) Locking Swivel Casters with Washer, Lock Nut [ww]
- (1) Base T-Tube [xx]
- (1) Base T-Tube with Mounting Holes [yy]
- (2) Base Caster Tubes [zz]



#72076 AIR-HYDRAULIC CONVERSION KIT

INCLUDES

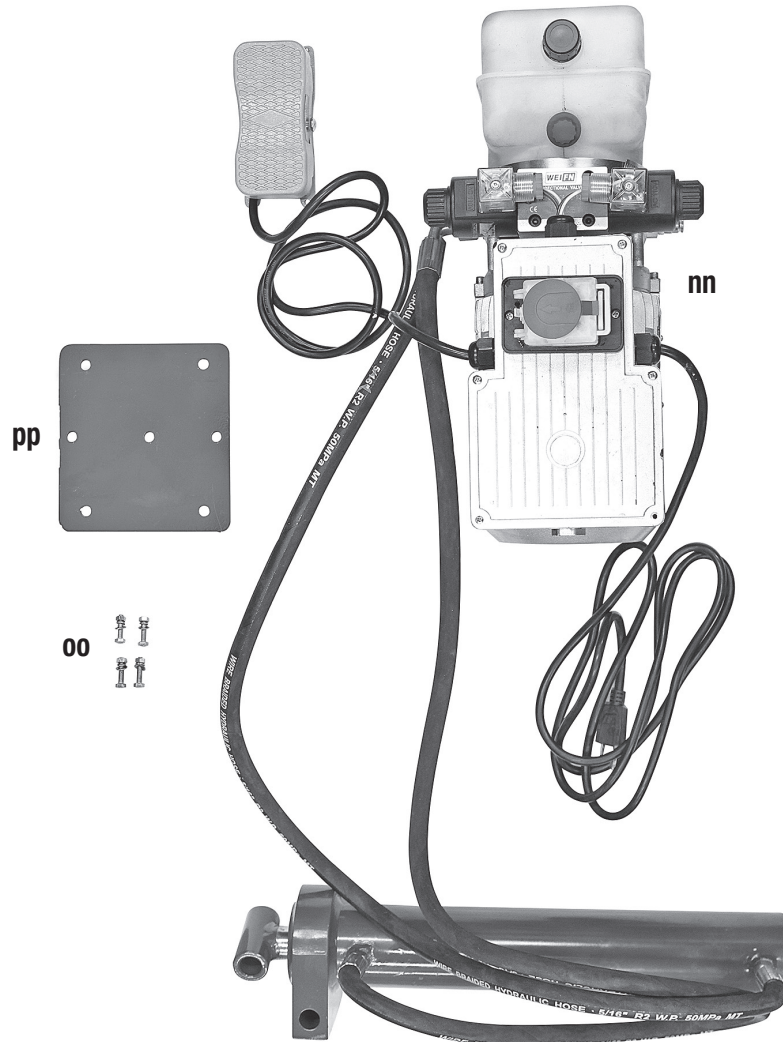
- (1) Reservoir/Pedal, Lines, Cylinder Assembly [qq]
- (1) Tray [rr]



#72077 ELECTRO-HYDRAULIC CONVERSION KIT

INCLUDES

- (1) Electric Motor, Hydraulic Pump, Lines, Pedal, Cylinder Assembly [nn]
- (4) M8x30 Cap Screws with Washer, Lock Washer, Nut [oo]
- (1) Mounting Plate [pp]



TUBE BENDING DIE KITS

- | | | | |
|--------|------------------------------|--------|------------------------------|
| #21117 | 0.75" x 3" Radius, 120° Die | #21123 | 0.75" x 3" Radius, 240° Die |
| #21118 | 1.0" x 4" Radius, 120° Die | #21124 | 1.0" x 4" Radius, 240° Die |
| #21119 | 1.5" x 5" Radius, 120° Die | #21125 | 1.5" x 5" Radius, 240° Die |
| #21120 | 1.625" x 5" Radius, 120° Die | #21126 | 1.625" x 5" Radius, 240° Die |
| #21121 | 1.75" x 6" Radius, 120° Die | #21127 | 1.75" x 6" Radius, 240° Die |
| #21122 | 2" x 6" Radius, 120° Die | | |

SPECIFICATIONS

#21115 HIGH-CAPACITY TUBING BENDER

Maximum Capacity: Ø2" O.D. x 0.120" Wall

#21129 MANUAL HANDLE

Length: 3' [0.9m]

#21116 FLOOR-MOUNTED STAND

Height: 3' [0.9m]

#72075 ROLLING STAND

Height: 3' [0.9m]

Die Storage: 6 Hangers

#72076 AIR-HYDRAULIC CONVERSION KIT

Working Pressure: 90 PSI [0.62 MPa]

Max Pressure: 100 PSI [0.7 MPa]

Air Input: 1/4" FNPT

Hydraulic Fluid Type / Capacity: ISO 32 / 0.42 gal [1.6 Liters]

#72077 ELECTRO-HYDRAULIC CONVERSION KIT

Motor Power: 0.75HP [0.55 kW]

Motor Electrical Rating: 110 VAC / 60 Hz / 5A / Single Phase

Hydraulic Fluid Type / Capacity: AW ISO 46 / 0.66 gal [2.5 Liters]

SAFETY INFORMATION

⚠ DANGER

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

⚠ WARNING

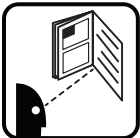
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ 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.



⚠ READ INSTRUCTIONS

- Thoroughly read and understand these product instructions before using.
- Keep these product instructions for future reference.



⚠ DANGER PINCH & CRUSH HAZARD!

- This tool has leveraged, rotating components that generate amplified crushing and bending forces capable of causing severe injury! Hydraulic piston rods rapidly deliver force capable of severing fingers! Keep fingers and hands away from moving parts when operating.
- When not in use, disconnect from electric or air power source.



⚠ WARNING INJURY HAZARD!

- Metal particles can be ejected from the metal surfaces when bending. Always wear ANSI approved eye protection when operating this tool.
- Handling sharp metal can cause serious cuts. Wear thick, well fitting work gloves to prevent cuts from handling sharp metal.
- In operation the Tubing Bender is subjected to high torque and weight loads. Improper mounting could cause it to suddenly fail. It is absolutely necessary that the Tubing Bender be securely bolted to a Bender Stand or sturdy workbench.



⚠ WARNING FALL HAZARD!

- Strenuous physical force may need to be applied to the Tubing Bender during use. Always be sure-footed and well balanced when operating to prevent personal injury and property damage. Wear appropriate, closed toe footwear to increase grip.
- Be sure there is sufficient working room around the tool for safe handling of various sizes of tubing. Always work in a clean, uncluttered environment to reduce injury risk.



⚠ WARNING UNSEEN HAZARDS!

- Check for possible interference with electrical lines, other utilities, or other obstructions before drilling into anything.



⚠ CAUTION INJURY HAZARD!

- Poorly secured workpieces may shift or suddenly drop during use. Always wear closed toe shoes. The use of safety toe shoes is recommended.
- Utilizing a tubing bender can generate excessive noise. Wear appropriate hearing protection while bending tubing.



⚠ CAUTION BURST HAZARD!

- Do not exceed 100 PSI (0.7 MPa) of tool inlet pressure. Permanent tool damage and/or bursting could occur and cause personal injury.
- High pressure hydraulic systems can cause personal injury. Inspect hydraulic system before each use. Discontinue use immediately if leakage or damage, such as scored lines or dry rotting, is observed.



⚠ CAUTION HEAVY WEIGHT!

- The High-Capacity Tubing Bender System has several large, heavy components which can cause serious injuries if allowed to drop. Ask for a helper to assist and team lift or utilize a suitable lifting device.



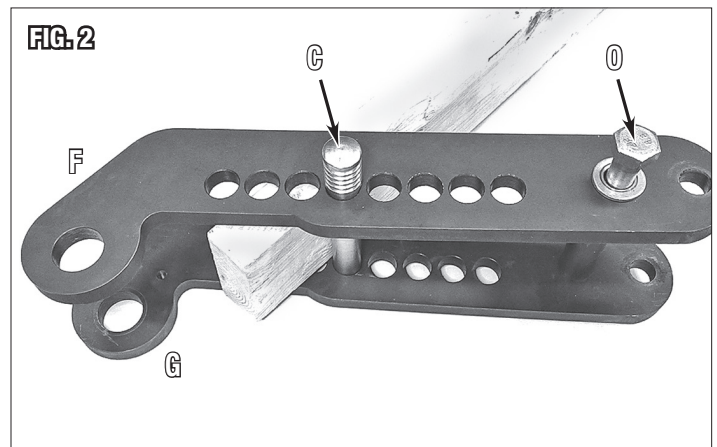
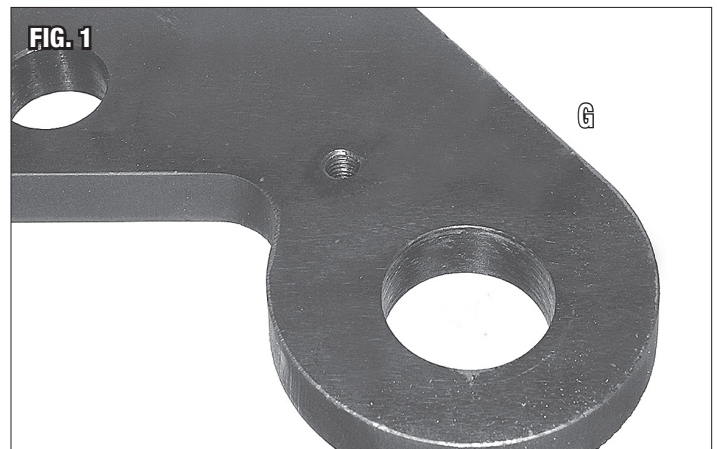
⚠ NOTICE

- Excessive resistance while operating could indicate a defect with the workpiece material or damaged Tubing Bender components. To avoid injury, stop work immediately and inspect workpiece material for nicks, dents, welds, excessive scale or remaining coatings. Also inspect Tubing Bender components.
- Manually bending tube with the included ratchet mechanism subjects the mount to high torque loads. For manual bending, the Frame must be rigidly mounted to an anchored stand or bench. Therefore, the Rolling Stand cannot be used for manual tube bending and must only be used with a Hydraulic Conversion Kit.
- Lubricate the tubing being bent to aid smooth bending and minimize the risk of marring the tube.

ASSEMBLY

FRAME ASSEMBLY

- Lay the Lower Frame Plate (with M8 threaded mounting holes) **[G]** on a clean, level work surface (**FIG 1**).
- Use a 4" block of wood or other suitable material to temporarily support the Upper Frame Plate **[F]** above the Lower Frame Plate (**FIG 2**). Inserting the $\frac{7}{8}$ " x 6-3/4" [$\varnothing 21.8\text{mm}$ x 172mm] Frame Pin **[C]** will also aid assembly.
- Find the M18x180 Frame Bolts with Spacer, Washers, Nylon Locknut **[O]** and Disassemble them for installation. Insert the Spacers between the Lower Frame Plate and the Upper Frame Plate (**FIG 2**). Assemble with a Washer under the Bolt head and Locknut. Hand tighten the Nuts.



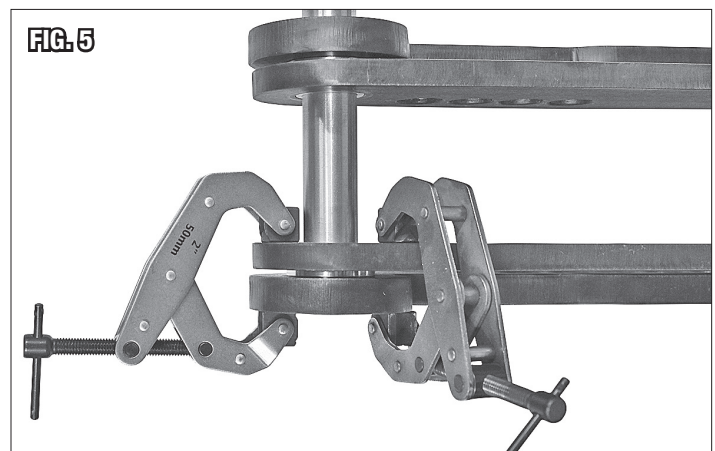
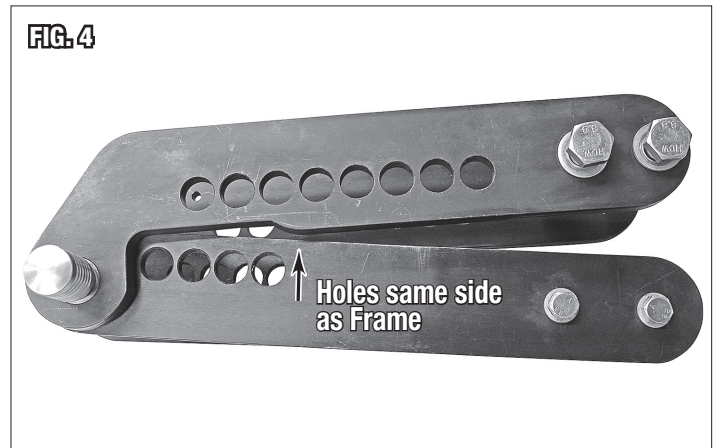
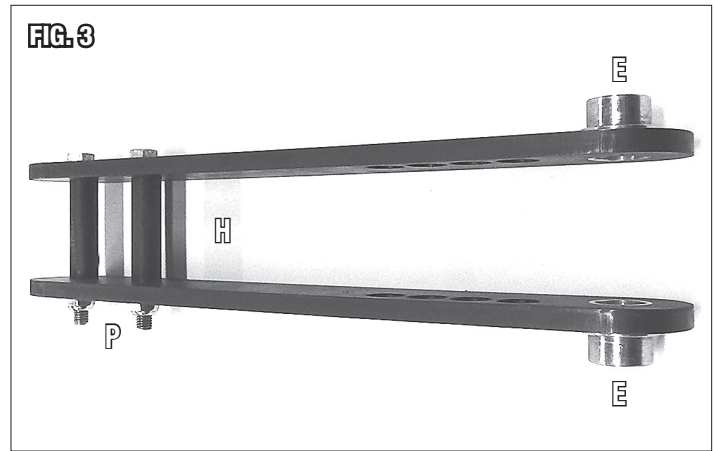
DRIVE LINK ASSEMBLY AND INSTALLATION

- Set the two Drive Links [H] along their edges on a clean, level work surface.
- Find the M12x120 Drive Link Bolts with Spacer, Washers, Nylon Locknut [P] and disassemble them for installation. Just as with the Frame, insert the Spacers between the Drive Links. Assemble with a washer under the bolt head and locknut. Make sure the Drive Pin holes are aligned. Snug the nuts to keep the Drive Plates from sliding off the bushings, but do not fully tighten yet (FIG 3).
- Insert the Brass Flanged Bushings [E] with the smaller diameter offsets in the large holes at the end of the Links and with the flanges facing outward (FIG 3).
- Spread the Frame apart and slip the Drive Link Assembly with Bushings between the Frame Plates and seat the Bushings in the large holes at the ends. The Drive Link pin holes must be on the same side as the Frame Plates (FIG 4).
- The $\text{\O}7/8'' \times 6-3/4''$ [$\text{\O}21.8\text{mm} \times 172\text{mm}$] Frame Pin [C] can now be inserted through the Bushings (FIG 4).

TECH TIP: It may be helpful to lay the frame on its side and use clamps or pliers to fully seat the Bushings (FIG 5).

If mounting to Floor-Mounted Stand (#21116), continue to **FLOOR-MOUNTED STAND ASSEMBLY**.

If mounting to Rolling Stand (#72075), continue to **ROLLING STAND ASSEMBLY**.



FLOOR-MOUNTED STAND ASSEMBLY

- For ease of use and safety, set aside a dedicated area for the Floor-Mounted Stand. Make sure to allow ample room for bending various lengths of tubing. The Stand must be located on a strong and level floor, preferably concrete, suitable for floor anchoring.
- Bolt the Angle Gussets **[ff]** to the Base with the M12x85 Bolts **[hh]**, Washers, Lock Washers, and Nuts **(FIG 6)**. Install the Bolts from the bottom side and without a Washer under the head for clearance. Fasten the Nuts tight on the top side with Washer and Lock Washer. Before tightening, verify the Pedestal **[cc]** can still slip between the Angle Gussets.
- Bolt the Base Extensions **[ee]** to the Base **[dd]** with the M12x135 Bolts **[jj]**, M12 Washers **[kk]**, M12 Lock Washers **[ll]**, and M12 Nuts **[mm]** **(FIG 7)**. Tighten securely.
- Insert the Pedestal **[cc]** between the Angle Gussets and fasten it with the M12x30 Bolts **[gg]** and remaining hardware **(FIG 7)**. Tighten securely.
- Utilize four 5/8" (M16) Bolts to anchor it to the floor via the mounting holes in the Base.

⚠ CAUTION INJURY HAZARD!

Manual tube bending subjects the Stand to high torque loads. The Stand must be rigidly anchored to the floor.

FIG. 6

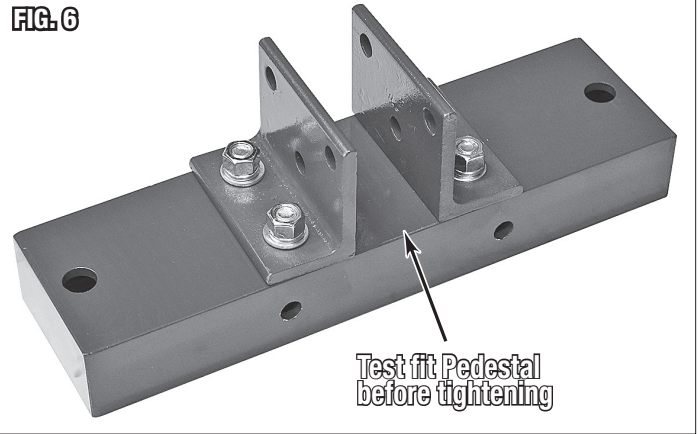
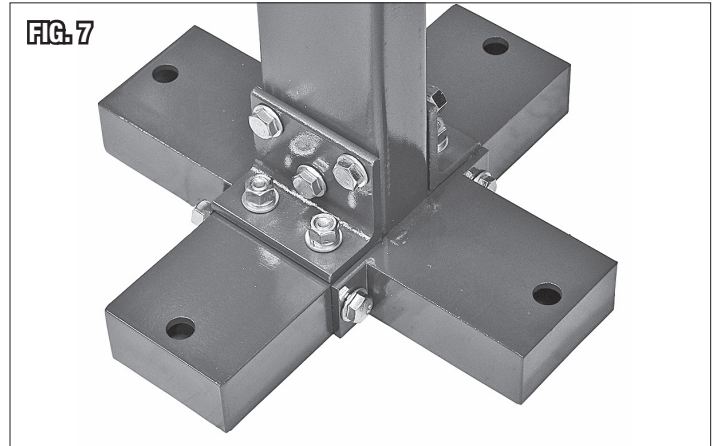


FIG. 7



ROLLING STAND ASSEMBLY

- Install the Base T-Tube [xx] and Base T-Tube with Mounting Holes [yy] to the Base Pedestal [vv] by sliding them in and locking them with M6x12 Socket Head Screws [ss] (FIG 8). The threaded holes in the T-Tubes should be facing upward.

NOTE: The side the Base T-Tube with Mounting Holes [yy] is installed to is ultimately user preference, but typically it is installed to the side with the M18 mounting holes because that will locate the hydraulic unit below the Cylinder.

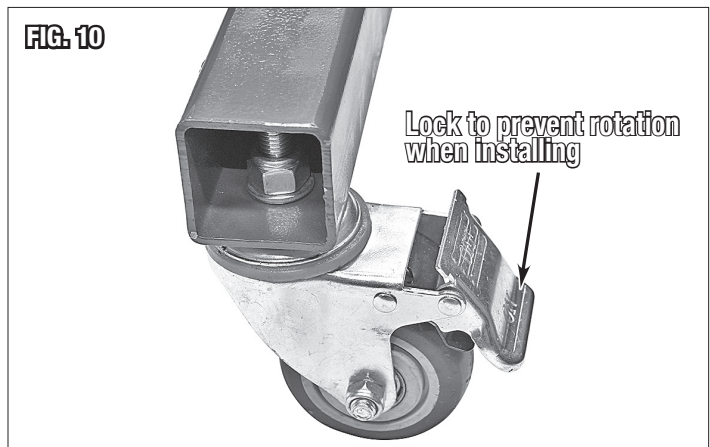
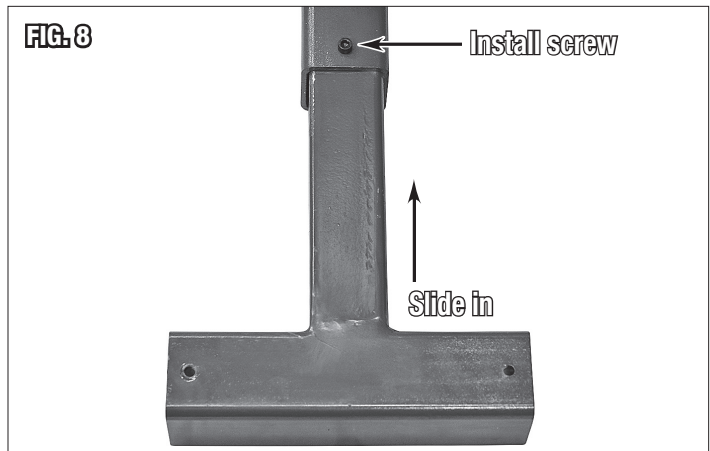
- Slide the Base Caster Tubes [zz] through the T-Tubes and center them before locking them in place with the remaining M6x12 Socket Head Screws (FIG 9).
- Install the Locking Swivel Casters with Washer, Lock Nut [ww] to the Caster Tubes (FIG 10).

TECH TIP: To ease installation, lock the Casters so you can use the wheel as leverage (FIG 10).

- Thread the M12x100 Cap Screws with Washer, Nut [uu] into the Pedestal a few turns and lock them with the jam Nut. These are useful for hanging die sets (FIG 11).
- The M6x12 Flat Head Screws [tt] are included for use with the Hydraulic Conversion Kits and will be covered later.

⚠ NOTICE

Manually bending tube with the included ratchet mechanism subjects the mount to high torque loads. For manual bending, the Frame must be rigidly mounted to an anchored stand or bench. Therefore, the Rolling Stand cannot be used for manual tube bending and must only be used with a Hydraulic Conversion Kit.

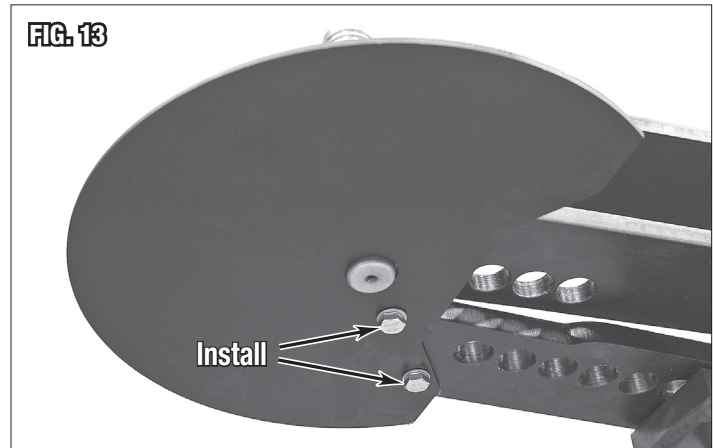
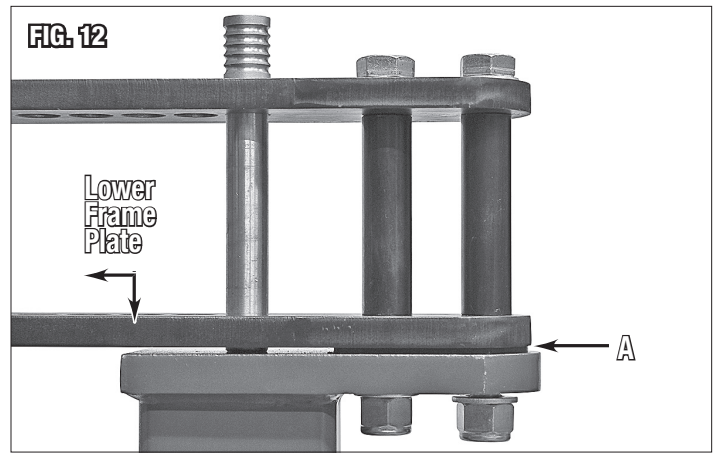


MOUNTING FRAME AND INSTALLING DEGREE PLATE

⚠ WARNING INJURY HAZARD!

In operation the Tubing Bender is subjected to high torque and weight loads. Improper mounting could cause it to suddenly fail. It is absolutely necessary that the Tubing Bender be securely bolted to a Bender Stand or sturdy workbench.

- Install the Frame Assembly to the mounting location in the orientation shown in (FIG 12). When mounting the unit, the Spacer Plate [A] must be located between the Lower Frame Plate and mounting surface. This is necessary to allow full Drive Pin projection through the Lower Plate (FIG 12).
- Leave the Screws loose for installation of your chosen drive method.
- Locate the Degree Plate [L] under the Lower Frame Plate, align the 2 holes in the Degree Plate with those in the Lower Frame Plate and fasten with the M8x20 Hex Head Screws [Q] and M8 Lock Washers [R] (FIG 13).
- Continue to **RATCHET DRIVE SETUP** for manual bending (components included) or **ELECTRO AND AIR-HYDRAULIC SETUP** for the optionally available hydraulic kits.



RATCHET DRIVE SETUP

- Place the Ratchet Plate [J] between the spread blades of the Ratchet Drive Link [K] as shown in (FIG 14) then pass the short M18 Shoulder Bolt with Nylon Locknut [N] through the blades of the Ratchet Drive Link and Ratchet Plate. Tighten securely.
- Place the outer Frame Spacer through the hole in the Ratchet Assembly and slip one of the Shaft Collars with Set Screw [M] on each side with the Ratchet Assembly centered on the Frame Spacer (FIG 15). Tighten the set screws of the Shaft Collars to lock in place.
- Insert the entire Ratchet Assembly between the Upper and Lower Frame Plates then slip the M18 Bolt through both Frame Plates and Ratchet Assembly (FIG 16).
- Temporarily insert the Pins in both the Frame and Drive Plates to verify they are aligned (FIG 17). All hardware should now be tightened.
- The optional Bender Handle (#21129) may be installed over the Ratchet Drive Link at this time (FIG 18).

CAUTION INJURY HAZARD!

Sudden slippage of the Bender Handle during use can cause serious injuries. Be sure the clamping bolts are securely tightened before use.

FIG. 14

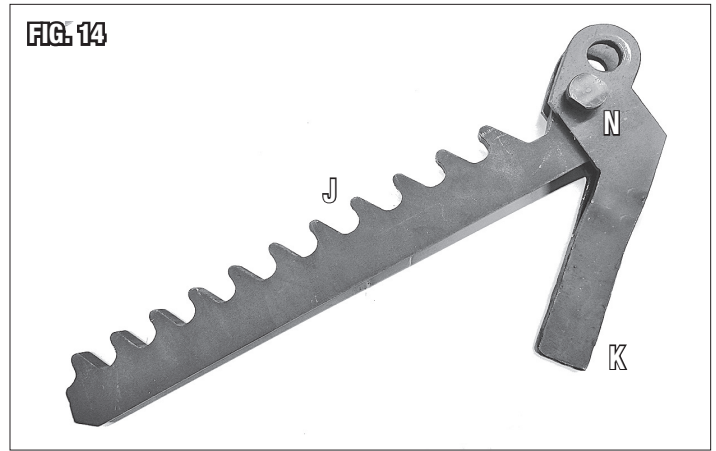


FIG. 15

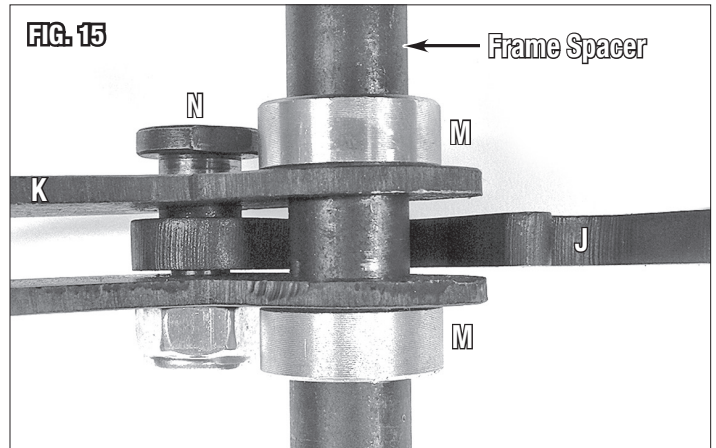


FIG. 16

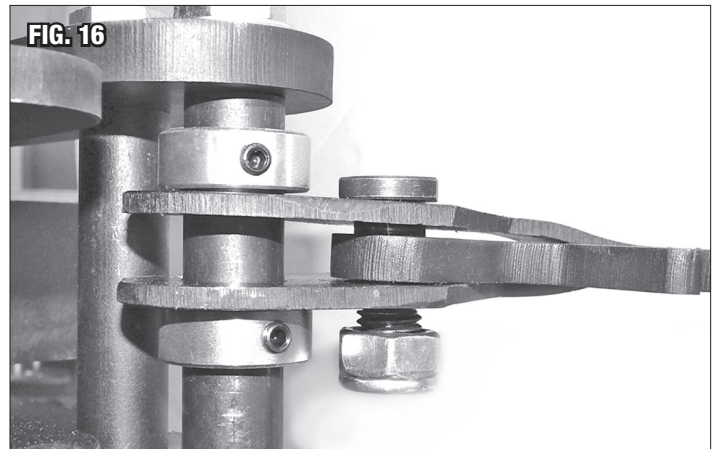


FIG. 17

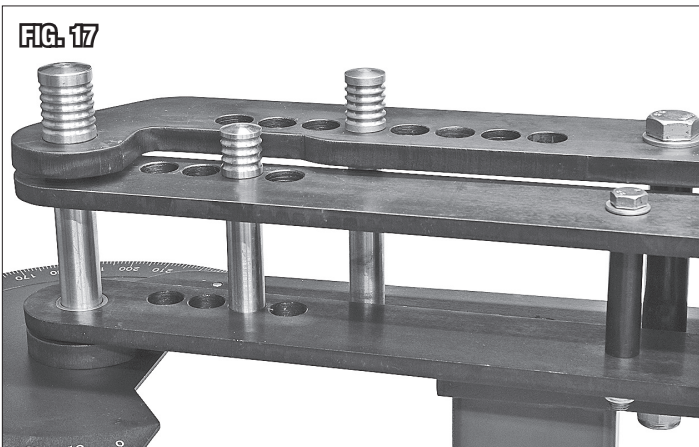
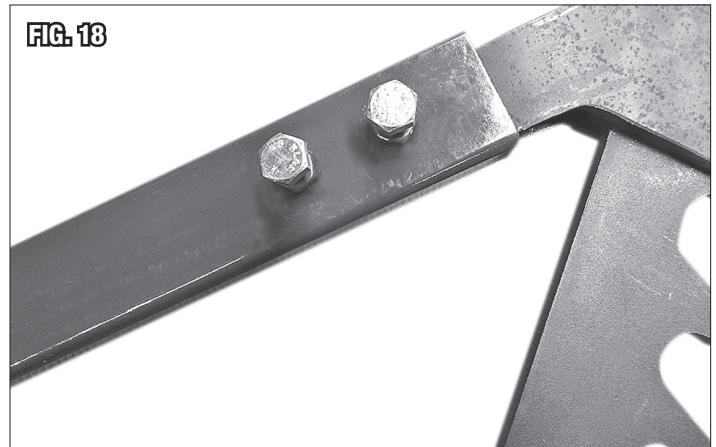


FIG. 18



ELECTRO AND AIR-HYDRAULIC SETUP

- The Electric Motor, Hydraulic Pump, Lines, Pedal, Cylinder Assembly [nn] and the Reservoir/Pedal, Lines, Cylinder Assembly [qq] are preassembled and require minimal setup for operation.
- The Reservoirs on both products are shipped drained. Before use you must fill the Reservoir with the appropriate grade and amount hydraulic fluid. The Air-Hydraulic unit requires 0.42 gal [1.6L] of ISO 32 hydraulic fluid and the Electro-Hydraulic unit requires 0.66 gal [2.5L] of AW (anti-wear) ISO 46 hydraulic fluid.
- Fill via the ports marked in (FIGS 21 & 22).
- Immediately prior to first use, the units will need to be cycled to fully extend and retract the cylinder, without load, several times to self-bleed air in the system. Open the Bleed Screw on the Air-Hydraulic Reservoir to allow air venting.
- Remove the outermost M18 Bolt and Spacer. With assistance from a helper, lift and insert the Cylinder Collar between the Upper and Lower Frame Plates then slip the M18 Bolt through both Frame Plates and the Collar (FIG 19). The Spacer is not used here.
- Remove the outermost M12 Bolt and Spacer. Slip the Spacer through the hole in the piston rod end (FIG 20). Swing the Drive Link Plates over the piston rod end, then reinsert the M12 Bolt.
- Temporarily insert the Pins in both the Frame and Drive Plates to verify they are aligned (FIG 17). All hardware may now be tightened.
- The kits include a Tray [rr] or Mounting Plate [pp] that can be fastened onto the Rolling Stand (#72075) with the three M6x12 Flat Head Screws [tt] included with the Rolling Stand. The Reservoir slips in the Tray for secure storage and the Motor can then be bolted to the Plate with the M8x30 Cap Screws with Washer, Lock Washer, Nut [oo] (FIGS 21 & 22).

NOTE: If mounting to the Floor Mounted Stand (#21116) or your own mount, you will need to determine a suitable location to securely bolt the Motor in place.

FIG. 19

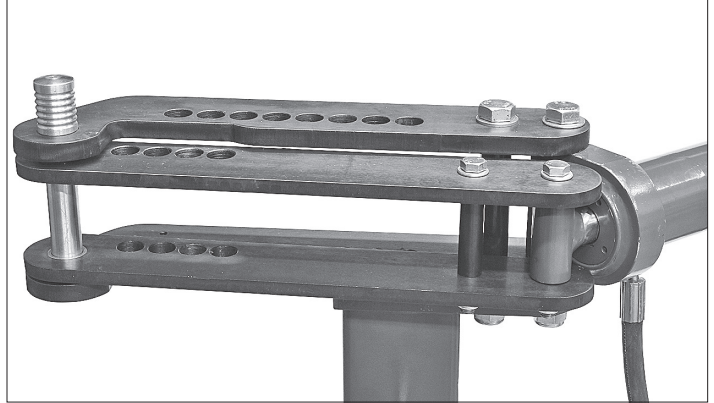


FIG. 20

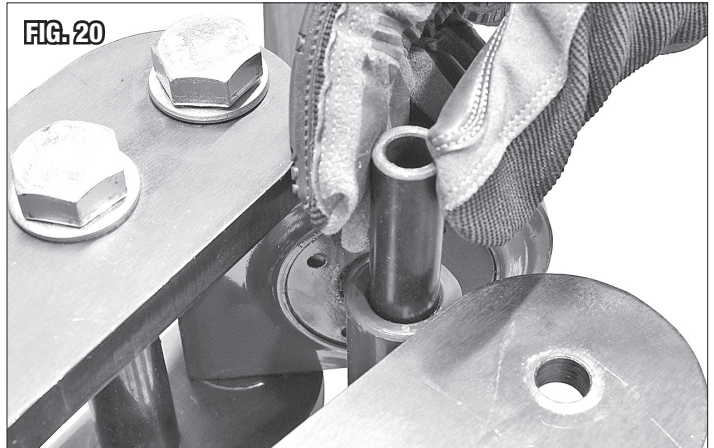


FIG. 21

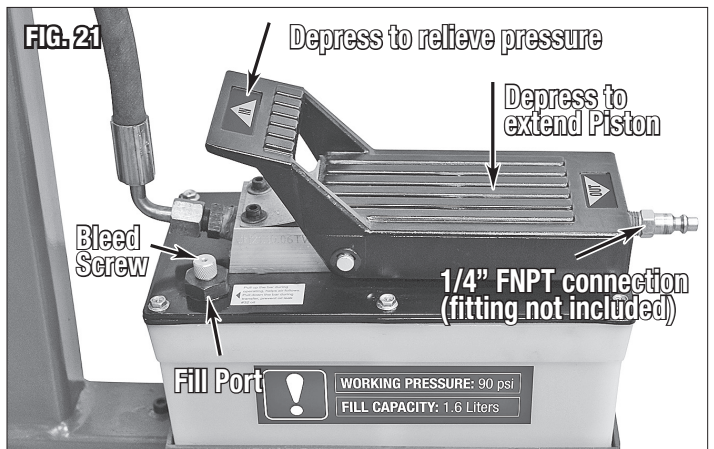
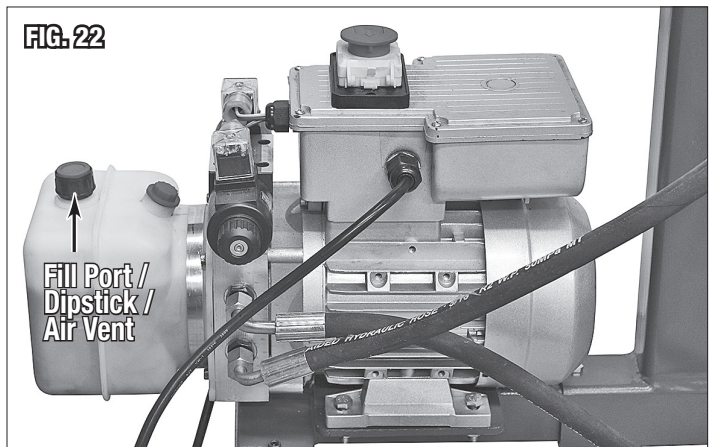


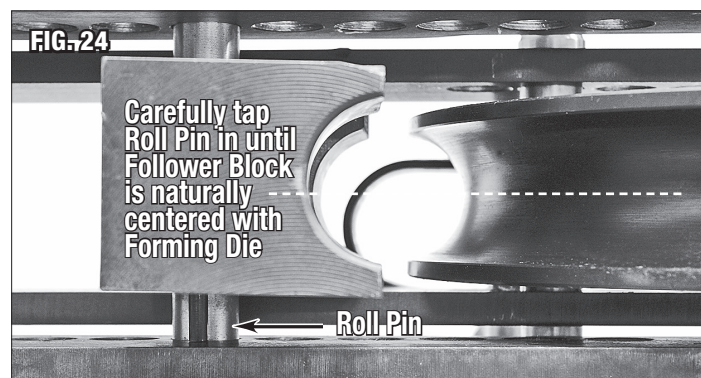
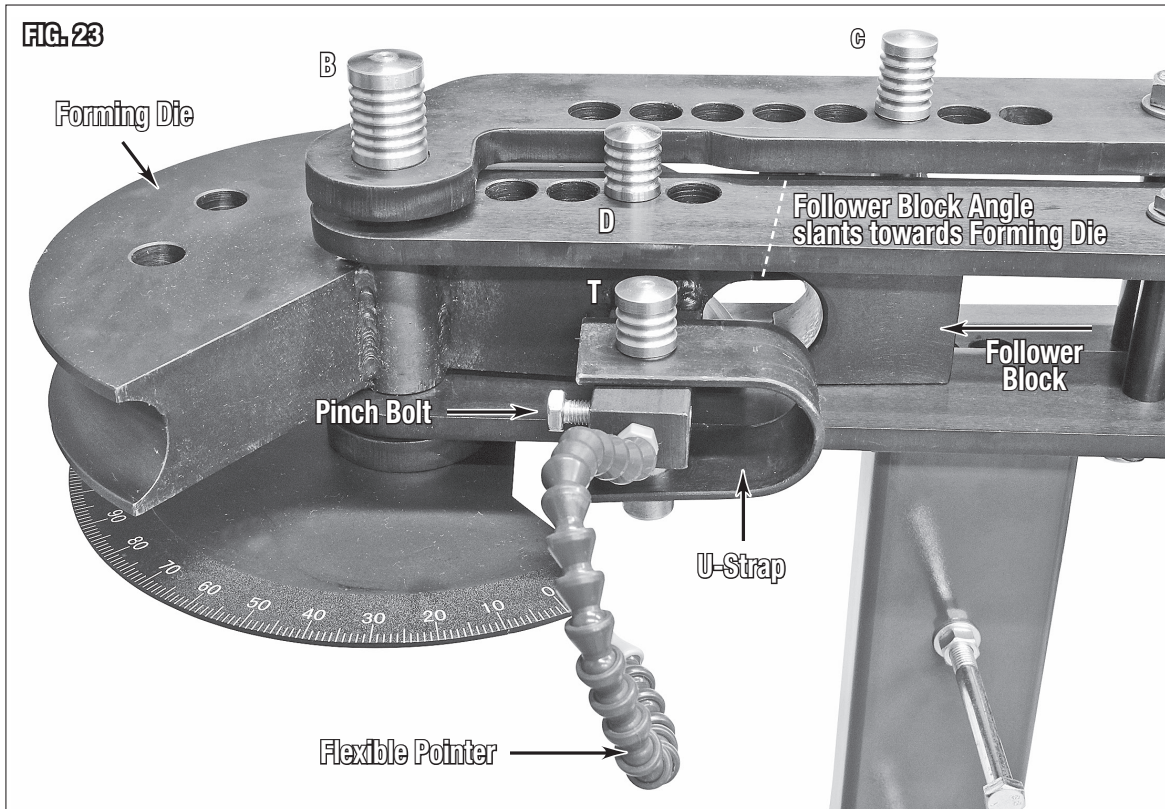
FIG. 22



INSTALLING DIES

IMPORTANT NOTE: The Forming Dies (not included, available separately), U-Straps and Follower Blocks are sized as a matched set each for a specific tubing size. Utilizing a die set for a tubing size it was not designed for will result in poor bend quality.

- Insert the selected Forming Die between Frame Plates with the rectangular U-Strap Block pointing towards the Drive Link Plates (**FIG 23**).
 - Slip the $\varnothing 1"$ x 6-1/2" [$\varnothing 24.8\text{mm}$ x 165mm] Pivot Pin **[B]** through the Forming Die center hole and both Bushings (**FIG 23**).
 - Place the corresponding sized U-Strap over the rectangular block protruding from the Forming Die then, depending on the die size, add a $\varnothing 7/8"$ x 3" [$\varnothing 21.8\text{mm}$ x 76mm] U-Strap Drive Pin **[T]** or $\varnothing 7/8"$ x 4" [$\varnothing 21.8\text{mm}$ x 102mm] U-Strap Drive Pin **[U]** to locate it (**FIG 23**).
 - Install the Roll Pin to the corresponding sized Follower Block. The Roll Pin keeps it aligned with the Forming Die and prevents the Drive Links from crushing it when they return (**FIG 24**).
 - After the Roll Pin is adjusted properly, slip Follower Block between the Upper and Lower Frame Plates. The angled "halfpipe" section of the Follower Block is oriented nearest to the Drive Links and pointing toward the Forming Die. Add the $\varnothing 7/8"$ x 6-3/4" [$\varnothing 21.8\text{mm}$ x 172mm] Frame Pin **[C]** in the closest possible hole to retain it (**FIG 23**).
 - Ensure the Drive Link Assembly is as close to the Frame as possible without binding or jamming.
 - Drop the $\varnothing 7/8"$ x 5-3/8" [$\varnothing 21.8\text{mm}$ x 136mm] Drive Link Pin **[D]** through the hole in the Forming Die nearest to the U-Strap when aligned with the hole in the Drive Links (**FIG 23**).
- NOTE:** If the Pivot Pin **[B]** is found to be stuck while performing a die change, loosen both Drive Link Bolts, lift the Drive Link assembly to release weight and support it while re-tightening the M8 Bolts.
- Install the Flexible Pointer pointing toward the Degree Plate and the Pinch Bolt (**FIG 23**).



TUBING PREPARATION

Before bending, it is important to understand how to get the desired results using the High-Capacity Tubing Bender. There is some preparation and calculation required when making a precise component.

- Tubing should be smooth, clean and unbent prior to loading it in the Tubing Bender.
- Immediately prior to bending, the tubing bend area and dies should be lubricated with oil to promote smooth forming.

SPRING BACK

Just as when bending sheet metal, spring back must be compensated for when bending tube. Spring back is the elastic tendency of the metal to return to its original shape. This means that for a perfect 90° bend you will have to bend slightly past 90° indicated on the machine. When bending pressure is released the piece will spring back to 90°.

Spring back varies mostly by material, size/thickness, center line radius, and less significantly by degrees of bend. Chromoly and high carbon steel will generally have more “spring back” than milder steels and aluminum.

- The best way to know your spring back is to make a test bend. Note what is indicated by the Degree Plate before releasing bending pressure. Measure the actual degrees of the bend and subtract that from the indicated number to get spring back (eg. indicated 90° - measured 88° = 2° spring back).
- “Over bend” the next piece by that amount for an accurate bend.

MINIMUM LENGTH FOR “X” DEGREES OF BEND

If you want to make a sample bend for mockup purposes or are going to insert the bend into a component, you are probably looking to make a “minimum tangent length” bend to waste as little tube as possible. This requires some basic calculations and considerations:

- Determine the Center Line Radius (CLR) of the die being used (this is commonly printed on the die or stated in the product name, eg. “Eastwood #21121 1.75” x 6” Radius, 120° Die” has a 6” CLR).
- Multiply the CLR by 6.28 (2 pi). Multiply the answer by the Degrees Of Bend (DOB) and remember to add in spring back factor.
- Divide answer by 360 then add 4” for the additional length required to reach the U-Strap.

$$\text{Minimum Tube Length} = \frac{(\text{CLR} * 6.28) * \text{DOB}}{360} + 4''$$

- After bending you will need to trim the straight excess on both sides to get just the bend.

LOCATED BENDS AND MULTI-BEND COMPONENTS

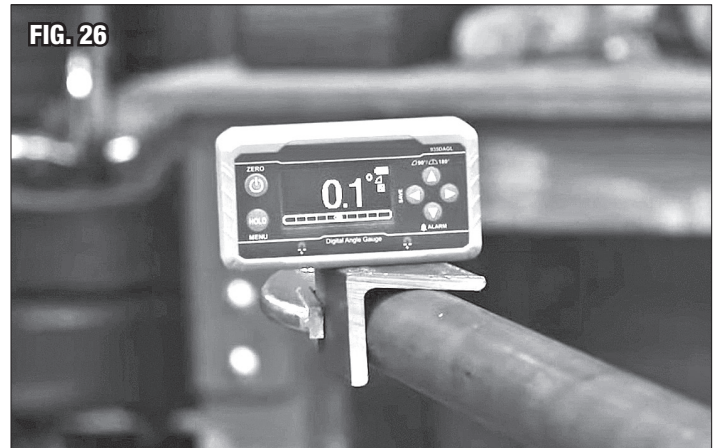
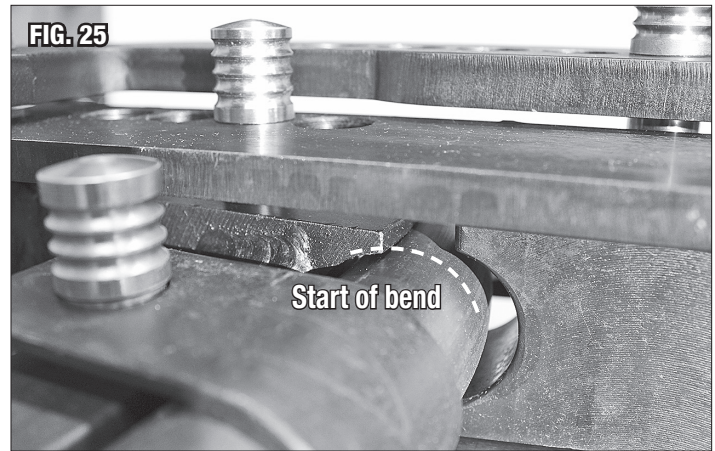
For more complicated precision bent components, such as roll cage hoops and bars, there are multiple planning methods. Guesstimating, hand calculating, and computer software are all options. However, they always revolve around knowing the “start” location(s) of the bend(s) and the total length of pipe required to make the component. 3D CAD programs or dedicated bending software such as that developed by Bend-Tech™ are appealing because they do the number crunching for you and are easy to adjust.

Calculating the start points and total length is the least wasteful way to make a components. This is the method described below. The alternative, commonly employed when estimating, is working from the center point of an extra-long tube symmetrically bending it from the inside out and chopping it after.

- Cut the tube down to the total length required.
- Choose a side of the tube (hereinafter referred to as the start of the tube) and mark the starting point(s) of the bend(s).
- Then insert the start of the tube through the dies and locate the first start point flush with the Forming Die face (**FIG 25**) and clamp it down.
- For single bend components, you will simply make the bend. For multiple bend components, it is critical to make sure the component is in the correct plane when resetting position for subsequent bends (eg. roll cage hoop bends must be kept in the same plane, or you end up with a twisted staple). The simplest way to do this is to clamp a flat piece of stock on the end of the tube. Use an angle indicator or level on top of the flat stock and zero it out or level it (**FIG 26**).
- Then, make the first bend. After you release pressure and unclamp the tube, slide it to the second start point and align flush with the Forming Die as before. This time you also need to make sure the piece clamped on to the end of the tube is still indicating level (**FIG 26**) (typical for roll cage hoop) or the specific angle you need before clamping it. Triple check both the second bend start point AND the tube rotation is correct when clamped BEFORE starting the bend.

TECH TIP: Roll cage hoops have a lot of leverage fighting on the third and fourth bends. This is when having a helper to support the hoop or an adjustable platform to rest it on is ideal.

- After that make your second bend, repeat for the remaining points.



OPERATION

⚠ DANGER PINCH AND CRUSH HAZARD!

This tool has leveraged, rotating components that generate amplified crushing and bending forces capable of causing severe injury! Hydraulic piston rods rapidly deliver force capable of severing fingers! Keep fingers and hands away from moving parts when operating. When not in use, disconnect from electric or air power source.

⚠ WARNING FALL HAZARD!

Strenuous physical force may need to be applied to the Tubing Bender during use. Always be sure-footed and well balanced when operating to prevent personal injury and property damage. Wear appropriate, closed toe footwear to increase grip.

Be sure there is sufficient working room around the tool for safe handling of various sizes of tubing. Always work in a clean, uncluttered environment to reduce injury risk.

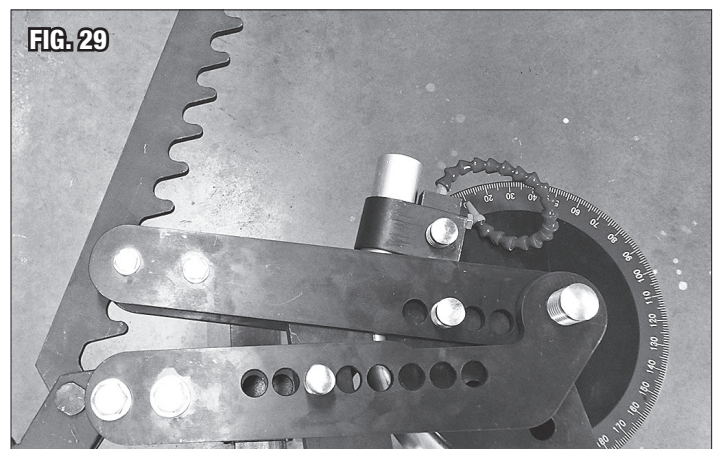
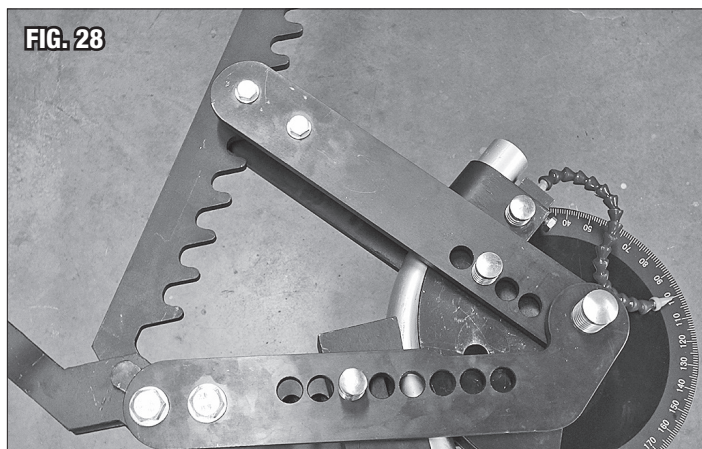
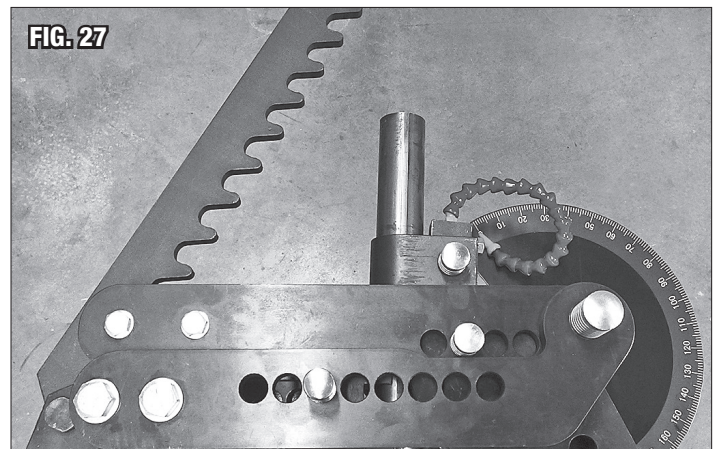
⚠ NOTICE

Excessive resistance while operating could indicate a defect with the workpiece material or damaged Tubing Bender components. To avoid injury, stop work immediately and inspect workpiece material for nicks, dents, welds, excessive scale or remaining coatings. Also inspect Tubing Bender components.

Lubricate the tubing being bent to aid smooth bending and minimize the risk of marring the tube.

RATCHET DRIVE OPERATION

- To bend tube with the ratchet mechanism, position the Ratchet with the first Tooth completely engaging the outermost Drive Link Spacer (FIG 27).
- Begin exerting pressure on the Bender Handle, slowly and steadily pulling to bend the workpiece.
- When the Bender Handle is at the end of its travel, stop and very gently pull it back several degrees to release the Ratchet Tooth from the Drive Link Spacer (FIG 28). Reposition the Ratchet to fully engage one of the Teeth further down (FIG 29).
- Once again, continue slow and steady bending. You will repeat this until out of Ratchet Teeth. Now that you understand the operation, continue to **BENDING TUBE** to make a bend.

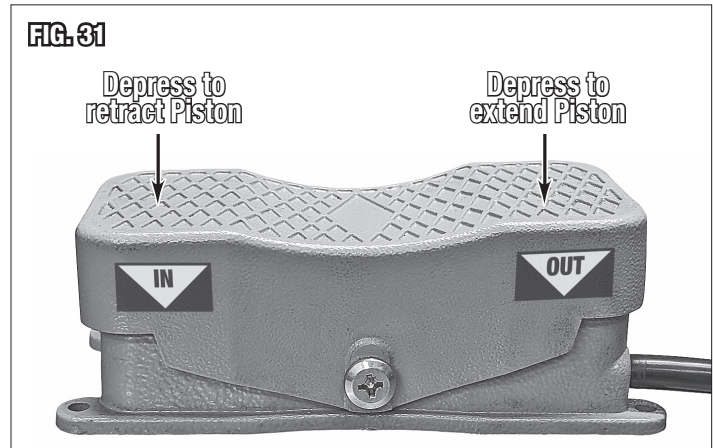
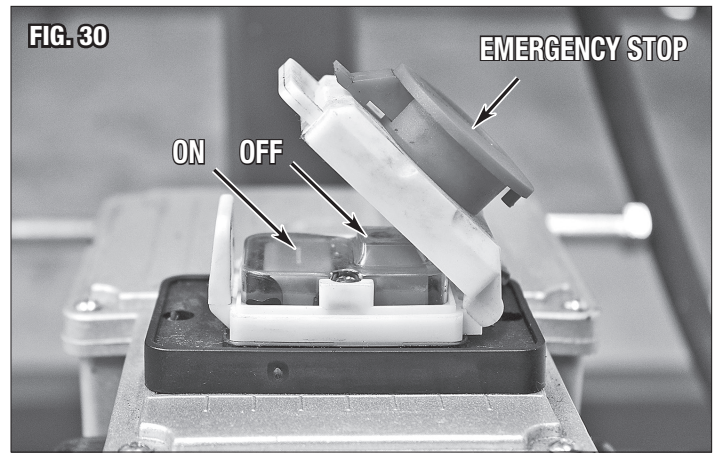


ELECTRO-HYDRAULIC OPERATION

- If using the Electro-Hydraulic kit, first plug into a power source.
- Release the Emergency Stop latch and lift the cover to reveal the Green Power Button. Press to power on the motor (**FIG 30**).
- The hydraulic piston can now be operated by hand or foot with the Rocker Switch. Take note of which direction extends and retracts the piston as shown on the Switch (**FIG 31**).
- Be extremely cautious when using the Electro-Hydraulic Conversion Kit. The hydraulic piston rapidly delivers forces capable of causing severe injury in both directions.
- When fully extended or retracted the hydraulic system changes tone as the relief valve opens and the motor loads up. Do not allow the motor to run against the relief valve for an extended period of time or it may overheat.
- After bending is finished, press the Red Button to turn the motor off or simply press the emergency stop latch closed (**FIG 30**). Disconnect from power source when no longer in use.

AIR-HYDRAULIC OPERATION

- If using the Air-Hydraulic Kit, first connect the 1/4" FNPT port to an air source (**FIG 21**).
- The hydraulic piston can then be operated by depressing the Rocker Pedal (**FIG 21**).
- Be extremely cautious when using the Air-Hydraulic Conversion Kit. The hydraulic piston rapidly delivers forces capable of causing severe injury.
- When fully extended the rapid air pumping noise will quickly slow down as pressure builds against the piston stop. Do not allow the pump to run against the piston stop for an extended period.
- After bending is finished, press elevated part of the Rocker Pedal (**FIG 21**) to relieve hydraulic pressure. The piston will retract slightly and can easily be fully retracted by pulling on the end of the Cylinder for leverage. Disconnect from air source when no longer in use.



BENDING TUBE

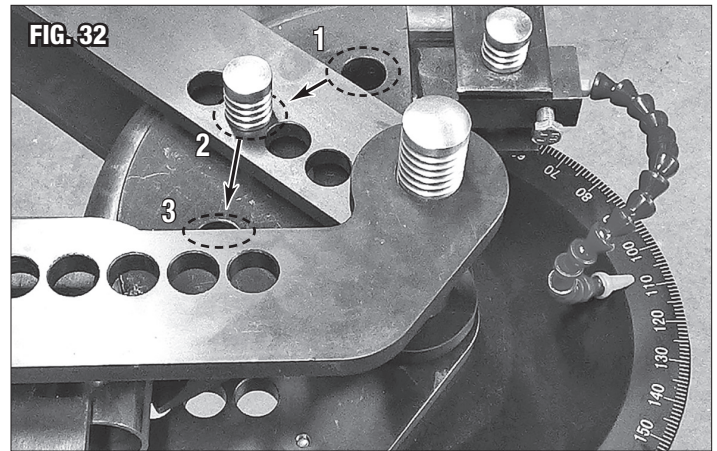
- Slip the workpiece tube in place between the Forming Die and Follower Block then place the U-Strap over the outer side of the tube (**FIG 27**). Lightly tighten the Pinch Bolt if needed.

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

- Drop the $\text{\O}7/8'' \times 5-3/8''$ [$\text{\O}21.8\text{mm} \times 136\text{mm}$] Drive Link Pin [**D**] through the hole closest to the U-Strap that aligns with one in the Drive Link Assembly (**FIG 27**).
- Begin exerting pressure on the workpiece to take up any lash and eliminate looseness, then set the Pointer to indicate 0° on the Degree Plate (**FIG 27**).
- Slowly and steadily bend the workpiece tubing.
- On average, the workpiece tubing will bend up to approximately 40° for each full travel length of the Drive Link. When no more bending range is available, pressure must be released, and the Drive Link Pin must be pulled out. Retract the Drive Link and align with the next hole along the Die before reinstalling the Pin (**FIG 32**).

IMPORTANT NOTE: Before releasing pressure, it is paramount that the U-Strap and pinch bolt firmly secure the tube in place for bend continuity. Do not allow the tube to slip or rotate as the Drive Link is reset.

- Continue bending to the desired angle. The position of the Pointer should not be reset, it will still be correct after moving the Pin.
NOTE: As detailed in **TUBING PREPARATION**, there will be a certain amount of "spring back" meaning that you must pull several degrees past your target degrees then allow it to "spring back" to the final degree mark.
- After bending is completed, you may release pressure on the Drive Link, loosen the Pinch Bolt and pull the U-Strap Pin to release the tube from the dies.



HYDRAULIC KIT TROUBLESHOOTING

PROBLEM	CAUSE	CORRECTION
Does Not Run	No Power to Hydraulic Pump	Verify input air source is minimum 3 CFM @ 100 psi or power connection is grounded 120 VAC outlet with 15 amp breaker.
		Check for tripped circuit breaker.
Hydraulic Pump Runs Too Slow/ Develops Low Power	Low Power from Supply Source	Verify input air source or circuit is not underdelivering.
Piston Stops Before Bend is Completed	Piston Fully Extended	Retract piston, then reset Drive Link and Pin to next position in forming Die to continue bend.
	Low Fluid Level in Reservoir	Retract piston fully and check fluid level in Reservoir.
	Tripped Circuit Breaker	Check for tripped circuit breaker.
	Obstruction or Binding of Components	Retract piston and verify no interference is occurring.
	Material Thickness Exceeds Capacity	Do not attempt to bend tube larger than 0.120" wall at 2" O.D.

ADDITIONAL ITEMS

R&D MUST-HAVE ACCESSORIES



#20447
Eastwood Professional Tubing Notcher



#67522
Yost HD550-C Heavy Duty Mechanics Vise



#63616
Fairmount Tools SAE Drill Guide

OPTIONAL ITEMS

- #20178** Eastwood Tubing Notcher Adaptor
- #20237** Eastwood Benchtop Metal Cutting Bandsaw

REPLACEMENT ITEMS

- #72617** Eastwood Tubing Bender 5pc Pin Set
- #72618** Eastwood Tubing Bender Degree Plate
- #72619** Eastwood Electro-Hydraulic Reservoir and Seal Kit

Visit eastwood.com for complete info and pricing.

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

The Eastwood Company 263 Shoemaker Road, Pottstown, PA 19464, USA 800.343.9353 eastwood.com

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