

MANUAL TUBE BENDER

MODEL TB-3



OPERATION MANUAL

The Tubing Bender TB-3 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 Die Sets. Build roll bars, shop fixtures, go-kart frames and much more with high accuracy and professional results.

SAFETY INFORMATION

READ INSTRUCTIONS

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

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

INJURY HAZARD!

- Tremendous external torque loads are placed on this Tubing Bender during operation. This tool cannot be operated without adequate support or severe personal injury or property damage can occur if it should suddenly become dislodged or moves while in use. Before beginning ANY work with this tool, it is absolutely necessary that it be securely bolted to a properly anchored Bender Stand or a heavy, sturdy, anchored workbench.

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

INJURY & DAMAGE HAZARD!

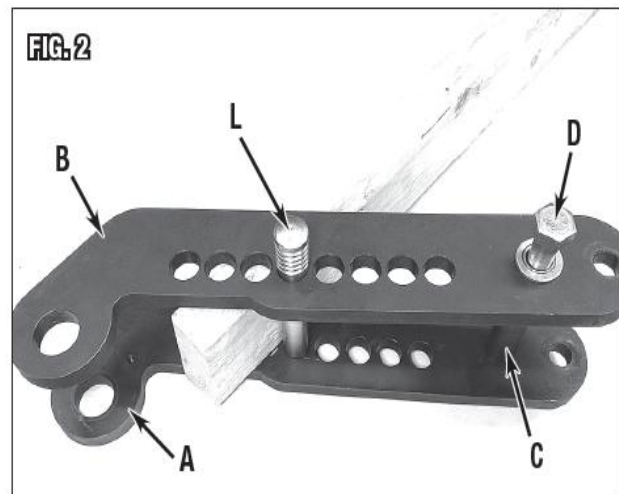
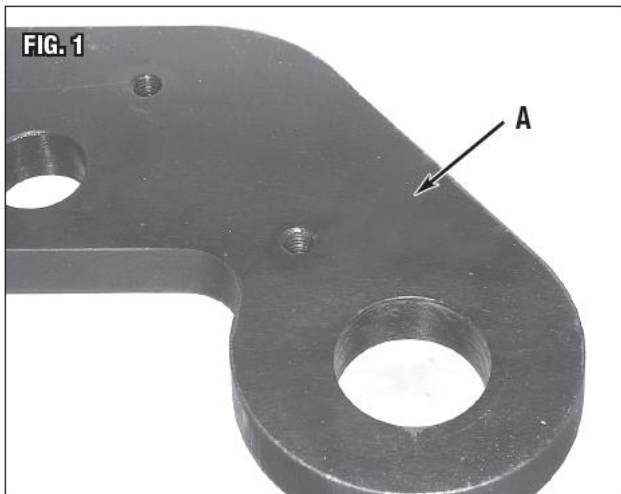
- Excessive resistance while operating could indicate a defect with the workpiece material or broken or damaged Tubing Bender components. To avoid injury, stop work immediately and inspect workpiece material for nicks, dents, welds, excessive scale or

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

FRAME ASSEMBLY

1. Lay the Lower Frame Plate (A) on a clean, level work surface.
Note: The Lower Frame Plate has two M8 tapped holes which must be placed downward toward the work surface (Fig 1).
2. Using a 4" block of wood or other suitable material, place it between the Lower Frame Plate (A) and the Upper Frame Plate (B) for temporary support.
3. Find the two 18mm bolt/washer/Frame Spacer/nut assemblies and disassemble them. Place the two ϕ 1" x 4" [ϕ 26mm x 102mm] Frame Spacers (C) between the Lower Frame Plate and the Upper Frame Plate (Fig 2).
4. Place an M18 x 120mm Bolt (D) with 18mm washer (E) through the 19mm hole in the Upper Frame Plate, Frame Spacer and Lower Frame Plate. Fix with Cotter Pin (F). Repeat with 2nd 18mm bolt and Frame Spacer leaving it only finger tight as well (Fig 2).



DRIVE LINK SUB-ASSEMBLY

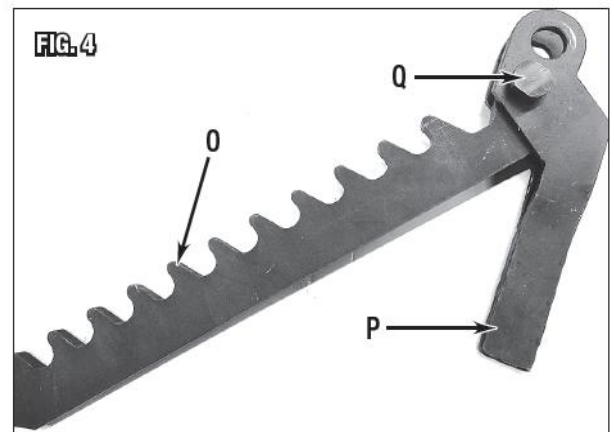
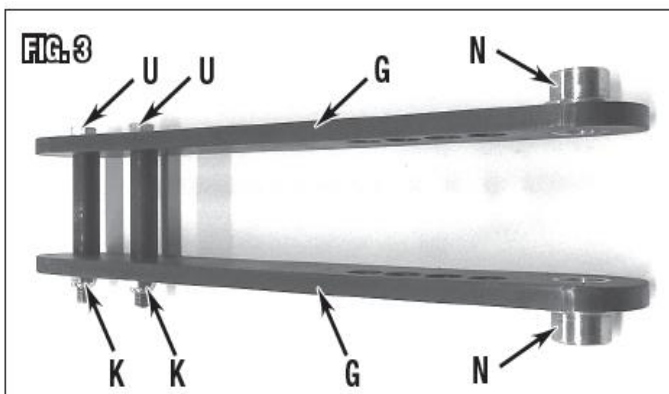
1. Set one the two Drive Links (G) along their edges on a clean, level work surface.
2. Find the two 12mm bolt/washer/Drive Link Spacer/nut assemblies and disassemble them. Place the two ϕ 3/4" x 2-13/16" [ϕ 19mm x 72mm] long Drive Link Spacers (H) between

the two Drive Links (G) (Fig 2).

3. Add a 12mm washer (I) to an M12 x 120mm Bolt (J) then slip it through the 13mm hole in the upper Drive Link, through Drive Link Spacer (H) and lower Drive Link (G). Place a 12mm washer (I) over the bolt and thread on the M12 nut (K) leaving it only finger tight at this time. Repeat with 2nd M12 Bolt (J) and Drive Link Spacer (H) leaving it only finger tight as well.
4. Check for alignment: Temporarily Insert the two $\phi 7/8"$ [$\phi 22\text{mm}$] polished Drive Pins (L) & (M) through two of the four 22.5 diameter holes in both Drive Links (G) to align them. Tighten both M12 Bolts (J) & M12 Locknuts (K) then remove the Drive Pins.
5. Insert two Brass Flanged Bushings (N) with the smaller diameter offsets in the large 32mm diameter holes and with the flanges located on the outer sides of the Drive Links (Fig 3).
6. Set this Sub-assembly aside for installation to Frame.

RATCHET SUB-ASSEMBLY

1. Place the Ratchet (O) between the spread blades of the Ratchet Lever (P) as shown in (Fig 4) then pass the short M18 x 2.5" [50mm] Shoulder Bolt (Q) through the blades of the Ratchet Lever (P) and Ratchet (O). Fix with Cotter Pin (F) .



INSTALLING DRIVE LINK SUB-ASSEMBLY

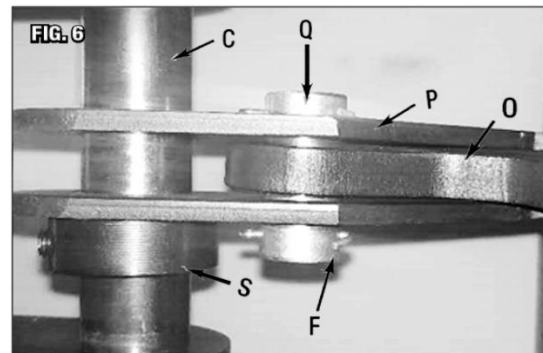
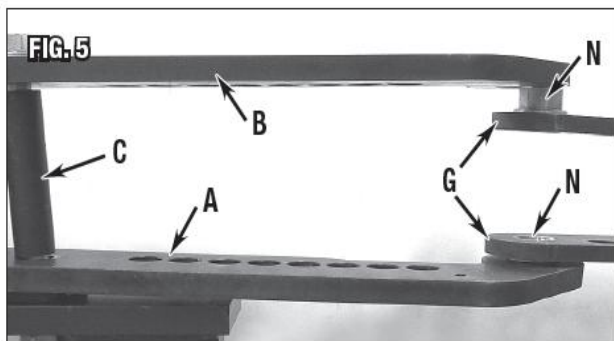
1. Back off the two M18 nuts out to the ends of the M18 bolts and spread the Upper and Lower Frame Plates (A) & (B) sufficiently to allow the large 32mm diameter holes to slip

over the previously installed Brass Bushings up to their flanges (Fig 5).

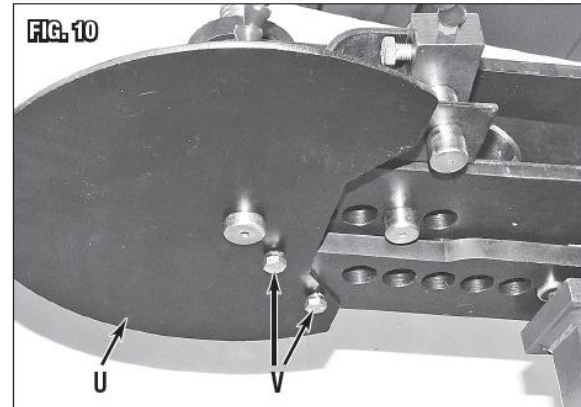
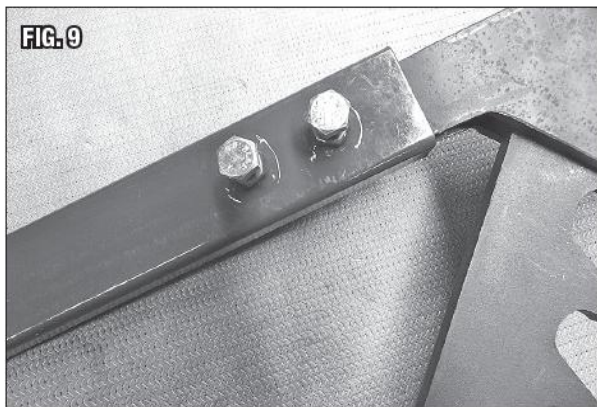
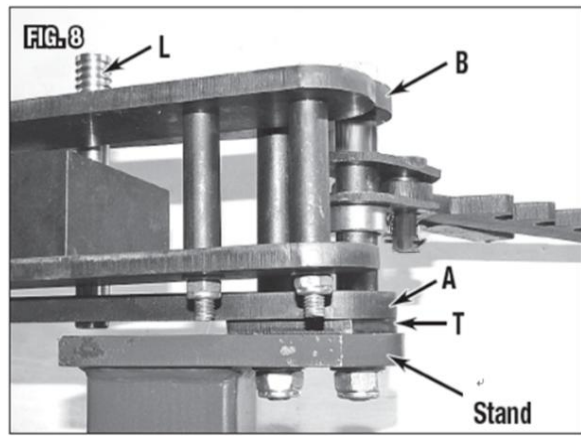
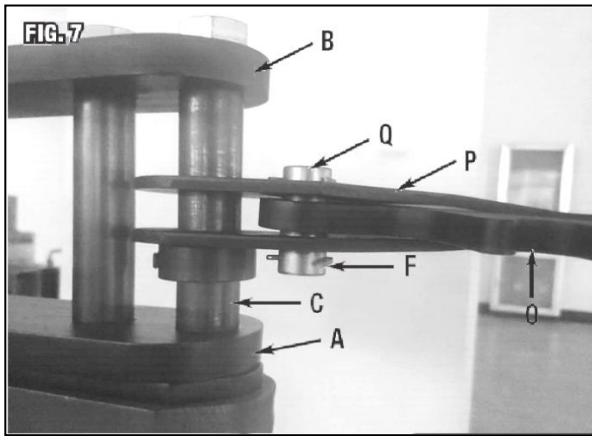
2. Slip the larger $\phi 1" \times 6\text{-}1/2"$ [$\phi 25\text{mm} \times 165\text{mm}$] Pivot Pin (R) through both Bushings.
3. Pull the Upper and Lower Frame Plates together with the INNER bolt finger tight leaving the outer M18 bolt and $\phi 1" \times 4"$ [$\phi 26\text{mm} \times 102\text{mm}$] Frame Spacer out for now (Fig 5).

INSTALLING RATCHET T/LEVER SUB ASSEMBLY IN FRAME

1. Place the $\phi 1" \times 4"$ [$\phi 26\text{mm} \times 102\text{mm}$] Frame Spacer through the holes in the Ratchet/Lever Sub-Assembly and slip one each of the Shaft Collars (S) on either side with the Ratchet/Lever Sub-Assembly centered on the Frame Spacer (Fig 6). Tighten the set-screws of the Shaft Collars (S) with a 4mm hex key.



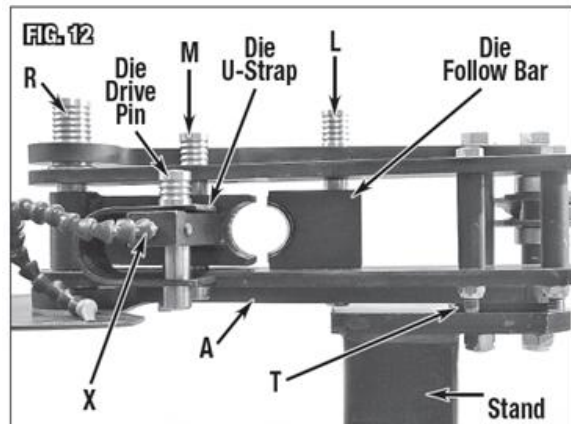
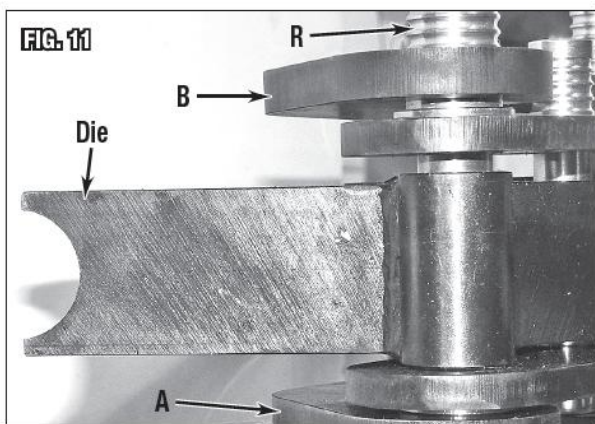
2. Insert the entire Ratchet/Lever Sub-Assembly between the Upper and Lower Frame Plates then slip the M18 bolt (D) through both Frame Plates and Ratchet/Lever Sub-Assembly (Fig 7).
3. When mounting the unit, the Spacer Plate (T) must be located between the Lower Frame Plate (A) and mounting surface. This is necessary to allow full Drive Pin projection through Plates (Fig 8).
4. Check for alignment: Temporarily Insert the $\phi 7/8" \times 6\text{-}3/4"$ [$\phi 22\text{mm} \times 172\text{mm}$] polished Drive Pin (L) through the $\phi 22.5$ holes in both Frame Plates to align them. Tighten both M12 bolts & nuts then remove the Drive Pin (Fig 8).
5. The optional Bender Handle may be installed over the Ratchet Lever (P) at this time (Fig 9).



INSTALLING DIES

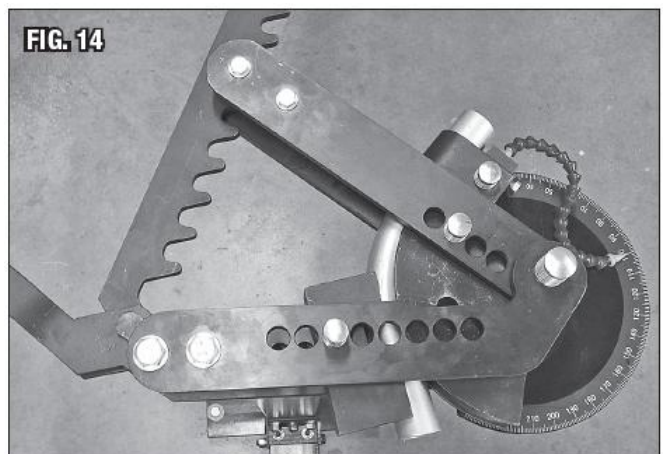
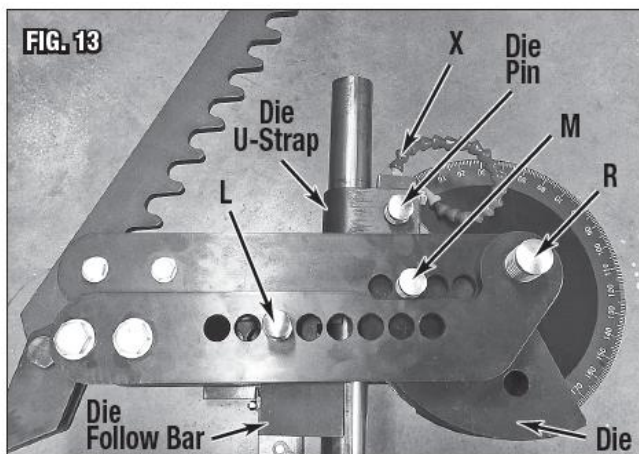
1. Insert the selected Forming Die in the Frame with the curved edge facing ratchet end and with the Clamp oriented toward the offset (Fig 11).
2. Slip the larger $\phi 1" \times 6-1/2"$ [$\phi 25\text{mm} \times 165\text{mm}$] Pivot Pin (R) through the Die pivot hole and both Bushings (Fig 11).
3. Place the corresponding sized U-Strap over the square offset block of the Forming Die then, depending on the die size, add a $\phi 7/8" \times 4"$ [$\phi 22\text{mm} \times 100\text{mm}$ or 75mm] U-Strap Drive Pin (Y or Z) to locate it (Fig 12).
4. Set the corresponding sized Followbar between the Upper and Lower Frame Plates then add the $\phi 7/8" \times 6-3/4"$ [$\phi 22\text{mm} \times 172\text{mm}$] Drive Pin (L) in the appropriate hole to retain it (Fig 12).
5. Rotate the Drive Link Assembly back as close to the frame as possible without binding or jamming.
6. Drop the $\phi 7/8" \times 5-3/8"$ [$\phi 22\text{mm} \times 136\text{mm}$] Drive Pin (M) through the hole in the outer die edge (closest to the U-Clamp) that aligns with one in the Drive Link Assembly (Fig 12).
7. Thread the base of the Degree Pointer (X) into the M9 thread on the end of the square

offset block of the Die (Fig 12).

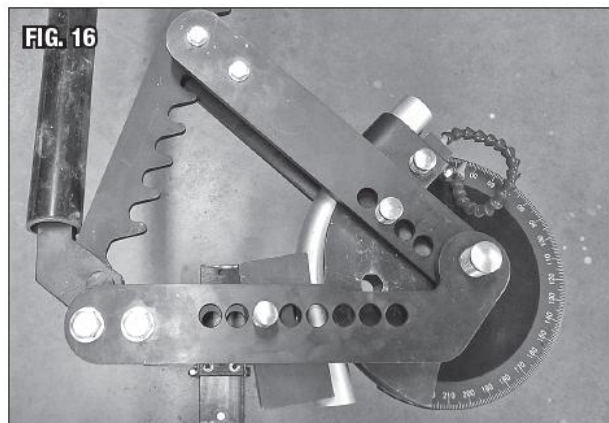
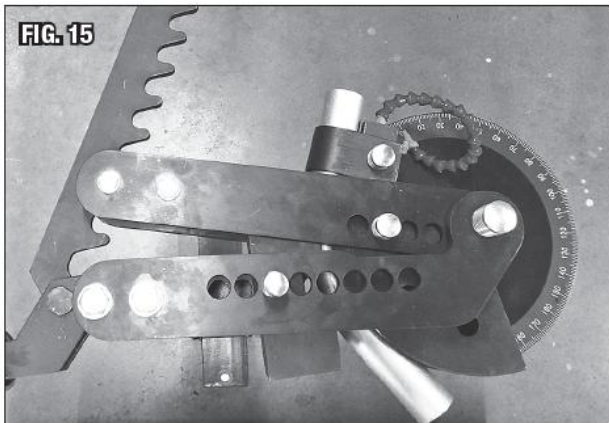


Operation

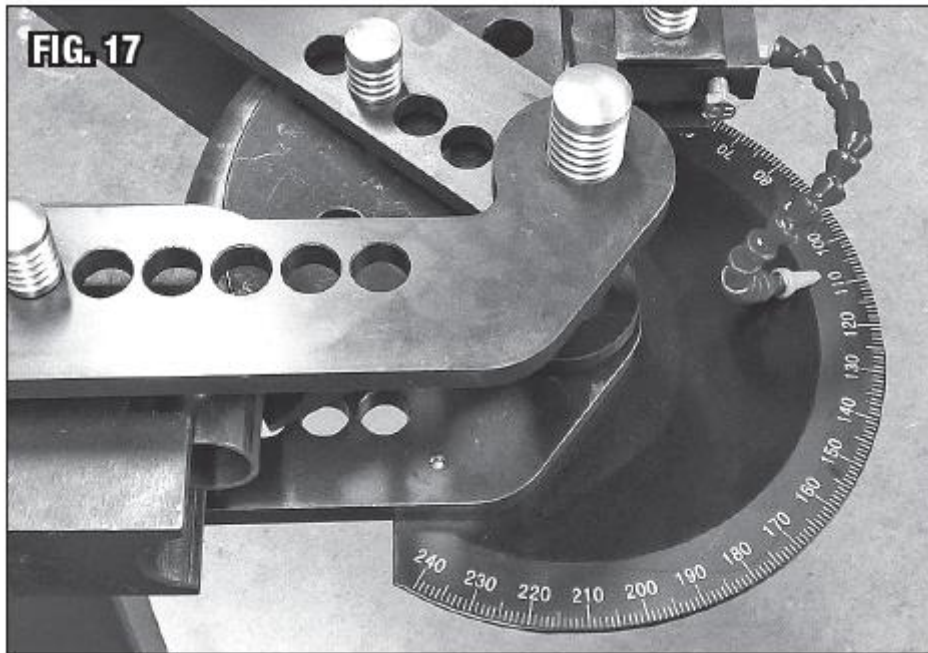
1. Slip the workpiece tube in place between the curved Die and Followbar then place the U-Clamp over the outer side of the tube (Fig 13). Lightly tighten the Retainer Bolt if needed.
Note: On thinner walled material, it may be helpful to place a small cut out section of material being used between end of the Retainer Bolt and outer side of workpiece tubing to avoid creating possible dents or damage.
2. Drop the $\phi 7/8$ "x5-3/8" [$\phi 22$ mm x136 mm] Drive Pin (M) through the hole in the outer die edge (closest to the U-Clamp) that aligns with one in the Drive Link Assembly (Fig 13).
3. Place the Ratchet with the Teeth completely engaging the Drive Sleeve of the Drive Link Assembly (Fig 13).
4. Begin exerting pressure on the Bender Handle to take up any lash and eliminate looseness then set the Pointer to indicate "0°" on the DegreePlate (Fig 13).



5. Slowly and steadily pull on the Bender Handle, bending the workpiece tubing as you go.
6. When the Bender Handle is at the end of its travel, stop and very gently pull it back several degrees releasing the Ratchet Teeth from the Drive Sleeve (Fig 14).
7. Reposition the Ratchet so that Drive Teeth further down the Ratchet fully engage the Drive Sleeve (Fig 15).
8. Once again, slowly and steadily pull on the Bender Handle, bending the workpiece tubing as you go. When the Bender Handle at the end of its travel, stop and very gently pull it back several degrees releasing the Ratchet Teeth from the Drive Sleeve.
9. Once the entire usable length of the Ratchet has been reached and no more bending range is available, the $\phi 7/8" \times 5-3/8"$ [$\phi 22\text{mm} \times 136 \text{ mm}$] Drive Pin (M) must be pulled out and relocated in the Drive Link and further toward the center of the Die (Fig 16).
Note: on average, the workpiece tubing will bend up to approximately 40° for each full travel length of the Ratchet).



10. To achieve more bending range; repeatedly pull the Drive Pin from the Curved Die and Drive Link Assembly and move to another hole further inward on the Die (Fig 17).
11. Once again, place the Ratchet with the Teeth completely engaging the Drive Sleeve of the Drive Link Assembly.
12. As previously, slowly and steadily pull on the Bender Handle, bending the workpiece tubing as you go. Watch the position of the Pointer on the Degree Wheel as you approach your desired angle (Fig 17).

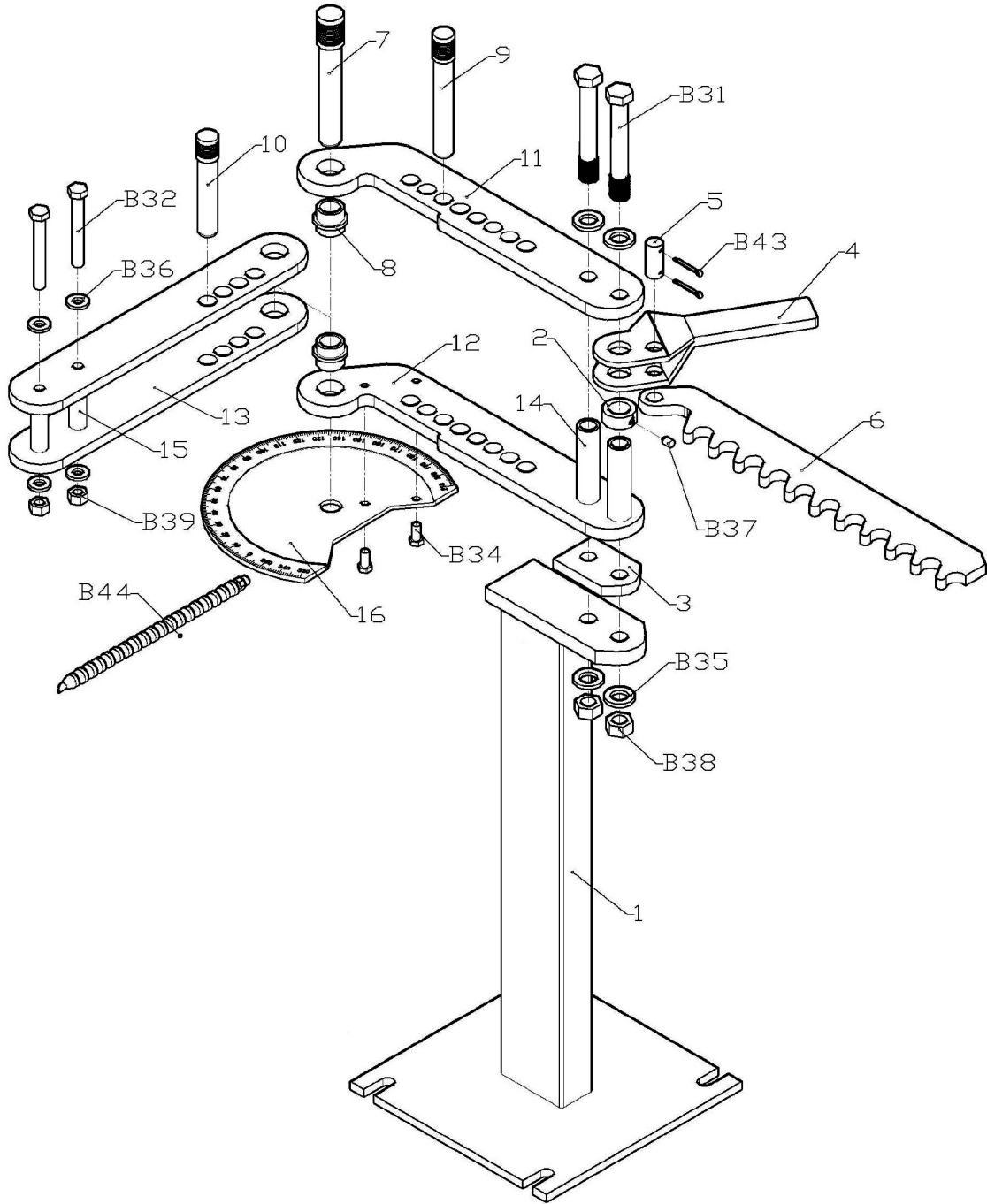


IMPORTANT NOTE: There will be a certain amount of “springback” meaning that you must pull several degrees past your gauge target then allow it to “spring back” to the final degree mark. This varies widely according to the particular material, diameter and thickness. Chromoly and high carbon steel will 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.

PARTS LIST

Part No.	Description	QTY	Remark
1	Frame	1	
2	Location Sets	1	
3	Bottom	1	
4	Swing Lever	1	
5	Rachet Pin	1	
6	Rachet	1	
7	1" Frame Pin	1	
8	Copper Sleeve	2	
9	7/8" Drive Pin	1	
10	7/8" Drive Pin	1	
11	Upper Frame Link	1	
12	Under The Fixed Plate	1	
13	3/4" Bolts & Washers	2	
14	1" OD Frame Spacer Tubes	2	
15	3/4" OD Drive Link Spacer Tubes	2	
16	Degree Plate	1	
B31	3/4" Bolts & Washers	2	
B32	1/2" Bolts & Washers	2	
B33	Hex Bolts	3	
B34	Hex Bolts	2	
B35	Flat Washer	4	
B36	Flat Washer	4	
B37	Hexagon Socket Set Screws With Cone	1	
B38	Non-Metallic Nut Inserts	2	
B39	Non-Metallic Nut Inserts	2	
B43	Cotter Pin	2	
B44	Plastic Pointer	1	

Assembly Drawing



Note: This manual is only for your reference. Owing to continuous improvement of the machines, Changes may be made at any time without obligation on notice.