

Parker 400 Series Tube Benders

Bulletin 4391-B400S



ENGINEERING YOUR SUCCESS.

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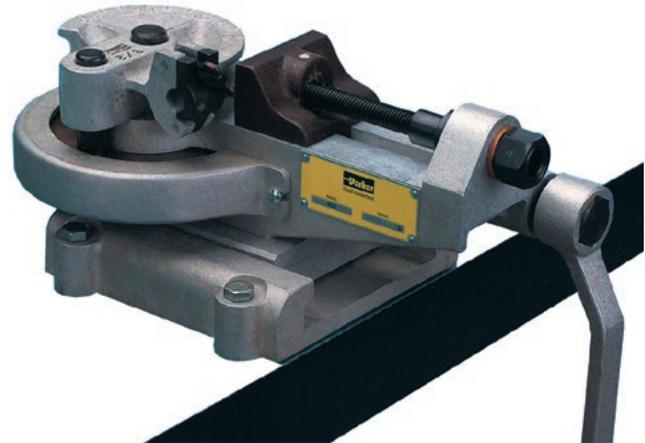
Parker Hannifin Corporation
Tube Fittings Division
Columbus, OH
www.parker.com/tfd

EXACTOL® Tube Benders

(For 1/4" – 1-1/2" diameter tubing)

*Sturdy...Simple...Manual...
Bends to exact tolerances.*

The Parker Exactol Tube Benders are probably the most versatile bench benders available today. Built for easy manual bending of copper, brass, aluminum, steel and stainless steel tubes to exact tolerances, the 400 Series benders are also compact and portable to any area for service use where a vise is available.



Along with the bender itself, Parker has developed a complete package of accessories to enable this tool to be used for all types of bending: close bend radius blocks, mandrels for thin wall tubes, bench mounting adapters and more.

Capacity

Tube Benders Maximum Capacity Guides

Tube O.D.	Material	Tube Wall Thickness (Inches)											
		0.035	0.049	0.058	0.065	0.072	0.083	0.095	0.109	0.12	0.134	0.156	0.188
		Bender Code*											
3/4"	S	AC	AC	AC	AC	C	C	C	C	C	C	C	C
	SS	AC	AC	C	C	C	C	C	C	C	C	C	C
1"	S	C	C	C	C	C	C	C	C	C	C	C	C
	SS	C	C	C	C	C	C	C	C	C	C	C	C
1-1/4"	S	C	C	C	C	C	C						
	SS	C	C	C	C	C							
1-1/2"	S	C	C	C	C	C							
	SS	C	C										

***Codes:**

- A Model 412 – Tubing (1/4" thru 3/4") – Worm & Gear – Rated Torque 2,700 in. lbs.
- C Model 424 – Tubing (1/4" thru 1-1/2") – Worm & Gear – Rated Torque 11,000 in. lbs.

Tube O.D. (mm)	Material	Tube Wall Thickness (mm)					
		1.5	2	2.5	3	3.5	4
		Bender Code*					
18	S	AC	AC	AC	AC	C	C
	SS	C	C	C	C	C	C
20	S	AC	AC	AC	C	C	C
	SS	C	C	C	C	C	C
22	S	C	C	C	C	C	C
	SS	C	C	C	C	C	
25	S	C	C	C	C	C	
	SS	C	C	C	C		
28	S	C	C	C	C		
	SS	C	C				
30	S	C	C	C	C		
	SS	C	C				
32	S	C	C				
	SS	C					
38	S	C					
	SS						

*Codes: A Model 412 — Tubing (6mm through 20mm)
C Model 424 — Tubing (6mm through 38mm)

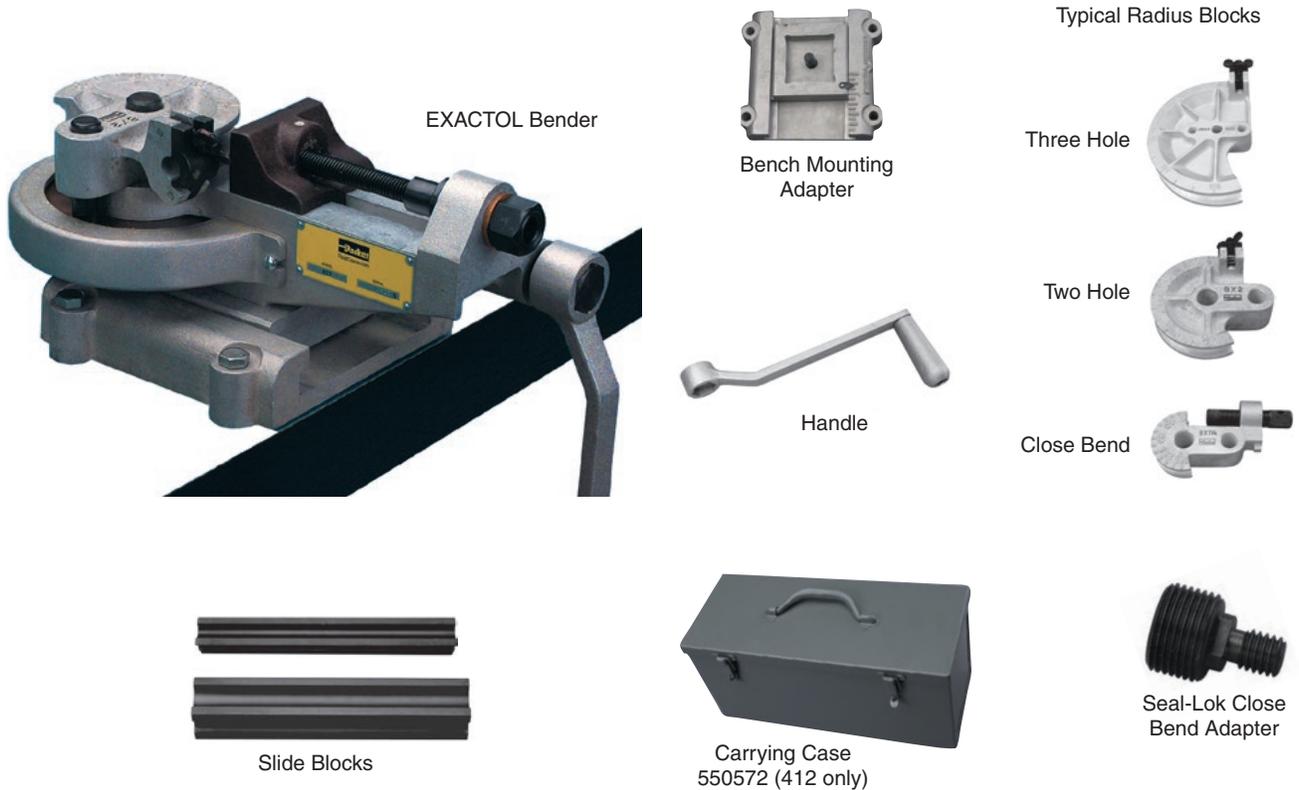
Specifications

Description	Model 412	Model 424
Min. tube size	1/4"	1/4"
Max. tube size	3/4"	1-1/2"
Max. bend	180°	180°
Max. radius	3"	5"
Gear ratio	60:1	60:1
Weight (base unit)	14 lbs.	40 lbs.
Finish	Natural Aluminum	Natural Aluminum

Notes:

1. All benders are capable of bending 1/2" O.D. and under fully annealed steel and stainless steel tubing with no limit on wall thickness.
2. All benders are capable of bending soft aluminum and copper tubing to the full range of each bender type capacity with no limit on wall thickness.
3. For hard copper and high strength aluminum use the tabulations shown for stainless steel. Observe that very hard materials may not be ductile enough to bend without fracture.

Bender Parts and Accessories



Slide Block	
Inch Sizes	Part #
4, 5, 6, 8, 10, 12	550585
14, 16, 18, 20	621045
24	870150
Metric Sizes	Part #
6, 8, 10, 12, 14mm	820091
15, 16, 18, 20mm	820092
22, 25, 28, 30mm	820093
38mm	870150

EXACTOL Bender (with Handle and Tie Bar)		
Model #	Tie Bar	Part #
412	N/A	560569
424	Included	621044*

Bench Mounting Adapter	
Model #	Part #
412	550570
424	631156

Seal-Lok Close Bend Adapter		
Tube O.D. (in.)	Threaded Pin Part No.	Seal-Lok Adapter Part No.
1/2	930420-8	930421-8
5/8	930420-10	930421-10
3/4	930420-12	930421-12
1	930420-16	930421-16
1-1/4	930420-20	930421-20
1-1/2	930420-24	930421-24

*Previously Model #420. Part number 621044 has been upgraded in capacity to support bending of 1 1/2" tubing.

Bender Construction

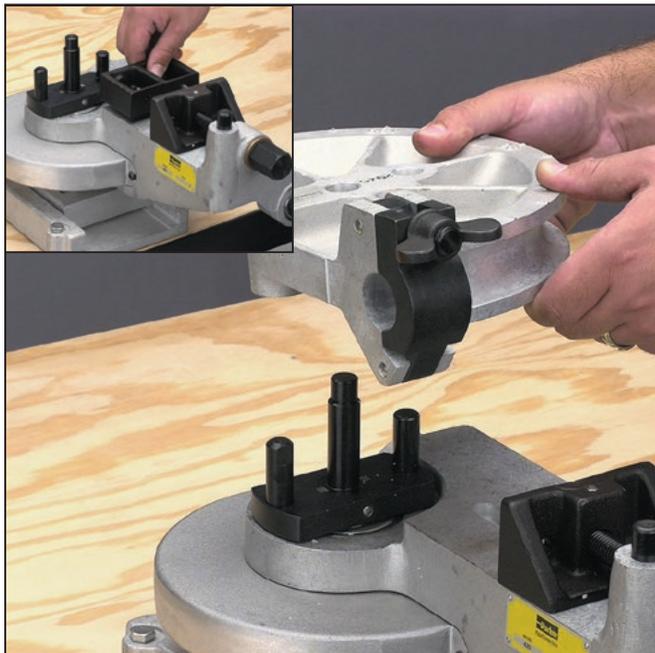
Each bender consists of a cast aluminum frame and base, with a manual crank-operated steel worm gear mechanism. A 60:1 ratio enables the operator to make bends up to 180° in one continuous smooth operation without strain or fatigue. Center drive shaft and worm gear shaft are supported with pre-lubricated ball bear-

ings. The worm gear has a ball-type thrust bearing, and is completely enclosed for safety and protection from external damage. The main base of the benders has a square base for clamping in a vise or each bender can also be mounted in an adapter unit and fastened to a workbench.

Radius Die Blocks

Radius die blocks can be furnished from stock in 34 sizes for standard bends ranging from 9/16" to 5" radii, as given in the chart below. There are six small radius die blocks, eleven large radius die blocks, three sizes of close bend radius blocks, and fourteen metric sizes of radius blocks (shown in chart below).

Each radius die block has a graduated marking at intervals of 15° to indicate the degree of bend. Each radius die block also has an integral clamp arrangement for easy, quick, positive clamping of the tube, except for the close bend radius blocks. Radius blocks are marked with the tube size and radius for identification.



Three Hole Blocks — To use the larger three hole radius blocks, just install a third pin in the drive plate, if necessary, then remove the slide block vise adapter by removing the two Allen-headed screws in back of plate to provide space for the larger radius blocks.



Close Bend Radius Blocks — The close bend radius blocks have a threaded pin which threads directly into both Triple-Lok and Ferulok tube fitting nuts. With the use of Parker's Seal-Lok close bend adapter, one can also use Seal-Lok fittings with a close bend radius block. They permit an operator to make his first bend very close to the end of the tube.

Radius Block Charts

Size	Tube O.D.		Small Radius Block			Large Radius Block			Radius Block Close Bend		
	(in.)	(mm)	Part No.	Radius*		Part No.	Radius*		Part No.	Radius*	
				(in.)	(mm)		(in.)	(mm)		(in.)	(mm)
4	1/4	6.4	550573	9/16	14.3	550579	3/4	18.5	—	—	—
5	5/16	7.9	550574	11/16	17.5	550580	1	25.4	—	—	—
6	3/8	9.5	550575	15/16	23.8	550581	1-1/4	31.8	—	—	—
8	1/2	12.7	550576	1-1/4	31.8	550582	2	50.8	590535	1-1/4	31.8
10	5/8	15.9	550577	1-1/2	37.5	550583	2-1/2	63.5	590535	1-1/2	38.1
12	3/4	19.0	550578	1-3/4	43.8	550584	3	76.2	590537	1-3/4	44.5
14	7/8	22.2	—	—	—	621046	3-1/2	88.9	—	—	—
16	1	25.4	—	—	—	621047	4	101.6	—	—	—
18	1-1/8	28.6	—	—	—	621048	4-1/2	114.3	—	—	—
20	1-1/4	31.8	—	—	—	621049	5	127.0	—	—	—
24	1-1/2	38.0	—	—	—	870149	5	127.0	—	—	—

*Radius to tube centerline.

Tube O.D. (mm)	Bend Radius (mm)	Part No.
6	14	820090-6mm
8	18	820090-8mm
10	24	820090-10mm
12	32	820090-12mm
14	38	820090-14mm
15	38	820090-15mm
16	38	820090-16mm
18	44	820090-18mm
20	44	820090-20mm
22	89	820090-22mm
25	102	820090-25mm
28	102	820090-28mm
30	127	820090-30mm
38	127	870149

Step 1: Mounting Tube Bender

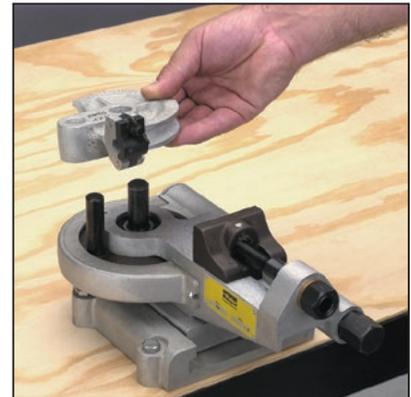
The tube bender should be mounted in a bench vise (or in an adapter assembly fastened to a bench). Be sure the bender is tightly clamped or securely bolted down.



Step 2: Select Radius Block

Select the proper radius block according to the chart on page 3. Radius blocks, size 1/4" through 3/4" are made to drive with two pins; radius blocks, 7/8" through 1-1/2", are made to drive with three pins. After selecting the proper size radius block, remove or add one drive pin in the drive plate to correspond with the radius block.

Mount the selected radius block on the center post and drive post. Position the radius block so the 0° mark is toward the vise face and handle end of bender. Radius blocks are accurately milled and bored to slip easily onto posts. Light lubrication of the posts will aid assembly. When handling radius blocks, as well as the slide block, care should be taken to avoid nicking the grooved surfaces.



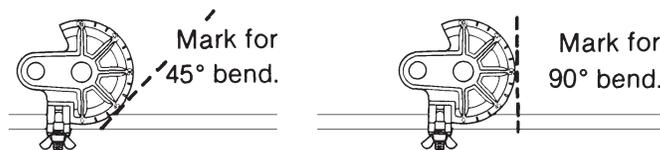
Step 3: Mark Tube

The first bend is easy. Simply measure from the end of the tube to the desired length of the centerline of the first bend. The tubing should be positioned in the bender so that the end measured from (or "measurement end") is to the left as you face the bender.



Step 4: Clamp Tube

Position the tube in the "opened" tube clamping device of the radius block so that the mark is tangent to the desired degree mark on the radius block (see diagram).



On long lengths of tubing, support is recommended to prevent sag and to help keep tubing aligned with the radius block centerline.

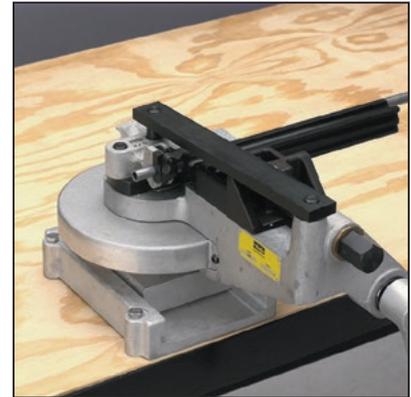


Step 5: Select Slide Block Groove

Select the proper groove of the slide block for the outside diameter of the tube (sizes are marked on the end of the slide block) and position the slide block accordingly, against the slide block vise face with the end of the block adjacent to the tube clamp of the radius block. Lubricate the slide block to facilitate sliding. Then, advance the slide block by means of the telescopic adjustment screw, to rest snugly against the tube, but not with so much pressure as to prevent the block from sliding easily along the slide block vise face.

**Step 6: Using the Tie Bar (if required)**

When it becomes difficult to hold distortion of the tube within 5% because of deflection of the bender, place the tie bar over the center post and the dowel pin. Always use the tie bar with heavy wall tubing — sizes 7/8" or above.

**Step 7: Bend the Tube**

Tube bending is accomplished with ease by means of the crank handle operating the mechanism through 60:1 ratio worm gear. As the bend is being made, the slide block travels with the tube and bears lightly against the radius block to form a true round die enclosing the tube, providing a smooth, full cross-section bend. The angle of the bend is indicated by the marks on the radius block. At the completion of bend the desired degree mark will be in line with the left side of the bender.

Step 8: After Bending the Tube

First, remove the tie bar, if in use. Next, retract the slide block vise and remove the slide block.

**Step 9: Completed Bent Tube**

Loosen the wing nut on the clamp, open, pull the tube out from the radius block and lift up. Your tubing is smoothly bent, without flattening or cracking.

To reset the tube bender, turn the worm wheel shaft counterclockwise to disengage. Turn the radius block back until the 0° mark is at its original starting point. The bender is then ready for inserting the next tube. Then turn the worm wheel shaft in clockwise direction to re-engage the gear for the start of the next bend.



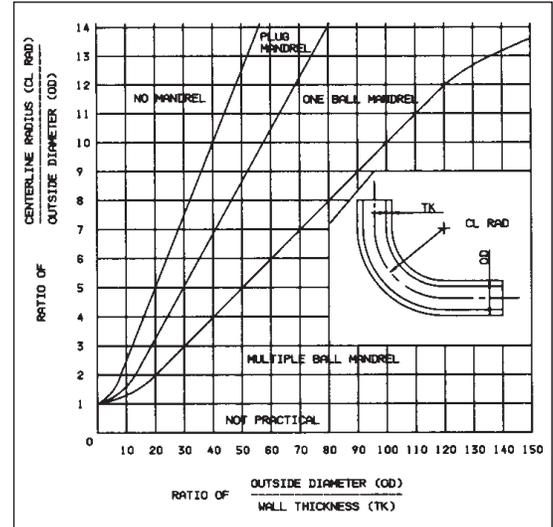
Bends from 90° to 180° — The 400 Series Tube Benders bend tubing up to 180° with ease. The procedure for bends over 90° is the same as for bends to 90°. See Step 4.

Instructions for Thin Wall Tube Bending with Mandrel Equipment

When bending thin wall tube it may be necessary to insert a mandrel into the tube to prevent excessive distortion or flattening. To accomplish such bending, a Mandrel, Mandrel Rod, and a Mandrel Rod Stop Assembly are required. The Rod Stop Assembly holds the end of the Mandrel Rod in proper alignment with the tube while the Mandrel, which is threaded onto the other end of the Mandrel Rod, supports the tube on its I.D., thus preventing tube kinking or flattening during bending.

Mandrel Equipment

Description	Part No.
Mandrel Rod Stop Assembly	550571
Stop Assembly Adapter Riser (424 only)	631154
Mandrel Rod Stop	820029



Mandrel Graph Chart

Mandrels (Plug Type)

Size	Tube O.D. (in.)	Part No.	Wall Thickness (in.)				
			—	0.035	0.042	0.049	0.065
6	3/8	924417	—	0.035	0.042	—	—
8	1/2	924417	—	0.035	0.042	0.049	—
10	5/8	924417	0.035	0.042	0.049	0.058	0.065
12	3/4	924417	0.035	0.042	0.049	0.058	0.065
14	7/8	924417	0.035	0.042	0.049	0.058	0.065
16	1	924417	0.035	0.042	0.049	0.058	0.065
18	1 1/8	924417	—	0.049	0.058	0.065	—
20	1 1/4	924417	—	0.049	0.058	0.065	—
24	1 1/2	924417	0.049	0.058	0.065	0.083	—

To order mandrels, specify tube O.D. and wall thickness.

Example: 924417-12X058

Mandrel Rod Specifications & Data

Mandrel Rod Dia. (in.)	Tube I.D. (in.)	Part No.	Mandrel Type
1/4	0.283 to 0.362	520506	solid
5/16	0.363 to 0.484	520507	solid
13/32	0.485 to 1.489	520508	solid

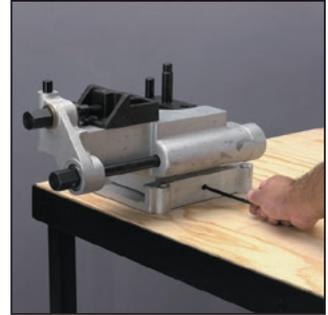


Mandrel

To order mandrel rods, specify mandrel rod size and mandrel type.

Step 1: Mount Bender in Adapter Assembly

For mandrel bending, it is necessary to install the bender in a bench mounting adapter assembly. Locate the adapter assembly front mounting holes about 3" from the front edge of the bench, with T slot front to back and scale on the right. Secure the bender in the adapter assembly by tightening the flat head screws in the bottom of the adapter slide. Then place the bender in the mounting assembly with the axis of its drive handle shaft parallel with the T slot. This places the handle end of the bender towards the operator with the adapter scale to the right. (The adapter slide and scale will be used later to align the bender with the mandrel).



Step 2: Install Mandrel Rod Stop Assembly

Draw a centerline for the mandrel rod stop assembly and height adapter to the right of the reference mark (A) on the adapter assembly. Position the rod-stop assembly and height adapter on this line with the single mounting hole nearest the bender.



Step 3: Select Radius Block Mandrel and Rod

Select the proper radius block according to the chart as described in Step 2 on page 4. Select the Mandrel according to the outside diameter and wall thickness of the tubing. The selected Mandrel is screwed onto one end of the mandrel rod. The other end of the mandrel rod is screwed onto the adapter and then into the rod stop assembly.



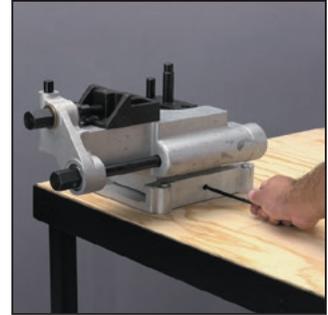
Step 4: Adjust Mandrel

For average bending, the mandrel should be adjusted so that the scribed line on its circumference is 5/8" behind the 0 mark on the radius block. Make this adjustment by turning locknuts on the mandrel rod stop assembly. The mandrel may be moved forward slightly to produce a more nearly perfect round cross-section of the bent tube, or it may be moved slightly backward to ease the bending effort. However, extremes in either direction may cause wrinkling, breaking, or flattening of the tube.



Step 5: Adjust Adapter Slide

Loosen the Allen head screw in slide adapter base and move the bender to adjust for the radius block in use. Position the slide indicator pointer to the radius of the radius block being used, in order to properly center the radius block with respect to the tube and mandrel rod. Then tighten the adapter slide screw with the Allen wrench.



Step 6: Mark Tube

Step 7: Clamp Tube

Step 8: Select Slide Block Groove

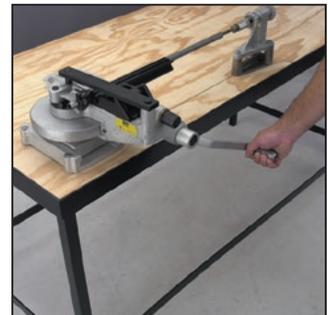
Step 9: Using the Tie Bar (if required)



These four steps are the same as Steps 3, 4, 5 and 6 shown on pages 4-5.

Step 10: Bend the Tube

Mandrel tube bending is easily accomplished by means of the crank handle operating the mechanism through the 60:1 ratio worm gear. As the bend is being made, the slide block travels with the tube and bears lightly against the radius block to form a true round bend enclosing the tube, providing a smooth, full cross-section bend.



Step 11: After Bending Tube

At the completion of the bend, remove the tie bar, retract the slide block vise and unscrew the wing nut on the radius block clamp. Then, to remove the tube, slide it out to the left, back along the axis of the mandrel assembly. Loosen the mandrel assembly if necessary to facilitate tube removal.

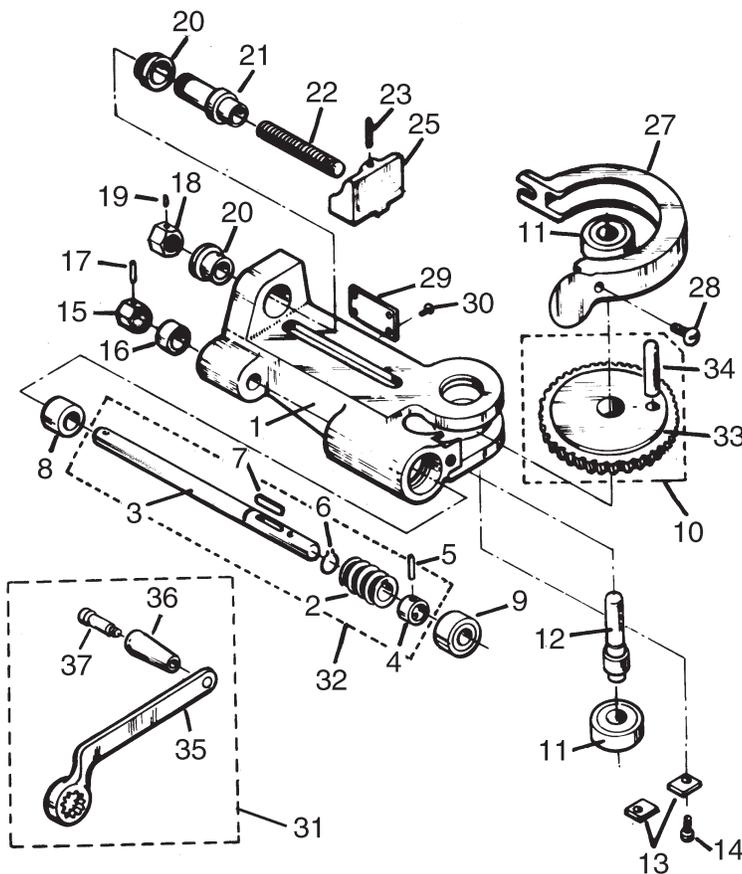


Model 412 Tube Bender/Maintenance and Parts List

Bender Maintenance

All parts should be kept clean and free from dirt and grit. Slide block and radius blocks should be handled carefully to avoid damaging the smooth grooved surfaces. Presence of nicks, burrs, pieces of dirt or chips may mar the surface of the tube and thereby weaken it.

All threaded parts should be cleaned and slightly greased occasionally to keep them in good working condition. This equipment will operate efficiently for a long period of time and will bend to exact tolerances repeatedly if these precautions are heeded.



Model 412 Parts List (Part # 560569)

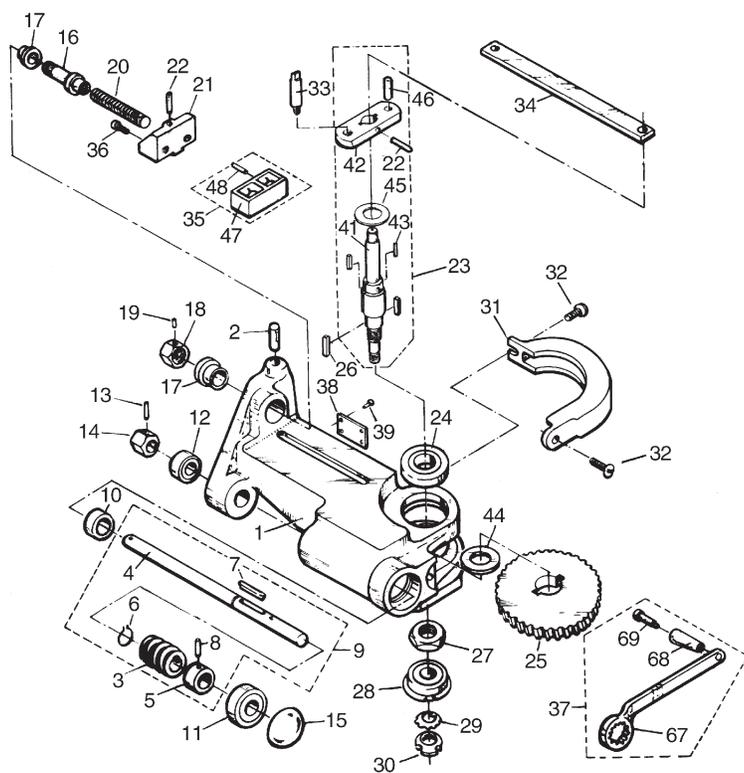
Item #	Description	Part No.	No. Req'd
1	Body	13001	1
2	Worm	550602	1
3	Shaft	550603	1
4	Collar	550604	1
5	Pin, 3/16 x 3/4 Driv-lok, C	48 x 238 Drive Pin	1
6	Snap Ring, Truarc #5100-75	56 x 207 Snap Ring	1
7	Key, 1/8 sq. x 1" long	13008	2
8	Bearing, "Nice" 1207-22	550606	1
9	Bearing, "Nice" 400- 26	550608	1
10	Worm Gear and Drive Post Assembly	550587	1
11	Bearing, N.D. 99504	550592	2
12	Center Post	13016	1
13	Bearing Stop	550615	2
14	Screw, 10-32 x 1/2 rd. Head	13023	2
15	Worm Nut	550610	1
16	Bearing, "Nice" 603-1/4	550607	1
17	Pin	550611	1
18	Clamp Nut	550598	1
19	Pin, 3/16 x 1 Driv-lok, C	48 x 240 Rd Hd Screw	1
20	Bearing, "Oilite" F-1025-6	550597	2
21	Screw Pilot	550596	1
22	Screw, Clamp	550599	1
23	Retaining Screw	550594	1
25	Slide Shoe	550593	1
27	Gear Guard	550590	1
28	Screw, 8/32 x 3/8 Rd. Hd.	13048	2
29	Nameplate	13049	1
30	Drive Screw, P.K. type "U" #0 x 1/8	13050	4
31	Crank Handle Subassembly	550612	1
32	Worm & Shaft Subassembly (2-7)	550601	1
33	Worm Gear	550587	1
34	Dowel Pin	13021	1
35	Crank Handle	13502	1
36	Knob	13054	1
37	Shoulder Screw	13055	1

Model 424 Tube Bender/Maintenance and Parts List

Bender Maintenance

All parts should be kept clean and free from dirt and grit. Slide block and radius blocks should be handled carefully to avoid damaging the smooth grooved surfaces. Presence of nicks, burrs, pieces of dirt or chips may mar the surface of the tube and thereby weaken it.

All threaded parts should be cleaned and slightly greased occasionally to keep them in good working condition. This equipment will operate efficiently for a long period of time and will bend to exact tolerances repeatedly if these precautions are heeded.



Model 424 Parts List (Part # 621044)

Item #	Description	Part No.	No. Req'd
1	Body	621062	1
2	Dowel Pin, 5/8 x 1-1/2	13102	1
3	Worm	621067	1
4	Shaft	621068	1
5	Collar	621069	1
6	Snap Ring Truarc #5100-75	56 x 212	1
7	Key, 3/16 sq. x 1-5/8 long	13110	1
8	Pin, Driv-lok Type A 1/4 dia. x 1	13111	1
9	Subassembly Work & Shaft	621066	1
10	Bearing, #D2620	13113	1
11	Bearing, #3038DS	13114	1
12	Bearing, #607	13115	1
13	Pin, Driv-lok Type E 1/4 dia. x 1-1/4	13117	1
14	Nut, Drive	621071	1
15	Plug, Bearing Retainer	621072	1
16	Screw, Pilot Adjusting	621073	1
17	Bearing, Flange, #FF-1102-6 "Oilite"	13123	2
18	Nut, Vise Jaw	621074	1
19	Pin, Vise Jaw Nut	621075	1
20	Screw, Vise Jaw Adjusting	621076	1
21	Vise Jaw	621077	1
22	Pin, Vise Jaw Adjusting Screw	621078	1
23	Center Post Subassembly	621079	1
24	Bearing, #55507 N.D. Double Row Ball	13136	1
25	Gear, Worm	621080	1
26	Key, Worm Gear 1/4 sq. x 19/32 long 22x20	13160	2
27	Nut, Worm Gear Retaining	621081	1
28	Bearing, #499604 N.D. Single Row Ball	13141	1
29	Lockwasher, #W-04	13142	1
30	Locknut, #N-04	13143	1
31	Guard, gear	621082	1
32	Screw, 1/4-28 x 5/8 long Round Hd. Mach. 4 x 126	13367	1
33	Pin, Drive	621083	2
34	Tie, Bar	621084	1
35	Adapter & Pin Subassembly, Slide Block	621085	1
36	Screw, 5/10-18 x 3/4 Soc. Hd. Cap	13152	1
37	Crank-handle Subassembly	621063	1
38	Nameplate	550609	1
39	Screw, #0 x 1/8 Type "U" P.K.	13050	4
41	Center Post	13157	1
42	Drive Plate	13159	1
43	Key, 1/4 sq. x 19/32	13160	1
44	Washer	621070	1
45	Washer	621070	1
46	Dowel Pin 5/8	13163	1
47	Vise Jaw Adapter	13165	1
48	Dowel Pin 1/4	13166	1
67	Crank Handle	13168	1
68	Knob	13054	1
69	Screw	13055	1

Model 412 Bender Kit

Part No.	Description
560569	412 Bender Body
550585	Slide Block for Sizes 4-6-8-10-12
550579	Size 4 Radius Block
550581	Size 6 Radius Block
550582	Size 8 Radius Block
550583	Size 10 Radius Block
550584	Size 12 Radius Block
—	Carrying case designed specifically for the 412 Kit.



Model 424 Bender Kit

Part No.	Description
621044	424 Bender Body
550585	Slide Block for Sizes 4-6-8-10-12
621045	Slide Block for Sizes 14-16-18-20
870150	Slide Block for Size 24
550579	Size 4 Radius Block
550581	Size 6 Radius Block
550582	Size 8 Radius Block
550583	Size 10 Radius Block
550584	Size 12 Radius Block
621047	Size 16 Radius Block
621049	Size 20 Radius Block
870149	Size 24 Radius Block
—	No carrying case available.



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7. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

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9. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

10. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest.

11. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney

fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

12. Cancellations and Changes. Buyer may not cancel or modify or cancel any order for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability.

13. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

14. Force Majeure. Seller does not assume the risk and is not liable for delay or failure to perform any of Seller's obligations by reason of events or circumstances beyond its reasonable control (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. Waiver and Severability. Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. Termination. Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a) breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or one if filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

17. Governing Law. This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

18. Indemnity for Infringement of Intellectual Property Rights. Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

19. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.

20. Compliance with Laws. Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act") and the U.S. Food Drug and Cosmetic Act ("FDCA"), each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U. K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.

05/14



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