



# Hydraulic Tube Bender

## Series HTB & HTB-A

### Operation and Maintenance Manual

Catalog: 02-0217ME

October 2013

aerospace  
climate control  
electromechanical  
filtration  
fluid & gas handling  
hydraulics  
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ENGINEERING YOUR SUCCESS.

**Rugged bending frame** is lightweight aircraft quality aluminum alloy, designed specifically for bending shoes below.



**Precision one-piece bending shoes** are permanent mold, heat treated aircraft quality aluminum alloy, designed to produce correct radii in high pressure tubing.

**One-piece shoe locking pin** locks bending shoe securely, pulls out for quick release.

**Standard: Single-stage hydraulic hand pump** is simple and easy to operate to 10,000 psi on heavy wall tubing.

**Ram retractor valve** relieves system pressure after bending. Spring loaded retracts for easy removal of tubing.

**Hydraulic Cylinder** threads into bending frame. Spring-loaded ram retracts for removal of tubing.

**A B** **Pivot pins** and **Pivot Pin Sleeves** are used to select different tubing sizes.

## Section 1.0 General Information

Parker Autoclave Engineers hydraulic tube bending system is designed expressly for Parker Autoclave Medium and High Pressure tubing of stainless steel and other materials. Used as intended, this equipment will provide rugged reliability and long service life in producing the correct safe bending radius consistent with the pressure handling requirements of the tubing.

This system provides fast accurate and reliable bending with the correct radii for O.D. tubing sizes from 1/4" through 1". Only one setup is required.

The Tube Bender is complete with pump, cylinder, frame and bending shoes, self contained in a portable case with a total weight of 57 lbs. (25.90 kg).

## Section 2.0 Assembly and Operation

*Be sure to read the Hydraulic Pump and Cylinder instruction sheets before operating the system.*

- 2.1 Thread cylinder into cylinder block on bending frame.
- 2.2 Connect pump to cylinder by means of hose provided.
- 2.3 Thread ram saddle into cylinder.
- 2.4 Attach correct sized bending shoe onto ram saddle and secure with shoe lock pin.
- 2.5 Insert pivot pin assemblies into the **correct matching bending frame holes** for the tubing you intend to bend.

- 2.6 Position tubing onto the shoe, allowing sufficient length of tubing to contact both pivot pins (see image below). See Section 3 for minimum required tube length.
- 2.7 Activate hydraulic pump until tubing is bent to the desired angle, up to 90°. (Bend a few degrees over the desired finished angle to allow for the normal springback of the tubing).
- 2.8 To remove tubing, open the ram retractor valve on the manual pump. (On systems equipped with air-operated pump, press the "release" end of the pedal). Ram retracts for easy removal of tubing.

### Caution

*This system is NOT intended or recommended for bending carbon steel pipe, conduit or the like. These bending shoes are permanent mold, heat treated aircraft quality aluminum alloy, designed specifically for use with 1/4", 3/8", 9/16", 3/4" and 1" O.D. stainless steel or other quality tubing.*

*Pipe or other O.D.'s may create unfavorable stresses on the bending shoes.*

*Before bending, be sure BOTH PIVOT PINS are in the correct and matching frame position. Otherwise, unequal stresses may occur on the bending shoe.*

*Use the correct hydraulic fluid. The model HTB pump and cylinder require use of EnerPac#HF-101 hydraulic oil.*



## Section 3.0 Minimum Bend (Mandrel) Radius

Shoe* Catalog Number	Tube Size inches (mm)		++ Rated Pressure (bar)	++ Minimum Bend Inside Radius Inches (mm)	Minimum Length Required 90° Bend Inches (mm)
	Outside Diameter	Inside Diameter			
201A-6016	9/16 (14.29)	0.359 (9.12)	15,000 (1034)	2.62 (66.5)	14 (35.6)
201A-6018	3/4 (19.05)	0.516 (13.11)	15,000 (1034)	3.50 (88.9)	16 (40.6)
201A-6020	1 (25.4)	0.688 (17.48)	15,000 (1034)	4.62 (117.3)	22 (55.8)
201A-6014+	1/4 (25.4)	0.109 (2.77)	20,000 (1379)	1.25+ (31.8)	8 (20.3)
201A-6014	3/8 (9.53)	0.203 (5.16)	20,000 (1379)	1.75 (44.5)	8 (20.3)
201A-6016	9/16 (14.29)	0.312 (7.92)	20,000 (1379)	2.62 (66.5)	14 (35.6)
201A-6018	3/4 (19.05)	0.438 (11.13)	20,000 (1379)	3.50 (88.9)	16 (40.6)
201A-6020	1 (25.4)	0.562 (14.27)	20,000 (1379)	4.62 (117.3)	22 (55.8)
201A-6020	1 (25.4)	0.438 (11.13)	30,000 (2068)	4.62 (117.3)	22 (55.8)
201A-6014+	1/4 (6.35)	0.083 (2.10)	60,000 (4137)	1.25 (31.8)	8 (20.3)
201A-6014	3/8 (9.53)	0.125 (3.18)	60,000 (4137)	1.75 (44.5)	8 (20.3)
201A-6016	9/16 (14.29)	0.250 (6.35)	40,000 (2758)	2.62 (66.5)	14 (35.6)
201A-6016	9/16 (14.29)	0.188 (4.78)	60,000 (4137)	2.62 (66.5)	14 (35.6)
NA **	5/16 (7.94)	0.062 (1.57)	150,000 (10342)	6.00 (152.4)	8 (20.3)

Annealed Parker Autoclave Engineers pressure tubing may also be bent on HTB tube bender using bending shoe sizes specified above.

\*HTB bending shoes are constructed of heat-treated aluminum alloy and designed specifically for use with Autoclave Engineers' heavy wall stainless tubing. They are not intended for bending such components as commercial pipe. Because of diameter differences, such misuse could fracture the bending shoe.

\*\* Information on bending 150,000 psi (10342 bar) tubing is included here for reference only. This tubing should not be bent on HTB hydraulic tube bender because of the 6" required minimum radius.

† Value shown is minimum bend radius of the tubing; bending shoe furnished (201A-6014) will bend tubing to 1.75" (44.5).

†† Pressure rating of the bent tube will be reduced. Consult the Technical Application section for pressure rating at various bend radii.

All dimensions for reference only and subject to change.

## Section 4.0 Parts List

Hydraulic Tube Bender (manual hydraulic pump) Complete with case .....	Model HTB
Hydraulic Tube Bender (air operated hydraulic pump) Complete with case .....	Model HTB-A
Portable Case .....	No. P-10011
Bending Frame (assembly with top and bottom plates, cylinder block, four cap screw assemblies and two frame feet) .....	No. 3010-6249
Hydraulic Cylinder .....	No. P-1892
Hydraulic Pump - Manual (standard) .....	No. P-1893
Hydraulic Pump - Air Operated (optional) .....	No. P-1948
Hydraulic Hose	
Bending Shoe:	
1/4" and 3/8" O.D. ....	No. 201A-6014
1/2" and 9/16" O.D. ....	No. 201A-6016
3/4" O.D. ....	No. 201A-6018
1" O.D. ....	No. 201A-6020
Ram Saddle .....	No. 101B-0313
Shoe Lock Pin Assembly.....	No. 101B-0314
Pivot Pin Assembly (2 required per frame) .....	No. 201A-6023
Pivot Pin Sleeve (2 required per frame) .....	No. 101B-0315

## Section 5.0 Air-Operated Hydraulic Pump Option

Air-operated hydraulic pump option can be used in place of standard hand pump. (Add "-A" to order number). Operating pressure 0-10,000 psi (0-690 bar). Required air pressure 30 psi (2.1 bar) minimum, 120 psi (8.3 bar) maximum. Reservoir capacity 24 cu.in. (393cm<sup>3</sup>). Available with optional hydraulic pressure gauge and gauge adapter. A lubricator/air separator is recommended for air operated units.



### WARNING

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**Instrumentation Products Division**  
Autoclave Engineers Operation  
8325 Hessinger Drive  
Erie, Pennsylvania 16509-4679 USA  
PH: 814-860-5700 FAX: 814-860-5811  
www.autoclave.com

Parker Hannifin Manufacturing Ltd.  
**Instrumentation Products Division, Europe**  
Industrial Estate Whitemill  
Wexford, Republic of Ireland  
PH: 353 53 914 1566  
FAX: 353 53 914 1582