Models HPST2375 & HAT2375 Rotary Draw Pipe Benders

INSTALLATION AND OPERATION MANUAL



Model HPST2375



Model HAT2375

Part Number: M-ED1-62
Edition 1 06/2023
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Introduction

Company Profile

Edwards Manufacturing Company manufactures a full line of high-quality, low-maintenance hydraulic ironworking machines, associated tooling, and accessories that are used in the steel fabrication industry. With proper operation, care, and maintenance, your Edwards Ironworker or Hydraulic Accessory Tool will provide years of safe, trouble-free service. Please take time to study this Operator's Manual carefully to fully understand this machine and Hydraulic Accessory Tool safety procedures, set-up, operation, care, maintenance, troubleshooting, and warranty coverage prior to putting the machine into production. Any questions not answered within this manual can be directed to your local Edwards Ironworker dealer or factory representative.

Contact the Factory:
Edwards Manufacturing Company
1107 Sykes Street
Albert Lea, MN 56007
Phone: 507.373.8206
Fax: 507.373.9433
www.edwardsironworkers.com

General Questions:
sales@edwardsmfg.us

Service Questions:
service@edwardsmfg.us

Machine Identification

Your Edwards Model HPST2375 or HAT2375 Rotary Draw Pipe Bender is serialized for quality control, production traceability, and warranty enforcement. When ordering parts or filing a warranty claim, please refer to the aluminum identification tag with engraved serial number, electrical, and power specifications.

Model Number:	_____
Serial Number:	_____
Date Purchased:	_____
Where Purchased:	_____

Warranty

Edwards Manufacturing Company will, within one (1) year of date of original purchase (proof of purchase required), replace F.O.B. the factory, any goods, excluding punches, dies and shear blades, which are defective in materials or workmanship provided that the buyer return the defective goods, freight pre-paid, to the seller, which shall be the buyer's sole and exclusive remedy for the defective goods. Hydraulic components are subject to their manufacturer's warranty.

Edwards Manufacturing Company will, within thirty (30) days of date of original purchase (proof of purchase required), replace F.O.B. the factory, any punches, dies and/or shear blades, which are defective in materials or workmanship.

This warranty does not apply to machines and/or components which have been altered, changed, or modified in any way, or subjected to abusive and abnormal use, inadequate maintenance and lubrication, or subjected to use beyond seller recommended capacities and specifications. Edwards Manufacturing Company shall not be liable for labor costs expended on such goods or consequential damages. Edwards Manufacturing Company shall not be liable to the purchaser or any other person for loss, down-time, or damage directly or indirectly arising from the use of the goods or from any other cause. No officer, employee, or agent of Edwards Manufacturing Company is authorized to make any oral representations or warranty of fitness or to waive any of the foregoing terms and none shall be binding on Edwards Manufacturing Company.

Operator and Supervisor Information

READ THIS MANUAL BEFORE OPERATING MACHINERY. Operating machinery before ready and understanding the contents of this manual greatly increases the risk of injury.

This manual describes 'best practices' in handling, installing, operating, and maintaining your machine. The contents of this manual is subject to change without notice due to improvements in the machinery or changes in National or International standards.

All rights reserved. Reproduction of this manual in any form, in whole or in part, is not permitted without the written consent of Edwards Manufacturing Company.

Keep this manual close to the machine to allow for easy reference when necessary.

Provide operators with sufficient training and education in the basic functions of the machine prior to machine operation.

Do not allow for operation of the machine by unqualified personnel. Edwards Manufacturing Company is not liable for accidents arising from unskilled, untrained operation.

Do not modify or change the machine without written authorization from Edwards Manufacturing Company. Unauthorized modification to this machine may result in serious operator injury, machine damage, and will void your machine warranty.

Never leave a powered machine unattended. Turn machinery OFF before walking away.

This machine is manufactured for use by able-bodied and able-minded operators only. Never operate machinery when tired or under the influence of drugs or alcohol.

Do not resell, relocate, or export to a destination other than to the original point of sale. Edwards has designed this machine to meet the standards of the original receiving country and is not liable for meeting any governing body or performance standards beyond those of the original receiving country.

Signal Word Definitions

⚠ DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation that, if not avoided, could result in mild to moderate injury and/or property damage.

NOTICE

Indicates information considered important but not hazard related.

Signal Word Panel on Machine

⚠ DANGER

Critical machine safety information is identified on signal word labels. Labels are attached adjacent to the potentially hazardous locations of the machine. Reference the Safety Information in this manual for additional information regarding the potentially hazardous condition identified on the label.

Review ALL labels on the machine, reference the Safety Information and the safety warnings within this manual before operating this machine.

1 Safety Information

⚠DANGER

Read this owner's manual carefully and completely. Improper installation, use, adjustment, servicing, and maintenance of this machine can cause property damage, serious injury, or death.

Safety equipment such as guards, hold-downs, safety glasses, dust masks, and hearing protection can reduce your potential for injury. However, safety equipment will not make up for poor judgment, carelessness, or inattention. Always use common sense and operate this machine with caution and care to lessen the possibility of personal injury. If a procedure feels dangerous, don't try it.

⚠DANGER

ELECTRICAL HAZARD: Dangerous high voltages are present inside the electrical enclosure of this machine. Only qualified, authorized maintenance or service personnel should gain access to the electrical panel. Do not assume the power to be off. Follow proper lockout procedures.

LOCKOUT POWER: Electrical circuits are live. Lockout/tagout upstream power source before any maintenance is performed.

⚠WARNING

CUT/CRUSH HAZARD: Moving parts can cut and crush. Never place your hands, fingers, or any part of your body in the die area of this machine. Be aware of the areas on either side of the dies for crush points created by material movement.

PINCH HAZARD: Keep hands and fingers away from the drive mechanisms, cylinders, ratchets, and other moving parts while operating the machine.

HYDRAULIC FLUID HAZARD: Hydraulic hoses and cylinders are under pressure. Pressurized fluid can pierce skin and cause severe injury. Always wear personal protective equipment when servicing and maintaining this machine.

SAFETY GUARDS: Physical barriers and guards have been designed and installed (where possible) to protect from moving parts that can pinch, cut, and crush. If you must remove a guard for servicing the bender, immediately replace the guard after servicing and prior to restoring power to the machine.

MOVING OBJECTS HAZARD: Always be aware of the swing area in which the material will travel during bending operation. The material will swing with significant force. Beware of pinch points and the force of the material movement, which may cause serious injury.

PROTECT EYES: Wear safety glasses or suitable eye protection when operating or near this machine.

PROTECT HEARING: Prolonged exposure to loud noise can cause hearing impairment or loss. Wear suitable hearing protection such as ear muffs or earplugs to protect against loud noises.

1. **Do not alter or modify this machine. Altering or modifying this machine may cause injury to the operator or others and may damage machine. Altering and modifying this machine will void the machine's warranty.**
2. **Only allow trained and qualified personnel to operate this machine.**
3. **Make sure guards are in place and properly working before operating machine.**
4. **Remove any adjusting tools before operating machine.**
5. **Keep the work area clean. Clutter invites injury.**
6. **Do not overload the machine. Overloading the machine may cause injury from flying parts. Do not exceed the specified machine capacities.**
7. **Material may have burrs and sharp edges. Always chamfer and deburr all sharp edges.**
8. **Do not force the machine. This machine will do a better job more safely if used as intended and within the machine's rated capacity. Do not use unapproved attachments or try to exceed the machine's rated capacity.**
9. **Use the right tool for the job. Do not attempt to force a small tool or attachment to do the work of a large industrial tool. Do not use a tool on a process for which it was not intended.**
10. **Dress appropriately. Do not wear jewelry or loose fitting clothing that can be caught in moving machine parts. Contain long hair and wear protective clothing and steel-toe shoes when operating this machine.**
11. **Do not overreach. Maintain proper footing and balance at all times. Do not reach over or across an operating machine.**
12. **Stay alert. Watch what you are doing and use common sense. Do not operate this machine or any tool when you are tired.**
13. **Check for damaged parts. Before using this machine, carefully check any part that appears to be damaged. Check for alignment and binding of moving parts that may affect proper machine operation.**
14. **Observe work area conditions. Do not use machine in damp or wet locations. Do not expose to rain. Keep work area well-lighted. Do not use this electrically-powered machine in the presence of flammable gases or liquids.**
15. **Keep children away. Never allow children in the work area. Never allow them to handle machines, tools, or extension cords.**
16. **Keep visitors a safe distance from the work area.**
17. **When not in use, store this machine in a dry area to inhibit rust. Keep children away from stored machine.**
18. **Do not operate this machine while under the influence of alcohol or drugs. Read warning labels on prescription drugs. If there is a doubt, do not operate this machine.**
19. **Turn off power and disconnect from power source before checking, cleaning, replacing parts, servicing, repairing, or performing maintenance.**
20. **Be sure all equipment is properly installed and grounded according to national, state, and local codes.**
21. **Inspect power and control cables periodically. Replace if bare wires are exposed or if the cable is damaged in any way. BARE WIRING CAN KILL! Do not touch live electrical components or parts.**
22. **Do not bypass or defeat any safety interlock systems.**

2 Product Overview

The HPST2375 and HAT2375 rotary draw pipe benders have the features and power to expand your fabrication capabilities. With a built-in PowerLink™ System, the HPST2375 rotary draw bender becomes a power source for the complete line of Edwards PowerLink hydraulic tools.

Powered by a 120V, 2HP motor, these dual-cylinder rotary draw-style benders produce up to a 180° bend in one stroke. The open style drop on tooling, adjustable Auto-Stop, and heavy-duty mobile cart ensures these rotary draw benders are simple to use and improves operator productivity. Whether you are bending an ornamental piece or a complete vehicle chassis, these rotary draw benders are the solution.

2.1 KEY FEATURES



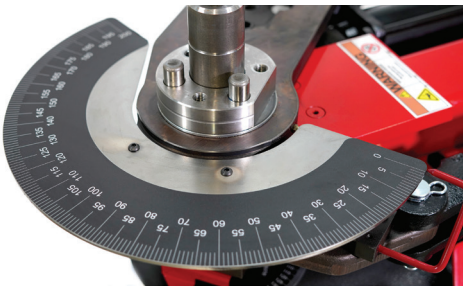
PowerLink source to power other Edwards tools (HPST2375 only)



Quick-connect plug and play operation (HPST2375 only)



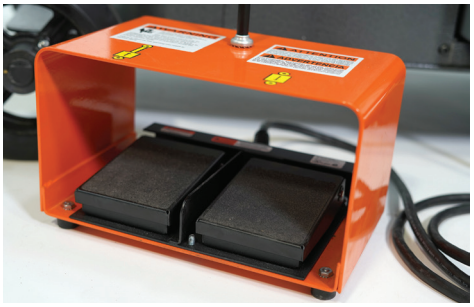
Hand-adjustable Auto-Stop feature



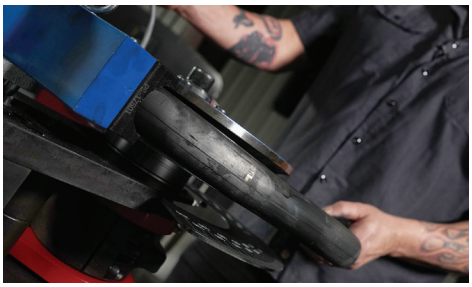
Large, easy to read degree dial for accurate bends



Powerful and efficient design



Electric foot pedal with integrated jog control



180° bend in one stroke

3 Unpacking

Your Edwards machine is shipped complete. Separate all parts from the packing material and check each item carefully. Make certain all items are accounted for before discarding any packing material.

⚠WARNING

SUFFOCATION HAZARD: Immediately discard any plastic bags and packing materials to eliminate choking and suffocation hazards to children and animals.

⚠WARNING

CHECK FOR MISSING PARTS: If any parts are missing, do not place the machine into service until the missing parts are obtained and installed correctly.

3.1 CLEANING

⚠WARNING

Do not use gasoline or other petroleum products to clean the machine. They have low flash points and can exploded or cause fire.

⚠CAUTION

When using cleaning solvents, work in a well-ventilated area. Many cleaning solvents are toxic if inhaled.

Your machine may be shipped with a rustproof waxy coating and/or grease on the exposed unpainted metal surfaces. Fully and completely remove this protective coating using a degreaser or solvent cleaner. DO NOT USE acetone or brake cleaner as they may damage painted surfaces.

Follow manufacturer's label instructions when using any type of cleaning product. After cleaning, wipe unpainted metal surfaces with a light coating of quality oil or grease for protection.

NOTICE

This waxy coating is not a lubricant and will cause the machine to stick and lose performance as the coating continues to dry.

3.2 TRANSPORTING AND LIFTING

⚠CAUTION

Make sure lifting and carrying operations are performed by skilled workers such as a truck operator, crane operator, etc. If lifting the machine with a crane, attach the lifting chain carefully, making sure the machine is well-balanced.

Follow these guidelines when lifting with truck or trolley:

- The lift truck must be able to lift at least 1.5 – 2 times the machines gross weight.
- Make sure the machine is balanced. While transporting, avoid rough or jerky motion, and maintain a safe clearance zone around the transport area.
- Use a fork lift with sufficient lifting capacity and forks that are long enough to reach the complete width of the machine.
- Approaching the machine from the side, lift the machine on the frame taking care that there are no cables or pipes in the area of the forks.
- Move the machine to the required position and lower gently to the floor.

Follow these guidelines when lifting crane or hoist:

- Use lift equipment such as straps, chains, capable of lifting 1.5 to 2 times the weight of the machine.
- Take proper precautions for handling and lifting.
- Check if the load is properly balanced by lifting it an inch or two.
- Lift the machine, avoiding sudden accelerations or quick changes of direction.
- Locate the machine where it is to be installed, then lower slowly until it touches the floor.

4 Installing & Setup

4.1 INSTALLATION LOCATION

IMPORTANT: Consider the following when looking for a suitable location to place the machine:

- Keep in mind the overall weight of the machine and the weight and size of the material being processed.
- Provide needed space for auxiliary stands, work tables, or other machinery.
- Provide proper clearance from walls and other obstacles.
- Maintain an adequate working area around the machine for safety.
- Have the work area well illuminated with proper lighting.
- Keep the floor free of oil and make sure it is not slippery.
- Remove scrap and waste materials regularly, and make sure the work area is free from obstructing objects.
- If long lengths of material are to be fed into the machine, make sure that they will not extend into any aisles.
- FLOOR & LEVELING: This machine distributes a large amount of weight over a small area. Make sure this machine is situated on a level, concrete floor. This ensures the floor is capable of supporting the weight of the machine, work stock, and the operator. If the unit wobbles or rocks once in place, be sure to eliminate by using shims.
- WORKING CLEARANCES: Be aware of the material sizes to be processed. Make sure to allow enough space for you to operate the machine freely.
- POWER SUPPLY PLACEMENT: Locate the power supply closed enough so the power cord does not create a tripping hazard. Observe all electrical codes if installing new circuits and/or outlets.

4.2 SETUP

⚠WARNING

Do not connect the machine to the electrical power supply until the machine is fully assembled and you read and understand this owner's manual.

Follow all local and national codes and electrical guidelines when connecting this machine to the power supply.

Filling Hydraulic Oil Tank

The hydraulic oil is the primary medium for transmitting pressure and also must lubricate the running parts of the pump.

After installation of the machine and before machine startup, bring the oil level up to 90% of capacity. Refer to any labels or marking affixed to the outside of the machine, If none exist, use SHELL BRAND #46 or #68 hydraulic oil or an equivalent with similar specifications. (Based upon location temperature and availability.)

Verify that any cylinder rams are is in the retracted position to prevent overfilling of the tank. Recheck the oil level after the first few hours of operation and again after the first full week of operation.

⚠CAUTION

A shortage of hydraulic oil can cause hydraulic system breakdown and damage to major mechanical parts due to overheating.

Installing Dies

Read through the remainder of the manual and become familiar with how to install dies, settings, and normal operation. See, Section 8.2 *Die Selection and Installation.*

5 Product Identification



Model HPST2375 Shown

Item	Description	Function
A	Forward Foot Pedal	Will operate the machine in the clockwise direction.
B	Reverse Foot Pedal	Will operate the machine in the counterclockwise direction.
C	Bender / PowerLink Switch *	Switch between Bender mode and PowerLink mode.
D	Emergency Stop Button	Depress button to immediately stop the bender action.
E	Push-To-Start Button	Push this button to start the hydraulic pump motor.
F	Power ON/OFF Switch	For turning power on and off to bender.
G	Remote Function Ports *	For connecting to another machine.
H	Auxiliary PowerLink Hookups *	Male and female hydraulic hookups to power other machines.
I	Lower Auto-Stop Bend Angle Scale	A scale plate which can be set to stop the bend at preset degrees.
J	Upper Bend Angle Indicator	Indicates the bend angle the spindle is currently positioned.
K	Upper Bend Angle Scale	A scale plate used to indicate the current position bend angle.
L	Main Spindle and Drive Pins	For supporting and driving the forming die.
M	Quick Release	For pivoting counter die away from bend die to remove material quickly.
N	Hydraulic Cylinders	Supply the bending force to rotate the forming die.
O	Hex Wrench	Used for adjusting and tightening the slide plate.

* Model HPST2375 only

6 Specifications

Maximum Center Line Radius (CLR)	7″-8″ (177.8mm - 203mm)*
Minimum Center Line Radius (CLR)	1/2″ (12.7mm)*
Minimum OD	1/4″ (6.35mm)
Mild Steel Pipe (Schedule 40)	2″ (50.8mm)
Aluminum Pipe (Schedule 40)	2″ (50.8mm)
Stainless Steel Pipe (Schedule 40)	1-1/2″ (38.1mm)
Mild Steel Round Tube (Wall)	2-1/2 ″ (1/8″) (63.5mm [3.175mm])
Aluminum Round Tube (Wall)	2-1/2″ (5/32″) (63.5mm [3.96mm])
Stainless Steel Round Tube (Wall)	2-3/8″ (1/8″) (60.325mm [3.175mm])
Chromolly Round Tube (Wall)	2″ (1/8″) (50.8mm [3.175mm])
Mild Steel Solid Rod	1″ (25.4mm)
Mild Steel Square Tube (Wall)	2″ (1/8″) (50.8mm [3.175mm])
Power Supply	2 HP, 115VAC, 20A, 1PH, 60Hz
Motor	2HP, 120VAC, 18A, 1ph, 60Hz
Sound Level	<70db
Product Dimensions (L x W x H)	55″ x 25.5″ x 45″ (1397 x 648 x 1143mm)
Shipping Dimensions (L x W x H)	60″ x 44″ x 70″ (1524 x 1117 x 1778mm)
Product Weight (Net)	596 lbs. (270kg)
Shipping Weight	696 lbs. (316kg)

* All capacities based on A53 grade A (mild steel) 48,000 psi tensile materials. Heavy wall and high tensile materials may reduce machine capacity.

7 Electrical

⚠WARNING

Make sure the grounding wire (green) is properly connected to avoid electric shock. Do not switch the position of the green grounding wire if any electrical plug wires are switched during hookup.

⚠WARNING

This machine operates on 120V electrical power. Make sure the available electrical power is 120V. Have any new circuits or outlets installed by a certified electrician. Follow all local and national codes and electrical guidelines when connecting this machine to the power supply.

⚠WARNING

Make sure to connect this machine to a properly-grounded electrical outlet. If you are not sure, have a qualified electrician check the receptacle.

7.1 POWER SPECIFICATIONS

Your machine is 115 volts, 60hz alternating current. Before connecting the machine to the power source, make sure the power source is OFF.

Before switching on the power, you must check the voltage and frequency of the power to see if they meet with the requirement, the allowed range for the voltage is ±5%, and for the frequency is ±1%.

Considerations

- Observe local electrical codes when connecting the machine.
- The circuit should be protected with a time delay fuse or circuit breaker with an amperage rating slightly higher than the full load current of machine.
- A separate electrical circuit should be used for your machines. Before connecting the motor to the power line, make sure the switch is in the “OFF” position and be sure that the electric current is of the same characteristics as indicated on the machine.
- All line connections should make good contact. Running on low voltage will damage the motor.
- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This machine is equipped with an electric cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.
- Improper connection of the equipment-grounding conductor can result in risk of electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the equipment-grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the equipment-grounding conductor to a live terminal.
- Check with a qualified electrician or service personnel if the grounding instructions are not completely understood, or if in doubt as to whether the machine is properly grounded.
- Repair or replace damaged or worn cord immediately.

7.2 EXTENSION CORD SAFETY

Extension cord should be in good condition and meet the minimum wire gauge requirements listed below:

AMP Rating	LENGTH 25ft	50ft	100ft
1-12	16 AWG	16 AWG	14 AWG
13-16	14 AWG	12 AWG	12 AWG
17-20	12 AWG	12 AWG	10 AWG
21-30	10 AWG	10 AWG	No

An undersized cord decreases line voltage, causing loss of power and overheating. All cords should use a ground wire and plug pin. Replace any damaged cords immediately.

7.3 POWER CORD CONNECTION

1. Turn the main disconnect switch on the control panel to the OFF position.
2. Unwrap the power cord and route the cord away from the machine toward the power supply. Route the power so it does NOT create a trip hazard.
3. Connect the power cord to the power supply and check that the power cord has not been damaged during installation.
4. When the machine is clear of any obstruction. The main power switch may be turn ON to test the operation.
5. Turn the switch OFF when the machine is not in operation.

8 Operation

⚠CAUTION

Always wear proper eye protection with side shields, safety footwear, and leather gloves to protect from burrs and sharp edges.

⚠CAUTION

Keep hands and fingers clear of the dies and swing arms. Stand to the front of the machine to avoid getting hit with the material during the bending process. When handling large heavy materials, make sure they are properly supported.

8.1 DRY RUNNING MACHINE

Before actually bending, several "dry runs" should be performed. This will remove any trapped air from the cylinders and hoses. Also, this will familiarize you with the controls and functions of the machine. To do this, follow the next steps.

1. Set the Auto-Stop (lower) Degree Dial to 200-degrees (see Section *8.5: Setting the Auto-Stop Position*).
2. With no material in the machine, press the Forward Foot Pedal (see Chapter *5: Product Identification*) until the hydraulic cylinders are fully extend and "deadheads". Then press the reverse foot pedal (see Chapter *5: Product Identification*) until the hydraulic cylinders are fully retracted and "deadhead" in the home position. The overload relief valve will make a squealing noise when the cylinders "deadhead"; this is normal and will not hurt the function of the machine.
3. Repeat this sequence as many times as necessary (usually 5-6 full cycles) to remove any trapped air and to synchronize the cylinders.
4. The foot pedals have function to provide forward and reverse operation. The pedals are spring-release and must be held in the forward or reverse positions to move the cylinders.

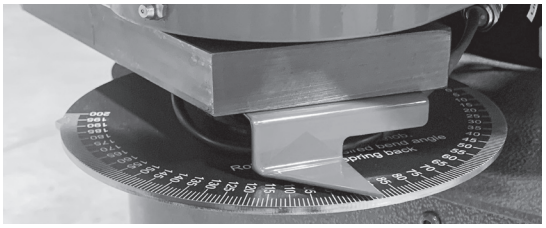


Figure 8.1 - Auto-Stop Dial

8.2 DIE SELECTION AND INSTALLATION

Before any bending can take place, the proper die set must be chosen to match the material being bent.

Example: 1-1/2" diameter tubing requires a die set marked 1-1/2" tube.

NOTICE

Damaged or worn tooling should be replaced before attempting to bend material. This will ensure that bends are correct and provide a longer life to machine components.

When handling large, heavy dies and/or material, make sure it is properly lifted and supported.

Die and Counter Die Parts ID

A Hook Arm
B Bend Die
C Hold down Bolts
D Plastic Slide
E Counter Die Mount
F Bronze Counter Die Insert
G "0" Mark
H Spindle
I Die Drive Pins
J 1/2-13 Tapped holes for bolting down dies
K Center Pin
L Hitch Pin
M Positioning Bolts

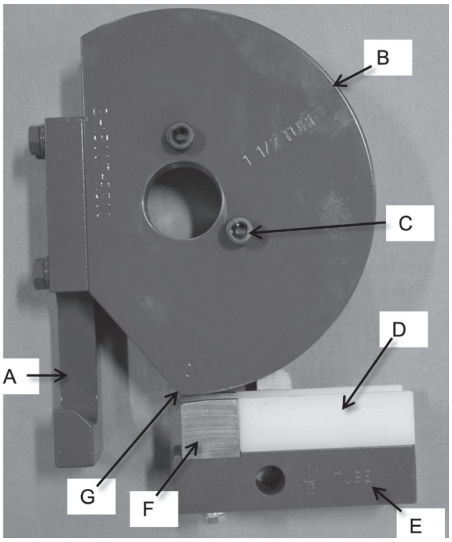


Figure 8.2 - Die and Counter Die Parts ID

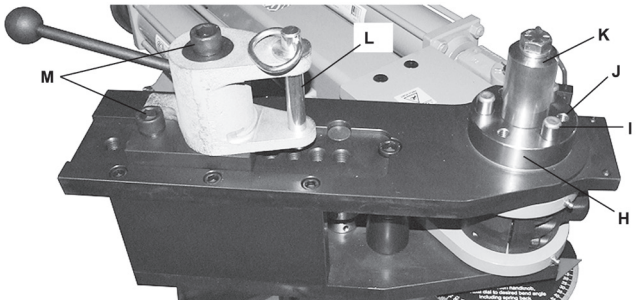


Figure 8.3 - Die and Counter Die Parts ID

⚠CAUTION

Failure to properly bolt down die will result in damage to machine and tooling. Bending material greater than capacity will damage the machine. These conditions are not covered under warranty.

Note: Pipe and Tube are not the same, (see Table 1, Chapter *13: Tables, Charts, & Diagrams*) for nominal pipe sizes. All EDWARDS dies are color-coded to avoid confusion between pipe and tube (see Table 2, Chapter *13: Tables, Charts, & Diagrams*).

1. To install the die, slip the die over the centering pin until the three unequally spaced drive pins engage the receiving holes formed in the die.

   Note: The die will only fit one way.

2. When the drive pins line up the die will drop all the way down to the spindle.
3. Install and tighten the 1/2-13 socket head bolts provided with the die. Tighten these bolts enough to hold the die firmly down to the spindle. Approximately 30-40ft-lb. (40-54Nm).
4. To install the counter die, remove the hitch pin (L) and insert the counter die in the opening in the counter die mount until the 3/4" holes line up.
5. Now insert the hitch pin through all the holes, reinstall clip on the hitch pin with the engraved side of the counter die facing up.
6. The counter die should be positioned approximately 1/8" (3mm) away from the die. This is accomplished by a combination of the slide plate position and changing between the two provided quick releases. (see Table 4, Chapter *13: Tables, Charts, & Diagrams*).
7. In combination, install the recommended quick release (silver [shown] or gold) and then position the slide plate in the recommended holes.
8. Tighten the two socket head bolts (M) to 200ft-lb. (271Nm).

NOTICE

The two M20 x 2.5 bolts hold the slide plate mechanism in place against the force generated during bending.

Incorrect Counter Die Positions



Figure 8.4 - Incorrect: Too Far Away From Die



Figure 8.5 - Incorrect: Touching Die

Correct Counter Die Position



Figure 8.6 - Correct: Approximately 1/8" (3mm) Away

NOTICE

Be sure the long end of the counter die points away from the hook arm or to the right of the machine.

8.3 INSERTING MATERIAL

1. Once the die set is properly installed, the material that matches the die can be inserted (Example: 1-1/4" tube would go into a die mark D-1250T-R***).
2. Open the counter die quick release assembly and insert the material past the hook arm. The start of bend mark is engraved with an "0" on the top of the die. Once the material is placed properly, the counter die slide block assembly can be tightened.

   Important: Liberally apply lubricant along the Counter Die and the 1/2 of the material that contacts the counter die (A) with a WD-40-style lubricant or equivalent. Do not lubricate the bending die. Lubricating the bending die will encourage slipping of material in the bending die.
3. Rotate the quick release counter die assembly until it firmly stops against its stop bolt. In some cases, usually with pipe, the quick release will not close all the way. This is ok, as the forward foot pedal is activated the material will force its way into the die and bend properly.

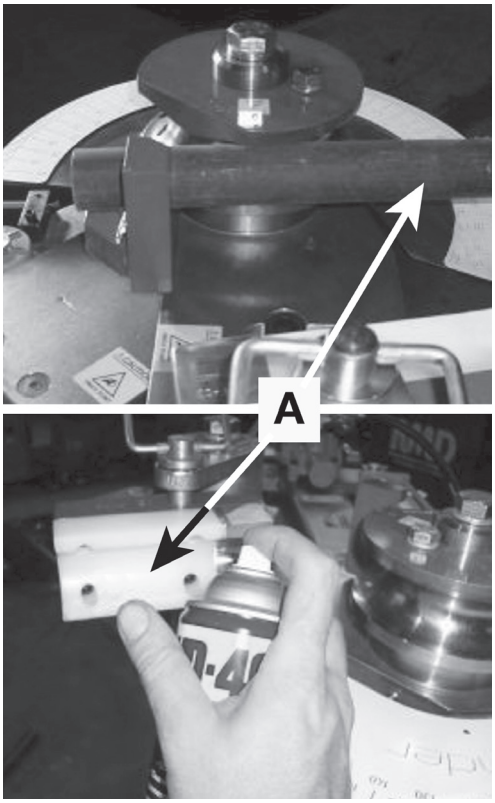


Figure 8.7 - Applying Lubricant

8.4 BENDING USING MAIN (TOP) DEGREE DIAL

1. After the material is installed, bending can take place.
2. Turn on the power switch
3. Keep hands away from the bending zone.
4. Press the Forward (right) Foot Pedal to rotate the die forward. Keeping the Forward Foot Pedal activated, visually watch the Main Degree Dial (A). Hold until the desired degree is displayed, bumping along as needed. The material will need to be bent past desired degree as all material has some "spring-back". This varies by material and can even vary between the same grades of material.
5. If the bend requires more degrees. Increase the degrees by further activating the Forward Foot Pedal. This allows the operator to gradually reach a bend angle on the first set up piece.
6. To determine the amount of spring-back for a certain material, it is necessary to bend a sample piece. Using a framing square, bend a piece of material until a perfect 90° bend is achieved. At that point, document the Main Degree Dial position (A). For example, to achieve a 90° bend on the piece pictured, 105 degrees was the total bend amount or 15-degrees of spring-back. Now you can add 15-degrees to any nominal bend angle to achieve accurate results for this material.

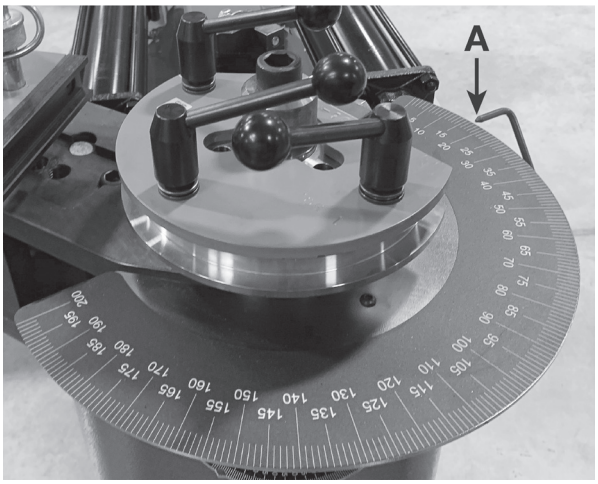


Figure 8.8 - Main (top) Degree Dial

8.5 SETTING THE AUTO-STOP POSITION

The cylinders must be fully retracted and the Main (top) Degree Dial must read “0” deg before setting the Auto-Stop (lower) Degree Dial.

Note: Do not adjust the micro switch mounting bracket; this is preset from the factory. Use only the black Auto-Stop Adjusting Knob (A, Figure 8.9) to adjust the dial.

1. **Method #1:** Using the Auto-Stop (lower) Degree Dial, set the lower pointer to the desired degrees by loosening the Auto-Stop Adjusting Knob (A, Figure 8.9) and rotating the Auto-Stop degree Dial until the desired bend angle plus spring-back is displayed (B, Figure 8.10).

   Example: 91-degree = 86-degree bend + 5-degrees of spring-back.

2. **Method #2:** You can set the Auto-Stop (lower) Degree Dial after a bend is complete also.

   Example: Bend a piece of material to a desired angle using the Main (top) Degree Dial only. Once you are at the final bend position, stop with the material still in the machine. Loosen the Auto-Stop Adjusting Knob (A, Figure 8.9) and rotate the Auto-Stop degree Dial to “0” degrees (B, Figure 8.10). You will feel a definite “click” latching the dial in position; this is the spring-loaded micro switch (C, Figure 8.9) holding the dial in position.

3. If the Auto-Stop Degree Dial is set and the desired angle is more or less degrees than planned / calculated for, simply advance or retard the Auto-Stop Degree Dial to compensate for the difference.

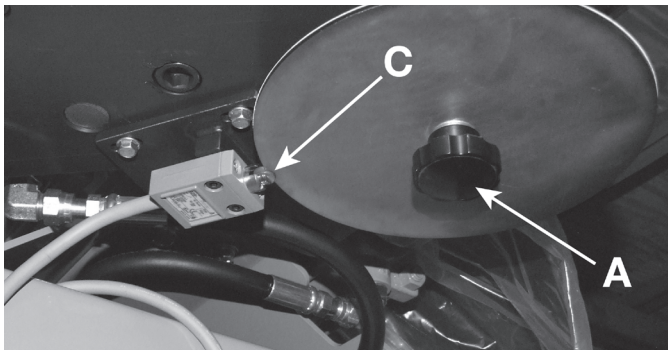


Figure 8.9 - Auto-Stop Knob

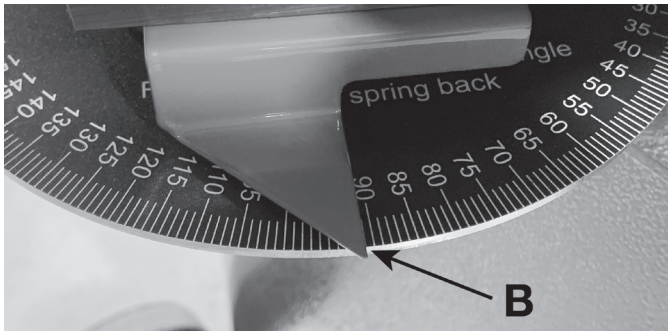


Figure 8.10 - Auto-Stop Setting

8.6 MATERIAL REMOVAL

1. After reaching the desired angle, the material needs to be removed.
2. Press the reverse (left) foot pedal. Both the die and the counter die will retract simultaneously. Run in reverse until all bending pressure is released from the bend.
3. Activate the quick release counter die lever (A, Figure 8.11) and completely remove the material.
4. After the material is safely removed, press the reverse (left) foot pedal keeping hands clear until both cylinders fully retract.
5. The machine is now at the “home” position and can be reloaded for the next bend.
6. Repeat previous steps.

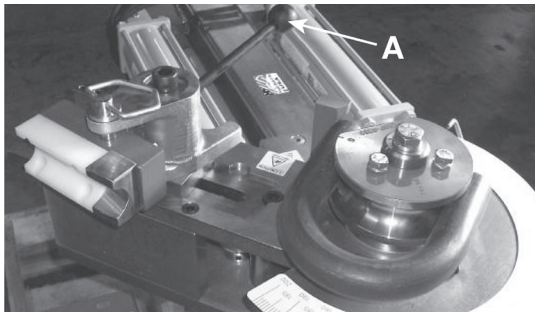


Figure 8.11 - Quick Release Counter Die Lever

8.7 LIMITATIONS

Material Insertion Limitations

- Figure 8.12 shows the recommended minimum / correct amount of material remaining to be fully supported in plastic slide after performing the bend.
- Figure 8.12 shows the maximum amount the material can be pulled through the Counter Die. Pulling the material further than shown into the counter die will destroy the plastic slide.

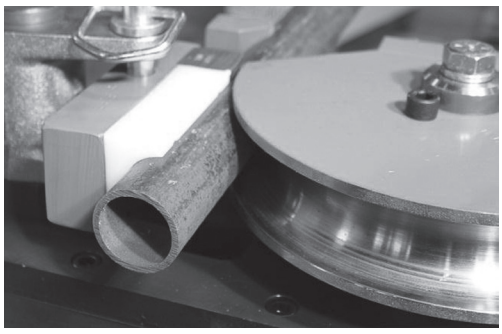


Figure 8.12 - Correct, Recommended Minimum

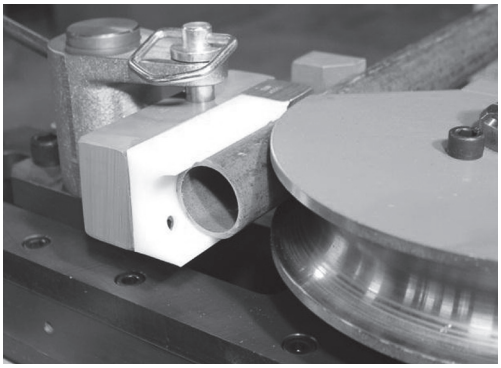


Figure 8.13 - Incorrect, Material Pulled In Too Far

- Figure 8.13 shows the material pulled too far into the counter-die. This will damage the plastic slide on the counter-die.
- Figure 8.14 shows bending material with an existing bend. In this photo, there is not enough material to complete a 90-degree bend. This bend will damage the dies. Extreme care must be taken when bending material with an existing bend. There must be enough straight material to complete the bend. If there is not enough material, the bent part of the material will crash into the counter die and damage the machine and tooling.

⚠CAUTION

Positioning the material in this fashion will cause damage to your tooling and machine. Do not pull bent material into the counter die. Make sure you have enough straight material on the draw side of the material to create your bend.

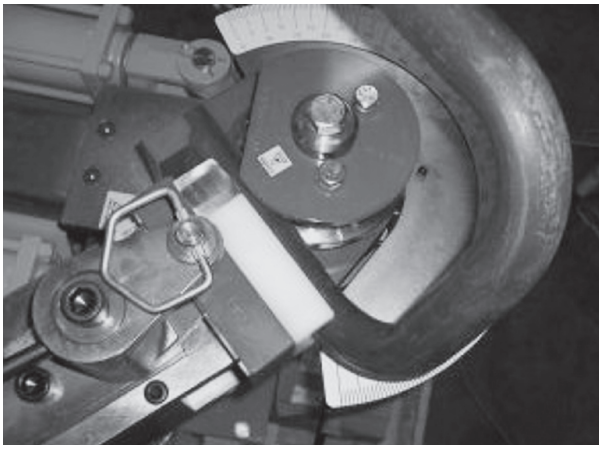


Figure 8.14 - Bending Material with Existing Bend

Bending More Than 180-Degrees

This machine is set up to make maximum bends of 180-degrees. The machine is capable of making bends beyond 180-degrees but you must contact EDWARDS about your application.

This also requires special tooling to allow the removal of the bent part. If standard tooling is used, the material will be locked onto the die.

8.8 UNDERSTANDING SPRING-BACK

Spring-back can be difficult to understand. As material is bent, the material's yield strength resists being formed. As a final degree is reached, the machine will have enough power to hold the bend at a set degree, but as the machine pressure is released, the material's built-in resistance causes it to "springs back".

Spring-back will vary with every size, type, and wall thickness. Therefore it will never be consistent from size to size.

The best way to determine material spring-back is to do sample bends to 90 degrees until a perfect 90 is obtained.

- At that point document the actual machine degree setting.
- Full manual mode is the best method to do these tests.
- Use the overbend amount and enter that value into the spring-back field.

8.9 MATERIAL SELECTION

When selecting material, keep these instructions in mind:

- Material must be clean and dry (without oil).
- Material should have a smooth surface so it processes easily.
- Dimensional properties of material must be consistent and not exceed the machine capacity values.
- Chemical structure of material must be consistent.
- Buy certificated steel from the same vendor when possible.

Material Layout

In order to create accurate parts, you will have to lay out the material in flat form. First you will need to determine how much material is used per degree of bend. Use the multiplier table on Table 3, Chapter *13: Tables, Charts, & Diagrams* to determine the arc lengths for the die in use. Or use the following formula:

Alternate Arc Length Formula

Example:

6.0 CLR x 2 = 12 12 x 3.14 = 37.699

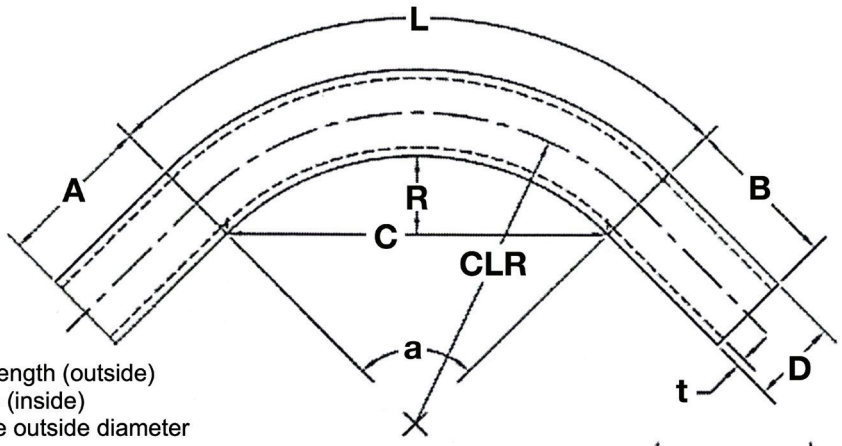
37.699/360 = 0.1047" per degree

0.1047 x 90 degrees = 9.425" of material used for a 90-degree bend.

Once the arc lengths are determined, you can begin layout of the material using Figure 8.15 as a reference.

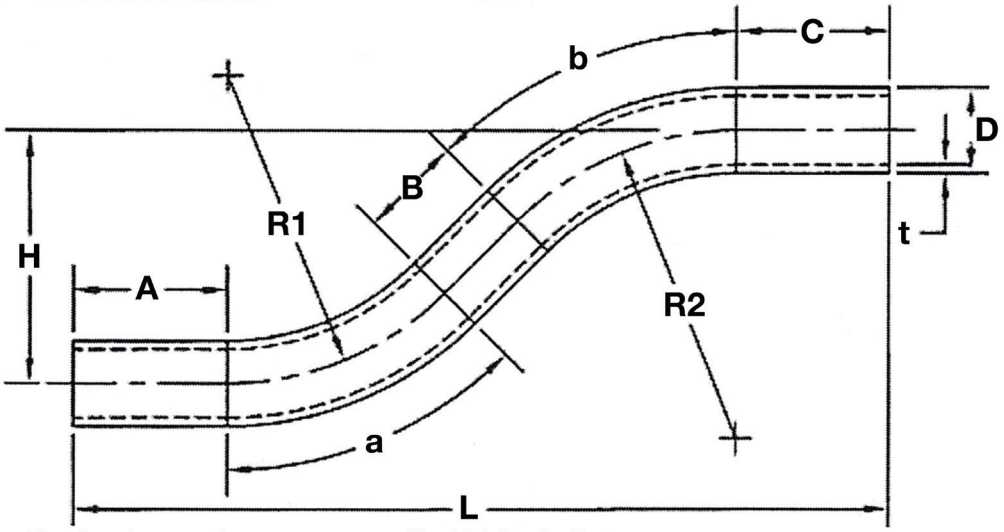
- Example #1 shows a simple part bent on the same plane in the same direction.
- Example #2 shows bending based off of a centerline in two directions.
- For symmetrical bends, centerline bending is easiest.
- Another way to layout material is to draw them in a 2D computer software program like Auto Cad. There are many free programs for download. In a 2D program, you will draw the parts centerline only with corresponding CLR's. Then you will be able to list individual segments of the bent part. This data can be directly entered into the control.
- Another program available is BEND-TECH, which is a program specifically designed for tube bending and will give you all the required data to make a part. This software is available from EDWARDS Manufacturing Company.
- Bending with a rotary draw bender required determining the start of bend point, which will line up with the "0" mark on the die. The portion of the tube towards the hook arm will be locked to the die. The portion of the tube towards the counter die is the draw side and will slide along the counter die and conform to the die shape/radius.

Example 1



L = Arc length (outside)
R = Rise (inside)
D = Tube outside diameter

Example 2



a = First bend arc angle
b = Second bend arc angle
A = First tangent
B = Straight between bends
C = Second tangent
D = Tube outside diameter

H = Height of offset
L = Length of offset
R1 = First radius
R2 = Second radius
t = Tube Wall Thickness

Figure 8.15 - Quick Release Counter Die Lever

8.10 **BENDING GLOSSARY**

Arc Length	The length of material along the centerline of the tubing.
Centerline Radius (CLR)	Distance in inches from the center of curvature to the centerline axis of the tube bending or pipe bending bends. Abbreviated as CLR. See Tube Bending and Pipe Bending Diagram.
Degree	Angle in degrees to which the tube/pipe bends are formed (i.e., 45-degrees, 90-degrees, 180--degrees, etc.)
Easy Way (EW)	Bending of a rectangular tube with its short side in the plane of the tube or pipe bend.
Hard Way (HW)	Bending of a rectangular tube with its long side in the plane of the tube or pipe bend.
I.D.	Inside diameter of the tube or pipe bends.
Minimum Tangent	The minimum straight on the end of pipe bends required by the bending machine to form the bend.
Neutral Axis	That portion of the pipe or tube that is neither in compression for tension.
O.D.	Outside diameter in inches of the tube or pipe.
Out of Plane	The deviation of the horizontal plain of a single pipe bend between its tangent points, based on the theoretical centerline of the pipe bend.
Ovality	The distortion or flattening of pipe or tube from its normal, round shape caused by the pipe bending process.
Spring-Back	Amount of degrees material will return after bending pressure is released.
Tangent	The straight portion of material on either side of arc or bending bends. See Tube Bending and Pipe Bending Diagrams.
Wall	The thickness in inches of tubular pipe bending material.
Wrinkles	Waving or corrugation of pipe bending bends in the inner radius.

8.11 BENDING SUGGESTIONS

Standard Elliptical

- Meant to get thinner wall tubing, to a tighter radius, without the tube collapsing.
- Function over form
- This die will distort the tubing

Standard Elliptical with Revised Counter Die

- “Middle ground” die configuration
- Wont bend as tight of a radius as the standard elliptical die, but will bend tighter than the true radius
- Less distortion, but still visible (as compared to the standard elliptical die configuration)

True Radius

- Minimal to no distortion
- Aesthetically pleasing bend
- Needs larger radius to bend without collapsing (as compared to the other two configurations)

Aluminum Bending

If bending aluminum, lubrication is very important, if the results are less than desirable with WD-40 other lubricants can be used such as:

- Johnson Paste Wax (seems to work the best)
- High Pressure grease
- Highly rich dish soap
- The bronze counter die must be polished and have no aluminum deposits or it will continue to pick up metal.
- If the Edwards Manufacturing Company standard counter-die is not producing desired results, roller counter dies are also available.
- Edwards Manufacturing Company has both steel rollers as well as plastic rollers. Plastic rollers are used primarily for polished aluminum. Steel rollers would be used for non-polished materials.
- Some aluminum will crack as it is being bent, 6061-T6 is very hard and may need to be annealed or ordered in the “T-0” condition. Aluminum will age harden so if possible, try to get freshly run material.

Heavy Wall DOM tubing

If heavy wall materials are bent to a tight radius, they can tend to slip in the hook arm causing a poor bend result, below are some suggestions

- Use a vise clamp on the outside of the hook arm to “lock” the material in place.
- Use a piece of two-sided coarse emery cloth in between the hook arm and the material, this works very well.
- In only this application, high pressure grease applied to the die groove also helps.
- Edwards Manufacturing Company can make special clamps to hold material in place.

Bending with Square Dies

Die Parts

1 Main Bending Die
2 Die Cap
3 Quick Release Handles
4 Hook-Arm
5 Hook-Arm Clamp
6 Plastic Slide
7 Slide Mount
8 Quick Release Studs

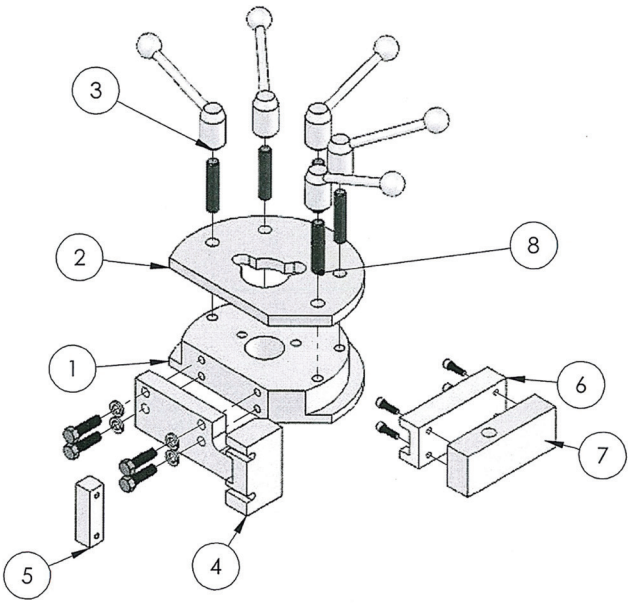


Figure 8.16 - Die Parts

Square Tooling Setup

1. Install the bending die (1) on to the spindle. Be careful not to pinch your fingers as you lower the die on to the spindle. The die will only fit on the spindle one way. Bolt the die to the spindle using the holes in the die.
2. Install the plastic counter die assembly (6 & 7) with the long end pointing away from the hook arm.
3. Snug up the cap clamps (3). Do not over tighten! Or they will be overly difficult to loosen after the bend is complete. Note: tighten clamps without material in the die. The clamps are lift and turn, so you can position them anywhere. This allows the handles to clear the counter-die mount during bending.
4. Insert the material into the hook arm (4) and pull into the die. It may be a tight fit. Continue to pull until the material is fully seated in the die's groove.
5. Lube the counter die and the material that will slide along the counter die. Bring the plastic counter die assembly up to the material, leaving about 1/8" to 1/4" gap. (Note: On some thinner material it helps to keep the counter die approx. 1" away from the material).

NOTICE

Do not lube the bending die surfaces. This will increase the possibility for slippage. Make sure all the die cap clamp handles (3) are inside the die diameter. They could catch the counter die mounting assembly and break off.

6. If the material slips during the bending operation, install the hook arm clamp (5). Do not use it unless needed.
7. Activate the bender and bend to the desired angle.
8. To remove the material, open the counter die and return bender to the "home position". Using a soft mallet, gently tap the cap clamps open and the material will spring out of the die (1). Remove the material and re-snug the cap clamps.
9. Install the next piece of material to be bent and repeat these steps.

Large Size Square

When bending larger than 1.5" (38.1mm) thinner wall square tubing, the counter die position seems to work better between 1/2" and 1" (12.7-25.4mm) farther away from the die. This seems do reduce side wall distortion and inner wrinkling. Although this suggestion is to help on large size, the same steps can be used for any square, if trying to achieve better results. If the square material slips in the hook arm, use the supplied clamp and bolts to hold in place.

Edwards Manufacturing Company offers crush bend dies to form a concave crease on the inside of square bends to reduce the possibility of wrinkling.

9 Lubrication & Maintenance

⚠DANGER

ELECTRICAL HAZARD: Make sure the machine is turned off and disconnected from the electrical power source before performing any maintenance.

LOCKOUT POWER: Electrical circuits are live. Lockout/tagout upstream power source before any maintenance is performed.

⚠WARNING

Maintenance should be performed on a regular basis by qualified personnel. Always follow proper safety precautions when working on or around any machinery.

NOTICE

Proper maintenance can increase the life expectancy of your machine.

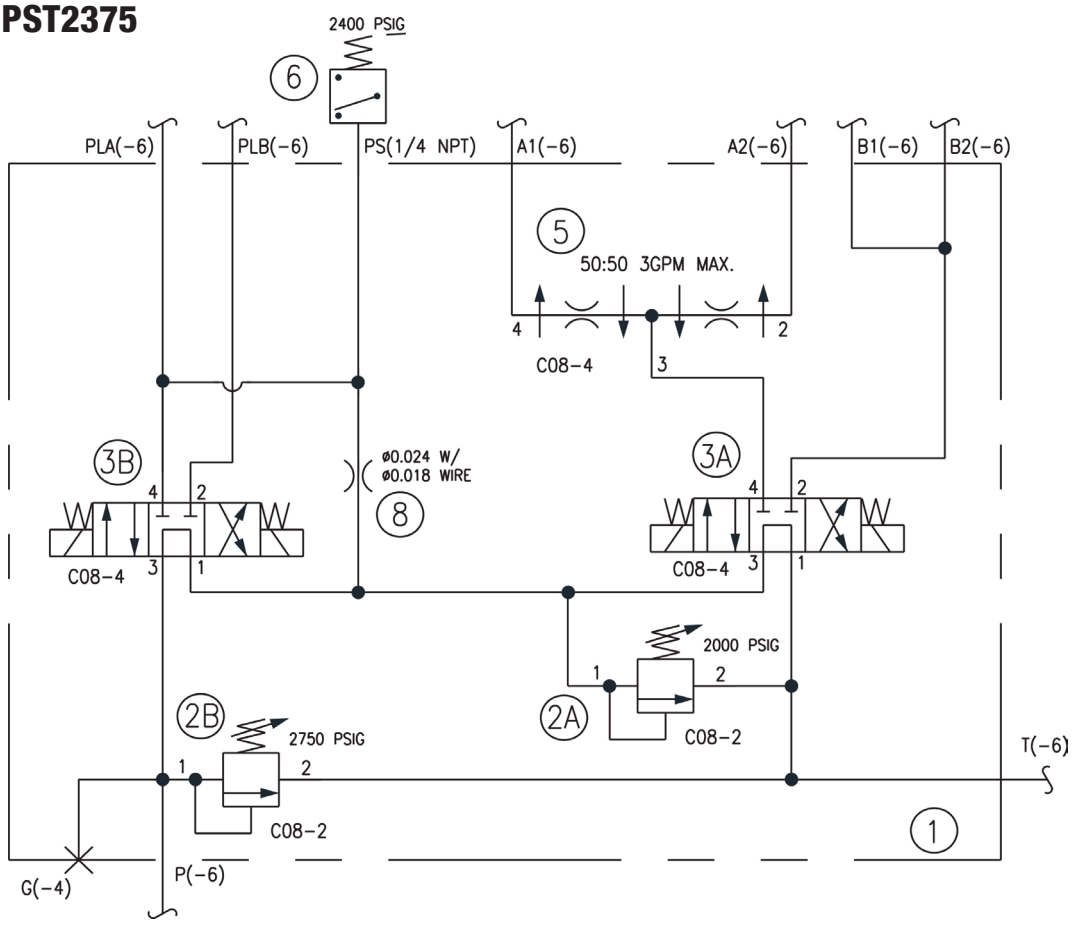
- Check daily for any unsafe conditions. If found, fix immediately.
- Check that all nuts and bolts are properly tightened.
- On a weekly basis, clean the machine and the area around it.
- Lubricate threaded components and sliding devices.
- Apply rust inhibitive lubricant to all non-painted surfaces.
- Check the fluid level in the power unit's reservoir monthly. If the level is below 1/2-full, fill to the top with AW-46 hydraulic fluid. Hydraulic fluid and the filter should be changed when the filter gauge reads "Change Filter".
- Check periodically for leaks. If a leak is detected, consult Edwards Manufacturing Company.
- There are four grease zerks on the machine at the main spindle pivots. Grease these zerks every month with only two pumps from a standard grease gun.
- Check for any loose or worn parts. Tighten any loose parts and replace any worn parts.
- If hoses or fittings are replaced, they must be rated for 4000psi (275 bars, 282 kg/cm).

10 Electrical Diagram

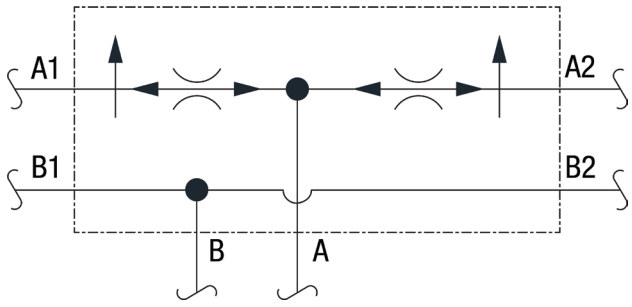
See Electrical Diagram label on inside control panel cover on the machine.

11 Hydraulic Diagrams

HPST2375



HAT2375



12 Troubleshooting

PROBLEM	SOLUTION
Cyliders not retracting all the way or not in sequence	Do the dry run sequence as outlined in Section 8.1.
Machine doesn't move forward or moves forward slowly and does not build up pressure	Check to make sure the auto-stop dial has the micro switch gap at .060" on the indicator point of the dial. If the micro switch gap is larger than .060", the micro switch will not light up and will not stop in set position. Once corrected, loosen auto-stop knob and set the auto-stop position. If micro switch still does not light up, contact Edwards.
	Check oil level or contact Edwards.
Material slips in the hook-arm	Too much lube on material and is transferring to the bend die. Clean the bend die with degreaser.
	The counter die should be lubed only.
	The material may need to be clamped.
	Wrong material for the die set.
Spindle drive pins are damaged	If the bend dies are not bolted down properly, the drive pins will get damaged. Replace drive pins.
Poor bend results	Check proper tooling for material, i.e., pipe vs. tube. Use green for pipe, blue for tube, red for metric, and gray for square or rectangle tubing. See pipe sizing chart. Wall thickness is too thin.

13 Tables, Charts, & Diagrams

Table 1: Standard Pipe Sizes and Schedules

PIPE SIZES	O.D.	Pipe Schedules and Wall Thickness					
		5	10	40	80	160	XX STRONG
1/8	0.405	0.400	0.050	0.068	0.095		
1/4	0.540	0.500	0.070	0.088	0.119		
3/8	0.675	0.500	0.070	0.091	0.126		
1/2	0.840	0.700	0.080	0.109	0.147	0.188	0.294
3/4	1.050	0.700	0.080	0.113	0.154	0.219	0.308
1	1.315	0.700	0.110	0.133	0.179	0.250	0.358
1-1/4	1.660	0.700	0.110	0.140	0.191	0.250	0.382
1-1/2	1.900	0.700	0.110	0.145	0.200	0.281	0.400
2	2.375	0.700	0.110	0.154	0.218	0.344	0.436
2-1/2	2.875	0.800	0.120	0.203	0.276	0.375	0.552

Table 2: Die Color Code Chart

Material	Color
Pipe	Green
Tube	Blue
Metric	Red
Square or Rectangle	Gray

Table 3: Arc Length Table

Formula: Arc Length = Constant x Bend Radius
Example: For a 90-degree bend with 6-inch CLR;1.5705 (from table) x 6-inch (CLR) = 9.423-inch (Arc Length)
For bends more the 90-degrees, Constants can be added together.

Degrees	Constant	Degrees	Constant	Degrees	Constant
1	0.0175	31	0.5410	61	1.0645
2	0.0349	32	0.5584	62	1.0819
3	0.0524	33	0.5759	63	1.0994
4	0.0698	34	0.5933	64	1.1168
5	0.0873	35	0.6108	65	1.1343
6	0.1047	36	0.6282	66	1.1517
7	0.1222	37	0.6457	67	1.1692
8	0.1396	38	0.6631	68	1.1866
9	0.1571	39	0.6806	69	1.2041
10	0.1745	40	0.6980	70	1.2215
11	0.1920	41	0.7155	71	1.2390
12	0.2094	42	0.7329	72	1.2564
13	0.2269	43	0.7504	73	1.2739
14	0.2443	44	0.7678	74	1.2913
15	0.2618	45	0.7853	75	1.3088
16	0.2792	46	0.8027	76	1.3262
17	0.2967	47	0.8202	77	1.3437
18	0.3141	48	0.8376	78	1.3611
19	0.3316	49	0.8551	79	1.3786
20	0.3490	50	0.8725	80	1.3960
21	0.3665	51	0.8900	81	1.4135
22	0.3839	52	0.9074	82	1.4309
23	0.4014	53	0.9249	83	1.4484
24	0.4188	54	0.9423	84	1.4658
25	0.4363	55	0.9598	85	1.4833
26	0.4537	56	0.9772	86	1.5007
27	0.4712	57	0.9947	87	1.5182
28	0.4886	58	1.0121	88	1.5356
29	0.5061	59	1.0296	89	1.5531
30	0.5235	60	1.0470	90	1.5705

Table 4: Counter-Die Placement Chart

CLR (Centerline Radius)	1" Thick Counter-Dies	1.5" Thick Counter-Dies	2" Thick Counter-Dies
1	#N/A	#N/A	Silver Hole #1
1.5	#N/A	Silver Hole #1	Gold Hole #1
2	Silver Hole #1	Gold Hole #1	Silver Hole #2
2.5	Gold Hole #1	Silver Hole #2	Gold Hole #2
3	Silver Hole #2	Gold Hole #2	Silver Hole #3
3.5	Gold Hole #2	Silver Hole #3	Gold Hole #3
3.75	Silver Hole #3	Gold Hole #3	Silver Hole #4
4	Silver Hole #3	Gold Hole #3	Silver Hole #4
4.5	Gold Hole #3	Silver Hole #4	Gold Hole #4
5	Silver Hole #4	Gold Hole #4	Silver Hole #5
5.5	Gold Hole #4	Silver Hole #5	Gold Hole #5
6	Silver Hole #5	Gold Hole #5	Silver Hole #6
6.5	Gold Hole #5	Silver Hole #6	Gold Hole #6
7	Silver Hole #6	Gold Hole #6	Silver Hole #7
7.5	Gold Hole #6	Silver Hole #7	Gold Hole #7
8	Silver Hole #7	Gold Hole #7	Silver Hole #8

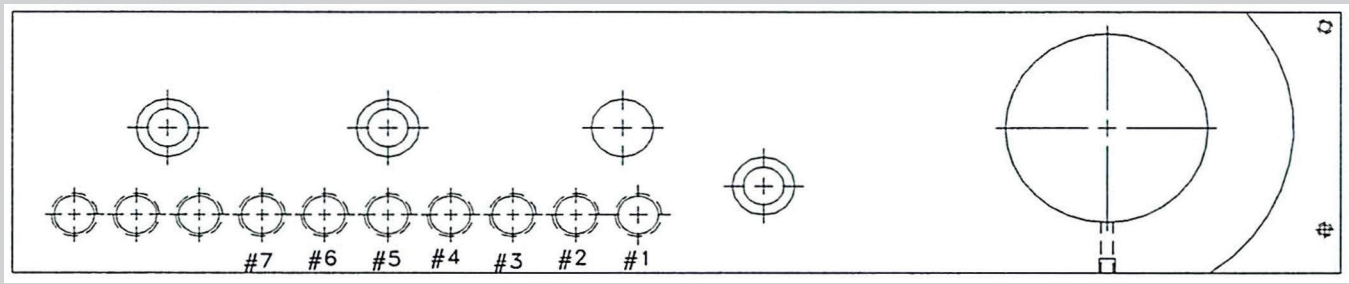


Diagram 1

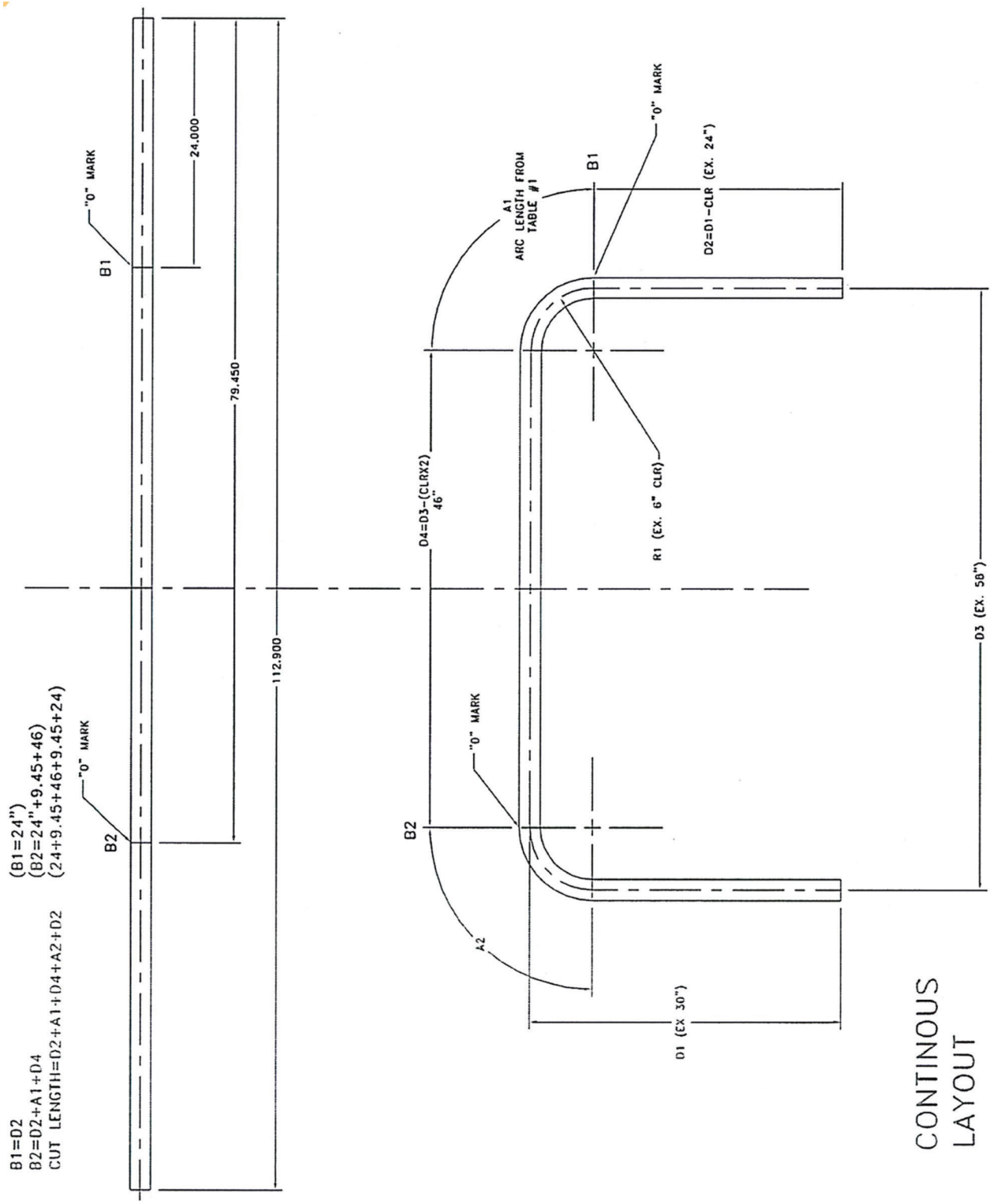
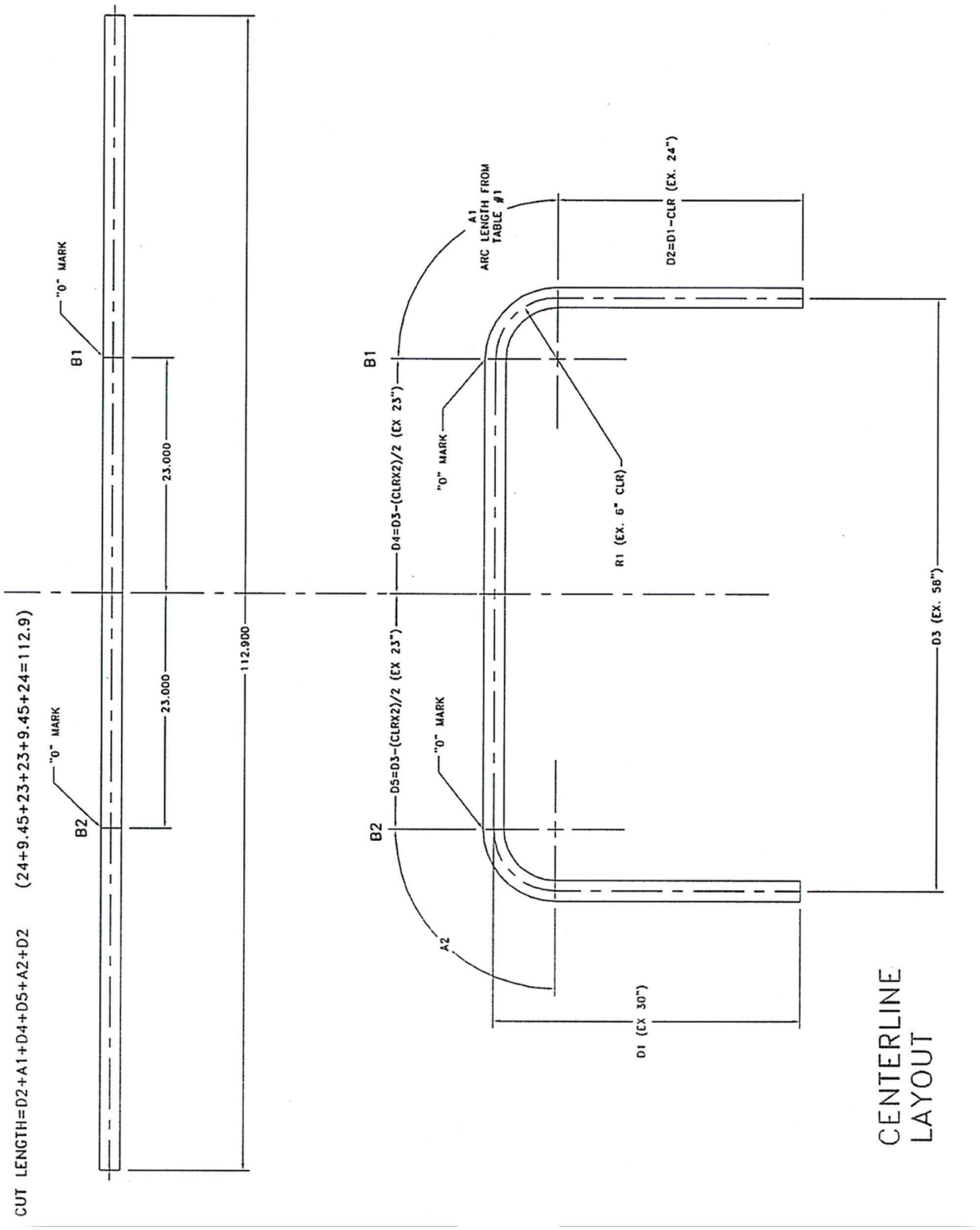
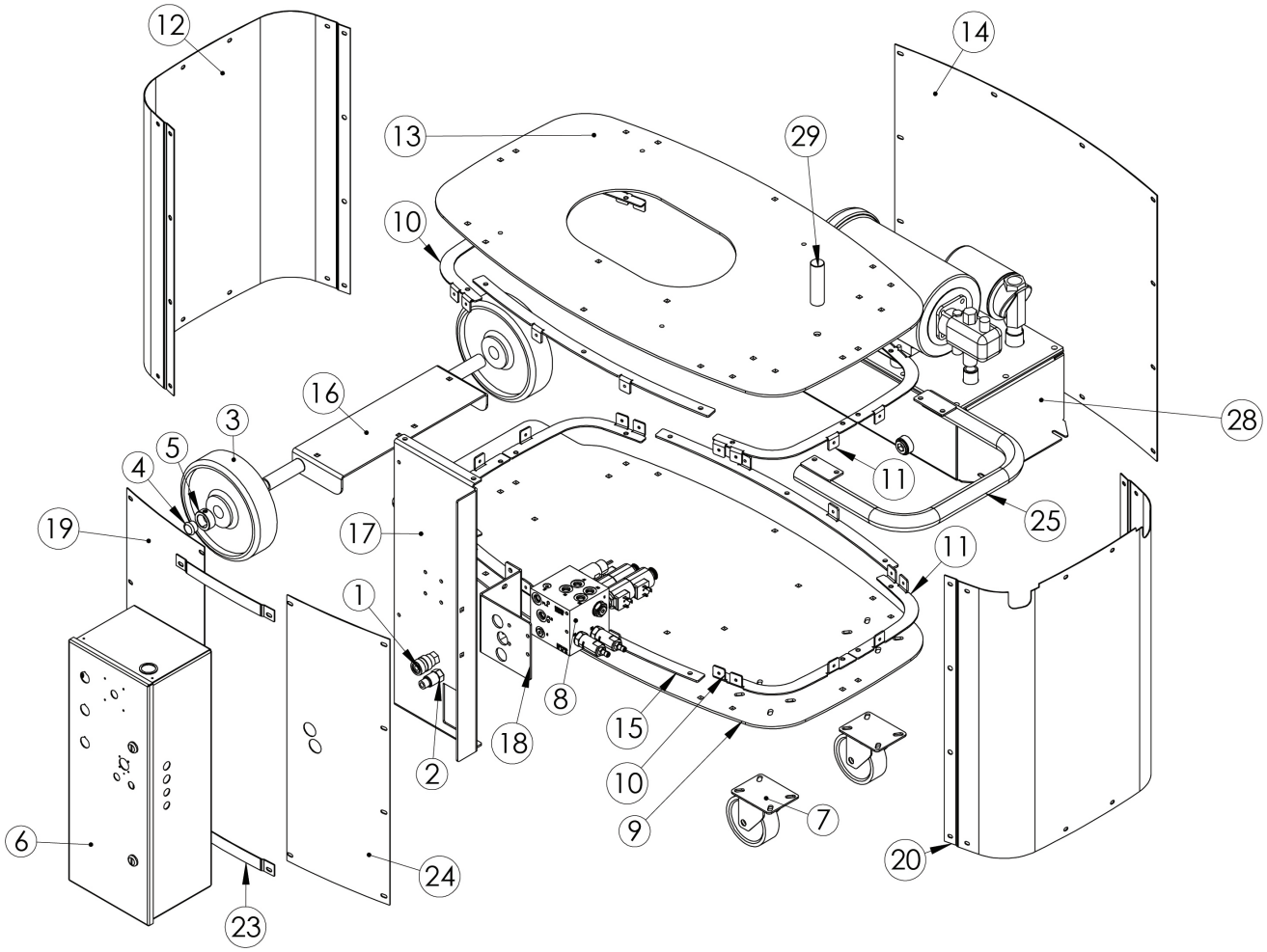

B1=D2
B2=D2+A1+D4
CUT LENGTH=D2+A1+D4+A2+D2
(B1=24")
(B2=24"+9.45+46)
(24+9.45+46+9.45+24)
"0" MARK
B1
24.000
79.450
112.900
"0" MARK
B2
A1
ARC LENGTH FROM TABLE #1
B1
"0" MARK
D2=D1-CLR (EX. 24")
D4=D3-(CLRX2)
46"
R1 (EX. 6" CLR)
D3 (EX. 58")
B2
"0" MARK
A2
D1 (EX 30")
CONTINOUS
LAYOUT

Diagram 2


CUT LENGTH=D2+A1+D4+D5+A2+D2 (24+9.45+23+23+9.45+24=112.9)
"0" MARK
B1
23.000
23.000
112.900
"0" MARK
B2
A1
ARC LENGTH FROM TABLE #1
D2=D1-CLR (EX. 24")
B1
D4=D3-(CLRX2)/2 (EX 23")
"0" MARK
R1 (EX. 6" CLR)
D3 (EX. 58")
D5=D3-(CLRX2)/2 (EX 23")
"0" MARK
B2
A2
D1 (EX 30")
CENTERLINE LAYOUT

14 Replacement Parts

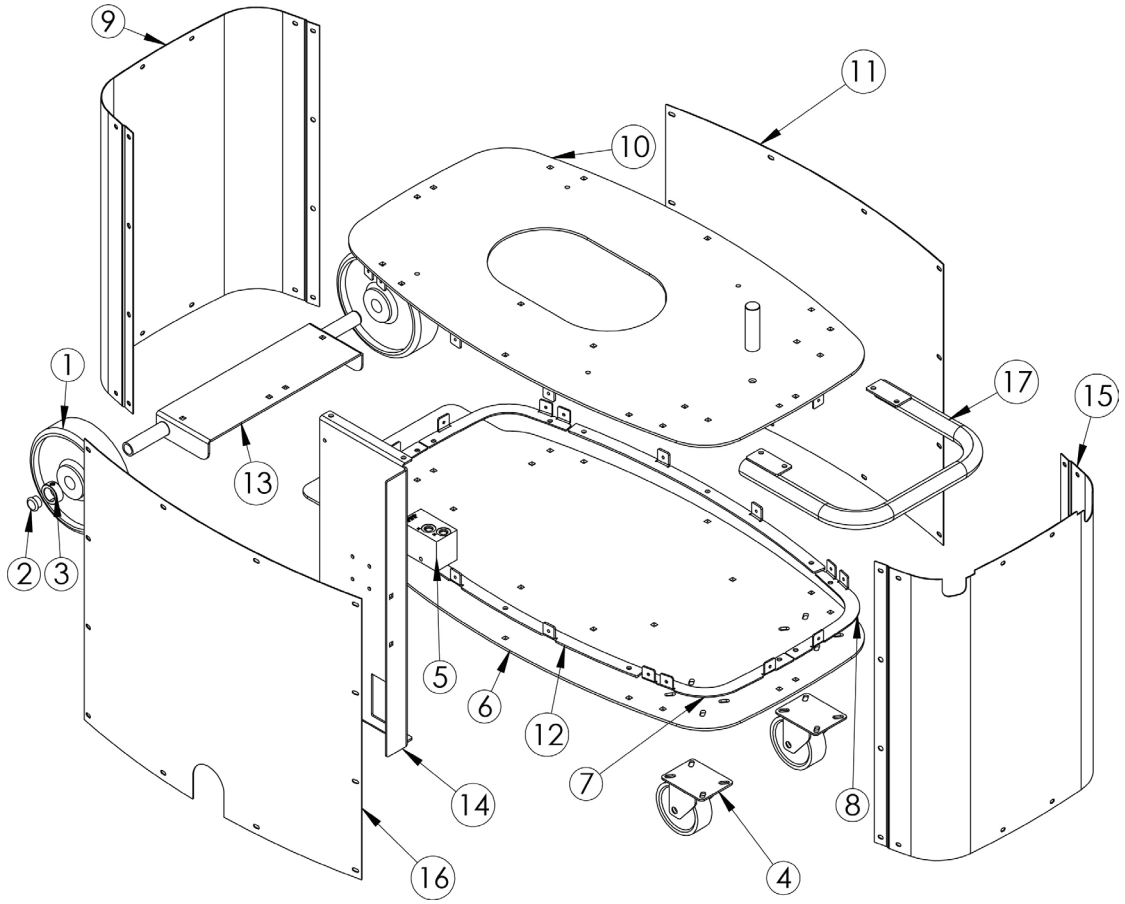
HPST2375 Base Assembly - Exploded View



HPST2375 Base Assembly - Parts List

Item	Part No.	Description	Qty.
1	800801000	Coupler Female	1
2	800801001	Coupler Male	1
3	BA9-PP0064	Wheel	2
4	ED1-14	Plastic Tube Plug	2
5	ED1-15	1" PC Collar	2
6	ED1-17	2HP 1PH 120V Control Box	1
7	ED1-20	4" Caster Wheel	2
8	ED1-22	Valve One	1
9	ED1-26	Base Plate	1
10	ED1-27	Panel Mount, LH	4
11	ED1-31	Panel Mount, LH	4
12	ED1-32	Panel Side	1
13	ED1-33	Top Plate	1
14	ED1-34	Panel Back	1
15	ED1-35	Panel Mount, Front & Back	4
16	ED1-37	Axel Assembly	1
	ED1-38	Axel Mount Plate	1
	ED1-41	Axel	1
17	ED1-42	Control Box Support	1
18	ED1-43	Valve Mount Bracket	1
19	ED1-44	Panel, LH	1
20	ED1-45	Panel Handle Side	1
21	ED1-47	Auto-Stop Dial	1
22	ED1-48	Top Degree Dial	1
23	ED1-49	Panel Center	2
24	ED1-50	Panel, RH	1
25	ED1-51	Handle, Assembly	1
	ED1-39	Handle	1
	ED1-40	Handle Mount Tab	2
26	ED1-54	Prox Mount Bracket	1
27	ED1-55	Prox Holder	1
28	ED1-58	Power Unit Assy.	1
	ED1-52	Tank Bottom Assy.	1
	ED1-56	Hydraulic Tank-Wrap	1
	ED1-57	Hydraulic Tank Slide	2
	24136	3/4 Plug	1
	472460	Coupler	1
	CM9-HE-M0097	Motor Mount 5/16"	4
	ED1-25	Hydraulic Tank Gasket	1
	ED1-53	Hydraulic Tank Cover	1
	66273	1/2" NPS Class 300 Sch 80	1
	66274	40D Steel Coupler, 3/4 BLK	2
	CM9-EM1110275	Motor, 2HP, 1PH, 115/230V	1
	HP5039	Filter Head (ZA 10315)	1
	HP956251Breather	Cap Breather	1
	HF70135	Filter, Short Spin-On 50T/55T/60	1
	CM9-HP10015-03605	Nipple, 3/4" x 4" Thread On	1
	CM9-HP10015-10050	Nipple, 1/2" x 5" Nipple S .40	1
	PF.NIP.40.P.PRO	Pipe Nipple, Schedule 40	1
	CM9-HP-47337	2 Stg-5GPM Pump, CBNA-4.2/1.0A	1
29	PB133	Die Pin Rack-Bender	1
Parts Not Shown			
	ED1-14	Plastic Tube Plug	2
	ED1-15	1" PC Collar	2
	ED1-16	Serial Plate	1
	ED1-18	P/Link Decal	1
	ED1-19	Control Box Decal	1
	ED1-36	12/3 Power Cord, 10ft	1
	CM9-HE-DS100-DG	Dual Foot Control	1

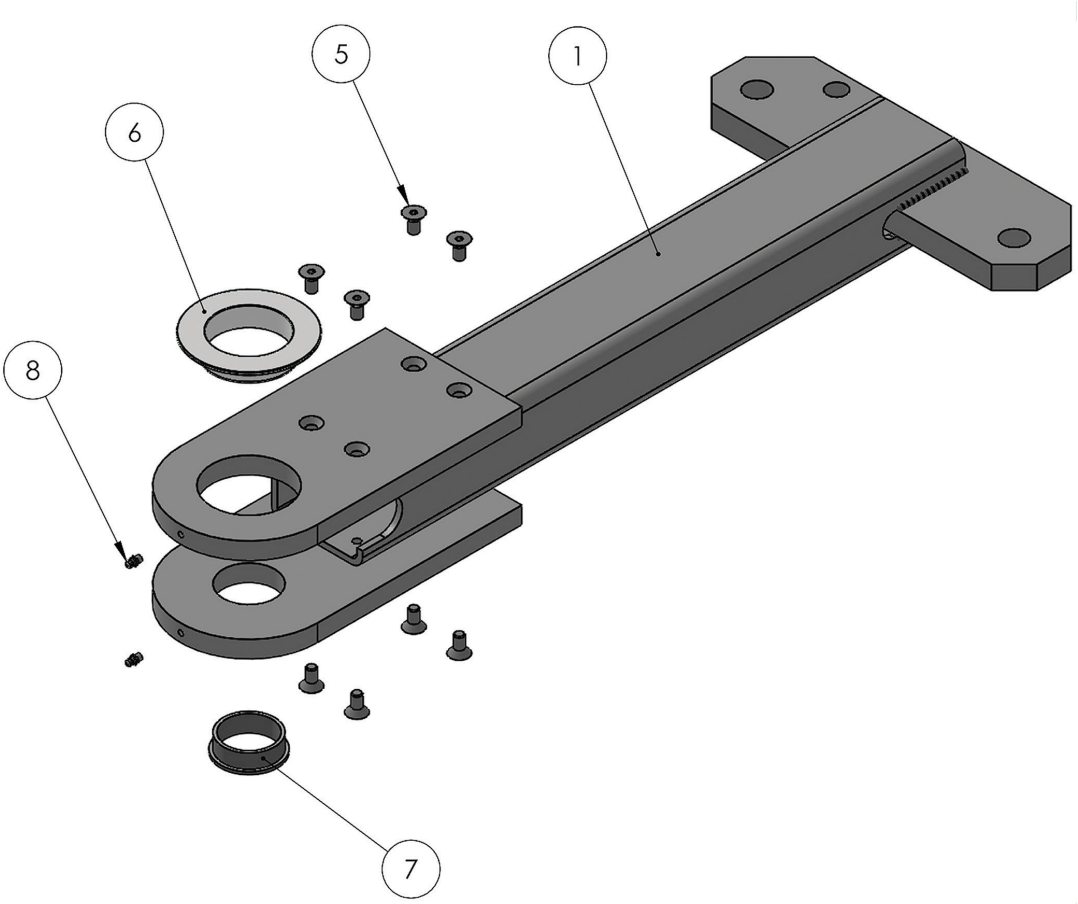
HAT2375 Base Assembly - Exploded View



HAT2375 Base Assembly - Parts List

Item	Part No.	Description	Qty.	Item	Part No.	Description	Qty.
1	BA9-PP0064	Wheel	2	13	ED1-37	Axel Assembly	1
2	ED1-14	Plastic Tube Plug	2		ED1-38	Axel Mount Plate	1
3	ED1-15	1" PC Collar	2		ED1-41	Axel	1
4	ED1-20	Caster Wheel	2	14	ED1-42	Control Box Support	1
5	ED1-21	Valve Two	1	15	ED1-45	Panel Handle Side	1
6	ED1-26	Base Plate	1	16	ED1-46	Side Wrap Hose Side	1
7	ED1-27	Panel Mount, LH	4	17	ED1-51	Handel Assembly	1
8	ED1-31	Panel Mount, LH	2		ED1-39	Handle	1
9	ED1-32	Panel Side	1		ED1-40	Handle Mount Tab	2
10	ED1-33	Top Plate	1	18	PB133	Die Pin Rack - Bender	1
11	ED1-34	Panel Back	1	**Parts Not Shown**			
12	ED1-35	Panel Mount, Front & Back	4		ED1-23	PL Hose Kit	1
					ED1-7	Dual Foot Control w/20" Cord	1

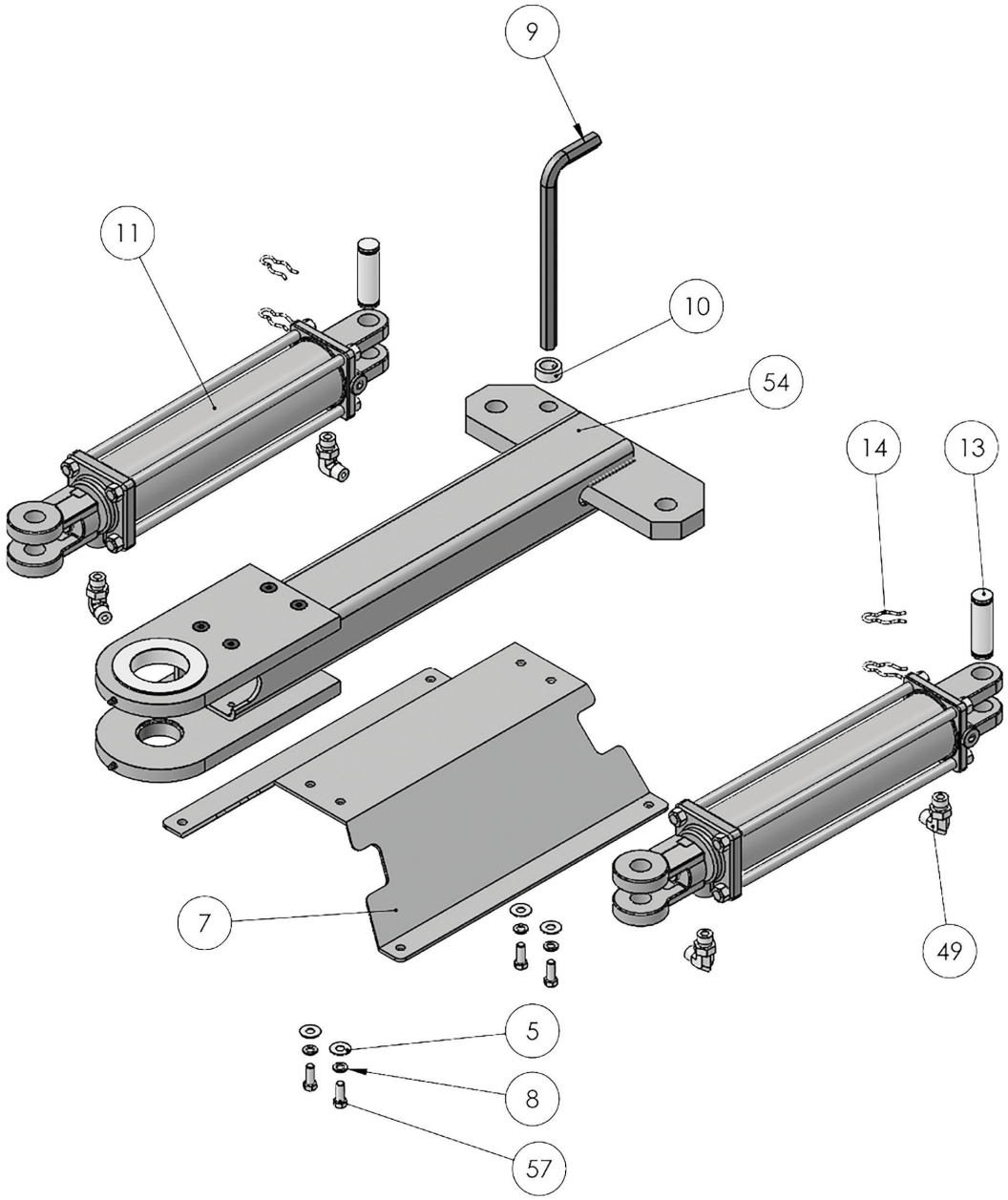
HPST2375 & HAT2375 Main Tube Assembly - Exploded View



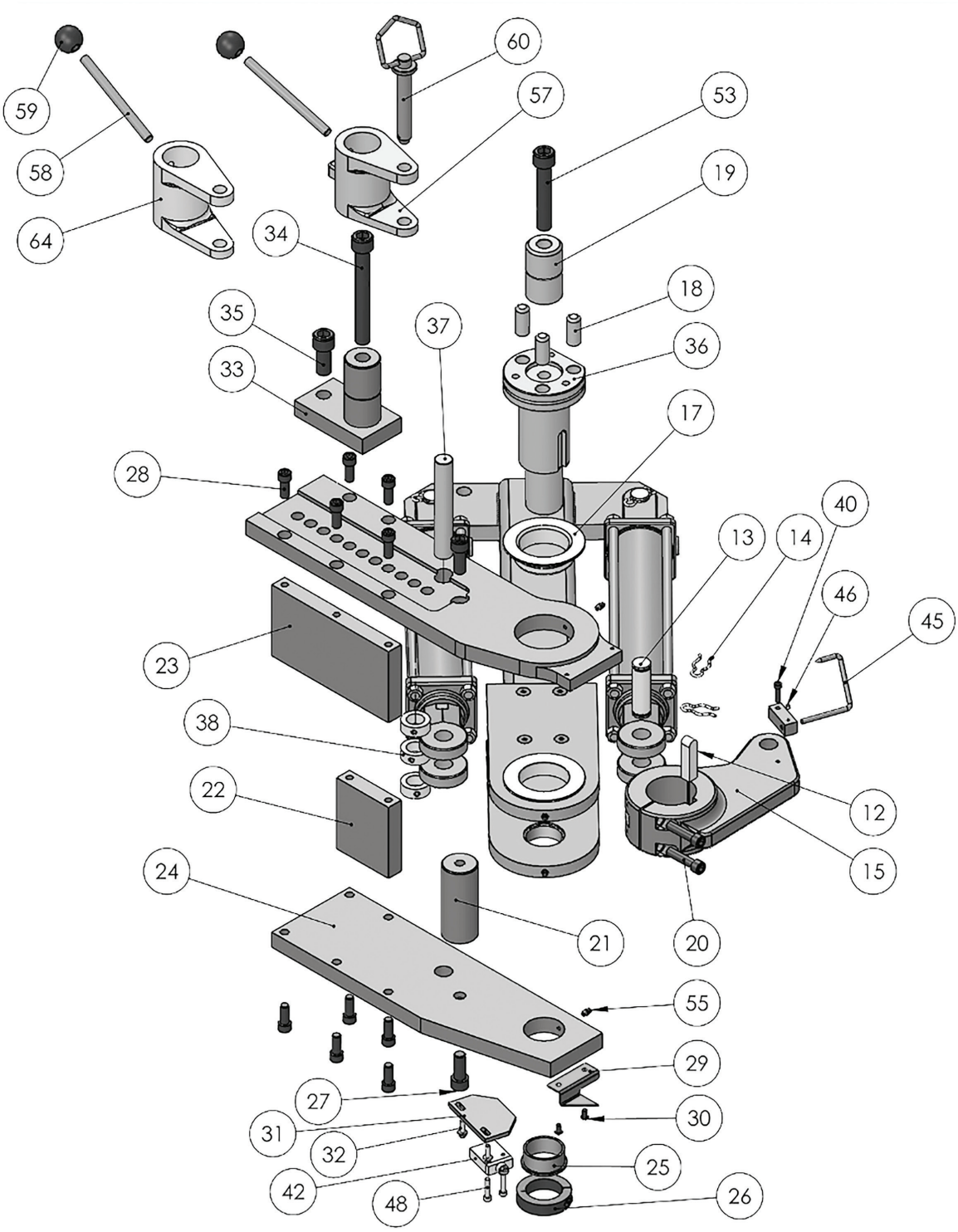
EHPST2375 & HAT2375 Main Tube Assembly - Parts List

Item	Part No.	Description	Qty.
1	M150-6A013	Main Tube	1
5	BS-0329	3/8"-16 x .75" SHCS	8
6	M150-7A015	Flanged Sleeve Bushing	1
7	PP-0294	Flanged Sleeve Bearing	1
8	BS-0070	.25-28 GREASE ZERK	2

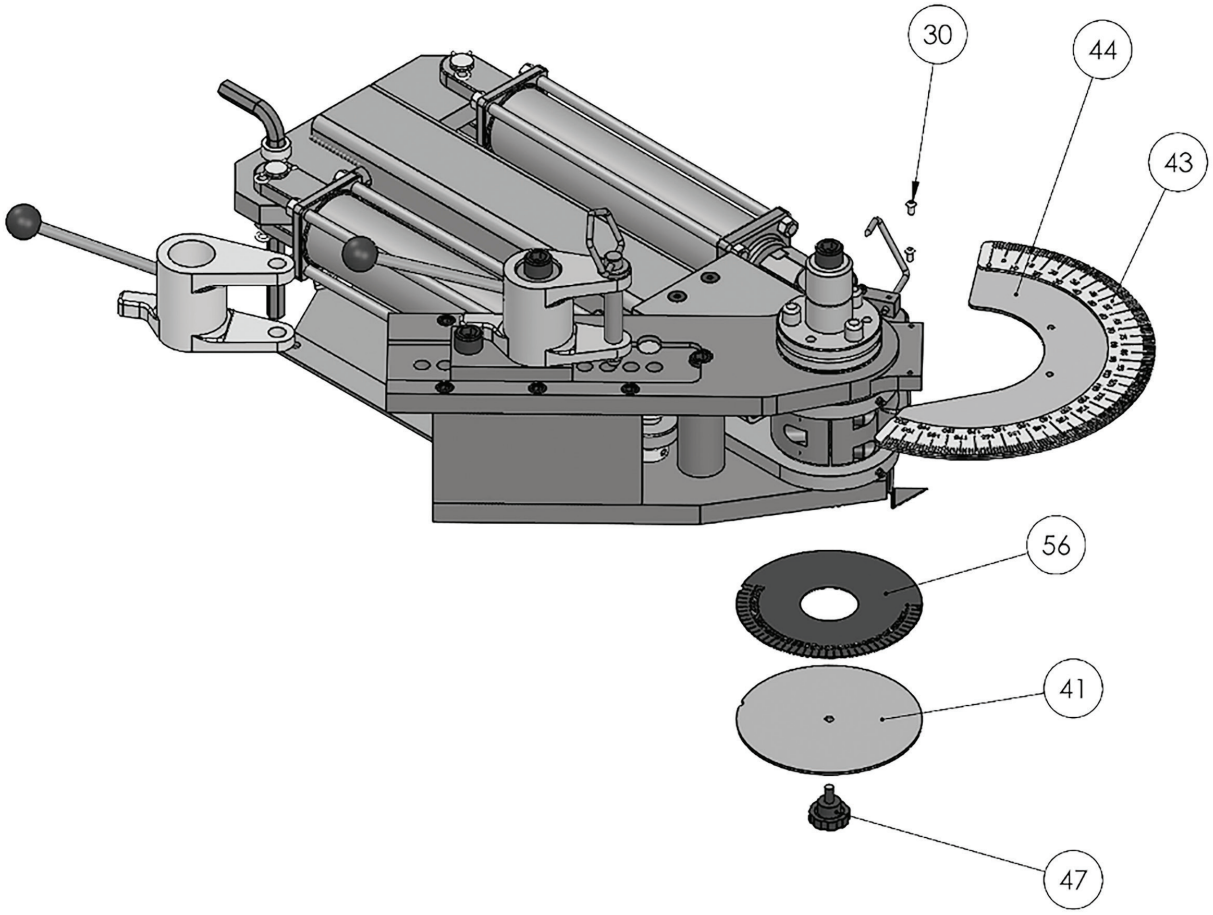
HPST2375 & HAT2375 Main Tube and Cylinders Assembly - Exploded View



HPST2375 & HAT2375 Main Tube and Cylinders Assembly - Exploded View



HPST2375 & HAT2375 Degree Dials - Exploded View



HPST2375 & HAT2375 Main Tube & Cylinders Assembly and Degree Dials - Parts List

Item	Part No.	Description	Qty.	Item	Part No.	Description	Qty.
5	BS-0083	3/8" Flatwasher	8	40	BSM-0003	M6 x 1.0 x 25 SHCS	1
7	M175-6A016	Riser	1	41	ED1-47	Auto-Stop Dial	1
8	BS-0074	3/8" Lockwasher	8	42	CM9-HE-217013	Prox Limit Switch Assembly	1
9	PP-1430	17mm Hex Key	1	43	M175-6A017	Adhesive Backed Degree Dial	1
10	PP-1494	20mm Set Screw Collar	1	44	ED1-48	Top Degree Dial	1
11	PP-0403	3" x 12" Hydraulic Cylinder	2	45	M175-6A018	M175 Pointer	1
12	M150-6A019	Drive Key	1	46	BSM-0145	M5 x 0.8 x 6 Set Screw	1
13	PP-1343	Pin	3	47	PP-0413	Auto-Stop Knob	1
14	PP-1321	Hairclip	6	48	BSM-0004	M6 x 1.0 x 30 SHCS	2
15	ME-M150-5A005	Torque Arm	1	49	PP-0853	-8 To -6 Elbow	4
16	ME-M150-6A052	Top Pivot Plate	1	53	BSM-0175	M20 x 2.5 x 110 SHCS	1
17	M150-7A014	Top Bushing	1	54	ME-M150-5A006	Main Tube Assembly	1
18	PP-1071	3/4" Dowel Pin	3	55	BS-0070	.25-28 Grease Zerk	2
19	ME-M300-7A003	Center Pin	1	56	M150-6A049	Auto-Stop Dial	1
20	BSM-0026	M12 x 1.75 x 50 SHCS	2	57	M150-5A001	Quick Release Casting (Short)	1
21	ME-M150-7A011	Spacer Shaft (Metric)	1	58	M150-7A013	Quick Release Shaft	2
22	ME-M175-6A004	Tie Bar (Short)	1	59	PP-0133	Black Ball Knob	2
23	ME-M175-6A008	Tie Bar (Long)	1	60	PP-0476	Hitch Pin Assembly (Short)	1
24	ME-M175-6A012	Lower Pivot Plate	1	61	PP-0750	24" Hydraulic Hose	4
25	PP-0295	Flanged Sleeve Bearing	1	64	M150-5A011	Quick Release Casting 1/2" Offset	1
26	PP-0293	2.0 Split Clamp Collar	1				
27	BSM-0030	M16 x 2.0 x 40 SHCS	2				
28	BSM-0023	M12 x 1.75 x 30 SHCS	10				
29	M175-6A010	Auto-Stop Pointer	1				
30	BSM-0138	M6 x 1.0 x 12 BHCS	4				
31	ME-M150-5A008	Switch Mount (Metric)	1				
32	BSM-0046	M6 x 1.0 x 20 Hex FLG	2				
33	ME-M150-5A016	Pivot Assembly (Metric)	1				
34	BSM-0144	M20 x 2.5 x 160 SHCS	1				
35	BSM-0040	M20 x 2.5 x 45 SHCS	1				
36	ME-M175-7A005	Spindle	1				
37	M175-7A004	Cylinder Pin (Long)	1				
38	PP-0035	1" Set Screw Collar	3				
39	ME-M150-6A020	Pointer Block	1				



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