

# CLEVELAND STEEL TOOL



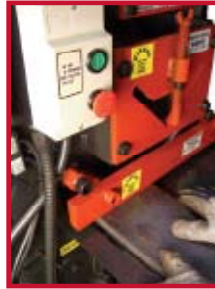
Punch



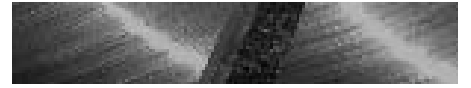
Notch



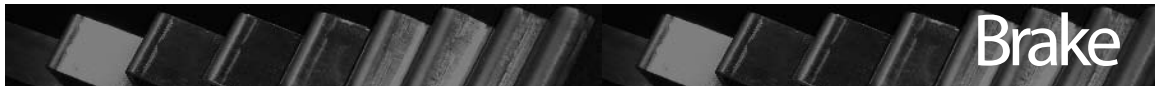
Pipe Notch



Bar Shear



Angle Shear



Brake



# IRONWORKER



## Owner/Operator Manual

Serial # \_\_\_\_\_

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# Company Profile

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*The Cleveland Steel Tool Company* offers 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 *Cleveland Steel Tool Ironworker* will provide years of safe, trouble-free ironworking service. Please take time to study this Operator's Manual carefully to fully understand Ironworker 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 *The Cleveland Steel Tool Company*.



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Cleveland, OH 44108  
800-446-4402 ph  
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sales@clevelandsteeltool.com

## ***Machine Identification***

Your *Cleveland Steel Tool Ironworker* has been serialized for quality control, product traceability and warranty enforcement. Please refer to the aluminum identification tag with the engraved serial number and electrical and power specifications when ordering parts or filing a warranty claim.

## ***Warranty***

*The Cleveland Steel Tool Company* will, within one (1) year of date of purchase, replace F.O.B. the factory, any goods, excluding punches, dies, and/or blades, which are defective in materials and workmanship provided that the buyer returns the defective goods, freight prepaid, to the seller, which shall be the buyer's sole and exclusive remedy for the defective goods. Hydraulic and electrical components are subject to their respective manufacturer's warranties. *The Cleveland Steel Tool Company* will, within thirty (30) days of date of purchase, replace F.O.B. the factory any punches, dies, and/or blades that prove to be defective in material and workmanship.

(Proof of purchase date required)

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. THIS WARRANTY IS VOID IF YOU ATTEMPT REPAIRS YOURSELF. In no event shall seller be liable for labor costs expended on such goods or consequential damages. Seller shall not be liable to the purchaser or any other person for loss, downtime, or damage directly or indirectly arising from the use of the goods or from any other cause. No officer, employee, or agent of seller is authorized to make any oral representations or warranty of fitness or to waive any of the foregoing terms of sale and none shall be binding on seller.



## ***Machine Operations***

*Cleveland Steel Tool Ironworkers* are designed to punch, shear and notch mild steel plate, barstock and angle. A wide range of accessories are available to fabricate rod and square stock, sheet metal and pipe. *Cleveland Steel Tool Ironworkers* operate by applying hydraulic force to a moving center. The center moves within a frame in a simple, vertical path and exerts force through shear blades, punch and dies, notchers, brake dies or bump-die tooling upon mild steel. Vertical travel of the moving center allows the operator to perform multiple operations on a *Cleveland Steel Tool Ironworker* without the requirement to remove adjacent tooling. *Cleveland Steel Tool Ironworkers* are designed for single operator use only.

### ***Safety Precautions***

Your *Cleveland Steel Tool Ironworker* uses hydraulic pressure and moving shear blades to cut steel products. To operate this tool safely, please review the following safety precautions:

- Read and understand your *CST Ironworker Operator Manual*.
- Use the tool ONLY for its intended operation.
- Wear approved eye protection.
- Wear protective gloves and clothing.
- Use the safety guards, material holddowns and punch stripper supplied with your *Ironworker*. Removal, modification or improper use of these safety devices may result in serious injury and will void your machine warranty.
- Keep away from moving parts during operation.
- Unplug or lock-out/tag-out your *Ironworker* before performing any maintenance or adjustment activities.
- Any maintenance, adjustment or changes in tooling for your *Ironworker* must be performed by a qualified individual familiar with the processes and procedures described in the *Operator Manual*.
- Maintain a clean machine. Remove any obstructions, slugs, cut-offs and filings from the work area.
- Adequately support the steel material being worked.
- Turn your *Ironworker* off when not in use – never leave a powered *Ironworker* unattended.

## ***Machine Setup***

Your *CST Ironworker* was bagged, palletized and shipped from the factory to your dock. Remove the protective packaging and bolts from the tubular legs that secure the machine to its pallet. Move your *Ironworker* to its fabrication location using either the lifting ring located at the top of the machine or by inserting your forklift forks within the tubular *Ironworker* legs. *Do not move the machine by any other means!* Locate your *Ironworker* adjacent to your power supply and wire according to the supplied diagrams.

### ***Electrical Hookup***

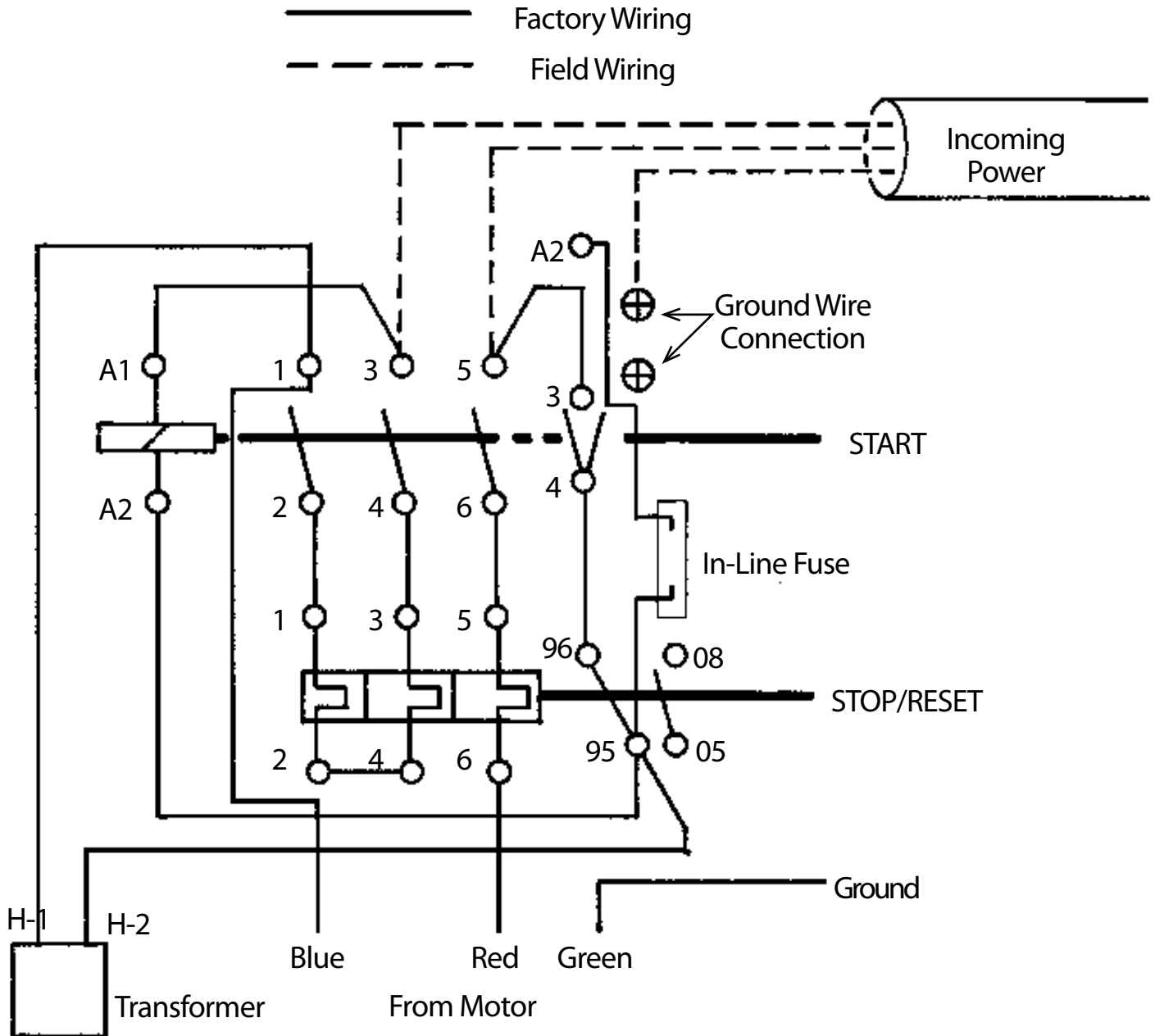
Confirm the electrical supply coming to the terminal location that will power your *Ironworker* with a certified electrician prior to hooking up your machine. Confirm your electrical supply with the electrical specifications of the machine listed in your *Operator Manual* and located on the *Ironworker* starter box. It is critical that a qualified electrician install your machine as your Warranty protection does not cover mis-wiring of electrical components at your site.

### ***Starterbox***

Have your electrician confirm the power supply coming into your facility and to the electrical terminal location. Provide the wiring diagrams (following pages) to the electrician prior to initiating the electrical hookup of the machine.

# Wiring Diagram

## 1~Phase 220 Volt Dan Foss Motor Starters



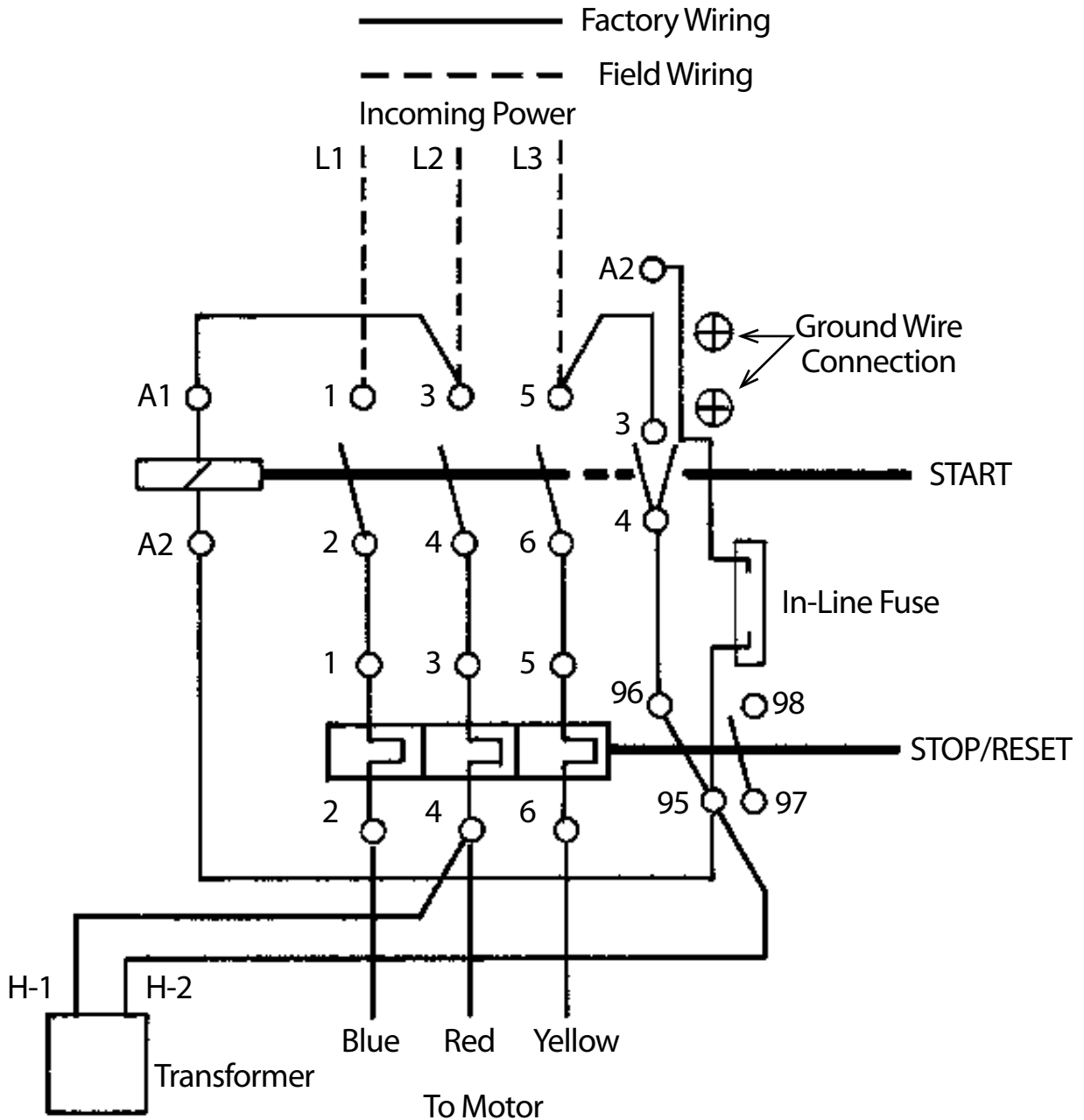
### Power Wiring of Overload Relay for Single-Phase Motors

*NOTE:* The overload relay is constructed to speed tripping in case of uneven loading or loss of one phase, consequently all 3 overload heaters must be used also on single-phase applications.

Incoming power hooks in on top of starter to #3 and #5. It does not matter which lead goes where, other than the ground. Motor is already wired for correct rotation.

# Wiring Diagram

## 3~Phase 220/440 Volt Dan Foss Motor Starters

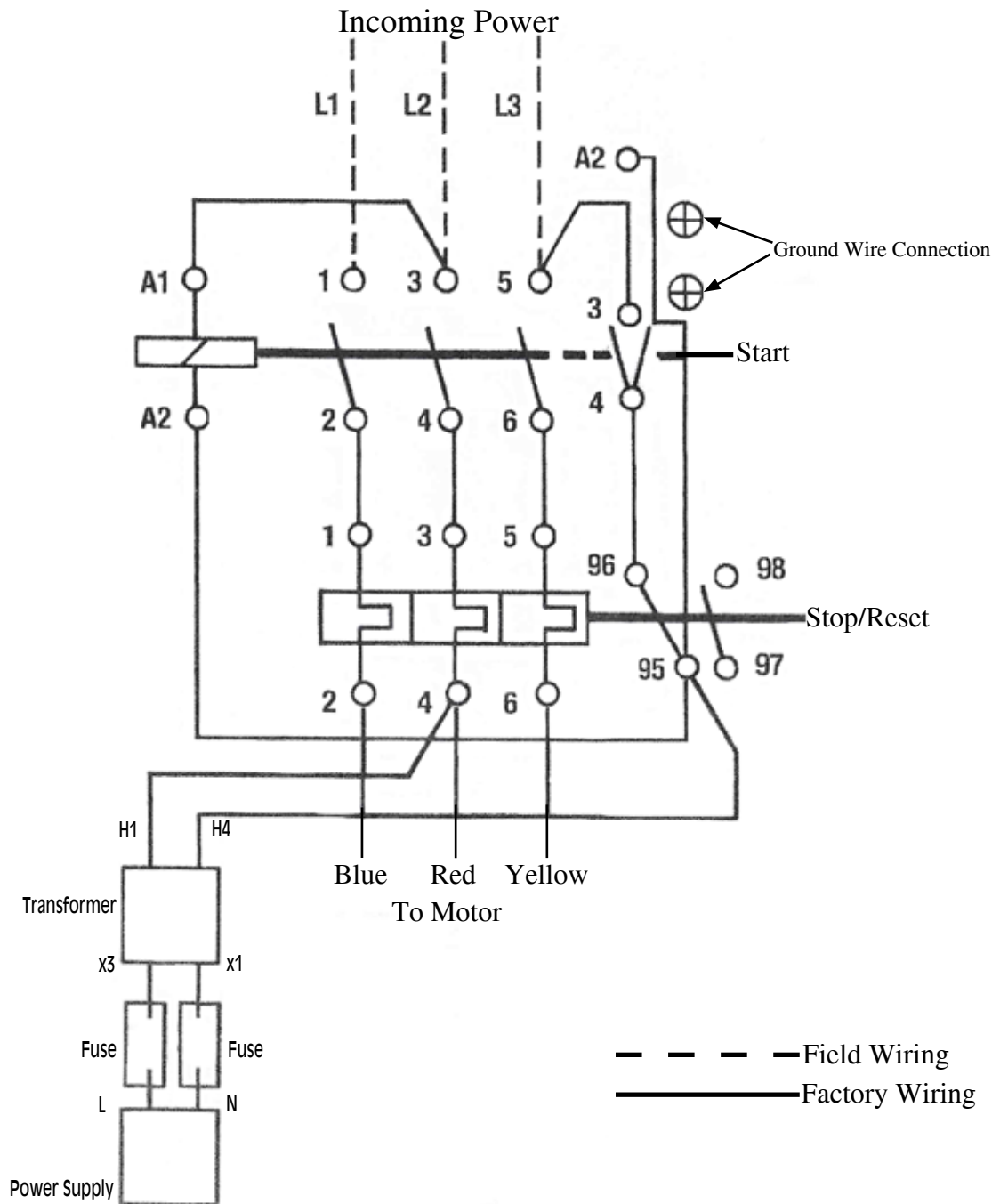


### For Manual Control with Buttons in Cover

Incoming power hooks in on top of starter to #1, 3, 5. Motor rotation is clockwise looking at fan end of motor. If rotating wrong direction, switch Line 2 and Line 3 around.

# Wiring Diagram

## 3~Phase 575/600 Volt Dan Foss Motor Starters



For Manual Control with Buttons in Cover  
 Incoming power hooks in on top of starter to #1, 3, 5.  
 Motor rotation is clockwise looking at fan end of motor.  
 If rotating wrong direction, switch Line 2 and Line 3.

## Care and Periodic Maintenance

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Your *CST* Ironworker will benefit from reasonable care and periodic maintenance.

- Provide clean ISO Viscosity 46 hydraulic fluid (or equal) to the cylinder in the Ironworker. Contaminated fluid will compromise your cutting operation.
- Grease all machine guides and pins daily. Your Ironworker is labeled with all grease locations that require maintenance.
- Maintain .010 clearance between fixed and movable shear blades on *40, 50, 55, 60 and 65 Ton* models at all times.
- Maintain .015 clearance between fixed and movable shear blades on *75, 100, 100D and 120 Ton* models at all times.
- Insert a feeler gauge between fixed and movable blades to verify proper blade clearance and shear tolerance.
- Adjust tolerance of shear blades by relieving the locking nuts that secure the gib-pins to the ironworker frame. Once loose, rotate gib-pins to push the operating center against the frame.
- Gap the angle and bar shear blades with the specified clearance and tighten the gib-pin lock nuts. *Failure to maintain proper clearance will result in lower quality cuts, damage to blade, blade pockets and the potential to damage the Ironworker frame.*
- Periodically check gib-pins for lubrication and snugness to the operating center. Tighten gib-pins and locking nuts to maintain blade clearance as indicated above. Gib-pins are wearing parts. Order replacement gib-pins through *The Cleveland Steel Tool Company*.
- The blade set of your Ironworker is crafted from S-7, heat treated steel. These are wearing parts that will fail over time. Order additional blade sets through *The Cleveland Steel Tool Company*.
- Check the hydraulic fluid level regularly. Replace the external oil filter on your Ironworker after your first 30 hours of use and every 1000 hours thereafter. Change your hydraulic oil every 5000 hours.
- Periodically clean your Ironworker with a compressed air nozzle and soft cloth. Remove filings, dirt, dust and grime from working surfaces.
- Periodically check tooling for wear. Replace worn tooling by calling *The Cleveland Steel Tool Company*.



# Punching

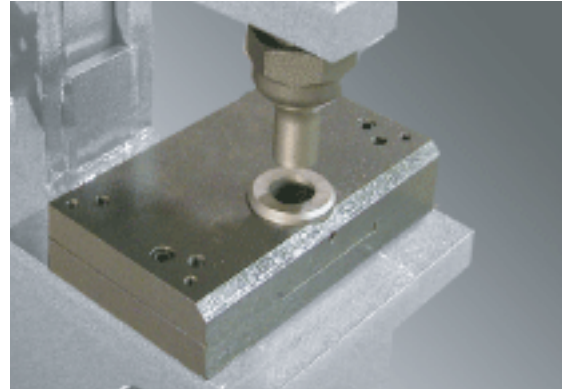
Your Ironworker is capable of punching materials as listed in the Ironworker Specifications section of this Manual as well as described on the capacity labels positioned at the Punch Station. The punch station on the *CST* Ironworker allows for a wide variety of punching, stamping or embossing applications. Standard and custom tooling is available to allow for flange or leg down punching of standard channel and angle sections. Refer to the accessory pages of your manual for further information.

## Setup

Your *CST* Ironworker has been shipped with a punch and die installed within the punch station. When changing the punch and die it is important to make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. To setup your punch station, please observe the following steps.

1. Swing the Punch Stripper up from the punch by loosening the stripper assembly bolts.
2. Remove punch by loosening the punch nut assembly with factory supplied wrench.
3. Remove die by loosening the set screw at the front edge of the punch table and then lifting die from the die holder. If the die resists removal gently tap the die from the underside of the punch table to loosen the die for removal.
4. Install new die and tighten set screw. If loading a shaped die, align the whistle spot with the set screw and tighten.
5. Install new punch and tighten punch nut with wrench. If using a shaped punch, align the locating keystock of the punch with the corresponding slot within the punch stem assembly and tighten the punch nut with the wrench.
6. Check for punch and die alignment by powering up the machine and inching down the punch to meet the die with the foot pedal. Check to see that the punch is centered in the die.
7. In the event that the punch and die are not aligned, loosen the bolts under the table allowing the table to be moved to center the die. When aligned, tighten the table bolts to secure the table.
8. Swing the stripper bar back in place allowing for minimal clearance between the top of the material and the bottom of the stripper and tighten the stripper bolts.

# Safe Operation



Please observe the following guidelines when operating the Punch Station:

- Follow manufacturers punch and die clearance recommendations shown on Pg. 11.
- Read, understand and follow punching tolerances shown on Pg. 11.
- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- The thickness of the material you are punching should not exceed the diameter of the punch being used.
- Check punch and die alignment after every tooling change or extended punch operation.
- The punch stripper must span the work material to avoid side loading the punch during stripping. Side loading may cause damage to the work piece and may damage the punch.
- Do not stack material to punch in the punching station.
- Use one or two drops of oil on the punch to aid in stripping material from the punch as well as to extend the life of the punch tooling.
- Punch complete holes only – nibbling of holes will side load the punch tooling and could result in punch breakage and operator injury.
- Use punching aids when working with small items at the punch station.

# Punching Operation

When familiar with the setup and safe operation of the punch station, clear the punch station of any tools or debris prior to powering the machine on. When clear, power the machine on and place the material to be punched between the punch and die. Check to see that your material is spanning the stripper plate and that adequate material is available beyond the stripper area to safely position the material. Clear your hands from the working area and depress the foot pedal to move the punch through the material and into the die. When the punch is complete, release the foot pedal to automatically strip the material from the punch and return the punch to its neutral position.

## Punch and Die Operating Clearances

The Cleveland Steel Tool Co. recommends the following clearances between punch and die.

| Material Thickness   | Total Clearance |
|----------------------|-----------------|
| 16 gauge and lighter | .006"           |
| 15 gauge – 13 gauge  | .010"           |
| 3/32" - 5/32"        | 1/64"           |
| 3/16" - 15/32"       | 1/32"           |
| 1/2" and heavier     | 1/16"           |

## Punching Capacities

You can determine the tonnage required to punch mild steel (65,000 psi tensile) by applying the following formulas for round or shaped holes and using the Punch Tonnage Chart. For materials other than mild steel please refer to the multiplier table.

**Round Holes:** Punch Diameter x Material Thickness x 80 = Tons of pressure required

Example: How many tons of force do I need to punch a 3/8" hole in 1/4" mild steel?  $.375 \times .25 \times 80 = 7.5$  tons

**Shaped Holes:**

$1/3$  Punch Perimeter x Material thickness x 80 = Tons of pressure required

Example: How much force do I need to punch a 3/8" x 1" rectangular hole in 1/4" mild steel?

$(.33 \times 2.75) \times .25 \times 80 = 18.2$  tons

## Material Multiplier

When punching materials other than mild steel first calculate tonnage as shown above then apply the multiplier for the listed material.

### Material Multiplier

|                       |      |
|-----------------------|------|
| Aluminum              | 0.38 |
| Brass (1/4 hard)      | 0.70 |
| Copper (1/2 hard)     | 0.52 |
| Steel (50% carbon)    | 1.50 |
| Steel (cold rolled)   | 1.24 |
| Stainless Steel (303) | 1.50 |
| Steel (ASTM A-36)     | 1.20 |

## Punch Tonnage Chart (Mild Steel of 65,000 PSI Tensile Strength)

### Punch Size (Fig. 1)

| Material Thickness | 1/8  | 3/16 | 1/4  | 5/16  | 3/8   | 7/16  | 1/2   | 9/16  | 5/8   | 11/16 | 3/4   | 13/16 | 7/8   | 15/16 | 1"    |
|--------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 26 ga.             | 0.18 | 0.27 | 0.36 | 0.45  | 0.54  | 0.63  | 0.72  | 0.81  | 0.90  | 0.99  | 1.07  | 1.16  | 1.25  | 1.34  | 1.43  |
| 24 ga.             | 0.24 | 0.36 | 0.48 | 0.60  | 0.72  | 0.84  | 0.96  | 1.08  | 1.20  | 1.31  | 1.43  | 1.50  | 1.67  | 1.89  | 1.91  |
| 22 ga.             | 0.30 | 0.45 | 0.60 | 0.75  | 0.90  | 1.05  | 1.20  | 1.35  | 1.50  | 1.65  | 1.80  | 1.95  | 2.10  | 2.24  | 2.39  |
| 20 ga.             | 0.36 | 0.54 | 0.72 | 0.90  | 1.08  | 1.26  | 1.44  | 1.62  | 1.80  | 1.98  | 2.15  | 2.33  | 2.51  | 2.69  | 2.87  |
| 18 ga.             | 0.48 | 0.72 | 0.96 | 1.20  | 1.43  | 1.67  | 1.91  | 2.15  | 2.39  | 2.63  | 2.87  | 3.11  | 3.34  | 3.58  | 3.82  |
| 16 ga.             | 0.60 | 0.90 | 1.20 | 1.50  | 1.79  | 2.09  | 2.39  | 2.69  | 2.99  | 3.29  | 3.59  | 3.89  | 4.19  | 4.49  | 4.78  |
| 14 ga.             | 0.75 | 1.12 | 1.49 | 1.87  | 2.24  | 2.61  | 2.99  | 3.36  | 3.73  | 4.11  | 4.48  | 4.86  | 5.23  | 5.60  | 5.97  |
| 12 ga.             | 1.05 | 1.57 | 2.09 | 2.62  | 3.14  | 3.66  | 4.18  | 4.71  | 5.23  | 5.75  | 6.28  | 6.80  | 7.32  | 7.85  | 8.57  |
| 10 ga.             |      | 2.02 | 2.69 | 3.36  | 4.04  | 4.71  | 5.38  | 6.05  | 6.73  | 7.40  | 8.07  | 8.74  | 9.42  | 10.09 | 10.76 |
| 3/16               |      | 2.81 | 3.74 | 4.68  | 5.61  | 6.50  | 7.48  | 8.42  | 9.35  | 10.29 | 11.22 | 12.16 | 13.09 | 14.03 | 14.96 |
| 1/4                |      |      | 5.00 | 6.25  | 7.50  | 8.75  | 10.00 | 11.25 | 12.50 | 13.75 | 15.00 | 16.25 | 17.50 | 18.75 | 20.00 |
| 3/8                |      |      |      | 11.25 | 13.13 | 15.00 | 16.88 | 18.75 | 20.63 | 22.50 | 24.38 | 26.25 | 28.13 | 30.00 |       |
| 1/2                |      |      |      |       | 20.00 | 22.50 | 25.00 | 27.50 | 30.00 | 32.50 | 35.00 | 37.50 | 40.00 |       |       |
| 5/8                |      |      |      |       |       |       |       | 31.25 | 34.38 | 37.50 | 40.63 | 43.75 | 46.88 | 50.00 |       |
| 3/4                |      |      |      |       |       |       |       |       |       |       | 45.00 | 48.75 | 52.50 | 56.25 | 60.00 |
| 7/8                |      |      |      |       |       |       |       |       |       |       |       | 61.25 | 65.63 | 70.00 |       |
| 1"                 |      |      |      |       |       |       |       |       |       |       |       |       |       |       | 80.00 |

*Required Capacity in Tons*

# Bar/Plate Shearing

Your Ironworker may include a bar/plate shear as a standard feature. The bar/plate shear will provide a distortion and burr free shear cut to mild steel bar or plate stock as listed in the Ironworker Specifications section of this Manual as well as described on the capacity labels positioned at the Shearing Station. The Shearing Station on the *CST* Ironworker allows for straight or angled cutting applications. The material hold down adjusts with a simple hand crank to safely restrain the material being cut.

## Setup

Standard bar/plate shears are factory adjusted to proper clearances and are ready to begin shearing operations. Shear blades are wearing parts and will need to be maintained or replaced over time. When maintaining or replacing your shear blades it is important to make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. To setup your bar/plate shear station when maintaining or replacing blades, please refer to the following steps.

## Safe Operation

Please observe the following guidelines when operating the Bar / Plate Shear Station

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Check shear blade clearance at every tooling change or extended shear operation. Maintain correct operating clearance at bar shear and angle shear stations.

*See the Care and Periodic Maintenance section of your Owners manual for tolerance adjustment instructions. Failure to maintain clearance will damage shear blades and support brackets.*

- Fully engage the material hold-down with the material being cut.
- Do not stack material to cut in the shear station.



- Perform complete shear operations only -partial shear cuts may jam the drop off side of the frame and could result in breakage and operator injury.
- Use shearing aids when working with small items at the shear station.

## Bar Shearing Operation

1. When familiar with the setup and safe operation of the shear station, clear the feed table of the shear station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be sheared on the feed table.
3. Push the material under the material hold-down and into the blade area.
4. Position your material to the desired cut and lower the material hold-down.
5. Tighten the hand-wheel to secure the material on the feed table.
6. Clear your hands from the working area and depress the foot pedal to activate the shear station.
7. When the cut is complete, release the foot pedal to return the shear blades to their neutral position.
8. Reverse the hand-wheel to raise the material hold-down and remove your material.

## ***Remove and replace stationary blade:***

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1. Remove the material hold-down assembly from the Ironworker frame by removing the return spring and bolts that secure the assembly to the Ironworker frame.
2. Remove blade bolts located under the feed table. Remove the stationary blade.
3. With blade removed, clean blade pocket of any dirt or debris.
4. Your shear blades have multiple cutting surfaces that can be flipped and rotated prior to full replacement of the part. Rotate the stationary blade to new cutting surface and reinstall in blade pocket.
5. Tighten the stationary blade back into the blade pocket.

## ***Remove and replace moving blade:***

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1. Remove the drop-off guard from the rear of the ironworker frame.
2. Power on the machine and inch the moving center down to reveal blade bolts for the moving blade.
3. With bolts exposed, turn machine off and disconnect from power source.
4. Remove blade bolts and remove blade from the blade pocket.
5. With blade removed, clean blade pocket of any dirt or debris.
6. Your shear blades have four cutting surfaces that can be used prior to full replacement of the part. Rotate the movable blade to new cutting surface and reinstall in blade pocket.
7. Tighten the movable blade back into the blade pocket.
8. Replace the drop-off guard to the rear of the Ironworker frame.
9. Return the machine to power and turn on to automatically return the moving center to its neutral position.
10. With a feeler gauge, check shear blade for correct operating clearance. See the Care and Periodic Maintenance section of this Owners manual for tolerance adjustment instructions. Failure to maintain clearance will damage shear blades and support brackets.
11. Replace and secure the material hold-down assembly and return spring to the Ironworker frame.

## ***Angle Shearing***

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Your Ironworker may include an angle iron shear as a standard feature. The angle shear will provide a distortion and burr free shear cut to mild steel angle stock as listed in the Ironworker Specifications section of this Manual as well as described on the capacity labels positioned at the Angle Shearing Station. The Angle Shearing Station on the *CST* Ironworker allows for straight cutting applications. An oversized material hold down adjusts with a simple thumb crank to safely restrain the material being cut.

### ***Setup***

Standard angle shears are factory adjusted to proper clearances and are ready to begin shearing operations. Shear blades are wearing parts and will need to be maintained or replaced over time. When maintaining or replacing your shear blades it is important to make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. When maintaining or replacing blades please refer to the following:

### ***Safe Operation***

Please observe the following guidelines when operating the Angle Shear Station

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Check shear blade clearance at every tooling change or extended shear operation. Maintain proper operating clearance at bar shear and angle shear stations. Failure to maintain clearance will damage shear blades and support brackets.
- Fully engage the material hold-down with the material being cut.
- Do not stack material to cut in the shear station.

- Perform complete shear operations only. Partial shear cuts may jam the drop off side of the frame and could result in breakage and operator injury.
- Do not shear angle shorter than the hold-down will accommodate.

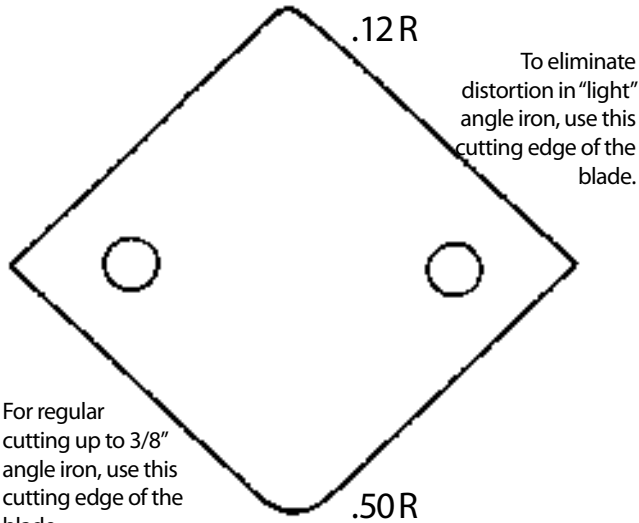
### ***Angle Shearing Operation***

1. When familiar with the setup and safe operation of the Angle Shear Station, clear shear station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be sheared into the material hold-down.
3. Push the material through the angle hold-down and into the blade area. Position your material to the desired cut and lower the material hold-down.
4. Tighten the thumb screw to secure the material in the angle shear. Clear your hands from the working area and depress the foot pedal to activate the shear station.
5. When the cut is complete, release the foot pedal to automatically return the shear blades to their neutral position.
6. Reverse the thumb screw to raise the material hold-down and remove your material.

See fig. for correct radius designation.

## Angle Shear Blade

## Remove and replace moving blade:



*Note: Using the larger radius for smaller angle will distort the cut material.*

## Remove and replace stationary blade:

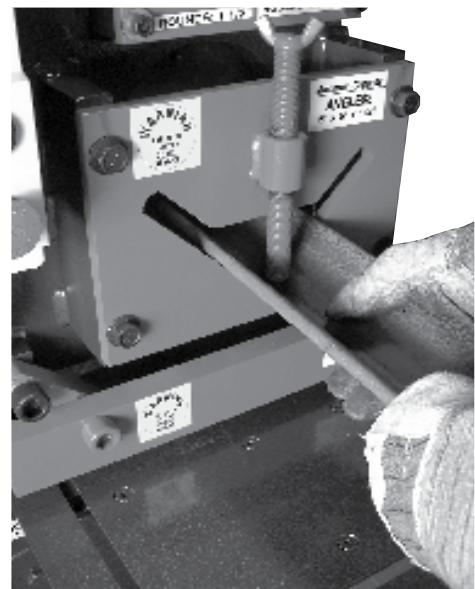
1. Remove the angle material hold-down assembly from the Ironworker frame by removing the bolts that secure the assembly to the Ironworker frame.
2. Remove blade bolts located behind the guard. Remove the stationary blades.
3. With blades removed, clean blade pocket of any dirt or debris.
4. Your stationary angle blades have two cutting edges.
5. Tighten the stationary blades back into the blade pocket.
6. Replace and secure the material hold-down and guarding to the Ironworker frame.

1. Remove the angle material hold-down assembly from the frame by removing the bolts that secure the assembly to the ironworker.
2. Remove blade bolts and remove blade from blade pocket.
3. With blade removed, clean blade pocket of any dirt or debris.
4. Tighten the movable blade back into the blade pocket.
5. With feeler gauge, check shear blade for the correct operating clearance. See the Care and Periodic Maintenance section of your owners manual for tolerance adjustment instructions. Failure to maintain clearance will damage shear blades and support brackets.

6. Replace and secure the material guard and hold-down assembly to the ironworker frame.

7. Your angle shear blades have two cutting edges. The .12 R is used for distortion free cuts of light angle (2x 2 and less). The .50R is used for heavier angle.

Note: Using the .50R for smaller angle will cause distortion of the angle cut.





## ***Notch Tooling (Standard)***

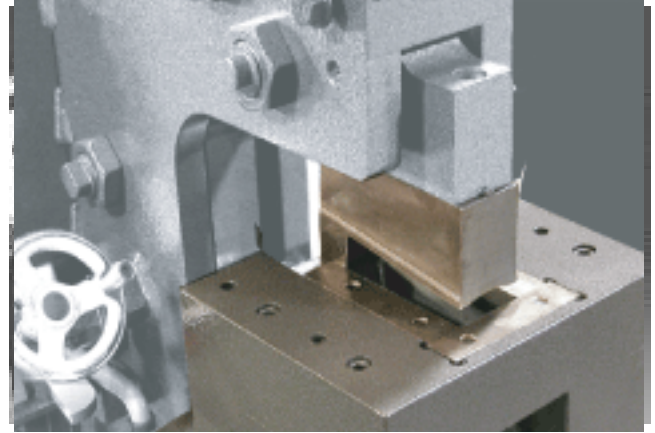
### ***60/65/100 Ton Deluxe 120 Ton***

Notch tooling will provide a distortion and burr free, three-sided shear cut to mild steel bar, plate or angle stock as listed in the Ironworker Accessories section of this Manual as well as described on the capacity labels positioned at the Notching Station. The Notching Station on the *CST* Ironworker allows for shaped, straight or angled notch cutting applications.

### ***Setup***

When adjusting any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. Your Notching Station is equipped with one, three-sided top notcher blade and three, four-sided bottom blades. The top blade is mounted to the moving “center” of the Ironworker, while the bottom three blades are secured into a base housing. If ordered as a factory installed option, your notcher assembly is setup for immediate operation. To setup your Notching station please observe the following steps.

1. Swing the notcher guard assembly up and away from the notcher table.
2. Install the top notcher blade with the keyway up and the “foot” of the blade facing the center of the machine. Secure the top blade using the two 1/2” socket head cap screws. Tighten bolts.
3. Install the notcher table assembly to the base table. The notcher table includes three blades secured within the table housing. Install with the open “U” facing the center of the machine. The guide foot of the top blade should be centered within the base table blades.



4. Loosely secure the table from the underside of the base with four 1/2” bolts and washers (provided).
5. Check for top and bottom blade alignment by powering up the machine and slowly inching down the top blade to meet the bottom blades with the foot pedal. Power the machine off.
6. Using a feeler gauge, adjust the clearance between the perimeter of the top and bottom blades to allow for .010 clearance on all three sides.
7. In the event that the top and bottom blades are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the top blade within the bottom blades. When aligned, tighten the table bolts to secure the table.
8. Adjust the four set screws at the sides of the notcher table to engage the base notcher table to the base table. Lock the four 3/8” nuts in place to secure the set screws in place. These added fixtures are to provide additional support to the base table during the notching operation.
9. Swing the notcher guard back in place. 15



# Notcher Station

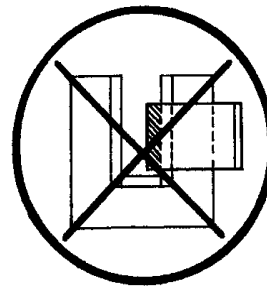
## Safe operation

Please observe the following guidelines when operating the Notcher Station.

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Check notcher blade clearance at every tooling change or extended notcher operation. Maintain .010 clearance between top and bottom notcher blades at all times. Failure to maintain clearance will damage blades and support pockets.
- Cut with a minimum two of three sides of the blade surfaces engaging the material being notched. Cutting on one blade surface may overload the blades and result in tooling damage or injury to the Operator. See fig.
- Do not stack material to cut in the notcher station.
- Perform complete notch operations only – partial notch cuts may jam the drop off side of the tooling and could result in breakage and operator injury.
- Use notching aids when working with small items at the notcher station.

# Notching Operation

1. When familiar with the setup and safe operation of the Notcher Station, clear the feed table of the notcher station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be notched on the feed table.
3. Push the material under the tooling guard and into the blade area.
4. Position your material to the desired cut. Clear your hands from the working area and depress the foot pedal to activate the notcher station. When the cut is complete, release the foot pedal to automatically return the top notcher blade to the neutral position.



TOP VIEW

Figure A

Incorrect use of Notcher – material supported on one blade

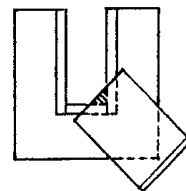


Figure B

Correct use of Notcher – material supported by two blades

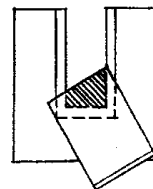


Figure C

Correct use of Notcher – material supported by three blades



# ***Notch Tooling (Optional)***

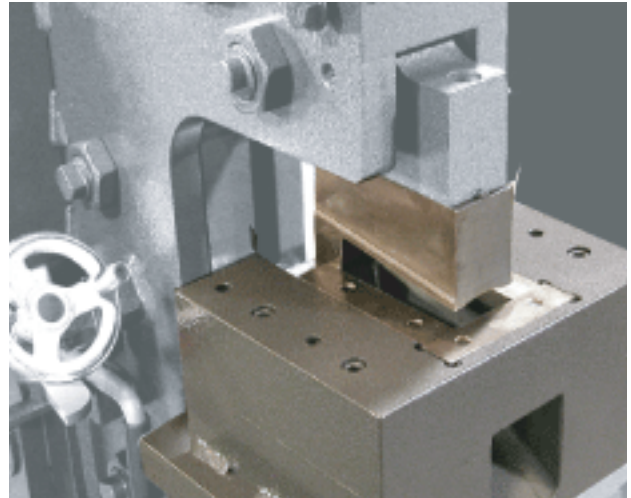
## ***25/40/50/55/75/100 Ton***

Optional Notch tooling will provide a distortion and burr free, three-sided shear cut to mild steel bar, plate, or angle stock as listed in the Ironworker Accessories section of this Manual as well as described on the capacity labels positioned at the Notching Station. The Notching Station on the CST Ironworker allows for shaped, straight or angled notch cutting applications.

### ***Setup***

Optional tooling and accessories fit within the open station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. Your Notching Station is equipped with one, three-sided top notcher blade and three, four-sided bottom blades. The top blade is mounted to the moving “center” of the Ironworker, while the bottom three blades are secured into a base housing. If ordered as a factory installed option, your notcher assembly is setup for immediate operation. If ordered as an option, the open cavity of the machine must be cleared of any existing tooling, material or debris prior to tooling installation. To setup your Notching Station, please observe the following steps.

1. Swing the notcher guard assembly up and away from the notcher table.
2. Install the top notcher blade with the keyway up and the “foot” of the blade facing the center of the machine. Secure the top blade using the two 3/8” socket head cap screws. Tighten bolts.



3. Install the notcher table assembly to the base table. The notcher table includes three blades secured within the table housing. Install with the open “U” facing the center of the machine. The guide foot of the top blade should be centered within the base table blades.
4. Loosely secure the table from the underside of the base with four bolts and washers (provided).
5. Check for top and bottom blade alignment by powering up the machine and slowly inching down the top blade to meet the bottom blades with the foot pedal. Power the machine off.
6. Using a feeler gauge, adjust the clearance between the perimeter of the top and bottom blades to allow for .010 clearance on all three sides.
7. In the event that the top and bottom blades are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the top blade within the bottom blades. When aligned, tighten the table bolts to secure the table.

## ***Notch Tooling (Setup continued)***

### ***25/40/50/55/75/100 Ton***

8. Adjust the four set screws at the sides of the notcher table to engage the base notcher table to the base table. Lock the four 3/8” nuts in place to secure the set screws in place. These added fixtures are to provide additional support to the base table during the notching operation.

9. Swing the notcher guard back in place.

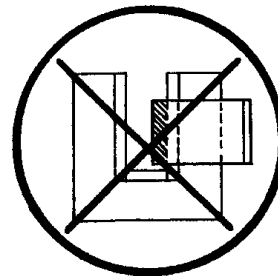
### ***Safe Operation***

Please observe the following guidelines when operating the *25 Ton and 55 Ton* Notcher Station.

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Check notcher blade clearance at every tooling change or extended notcher operation. Maintain .010 clearance between top and bottom notcher blades at all times. Failure to maintain clearance will damage blades and support pockets.
- Cut with a minimum two of three sides of the blade surfaces engaging the material being notched. Cutting on one blade surface may overload the blades and result in tooling damage or injury to the Operator. See fig.
- Do not stack material to cut in the notcher station.
- Perform complete notch operations only – partial notch cuts may jam the drop off side of the tooling and could result in breakage and operator injury.
- Use notching aids when working with small items at the notcher station.

## ***Notching Operation***

1. When familiar with the setup and safe operation of the Notcher Station, clear the feed table of the notcher station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be notched on the feed table.
3. Push the material under the tooling guard and into the blade area. Position your material to the desired cut. Clear your hands from the working area and depress the foot pedal to activate the notcher station.
4. When the cut is complete, release the foot pedal to automatically return the top notcher blade to the neutral position.



TOP VIEW

Figure A

Incorrect use of Notcher – material supported on one blade

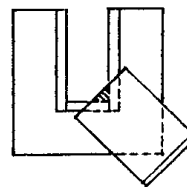


Figure B

Correct use of Notcher – material supported by two blades

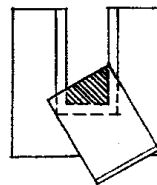


Figure C

Correct use of Notcher – material supported by three blades

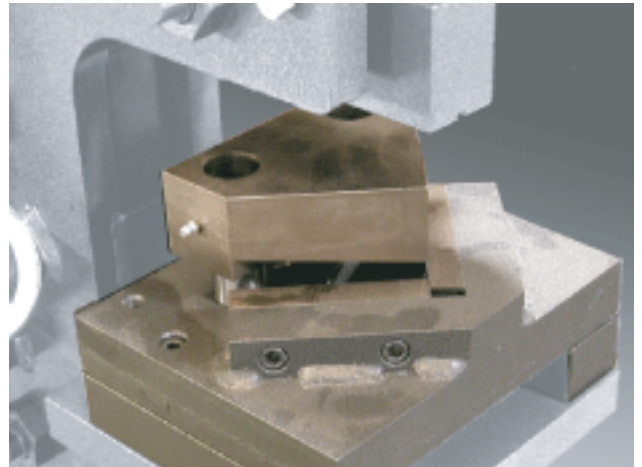
## ***V-Notch Tooling (Optional)***

Optional V-Notch tooling will provide a distortion and burr free, two-sided, 92 degree shear cut to mild steel bar, plate or angle stock. Common use of this tooling is in the fabrication of angle iron frames. Please review capacity labels positioned at the V-Notching Station.

### ***Setup***

Optional tooling and accessories fit within the open station of the machine. When changing any tooling, always wear protective safety glasses and clothing and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. Your V-Notch Station is equipped with one, two-sided top notcher blade and two, four-sided bottom blades. The top blade is mounted to guide pins and return springs of the tooling base. The moving “center” of the Ironworker, pushes on the top V-Notch blade via the accessory push block. If ordered as a factory installed option, your V-Notcher assembly is setup for immediate operation. If ordered as an option, the open cavity of the machine must be cleared of any existing tooling, material or debris prior to tooling installation. To setup your V-Notching station please observe the following steps.

1. Remove all tooling and guarding from the open station.
2. Install the push block supplied with the V-Notcher assembly. The V-shaped end of the push block should be pointing away from the machine. Secure the push block with bolts provided.
3. Place the V-Notcher assembly on the Ironworker support table with the V pointing away from the machine.
4. Loosely secure the table from the underside of the base with four 1/2" bolts and washers (provided).



5. Check for push block and top blade alignment by powering on the machine and slowly inching down the push block to meet the top blade with the foot pedal. Power the machine off.
6. In the event that the push block and top blade are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the push block centerline to the top blade. When aligned, tighten the table bolts to secure the table.
7. Install the V-Notcher guard with the bolts provided.

### ***Safe Operation***

Please observe the following guidelines when operating the V- Notcher Station.

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Check V-Notcher blade clearance at every tooling change or extended notcher operation. Maintain .010 clearance between top and bottom notcher blades at all times. Failure to maintain clearance will damage blades and support pockets.

## ***V-Notch Tooling (Optional)***

### ***Safe Operation continued***

- Cut with a minimum of two sides of the blade surfaces engaging the material being notched. Cutting on one blade surface may overload the blades and result in tooling damage or injury to the operator.
- Do not stack material to cut in the V-Notcher station.
- Perform complete notch operations only – partial notch cuts may jam the drop off side of the tooling and could result in breakage and operator injury.
- Use notching aids when working with small items at the notcher station.

## ***V-Notching***

### ***Operation***

1. When familiar with the setup and safe operation of the V-Notcher Station clear the feed table of the notcher station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be notched on the feed table. Push the material under the tooling guard and into the blade area.
3. Position your material to the desired cut. Clear your hands from the working area and depress the foot pedal to activate the notcher station. When the cut is complete, release the foot pedal to automatically return the top notcher blade to the neutral position.

# ***Oversize Punch Tooling***

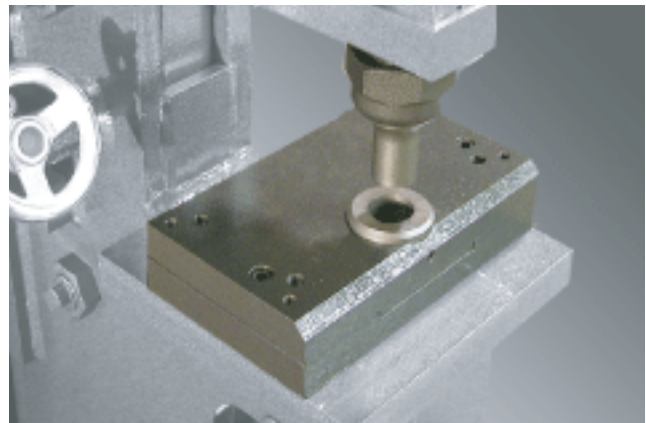
## ***(Optional)***

Your Ironworker is capable of punching oversize holes in material listed in the *Ironworker Accessories* section of this Manual. Standard and custom tooling is available to allow for flange or leg down punching of angle sections.

## ***Setup***

Optional tooling and accessories fit within the open or standard punch station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. To setup your OverSize Punch Tooling station please observe the following steps.

1. Swing the Punch Stripper assembly up from the standard punch by loosening the stripper assembly bolts from the Ironworker frame.
2. Remove the standard punch holder from the operating center and the standard die table from the support table base.
3. Secure the oversize punch holder to the operating center with the bolts provided.
4. Place the oversize die tables on the support table base and loosely install 4 bolts (provided) through the underside of the support table into the oversize die tables.
5. Install new oversize die and tighten set screw. If loading a shaped die, align the whistle spot with the set screw and tighten.
6. Install new oversize punch and tighten punch nut with wrench. If using a shaped punch, align the locating keystick of the punch with the corresponding slot within the punch stem assembly and tighten the punch nut with the wrench.



7. Check for punch and die alignment by powering up the machine and slowly inching down the punch to meet the die with the foot pedal. Check to see that the punch is centered in the die.
8. In the event that the punch and die are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the die. When aligned, tighten the table bolts to secure the table.
9. Swing the stripper bar back in place allowing for minimal clearance between the top of the material and the bottom of the stripper and tighten the stripper bolts.

## ***Safe Operation***

Please observe the following guidelines when operating the Oversize Punch Station.

- Always use safety glasses and factory supplied guards when operating your Ironworker.
- Read, understand and follow punching tolerances shown in the Punching section of this manual.

# ***Oversize Punch Tooling***

---

## ***Safe Operation continued***

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- The thickness of the material you are punching should not exceed the diameter of the punch being used.
- Follow manufacturers punch and die clearance recommendations as shown in the Punching section of this manual.
- Check punch and die alignment after every tooling change or extended punch operation.
- Adjust the punch stripper supplied with your CST Ironworker to allow for material positioning and material stripping. Make sure the stripper spans the material being punched.
- Do not stack material to punch in the punching station.
- Use one or two drops of oil at the punch to aid in stripping material from the punch as well as to extend the life of the punch tooling.
- Punch complete holes only – nibbling will side load the punch tooling and could result in punch breakage and operator injury.
- Use punching aids when working with small items at the punch station.

# ***Oversize Punch Tooling***

---

## ***Operation***

1. When familiar with the setup and safe operation of the oversize punch station, clear the punch station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be punched between the punch and die.
3. Check to see that your material is spanning the stripper plate and that adequate material is available beyond the stripper area to safely position the material.
4. Clear your hands from the working area and depress the foot pedal to move the punch through the material and into the die.
5. When the punch is complete, release the foot pedal to automatically strip the material from the punch and return the punch to its neutral position.



# *Pedestal Die Tooling*

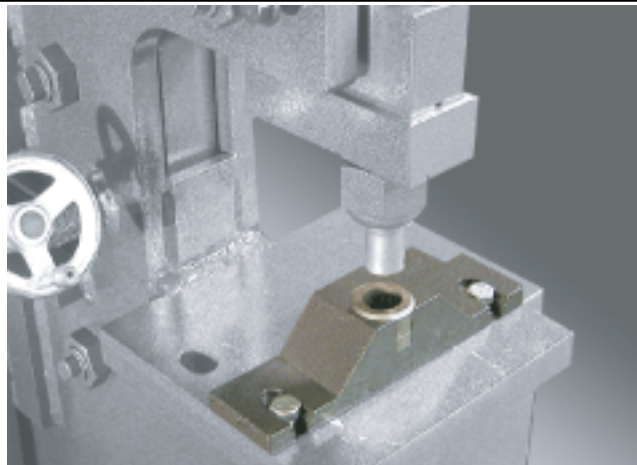
## *(Optional)*

Your Ironworker will punch materials listed in the Ironworker Specifications section of this Manual as well as described on the capacity labels positioned at the Punch Station. Pedestal Die tooling is available in standard and oversize configurations to allow for 2"x2"x1/4" max. angle to be punched leg down at the punch station. Standard 2"x1/4" max. channel sections may be web punched and special offset dies are available for punching close to web/flange unions. Refer to the accessory pages of your manual for further information.

## **Setup**

Optional tooling and accessories fit within the open or standard punch station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. To setup your Pedestal Die Tooling station please observe the following steps.

1. Swing the Punch Stripper up from the punch by loosening the stripper assembly bolts.
2. Remove standard die table from the fixed table base by removing the four bolts.
3. Install new Pedestal Die Table to fixed table base with the two 1/2" bolts provided. Loosely secure bolts with the supplied washers and nuts from the underside of the table.
4. Install die and tighten set screw. If loading a shaped die, align the whistle spot with the set screw and tighten.
5. Install punch and tighten punch nut with wrench. If using a shaped punch, align the



locating keystone of the punch with the corresponding slot within the punch stem assembly and tighten the punch nut with the wrench.

6. Check for punch and die alignment by powering up the machine and inching down the punch to meet the die with the foot pedal. Check to see that the punch is centered in the die.
7. In the event that the punch and die are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the die. When aligned, tighten the Pedestal Die Table bolts to secure the table.
8. Swing the stripper bar back in place allowing for minimal clearance between the top of the material and the bottom of the stripper and tighten the stripper bolts.

# ***Pedestal Die Tooling***

## ***Safe operation***

Please observe the following guidelines when operating the Punch Station.

- Read, understand and follow the punch size tolerances shown in Fig. 1 (page 11).
- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- The thickness of the material you are punching should not exceed the diameter of the punch being used.
- Follow manufacturer's punch and die operating clearance recommendations as shown on page 11.
- Check punch and die alignment after every tooling change or extended punch operation.
- Adjust the punch stripper supplied with your *CST* Ironworker to allow for material positioning and material stripping.
- Do not stack material to punch in the punching station.
- Use one or two drops of oil at the punch to aid in stripping material from the punch as well as to extend the life of the punch tooling.
- Punch complete holes only – partial holes will side load the punch tooling and could result in punch breakage and operator injury.
- Use punching aids when working with small items at the punch station.

# ***Pedestal Die Operation***

## ***Operation***

1. When familiar with the setup and safe operation of the Pedestal Die Tooling installed in the punch station, clear the punch station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be punched between the punch and die. Check to see that your material is spanning the stripper plate and that adequate material is available beyond the stripper area to safely position the material.
3. Clear your hands from the working area and depress the foot pedal to move the punch through the material and into the die.
4. When the punch is complete, release the foot pedal to automatically strip the material from the punch and return the punch to its neutral position.



# *Pipe Notcher Tooling*

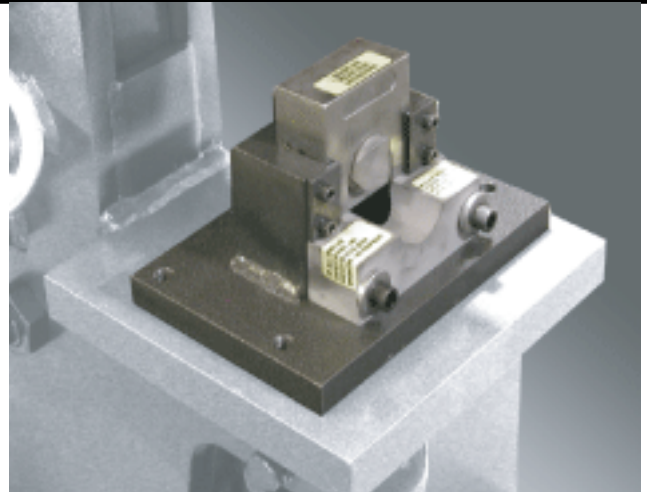
## *(Optional)*

Optional Pipe Notcher tooling will provide a distortion and burr free notch cut to mild steel pipe stock as listed in the Ironworker Accessories section of this Manual as well as described on the capacity labels positioned at the Pipe Notcher Station.

## *Setup*

Optional tooling and accessories fit within the open station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. Your Pipe Notcher Station is equipped with one, top notcher die and one, bottom notcher die. The top die is mounted within a spring loaded guide housing mounted to the tooling base. The bottom die attaches to the face of the guide housing and is machined with a saddle to aid in centering and guiding pipe sections into the die housing. The moving “center” of the Ironworker, pushes on the top Pipe Notcher blade via the accessory push block. If ordered as a factory installed option, your Pipe Notcher assembly is setup for immediate operation. If ordered as an option, the open cavity of the machine must be cleared of any existing tooling, material or debris prior to tooling installation. To setup your Pipe Notcher station please observe the following steps.

1. Remove all tooling and guarding from the open station.
2. Install the push block supplied with the Pipe Notcher assembly. Secure the push block with bolt provided.



3. Place the Pipe Notcher assembly on the Ironworker support table with the bottom die pointing away from the machine.
4. Loosely secure the table from the underside of the base with four 1/2” bolts and washers (provided).
5. Check for push block and top die alignment by powering on the machine and slowly inching down the push block to meet the top die with the foot pedal. Power the machine off.
6. In the event that the push block and top die are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the push block centerline to the top blade. When aligned, tighten the table bolts to secure the table.
7. Power the machine on and jog the center down. The pipe dies will close or bypass each other. The push block should not come in contact with the die housing.

## *Pipe Notcher Tooling*

### *Safe Operation*

Please observe the following guidelines when operating the Pipe Notcher Station.

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Keep the Pipe Notcher tooling clean. When dirt or metal chips accumulate, remove 5/16-18 x 1/2" limit screw located in the center at the rear of punch. Lift out punch holder and two springs. Clean holder with solvent or kerosene.
- Do not stack material to cut in the Pipe Notcher station.
- Perform complete notch operations only – partial notch cuts may jam the drop off side of the tooling and could result in breakage and operator injury.
- Use notching aids when working with small items at the notcher station.

## *Pipe Notcher Operation*

1. When familiar with the setup and safe operation of the Pipe Notcher Station clear the feed table of the notcher station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be notched on the feed table.
3. Push the material under the tooling guard and into the blade area. Position your material for the desired cut.
4. Clear your hands from the working area and depress the foot pedal to activate the notcher station. When the cut is complete, release the foot pedal to automatically return the top notcher blade to the neutral position.

# *Brake Tooling*

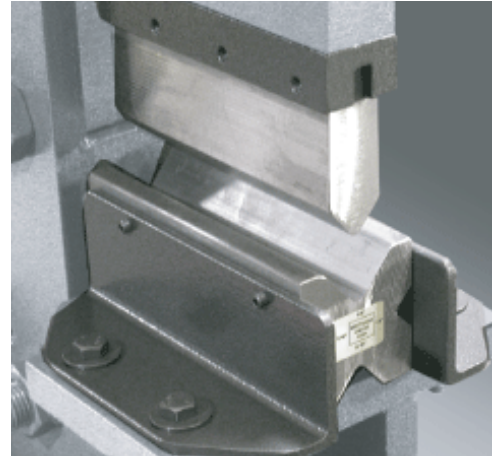
## *(Optional)*

Optional Brake tooling is available in 7", 8", 10" and 12" assemblies for your CST Ironworker. Brake tooling will allow for the bending of 1/16", 3/16", 1/8" and 1/4" flat, bar or angle stock up to 90 degrees. This tooling is most effective when ordered with the factory installed Electric Stroke Control feature.

## *Setup*

Brake tooling can be accommodated in either the open or punch station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. Your Brake tooling is equipped with one mounting bracket to secure the "punch" to the center of the machine, one "punch", one "4-way die", and two bottom brackets that secure the "die" to the base table. The moving "center" of the Ironworker, pushes the top punch into the shaped die to bend the specified material. If ordered as a factory installed option, your Brake assembly is setup for immediate operation. If ordered as an option, the open or punch station must be cleared of any existing tooling, material or debris prior to tooling installation. To setup your Brake, please observe the following steps.

1. Remove all tooling and guarding from the open or punch station.
2. Secure the Brake mounting bracket to the "center" with bolts provided. The 1/2" tapped hole is positioned to the outside of the machine.
3. Position punch in the bracket so that the milled relief in the keyway slips over the bracket bolt. Tighten set screws in the bracket to secure the punch.



4. Place the die assembly on the Ironworker support table.
5. Loosely secure the two support brackets to the support table from the underside of the base with four 1/2" bolts, nuts and washers (provided).
6. Check for punch and die alignment by powering on the machine and slowly inching down the punch to meet the bottom die with the foot pedal. Power the machine off.
7. In the event that the punch and die are not aligned, simply loosen the bolts under the table allowing the die block to be moved to center the punch. When aligned, tighten the table bolts to secure the table.
8. Select 1/16", 3/16", 1/8" or 1/4" test material for bending. Rotate your four-way die to your selected material thickness. Power the machine on and jog the center down until the punch pushes the sample material into the die. If the punch stops before the material has been formed to a 90 degree angle, a small steel shim must be placed between the die and support table.
9. Re-install all guarding to the machine prior to machine use.

## ***Brake Tooling***

### ***Safe Operation***

Please observe the following guidelines when operating the Brake Station.

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Keep the brake tooling clean.
- Check Brake clearance and alignment at every tooling change, maintenance cycle or extended Brake operation. Failure to maintain proper clearance may damage punch, die and support brackets or adjacent tooling.
- Brake material towards the center of the brake length.
- Do not stack material in the Brake station.
- Use Brake aids when working with small items at the Brake station.
- When not in use remove the Brake die from the holder.

## ***Brake Operation***

1. When familiar with the setup and safe operation of the Brake, clear the station of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and place the material to be “bent” on top of the bottom die.
3. Center your material within the length of the bottom die. Bending material to the front or back of the brake die may damage your Ironworker.
4. Position your material for the desired brake. Clear your hands from the working area and depress the foot pedal to activate the brake station.
5. When the brake operation is complete, release the foot pedal to return the punch to the neutral position.

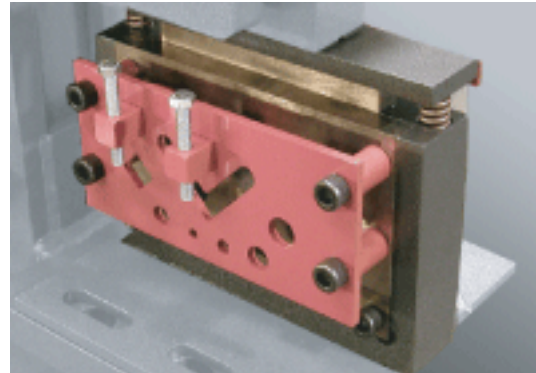
# Rod Shear / Multi-Shear Tooling

## (Optional)

Optional “bump-die” shear tooling is available for your *CST* Ironworker. Rod Shear or Multi-Shear Tooling will provide distortion and burr free cuts to mild steel rod, square, bar and small angle stock as listed in the Ironworker Accessories section of this Manual.

## Setup

Optional “bump-die” tooling and accessories fit within the open or punch stations of the machine. Verify recommended location per Ironworker model below. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. *CST* “bump-die” tooling consists of a housing which holds a stationary blade, a moving blade, return springs and a push block. The moving “center” of the Ironworker, pushes on the top moving blade via the push block to shear the material. If ordered as a factory installed option, your “bump-die” assembly is setup for immediate operation. If ordered as an option, the open or punch cavity of the machine must be cleared of any existing tooling, material or debris prior to tooling installation. To setup your Rod Shear or Multi-Shear Tooling please observe the following steps.



1. Identify install location:

|                               |                       |
|-------------------------------|-----------------------|
| 25 Ton                        | open station          |
| 40 Ton                        | open or punch station |
| 50 Ton                        | punch station         |
| 55 Ton                        | open or punch station |
| 65 Ton                        | punch station or open |
| 75 Ton                        | punch station         |
| 100 Ton                       | open or punch station |
| 100 Ton <small>Deluxe</small> | punch station         |
| 120 Ton                       | open cavity           |
2. Remove all tooling and guarding from the appropriate open, punch or open cavity station.
3. Place the “bump-die” assembly on the Ironworker support table with the push block in line with the moving center.
4. Loosely secure the table from the underside of the base with four 1/2” bolts and washers (provided).
5. Power the machine on and jog the center down. The moving blade will close or bypass the fixed blade. The push block should not come in contact with the die housing.

## ***Rod Shear/Multi-Shear***

### ***Safe Operation***

Please observe the following guidelines when operating any Rod Shear or Multi-Shear bump-die tooling

- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Keep the tooling clean.
- Check blade clearance and alignment at every tooling change, maintenance cycle or extended tooling operation. Maintain .010 clearance between blades at all times. Failure to maintain clearance will damage blades and support pockets.
- Do not stack cut material.
- Perform complete shearing operations only – partial cuts may jam the tooling and could result in breakage and operator injury.
- Use shearing aids when working with small items at the Rod Shear or Multi-Shear Tooling station.

## ***Rod Shear/Multi-Shear***

### ***Operation***

1. When familiar with the setup and safe operation of the Rod Shear or Multi-Shear Tooling, clear the work area of any tools or debris prior to powering the machine on.
2. When clear, power the machine up and insert material through the tooling guard and into the blade area.
3. Position your material for the desired cut. Clear your hands from the working area and depress the foot pedal to activate the tooling station.
4. When the cut is complete, release the foot pedal to automatically return the tooling to the neutral position.

# 241 Punch Tooling

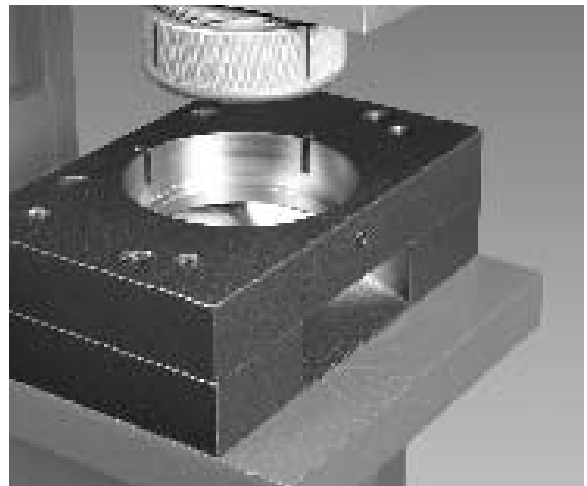
## *(Optional)*

Your Ironworker is capable of punching materials as listed in the Ironworker Specifications section of this Manual as well as described on the capacity labels positioned at the Punch Station. The punch station on the *CST* Ironworker allows for a wide variety of punching and stamping applications. Standard and custom tooling is available to allow for flange or leg down punching of standard angle sections. Refer to the accessory pages of your manual for further information.

## *Setup*

Optional tooling and accessories fit within the open or standard punch station of the machine. When changing any tooling, always wear protective safety glasses and make sure the machine is turned off. Failure to power down your machine could result in injury to the operator performing the work. To setup your 241 Punch Tooling please observe the following steps.

1. Remove the standard punch stripper from the ironworker frame, punch holder from the operating center and the standard die table from the support table base.
2. Secure the 241 punch holder to the operating center by first removing the stem from the holder. Place the holder to the operating center with the tapped hole positioned to the outside of the center. Install holder with two 1/2" SHCS bolts and tighten. Install stem to holder with four 3/8" SHCS bolts and tighten.
3. Place the 241 die table and slug chute on the support table base and loosely install four 1/2" bolts (provided) through the underside of the support table into the 241 die table.



4. Install new oversize die and tighten set screw. If loading a shaped die, align the pin and tighten the set screw.
5. Install new 241 punch and tighten with spanner wrench. If using a shaped punch, align the locating keystock of the punch with the corresponding slot within the punch stem assembly and tighten the punch nut with the wrench.
6. Check for punch and die alignment by powering up the machine and slowly inching down the punch to meet the die with the foot pedal. Check to see that the punch is centered in the die.
7. In the event that the punch and die are not aligned, simply loosen the bolts under the table allowing the table to be moved to center the die. When aligned, tighten the table bolts to secure the table.
8. Install and secure the 241 stripper bar to the ironworker frame allowing for minimal clearance between the top of the material to be punched and the bottom of the stripper.

# 241 Punch Tooling

# Operation

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## Safe Operation

Please observe the following guidelines when operating the 241 Punch Station.

- Always use safety glasses and factory supplied guards when operating your Ironworker.
- Read, understand and follow the punch size tolerances shown in Fig. 1 (page 11).
- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- The thickness of the material you are punching should not exceed the diameter of the punch being used .
- Follow manufacturer’s punch and die operating clearance recommendations as shown on page 11.
- Check punch and die alignment after every tooling change or extended punch operation.
- Adjust the punch stripper supplied with your *CST* Ironworker to allow for material positioning and material stripping.
- Do not stack material to punch in the punching station.
- Use one or two drops of oil at the punch to aid in stripping material from the punch as well as to extend the life of the punch tooling.
- Punch complete holes only – nibbling of holes will side load the punch tooling and could result in punch breakage and operator injury.
- Use punching aids when working with small items at the punch station.

1. When familiar with the setup and safe operation of the oversize punch station, clear the punch station of any tools or debris prior to powering the machine on.

2. When clear, power the machine up and place the material to be punched between the punch and die.

3. Check to see that your material is spanning the stripper plate and that adequate material is available beyond the stripper area to safely position the material.

4. Clear your hands from the working area and depress the foot pedal to move the punch through the material and into the die. When the punch is complete, release the foot pedal to automatically strip the material from the punch and return the punch to its neutral position.



## *(Standard/Optional)*

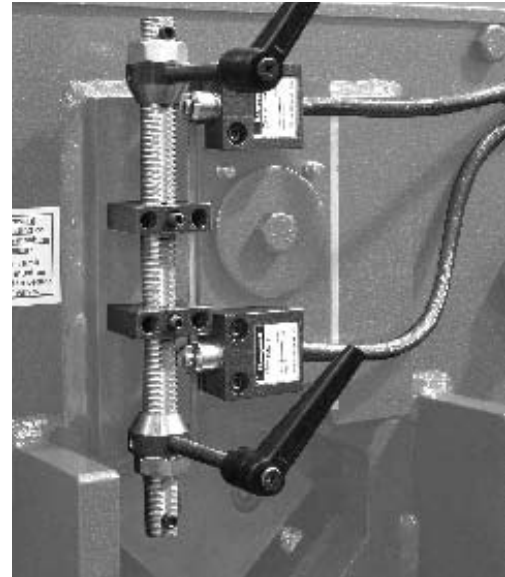
Electric stroke control is standard on both the 100 Ton Deluxe and 120 Ton. This is also an available option on all machines within the *CST* Ironworker line. Stroke control enables the Ironworker operator to shorten up and down stroke with minor adjustment of two hand screws. Utilize stroke control to control precision bending with your brake tooling, control stroke when using embossing or bump dies or simply increase production from your punch, notch or shear stations.

## **Setup**

Stroke control is currently offered only as a factory installed option and arrives fully setup for immediate use. Always wear protective safety glasses and make sure the machine is turned off when adjusting the electric stroke control option. Failure to power down your machine could result in injury to the operator performing the work.

**Safe Operation** Please observe the following guide-lines when adjusting the electric stroke control function.

- Always use safety glasses and factory supplied guards when operating your Ironworker.
- Read, understand and follow punching, notching and shearing tolerances as described in related chapters of this manual.
- Never exceed the capacities of the machine or tooling as described in the Ironworker specifications or listed at the tooling station.
- Keep limit switches free of dirt and grime.
- Never remove stroke retention nuts from factory setting.
- Never reverse stroke limit switches.



## **Set**

*upstroke for rapid cycling of your punching, shearing and notching stations.*

- Power machine on and use the jog function of your electric foot pedal to bring tooling down to rest just above the material being worked.
- Turn machine off.
- Adjust upper handle with tapered collar to engage limit switch.
- Power machine on. Tooling will stay in set position.
- Remove material from tooling station and cycle machine. Tooling should return to pre-set position.
- Place material in tooling station and cycle machine.

## *Set downstroke for bump die operation*

- Power machine on and use the jog function of your electric foot pedal to bring ram down to engage tooling. Jog ram to push bump die tooling to the specified depth.
- Turn machine off.
- Adjust lower handle with tapered collar to engage limit switch.

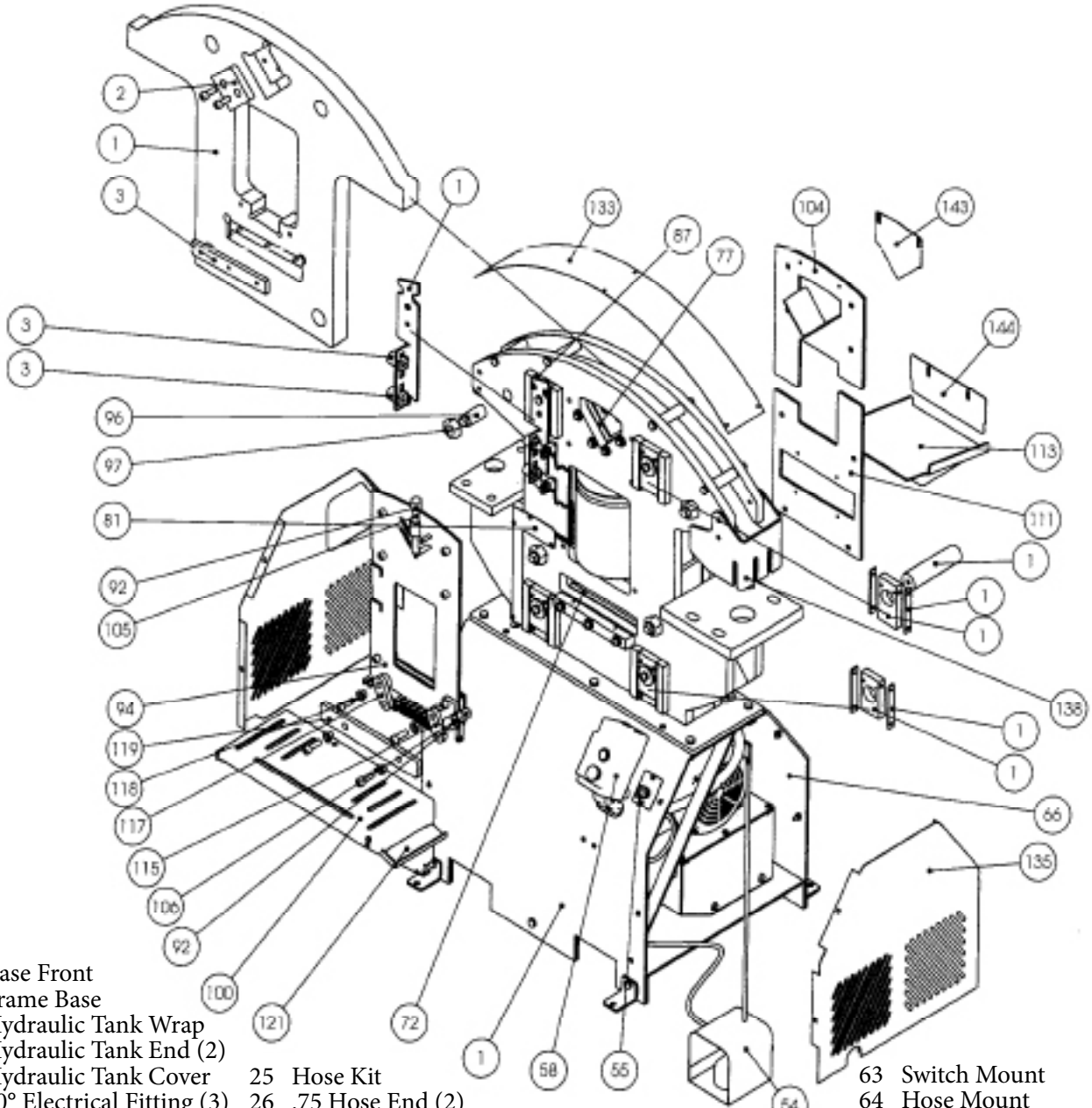
# Troubleshooting

Your *CST* Ironworker is designed for years of trouble-free use. In the event of operational problems please refer to the following troubleshooting strategies prior to contacting *The Cleveland Steel Tool Co.* All remedial actions are to be performed with the Ironworker powered off and power to the hydraulic supply turned off.

| Problem   | Solution   |
|---|--|
| Machine runs but will not cycle   | Check rotation of motor<br>Check correct amp/voltage to machine<br>Check drive key is in place<br>Check foot pedal cable obstruction   |
| Machine cycles down but will not return to neutral position                         | Check rotation of motor<br>Check return spring at valve<br>Check foot pedal linkage  |
| Machine turns off after short time in use   | Check correct amp/voltage to machine   |
| Electric stroke option malfunction  | Check correct amp/voltage to machine<br>Check fuse at starter box<br>Check fuse at transformer box<br>Check for loose microswitch connections<br>Check for damaged microswitch   |
| Distortion of small angle shear cut   | Check radius orientation of blade  |
| Brass shavings below gib-pins and slides during the break-in period and after blade | Brass shavings are common and expected maintenance   |
| Hydraulics feel hot after operation   | Hydraulic system operates within the 160 – 190 degree range  |
| Shear blades or punch and die do not close completely                               | Check for notch tooling obstruction<br>Check for brake tooling obstruction   |
| Punch and die misalignment  | Check that punch is tight in holder<br>Check that punch stud is secure in block<br>Check for table alignment   |
| Machine will not complete punch or shear operation                                  | Check tonnage of machine rating against steel hardness and thickness<br>Check for work station obstruction<br>Check foot pedal linkage<br>Check hydraulic fluid level<br>Check slides for wear or obstruction<br>Check electric stroke control option<br>Check die support plate |
| Hydraulic oil overflow/foaming at breather cap                                      | Check hydraulic fluid level<br>Check for loose hose coupling   |

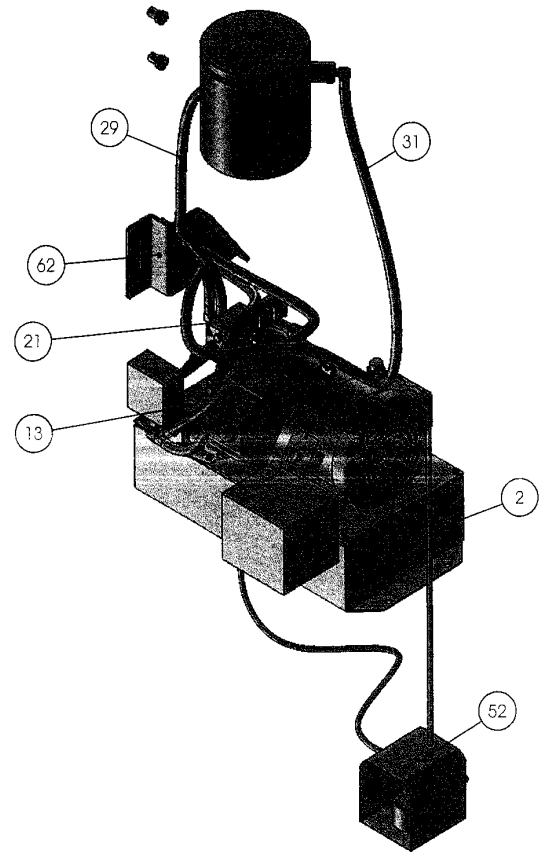
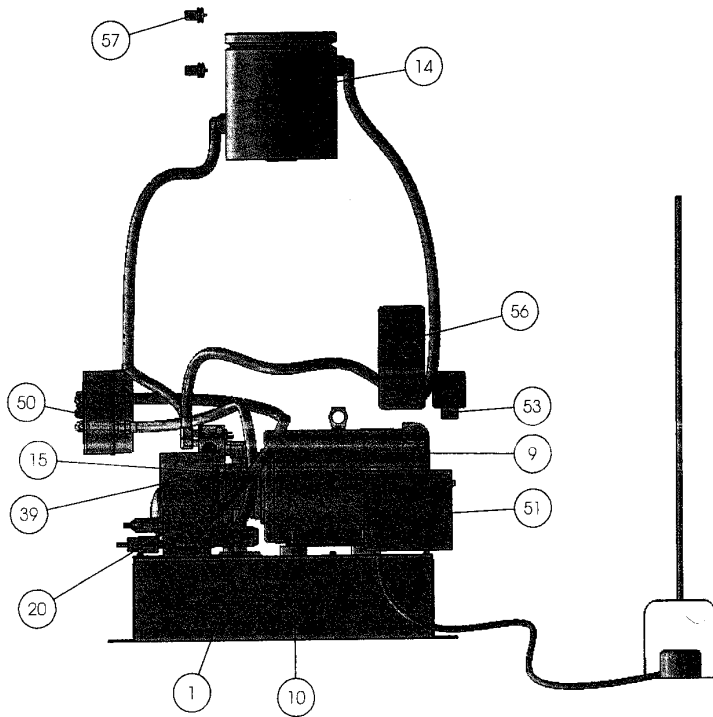


# *40 Ton Ironworker Parts List*



- |                              |                               |                                 |                             |
|------------------------------|-------------------------------|---------------------------------|-----------------------------|
| 1 Base Front                 | 25 Hose Kit                   | 51 Fitting Hose Kit             | 63 Switch Mount             |
| 2 Frame Base                 | 26 .75 Hose End (2)           | 52 Acc. Wire Kit (3)            | 64 Hose Mount               |
| 3 Hydraulic Tank Wrap        | 27 Bulk Head Hose Kit (2)     | 53 6 x 6 Electrical Box         | 65 Switch Mount Plate       |
| 4 Hydraulic Tank End (2)     | 28 Bulk Head Nut Hose Kit (2) | 54 Electric Foot Control        | 66 Base Back                |
| 5 Hydraulic Tank Cover       | 29 Coupler Male               | 55 Switch                       | 67 Base Doubler Plate       |
| 6 90° Electrical Fitting (3) | 30 Coupler Female             | 56 Elec. Kit 7                  | 68 Shipping Leg Bracket (4) |
| 7 4" Pipe                    | 31 Hose Kit                   | 57 Starter to Power Supply Box  | 69 Box Mount Bracket        |
| 8 Pipe Coupler 1.00 (2)      | 32 Fitting Hose Kit (8)       | 58 Starter Box                  | 70 Base Top Plate           |
| 9 1.5 Pipe Nipple            | 33 Hose Kit                   | 59 Elec. Kit (2)                | 71 Gommel (2)               |
| 10 9" Pipe                   | 34 Fitting Hose Kit           | 60 Elec. Kit (4)                | 72 Bottom Blade (2)         |
| 11 5HP 220/440V              | 35 Hose Kit                   | 61 Hex Bolt (4)                 | 73 Front Frame              |
| 12 Motor Mount (4)           | 36 Hose Kit                   | 62 Hex Washer Head Self Tap(16) | 74 Stand Off Gusset (2)     |
| 13 Hex Nut 3/8 (4)           | 37 Electric Kit Wire 2        |                                 | 75 Stand Off Gusset (2)     |
| 14 Flange Kit                | 38 Electric Kit               |                                 | 76 Flat Blade Support       |
| 15 Hydraulic Valve           | 39 Fitting Hose Kit           |                                 | 77 Bottom Angle Blade (2)   |
| 16 Hydraulic Cylinder        | 40 Acc Wire Kit               |                                 | 78 Angle Blade Support      |
| 17 Hydraulic Pump            | 41 4 x 4 Acc. Electrical Box  |                                 | 79 Stand Off (4)            |
| 18 Socket Cap Bolt (12)      | 42 Acc. Wire Kit              |                                 | 80 Filler Guard             |
| 19 Filter Head               | 43 Acc. Wire Kit              |                                 | 81 Wire Guard               |
| 20 Filter Short              | 44 Acc. Wire Kit              |                                 | 82 Center                   |
| 21 Fill Cap Oil              |                               |                                 |                             |
| 22 Valve Mount Bracket       |                               |                                 |                             |
| 23 Hydraulic Valve           |                               |                                 |                             |
| 24 Hose Kit                  |                               |                                 |                             |

# 40 Ton Hydraulic Replacement Parts



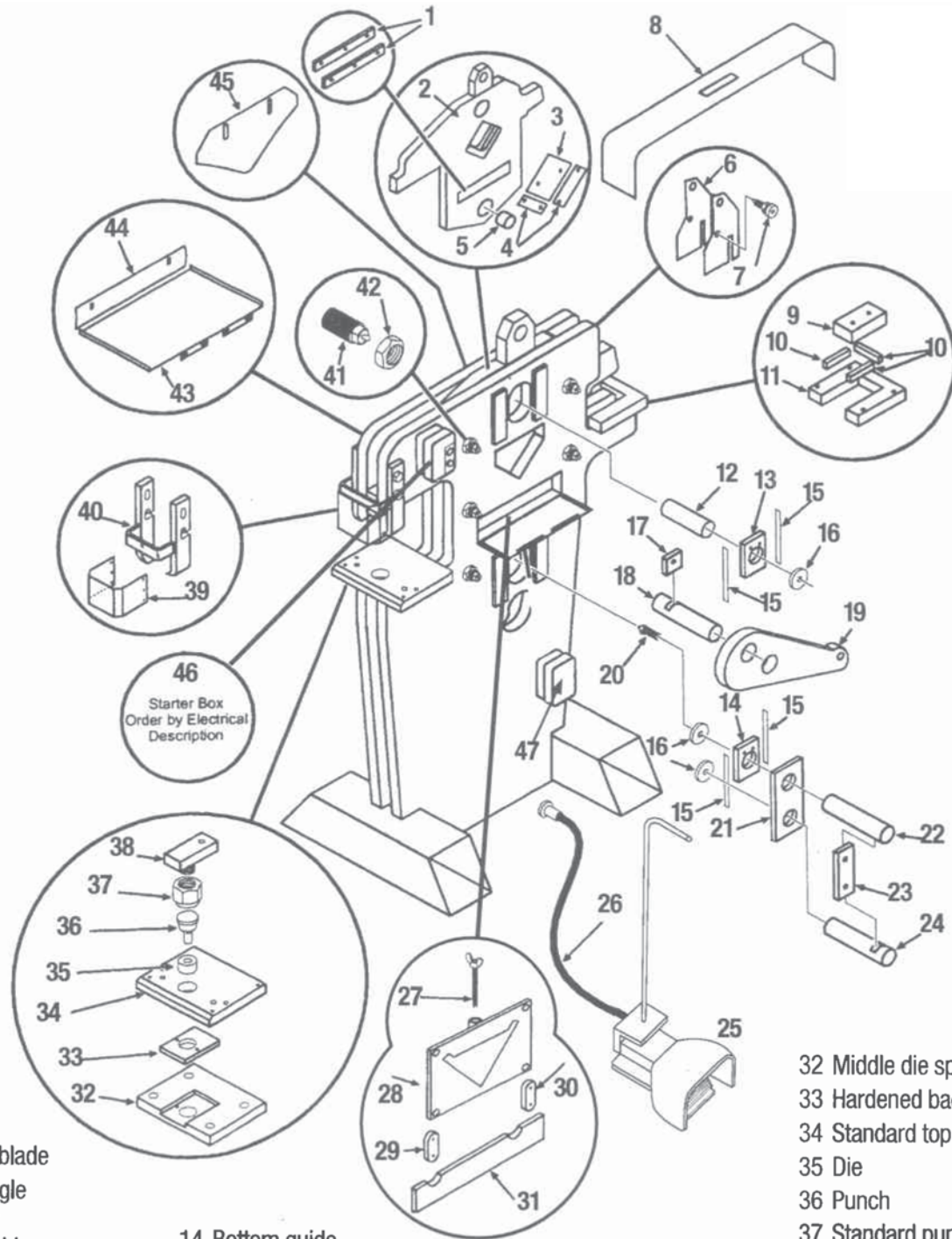
Continued.....

- 83 Center Angle Blade
- 84 Socket Cap Bolt (20)
- 85 Frame Back
- 86 Guide Pin (4)
- 87 Guide Block Top
- 88 Brass Slide Insert (16)
- 89 Vertical Slide Support (16)
- 90 Stroke Control Bracket
- 91 T Nut 3/8 (2)
- 92 Knob (4)
- 93 Pin Washer (7)
- 94 Front Guard
- 95 Stroke Control Bracket (2)
- 96 Steel Gib Plug, Greaseless (8)
- 97 Nut Gib Pins (8)
- 98 Guard Spacer
- 99 Pocket Gusset

- 100 Feed Table
- 101 Guard Spacer
- 102 Flat Hold Bracket
- 103 Holddown Sleeve (2)
- 104 Guard Top Back
- 105 Threaded Holddown 6.00
- 106 Threaded Holddown 3.75
- 107 Push Block
- 108 Push Block Clamp Bar (2)
- 109 Cylinder Retainer (2)
- 110 Back Guard Spacer
- 111 Guard Back Lower
- 112 Back Guard Spacer
- 113 Drop Chute
- 114 Drop Chute Bracket
- 115 Rt. Swing Link

- 116 Spacer
- 117 Lt. Swing Link
- 118 Bushing Swing Link (4)
- 119 Flat Hold Down
- 120 Tool Tray
- 121 Tool Tray
- 122 Starter Mount 1/4" (3)
- 123 Set Screw .375 (2)
- 124 Angle Drop
- 125 Hex Bolt .500 (24)
- 126 Spring Hook
- 127 .500 Hex Nut (11)
- 128 Button Head .25 (20)
- 129 Hex Bolt
- 130 Flat Head Cap Bolt (4)

# 50 Ton Ironworker Parts List



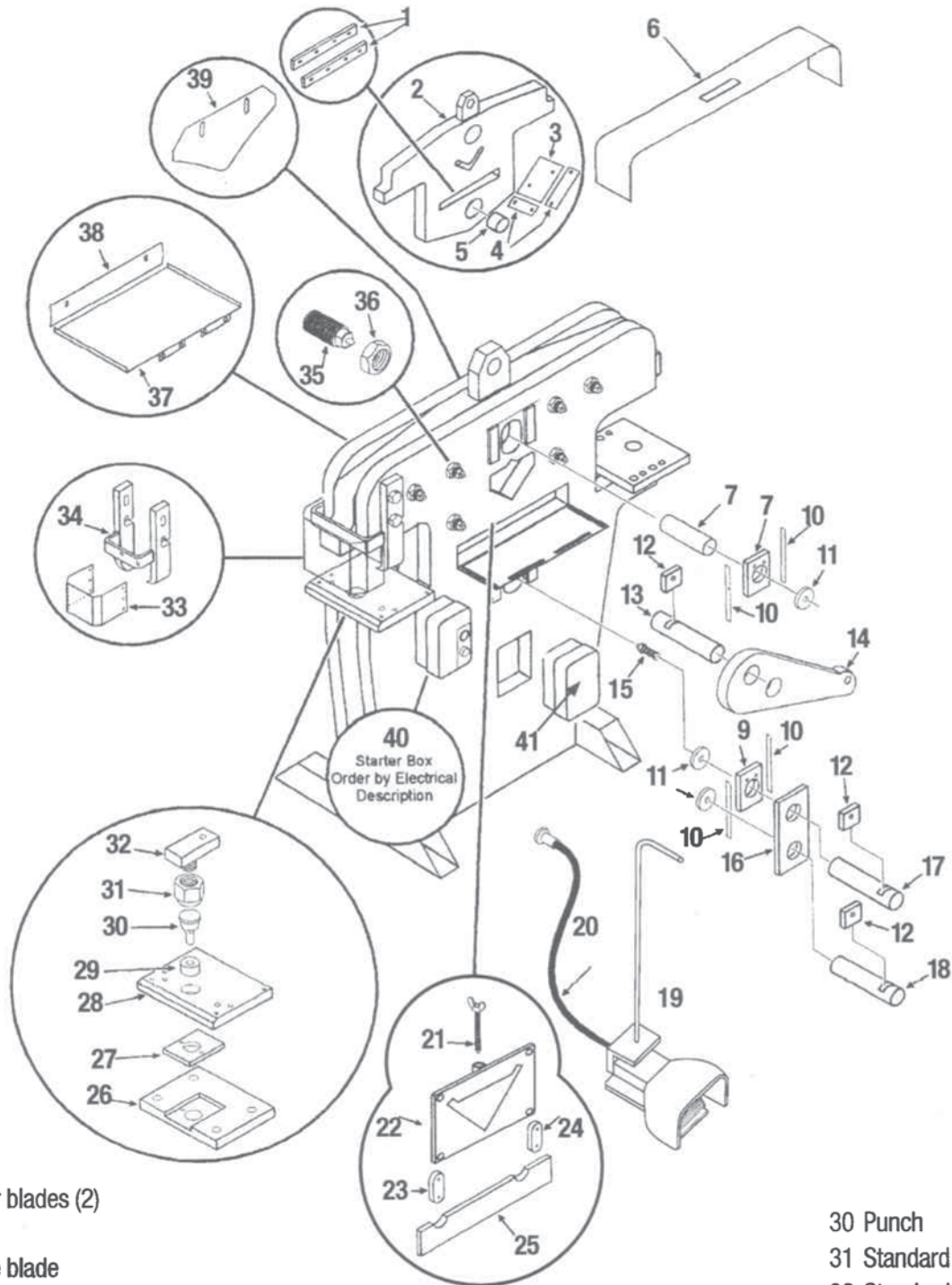
- 1 Bar shear blades (2)
- 2 Center
- 3 Top angle blade
- 4 Bottom angle blades (2)
- 5 Spring bushing
- 6 Notcher guard
- 7 Notcher guard plunger bolt
- 8 Top cover
- 9 Top notcher blade
- 10 Bottom notcher blades (3)
- 11 Notcher table
- 12 Top guide pin
- 13 Top guide blocks (2)

- 14 Bottom guide blocks (2)
- 15 Brass slides (8)
- 16 Flat washer (4)
- 17 Retainer block (small)
- 18 Whale pivot pin
- 19 Whale assembly
- 20 Grease bolt
- 21 Link (2)
- 22 Top link pin
- 23 Retainer block (large)
- 24 Bottom link pin
- 25 Electric foot pedal
- 26 Pedal cable
- 27 Angle hold-down screw
- 28 Angle rest
- 29 Hold-down hinge
- 30 Hold-down hinge
- 31 Hold-down bar

- 32 Middle die spacer plate
- 33 Hardened backup plate
- 34 Standard top die plate
- 35 Die
- 36 Punch
- 37 Standard punch nut
- 38 Standard punch holder
- 39 Punch shield
- 40 Punch stripper
- 41 Gib pin (12)
- 42 Jam nut (12)
- 43 Drop off table
- 44 Bar shear guard
- 45 Angle guard
- 46 Starter box
- 47 Electrical box



# 55 Ton Ironworker Parts List



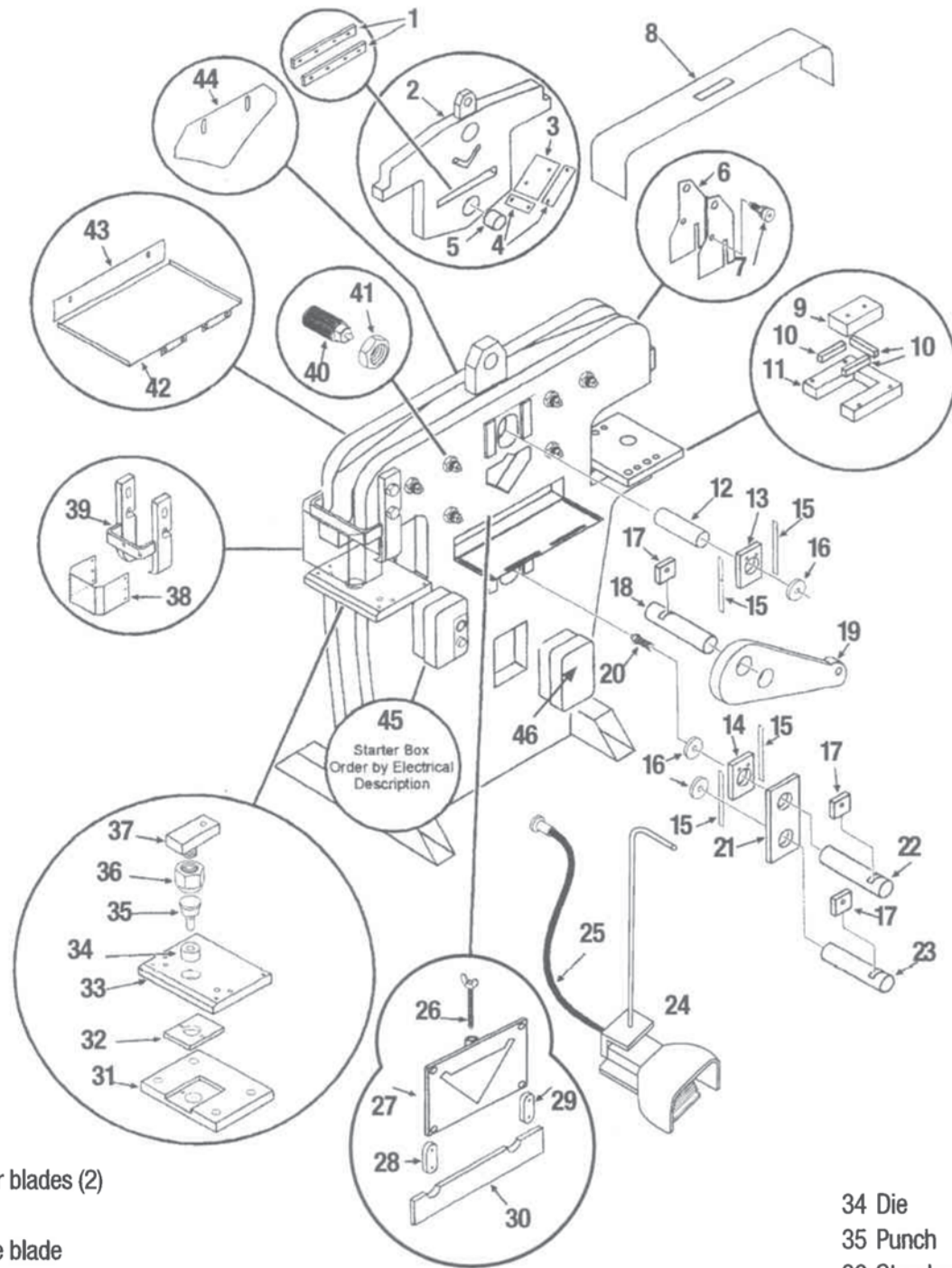
- 1 Bar shear blades (2)
- 2 Center
- 3 Top angle blade
- 4 Bottom angle blades (2)
- 5 Spring bushing
- 6 Top cover
- 7 Top guide pin
- 8 Top guide blocks (2)
- 9 Bottom guide blocks (2)
- 10 Brass slides (8)
- 11 Flat washer
- 12 Retainer block (small)
- 13 Whale pivot pin

- 14 Whale assembly
- 15 Grease bolt
- 16 Link (2)
- 17 Top link pin
- 18 Bottom link pin
- 19 Electric foot pedal
- 20 Pedal cable
- 21 Angle hold-down screw

- 22 Angle rest
- 23 Hold-down hinge
- 24 Hold-down hinge
- 25 Hold-down bar
- 26 Middle die spacer plate
- 27 Hardened backup plate
- 28 Standard top die plate
- 29 Die

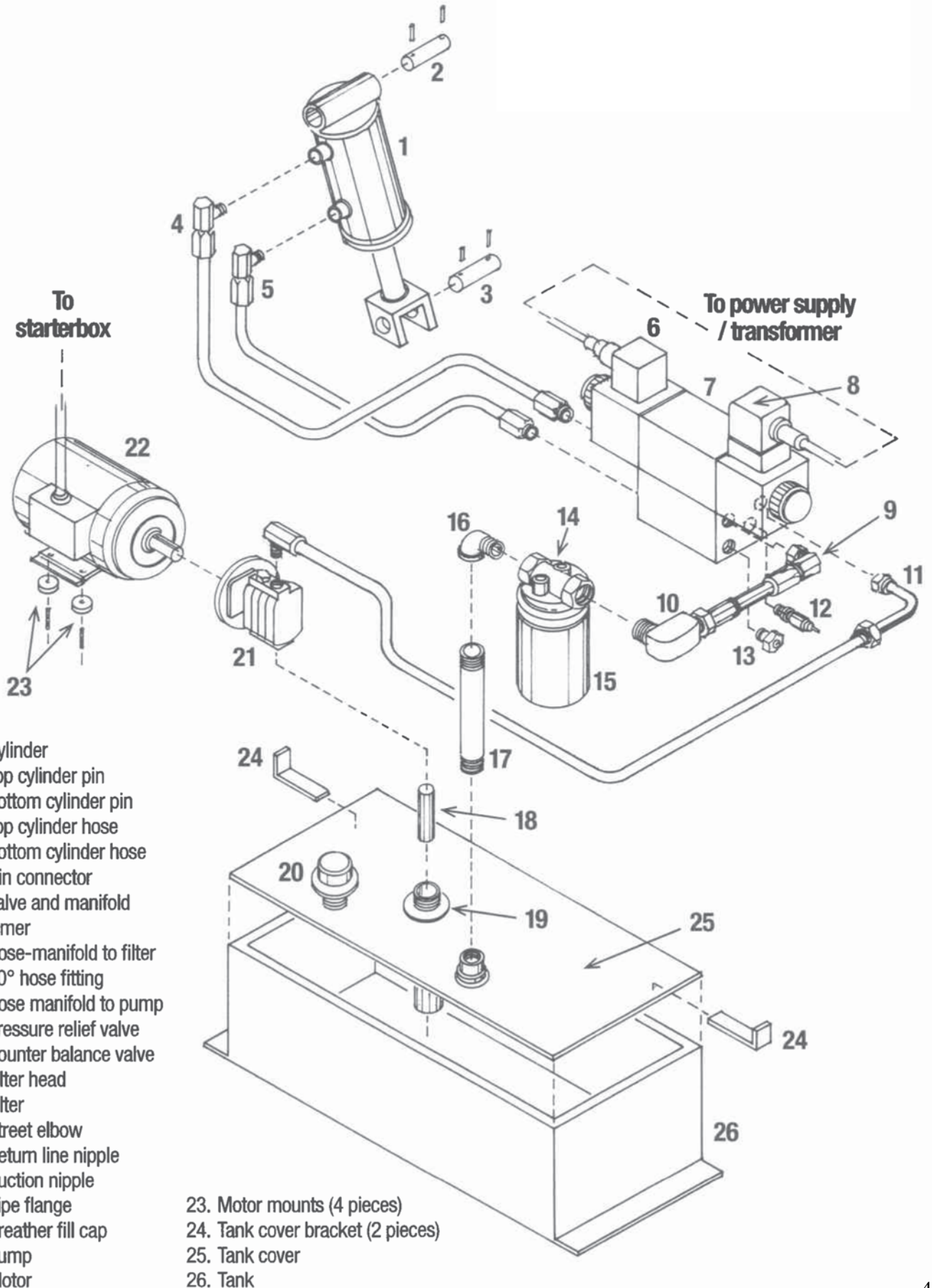
- 30 Punch
- 31 Standard punch nut
- 32 Standard punch holder
- 33 Punch shield
- 34 Punch stripper
- 35 Gib pin (12)
- 36 Jam nut (12)
- 37 Drop off table
- 38 Bar shear guard
- 39 Angle guard
- 40 Starter box
- 41 Electrical box

# 60 Ton Ironworker Parts List



- |                              |                            |                            |                          |
|------------------------------|----------------------------|----------------------------|--------------------------|
| 1 Bar shear blades (2)       |                            |                            |                          |
| 2 Center                     |                            |                            |                          |
| 3 Top angle blade            |                            |                            |                          |
| 4 Bottom angle blades (2)    |                            |                            |                          |
| 5 Spring bushing             | 14 Bottom guide blocks (2) | 24 Electric foot pedal     | 34 Die                   |
| 6 Notcher guard              | 15 Brass slides (8)        | 25 Pedal cable             | 35 Punch                 |
| 7 Notcher guard plunger bolt | 16 Flat washer             | 26 Angle hold-down screw   | 36 Standard punch nut    |
| 8 Top cover                  | 17 Retainer block          | 27 Angle rest              | 37 Standard punch holder |
| 9 Top notcher blade          | 18 Whale pivot pin         | 28 Hold-down hinge         | 38 Punch shield          |
| 10 Bottom notcher blades (3) | 19 Whale assembly          | 29 Hold-down hinge         | 39 Punch stripper        |
| 11 Notcher table             | 20 Grease bolt             | 30 Hold-down bar           | 40 Gib pin (12)          |
| 12 Top guide pin             | 21 Link (2)                | 31 Middle die spacer plate | 41 Jam nut (12)          |
| 13 Top guide blocks (2)      | 22 Top link pin            | 32 Hardened backup plate   | 42 Drop off table        |
|                              | 23 Bottom link pin         | 33 Standard top die plate  | 43 Bar shear guard       |
|                              |                            |                            | 44 Angle guard           |
|                              |                            |                            | 45 Starter box           |
|                              |                            |                            | 46 Electrical box        |

# 50/55/60 Ton Hydraulic Replacement Parts

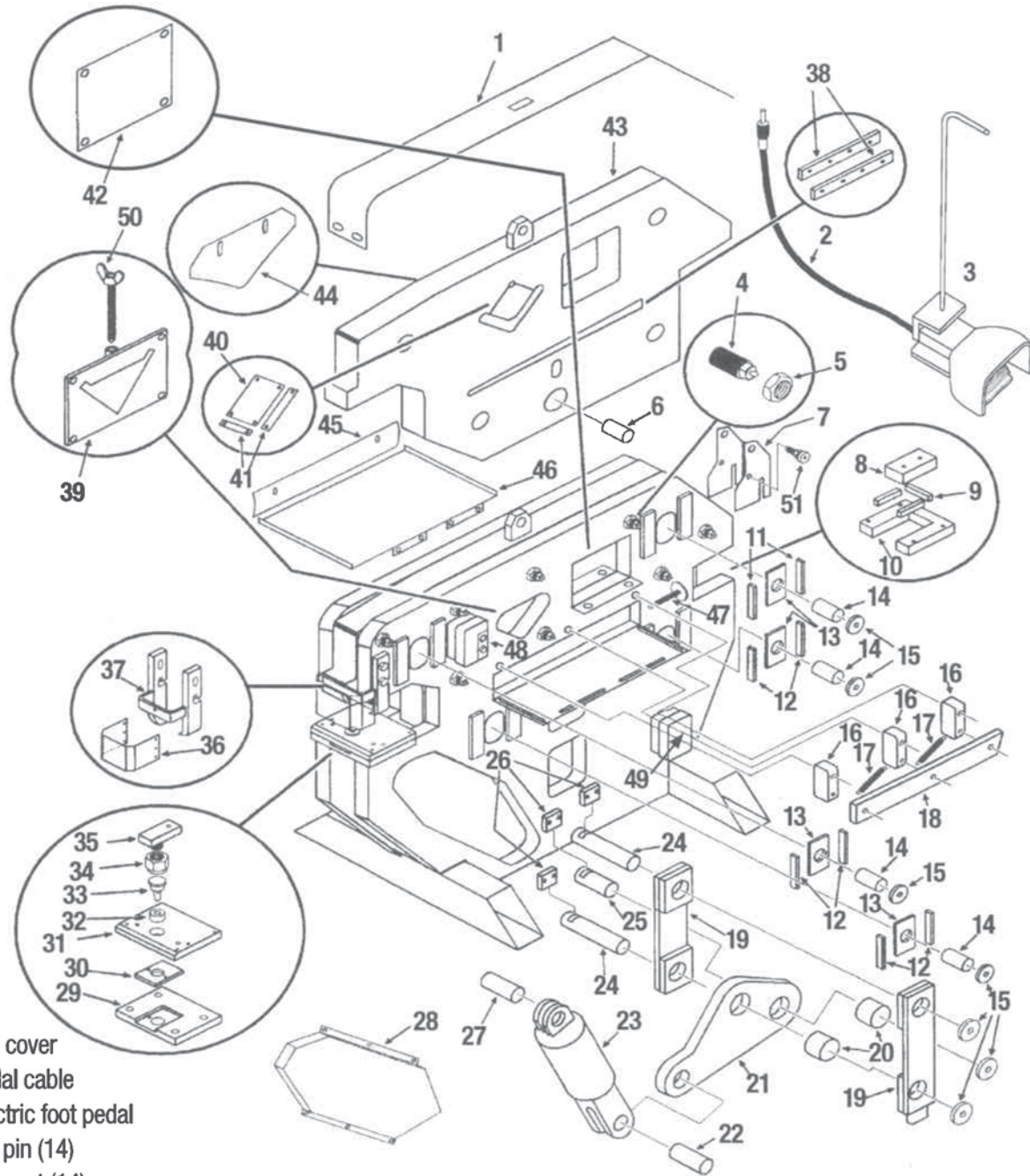


- 1. Cylinder
- 2. Top cylinder pin
- 3. Bottom cylinder pin
- 4. Top cylinder hose
- 5. Bottom cylinder hose
- 6. Din connector
- 7. Valve and manifold
- 8. Timer
- 9. Hose-manifold to filter
- 10. 90° hose fitting
- 11. Hose manifold to pump
- 12. Pressure relief valve
- 13. Counter balance valve
- 14. Filter head
- 15. Filter
- 16. Street elbow
- 17. Return line nipple
- 18. Suction nipple
- 19. Pipe flange
- 20. Breather fill cap
- 21. Pump
- 22. Motor

- 23. Motor mounts (4 pieces)
- 24. Tank cover bracket (2 pieces)
- 25. Tank cover
- 26. Tank

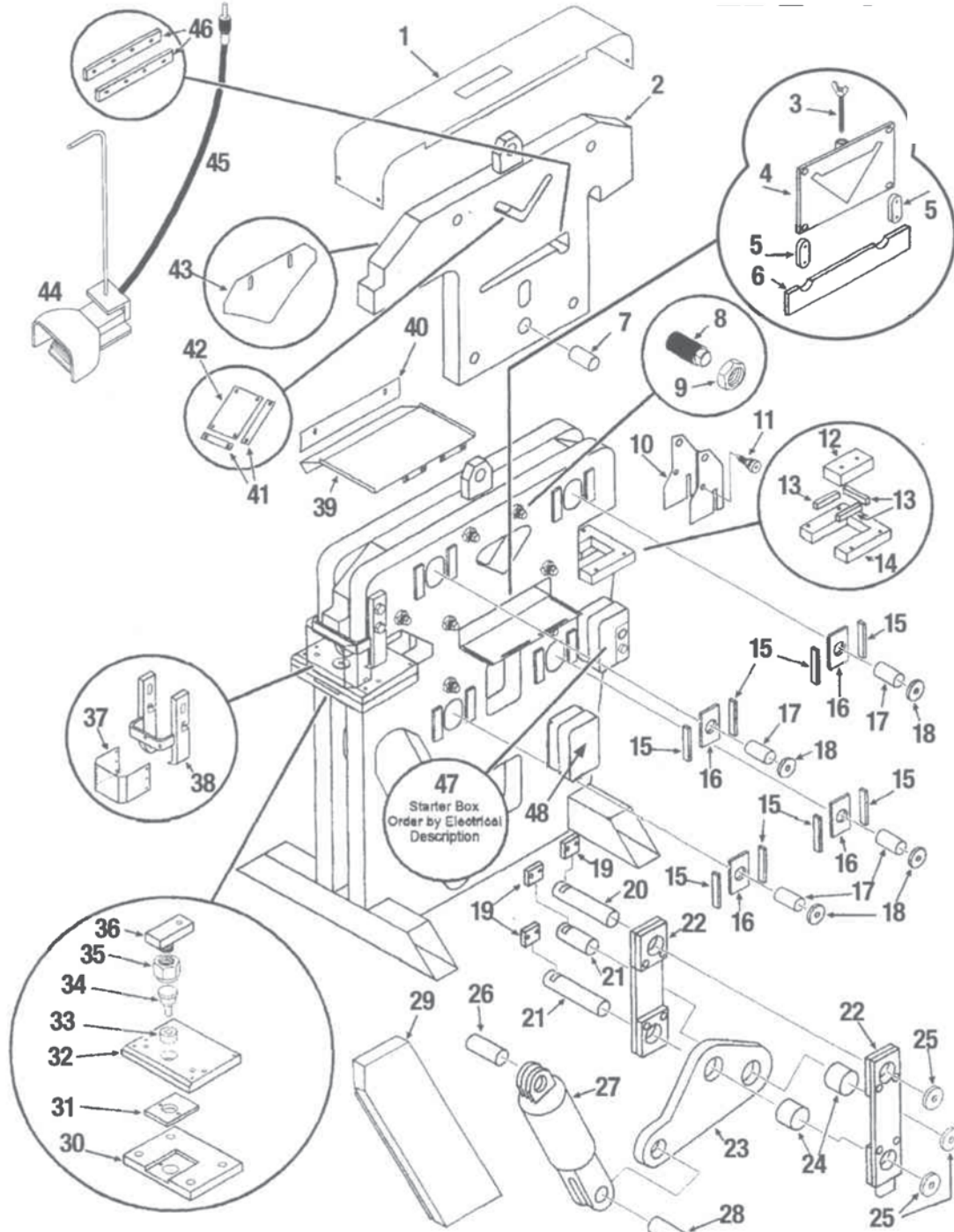


# 65 Ton Ironworker Parts List



- |  |                           |                            |
|--|---------------------------|----------------------------|
| 1 Top cover  | 16 Hold-down hinge        | 28 Cylinder cover          |
| 2 Pedal cable                                      | 17 Hold-down spring (3)   | 29 Middle die spacer plate |
| 3 Electric foot pedal                              | 18 Hold-down bar          | 30 Hardened backup plate   |
| 4 Gib pin (14)                                     | 19 Link (2)               | 31 Standard top die plate  |
| 5 Jam nut (14)                                     | 20 Spring bushing         | 32 Die                     |
| 6 Spring bushing                                   | 21 Whale assembly         | 33 Punch                   |
| 7 Notcher guard                                    | 22 Cylinder pin (bottom)  | 34 Standard punch nut      |
| 8 Top notcher blade                                | 23 Cylinder               | 35 Standard punch holder   |
| 9 Bottom notcher blades (3)                        | 24 Top link pin           | 36 Punch shield            |
| 10 Notcher table                                   | 25 Whale pin              | 37 Punch stripper          |
| 11 Brass slides                                    | 26 Pin retainer block (3) | 38 Bar shear blades (2)    |
| 12 Brass slides                                    | 27 Cylinder pin (top)     | 39 Angle rest              |
| 13 Top guide blocks (4)<br>Bottom guide blocks (4) |                           | 40 Top angle blade         |
| 14 Guide pin                                       |                           | 41 Bottom angle blades (2) |
| 15 Flat washer (4)                                 |                           | 42 Open station cover (2)  |
|  |                           | 43 Center                  |
|  |                           | 44 Angle guard             |
|  |                           | 45 Bar shear guard         |
|  |                           | 46 Drop off table          |
|  |                           | 47 Hold-down handwheel     |
|  |                           | 48 Starter box             |
|  |                           | 49 Electrical box          |
|  |                           | 50 Angle hold-down screw   |

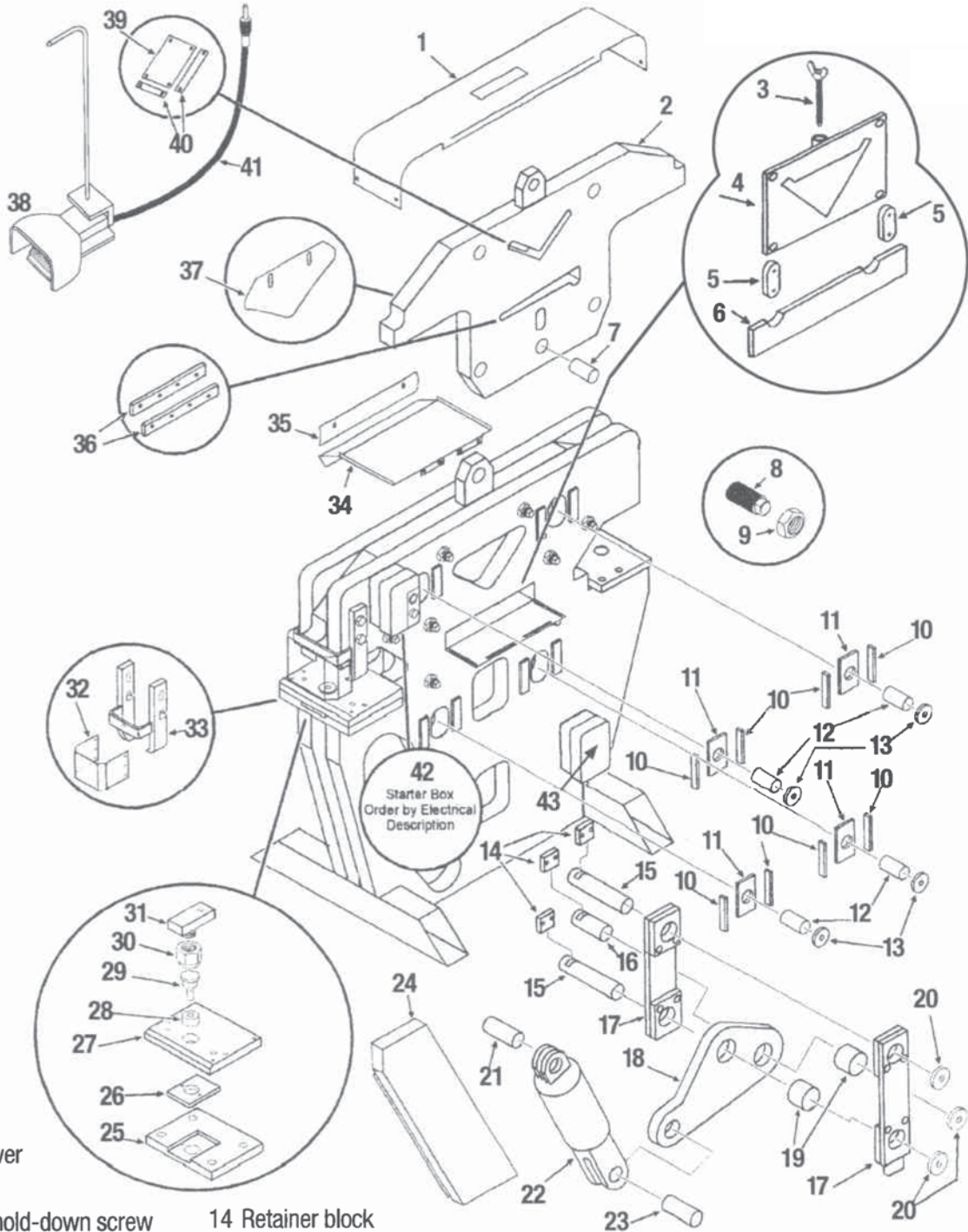
# 75 Ton Ironworker Parts List



- |                               |                              |                            |                            |
|-------------------------------|------------------------------|----------------------------|----------------------------|
| 1 Top cover                   | 13 Bottom notcher blades (3) | 25 3-1/2" Flat washer      | 37 Punch shield            |
| 2 Center                      | 14 Notcher table             | 26 Top cylinder pin        | 38 Punch stripper          |
| 3 Angle hold-down screw       | 15 Brass slides (16)         | 27 Hydraulic cylinder      | 39 Drop off table          |
| 4 Angle rest                  | 16 Guide blocks (8)          | 28 Bottom cylinder pin     | 40 Bar shear guard         |
| 5 Hold-down hinges            | 17 Guide pin (4)             | 29 Cylinder cover          | 41 Bottom angle blades (2) |
| 6 Hold-down bar               | 18 Flat washer               | 30 Middle die spacer plate | 42 Top angle blade         |
| 7 Spring bushing              | 19 Retainer block            | 31 Hardened backup plate   | 43 Angle guard             |
| 8 Gib pin (18)                | 20 Bottom link pin           | 32 Standard top die plate  | 44 Electric foot pedal     |
| 9 Jam nut (18)                | 21 Whale pivot pin           | 33 Die                     | 45 Pedal cable             |
| 10 Notcher guard              | 22 Link (2)                  | 34 Punch                   | 46 Bar shear blades (2)    |
| 11 Notcher guard plunger bolt | 23 Whale assembly            | 35 Standard punch nut      | 47 Starter box             |
| 12 Top notcher blade          | 24 Spring bushing            | 36 Standard punch holder   | 48 Electrical box          |

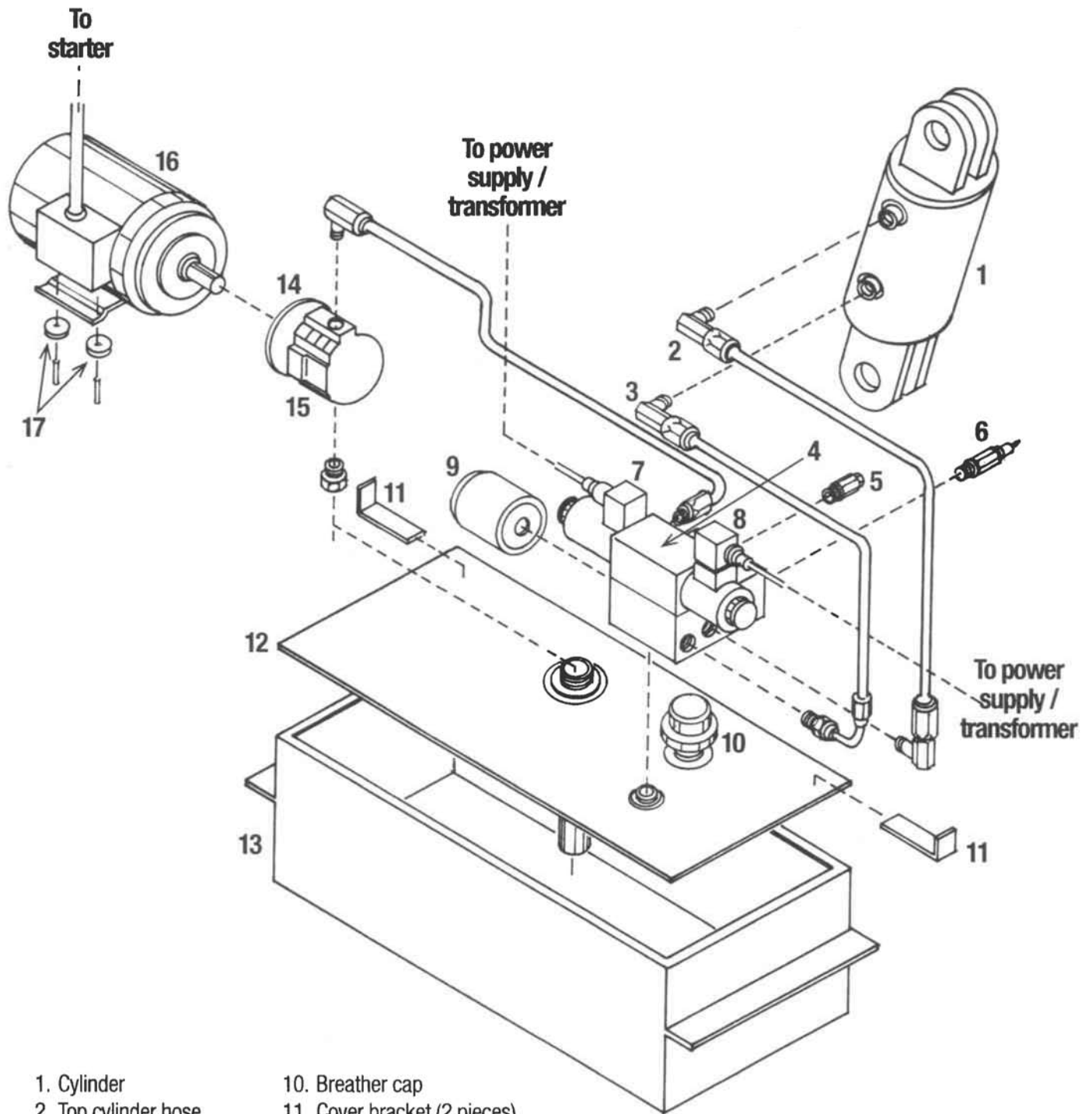


# 100 Ton Ironworker Parts List



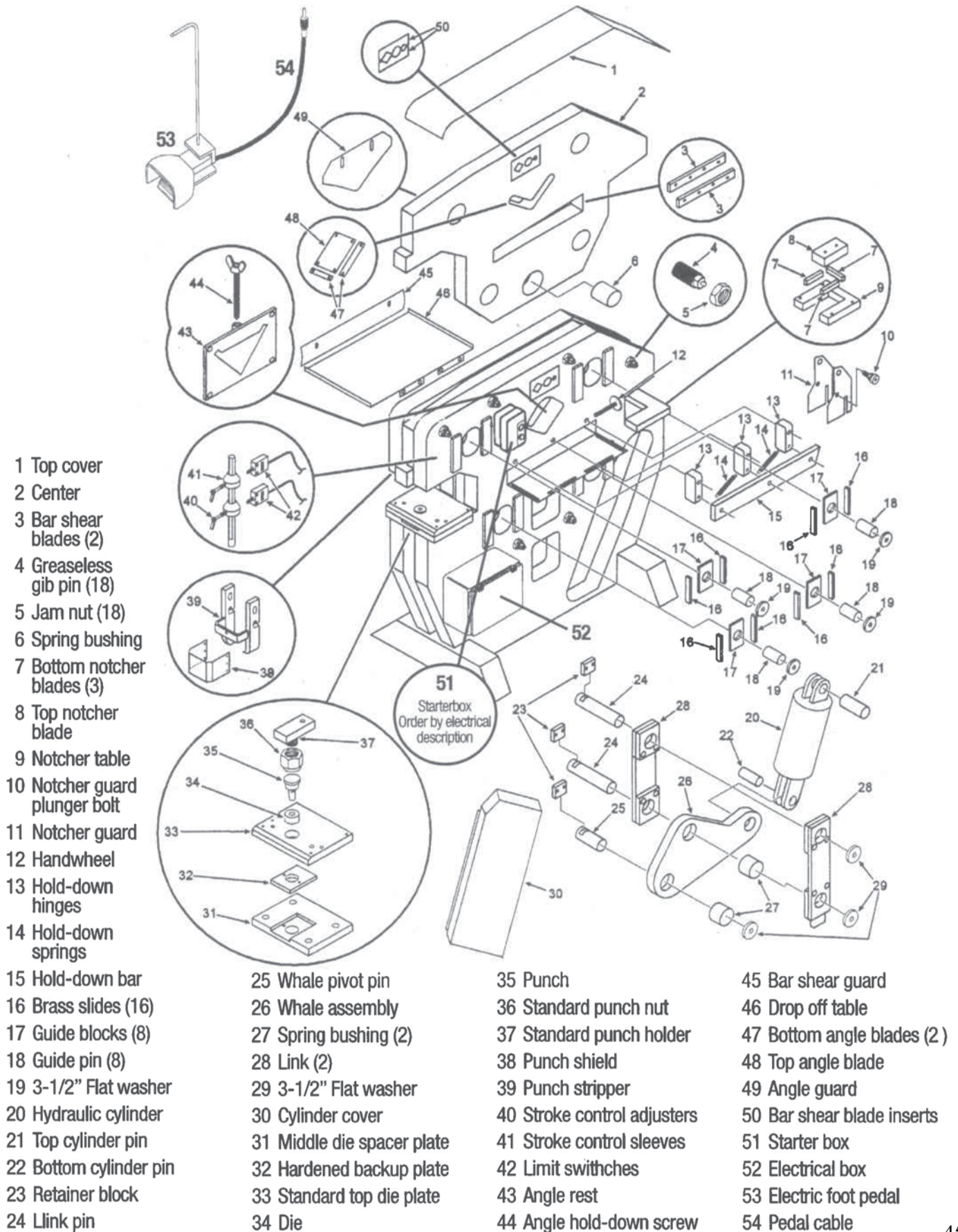
- |                           |                        |                            |                            |
|---------------------------|------------------------|----------------------------|----------------------------|
| 1 Top cover               | 14 Retainer block      | 25 Middle die spacer plate | 35 Bar shear guard         |
| 2 Center                  | 15 Link pin            | 26 Hardened backup plate   | 36 Bar shear blades (2)    |
| 3 Angle hold-down screw   | 16 Whale pivot pin     | 27 Standard top die plate  | 37 Angle guard             |
| 4 Angle rest              | 17 Link (2)            | 28 Die                     | 38 Electric foot pedal     |
| 5 Hold-down hinges        | 18 Whale assembly      | 29 Punch                   | 39 Top angle blade         |
| 6 Hold-down bar           | 19 Spring bushing (2)  | 30 Standard punch nut      | 40 Bottom angle blades (2) |
| 7 Spring bushing          | 20 3-1/2" Flat washer  | 31 Standard punch holder   | 41 Pedal cable             |
| 8 Greaseless gib pin (18) | 21 Top cylinder pin    | 32 Punch shield            | 42 Starter box             |
| 9 Jam nut (18)            | 22 Hydraulic cylinder  | 33 Punch stripper          | 43 Electrical box          |
| 10 Brass slides (16)      | 23 Bottom cylinder pin | 34 Drop off table          |                            |
| 11 Guide blocks (8)       | 24 Cylinder cover      |                            |                            |
| 12 Guide pin (4)          |                        |                            |                            |
| 13 Flat washer            |                        |                            |                            |

# 65/75/100 Ton Hydraulic Replacement Parts



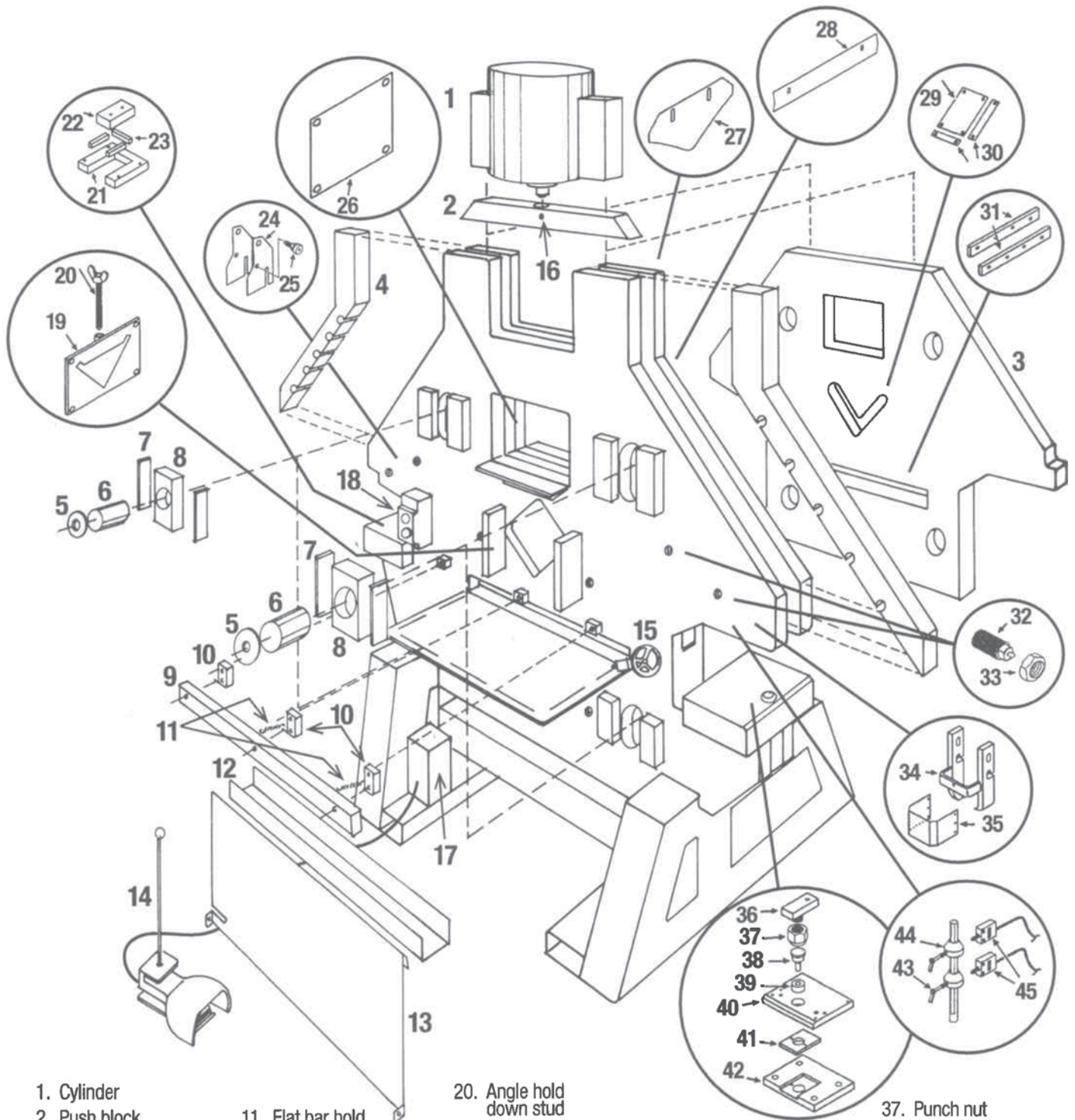
- |                          |                                    |
|--------------------------|------------------------------------|
| 1. Cylinder              | 10. Breather cap                   |
| 2. Top cylinder hose     | 11. Cover bracket (2 pieces)       |
| 3. Bottom cylinder hose  | 12. Tank cover                     |
| 4. Manifold and valve    | 13. Tank                           |
| 5. Relief valve          | 14. Coupling                       |
| 6. Counter balance valve | 15. Pump                           |
| 7. Din connector         | 16. Motor                          |
| 8. Timer                 | 17. Rubber motor mounts (4 pieces) |
| 9. Filter                |                                    |

# 100 Ton Deluxe Ironworker Parts List





# 120 Ton Ironworker Parts List



- |   |  |                                  |                              |
|---|--|----------------------------------|------------------------------|
| 1. Cylinder                               | 11. Flat bar hold down return spring (2 pcs) | 20. Angle hold down stud         | 37. Punch nut                |
| 2. Push block                             | 12. Punch / die tooling tray                 | 21. Top notcher table            | 38. Punch                    |
| 3. Center                                 | 13. Front cover                              | 22. Top notcher blade            | 39. Die                      |
| 4. Frame insert (2 pcs)                   | 14. Electric foot pedal                      | 23. Notcher table blades (3 pcs) | 40. Top punch table          |
| 5. Guide pin washer (8 pcs)               | 15. Hold down handwheel                      | 24. Notcher guard                | 41. Back up plate            |
| 6. Guide pin (4 pcs)                      | 16. Roll pin                                 | 25. Plunger bolt                 | 42. Middle punch table       |
| 7. Greasable brass slides (16 pcs)        | 17. Electrical box                           | 26. Open station guard           | 43. Stroke control adjusters |
| 8. Guide block (8 pcs)                    | 18. Starter box                              | 27. Angle drop off guard         | 44. Stroke control sleeves   |
| 9. Flat bar hold down                     | 19. Angle hold down                          | 28. Flat bar drop off guard      | 45. Limit switches           |
| 10. Flat bar hold down swing link (3 pcs) |  | 29. Top angle blade              |                              |
|   |  | 30. Bottom angle blades (2 pcs)  |                              |
|   |  | 31. Flat bar blades (2 pcs)      |                              |
|   |  | 32. Gib pin (10 pcs)             |                              |
|   |  | 33. Gib jam nut (10 pcs)         |                              |
|   |  | 34. Punch stripper               |                              |
|   |  | 35. Punch stripper guard         |                              |
|   |  | 36. Punch holder                 |                              |

# 100 Ton Deluxe/120 Ton Hydraulic Replacement Parts

