

# **SCOTCHMAN INDUSTRIES**

**MODEL**

**6509-24FF**

**IRONWORKER**

**ALSO AVAILABLE IN SPANISH**

**TAMBIEN DISPONIBLE EN ESPANOL**

**PRINTED MARCH 2005**

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# 1.0 INTRODUCTION

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The Scotchman 6509-24M is a versatile, multi-purpose, shearing, punching and forming machine engineered for trouble free operation. The design of the machine combines simplicity of operation with smooth, full stroke control. The ability of the operator to control the machine's direction of movement at any point in the stroke (stop, jog or reverse) gives the Scotchman 6509-24M Ironworker a tremendous advantage over mechanical ironworkers. There is no chance of the Scotchman being "accidentally tripped". The hydraulic system operates at a maximum pressure of 2,700 PSI and is protected from overload by a pilot operated relief valve. The Scotchman 6509-24M Ironworker lends itself to a variety of special purpose tools that can be mounted on the tool table where a selection of power and stroke potentials are available.

## **2.0 SAFETY PRECAUTIONS**

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- 1) The operators of this machine must be qualified and well trained in the operation of the machine.  
  
The operators must be aware of the capacities of the machine and the proper use of the hold down devices, strippers and guards provided with the machine.**
- 2) All of the guards, adjustable restrictors and awareness barriers must be installed on the machine and kept in good working order. Promptly replace worn or damaged parts with authorized parts.**
- 3) Never place any part of your body into or under any of the machine's moving parts, strippers or hold devices.**
- 4) Wear the appropriate personal protective equipment. Safety glasses are required at all times, whether operating, setting up or observing this machine in operation. Since heavy pieces of metal with sharp edges can be processed on this machine, the operator should also wear steel-toed shoes and tight fitting leather gloves.**
- 5) Strictly comply with all warning labels and decals on the machine. Never remove any of the labels. Replace worn or damaged labels promptly.**
- 6) Always disconnect and lock out the power when performing maintenance work or setting up any tooling on the machine. Follow the procedures outlined in the operator's manual for setting up, changing or aligning any tooling on this machine.**
- 7) Never operate this machine with dull or damaged tooling. Replace worn punches, dies and blades promptly.**
- 8) Practice good housekeeping. Keep the area around the machine clear and well lit. Do not obstruct the operator's position by placing anything around the machine that would impede the operator's access to the machine.**

- 9) Never modify this machine in any way without the written permission of the manufacturer.**
- 10) Never leave this machine running unattended.**
- 11) Always operate the punch station facing the station, standing. Never operate any of the work stations from a sitting or kneeling position.**
- 12) Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturer's instructions.**
- 13) A safety VHS tape was mailed to you or shipped with the machine. If you did not receive it, please contact the factory or your local dealer immediately and one will be sent to you at no charge. If this machine was purchased used, please contact the factory for a safety VHS tape.**

## **2.1 WARRANTY**

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**Scotchman Industries Inc. will, within one year of date of purchase, replace F.O.B. the factory or refund the purchase price for any goods which are defective in materials or workmanship, provided that the buyer returns the warranty registration card within thirty days of the purchase date and, at the seller's option, returns the defective goods freight and delivery prepaid to the seller, which shall be the buyer's sole and exclusive remedy for defective goods.**

**Hydraulic and electrical components are subject to their respective manufacturer's warranties.**

**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 the seller's recommended capacities and specifications.**

**In no event shall seller be liable for labor cost expended on such goods or consequential damages.**

**The seller shall not be liable to purchaser or any other person for loss or damage directly or indirectly arising from the use of the goods or from any other cause.**

**No officer, employee or agent of the 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 the seller.**

**Any electrical changes made to the standard machine due to local electrical code variations must be paid by purchaser.**

**As we constantly strive to improve our products, we reserve the right to make changes without notification.**

## **3.0 WARNING LABELS**

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| <b>ITEM</b> | <b>PART #</b> | <b>DESCRIPTION</b>             |
|-------------|---------------|--------------------------------|
| <b>K</b>    | <b>003145</b> | <b>REMOVE TOOL</b>             |
| <b>L</b>    | <b>003110</b> | <b>PUNCH &amp; DIE WARNING</b> |
| <b>M</b>    | <b>003115</b> | <b>DO NOT REMOVE</b>           |
| <b>N</b>    | <b>003125</b> | <b>KEEP HANDS CLEAR</b>        |
| <b>O</b>    | <b>003130</b> | <b>30 TON OFFSET</b>           |
| <b>P</b>    | <b>019101</b> | <b>HEAVY END DECAL</b>         |
| <b>Q</b>    | <b>003100</b> | <b>WARNING LABEL</b>           |
| <b>R</b>    | <b>003120</b> | <b>DANGER VOLTAGE LABEL</b>    |
| <b>S</b>    | <b>003105</b> | <b>BAR SHEAR WARNING</b>       |
| <b>T</b>    | <b>003530</b> | <b>COMPLETE DECAL PKG.</b>     |





# 4.0 INSTALLATION & SET UP

⊗ **CAUTION: THIS SECTION DISCUSSES INSTALLATION AND SET-UP PROCEDURES. PLEASE READ THOROUGHLY BEFORE OPERATING THIS MACHINE.**

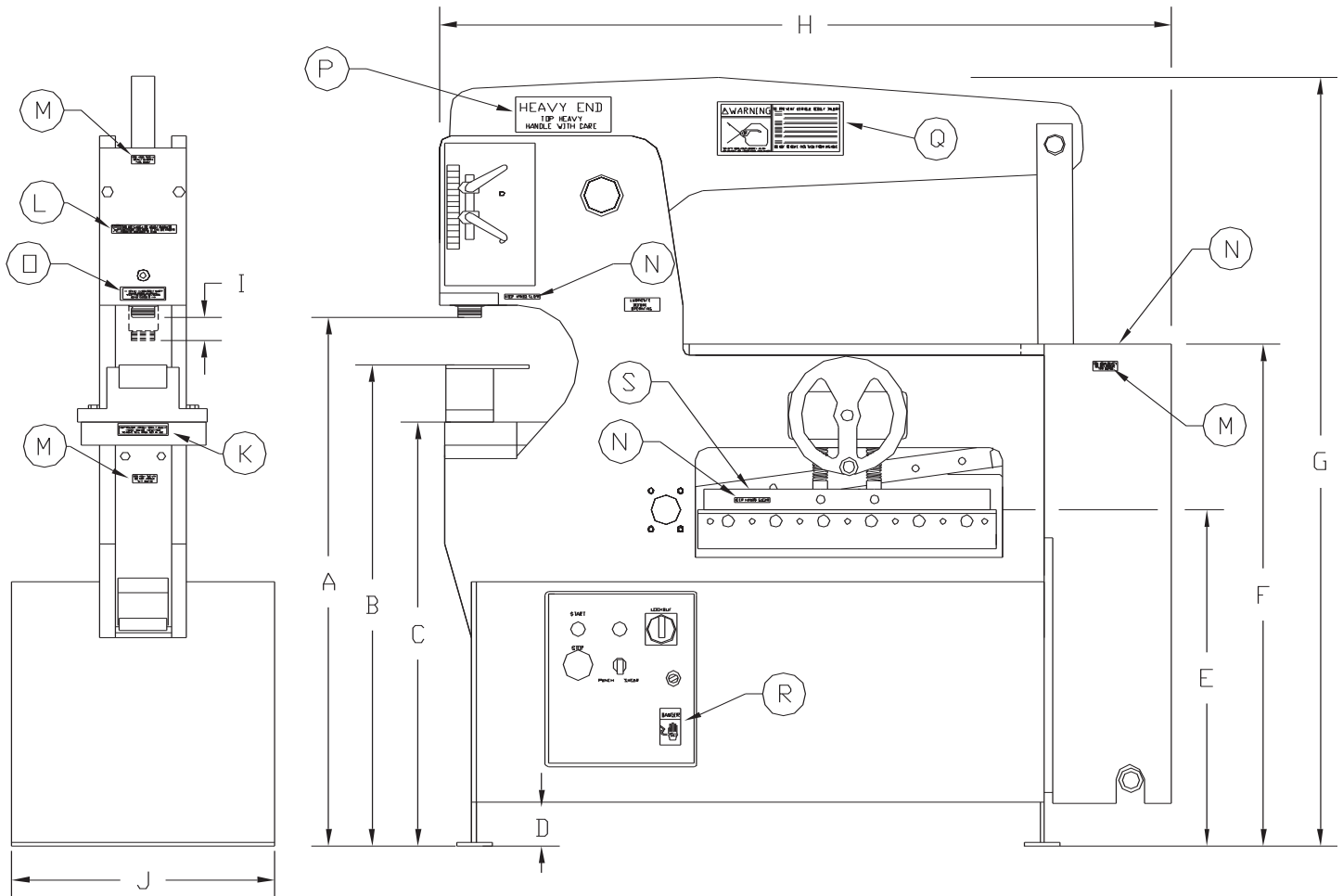


FIGURE 2

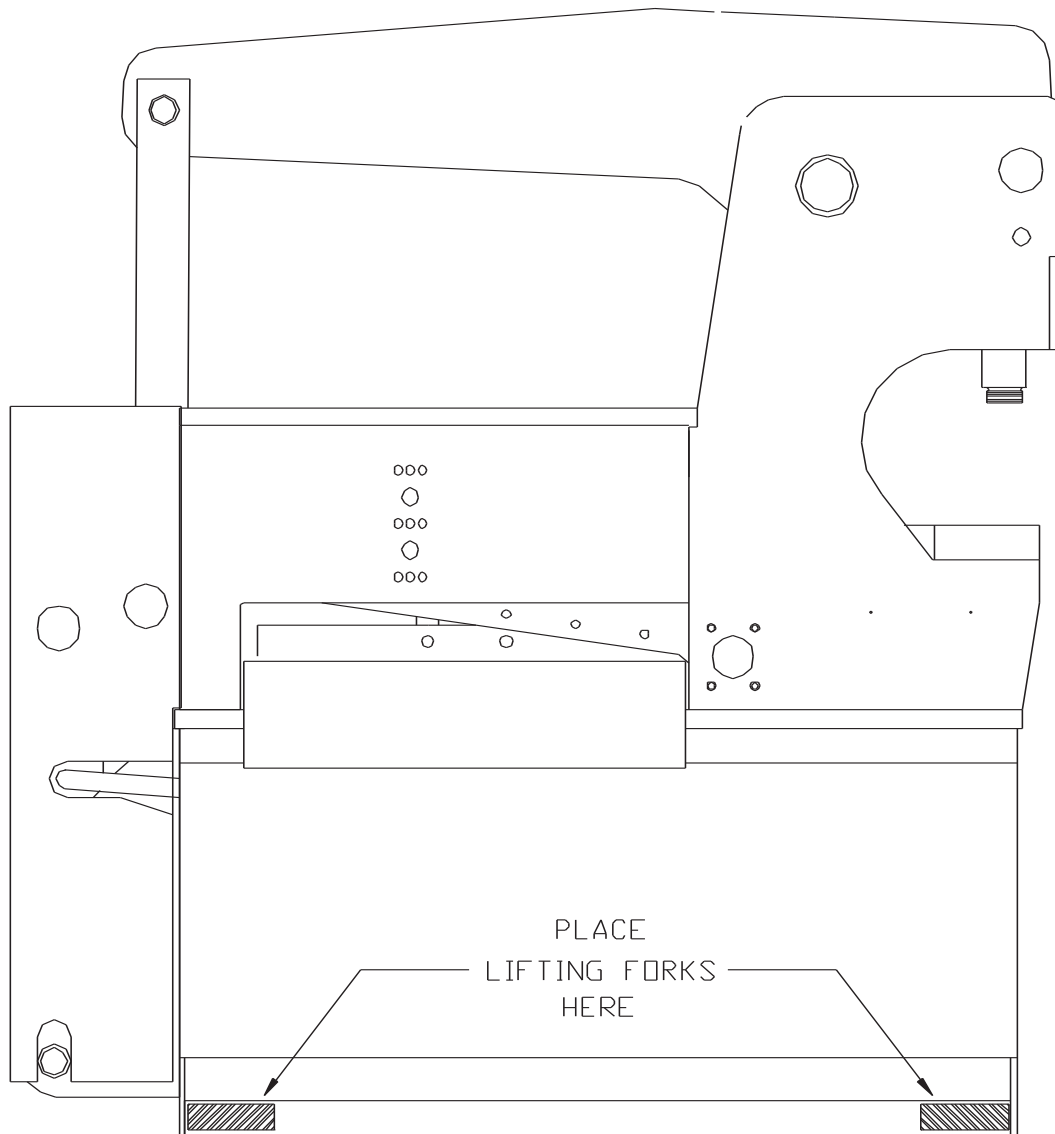
## 4.1 PHYSICAL DIMENSIONS

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|                               | INCHES     | CM        |
|-------------------------------|------------|-----------|
| A. Floor to punch ram         | 44-7/8     | 113.9     |
| B. Floor to top of die holder | 40-7/8     | 103.8     |
| C. Floor to punch bolster     | 36         | 91.4      |
| D. Floor to bottom rail       | 3-3/4      | 9.5       |
| E. Floor to Bar Shear         | 28-1/2     | 72.4      |
| F. Floor to tool table        | 42-1/2     | 107.9     |
| G. Height                     | 66         | 167.6     |
| H. Length                     | 61-1/2     | 156.2     |
| I. Punch stroke               | 2          | 5         |
| J. Width                      | 22         | 55.8      |
| K. Weight                     | 2,750 LBS. | 1,250 KG. |

## 4.2 MACHINE MOVING PROCEDURES

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**FIGURE 3**

**This machine is designed to be moved with a forklift. The weight of this machine is 2,750 pounds (1,250 Kg.). Check the capacity of the lifting equipment before attempting to move the machine.**

**➔ THIS MACHINE IS TOP HEAVY AND SHOULD BE MOVED WITH CARE AND ON FLAT SURFACES ONLY.**

**This is the quickest and safest means of moving the machine. The forks of the lift should be spread so that they fit inside the lifting channels provided.**

## **4.3 PHYSICAL INSPECTIONS**

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After the machine has been located, remove the side shrouds and inspect the interior of the machine for possible shipping damages.

**CHECK SPECIFICALLY THE FOLLOWING ITEMS:**

- A. Stroke control handles and limit switches.**
- B. Pump and motor assembly.**
- C. Hydraulic hoses and fittings.**
- D. Starter box and control box.**
- E. Electrical connections.**
- F. Control valve.**

The reservoir is full of oil. The recommended oil is a lightweight, nonfoaming, anti-wear, hydraulic oil such as Mobil DTE-25, with a minimum ISO cleanliness code of 20/18/15, or equivalent.

The reservoir holds 12 U.S. gallons (45 liters).

**⊠ CAUTION: DO NOT OVER FILL!**

## 4.4 ELECTRICAL REQUIREMENTS

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### FIGURE 4

**⊗ CAUTION: TO PREVENT DAMAGE TO THE MOTOR AND DANGER TO THE OPERATOR, ALL ELECTRICAL CONNECTIONS SHOULD BE MADE BY A LICENSED ELECTRICIAN.**

All machines are wired for three phase electrical power unless otherwise specified.

To insure satisfactory machine performance, the supply voltage should be (+ or -) 10% of the motor voltage rating. Check the motor data tag for full load current requirements. The electrical diagram for the machine is inside the cover of the control box. The diagram is also in FIGURE 4 ABOVE.

For electrical supply lines ten feet (3m) or shorter, we recommend at least 12 gauge, and preferably, 10. For longer electrical supply lines, use at least 10 gauge, and preferably, 8. We do not recommend supply lines longer than twenty five feet (7.5m).

## POWER REQUIREMENTS:

|                        |                         |
|------------------------|-------------------------|
| Motor frame 3PH = 182T | 1PH = 184T              |
| MOTOR VOLTAGE          | FULL LOAD CURRENT       |
| (VAC)                  | (AMPS)                  |
| 208                    | 15.5                    |
| 230                    | 14                      |
| 460                    | 7                       |
| 575                    | 5.9                     |
| 230 (Single Phase)     | 23.5                    |
| Motor power rating:    | 5hp Speed 1,725 RPM     |
| KVA power rating:      | 5.6 KVA Frequency 60 HZ |
| Starting Current:      | 210% Full Load          |

## 4.5 MACHINE START-UP

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Before starting this machine, take time to thoroughly review the VHS safety tape and the operator's manual. This machine is equipped with a lock-out, disconnect switch.

We strongly urge you to follow OSHA directive CFR-1910.147 (effective 09-01-90) regarding lock-out, tag-out procedures.

Before powering the machine, be sure that all packing materials and tools have been removed from the machine and that the work stations are clear.

**TO POWER THE MACHINE**, place the disconnect switch in the ON position and the selector switch in the START position. Momentarily power the machine by pushing the green START button and have someone note the rotation of the motor. Motor rotation should be counterclockwise when viewed from the shaft end of the motor. If it is not correct, the electrician will have to switch two of the three supply line wires to change the direction of rotation.

Once the machine has been powered, it will not move until the selector switch has been placed in either the punch or the shear position. Placing the selector switch in the PUNCH position will cause the arms to move down. Placing the selector switch in the SHEAR position will cause the arms to move up. Any time that the power to the machine has been turned off, the selector switch must be placed in the START position to restart the machine.

## **4.6 MACHINE STROKE INSPECTION & ADJUSTMENT**

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The stroke setting is important for the proper operation of the machine. If this setting has changed, the machine may overtravel and cause the cylinder to "bottom out". This continued condition will eventually cause the starter overload to open. It can also cause the hydraulic oil to overheat and damage hydraulic system components. A slight change in the stroke setting can result in inadequate stroke to operate the tooling. A check of the machine's stroke setting is made at the punch station. SEE FIGURE 5 ON THE FOLLOWING PAGE. Set the stroke control handles (A) out to their farthest position away from the metering boss (B). Turn the selector switch (E) to the START position and power the machine.

Place the selector switch in the PUNCH position. Measure the distance from the punch ram to the top of the bolster. The distance should be 8-13/16 inches (224mm). Switch the selector switch to the SHEAR position and measure the distance. The distance should be 6-13/16 inches (173mm). If the stroke is out of these limits, use the following procedure.

1. Loosen the two mounting plate screws (C) that hold the mounting plate to the machine.

SEE FIGURE 5 ON THE FOLLOWING PAGE.

2. Move the plate vertically, up or down. Moving the plate up will bring the distance down and a movement down will bring the distance up. Moving the plate 1/8 of an inch (3mm) will move the dimension approximately 1/8 of an inch (3mm).

3. Tighten the screws and re-check the dimensions. Repeat, if needed.

- |    |                            |
|----|----------------------------|
| A. | STROKE CONTROL HANDLES (2) |
| B. | METERING BOSS              |
| C. | MOUNTING PLATE SCREWS (2)  |
| D. | UPPER CONNECTING LINK PIN  |
| E. | PUNCH/SHEAR SWITCH         |





## **5.0 MAINTENANCE**

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The Scotchman Ironworker is an exceptionally rugged machine designed for long life with a minimum amount of maintenance. A regular program of servicing will extend the life of the machine and prevent costly down time.

### **5.1 LUBRICATION**

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**IMPORTANT:** Before operating the 6509-24M, apply oil to the angle shear blades, bar shear blades and the punch and die. Re-oil punches and dies every 5 to 10 holes and blades every 10 to 15 cuts. The oil will allow the machine to shear, punch and strip more easily and increase tool life considerably. (We recommend cutting oil or motor oil swabbed on with a brush or applied with a squirt can or a spray applicator.)

### **5.2 ROUTINE LUBRICATION**

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Grease the main pins (A & B) and the punch ram (D) daily.

(SEE FIGURE 6 ON THE FOLLOWING PAGE.)

Grease all other fittings twice per week.

Mobil grease XHP222 Special is recommended.

Check the oil level in the reservoir at least once a month. It should be 1-1/2 inches below the top of the reservoir.

Change the hydraulic oil and filter at least once a year; more often, under adverse conditions.

**TO CHANGE THE HYDRAULIC OIL, TURN THE MACHINE'S POWER OFF.**

Remove the drain plug from the bottom of the reservoir. Allow the oil to drain.

Replace with 12 U.S. gallons (45 liters) of lightweight, non-foaming, hydraulic oil such as Mobil DTE-25, with a minimum ISO cleanliness code of 20/18/15, or equivalent. The filter can be replaced by a Fram P1653A, Motorcraft FH-10, NAPA 1551, Baldwin BT 839-10 or equivalent.

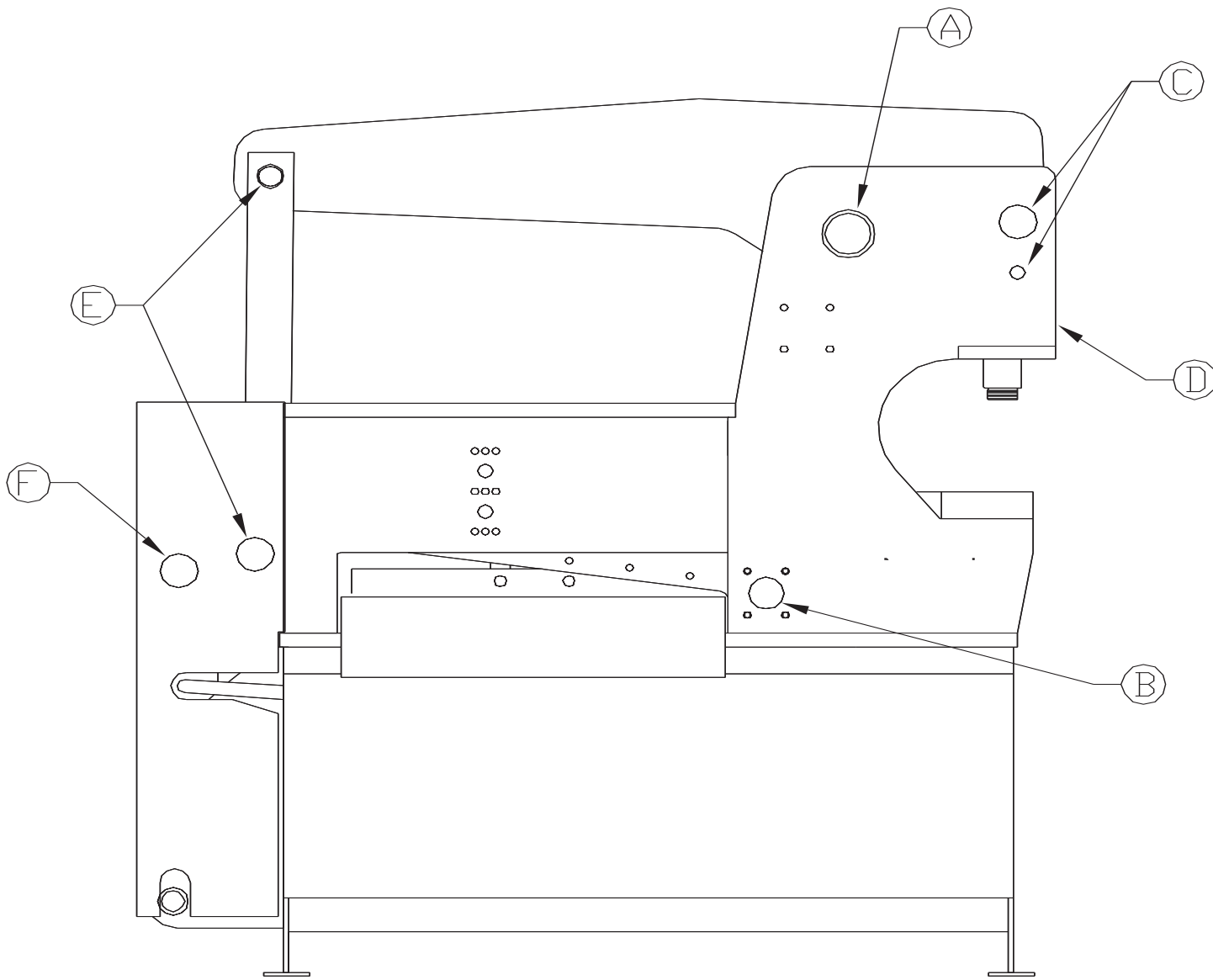


FIGURE 6

## 5.3 SCHEDULED MAINTENANCE

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A program of scheduled maintenance should be set up and documented according to your application and the frequency you use this machine. The following is a list of important items that should be included in a scheduled maintenance program:

### 1. EVERY 500 HOURS OR 6 MONTHS:

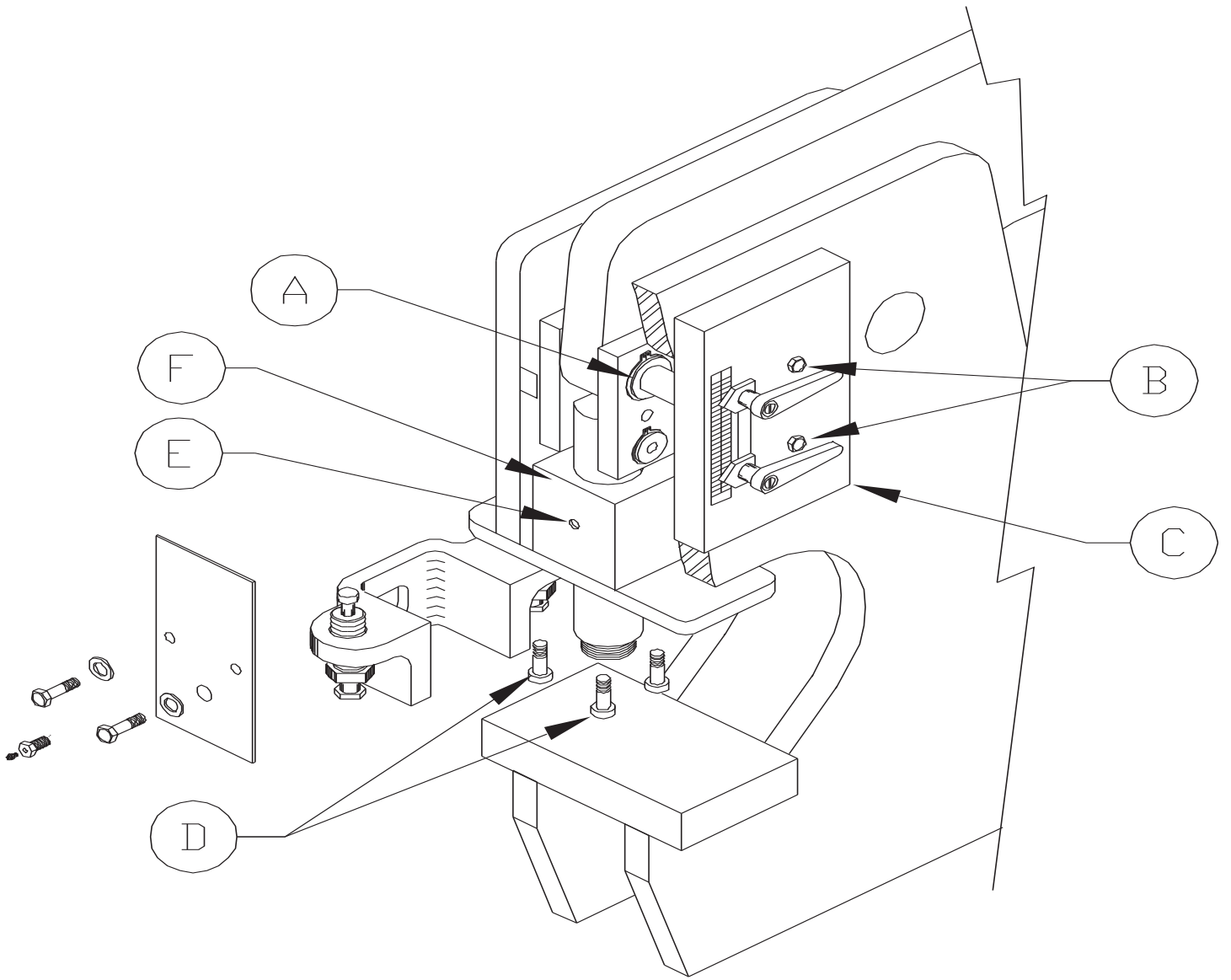
#### A. Check the tolerance between the punch ram and the punch ram bushing.

To check the tolerances, remove the punch ram and the bushing from the machine. For parts identification, SEE FIGURE 7 ON THE FOLLOWING PAGE.

1. To remove the punch ram and bushing, cycle the machine until the upper punch pin (A) aligns with the access hole in the frame.
  2. Remove the two mounting bolts (B) from the stroke control mounting plate (C) and remove the stroke control assembly.
  3. Remove the die holder and block up the punch ram.
  4. Remove the snap ring retainers from the upper punch pin and remove the four mounting bolts (D) and the grease bolt (E) from the punch ram bushing (F).
  5. Remove the punch ram and the bushing. Care should be taken when removing these parts; **THEY ARE HEAVY.**
  6. Clean all grease and dirt off both parts and check the clearance between the outside diameter of the punch ram and the inside diameter of the punch ram bushing. If the clearance between the two parts is five thousandths (.005) or more, replace both parts. Reassemble parts in reverse order.
- B. Check the condition of the cutting blades on the bar shear, angle shear and any other component tool.
- C. Check the condition of the bushing in the upper arm and shear arm. This can be done by visually watching the arms for vertical movement while the machine is in operation.

If vertical movement is noted, block or support the arms with a lifting device and remove the pin and check the clearance. If the clearance between the pin and the bushing exceeds twelve (.012) thousandths (.3mm), replace the bushing. Since the 6509-24M can be used for a wide variety of applications with many optional tools, these may not be all of the items that you need to include in a scheduled maintenance program.

If you have questions about other applications, contact your local dealer or the factory.



**FIGURE 7**

## 6.0 MACHINE OPERATION

### 6.1 PUNCH OPERATION

- ALWAYS WEAR SAFETY GLASSES.
- THE FIRST AND MOST IMPORTANT PROCEDURE IS THE PROPER METHOD OF CHANGING AND ALIGNING PUNCHES AND DIES.

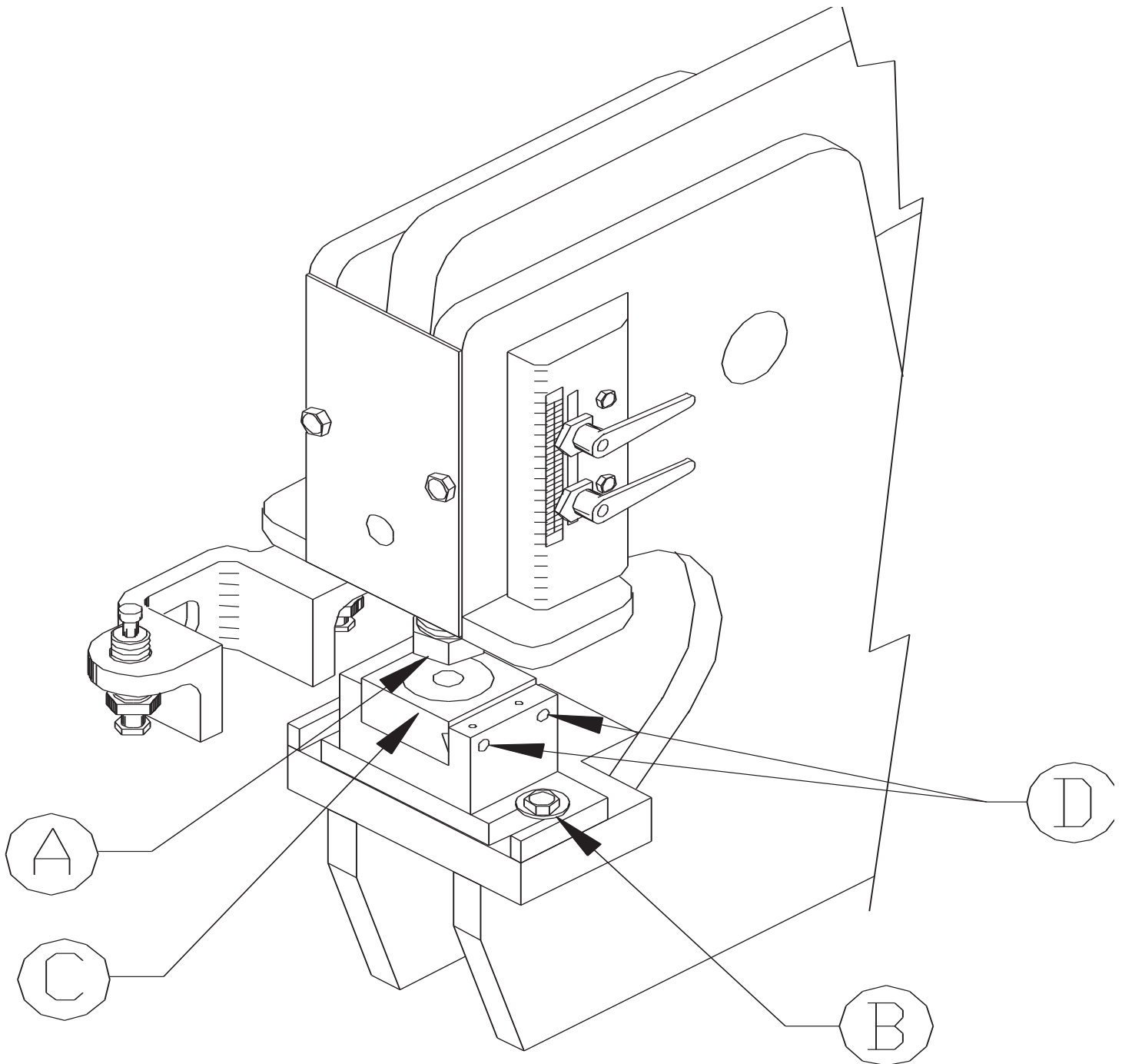


FIGURE 8

## **A. ALIGNMENT AND REMOVAL OF PUNCHES AND DIES:**

- ⚠ **WARNING:** Failure to properly align punches and dies can cause serious bodily injury to personnel and/or damage to equipment. Please read carefully and understand the following method. It will also be helpful to refer to the safety tape provided for a visual reference. If you did not receive a safety tape, please contact your dealer or the factory.

For parts identification, REFER TO FIGURE 8 ON THE PRECEDING PAGE.

**MOVE ALL TOOLING TO THE BACK OF THE TOOL TABLE AND CRANK THE BAR SHEAR HOLD-DOWN TO THE DOWN POSITION WHEN PUNCHING.**

- ⚠ **FAILURE TO MOVE THE ANGLE SHEAR, CHANNEL SHEAR, BRAKES ETC., OUT FROM UNDER THE UPPER ARM CAN RESULT IN POSSIBLE DANGER TO OTHER PERSONNEL AND DAMAGE TO THE TOOLS.**

1. With the machine in the PUNCH position, turn the machine's electrical power off at the disconnect switch.
2. Release the stripper and swing it to the side, out of the way of the punch ram and the punch retaining nut (A).
3. Loosen the die holder bolts (B).
4. Loosen and remove the punch retaining nut (A) and set the punch retaining nut and punch aside.
5. Loosen the two set screws (D) holding the die insert (C). Remove the die insert and loosen the set screw holding the die on, remove it and set it aside.

- ⊠ **CAUTION: IF YOU ARE USING THE OFFSET DIE HOLDER FOR FLANGED PUNCHING, PLEASE SEE SPECIAL INSTRUCTIONS IN SECTION 7.9B.**

6. Place the disconnect switch in the ON position and the selector switch in the START position. Power the machine by pressing the green START button.
7. Check to make sure that there are no objects (such as tools) on or under any of the moving parts.
8. Place the selector switch in the SHEAR position and allow the ram to extend.
9. Turn the machine's power off.
10. Clean the die insert cavity of any foreign material.
11. Select the proper punch and die. Make sure that there is proper clearance between the punch and die. For recommended clearances, SEE SECTION 6.1, PARAGRAPH G.
12. Clean both the punch and the die.
13. Insert the proper die in the die insert (C). (If the die has a flat spot in it, align this with the set screw in the die insert.) Tighten the set screw firmly with an allen wrench.
14. Insert the punch into the punch retaining nut (A), making sure that it seats properly. Place the punch retaining nut assembly on the die insert, with the punch inserted in the die.

☒ **NOTE:** Please note that all of our shaped punches, including squares, ovals, hexagons and special order punches, are manufactured with a keyed locking system. The keyed slot mates with slots in the punch ram to allow two positive locked positions for the punch.

15. Place the insert back in the die holder and tighten the set screws.
16. Raise the punch retaining nut and turn it on to the punch ram. (The die holder may have to be moved slightly to align the punch retaining nut to the punch ram.)
17. If you are using keyed punches, manually rotate the punch so that the key seats in the ram before tightening the nut.
18. Tighten the punch retaining nut, using a wrench. Make sure that there is equal clearance on all sides of the punch in the die.

☒ **NOTE:** WHEN USING A HEAVY DUTY SPLIT-RING RETAINING NUT, AFTER THE NUT HAS BEEN TIGHTENED, TIGHTEN THE BRASS BILLET SET SCREW AGAINST THE THREADS OF THE RAM.

19. Re-tighten the bolts in the die holder.
20. Check to be sure of proper alignment. Realign, if necessary.
21. Return the stripper to the forward position.
22. Place the disconnect switch in the ON position and the selector switch in the START position and power the machine.
23. Place the selector switch in the SHEAR position. To be sure that the clearance is correct, jog the machine several times with the foot switch, without letting the punch come out of the die.
24. Place the selector switch in the PUNCH position.
25. Oil the punch and die before use and every 5 to 10 holes, thereafter. (For lubrication instructions, SEE SECTION 5.1)
26. Punch three to five holes and re-tighten the punch retaining nut.
27. The punch and die alignment should be checked every two to three hours during the punching operations. To do this, bring the punch down so that it enters the die. Turn off the machine. Check and tighten the punch retaining nut, the allen screw holding the die and the two bolts holding the die holder. Check for equal clearance between the punch and die. Place the selector switch in the START position and power the machine. Place the selector switch in the SHEAR position and, using the foot switch, jog the machine several times to be sure of proper alignment.

#### **B. CHECK ALL PUNCHING TOOLS FOR TIGHTNESS.**

Tools should be checked at the start of each operation and intermittently during the workday. Check the punch retaining nut, die, stripper and die holder. Tools tend to loosen under punching shock. Keep them tight to prevent punch to die contact.



☒ **NOTE: WHEN PUNCHING LARGE DIAMETER HOLES, OR IN CASES OF HIGH PUNCH SHOCK, IT WILL HELP IF THE STROKE OF THE MACHINE IS ADJUSTED SO THAT THE PUNCH STOPS JUST ABOVE THE PLANE OF THE DIE, APPROXIMATELY FIFTEEN THOUSANDTHS OF AN INCH (.3MM).**

**C. DO NOT PUNCH ANYTHING THICKER THAN THE PUNCH DIAMETER.**

This "rule of thumb" can be extended, but the punch supplier or Scotchman should be consulted first, (i.e. do not punch plate thicker than 1/2 inch with a 1/2 inch diameter punch). This rule of thumb applies to mild steel and must be reduced when punching alloy steels.

Contact the factory or your local dealer before attempting to punch any type of alloys.

**D. LUBRICATE THE PUNCH AND DIE.**

This will hold stripping forces to a minimum and greatly extend punch life. Lubrication must be applied after every 5 to 10 holes.

**E. PUNCH FULL AND COMPLETE HOLES. DO NOT PUNCH PARTIAL HOLES.**

The side thrust encountered in punching a partial hole can force the punch over against the die and result in punch or die breakage. This may result in serious bodily injury!

**F. MAINTAIN SUFFICIENT MATERIAL BETWEEN THE PUNCHED HOLE AND THE EDGE OF THE WORKPIECE.**

The edge of the punch should be clear of the edge of the workpiece by a distance equal to the thickness of the material. Any edge distance less than this will result in a deformed workpiece.

**G. STAY WITHIN RATED PUNCHING CAPACITIES.**

Your 6509-24M Ironworker is designed to operate in mild steel. Within conservative limits, it can also operate in medium carbon annealed steel and some forms of abrasion resistant steels. Conditions of high shock can be encountered when punching alloyed steels and, accordingly, the machine rating must be reduced. **THE MAXIMUM THICKNESS THAT CAN BE PUNCHED IS 3/4 OF AN INCH (20MM) MILD STEEL.**

Punch to die clearance depends on material thickness.

**In mild steels, material thicknesses of 1/4 inch through 5/8 inch should have a total punch to die clearance of 1/32 inch. (Punch diameter + 1/32" = Die diameter.)**

**3/4 inch thick mild steel should have a minimum of 1/16 inch clearance. (Punch diameter + 1/16" = Die diameter.)**

**In thin materials, the recommended punch to die clearance is 1/10 of the material thickness.**

**We do not recommend less than 1/64 inch total clearance, due to working clearances necessary in the punch ram and the punch bushing.**

**For capacities, REFER TO THE PUNCH TONNAGE CHART IN FIGURE 9 BELOW.**

**FIGURE 9**

## 6.1B STRIPPER ADJUSTMENT

⊗ CAUTION: TO PREVENT PUNCH BREAKAGE ON THE RETURN STROKE, THE STRIPPER MUST BE ADJUSTED SO THAT THE BOTTOM OF THE STRIPPER IS PARALLEL WITH THE MATERIAL BEING PUNCHED.

REFER TO FIGURE 10 BELOW.

TO ADJUST THE STRIPPER:

1. The height of the stripper is adjusted using the adjustment bolts (A & B).
2. The stripper is opened by pushing up on item (C) and swinging it out toward the front of the machine.
3. If you are punching light material or pieces too small to contact both sides of the stripper, install the plate (D) on the bottom of the stripper.
4. For maximum visibility and safety, always adjust the stripper down as close to the material as possible.

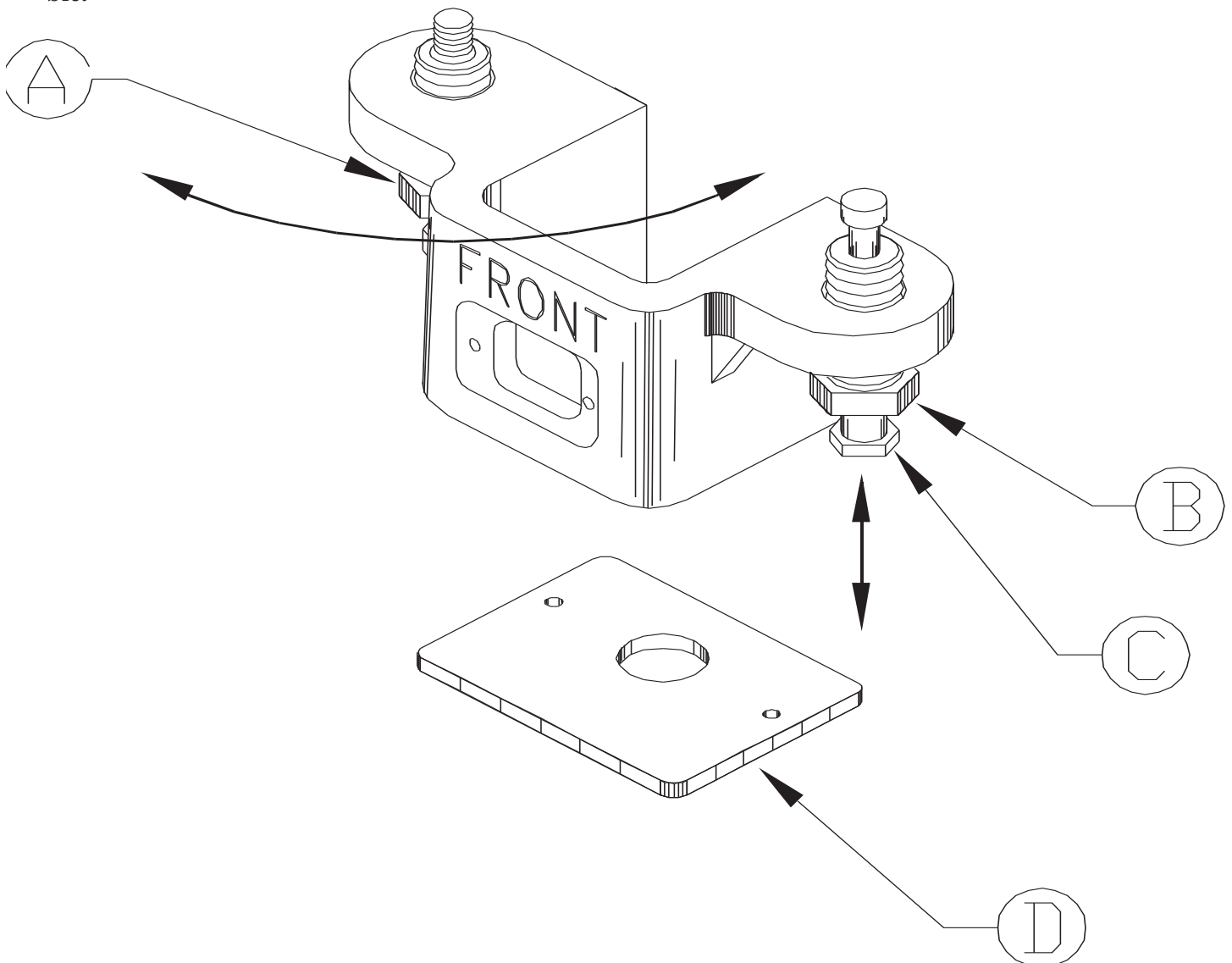


FIGURE 10

## **6.2 BAR SHEAR OPERATION**

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**⊗ CAUTION: ANY TIME THAT THE SHEAR SECTION IS NOT IN USE, CRANK THE HOLD-DOWN DEVICE TO ITS FULL DOWN POSITION.**

Before using the bar shear, make sure that all tooling has been moved out from under the upper arm and that the punch and die have been removed from the punch station. When using the Bar Shear on your Scotchman Ironworker, ALWAYS use the hold-down device.

NEVER put any part of your body between the hold-down and the material to be sheared.

A clearance of 1/8 inch (3mm) between the hold-down and material to be sheared is acceptable.

The maximum tonnage available on the bar shear is to the left, or closest to the pivot point. For applications that do not require the maximum tonnage, move the material to the right, for minimal distortion on the drop piece.

Do not attempt to shear pieces that are too short for the hold-down to grip as this will cause the material to kick-up and will result in a poor quality cut and possible damage to the machine.

**THE BASIC METHOD OF OPERATING THE BAR SHEAR CONSISTS OF SIX STEPS:**

- 1. Place the selector switch in the START position and power the machine.**
- 2. Place the selector switch in the SHEAR position.**
- 3. Place the material to be sheared between the shear blades.**
- 4. Crank the hold-down device down to the material being sheared. This prevents kick-up of the material, which could cause injury to the operator and damage to the machine.**
- 5. Keep your hands clear from all moving parts.**
- 6. Depress the foot switch. Lubricate the blades every 10 to 15 cuts.**

**IN ADDITION TO THE SIX BASIC STEPS OF OPERATION, THE OPERATOR SHOULD ALSO BE FAMILIAR WITH THE FOLLOWING:**

**A. MAINTAIN PROPER BLADE CLEARANCE.**

The quality of the cut is an immediate indication of the condition of the Shear Blades, the amount of clearance between the blades or the amount of "spring-back" in the Shear Arm.

The Shear Blades are symmetrical and can be rotated to expose four (4) cutting edges. For recommended clearances, SEE FIGURE 12 ON PAGE 33.

**B. ALL CUTS SHOULD BE MADE AS FAR FROM THE ARM PIVOT AS POWER WILL PERMIT.**

The Shear Blades should contact the workpiece as flat as possible, to reduce to a minimum the amount of "curl" on the cut-off piece. More shearing force is obtained as the operator moves the workpiece toward the left. The machine is designed to shear mild steel rated on 60,000 tensile.

The maximum capacity of the bar shear is 1 x 6 inch (25 x 150mm) mild steel.

## **6.2A SHEAR ARM ADJUSTMENT**

---

**REFER TO FIGURE 11 ON THE FOLLOWING PAGE.**

**Adjustment on the shear arm is maintained on the front (operator's) side by the pressure plate (A) and on the rear by the rub blocks (I & J). The cylinder cover shroud must be removed to gain visual access.**

**USE THE FOLLOWING STEPS TO ADJUST THE SHEAR ARM.**

**SEE FIGURE 11 ON THE FOLLOWING PAGE.**

- 1. Before making these adjustments, loosen the lower blade holder (C) and back the lower blade away from the upper blade. After making these adjustments, reset the blades following the instructions in SECTION 6.2B.**
- 2. Loosen the six adjusting screws (H) for each of the rub blocks (I) and remove the rub blocks by taking out the three mounting screws (G). (If excessive concave wear is noted on the rub blocks, they can be turned and the back surface used.) Set the pressure plate adjustment before resetting the rub blocks.**
- 3. For the pressure plate adjustment, loosen the lock nuts (B) on the four adjusting screws that engage the pressure plate (A).**
- 4. Tighten all four adjusting screws on the pressure plate so that they are "snug" and will force the shear arm solidly against the rear frame. (Excessive tightening of these screws only increases wear.)**
- 5. Replace the rub blocks (I). With the shear arm in the down position, tighten the bottom adjusting screws (H) until the rub blocks come in contact with the shear arm rub blocks (J). Raise the arm about half way and adjust the middle two adjusting screws (H) until the rub blocks make contact. Then, raise the arm completely and adjust the top two screws. (Once again, excessive tightening will cause unnecessary wear.) Check to be sure that the rub blocks (I) are in contact with the shear arm rub blocks (J) throughout the full stroke.**
- 6. Tighten the lock nuts (A) on the pressure plate adjusting screws.**
- 7. Reset the shear blade adjustment. SEE SECTION 6.2B.**

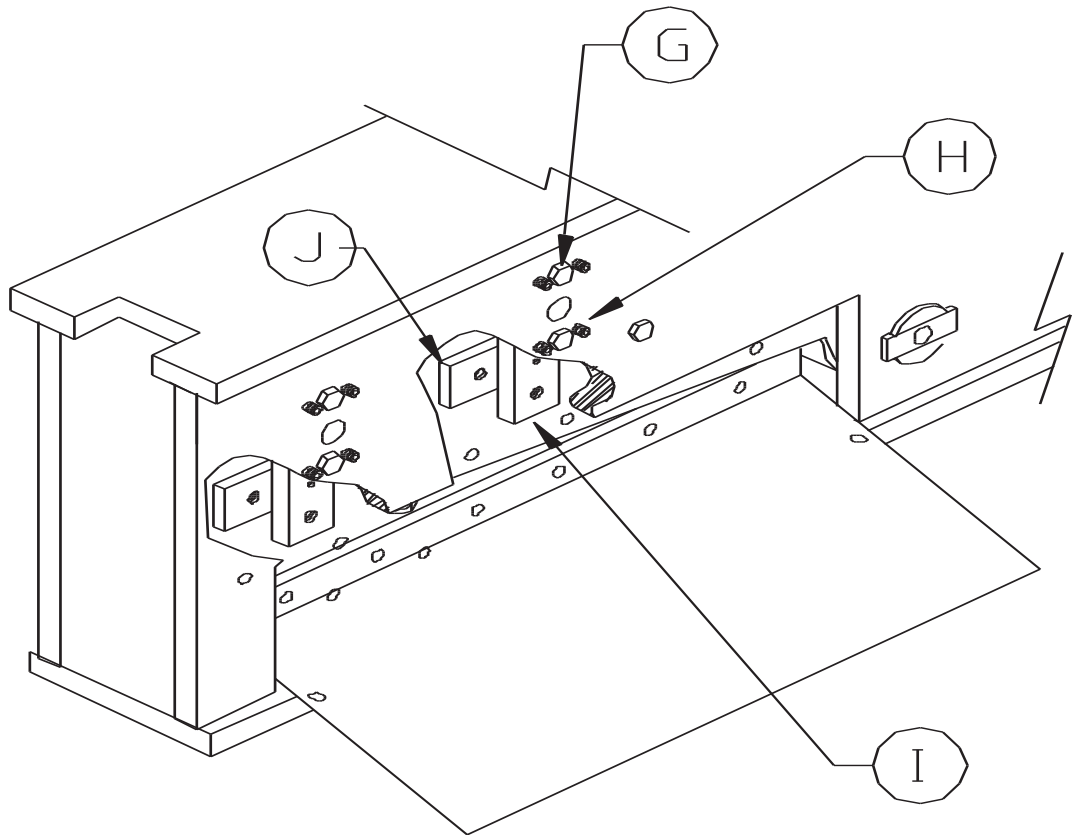
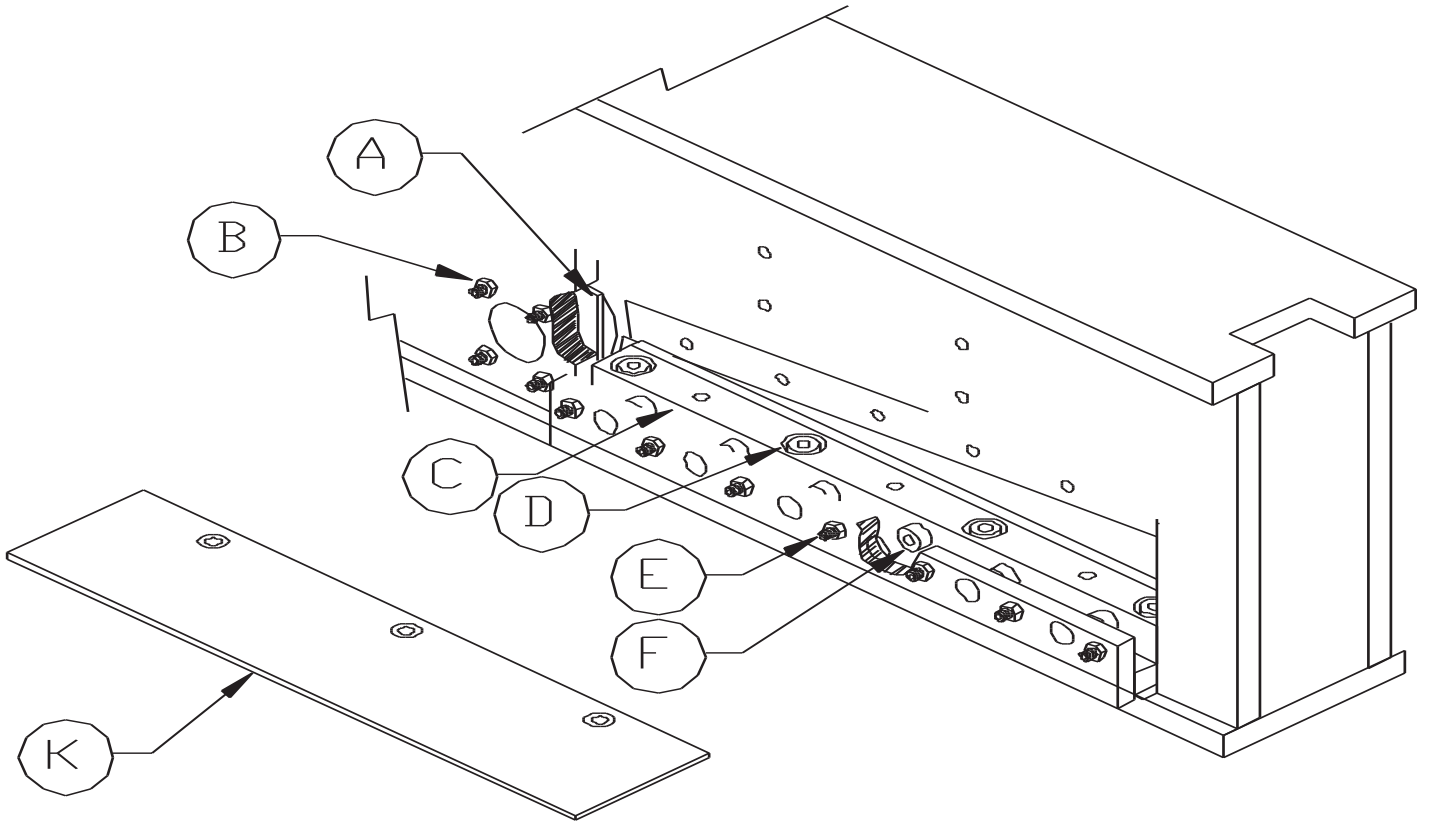


FIGURE 11

## **6.2B SHEAR BLADE ADJUSTMENT**

---

**SEE FIGURE 11 ON THE PRECEDING PAGE.**

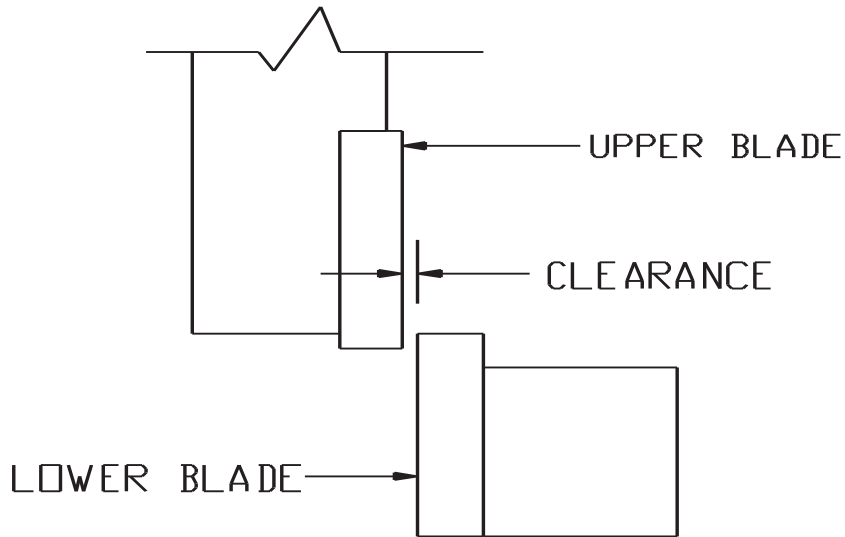
- 1. Remove the Shear Table (K) and unlock the lock nuts on the back-up screws (E).**
- 2. Loosen the four (4) socket head retaining screws (D) that hold the lower blade support (C) to the top of the Shear Bed and remove the blade and the lower blade holder.**
- 3. Lower the Shear Arm to the full down position. Replace the Shear Blade and the lower blade support. Place a business card or shipping tag (approximately .010 in. thick) between the blades, one at each end of the blades and one in the middle. Hold the blades firmly together and partially tighten the (4) socket head retaining screws (D) that hold the lower blade support (C) in place. Adjust the back-up screws (E) firmly against the lower blade support (C). (Do not tighten so as to compress paper shims between the blades.) Tighten the (4) socket head retaining screws (D) to approximately 100 ft.-lbs. torque and lock the back-up screws (E) with the lock nuts.**
- 4. Raise the Shear Arm and then LOWER IT SLOWLY, WATCHING THE BLADE ENGAGEMENT. MAKE SURE THAT THE BLADES DO NOT COME IN CONTACT WITH EACH OTHER.**
- 5. This adjustment will give a blade clearance of .005 to .010 thousandths of an inch (.12 to .25mm). If the machine is being used to shear thicker sections of plate (1/2 inch (12mm) or thicker), we recommend increasing the clearance. A clearance of 5 to 7 percent of the material thickness is recommended. For recommended clearances, SEE FIGURE 12 ON THE FOLLOWING PAGE.**
- 6. Replace the Shear Table (K).**

**KEEP THE SHEAR SECTION CLEAR.**

**Small slivers, short cuts etc. should be removed from the slug chute to prevent buildup. Buildup of short cuts can result in damage to the machine and POSSIBLE INJURY to other personnel.**



# RECOMMENDED CLEARANCE FOR FLAT BAR SHEAR BLADES



BASED ON MILD STEEL OF 60000 P.S.I. TENSILE STRENGTH

| MATERIAL THICKNESS |    | CLEARANCE |         |
|--------------------|----|-----------|---------|
| INCH               | MM | INCH      | MM      |
| 1.00               | 25 | .040-.060 | 1.0-1.5 |
| 7/8                | 22 | .035-.050 | .9-1.3  |
| 3/4                | 19 | .030-.045 | .75-1.1 |
| 5/8                | 16 | .025-.035 | .63-.9  |
| 1/2                | 13 | .020-.030 | .5-.75  |
| 3/8                | 10 | .015-.025 | .38-.63 |
| 1/4                | 6  | .010-.015 | .25-.38 |
| 1/8                | 3  | .005-.010 | .13-.25 |
| 1/16               | 15 | .005      | .13     |

DO NOT SET CLEARANCE LESS THAN .005 (0.13MM)

FIGURE 12

## **7.0 OPTIONAL TOOL OPERATION**

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**⊗ CAUTION: MOVE ALL TOOLS OUT FROM UNDER THE UPPER ARM WHEN THEY ARE NOT IN USE.**

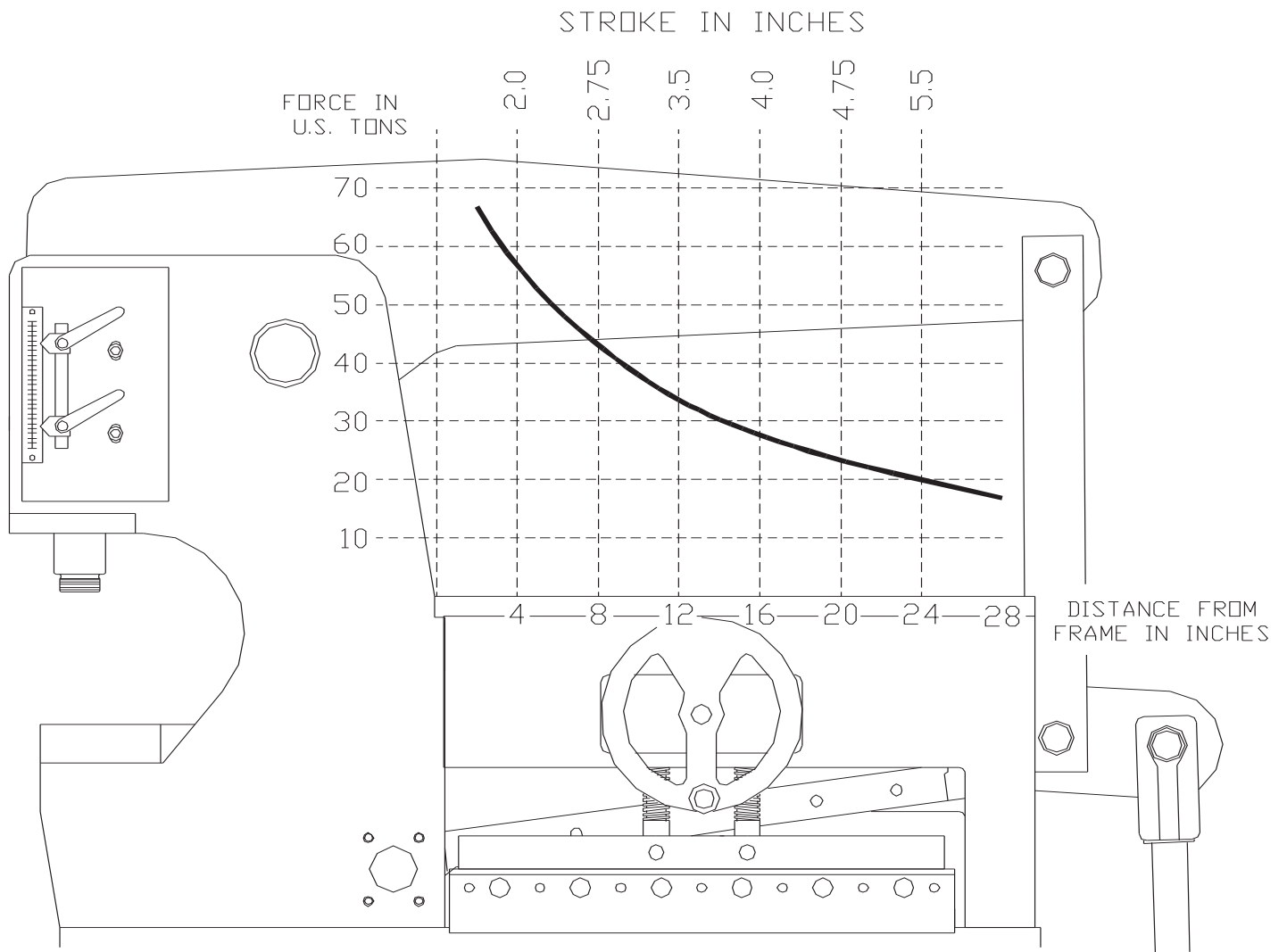
**When using the tool station, crank the bar shear hold-down device completely down and remove the punch and die.**

**As with all functions on this machine, SAFETY GLASSES ARE REQUIRED when using optional tools of any type.**

**Each self contained tool has its own stroke and tonnage requirements. This section will cover the operation and location of each tool.**

**At the beginning of the section, there is a graphical illustration of the available tonnage at locations along the Upper Arm. SEE FIGURE 13 ON THE FOLLOWING PAGE.**

**This graph will be helpful in setting up various Scotchman or custom tooling.**



**FIGURE 13**

## 7.1 6 X 6 ANGLE SHEAR

---

The 6 x 6 angle shear is a component tool designed to shear angle iron. It installs in the tool station on this machine and has a maximum capacity of 6 x 6 x 3/8 or 5 x 5 x 1/2 inch (150 x 150 x 9.5 or 125 x 125 x 12mm) mild steel angle iron. The selector switch must be in the SHEAR position to operate this tool.

### 7.1A 6 X 6 ANGLE SHEAR INSTALLATION

---

SEE FIGURE 14 ON THE FOLLOWING PAGE.

The 6 x 6 Angle shear mounts in the tool station under the upper arm.

1. Before mounting the tool under the arm, remove the upper blade and install the return springs (A).
2. The selector switch must be in the SHEAR position and the arm up.
3. Slide the tool under the arm, as close to the machine's frame as possible.
4. The tool is held in place with the finger clamps (B) provided.
5. Care must be taken to align the slug slot in the angle shear with the slot in the tool table and the pressure block squarely under the power arm.
6. The upper stroke of the machine should be set so that the upper blade raises high enough to slide the workpiece freely through the unit. The lower stroke should be set so that the upper blade point enters the lower blades approximately 1/8 inch (3mm).

### 7.1B 6 X 6 ANGLE SHEAR OPERATION

---

Oil must be applied to the blades before the first cut is made and every 10 to 15 cuts, thereafter.

Grease the slider block between the upper arm and the tool every two hours of operation. A set of lower blade shims are shipped with each unit. These are to be installed between the lower blades and the side plate when shearing lighter angle (up to 5/16 of an inch (8mm) thick). If a burr develops when shearing very light gauge angle, the clearance should be reduced further by adding additional shim stock. All shims must be removed when shearing angle thicker than 5/16 of an inch (8mm).

When cutting angle iron with legs of unequal length, a special upper angle shear blade is necessary.

- ⚠ Do not attempt to cut unequal leg angle iron with the standard blade. It only takes one cut to damage the tool.

For available blades, SEE THE TOOLING PARTS MANUAL.

- ☒ NOTE: Always shear unequal leg angle with the long leg to the right. If the upper blade does not contact both legs of the angle at the same time at the beginning of the cut, the shear will be damaged.

⊗ **CAUTION: IF THE ANGLE SHEAR SHOULD JAM FOR ANY REASON, DO NOT ATTEMPT TO FREE IT BY HAND!!! USE A PRY BAR OR SIMILAR DEVICE. REPLACE THE BLADES OR INSTALL SHIMS, DEPENDING ON WHAT CAUSED THE JAM. REMOVE THE TOOL WHEN IT IS NOT IN USE.**

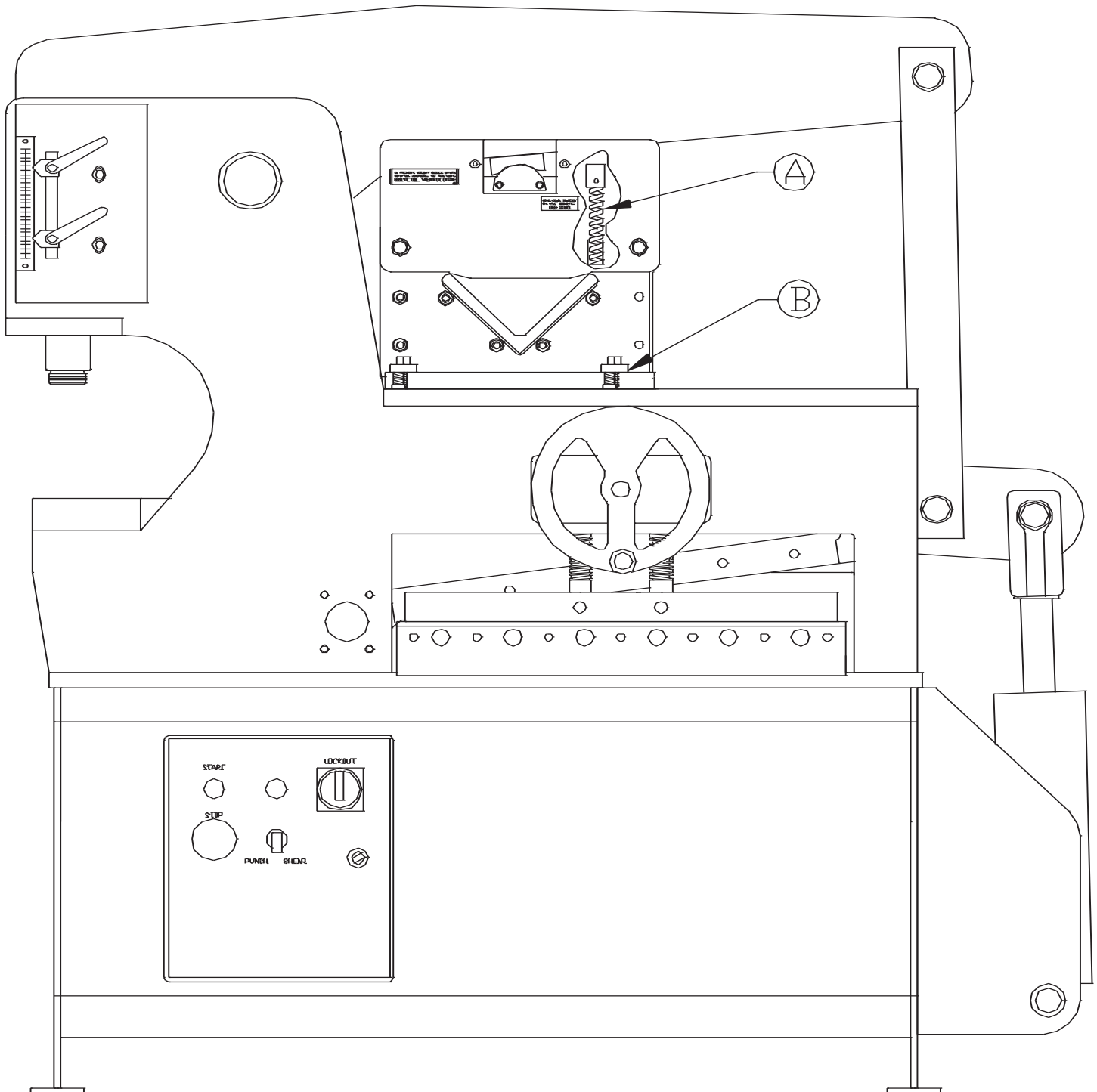


FIGURE 14

## **7.2 ROD SHEAR**

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The rod shear is a component tool designed to shear sections of solid round and square stock. It has 9 round cavities that range from 1/4 to 1-1/4 inches (6 to 30mm) and one square cavity that has the capacity 1/4 to 1 inch (6 to 25mm). The selector switch must be in the SHEAR position to operate this tool.

### **7.2A ROD SHEAR INSTALLATION**

---

---

SEE FIGURE 15 ON THE FOLLOWING PAGE.

The rod shear mounts in the tool station under the upper arm and is held in place with finger clamps.

Since the rod shear requires a short stroke (approximately 1/2 inch (12mm) and has no slug, it can be operated at any practical location under the upper arm.

To prevent damage to the tool, the stroke of the machine must be set when using the rod shear.

Set the upstroke of the machine so that the workpiece easily slides through the tool.

Set the downstroke so that the cut can be made with a minimum amount of stroke.

### **7.2B ROD SHEAR OPERATION**

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---

Oil the blades before starting and every 10 to 15 cuts, thereafter.

Grease the slider block between the upper arm and the tool every two hours of operation.

On all round sizes, select the proper cavity for the size being sheared.

In the square cavity there is a kick-up bolt adjustment.

Adjust this bolt so that the workpiece will just feed under the bolt and remains horizontal to the shear.

⊠ CAUTION: WHEN SHEARING SHORT PIECES OR NIPPING THE ENDS OF THE ROD, CARE SHOULD BE TAKEN SO THAT THE SLUGS DO NOT BUILD UP IN THE DROPOFF SIDE. IF SLUGS BUILD UP IN THE DROPOFF SIDE, THERE IS A POSSIBILITY OF INJURY TO OTHER PERSONNEL AND DAMAGE TO THE TOOL. REMOVE THE ROD SHEAR WHEN IT IS NOT IN USE.

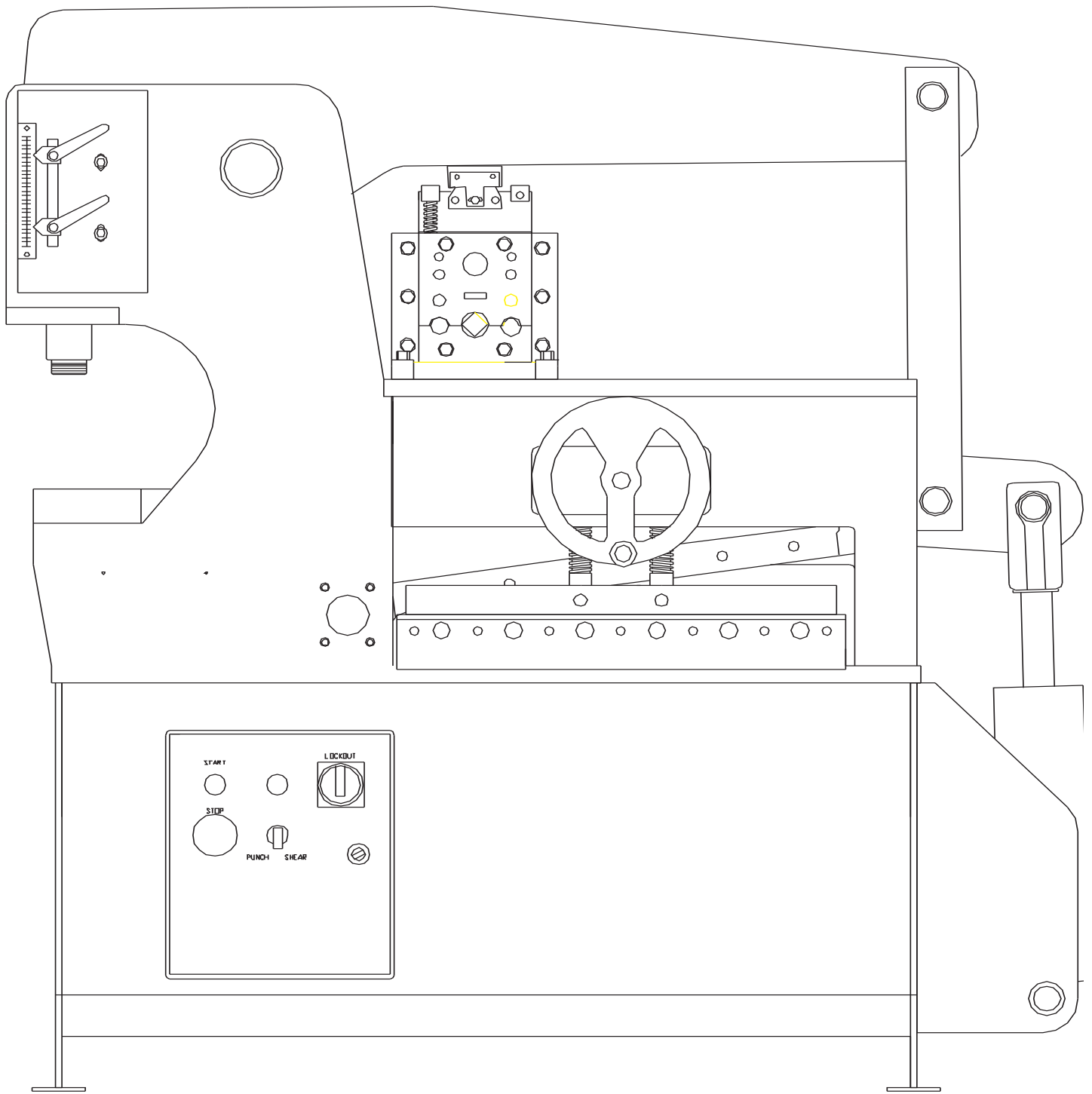


FIGURE 15

## **7.3 6 X 6 NINETY DEGREE NOTCHER**

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The 6 x 6 ninety degree notcher is a component tool designed to cut 90 degree Vee notches in angle and flat stock. It has a maximum capacity of 5/16 of an inch (8mm) thickness mild steel.

### **7.3A 6 X 6 NINETY DEGREE NOTCHER INSTALLATION**

---

SEE FIGURE 16 ON THE FOLLOWING PAGE.

The 6 x 6 ninety degree notcher can be mounted either under the upper arm on the tool table or in the punch station.

When the notcher is mounted on the tool table, the selector switch must be in the SHEAR position.

When the notcher is in the punch station, the selector switch must be in the PUNCH position.

⊗ **CAUTION: IN EITHER STATION, CARE MUST BE TAKEN TO SET THE UPPER AND LOWER STROKE CONTROLS ON THE MACHINE. FAILURE TO SET THE STROKE CONTROLS WILL RESULT IN DAMAGE TO THE TOOL AND POSSIBLE INJURY TO THE OPERATOR.**

The upper stroke should be set so that the pusher assembly is held in place by the spring tension of the tool. The lower stroke must be set so that the upper blade just passes the lower blades at the point of the vee by no more than 1/16 of an inch (1.5mm).

To install the notcher under the upper arm, the tool should be mounted as close to the frame as possible and anchored with the bolts (A) provided. The pusher (B) and beam block (C) should be installed per the dimensions in FIGURE 16.

To mount the notcher in the punch station, remove the die holder and stripper. Mount the notcher, using the heavy washer and bolt (D) provided. SEE FIGURE 16. Line the pusher up to the punch ram and tighten the mounting bolts. After the notcher is mounted, install the neo-prem slug pad.

### **7.3B 6 X 6 NINETY DEGREE NOTCHER OPERATION**

---

Lubricate the blades before starting and every 10 to 15 cuts, thereafter. Lubricate the pusher bars (B & C) every two hours of operation. Do not attempt to shear material thicker than 5/16 OF AN INCH (8mm) and never side load the notcher. The slug must be removed after every cut. Remove the slug with a magnetic probe or tongs.

➡ **DO NOT REMOVE THE SLUGS BY HAND.**

➡ **ALWAYS REMOVE THE NOTCHER WHEN IT IS NOT IN USE.**



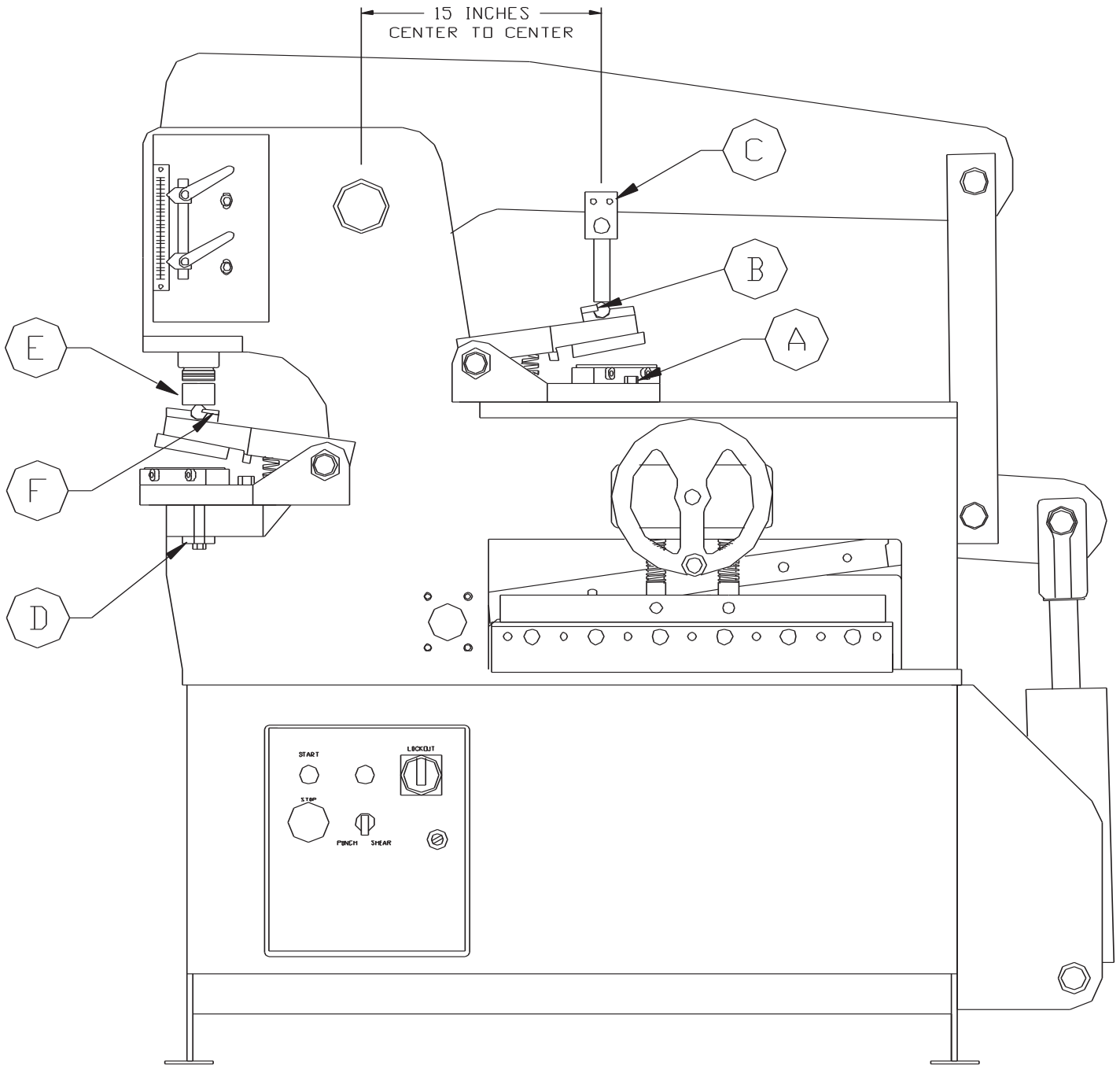


FIGURE 16

## **7.3C BLADE REPLACEMENT**

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The lower blades are symmetrical and can be rotated to expose four cutting edges.

The upper blades have two cutting edges.

**TO ROTATE OR REPLACE THE BLADES, USE THE FOLLOWING STEPS:**

**⊗ CAUTION: THE UPPER CASTING OF THE NOTCHER IS HEAVY ENOUGH TO CAUSE INJURY IF DROPPED. USE CARE WHEN HANDLING THIS TOOL.**

1. Remove the return springs from the unit.
2. Rotate or replace the upper blade and snug bolts only, to allow further adjustments.
3. Rotate or replace the lower blades.
4. Lower the upper blade down until it just passes the lower blade, approximately 1/16 of an inch (1.5mm).
5. Adjust the upper blade until the point almost touches the lower blades.
6. Center the rear of the upper blade with the rear of the lower blades. There should be a clearance of approximately .005 of an inch (.12mm) on each side.
7. Tighten the upper blade bolts. To check blade alignment, raise and lower the upper casting several times, by hand. After alignment, tighten the back up set screws, making sure that the upper blade does not move.

## **7.4 RECTANGLE NOTCHER**

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The Rectangle Notcher is a component tool designed to make a 2 inch (50mm) wide notch in angle iron or flat stock.

### **7.4A RECTANGLE NOTCHER INSTALLATION**

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**SEE FIGURE 17 ON THE FOLLOWING PAGE.**

The Rectangle Notcher mounts only in the punch station on this model. The selector switch must be in the **PUNCH** position to operate this tool.

**TO MOUNT THE NOTCHER**, remove the die holder and stripper. Mount the notcher so that the punch ram lines up over the pressure block on the tool. With the bolts provided, anchor the tool to the punch bolster.

## 7.4B RECTANGLE NOTCHER OPERATION

---

- ⊗ **CAUTION: BEFORE OPERATING THIS TOOL, THE DOWNSTROKE OF THE MACHINE MUST BE SET SO THAT THE FRONT OF THE TOP BLADE JUST PASSES THE LOWER BLADES, APPROXIMATELY 1/8 OF AN INCH (1.5MM). FAILURE TO SET THE STROKE WILL RESULT IN DAMAGE TO THE TOOL AND POSSIBLE INJURY TO THE OPERATOR. LUBRICATE THE BLADES BEFORE THE FIRST CUT AND EVERY 10-15 CUTS, THEREAFTER. THE MAXIMUM MATERIAL THICKNESS THAT CAN BE SHEARED IS 3/8 OF AN INCH (9.5MM).**
- ➡ **ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE.**

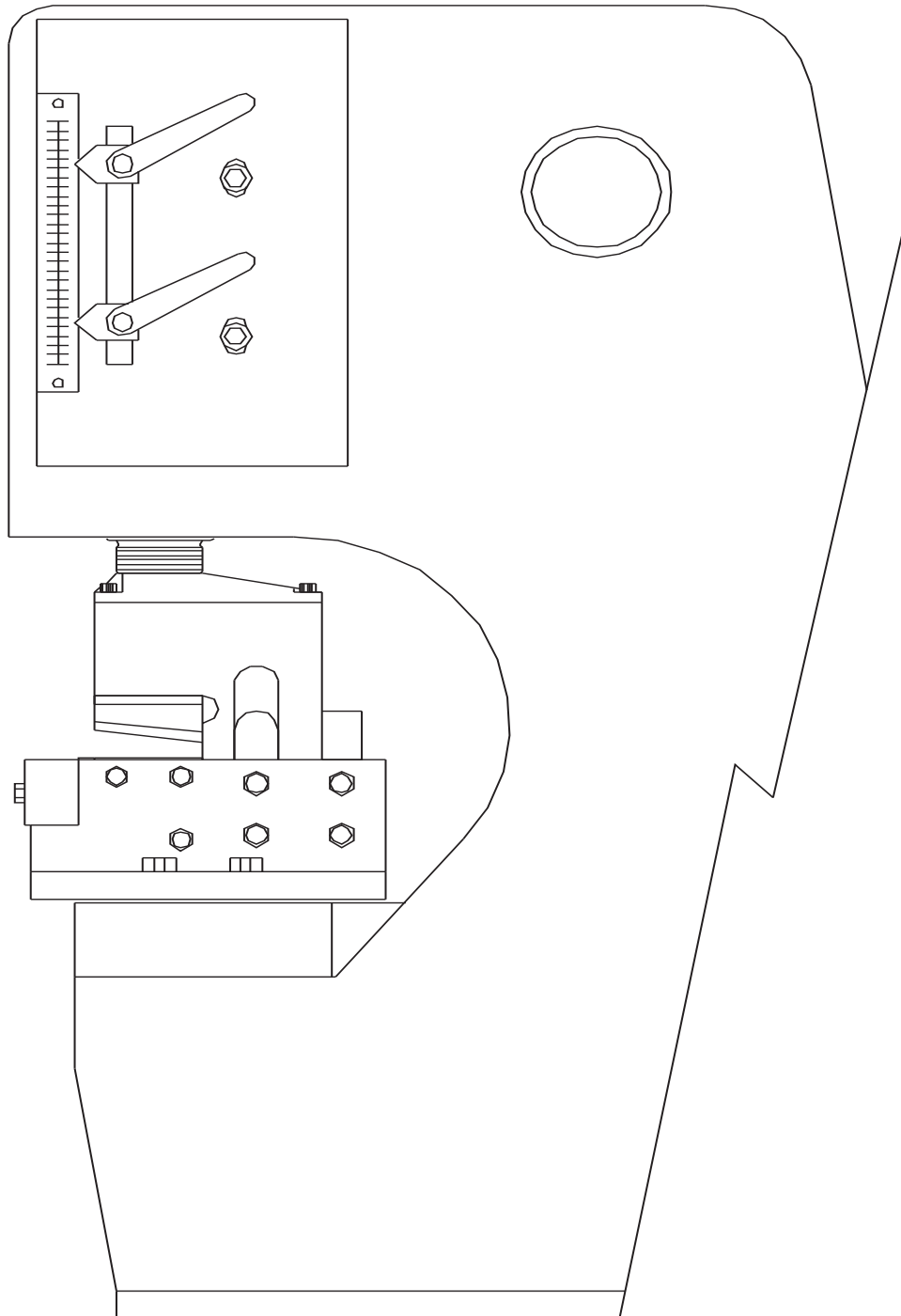


FIGURE 17

## 7.5 12, 18 AND 24 INCH BRAKES

---

Brakes are component tools designed to bend and form mild steel. They are shipped standard with dies to accommodate material up to 1/4 of an inch (6mm) thickness. The selector switch must be in the SHEAR position to operate these tools.

### 7.5A BRAKE INSTALLATION

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SEE FIGURE 18 BELOW.

There are three lengths of brakes available for this model: 12, 18 and 24 inch. The brakes mount under the upper arm in the tool station and are held down with the finger clamps provided. Mount the 12 and 18 inch brakes as close to the frame as possible, for maximum tonnage available. There is a press brake tonnage chart that will be helpful when using a brake on this machine. SEE FIGURE 19 ON THE FOLLOWING PAGE. On this model, the twelve inch brake has 40 tons, the eighteen inch has 35 tons and the twenty four inch has 30 tons.

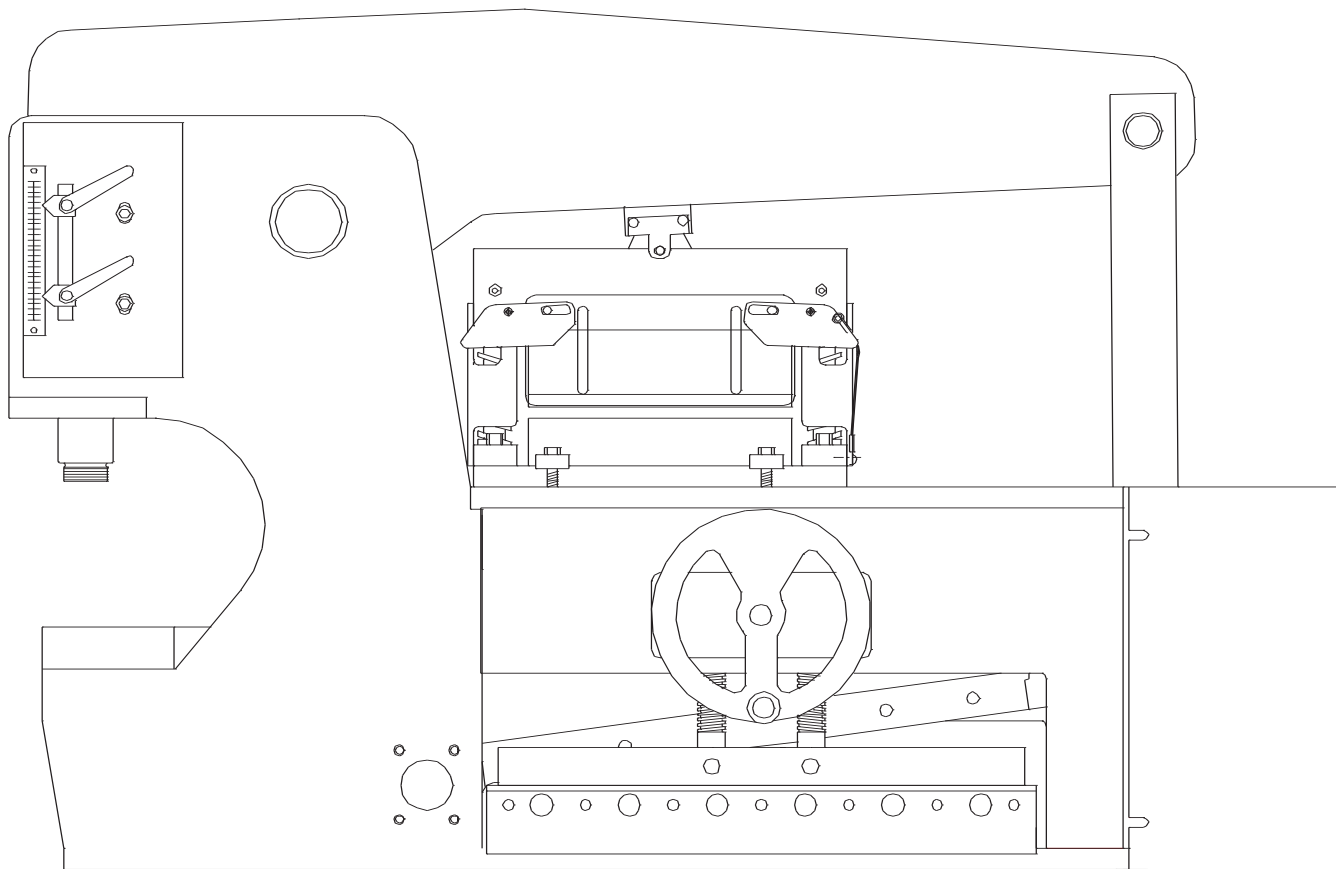


FIGURE 18

## 7.5B BRAKE OPERATION

➡ NEVER PUT YOUR HANDS INTO OR AROUND A BRAKE WHILE IT IS IN OPERATION.

Grease the slider block between the upper arm and the tool every two hours of operation.

Hold short pieces with tongs or a similar device. In using the brake, it is necessary to load the brake centrally. (Visual centering is sufficient.) If work is performed offcenter, the guide pins could be damaged. The brake lift is provided by springs. If sticking occurs at the bottom of the stroke and the upper die does not return, usually a slight tap on the upper die is sufficient to free the guides.

➡ DO NOT ATTEMPT TO FREE THE BRAKE BY HAND.

Sticking can be caused by lack of lubrication, complexity of the part being bent or bent guide pins. Keep the guides well lubricated and replace them if they are damaged.

It is common practice to have the bottom die opening 8 times the thickness of the material being bent. If the parts require a bend of less than 90 degrees, adjust the downstroke of the machine until the desired bend is obtained. A great variety of standard brake dies can be used with this unit. These are available from Scotchman Industries or Brake Die suppliers.

➡ REMOVE THE TOOL WHEN IT IS NOT IN USE.

### TONNAGE CHARTS

PRESSURE IN TONS PER LINEAR FOOT REQUIRED TO MAKE 90 DEGREE AIR BEND IN MILD STEEL

| THICKNESS OF METAL |        | WIDTH OF V-DIE OPENING |      |     |     |      |      |      |      |       |       |       |      |       |      |       |      |       |       |      |      |      |      |  |
|--------------------|--------|------------------------|------|-----|-----|------|------|------|------|-------|-------|-------|------|-------|------|-------|------|-------|-------|------|------|------|------|--|
| GAUGE              | INCHES | 1/4                    | 5/16 | 3/8 | 1/2 | 5/8  | 3/4  | 7/8  | 1    | 1-1/8 | 1-1/4 | 1-1/2 | 2    | 2-1/2 | 3    | 3-1/2 | 4    | 5     | 6     | 7    | 8    | 10   | 12   |  |
| 20                 | .036   | 2.9                    | 2.2  | 1.7 | 1.2 | 1.0  |      |      |      |       |       |       |      |       |      |       |      |       |       |      |      |      |      |  |
| 18                 | .048   |                        | 4.0  | 2.9 | 2.2 | 1.6  | 1.3  |      |      |       |       |       |      |       |      |       |      |       |       |      |      |      |      |  |
| 16                 | .060   |                        |      | 5.6 | 3.6 | 2.7  | 2.2  | 1.7  |      |       |       |       |      |       |      |       |      |       |       |      |      |      |      |  |
| 14                 | .075   |                        |      |     | 6.0 | 4.5  | 3.4  | 3.0  | 2.5  | 2.1   |       |       |      |       |      |       |      |       |       |      |      |      |      |  |
| 13                 | .090   |                        |      |     |     | 6.8  | 5.4  | 4.3  | 3.7  | 3.3   | 2.9   |       |      |       |      |       |      |       |       |      |      |      |      |  |
| 12                 | .105   |                        |      |     |     | 10.1 | 7.4  | 6.3  | 5.4  | 4.4   | 4.0   | 3.2   |      |       |      |       |      |       |       |      |      |      |      |  |
| 11                 | .120   |                        |      |     |     |      | 10.5 | 8.8  | 7.2  | 6.2   | 5.4   | 4.3   | 3.2  |       |      |       |      |       |       |      |      |      |      |  |
| 10                 | .135   |                        |      |     |     |      |      | 11.3 | 9.6  | 8.4   | 7.0   | 8.6   | 4.1  |       |      |       |      |       |       |      |      |      |      |  |
| 9                  | .150   |                        |      |     |     |      |      |      | 13.1 | 11.9  | 9.0   | 6.7   | 5.2  | 3.5   |      |       |      |       |       |      |      |      |      |  |
| 7                  | .188   |                        |      |     |     |      |      |      |      | 16.4  | 14.0  | 11.2  | 7.6  | 5.8   | 4.5  |       |      |       |       |      |      |      |      |  |
| 1/4                | .250   |                        |      |     |     |      |      |      |      |       | 28.8  | 22.0  | 15.3 | 11.5  | 9.1  | 7.5   | 6.2  |       |       |      |      |      |      |  |
| 5/16               | .313   |                        |      |     |     |      |      |      |      |       |       | 38.0  | 26.0 | 19.2  | 16.0 | 12.5  | 10.6 | 7.6   |       |      |      |      |      |  |
| 3/8                | .375   |                        |      |     |     |      |      |      |      |       |       |       | 41.0 | 29.9  | 24.0 | 19.4  | 16.0 | 12.3  | 9.3   |      |      |      |      |  |
| 7/16               | .438   |                        |      |     |     |      |      |      |      |       |       |       |      | 45.2  | 35.0 | 28.0  | 24.0 | 17.0  | 14.6  | 11.1 |      |      |      |  |
| 1/2                | .500   |                        |      |     |     |      |      |      |      |       |       |       |      |       | 47.9 | 39.0  | 33.1 | 24.0  | 19.0  | 15.6 | 12.7 |      |      |  |
| 5/8                | .625   |                        |      |     |     |      |      |      |      |       |       |       |      |       |      | 69.5  | 58.0 | 42.2  | 32.4  | 26.0 | 23.0 | 16.5 |      |  |
| 3/4                | .750   |                        |      |     |     |      |      |      |      |       |       |       |      |       |      |       | 92.0 | 69.0  | 52.2  | 42.2 | 36.0 | 27.0 | 21.0 |  |
| 7/8                | .875   |                        |      |     |     |      |      |      |      |       |       |       |      |       |      |       |      | 104.0 | 80.0  | 63.0 | 52.5 | 39.4 | 31.2 |  |
| 1.0                | 1.00   |                        |      |     |     |      |      |      |      |       |       |       |      |       |      |       |      |       | 112.2 | 90.0 | 76.0 | 56.2 | 44.0 |  |

PRESSURES HIGHLIGHTED ARE FOR DIES WITH FEMALE DIE OPENINGS APPROX. 8 TIMES METAL THICKNESS, WITH RADIUS ON MALE DIE EQUAL TO METAL THICKNESS, AND ARE CONSIDERED IDEAL FOR RIGHT ANGLE BENDING.

BENDING PRESSURES REQUIRED FOR OTHER METALS AS COMPARED TO 60,000 P.S.I. TENSILE MILD STEEL ON CHART:

SOFT BRASS . . . . . 50% OF PRESSURE LISTED  
 SOFT ALUMINUM . . . . . 50% OF PRESSURE LISTED  
 ALUMINUM ALLOYS (Heat treated) . . . . . SAME AS STEEL  
 STAINLESS STEEL . . . . . 50% MORE THAN STEEL  
 CHROME MOLYBDENUM . . . . . 100% MORE THAN STEEL

FIGURE 19

## **7.6 ANGLE IRON BRAKE**

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This brake is designed to form box frames out of angle iron. It has a maximum capacity of 1/4" (6mm).

### **7.6A ANGLE IRON BRAKE INSTALLATION**

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SEE FIGURE 20 ON THE FOLLOWING PAGE.

This brake mounts in the punch station and the selector switch must be in the PUNCH position to operate this tool. The die holder, punch retaining nut and the stripper must be removed to install this tool.

Mount the tool so that it lines up directly under the punch ram and anchor it to the punch bed with the clamp provided.

### **7.6B ANGLE IRON BRAKE OPERATION**

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The downstroke of the machine must be set, to prevent damage to the tool. Grease the brake guides every two hours of operation.

➡ **ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE!**

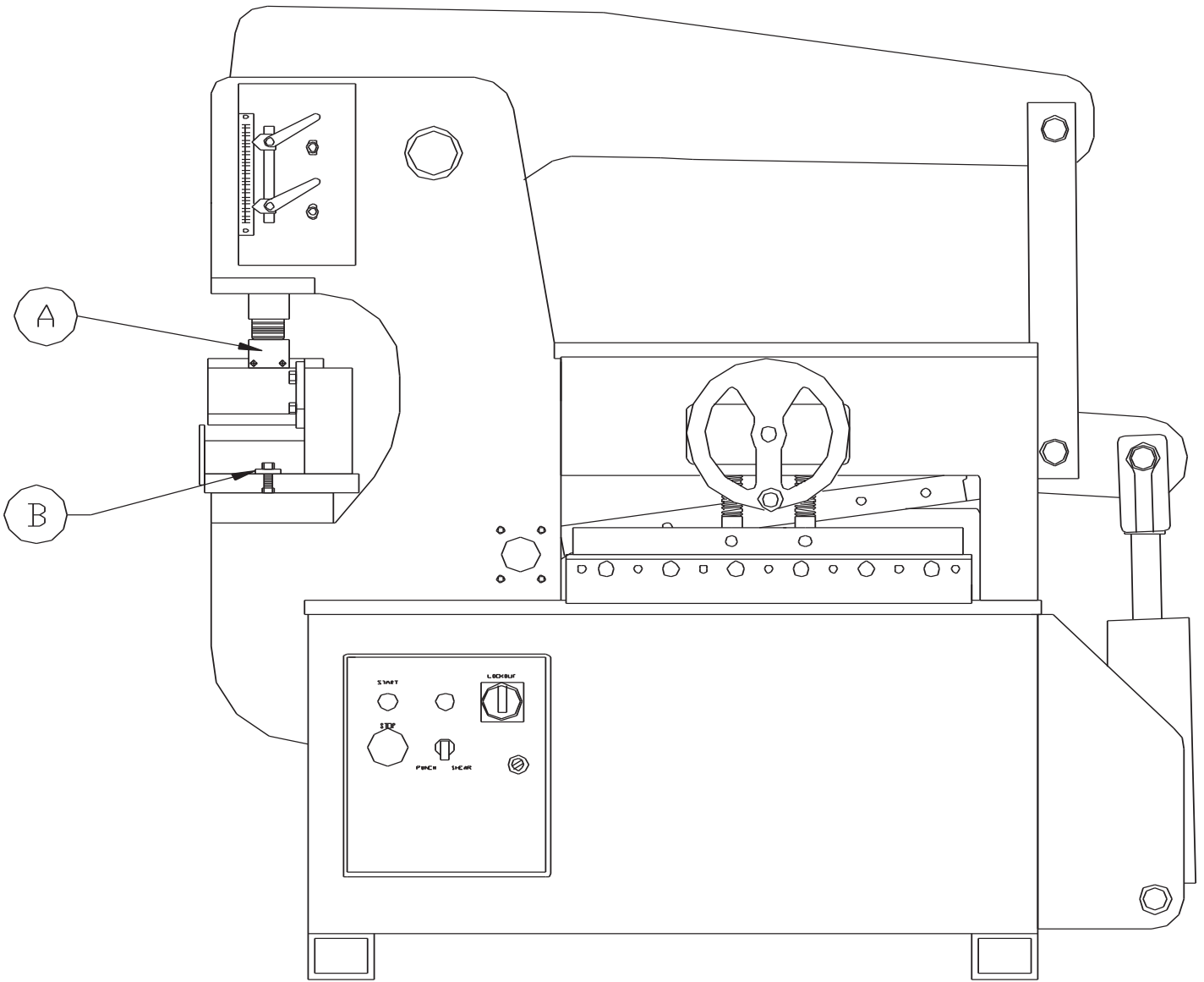


FIGURE 20

## 7.7 CHANNEL SHEAR

The Channel Shear is a component tool designed to shear 2 to 5 inch (50 to 125mm) standard channel on this model.

### 7.7A CHANNEL SHEAR INSTALLATION

SEE FIGURE 21 BELOW.

The Channel Shear installs under the upper arm in the tool station. The selector switch must be in the SHEAR position to operate this tool.

Before installing the tool, remove the upper blade. Install the spring guide pins with the head down in the side plate of the shear. REFER TO THE INSERT IN FIGURE 21 BELOW.

Slide the return springs over the guide pins, the short one first, followed by the long one. Replace the top blade.

Mount the shear as close to the frame as possible, with the locking handle to the cylinder end. Make sure that the slug slot in the tool aligns with the slug slot in the tool table. Anchor the tool with the finger clamps provided.

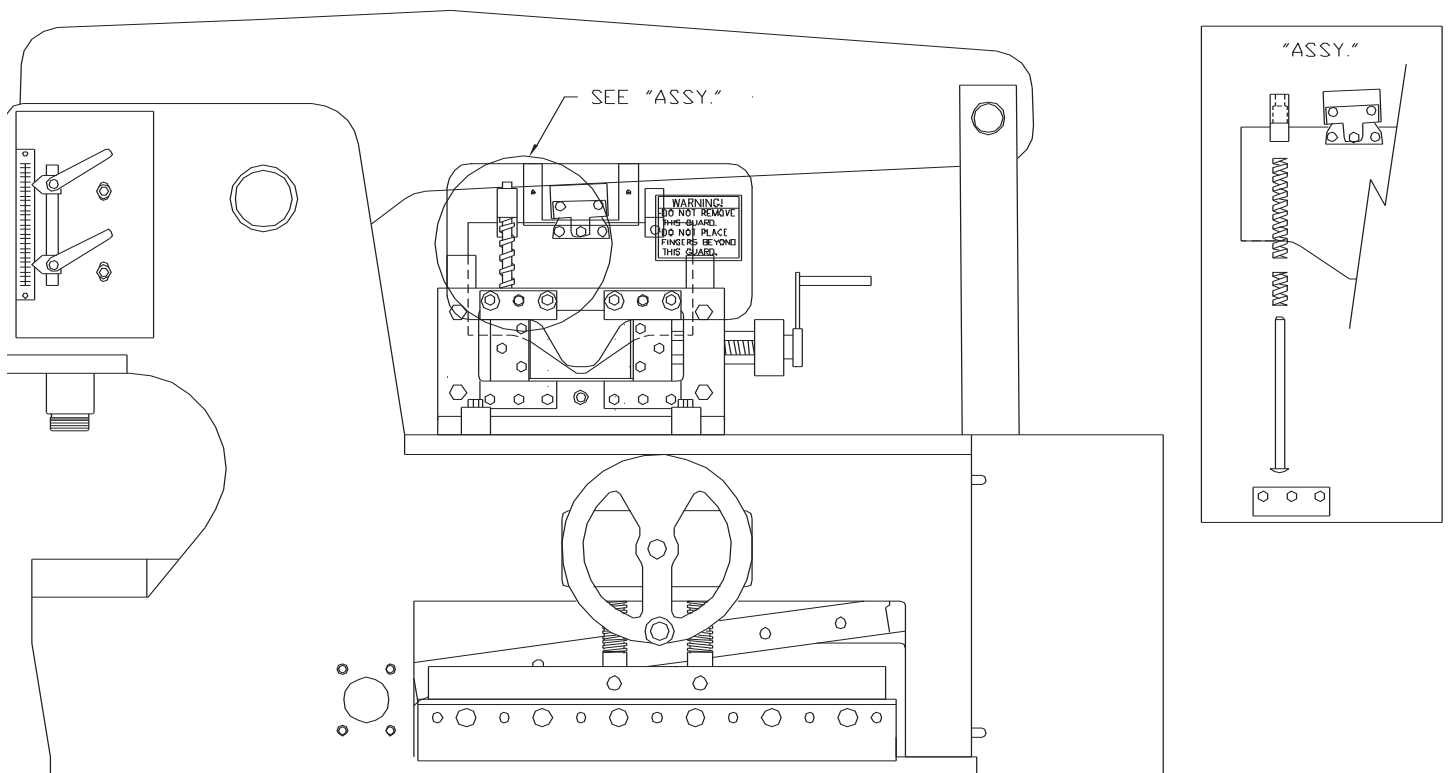


FIGURE 21



## **7.7B CHANNEL SHEAR OPERATION**

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The Channel Shear will shear from 2 to 5 inch (50 to 150mm) lightweight (5.4 lb/ft) channel with minimum distortion. Lubricate the blades before the first cut and every 10 to 15 cuts, thereafter. Grease the slider block between the upper arm and the tool every two hours of operation.

**THE FOLLOWING ARE BASIC STEPS IN SHEARING WITH THE CHANNEL SHEAR.**

— **ADJUST BOTH MOVING AND STATIONARY SIDE BLADES TO THE SIZE OF CHANNEL BEING SHEARED.**

Improper adjustment of the vertical blades will result in damage to the channel shear. To keep the channel centered in the unit, it is necessary to reset the stationary side blades for each size of channel.

**ONE METHOD OF ACCOMPLISHING THIS ADJUSTMENT IS AS FOLLOWS:**

Place a piece of channel, the size to be sheared, in the tool. Remove the lifting springs and lower the upper blade by hand until it contacts the channel iron. Locate the channel so that the upper blade contacts both legs, which will center it in the shear. Adjust the movable vertical blades up to the flange of the channel. Loosen the fixed vertical blade clamps (four places). Slide the fixed blades up to the channel flange. Tighten the blade clamps and adjust the back-up socket set screws up against the fixed vertical blades. Now, check to see that the blades have good alignment, front and back, and have maintained their perpendicularity to the lower blades.

— **POSITION THE ADJUSTING HANDLE.**

The adjusting handle can be relocated to permit easy opening and closing of the movable vertical blades. (Approximately 1/2 turn will lock and unlock the workpiece.)

— **SET THE BOTTOM OF THE STROKE AS LOW AS POSSIBLE.**

The bottom of the stroke should be set as low as possible, without bottoming any part of the upper blade, blade holder or pressure block. The upper stroke should be set to allow the workpiece to feed through the shear freely.

— **PROCEDURE FOR SHEARING:**

Lubricate the blades with oil before making the first cut and every 10 to 15 cuts, thereafter. This lubrication is critical on the channel shear.

Position the workpiece. Snug the movable blades up to the channel's flange. Depress the foot switch and shear the workpiece. Before releasing the foot switch, back the movable blades off by 1/2 turn of the locking handle. Make sure that the slug drops from the chute after each stroke.

All of the bottom and vertical blades are symmetrical and can be turned to present four (4) cutting edges.

Clearance between the upper and lower blades is changed by the addition or removal of shims. A clearance of twenty thousandths of an inch (.5mm) is recommended. For efficient shearing, blades must be kept sharp.

➡ **REMOVE THE TOOL WHEN IT IS NOT IN USE.**

## **7.8 PIPE NOTCHER**

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The Pipe Notcher is a component tool designed to saddle cut pipe or tubing for applications such as railings. There are notchers available to notch angles in pipe and tubing, also. For prices and availability, contact your local dealer or the factory.

### **7.8A PIPE NOTCHER INSTALLATION**

---

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SEE FIGURE 22 ON THE FOLLOWING PAGE.

The pipe notcher can be installed in either the punch station or under the upper arm.

When installed on the tool table, the selector switch must be in the SHEAR position.

When installed in the punch station, the selector switch must be in the PUNCH position.

When installing the notcher in the punch station, remove the die holder and the stripper.

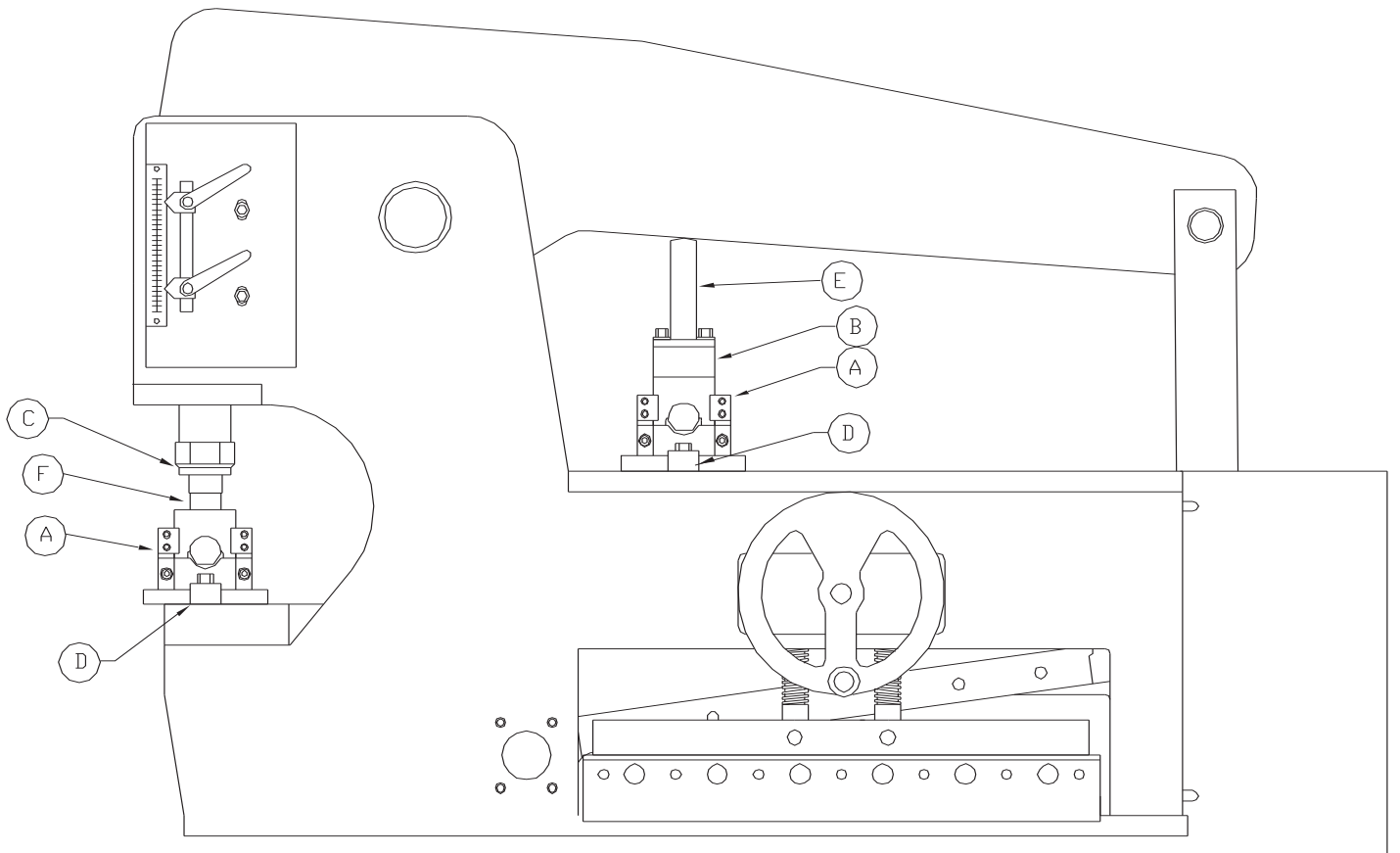
Install the pusher (F) on the punch ram, using the #45 punch retaining nut (C).

Set the notcher on the bolster with the cutting die facing either left or right and align the slug hole in the notcher with the hole in the bolster. Anchor the tool with the finger clamps provided (D).

☒ **NOTE: ONE FINGER CLAMP WILL CLAMP THE NOTCHER BASE ON THE FRONT; THE OTHER CLAMP BACKS UP THE TOOL.**

To mount the notcher on the tool table, attach the riser (B) and the pusher (E) to the tool and align the slug hole in the tool with the slug hole in the tool table. Anchor the tool to the tool table with the finger clamps provided (D).

☒ **CAUTION: WITH THE TOOL MOUNTED IN EITHER STATION, IT IS NECESSARY TO SET THE DOWNSTROKE OF THE MACHINE TO PREVENT DAMAGE TO THE TOOL. THE UPPER DIE SHOULD NOT PASS THE LOWER DIE BY MORE THAN 1/32 OF AN INCH (.7MM).**



**FIGURE 22**

## 7.8B PIPE NOTCHER OPERATION

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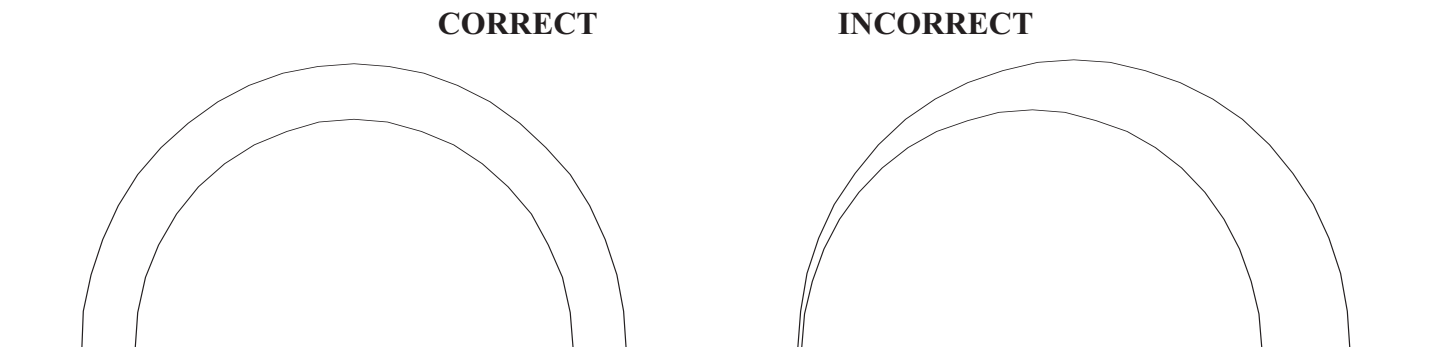
The Pipe Notcher is a vendored item for Scotchman Industries.

The following is the manufacturer's recommendation for maintenance and alignment of this tool.

➡ **PLEASE READ CAREFULLY BEFORE USE OF TOOLING.**

**TO ACHIEVE THE BEST RESULTS FROM YOUR UNIT,  
PLEASE OBSERVE THESE SIMPLE RULES:**

- A. Keep the unit clean.** Whenever dirt or metal chips accumulate, remove the 8mm limit screw located in the center at the rear of the punch. Lift out the punch-holder and the two springs(1/2 x 3"). Clean the unit with solvent.
  
- B. Check the alignment of the unit.** After cleaning the unit, always check the alignment of the punch and die section. To check the alignment, insert the punch and holder, without the springs, into the housing and check the gap. **SEE FIGURE 23 BELOW.**



**FIGURE 23**

If proven correct, tighten the two M-10 socket head screws holding the die section in place. Apply some high pressure lube all around the inside of the housing, then re-assemble the unit, reversing the above procedures.

⊠ **CAUTION: WHEN USING THIS TOOL, ALWAYS WEAR SAFETY GLASSES.**

Before operation, lubricate the sides and back of the upper die with way oil. Repeat this lubrication once daily. Cutting blades should be lubricated with a cutting oil or motor oil before making the first cut and after every 10 to 15 cuts.

## 7.7C PIPE NOTCHER CAPACITIES

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Two inch (2") Schedule 40 is the maximum thickness that can be cut. Lighter weight tubing may be cut, but will probably require different dies for best cutting results. Lighter tubing up to this diameter can be cut with appropriate dies. Separate dies are required for each size pipe or tubing being notched.

## 7.9 PICKET TOOL INSTALLATION & OPERATION

This tool mounts in the punch station only. REFER TO THE DRAWING BELOW. The machine must be in the PUNCH position to operate this tool. Remove the die holder, stripper and the punch retaining nut. Install the tool so that the punch ram aligns with the ram on the picket tool and, with the finger clamps (C) provided, anchor it to the punch bolster.

⊗ CAUTION: THE DOWNSTROKE OF THE MACHINE MUST BE SET BEFORE OPERATION OF THE TOOL. FAILURE TO SET THE DOWNSTROKE OF THE MACHINE WILL RESULT IN DAMAGE TO THE TOOL.

1. Set the downstroke of the machine so that the upper die clears the lower die by twice the wall thickness of the tube, plus 1/32 of an inch (.8mm).
2. Adjust the tube stop (A) just low enough to contact the upper edge of the tube.
3. Adjust the rest stop (B) so that it is approximately half of the tube size below the lower die.
4. Feed the tube into the tool until it contacts the stop (A). Depress the foot pedal.
5. Make sure that the slugs eject from the tool as the next piece is fed into the tool.
6. Lubricate the dies every 10 to 15 cuts and grease the ram daily.

⊗ CAUTION: ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE !!

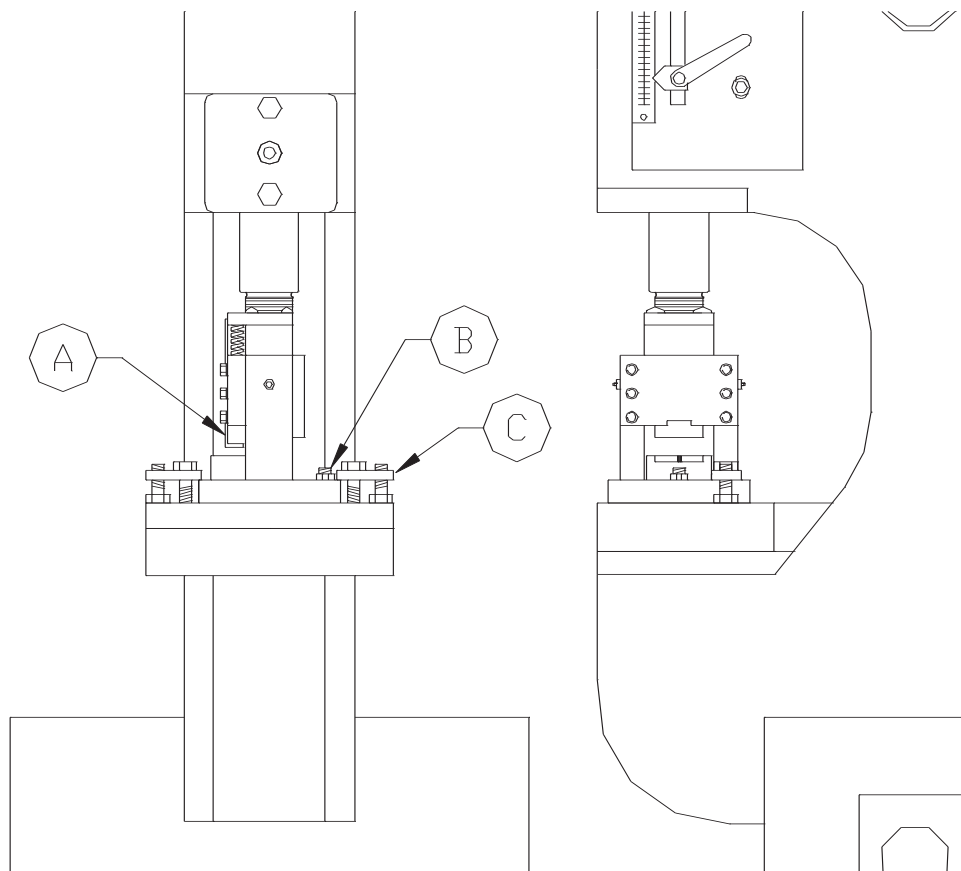


FIGURE 24

## **7.10 SQUARE TUBE SHEAR**

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SEE FIGURE 25 ON THE FOLLOWING PAGE.

The square tube shear is designed to shear square tubing from 1/4" to 2".

16 gauge is the maximum material thickness.

### **7.10A SQUARE TUBE SHEAR INSTALLATION**

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SEE FIGURE 25 ON THE FOLLOWING PAGE.

This tool mounts on the tool table. The machine must be in the SHEAR position to operate this tool.

1. Mount the tool over the slug release slot in the table and squarely under the upper arm.
2. Grease the pressure cap before using and every two hours, thereafter.
3. Anchor the tool with the finger clamps (B) provided.
4. Set the upstroke of the machine so that the size of tube you want to shear will feed through the tool.

Make sure that the upstroke is set so that there is spring tension on the pressure block at all times.

5. Set the downstroke so that the upper blade passes the lower blade by approximately 1/8".

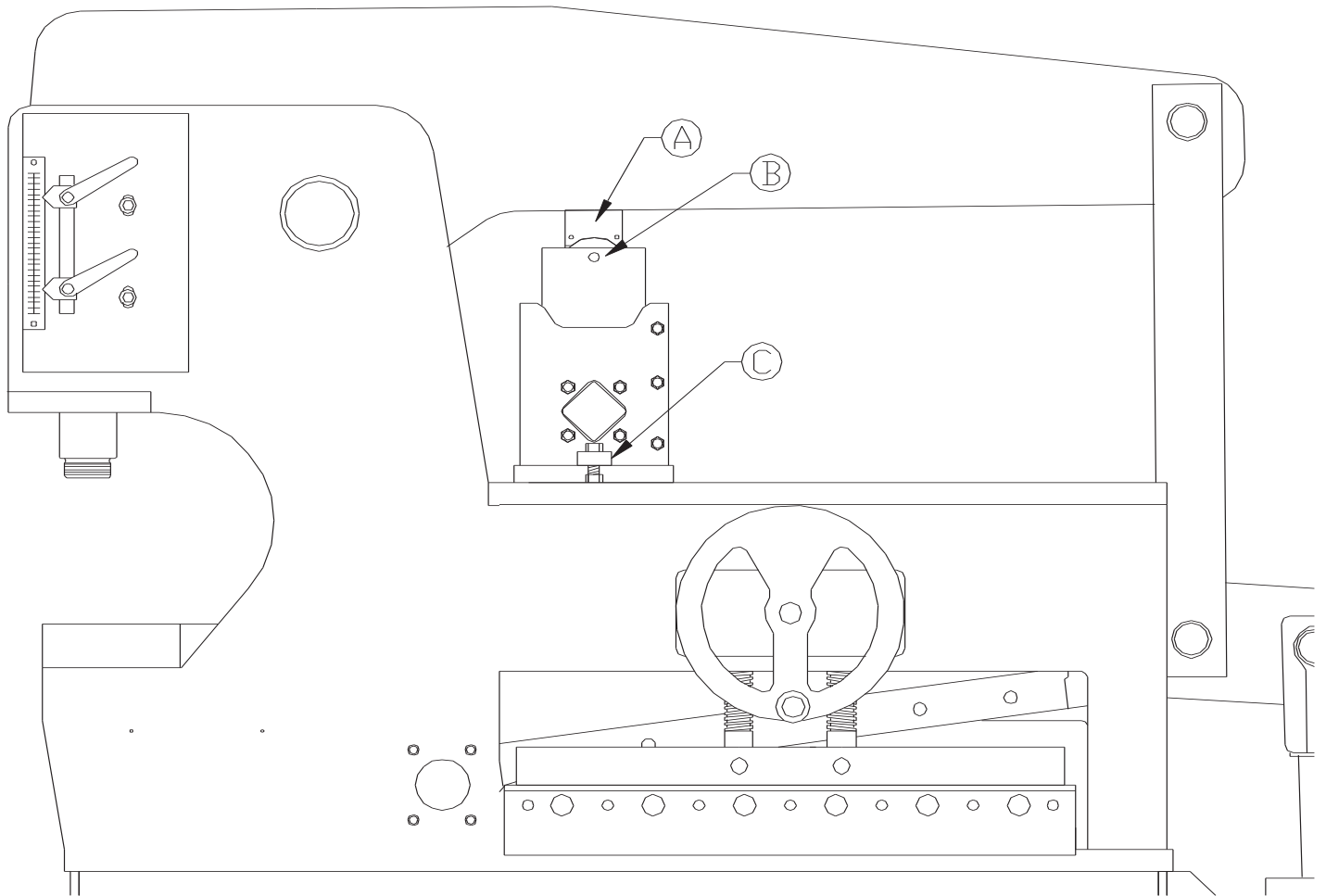
### **7.10B SQUARE TUBE SHEAR OPERATION**

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1. The selector switch must be in the SHEAR position to operate this tool.
2. Set the downstroke of the machine so that the upper blade passes the lower blade by approximately 1/8 of an inch.
3. Feed the tubing through the shear to the desired length and depress the foot pedal.
4. Lubricate the blades every ten to fifteen cuts.

⊗ CAUTION: ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE.



**FIGURE 25**

## **7.11 OPTIONAL PUNCH AND DIE HOLDERS**

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### **7.11A 2-1/2" AND 3" DIE INSERTS**

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The 2-1/2 and 3 inch (63 and 76mm) die inserts are designed to fit in the standard die holder in place of the 2 inch (50mm) insert. They are used in oversize punching applications. For applications, refer to the punch and die section of the Tooling Parts Manual.

### **7.11B OFFSET DIE HOLDER FOR FLANGE PUNCHING**

---

The offset die holder is used for punching holes in the flange of structural shapes such as channel, I-beam and H-beam. The offset die holder is installed in place of the standard die holder. The offset die holder requires four bolts to anchor it to the bolster. Use the two bolts provided with the die holder and the two bolts from the standard die holder on the machine. Use the same method of installing and aligning punches and dies as outlined in SECTION 6.1, with a few exceptions. The die holder must be removed to install a new punch and die. The downstroke of the machine must be set.

⊗ **CAUTION:** Failure to set the stroke will allow the punch retaining nut to strike the die holder, causing damage to the machine and possible injury to the operator. Because of its design, the offset die holder has a maximum capacity of 30 tons. Exceeding 30 tons will damage the tool and may cause injury to the operator. For punch tonnage requirements, REFER TO FIGURE 9 ON PAGE 26.

The offset die holder is designed to be used in conjunction with an offset stripper. The standard stripper will not work with the offset die holder.

### **7.11C 6 X 6 DIE HOLDER**

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Always follow the preferred method of aligning punches and dies. SEE SECTION 6.1. The 6 x 6 die holder is installed in place of the standard die holder. The 6 x 6 die holder requires four mounting bolts that are shipped with the tool. Capacities for oversize punching with this tool go up to 4 inch (100mm) diameter rounds. For sizes and applications, refer to the punch and die section of the Tooling Parts Manual.

### **7.11D # 45 PUNCH RETAINING NUT**

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The #45 punch retaining nut is of the same design as the #40 and is used in oversize punching applications. For applications, refer to the punch and die section of the Tooling Parts Manual.



## 7.11E HEAVY DUTY SPLIT RING RETAINING NUT

SEE FIGURE 26 BELOW.

The heavy duty split-ring retaining nut is used in oversize punching applications that require a punch with a 2 inch (50mm) shank diameter. This retaining nut is provided with a brass billet screw in the threaded section. After the punch and die alignment is completed by following instructions in SECTION 6.1, tighten the brass billet against the ram threads. Remember to loosen the brass billet before removing the retaining nut. This retaining nut requires a pin wrench, which should be ordered when ordering the nut.

To use the heavy duty split-ring retaining nut, remove the six socket head cap screws (D). Slide the retaining ring (C) over the punch shank. Place the split-ring (B) into the groove on the punch. Place the ring nut (A) on the punch and replace the six socket head cap screws (D).

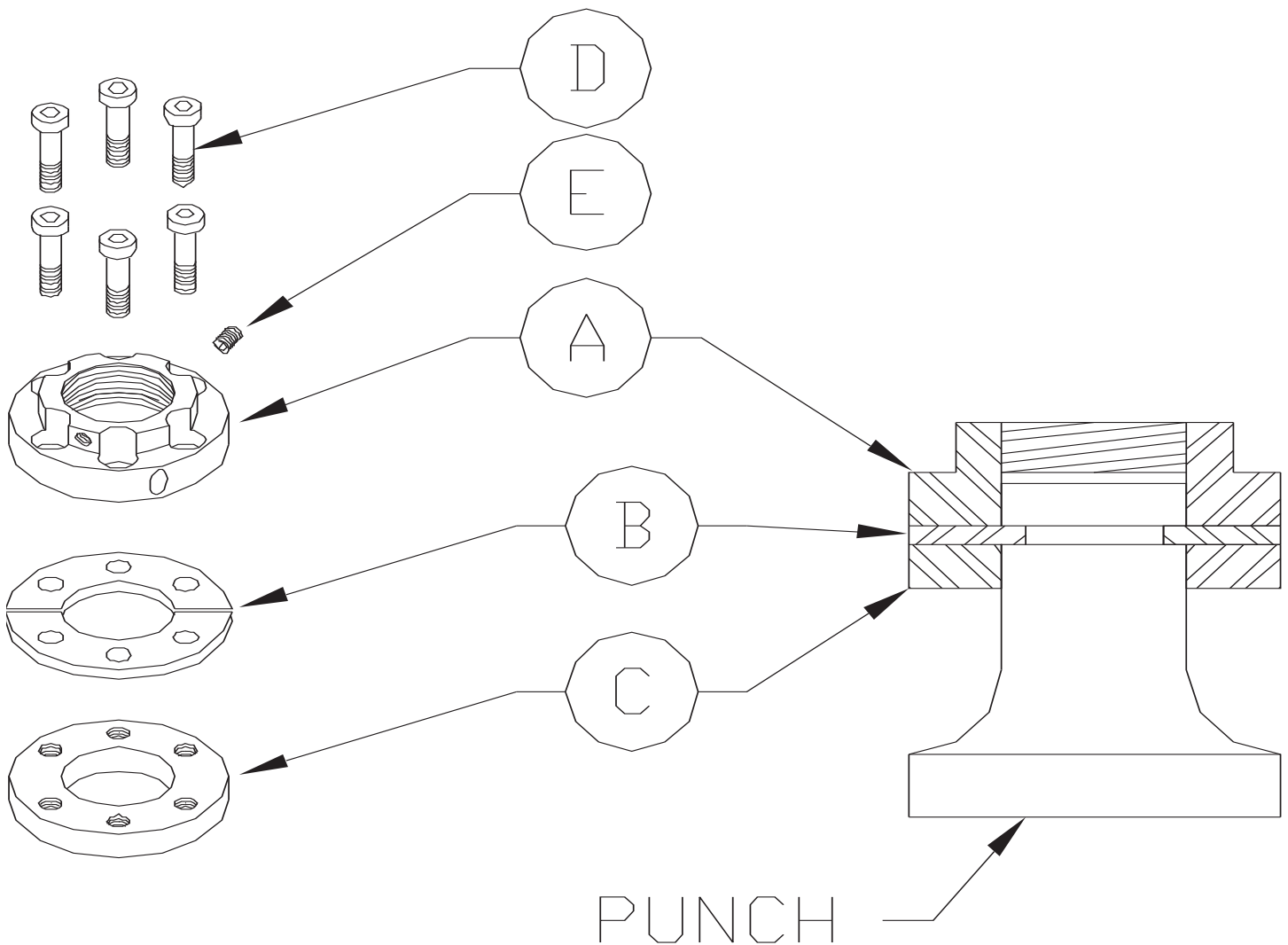


FIGURE 26

## **7.12 OPTIONAL GAUGING EQUIPMENT**

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### **7.12A 54 INCH (137 CM) DELUXE BACK GAUGE**

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The 54 inch (138cm) back gauge mounts on the dropoff side of the machine and will reach all three stations from one point. It is designed to be used as a length stop in the shear, punch and tooling stations.

For the proper configuration for each station, SEE FIGURE 27 ON THE FOLLOWING PAGE.

### **7.12B MITER TABLE (BAR SHEAR)**

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The optional miter table is designed for use in the bar shear. It mounts in place of the standard shear table. It has a guide built in to allow easy positioning of material to be cut at various angles, as well as straight cutting. For parts identification, see the Tooling Parts Manual.

### **7.12C PUNCH TABLE**

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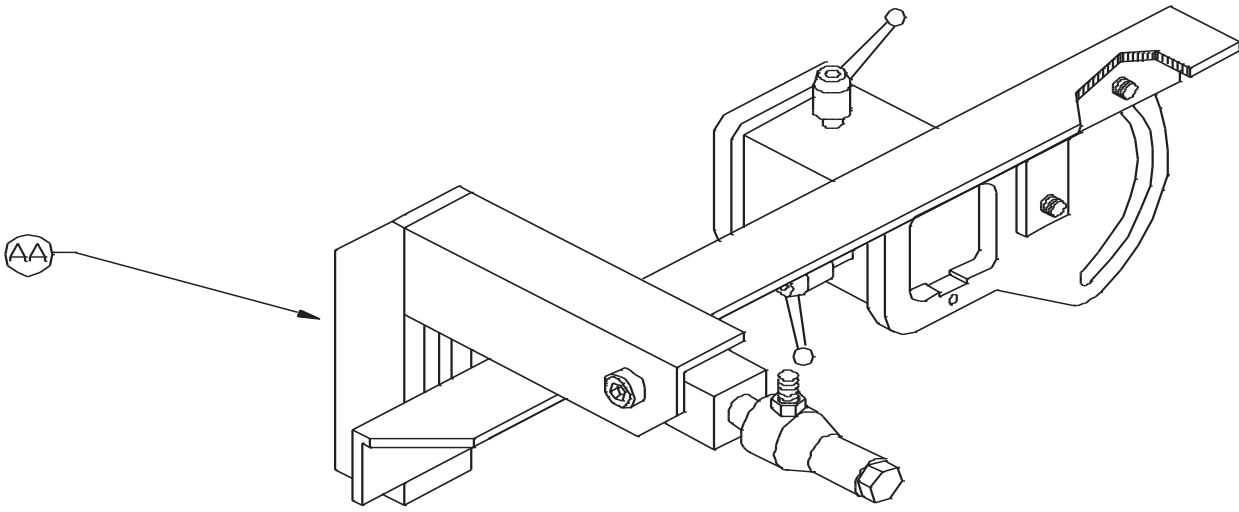
The optional punch gauging table is designed to replace the standard table. It is equipped with quick set-up guides for a wide variety of punching applications. For parts identification, see the Tooling Parts Manual.

### **7.12D JOG CONTROL**

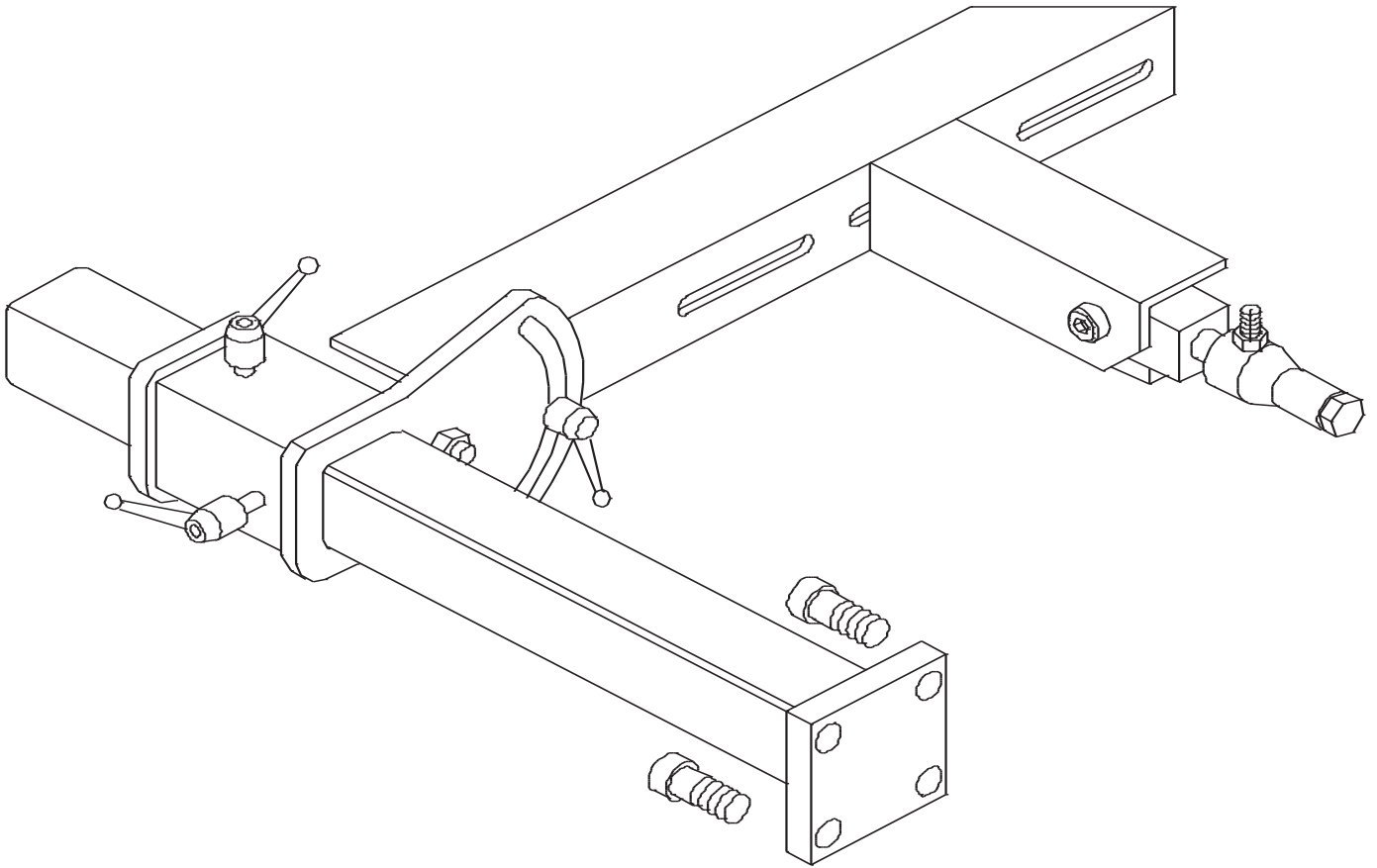
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The jog control is an optional electrical hand control that allows jogging of the machine in either the punch or the shear position. It can be used in a variety of functions, such as setting up various bends on brake tools. When the machine is in the JOG position, the foot switch is inoperative.



PUNCH MOUNTING



STANDARD MOUNTING

FIGURE 27

## **8.0 TROUBLE SHOOTING GUIDE**

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### **8.1 ELECTRICAL TROUBLE SHOOTING - MOTOR**

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**⊗ CAUTION: ALL ELECTRICAL WORK PERFORMED ON THE 6509 IRONWORKER SHALL BE DONE BY A QUALIFIED ELECTRICIAN.**

#### **A. MOTOR WILL NOT RUN:**

- 1. Check to be sure that the disconnect switch is in the ON position and that the selector switch is in the START position.**
- 2. Check to be sure that plant voltage and phase correspond to the machine voltage and phase.**
- 3. Check the line wiring connections at the starter. For the wiring diagram, SEE FIGURE 4 ON PAGE 14.**
- 4. Check the primary and secondary fuses on the transformer.**
- 5. Check the line voltage at the starter. If the correct line voltage is present at the starter, either the starter or the motor is defective. Contact your local dealer or the factory.**

#### **B. MOTOR RUNS BUT THE MACHINE WILL NOT CYCLE WHEN DEPRESSING THE FOOT PEDAL:**

- 1. Check the motor rotation. It should be counterclockwise when facing the shaft end of the motor.**
- 2. Check the selector switch. It must be in either the PUNCH or the SHEAR position or the machine will not move.**
- 3. Check the stroke control adjustment and make sure that only one limit switch is in contact with the metering boss. If both limit switches are in contact with the metering boss, the machine will not move. Loosen the stroke control handles and move the limit switches. Try the machine again.**
- 4. Check the fuses in the control box. There are two fuses in line on the primary side of the transformer and one on the secondary side. Remove the fuses and check them with an Ohm meter and replace them, if necessary. Use a Bussman FNQ-R1 600 volt or equivalent for the primary side. Use a Bussman FLM-1 6/10 or equivalent for the secondary side.**
- 5. Check the limit switches. (For procedures, REFER TO SECTION 8.2.)**
- 6. No power from the transformer: Check the voltage across the transformer's secondary terminals. It should read 110 to 120 volts.**

7. The solenoid on the control valve is not functioning: REFER TO SECTION 8.3.
8. The foot pedal switch is not functioning properly: A voltage test may be run on the terminal strip in the control box to determine if the foot-switch is working properly.

**⊗ WARNING: THERE IS LINE VOLTAGE PRESENT IN THE CONTROL BOX WHEN THE MACHINE IS POWERED. THESE TESTS SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN.**

**TO TEST THE FOOT SWITCH,** place the selector switch in the START position and power the machine. Place the selector switch in the PUNCH or the SHEAR position and test the voltage between terminal #'s 1, 2, 3 & ground. A test between terminal 1 and ground will determine if there is voltage present to the pedal. The reading should be 110-120 volt. With the pedal up, the voltage should read 110-120V between #'s 2 & ground. There should be no voltage reading between #'s 3 & ground. With the pedal depressed, the voltage should read 110-120V between #'s 3 & ground. There should be no voltage reading between #'s 2 & ground. If these readings are not correct, continue on with the following steps:

- A. Turn the machine's power off at the disconnect switch. Remove the cover on the foot switch and check for any loose connections.
  - B. Make sure that the switches are adjusted properly. (You should hear two distinct "clicks" when depressing the pedal.) There is a set screw adjustment on the pedal shaft to adjust the switches.
  - C. Check the switches with an Ohm meter.
9. Damage to the foot pedal cord: Check the continuity of the wire in the cord with an Ohm meter.

Make sure that the power to the machine is off and locked out. The wires must be disconnected from the pedal and the terminal blocks.

10. The pump to motor coupler is damaged: Loosen the set screws in the pump and motor flanges and slide them apart. Inspect the coupler; if it's damaged, replace it.

## **8.2 LIMIT SWITCH INSPECTION**

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The limit switches are sealed units and cannot be taken apart. The plunger can be manually checked.

It should move freely in and out. The switches can also be tested with an Ohm meter.

The wires must be disconnected from the terminal blocks and the power to the machine off.

With the plunger out, the switch should read continuity; with the plunger depressed, it should read open.

## **8.3 CONTROL VALVE INSPECTION**

---

**THE MACHINE WILL ONLY TRAVEL IN ONE DIRECTION.**

**THIS COULD BE CAUSED BY:**

- A. Contamination in the hydraulic oil which causes the spool to stick in one position. With the machine's power off, the spool of the valve can be manually shifted. On each end of the control valve, there is a pin in the center of the knurled nut that holds the coil on. To shift the spool manually, use a small punch or similar device to push these pins in by hand, first one and then, the other. Turn the machine on and try it again. If the machine now operates, the hydraulic oil and the filter should be changed.**
- B. A defective coil on the control valve: The coils can be checked by using an Ohm meter. The wires to the coils must be disconnected. If the ohm reading shows open, the coil is defective and must be replaced.**

## **8.4 HYDRAULICS**

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### **THE MOST COMMON HYDRAULIC PROBLEMS ARE:**

- 1. Low level of hydraulic oil in the reservoir: The reservoir holds 12 U.S. gallons (45 Liters). The level should be 1" below the top of the reservoir.**
- 2. Contamination in the hydraulic oil: The oil and the filter should be changed at least once a year and any time there is a possibility that contamination has gained access into the system.**

**For recommended hydraulic oil, SEE SECTION 5.2.**

- 3. Low pressure caused by worn or damaged parts in the cylinder or pump: There is a pressure port for a pressure gauge provided on all machines. The port will be on the valve manifold or the pressure line between the pump and the valve. A gauge with a minimum capacity of 3,000 PSI is required. With the machine's power off, install the pressure gauge. Power the machine and place a piece of steel in the shear section and clamp it down with the hold down device. Attempt to shear the piece, watching the pressure gauge for a reading. The system pressure of this machine is 2,700 PSI. The pressure is adjustable by adjusting in the relief valve adjustment on the control valve manifold. If the pressure cannot be increased, call your local dealer or the factory.**

## **8.5 CYLINDER SEAL REPLACEMENT**

---

Use the following steps to replace the seals in the hydraulic cylinder:

**SEE FIGURE 28 ON THE FOLLOWING PAGE. IF YOUR MACHINE HAS A DIFFERENT STYLE OF CYLINDER, REFER TO SECTION 10.0.**

- 1. With the selector switch in the SHEAR position and the arms up, turn the machine's power off at the disconnect switch and lock it.**
- 2. Block the arms up, either on the tool table or under the shear arm. SEE ITEM A.**
- 3. Remove the hydraulic hoses from the cylinder and allow the oil to drain from the cylinder.**
- 4. Remove the cylinder clevis pin (D) and swing the cylinder out away from the arm.**
- 5. The cylinder head (B) is threaded into the cylinder.**
- 6. Use a pin wrench to unscrew the cylinder head from the cylinder tube.**
- 7. Place a rod through the cylinder clevis and pull the cylinder apart, using a come-a-long or similar device.**
- 8. Remove the locking nut from the end of the cylinder shaft and slide the piston and the head off of the shaft.**
- 9. Replace all of the seals. There will be extra seals in the kit. Match up the replacement seals with the old ones and discard the rest.**
- 10. Clean all of the parts, including the inside of the cylinder tube, and check all parts for nicks and scratches.**
- 11. Oil all of the seals before reassembling the cylinder.**
- 12. After the piston and head are assembled on the shaft, they can be tapped back into the tube with a brass or plastic hammer.**
- 13. Rethread the cylinder head into the tube.**
- 14. Reconnect the hoses to the cylinder.**
- 15. Use care removing the blocking device (A) from under the arms. Since the cylinder does not contain oil, it may drop some when the blocks are removed.**
- 16. Cycle the machine several times to purge the air out of the hydraulic system.**



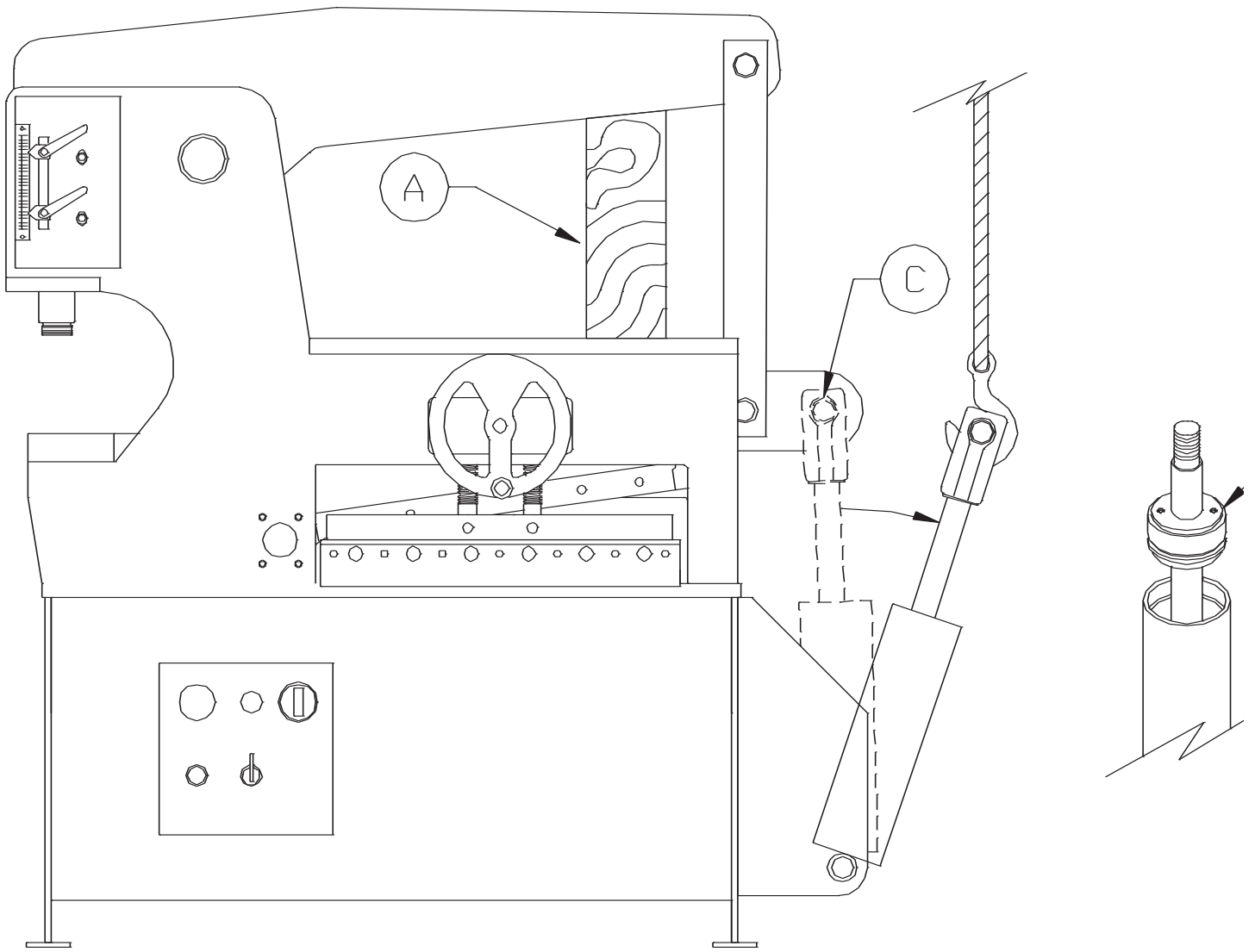


FIGURE 28

## 9.0 6509 IRONWORKER PARTS LISTS

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THE FOLLOWING SECTION CONTAINS THE IRONWORKER  
PARTS LISTS AND DRAWINGS.

FOR YOUR CONVENIENCE,  
ALWAYS GIVE YOUR COMPLETE SERIAL NUMBER WHEN ORDERING PARTS.

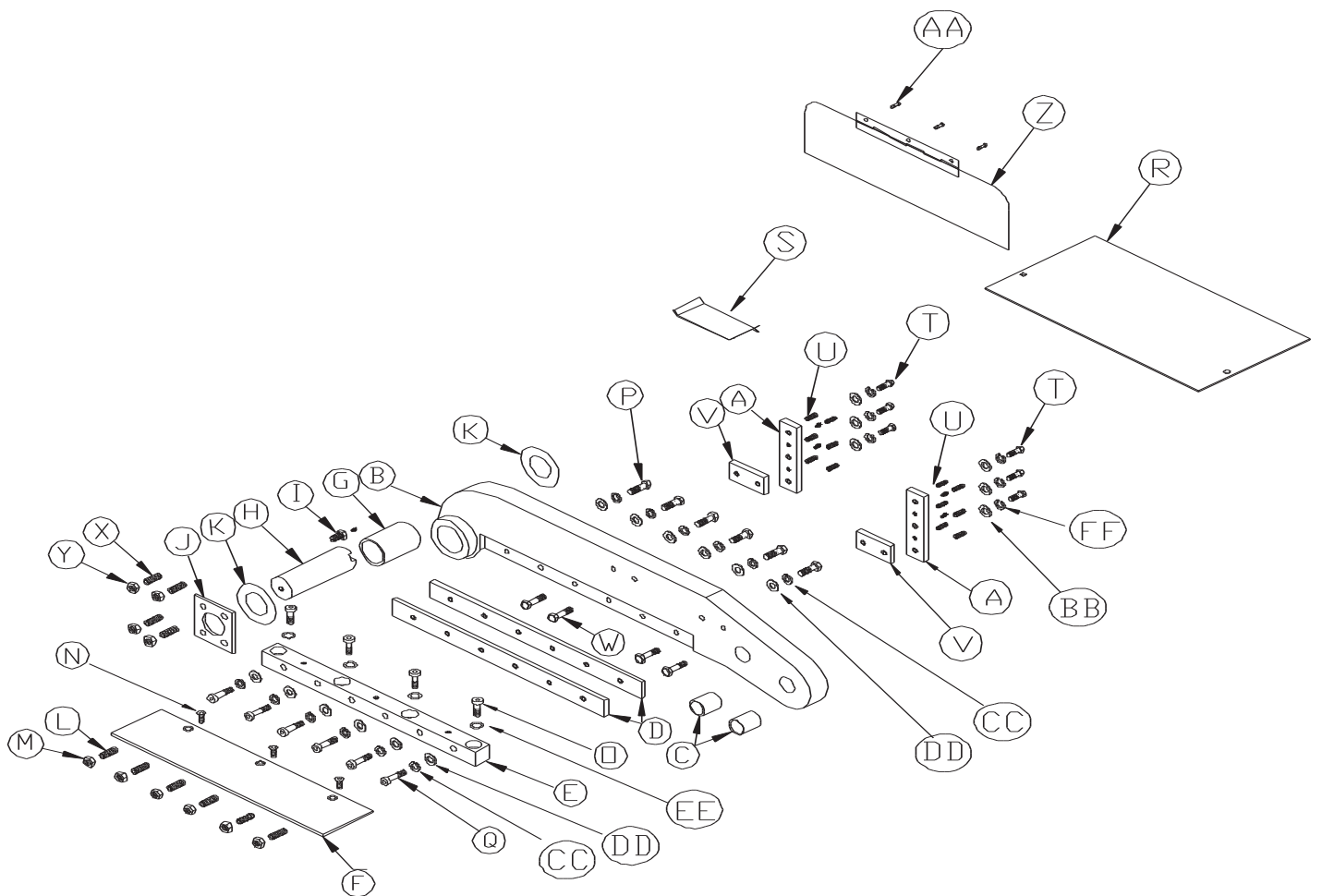
### 9.1 SHEAR ARM ASSEMBLY

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| ITEM | PART # | DESCRIPTION          |
|------|--------|----------------------|
| A    | 030650 | Rub Block            |
| B    | 006240 | Shear Arm            |
| C    | 010176 | Brass Bushings       |
| D    | 080031 | 24" Shear Blades     |
| E    | 006250 | Lower Blade Holder   |
| F    | 007100 | Shear Table          |
| G    | 007249 | Main Pin Bushing     |
| H    | 006129 | Shear Arm Pin        |
| I    | 080174 | Grease Bolt          |
| J    | 010177 | Pressure Plate       |
| K    | 007273 | Brass Plate (2 Req.) |
| L    | 218120 | M-12 Set Screw       |
| M    | 210014 | M-12 Jam Nut         |
| N    | 230207 | M-10 FSHCS           |
| O    | 221417 | M-16 SHCS            |
| P    | 205422 | M-12 HHCS            |
| Q    | 221322 | M-12 SHCS            |
| R    | 007112 | Shear Slug Chute     |
| S    | 006227 | Tooling Slug Chute   |
| T    | 201220 | M-10 HHCS            |
| U    | 218112 | M-12 Set Screw       |
| V    | 006015 | Shear Arm Rub Plate  |
| W    | 205425 | M-12 HHCS            |
| X    | 218120 | M-12 Set Screw       |
| Y    | 210014 | M-12 Jam Nut         |
| Z    | 007405 | Rear Shear Door      |
| AA   | 220014 | M-6 BHCS             |

|           |               |
|-----------|---------------|
| <b>BB</b> | <b>214012</b> |
| <b>CC</b> | <b>212014</b> |
| <b>DD</b> | <b>214014</b> |
| <b>EE</b> | <b>214017</b> |
| <b>FF</b> | <b>212012</b> |

|                         |
|-------------------------|
| <b>M-10 Washer</b>      |
| <b>M-12 Lock Washer</b> |
| <b>M-12 Washer</b>      |
| <b>M-16 Washer</b>      |
| <b>M-10 Lock Washer</b> |



**FIGURE 29**

## 9.2 PUNCH ASSEMBLY

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| ITEM  | PART # | DESCRIPTION                    |
|-------|--------|--------------------------------|
| A     | 006260 | Punch Bolster                  |
| B     | 221420 | M-16 SHCS                      |
| C     | 113017 | Reid Washer                    |
| D     | 201640 | M-16 HHCS                      |
| E     | 534001 | Die Holder (Includes F, I & J) |
| F     | 218058 | M-10 Set Screw                 |
| G     | 006202 | #82 Die Insert                 |
| H     | 218050 | M-10 Set Screw                 |
| I     | 534402 | Punch Plate                    |
| J     | 230107 | M-8 FSHCS                      |
| K     | 016095 | #40 Punch Retaining Nut        |
| L     | 221312 | M-12 SHCS                      |
| M & W | 010220 | Punch Ram & Bushing Set        |
| N     | 007232 | Lower Punch Pin                |
| O     | 016063 | 1-1/2" Snap Ring               |
| P     | 016620 | 2" Snap Ring                   |
| Q     | 006174 | Upper Punch Pin & Bushing      |
| R     | 208014 | M-12 Hex Nut                   |
| S     | 006113 | Punch Strap (Tapped)           |
| T     | 006114 | Punch Strap                    |
| U     | 243101 | Grease Nipple                  |
| V     | 201440 | M-12 HHCS                      |
| X     | 007140 | Punch Ram Shroud               |
| Y     | 214012 | M-10 Washer                    |
| Z     | 203212 | M-10 HHCS                      |
| AA    | 015033 | Keyed Insert                   |
| BB    | 004123 | Key                            |

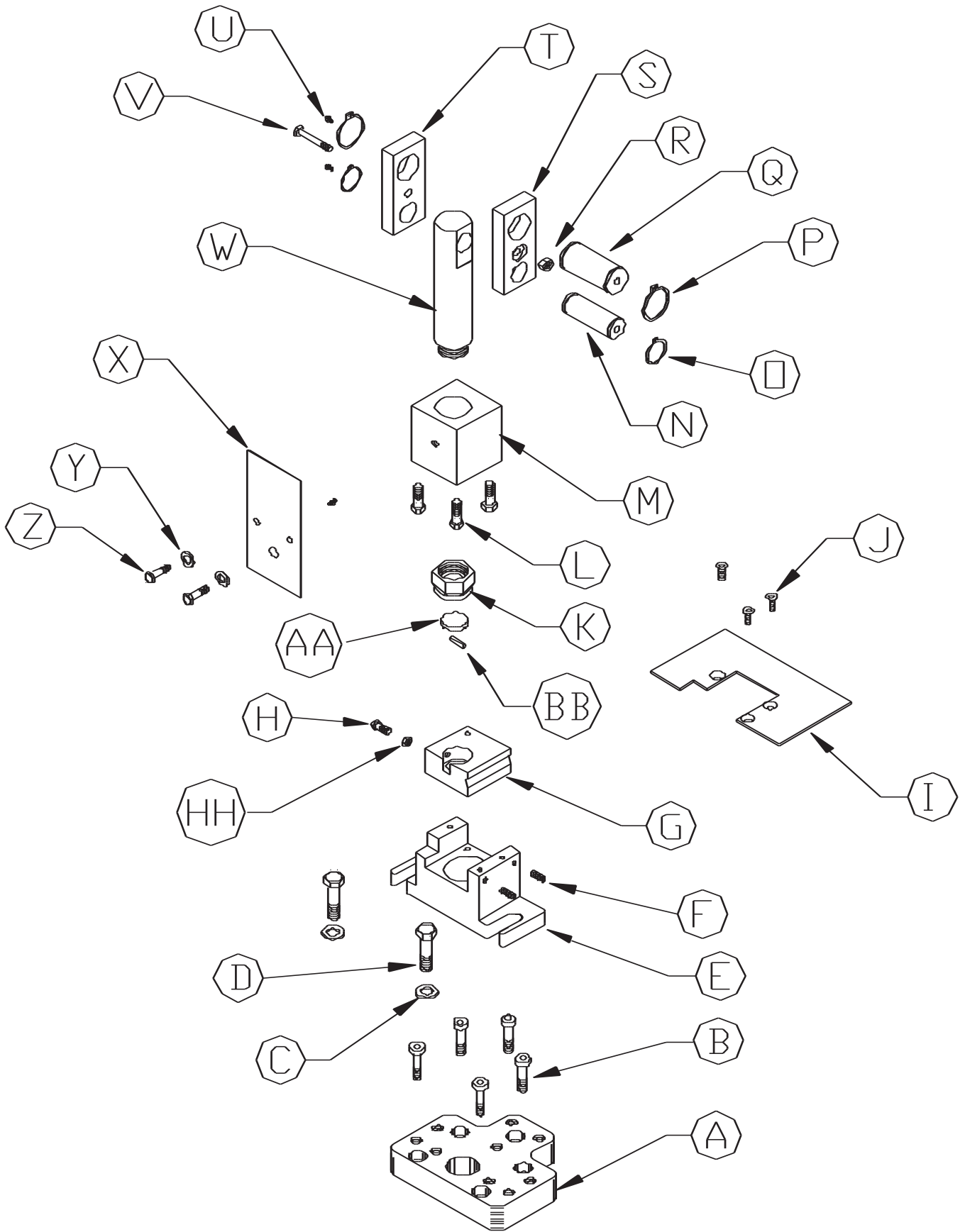


FIGURE 30

### 9.3 STRIPPER ASSEMBLY

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| ITEM | PART # | DESCRIPTION                 |
|------|--------|-----------------------------|
| A    | 007228 | Stripper                    |
| B    | 007229 | Adjustment Screw (Left)     |
| C    | 007237 | Stripper Stud (Left)        |
| D    | 007240 | Spring Retainer             |
| E    | 007241 | Spring                      |
| F    | 007236 | Adjustment Screw (Right)    |
| G    | 007239 | Spring Rod                  |
| H    | 220014 | M-6 x 10 BHCS               |
| I    | 007242 | Sight Glass (3-1/4 x 1-7/8) |
| II   | 007248 | Sight Glass (4 x 2-5/15)    |
| J    | 007253 | Stripper Plate              |
| K    | 230005 | M-6 x 12 FSHCS              |
| L    | 007244 | Stripper Retainer           |
| M    | 001541 | Ball Spring Screw           |
| N    | 110014 | 1/2 x 13 Jam Nut            |

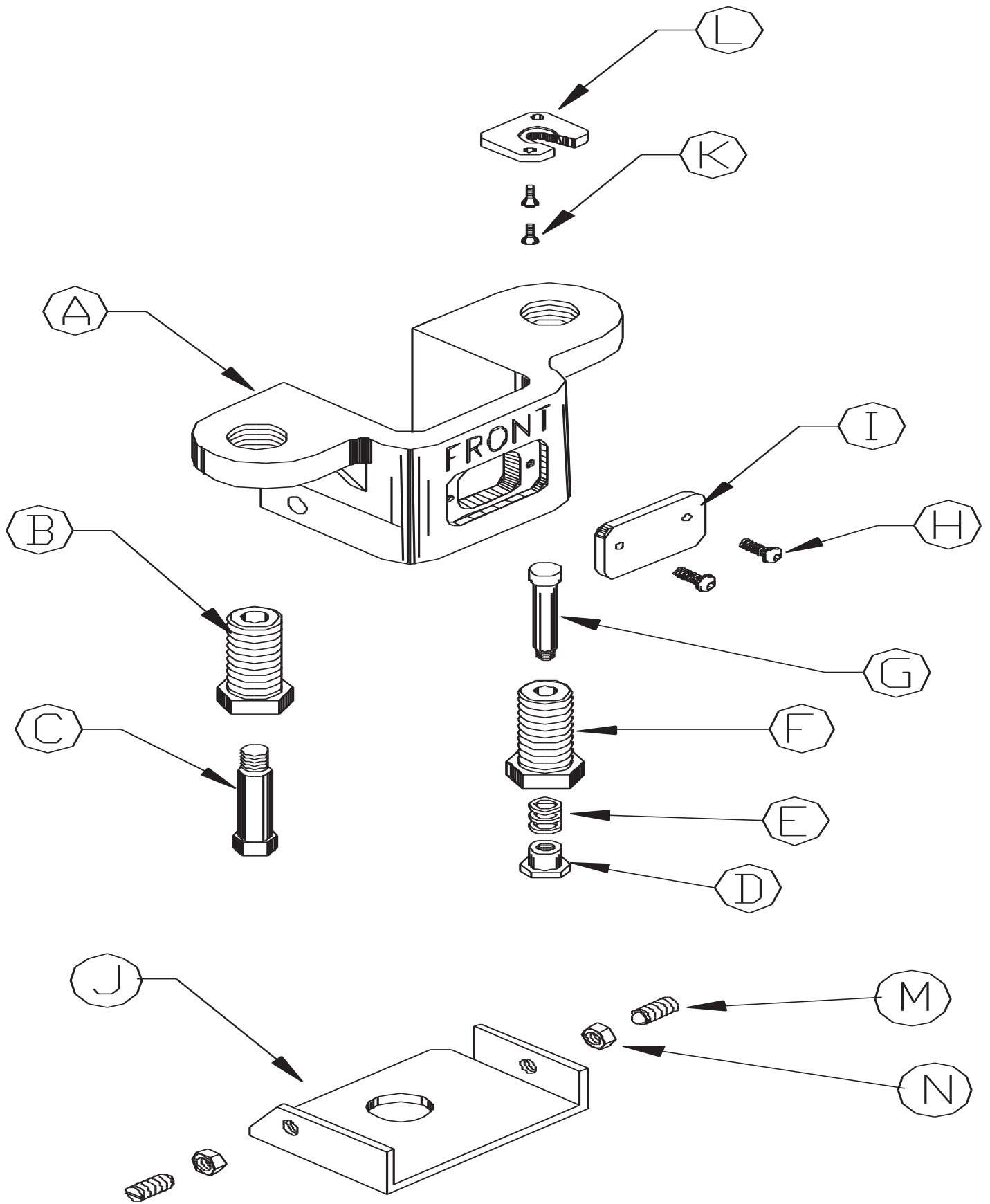


FIGURE 32





## 9.4 UPPER ARM ASSEMBLY

| ITEM | PART # | DESCRIPTION                      |
|------|--------|----------------------------------|
| A    | 007220 | Upper Arm (Includes A, B, D & F) |
| B    | 010176 | Bushing                          |
| C    | 080174 | Grease Bolt                      |
| D    | 007226 | Upper Arm Bushing                |
| E    | 006130 | Upper Arm Pin                    |
| F    | 006174 | Punch Pin & Bushing              |

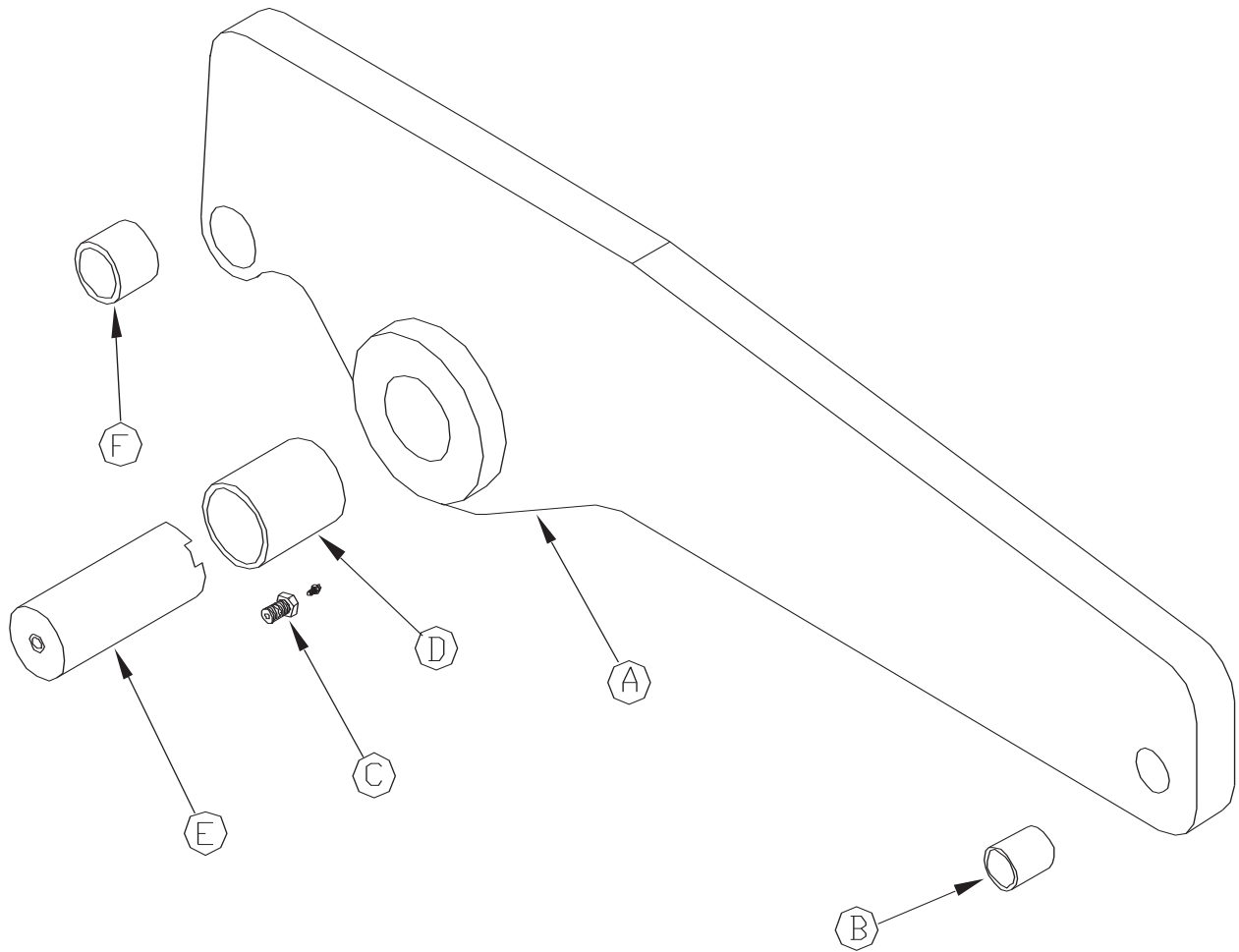


FIGURE 32

## 9.5 STROKE CONTROL ASSEMBLY

| ITEM | PART # | DESCRIPTION   |
|------|--------|---|
| A    | 007104 | Cover (S/N#5035FF To 5279FF)  |
| A1   | 007105 | Cover (S/N#5280FF & Up)   |
| B    | 212012 | M-10 Lock Washer  |
| C    | 201220 | M-10 HHCS   |
| D    | 004087 | Pointer   |
| E    | 207012 | M-10 Star Washer  |
| F    | 080061 | Handles   |
| G    | 073450 | Machine Screw   |
| H    | 213005 | M-5 Washer  |
| I    | 004085 | Scale   |
| J    | 004086 | Limit Switch Mount  |
| K    | 562113 | Limit Switch  |
| L    | 221002 | M-4 SHCS  |
| M    | 221322 | M-12 SHCS   |
| N    | 006232 | Metering Boss   |
| O    | 007107 | Stroke Control Assembly<br>(Includes A, D, E, F, G, H, I, J, K & L) |

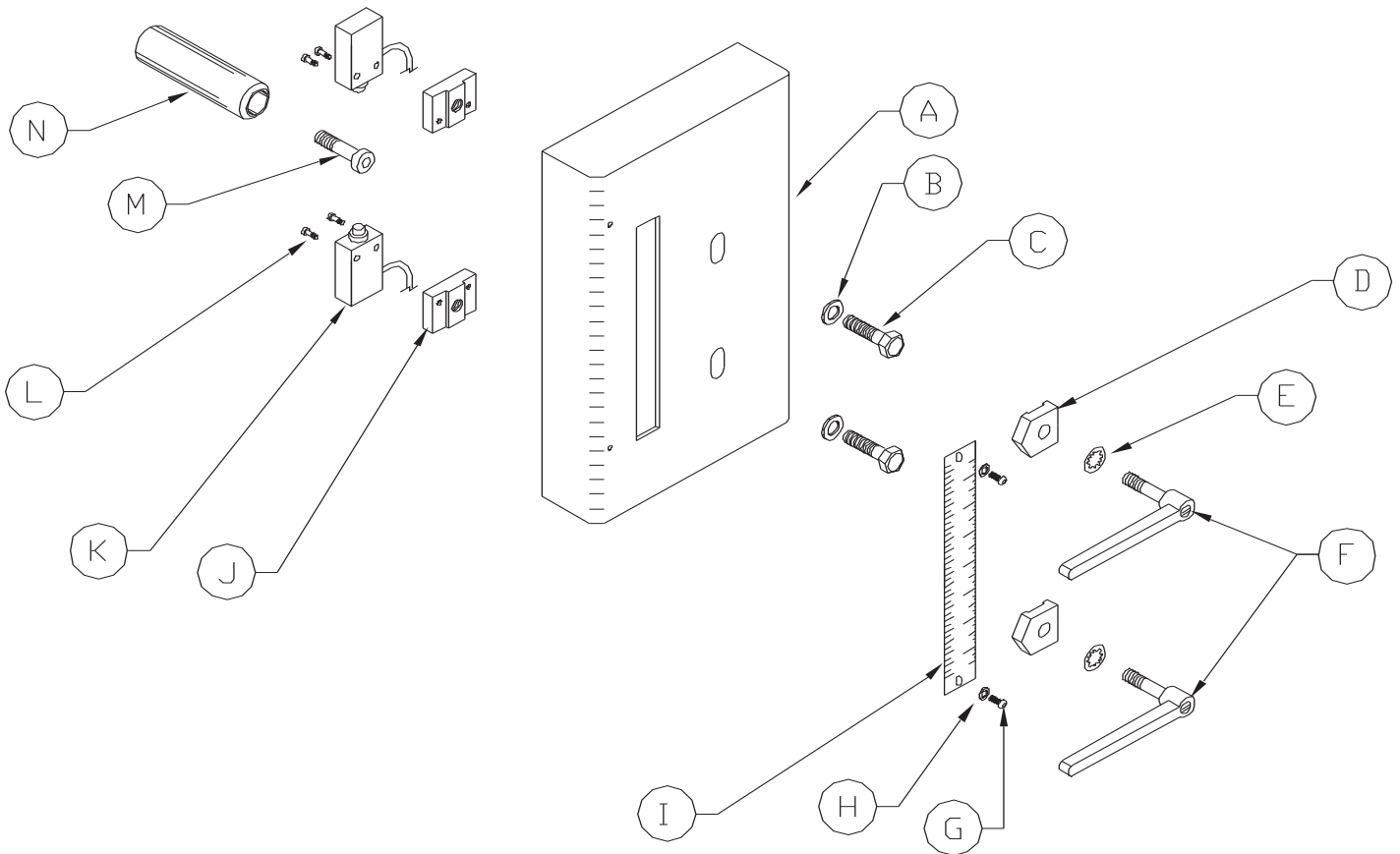


FIGURE 33

## 9.6 HOLD DOWN ASSEMBLY

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| ITEM | PART # | DESCRIPTION          |
|------|--------|----------------------|
| A    | 013185 | Guard                |
| B    | 080342 | Housing              |
| C    | 080337 | Post-Left            |
| D    | 080336 | Post-Right           |
| E    | 017340 | Key 7 x 7 x 24       |
| F    | 080347 | Gear-Left            |
| H    | 080348 | Gear-Center          |
| I    | 080349 | Gear-Right           |
| J    | 080338 | Wheel Shaft          |
| K    | 080344 | Base                 |
| L    | 220026 | M-6 BHCS             |
| M    | 141415 | 1/4 x 1-3/4 Roll Pin |
| N    | 017346 | 250mm Wheel          |
| O    | 210014 | M-12 Jam Nut         |
| P    | 017347 | Handle               |
| Q    | 221330 | M-12 SHCS            |
| R    | 221120 | M-8 SHCS             |
| S    | 080339 | Wheel Washer         |
|      | 003105 | Label (Warning)      |
|      | 003125 | Label (Hands Clear)  |
|      | 017343 | Complete Hold Down   |

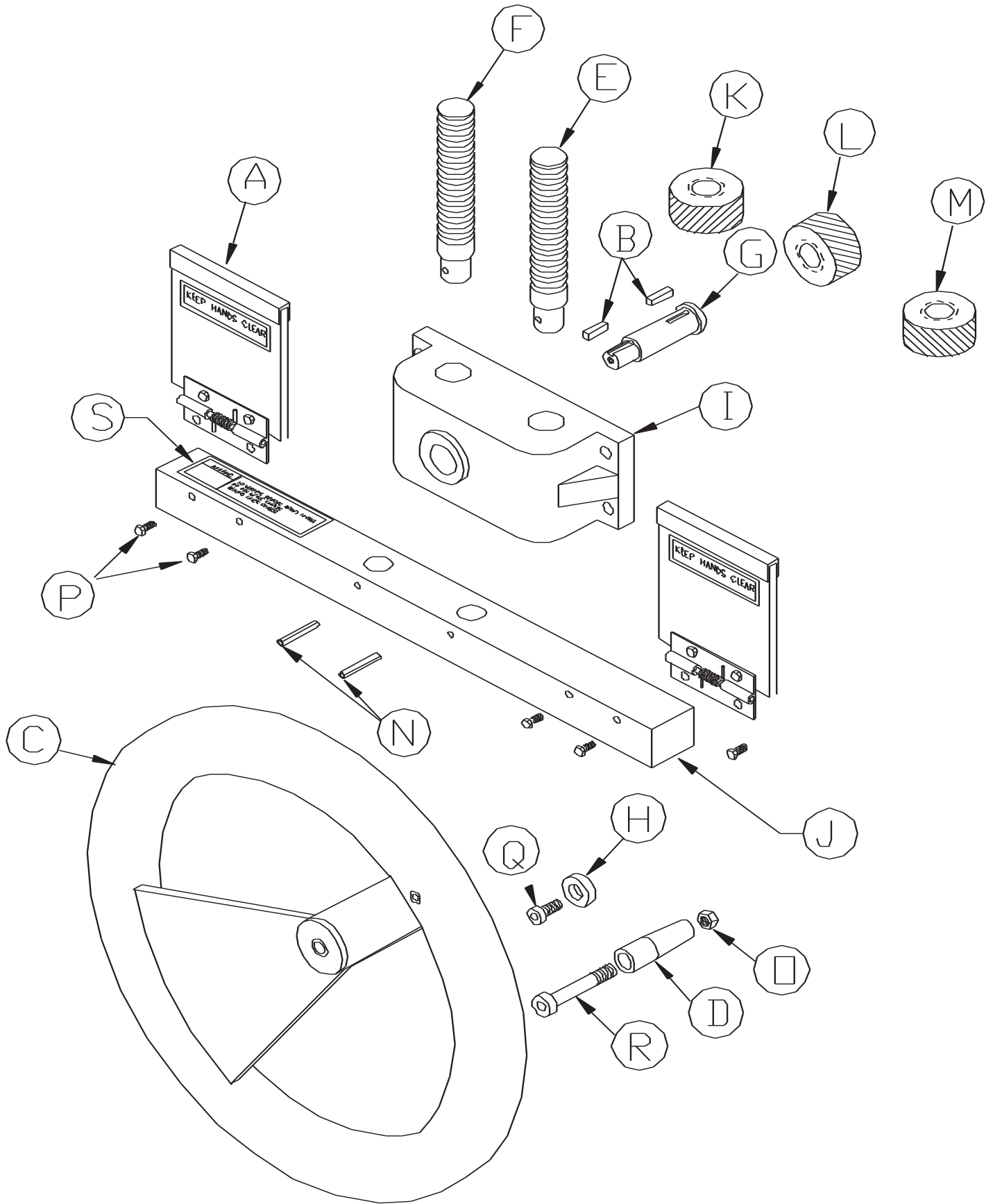


FIGURE 34

## 9.7 CYLINDER ASSEMBLY

| ITEM | PART # | DESCRIPTION                      |
|------|--------|----------------------------------|
| A    | 006230 | Clevis Pin                       |
| B    | 007403 | Cylinder Clevis                  |
| C    | 007404 | Cylinder                         |
| D    | 007426 | Cylinder Anchor Pin              |
| E    | 016063 | 1-1/2" Snap Ring                 |
| F    | 006235 | Cylinder Shroud                  |
| G    | 224205 | M-10 WLCS                        |
| H    | 007162 | Rear Shroud                      |
| I    | 007152 | Front Shroud                     |
| J    | 007401 | Cylinder Seal Kit (Not Pictured) |

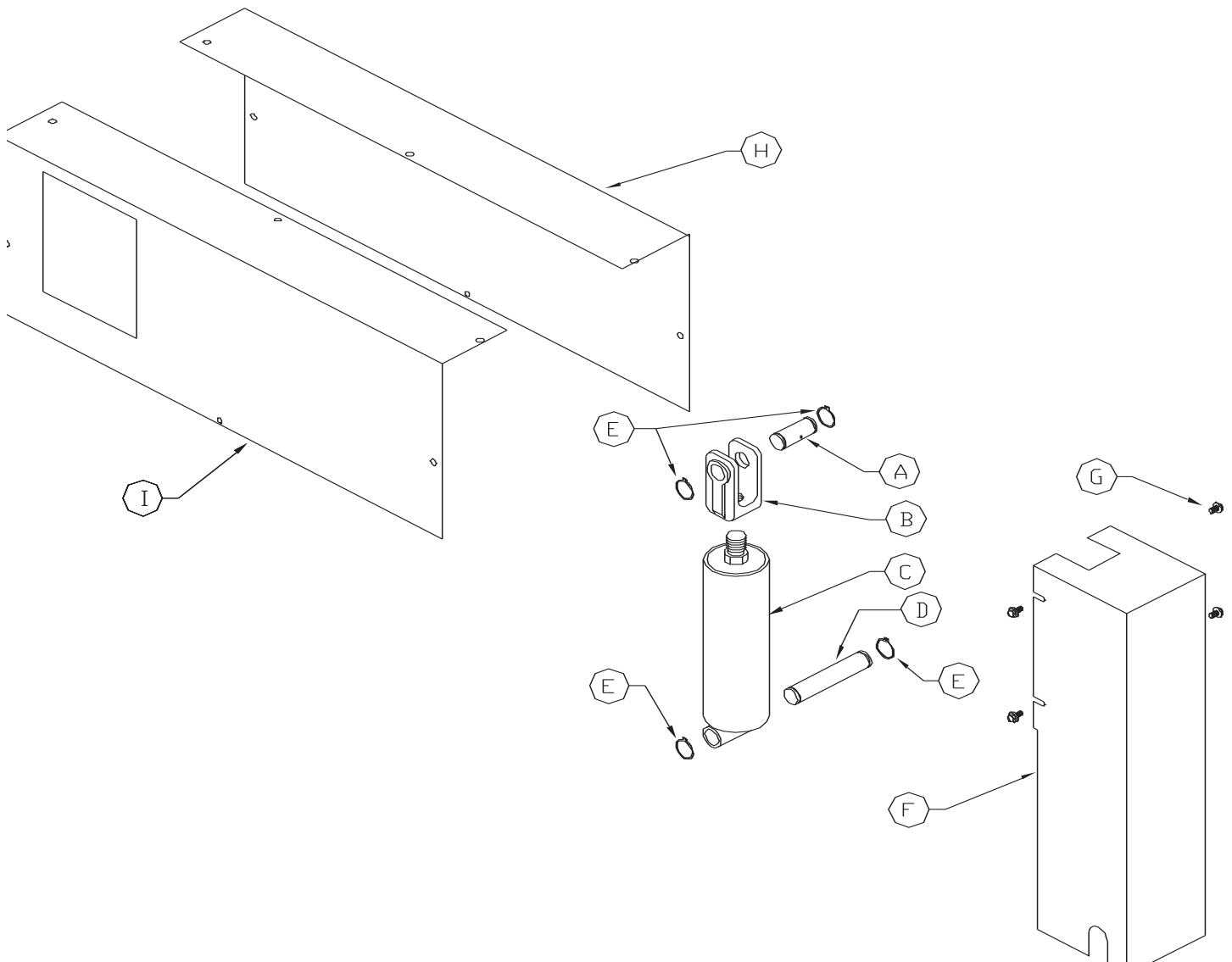


FIGURE 35

## 9.8 CONNECTING LINK ASSEMBLY

| ITEM | PART#  | DESCRIPTION          |
|------|--------|----------------------|
| A    | 007263 | Connecting Link      |
| B    | 006160 | Connecting Link Pins |
| C    | 016063 | 1-1/2" Snap Ring     |
| D    | 243101 | M-6 Grease Zerk      |

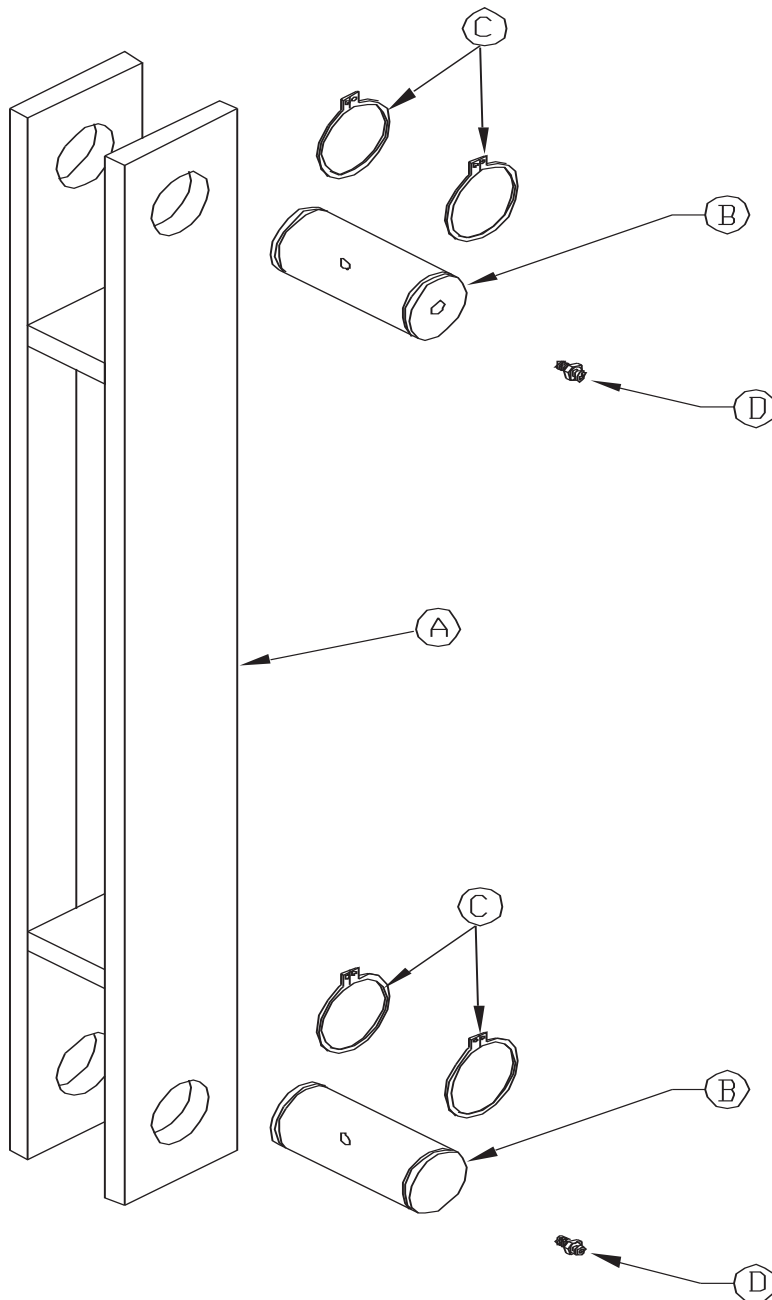


FIGURE 36

## 9.9 POWER UNIT

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| ITEM | PART#  | DESCRIPTION                                 |
|------|--------|---|
| A    | 006050 | Valve Assembly (Includes Manifold & Filter) |
| A1   | 552135 | Valve (Ser.#5575FF996 & Prior)              |
| A2   | 552169 | Valve (Ser.# 5576FF996 & Up)                |
| A3   | 006051 | Coil For A2 Valve                           |
| A4   | 006057 | Coil For 5575FF & Prior                     |
| B    | 011410 | Filter Element                              |
| C    | 003740 | Hose  |
| D    | 003750 | Hose  |
| E    | 203210 | M-10 HHCS                                   |
| F    | 003905 | Valve Back Plate                            |
| G    | 158050 | Magnetic Plug                               |
| H    | 006560 | Complete Power Unit (Less Motor)            |
| I    | 007400 | Cylinder                                    |
| J    | 003880 | O-Ring Adaptor                              |
| K    | 003915 | Return Hose                                 |
| L    | 003920 | Hose  |
| M    | 003830 | 90 Degree SAE Adaptor                       |
| N    | 201210 | M-10 HHCS                                   |
| O    | 212012 | M-10 Lock Washer                            |
| P    | 003925 | Suction Screen                              |
| Q    | 003820 | 90 Degree SAE Adaptor                       |
| R    | 007340 | Pump  |
| R1   | 007345 | Pump Seal Kit                               |
| S    | 003935 | Seal Kit                                    |
| T    | N/A    | Reservoir Top                               |
| U    | 016088 | Filler Cap                                  |
| V    | 073106 | M-6 Lock Washer                             |
| W    | 201120 | M-6 HHCS                                    |
| X    |        | Motor (Must Specify Voltage)                |
| Y    | 010674 | 5J 1-1/8 Flange                             |
| Z    | 010670 | 5J Coupler                                  |
| AA   | 010676 | 5J 5/8 Flange                               |
| BB   | 115011 | 5/16 Greer Nut                              |
| CC   | 158202 | Grommet                                     |
| DD   | 158201 | Grommet                                     |

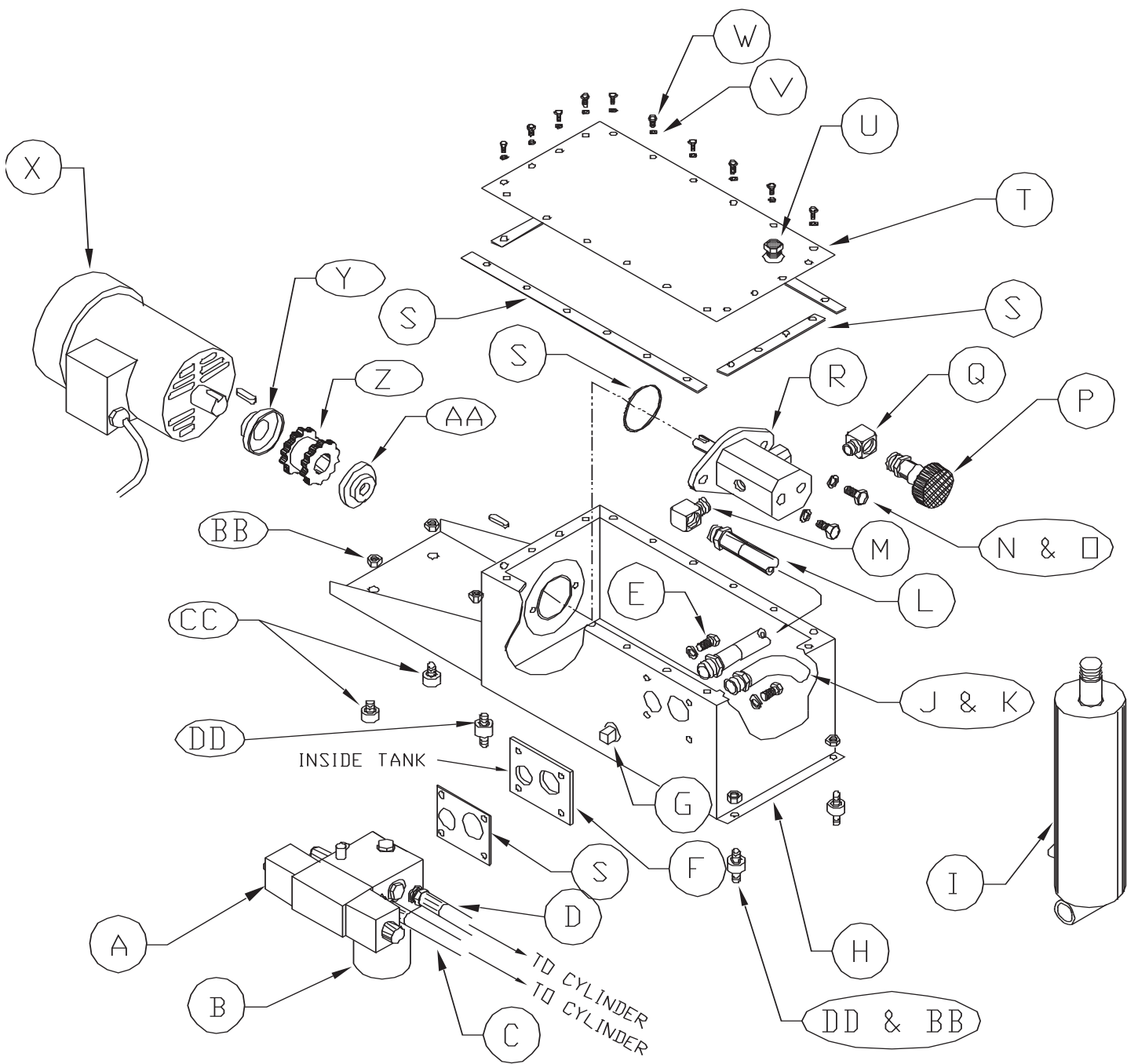


FIGURE 37



## 9.10 ELECTRICAL UNIT

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| ITEM | PART #           | DESCRIPTION                            |
|------|------------------|--|
|      | <b>K &amp; M</b> |  |
| A    | 011930           | Transformer                            |
| B    | 011933           | Primary Fuse                           |
| C    | 011835           | Secondary Fuse                         |
| D    | 011837           | Stop Switch Assembly                   |
|      | 048125           | Stop Switch Actuator                   |
| E    | 011840           | Start Switch Actuator                  |
|      | 011841           | Start Switch Assembly                  |
| F    | 011843           | Selector Switch (Punch/Shear)          |
|      | 011844           | Selector Switch Knob                   |
| G    | 011846           | Coil                                   |
| H    | 011948           | Start Switch Lamp                      |
| I    | 562453           | Foot Switch                            |
|      | 011753           | Cord (Foot Switch)                     |
|      | 562452           | Micro Switch (Foot Switch)             |
| J    | 562023           | Run/Jog Switch (Optional)              |
| K    | 004524           | Jog Control (Optional)                 |
| KA   | 004088           | Jog Control Lever                      |
| L    | 562113           | Limit Switch                           |
| M    | 011854           | Disconnect Switch                      |
| MA   | 011895           | Disconnect Switch Knob                 |
| N    | 011836           | Contact (S&S Less Coil, K&M With Coil) |
| O    | 011996           | Overload (230 Volt 3ph & 1ph)          |
| P    | 011994           | Overload (460 Volt)                    |
| Q    | 011994           | Overload (575 Volt)                    |

| LINE       | JUMPER      |
|------------|-------------|
| 230V H1 H4 | H1&H3 H2&H4 |
| 480V H1 H4 | H2&H3       |

| VOLTAGE | LINE  |
|---------|-------|
| 208V    | H7 H6 |
| 230V    | H7 H5 |
| 380V    | H7 H4 |
| 460V    | H7 H3 |
| 550V    | H7 H2 |

3FU REPLACEMENT FUSE LITTLE FUSE  
FLM-1 6/10 OR EQUIV.

TERMINAL ARRANGEMENT

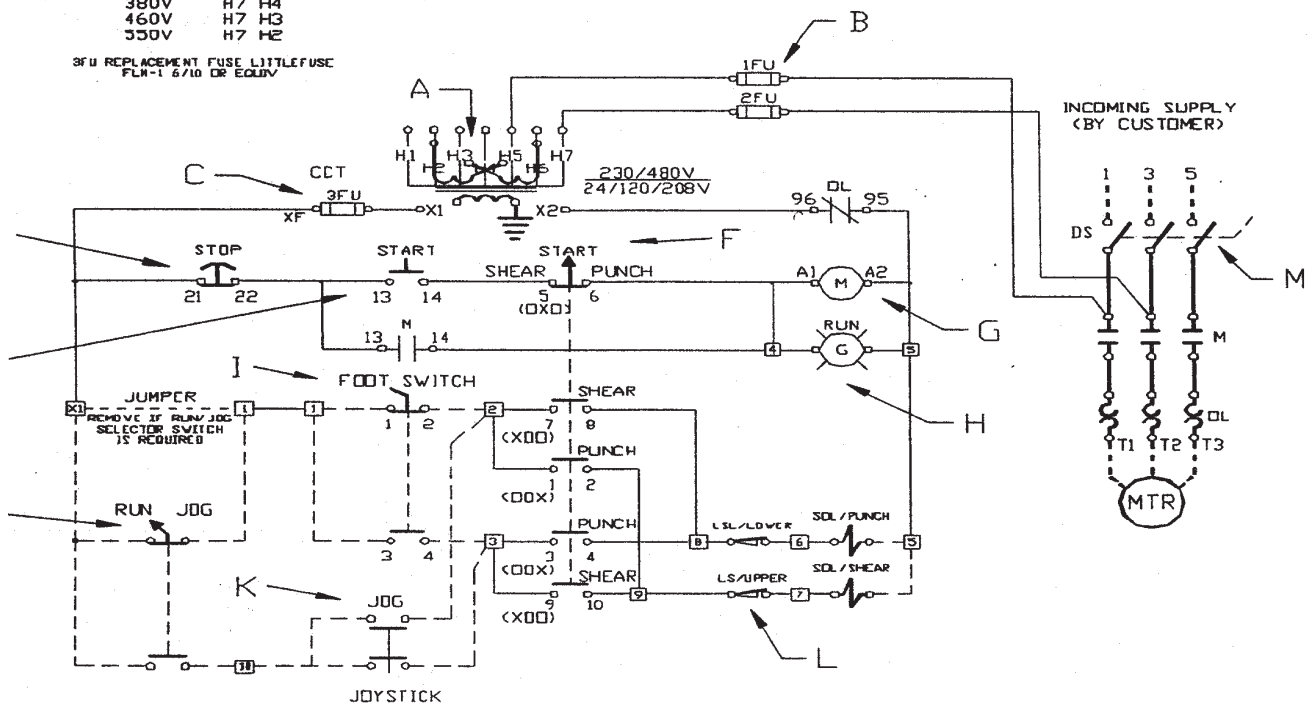


FIGURE 38

# **10.0 SUPPLEMENT FOR OLDER MODELS**

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## **10.1 CYLINDER SEAL REPLACEMENT**

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Use the following steps to replace the seals in the hydraulic cylinder:

SEE FIGURE 39 ON THE FOLLOWING PAGE.

- 1. With the selector switch in the SHEAR position and the arms up, turn the machine's power off at the disconnect switch and lock it.**
- 2. Block the arms up, either on the tool table or under the shear arm. SEE ITEM (A).**
- 3. Remove the hydraulic hoses from the cylinder and allow the oil to drain from the cylinder.**
- 4. Remove the cylinder clevis pin (D) and swing the cylinder out away from the arm.**
- 5. The cylinder head (B) is threaded into the cylinder.**
- 6. Use a pin wrench to unscrew the cylinder head from the cylinder tube.**
- 7. Place a rod through the cylinder clevis and pull the cylinder apart, using a come-along or similar device.**
- 8. Remove the locking nut from the end of the cylinder shaft and slide the piston and head off of the shaft.**
- 9. Replace all of the seals. There will be extra seals in the kit. Match up the replacement seals with the old ones and discard the rest.**
- 10. Clean all of the parts, including the inside of the cylinder tube, and check all parts for scratches and nicks.**
- 11. Oil all of the seals before reassembling the cylinder.**
- 12. After the piston and head are assembled on the shaft, they can be tapped back into the tube with a brass or plastic hammer.**
- 13. Rethread the cylinder head into the tube.**
- 14. Reconnect the hoses to the cylinder.**
- 15. Use care removing the blocking device (A) from under the arms. Since the cylinder does not contain oil, it may drop some when the blocks are removed.**
- 16. Cycle the machine several times to purge the air out of the hydraulic system.**

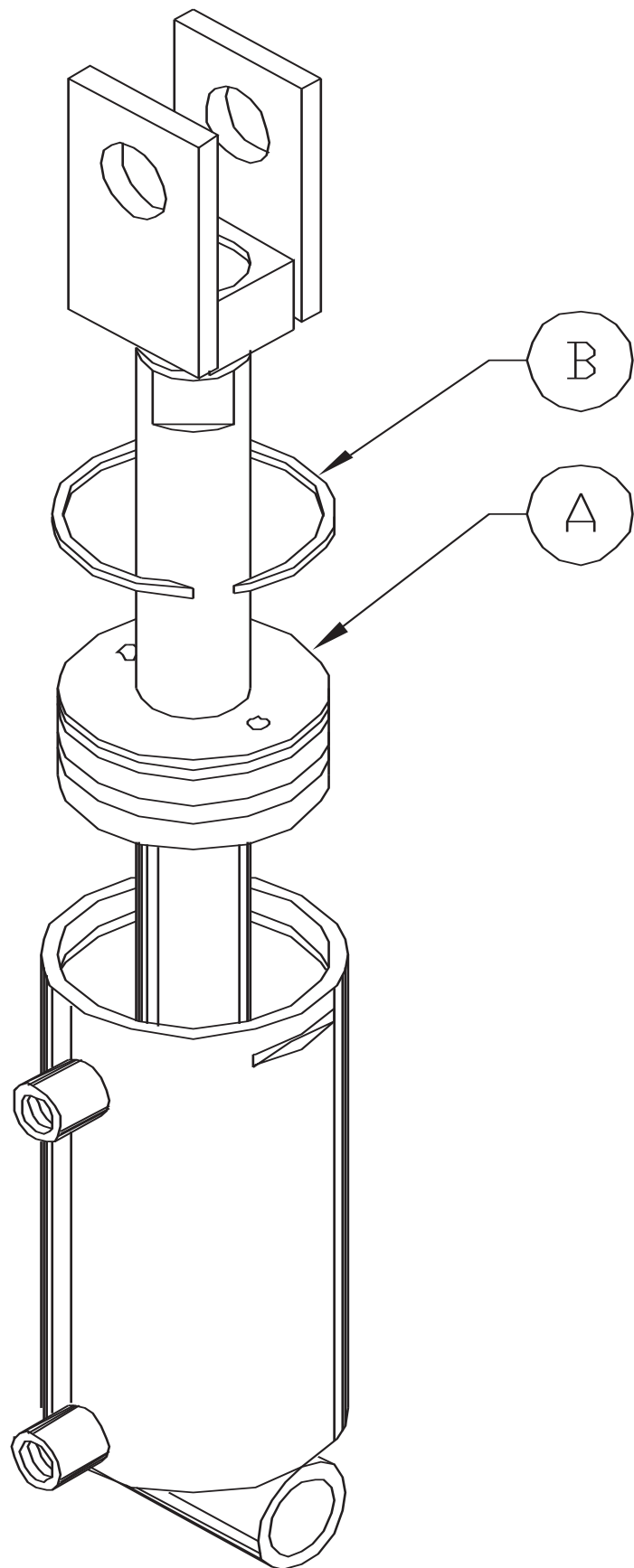


FIGURE 39

## 10.2 STRIPPER ASSEMBLY

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| ITEM | PART # | DESCRIPTION                 |
|------|--------|-----------------------------|
| A    | 007228 | Stripper                    |
| B    | 007229 | Adjustment Screw (Left)     |
| C    | 007237 | Stripper Stud (Left)        |
| D    | 007240 | Spring Retainer             |
| E    | 007241 | Spring                      |
| F    | 007236 | Adjustment Screw (Right)    |
| G    | 007239 | Spring Rod                  |
| H    | 220014 | M-6 x 10 BHCS               |
| I    | 007242 | Sight Glass (3-1/4 x 1-7/8) |
| II   | 007248 | Sight Glass (4 x 2-5/15)    |
| J    | 007247 | Stripper Plate              |
| K    | 230005 | M-6 x 12 FSHCS              |
| L    | 007244 | Stripper Retainer           |

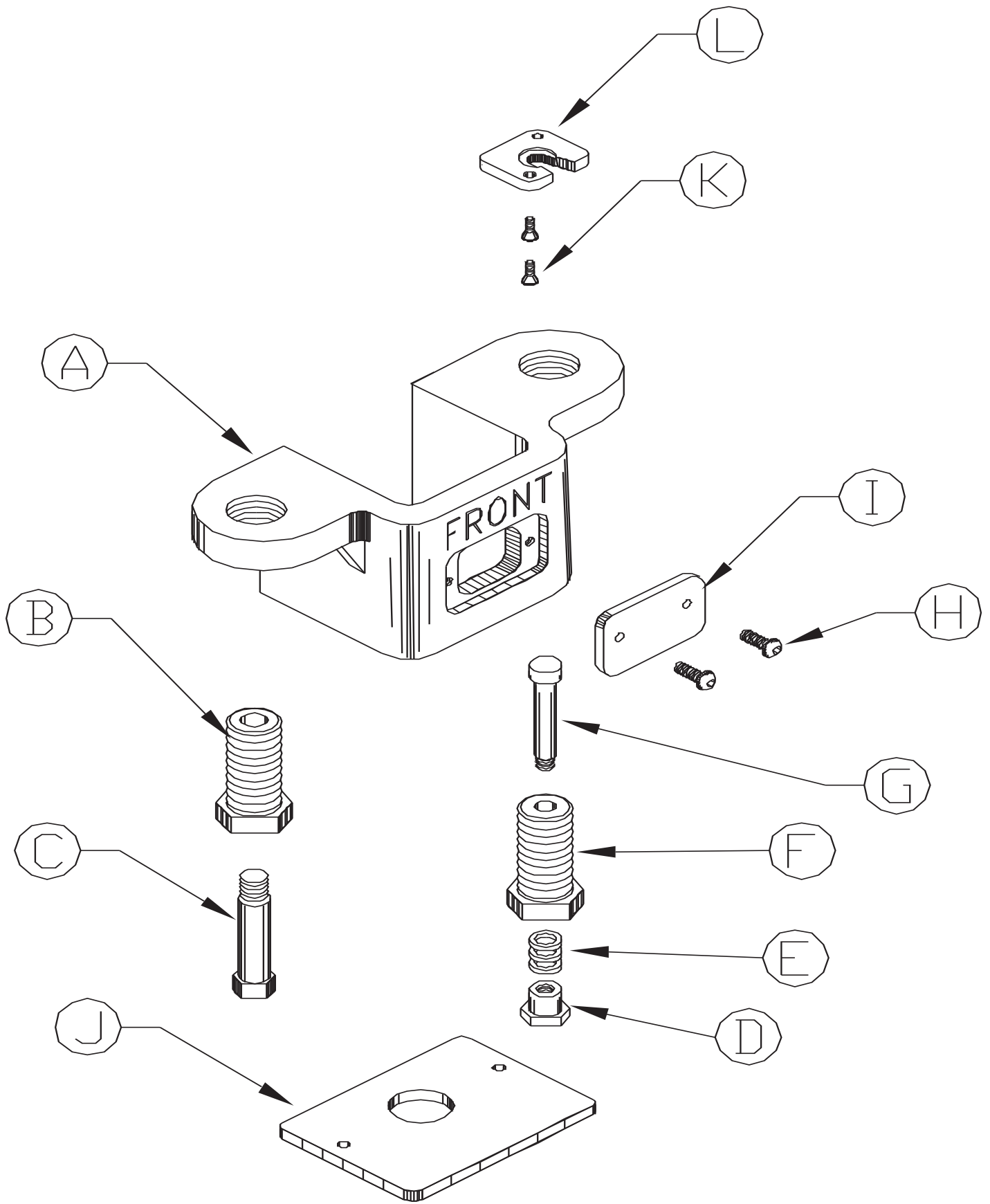


FIGURE 40