

Scotchman[®]

Metal Fabricating Solutions

MODEL PORTA-FAB 45 TON IRONWORKER



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1.0 INTRODUCTION

The SCOTCHMAN IRONWORKER 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, (i.e. stop, jog or reverse) gives the SCOTCHMAN IRONWORKER a tremendous advantage over mechanical ironworkers.

There is no chance of the SCOTCHMAN IRONWORKER being accidentally tripped.

The hydraulic system operates at a maximum pressure of 2,500 PSI (172 BAR) and is protected from overload by a built-in relief valve.

2.0 SAFETY PRECAUTIONS

- 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 operators 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 and 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 clean and well lit. Do not obstruct the operator's position by placing anything around the machine that impedes 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. **Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturer's instructions.**
12. **A safety video for this machine is available online at Scotchman.com. You can use the camera on on your smart phone to view it via the QR code below. Scotchmans also has many other helpful and informative videos posted on YouTube related to this machine.**

**IT IS HIGHLY RECOMMENDED THAT ANYONE
WHO OPERATES THIS MACHINE SHOULD
VIEW AND UNDERSTAND THE SAFETY VIDEO**

**Porta-Fab 45
SAFETY
VIDEO**



2.1 WARRANTY

SCOTCHMAN INDUSTRIES, INC. will, within three years of the 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 the buyer returns the warranty registration card within thirty (30) 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 seller's sole and exclusive remedy for defective goods.

Hydraulic and electric 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 abuse and abnormal use, inadequate maintenance and lubrication or subjected to use beyond the seller's recommended capacities and specifications.

In no event shall the 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 variation 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

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	1	003100	Large Safety Glasses
2	1	003110	Punch & Die Warning
3	1	003175	Caution Contamination (Not Shown)
4	1	003190	20K Punch Sticker
5	1	010115	15" Scotchman Decal
6	1	003105	Fingers Beyond Bar Guard
7	1	016328	Angle Shear Front Decal
8	1	012372	Porta-Fab Capacity Decal
9	1	003122	Danger Voltage Sticker (Not Shown)
10	1	012461	Porta Fab 45 110V Elec. Sticker (Not Shown)
11	1	012462	PF45 Start/Stop Decal
12	1	019100	U.S. DATA Plate
13	1	019102	Decal "Reservoir Capacity" (Not Shown)
14	1	019103	Decal "Lubricate"
15	6	019105	Decal "Grease Point"
16	1	019127	US Flag Decal
17	1	019300	Right Hand Rule 12"
18	1	093001	110V Sticker
19	1	003565	45 Decal Package

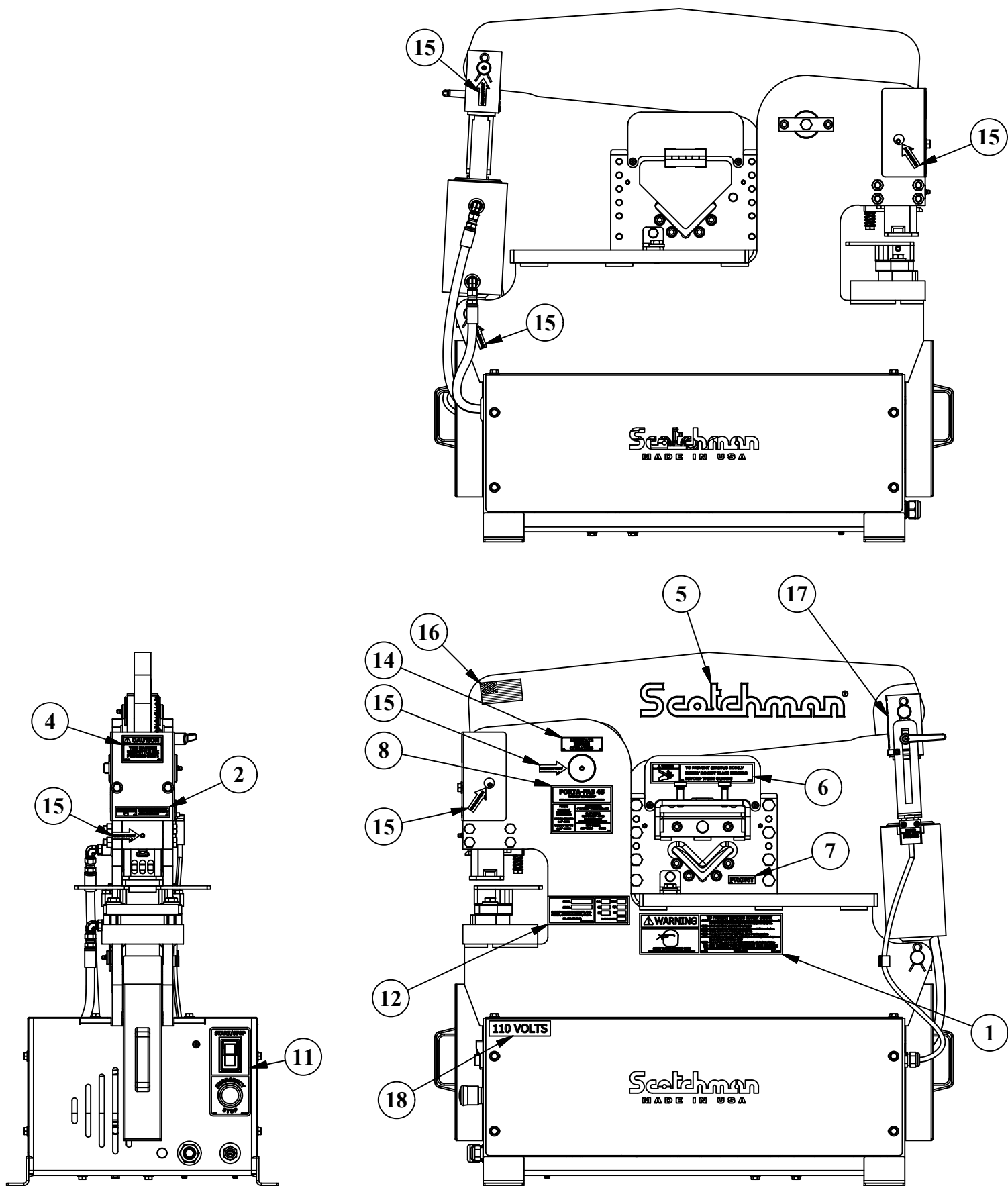


FIGURE 1

4.0 INSTALLATION AND SET-UP

CAUTION: THIS SECTION DISCUSSES INSTALLATION AND SET-UP PROCEDURES.
PLEASE READ ALL SECTIONS OF THIS MANUAL THOROUGHLY BEFORE OPERATING
THIS MACHINE.

4.1 PHYSICAL DIMENSIONS

		WITHOUT STAND		WITH STAND	
		INCHES	MM	INCHES	MM
A	Floor To The Top Of Die Holder	22.04	560	39.54	1004
B	Floor To Punch Bolster	19.20	488	36.70	932
C	Throat Depth	4.25	108	4.25	108
D	Floor To Tool Table	21.45	545	38.95	989
E	Punch Stroke	1.06	270	1.06	270
F	Height	39.19	996	56.70	1440
G	Length	38.12	968	38.12	968
H	Width	20	508	20	508
I	Weight	605 LBS.	275 KG	635 LBS.	288 KG

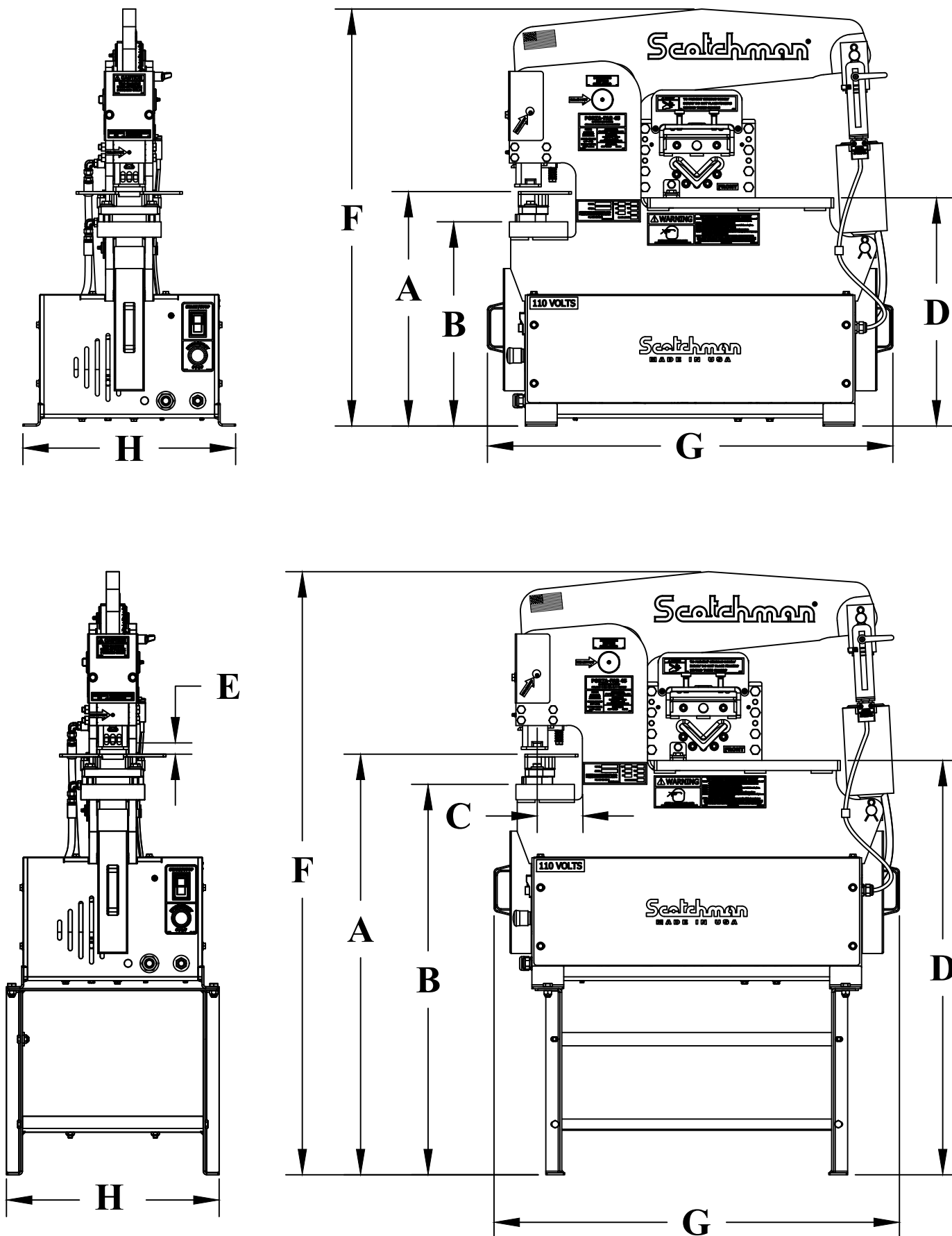


FIGURE 2

4.2 MACHINE MOVING PROCEDURES

⊠ **CAUTION: BE SURE THAT ANY LIFTING DEVICE HAS ADEQUATE CAPACITY BEFORE ATTEMPTING TO MOVE THIS MACHINE.**

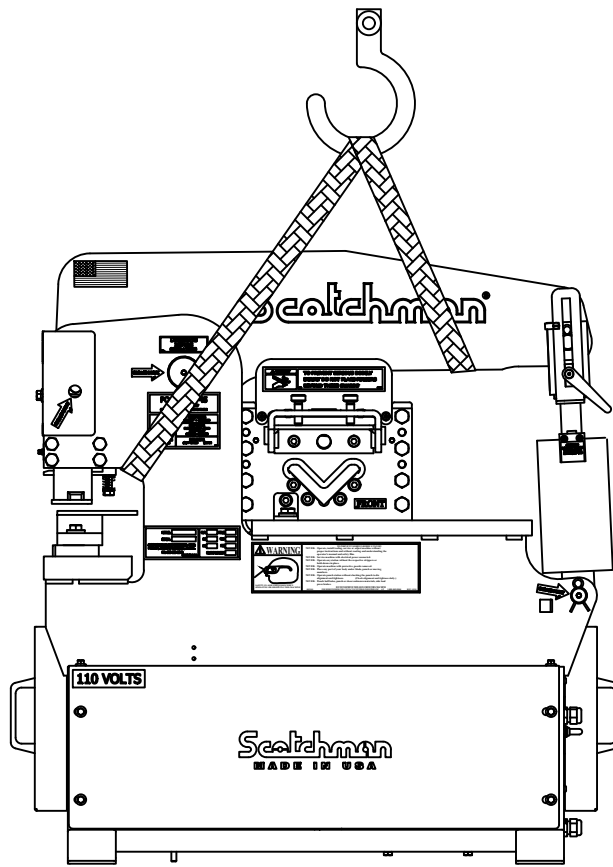
The weight of this machine is 605 pounds (274.42 kg) without the stand and 635 pounds (288.03 kg) with the stand.

**FIGURE 3 ON THE FOLLOWING PAGE DEMONSTRATES
THE USE OF AN OVERHEAD LIFT OR A FORK LIFT.**

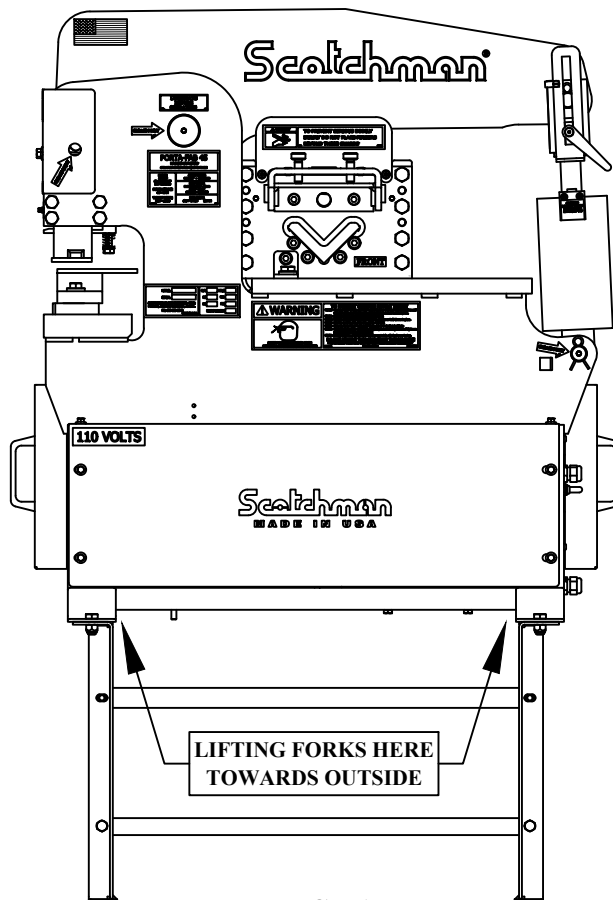
These are the only two recommended methods of moving this machine. The machine should be moved by the use of an overhead lift if it is not equipped with the stand and with a forklift if it is equipped with the stand. When using a fork lift, spread the forks of the lift as wide as possible for stability. Lift only on the base of the machine. Do not lift the machine by placing the forks under the base of the stand.

4.3 PHYSICAL INSPECTION

Any damage to the machine during shipment should be reported to the delivery carrier immediately and a damage report made out so that a claim can be placed. The carrier is responsible for shipping damage, but it is the customer's responsibility to report damages, external or internal, immediately. After the machine has been positioned, the shroud on the operator's side should be removed and an inspection made of the interior for missing or damaged parts.



WITHOUT STAND



WITH STAND

FIGURE 3

4.4 ELECTRICAL REQUIREMENTS

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

A 10 foot (3 meter) 10 gauge cord is provided with this machine. A 30 Amp service is required for this machine and the plug you install on the cord must have a minimum rating of 30 amps. We do not recommend using extension cords with this machine. If there is a case where an extension cord must be used, it must be of adequate gauge and rating to support the amp draw of this motor. Failure to adequately size an extension cord for this machine may result in damage to the machine. Any extension cord used with this machine must be at least 10 gauge and have ends rated for 30 amps. Check the motor data tag for full load current requirements.

MOTOR VOLTAGE	FULL LOAD CURRENT
1PH 115V	19 AMPS
RPM: 1725	FRAME: 56C
POWER RATING: 2HP	HZ: 60

4.5 MACHINE START-UP

Before starting this machine, take time to thoroughly review the safety video at scotchman.com and the operator's manual. Scotchmans also has many other helpful & informative videos posted on YouTube related to this machine. We strongly urge you to follow the 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 all work stations are clear.

5.0 MAINTENANCE

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 machine's life and prevent costly downtime.

5.1 LUBRICATION

➤ IMPORTANT:

Before operating the Porta-Fab Ironworker, apply oil to the **THREE IN ONE TOOL** blades and the punch and die. Re-oil the punches and dies every 5 to 10 holes and the blades every 10 to 15 cuts. The oil will allow the machine to shear, punch and strip easier and increase tool life considerably. We recommend cutting oil or motor oil swabbed on with a small brush or applied with a squirt can or spray applicator. Grease the main pivot pin and the punch barrel and guide daily.

NOTICE: Tap Magic EP-XTRA is the lubrication cutting oil that Scotchman recommends using to lube punches, dies, and shear blades. When used in excess, combined with oils from certain steels or cleaning products, can cause a reaction that may damage the paint on the machine. Any lubricating oil should be applied only to the punches, dies, or shear blades, and not sprayed around and allowed to run down the sides of the machines or pool on the covers as this may cause the paint to peel. Keep the machine clean and wiped down to keep the oils from damaging the paint.

A multi-purpose, Molybdenum Disulfide (Mobile Grease XHP 222 Special or equivalent), high pressure grease is recommended. Check the oil level in the reservoir once a month. To check the oil level, remove the filler cap and measure the depth of the oil in the reservoir. The fluid should be 1/2" inch below the top of the reservoir. Use a lightweight, non-foaming, hydraulic oil such as Mobil DTE-25, or equivalent with a minimum ISO cleanliness code of 18/16/13. The reservoir capacity is 2 U.S. gallons (7.6 liters).

5.2 SCHEDULED MAINTENANCE

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 250 HOURS OR THREE MONTHS

Check the clearance between the punch barrel (A) and the punch barrel guide (B).

FOR PARTS IDENTIFICATION, SEE FIGURE 4 ON THE FOLLOWING PAGE.

TO CHECK THE CLEARANCE:

- 1. With a punch and die properly installed following the instructions in SECTION 6.2, operate the machine until the punch enters the die.**
- 2. With the punch in the die, jog the machine with the foot pedal, watching for lateral movement of the punch in the die.**
- 3. If lateral movement is noted, turn the machine's power off. Remove the punch barrel (A) and punch barrel guide (B) from the machine and check the tolerance between the two parts.**
- 4. If the tolerance exceeds three (.003) thousandths of an inch (.07mm), replace both parts.**
- 5. When replacing these parts, do not over tighten the drag link bolts (C & E). The bolts should be tight enough to restrict the punch barrel from rotating, but not so tight that they won't allow the drag links (D) to rotate as the arm travels down.**

2. EVERY 500 HOURS OR SIX MONTHS:

- A. Check the condition of the blades and any component tools for wear. Replace worn parts promptly**

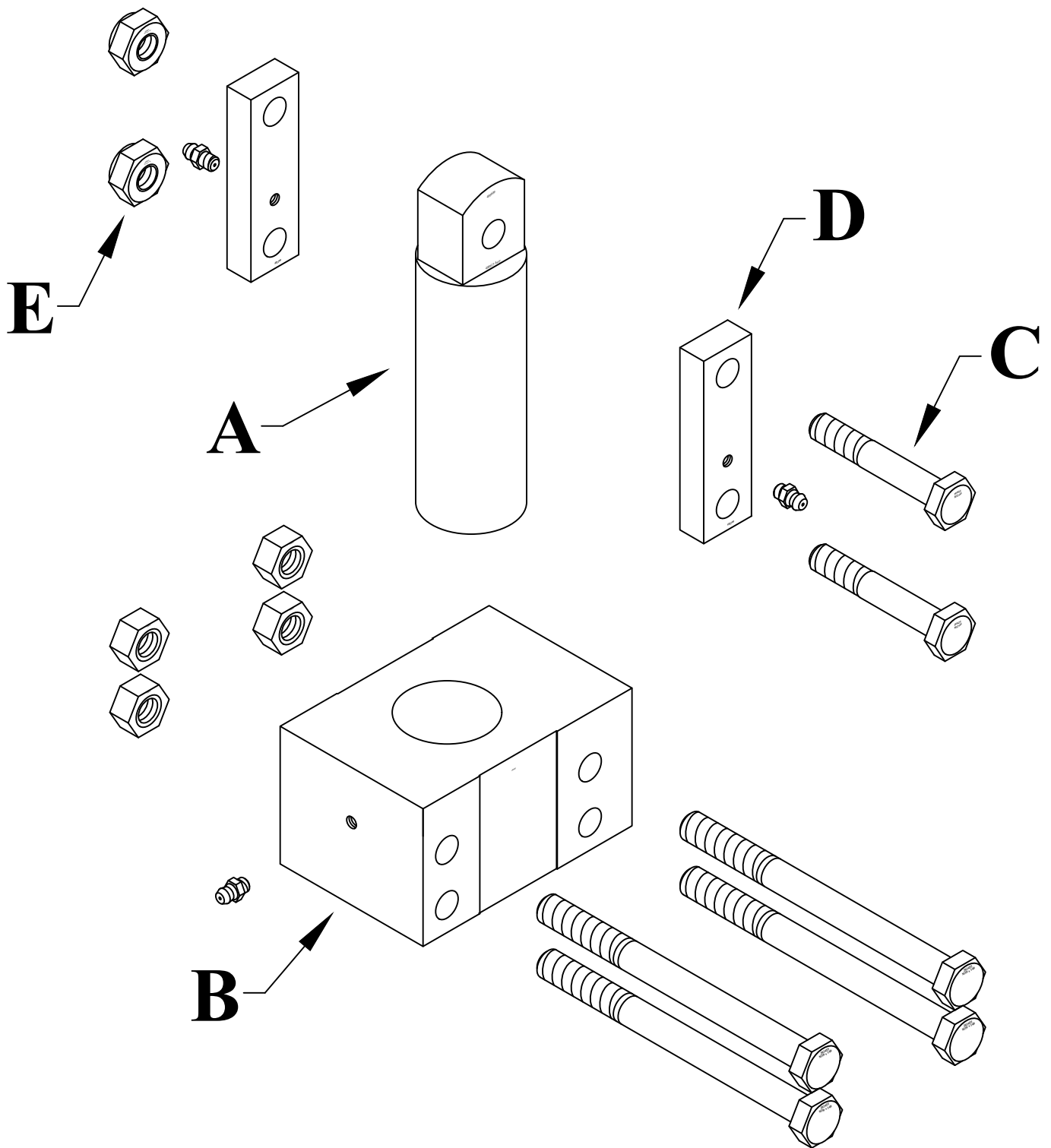


FIGURE 4

6.0 MACHINE OPERATION

6.1 CONTROLS

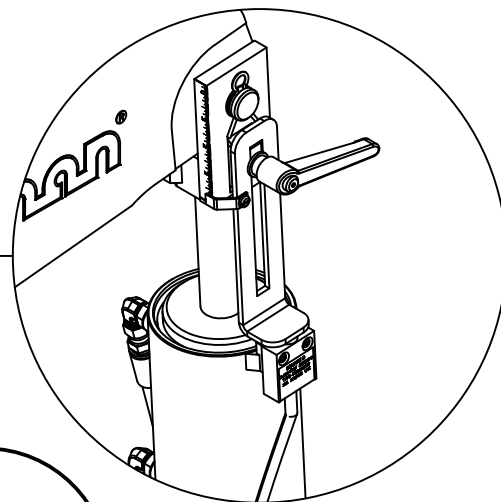
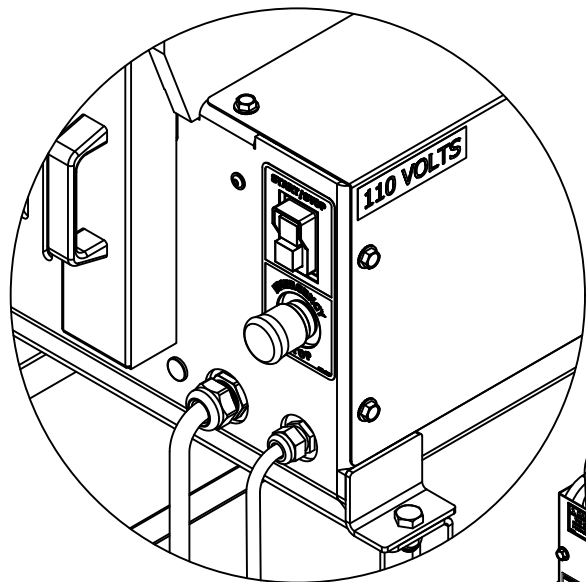
SEE FIGURE 5 ON THE NEXT PAGE

1. **EMERGENCY STOP**: This button will stop the machine in the event of an emergency. The machine cannot be restarted until the button has been manually reset but pulling it out.
2. **START BUTTON**: Pressing this button will start the machine. The EMERGENCY STOP button must be reset for the machine to start up and run.
3. **STOP BUTTON**: Pressing this button will turn off the machine if it is running.
4. **FOOT PEDAL**: The foot pedal is used to operate the machine during use. The foot pedal is comprised of two individual foot switches with a divider to prevent incidental operation of both switches at once and has a heavy-duty protective shell.
 - 4.1 One foot switch will move the tool beam down, raising the punch.
 - 4.2 The other foot switch will move the tool beam up, lowering the punch.
5. **STROKE CONTROL**: The stroke control is used to set the upper limit of travel when using the punch station, and to set the lower limit of travel when using tools in the tool table area. The adjustment handle is loosened to allow the stroke control stop to be adjusted up or down. Setting the stroke control is necessary to prevent damage to tools used in the tool table area.

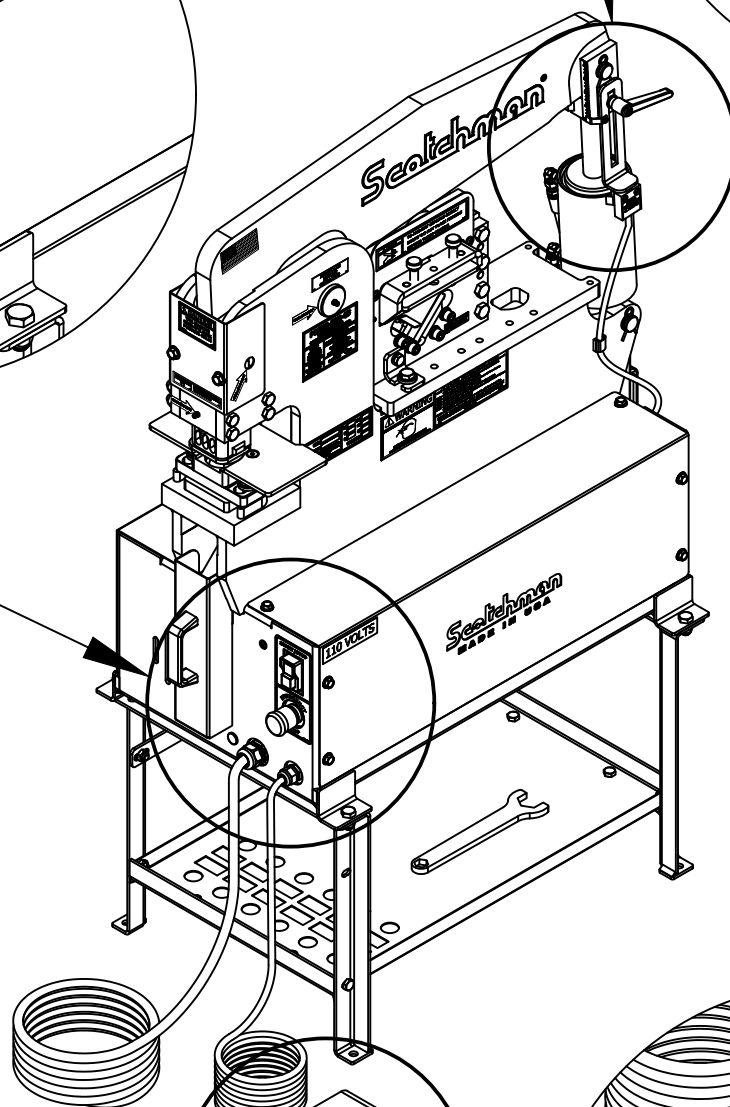
⊠ **CAUTION:**
WHEN USING THE PUNCH STATION:
**CONFIRM THAT THE TOOLS IN THE TOOL TABLE AREA CAN NOT BE
OVER-STROKED AND DAMAGED; OR REMOVE ALL THE TOOLS FROM
THE TOOL TABLE AREA.**

⊠ **CAUTION:**
WHEN USING THE TOOL TABLE AREA:
REMOVE THE PUNCH AND DIE FROM THE PUNCH STATION.

**START BUTTON
STOP BUTTON
EMERGENCY STOP**



**STROKE
CONTROL**



FOOT PEDAL

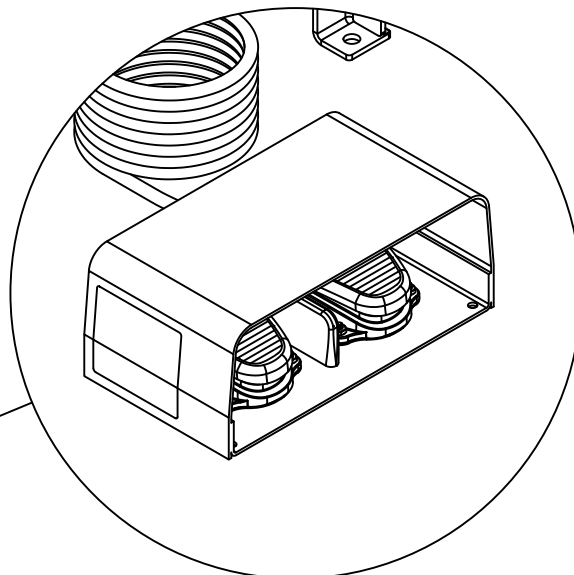
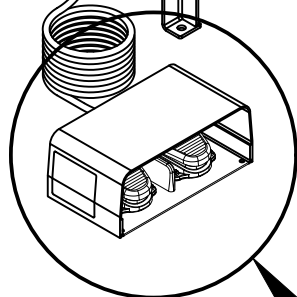


FIGURE 5

6.2 PUNCH OPERATION

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

➡ **WARNING:** FAILURE TO PROPERLY ALIGN PUNCHES AND DIES CAN CAUSE SERIOUS INJURY TO PERSONNEL AND/OR DAMAGE TO EQUIPMENT.

Please read carefully and understand the following method. It would also be helpful to refer to the safety video on scotchman.com for a visual reference. Scotchmans also has many other helpful & informative videos posted on YouTube related to this machine. You can scan the QR code below to see our video on how to align a punch and die for this machine.

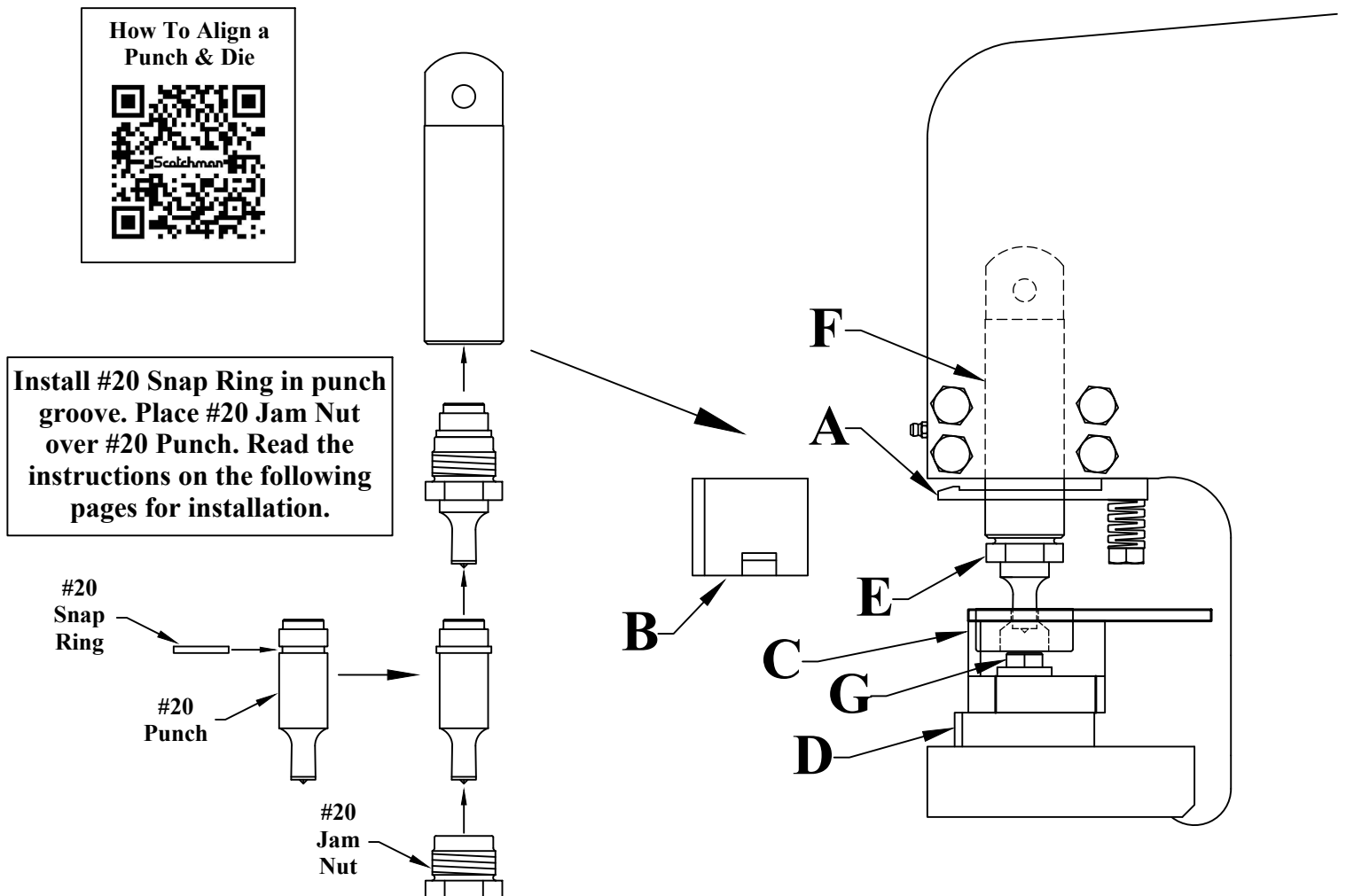


FIGURE 6

A. ALIGNMENT AND REMOVAL OF PUNCHES AND DIES.

REFER TO FIGURE 6 ON THE PRECEDING PAGE.

- 1. With the punch in the down position and the arm up, turn the machine's electrical power OFF.**
- 2. Remove the stripper (B) by pressing down on the tab (A) and pulling the stripper toward you.**
- 3. Loosen and remove the bolts (G) holding the die holder (C) and remove the spacer (D) from under the die holder (C) and then the die holder can be lowered off the punch and removed.**
- 4. Loosen the set screw holding the die. Remove the die and set it aside.**
- 5. Loosen and remove the punch jam nut (E) and set the punch retaining nut and punch aside.**
- 6. Select the proper punch and die. Make sure that there is proper clearance between the punch and die.**

FOR RECOMMENDED CLEARANCES, SEE PARAGRAPHS F & G IN SECTION 6.2.

► **NOTE: ALL SHAPED #20 PUNCHES, INCLUDING OVALS, SQUARES, HEXAGONS, AND SPECIAL ORDER PUNCHES, ARE SUPPLIED WITH AN ALIGNMENT KEYWAY MACHINED INTO THE PUNCH. THERE IS A KEY BUILT INTO THE MACHINE'S PUNCH BARREL THAT MATES WITH THE PUNCH KEYWAY. ALL PUNCHES USED ON THIS MACHINE MUST BE THE #20 STYLE.**

- 7. Clean both the punch and the die.**
- 8. Insert the proper punch in the punch jam nut (E) and thread it into the punch barrel (F) and tighten it with a wrench. If you are using a shaped punch, rotate the punch by hand until it seats on the key, before tightening the nut.**
- 9. Insert the proper die in the die holder with the flat side of the die aligned with the set screw. Tighten the set screw firmly with a hex key wrench.**
- 10. Place the die holder on the bolster and then raise it up so that the punch enters the die.**
- 11. Insert the spacer plate (D) under the die holder (C) on the bolster and insert bolts - hand tighten.**

12. Align the punch to the die so that there is equal clearance on all sides of the punch in the die.
13. Tighten both the die holder bolts (G) firmly.
14. Check to be sure that the punch and die are still in alignment. Realign, if necessary.
16. Replace the stripper (B). Check to make sure that there are no objects (such as tools) on or under any of the moving parts of the machine.
- **NOTE:** If punching holes larger than 1", remove the stripper plate or it will be damaged.
17. Start the machine and slowly run the punch in and out of the die making sure that there is equal clearance on all sides of the punch in the die.
18. Lubricate the punch and die before using and every 5 to 10 holes, thereafter.

FOR LUBRICATION INSTRUCTIONS, SEE SECTION 5.1

⊠ **CAUTION:** REMOVE PUNCH AND DIE WHEN NOT IN USE.

B. CHECK PUNCHING TOOLS FOR TIGHTNESS.

Periodically during the day, check the punch and die for alignment. To do this, run the punch down until it enters the die and turn the machine's power OFF. Tighten the set screw holding the die, the die holder bolts and the punch retaining nut. Check the alignment of the punch and die. Power the machine and jog the punch up and down several times, to be sure of proper alignment.

C. CONTACT BOTH SIDES OF THE STRIPPER.

Punch holes with sufficient material to contact both sides of the punch stripper. If the workpiece does not contact both sides of the stripper, the side thrust may break the punch and will deform the workpiece.

D. SPECIAL STRIPPERS MAY BE REQUIRED FOR CERTAIN JOBS.

The standard stripper has been designed to work for most applications. For other applications, such as stripping small channel, a special stripper may have to be fabricated. The important consideration is to keep material level while stripping. When punching thin

strap iron, the material will tend to draw up into the stripper. To prevent this, a plate or large washer can be attached to the bottom of the stripper, to reduce the size of the opening. This type of stripper will also allow you to punch in the corners of material. There is an oversize stripper available for oversize punching applications.

E. PUNCHING ANGLE IRON.

This machine is designed to punch angle iron with the leg down. If the application requires punching closer to the web than the standard dies allow, special offset dies are available.

FOR ADDITIONAL INFORMATION ON PUNCHES AND DIES, SEE THE #20 TOOLING MANUAL.

⊠ **CAUTION: PUNCHING ANGLE IRON WITH THE LEG UP WILL CAUSE DAMAGE TO THE PUNCH RETAINING NUT.**

F. PUNCHING CAPACITIES.

<u>MAXIMUM PUNCH SIZES FOR MILD STEEL (65,000 PSI TENSILE)</u>					
MATERIAL THICKNESS			DIAMETER OF HOLE		
INCHES	MM		INCHES	MM	
1/4	6	OPTIONAL DIE HOLDER	2-1/4	57	
5/16	7.9	OPTIONAL DIE HOLDER	1-3/4	44	
3/8	8	STANDARD DIE HOLDER	1-1/4	32	
1/2	12	STANDARD DIE HOLDER	1-1/8	28	

► **NOTE: 1/2 INCH IS THE MAXIMUM MATERIAL THICKNESS.**

SEE FIGURE 7 ON THE NEXT PAGE FOR CHART SHOWING TONNAGE REQUIREMENTS

TONS REQUIRED PER HOLE TO PUNCH MILD STEEL HAVING 65,000 PSI TENSILE STRENGTH

HOLE DIAMETER		1/8 .125	3/16 .1875	1/4 .250	5/16 .3125	3/8 .375	7/16 .4375	1/2 .500	9/16 .5625	5/8 .625	11/16 .6875	3/4 .750	13/16 .8125	7/8 .875	15/16 .9375	1 1.00
METAL GAUGE	THICKNESS INCHES	P R E S S U R E I N T O N S														
28	.015	.2	.2	.3	.4	.4	.5	.6	.7	.7	.8	.9	1.0	1.1	1.2	1.3
26	.018	.2	.3	.4	.4	.5	.6	.7	.8	.9	1.0	1.1	1.1	1.2	1.3	1.4
24	.024	.2	.4	.5	.6	.7	.8	.9	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.9
22	.030	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4
20	.036	.4	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5	2.6	2.8
18	.048	.5	.7	.9	1.2	1.4	1.6	1.9	2.1	2.4	2.6	2.8	3.1	3.3	3.5	3.8
16	.060	.6	.9	1.2	1.5	1.8	2.1	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7
14	.075	.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	5.1	5.5	5.9
12	.105	1.0	1.5	2.1	2.6	3.1	3.6	4.1	4.6	5.1	5.7	6.2	6.7	7.2	7.7	8.2
10	.135	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	7.3	7.9	8.6	9.2	9.9	10.6
5/32	.157	---	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.7	8.4	9.2	10.0	10.7	11.5	12.3
3/16	.188	---	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	14.8
1/4	.250	---	---	4.9	6.1	7.4	8.6	9.8	11.1	12.3	13.5	14.7	16.0	17.2	18.4	19.7
3/8	.375	---	---	---	---	11.1	12.8	14.8	16.5	18.5	20.2	22.1	23.8	25.8	27.5	29.5
1/2	.500	---	---	---	---	---	---	19.7	22.0	24.6	26.9	29.5	31.8	34.4	36.8	39.4
5/8	.625	---	---	---	---	---	---	---	---	30.8	33.7	36.9	39.9	43.0	46.0	49.2
3/4	.750	---	---	---	---	---	---	---	---	---	---	44.3	47.7	51.7	55.2	59.0
1	1.00	---	---	---	---	---	---	---	---	---	---	---	---	---	---	80.0

FIGURE 7

Your Scotchman Ironworker is designed to operate in mild steel. Within conservative limits, it can also operate in medium carbon annealed steels and some forms of abrasion resistant steels.

Conditions of high shock can be encountered when punching alloy steels and accordingly, the machine rating must be reduced

► **NOTE: WHEN CONDITIONS OF HIGH SHOCK ARE ENCOUNTERED, SET THE DOWN STROKE OF THE MACHINE SO THAT THE PUNCH STOPS JUST ABOVE THE PLANE OF THE DIE. THIS WILL REDUCE THE SHOCK WHEN THE PUNCH BREAKS THROUGH THE MATERIAL.**

The Porta-Fab Ironworker uses # 20K punches and dies that have a built-in clearance of thirty two (.032) thousandths of an inch. Under normal punching conditions, a punch will use a corresponding die stamped the same size.

A 3/8 inch punch will use a die stamped 3/8 inch. All Scotchman #20K punches and dies are stamped with the size. All dies have a larger hole in the bottom side for slug relief.

Make sure that the smaller side of the die mates to the punch before installing it in the machine. When punching materials other than mild steel or in cases of high punch shock, we recommend increasing the CLEARANCE. In thin materials, the recommended clearance is 1/10 of the material thickness.

Due to working clearances in the machine, we do not recommend clearances of less than 1/64 of an inch.

G. DO NOT PUNCH MATERIAL THICKER THAN THE DIAMETER OF THE PUNCH.

This "RULE OF THUMB" can be extended, but the punch supplier or Scotchman should be consulted first; (i.e. do not punch material thicker than 1/4 inch with a 1/4 inch diameter punch).

This rule of thumb applies to mild steel only and must be reduced when punching alloy steels.

⊠ **CAUTION: CONTACT YOUR LOCAL DEALER OR THE FACTORY BEFORE ATTEMPTING TO PUNCH ANY TYPE OF ALLOY STEEL.**

H. PUNCH FULL, COMPLETE HOLES.

The side thrust encountered in punching partial holes can force the punch over against the die and result in punch or die breakage. **THIS MAY RESULT IN SERIOUS BODILY INJURY.**

Special nibbling punch and die sets are available for punching into the edge of material.

For further information, contact your local dealer or Scotchman.

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

The edge of the punch should clear 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.

J. DO NOT WORK WITH DULL OR DAMAGED TOOLING.

⊠ **CAUTION: WORKING WITH DULL OR DAMAGED PUNCHES AND DIES WILL INCREASE THE TONNAGE REQUIRED TO PERFORM THE OPERATION. THIS MAY RESULT IN FAILURE OF THE TOOL AND POSSIBLE INJURY TO PERSONNEL. IT WILL ALSO RESULT IN A LESS THAN DESIRABLE WORK PIECE.**

K. SET THE STROKE CONTROL

The stroke control can be adjusted to change the upper stroke limit of the punch. If desired, adjust the stroke to stop the upwards travel of the punch just above the bottom of the stripper to improve cycle times.

6.3 THREE IN ONE COMBINATION TOOL

The Three In One tool is a component tool designed to shear angle iron, round stock and plate. It installs on the tool table and has a maximum capacity of 3" x 3" x 5/16" inch (76x76x8mm) mild steel angle iron, 3/4" inch (19mm) round bar and 1/2" x 4" (12x102mm) or 3/8" x 6" (10x152mm) plate.

6.3A THREE IN ONE COMBINATION TOOL INSTALLATION

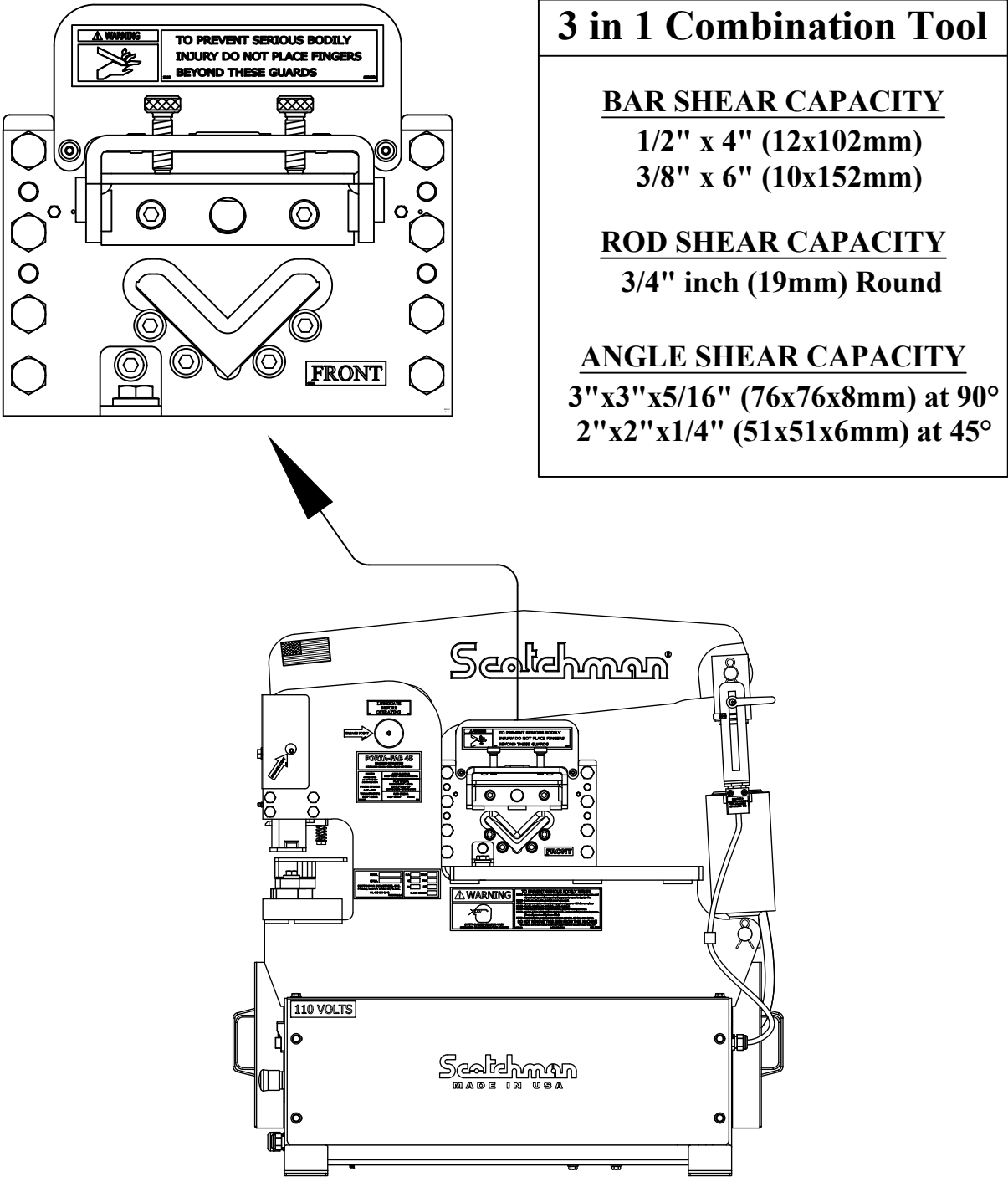


FIGURE 8

THE THREE IN ONE SHEAR MOUNTS ON THE TOOL TABLE AS SHOWN ON PREVIOUS PAGE

► **NOTE: REMOVE THE PUNCH AND DIE BEFORE MOUNTING THIS TOOL.**

1. The arm must be in the up position.
2. Slide the tool under the arm with the Warning Label and the (2) thumb screws facing the operator's side of the machine.
3. The tool anchors to the tool table with the bolts provided. One is in the front of the tool and the other is on the back.
4. Make sure that the rounded cap on top of the tool is aligned squarely under the arm.
5. Grease the blade guides before using and twice daily when this tool is in use. There are (2) grease zerks on the front of the tool and (2) on the back of the tool.

6.3B THREE IN ONE COMBINATION TOOL OPERATION

Apply oil to the upper and lower blades before the first cut is made and every 10 to 15 cuts, thereafter. Grease the slide block every two hours of operation. This reduces cutting tonnage and increases blade life.

USE THE FOLLOWING STEPS:

1. Feed the workpiece through the tool, keeping it horizontal with the tool.
2. For the plate shear section of the tool, adjust the hold down screws to the size of material being sheared.
3. Depress the foot pedal and shear the material.

IN ADDITION TO THESE BASIC STEPS, the operator should be familiar with the following:

A. MAINTAIN PROPER BLADE CLEARANCE.

Do not work with dull or damaged blades. If the blades are chipped or dull, they should be replaced.

The movable blade for the multi tool is designed to fit only one way. Installing the blade backwards will cause damage to the tool. The blade must be installed so that the angle on the plate shear portion of the blade runs from smallest to largest, from left to right. SEE FIGURE 9 ON THE FOLLOWING PAGE.

B. MITER CUTTING.

The angle shear on this model is capable of mitering angle up to 2" x 2" x 1/4" inch (51 x 51 x 6mm) to forty five (45) degrees. To miter cut, raise the guard and feed the material into the shear until it contacts the lower blades, opposite the side it is being fed from.

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

► CAUTION: IF THIS TOOL GETS STUCK AND REMOVED FROM MACHINE, 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. ALWAYS REMOVE THE TOOL WHEN IT IS NOT IN USE.

Moving Blade must be positioned in the tool as shown below or damage will result!!

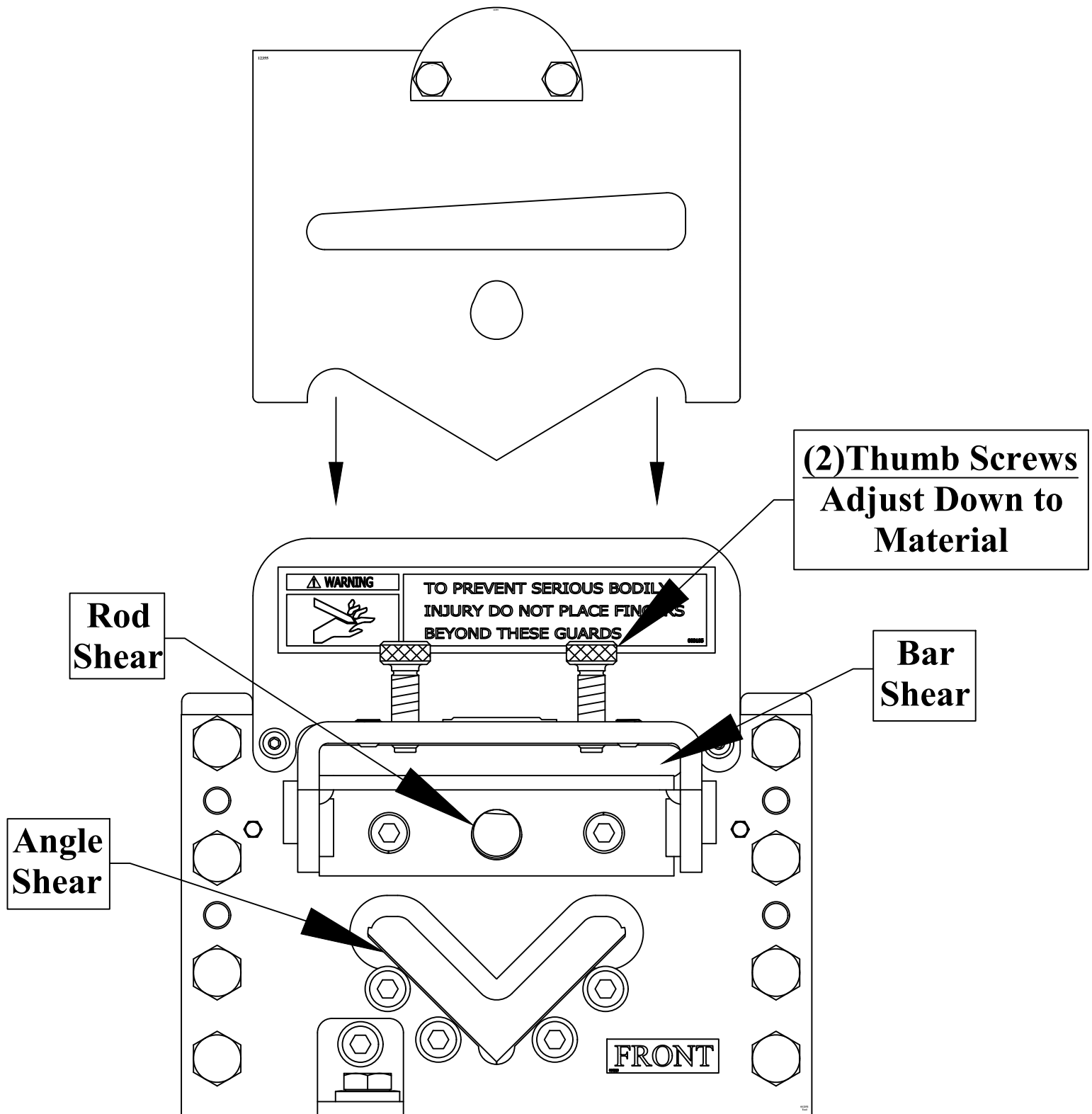


FIGURE 9

7.0 OPTIONAL TOOLING

⊗ **CAUTION:** WHEN USING THE TOOL STATION REMOVE THE PUNCH AND DIE FROM THE PUNCH STATION.

➡ **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 installation, operation and maintenance of each tool.

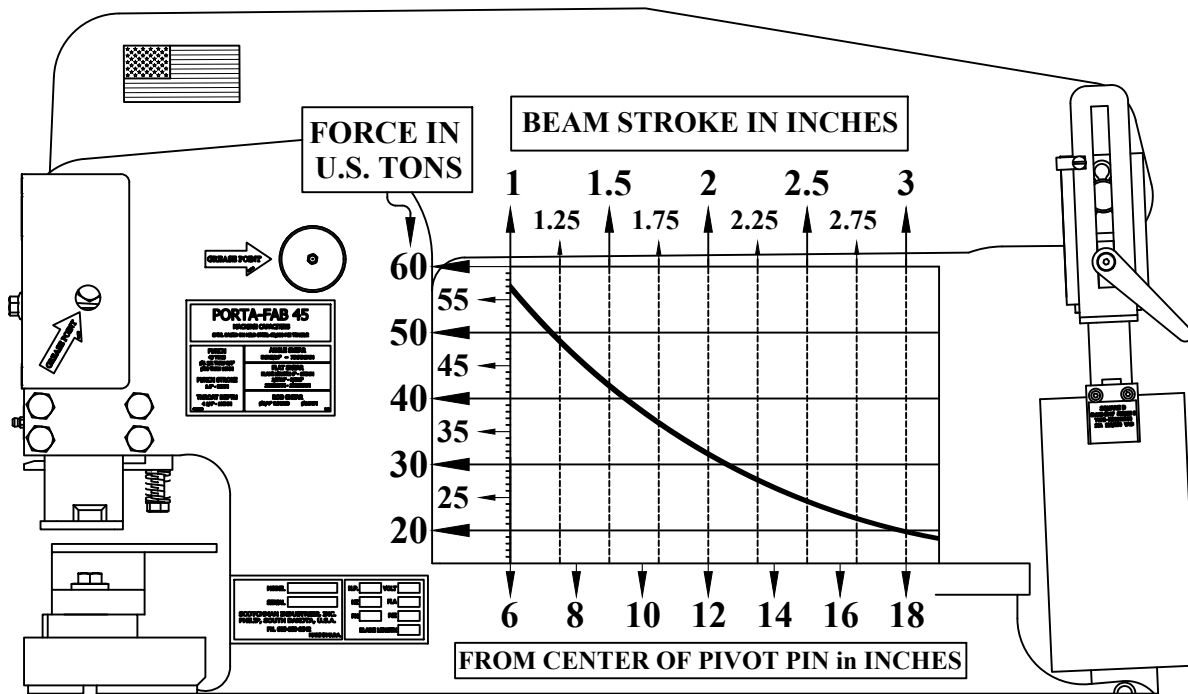


FIGURE 10

NOTE: If tool ever jams or gets stuck - **REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.**

7.1 ROD SHEAR

The rod shear is a component tool designed to shear solid sections of round and square stock. It has a maximum capacity of 3/4 inch (19mm) in round or square.

7.1A ROD SHEAR INSTALLATION

SEE FIGURE 11 BELOW.

The rod shear mounts on the tool table in place of the Three in One shear and is anchored with the bolts provided. Mount the tool so that it is aligned squarely under the arm and lubricate the pressure cap on the top of the tool before installing it. Lubricate the top of the tool every two hours of operation. The rod shear requires a short stroke (approximately 1/2 inch, 12mm) and takes no slug.

7.1B ROD SHEAR OPERATION

Oil should be applied to both blades before the first cut and after every 10 to 15 cuts. On all round sizes, select the cavity closest to 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 tool.

► CAUTION: ALWAYS REMOVE THE ROD SHEAR WHEN IT IS NOT IN USE.

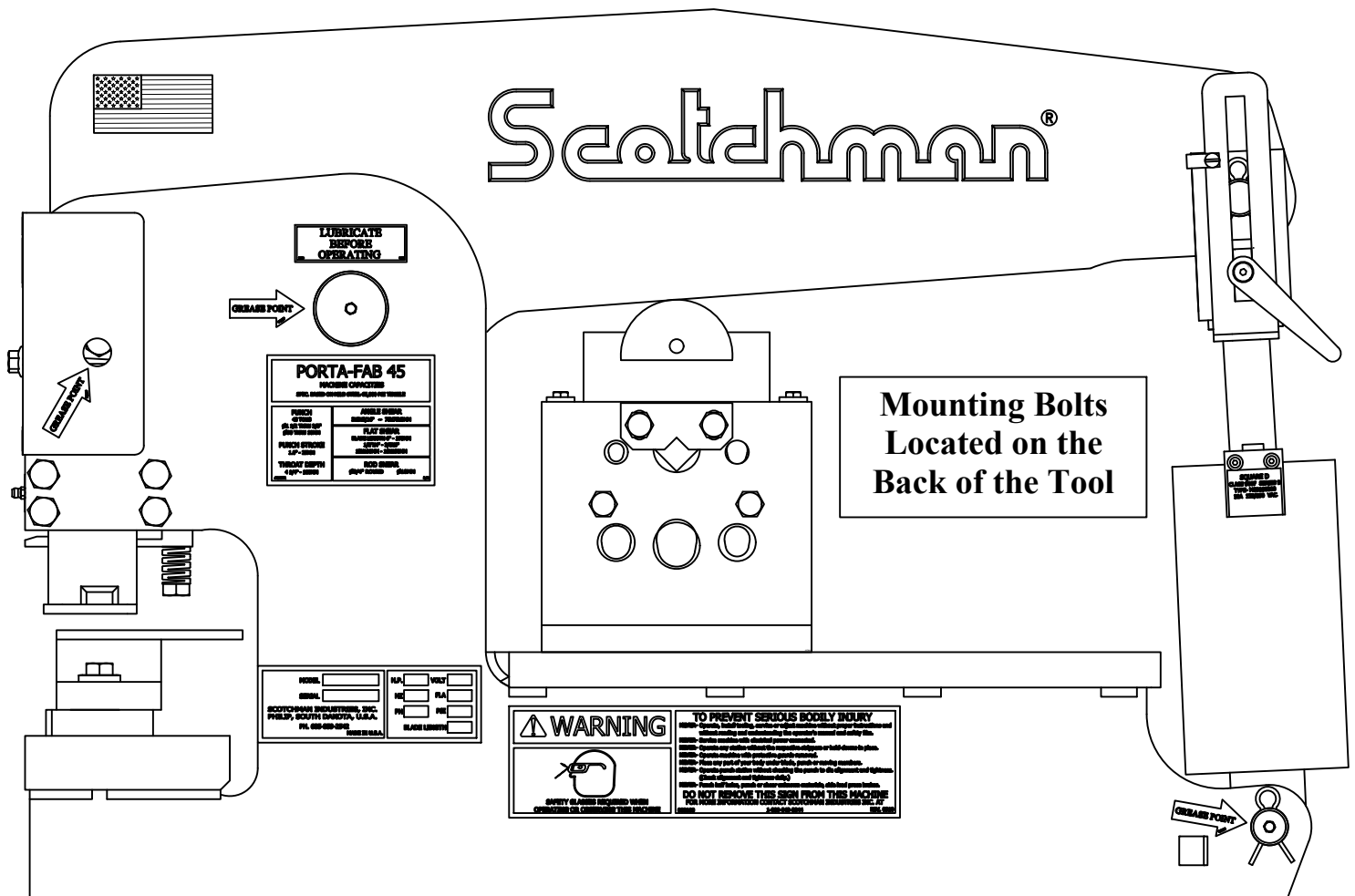


FIGURE 11

7.2 SIX INCH BRAKE

The six inch brake is a component tool designed to bend and form mild steel.

The six inch brake mounts in the punch station.

7.2A SIX INCH BRAKE INSTALLATION

SEE FIGURE 12 ON THE FOLLOWING PAGE.

1. Remove the die holder, stripper and punch retaining nut.

► **NOTE: THE STRIPPER MOUNTING PLATE (D) MUST BE REMOVED TO OPERATE THIS TOOL. FAILURE TO REMOVE THE STRIPPER MOUNTING PLATE WILL CAUSE DAMAGE TO THE BRAKE.**

2. Install the upper brake die (A) in the punch barrel. Do not tighten the retaining nut at this time.
3. Bolt the brake base (B) to the punch bolster, using the two bolts from the die holder. Do not tighten at this time.
4. Place the lower brake die (C) in the brake base (B).
5. Align the upper and lower dies and tighten the punch retaining nut and bolts in the base.

7.2B SIX INCH BRAKE OPERATION

The brake must be center loaded, to prevent damage to the tool. The lower die can be rotated to expose four different vee opening sizes (1/2, 5/8, 7/8 and 1 inch). The maximum material capacity for this tool is 1/4 x 6 inch (6 x 152mm).

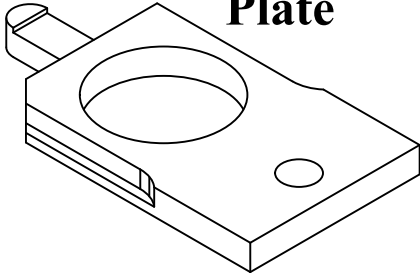
► **CAUTION: ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE.**

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

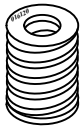
REMOVE

(D) 3 pcs.

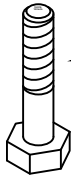
Stripper
Mounting
Plate



Spring



Bolt

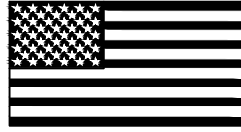


D

A

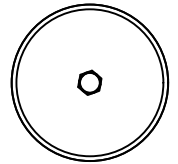
C

B



LUBRICATE
BEFORE
OPERATING

GREASE POINT



GREASE POINT

PORTA-FAB 45

MACHINE CAPACITIES

SPEC. BASED ON MILD STEEL-60,000 PSI TENSILE

PUNCH

20 TONS (41 MET)

24-1/2" THRU 1/2"

STEEL THRU 1/2"

PUNCH STROKE

1.00" - 27/8"

THROAT DEPTH

4-1/4" - 100/101

PRECUT

ANGLE SHEAR

3" X 3" X 5/16" - 7/8" X 7/8" X 3/4"

FLAT SHEAR

BLADE LENGTH 6" - 100/101

1/2" X 4" - 3/8" X 4"

100/101 X 100/101 - 100/101 X 100/101

ROD SHEAR

50/4" ROUND 100/101

3.51

MODEL

SERIAL

SCOTCHMAN INDUSTRIES, INC.
PHILIP, SOUTH DAKOTA, U.S.A.

PH. 605-659-2542

MADE IN U.S.A.

H.P.

HZ

PH

BLADE LE

FIGURE 12

7.3 EIGHT AND TWELVE INCH BRAKES

The eight and twelve inch brakes are component tools designed to bend and form mild steel. They mount on the tool table in place of the angle shear. The brakes are shipped with standard dies to accommodate material up to 1/4 inch (6mm) thick.

7.3A EIGHT AND TWELVE INCH BRAKE INSTALLATION

SEE FIGURE 13 ON THE FOLLOWING PAGE.

Both the eight and twelve inch brakes mount on the tool table in place of the Three in One tool and are anchored with the bolts provided.

EIGHT INCH BRAKE

The eight inch brake base is provided with four mounting holes. Only two are required to mount the tool on this machine. Mount the eight inch brake about 2-3/8" from the machine frame. Toward the back of the tool there are two holes that will align with the tapped holes in the tool table. Use the 2 bolts provided to mount tool to tool table as shown.

TWELVE INCH BRAKE

In the middle of the twelve inch brake base, there is one mounting hole to mount this tool. Only one bolt is used to mount the tool on this machine. Mount the twelve inch brake about 1-3/4" from the machine frame. The mounting hole should align with the 4th tapped hole from the front of the tool table. Use the bolt provided to mount tool to tool table as shown.

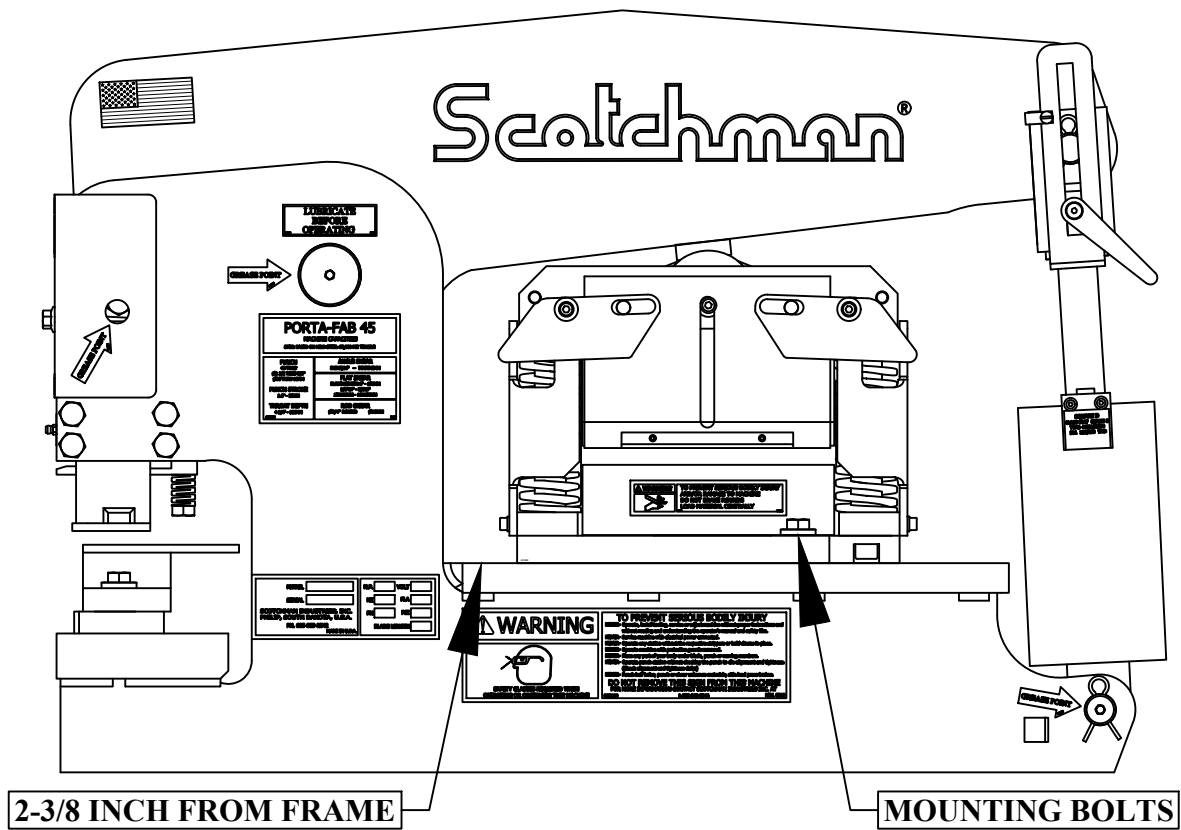
IN FIGURE 14 ON PAGE 35, THERE IS A PRESS BRAKE TONNAGE CHART THAT WILL BE HELPFUL WHEN USING A BRAKE ON THIS MACHINE.

On this model, the twelve inch brake has twenty tons of force. The eight inch has twenty five tons of force. The twelve inch brake has an optional Brake Table with Scale available for it under P/N 026865. It is shown in further detail in our #20 Tooling Manual. P/N 002519 (see picture) is the complete 12" Brake and Brake Table with Scale.

NOTE: If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.



8" Brake



12" Brake

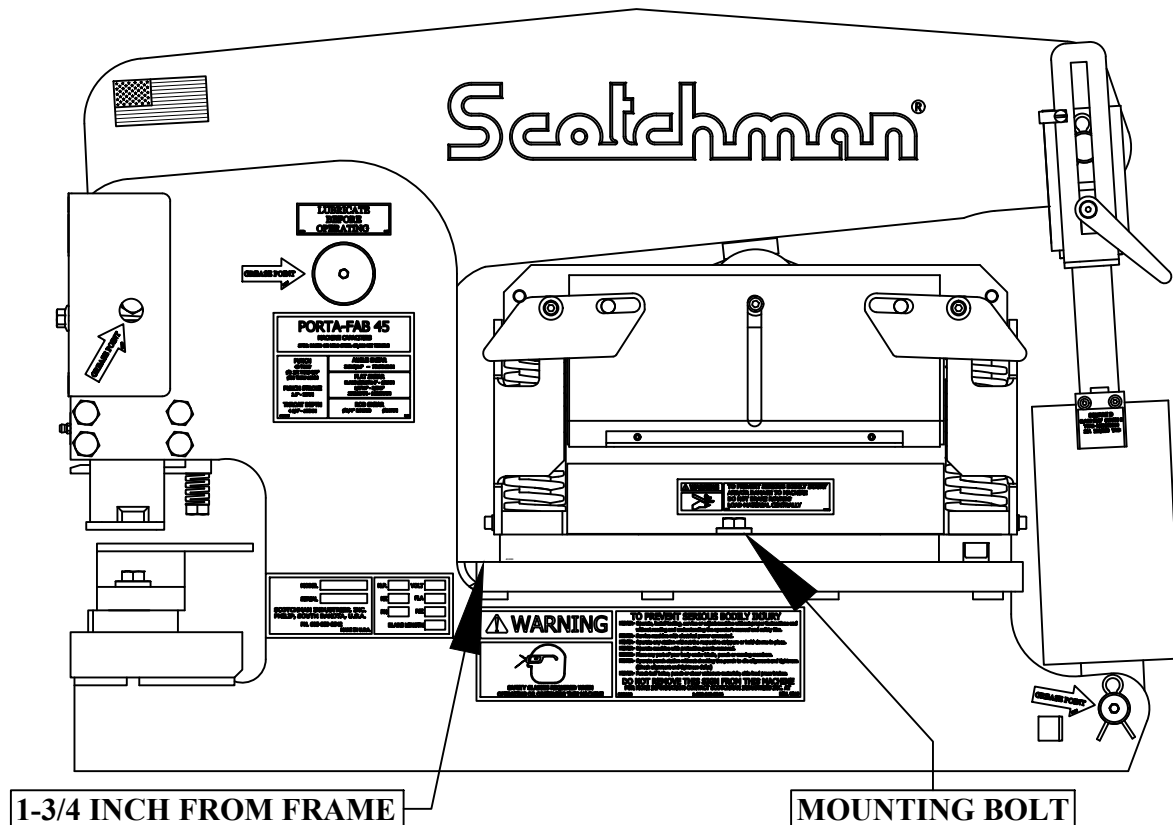


FIGURE 13

7.3B EIGHT AND TWELVE INCH BRAKE OPERATION

⊠ **CAUTION: NEVER PUT YOUR HANDS INTO OR AROUND A BRAKE WHILE IT IS IN OPERATION.**

Hold short pieces with tongs or similar devices. In using the brake, it is necessary to load the brake centrally. (Visual centering is sufficient.) If work is performed off center, 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.

⊠ **CAUTION: NEVER ATTEMPT TO FREE THE BRAKE BY HAND.**

Sticking can be caused by lack of lubrication, the complexity of the part being bent or bent guide pins.

Keep the guides well lubricated. It is common practice to have the bottom die opening 8 times the thickness of the material being bent.

FOR TONNAGE REQUIREMENTS, SEE FIGURE 14 ON THE FOLLOWING PAGE.

If parts require bends less than 90 degrees, adjust the stroke 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 your local dealer.

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

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

BRAKE TONNAGE CHART

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	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	5.6	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	80.0	63.0	52.5	39.4	31.2
1.0	1.00																		112	90.0	76.0	56.2	44.0

PRESSURES HIGHLIGHTED IN **BOLD** 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 65,000 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 14

7.4 PIPE NOTCHER

The pipe notcher is a component tool designed to saddle cut pipe or tubing for applications such as railings. There are dies available to notch angles in tubes and pipe, also.

For prices and availability, contact your local dealer or the factory.

7.4A PIPE NOTCHER INSTALLATION

SEE FIGURE 15 ON THE FOLLOWING PAGE.

The pipe notcher can be installed in either the punch station or on the tool table.

TO MOUNT THE PIPE NOTCHER IN THE PUNCH STATION:

1. Remove the die holder, die holder plate, stripper, punch and punch retaining nut.
2. Install the punch pusher (A) in the punch barrel.
3. Install the return springs, the upper die and the lower die in the pipe notcher housing (C).
4. Mount the pipe notcher so that the cutting dies face away from the machine. Use the bolts provided to anchor the tool in place. Align the tool over the slug hole in the bolster, to assure proper slug removal.

► **NOTE: THE PUNCH PUSHER WILL NOT ALIGN DIRECTLY OVER THE PIPE NOTCHER. THIS IS OK.**

TO MOUNT THE PIPE NOTCHER ON THE TOOL TABLE:

1. Install the return springs, the upper die and the lower die in the housing.
2. Bolt the beam pusher (B) to the upper die.
3. Place the tool on the tool table with the cutting dies facing the operator's side of the machine.
4. Align the slug slot in the tool with the slot in the tool table. Anchor the tool with the bolt provided (D).

⊠ **CAUTION: WITH THE TOOL MOUNTED IN EITHER STATION, IT IS NECESSARY TO SET THE DOWN-STROKE 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).**

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

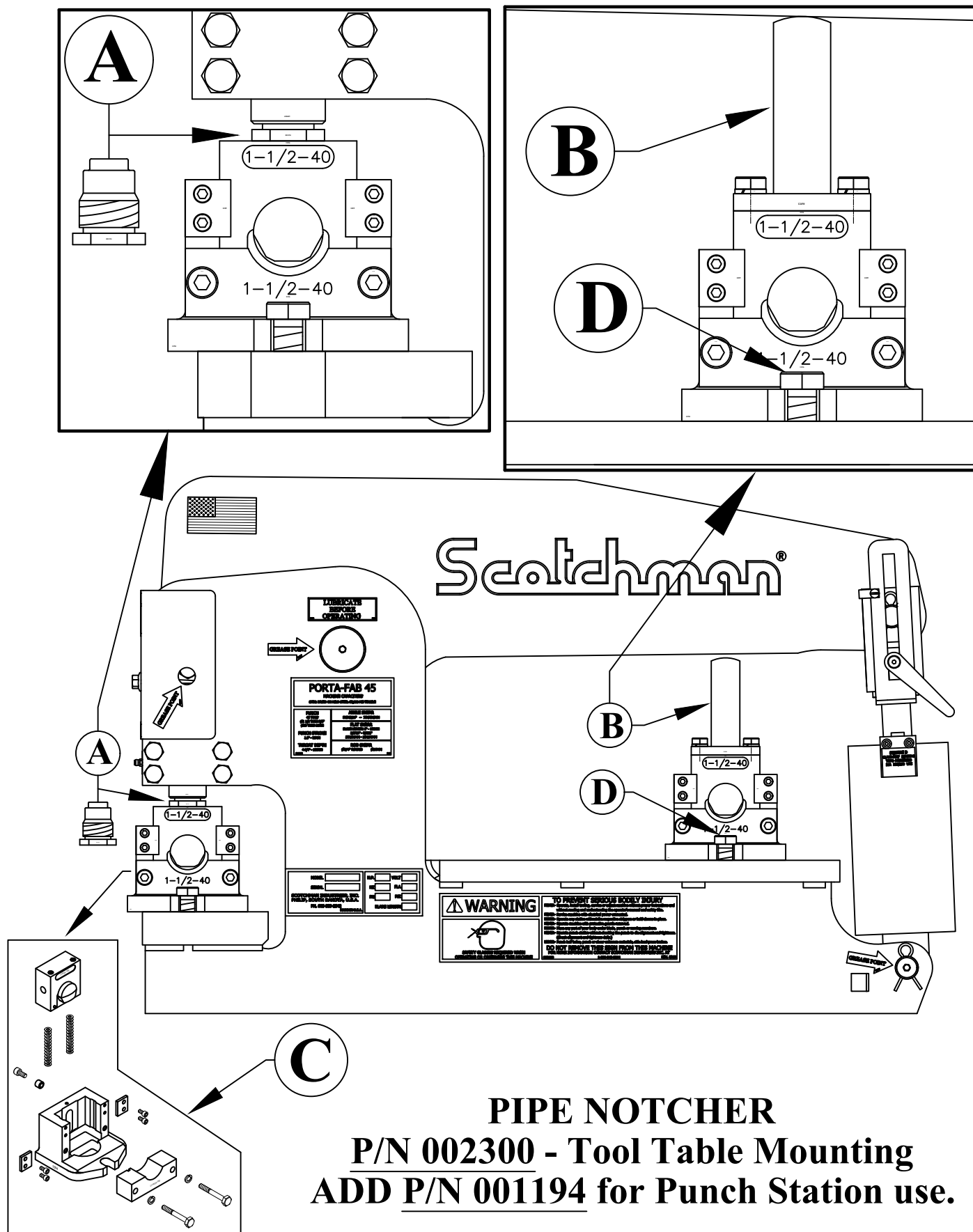


FIGURE 15

7.4B PIPE NOTCHER OPERATION

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. Clean the unit with solvent.**
- B. Never remove the M10 set-screw from the upper die. Generally, it should not be necessary to remove the set screw that holds the insert in the top die (Scotchman product).**
- C. Check the alignment of the unit. After cleaning the unit, always check the alignment of the punch and die. To check the alignment, insert the punch and die holder, without the springs, into the housing and check the gap.**

SEE FIGURE 16 ON THE FOLLOWING PAGE.

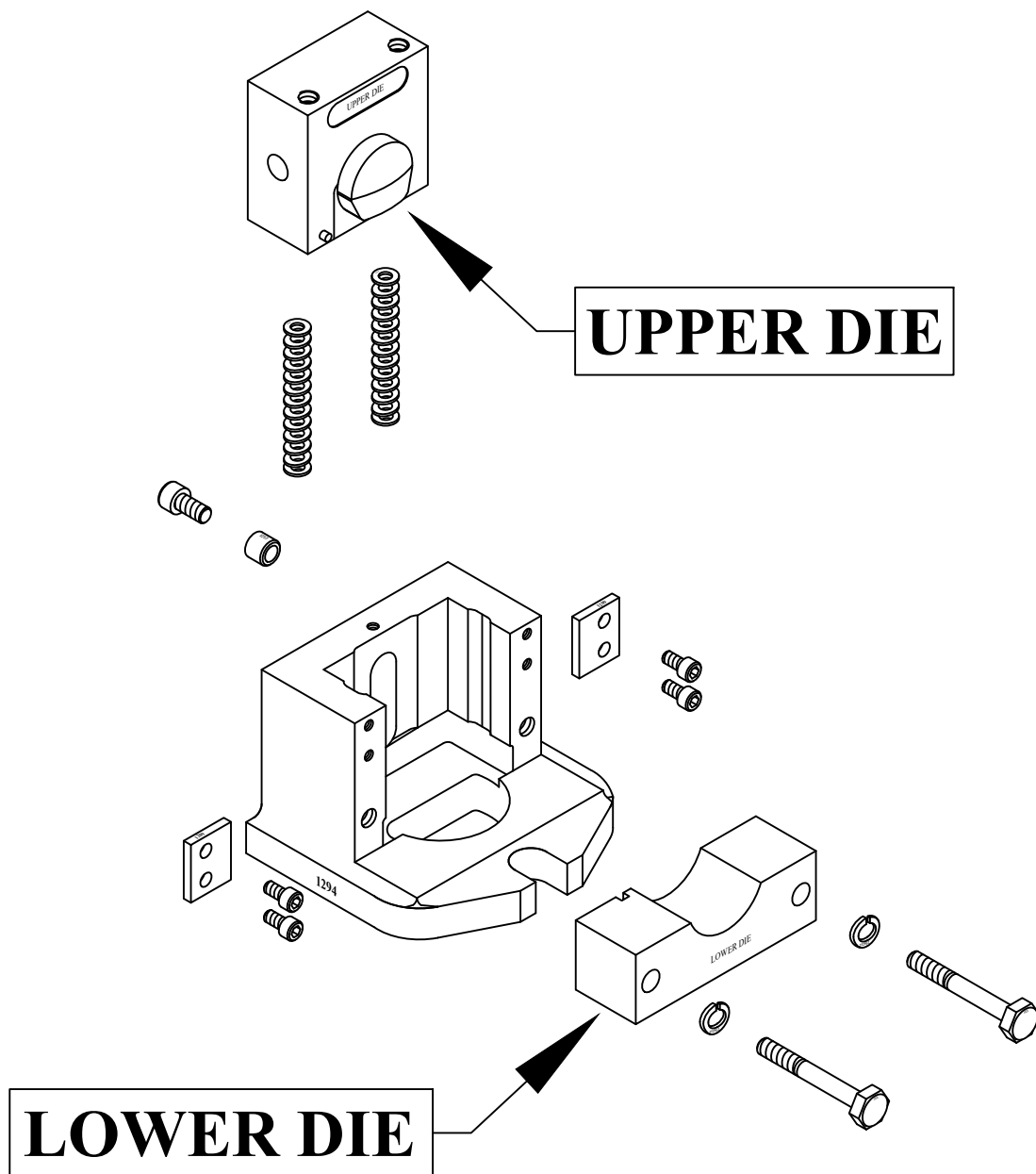
If proven correct, tighten the two M10 socket head screws holding the lower die section in place. Apply some high pressure lube all around the inside of the housing. Re-assemble the unit, reversing the above procedures.

Before operating, lubricate the back and sides of the upper die with way oil. Repeat this lubrication once daily. Apply cutting oil or motor oil to the cutting dies before the first cut and every 10 to 15 cuts, thereafter.

7.4C PIPE NOTCHER CAPACITIES

Two inch (2") schedule 40 pipe is the maximum thickness that can be cut. Lighter weight tubing may be cut but will probably require different dies for best cutting results. Separate dies are required for each size of pipe or tubing being notched.

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



PROPER ALIGNMENT OF PIPE NOTCHER DIES

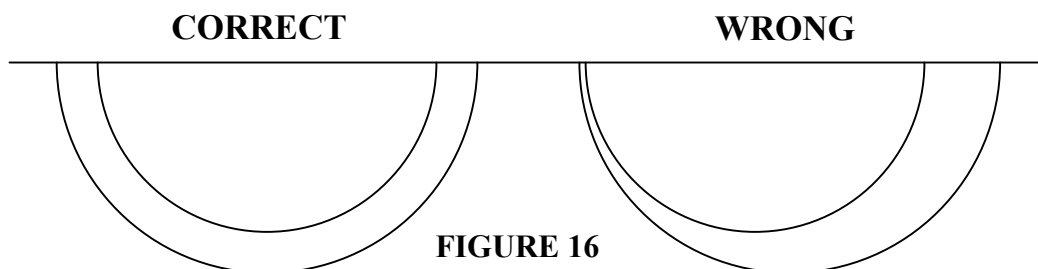


FIGURE 16

7.5 RECTANGLE NOTCHER

The rectangle notcher is a component tool designed to make rectangle and vee notches in angle iron and flat stock. The maximum capacity of this tool is 2 x 1-3/4 inch (51 x 44mm) rectangle notch in 1/4 inch (6mm) material or a 1-1/2 inch (38mm) vee notch.

7.5A RECTANGLE NOTCHER INSTALLATION

SEE FIGURE 17 ON THE FOLLOWING PAGE.

1. Operate the machine until the cylinder completely retracts.

NOTE: THE STRIPPER MOUNTING PLATE (G) MUST BE REMOVED TO OPERATE THIS TOOL. FAILURE TO REMOVE THE STRIPPER MOUNTING PLATE WILL CAUSE DAMAGE TO THE BRAKE.

2. Remove the die holder, die holder plate, stripper, punch and punch retaining nut.
3. Thread the notcher pusher (A) into the punch ram and tighten it with a wrench.
4. Place the tool (B, E & F) on the punch bolster. Raise the upper notcher ram (B) up to the pusher (A) and tighten the set screw (C).
5. Start the mounting bolts (D) in the lower die. Align the upper ram and lower die and tighten the mounting bolts (D).

7.5B RECTANGLE NOTCHER OPERATION

1. Lubricate the upper ram and lower die before the first cut and every 10 to 15 cuts, thereafter.
2. Place the material to be notched between the upper and lower dies and make the cut.
3. After the cut is made, remove the material before releasing the foot pedal.

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

NOTE: If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.

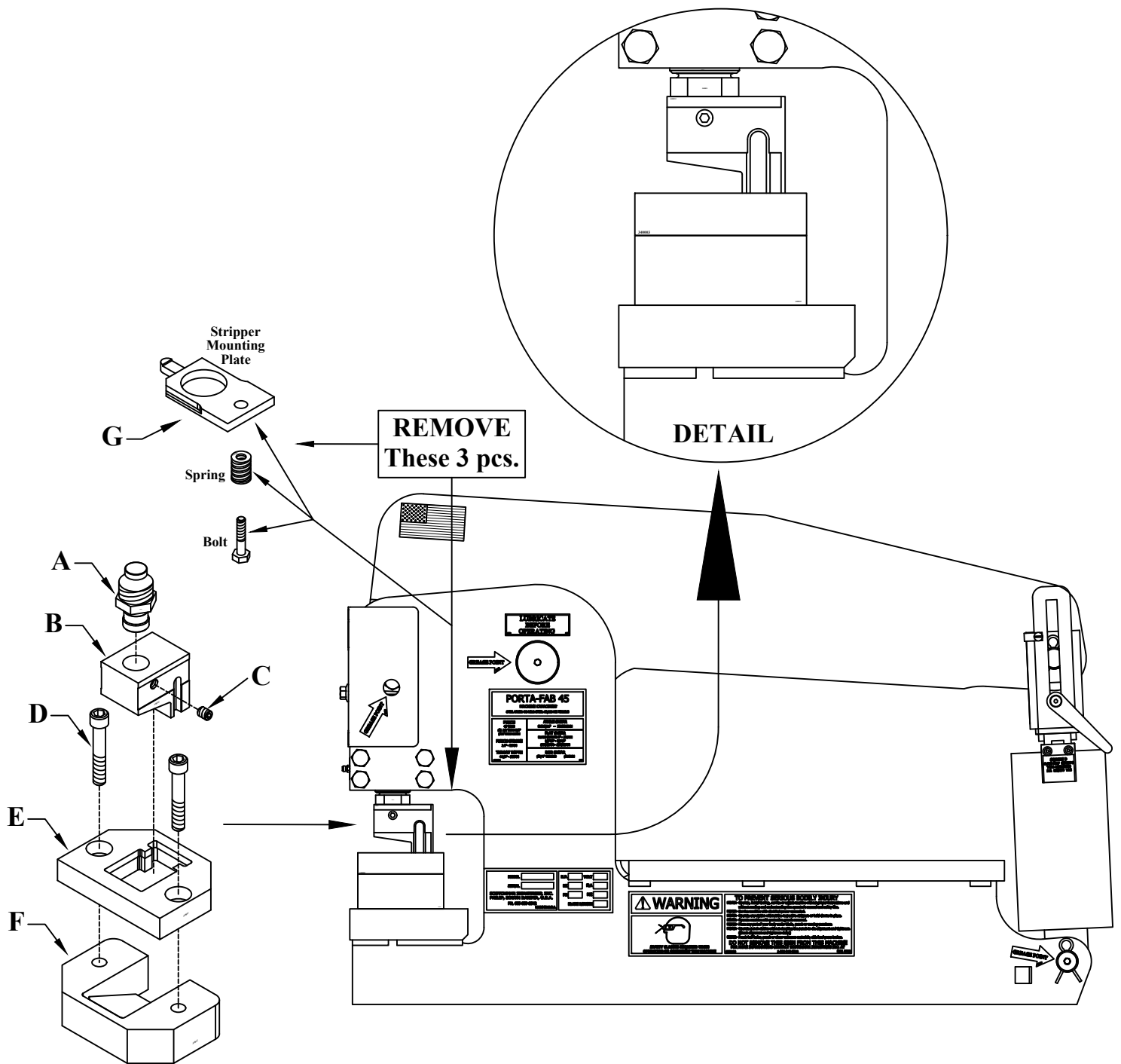


FIGURE 17

7.6 PICKET FENCE TOOL

The picket fence tool is designed to make picket points on square tubing for ornamental fence applications. The tool has a maximum capacity of 1 inch (25mm), 16 gauge tubing.

7.6A PICKET FENCE TOOL INSTALLATION

SEE FIGURE 18 ON THE FOLLOWING PAGE.

This tool mounts on the tool table in place of the Three in One tool and is anchored with the same bolts.

Lubricate the pressure block (A) before installing it on the tool and after every two hours of operation.

7.6B PICKET FENCE TOOL OPERATION

1. Rotate the tube guide on the front of the tool to the size of tube you are shearing. Remove the tube guide if you are shearing 1 inch tubing.
2. Adjust the tube stop (B) just low enough to contact the upper edge of the tube.
3. Adjust the rest stop (C) 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 (B). Depress the shear pedal.
5. Lubricate the dies every 10 to 15 cuts and grease the ram daily.

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

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

7.7 6 x 6 NINETY DEGREE NOTCHER

The six inch (152mm) ninety degree notcher is a component tool designed to make square and vee notches in angle iron and flat stock. The maximum capacity of the tool is 3 x 3 x 1/4 inch (76 x 76 x 6mm) or 6 x 6 x 1/8 inch (152 x 152 x 3mm).

7.7A 6 x 6 NINETY DEGREE NOTCHER INSTALLATION

SEE FIGURE 19 BELOW.

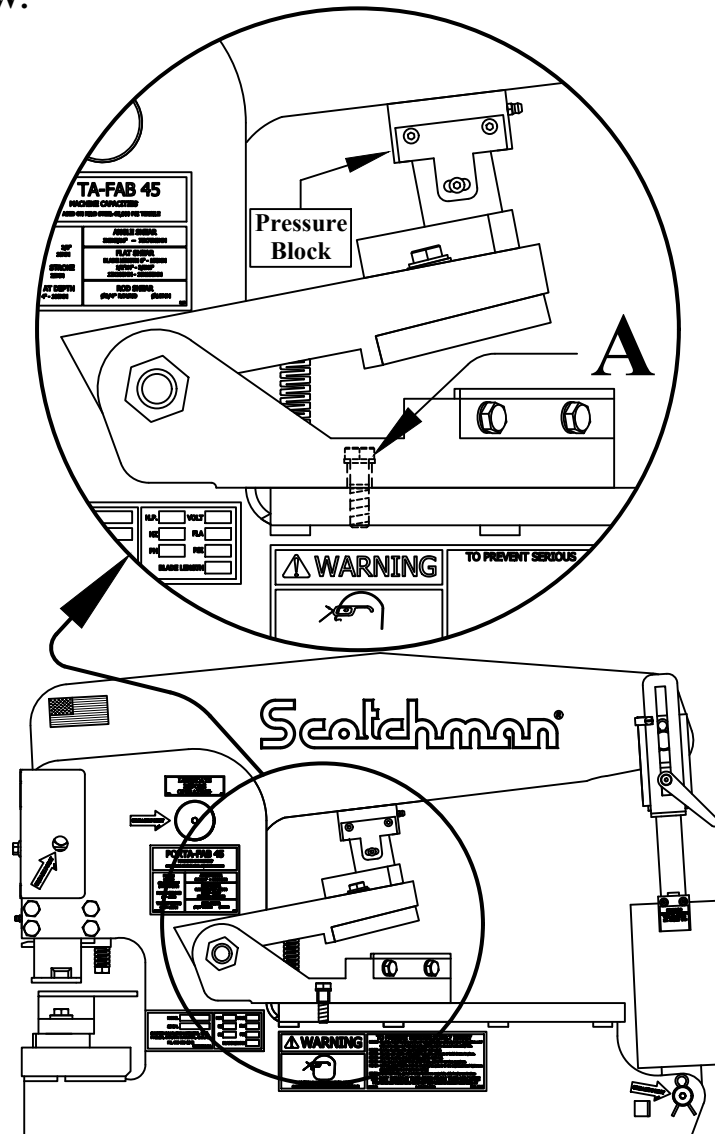


FIGURE 19

TO INSTALL THE NOTCHER ON THE TOOL TABLE, the tool should be mounted as close to the frame as possible and anchored through the bottom of the notcher casting, as shown, with the bolts and washers (A) provided.

NOTE: If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.

7.7B 6 x 6 NINETY DEGREE NOTCHER OPERATION

Lubricate the blades before starting and every 10 to 15 cuts, thereafter. Oil the pressure block every two hours of operation. Do not attempt to shear material thicker than 1/4 inch (6mm) 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!

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

7.7C BLADE REPLACEMENT

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

The upper blade has 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. To allow further adjustments, rotate or replace the upper blade and snug bolts, only.
3. Rotate or replace the lower blades.
4. Lower the upper blade down until it just passes the lower blade, approximately 1/16 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 lower blades. There should be a clearance of approximately .005 of an inch (.12mm) on each side.
7. Tighten the upper blade bolts. Raise and lower the upper casting several times by hand, to check blade alignment. After alignment, tighten the back up set screws, making sure that the upper blade does not move.

7.8 SQUARE TUBE SHEAR

The square tube shear is designed to shear square tubing from 1/4" to 1". 16 gauge is the maximum material thickness.

7.8A SQUARE TUBE SHEAR INSTALLATION

SEE FIGURE 20 ON THE FOLLOWING PAGE.

The tool mounts on the tool table in place of the Three-In-One Tool and is anchored with the same bolts (C). Lubricate the rocker block (A) before installing the tool and after every two hours of operation.

7.8B SQUARE TUBE SHEAR OPERATION

1. Feed the tubing through the shear to the desired length and depress the foot pedal.
2. Lubricate the blades every 10 to 15 cuts.

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

7.9 OPTIONAL DIE HOLDERS AND STRIPPERS

7.9A 2-5/8 INCH (66 MM) DIE HOLDER

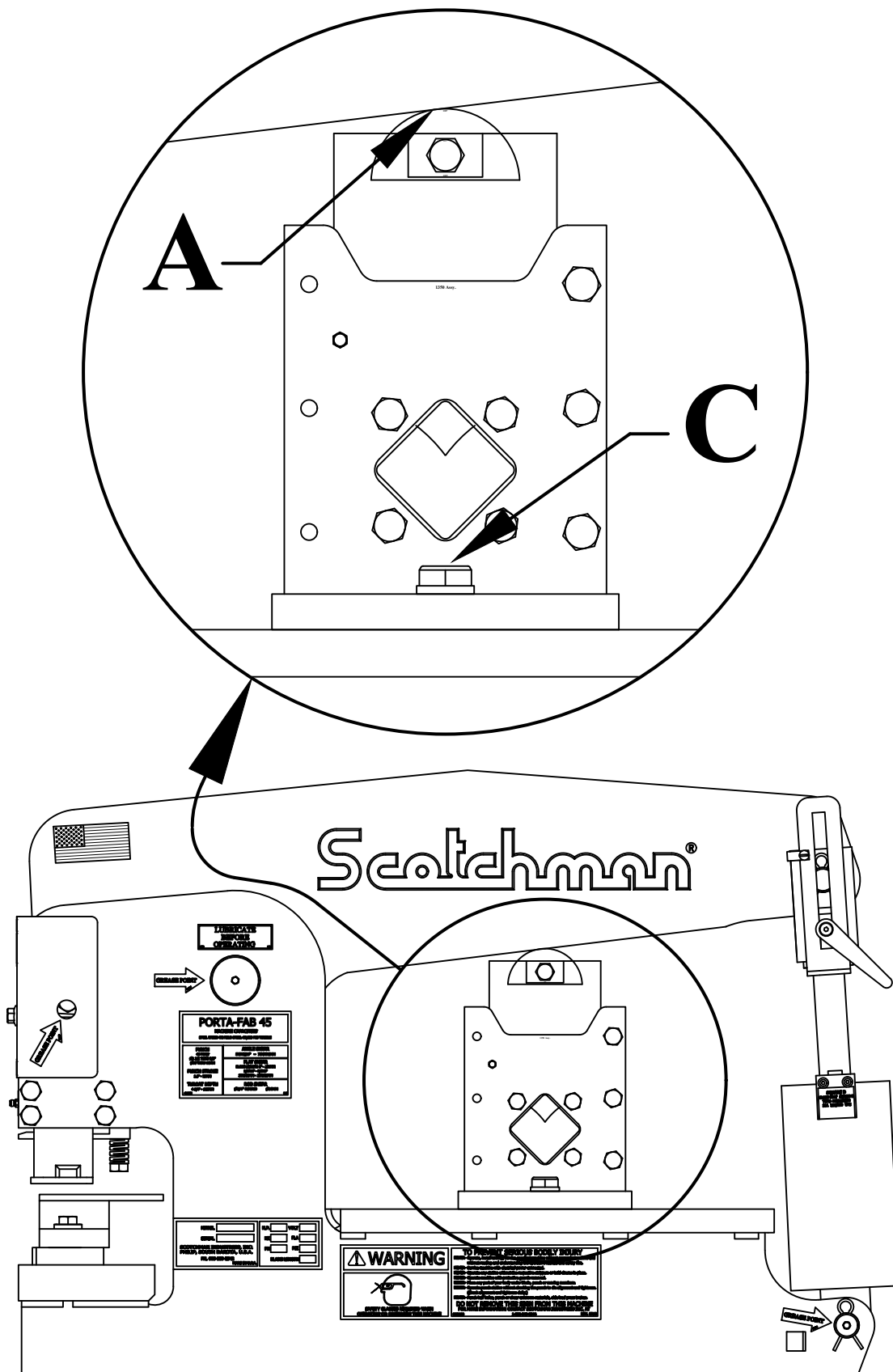
The optional 2-5/8 inch (66mm) die holder is of the same design as the standard die holder. It is used in oversized punching applications. FOR MORE INFORMATION, REFER TO THE #20 TOOLING MANUAL. Always use the preferred method of aligning punches and dies. REFER TO SECTION 6.2.

79.B 4 x 6 DIE HOLDER

The 4 x 6 inch die holder is used in oversize punching applications. FOR MORE INFORMATION, REFER TO THE #20 TOOLING MANUAL. Always use the preferred method of aligning punches and dies referred to in SECTION 6.2.

7.9C OPTIONAL STRIPPER

The optional stripper is used in oversize punching applications. FOR MORE INFORMATION, REFER TO THE #20 TOOLING MANUAL.



NOTE: If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.

FIGURE 20

7.10 MULTI-SHEAR TOOL

The Multi-Shear Tool is designed to shear standard Unistrut profiles, as well as many other specialty profiles.

7.10A MULTI-SHEAR TOOL INSTALLATION

SEE FIGURE 21 ON THE FOLLOWING PAGE.

If the punch and die are mounted on the machine, remove them.

1. Run the Punch Beam above the tool table, up to its highest setting.
2. Place the tool on the tool table under the punch beam, keeping it towards the "punch end" of the tool table.
3. Locate the clamp (B) and the bolts and washers (C) and loosely mount the tool to the fourth set of holes from the left on the tool table. (Do not place the Multi-Shear Tool any further towards the rear of the machine due to possible "bottoming out" condition.
4. Make sure that the tool is located under the beam correctly by aligning the pressure cap (A) under the beam. Once the tool is squarely under the beam, tighten the bolts (C) for the clamp (B) to hold it in place.
5. Set the upstroke of the machine so that the size of material that you want to shear will feed through the tool.
6. Make sure that the upstroke is set so that there is spring tension on the pressure block at all times.
7. Set the down-stroke of the machine so that the moving blade travels only far enough to shear the material and, no further.

7.10B MULTI-SHEAR TOOL OPERATION

1. Set the down-stroke of the machine so that the moving blade travels only far enough to shear the material and, no further. "Bottoming out" of this tool may ruin it!!
2. Feed the material through the shear to the desired length and depress the foot pedal.
3. Grease the pressure cap (A) before using and every two hours, thereafter.
4. Lubricate the blades every ten to fifteen cuts.

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

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

NOTE: See-Thru Guard is for Clarity

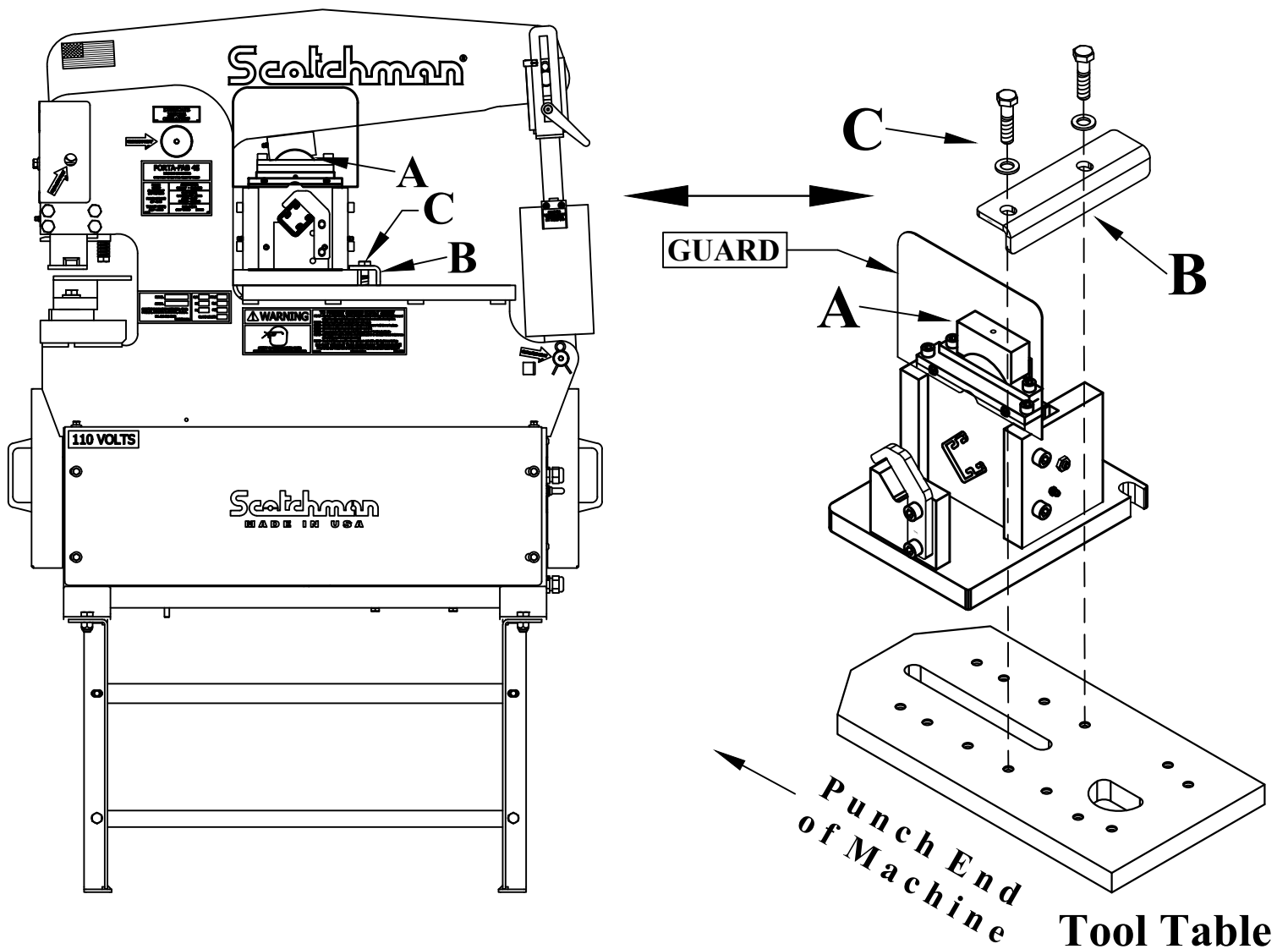


FIGURE 21

7.11 WELD COUPON BENDER TOOL

The Weld Coupon Bender Tool is designed to bend welded test coupons into "U" and "V" shapes for the purpose of testing soundness and ductility of welds. The maximum size of a test clip is 7" long x 2" wide x 3/8" (178 x 51 x 10mm) thick. Rollers are 4" (102mm) apart.

7.11A WELD COUPON BENDER TOOL INSTALLATION

SEE FIGURE 22 ON THE FOLLOWING PAGE.

The Weld Coupon Bender Tool mounts on the tool table under the upper arm and is held in place with the two M-12 bolts and flat washers (A). Use the 4th set of holes from the left (punch end) on the tool table. It mounts as shown in the drawing. Make sure that the Rocker Cap (B) is squarely under the arm and that the stationary back of the Coupon Bender is clear of the moving arm of the ironworker. The down-stroke must be set properly with this tool. On the left side of the tool, under the roller, there are two lines machined in the tools back support. The upper line is for when the "V" die is used and the lower line is for when the "U" die is used. The stroke is to be set by aligning the bottom of the ram with the appropriate line machined in the back support. Please see the drawing under "Setting the Stroke".

7.11B WELD TESTER OPERATION

1. Grease the Rocker Cap (B) between the upper arm and the tool and again after every two hours of use. Grease the ram, using the two grease zerks on the side.
2. Lightly grease the rollers, using the two grease zerks on the front of the weld tester. Make sure that the rollers still turn easily. Too much grease can cause the tool to not work properly.
3. Lightly lubricate the underside of the die and outside of the two rollers, with a spray lube such as WD-40 and, again, every 10-15 bends, thereafter.
4. Insert the weld test coupon by sliding it onto the rollers. Using the back of the weld tester, square up the test piece and then, move it forward enough to center under the die.

Make sure that the weld test coupon is square and centered under the die.

5. Make sure that the down-stroke of the tool is set so that the bottom of the ram - NOT the die - is aligned with the correct scribe line.
6. After bending the weld test coupon, let the tool return to the resting position. Remove the test coupon and inspect the weld.

<u>NOTE:</u> If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE <u>BEFORE</u> ATTEMPTING TO FREE IT.
--

► REMOVE THE WELD TESTER WHEN IT IS NOT IN USE.

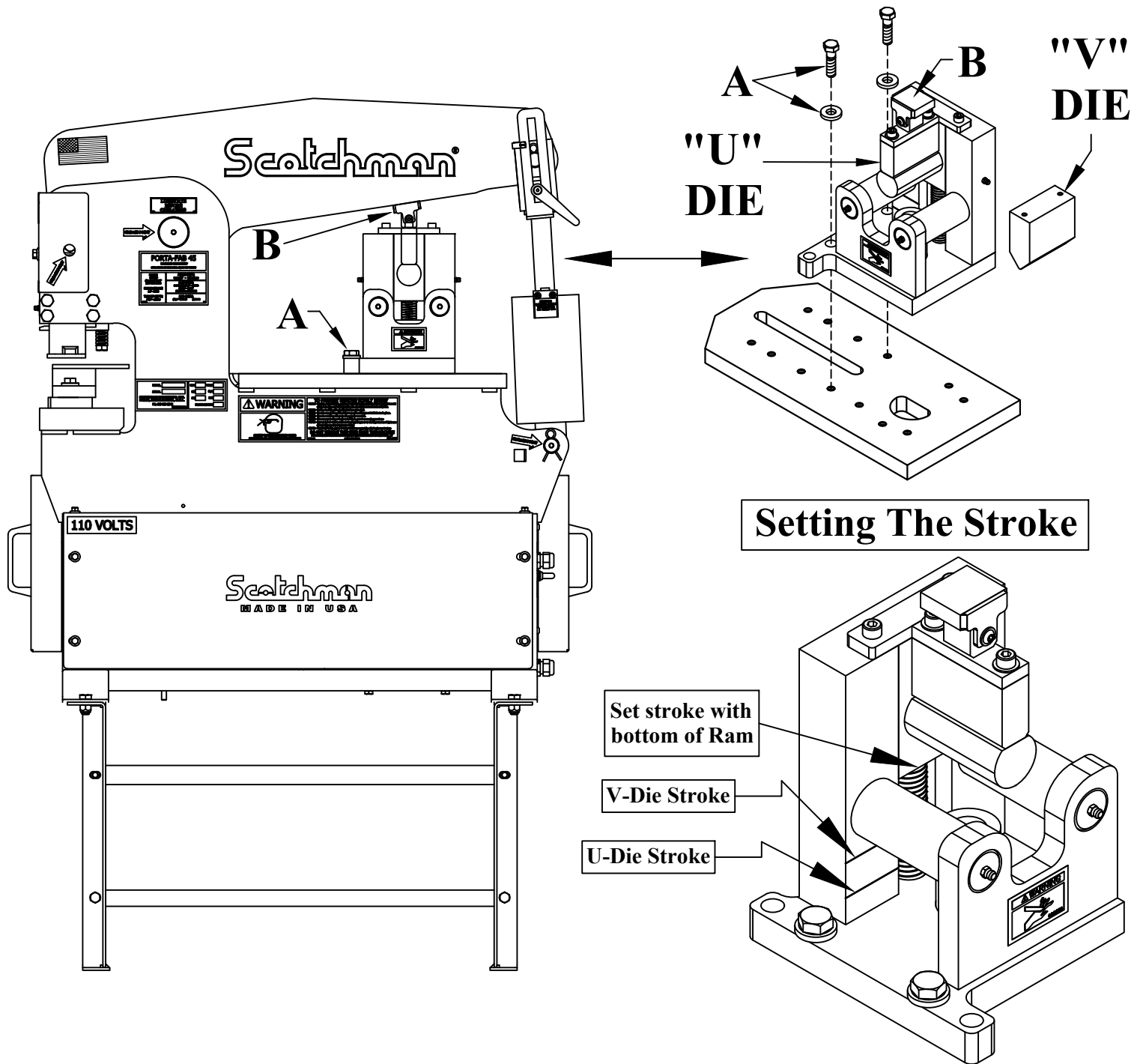
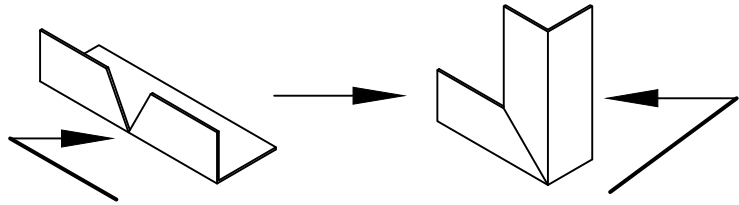


FIGURE 22

7.12 OPEN END BRAKE



The Open End Brake is a tool designed to bend notched angle iron into a "picture frame" corner. It can bend flat metal as well. Please scan the QR Code on the following page with the camera on your phone to see this tool in use.

7.12A OPEN END BRAKE INSTALLATION

SEE FIGURE 23 ON THE FOLLOWING PAGE.

The Open End Brake tool mounts on the tool table under the upper arm and is held in place with an M12 bolt and flat washer (A). Note that the tool can be mounted with the open end facing the operator, or it can be mounted with the open end facing toward the hydraulic cylinder.

The Pressure Cap (B) is what the arm pushes on. The pressure cap is attached to a rail along the top die via two set screws (C). The Pressure Cap can be moved along the top die, but it is recommended to keep it centered on the rail.

7.12B OPEN END BRAKE OPERATION

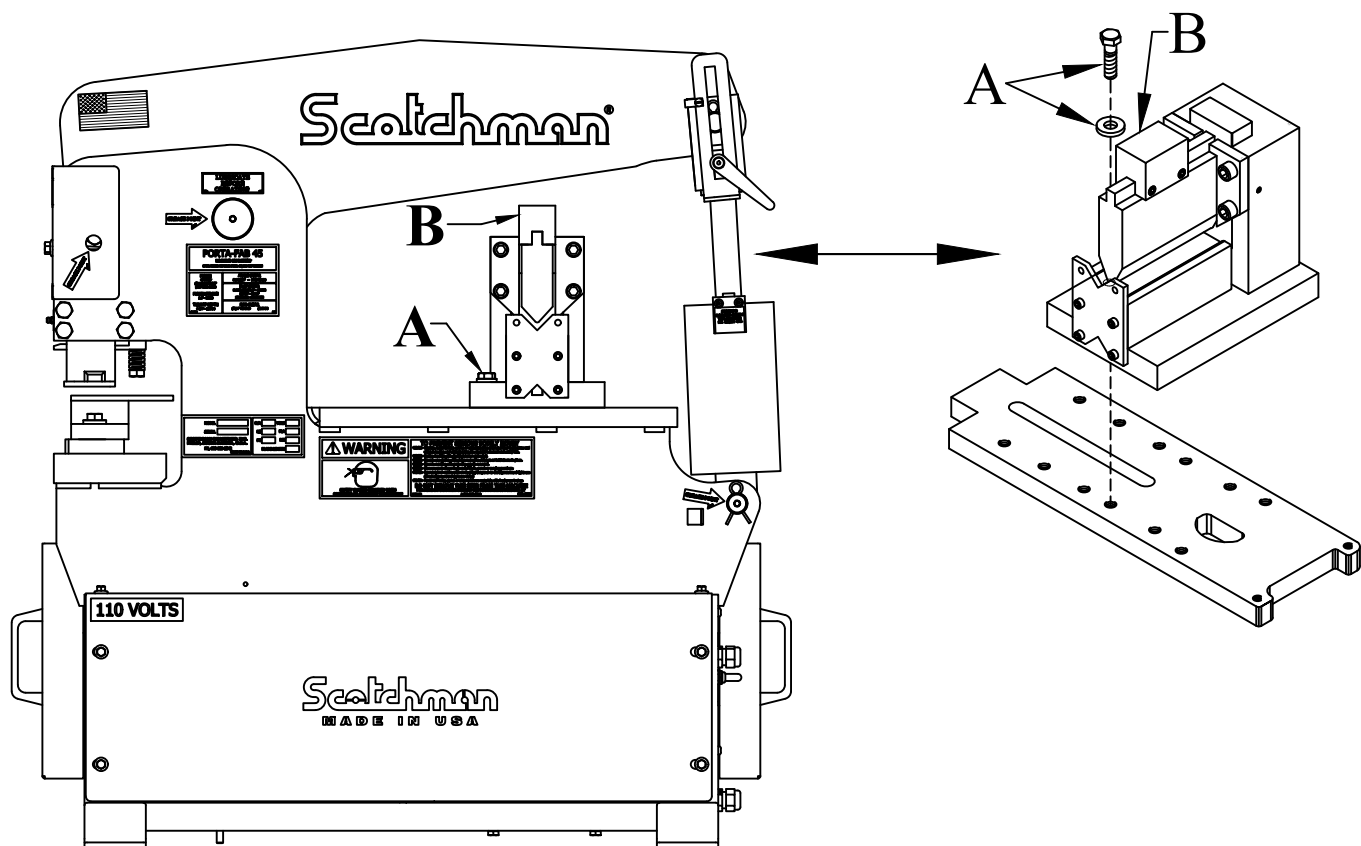
The following apply to this Tool regardless of the Ironworker Model.

1. Grease the Guide Post every 2 hours of operation. There are (2) Grease Zerks - one on each side of the Guide Post.
2. The recommended Die Size is 8 times the thickness of the Material. Brake is supplied with (2) One Inch Dies as Standard Equipment. The Maximum Recommended Material with the Standard Dies is 1/4 inch Thick.
3. **NEVER** put your hands into or around this Brake when it is in operation!! Hold short pieces with Tongs or similar device.

NOTE: If tool ever jams or gets stuck - REMOVE THE TOOL FROM THE MACHINE BEFORE ATTEMPTING TO FREE IT.

4. Use a pry bar to free it and repair or replace whatever caused the jam. The sticking of the Brake can be caused by: Complexity of the part, lack of Lubrication or Interference between the Guide and Post.
5. **ALWAYS** - Remove This Tool From The Machine When Not In Use!!

The "OPEN" end of brake is facing the operator.



The "OPEN" end of brake is facing the hydraulic cylinder.

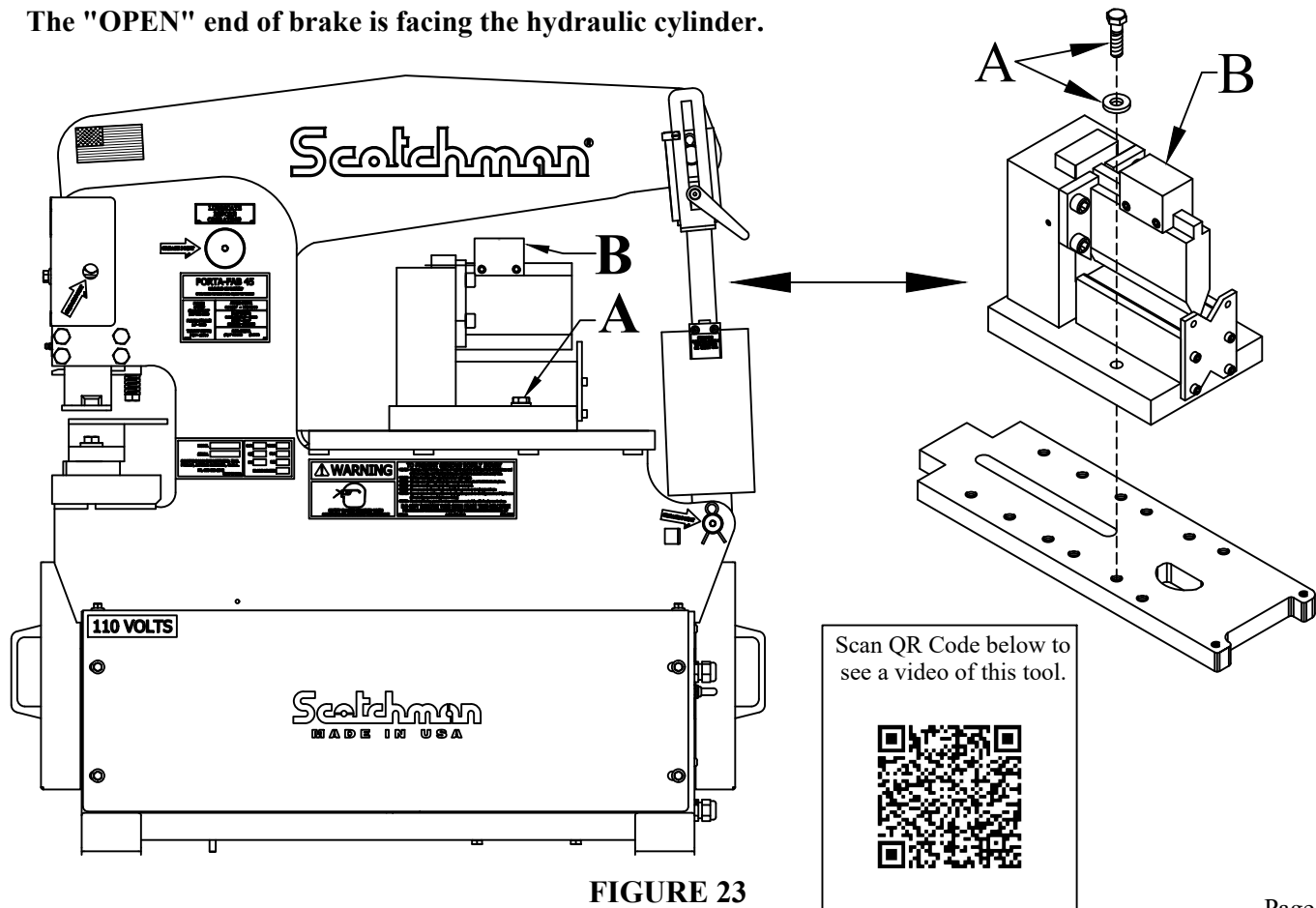


FIGURE 23

8.0 TROUBLE SHOOTING GUIDE

8.1 ELECTRICAL - MOTOR

 **CAUTION: ALL ELECTRICAL WORK PERFORMED ON THIS MACHINE SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN.**

A. MOTOR WILL NOT RUN:

1. Check to be sure that the power service supplying the machine is turned on and properly rated for the load. A 30A service is required for this machine.

 **NOTE: MAKE SURE THE POWER CORD IS IN GOOD CONDITION. IF IT HAS BEEN PINCHED OR CUT - REPLACE IT!!**

2. Check the motor protection breaker. Remove the base cover on the front of the machine. The breaker is located on top of the electrical enclosure. Press the button to reset the breaker. SEE FIGURE 24 on page 58.
3. Check the EMERGENCY STOP button. A defective or stuck EMERGENCY STOP button will not allow the machine to be powered. With the power to the machine turned off, check the continuity of the EMERGENCY STOP button using an ohm meter. With the switch in its normal position (pulled out), the reading should show continuity from one terminal to the other.

 **DO NOT OPERATE THIS MACHINE WITH THE EMERGENCY STOP BUTTON BYPASSED!**

4. Check the line wire connections at the motor contactor.
5. Check the motor contactor. Open the electrical enclosure and with power supplied to the machine, observe the contactor when the start button is pressed. An audible click should be heard when the contactor engages. If the contactor does not engage, go to SECTION 8.1 A6. If the contactor engages but the motor does not start, continue to SECTION 8.1 A10.
6. Check the control circuit fuse. With power to the machine turned off, remove the fuse from the fuse holder and using an ohm meter check for continuity. If no continuity, replace the fuse of the same type and rating. SEE SECTION 8.2A.
7. Check the START button. With power to the machine turned off, remove the wires from terminals 13 and 14 of the START/STOP switch. Using an ohm meter, check the continuity between terminals 13 and 14 when the START switch is pressed. If there is no continuity, the START/STOP switch is defective and should be replaced.

8. Check the voltage at the motor contact coil. The START/STOP switch is comprised of a small relay to create a latching circuit that supplies constant power to the starter contactor after a single button press. Press the START button, then check the voltage between X2 on the terminal strip and A2 terminal of the motor contactor (where red wires attach). This should measure 110-120V AC after the START button has been pressed.
 9. Check the motor contactor coil. With power to the machine turned off, remove the red wires from terminal A2 of the contactor, and the white from terminal A1 of the contactor. Using an ohm meter, measure the resistance between A1 and A2. If the ohm reading shows open, the contactor is defective and must be replaced.
 10. Check the line voltage at the motor contactor. With power supplied to the machine, measure the line-to-line voltage at L1 and L2. This should measure 110-120V AC. With the contactor engaged (after pressing the START button), measure the line-to-line voltage at T1 and T2. This should measure 110-120V AC.
 11. Check the wiring connections and line voltage at the motor. If the correct line voltage is present at the motor when the motor contactor is engaged and the motor will not start, the motor is defective. Contact your local dealer or the factory.
- B. MOTOR STARTS BUT WILL NOT CONTINUE RUNNING ONCE THE START BUTTON HAS BEEN RELEASED:**
1. The internal relay of the START/STOP switch is defective and the switch must be replaced.

8.2 ELECTRICAL - CONTROLS

A. CONTROL CIRCUIT FUSE BLOWN:

1. A ground fault or over current has caused the fuse to blow.
2. Check the power cord for damage.
3. Check the foot pedal cord for damage.
4. Check all wiring connections in electrical enclosure for inadvertent contact.
5. Check the foot pedal switches. SEE SECTION 8.3. Remove the foot pedal wires from the terminal strip and using an ohm meter, check for continuity between the foot pedal wires and ground (terminal X2).
6. Check the control valve coils for failure. SEE SECTION 8.5.
7. Check the motor contactor coil for failure. SEE SECTION 8.1 A9.
8. Check the motor wiring connections.

B. MOTOR RUNS, BUT THE MACHINE WILL NOT MOVE IN ONE OR BOTH DIRECTIONS WHEN DEPRESSING THE FOOT PEDAL:

► **NOTE: MAKE SURE THE CORD FROM THE FOOT PEDAL IS IN GOOD CONDITION. IF IT HAS BEEN PINCHED OR CUT - REPLACE IT!!**

1. Check the motor rotation. It should be clockwise when viewed from the fan end of the motor. If it is running backwards, see the motor data plate for wiring details.
2. Check the wiring connections to the foot pedal, limit switch, and control valves.

► **NOTE: SEE SECTION 10.0 FOR WIRING DIAGRAM.**

3. Check the stroke control adjustment and make sure that it is not set to the top limit and in contact with the limit switch.
4. Check the foot pedal. SEE SECTION 8.3.
5. Check the limit switch. SEE SECTION 8.4.
6. Check the control valve. SEE SECTION 8.5.
7. The problem may be mechanical. Make sure all grease fittings have been well lubricated.
8. The problem may be hydraulic related. SEE SECTION 8.6.

8.3 FOOT PEDAL INSPECTIONS

⊗ **CAUTION: ALL ELECTRICAL WORK PERFORMED ON THIS MACHINE SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN.**

1. Remove the electrical enclosure cover and start the machine.
2. Test the voltage between terminals X2 and 1 on the terminal strip. The voltage should read 110-120V AC.
3. Press the RIGHT foot pedal. With the pedal depressed, the voltage should read 110-120V AC between terminals X2 and 2 on the terminal strip.
4. Press the LEFT foot pedal. With the pedal depressed, the voltage should read 110-120V AC between terminals X2 and 3 on the terminal strip.
5. If these readings are not correct, continue with the following steps.
 - a. Turn the machine off and remove power to the machine. Remove the foot pedal wires from terminals 1 (black), 2 (white), and 3 (red) on the terminal strip.
 - b. Using an ohm meter, check the continuity between the black and white wire when the RIGHT pedal is depressed. If the reading shows open, the foot pedal or foot pedal cord is defective and must be replaced.

- c. Using an ohm meter, check the continuity between the black and red wire when the LEFT pedal is depressed. If the reading shows open, the foot pedal or foot pedal cord is defective and must be replaced.

8.4 LIMIT SWITCH INSPECTIONS

1. The limit switch is a sealed unit and can not be taken apart.
2. Check the plunger movement. It should move freely in and out.
3. With the power to the machine removed, remove the wires for the limit switch from terminals 2 (red) and 4 (black) on the terminal strip.
4. Using an ohm meter, check the continuity of the limit switch. With the plunger out, the switch should read continuity. With the plunger depressed, the switch should read open. If the reading shows open in both states, the limit switch is defective and must be replaced.

8.5 CONTROL VALVE INSPECTION

- A. THE MACHINE WILL ONLY TRAVEL IN ONE DIRECTION OR WILL NOT MOVE.**
1. Oil contamination or mechanical failure can cause the control valve spool to stick in one position. The following procedure outlines how to manually test the function of the control valve.
 2. Remove the front cover of the machine.
 3. Locate the manual valve control knob. This is a red knob located on the control valve between the motor and reservoir. SEE FIGURE 25.

► **NOTE: MAKE SURE THE MACHINE IS IN A SAFE CONDITION AND ALL OPERATORS/BYSTANDERS ARE CLEAR OF THE MACHINE BEFORE PROCEEDING.**

4. With the machine running, push the red knob in by hand. The machine should travel DOWN.
5. With the machine running, pull the red knob out by hand. The machine should travel UP.
6. If no movement is observed in one or both directions, check the hydraulic pressure of the machine. SEE SECTION 8.6.
7. If the machine passes the hydraulic system pressure tests outlined in SECTION 8.6 and still no movement is observed, the control valve is defective and must be replaced.

**FRONT COVER MUST BE
REMOVED TO GAIN ACCESS
TO CIRCUIT BREAKER
AND/OR TEST PORT**

**CIRCUIT
BREAKER**

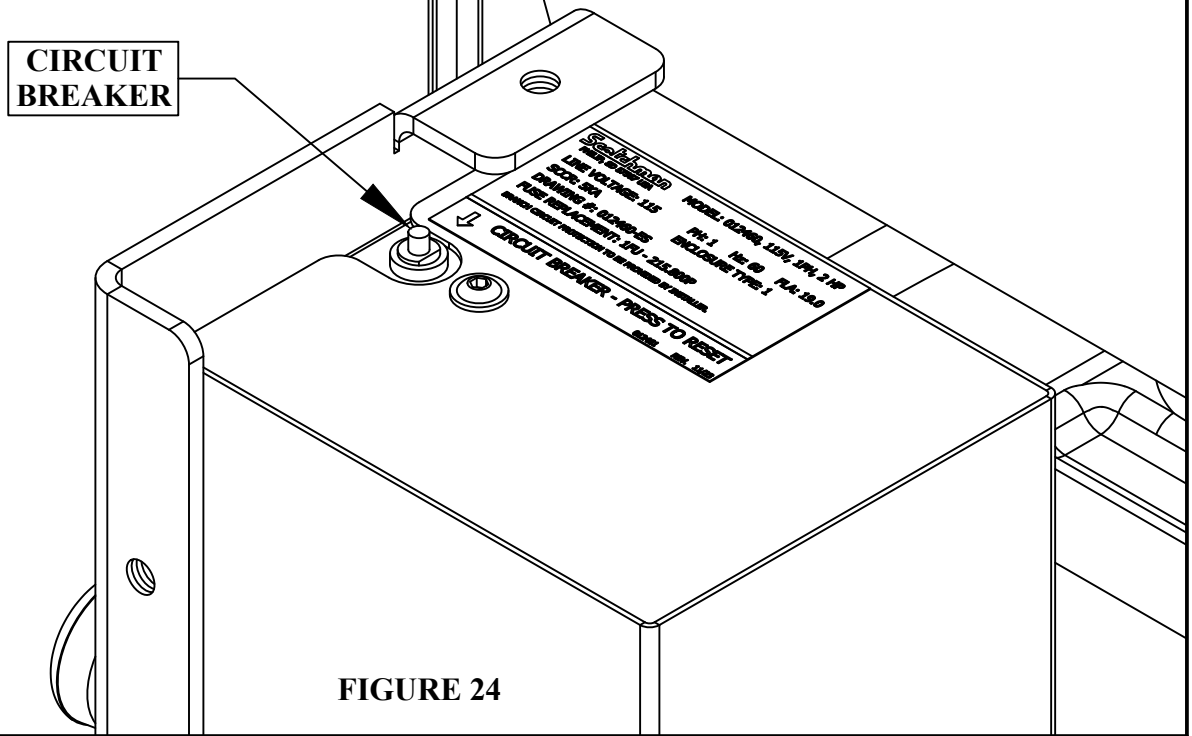


FIGURE 24

**TEST PORT
REMOVE DUST CAP
AND INSTALL GAUGE**

**P/N 001144
PRESSURE
GAUGE**

**MANUAL VALVE
CONTROL KNOB**

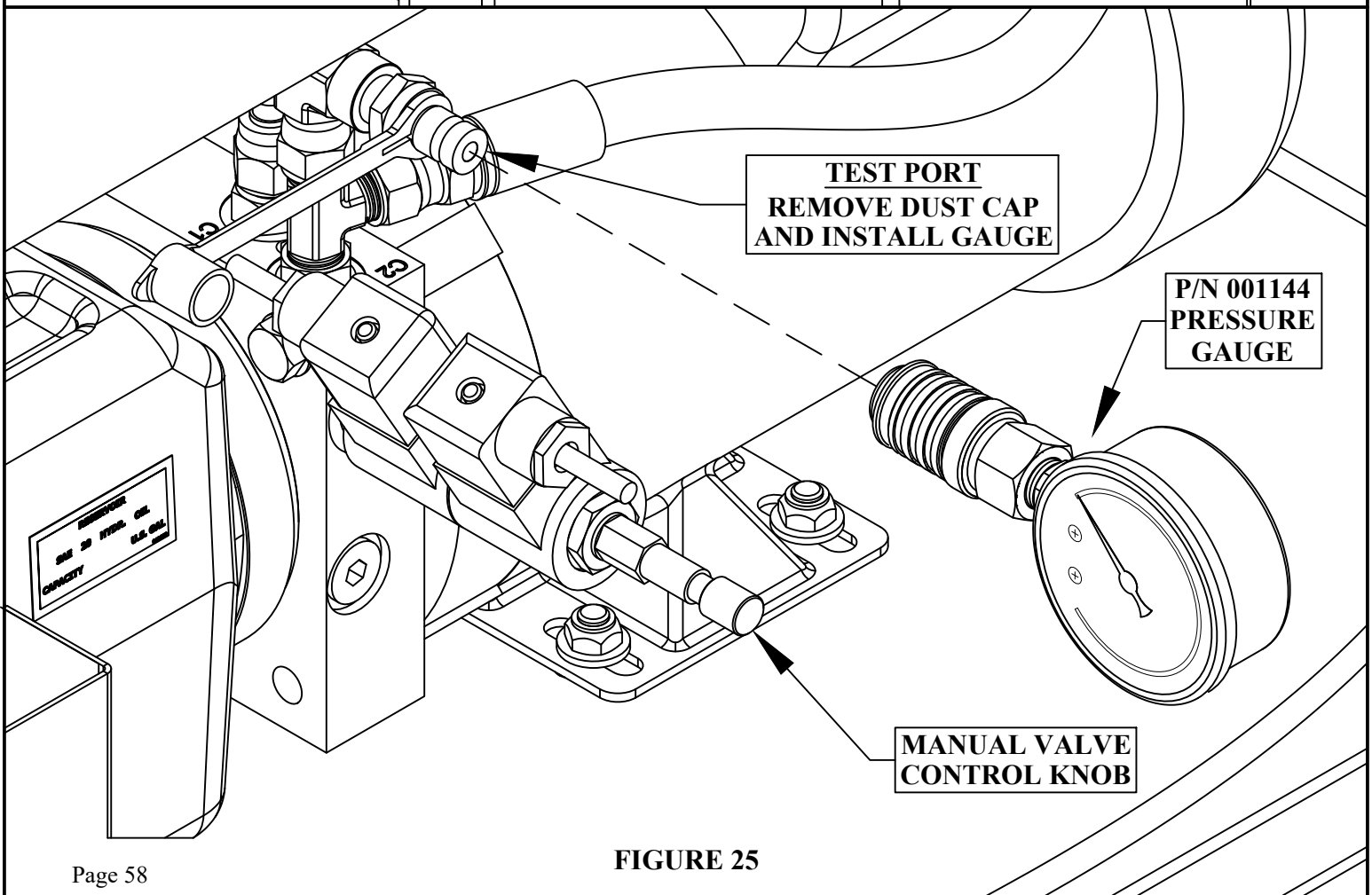


FIGURE 25

8.6 HYDRAULIC SYSTEM

► **NOTE: THERE IS A PRESSURE TEST PORT PROVIDED ON THE MACHINE TO CHECK THE SYSTEM PRESSURE. THE TEST PORT IS LOCATED ON TOP OF THE CONTROL VALVE IN THE BASE OF THE MACHINE. A PRESSURE GAUGE WITH A MINIMUM OF THREE THOUSAND (3,000) P.S.I. (207 BAR) IS REQUIRED. A PRESSURE GAUGE WITH TEST PORT ADAPTOR IS AVAILABLE FROM SCOTCHMAN INDUSTRIES AS P/N 001144 (See Fig. 25).**

THE MOST COMMON HYDRAULIC PROBLEMS ARE:

A. LOW LEVEL OF HYDRAULIC FLUID IN THE RESERVOIR:

1. The reservoir holds 2 U.S. gallons (7.6 liters). The level should be approximately a 1/2 inch (12MM) below the top of the reservoir.
2. Top off the hydraulic fluid with a lightweight non-foaming hydraulic oil such as Mobil DTE 25 or equivalent, with a minimum ISO cleanliness of code of 18/16/13.

B. LOW PRESSURE CAUSED BY WORN OR DAMAGED PARTS IN CYLINDER OR PUMP.

1. Check the system pressure.
2. With the machine's power off, install the pressure gauge. SEE FIGURE 25
3. Power the machine and cycle it to the end of the stroke in one direction then the other, watching the gauge for a reading. it may be necessary to remove the stroke control to allow the cylinder to reach the end of its stroke. The system pressure for this machine is 2,500 P.S.I. (172 Bar).
4. If low pressure is observed in both directions: Check the system relief pressure setting.
5. The relief pressure adjustment is on the top of the manifold between the motor and the pump. SEE FIGURE 26 (page 61). Shown with rear cover removed - But can be accessed from the front.
6. Take the locking cap off to access the adjusting screw.
7. Turning the screw clockwise should increase the maximum pressure. Turn the screw in small increments, then test the system pressure as outlined in STEP 1. If the system cannot be adjusted, proceed to SECTION 8.6C.
8. Retighten cap to 100-125 in.-lbs. to avoid leaks. Make sure the copper seal is included.

⊠ **CAUTION: NEVER SET THE PRESSURE OF THE MACHINE ABOVE 2,500 P.S.I. (172 BAR). MACHINE DAMAGE OR PERSONAL INJURY CAN OCCUR.**

C. CYLINDER LEAKING INTERNALLY:

- 1. If the pressure setting does not respond to changes to the relief adjustment screw, check the cylinder for internal leaks.**

NOTE: A -06 JIC plug and a -06 JIC cap will be needed for this procedure.

- 2. Move the beam to the bottom of its stroke, then raise slightly.**
- 3. Place a block under the beam to hold it in place.**
- 4. Turn the the machine off.**
- 5. Remove the lower cylinder hose from the 90° fitting adaptor. Install the -06 JIC plug in the lower cylinder hose and place the -06 JIC cap on the 90° fitting. SEE FIGURE 27**
- 6. The hose and cylinder should now be sealed from leaking externally when the system is under pressure. Remove the block placed under the beam.**
- 7. Restore power to the machine. Cycle the machine as if to bring the tool arm down (punch retract).**
- 8. If the cylinder extends, oil is bypassing internally and the cylinder seals need to be replaced.**
- 9. If the cylinder does not move and low pressure is still observed, the pump is defective and must be replaced.**

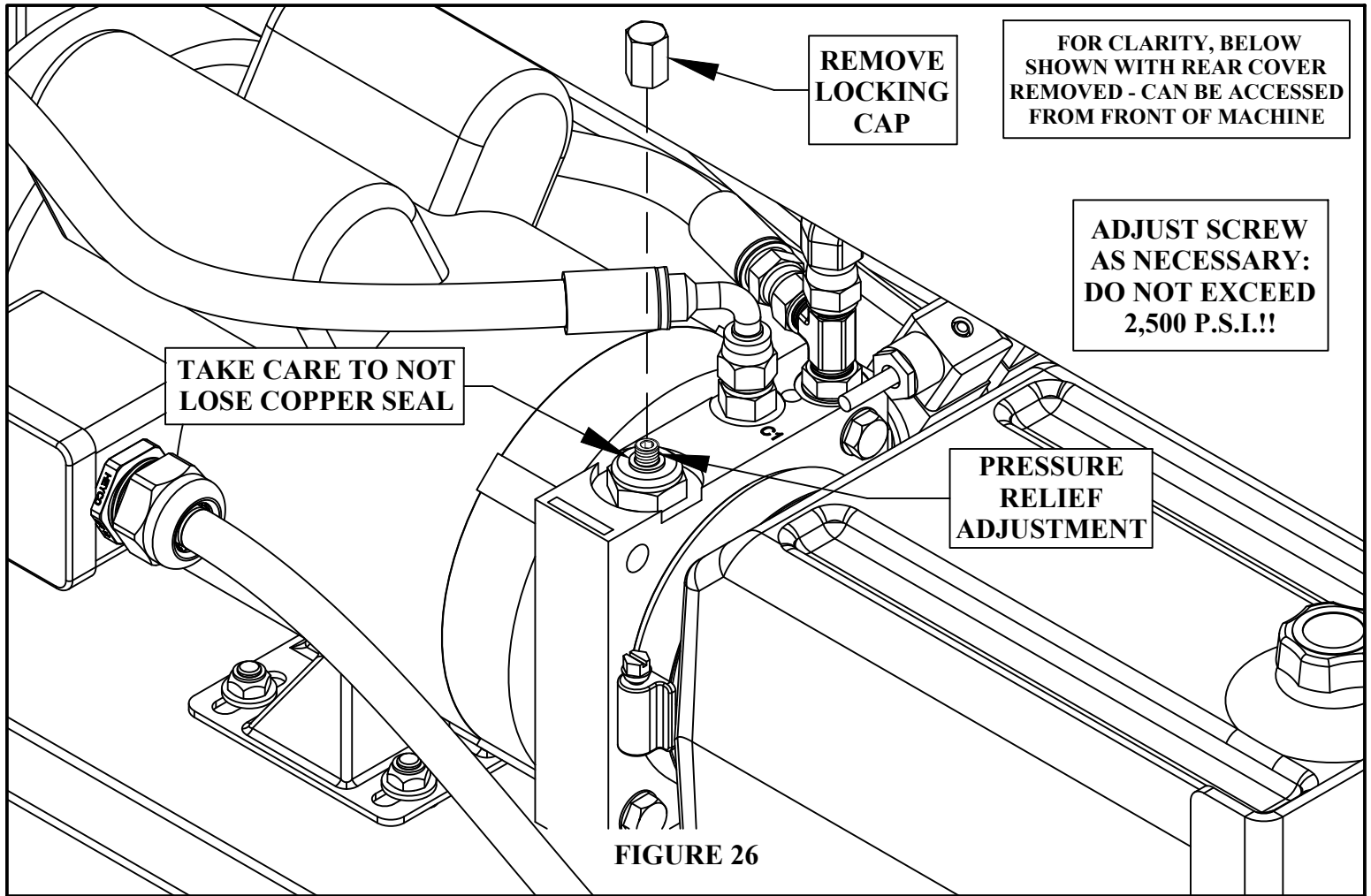


FIGURE 26

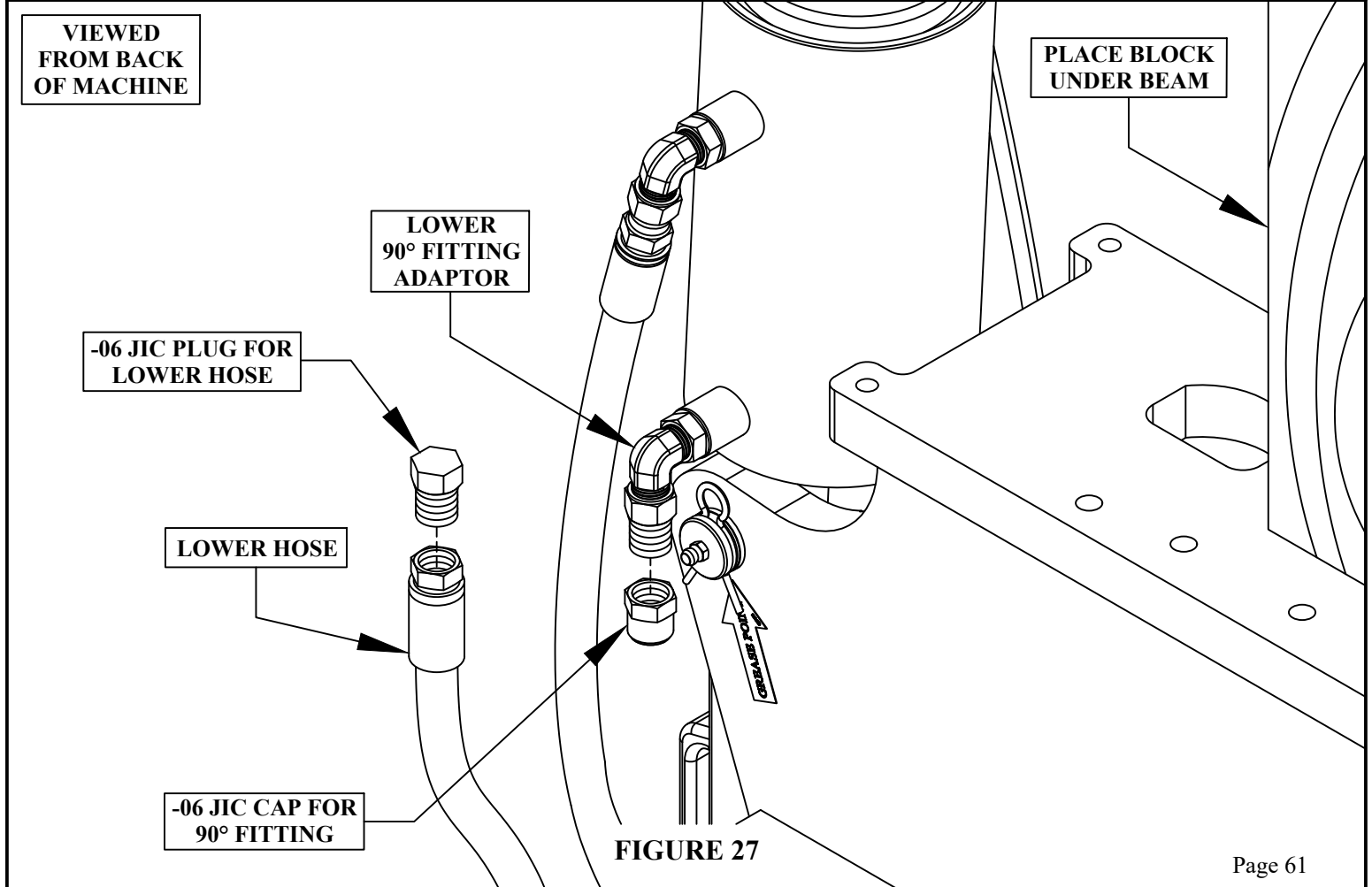


FIGURE 27

8.7 CYLINDER SEAL REPLACEMENT

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

SEE FIGURE 28 ON THE FOLLOWING PAGE.

- 1. With the arm up, turn the machine's power OFF.**
- 2. Block the arm up on the tool table (A).**
- 3. Remove the hoses from the cylinder and allow the fluid to drain.**
- 4. Remove the cylinder clevis pin (B) and swing the cylinder out away from the arm.**
- 5. Remove the retaining ring (C) from the top of the cylinder.**
- 6. Tap the head down into the tube and remove the second ring (D).**
- 7. Place the pin (B) through the clevis and pull the cylinder apart, using a come-along or similar device.**
- 8. Remove the locking nut (F) from the end of the 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 the replacement seals with the old ones and discard the rest.**
- 10. Clean all parts, including the inside of the tube, and check all parts for nicks or scratches.**
- 11. Oil all of the seals before reassembling the cylinder.**
- 12. After the head and piston are assembled on the shaft, torque the locking nut (F) to 100 foot pounds.**
- 13. Tap the shaft assembly back into the tube, using a brass or plastic hammer and then, install the ring (D).**
- 14. Tap the head into the tube and install the retaining ring (C).**
- 15. Replace the cylinder clevis pin (B) and connect the hoses to the cylinder.**
- 16. Use care when removing the block (A). The cylinder does not have fluid in it and the arms may drop some when the block is removed.**
- 17. Cycle the machine several times before performing any work.**

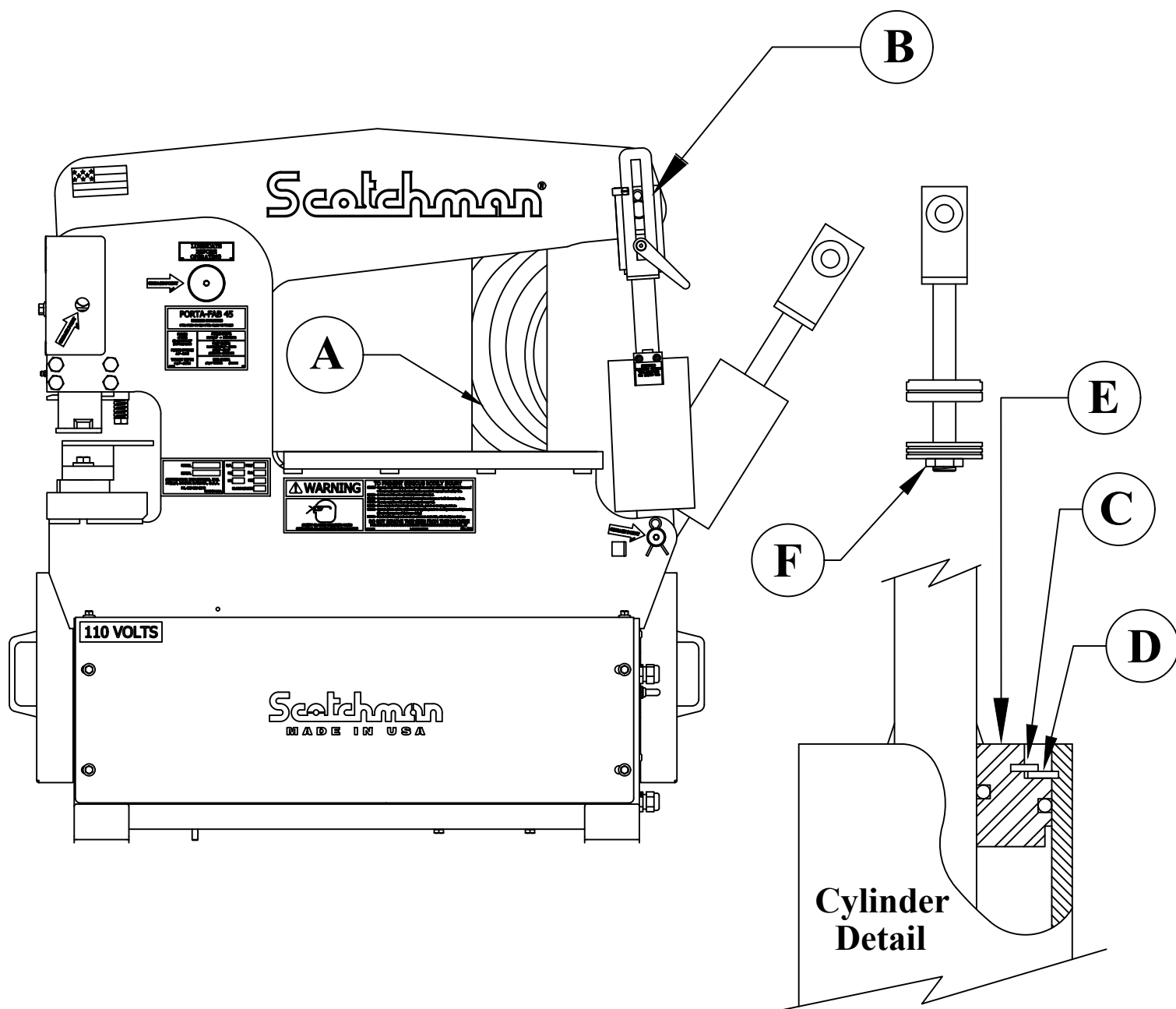


FIGURE 28

9.0 MACHINE PARTS LISTS

The Following Sections Contain The Ironworker And Optional Tooling Parts Lists And Drawings. For Your Own Convenience, Always Give Your Complete Serial Number When Ordering Parts.

9.1 PUNCH ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
A	1	012305	Punch Beam (Includes B, F, G, H, I, & J)
B	1	012304	Bushing
C	1	012331	Punch Pin S/N 2400PF0717 and up
C1	1	012321	Punch Pin S/N 2376PF07/17 & Prior
D	1	201410	M12 X 25MM HHCS S/N 2400PF0717 and up
D1	1	006018	Grease Bolt S/N 2376PF07/17 & Prior
E	3	243101	Grease Zerk
E1	1	212014	M12 Lock Washer
F	1	412311	Pressure Block
G	2	233315	M-5 RHMS
H	2	234008	M-5 Hex Nut
I	1	312361	Spring Clip
J	1	221005	M-6 x 12 SHCS
K	2	215014	M-12 Greer Nut
L	2	402290	Drag Link
M	1	400615	Punch Barrel (Includes R)
N	2	205425	M-12 HHCS
O	4	208014	M-12 Nut
P	4	203450	M12 X 130 HHCS S/N 2400PF0717 and up
P1	4	203455	M-12 x 140 HHCS S/N 2376PF07/17 & Prior
Q	1	401464	Punch Barrel Guide
Q1	1	012325	Punch Barrel Guide (Ser.#1038 & Prior)
R	1	000624	Punch Jam Nut
R1	1	000628	Jam Nut Wrench
S	1	401479	Stripper Clip
T	1	401490	Stripper
T1	1	001580	Complete Stripper (Inc. S, T, U, V, W, & X)
U	1	500040	3/4 x 1 Spring
V	1	201220	M-10 HHCS
W	1	401492	Stripper Plate
X	2	230005	M-6 x 12 FSHCS
Y	2	230107	M-8 FSHCS
Z	1	400726	Punch Plate
AA	2	205422	M-12 x 55 HHCS
BB	2	162005	Washer Reid
CC	1	401470	Die Holder (Includes Y & DD)
DD	1	219047	M-10 x 12 SS
EE	1	001472	Die Holder Spacer

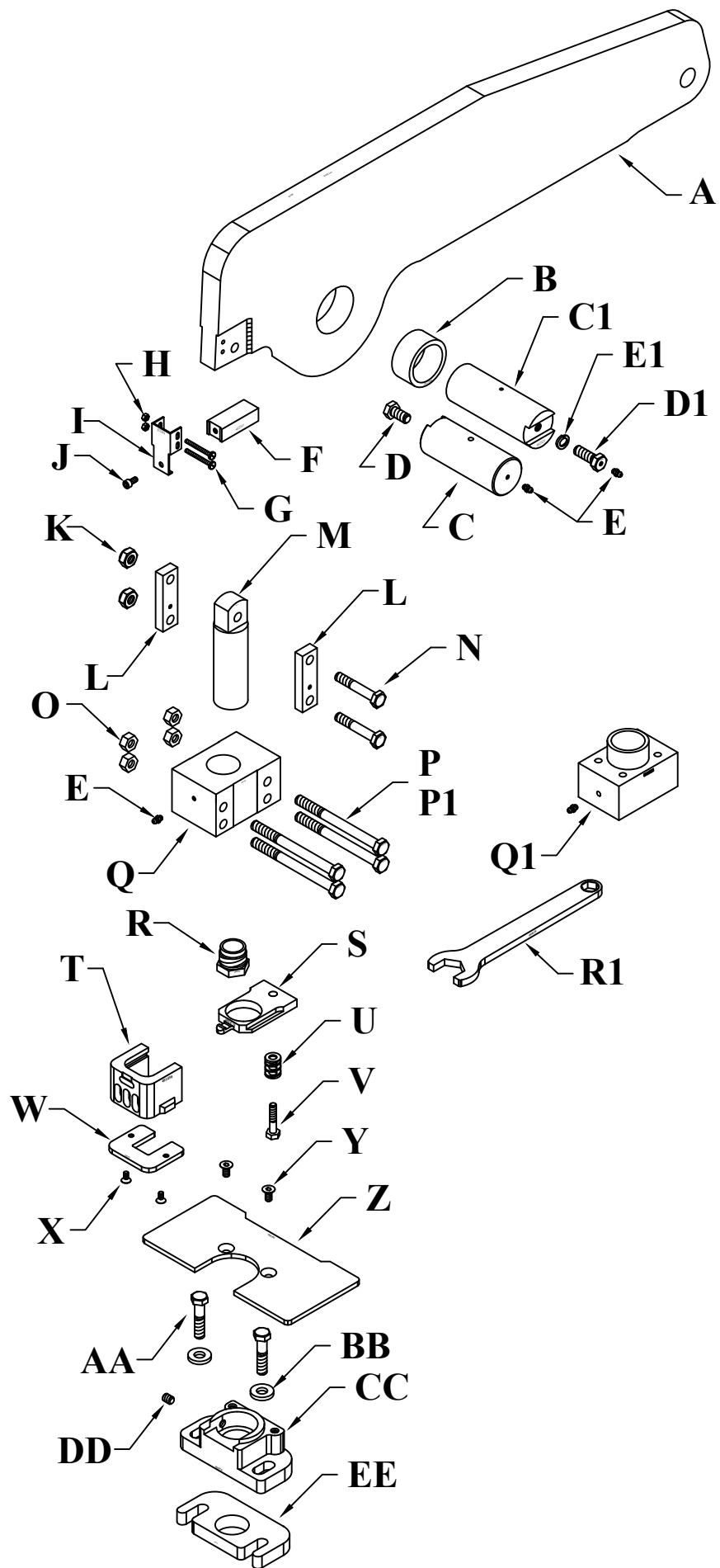
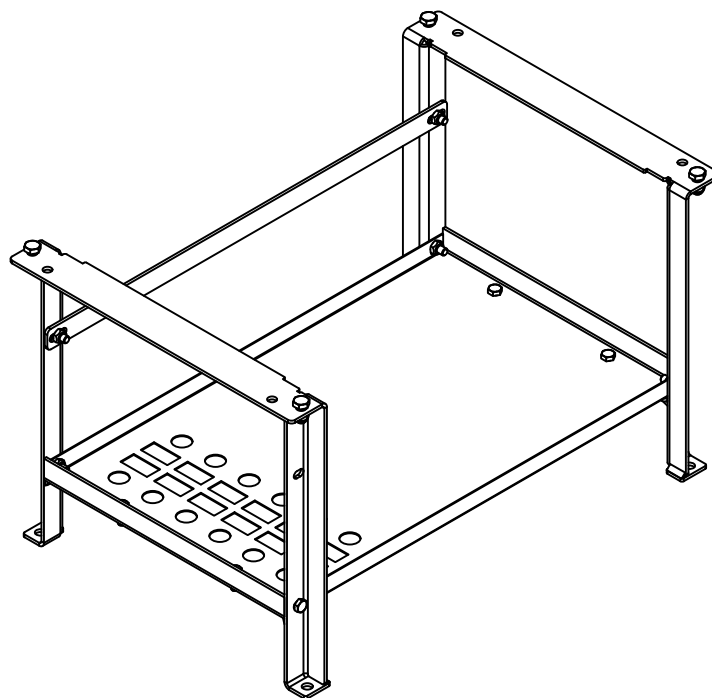


FIGURE 29

9.2 STAND ASSEMBLY

ITEM	QTY	PART #	DESCRIPTION
A	2	012343	Leg Ass'y 45 Stand
B	1	012349	Shelf
C	1	012440	PF Brace Base
D	10	201210	M10 X 20MM HHCS
E	10	215012	M10 Greer Nut
F	4	201410	M12 X 25MM HHCS
G	4	215014	M12 Greer Nut
H	1	012342	Complete Stand Assy.



FULLY ASSEMBLED STAND

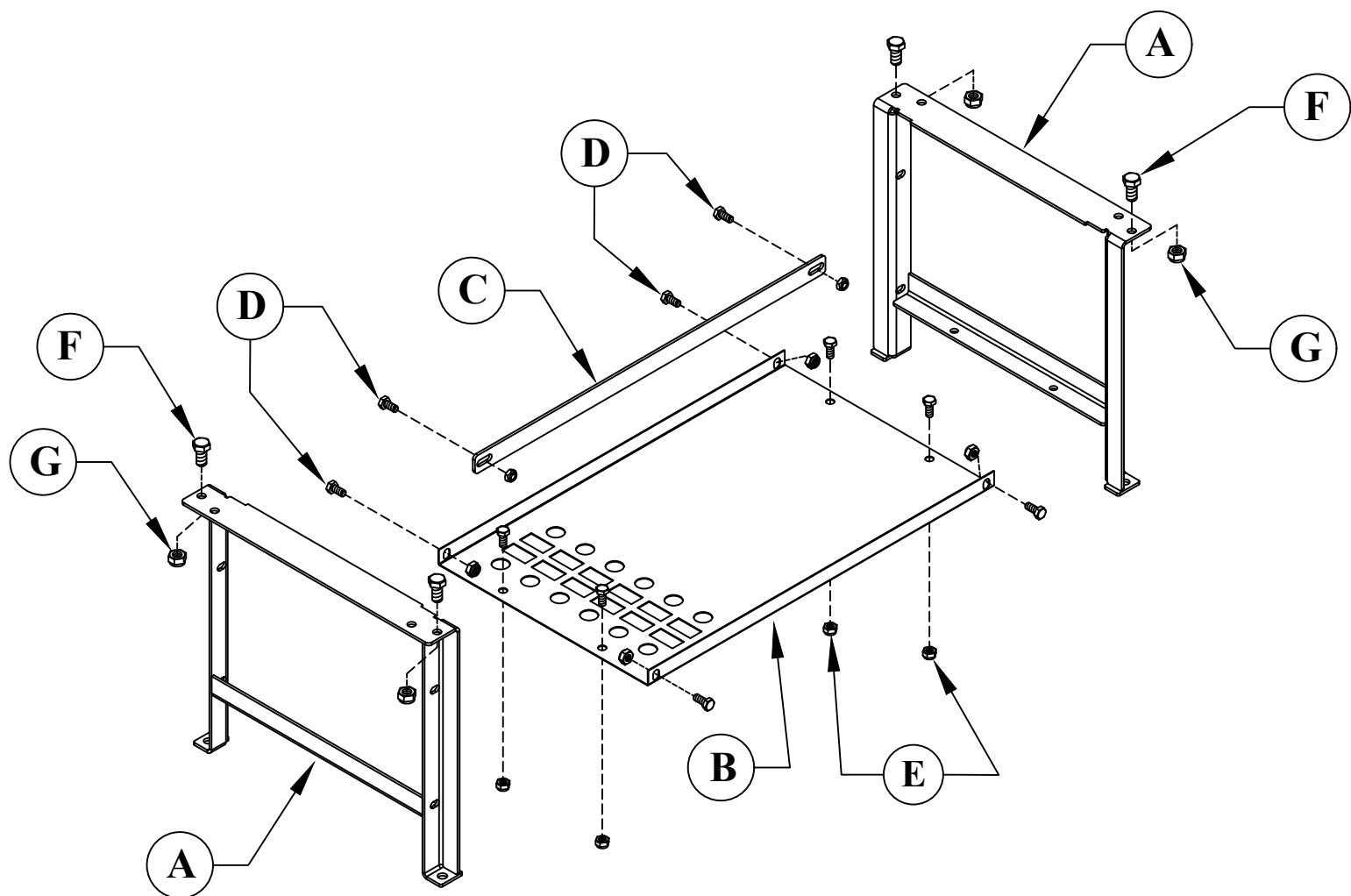


FIGURE 30

9.3 BASE ASSEMBLY

PARTS LIST		
ITEM	PART #	DESCRIPTION
1	000202	1/2" Liq. Type Cord Conn
2	012390	PF Punch Guard
3	224205	M10 X 16MM DIN-BN73 WLCS
4	012320	Push in Grommet
5	012322	A.S. Slug Chute--Rev. B
6	012323	Punch Slug Chute--Rev. A
7	012338	Foot Switch Ass'y - Linemaster
*7A	012405	Microswitch - Linemaster Foot Switch
7B	012463	Foot Switch Ass'y - SSC
*7C	012464	Microswitch - SSC Foot Switch
8	012371	Bucket Washer
9	012380	Punch Slug Receptacle
10	046018	Handle MT/105
11	220014	M6 X 10MM DIN BN19 BHCS
12	012383	PF Shroud Painted - Front
12A	012382	PF Shroud Painted - Rear
13	012458	Supply Cable Porta Fab
14	014405	Stainless Back Plate Assy
15	158008	5/8" Black Plug (Thick)
16	220016	M6 X 10MM DIN WN11252 BF
17	224105	M8 X 16MM DIN-BN73 WLCS
18	224205	M10 X 16MM DIN-BN73 WLCS
19	562502	1/2 Conduit Locknut

*** Before ordering a microswitch - Inspect foot pedal to determine if it's a Linemaster or SSC.**

9.4 POWER UNIT

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	1	000205	1/2" Large Cord Grip
2	1	003175	Caution Contamination
3	1	003955	Diagnostic Nipple
4	2	003960	Dust Cap
5	1	012327	Cylinder Clevis
6	1	012328	Porta-Fab 45 Cyl. Ass'y (Inc. #5)
7	1	012402	Porta-Fab 45 Cyl. Seal Kit
8	1	012436	Lower Cyl Hose
9	1	012437	Tee
10	1	012438	Straight Fitting
11	1	012439	Elbow
12	1	012444	Power Unit (Bucher)
13	1	012446	Directional Valve (Bucher)
14	2	012447	Coil (Bucher)
15	2	012448	Elbow
16	1	012449	Upper Cyl Hose
17	1	012454	2HP Motor (Bucher)
18	1	006540	DIN Conn (A) Black
19	1	006545	DIN Conn (A) Grey
20	1	019102	Decal"Reservoir Capacity"
21	9	114010	1/4 Flat Washer
22	5	201140	M8 X 20 DIN933 HHCS
23	5	215013	M8 DIN985 Greer Nut
24	1	562502	1/2 Conduit Locknut
25*	1	001144	Pressure Gauge (Not Included)

*** Can be purchased for hydraulic diagnosis.**

HYD. HOSE ROUTING	
HOSE 16	Top Port of Cylinder to C2 (outside) Port on Power Unit
HOSE 8	Bottom Port Cylinder to C1 (inside) Port on Power Unit

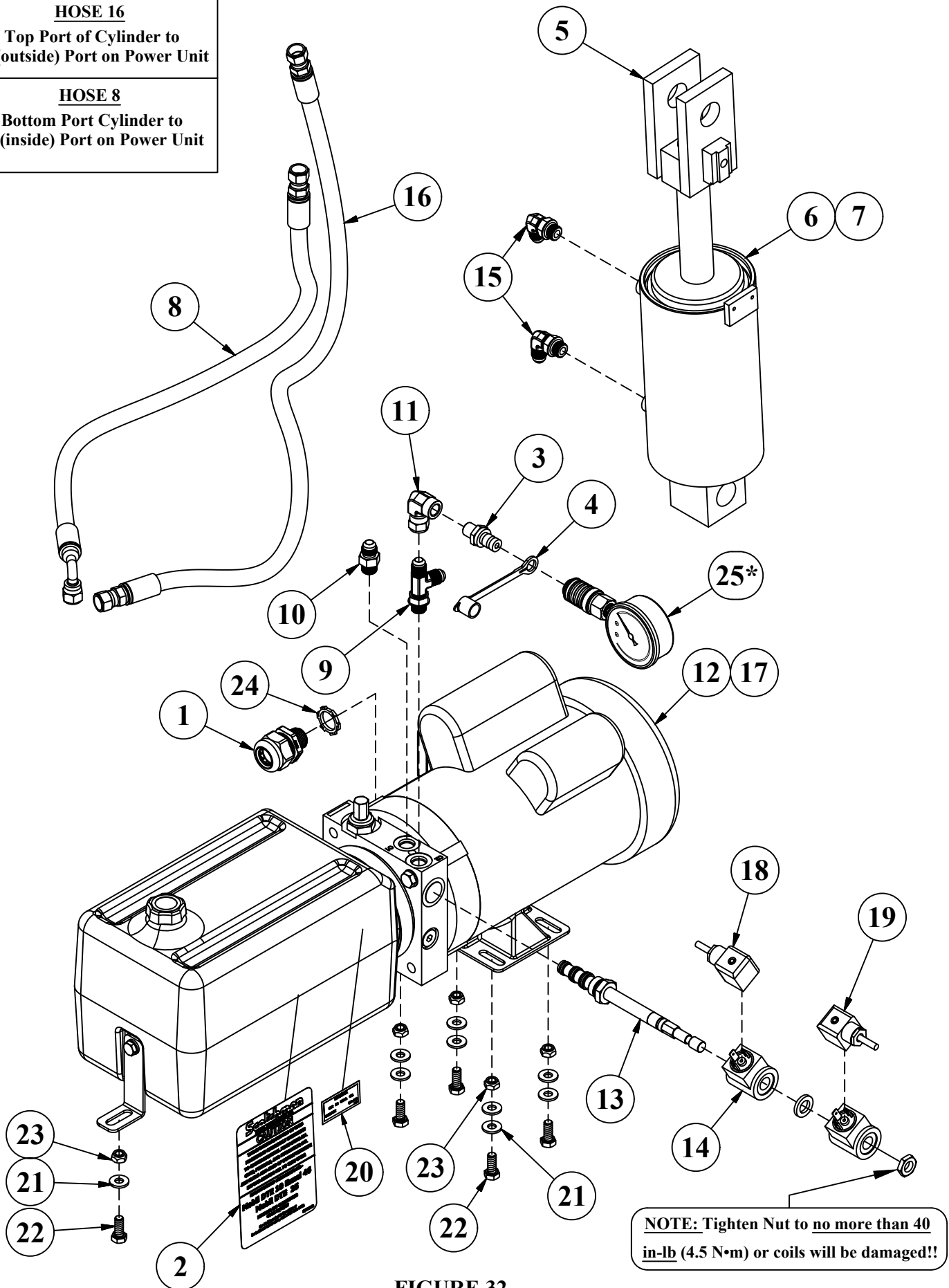


FIGURE 32

9.5 STROKE CONTROL

ITEM	QTY.	PART #	DESCRIPTION
A	1	412191	Upper Punch Pin - Metric
B	2	243101	M-6 x 13.5 OAL Gold Zerk
C	4	155010	1" External Snap Ring
D	1	012327	Cylinder Clevis
E	1	019305	Right Hand Rule
F	1	012410	45 Pointer S.C.
G	1	073407	M-5 x 6 Slot Head
H	1	214012	M-10 Regular Washer
I	1	080061	Stroke Adjustment Handle
J	1	562113	M.S. Limit Switch
K	2	073450	M-4 x 16MM SHCS
L	1	012328	45 Cylinder Ass'y (Inc. D)
M	1	412241	Cylinder Pivot Pin
O	1	012420	45 Slider S.C.

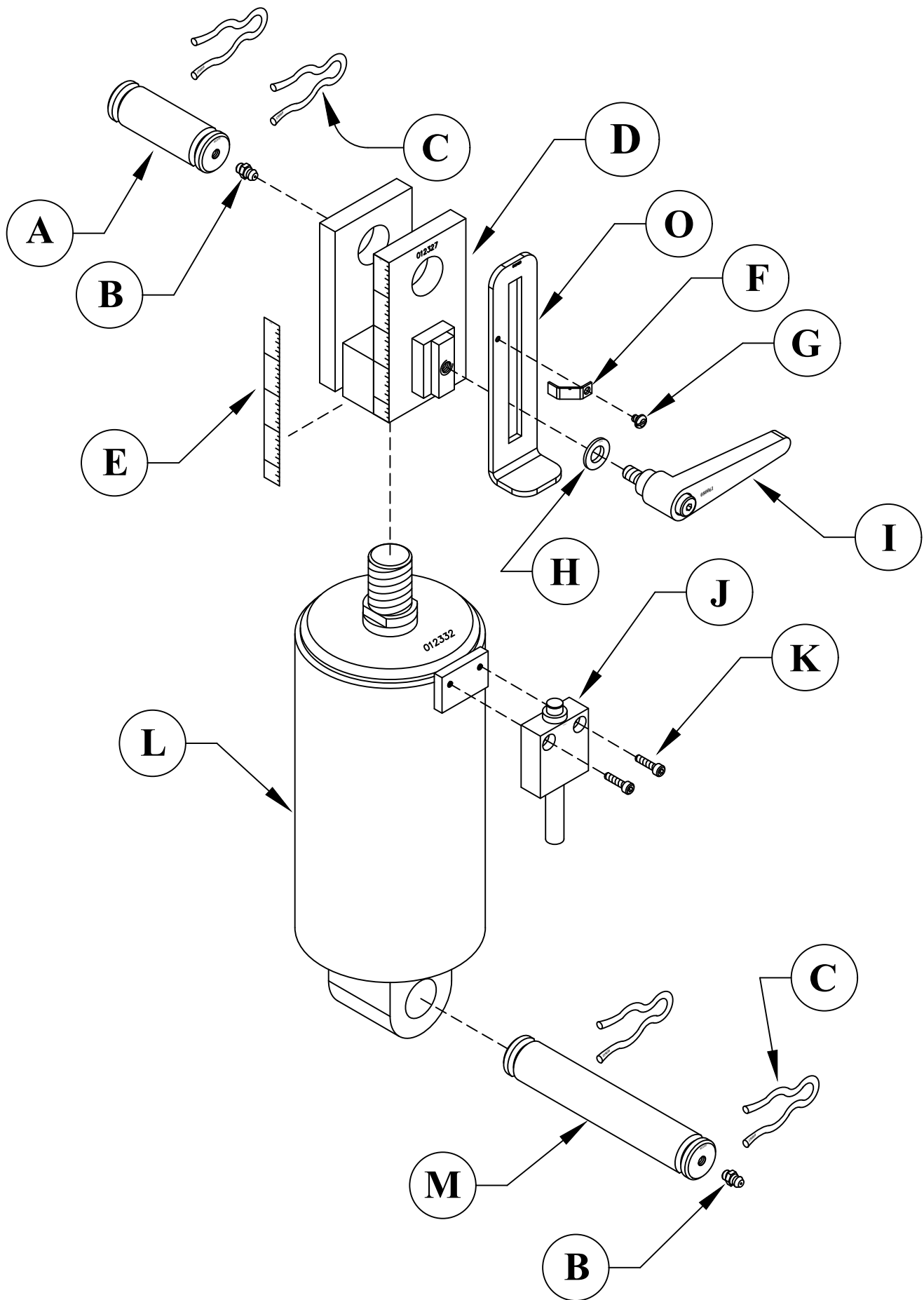


FIGURE 33

9.6 CONTROL BOX

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	3	000202	1/2" Cord Grip
2	2	000205	1/2" Large Cord Grip
3	1	003122	Danger Voltage Sticker
4	1	006540	DIN Connector (A) Black
5	1	006545	DIN Connector (A) Grey
6	2	011780	Screwless End Stop
7	1	011781	Ground Terminal Block
8	6	011782	Terminal Block
9	1	011783	End Plate (For #011782)
10	1	011784	Fuse Disconnect Terminal Block
11	1	011785	8/10A TD Fuse - 5X20MM
12	1	011786	Terminal Jumper
13	1	011787	PF45 110V Terminal Label
14	1	011788	End Plate (For #011781)
15	1	011790	110V Definite Purpose Contactor
16	1	011791	Start/Stop Relay Switch
17	1	011792	20A Breaker Surface Mount
18	1	011862	E-Stop Operator Pkgd. W/ 11872
19	1	011867	Contact M22-K01
20	1	012455	PF45 Electric Panel
21	1	012456	PF45 Electric Panel Cover
22	1	012461	Porta Fab 45 110V Electric Sticker
23	1	060049	Single Wire Ground Lug
24	5	073204	M4 DIN934 Hex Nut
25	1	075210	Electric PD Mount Strip
26	2	220016	M6 X 10MM DIN WN11252 BF
27	5	562502	1/2 Conduit Locknut

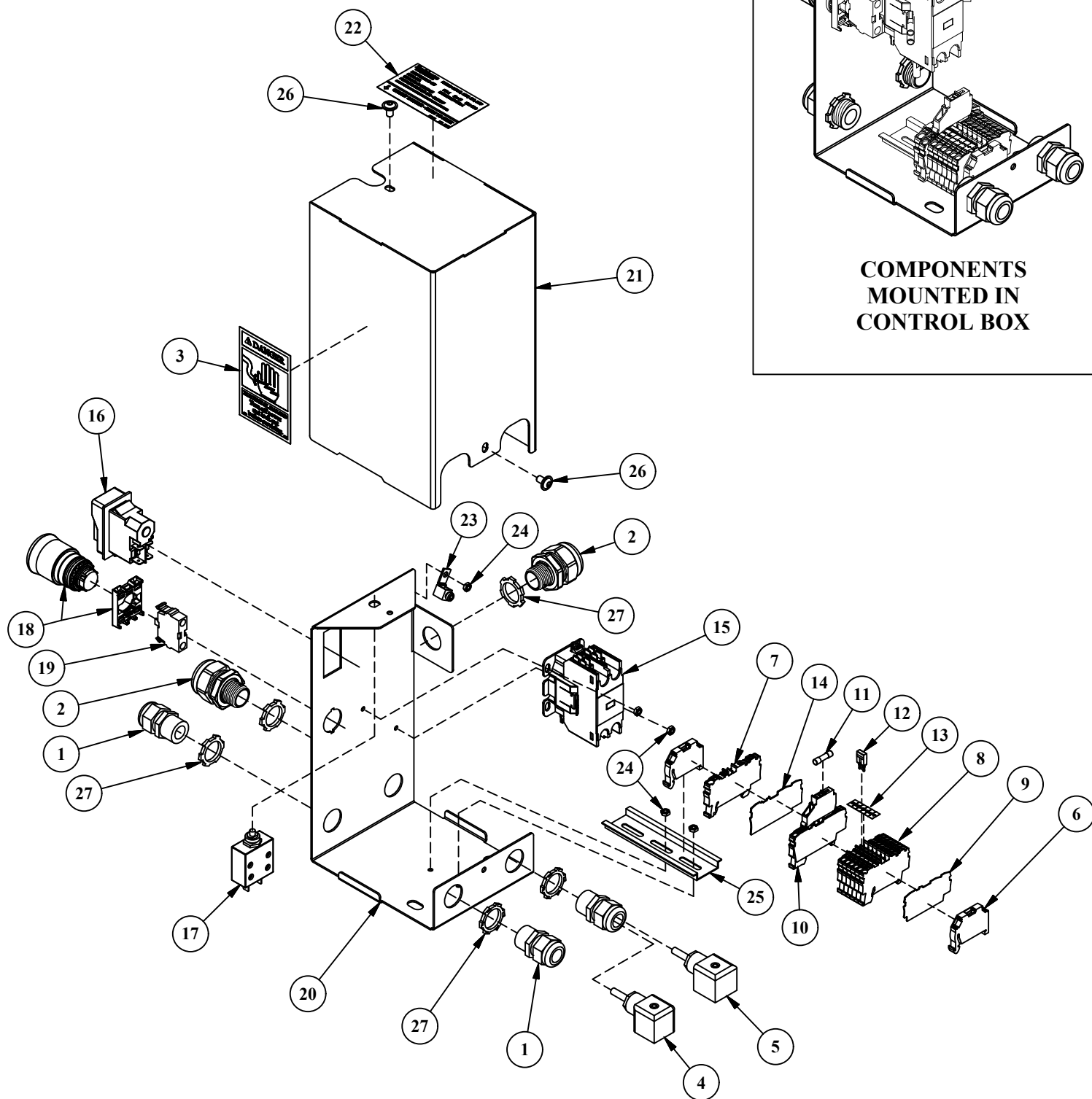


FIGURE 34

10.0 WIRING DIAGRAM

PN 012460 RATING TABLE	
LINE VOLTAGE (1PH)	115
MAX. HP	2
MOTOR FLA	19

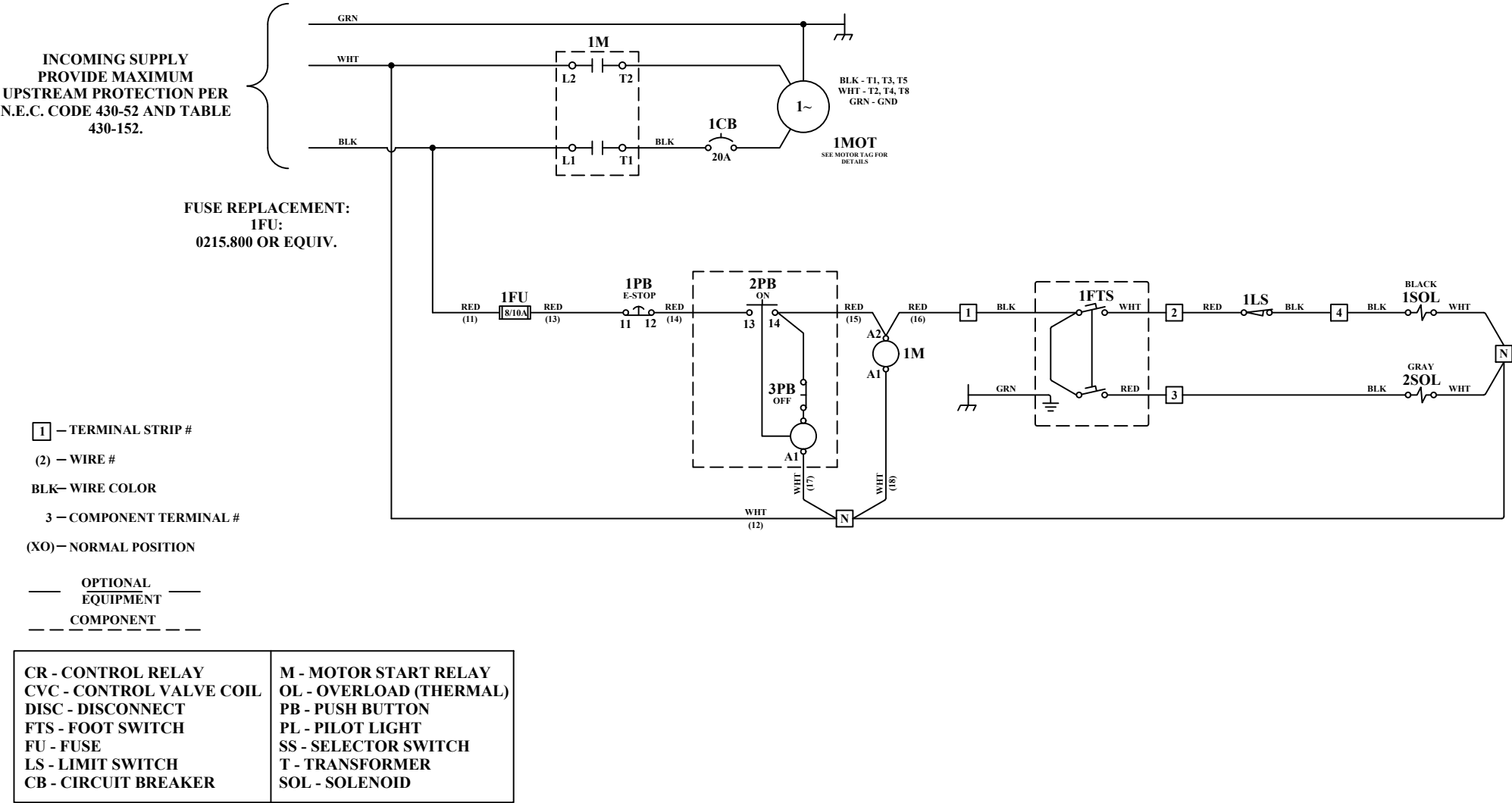


FIGURE 35

11.0 HYDRAULIC SCHEMATIC

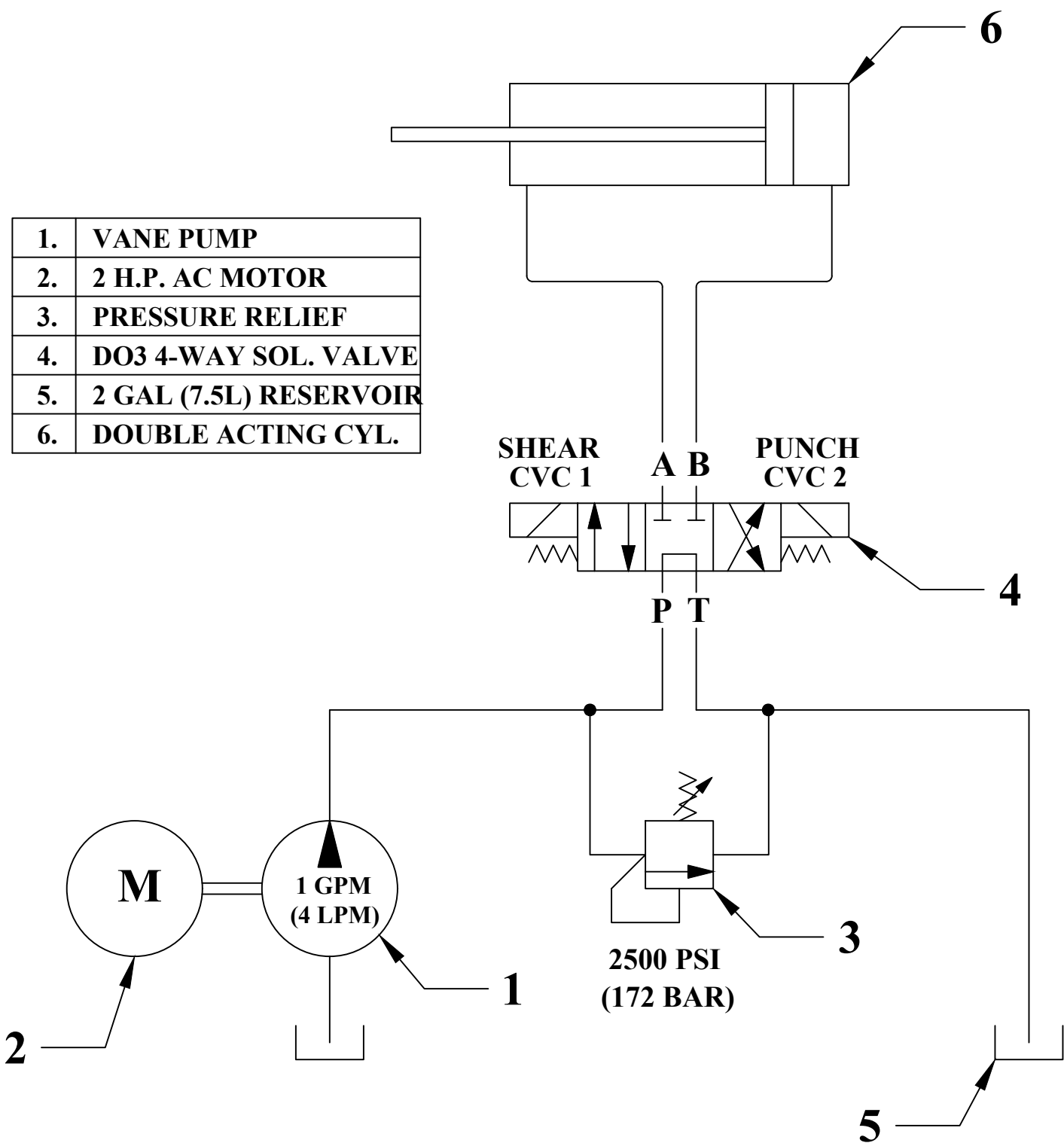


FIGURE 36