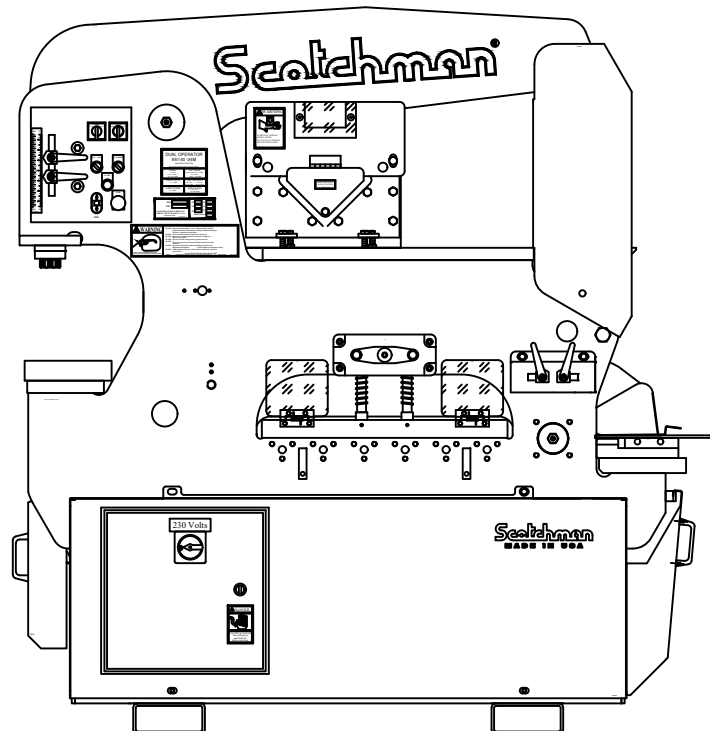


**You have downloaded a manual for our
Model DO 95/140-24M Ironworker.**

**This manual does not include all of the
optional tooling for this machine.**

**If you would like a tooling manual,
please download our #40 Tooling Manual.**





www.scotchman.com

**MODEL
DO 95/140-24M
IRONWORKER**

SERIAL # 1863 M1221 & UP

VERSION 9 - JANUARY 2025

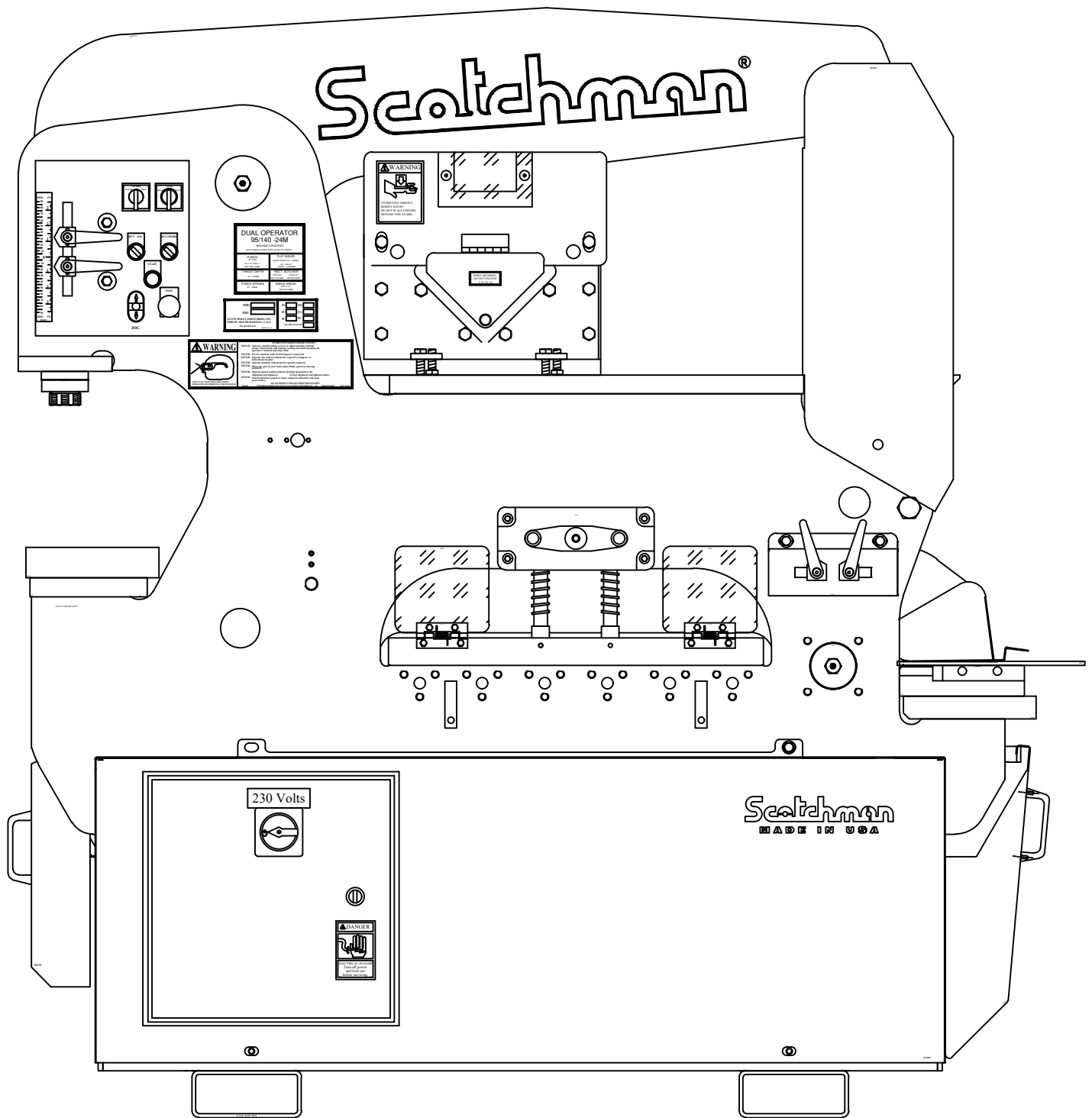


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1.0 INTRODUCTION

The Scotchman DO 95/140-24M 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 operators to control the machine's direction of movement at any point in the stroke (stop, jog or reverse) gives the Scotchman Ironworker a tremendous advantage over mechanical Ironworkers. There is no chance of the Scotchman being "accidentally tripped".

The Scotchman DO 95/140-24M is designed as a dual operator Ironworker. On this model, the punch and tooling stations operate independently of the shear and notcher stations.

This machine is designed for the user that wants the advantage of doubling production by having two operators using the same machine at the same time. Scotchman also offers many optional tools that are adaptable to this model. Some of the optional tools available are: a channel shear, pipe notcher, 12 & 24 inch brake attachments, a picket tool and a variety of special tools. If you have a special application, please contact your dealer or the factory.

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 device, strippers and guards provided with the machine. This manual is not intended to teach untrained personnel how to operate machinery.
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 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 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 flat bar shear and tooling station from the operator's side (the side the electrical control is mounted on). Always operate the punch station facing the station, standing. Never operate any of the work stations from a sitting or kneeling position.
12. Always be aware of what the operator of the other station is doing at all times.
13. Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturer's instructions.
14. A safety CD or VHS tape should have been sent with this machine or mailed to you prior to your receiving the machine. If you did not receive it, please contact your local dealer or the factory immediately and we will send one. If this machine was purchased used, contact the factory for a safety CD or VHS tape.

2.1 WARRANTY

Scotchman Industries, Inc. will, within three (3) 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 buyer'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 the 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.

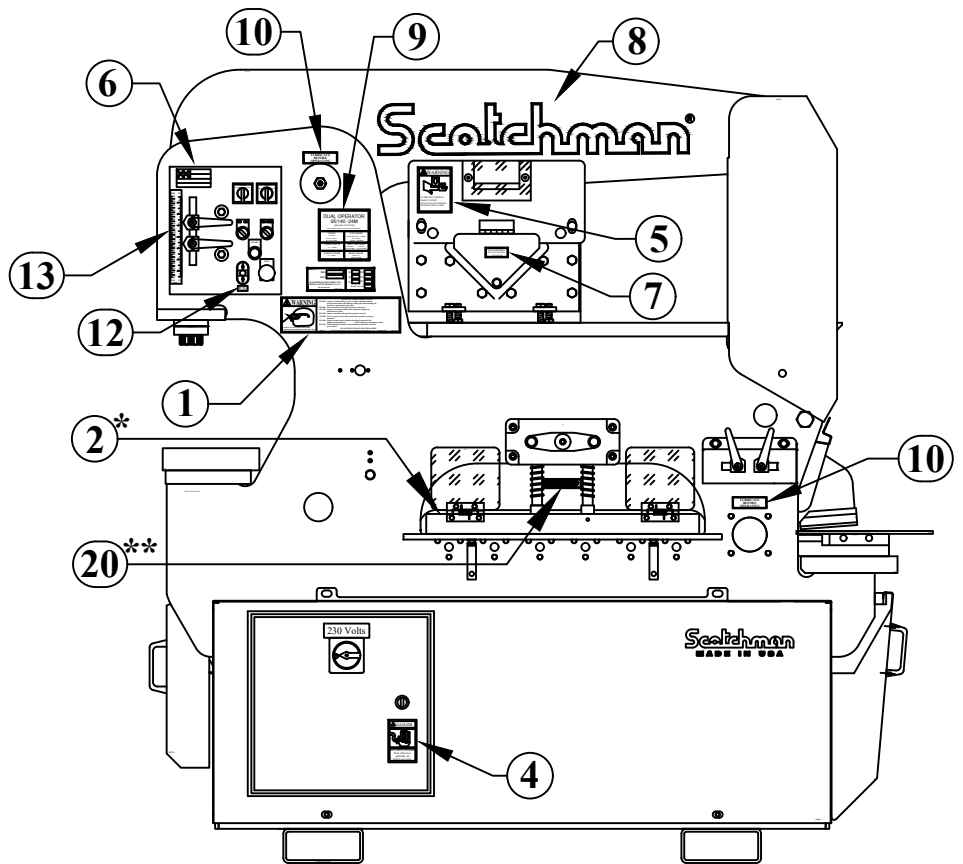
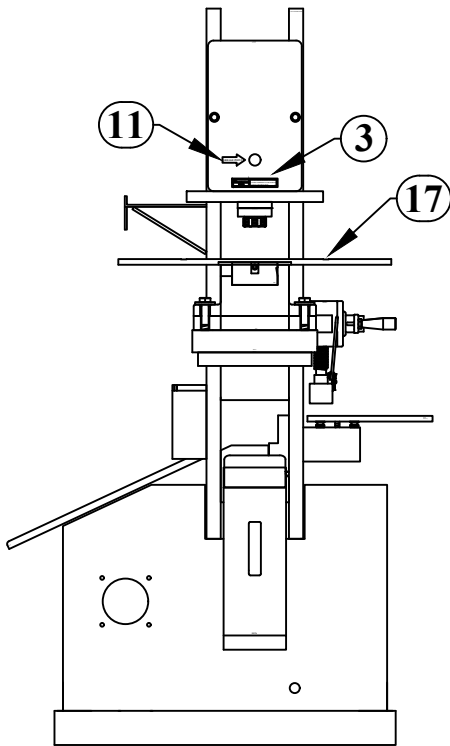
3.0 MACHINE DECALS

Item	Qty	Part #	Description
1	1	003100	Large Safety Glasses
2*	1	003105	Fingers Beyond Bar Guard
3	1	003110	Punch and Die Warning
4	1	003122	Danger Voltage
5	2	003140	Finger Beyond Tool Shear
6	1	019127	US Flag Decal
7	1	003195	3 x 3 x 1/4 Max Sticker
8	1	010117	27" Scotchman Decal
9	1	019151	95/140 CAPACITY DECAL
10	4	019103	Decal "Lubricate"
11	6	019105	Decal "Grease Point"
12	1	003200	Jog Decal
13	1	004085	Scale Stroke Control
14	1	004349	Notice Notcher Sticker
15	1	014325	Warning High Pressure Hose
16	1	003170	1/2 Max Notcher Cap/Sticker
17	1	019300	Right Hand Rule 12"
18	1	003175	Caution Contamination (not Shown)
19	1	019102	Decal "Reservoir Capacity" (not Shown)
20**	1	003101	Sabre Blade Decal
21	1	003582	DO-95 Decal Package

*Located On Top of Hold-Down

**Located On Shear Arm

Punch End



Notcher End

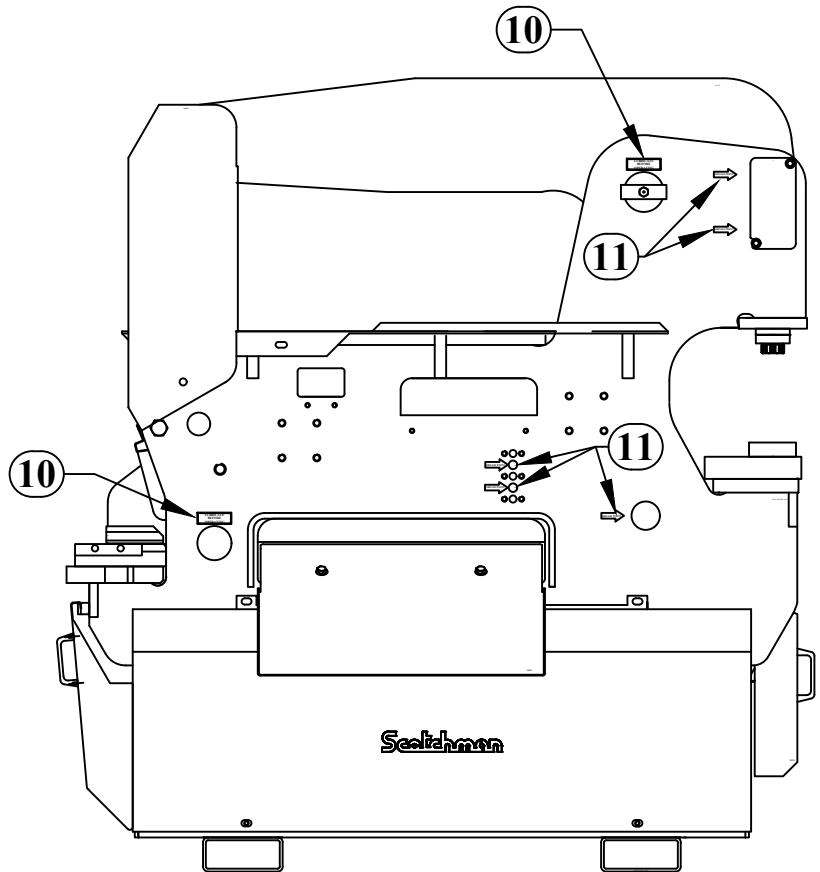
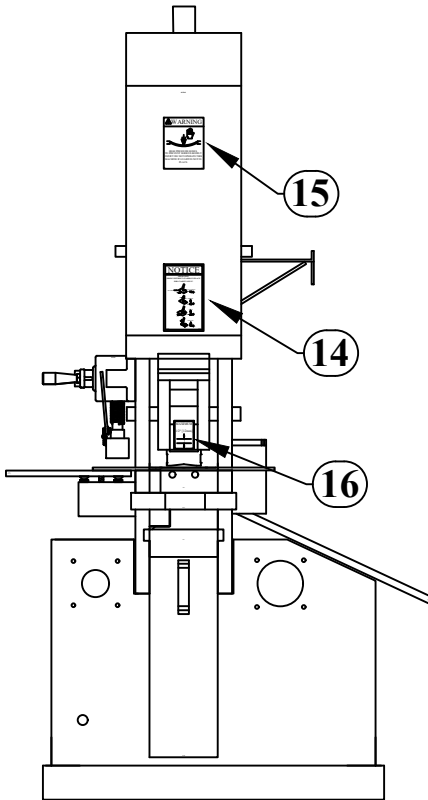


FIGURE 1

4.0 INSTALLATION AND SET UP

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

4.1 PHYSICAL DIMENSIONS - SEE FIGURE 2

ITEM	DESCRIPTION	INCHES	CM
1	Floor to Punch Ram	46-11/16	118.6
2	Floor to top of Die Holder	42-7/16	107.8
3	Floor to Punch Bolster	36-1/2	92.7
4	Floor to Bottom Rail	3	7.6
5	Floor to Bar Shear	29	73.7
6	Floor to Tool Table	41-1/2	105.4
7	Height	72-1/8	183.2
8	Length	68-7/8	174.9
9	Width	37-7/16	95
10	Notcher Table	29-3/16	74.1
11	Punch Stroke	2.03	5.1
12	Weight	3,790 LBS.	1,719 KG.

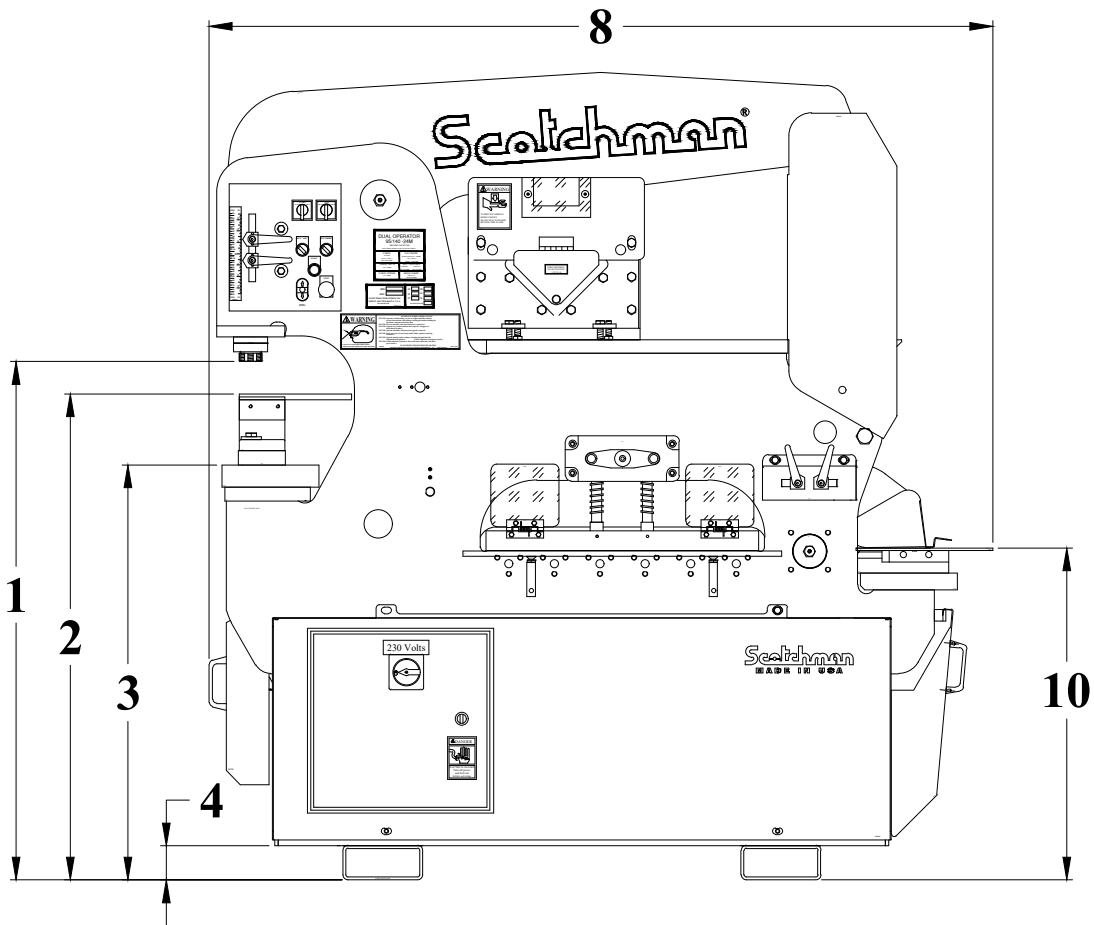
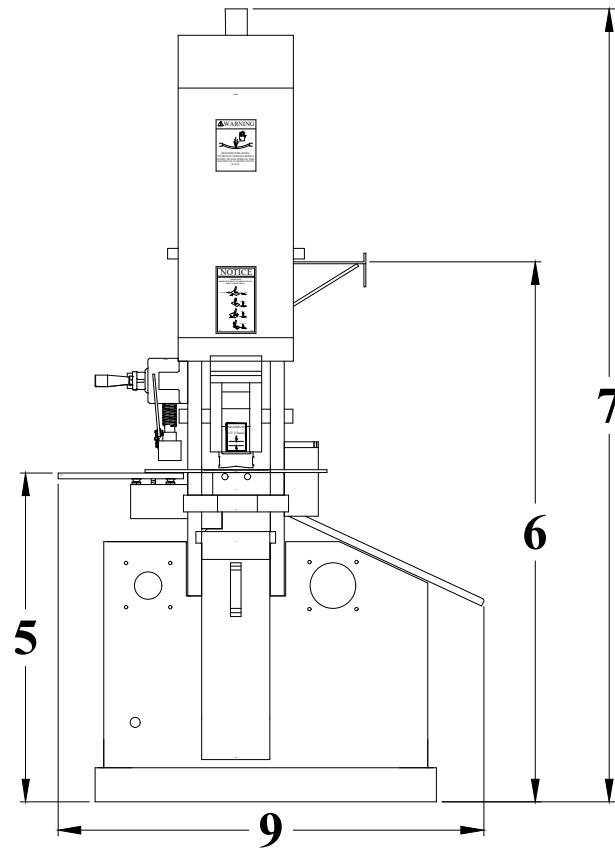


FIGURE 2

4.2 MACHINE MOVING PROCEDURES

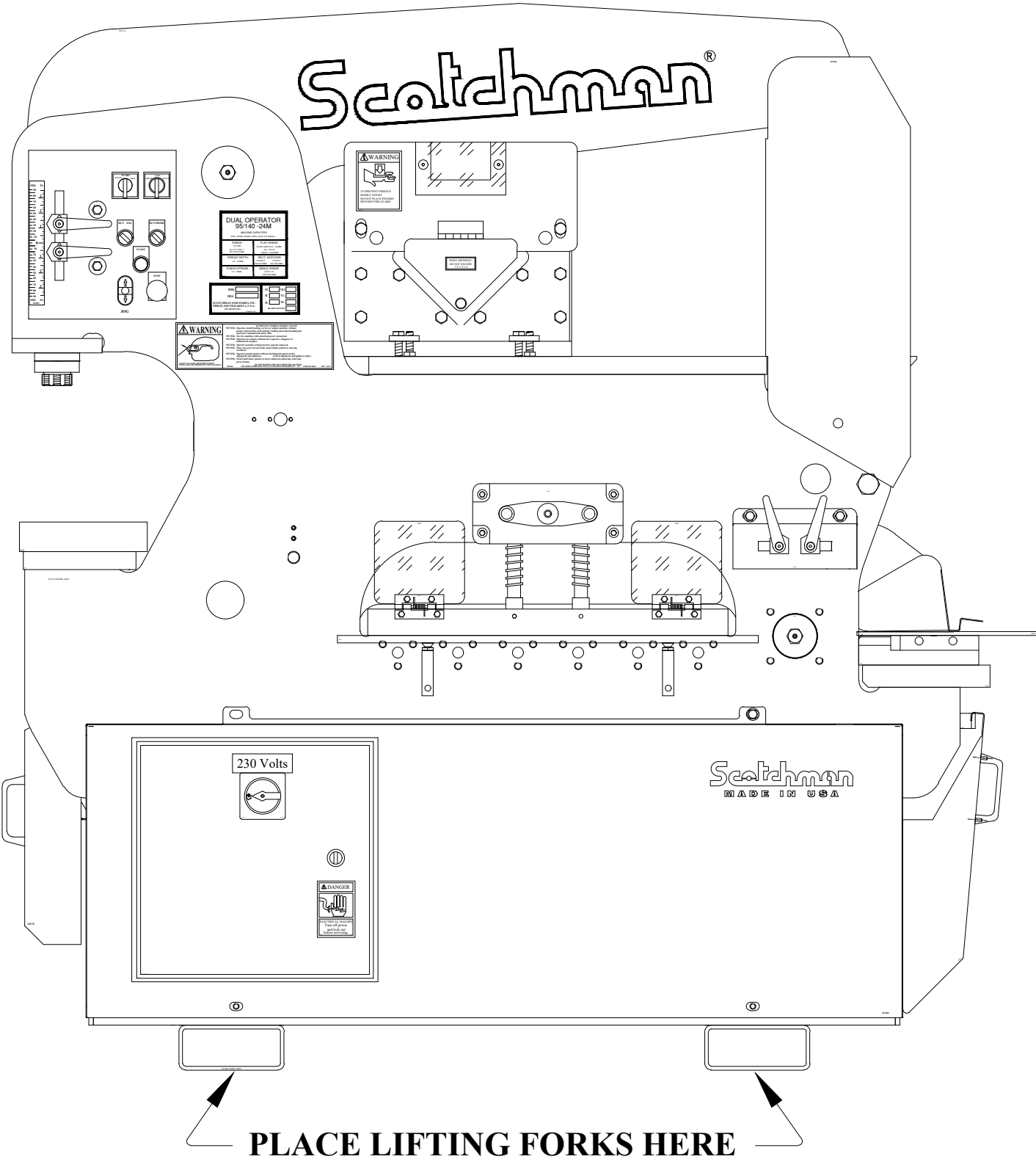


FIGURE 3

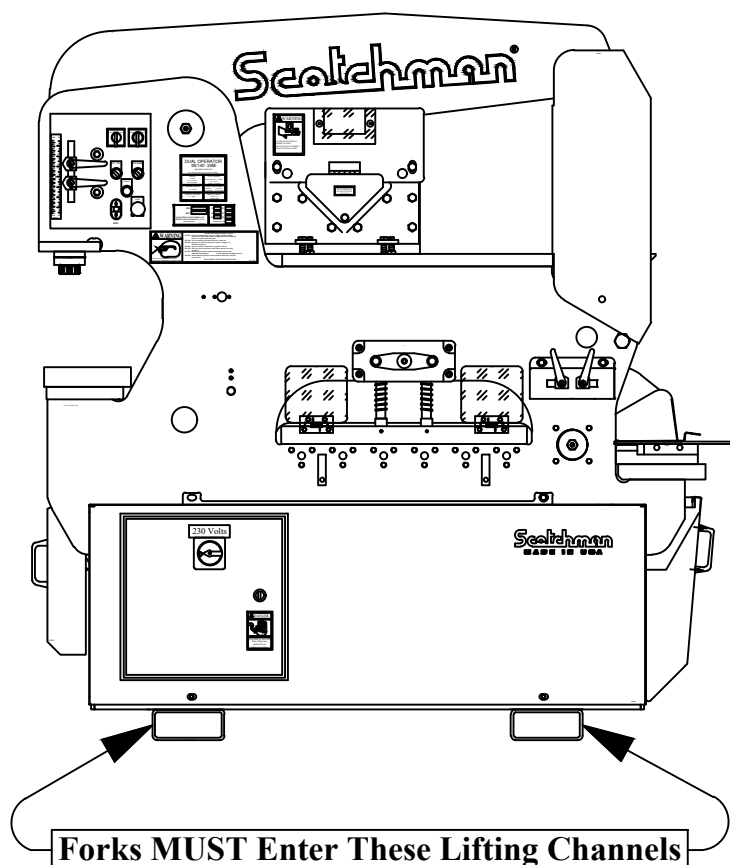
The weight of this machine is 3,790 pounds (1,720 KG.).

Check the capacity of lifting equipment before attempting to move the machine.

- ▶ **WHEN MOVING THIS MACHINE WITH A FORKLIFT, PLEASE NOTE: THIS MACHINE IS TOP HEAVY AND SHOULD BE MOVED WITH CARE, ON FLAT SURFACES ONLY.**
- ▶ **MAKE SURE THAT THE TEETH OF YOUR FORKLIFT ENTER THE LIFTING CHANNELS PROVIDED.**
- ▶ **FAILURE TO USE THE LIFTING CHANNELS MAY RESULT IN SERIOUS BODILY INJURY AND DAMAGE TO THE MACHINE.**

MACHINE IS TOP HEAVY!!

Use Extreme Caution when moving



4.3 PHYSICAL INSPECTION

Any damage to the machine during shipment should be reported to the delivery carrier immediately.

A damage report must be made 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.

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:

- 1. The stroke control handles.**
- 2. The jog switch.**
- 3. The selector switch.**
- 4. The emergency stop buttons.**
- 5. Hydraulic hoses and fittings.**
- 6. A general inspection of machine shrouds, guards and awareness barriers.**
- 7. Check the re-pack box for all accessory items ordered with the machine.**

The reservoirs are full of oil. The recommended oil is a lightweight, non-foaming, anti-wear, hydraulic oil such as a Mobil DTE-25 or equivalent.

The reservoir capacity is 14 U.S. gallons (53 liters).

The fluid level should be approximately 2 inches (50mm) below the top of the reservoir.

► CAUTION: DO NOT OVER FILL!!

4.4 ELECTRICAL REQUIREMENTS

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

All machines are wired for three phase electrical power unless otherwise specified by customer. 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 SECTION 11 AT THE END OF THIS MANUAL.

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

POWER REQUIREMENTS:

Motor frame: 3 PH = 215-TC 1 PH = 215TC

MOTOR VOLTAGE	FULL LOAD CURRENT
208	31
230	29.6
460	14.8
575	12
230 (Single phase)	40
Motor power rating: 10hp	Speed 1,740 RPM
KVA power rating:	7.9 KVA at 230 Volts Frequency 60 HZ.
Starting Current:	210% Full Load

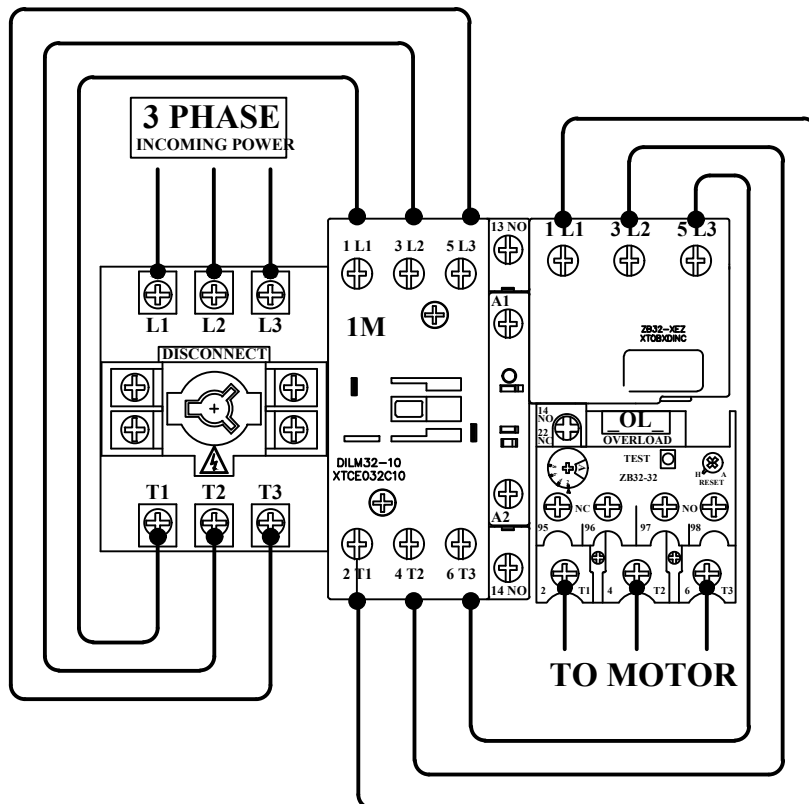
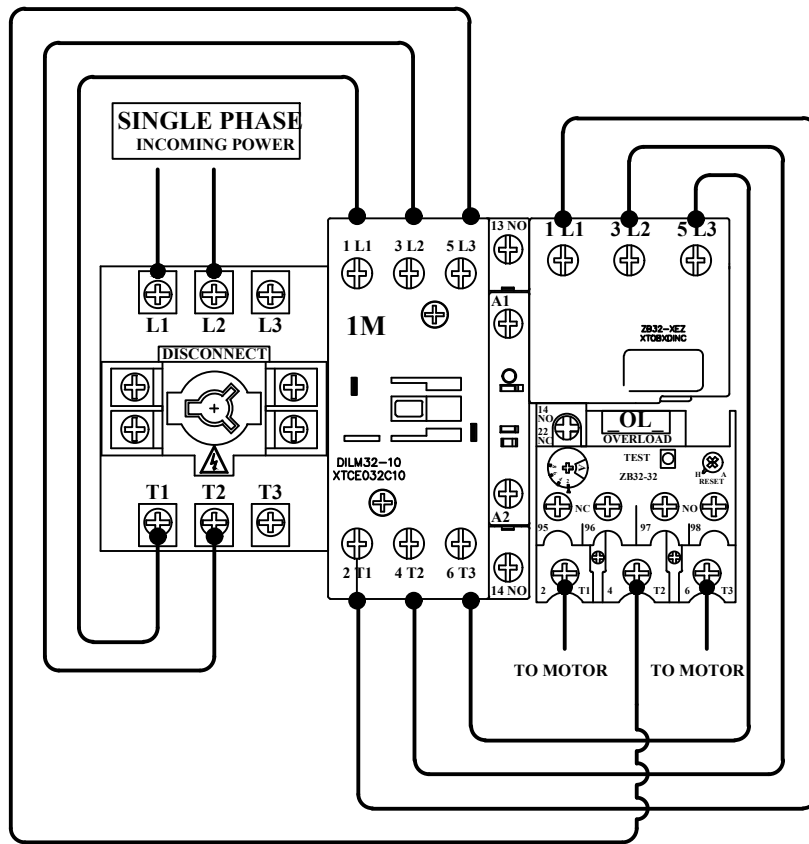
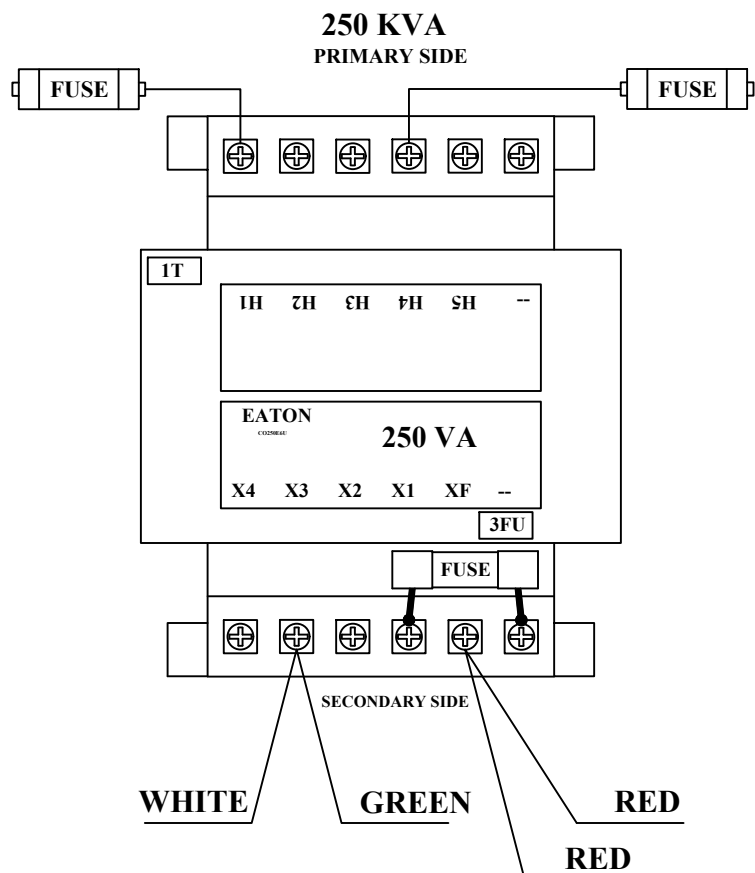


FIGURE 4A



H1-H2	H1-H3	H1-H4	H1-H5
208	380	440	500
220	400	460	550
230	415	480	575
240			600

XF-X2	XF-X3	XF-X4
99	120	130
95	115	125
91	110	120
85	100	110

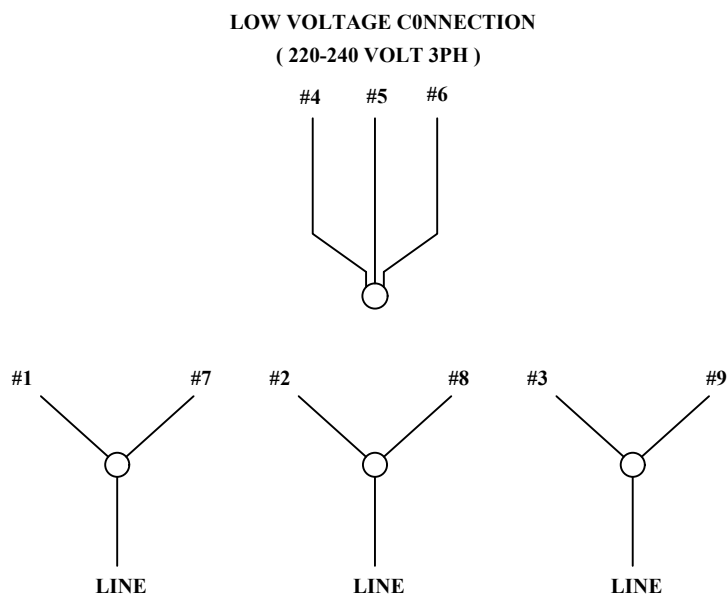
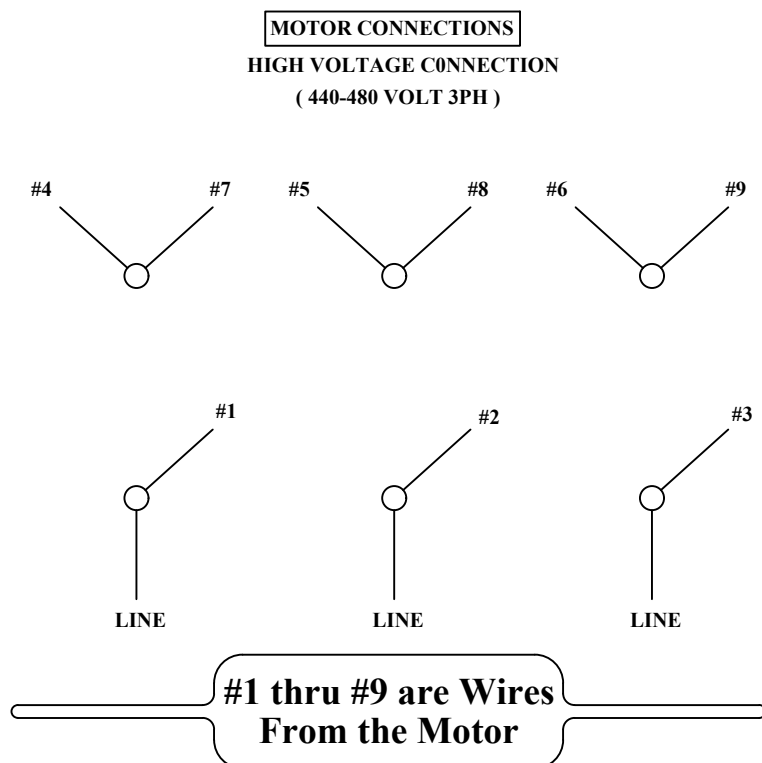


FIGURE 4B

4.4A CONTROL PANEL FUNCTIONS

Since this machine can be operated by two people at the same time, it is important that the operators be very familiar with all of the control panel functions and how they affect the operation of the machine.

REFER TO FIGURE 5 BELOW.

1. This is the jog control. It only operates when the RUN/JOG selector switch (2) is in the JOG position.

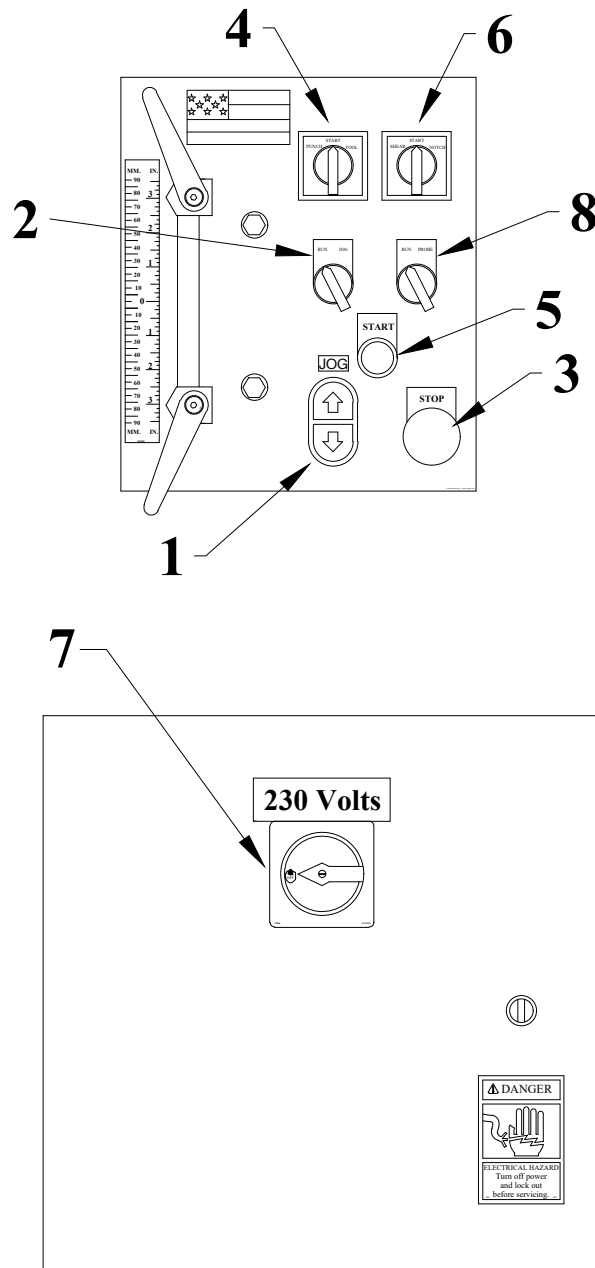


FIGURE 5

2. This is the RUN/JOG selector switch for the PUNCH/TOOL station of the machine. When this switch is in the RUN position, the station will operate with the foot pedal only. When the switch is in the JOG position, the station will only operate with the jog control. The jog control is very useful for setting the machine's stroke for various tooling and for finding center punch marks when punching.
 - ▶ **CAUTION: WHEN THE JOG FEATURE IS USED, THE MACHINE WILL REMAIN AT WHATEVER POINT THE JOG CONTROL IS RELEASED. WHEN THE RUN/JOG SWITCH IS MOVED TO THE RUN POSITION, THIS STATION WILL TRAVEL TO WHATEVER POSITION THE SELECTOR SWITCH (4) IS IN.**
3. There is an emergency stop switch on each end of the machine. On the punch end, it is located in the control panel; on the notcher end, it is located in the base of the machine. When these switches are depressed, they must be manually reset by pulling them out.
4. This is the selector switch for the PUNCH/TOOL stations. This switch (4) & the SHEAR/NOTCH switch (6) must both be in the START position and Disconnect Switch (7) in the ON position to power the machine. Any time that the power has been turned off, both selector switches (4 & 6) must be placed in the START position to power it again. Placing this switch in the PUNCH position will cause the punch to retract and the tooling arm to travel down. Placing it in the TOOL position will cause the arm to extend and the punch to close.
 - ▶ **CAUTION: WHENEVER YOU ARE USING THE PUNCH STATION, REMOVE ALL TOOLS FROM THE TOOL TABLE AREA. WHEN USING THE TOOL TABLE AREA, REMOVE THE PUNCH AND DIE FROM THE PUNCH STATION.**
5. This is the Start Switch for the machine. The Disconnect Switch (7) must be in the ON position and both selector switches (4 & 6) must be in the START position before you can power the machine.
6. This is the selector switch for the SHEAR/NOTCH stations. This switch (6) & the PUNCH/TOOL switch (4) must both be in the START position and the Disconnect Switch (7) must be in the ON position to power the machine. Any time that the power to this station has been turned off, both selector switches (4 & 6) must be placed in the START position to power it again. Placing this switch in the SHEAR position will cause the notcher blades to close and the flat bar shear blades to open. Placing the switch in the NOTCH position will cause the notcher blades to open and the flat bar shear blades to close.
 - ▶ **CAUTION: WHEN THE MACHINE IS USED IN THE FLAT BAR SHEAR POSITION, MAKE SURE THAT THE NOTCHER GUARD IS CLOSED. WHEN THE MACHINE IS USED IN THE NOTCH POSITION, MAKE SURE THAT THE HOLD DOWN DEVICE ON THE FLAT BAR SHEAR STATION IS IN THE DOWN POSITION.**
7. This is the main Disconnect Switch for the machine. When this switch is in the OFF position, none of the other operating controls for either station will function. It can be locked out in the OFF position for safety if the machine needs maintenance or repairs.
8. This is an optional switch for machines equipped with an electronic back gauge.

4.5 MACHINE START UP

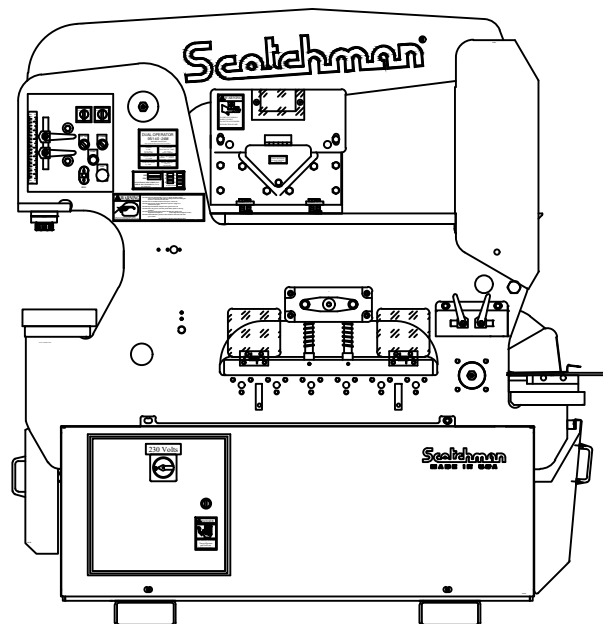
Before starting this machine, please take time to thoroughly review the safety CD and the operator's manual.

This machine is equipped with a lock-out, disconnect switch as standard equipment. 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.

See FIGURE 6 for the following steps to POWER the machine:

- 1. Place the disconnect switch (7) in the ON position and both selector switches (4 & 6) in the START position.**
- 2. Momentarily power the machine by pushing the green START button (5) and note the rotation of the motor. The motor rotation should be counterclockwise when viewed from the shaft end of the motor.**
- 3. If the rotation is not correct, the electrician will have to switch two of the line wires to change the direction of rotation. Once the machine has been powered, it will not move until one or both of the selector switches have been placed in a position other than the START position.**



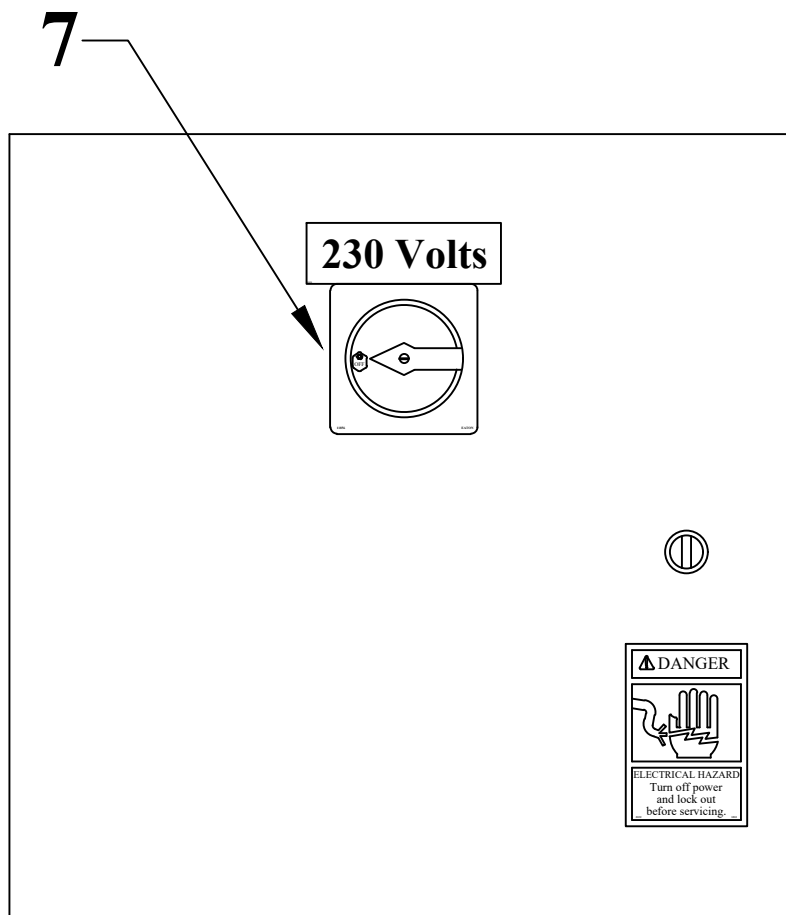
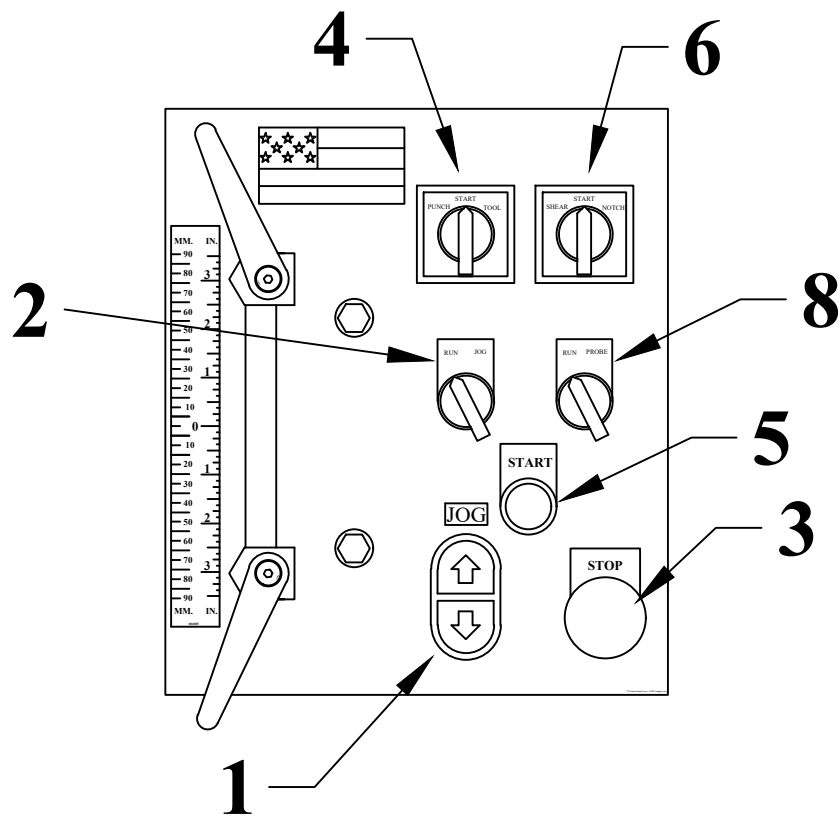
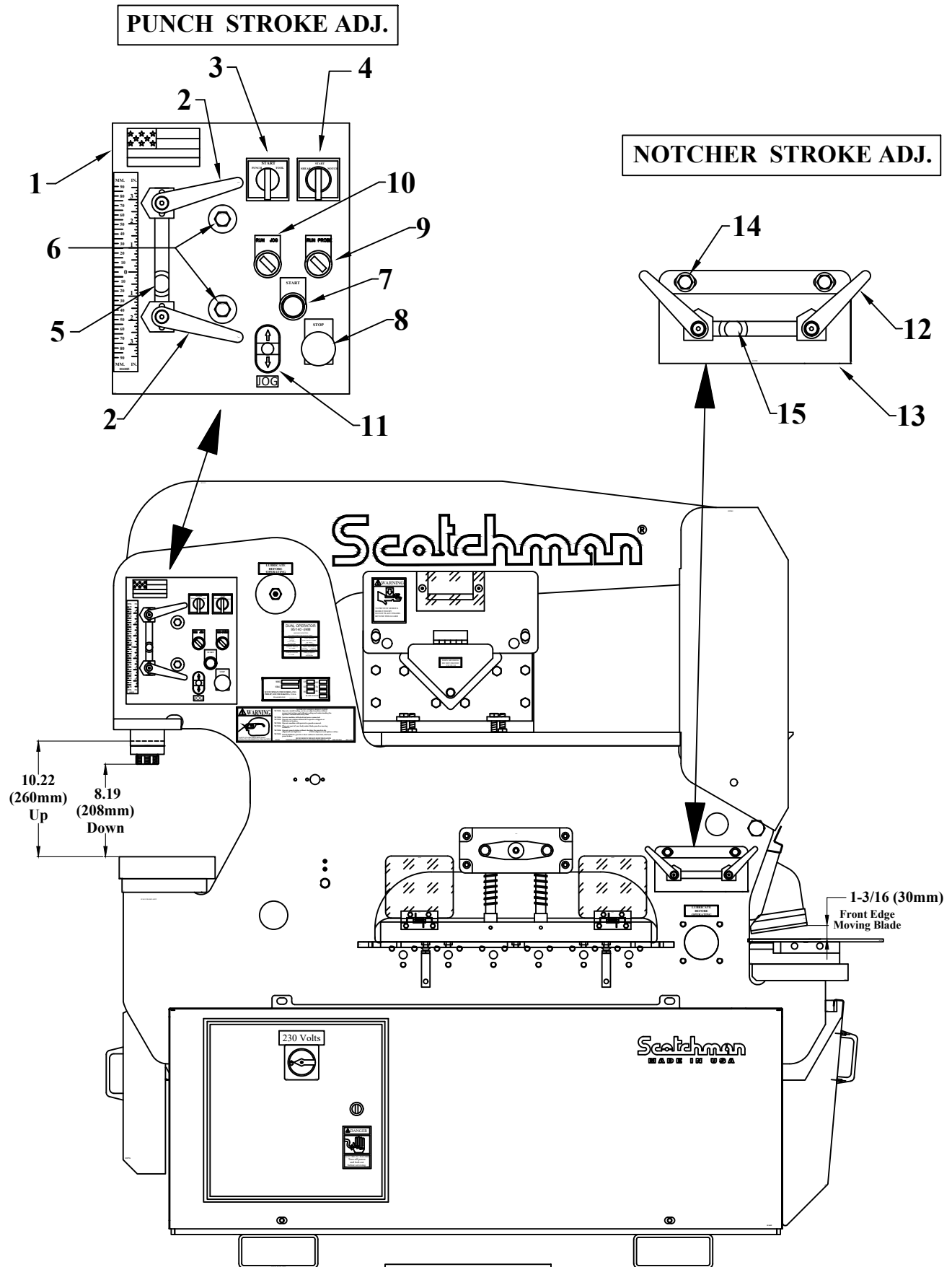


FIGURE 6

4.6 MACHINE STROKE INSPECTION & ADJUSTMENT



4.6A PUNCH & TOOL STATION

The stroke setting is important for the proper operation of the machine. If this setting has changed, the machine may over travel 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 for the punch and tooling station is made at the punch station.

SEE FIGURE 7 ON THE PRECEDING PAGE.

- 1. Mounting Plate**
- 2. Stroke Control Handles (2)**
- 3. Punch/Tool/Start Selector Switch**
- 5. Metering Boss**
- 6. Mounting Plate Bolts**
- 7. Start Switch**
- 10. Run/Jog Switch**

► PUNCH & TOOL STROKE ADJUSTMENT ◀

- 1. Set the stroke control handles (2) out to their farthest position.**
- 2. Place the disconnect switch in the ON position and both selector switches (3 & 4) in the START position.**
- 3. Turn the RUN-JOG switch (10) to the JOG position.**
- 4. The die holder must be removed and the stripper swung to the side, out of the way.**
- 5. Power the machine and jog the ram down until it measures 8-3/16 inches (208mm) from the bolster to the bottom of the ram.**
- 6. Turn the machine's power off.**
- 7. Check to see if the metering boss (5) has contacted the lower limit switch.**
- 8. If it has not, loosen the two mounting plate screws (6) and move the mounting plate (1) up until contact is made.**
- 9. Tighten the screws and re-check the dimensions. Repeat, if needed.**
- 10. When the ram is in the UP position, the dimension is 10-7/32 inches (260mm).**

4.6B NOTCH & SHEAR STATION

A check of the machine's stroke setting for shearing and notching is made at the notcher station.

SEE FIGURE 8 ON THE FOLLOWING PAGE.

4. Shear/Notch/Start Selector Switch

7. Start Switch

12. Stroke Control Handles (2)

13. Mounting Plate

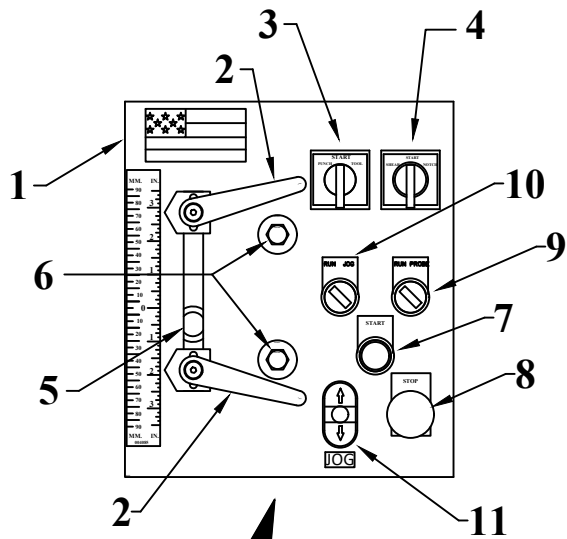
14. Mounting Plate Bolts

15. Metering Boss

► NOTCH & SHEAR STROKE ADJUSTMENT ◄

- 1. Set the stroke control handles (12) out to their farthest position.**
- 2. Place the disconnect switch in the ON position and both selector switches (3 & 4) in the START position and power the machine.**
- 3. Place the selector switch in the notching position and allow the machine to travel to the end of the stroke and then, turn the power off.**
- 4. Measure the distance from the front of the top notcher blade to the top of the lower notcher blade. The distance should be 1-3/16 inches (30mm).**
- 5. If this dimension is not correct, loosen the mounting plate screws (14) and move the mounting plate slightly, left or right. Moving the plate left will increase the dimension; moving it right will decrease it.**
- 6. Tighten the screws and re-check the dimensions. Repeat, if needed.**

PUNCH STROKE ADJ.



NOTCHER STROKE ADJ.

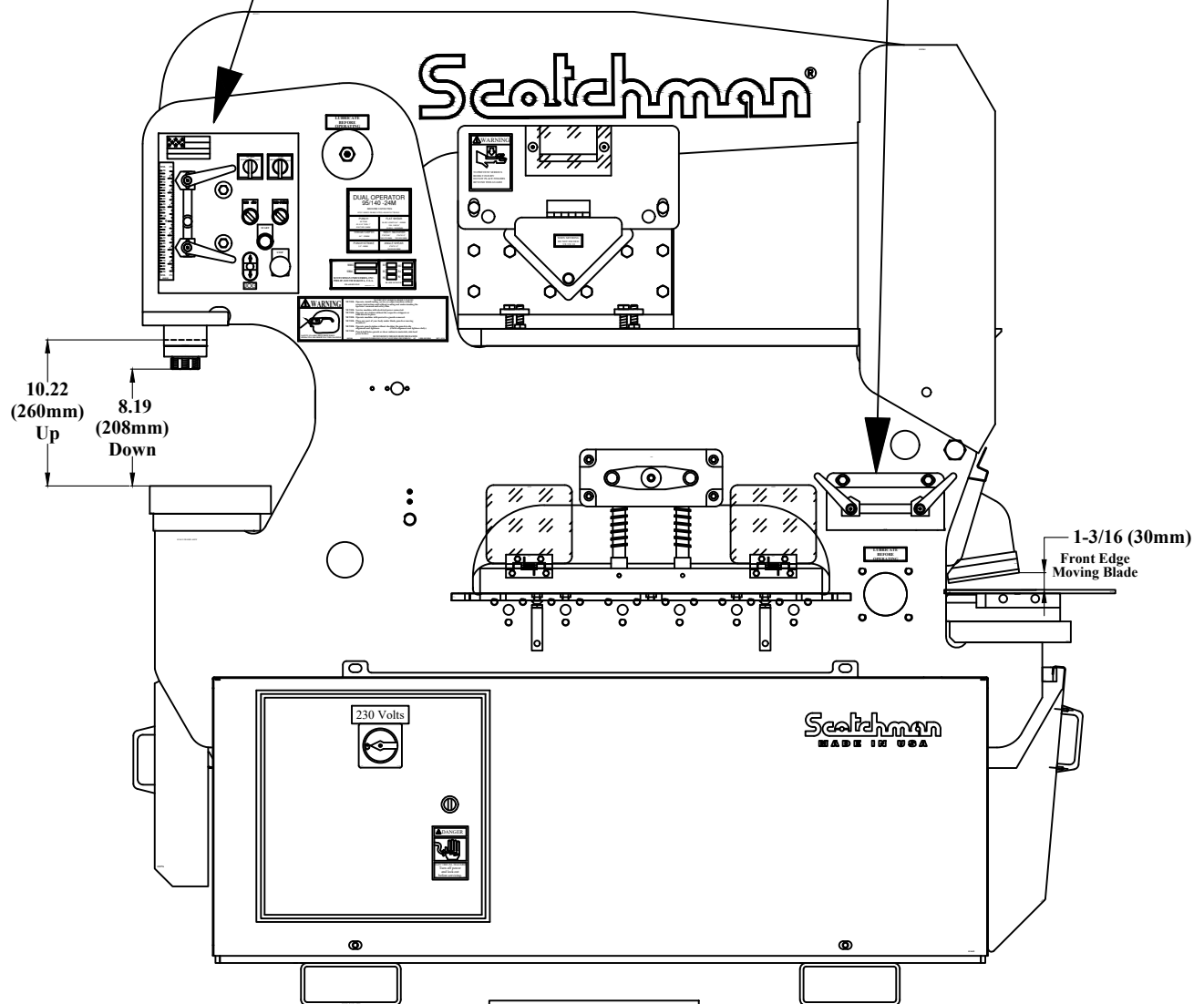
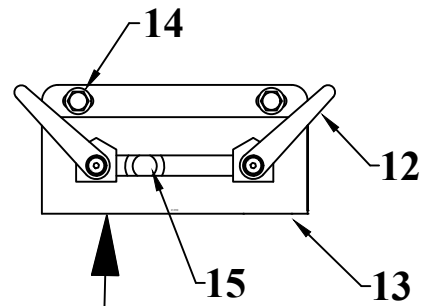


FIGURE 8

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 life of the machine and prevent costly down time.

5.1 LUBRICATION

IMPORTANT: Before operating this machine, apply oil to the notcher, rod shear, angle shear, 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 easier 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.

Grease the main pins (2 & 3) and the punch ram bushing (1) daily. SEE FIGURE 9 ON THE FOLLOWING PAGE.

Grease all other fittings twice per week. All grease locations are indicated with decals shown below. Mobil Grease XHP 222 Special is recommended.

Once a month, check the oil level in the reservoir. It should be approximately 2 inches (50mm) below the top of the reservoir.

The recommended hydraulic oil is a lightweight, non-foaming, hydraulic oil such as Mobil DTE 25 or equivalent, with a minimum ISO cleanliness code of 20/18/15. The reservoir capacity is 14 U.S. gallons (53 liters).



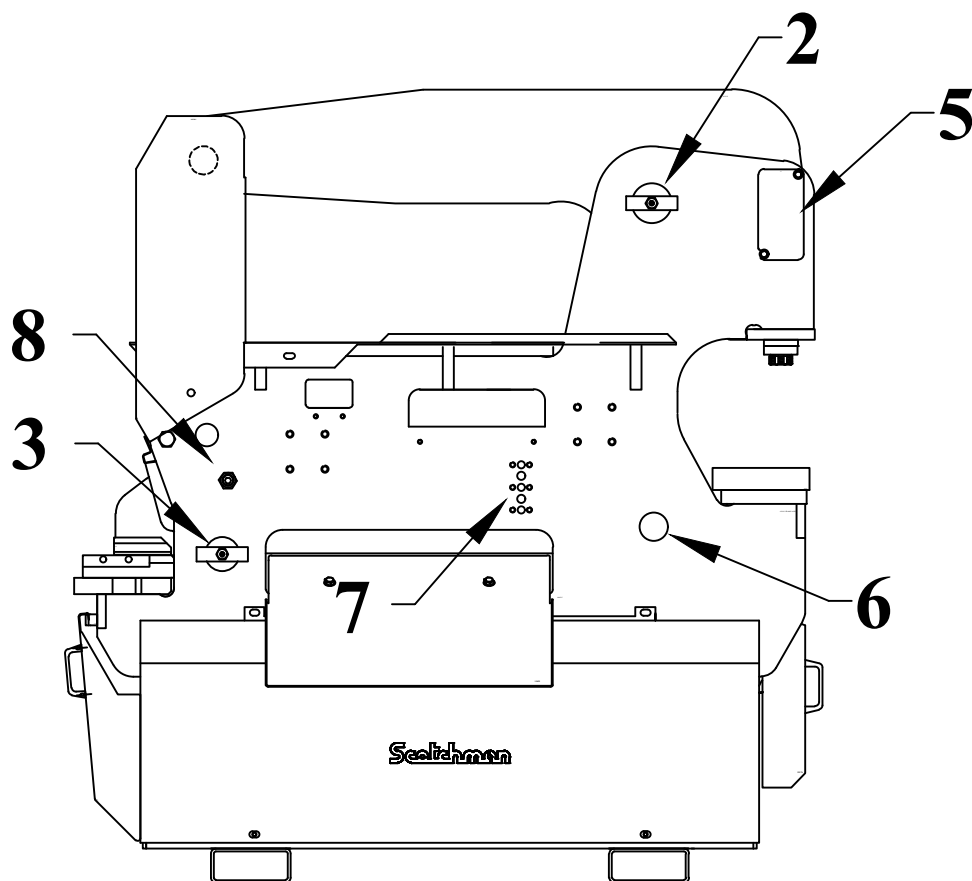
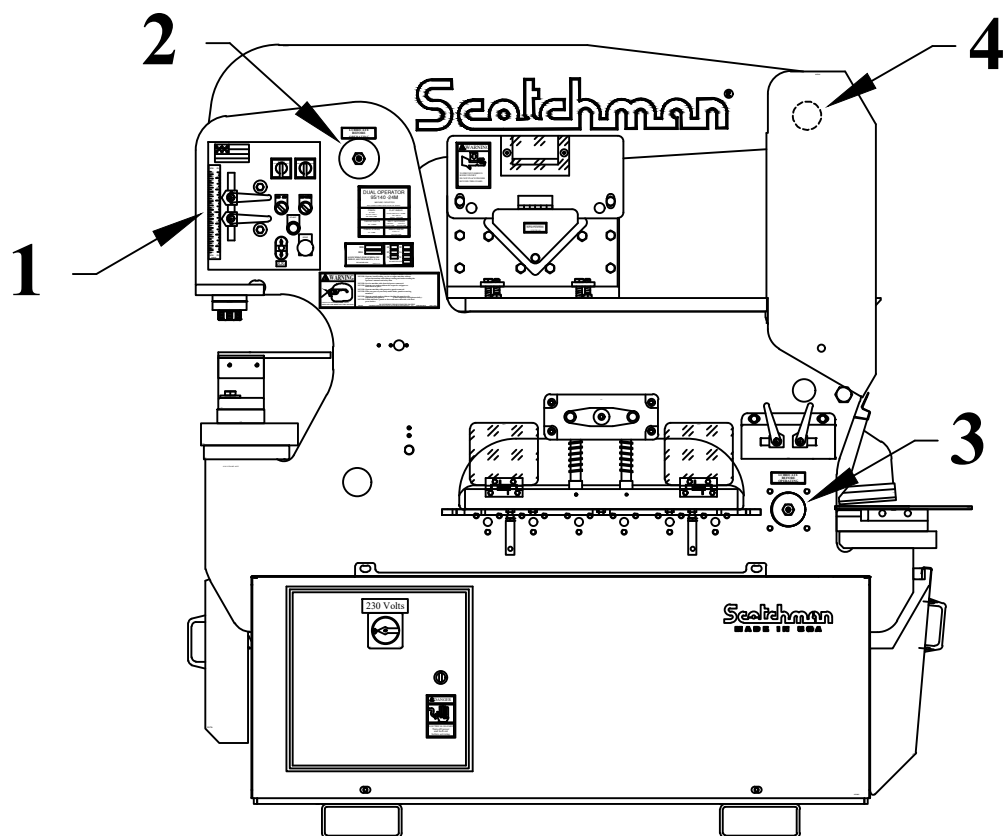


FIGURE 9

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 some important items that should be included in a scheduled maintenance program.

Since this machine can be used for a wide variety of applications with many optional tools, every user must design and implement a scheduled maintenance program that fits his needs.

1. EVERY 500 HOURS OR SIX MONTHS:

- A. Check the tolerance between the punch ram and the punch ram bushing. For parts identification, SEE FIGURE 10 ON THE FOLLOWING PAGE.**

2. TO CHECK THE CLEARANCE BETWEEN THE RAM AND THE BUSHING:

- A. Install a punch and die following the method outlined IN SECTION 6.1.**
- B. Place the run/jog switch in the JOG position. With the punch in the die, jog the machine up and down several times, watching for any lateral movement of the punch in the die.**
- C. If any movement is noted, check the mounting bolts in the punch ram bushing. Make sure that they are tight. Also, check the bolt that runs through the punch ram straps to make sure that it's not so tight that the straps are binding on the arm or the punch ram.**
- D. If there is still lateral movement of the punch in the die, remove the punch ram and the bushing and check the clearance between the two parts.**
- E. If the clearance between the two parts is more than five thousandths (.005) of an inch (.12mm), replace both parts.**

3. Check the condition of all cutting blades on the machine and any optional tools.

- 4. Check the condition of the bushings in the shear beam and the upper beam. This can be done visually by watching the beams for vertical movement while the machine is in operation. If vertical movement is noted, block or support the beam with a lifting device and remove the main pin and check the clearance. If the clearance exceeds twelve thousandths (.012) of an inch (.3mm), replace the bushing.**

5. EVERY 1,500 HOURS OR 1 YEAR:

- A. Change the hydraulic fluid in the reservoir and replace the filter. For recommended fluids, SEE SECTION 5.1.**

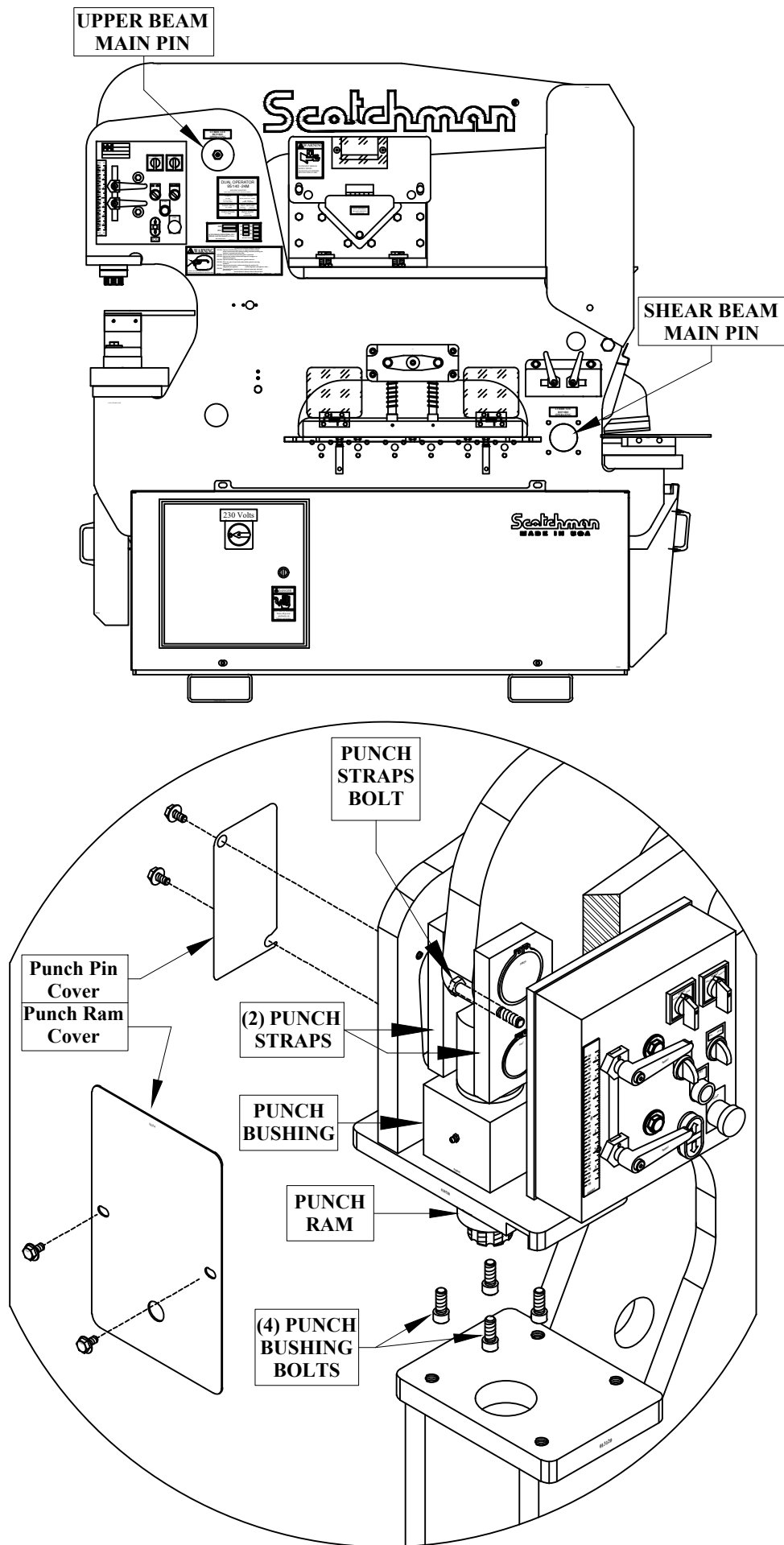


FIGURE 10

6.0 MACHINE OPERATION

6.1 PUNCH OPERATION

The first and most important procedure is the proper method of changing and aligning punches and dies.

► ALWAYS WEAR SAFETY GLASSES.

A. ALIGNMENT AND REMOVAL OF PUNCHES AND DIES:

► **WARNING: FAILURE TO PROPERLY ALIGN PUNCHES AND DIES CAN CAUSE SERIOUS BODILY INJURY AND/OR DAMAGE TO EQUIPMENT. PLEASE READ CAREFULLY AND UNDERSTAND THE FOLLOWING METHOD. IT WILL ALSO BE HELPFUL TO REFER TO THE SAFETY CD PROVIDED FOR A VISUAL REFERENCE. IF YOU DID NOT RECEIVE A SAFETY CD, PLEASE CONTACT YOUR DEALER OR THE FACTORY.**

REFER TO FIGURE 11 BELOW.

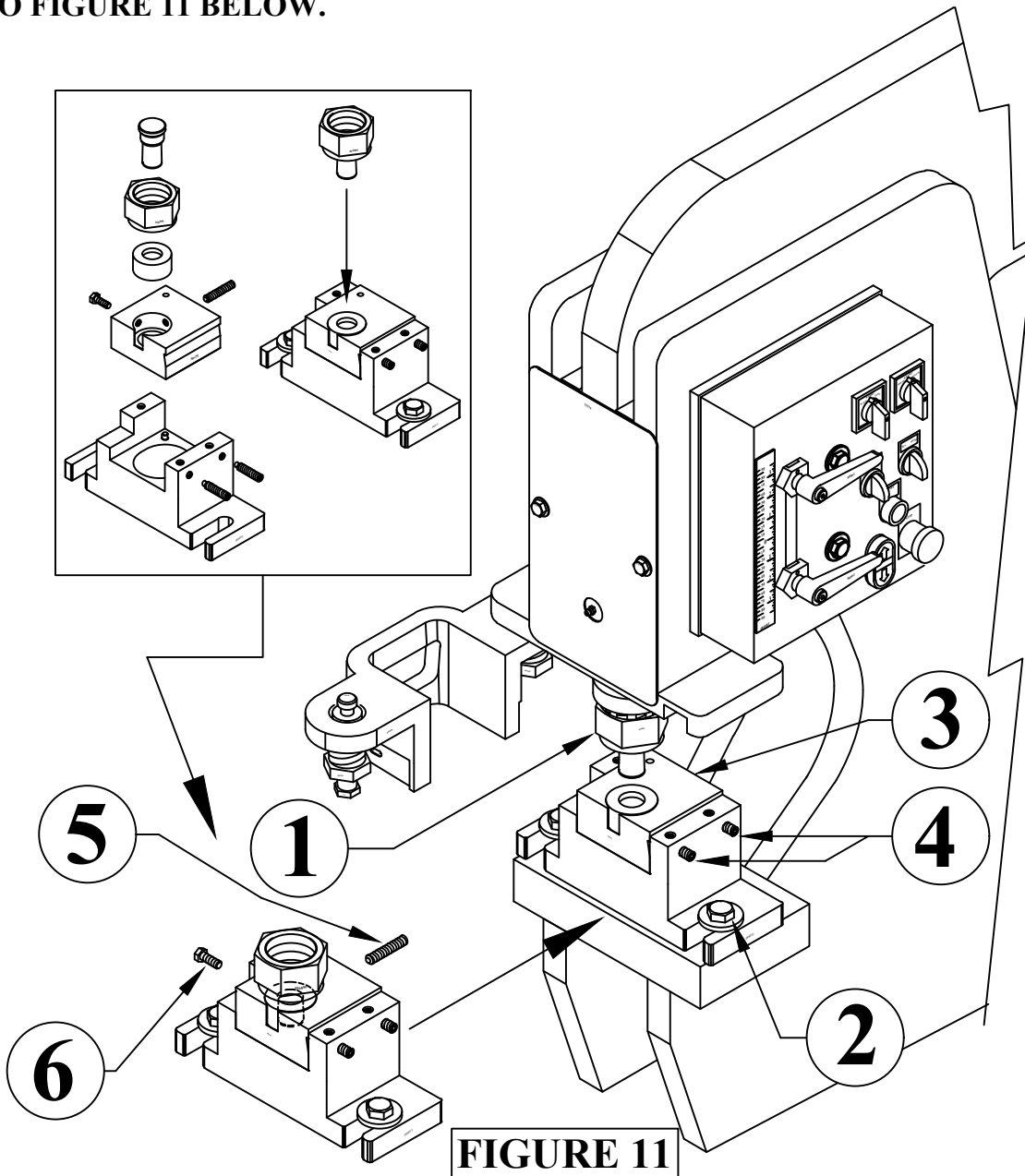


FIGURE 11

- ▶ **PLEASE NOTE: THERE IS AN EMERGENCY STOP PALM BUTTON ON BOTH ENDS OF THIS MACHINE.**
- ▶ **NOTE: THIS SET-UP IS FOR THE STANDARD AND OVERSIZE DIE HOLDERS. IF YOU ARE USING THE OFFSET DIE HOLDER, REFER TO SECTION 7.10A FOR INSTRUCTIONS.**

1. **With the machine's PUNCH/TOOL selector switch in the PUNCH position and the ram retracted, turn off the power.**
2. **Push up on the bolt holding the stripper on the right hand side and pull the stripper forward and to the side, out of the way of the punch ram and retaining nut.**
3. **Remove the punch retaining nut (1) and set the punch retaining nut and punch aside**
4. **Loosen the set screws (4) holding the die insert (3). Remove the die insert (3) and loosen the set screw (5) and bolt (6) holding the die and remove the die.**
5. **Clean the die holder cavity of any foreign material.**
6. **Place the disconnect switch in the ON position and the selector switches 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) under or on any of the moving parts.**
8. **Place the selector switch in the TOOL position and allow the cylinder to completely extend.**
9. **Turn the machine's power off.**
10. **Select the proper punch and die. Make sure that there is proper clearance between the punch and die. For recommended clearances, SEE PARAGRAPH I in this section.**
11. **Clean both the punch and die of any foreign material.**
12. **Insert the proper die in the die insert (3). (If the die has a flat spot on it, align this with the set screw (5) or bolt (6) in the die insert.) Tighten bolt & the set screw firmly.**
13. **Insert the punch into the punch retaining nut. Make sure that it seats properly. Place the punch retaining nut assembly on the die insert (3) with the punch inserted in the die. Place the die insert back in the die holder and tighten the two set screws (4).**
- ▶ **NOTE: IF YOU ARE USING PUNCHES THAT REQUIRE A KEY, INSERT THE KEY IN THE PUNCH AT THIS POINT.**
14. **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.) When using keyed punches, after you start the nut on the ram, raise the punch and rotate it until the key seats in the punch ram.**
15. **Use the supplied wrench to tighten the punch retaining nut. Make sure that there is equal clearance on all sides of the punch in the die.**

16. Re-tighten the bolts (2) in the die holder.
17. Check to be sure of proper alignment. Realign, if necessary.
18. Return the stripper to the locked position. For stripper adjustment procedures: SEE PARAGRAPH D BELOW.
19. Place the disconnect switch in the ON position and the selector switches in the START position. Power the machine by pressing the green START button.
20. Place the selector switch in the TOOL position. To be sure that the alignment is correct, jog the machine several times with the foot switch, without letting the punch come out of the die.
21. Place the selector switch in the PUNCH position.

B. KEYED PUNCHES.

This machine is equipped with a keyed punch ram insert. All shaped punches and dies manufactured by Scotchman are milled for keyed alignment.

- **NOTE: IF YOU DO NOT USE A KEY WITH SHAPED PUNCHES, IT MAY BE HELPFUL TO HOLD THE BODY OF THE PUNCH WITH A WRENCH WHILE TIGHTENING THE PUNCH RETAINING NUT. THIS WILL HELP TO KEEP THE PUNCH FROM ROTATING WITH THE NUT AS IT IS BEING TIGHTENED.**

C. CHECK ALL PUNCHING TOOLS FOR TIGHTNESS.

The punch and die alignment should be checked intermittently during the punching operations. To do this, bring the punch down so that it enters the die. Turn the machine off. Check and tighten the punch retaining nut, the set 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 the run/jog switch in the JOG position and power the machine. Place the selector switch in the TOOL position and jog the machine several times to be sure of proper alignment. Place the selector switch in the PUNCH position.

D. PROPER ADJUSTMENT OF THE STRIPPER:

SEE FIGURE 12 ON THE FOLLOWING PAGE.

To prevent damage to the stripper plate, proper adjustment of the stroke and the height of the stripper are necessary on this model. The stripper should be adjusted down to approximately 1/8 of an inch (3 mm) above the material being punched.

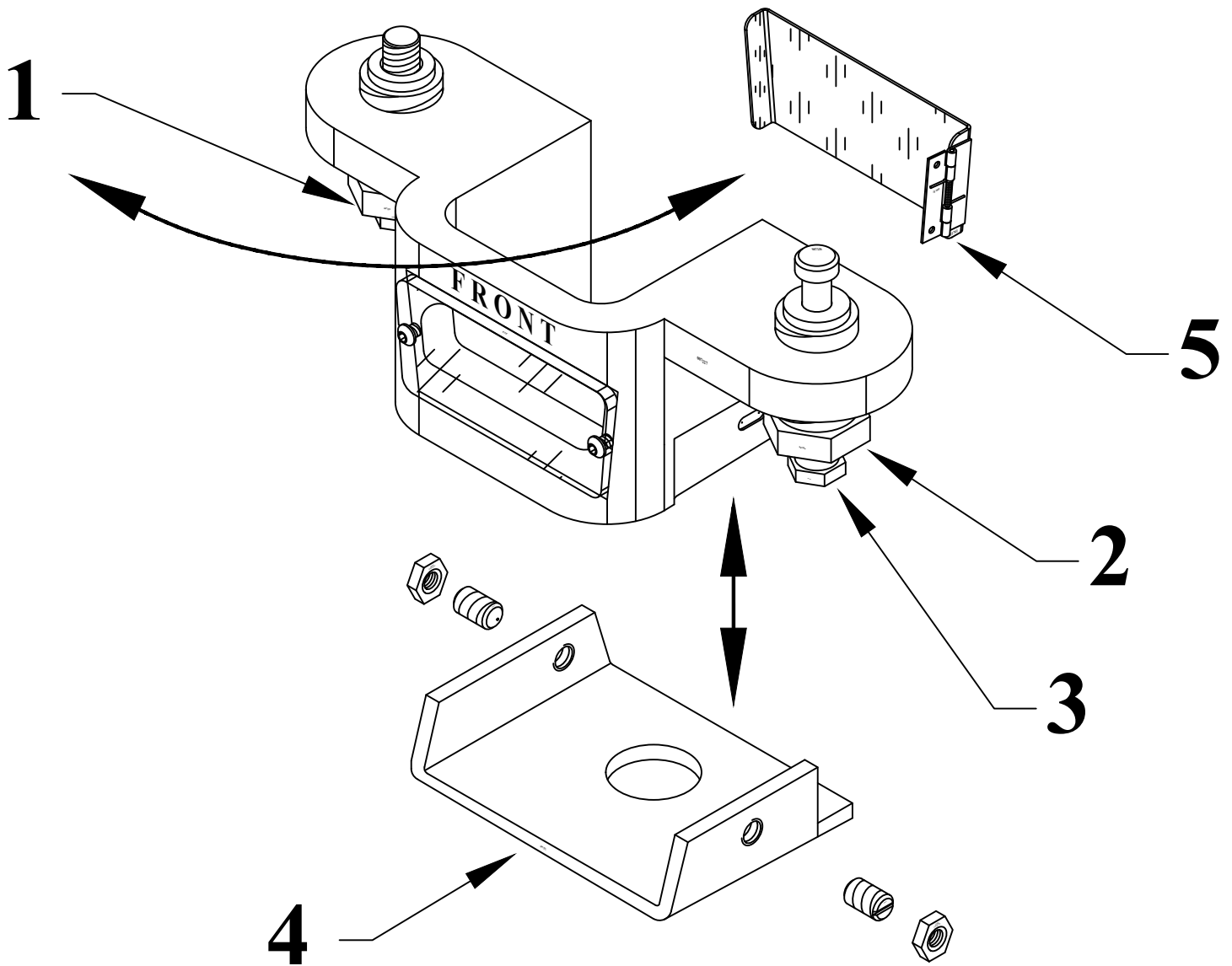


FIGURE 12

TO ADJUST THE STRIPPER:

1. The height of the stripper is adjusted using the adjustment bolts (1 & 2).
2. The stripper is opened by pushing up on item (3) 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 (4) on the bottom of the stripper.
4. For maximum visibility and safety, always adjust the stripper down as close to the material as possible.

► **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.**

E. 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 only and must be reduced when punching alloy steels. Contact the factory or your local dealer before attempting to punch any type of alloy steel.

F. 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.

G. 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 and possible injury to the operator.

H. 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 being punched. Any edge distance of less than this amount will result in a deformed workpiece.

I. STAY WITHIN RATED PUNCHING CAPACITIES.

This machine 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. The machine rating must be reduced accordingly.

Punch to die clearance depends on the material thickness. In mild steels, material thickness of 1/8 inch through 5/8 inch should have a total punch to die clearance of 1/32 inch. (Punch diameter + 1/32" = Die diameter). 5/8 to 1 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 of an inch (.4mm) total clearance due to working clearances necessary in the punch ram and punch bushing. 1 inch (25mm) mild steel is the maximum material thickness this machine is designed to punch. For capacities:

REFER TO THE PUNCH TONNAGE CHART IN FIGURE 13 ON THE FOLLOWING PAGE

- **NOTE: WHEN PUNCHING LARGER DIAMETER HOLES OR ALLOY STEELS, SET THE DOWNSTROKE OF THE MACHINE SO THAT THE PUNCH STOPS JUST ABOVE THE PLANE OF THE DIE, APPROXIMATELY FIFTEEN THOUSANDTHS OF AN INCH (.3MM). THIS WILL REDUCE THE PUNCHING SHOCK ENCOUNTERED IN THESE APPLICATIONS.**

TONS REQUIRED 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

NOTE: THIS IS RATED ON MILD STEEL HAVING A 65,000 PSI TENSILE STRENGTH.

DO-95/140 MAXIMUM MATERIAL THICKNESS IN PUNCH STATION IS 1 INCH (25MM).

FIGURE 13

6.2 BAR SHEAR OPERATION

- ▶ **CAUTION: WHEN THE BAR SHEAR STATION IS NOT IN USE, ALWAYS CRANK THE HOLD-DOWN DEVICE TO ITS DOWN POSITION.**

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 (3 mm) between the hold-down and the material to be sheared is acceptable. The maximum tonnage available on the bar shear is to the right, or closest to the pivot point. For applications that do not require the maximum tonnage, move the material to the left for minimal distortion of the drop-off 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 result in a poor quality cut and possible damage to the machine. The maximum material that can be sheared is 1 x 8 inch (25 x 203mm) mild steel. This is WITH the Saber Blade (upper blade) which IS standard equipment for this machine. Consult dealer or factory for details if needed.

THE BASIC METHOD OF OPERATING THE BAR SHEAR CONSISTS OF FIVE STEPS.

1. Place the disconnect switch in the ON position and both selector switches 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 UNTIL IT CONTACTS THE MATERIAL TO BE SHEARED.** This prevents "kick-up" of the work piece and possible damage to the shear blades.
5. **DEPRESS THE FOOT PEDAL.** Keep hands clear of all moving parts.

Lubricating oil should be applied to the blades every 10 to 15 cuts. In addition to the above five basic steps of operation, the operator should also be familiar with the following:

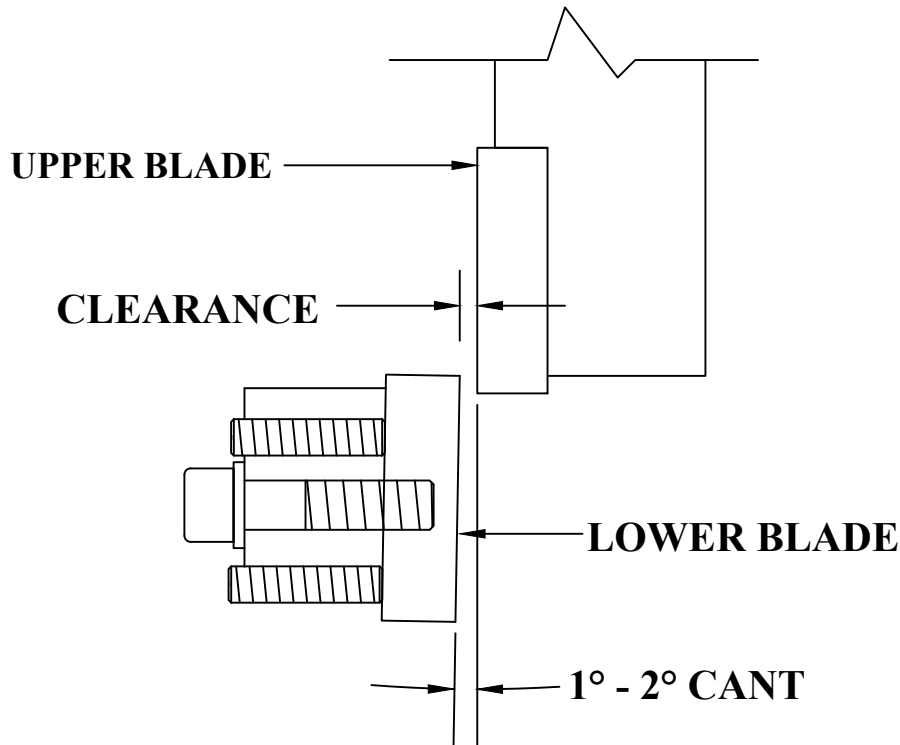
A. MAINTAIN PROPER BLADE CLEARANCE.

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. Only the bottom shear blade is symmetrical and can be rotated to expose up to four (4) cutting edges. The top blade is slightly curved on the cutting side and has only (2) cutting edges. For blade clearance recommendations, see Figure 14 on the following page. For adjustment procedures, REFER TO SECTIONS 6.2A AND 6.2B.

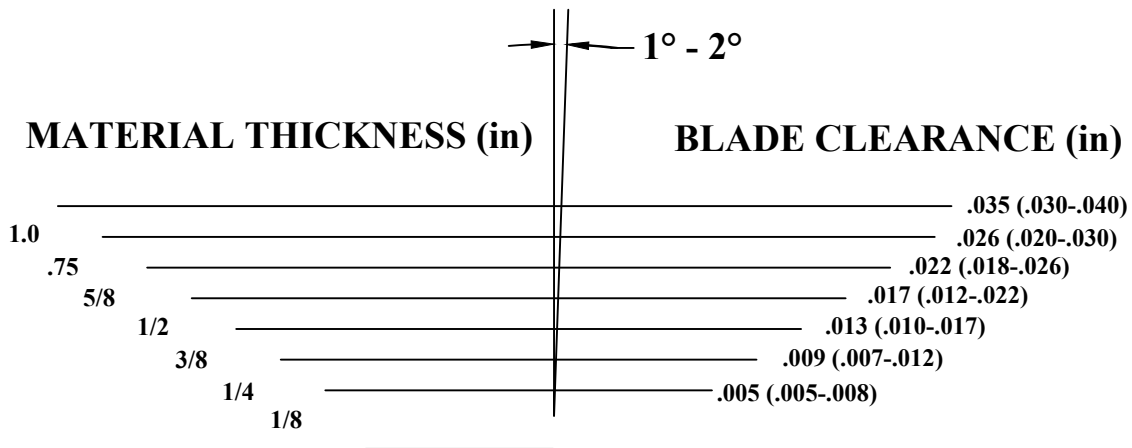
B. ALL CUTS SHOULD BE MADE AS FAR FROM THE ARM PIVOT AS POWER WILL PERMIT.

The shear blades should contact the work piece as flat as possible, to reduce to a minimum the amount of "curl" on the drop-off piece. More shearing force is obtained as the operator moves the work-piece to the right. The machine is designed to shear mild steel rated at 65,000 PSI tensile strength.

RECOMMENDED CLEARANCE FOR FLAT BAR SHEAR BLADES



BELOW BASED ON A36 MILD STEEL OF 65,000 P.S.I. TENSILE STRENGTH



Blade clearance is factory set to 0.020" (0.51 mm).

DO NOT SET CLEARANCE LESS THAN 0.005" (0.13 mm).

For material thickness or blade clearances outside of this chart, consult dealer or factory.

FIGURE 14

6.2A SHEAR ARM ADJUSTMENT

Adjustment on the shear arm is maintained on the front (operator's) side by the pressure plate (1) and on the rear by the rub blocks (3, 4 & 7).

**USE THE FOLLOWING STEPS TO ADJUST THE SHEAR ARM.
SEE FIGURE 15 ON THE FOLLOWING PAGE.**

- 1. Before making these adjustments, loosen the lower blade and back it away from the upper blade. After making these adjustments, reset the blades following the instructions in SECTION 6.2B.**
- 2. Loosen the six adjusting set screws (6) for the frame rub block (7) and remove the rub block by taking out the three mounting bolts (5). Look at the fiber rub block (4) that is bolted to the shear beam. If excessive concave wear is noted on this rub block, it can be turned and the back surface used. Set the pressure plate adjustment before resetting these rub blocks.**
- 3. For the pressure plate adjustment, loosen the lock nuts (2) on the four adjusting screws that engage the pressure plate (1).**
- 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. Tighten the adjusting screws to 30 ft-lbs (41 Nm). Excessive tightening of these screws will only increase wear.**
- 5. Replace the rub block (4). With the shear arm in the down position, tighten the bottom two adjusting set screws (6) until the rub block comes in contact with the shear arm rub block (7). Raise the arm about halfway and adjust the middle two adjusting set screws (6) until the rub block makes contact. Then, raise the arm completely and adjust the top set screws. (Once again, excessive tightening will cause unnecessary wear.) Check to be sure that the rub block (4) is in contact with the shear arm rub block (7) throughout the full stroke.**
- 6. Tighten the lock nuts (2) on the pressure plate adjusting screws.**
- 7. Loosen the lock nut on the rub bolt (3) and adjust the bolt in until it contacts the arm.**

► DO NOT OVER-TIGHTEN THIS BOLT!! ◀

Just adjust it in until it contacts the arm and then, tighten the lock nut.

- 8. SHEAR BLADE WILL NEED TO BE ADJUSTED - SEE SECTION 6.2B .**

Cutaway Views

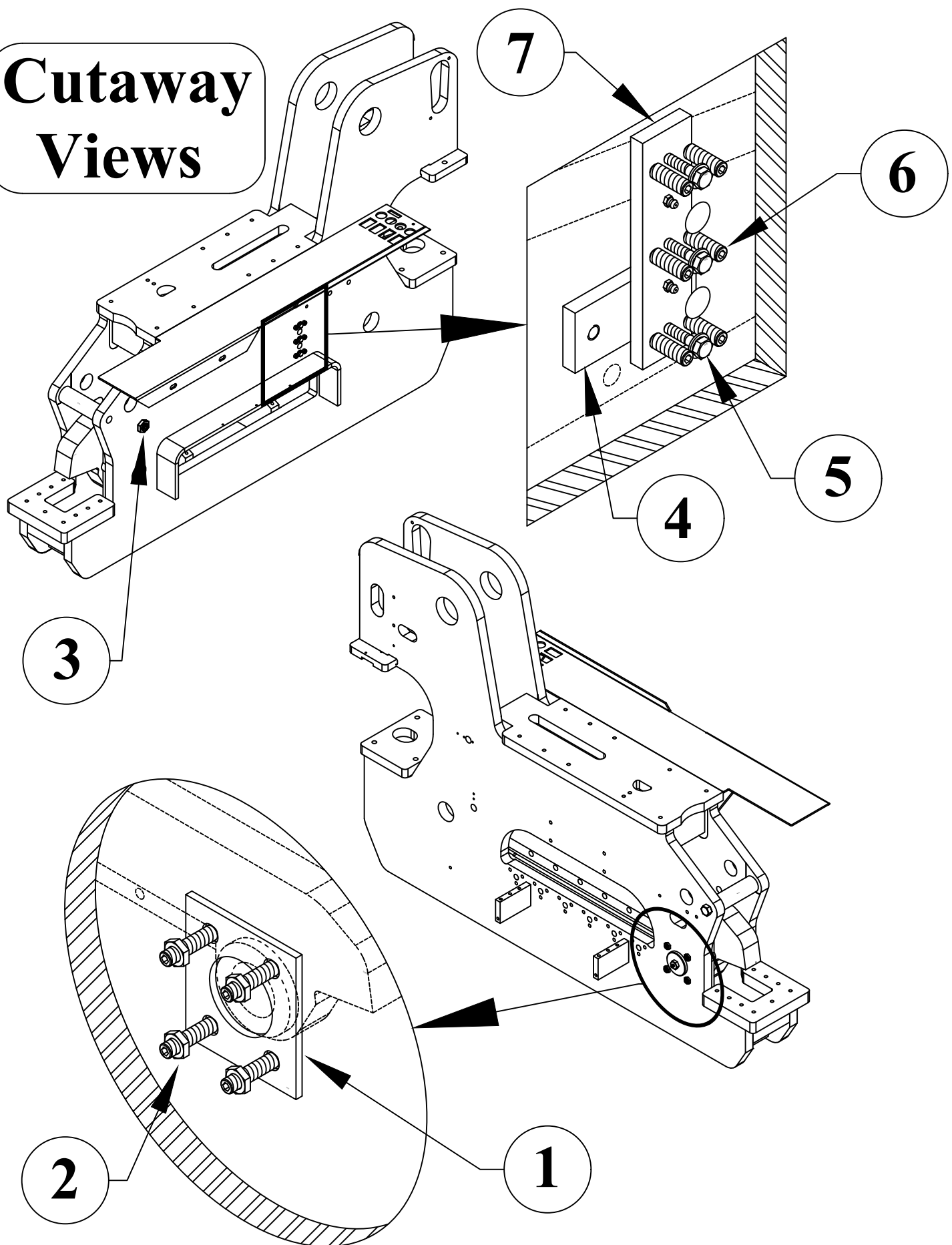


FIGURE 15

6.2B SHEAR BLADE ADJUSTMENT PROCEDURE

CAUTION: Cutting Edge Is Curved On Upper Blade!! It has just TWO cutting edges.
IT CAN ONLY BE ROTATED END-FOR-END!!

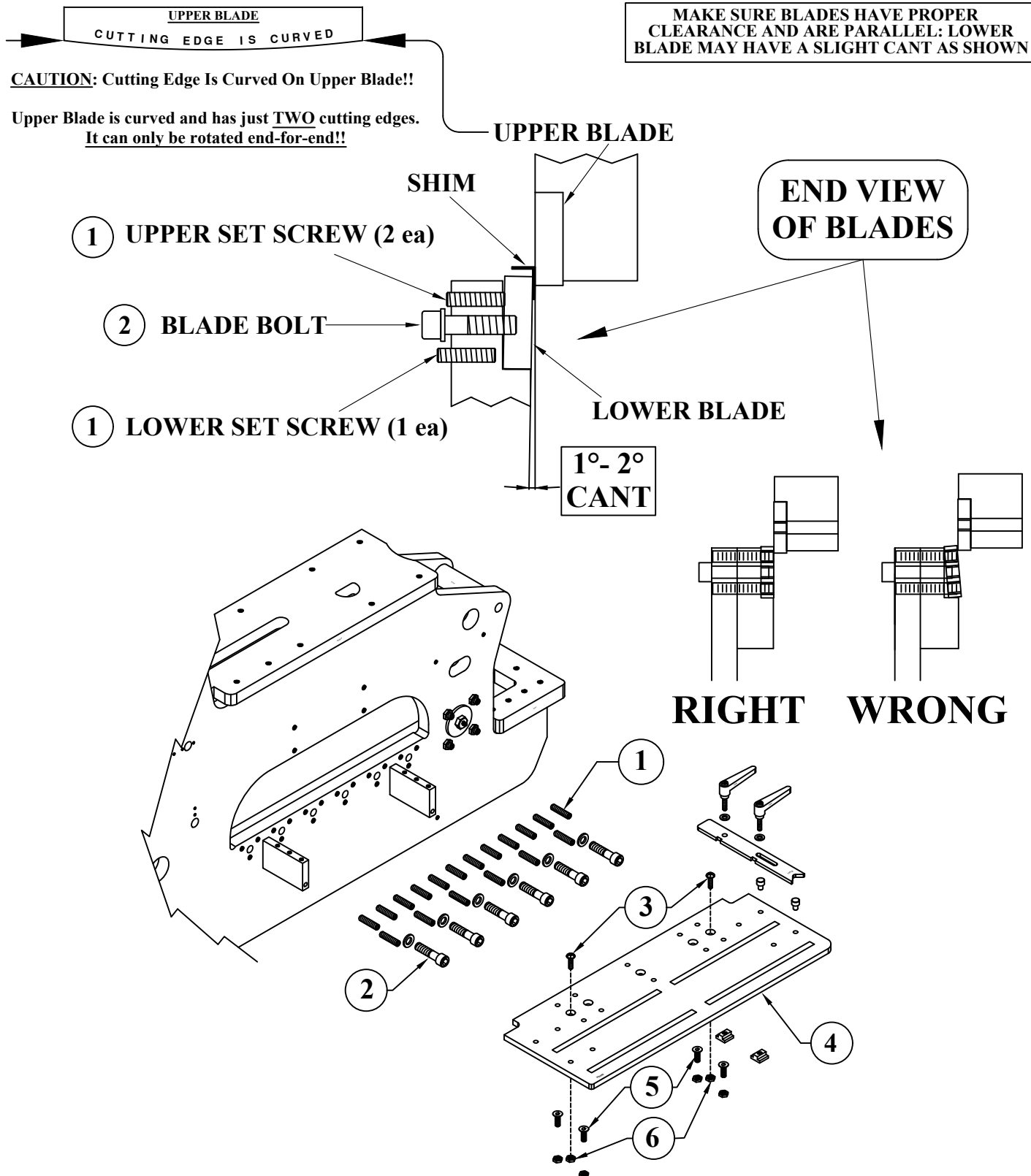
SEE FIGURE 16 ON THE FOLLOWING PAGE.

1. Place the selector switch in the SHEAR position and allow the arms to raise completely.
 2. Crank the hold-down device all the way up and remove the shear table.
 3. To remove the shear table, loosen the jam nuts (6) on the bolts (3) and remove the bolt. Remove the lower blade bolts (2) and back the adjustment screws (1) out.
 4. Remove the lower blade.
 5. Power the machine and place the selector switch in the PUNCH position. Allow the arm to travel to its full down position. Turn the power off.
 6. Rotate "end-for-end" or replace the upper shear blade. (See "CAUTION" above)
 7. Rotate or replace the lower blade and start the socket head retaining bolts (2).
 8. Place a shim with the desired clearance between the upper and lower blades.
 9. Adjust the lower blade to the top blade, with the upper adjusting screws (1), about 1/8 of a turn past resistance.
 10. Tighten the bolts (2) to 1/4 a turn past resistance.
 11. Adjust the lower adjusting screws (1) up to the blade and then, tighten all of the bolts, starting with the blade bolts (2) and then, the adjusting screws (1).
 12. **CAUTION:** THE BLADES MUST BE ADJUSTED PARALLEL TO EACH OTHER, vertically or with the cutting edge of the lower blade at a slight cant towards the upper blade.
 13. Power the machine and place the selector switch in the SHEAR position. With the foot pedal, cycle the shear down slowly, watching the blade engagement. Make sure that the blades do not contact each other.
 14. Replace the shear table (4). If needed, the shear table can be adjusted to match the lower blade.
 15. The table is adjusted with the four screws (5).
- If the machine is being used to shear maximum capacities, we recommend increasing the clearance. A clearance of five to seven percent of the material thickness is recommended.

QUICK GUIDE TO CHANGING BAR SHEAR BLADES

- 1st - REMOVE LOWER BLADE
- 2nd - CHANGE UPPER BLADE
- 3rd - START BOLTS (2) IN LOWER BLADE
- 4th - PLACE DESIRED SHIM BETWEEN BLADES

- 5th - ADJUST UPPER SET SCREWS 1/8 TURN PAST RESISTANCE
- 6th - TIGHTEN BLADE BOLTS 1/4 TURN PAST RESISTANCE
- 7th - ADJUST LOWER SET SCREWS UP TO LOWER BLADE
- 8th - FINAL TIGHTEN: BLADE BOLTS, THEN SET SCREWS



6.3 RECTANGLE NOTCHER OPERATION

This tool is operated with the SHEAR/NOTCH selector switch in the NOTCH position.

- **CAUTION: WHEN THE NOTCHER STATION IS NOT IN USE, BE SURE THAT THE GUARD IS IN THE CLOSED POSITION, TO PREVENT ANYONE FROM STORING TOOLS OR MATERIAL ON THE TABLE OR IN THE BLADE CAVITY.**

Rectangular Notching applications up to 3" x 5" x 3/8" (76 x 127 x 10mm) and 3" x 4" x 1/2" (76 x 102 x 12mm) and a 90 Degree vee notch of 3" x 3" x 3/8" (76 x 76 x 10mm). These are the maximum capacities of the this Notcher.

TO OPERATE THE NOTCHER, USE THE FOLLOWING STEPS:

1. Raise the guard.
2. Place the workpiece between the blades. Cycle the machine until the blades have sheared completely through the material. Continue to hold your foot on the pedal while you remove the material toward you on a horizontal plane.
3. Once the material is away from the blades, remove your foot from the pedal. The machine will return to a neutral position, ready for the next cut. Lubricate the blades every 10 to 15 cuts.

6.3A RECT. NOTCHER BLADE ADJ. & REPLACEMENT

SEE FIGURE 17 ON THE FOLLOWING PAGE.

1. Place the selector switch in the NOTCH position and allow machine to retract to the end of the stroke. **TURN THE MACHINE'S POWER OFF!**
2. Raise the notcher guard (1) to its up position.
3. Remove the notcher table (2).
4. Remove the bolts (5) holding the lower blade holder (8) and remove it.
5. The lower blades (6 & 7) can now be replaced or rotated, to expose a new cutting edge.
6. Remove the top blade (3). The top blade cannot be rotated and must be replaced, if damaged. Before installing a new top blade, check the arm for possible wear. If there is no wear, install the new blade on the arm.
7. Place the disconnect switch in the ON position and both selector switches in the START position. Power the machine.
8. Place the selector switch in the NOTCH position. Jog the arm down to a point where the top blade (3) is parallel with the bolster. **TURN THE MACHINE'S POWER OFF.**
9. Replace the lower blade holder (8) with the blades (6 & 7) installed. Start the mounting bolts (5). **DO NOT TIGHTEN.**

10. Manually align the lower blades to the upper blades, with equal clearance all the way around. A clearance of twenty five thousandths (.025) of an inch (.6mm) is recommended. The lower blades may require shimming to achieve the proper clearance. Tighten the blade holder bolts (5) to approximately 100 foot pounds (136 N·m) of torque. Recheck the alignment.
11. Install the notcher table (2) and close the guard (1).

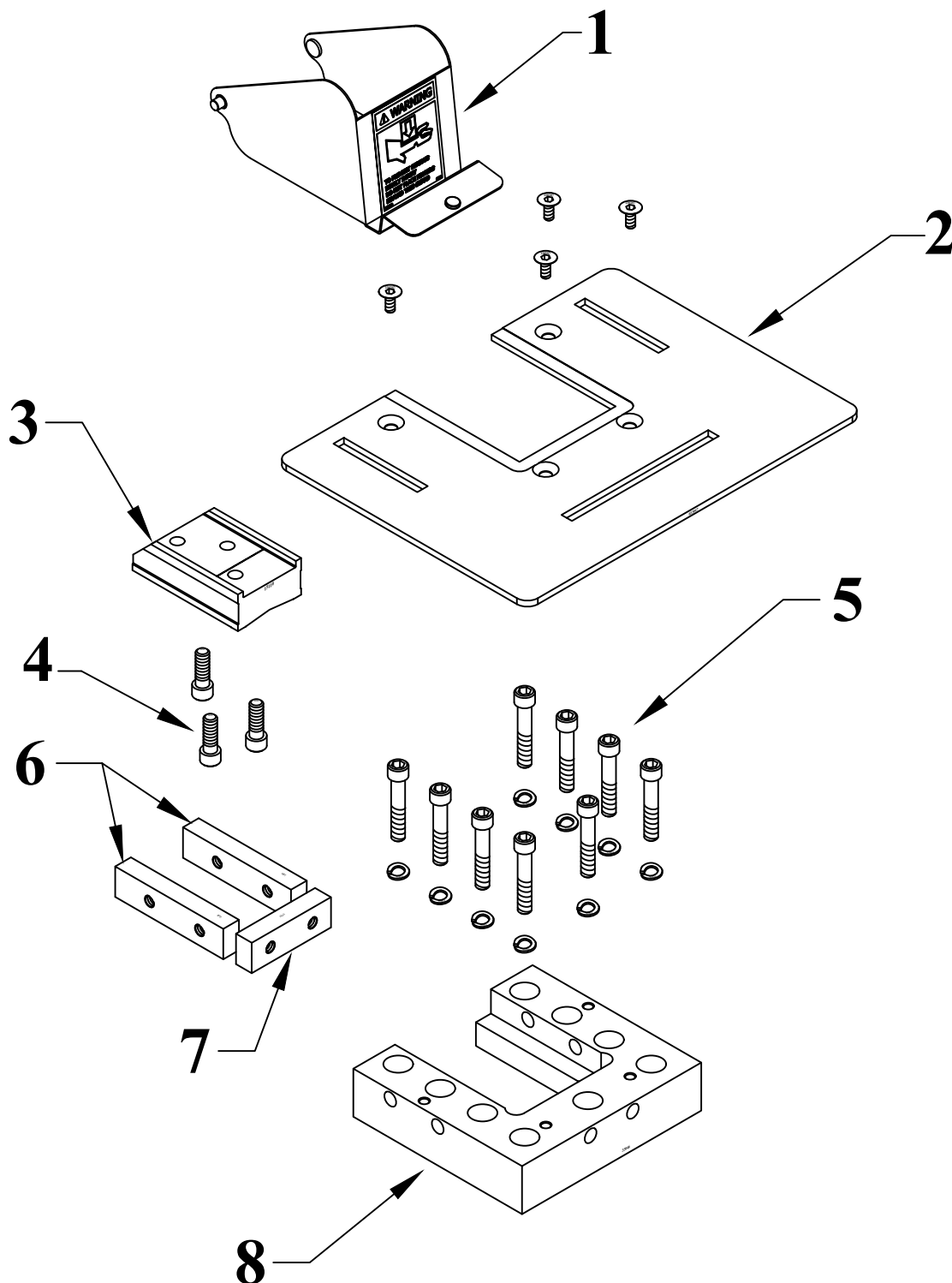


FIGURE 17

7.0 OPTIONAL TOOLS

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

When using the tool station, remove the punch and die.

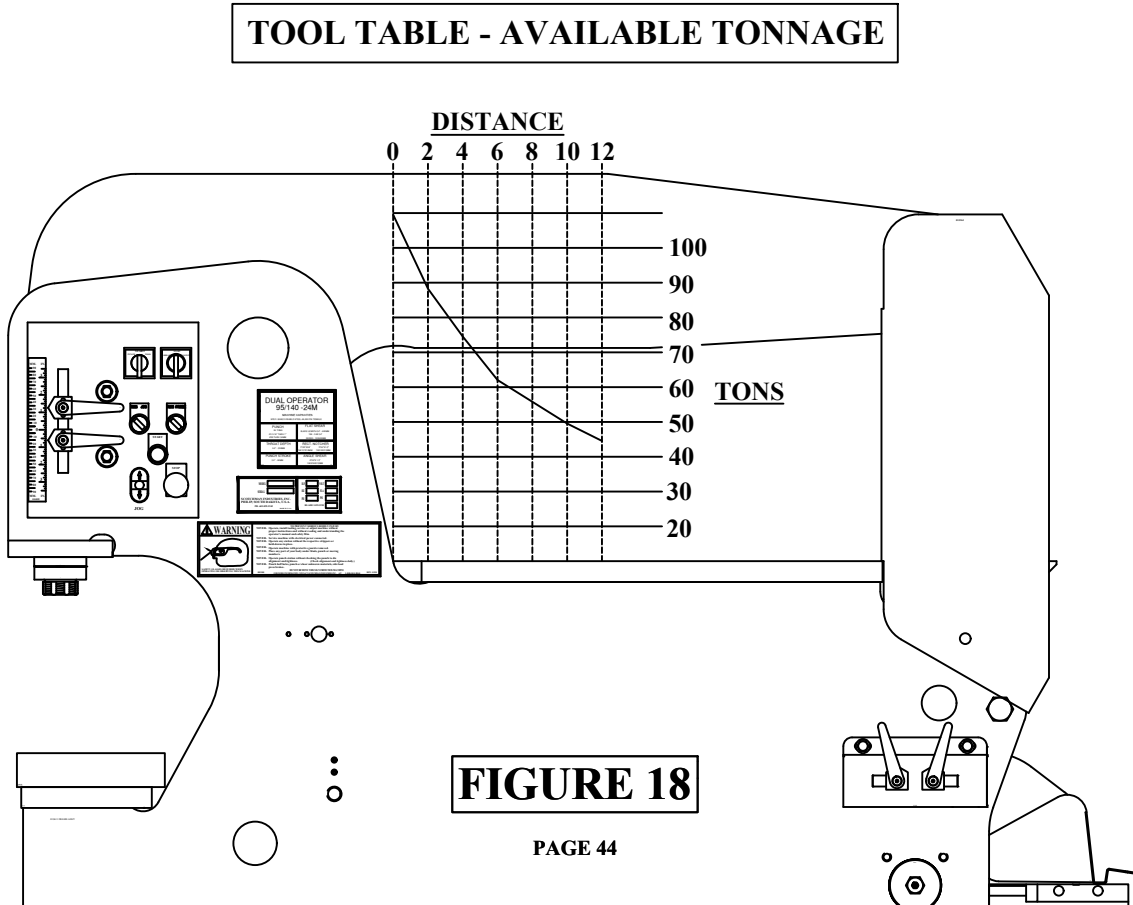
As with all functions on this machine, SAFETY GLASSES ARE REQUIRED when using optional tools of any type.

Each self contained tool has its own stroke and tonnage requirements. This section will over the operation and location of each tool. On the following page, there is a graphical illustration of the available tonnage at locations along the upper arm.

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

SEE FIGURE 18 BELOW.

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



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 1/2 inch (152 x 152 x 12mm) mild steel angle iron.

The selector switch must be in the TOOL position and the upper arm in the UP position to operate this tool.

7.1A 6 X 6 ANGLE SHEAR INSTALLATION

SEE FIGURE 19 ON THE NEXT 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 (1).
2. The selector switch must be in the TOOL position and the arm in the UP position to operate this tool.
3. Slide the tool under the arm and as close to the machine's frame as possible.
4. The tool is held in place with the finger clamps (2) 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 assembly squarely under the 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 tool and the arm 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" or 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. We have (4) optional top blades available for cutting unequal length angle iron that will accommodate most sizes. We also have a P/N 026708 "Quick Change" kit available that is a real time saver. With this kit changing from a standard to an unequal length blade can be done much faster.

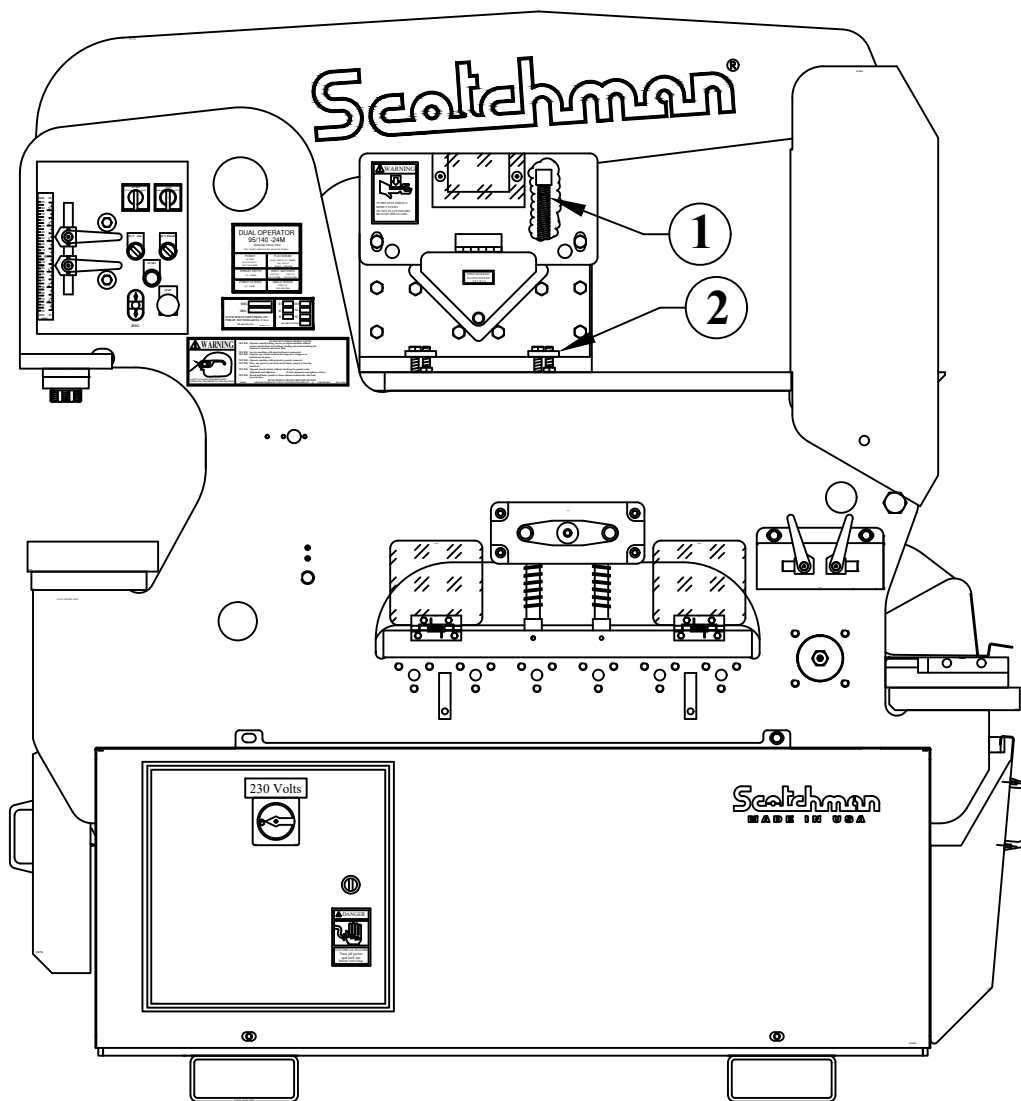


FIGURE 19

FOR AVAILABLE BLADES, SEE THE #40 TOOLING PARTS MANUAL.

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

- **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. ALWAYS REMOVE THE TOOL WHEN IT IS NOT IN USE.**

7.1C 6" A.S. MITER ATTACHMENT ASSEMBLY

We have P/N 026737 Miter Attachment for the 6 X 6 Angle Shear that is very helpful in making miter cuts on angle iron. It bolts on to the front of the Angle Shear with (4) bolts and has (2) rest buttons that can be used on either side to help to make quick and accurate miter cuts. This helps in making a square shape or a "picture frame" out of angle iron. See Figure 19A below.

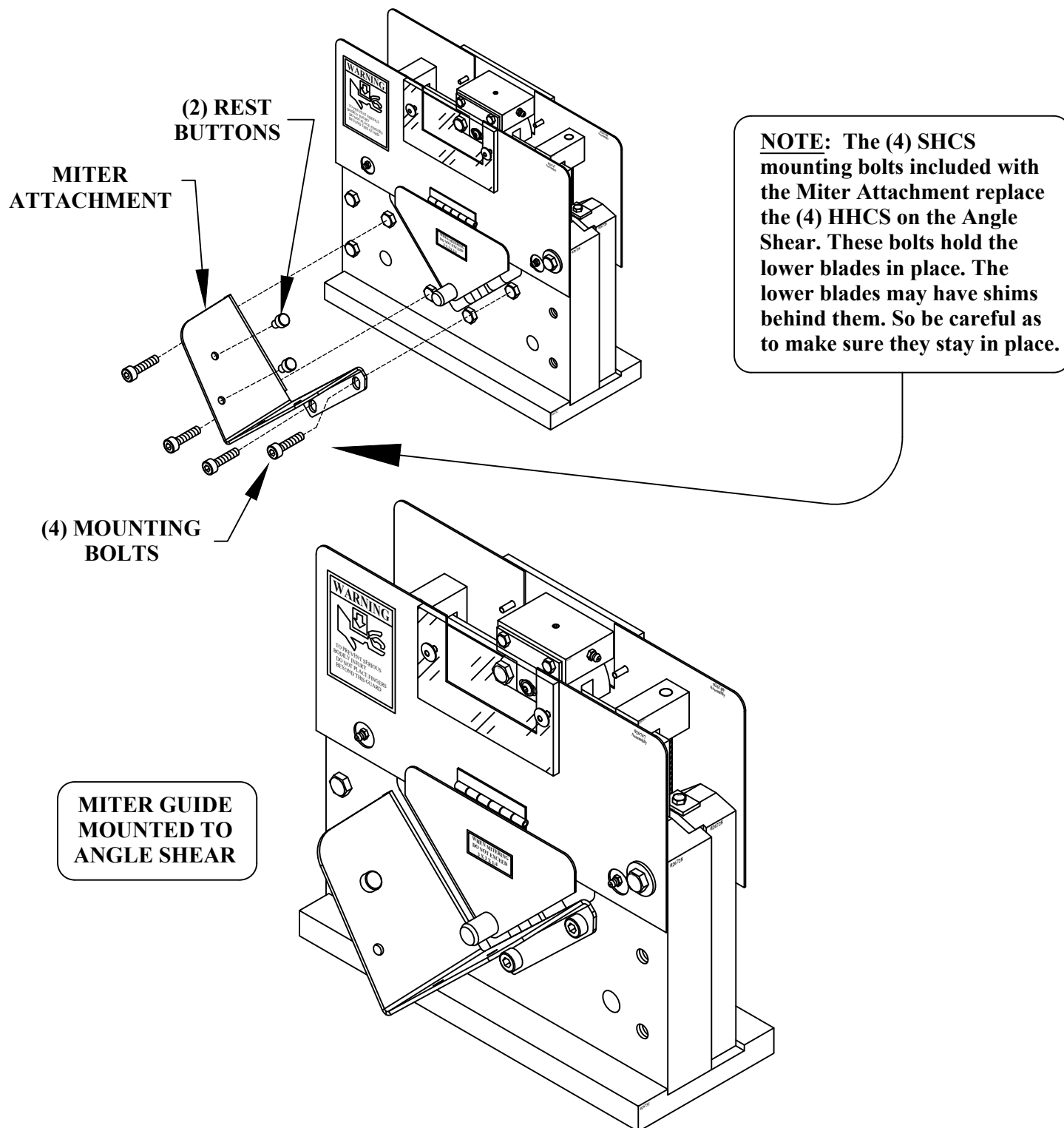


FIGURE 19A

7.2 ROD SHEAR

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 TOOL position to operate this tool.

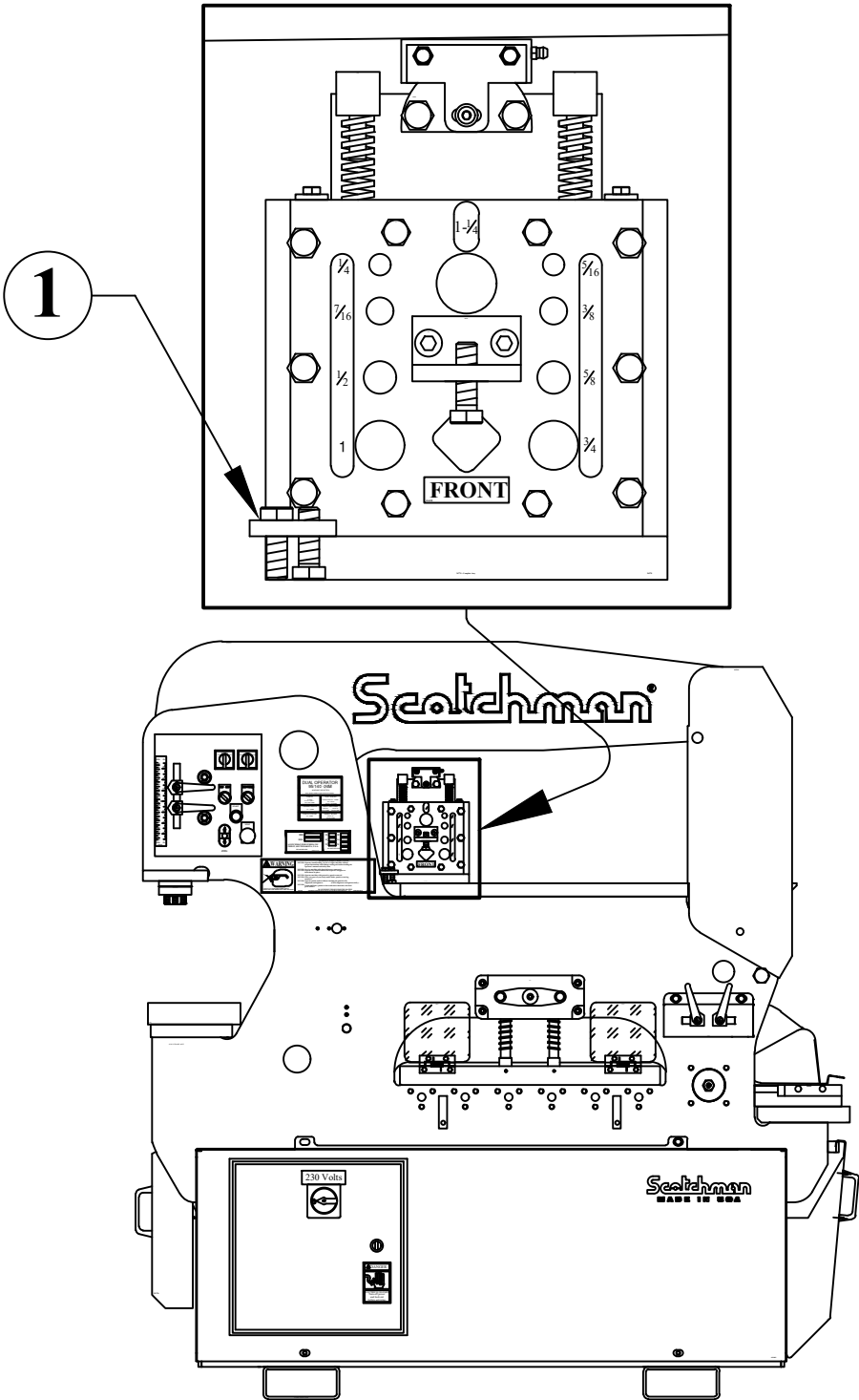


FIGURE 20

7.2A ROD SHEAR INSTALLATION

SEE FIGURE 20 ON THE PRECEDING PAGE.

The rod shear mounts in the tool station under the upper arm and is held in place with the finger clamps (1) provided.

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. Care must be taken to align the pressure block of the tool squarely under the upper arm.

- ▶ **CAUTION: 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 down stroke so that the cut can be made with a minimum amount of stroke.

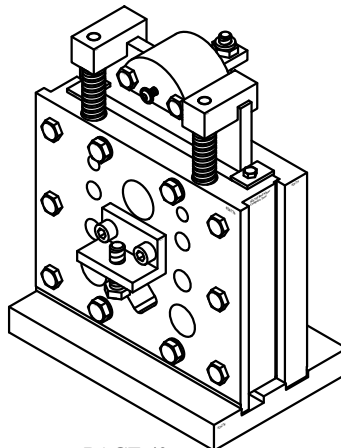
Failure to set the stroke of the machine will damage the tool.

7.2B ROD SHEAR OPERATION

Oil the blades before starting and every 10 to 15 cuts, thereafter. Grease the slider block between the tool and the arm 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 DROP-OFF SIDE. IF THIS HAPPENS, THERE IS A POSSIBILITY OF INJURY TO OTHER PERSONNEL AND DAMAGE TO THE TOOL. ALWAYS REMOVE THE ROD SHEAR 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.



7.3 6 X 6 90° V - NOTCHER

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 90° V - NOTCHER INSTALLATION

SEE FIGURE 21 ON THE FOLLOWNG 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 mounted on the tool table, the selector switch for the PUNCH/TOOL station must be in the TOOL position.

When the notcher is mounted in the punch station, the selector switch for the PUNCH/TOOL station 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 pusher is attached to notcher by the notcher clip (1) and the pusher assembly should be under 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 (6) provided. The pusher (2) and beam block (5) should be installed as shown in FIGURE 21.

To mount the notcher in the punch station, first remove the punch, die, die holder and stripper. Mount the short punch pusher (3) with the jam nut. Mount the notcher to the punch table with the front of the notcher extending past the front of the punch table about a 5/16 inch. SEE FIGURE 21. Secure the notcher to the punch table with the heavy washer and bolt (7) provided. Punch pusher (3) and notcher pusher (4) should align as shown with the punch pusher toward the front of the notcher pusher. After the notcher is mounted, install the neoprene slug pad.

7.3B 6 X 6 90° V - NOTCHER OPERATION

Lubricate the blades before starting and every 10 to 15 cuts, thereafter. 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 with a magnetic probe or tongs after every cut.

- ▶ **DO NOT REMOVE THE SLUGS BY HAND.**
- ▶ **ALWAYS REMOVE THE NOTCHER 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.**

6 X 6 90° V - NOTCHER

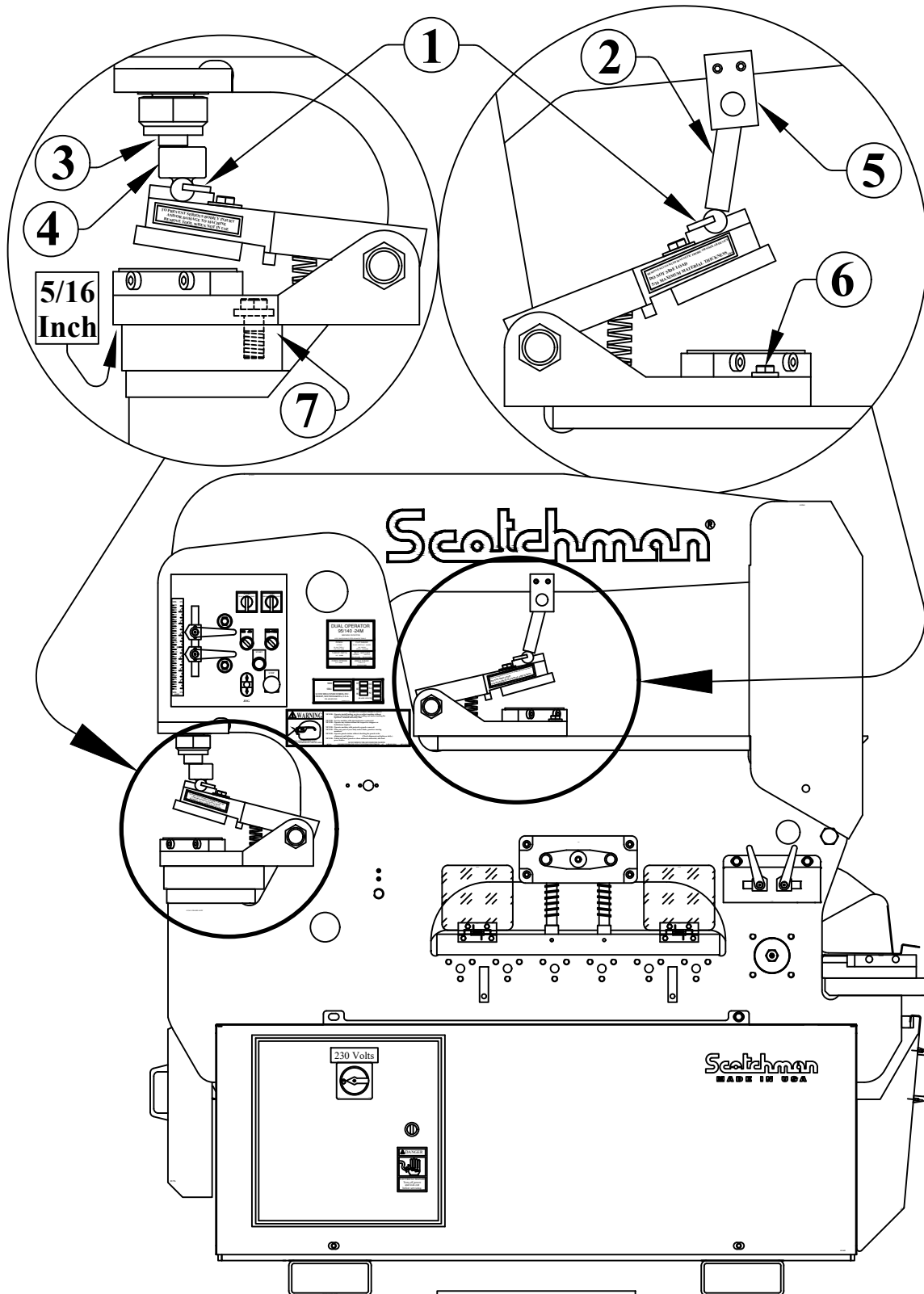


FIGURE 21

7.3C BLADE REPLACEMENT

The lower blades of the 6 x 6 ninety degree notcher are symmetrical. They can be rotated to expose (4) cutting edges.

The upper blade has (2) 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. Raise and lower the upper casting several times by hand, to check blade alignment. After alignment, tighten the back-up set screws to make sure that the upper blade does not move.

7.4 12 & 24 INCH BRAKES

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

7.4A BRAKE INSTALLATION

SEE FIGURE 22 ON THE NEXT PAGE

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

There are two lengths of brakes available for this model: 12 and 24 inch. The brakes mount under the upper arm in the tool station and are held down with the finger clamps provided. For maximum tonnage available, mount the 12 inch brake as close to the frame as possible. The PUNCH/TOOL selector switch must be in the TOOL position to operate this tool. Care must be taken to align the tool squarely under the upper arm. There is a press brake tonnage chart - PLEASE SEE FIGURE 23 - that will be helpful when using a brake on this machine. On this model, the 12 inch brake has 65 tons of force and the 24 inch has 45 tons.

7.4B BRAKE OPERATION

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

Hold short pieces with tongs or a similar device. When 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, a slight tap on the upper die is usually 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 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 down stroke 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.

ALWAYS REMOVE THE 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.

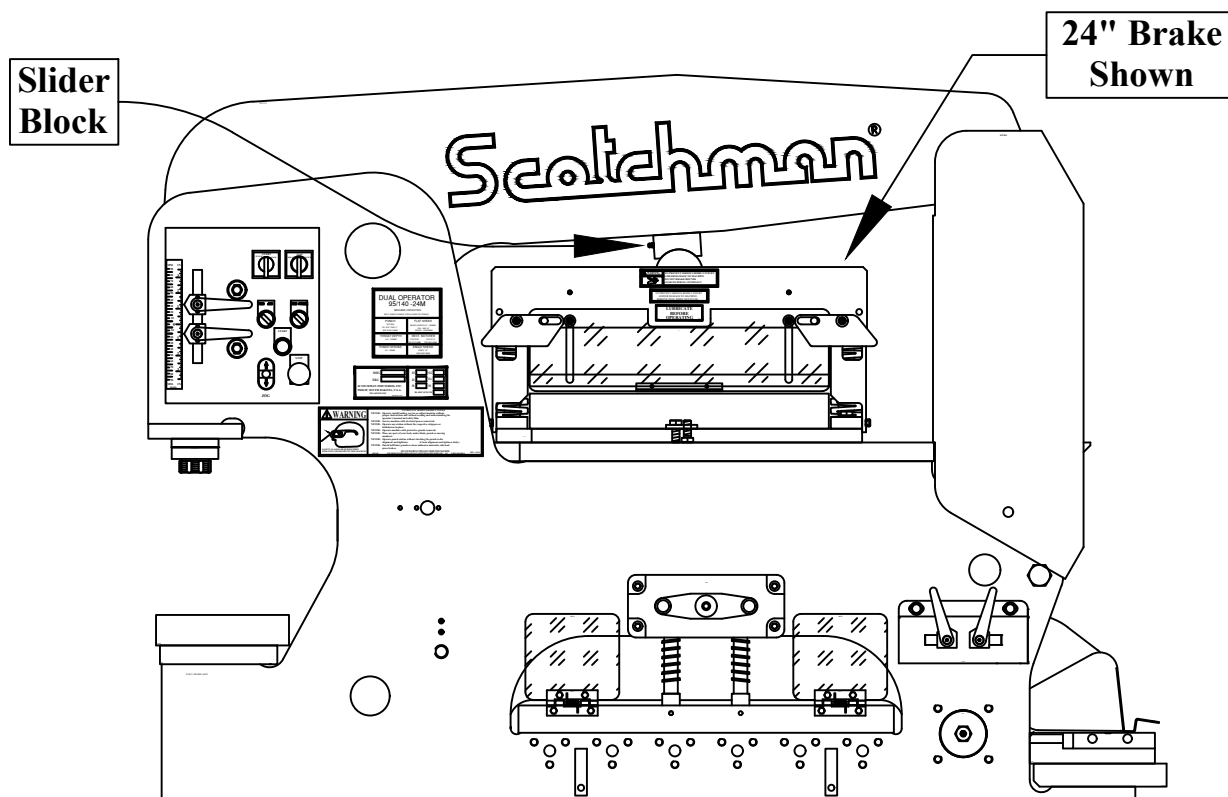


FIGURE 22

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	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

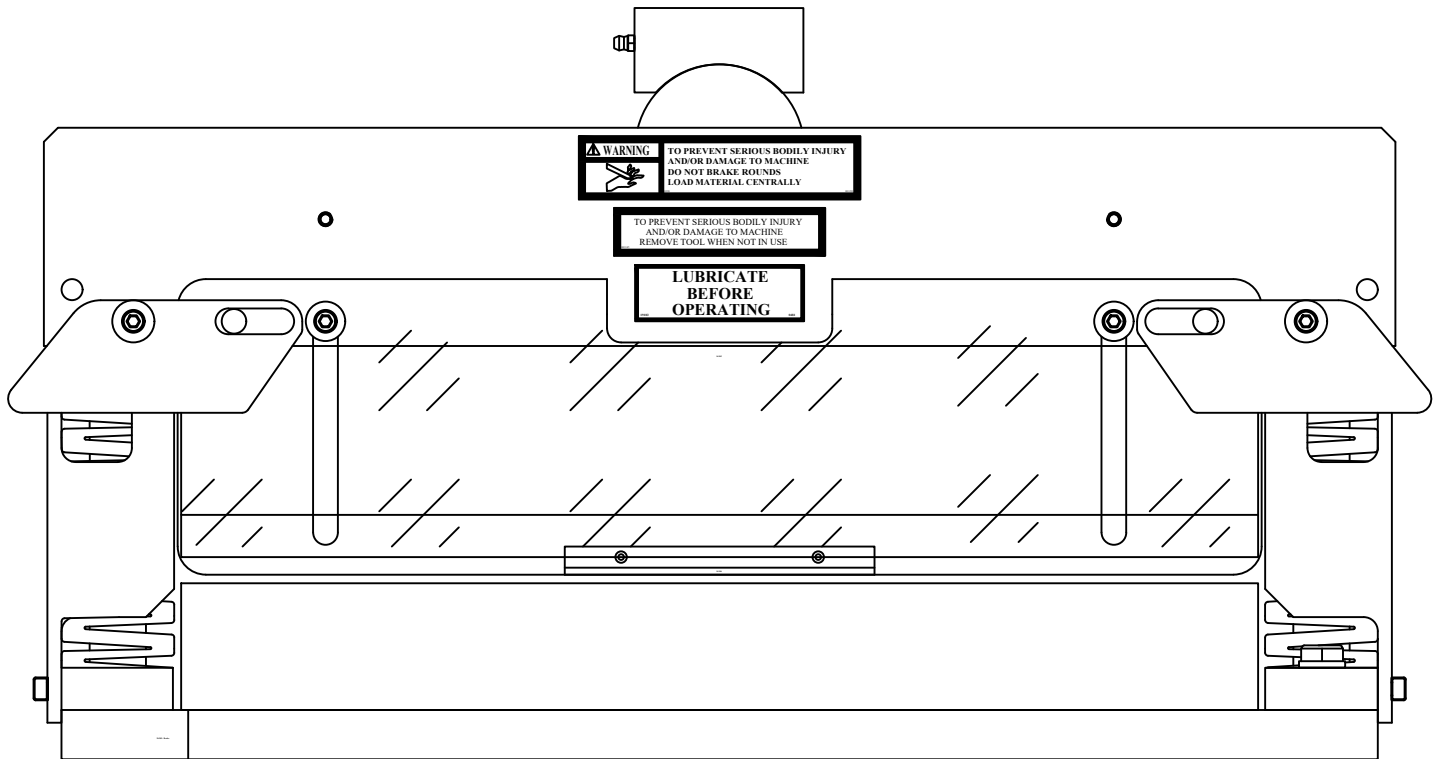
PRESSURES HIGHLIGHTED ARE FOR DIES WITH FEMALE DIE OPENINGS APPROX. 8 TIMES METAL THICKNESS, WITH RADIUS ON MALE DIE EQUAL TO METAL THICKNESS, AND ARE CONSIDERED IDEAL FOR RIGHT ANGLE BENDING.

BENDING PRESSURES REQUIRED FOR OTHER METALS AS COMPARED TO 65,000 P.S.I. TENSILE MILD STEEL ON CHART:

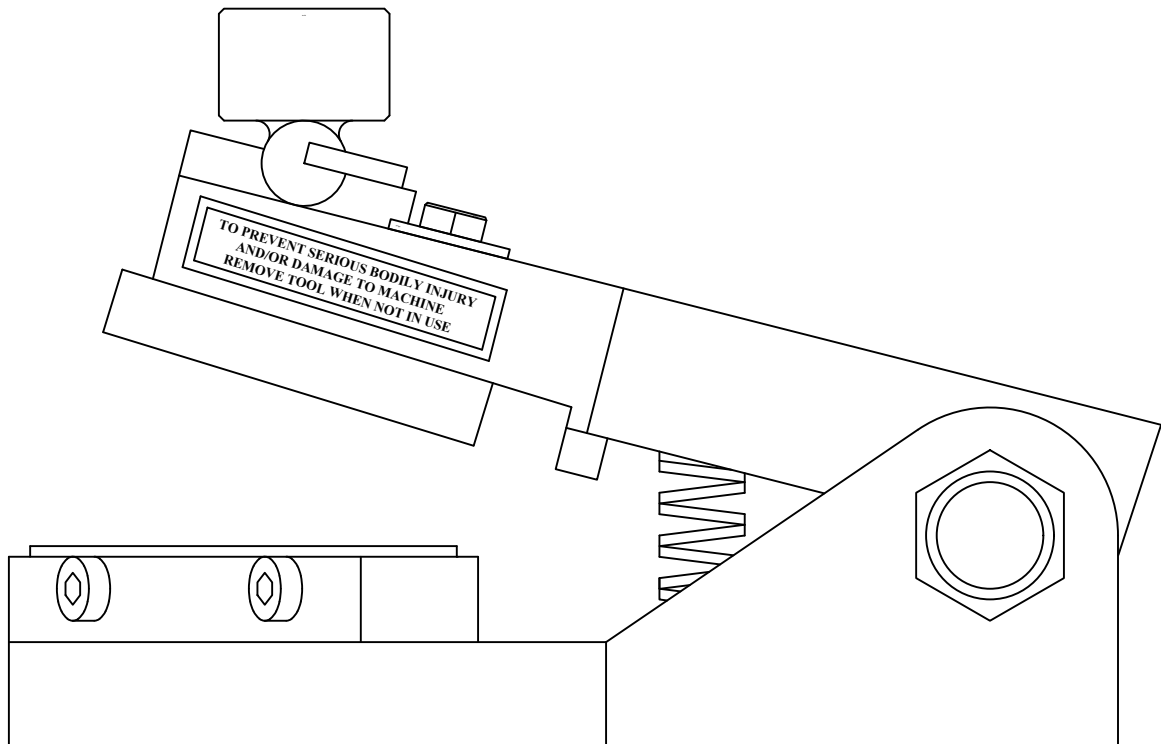
SOFT BRASS.....50% OF PRESSURE LISTED
 SOFT ALUMINUM.....50% OF PRESSURE LISTED
 ALUMINUM ALLOYS (**HEAT TREATED**) ..SAME AS STEEL
 STAINLESS STEEL.....50% MORE THAN STEEL
 CHROME MOLYBDENUM.....100% MORE THAN STEEL

FIGURE 23

026303 - 24" BRAKE W/2" DIES



026375 - V NOTCHER



7.5 OPEN END BRAKE

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

7.5A OPEN END BRAKE INSTALLATION

SEE FIGURE 24 ON THE FOLLOWING PAGE.

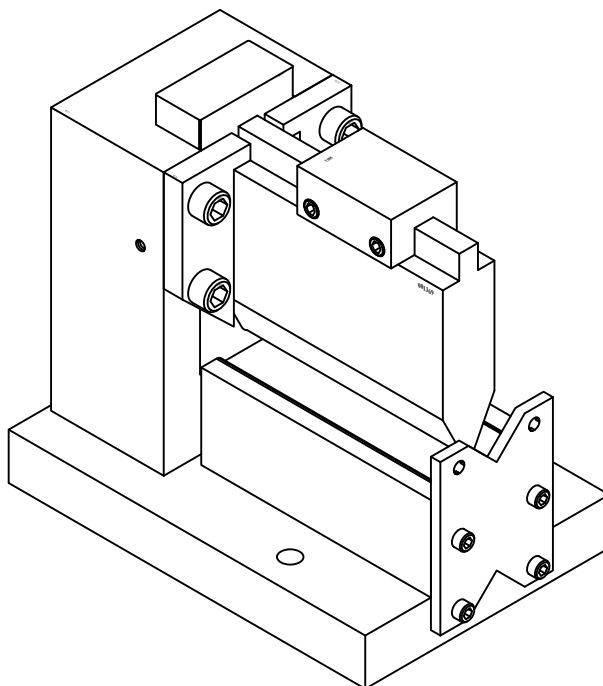
This brake mounts in the punch station and the selector switch must be in the PUNCH position to operate this tool. The die holder, punch retaining nut and the stripper must be removed to install this tool. Mount the tool so that it lines up directly under the punch ram and anchor it to the punch bed with the finger clamps provided.

7.5B OPEN END BRAKE OPERATION

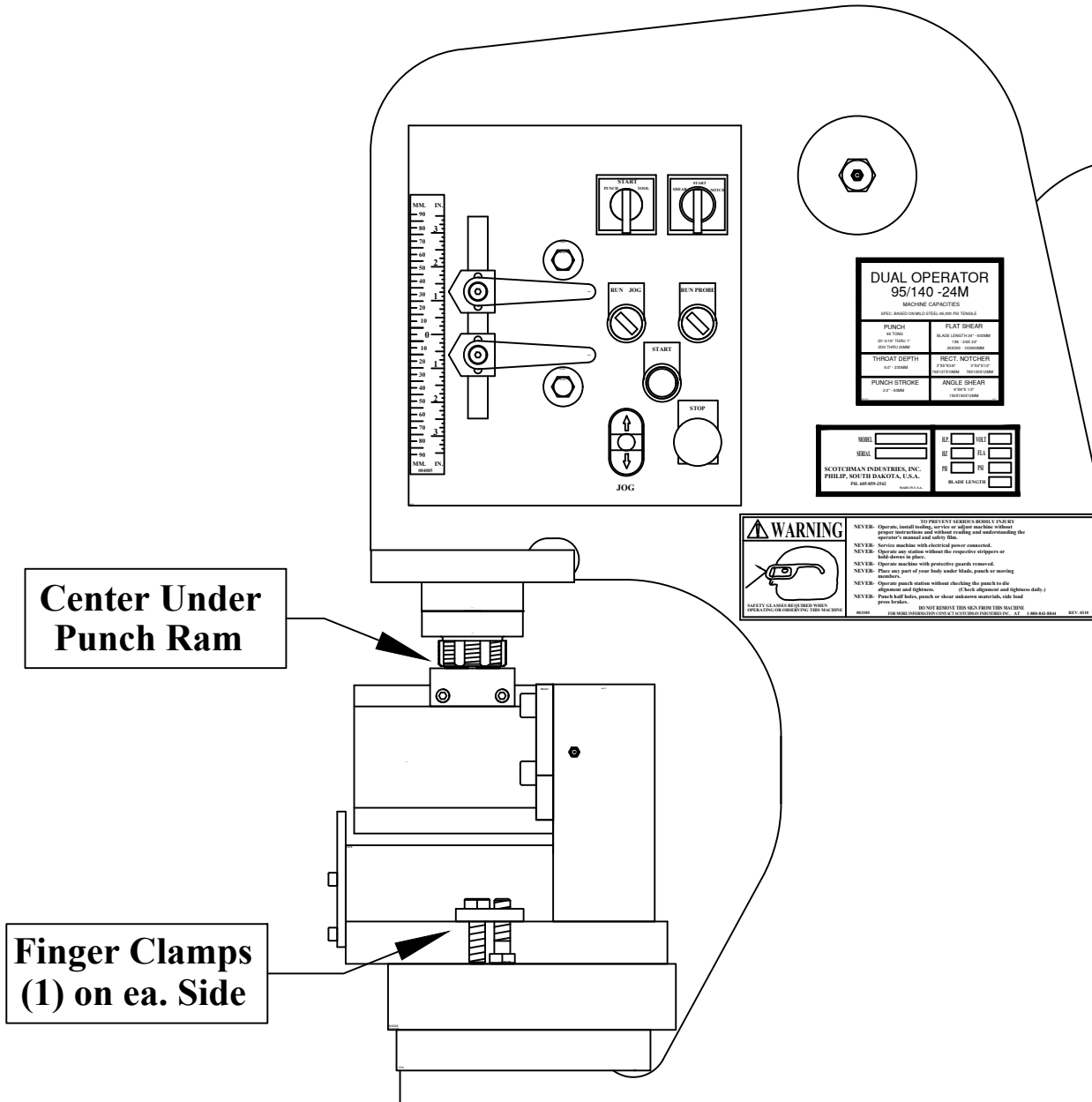
The down stroke of the machine must be set, to prevent damage to the tool. Grease the brake guides every two hours of operation.

- ▶ ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE!

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



OPEN END BRAKE



Tool is designed to bend notched angle iron to a 90° angle as shown below.

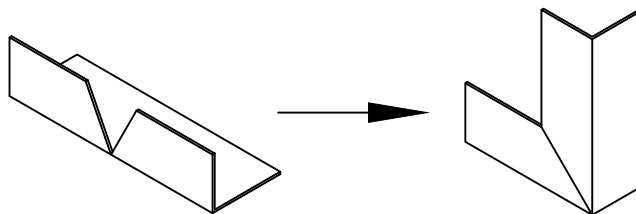


FIGURE 24

7.6 CHANNEL SHEAR

The Channel Shear is a component tool designed to shear 2 to 6 inch (51 to 152mm) standard channel on this model. The PUNCH/TOOL selector switch must be in the TOOL position to operate this tool.

7.6A CHANNEL SHEAR INSTALLATION

SEE FIGURE 25 ON THE NEXT PAGE.

The channel shear installs under the upper arm in the tool station. The PUNCH/TOOL selector switch must be in the TOOL 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. PLEASE SEE "UPPER BLADE ASSY" in FIGURE 25. 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 hand crank to the cylinder end of ironworker. Make sure that the slug slot in the tool aligns with the slug slot in the tool table. Care must be taken to squarely align the tool under the upper arm. Anchor the tool with the finger clamps provided.

7.6B CHANNEL SHEAR OPERATION

The channel shear will shear from 2 to 6 inch (51 to 152mm) standard channel with minimum distortion. Lubricate the blades before the first cut and every 10 to 15 cuts, thereafter. Grease the slider block between the tool and the arm every two hours of operation.

The following are BASIC STEPS IN SHEARING WITH THE CHANNEL SHEAR.

A. ADJUST BOTH THE 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 vertical side blades with the hand crank up to the flange of the channel. Loosen the (4) fixed vertical blade clamps (two in front & two in back with three bolts each) and 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 perpendicular position to the lower blades.

B. 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 work piece.)

CHANNEL SHEAR

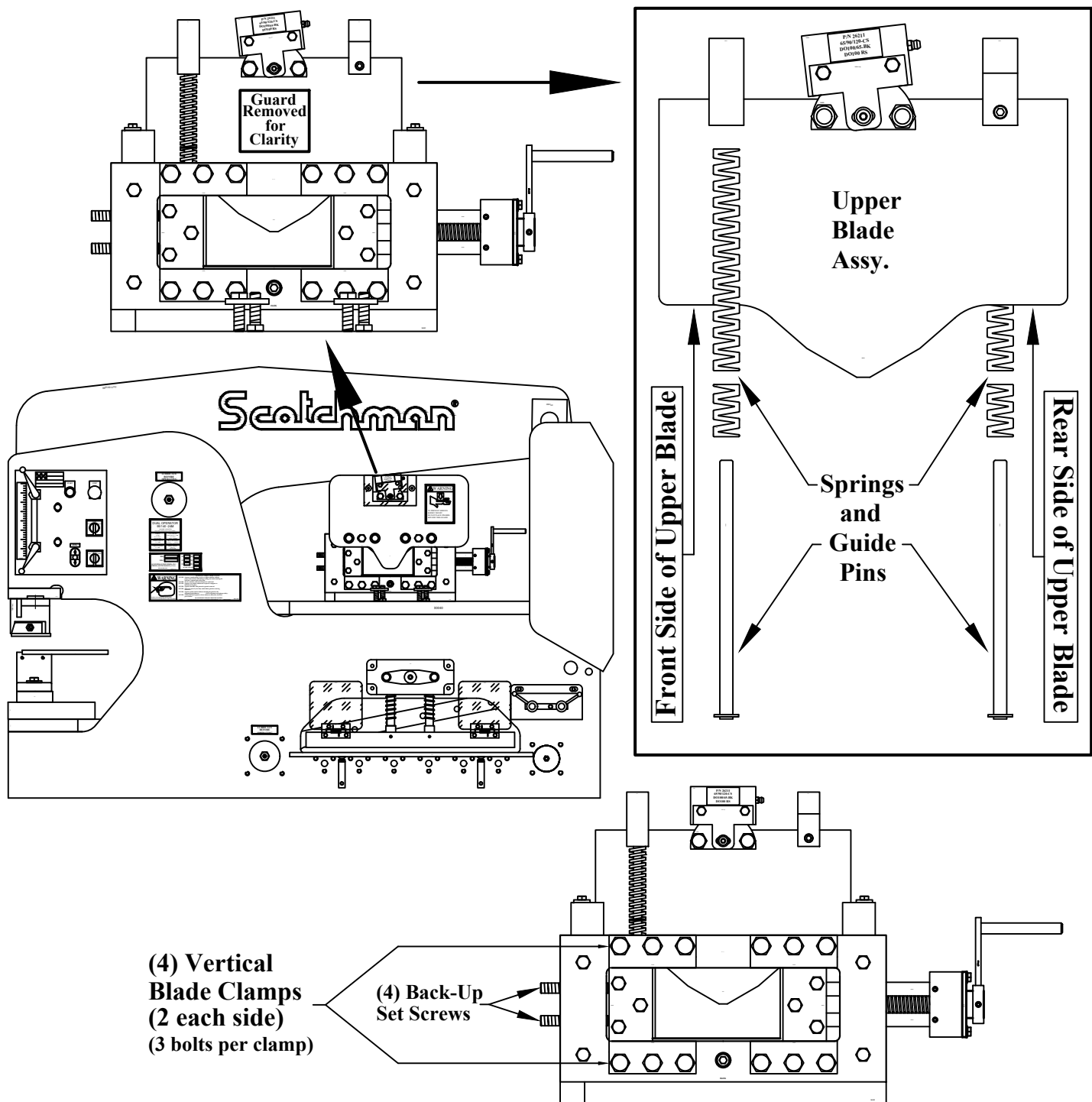


FIGURE 25

C. 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. The upper stroke should be set to allow the workpiece to feed freely through the shear.

D. PROCEDURE FOR SHEARING.

Lubricate the blades 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.

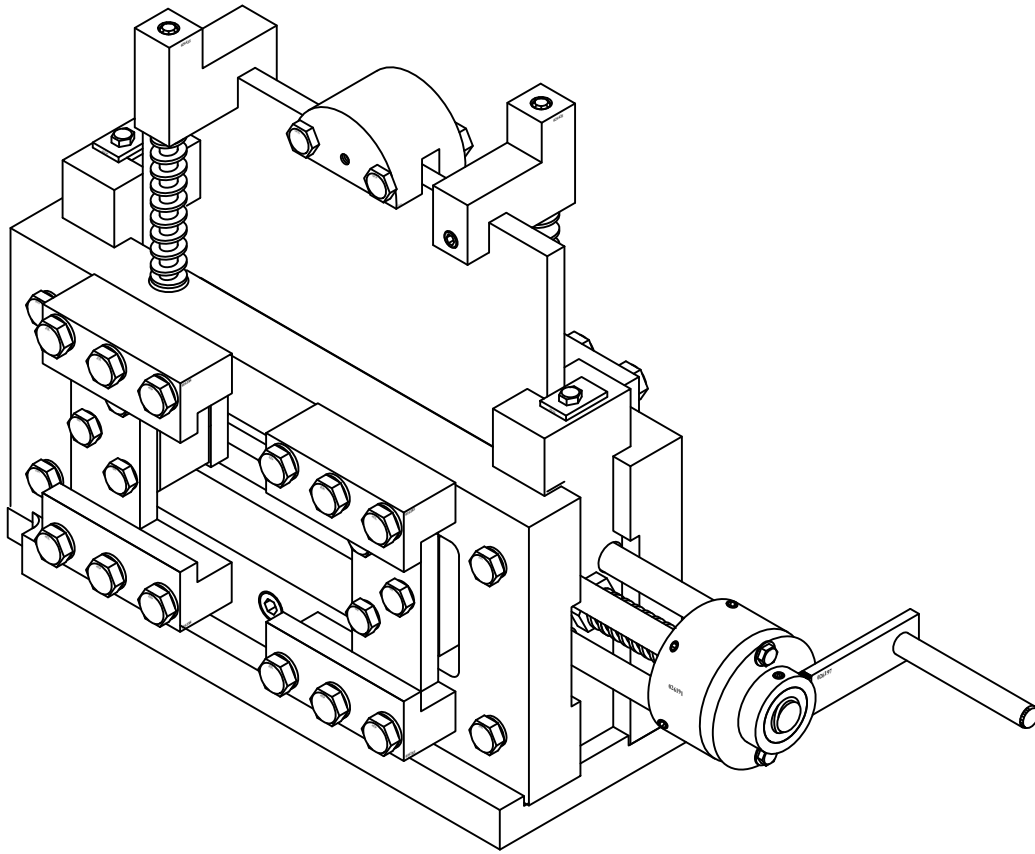
► A FEW SPECIAL PRECAUTIONS ◀

- 1. The stationary blade adjustment on the tool must be made so that the point of the upper blade makes contact with the channel directly in the center of the web.**
- 2. The crank adjustment must be used to clamp up the material prior to the cut and loosened after the cut.**
- 3. Any systems used to feed the material must hold the material at a true horizontal plane.**
- 4. Do not place any part of your body in or near the blade and return spring area.**
- 5. Lubricate the blades every 10 to 15 cuts for maximum blade life.**

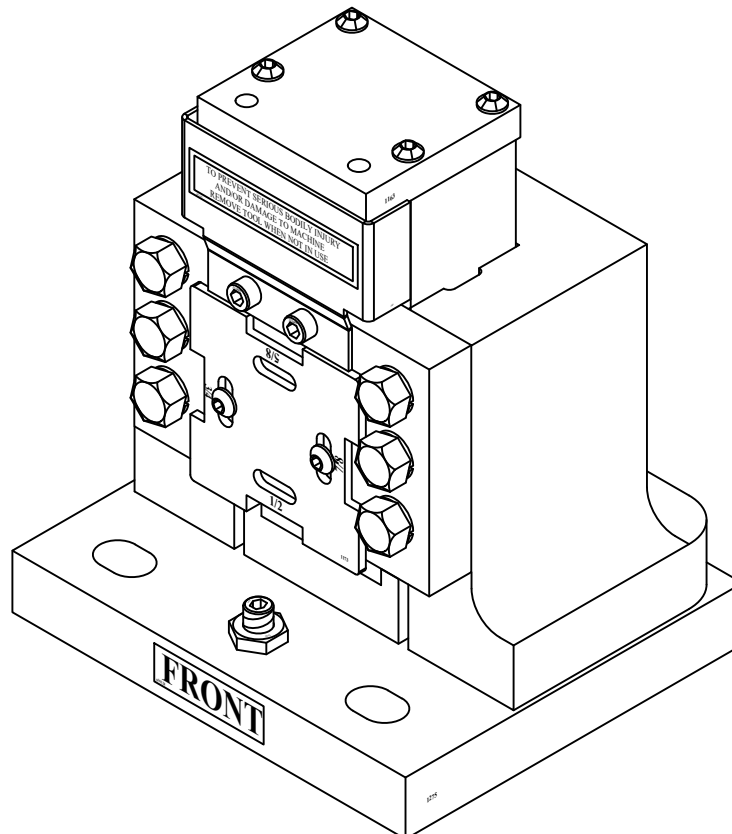
► CAUTION: TO PREVENT POSSIBLE INJURY TO PERSONNEL AND DAMAGE TO THE TOOL, THIS TOOL MUST BE REMOVED WHEN IT IS NOT IN USE.

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

026372 - 6" CHANNEL SHEAR



001293 - PICKET TOOL HOUSING



7.7 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 pipe and tubing, also. For prices and availability, Contact your local dealer or the factory.

7.7A PIPE NOTCHER INSTALLATION

SEE FIGURE 26 ON THE NEXT PAGE.

The pipe notcher can be installed in either the punch station or under the upper arm. When installed on the tool table, the PUNCH/TOOL selector switch must be in the TOOL position. When installed in the punch station, the PUNCH/TOOL 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 (2) on the punch ram using the #45 punch retaining nut (1). Attach the riser (3) to the tool. Set the notcher on the bolster and align the slug hole in the notcher with the hole in the bolster. Anchor the tool with the finger clamps (4) that are provided.

To mount the notcher on the Tool Table, attach the riser (3), the spacer (6), and the pusher (5) to the tool and align the slug hole in the tool with the slug hole in the tool table. See "Tool Table Configuration" on the middle-right in Figure 26 on the next page. Anchor the tool to the tool table with a bolt and washer (7) that are provided.

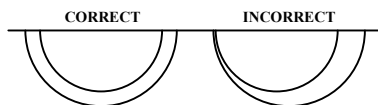
- ▶ **CAUTION: WITH THE TOOL MOUNTED IN EITHER STATION, IT IS NECESSARY TO SET THE DOWNSTROKE OF THE MACHINE TO PREVENT DAMAGE TO THE TOOL. THE UPPER DIE SHOULD NOT PASS THE LOWER DIE BY MORE THAN 1/32 OF AN INCH (.7MM).**

7.7B PIPE NOTCHER OPERATION

PLEASE READ CAREFULLY BEFORE USING.

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 upper die. Lift out the upper die assembly and the two springs (1/2 x 3"). Clean the unit with solvent.
- B. After cleaning the unit, always check the alignment of the upper and lower dies. To check the alignment, insert the upper die and holder, without the springs, into the housing and check for equal gap. SEE ▶▶▶



The upper die should have a 3/16" pin that aligns with a groove in the lower die to insure alignment. 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

Two inch (2") Schedule 80 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.

- ▶ 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.**

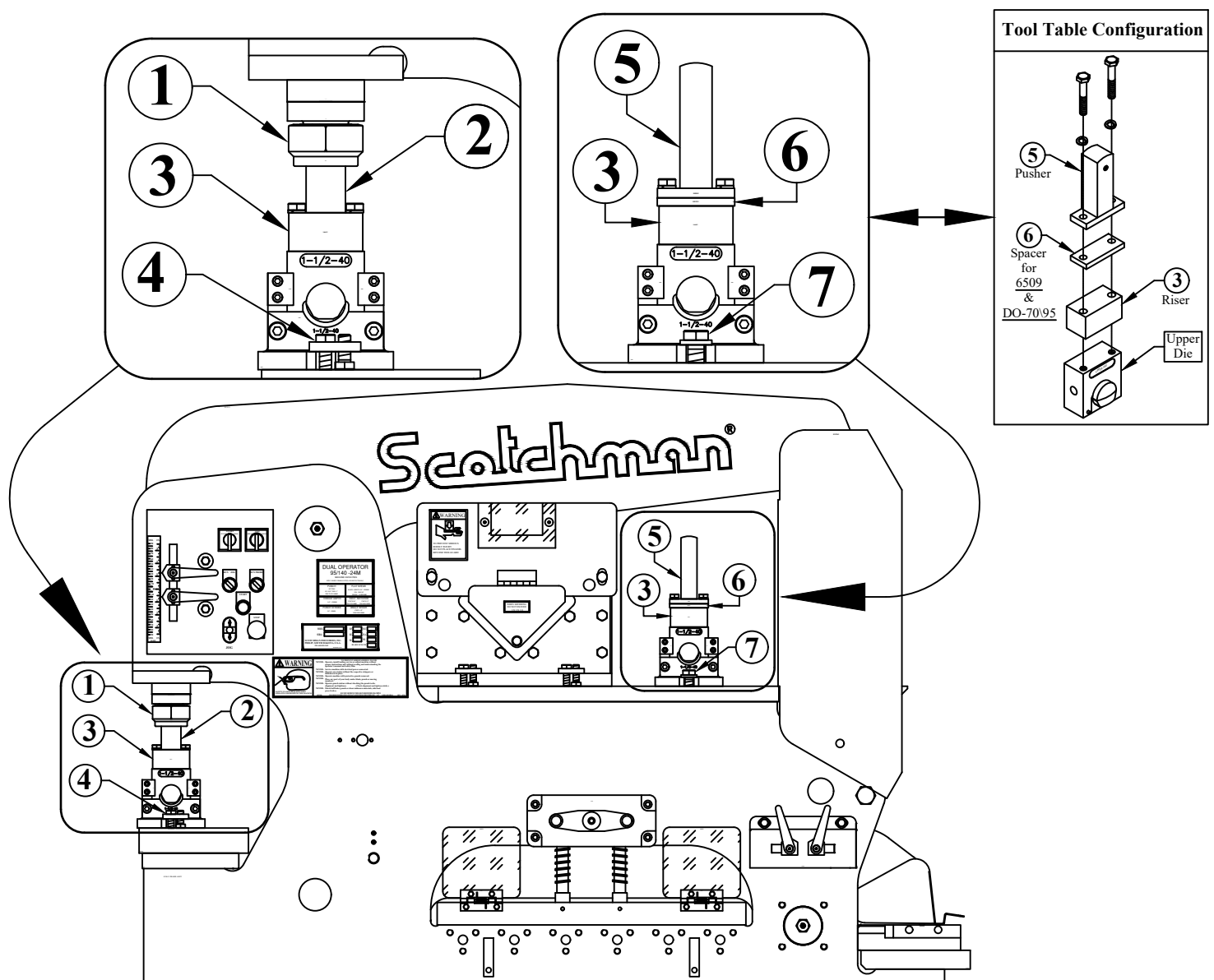


FIGURE 26

7.8 PICKET FENCE TOOL

The picket fence tool is designed to put picket fence points on square tubing from 1/2 to 1 inch (12 to 25 mm). This tool is mounted in the punch station and operated with the PUNCH/TOOL selector switch in the PUNCH position.

7.8A PICKET FENCE TOOL INSTALLATION

SEE FIGURE 27 ON THE NEXT PAGE.

1. Remove the die holder, stripper and punch retaining nut.
2. Install the punch pusher (2), using the #45 punch retaining nut (1).
3. Install the tool so that the punch pusher (2) aligns with the ram on the picket tool.
4. Anchor the tool to the punch bed with the finger clamps (4) provided as shown.

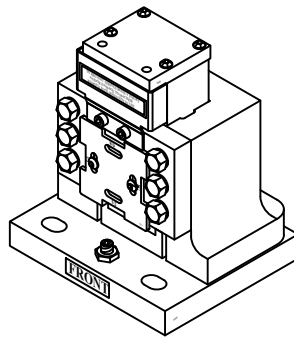
7.8B PICKET FENCE TOOL OPERATION

► **CAUTION: THE DOWNSTROKE OF THE MACHINE MUST BE SET BEFORE OPERATING THIS TOOL. FAILURE TO SET THE DOWNSTROKE OF THE MACHINE WILL RESULT IN DAMAGE TO THE TOOL AND POSSIBLE INJURY TO PERSONNEL.**

1. Rotate the tube guide (3) on the front of the tool to the size of the tube you are using. If you are using 1 inch (25mm) tube, then remove it.
2. Adjust the tube stop (5) just low enough to contact the upper edge of the tube when it's fed into the tool.
3. Adjust rest stop (6) so that it is approximately one half of the tube size below the lower die.
4. Feed tube into tool until it reaches the tube stop (5) and cycle the machine.
5. Make sure that the slugs eject from the tool as the next piece is fed into the tool.
6. Lubricate dies every 10-15 cuts - grease picket ram daily.
7. The maximum capacity is 1 inch (25mm) 16 gauge (.060 (1.5mm)) tubing!!

► **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.



PICKET FENCE TOOL

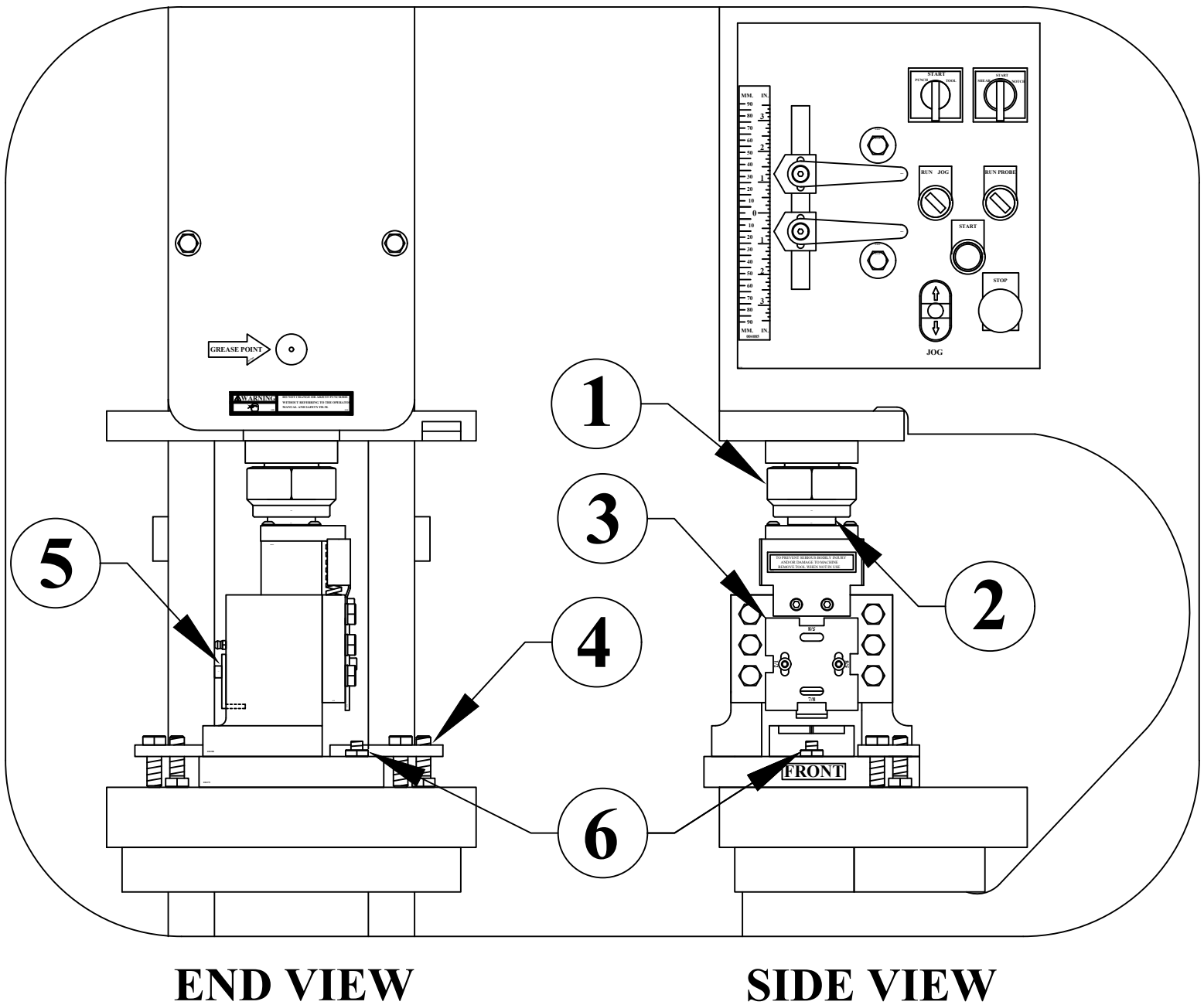


FIGURE 27

7.9 SQUARE TUBE SHEAR

The square tube shear is designed to shear square tubing from 1/4" to 2" (6mm to 51mm).

16 gauge (.060 or 1.5mm) is the maximum material thickness.

7.9A SQUARE TUBE SHEAR INSTALLATION

SEE FIGURE 28 ON THE FOLLOWING PAGE.

The tool mounts on the tool table in place of the angle shear and is anchored with the finger clamps.

Lubricate the pressure block (1) before installing the tool and after every two hours of operation via grease zerk.

Make sure tool is mounted squarely & securely under the beam.

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.

Set the down stroke so that the upper blade (2) passes the lower blade (3) by approximately 1/8" (3mm).

7.9B SQUARE TUBE SHEAR OPERATION

1. The selector switch must be in the TOOL position to operate this tool.
2. Set the down stroke of the machine so that the upper blade (2) passes the lower blade (3) by approximately 1/8 of an inch (3mm). This is to insure tool will not "bottom out".
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.**

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

SQUARE TUBE SHEAR

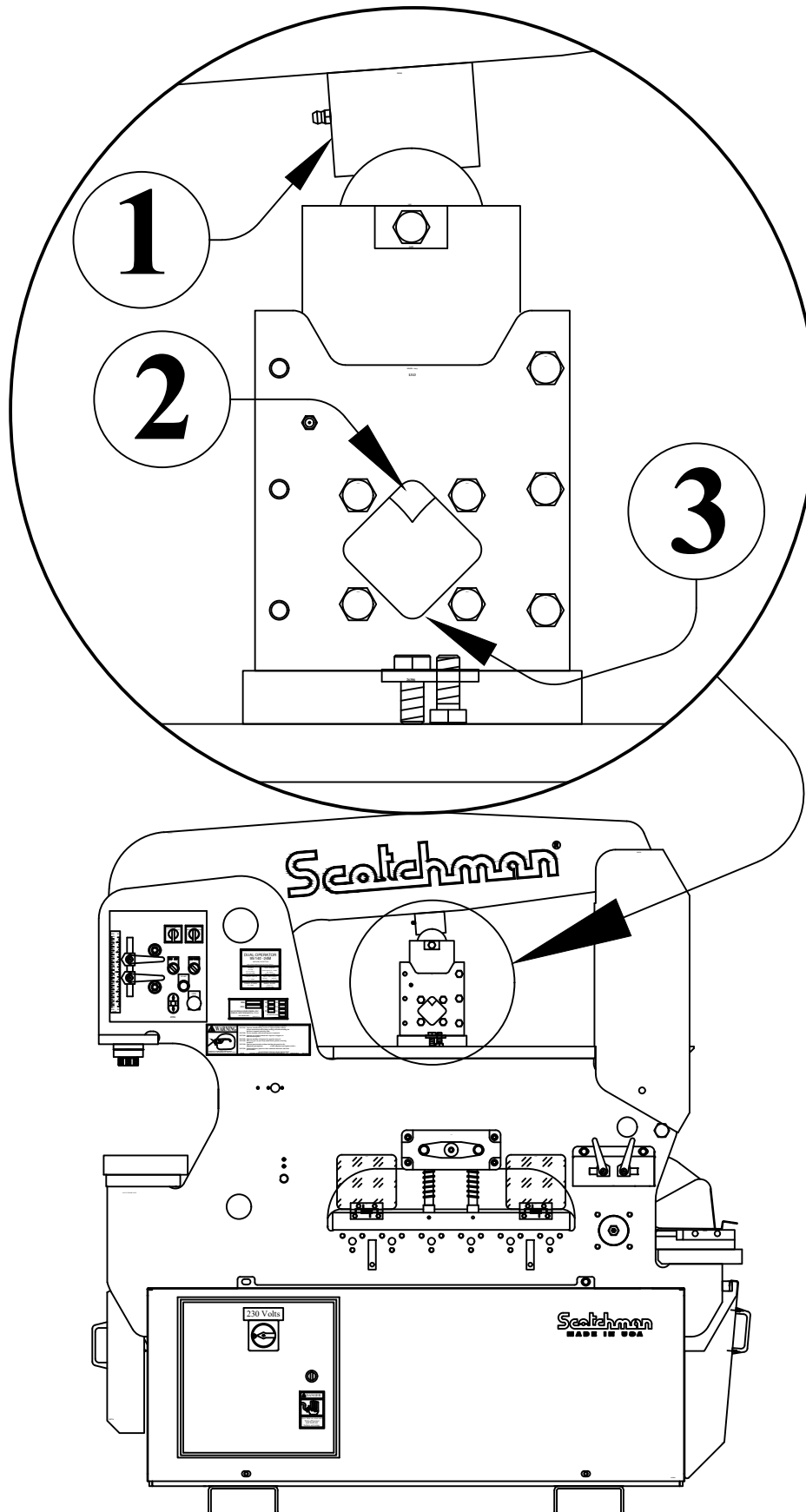


FIGURE 28

7.10 OPTIONAL DIE HOLDERS & PUNCH RETAINING NUTS

7.10A 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.

Use the same method of installing and aligning punches and dies as outlined in SECTION 6.1, with the following exceptions:

The punch retaining nut, punch and die must be inserted in the die holder before the machine is powered and placed in the PUNCH position.

The down stroke of the machine must be set to prevent damage to the tool and possible injury to the operator.

Because of its design, the maximum punching capacity of the offset die holder is forty (40) tons. SEE FIGURE 29

- ▶ **CAUTION: THE OFFSET DIE HOLDER MUST BE REMOVED WHEN IT IS NOT IN USE.**
- ▶ **FOR SIZES AND APPLICATION, SEE THE TOOLING PARTS MANUAL.**

7.10B 2-1/2 AND 3 INCH (63 AND 76 MM) DIE HOLDERS

Always follow the preferred method of aligning punches and dies. SEE SECTION 6.1.

The 2-1/2 and 3 inch (63 and 76mm) die holders are used in place of the standard die holder. These die holders are for oversized punching. SEE FIGURE 29

- ▶ **FOR SIZES AND APPLICATIONS, SEE THE #40 TOOLING PARTS MANUAL.**

7.10C 6 X 6 DIE HOLDER

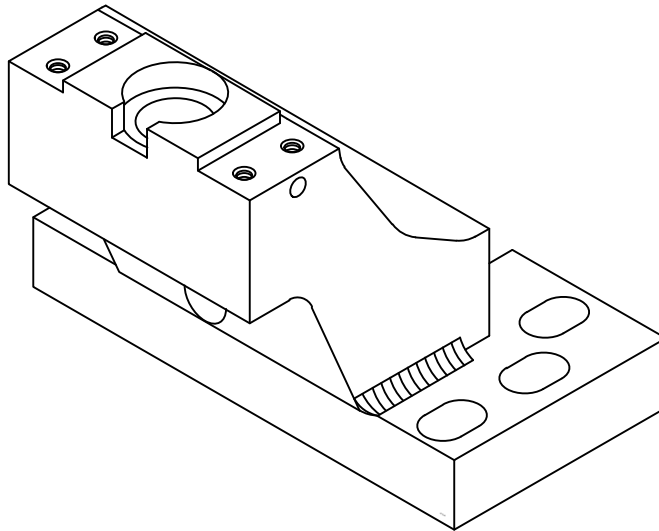
Always follow the preferred method of aligning punches and dies. SEE SECTION 6.1.

The 6 x 6 die holder is used in place of the standard die holder. This 6 x 6 die holder is provided with a riser plate that must be used with this model and mounted with the bolts provided.

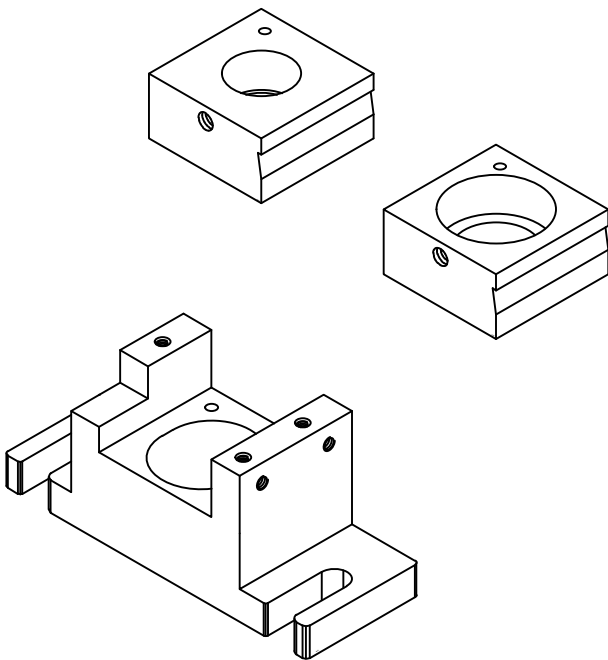
Capacities for oversize punching with this tool go up to 4 inches (102mm). SEE FIGURE 29

- ▶ **FOR SIZES AND APPLICATION, SEE THE #40 TOOLING PARTS MANUAL.**

OFFSET DIE HOLDER



2-1/2 AND 3 INCH DIE HOLDERS



6 x 6 DIE & HOLDER (up to 4" Dia.)

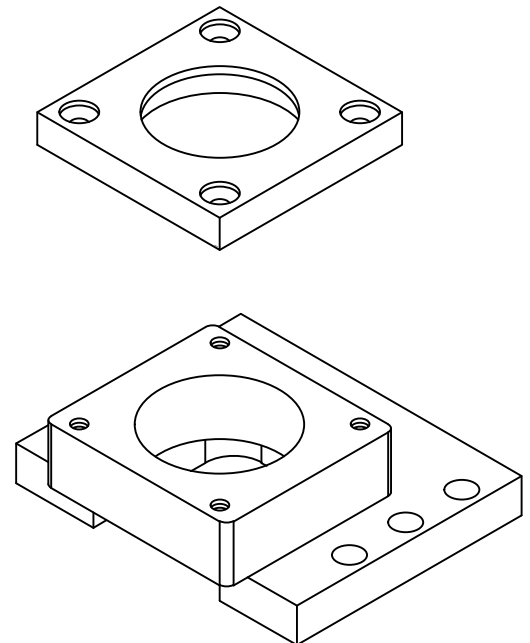


FIGURE 29

7.10D #45 PUNCH RETAINING NUT

The #45 punch retaining nut is of the same design as the #40 and is used in oversize punching applications. FOR REQUIREMENTS, SEE THE #40 TOOLING PARTS MANUAL.

7.10E HEAVY DUTY SPLIT RING RETAINING NUT

SEE FIGURE 30 BELOW

1. Remove the six socket head cap screws (1).
2. Slide the retaining nut (4) over the punch shank.
3. Place the split-ring (3) into the groove in the punch (5).
4. Place the ring nut (2) on the punch and replace the six socket head cap screws (1).
5. Use the heavy duty nut wrench (6) to tighten the split-ring retaining nut.
6. Follow the instructions in SECTION 6.1 to make sure of correct punch and die alignment.

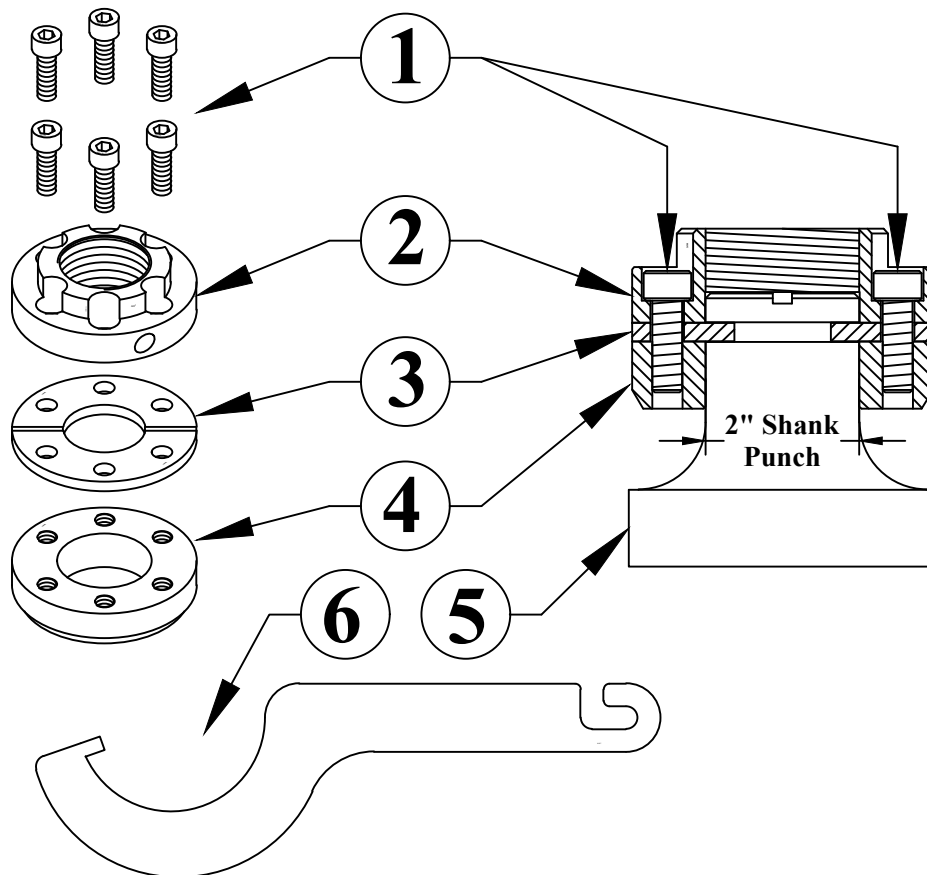
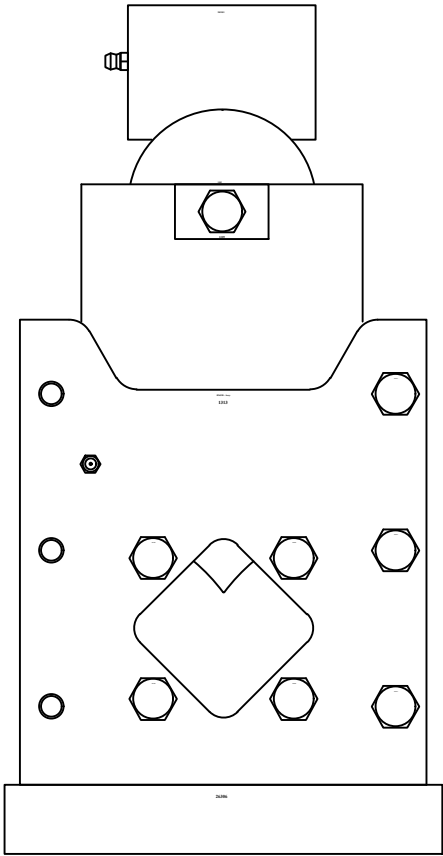


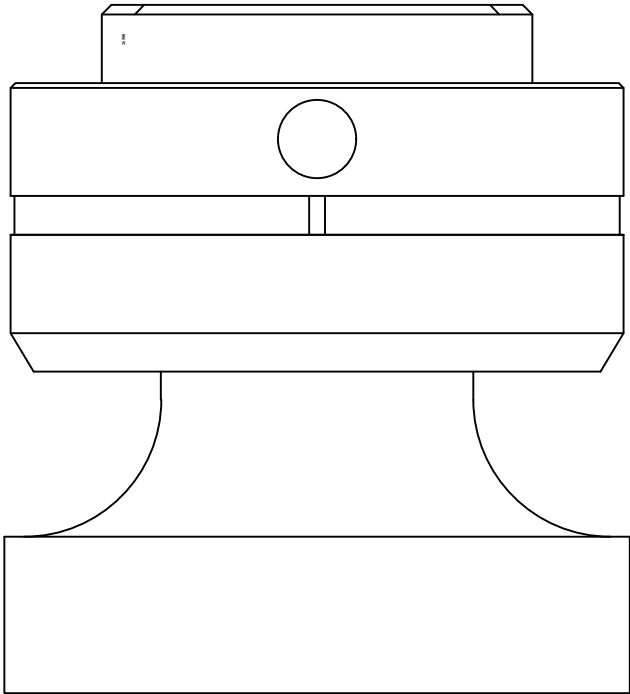
FIGURE 30

026350 - SQUARE TUBE SHEAR



026500 - HEAVY DUTY RETAINING NUT

(punch not included)

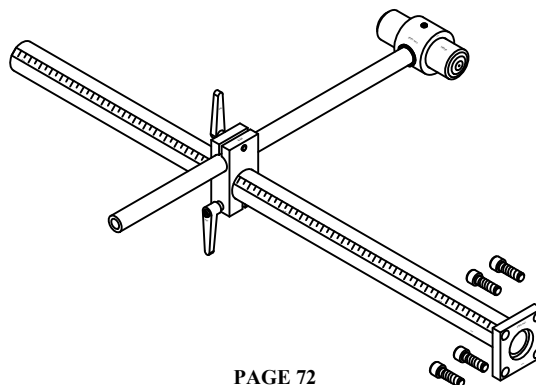


7.11 FORTY-EIGHT INCH BACK GAUGE

This back gauge (P/N 025603) is designed to fit a wide range of models. The mounting location is on the back, or drop off side, of the machine. Please see the attached drawing. A few models have two mounting locations, depending upon how far apart the work stations are. Because this is a universal tool, there are a few things you need to do to complete the set-up for your particular model.

1. First, mount the main tube, Item (7), to the machine, using the bolts provided.
2. Assemble the balance of the back gauge per the attached drawing.
3. Slide the balance of the assembly on the main tube (7) so that the slide block (6) is as close to the machine's frame as possible and lined up with the plate shear on your model. Lock the slide in place.
 - ▶ PLEASE NOTE that the locking handles are a ratchet type handle. If they contact the frame of the machine when tightening them, pull the handle out and ratchet it back to continue tightening.
4. Once the slide block (6) is tightened to the main tube, loosen the set screw (4) and slide the probe in as close the bottom shear blade as possible.
5. On some models, the probe will reach the lower shear blade. On these models, lock the set screw (4) with the probe against the shear blade and install the scale (8) on the main tube with 0 inches aligned with the slide block (6).
6. On models where the probe does not reach the lower shear blade, set the probe at a set distance away from the lower blade such as 1 or 2 inches (25 or 51mm). If the probe is 1 inch (25mm) from the lower blade install the scale with the 1 inch (25mm) mark aligned with the slide block (6).
7. When you move the probe to another station, you will have to re-calibrate the stop by moving the slide block (6) in to the preset point on your scale and loosening the set screw (4) and adjusting the probe accordingly.
8. The other important thing is to set the probe where it contacts the material you are going to cut. FIGURE 31 on the next page shows the recommended placement of the probe in relation to the material being cut. . If the probe is not properly set, the material can move the probe and cause changes in the length of your parts.

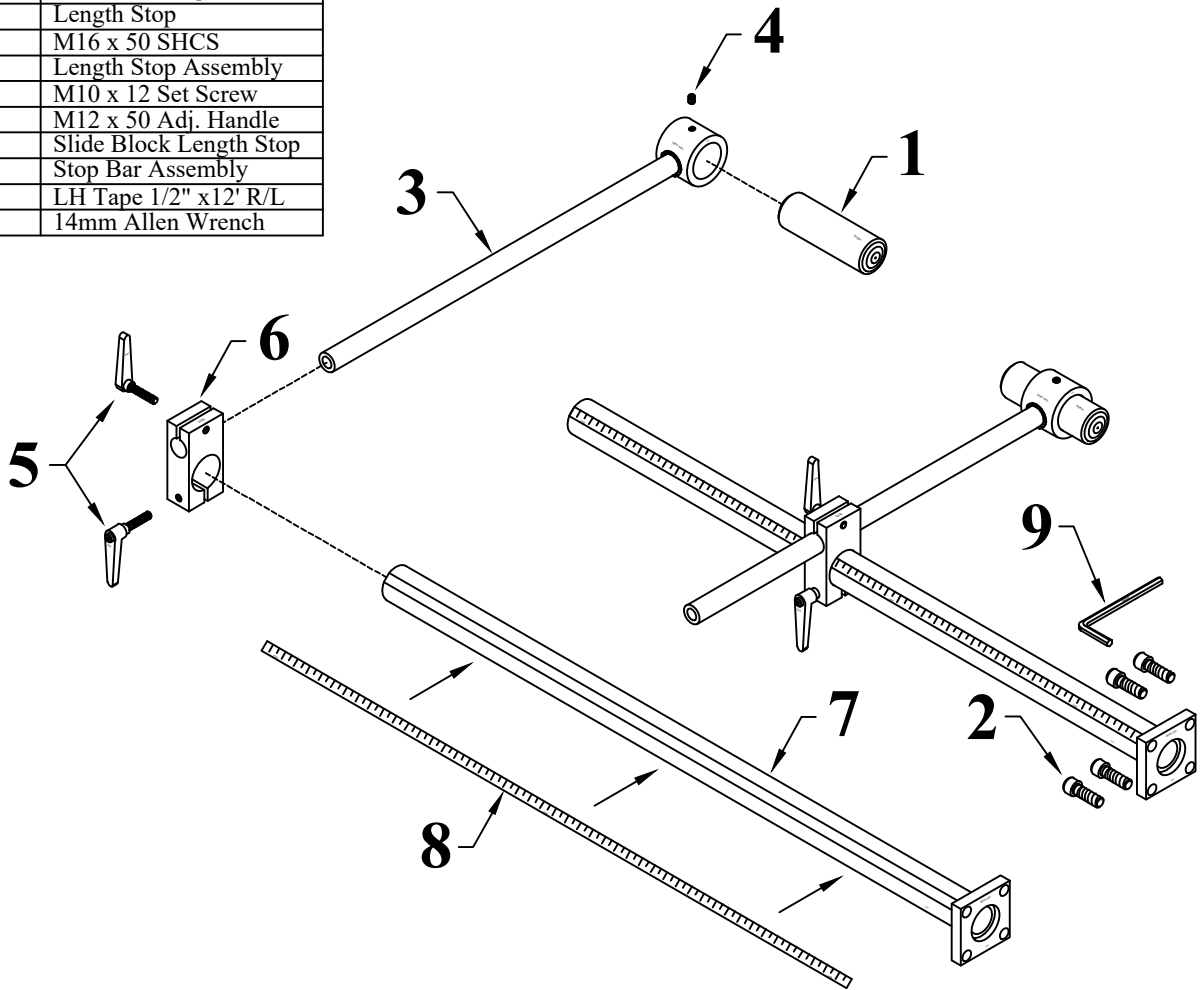
NOTE: There is also an Electric Back Gauge (P/N 026610) available for this machine. Contact your dealer, or call the factory at 1-605-859-2542 for more information.



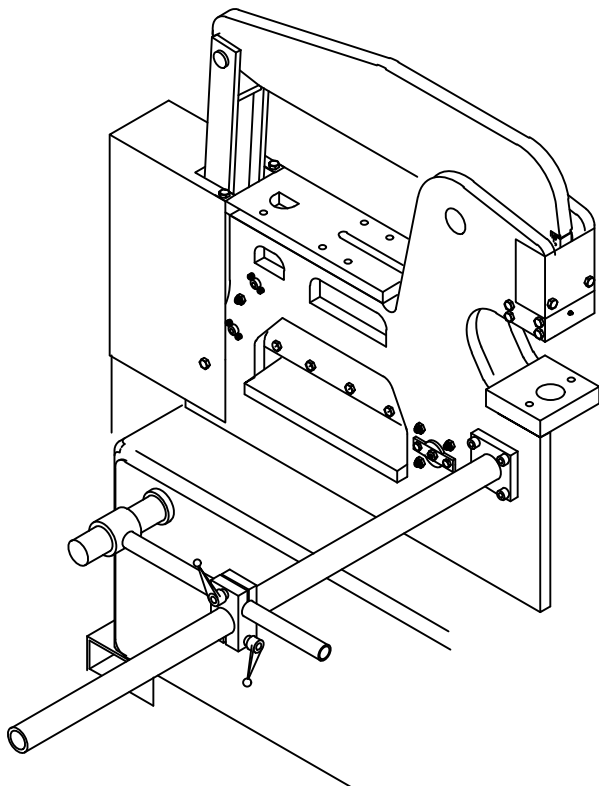
Parts List 025603 - Deluxe Back Gauge 48"

Item #	Qty	Part Number	Description
1	1	025324	Length Stop
2	4	221420	M16 x 50 SHCS
3	1	025317	Length Stop Assembly
4	2	219047	M10 x 12 Set Screw
5	2	025361	M12 x 50 Adj. Handle
6	1	025320	Slide Block Length Stop
7	1	025312	Stop Bar Assembly
8	1	029220	LH Tape 1/2" x 12' R/L
9	1	080189	14mm Allen Wrench

48 INCH BACK GAUGE



BACK GAGE MOUNTING



PROBE PLACEMENT

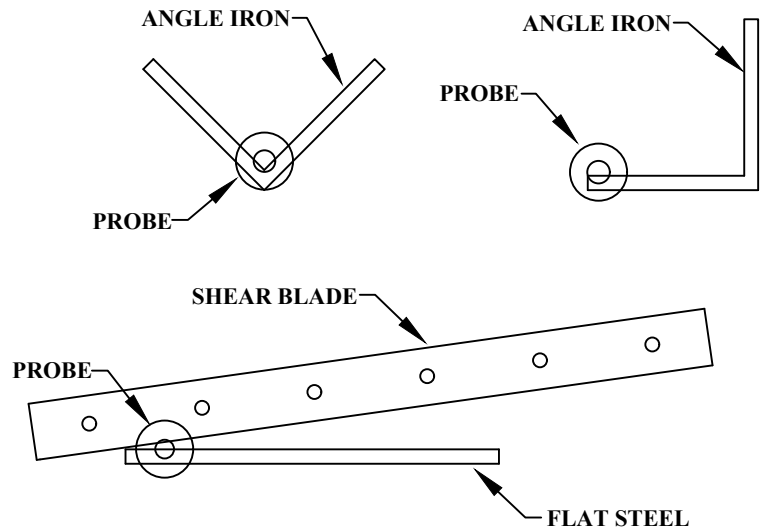


FIGURE 31

7.12 URETHANE STRIPPER

Scotchman does not recommend this unit for all general punching applications. However, using this specially designed "Non Deform" stripper unit does offer a significant advantage over a standard stripper arrangement in reducing distortion when punching a confined pattern or series of holes in flat bars or plates.

- **NOTE: THIS STRIPPER ONLY WORKS WITH #40 TOOLING. THE MAXIMUM HOLE SIZE THAT CAN BE PUNCHED ARE 1-1/4 (31mm) ROUND AND OVAL AND 3/4 (19mm) SQUARE.**

The action of this unit will minimize distortion in the work piece and in many cases eliminate costly correction and straightening processes. Of course, there is a limit to how much material can be removed in a confined area without causing some deformation. Contact your local Scotchman dealer for advice. Combining this unit with a linear feed repetitive stop system for punching a series of holes in flat bar will significantly increase productivity. Because of the action of this type of unit, particular attention must be paid when setting the stroke length. The stripper unit moves in conjunction with the punch and extra care must be taken by the operator. (Refer to the setting and operating instructions in this section.)

The maximum thickness which can be punched using this unit is 3/4" (19mm) in steel with a rated tensile strength of 65,000 psi.

7.12A INSTALLING THE URETHANE STRIPPER, PUNCH & DIE

1. Raise the top limit switch to its highest position. Power the machine and let the punch ram retract to its full UP position.
2. Open the standard stripper and remove it from the machine by removing the left hand mounting bolt.
3. If there is a punch and die installed in the machine, remove them. Remove table from die holder (1).
4. Loosen the two bolts (2) holding the die holder and replace the die holder.
5. Remove the punch ram adapter (3) from the end of the punch ram.
6. Disassemble the urethane stripper by removing the two M12 bolts (4) and large washers (5).
7. Install the stripper mounting plate (6) and the punch ram adapter to the punch ram with the bolts provided.

8. Select the proper punch and die. Make sure that there is proper clearance between the punch and die. For recommended clearances:

GO TO SECT. 6.1 "PUNCH OPERATION" - Letter "I"

9. Clean both the punch and die of any foreign material.
10. Insert the proper die in the die insert (7). If the die has a flat spot in it, and the flat spot needs to be on the side instead of the back; remove the die insert by loosening the two set screws (8) from the side of the die holder, and insert the die by aligning the flat spot with the side set screw (9). Then tighten the set screw firmly with a wrench and re-install the die insert. Mount table on the die holder.
11. Insert the punch into the punch retaining nut. Make sure that it seats properly. Place the punch retaining nut assembly on the die insert, with the punch inserted in the die.

► **NOTE: IF YOU ARE USING PUNCHES THAT REQUIRE A KEY,
INSERT THE KEY IN THE PUNCH AT THIS POINT.**

12. Place the selector switch in the ON position and the selector in the start position. Power the machine by pressing the green START button.
13. Check to make sure that there are no objects (such as tools) under or on any of the moving parts.
14. Place the selector switch in the jog position and carefully inch the punch ram to its set DOWN position.
15. Turn machine's power OFF.
16. Lift the punch retaining nut and start threading it onto the punch ram adapter.
17. Use a wrench to tighten the punch retaining nut. Make sure that there is equal clearance on all sides of the punch in the die.
18. Re-tighten the bolts in the die holder.
19. Check to be sure of proper alignment. Realign, if necessary.
20. Power the machine on and place the selector switch in the JOG position. Carefully inch the punch ram down until there is just enough space to slide the lower assembly (10) underneath the stripper mounting plate and power off the machine.
(See "Gap" IN FIGURE 32).

► **NOTE: LINE UP THE POSTS (11) OF THE LOWER ASSEMBLY WITH THE
BUSHING HOLES IN THE STRIPER MOUNTING PLATE.
FAILURE TO DO THIS MAY RESULT IN DAMAGE TO THE BUSHINGS!**

21. Using the M12 hex bolts and large washers, insert the bolts through the large bushing holes of the of the stripper mounting plate, and thread the bolts into the posts. Tighten the bolts all the way, making sure the posts are guided into the bushings correctly. The bolts should be tightened until they bottom out on the top of the posts.

7.12B CHANGING THE URETHANE SPRINGS

SEE FIGURE 32

If the unit is constantly over stroked or over a period of time, it may be necessary to renew the urethane springs. REFER TO FIGURE 32. The springs should be checked periodically. (A sure sign of over stroking is cracking or splitting of the springs.)

1. Remove both M12 hex bolts (4) and large washers (5) from the stripper assembly.
2. Remove the lower assembly (10) of the stripper by lifting the stripper mounting plate (6) with equal force on each end (to avoid binding).

► **NOTE: IF THE STRIPPER IS ATTACHED TO THE MACHINE, RAISE THE PUNCH RAM SO THAT THE LOWER ASSEMBLY OF THE STRIPPER CAN BE REMOVED.**

3. If the posts gets stuck in the bushings (12) of the stripper mounting plate, it may be necessary to remove the set screws (13) so the stripper plate (14) will be able to be removed.

CAUTION: KEEP HANDS CLEAR: WHEN THE SET SCREWS ARE REMOVED, THE STRIPPER PLATE WILL LIKELY FALL DOWN TO THE TABLE AND INJURE ANY BODY PARTS THAT ARE UNDERNEATH IT.

4. If the posts have become loose in the stripper plate, remove the appropriate set screws, (or if the set screws have already been removed), apply a thread locking solution such as Blue Loctite® and reinsert the set screws, making sure they are inserted into the dimples on the bottom of the posts (SEE "DIMPLE TOWARDS FRONT" IN FIGURE 32).
5. While the lower assembly is removed it is recommended to check the conditions of the bushings in the stripper mounting plate for excessive wear, if they need to be replaced, the stripper mounting plate must be removed from the punch ram, then the bushings can be removed using a hammer and a large diameter punch. Use a rubber mallet or a block of wood when installing new bushings so no damage is caused to the bushings.

6. Using the M12 hex bolts and large washers, insert the bolts through the large bushing holes of the stripper mounting plate, and thread the bolts into the posts. Tighten the bolts all the way, making sure the posts are guided into the bushings correctly. The bolts should be tightened until they bottom out on the top of the posts.

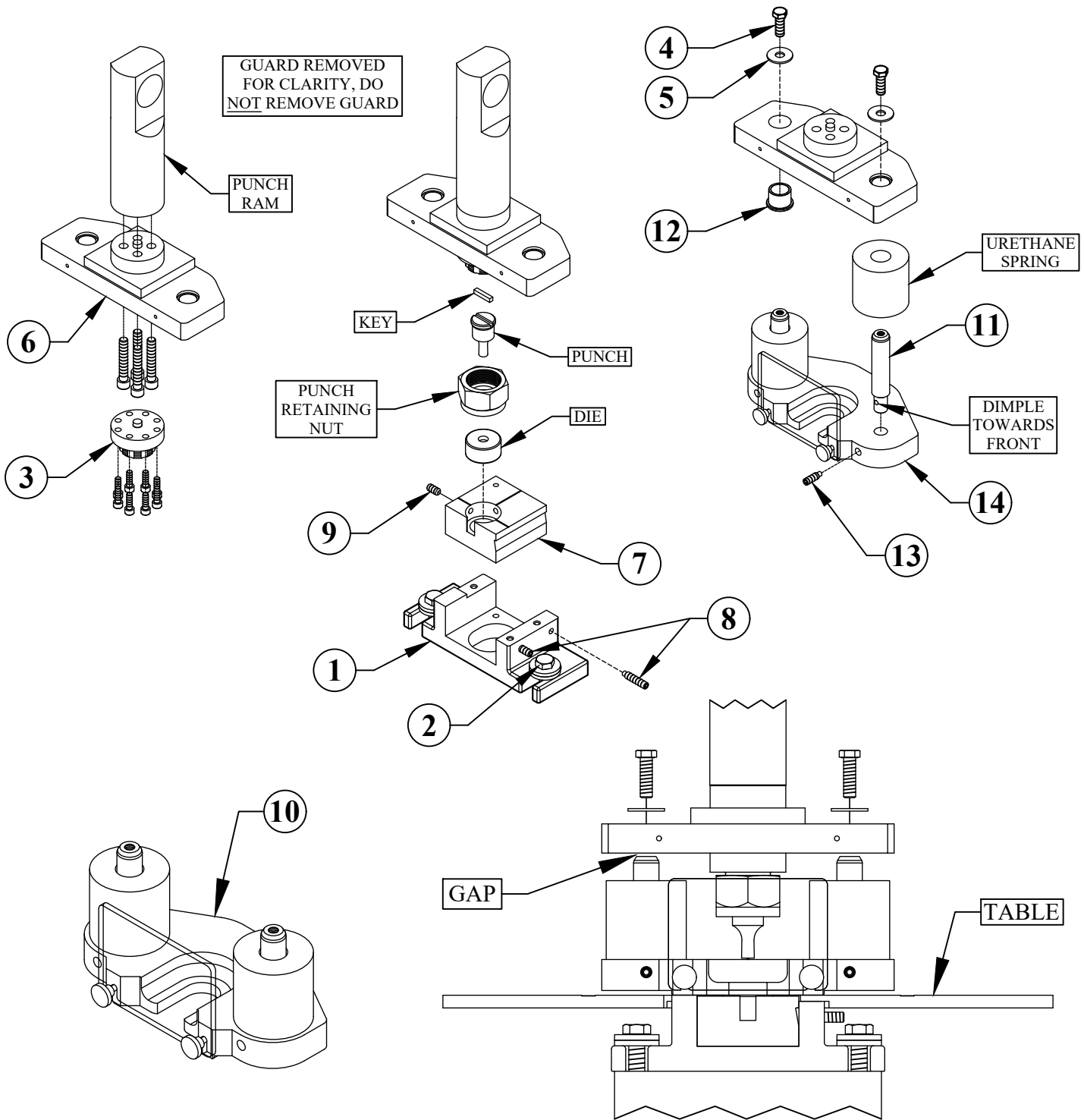


FIGURE 32

7.13 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" apart (102mm).

7.13A WELD COUPON BENDER TOOL INSTALLATION

SEE FIGURE 32A ON THE FOLLOWING PAGE.

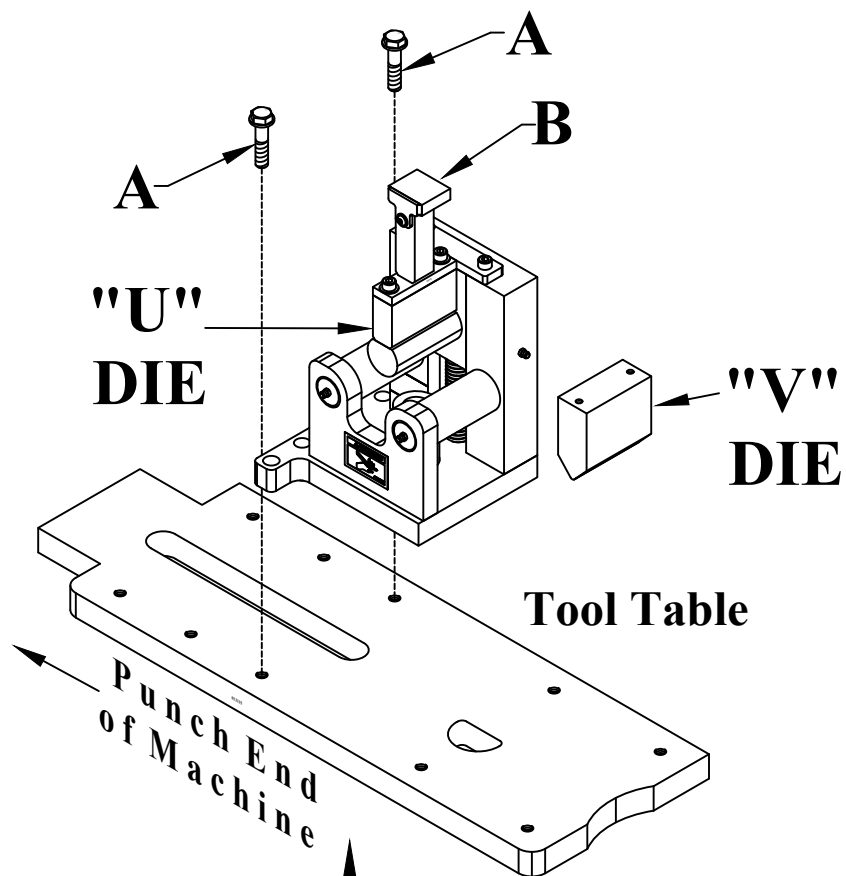
1. The Weld Coupon Bender Tool mounts on the tool table under the upper arm and is held in place with M12 bolts (A). Use the 3rd set of holes from the left (punch end) on the tool table and mount it as shown in the drawing.
- **NOTE:** THE DOWN STROKE MUST BE SET PROPERLY WITH THIS TOOL.
2. Make sure 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.
3. 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. 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".

7.13B WELD COUPON BENDER TOOL 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 the 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 on to the rollers. Using the back of the weld tester, square the test piece and then, move it forward enough to center it under the die. Make sure that the up 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. The tool can be seen in use at www.scotchman.com.

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

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



WELD COUPON BENDER TOOL

Setting The Stroke

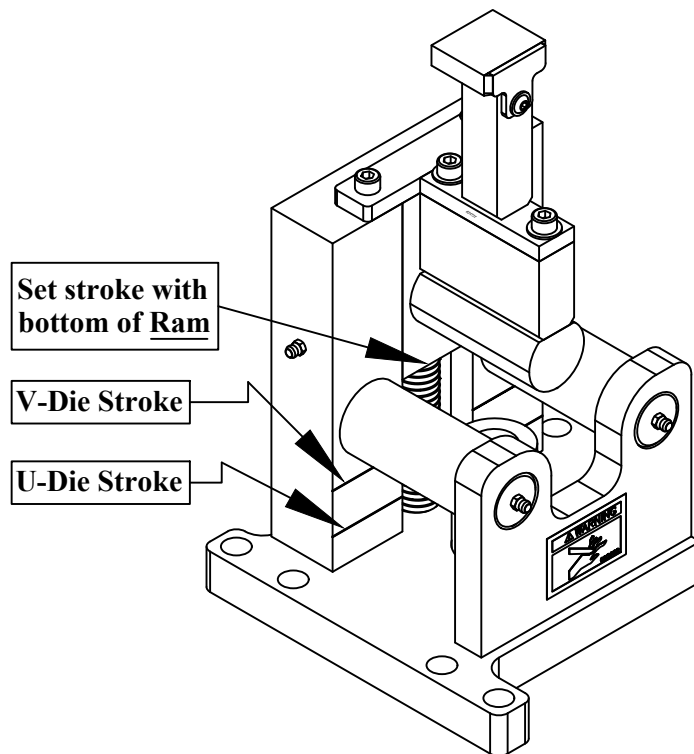
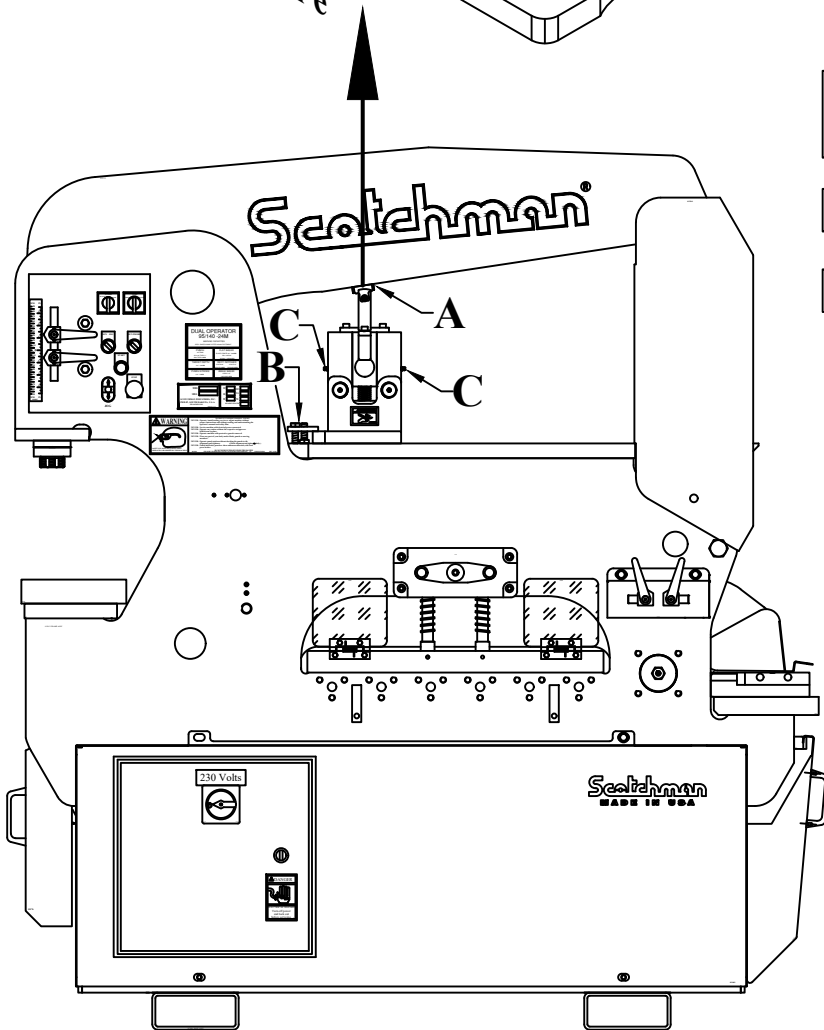


FIGURE 32A

7.14 MULTI-SHEAR TOOL

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

7.14A MULTI-SHEAR TOOL INSTALLATION

SEE FIGURE 32B ON THE FOLLOWING PAGE.

If the punch and die are mounted on the machine, REMOVE THEM.

1. Turn the machine on and put it in the SHEAR position. 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. Use two finger clamps (B) and loosely mount the tool, using the 1st set of holes on the tool table. DO NOT place the Multi-Shear tool any further towards the rear of the machine, due to possible "bottoming out".
4. Make sure 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 finger clamps (B) to hold the tool 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.

7.14B MULTI-SHEAR TOOL OPERATION

1. The selector switch must be in the SHEAR position to operate this tool.
2. 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" this tool may ruin it!!
3. Feed the material through the shear to the desired length and depress the foot pedal. The Material Length Stop (C) simply screws into the back of the tool and is easily adjusted.
4. The pressure cap (A) has a grease zerker and the tool has two (2) grease zerks; one on each side. Grease before using and every two hours thereafter.
5. Lubricate the blades every ten to fifteen cuts.

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

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

NOTE: See-Thru Guard is for Clarity

MULTI-SHEAR TOOL

Detail View

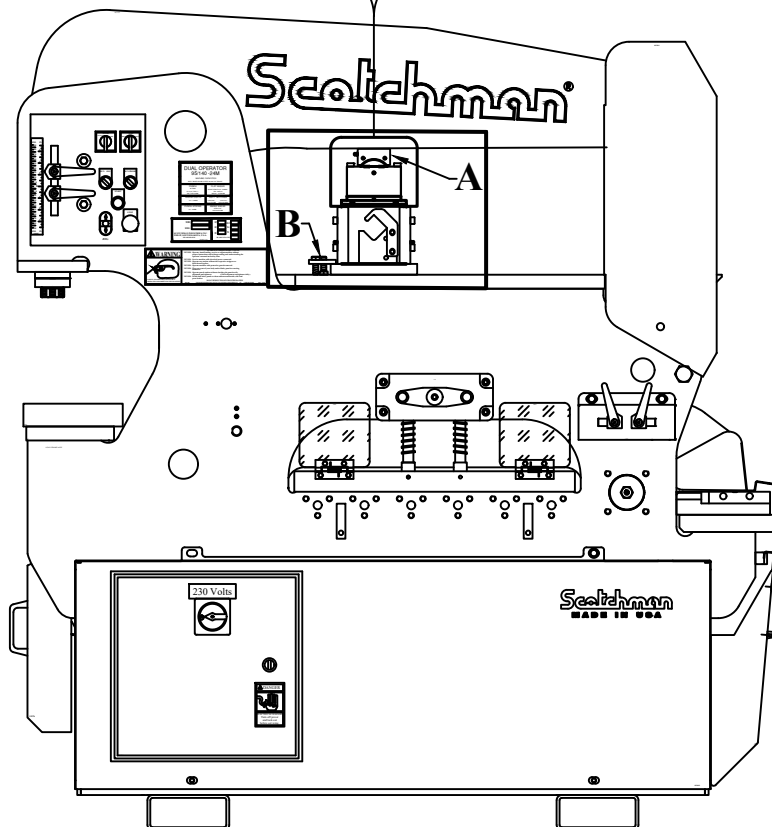
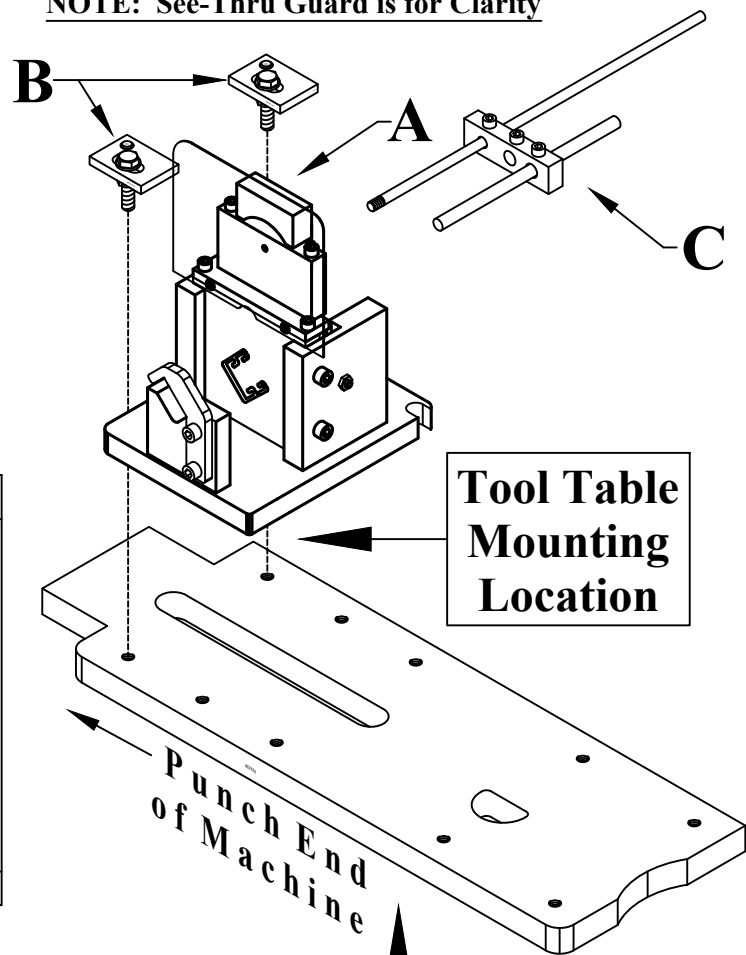
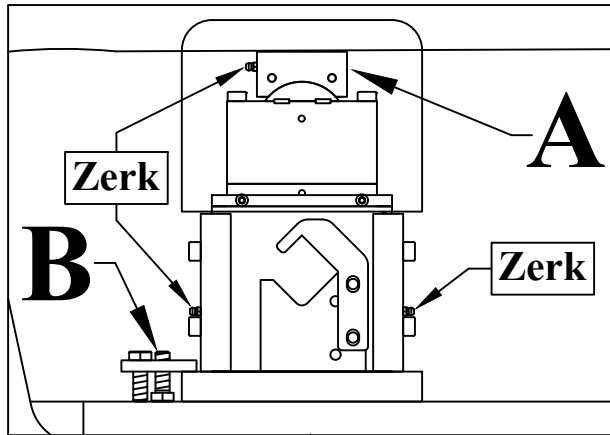


FIGURE 32B

8.0 TROUBLE SHOOTING GUIDE

8.1 ELECTRICAL TROUBLESHOOTING: PUNCH/TOOL STATION

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

A. MOTOR WILL NOT RUN:

1. Check the PUNCH/TOOL and SHEAR/NOTCH selector switches. The machine will not start unless both selector switches are in the START position.
2. Check the disconnect switch. Make sure that it is in the ON position.
3. Check the emergency stop palm buttons. A defective or stuck emergency stop button will not allow the machine to be powered. Check the emergency stop buttons with an Ohm meter. With the switch in its normal position, the reading should show continuity from one terminal to the other.

DO NOT OPERATE THIS MACHINE WITH THE EMERGENCY STOP BUTTONS BYPASSED!!

4. Check to be sure that plant voltage and phase correspond to the machine voltage and phase.
5. Check the line wiring connections at the starter. FOR THE WIRING DIAGRAM, SEE SECTION 10.
6. 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. THE MOTOR RUNS BUT THE MACHINE WILL NOT CYCLE 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 PUNCH/TOOL selector switch. The machine will not move unless the selector switch is in either the PUNCH or the TOOL position.
2. Check the motor rotation. It should be counterclockwise when viewed from the shaft end of the motor.
3. Check the run/jog switch. The foot pedal will not operate the machine when this switch is in the JOG position.
4. Check the fuses in the control box. There are two fuses on the primary side of the transformer and one on the secondary side. Remove the fuses and check them with an Ohm meter.
5. Check the limit switches. FOR PROCEDURES, REFER TO SECTION 8.1B.
6. No power from the transformer: Check the voltage across the transformer 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.

Sect. 9.9 POWER UNIT & Sect. 10.0 ELECTRICAL SCHEMATIC will help with below.

To test the foot switch, power the machine and test the voltage between terminal #'s 17, 18, 19 & Ground. Test the voltage between terminal #19 and Ground. The reading should be 110 to 120 volts. This will determine that you have the proper voltage to the pedal. With the pedal up, the voltage should read 110 to 120 volts between #17 and Ground. There should be no voltage reading between 18 and Ground. With the pedal depressed, the voltage should read 110 to 120 volts between #18 and Ground here should be no voltage reading between #17 and 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 pedal and check for any loose connections.
 - B. Make sure that the switches are adjusted properly. (You should hear two distinct "clicks", approximately 1/2 inch (12mm) apart, 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 wires 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 terminal block.

8.1A ELECTRICAL TROUBLESHOOTING: SHEAR/NOTCH STATION

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

- A. **MOTOR WILL NOT RUN:**
 1. Check the SHEAR/NOTCH and PUNCH/TOOL selector switches. The machine will not start unless the selector switches are both in the START position.
 2. Check the disconnect switch. Make sure that it is in the ON position.
 3. Check the emergency stop palm button. A defective or stuck emergency stop button will not allow the machine to be powered. Check the emergency stop button for this station of the machine with an Ohm meter. With the switch in its normal position, the reading should show continuity from one terminal to the other.

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

4. Check to be sure that plant voltage and phase correspond to the machine voltage and phase.
 5. Check the line wiring connections at the starter. **FOR THE WIRING DIAGRAM, SEE SECTION 10.**
 6. 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. THE MOTOR RUNS BUT THE MACHINE WILL NOT CYCLE WHEN DEPRESSING THE FOOT PEDAL.**

1. Check the SHEAR/NOTCH selector switch. The machine will not move unless the selector switch is in either the SHEAR or the NOTCH position.
2. Check the motor rotation. It should be counterclockwise when viewed from the shaft end of the motor.
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 on the primary side of the transformer and one on the secondary side. Remove the fuses and check them with an Ohm meter.
5. Check the limit switches. **FOR PROCEDURES, REFER TO SECTION 8.1C.**
6. No power from the transformer: Check the voltage across the transformer secondary terminals. It should read 110 to 120 volts.
7. The solenoid on the control valve is not functioning. **REFER TO SECTION 8.2.**
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, power the machine and test the voltage between terminal #'s 9, 20, 21 & Ground. Test the voltage between terminal #9 and Ground. The reading should be 110 to 120 volts. This will determine that you have the proper voltage to the pedal.

With the pedal up, the voltage should read 110 to 120 volts between #20 and Ground. There should be no voltage reading between #21 and Ground.

With the pedal depressed, the voltage should read 110 to 120 volts between #21 and Ground. There should be no voltage reading between #20 and Ground. If these readings are not correct, continue on with the following steps.

- A. Turn the machine's power off at the SHEAR/NOTCH station and turn off the disconnect switch. Remove the cover on the foot pedal and check for any loose connections.**
 - B. Make sure that the switches are adjusted properly. (You should hear two distinct "clicks", approximately 1/2 inch (12mm) apart, 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: Use an Ohm meter to check the continuity of the wires from the foot pedal. Make sure that the power to the machine is off and locked. The wires must be disconnected from the pedal and terminal block.**

8.1B LIMIT SWITCH INSPECTION: PUNCH/TOOL STATION

To determine if the limit switches are functioning properly, place the run/jog switch in the JOG position and move the limit switches out to their farthest position. Place the PUNCH/TOOL selector switch in the START position and the disconnect switch in the ON position to power the machine. Place the selector switch in the PUNCH position. The machine should move when the jog button is pushed and stop moving when released. This would indicate the control valve is working properly.

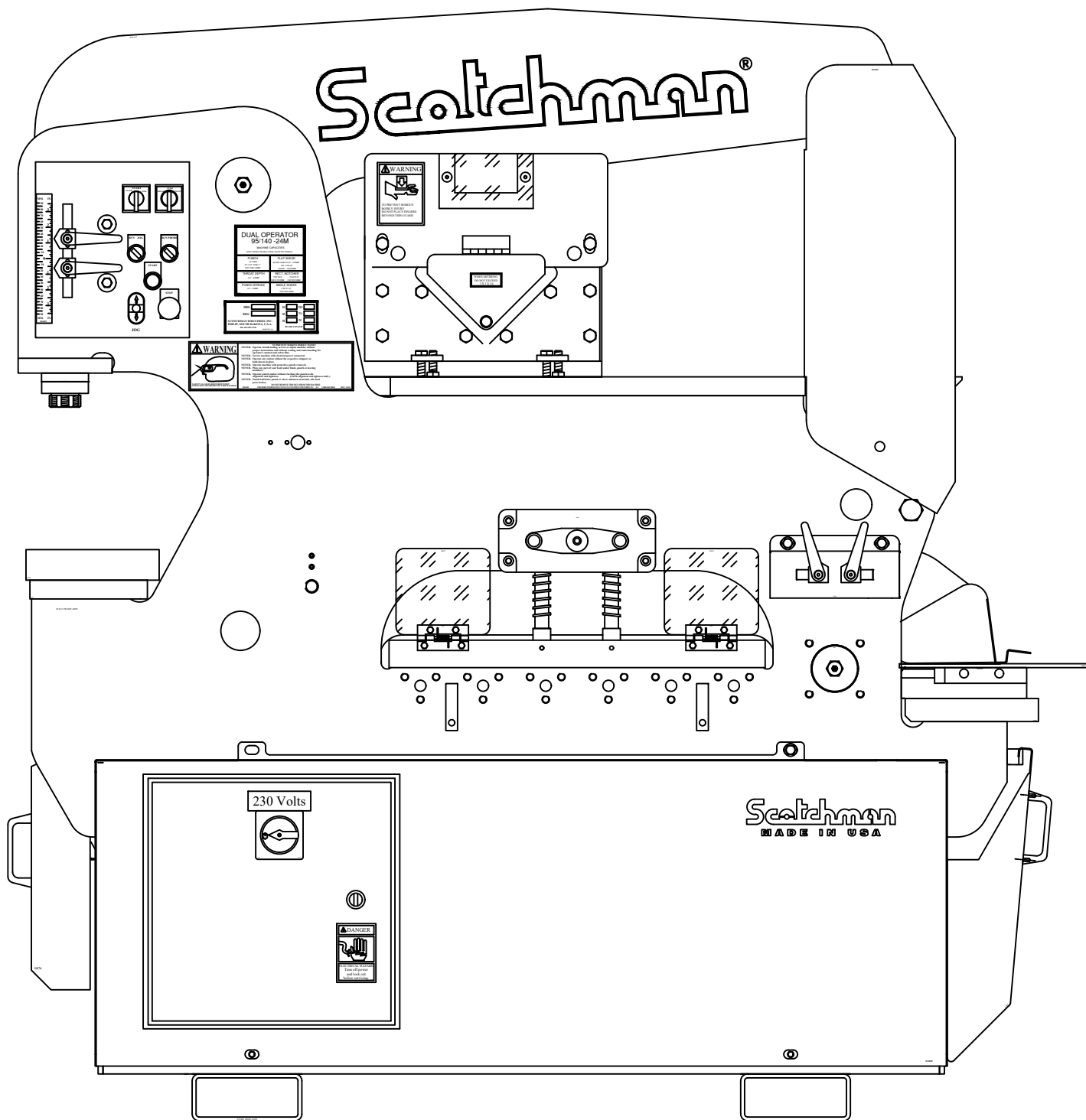
While holding the jog control, use a pencil or similar device and depress the limit switch plunger that the metering boss is traveling towards. If the machine stops when the switch is depressed, the limit switch is functioning properly. This would also indicate the control valve is working properly as well. Check both limit switches.

If the machine does not stop when the limit switch plunger is depressed, the limit switch is not functioning properly.

Check the limit switch plunger to make sure that it is operating freely. The limit switch can be tested with an Ohm meter. The limit switch wires must be disconnected from the terminal block to test it. The switch should have continuity with the plunger out and open with the plunger depressed. Call the factory for help if needed.

8.1C LIMIT SWITCH INSPECTION: SHEAR/NOTCH STATION

To determine if the limit switches are functioning properly, move the limit switches out to their farthest position. Place the SHEAR/NOTCH selector switch in the START position and the disconnect switch in the ON position to power the machine. Place the selector switch in the SHEAR position. Depressing the foot switch should cause the machine to move and releasing it should cause it to return. This indicates the control valve is working properly. While depressing the foot switch, use a pencil or similar device and depress the limit switch that the metering boss is traveling towards. If the machine does not stop when the switch is depressed, the limit switch is not functioning properly. Check both limit switches.



If the machine stops instead of returning when the foot switch is released, the problem is in the limit switch.

Check the limit switch plunger to make sure that it is operating freely. The limit switch can be tested with an Ohm meter. The limit switch wires must be disconnected from the terminal block to test it. The switch should have continuity with the plunger out and open with the plunger depressed. Call the factory for help if needed.

8.2 CONTROL VALVE INSPECTION

THE MACHINE WILL ONLY TRAVEL IN ONE DIRECTION.

This could be caused by:

- 1. 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. To shift the spool manually, on each end of the control valve, there is a pin in the center of the knurled nut that holds the coil on. Using a small punch or similar device, push these pins in by hand, first one and then, the other. After manually shifting the spool, turn the machine on and try it again. If the machine now operates, the hydraulic oil and the filter should be changed.

- 2. A DEFECTIVE COIL ON THE CONTROL VALVE:**

The coils can be checked 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.

8.3 HYDRAULICS

THE MOST COMMON HYDRAULIC PROBLEMS ARE:

- 1. Low level of hydraulic oil in the reservoir: The reservoir holds 14 U.S. gallons (53 liters). The level should be approximately 2 inches (50mm) 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 THE RECOMMENDED HYDRAULIC OIL, SEE SECTION 5.2.

- 3. Low pressure caused by worn or damaged parts in the cylinders or pumps: There is a pressure port for a pressure gauge provided on all machines. The port will be on the valve manifold. A gauge with a minimum capacity of 3,000 PSI (207 BAR) is required. With the machine's power off, install the pressure gauge.**

For the SHEAR/NOTCH station of the machine, power the machine and place a thick piece of steel on the far left side of the bar shear furthest away from the pivot pin and clamp it down with the hold down device. Attempting to shear the piece should stall the machine. Watch the pressure gauge for a reading. The system pressure of this station is 3,000 PSI (207 BAR) plus or minus 50 PSI (3.5 BAR). If pressure is out of this range, call your local dealer or the factory.

For the PUNCH/TOOL station of the machine the pressure setting is 3,000 PSI (207 BAR) plus or minus 50 PSI (3.5 BAR). To set the pressure, remove the die holder, punch and punch retaining nut. Place a substantial block of steel, at least four inches square and eight and one half inches tall, under the punch ram.

Place the RUN/JOG switch in the JOG position and the selector switch in the TOOL position. Power the machine and jog the ram down to the block and stall the machine, reading the gauge at the same time.

8.4 HYDRAULIC CYLINDER SEAL REPLACEMENT

FOR PARTS IDENTIFICATION, REFER TO FIGURE 33 ON THE FOLLOWING PAGE.

- 1. After removing the cylinder from the machine, lay it on its side with the ports down and allow the hydraulic fluid to drain.**
- 2. After the fluid drains, clamp the cylinder in a vise or similar holding device.**
- 3. The cylinder head (1) is threaded into the body (2) of the cylinder. There are pin holes in the top of the head for a pin wrench.**
- 4. To remove the head, remove the set screw from the head and place a pin wrench in the pin hole on the head and rotate the head counterclockwise to unscrew from the body.**
- 5. After the head has been unscrewed, anchor the cylinder body (2) solidly and hook a come-a-long to the cylinder clevis and pull the head (1) and cylinder shaft (3) out of the tube.**
- 6. Remove the locking nut (4) from the cylinder shaft (3) and slide the piston (5) and head (1) off of the shaft and remove all of the seals.**
- 7. Clean all of the parts and inspect the inside of the tube, the piston, the shaft and the inside of the head for scoring or nicks.**
- 8. Install the new seals and lubricate them before re-assembling the parts.**
- 9. Place the head and piston on the shaft and torque the locking nut on the shaft to 100 foot pounds. To prevent the nut from working loose after the cylinder has been reassembled, rivet the threads on the end of the ram with a chisel or punch.**
- 10. Stand the cylinder tube upright in a vise and place the shaft assembly on the tube.**
- 11. Tap the head and piston down into the tube with a brass or plastic hammer.**
- 12. Screw the head back into the tube with the pin wrench and reinstall set screw.**

SEALS IN HYDRAULIC CYLINDERS

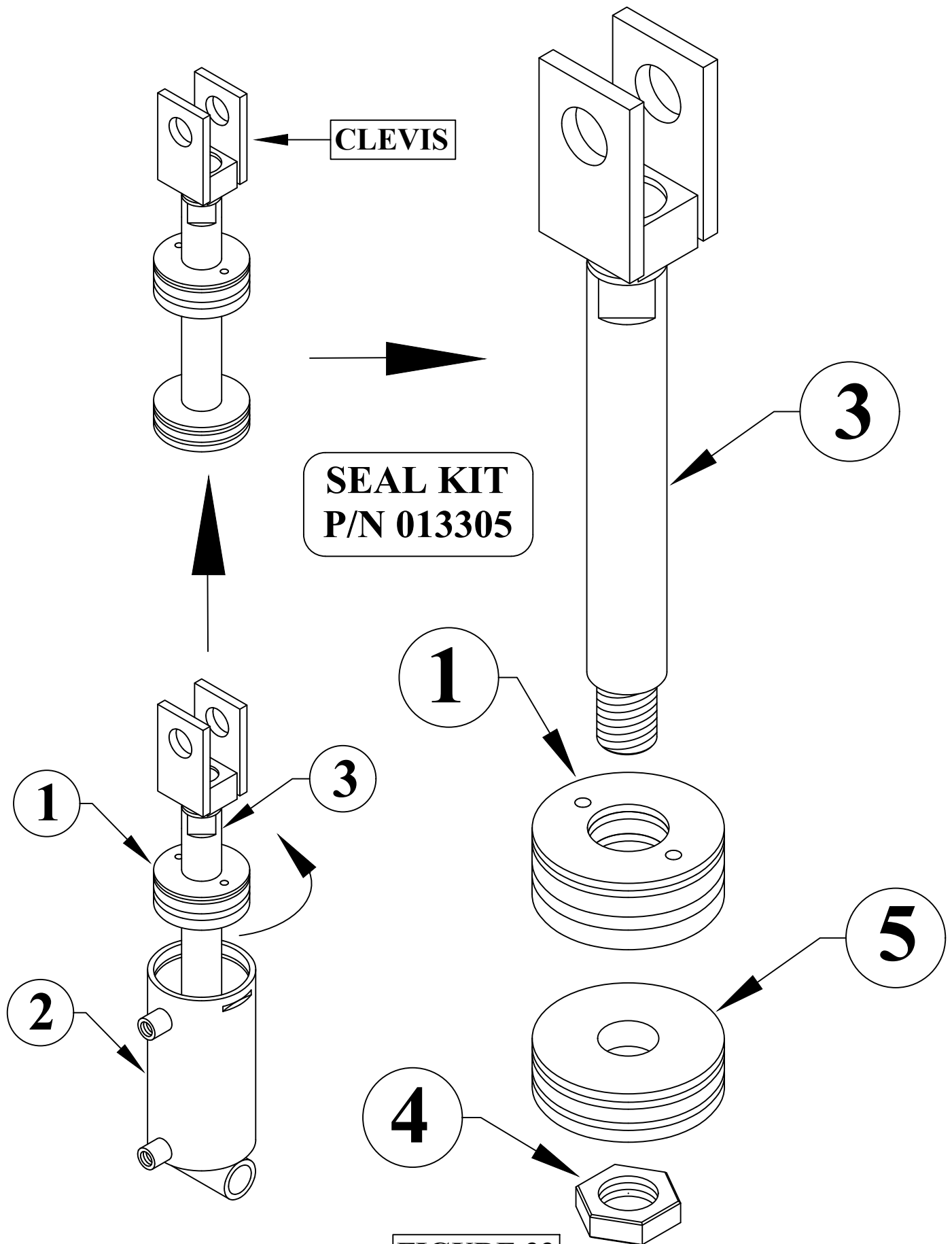


FIGURE 33

9.0 PARTS LISTS

9.1 SHEAR ARM ASSEMBLY (SERIAL #'S 1402 & UP)

ITEM	QTY.	PART #	DESCRIPTION
1	1	013106	SHEAR BEAM ASSEMBLY INCLUDES 1, 2, 12, 13, 18 & 20
2	1	080169	CONNECTING LINK BUSHING
3	1	006190	UPPER PUNCH PIN METRIC
4	1	013172	M24 X 80 SET SCREW
5	1	210024	JAM NUT
6	1	033175	LOWER BLADE
7	4	210014	M12 JAM NUT
8	6	221430	M16 X 75 SHCS
9	22	218120	M12 X 50 SET SCREWS
10	6	214016	M16 FLAT WASHER
11	1	422063	24" METRIC SABRE BLADE
12*	2	221322	M12 X 60 SHCS
13	1	007226	BUSHING
14	1	080174	GREASE BOLT
15	1	004112	MAIN PIN
16	1	037273	BRASS SHIM
17	1	012121	PRESSURE PLATE
18	11	214014	M12 FLAT WASHER
19	1	004109	FRAME RUB BLOCK
20	1	006015	RUB BLOCK
21	1	013325	SHEAR CYL ASS'Y
22	1	004117	PIN CYLINDER ANCHOR
23	4	016620	SNAP RINGS - 2"
24	9	205425	M12 X 65 HHCS
25	6	218112	M12 X 35 SET SCREW
26	1	212016	M16 LOCK WASHER
27	9	212014	M12 LOCK WASHER

✱ P/N 201432 – M12 X 80 HHCS was used on machines made 03/09 and prior.
The newer machines have a recess and use a shorter SHCS with a washer.
If in doubt, please see what your machine has before ordering.

SHEAR ARM ASSEMBLY

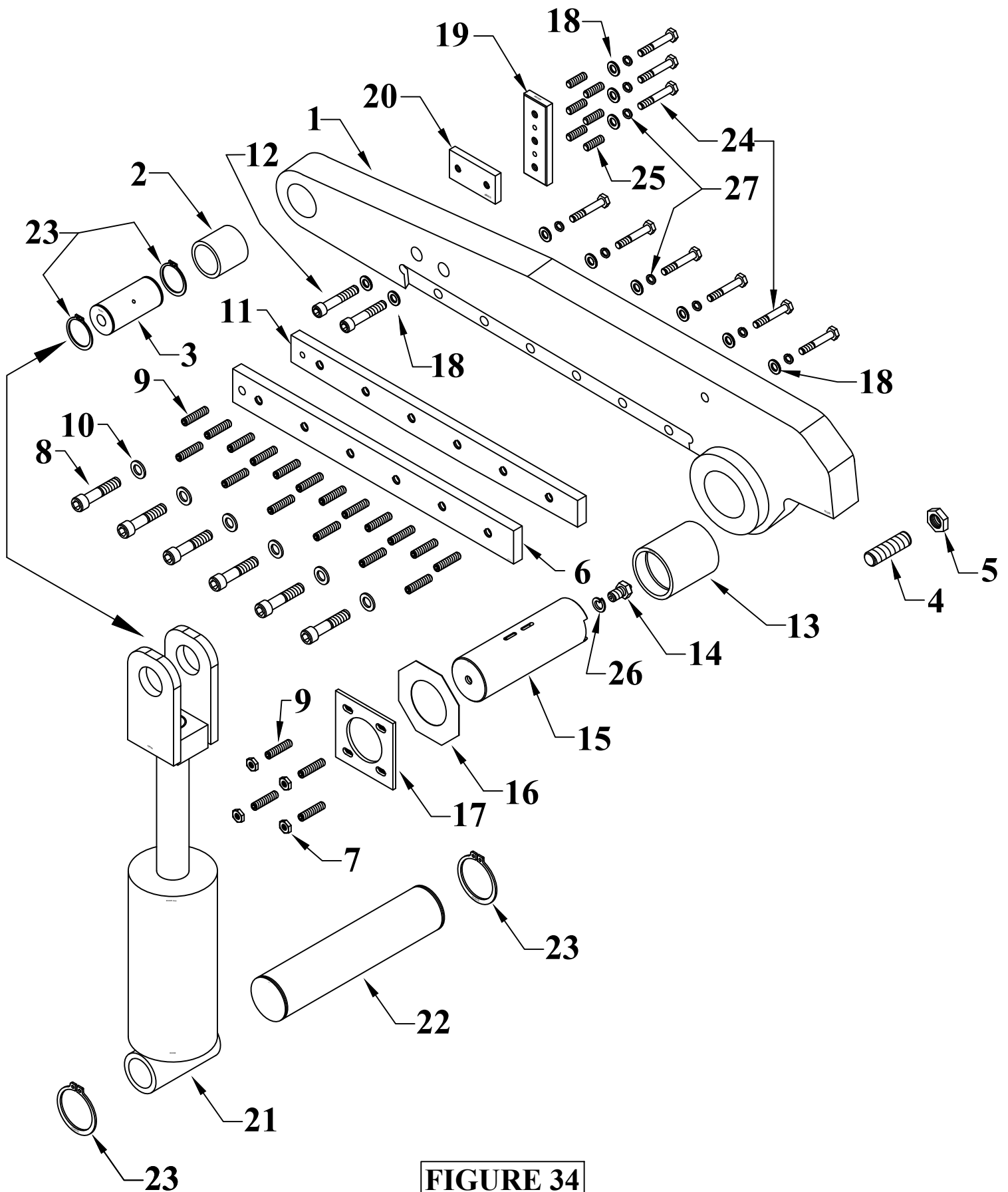


FIGURE 34

9.2 PUNCH ASSEMBLY

9.2A PUNCH STRAPS, PUNCH RAM AND GUIDE

ITEM	QTY.	PART #	DESCRIPTION
1	1	see 4A	STRAP
2	1	see 4A	STRAP
3	2	080192	2.505 BRASS WASHER
4	2	015131	2.003 BRASS WASHER
4A	1	015132	PUNCH LINK KIT INC. 1, 2, 3, & 4
5	1	006172	UPPER PUNCH PIN BUSHING
6	1	030625	UPPER PUNCH PIN
7	2	016625	2 1/2" SNAP RING
7A	1	032074	KIT INCLUDES 5, 6, 7 & 20
8	1	036167	LOWER PUNCH PIN
9	2	016620	SNAP RING 2"
10	1	080309	METER BOSS FI85/DO70-95
11	1	221327	M12 X 70 SHCS
12	1	201440	M12 X 100 HHCS
13	1	210014	M12 JAM NUT
14	1	see 15	PUNCH RAM
15	1	010236	PUNCH RAM W/INSERT INCLUDES: 14, 16, 17,18, 19, 20, 21 & 22
16	1	012077	3" PUNCH HOLDER
17	8	221120	M8 X 25 SHCS
18	1	141010	3/16 X 1/2 ROLL PIN
19	1	015033	INSERT W/KEY INC. 17, 18 & 19
20	1	004123	1/4" KEY (ALL KEY PUNCH)
21	3	243101	M6 X 13.5 OAL GOLD ZERK
22	1	030645	GUIDE BLOCK (see 15)
23	4	221312	M12 X 30 SHCS
24	1	016095	#40 XL PUNCH RET NUT
25	1	013274	PUNCH COVER PAINTED
26	2	224205	M10 X 16MM WLCS

PUNCH ASSY. EXPLODED VIEW

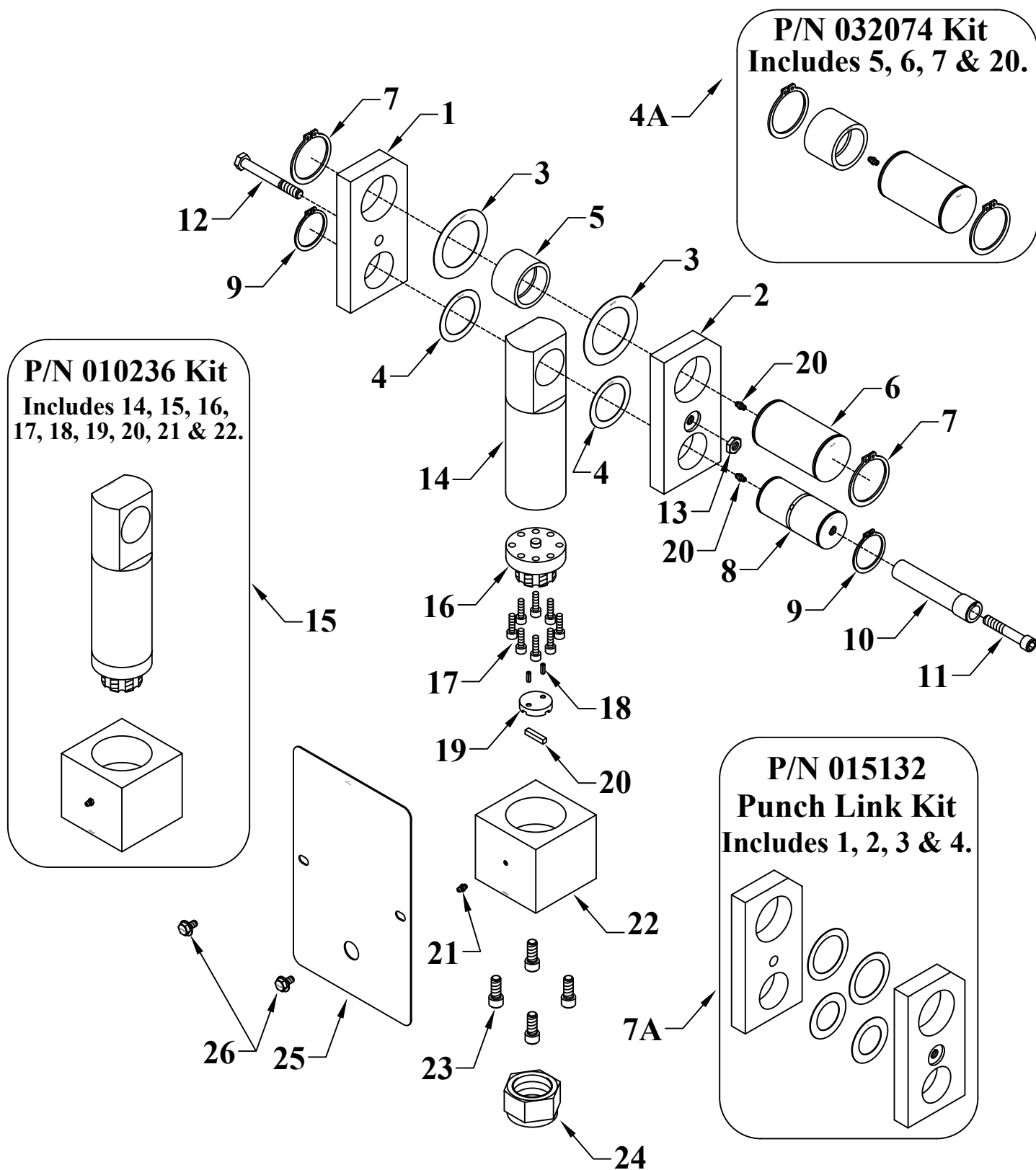
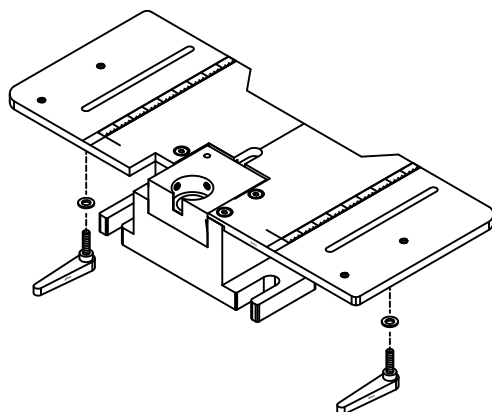


FIGURE 35

9.2B DIE HOLDER, DIE SPACER & PUNCH TABLE

ITEM	QTY.	PART #	DESCRIPTION
1	2	026618	TEE NUT (M10)
2	1	026697	GUIDE FINISHED
3	3	230107	M8 X 16 FSHCS
4	1	080182	M5 ALLEN WRENCH
5	1	026713	PUNCH TABLE WITH SCALE 9"
5A	1	026712	PUNCH GAUGING TABLE W/SC INCLUDES: 1, 2, 4, 5, 6, & 7
6	2	080063	RS/JIG HANDLE
7	2	214012	M10 WASHER
8	1	219060	M10 X 50 FP SET SCREW
9	1	204220	M10 X 30 HHCS
10	1	006202	#82 METRIC DIE INSERT
10A	1	006252	INSERT FOR 2-1/2" DIES (not inc.)
10B	1	006302	INSERT FOR 3" DIES (not inc.)
11	2	113017	1 3/4 OD X 21/32 ID WASHER
12	2	201640	M16 X 90 HHCS
13	1	077145	M7.5 X 20 PIN
14	2	218058	M10 X 45 DP SS
15	1	006013	DIE HOLDER METRIC
16	1	015440	DIE HOLDER SPACER
17	1	013122	PUNCH BOLSTER
18	1	221420	M16 X 50 SHCS



DIE HOLDER & PUNCH GAUGING TABLE

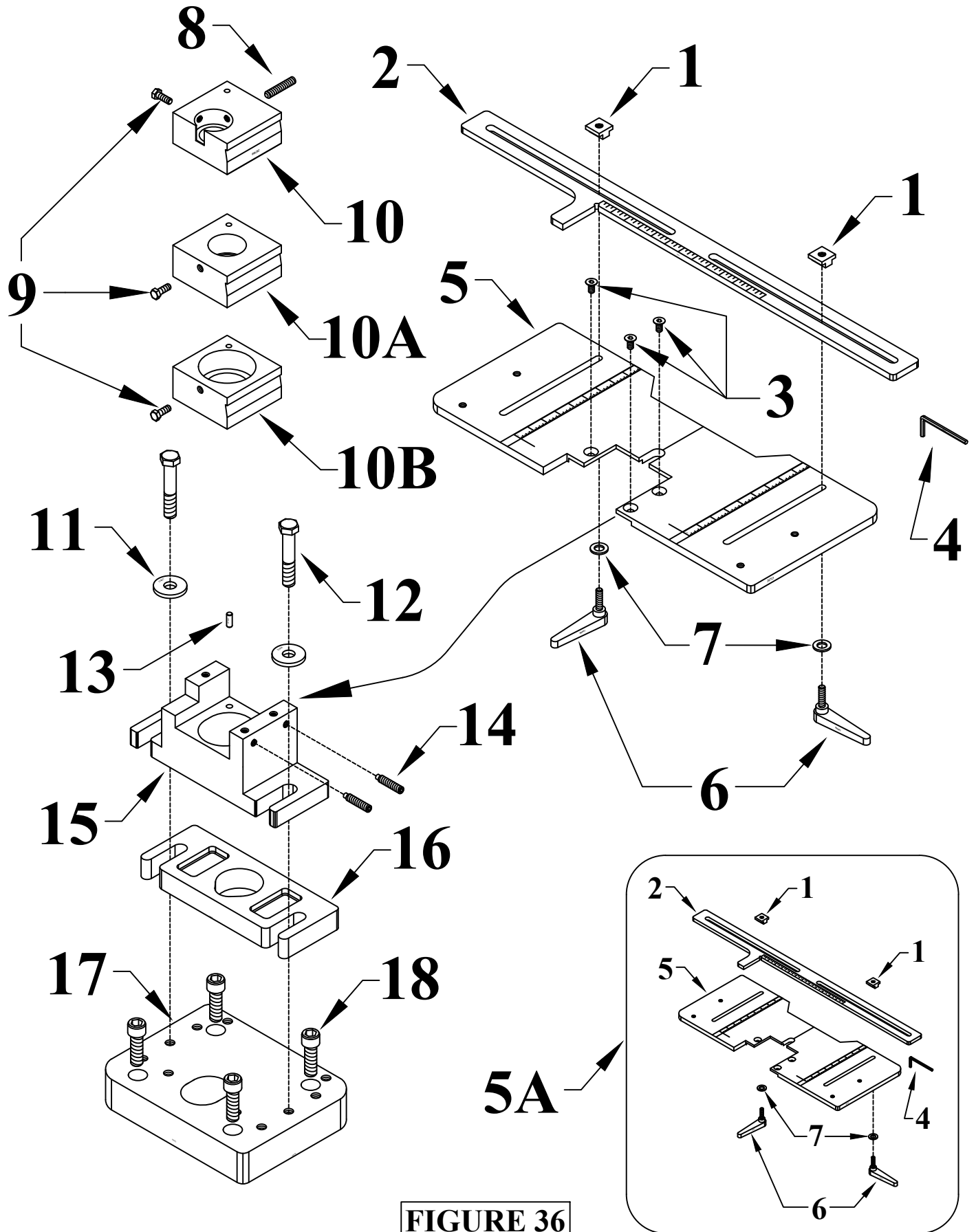


FIGURE 36

9.3 STRIPPER ASSEMBLY

ITEM	QTY.	PART #	DESCRIPTION
1	1	007244	RETAINER STRIPPER
2	2	230007	M6 X 16 FSHCS
3	2	660255	#6 X 3/8" DRIVE SCREW
4	2	see 6A	1/8 STEEL POP RIVET
5	1	see 6A	STRIPPER HINGE
6	1	see 6A	STRIPPER DOOR
6A*	1	011732	STRIPPER DOOR ASS'Y INCLUDES 4, 5, & 6
7	1	007225	PAINTED STRIPPER
8	1	007268	SIGHT GLASS SER. # 1100 & UP
8A	1	007242	SIGHT GLASS Ser. # 1099 & PRIOR
9	2	220014	M6 X 10MM BHCS
10	1	007229	ADJ.SCREW STRIPPER LEFT
11	1	007237	HEX HEAD STRIPPER STUD
12	1	007239	SPRING ROD STRIPPER
13	1	007236	ADJ. SCREW STRIPPER RIGHT
14	1	007241	STRIPPER SPRING
15	1	007240	SPRING RETAINER
16	2	110014	1/2-13 JAM NUT
17	2	001541	BALL SPRING SCREW
18	1	007252	STRIPPER PLATE
18A	1	007253	STRIPPER PLATE ASS'Y INCLUDES 16, 17 & 18
19	1	014229	STRIPPER ASS'Y INCLUDES 3, 6A, 7, 8, 9 & 18A
20	1	014228	DO70/150 SALES STRIPPER INCLUDES ALL OF THE ABOVE

*Must add 2 pcs. of ITEM 3

STRIPPER ASSEMBLY

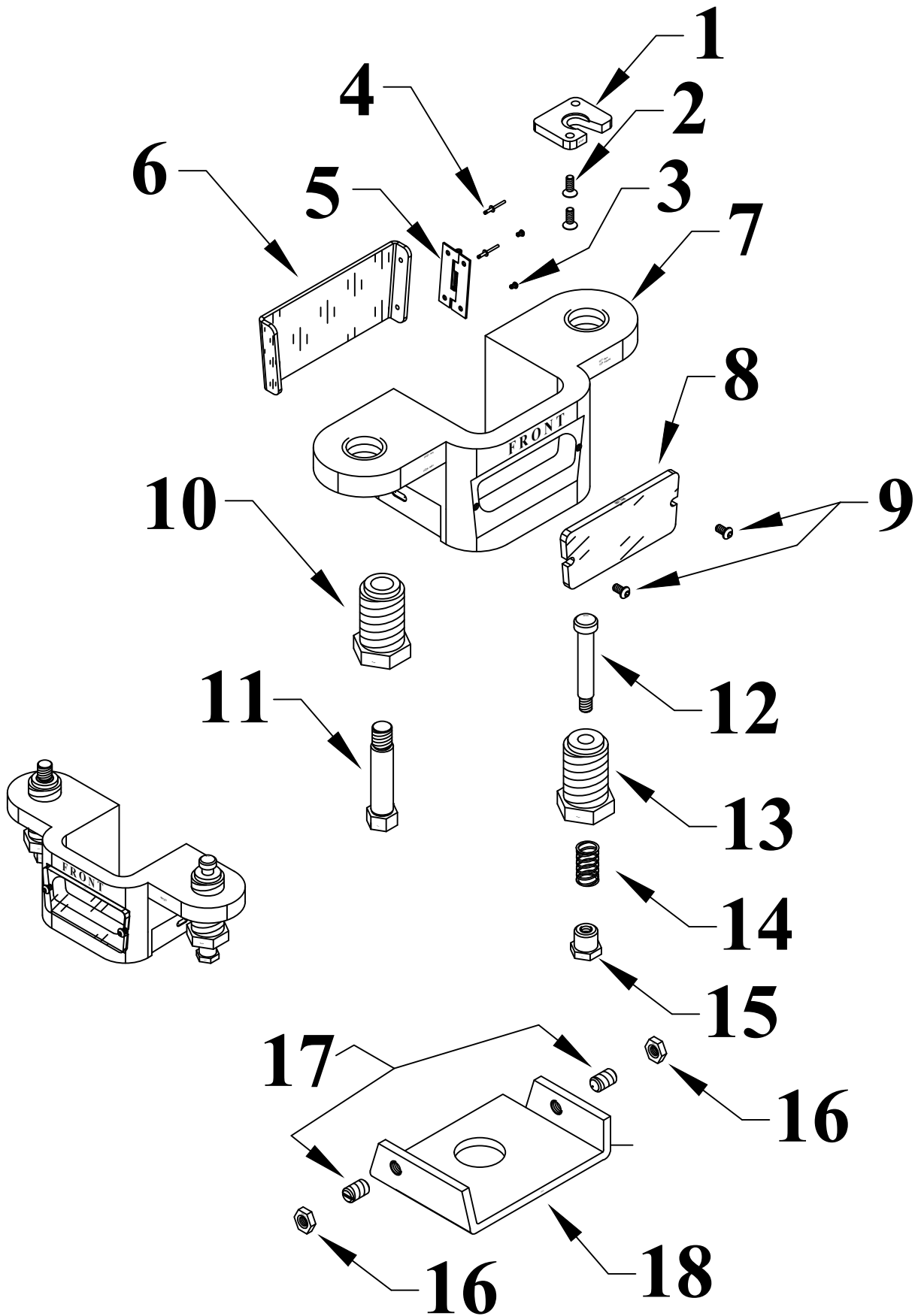
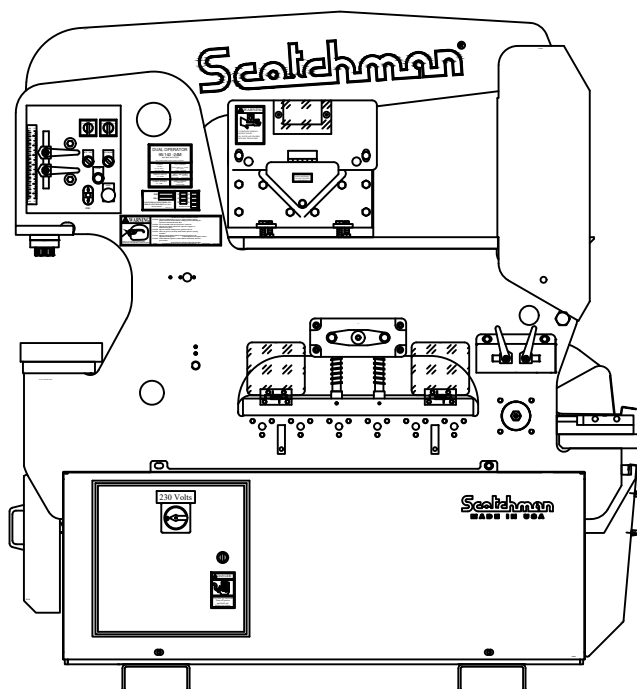


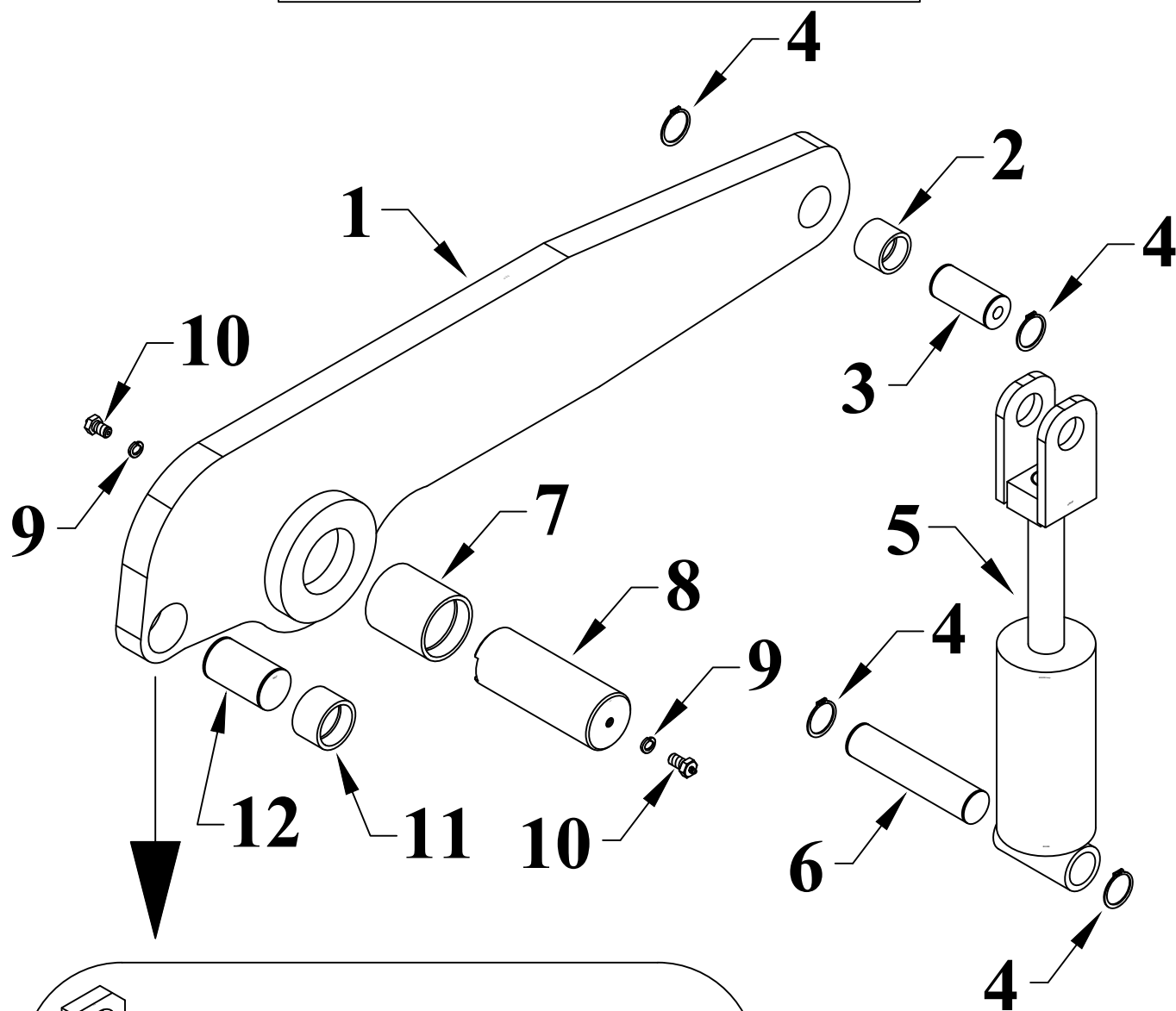
FIGURE 37

9.4 UPPER ARM ASSEMBLY

ITEM	QTY.	PART #	DESCRIPTION
1	1	013113	PUNCH BEAM ASS'Y INCLUDES 2, 7 & 11
2	1	006172	UPPER PUNCH PIN BUSHING
3	1	006190	UPPER PUNCH PIN METRIC
4	4	016620	SNAP RING 2"
5	1	013320	PUNCH CYL ASS'Y
6	1	004117	PIN CYLINDER ANCHOR
7	1	015312	MAIN BUSHING-TOOL BEAM
8	1	13114	MAIN PIN-TOOL BEAM
9	2	212016	M16 LOCK WASHER
10	2	080174	GREASE BOLT M16 X 25MM
11	1	see 13	UPPER PUNCH PIN BUSHING
12	1	see 13	UPPER PUNCH PIN
13	1	032074	KIT - INCLUDES 11 & 12



UPPER ARM ASSEMBLY



SEE SECTION 9.2A:

**PUNCH STRAPS,
PUNCH RAM
AND GUIDE**

**for information on these
punch related parts.**

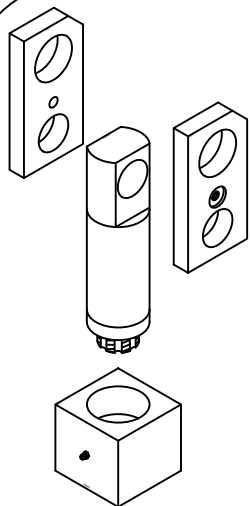
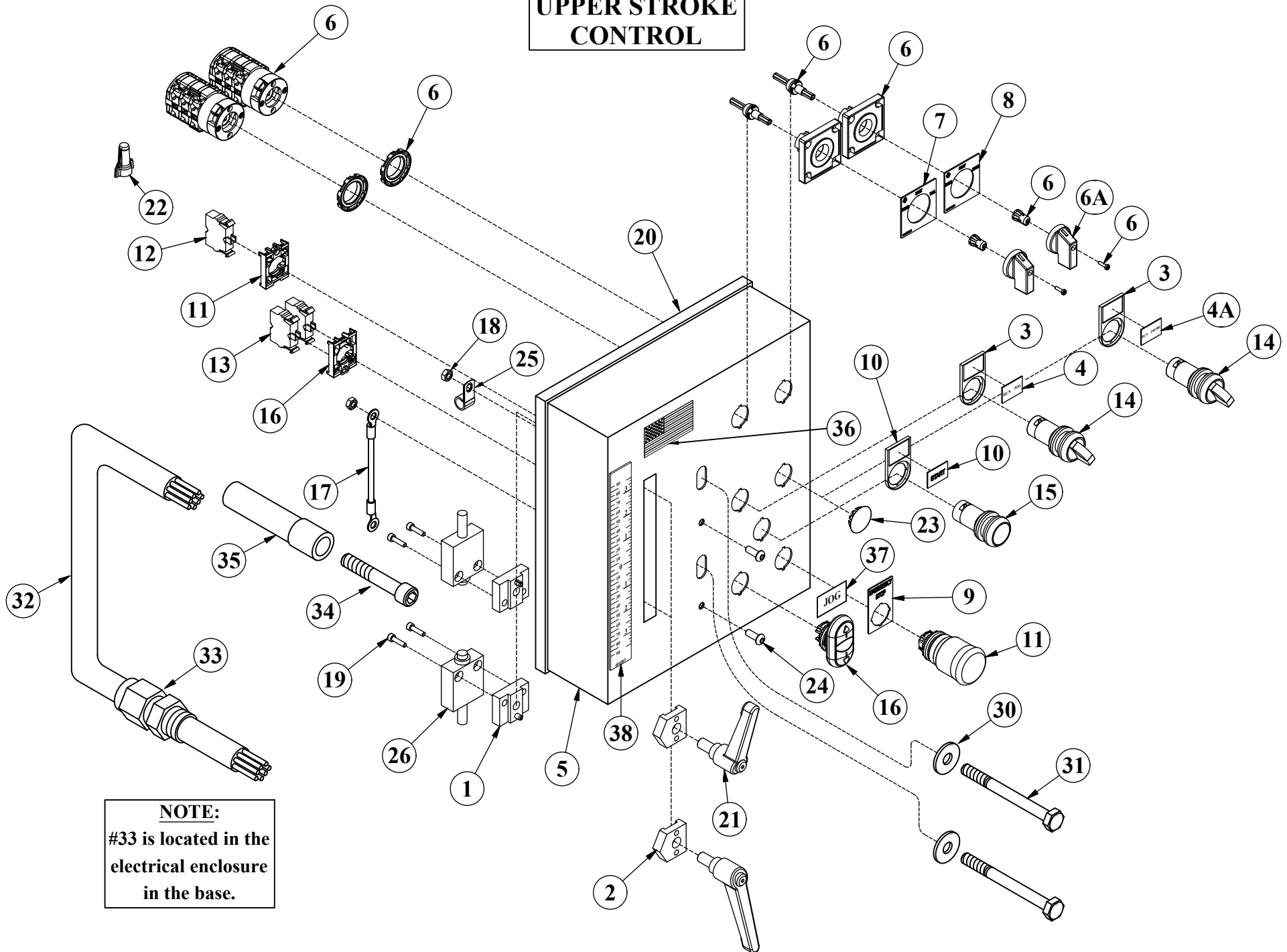


FIGURE 38

9.5 UPPER STROKE CONTROL ASSEMBLY

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	2	004086	MICRO SWITCH MOUNT
2	2	004087	POINTER REV. A
3*	1	004521	LEGEND PLATE HOLDER
4	1	004526	RUN JOG LEGEND
4A*	1	004520	RUN PROBE LEGEND (used only when equipped with Elec. Backgage)
5	1	007712	STROKE COVER PAINTED
6	2	011200	KRAUS & NAIMER CAM SWITCH
6A	2	011225	CAM SWITCH KNOB-KRAUS & NAIMER
7	1	011212	LEGEND PUNCH/START/TOOL K&N
8	1	011213	LEGEND SHEAR/START/NOTCH K&N
9	1	011500	LEGEND STOP
10	1	011509	LEGEND START
11	1	011862	E-STOP OPERATOR PKGD. W/ 11872
12	1	011867	CONTACT M22-K01
13	2	011874	CONTACT ELEMENT
14*	1	011877	SELECTOR SWITCH
15	1	011879	START BUTTON (Replaces Old Version)
16	1	011886	JOG PUSH BUTTON PKGD. W/ 11872
17	1	011912	GROUND WIRE ASS'Y
18	2	073206	M6 DIN934 HEX NUT
19	4	073450	M4 X 16MM DIN912 SHCS
20	45	077907	SHROUD EDGE
21	2	080061	STROKE ADJUSTMENT HANDLE
22	1	145001	RED WING WIRE NUT
23	1	158101	7/8 STEEL HOLE PLUG
24	2	220020	M6 X 16MM ISO 7380 BHCS
25	1	562040	WIRE CABLE CLAMP
26	2	562112	LIMIT SWITCH MS01S03
27	67	660470	16GA BLACK MTW WIRE (not shown)
28	95	660477	18/18 CABLE (not shown)
29	7	660505	BLACK NYLON CABLE TIE (not shown)
30	2	213012	M10 DIN9021 BLACK WASHER
31	2	201240	M10 X 110MM DIN 931 HHCS
32	85	660457	18/12 CABLE(19015)
33	1	562501	PG16 LIQUID CORD CONN
34	1	221327	M12 X 70MM DIN912 SHCS
35	1	080309	METER BOSS FI85/DO70-95
36	1	019127	US FLAG DECAL
37	1	003200	JOG DECAL
38	1	004085	SCALE STROKE CONTROL
39	1	033707	D.O. STROKE ASS'Y

UPPER STROKE CONTROL

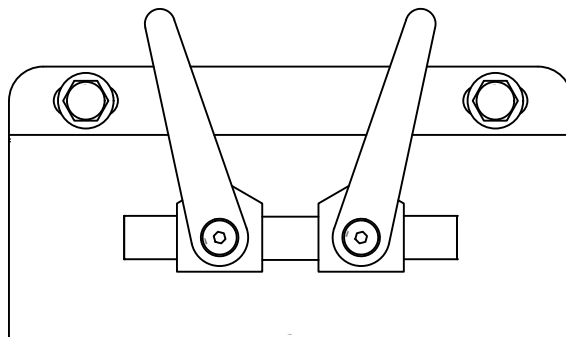


NOTE:
#33 is located in the
electrical enclosure
in the base.

FIGURE 39

9.5A SHEAR & NOTCHER STROKE

ITEM	QTY.	PART #	DESCRIPTION
1	2	080061	STROKE ADJUSTMENT HANDLE
2	2	004087	POINTER
3	1	013190	NOTCHER STROKE BOX
4	1	011713	LATCHING CLIP
5	2	141010	3/16 X 1/2 ROLL PIN (inc. with 6)
6	2	004086	MICRO SWITCH MOUNT (incs. 5)
7	2	562113	M.S. LIMIT SWITCH
8	4	073450	M4 X 16MM SHCS
9	1	013191	NOTCHER METER ROD
10	2	214012	M10 REGULAR WASHER
11	2	203210	M10 X 25MM HHCS
12	1	013290	D.O. 70/95 NOTCHER S.C. INCLUDES 1, 2, 3, 4, 5, 6, 7, & 8



SHEAR & NOTCHER STROKE CONTROL

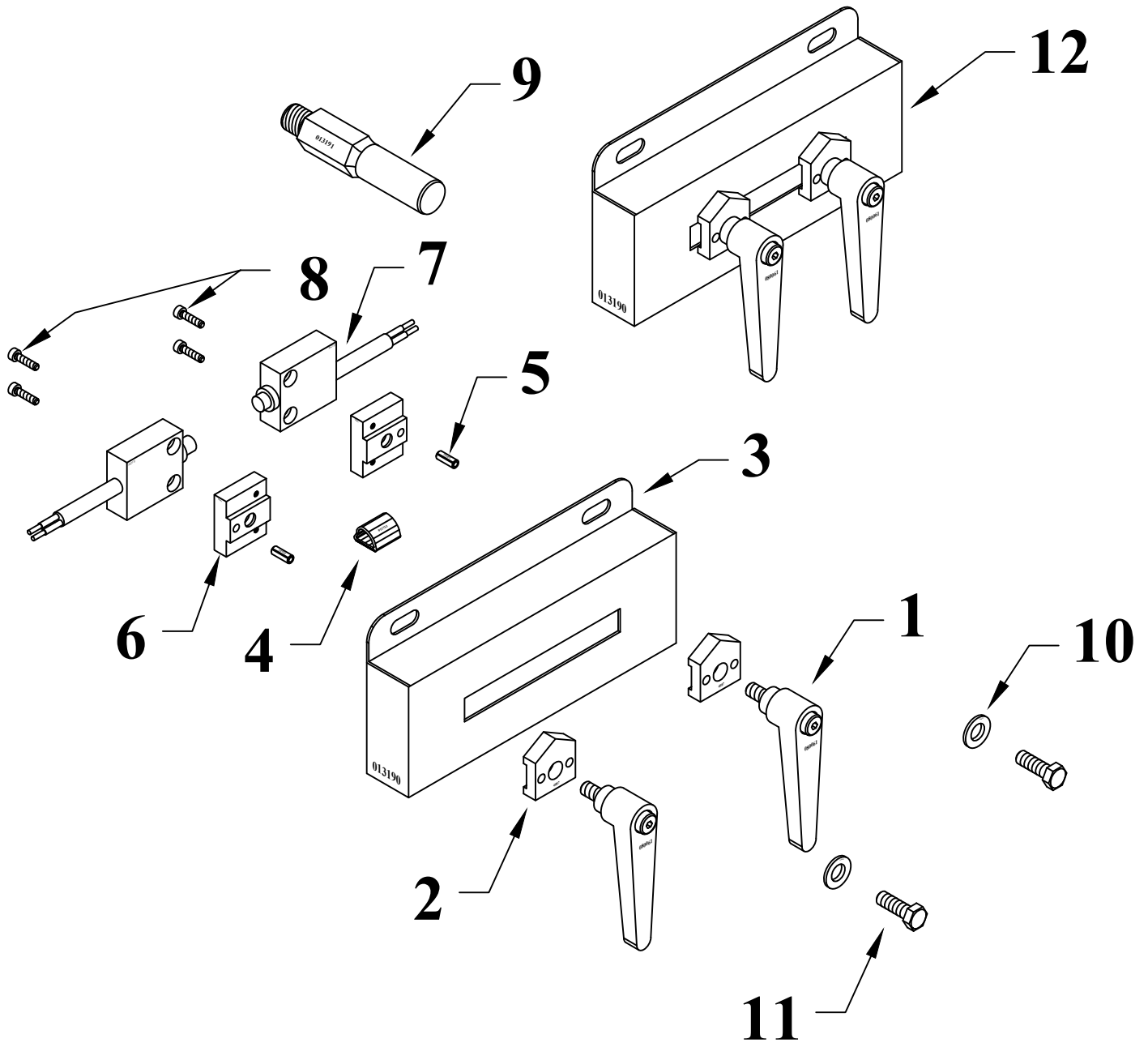
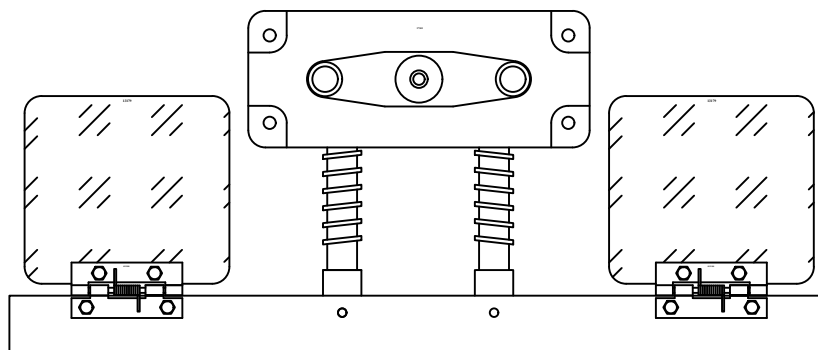


FIGURE 40

9.6 HOLD DOWN ASSEMBLY

ITEM	QTY.	PART #	DESCRIPTION
1	1	080348	H.D. GEAR CENTER
2	1	080347	H.D. GEAR LEFT
3	1	080439	H.D. GEAR RIGHT
4	1	080338	WHEEL SHAFT H.D.
5	2	017430	7 X 7 X 24 KEY SHAFT
6	1	080342	HOUSING H.D.
7	2	013185	FRONT BAR SHEAR GUARD
8	4	221320	M12 X 50MM SHCS
9	4	212014	M12 LOCK WASHER
10	1	080336	H.D. POST RIGHT
11	1	080337	H.D. POST LEFT
12	1	017342	HOLDDOWN CRANK
13	2	210014	M12 JAM NUT
14	1	080339	WHEEL WASHER H.D.
15	1	221120	M8 X 25 SHCS
16	2	017347	HANDLE HOLDDOWN
17	2	221335	M12 X 80MM SHCS
18	1	003105	FINGERS BEYOND BAR GUARD
19	1	080344	HOLDDOWN BASE-BAR SHEAR
20	4	201110	M6 X 12 HHCS
21	2	141415	1/4 " X 1-3/4 " ROLL PIN
22	1	080430	XL SHEAR TABLE



HOLD DOWN ASSEMBLY

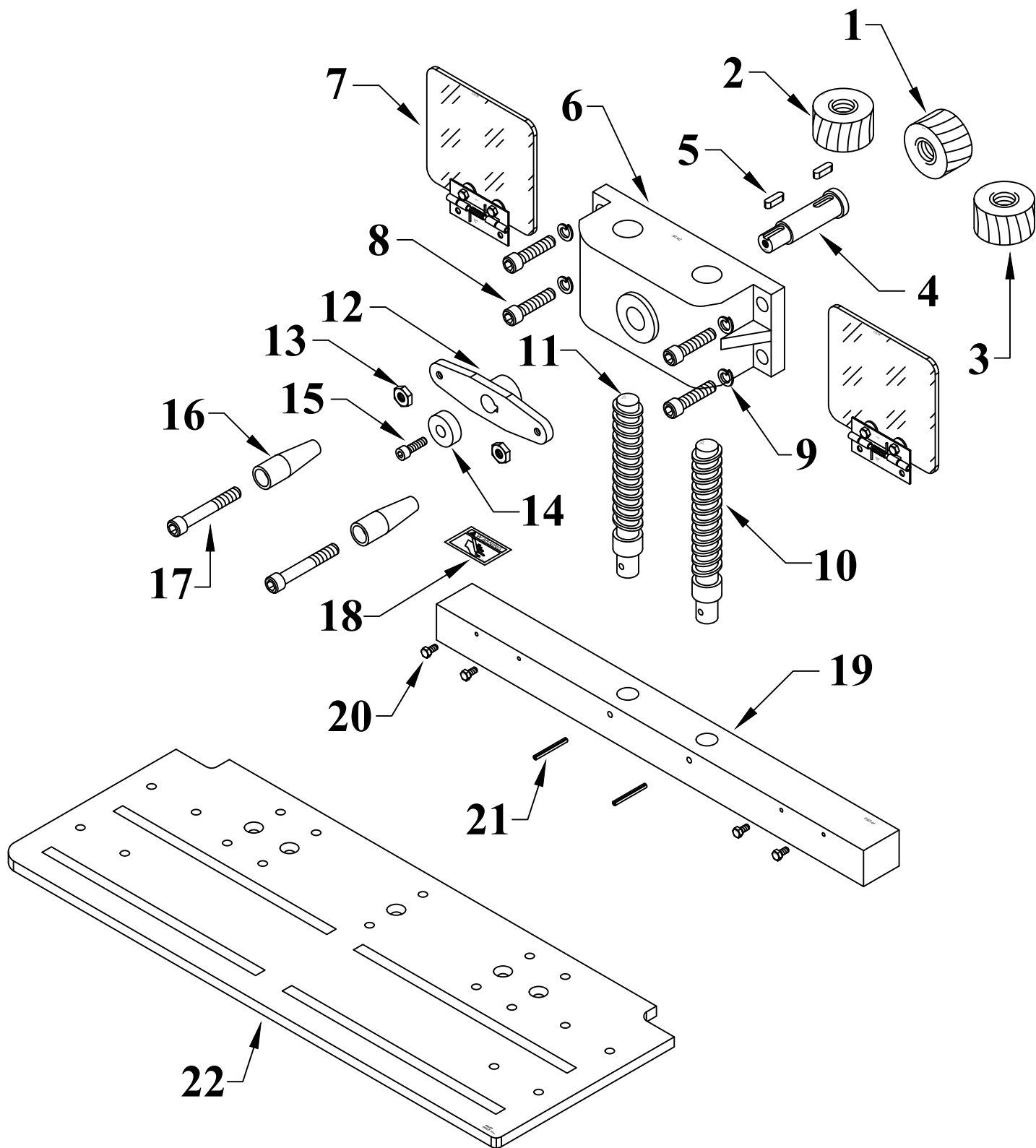


FIGURE 41

9.7 SLUG BUCKETS, FAN & E-STOP

ITEM	QTY.	PART #	DESCRIPTION
S L U G B U C K E T S			
1	1	013168	NOTCHER BUCKET ASS'Y
2	2	220016	M6 X 10MM BF - (2) PER BUCKET
3	1	046018	HANDLE - (2) PER BUCKET
4	1	033176	PUNCH BUCKET ASS'Y
F A N & G U A R D			
5	4	201000	M4 X 30MM HHCS
6	8	213005	M5 LARGE WASHER
7	2	014113	FAN GUARD
8	1	014115	FAN
9	1	073204	M4 HEX NUT
10	1	073450	M4 X 16MM SHCS
E M E R G E N C Y S T O P D E T A I L			
11	1	000415	EMERGENCY STOP BOX
12	1	562502	1/2 CONDUIT LOCKNUT
13	1	000202	1/2" LIQ. TYPE CORD CONN
14	1	660435	14/3 SJOW 300V CORD - 64"
15	1	004216	EMERGENCY STOP W/BUTTON
16	2	213005	M5 LARGE WASHER
17	1	133313	#8-32 X 3/16 PHILLIPS PAN M/S
18	1	004214	D070 EMERGENCY STOP ASS'Y INCLUDES 11 THRU 15

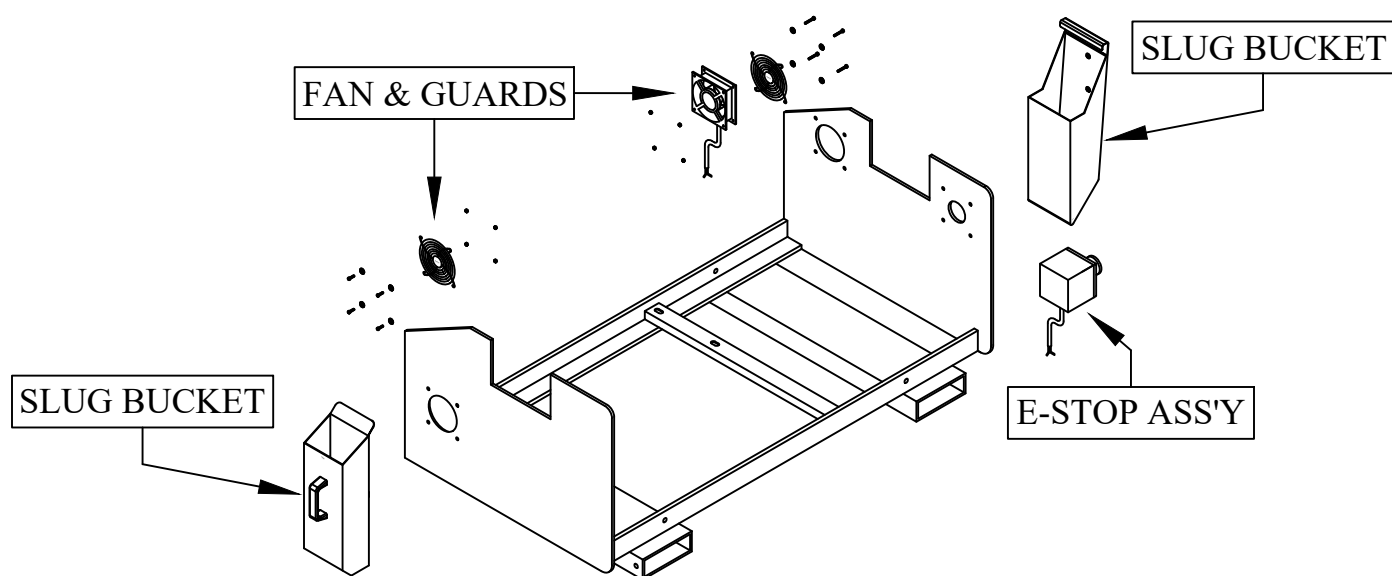
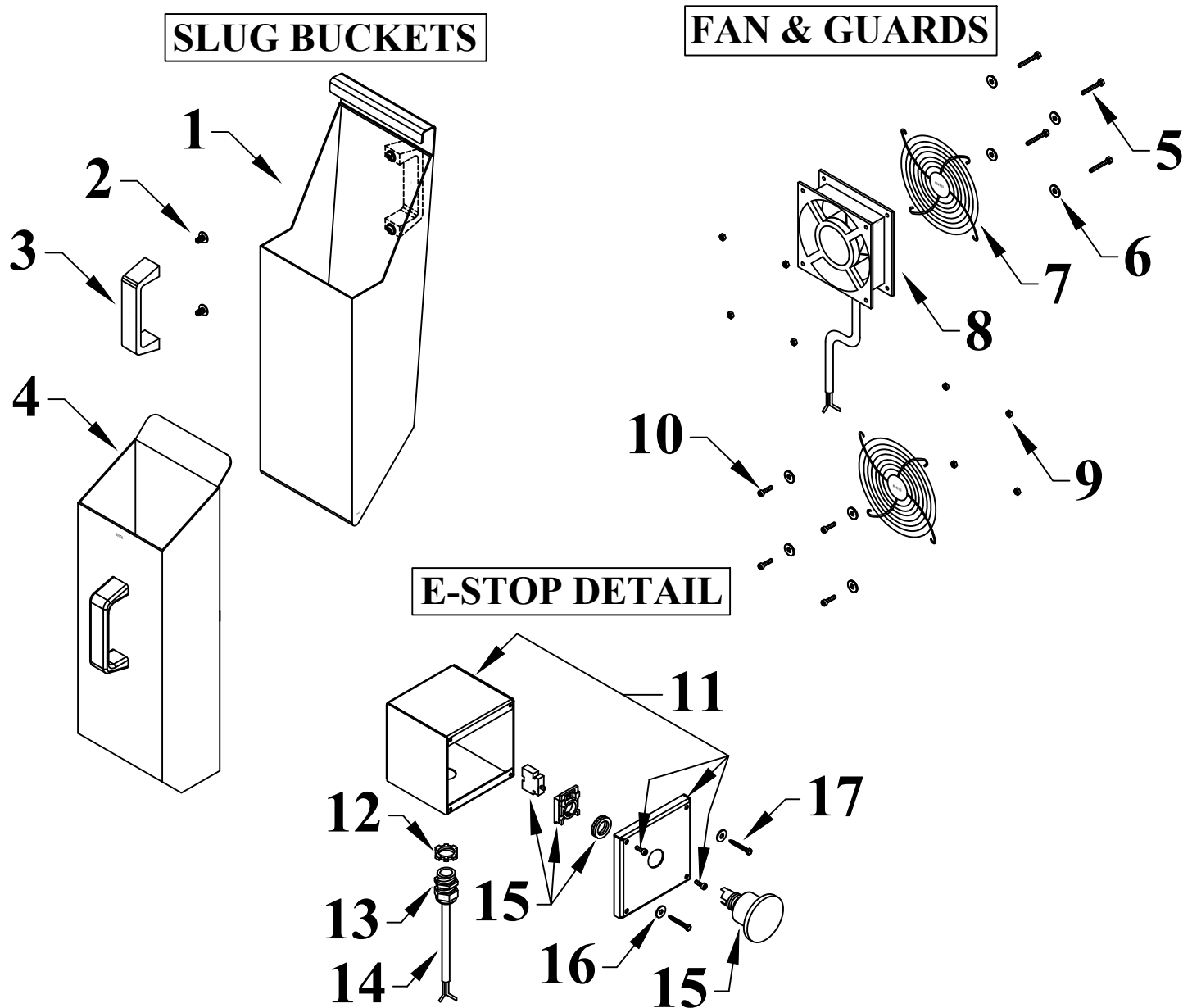


FIGURE 42

9.8 SHEET METAL PARTS & HARDWARE

ITEM	QTY.	PART #	DESCRIPTION
1	18	224205	M10 X 16MM WLCS
2	1	013274	PUNCH COVER PAINTED
3	3	221005	M6 X 12MM SHCS
4	1	013289	SHEAR DOOR ASS'Y
5	1	221002	M4 X 12MM SHCS
6	1	013157	SHIELD
7	1	073204	M4 HEX NUT
8	1	013178	NYLON CABLE CLAMP
9	1	341140	PIPE NOTCHER SLUG RAMP
10	2	204222	M10 X 55MM HHCS
11	2	214012	M10 REGULAR WASHER
12	1	013160	TOOLING SLUG CHUTE
13	1	013621	SLUG CHUTE
14	1	013261	DO70/95 CYLINDER SHROUD
15	1	013628	REAR SHROUD
16	1	013267	DO70/95 NOTCHER GUARD
17	1	013151	NOTCHER SLUG CHUTE
18	1	013629	FRONT SHROUD



SHEET METAL PARTS

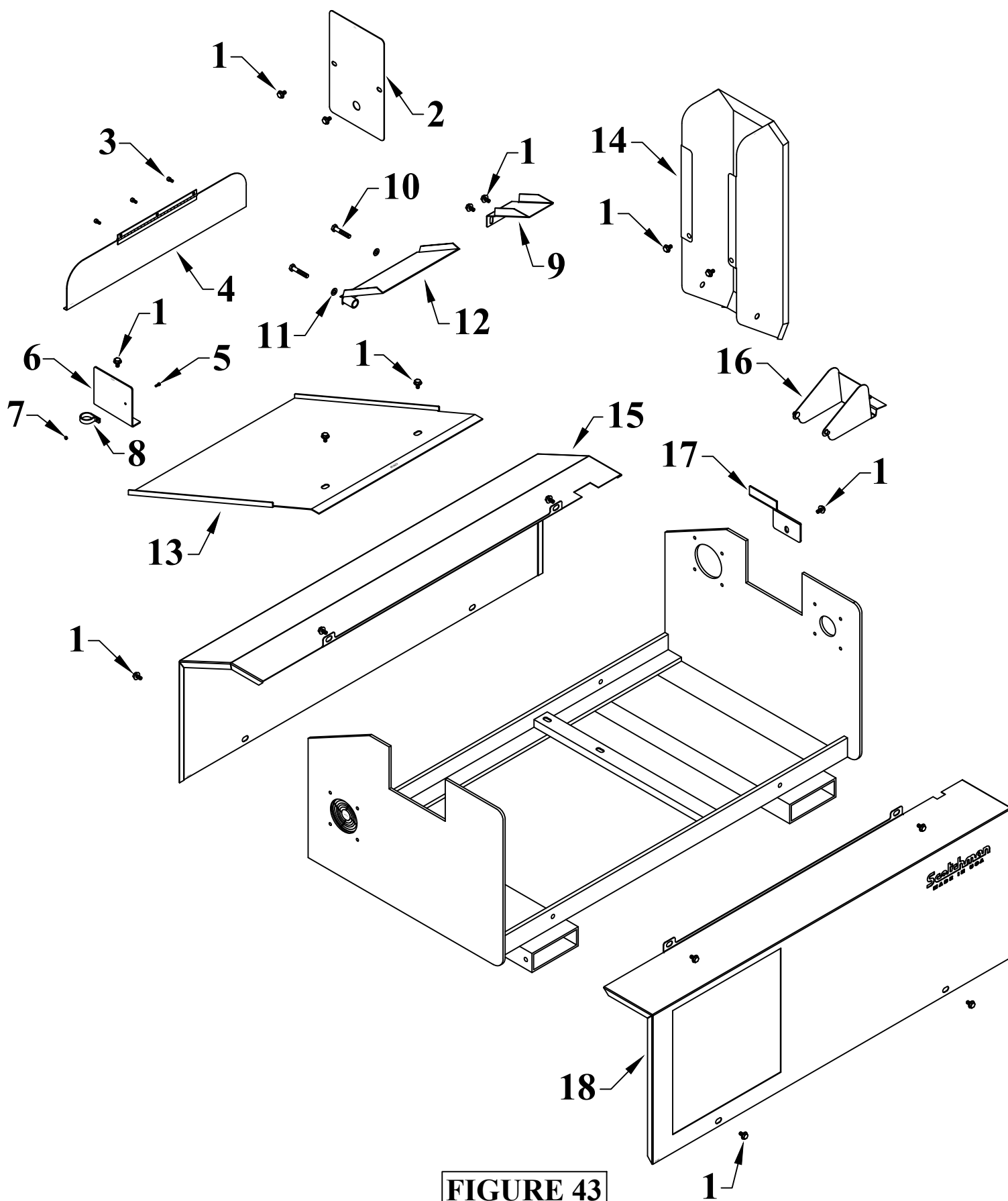
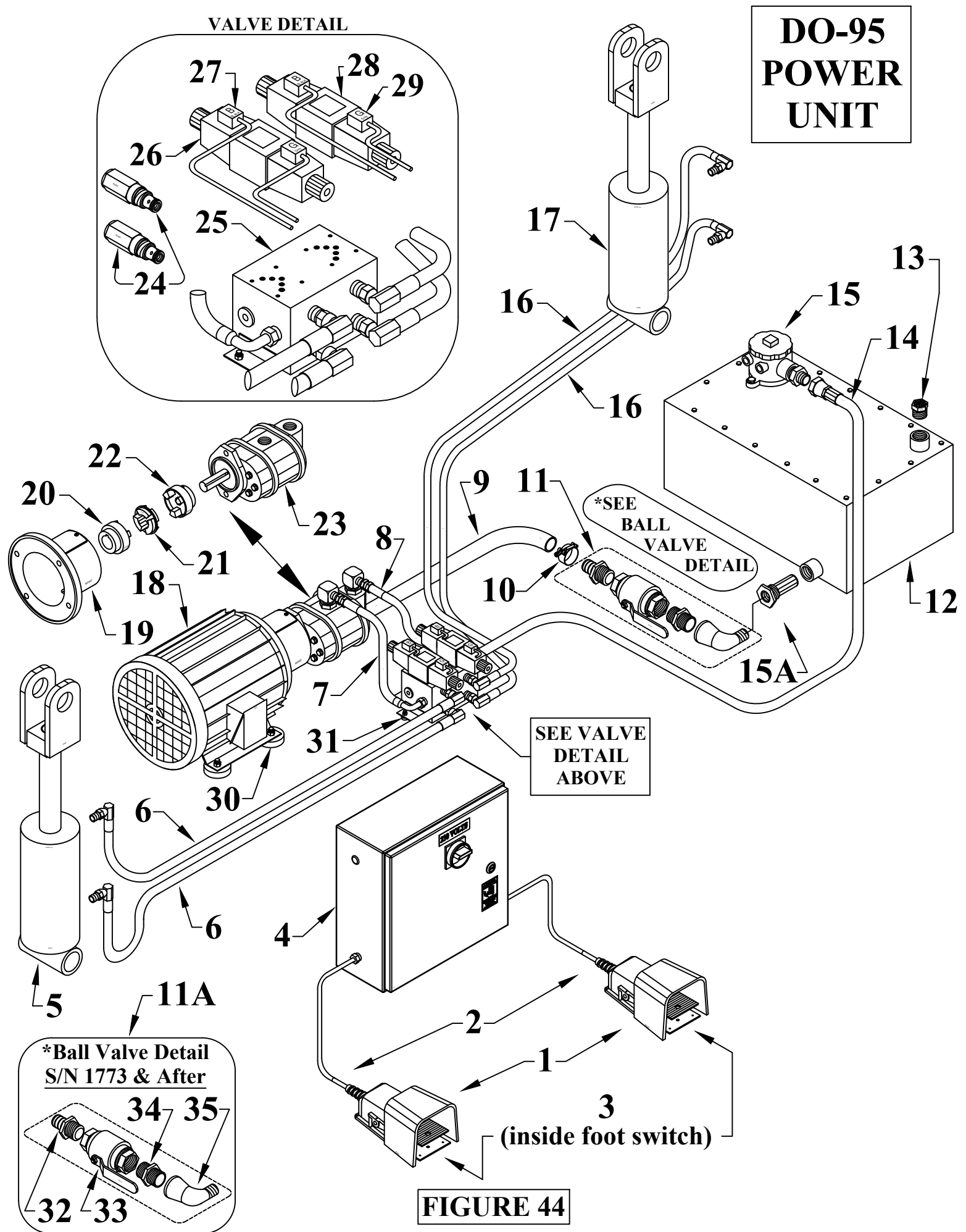


FIGURE 43

9.9 POWER UNIT DO-95

ITEM	QTY.	PART #	DESCRIPTION
1	2	562453	FOOT SWITCH ASSEMBLY INCLUDES ITEM 2
2	2	011753	168" FOOT CABLE SALES
*3	1	562451	MICROSWITCH FOR SSC FOOT PEDAL (not shown)
*3A	1	562452	MICROSWITCH FOR LINEMASTER FOOT PEDAL (not shown)
4	1	013220	DO 70/95 CONTROL BOX ASS'Y INCL. 1, 2, 27, 29 & FAN CORD
5	1	013325	SHEAR CYL ASS'Y
6	2	003732	PRESSURE HOSE 25"
7	1	013407	PRESSURE HOSE 14"
8	1	013405	PRESSURE HOSE 12"
9	1	013420	1-1/4" X 7-3/4" S. HOSE
10	1	013417	1.5" HOSE CLAMP
11	1	013390	BALL VALVE KIT - S/N 1772 & Prior
11A			For S/N 1773 & After,, see Items 32 - 35
12	1	013403	D.O. 70/95 RESERVOIR - S/N 1772 & Prior
12A	1	033500	D.O. 70/95 RESERVOIR - S/N 1773 & After
13	1	016088	FILLER BREATHER CAP
14	1	013425	3/4 X 17" RETURN HOSE
15	1	006630	REPLACEMENT FILTER
15A	1	013400	SUCTION SCREEN
16	2	003731	PRESSURE HOSE 64"
17	1	013320	PUNCH CYL ASS'Y
18	1	013501	ASS'Y 1PH MOTOR 10HP 230V 60HZ
	1	013508	ASS'Y MOTOR 10HP 208/230V
	1	013509	ASS'Y MOTOR 10HP 460V
19	1	013432	BELL HOUSING 10HR
20	1	013426	MOTOR COUPLER
21	1	013427	INSERT COUPLER
22	1	013428	PUMP COUPLER
23	1	013415	PUMP 70/95
24	2	013430	RELIEF VALVE 95/135
25	1	013408	MANIFOLD 10HR 70/120
26	4	013412	COIL 10HR UNIT
27	2	006540	DIN CONN (A) BLACK
28	2	013410	VALVE 70/95
29	2	006545	DIN CONN (A) GREY
30	4	006970	D.O. VIBRATION DAMPENER
31	4	158200	1/4 X 3/4 GROMMET
32	1	013436	1.5" NPT x 1.25" HOSE BARB - S/N 1773 & After
33	1	013419	1.5" BALL VALVE - S/N 1773 & After
34	1	013423	1.5" X 1.5" NIPPLE - S/N 1773 & After
35	1	013444	1.5"F X 1.5"M REDUCING 90 - S/N 1773 & After
36		013305	DO70/95 CYLINDER SEAL KIT (This Kit is for either Cylinder)

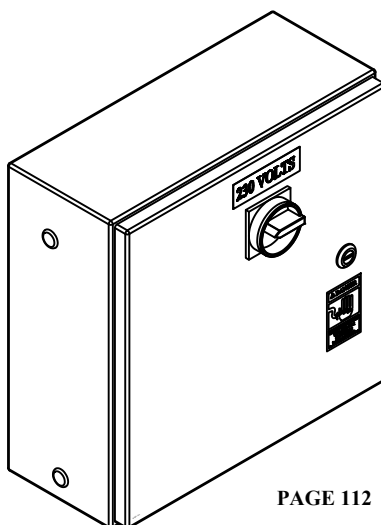
* **BEFORE ORDERING A MICROSWITCH:** Inspect foot pedal to determine if it's a **LINEMASTER** or **SSC**.



9.10 ELECTRICAL UNIT

ITEM	QTY.	PART #	DESCRIPTION
1	1	011861	TRANSFORMER-250VA
2	1	011920	1 AMP PRIMARY FUSE
3	2	011835	2 AMP SECONDARY FUSE
2A*	1	011852	3 AMP PRIMARY FUSE
3A*	2	011853	5 AMP N/A: USE GRAINGER PART # 6F118
4	1	011856	DISCONNECT SWITCH
5	1	011976	3 PH CONTACTOR DILM 32-10
5A	1	011977	1 PH CONTACTOR DILM 65
6	1	011969	OVERLOAD MOUNTING BASE 1 PH
6A	1	011949	OVERLOAD MOUNTING BASE 3PH
7	1	011997	(230V 1 PH) ZB65-57 OVERLOAD
7A	1	013217	(460V) ZB32-16 OVERLOAD
7B	1	013221	(230V) ZB32-32 OVERLOAD
8	1	550065	OPTIONALBACK GAUGE RELAY
9	1	N/A	TERMINAL STRIP
10	1	013220	DO 70 CONTROL BOX ASS'Y

* Older machines used two 3 amp primary fuses and one 5 amp secondary fuse. Make sure to replace fuse with one that has the same amp rating.



CONTROL BOX ASS'Y

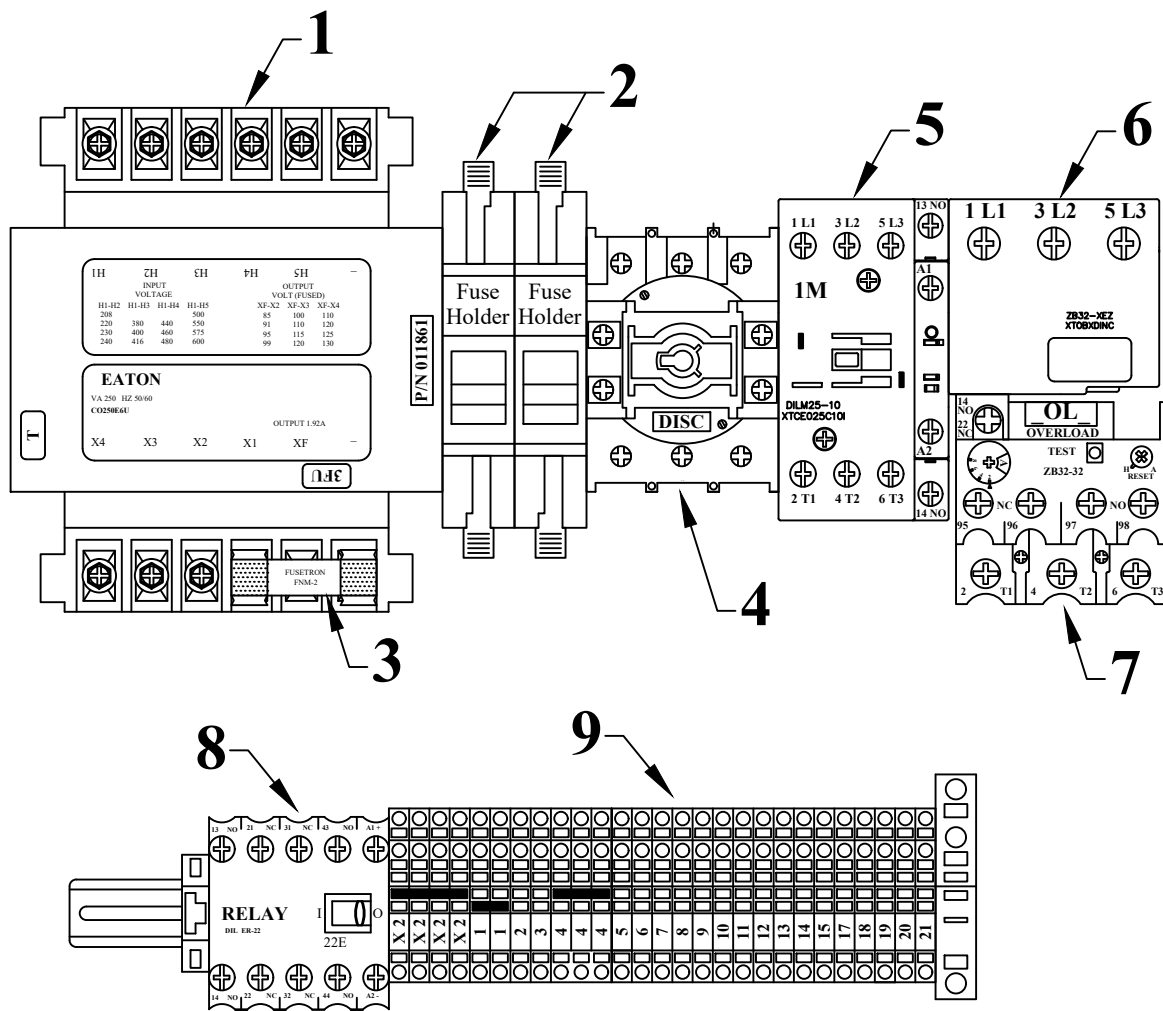


FIGURE 45

9.11 NOTCHER ASSEMBLY

ITEM	QTY.	PART #	DESCRIPTION
1	1	013267	D.O. 70/95 NOTCHER GUARD
2	4	230207	M10 X 20 FSHCS
3	2	080061	STROKE ADJUSTMENT HANDLE
4	2	214012	M10 REGULAR WASHER
5	2	014116	L TABLE STOP
6	1	033047	D.O. NOTCHER TABLE - USED ON DO70 S/N: 1512M0116 & UP, DO95 S/N: 1694M0116 & UP
6A	1	014119	D.O. NOTCHER TABLE - USED ON DO70 S/N: 1511M0116 & PRIOR, DO95 S/N: 1693M0116 & PRIOR
7	2	026624	TEE NUT NOTCH TABLE
8	1	015110	TOP NOTCHER BLADE
9	3	221314	M12 X 35MM SHCS
10	2	004892	A.S. & NOTCHER BLADE
11	1	015111	FRONT NOTCHER BLADE
12	9	221322	M12 X 60MM SHCS
13	9	212014	M12 LOCK WASHER
14	4	221326	M12 X 65MM SHCS
15	1	033046	DO70/95 FI85 BLADE HOLDER DO70 S/N: 1512M0116 & UP, DO95 S/N: 1694M0116 & UP
15A	1	015113	NOTCHER BLADE HOLDER DO70 S/N: 1511M0116 & PRIOR, DO95 S/N: 1693M0116 & PRIOR
16	2	221327	M12 X 70MM SHCS
17	1	013151	NOTCHER SLUG CHUTE
18	1	224205	M10 X 16MM WLCS
19	2	221005	M6 X 12MM SHCS
20	2	213007	M6 LARGE WASHER
21	1	046018	HANDLE MT/105
22	1	013168	NOTCHER BUCKET ASS'Y INCLUDES 19, 20 & 21

NOTCHER ASSEMBLY

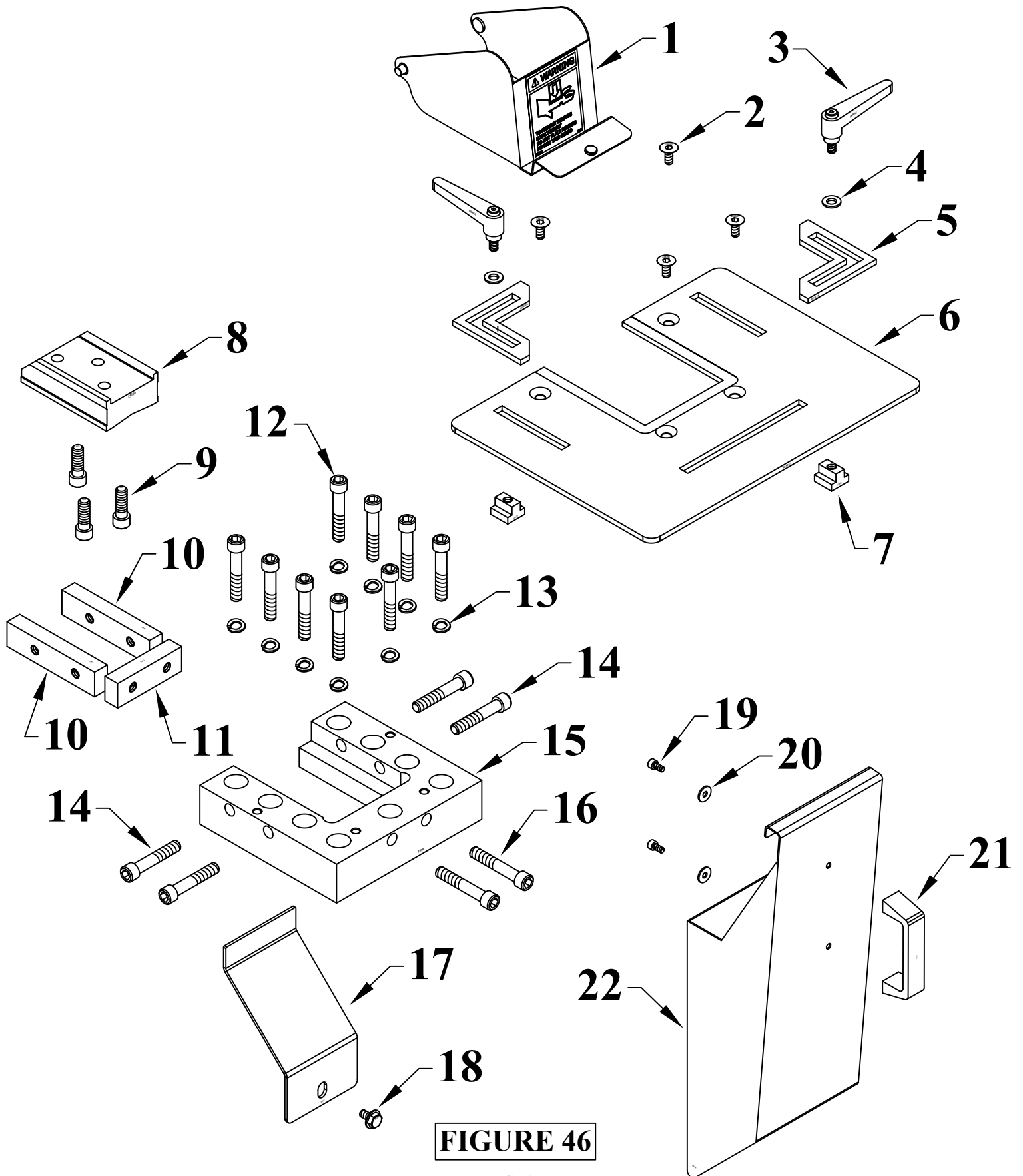
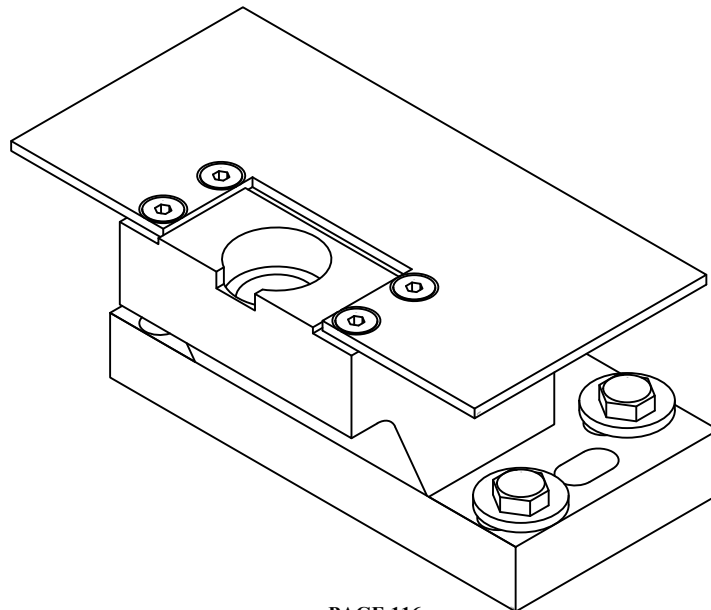


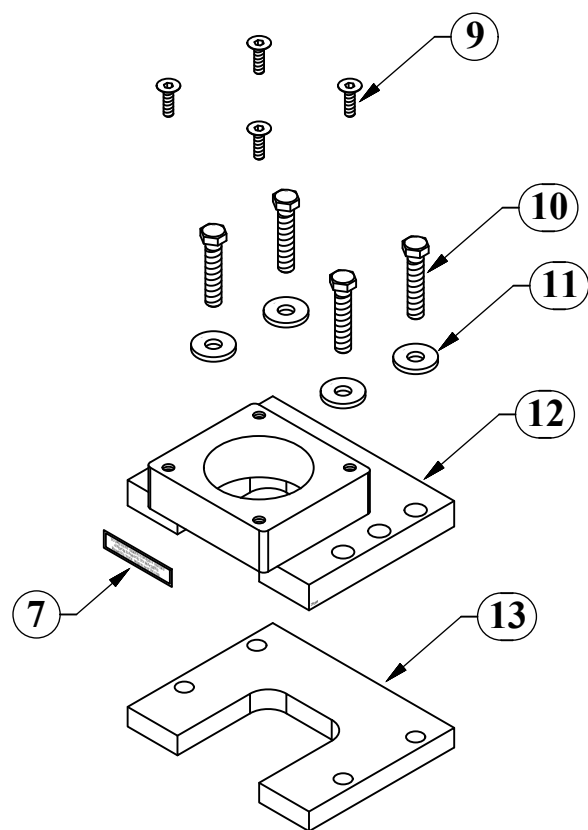
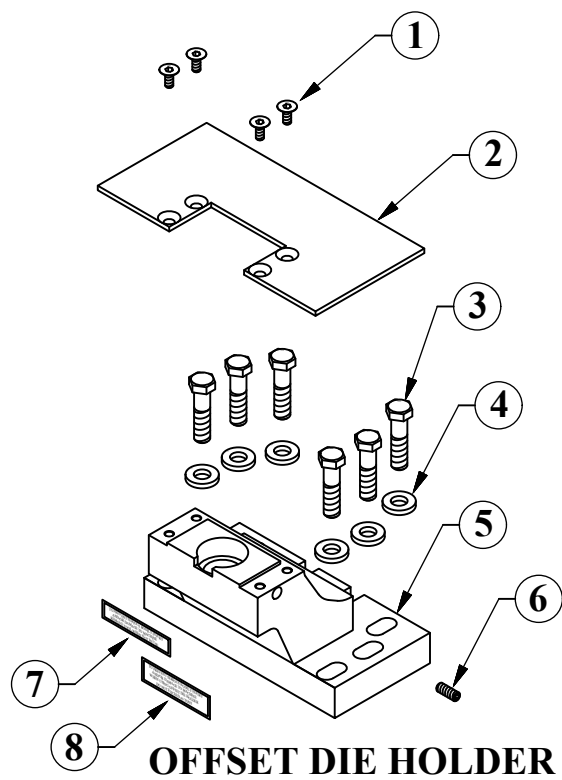
FIGURE 46

9.12 OPTIONAL DIE HOLDERS

ITEM	QTY	PART #	DESCRIPTION
1	4	230207	M10 X 20 FSHCS
2	1	004275	OFFSET DIE HOLDER TABLE
3	4	201625	M16 X 65 HHCS
4	6	113020	5/8" HARD WASHER
5	1	013186	OFFSET DIE HOLDER 2" DIE
6	1	219050	M10 X 25 SS
7	1	003145	REMOVE TOOL LABEL
8	1	003135	40 TON OFFSET CAPACITY
9	4	230415	M12 X 35 FHCS
10	2	203630	M16 X 80 HHCS
11	6	113017	1 3/4" X 21/32" WASHER
12	1	028300	6 X 6 DIE HOLDER
13	1	080841	6 X 6 DIE HOLDER RISER



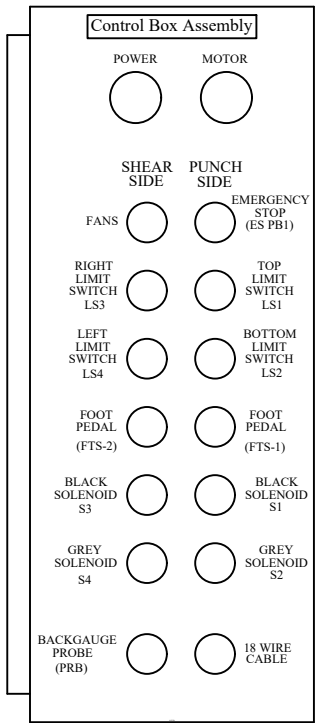
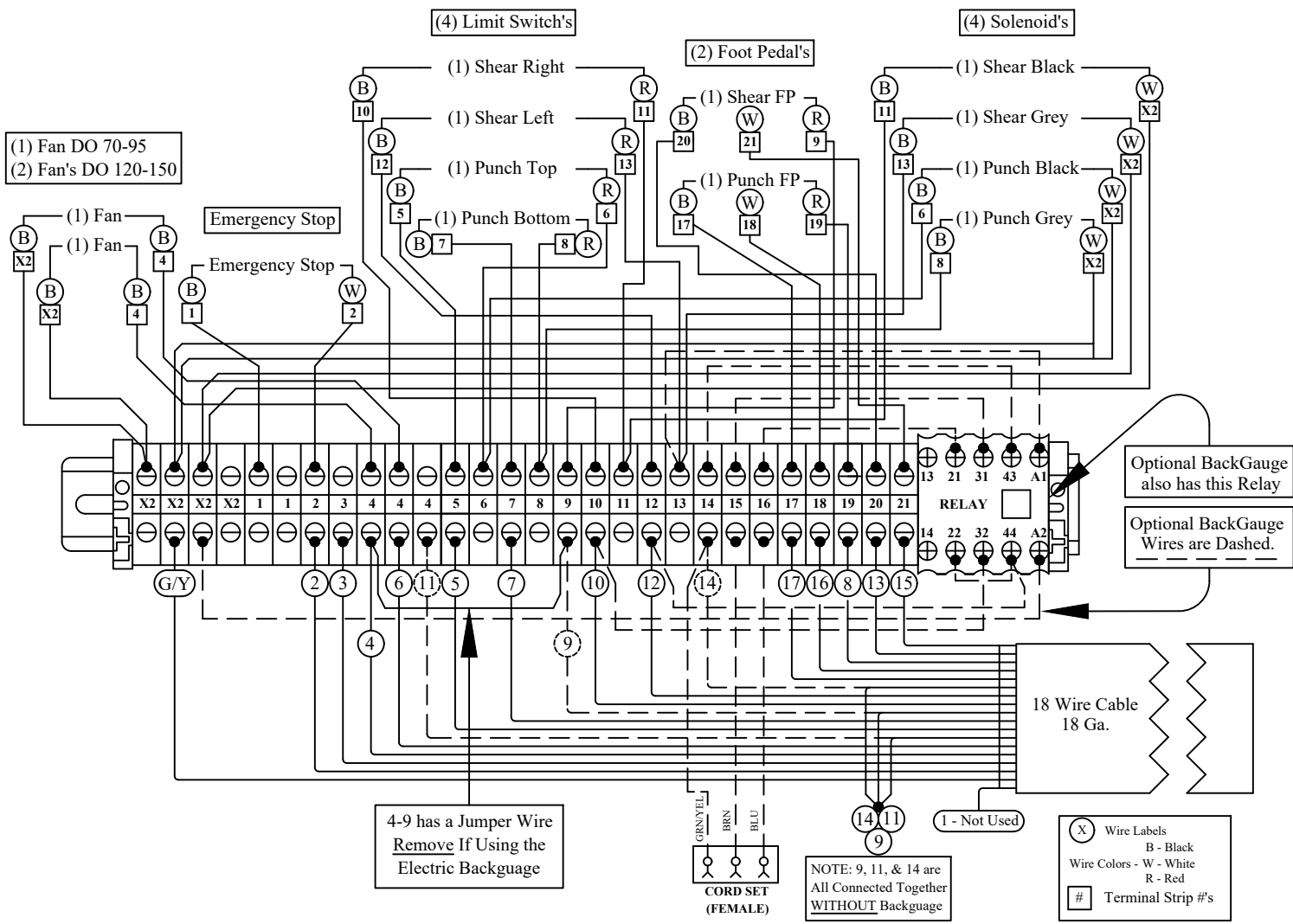
OPTIONAL DIE HOLDERS



6 x 6 DIE HOLDER

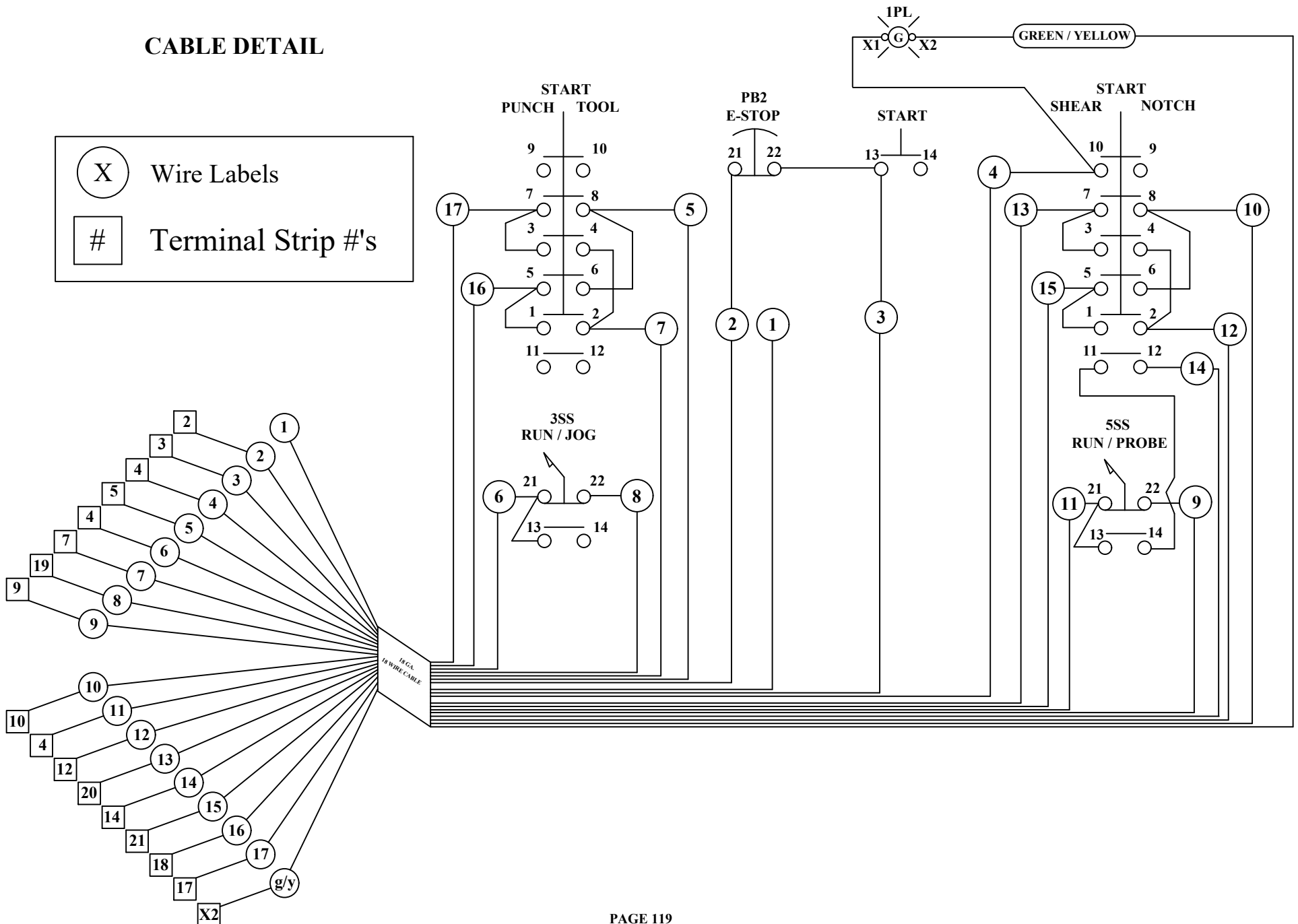
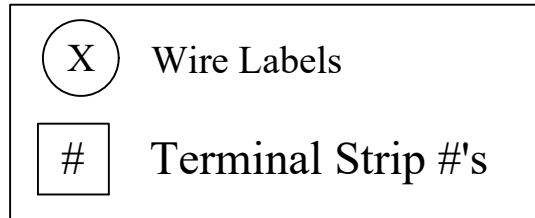
FIGURE 47

10.0 ELECTRICAL SCHEMATIC



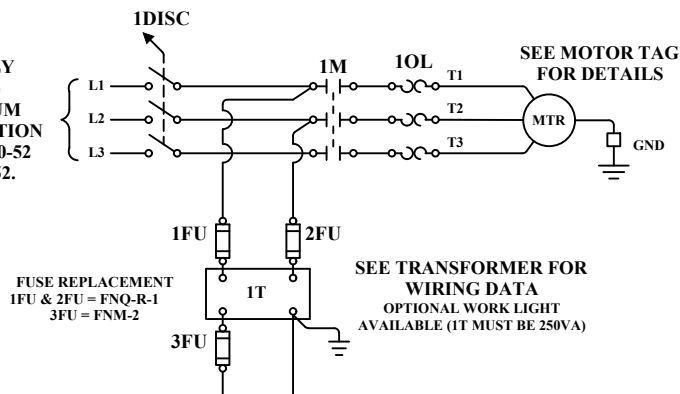
COMPONENT ENCLOSURE

CABLE DETAIL



DO70/95 3PH

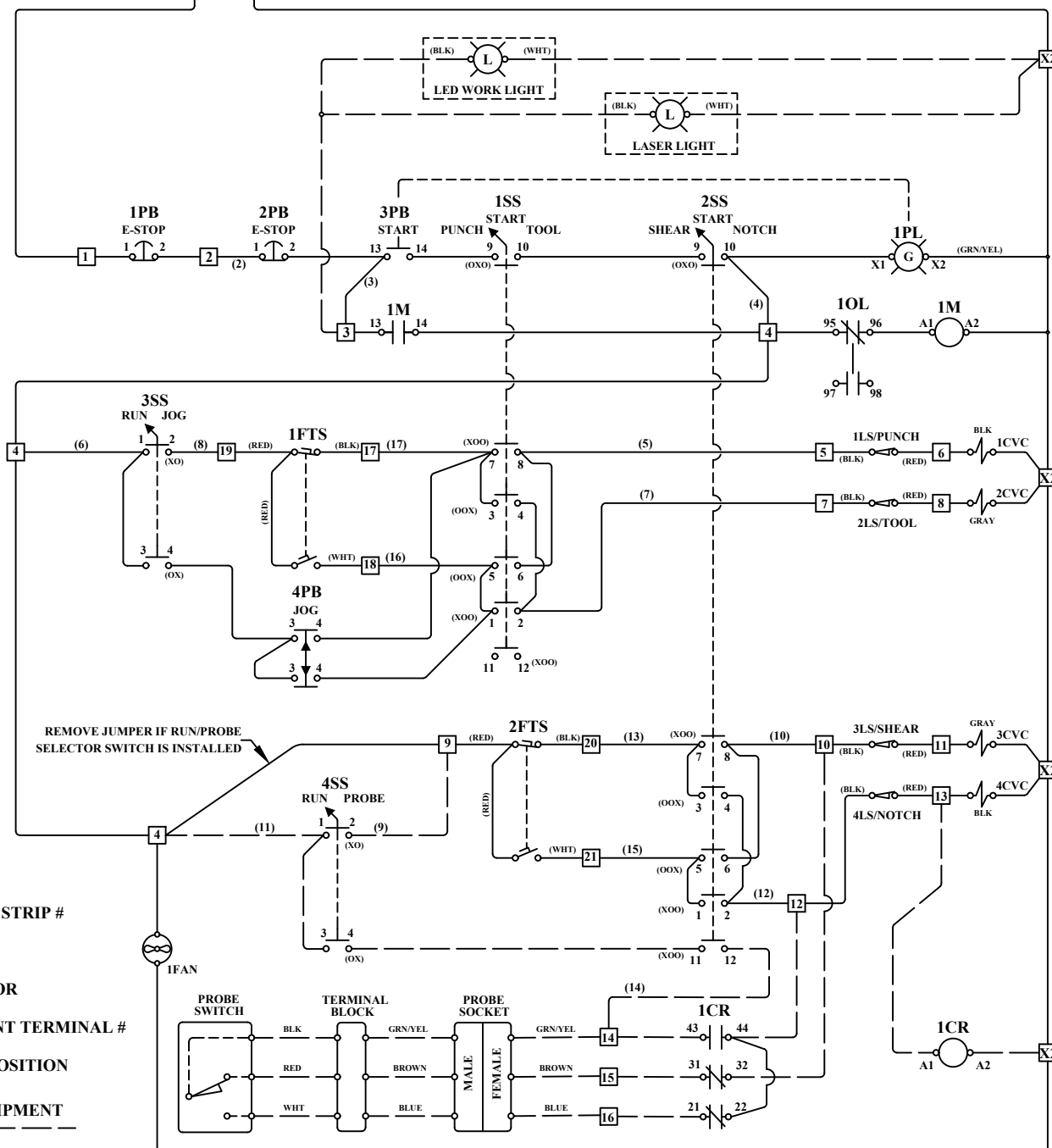
INCOMING SUPPLY
(BY CUSTOMER)
PROVIDE MAXIMUM
UPSTREAM PROTECTION
PER N.E.C. CODE 430-52
AND TABLE 430-152.



PN 013220 RATING TABLE					
LINE VOLTAGE (3PH)	208	230	380	460	575
MAX. HP	10	10	10	10	10
MOTOR FLA	27.6	25	15.8	12.5	9.6
OVERLOAD	ZB32-32	ZB32-32	ZB32-16	ZB32-16	ZB32-16

CR - CONTROL RELAY
CVC - CONTROL VALVE COIL
DISC - DISCONNECT
FTS - FOOT SWITCH
FU - FUSE
LS - LIMIT SWITCH

M - MOTOR START RELAY
OL - OVERLOAD (THERMAL)
PB - PUSH BUTTON
PL - PILOT LIGHT
SS - SELECTOR SWITCH
T - TRANSFORMER



1 - TERMINAL STRIP #

(2) - WIRE #

BLK- WIRE COLOR

3 - COMPONENT TERMINAL #

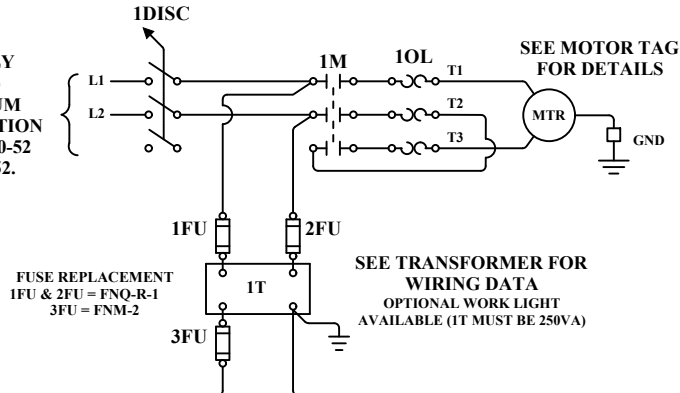
(XO) - NORMAL POSITION

OPTIONAL EQUIPMENT

COMPONENT

DO70/95 230V 1PH

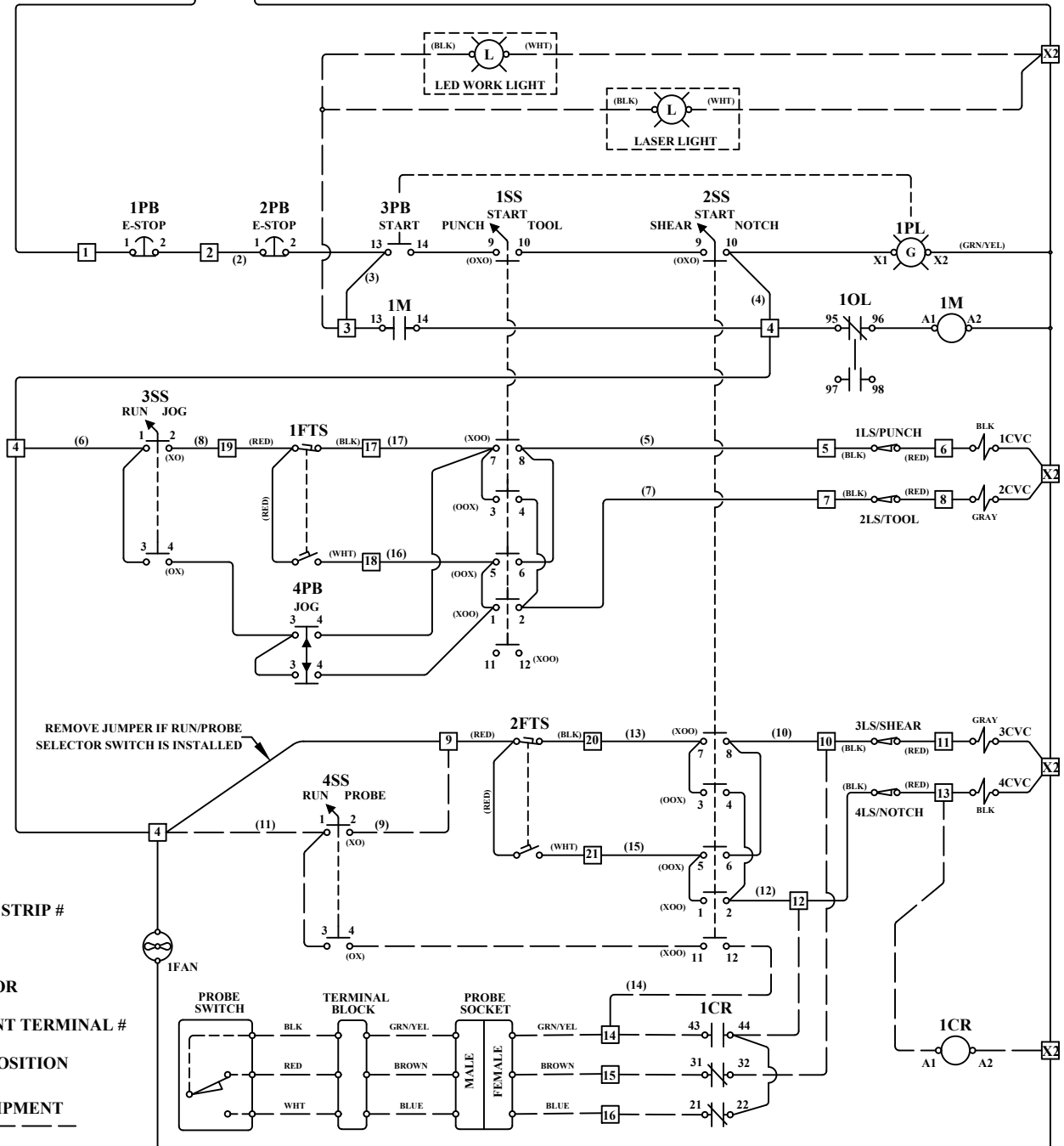
INCOMING SUPPLY
(BY CUSTOMER)
PROVIDE MAXIMUM
UPSTREAM PROTECTION
PER N.E.C. CODE 430-52
AND TABLE 430-152.



PN 013225 RATING TABLE	
LINE VOLTAGE (1PH)	230
MAX. HP	10
MOTOR FLA	40
OVERLOAD	ZB65-57

CR - CONTROL RELAY
CVC - CONTROL VALVE COIL
DISC - DISCONNECT
FTS - FOOT SWITCH
FU - FUSE
LS - LIMIT SWITCH

M - MOTOR START RELAY
OL - OVERLOAD (THERMAL)
PB - PUSH BUTTON
PL - PILOT LIGHT
SS - SELECTOR SWITCH
T - TRANSFORMER



1 - TERMINAL STRIP #

(2) - WIRE #

BLK- WIRE COLOR

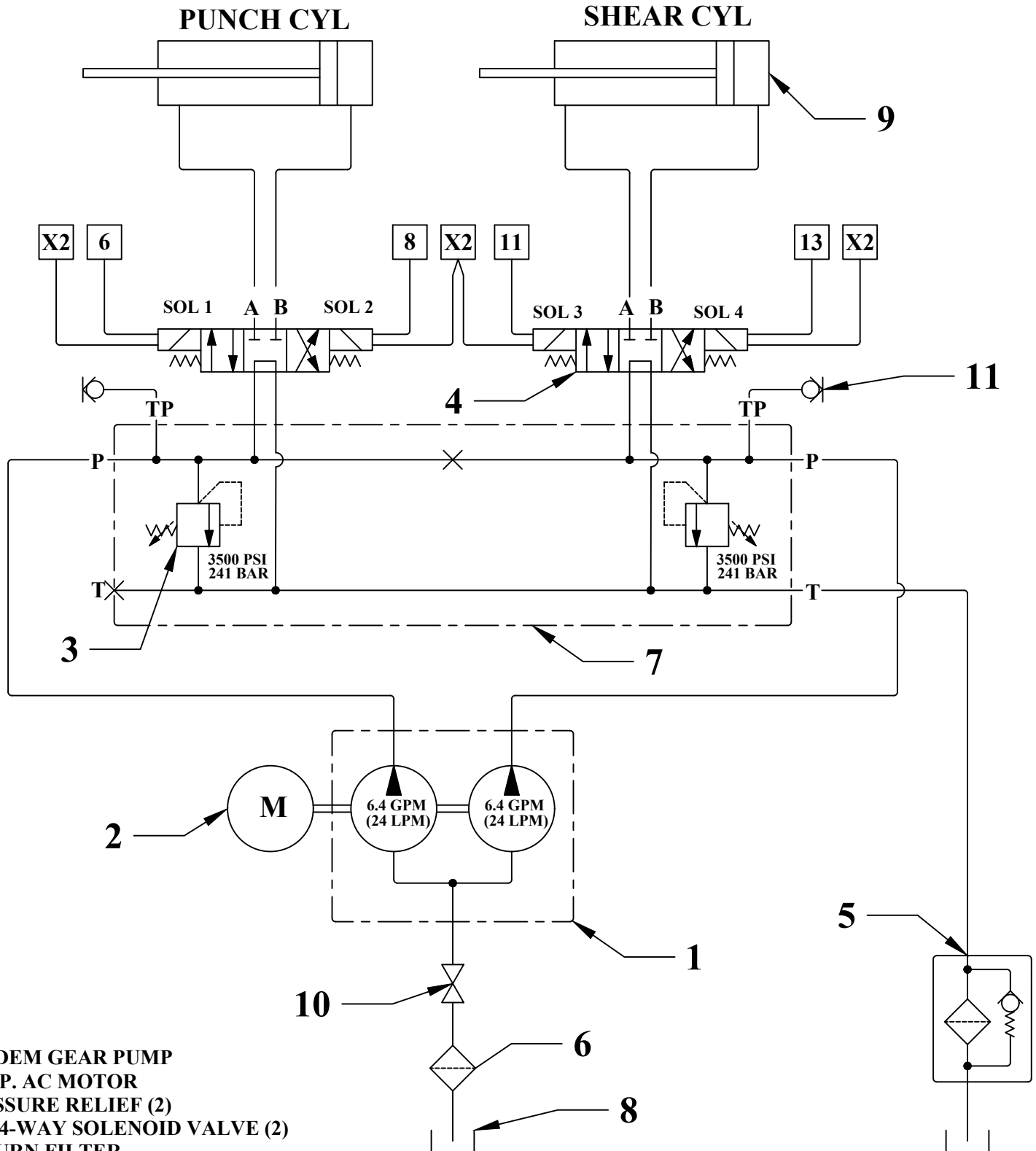
3 - COMPONENT TERMINAL #

(XO) - NORMAL POSITION

OPTIONAL EQUIPMENT

COMPONENT

11.0 HYDRAULIC SCHEMATIC DO-95



- 1 = TANDEM GEAR PUMP
- 2 = 10 H.P. AC MOTOR
- 3 = PRESSURE RELIEF (2)
- 4 = DO3 4-WAY SOLENOID VALVE (2)
- 5 = RETURN FILTER
- 6 = SUCTION STRAINER
- 7 = VALVE MANIFOLD
- 8 = 14 GAL (53L) VENTED RESERVOIR
- 9 = DOUBLE ACTING CYLINDER (2)
- 10 = MANUAL SHUT-OFF VALVE
- 11 = LINE PRESSURE TEST PORT (2)

LEGEND

LINE, WORKING MAIN

LINE, PILOT