You have downloaded a manual for our

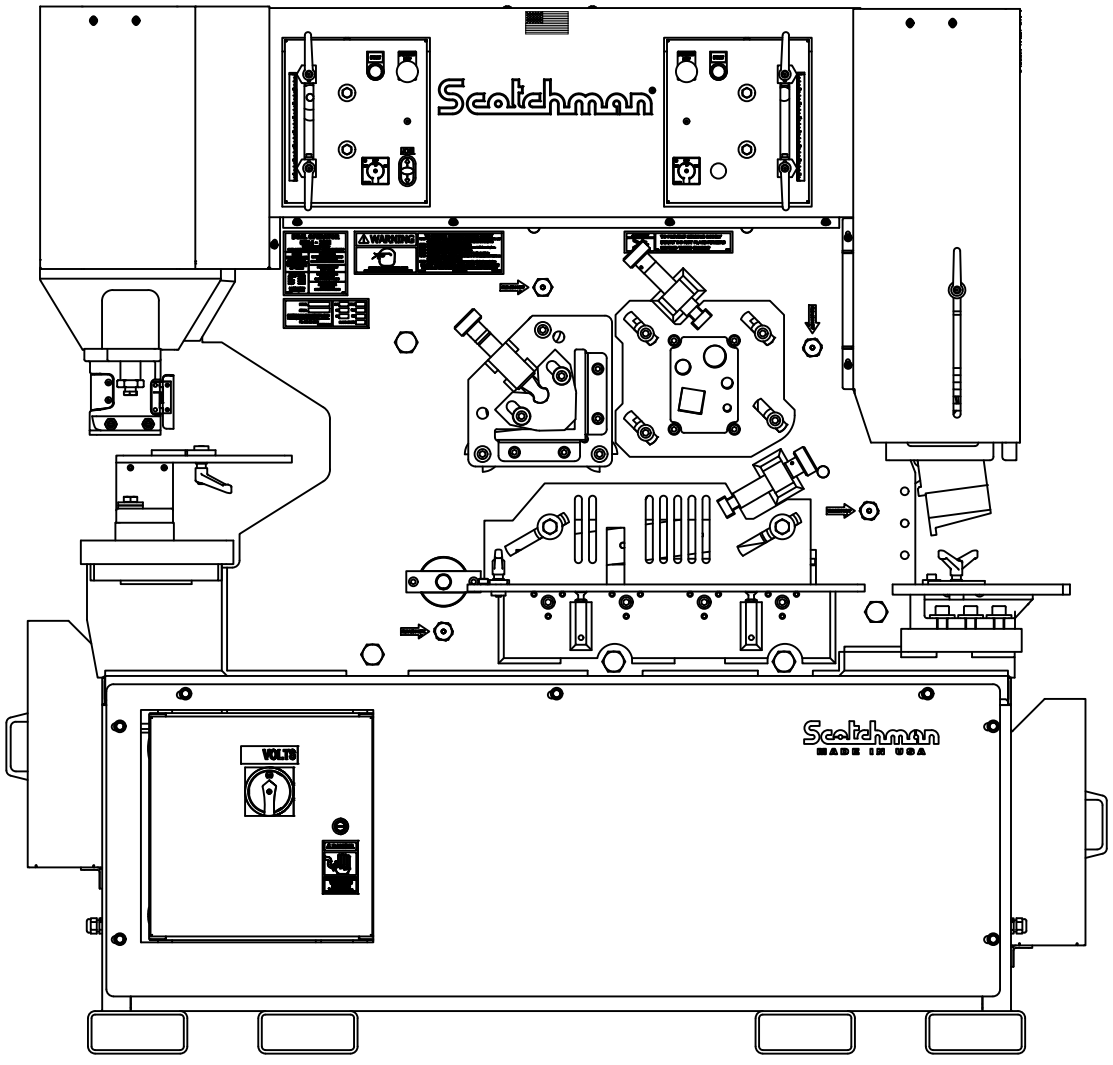
Model DO-8514-20M Ironworker.

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.



Scotchman®

Metal Fabricating Solutions

www.scotchman.com

MODEL

DO-8514-20M

IRONWORKER

SERIAL # 1259M & UP

PRINTED MAY 2024

SCOTCHMAN IND. - 180 E US HWY 14 - PO BOX 850 - PHILIP, SD 57567 Phone: 1-800-843-8844

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1.0 INTRODUCTION

The Scotchman DO-8514-20 is a versatile, dual operator, multi-purpose, shearing, punching and forming machine engineered for trouble free operation.

The design of the machine combines simplicity of operation with smooth, full stroke control.

The ability of the operator to control the machine.s direction of movement at any point in the stroke, (stop, jog or reverse), gives the Scotchman Ironworker a tremendous advantage over mechanical ironworkers. There is no chance of the Scotchman being "accidentally tripped".

The hydraulic system operates at a maximum pressure of 3,350 PSI (231 BAR) for the shear and 3,800 PSI (262 BAR) for the punch and is protected from overload by a relief valve.

The Scotchman DO-8514-20 is designed as a fully-integrated, tooled Ironworker. On this model, the tools are an integral part of the machine and are designed for the user that wants the advantage of five separate working stations without the necessity of tooling changes.

While this is a fully-integrated machine, Scotchman still offers many optional tools that are adaptable to this model.

Some of the optional tools available are: a channel shear, pipe notcher, brake attachment, etc., as well as a variety of special tools which can, if necessary, be tailored to suit your special needs. If you have a special application, please contact your dealer or the factory.

This instruction manual gives a comprehensive guide on the use of the ironworker, covering commissioning, operating, maintenance and safety. The installation engineer and all operators should carefully study this manual before the machine is installed and subsequently, put into operation. It is the duty of all operators and setters to acquaint themselves with the safe working practices contained in this manual and to ensure that all of these practices are adopted at all times.

2.0 SAFETY PRECAUTIONS

1. **The operators of this machine must be qualified and well trained in the operation of the machine. The operators must be aware of the capacities of the machine and the proper use of the hold down devices, strippers and guards provided with the machine.**
2. **All of the guards, adjustable restrictors and awareness barriers must be installed on the machine and kept in good working order. Promptly replace worn or damaged parts with authorized parts.**
3. **Never place any part of your body into or under any of the machines moving parts, strippers or hold devices.**
4. **Wear the appropriate personal protective equipment. Safety glasses are required at all times, whether operating, setting up or observing this machine in operation. Since heavy pieces of metal with sharp edges can be processed on this machine, the operator should also wear steel-toed shoes and tight fitting leather gloves.**
5. **Strictly comply with all warning labels and decals on the machine. Never remove any of the labels. Replace worn or damaged labels promptly.**
6. **Always disconnect and lock out the power when performing maintenance work or setting up any tooling on the machine. Follow the procedures outlined in the operators 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 operators position by placing anything around the machine that would impede the operators access to the machine.**
9. **Never modify this machine in any way without the written permission of the manufacturer.**
10. **Never leave this machine running unattended.**
11. **Always operate the punch station facing the station, standing. Never operate any of the work stations from a sitting or kneeling position.**
12. **Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturers instructions.**
13. **A safety video for this machine is available online at Scotchman.com. You can use the camera on on your smart phone to view it via the QR code below. Scotchmans also has many other helpful and informative videos posted on YouTube related to this machine.**

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

DO-8514-20M SAFTEY VIDEO

2.1 WARRANTY

Scotchman Industries, Inc. will, within one (3) year 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 WARNING LABELS

ITEM	PART #	DESCRIPTION
1	003100	SAFETY GLASSES LABEL
2*	003101	SABRE BLADE DECAL
3	003105	FINGERS BEYOND BAR GUARD
4	003110	PUNCH AND DIE WARNING
5	003170	1/2 MAX NOTCHER CAP/STICKER
6	003175	CAUTION CONTAMINATION (not shown)
7	003200	JOG DECAL
8	004349	NOTICE NOTCHER STICKER
9	010115	15" SCOTCHMAN DECAL
10	014325	WARNING HIGH PRESS HOSE
11	019102	DECAL"RESERVOIR CAPACITY" (not shown)
12	019103	DECAL "LUBRICATE"
13	019105	DECAL "GREASE POINT"
14	019127	US FLAG DECAL
15	019300	RIGHT HAND RULE 12"
16	019330	FIDO CAPACITY DECAL
17	003122	DANGER VOLTAGE STICKER
18	003585	DO-85 DECAL PACKAGE

***NOT SHOWN - Located On Shear Arm**

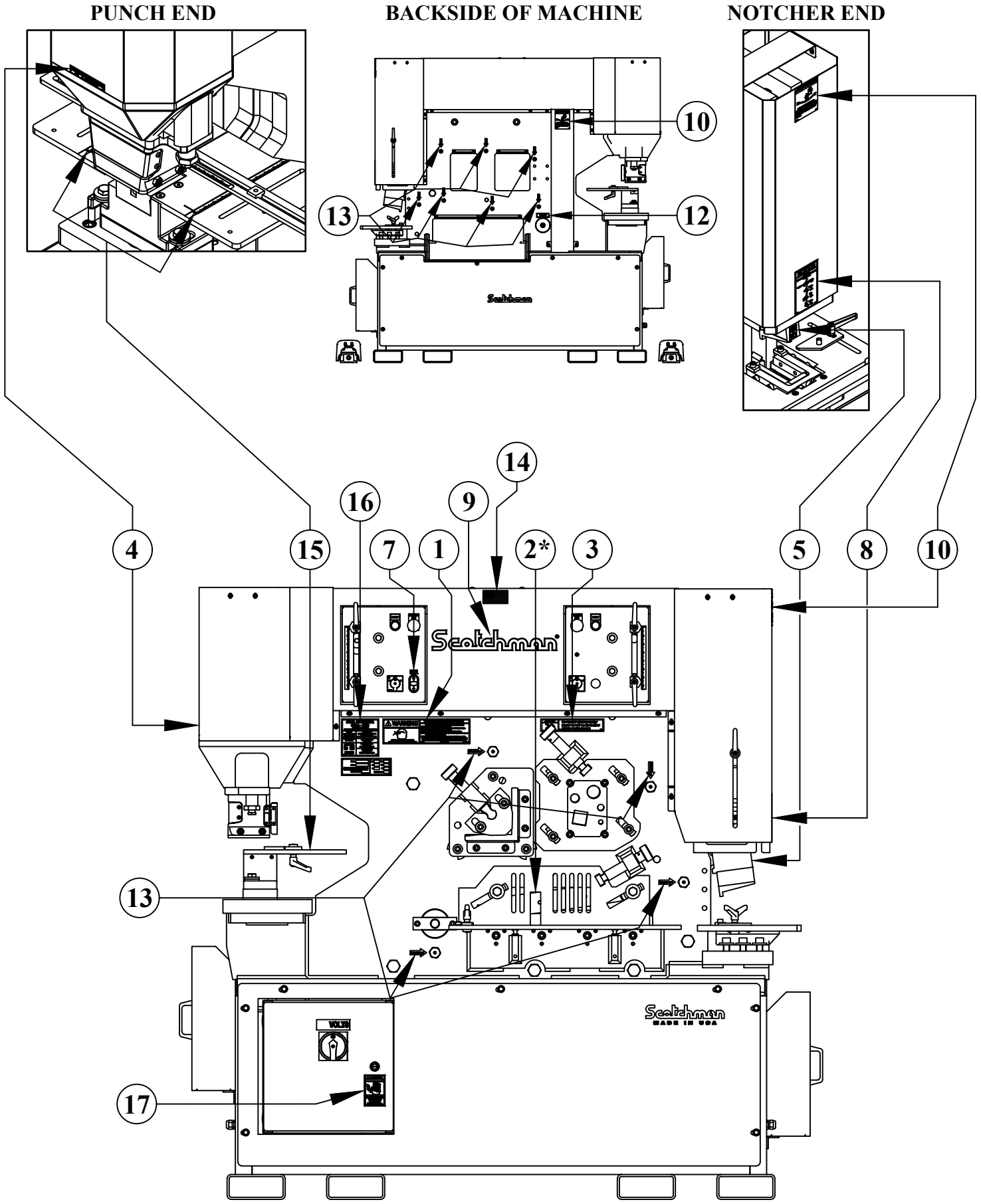

PUNCH END
BACKSIDE OF MACHINE
NOTCHER END
10
13
12
14
16
9
4
15
7
1
2*
3
5
8
10
13
17
Scotchman
MADE IN USA

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

		INCHES	CM
A.	Floor To Punch Ram	47-1/2	120.7
B.	Floor To Top Of Die	42-1/4	106.4
C.	Floor To Top Of Bolster	36-1/4	92.1
D.	Floor To Bottom Of Bolster	34-1/2	87
E.	Throat Depth	14	35.6
F.	Floor To Bottom Of Base	3	7.6
G.	Floor To Bar Shear & Notcher	33-1/8	84.2
H.	Floor To Angle Shear	43-1/4	109.8
I.	Floor To Rod Shear (Nominal)	44	112.7
J.	Height	73-5/8	187
K.	Width	30	76.2
L.	Floor To Top Of Shroud	26-9/16	67.5
M.	Length	72-3/4	184.8
N.	Punch Stroke	3	7.6
	Weight	5,500 LB.	2,500 KG.

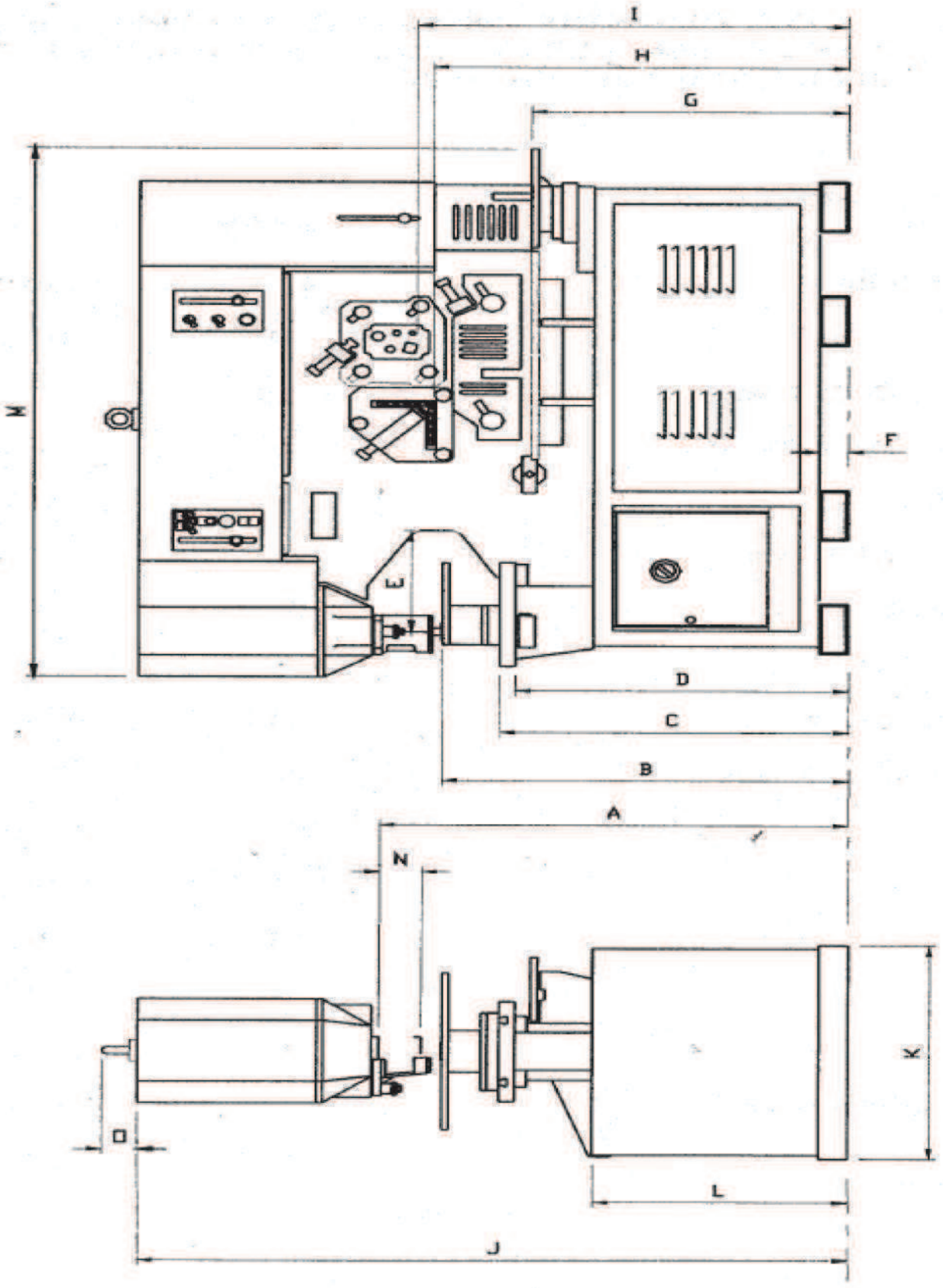


FIGURE 2

4.2 MACHINE MOVING PROCEDURES

⌦ **CAUTION: BE SURE THAT ANY LIFTING DEVICE HAS ADEQUATE CAPACITY BEFORE ATTEMPTING TO MOVE THIS MACHINE. THIS MODEL WEIGHS 5,500 LB. (2,500 KG.) AND IS TOP HEAVY!!**

A lifting eye can be supplied as an option for locating the machine and is secured to the center top of the machine. Once the machine is located, the lifting eye can be removed and stowed in the base of the machine, for future use in relocating the machine. Only use a suitably rated chain or sling with this method of lifting.

➲ **DO NOT USE SLINGS UNDER THE MACHINE!!!**

Alternatively, a forklift can be used to locate the machine. There are tubes built into the base structure for this purpose. Lift with the tines of the forklift through the base tubes and ensure that the tines extend through the length of the tubes. (SEE FIGURE 3.)

➲ **EXTREME CARE MUST BE TAKEN WHEN CARRYING OUT EITHER OF THE ABOVE MANEUVERS.**

When transporting the machine, it must be secured down to the bed of the transporter. When using securing straps over the machine, care must be taken in their positioning, as the straps could damage the top covers.

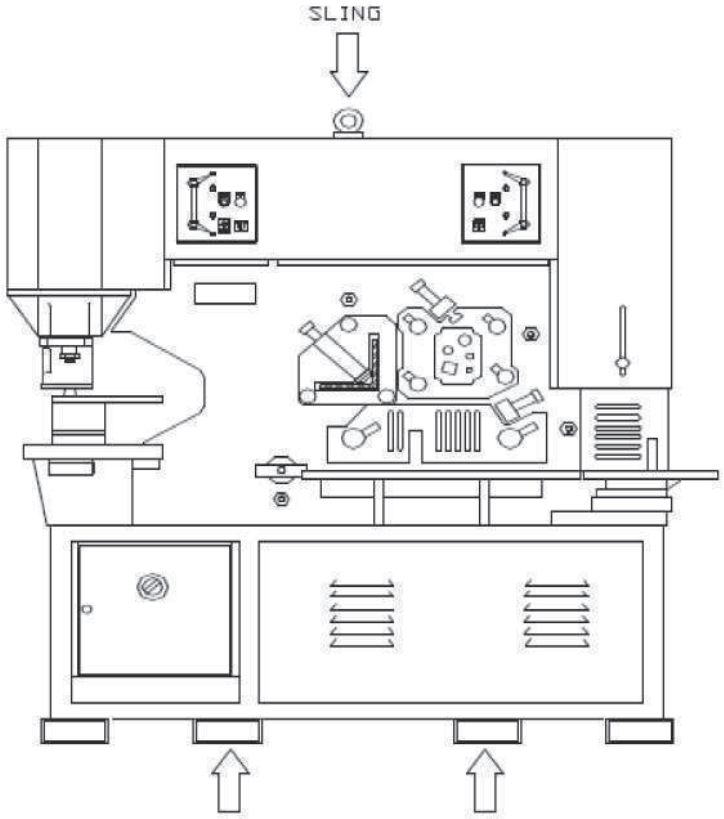


FIGURE 3

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 immediately report damages, external or internal.

After the machine has been located, remove the base panels and inspect the interior of the machine for possible shipping damage.

CHECK SPECIFICALLY THE FOLLOWING ITEMS:

1. **The stroke control handles.**

2. **The jog switch.**

3. **The selector switches.**

4. **The emergency stop buttons.**

5. **Hydraulic hoses and fittings.**

6. **A general inspection of machine shrouds, guards and awareness barriers.**

7. **Foot pedals and cables.**

8. **Check the re-pack box for all accessory items ordered with the machine.**

   The reservoir is 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 eighteen (18)U.S. gallons (68 liters).

   The fluid level should be approximately 1-3/4 inches (45mm) 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 SHOULD BE MADE BY A LICENSED ELECTRICIAN.**

All machines are wired for three phase electrical power unless otherwise specified by customer. The supply voltage should be (+ or -) 10% of the motor voltage rating, to insure satisfactory machine performance. Check the motor data tag for full load current requirements.

The electrical diagram for the machine is inside the cover of the control box.
THE DIAGRAM IS ALSO IN FIGURE 4.

For electrical supply lines ten feet (3 m) or shorter, we recommend at least 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). For 1PH machines, use 8 gauge wire.

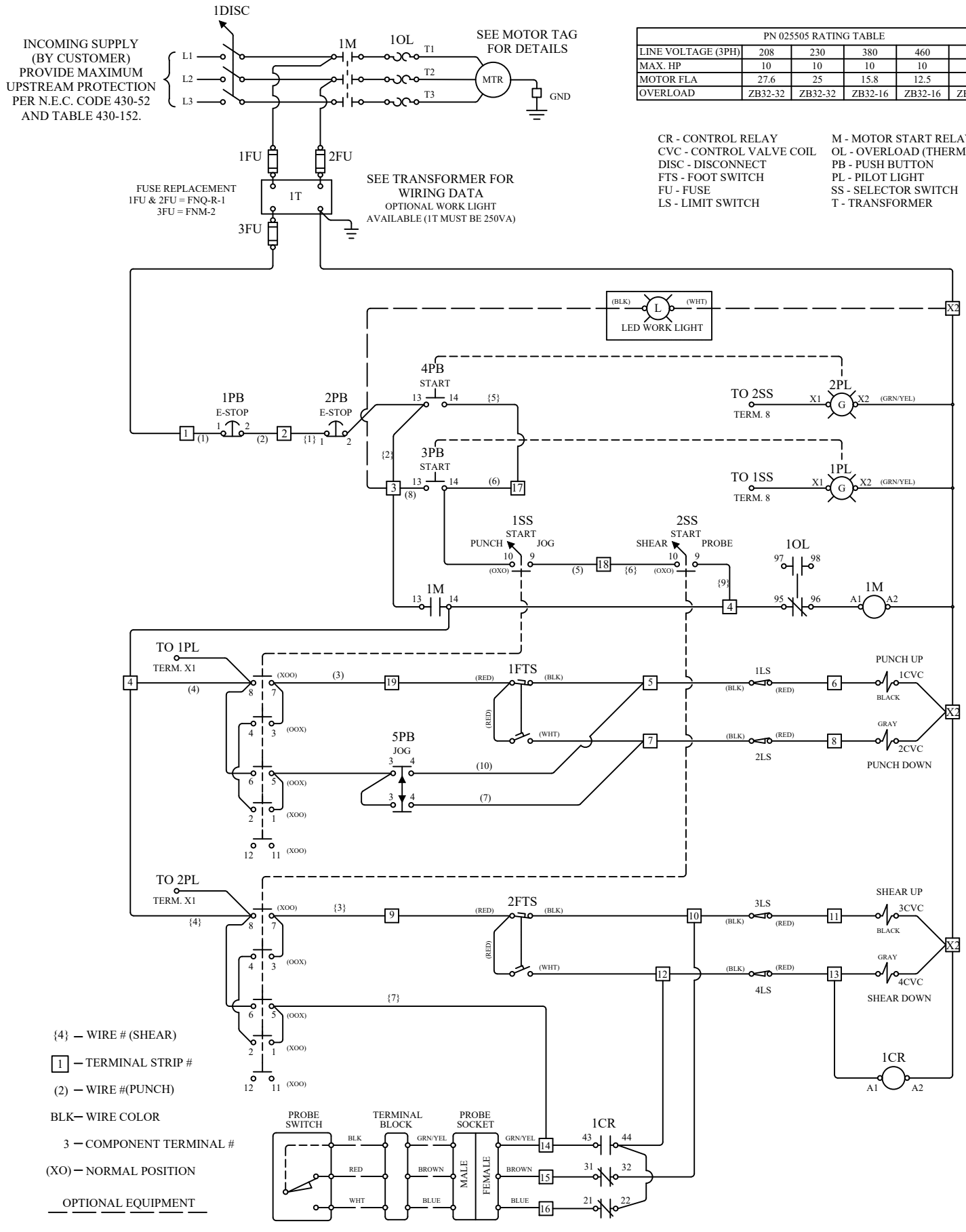
POWER REQUIREMENTS:

MOTOR VOLTAGE (VAC)	FULL LOAD CURRENT (AMPS)
208	26.7
230	25.2
460	12.6
575	12
220 1PH	40
Motor Frame:	215T
Motor Power Rating: 10hp (7.5 kW) Speed 1,760 RPM	
Short Circuit Current Rating (SCCR)	5 kA RMS

DO85 3PH

PN 025505 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



{4} — WIRE # (SHEAR)

[1] — TERMINAL STRIP #

(2) — WIRE #(PUNCH)

BLK— WIRE COLOR

3 — COMPONENT TERMINAL #

(XO) — NORMAL POSITION

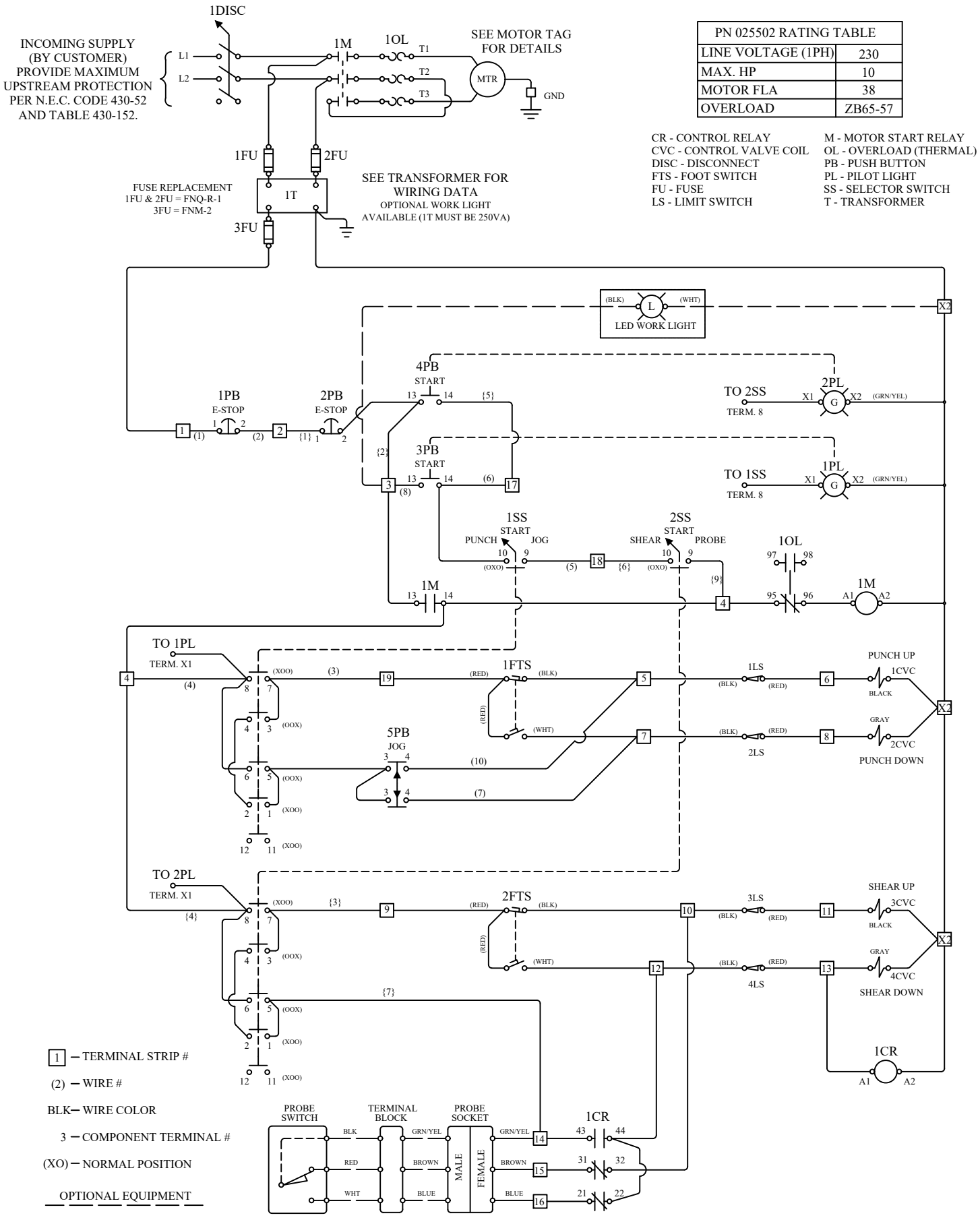
OPTIONAL EQUIPMENT

COMPONENT

FIGURE 4

SCOTCHMAN INDS. - 180 E US HWY 14 - PO BOX 850 - PHILIP, SD 57567 Call: 1-605-859-2542

DO85 230V 1PH



PN 025502 RATING TABLE	
LINE VOLTAGE (1PH)	230
MAX. HP	10
MOTOR FLA	38
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

FIGURE 4A

SCOTCHMAN INDS. - 180 E US HWY 14 - PO BOX 850 - PHILIP, SD 57567 Call: 1-605-859-2542

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4.5 MACHINE CONTROL PANELS

- **BEFORE STARTING THIS MACHINE, TAKE TIME TO THOROUGHLY REVIEW THE SAFETY VIDEO AT SCOTCHMAN.COM AND THE OPERATOR'S MANUAL.**
- **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 FUNCTION AND HOW THEY AFFECT THE OPERATION OF THE MACHINE. REFER TO FIGURE 5 BELOW.**

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.

1. **MAIN DISCONNECT SWITCH: When this switch is in the OFF position, it can be locked out. When the switch is in the OFF position, none of the operating controls of the machine will function. This switch should always be switched to the OFF position when the machine is not in use.**

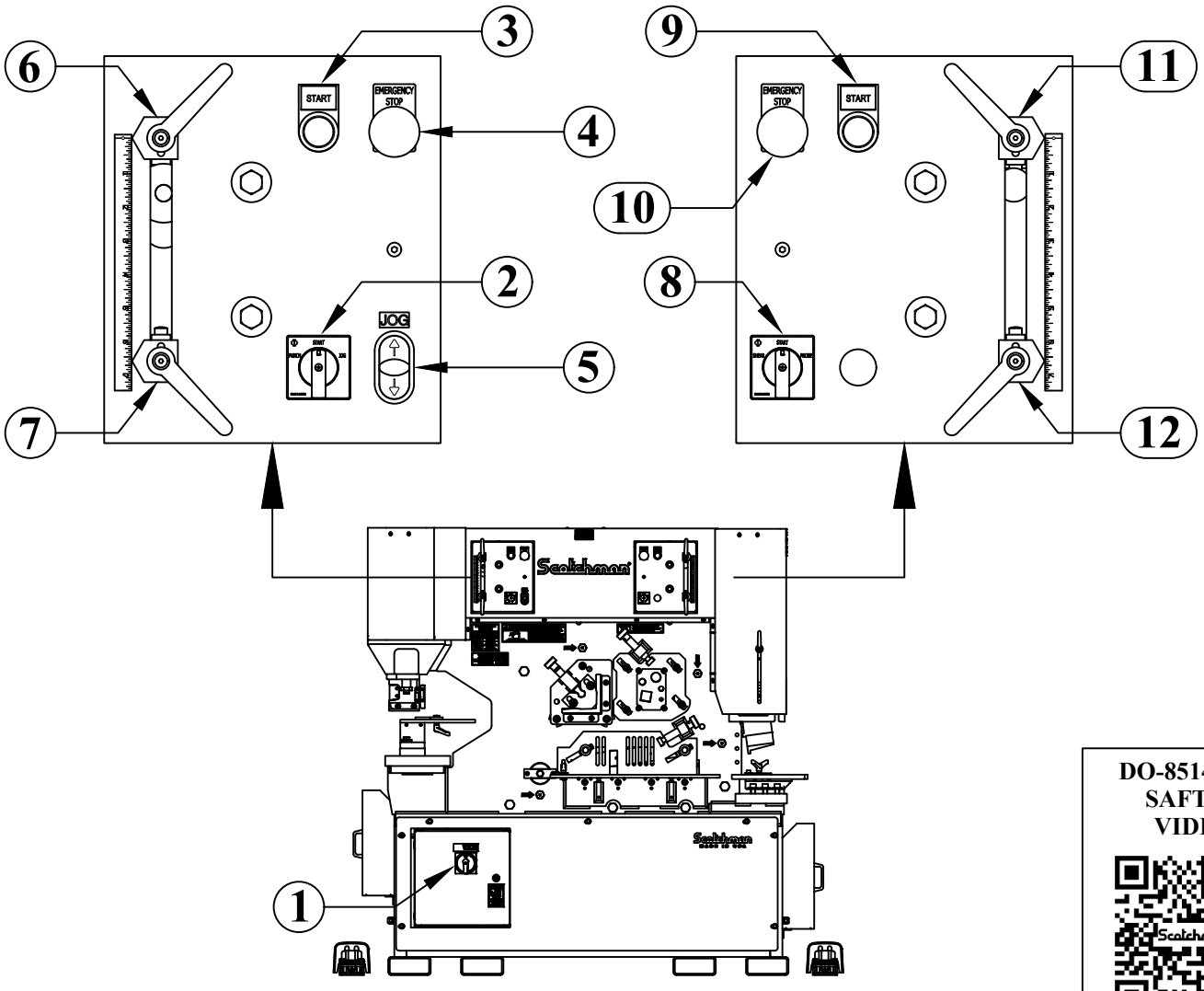


FIGURE 5

DO-8514-20M SAFTEY VIDEO

2. **PUNCH/START/JOG SELECTOR SWITCH: This switch must be switched to START, together with selector switch 8 (SHEAR/START/PROBE), to start the machine. Selecting PUNCH enables control of the punch, using the foot switch. Fully depressing the foot switch will lower the punch. The punch will automatically return on release of the foot switch. Selecting JOG disables the punch foot switch and enables control of the punch, using push button 2 (JOG BUTTONS). Using the appropriate JOG push button to control the punch raises or lowers the punch. The punch will NOT automatically return when using JOG.**
3. **START PUSH BUTTON: Push and release to start the machine. PUNCH and SHEAR selector switches 5 and 8 must be switched to START; also, E-STOP buttons 4 and 10 must be released to start the machine.**
4. **E-STOP BUTTON: Press to stop machine. Once pressed, the button will isolate the restart of the machine until released.**
5. **JOG BUTTONS: Select JOG on selector switch 2. This isolates the PUNCH foot switch and enables the lowering or raising of the punch, using the appropriate UP/DOWN jog button.**

⌦ **CAUTION: WHEN THE JOG FEATURE IS USED, THE PUNCH WILL REMAIN AT WHATEVER POINT THE JOG CONTROL IS RELEASED. WHEN SELECTOR SWITCH 2 IS SWITCHED TO "PUNCH", THE PUNCH WILL THEN AUTOMATICALLY TRAVEL UP TO THE SETTING OF THE UPPER LIMIT SWITCH, 6.**

6. **STROKE UPPER LIMIT SWITCH: Positioning this switch limits the UP stroke of the punch.**
7. **STROKE LOWER LIMIT SWITCH: Positioning this switch limits the DOWN stroke of the punch.**
8. **SHEAR/START/PROBE SELECTOR SWITCH: This switch must be switched to START, together with selector switch 2 (PUNCH/START/JOG), to start the machine. Selecting SHEAR enables control of the shear, using the foot switch. Fully depressing the foot switch will lower the beam. The beam will automatically return on release of the foot switch. Selecting PROBE disables the shear foot switch and enables the use of the adjustable rear probe (optional) for the automatic cutting to length of bar and sections through the appropriate aperture.**
9. **START PUSH BUTTON: Push and release to start the machine. Punch and shear selector switches 2 and 8 must be switched to START; also, E-STOP buttons 4 and 10 must be released to start the machine.**
10. **E-STOP BUTTON: Press to stop the machine. Once pressed, the button will isolate the restart of the machine, until released.**
11. **STROKE UPPER LIMIT SWITCH: Positioning this switch limits the UP stroke of the beam.**
12. **STROKE LOWER LIMIT SWITCH: Positioning this switch limits the DOWN stroke of the beam.**

4.6 MACHINE START-UP

BEFORE STARTING THIS MACHINE, PLEASE TAKE TIME TO THOROUGHLY REVIEW THE SAFETY VIDEO AT SCOTCHMAN.COM AND THE OPERATORS MANUAL. YOU CAN USE THE CAMERA ON ON YOUR SMART PHONE TO VIEW IT VIA THE QR CODE BELOW. SCOTCHMANS ALSO HAS MANY OTHER HELPFUL AND INFORMATIVE VIDEOS POSTED ON YOUTUBE RELATED TO THIS MACHINE.

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

DO-8514-20M SAFTEY VIDEO

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.

TO POWER THE MACHINE:

1. **Place the disconnect switch (1) in the ON position and both selector switches (2 & 8) in the START position. Check that both E-STOP buttons have been released.**

2. **Momentarily power the machine by pushing the green START button (3) or (9) and then, immediately press either STOP buttons and note the rotation of the motor as it stops. 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, the machine's control circuit will not be in circuit. The machine cannot be operated until one or both of the selector switches have been placed in a position other than the START position.

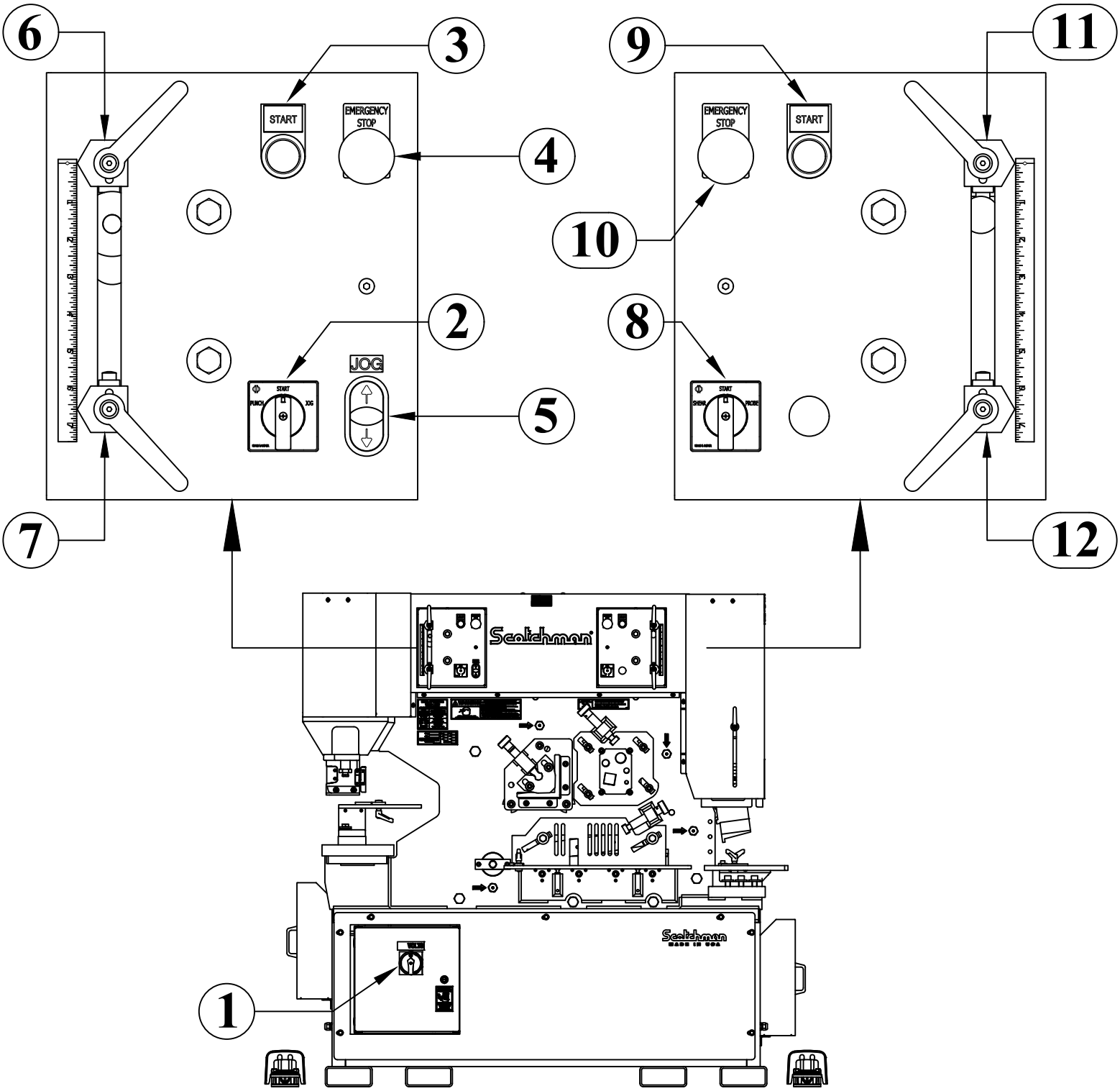

6
3
9
11
START
EMERGENCY STOP
EMERGENCY STOP
START
4
10
2
8
JOG
START
PUNCH
JOG
START
SHEAR
PROBE
5
7
12
Scotchman
Scotchman
MADE IN USA
1

FIGURE 6

4.7 MACHINE STROKE INSPECTION & ADJUSTMENT: PUNCH

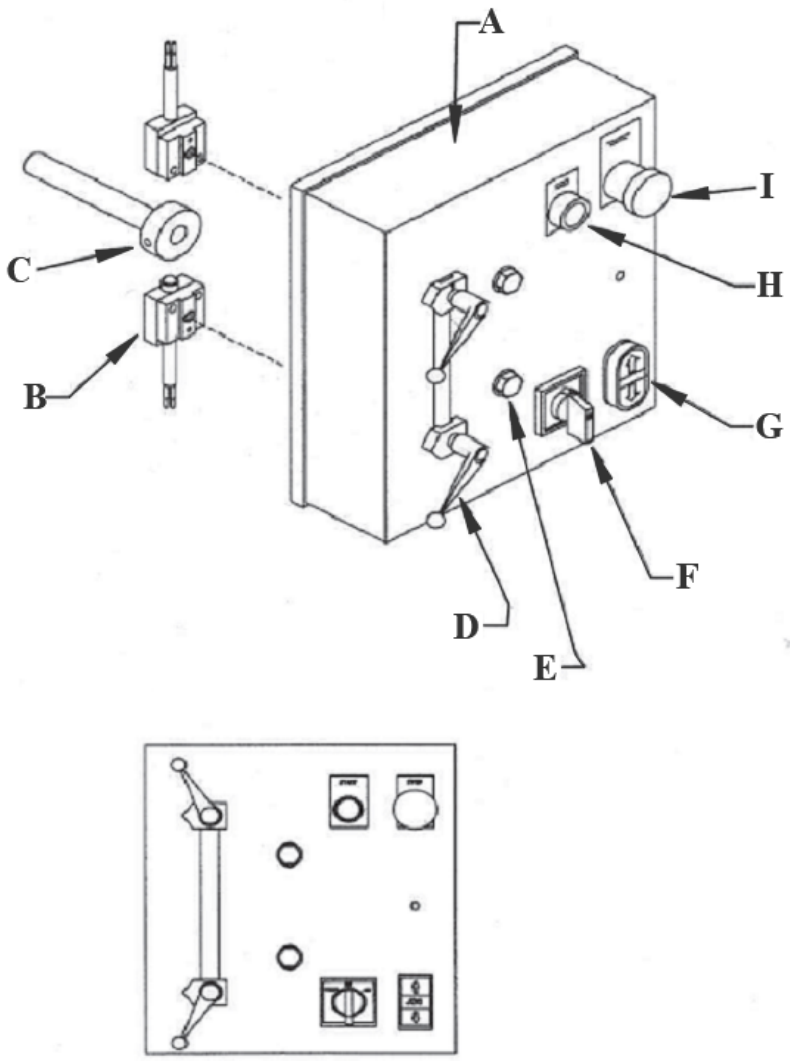


FIGURE 7

ITEM	DESCRIPTION	QTY
A	CONTROL BOX	1
B	LIMIT SWITCH	2
C	METER BOSS END (SWITCH ACTUATOR)	1
D	LOCK HANDLE	2
E	CONTROL BOX SECURING SCREWS	2
F	PUNCH/START/JOG SELECTOR	1
G	JOG SWITCH	1
H	START SWITCH	1
I	E-STOP SWITCH	1

The stroke setting is important for the proper operation of the machine. In the highly unlikely event that this setting has changed in transit, 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. It is advisable that the stroke setting of the punch is checked prior to the commissioning of the machine. "Bottom out" is a term given whereby the cylinder piston pressures on the cylinder gland at the bottom of the stroke, or alternatively, the cylinder piston fouls the cylinder cap at the top of the stroke. Either or both of these symptoms can be recognized by an increase in machine running noise. The slot in the control panel limits the stroke of the punch ram. However, to avoid "bottoming out", this panel must be correctly set in relation to the cylinder stroke actuator (C). The following is a step by step guide to ensure that this panel is set correctly.

REFER TO FIGURE 7 ON THE PRECEDING PAGE.

1. **Remove the Punch Die Holder from the punch bolster and open the punch stripper unit.**
2. **Set the stroke control handles (D) out to their farthest position.**
3. **Place the disconnect switch in the ON position and both selector switches (F) in the START position. Check that both E-STOP buttons are released. Power the machine.**
4. **Turn the run-jog switch (F) to the JOG position.**
5. **Jog the ram down until it stops. With the down jog button held in check, there is no obvious increase in machine noise when the punch ram stops its travel.**
6. **To double check, turn the machine's power OFF and check to see if the switch actuator (C) has contacted the lower limit switch (B).**
7. **If it has not, loosen the two mounting plate screws (E) and move the mounting plate (A) up until contact is made.**
8. **Tighten the screws and re-check through operations 5 & 6. Repeat, if needed.**
9. **To check the top of the stroke, jog the ram UP until it stops. With the UP jog button held in check, there is no obvious increase in machine noise when the punch ram stops.**
10. **To double check, turn the machine's power OFF and check to see if the switch actuator (C) has contacted the upper limit switch (B).**
11. **If it has not, loosen the two mounting plate screws (E) and move the mounting plate down until contact is made.**
12. **Tighten the screws and re-check through operations 9 & 10. Re-check the bottom of the stroke operations 5 & 6.**
13. **To replace the Punch Die Holder, refer to Section 6 "Machine Operation: Punch" in this manual.**

4.8 MACHINE STROKE INSPECTION & ADJUSTMENT: SHEAR

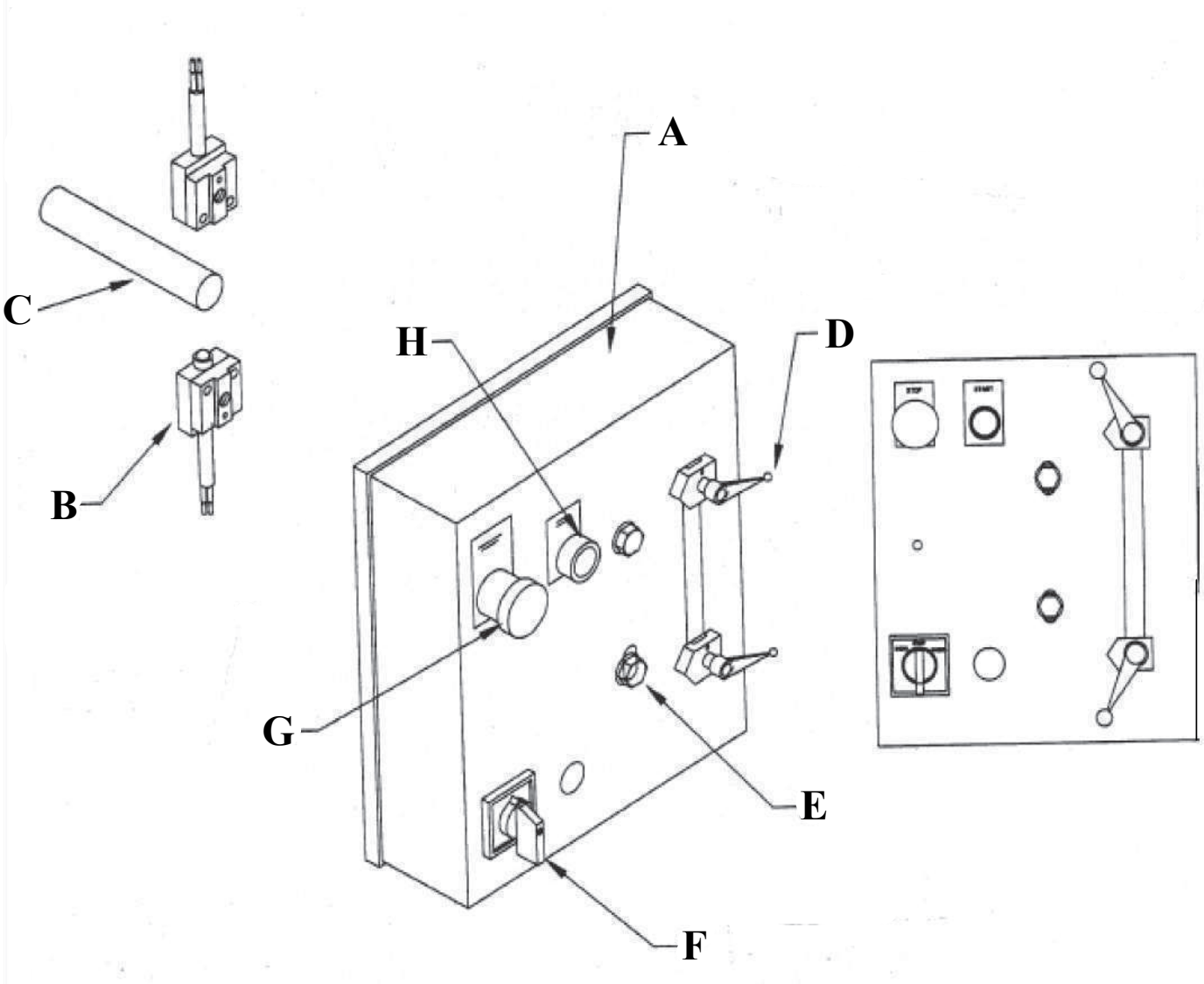


FIGURE 8

ITEM	DESCRIPTION	QTY
A	CONTROL BOX	1
B	LIMIT SWITCH	2
C	METER BOSS ROD (SWITCH ACTUATOR)	1
D	LOCK HANDLE	2
E	CONTROL BOX SECURING SCREWS	2
F	SHEAR/START/PROBE	1
G	E-STOP SWITCH	1
H	START SWITCH	1

The stroke setting is important for the proper operation of the machine. In the highly unlikely event that this setting has changed in transit, 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. It is advisable that the stroke setting of the beam is checked prior to the commissioning of the machine. "Bottom out" is a term given whereby the cylinder piston pressures on the cylinder gland at the bottom of the stroke, or alternatively, the cylinder piston fouls the cylinder cap at the top of the stroke. Either or both of these symptoms can be recognized by an increase in machine running noise. The slot in the control panel limits the stroke of the shear beam. However, to avoid "bottoming out", this panel must be correctly set in relation to the cylinder stroke actuator (D). The following is a step by step guide to ensure that this panel is set correctly.

REFER TO FIGURE 8 ON THE PRECEDING PAGE.

1. **Remove the Notcher Blade Holder from the bolster.**
2. **Set the stroke control handles (D) out to their farthest position.**
3. **Place the disconnect switch in the ON position and both selector switches (F) in the START position. Check that both E-STOP buttons are released. Power the machine.**
4. **Turn the Shear/Probe switch (F) to the SHEAR position.**
5. **Using the Shear foot switch, lower the beam down until it stops. With the foot switch held in check, there is no obvious increase in machine noise when the beam stops its travel.**
6. **To double check, with the foot switch still depressed, turn the machine's power OFF and check to see if the switch actuator (C) has contacted the lower limit switch (B). Also, check to see if the blades have cross-over at the Shear and Angle Stations.**
7. **If the actuator has not contacted the limit switch, loosen the two mounting plate screws (E) and move the mounting plate (A) up until contact is made.**
8. **Tighten the screws and re-check through operations 5 & 6. Repeat, if needed.**
9. **To check the top of the stroke, switch the selector switch back to START and power the machine. Switch the selector switch to SHEAR. CAUTION: The beam will return to its top position automatically. Check that there is no obvious increase in machine noise when the beam stops.**
10. **To double check, turn the machine's power OFF and check to see if the switch actuator (C) has contacted the upper limit switch (B). Also, the round and square holes in the section blades should be in line.**
11. **If the blades are not in line, loosen the two mounting plate screws and move the mounting plate down until contact is made**
12. **Tighten the screws and re-check through operations 9 & 10. Re-check the bottom of the stroke operations 5 & 6.**
13. **To replace the Notch die Holder, refer to Section 6.5 "Rectangular Notch" in this manual.**

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 the DO-8514-20M, 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 the blades every 10 to 15 cuts.

The oil will allow the machine to shear, punch and strip easier and increase tool life considerably.

We recommend cutting oil or motor oil swabbed on with a brush or applied with a squirt can or a spray applicator.

Lubrication of the Shear Beam is carried out on the back plate of the machine (offcut side). There are seven lubrication points, plus one on the Main Pivot Pin. Grease the main pin daily and grease all other lube points twice per week. Points are located as shown in FIGURE 9 on the following page. Once a month, apply a little grease to the two bronze Punch Ram Guide Pads (A), located as shown in FIGURE 9 Mobil Grease XHP 222 Special is recommended.

Once a month, check the oil level in the reservoir. It should be approximately 1-3/4 inches (45mm) 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 18 U.S. gallons (68 liters).

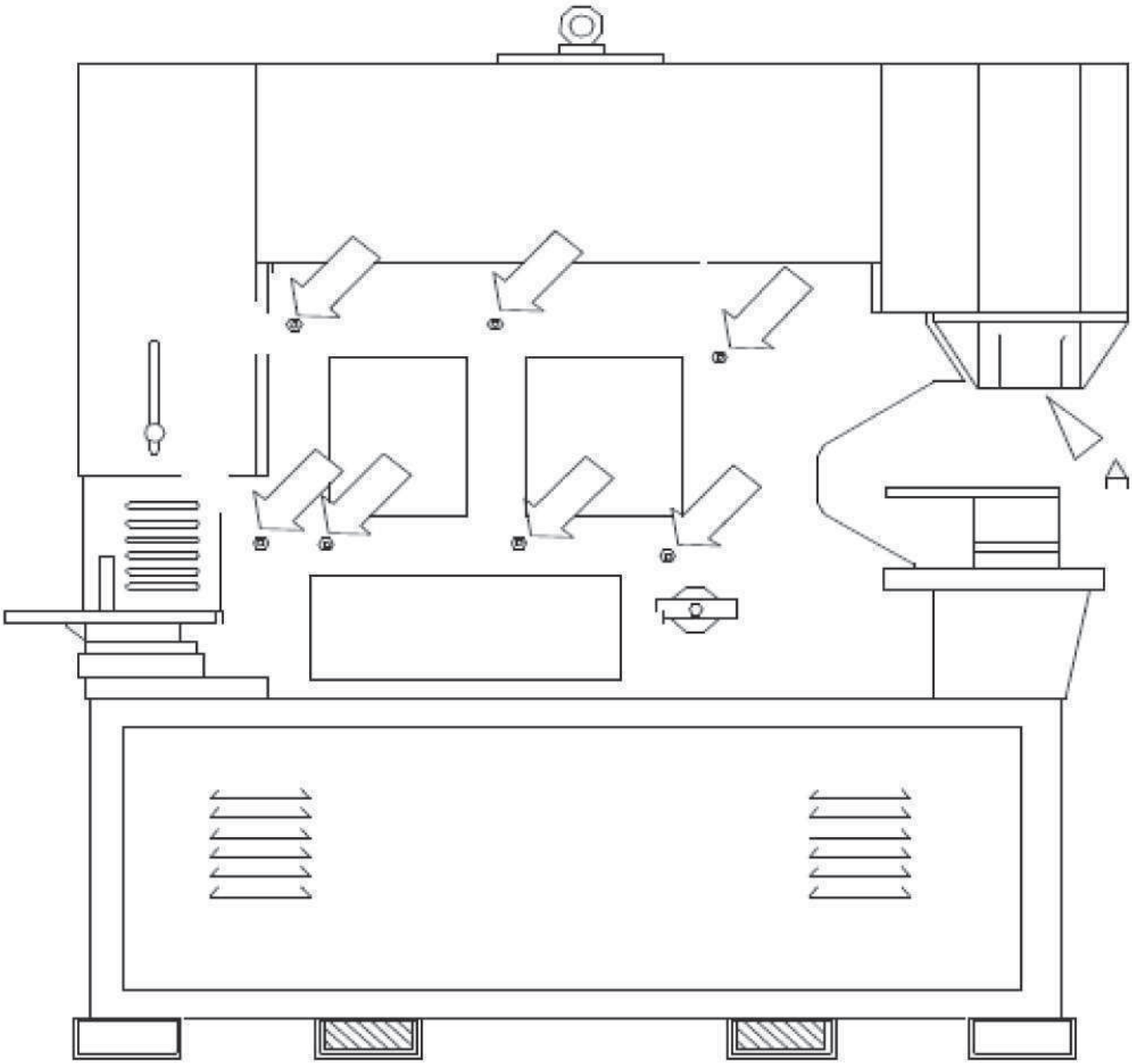


FIGURE 9

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 the DO-8514-20M 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 their needs.

1. **DAILY:**

   Check the condition of all blades, punches and dies.

   Check that the surrounding work area is clear and remove off-cuts and slugs from the floor area.

   Clear any mill scale which may have collected around the work station apertures.

   Check that all hold downs and strippers are properly set, secure and functioning properly.

   Lubricate the Main Pin, as outlined in Section 5.1.

   After starting the machine, check that the movement of the punch ram and shear beam is smooth when running no load.

2. **TWICE WEEKLY: Lubricate lubrication points, as outlined in Section 5.1.**

3. **EVERY 250 HOURS OR THREE MONTHS:**

   Examine the foot pedal cables for damage. While installing a punch, as outlined in Section 6, check that there is no rotational movement of the punch ram when tightening or loosening the jam nut.

4. **EVERY 500 HOURS OR SIX MONTHS:**

   Check the Shear Beam for lateral movement. During the working life of the machine, the shear beam may require adjustment. An indication of this is the severe and rapid wearing of the rectangular notcher and dies while using the bar shear station. There are four adjusters on the feed side of the machine. Once adjustment has been made, you may find that the shearing blades at each work station will require re-setting. SEE FIGURE 10 ON THE FOLLOWING PAGE.

➲ **DO NOT ATTEMPT TO ADJUST THE SHEAR BEAM IN THE DOWN POSITION WHEN THE RECTANGULAR NOTCH HAS ENTERED THE DIES.**

Removing the section and shear hold-downs will improve access.

Loosen the four M-20 adjuster lock nuts. Loosen all four adjusters.

Tighten the bottom left and top right adjusters, forcing the beam against the back plate.

Tighten the two remaining adjusters finger tight, until resistance is felt.

Release the first two adjusters and tighten them finger tight.

Carefully tighten all four adjuster locking nuts while holding the adjusters.

Check the condition of the shear beam bushings. This can be done visually, by watching the beam 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. Check the clearance. If the clearance is in excess of 0.15" (0.4mm), replace the bushing.

4. EVERY 1,500 HOURS OR ONE YEAR:

Change the hydraulic fluid in the reservoir and replace the filter. For recommended fluids, see Section 5.1.

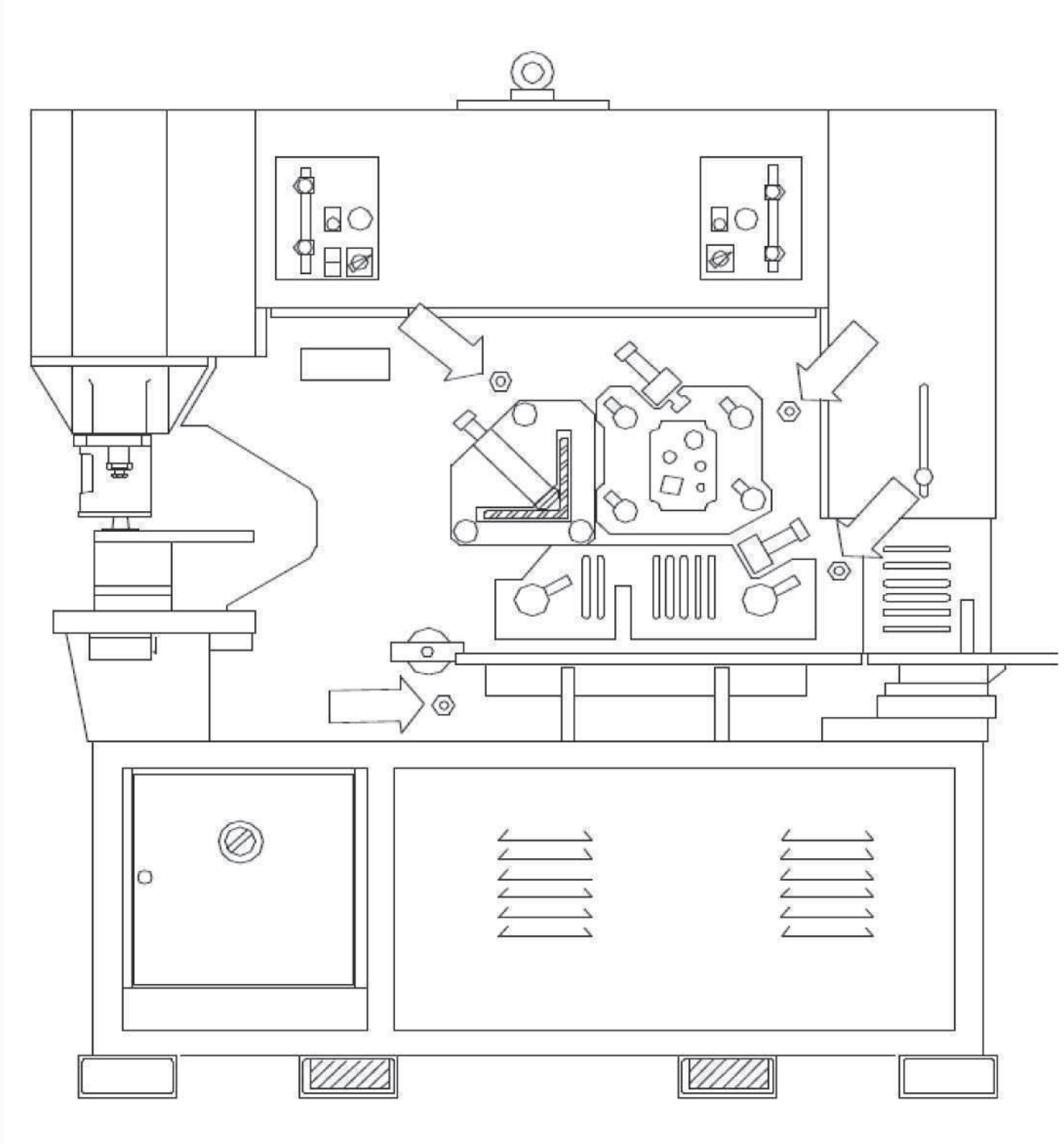


FIGURE 10

6.0 MACHINE OPERATION

6.1 PUNCH OPERATION

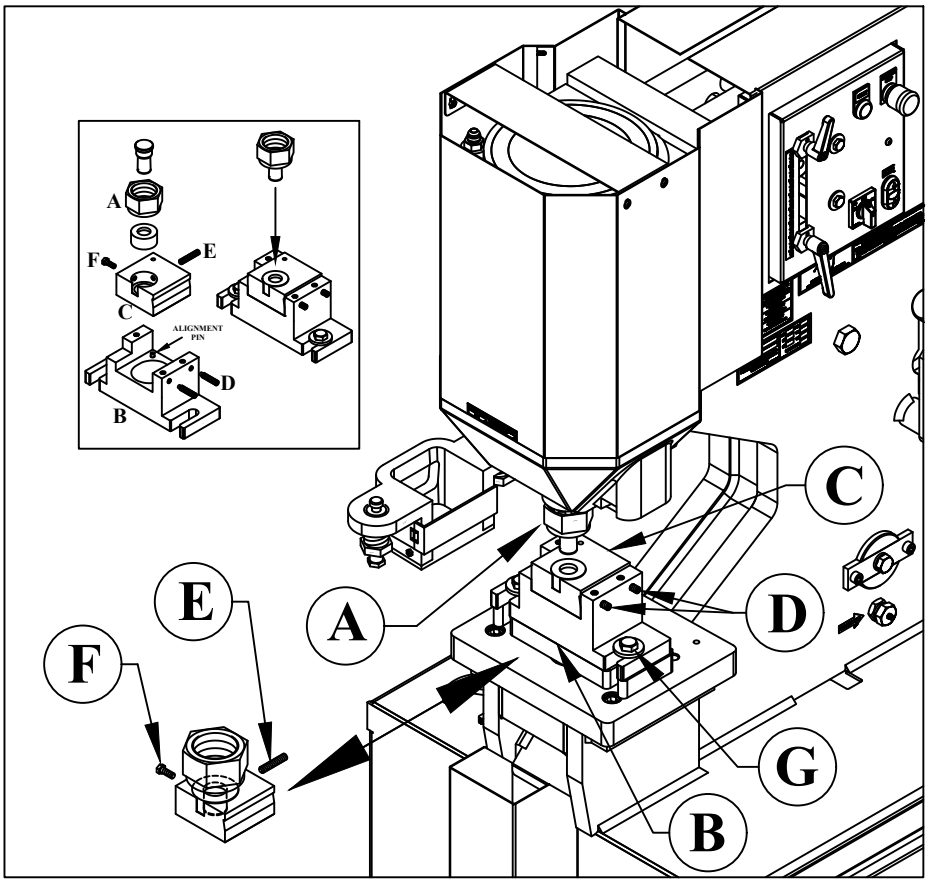
THE FIRST AND MOST IMPORTANT PROCEDURE IS THE PROPER METHOD OF CHANGING AND ALIGNING PUNCHES AND DIES. ALWAYS WEAR SAFETY GLASSES.

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 VIDEO AT SCOTCHMAN.COM FOR A VISUAL REFERENCE. YOU CAN USE THE CAMERA ON YOUR SMART PHONE TO VIEW IT VIA THE QR CODE BELOW. SCOTCHMAN ALSO HAS MANY OTHER HELPFUL AND INFORMATIVE VIDEOS**

✉ **POSTED ON YouTube RELATED TO THIS MACHINE.**

► **NOTE: THERE IS AN EMERGENCY STOP PALM BUTTON ON BOTH ENDS OF MACHINE.**



How To Align a Punch & Die

ABOVE SHOWN WITH PUNCH TABLE REMOVED FOR CLARITY

FIGURE 11

THIS SET-UP IS FOR THE STANDARD AND OVERSIZE DIE HOLDERS. IF USING THE OFFSET DIE HOLDER, REFER TO SECTION 7.6A, FOR INSTRUCTIONS.

1. **With the machine's PUNCH/JOG selector switch in the PUNCH position and the ram retracted, turn off the power.**
2. **Push up on the right hand side bolt holding the stripper and pull the stripper forward and around to the left side, away from the punch ram and retaining nut.**
3. **Remove the punch retaining nut (A) and set the punch retaining nut and punch aside - Then loosen the two bolts (G) on the die holder (B).**
4. **Loosen 2 set screws (D) & remove the die insert (C) from die holder (B).**
5. **Loosen the bolt (F) & set screw (E) holding the die in the insert (C). Remove the die from the insert.**

► **NOTE: The die insert has an alignment pin in it and it must be lifted up to remove it.**

6. **Place the disconnect in the ON position and the selector switches in the START position. Power the machine by pressing the green START button.**

⌦ **CAUTION: IF YOU ARE USING THE OFFSET DIE HOLDER FOR FLANGED PUNCHING, PLEASE SEE SPECIAL INSTRUCTIONS IN SECTION 7.6A BEFORE CONTINUING.**

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 JOG position and carefully inch the cylinder ram down.**
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 ON PAGE 32.**
11. **Clean both the punch, die, and the die holder cavity of any foreign material.**
12. **Insert the proper die in the die insert (C). (If the die has a flat spot in it, align this with the bolt in the die insert.) Tighten the bolt (F) firmly with a wrench and tighten set screw (E).**
13. **Insert the punch into the punch retaining nut. Make sure that it seats properly. Place the punch retaining nut and punch on the die insert (C), 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.**

14. **Place the die insert and punch assembly in the die holder and tighten the set screws (D) holding the insert in the holder.**
15. **Lift the punch retaining nut and turn it onto 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.**
16. **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.**

17. **If the die holder has been adjusted, re-tighten the bolts (G) in the die holder.**
18. **Check to be sure of proper alignment. Realign, if necessary.**
19. **Return the stripper to the locked position. (For stripper adjustment procedures, SEE PARAGRAPH D BELOW.)**
20. **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.**
21. **Place the selector switch in the JOG position. To be sure that the alignment is correct, inch the punch up and down several times, without letting the punch come out of the die.**
22. **Place the selector switch in the PUNCH position.**

B. KEYED PUNCHES:

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

C. CHECK ALL PUNCHING TOOLS FOR TIGHTNESS.

The punch and die alignment should be checked intermittently during 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 (A), the bolt (F) and set screw (E) holding the die, the two set screws (D) holding the die insert (C) and the two bolts (G) on the die holder (B). Check for equal clearance between the punch and die. Place the selector switch in the START position. Power the machine and switch the selector switch to JOG. Inch the punch up and down several times, to be sure of proper alignment. Make any adjustments that are necessary. Turn the selector switch to the PUNCH position to continue production.

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 no more than 1/8 of an inch (3mm) above the material being punched.

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

⌦ **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.

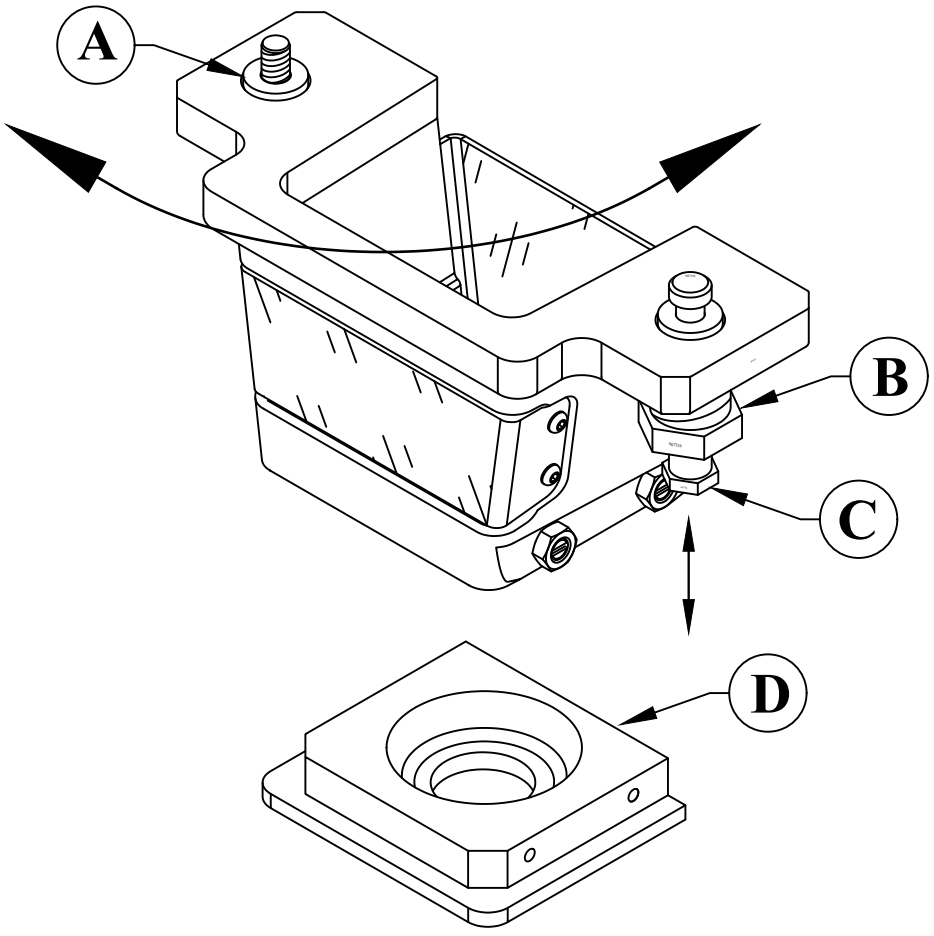


FIGURE 12

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.

The D.O.8514-20M Ironworker is designed to operate in mild steel.

Within conservative limits, it can also operate in medium carbon annealed steel and some forms of abrasion resistant steels.

Conditions of high shock can be encountered when punching alloyed steels.

The machine rating must be reduced accordingly.

Punch to die clearance depends on the material thickness.

In mild steels, material thicknesses of 1/8 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" thick mild steel should have a minimum of 1/16" 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.

The maximum material thickness this machine is designed to punch is 1 inch (25mm) mild steel.

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 PER HOLE TO PUNCH MILD STEEL HAVING 65,000 PSI TENSILE STRENGTH																
HOLE DIAMETER		1/8 .125	3/16 .1875	1/4 .250	5/16 .3125	3/8 .375	7/16 .4375	1/2 .500	9/16 .5625	5/8 .625	11/16 .6875	3/4 .750	13/16 .8125	7/8 .875	15/16 .9375	1 1.00
METAL GAUGE	THICKNESS INCHES	PRESSURE IN TONS														
28	.015	.2	.2	.3	.4	.4	.5	.6	.7	.7	.8	.9	1.0	1.1	1.2	1.3
26	.018	.2	.3	.4	.4	.5	.6	.7	.8	.9	1.0	1.1	1.1	1.2	1.3	1.4
24	.024	.2	.4	.5	.6	.7	.8	.9	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.9
22	.030	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4
20	.036	.4	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5	2.6	2.8
18	.048	.5	.7	.9	1.2	1.4	1.6	1.9	2.1	2.4	2.6	2.8	3.1	3.3	3.5	3.8
16	.060	.6	.9	1.2	1.5	1.8	2.1	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7
14	.075	.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	5.1	5.5	5.9
12	.105	1.0	1.5	2.1	2.6	3.1	3.6	4.1	4.6	5.1	5.7	6.2	6.7	7.2	7.7	8.2
10	.135	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	7.3	7.9	8.6	9.2	9.9	10.6
5/32	.157	- - -	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.7	8.4	9.2	10.0	10.7	11.5	12.3
3/16	.188	- - -	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	14.8
1/4	.250	- - -	- - -	4.9	6.1	7.4	8.6	9.8	11.1	12.3	13.5	14.7	16.0	17.2	18.4	19.7
3/8	.375	- - -	- - -	- - -	- - -	11.1	12.8	14.8	16.5	18.5	20.2	22.1	23.8	25.8	27.5	29.5
1/2	.500	- - -	- - -	- - -	- - -	- - -	- - -	19.7	22.0	24.6	26.9	29.5	31.8	34.4	36.8	39.4
5/8	.625	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	30.8	33.7	36.9	39.9	43.0	46.0	49.2
3/4	.750	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	44.3	47.7	51.7	55.2	59.0
1	1.00	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	80.0

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

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

It is also important that the hold-down is correctly adjusted to avoid possible damage to the machine and injury to the operator. The hold-down is adjustable to cover all thicknesses of material within the rated capacity of the machine. A shear support table with adjustable guide is fitted to allow the accurate feeding of material at any angle. By feeding angle iron through the angle slot, it is possible to miter the leg of angle, having already cut the angle to the desired length in the angle shear aperture. The maximum material that can be sheared is 1 x 16 inch (25 x 406mm) mild steel.

The standard shear blades fitted to the machine comprise of an upper shaped moving blade and a bottom rectangular fixed blade. The combination of these two blades offers absolute minimum distortion through all thicknesses of material within the rated capacity of the machine. After a period of time and subsequent dulling of the blades, the blades can be removed and turned. The lower fixed blade can be turned offering four cutting edges and the upper moving blade can be turned offering two cutting edges. Alternatively, the machine can have a pair of 'rectangular blades' fitted, which offers multi-edged economy shearing with only a small margin of distortion on wide bars.

After turning or grinding worn blades, they must be refitted and adjusted to clearances listed in this section. The upper 'moving blade' is not adjustable and the 'fixed blade' must be adjusted to suit. The 'fixed blade' securing and adjusting screws are more accessible when the shear table and the hold-down have been removed. An even clearance between the 'moving' and 'fixed blade' along their entire length is important and attention should be given to ensuring that the 'fixed blade' is in a vertical plane.

REFER TO SECTION 6.2B.

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

1. **Place the selector 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.**

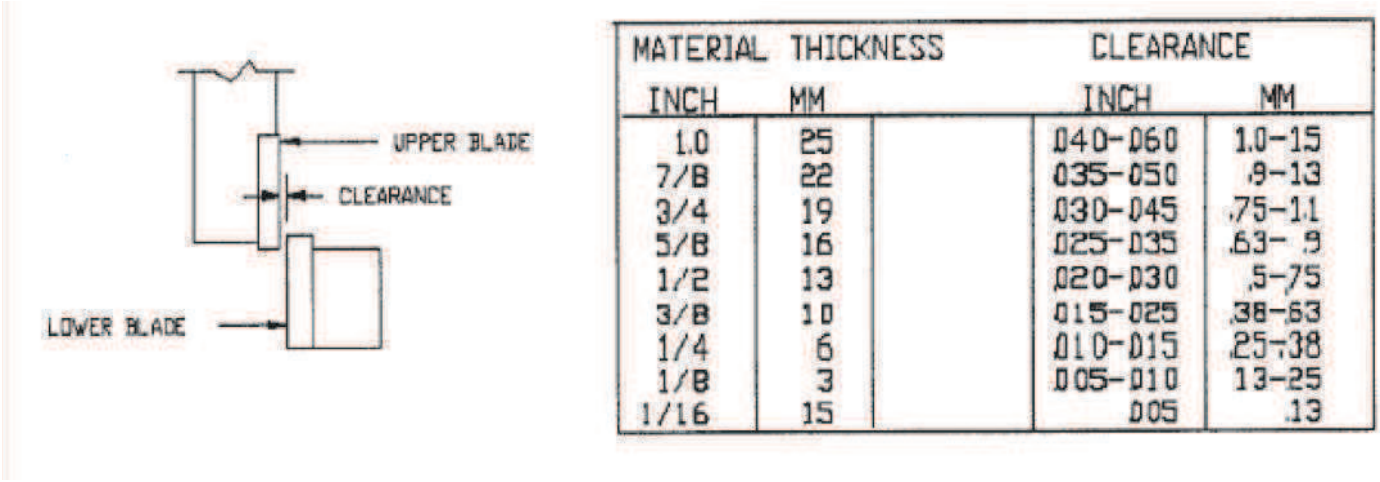
4. **Adjust the hold-down device down until it contacts the material to be sheared and tighten both hold-down knobs. REFER TO SECTION 6.2A. This prevents "kick-up" of the workpiece and possible damage to the machine.**

5. **DEPRESS THE FOOT PEDAL.**
   Lubricating oil should be applied to the blades every 10 to 15 cuts.

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

MAINTAIN PROPER BLADE CLEARANCE.

The quality of the cut is an immediate indication of the condition of the shear blades or the amount of clearance between the blades. For adjustment procedures, REFER TO SECTIONS 6.2B.



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

Based on mild steel of 65,000 psi tensile strength.
REFER TO SECTION 6.2B, FOR SHEAR BLADE ADJUSTMENT.

FIGURE 14

6.2A HOLD-DOWN ADJUSTMENT

SEE FIGURE 15 BELOW.

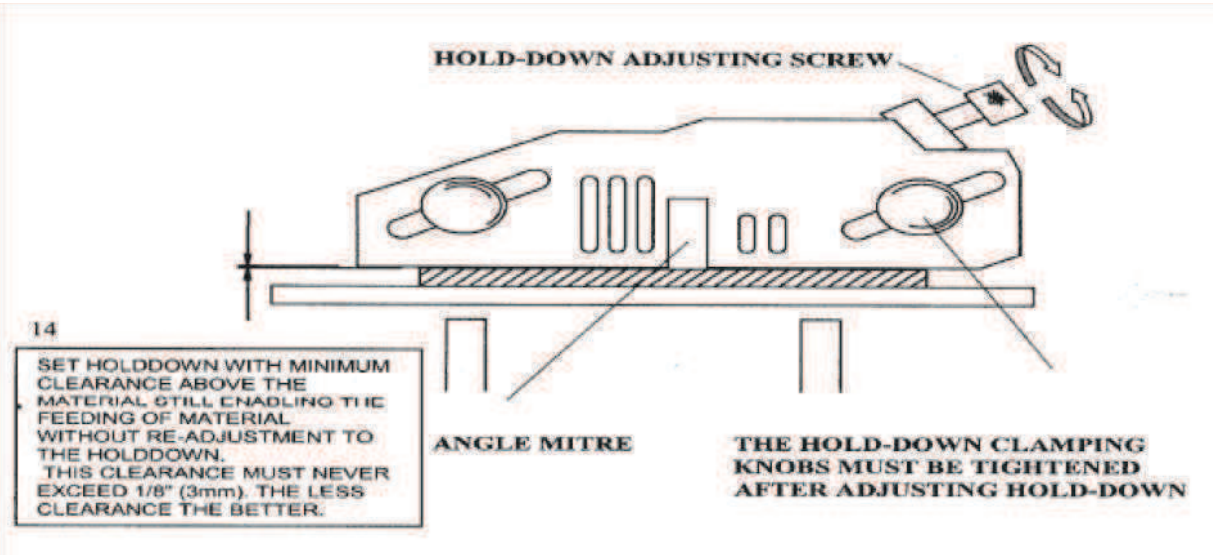


FIGURE 15

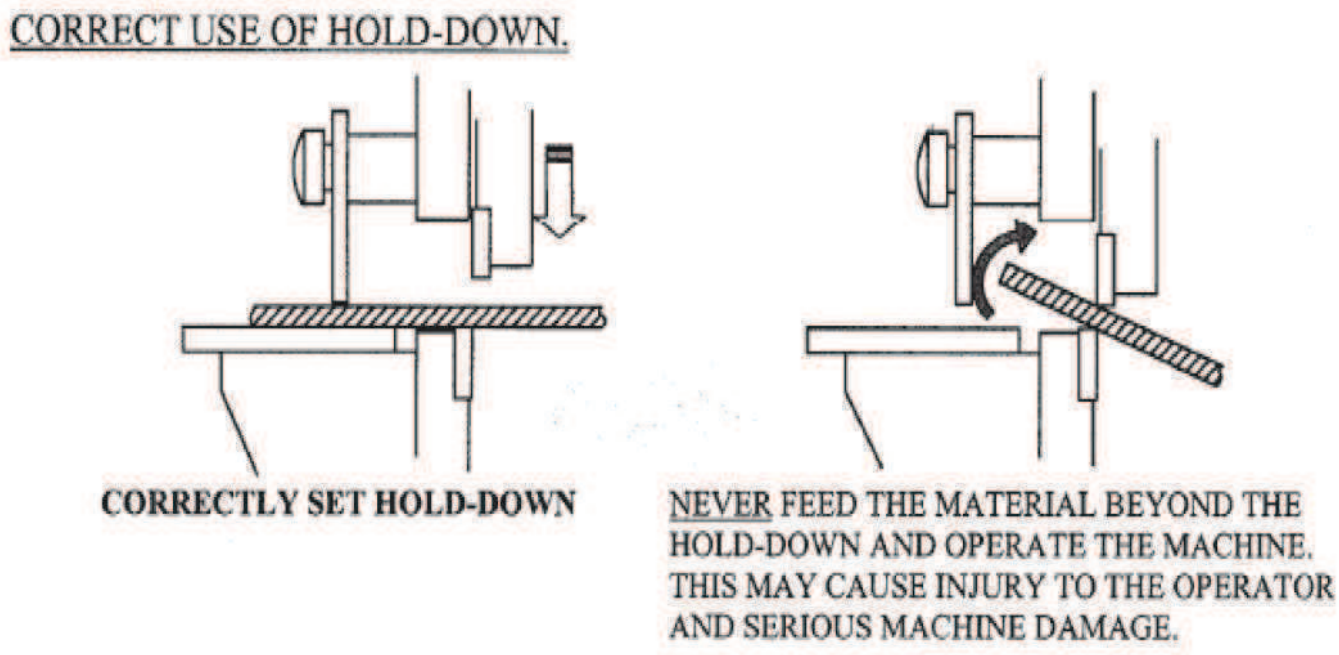


FIGURE 16

☑ **Ensure that the hold-down is correctly adjusted for the relevant material.**

⌦ **NEVER allow the ends of the material to pass beyond the hold-down when shearing. This may cause serious damage to the machine. Always feed material from the hold-down side.**

☑ **Keep the blade area clean. Do not allow buildup of mill-scale.**

☑ **Stay within the rated capacity of the machine.**

☑ **The quality of the cut is usually an indication of the condition of the blades or their setting.**

6.2B SHEAR BLADE ADJUSTMENT

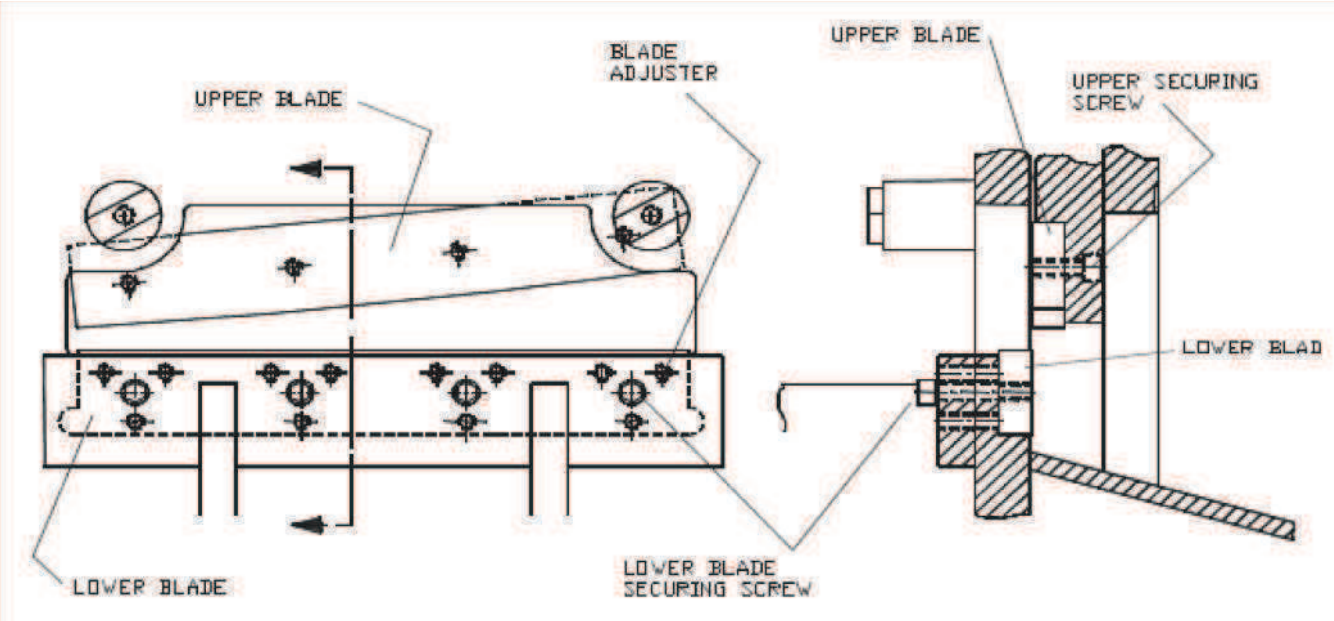


FIGURE 17

- ☐ **To set blades, lower the arm so that the upper blade crosses the lower blade. (If fitting new or re-ground blades, ensure that the lower blade is fully adjusted away from the upper blade before lowering the arm.)**
- ☐ **Switch off the machine.**
- ☐ **Remove the shear hold-down and the shear support table.**
- ☐ **Adjust the lower blade to the upper blade to achieve desired clearance. See Figure 14 on page 35. Ensure that the lower blade is adjusted with a slight cant, or tilt of a few thousandths of an inch, so that the cutting edge of the blade is closer to the top blade.**
- ☐ **Lock the upper blade in position by tightening the upper blade securing screws.**
- ☐ **Check and readjust the blade setting, if necessary.**
- ☐ **Re-fit the hold-down and the shear support table to the machine.**

The upper blade has two cutting edges, whereby the lower blade has four. It is possible to replace the shaped upper blade by a rectangular lower blade, therefore offering multi-edged economy shearing with only a very small amount of distortion on wide bars.

FOR SHEAR BEAM (ARM) ADJUSTMENT, REFER TO MAINTENANCE IN SECTION 5.2.

6.3 ANGLE SHEAR OPERATION

- **WHEN USING THE ANGLE 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.**

- **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 PROBABLY RESULT IN DAMAGE TO THE MACHINE.**

It is also important that the hold-down is correctly adjusted, to avoid possible damage to the machine and injury to the operator. The hold-down is adjustable to cover all thicknesses of material within the rated capacity of the machine. The maximum material that can be sheared is 6" x 6" x 1/2" (152mm x 152mm x 12mm).

The standard angle shear blades fitted to the machine comprise of an upper moving blade and two bottom fixed rectangular blades. The approach angle of the moving blade offers minimum distortion through all thicknesses of material within the rated capacity of the machine.

After a period of time and subsequent dulling of the blades, they can be removed and turned. All blades can be turned, each blade offers a choice of four cutting edges. After turning or grinding worn blades, they must be Re-fitted and adjusted to a clearance of 0.010'/0.015" (0.25mm/0.4mm).

The upper "moving" blade is not adjustable and the bottom "fixed" blades must be adjusted to suit. An even clearance between the moving and fixed blades along their entire length is important and attention should be given to ensuring that the fixed blades are in a vertical plane. REFER TO SECTION 6.3B.

6.3A ANGLE SHEAR HOLD-DOWN ADJUSTMENT

- ☐ **To set the hold-down, feed the angle to be cropped through the hold-down and angle shear, as shown in Figure 17. Feed the angle horizontally and square to the machine.**
- ☐ **Loosen the locking screw and adjust the hold-down screw to the apex of the angle.**
- ☐ **Tighten the locking screw.**

- ✓ **Ensure that the hold-down is correctly adjusted and secure.**
- ✓ **Always feed material from the hold-down side of the machine.**
- ✓ **Operate the machine while holding the angle firmly against the hold-down screw.**

- ➲ **NEVER allow the ends of the angle to pass beyond the hold-down when shearing. This may cause serious damage to the machine.**

- ✓ **Keep the blade area clean. Do not allow buildup of mill scale.**
- ✓ **Stay within the rated capacity of the machine.**
- ✓ **The quality of cut is usually an indication of the condition of the blades or their setting.**

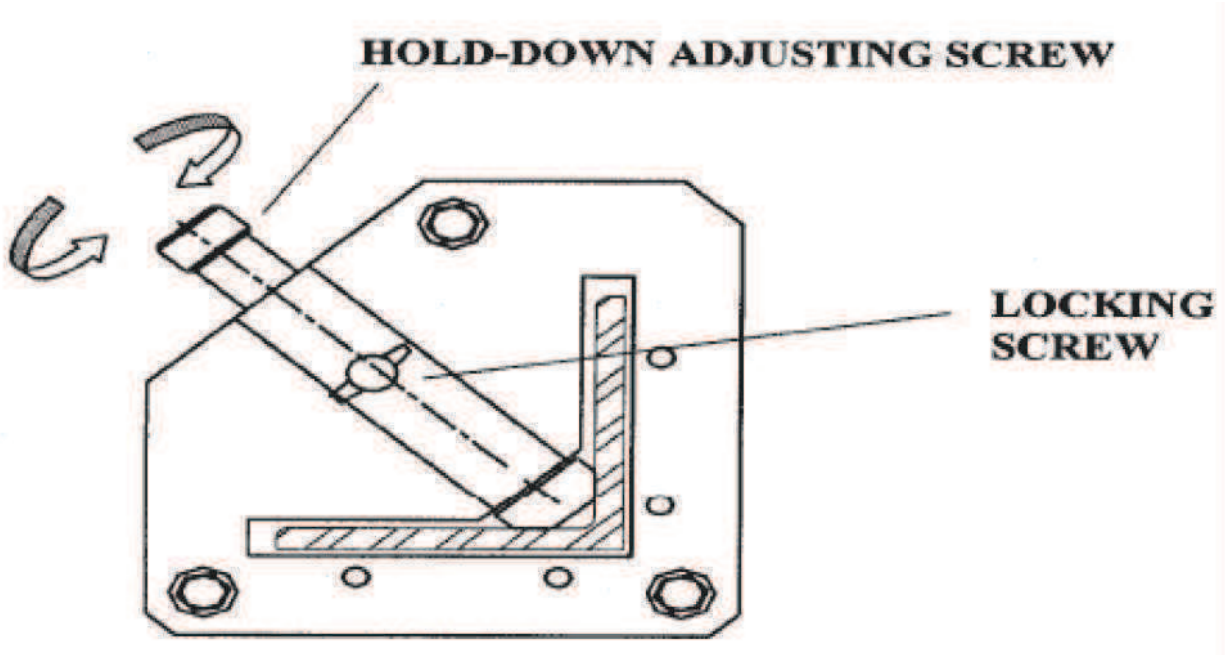


FIGURE 18

6.3B ANGLE SHEAR BLADE ADJUSTMENT OR REPLACEMENT

REFER TO FIGURE 19.

- ☐ **To set the blades, lower the Shear Beam so that the upper moving blade crosses over the fixed lower blades. (If fitting new or re-ground blades, ensure that the fixed lower blades are fully adjusted away from the upper moving blade before lowering the Shear Beam.)**
- ☐ **While holding the Shear Beam down on the foot switch, switch the machine to OFF.**
- ☐ **Remove the Angle Hold-Down.**
- ☐ **Adjust the two fixed blades to the Shear Beam Blade, to achieve a clearance of 0.010"/0.015" (0.25mm/0.4mm). Ensure that the fixed blades are seated vertical and that the clearances are even along the blade lengths.**
- ☐ **Lock the fixed blades in position by tightening the four fixed blade securing screws.**
- ☐ **Check and re-adjust the blade setting, if necessary.**
- ☐ **Re-fit and secure the hold-down to the machine.**

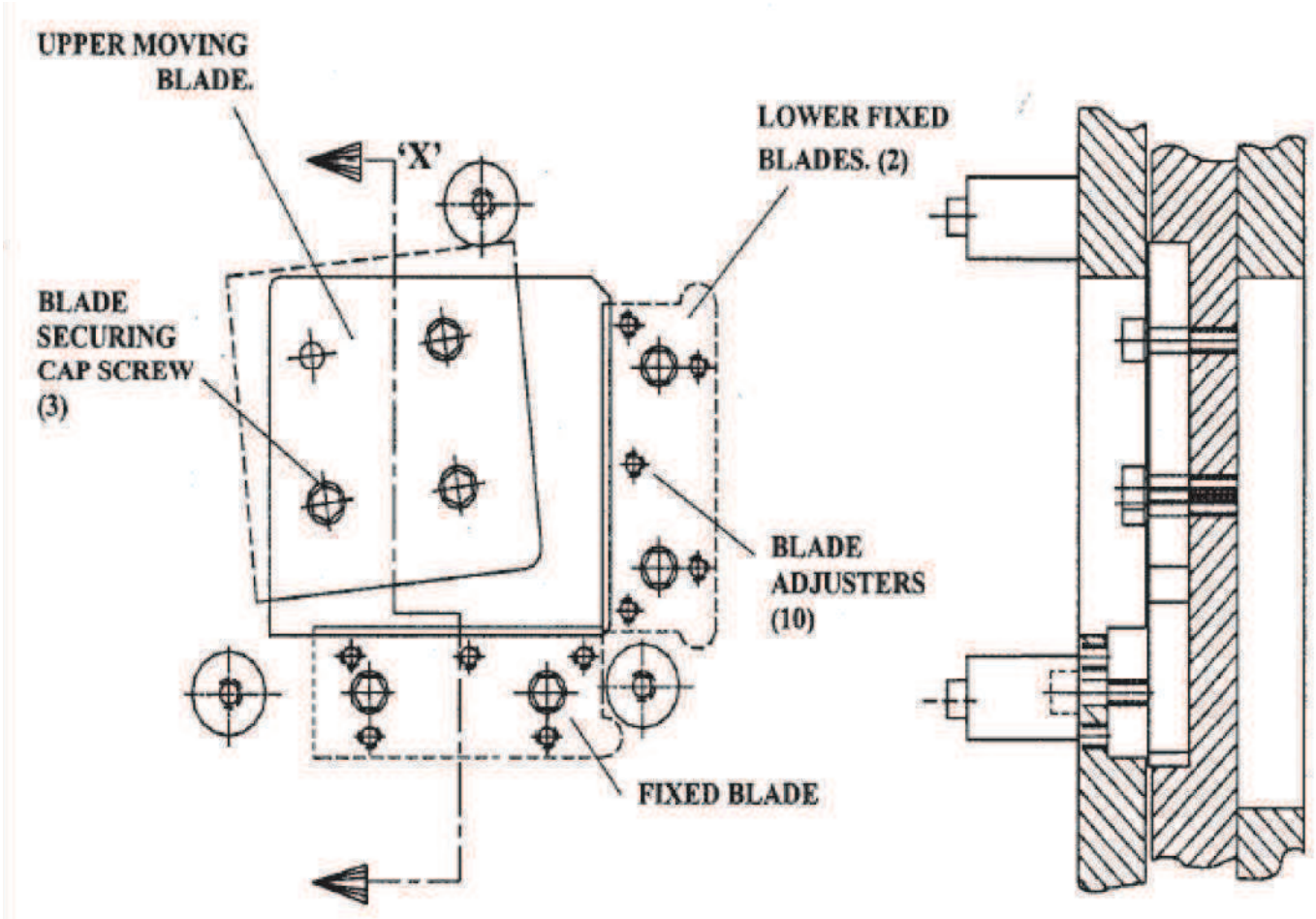


FIGURE 19

6.4 ROD SHEAR OPERATION (CHANNEL SHEAR BLADES OPTIONAL)

☒ **NOTE: CHANNEL SHEAR BLADES ARE AVAILABLE FOR USE IN THE ROD SHEAR CAVITY. The blade setting procedure is the same for channel shear and rod shear blades, as outlined in Section 6.3. Section 9.8A OPTIONAL CHANNEL SHEAR BLADES will also assist with installation.**

A variety of sections can be sheared at this work station aperture: round and square bar, angle, channel and joist are the more common sections. Blades for round and square sections are supplied standard and have apertures of varying sizes. The hold-down is adjustable to cover smaller diameters and squares while using the standard blades supplied with the machine. When using multi-hole blades, always use the aperture with the least clearance around the material. The quality of bar cutting is improved with closer blade/material clearances.

The blades are supplied in pairs. The moving blade is generally called the "Beam Blade" and the stationary blade is called the "Fixed Blade". The blades cannot be fitted in the wrong position as the fixed blade is 3mm larger than the beam blade. The beam blade has a recess in one corner to align with the location screw secured in the machined blade seat of the shear beam.

After a period of time and subsequent dulling of the blades, it will be necessary to sharpen the blades. A generous grinding allowance of 1/16" (2mm) per blade has been allowed; grind the cutting face of each blade, only. It is difficult to set precise blade clearances at this work station due to the size and shape of the blades. They are sometimes magnetic and have to be removed from the machine together. Always wear gloves when removing the blades and handle with care. Gentle tapping from the off-cut side of the machine, with a rubber mallet, will free the blades. (See Section 6.4B, for blade adjustment.)

6.4A ROD SHEAR HOLD-DOWN ADJUSTMENT

➲ **ALWAYS CHECK THAT THE HOLD-DOWN IS CORRECTLY SET AND SECURE BEFORE CUTTING A SECTION. NEVER FEED MATERIAL BEYOND THE HOLD-DOWN.**

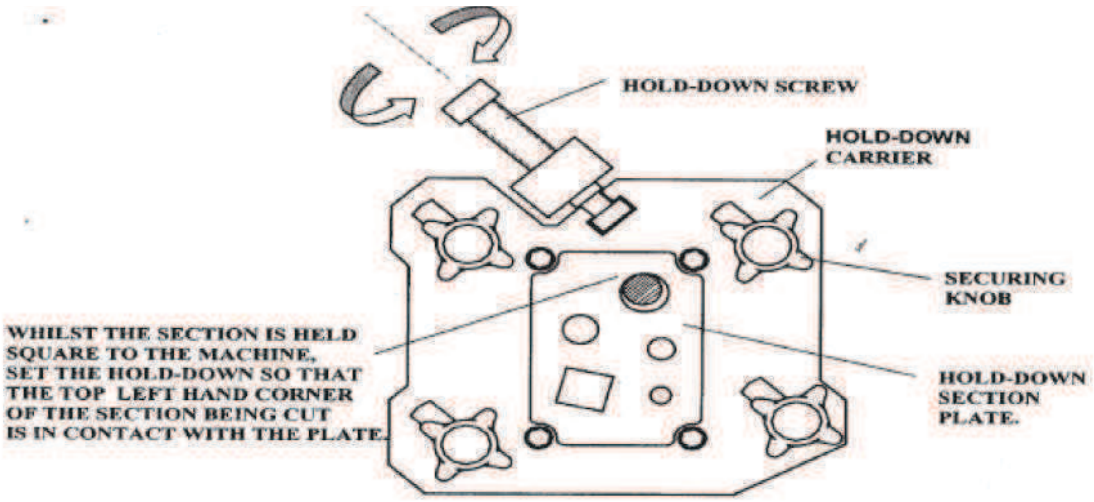


FIGURE 20

1. **Check that the blades are correctly fitted and adjusted. (Refer to Figures 20 and 21.)**
2. **Fit the appropriate hold-down plate to the carrier. Ensure that it aligns with the blades.**
3. **Place the disconnect switch in the ON position and both selector switches in the START position and power the machine.**
4. **Place the selector switch in the SHEAR position.**
5. **Feed the material to be sheared through the hold-down and section blades.**
6. **Ensure that the hold-down is correctly adjusted and secured. Ensure that the feed material is square to and held firmly against the hold-down. See Figure 20.**
7. **Depress the foot pedal.**

⊠ **NEVER allow the ends of the section material to pass beyond the hold-down when shearing. This may cause serious damage to the machine.**

➲ **Always feed material from the hold-down side of the machine.**

➲ **Keep the blade area clean. Do not allow buildup of mill scale.**

➲ **Stay within the rated capacity of the machine.**

In addition to the above seven basic steps of operation, the operator should also be familiar with the following: MAINTAIN PROPER BLADE CLEARANCE. The quality of the cut is an immediate indication of the condition of the shear blades or the amount of clearance between the blades.

For adjustment procedures, refer to Section 6.4B.

6.4B BLADE REMOVAL/FITTING AND SETTING

REMOVAL: (REFER TO FIGURE 21.)

☐ **Position the shear slide at the top of its stroke, ensuring that the section blades are in line with each other.**

- ☐ **Switch the machine OFF.**
- ☐ **Remove the hold-down carrier.**
- ☐ **Remove the pair of blade clamps.**
- ☐ **Remove the fixed blade and then, the moving blade. During the working and manufacturing process of these blades, they can become slightly magnetized. Gently tapping the blades with a rubber or copper mallet, on the "off-cut" side of the machine, will release the blades.**
- ☐ **Thoroughly clean the blade seat pocket on the machine.**

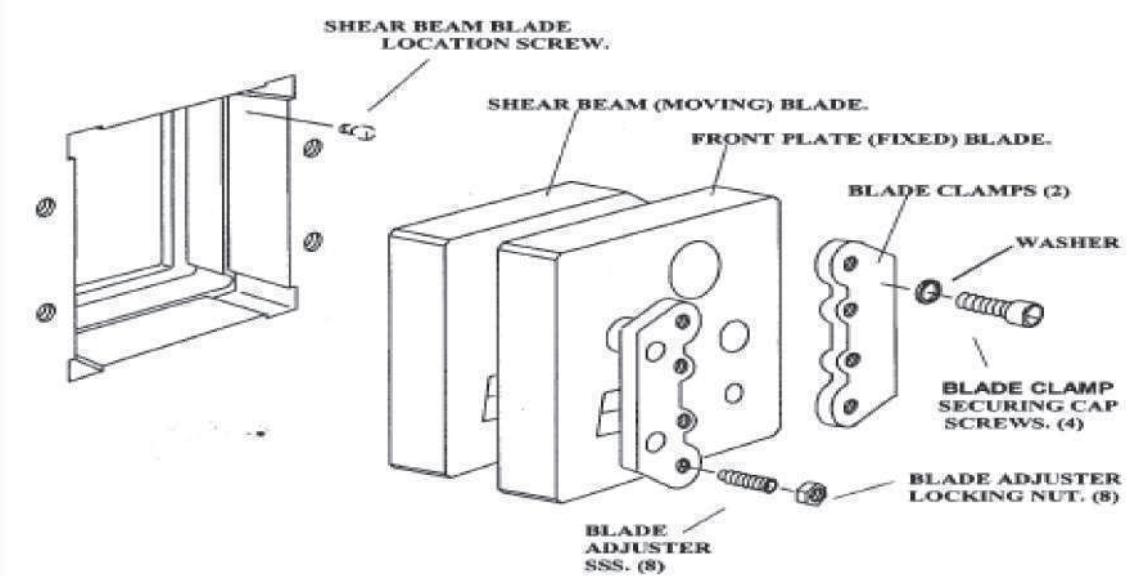


FIGURE 21

FITTING AND SETTING:

- ☐ **Ensure that the blades and the blade seat pocket are clean. Lightly oil the blades.**
- ☐ **Insert the smaller moving blade into the shear slide, aligning the blade's beveled corner with the location screw in the beam slide (top right hand corner). Ensure that the blade is properly seated.**
- ☐ **Insert the larger fixed blade, checking that the blade apertures align with the moving blade.**
- ☐ **Ensure that the blade is properly seated against the moving blade.**
- ☐ **Loosen the blade adjusters in the blade clamps and secure the blade clamps to the machine, checking that the adjusters are not in contact with the fixed blade.**
- ☐ **"Finger tighten" all of the blade adjusters to the body blade. Then, release each adjuster by one fifth of a turn.**
- ☐ **Tighten the adjuster lock nuts while holding the adjuster with an allen key. Check for clearance of approximately 0.10"/0.15" (0.2/0.4mm) between the adjusters and the fixed blade. Repeat the setting process, if necessary.**
- ☐ **Secure the appropriate stripper plate to the carrier, ensuring that its opening aligns with the fixed blade.**
- ☐ **Fit the hold-down to the machine. Adjust the hold-down so that the feed material is square to the machine and in contact with the hold-down plate on the top left hand corner. Tighten the hold-down clamping knobs.**

6.5 RECTANGLE NOTCHER OPERATION

This work station can be used for a variety of uses. Rectangular notching, vee notching, corner notching, bar bending and punching are the main applications. Rectangular corner notching is supplied as standard. For details of alternative tooling arrangements, contact your machine supplier or Scotchman. When taking a two sided notch or nibbling, always carry out this operation on the left hand side cutting face of the top blade. A slight lifting of the material as it is notched will be experienced.

➲ **NEVER EXCEED THE RATED CAPACITY OF THE MACHINE.**

The lower blades have four cutting edges and can be turned, when they have dulled, to present new cutting edges. The top blade and bottom blades can be sharpened. Grind the sides and front face of the blade and only the side faces of the lower blades. The top blade is secured to the shear beam. The top Notch Blade holder and RH Lower Notch Blade have to be adjusted to suit. The capacity of the Rectangular Notch Station is 2" x 4" x 1/2", (51mm x 101mm x 12mm) based on material tensile strength 65,000 lbs.

6.5A RECTANGLE NOTCHER BLADE ADJUSTMENT OR REPLACEMENT

Raise the notch guard. Check that the upper and lower blades are correctly fitted and adjusted. Refer to Section 6.5B and Figures 22 &23. Place the disconnect switch in the ON position and both selector switches in the START position and power the machine. Place the selector switch in the SHEAR position. Carefully lower the notcher's top blade with the foot switch until the heel of the blade just enters the lower blades. While holding in this position on the foot switch, switch the machine to OFF. Adjust the top stroke control until the switch "B" is in contact with the actuator "C". (Refer to Figure 8.) Re-start the machine and check the stroke of the top blade. Place the material to be notched onto the lower notch blades and lower the notch guard. Secure the Guard above the material, with a small clearance of about 1/4" (6mm) to enable withdrawal and re-positioning of the material. Correctly position the material to be be notched. (The back stops on the notch table and if the top blade heel is correctly set, it will not allow the material to be fed in too deep. However, always ensure that the material is not fed in deeper than the top blade heel.) Fully depress the foot switch and hold it firmly down.

➲ **IMPORTANT: When the top blade has finished its down travel and notched the material, maintain a firm pressure on the foot switch, holding the top blade in the down position. The top blade is waisted so withdraw the material fully away from the top blade. Only when the material has been removed from the top blade should the foot switch be released, to allow automatic withdrawal of the top blade, ready for the next cut.**

Stay within the rated capacity of the machine.
Keep the blade area clean. Do not allow a buildup of mill scale.
Only operate the machine with a correctly set guard.
Lubricate the blades every 10-15 cuts.

⌦ **CAUTION: NEVER FEED THE MATERIAL INTO THE NOTCH DEEPER THAN THE TABLE BACK STOPS OR THE HEEL OF THE TOP BLADE.**

⌦ **AFTER NOTCHING, NEVER REMOVE YOUR FOOT FROM THE FOOT SWITCH WITHOUT FIRST WITHDRAWING THE MATERIAL FROM THE TOP BLADE.**

TOP BLADE REMOVAL/FITTING (Refer to Figure 22.)

The top blade is not adjustable and is secured to the shear beam via the top blade carrier by two socket cap screws. The top blade carrier only requires removal when converting this work station for purposes other than rectangular notching.

REMOVAL:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **Adjust the top stroke control up to its farthest position. The top blade will retract as the stroke control is raised.**
- ☐ **Switch the machine to OFF.**
- ☐ **Raise the notch guard.**
- ☐ **Slacken and remove the two socket cap screws retaining the top blade.**

FITTING:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **Adjust the top stroke control up to its farthest position. The top blade will retract as the stroke control is raised.**
- ☐ **Switch the machine to OFF.**
- ☐ **Raise the notch guard. Clean the top blade seating in the top blade carrier. Position the new or re-ground top blade in the top blade carrier seating, with the heel to the rear. Tighten both socket cap screws while ensuring that the top blade is firmly seated against the back heel of the carrier.**
- ⌦ **Do not operate the machine without re-setting the lower blades and lower blade holder, as outlined in the following section.**

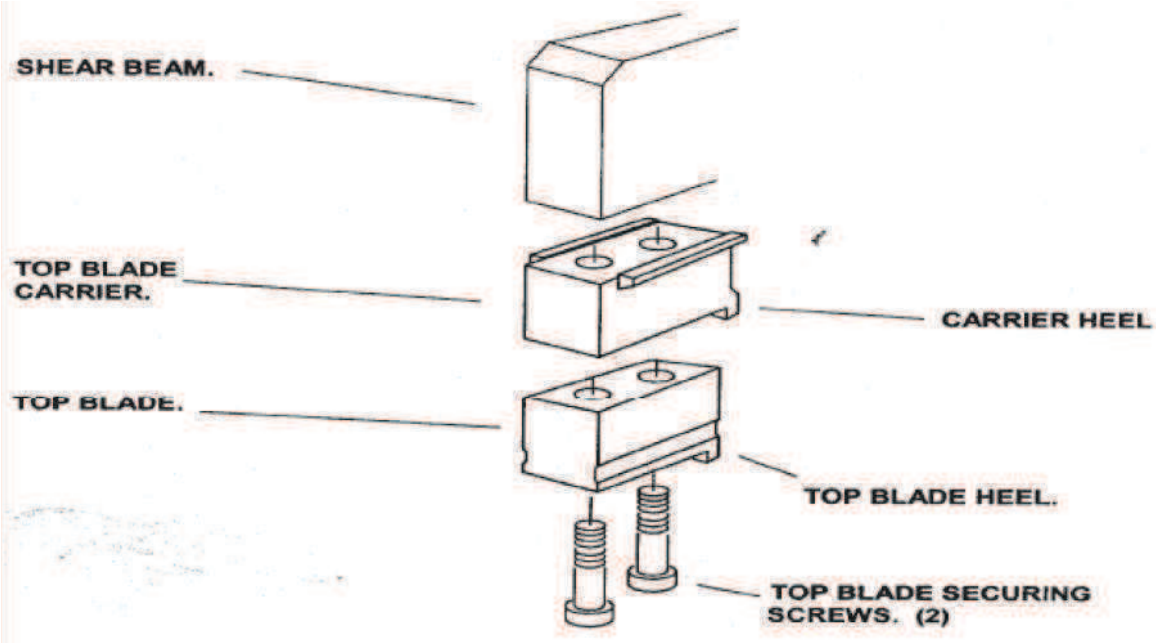


FIGURE 22

LOWER BLADE REMOVAL/FITTING AND SETTING. (Refer to Figures 23.)

The lower blades each have four cutting edges and can be turned to present a new cutting edge, when dulled. The lower blades are secured in the blade holder. The right hand blade is adjustable. This blade adjustment is particularly useful as the correct clearances can be maintained when the upper blade has been re-ground. If re-grinding the lower blades, grind the sides of the blades only. A maximum grind allowance of 1/32" (1mm) has been allowed. Whether just turning or re-fitting ground blades, once the original setting of the notch tooling has been disturbed, it will be necessary to carry out the following to re-set the notch tooling properly.

REMOVAL:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **If necessary, adjust the top stroke control so that the top blade is well clear of the lower blades. (The top blade will retract as the stroke control is raised.)**
- ☐ **Switch the machine to OFF, raise the notch guard and remove the notch table.**
- ☐ **Slacken and remove the six socket cap screws retaining the lower blades. Loosen the six blade adjusters SS on the RH side of the blade holder. Remove the lower blades and clean the blade seats.**

FITTING AND SETTING:

- ☐ **Power the machine and select SHEAR on the selector switch.**
- ☐ **Firmly depress the foot switch and carefully lower the top blade so that it enters the empty blade pocket in the lower blade holder. While holding the top blade in this position on the foot switch, switch the machine to OFF.**
- ☐ **Loosen the six hex head screws securing the lower blade holder. It is not necessary to remove the screws or the holder.**
- ☐ **Position the new or turned lower blades in the blade seats on the LH side and front of the blade holder, only. Secure and tighten.**
- ☐ **Position the new or turned RH blade in its seat and retain the blade finger tight only.**
- ☐ **Slide the blade holder to align the LH and front lower blades with the upper blade. Set an equal clearance of 0.025" (0.6mm) between the blades.**
- ☐ **Securely tighten the six hex head blade holder screws to a torque of approximately 100 ft./lbs. (135nm). Check that the blade clearances have not moved in tightening. Re-set, if necessary.**
- ☐ **Loosen the RH lower blade and adjust the blade to the top blade with an equal clearance of 0.025" (0.6mm). When setting this blade, achieve a slight "toe in" to assist in slug rejection.**
- ☐ **Tighten the two blade securing socket cap screws, pulling the blade back against the adjustment screws. Check that the blade clearance has not moved in tightening. Re-set, if necessary.**
- ☐ **Re-fit the punch table.**
- ☐ **Power the machine and select SHEAR on the selector switch to retract the top blade.**
- ☐ **Depress the foot switch and carefully lower the top blade, to check blade clearances.**
- ☐ **Refer to Section 6.5A to set the machine for Notch Operation.**

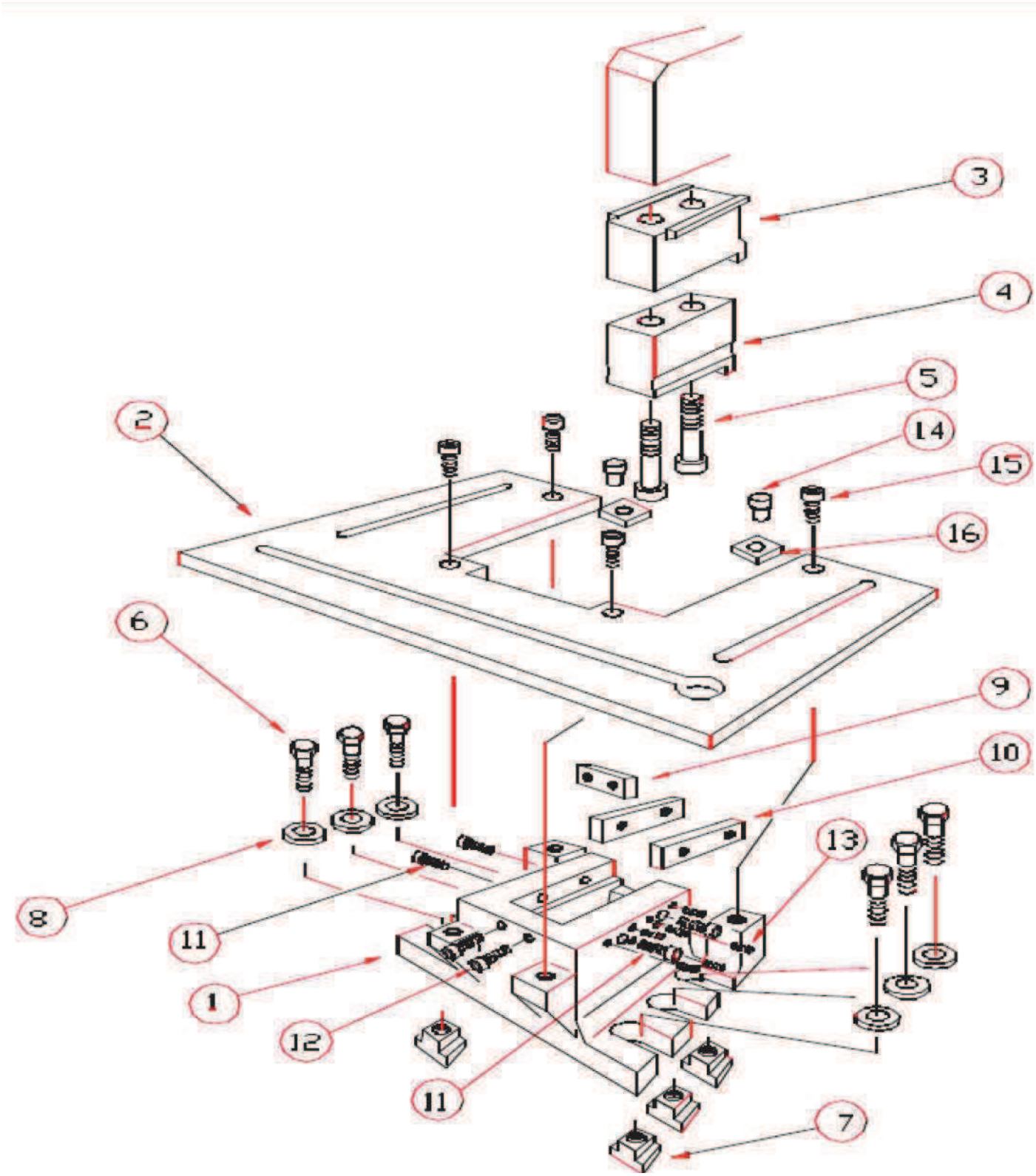


FIGURE 23

7.0 OPTIONAL TOOL OPERATION

⌦ **CAUTION: REMOVE THESE TOOLS FROM THE MACHINE WHEN THEY ARE NOT IN USE.**

As with all functions on this machine, SAFETY GLASSES ARE REQUIRED when using optional tools of any type. Each self-contained tool has its own stroke and tonnage requirements. This section will cover the operation and location of each tool.

7.1 6 X 6 NINETY DEGREE 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 inch (8mm) thick mild steel.

7.1A 6 X 6 NINETY DEGREE NOTCHER INSTALLATION

SEE FIGURE 24 ON THE FOLLOWING PAGE.
The 6 x 6 ninety degree notcher mounts in the PUNCH station only.

1. **Remove the stripper and die holder.**
2. **Install the punch pusher (C) provided.**
3. **Install the return springs and the neoprene slug pad in the notcher.**
4. **Mount the riser plate (A) to the punch bolster, with the bolts provided.**
5. **Align the tool directly under the ram and anchor it to the riser plate, with the bolts provided.**

⌦ **CAUTION: CARE MUST BE TAKEN TO SET THE UPPER AND LOWER STROKE CONTROLS ON THE MACHINE. FAILURE TO DO SO WILL RESULT IN DAMAGE TO THE TOOL AND POSSIBLE INJURY TO THE OPERATOR.**

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

7.1B 6 X 6 NINETY DEGREE NOTCHER OPERATION

Lubricate the blades before starting and every 10 to 25 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.**

7.1C BLADE REPLACEMENT

The lower blades are symmetrical and can be rotated to expose four cutting edges. The upper blade has two cutting edges. To rotate or replace the blades, use the following steps.

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

1. **Remove the return springs from the unit.**
2. **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" or 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.**

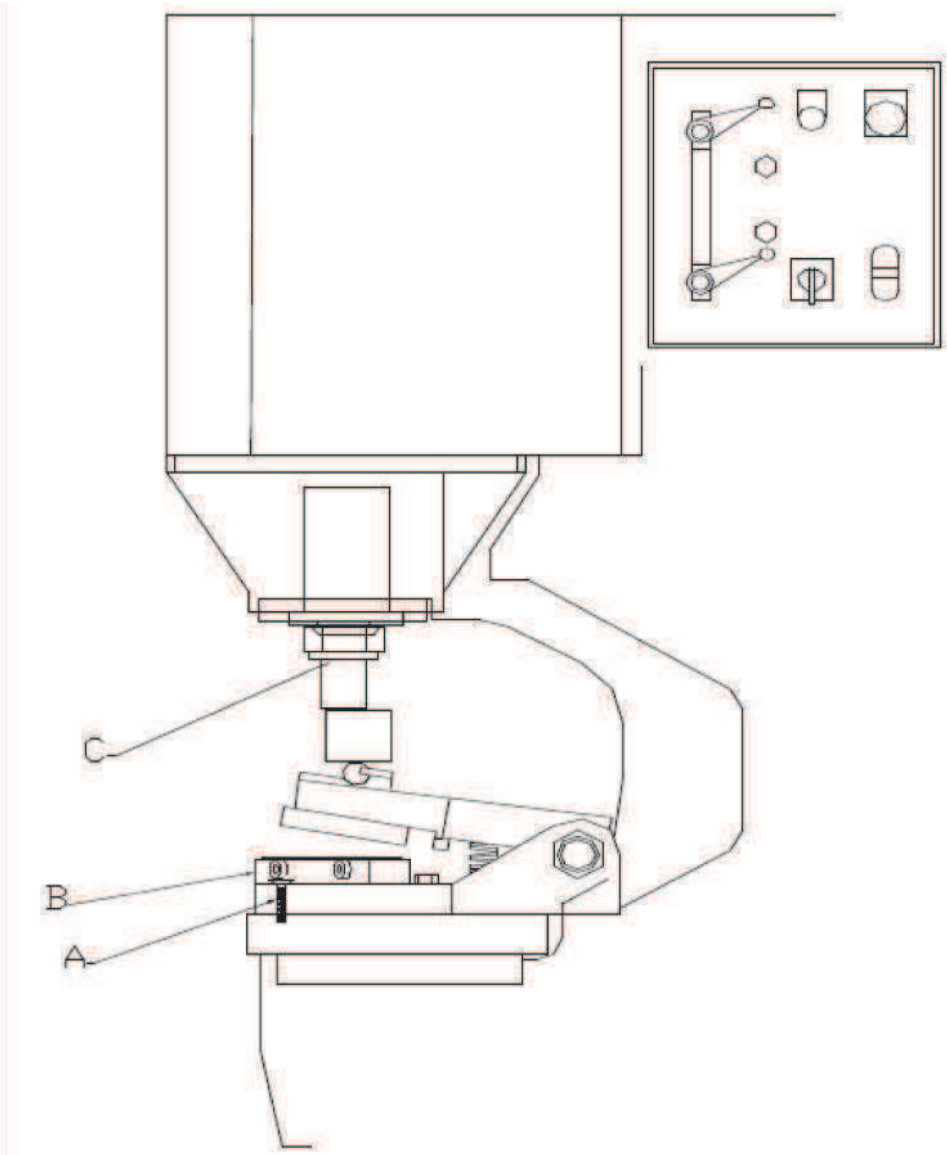


FIGURE 24

7.2 12 & 24 INCH BRAKES

Brakes are component tools designed to bend and form mild steel. They are shipped standard with dies to accommodate material up to 1/4 of an inch (6mm) thickness.

7.2A 12 & 24 INCH BRAKE INSTALLATION

SEE FIGURE 26 ON THE FOLLOWING PAGE.

1. **Remove the stripper and the die holder.**
2. **Remove the threaded punch holder and replace it with the tool pusher (C).**
3. **Install the brake with the guard (B) to the operator's side of the machine and anchor it with the finger clamps (A) provided.**
4. **Align the tool directly under the ram.**

There are two lengths of brakes available for this model: 12 and 24 inch. There is a press brake tonnage chart ON THE FOLLOWING PAGE that will be helpful when using a brake on this machine. On this model, both brakes have 85 tons of force.

7.2B 12 & 24 INCH BRAKE INSTALLATION

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

Hold short pieces with tongs or a similar device.
In using the brake, it is necessary to load the brake centrally. (Visual centering is sufficient.)
If the work is performed off-center, the guide pins could be damaged.
The brake lift is provided by the 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 they are damaged.
It is common practice to have the bottom die opening 8 times the thickness of the material being bent.
If parts require bends of less than 90 degrees, adjust the stroke until the desired bend is obtained.
A great variety of standard brake dies can be used with this unit. These are available from Scotchman Industries or brake die suppliers.

➲ **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.

BRAKE TONNAGE CHART

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

THICKNESS OF METAL		WIDTH OF V-DIE OPENING																				
GAUGE	INCHES	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1	1-1/8	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	5	6	7	8	10	12
20	.036	2.9	**2.2**	1.7	1.2	1.0																	
18	.048		4.0	**2.9**	1.6	1.3																	
16	.060			5.6	**3.6**	2.7	2.2	1.7															
14	.075				6.0	**4.5**	3.4	3.0	2.5	2.1													
13	.090					6.8	**5.4**	4.3	3.7	3.3	2.9												
12	.105					10.1	7.4	**6.3**	5.4	4.4	4.0	3.2											
11	.120						10.5	8.8	**7.2**	6.2	5.4	4.3	3.2										
10	.135							11.3	9.6	**8.4**	5.6	4.1											
9	.150								13.1	11.9	**9.0**	6.7	5.2	3.5									
7	.188									16.4	14.0	**11.2**	7.6	5.8	4.5								
1/4	.250										28.8	22.0	**15.3**	11.5	9.1	7.5	6.2						
5/16	.313											38.0	26.0	**19.2**	16.0	12.5	10.6	7.6					
3/8	.375												41.0	29.9	**24.0**	19.4	16.0	12.3	9.3				
7/16	.438													45.2	35.0	**28.0**	24.0	17.0	14.6	11.1			
1/2	.500														47.9	39.0	**33.1**	24.0	19.0	15.6	12.7		
5/8	.625															69.5	58.0	**42.2**	32.4	26.0	23.0	16.5	
3/4	.750																92.0	69.0	**52.2**	42.2	36.0	27.0	21.0
7/8	.875																	104	80.0	**63.0**	52.5	39.4	31.2
1.0	1.00																		112	90.0	**76.0**	56.2	44.0

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

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

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

FIGURE 25

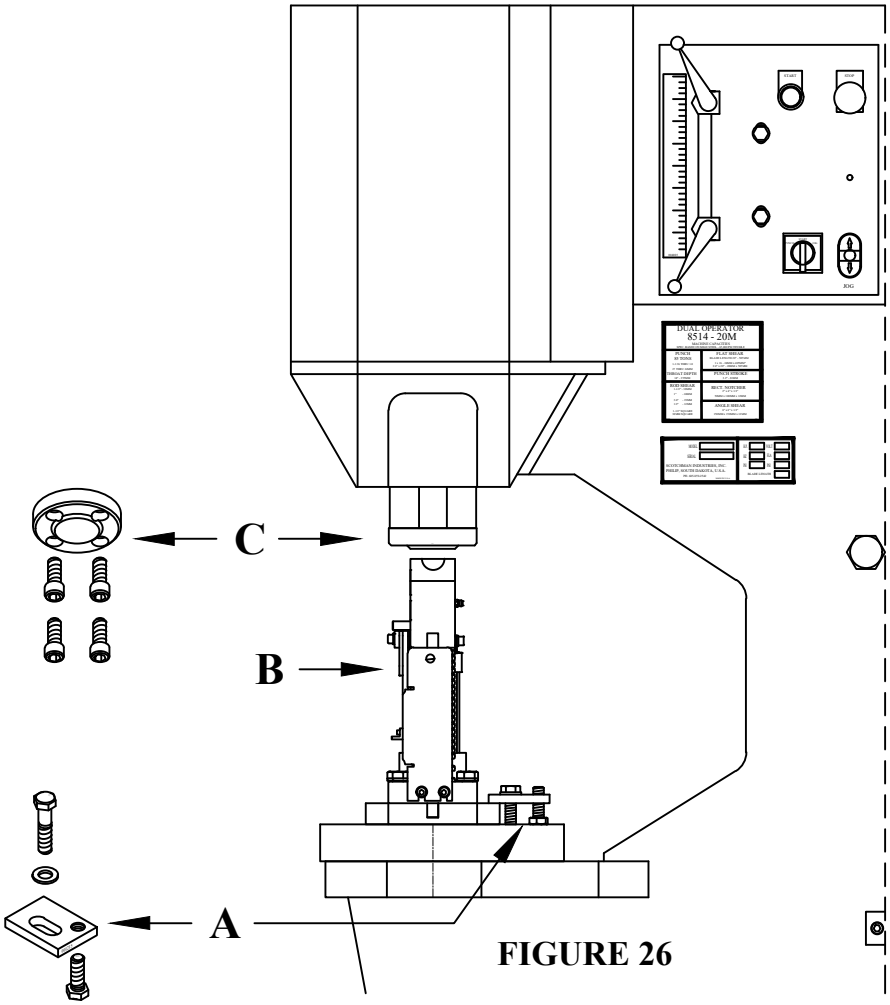


FIGURE 26

7.3 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.

7.3A PIPE NOTCHER INSTALLATION

SEE FIGURE 27 ON THE FOLLOWING PAGE.

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

WHEN INSTALLING THE PIPE NOTCHER IN THE PUNCH STATION:

1. **Remove the stripper and the die holder.**
2. **Remove the threaded punch holder and replace it with the tool pusher (C).**
3. **Install the pusher assembly (D) on the tool.**
4. **Install the pipe notcher and anchor it with the bolt (A) provided.**
5. **Align the tool directly under the ram and over the slug release hole.**

WHEN INSTALLING THE PIPE NOTCHER IN THE NOTCHING STATION:

1. **Remove the upper blade and the blade holder.**
2. **Remove the lower blade holder and the blades.**
3. **Install the pusher assembly (B) on the tool.**
4. **Install the pipe notcher and anchor it with the finger clamps (E) provided.**
5. **Align the tool directly over the slug slot.**

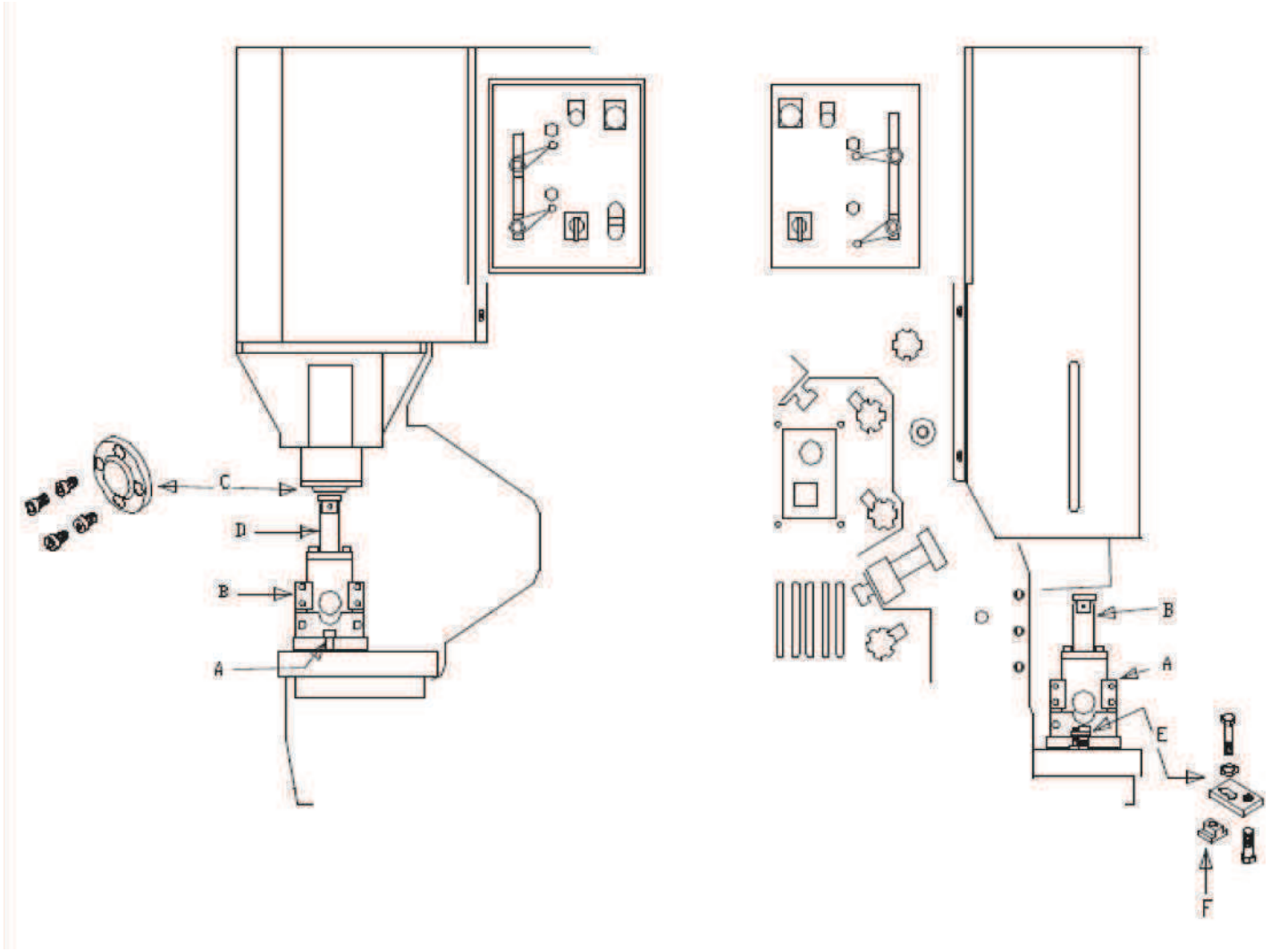


FIGURE 27

7.3B PIPE NOTCHER OPERATION

The pipe notcher is a vendor item for Scotchman Industries. The following is the manufacturer's recommendation for maintenance and alignment of this tool.

A. Keep the unit clean. Whenever dirt or metal chips accumulate, remove the 8mm limit screw located in the center at the rear of the punch. Lift out the punch holder and the two springs (1/2 x 3 inch). Clean the unit with solvent.

B. Check the alignment of the unit. After cleaning the unit, always check the alignment of the upper and lower dies. To check the alignment, insert the upper die and die holder, without the springs, into the housing and check the gap. SEE FIGURE 28 ON THE FOLLOWING PAGE.

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

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

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.

7.3C 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.

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

➲ **ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE.**

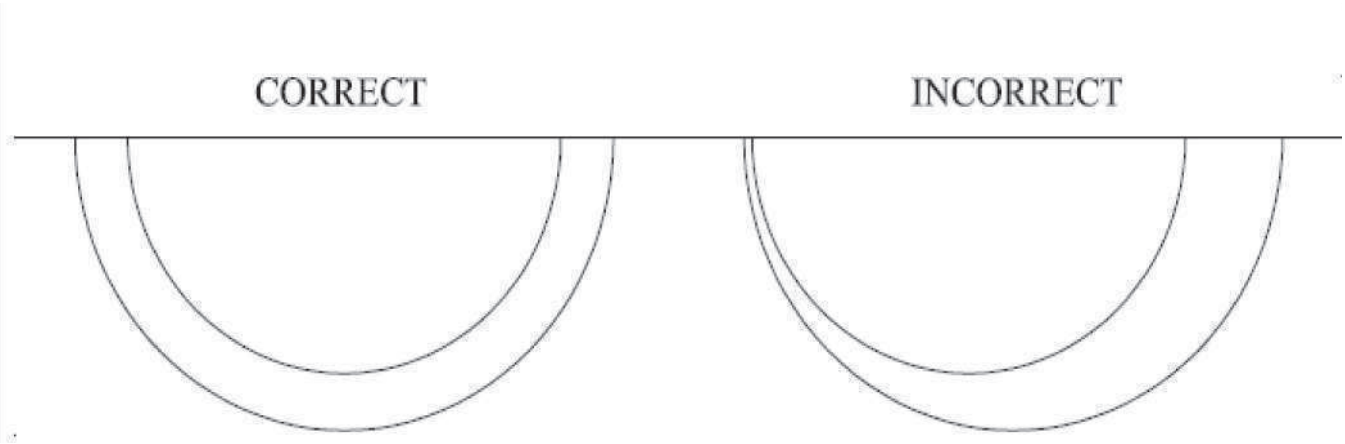


FIGURE 28

7.4 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 25mm). This tool can be mounted in the punch or notcher station.

7.4A PICKET FENCE TOOL INSTALLATION

SEE FIGURE 29 ON THE FOLLOWING PAGE.

TO MOUNT THE TOOL IN THE PUNCH STATION:

1. **Remove the stripper and the die holder.**
2. **Remove the threaded punch holder and replace it with the tool pusher (C).**
3. **Install and lubricate the rocker cap assembly (B) on the tool.**
4. **Install the picket tool and anchor it with the finger clamps (A) provided.**
5. **Align the tool directly under the ram.**

WHEN INSTALLING THE PICKET TOOL IN THE NOTCHING STATION:

1. **Remove the upper blade and blade holder.**
2. **Remove the lower blade holder and blades.**
3. **Install the rocker cap assembly (B) on the tool.**
4. **Install the picket tool and anchor it with the finger clamps (E) provided.**

7.4B 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. **Set the down stroke of the machine so that the upper die clears the lower die by twice the wall thickness of the tube, plus 1/32 of an inch (.8mm).**
2. **Adjust the tube stop (D) just low enough to contact the upper edge of the tube.**
3. **Adjust the rest stop (E) so that it is approximately half of the tube size below the lower die.**
4. **Feed the tube into the tool until it contacts the stop (D). Depress the foot pedal.**
5. **Make sure that the slugs eject from the tool as the next piece is fed into the tool.**
6. **Lubricate the dies every 10 to 15 cuts and grease the ram daily.**

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.**

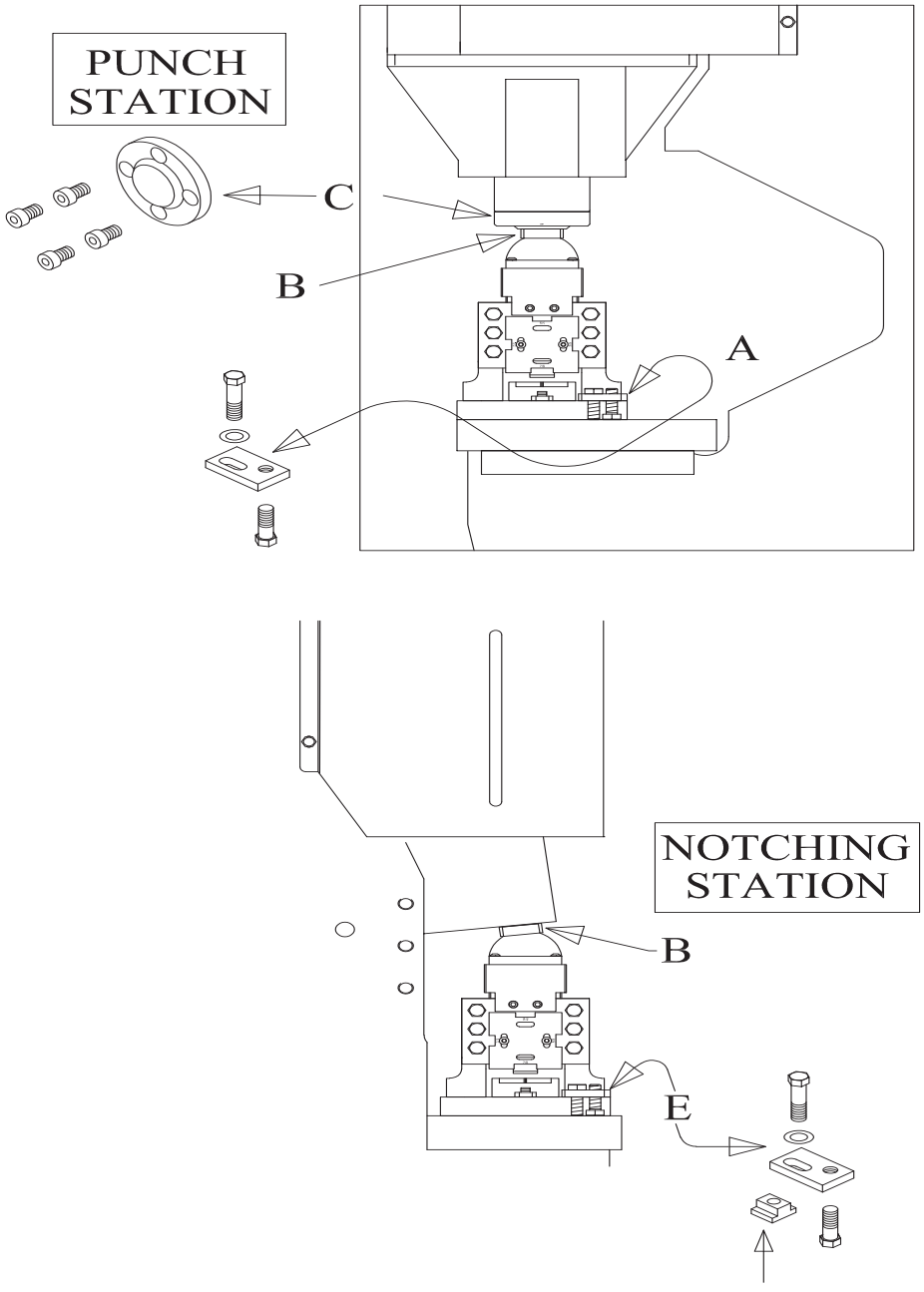


FIGURE 29

7.5 SQUARE TUBE SHEAR

SEE FIGURE 30 ON THE FOLLOWING PAGE.

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.

7.5A SQUARE TUBE SHEAR INSTALLATION

SEE FIGURE 30 ON THE FOLLOWING PAGE.

The square tube shear is to be mounted in the punch station.

TO MOUNT THE TOOL IN THE PUNCH STATION:

1. **Remove the stripper and the die holder.**
2. **Remove the threaded punch holder and replace it with the tool pusher (C).**
3. **Install the springs and pusher assembly (B) on the tool.**
4. **Install the tube shear and anchor it with the finger clamps (A) provided.**
5. **Align the tool directly under the ram.**

7.5B SQUARE TUBE SHEAR OPERATION

1. **Set the down stroke of the machine so that the upper blade passes the lower blade by approximately 1/8 (3mm) of an inch.**
2. **Feed the tubing through the shear to the desired length and depress the foot pedal.**
3. **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.**

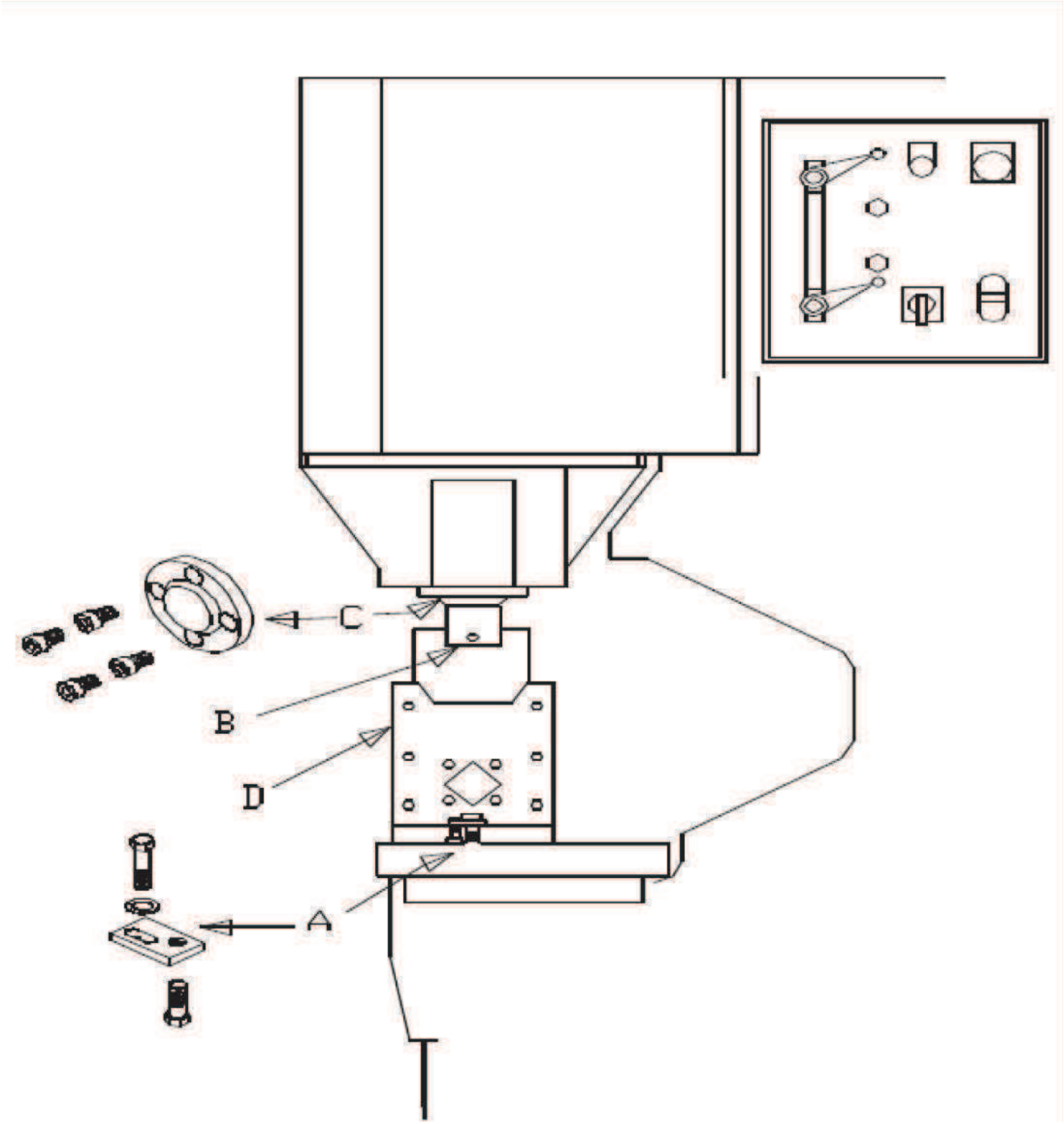


FIGURE 30

7.6 OPTIONAL DIE HOLDERS AND PUNCH HOLDERS

7.6A 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 a few 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.

⌦ CAUTION: THE OFFSET DIE HOLDER MUST BE REMOVED WHEN IT IS NOT IN USE.

7.6B 2-1/2 AND 3 INCH (63 AND 76 MM) DIE INSERTS

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 inserts are used in place of the standard die holder.

These die holders are for oversized punching.

7.6C 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 (100mm).

7.6D #45 PUNCH RETAINING NUT

The #45 punch retaining nut is of the same design as the #40 and is used in oversize punching applications.

7.6E HEAVY DUTY SPLIT-RING RETAINING NUT

SEE FIGURE 31 ON THE FOLLOWING PAGE.

The heavy duty split-ring retaining nut is used in oversize punching applications that require a punch with a 2 inch (50mm) shank diameter (E). Follow the instructions IN SECTION 6.1 for proper punch and die alignment. This retaining nut requires a pin wrench (F) which should be ordered when ordering the nut. To use the heavy duty split-ring retaining nut, remove the six socket head cap screws (D).

Slide the retaining ring (C) over the punch shank. Place the split-rings (B) into the groove in the punch. Place the ring nut (A) on the punch and replace the six socket head cap screws (D).

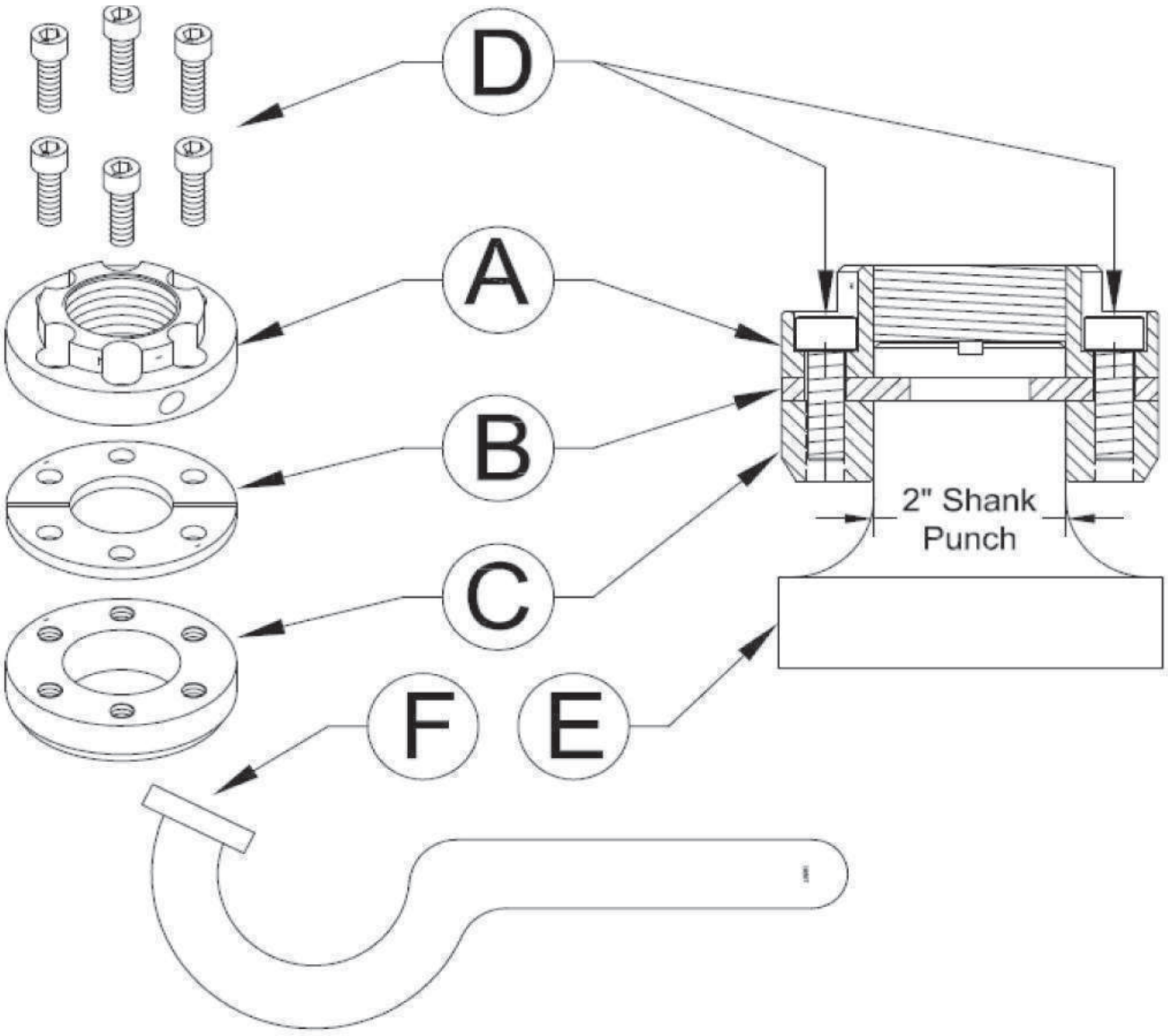


FIGURE 31

7.7 FORTY EIGHT INCH ELECTRIC BACK GAUGE

For the proper assembly for the respective stations, SEE FIGURE 32 BELOW.

The back gauge is an option that mounts to the drop-off side of the machine.

It is an adjustable forty eight inch length gauge capable of reaching all work stations on this machine from one location.

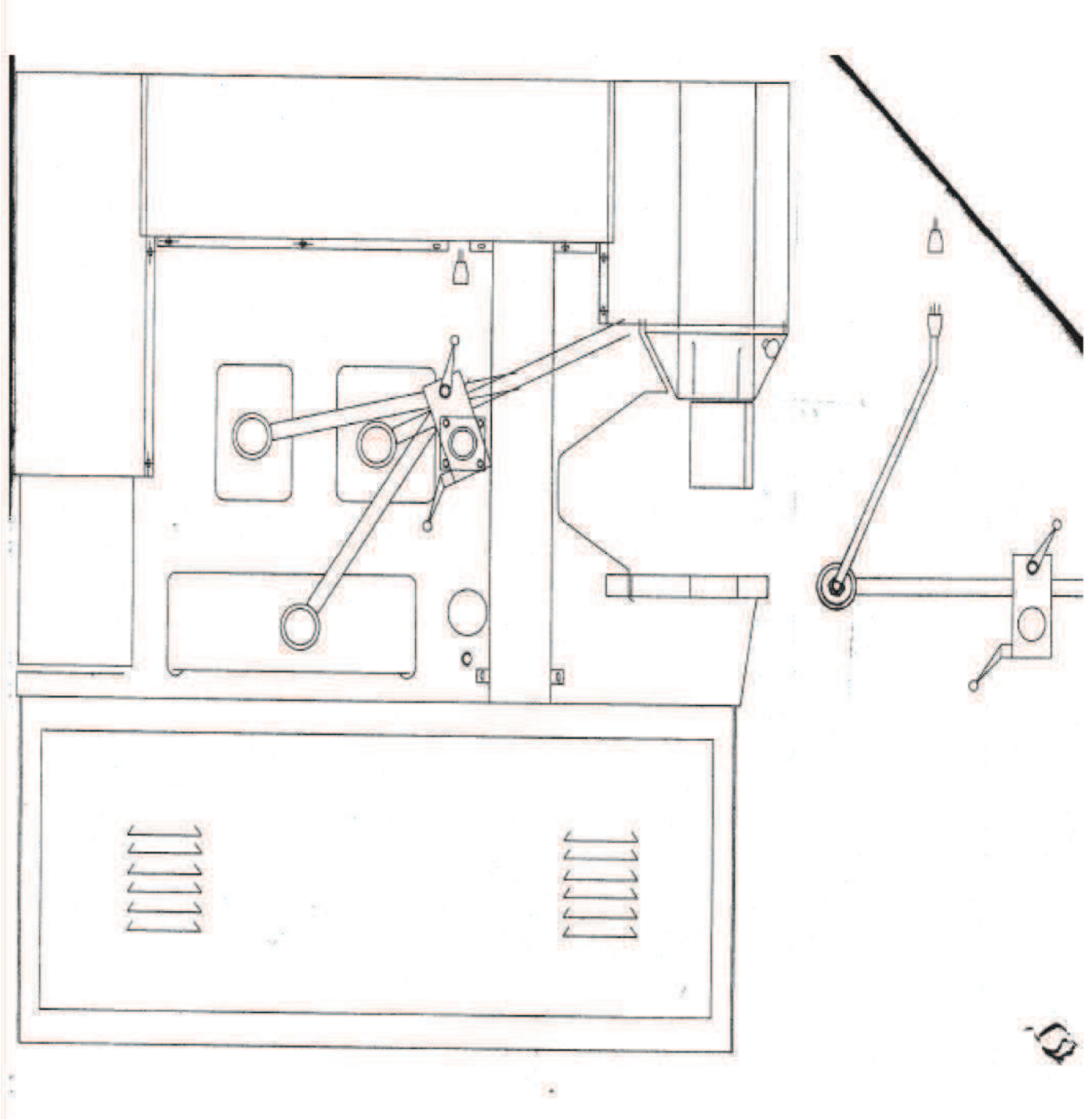
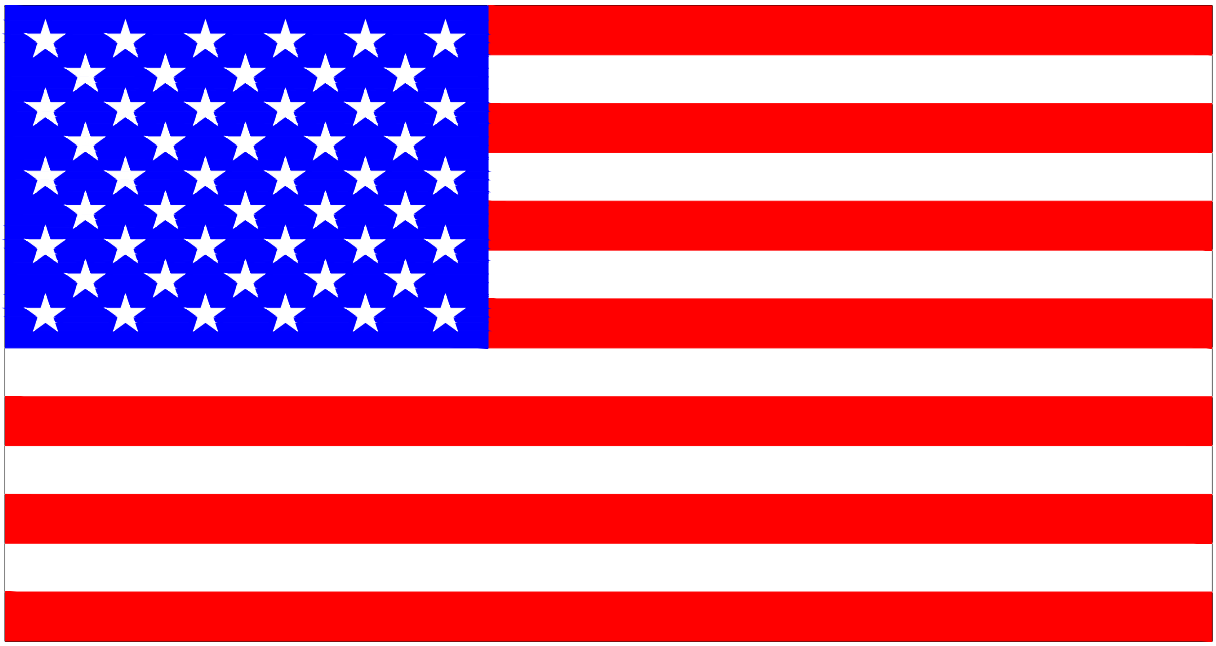


FIGURE 32

Scotchman®

Metal Fabricating Solutions

AMERICAN MADE



WWW.SCOTCHMAN.COM

7.8 ANGLE IRON BRAKE

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

7.8A ANGLE IRON BRAKE INSTALLATION

SEE FIGURE 32A 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. Put the pusher (A) in the punch retaining nut (B) and install on the punch ram (C). The pressure cap (D) mounts on top of the tool and held in place by two set screws (E). Mount the tool as shown in Figure 32A so that the pressure cap (D) is centered directly under the punch ram (C). Anchor the tool to the punch bed with the two M-16 bolts used in the punch station and finger clamps (F) provided.

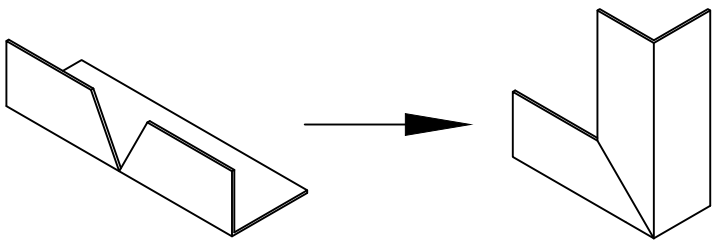
7.8B ANGLE IRON BRAKE OPERATION

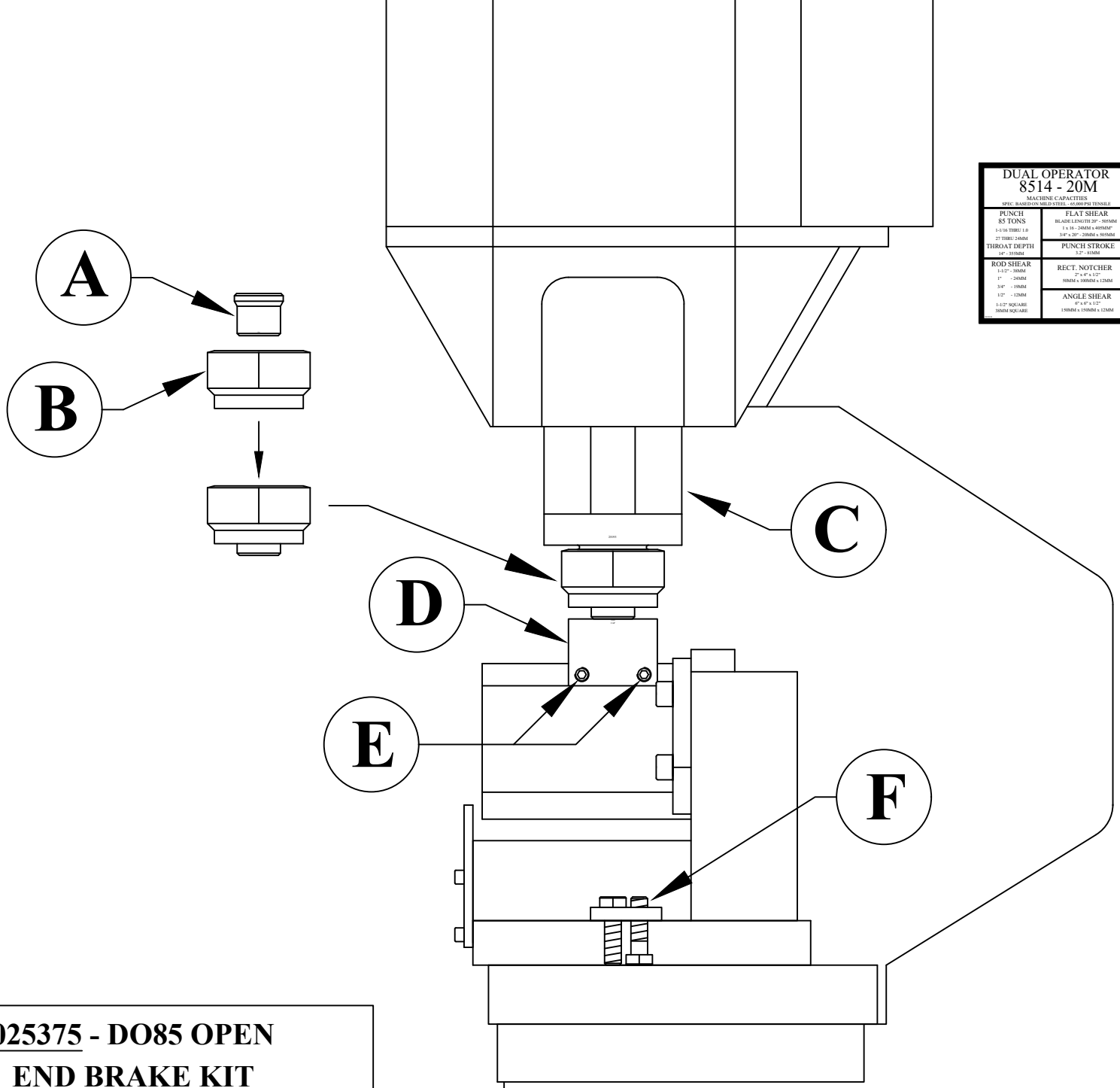
The down stroke of the machine must be set to prevent damage to the tool. Grease the brake guides every two hours of operation.

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

➲ **ALWAYS REMOVE THIS TOOL WHEN IT IS NOT IN USE.**

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





DUAL OPERATOR
8514 - 20M

MACHINE CAPACITIES
SPEC. BASED ON MILD STEEL - 65,000 PSI TENSILE

PUNCH 85 TONS 1-1/16 THRU 1.0 27 THRU 24MM	FLAT SHEAR BLADE LENGTH 20" - 505MM 1 x 16 - 24MM x 405MM" 3/4" x 20" - 20MM x 505MM
THROAT DEPTH 14" - 355MM	PUNCH STROKE 3.2" - 83MM
ROD SHEAR 1-1/2" - 38MM 1" - 24MM 3/4" - 19MM 1/2" - 12MM 1-1/2" SQUARE 38MM SQUARE	RECT. NOTCHER 2" x 4" x 1/2" 50MM x 100MM x 12MM
	ANGLE SHEAR 6" x 6" x 1/2" 150MM x 150MM x 12MM

<u>025375</u> - DO85 OPEN END BRAKE KIT

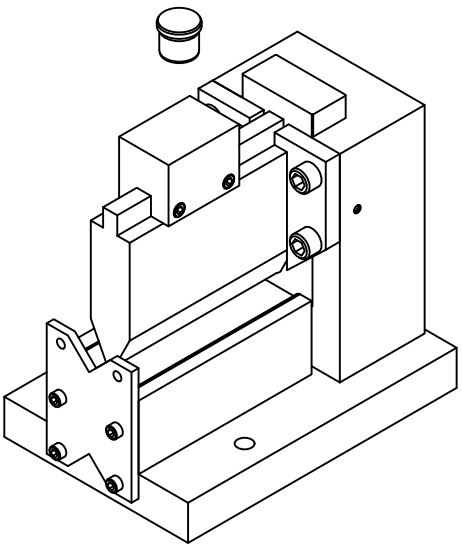


FIGURE 32A

7.9 MULTI-SHEAR TOOL

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

7.9A MULTI-SHEAR TOOL INSTALLATION

SEE FIGURE 32B ON THE FOLLOWING PAGE.

1. **Remove the punch, die, and die holder and install the short pusher as shown in upper left.**
2. **Turn the machine on and put it in the PUNCH position. Run the punch ram up to its highest setting.**
3. **Place the tool in the punch station under the punch ram as shown in Fig. 29A.**
4. **Use two bolts and thick washers (A & B) to mount the tool to the punch bolster. The base has a two mounting holes: (A) has a slot in the base of the tool and (B) is a centered mounting hole on the other end of the base. For clarity, the base is shown with the mounting locations left-center Fig. 29A.**
5. **Make sure the pusher is aligned with the pusher riser top of the moving blade and not contacting the pusher riser bolts before tightening mounting bolts. The pusher may me slightly off to one side or the other - This is fine.**
6. **The strut guide (C) may be like the one shown, or it may be adjustable. It depends on what the profile being sheared is like.**

► **NOTE: A TECHNICAL DRAWING OR SAMPLES OF THE SHAPE YOU WANT TO SHEAR IS REQUIRED TO PURCHASE THIS TOOL.**

7. **Make sure that the upstroke is set so that there is spring tension on the pressure block at all times.**
8. **Set the down stroke of the machine so that the moving blade travels only far enough to shear the material and no further.**

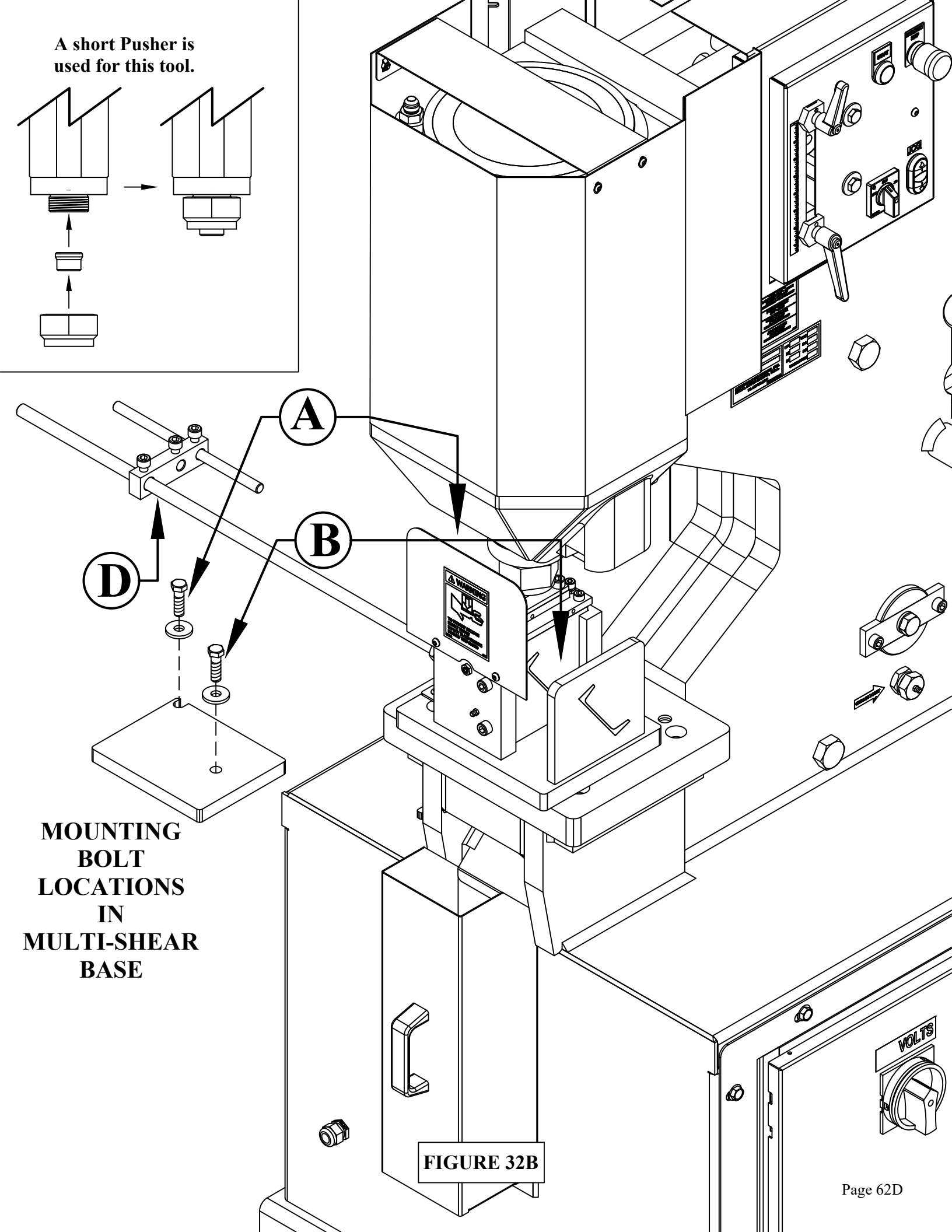
7.9B MULTI-SHEAR TOOL OPERATION

1. **The selector switch must be in the PUNCH 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 (D) screws into the back of the tool, if needed.**
4. **The tool has two (2) grease zerks; one on each side. Grease before using and every two hours after.**
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.**

A short Pusher is used for this tool.



MOUNTING BOLT LOCATIONS IN MULTI-SHEAR BASE

FIGURE 32B

7.10 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).

7.10A WELD COUPON BENDER TOOL INSTALLATION

SEE FIGURE 32C ON THE FOLLOWING PAGE.

The Weld Coupon Bender Tool mounts in the punch station and is held in place with a finger clamp (A) as shown.

1. **Remove the jam nut, punch, die, and die holder. Turn the machine on and put the switch in the PUNCH position and run the punch ram up to its highest setting. Turn off machine.**
2. **Set tool on punch bolster and make sure that the rocker cap (B) is squarely under the punch ram and that the stationary back of the coupon bender will clear the punch ram as it moves down.**
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 (C) is used and the lower line is for when the "U" die (in tool) 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 the lower part of Figure 32C under "Setting the Stroke".**

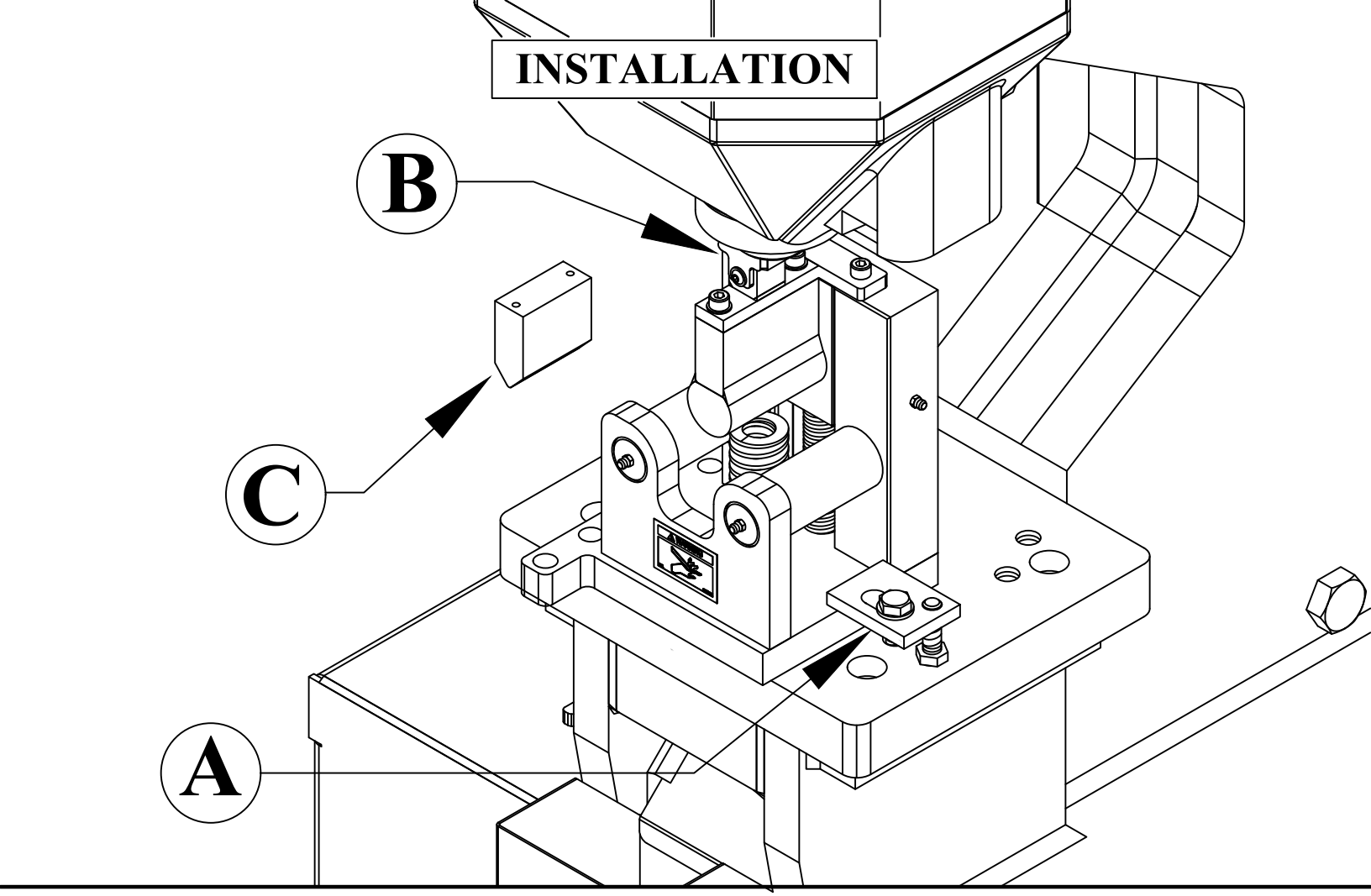
► **NOTE: THE DOWN STROKE MUST BE SET PROPERLY WITH THIS TOOL.**

7.10B WELD COUPON BENDER TOOL OPERATION

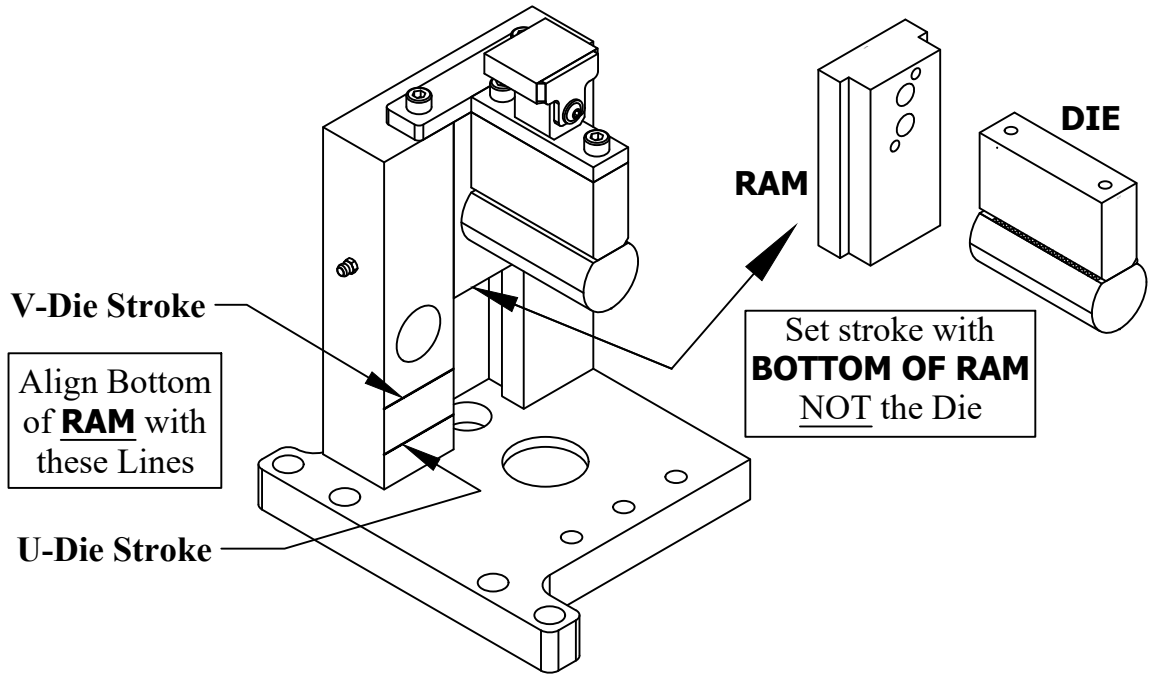
1. **Grease the rocker cap (B) between the upper arm and the tool and again after every two hours of use. Grease the ram, using the two grease zerks on the side.**
2. **Lightly grease the rollers, using the two grease zerks on the front of the weld tester. Make sure that the rollers still turn easily; 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 up the test piece and then, move it forward enough to center it under the die. Make sure that the weld test coupon is square and centered under the die.**
5. **Make sure that the down stroke of the tool is set so that the bottom of the ram - NOT the die - is aligned with the correct scribe line.**
6. **After bending the weld test coupon, let the tool return to the resting position. Remove the test coupon and inspect the weld. 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.**



SETTING THE STROKE



CAUTION: DO NOT STROKE TOOL PAST THE U-DIE STROKE LINE

FIGURE 32C

8.0 TROUBLE SHOOTING GUIDE

8.1 ELECTRICAL TROUBLE SHOOTING - PUNCH STATION

⌦ **CAUTION: ALL ELECTRICAL WORK PERFORMED ON THE DO-8514-20M IRONWORKER SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN.**

A. MOTOR WILL NOT RUN:

1. **Check the PUNCH/JOG and the SHEAR/PROBE selector switches. The machine will not start unless both selector switches ares in the START position.**
2. **Check the disconnect switch. Make sure that it is in the ON position.**
3. **Check the emergency stop 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 the 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 11.0.**
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 PUNCH/JOG selector switch. The machine will not move unless the selector switch is in either the PUNCH or the JOG position.**
2. **Check the PUNCH/JOG switch. The foot pedal will not operate the machine when this switch is in the JOG position. The jog button will not work with it in the PUNCH position.**
3. **Check the motor rotation. It should be counterclockwise when viewed from the shaft end of the motor.**
4. **Check the stroke control adjustment and make sure that only one limit switch is in contact with the actuator boss. If both limit switches are in contact with the switch actuator, the machine will not move.**
5. **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.**
6. **Check the limit switches. (For procedures, REFER TO SECTION 8.3.)**

7. No power from the transformer: Check the voltage across the transformer's secondary terminals. It should read 110 to 120 volts.

8. The solenoid on the control valve is not functioning. REFER TO SECTION 8.5.

9. 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 switch the selector to PUNCH.
Test the voltage between terminal #'s19, 5, 7 and ground. To establish that a supply is present to the foot switch, the voltage should read 110 to 120 volts between terminal 19 and ground.
With the pedal up, the voltage should read 110 to 120 volts between 5 and ground.
There should be no voltage reading between 7 and ground.
With the pedal depressed, the voltage should read 110 to 120 volts between 7 and ground.
There should be no voltage reading between 5 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. 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.

10. 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 the terminal block.

8.2 ELECTRICAL TROUBLE SHOOTING: SHEAR/NOTCH STATION

CAUTION: ALL ELECTRICAL WORK PERFORMED ON THE DO-8514-20M IRONWORKER SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN.

A. MOTOR WILL NOT RUN:

1. **Check the PUNCH/JOG and the 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 button. 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 the 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 FIGURE 4 ON PAGE 15.)**
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/PROBE selector switch. The machine will not move unless the selector switch is in either the SHEAR or the PROBE position. The foot switch will not operate when switched to PROBE. The probe will not operate when switched to SHEAR.**
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 actuator boss. If both limit switches are in contact with the switch actuator, 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 8.3.)**
6. **No power from the transformer: Check the voltage across the transformer's secondary terminals. It should read 110 to 120 volts.**

7. The solenoid on the control valve is not functioning. REFER TO SECTION 8.5.

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 switch the selector to SHEAR.

Test the voltage between terminal #'s 9, 10, 12 and ground. To establish that a supply is present to the foot switch, the voltage should read 110 to 120 volts between terminal 9 and ground.

With the pedal up, the voltage should read 110 to 120 volts between 10 and ground.

There should be no voltage reading between 12 and ground.

With the pedal depressed, the voltage should read 110 to 120 volts between 12 and ground.

There should be no voltage reading between 10 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. 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.

10. 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 the terminal block.

8.3 LIMIT SWITCH INSPECTION PROCEDURE

PUNCH/TOOL STATION:

To determine if the limit switches are functioning properly, move both limit switches out to their farthest position. Place the disconnect switch in the ON position and both selector switches in the START position and power the machine. Select JOG on the selector switch. While holding the jog control, use a pencil or similar device and depress the limit switch that the actuator is traveling towards.

If the machine does not stop, the limit switch or the control valve 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.

The switch should read continuity with the plunger out.

Having checked the limit switch and the machine does not stop when the jog button is released indicates a faulty hydraulic control. REFER TO SECTION 8.5.

8.4 LIMIT SWITCH INSPECTION PROCEDURE

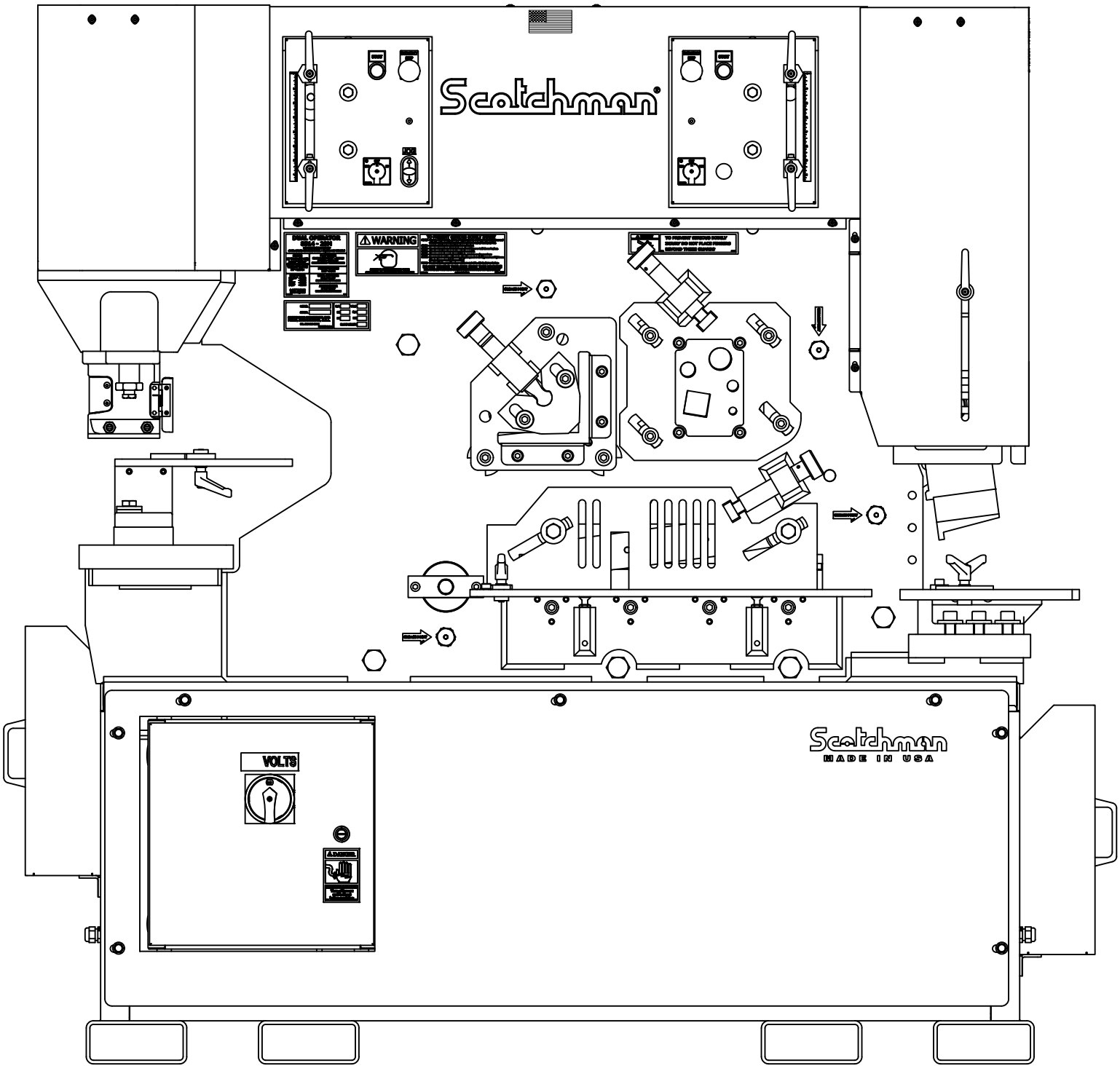
SHEAR/NOTCH STATION:

To determine if the limit switches are functioning properly, move both limit switches out to their farthest position. Place the disconnect switch in the ON position and both selector switches in the START position and power the machine. Select SHEAR on the selector switch. While holding the jog control, use a pencil or similar device and depress the limit switch that the actuator is traveling towards.

If the machine does not stop, the limit switch or the control valve 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.
The switch should only read continuity with the plunger out.

Having checked the limit switch and the machine does not stop its downward travel when the foot switch is released mid stroke or its return travel when the foot switch is depressed mid stroke indicates a faulty hydraulic control valve. REFER TO SECTION 8.5.

DO-8514-20M
IRONWORKER



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8.5 HYDRAULICS

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, 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 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.**

THE MOST COMMON HYDRAULIC PROBLEMS ARE:

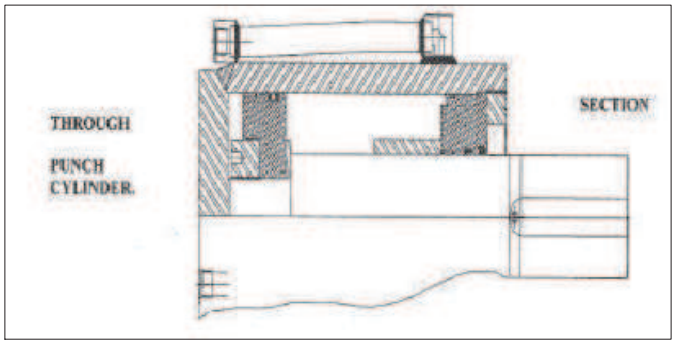
1. **LOW LEVEL OF HYDRAULIC OIL IN THE RESERVOIR: The reservoir holds 18 U.S. Gallons (68 liters). The level should be approximately 1-3/4 inches (45mm) below the top of the reservoir.**

2. **CONTAMINATION IN THE HYDRAULIC OIL: The oil and the filter should be changed at least once a year and any time that there is a possibility that contamination has gained access into the system. For recommended hydraulic oil, SEE SECTION 5.1.**

3. **LOW PRESSURE CAUSED BY WORN OR DAMAGED PARTS IN THE CYLINDER OR PUMP:**

   There is a pressure port for a pressure gauge provided on all machines. The port will be on the manifold. A gauge with a minimum capacity of 4,000 PSI (275 BAR) is required. With the machine.s power off, install the pressure gauge. To set the pressure for the SHEAR/NOTCH station, remove the punch and the punch carrier. Place a piece of steel 4" sq x minimum thickness 3/4" (19mm) on the lower notch blades. Then, place a length of 4" sq timber on top of the steel Plate. Power the machine and select SHEAR on the selector switch. Depress the shear foot switch to lower the notch top plate onto the timber, stalling the shear beam. Hold this position on the foot switch and take the pressure gauge reading. The system pressure of this station should be 3,350 (231 BAR). The pressure is adjustable by adjusting the shear relief valve adjustment on the control valve manifold. If the pressure cannot be increased, call your local dealer or the factory.

8.6 REPLACING THE SEALS IN THE PUNCH CYLINDER



025101
CYLINDER

025099
SEAL KIT

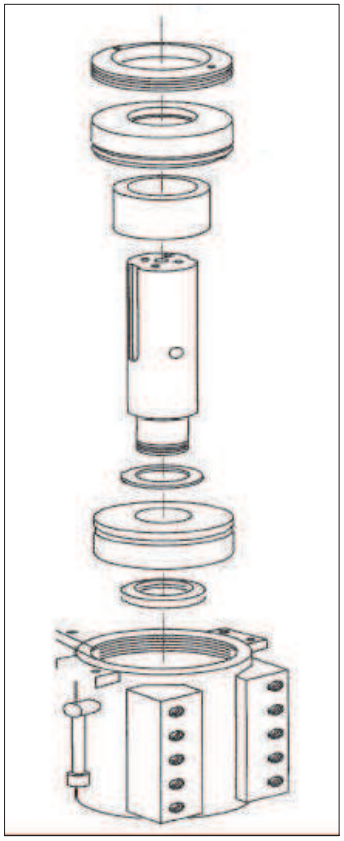


FIGURE 33

FIGURE 34

1. Note the alignment of the two slots and hole in the punch ram in respect to the body of the cylinder. When re-assembling the ram, the slots and hole should be in the same positions to the cylinder axis.

2. After removing the cylinder from the machine, drain the oil from the cylinder.

3. Secure the cylinder to the floor, machine bolster or similar heavy support.

4. The cylinder head is retained in the body of the cylinder by a threaded ring. There are pin holes in the top of the ring for a pin wrench. To remove, rotate the ring counter-clockwise.

5. After the ring has been removed, lift the ram assembly from the body of the cylinder. Before attempting this maneuver, ensure that the cylinder is secured down.

6. Clean all of the parts and inspect the inside of the tube, head, ram and piston for scoring.

7. Dismantle the ram assembly and install the new seals. Lubricate the seals before re-assembling the parts.

8. Replace the piston on the ram and torque the ring to 100 ft. lbs. (135 Nm). To prevent the ring from working loose, rivet the threads on the end of the ram, with a chisel or punch.

9. Lower the ram assembly onto the tube and position the slots in the ram parallel to the securing blocks and tap the assembly into place, using a brass or plastic hammer.

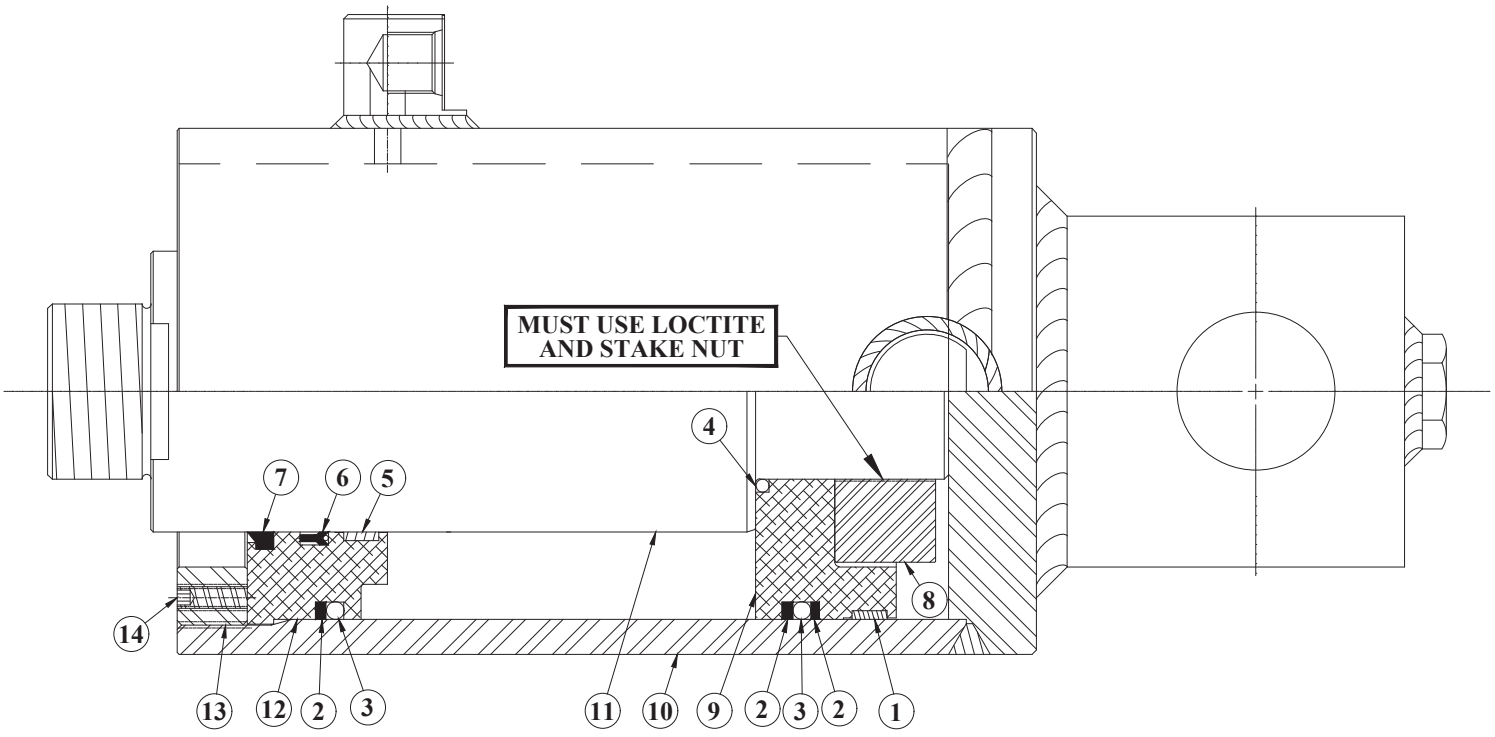
10. Position the stroke spacer and head on the ram and tap into place, using a brass or plastic hammer.

11. Replace the locking ring and tighten it, to secure the head in position.

12. If it is necessary to turn the ram to align the slots, NEVER turn the ram counter-clockwise looking on the end of the ram. (To turn the ram, position two socket cap screws in two opposite holes in the end of the ram. Position a bar between the heads of the screws and lever around.)

8.7 REPLACING THE SEALS IN THE SHEAR CYLINDER:

1. After removing the cylinder from the machine, lay it on its side with the ports down and allow the hydraulic fluid to drain. After the fluid drains, clamp the cylinder in a vise or similar holding device.
2. The cylinder head ring is threaded into the body of the cylinder and retains the cylinder head. There are two holes in the top of the ring for a pin wrench. To remove the ring, turn the pin wrench counter-clockwise.
3. After the retaining ring has been removed, anchor the cylinder to a floor or something secure. Hook a come-a-long to the cylinder clevis and pull the head and ram out of the tube.
4. Clean all parts and inspect the inside of the tube and head for scoring. Also, inspect the ram and head for scoring. Dismantle the ram assembly and remove all of the seals.
5. Install the new seals and lubricate the seals before re-assembling the parts.
6. Replace the piston on the ram and torque the ring to 100 ft. lbs., to prevent the ring from working loose. Rivet the threads on the end of the ram with a chisel or punch.
7. Secure the cylinder in a vise by gripping the lug with the tube upwards.
8. Set the ram assembly onto the tube and tap the assembly down, using a brass or plastic hammer.
9. Position the head on the ram and tap into place using a brass or plastic hammer.
10. Replace the locking ring and tighten it, to secure the head in position.

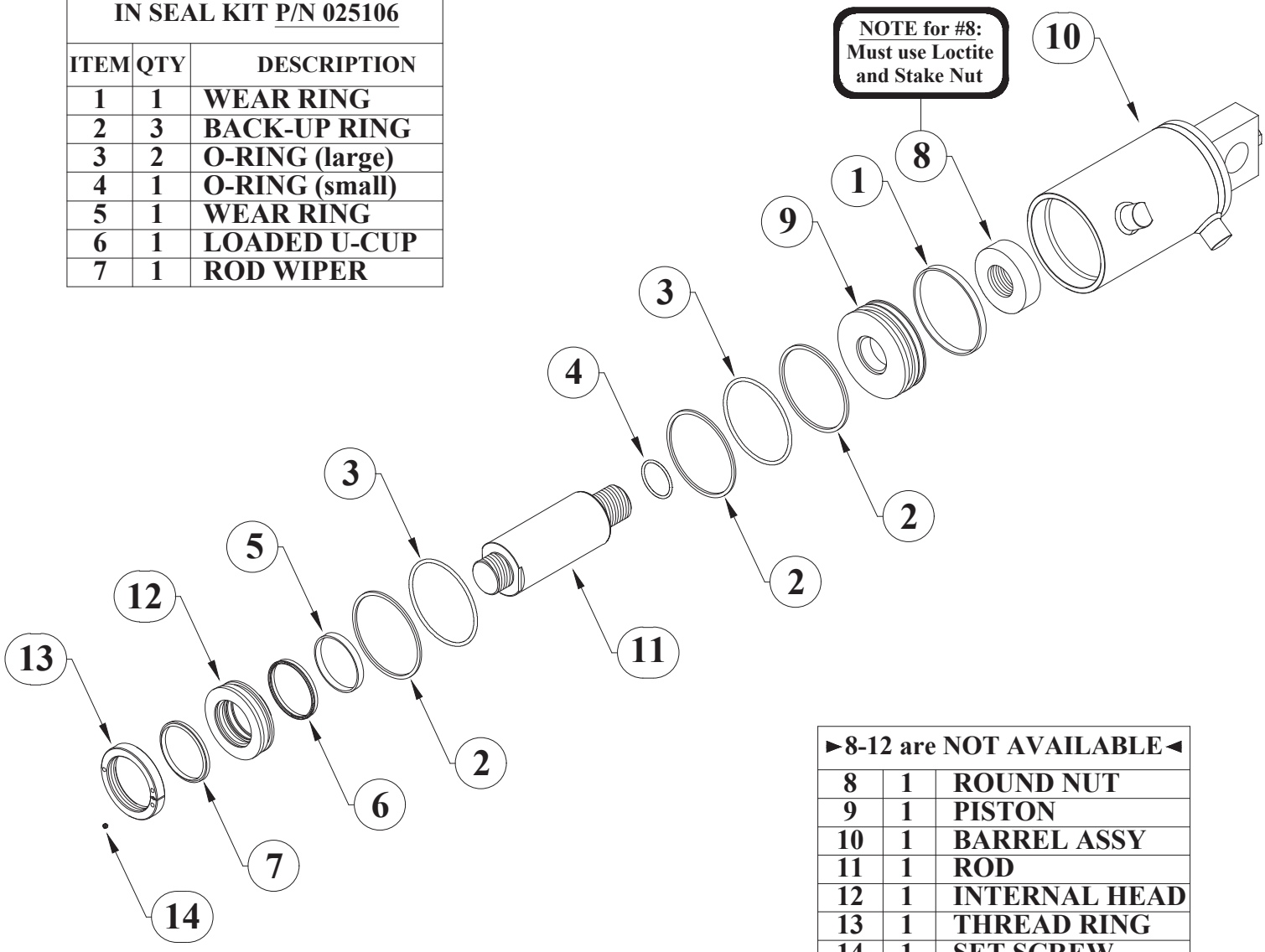


ITEM LIST IS ON THE NEXT PAGE

FIGURE 35

025105 - CYLINDER
025106 - SEAL KIT

ITEM'S 1-7 ARE INCLUDED IN SEAL KIT P/N 025106		
ITEM	QTY	DESCRIPTION
1	1	WEAR RING
2	3	BACK-UP RING
3	2	O-RING (large)
4	1	O-RING (small)
5	1	WEAR RING
6	1	LOADED U-CUP
7	1	ROD WIPER



►8-12 are NOT AVAILABLE◄		
8	1	ROUND NUT
9	1	PISTON
10	1	BARREL ASSY
11	1	ROD
12	1	INTERNAL HEAD
13	1	THREAD RING
14	1	SET SCREW

FIGURE 36

9.0 PARTS LISTS

The Following Sections Contain Ironworker And Tooling Parts Lists And Drawings.

For Your Convenience, Always Give Your Complete Serial Number When Ordering Parts.

9.1 TOOLING ARM ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025129	Shear Beam
2	025074	Main Pivot Bush
3	025328	Clevis Pin Bush
4	025143	Clevis Pin
5	025069	Main Pivot Pin
6	025107	Main Pin Head Lock
7	025134	Pressure Pad
8	025295	Rectangular Notch Carrier
10	025266	Angle Blade (Moving)
11	015114	Angle Blade (Fixed)
12	025284	Section Blade (Fixed)
13	025287	Section Blade (Moving)
14	025122	Section Blade Clamps
15	025260	Shear Blade (Shaped)
16	025257	Shear Blade (Rectangular)
17	025254	Rectangular Notch Top Blade
18	214014	M-12 Washer
20	221005	M-6 x 12 SHCS
21	221210	M-10 x 25 SHCS
22	016630	2-1/4" External Snap Ring
23	221312	M-12 x 30 SHCS
24	221315	M12 X 40 SHCS
25	221327	M-12 x 70 SHCS
26	221835	M-20 x 110 SHCS
28	201610	M-16 x 25 HHCS
29	080174	M-16 Grease Bolt
31	210014	M-12 Jam Nuts
32	219060	M-10 x 50 Skt Set Screw
33	218112	M-12 x 35 Skt Set Screw
34	218350	M-20 x 50 Skt Set Screw
36	210012	M-10 Jam Nut

37	**073210**	**M-20 Jam Nut**
38 & 39	**212016**	**M-16 Lock Washer**

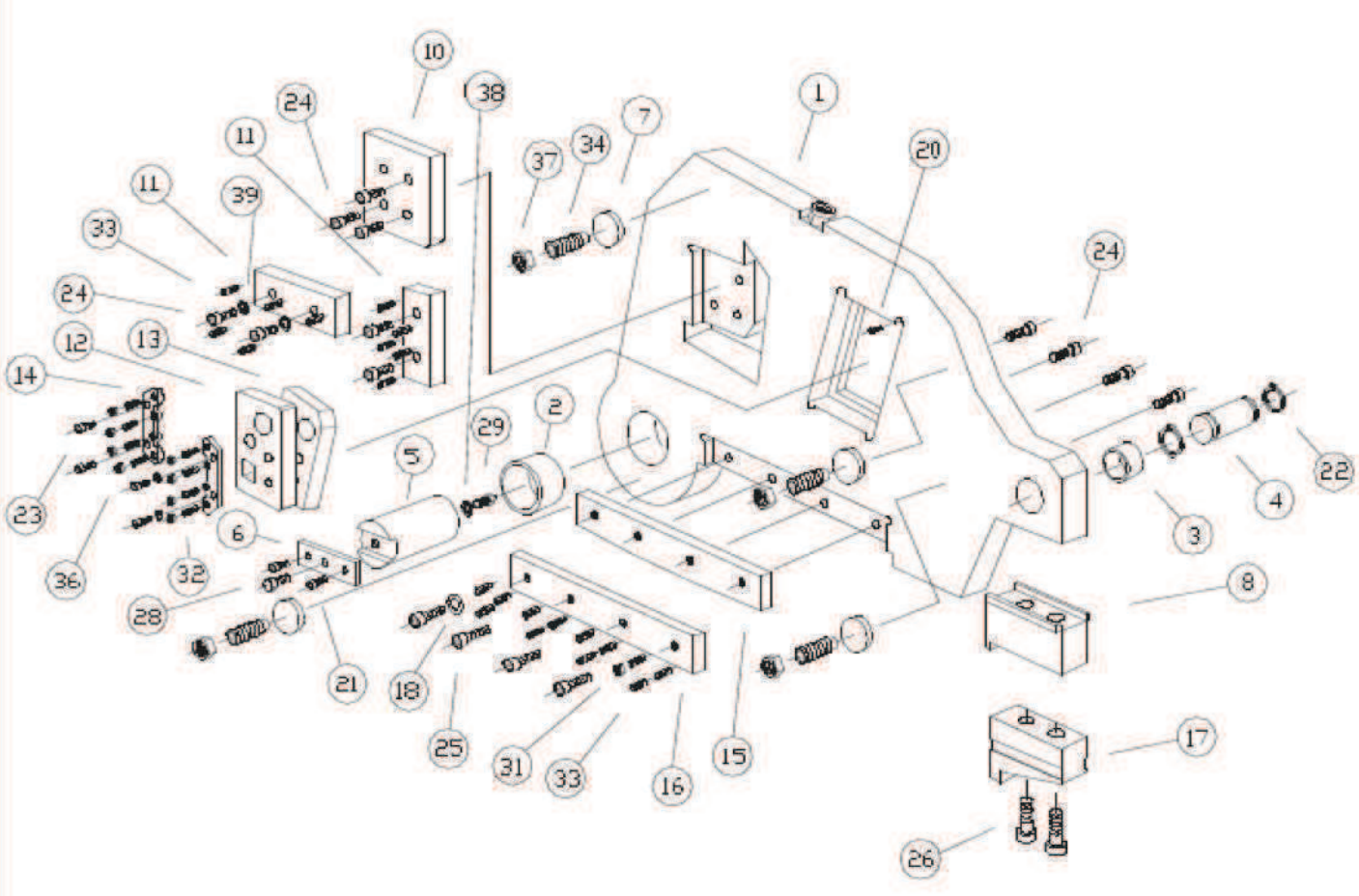


FIGURE 37

9.2 PUNCH ASSEMBLY

ITEM	PART #	DESCRIPTION
1	016095	#40 Punch Retaining Nut
2	006202	#82 Die Insert
3	006013	Die Holder
4	015440	Die Holder Spacer
5	025153	Punch Bolster
6	221417	M-16 x 45 SHCS
7	218058	M-10 x 45 SS
8	201640	M-16 x 90 SHCS
9	113017	Reid Washer
10	204220	M-10 x 30 HHCS
11	026709	Punch Table Assembly (Includes 12, 13, 15 & 16)
12	026697	Back Gauge (Guide)
13	026618	Tee Nut
14	230107	M-10 x 20 FSHCS
15	080063	Handle
16	019305	Scale
17	113016	Washer
18	219060	Hardened Pin

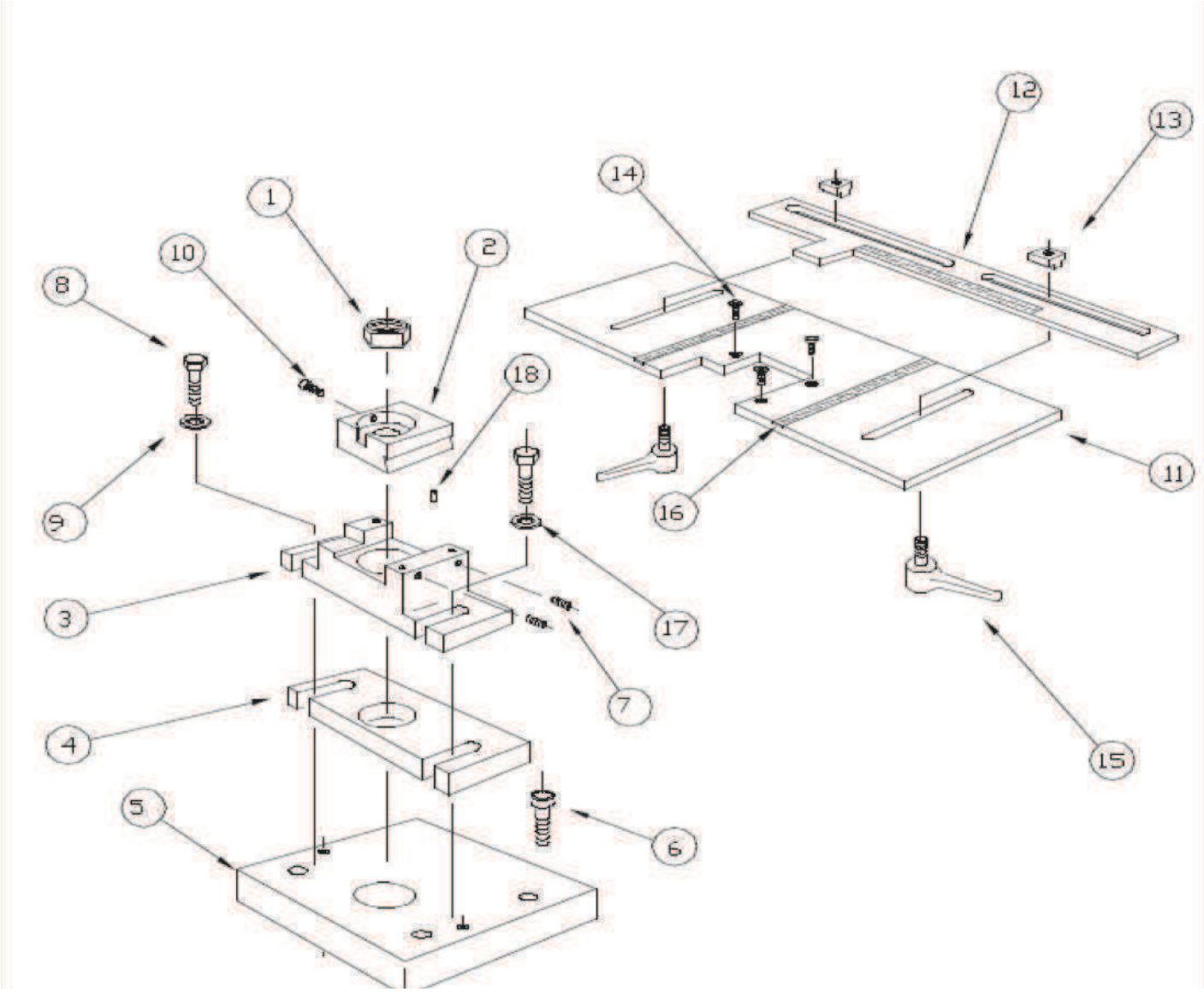


FIGURE 38

9.3 PUNCH CYLINDER RAM ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025100	Punch Cylinder
2	025193	Punch Holder Assembly
3	221220	M-10 x 40 SHCS
4	025008	Ram Guide Casting
5	221120	M-10 x 25 SHCS
6	025146	Ram Guide
7	221312	M-12 x 30 SHCS
8	219050	M-10 x 25 SS
9	025155	Punch Stroke Bracket
10	222080	M-24 x 100 Cap Hd Skt Screw
11	214024	M-24 Washer
12	221310	M-12 x 25 SHCS
13	025187	Metering Boss
14	025186	Metering Boss End
15	004123	Key

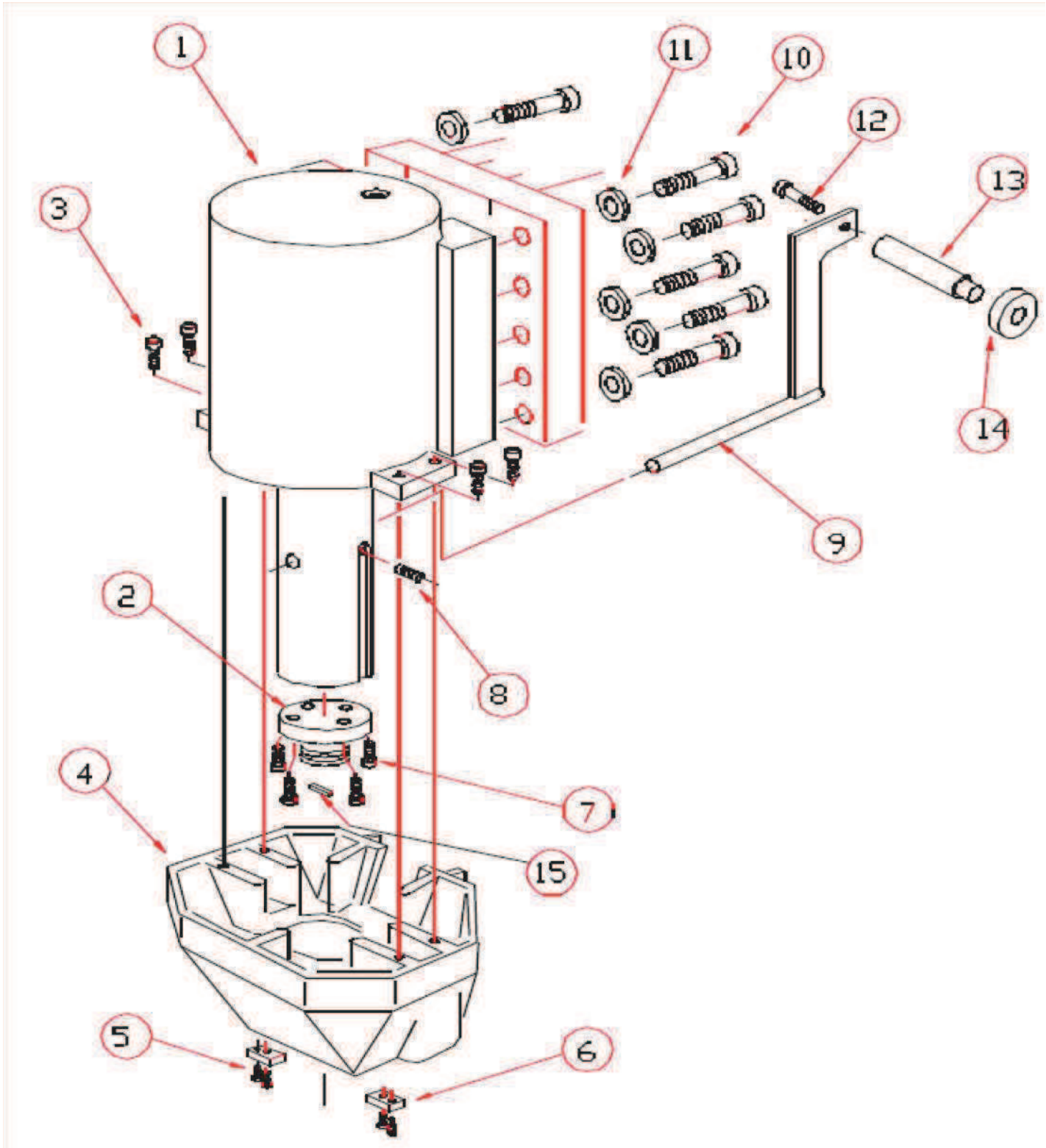


FIGURE 39

9.4 PUNCH STRIPPER ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025012	Stripper
2	007229	Adjustment Screw (Left)
3	007237	Stripper Stud (Left)
4	007240	Spring Retainer
5	007241	Spring
6	007236	Adjustment Screw (Right)
7	007239	Spring Rod
8	025383	Lexan Sight Guard
9	025018	Stripper Insert Plate
10	007244	Stripper Retainer
11	110014	1/2 x 13 Jam (Locking) Nut
12	001541	Ball Spring Screw
13	220014	M-6 x 10 Button Head Socket Screw
14	025733	Lexan Stripper Door Assembly
15	660255	#6 X 3/8 Drive Screw
16	230007	M-6 x 16 SHCS
17	025013	Complete Stripper Assembly (Includes all items on this page.)

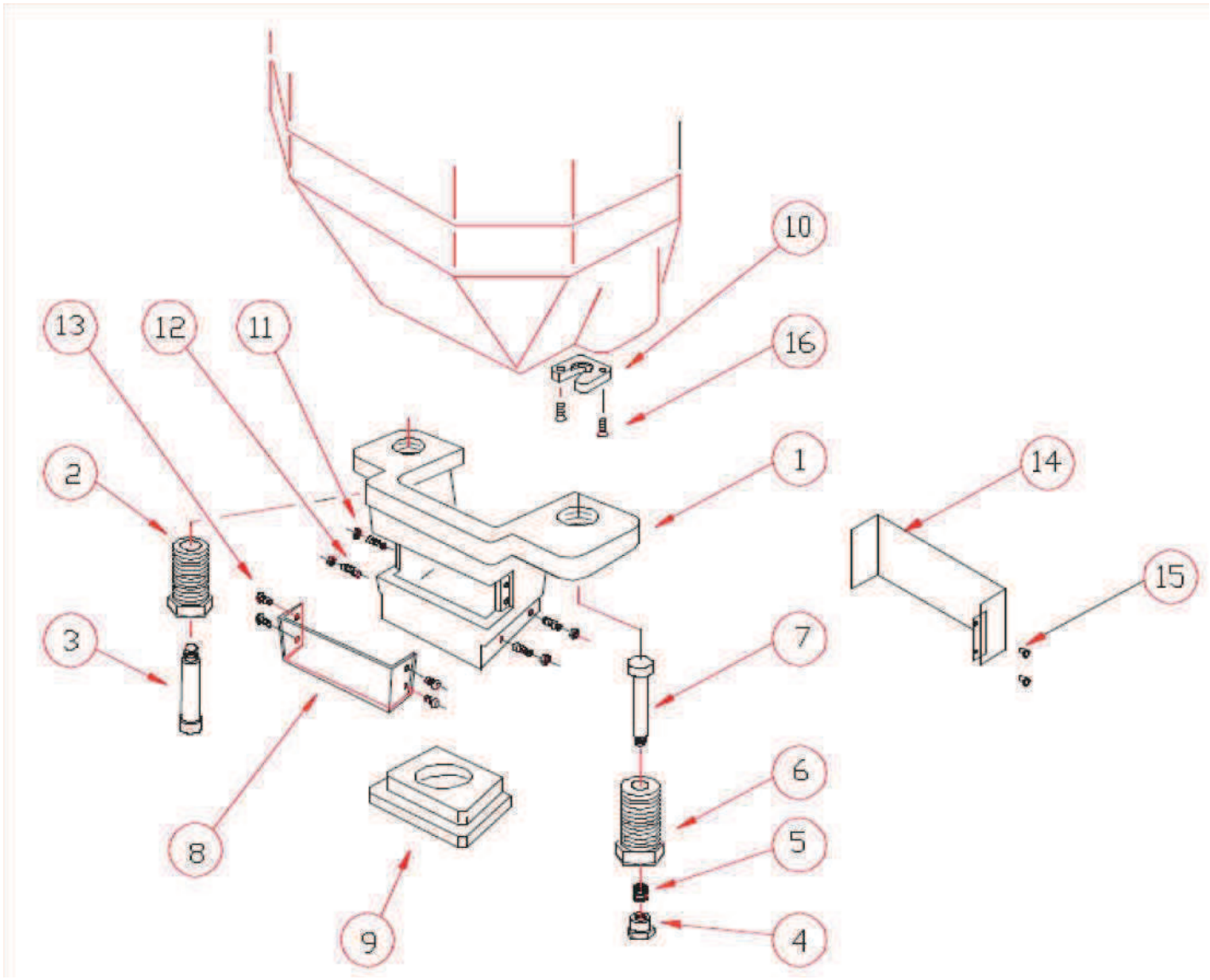


FIGURE 40

9.5 RECTANGULAR NOTCH ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025022	Rectangular Notch Bolster
2	025285	Notcher Table
3	025295	Rectangular Notch Carrier
4	025254	Top Blade
5	221835	M-20 x 110 SHCS
6	221417	M-16 x 40 SHCS
7	026625	M-16 Tee Nut
8	113017	M-16 Hd Die Holder Washer
9	025272	Lower Front Blade
10	025269	Lower Side Blades
11	221315	M-12 x 40 SHCS
12	221314	M-12 x 35 SHCS
13	218035	M-8 x 25 SHCS
14	221210	M-10 x 25 SHCS
15	221210	M-10 x 25 SHCS
16	025067	Back Stop
17	014216	Angle Guide
18	080063	Handles
19	025934	Tee Nut
20	025904	Table Guide

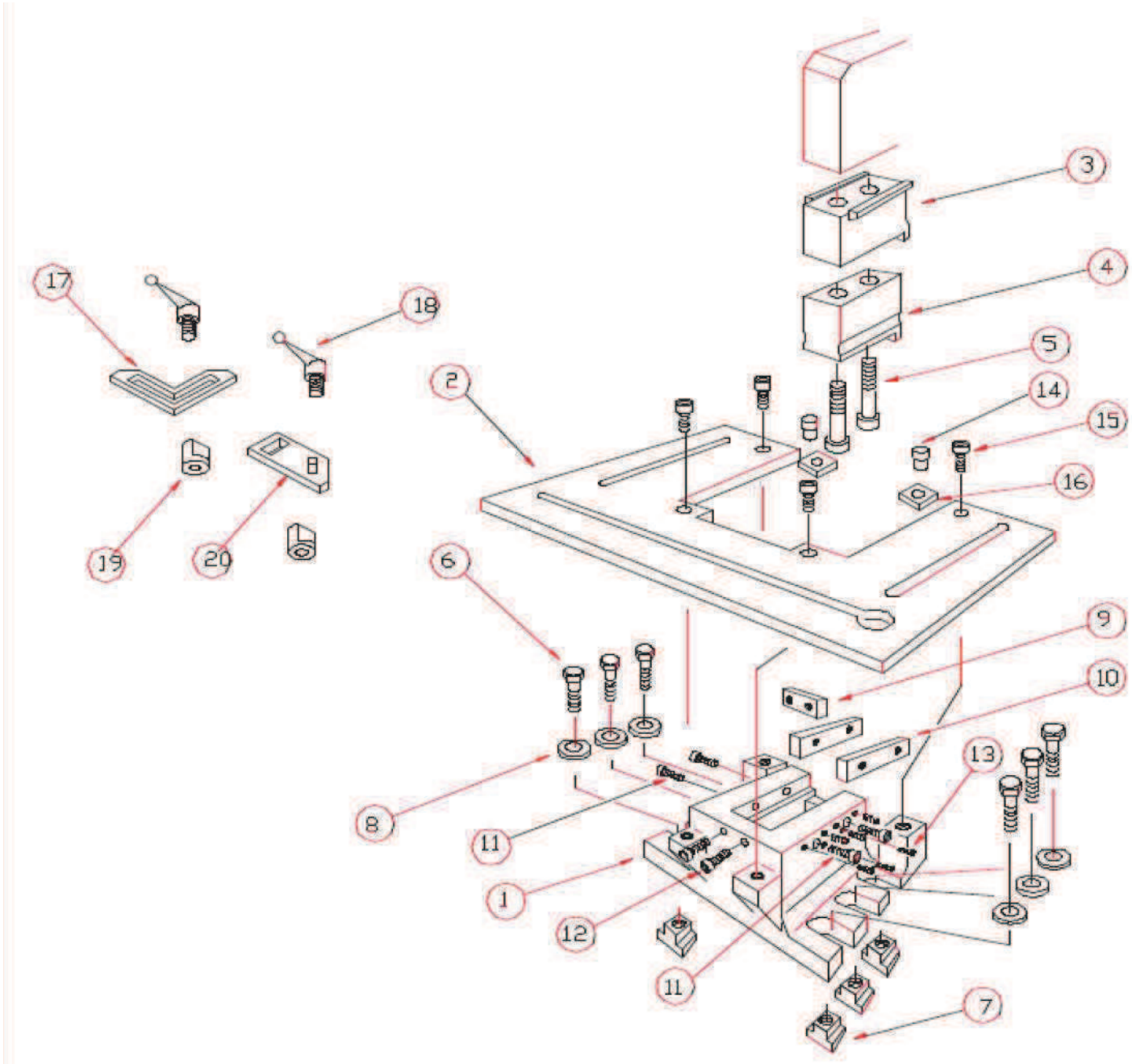
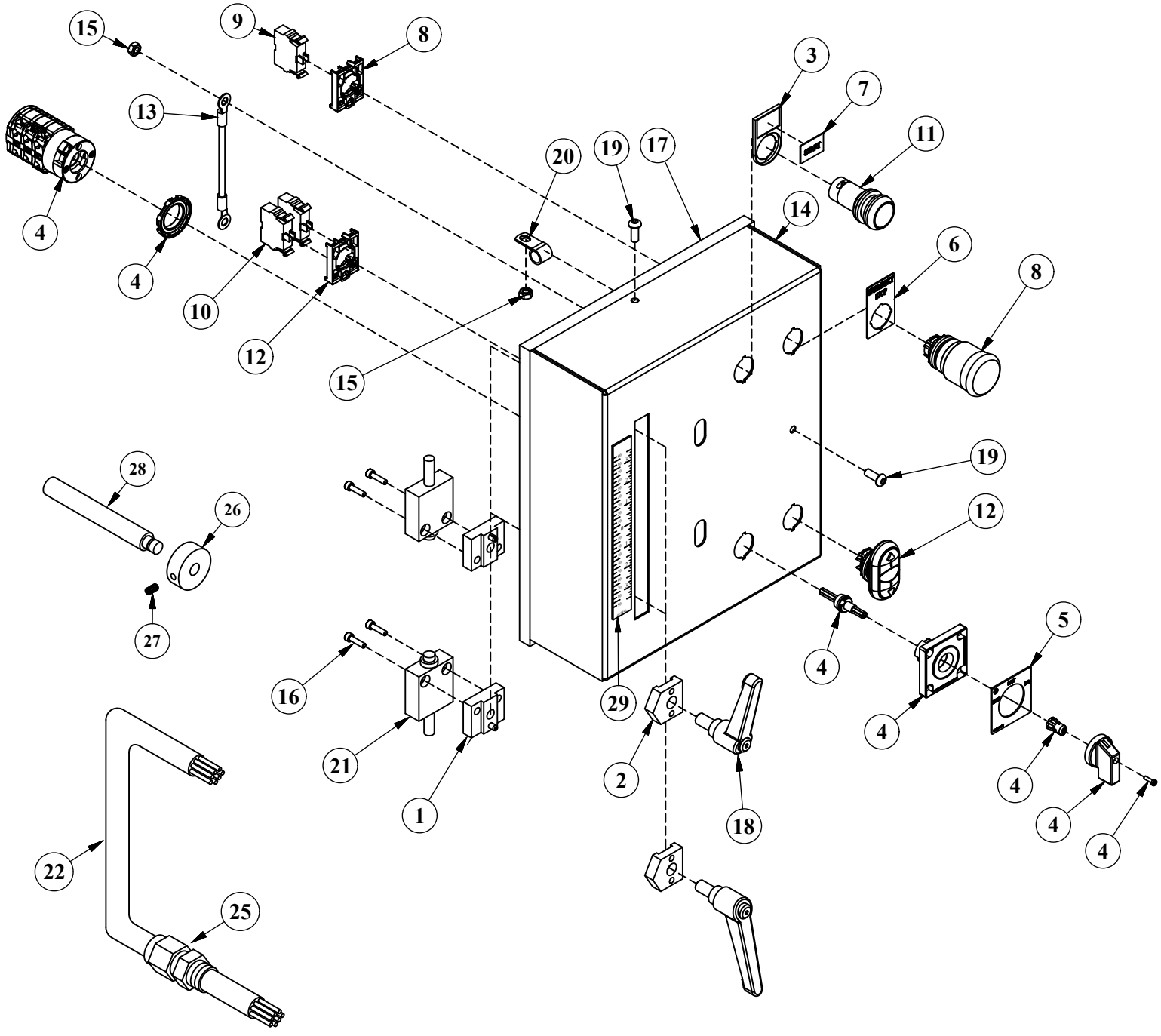


FIGURE 41

9.6 PUNCH STROKE 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	011200	KRAUS & NAIMER CAM SWITCH
5	1	011214	LEGEND PUNCH/START/JOG K&N
6	1	011500	LEGEND STOP
7	1	011509	LEGEND START
8	1	011862	E-STOP OPERATOR PKGD. W/ 11872
9	1	011867	CONTACT M22-K01
10	2	011874	CONTACT ELEMENT
11	1	011879	START BUTTON
12	1	011886	JOG PUSH BUTTON PKGD. W/ 11872
13	1	011912	GROUND WIRE ASS'Y
14	1	025622	STROKE COVER PAINTED
15	2	073206	M6 DIN934 HEX NUT
16	4	073450	M4 X 16MM DIN912 SHCS
17	45	077907	SHROUD EDGE
18	2	080061	STROKE ADJUSTMENT HANDLE
19	2	220020	M6 X 16MM ISO 7380 BHCS
20	1	562040	WIRE CABLE CLAMP
21	2	562112	LIMIT SWITCH MS01S03
22	108	660457	18/12 CABLE(19015)
23	27	660470	16GA BLACK MTW WIRE (not shown)
24	5	660505	BLACK NYLON CABLE TIE (not shown)
25	1	562501	PG16 LIQUID CORD CONN
26	1	025186	METER END
27	1	218023	M6 X 12MM DIN 916 SET SCREW
28	1	025187	METER BOSS PUNCH
29	1	019350	SCALE-LEFT HAND
30	1	025620	PUNCH STROKE FIDO (complete assy)

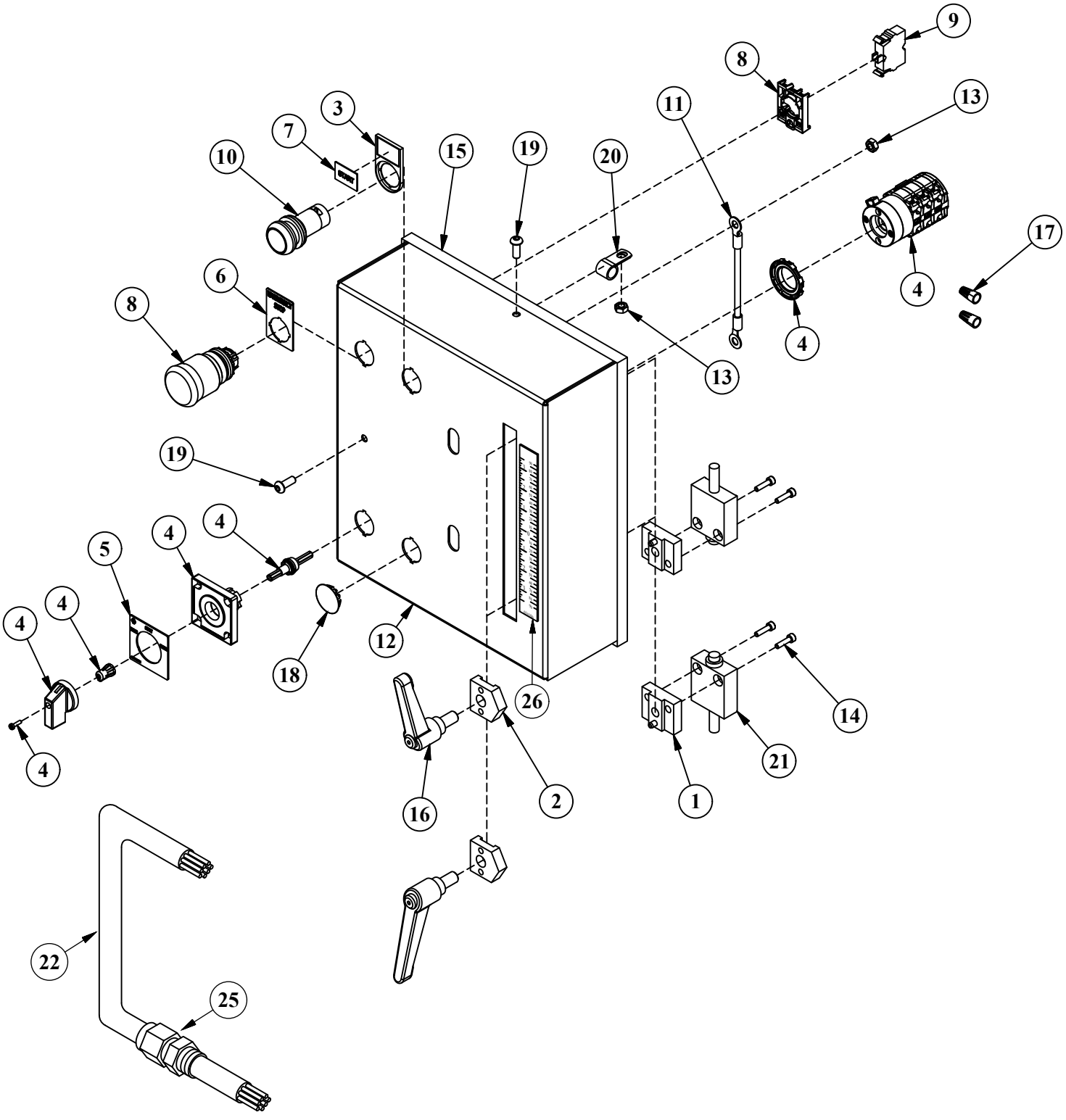


NOTE:
#25 is located in the electrical enclosure in the base.

FIGURE 42

9.7 SHEAR STROKE 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	011200	KRAUS & NAIMER CAM SWITCH
5	1	011215	LEGEND SHEAR/START/PROBE K&N
6	1	011500	LEGEND STOP
7	1	011509	LEGEND START
8	1	011862	E-STOP OPERATOR PKGD. W/ 11872
9	1	011867	CONTACT M22-K01
10	1	011879	START BUTTON
11	1	011912	GROUND WIRE ASS'Y
12	1	025622	STROKE COVER PAINTED
13	2	073206	M6 DIN934 HEX NUT
14	4	073450	M4 X 16MM DIN912 SHCS
15	45	077907	SHROUD EDGE
16	2	080061	STROKE ADJUSTMENT HANDLE
17	2	145005	SMALL BLUE WIRE NUT
18	1	158101	7/8 STEEL HOLE PLUG
19	2	220020	M6 X 16MM ISO 7380 BHCS
20	1	562040	WIRE CABLE CLAMP
21	2	562112	LIMIT SWITCH MS01S03
22	132	660457	18/12 CABLE(19015)
23	19	660470	16GA BLACK MTW WIRE (not shown)
24	5	660505	BLACK NYLON CABLE TIE (not shown)
25	1	562501	PG16 LIQUID CORD CONN
26	1	019300	RIGHT HAND RULE 12"
27	1	025625	SHEAR STROKE FIDO (complete assy)



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

FIGURE 43

9.8 ANGLE SHEAR ASSEMBLY (SER. #.S 1077 & UP)

P A R T S L I S T				P A R T S L I S T			
ITEM	QTY	PART #	DESCRIPTION	ITEM	QTY	PART #	DESCRIPTION
1	1	015273	A.S. Holddown Ass'y (was P/N 025176)	10	4	214012	M10 Regular Washer
2	1	025180	Hold Down Screw	11	2	025183	Stand-Off A.S. Holddown
3	1	025083	Hold Down Knob	12	3	162005	1-1/8 OD x 3/16 ID Reid Washer
5	2	025070	Angle Shear Guide Bracket	13	4	221417	M16 X 45MM DIN912 SHCS
6	1	025181	Angle Shear Slider	14	6	221315	M12 X 40MM DIN912 SHCS
7	4	221210	M10 X 25MM DIN912 SHCS	15	2	221310	M12 X 25MM DIN912 SHCS
8	2	015114	Short Angle Blade	16	1	218022	M6 X 6MM DIN916 Set Screw
9	1	025266	Angle Shear Blade Slide	17	10	218112	M12 X 35MM DIN913 FP Set Screw

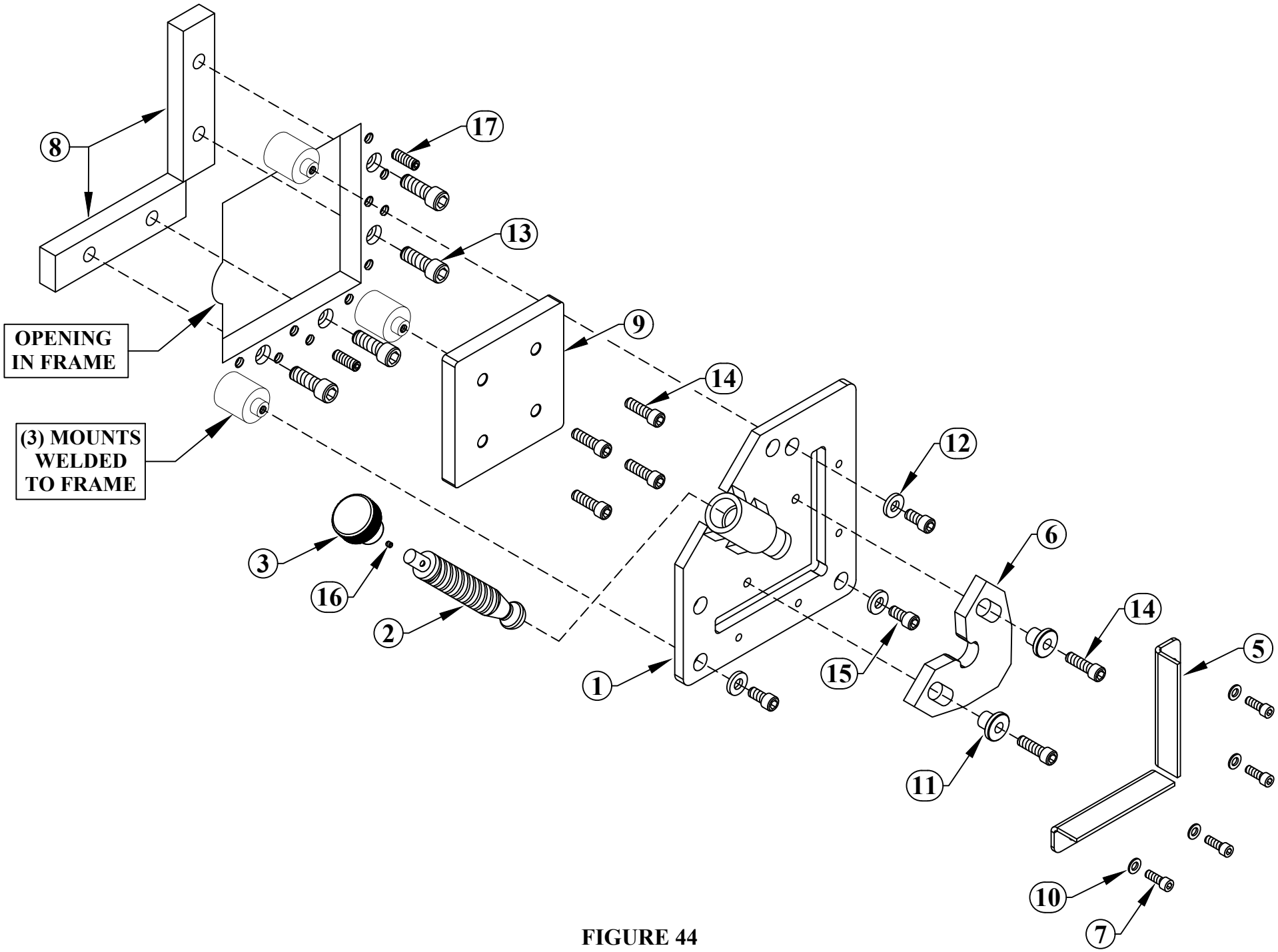

8
17
13
OPENING IN FRAME
9
14
(3) MOUNTS WELDED TO FRAME
12
3
6
16
14
2
5
1
15
11
10
7

FIGURE 44

9.8A OPTIONAL CHANNEL SHEAR BLADES (Installed in the rod shear cavity)

Use the same blade setting procedure for rod shear blades outlined in section 6.3.

ITEM	PART#	DESCRIPTION
1	025087	Hold Down Plate
2		Guide Plate (Comes w/Blade Set)
3	212012	Jam Nut
4	025083	Hold Down Screw
5	025080	End Piece
6	213014	Washer
7	025122	Mounting Plates
8	090407	Knob
9	025420	2" Blade Set
	025425	3" Blade Set
	025430	4" Blade Set
	025435	5" Blade Set
	025440	6" Blade Set
11	218022	M-6 x 6 Set Screw
12	221210	M-10 x 25 SHCS
13	221312	M-10 x 30 SHCS
14	221005	M-6 x 12 SHCS
15	218060	M-10 x 50 Set Screw

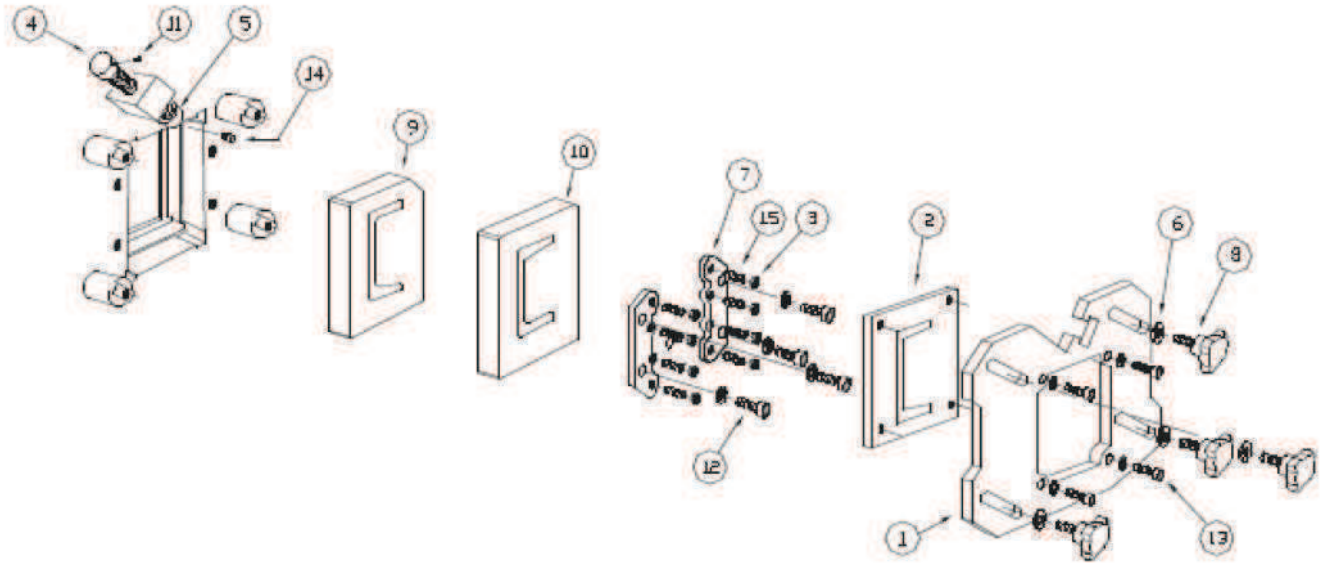


FIGURE 45

9.9 ROD SHEAR ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025087	Hold Down Carrier
2	025090	Hold Down Plate
3	210012	M-10 Jam Nut
4	025083	Screw Knob
5	025080	Carrier Adjuster Screw
6	213014	M-12 Washer
7	025122	Blade Clamps
8	090407	M-12 Star Knob
9	025287	Section Blade (Moving)
10	025284	Section Blade (Fixed)
11	218022	M-6 x 6 Set Screw
12	221312	M-12 x 30 Cap SHCS
13	221210	M-10 x 25 SHCS
14	221005	M-6 x 12 SHCS
15	219060	M-10 x 50 Skt Set Screw

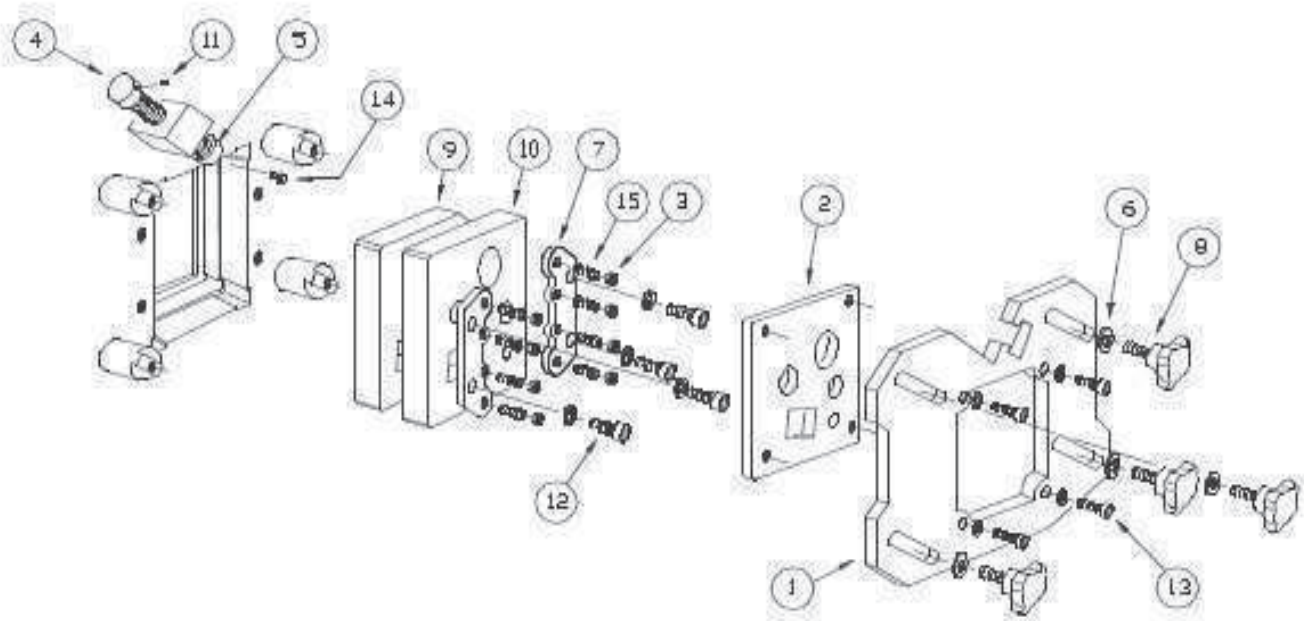


FIGURE 46

9.10 FLAT BAR SHEAR ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025078	Hold Down Plate
2	090409	M16 Star Knob
3	113017	M16 Hd Plain Washer
4	025164	Table Support Angle
5	208014	M12 Nut
6	221310	M12 x 25 SHCS
7	214014	M12 Plain Washer
8	218122	M12 x 60 Skt Set Screw
8A	210014	M12 Jam Nut For #20
9	221327	M12 x 70 SHCS
10	025083	Adjuster Knob
11	025080	Adjuster Screw
12	218022	M6 x 6 Skt Set Screw
13	025257	Bottom Rect. Blade
14	221315	M12 x 40 SHCS
15	025260	Top Shaped Blade
16	025261	Shear Table Complete (Ser. #S 1087M06 & Prior)
16A	080435	Shear Table Complete (Ser.#s 1088M0607 & Up)
17	218110	M12 x 25 Skt Set Screw
18	221310	M12 x 25 SHCS
19	080063	Handles
20	025705	Guide
21	026618	Tee Nuts

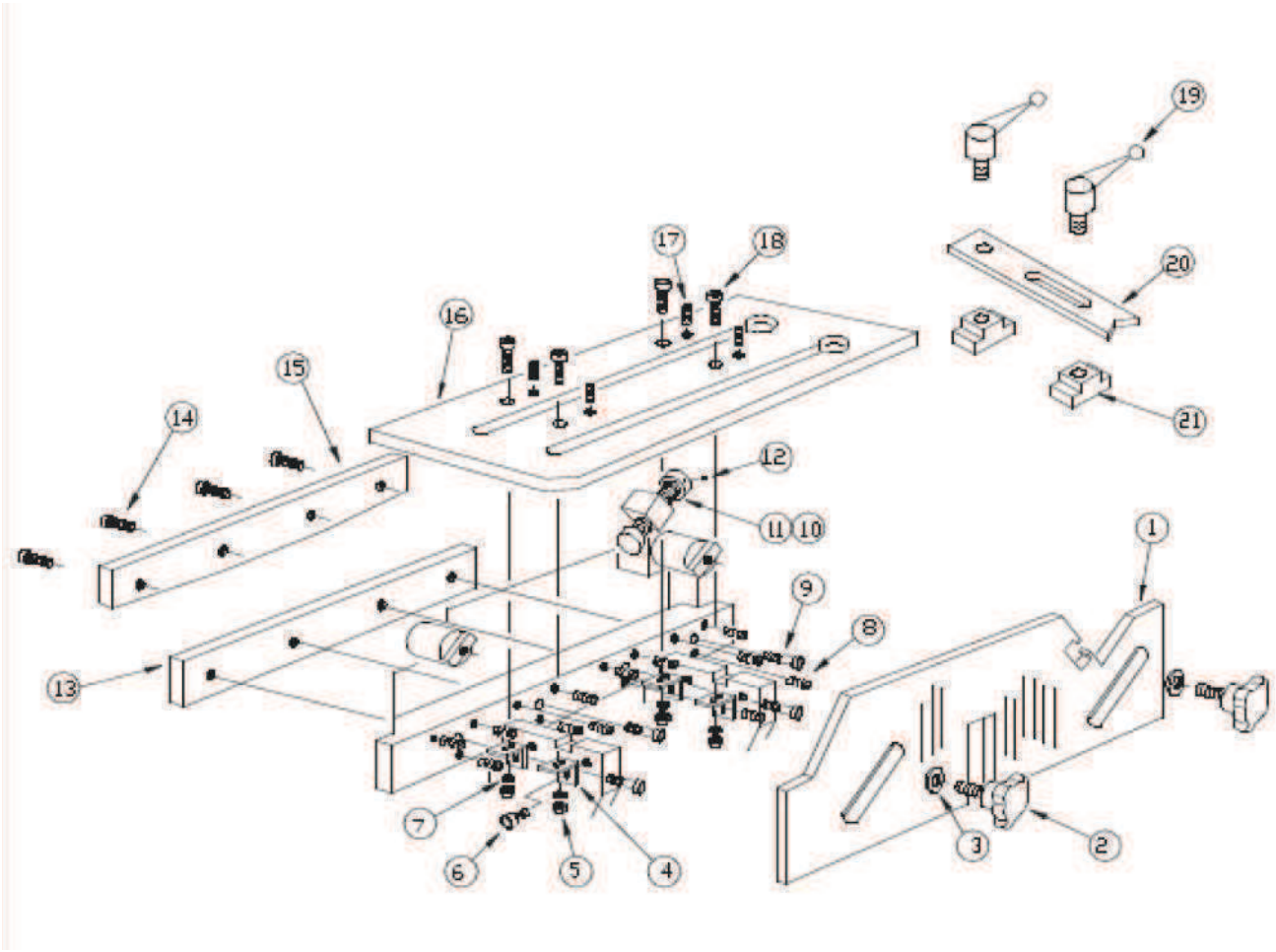


FIGURE 47

9.11 MACHINE COVERS AND GUARDS

ITEM	PART #	DESCRIPTION
1	025387	Punch Cylinder Cover - Sales
2	025396	Punch Top Cover - Painted
3	080061	Knob
4	213012	Washer
5	025388	Top Front Cover - Painted
7	025274	Shear Cylinder Cover
8	025277	Notch Guard
9	025397	Notcher Top Cover - Painted
10	025292	Rear Top Cover - Painted
12	025380	Hose Shroud
13	025402	Rod Shear Cover
14	025406	Angle Shear Cover
15	025409	Shear Cover
17	025351	Rear Cover Louvre - Painted
18	025596	Front Cover Louvre - Painted
19	025598	Front Panel - Painted
20	025605	M-30 Lifting Eye (Optional)
21	220016	M-6 x 10 Button Hd Skt Screws (Not Pictured)
22	025240	Bucket Assembly

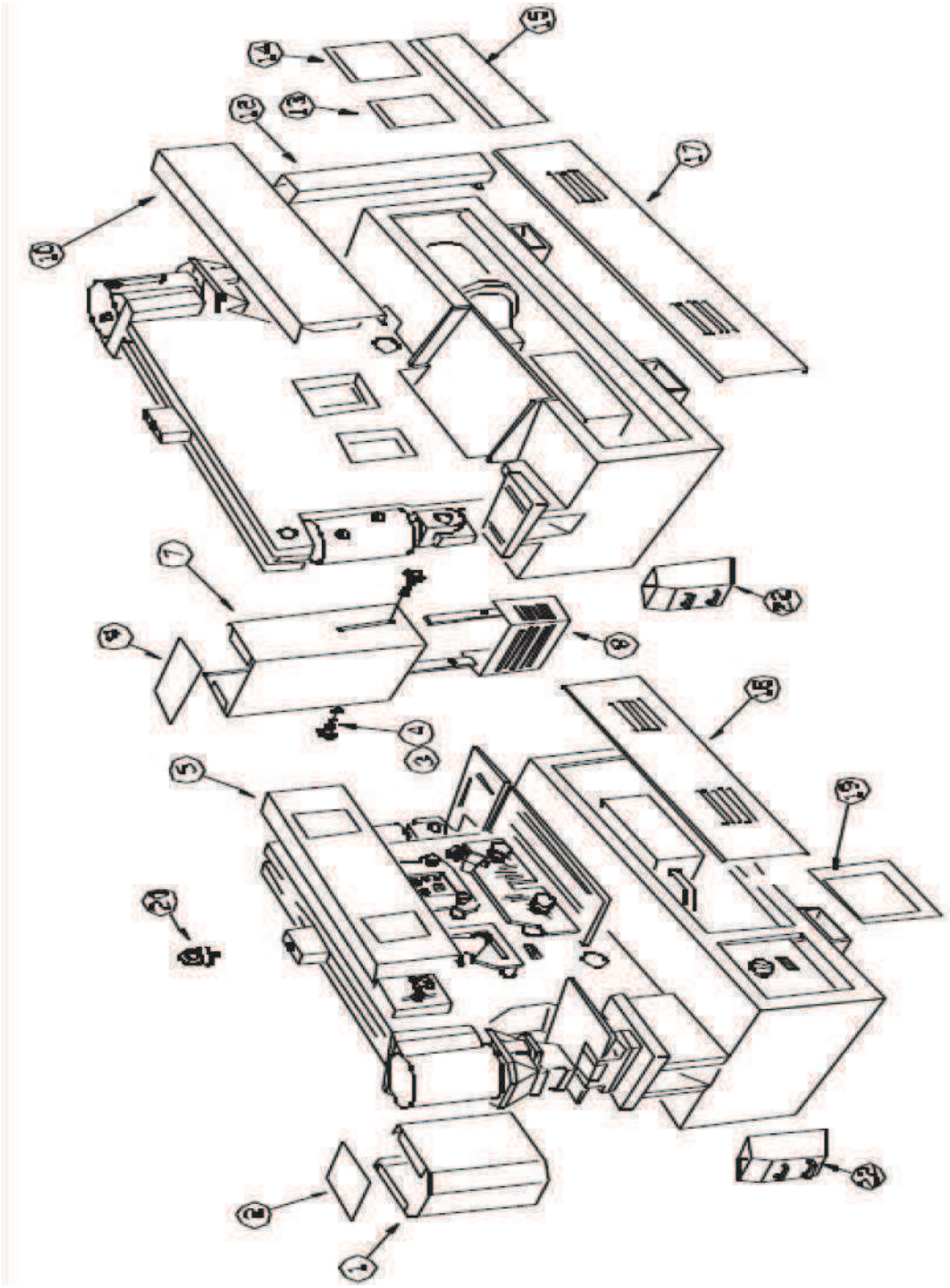


FIGURE 48

9.12 HYDRAULIC POWER UNIT

ITEM	PART #	DESCRIPTION
1	025100	Punch Cylinder
2	025105	Shear Cylinder
3	025071	Cylinder Pin
4	016630	2-1/4" External Snap Ring
5	025143	Clevis Pin
7	025173	Clevis
8	N/A	Manifold Assembly
9	013410	Direction Control Valve
10	006630	Filter
11	016088	Filler Cap
12	013404	Oil Reservoir (S/N 1232 and prior)
12A	025500	Oil Reservoir (S/N 1233 and after)
13	SEE BELOW	Motor Assembly
	013501	Ass'y 1PH Motor 10HP 230V 60HZ
	013508	Ass'y Motor 10HP 208/230V
	013509	Ass'y Motor 10HP 460V
14	013415	Pump
15	025610	Pressure Hose
16	025612	Pressure Hose
17	025614	Pressure Hose
19	025616	Pressure Hose
20	013407	Pressure Hose (Long)
21	013405	Pressure Hose (Short)
22	013425	Tank Return Hose
23	013420	Pump Suction Hose (S/N 1232 and prior)
23A	025498	Pump Suction Hose (S/N 1233 and after)
23B	013390	Ball Valve Kit (S/N 1232 and prior)
23C	013419	1.5" Ball Valve (S/N 1233 and after)
23D	013423	Hex Nipple (S/N 1233 and after)
23E	013436	Hose Barb (S/N 1233 and after)
23F	013444	Street Elbow(S/N 1233 and after)
24	033160	Hose Clip
25	224205	M-10 x 16 WLCS For #24
26	013400	Suction Screen Not Pictured
27	025540	Relief Cartridge - Shear Not Pictured (S/N 1233 and prior)
27A	025550	Relief Cartridge - Punch Not Pictured (S/N 1233 and prior)
27B	025535	Relief Cartridge Not Pictured (S/N 1234 and after)
30	025099	Punch Cylinder Seal Kit
31	025105	Shear Cylinder Seal Kit
32	006950	Power Unit (S/N 1233 and prior)
32A	006690	Power Unit (S/N 1234 and after)

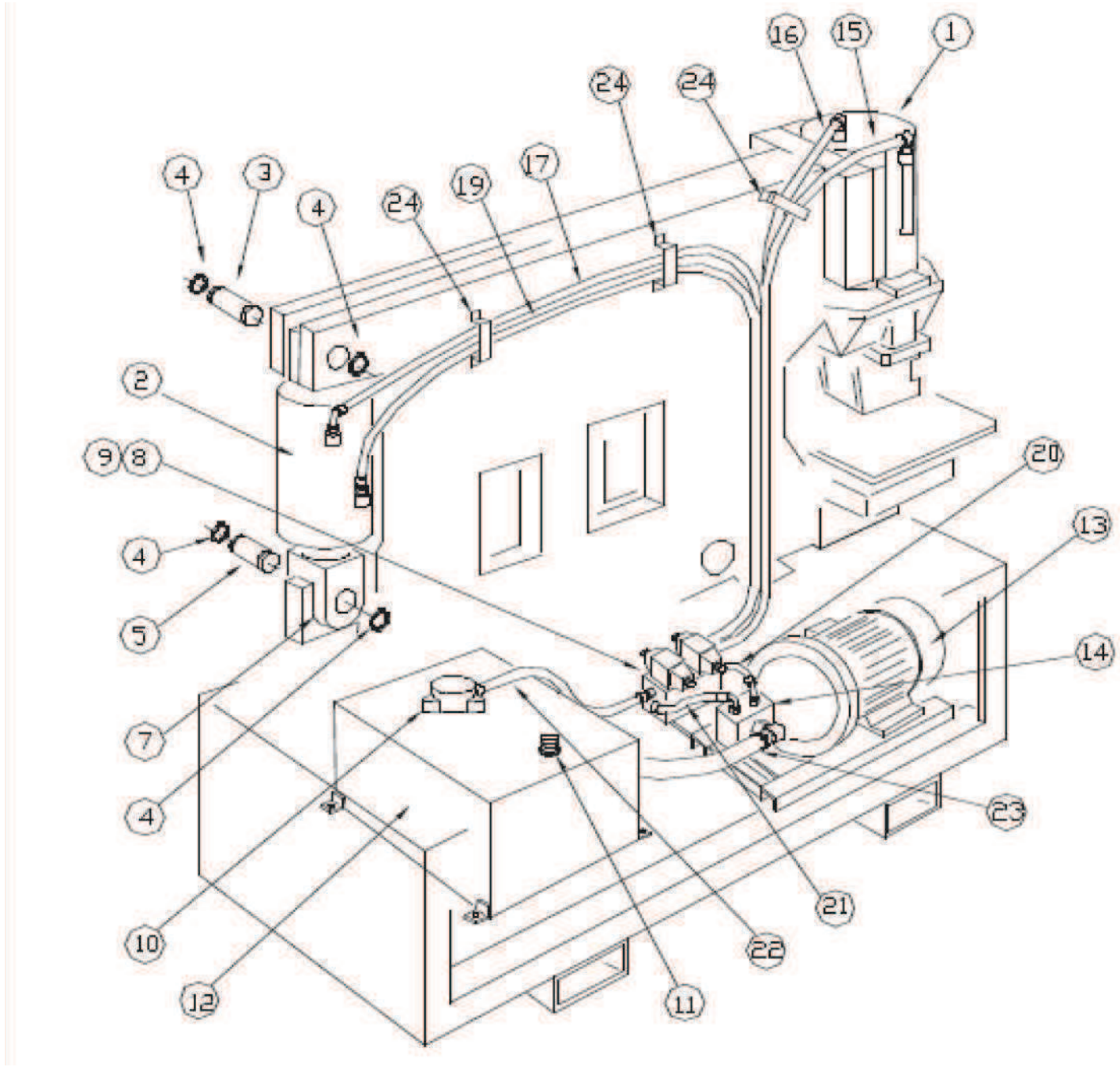


FIGURE 49

9.13 ELECTRICAL UNIT

P A R T S L I S T		
ITEM	**PART #**	**DESCRIPTION**
1	**011879**	**Start Switch Assembly**
	011869	**Start Switch Actuator (N/A replaced by above)**
2	**011837**	**E-Stop Switch Assembly**
	011862	**Stop Switch Assembly**
3	**011884**	**Jog Control**
3A	**011886**	**Jog Buttons**
4	**011200**	**Krause & Naimer Cam Switch**
5	**011873**	**Start Lamp (obsolete)**
6	**011861**	**Transformer**
7	**011835**	**Secondary Fuse 2A**
8	**011933**	**Primary Fuse 1-1/2A**
9	**011976**	**Contactor (3 PH)**
9A	**011977**	**Contactor (1 PH)**
10	**013221**	**Overload 230V 3PH**
10A	**011997**	**Overload 230V 1PH**
10B	**013217**	**Overload 460V 3PH**
14	**550065**	**Control Relay**
15	**011856**	**Disconnect Switch**
	011857	**Disconnect Switch Actuator**
16	**562453**	**Shear Foot Pedal**
	562453	**Punch Foot Pedal**
17*	**562451**	**Microswitch For SSC Foot Pedal (not shown)**
	562452	**Microswitch For Linemaster Foot Pedal (not shown)**

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

Punch Stroke Control **Shear Stroke Control**

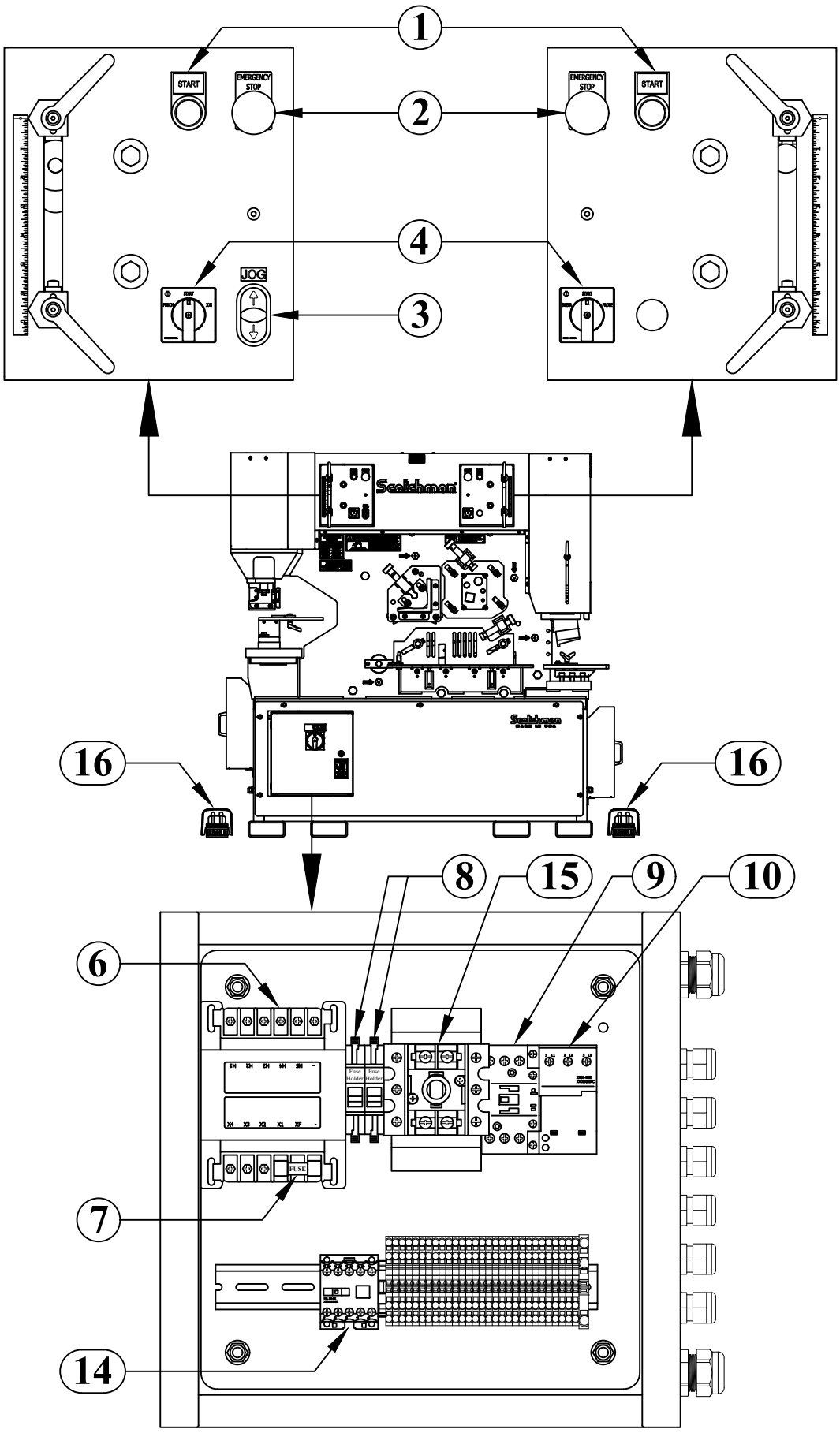


FIGURE 50

9.14 SHEAR STROKE ACTUATOR ASSEMBLY

ITEM	PART #	DESCRIPTION
1	025356	Shear Stroke Bar
2	025189	Shear Boss
2A	025188	Bushing For #2
3	221210	M-10 x 25 Cap Hd Skt Screw
4	221005	M-6 x 12 Cap Hd Skt Screw
5	025368	Slide Block Guide
6	208012	M-10 Hex Nut
7	201210	M-10 x 20 Hex Head Screw

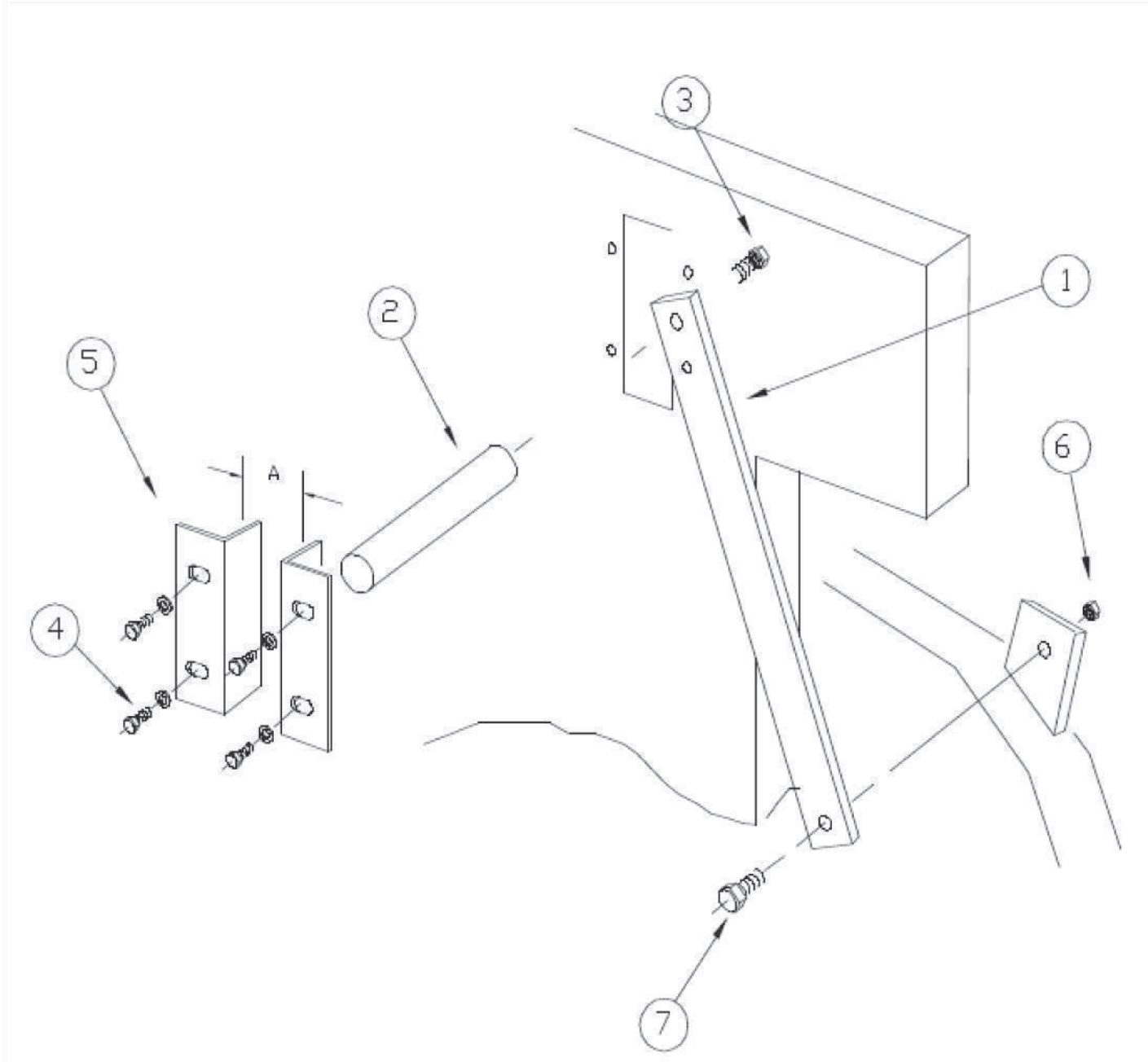


FIGURE 51

10.0 OPTIONAL EQUIPMENT AND TOOLING

This section of the manual contains details of a selection of optional tooling available for use on the D.O.8514-20M Ironworker. Much of this tooling is readily available and underlines the truly universal aspects of the machine. Check with Scotchman or your machine supplier for a more comprehensive list of tooling. For those special applications, Scotchman offers an excellent special tooling design and manufacturing service. Combining tooling tailor-made to your requirements will fully utilize your ironworker and maximize productivity. Check with Scotchman or your machine supplier for further details.

10.1 BRAKE (NOTCH STATION)

Capacity 6" x 1/2" (152mm x 12mm) mild steel. Max tensile strength 65,000psi. Because of the restricted width of the vee in the bottom tool, when bending material 1/2" (12mm) thick, some cracking of material may be experienced. With many grades of mild steel bar, this will not occur. However, to overcome this problem, a suitably designed bar bender with a wider vee should be used at the punch station. Contact Scotchman or your machine supplier for details of this alternative bar bending arrangement.

BAR BEND ASSEMBLY

(Refer to Figure 52 on page 105.)

- ☑ **Position the Shear Beam at the top of its stroke, with the top limit switch set at the top of its slot.**
- ☑ **Turn the machine OFF and lift the notcher guard to its top position and secure it in place.**
  Dismantle the notcher tooling secured to the machine.
  Clean the notcher bolster and the shear beam and secure the top tool carrier (item 1) to the shear beam. Loosely assemble the two side plates (item 2) to the carrier.
  Position the top tool (item 4) between the side plates. Slide the pin (item 3) through both side plates and the top tool.
- ☑ **Tighten both side plates to the carrier and secure the two pin retaining screws and washers (items 10 and 14) in both side plates. Check that the top tool is not locked and can rock freely.**
- ☑ **Position the bottom plate (item 6) on the notch bolster and locate the bottom tool (item 5) in its seating. (The bottom tool is not secured to the bottom plate.)**
- ☑ **Power the machine, switch to shear and carefully lower the top tool until the top tool is clear of the bottom of the vee in the bottom tool by about 1/4". Holding the top tool in this position on the foot switch, switch the machine OFF.**
- ☑ **Align the vee in both tools, with the top vee tool flush at the rear of the vee on the bottom tool.**
- ☑ **Secure the bottom plate (item 6) to the bolster.**
- ☑ **Power the machine, switch to shear and set the stroke, as detailed in the following paragraphs.**

➲ **CARE MUST BE TAKEN AS THE TOP TOOL WILL RETRACT AUTOMATICALLY.**

STROKE SETTING

This tool is designed for air bending, only, and at no time should the top tool bottom on the material and bottom tool. Failure to observe this will probably damage the tooling. Care must be taken to avoid this during tool setting and once set, a correctly set bottom stroke control will avoid this eventuality during bending operations.

- ☑ **Place a piece of material, the same thickness that you require to bend, on to the bottom tool.**
- ☑ **Carefully lower the top tool until the material is bent to the desired angle. While holding the top tool in this position on the foot pedal, switch off the machine. NEVER ALLOW THE TOP TOOL TO BOTTOM OUT ON THE MATERIAL AND BOTTOM TOOL.**
- ☑ **Adjust the bottom limit switch upwards until a positive click is heard and the switch is in contact with the actuator.**
- ☑ **Power the machine and switch the selector switch to SHEAR. CARE MUST BE TAKEN AS THE TOP TOOL WILL RETRACT AUTOMATICALLY.**
- ☑ **Lower the top tool to approximately 1/8" (3mm) above the thickness of material to be bent. While holding the top tool in this position on the foot pedal, switch off the machine.**
- ☑ **Adjust the top limit switch downwards until a positive click is heard and the switch is in contact with the actuator.**
- ☑ **Do not lower the notch guard as this will interfere with the material during bending. Restart the machine to commence bending.**
- ☑ **Check that the tooling is correctly fitted and that the top tool can rock freely.**
- ☑ **Ensure that the top and bottom stroke limit switches are correctly set, to avoid possible damage to the tooling or injury to the operator.**
- ⌦ **NEVER TRY TO BEND MATERIAL, GUESSING THE LENGTH OF DOWN STROKE.**
- ☑ **Always set the top of the stroke 1/8" (3mm) above the unbent material thickness.**
- ☑ **A good tip is to bend a selection of thicknesses to the required angle. Retain them and use them as gauges for future stroke setting.**
- ☑ **Keep fingers away from the tool during operation.**
- ☑ **Use a brush or air line to clean away build-up of mill scale. Do not use fingers.**

10.1 BRAKE (NOTCH STATION) CON'T.

ITEM	PART #	DESCRIPTION
1	025466	Top Tool Carrier
2	025469	Top Tool Side Plates
3	025410	Top Tool Pin
4	025472	Upper Die
5	025457	Lower Die
6	025460	Bottom Tool Holder
7	026625	M-16 Tee Nuts
8	221815	M-20 x 45 SHCS
9	221210	M-10 x 25 SHCS
10	073660	M-8 x 12 SHCS
11	203620	M-16 x 50 HHCS
12	113017	16mm Hd Plain Washer
13	214012	10mm Plain Washer
14	214011	8mm Plain Washer
16	025360	Complete Tool

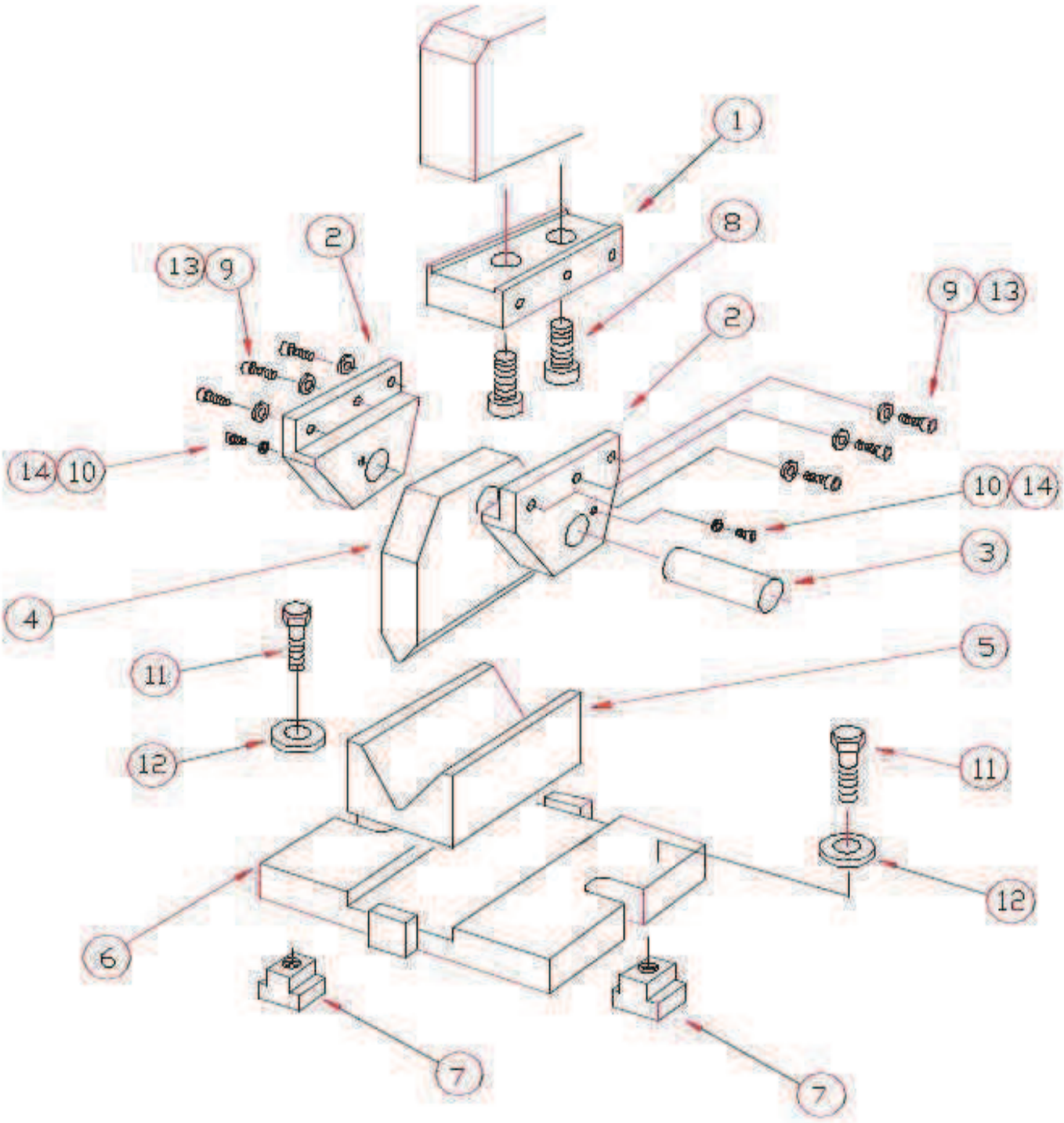


FIGURE 52

10.2 ALTERNATE PUNCH (NOTCH STATION)

Capacity 50 tons. Maximum thickness 3/4" (19mm) mild steel. Max tensile strength 65,000 psi. Notch Station punching is an extremely useful feature of the machine. When the punch station is being used exclusively for other purposes or high volume production, it enables the continued use of the machine with a secondary punch station. All safety and setting procedures are similar to the punch station procedures and must be followed at all times.

HOLE PUNCH ASSEMBLY

(Refer to FIGURE 53 on Page 109.)

- ☑ **Position the Shear Beam at the top of its stroke, with the top limit switch set at the top of its slot.**
- ☑ **Turn the machine OFF and lift the notcher guard to its top position and secure it in place.**
- ☑ **Dismantle the notcher tooling secured to the machine.**
- ☑ **Clean the notcher bolster and the tool seating on the shear beam and secure the punch adapter (13) to the shear beam. Secure the punch holder (12) to the carrier.**
  Refer to FIGURE 53.
- ☑ **Loosely position the die holder (14) on the notch bolster.**
- ☑ **Assemble the stripper arrangement to the machine, as outlined in FIGURE 54 and fully open the stripper (1).**

ALIGNMENT AND REMOVAL OF 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 VIDEOS AT SCOTCHMAN.COM FOR A VISUAL REFERENCE. YOU CAN USE THE CAMERA ON YOUR SMART PHONE TO VIEW THEM VIA THE QR CODE AT THE BOTTOM OF THE NEXT PAGE. SCOTCHMAN ALSO HAS MANY OTHER HELPFUL AND INFORMATIVE VIDEOS POSTED ON YouTube RELATED TO THIS MACHINE.**

1. **Select START on the shear selector switch and power the machine.**
2. **Check to make sure that there are no objects (such as tools) under or on any of the moving parts**
3. **Select SHEAR on the selector switch. Using the foot switch, carefully inch the shear slide down until the punch holder (item 3) is horizontal. Holding the shear slide in this position, switch the machine to OFF. IT IS IMPORTANT TO LOWER THE TOP LIMIT SWITCH UNTIL IT COMES IN CONTACT WITH THE METER BOSS ROD.**

4. **Select the proper punch and die. For recommended clearances, SEE PARAGRAPH I ON PAGE 32.**
5. **Clean both the punch and die of any foreign material.**
6. **Insert the proper die in the die holder (14). (If the die has a flat spot in it, align this with the set screw in the die holder.) Tighten the set screw (20) firmly with a hex key wrench.**
7. **Insert the punch into the punch retaining nut (10). Make sure that it seats properly. Place the punch retaining nut assembly on the die holder (14), 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.**

8. **Lift the punch retaining nut and turn it on to the punch holder. (The die holder may have to be moved slightly, to align the punch retaining nut to the punch holder.) When using keyed punches, after you start the nut on the punch holder, raise the punch and rotate it until the key seats in the punch ram.**
9. **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.**
10. **If the die holder has been adjusted, re-tighten the bolts (18) in the die holder.**
11. **Check to be sure of proper alignment. Realign, if necessary.**
12. **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.**
13. **Check that the top limit switch has been lowered to the meter boss rod. See paragraph #3. Place the selector switch in the SHEAR position. To check that the alignment is correct, raise the top limit switch approximately 1/2" and, using the foot switch, inch the punch up and down several times, without letting the punch come out of the die.**
14. **Raise the top limit switch so that the punch just clears the work piece.**
15. **Return the stripper to the locked position. For stripper adjustment procedures, see pages 30 and 31.**

How To Align a Punch & Die

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

DO-8514-20M SAFTEY VIDEO

10.3 HOLE PUNCH (NOTCHER STATION)

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	1	003110	PUNCH & DIE WARNING
2	1	004123	1/4" KEY
3	1	007229	ADJ.SCREW STRIPPER LEFT
4	1	007236	ADJ.SCREW STRIPPER RIGHT
5	1	007237	HEX HEAD STRIPPER STUD
6	1	007239	SPRING ROD STRIPPER
7	1	007240	SPRING RETAINER
8	1	007241	STRIPPER SPRING 27LBS
9	1	007244	RETAINER STRIPPER
10	1	016095	#40 XL PUNCH RET NUT
11	1	025112	STRIPPER EURO 85
12	1	025193	PUNCH RETAINER FIDO
13	1	025496	PUNCH ADAPTER
14	1	025506	#82 DIE HOLDER
15	1	025524	STRIPPER OPTIONAL PUNCH
16	4	026625	M16 X 18MM DIN 508 TEE N
17	4	113017	1 3/4 OD X 21/32 ID REID
18	4	201620	M16 X 55MM DIN931 HHCS
19	6	214016	M16 DIN125 REGULARWASHER
20	1	219047	M10 X 12MM DIN913FP S.S.
21	4	221310	M12 X 25MM DIN912 SHCS
22	6	221412	M16 X 35MM DIN912 SHCS
23	2	230007	M6 X 16 DIN 7991-10 FSHCS
24	2	230620	M20 X 40 DIN 7991-10.9 FSHCS
25	1	025485	COMPLETE PUNCH ASS'Y NOTCHER STATION

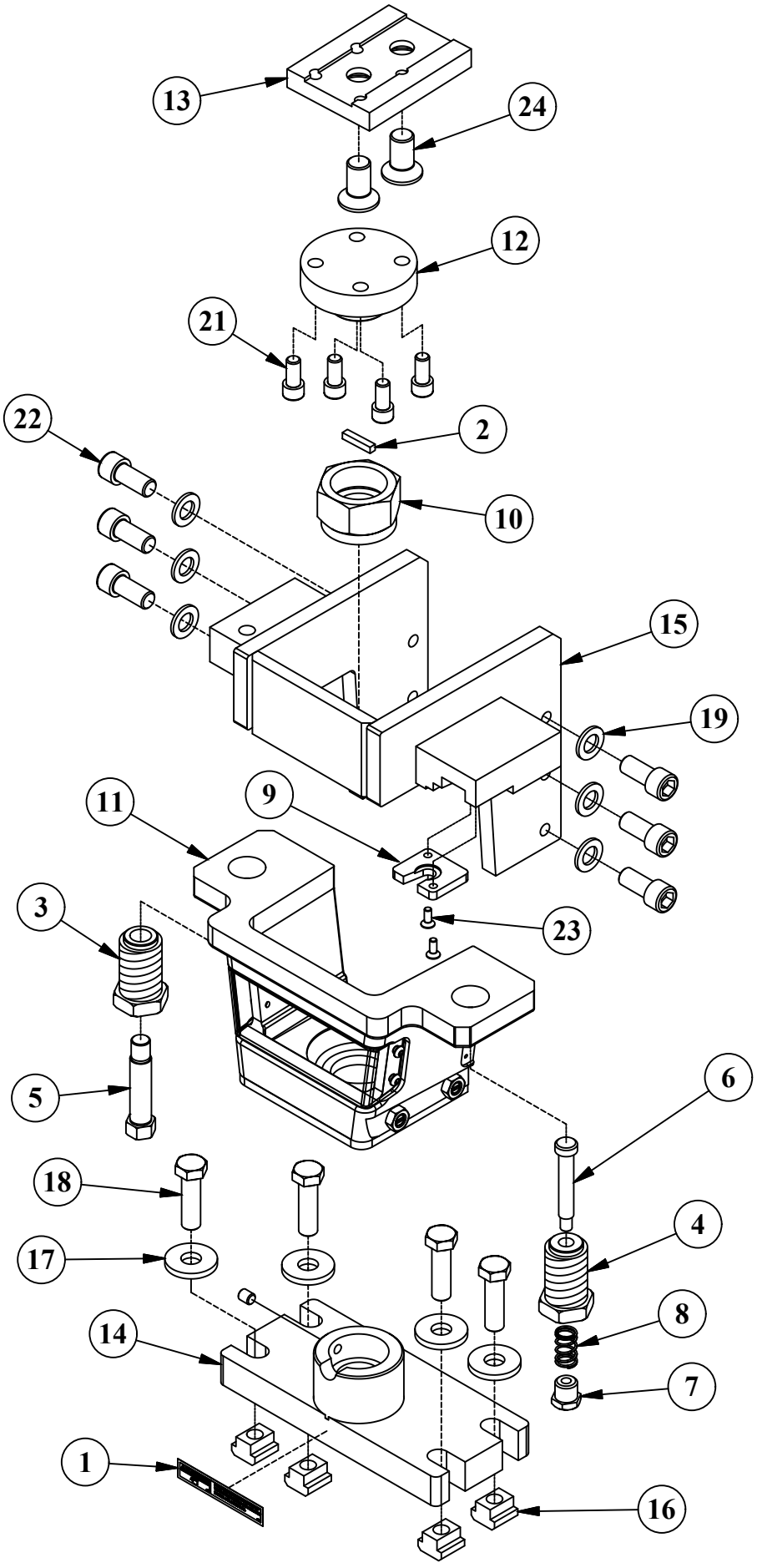


FIGURE 53

10.4 PUNCH STRIPPER (NOTCH STATION)

PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	4	001541	BALL SPRING SCREW
2	1	025011	STRIPPER SUB FIDO
3	1	025018	INSERT STRIPPER EURO 85
4	1	025383	POLY STRIPPER GUARD
5	1	025733	LEXAN STRIPPER DOOR ASS'Y
6	4	110014	1/2-13 JAM NUT
7	4	220014	M6 X 10MM DIN BN19 BHCS
8	2	660255	#6 X 3/8" DRIVE SCREW
9	6	214016	M16 RegularWasher
10	6	221412	M16 X 35MM SHCS
11	1	025524	Stripper Optional Punch
12	1	007244	Retainer Stripper
13	2	230007	M6 X 16 FSHCS
14	1	007229	Adj.Screw Stripper Left
15	1	007237	Hex Head Stripper Stud
16	1	007239	Spring Rod Stripper
17	1	007236	Adj. Screw Stripper Right
18	1	007241	Stripper Spring
19	1	007240	Spring Retainer

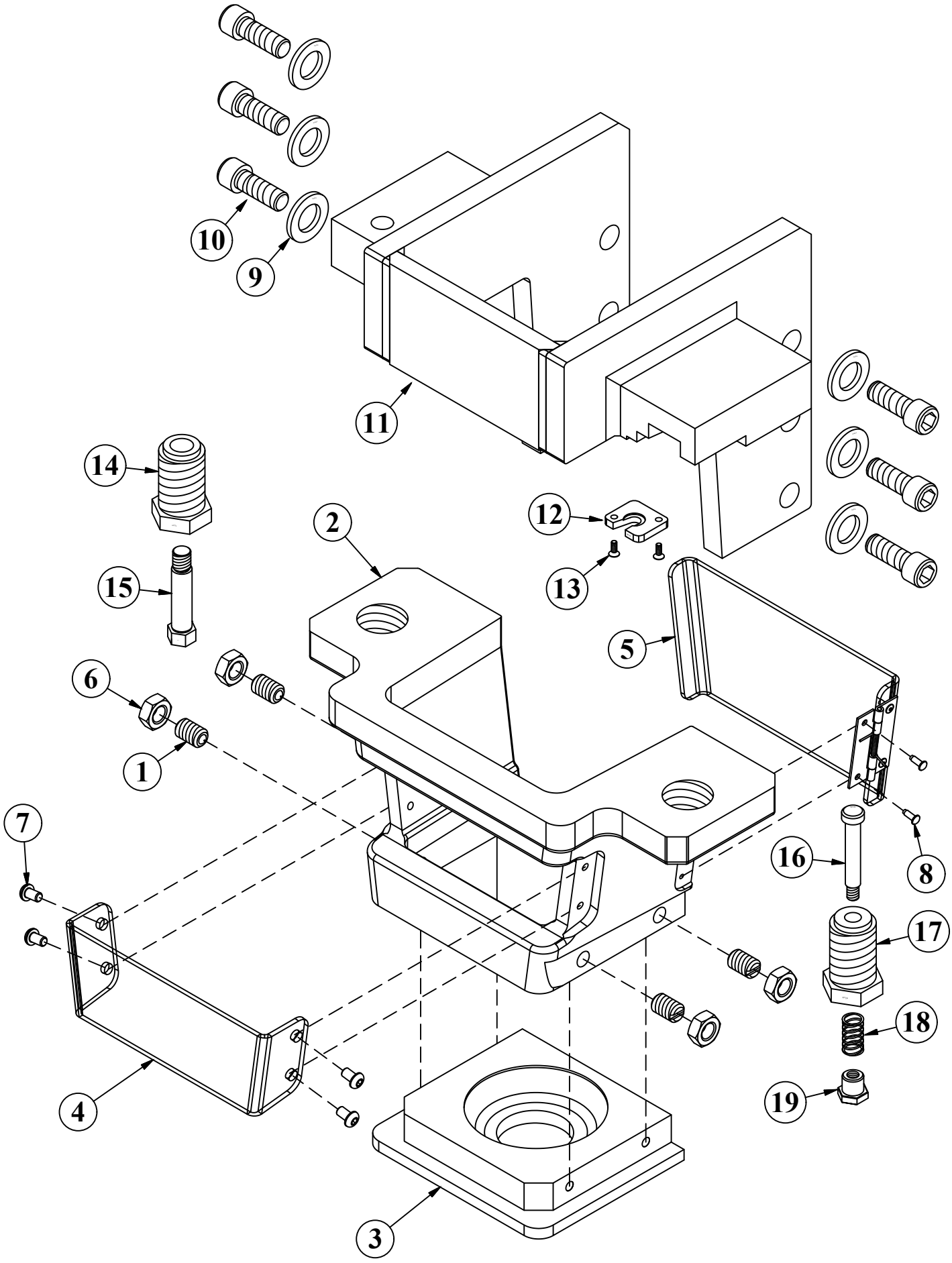


FIGURE 54

10.5 NINETY DEGREE NOTCHER - NOTCH STATION

Capacity: 2" (51mm) deep through material 1/2" (12mm) thick of max tensile strength 65,000 psi. Vee notch is one of the many alternative tooling arrangements that can be used at this work station. Vee notch is particularly useful for corner notching flat sheet or plate. Another common use is vee notching into the leg of angle, to accommodate the bending of the opposing leg. Notching the end of the leg of angle will prepare the angle for corner construction welding as an alternative to mitering.

➲ **NEVER EXCEED THE RATED CAPACITY OF THE MACHINE.**

The bottom blades have four cutting edges and can be turned to present new cutting edges when they have dulled. The top blade and bottom blades can be sharpened by grinding the side faces.

10.5A NOTCHER OPERATION

SEE FIGURE 55 ON PAGE 117.

1. **Raise the notcher guard.**
2. **Check that the top and bottom blades are correctly fitted and adjusted. Refer to Section10.5B &C.**
3. **Adjust the back stops to ensure that the material does not extend beyond the back face of the top blade.**
4. **Place the disconnect switch in the ON position and both selector switches in the START position and power the machine.**
5. **Place the selector switch in the SHEAR position.**
6. **Carefully lower the top blade on the foot switch until the top blade just clears the material thickness to be cut. While holding in this position on the foot switch, switch the machine to OFF.**
7. **Adjust the top stroke control until the switch is in contact with the actuator.**
8. **Re-start the machine and check the stroke of the top blade.**
9. **Place the material to be notched onto the bottom notch blades and lower the notch guard. Secure the guard above the material with a small clearance of about 1/4" (6mm), to enable the withdrawal and re-positioning of the material.**
10. **Correctly position the material to be notched. (With the back stops on the notch table correctly set, it will not allow the material to be fed in too deep. However, always ensure that the material is not fed in beyond the depth of the top blade.**

Fully depress the foot switch and hold it firmly down. Once the notch is complete, it is possible to remove the foot from the foot switch, allowing the top blade to return to its top position. With vee notching, there is no stripping action.

☑ **Stay within the rated capacity of the machine.**
☑ **Keep the blade area clean. Do not allow a buildup of mill scale.**
☑ **Only operate the machine with a correctly set guard.**
☑ **Lubricate the blades every 10-15 cuts.**

➲ **NEVER FEED THE MATERIAL INTO THE NOTCH DEEPER THAN THE TABLE BACK STOPS OR THE HEEL.**

10.5B TOP BLADE REMOVAL/FITTING

REFER TO FIGURE 55 ON PAGE 117.

REMOVAL:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **Adjust the top stroke control up to its farthest position. The top blade will retract as the stroke control is raised.**
- ☐ **Switch the machine to OFF.**
- ☐ **Raise the notcher guard.**
- ☐ **Slacken and remove the two socket cap screws retaining the top blade. Also, remove the top blade carrier if changing to a different tooling arrangement.**

FITTING:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **Adjust the top stroke control up to its farthest position. The top blade will retract as the stroke control is raised.**
- ☐ **Switch the machine to OFF.**
- ☐ **Raise the notcher guard.**
- ☐ **Clean the top blade seat on the shear beam. Assemble and secure the top blade carrier, ensuring that it is properly seated against the heel of the shear beam.**
- ☐ **Assemble and secure the top blade (12) to the carrier (10), ensuring that the blade is seated against the two heel pins on the carrier.**
- ➲ **DO NOT OPERATE THE MACHINE WITHOUT RE-SETTING THE LOWER BLADE HOLDER, AS OUTLINED IN THE FOLLOWING SECTION.**

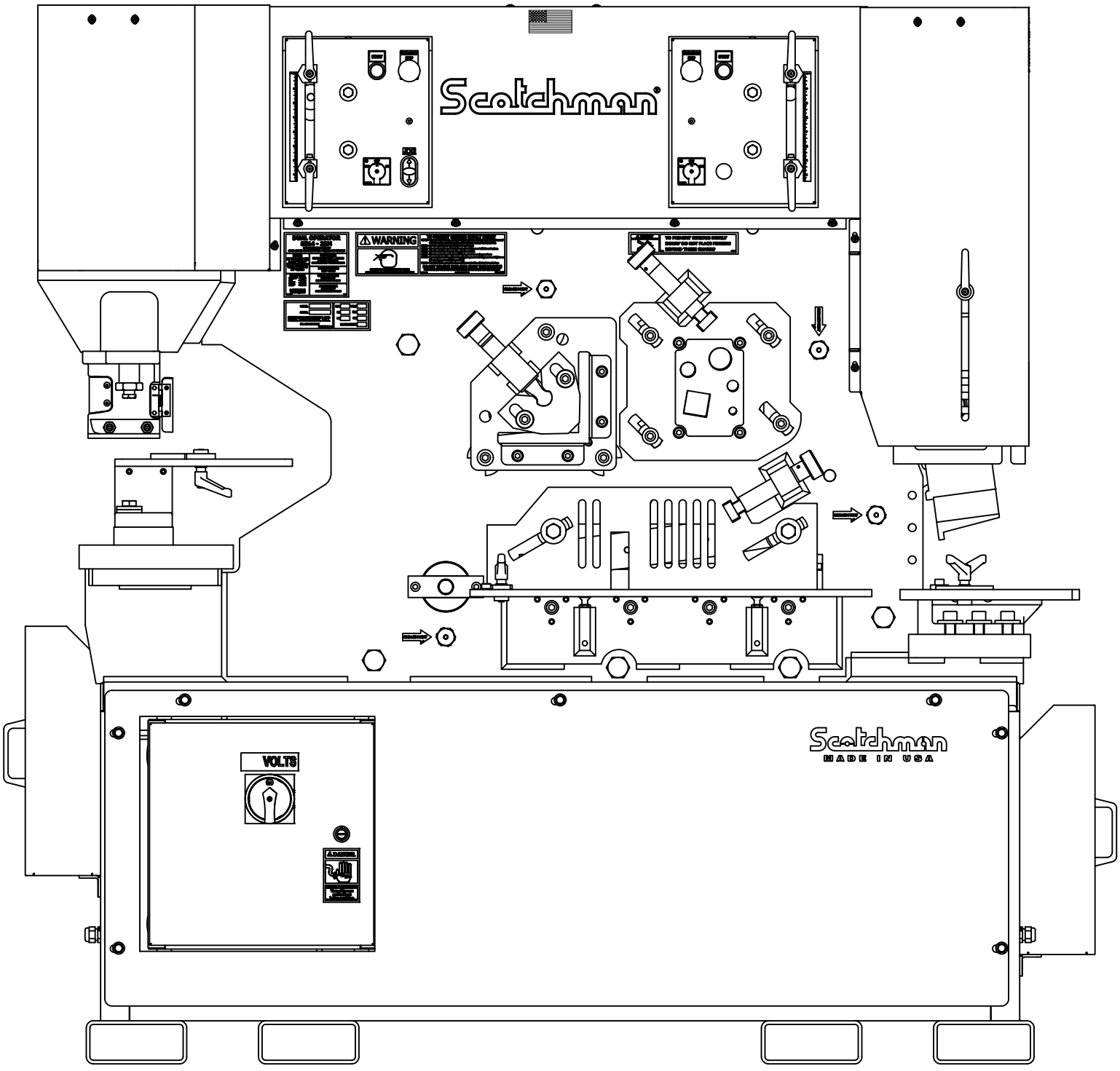
10.5C LOWER BLADE REMOVAL/FITTING

The lower blades each have four cutting edges and can be turned to present a new cutting edge when dulled. The lower blades are secured in the blade holder. If re-grinding the blades, grind the side of the blades, only. A maximum grind allowance of 1/32" (1mm) has been allowed. Whether just turning or re-fitting ground blades, once the original setting of the notch tooling has been disturbed, it will be necessary to carry out the following to re-set the notcher tooling properly.

REMOVAL:

- ☐ **Having powered the machine, select SHEAR on the selector switch.**
- ☐ **If necessary, adjust the top stroke control so that the top blade is well clear of the lower blades. (The top blade will retract as the stroke control is raised.)**
- ☐ **Switch the machine to OFF, raise the notcher guard and remove the notch table.**
- ☐ **Slacken and remove the four socket cap screws retaining the lower blades. Remove the lower blades and clean the blade seats.**
- ☐ **Loosen the four hex head screws (15) securing the die holder(1) to the bolster and remove the die holder from the bolster. Clean the bolster.**
- ☐ **Secure the bottom blades to the die holder as detailed in Figure 54. (Note that there is no blade adjustment on vee notch.)**
- ☐ **Ensure that the notch guard is fully raised. Power the machine and select SHEAR. Having secured the top tool to the shear beam, carefully lower the top tool to its bottom position. While holding in this position on the foot switch, switch the machine to OFF.**
- ☐ **Having secured the dies to the die holder, place the die holder onto the bolster and slide the die holder to the top blade. Finger tighten the four hex head securing screws. Adjust the position of the die holder to achieve a blade clearance of 0.025" (0.6mm). See Figure 54.**
- ☐ **Securely tighten the four hex head blade holder screws to a torque of approximately 100 ft.lbs. (135Nm). Check that the blade clearances have not moved in tightening. Re-set, if necessary.**
- ☐ **Fit the support table as in Figure 54 and set the back stops so that the material does not extend beyond the rear of the top blade.**
- ☐ **Power the machine and select SHEAR on the selector switch. Care must be taken as the shear beam will lift when SHEAR is selected.**
- ☐ **Depress the foot switch and carefully lower the top blade to check blade clearances.**

SCOTCHMAN DO-8514-20M IRONWORKER



10.5D 3 X 3 NINETY DEGREE NOTCHER (NOTCH STATION)

ITEM	PART #	DESCRIPTION
1	025906	Die Holder
2	025269	Bottom Blade
3	221314	M-12 x 35 SHCS
4	025937	Support Table
5	221210	M-10 x 25 SHCS
6	025904	Table Guide
7	014216	Angle Guide
8	025934	Table Nut
9	080061	Handle
10	025924	Top Blade Carrier
11	221825	M-20 x 75 SHCS
12	025927	Top Blade
13	221210	M-10 x 25 SHCS
14	026625	M-16 Tee Nut
15	203620	M-16 x 50 HHCS
16	113017	M-16 Washer
17	025490	Complete Tool
18	212014	Lock Washer

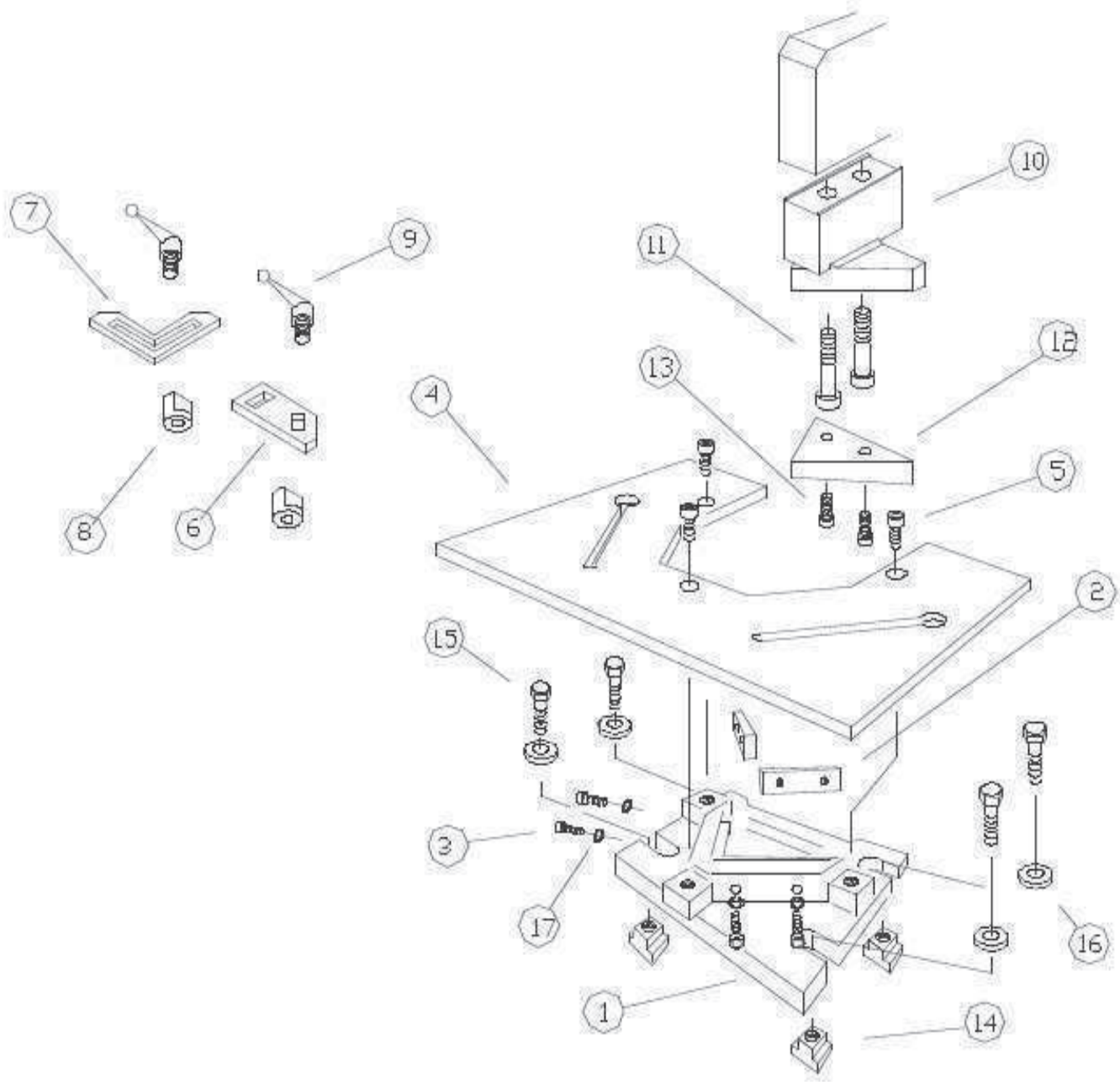


FIGURE 55

10.6 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 bar or plate.

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 how much material can be removed in a confined area without causing some deformation. Contact your dealer or Scotchman 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 on the D.O.8514 machine is 3/4" (19mm) in steel with a rated tensile strength of 65,000 lbs. psi.

10.6A CHANGING THE URETHANE SPRINGS

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 57 ON PAGE 125. The springs should be checked periodically. (A sure sign of over stroking is cracking or splitting of the springs.)

1. **Secure the unit in a vise by clamping the bottom plate (item11).**
2. **Loosen and remove both nyloc nuts (6). When loosening the nyloc nuts (6), if one or both tie rods become loose, remove the loose tie rod(s) from the base plate and remove the nut(s) from the tie rod(s). Re-tighten the tie rod(s) into the base plate and lock in place, using a thread locking solution such as Nutlocâ .**
3. **Remove items 1 and 7, top plate and spring spacers.**
4. **Remove item 8, urethane springs.**
5. **Re-assemble the unit with new urethane springs and finger tighten both nyloc nuts.**
6. **Tighten both retaining nuts to achieve the correct setting distance.**

10.6B INSTALLING THE URETHANE STRIPPER & PUNCH & DIE

REFER TO FIGURE 56.

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.**

4. **Remove the two bolts holding the die holder and remove the spacer plate from under the die holder. Replace the die holder bolts with the shorter bolts (F) provided with the urethane stripper. Do not tighten the bolts yet.**

5. **Remove the punch holder (B) from the end of the ram.**

6. **Disassemble the urethane stripper by removing the two retaining nuts (I).**

7. **Install the stripper mounting plate (A) and the punch holder (B) to the 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, SEE PARAGRAPH I ON PAGE 32.**

9. **Clean both the punch and die of any foreign material.**

10. **Insert the proper die in the die insert (J). (If the die has a flat spot in it, align this with the bolt in the die insert.) Tighten the bolt firmly with a wrench.**

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 (J), 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 disconnect switch in the ON position and the selector switches 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 cylinder ram to its set DOWN position.**

15. **Turn the machine's power OFF.**

16. **Lift 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.**

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 (F) in the die holder.**

19. **Check to be sure of proper alignment. Realign, if necessary.**

20. **Power the machine and raise the ram to the top of its stroke and turn the machine OFF.**

21. **Slide the bottom half of the urethane stripper onto the stripper mounting plate (A) from the inside of the machine.**

22. **Make sure that the spring retainers (G) are positioned so that the lip on the retainer fits against the machined area on the front of the mounting plate (A). Finger tighten the retaining nuts (I).**

23. **Power the machine and jog the ram down until the urethane stripper contacts the top of the die die holder. Continue to jog the ram down, compressing the urethane springs until the retaining nuts (I) can be tightened down to the shoulder on the stud.**

24. **Install the stripper guard (H) on the front of the stripper.**

⌦ **CAUTION: REMEMBER THAT THE MAXIMUM CAPACITY OF THIS STRIPPER IS 3/4 INCH MATERIAL. ALSO, REMEMBER THAT THE STRIPPER MOVES WITH THE PUNCH.**

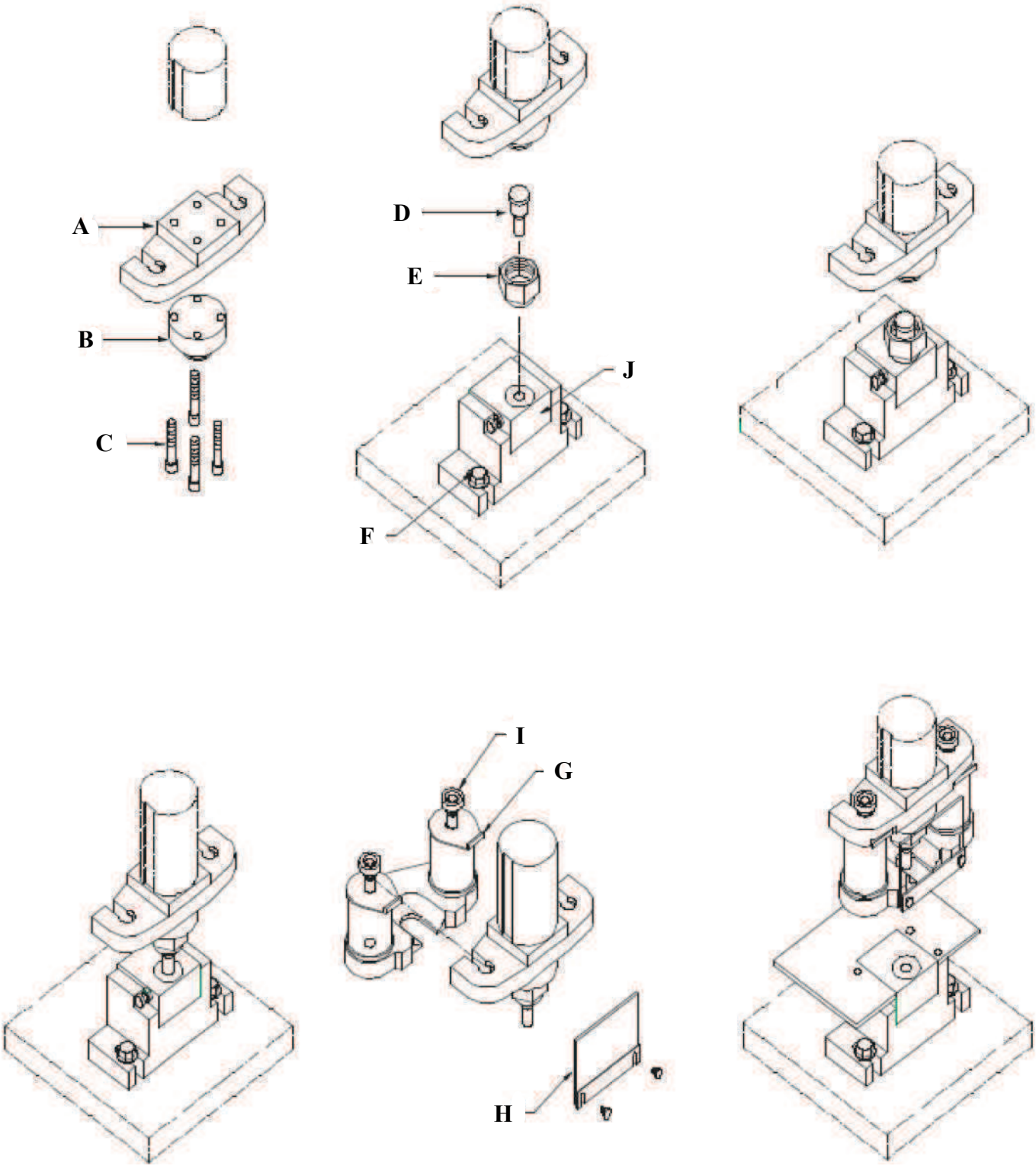
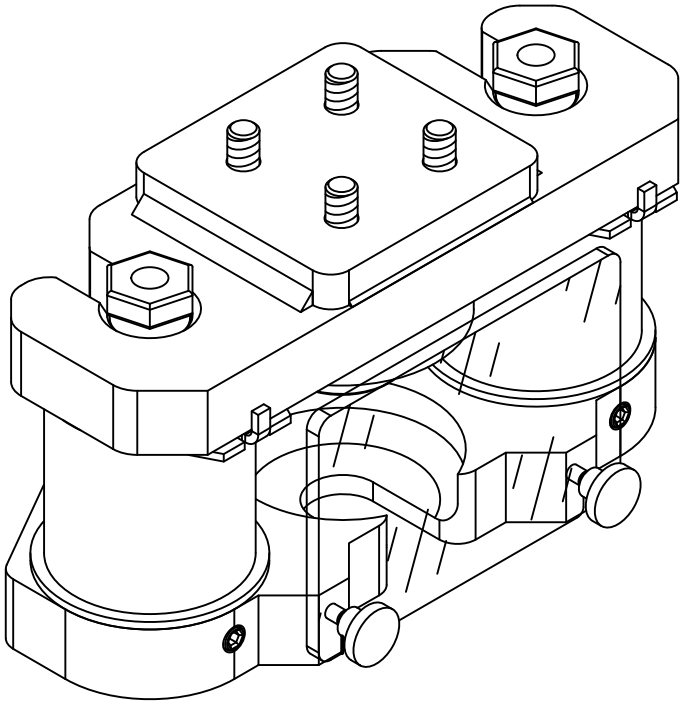
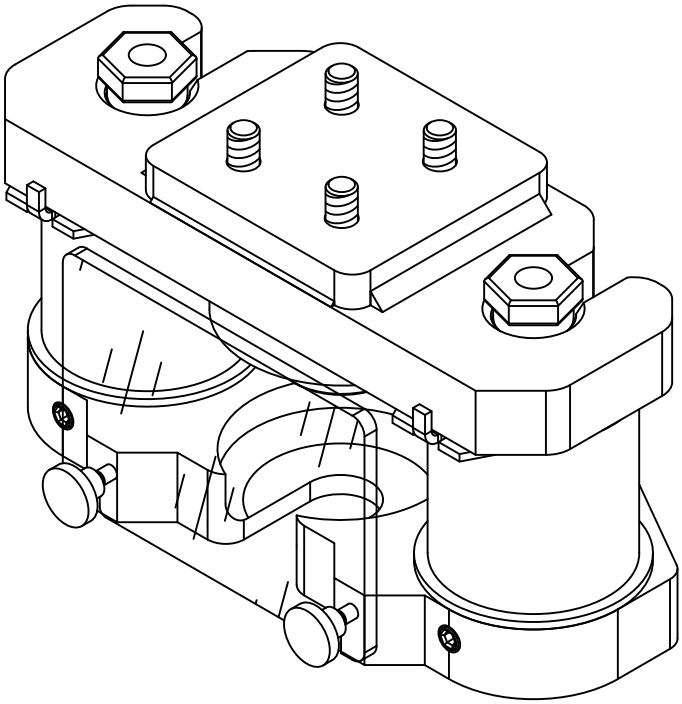
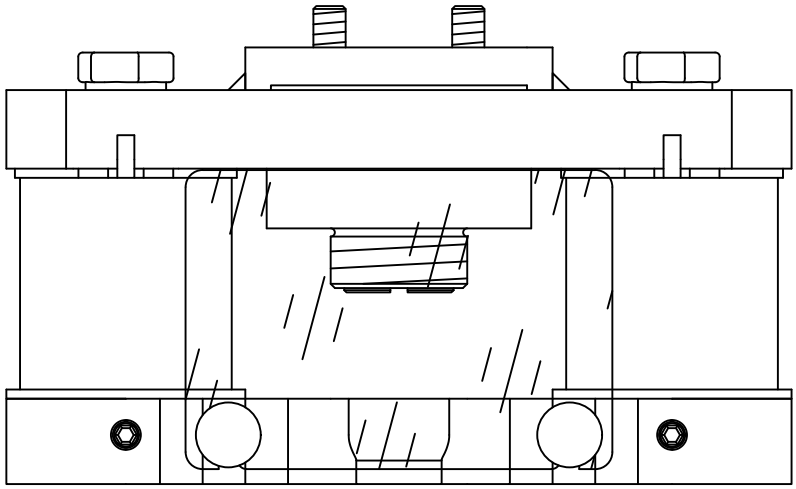


FIGURE 56

025475 - DO85 URETHANE STRIPPER ASSY







SOME OF SCOTCHMANS TOOLING

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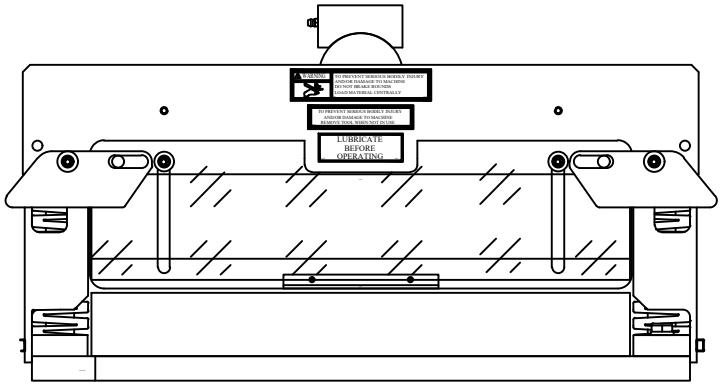
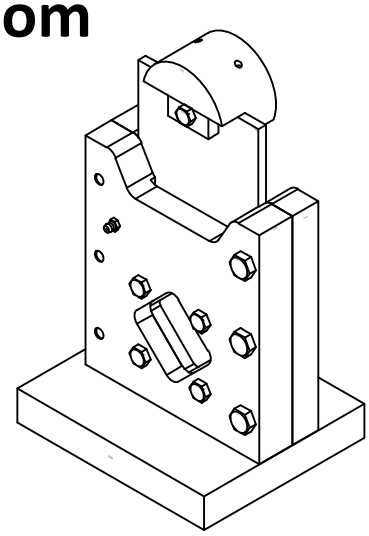
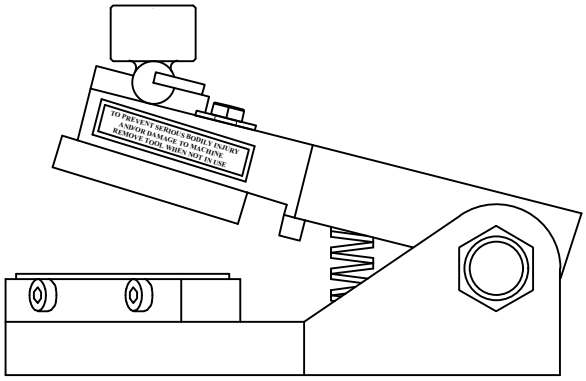


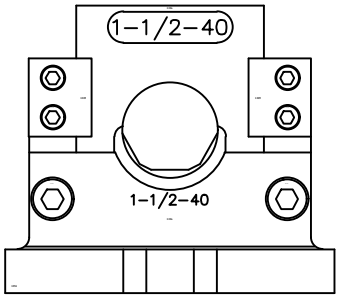
12" and 24" Brakes



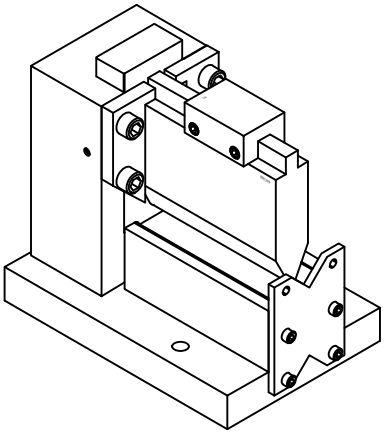
Square Tube Shear



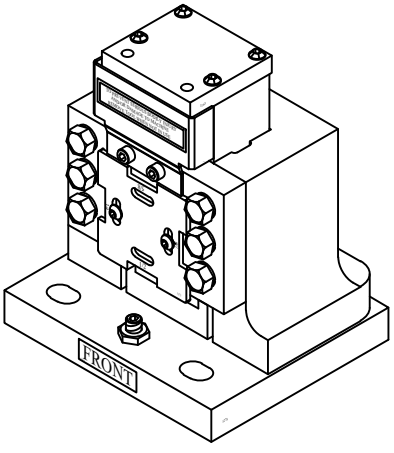
6 x 6 x Ninety Degree Notcher



Pipe Notcher



6" Angle Iron Brake



Picket Tool

10.6C URETHANE STRIPPER

ITEM	PART #	DESCRIPTION
1	025441	Top Plate
2	025193	Punch Carrier
3	221329	M-12 x 70 SHCS
5	213007	M-6 Washer
6	025453	Post Nut
7	025443	Post Retainer
8	025455	Urethane Spring
9	025456	Spring Spacer
10	025454	Spring Post
11	025447	Stripper Plate
12	218023	M-6 x 12 SS
13	025450	Lexan Shield
14	073691	Knob
	025475	Complete Unit

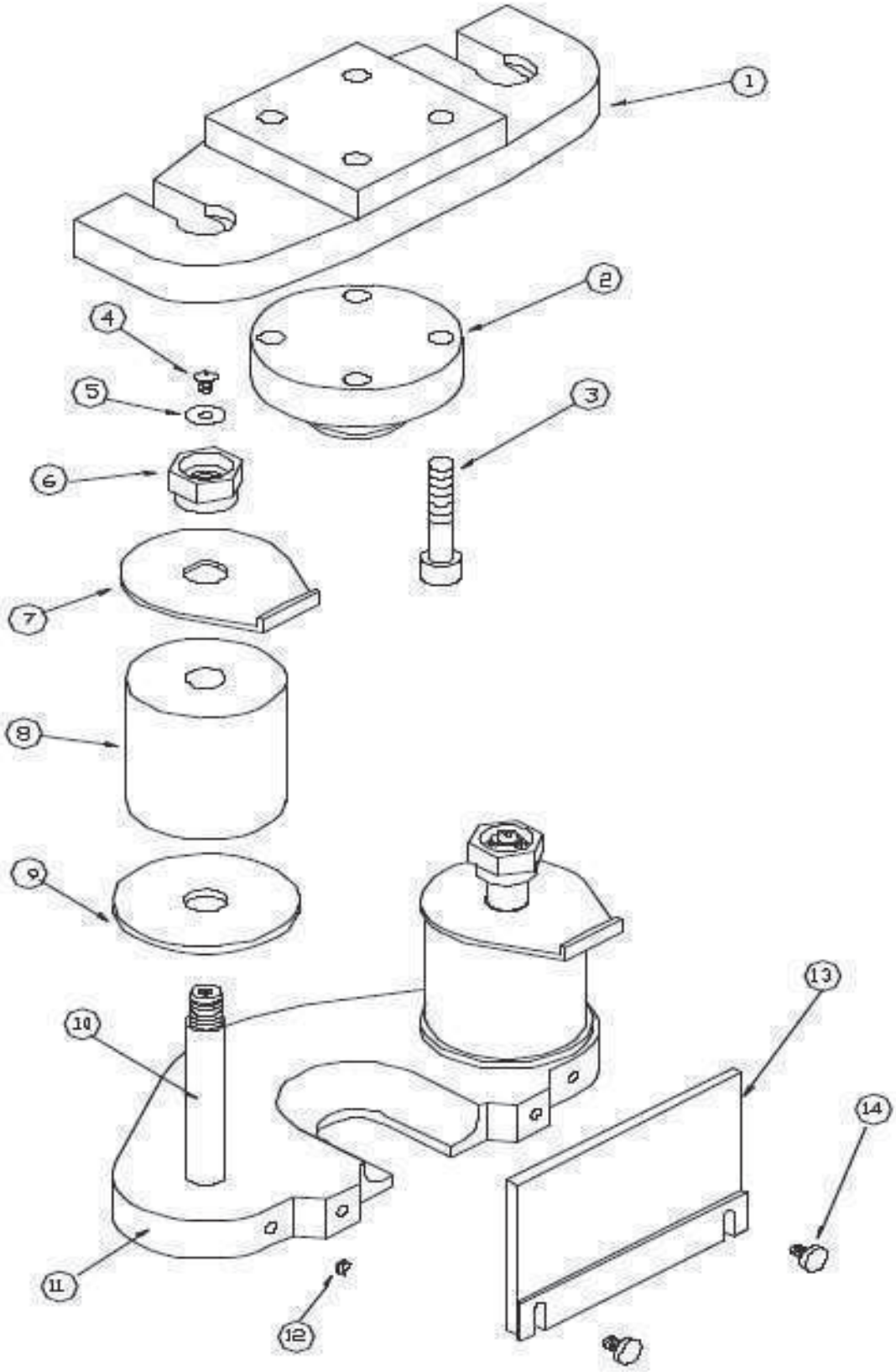


FIGURE 57

10.7 ELECTRIC BACK GAUGE

10.7A SETTING THE LENGTH STOP TO THE MACHINE

The length stop has to be set to suit the model of the machine.
The following steps outline this simple procedure.

In Figure 58, a dimension of 2-5/16" (59mm) is the internal adjustment for actuating the switch correctly. This distance is set at the factory and should only require adjustment when a new micro switch is fitted. THIS SCREW IS NOT TO ADJUST THE LENGTH STOP.

Secure the length stop assembly to the machine.
Set the slide block on the bar so that the scale arrow points to any setting distance, say 10". Secure the slide block in this position. Arrange the vertical bar so that the length stop is in line with the shear blades. Loosen the three screws clamping the switch housing. Using a steel rule, measure the setting distance of 10" from the shear blade to the compressed stop. While holding the housing in this position, tighten one of the three clamping screws. Check that the setting is correct with the stop compressed. Remove the two remaining clamping screws and, using a 5mm drill, dimple the two clamping screw positions. Replace these two screws and tighten, to clamp the housing. Remove the single screw and dimple the housing. Replace the screw and tighten. (Check that the setting is correct.)

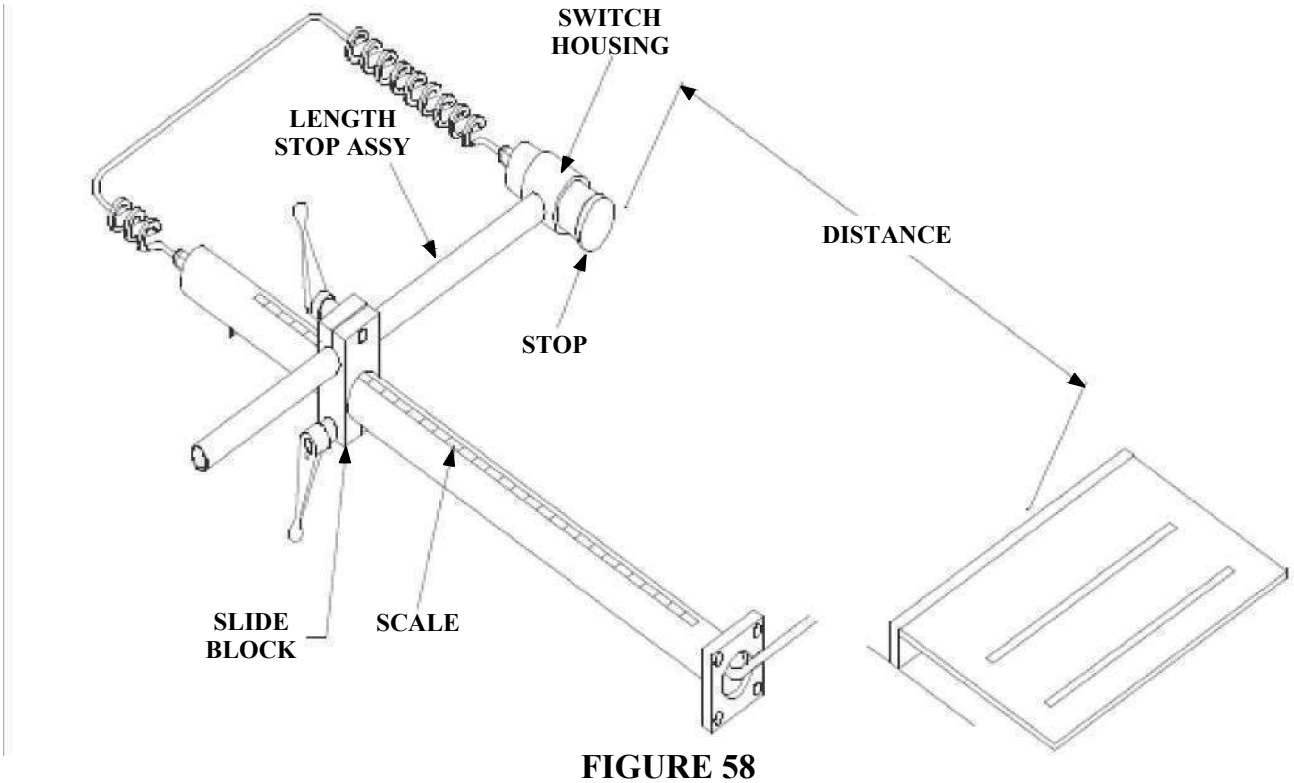


FIGURE 58

The Electric Back Gauge can be positioned and used at any of the shearing or cropping work stations. It will increase productivity, particularly when cropping large batches.

Refer to Section 6.0 of this manual for Bar Shear Operation and do not be tempted to get that last length of cut from the bar if it is not correctly positioned under the hold down. This may cause serious damage to the machine. On the length left over, mark the desired length and crop off the off-cut.

10.7B USING THE ELECTRIC BACK GAUGE

- ☐ **Clamp the sliding block, with the pointer indicating the desired cutting length. Adjust and clamp the probe so that it is in line with the position of the feed material. When setting this position, to avoid short cuts of material jamming between the probe and blade, set the probe off-center to the material, allowing the material to fall away as it is cut.**
- ☐ **Set the hold down for the material to be cut. (See appropriate work station in Section 6.)**
- ☐ **Power the machine and select SHEAR on the selector switch. To speed up production when using the bar shear, set the top limit switch so that the moving blade just clears the material to be cut. (Refer to Section 4.8.) When using the angle or section crop, the top limit switch must remain in its top position. Adjust the bottom limit switch to avoid unnecessary travel. (Refer to Section 4.8.)**
- ☐ **Select PROBE on the selector switch. Selecting probe isolates the foot switch.**
- ☐ **Feed the material through the set hold down to the probe and press firmly. This will activate the shear beam to make one complete cycle of cut. When the shear beam returns to its top position, it is possible to repeat the cut. If the material jams, switch the machine to OFF and release the material.**
- ✓ **Always follow the safety guidelines in this manual.**
- ✓ **Ensure that the hold-down is correctly adjusted and secured for the relevant material.**
- ⌦ **NEVER ALLOW THE ENDS OF THE MATERIAL TO PASS BEYOND THE HOLD-DOWN WHEN SHEARING. THIS MAY CAUSE SERIOUS DAMAGE TO THE MACHINE.**
- ✓ **Always feed material from the hold-down side.**
- ✓ **Keep the blade area clean. Do not allow build-up of mill scale.**
- ✓ **Stay within the rated capacity of the machine.**
- ✓ **The quality of the cut is usually an indication of the condition of the blades or their setting.**

10.7C ELECTRIC BACK GAUGE

ITEM	PART #	DESCRIPTION
1	025338	Stop
2	208012	M-10 Hex Nut
3	201220	M-10 x 50 HHCS
4	025332	Spring
5	025335	Spring Plate
6	025323	Housing
7	218023	M-6 x 12 SS
8	218022	M-6 x 6 SS
9	562113	Limit Switch
10	073450	M-4 x 16 SHCS
11	220010	M-4 x 10 BHCS
12	025329	Switch Mount
13	025326	Gland Plate
14	000202	Cord Grip
15	219047	M-10 x 10 SS
16	025317	Length Stop
17	025320	Slide Block
18	025361	Handles
19	000202	Cord Grip
20	025330	Gland Plate
21	075207	Terminal Block
22	218022	M-6 x 6 SS
23	025308	Tube Assembly
24	025342	Cord Set (Female)
25	025340	Cord Set (Male)
26	221420	M-16 x 50 SHCS
27	041018	Scale
	025600	Complete Assembly

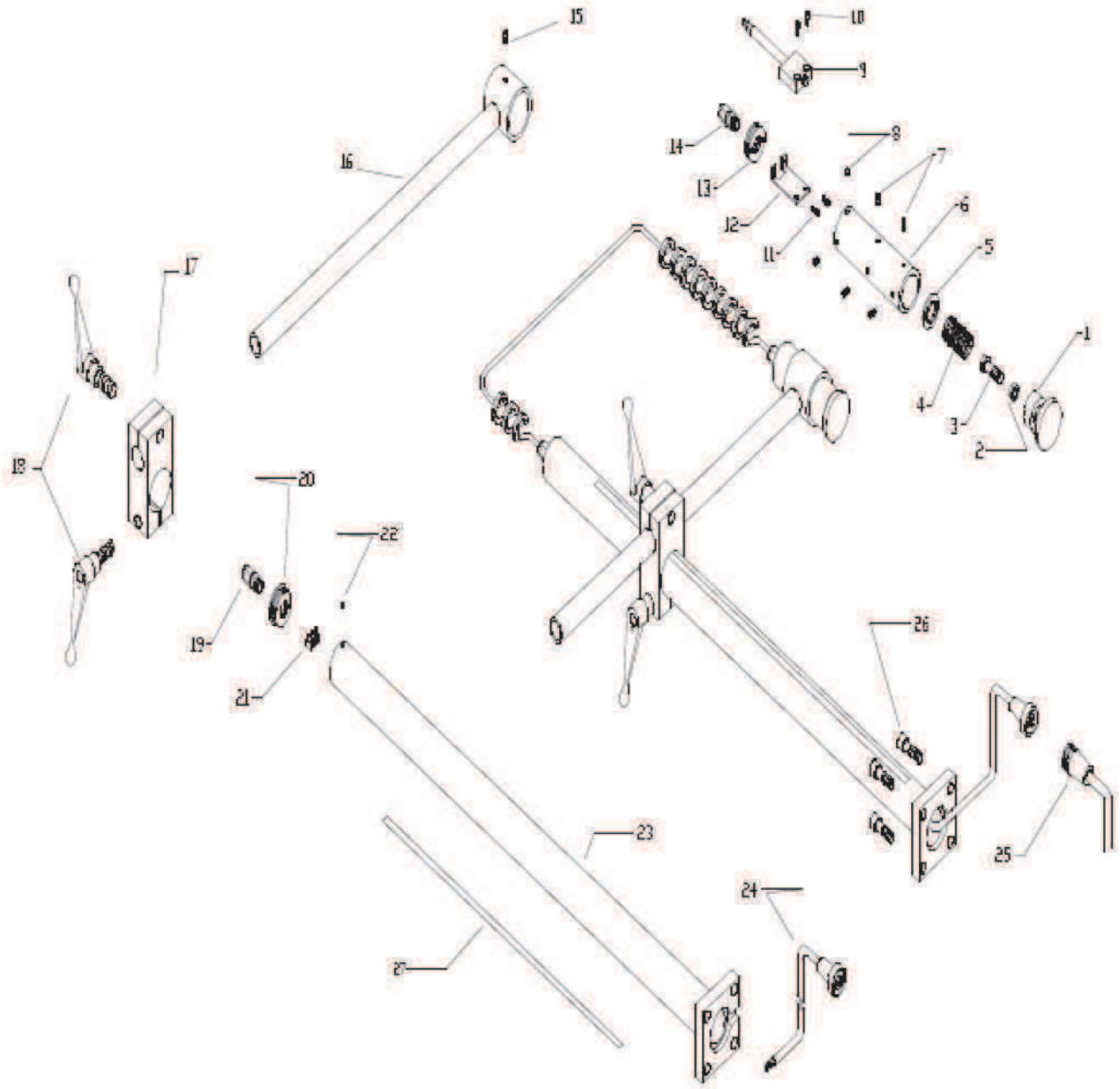
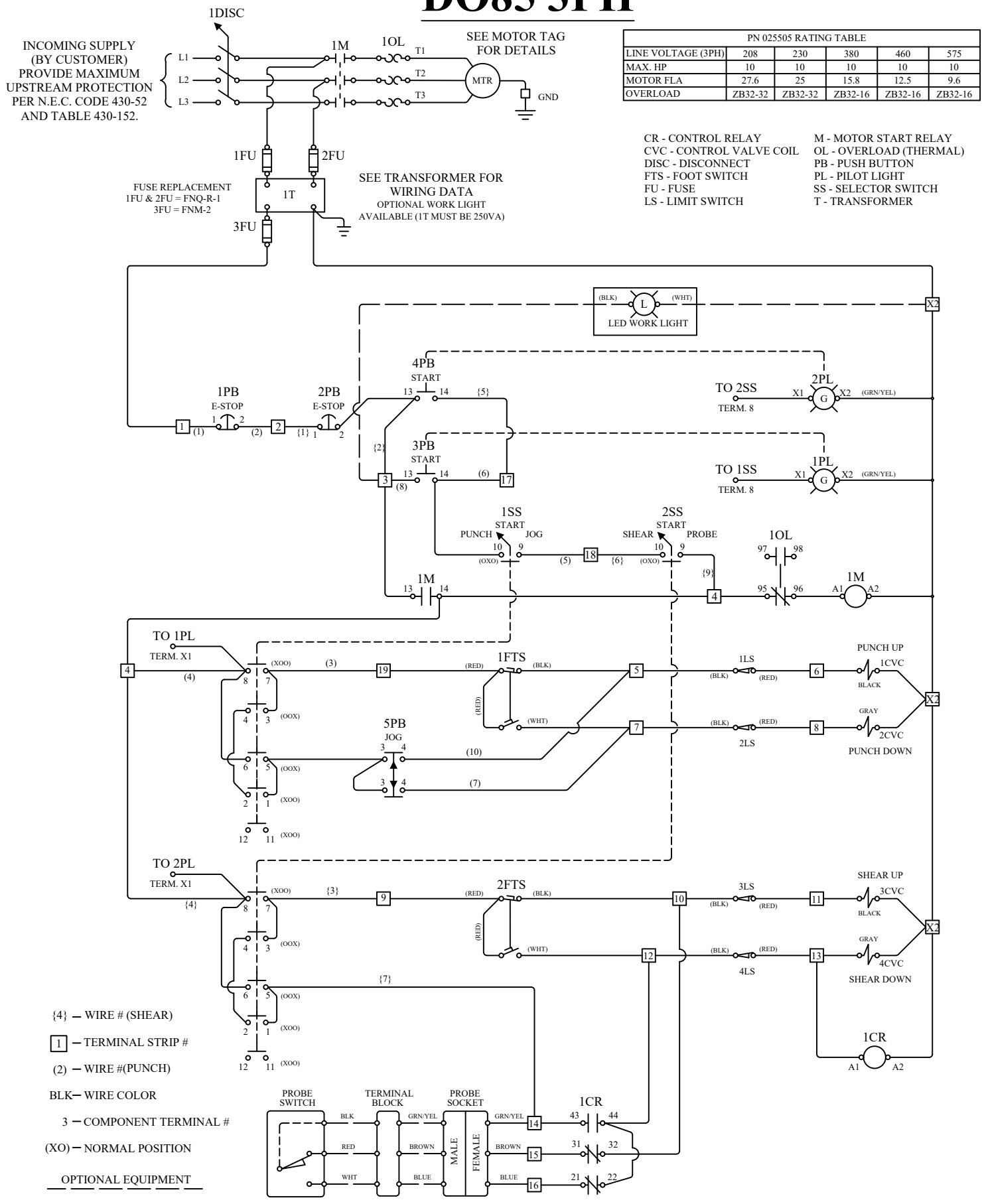


FIGURE 59

11.0 ELECTRICAL & HYDRAULIC SCHEMATICS

DO85 3PH



PN 025505 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

{4} — WIRE # (SHEAR)

[1] — TERMINAL STRIP #

(2) — WIRE #(PUNCH)

BLK— WIRE COLOR

3 — COMPONENT TERMINAL #

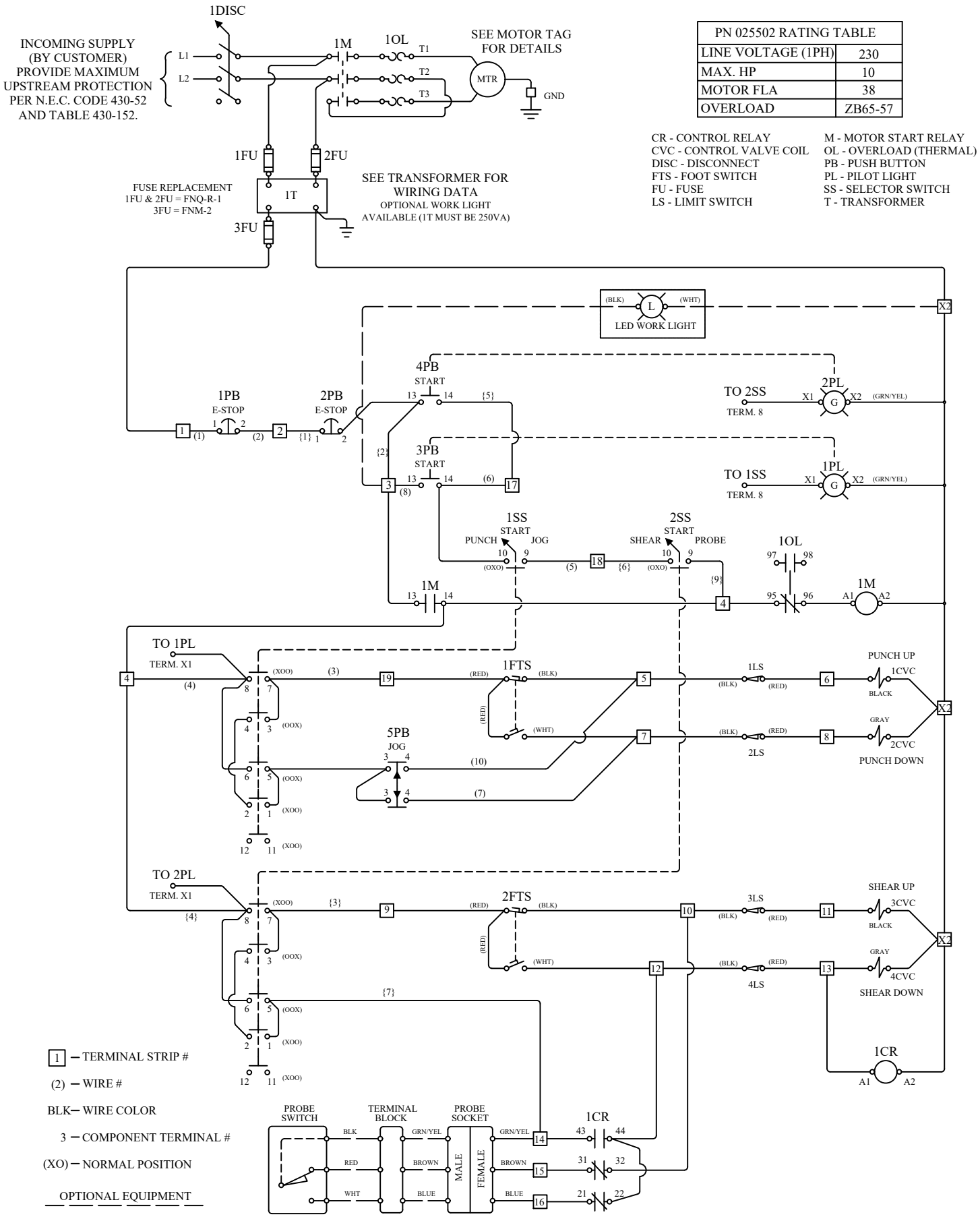
(XO) — NORMAL POSITION

OPTIONAL EQUIPMENT

COMPONENT

FIGURE 60

DO85 230V 1PH



PN 025502 RATING TABLE	
LINE VOLTAGE (1PH)	230
MAX. HP	10
MOTOR FLA	38
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

FIGURE 60A

DO-85 Electrical Enclosure

(see next page for more Detail)

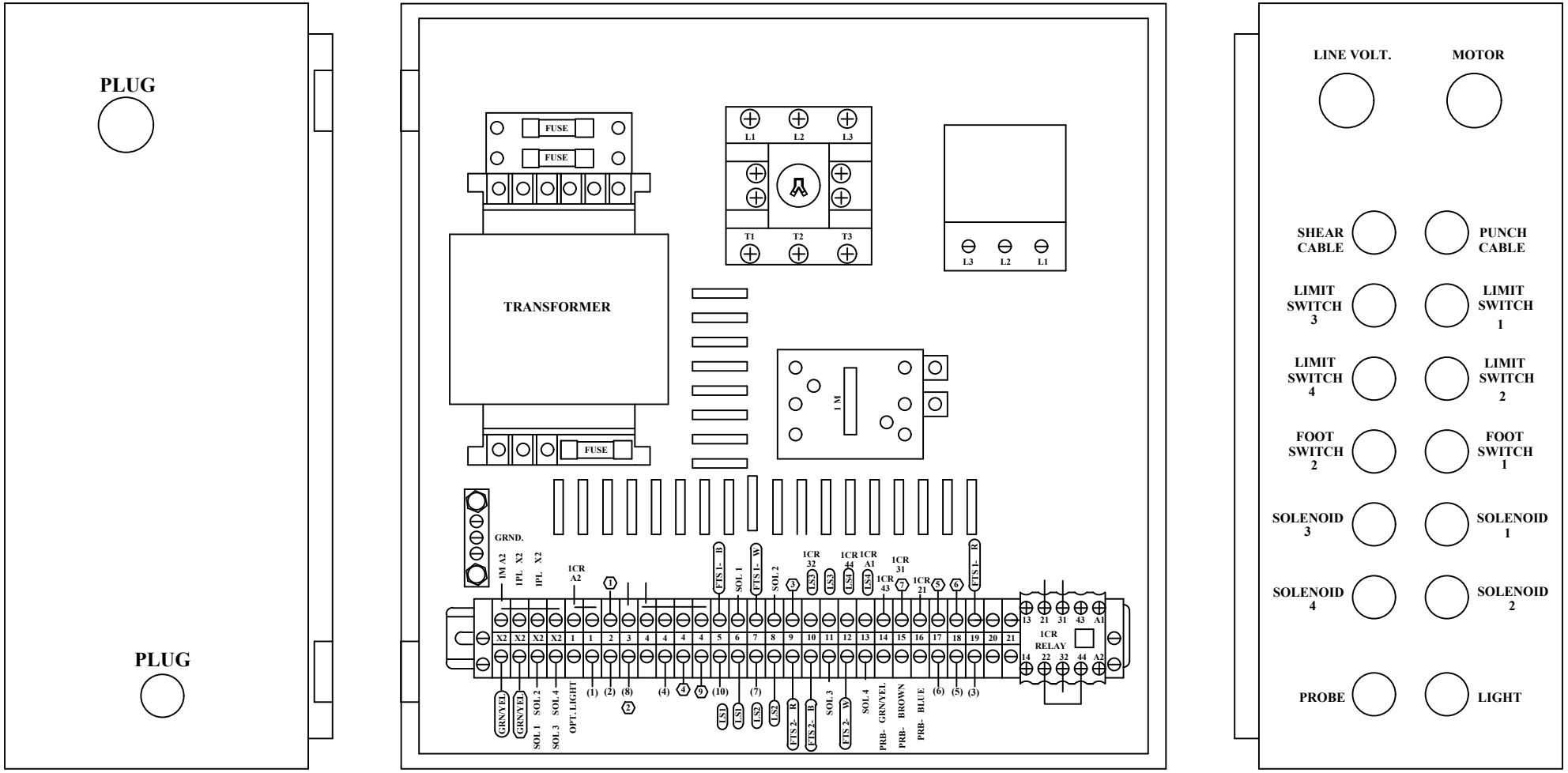
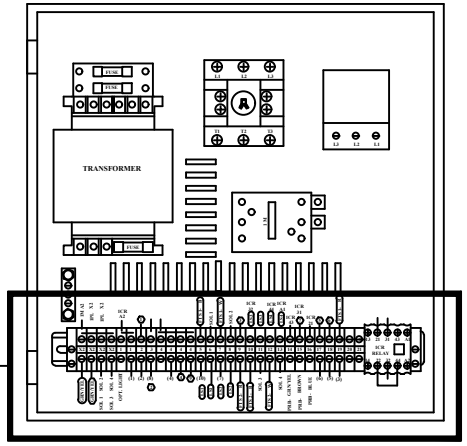


FIGURE 61

DO-85 Electrical Enclosure - Terminal Strip Detail

LS = LIMIT SWITCH
PB = PUSH BUTTON
SS = SELECT SWITCH
SOL. = SOLENOID
FTS = FOOT SWITCH
PL = PILOT LIGHT
CR = CONTROL RELAY
OL = OVERLOAD
M = MOTOR START RELAY
PRB = PROBE SWITCH



(#) CABLE FROM BOX #25620 (PUNCH) WITH WIRE NUMBER (NO.)

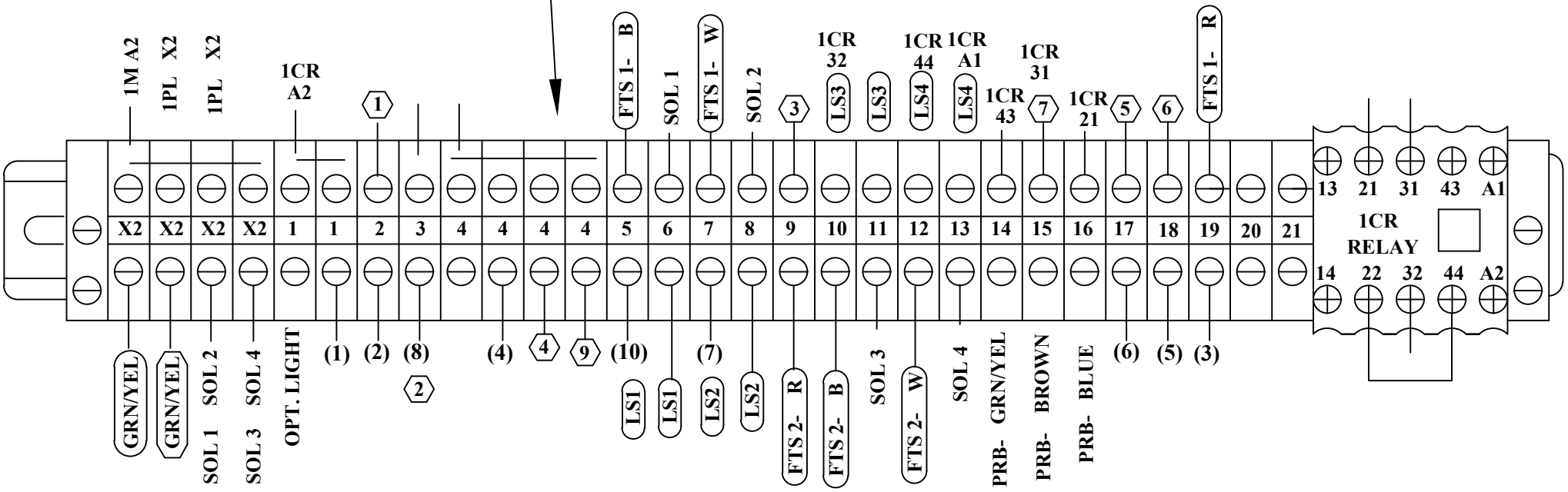
(#) CABLE FROM BOX #25625 (SHEAR) WITH WIRE NUMBER (NO.)

= FIELD WIRING

MAIN ENCL. WIRING

TERMINAL STRIP NUMBER

SWITCH TERMINAL NUMBER



LS1 LIMIT SWITCH-PUNCH

FTS 1- B FOOT SWITCH-PUNCH-WIRE COLOR

(1) CABLE WIRE NO.- PUNCH

SOL 1 SOLENOID-PUNCH-SOL.NO.

LS3 LIMIT SWITCH-SHEAR

FTS 2- B FOOT SWITCH-SHEAR-WIRE COLOR

1 CABLE WIRE NO.- SHEAR

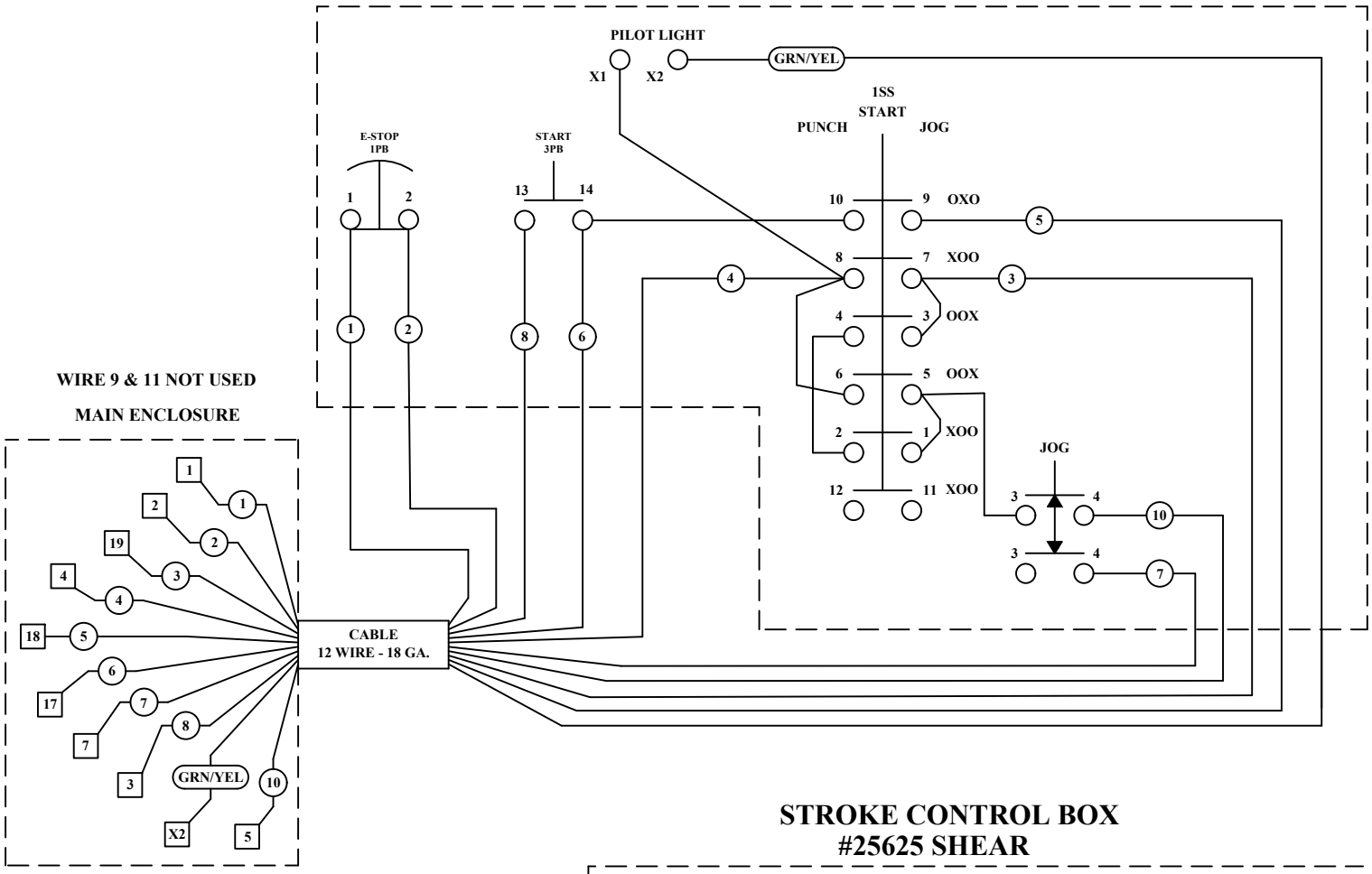
SOL 3 SOLENOID-SHEAR-SOL.NO.

1CR 31 CONTROL RELAY-TERMINAL NO.-PROBE

PRB. PROBE CABLE-WIRE COLOR

JUMPER WIRE

STROKE CONTROL BOX
#25620 PUNCH



STROKE CONTROL BOX
#25625 SHEAR

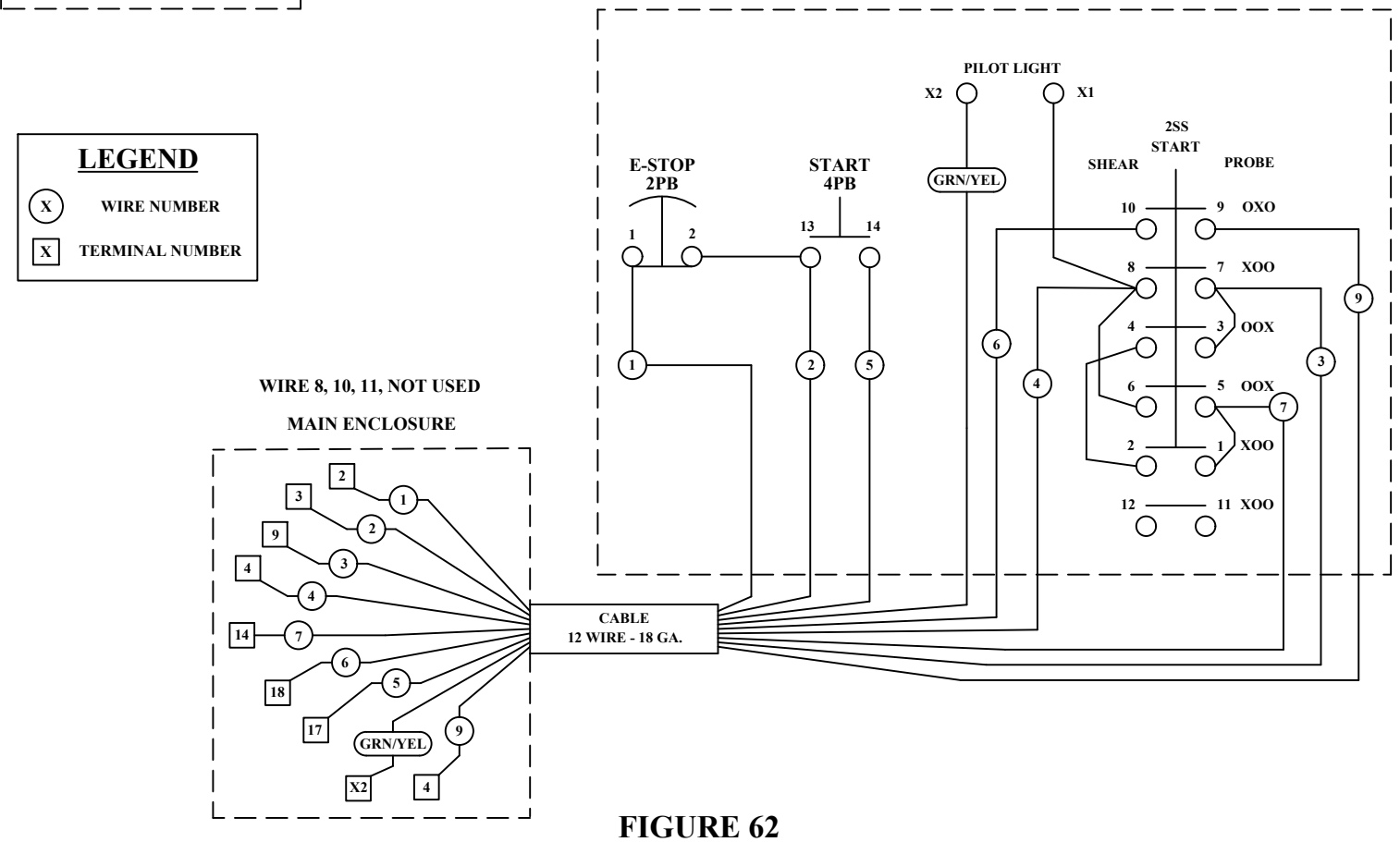
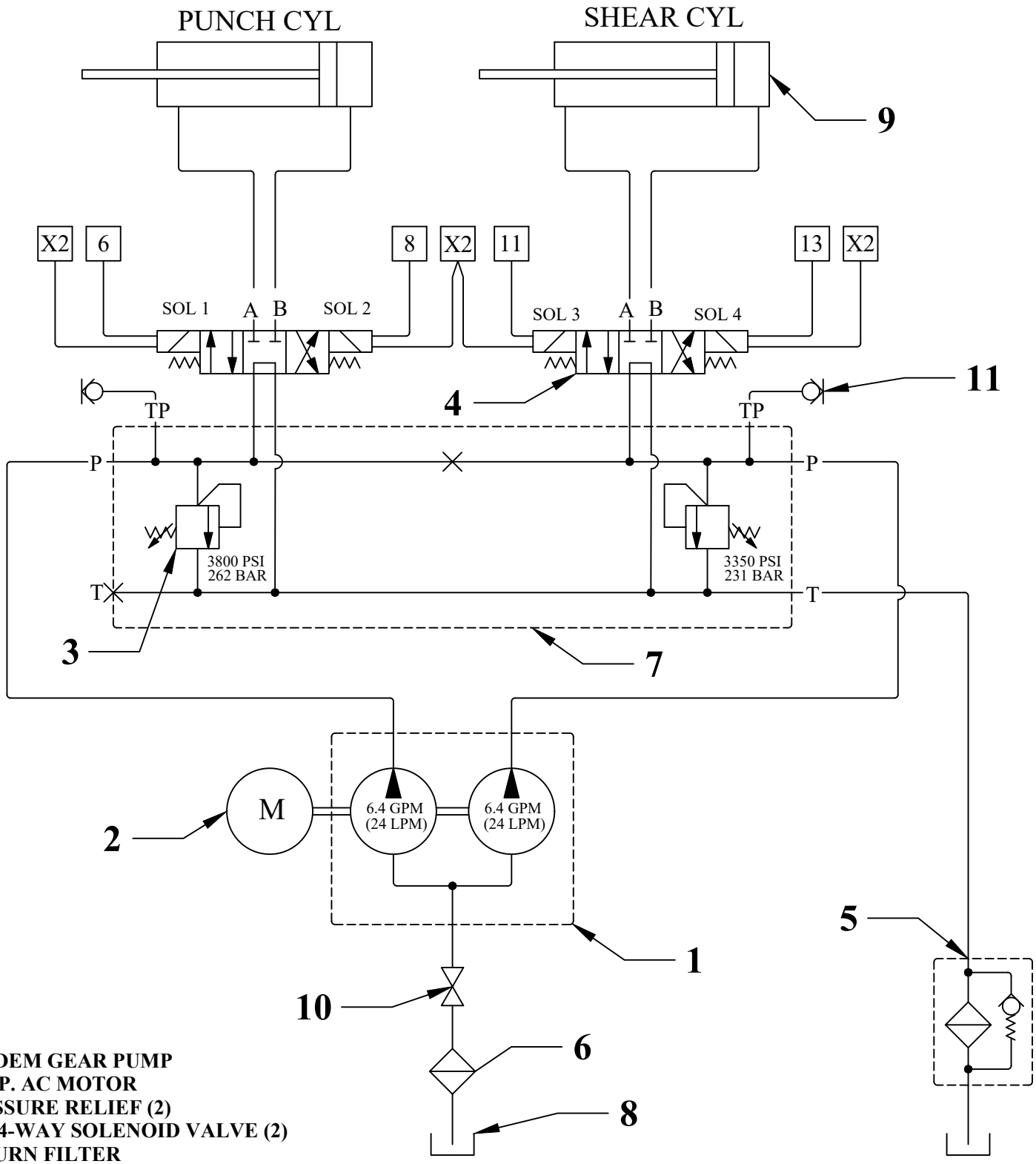


FIGURE 62

DO85 HYD. SCHEMATIC



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 = 18 GAL (68L) VENTED RESERVOIR
9 = DOUBLE ACTING CYLINDER (2)
10 = MANUAL SHUT-OFF VALVE
11 = LINE PRESSURE TEST PORT (2)

FIGURE 63