



# **OPERATION AND MAINTENANCE MANUAL FOR PEMSERTER® SERIES 4® - VERSION M**

## **HARDWARE INSERTION MACHINE (Original Instruction)**



PennEngineering®  
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Kunshan, Jiangsu Province 215300, P.R.China  
[www.pemnet.com](http://www.pemnet.com).  
PRODUCED IN CHINA BY PEM (CHINA) Co., Ltd

# OPERATION AND MAINTENANCE MANUAL

**SERIAL NUMBER** \_\_\_\_\_

**NOTE:** Your New PEMSERTER® Series 4®  
Hardware Insertion Machine  
has been assigned a Serial Number as indicated above.

This Number Must Be Referenced  
In all Correspondence

Part Number 8018760  
Revision J (25-FEB-2022)



## **Read Manual Before Operating Machine!**

### **FOREWORD**

Thank you for purchasing a PEMSERTER® Series 4® Hardware Insertion Machine. With the proper care and maintenance, your machine will install millions of fasteners safely, quickly and consistently. The machine has a maximum 6 ton (54kN) capacity with an 18 inch (450 mm) throat. It is totally pneumatically controlled and operated. No electric power is required.

The Hardware Insertion Machine is covered by a one (1) year limited warranty.

Should any questions or problems arise concerning your Series 4® Machine, contact the PennEngineering® Service Department. **Toll-free telephone number +86(512)5726-9310 (in China) or +1 (209)-848-4000(in America) or +31(541)-530-230 (in Europe)**

Set-up, Training and Repair Service is available to you as long as you own your Machine. Free telephone instruction and Service is available for the lifetime of your Machine by calling the PennEngineering® Service Department.

### **SHIPPING DAMAGE**

The PEMSERTER® Series 4® Machine has been shipped to you packaged to withstand normal handling during transit. Upon receipt, the unit should be checked for any damage that may have occurred during shipment due to improper handling. Should any damage be found, the transportation company who delivered the unit must be immediately notified as should the PennEngineering® Service Department.

### **SPECIFICATIONS:**

Ram Force.....	400 to 12,000 lbf (1.8 to 53.4 kN)
Ram Stroke.....	7/32 inch (5.5mm)
Air Requirements.....	90 to 100 PSI (6 to 7 BAR)
Air Line .....	½" (12mm) I.D. Minimum line flow
Throat Depth.....	18" (45cm)
Weight (Insertion Machine ).....	485 lbs (220kg)
Weight (Stand ).....	230 lbs (105kg)
Ambient Temperature .....	-20° F to 120° F (-29° C to 49° C)
Ambient Humidity .....	0% to 80% (Not reflective of inlet air)
Air Consumption .....	Approx. 2.3 liters/sec at 1 atm (4.9 scfm) 20 insertions per minute at 20 kN (4500 lbf)

# SAFETY

The Series 4<sup>®</sup> was designed to conform to applicable ISO, ANSI, OSHA, CEN and CSA safety standards.

The Series 4<sup>®</sup> is compliant to applicable European Union (EU) directives and bears the CE Mark.

The Series 4<sup>®</sup> conforms to the essential requirements of the following directives:

2006/42/EC Machinery Directive

of which only the Essential Health and Safety Requirements of Annex I apply.

EN ISO 12100 Safety of Machine Tools. Hardware Insertion Machine.

Please read and follow the safety precautions listed below.



## GENERAL SAFETY PRECAUTIONS

- ◆ Always use safety goggles when operating or maintaining the machine.
- ◆ Always disconnect the air supply before maintaining the machine.(shut-off the pressure relief valve and should be locked it.)
- ◆ Ear Protection is recommended.
- ◆ Before using the machine, make sure that a shutoff device has been fitted on the air supply line and the location is easily accessible, so that the air supply to the machine can be shut off in an emergency.
- ◆ Check the air hose and fittings regularly for wear.
- ◆ Use only approved parts for maintenance and repairs.
- ◆ Do not use chipped, cracked or damaged accessories and tools.
- ◆ Attach air line securely.
- ◆ Keep body parts away from moving parts.
- ◆ Never wear jewelry, loose clothing or anything that could get caught in moving parts.
- ◆ If a new user is operating the machine, be sure these instructions are readily available.
- ◆ Do not use the machine in any way other than for its intended purposes.
- ◆ Do not modify the machine
- ◆ The equipment is not allowed to operate in explosive, corrosive or underground environment or environment containing flammable or poisonous substances.

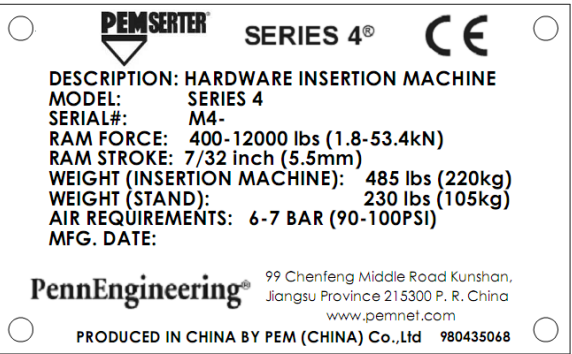

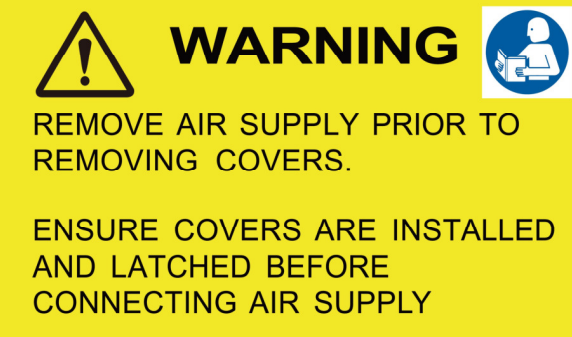







## WARNING:

The PEMSERTER<sup>®</sup> Series 4<sup>®</sup> machine is equipped with a point-of-operation safety device to protect the operator from potential injury. A detailed explanation of the safety system can be found in Section 4 – “Operator Safety” of this manual. ANSI specification Number B11.1-1982, Section 5 states "It is the employer's responsibility to ensure the usage of a point-of-operation safety or guard or a properly applied and adjusted point-of-operation safety device on every operation performed on a press production system." It is important that employers ensure that their operators understand and are trained to properly set-up the Series 4<sup>®</sup> safety system before operation.




**IMPORTANT:** The setup gap, as explained later in this manual, must not exceed 7/32 of an inch (5,5 mm) between the punch and anvil, with the ram fully extended by gravity, to comply with most major safety standards which set the limit at 1/4" or 6mm (Figure 4.0). These include standards published by ISO, ANSI, OSHA, CEN and CSA.

Label	Definition
Series 4 Plate	 <p><b>PEMSERTER</b> <b>SERIES 4®</b> <b>CE</b></p> <p>DESCRIPTION: HARDWARE INSERTION MACHINE  MODEL: SERIES 4  SERIAL#: M4-  RAM FORCE: 400-12000 lbs (1.8-53.4kN)  RAM STROKE: 7/32 inch (5.5mm)  WEIGHT (INSERTION MACHINE): 485 lbs (220kg)  WEIGHT (STAND): 230 lbs (105kg)  AIR REQUIREMENTS: 6-7 BAR (90-100PSI)  MFG. DATE:</p> <p><b>PennEngineering®</b> 99 Chenfeng Middle Road Kunshan,  Jiangsu Province 215300 P. R. China  www.pemnet.com</p> <p>PRODUCED IN CHINA BY PEM (CHINA) Co.,Ltd 980435068</p>
Warning Plate	 <p><b>WARNING</b></p> <p>NEVER OPERATE, SERVICE, ADJUST THIS MACHINE, OR INSTALL TOOLS, WITHOUT FIRST READING AND UNDERSTANDING THE INSTRUCTION MANUAL.</p> <p>NEVER INSTALL TOOLS OR SERVICE THIS MACHINE UNLESS AIR SUPPLY IS DISCONNECTED.</p> <p>NEVER REMOVE OR ALTER ANY SAFETY DEVICE ON THIS MACHINE.</p> <p>WORK SAFELY AT ALL TIMES.</p> <p>THE GAP BETWEEN THE SURFACES OF THE PUNCH AND ANVIL, WITH THE PUNCH FULLY EXTENDED, SHOULD NOT EXCEED 7/32" (5.5 mm).</p> <p><b>DO NOT REMOVE PLATE</b></p>
Warning Label	 <p><b>WARNING</b></p> <p>REMOVE AIR SUPPLY PRIOR TO REMOVING COVERS.</p> <p>ENSURE COVERS ARE INSTALLED AND LATCHED BEFORE CONNECTING AIR SUPPLY</p>
Warning Label	 <p><b>WARNING</b></p> <p>Do not activate <b>Foot Pedal</b> until part has been placed on the Anvil</p>

Label	Definition
	General Warning Label – There are items that require attention. These are specified in the operator’s manual.
	Eye Protection Label – Eye protection must be worn when operating the press.
	Pinch Point Label – Keep hands away from area.
	Read Manual Label –Read the content before operation.

#### OPTION

Label	Definition
	<p><b>CAUTION: Laser Radiation. Do not stare into beam. Class 2 laser product.</b></p> <p><b>Per EN 60825 and ANSI Z136.1:</b> Class 2 lasers are low power devices emitting visible radiation in the wavelength range 400nm to 700nm. Momentary viewing is not considered hazardous since the upper radiant power limit on this type of device is less than the MPE (Maximum Permissible Exposure) for momentary exposure of 0.25 second or less. Intentional extended viewing, however, is considered hazardous.</p> <p>Never aim the spotting light anywhere except at the workpiece.</p>

## **WARRANTY**

PennEngineering® warrants that this product, when correctly used according to directions and under normal operating conditions, will be free from defects in material and workmanship for a period of one (1) year from the date of purchase.

This warranty shall not apply to any product which has been altered, changed or repaired, normal maintenance excluded, except as authorized by PennEngineering®. This warranty shall not apply to any product that has been subject to misuse, negligence or accident.

The purchaser's exclusive and sole remedy shall be limited to repair, modification or replacement at the discretion of PennEngineering®. In no event shall PennEngineering® be liable for the cost of any indirect or consequential damage. In no case shall PennEngineering®'s liability exceed the purchase price of the product.

This warranty is exclusive and in lieu of all other warranties. No oral or written information by PennEngineering®, its employees, representatives, distributors or agents shall increase the scope of the above warranty or create any new warranty.

# **PEMSERTER® SERIES 4® - VERSION M HARDWARE INSERTION MACHINE OPERATION AND MAINTENANCE MANUAL**

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## SECTION 1

### AIR SUPPLY PREPARATION

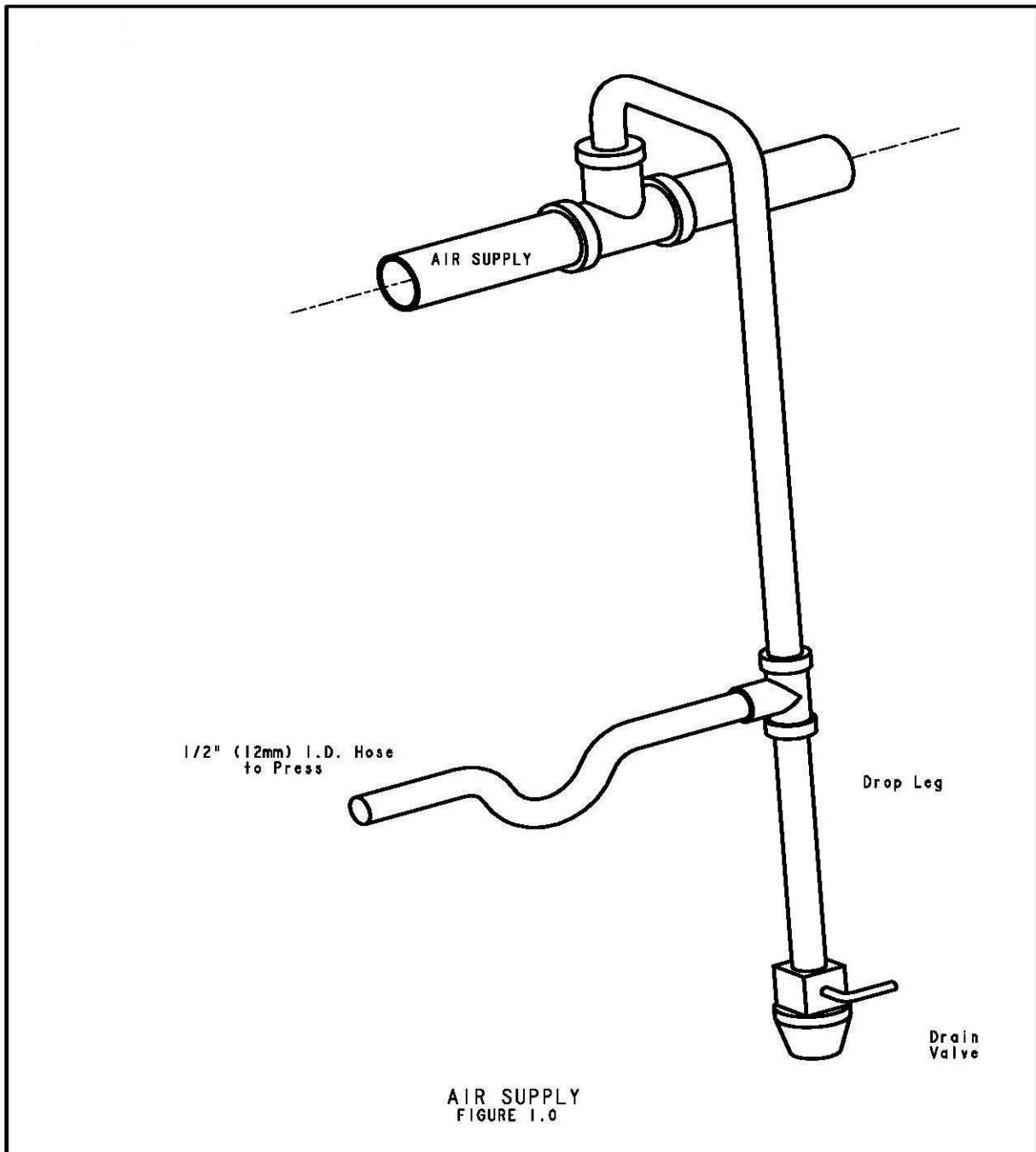
#### Recommended Air Supply Hook-Up Arrangement

Proper air supply is very important to the performance and maintenance of the machine. Following these simple guidelines will ensure good machine performance.

- **Air Quality** - The quality of the air supply is very important. The air must be clean and dry. Moisture and debris will contaminate the valve systems and lead to machine performance and maintenance problems.
- **Air Supply Flow** - Use a minimum 12mm (1/2") inside diameter line and fittings from the compressed air source to the machine. Shop pressure ranging between 6 to 7 BAR (90 psi to 110 psi) is acceptable. Inadequate air flow will affect machine performance.
- **Air Consumption** – Average air consumption running at 20 kN (4500 lbf) at 20 insertions per minute is about 2.3 liters/sec at 1 atm. (4.9 scfm). Air Supply Flow requirements are higher than those reflected by these values as air is not being consumed during the entire cycle time.
- **Piping Installation** – Proper piping hook-up will help achieve the above requirements. See figure 1.0 on the next page.  
Connect to your supply line with a pipe pointing upwards that curves over and down. This arrangement will help prevent water and compressor oil from entering the machine.  
Connect to that drop with your supply fitting for a 12mm (1/2") or larger hose.  
Continue the end of the drop to a drain valve. This will help collect additional water and oil and allow the system to be purged.  
If your factory air supply falls short of the above recommendations, an air reservoir tank of an appropriate size for your location can be used.  
An auxiliary filter/separator installed immediately outside the machine is recommended.



**CAUTION:** Before connecting air supply to the machine, ensure initial machine set-up is complete and the ram force is set at the minimum (Ram Force knob turned completely counter-clockwise).



## SECTION 2

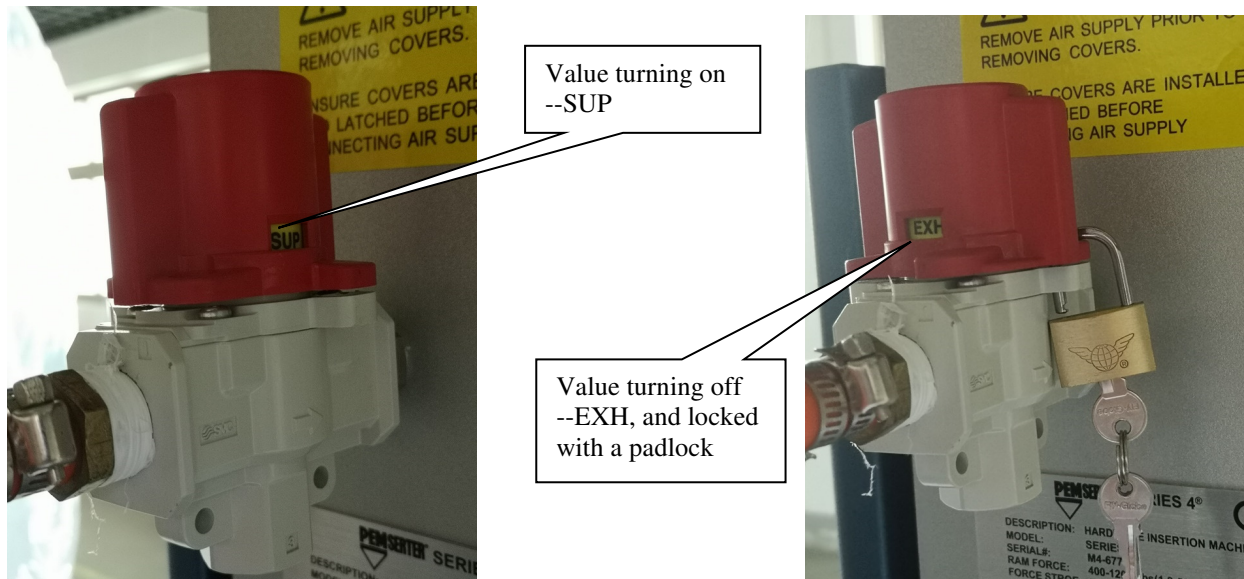
### UNPACKING AND INITIAL SET-UP

Select a clean, well-lit area to place your Series 4® machine. Check that the floor is in good condition and capable of supporting the weight of the machine, stand and operator. Provide an area around the machine that will allow for the removal of the top cover and clearance for opening the back door. A minimum of (2) feet (60 cm) along each side and (2) feet (60 cm) behind the machine is recommended (Figure 2.0).

Carefully remove the crating and packing materials around the machine and stand. Remove the box strapped to the crate containing assembly hardware, footswitch, tooling, etc.

Remove the top cover from the machine. Observe the red warning tags. Follow the instructions and remove only the items required for shipping.

**Air Supply Inlet System** The supply of compressed air enters the Hardware Insertion Machine in frame above the side through a system, which includes a pressure relief valve (outside the frame--use as a switch) and a main air filter exhaust/supply valve (inside the frame). The regulator is manually set to control the supply line pressure. Turning on the pressure relief valve(State – SUP) /supply valve supplies air to the machine. When the pressure relief valve is turned off the valve closes (State – EXH) and exhausts all downstream compressed air in the machine quickly, and should be locked with a padlock.(Figure 3.3)





**CAUTION:** Do not remove the remaining warning tags until all instructions are read and understood.

Attach shackles and a chain through the (2) machine lifting holes (Figure 3.0). The machine and stand weigh approximately 715 pounds (325 kg). Unbolt, then lift the machine and stand from the pallet. Remove the chain and shackles and secure the top cover.



**WARNING:** Do not lift the assembled machine and stand by the stand. The assembled machine and stand is top heavy and may fall if tilted beyond 10° of vertical.



**IMPORTANT:** Bolt the stand to the floor. Use appropriate fasteners for the type of floor. Use steel bolts of 10mm (3/8") diameter.



**Forklift Location**



Fork lift location

Fork lift location



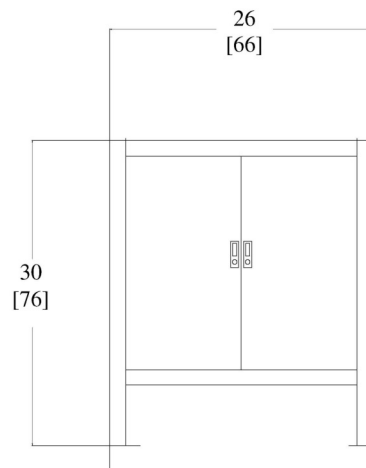
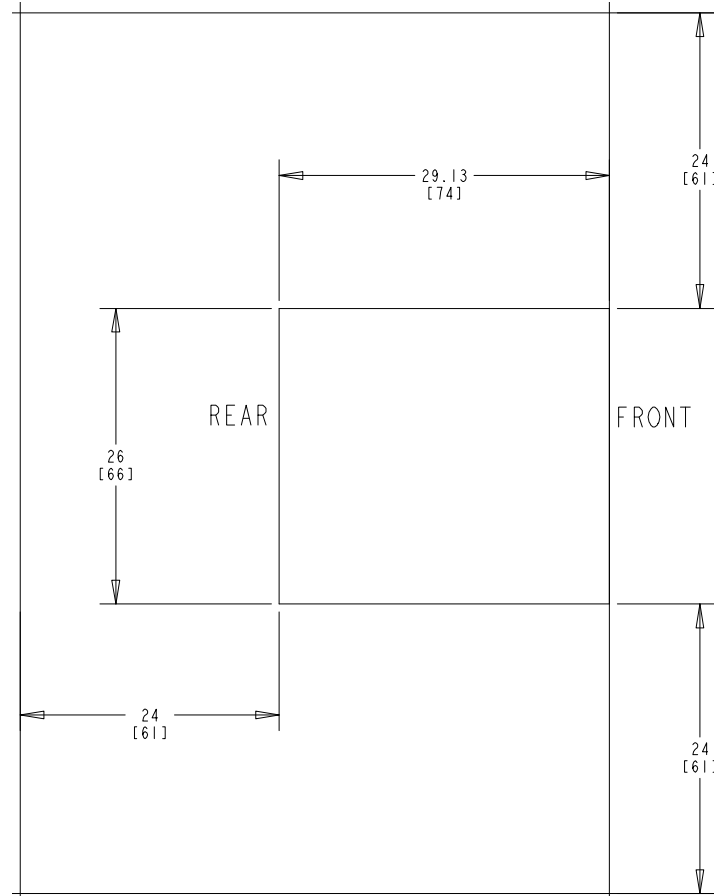
**In the factory**



Fork lift location

## RECOMMENDED CLEARANCE FOR MACHINE STAND

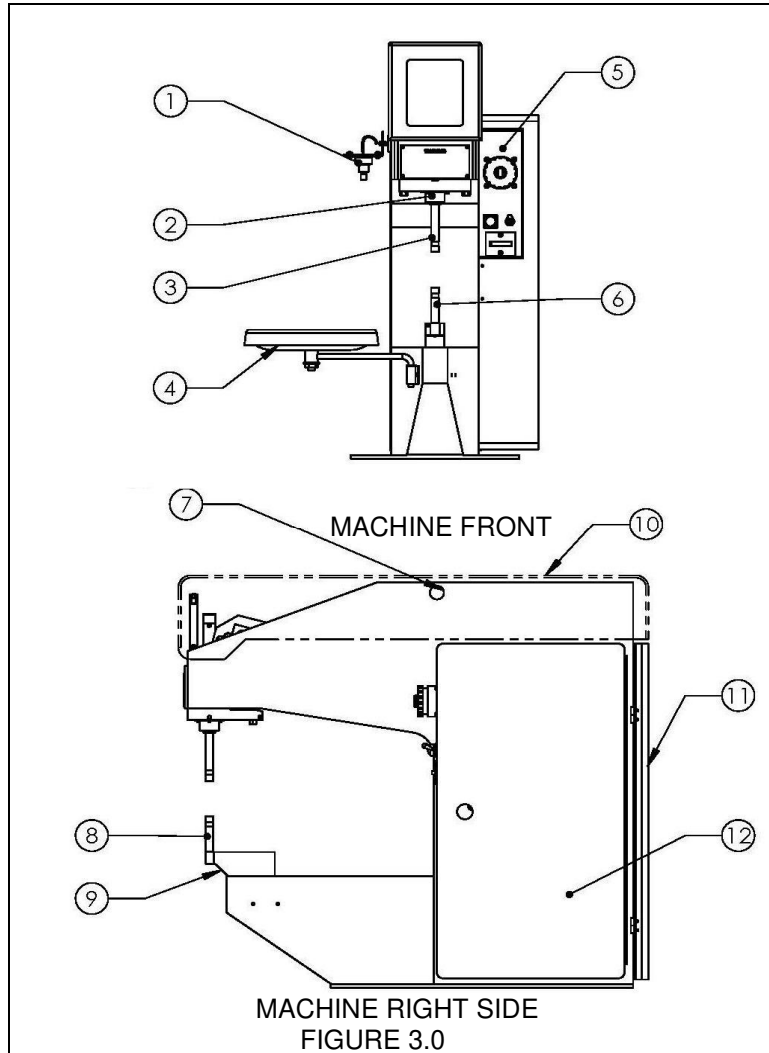
NOTE:  
Dimension shown in [ ]  
Are in Centimeters



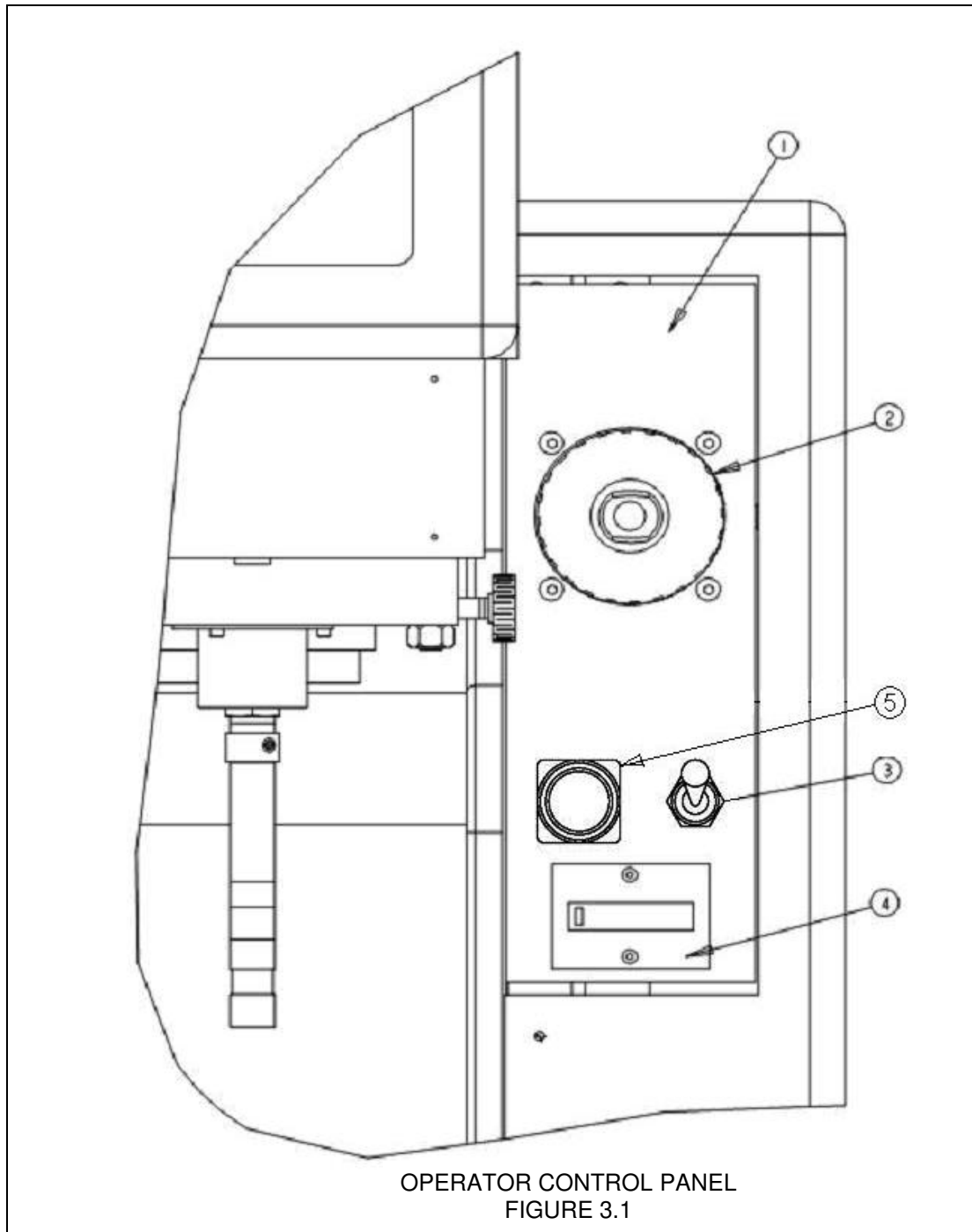
STAND PLACEMENT AND RECOMMENDED  
CLEARANCES FIGURE 2.0

## SECTION 3

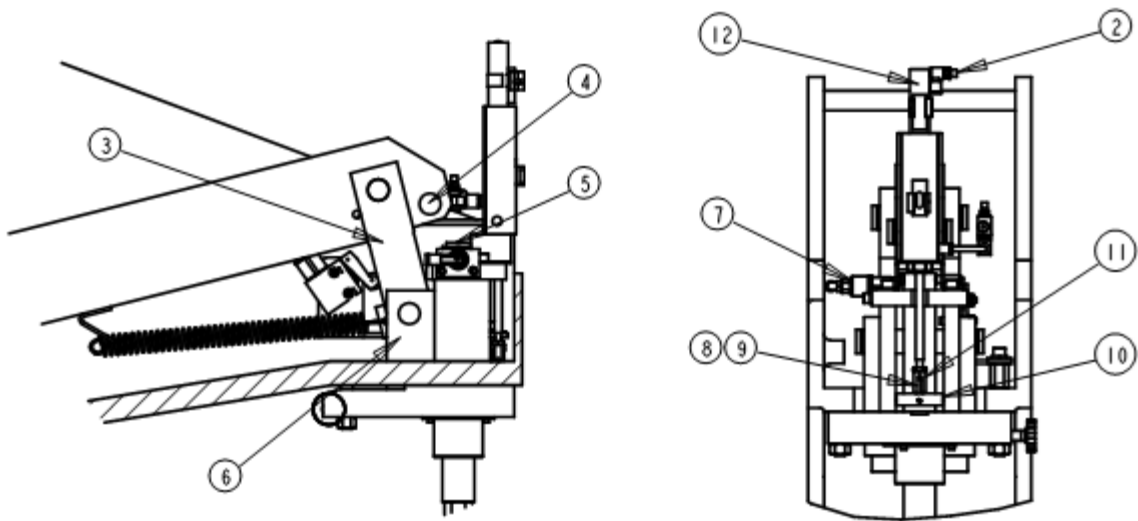
### MACHINE FAMILIARIZATION



Item	Description	Qty.
1	Spotting Light (Options)	1
2	Ram Bearing	1
3	Ram Bushing & Jam Nut	1
4	Parts Tray	1
5	Control Panel Assy.	1
6	Punch	1
7	Lifting Holes	1
8	Anvil	1
9	Anvil Holder	1
10	Top Cover	1
11	Rear Cover	1
12	Tool Storage Cabinet	1

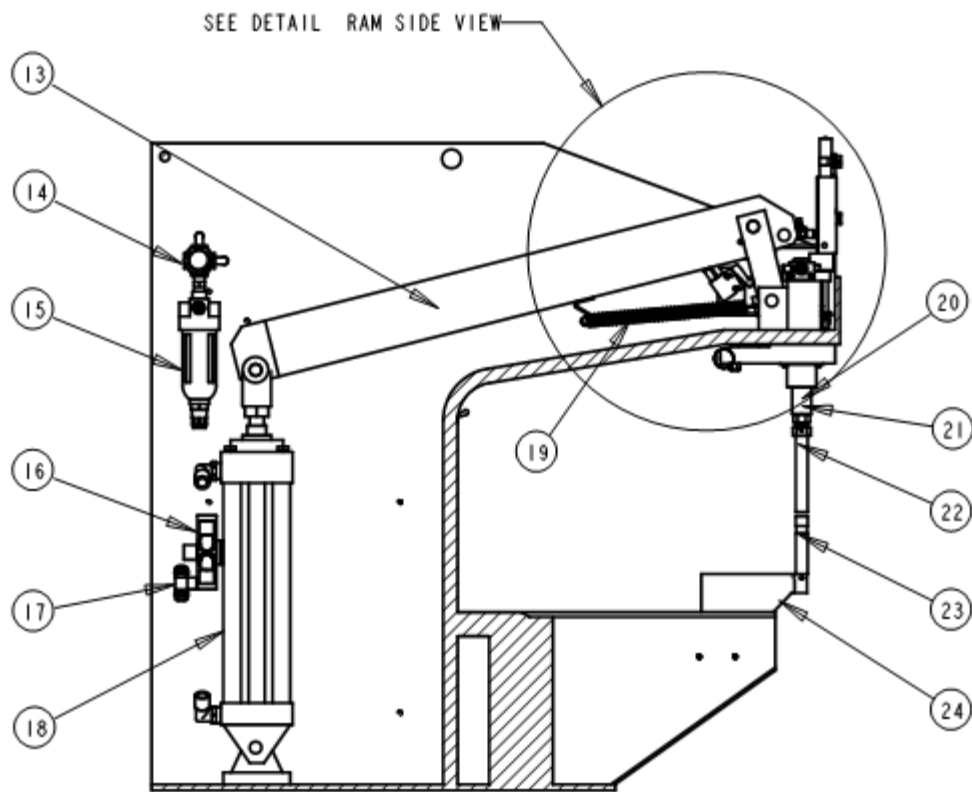


Item	Description	Qty.
1	Control Panel	1
2	Ram Force/Air Pressure Adjustment	1
3	Set-Up/Cycle Switch	1
4	Pneumatic Totalizer	1
5	OPTICAL SENSOR INDICATOR	1



RAM SIDE VIEW

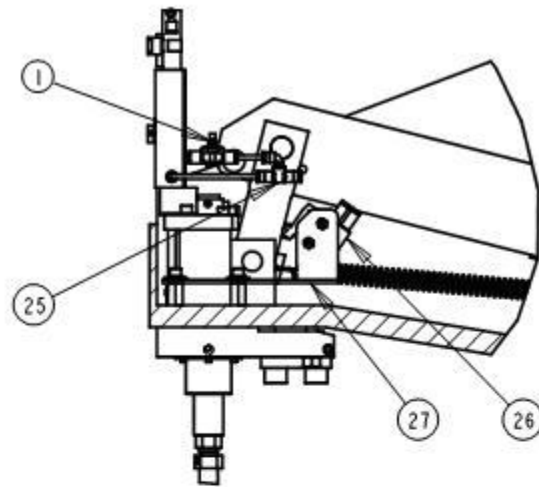
RAM FRONT VIEW



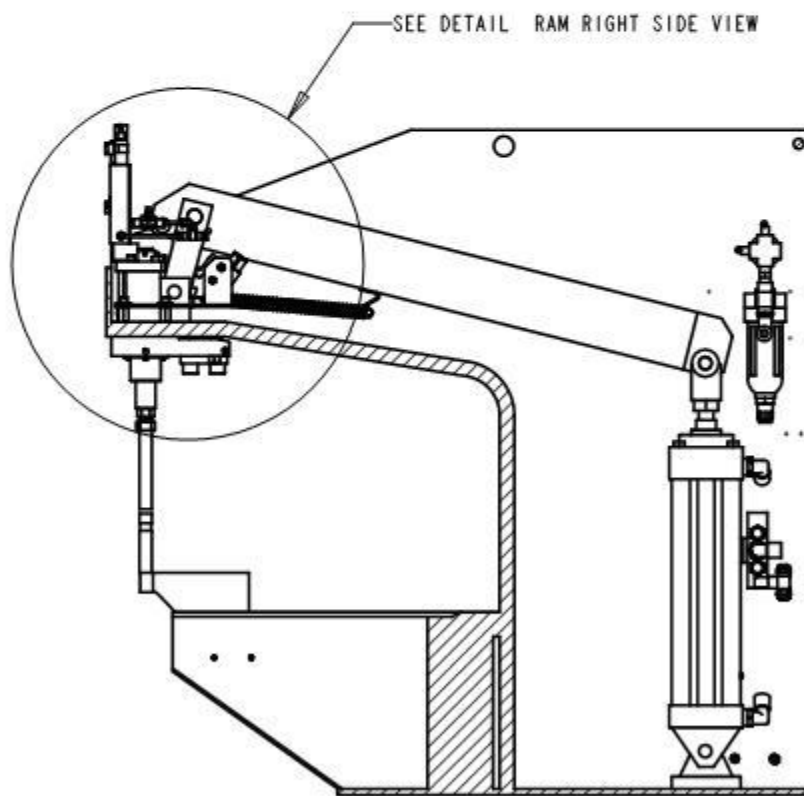
MACHINE ASSEMBLY

FIGURE 3.2



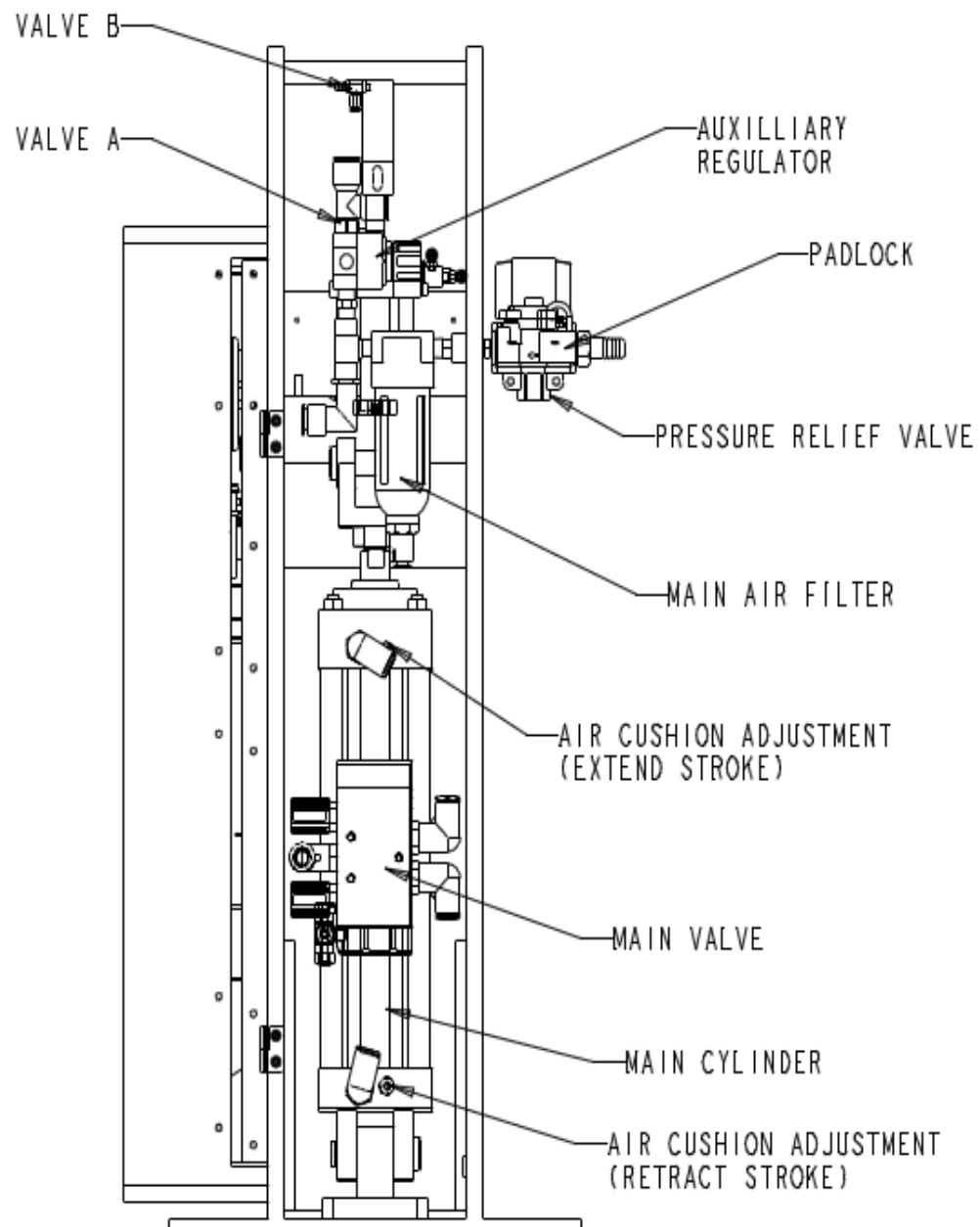


RAM RIGHT SIDE VIEW

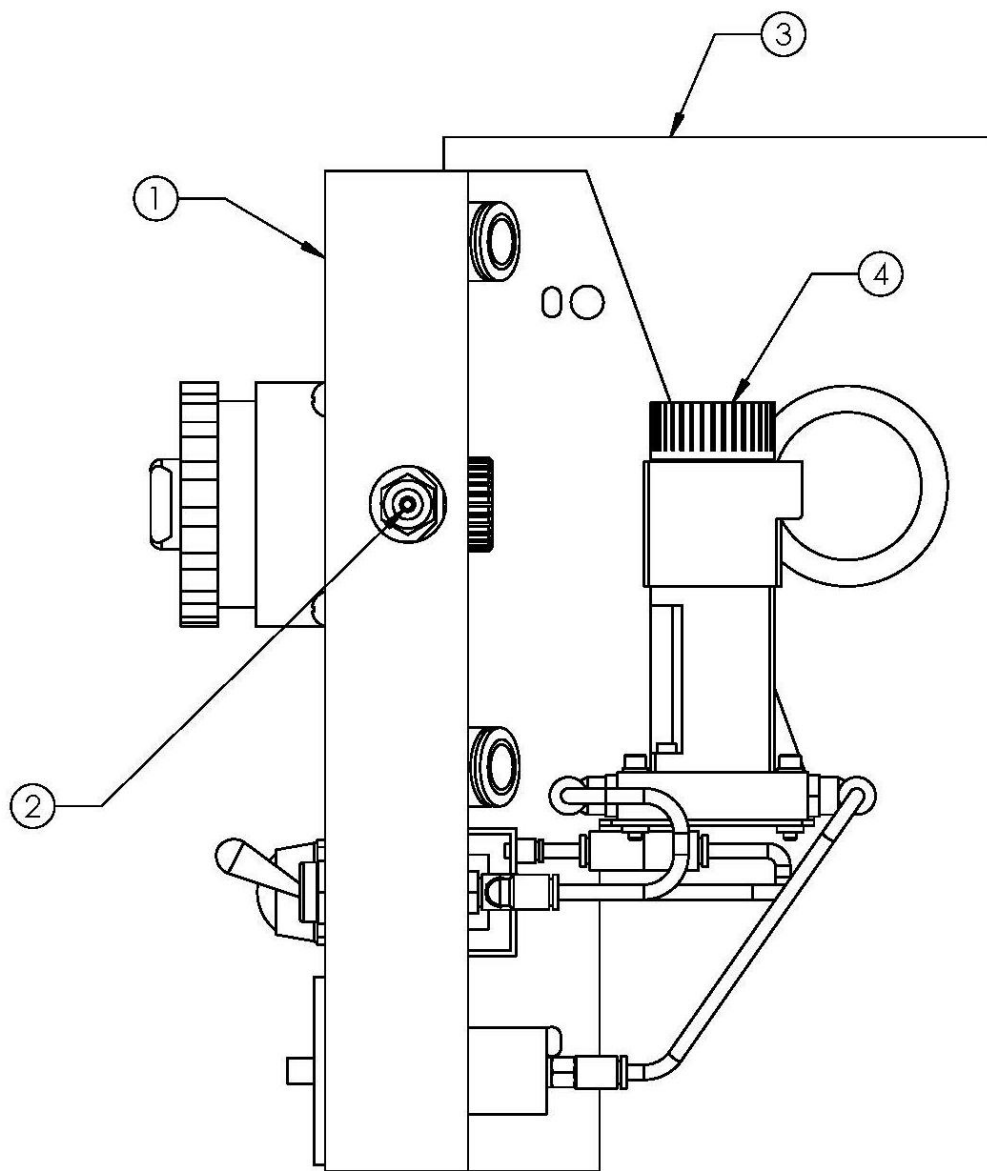


MACHINE ASSEMBLY  
FIGURE 3.2 CONTINUED

27	8004686	MOUNTING BRACKET, ROLLER VALVE	1
26	8002157	LEVER ROLLER VALVE	1
25	8002805	QUICK EXHAUST VALVE	1
24	980035003	ANVIL HOLDER TURRET	1
23		ANVIL-AS REQUIRED	1
22		PUNCH-AS REQUIRED	1
21	980335097	BUSHING RAM	1
20	980335098	RAM JAM NUT ALL PS-4 MODELS	1
19	980039483	SPRING EXTENSION	1
18	8015019 (Up to S/N 5438) 8017765 (S/N 5439 & Up)	CYLINDER NFPA, 3-1/4	1
17	8015022 (Up to S/N 5438) 9800393039 (S/N 5439 & Up)	FITTING SHUTTLE VALVE	1
16	8015511 (Up to S/N 5438) 9800393037 (S/N 5439 & Up)	MAIN VALVE	1
15	980445023	(B)FLTR AUX REG.ASSY,PS4	1
14			
13	980435103	LEVER 18 TO 1 SERIES 4 PRESS	1
12	980445024	(B) LIFT CYL ASSY 9/16 PS4	1
11	980039015	CLEVIS 10-32 BRASS	1
10	980435060	PLATE CROSS PIN RAM MOD PS4	1
9	980039078	PIN SPRING 1/8 x 3/8	1
8	980435059	LINK CLEVIS LIFT CYL PS4	1
7	980445025	BALL ACT./VALVE KIT	1
6	980435007	PIVOT BLOCK	2
5	980435012	RAM PS4	1
4	980420016	PIN DOWEL 3/4 GROOVED 2IN	1
3	980435008	LINK LEVER	2
2	8002804	VALVE FLOWCNTRL 5/32OD,10/324J	1
1	8005969	VALVE FLOW CONTROL, 5/32	1
ITEM	PART NUMBER	DESCRIPTION	QTY
<b>FIGURE 3.2 (CONTINUED)</b> <b>MACHINE ASSEMBLY</b>			



REAR VIEW  
FIGURE 3.3



TIMER LOCATION (CONTROL BOX REMOVED)  
FIGURE 3.4

Item	Description	Qty.
1	Control Panel	1
2	Pressure Diagnostic Connection	1
3	Control Box(Removed)	1
4	Timer	1

## SECTION 4



### OPERATOR SAFETY

An important feature of the PEMSERTER® Series 4® Model M machine is its "Point of Operation" safety. When the footswitch is depressed, the ram extends by gravity. At the end of the ram stroke, the ram cross pin actuates the ball valve causing the installation force to be applied to the ram assembly and punch. If an obstruction, greater than the set gap between the punch and the anvil, is encountered, the ball valve will not be actuated and the installation force will not be applied.



**Caution:** The foot pedal can only be stepped down when the parts is put on the punch

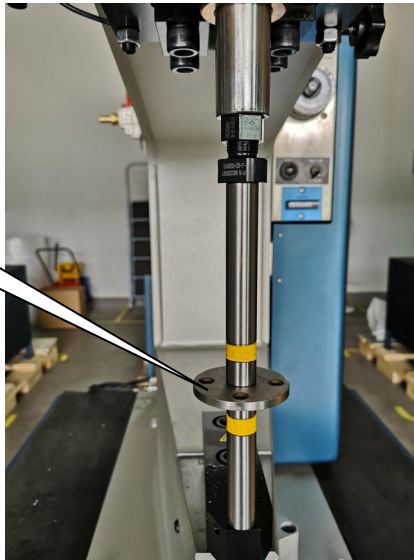


**Important:** The gap must not exceed 7/32 of an inch (5,5 mm) set gap between the punch and anvil, with the ram fully extended by gravity, to comply with most major safety standards which set the limit at 1/4" or 6mm (Figure 4.0). These include standards published by ISO, ANSI, OSHA, CEN and CSA.

#### Ball valve location confirmation

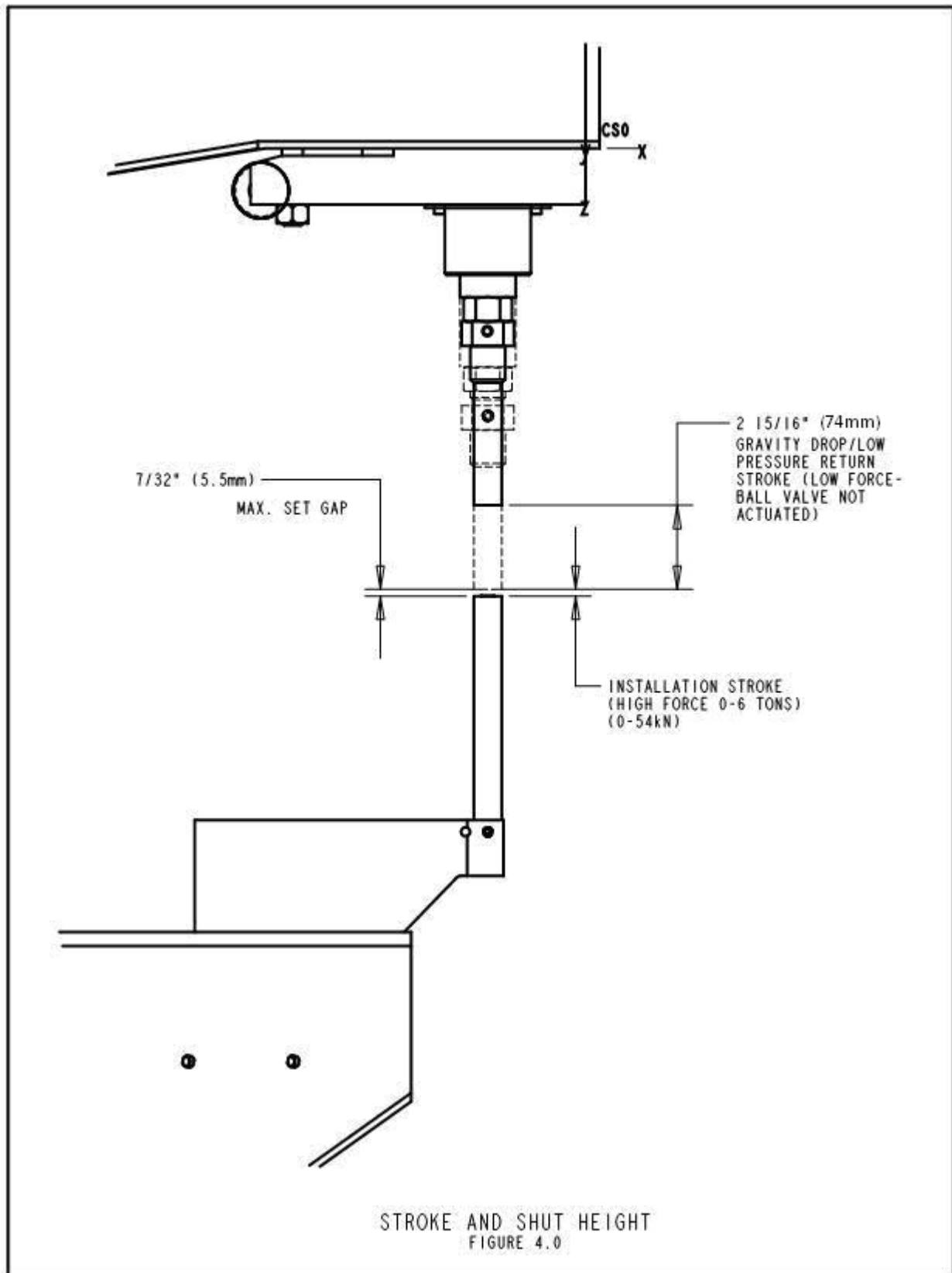
While the ram down set the gap between the punch and anvil to .004inch (0.10mm). Confirm with the feeler that the ball valve can be activated at .177inch (4.5mm) at 12000 pounds force with the main cylinder extended, and the ball valve cannot be activated at .217inches (5.5mm) at 12000 pounds force with the main cylinder extended.

4.5mm Feeler



5.5mm Feeler





## **A AIRBORNE NOISE EMISSIONS**

A PEMSERTER® Series 4® - Model M Hardware Insertion Machine was set at the maximum ram force and cycled continuously.

Sound pressure was measured at a distance of 1 meter from the surface of the press at a height of 1.6 meters from the floor at a worst case point (behind the machine, near the installation force cylinder).

Equivalent continuous A-weighted sound pressure = 53.5 dB

Peak A-weighted instantaneous sound pressure = 85.0 dB

Sound pressure was measured at the operator's working level (area in front of the machine).

Equivalent continuous A-weighted sound pressure = 45.0 dB

Peak A-weighted instantaneous sound pressure = 84 Db



However, If the machine is operated in a room with other machines, the sound emission level (rated level) can be over 85 dB(A)

If this is the case, improve the acoustics in the room. If you do not, the hearing of the operators may be damaged.

Equipment used during testing:

Description: Sound Level Meter  
Manufacturer: General Radio  
Model: 1565-B  
Serial Number: 05563

Description: Noise Dosimeter  
Manufacturer: Metrosonics  
Model: dB307 Class 2A  
Serial Number: 5791

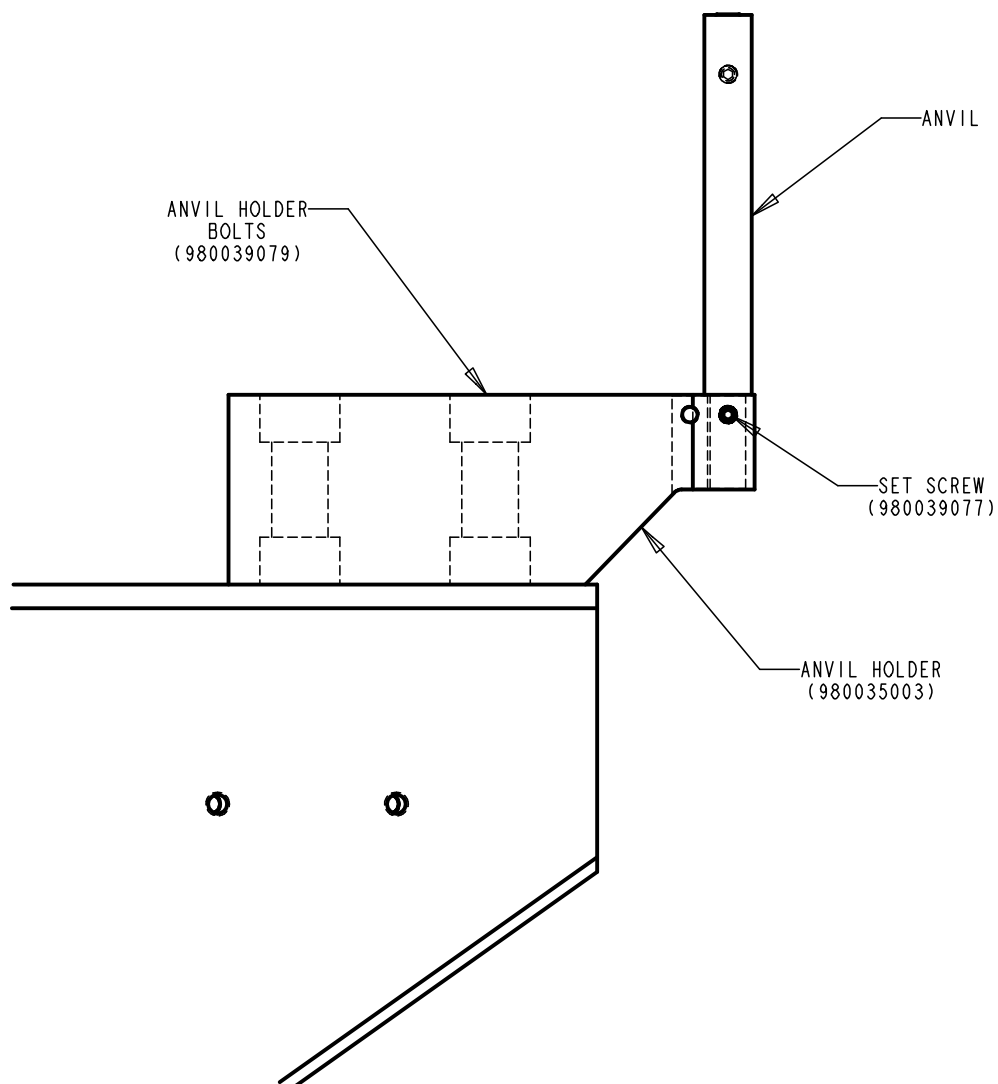
## **SECTION 5**

### **TOOLING SET-UP**

#### **STANDARD PUNCH AND ANVILS**

1. Refer to the tooling guide for the appropriate punch and anvil for the fastener being installed.
2. Set the ram force to OFF. Disconnect the air supply to the machine. The ram will extend by gravity. Remove the punch by loosening the (2) set screws in the ram bushing. Install the new punch and tighten the (2) set screws.
3. Set the ram force to OFF. Connect the air supply to the machine. The ram will retract.
4. Loosen the set screw in the side of the anvil holder and remove the anvil. Install the new anvil into the anvil holder and tighten the set screw (Figure 5.0).
5. Set the ram force to OFF. Disconnect the air supply to the machine. Check the alignment of the outside diameters of the punch and anvil. If necessary, align the anvil to the punch. Loosen the bolts in the anvil holder, reposition the anvil holder and then torque the anvil holder bolts to 100 foot pounds (136 Nm).



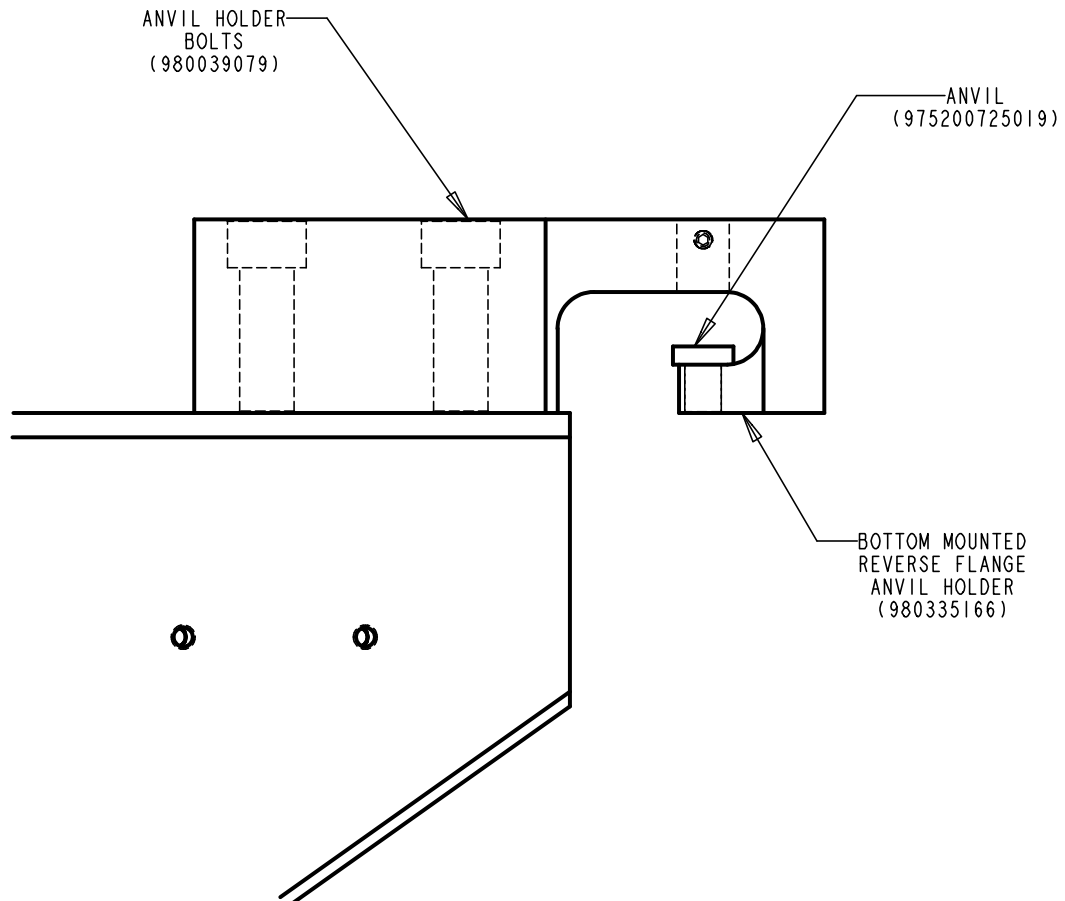


ANVIL AND ANVIL HOLDER (STANDARD)  
FIGURE 5.0

## BOTTOM MOUNTED REVERSE FLANGE ANVIL HOLDER

1. Refer to the tooling guide for the appropriate punch and anvil.
2. Set the ram force to OFF. Disconnect the air supply to the machine. The ram will extend by gravity. Remove the punch by loosening the (2) set screws in the ram bushing. Install the new punch and tighten the (2) set screws.
3. Set the ram force to OFF. Connect the air supply to the machine. The ram will retract.
4. Remove the standard anvil holder. Install the Bottom Mounted Reverse Flange Anvil Holder. **Do not tighten bolts** (Figure 5.1).
5. Set the ram force to OFF. Disconnect the air supply to the machine. Position the anvil holder to achieve the alignment of the outside diameters of the punch and anvil. Torque the anvil holder bolts to 100 foot pounds (136 Nm).

KIT ASSEMBLY  
(980020025)

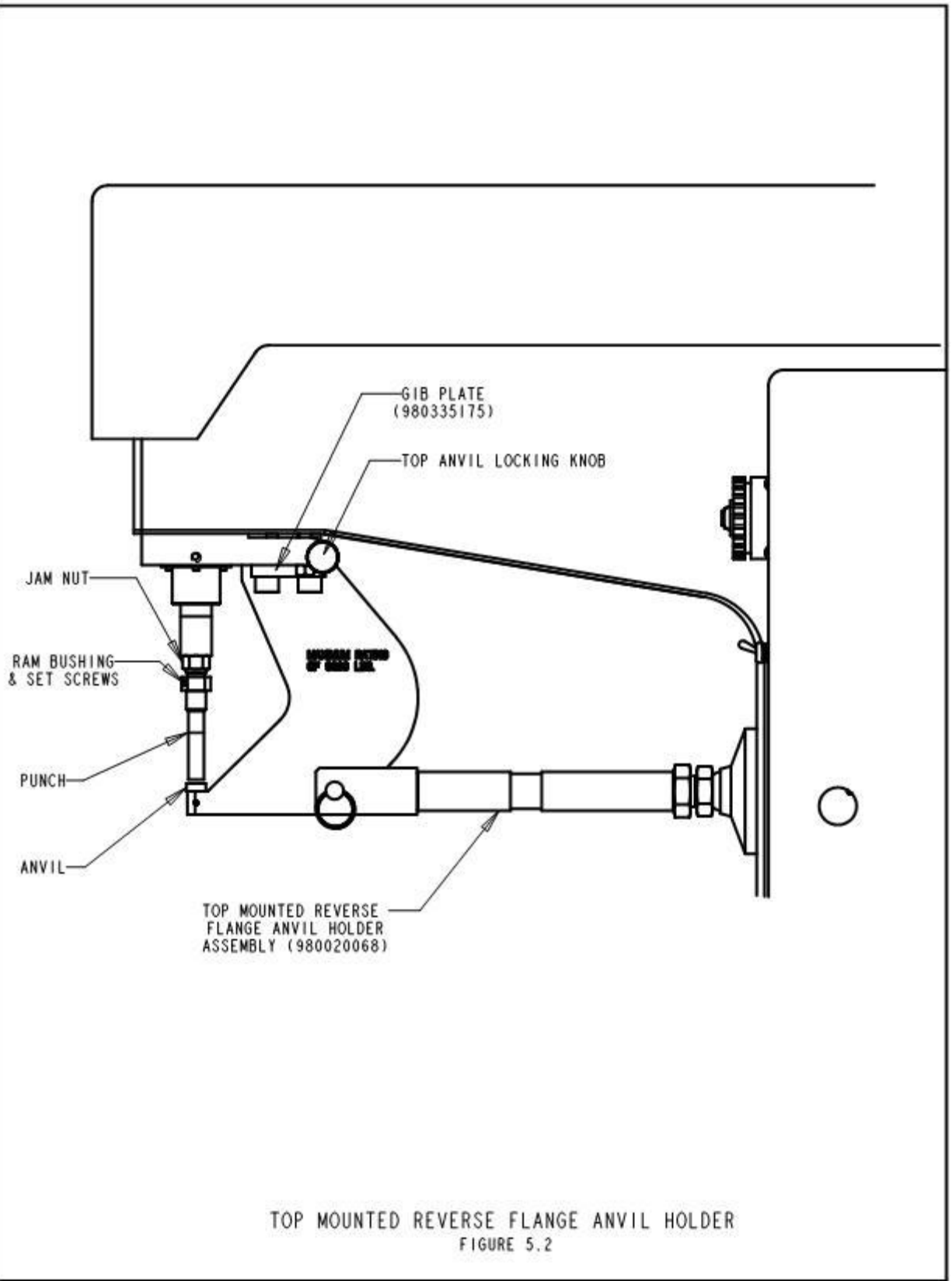


KIT ALSO INCLUDES PUNCH NOT SHOWN  
(975201037825)

BOTTOM MOUNTED REVERSE FLANGE ANVIL HOLDER  
FIGURE 5.1

## **TOP MOUNTED REVERSE FLANGE ANVIL HOLDER**

1. Refer to the tooling guide for the appropriate punch and anvil.
2. Set the ram force to OFF. Disconnect the air supply to the machine. The ram will extend by gravity. Remove the punch by loosening the (2) set screws in the ram bushing. Install the new punch and tighten the (2) set screws.
3. Set the ram force to OFF. Connect the air supply to the machine. The ram will retract.
4. Turn the top anvil holder locking knob (Figure 5.2) counter-clockwise to retract the pin in the T slot mount. Insert the Top Mounted Reverse Flange Anvil Holder into the T slot mount and slide completely forward. Adjustment of the gib plate may be required for more or less clearance in the T slot. If the gib plates are adjusted, retorque to 35 foot pounds (47.5 Nm). With the Top Mounted Reverse Flange Anvil Holder in place, tighten the top anvil holder locking knob.
5. Place the brace assembly against the frame and tighten the leveling pad. It may be necessary to re-tighten the leveling pad after the machine cycles, a few times, under installation force.
6. Install the anvil into the Top Mounted Reverse Flange Anvil Holder.



## SECTION 6

### MACHINE SET-UP AND OPERATION



#### **Before operating the machine**


Install the tooling (See the TOOLING SET-UP)

Always wear eye protection when operating the machine


Always keep all body parts as far away from moving parts as possible

Test the safety system every day (Refer to Page 34)

1. Set the ram force to OFF by turning the RAM FORCE ADJUSTMENT knob counter-clockwise (Figure 3.1).
2. Connect the air supply to the machine.
3. Place the SET-UP/CYCLE switch to "Set-Up".
4. When installing nuts, place the nut, shank up, in the counterbore of the anvil. Place the fastener installation hole of the workpiece on the shank of the nut. When installing studs or standoffs, place the fastener through the fastener installation hole of the workpiece. Then, insert the fastener with the workpiece into the anvil hole.
5. Depress the footswitch. The ram will extend and will remain extended as long as the footswitch is depressed. Use (2) 3/4 inch wrenches, one wrench on the ram bushing and the other wrench to loosen and tighten the ram jam nut (Figure 6.0). If only one wrench is used, the cross pin assembly may break. After the ram jam nut has been loosened, turn the punch by hand clockwise to lower the punch or counter-clockwise to raise the punch. With the ram fully extended and the ram jam nut loose, adjust the punch to slightly contact the panel (for nuts) or the head of the fastener (for studs and standoffs). At this point the optical sensor indicator will be orange. Next turn the punch by hand clockwise until the optical sensor indicator turns black, then turn the punch counter-clockwise slowly until the optical sensor indicator just turns back to orange, the press is now set. Tighten the ram jam nut using the (2) 3/4 inch wrenches as described above. Remove your foot from the footswitch. The ram will retract.

**NOTE:**  Caution must be taken not to exceed 7/32 of an inch (5,5 mm) gap between the surfaces of the punch and anvil, with the punch fully extended, to comply with OSHA and CE specifications. Refer to the OPERATOR SAFETY section of this manual for additional information.

6. Turn the RAM FORCE ADJUSTMENT knob to 1,000 to 1,500 lbs. (4.5 to 6.7 kN) of force. Depress the footswitch and hold the footpedal down until the ram is fully extended. Remove your foot from the footswitch, the ram will remain extended. If the ram retracts, check that the SET-UP/CYCLE switch is in "Set-Up" (not "Cycle") and the ram bushing is adjusted correctly. If it is not in "Set-Up" or if the ram bushing is not adjusted correctly, repeat steps 1 through 5.

**WARNING:**  Do not exceed 9,000 lbs. (40 kN) of force if the machine is set-up with a Top Mounted Reverse Flange Anvil Holder or tooling damage will occur. Do not exceed 6,000 lbs. (27 kN) of force, if the machine is set-up with a Bottom Mounted Reverse Flange Anvil Holder. Never exceed 12,000 lbs (54 kN).

Continue to turn the RAM FORCE ADJUSTMENT knob SLOWLY clockwise, while looking at the fastener and workpiece, until the fastener is properly installed.

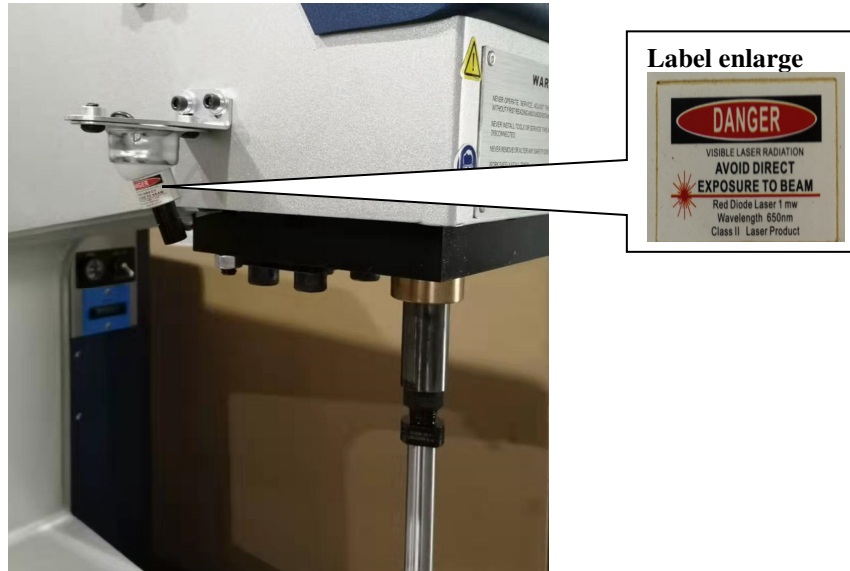
7. Place the SET-UP/CYCLE switch to "Cycle". The ram will retract.
8. The machine is now set-up for installation of fasteners for nuts. Place the nut, shank up, into the counterbore of the anvil. Place the fastener installation hole of the workpiece over the shank of the nut. Depress the footswitch. The ram will descend, install the fastener and retract.

For studs, place the fastener through the fastener installation hole of the workpiece. Then, insert the fastener with the workpiece into the anvil hole. Depress the footswitch. The ram will descend. Install the fastener and retract.

## FOOTSWITCH OPERATION SERIES 4 MACHINE

The footswitch must be depressed until the ram drops and the main cylinder begins to move.

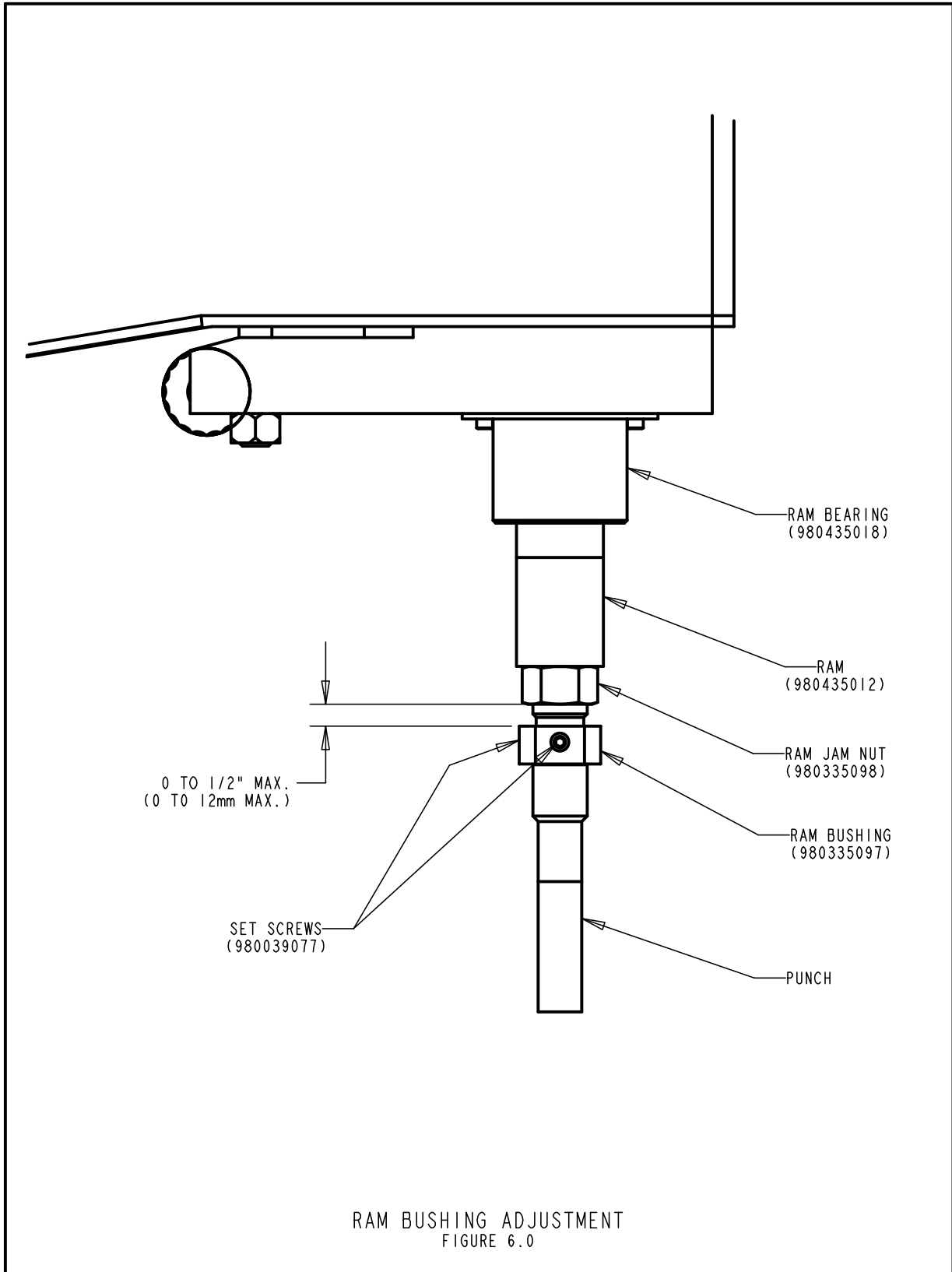
### **Laser Spotting with Magnetic Base (Option)**



### **Pneumatic Totalizer**

The 6-digit (0-999,999) totalizer is assembled into Control Panel Assembly. Counter is incremented with each press stroke. Counter should be reset after safety setup stroke to Operator manually resets counter.





## SECTION 7

### HARDWARE INSERTION MACHINE MAINTENANCE ADJUSTMENTS



**WARNING: DISCONNECT THE AIR SUPPLY BEFORE PERFORMING ANY MAINTENANCE .**



**WARNING: COMPLETE THE FOLLOWING MAINTENANCE EVERY DAY**

**Perform the safety stop distance test (5.5mm & 4.5mm feeler testing).**

**Purpose:** To check that the safety system is operating properly.

**Why:** The safety system of the machine is the most important system. It is designed to be self-diagnosing and so no single component fault will compromise the system. However, a check should always be done as a final test of the system.

**How Often:** Perform Daily and while change the tooling

**Tools Needed:** 5.5mm & 4.5mm feeler (The final customer must provide it)

- **Install Tooling** - any punch and anvil set can be used. Standard flat punch and anvil for a Series 4 are 16mm (.625") in diameter and 102mm (4.0") long & 76mm (3.0") long .(Ensure that the distance of 0.10mm or only touch the punch and anvil )
- **Adjust Force** –Adjust Air Pressure Adjustment to 12000lbs.
- **Test Safety System** - Test that the safety system is functioning properly. Use the following test:
  - a) After completing the safety setup step with nothing between the punch and the anvil. Place a 4.5mm feeler on the anvil.
  - b) Wear eye protection, keep body parts away from moving parts, as far as possible.
  - c) Step on the foot pedal.
  - d) The ram will extend, the punch will contact the 4.5mm feeler and the machine appear the high force.
  - e) Release the foot pedal, than place a 5.5mm feeler on the anvil. Step on the foot pedal again.
  - f) The ram will extend, the punch will contact the 5.5mm feeler and the machine will indicate a safety fault.
  - g) If the machine appear the high force, the machine has failed the safety test. Turn the machine off. Lock out the air supply. Contact your service representative



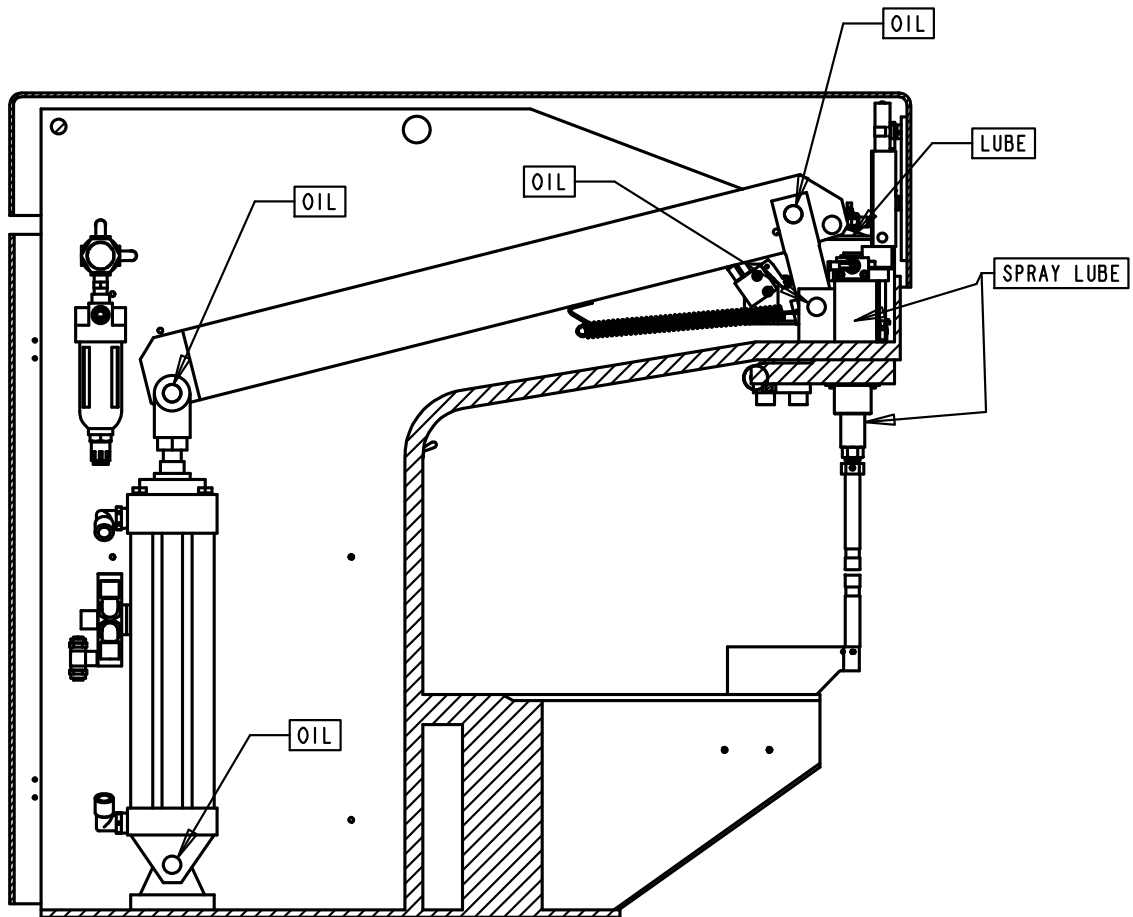
**IMPORTANT: COMPLETE THE FOLLOWING MAINTENANCE EVERY WEEK.**

1. Lubricate all pivot points with a good quality lubricating oil, such as SAE 20-30. (Refer to Figure 7.0).

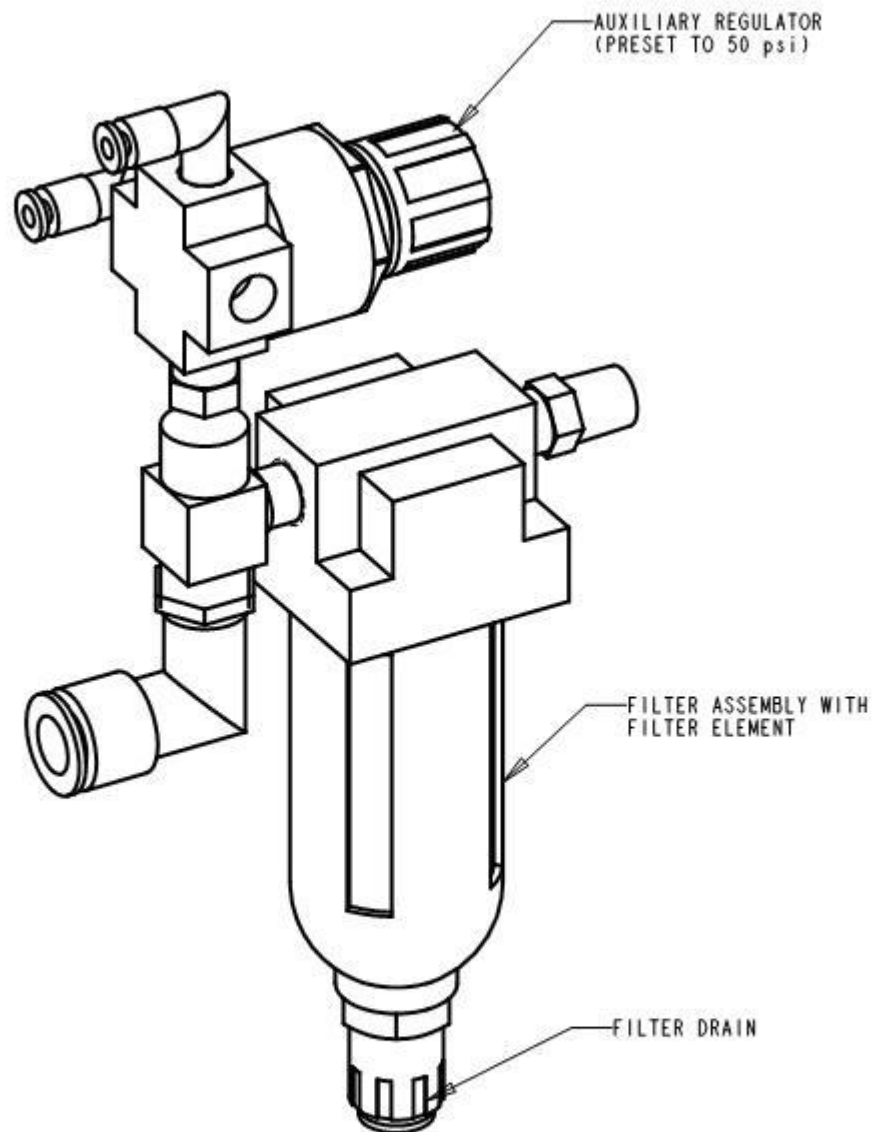


**Note: Should open the top cover before lubrication, if done, should lock latch of the top cover.**

2. Spray the upper and lower portion of the ram with WD-40, CRC 5-56 or equivalent. Wipe clean with a cloth and respray with a light coat.
3. The MAIN AIR FILTER is equipped with an automatic drain (Figure 7.1). If an excessive amount of liquid (over 1/2 inch or 12mm) is in the filter bowl, annual draining and cleaning is required to clean the filter bowl. Remove the filter bowl and clean with a clean cloth and soap. Wipe the bowl dry and re-install. Never clean the filter bowl with solvents. Solvents may weaken the bowl material resulting in bowl deterioration.



LUBRICATION POINTS  
FIGURE 7.0



MAIN AIR FILTER  
FIGURE 7.1

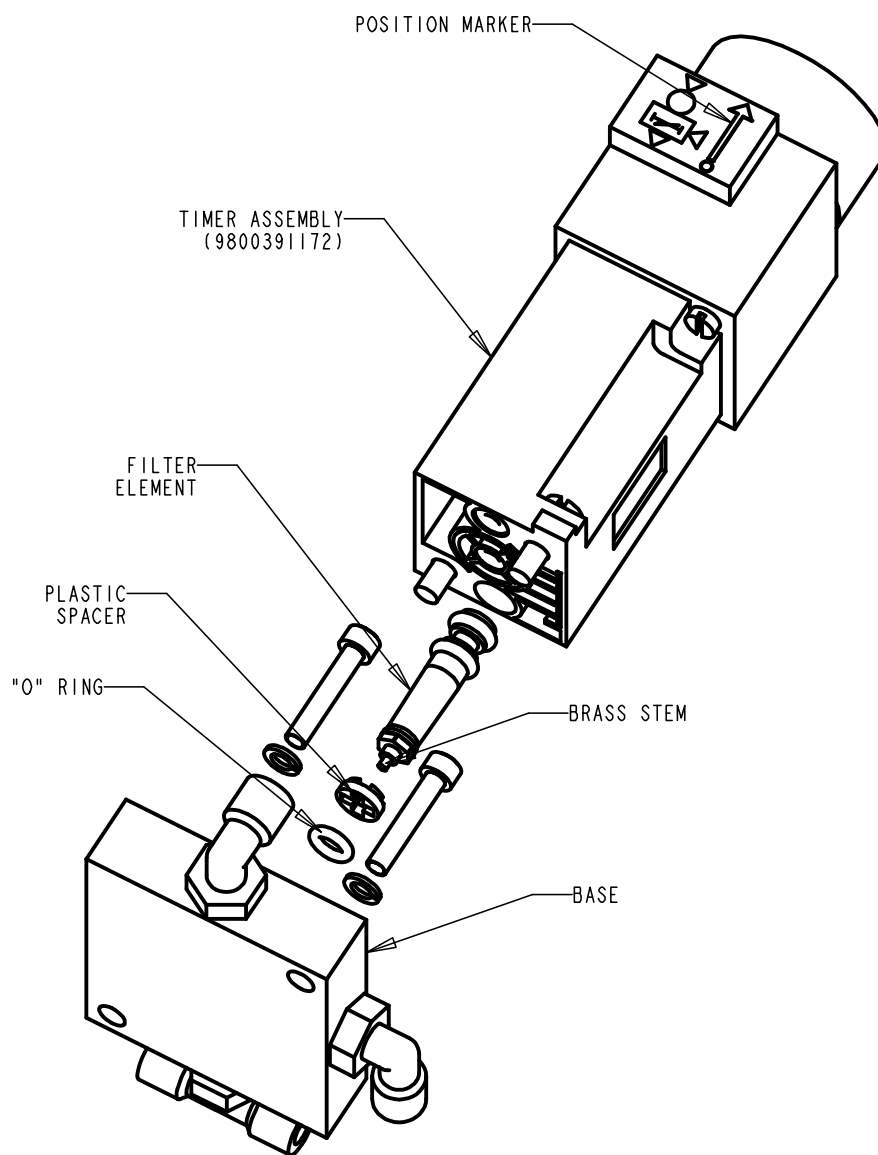


**WARNING: DISCONNECT THE AIR SUPPLY BEFORE PERFORMING ANY MAINTENANCE.**



**IMPORTANT: COMPLETE THE FOLLOWING MAINTENANCE EVERY (6) MONTHS.**

TIMER FILTER - Open the tool storage cabinet and remove the control box (Figure 3.4) using a socket wrench. Remove the timer assembly from the base (Figure 7.2) using a straight blade screwdriver. Remove the small "O" ring, then the plastic spacer. Grasp the small brass stem on the filter element and pull straight out. Clean the filter element in solvent, blow dry, and reassemble.



TIMER DISASSEMBLY  
FIGURE 7.2

## **FLOW CONTROL VALVE ADJUSTMENTS (Figure 3.3)**

All FLOW CONTROL VALVES are set at the factory for optimum press performance. Incorrectly altering these settings may cause machine damage. However, as machine components wear or are replaced, the ram may descend too slowly or retract too fast, requiring the following adjustments.

### **FLOW CONTROL VALVE FUNCTIONS**

VALVE A - VALVE A controls the speed at which the ram descends. VALVE A regulates the amount of air exhausted from the lift cylinder when the footswitch is depressed.

VALVE B - VALVE B assists in controlling the speed at which the ram retracts along with cushioning the ram stop. VALVE B regulates the amount of air exhausted from the lift cylinder.

### **ADJUSTMENT PROCEDURE**

VALVE A - Fully close VALVE A by turning clockwise. Then, open VALVE A by turning counter-clockwise approximately 1/4 turn.

VALVE B - Fully close VALVE B by turning clockwise. Then, open VALVE B by turning counter-clockwise approximately 1/4 turn.

### **FINAL ADJUSTMENT**

An additional adjustment may be required based on the machine's actual operation. For example: If, after all adjustments are made, the ram descends too slowly, adjust VALVE A counter-clockwise to increase the amount of air exhausted from the lift cylinder.



## LEVER ROLLER VALVE BRACKET ADJUSTMENT

The lever roller valve bracket adjustment is set at the factory for optimum machine performance. If during maintenance servicing the bracket is moved it will need to be readjusted.

### LEVER ROLLER VALVE FUNCTIONS

The lever roller valve controls air flow from the foot pedal to the lift cylinder. When the valve is actuated by the lever arm, air flows into the lift cylinder, and the ram is retracted.

### ADJUSTMENT PROCEDURE

Make sure the main cylinder and lever are in the fully retracted position.



**IMPORTANT:** Turn the force regulator off so that the ram will not move.

Position the bracket so that the valve is not activated.

Tighten the 1/4-20 x 1/2 lg socket set screws that hold down the bracket to the point where the bracket will not move freely but do not tighten completely.

Using a hammer gently tap the bracket forward towards the front of the machine until the lift cylinder returns to the up position and the ram is retracted.

Tighten the 1/4-20 x 1/2 lg socket head cap screws completely.

## SECTION 8

### TROUBLE SHOOTING GUIDE



**WARNING: DISCONNECT THE AIR SUPPLY BEFORE PERFORMING ANY WORK THAT REQUIRES REMOVING OR OPENING THE COVERS.**

TROUBLE SHOOTING GUIDE		
PROBLEM	CAUSE	CORRECTIVE ACTION
Punch will not descend.	Footswitch not operating.	Remove footswitch air connection from machine. If machine cycles, replace footswitch.
	Ram Bushing jammed in Ram Bearing.	Unlatch and remove the top cover. Free Ram by lightly striking top of Ram Assembly. Remove Ram Bearing and replace. Reassemble and ensure that the set screws are fully installed in the Ram Bushing.
	Footswitch hose kinked.	Unkink Footswitch hose.
	Cross Pin Assembly interfering with Bearing Plate.	Remove Ram Module from frame. File coined area on Bearing Plate.
	Ram Module hardware loose.	Remove Ram Module. Apply Loctite #242 to hardware and reassemble.
Ram will not retract.	Broken Plate Cross Pin Assembly.	Replace Plate Cross Pin Assembly.
	Clogged Timer Filter.	Clean all air filters. Replace Timer if necessary.

TROUBLE SHOOTING GUIDE		
PROBLEM	CAUSE	CORRECTIVE ACTION
Ram will not retract (Continued)	Main Valve jammed.	Remove Main Valve Assembly. Disassemble valve and clean in mineral spirits. Replace Main Valve Assembly if necessary. Clean all air filters.
	Exhaust Muffler clogged on Main Valve Assembly.	Replace Exhaust Muffler.
	Flow control Valve B adjustment required.	Fully close Flow Control Valve B by turning clockwise. Then, open valve by turning counter-clockwise approximately $\frac{1}{4}$ turns. Ensure Ram does not slam when retracting.
	Timer adjustment required.	Open tool cabinet. Remove control box. Set Timer dial to "A" setting. Cycle press and readjust if necessary. Turn dial clockwise to increase Ram extension time, and turn dial counter-clockwise to decrease Ram extension time.
	Set-Up/Cycle switch in "Set-Up" position.	Place switch in "Cycle" position.
	No air supplied to machine.	Check machine air supply connections and main air supply.
	Lever roller valve failure.	Replace lever roller valve.
	Lever roller valve bracket out of adjustment.	Adjust lever roller valve bracket per adjustment instructions.

TROUBLE SHOOTING GUIDE		
PROBLEM	CAUSE	CORRECTIVE ACTION
Fastener will not install.	Ram Bushing improperly adjusted.	Adjust Ram Bushing per Tooling Set-Up and Operation section.
	Workpiece material too hard.	Check hardness of workpiece and compare with PEM® fastener catalog specifications.
	Punch and anvil lengths incorrect.	Combined length of punch and anvil must total 7 inches (178 mm), except when using the Top Mounted Reverse Flange Anvil Holder and the Bottom Mounted Reverse Flange Anvil Holder. (Combined lengths are 3.25 (83 mm) and 8.44 (214 mm) inches respectively.)
	Incorrect fastener installation hole size in workpiece.	Measure hole size and compare with PEM® fastener catalog specification.
	Timer adjustment required.	Open tool cabinet. Remove control box. Set Timer dial to "A" setting. Cycle press and readjust if necessary. Turn dial clockwise to increase Ram extension time.
	Timer not operating.	Remove Timer and clean Timer filter. Replace Timer if necessary.

TROUBLE SHOOTING GUIDE		
PROBLEM	CAUSE	CORRECTIVE ACTION
Fastener will not install. (Continued)	Main Valve jammed.	Remove Main Valve Assembly. Disassemble Valve and clean in mineral spirits. Replace Valve if necessary. Clean air filters.
Punch descends too slowly.	Ram Module Assembly dirty.	Clean Ram Module Assembly as described in Maintenance section.
	Ram Bearing damaged.	Remove Ram Bearing and replace. Reassemble and ensure that the set screws are fully installed in the Ram Bushing.
	Footswitch not operating.	Replace footswitch.
	Flow Control Valve A adjustment required.	Fully close Flow Control Valve A by turning clockwise. Then, open valve by turning counter-clockwise ¼ turns. Cycle press and ensure Ram does not bounce at bottom of stroke. Readjust if necessary.
Ram slams when retracting.	Flow Control Valve B adjustment required.	Fully close Flow control Valve B by turning clockwise. Then, open valve by turning counter-clockwise approximately ¼ turns. Cycle press and ensure Ram does not slam when retracting. Readjust if necessary.

TROUBLE SHOOTING GUIDE		
PROBLEM	CAUSE	CORRECTIVE ACTION
Tooling leaves marks on workpiece.	Excessive Ram force.	Reduce Ram force. Refer to Tooling Set-Up and Operation section.
	Sharp edge on punch or anvil.	Break edge of punch or anvil .015" X 45E(.38 mm X 45E) maximum.
Main Cylinder slamming at end of stroke.	Main cylinder air cushion misadjusted.	Adjust appropriate air cushion - extend or retract. (Figure 3.3)
Lever assembly slams hard on up-stroke.	Ram bushing set-up too low. The link levers hitting ram module before lever roller contacts ram cap.	Adjust ram bushing out and set up ram at top of ball valve per set-up instructions.

## SECTION 9

### RECOMMENDED SPARE PARTS

<u>QUANTITY</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
1 piece	9800391172	Timer Valve (Figure 7.2)
1 piece	980335097	Ram Bushing (Figure 6.0)
1 piece	980335098	Ram Jam Nut (Figure 6.0)
1 piece	980420081	Cross Pin Plate Assy (Figure 3.2)
2 pieces	980039077	Socket Set Screw #10-32 X 1/4 Lg. (Figure 6.0)
1 piece	8015018	Filter Element-FESTO (Figure 7.1)
1 piece	980435061	Upper Ram Cross Pin
1 piece	9800391652	Retaining Ring
1 piece	8002157	Lever Valve (Figure 3.2)

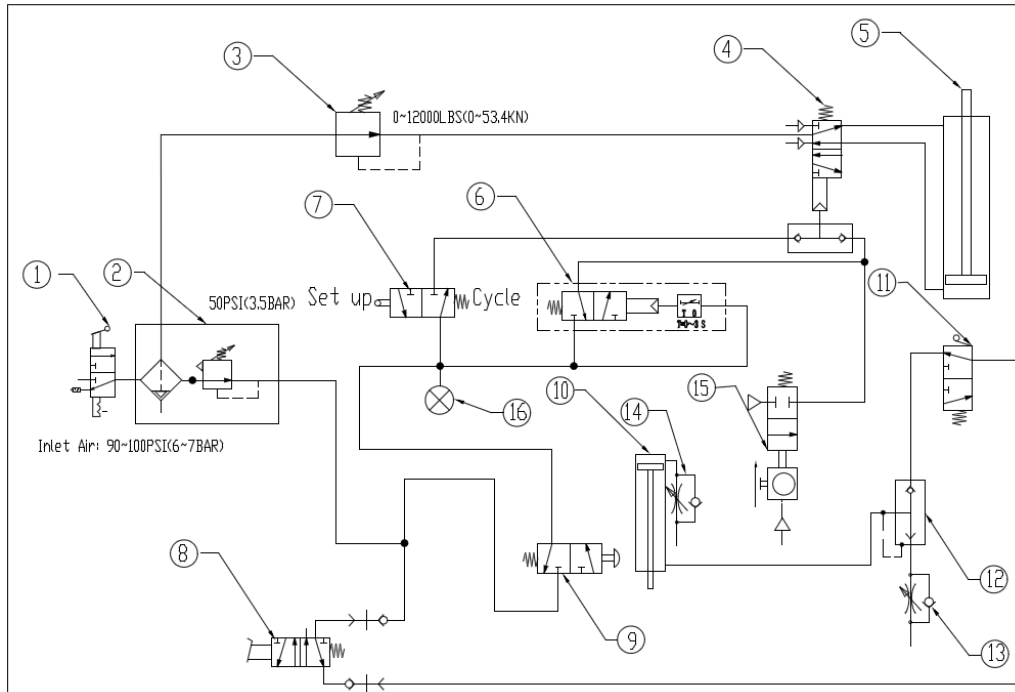
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**Not included in Spare Parts Kit:**

1 piece	8002946	Pressure Diagnostic Gauge Assy (Optional)
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## SECTION 10

### PENUMATIC DIAGRAM



16	8018733	OPTICAL SENSOR INDICATOR	1
15	8014151	PNEUMATICS TOTALIZER	1
14	8002804	VALVE FLOWCNTRL	1
13	8005969	VALVE FLOW CNTRL 5/32 FIT	1
12	8002805	VALVE QUICK EXHAUST	1
11	8002157	VALVE LEVER	1
10	8015031	LIFT CYL ASSY	1
9	980039005	VALVE N/C POPPET	1
8	8017545	FOOT PEDAL	1
7	980039016	VALVE TOGGLE AIR	1
6	9800391172	RELAY TIME DELAY	1
5	8014156 (Up to S/N 5438) 8017764 (S/N 5439 & Up)	MAIN CYLINDER ASSY	1
4	8015511 (Up to S/N 5438) 9800393037 (S/N 5439 & Up)	MAIN VALVE	1
3	9800393029	1-TURN REG 3/8NPT ASSY-4J	1
2	8015018	FLT AUX REGU.ASSY	1
1	8024761	PRESSURE RELIEF VALUE	1
<b>ITEM</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>	<b>QTY</b>



## SECTION 11 APPENDIX

### DECLARATION OF CONFORMITY EG-KONFORMITÄTSERKLÄRUNG

Business name of the manufacturer: PEM (CHINA) Co., Ltd.

*Firmenbezeichnung des Herstellers:*

Full address of the manufacturer: 99 Middle Chenfeng Road Kunshan, Jiangsu Province 215300, P. R. China

*Vollständige Adresse des Herstellers:*

*Business name:* PENNENGINEERING FASTENING TECHNOLOGIES(EUROPE)LTD.

*Name and position:* Fergus, Mary Ann, Managing Director

*Address:* Mervue Business Park, Galway

*Country:* The Ireland

PENN Engineering, Mervue Business Park, Galway, Ireland.

We declare that the machinery

*Wir erklären hiermit, dass die Maschine*

product name: HARDWARE INSERTION MACHINE  
*Produktbezeichnung:*

commercial name:  
*Handelsbezeichnung:*

model: SERIES 4  
*Modell:*

type:  
*Typ:*

serial number: M4-6770  
*Seriennummer:*

fulfills all the relevant provisions of Directives  
*entspricht allen relevanten Anforderungen folgender Richtlinien*  
**2006/42/EC**

tested in accordance with below standards  
*wurde gemäß folgender Normen geprüft*  
**EN ISO 12100:2010**

place and date of the declaration:  
*Ausstellungsort und Datum der Erklärung*

signature of the person:  
*Unterschrift des Ausstellers*

