PennEngineering®

OPERATION AND MAINTENANCE MANUAL FOR THE PEMSERTER® SERIES 3000® FASTENER INSTALLATION PRESS

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OPERATION AND MAINTENANCE MANUAL

PEMSERTER® SERIES 3000® PRESS

MODEL

FASTENER INSTALLATION PRESS

SERIAL NUMBER _____

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PEMSERTER® SERIES 3000® FASTENER INSTALLATION PRESS

OPERATION AND MAINTENANCE MANUAL

TABLE OF CONTENTS

Read Manual Before Operating Press!

SECTION 1

INTRODUCTION

The PEMSERTER® Series 3000® Fastener Installation Press manual describes the standard Automatic version of the Series 3000 press.

Features:

- Safety and Protection System, sensitive down to 0.4 mm (0.015”)
- Unique high speed ram approach with energy efficient power stroke.
- Computer control system with touch screen interface. Provides simple and precise controls for the operator. Designed for easy set-up, operation, maintenance and diagnostics.
- Quick Set-up/change-over automatic feed tooling system. Provides an extensive selection of tooling for different fasteners using the same feeder bowl.

Specifications:

• Ram Force	1.8 to 71.2 kN (400 to 16,000 lbs)
• Pressure System Type	Electro Mechanical Actuator
• Air Requirements	5 to 6 BAR (75 to 90 PSI) 6 mm (1/4”) dia. minimum line flow
• Throat Depth	61 cm (24”)
• Height	208 cm (82”)
• Width	92 cm (36”)
• Depth	126 cm (49.5”)
• Weight	1,235 kg (2,725 lbs.)
• Electrical (North America)	240-250VAC, 60 Hz, 20A, 1ϕ
• Electrical (Europe and Pacific Rim)	240-250VAC, 50 Hz, 20A, 1ϕ
• Air Consumption	Automatic nut mode at 30 insertions per minute is about 1.3 liters/sec at 1 atm. (2.75 scfm). Automatic stud mode at 30 insertions per minute is about 3.4 liters/sec at 1 atm. (7.25 scfm).

SAFETY

The Series 3000® was designed to conform to applicable ISO, ANSI, OSHA, CEN and CSA safety standards.
The Series 3000® is compliant to applicable European Union (EU) directives and bears the CE Mark.
The Series 3000® conforms to the essential requirements of the following directives:

EN 60204-1 Safety of Machinery – Electrical Equipment of Machines Part 1: General Requirements.
EN 1050 Safety of Machinery – Principles for Risk Assessment
EN 349 Safety of Machinery – Minimum Gaps to Avoid Crushing of Parts of the Human Body.
EN 61000-6-4; 2001 – Emissions Requirements
EN 61000-6-2; 2001 – Immunity Requirements

Please read and follow the safety precautions listed below.

SAFETY PRECAUTIONS

- Always shut off and lock out the electrical power before servicing the press. The voltages used in the machine can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the machine.
- Always use safety goggles when operating or maintaining the press.
- Ear Protection is recommended.
- Before using the press, 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 press 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 press, be sure these instructions are readily available.
- Do not use the press in any way, other than for its intended purposes.
- Do not modify the press in any way.
- Fasteners are blown at a high velocity. Tubing must always be secured before machine is operated. Check integrity of tubing before use.

ELECTRICAL SAFETY PRECAUTIONS:

- Always shut off and lock out the electrical power before servicing the press. The voltages used in the machine can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the machine.
- The AC supply must be disconnected from the drive using an approved isolation device before any cover is removed from the drive or before any servicing work is performed.
- The STOP function does not remove dangerous voltages from the drive, the motor or any external option units.
- The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated at least ten minutes before work may continue.
- Secure Disable function does not remove dangerous voltages from the drive, the motor or any external option units.

WARNING: Immediately upon receipt of your press, establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the press without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode. PennEngineering® is not responsible for improper maintenance mode procedures, which result in a loss of operation of the press or operator safety.

Label	Definition
	General Warning Label – There are items that require attention. These are specified in the operator's manual.
	**CAUTION: Laser Radiation. Do not stare into beam. Class 2 laser product.** **Per EN 60825 and ANSI Z136.1:** Class 2 lasers are low power devices emitting visible radiation in the wavelength range 400mm to 700mm. 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. Never aim the spotting light anywhere except at the workpiece.
	Eye Protection Label – Eye protection must be worn when operating the press.
	Hot Surface Label – Hot Surface. Do not touch.
	Pinch Point Label – Keep hands away from area.

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® 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.

Should any questions or problems arise concerning your Series 3000 press, contact the PennEngineering® Service Department. **Toll-free telephone number 1-800-523-5321 (in North America) or 215-766-8853.**

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

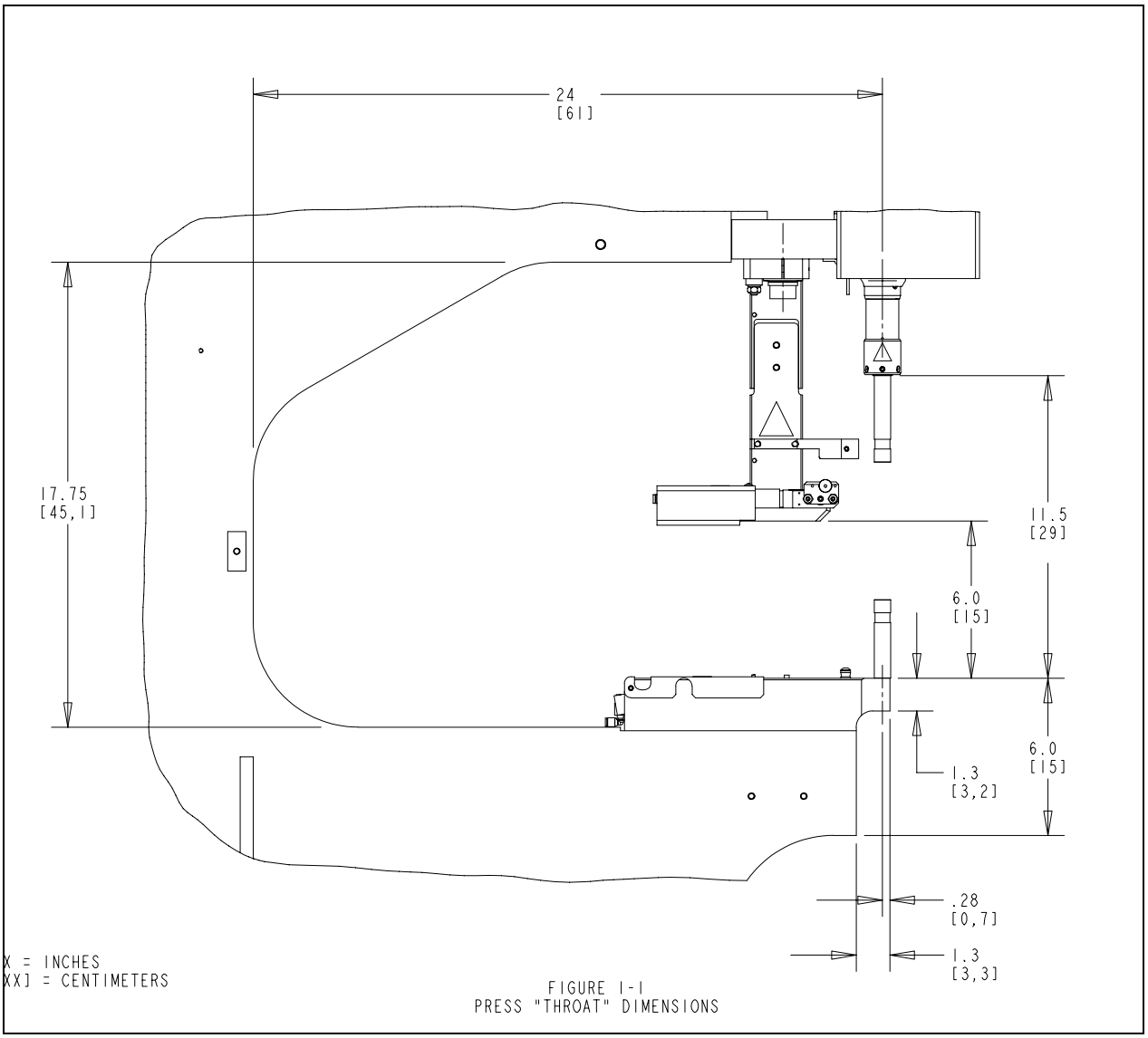


FIGURE 1-1
PRESS "THROAT" DIMENSIONS

SECTION 2

IDENTIFYING AND LOCATING MAJOR COMPONENTS OF THE PRESS

Identifying Major Components of the Press

This section introduces the user to the major components of the press.

Frame

The frame is the structure of the press. The main section is made of solid steel with welded components that form the base and the other support sections. All parts are directly or indirectly mounted onto the frame.

Actuator/Ram

The ram force of the press is exerted by an electro-mechanical roller screw linear actuator. It is mounted to the frame and surrounded by the front enclosure. Attached to the actuator, at the back end is an encoder which reads the location of the actuator. Attached to the actuator rod (ram) is the safety assembly, described in Section 3.

Operator Controls

All the operator controls are located on the door of the Front Enclosure except the foot pedal. These include the Touch Screen, the E-Stop button, the Power ON button, the Power OFF button, the Audible Beeper, and the Spotting Light button.

- **Touch Screen** - This is the primary interface to the press control system (the PC). It is used for installation and automatic feed setup and configuration, feedback to the user and diagnostics. The screen displays multimedia information and allows the operator to make selections by touching different parts of the screen as indicated by what is displayed on the screen. The touch screen is programmed with an automatic screen save mode that blanks the screen when not in use after 10 minutes. To reactivate the screen, just touch anywhere on the screen. Detailed explanations of each screen are provided in Section 6 of this manual.

- **E-Stop Button** - Pressing this button causes the following:
  - Engages and independent emergency breaking circuit that rapidly decelerates and stop all actuator (ram) motion in accordance with the safety assembly described in Section 3.
  - Disconnects power to the quick exhaust/supply valve (see air supply inlet system on page 8). When pressure is exhausted, all pneumatic motion stops.
  - During an E-Stop condition all outputs are turned off. The control system remains on-line and detects the E-stop.

- **Power ON Button** - If the press is on, this button is lit green. When the press is off, pressing this button will provide power to the press control system.

- **Power OFF Button** – This button is lit amber if there is electricity connected to the press but the press is off. When the press is on, the amber light will be off. Press this button to turn the press off, power will be switched off from the control system and all moving components including the quick exhaust/supply valve.

- **Audible Beeper** - This beeper is controlled by the PLC and is used to indicate to the operator when the press or operation requires special attention. The volume can be adjusted by turning the outer ring and adjusting the aperture of the beeper.

- **Spotting Light Push Button** – Push this button to turn the spotting light on and off. This button is lit when the laser spotting light is on. Never aim the spotting light anywhere except at the workpiece and, never look directly into the spotting light.

- **Foot Pedal** - The foot pedal is used by the operator to control the start of a press cycle. It frees the operator to use his hands to manipulate the workpiece.

Electrical Drive Enclosure (Main) – See Figure 2-5

The main drive enclosure on the right side of the press houses all the major components of the Servo Drive System that control the main actuator. These components include the main servo drive controller, the high torque motor controller, the emergency breaking circuit, the 24 volt power supply, and the main power disconnect.

Electrical Enclosure Lower – See Figure 2-6

The Lower Electrical Enclosure, under the Main Drive Enclosure, houses the Input / Output Module, Ethernet Switch, Force Sensor Signal Conditioner, and various electrical components and distribution terminals. The door is key-locked.

Vibratory Feeder Bowl (Automatic Fastener Feeding Component)

The Vibratory Feeder Bowl, on the left side of the press, is used for automatic feeding of fasteners. It is an electrically driven device, which holds and moves different types of fasteners. Various types of tooling components are attached to the bowl to orient the fasteners being fed out of the bowl. The vibratory bowl comes equipped with a "Universal Escapement" adapter, which is used for all nut-type tooling and some stud-type tooling. The Vibratory Feeder Bowl is controlled by a dial and a switch on the Bowl Control Box, above the bowl.

- **Bowl Amplitude Dial -** The bowl's amplitude or force of vibration is regulated by a dial control. The amplitude adjustment is used to control the feed rate and performance of the automatic feeding process.

- **Bowl Three Mode Switch -** A 3 position switch is used to select whether the bowl is always on, always off or automatically controlled by the PLC. When the switch is set to auto, the PLC turns on the bowl during run mode and during diagnostics. During run mode the PLC will turn the bowl off if there is a period of inactivity. The PLC will restart the bowl automatically when the next fastener is fed. When loading or unloading fasteners , turn the bowl ON/OFF as desired. Return the switch to AUTO when finished.

Shuttle Support Assembly (Automatic Fastener Feeding Component)

The Shuttle Support Assembly located next to the Vibratory Feeder Bowl is used to hold and actuate tooling shuttle components, route air supplies and hold the Stud-in-tube-Sensor and "Puffer" Flow Control Valve. The Shuttle Air Cylinder on the Shuttle Support Assembly actuates tooling shuttles. The shuttle receives the parts fed from the vibratory feeder bowl, singulates the parts and feeds them out to the punch/anvil area. The Shuttle Support Assembly is aligned with the vibratory feeder bowl. Proper alignment is important to the functioning of the shuttle tooling.

- **Stud-in-tube Sensor -** The PLC uses this ring sensor to monitor and control the feeding process of stud-type tooling.

- **Puffer Flow Control Valve -** This valve controls the air flow to the Vibratory Feeder Bowl tooling attachments and is used to regulate various aspects of the escapement and nutgate performance.

Slide and Gripper Assembly (Automatic Fastener Feeding Component)

The Slide and Gripper Assembly mounted to the top of the frame throat is used to hold top-feed tooling components and has two pneumatic actuators. The two actuators are a linear slide cylinder and a parallel acting gripper. The gripper is used to actuate the tooling jaws that hold fasteners. The gripper opens and closes to receive and release fasteners. The gripper is attached to the end of the linear slide. The linear slide is used to move the gripper and jaws from its retracted position out to the punch position. This system is used to feed fasteners out to tooling punches. The Slide and Gripper Assembly also holds tube extension tooling for stud-type tooling. The Slide and Gripper Assembly can be removed for special workpiece accessibility.

Anvil holder Assembly

The Anvil Holder Assembly mounted to the bottom of the frame throat is used to hold the anvil tooling components and has a single air cylinder. The Bottom Feed Cylinder is used to actuate Bottom Feed Nut Tooling Modules.

Tooling Valve Enclosure

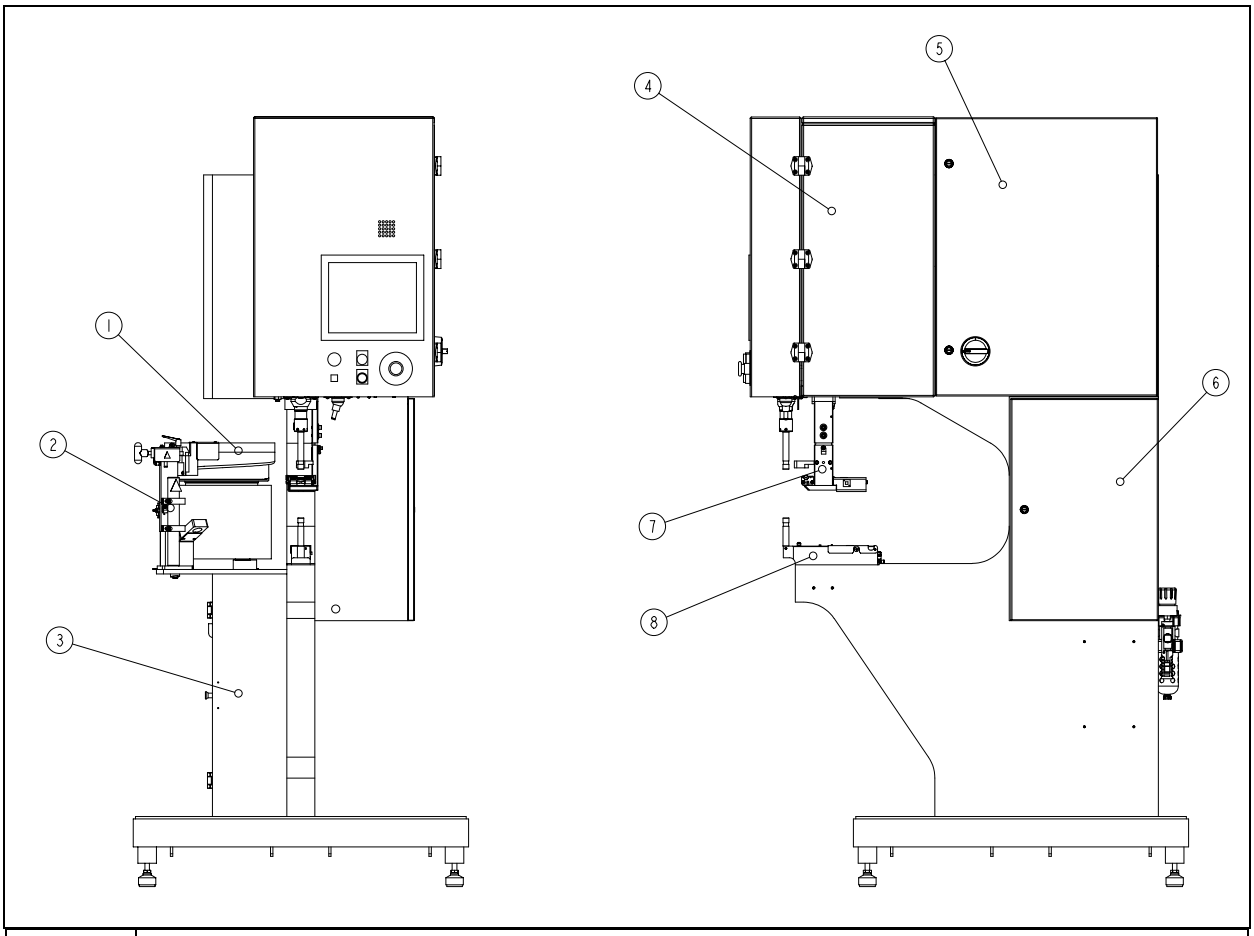
The Tooling Valve Enclosure is located underneath the Vibratory Feeder Bowl. Behind the door is another enclosure that contains the pneumatic valves that control the different tooling actuators and blowers.

Air Supply Inlet System

The supply of compressed air enters the press in the back through a system, which includes a filter/regulator and an electrically controlled quick exhaust/supply valve. The regulator is manually set to control the supply line pressure. Turning on the quick exhaust/supply valve supplies air to the press. When the quick exhaust/supply valve is turned off the valve closes and exhausts all downstream compressed air in the press quickly.

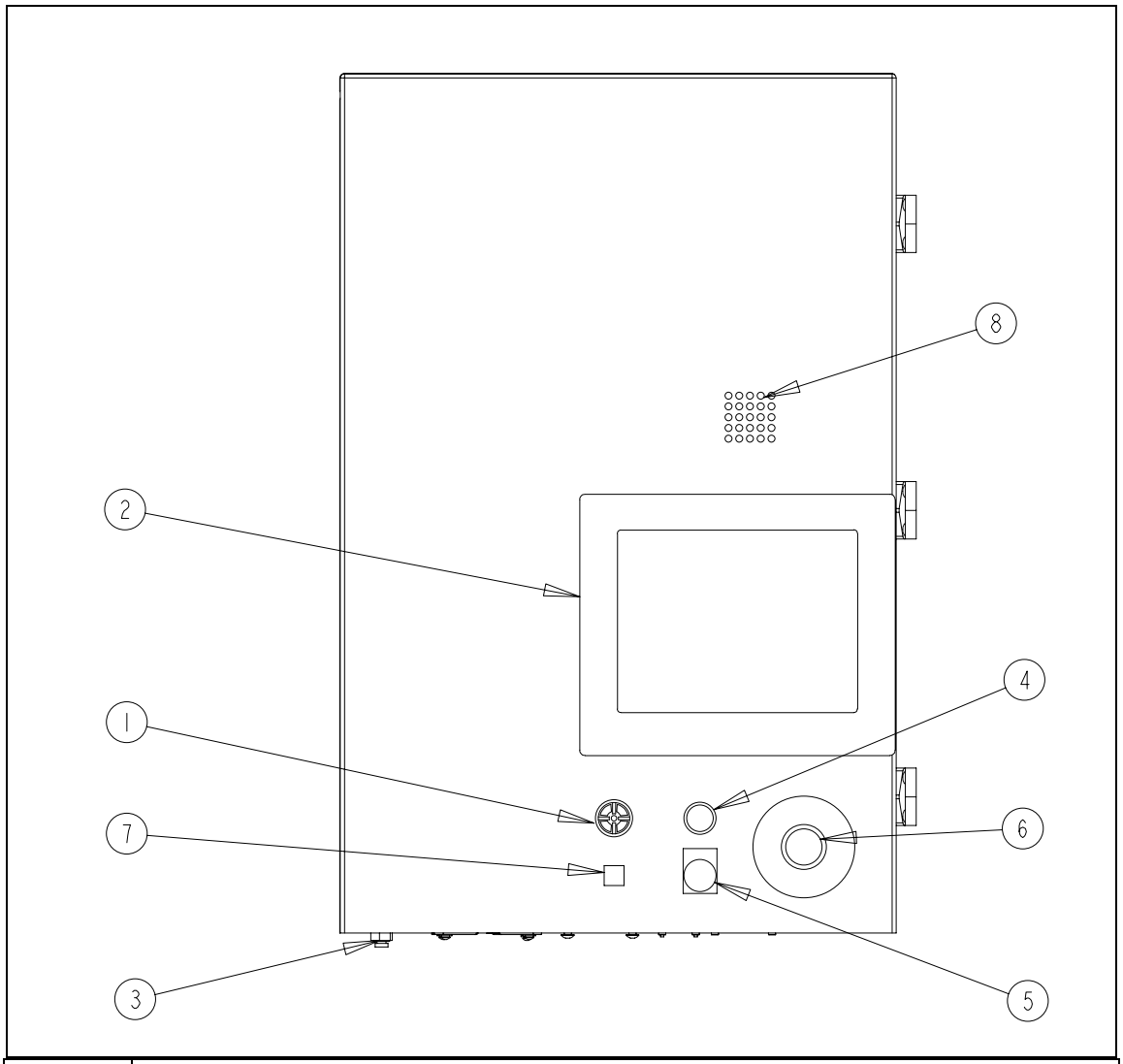
Tooling Storage Cabinet (Optional)

The Tooling Storage cabinet is located on the left side of the press.



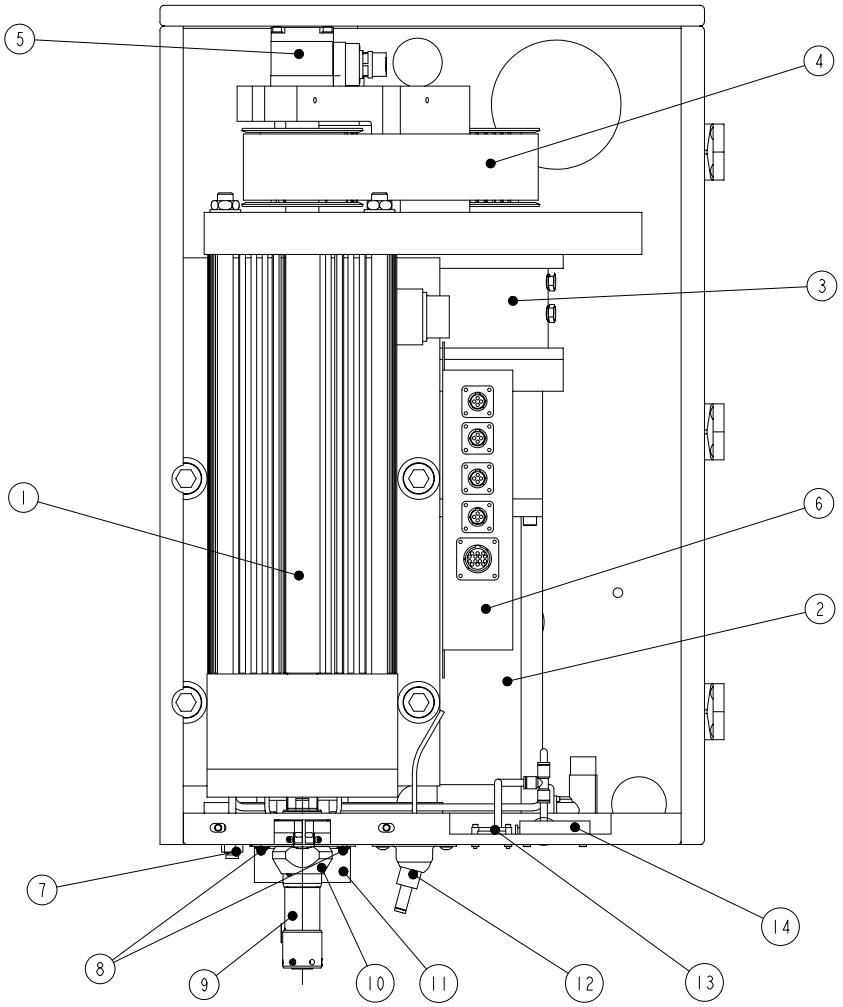
ITEM	DESCRIPTION
1	VIBRATORY FEEDER BOWL
2	SHUTTLE SUPPORT ASSEMBLY
3	TOOLING VALVE/STORAGE ENCLOSURE
4	MAIN ACTUATOR (RAM) ENCLOSURE
5	MAIN ELECTRICAL DRIVE ENCLOSURE (UPPER)
6	ELECTRICAL ENCLOSURE (LOWER)
7	SLIDE AND GRIPPER ASSEMBLY
8	ANVIL HOLDER ASSEMBLY

FIGURE 2-1
SERIES 3000 PRESS



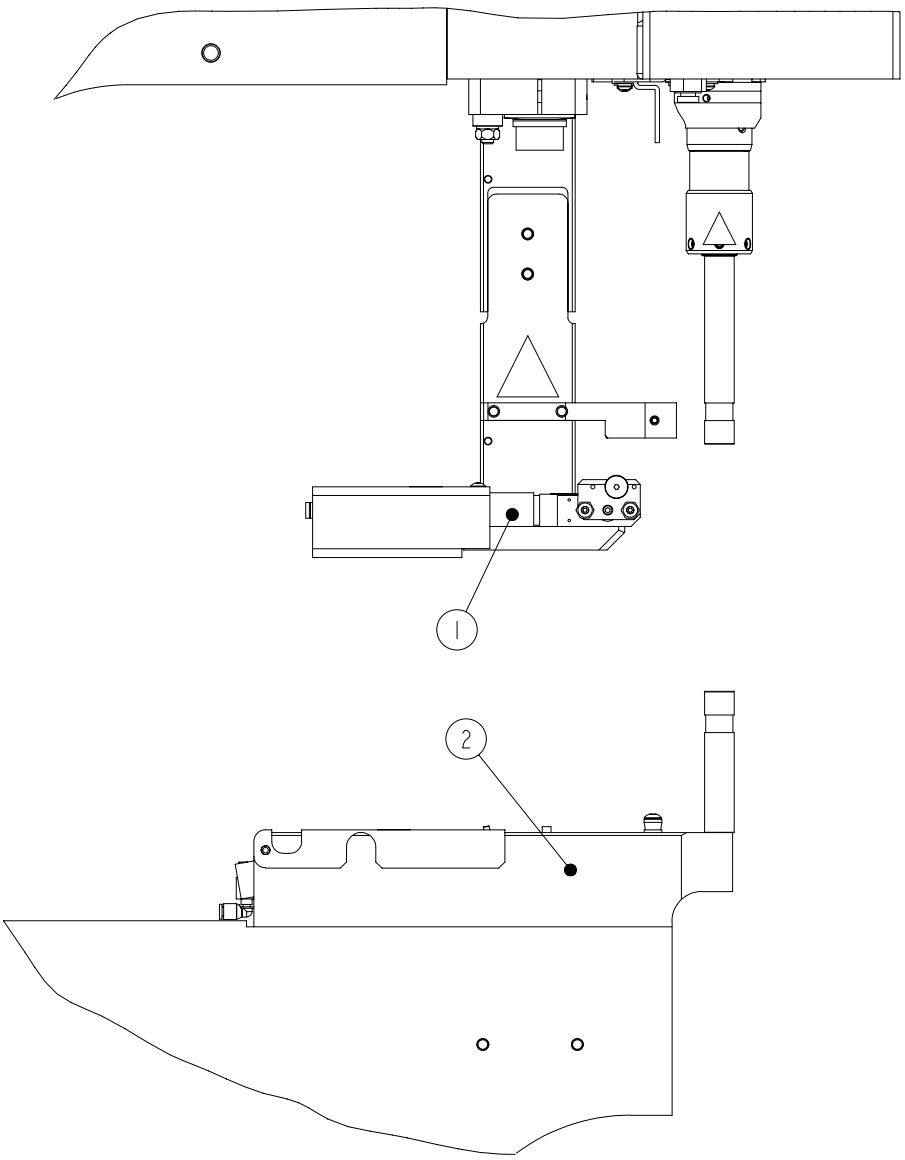
ITEM	DESCRIPTION
1	AUDIBLE BEEPER
2	TOUCH SCREEN
3	VACUUM PORT
4	POWER “OFF” BUTTON
5	POWER “ON” BUTTON
6	E-STOP BUTTON
7	SPOTTING LIGHT ON/OFF BUTTON
8	SPEAKER ASSEMBLY

FIGURE 2-2
OPERATOR CONTROLS



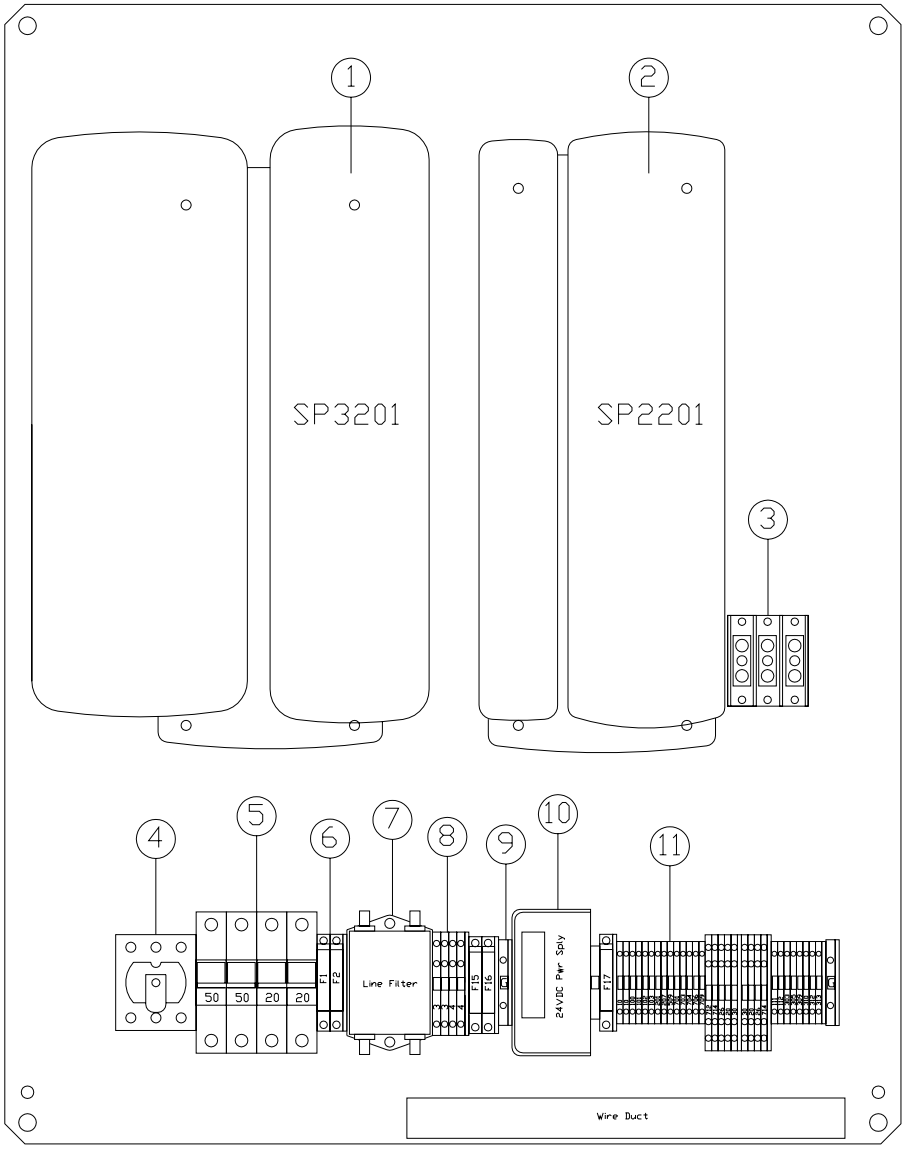
ITEM	DESCRIPTION
1	ELECTRO-MECHANICAL ROLLER SCREW LINEAR ACTUATOR
2	HIGH TORQUE MOTOR
3	CLUTCH
4	BELT
5	ENCODER
6	JUNCTION BOX
7	VACUUM PORT
8	OPTICAL SENSORS
9	SAFETY HOUSING ASSEMBLY
10	REFLECTIVE COLLAR
11	PROXIMITY SWITCH BRACKET
12	LASER SPOTTING LIGHT
13	TUBING TEE-FITTING
14	VACUUM GENERATOR

FIGURE 2-3
MAIN ACTUATOR ENCLOSURE



ITEM	DESCRIPTION
1	SLIDE AND GRIPPER ASSEMBLY
2	ANVIL HOLDER ASSEMBLY

FIGURE 2-4
PUNCH AND ANVIL AREA DETAIL



ITEM	DESCRIPTION
1	HIGH SPEED DRIVE
2	HIGH TORQUE DRIVE
3	AC SUPPLY TERMINAL
4	MAIN SWITCH
5	BREAKERS
6	FUSES
7	LINE FILTER
8	TERMINALS
9	GROUND TERMINAL
10	24VDC POWER SUPPLY
11	TERMINALS

FIGURE 2-5
MAIN ELECTRICAL DRIVE ENCLOSURE (UPPER)

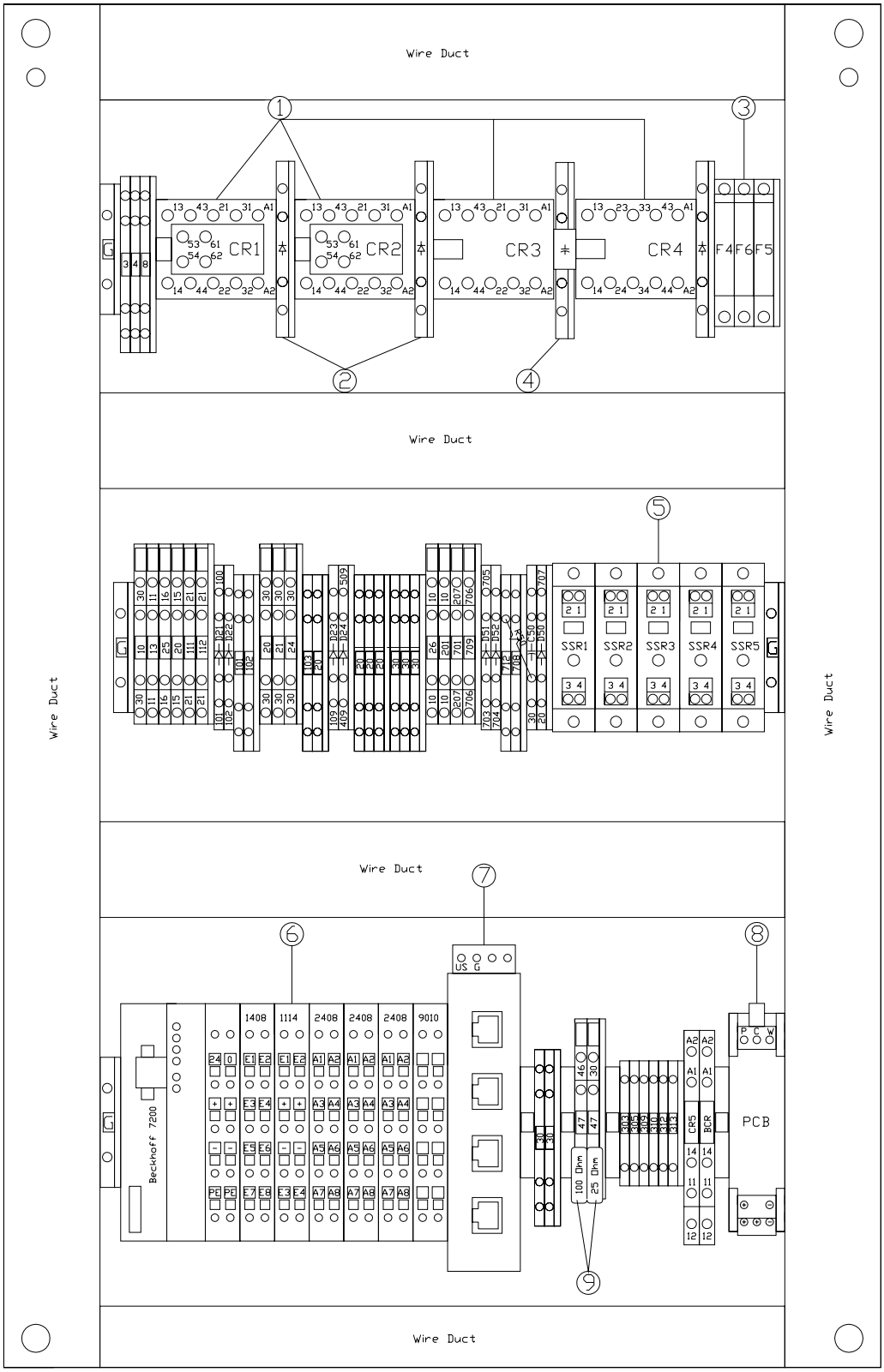


FIGURE 2-6
ELECTRICAL ENCLOSURE (LOWER) - CONTINUED

ITEM	DESCRIPTION
1	MAIN CONTROL RELAYS
2	DIODE TERMINALS
3	FUSES
4	CAPACITOR
5	SOLID STATE RELAYS
6	EXPANSION INPUT/OUTPUT BLOCK
7	ETHERNET SWITCH
8	STRAIN SENSOR AMPLIFIER
9	RESISTORS
FIGURE 2-6 ELECTRICAL ENCLOSURE (LOWER)	

SECTION 3

SAFETY SYSTEM OPERATION

 **WARNINGS** - To avoid injury:

1. Always shut off and lock out the electrical power, before servicing this machine. The voltages used in the machine can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the machine.
2. Only authorized and trained personnel should maintain, repair, setup, or operate this equipment.
3. Always use eye protection when operating or maintaining the press.

SYSTEM SAFETY FEATURES

1. The main actuator (ram) is equipped with a secondary winding optimized for breaking. This winding in conjunction with the emergency breaking circuit is used for emergency stopping. When the electrical power is removed or the “OFF” push-button or E-Stop is pressed the press defaults to this circuit and rapidly stops the movement of the ram.

2. Shutting off the electrical power, with either the “OFF” push-button, or the E-Stop button, will cause the electric quick exhaust/supply valve to exhaust all air pressure in the press. Without contained pressure, all pneumatic motion stops.

3. The electrical cabinet door is key-locked to discourage unauthorized access.

4. The patented safety system can distinguish between a work piece properly set-up between the ram and the anvil, and a foreign object placed between the ram and the anvil. The safety system operates as follows:

    - A device called an encoder is installed on the top of the main actuator. The encoder senses the position of the main actuator and transmits that information back to the PLC.

    - A device called the "safety assembly" is installed in the bottom of the ram. The assembly consists of a fixed section called the housing and a compressible spring-loaded section called the adapter. The adapter holds the punch tooling. When the ram extends and the adapter or punch tooling contacts an object, the safety assembly compresses.

    - Two redundant pairs of optical thru-beam sensors are located inside the front enclosure, under the actuator. Each pair of sensors maintains an individual optical beam path that is reflected through one of two holes in the ram by the "reflective collar". When the safety assembly is compressed, part of the safety assembly inside the ram, blocks both beam paths and the sensors are triggered.

- When the sensors are triggered, because, either the safety assembly is compressed, the reflective collar is moved, or the beam path is blocked in some other way, the PLC immediately senses the change.

- During a Setup Cycle, the PLC uses this system to "learn" where the fastener and workpiece location is by moving the ram down, compressing the safety assembly, sensing the contact and reading the encoder. The data of the contact location is saved and used for a comparison during each press/run cycle.

- During Press Cycling, the PLC determines each time it senses that the safety assembly/punch has contacted something, whether it is "legitimate" or "not legitimate". A "safety window" is used to allow for minor variations with workpiece or operator precision.

- Only if BOTH redundant signals agree and the latest contact point is within the "safety window", does the PLC allow the safety assembly to fully compress and apply the predetermined high force needed for fastener installation**.**

5. Three levels of access security are available, each with a different four digit pass code

WARNING: Immediately upon receipt of your press, establish a "Maintenance Code" for your supervisor/maintenance personnel only, as it is possible, however difficult, to operate the press without the standard safeguards in place in the Maintenance Mode. Only trained personnel should use the Maintenance Mode the PennEngineering® is not responsible for improper maintenance mode procedures which result in a loss of operation of the press or operator safety.

6. If the encoder or either of the ram safety sensors should develop an open or a shortfault, the entire system, including the ram, will come to an immediate stop, and not operate further, until repairs are made.

SECTION 4

PRESS INSTALLATION

Moving The Press

- When using a forklift or pallet jack be sure that the forks are properly located between the fork guide tabs under the base of the press. When hoisting from above, be sure to balance the chain or strap between the two eyebolts to prevent swinging.

WARNING: unbalanced loading of the press or sudden stops may lead to toppling of the press.

Locating The Press

- Select a well-lit clean area with a (relatively) level floor. The floor must be able to support the weight of the press.

Leveling The Press

- The press should be leveled and stabilized after it has been located. This is done by adjusting the height of each footpad then locking each footpad in position by tightening a jam nut. This task requires two 3/4" wrenches (See Fig 4-1). An adjustable wrench may also be used. Adjust the foot pad while reading the level at the tooling nut gate adapter. The universal escapement adapter must sit level for proper functioning of the feed systems.

Open Space Requirements

- PennEngineering® has no specific requirements for providing open space around the perimeter of a press. However, be sure to comply with any national or regional safety codes that may dictate otherwise. For example, In the US the National Electrical Code requires that there be at least thirty-six inches of clearance in front of the electrical enclosure. We do recommend that you at least leave enough space around the press so the various storage and maintenance enclosures can be opened fully and so the largest workpieces can be accommodated.

Electrical Requirements for Machine Hookup.

WARNING: Electric Shock Risk - The voltages present in the following locations can cause severe electric shock and may be lethal:

- AC supply cables and connections
- DC and brake cables, and connections
- Output cables and connections
- Many internal part of the drive and external option units

- The drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated at least ten minutes before work may continue.

AC Supply Requirements

IMPORTANT: An external separately mounted fused switch must be provided when connecting the machine to the incoming power supply. Fuse rating is 20 amps 250 Volts AC.

Voltage: 200V to 240V ± 10%
Maximum Continuous Input Current: 15 amps
External fuser – 20 amps rating IECgG
20 amps rating C Class (North America)
Wires cross section – 4mm square (Europe)
AWG #12 (North America)
Number of Phases: 2 (Phase to Phase) for North America
Single (Phase to Neutral) for Europe
Maximum supply imbalance: 2% negative phase sequence (equivalent to 3% voltage imbalance between phases).

Frequency range: 48 to 65 Hz

For UL compliance only, the maximum supply symmetrical fault current must be limited to 100ka.

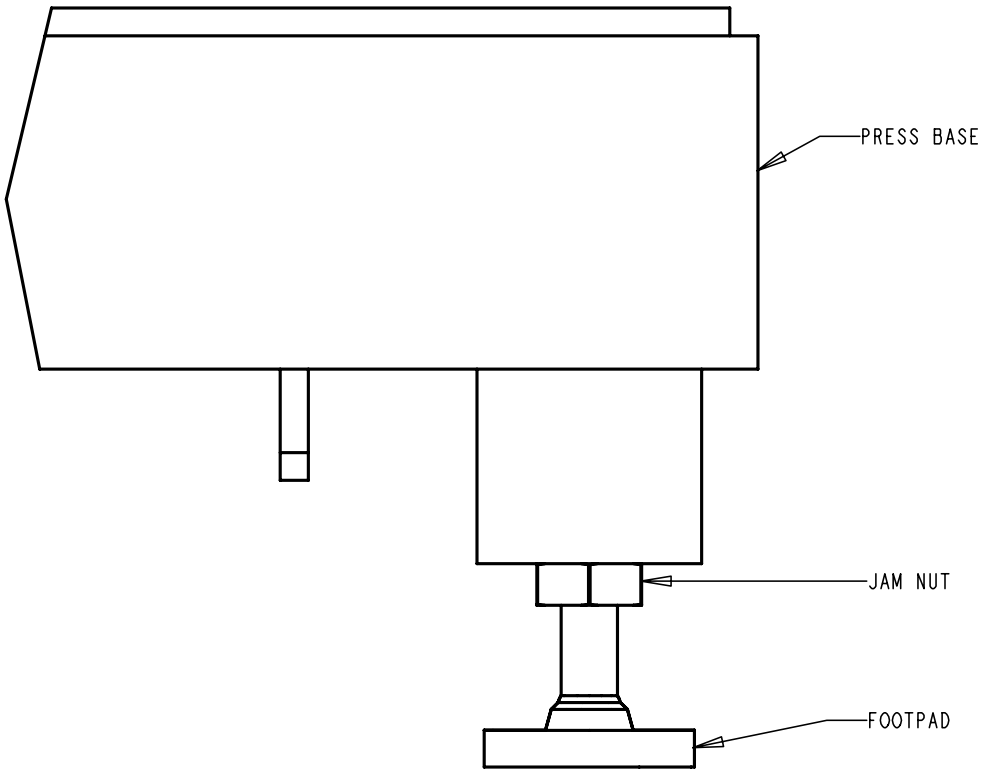


FIGURE 4-1
ADJUSTABLE FOOTPAD

Recommended Air Supply Hook-Up Arrangement

Proper air supply is very important to the performance and maintenance of the press. Following these simple guidelines will ensure good press 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 oil and valve systems and lead to press 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 press. Shop pressure ranging between 6 to 7 BAR (90 psi to 100 psi) is acceptable. Inadequate air flow will affect press performance.
- **Air Consumption** - Average air consumption running in automatic nut mode at 30 insertions per minute is about 1.3 liters/sec at 1 atm. (2.75 scfm). Average air consumption running in automatic stud mode at 30 insertions per minute is about 3.4 liters/sec at 1 atm. (7.25 scfm).
- **Piping Installation** – Proper piping hookup will help achieve the above requirements. See figure 4-2 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 press.
  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.

Install The Foot Switch

- Plug the foot switch into the receptacle located at the lower left corner of the front of the electrical enclosure.

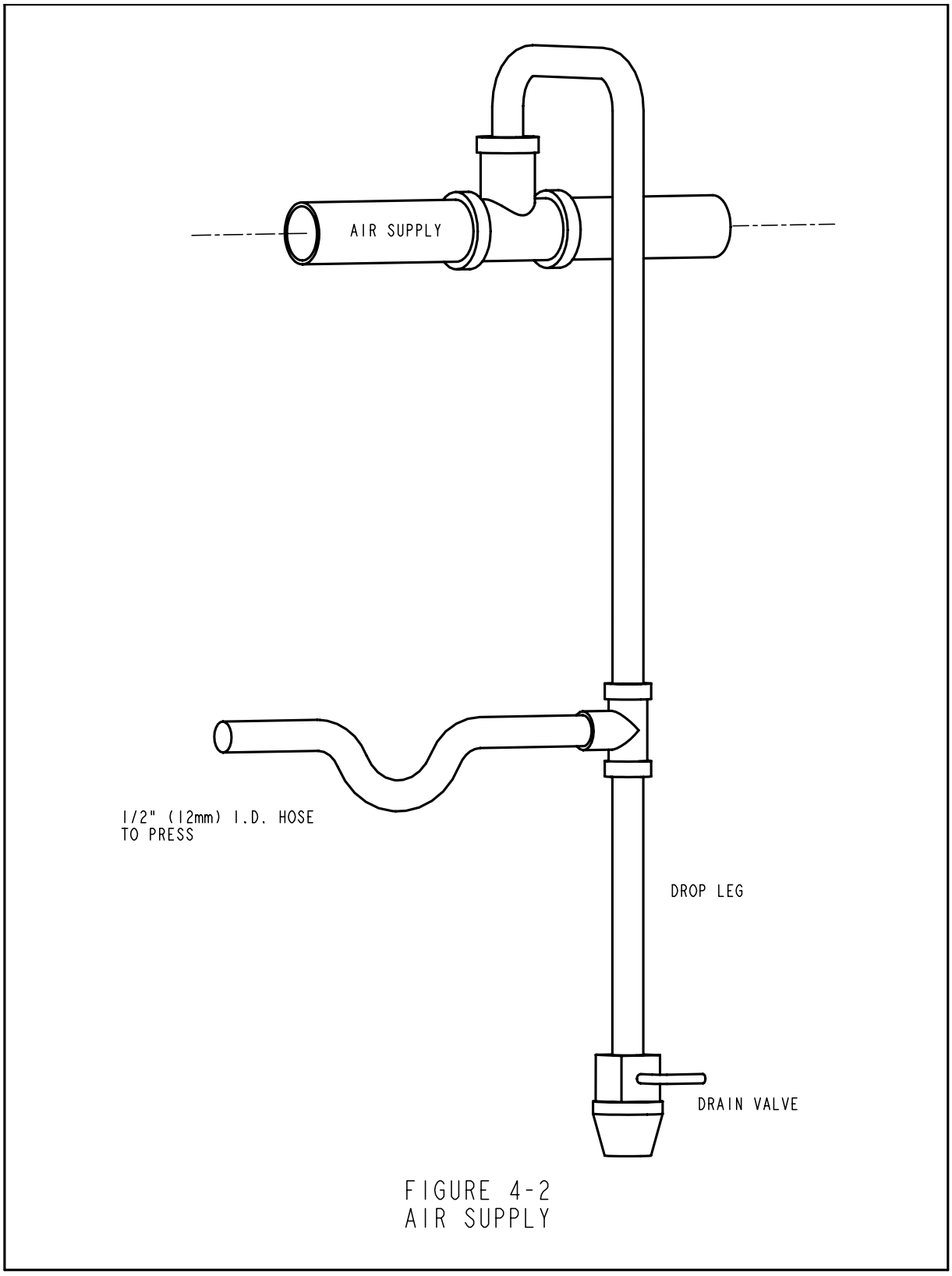


FIGURE 4-2
AIR SUPPLY

SECTION 5

GENERAL FUNCTION DESCRIPTIONS

System Function:

The function of a **PEMSERTER® SERIES 3000® FASTENER INSTALLATION PRESS** is to safely, quickly and consistently install PEM® brand self-clinching fasteners in various types of sheet material. To do this the press uses:

- A patented point-of-operation safety system that controls the descent of the ram and does not allow the ram to descend if it contacts any object other than the intended fastener and workpiece.
- Automatic fastener feeding system that locates the fastener at the point of insertion, so that the operator is free to handle just the workpiece.
- Electro Mechanical Actuator that provides quick ram travel with high installation forces at the point of insertion.
- Precise installation tools and computer controlled installation forces.

Self-clinching Fastener Installations:

PEM® self-clinching fasteners are installed into punched or drilled holes in ductile sheet material. To install a PEM® self-clinching fastener:

- The shank of the fastener is placed into the installation hole until the part of the fastener that is larger than the hole called the displacer (such as the knurls for nuts, or the head for standoffs) sits on the edge of the hole.
- A parallel squeezing force is applied to press the displacer (overhanging part) of the fastener into the sheet material.
- The force causes the sheet material to cold flow into the undercut of the fastener that is between the displacer and the shank. This traps the fastener within the sheet metal.

The following section of the manual describes the setup process in general. For details on setting up and operating the press see the appropriate section in the manual.

Step 1 - Setup Tooling

Tooling setup consists of selecting appropriate tooling for the fastener being fed and the workpiece, installing the tooling on the press and adjusting the feed controls.

Different types of tooling that feed the same size fastener are selected for accessing different shapes and sizes of workpieces.

See the Tooling Guide on selecting the right tooling.

Step 2 - Select the Setup for the Tooling and Fastener on the Touchscreen

Once the tooling is installed, the next step is to setup the press by using the touchscreen. The touchscreen setup is simple and can be done one of three ways.

- **New Tool Set-up** – Choose tooling mode, fastener size and workpiece material.
- **Recall A Job** – Select from a previously programmed Job stored in the press
- **Recall Last Job** – Run the same Job that was just run, the press remembers, even if it is turned off between jobs.

See the Touchscreen Controls section of this manual on choosing the right selections for setup.

When the selections are complete, the press automatically sets the values for operation and moves onto safety setup.

Step 3 - Safety Setup

The next step is very quick and simple but very important.
Safety Setup is the step where the press learns the position of installation called the Safety Setpoint. The operator positions the materials for an installation, but the press does not actually install the fastener. The ram extends and touches the fastener and workpiece. The touch point teaches the press where the proper installation point should be. The Press is ready to install fasteners.

Fastener Automatic Feed Functions:

Automatic Fastener Feeding is done from the vibratory feeder bowl to the insertion point in the workpiece. The following steps are taken:

- The vibratory feeder bowl moves the fasteners around the bowl and past a tooling component called a nutgate for nut-type tooling or an escapement for stud-type tooling.

- The fasteners are oriented in the tooling and fed into a tooling shuttle. The shuttle takes the first fastener and separates it from the rest. That fastener is blown with compressed air out of the shuttle into a plastic tube that leads to the punch and anvil area.

- Depending on the type of tooling the fastener is either fed directly into a tooling module like a stud-injector module or bottom feed nut module or into a set of jaws on the top feed slide and gripper system.

- During a top-feed tooling installation, the fastener is picked up from the jaws either by a vacuum punch or pin punch and the jaws open and pull back.

- The workpiece is placed with the installation hole onto either a fastener or tooling guide pin. When the operator has located the workpiece, the foot pedal can be depressed to begin the installation process.

Installation Process:

- When the foot pedal is depressed, the ram extends down quickly bringing the punch to the workpiece.

- When the fastener contacts the workpiece the safety sensors are tripped. The Press Control System checks that the position called the insertion point, is at the same position as the learned position at setup, the safety setpoint. Only if the insertion point is within a certain range of the safety setpoint, does the installation proceed.

- If the insertion point is good then the high installation force is applied to install the fastener and the ram returns up.

Special Features and Conditions:

• **Interrupted Mode –** When running in Interrupted Mode the press will slow down and stop upon contacting the workpiece and fastener. This mode is the ultimate in assurance just before installation that a workpiece or layers of workpieces are properly aligned.

• **Setpoint Tolerance –** Can be selected for Standard Tolerance or Narrow Tolerance. Narrow Setpoint Tolerance sets a smaller range for the allowed deviation of each installation from the Safety Setpoint. Narrow Tolerance is used for smaller fasteners and more precise operations to assure proper installation in the workpiece hole. This mode is less tolerant of workpieces not held level and poor hole quality or hole debris.

• **Safety Fault Error -** If the difference between the insertion point and the safety setpoint is outside the range of the setpoint tolerance then a safety fault error condition occurs. When a safety fault occurs the redundant safety valves close, immediately stopping downward ram motion. The ram reverses direction and retracts the punch. The safety assembly on the end of the ram never fully compresses and the boost cycle is never initiated.

SECTION 6

TOUCH-SCREEN CONTROLS

A Windows XP driven Touch-Screen PC is embedded in the PEMSERTER® Series 3000® press to provide operator access to press information. The primary function of the screen is to display process related data that is used to monitor and control the press operation. The touch-screen capability interfaces the operator to the process by soliciting operator input.

A programmable logic controller (PLC) is the high speed primary control device that is programmed to interact with both the process and the operator to accomplish press setup, operation, and maintenance functions.

Programming in the PLC and touch-screen device allows the operator to run the process via convenient high level commands that may have predetermined sequencing or logic to protect both the operator and machinery.

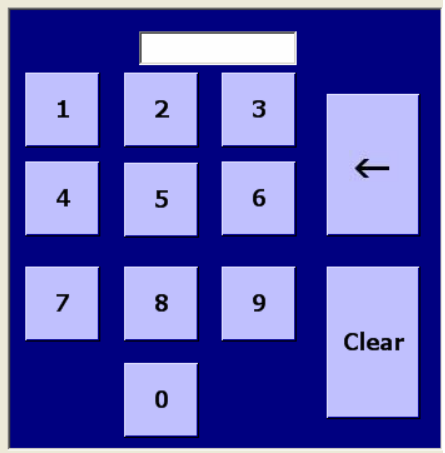
The PC screens offer data management, diagnostics, training, and help functions.

All displays are configurable with regard to language and units. The behavior of these screen elements can be set by the user after delivery under password protection.

The following sections describe the information and functions available on each of the screens. Below each screen is a description of the information and functions available on the screen. Each button that leads to a different screen is listed with the section of this document that describes the next screen.

Number Entries (Key Pad Function)

In several of the screens where a number must be entered, a special feature is used, called a keypad. Each digit of the number is entered by pressing the specific number button. The Number Entry is not accepted until pressing the appropriate button for that value. Where decimal points are a part of the number, the placement is established. The keypad also contains a backspace and Clear buttons.



Alphanumeric Entries (Key Pad Function)

There are also screens where alpha characters must be entered. A QWERTY style keypad overlay the screen as a popup when an applicable entry field is selected. This keyboard mimic acts as a normal keyboard.

HELP Screens

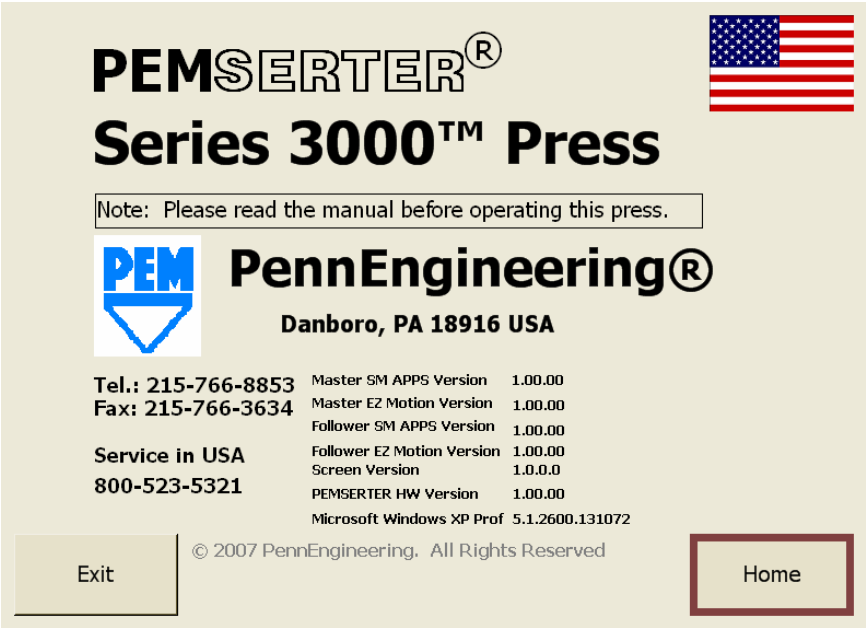
Help Screens are available throughout the touchscreen system of menus. They offer immediate explanations of the functions on the screens like the ones in this document.
The Help Screens are online documentation. Actual pictures of the Help screens are not included in this documentation.

[BACK] – Returns the touch screen control back to the screen where the Help Screen was originally called from.

[NEXT] – Proceeds to the next Help Screen available on the same topic. Some help buttons may have more than one page of information.

[PREVIOUS] – Returns to the previous Help Screen.

6.1 TITLE SCREEN



Powering the PEMSERTER® system causes the Windows operating system to boot. When the boot is complete the "PEMSERTER®" title screen (**Logo Screen**) appears on the touch-screen.

The PennEngineering® Sales Representative's addresses and phone numbers also appear on the Title Screen.

"Master SM APPS Version", "Master EZ Motion Version", "Follower SM APPS Version", and Follower EZ Motion Version are the version number of the PLC resident software.

"PEMSERTER® Screen Version" is the version number of the Screen software.
"PEMSERTER HW Version" is the model number of the press.

[CONTINUE] → to → 6.2 Access Code Screen

Language Selection [FLAGS] – The operator can select the base language that is used for the default language in all screens including titles, descriptions, and help text by choosing the appropriate national flag.

[HOME] – This button sets the ram to the home position.

[EXIT] – Closes program to allow for the press to be completely shut down.
The PS 3000 is equipped with a "Windows" based PC and must be shut down in a specific sequence. Before turning off the main disconnect on the side of the machine "Windows" must be closed and the PC must be shut down.
To accomplish this:

- Return to the logo screen

- Push the **[Exit]** button (this will open up two options)
    - **[Exit to "Windows"]**
    - **[Shut Down]**

Shut Down Mode:

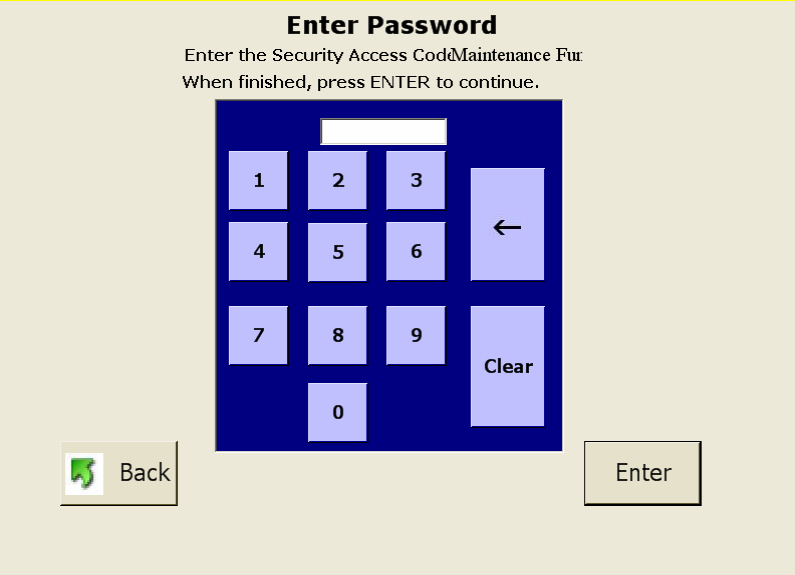
- To shut down the machine press **[Shut Down]**. This will open a dialog box for confirmation of shut down.
- From the dialog box choose **[Yes]** to continue shut down. This will automatically close windows and turn off the PC.

Exit to Windows Mode:

- To Exit to "Windows" a security code is required.
- Press **[Exit to Windows]**. A security code key pad will appear.
- Enter the proper security code and press **[Enter]** (The required security code is the same as the maintenance pass code).
- This will quit the application and return the PC to the "Windows" desk top.
- To continue shut down from the Windows desk top press the "Start" button. A dialog box will open.
- Chose **[Turn off computer]**. This opens another dialog box.
- Choose "Turn off".
- "Windows" will then close.
- Once "Windows" has closed and the PC has shut down it is then safe to turn off the main disconnect on the side of the machine.

Caution!! Before opening the electrical enclosure wait 30 seconds after the main disconnect is turned off. This will allow any residual electrical current to dissipate from the servo drives.

6.2 ACCESS CODE SCREEN



This screen appears and limits access to different levels of functions depending on which access codes have been established. See 6.35 Access Code Setup Screen. If the access code is set to 0000 then this screen will be bypassed and the touchscreen menu will proceed to the next function. This same screen appears in different places for Operator Access, Setup Access and Maintenance Access.

To proceed to the next screen:

Enter the Correct 4-digit Access Code.

[↵] – Proceeds to the appropriate screen

If in Operator Access Screen – Proceeds to Mode Selection

→ to → 6.3 Mode Selection Screen

If in Setup Access Screen - Proceeds to Run Value Change screens

→ to → 6.15 Manual Force Entry
→ to → 6.19 Preset Force Screen
→ to → 6.20 ISS Screen
→ to → 6.30 Timers Screen
→ to → 6.31 Run Mode Parameters Screen

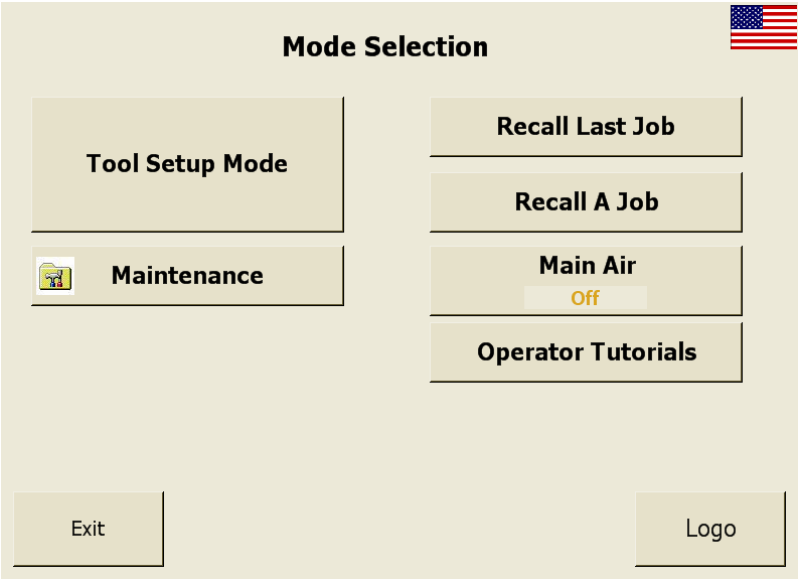
If in Maintenance Access Screen - Proceeds to Maintenance Menu Screen

→ to → 6.28 Maintenance Menu Screen

If the code is entered incorrectly, an audible alarm is sounded.

If the access code is forgotten, call your PennEngineering® Service Representative.

6.3 MODE SELECTION SCREEN



This screen allows you to enter into a selected type of installation setup procedure or maintenance mode, and to toggle certain operations.

[TOOL SET-UP MODE] – Proceeds to a setup process, which allows the operator to select the installation mode, fastener size, material type and to change the installation force.

→ **to** → **6.4 Tooling Selection screen**

[RECALL LAST JOB] – Proceeds directly to safety setup of press using the values defined in the last setup, even if the press had been turned off.

→ **to** → **6.22 Safety Setup Procedure screen**

[RECALL A JOB] – Proceeds to a menu of previously setup jobs.

→ **to** → **6.28 Recall Job screen**

[MAINTENANCE] – If the Maintenance access code has been set this button proceeds to the Maintenance Access Screen

→ **to** → **6.2 Access Code screen**

If the Maintenance access code has been set to 0000 this button proceeds to the Maintenance Menu Screen directly

→ **to** → **6.29 Maintenance Menu screen**

[MAIN AIR] – Turns the main air on and off.

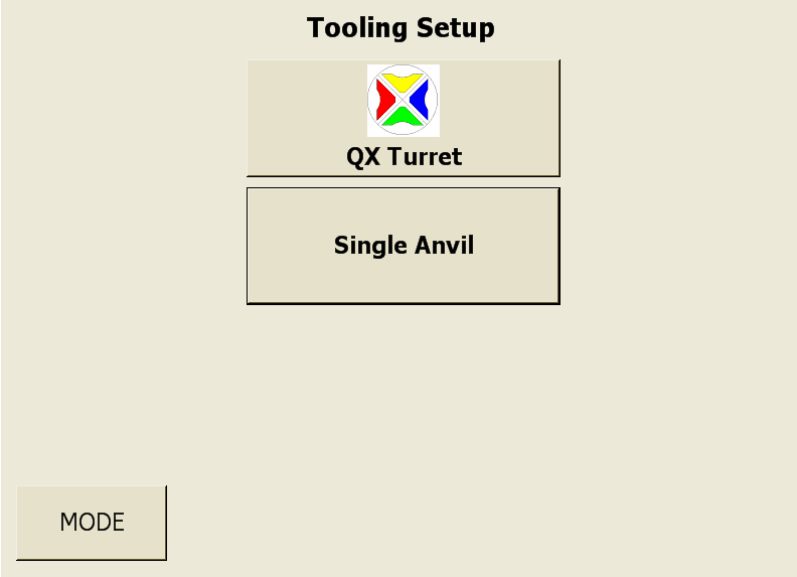
[OPERATOR TUTORIALS] – Proceeds to menu for instructional videos.

→ **to** → **6.36 Maintenance Tutorials Screen**

[LOGO SCREEN] – Returns to main title screen

→ **to** → **6.1 Title screen**

6.4 TOOLING SETUP SCREEN



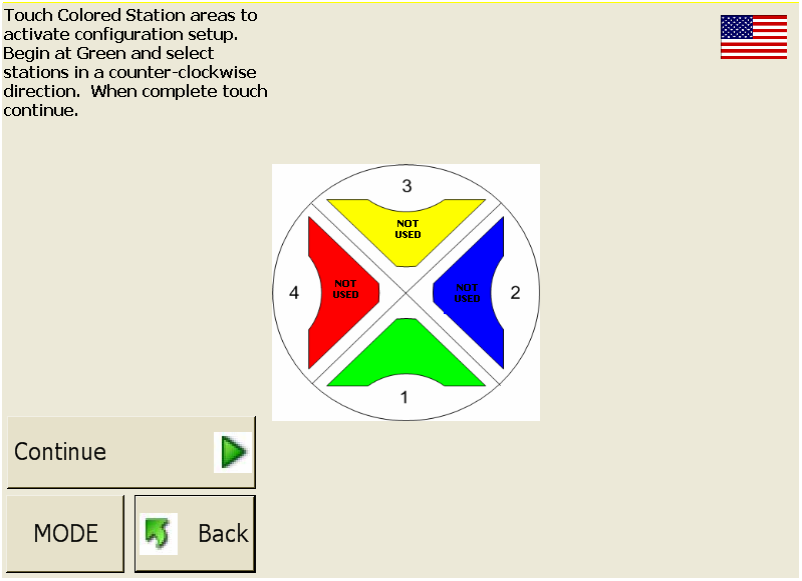
This screen determines the tooling configuration and with workpiece image mode that is used for the setup procedure.

[QX TURRET] - Directs the setup procedure through QX Turret mode.
→ to → 6.5 QX Multiple Tool screen

[SINGLE TOOL] – Directs the setup procedure through single tool configuration.
→ to → 6.9 Single Tool Set Feed Source Screen
This is after a double confirmation step to assure that single tooling is the current tooling.
First Confirmation: ARE YOU SURE THAT THIS IS A SINGLE TOOL SETUP?
Second Conformation: ARE YOU SURE QX TOOLING HAS BEEN REMOVED?

[MODE] – Returns to Mode Selection Screen
→ to → 6.3 Mode Selection screen

6.5 MULTI TOOL SETUP SCREEN



This screen determines the tooling configuration for a QX Turret Tooling operation for each station.

To program the stations, begin at GREEN and select stations in counter-clockwise direction.

When the desired stations have been defined as required by the job being set up, the operator advances to the next screen by selecting **[CONTINUE]**.

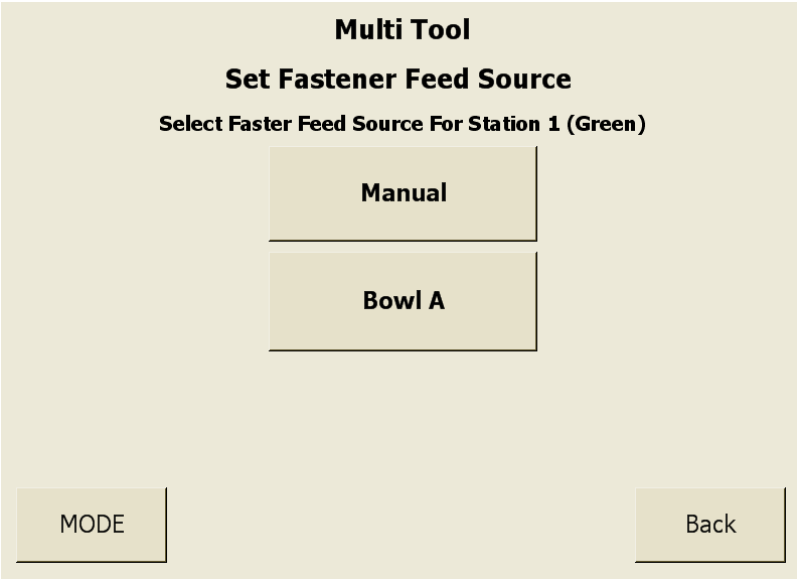
 - (4 Button) Selecting the quarter of the circular turret will toggle the color selected to active or inactive. An inactive Station is marked as **NOT USED**. And active station displays blank data fields for that station that are defined during the setup process.

[MODE] – Returns to Mode Selection Screen
→ **to** → **6.3 Mode Selection screen**

[CONTINUE] – Save tooling options and moves to next screen.
→ **to** → **6.6 Multiple Tooling Fastener Feed Setup screen**

[BACK] – Returns to Mode Selection Screen without saving the selections.
→ **to** → **6.4 Automatic Tooling Setup screen**

6.6 MULTIPLE TOOLING SET FASTENER FEED SOURCE SCREEN



This screen determines the fastener feed source for the QX Station shown on the screen.

The two feed options for Multiple Tooling are manual feed or feed from Bowl A with automatic feed.

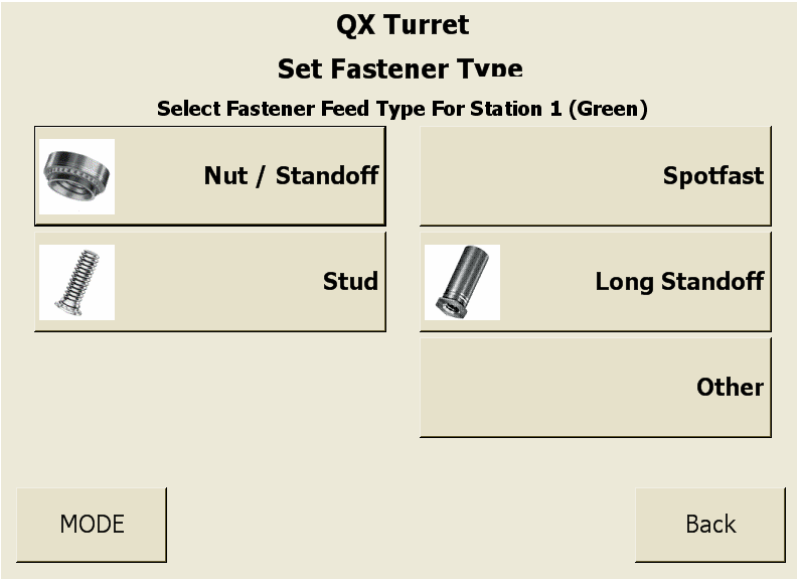
[MANUAL] - Select to indicate that the fastener feed for that station for the job is manual.
→ to → 6.12 Select Force Setup screen

[BOWL A] - Select to indicate that the fastener feed for that station for the job is automatic and from Bowl A.
→ to → 6.7 Set Fastener Type screen

[MODE] – Returns to Mode Selection Screen
→ to → 6.3 Mode Selection screen

[BACK] – Returns to Tooling Setup Screen without saving the selections.
→ to → 6.4 Tooling Setup screen

6.7 MULTIPLE TOOLING SET FASTENER TYPE SCREEN



This screen determines the fastener type for the active QX Station.

The operator must select one of these options to advance to the next step of Multiple Tooling setup.

[NUTS/SO] – Nut and Short Standoff Mode is for automatic feeding of nuts to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener. See Tooling Section for description of tools and operation.

→ to → 6.8 Set Fastener Feed Type screen

[STUDS/BSO] – Top Feed Stud and Blind Standoff Mode is for automatic feeding of studs and blind standoffs to the Top Feed Hanger Assembly, for punch pick-up by vacuum. See Tooling Section for description of tools and operation.

→ to → 6.12 Select Force Setup screen

[SPOTFAST] - Select to indicate that the fastener type for the single tool operation is a Spotfast fastener.

→ to → 6.12 Select Force Setup Screen

[LONG STANDOFFS] – Top Feed Long Standoff Mode is for automatic feeding of longer standoffs to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener. See Tooling Section for description of tools and operation.

→ to → 6.12 Select Force Setup Screen

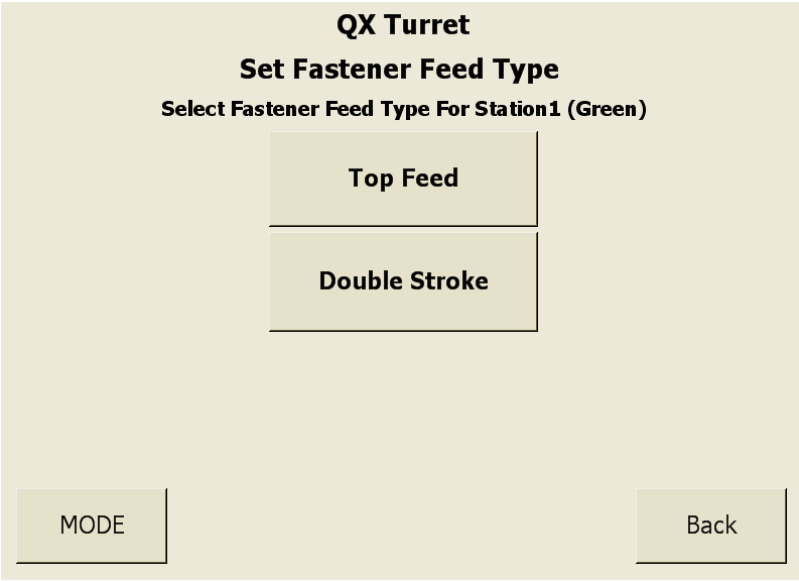
[OTHER] – Other Mode is for special custom modes defined especially for specific fasteners and applications. See Documentation that accompanied tooling for description of tools and operation.

→ to → 6.12 Select Force Setup Screen

[MODE] – Returns to Mode Selection Screen
→ **to** → **6.3 Mode Selection screen**

[BACK] – **Multiple Tooling Set Fastener Type Screen**
→ **to** → **6.6 Multiple Tooling Set Fastener Type Screen**

6.8 MULTIPLE TOOLING SET FEED TYPE SCREEN



When the selected fastener type is a nut from a bowl, the operator must specify the feed position. For all other fastener types this screen is skipped in the setup procedure.

The two (2) options are **[TOP FEED]** and **[DOUBLE STROKE]**. When the operator selects one of these options the setup procedure advances to the next step of Multiple Tooling setup.

[TOP FEED] – Top Feed Mode is for automatic feeding of nuts and short standoffs to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener. See Tooling Section for description of tools and operation.

→ to → 6. 12 Select Force Setup screen

[DOUBLE STROKE] – Top Feed/Bottom Installation Double Stroke Nuts Mode is for automatic feeding of nuts to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener and deposit onto a double stroke bottom installation anvil. See Tooling Section for description of tools and operation.

→ to → 6. 12 Select Force Setup screen

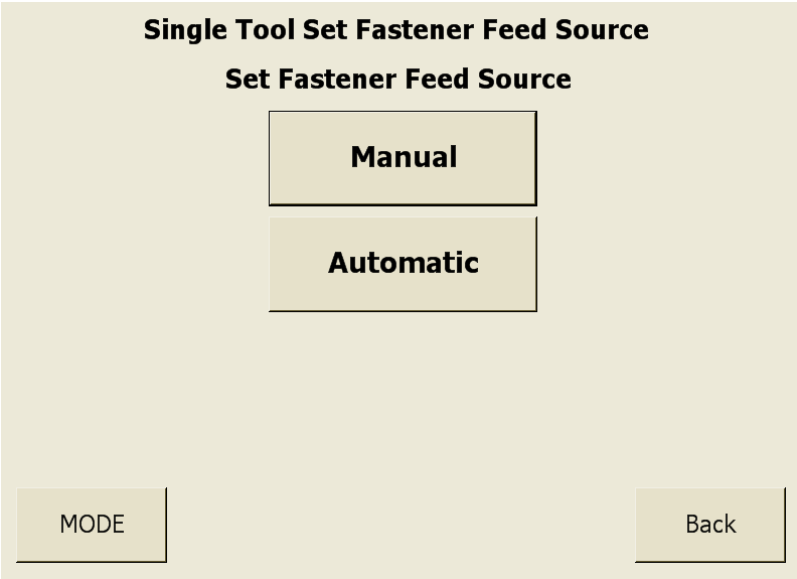
[MODE] – Returns to Mode Selection Screen

→ to → 6.3 Mode Selection screen

[BACK] – Multiple Tooling Set Fastener Type Screen

→ to → 6.7 Multiple Tooling Set Fastener Type Screen

6.9 SINGLE TOOL SET FEED SOURCE SCREEN



This screen determines the fastener feed source for a fixed tooling configuration.

The two options are **[MANUAL FEED]** and **[BOWL FEED]**.

[MANUAL FEED] – Select to indicate that the fastener feed for the single tool operation is manual.

→ to → 6.12 Select Force Setup Screen

[AUTOMATIC FEED] - Select to indicate that the fastener feed for the single tool operation is automatic.

→ to → 6.10 Single Tool Set Fastener Type Screen

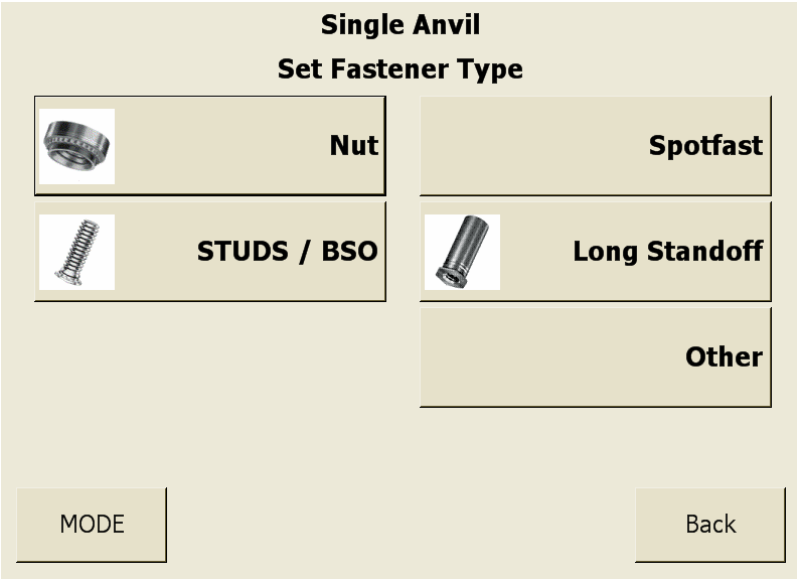
[MODE] – Returns to Mode Selection Screen

→ to → 6.3 Mode Selection screen

[BACK] – **Tooling Setup Screen**

→ to → 6.4 Tooling Setup Screen

6.10 SINGLE TOOL SET FASTENER TYPE SCREEN



This screen determines the fastener type for a single tooling configuration.

When the selected fastener source is from a bowl, the operator must specify the fastener type. When manual feed is selected, this screen is skipped in the setup procedure.

[NUT/SO] – Nut and Short Standoff Mode is for automatic feeding of nuts. Operator chooses the feed method using the Set Fastener Feed Type screen.

→ to → 6.11 Set Fastener Feed Type screen

[STUDS/BSO] – Top Feed Stud and Blind Standoff Mode is for automatic feeding of studs and blind standoffs to the Top Feed Hanger Assembly, for punch pick-up by vacuum. See Tooling Section for description of tools and operation.

→ to → 6.12 Select Force Setup screen

[SPOTFAST] – SpotFast Mode is for automatic feeding of SpotFast fasteners to the Top Feed Hanger Assembly for punch pick-up by vacuum.

→ to → 6.12 Select Force Setup Screen

[LONG STANDOFFS] – Top Feed Long Standoff Mode is for automatic feeding of longer standoffs to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener. See Tooling Section for description of tools and operation.

→ to → 6.12 Select Force Setup Screen

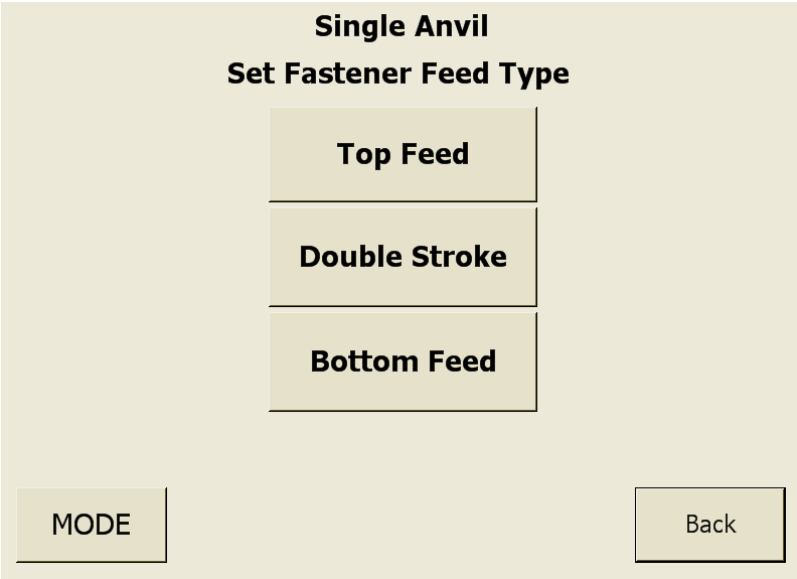
[OTHER] – Other Mode is for special custom modes defined especially for specific fasteners and applications. See Documentation that accompanied tooling for description of tools and operation.

→ to → 6.12 Select Force Setup Screen

[MODE] – Returns to Mode Selection Screen
→ **to** → **6.3 Mode Selection screen**

[BACK] – Single Tool Set Fastener Feed Source Screen
→ **to** → **6.9 Single Tool Set Fastener Feed Source Screen** without saving the entered data

6.11 SINGLE TOOL SET FEED TYPE SCREEN



This screen determines the nut feed type for a single tooling configuration. Bottom Feed is not available when QX Turret is installed on press.

When the selected fastener type is a nut from a bowl, the operator must specify the feed position. For all other fastener types this screen is skipped in the setup procedure.

The operator must select one of these options to advance to the next step of Single Tool setup.

[TOP FEED] – Top Feed Mode is for automatic feeding of nuts and short standoffs to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener. See Tooling Section for description of tools and operation.

→ to → 6. 12 Select Force Setup screen

[DOUBLE STROKE] – Top Feed/Bottom Installation Double Stroke Nuts Mode is for automatic feeding of nuts to the Top Feed Hanger Assembly, for punch pick-up through the internal hole of the fastener and deposit onto a double stroke bottom installation anvil. See Tooling Section for description of tools and operation.

→ to → 6. 12 Select Force Setup screen

[BOTTOM FEED] - Bottom Feed Nut Mode is for automatic feeding of nuts to a Bottom Feed Module Tool mounted on the anvil holder. See Tooling Section for description of tools and operation.

→ to → 6. 14 Select Force Setup screen

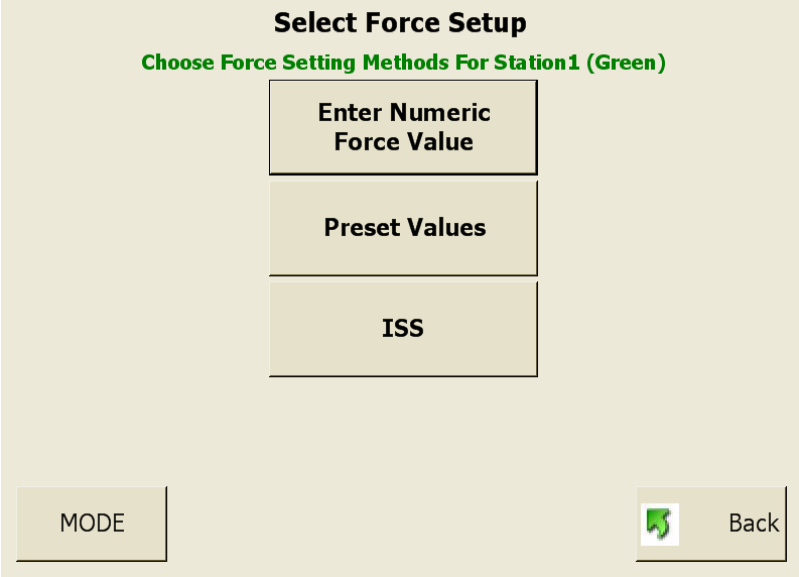
[MODE] – Returns to Mode Selection Screen

→ to → 6.3 Mode Selection screen

[BACK] – Returns to Single Tool Set Fastener Type Screen without saving any data.

→ to → 6.8 Single Tool Set Fastener Type Screen

6.12 SELECT FORCE SETUP SCREEN



This screen allows the operator to determine the method of establishing the Force Setpoint for each station defined previously in the setup procedure.

[ENTER NUMERIC FORCE VALUE] - Allows the operator to manually enter any value within the force range of the ram, 1.8 to 71.2 kN (400 to 16,000 lbs).

→ to → 6. 13 Manual Force Setting screen

[PRESET VALUES] – This method uses a table of pre-calculated range of forces for each fastener type, size and the workpiece material to guide the operator in selecting Force Setpoint.

→ to → 6. 14 Select Fastener Size and Workpiece Material Screen

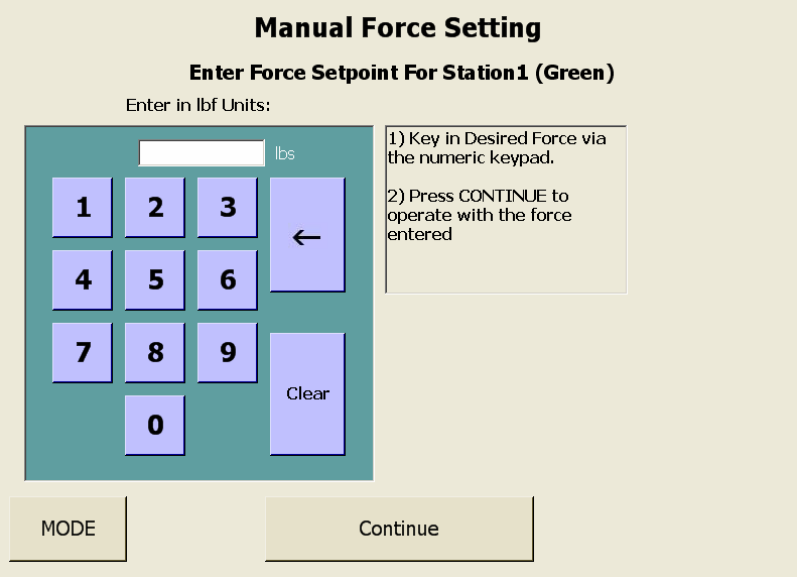
The **[ISS]** method uses the press to create a force versus position profile to analyze the installation. An algorithm identifies the optimum Force Setpoint.

→ to → 6. 16 ISS Screen

[MODE] – Returns to Mode Selection Screen

→ to → 6.3 Mode Selection screen

6.13 MANUAL FORCE SETTING SCREEN



This screen allows the operator to manually enter the Force Setpoint by keypad.

Operator keys in the desired force using the numeric keypad and presses **[CONTINUE]**.

[MODE] – Returns to Mode Selection Screen

→ to → 6.3 Mode Selection screen

[CONTINUE] – Saves the last Force Setpoint. It is not active until a value is entered.

On the initial setup pass for Multiple Tool configuration, the Set Workpiece Image Screen is activated.

→ to → 6.17 Set Workpiece Image screen

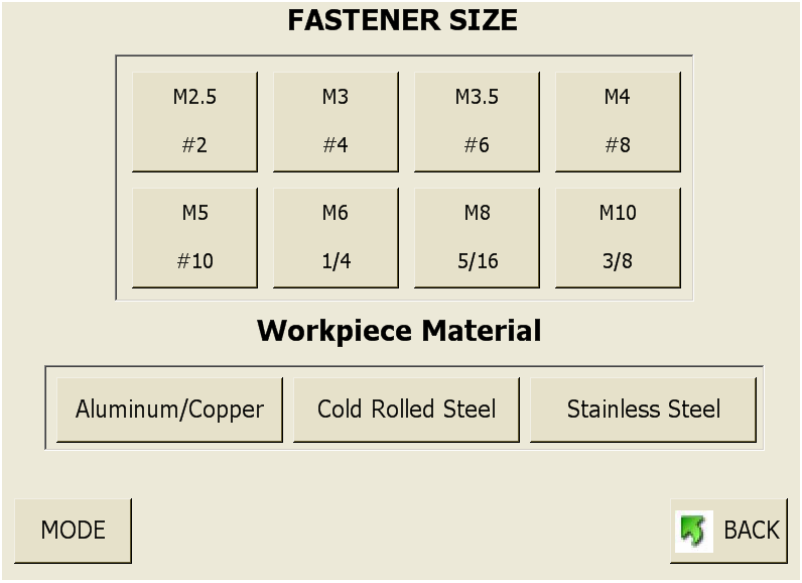
If this job has a workpiece image set, the setup procedure advances to the Set Workpiece Insertions Screen.

→ to → 6.20 Set Workpiece Insertions screen

[BACK] – Returns to Select Force Setup Screen.

→ to → 6.12 Select Force Setup Screen

6.14 SIZE AND MATERIAL SELECTION SCREEN



This screen allows the operator to select the fastener size being installed and workpiece material it is being installed into. Based on the operators selections, the Series 3000:

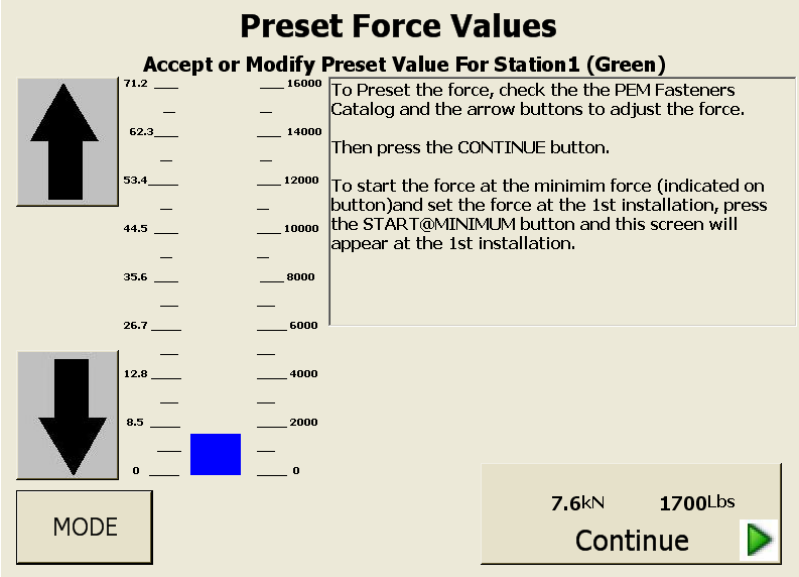
1) Limits the maximum installation force for operator safety.
2) Selects automatic feeding function settings
3) Presets a suggested installation force

[ANY SIZE] + [ANY MATERIAL] – Select a size or material, after selecting one, the operator can change the selection just by pressing a different selection. As soon as BOTH a size and a material is selected **[CONTINUE]** button appears.

[CONTINUE] – Proceeds to Preset Force Values Screen. It is not active until a value is entered.
→ to → 6.15 Preset Force Screen

[BACK] – Returns to Select Force Setup Screen
→ to → 6.12 Select Force Setup Screen

6.15 PRESET FORCE VALUES



When this screen appears a recommended installation force will be preset. The operator can continue with the recommended setting, or adjust the value using the arrows, then continue.

[↑] – Increases Force Setting up to limit imposed by fastener size and workpiece material setting.

[↓] – Decreases Force Setting down to minimum

[MODE] – Returns to mode selection screen.

→ **to** → **6.3 Mode Selection Screen**

[CONTINUE] -

Initial setup pass for tooling configuration

→ **to** → **6.17 Set Workpiece Image Screen**

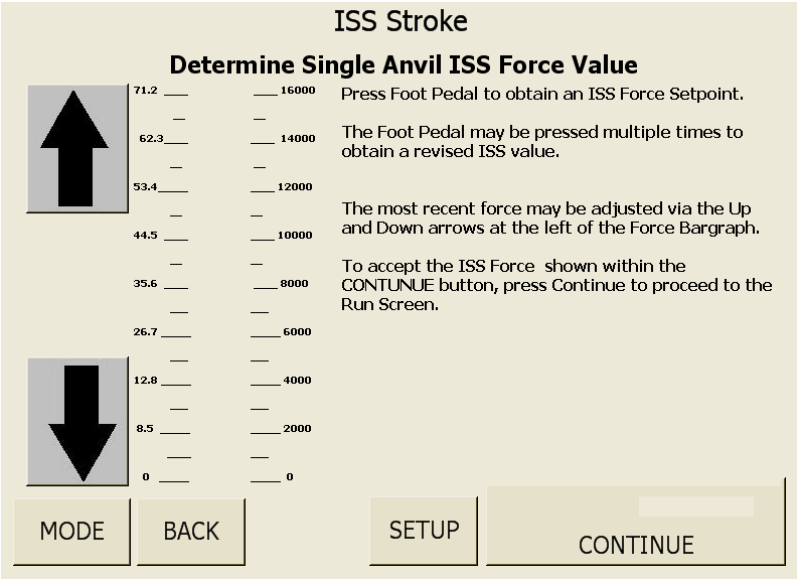
If this job has a workpiece image set, the setup procedure advances to:

→ **to** → **6.20 Set Workpiece Insertions Screen**

If there is no workpiece image for this job, the setup procedure advances to:

→ **to** → **6.21 Insertion Count Entry Screen**

6.16 ISS Screen



This screen provides Force Setpoint analysis of an unknown part.

A Force versus Position profile is gathered and applied to an algorithm that establishes the optimum Force Setpoint for the part based on the characteristics of the profile.

Depending on the type of feed, a part must be positioned for ram action. When ready the operator uses the foot pedal to start the analysis.

The result Force Setpoint is displayed numerically and graphically on the ISS Screen.

The operator may adjust the force manually using the arrows. The last analysis before the **[CONTINUE]** button selected is the Force Setpoint that will initially be used for insertion of that part.

[SAFETY SET-POINT RE-SETUP] – Advances to the Safety Setup Screen and allows the operator to begin ISS procedure again.

[MODE] – Returns to mode selection screen.
→ to → 6.3 Mode Selection Screen

[CONTINUE] - The last reported Force Setpoint is saved.
Initial setup pass for a Multiple Tool configuration,
→ to → 6.17 Set Workpiece Image Screen

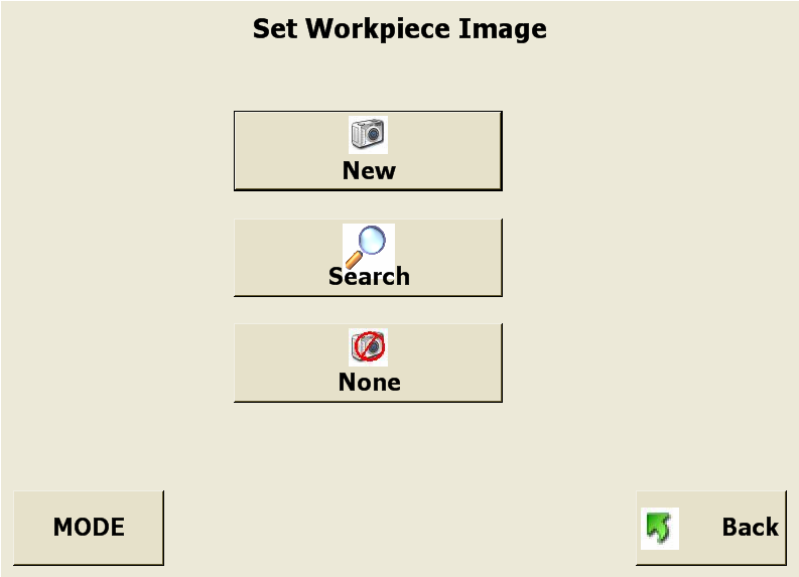
If this job has a workpiece image set, the setup procedure advances to:
→ to → 6.20 Set Workpiece Insertions Screen

If there is no workpiece image for this job, the setup procedure advances to (depending on the User Options – Section 6.36):

→ **to** → **6.21 Insertion Count Entry Screen** or
→ **to** → **6.22 Safety Setpoint Setup Screen**

[BACK] – Returns to Select Force Setup Screen
→ **to** → **6.12 Select Force Setup Screen**

6.17 SET WORKPIECE IMAGE



This screen allows the user to specify the workpiece source for the job.

An existing image on file may be used or a new image set can be captured and stored for current and future use.

[NEW] – Select this button to import picture of workpiece.
→ to → 6.18 Capture Workpiece Images Screen

[SEARCH] – Select this button to search for previously captured workpieces.
→ to → 6.19 Search Workpiece Images Screen

[NONE] – Indicates that no workpiece image capture or recall is pending for this job.
→ to → 6.20 Set Workpiece Insertions Screen

6.18 CAPTURE WORKPIECE IMAGE SCREEN

This screen allows the user to enter new workpiece images into the system.

Attaching a digital camera to the USB port of the Touch Screen allows the setup to access photos stored in the camera. Verify that the camera is turned on.
NOTE: Initial use of digital camera may require Windows shutdown and restart to install driver.

[NEXT DIRECTORY] – Activates Windows Explorer menu to select file source location.

Each picture is displayed with its file name. Use the **[PREVIOUS PAGE]** and **[NEXT PAGE]** buttons for scrolling though the entire picture set.

Selecting a thumbnail highlights that workpiece for capture.

The user may enter multiple images. Selecting an image activates the **[CONTINUE]** button. Selecting **[CONTINUE]** button stores the images and the setup proceeds to the next step.

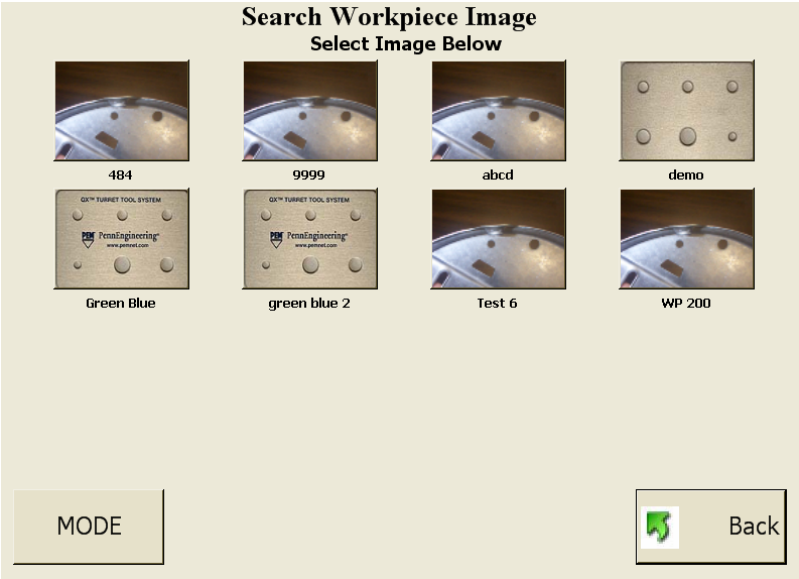
The operator enters the insertion points later in the setup process.

[MODE] – Returns to mode selection screen.
→ to → 6.3 Mode Selection Screen

[CONTINUE] - The selected workpiece set is saved for use in the job and the operator is prompted to define insertions later in the setup process. This button is not active until an image is selected.
→ to → 6.20 Set Workpiece Insertions Screen

[BACK] – Returns to Set Workpiece Image Screen
→ to → 6.17 Set Workpiece Image Screen

6.19 SEARCH WORKPIECE IMAGE SCREEN



This screen allows the user to search for and select a workpiece set from a list of previously captured workpieces.

An alphabetical ordered list of workpiece thumbnail with file names is displayed. One item can be highlighted. Touching one of the thumbnails cause that workpiece to be selected. Press **[CONTINUE].**

The images collected via image selection when the **[CONTINUE]** button is selected are used for the job setup. The operator enters the insertion points later in the setup process.

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

[CONTINUE] - The selected workpiece set is saved for use in the job and the operator is prompted to define insertions later in the setup process. This button is not active until an image is selected.

→ to → 6.21 Set Workpiece Insertions Screen

[BACK] – Returns to Set Workpiece Image Screen

→ to → 6.17 Set Workpiece Image Screen

6.20 SET WORKPIECE INSERTIONS SCREEN

This screen allows the user to specify a spot on the workpiece for the intended insertion.

All insertions for the station or single tool should be specified before proceeding to the next setup step.

The insertions are entered in order. The insertion points are specified by touching the image at the point of insertion. The operator accepts the displayed insertion point by presses **[ENTER]** and continues to the next insertion. If the insertion spot was picked incorrectly, the operator can pick again and the **[DELETE]** appears, press to cancel the last insertion and allows the user to continue without that insertion.

When all insertion have been entered the operator can proceed to the next station to specify insertions for that part by touching **[CONTINUE]**.

When the last station's insertion points have been identified, press **[CONTINUE].**

→ to → 6.22 Safety Setpoint Screen

[IMAGE] - Causes the next workpiece image in the set to be displayed with wrap around to the first image.

[SAVE] - The coordinates of the last workpiece image selection are added to the job. The insertion sequence number is incremented.

[CLEAR ALL] – Removes all picked insertion points from image.

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

[DONE] – Terminates the insertion selection cycle and saves the insertions for that station.
If there are more stations to define for this job, the setup procedure advances.

→ to → 6.5 Multiple Tooling Setup Screen

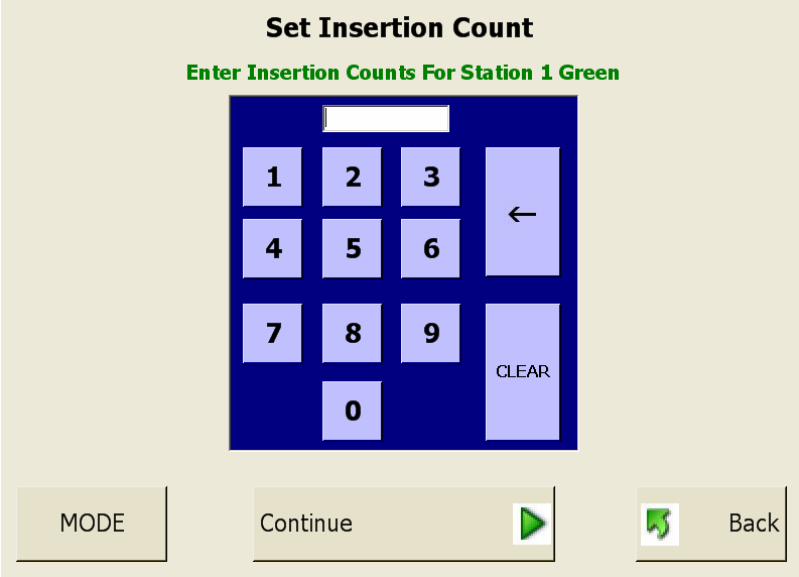
If this is a single tool job or the last defined station, then the setup mode terminates and run mode begins with the single tool setup or the Green station in a multiple tooling setup.

→ to → 6.22 Safety Setpoint Procedure Setup Screen

[BACK] – Returns to Set Workpiece Image Screen

→ to → 6.17 Set Workpiece Image Screen

6.21 INSERTION COUNT ENTRY SCREEN



This screen is required to specify the number of insertions for each station or a single tooling operation when a workpiece image has not been specified.

A simple keypad entry of the number of insertions defines the insertion count so that the system can control tooling stations and/or the workpiece count.

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

[CONTINUE] – The last entered value is saved as the insertion count for that fastener.

If there are more stations to define for this job, the screen advances.

→ to → 6.5 Multiple Tooling Setup Screen

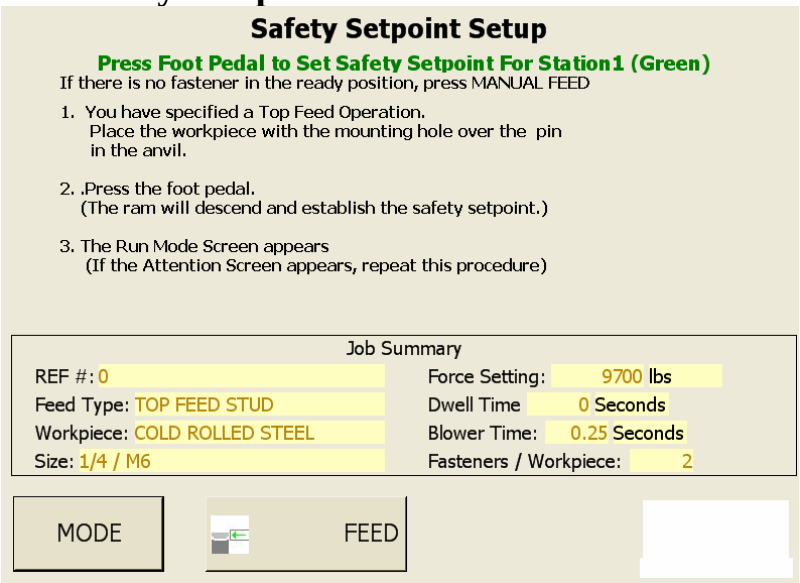
If this is a single tool job or the last defined station, then the setup mode terminates and run mode begins with the single tool setup or the Green station in a multiple tooling setup.

→ to → 6.22 Safety Setpoint Procedure Setup Screen

[BACK] – Returns to Select Force Setup Screen

→ to → 6.12 Select Force Setup Screen

6.22 Safety Setup Procedure Screens



If the press was setup in a fastener feeding mode, the system will automatically feed a fastener to the insertion area.

This screen directs the operator to check that the fastener and workpiece is properly setup for the safety position learn sequence and directs the operator to initiate the sequence. The instructional text may differ, depending on the tooling mode selected.

It is very important that the fastener and workpiece be held flat to the top of the anvil. (See Section 10)

The last step of each every sequence directs the operator to Depress The Footpedal. The Ram will extend down and touch the fastener and workpiece and return back up, without installing the fastener. The PLC uses this step to learn the position at which it is safe to install, called the Safety Setpoint.

It is very important that, at the bottom of the ram stroke when the ram contacted the fastener and the work piece, that the fastener was fully in the workpiece hole and both were flat to the anvil. If this did not occur, use the Re-setup function on the run screen to repeat the process. See 6.23 Run Mode Screen for Re-Setup details. (see Section 10)

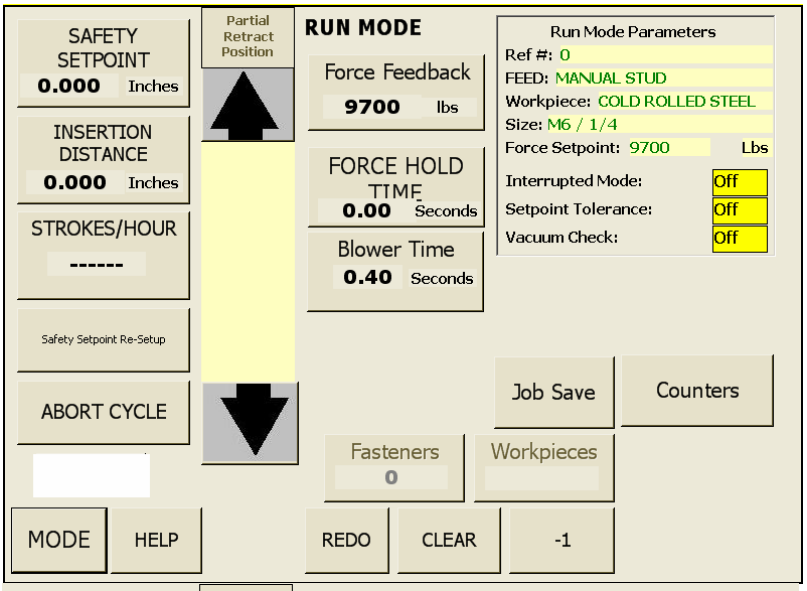
[MODE] – Returns to mode selection screen.
→ to → 6.3 Mode Selection Screen

[FEED] – Initiates a feed sequence to bring a fastener into position for the safety learn sequence, if first fastener lost.

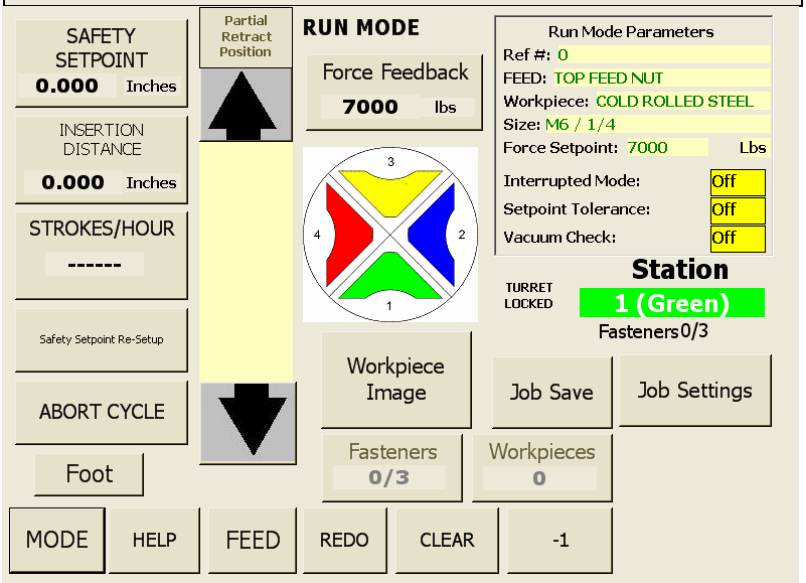
(Successful Learn Sequence) – After the operator performs a successful safety setup operation the screen will automatically move onto the Run Mode, ready to install the fastener.

→ to → 6.23 Run Mode Screen

6.23 RUN MODE SCREEN



RUN MODE SCREEN FOR: SINGLE TOOL MODE



RUN MODE SCREEN FOR: MULTI TOOL MODE

This screen functions as a main control panel while the press is operating in production mode. Various buttons and displays on the screen perform the following functions:

SAFETY SETPOINT – Displays the current value of the learned touch position for a safe installation.

INSERTION DISTANCE – Displays the value of the touch position of the last attempted installation, successful or not

[STROKES/HOUR] – Button/Display, Displays a counter of the average rate of good insertions. This value resets to zero after each setup. Press the display button to turn this feature on or off. If this feature is off, the display will be 0, all the time.

[SAFETY SETPOINT RE-SETUP] - Enables the press to learn a new Safety Setpoint, without leaving RUN mode. Touch this button and the button flashes. Depress the foot pedal and the press will perform a learn sequence and reset the Safety Setpoint to the new position. The press WILL NOT perform an insertion. (See 6.8 Safety Setup Procedure Screen)

[ABORT CYCLE] - Cancels an Interrupted Cycle at the wait point and allows the operator to start over again.

Ram Position Display Bars – Indicates the adjusted return position of the ram. The bar represents the amount of extension of the ram. The lowest setting for the return position is approximately 25mm (1 inch) above the safety setpoint. The arrow buttons on either end of the bar display are used to change the return position of the ram. This function can be used to reduce the stroke in certain modes and increase cycle rate. This function is disabled for tooling modes requiring the Top Feed System.

[↑] – Raises the return position of the ram.

[↓] – Lowers the return position of the ram.

[FORCE FEEDBACK] – Button/Display, Displays the actual insertion force calculated from the hydraulic ram pressure. This value resets to zero at the beginning of an insertion attempt and displays the insertion force during insertion. The value at the end of insertion is locked until the next insertion attempt. Touch this button to go to the screen to adjust the preset force.

This button is SETUP access password protected. See 6.40 Access Code Setup Screen
→ to → 6.12 Select Force Setup Screen

[CLEAR PASSWORD] – This button flashes after a SETUP access code is entered at one of the protected functions. While the button is flashing, the operator can access any of the protected functions without re-entering the SETUP access password again. Touching this button clears the SETUP access code, the button will stop flashing, and the next time a protected function is selected the access code screen (see 6.2) will appear again.

[GENERATE JOB LOG FILE] - This button appears when the Automatic Job Logging Option is disabled. It allows the operator the choice of generating a data export file of the job information, including the job setup information, counter totals, and insertion forces. The user can access the job export files via a 3rd party spreadsheet or database package to create reports or as an analysis tool.

[WORKPIECE IMAGE] This button appears when in EZ Screen mode and a workpiece image is included in the job setup. Selecting the WORKPIECE IMAGE button activates a screen that shows the workpiece image marked with the insertions for the single tooling operation or for the current tooling station in an automatic tooling operation. The next insertion pint is always highlighted and the screens advance if the workpiece is specified as a multiple image set.

[RUN MODE PARAMETERS] – Button/Display displays job setup information, including mode selections. The dark filled circles indicate the mode is activated. Touch this button to go to the run mode parameter screen.

The Run Mode Parameters area is used for display of the workpiece image when an image set is defined.

Workpiece image display has the priority and is the default mode when a workpiece image has been defined for the job.

In this case, the operator can access the Run Mode Parameters for the next insertion by selecting the workpiece image as a target. Selecting the Run Mode Parameters below the title toggles back to the pending workpiece image for the next insertion.

→ to → 6.26 Run Mode Parameters Screen

[BLOWER TIME] - Allows the blower time for automatic feed modes to be adjusted. The blower time is the duration that the air stays on to blow the fastener from the shuttle mechanism through the feed tubing to the insertion area. Touch this button to go to the screen to adjust the blower time. To set the time, enter the value using the keyboard and touch this button.

[FORCE HOLD TIME] – Allows the force hold time to be adjusted. The force hold time is the amount of time that the target force is applied before retraction. Increase the force hold time if the fastener is not being fully installed. Decrease the force hold time if the fastener is being over installed. To set the time, enter the value using the keyboard and touch this button.

[SAVE JOB] – Allows the operator to save the current settings of the Run Mode into a preset memory location for Recall with the Recall Job function. The Save function will save the following settings:

Tooling Mode	Fasteners/Workpiece Count
Fastener Size Selection	Workpiece Complete Notify Setting
Workpiece Material Selection	Cycle Mode (Continuous/Interrupted)
Preset Force	Setpoint Tolerance (Standard/Narrow)
Blower Time	Safety Fault Auto Reset Mode
Force Hold Time	Vacuum Check Mode

A summary of some of this information is displayed in the Summary Box.
Current Workpiece and Fastener Counts and Workpieces/Batch WILL NOT be saved.

Any adjustments made to the recommended values will be saved with the job. If Fasteners/Workpiece Count is set, when the job is recalled, the count will be set to zero but will be enabled and start counting. If it is desired for the counter not to be enabled for every job, set the counter to zero.

→ to → 6.29 Store Job Screen

[FASTENERS] – Display/Button, The first larger number is the current number of fasteners installed in the current workpiece. Touch and hold this button to reset the count to 0. The second smaller number is the number of fasteners per workpiece, set at the counters screen, see below. When the first number reaches the second number the workpiece will be complete and the fastener count will automatically reset to zero. The second number does not change during run.

[WORKPIECES] – Display/Button, The first, larger number is the current number of workpieces completed since the last reset of this counter. Touch and hold this button to reset the current count to 0. The second smaller number is the number of workpieces per batch, set at the counters screen, see below. When the first number reaches the second number the batch will be complete and the workpiece count will automatically reset to zero. The second number does not change during run.

[-1] – Shift Decrement Button, Touch this button and touch either the Workpieces Button or the Fasteners Button to decrement the current count by 1.

[COUNTERS] or [JOB SETTINGS] - Allows the Workpiece and Fastener Counters to be set. Touch this button to go to the screen to set both counters.

→ to → 6.25 Counters / QX Job Settings Screen

[REDO] – In any automatic tooling mode, it enables the press to attempt another insertion without feeding another fastener. Touch this button and the button flashes. Depress the foot pedal and the ram will extend, insert and return again without feeding a new fastener. The Safety Window becomes set to the standard tolerance during the REDO cycle *only*, negating "Narrow Setpoint Tolerance" for just the redo stroke. If it is enabled, touching the button again will disable it. This function can be used for a restrike of a partially installed fastener or for a manual insertion during an automatic feed run without leaving the run screen.

[FEED] - By pushing this button the operator can cause the system to feed another fastener to the workpiece area, without activating the ram. This feature is used only if a fastener is lost during the standard feed process.

[HELP] – Run Mode Help Screens

→ to → Help Screen

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

6.24 RUN MODE WORKPIECE SCREEN

In Run Mode, the user can use the workpiece image as a guide for insertions. If a workpiece image has been included for a job the operator can activate the **Run Mode Workpiece Screen** which always shows the next insertion position.

If the job is a Multiple Tooling operation, the Tooling Station is displayed in the lower left corner.

The screen will show each insertion point for the single tool operation or for the multiple tooling station that is active. Each point is displayed according to insertion order specified in the setup. The completed insertion point is highlighted.

[ABORT CYCLE] - Cancels an Interrupted Cycle at the wait point and allows the operator to start over again.

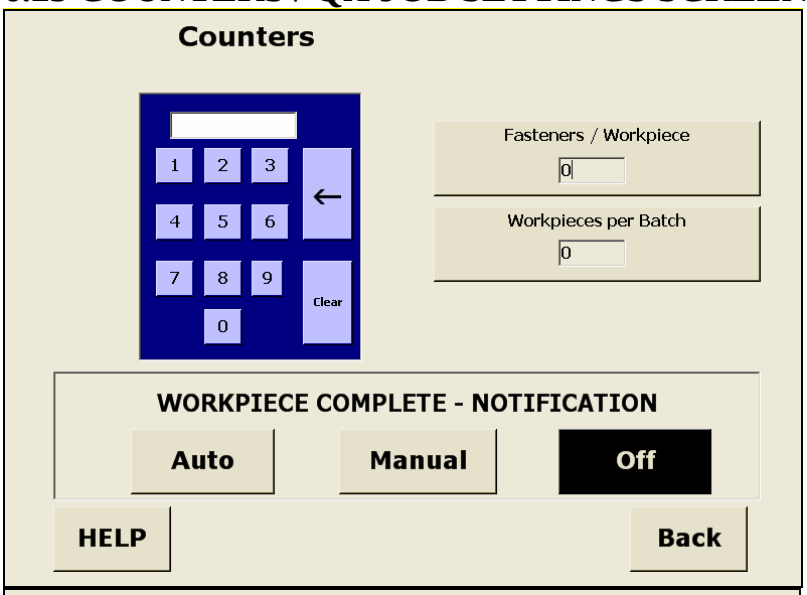
[FEED] - By pushing this button the operator can cause the system to feed another fastener to the workpiece area, without activating the ram. This feature is used only if a fastener is lost during the standard feed process.

[REDO] – In any automatic tooling mode, it enables the press to attempt another insertion without feeding another fastener. Touch this button and the button flashes. Depress the foot pedal and the ram will extend, insert and return again without feeding a new fastener. The Safety Window becomes set to the standard tolerance during the REDO cycle *only*, negating "Narrow Setpoint Tolerance" for just the redo stroke. If it is enabled, touching the button again will disable it. This function can be used for a restrike of a partially installed fastener or for a manual insertion during an automatic feed run without leaving the run screen.

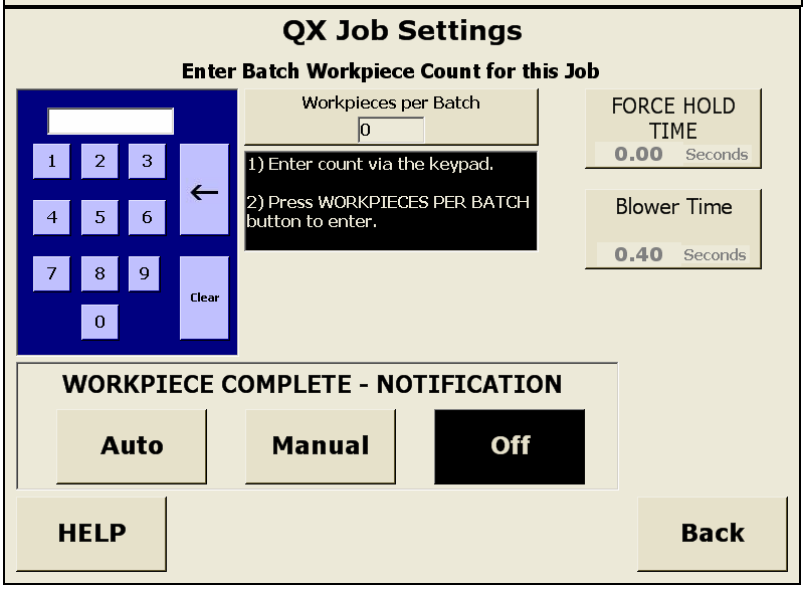
[BACK] – Returns to Run Mode Screen.

→ **to** → **6.23 Run Mode Screen**

6.25 COUNTERS / QX JOB SETTINGS SCREENS



COUNTERS SCREEN FOR:
SINGLE TOOL MODE



QX JOB SETTINGS
SCREEN FOR:
MULTI TOOL MODE

This screen allows the operator to change the fasteners per workpiece and workpieces per batch counter presets.

Counter Keypad – The operator uses the keypad to set the value of each digit for either counter. The range of each counter is from 0 to 9999.

[FASTENERS per WORKPIECE] – Touch this button after entering value using the keypad to preset the value of fastener insertions per workpiece. If this is set to zero, the counter will be disabled. If this counter is set to a value greater than zero, completed insertions will be counted. The fastener count is incremented after the end of the insertion force dwell. When the fastener count on the Run Mode Screen reaches this preset value, one workpiece completed will be counted, a Workpiece Complete warning may be displayed and the Workpiece counter will be incremented by 1 and the Fastener counter will be reset to zero.

[WORKPIECES per BATCH] – Touch this button after entering value using the keypad to preset the value of workpieces per batch. If this is set to zero, the counter will be disabled. If this counter is set to a value greater than zero, completed workpieces will be counted. The workpiece count is incremented after the fasteners per workpiece count is reached. When workpiece count on the Run Mode Screen reaches this preset value, a Batch Complete warning may be displayed and the Workpiece counter will be reset to zero.

Workpiece Complete Warning Screen Selection Buttons –

[AUTO] – Toggles Workpiece Complete Warning Screen to automatically return to run screen after a brief flash and audio warning.

[MANUAL] – Toggles Workpiece Complete Warning Screen to require the operator to touch the reset button on the screen, when the Workpiece Complete Warning Message Screen appears. There is an audio warning when the screen appears.

[OFF] – Toggles Workpiece Complete Warning Screen to not appear. There is only an audible warning.

Included on QX Job Settings Screen:

[BLOWER TIME] - Allows the blower time for automatic feed modes to be adjusted. The blower time is the duration that the air stays on to blow the fastener from the shuttle mechanism through the feed tubing to the insertion area. To set the time, enter the value using the keypad and touch this button.

[FORCE HOLD TIME] – Allows the force hold time to be adjusted. The force hold time is the amount of time that the target force is applied before retraction. Increase the force hold time if the fastener is not being fully installed. Decrease the force hold time if the fastener is being over installed. To set the time, enter the value using the keypad and touch this button.

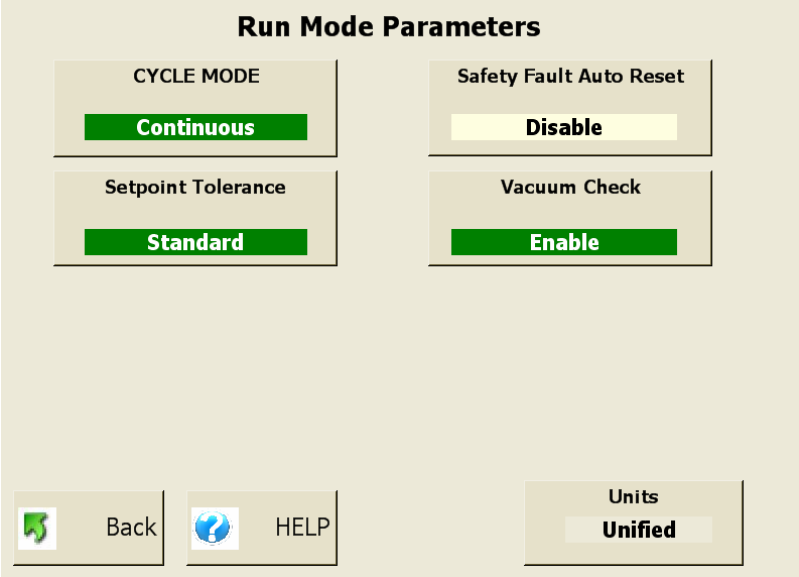
[BACK] – Returns to Run Mode screen.

→ to → 6.23 Run Mode Screen

[HELP] – Counter Help Screen

→ to → Help Screen

6.26 RUN MODE PARAMETERS SCREEN



This screen functions as a main control panel while the press is operating in production mode. Various buttons and displays on the screen perform the following functions:

[CONTINUOUS/ INTERRUPTED CYCLE] – Button/Display, Displays what mode the press is operating in Continuous Cycle Mode or Interrupted Cycle Mode. Touch this button to toggle between the two modes.

Continuous Cycle Mode – When the operator depresses the foot pedal, the ram will complete a full insertion cycle, extend, insert the fastener and return.

Interrupted Cycle Mode – When the operator depresses the foot pedal, the ram will extend, STOP and WAIT. When the operator depresses the foot pedal again, the ram will insert the fastener and return. This provides for some specialized applications, the opportunity to examine or adjust the fastener/workpiece positions just before the actual insertion.

[STANDARD/NARROW SETPOINT TOLERANCE] – Toggles the Setpoint Tolerance window from Standard to Narrow. Standard tolerance allows for normal variations of workpiece and fastener dimensions and operator handling of the workpiece. Narrow tolerance requires more precise dimensions and operator handling. A narrow tolerance is typically used for the most delicate workpieces with consistent thickness.

[ENABLE SAFETY FAULT AUTO RESET] – This button turns Auto Reset function on and off. In Auto Reset mode, if a safety fault occurs, the operator is not required to touch the screen to reset. These two safety faults are automatically reset:

Safety Sensors tripped ABOVE setpoint, during Run mode, the ram contacted something before it reached the minimum allowable insertion distance.

Safety Sensor tripped BELOW setpoint, during Run mode, the ram did not contact anything before it reached the maximum allowable insertion distance.

[ENABLE VACUUM CHECK] – This button will turn the Vacuum Check function on and off. If the press is operating in stud mode, this feature will check for the presence of the fastener on the vacuum punch.

[METRIC/UNIFIED RUN SCREEN UNITS] – Touch this button to change the display to either metric or unified units. The unit selected is displayed in dark.

[BACK] – Returns to Run Mode screen.
→ to → 6.23 Run Mode Screen

[HELP] – Run Mode Parameters Help Screens
→ to → Help Screen

6.27 STORE/RECALL JOB SCREEN

This screen allows the operator to recall preset job settings or save preset job settings depending on whether this screen was accessed from the Mode Selection Screen or the Run Mode Screen.

Job Information – (Display) A block of job information that is stored or to be stored reflecting the job entered or selectred on this screen.

Job Directory – (Display/Selection List) – A list of all saved jobs. Touching any entry selects that job. The job can be then deleted or recalled. When highlighted the job summary block reflects the highlighted saved job.

Keyboard - The operator uses the embedded keyboard to type in a job name using numbers and alpha characters. The entry field is initially blank. The field can be changed to any alphanumeric string the operator chooses as the job name. This name is used to identify the job parameter set for [SEARCH] and [RECALL], or for [SAVE]. Once a job is found via a search, it can be recalled or cleared from storage.

[SEARCH] - Searches for a stored job that has the entered name. A message on the screen indicates if the job was not found.

[RECALL] – Takes the stored job parameters found via [SEARCH] or Job Directory highlight and uses those parameters for the current job. This button is active if the entered job is already stored.

[DELETE] – This function will clear all data associated with a job N^{o}. After entering Job N^{o}. to be cleared, press the [DELETE] button.

[SAVE] - This button adds the current run job parameters to the jobs stored the system. This button is active if the entered job name has no associated stored job.

[SETUP] – This option appears when selecting **[RECALL A JOB]** from Mode Selection Screen (Fig 6.3). Proceeds to Safety Setup Screen.

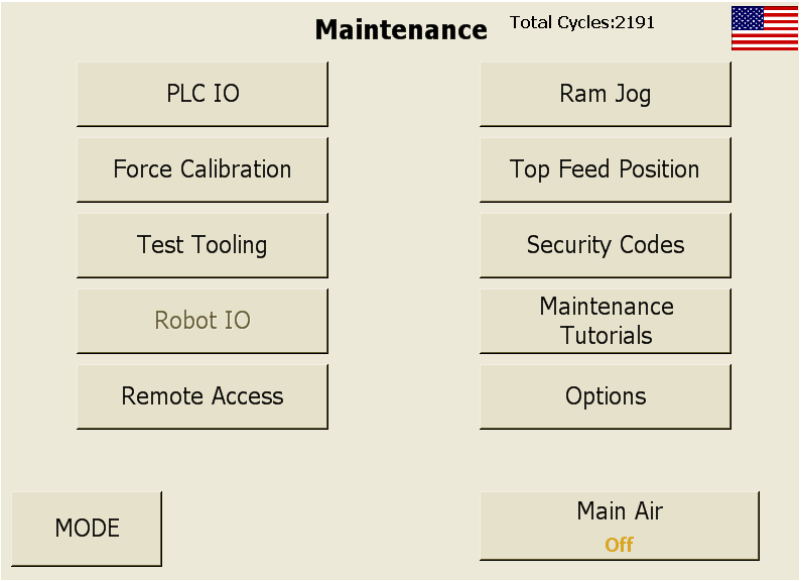
[BACK] - This button set the active screen back to the **Run Mode Screen** with the job parameters indicated by the job name displayed on the button.

→ to → 6.23 Run Mode Screen

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

6.28 MAINTENANCE MENU SCREEN



This screen allows the operator to access the maintenance functions. Here the operator can access certain setup screens, a maintenance control screen and automatic feed tooling test modes.

[PLC I/O] – Proceed to PLC Inputs/Outputs Control Screen, which allows maintenance personnel to independently control PLC Input/Output signals for diagnostic purposes.

→ to → 6.29 PLC Input/Output Control Screen

[FORCE CALIBRATION] – Proceeds to Force Calibration Screen, which allows maintenance personnel to check and calibrate force settings.

→ to → 6.30 Force Calibration Screen

[TEST TOOLING] – Proceeds to Test Tooling screen, which allows maintenance personnel to test auto tooling and to turn On/Off sensor settings and Fastener Length Monitoring function.

→ to → 6.31 Test Tooling Screen

WARNING: The tooling test modes must be used with care. Always install the proper tooling before operating any test mode. Failure to follow these requirements may result in damage to tools and a safety hazard.

[ROBOTIC I/O] - To be determined at later date. Activates the Robotic I/O Screen used to manually control the robotic outputs.

[REMOTE ACCESS] - Toggling this button enables and disables the authorization for remote access. As standard remote access via the Internet is considered a risk, so the normal setting is Disabled. However, there may be cases where PennEngineering® Engineers can troubleshoot from a remote site. Enabling the Remote Access allows the PennEngineering® Engineers the capability to view each screen and select targets. Note: The local operator keeps his control of the ram because the foot pedal is locked out to be a local switch. Therefore, troubleshooting

requires local assistance. This is to assure the safest possible practices when troubleshooting problems from a remote terminal.

When switching from enable to disable, the 3rd party remote access screen is displayed.

[RAM JOG] – Proceeds to Jog Screen, allows operator to control ram position at various speeds for setup purposes.

→ to → 6.32 Ram Jog Screen

[TOP FEED POSITION] – Allows the Top Feed Slide Position to be adjusted. The Top Feed Slide Timing affects the performance of the top feed automatic nut pick-up sequence. Touch this button to go to the screen to adjust the timing.

→ to → 6.33 Top Feed Slide Timing Adjustment Screen

[SECURITY CODES] – Allows the Access and Maintenance Access Codes to be enabled and changed.

→ to → 6.34 Access Code Setup Screen

[MAINTENANCE TUTORIALS] – Proceeds to Maintenance Tutorial screen, allows operator to view instructional videos imbedded into the program.

→ to → 6.35 Maintenance Tutorial Screen

[OPTIONS] – Proceeds to User Option Screen, allows operator to select operation options for the press.

→ to → 6.36 User Options Screen

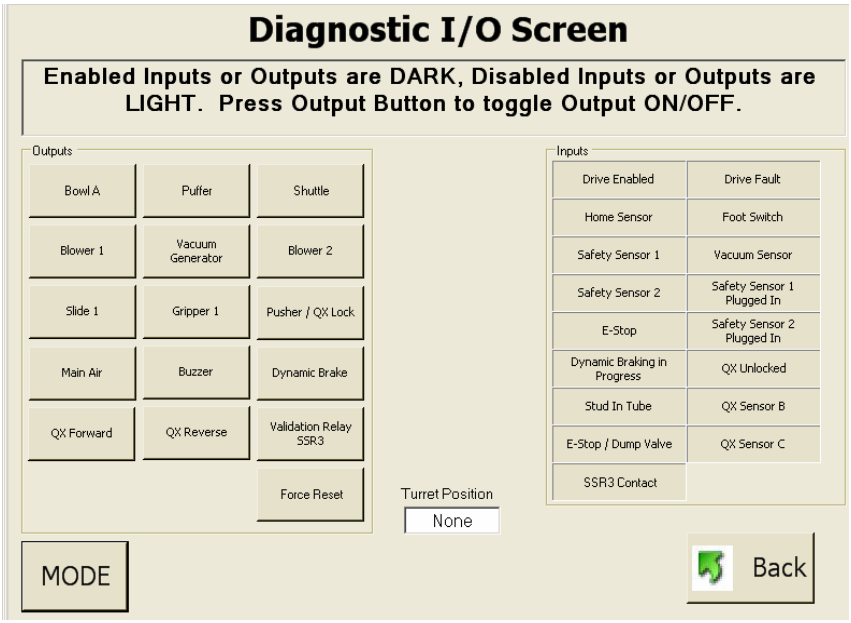
[MAIN AIR] – Turns the main air on and off.

Total Cycles - Displays a permanent cycle counter for machine.

[MODE] – Returns to mode selection screen.

→ to → 6.3 Mode Selection Screen

6.29 PLC INPUT/OUTPUT CONTROL SCREEN



This screen allows the operator to view the status of all input signals to the PLC and control all of the output signals from the PLC. Each output button allows an output control signal to be turned on and off. The small numbers inside each display and button correspond to the wired location on the PLC. Ram Jog Speed and Force can also be adjusted from this screen. There are also display readings for the various analog signals also.

[INPUT SIGNALS] – Each Display shows the status of one input, if the button is dark, the input signal is ON.

[OUTPUT SIGNALS] – Each Button controls one output, if the button is dark, the output signal is ON. Some buttons are interlocked to function safely and properly. Also, some buttons are momentary and some are hold types for the same reason. Touch a light button to turn an output ON. Touch a dark button to turn an output OFF.

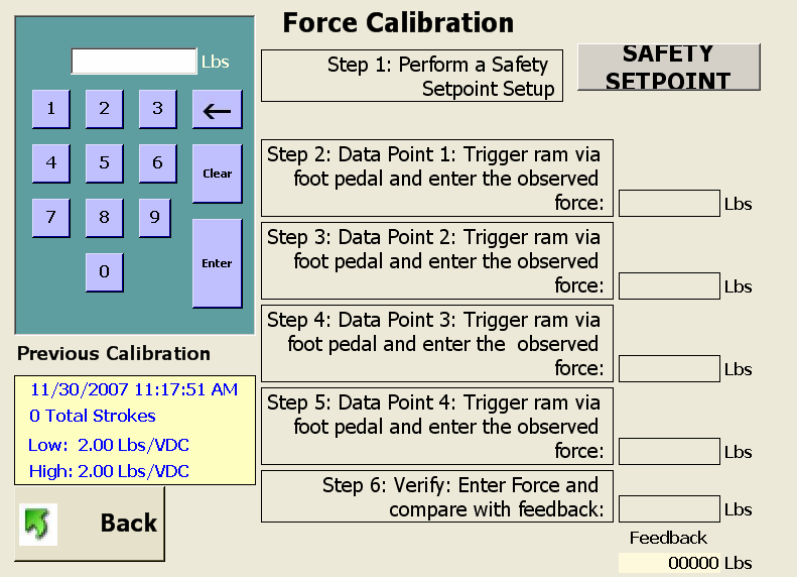
There is one exception to output button behavior described above:
[PUFFER] – The output for Puffer control operates in a quasi-three state fashion.

Always ON –	Cycle for Stud Feed Mode
On/Off Blink Cycle -	Cycle for Nut Feed Mode
Always OFF -	Puffer is Off

If the operator touches the light button, the output will cycle on and off, simulating the program cycle for nut feed modes.
If the operator touches the cycling button, the output will remain steady on, simulating the program cycle for stud feed modes. If the operator touches the dark button, the output will turn off.

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.30 Force Calibration Screen



This screen allows maintenance personnel to check the calibration for force. Maintenance personnel can move the ram up and down, adjust the force setting, boost to high force and check the readings.

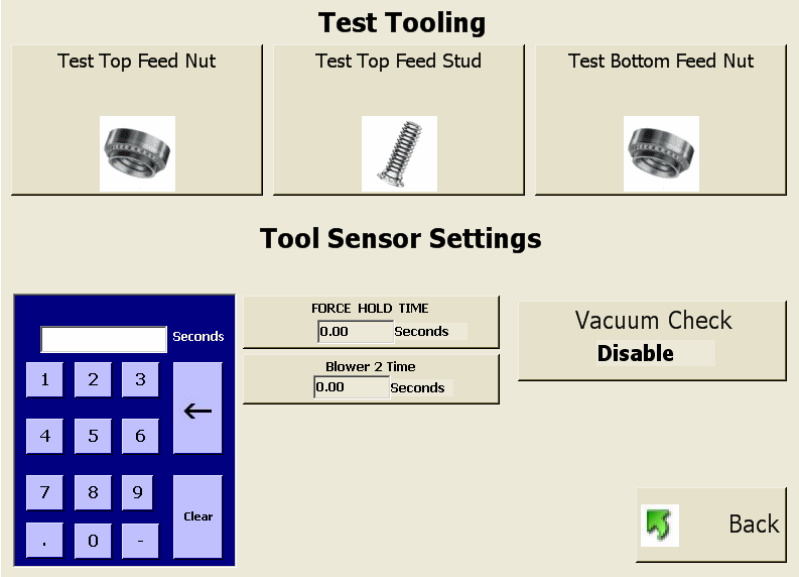
Follow the steps on the screen to properly calibrate the force.

Maintenance personnel can set expiration time for the calibration on the User Options screen (Figure 6-

[BACK] – Returns to Maintenance Menu screen.

→ to → **6.28 Maintenance Menu Screen**

6.31 TOOLING TEST SCREEN



<u>WARNING</u>: The tooling test modes must be used with care. Always install the proper tooling before operating any test mode. Failure to follow these requirements may result in damage to tools and a safety hazard.

[TEST – TOP FEED NUT] – Runs an automatic top feed nut sequence from shuttle to top feed slide extend. This test cycle will run for most top feed nuts and short standoffs. The cycle will run indefinitely.

[TEST-STUD] – Runs an automatic top feed stud sequence from shuttle to vacuum punch. This test cycle will run for most top feed studs and standoffs. The cycle will run indefinitely

[TEST-BOT. FEED NUT] – Runs an automatic bottom feed nut sequence from shuttle to bottom feed module extend. This test cycle will run for most bottom feed nuts. The cycle will run indefinitely.

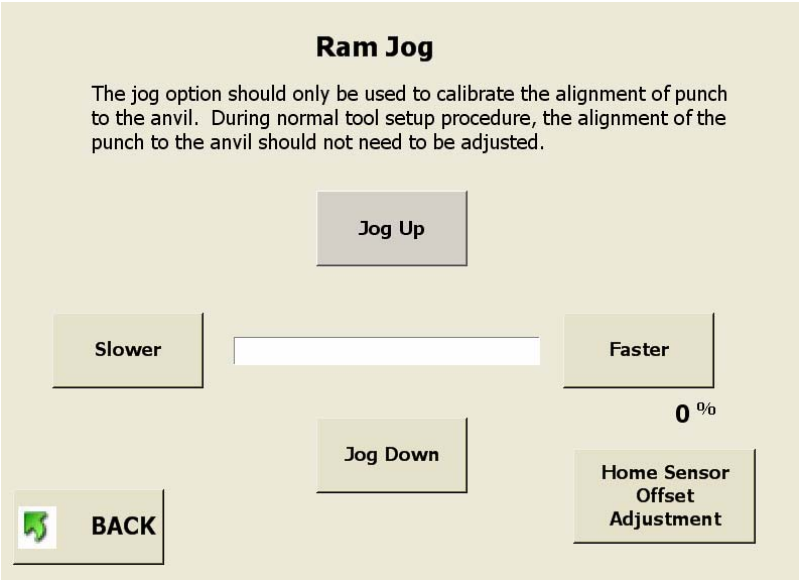
[ENABLE VACUUM CHECK] – This button will turn the Vacuum Check function on and off. If the press is operating in stud mode, this feature will check for the presence of the fastener on the vacuum punch.

TIMES - Allows the user to adjust the embedded tooling times and delays. Enter the new time on the keypad and press the appropriate time.

[BACK] – Returns to Maintenance Menu screen.

→ to → 6.28 Maintenance Menu Screen

6.32 RAM JOG SCREEN



This screen allows the operator to jog the ram up and down and reduce the speed.
It is used for maintenance procedures.

[JOG UP] – Touch and hold this button to move the Ram Up.

[JOG DOWN] – Touch and hold this button to move the Ram Down.

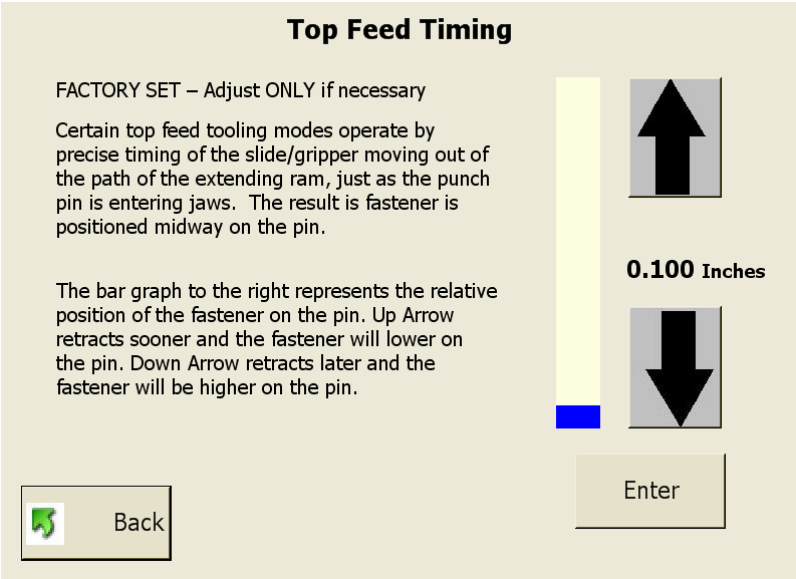
[SLOWER] – Touch this button to reduce the speed of the Ram

[FASTER] – Touch this button to increase the speed of the Ram

[HOME SENSOR OFFSET ADJUSTMENT] – Used for resetting the "Home" position if the actuator is replaced or if the home sensor is dislodged.

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.33 TOP FEED POSITION SCREEN



This screen allows the operator to adjust the timing of the top feed slide in automatic, top feed nut and standoff mode. During the top feed nut and standoff sequence, the fastener is picked up by the punch. The pick-up is accomplished by the ram moving down, passing a pin on the punch through the hole of the fastener. As the pin is passing through the hole, the top feed jaws are opened and the slide is retracted. The timing of this process must be relatively precise, in order for the fastener to be picked-up properly. The adjustment made on this screen sets the opening of the jaws and retracting of the slide to occur earlier or later. The ideal location of the fastener is in the middle of the pin.

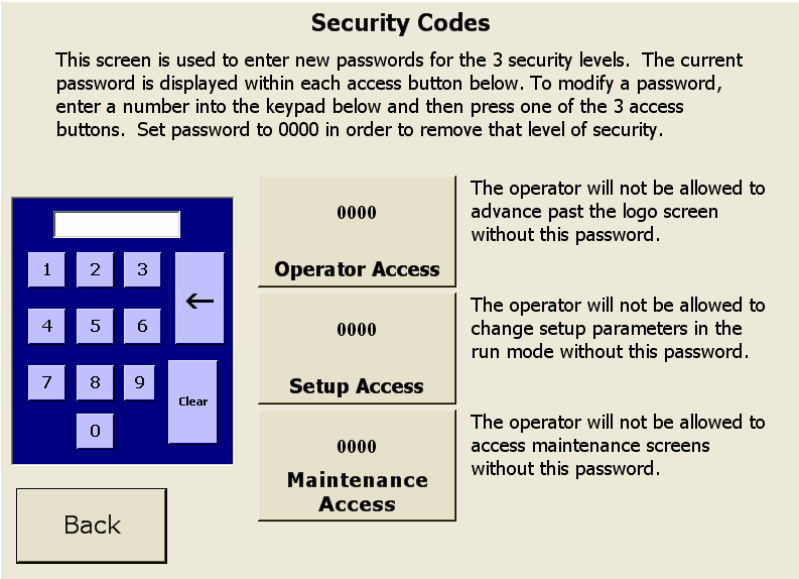
The top of the dark bar indicates relative position of the fastener not actual.

[↑] – Moves the relative location of the fastener on the pin higher. (Open jaws later).

[↓] – Moves the relative location of the fastener on the pin lower (Open jaws earlier).

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.34 SECURITY CODE SETUP SCREEN



This screen allows the operator to enter and change the operator access, setup access and maintenance access codes. The initial settings of the three are zero, disabling each access screen. **IMPORTANT: Upon receipt of the Series 3000 Press, immediately establish a Maintenance Access Code. The maintenance access screens allow operation of the press without the standard safeguards in place. Only trained personnel should use the functions accessible on the Maintenance Menu Screen.**

Code Keypad – The operator uses the keypad to set the value of each digit for either code. The code can be any 4-digit number from 0000 to 9999.

[OPERATOR ACCESS CODE] – Touch this button after entering value using the keypad to set the Operator Access Code. If this is set to zero, the access screen will be disabled. If this code is set to any other value, the access screen will be enabled and the code will have to be entered to operate the press.

[SETUP ACCESS CODE] – Touch this button after entering value using the keypad to set the Setup Access Code. If this is set to any other value, the setup access screen will be enabled and the code will have to be entered to change the setup parameters in Run mode. The Setup Access code will be needed to change the following run mode functions:

Force Setpoint
All Timer and Delay Settings
Run Mode Parameters Screen:
- Cycle Mode (Continuous/Interrupted)
- Setpoint Tolerance (Standard/Narrow)
- Safety Fault Auto Reset (Enable/Disable)
- Vacuum Check (Enable/Disable)
- Run Screen Units (Metric/Unified)

Save a Job

Note: after the Setup Access Code is entered once, it is active until run mode is exited or the "Clear Setup Password" button is touched.

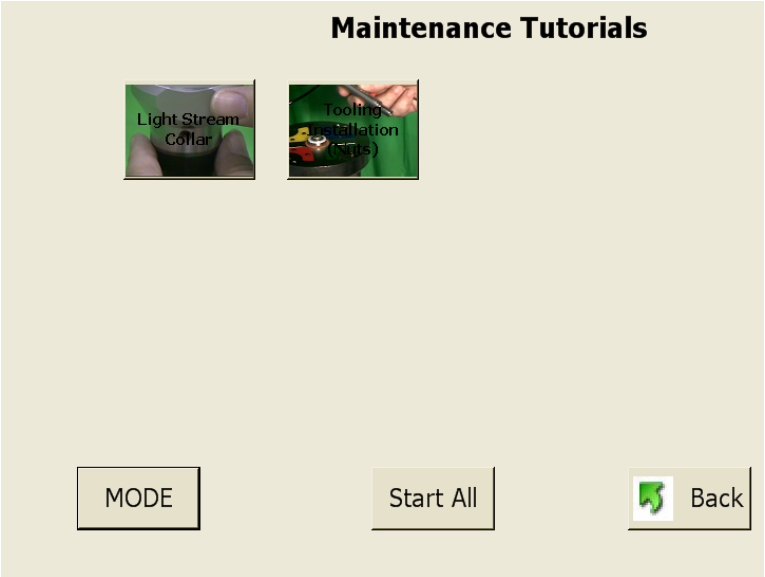
[MAINTENANCE CODE] – Touch this button after entering value using the keypad to set the Maintenance Code. If this is set to zero, the maintenance access screen will be disabled. If this code is set to any other value, the maintenance access screen will be enabled and the code will have to be entered to access the maintenance functions. Access is given to the following maintenance screens:

Maintenance Menu
- PLC I/O
- Ram & Force Calibration
- Test Tooling / Settings
- Ram Jog
- Top Feed Slide Timing
- Security Codes

Note: Anyone who has access to Security codes screen (Maintenance password required) will therefore have access and can change all of the security passwords.

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.35 MAINTENANCE TUTORIALS SCREEN



The **Tutorial Screen** allows the users to access tutorial information that is embedded in the touchscreen system.

The tutorials available are displayed on the screen. Touching a tutorial on the screen selects that tutorial.

Tutorial 1 Installation

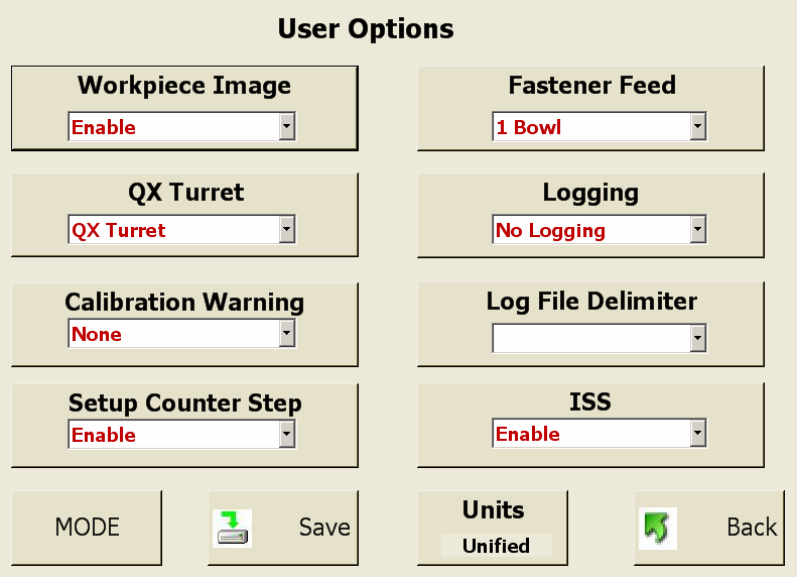
Each tutorial in the tutorial directory is included and may be chosen to be reviewed. The Tutorials Screen is activated after the presentation for additional selections or Cancel to the previous screen.

[START ALL] – Plays all tutorials.

[MODE] – Returns to mode selection screen.
→ to → 6.3 Mode Selection Screen

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.36 USER OPTIONS SCREEN



This screen offers the PEMSERTER® 3000® user the capability to control the behavior of the screen navigation by bypassing choices that do not apply to their press configuration. It also tailors the functions or appearance to their preference.

[WORKPIECE IMAGE] - (ENABLE/DISABLE) - Selecting this button toggles the options to bypass the Workpiece image processing by setting the option to DISABLE, or utilizing the full capability of the imaging process by allowing entry of one or more images per job.

[QX TOOLING STATIONS] - MANUAL ONLY/ONE STATION/TWO STATION/THREE STATION/FOUR STATION) This setting allows the user to have a default tooling configuration to bypass screens that would not apply to the users press configuration or general operation. The number of stations or single tool operation can be set by toggling the button.

[CALIBRATION WARNING] - (NONE/10000 CYCLES/20000 CYCLES/6 MONTH/1 YEAR) This button defines a calibration warning based on number of cycles or time since the last Force Calibration. The toggle offers combinations of cycles and times for the user selection or NONE if the warning is not desired.

[SETUP COUNTER OPTION] - (ENABLE/DISABLE) This option allows the user to specify that the appropriate counter screen appear during the Setup Process.

[FASTENER FEED] - (MANUAL/ONE BOWL/TWO BOWL) Specifies the press feed setup to direct the Setup screens to offer the available choices.

[LOGGING] - (ENABLE/DISABLE) This determines if batch logs are automatically generated for each batch. If the option is disabled the user may manually select a log generation via a button on the **Run Mode Screen** (Section 6.27)

[LOGGING DELIMITER] – (**COMMA/SEMI COLON/QUOTE.)** The user sets the delimiter for the Logging Data file. The button action toggles through the common delimiter choices.

[ISS] - **(ENABLE/DISABLE)** The user has the choice of exposing the ISS Force determination process from the Setup procedure by setting this option to DISABLE. Otherwise, the ISS option appears on the **Select Force Setup Screen** (Section 6.14).

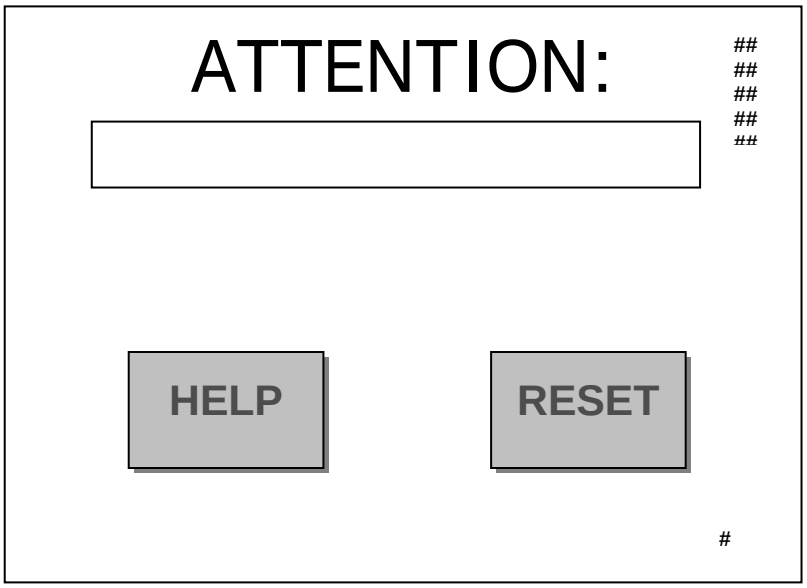
[UNITS] – (UNIFIED/METRIC) - Touch this button to change the display to either metric or unified units. The unit selected is displayed in dark.

[SAVE] – Saves the settings selected.

[MODE] – Returns to mode selection screen.
→ to → 6.3 Mode Selection Screen

[BACK] – Returns to Maintenance Menu screen.
→ to → 6.28 Maintenance Menu Screen

6.37 ATTENTION: MESSAGE DISPLAY SCREEN



This screen automatically displays when the control system detects a situation that requires the attention of the operator. The appropriate diagnostic messages are displayed on the screen. Listed below are the diagnostic messages and an explanation of each situation.

[HELP] – Attention Screen Help Screen – displays listing of messages and explanations
→ to → Help Screen

[RESET] – Clears Attention Screen – returns to previous screen.
Two common messages can be set to automatically reset. They are:
Safety Sensor Trip outside of Window
Workpiece Complete

Attention Messages

Safety Sensors Tripped ABOVE Setpoint (#50)
Safety Sensors Tripped BELOW Setpoint (#51) – The safety sensors detected that the ram contacted an object outside the allowable window set around the Safety Setpoint.

Vacuum Switch Set Too Low (#52) – The vacuum switch input was triggered while the vacuum output was off.

No Ram Contact (#53) – The Ram extended fully without safety system detecting any contact.

Force Too High (#55) – The measured force exceeded what the selected tooling will allow.

Safety Setpoint Too High (#56)
Safety Setpoint Too Low (#57) - During the Safety Setup Procedure the learned safety setpoint was outside the allowable range. The ram must travel at least 63.5 mm (2.5 inches) and no more than 178 mm (7.0 inches). If in Top Mount Anvil Mode the minimum travel is 38 mm (1.5 inches).

Ram Position Error (#60) – Occurs at Mode selection, if Ram position is NOT measured as "Home" when a Setup is attempted

Sensors Unplugged / F6 Blown (#61) – The System does not detect the loopback signal from the Safety Sensors, Fuse 6 may be blown.

Lt.StreamErr1–Sensors Out of Sync (#65) - Both of the light sensors did not trip within a certain distance from one another.

Lt.StreamErr2-Collar Became Dislodged (#66) – One of the safety sensors tripped while the ram was going up and was above the top safety window setpoint.

Lt.StreamErr3-Safety Sensor Tripped (#67) – One of the safety sensors tripped while the ram was in the "Home" position.

Safety Setpoint Error (#70) – The safety setpoint self-adjusting average is now outside the allowable limits.

Force Too Low (#71) – The press did not achieve its programmed force.

Stud Sensor Tripped Prematurely (#72) – Sensor at Input 4 came ON out of sequence. Check if sensor is blocked or if correct sensor is installed and selected.

Force Stroke Beyond Safety Limit (#73) – During boost, the ram traveled more than the maximum allowable insertion distance.

Vacuum Lost (#76) – The vacuum input signal was lost during the down stroke.

Stud-in-Tube System Error (#78) – The system failed to detect a fastener on 5 consecutive tries.

Safety Setpoint Out of Range (#80) – The safety setpoint is too far above the tool-to-tool safety setpoint.

Safety Stop Distance Fault (#81) – During a safety fault or setup, the ram traveled too far. Contact your service representative to report the problem and receive further assistance.

Safety Sensor Circuit Error (#82, #83, #84, #85) – Signal error. Record fault number and contact your service representative to report the problem and receive further assistance.

Turret Error: Lock Pin (#101) – The QX Turret Locking Pin is not operating properly. Check air supply pressure and pneumatic connections to QX Turret.

Turret Error: Rotation Problem (#102) – The QX cannot find a position. Check all electrical connections, fuse, and mechanical installation of QX Turret.

Master Drive Tripped (#103) – The High Speed Drive has tripped. Press, then release the Emergency Stop button, then press reset button on the screen. When software restarts, re-home press.

Master Drive Overheat (#104) – The High Speed Drive has overheated. Allow press to cool.

Master Drive Braking Resistor Alarm (#105) – The High Speed Drive Braking Resistor has failed. DO NOT OPERATE PRESS.

Master Drive Overload (#106) – The High Speed Drive has overloaded.

Master Drive Warning (#107) – The High Speed Drive has an unknown error.

Accumulator (#108) – The High Speed Drive Accumulator has overloaded. Wait several minutes.

Follower Drive Tripped (#109) – The High Torque Drive has tripped. Press the Emergency Stop button, then press reset button on the screen. When software restarts, re-home press.

Follower Drive Overheat (#110) – The High Torque Drive has overheated. Allow press to cool.

Follower Drive Braking Resistor Alarm (#111) – The High Torque Drive Braking Resistor has failed. DO NOT OPERATE PRESS.

Follower Drive Overload (#112) – The High Torque Drive has overloaded.

Drive CTComms Communications Lost (#113) – Communications has been lost between Servo Drives.

High Speed CTComms Communications Lost (#114) – High Speed Drive Communications has been lost.

I/O Communications Lost (#115) – I/O Communications has been lost.

PLC Communications Failed (#116) – Communications has been lost between PC/HMI and Servo Drives.

E-Stop Pressed (#117) –E-Stop has been pressed. Release E-Stop, acknowledge message, then re-home press when software restarts.

Control Circuits Disabled (#118) – The control circuits are disabled. Press the green start button to reset.

Force Calibration Expired (#203) – Force Calibration has expired. Unit must be re-calibrated.

PLC Mode Change Failed (#211) – The PLC did not respond to a command.

Feed Cycle Failed (#213) – The press failed to feed a new part.

SECTION 7

ELECTROMECHANICAL ACTUATOR / PNEUMATIC SYSTEM

A. ELECTRO MECHANICAL ACTUATOR

The ram movement and squeezing force is produced by an Electro Mechanical Actuator Assembly. The components of this assembly are: the Main Actuator, the Clutch Assembly, and the high torque motor.

Moving the Ram Down

- When energized the main actuator moves the ram down to the insertion position.
- As the ram approaches the insertion position it begins to decelerate. As the ram decelerates the booster motor accelerates and engages the clutch. With the clutch engaged and the ram *safely* in the insertion position the high torque motor applies the insertion force.

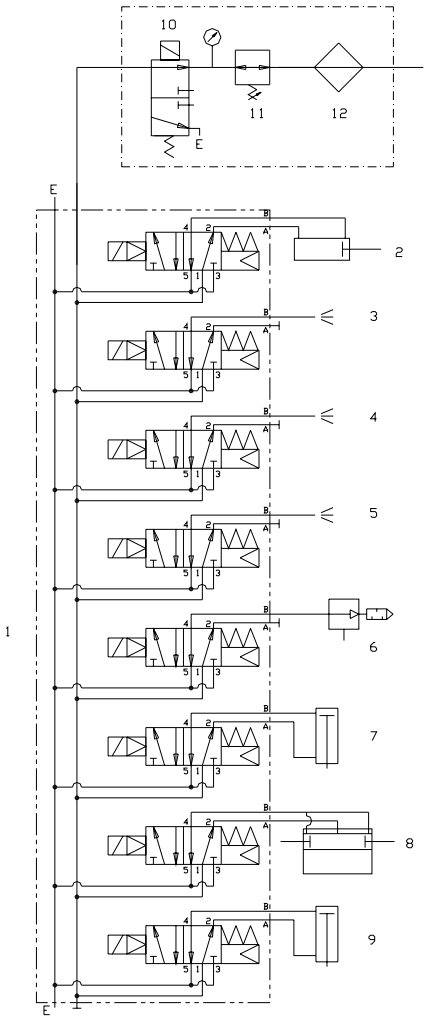
Moving the Ram Up

- When the insertion is complete the high torque motor reverses direction and begins to move the ram up.
- When the ram is above the insertion position the main actuator is energized which disengages the clutch.
- When the clutch is disengaged the main actuator accelerates and returns the ram to the home position.

B. THE PNEUMATIC SYSTEM

Initial Air Entry

- Your factory air supply should be clean, dry and, ideally, have a high flow capability. Airline feeds smaller than 12mm (1/2”) will increase cycle time.
- Factory compressed air, set between 6 and 7 BAR (90 to 100 psi), enters the system through a manually adjusted filter/regulator which is mounted on the back of the machine.
- After passing through the filter/ regulator, the air is distributed into the 1/4” (6mm) line which leaves the manifold is used for various machine functions, which manipulate, transport, and position fasteners. It supplies an 8-valve manifold located under the Feeder Bowl. See section nine for additional information.



ITEM	DESCRIPTION
1	TOOLING VALVE MANIFOLD
2	SHUTTLE CYLINDER
3	PUFFER
4	BLOWER 1
5	BLOWER 2
6	VACUUM ASPIRATOR
7	SLIDE CYLINDER
8	GRIPPER CYLINDER
9	PUSHER CYLINDER
10	“DUMP” VALVE
11	REGULATOR
12	FILTER

FIGURE 7-1
HYDRAULIC / PNEUMATIC DIAGRAM

SECTION 8

ELECTRICAL SYSTEM

 **WARNING:** The **PEMSERTER® SERIES 3000® FASTENER INSTALLATION PRESS** uses high voltage electrical power. Additionally, the drive contains capacitors that remain charged to a potentially lethal voltage after the AC supply has been disconnected. If the drive has been energized, the AC supply must be isolated at least ten minutes before work may continue. Only trained and authorized personnel may attempt to maintain, service, or repair its electrically powered subsystems, components or parts.

The electrical panel enclosure requires a special key to open. The purpose of this feature is to protect the machine from unauthorized persons tampering with the system and to help prevent unauthorized and untrained personnel from receiving an electrical shock. We suggest the key be kept by a manager/supervisor who will properly control its use.

AC Power Distribution:

The press is equipped with a two-pole main circuit breaker.

The inline AC power entering the press is routed to the following areas:

- The main actuator drive.
- The high torque drive.
- The PC HMI.
- The DC power supply.
- The vibratory bowl driver controller.

DC Power Distribution:

- The DC power supply feeds the expansion Input/Output unit. Through various sub-circuits, it also feeds the sensors and other inputs and the outputs.

- The controller of the press electronics system is the PLC. The PLC receives input from sensors located throughout the machine which tell it the status of operations at any point. With the exception of ram movement the PLC by means of air valves control most of the machine's activities, including the tooling which transports and positions the fasteners.

- There are 4 DC fuses. They protect (1) the sensors (2) the Ethernet switch, (3) the expansion Input/Output Unit and (4) the enclosure fan.

ELECTRICAL/ELECTRONIC COMPONENTS

(Note: Most of the items mentioned below are illustrated in section two of this manual.)

Name	Location	Purpose
INPUTS:		
Emergency Stop	Emergency Stop Circuit	Detects that the Emergency Stop button has been pressed and stops the program.
Safety Sensor 1	Left side of ram, under cylinder inside front enclosure.	An optical beam sensor which tells the PLC when the ram's "safety" has made contact with an object. Depending upon where, along the ram's travel, contact was made, the PLC will "decide" whether to proceed, or to stop and retract the Ram.
Safety Sensor 2	Right side of ram under cylinder inside front enclosure.	Another optical beam sensor which tells the PLC when the ram's "safety" has made contact with an object. (For redundancy)
Fastener Sensor	Attached to the tooling near the bowl. (Used for Stud-In-Tube sensors.)	Stud-In-Tube ring sensor turns ON when a long fastener enters the tubing and is ready to be blown to the insertion tooling.
Safety Sensor Relays	Electrical Enclosure (Lower)	Checks safety conditions to activate/de-activate the dynamic braking system.
Validation Relay	Electrical Enclosure (Lower)	Checks that DC power is ON to hold the safety valves open during a valid installation. Checks that DC power is OFF to close the safety valves during a safety fault.
Foot Switch	Floor	When pressed, the foot switch initiates an insertion cycle.
Vacuum Switch - Top Feed	Inside the main actuator (Ram) Enclosure	When using top feed tooling, the vacuum switch informs the control system that a fastener is ready for insertion. The switch is activated when a fastener is being held on the bottom of the ram punch, due to the vacuum created by the vacuum generator.

Name	Location	Purpose
INPUTS: (Continued)		
Sensor 1 Plugged In	Sensor 1 Plug/ Front Enclosure	Loopback verifies that Safety Sensor 1 is plugged in.
Sensor 2 Plugged In	Sensor 2 Plug/Front Enclosure	Loopback verifies that Safety Sensor 2 is plugged in.
OUTPUTS:		
Safety Validation Relay	Electrical Enclosure (Lower)	Enhances redundancy of control of dynamic braking.
Dynamic Braking Relay	Electrical Enclosure (Lower)	Activates drive dynamic braking system.
Test Braking Relay	Electrical Enclosure (Lower)	Tests functionality of dynamic braking system.
Bowl Control	Inside the cover of the enclosure under the vibratory bowl.	Enables the PLC to turn the bowl on and off.
Audio Beeper	Located under the touchscreen.	The adjustable audio signal is used to inform the operator that a work piece is finished and/or that a batch has been completed, or of a Safety Fault.
Main Air	Part of air inlet system at rear of press.	Exhausts any air pressure, capable of causing any motion of the Ram or Tooling components.
Vacuum Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to a vacuum generator which creates the vacuum used to hold a fastener against the punch. The punch is installed on the bottom of the ram.
Shuttle Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to the shuttle cylinder to move back and forth to acquire a fastener and then deposit it at the mouth of the tube.
Puffer Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	The air is used to help align fasteners with the bowl escapement tooling, and to create a vacuum used to pull the correctly oriented nuts into the escapement.
Slide Extend Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to the Slide cylinder to extend or retract the slide from under the punch
Blower Solenoid One	Part of the “tooling” valve assembly installed under the vibratory bowl.	Used for Stud type feeding, to blow a fastener up into a receiving area prior to the shuttle moving back for the next fastener. Once the Shuttle has moved, the fastener drops into the mouth of the tube.

Name	Location	Purpose
OUTPUTS: (Continued)		
Blower Solenoid Two	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to blow fasteners through the tubing to the punch/anvil area (front tooling).
Gripper Close Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to the gripper assembly during top feed operations. The gripper assembly rides on the slide assembly. Its jaws will be closed in order to hold a fastener in position under the punch. The jaws will open when the punch is able to hold the fastener.
Pusher Extend Solenoid	Part of the “tooling” valve assembly installed under the vibratory bowl.	Flows air to the Pusher cylinder in the bottom feed module. The module pushes the fastener out to the anvil point, in position for insertion.

Name	Location	Purpose
ELECTRICAL COMPONENTS :		
Encoders	Main Actuator (Ram) Enclosure	Used to read the ram actuators position.
Main Switch	Main Electrical Drive Enclosure (Upper)	Connects and disconnects AC power supply to machine.
High Speed Drive	Main Electrical Drive Enclosure (Upper)	Controls the main actuator and transports the ram up and down rapidly.
Dynamic Braking Resistors	Main Electrical Drive Enclosure (Upper)	Controls dynamic braking process.
High Torque Drive	Main Electrical Drive Enclosure (Upper)	Controls the high torque motor for high force pressing.
24VDC Power Supply	Main Electrical Drive Enclosure (Upper)	Produces 24 VDC voltages necessary for all internal PLC and drives functions.
Expansion Input/Output Modules	Electrical Enclosure (Lower)	5 Modules are used to control the system.
Safety Relay	Electrical Enclosure (Lower)	Enhances redundancy of control of dynamic braking.
Dynamic Braking Relay	Electrical Enclosure (Lower)	Activates drive dynamic braking system.
Braking Test Relay	Electrical Enclosure (Lower)	Tests functionality of dynamic braking system.
Ethernet Switch	Electrical Enclosure (Lower)	Assures internet connections between drives, Expansion Input/Output Unit and PC HMI.
Strain Sensor Amplifier	Electrical Enclosure (Lower)	Conditions strain sensor signal before supplied as analog signal to controller.

SECTION 9

TOOLING SET-UP

Tooling

The PEMSERTER® Series 3000® Fastener Installation Press can be equipped with interchangeable tooling in order to properly install numerous types of PEM® fasteners. Series 3000™ Tooling refers to components that are installed onto the press that are specific to automatically feed and install different types of fasteners in different ways.

Manual versus Automatic Tooling

Manual tooling refers typically to the punch and anvil set that is used to install the fasteners. Placement of each fastener into the workpiece hole is done by the operator. Only moving the ram down and the installation stroke is controlled by the press. Automatic tooling refers to the set of specific components that orient the fasteners feeding from the vibratory bowl to the automatic punch and anvil that allow the operator to locate the workpiece properly and carry the fastener into the workpiece hole. The press handles the entire sequence. In Automatic Feed Mode the operator only handles the workpiece.

Manual Tooling

The two tooling components that exert the installation squeezing force are called the Punch and Anvil. Typically the punch is the moving element, installed in the end of the safety adapter at the end of the ram. The anvil is the stationary element installed in the anvil holder at the bottom of the press throat. In a typical installation, the punch pushes the displacer into the workpiece and the anvil supports the other side of the workpiece and provides the reaction force.

Different Punches and Anvils are selected for different types, sizes and materials of fasteners. The shape of the punch and anvil differ to account for the different shapes in fasteners. However, for many fastener applications a flat surface punch is used. Anvils are more varied. For instance, for studs, an anvil with a hole in the middle is used to accept the long body of the stud. An anvil with a different diameter hole is needed for each different size of the stud in order to support the material properly.

Specific tooling is sometimes required to accommodate different sizes and shapes of workpieces. There are different length punches and anvils to reach or accommodate workpieces . There are different diameter or special featured punches and anvils to accommodate different workpiece material and thickness.

Automatic Tooling Set Selection

There are different types of automatic feed tooling to feed different types, sizes and materials of fasteners. There are even different types of automatic feed tooling to feed the same fasteners.

PEMSERTER® Series 3000® Automatic Tooling consists of a number of basic types.

- Top Feed Tooling - feeds the fastener to the Slide/Gripper Assembly at the top of the throat. The workpiece is located and the hole centered on an automatic feed anvil. When the press is actuated the fastener is put on the end of an automatic feed punch and carried down to the waiting workpiece for insertion. This type of tooling is available for various nuts, studs and standoffs, as well as special fasteners.

- Double Stroke Bottom Feed Nut Tooling - is for nut-type similar to Top Feed Tooling except that the workpiece is not placed on the anvil before the press is actuated. During this mode the fastener is fed to the Slide/Gripper Assembly. When the foot pedal is pressed the first time the nut is carried down to the anvil and deposited on the anvil, shank up. Then the workpiece is placed onto the fastener shank. When the foot pedal is pressed the second time the installation process is started. This type of tooling is used when the installation side of the workpiece is not accessible by the punch and the anvil length and shape is required to accommodate the workpiece.

- Bottom Feed Module Tooling - does not feed the fastener to the Slide/Gripper Assembly. Instead the fastener is fed directly into a punch or anvil module. For nut-type fasteners a Bottom Feed Nut Module is installed on the anvil holder. The nut is fed out to the Bottom Feed Nut Module, the module is actuated by the Bottom Feed Cylinder and the fastener is pushed out into place. The workpiece is located on the shank of the fastener like Double Stroke Bottom Feed Nut Tooling. The punch comes down and does the insertion. These types of tooling are used for applications where the shape or size of the workpiece can be accommodated by the type of module tooling.

Tooling Mode Selection on the Touch Screen

During the setup selection process of the press, the tooling mode must be selected on the touch screen. The tooling modes available are:

[MANUAL NUT]
[MANUAL STUD]
[TOP FEED NUTS/SO]
[BOTTOM FEED DOUBLE STROKE]
[BOTTOM FEED NUTS]
[STUDS/BSO]
[LONG STANDOFFS]
[SPOTFAST]
[PANEL FASTENER]
[CUSTOM]

NOTE: For Standoff Fasteners different tooling modes are selected based on size and type. Choose:
[LONG STANDOFFS] - if the standoff length is long like a stud and the tooling components have a stud-type shuttle with round tubing and a pin punch
[TOP FEED NUT/SO] - if the standoff length is short and looks like a nut and the tooling components have a nut-type shuttle with rectangular tubing
[STUDS/BSO] - if the standoff is long or blind (no thru hole) and the tooling components have a stud-type shuttle with round tubing and vacuum punch Top Feed Nut Tooling

Tooling Component Installation

<u>Stud Escapement and Nut Gate</u>

- The purpose of an escapement is to properly align the fasteners so that other tooling can deliver and position them at the ram/anvil area, properly positioned for insertion. Escapements are installed on the outside/top part of the vibratory bowl.
- The escapements used with nuts have two parts: (1) the first part of the escapement is called the nut gate adapter. The nut gate adapter is placed upon the escapement adapter with two positioning pins. (2) The second piece is called the nut gate. The nut gate provides a “fastener-specific” machined channel which will funnel only properly aligned nuts to the shuttle. The nut gate is positioned on top of the nut gate adapter with the same two positioning pins and is secured in place with one thumb screw.
- The escapements used with studs are “stud specific”. The escapement is mounted onto the “escapement adapter” with the nut gate adapter removed.

- After mounting an escapement, push the “puffer” air hose into the escapement air intake connector. The puffer has two functions: (1) to blow excess and misaligned fasteners off the top part of the bowl’s ramp, back into the bowl and; (2) to create a slight vacuum (only when inserting nuts) which helps pull the nuts into the escapement channel.
- Adjust the puffer air pressure by turning the puffer’s flow-control knob. Excess/Misaligned nuts and studs should be blown back into the bowl, while correctly oriented nuts should be gently drawn into the channel This knob is located below the escapement mounting area.

Shuttle And Tube

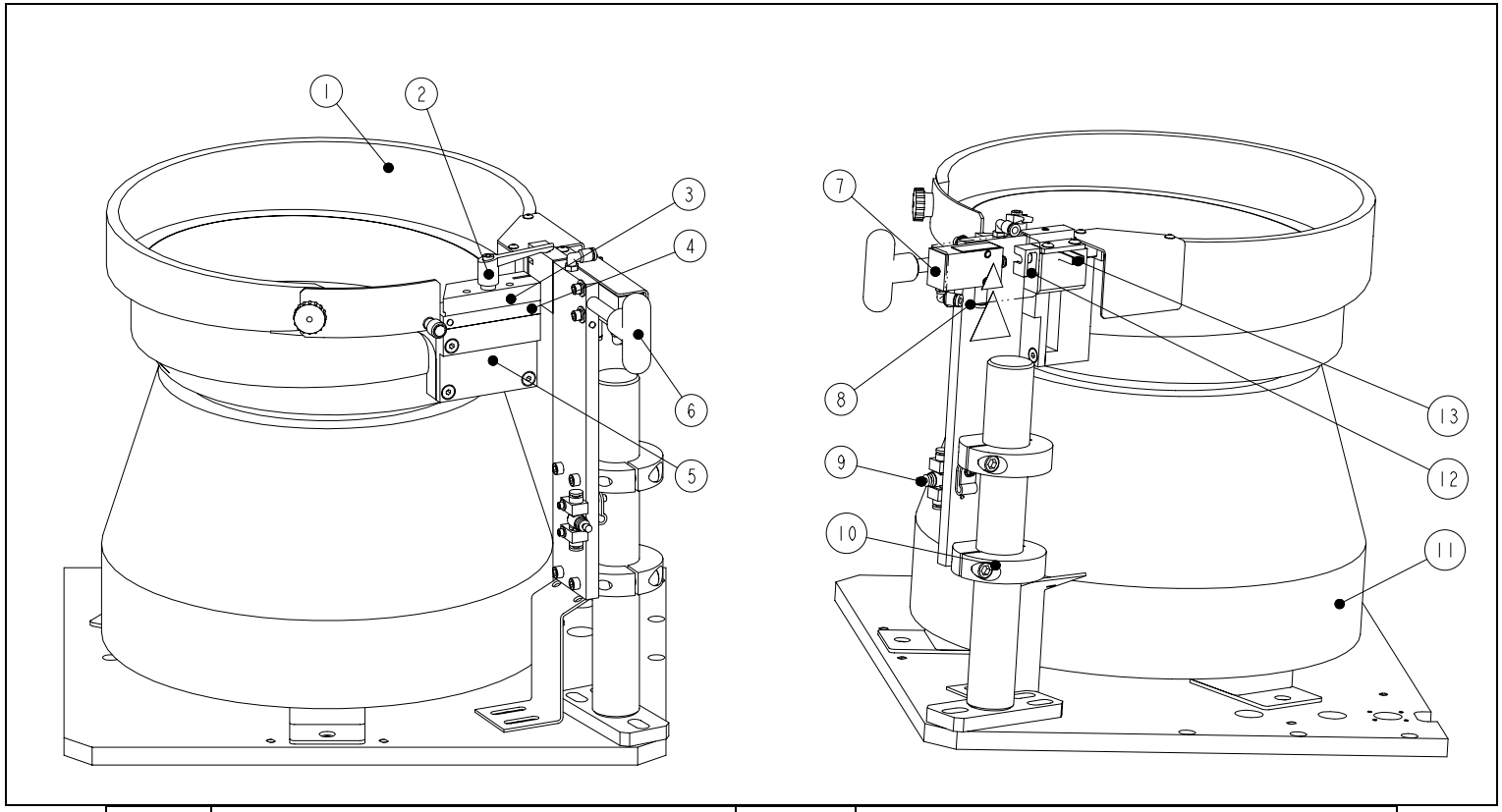
- The purpose of a shuttle is to move the fasteners, one at a time, from the escapement to the mouth of its mated plastic tube which will then transport the fasteners to the punch/anvil area.
- To prevent fasteners from becoming misaligned, each shuttle and each tube is designed to be part specific. For this reason the shuttles are typically left attached to their mated tubes and handled as one assembly.
- When installing a shuttle: (1) attach it to the shuttle air cylinder. This air cylinder is mounted on the same bracket that will support the shuttle after it is installed. The function of this air cylinder is to push and pull the shuttle’s slide back and forth. To attach the air cylinder to the shuttle, slide the shuttle’s clevis over the tip on the end of the cylinder rod; (2) position the shuttle over the two positioning pins then secure it in place with its one tee handle. Be sure to maintain a gap of about 1mm (.040”) between the shuttle and the escapement.

Tube Extension, Jaws, Punch

- Slide the punch into the bottom of the safety housing and secure it by tightening the two setscrews.
- Slide the anvil into the anvil holder and tighten its mounting screw to hold it in position.
- Install the set of jaws on the gripper assembly. Locate each jaw using the two positioning pins provided, then secure it by tightening its thumbscrew.
- For nut insertion, twist the tubing 180 degrees (so the nut will be positioned shank-side down) and slide the end of the tube over the fitting on the left jaw
- For studs, slide the tube extension onto the end of the fastener delivery tube then insert the tube extension into the tube hanger, (the tube hanger is part of the tool support assembly). Be sure stud tubing *always* runs through the Stud-in-Tube sensor.

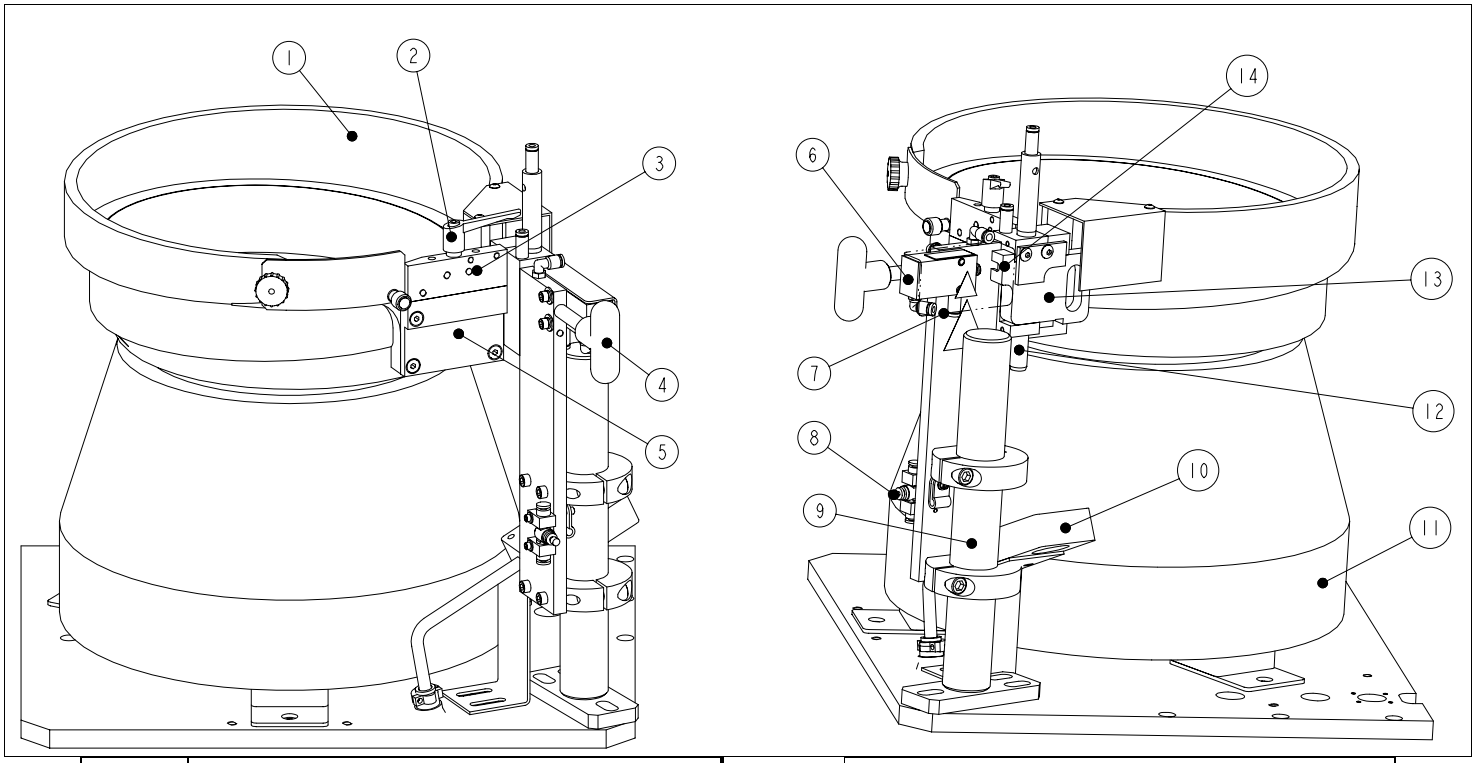
Bottom Feed Nut Module

- Attach the bottom feed tooling module to the top of the anvil holder. This is done in three steps: (1) place the hole in the bottom feed tooling module's slide, over the pin on the end of the cylinder rod; (2) place the hole in the bottom of the tooling module over the positioning pin on the anvil holder; and (3) tighten the two setscrews on the sides of the bottom tooling module to hold it in position.
- Only if you encounter fast/slow module performance adjust the air flow going to the cylinder assembly (located on the back end of the anvil holder), by turning the air flow control knob. The knob is on the end of the cylinder assembly.
- Slide the end of the fastener delivery tube over the intake at the rear of the bottom tooling module.



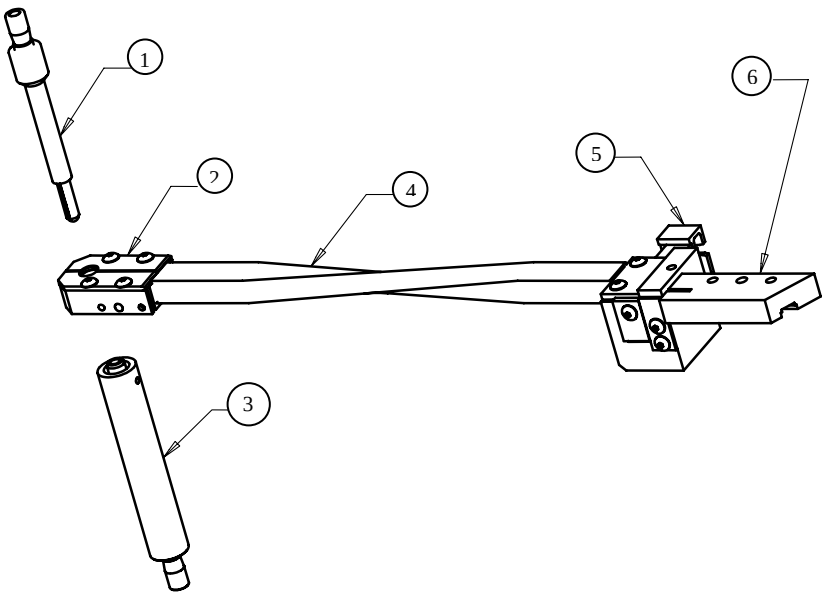
ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	FEEDER BOWL	8	TRANSPARENT SHUTTLE GUARD
2	RETAINING HANDLE	9	“PUFFER” FLOW CONTROL VALVE
3	NUT GATE	10	SHUTTLE SUPPORT ASSEMBLY
4	NUT GATE ADAPTER	11	FEEDER BASE
5	ESCAPEMENT ADAPTER	12	CLEVIS
6	HANDLE	13	TUBING ADAPTER
7	SHUTTLE AIR CYLINDER		

FIGURE 9-1
FEEDER BOWL SYSTEM WITH NUT TOOLING



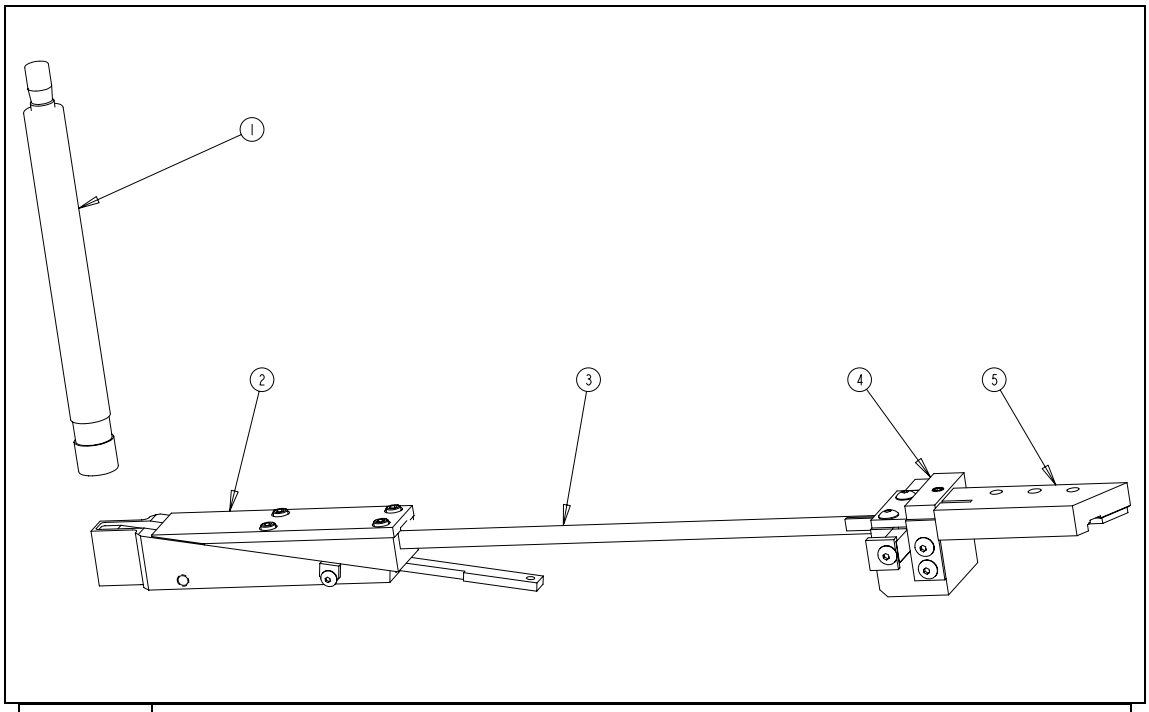
ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	FEEDER BOWL	8	“PUFFER” FLOW CONTROL VALVE
2	RETAINING HANDLE	9	SHUTTLE SUPPORT ASSEMBLY
3	STUD ESCAPEMENT	10	RING SENSOR
4	HANDLE	11	FEEDER BOWL BASE
5	ESCAPEMENT ADAPTER	12	TUBING ADAPTER
6	SHUTTLE AIR CYLINDER	13	STUD SHUTTLE ASSEMBLY
7	TRANSPARENT SHUTTLE GUARD	14	CLEVIS

FIGURE 9-2
FEEDER BOWL SYSTEM WITH STUD TOOLING



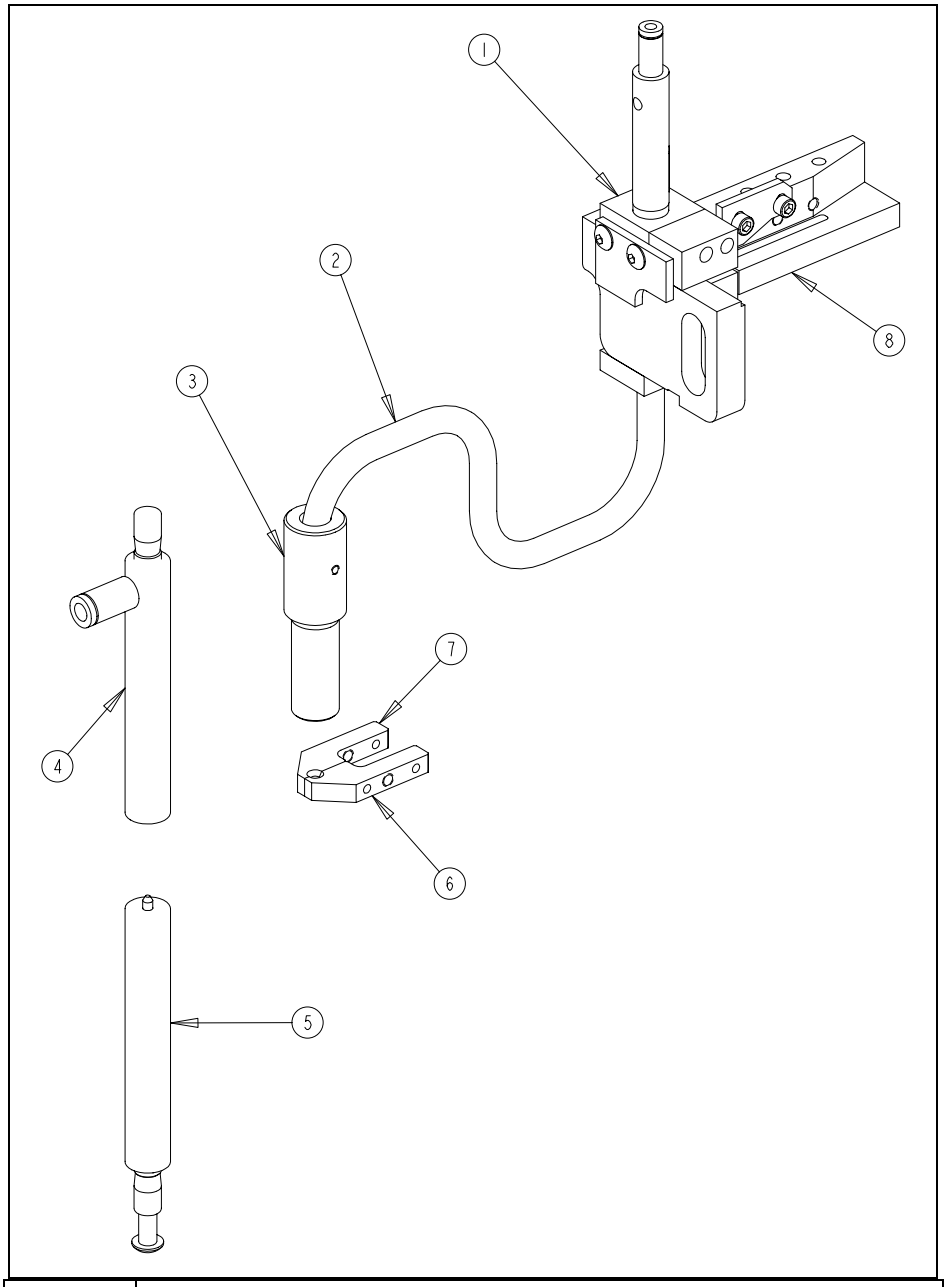
ITEM	DESCRIPTION
1	PUNCH ASSEMBLY
2	JAW ASSEMBLY
3	ANVIL ASSEMBLY
4	TUBING
5	SHUTTLE ASSEMBLY
6	NUT GATE

FIGURE 9-3
TOP FEED NUT TOOLING PACKAGE



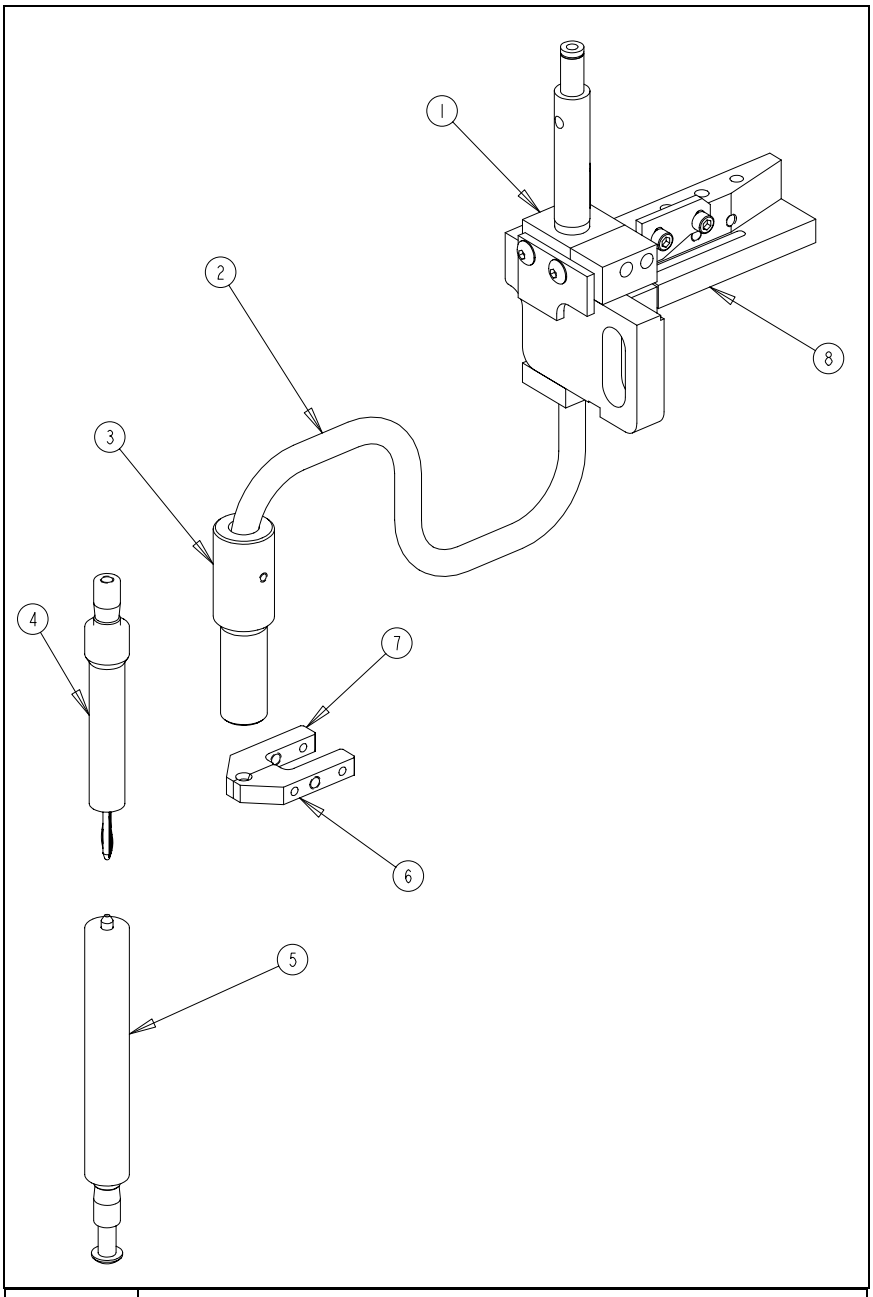
ITEM	DESCRIPTION
1	PUNCH ASSEMBLY
2	MODULE ASSEMBLY
3	TUBING
4	SHUTTLE ASSEMBLY
5	NUT GATE

FIGURE 9-4
BOTTOM FEED NUT TOOLING PACKAGE



ITEM	DESCRIPTION
1	SHUTTLE ASSEMBLY
2	TUBING
3	TUBE EXTENSION
4	PUNCH ASSEMBLY
5	ANVIL ASSEMBLY
6	RIGHT HAND JAW
7	LEFT HAND JAW
8	STUD ESCAPEMENT

FIGURE 9-5
TOP FEED STUD/STANDOFF TOOLING PACKAGE



ITEM	DESCRIPTION
1	SHUTTLE ASSEMBLY
2	TUBING
3	TUBE EXTENSION
4	PUNCH ASSEMBLY
5	ANVIL ASSEMBLY
6	RIGHT HAND JAW
7	LEFT HAND JAW
8	STUD ESCAPEMENT

FIGURE 9-6
TOP FEED STANDOFF PIN TYPE TOOLING PACKAGE

SECTION 10

PRESS OPERATION

Before running the press:

- **Install the tooling** (See Tooling Section 9).
- **DO NOT overfill feeder bowl. To allow the fasteners to properly move in the bowl, maximum FILL height is ½ of bowl depth.**
- **Check air supply** – be sure it is connected and that the pressure is between 6 and 7 BAR (90 to 100 psi)
- **Check electrical power supply** – Be sure rotary disconnect on Main Drive Enclosure is set to on. On state is indicated by amber illuminated "off" button on the front of the press
- **Always wear eye protection when operating the press**.
- **Always keep all body parts as far away from moving parts as possible.**
- **Test the safety system every day.**

Testing the Safety System:

- **Install Tooling** - Flat surfaced punch and anvil can be used. Standard flat punch and anvil for a Series 3000 are 16mm (.625") in diameter and 102mm (4.0") long.
  - **WARNING: DO NOT USE Bottom Feed Modules, Counter-Bored Punches or any custom designed or modified tooling to perform this test.**
- **Turn On the Press** – push the green ON button.
- **Access the Setup** – press **[CONTINUE]** on the touchscreen.
- **Select Setup Type** – press **[TOOL SET-UP MODE]**
- **Select Tooling Setup** – press **[SINGLE TOOL]**
- **Select Fastener Feed Source** – press **[MANUAL FEED]**
- **Select Force –** press **[PRESET VALUES]** to accept the default force.
- **Press [MANUAL NUT] or [MANUAL STUD]**
- **Select Fastener Size and Workpiece Material** – select any size and material
- **Press [CONTINUE] to use preset force**
- **Perform Safety Setup** – With NO fastener or workpiece between the punch and the anvil. Step on the foot pedal, the ram will extend and the punch and anvil will touch and "learn" the safety setup position. The ram will return up and the run screen will appear.
- **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 wooden lead pencil on the anvil.
b) Wear eye protection, keep body parts away from moving parts, as far as possible.
c) Step on the footpedal.

d) The ram will extend, the punch will contact the pencil and the press will indicate a safety fault.
e) If the wood of the pencil is broken, the press has failed the safety test.
Turn the press off.
Remove and Lock out the power and air supply.
Contact your service representative.

Wood Lead Pencil - 6.3mm-7.6mm (.250-.300”) flat-to-flat hexagon (6-sided) cross section.

Running the press:

- **Turn On the Press** – push the green ON button.

- **Access the Setup** – press [CONTINUE] on the touchscreen.

- **Select Setup Type** – press either
[TOOL SETUP] – to setup a new job
[RECALL A JOB] – to select a job from a pre-saved list
[RECALL LAST JOB] – to select the same job that was last run, even if the press was turned off.

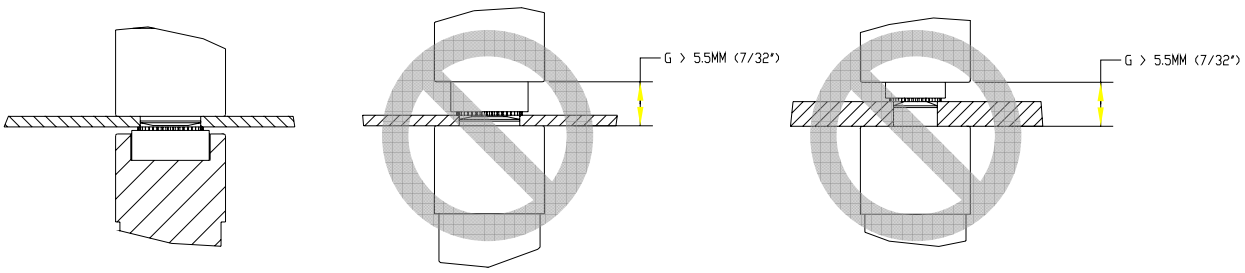
- **Select Tooling Setup** – press selection

  Multi Tool - Determine Station Setup for QX Turret Tool.
  See Section 6 Touch Screen Controls for setup instructions

  Single Tool - Determine Automatic Feed or Manual Feed.
  See Section 6 Touch Screen Controls for setup instructions

- **Perform Safety Setup** - Follow the instructions on the screen. If in automatic feed mode a fastener will be fed. Position the workpiece properly, flat on the anvil or fastener. Step on the foot pedal, the ram will extend and touch the fastener and workpiece and "learn" the safety setup position. The fastener will not be installed.

IMPORTANT: The ram must contact the fastener fully in the workpiece (but not installed) and both the fastener and workpiece must be flat to the punch and anvil. The gap between the punch and the anvil must not exceed 5.5mm (7/32”) to conform to internationally recognized safety standards. This means that the stacked height of the fastener and the workpiece before installation must not exceed 5.5mm (7/32”).

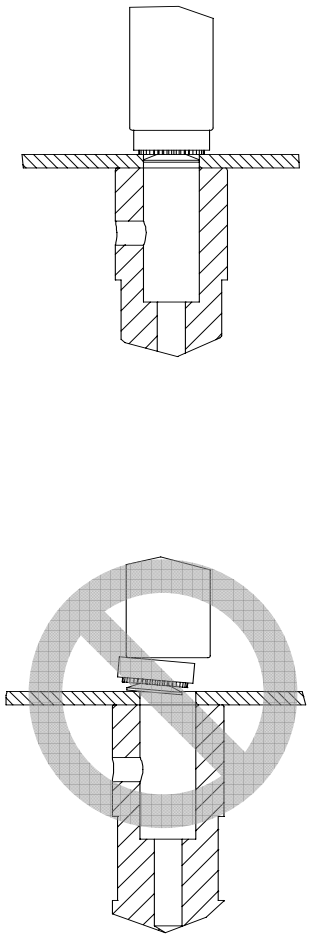


See drawings on next page for examples of proper and improper setup.

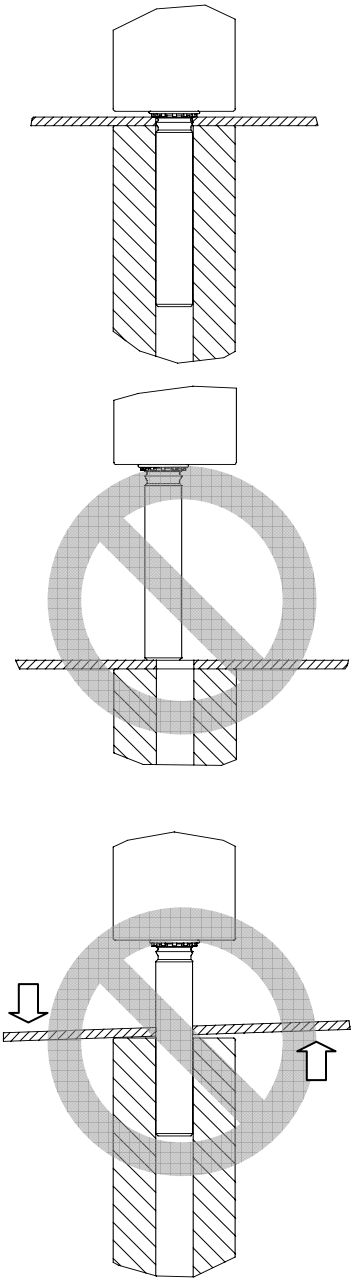
- **Install Fastener** – Position the workpiece properly, flat on the anvil or fastener. Step on the foot pedal. The ram will extend and install the fastener. The press will then get ready to install the next fastener.

EXAMPLES:

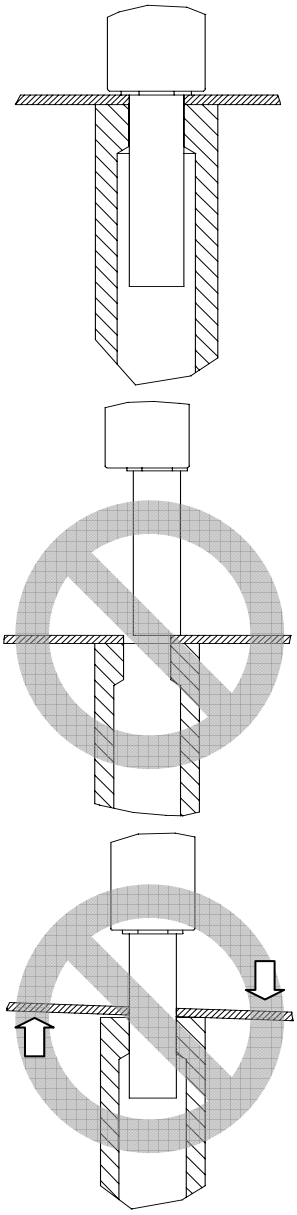
Nut Setup



Stud Setup



Standoff Setup



SECTION 11

MAINTENANCE

The most important element of maintaining your PEMSERTER® Series 3000® Press is to ensure that the compressed air supply is clean and dry. Do not use lubricated air.

Following the maintenance schedule below will also help maintain your press in good running order.

IMPORTANT: Only qualified individuals should perform maintenance procedures. Unless otherwise specified, perform all maintenance with the press disconnected from air and power. Follow safe practices and obey all local safety regulations.

Maintenance Schedule – PEMSERTER® Model 3000

Daily Inspection

• Check tooling	• DO NOT USE tooling that is cracked, chipped or otherwise damaged. • Check that all retracting pins move freely.
• Check footpedal cord	• Repair or replaced any broken, frayed or otherwise damaged cord.
• Check Safety Stop Distance	• Perform Safety Stop Distance Check Procedure (“Pencil Test”)

Weekly Inspection

• Check Lightstream Collar	• If plastic lens is dirty, clean with optical cleaning solution and soft cloth.
• Clean Press	• Wipe clean any build up of possible grime, oil mist or other material from room air. This will assist in detecting actual problems with the press systems.

Monthly Inspection and Maintenance

• Check Tooling Alignment	• Check Punch and Anvil alignment • Check Jaw to Punch alignment • Check Bowl to Shuttle alignment
• Check Lightstream operation	• Remove any punch and anvil tooling and in Maintenance Mode on the Touchscreen, jog the ram all the way down to the end of its stroke. Check to make sure that the Safety Sensor LED's do not change or flicker along the entire stroke.
• Check Safety Assembly Operation	• Push on the Punch Adapter of the Safety Assembly by hand and make sure that it moves freely and smoothly along the entire spring-loaded stroke.
• Check Actuator Movement	• Check Shuttle Cylinder moves freely • Check Slide moves freely • Check Gripper moves freely • Check Bottom Feed Cylinder moves freely.
• Check Vibratory Bowl	• Check for dirt, powder, or any other material in bowl, clean as needed. • Check the inside surfaces of the bowl, the surfaces should have an even sand blasted finish. If parts of the bowl become polished and shiny, the bowl surface should be sand blasted.
• Check Tooling Adapter	• Check the surface of the tooling nutgate adapter plate. The top surface should have an even sand blasted finish. If areas of the plate become polished and shiny, the plate should be sand blasted.

Annual Maintenance

• Clean Air Valves (optional)	• If contaminant build up occurs, clean the pneumatic valves annually.
• Clean Vacuum Generator (optional)	• If contaminant build up occurs, clean the vacuum generator annually.
• Check Vibratory Bowl Magnet Gaps	• Gap between magnetic coils and striker plate should be 0.9 to 1.0 mm (.035"-.040") and parallel. Adjust with screws as needed. Be sure to keep coils and plates parallel.

Testing the Safety Stop Distance ("Pencil Test")

Purpose: To check that the safety system is operating properly.
Why: The safety system of the press 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
Tools Needed: Wooden Lead Pencil - 6.3mm-7.6mm (.250-.300") flat-to-flat hexagon (6-sided) cross section
(Any standard pencil will do but the one commonly used is a wooded lead pencil with a 6.3mm-7.6mm (.250-.300") flat-to-flat hexagon (6-sided) cross section.)

- **Install Tooling** - Flat surfaced punch and anvil can be used. Standard flat punch and anvil for a Series 3000 are 16mm (.625") in diameter and 102mm (4.0") long.
  - **WARNING: DO NOT USE Bottom Feed Modules, Counter-Bored Punches or any custom designed or modified tooling to perform this test.**
- **Turn On the Press** – push the green ON button.
- **Access the Setup** – press **[CONTINUE]** on the touchscreen.
- **Select Setup Type** – press **[TOOL SET-UP MODE]**
- **Select Tooling Setup** – press **[SINGLE TOOL]**
- **Select Fastener Feed Source** – press **[MANUAL FEED]**
- **Select Force –** press **[PRESET VALUES]** to accept the default force.
- **Press [MANUAL NUT] or [MANUAL STUD]**
- **Select Fastener Size and Workpiece Material** – select any size and material
- **Press [CONTINUE] to use preset force**
- **Perform Safety Setup** – With NO fastener or workpiece between the punch and the anvil. Step on the foot pedal, the ram will extend and the punch and anvil will touch and "learn" the safety setup position. The ram will return up and the run screen will appear.
- **Test Safety System** - Test that the safety system is functioning properly. Use the following test:

f) After completing the safety setup step with nothing between the punch and the anvil. Place a wooden lead pencil on the anvil.
g) Wear eye protection, keep body parts away from moving parts, as far as possible.
h) Step on the footpedal.
i) The ram will extend, the punch will contact the pencil and the press will indicate a safety fault.
j) If the wood of the pencil is broken, the press has failed the safety test.
   Turn the press off.
   Remove and Lock out the power and air supply.
   Contact your service representative.

SECTION 12

TROUBLESHOOTING UPDATE

Note: If an internal PLC problem should develop, call a PennEngineering® service technician. Clients in the USA, please call 800-523-5321. International clients, please call (215) 766-8853.		
SYMPTOMS	**DIAGNOSTICS & PROBABLE CAUSE(S)**	**PROBABLE SOLUTION(S)**
A. Whole System Malfunctions		
1. The press will not start. (OFF light not lit)	a. Electrical disconnect turned off. b. No power to the press. c. DC Power Supply failure.	a. Turn on. b. Check main fuses. c. Check DC Power supply, replace if faulty.
The press will not start (ON light is lit)	a. OFF button is "open". b. ON button is not closing. c. MCR(Main Control Relay) system failure. d. F1 and/or F2 fuses are open.	a. Check button, replace if faulty. b. Check button, replace if faulty. c. Check the wiring continuity, replace if faulty. d. Replace fuses.
2. The press will not cycle.	a. Safety sensor inputs 1 & 2 are on. b. Footpedal is not making the proper input.	a. The reflector is not in proper position for "lightstream" process. b. Check the footpedal & wiring. Replace if faulty.
3. SAFETY FAULTS: Sensors tripping above/ below the safety window.	a. Misalignment of punch/ gripper/ anvil. b. Slide/gripper require maintenance/cleaning. c. Safety housing spring damaged.	a. Check alignment. b. Clean/lube shafts as necessary. c. Check spring/replace if faulty.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
B. Electrical/Electronic Malfunctions		
1. The HMI will not work but the power button is lit.	a. Fuse F15 and/or 16 is open.	a. Analyze and repair the HMI related circuitry then replace the fuse. b. Replace the HMI if faulty.
2. The sensors are not functioning.	a. Check to see if fuses F1, F2 or F6 are open. b. Check all sensors to see if one has a "short."	a. If open, investigate the circuitry and replace fuses. b. Repair the "short" problem and/or replace the sensor.
3. The DC power supply is not functioning.	a. Check fuses F1 and F2. b. Check for line voltage at the supply terminals.	a. Replace if blown. b. Check the wiring. c. Replace the power supply.
4. The press will not power-up.	a. Check to see if there is in-coming power. b. Check to see if the main disconnect is shut off. c. Check MCR system wiring.	a. Provide the power. b. Turn to the ON position.
5. The press will not power-down.	a. Check to see if the OFF button is faulty. b. Check MCR system wiring.	a. Replace if faulty.
6. No voltage at a particular solenoid.	a. Check for a shorted coil. b. Check the related output voltage.	a. Repair or replace. b. Replace module if faulty
C. Ram Malfunctions		
1. The ram does not move up and down smoothly.	a. Check the high speed and high torque actuators.	a. Contact local service representative.
2. The ram will not go down.	a. Check the drives and control system.	a. Contact local service representative.
3. The ram will not go up.	a. Check the drives and control system.	a. Contact local service representative.
4. The safety assembly tip is wobbly.	a. Check the set screws holding the punch.	a. Tighten the set screws.
5. There is insufficient insertion force.	a. Check to see if the force level was set too low. b. Check the control system.	a. Reset the force level via the touch screens. b. Contact local service representative.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
D. Pneumatic System Malfunctions		
1. No vacuum at the punch.	a. Check appropriate output voltage. b. Check the vacuum aspirator solenoid.	a. If not putting out 24V contact service representative. If putting out 24V and the solenoid is not working replace the solenoid. b. Replace if faulty
2. No air is entering the press.	a. Check to see if the manually operated regulator is closed. b. Check the quick exhaust/supply valve.	a. Open the regulator. Replace if faulty. b. Replace if faulty.
3. No compressed air "dumping" noise is heard when the press is shut down.	a. Check the quick exhaust/ supply valve for incoming pressure.	a. Replace if faulty.
E. Tooling Malfunctions		
1. If : • The puffer is not working properly. • Blower 1 is not working properly. • Blower 2 is not working properly. • The shuttle is not sliding back and forth. • The upper front tooling slide does not extend. • The bottom feed nuts are not being pushed out to the anvil. • The gripper assembly is not functioning.	a. Check appropriate output voltage. b. Check the voltage on the solenoid.	a. If not putting out 24V contact service representative. b. If putting out 24V, the voltage is powering solenoid and the solenoid is not working replace the solenoid
2. The shuttle is jammed.	a. A fastener is jammed.	a. Clear the fastener.
3. Nuts or studs are not being drawn through the escapement properly.	a. The escapement is out of alignment.	a. Realign the escapement.
4. The long lengths of studs are jamming in the tube.	a. Bends in tube are too tight	a. Redress tube to bend toward the frame and then through the tube clips on the frame.

SYMPTOMS	DIAGNOSTICS & PROBABLE CAUSE(S)	PROBABLE SOLUTION(S)
5. Shuttle vibrates with the bowl.	a. Shuttle is too close to the escapement.	a. Maintain a gap of about .040” (1mm) between the shuttle and the escapement.
F. Vibratory Bowl Malfunction		
1. The bowl does not vibrate.	a. Check appropriate output voltage. b. Check the voltage on the solenoid. c. Check the bowl driver controller internal circuitry.	a. If not putting out 24V contact service representative. b. If putting out 24V, the voltage is powering solenoid and the solenoid is not working replace the solenoid c. Check for a shorted winding on both magnets. Repair the short then replace the bowl driver controller fuse. Replace parts, or the controller, as necessary.

SECTION 13
SPARE PARTS UPDATE

PART DESCRIPTION	PART NUMBER	QTY	MANUFACTURER	MANUFACTURER'S PART NUMBER
Level One Spare Parts (Maintain this minimum inventory of parts for standard mechanical wear items on the press.)				
SENSOR, SAFETY	8009715	1	OMRON	E3Z-T81
VALVE, 4 WAY 2 POSITION	8003211	1	SMC	VQZ2151-5LO
AIR CYL. (SHUTTLE)	8000680	1	COMPACT AIR	BFH12X1
AIR CYL. (PUSHER)	8000467	1	COMPACT AIR	BFH12X2
GRIPPER	8006257	1	PennEngineering®	
LINEAR SLIDE	8006258		PennEngineering®	